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Geauga SWCD Mission:

"To conserve, protect, and enhance the resources of Geauga County by providing leadership, education, and assistance to all."

All services are provided without regard to race, religion, gender, age, physical or mental handicap, nation origin or politics.

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Best Management Practices

Erosion & Sediment Control Field Manual

For Local Government Highway and Public Utility Departments

Preface

Excessive sediment entering streams is detrimental to the health of a stream and the aquatic organisms living within. According to the EPA, erosion resulting from human activities accounts for 70% of soil loss, whereas the remaining 30% is from natural processes.

This field manual for erosion and sediment control was developed for local service department personnel as an abbreviated and portable guide to refer to when performing soil disturbing activities in order to minimize the amount of sediment leaving a work site and entering a body of water.

This is not a complete list nor does it contain explicit details of all Best Management Practices (BMPs), rather a list of the more common practices and basic information needed for practices commonly encountered for local service department personnel. For a comprehensive list of BMPs, refer to the Ohio Department of Natural Resources (ODNR) "Rainwater and Land Development Manual" which may be viewed at the following link: http://epa.ohio.gov/Portals/35/storm/technical_assistance/Intro_11-6-14-1.pdf

Information for this field manual was based on the 2006 Third Edition of the "Rainwater and Land Development Manual" updated as of November 6, 2014.



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Rock Outlet Protection



CORRECT



INCORRECT

What

- A rock or riprap apron typically at the outlet of storm drains, culverts, open channels, sediment traps, or detention facilities

Why

- Provides an erosion-resistant transition area where concentrated or high velocity flows can dissipate energy before entering other open channels or natural streams

How

- Outlet protection shall consist of a rock or riprap layer and an underlying filter or gravel bedding
- Width of the protection should be the width of the headwall or 4 feet wider than the pipe diameter
- Size, depth and width of the rock is based on the velocity of water and the slope of the discharge area (Minimum rock size is Type D ≥ 6 ")

Maintenance

- If erosion or undermining occurs, replace rocks with larger rocks and/or create a more level surface

Rock Lined Channel



What

- A trapezoidal-shaped channel that is filled with rock riprap placed on top of a filter or bedding material

Why

- A rock lined channel allows for the conveyance of runoff from areas of concentrated flow without damage from erosion or flooding

How

- The design capacity of the rock lined channel should be adequate to carry the peak rate of runoff from a 10-year frequency storm or higher
- The area above the rock should be vegetated or otherwise protected

Maintenance

- Ensure no erosion or undermining occurs and replace and repair as necessary and/or create a more level surface area

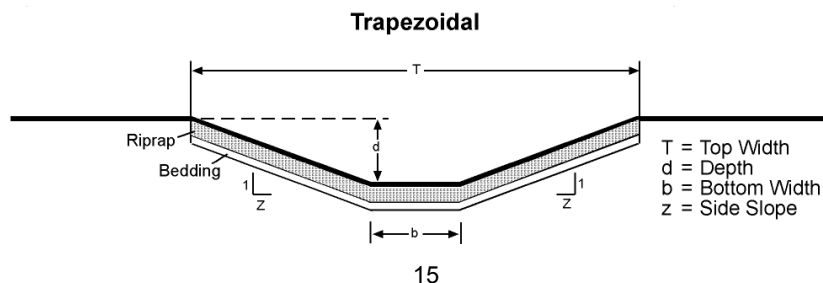


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Silt Fence



CORRECT



INCORRECT

What

- A geotextile fence installed to enclose disturbed areas of soil

Why

- Silt fence traps sediment-laden sheet runoff from a disturbed area and filters out sediment before the runoff enters streams, storm sewer systems, and adjacent properties

How

- Proper installation is critical and consists of being installed as follows:
 - Prior to land disturbance occurring
 - Along the contour
 - With the fence pulled tight and supported on the downslope side with stakes and the bottom 6 inches entranced into the ground
 - By wrapping ends of silt fence together before placing into ground
 - With the ends of the silt fence brought upslope to prevent runoff from going around the ends

Maintenance

- Remove sediment accumulation from the silt fence when sediment reaches half the height of the silt fence and inspect regularly for fallen sections of fence

Rolled Erosion Control Practices Turf Reinforcement Matting



Rolled Erosion Control



**Turf Reinforcement
Matting**

What

- Mattings/blankets made of a degradable material and typically integrated with seed and fertilizer

Why

- Stabilizes easily eroded areas such as concentrated flow areas and steep slopes while vegetation becomes established
- Reduces soil erosion by providing temporary cover from the erosive action of rainfall and runoff
- Assists vegetative growth while providing soil/seed contact

How

- Before applying seed, prepare slope by removing all rocks, clods, vegetation, or other debris so matting will have direct contact with the soil surface
- Follow specifications to install matting in the ODNR "Rainwater and Land Development Manual" with regard to:
 - Utilizing trenches and erosion check slots
 - Overlapping the material and direction of placement
 - Anchoring material into place

Maintenance

- After large rain events repair section and restaple as necessary

Dust Control



Calcium Chloride

What

- Prevents or reduces dust from exposed soils during land disturbance, demolition, and construction activities

Why

- Reduces the presence of airborne substances which may present health hazards, traffic safety problems, or harm to animal or plant life, and potential air quality regulatory fines

How

- Limit the amount of soil disturbance at any one time
- Stabilize soils utilizing any one or combination of methods below:
 - Apply mulch or vegetation
 - Temporarily leave soils rough graded
 - Sprinkle the site with enough water to prevent dust but not cause erosion
 - Use stone or chemical stabilizers
 - Preserve existing windbreaks
 - Apply calcium chloride
 - Use of a street sweeper/vacuum

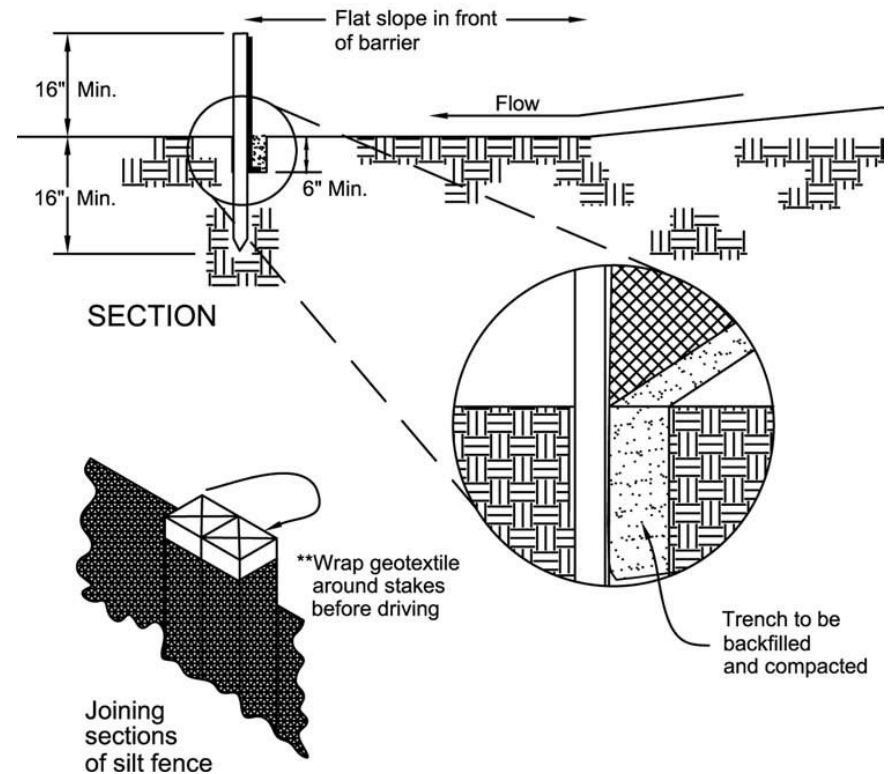
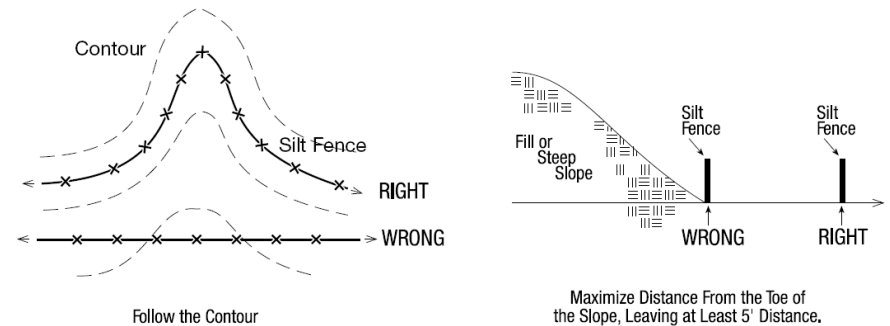
Maintenance

- Reapply dust control as needed
- Regularly sweep debris from roadways



Street Sweeper

Specifications for Silt Fence



Storm Drain Inlet Protection



CORRECT



INCORRECT

What

- Sediment barriers that are typically made of geotextile fabric attached to a 2" x 4" wood frame, washed gravel, crushed stone, or proprietary geotextile bags

Why

- Removes sediment from storm water before it enters storm sewers and downstream areas
- Applicable anywhere site runoff could potentially enter through storm drain inlets

How

- Must be installed before disturbance begins or before the inlet becomes functional
- A frame should be constructed out of 2" x 4" wood posts with each post driven 1 foot into the ground
- Attach wire mesh to frame and then stretch geotextile fabric tightly around the frame, overlapping fabric so ends of the cloth are not fastened to the same post
- Compact backfill around the inlet to the top of the inlet

Maintenance

- Remove sediment buildup when it reaches half the height of the barrier or replace geotextile bags when full

Filter Sock



CORRECT



INCORRECT

What

- Sediment trapping devices using compost inserted into a flexible, permeable tube (often used as substitute for silt fence)

Why

- Appropriate for limited drainage areas requiring sediment control where runoff is in the form of sheet flow or in areas that silt fence is normally considered acceptable

How

- A preferred alternative where equipment may drive near or over sediment barriers, though driving over filter socks is not recommended
- Filter socks must be placed on a level contour to capture sheet flow, not concentrated flows, and preferably at least five (5) feet away from the toe of the slope
- Runoff must not exceed the berm height, otherwise a larger filter sock or alternative sediment control should be used
- The filter sock must be staked with 2" x 2" stakes driven a minimum of 12" into the ground

Maintenance

- Remove sediment when accumulation is half the height of sock
- If driven over, repair or move back in place

Phased Ditch Disturbance



CORRECT



INCORRECT

What

- Limits the total amount of disturbance at any one time
- Sequences operations so that at least half the site is either undisturbed vegetation or re-stabilized prior to additional disturbance operations

Why

- To protect highly erodible areas such as ditches and swales
- As storm water flows through scraped ditches, it erodes soil and carries the extra sediment and nutrients into streams
- Prevents sediment from redepositing in areas that were just ditched

How

- Check the weather forecast and conduct work when there will be several days of clear weather
- When possible, re-vegetate the area immediately
- Create phases that can be stabilized quickly

Maintenance

- Ensure work is progressing as planned and areas are being seeded regularly prior to new areas being exposed

Mulching



What

- A protective layer of mulch, usually straw, applied to bare soil or in conjunction with temporary or permanent seeding

Why

- If soil is left bare/exposed, there can be significant loss of soil due to erosion caused by raindrop impact or wind
- When used in conjunction with seed, straw mulch helps to establish vegetation by keeping the seed in place, conserving moisture, and creating favorable conditions for seed to germinate

How

- Spread layer of straw mulch on all disturbed portions of construction sites that will not be re-disturbed for more than 14 days
- Mulch must consist of one of the following:
 - Straw - apply at a rate of 2 tons/acre
 - Hydroseeder - apply wood cellulose fiber at 2,000 lb/acre
 - Wood mulch/chips - apply at 10-20 tons/ac

Maintenance

- Reseed and mulch if no growth is evident within the specified germination period
- If mulch is washed or blown away, remulch and apply a tackifier

Temporary and Permanent Seeding



What

- Temporary seeding establishes temporary cover on disturbed areas by planting rapidly growing annual grasses or grains for areas temporarily being unworked or prior to the onset of winter
- Permanent seeding provides a perennial vegetation to permanently stabilize disturbed soil from construction activity

Why

- Most effective erosion control method for final stabilization or
- Used to permanently stabilize soil, reduce erosion, prevent sediment pollution, reduce runoff by promoting infiltration and provide storm water quality benefits offered by dense grass cover

How

- Important aspects to temporary seeding include:
 - Selection of the right plan materials
 - Site preparation to give the plants the best environment to succeed (loose and moist soil)
 - A soil test can determine if soil amendments, such as lime or fertilizer, are necessary
 - Apply seed uniformly using a spreader or hydroseeder

Maintenance

- Areas failing to vegetate should be reseeded and fertilized as needed
- Seeding during hot and dry months may require irrigation

Temporary Stream Crossing



What

- Used when equipment or construction vehicles must cross the stream channel for a short period of time
- It is a temporary practice which includes restoring the crossing area after construction

Why

- Provides construction traffic temporary access across a stream while reducing the amount of disturbance and sediment pollution

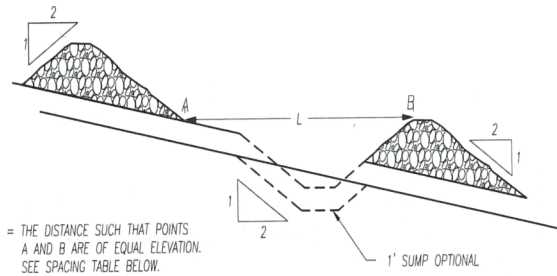
How

- Applicable to streams with a drainage area of less than 5 square miles
- Crossing must be at a 90° angle to the stream to disturb as little of the stream as possible
- Only clean stone shall be placed within the stream channel
- Structures are subject to the rules and regulations of the U.S. Army Corps of Engineers for in-stream modifications. Contact their local office with any questions (www.lrb.usace.army.mil)

Maintenance

- Ensure dewatering devices are being utilized if needed
- Keep construction traffic on crossing

Rock Check Dam



What

- Small rock dams constructed in swales, grassed waterways, ditches, or diversions

Why

- Reduces velocity of concentrated flows, thereby reducing erosion within the waterway

How

- Center of the check dam must be lower than the sides so water to flows over and not around check dam
- Dam shall be constructed of 4" to 8" diameter stone and completely cover the width of the channel
- Maximum height of check dam shall not exceed 3 feet
- This practice often traps some sediment, but its trapping efficiency is extremely poor and should not be used as a sediment-trapping practice
- Spacing between check dams shall be done to ensure that the toe of the upstream dam is at the same elevation as the top of the downstream dam (see diagram above)

Maintenance

- Remove sediment behind check dam once it accumulates to half the height of the check dam

Construction Entrance (Entrance to Staging Area)



CORRECT

INCORRECT

What

- Stabilized pad of stone underlain with a geotextile fabric where construction vehicle traffic is prevalent at construction site entrances or equipment/material staging areas

Why

- Reduce the amount of mud tracked out onto roadways from construction traffic entering and leaving site or material/equipment staging area

How

- Placement of #2 stone at a depth of 6-10" (depending on traffic load) on top of geotextile fabric
- Minimum width of 14 feet and at least 30 feet long

Maintenance

- Top-dress entrance area with stone as needed as stone wears away or mud migrates to the surface of the stone
- Manually remove large clumps of debris and mud as necessary

Dewatering Measures



Filter Bag



Sediment Trap

What

- A filtering technique to remove sediment from water being pumped from work areas prior to being released off site

Why

- Utilize whenever water hinders construction activities and has the potential of contributing sediment to streams if not treated before leaving the work site
- Reduces sediment impacts to downstream water resources by either allowing the sediment in the water to settle or by removing sediment before releasing the water

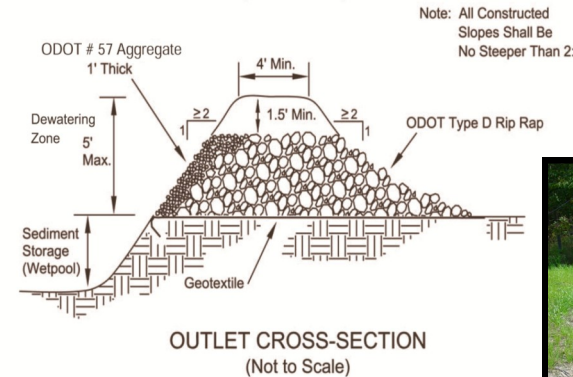
How

- Larger particle sizes can settle out with filter strips and settling ponds
- More than one measure may be necessary to filter finer particle sizes, including but not limited to:
 - Sediment traps
 - Geotextile filter bags placed on flat ground

Maintenance

- Once the bag or trap is full, replace or cleanout

Sediment Traps



What

- Ponded area created to settle sediment out of storm water before leaving project area.
- Only applicable for drainage areas of one (1) to five (5) acres

Why

- To allow sediment laden storm water runoff to pass through and settle out large sediment particles before discharging from a construction site

How

- Constructed prior to storm water discharge point on a construction site or in series to break up a drainage area into one (1) to five (5) acre sections to be treated
- Provide sediment storage zone and dewatering zone as sized by an engineer

Maintenance

- Clean out sediment from sediment storage area as it becomes full
- Remove trash and debris that may block the spillway