

**GUIDE SPECIFICATION**

**SECTION 07 33 63  
HIGH PROFILE (INTENSIVE) VEGETATED ROOFING  
RAM TOUGH 250DM·PMR  
HOT FLUID-APPLIED WATERPROOFING**

**PART 1 - GENERAL**

1.00 GENERAL

The general conditions, special conditions, applicable portions of Division 1 and requirements for general construction and sub-trades form a part of this specification.

1.01 RELATED SECTIONS

Section 02 40 00	Demolition
Section 03 30 00	Concrete
Section 04 00 00	Masonry
Section 06 00 00	Carpentry
Section 07 60 00	Sheet Metal
Section 07 72 00	Roofing Accessories
Section 07 90 00	Caulking & Sealants
Section 32 90 00	Landscaping

Edit to Project Requirements

1.02 SCOPE

The work includes supplying all materials, labor, and equipment to complete the installation of the Fluid Applied Waterproofing and Greenroof-Roofscapes<sup>®</sup> assembly, including water retention mat, drainage/water retention component, filter fabric, lightweight engineered growing media and vegetation

1.03 QUALIFICATIONS

Only a contractor approved and licensed by the manufacturer shall install the waterproofing system. Polymerized bitumen, reinforcing sheet and all other major Greenroof-Roofscapes<sup>®</sup> components shall be supplied through the same firm to insure single-source responsibility. An independent laboratory may test materials for compliance with published physical properties and these specifications.

## 1.04 SUBMITTALS

- A. Submit Manufacturer's written approval or license of applicator for installation of the herein specified Waterproofing System.
- B. Submit Manufacturer's sample Twenty (20) Year Labor and Material System Warranty and Manufacturer's Intent to Warranty Certification for this project.
- C. Submit most recent copy of Manufacturer's literature applicable to products and specifications to be used, as specified herein, including applicable flashing details.
- D. Submit three sheet samples approximately 8 x 10 inches or alternately 3 units that are representative of the following products:

Select Components Utilized
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- |                          |                     |
|--------------------------|---------------------|
| • Membrane Reinforcement | • Protection Course |
| • Membrane Flashing      | • Drainage Mat      |
| • Root Barrier           | • Metal Curbing     |
| • Drain Boxes            | • Paver Pedestals   |
| • Vent Pipe Flashing     | • Insulation        |
| • Filter Fabric          |                     |

- E. Submit three samples of elastomeric bitumen.
- F. Submit evidence of Manufacturers history of production for the system specified herein. A minimum of fifteen (15) years' experience is required in conjunction with the 20 year warranty. Documentation shall include job lists with project size, Architect of record, installing Applicator, telephone numbers and contact names.
- G. Submit, in duplicate, certification from the primary Manufacturer, properly attested by a corporate officer, stating that all materials being supplied comply with the specifications and requirements of the contract documents, including conformance with all federal, state and local building codes including United States Code Section 41:10, Subsections a-d, popularly known as the "Buy American Act".

## 1.05 QUALITY ASSURANCE

- A. The contractor shall submit information on the entire assembly in the form of published literature, detailed specifications, and details.
- B. All component products incorporated into the Greenroof-Roofscapes<sup>®</sup> system shall be supplied by or approved by the waterproofing membrane manufacturer.
- C. The contractor shall employ an Electric Field Vector Mapping Service (EFVM) to survey the completed membrane application. The Greenroof-Roofscapes<sup>®</sup> System supplier shall approve the surveyor.

- D. Pre-Construction Conference – The manufacturer will meet with the necessary parties at the jobsite to review and discuss project conditions as it relates to the integrity of the roofing assembly.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store materials under provisions of General Conditions Section.
- B. Deliver materials to jobsite on pallets. Package labels shall indicate material name, production date and product code.
- C. Store materials in dry, protected areas in an upright position. Control temperature of storage areas in accordance with manufacturer's instructions. Protect moisture sensitive materials by storing raised off the ground with breathable tarps on sides and top surfaces.

#### 1.07 PROJECT CONDITIONS

- A. Follow local, state, and federal regulations, safety standards, and codes. When a conflict exists use the stricter requirement.
- B. Do not apply waterproofing materials unless proper bitumen application temperatures (approximately 350°F-400°F) can be maintained, or when moisture in any form (i.e. rain, dew, ice, frost, snow, etc.) is present on the deck. Do not heat bitumen above 400°F.
- C. Confirm the roof deck is structurally sound enough to support the live load requirements of the waterproofing system installation. Do not overload any concentrated area.
- D. Sequencing and Scheduling: The work shall be scheduled in the construction sequence so that designated complete contiguous areas can be installed and completed, including overlay elements and wear courses, before other construction trades are allowed in the area. Prior to starting the work, all drains shall be operative and all deck projections, sleeves and all other penetrations shall be installed in place and operative.

#### 1.08 REGULATIONS COMPLIANCE

It shall be the contractor's responsibility to ensure that all applicable permits are obtained prior to the start of the work.

#### 1.09 WARRANTY

The supplier of Greenroof-Roofscapes<sup>®</sup> System shall furnish its standard twenty-year warranty for labor and materials, including the membrane, membrane flashings, protection course, drainage medium, insulation and all other green roof components supplied by the manufacturer.

The system warranty shall also include two-year warranty of planting survivability of eighty percent of the initial installation density for approved plantings. The two-year planting warranty shall be renewable under a service and maintenance agreement with an approved landscaping contractor.

**PART 2 - PRODUCTS**

2.01 ACCEPTABLE MANUFACTURERS

All components shall be obtained or approved by a single source membrane manufacturer to ensure total system compatibility and integrity.

The Barrett Company is set forth as the referenced standard of quality.

Barrett Company, Inc.  
 33 Stone House Road  
 Millington, NJ 07946  
 800-647-0100  
 Web Site - [www.barrettroofs.com](http://www.barrettroofs.com)

2.02 MATERIALS

A. Waterproofing Membrane:

1. Hot polymeric waterproofing: Ram Tough 250 SBS Kraton® fluid-applied modified bitumen shall have inert mineral stabilizer and recycled tire rubber crumb content. Waterproofing material shall comply with the following specifications:

<u>TEST</u>	<u>CGSB 37-GP-50M REQUIREMENTS</u>	<u>TYPICAL TEST RESULT</u>
Flash Point	Min. 500°F (260°C)	600°F (327°C)
Penetration, 0.1 mm	Max. 110 @ 77°F (25°C) Max. 200 @ 122°F (50°C)	83dmm 165dmm
Flow	Max. 3	0.5mm
Toughness	Min. 5.5	11.7 joules
Ratio of Toughness, J/N to Peak Load	Min. 0.040	0.059
Adhesion	Min. 1	1.2
Water Vapor Permeance	Max. 1.7	0.39ng/Pa.m²

Water Absorption	Loss 0.18 Gain 0.35	0.22+ grams
Crack bridging @ -13°F (-25°C)	No cracking No delamination No loss of adhesion	No cracking No delamination No loss of adhesion
Heat Stability @ 392°F (200°C)	Max 110 @ 77°F (25°C)	80
Penetration, 0.1 mm	Max 200 @122°F (50°C)	155
Low Temp Flex @ -13°F (-25°C)	No cracking No delamination No loss adhesion	No cracking No delamination No loss adhesion
Viscosity @ 392°F (200°C)	Min. 2 Max. 15	5 Seconds

2. Uncured, non-staining neoprene flashing sheet: Ram Flash 327 HDR sheet shall comply with the following minimum specifications:

<u>TEST</u>	<u>METHOD</u>	<u>TYPICAL TEST RESULTS</u>
Thickness	ASTM D - 412	60 Mils
Thickness Tolerance	ASTM D - 412	±10%
Tensile Strength min	ASTM D - 412	1500 psi, min.
Elongation, ultimate	ASTM D - 412	250%
Hardness, Curometer, A	ASTM D - 2240	60 ±10
Tear resistance	ASTM D - 294	120 lb f/in. min.
Brittleness Temperature, Die C max	ASTM D - 746	-30° F (-35° C)
Flame Resistance Must not propagate flame	ASTM C - 542	Pass

Resistance to Heat Aging Properties after 70 h at 212°F Hardness increase max.	ASTM D - 573	+ 10%
Resistance to Oil Aging Change in Volume, max after 70 h Immersion in ASTM Oil #3 at 212°F	ASTM D-471	+ 80%
Resistance to Water Change in Mass, max, after 7 days Immersion at 158°F	ASTM D - 471	+ 10%
Water Vapor Permeance	ASTM E - 96	.07 perms

3. Ply sheet: Poly-Felt 125 VP spunbond polyester fabric, heat set with heat resistant resin binder, shall comply with the following minimum specifications:

<u>TEST</u>	<u>METHOD</u>	<u>TYPICAL TEST RESULTS</u>
Basis Weight	ASTM D - 3776	60 GR/M <sup>2</sup>
Grab Tensile	ASTM D - 4830	34/lb. MD 32/lb. CD
Elongation	ASTM D - 4830	37% MD 42% CD
Trapezoid Tear	ASTM D - 4830	14lb. MD 12lb. CD
Ames Thickness	ASTM D - 1777-64	9.5 mils
Fatigue Life	ASTM D-8B	>10,000 cycles

4. Protection Course: Ram-203 shall comply with the following minimum specifications:

<u>TEST</u>	<u>METHOD</u>	<u>TYPICAL TEST RESULTS</u>
Thickness	ASTM D-412	2.2 mm min.
Weight	ASTM D- 412	Min. 50 lbs./ 100SF

5. Flashing Sheet: Ram 306 granular surfaced SBS sheet shall comply with ASTM-D 6164, Type I, Grade G specifications
6. Extruded polystyrene insulation shall comply with ASTM C-578, \_\_\_\_\_ inches thick with a compressive strength of 60 PSI and an R factor of 5 per inch. Insulation of three inches or greater thickness shall be installed in multiple layers, offset from the lower layer.

Insulation is recommended but not required. If compressive loads in excess of 60 pounds per square inch are anticipated, specify Dow Styrofoam High Load, 100 pounds compressive strength per square inch.

7. Aeration Mat: Ram-Aeration 600, geo-textile sheeting and plastic grid work.
8. Primary Root Barrier: Ram-30H, 30 mil High Density Polyethylene Sheet and RB25 seaming tape for all seams.
9. Drainage and water retention Mat: Ram-Drain 2451, composite polyethylene drainage medium consisting of a 3 dimensional water-retaining core with polypropylene geo-textile fabric bonded to both sides of the core. Ram-Drain 2451 shall comply with the following minimum specifications:

<u>TEST</u>	<u>METHOD</u>	<u>TYPICAL TEST RESULTS</u>
Thickness	ASTM D-1777	1.0 inches
Compressive Load Test	ASTM D-1621 mod.	9500 lbs. /sq. ft.
Flow	ASTM D-4716	100gals./min/ft wide
Fabric Flow	ASTM D-4491	.70 gpm / sq ft
Grab Tensile	ASTM D-4632	130 lbs.
U.V. Resistance	ASTM D-4355	Stabilized passed.
Puncture Resistance	ASTM D-4833	35 lbs.
Water Retention		14 cu. in./sf

B. Related Materials:

1. Primer: Ram Primer/Surface Conditioner shall comply with ASTM D-41 requirements.
2. Nails and mechanical fasteners: As recommended by the fastener manufacturer for specific applications and approved by the membrane manufacturer.
3. Geotextile Erosion Control Mat shall be Barrett Erosion Control Mat or approved equal. Control Mesh shall be a photodegradable open weave mesh designed to hold vegetation and soil in place until vegetation is established. Erosion control mat typically lasts through one or two growing seasons under normal conditions. Use in conjunction with Greenroof·Roofscapes<sup>®</sup> pins and plates set on 4 foot centers.
4. Paver Units – Exposed aggregate precast concrete units, lightly sandblasted in production, in standard colors as selected by the Architect. Paver unit size shall be 2 inches thick, 24 inches x 24 inches square. The membrane manufacturer shall approve paver unit manufacturer for total system warranty.

<u>TEST</u>	<u>METHOD</u>	<u>TYPICAL TEST RESULTS</u>
Compressive Strength	ASTM C-140	8000 psi, min
Water Absorption	ASTM C-140	5% max
Freeze/Thaw Resistance	ASTM C-67:8	1% loss, max
Flexural Strength	ASTM C-293	600 PSI

5. Paver Pedestal units and Leveling Plates: Barrett “Roofscape” Pedestal Units fabricated from high-density polyethylene with integral 1/8-inch joint spacer ribs. Pedestal units shall have thorough drainage. Pedestal units shall meet the following values:

<u>TEST</u>	<u>METHOD</u>	<u>TYPICAL TEST RESULTS</u>
Low Temperature Brittleness	ASTM D-476	90°F
Shore Hardness	ASTM D-1706 D	65
Softening point	ASTM D-1525 2	64°F
Weatherability		Unaffected



6. Filter Fabric: non-woven geotextile Poly·Felt Filter Fabric 3.5 or approved equal.
7. Growing medium shall be "Rooflite Intensive" as blended by Skylands USA, Avondale, PA or approved equal.
8. Vegetation shall be sedum supplied by Emory Knoll Farm's Nursery and approved by Architect and the Owner. Regional plant lists are available
9. Roof Drain Inspection Boxes – Roofscapes Drain Access Boxes, stainless steel or aluminum or approved equal specifier choice with Kynar finish as selected by Architect.
10. Metal Curbing – Roofscapes stainless steel or aluminum edging or approved equal specifier choice with Kynar finish as selected by Architect.
11. Vent Pipe Inspection Boxes – Roofscapes stainless steel or aluminum Access Boxes or approved equal specifier choice with Kynar finish as selected by Architect.

### **PART 3 - EXECUTION**

#### 3.01 PREPARATION

- A. Remove trash, debris, grease, oil, water, moisture and other contaminates from the deck, which may affect bond of bitumen to deck surface.

**Optional:**

Sandblasting and/or shot-blasting procedures may be required on certain renovation work to provide the best possible surface. If required, provide unit price per square foot in bid documents.

- B. Condition of Surface: Any new concrete surfaces shall be wood float finish ACI 301-11.7.3 or better. All concrete shall have cured for a minimum of 28 days or, alternatively, pass ASTM D-4263 Plastic Film Moisture Content Test and the NRCA deck dryness test. All surfaces shall be dry, clean, firm and free from laitance, frost, dust, dirt, oil, unapproved curing compounds or other foreign matter detrimental to performance of waterproofing membrane. The Contractor shall certify no wax base curing compounds have been used. Follow ASTM D-5295 Guide for preparation of concrete surfaces.
- C. Before commencing work, examine all areas and report to Architect in writing any conditions that will adversely affect successful installation. Do not begin work until the conditions have been corrected. Voids, cracks, holes and other damaged surfaces shall be repaired with materials compatible with Ram Tough 250. On existing concrete decks, all old existing membrane and flashings shall be completely removed to bare concrete.

- D. Expansion Joints: Expansion joints shall be sharply formed and free of broken edges or loose aggregate and completely free of preformed joint fillers, sealants, or back-up materials to a depth that is at least twice the width of the joint. Curb expansion joints at each side of the joint, by either integrally forming with the slab or securely fastening sulfate treated wood blocking to deck. Chamfer the edges of curbs that membrane is installed over.
- E. Verify concrete surfaces are properly cured, dry and reasonably smooth. Prepare other surfaces according to respective manufacturer's published instructions. All metalwork shall be free of process oils and rust, cleaned to a bright condition. Use cleaning materials and methods necessary to render an acceptable dust free surface, including oil-free, filtered compressed air or high-speed power blowers. Protect adjacent areas from damage with tarpaulin or other durable materials.
- F. No protection from the weather is necessary for Ram Tough 250, but temporary protection for installed membrane is required to prevent damage by mechanical gouging, scraping, spilling of oil, solvents or exposure to excessive heat.

### 3.02 CRACK TREATMENT

At cracks over 1/16 inch width and all construction joints, apply Ram-Tough 250, 125 mils thick, then center a 6 inch wide strip of Ram-Flash 327 HDR neoprene flashing over the joint or crack and embed into the warm Ram-Tough 250. Avoid air pockets. Allow assembly to cool. Flashing should be installed before the continuous, unbroken thick film of Ram-Tough 250 or reinforcement felt is applied over the entire roof surface and flashing areas in accordance with Section 3.05.

### 3.03 EXPANSION JOINTS

For expansion joints up to 3 inches in width, with a designed total movement of 50% or less, Ram Flash 327 HDR neoprene flashing shall be placed over the joint as shown on the drawings and embedded into a 125 mil thick coating of Ram-Tough 250. The sheet shall be looped into the joint 1-1/2 times the joint width at maximum opening and extend 8 inches onto the deck on each side of the joint. The sheet shall be covered and the loop filled solid and flush with Ram-Tough 250. Install foam rod to equal joint width and install a second sheet of neoprene flashing looped over the foam rod. Extend sheet 12 inches onto the deck on each side of the joint in hot Ram-Tough 250. Overcoat neoprene flange on each side.

### 3.04 FLASHING

#### A. BASE FLASHING BASE PLY

Complete base flashing base ply work before doing flat field application in 3.05. Carry hot applied Ram-tough 250 and reinforcement up all junctions of horizontal deck and vertical surfaces, all changes of plane, all cold joints and cracks as indicated on the drawings. At all parapets, walls, curbs, penetrations, drains, edges, and other changes of plane, install Ram Flash 327 HDR 60 mil neoprene flashing with hot fluid Ram-Tough 250 as shown on the drawings, extending to top of the flashing over the base coat of Ram-

Tough 250 and polyester reinforcement.

Apply the neoprene flashing tight to all substrates starting the installation on the flat and working the sheet into place in upward direction. Finished sheet shall be completely adhered with no unsupported “bridging” at the change of plane. Over-coat sheet with another 125-mil coat of the Ram-Tough 250. Application width of neoprene flashing sheet shall be a minimum 3 inches in any single direction or more as required by field conditions.

**B. BASE FLASHING CAP PLY**

Do not install the base flashing cap ply until the flat field of the roof is completed. Precut Ram 306 sheet across the roll to install in 36 inch wide sheets. Embed Ram 306 SBS granular cap sheet membrane into hot Ram-Tough 250 extending flashings out onto the field of the roof 3 inches minimum and up vertical surfaces 8 inches minimum and 24 inches maximum. Overlap shall be 3 inches minimum. Mechanically fasten top to the substrate with 1/8 inch thick flat bar stock termination bar and mechanically fasten 8 inches on centers. Seal the top edge of the flashings installed each day with Ram Mastic. Counter-flashing is required.

**3.05 MEMBRANE INSTALLATION**

- A. Surface Conditioner: Each day, prior to application of Ram Tough 250, apply surface conditioner, as a fine spray at a rate of approximately 1 gallon per 300-600 square feet. Allow to dry tack free. Do not allow primed surface to be contaminated with construction debris or dust barrier. Re-prime and allow drying as may be required by job conditions.
- B. Application: Units of Ram Tough 250 shall be melted in an approved double-jacketed air or oil bath melter under continuous agitation until the material can be drawn free flowing and lump-free at a temperature of approx. 350°F - 400°F. Apply the Ram Tough 250 at a rate to provide a continuous coating, not less than 90 mils thick at any point. Carry slab applications up all vertical wall surfaces a minimum of 8 inches.
- C. Hot fluid-applied Ram Tough 250 shall be applied in a width exceeding the width of the reinforcement fabric roll. While Ram Tough 250 is hot and tacky, install Poly-Felt 125 VP reinforcement, brooming in place from the side of the fabric. Side laps shall be a minimum of 2 inches with lap placement so that water flows over them. All laps shall be sealed with hot Ram Tough 250 under lap. In no place shall reinforcement touch reinforcement. End laps shall be 6 inches. Carry reinforcement up all vertical wall surfaces a minimum of 6 inches.
- D. After reinforcement fabric has been placed and broomed in, install second layer of Ram Tough 250, a minimum of 125 mils thick, at all points of the deck and walls. Carry slab applications up vertical wall surfaces a minimum of 8 inches. Do not leave any reinforcement fabric uncoated at end of day’s work or in inclement weather. Complete installation of all plies each day including the protection course.

### 3.06 FLOOD TEST

Each contiguous flat deck area shall be water tested with 2 inches of standing water for a 48-hour period in accordance with ASTM D-5957. Provisions for overflow in event of rain shall be provided. Any area not passing Flood Test shall be repaired and retested until watertight. Flood Test shall be witnessed and approved by Architect and Manufacturer providing the system warranty.

Alternate: Provide electric field vector moisture survey (EFVM) by certified and approved surveyor.
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### 3.07 PROTECTION COURSE

The protection course is installed directly over the membrane and under the insulation using Ram-Tough 250 as the adhesive. Starting at the low points, apply specified protection course, lapping the side laps a minimum of 2 inches. The laps shall face away from the direction of drainage gradient.

### 3.08 INSULATION

After the membrane, flashing and other associated, work is completed; the EFVM tests completed and approved by the manufacturer, proceed with the installation of the extruded polystyrene insulation. Place insulation panels directly on the protection course with open channel sides down. Stagger end joints. Tightly abut all boards. The maximum acceptable opening between boards is ¼ inch. Whenever 3 or more inches of insulation are specified, install in multiple layers, thickest layer on top, offsetting all joints by a half sheet. Provide temporary ballast as required to prevent wind damage. Do not leave exposed with any dark covering in warm weather under any circumstance.

### 3.09 AERATION MAT

The Aeration Mat 600 shall be placed directly over insulation. Provide 3-inch side laps.

### 3.10 DRAIN AND VENT PIPE ACCESS BOXES

Sheet metal inspection boxes shall be fabricated from aluminum alloy 3003 – H14 in compliance with ASTM B-209 specifications, with H14 temper or minimum 0.015 thick stainless steel with a 2-D finish as specified by the Architect. Thickness gauge shall be as recommended by SMACNA reference tables for the span and load requirements encountered.

Place access boxes and border elements in locations noted on the drawings and at all drains and vent pipe protrusions.

### 3.11 PRIMARY ROOT BARRIER

The primary root barrier, RB 30H shall be installed in accordance with manufacturer's recommendations. Install primary root barrier sealing all seams with Ram RB25 root barrier tape.

Provide a minimum of 12-inch side and end laps of root barrier. Run root barrier full height at all base flashings, drain access boxes, vent pipe access boxes and perimeters and seal with RB25 tape. In hot weather when the black surface of the root barrier could generate enough heat to affect the insulation, cover with drainage mat immediately with white surfacing to prevent excessive insulation expansion.

### 3.12 METAL BORDER EDGING

Set metal border edging over the root barrier as shown on the drawings using edge clips at all joints.

### 3.13 WATER RETENTION AND DRAINAGE MAT

Starting at the low points, apply Ram 2451 water retention drainage mat over primary root barrier, with open side of reservoir cups oriented to retain water. At the side laps glue or tape fabric overlap 2 feet on centers with 2 ½-inch overlap over the previously installed material. End laps are installed by pulling back the fabric 6 inches, nesting the next roll of material into the exposed 6-inch lap, replacing the 6-inch fabric flap, taping it in place and proceeding with installation. Temporary ballast may be required to keep drainage course in place until the overburden is installed.

### 3.14 PAVERS AND PEDESTALS

Specified paver units shall be set on specified pedestals to line and grade as shown, with uniform joint width. Adjust pedestal elements so that precast paver has bearing on all four corners. Where cutting is required, it shall be done with a high-speed masonry saw producing clean sharp edges. Precast paver units shall fit to within ¼ inch of all projections and walls or as shown on drawings. Use concrete core machine to make circular holes at pipe obstructions. General Contractor shall protect units in place from soiling or damage during the construction process. Replace any units damaged prior to completion. Provide shims as required to align paver surface with existing elements and other pavers.

### 3.15 GROWING MEDIA AND EROSION CONTROL MAT

The landscape installation shall commence with application of the growing medium, vegetation and other specified components in strict compliance with weather requirements as set forth by the approved media supplier. Install specified soil over the drainage mat as prescribed by the media supplier. Install geo-textile erosion control mat over the soil with side and end laps of 12 inches. Ballast all edges of the geotextile with specified pavers or stone ballast in a minimum 4 foot width. Install biodegradable erosion control pins and plates on 4 foot centers in all directions over the field of the roof.

- A. Fill vegetation free zones with extruded polystyrene insulation and cover with filter fabric, washed river rock, or paver ballast as shown on the drawings.

- B. Thoroughly soak the growth media with water using a sprinkler or hand sprayer. For a 4-inch growth media layer, expect to use approximately 30 gallons per 100 sq. ft.

### 3.16 PLANTING

- A. Vegetation mixture shall include sedum species that will generate a continuous ground cover. Maximum mature plant height is generally less than 24 inches.
- B. All high profile planting schemes should incorporate a variegated Sedum design. The plant mixture must include a minimum of 5 species of Sedum in approximately equal quantities. Sedum planting season generally runs from April until October. Consult with supplier to verify planting times. Do not plant vegetation out of season or adverse weather conditions as recommended by nursery supplier.
- C. Cut an 8 inch X through the Erosion Control Mat and set plugs into the media to their full depth with the media pressed firmly around the installed plugs. Install plugs at the rate of 2 per square foot. At the end of each day, soak newly planted areas.
- D. Provide plant maintenance for the first two years, maintaining a minimum of 80% plant survivability. Replace plantings that fail to meet survivability requirements.
- E. When using a sedum mat, install as prescribed by the approved media supplier. Water the finished installation with a heavy soaking and re-water as required by weather conditions.

Optional: Installer shall maintain all vegetation for a two-year period commencing from the date of the installation.

### 4.0 FIELD QUALITY CONTROL

- A. Adhesion Tests and Thickness Tests shall be monitored by applicator every hour throughout the application process.
- B. Upon completion of the membrane and prior to installing insulation or after overburden, retain the services of an approved surveyor and conduct an Electric Field Vector Mapping (EFVM) survey of all waterproofed deck areas to verify entire waterproofing membrane is free of holes, open seams, and capillary defects that allow water to pass. Administrator EFVM by a qualified testing agency as follows:
  - a.
    - 1) Place conductor wire on bare membrane. Secure wire with small strips of waterproofing or other compatible membrane or tape.
    - 2) Thoroughly wet waterproofing membrane with potable water in area of test. Wetting can be accomplished by hand or mechanical spray devices. Membrane shall be wet during testing procedures.
    - 3) Technician shall mark on waterproofing membrane or surface exact location of defect and assign an identification number to each location.
    - 4) Visually inspect entire waterproofing membrane area and repair breaches found. An EFVM retest shall be performed to confirm integrity of repair(s).

- b. Technician shall prepare a report of each day's test results containing a written description and photograph of defect(s) located and a schematic CAD drawing indicating location of conductor wire and of defect(s) located in testing field to within 1 in (25 mm) of accuracy. This report shall be made available in hard copy.
  - c. Report results of tests, both successful and unsuccessful. In addition to results, report shall include date of test, project name, list of products being applied and tested, name of applicator, name of Contractor, and conditions causing failure of waterproofing membrane in event of an unsuccessful test.
  - d. Materials and installations failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense."
- C. Should the quality of the membrane application be questioned by the architect or manufacturer supplying the warranty, test cuts may be required. If test cuts are required, it will be the contractor's responsibility to take the required samples and submit them to a qualified laboratory, approved by the materials manufacturer. If the test cuts are found to be deficient, the cost of the test cuts and laboratory testing shall be the responsibility of the contractor.

Any areas found deficient must be replaced or repaired in accordance with the materials manufacturer's recommendations and approved by the architect. The cost of such repairs or replacement shall be the contractor's responsibility.

- D. Correct deficiencies in roof, if any, as prescribed by material Manufacturers and approved by the Architect.

#### 4.1 CLEANING

- A. Remove equipment, trash, debris and any excess material from the jobsite.
- B. Repair damage and remove any stains caused by work of this Section.

#### MAINTENANCE:

Semi-annual inspections and a systematic maintenance program are recommended to the Owner and Architect for the waterproofing. The Greenroof Roofscapes components maintenance will vary with plant choice, design and weather conditions and shall be as set forth in the warranty documents. Consult your Barrett Representative or Barrett Approved Applicator for further information.

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