MA

Matting

Description

Erosion control matting is used to stabilize soils, steep slopes and drainage channels. They are used in swales with slopes less than 5 percent or with stormwater velocities less than 8 feet per second. Various types of materials are used for blankets such as:

- Woven or bonded synthetic materials such as polypropelene, polyester, polyethylene, nylon, polyvinyl chloride, glass, and other various mixtures of these.
- Blankets of woven straw mulch or coconut fiber with a synthetic layer or net.
- Netting made from jute or other wood fiber, plastic, paper, or cotton used to hold mulch and matting to the ground.

Placing erosion control mats or blankets can significantly reduce erosion on previously graded and seeded swales, channels, slopes, or critical areas. Firmly anchor erosion control matting by means of trenching, anchor slots, stakes, or staples. This practice will create a significant reduction in sediment runoff.

Selection Criteria

Erosion control matting can be used in any area subjected to erosive action for which permanent grass vegetation has been planted. Typical applications include: graded slopes, stormwater channels, detention structures, stream banks, or swales.

Erosion control matting generally consists of a biodegradable plastic net with some form of organic material such as straw, wood shavings, or coconut fiber. The overall purpose of the matting is to protect the soil and seeds from raindrop impact or from surface water runoff, while allowing air and sunlight to pass through the matting to the underlying vegetation.

The biodegradable net is manufactured as a very thin plastic mesh (polypropylene) which does not contain any chemicals to resist deterioration from the natural ultraviolet sunlight. The net biodegrades naturally within a year or two, by which time a thick healthy stand of vegetation should be established. Principal functions of the biodegradable net are to:

- Contain the organic matting from blowing or washing away.
- Allow easy transportation and installation of the product.

The areas to receive the erosion control matting should be previously shaped, fertilized, and seeded. A smooth surface, free of depressions and eroded areas, is necessary to prevent water from flowing underneath the matting edges, especially on the uphill side.

Design Considerations

Numerous types of erosion control matting currently exist on the marketplace. Erosion control products should always be installed in accordance with the manufacturer's instructions; typical generic installation procedures are given in the Figure 1. The basic types of lightweight erosion control mats for gentle slope applications are:

Straw Blanket
Straw shall consist of clean, weed-free harvested straw with an average length of at least 6 inches. The typical roll will be 4 to 12 feet wide, and has a minimum dry weight of approximately 0.5 pounds per square yard.

Excelsior Blanket
Excelsior (shaved wood fibers) shall generally be curled with at least 80% of fibers having a minimum length of 6 inches. A typical roll will be 4 to 12 feet wide and has a minimum dry weight of 0.8 pounds per square yard.

Jute Mesh
Jute mesh consists of woven root fiber or yarn with regularly spaced openings between strands. A typical jute mesh will weigh approximately 1.0 pounds per square yard for basic slope applications.

Coconut fiber can also be specified as part of an erosion control mat. Other types of biodegradable products can also be used. Most erosion control mats also contain thin thread to keep the materials within the plastic netting. An approximate rule of thumb is that a one-sided blanket lasts for 1 year and a two-sided blanket lasts for 2 years.

There are a wide variety of ways to fasten an erosion control mat. Trenching and cutoff slots are used to anchor the mat, but additional fasteners are usually needed.

It is highly recommended that biodegradable materials and methods should be used to install a temporary product such as erosion control matting.

Basic materials for anchoring erosion control mats are:

Metal Staples
Metal U-shaped wire staples are commonly used in conjunction with a staple gun as a quick way to install anchoring. Typical staples are 6" to 10" deep, with a 1" width to hold down the erosion control mat. Staples are generally 10-gauge or 11-gauge.

Wooden Stakes
Stakes should be made from sound pieces of wood, at least 1" wide, and typically sawn into a triangular shape. Wooden stakes are usually 12" to 18" in length, depending on the type of soil.

Biodegradable Stakes
Biodegradable stakes are made of plastic or other materials, which will degrade naturally in few years.

Choose biodegradable stakes with projected life as recommended by the manufacturer. Plastic stakes are specifically made to hold erosion control matting and are generally more effective than wood stakes.

Installation

As site conditions and precise function may vary, consult manufacturer's guidelines for specific product installations (and maintenance).

Erosion control fabrics may generally be applied perpendicular or horizontal to the contour lines depending upon slope characteristics and the roll width. Place erosion control mats in direction of water flow for ditch installation, working upstream. Trim matting as necessary to fit the area to be covered. Use large pieces whenever possible and discard small pieces. The following guidelines are suggested for orientation:

- Erosion control matting should be placed horizontal (with contours):
  - On slopes that are less than 2:1 (H:V) and less than 20 feet long.
  - In situations where one width of the fabric roll will cover entire length.
- Erosion control matting should be placed perpendicular (downhill):
  - On slopes steeper than 2:1 (H:V) or on slopes longer than 20 feet.
  - If the downhill length of the slope exceeds the width.
  - On slopes with runoff from adjacent areas regardless of length or steepness.

Site Preparation

Proper site preparation is essential to ensure complete contact with subgrade. Grade and shape the installation area, removing all rocks, clods, vegetation or other obstructions. Prepare subgrade by loosening at least 2 inches of topsoil beneath erosion control matting installation. Incorporate topsoil amendments as necessary, such as compost, lime and fertilizer, according to soil tests and manufacturer recommendations.

Delivery and Storage

Deliver erosion control matting to the application site in rolls that are wrapped with protective coverings to prevent damage from mud, dirt, dust and debris. Inspect materials to ensure that they are free of defects or flaws. Store materials above the ground surface and away from potential stormwater contact. Protect materials from direct sunlight and from extreme hot or cold temperatures.

Staples or stakes should generally be placed 12 inches apart within anchor trenches and along horizontal overlapping joints. Interior staples or stakes should be placed in the pattern recommended by the mat manufacturer. Extra staples or stakes should be used for drainage channels, particularly near culverts and flumes.

Slopes flatter than 4:1 (H:V) may have a typical staple or stake spacing of 5 feet apart on all edges and 1 foot apart at all joints and ends. On all slopes steeper than 4:1 (H:V) and in all ditches, a typical installation pattern is three staggered rows spaced 3 feet apart. Follow manufacturer's recommendations for spacing and materials.

Check slots should be spaced at not more than 50 feet from an end slot or another check slot. Check slots should be placed with a tight fold of matting anchored 6 inches vertically into the ground and 6 inches across, then tamped firmly.

Ditches and Channels

Matting should be unrolled from the downstream end headed toward the upstream direction of flow.

The mat should generally be installed to minimize the number of seams and joints in the channel with edges and ends above the bottom invert of the ditch. This may require a wider roll of erosion control mat to be purchased especially for ditches.

Anchor ditches are required on all four sides of the erosion control mat in addition to staples or stakes. Anchor ditches within the channel or adjacent to culverts should have a transverse fold (see the figures below).

When unrolled, fibers should be in contact with the soil and the netting should be on top (to prevent fibers from floating or washing away). Stakes or staples should be driven vertically into the ground, anchoring the mat firmly to the soil, and driven flush with the surface of the mat.

Check slots should be spaced at not more than 50 feet from an end slot or another check slot. Check slots should be placed with a tight fold of matting anchored at least 6 inches vertically into the ground and 6 inches across, then tamped firmly.

Maintenance & Inspection

The following items should be checked when inspecting the installation of erosion control mats:

- Uphill and downhill anchor slots should be installed at least 6 inches deep.
- Overlap by at least 3 inches or as recommended by manufacturer.

Fasteners should be spaced and distributed evenly at correct density.

Inspect erosion control mats weekly and after rainstorms to check for movement of topsoil, movement of the mulch, or erosion. Promptly repair or replace erosion control matting in the event of washout, breakage, or erosion damage. Repair ground surface with topsoil, replace mulch and fertilizer in addition to seed, and then install new netting.

Limitations

Inadequate coverage or anchoring results in erosion, washout, and poor plant establishment. If appropriate anchor spacing is not applied, then seed, topsoil, and mulch may be lost to wind and stormwater runoff.

Do not install within a stream or drainage channel that carries water continuously. If the channel grade and liner are not appropriate for the runoff velocity, channel bottom erosion will result and vegetation will grow poorly.

Pictures 1 - 3
Coconut Fiber Matting Applications

Figure 1
Matting Blanket Installation

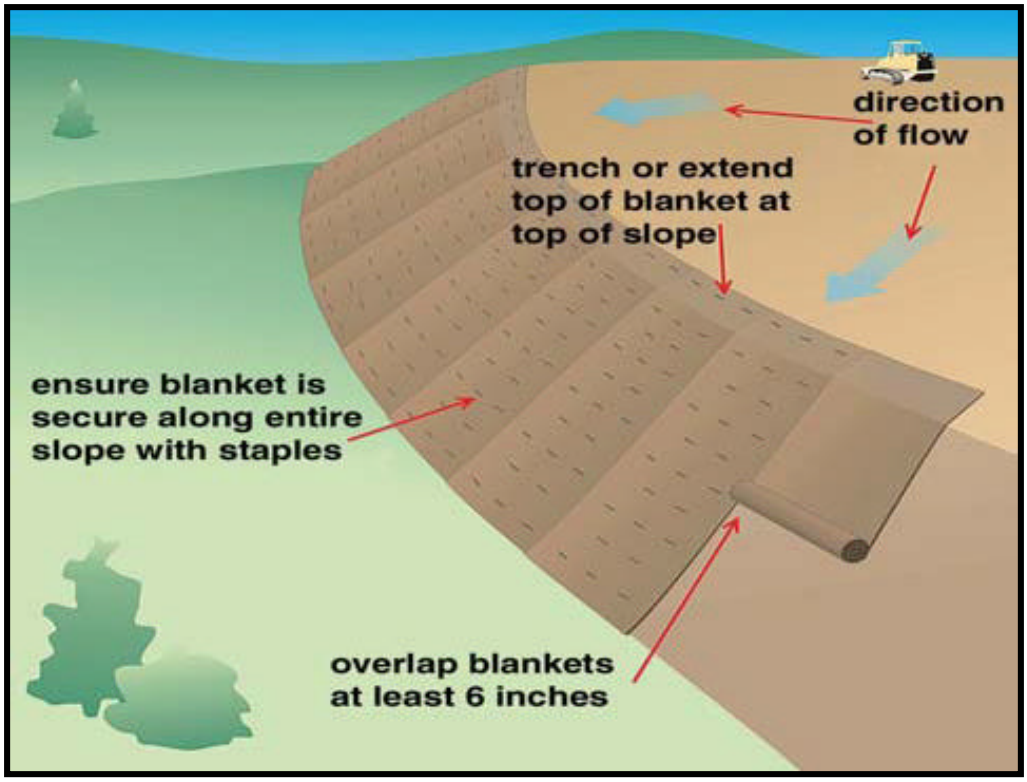
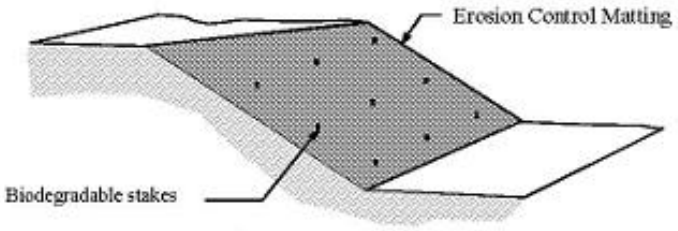
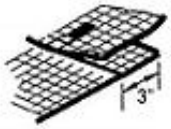


Figure 2
Matting Blanket Installation



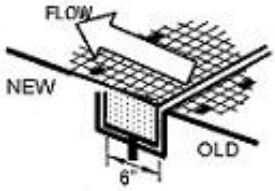
UPHILL ANCHOR SLOT:

Bury the uphill end of the mat within a trench at least 6" deep (12" deep for longer slopes). Tamp the soil firmly. Staple or stake at 12" intervals across the mat.



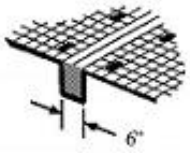
OVERLAP:

Overlap edges of the strips at least 3" (and preferably more for channels). Staple or stake every 12" down the center of the overlap.



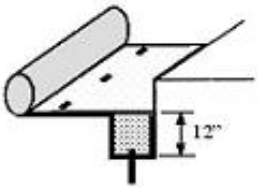
ANCHOR SLOT (WITHIN A CHANNEL):

Dig a slot 6" deep and 6" wide at end of the previous roll, and insert old roll on bottom and sides of anchor slot. Insert the new roll on bottom and sides of anchor slot, then install stakes or staples through both rolls at the bottom of the anchor slot. Fill anchor slot with soil, tamp firmly, and then install new roll in the upstream direction.



CHECK SLOTS:

Check slots should be made every 50 feet on slopes and intermittent drainage channels. Insert a fold of the mat into a 6" deep trench and tamp firmly. Staple or stake at 12" intervals across the mat. Lay mat smoothly on the surface of the soil. Do not stretch the mat and do not allow wrinkles.



ANCHORING ENDS AT STRUCTURES:

Place end of mat in a 12" deep slot at the side of structure. Place stakes or staples at 12" intervals within slot. Fill trench and tamp firmly. Roll mat up the channel or downhill as necessary.

References

Knoxville (City of). October 2007. Knoxville Stormwater Engineering Division. City of Knoxville BMP Manual. http://www.ci.knoxville.tn.us/engineering/bmp manual/

USEPA, Office of Wastewater Management (OWM). April 09, 2007. “National Menu of Stormwater Best Management Practices”.
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