2.14 TURF REINFORCEMENT MATS

Overview

Description: Turf reinforcement mats (TRMs) are three-dimensional matting products, constructed from non-degradable synthetic materials or a composite of degradable and non-degradable materials. The matting reinforces the root structure of the vegetation to create a system that can withstand high shear stresses. TRMs are used mainly in channels, ditches, and other high-flow applications in which vegetation alone cannot withstand the erosive forces of the flow.

Problem identification: Some existing channels, ditches, and other areas subject to high-velocity flows, such as pipe outlets, require special structural devices to protect the ditch sides and bottom from erosion. Some vegetated channels are required to withstand flow velocities between 10 and 20 fps.

Design purpose: Several purposes. Immediately after installation, the TRM provides significant stabilization to the disturbed surface on which it is placed. The mat promotes the growth of vegetation by maintaining consistent moisture and temperature levels. As the vegetation grows down through the mat, the roots become interlocked with the matting, providing a system with a high resistance to erosion.

Advantages:

- Withstands high shear stress from flowing water
- Provides permanent, long-term reinforcement of vegetation
- Vegetation creates a more aesthetically pleasing appearance than “hard armor” techniques
- Stabilizes ground where vegetation is difficult to establish
- Usually a less expensive alternative to “hard armor” techniques

Limitations:

- With numerous products available, appropriate product selection can be difficult
- Can withstand a limited amount of flow before “hard armoring” is required

Associated practices: Used with RECPs, riprap, or other hard armor techniques.

Installation: Turf reinforcement mats should be installed in locations where vegetation alone cannot withstand the anticipated flow velocities, where hard armor is not necessary, or where hard armor will be visually unappealing.

Most TRM products are designed and rated for resistance to shear stress. Shear stress in channels lined with TRMs is calculated in the same manner as for grass channels. If the channel is to be vegetated, a variable Manning coefficient will need to be calculated. If the channel is being analyzed for performance with the TRM alone, a constant Manning coefficient provided by the manufacturer may be used.

After calculating the shear stress in the channel, an appropriate TRM that will withstand the anticipated stress can be selected. Many TRM manufacturers provide software to aid in the

calculation of shear stress and the selection of an appropriate TRM. This software may be available through the manufacturer's website or a local product representative.

TRMs should be installed in accordance with the manufacturer's recommendations. The general procedure for TRM installation is to prepare the ground surface, ensuring it is smooth to prevent rilling, followed by seeding and fertilizing, if required. Some manufacturers may recommend placing the mat first, then seeding directly into the mat, followed by spreading a one- or two-inch layer of topsoil over the mat and seed. After ground preparation, the TRM 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 mats, and any additional product requirements. Installing the appropriate number of staples or stakes is important to prevent "tenting" of the material as the vegetation begins to grow and pushes up on the matting.

When the mat is placed first, followed by seeding and spreading a one- or two-inch layer of topsoil over the mat and seed, a secondary RECP should be placed over the TRM to protect the top layer of soil and seed until the vegetation can become established.

At the beginning of the installation, the product should be trenched in and anchored to prevent water from flowing under the matting. It is also recommended that additional staple barriers or trenches be installed at 25- to 35-foot intervals along the installation to cut off any flow that has developed under the matting and force the flow back on top of the matting.

Maintenance/inspection: Once installed, little maintenance needs to be done to TRMs. If the TRM is to be vegetated, the vegetation should be watered as needed. Until the vegetation is fully established, the ground surface should be inspected for signs of rill or gully erosion below the matting. If there are any signs of erosion, tearing of the matting, or areas where the matting is no longer anchored firmly to the ground, the matting should be repaired.

Design life: Permanent.

Estimated cost: Varies with the size and type of mat materials used in the design.