

FocalPoint Bioretention System Material & Installation Specifications

Technical Specification:

PART 1 – GENERAL

1.01 General Provisions

- A. The Conditions of the Contract and all Sections of Division 1 are hereby made a part of this Section.
- B. The following general specifications describe the components and installation requirements for the FocalPoint Bioretention System (FPBS) includes high performance, modular underdrain/storage components and Filterra engineered media for bioretention filtration of storm water that utilizes physical, chemical and biological mechanisms of a soil, plant, and microbe complex, to remove pollutants typically found in urban storm water runoff.

1.02 Description of Work

- A. Work Included:
 - 1. Provide all required engineering assistance required to properly size and install all components of the treatment system in accordance with the approved drawings and these specifications.
 - 2. Provide excavation and base preparation per Manufacturer's recommendations and/or as shown on drawings, to provide adequate support for project design loads and safety from excavation sidewall collapse. See Section 2. Materials.
 - 3. Provide (FPBS) and all related products including storage media, geotextiles, geogrids, inlet and outlet pipe with connections and installation per the Manufacturer's instructions furnished in these specifications.
 - 4. Media and underdrain/storage system manufacturers must have a minimum of 5 years experience in producing systems for commercial use and a minimum of 2,500 operational installed units.
- B. Related Work:
 - 1. Subgrade excavation and preparation under Section 02300 - Earthwork.
 - 2. Subsurface drainage materials - Section 02700 - Subsurface Drainage and Structures, as needed.

1.03 Quality Assurance

- A. All underdrain/storage system materials must be manufactured in ISO certified facilities.
- B. The quality of the underdrain/storage system materials, filter media, landscape materials and all other appurtenances and their assembly process shall be subject to inspection upon delivery of the system to the work site.
- C. All plant materials shall comply with the type and size required by the approved drawings and shall be alive and free of obvious signs of disease.
- D. Filter media shall be visually inspected to ensure appropriate volume, texture and consistency with the approved drawings. Filter media must be certified following TAPE or TARP protocol

testing by the manufacturer to meet or exceed the filter media minimum flow rates and pollutant removal efficiency of the Filterra Engineered Media System.

- E. Installation: Performed only by skilled work people with satisfactory record of performance on bulk earthworks, pipe, chamber, or pond/landfill construction projects of comparable size and quality.

1.04 Submittals

- A. Installation, Operation, and Maintenance Manuals: The contractor shall submit the manufacturers approved FocalPoint installation, operation, and maintenance manuals for the system. It will be the responsibility of the system owner/operator or their contractor to ensure the unit is operated and maintained in accordance with the manual.
- B. Drawings: The contractor shall be provided dimensional drawings and, when specified, utilize these drawings to show details for construction, materials, specifications and pipe connections.
- C. Manufacturer's Warranty: The manufacturer shall warranty all components of the units for a minimum period of one year provided the unit is operated and maintained in accordance with the manual. Improper operation, maintenance or accidental or illegal activities (i.e. dumping of pollutants, vandalism, etc.) will void the warranty.
- D. Substitutions: Any proposed equal alternative product substitution to this specification must be submitted for review and approved prior to bid opening. Review package should include third party reviewed performance data for both flow rate and pollutant removal of filtration media. Pollutant removal data should follow TAPE or TARP protocols.

1.05 Delivery, Storage, and Handling

- A. Protect all materials from damage during delivery and store UV sensitive materials under tarp to protect from sunlight including all plastics, when time from delivery to installation exceeds one week. Storage should occur on smooth surfaces, free from dirt, mud and debris.
- B. Handling is to be performed with equipment appropriate to the materials and site conditions, and may include hand, handcart, forklifts, extension lifts, etc.

1.06 Project Conditions

- A. Review manufacturer's recommended installation procedures and coordinate installation with other work affected, such as grading, excavation, utilities, construction access and erosion control to prevent all non-installation related construction traffic over the completed FPBS installation.
- B. Cold weather:
 - 1. Do not use frozen materials or materials mixed or coated with ice or frost.
 - 2. Do not build on frozen ground or wet, saturated or muddy subgrade.
 - 3. Care must be taken when handling plastics when air temperature is at 40 degrees or below as plastic becomes brittle.

- C. Protect partially completed installation against damage from other construction traffic when work is in progress and following completion of backfill by establishing a perimeter with highly visible construction tape, fencing, or other means until construction is complete.
- D. Protect adjacent work from damage during FPBS installation.
- E. Soil stabilization of the site must be complete before the FPBS can be brought online. Soil stabilization occurs when 90% of the site has been paved or vegetated. Temporary erosion control and/or sedimentation prevention measures should be implemented to reduce the possibility of sediments being transported into the FocalPoint system prior to full stabilization of the site. Significant sediment loads can damage the FocalPoint system and lead to failure if not prevented or remediated promptly.

PART 2 – PRODUCTS

2.01 Availability

- A. The bioretention system must:

1. Be modular in nature
2. Fit into the footprint of the specified system
3. Have a minimum of 5 years of use in the United States
4. Have a minimum of 2,500 installations and performing
5. Meet the following requirements:

- B. Approved Products include:

Underdrain

Atlantis Matrix D-RainTank
Atlantis 52MM Drainage Cell
Atlantis 30MM Drainage Cell

Manufactured by:

Atlantis Corporation Pty Ltd
Unit 3, 19-21 Gibbes Street
Chatswood, NSW –2067 Australia

Distributed by:

Construction EcoServices
1930 Aldine Western Rd.
Houston, TX 77038
Phone: 832-446-1001

Engineered Soil Media

Filtterra Engineered Bioretention Media
Bacterra Engineered Bioretention Media

Manufactured by:

Filtterra, Inc.
11352 Virginia Precast Road
Ashland VA 23005

Distributed by:

Construction EcoServices
1930 Aldine Western Rd.
Houston, TX 77038
Phone: 832-446-1001

2.02 Materials

- A. Base of Excavation: Shall be smooth, level and free of lumps or debris, and compacted to at least 95% Standard Proctor Density (or as required by Engineer) unless infiltration of stormwater into subgrade is desired. A thin layer (3") of base material (See Section C) is recommended to establish a level working platform (may not be needed in areas with sandy soils meeting requirements of Section C below). A CBR >5 must be achieved prior to beginning installation of Raintanks. If the base is pumping or appears excessively soft, a geotechnical engineer should be consulted for advice. In many cases, a stabilization geotextile and 6" of compactable material that drains well will be sufficient to amend the bearing capacity of the soil.
- E. Geotextile: Most applications require 8 oz Non-Woven Geotextile or equivalent nonwoven geotextile with a nominal weight of 8 oz per square yard. Applications requiring water to ex-filtrate through the geotextile to sub-soils from the FPBS should use a woven monofilament such as Propex 111F or equivalent. Geotextile should be placed appropriate for the soil type and depth, and wrap the FPBS on the bottom and up all 4 sides. No geotextiles should be used in the water column. Allow for 24" of geotextile fabric on all sides to come up the sides of the excavation to be a separation layer between the Filterra soils and backfill materials.
1. Performance Criteria
 - a. Net Void Area 95 %
 - b. Service Temperature -20 to 130 Degrees Fahrenheit
 - c. Unit Weight (Single Module w/ two internal plates) > 13.5 lbs
 - d. Opening Size < 1.5 square inches
 - e. Rib Orientation Linear & Parallel
 - f. Unconfined Crush Strength* (5" x 5" plate) 34 psi
 - g. Unconfined Crush Strength* (11" x 16" plate) 45 psi
 - h. Unconfined Crush Strength* (16" x 27" plate) 30 psi
 - i. Diagonal Strength* (16" x 27" plate) 19 psi
 - j. 90 Day Creep Strain < 0.5 %
- D. Side Backfill: Structural fill, sand or other free-draining materials < 1.5" in diameter and compactable to 95%. Material must be free from lumps, debris and any sharp objects that could penetrate the geotextile. Material is used for base, backfill along the sides of the structure. Material must be compacted with powered mechanical compactor in lifts that do not exceed 12" to provide a settlement-free surface. Even when "self-compacting" backfill materials are selected, a vibratory compactor must be used.
- F. Separation Mesh: The top of the tank and 4 sides are to be wrapped in ECOMESH, or equivalent, composed of high-tenacity monofilament yarns woven together to produce an open mesh geotextile with the flowing specifications, which is inert to biological degradation and resistant to naturally encountered chemicals, alkalis and acids.
1. Performance Criteria
 - a. Tensile Strength 1440 lbs/ft MD, 1733 lbs/ft CD
 - b. Creep Reduced Strength 471 lbs/ft MD, 566 lbs/ft CD
 - c. Long Term Allowable Design Load 407 lbs/ft MD, 490 lbs/ft CD
 - d. Aperture Size .08" x .08"

- e. Mass/Unit Area 5.8 oz/sq yd
- E. Separation Layer: Six inches of 1/2" washed pea gravel is to be placed on top of the underdrain system between it and the engineered soil media.
- F. Engineered Soil Media:
 - 1. Manufacturer shall provide, at no additional cost, maintenance of the treatment system for a period of one year.
 - 2. Performance Criteria
 - a. The media shall achieve a flow rate equivalent to a minimum of 100 inches per hour, verified via third party report.
 - b. The system shall remove 80% Total Suspended Solids (TSS) using a SIL-CO-SIL 106 typical particle size distribution in the laboratory. Field results should show at least 80% TSS removal following either TAPE or TARP protocols.
 - c. The system shall be located to ensure that high flow events shall bypass and be safely conveyed.

PART 3 - EXECUTION

3.01 Inspection

- A. Examine prepared excavation for smoothness, compaction and level. Check for presence of high water table, which must be kept at levels below the bottom of the under drain structure at all times. If the base is pumping or appears excessively soft, a geotechnical engineer should be consulted for advice.
- B. Installation commencement constitutes acceptance of existing conditions and responsibility for satisfactory performance. If existing conditions are found to be unsatisfactory, contact Project Manager or Engineer for resolution prior to installation.

3.02 Preparation

- A. Using Side Backfill Material (Section 2.02 C) level the base of the excavated area as per engineering detail to establish a working platform for the USDS.
- B. It is helpful to identify the outline of the structure on the floor of the excavation, using spray paint or chalk line, to ensure square orientation during module placement.

3.03 Installation of the Underdrain System

- A. Each system must be constructed at the locations and elevations according to the approved drawings. Any Modifications to the elevation or location shall be at the direction and approval of the engineer.
- B. If a liner is being used in the system to harvest storm water or prevent groundwater intrusion, install per manufacturer's recommendations and per engineering detail.
- C. Place geotextile on the base of the excavation and sidewalls with material extending upwards on all sides to reach the level of the final grade surface, so as to encase engineered media when placed. If engineering drawings do not require geotextile on the base of the excavation, sides will still need geotextile to be placed as described.

- D. Place ECOMESH over the top and extend down all four sides of the Raintank system to prevent pea gravel from intruding into the underdrain.
- E. Wrap the Raintank in geotextile fabric previously placed on the bottom and up all four sides to prevent soil entry into the system. Overlap geotextile 12" or as recommended by manufacturer. Take great care to avoid damage to (optional) liner during placement.
- F. Identify locations of inlet, outlet, inspection ports, and any other penetrations of the geotextile, (optional) liner, and ECOMESH, securing pipe into boots with stainless steel pipe clamps. Support pipe in trenches during backfill operations to prevent damage to geotextile, (optional) liner or pipe.
- G. Backfill with recommended side backfill, compact in 12" (max) lifts. Place backfill CAREFULLY to avoid shoving or damaging system components. Use a powered mechanical compactor or hand tamper to compact backfill on underdrain sides with care to avoid damage to geotextile or (optional) liner.
- H. Above the underdrain and on top of the ECOMESH place 6" of 1/2" pea gravel, and bring backfill up the outside of the FocalPoint System to match, in one six inch lift.
- I. Place 12"W x 24"D gabion around the perimeter of the FocalPoint System, or as specified by engineer. Fill baskets with fill site soil to grade. At and above grade, place clean 3"x5" crushed concrete inside gabion basket, close and fasten.
- J. Engineered media shall be brought in and placed in one twelve inch lift. Be sure there is a separation layer of geotextile fabric between gabion wall and engineered media to prevent sediment migration. Cut this fabric level with top of engineered soil media.
- K. Place specified shallow rooted shrubs and clump grasses with care into the engineered media. If planting potted plants be sure to remove as much of the soil in the root ball as possible before planting.
- L. Backfill depth (pea gravel and engineered soil media) over underdrain must be a MINIMUM of 18".

3.04 Cleaning

- A. Perform cleaning during the installation of work and upon completion of the work. Remove from site all excess materials, debris, and equipment. Repair any damage to adjacent materials and surfaces resulting from installation of this work.

PART 4 – USING THE SYSTEM

4.01 Maintenance Requirements

- A. Each correctly installed system is to be maintained by the manufacturer for a minimum period of one year. The cost of this service is to be included in the price of the system.
- B. Annual maintenance consists of a maximum of two (2) scheduled visits
- C. Each maintenance visit consists of the following:
 1. system inspection

2. foreign debris, silt, plant material and trash removal
 3. filter media evaluation
 4. plant health evaluation
 5. disposal of all maintenance reuse items (mulch, etc.)
 6. maintenance records updated and stored
- D. To ensure long term performance of each FocalPoint Bioretention System, continuing annual maintenance programs should be performed per the latest FocalPoint Operations and Maintenance Manual.
- E. If sediment has accumulated beyond an acceptable level, it will be necessary to flush the underdrain. This can be done by pumping water into the Maintenance Port or adjacent structure, allowing the turbulent flows through the underdrain to re-suspend the fine sediments. If multiple Maintenance Ports have been installed, water should be pumped into each port to maximize flushing efficiency. Sediment-laden water can be pumped out and either captured for disposal or filtered through a Dirtbag, if permitted by the locality.

END OF SECTION