

Hydraulic Biotic Soil Amendments (HBSAs)

1.0 Hydraulic/Biotic Soil Amendments

1.1 Description

Hydraulic Biotic Soil Amendments (HBSAs) are soil amendments engineered to improve the development of deficient soils and to facilitate sustainable vegetation. HBSAs typically consist of organic material and nutrient sources combined with soil building and biostimulant components. The materials and components involved vary between different products but are designed to facilitate faster plant growth as well as sustained long term growth. They are typically hydraulically applied, but some products can be applied using other methods. Certain HBSAs may help achieve a minimal level of erosion control but may not replace the use of erosion control products. Strictly follow manufacture's installation requirements.

Hydraulic Biotic Soil Amendments are used to amend poor quality soils which have a lack of organic matter and little to no bioactivity. Use a HBSA if soil is determined to be deficient from the results of a soil organic matter test or the soil analysis as outlined in *SCDOT Supplemental Technical Specification for Seeding SC-M-810-4, or latest revision*.

1.2 Materials

Provide a Hydraulic Biotic Soil Amendment that is composed of non-toxic materials. Use HBSA materials certified to be weed seed free.

Hydraulic Biotic Soil Amendments typically contain a blend of organic and natural fibers with fast-acting soil building and growth components. These materials and components increase the water and nutrient holding capacity of the soil and create an environment for growth of beneficial microorganisms while allowing seed germination and vegetation establishment within the HBSA.

Provide a HBSA that contains compounds such as:

- Biochar
- Humus/Humic Acid
- Mycorrhizae Fungi
- Seaweed Extract
- Trace Elements
- Growth Stimulators
- Beneficial Microorganisms
- Micronutrients
- Organic Growth Medium

Additional seed, fertilizer, tackifier, and/or any other soil amendments may be needed to mix with or be used in conjunction with the HBSA for application as determined by soil testing or recommendations by the product manufacturer.

A separate application of an erosion control product may be necessary based on site conditions and recommendations of the product manufacturer.

Table 1: HBSA Performance and Physical Requirements

HBSA Property	Test Method	Desired Results
Physical		
Color	Observation	Colored to contrast application area, shall not stain concrete or painted surfaces
Organic Matter	ASTM D586	85% minimum
Acute Toxicity	ASTM 7101 & EPA Method 2021.0	Non-toxic
pH	ASTM D1293	5.0 - 8.5
C:N Ratio	ASTM E1508	10:1 minimum 100:1 maximum
Water Holding Capacity	ASTM D7367	400% minimum
Moisture Content	ASTM 2974	10% minimum, 50% maximum
Endurance		
Functional Longevity	Observation	Grass established in 3 months
Performance		
Vegetation Establishment	ASTM 7322	400% minimum

1.2.1 Quality Assurance

Provide HBSA listed on the most recent edition of *SCDOT Qualified Product List 98*.

At the time of delivery, provide the RCE with the specific HBSA packing list containing complete identification, including but not limited to the following:

- Manufacturer name and location,
- Manufacturer telephone number and fax number,
- Manufacturer's e-mail address and web address, and
- HBSA name, model and/or serial number.
- Certification that the specific HBSA meets the physical and performance criteria of this specification.

1.3 Construction Requirements

1.3.1 Installation

Representative soil samples must be obtained from the area of interest and tested as described in *SCDOT Supplemental Technical Specification for Seeding SC-M-810-4, or latest revision*. When test results indicate that soils are excessively nutrient deficient to the extent of requiring costly fertilizer additions and/or have excessively low pH values (lower than 5.0) to the extent of requiring costly lime additions, a soil organic matter test should be performed. Soils with less than 3% organic matter are typically

considered deficient and a HBSA should be utilized. If soils are known or suspected to be of poor quality, it may be requested by the RCE to have the organic matter test performed at the same time as the initial soil test. Areas which have been seeded previously and have failed to establish sufficient cover may be tested for organics and treated with a HBSA at the discretion of the RCE.

Ensure the seedbed conforms to the finished grade and cross section shown on the Plans or as otherwise directed by the RCE before applying the HBSA. Before applying the HBSA, loosen the seedbed a minimum depth of three (3) inches. For seedbeds on a slope, an acceptable method of preparation is vertically tracking the seedbed up and down using proper equipment. Remove stones larger than two and one-half (2½) inches in any dimension, large clods, roots, or other debris brought to the surface.

HBSA products are typically applied using approved hydraulic methods and equipment. The type and size of the hydraulic equipment used can influence the mixing rate of the HBSA. Other methods of application may be acceptable if deemed appropriate based on site conditions and manufacturer recommendations. Typical applications rates are 3,500-5,000 pounds per acre. Additional tracking or integration into the seedbed may be necessary after application. Always follow the manufacturer's specifications and requirements when applying HBSAs.

Mix additional seed, fertilizer, tackifier, and/or any other soil amendments with the HBSA before application if instructed to do so by the manufacturer.

Site conditions and recommendations by the manufacturer will dictate the need for and the type of erosion control products required. . If erosion control products are to be used, they should be installed after application of the HBSA is complete. For more information about the use of erosion control products, see *SCDOT Supplemental Technical Specification for Seeding SC-M-810-4*, *SCDOT Supplemental Technical Specifications for HECs (SC-M-815-4, SC-M-815-5, SC-M-815-6, SC-M-815-7)*, and *SCDOT Supplemental Technical Specification for RECPs SC-M-815-9*, or latest revisions.

HBSAs typically should not be applied within 24 hours of recent rain or when rain is forecasted to occur in the next 24 hours unless protected by erosion control products. Follow instructions and/or recommendations from the manufacturer about appropriate conditions for application.

The HBSA should be applied in compliance with all manufacturer's specifications and the *SCDOT Supplemental Technical Specification for Seeding SC-M-810-4*, or latest revision. The RCE reserves the right to reject or approve any HBSA plans before application is initiated.

1.3.2 Delivery Storage and Handling

HBSAs are contained in pre-packaged bags prepared by the manufacturer to assure material quality control and performance. Products that are not pre-packaged by the manufacturer shall not be accepted. The pre-packaged bags are typically delivered on pallets by truckload. Bags should be kept in safe storage where they are protected from weather, excessive temperatures, and construction operations. Handle products in compliance with any instructions or recommendations stated by the manufacturer. Clean any spills promptly.

1.3.3 Inspection and Maintenance

A Hydraulic Biotic Soil Amendment maintenance plan should be prepared that includes the following:

- Reapplication of the HBSA to disturbed areas as directed by the RCE
- Proper maintenance of equipment to provide uniform application rates
- Rinsing thoroughly of all HBSA mixing and application equipment and appropriate discharge of rinse water

Evaluate the quality of the HBSA application by visual observation after it is applied. Ensure the HBSA uniformly covers the entire application area with a minimum coverage rate of 95%. Do not apply more or

less of the product to any certain sections of the subject area. The product application should remain uniform throughout the entire treated area for best results.

If HBSA treated soils are damaged, or soil or vegetation quality shows the need for additional application, reapply HBSA in accordance with the manufacturer's instructions. Reapplication must be approved by the RCE. SCDOT will not pay for reapplication of the HBSA if it is not approved by the RCE.

1.3.4 Acceptance

Obtain RCE acceptance and approval of HBSA installations. When requested by the RCE, ensure that a manufacturer's representative is on-site to oversee and approve the initial HBSA installation. Obtain a letter from the manufacturer approving the installation and application when requested by the RCE.

1.4 Measurement

The quantity for the pay item is the surface area covered by the Hydraulic Biotic Soil Amendment applied at the recommended rate and is measured by the one-acre unit of HBSA in-place, complete, and accepted. The installation may require written acceptance by the manufacturer's representative before acceptance for payment.

1.5 Payment

Payment for the accepted quantity for each pay item, measured in accordance with this Specification, is determined using the Contract unit bid price for the applicable pay item. The payment includes all direct and indirect costs and expenses necessary to complete the work.

Payment for Hydraulic Biotic Soil Amendment is full compensation for furnishing all materials (excluding seed, fertilizer, agricultural lime, compost, mulch, straw or hay with tackifier, HECP, or ECB) and includes all other materials, labor, equipment, tools, supplies, transportation, and incidentals necessary to fulfill the requirements of the pay item in accordance with the Plans, Specifications, and other terms of the Contract. Payment is 100% upon approval of acceptable application of Hydraulic Biotic Soil Amendment meeting the requirements of this Specification.

Table 2: Bid Item Number

Bid Item Number	Description	Unit
8151055	Hydraulic Biotic Soil Amendment (HBSA)	ACRE