Temporary Rolled Erosion Control Products (RECP)

Source: North American Green - SC150

BENEFITS

	L	M	H
Flow Control	■		
Erosion Control	■	■	■
Sediment Control			
Runoff Reduction			
Flow Diversion			

Description: Temporary RECPs consist of prefabricated blankets or netting which are formed from both natural and synthetic materials.

Typical Uses: Temporary RECPs are used as a temporary surface stabilizing measure and to aid in the establishment of vegetation. RECPs are typically used on steep slopes and in vegetated channels.

Advantages:

- Numerous manufacturers, each with a number of different products, allow for the selection of a product that meets the individual characteristics of each site.
- Stabilizes disturbed slope and protects surface from erosive forces of raindrop impact.
- Promotes growth of vegetation.
- Most products degrade over time, eliminating potential maintenance issue.

Limitations:

- With numerous products available, appropriate product selection can be difficult.
- Various products and manufacturers have different design and construction standards. Designer must rely on manufacturer's data.
- RECPs are temporary and do not provide permanent stabilization.
- Permanent stabilization and protection is dependent on the establishment of vegetation.

Longevity: Varies based upon product specified (3 months to 36 months)

SUDAS Specifications: Refer to Section 9040, 2.05 and 3.08

A. Description/Uses

Temporary rolled erosion control products (RECP) consist of netting or blanket materials that are used to stabilize disturbed surfaces and promote the establishment of vegetation. RECPs may also be used to stabilize the surface of channels until vegetation can be established, for low to moderate flow conditions.

They are manufactured from a wide variety of different materials including coconut fiber (coir), jute, nylon, polypropylene, PVC, straw, hay, or wood excelsior. These materials may be used individually, or in combination to form nets or blankets.

The products function by protecting the ground surface from the impact of raindrops and stabilize the surface until vegetation can be established. RECPs also promote the growth of vegetation by helping to keep seed in place, and by maintaining a consistent temperature and moisture content in the soil.

RECPs are not intended to provide long-term or permanent stabilization of slopes or channels. Their role is to protect the surface until the vegetation can establish itself and become the permanent stabilizing feature. In fact, most RECPs are either biodegradable or photodegradable and will decompose over a period of time.

B. Design Considerations

RECPs are produced by a number of manufacturers, and are available in a wide variety of different configurations. Competing products from different manufacturers can have completely different material compositions and construction, but be intended to serve the same purpose. Given the wide variety of RECPs available, product selection and specification can be difficult. Fortunately, the Erosion Control Technology Council (ECTC) has developed a uniform product selection guide for RECPs. The ECTC is an organization representing suppliers and manufacturers of rolled erosion control products. A list of member organizations is available on their website (www.ectc.org).

Table 7E-5.01 follows the guidelines of the ECTC and classifies products based upon longevity and product description. RECP longevity is divided into 4 categories ranging from 3 months to 3 years. RECPs are further classified by their general material properties and construction. These classifications include: mulch control nets, open weave textiles, and erosion control blankets.

Mulch control nets (MCN) are used in conjunction with loose mulches. The MCN is applied over the loose mulch to stabilize and hold it in place. MCNs are used as an intermediate application where loose mulch may not be stable, but an open weave textile or erosion control blanket is not necessary.

Open weave textiles (OWT) consist of natural or synthetic yarns that are woven into a 2-D matrix. OWT are similar to mulch control nets, but have higher strength and a more tightly woven construction, allowing them to provide erosion protection with or without the use of an underlying loose mulch layer.

While available, the use of mulch control nets and open weave textiles as rolled erosion control products is fairly uncommon. Erosion control blankets (ECB) are the most commonly used RECP. ECB are constructed of natural and synthetic materials that are glued, woven, or structurally bound with a netting or mesh. The most common of these products are made from straw, wood excelsior or coconut fiber attached to/between netting. Wide varieties of erosion control blankets are available.

ECTC also established recommendations on the appropriate use/performance for each product classification. RECP selection and design should follow the product classification and recommendation shown in Table 7E-5.01.

For slope applications, the designer should select a product from Table 7E-5.01 that has the desired longevity and is rated for the proposed slopes.

For channel applications, the channel lining should be analyzed for the 10 year storm in the permanent vegetated state (ignoring the RECP) as described in Section 7E-23 (Grass Channel). The RECP should also be analyzed for shear stress. This analysis should be for the unvegetated state, representing the situation immediately after installation. Since it is considered a temporary measure, stabilizing the channel only until vegetation is established, the RECP does not need to be analyzed for a 10 year event as the vegetation does. Analyses of the RECP's shear strength for a 2 year event is adequate.

Proper installation of RECPs is critical. Prior to placing a RECP, the ground should be prepared and the area should be seeded and fertilized. It is imperative that seeding occur prior to placement of the RECP to ensure proper contact between seed and soil. Some manufacturers can embed the specified seed mixture into the product during the manufacturing process (if this process is used, follow the manufacturer's recommended installation specifications). After seeding, the appropriate RECP may be placed and anchored with stakes or staples. The manufacturer will provide specifications for the pattern and spacing of anchor stakes or staples, overlap between rolls (typically 6 inches), and any additional product requirements. It is important that the stakes or staples be properly installed to prevent "tenting" of the product as the vegetation begins to grow and push up on the matting. This can create an unsightly situation and the product can become entangled in mowing equipment.

At the tops of slopes and at the entrance to a channel, the leading edge of the RECP should be trenched into the ground, approximately 6 inches, anchored in place with stakes or staples, and backfilled. This prevents runoff from lifting the leading edge, and flowing between the ground and the RECP. Subsequent segments of RECPs should have their upstream edges trenched in, and the downstream edge should slightly overlap the next section to prevent water from flowing under the product.

Table 7E-5.01: Typical Rolled Erosion Control Product Properties and Uses

Type	Product Description	Material Composition	Slope Applications	Channel Applications
			Max. Grade	Permissible Shear Stress [1,2]
ULTRA SHORT-TERM - Typical 3 Month Functional Longevity				
1.A	Mulch Control Nets	A photodegradable synthetic mesh or woven biodegradable natural fiber netting	5:1 (H:V)	0.25 lbs/ft^2
1.B	Netless Rolled Erosion Control Blankets	Natural and/or polymer fibers mechanically interlocked and/or chemically adhered together to form a RECP	4:1 (H:V)	0.5 lbs/ft^2
1.C	Single-net Erosion Control Blankets and Open Weave Textiles	Processed degradable natural and/or polymer fibers mechanically bound together by a single rapidly degrading, synthetic or natural fiber netting or an open weave textile of processed rapidly degrading natural or polymer yarns or twines woven into a continuous matrix.	3:1 (H:V)	1.5 lbs/ft^2
1.D	Double-net Erosion Control Blankets	Processed degradable natural and/or polymer fibers mechanically bound together between two rapidly degrading, synthetic or natural fiber nettings.	2:1 (H:V)	1.75 lbs/ft^2
SHORT-TERM - Typical 12 Month Functional Longevity				
2.A	Mulch Control Nets	A photodegradable synthetic mesh or woven biodegradable natural fiber netting	5:1 (H:V)	0.25 lbs/ft^2
2.B	Netless Rolled Erosion Control Blankets	Natural and/or polymer fibers mechanically interlocked and/or chemically adhered together to form a RECP	4:1 (H:V)	0.5 lbs/ft^2
2.C	Single-net Erosion Control Blankets and Open Weave Textiles	An erosion control blanket composed of processed degradable natural or polymer fibers mechanically bound together by a single degradable synthetic or natural fiber netting to form a continuous matrix or an open weave textile composed of processed degradable natural or polymer yarns or twines woven into a continuous matrix.	3:1 (H:V)	1.5 lbs/ft^2
2.D	Double-net Erosion Control Blankets	Processed degradable natural and/or polymer fibers mechanically bound together between two degradable synthetic or natural fiber nettings.	2:1 (H:V)	1.75 lbs/ft^2
EXTENDED-TERM - Typical 24 Month Functional Longevity				
3.A	Mulch Control Nets	A slow degrading synthetic mesh or woven natural fiber netting	5:1 (H:V)	0.25 lbs/ft^2
3.B	Erosion Control Blankets and Open Weave Textiles	An erosion control blanket composed of processed slow degrading natural or polymer fibers mechanically bound together between two slow degrading synthetic or natural fiber nettings to form a continuous matrix or an open weave textile composed of processed slow degrading natural or polymer yarns or twines woven into a continuous matrix.	1.5:1 (H:V)	2.0 lbs/ft^2
LONG-TERM - Typical 36 Month Functional Longevity				
4	Erosion Control Blankets and Open Weave Textiles	An erosion control blanket composed of processed slow degrading natural or polymer fibers mechanically bound together between two slow degrading synthetic or natural fiber nettings to form a continuous matrix or an open weave textile composed of processed slow degrading natural or polymer yarns or twines woven into a continuous matrix.	1:1 (H:V)	2.25 lbs/ft^2

[1] Refer to Section 7E-18 - Turf Reinforcement Mats for additional information on determining shear stress in a channel
[2] Minimum shear stress RECP (unvegetated) can sustain without physical damage or excess erosion (0.5 inch soil loss during 30 minute flow event)

Source: Lancaster and Austin, 2004

C. Application

Rolled erosion control products should be used on bare ground that is highly susceptible to erosion, such as slope and channels, and in locations where establishing vegetation may otherwise be difficult.

There are a wide variety of RECPs available. Table 7E-5.01 shows the recommended applications for slopes and channels for each type of product. A manufacturer or supplier can provide further assistance in selecting an appropriate RECP. For channel applications, products that contain straw are not recommended due to the likelihood that the concentrated flow will dislodge the straw from the binding material, creating the potential for clogging problems downstream.

D. Maintenance

Once installed, there is little maintenance that needs to be done to RECPs. If the RECPs are vegetated, the vegetation should be watered as needed (refer to Section 7E-24). Until the vegetation is fully established, the surface should be inspected for signs of rill or gully erosion below the matting. Any signs of erosion, tearing of the product, or areas where the product is no longer anchored firmly to the ground should be repaired.

E. Time of Year

Seeding and placement of RECPs should be completed well within the annual seeding window. While RECPs provide some stabilization of the channel or slope surface until the vegetation is established, the vegetation ultimately provides stabilization of the surface. The vegetation needs time to establish so it can resist flows from winter snowmelt and spring rains.

F. Design Example

Due to difficulty establishing vegetation, and concerns with channel erosion, assume that a RECP is proposed for the design example from Section 7E-23 (Grass Channel).

Find the shear stress in the bare channel after the RECP has been installed. Determine if the RECP is sufficient to temporarily stabilize the channel, until the vegetation can become established.

The manufacturer states that the RECP can withstand a shear stress (without vegetation) of 2.0 lbs/ft^2. In addition, the manufacturer states that for depths between 0.5 feet and 2 feet, the Manning coefficient for the RECP varies from 0.05 to 0.018 respectively. The coefficient used for the analysis should be interpolated based upon the depth.

Assume a flow depth of 1.5 feet. Interpolating, the Manning coefficient is 0.029.

Trial 1 - Assume a depth of 1.5 feet. Interpolating, the Manning coefficient is 0.029.

Area, A=13.5; Wetted Perimeter, P=15.4; Hydraulic Radius, R=0.88
From Manning's Equation, Q=50 cfs. This is too high. Try a lower depth.

Trial 2 - Try 1.0 feet. n= 0.039.

A=8.4; P=12.1; R=0.67; Q=19.5 cfs Too low. Try higher depth.

Trial 3 - Try 1.1 feet. n=.0372

A=8.1; P=12.1; R=0.67; Q=25.07 cfs. Say 24 cfs. OK

Find the shear stress on the bare RECP liner.

$$\tau_{max} = \gamma \times d \times S = 62.4 \times 1.1 \times 0.01 = 0.69 \text{ lbs/ft}^2$$

0.69 lbs/ft^2 is less than the allowable value of 2.0 lbs/ft^2. The RECP liner should adequately protect the channel until vegetation is established.