E-5 VEGETATED WATERWAYS

PURPOSE & APPLICATIONS

A vegetated waterway is a natural or constructed waterway (ditch) or outlet, shaped or graded to form either a parabolic, or trapezoidal cross-section, and established with suitable. It reduces gully erosion and provides limited filtering of sediment and pollutants.
This practice is applicable at all sites where concentrated runoff needs to be conveyed and controlled without causing erosion (roadside ditches, drainage easements, etc.). Stone centered waterways are also practical where machinery will need to cross them.

CONSIDERATIONS

- Lack of established vegetation in late fall may result in spring erosion and water quality deterioration. Refer to the OVERWINTER STABILIZATION AND CONSTRUCTION BMP.
- Areas with seepage (high water table) may be regulated wetlands and a NRPA permit may be required.
- Local fishery and wildlife needs should be considered in the selection of vegetative seed mixtures. If shading is required to keep water temperatures low for fisheries, trees and shrubs should be planted to shade the waterway.

SPECIFICATIONS

1. Design Specifications

Refer to the detail drawing found at the back of this section for the proper design and construction of a vegetation swale.
Capacity: The minimum capacity of the swale must be sufficient to confine the peak runoff expected from a storm of 10-year frequency, 24-hour duration at a minimum. On slopes of less than 1 percent, out-of-bank flow may be permitted if such flow will not cause erosion, property damage, or threaten life.
Velocity: Velocities shall not exceed the maximum permissible velocity values for vegetated soils as listed in APPENDIX B.
Slope: The vegetation within a ditch line with a slope greater than 8 % will not hold or remain healthy. Thus, ditches with a slope steeper than 8% will need to be ripraped. See the RIPRAP WATERWAYS BMP.
Drainage: A stone center drains or another suitable reinforcement drainage measure shall be provided for swales having a continuous flows, a high water table, or seepage problems. Stone sizing for stone-centered waterways should be no larger than 2-3 inches (D50). Sites with flatter slopes (less that 2%) where water- tolerant vegetation, such as reed canarygrass, can be grown and erosion will not occur may not require additional reinforcement. NOTE: This condition is indicative of a wetland area and a NRPA permit would be required.
Outlet: All grassed waterways shall have a stable outlet with adequate capacity for the design flow. The outlet can be another vegetated channel, an earth ditch, a natural channel, or other suitable outlet. The bank-full discharge from the new channel shall flow smoothly into the existing channel without any velocity increase or depth loss.
Erosion Control Blanket: The placement of one strip of erosion control blanket at the base of a ditch or swale is an excellent way to protected the newly excavated ditch from erosion until vegetation is established. This is especially beneficial when the swale has a slight slope. However, the manufacturer's specification for stapling must be followed.

2. Vegetative Specifications

Special emphasis will be given to the proper installation and maintenance of vegetative practices during planning, design, and construction.

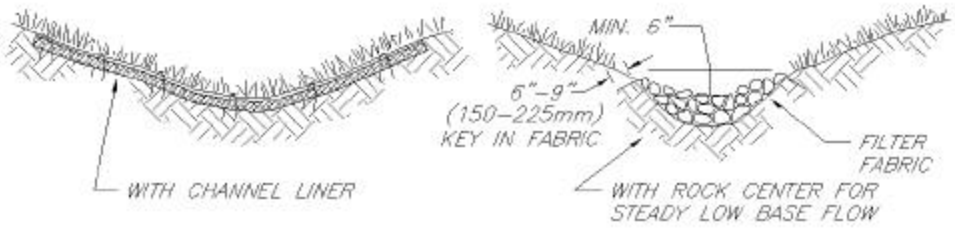
- Upon final grading, the disturbed areas shall be immediately seeded to permanent vegetation and mulched and will not be used as outlets until a dense, vigorous vegetative cover has been obtained. Refer to the PERMANENT VEGETATION BMP. See APPENDIX A for suitable seed mixtures for the purpose and site conditions.
- Seeded areas need protection during establishment and will be treated in accordance with the MULCHING BMP. Note that netting or excelsior mesh should be installed in the base of all vegetated channels until vegetation is well established (75% surface cover at a minimum).

3. Schedule of Installation

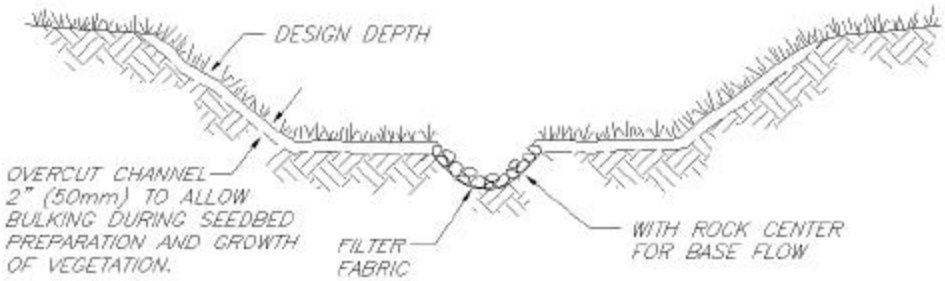
Once soil is exposed for waterway construction, it should be immediately shaped, graded and stabilized.
Vegetated waterways need to be stabilized early during the growing season (prior to September 15). If final seeding of waterways is delayed past September 15, emergency provisions such as sod or riprap may be required to stabilize the channel. Waterways should be fully stabilized prior to directing runoff to them.

MAINTENANCE

A maintenance program should be established to maintain waterway capacity, vegetative cover, and the outlet. The need for periodic liming and fertilizing shall be based on soil tests or visual observation. Mow waterway at least once annually. When practical, delay mowing until after July 15 to accommodate ground nesting wildlife. Mow to a height of 4 to 6 inches to help maintain good surface protection. Excessive growth shall be removed. Do not mow later than 30 days prior to the first killing frost (average date).



TYPICAL PARABOLIC CHANNEL
CROSS-SECTION



TYPICAL TRAPEZOIDAL CHANNEL
CROSS-SECTION

NOTES

1. CHOOSE FABRIC BASED ON SOILS PRESENT, I.E., COARSE OR CLAYS/SILTS.
2. ROCK SIZE IN CHANNEL CENTER BASED ON VELOCITY, SEE ROCK SIZING.
3. USE TURF REINFORCEMENT MATS IF VELOCITY EXCEEDS 3 FPS. REFER TO APPROPRIATE CHAPTER IN MANUAL.

GRASS-LINED CHANNEL
TYPICAL CROSS SECTIONS

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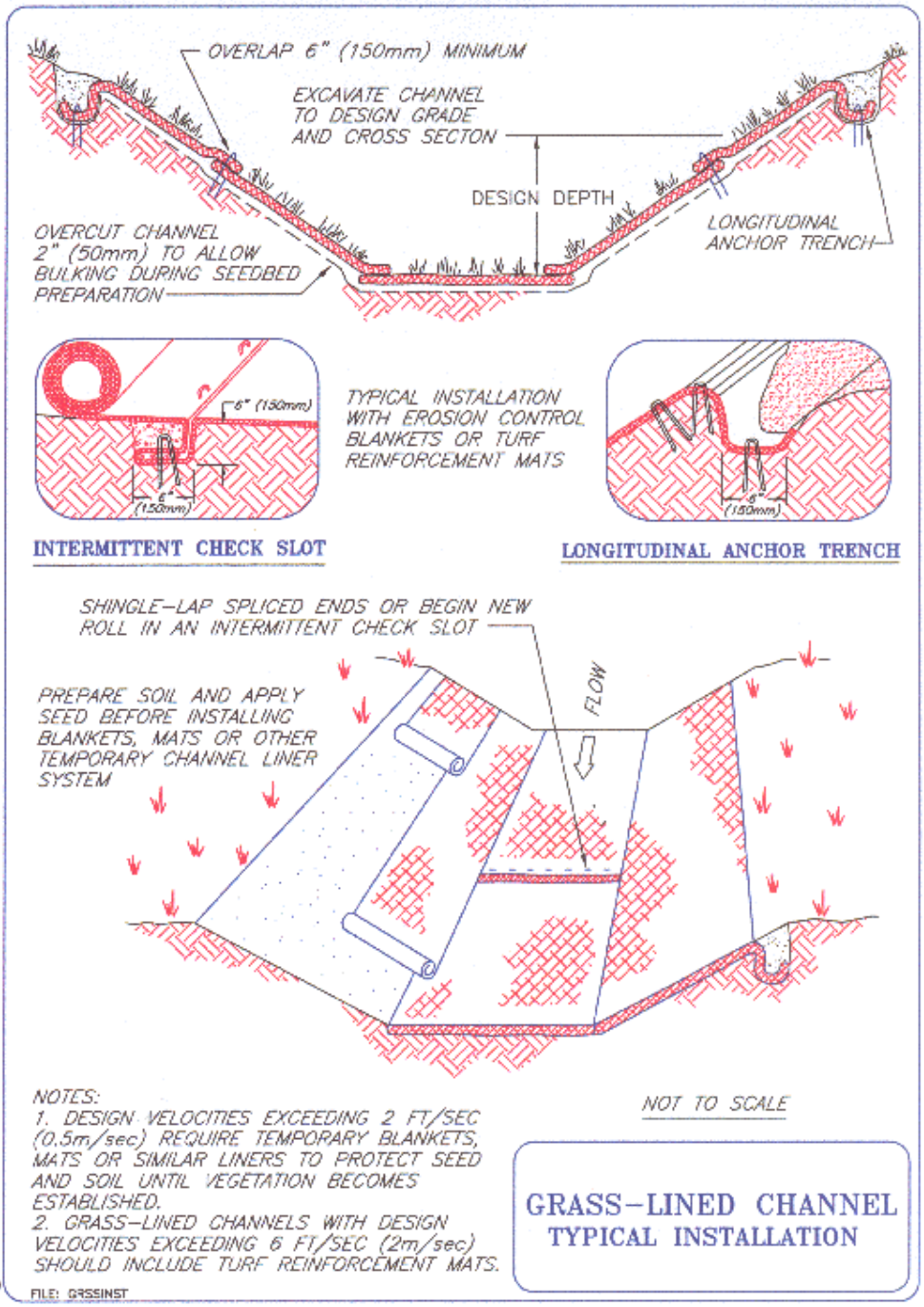
OVERLAP 6" (150mm) MINIMUM
EXCAVATE CHANNEL TO DESIGN GRADE AND CROSS SECTON
DESIGN DEPTH
OVERCUT CHANNEL 2" (50mm) TO ALLOW BULKING DURING SEEDBED PREPARATION
LONGITUDINAL ANCHOR TRENCH
6" (150mm)
6" (150mm)
TYPICAL INSTALLATION WITH EROSION CONTROL BLANKETS OR TURF REINFORCEMENT MATS
6" (150mm)
INTERMITTENT CHECK SLOT
LONGITUDINAL ANCHOR TRENCH
SHINGLE-LAP SPLICED ENDS OR BEGIN NEW ROLL IN AN INTERMITTENT CHECK SLOT
PREPARE SOIL AND APPLY SEED BEFORE INSTALLING BLANKETS, MATS OR OTHER TEMPORARY CHANNEL LINER SYSTEM
FLOW
NOTES:
1. DESIGN VELOCITIES EXCEEDING 2 FT/SEC (0.5m/sec) REQUIRE TEMPORARY BLANKETS, MATS OR SIMILAR LINERS TO PROTECT SEED AND SOIL UNTIL VEGETATION BECOMES ESTABLISHED.
2. GRASS-LINED CHANNELS WITH DESIGN VELOCITIES EXCEEDING 6 FT/SEC (2m/sec) SHOULD INCLUDE TURF REINFORCEMENT MATS.
NOT TO SCALE
GRASS-LINED CHANNEL
TYPICAL INSTALLATION
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