

# Channel Erosion Mat

## (1053)

Wisconsin Department of Natural Resources  
Conservation Practice Standard

### I. Definition

A protective soil cover of straw, wood, coconut fiber or other suitable plant residue, or plastic fibers formed into a mat, usually with a plastic or biodegradable mesh on one or both sides. Erosion mats are rolled products available in many varieties and combination of materials and with varying life spans.

### II. Purpose

The purpose of this practice is to protect the channel from erosion or act as turf reinforcement during and after the establishment of grass or other vegetation in a channel. This practice applies to both *Erosion Control Revegetative Mats (ECRM<sup>1</sup>)* and *Turf-Reinforcement Mats (TRM)*.

### III. Conditions Where Practice Applies

This standard applies where runoff channelizes in intermittent flow and vegetation is to be established. Some products may have limited applicability in projects adjacent to navigable waters.

### IV. Federal, State, and Local Laws

Users of this standard shall be aware of applicable federal, state, and local laws, rules, regulations, or permit requirements governing the use and placement of erosion mat. This standard does not contain the text of federal, state, or local laws.

### V. Criteria

This section establishes the minimum standards for design, installation and performance requirements. To complete the shear calculations, a 2 year, 24 hour storm event shall be used to calculate depth of flows for an ECRM. For sizing a TRM, use the depth of flow corresponding to the maximum design capacity of the channel.

Only mats listed in the Wisconsin Department of Transportation (WisDOT) Erosion Control Product Acceptability List (PAL) will be accepted for use in this standard.

To differentiate applications WisDOT organizes erosion mats into three classes of mats, which are further broken down into various Types.

- A. **Class I:** A short-term duration (minimum of 6 months), light duty, organic ECRM with plastic or biodegradable netting.
  - 1. **Type A** – Only suitable for slope applications, not channel applications.
  - 2. **Type B** – Double netted product for use in channels where the calculated (design) shear stress is 1.5 lbs/ft<sup>2</sup> or less.
- B. **Class II:** A long-term duration (three years or greater), organic ECRM.
  - 1. **Type A** – Jute fiber only for use in channels to reinforce sod.
  - 2. **Type B** – For use in channels where the calculated (design) shear stress is 2.0 lbs/ft<sup>2</sup> or less. Made with plastic or biodegradable mat.
  - 3. **Type C** – A woven mat of 100% organic material for use in channels where the calculated (design) shear stress is 2.0 lbs/ft<sup>2</sup> or less. Applicable

<sup>1</sup> Words in the standard that are shown in italics are described in X. Definitions. The words are italicized the first time they are used in the text.

for use in environmentally sensitive areas where plastic netting is inappropriate.

- C. **Class III:** A permanent 100% synthetic ECRM or TRM. Class I, Type B erosion mat or Class II, Type B or C erosion mat must be placed over a soil filled TRM.
1. **Type A** – An ECRM for use in channels where the calculated (design) shear stress of 2.0 lbs/ft<sup>2</sup> or less.
  2. **Type B** – A TRM for use in channels where the calculated (design) shear stress of 2.0 lbs/ft<sup>2</sup> or less.
  3. **Type C** – A TRM for use in channels where the calculated (design) shear stress of 3.5 lbs/ft<sup>2</sup> or less.
  4. **Type D** – A TRM for use in channels where the calculated (design) shear stress of 5.0 lbs/ft<sup>2</sup> or less.

D. **Installation**

1. ECRM shall be installed after all topsoiling, fertilizing, liming, and seeding is complete.
2. Erosion mats shall extend for whichever is greater: upslope one-foot minimum vertically from the ditch bottom or 6 inches higher than the design flow depth.
3. The mat shall be in firm and continuous contact with the soil. It shall be anchored, overlapped, staked and entrenched per the manufacturer's recommendations.
4. TRM shall be installed in conjunction with the topsoiling operation and shall be followed by ECRM installation.
5. At time of installation, document the manufacturer and mat type by saving material labels and manufacturer's installation instructions. Retain this documentation until the site is stabilized.

VI. **Considerations**

- A. Erosion mats shall be selected so that they last long enough for the grass or other vegetation to become densely established.
- B. Consider using Class II, Type C mats adjacent to waterways where trapping small animals is to be avoided.
- C. Class III TRM may be appropriate as a replacement for riprap as a channel liner. Check the shear stress criteria for the channel to determine mat applicability.
- D. Once a gully has formed in a channel, it is difficult to stabilize due to loss of soil structure. Even when the gully is filled with topsoil and reseeded, the soil has a tendency to dislodge in the same pattern. If gully formation continues to be a problem the design should be reevaluated, including other mat classes or riprap.
- E. It may be difficult to establish permanent vegetation and adequate erosion protection in a channel with continuous flow. Consider riprap or planting wetland species with an ECRM.
- F. Documentation of materials used, monitoring logs, project diary, and weekly inspection forms including erosion and stormwater management plans, should be provided to the authority charged with long term maintenance of the site.
- G. Channel cross sections may be parabolic, v-shaped or trapezoidal. The use of "V" channels is generally discouraged due to erosion problems experienced.
- H. To help determine the appropriate channel liner, designers can refer to the design matrix in the back of the WisDOT PAL. However, for channels not conforming to the typical section shown in the channel matrix or having a depth of flow greater than 6 inches (150 mm), the designer will need to design

for an appropriate channel liner. One way to do this is to use the "tractive force" method presented in FHWA's Hydraulic Engineering Circular (HEC) No. 15. This method requires that the calculated maximum shear stress of a channel is not to exceed the permissible shear stress of the channel liner. To use this method, permissible shear stress values are stated next to each device listed in the channel matrix.

D. Maintenance shall be completed as soon as possible with consideration to site conditions.

## VII. Plans and Specifications

- A. Plans and specifications for installing erosion mat shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. The plans and specifications shall address the following:
  - 1. Location of erosion mat
  - 2. Installation sequence
  - 3. Material specification conforming to standard
- B. All plans, standard detail drawings, or specifications shall include schedule for installation, inspection, and maintenance. The responsible party shall be identified.

## VIII. Operation and Maintenance

- A. Erosion mats shall at a minimum be inspected weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24-hour period.
- B. If there are signs of rilling under the mat, install more staples or more frequent anchoring trenches. If rilling becomes severe enough to prevent establishment of vegetation, remove the section of mat where the damage has occurred. Fill the eroded area with topsoil, compact, reseed and replace the section of mat, trenching and overlapping ends per manufacturer's recommendations. Additional staking is recommended near where rilling was filled.
- C. If the reinforcing plastic netting has separated from the mat, remove the plastic and if necessary replace the mat.

## IX. References

WisDOT "Erosion Control Product Acceptability List" is available online at <http://www.dot.wisconsin.gov/business/engrserv/pal.htm>.

## X. Definitions

*Channel Erosion:* The deepening and widening of a channel due to soil loss caused by flowing water. As rills become larger and flows begin to concentrate, soil detachment occurs primarily as a result of shear.

*Erosion Control Revegetative Mats (ECRM) (II):* Erosion control revegetative mats are designed to be placed on top of soil.

*Turf-Reinforcement Mats (TRM) (II):* Turf-reinforcement mats are permanent devices constructed from various types of synthetic materials and buried below the surface to help stabilize the soil. TRMs must be used in conjunction with an ECRM or an approved soil stabilizer Type A (as classified in the WisDOT PAL)