Erosion Control Blankets (ECBs)

Plan Symbol

Description

Temporary erosion control blankets (ECBs) are products composed primarily of biologically, photochemically or otherwise degradable constituents such as wheat straw, coconut fiber, or aged curled excelsior wood product with longevity of approximately 1- to 3-years.

When and Where to Use It

ECBs are used for the temporary stabilization of soil immediately following seeding until the vegetative cover has grown and becomes established. ECBs provide temporary protection by degrading over time as the vegetation becomes established. Some products are effective for a few months while others degrade slowly and are effective for up to 3-years.

ECB Categories

- Class A (Slope Applications Only)
- Class B (Channel Applications Only).

Class A ECBs are for **slope applications only**.

- Applicable for slopes **2H:1V or flatter** only. Slopes greater than 2H:1V require Turf Reinforcement Matting (TRM).

Class B ECBs are for **channel applications**.

- Applicable for channels and concentrated flow areas with a maximum calculated shear stress **less than 1.75 lb/ft^2**. Channels and concentrated flow areas with design shear stresses greater than 1.75 lb/ft^2 require TRM

All acceptable Class A and Class B temporary erosion control blankets consisting of straw, coconut, or straw-coconut blends meet the following requirements:

- Utilize non-organic, photodegradable or biodegradable polypropylene netting.
- Consist of **double netted matting**, defined as matting with netting on both sides of the blanket. The top netting is degradable polypropylene with a maximum mesh opening of 0.75 inches by 0.75 inches. The bottom is degradable polypropylene with a maximum mesh opening of 0.5 inches by 0.5 inches.
- Be sewn on center a maximum of 2.0 inches

All acceptable Class A and Class B temporary erosion control blankets consisting of curled excelsior fibers meet the following requirements:

- Utilize non-organic, photodegradable or biodegradable polypropylene netting
- Consist of double netted matting. Double netted matting is matting with netting on both sides of the blanket. The degradable polypropylene top netting requires a maximum mesh opening of 1.0-inches by 1.0-inches, while the degradable polypropylene bottom netting requires a maximum mesh opening of 1.0-inches by 1.0-inches
- Consist of curled excelsior interlocking fibers with 80% of the fibers a minimum of 6-inches long
- Sewn on center a maximum of 4.0-inches.

Use Class A and Class B temporary erosion control blankets having the following Minimum Average Roll Values (MARV) for physical properties, as derived from quality control testing performed by a Geosynthetic Accreditation Institute – Laboratory Accreditation Program (GAI-LAP) accredited laboratory:

- Minimum mass per unit area (ASTM D6475) of 6 oz/yd^2 (203 g/m^2)
- Minimum thickness (ASTM D6525) of 0.25-inches (6 mm)
- Minimum initial grab tensile strength (ASTM D6818) of 75 x 75 lb/ft. (1 x 1 kN/m)
- Minimum roll width of 48-inches (1.22 m)
- For Class B channel applications, a minimum unvegetated shear stress of 1.0 lb/ft^2 (48 N/m^2) based on short-term peak flow duration of 0.5 hour is required.

Installation

Grade and compact areas to be protected with ECBs as indicated on the plans.

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

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

The proper installation of ECBs is different for each product, therefore the recommended installation procedure from the specific manufacturer should be followed.

When requested, a Manufacturer's Representative may be required to be on-site to oversee and approve the initial installation of the ECB. When requested, a letter from the Manufacturer approving the contractor installation may be required.

Inspection and Maintenance

- Inspect areas protected by ECBs for dislocation or failure every 7 calendar days and within 24-hours after each storm that produces ½-inch or more of rain.
- Conduct regular inspections until grasses are firmly established.
- Adhere to the pinning or stapling pattern as shown on the Manufacturer's installation sheet. If there is evidence that the ECB is not securely fastened to the soil, require extra pins or staples to inhibit the ECB from becoming dislodged.
- If washout or breakage occurs, 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 ECB material as needed.

ECB Channel Design Criteria

The design of a permanent conveyance with a grassed or vegetative lining should address the bare condition prior to vegetation being established. An ECB will protect the conveyance during this period. Use both the tractive force and the permissible velocity methods to determine the level of protection that is required.

The design of ECBs is based on the anticipated shear stresses and maximum flow velocities the fabric will encounter. Once the design shear stresses and maximum flow velocities are known, select a corresponding ECB that meets the conditions from the SCDOT approved product list.

- The governing equation for maximum channel shear stress is:

$$\tau = \gamma \, d_n \, S$$

Where:

τ	=	maximum shear stress (lbs/ft^2)
γ	=	unit weight of water = 62.4 lbs/ft^3
d_n	=	maximum normal channel flow depth (ft)
S	=	channel bed slope (ft/ft)

The following variables are required to determine the maximum velocity in a channel for a 10-year 24-hour storm event.

- Design peak flow rate value in cubic feet per second (cfs) for the 10-year 24-hour storm,
- Channel dimensions designed to carry the peak flow rate. For simplicity, all channels will be assumed to be trapezoidal in shape,
- Channel bed slope,
- Manning's channel roughness coefficient (n) of the ECB from the following conditions:
  - Bare ECB with no vegetation,
  - ECB with maintained vegetation, and
  - ECB with un-maintained vegetation, and
- Normal channel flow depth (d_n) based on peak flow rate, channel dimensions and Manning's n value.

The governing equation for maximum velocity is Manning's Equation:

$$V = (1.49 / n) \; R^{2/3} \; S^{1/2}$$

Where :

V	=	Maximum velocity (ft/sec)
n	=	Manning's channel roughness coefficient
R	=	Hydraulic radius of the flow based on d_n (ft)
S	=	Channel bed slope (ft/ft)

ECB Slope Application

ECB Slope Application

Preventive Measures and Troubleshooting Guide

Field Condition	Common Solutions
Undercutting occurs along the top of the slope.	Dig a 6-x 6-inch trench along the top of the slope and anchor blanket into trench by back filling and tamping the soil.
Blankets separate along the seams.	Overlap adjacent blanket 2- to 3-inch and staple every 3-feet.
Blankets separate where the rolls are attached end to end.	Shingle the blanket so the top blanket covers the bottom blanket by 6-inches and staple through the overlapped areas every 12-inches.
Blanket does not make complete contact with the soil surface.	Prepare the soil surface by removing rocks, clods, sticks and vegetation, fill in rill, and uneven areas.
Excessive water flows across stabilized surface.	Use other BMPs to limit flow on stabilized area. Use other BMPs to reduce slope lengths. Do not use to stabilize areas with swift moving concentrated flows.