SECTION 07 14 10

GARDEN ROOF ASSEMBLY

PART 1 – GENERAL

1.01 SUMMARY

A. This specification covers the installation of a complete garden roof assembly, with waterproofing membrane, protection course, drainage board, filter fabric, etc.

1.02 RELATED SECTIONS

A. DIVISION 2 - Sitework 32 14 00 – Unit Paving as supplied by American Hydrotech, Inc.

B. DIVISION 3 - Concrete Section 03 30 00 - Roof Deck Surface/Substrate
The coordination of this section is necessary to facilitate the successful installation of the waterproofing membrane.

Cast in Place Concrete/Composite Deck

A. Strength/density: minimum 2,500 psi (17,235 kPa) compressive strength
minimum 115 pcf (1842 kg/m^3) density
B. Finish: Wood-float or wood-troweled equivalent finish. Steel troweled is not desirable.
C. Concrete Hydration (Cure):

1. Method of Cure: Water cure, wet coverings, paper sheets, plastic sheets or approved liquid curing compound (sodium silicate preferred). **Contact Hydrotech for other alternatives.**
2. Duration of Cure/Dry:

a. Structural Weight Concrete: recommend 28 days, minimum 14 days, prior to application of the membrane.
b. Lightweight Structural Concrete: recommend 60 days, minimum 28 days, prior to application of membrane. Venting of the deck from the underside is recommended to facilitate drying.
c. The above minimum cure/dry times are recommended based upon basic concrete fundamentals and experience. Depending on conditions (i.e., ambient temperature, humidity) the concrete may be dry enough to receive application of the membrane in less than the 14 day minimum recommendation. Consult Hydrotech for specifics when less than the minimum is desired.

C. DIVISION 06 - Wood blocking and curbing
D. DIVISION 07 – Insulation
E. DIVISION 07 - Sheet metal flashing and counterflashing
F. DIVISION 07 - Caulking and sealants
G. DIVISION 07 - Roof hatches
H. DIVISION 22 - Plumbing specialties
I. DIVISION 32 - Landscaping

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM).
B. Canadian General Standards Board, CGSB-37.50-M89, Standard for Asphalt, Rubberized, Hot Applied, for Roofing and Waterproofing.
C. Underwriters Laboratories (UL) Class A.

1.04 DEFINITIONS

A. Green Roof -- An area of planting/landscaping, built up on a waterproofed substrate at any level that is separated from the natural ground by a man-made structure.
B. Extensive Green Roof -- Low to no maintenance landscaping consisting of shallow soil depths (< 6 inches (152mm) with plant varieties restricted to primarily mosses, herbs and succulents capable of withstanding harsh growing conditions.
C. Intensive Green Roof -- Landscaping requiring regular maintenance, consisting of deeper soil depths (> 8 inches (203mm) with a wider variety of plant species possible including shrubs and small trees.
D. Shallow-Intensive/Lawn Green Roof –– Landscaping requiring more regular maintenance than an extensive condition but limited in plant selection due to shallower soil depths, (i.e., sod grass lawn).
E. Garden Roof® -- Patented system of drainage, water retention and root barrier components utilized in the construction of green roofs over Hydrotech's MM 6125EV® roofing membrane.
F. Steep Slope Green Roof -- Defined as a slope exceeding 3:12 pitch.

1.05 SYSTEM DESCRIPTION

A. Furnish and install a completed Intensive Garden Roof® Assembly including concrete surface conditioner, Monolithic Membrane 6125EV®-FR and flashings, protection course/root barrier protection, water retention mat, drainage/water retention component, filter fabric, lightweight engineered growing medium (soil) and vegetation.

1.06 SUBMITTALS

A. Certification from an approved independent testing laboratory experienced in testing rubberized asphalt material, that the material meets the CGSB-37.50-M89 standard for rubberized asphalt membranes, including applicable ASTM procedures.

B. Certification showing full time quality control of production facilities responsible for the manufacture of the rubberized asphalt and that each batch of material is tested to insure conformance with the manufacturers published physical properties.

C. Certification showing that all components of the green roof assembly are being supplied and warranted by a single-source manufacturer.

D. Evidence that the roof membrane assembly is currently Class A listed with Underwriters Laboratories.

E. Evidence that the extruded polystyrene insulation if used is free from CFC's.

F. The plant manufacturing the rubberized asphalt material must have IS0 9001-2000 approval as evidenced by a notarized copy of the official certificate.

G. Provide product data on all components of the green roof assembly.

1.07 QUALITY ASSURANCE

A. Refer to Section 1.05 SUBMITTALS. Include items A., B., C. & D.

B. The Roofing/Waterproofing Contractor shall demonstrate qualifications to perform the work of this Section by submitting the following documentation:

1. Certification or license by the membrane manufacturer as a locally based, authorized applicator of the product the installer intends to use, for a minimum of five (5) years.

2. List of at least three (3) projects, satisfactorily completed within the past five (5) years, of similar scope and complexity to this project. Previous experience submittal shall correspond to specific membrane system proposed for use by applicator.

C. Refer to Section 1.04 SYSTEM DESCRIPTION. Include single-source for all components from the manufacturer.

D. The rubberized asphalt membrane product shall contain an inert clay filler and crumb rubber to enable the product to be resistant to acids (fertilizers, building washes and acid rain) and maintain membrane thickness during application.

E. Membrane Manufacturer shall have available an in-house technical staff to assist the contractor, when necessary, in application of the products and final inspection of the assembly.

F. Membrane Manufacturer Qualifications: Manufacturer shall demonstrate qualifications to supply materials of this section by certifying the following:

1. Membrane Manufacturer must show evidence that the specified rubberized asphalt has been manufactured by the same source for fifteen (15) years and successfully installed on a yearly basis for a minimum of fifteen (15) years on projects of similar scope and complexity.

2. Membrane Manufacturer must not issue warranties for terms longer than they have been manufacturing their hot fluid rubberized asphalt membrane.

G. Pre-Construction Conferences. 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.

1.08 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original unopened containers of packaging clearly labeled with manufacturer's name, brand name, instruction for use, all identifying numbers, and U.L. labels.

B. Materials shall be stored in a neat, safe manner, not to exceed the allowable structural capacity of the storage area.

C. Store materials in a clean, dry area protected from water and direct sunlight.

D. Store all adhesives at temperatures between 60°F (15.5°C) and 80°F (26.6°C). If exposed to lower temperatures, restore materials to 60°F (15.5°C) minimum temperature before using.

1.09 PROJECT CONDITIONS

A. Application of the membrane shall not commence nor proceed during inclement weather. All surfaces to receive the membrane shall be free of water, dew, frost, snow and ice.

B. Application of membrane shall not commence nor proceed when the ambient temperature is below 0°F (-17.7°C).

C. Preparation and application of membrane must be conducted in well ventilated areas.

D. Over its service life, do not expose membrane or accessories to a constant temperature in excess of 180°F (82°C) (i.e., hot pipes and vents or direct steam venting, etc.).

E. Adhesives contain petroleum distillates and are extremely flammable. Do not breathe vapors or use near an open fire. Do not use in confined areas without adequate ventilation. **Consult container or packaging labels and Material Safety Data Sheets (MSDS) for specific safety information.**

F. Do not allow waste products (petroleum, grease, oil, solvents, vegetable or mineral oil, animal fat, etc.) to come in contact with the roof membrane. Any exposure to foreign materials or chemical discharges must be presented to membrane manufacturer for evaluation to determine any impact on the roof membrane assembly performance.

G. Concrete Deck Surface Condition. **IMPORTANT - Refer to 1.02 Related Sections.**

H. Deck Preparation; refer to Section 3.02 Preparation.

I. Deck slopes greater than 3 inches in 12 inches (approx. 15 degrees or 25%) shall be limited to extensive and shallow-intensive applications and require special installation considerations. **CONTACT Hydrotech for specifics.**

J. Ballasting requirements vary depending on height of roof deck, parapet height and design wind speed based upon building location. Vegetated green roofs also require proper ballasting and the possible use of wind erosion mats. **CONTACT Hydrotech for ballasting recommendations.**

K. General Contractor shall assure that adequate protection is provided after installation so other trades do not damage membrane.

1.10 WARRANTY

A. Upon completion of the work, the contractor must supply the owner with a single-source warranty of U.S. origin direct from the manufacturer.

B. Each warranty varies in scope and terms. **Contact Hydrotech for exact warranty terms and conditions to meet the specific project requirements.**

C. Warranties available from the manufacturer:

1. **Material Warranty;** excludes labor.
   Duration: 20-year
2. **Watertightness Warranty**; includes labor and material.
   Duration: 20-year

3. **Thermal Warranties;** includes 80% retention of the original thermal value and remain on the deck at 70 mph wind gust. Duration 20-year
4. **Total System Warranties;** covers components of the green roof assembly, including membrane, flashing, insulation, Garden Roof® components and pavers. Includes removal and replacement of the Garden Roof® components, pavers and soil (≤24 inches deep) when supplied by and installed per Hydrotech's requirements.
   a. Duration of Membrane/Flashing: 20-year (watertight condition)
   b. Material Integrity of Garden Roof® Components: 15-year
   c. Duration of Pavers: 10-year (will not crack, split or disintegrate due to freeze-thaw)

PART 2 – PRODUCTS

2.01 GENERAL

A. Refer to Section 1.04, System Description. All components must be obtained as a single-source from the membrane manufacturer to ensure total system compatibility and integrity.

Manufacturer: American Hydrotech, Inc., or equal
303 East Ohio Street
Chicago, Illinois 60611-3318
800-877-6125 or 312-337-4998
FAX: 312-661-0731
Web Site: http://www.hydrotechusa.com

2.02 MATERIALS

A. Membrane

1. Membrane shall be a hot, fluid applied, rubberized asphalt membrane meeting the CGSB-37.50-M89 standard and other pertinent physical properties:
   - American Hydrotech, Inc., Monolithic Membrane 6125

PROPERTY	TEST METHOD	TYPICAL RESULT
Flash point	ASTM D-92 CGSB-37.50-M89	<500°F* (260°C)
Penetration	ASTM D-5329 CGSB-37.50-M89	98 mm @77°F (25°C) 187 mm @122°F (50°C)
Flow	ASTM D-5329 CGSB-37.50-M89	1.0 mm @ 140°F (60°C)
Toughness	CGSB-37.50-M89	16.0 Joules
Ratio of Toughness to Peak Load	CGSB-37.50-M89	0.069

Water Vapor Permeability	ASTM E-96, PROCEDURE E CGSB-37.50-M89	0.3 ng/Pa(s)M^2
Water Absorption	CGSB-37.50-M89	.11 gram weight gain
Low Temperature Flexibility (-25°C)	CGSB-37.50-M89	No delamination, adhesion loss, or cracking
Low Temperature Crack Bridging Capability	CGSB-37.50-M89	No cracking, adhesion loss, or splitting
Heat Stability	CGSB-37.50-M89	No change in viscosity, penetration, flow or low temperature flexibility
Viscosity	CGSB-37.50-M89	11.0 seconds
Water Resistance (5 days/50°C)	CGSB-37.50-M89	No delamination, blistering, emulsification, or deterioration
Softening Point	ASTM D-36	180°F (82°C)
Elongation	ASTM D-5329	1000% minimum
Resiliency	ASTM D-3407	40% minimum
Bond to Concrete	ASTM D-3407	Pass 0°F (-18°C)
Acid Resistance	ASTM D-896 Procedure 7.1 (N-8)	Pass-50% Nitric Acid -50% Sulfuric Acid
Resistance to Hydrostatic Pressure	ASTM D-08.22 Draft 2	100 psi (equals 231 foot of head water)
Resistance to Salt Water	ASTM D-896 similar 20% sodium chloride sodium carbonate calcium chloride	No delamination, blistering, emulsification or deterioration
Resistance to Fertilizer	ASTM D-896 similar undiluted, 15/5/5, nitrogen/phosphorus potash	No delamination, blistering, emulsification or deterioration
Resistance to Animal Waste	3-year exposure	No deterioration
Solids Content		100%-no solvents

Shelf Life	10 years (sealed)
Specific Gravity	1.23 + .02

*102°F more than the application temperature recommended by the manufacturer.

B. Surface Conditioner

1. Asphaltic surface conditioner for concrete surfaces meeting ASTM D41
   - American Hydrotech, Inc., Surface Conditioner

C. Reinforcing

1. Spunbonded polyester fabric (standard duty) reinforcing sheet.
   - American Hydrotech, Inc., Flex Flash F®
2. 60-mil (1.5 mm) thick, uncured neoprene (heavy duty) reinforcing sheet.
   - American Hydrotech, Inc., Flex Flash UN®

D. Flashing

1. 60-mil (1.5 mm) thick, uncured neoprene sheet.
   - American Hydrotech, Inc., Flex Flash UN®
2. 157-mil (4 mm) thick, torch-grade, modified asphalt, reinforced flashing membrane.
   - American Hydrotech, Inc., Flex-Flash MB®

E. Adhesives/Sealant

1. Contact adhesive to bond elastomeric flashing together.
   - American Hydrotech, Inc., Splicing Cement
2. Contact adhesive to bond elastomeric flashing to an approved substrate.
   - American Hydrotech, Inc., Bonding Adhesive
3. Sealant to seal elastomeric flashing seam edge.
   - American Hydrotech, Inc., Lap Sealant

F. Separation/Root Barrier Protection Course – As indicated on Drawings

1. For intensive conditions; a 160-mil (4 mm) thick polyester reinforced, modified asphalt sheet with granular surface and root inhibiting additive.
   - American Hydrotech, Inc., Hydroflex® RB2.

G. Prefabricated Drainage Course

1. A composite drainage system consisting of a three-dimensional, crush-proof, drainage core and a filter fabric.
   - American Hydrotech, Inc., Hydrodrain® 300

H. Insulation

1. An extruded polystyrene rigid board insulation.
   - STYROFOAM® Brand insulation [TYPE] as manufactured by The Dow Chemical Company, marketed by American Hydrotech, Inc.

   a. Insulation shall meet ASTM C-578, Type VI or VII.

b. Minimum compressive strength, ASTM D-1621, 40 or 60 psi (276 or 414 kPa) (variance by type of product)
c. Maximum water absorption by volume per ASTM C-272,0.1%
d. Water vapor permeance for 1" product per ASTM E-96, 1.0 perm (max.) (63 ng/Pa/s/m^2)
e. Insulation shall have an R value of 5.0°F ft^2 h/Btu/in. (0.88 K m^2/W) of thickness when tested at 75°F (23.9°C) mean temperature in accordance with ASTM C-518
f. Product shall be free of CFC's

Product types available: STYROFOAM® Brand, RoofMate; Ribbed RoofMate; PlazaMate; and High Load 100. **CONSULT Hydrotech for recommended product type.**

I. Air Layer (If required, consult Hydrotech)

1. Required air space over STYROFOAM® insulation when moisture mat is required shall be composed of a crush-proof core and non-woven filter fabric.
- American Hydrotech, Inc., Hydrodrain® AL or Hydrodrain 300.

J. Water Retention Mat

1. Non-woven, synthetic fiber mat capable of retaining additional moisture for potential use by vegetation.
- American Hydrotech, Inc., Moisture Mat

K. Drainage/Water Retention Component

1. Three-dimensional, molded panels of recycled polyethylene with drainage channels top and bottom sides and water retention reservoirs top side.
- American Hydrotech, Inc., Gardendrain™

a. Intensive Conditions:
- Gardendrain GR30 or Gardendrain GR50 – As indicated on Drawings.

L. Filter Fabric

1. Non-woven, polymeric, geotextile fabric.
- American Hydrotech, Inc., SystemFilter

M. Soil

1. Custom growing media mix capable of supporting vigorous growth of the specified vegetation, complying with the following specification.
- American Hydrotech, Inc., Intensive LiteTop® Growing Media

Property	**Intensive***	**Shallow-Intensive/Lawn***	**Extensive***
Grain Size Distribution			
clay fraction	0-2 %	< 2 %	< 1 %
passing #200 sieve	5-15 %	3-6 %	1-3 %
passing #60 sieve	10-25 %	10-30 %	5-25 %
passing #18 sieve	20-50 %	20-50 %	20-50 %
passing 1/8-inch sieve	55-95 %	55-95 %	55-95 %
passing 3/8-inch sieve	90-100 %	90-100 %	90-100 %

Density			
Application Density	0.7 - 1.1 g/cm3 (44 lbs – 68 lbs/cf)	0.8 - 1.2 g/cm3 (50 lbs - 75 lbs/cf)	0.6 - 1.1 g/cm3 (38 lbs – 69 lbs/cf)
Saturated Density	1.0 - 1.5 g/cm3 (62 lbs - 93 lbs/cf)	1.0 - 1.5 g/cm3 (62 lbs - 93 lbs/cf)	0.9 - 1.4 g/cm3 (56 lbs – 87 lbs/cf)
Dry Density	0.6 -1.1 g/cm3 (38 lbs - 68 lbs/cf)	0.7 -1.1 g/cm3 (44 lbs - 68 lbs/cf)	0.5 -1.0 g/cm3 (31 lbs – 62 lbs/cf)
Water & Air Management (% vol.)			
saturated water capacity	>40 %	>35 %	>30 %
saturated air content	>10 %	>15 %	>10 %
Saturated Hydraulic Conductivity	>0.5 mm/min (>1.0 in/hr)	>1.2 mm/min (>2.8 in/hr)	>0.6 mm/min (>1.4 in/hr)
pH, Lime, and Salt Content			
pH (saturated paste)	5.5 - 7.5	6.0 - 7.5	6.0 - 7.5
carbonate content	<25 g/l	<25 g/l	<25 g/l
salts content (water extract)	<3.0 g/l (2.0 mmhos/cm)	<3.0 g/l (<2.0 mmhos/cm)	<2.5 g/l (<1.7 mmhos/cm)
Organics			
OM content	6 – 12 mass %	3 – 6 mass %	3 – 6 mass %
C/N ratio	<20	<20	<20
Nutrients (plant available)**			in lb/1,000 ft3
nitrogen (NO3)	3 – 15	3 – 15	3 – 15
phosphorus	1 – 7	1 – 7	1 – 7
potassium	6 – 15	6 – 15	6 – 15
calcium	19 – 65	19 – 65	19 – 65
magnesium	3 – 15	3 – 15	3 – 15
CEC Capacity	>6 cmol/kg	>5 cmol/kg	>5 cmol/kg

Compost Fraction

1) Meet or exceed USEPA Class A standard, 40 CFR 503.13, Tables 1 & 3 (chemical contaminants) and 40 CFR 503.32(a) (pathogens) and/or be permitted in the state of origin to produce Class A material.
2) Meet US Compost Council STA/TMECC criteria or equal for Class I or II stable, mature product.

* Values shall be adjusted due to availability of local materials or special project conditions related to plant.
* Values shall be adjusted due to availability of local materials or special project conditions related to plant selection and/or environmental conditions.
** Nutrients shall be adjusted with appropriate slow-release fertilizer with micronutrient additions if below lower target range.

2. Expanded lightweight aggregate for use as fill material for drainage/water retention component as required.
 - American Hydrotech, Inc., LiteTop® Lightweight Aggregate

a. 3/8” - 3/4” (9.5 - 20 mm) expanded, lightweight aggregate

N. Hardscape / Roof Ballast

1. Pavers

a. Architectural Finish Pavers
 - American Hydrotech, Inc., Architectural Pavers, meeting the following physical properties:

PROPERTY	TEST METHOD	VALUES
Compressive Strength	ASTM C140	≥7,000 psi average min.
Flexural Strength	ASTM C293	≥600 psi average min.
Water Absorption	ASTM C140	Not greater than 5%
Freeze/Thaw	ASTM C67	≤1% loss/dry weight (50 Cycles)
Centerload	-	Min. 1,750 lbs.

2.03 RELATED MATERIALS

A. Plants desired shall be selected by the landscape architect/ designer in keeping with the overall plan intended.

B. Metal counterflashing is typically required to provide protection to vulnerable flashing materials from damage due to gardening activities.

PART 3 – EXECUTION

3.01 INSPECTION

A. The roofing contractor shall examine all surfaces to receive the roofing assembly to verify it is acceptable and proper for the application of the membrane. **Refer to American Hydrotech's Pre-Installation & Application Guidelines.**

B. The roofing contractor shall not proceed with the installation of the roof membrane assembly until all roof defects have been corrected.

3.02 PREPARATION

A. All surfaces must be dry, smooth, free of depressions, voids, protrusions, clean and free of unapproved curing compounds, form release agents and other surface contaminants. (Edit to project requirements)

1. Cast in-place concrete/Composite deck

   a. Poured in place concrete must be monolithic, smooth, free of voids, spalled areas, laitance, honeycombs, and sharp protrusions.
   b. **Refer to Section 1.02 of this specification, Division 3.**

2. Precast concrete decks

   a. Precast units shall be mechanically secured to minimize differential movement and all joints between units shall be grouted.

3. Plywood decks

   a. Minimum thickness of 1/2" (12.7 mm) is required with adequate structural support.
   b. Tongue and groove joint edges shall be required.
   c. Adequate number and type of fasteners shall be used to comply with applicable codes and maintain structural integrity.

B. Substrate cleaning

1. Thoroughly sweep the substrate which is to receive the roof membrane.

2. Substrate must also be blown clean using an air compressor to remove any remaining loose debris.

3. Final check to determine if concrete has been properly cleaned is to apply a test patch of Monolithic Membrane 6125® to the surface and check its adhesion.

3.03 INSTALLATION

A. Surface conditioner application (to concrete)

1. Apply the surface conditioner only to concrete using a hand held sprayer evenly at a rate of 300 to 600 SF/gallon (7.4 - 14.7 m^2/L) depending on surface texture. Surface conditioner shall "tan" the surface, not blacken it.
2. Allow sufficient time for the surface conditioner to thoroughly dry prior to the membrane application.

B. Membrane preparation

1. The membrane shall be heated in double jacketed, oil bath or hot air melter with mechanical agitation, specifically designed for the preparation of a rubberized asphalt membrane.

2. Heat membrane until membrane can be drawn-free flowing at a temperature range between 350°F (176°C) and 375°F (190°C).

C. Detailing/Flashing

1. All detailing and flashing shall be done in accordance with the manufacturer's standard guideline details.

2. All detailing and flashing shall be completed before installing the membrane over the field of the substrate.

3. Substrate board joints shall be pre-detailed with membrane and fabric reinforcing prior to full membrane application.

D. Membrane Application

1. Apply the rubberized asphalt membrane at a rate to provide a continuous, monolithic coat of 90 mil minimum (approximately 2.3 mm), into which is fully embedded a layer of the spunbonded polyester fabric reinforcing sheet, followed by another continuous monolithic coat of membrane at an average thickness of 125 mil (approx. 3.2 mm). Total membrane thickness is to be 215 mils average (approx. 5.5 mm), 180 mils minimum.

2. Overlap fabric reinforcing sheet 1-2 inches (25.4 mm - 50.8 mm) with membrane between sheets.

3. Pre-detailing of joints between plywood and gypsum board decks is required for warranties greater than 10 years.

3.04 SEPARATION/PROTECTION COURSE INSTALLATION

A. Separation/Protection course shall be installed as follows:

1. Embed the Hydroflex® RB2 protection/root barrier protection course into the membrane while it is still hot to insure a good bond.

a. Overlap adjoining sheet edges 4” (100 mm) and seal the laps with a propane torch.

3.05 WATER TEST

A. The roof area or portions thereof shall be leak tested by means of electronic testing or by ponding water at a minimum depth of 2" (50.8 mm) for a period of 48 hours to check the integrity of the membrane installation.

B. VERIFY that the structure can support the deadload weight of a watertest before testing.

C. If leaks should occur the water must be drained completely and the membrane installation repaired.

3.06 GARDEN ROOF® COMPONENTS INSTALLATION

A. Root Barrier Protection.

1. Where Hydroflex RB was previously installed, no additional root protection is required.

2. Root Stop shall be laid over previously installed Hydroflex 30, lapping adjacent sheets 5 feet (1.5 m), or 1 foot (300 mm), overlap is acceptable if Seam Tape is used. The Root Stop shall be turned up all vertical, roofed/flashed surfaces to completely protect waterproofing and flashings.

B. Insulation. Where specified, STYROFOAM® brand insulation shall be installed loose-laid in accordance with manufacturer's recommendations.

C. Air Layer. When insulation ***and*** Moisture Mat are specified an air layer is required between the surface of the insulation and the water retention mat. A layer of Hydrodrain® AL or 300 shall be installed over the insulation. The 4 inch (100 mm) salvage edge of the geotextile fabric overlaps adjoining sheets and can be held in place with duct tape.

D. Moisture Mat. Where specified, a layer of Moisture Mat shall be installed over the root barrier (when no insulation is specified) or air layer/ insulation, lapping adjacent rolls a minimum of 4 inches (100 mm). The Moisture Mat shall be turned up all vertical, roofed/flashed surfaces a minimum of 6 inches (150 mm) beyond the anticipated soil level. Any excess shall be trimmed down to the level of the soil.

E. Drainage/Water Retention Component.

1. Gardendrain™ GR30 or Gardendrain™ GR50, shall be installed with holes through the dimples on top, over the root barrier protection, water retention mat. Adjacent panels may be butt together or overlapped approximately 1 inch (25 mm). Gardendrain® shall be cut to fit around penetrations, etc. with a heavy-duty utility knife or small toothed saw.

2. The cups of the Gardendrain shall be filled with lightweight aggregate level with the top surface of the panels where required due to loading conditions.

F. Filter Fabric.

1. A layer of SystemFilter shall be laid over the Gardendrain, lapping adjacent rolls a minimum of 6 inches (150 mm). Enough material shall be left to be drawn up above the anticipated soil level. Any excess shall be trimmed down to the level of the soil.

a. For slopes ≥2:12 and <3:12 (approx. 10 - 15°, 17 - 25%) filter fabric shall not be installed over the Garden Drain GR30 or GR50 throughout the field of the roof so that the growing media may be placed directly into the cups. Filter fabric shall be laid at penetrations, terminations, etc.

3.07 HARD SCAPE/ACCESSORY INSTALLATION

A. Stone and/or paver ballast shall be installed at all roof perimeters, building walls, penetrations, and access hatches and as required for flashing vegetation barriers, proper wind design, fire breaks, and as walkway/maintenance paths.

B. All drains shall be fitted with inspection/maintenance boxes and grills, built up to ensure access at soil level.

3.08 SOIL INSTALLATION

A. LiteTop soil shall be placed carefully to avoid damage or displacement of other materials such as walls, paving, drainage components, filter fabric, and roofing membrane.

B. LiteTop soil shall be placed to within 1 inch greater than final grade or to a depth of no greater than 8 inches and compacted as described in 3.08.C. below. For final grades less than 8 inches only one round of compaction shall be performed and remaining soil loosely placed such that top of soil exceeds final grade by 1 inch (see 3.08.D. below). For final grades greater than 8 inches, place soil at no greater than 6 inches and repeat procedure until soil has been compacted within 1 inch of final grade.

C. Compaction shall be performed with a 200 – 300 lb. landscape roller or lightly compacted with a hand held mechanical compactor to achieve a 50 – 60 % compaction as determined by ASTM D1557.

D. After compaction remaining soil shall be placed at 1 inch greater than final grade and thoroughly watered or jetted over entire area. Low settled areas shall be filled with additional soil and re-wet to achieve uniform prescribed final grade.

3.09 VEGETATION INSTALLATION

A. Supply and install specified vegetation strictly in accordance with the landscape architect/designers instructions, plans and good practice.

END OF SECTION