



**Recyclex® TRM  
TURF REINFORCEMENT MAT  
SPECIFICATION**

**PART I - GENERAL**

**1.01 Summary**

- A. The Turf Reinforcement Mat (TRM) contains post-consumer recycled polyester fiber for the purpose of erosion control and revegetation as described herein.
- B. This work shall consist of furnishing and installing the TRM; including fine grading, installing TRM, stapling, and miscellaneous related work, in accordance with these standard specifications and at the locations identified on drawings or designated by the owner’s representative. This work shall include all necessary materials, labor, supervision, and equipment for installation of a complete system.
- C. All work of this section shall be performed in accordance with the conditions and requirements of the contract documents.
- D. The TRM shall be used to prevent surface erosion and enhance revegetation. Based on a project-by-project engineering analysis, the TRM shall be suitable for the following applications:
  - 1. Slope protection
  - 2. Channel and ditch linings
  - 3. Reservoir embankments and spillways
  - 4. Culvert inlets and outfalls
  - 5. Dikes, levees, and riverbanks

**1.02 Performance Requirements**

- A. TRM shall provide a permanent cover material to reduce slope and/or channel erosion and enhance revegetation. TRM performance capabilities shall be determined by ASTM D 6459, “Determination of Erosion Control Blanket (ECB) Performance in Protecting Hillslopes from Rainfall-Induced Erosion”, and ASTM D 6460, “Determination of Erosion Control Blanket (ECB) Performance in Protecting Earthen Channels from Stormwater-Induced Erosion.”

- B. TRM performance requirements:

Slopes:	≤ .5H:1V
C factor:	.022
Shear Stress:	10.0+ lb/ft <sup>2</sup> (480+ Pa)
Velocity:	17.0+ ft/sec (5.2+ m/sec)
Functional Longevity:	Permanent



### 1.03 Submittals

- A. Submittals shall include complete design data, Product Data Sheets, Product Netting Information, SDS, Staple Pattern Guides, Installation Guidelines, Manufacturing Material Specifications, Manufacturing Certifications, CAD details, and a Manufacturing Quality Control Program. In addition, the Manufacturer shall provide a test report providing data showing the performance capabilities of the TRM along with reference installations similar in size and scope to that specified for the project.

### 1.04 Delivery, Storage, and Handling

- A. TRM shall be furnished in rolls and wrapped with suitable material to protect against moisture intrusion and extended ultraviolet exposure prior to placement.
- B. TRM shall be of consistent thickness with fibers distributed evenly over the entire area of the TRM.
- C. TRM shall be free of defects and voids that would interfere with proper installation or impair performance.
- D. TRM shall be stored by the Contractor in a manner that protects them from damage by construction activities.

## PART II - PRODUCTS

### 2.01 Turf Reinforcement Mat

- A. TRM shall be Recyclex TRM, as manufactured by American Excelsior Company, Arlington, TX (1-866-9FIBERS).
- B. Recyclex TRM, non-degradable Turf Reinforcement Mat, consists of 100% post-consumer recycled polyester (green or brown bottles) with 80% of fibers  $\geq 5$  inches in length. It is of consistent thickness with fibers evenly distributed throughout the entire area of the TRM. The top of each TRM shall be covered with extra heavy duty black netting and the bottom with heavy duty black netting. Fibers shall be tightly crimped and curled to allow fiber interlock and to retain 95% memory of the original shape after loading by hydraulic events. Fibers shall have a specific gravity of greater than 1.0; therefore, the TRM will not float during hydraulic events. Recyclex TRM shall meet Federal Government Executive Order initiatives for use of products made from, or incorporating, recycled goods. Recyclex TRM shall be manufactured in the U.S.A. and the fibers shall be made from 100% recycled post-consumer goods.



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C. TRM shall have the following material characteristics:

<b>Width</b>		8.0 ft (2.4 m)	16 ft (4.9 m)
<b>Length</b>		90.0 ft (27.4 m)	90.0 ft (27.4 m)
<b>Area</b>		80.0 yd <sup>2</sup> (66.9 m <sup>2</sup> )	160.0 yd <sup>2</sup> (133.8 m <sup>2</sup> )
<b>Weight</b>		50.0 lb (22.7 kg)	100.0 lb (45.4 kg)
<b>Fiber Length (80% min.)</b>		≥5.0 in (≥12.7 cm)	≥5.0 in (≥12.7 cm)
<b>Mass per Unit Area (± 10%)</b>		0.625 lb/yd <sup>2</sup> (0.34 kg/m <sup>2</sup> )	0.625 lb/yd <sup>2</sup> (0.34 kg/m <sup>2</sup> )
<b>Net Openings</b>	<b>Polypropylene Top</b>	0.75 in x 1.0 in (19.1 mm x 25.4 mm)	0.75 in x 1.0 in (19.1 mm x 25.4 mm)
	<b>Polypropylene Bottom</b>	0.75 in x 0.75 in (19.1 mm x 19.1 mm)	0.75 in x 0.75 in (19.1 mm x 19.1 mm)

### TYPICAL INDEX VALUES

<b>Index Property</b>	<b>Test Method</b>	<b>Value</b>
Thickness	ASTM D 6525	0.371 in (9.4 mm)
Light Penetration	ECTC Procedure	55%
Resiliency	ASTM D 6524	85%
Mass per Unit Area	ASTM D 6566	0.63 lb/yd <sup>2</sup> (0.342 kg/m <sup>2</sup> )
MD-Tensile Strength Max.	ASTM D 6818	387.6 lb/ft (5.66 kN/m)
TD-Tensile Strength Max.	ASTM D 6818	340.8 lb/ft (4.97 kN/m)
MD-Elongation	ASTM D 6818	21.2%
TD-Elongation	ASTM D 6818	20.3%
Swell	ECTC Procedure	26%
Water Absorption	ASTM D 1117/ECTC	20%
Specific Gravity	ASTM D 792	1.28
UV Stability	ASTM D 4355 (1,000 hr)	90% minimum
Porosity	Calculated	97.6%
Bench-Scale Rain Splash	ASTM D 7101	SLR = 6.17 @ 2 in/hr <sup>a,b</sup>
Bench-Scale Rain Splash	ASTM D 7101	SLR = 5.90 @ 4 in/hr <sup>a,b</sup>
Bench-Scale Rain Splash	ASTM D 7101	SLR = 5.63 @ 6 in/hr <sup>a,b</sup>
Bench-Scale Shear	ASTM D 7207	2.84 lb/ft <sup>2</sup> @ 0.5 in soil loss <sup>b</sup>
Germination Improvement	ASTM D 7322	525.6%

<sup>a</sup> SLR is the Soil Loss Ratio, as reported by NTPEP/AASHTO. <sup>b</sup> Bench-scale index values should not be used for design purposes.

### 2.02 Staples

- A. Staples shall be U-shaped, 11 gauge steel wire and shall be 1 inch wide by 6 inches long, or 2 inches wide by 8 inches long.

## PART III - EXECUTION

### 3.01 TRM Supplier Representation

- A. Contractor shall coordinate with the TRM supplier for a qualified representative to be present at the job site on the start of installation to provide technical assistance as needed. Contractor shall remain solely responsible for the quality of installation.



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### 3.02 Site Preparation

- A. Before placing TRM, the Contractor shall certify that the subgrade has been properly compacted, graded smooth, has no depressions, voids, soft or uncompacted areas, is free from obstructions such as tree roots, protruding stones or other foreign matter, and is seeded and fertilized according to project specifications. The Contractor shall not proceed until all unsatisfactory conditions have been remedied. By beginning construction, Contractor signifies that the preceding work is in conformance with this specification.
- B. Contractor shall fine grade the subgrade by hand dressing where necessary to remove local deviations.
- C. No vehicular traffic shall be permitted directly on the TRM.

**NOTE: Topsoiling, seeding, and fertilizing is not included in this specification.**

### 3.03 Slope Installation

- A. TRM shall be installed as directed by the owner's representative in accordance with manufacturer's Installation Guidelines, Staple Pattern Guides, and CAD details. The extent of TRM shall be as shown on the project drawings.
- B. TRM shall be orientated in vertical strips and anchored with staples, as identified in the Staple Pattern Guide. Adjacent strips shall be overlapped to allow for installation of a common row of staples that anchor through the nettings of both TRMs. Horizontal joints between TRMs shall be sufficiently overlapped with the uphill end on top for a common row of staples so that the staples anchor through the nettings of both TRMs.
- C. Where exposed to overland sheet flow, a trench shall be located at the uphill termination. TRM shall be stapled to the bottom of the trench. The trench shall be backfilled and compacted. Where feasible, the uphill end of the TRM shall be extended three feet over the crest of the slope.
- D. Slope TRM shall be overlapped by the channel TRM sufficiently for a common row of staples to anchor through the nettings of both products when terminating into a channel.

### 3.04 Channel Installation

- A. TRM shall be installed as directed by the owner's representative in accordance to manufacturer's Installation Guidelines, Staple Pattern Guides, and CAD details. The extent of TRM shall be as shown on the project drawings.
- B. TRM shall be installed parallel to the flow of water. The first roll shall be centered longitudinally in mid-channel and anchored with staples as identified in the Staple Pattern Guide. Subsequent rolls shall follow from channel center outward and be overlapped to allow installation of a common row of staples so that the staples anchor through the nettings of both TRMs.
- C. Successive lengths of TRM shall be overlapped sufficiently for a common row of staples with the upstream end on top. Staple the overlap across the end of each of the overlapping lengths so that staples anchor through the nettings of both TRMs.



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- D. A termination trench shall be located at the upstream termination. TRM shall be stapled to the bottom of the trench. The trench shall be backfilled and compacted.

### **3.05 Quality Assurance**

- A. TRM shall not be defective or damaged. Damaged or defective materials shall be replaced at no additional cost to the owner.
- B. Product shall be manufactured in accordance to a documented Quality Control Program. At a minimum, the following procedures and documentation shall be provided upon request:
  1. Manufacturing Quality Control Program Manual
  2. First piece inspection of products produced to assure component materials and finished product tolerances are within manufacturer specifications.
  3. Additional inspections for product conformance shall be conducted during the run after the first piece inspection.
  4. Every roll shall be visually inspected.
  5. Additional inspections for product conformance shall be conducted during the run after the first piece inspection.
  6. At a minimum, every third roll shall be weighed to insure conformance of manufacturers specifications.
  7. Each individual erosion control blanket shall be inspected prior to packaging for conformance to manufacturing specifications.

### **3.06 Clean-up**

- A. At the completion of this scope of work, Contractor shall remove from the job site and properly dispose of all remaining debris, waste materials, excess materials, and equipment required of or created by Contractor. Disposal of waste materials shall be solely the responsibility of Contractor and shall be done in accordance with applicable waste disposal regulations.

### **3.07 Method of Measurement**

- A. The TRM shall be measured by the square yard of surface area covered. No measurement for payment shall be made for overlaps, fine grading, trenching, staples, or other miscellaneous materials necessary for placement of the erosion control TRM.



**3.08 Basis of Payment**

- A. The accepted quantities of TRM shall be paid for at the contract unit price per square yard, complete in place.

Payment shall be made under:

**Pay Item**

Turf Reinforcement Mat

**Pay Unit**

Square Yards

Disclaimer: Recyclax is a system for erosion control and revegetation on slopes and channels. American Excelsior Company (AEC) believes that the information contained herein to be reliable and accurate for use in erosion control and re-vegetation applications. However, since physical conditions vary from job site to job site and even within a given job site, AEC makes no performance guarantees and assumes no obligation or liability for the reliability or accuracy of information contained herein for the results, safety, or suitability of using Recyclax, or for damages occurring in connection with the installation of any erosion control product whether or not made by AEC or its affiliates, except as separately and specifically made in writing. These specifications are subject to change without notice.



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