
PART 1 GENERAL**A. SCOPE:**

1. This work consists of furnishing for placement, geotextile material in drains, under embankments, for embankment reinforcement, under riprap, paving inlays, shear keys and erosion control applications, behind retaining structures, over roadbed subgrade, in trench foundation stabilization, and beneath pavement overlays, as shown on the Plans and as directed.

B. DEFINITIONS.

1. **GEOTEXTILE FABRIC** - Geotextile fabric is defined as a fabric manufactured specifically for use in civil engineering applications. Fibers used in the manufacture of geotextiles consist of long chain synthetic polymers. At least 85-percent by weight of the long chain polymers are polyolephins, polyesters, or polyamides.
 - a. **Drainage Geotextile** - For installation in subsurface drains or other drainage locations.
 - b. **Embankment Geotextile** - For installation within or under embankments for stabilization.
 - c. **Riprap Geotextile** - For installation behind and beneath riprap, buttresses, inlays, shear keys, and erosion control applications.
 - d. **Wall Geotextile** - For construction of retained earth walls.
 - e. **Subgrade Geotextile** - For installation on subgrade and in other material separation applications.
 - f. **Pavement Overlay Fabric** - For installation beneath an asphaltic cement overlay.
2. **MACHINE DIRECTION** - The long, or wrap, direction of the geotextile. The cross-machine, or fill, direction is perpendicular to the machine direction.
3. **NONWOVEN GEOTEXTILE** - A textile produced by bonding and/or interlocking of fibers by mechanical, heat, or chemical means.
4. **WOVEN GEOTEXTILE** - A textile comprising two or more sets of filaments or yarns interlaced in such a way that they result in a uniform pattern.
5. **ROLL** - Unit of continuous geotextile without transverse seams as furnished by the manufacturer. Roll sizes may vary between manufacturers and types of geotextiles.
6. **ROLL VALUES** - Roll values are as follows:

- a. **Average Roll Value** - The average roll value for each property is determined by testing a representative number of samples in a roll according to the test methods specified in Part 4 - Testing. An average of these tests becomes the average roll value for each roll tested.
 - b. **Minimum Roll Value** - The minimum average roll value for each property is the mean of the average roll values for all rolls tested minus 2 standard deviations, all as determined by the manufacturer. The minimum average roll value for each property is determined by testing a representative number of rolls in a production run according to ASTM D4354 sampling procedures and the test methods specified in Part 4 Testing.
 - c. **Minimum Value** - The minimum value is the specified value for each geotextile property that shall be met or exceeded by the manufacturer's minimum average roll value for the production run and, if sampled and tested by the average roll value for any roll.
7. **SEAM ALLOWANCE** - The minimum distance from the edge of a geotextile to the stitch-line nearest to that edge.
 8. **SEAM TYPE** - A designation relating to the essential characteristics of geotextile positioning and rows of stitching in a specified sewn seam as shown on the Plans
 9. **SELVAGE** - The finished edge of a geotextile parallel to the machine direction.
 10. **ULTRAVIOLET STABILITY** - The ability of a geotextile to resist deterioration when exposed to UV rays.
 11. **OTHER DEFINITIONS** - Other terms not defined in this section may be found in ASTM D123 and ASTM D4439.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS:

- A. The geotextile shall: Be composed of a polymeric yarn or fiber oriented into a stable network which retains its relative structure during handling, placement, and design service life.
- B. The geotextile shall;
 - Meet or exceed the properties specified in Table A-1.
 - Be free of any chemical treatment or coating which might significantly reduce permeability.
 - Have the selvage finished so the outer fibers are prevented from pulling away from the fabric.
 - Be free of defects or tears.
 - Be resistant to ambient temperatures, acid and alkaline conditions, microorganisms and insects.

2.2 ACCEPTANCE REQUIREMENTS:

- A. Base the actual minimum average roll values furnished by the manufacturer on representative test results from the manufacturing plant which produced the rolls, and shall meet or exceed each of the specified minimum values. Clearly label all rolls as being part of the same production run certified as meeting all applicable requirements.

2.3 FIELD SEAM STITCHING EQUIPMENT:

- A. Use field seam stitching equipment that provides an acceptable lock-type stitch as recommended by the geotextile manufacturer and approved by the Engineer.

2.4 GEOTEXTILE PROPERTY VALUES:

TABLE A-1

Geotextile Property	Test Method	Minimum Values							
		Drainage Geotextile (1)		Riprap Geotextile (1)		Subgrade Geotextile	Embankment Geotextile	Wall Geotextile (1)	Pavement Geotextile (1)
Grab tensile strength minimum in each principal direction	ASTM D 4632	Type 1	Type 2	Type 1	Type 2	180 lb	230 lb	---	80 lb
		80 lb	180 lb	200 lb	260 lb				
Grab Elongation	ASTM D 4632	15%		15%		---	---	---	50%
Burst strength, diaphragm method	ASTM D 3786 Mod.	130 psi	290 psi	320 psi	430 psi			---	---
Puncture strength	ASTM D 4833 or ASTM D 3787 Mod.	35 lb	80 lb	80 lb	110 lb	80 lb	110 lb	---	---
Apparent opening size (AOS), US Std. Sieve	ASTM D 4751	No. 70 sieve or smaller opening		No. 70 sieve or smaller opening		No. 30 sieve or smaller opening	No. 30 sieve or smaller opening	(2)	---
Water permeability	ASTM D 4491	0.1 cm/sec		0.1 cm/sec		0.005 cm/sec	0.005 cm/sec	(2)	---
Ultraviolet stability	ASTM D 4355	---		70% strength retained		---	---	70% strength retained	---
Wide strip tensile strength	ASTM D 4595	---		---		---	---	(2)	---
Asphalt retention	ODOT TM 817 (TF25, Method 3) (3)	---		---		---	---	---	0.20 gal/sy
Melting point	ASTM D 276	---		---		---	---	---	300° F

- (1) Silt film or silt tape fabrics are not acceptable.
(2) See Special Provisions for required minimum values.
(3) Task Force 25 test methods, developed by the ASTM Committee on geotextiles and INDA.

PART 3 EXECUTION**3.1 ACQUISITION AND STORAGE:**

- A. Provide complete rolls of geotextile as furnished by the Manufacturer and protect against damage and deterioration. Store all geotextile rolls in a dry place and off the ground at all times according to ASTM D 4873. Cover all rolls a partial rolls with a dark protective covering when

received at the project site. The geotextile will be rejected for use if the Engineer determines it has defects, deterioration, or has been damaged.

3.2 PLACEMENT:

A. SURFACE PREPARATION.

1. Prepare the surface receiving the geotextile to a smooth condition free of obstructions, depressions and debris unless otherwise directed. Do not drag the geotextile on the ground or mishandle in any way.
2. Loosely place the geotextile without wrinkles so placement of the overlying material will not tear the geotextile. Lap or sew the geotextile at the ends and sides of adjoining sheets as specified.

B. SLOPE PREPARATION.

1. Place the geotextile with the machine direction oriented up-down the slope. Lap the upper sheets over the top of the lower sheets. When the geotextile is placed on a slope steeper than 6:1, securely anchor the laps to the ground surface with pins or stakes as necessary to prevent slippage and tearing of the geotextile. Start placement of fill material on the geotextile at the toe of the slope and proceed upwards.

C. WHERE EXPOSED TO WATER.

1. If geotextiles are placed under water or in areas where water will flow, the geotextile may be placed with the machine direction parallel to the direction of water flow instead of the placement direction specified in paragraph (B)(1) "Slope Preparation". Overlap sheets so the upstream sheet is placed over the top of the downstream sheet. Adequately secure the geotextile to prevent slippage. As the geotextile is placed under water, place the backfill material on it to the required thickness. Do not place geotextile more than 50 feet ahead of the specified cover material.

3.3 OVERLAPS:

A. Minimum overlap requirements for geotextiles are:

<u>Geotextile Application</u>	<u>Minimum Overlap Requirements, (inches)</u>
> Drains	12
> Embankment Stabilization	24
> Geotextile Wall Barrier	24
> Pavement Overlays	12
> Riprap and Rock Buttresses	24
> Roadbed Subgrade Stabilization	24
> Pipe Trench Foundation Stabilization	12

B. If the Engineer determines the specified overlap is not sufficient, increase the overlap to provide adequate coverage or sew the geotextile together in the field. If sewn, reference subsection 2.3

"Field Seam Stitching Equipment", and subsection 3.4 "Field Seams".

3.4 FIELD SEAMS:

A. GENERAL.

1. Obtain the Engineer's approval before field seaming and stitching. Sew field seams with polymeric thread consisting of polypropylene, polyester or kevlar, and as resistant to deterioration as the geotextile being sewn.
2. Field seams shall otherwise conform to specifications in ODOT Manual, Section 00350.40.d (or latest revision).

3.5 PROTECTION OF GEOTEXTILE:

- A. Protect the geotextile at all times from ultraviolet (UV) rays, contamination by surface runoff, and construction activities.
- B. Traffic or construction equipment will not be permitted directly on the geotextile unless approved by the Engineer.
- C. When placed for construction, cover the geotextile with specified cover material as soon as possible. Do not leave in uncovered condition for more than 3 days except when used with temporarily retained earth walls and asphalt overlays.
- D. Place cover material on the geotextile in a manner that the geotextile is not torn, punctured, or shifted. Use a minimum 6-inches thick cover layer or twice the maximum aggregate size, whichever is thicker. End-dumping cover material directly on the geotextile will not be permitted.
- E. Limit construction vehicles in size and weight so rutting in the initial layer above the geotextile is not more than 3-inches deep or 1/2 the layer thickness, whichever is lesser. Turning of vehicles on the first layer will not be permitted.

3.6 REPAIR OF GEOTEXTILE:

- A. Repair or replace all torn, punctured, or contaminated geotextiles during construction at no cost to the Owner. Repair by placing a patch of the specified geotextile over the affected area. Overlap geotextiles in accordance with subsection 3.3 "Overlaps". Where geotextile seams are required to be sewn, repair any damaged sheet by sewing unless otherwise indicated on the Plans or Special Provisions.

3.7 DRAINAGE GEOTEXTILE:

- A. When used in trenches or drains, place the geotextile in the trench as shown on the Plans to loosely conform to the shape of the trench with no wrinkles or folds.

3.8 EMBANKMENT GEOTEXTILE:

- A. Construct embankment stabilization according to the details as shown on the Plans. Place the geotextile layers so the geotextile machine direction is transverse to the embankment centerline. Spread the geotextile so all slack wrinkles are eliminated.

3.9 RIPRAP GEOTEXTILE:

- A. Place geotextile behind and beneath riprap, buttresses, inlays, shear keys, and erosion control applications according to the details as shown. Demonstrate to the satisfaction of the Engineer that the combination of the rock fill drop height and thickness of any aggregate cushion, when specified or required, are adequate to not puncture or damage the geotextile when placing the riprap or stone embankment material. In addition, the following limits apply:

<u>Size of Rock</u>	<u>Maximum Drop Height (ft.)</u>	
	<u>Onto Geotextile</u>	<u>On Aggr. Cushion Blanket</u>
Greater than 200 lb (Class 200)	0	3
200 lb (Class 200) or less	3	3

- B. After placing the riprap, backfill all voids in the riprap face so the geotextile is completely covered and not visible.

3.10 MEASUREMENT AND PAYMENT:

- A. When specified in the Form of Proposal as a bid item, geotextile and/or fabric shall be field measured and paid to the nearest 0.1 SY.

3.11 SUBMITTAL REQUIREMENTS:

- A. Submit the following as a minimum.
1. Minimum average roll values for each of the specified properties from the production run as the delivered material.
 2. Production run number, production plant name and location.

PART 4 TESTING

4.1 MANUFACTURER'S SAMPLING AND TESTING:

- A. The Engineer, at his discretion, may require to sample and test products for compliance with pertinent requirements.
- B. The entire production run will be accepted or rejected, based on the out come of the test results.
- C. The Manufacturer's reported property values shall be based on the following sampling and testing requirements:

1. **SAMPLING** - Sample all geotextiles according to ASTM D4354. The production unit used for sampling shall be a roll.

2. **TESTING** - Perform specified tests to determine geotextile properties for the intended application(s). Test the tensile strength requirements in both machine and cross-machine directions.

END OF SECTION