

ROLLED EROSION CONTROL PRODUCTS (RECP)

SCDOT Designation: SC-M-815-9 (07/17)

1.0 Rolled Erosion Control Products (RECP)

This Supplemental Specification replaces sections 815.1.1.1, 815.2.1, 815.4.2, 815.5, and 815.6 for Rolled Erosion Control Products in the *South Carolina Department of Transportation Standard Specifications for Highway Construction*, 2007 Edition. This Supplemental Specification shall be considered the latest version of SC-M-815-9 as of April 1, 2016.

1.1 Description

1.1.1 Temporary Erosion Control Blankets (ECB)

Temporary erosion control blankets are designated on the Plans or by the Resident Construction Engineer (RCE). The following criteria are followed to select the type of temporary erosion control blanket utilized.

- Install temporary erosion control blankets on slopes **2.0H:1V** or flatter only. For slopes greater than **2.0H:1V** use turf reinforcement matting (TRM).
- Install temporary erosion control blankets in channels or concentrated flow areas with a maximum calculated design shear stress less than or equal to **1.75 lb/ft²**. For channels and concentrated flow areas with design shear stresses greater than **1.75 lb/ft²** use turf reinforcement matting (TRM).

1.1.2 Turf Reinforcement Matting (TRM)

Use turf reinforcement matting (TRMs) in hydraulic applications, such as high flow ditches and channels, steep slopes, stream banks, and shorelines, where erosive forces may exceed the limits of natural, unreinforced vegetation or in areas where limited vegetation establishment is anticipated.

Turf reinforcement matting is designated on the Plans or by the Resident Construction Engineer (RCE). The following criteria are followed to select the type of TRM utilized.

- Install a TRM **Type 1** on slopes **2.0H:1V** or flatter or in channels where the calculated design shear stress is **4.0 lb/ft²** or less.
- Install a TRM **Type 2** on slopes **1.5H:1V** or flatter or in channels where the calculated design shear stress is **8.0 lb/ft²** or less.
- Install a TRM **Type 3** on slopes **1.0H:1V** or flatter or in channels where the calculated design shear stress is up to **12.0 lb/ft²**.

1.2 Materials

1.2.1 Temporary Erosion Control Blankets (ECB)

Provide erosion control and facilitate vegetation establishment with temporary erosion control blankets (ECBs) composed of processed degradable natural and/or polymer fibers mechanically bound together between synthetic or natural fiber nettings. Do not use single netted straw blankets or single netted straw blend blankets under this specification.

Provide temporary erosion control blankets with properties derived from quality control testing listed in the American Association of State Highway and Transportation Officials (AASHTO) National Transportation

Product Evaluation Program (NTPEP) for Erosion Control Products (ECP) and conforming to the performance and physical requirements shown in Table 1.

Table 1: Minimum Requirements for Temporary Erosion Control Blankets

Property	Test Method	Temporary ECB
Functional Longevity ⁴	SCDOT Testing Methods	Up to 12 months
Maximum Slope Application	Observed	2.0H:1V
Vegetation Establishment	ECTC Method #4 or ASTM D7322	200% min
Cover Factor ¹	ASTM D6459	$C \leq 0.05$
Tensile Strength ²	ASTM D6818	75 lb/ft
Shear Stress ³	ASTM D6460	$\geq 1.75 \text{ lb/ft}^2$

¹ "C" Factor calculated as ratio of soil loss from ECB protected slope to ratio of soil loss from unprotected (control) plot in large-scale testing using ASTM D6459 on loam soil types.

² Minimum tensile strength in the machine direction using ASTM D6818 .

³ Minimum shear stress on unvegetated temporary ECB can sustain without physical damage or excess erosion (> 0.5 in soil loss) during a 30-minute flow event in large-scale testing using ASTM D6460.

⁴ Functional longevity tests performed at a testing facility approved by SCDOT. Use most current functional longevity test methods established by SCDOT.

1.2.2 Turf Reinforcement Matting (TRM)

Provide turf reinforcement matting (TRM) composed of non-degradable synthetic fibers, filaments, nets, wire mesh and/or other elements, processed into a permanent, three-dimensional matrix. For TRM Types 1 and 2, the non-degradable three-dimensional matrix may be infilled with degradable materials. Use TRMs designed to impart immediate erosion protection, enhance vegetation establishment and provide long-term functionality by permanently reinforcing vegetation during and after maturation.

Provide TRMs with properties derived from quality control testing listed in the American Association of State Highway and Transportation Officials (AASHTO) National Transportation Product Evaluation Program (NTPEP) for Erosion Control Products (ECP) and conforming to the performance and physical requirements shown in Table 2.

Table 2: Minimum Requirements for TRMs

Property	Test Method	Type 1	Type 2	Type 3 ⁴
General				
May Be Supplemented with Degradable Infill Components	Observed	Yes	Yes	No
Physical				
Minimum Thickness	ASTM 6525	0.25 in	0.25 in	0.25 in
Vegetation Establishment	ECTC Method #4 or ASTM D7322	200% min	200% min	200% min
UV Resistance ¹	ASTM D4355	80% @ 1000 hrs	80% @ 1000 hrs	80% @ 1000 hrs
Tensile Strength ²	ASTM D6818	145 X 110 lb/ft	170 X 130 lb/ft	1,000 x 900 lb/ft
Performance				
Maximum Slope Application	Observed	2.0H:1V	1.5H:1V	1.0H:1V
Shear Stress ³	ASTM D 6460	≥ 4.0	≥ 8.0	≥ 12.0

¹ Tensile strength retained of structural components after exposure.

² Minimum tensile strength in both machine and cross machine directions, under dry or saturated conditions using ASTM D6818.

³ Minimum shear stress a fully vegetated TRM can sustain without physical damage or excess erosion (> 0.5 in soil loss) during a 30-minute flow event in large-scale testing using ASTM D6460.

⁴ *Use a TRM Type 3 with a minimum tensile strength of 2,100 X 1,800 lb/ft when field conditions exist with high loading and/or high survivability requirements as the result of maintenance, structural backfills protecting critical structures, utility cuts, potential traffic areas, abrasion, and higher factors of safety and/or general durability concerns.*

1.2.3 Quality Assurance

Provide RECPs listed on the most recent edition of *SCDOT Qualified Product List 55 and 56* in the appropriate category. RECP acceptance is granted based on the manufacturers' certification and testing with the American Association of State Highway and Transportation Officials (AASHTO) National Transportation Product Evaluation Program (NTPEP) for Erosion Control Products (ECP).

At the time of delivery, provide the RCE with the RECP packing list containing complete identification, including but not limited to the following:

- Manufacturer name and location,
- Manufacturer telephone number and fax number,
- Manufacturer's e-mail address and web address, and
- RECP name, model and/or serial number.
- Certification that the specific RECP meets the physical and performance criteria of this specification.

Provide the RCE NTPEP certification signed by a responsible representative of the RECP manufacturer within 24 hours of each RECP truckload shipment of material to the construction site.

1.3 Construction Requirements

1.3.1 Site Preparation

Grade areas to be treated with RECPs and compact as indicated or as directed by the Engineer or Manufacturer's Representative.

Remove large rocks, soil clods, vegetation, and other sharp objects that could keep the RECP from intimate contact with subgrade.

Prepare seedbed by loosening the top 2 to 3 inches of soil above final grade.

Add seed, lime, and fertilizer as outlined in *SCDOT Supplemental Specification for Seeding SCDOT (SC-M-810-4) or latest revision*.

1.3.2 General Installation

Always follow the specific manufacturer's installation procedures included with each RECP. If requested by the RCE, arrange for a manufacturer's representative to be on-site to oversee and approve the initial installation of the RECP. Provide a letter from the manufacturer approving the installation when requested by the RCE.

The maximum allowable continuous slope length for Temporary ECB slope applications is 50 feet. Provide slope interruption devices for continuous slope length longer than 50 feet. At the discretion of the RCE, use slope interruption devices on slope lengths less than 50 feet when slope erosion is observed. Refer to *SCDOT Supplemental Specification for Inlet Structure Filters Type F – Non Weighted (SC-M-815-8) or latest revision* for slope interruption device description, materials, and construction requirements.

Install the RECP at the elevation and the alignment indicated on the plans.

Use anchors (stakes, pins, or staples) with a minimum length of 6 inches to secure temporary erosion control blankets. Use 12 inch anchors for specific erosion control blankets in sandy, loose, or wet soils or as directed by the RCE or manufacturer's representative.

Use anchors (stakes, pins, or staples) with a minimum length of 6-inches to secure permanent TRMs. Use longer anchors for specific TRM installation in sandy, loose, or wet soils, or as directed by the RCE or manufacturer's representative.

Use Table 3 to determine minimum anchoring frequency. Refer to the manufacturer's recommendation for additional information. Install anchors at the manufacturer's rate if it is greater than the minimum values listed in Table 3 to ensure the manufacturers warranty is not violated.

Table 3: RECP Anchoring Requirements

Slope Grade	Anchoring Frequency
Up to 3H:1V	1.5 anchor/square yard
3H:1V to 2H:1V	2.0 anchors/square yard
2H:1V to 1H:1V	3.5anchors/square yard
Steeper than 1H:1V and Channel Bottoms	4.0 anchors/square yard

Obtain RCE and manufacturer's representative approval before execution of alternate installation methods to those specified herein.

1.3.3 Slope Installation

At the top of the slope construct a 6 inch (deep) x 12 inch (wide) anchor trench to inhibit undermining from stray surface water. Extend the upslope terminal end of the RECP 30 inches past the anchor trench.

Use anchors to fasten the RECP material into the upslope anchor trench on 12 inch centers. Backfill the trench with soil and compact. Apply seed to the backfilled soil surface and cover with the remaining 12 inches of the RECP terminal end. Anchor the terminal end down slope of the anchor trench on 12 inch centers.

Securely fasten all RECP materials to the soil by installing anchors at a minimum rate of 1.5 anchors per square yard. Select anchors that have sufficient ground penetration to resist pullout. Increase the anchoring frequency if the RCE or manufacturer's representative determines it necessary due to site conditions (i.e., loose or wet soils).

Unroll the RECP parallel to the primary direction of water flow and place in direct contact with the soil surface. Do not stretch or allow the material to bridge over surface inconsistencies. Overlap the edges of adjacent (vertically down the slope) RECPs a minimum of 3-inches with the upslope roll overlapping on top of the down slope roll in shingle style.

Overlap the edges of parallel (horizontal across the slope) blankets 3 to 6 inches depending on the type of RECP used.

1.3.4 Channel Installation

Excavate anchor trenches or install anchor check slots perpendicular to the flow direction across the entire width of the channel at 30-foot maximum intervals and at the terminal end of the channel reach.

Construct a 6 inch (deep) x 12 inch (wide) beginning anchor trench. Extend the downstream end of the RECP 30-inches past the anchor trench and use the slack RECP material to cover the backfilled soil. Fasten the RECP material into the anchor trench on 12 inch centers.

Excavate 6-inch x 6-inch check slots at a maximum of every 30 feet along the length of the channel.

An alternative installation for checks slots is a double row of anchors. For anchor check slot applications, place two rows of anchors 4-inches apart and install each row of anchors on 12-inch centers. Drive all anchors flush with the soil surface.

Beginning at the downstream end in the center of the channel, place the initial end of the first RECP in the anchor trench and secure it with ground anchor devices at 12 inch intervals.

Position adjacent rolls in the anchor trench in the same manner, overlapping the proceeding roll a minimum of 3 inches. Secure the RECP at 12 inch intervals along the anchor trench, backfill and compact with specified soil or as directed by the RCE or manufacturer's representative.

Unroll the center strip of RECP upstream over compacted trench. Stop at the next check slot or terminal anchor trench. Unroll adjacent rolls of RECP upstream in similar fashion, maintaining a 3 inch overlap.

Fold and secure the RECP snugly into transverse check slots. Lay material in bottom of the slot, and then fold the material back against itself as indicated. Anchor through both layers of RECP at 12 inch intervals. Backfill with soil and compact. Continue unrolling the RECP widths upstream over compacted slot to next check slot or terminal anchor trench.

Secure RECP to the channel bottom with anchors at a frequency of 2.5 anchors per square yard. Select anchors that have sufficient ground penetration to resist pullout. Increase the anchoring frequency if the RCE or manufacturer's representative deems it necessary due to site conditions (i.e., loose or wet soils).

Cut longitudinal anchor slots 4 inches x 4 inches at the top of each slope. Fasten the RECP material into the longitudinal anchor slots on 12 inch centers.

1.3.5 Delivery, Storage, and Handling

Follow the requirements of ASTM D4873 for RECP labeling, shipment and storage. Ensure that product labels clearly show the RECP manufacturer name, supplier name (if applicable), style or product name, and roll (item) number. Include with each shipping document a notation certifying that the material is in accordance with the manufacturer's certificate.

Wrap each RECP roll with a material that protects the RECP from damage due to shipment, water, sunlight, and contaminants. Maintain the protective wrapping during shipment and storage.

During storage, elevate the RECP rolls off the ground and adequately cover to protect them from the following:

- Site construction damage,
- Extended exposure to ultraviolet (UV) radiation,
- Precipitation,
- Chemicals that are strong acids or strong bases,
- Flames,
- Sparks,
- Temperatures in excess of 160° F , and
- Other environmental conditions that can damage the physical properties RECPs.

1.3.6 Inspection and Maintenance of RECPs

Check areas protected by RECPs for dislocation or failure every seven 7 calendar days.

Ensure the pinning or stapling pattern is consistent with that shown on the manufacturer's installation sheet. If there is evidence that the RECP is not securely fastened to the soil, install extra pins or staples to inhibit the RECP from becoming dislodged.

Inspect regularly until grass or vegetation is firmly established.

Repair all damaged areas immediately by restoring the soil on slopes or channels to its finished grade, re-apply fertilizer and seed, and replacing the appropriate RECP material as needed.

1.3.7 Acceptance

Obtain RCE acceptance and approval for RECP installations. When requested by the RCE, ensure that a manufacturer's representative is on-site to oversee and approve the initial RECP installation. Obtain a letter from the manufacturer approving the installation when requested by the RCE.

1.4 Measurement

The quantity of the pay item Temporary Erosion Control Blanket (ECB) and Turf Reinforcement Matting (TRM) Type (1,2,or 3) is the actual surface area covered by the rolled erosion control product and is measured by the square yard (SY) unit of material in-place, complete and accepted. Seams, overlaps,

anchor trenches, and wastage are not measured. Products damaged by the Contractor's operations are not included in the measurement,

1.5 Payment

Payment for Temporary Erosion Control Blanket (ECB) Class and Turf Reinforcement Matting (TRM) Type (1,2, or 3) is full compensation for installing the ECB or TRM as specified or as directed and includes furnishing, placing, maintaining and inspecting the RECP; providing anchor devices and trenches, quality control testing; and all other materials, labor, equipment, tools, supplies, transportation, and incidentals necessary to fulfill the requirements of the pay item in accordance with the Plans, Specifications, and other terms of the Contract.

Bid item numbers and descriptions are shown in Table 4.

Table 4: Bid Item Number

Bid Item Number	Description	Units
8151151	Turf Reinforcement Matting (TRM) Type 1	SY
8151152	Turf Reinforcement Matting (TRM) Type 2	SY
8151153	Turf Reinforcement Matting (TRM) Type 3	SY
8151150	Temporary Erosion Control Blanket (ECB)	SY
8152006	Inlet Structure Filter Type F - Non-Weighted (Slope Interruption Devices)	LF