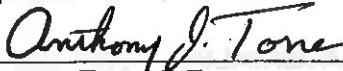


SUPERSEDED BY EC 13-015 EFFECTIVE 1/9/14		New York State Department of Transportation ENGINEERING INSTRUCTION	EI 11-019								
Title: SECTION 737 – GEOSYNTHETICS											
Target Audience: <table border="0"> <tr> <td>☐ Manufacturers (18)</td> <td>☐ Surveyors (33)</td> </tr> <tr> <td>☒ Local Govt. (31)</td> <td>☒ Consultants (34)</td> </tr> <tr> <td>☒ Agencies (32)</td> <td>☒ Contractors (39)</td> </tr> <tr> <td>☐ _____ ()</td> <td></td> </tr> </table>		☐ Manufacturers (18)	☐ Surveyors (33)	☒ Local Govt. (31)	☒ Consultants (34)	☒ Agencies (32)	☒ Contractors (39)	☐ _____ ()		Approved:  Anthony Torre, P.E. Acting Deputy Chief Engineer (Research) 10/03/2011 Date	
☐ Manufacturers (18)	☐ Surveyors (33)										
☒ Local Govt. (31)	☒ Consultants (34)										
☒ Agencies (32)	☒ Contractors (39)										
☐ _____ ()											

ADMINISTRATIVE INFORMATION:

- This Engineering Instruction (EI) is effective beginning with projects submitted for the letting of May 3, 2012.
- This EI modifies EI 10-025.
- The revisions issued with this EI will be incorporated into the next update of the Standard Specifications.

PURPOSE: The purpose of this EI is to revise Section 737 Geosynthetics; specifically to revise the material requirements for §737-01 *Geotextiles* and issue the new §737-09 *Geosynthetic Fibers*.

TECHNICAL INFORMATION:

Silt Fences:

- Note 1 in Table 737-01G was amended to provide the required strength of the additional support element for supported silt fence installations, particularly the strength of the prefabricated polymeric mesh.
- A silt fence utilizes either a woven or non-woven geotextile, which may either include an additional support element or be unsupported when installed in the silt fence application.
- Unsupported silt fence geotextile has a minimum strength requirement of 123 lbs force in the Machine Direction (MD) and a minimum strength requirement of 101 lbs force in the Cross-Machine Direction (XD).
- To determine the allowable post spacing for an unsupported silt fence, the geotextile's percent elongation is determined following ASTM D4632. If the percent elongation is less than 50%, the post spacing can be up to 6.5 feet apart. However, if the percent elongation is equal to or greater than 50%, the post spacing can be no more than 4.0 feet.
- Geotextiles which fail to meet the strength requirements for unsupported silt fence but achieve a minimum grab strength of 90 lbf in both the Machine Direction (MD) and the Cross-Machine Direction (XD) can be used as silt fence but an additional support element is required to be installed in the assembly. Supported silt fence shall consist of either 14 gage steel wire with a mesh spacing of 6 in. x 6 in. or prefabricated polymeric mesh.
- The Department maintains an Approved List for Geotextiles, under Geosynthetics for Highway Construction at: <https://www.dot.ny.gov/divisions/engineering/technical-services/technical-services-repository/alme/pages/470-1a.html>, which identifies approved silt fence geotextiles.

Geosynthetic Fibers:

- §737-09 *Geosynthetic Fibers* is being added to provide the material requirements for geosynthetic fibers.

- Geosynthetic fibers are expandable polypropylene strands that, when mixed with soils, have shown the ability to somewhat increase its bearing capacity and shear strength. Typical mixtures vary between 0.1 and 0.4% by weight.

IMPLEMENTATION:

- The Main Office Design Quality Assurance Bureau will insert these standard specification revisions into contract proposals beginning with projects submitted for the letting of May 3, 2012.

TRANSMITTED MATERIALS: This EI transmits material requirement revisions to Standard Specification Section 737 Geosynthetics. Both Metric and U.S. Customary revisions are attached.

BACKGROUND: The general term geosynthetics encompasses the subfamilies of geotextiles, geogrids, geocells, geocomposites, and geomembranes. Various construction practices incorporate geosynthetics to take advantage of their properties and ease of installation. Geosynthetics have six primary functions: filtration, drainage, separation, reinforcement, fluid barrier, and protection. The type of geosynthetic used on a particular project will depend on its intended primary function in the installation, and thus its critical properties.

Silt Fences:

A silt fence is a geotextile used as a temporary structure to remove suspended particles from runoff water from construction sites. The silt fence installation attempts to maximize flow of water through the geotextile, while retaining the maximum amount of sediment.

Geosynthetic Fibers:

Geosynthetic fibers are expandable polypropylene strands used to stabilize soils.

REFERENCES: Further information on geosynthetic fibers may be found in such sources as:

1. Engineering Properties of Sand-Fiber Mixtures for Road Construction
Journal of Geotechnical and Geoenvironmental Engineering, Vol. 127, No. 3, March 2001
2. California Bearing Ratio Improvement of Remolded Soils by the Addition of Polypropylene Fiber Reinforcement
Transportation Research Record 1295, 1991
3. Strength and Deformation Properties of Soils Reinforced with Fibrillated Fibers
Technical Notes, Geotechnical International, Vol. 4, No. 1, 1997
<http://www.geosyntheticssociety.org/Resources/Archive/GI/src/V4I1/GI-N4-N1-Paper5.pdf>
4. Final Report: The Use of Geofiber and Synthetic Fluid for Stabilizing Marginal Soils
University of Fairbanks, Alaska
INE Project Number: RR07.03
October 1, 2007
http://ine.uaf.edu/autc/files/2011/02/INE_AUTC_RR07_03.pdf
5. Fiber Reinforcement for Rapid Stabilization of Soft Clay Soils
Transportation Research Board of National Academies
Transportation Research Record; ISSN 0361-1981; Volume 2026 / 2007
<http://trb.metapress.com/content/3054213662612k61/fulltext.pdf>
6. Building Roads on Soft and Sandy Soils
Army Engineer Research and Development Center
Geotechnical and Structures Laboratory, Vicksburg, Mississippi
<http://www.almc.army.mil/alog/issues/JanFeb02/MS698.htm>

El 11-019 Page 3 of 3

CONTACT: Questions or comments regarding this issuance should be directed to Randall J. Romer, P.E., of the Geotechnical Engineering Bureau at (518) 457-4714, or via e-mail at rromer@dot.state.ny.us. Questions or comments regarding the technical aspects of the revision to the Standard Specification should be directed to James Curtis, of the Geotechnical Engineering Bureau at (518) 457-4735, jcurtis@dot.state.ny.us.

SECTION 737 – GEOSYNTHETICS

Make the following changes to the Standard Specifications dated May 4, 2006 as modified by EI 10-025:

Delete §737-01 Geotextiles; Material Requirements; “*G. Silt Fence*” entirely and **Replace** it with the following:

G. Silt Fence. Silt fences shall meet the requirements of Table 737-01G.

Table 737-01G Silt Fence Requirements									
Application	Geotextile Structure	Minimum Strength Class Requirements						Silt Fence Class Requirements	
		Max. Post Spacing (m)	Percent Elongation (%)	Grab Strength (N)	Orientation ³	Fence Between Posts	Designation	Class	Apparent Opening Size (maximum)
Silt Fence	Any type listed in §737-01 Scope	1.2	NA	400	MD	Supported ¹	s	NA	Sieve Size (mm)
					XD			(X)	Sieve Design.
		1.2	≥ 50% ²	550	MD	Unsupported	us 1.2	0.6	No. 30
				450	XD				
		2.0	< 50% ²	550	MD	Unsupported	us 2		
				450	XD				Minimum Permittivity (sec ⁻¹)

Table 737-01G Notes:

- ¹ Silt fence support shall consist of either 14 gage steel wire with a mesh spacing of 150 mm x 150 mm or prefabricated polymeric mesh with a minimum ultimate tensile strength of 2920 N/m in both machine and cross machine directions measured in accordance with ASTM D6637.
- ² As measured in accordance with ASTM D4632.
- ³ MD = Machine Direction, XD = Cross-Machine Direction.

SECTION 737 – GEOSYNTHETICS

Add the following:

737-09 GEOSYNTHETIC FIBERS

SCOPE. This specification covers the material requirements and methods of testing geosynthetic fibers used in highway construction.

GENERAL. Submit the geosynthetic fiber material certification with the material. Include in the certification the geosynthetic fiber manufacturer's name, the geosynthetic fiber name, the test lot number, the polypropylene percentage, fiber length, specific gravity, carbon black content, tensile strength, tensile elongation and Young's modulus.

MATERIAL REQUIREMENTS. Geosynthetic fibers shall consist of fibrillated polypropylene strands and shall be tested and certified to meet the minimum requirements listed in Table 737-09 *Geosynthetic Fiber Requirements*.

TABLE 737-09 GEOSYNTHETIC FIBER REQUIREMENTS		
Property	Test Method	Requirement
Polypropylene	ASTM D4101 Group 1/ Class 1/ Grade 2	99.4 % minimum
Fiber Length	Measured	25 mm
Specific Gravity	ASTM D792	0.91 gr/cm ³
Carbon black Content	ASTM D1603	0.6 % minimum
Tensile Strength	ASTM D2256	311 MPa minimum
Tensile Elongation	ASTM D2256	15 % maximum
Young's Modulus	ASTM D2101	4827 MPa minimum

BASIS OF ACCEPTANCE. Geosynthetic fibers will be accepted on the basis of

1. A material certification identifying:
 - a. The geosynthetic fiber manufacturer's name,
 - b. The geosynthetic fiber name,
 - c. The test lot number,
 - d. The polypropylene percentage,
 - e. The fiber length,
 - f. The specific gravity,
 - g. The carbon black content,
 - h. The tensile strength,
 - i. The tensile elongation, and
 - j. Young's modulus.
2. An evaluation that the information on the material certification meets the minimum requirements for the geosynthetic fiber stated in Table 737-09 *Geosynthetic Fiber Requirements* and the contract documents.

SECTION 737 – GEOSYNTHETICS

Make the following changes to the Standard Specifications dated May 1, 2008 as modified by EI 10-025:

Delete §737-01 Geotextiles; Material Requirements, “G. Silt Fence” entirely and **Replace** it with the following:

G. Silt Fence. Silt fences shall meet the requirements of Table 737-01G.

Table 737-01G Silt Fence Requirements											
Application	Geotextile Structure	Minimum Strength Class Requirements						Silt Fence Class Requirements			
		Max. Post Spacing (ft.)	Percent Elongation (%)	Grab Strength (lbf)	Orientation ³	Fence Between Posts	Designation	Class	Apparent Opening Size (maximum)		Minimum Permittivity (sec ⁻¹)
Silt Fence	Any type listed in §737-01 Scope	4.0	NA	90	MD	Supported ¹	s	NA (X)	0.0234	No. 30	0.05
					XD						
		4.0	≥ 50% ²	123	MD	Unsupported	us 4.0				
					XD						
		6.5	< 50% ²	123	MD	Unsupported	us 6.5				
					XD						
				101							

Table 737-01G Notes:

- ¹ Silt fence support shall consist of either 14 gage steel wire with a mesh spacing of 6 in. x 6 in. or prefabricated polymeric mesh with a minimum ultimate tensile strength of 200 lb/ft in both machine and cross machine directions measured in accordance with ASTM D6637.
- ² As measured in accordance with ASTM D4632.
- ³ MD = Machine Direction, XD = Cross-Machine Direction.

SECTION 737 – GEOSYNTHETICS

Add the following:

737-09 GEOSYNTHETIC FIBERS

SCOPE. This specification covers the material requirements and methods of testing geosynthetic fibers used in highway construction.

GENERAL. Submit the geosynthetic fiber material certification with the material. Include in the certification the geosynthetic fiber manufacturer's name, the geosynthetic fiber name, the test lot number, the polypropylene percentage, fiber length, specific gravity, carbon black content, tensile strength, tensile elongation and Young's modulus.

MATERIAL REQUIREMENTS. Geosynthetic fibers shall consist of fibrillated polypropylene strands and shall be tested and certified to meet the minimum requirements listed in Table 737-09 *Geosynthetic Fiber Requirements*.

TABLE 737-09 GEOSYNTHETIC FIBER REQUIREMENTS		
Property	Test Method	Requirement
Polypropylene	ASTM D4101 Group 1/ Class 1/ Grade 2	99.4 % minimum
Fiber Length	Measured	1 inch
Specific Gravity	ASTM D792	0.033 lb/in ³
Carbon black Content	ASTM D1603	0.6 % minimum
Tensile Strength	ASTM D2256	45 ksi minimum
Tensile Elongation	ASTM D2256	15 % maximum
Young's Modulus	ASTM D2101	700 ksi minimum

BASIS OF ACCEPTANCE. Geosynthetic fibers will be accepted on the basis of

1. A material certification identifying:
 - a. The geosynthetic fiber manufacturer's name,
 - b. The geosynthetic fiber name,
 - c. The test lot number,
 - d. The polypropylene percentage,
 - e. The fiber length,
 - f. The specific gravity,
 - g. The carbon black content,
 - h. The tensile strength,
 - i. The tensile elongation, and
 - j. Young's modulus.
2. An evaluation that the information on the material certification meets the minimum requirements for the geosynthetic fiber stated in Table 737-09 *Geosynthetic Fiber Requirements* and the contract documents.