

## SECTION 02340

### GEOTEXTILE FABRICS AND MEMBRANES

#### PART 1 - Description

This section covers furnishing and placing geotextiles as shown on the plans or directed, in accordance with these specifications. The geotextile usage will determine the applicable specifications and the corresponding pay item.

#### PART 2 - Materials

A. The geotextile shall consist only of woven or non-woven, long-chain polymeric filaments or yarns such as polyethylene, polyester, polypropylene, polyamide, or polyvinylidene chloride formed into a stable network such that the filaments or yarns retain their relative positions to each other.

#### B. Membrane Requirements

Geotextile and Impermeable Plastic Membrane Specifications								
Fabric and Membrane Property	Test Method	Drainage And Filtration	Erosion Control	Silt Fence	Separation & Stabilization		Embankment & Retaining Wall Reinforcement	Impermeable Plastic Membrane
					Woven	Non-Woven		
*EOS (mm)	ASTM D4751	40-70	40-100	40-100	30-50	40-100	30-70	-----
Thickness, Mils (mm)	ASTM D5199	-----	-----	-----	-----	-----	-----	12 (0.305)
Permittivity, cm/sec	ASTM D5199	1.0	1.0	0.1	0.05	1.0	0.05	<10 <sup>-7</sup> cm/sec
Grab Tensile Strength	ASTM D4632	90	180	90	200	160	300	150
Elongation at Failure% Min	ASTM D4533	40	40	50	15	40	15	20
Trap Tear Strength, lbs	ASTM D4833	40	70	50	65	60	110	50
Puncture Strength, lbs	ASTM D4632	50	90	60	90	80	110	60

\*Equivalent or Apparent Opening Size, U.S. Standard Sieve (mm)

## **PART 3 – Execution for Stabilization Fabric**

### **3.01 Equipment**

- A. Equipment loads when placing and compacting the material placed over the stabilization geotextiles shall comply with the following:
1. Maximum wheel load shall be 9,945 pounds (4500 kg), or as specified.
  2. Maximum contact pressure shall be 60 psi (400kPa). The contact pressure is calculated from the applied wheel load in newtons and the resulting contact area in square meters.
  3. Rutting in excess of three inches (3”) (75mm) will not be allowed. Equipment loads are to be lightened if this occurs. Ruts shall be repaired by filling the ruts with additional material.

### **3.02 Construction Requirements.**

- A. The geotextile shall be lapped at the ends and sides of adjoining sheets unless shown otherwise on the plans or described herein. Geotextile that is joined by sewing shall have strength properties at the seam equal to the specified strength requirements of the geotextile. All seams shall be exposed for ease of inspection. High-strength polyester, polypropylene or kevlar thread shall be used for sewn seams. Nylon threads shall not be used. Overlapping J seams and double sewing are required for field seams.
- B. Gravel, pit run base course, sand, or other specified material shall be placed on the geotextile so that it is not torn, punctured, or shifted. Maximum pile heights of materials shall be limited to prevent geotextile distortion. Any geotextile that is torn or punctured shall be repaired. The repair shall consist of a patch of the same type of geotextile placed over the ruptured area and overlapped a minimum of three feet (3’) (1m) from the edge of any part of the rupture, or a sewn patch with the same requirements for seam strength as that of the geotextile being repaired.
- C. Pegs or pins, as approved by the Engineer, may be used to hold the geotextile for embankment erosion control in place until the specified cover material has been placed. Pegs or pins shall not be used for other types of geotextile installations without approval of the Engineer. If such approval is given, pegs or pins shall be used only at locations that are not detrimental to the finished product.
- D. When geotextile is used for foundation stabilization, the following criteria shall govern:
1. The cover material shall be placed over the geotextile in 1-foot (0.3m)+/- lifts.
  2. Equipment shall not be operated directly on the geotextile. The minimum left thickness shall be maintained at all times.

3. The cover material shall be compacted with a roller or other equipment as approved by the Engineer.
  4. Prior to the installation of geotextile, the subgrade shall be leveled and smoothed to remove ruts, depressions, or humps, which exceed four inches (4") (100mm). The surface also shall be free of rocks, stumps, roots, brush, limbs, or other objects that might tear or puncture the geotextile or result in geotextile wear.
- E. During periods of shipment and storage, the geotextile shall be enclosed in heavy duty wrapping to protect it from direct sunlight, ultraviolet rays, temperatures greater than 140°F (60°C), mud, dirt, dust, and debris. Any geotextile left unprotected shall be removed from the project.
- F. The product name, type of material and the lot or batch identification shall be clearly labeled on each roll.
- G. Except for geotextile used for erosion control and silt fence, the cover material shall be placed over the fabric within five (5) days.
- H. Test results, with a certification by the manufacturer showing the geotextile performance in regard to the material requirements of this specification, shall be submitted to the Engineer. At least two weeks before the use of any geotextile, a sample six feet (6') (2 m) in length by the full width of the roll shall be submitted to the Engineer. The sample shall be labeled with the product name, machine direction, the lot and batch number, date of sampling, project number, and certification of compliance with the material specifications. If sewing is specified, a seam sample also shall be submitted to the Engineer. The sample sewn section shall be six feet (6') (2 m) by three feet (3') (1 m) with the seam in the center and parallel to the six feet (6') (2 m) length.

### 3.03 Installation

- A. The geotextile shall be laid smooth without wrinkles or folds on the prepared subgrade in the direction of construction traffic. Adjacent geotextile rolls shall be overlapped, sewn, or joined as required in the plans. Overlaps shall be in the direction as shown on the plans. See table below for overlap requirements.

Stabilization Fabric

Soil CBR	Method of Joining
Greater than 3	300 - 450 mm (12 - 18 in) overlap
1 - 3	600 - 1000 mm (24 - 40 in) overlap
0.5 - 1	1000 mm (40 in) overlap or sewn
Less than 0.5	Sewn
All roll ends	1000 mm (40 in) overlap or sewn

- B. On curves, the geotextile may be folded or cut to conform to the curves. The fold or overlap shall be in the direction of construction and held in place by pins, staples, or piles of fill or rock.
- C. Prior to covering, the geotextile shall be inspected by a certified inspector of the Engineer to ensure that the geotextile has not been damaged during installation. Damaged geotextiles, as identified by the Engineer, shall be repaired immediately. Cover the damaged area with a geotextile patch which extends an amount equal to the required overlap beyond the damaged area.
- D. The subbase shall be placed by end dumping onto the geotextile from the edge of the geotextile, or over previously placed subbase aggregate. On soils with  $CBR > 3$ , most rubber-tired vehicles can be driven at slow speeds, less than 10 mph (16 km/h) and in straight paths over the exposed geotextile without causing damage to the geotextile. Sudden braking and sharp turning should be avoided. Tracked construction equipment should not be operated directly upon the geotextile. A minimum fill soil thickness of 6 in (15cm) is required prior to operation of tracked vehicles over the geotextile. Turning of tracked vehicles should be kept to a minimum to prevent tracks from displacing the fill and damaging the geotextile. Turning of vehicles shall not be permitted on the first lift above the geotextile.
- E. On subgrades having a CBR value of less than 1, the subbase aggregate should be spread in its full thickness as soon as possible after dumping to minimize the potential of localized subgrade failure due to overloading of the subgrade.
- F. Any ruts occurring during construction shall be filled with additional subbase material, and compacted to the specified density.
- G. If placement of the backfill material causes damage to the geotextile, the damaged area shall be repaired as previously described above. The placement procedure shall then be modified to eliminate further damage from taking place.

**END OF SECTION**