Westmoreland Conservation District

J. Roy Houston Conservation Center
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724-837-5271

email: wcd@wcdpa.com
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Mission

The Westmoreland Conservation District promotes, educates, and implements conservation principles through examples and programs. We encourage best management practices and voluntary compliance of laws. Our Board of Directors, professionals, and volunteers are committed to the leadership and service required in pursuing a better environment. We use our skills and talents, and the cooperation of our partners to build a culture of responsible stewardship and sustainability.

4/22-250

Westmoreland Conservation District

Contractor's Field Guide to CONSERVATION

Best Management Practices (BMPs)

Purpose

This field guide is designed as a reference for the proper installation of erosion and sediment control best management practices. You will find standard details for site access, perimeter erosion and sediment controls, outlet protection, stream/wetland crossings, and site stabilization. Those listed in the field guide are representative of the many Best Management Practices (BMPs) available to site contractors.

Sediment is the number one pollutant in Pennsylvania's streams and rivers. Implementing these erosion and sediment controls will reduce this source of pollution in our waterways. Clean, healthy streams benefit our communities, our local wildlife, and our economy.

Plans and Permits

Please be aware that your project may need approval from the municipality, the conservation district, or PA Department of Environmental Protection (DEP).

PA DEP's Chapter 102 regulations require a written Erosion and Sediment (E&S) Control Plan for projects involving the disturbance of more than 5,000 square feet of land. In certain municipalities, this type of project also requires municipal and conservation district approval prior to starting the project. Any earthmoving project with disturbance greater than one acre requires a National Pollutant Discharge Elimination System (NPDES) permit from the conservation district and/or PA DEP.

Projects that impact streams, wetlands, ponds, lakes, rivers, etc., may require a Chapter 105 permit from PA DEP or the conservation district. In general, Chapter 105 permits are necessary if your project changes the course, current, cross-section, or quality of a stream or other body of water.

Please contact the conservation district for more information on permits.

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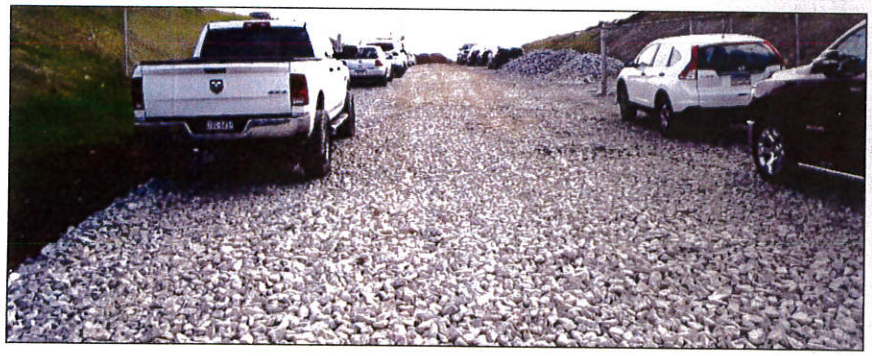
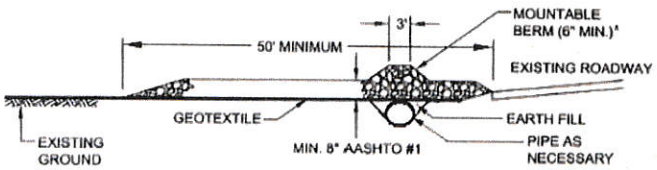


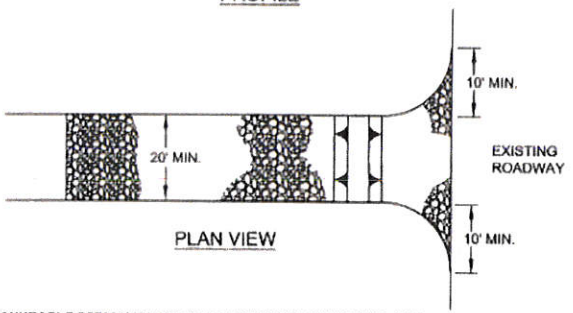
Purpose

A rock construction entrance should be installed whenever it is anticipated that construction traffic will exit the project site onto any roadway, public or private. Access to the site should be limited to the stabilized construction entrance.

STANDARD CONSTRUCTION DETAIL # 3-1
Rock Construction Entrance



PROFILE



PLAN VIEW

* MOUNTABLE BERM USED TO PROVIDE PROPER COVER FOR PIPE

Modified from Maryland DOE

- Use a rock entrance wherever vehicles may be expected to enter or leave the site.
- Remove topsoil prior to installation of rock construction entrance. Place geotextile fabric and extend rock over full width of entrance.
- Use clean AASHTO#1 (without fines) to build the entrance.
- Divert runoff from roadway to a suitable sediment removal BMP prior to entering rock construction entrance.
- Install mountable berm wherever optional culvert pipe is used and install proper pipe cover as specified by manufacturer if not otherwise provided.
- Size pipe accordingly to the size of ditch being crossed.
- Do not sweep or deposit sediment on roadways or to roadside ditches, sewers, culverts, or other drainage courses.
- Keep a stockpile of fresh clean stone to restore the entrance if it becomes dirty.

Operation & Maintenance

Rock construction entrance must maintain a constant thickness throughout the project's completion.

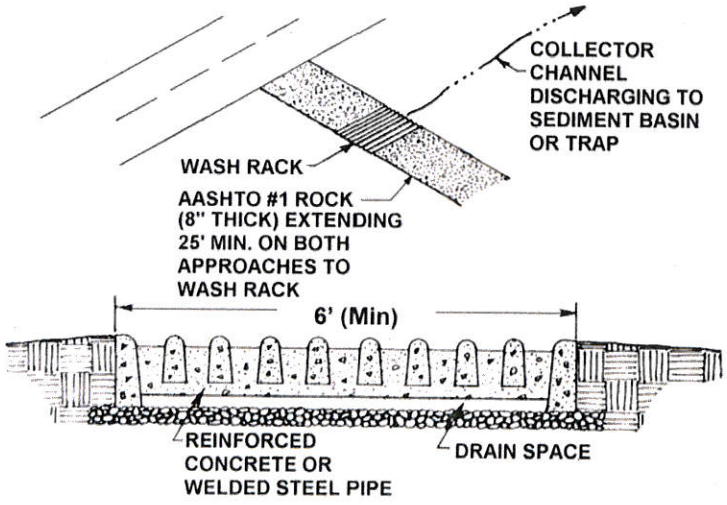
If excessive amounts of sediment are being deposited on roadways, extend length of rock construction entrance by 50 feet increments until condition is alleviated or install a wash rack.

Rock Construction Entrance with Wash Rack

Purpose

Wash racks remove sediment off tires prior to entering a roadway and are required when working in High Quality or Exceptional Value watersheds. Wash racks should discharge to a sediment trap.

STANDARD CONSTRUCTION DETAIL # 3-2
Rock Construction Entrance with Wash Rack



Modified from Smith Cattleguard Company

Rock Construction Entrance with Wash Rack

- Wash rack must at least be 20 feet wide.
- Wash rack must be designed with the anticipated construction vehicles in mind.
- A water supply must be available to wash off the wheels of all exiting vehicles.
- All sediment deposited on roadways must be removed and returned to the construction site.
- Do not sweep or deposit sediment on roadways to roadside ditches, sewers, culverts, or other drainage courses.
- Various commercial construction entrance products are available. Check with the conservation district first.

Operation & Maintenance

Rock construction entrance must maintain a constant thickness throughout the project's completion.

Drain space under wash rack must be kept open and clear of debris at all times.

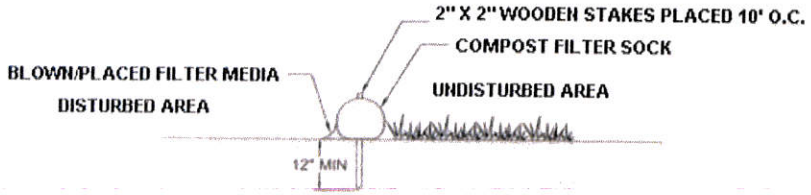
Any damage to the wash rack must be repaired before further use.

Compost Filter Sock

Purpose

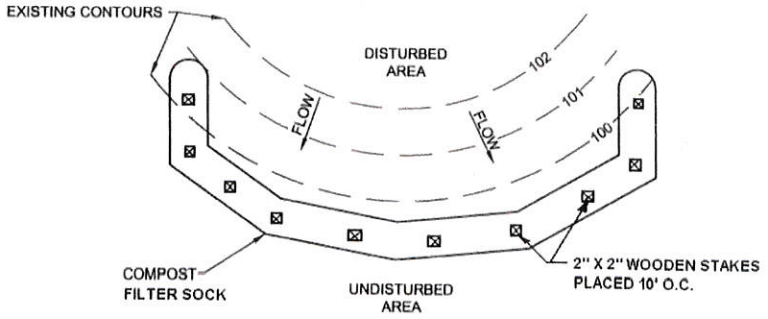
Compost filter socks are used for site perimeter control. They are made of a biodegradable or photodegradable mesh tube filled with a compost filter media.

STANDARD CONSTRUCTION DETAIL #4-1
COMPOST FILTER SOCK



SECTION VIEW
NTS

Compost Filter Sock



PLAN VIEW
NTS

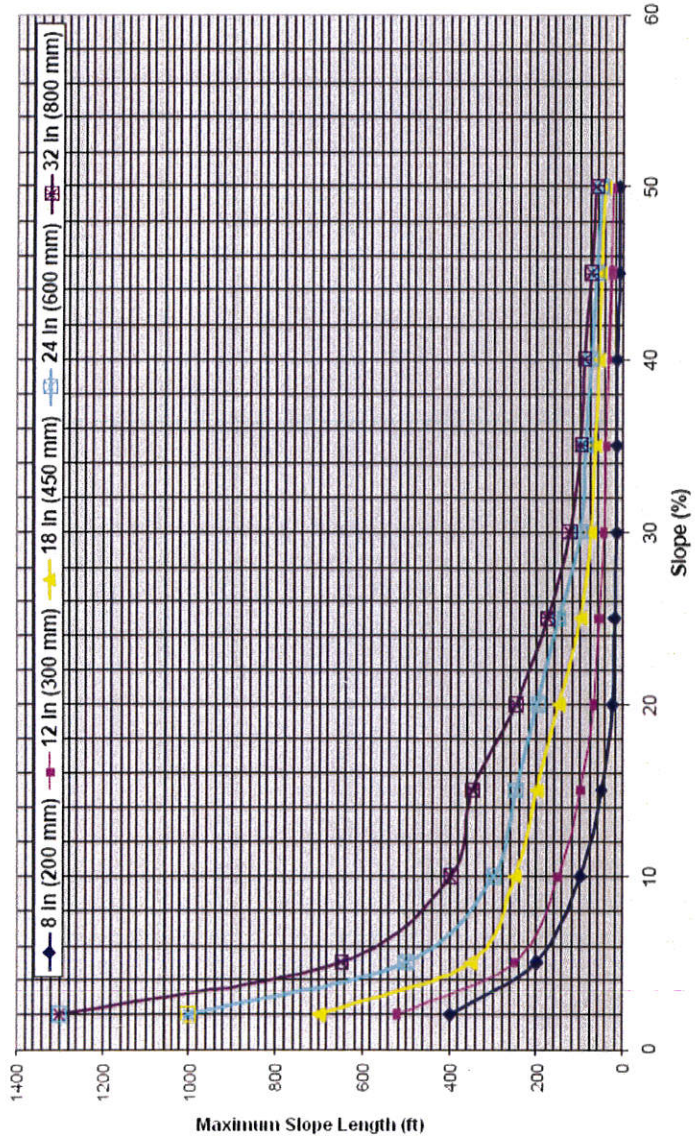
Filtrexx

TABLE 4.2
Compost Standards

Organic Matter Content	**25% - 100%** (dry weight basis)
Organic Portion	Fibrous and elongated
pH	5.5 - **8.5**
Moisture Content	**30% - 60%**
Particle Size	**30% - 50%** pass through **3/8" sieve**
Soluble Salt Concentration	5.0 dS/m (mmhos/cm) Maximum

- Compost filter sock must meet standards from Table 4.2
- Place compost filter sock on level grade and in contact with the ground.
- Turn both ends of the sock at least 8 feet up the slope at 45 degrees to main sock alignment.
- Install stakes immediately downslope of sock.
- Do not let traffic cross over compost filter sock.
- Remove accumulated sediment when it reaches half the aboveground height of the sock, then dispose properly.
- Remove stakes when area is stable. Sock can then be left in place and vegetated or removed.
- Cut compost filter sock mesh and spread mulch as a soil supplement after removal.

FIGURE 4.2
MAXIMUM PERMISSIBLE SLOPE LENGTH ABOVE COMPOST FILTER SOCKS



Adapted from Filtrexx

NOTE: 8" diameter socks should only be used to control small (≤ ¼ acre) disturbed areas on individual house lots).

- Do not place compost filter sock below a pipe outlet from a sediment trap or pond.
- Do not use compost filter sock across a stream or channel where flow is expected.

Operation & Maintenance

Inspect compost filter sock weekly and after each rain event.

Repair damaged compost filter sock according to manufacturer's specifications or within 24 hours of inspection.

Replace biodegradable filter sock after 6 months, photodegradable sock after 1 year.

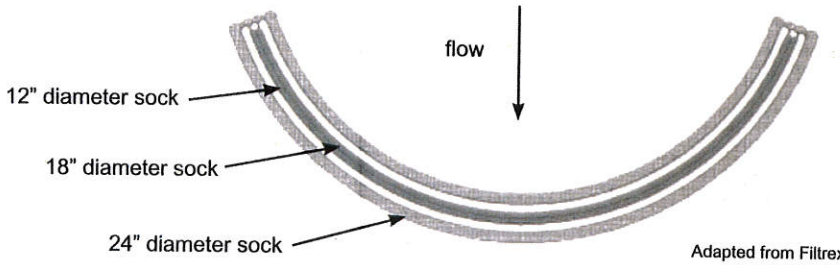
Replace polypropylene sock according to manufacturer's specifications.

Compost Filter Sock Trap

Purpose

Compost filter sock traps are used in areas that are difficult to install conventional sediment traps. They are composed of stacked compost socks in a pyramid configuration. They are useful to control access roads.

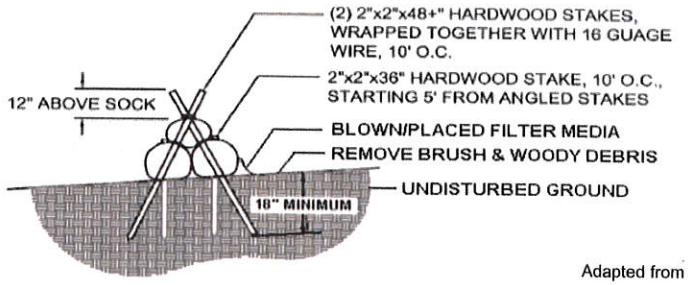
Standard Construction Detail #3-11 Compost Sock Sediment Trap



Adapted from Filtrexx

- Compost filter sock trap shall be sized to provide 2,000 cubic feet of storage capacity for each acre tributary to the trap. The maximum drainage area is five acres.
- Sediment accumulation shall not exceed 1/3 the total height of the trap.
- Socks shall be of larger diameter at the base of the trap and decrease in diameter for successive layers as indicated to the left.

Compost Filter Sock Trap



Adapted from Filtrexx

STAKING DETAIL

- Ends of the trap shall be a minimum of 1 foot higher in elevation than the mid-sections, which shall be located at the point of discharge.
- Compost sock sediment traps must not exceed three socks in height and must be stacked in pyramidal form. Minimum base width is equivalent to the height.
- Minimum trap height is one 24 inch diameter sock with 12 inches freeboard for each tributary drainage acre.
- Additional storage may be provided by excavating a 12 inch deep sump, extending 1 to 3 feet upslope of the socks along the lower side of the trap.
- Wrap the ends of the compost filter sock trap upslope so that sediment-laden water can pond in it.
- Do not use the compost filter sock trap in a stream or area of concentrated flow.

Operation & Maintenance

Compost sock sediment traps must be inspected weekly and after each rain event.

Sediment must be removed when it reaches 1/3 the height of the socks.

Photodegradable and biodegradable socks must not be used for more than 1 year.

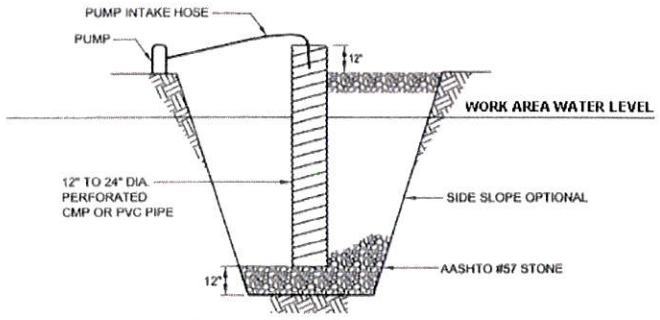
Sump Pit

Purpose

The sump pit serves to gather muddy water from a construction area into a single location where it may be pumped to a sediment filtering BMP, and discharged.

The sump pit may be used in combination with compost filter sock traps or other BMP's. The construction of the sump pit may allow it to serve as a standalone BMP in certain locations.

STANDARD CONSTRUCTION DETAIL #3-17
Sump Pit



Adapted from USDA NRCS

Sump Pit

- Locate sump at low point in work area and outside of construction activity.
- Wherever runoff from a work area flows directly to sump area, a filter bag must be attached at the discharge point unless pumping to a sediment basin or sediment trap.
- Minimum diameter of pit bottom must be 24 inches larger than pipe diameter.
- Minimum depth of pit must be 24 inches below water level in work area (including the AASHTO #57 stone).
- 12 to 24 inches perforated CMP or PVC pipe must be set on 12 inches of clean AASHTO #57 stone.
- Void space around pipe must be filled with AASHTO #57 stone. Pipe must extend 12 inches minimum above top of stone and/or water being pumped from work area.
- Set pump intake inside standpipe.
- The discharge from the pump must be to a stable area below disturbances from the work zone.
- Sump may be used in conjunction with filter bag where additional filtering is needed.

Operation & Maintenance

Remove sediment when 1/2 the depth of the pit is reached.

Inspect pump intake hose when in use.

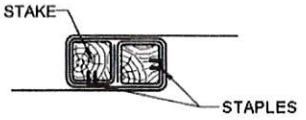
Silt Fence - Standard 18”

Purpose

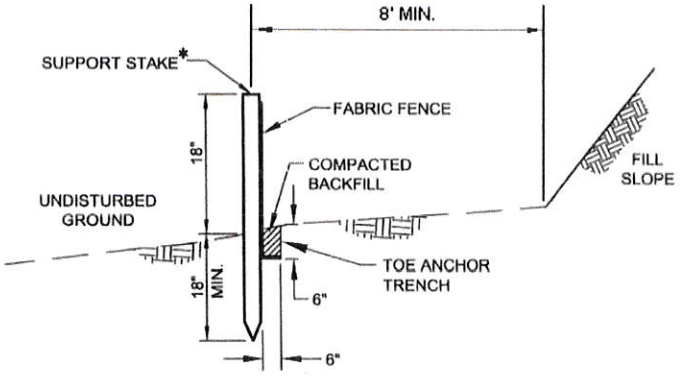
Silt fence is used to prevent sediment from leaving a disturbed site. Silt fence is placed below the disturbed area, and is sized according to the slope length and steepness. Silt fence traps the sediment and allows clean water through.

STANDARD CONSTRUCTION DETAIL # 4-7
Standard Silt Fence (18” High)

*STAKES SPACED @ 8' MAX. USE 2" x 2" (± 3/8") WOOD OR EQUIVALENT STEEL (U OR T) STAKES



JOINING FENCE SECTIONS

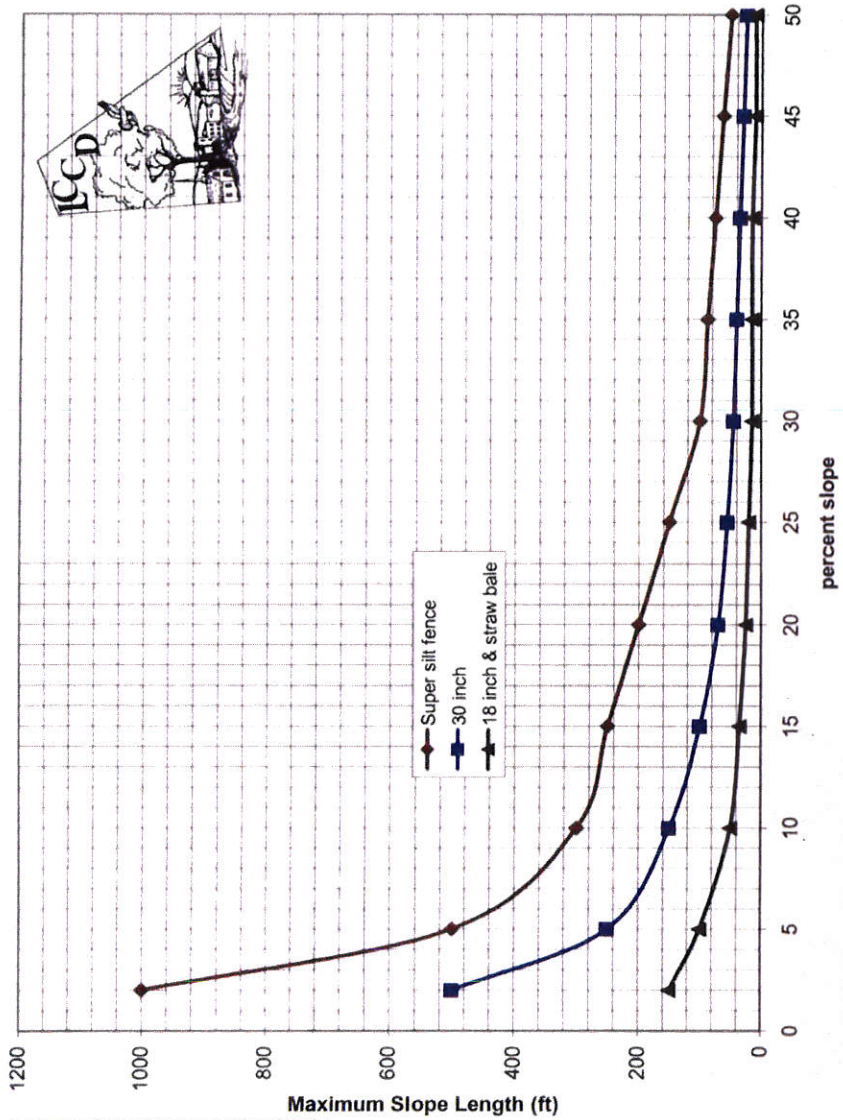


ELEVATION VIEW

PA DEP

- Geotextile fabric width must be at a minimum of 18 inches.
- Stakes must be hardwood or equivalent steel, (U or T) stakes.
- Place silt fence at a level grade.
- Turn both ends of the fence at least 8 feet up slope at 45 degrees to the main fence alignment.

FIGURE 4.3
Maximum Permissible Slope Length above Silt Fence and Straw Bale Barriers



Lebanon County Conservation District

Operation & Maintenance

Any section of silt fence which has been undermined or topped must be immediately replaced with a rock filter outlet.

Fence must be removed and properly disposed of when tributary area is permanently stabilized.

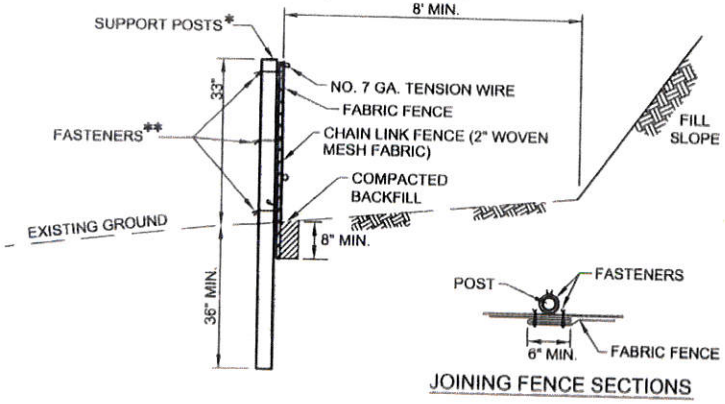
Remove sediment when accumulations reach half the aboveground height of the fence.

Silt Fence - Super Silt Fence

Purpose

Super silt fence is composed of chain link fence backed with geotextile fabric. It may be used to control runoff from some small disturbed areas where the maximum slope lengths for reinforced silt fence cannot be met and where sediment traps cannot be installed due to site constraints.

STANDARD CONSTRUCTION DETAIL # 4-10
Super Silt Fence



- Geotextile filter fabric must have a minimum width of 42 inches.
- Install posts with a posthole drill.
- Chain link must be galvanized No. 11.5 ga. steel wire with 2 ¼ inch opening, No.11 ga. aluminum coated steel wire in accordance with ASTM-A-491, or galvanized No.9 ga. steel wire top and bottom with galvanized No. 11 ga. steel intermediate wires. No. 7 ga. tension wire to be installed horizontally through holes at top and bottom of chain-link fence or attached with hog rings at 5 foot centers.
- Place silt fence at level grade.
- Turn both ends of the fence at least 8 feet upslope at 45 degrees to main barrier alignment.

Operation & Maintenance

Remove sediment when accumulations reach 1/2 the aboveground height of the fence.

Fence must be removed and properly disposed of when tributary area is permanently stabilized.

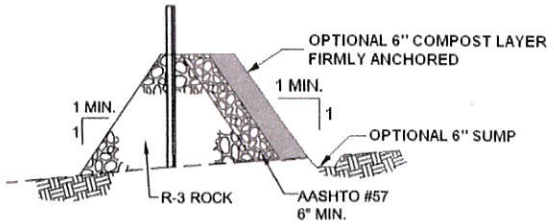
Rock Filter Outlet

Purpose

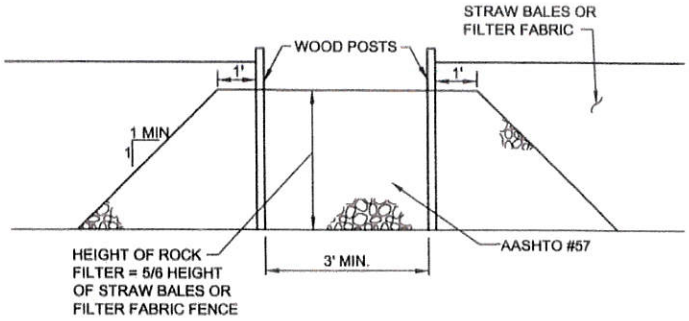
Rock filter outlets are used to drain a buildup of water through silt fence or compost sock.

Rock Filter Outlet

STANDARD CONSTRUCTION DETAIL # 4-6
Rock Filter Outlet



OUTLET CROSS-SECTION



UP-SLOPE FACE

PA DEP

- Use R-3 or R-4 rock and then faced with 2B stone or AASHTO #57.
- Install rock filter outlets where failure of a silt fence or straw bale barrier has occurred due to concentrated flow.
- Anchored compost layer must be used on upslope face in High Quality and Exceptional Value watersheds.

Operation & Maintenance

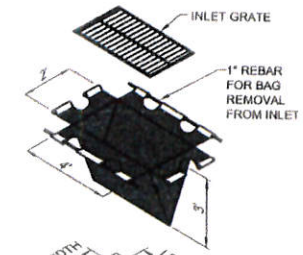
Remove sediment when accumulations reach 1/3 the height of the outlet.

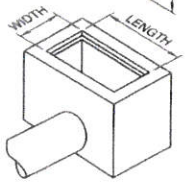
Inlet Protection - Inlet Filter Bag

Purpose

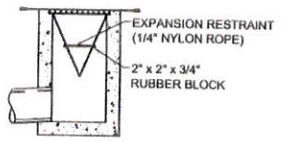
Inlet filter bags area used to protect inlets from silt and protect the stream from silt. Filter bags should be used where the inlets do not drain to a sediment trap or sediment basin. Bags are set inside of the inlet and the grate set on top.

STANDARD CONSTRUCTION DETAIL # 4-16
Filter Bag Inlet Protection - Type M Inlet

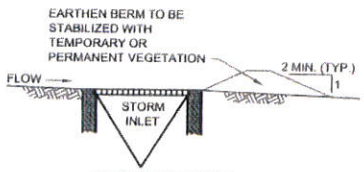




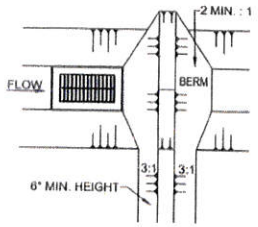
ISOMETRIC VIEW



INSTALLATION DETAIL



ELEVATION VIEW



PLAN VIEW

Adapted from PennDOT RC-70, 2008 Edition

- ½ acre maximum drainage area
- Guide the water into the inlet with an earth berm.
- Maintain rolled earthen berm until roadway is covered in stone. Maintain road subbase berm until roadway is paved. Maintain earthen berm in channel until permanent stabilization is completed.
- Geotextile fabric must have a minimum tensile strength of 120 pounds, burst strength of 200 psi, and trapezoidal tear strength of 50 pounds.
- Filter bags must trap all particles not passing a No. 40 sieve.
- Do not use on major paved roadways where ponding may cause traffic hazards.

Operation & Maintenance

Inspect inlet filter bags weekly and after each rain event because they tend to clog in clay-based soil areas.

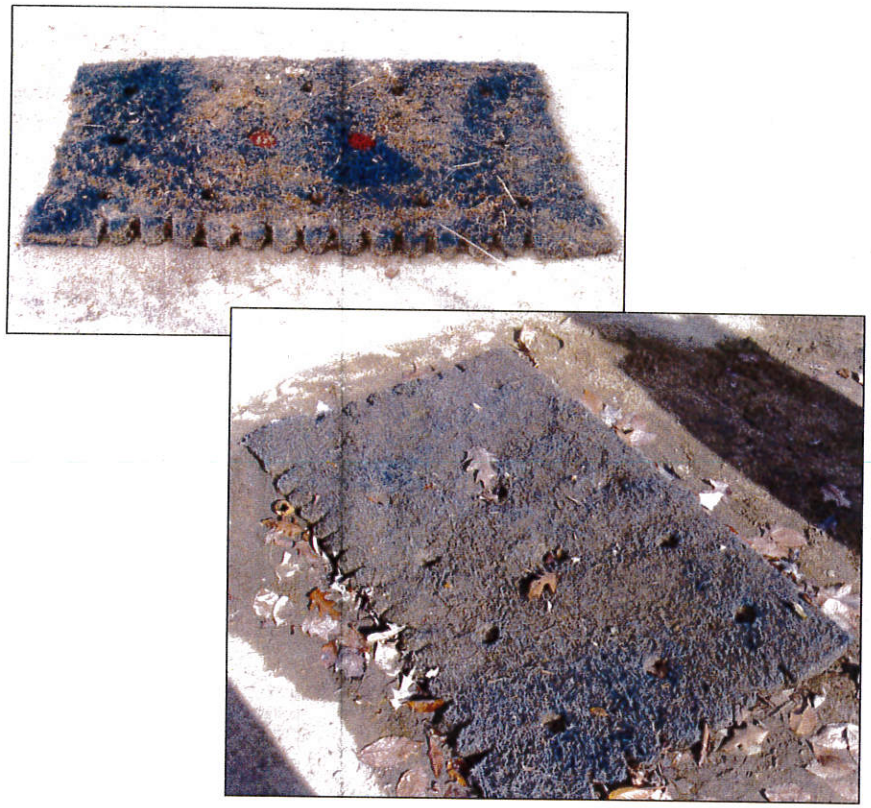
Empty, rinse, or replace bags when half full or when flow capacity has been reduced to cause flooding or bypassing of an inlet.

Replace damaged or clogged bags.

Needed repairs should start immediately after inspection.

Dispose accumulated sediments properly.

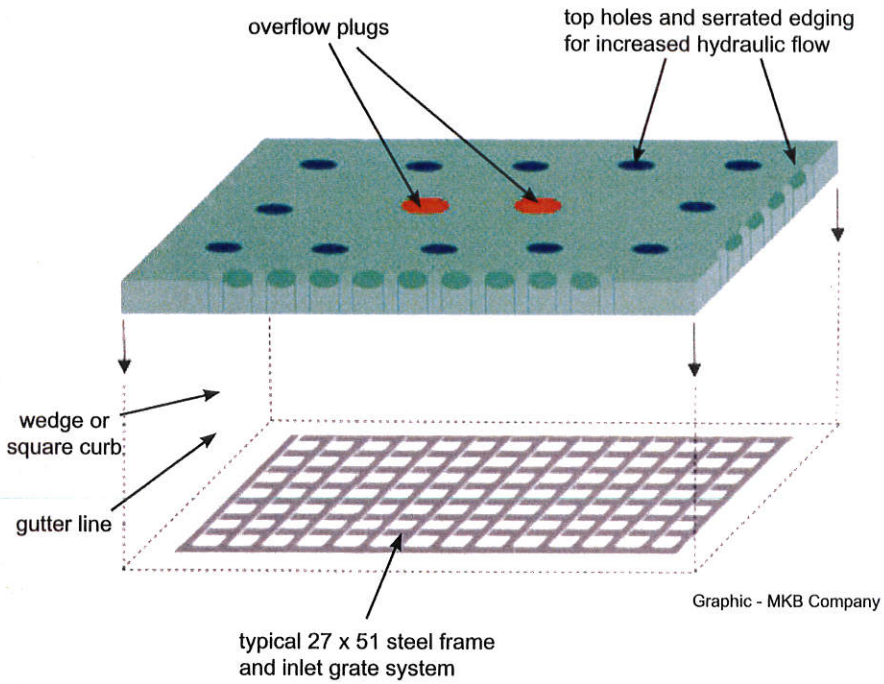
Inlet Protection – Inlet Filter Mat



Purpose

Inlet filter mats are highly effective protection against sediment and debris clogging storm water inlets. They greatly reduce the risk of street flooding. No tools are needed for installation, and they are easy to maintain. Being able to reuse filter mats make them the simple, reliable and cost effective solution inlet protection has always needed.

Inlet Protection - Inlet Filter Mat



Graphic - MKB Company

- Use the inlet filter mat where there is high traffic, but do not use when subject to snow plowing.

Operation & Maintenance

Inspect inlet filter mats weekly and after each rain event because they tend to clog in clay-based soil areas.

Empty, rinse, or replace mats when 1/2 full or when flow capacity has been reduced to cause flooding or bypassing of an inlet.

Replace damaged or clogged mats.

Needed repairs should start immediately after inspection.

Dispose accumulated sediments properly.

Top of Slope Berm

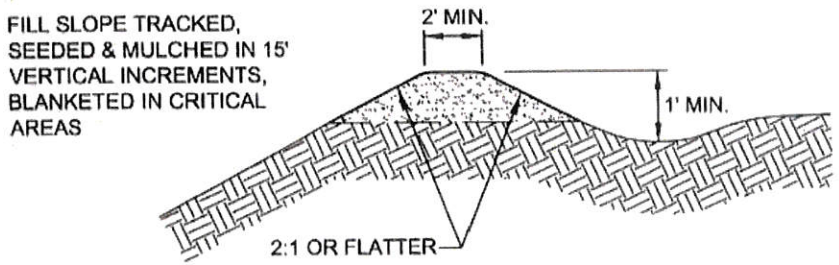
Top of slope berm

Top of slope channels

Purpose

Top of slope berms control runoff to prevent water from flowing over the edge of the fill slopes and causing erosion.

STANDARD CONSTRUCTION DETAIL # 6-4
Top-of-Slope Berm



Adapted from North Carolina DENR

- Berms must outlet to slope pipes, channels, or other approved means of conveying runoff to a sediment trap, sediment basin, or collector channel. No more than five acres should drain to berm.
- Channel behind berm must have positive grade to outlet and an appropriate protective lining.
- Berm must be adequately compacted to prevent failure.
- An acceptable alternative to top-of-slope berm is to continuously grade the top of fill to direct runoff away from the fill slope to a collector channel, sediment trap, or sediment basin.

Operation & Maintenance

Temporary berms must be placed, maintained, and adjusted continuously until 90% vegetative growth is established on the exterior of fill slopes with permanent storm drainage facilities functioning.

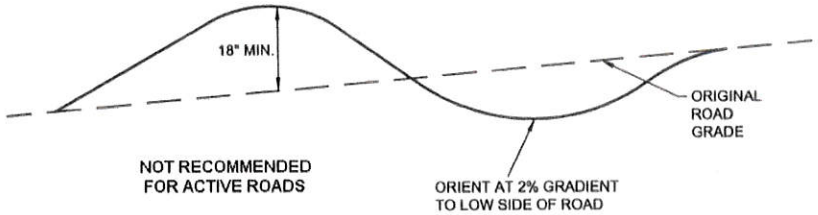
Waterbars

Purpose

Waterbars are typically used to control stormwater runoff on retired access roads and skid trails. They are also used to control runoff on pipeline and utility right of ways. They may be used to direct runoff to sediment traps and basins.

- Waterbars must discharge to a stable area.

STANDARD CONSTRUCTION DETAIL #3-5
Waterbar



Adapted from USDA Forest Service

TABLE 3.1 – Maximum Waterbar Spacing

PERCENT SLOPE	SPACING (FT)
<5	250
5 - 15	150
15 - 30	100
> 30	50

Adapted from USDA Forest Service

Operation & Maintenance

Waterbars must be inspected weekly (daily on active roads) and after each rain event.

Damaged or eroded waterbars must be restored to original dimensions within 24 hours of inspection.

Maintenance of waterbars must be provided until roadway, skidtrail, or right-of-way has achieved permanent stabilization.

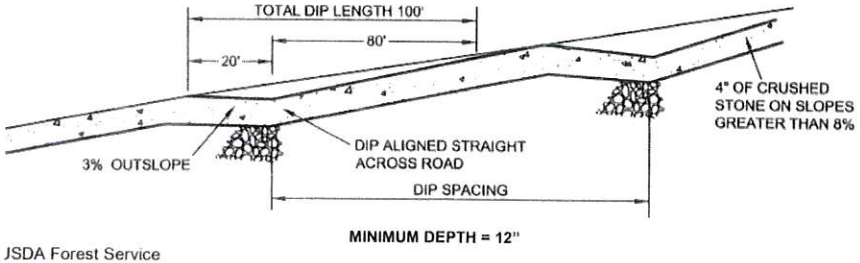
Waterbars on retired roadways, skidtrails, and right-of-ways must be left in place after permanent stabilization has been achieved.

Broad-based Dip

Purpose

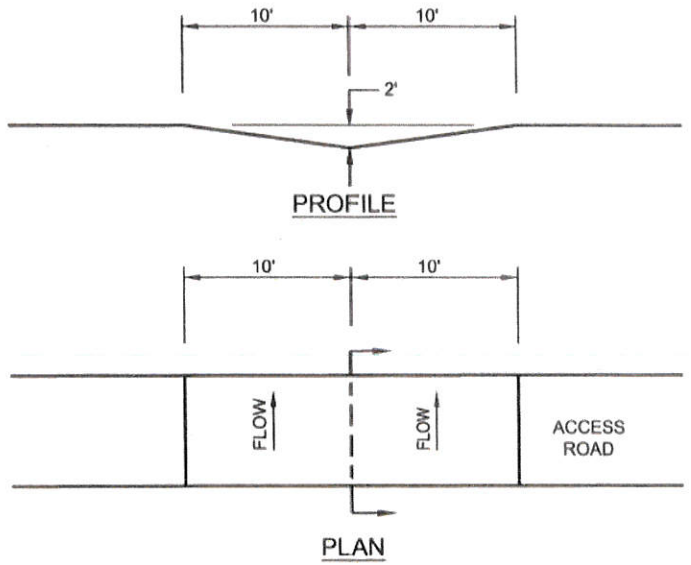
Broad-based dips are used on active access roads to divert stormwater and runoff and are easily traversed by most construction equipment.

STANDARD CONSTRUCTION DETAIL # 3-7
Broad-based Dip for High Gradient (5% - 10%) Roadways



JSDA Forest Service

STANDARD CONSTRUCTION DETAIL # 3-6
Broad-based Dip for Low Gradient (≤5%) Roadways



Maine DEP

- Broad-based dips must be constructed to the dimensions shown and at the locations shown on the plan drawings.
- Dips must be oriented so as to discharge to the low side of the roadway to a stable area.

Operation & Maintenance

Dips must be inspected daily.

Damaged or non-functioning dips must be repaired by the end of the workday.

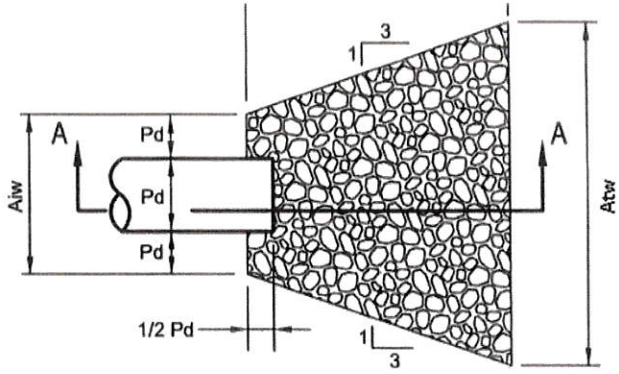
Outlet Protection - Riprap Apron

Purpose

Riprap aprons are an erosion control device to prevent scour at pipe and channel outfalls. It is important that riprap aprons are sized correctly to prevent displacement and erosion below the outlet protection.

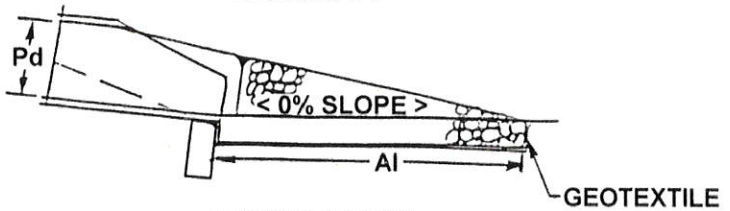
Outlet Protection - Riprap Apron

STANDARD CONSTRUCTION DETAIL #9-2
Riprap Apron at Pipe Outlet without Flared Endwall



PLAN VIEW

SECTION Y-Y



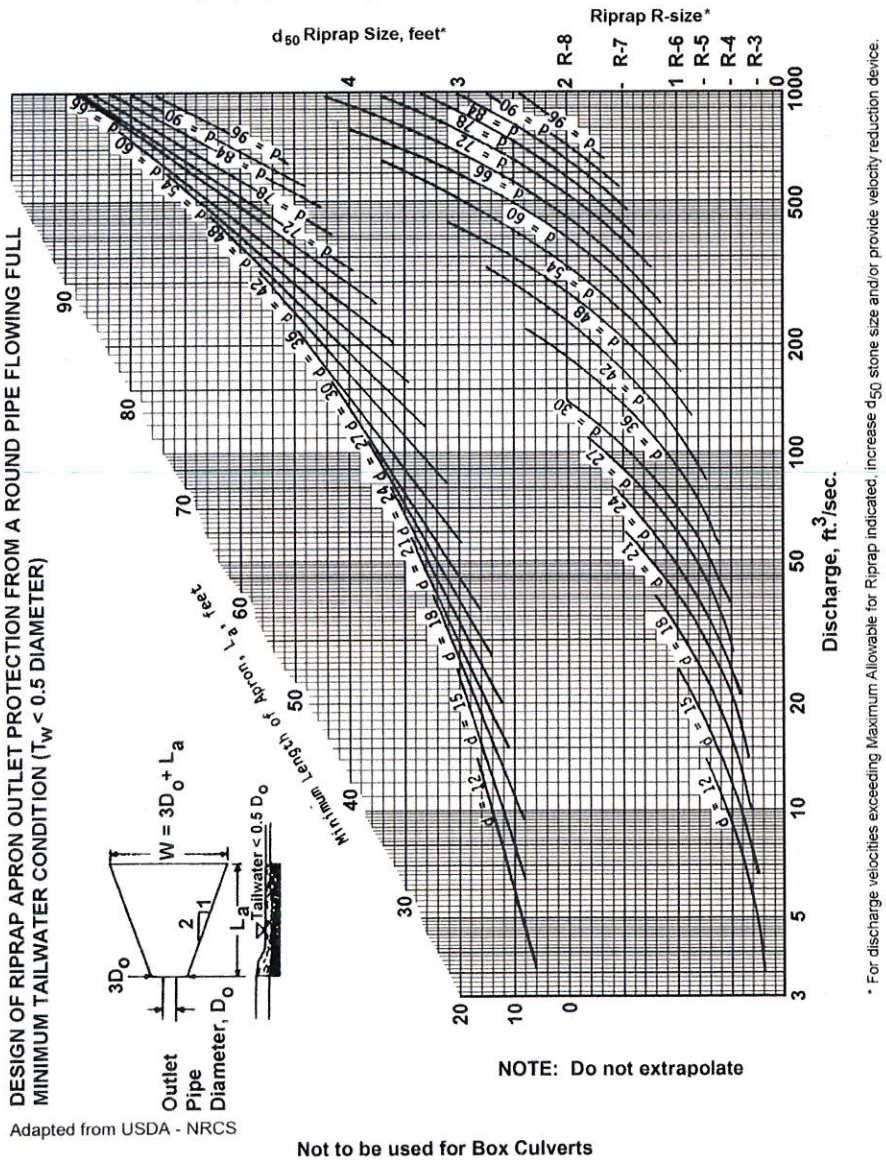
ELEVATION VIEW

PA DEP

NOTE: This table is intentionally blank and should be filled in by the plan preparer.

OUTLET NO.	PIPE DIA Pd (IN)	RIPRAP		APRON		
		SIZE (R-__)	THICK. Rt (IN)	LENGTH Al (FT)	INITIAL WIDTH Aiw (FT)	TERMINAL WIDTH Atw (FT)

FIGURE 9.3
Riprap Apron Design, Minimum Tailwater Condition



Adapted from USDA - NRCS

Not to be used for Box Culverts

* For discharge velocities exceeding Maximum Allowable for Riprap indicated, increase d_{50} stone size and/or provide velocity reduction device.

- All aprons must be constructed to the dimensions shown.
- Adjust terminal widths to match receiving channels.
- Extend riprap on backside of apron to at least ½ the depth of pipe on both sides to prevent scour around the pipe.
- Grouting riprap is not recommended.
- Carry the rock riprap apron clear to the bottom of the bank or edge of the stream.
- Use clean rock riprap to create the apron.
- Dish the apron out so that water stays on the apron its full length.
- Clean sediment from riprap aprons.
- Do not use R-3 or R-4 rock on pipes larger than 12 inches.

Operation & Maintenance

Inspect riprap aprons weekly and after each rain event.

Any displaced riprap within the apron should be replaced immediately.

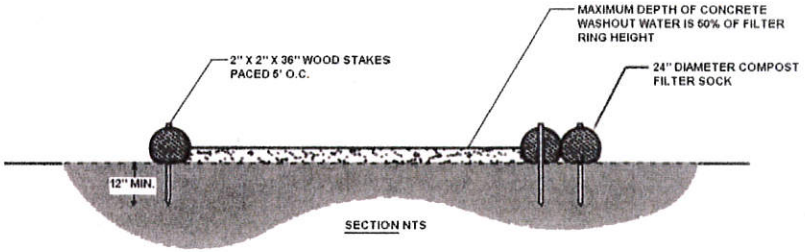
Concrete Washout

Purpose

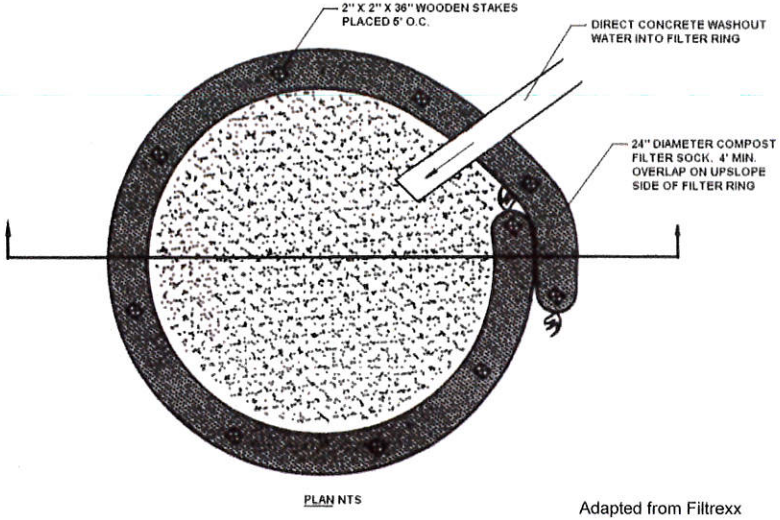
Concrete washouts are utilized to contain concrete wastes from entering and polluting surface waters. Concrete washouts are not necessary on site if vehicles are able to wash out back at the concrete facility.

- Use an impervious geomembrane liner under the compost sock ring.
- Place the concrete washout at least 50 feet from a stream, storm drain, or drainage channel.

FIGURE 3.18
Typical Compost Sock Washout Installation



NOTES:
1. INSTALL ON FLAT GRADE FOR OPTIMUM PERFORMANCE
2. 18" DIAMETER FILTER SOCK MAY BE STACKED ONTO DOUBLE 24" DIAMETER SOCKS IN PYRAMIDAL CONFIGURATION FOR ADDED HEIGHT.



Adapted from Filtrexx

Operation & Maintenance

Accumulated materials should be removed when the washout reaches 75% capacity.

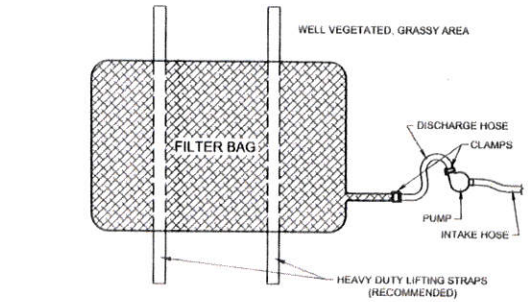
Plastic liners should be replaced with each cleaning of the washout facility.

Pumped Water Filter Bag

Purpose

Pumped water filter bags are a sediment control device that filters sediment laden water from ditches, ponds, or other areas of containment prior to discharging to surface waters.

STANDARD CONSTRUCTION DETAIL # 3-16
Pumped Water Filter Bag



Property	Test Method	Minimum Standard
Avg. Wide Width Strength	ASTM D-4884	60 lb/in
Grab Tensile	ASTM D-4632	205 lb
Puncture	ASTM D-4833	110 lb
Mullen Burst	ASTM D-3786	350 psi
UV Resistance	ASTM D-4355	70%
AOS % Retained	ASTM D-4751	80 Sieve

Pumped Water Filter Bag

- Filter bags must trap particles larger than 150 microns.
- Low volume filter bags must be made from non-woven geotextile material sewn with higher strength, double stitched "J" seams.
- High volume bags must be made from woven geotextiles and meet the tables standards.
- Keep spare bags on site in case filter bag fails or becomes full.
- Place bags on straps for easy removal.
- Keep bags on well vegetated areas and discharge onto stable, erosion-resistant locations.
- Provide a geotextile underlayment and flow path if this cannot be achieved.
- Do not place bags on a slope greater than 5%.
- Place clean rock or other non-erodible material under filter bags if slope exceeds 5%.
- Install a compost berm or compost filter sock below bags located in HQ or EV watersheds, within 50 feet of any surface water, or where grassy area is not available.
- Use the proper size of filter bag for the pump you intend to use.
- Remove the pumped water filter bag when it is no longer needed and revegetate the area as necessary.
- Do not place the pumped water filter bag in a stream channel or wetland.
- Do not place the pumped water filter bag where equipment cannot get in to service or remove it.

Operation & Maintenance

Replace filter bags when they become 50% full of sediment.

Inspect filter bags hose connections for leakage while in use.

Working in a Stream

Purpose

In-stream work can be done safely and effectively while also protecting the environment. It is important to keep the stream out of the work area and to keep muddy water out of the stream.

Important Points

- Contact the conservation district to see if a permit is required for any in stream projects.
- Grubbing must not take place within 50 feet of top-of-bank until all materials required to complete the crossing are on site and pipe is ready for installation.
- Hazardous or pollutant material storage areas must be located at least 100 feet back from the top of stream bank.
- Install a cofferdam made of sandbags, jersey barriers, or other non-erosive material, no earth fill.
- For low gradient channels, the rock filter may be replaced by an impervious cofferdam to prevent backflow into the work area.
- Excavate a sump for the pump intake.
- Bypass pump intake must be maintained at a sufficient distance from the bottom to prevent pumping of channel bottom materials.
- Water accumulating within the work area must be pumped to a pumped water filter bag or sediment trap prior to discharging to any surface waters.
- Trench plugs must be installed within the trench on both sides of the stream channel.
- Appropriate streambank protection must be provided within the channel.
- All disturbed areas within 50 feet of top-of-bank must be blanketed or matted within 24 hours of initial disturbance for major streams unless otherwise authorized.
- In stream work should only occur during low flow.

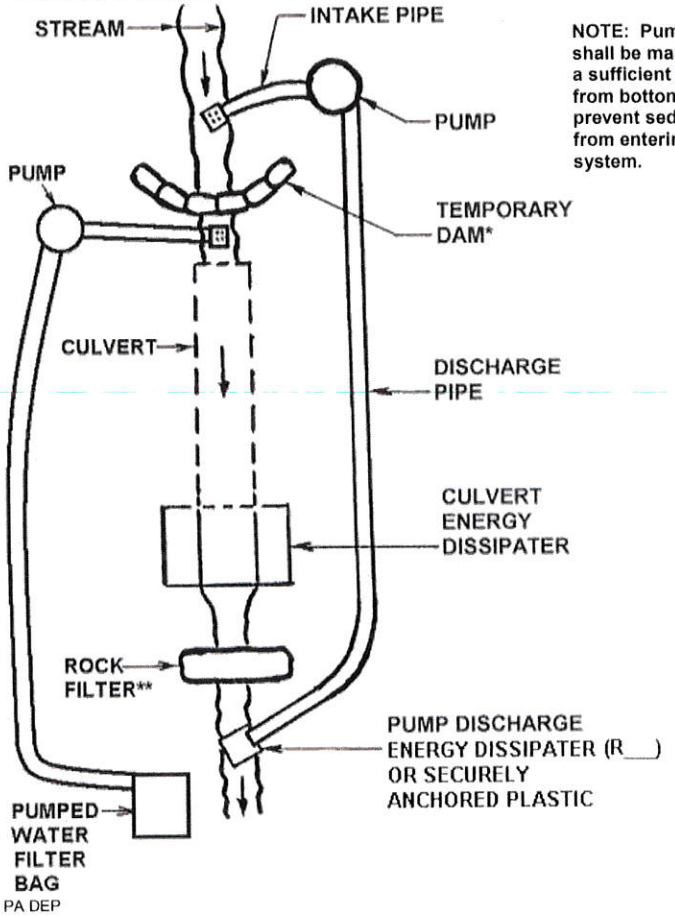
Stream Crossing - Temporary Cofferdam and Pump Bypass

Purpose

A stream crossing with a cofferdam and pump bypass is typically utilized during in stream work for the placement of a culvert or utility line crossing. This BMP allows the earthwork to be performed in dry conditions while preventing sediment laden water from entering the stream.

- Contact the conservation district to see if a permit is needed for any in-stream projects.

FIGURE 3.11
Temporary Cofferdam and Pump Bypass Around In-channel Work Areas



NOTE: Pump intake shall be maintained a sufficient distance from bottom to prevent sediment from entering the system.

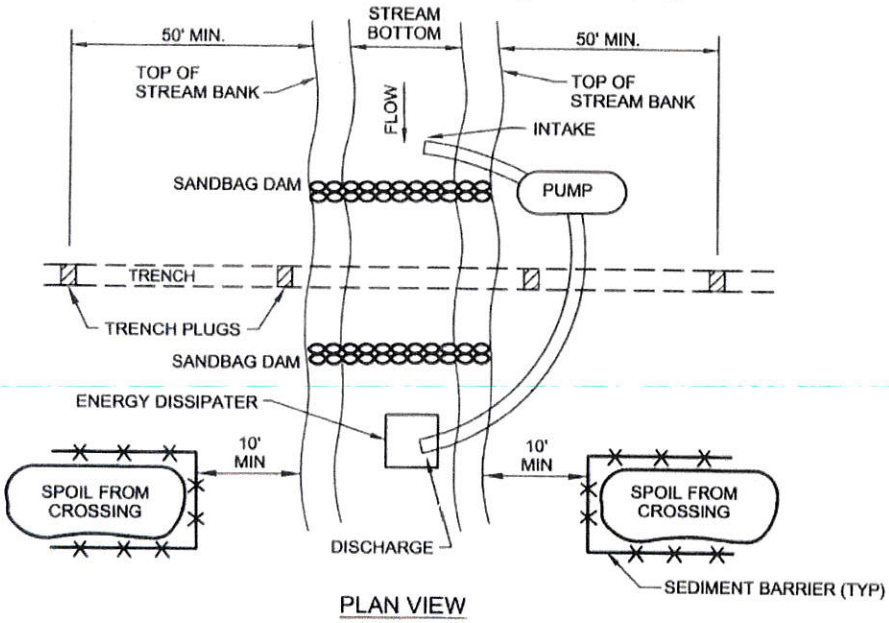
PA DEP

* Sandbags (Standard Construction Detail #3-15), Jersey barriers (Figure 3.13) or other non-erosive material, no earth fill. Do not excavate a sump for the pump intake.

** See Standard Construction Detail # 4-14. For low gradient channels, the rock filter may be replaced by an impervious cofferdam to prevent backflow into the work area.

Stream Crossing - Temporary Cofferdam and Pump Bypass

STANDARD CONSTRUCTION DETAIL #13-2
Typical Utility Line Stream Crossing with Pump Bypass



PLAN VIEW

PA DEP

Operation & Maintenance

Make sure sandbag dam stays intact.

Energy dissipater needs to be intact where hose discharges.

Inspect pumped water filter bag daily.

Repair and replace damaged sandbags immediately.

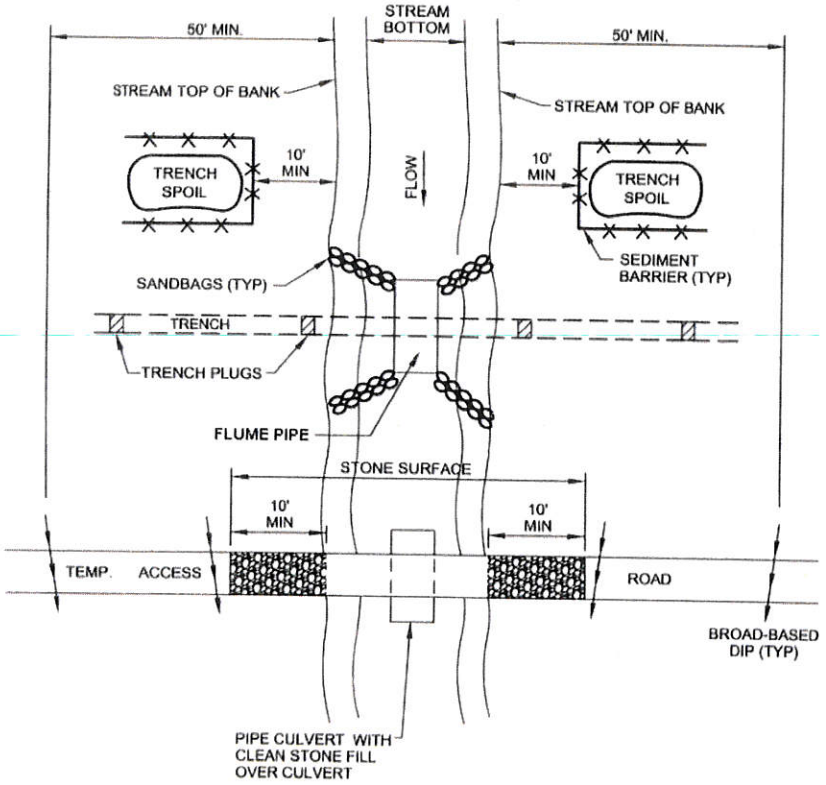
Stream Crossing - Rigid or Flexible Pipe Flume

Purpose

Stream crossings using rigid or flexible pipe flumes are typically utilized for utility line or temporary equipment crossings. This BMP directs the stream through the flume creating an area in dry conditions, or it can be utilized to travel over the stream channel.

- Contact the conservation district to see if a permit is needed for any in-stream projects.

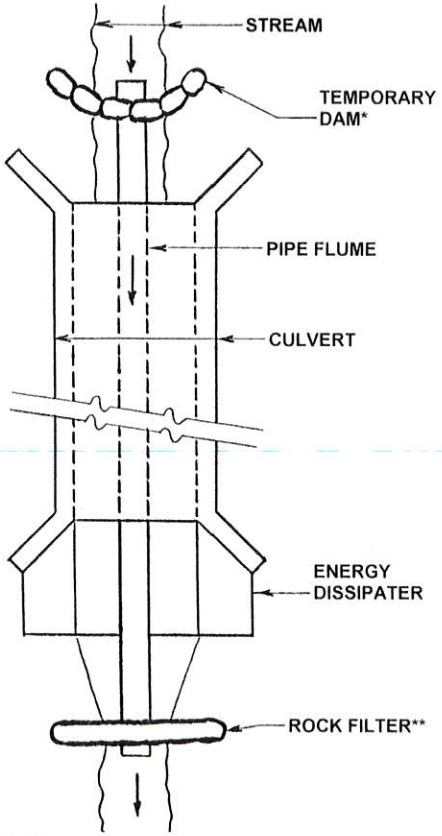
STANDARD CONSTRUCTION DETAIL #13-1
Typical Utility Line Flumed Stream Crossing with Optional Access Road



PLAN VIEW

PA DEP

FIGURE 3.10
Rigid or Flexible Pipe Flume Through a Work Area



PA DEP

* Sandbags (Standard Construction Detail #3-15), Jersey barriers (Figure 3.13) or other non-erosive material, no earth fill.

** See Standard Construction Detail # 4-14. For low gradient channels, the rock filter may be replaced by an impervious cofferdam to prevent backflow into the work area.

Operation & Maintenance

Inspect cofferdams daily.

Repair and replace defects immediately.

Cofferdam

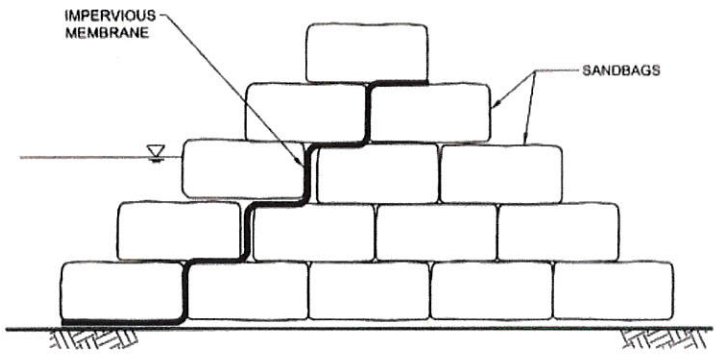
Purpose

Cofferdams are utilized in stream crossings to either divert the stream or temporarily dam the stream to be pumped around. Cofferdams are typically constructed of sandbags or jersey barriers or other non-erosive material, not earth fill. Contact the conservation district to see if a permit is needed for any stream projects.

- Plan the cofferdam for expected high flows during the duration of your project.
- Remove all cofferdam materials from stream when done.
- Do not use streambed material to build a cofferdam.
- Do not use "dirty" material to build a cofferdam.

Cofferdam Details

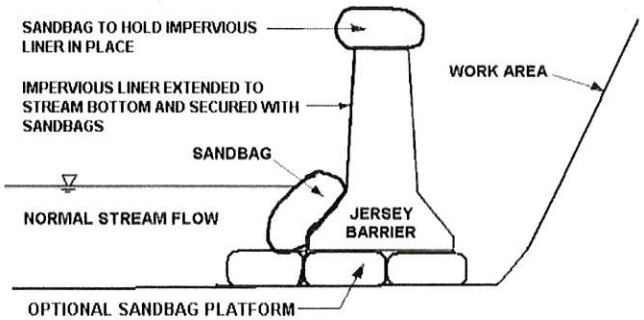
STANDARD CONSTRUCTION DETAIL #3-15
Sandbag Diversion Dam or Cofferdam



PA DEP

2 BAG MINIMUM HEIGHT ABOVE NORMAL BASE FLOW

FIGURE 3.13
Jersey Barrier Cofferdam – End View



PA DEP

Operation & Maintenance

Make sure it stays intact.

Sandbags need to stay in place.

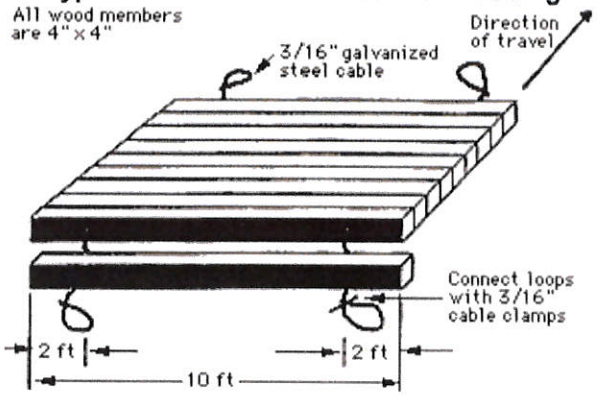
Repair and replace any damaged bags immediately.

Wetland Crossing

Purpose

Wetland crossings are temporary mats utilized for equipment crossings. This BMP allows equipment to avoid compaction of the wetland soils. When the BMP is removed, the wetland vegetation is able to reestablish.

FIGURE 3.7
Typical Wood Mat for Wetland Crossing



University of Minnesota FS 07009

A geotextile underlayment shall be used under the wood mat.

- Contact your conservation district to determine if a permit is needed for your project.
- Avoid wetland crossings wherever possible.
- Select crossing location to have the least impact possible.
- Conform to the erosion control plan and permit requirements.
- Temporary crossings should be constructed with minimum disturbance and with materials that can be completely removed.
- Utilize geotextile underlayment.

Operation & Maintenance

Inspect mats daily.

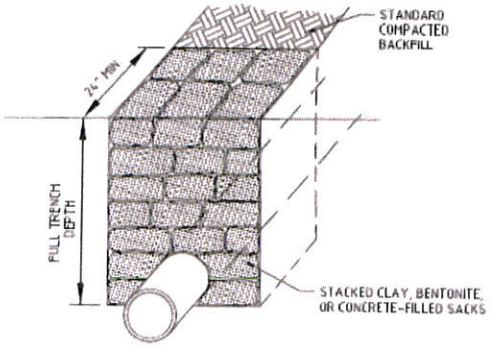
Mats need to be kept scraped and side pieces (or skirts) need to be in place.

Trench Plug

Purpose

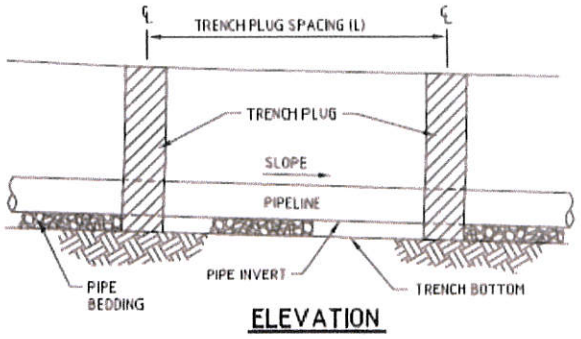
Trench plugs are utilized in utility trenches to prevent flow along utility lines or draining of surface waters. Trench plugs are typically constructed of stacked clay, bentonite, or concrete sacks.

STANDARD CONSTRUCTION DETAIL # 13-4
Typical Trench Plug Installation



SECTION VIEW

Trench Plug



ELEVATION

TABLE 13.1
Maximum Spacing and Materials for Trench Plugs

Trench Slope (%)	Spacing L (FT)	Plug Material
< 5	1,000	* Clay, Bentonite, or Concrete Filled Sacks
5 - 15	500	* Clay, Bentonite, or Concrete Filled Sacks
15 - 25	300	* Clay, Bentonite, or Concrete Filled Sacks
25 - 35	200	* Clay, Bentonite, or Concrete Filled Sacks
35 - 100	100	* Clay, Bentonite, or Concrete Filled Sacks
> 100	50	Cement Filled Bags (Wetted) or Mortared Stone

***TOPSOIL MAY NOT BE USED TO FILL SACKS.**

Impervious trench plugs are required for all stream, river, wetland, or other water body crossings.

- Trench plugs can be sand, clay or concrete filled sacks or synthetic foam. Topsoil may NOT be used.
- Impervious trench plugs are required for all stream or wetland crossings.
- Spacing of trench plugs should be according to slope of trench

1,000 ft for 5% slope or less
500 ft for 5%-15% slope
300 ft for 15%-25% slope
200 ft for 25%-35% slope

Operation & Maintenance

Should provide a water tight seal.

Vegetative Stabilization - Temporary and Permanent Seeding and Mulching

Purpose

Vegetative stabilization is utilized during earth disturbance to reduce soil loss. Seed can be applied to achieve temporary or permanent vegetative stabilization. When earthwork ceases for 4 days or more, temporary seeding should occur. Special protection watersheds require immediate stabilization when earthwork ceases.

TABLE 11.2
Soil Amendment Application Rate Equivalents

Soil Amendment	Permanent Seeding Application Rate			Notes
	Per Acre	Per 1,000 sq. ft.	Per 1,000 sq. yd.	
Agricultural lime	6 tons	240 lb.	2,480 lb.	Or as per soil test; may not be required in agricultural fields
10-10-20 fertilizer	1,000 lb.	25 lb.	210 lb.	Or as per soil test; may not be required in agricultural fields
	Temporary Seeding Application Rate			
Agricultural lime	1 ton	40 lb.	410 lb.	Typically not required for topsoil stockpiles
10-10-10 fertilizer	500 lb.	12.5 lb.	100 lb.	Typically not required for topsoil stockpiles

Adapted from Penn State, "Erosion Control and Conservation Plantings on Noncropland"

NOTE: A compost blanket which meets the standards of this chapter may be substituted for the soil amendments shown in Table 11.2.

TABLE 11.4
Recommended Seed Mixtures

Mixture Number	Species	Seeding Rate - Pure Live Seed [1]	
		Most Sites	Adverse Sites
1 [2]	Spring oats (spring), or	64	96
	Annual ryegrass (spring or fall), or	10	15
	Winter wheat (fall), or	90	120
	Winter rye (fall)	56	112
2 [3]	Tall fescue, or	60	75
	Fine fescue, or	35	40
	Kentucky bluegrass, plus	25	30
	Redtop[4], or	3	3
	Perennial ryegrass	15	20
3	Birdsfoot trefoil, plus	6	10
	Tall fescue	30	35
4	Birdsfoot trefoil, plus	6	10
	Reed canarygrass	10	15
5 [8]	~~Crownvetch, plus~~	10	15
	Tall fescue, or	20	25
	Perennial ryegrass	20	25
6 [5,8]	~~Crownvetch, plus~~	10	15
	Annual ryegrass	20	25
7 [8]	Birdsfoot trefoil, plus	6	10
	~~Crownvetch, plus~~	10	15
	Tall fescue	20	30
8	Flatpea, plus	20	30
	Tall fescue, or	20	30
	Perennial ryegrass	20	25
9 [6]	Serecia lespedeza, plus	10	20
	Tall fescue, plus	20	25
	Redtop[4]	3	3
10	Tall fescue, plus	40	60
	Fine fescue	10	15
11	Deertongue, plus	15	20
	Birdsfoot trefoil	6	10
12 [7]	Switchgrass, or	15	20
	Big Bluestem, plus	15	20
	Birdsfoot trefoil	6	10
13	Orchardgrass, or	20	30
	Smooth bromegrass, plus	25	35
	Birdsfoot trefoil	6	10

Penn State, "Erosion Control and Conservation Plantings on Noncropland"

1. PLS is the product of the percentage of pure seed times percentage germination divided by 100. For example, to secure the actual planting rate for switchgrass, divide 12 pounds PLS shown on the seed tag. Thus, if the PLS content of a given seed lot is 35%, divide 12 PLS by 0.35 to obtain 34.3 pounds of seed required to plant one acre. All mixtures in this table are shown in terms of PLS.
2. If high-quality seed is used, for most sites seed spring oats at a rate of 2 bushels per acre, winter wheat at 11.5 bushels per acre, and winter rye at 1 bushel per acre. If germination is below 90%, increase these suggested seeding rates by 0.5 bushel per acre.
3. This mixture is suitable for frequent mowing. Do not cut shorter than 4 inches.
4. Keep seeding rate to that recommended in table. These species have many seeds per pound and are very competitive. To seed small quantities of small seeds such as weeping lovegrass and redtop, dilute with dry sawdust, sand, rice hulls, buckwheat hulls, etc.
5. Use for highway slopes and similar sites where the desired species after establishment is crownvetch.

TABLE 11.5
Recommended Seed Mixtures for Stabilizing Disturbed Areas

Site Condition	Nurse Crop	Seed Mixture (Select one mixture)
Slopes and Banks (not mowed)		
Well-drained	1 plus	3, 5, 8, or 12[1]
Variable drainage	1 plus	3 or 7
Slopes and Banks (mowed)		
Well-drained	1 plus	2 or 10
Slopes and Banks (grazed/hay)		
Well-drained	1 plus	2, 3, or 13
Gullies and Eroded Areas	1 plus	3, 5, 7, or 12[1]
Erosion Control Facilities (BMPs)		
Sod waterways, spillways, frequent water flow areas	1 plus	2, 3, or 4
Drainage ditches		
Shallow, less than 3 feet deep	1 plus	2, 3, or 4
Deep, not mowed	1 plus	5 or 7
Pond banks, dikes, levees, dams, diversion channels, And occasional water flow areas		
Mowed areas	1 plus	2 or 3
Non-mowed areas	1 plus	5 or 7
For hay or silage on diversion channels and occasional water flow areas	1 plus	3 or 13
Highways [2]		
Non-mowed areas		
Pure crownvetch[3]	1 plus	5 or 6
Well-drained	1 plus	5, 7, 8, 9, or 10
Variable drained	1 plus	3 or 7
Poorly drained	1 plus	3 or 4
Areas mowed several times per year	1 plus	2, 3, or 10
Utility Right-of-way		
Well-drained	1 plus	5, 8, or 12[1]
Variable drained	1 plus	3 or 7
Well-drained areas for grazing/hay	1 plus	2, 3, or 13
Effluent Disposal Areas	1 plus	3 or 4
Sanitary Landfills	1 plus	3, 5, 7, 11[1], or 12[1]
Surface mines		
Spoils, mine wastes, fly ash, slag, settling basin Residues and other severely disturbed areas (lime to soil test)	1 plus	3, 4, 5, 7, 8, 9, 11[1], or 12[1]
Severely disturbed areas for grazing/hay	1 plus	3 or 13

Penn State, "Erosion Control and Conservation Plantings on Noncropland"

1. For seed mixtures 11 and 12, only use spring oats or weeping lovegrass (included in mix) as nurse crop.
2. Contact the Pennsylvania Department of Transportation district roadside specialist for specific suggestions on treatment techniques and management practices.
3. Seed mixtures containing crown vetch should not be used in areas adjacent to wetlands or stream channels due to the invasive nature of this species.

Vegetative Stabilization -
Temporary and Permanent Seeding and Mulching

TABLE 11.6
Mulch Application Rates

Mulch Type	Application Rate (Min.) Per Acre	Per 1,000 sq. ft.	Per 1,000 sq. yd.	Notes
Straw	3 tons	140 lb.	1,240 lb.	Either wheat or oat straw, free of weeds, not chopped or finely broken
Hay	3 tons	140 lb.	1,240 lb.	Timothy, mixed clover and timothy or other native forage grasses
Wood Chips	4 - 6 tons	185 - 275 lb.	1,650 - 2,500 lb.	May prevent germination of grasses and legumes
Hydromulch	1 ton	47 lb.	415	See limitations above

- E & S controls must remain in place and function properly until a 70% UNIFORM vegetative cover is established throughout the entire site
- Site should be stabilized immediately once final grade is achieved.

Operation & Maintenance

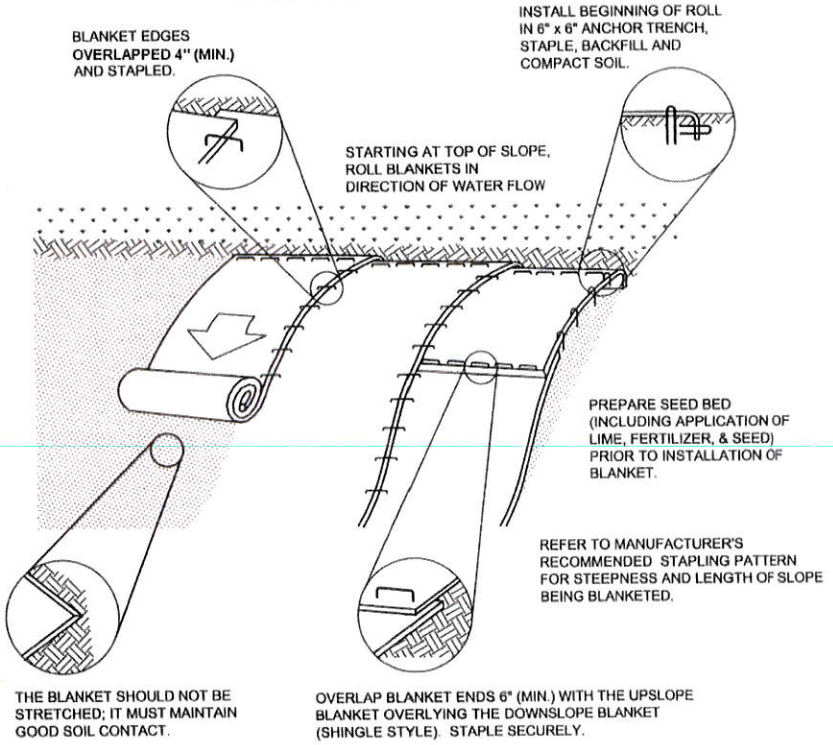
Inspect for 70% uniform perennial vegetative cover, and seed and mulch bare spots as necessary.

Slope and Channel Stabilization - Erosion Control Blanket

Purpose

Erosion control blanket provides immediate stabilization of earth disturbance while vegetation is establishing. Erosion control blanket provides direct contact to the soil to prevent erosion from occurring on steep slopes and channels.

STANDARD CONSTRUCTION DETAIL # 11-1
Erosion Control Blanket Installation



Source Unknown

Seed and soil amendments shall be applied according to the rates in the plan drawings prior to installing the blanket.

Provide anchor trench at toe of slope in similar fashion as at top of slope.

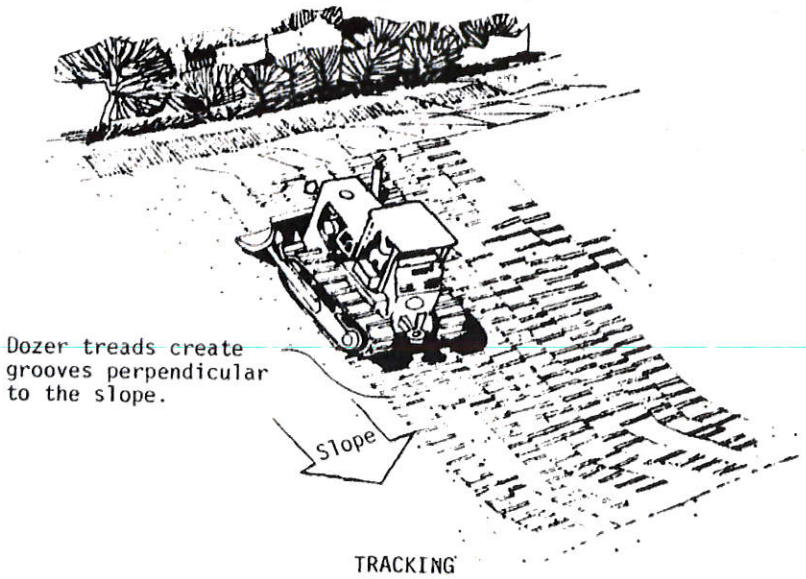
Slope surface shall be free of rocks, clods, sticks, and grass.

Blanket shall have good continuous contact with underlying soil throughout entire length. Lay blanket loosely and stake or staple to maintain direct contact with soil. Do not stretch blanket.

The blanket shall be stapled in accordance with the manufacturer's recommendations.

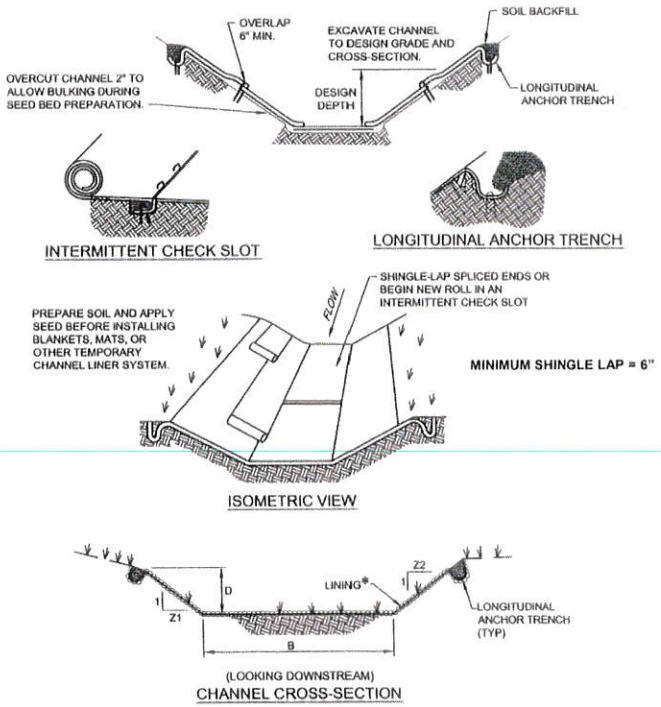
Blanketed areas shall be inspected weekly and after each runoff event until perennial vegetation is established to a minimum uniform 70% coverage throughout the blanketed area. Damaged or displaced blankets shall be restored or replaced within 4 calendar days.

FIGURE 11.3
Tracking a Fill Slope



Michigan Soil Erosion and Sedimentation Control Guidebook

STANDARD CONSTRUCTION DETAIL # 6-1
Vegetated Channel



* SEE MANUFACTURER'S LINING INSTALLATION DETAIL FOR STAPLE PATTERNS, AND VEGETATIVE STABILIZATION SPECIFICATIONS FOR SOIL AMENDMENTS, SEED MIXTURES AND MULCHING INFORMATION.

Adapted from Salix Applied Earthcare - Erosion Draw 5.0

NOTE: This table is intentionally blank and should be filled in by the plan preparer.

CHANNEL NO.	STATIONS	BOTTOM WIDTH B (FT)	DEPTH D (FT)	TOP WIDTH W (FT)	Z1 (FT)	Z2 (FT)	LINING*

Anchor trenches shall be installed at beginning and end of channel in the same manner as longitudinal anchor trenches.

Channel dimensions shall be constantly maintained. Channel shall be cleaned whenever total channel depth is reduced by 25% at any location. Sediment deposits shall be removed within 24 hours of discovery or as soon as soil conditions permit access to channel without further damage. Damaged lining shall be repaired or replaced within 48 hours of discovery.

Slope and Channel Stabilization - Erosion Control Blanket

- Slope protection anchor trenches must be installed at the top of the slope.
- Anchor trenches must be installed at beginning and end of channel in the same manner as longitudinal anchor trenches.
- Channel dimensions must be constantly maintained.
- Blanket must be in contact with and anchored to the soil material on the slope and in the channel.

Operation and Maintenance

Erosion Control Blanket

Blanketed areas must be inspected weekly and after each rain event until there is 70% uniform perennial vegetated cover throughout the blanketed area.

Replace damaged or displaced blankets within 4 calendar days.

Vegetative Channel

Channel must be cleaned whenever total channel depth is reduced by 25% at any location.

Sediment deposits must be removed within 24 hours of discovery or as soon as soil conditions permit access to channel without further damage.

Damaged lining must be repaired or replaced within 48 hours of discovery.

Roadside ditch

Vegetated vs. unstabilized

Disclaimer

The information provided in this field guide is solely intended as guidance. The highlighted BMPs should be constructed according to the approved engineered site drawings, which should be available on site. Nothing herein amends, alters, or changes any regulatory requirements. These guidelines are not to be considered either an adjudication or regulation.

Acknowledgements

This field guide was compiled by technical staff from the Westmoreland Conservation District. The photos included demonstrate good examples of construction site Best Management Practices that the district staff members have observed in southwestern Pennsylvania. Unless otherwise noted, drawings and photos were provided by the Westmoreland Conservation District and the PA Department of Environmental Protection Erosion and Sediment Pollution Control Program Manual.

Funding

Financial and other support for the field guide has been provided by the Department of Environmental Protection's 2021 Environmental Education Grants Program.