SECTION 245—GEOSYNTHETICS

245.01—Description

These specifications cover artificial fiber textile products to be used in transportation construction work.

245.02—Detail Requirements

Geosynthetics shall include a label that clearly shows the manufacturer or supplier name, style name, and roll number. The shipping document shall include documentation to comply with the requirements of Section 245.03.

Each geosynthetic roll shall be wrapped or otherwise packaged in a manner that will protect the geosynthetic, including the ends of the roll, from damage due to shipment, water, sunlight, and contaminants. The protective wrapping shall be maintained during periods of shipment and storage.

During storage, geosynthetics rolls shall be elevated off the ground and adequately covered to protect them from the following: site construction damage; precipitation; extended ultraviolet radiation including sunlight; chemicals that are strong acids or strong bases; flames including welding sparks; temperatures in excess of 160 degrees F; and other environmental conditions that may damage the physical property values of the geosynthetic. Geosynthetics that are not properly protected may be subject to rejection.

245.03—Testing and Documentation

Each geosynthetic material provided to the project shall be tested by the Contractor to determine conformance with the material properties specified herein within 24 months of submission. Test results reported from AASHTO's National Transportation Product Evaluation Program—Laboratory Results of Evaluations on Geotextile and Geosynthetics may be used. The Contractor shall provide certification of the material in accordance with the requirements of AASHTO M288, Section 4, Certification, and copies of the test results. The Contractor's testing, however, will not be the sole basis for acceptance.

The Department will sample and test the geosynthetics for acceptance to verify conformance with this specification. Sampling shall be performed in accordance with the requirements of ASTM D4354, Procedure C. In the absence of the Department's testing, acceptance may be based on the manufacturer's certifications as a result of testing by the manufacturer of quality assurance samples obtained using the procedure for ASTM D4354 Procedure B Sampling for Manufacturer's Quality Assurance (MQA) Testing. A lot size shall be considered to be the shipment quantity of the given product or a truckload of the given product, whichever is smaller.

Property values, with the exception of apparent opening size (AOS) and panel vertical strain, in these specifications represent minimum average roll values (MARV) in the weakest principal direction (i.e., average test results of any roll in a lot sampled for conformance or quality assurance testing shall meet or exceed the minimum values provided herein). Values for AOS and panel vertical strain represent maximum average roll values.

Tests shall be performed in accordance with the methods referenced in this specification for the indicated application. The number of specimens to test per sample is specified by each test method. Geotextile product acceptance shall be based on conformance to the requirements of ASTM D4759. Product acceptance is determined by comparing the average test results of specimens in a given sample to the specification MARV.

(a) **Geotextile Fabric for Use in Silt Fences, Silt Barriers, or Filter Barriers:** Geotextile shall function as a vertical; permeable interceptor designed to remove suspended soil from overland water flow. Fabric shall filter and retain soil particles from sediment-laden water to prevent eroding soil from being transported off the construction site by water runoff. Fabric shall contain ultraviolet inhibitors and stabilizers to provide at least 6 months of expected, usable construction life at a temperature of 0 degrees F to 125 degrees F. The tensile strength of the material after 6 months of installation shall be at least 50 percent of the initial strength.

Physical Property	Test Method	Requirements
Filtering efficiency	VTM-51	Min. 75%
Flow rate	VTM-51	Min. 0.2 gal/ft2/min

In addition to these requirements, the geotextile shall comply with the requirements of AASHTO

M288 for temporary silt fence property requirements, Table 6, for grab strength and ultraviolet stability.

(b) **Geotextile for Use as Riprap Bedding Material:** Geotextile shall comply with the requirements of AASHTO M288 for separation geotextile properties, Table 3, for apparent opening size and ultraviolet stability and geotextile strength property requirements, Table 1, Class 2, for grab strength and puncture strength.

(c) **Geotextile Fabric for Use in Drainage Systems (Drainage Fabric):** Drainage fabric shall be nonwoven and clog resistant, suitable for subsurface application, and thermally and biologically stable.

The geotextile shall retain at least 75 percent of its ultimate strength when subjected to substances having a pH of a minimum of 3 and a maximum of 12 for a period of 24 hours.

Physical Property	Test Method	Requirements
Permittivity	ASTM D4491	Min. 0.5 sec-1
Apparent opening size	ASTM D4751	Max. No. 50 sieve

In addition to these requirements, the geotextile shall comply with the requirements of AASHTO M288 for strength requirements, Table 1, Class 3, for grab strength.

(d) **Geotextile for Use in Stabilization:** These are geotextiles used in saturated and/or unstable conditions to provide the functions of separation and reinforcement.

1 **Subgrade Stabilization Fabric:**

Physical Property	Test Method	Requirements
Apparent opening size	ASTM D 4751	Max. No. 20 sieve

In addition to this requirement, the geotextile shall comply with the requirements of AASHTO M 288 for strength property requirements, Table 1, Class 3, for grab strength, tear strength, and puncture strength.

2 **Embankment Stabilization Fabric Up to 6 Feet High:**

Physical Property	Test Method	Requirements
Apparent opening size	ASTM D 4751	Max. No. 20 sieve
Seam strength	ASTM D 4632	90% specified grab strength

In addition to this requirement, the geotextile shall comply with the requirements of AASHTO M288 for strength property requirements, Table 1, Class 1 for grab strength, tear strength, and puncture strength.

(e) **Prefabricated Geocomposite Pavement Underdrain:** Prefabricated geocomposite pavement underdrain shall consist of a polymeric drainage core encased in a nonwoven filter fabric envelope having sufficient flexibility to withstand bending and handling without damage. Prefabricated geocomposite pavement underdrain shall conform to the following:

1 **Core:** The drainage core shall be made from an inert, polymeric material resistant to commonly encountered chemicals and substances in the pavement environment and shall have a thickness of not less than 3/4 inch.

Physical Properties	Test Method	Requirements
Compressive strength panel vertical strain and core area change	ASTM D1621/D2412	Min. 40 psi at 20% deflection
Panel vertical strain and core area change at 22.7 psi	ASTM D6244	Max. 10% for core area and panel height
Water flow rate)after 100 hr at 10 psi normal confining pressure gradient of no more than 0.1)	ASTM D4716	Min. 15 gal/min/ft width for 12-in specimen length

The core shall retain at least 75 percent of its ultimate strength when subjected to temperatures of 0 degree F and 125 degrees F, respectively, for a period of 24 hours.

2 **Filter Fabric:** Geotextile shall be bonded to and tightly stretched over the core. Geotextile shall not sag or block the flow channels, shall have a life equivalent to that of the core material, and shall conform to the requirements of (c) herein.

(f) **Geocomposite Wall Drains:** Geocomposite wall drains may be used as an alternative to porous backfill when permitted by the Engineer. Geocomposite wall drains will not be permitted for use with walls considered critical by the Engineer. Critical walls shall include walls over 15 feet in height and walls supporting bridge abutments or other structures on spread footings.

Prefabricated geocomposite wall drain shall consist of a polymeric drainage core encased in a nonwoven filter fabric envelope having sufficient flexibility to withstand bending and handling without damage. Geocomposite wall drains shall conform to the following:

1 **Core:** The drainage core shall be made from an inert, polymeric material resistant to commonly encountered chemicals and substances in the roadway.

Physical Property	Test Method	Requirements
Compressive strength at 20% deflection	ASTM D1621/D2412	Min. 40 psi
Water flow rate (after 100 hr at 10 psi normal confining pressure and gradient of no more than 0.1)	ASTM D4716	Min. 15 gal/min/ft width (for 12-in specimen length)

The core shall retain at least 75 percent of its ultimate strength when subjected to temperatures of 0 degree F and 125 degrees F for a period of 24 hours.

2 **Filter Fabric:** Geotextile shall be bonded to and tightly stretched over the core. Geotextile shall not sag or block the flow channels, shall have a life equivalent to that of the core material, and shall conform to the requirements of (c) herein.

(g) **Geomembrane Moisture Barrier:** Geomembrane moisture barrier shall be resistant to biological attack. Geomembrane shall be constructed of PVC, shall have a thickness of 30 mils, and shall conform to the requirements of the PVC Geomembrane Institute 1197 material specification for PVC geomembrane or shall conform to the following requirements:

Physical Property	Test Method	Requirements
Thickness	ASTM D5199	Min. 30 mils
Tensile (1-in strip)	ASTM D882	Min. 130 kip/ft
Tear (Die C)	ASTM D1004	Min. 200 lbf
Puncture	ASTM D4833	Min. 620 lbf

(h) **Dewatering Bag:** A nonwoven geotextile sewn together to form a bag that can be used in lieu of a de-watering basin for the purpose of filtering out suspended soil particles. The bag shall be capable of accommodating the water flow from the pump without leaking at the spout and seams.

Physical Property	Test Method	Requirements
Grab strength @ Elongation >50%(CRE/Dry)	ASTM D4632	Min. 250 lb (min)
Seam strength	ASTM D4632	90% Specified grab strength
Puncture	ASTM D4833	Min. 150 lb
Mullen burst	ASTM D3786	Min. 450 psi
Flow rate	ASTM D4491	Min. 0.189 ft3/sec/ft2(min)
Permittivity	ASTM D4491	Min. 1.2 sec-1
UV resistance	ASTM D4355	Min. 70% at 500 hr
AOS	ASTM D4751	Max. 100 sieve

(i) **Paving Geosynthetics:** Paving geosynthetics shall be used as an interlayer between pavement layers. Specific application of these paving geosynthetics shall be determined by the Engineer.

1. **Geotextile Paving Fabric:** The geotextile shall conform to the requirements of AASHTO M288 Paving Fabric Property Requirements, Section 9.
2. **Pavement Reinforcing Mat:** The geotextile shall meet the requirements of ASTM D7239 Geosynthetic Paving Mat, Type 1.