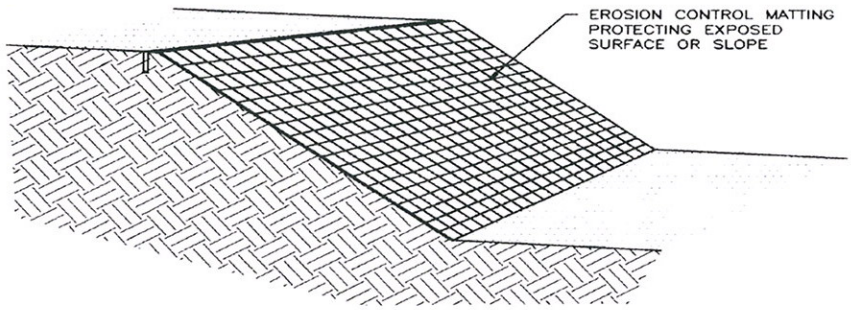
ACTIVITY: Nets and Mats

WTCP-06



Targeted Constituents				
● Significant Benefit		◗ Partial Benefit		○ Low or Unknown Benefit
● Sediment	○ Heavy Metals	○ Floatable Materials	○ Oxygen Demanding Substances	
○ Nutrients	○ Toxic Materials	○ Oil & Grease	○ Bacteria & Viruses	○ Construction Wastes

Implementation Requirements				
● High		◗ Medium		○ Low
● Capital Costs	◗ O & M Costs	◗ Maintenance	● Suitability for Slopes >5%	○ Training

Description

To prevent or reduce erosion on previously shaped and seeded swales, channels, slopes, or other critical areas by the placing and securing of either jute mesh, excelsior matting, erosion control fabric, or other approved matting. This management practice is likely to create a significant reduction in sediment.

Suitable Applications

- Erosion control matting can be used in any area subjected to erosive actions. Such areas include, but are not limited to: newly graded slopes, detention structures, and stream banks where moving water is likely to wash out new vegetative plantings.
- Mattings are quite effective on steep slopes and ditches where design flow may exceed 3.5 feet per second (1.1 m/s).
- Mattings are advantageous in areas with high soil erosion potential.

Approach

Site Preparation: The areas to receive the erosion control matting should have been previously shaped, fertilized, and seeded as shown on the plans or as specified by the Engineer. A smooth surface free of depressions and eroded areas that would allow water to collect or flow under the matting is required. Unless otherwise specified, the soil should be left with a loose surface after seeding.

Installation: Numerous variations of erosion control mattings currently exist. Basic application of a few most commonly used erosion control mattings are listed below. Erosion control products should always be installed in accordance with the manufacturer's instructions. A basic installation illustration is given in Figures WTCP-06-1 and 2.

Erosion Control Fabrics

- Erosion control fabrics, such as nettings, are especially useful when applied over

mulch, over sod, and/or in low volume and velocity ditches. Erosion control fabrics may be applied perpendicular or horizontal to the contour lines depending upon the slope characteristics, but should be placed in the direction of the water flow in ditch installation.

- Fabric should be placed approximately horizontal on slopes that are less than 2:1 (H:V) and less than 20 feet (6.1 m) long or in situations where one width of the fabric will cover the entire length.

- Fabric should be placed approximately perpendicular on slopes greater than 2:1 (H:V), if the length of the slope exceeds the width to be covered, or on slopes with excessive runoff from adjacent areas regardless of the degree or length of the slope.

- Prior to netting placement, a 12-inch (0.3 m) deep anchor trench should be dug at the top and toe of the slope with the top trench placed 12-inches (0.3 m) back from the crown, or a berm over which the fabric can be carried should be used.

- For perpendicular application the erosion control fabric should be tucked into the top trench, stapled, and covered with topsoil. The material is then unrolled and stapled as the work proceeds. The vertical strips should have a 4-inch (10.2-cm) overlap. The material should be in the trench at the bottom of the slope.

- For horizontal application, work must proceed from the bottom toward the top of the slope with a 4-inch (10.2-cm) overlap. After cutting, the material should be folded under 3 to 4 inches (7.6 to 10.2 cm) at the end, stapled, and covered with topsoil.

- The netting should not be stretched, but allowed to lay smoothly and loosely on the surface.

- Staples should be placed 9 to 12 inches (22.9 to 30.5 cm) apart in the trenches and along horizontal lap joints. For perpendicular applications, a 3-foot (0.91-m) interval is sufficient along the laps. Staples should be placed in three alternating rows at approximately 3-foot (0.91-m) intervals along the length of the inner portions of the material. Extra staples on 9- to 12-inch (22.9- to 30.5-cm) centers should be used around the mouths of culverts and flumes.

Where extremely erodible soil is anticipated, terracing should be implemented.

Excelsior Matting

- Matting should be unrolled in the direction of flow with edges and ends butted snugly against each other. Anchor ditches should be required on the upgrade side of the fabric when directed by the Engineer. When unrolled, the netting should be on top and fibers should be in contact with the soil.

- Staples should be driven vertically into the ground, anchoring the mat firmly to the soil, and driven flush with the surface of the mat. Slopes flatter than 4:1 (H:V) should be stapled no more than 5 feet (1.5 m) apart on all edges and 1 foot (0.3 m) apart at all joints and ends. On all slopes steeper than 4:1 (H:V) and in all ditches,

three staggered rows of staples should be spaced 2.5 to 3 feet (0.76 to 0.91 m) apart. Additionally, all joints and ends should be spaced not more than 6 inches (15.2 cm) apart. The spacing of staples may be modified to fit the conditions as directed by the Engineer.

Jute Mesh

- When jute mesh is to be used, the upslope end should be in a trench at least 6 inches (15.2 cm) deep with the soil firmly tamped against it and unrolled in the direction of the water flow. It should be anchored around the edges as well. The matting should not be stretched but should be spread evenly and smoothly so that it is in close contact with the ground at all points.
- Successive strips of matting should overlap at least 6 inches (15.2 cm) at the ends, with the upgrade strip on top. Parallel strips of matting should overlap at least 4 inches (10.2 cm).
- Check slots should be spaced not more than 50 feet (15.2 m) from an end slot or another check slot. Check slots should be placed with a tight fold of matting anchored at least 6 inches (15.2 cm) vertically into the ground and tamped firmly.
- After the matting is stapled into place, it should then be pressed into the ground with a light lawn roller or by similar means.

Staples

- Staples should be No. 11 gauge new steel wire formed into a "U" shape. Staples should be 6 to 10 inches (15.2 to 25.4 cm) long, with the longer staples used on loose, unstable soils. Staples should be spaced not more than 4 feet (1.2 m) apart in three rows for each strip, with one row along each edge and one row alternately spaced in the center. On overlapping edges of parallel strips, staples should be spaced not more than 2 feet (0.61 m) apart. All anchor, junction, and check slot staples should be spaced not more than 6 inches (15.2 cm) apart.

Maintenance

- Inspect erosion control mattings after rainstorms to check for movement of topsoil, movement of the mulch, or erosion. Continue inspections until vegetation is firmly established.
- In the cases of washout, breakage, or erosion occurring, repair surface, reseed, resod, remulch and/or replace topsoil, and install new netting.

Limitations

- Inadequate coverage or anchoring results in erosion, washout, and poor plant establishment.
- If appropriate staple spacing is not applied or applied in an insufficient amount, then seed, topsoil, and mulch maybe lost to wind and stormwater runoff.
- If the channel grade and liner are not appropriate for the runoff velocity, channel bottom erosion may result.

Primary References

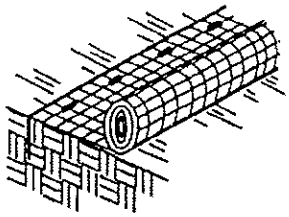
Soil Erosion Prevention and Sediment Control Reducing Nonpoint Source Water Pollution on Construction Sites, University of Tennessee, Knoxville, Department of Civil and Environmental Engineering, August 1998.

California Storm Water Best Management Practice Handbooks, CDM et.al. for the California SWQTF, 1993.

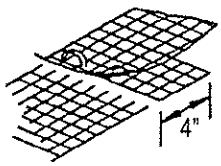
Caltrans Storm Water Quality Handbooks, CDM et.al. for the California Department of Transportation, 1997.

Inspection Checklist

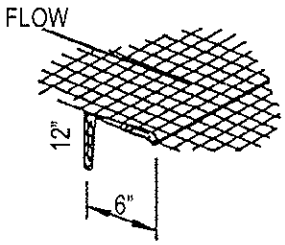
- Are there signs of washout, breakage or erosion?
- Are there areas that require reseeding?
- Are the appropriately sized staples distributed evenly and at the appropriate density?
- Are check slots installed?
- Is there at least a 4-inch (10.2-cm) overlap in parallel strips (running down hill)?
- Are anchor and joining slips at least 12-inches (30.5-cm) deep?



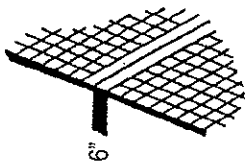
ANCHOR SLOT: BURY THE UP-CHANNEL END OF THE NET IN A 12" DEEP TRENCH. TAMP THE SOIL FIRMLY. STAPLE AT 12" INTERVALS ACROSS THE NET.



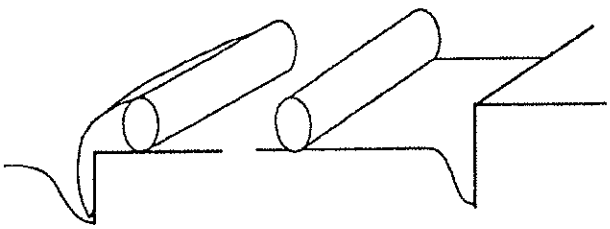
OVERLAP: OVERLAP EDGES OF THE STRIPS AT LEAST 4". STAPLE EVERY 12" DOWN THE CENTER OF THE STRIP.



JOINING STRIPS: INSERT THE NEW ROLL OR NET IN A TRENCH, AS WITH THE ANCHOR SLOT. OVERLAP THE UP-CHANNEL END OF THE PREVIOUS ROLL 18" AND TURN THE END OF THE PREVIOUS ROLL, JUST BELOW THE ANCHOR SLOT, LEAVING 6" OVERLAP.



CHECK SLOTS: ON ERODIBLE SOILS OR STEEP SLOPES, CHECK SLOTS SHOULD BE MADE EVERY 15 FEET. INSERT A FOLD OF THE NET INTO A 6" TRENCH AND TAMP FIRMLY. STAPLE AT 12" INTERVALS ACROSS THE NET. LAY THE NET SMOOTHLY ON THE SURFACE OF THE SOIL – DO NOT STRETCH THE NET, AND DO NOT ALLOW WRINKLES.



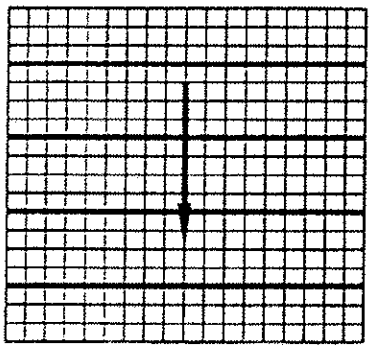
ANCHORING ENDS AT STRUCTURES: PLACE THE END OF THE NET IN A 12" SLOT ON THE UP-CHANNEL SIDE OF THE STRUCTURE. FILL THE TRENCH AND TAMP FIRMLY. ROLL THE NET UP THE CHANNEL. PLACE STAPLES AT 12" INTERVALS ALONG THE ANCHOR END OF THE NET.

INSTALLATION OF NETTING AND MATTING

Figure WTCP-06-1
Mat Anchoring

ON SHALLOW SLOPES, STRIPS OF NETTING MAY BE APPLIED ACROSS THE SLOPE.

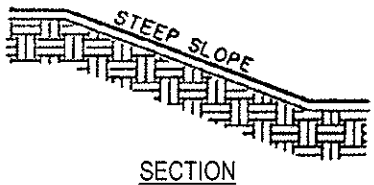
SECTION



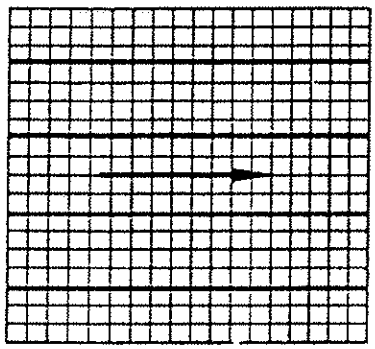
(SHALLOW SLOPES)

PLAN

ON STEEP SLOPES, APPLY STRIPS OF NETTING PARALLEL TO THE DIRECTION OF FLOW AND ANCHOR SECURELY.



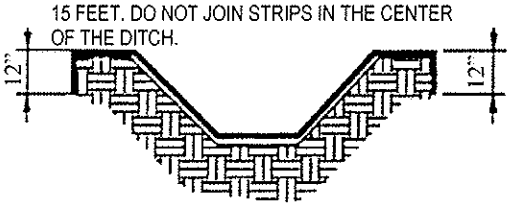
SECTION



(STEEP SLOPES)

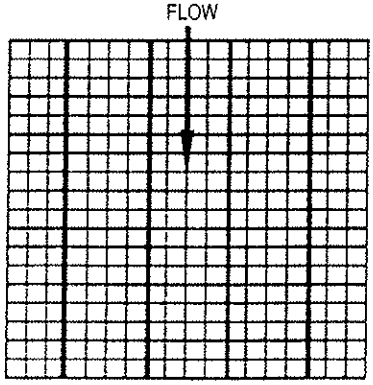
PLAN

IN DITCHES, APPLY NETTING PARALLEL TO THE DIRECTION OF FLOW. USE CHECK SLOTS EVERY 15 FEET. DO NOT JOIN STRIPS IN THE CENTER OF THE DITCH.



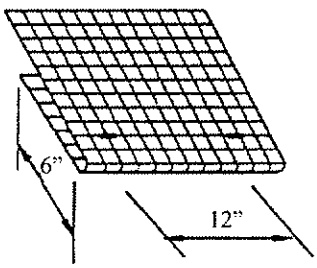
SECTION

FLOW



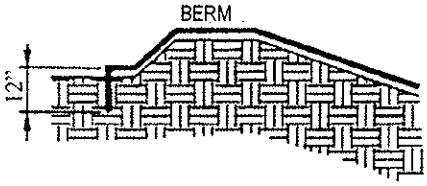
(DITCH)

PLAN



BRING NETTING DOWN TO A LEVEL BEFORE TERMINATING THE INSTALLATION. TURN THE END UNDER 6" AND STAPLE AT 12" INTERVALS.

BERM



WHERE THERE IS A BERM AT THE TOP OF THE SLOPE, BRING THE MATTING OVER THE BERM AND ANCHOR IT BEHIND THE BERM WITH A 12" ANCHOR TRENCH.

Figure WTCP-06-2
Mat Anchoring and Layout