

WYOMING DEPARTMENT OF TRANSPORTATION

Pollution Controls and Best Management Practices for Storm Water During Construction

FIELD GUIDE



USE OF THIS FIELD GUIDE

This WYDOT Pocket Field Guide has been designed and developed to be used in the field for storm water management during construction by a wide range of personnel. This Field Guide includes: WYDOT specifications from the *Standard Specifications for Road and Bridge Construction*, WYDOT standard details from the *Temporary Erosion Control Measures for Storm Water Pollution Prevention – Standard Plan Sheets*. Photographic examples have also been incorporated to provide visual models to demonstrate actual field installations. The focus of this Field Guide is to provide Best Management Practice (BMP) application and installation information to personnel responsible for pollution prevention controls and BMPs in the field, as well as others responsible for environmental compliance.



WYOMING STORM WATER PERMIT FOR CONSTRUCTION ACTIVITIES

Regulations under the Federal Clean Water Act and Chapter 2 of the Wyoming Water Quality Rules and Regulations, require operators of construction sites that disturb an acre or more to obtain coverage under the general construction storm water permit and to develop a plan to ensure that storm water runoff from the project is clean enough to discharge to surface waters without causing or contributing to water quality concerns. In Wyoming, the Department of Environmental Quality (DEQ) implements the storm water program under the Wyoming Pollutant Discharge Elimination System (WYPDES).

WHAT IS THE CONCERN WITH STORM WATER RUN-OFF FROM CONSTRUCTION ACTIVITIES?

Runoff from construction sites can carry pollutants harmful to the quality of receiving waters (creeks, rivers, lakes and wetlands).

Sediment is usually the most abundant pollutant from construction sites. If suspended in water, sediment (TSS or total suspended solids) can clog fish gills, cloud the water, reduce plant growth and increase treatment costs for public and private water supplies. Sediment that settles to the bottom can smother aquatic organisms and eliminate breeding sites for fish. Stream channels can accumulate so much sediment the flow capacity may be reduced increasing the potential for flooding.

Fuels and lubricants stored and used on site can contribute hydrocarbons to runoff.

Concrete washout in its liquid form contains particles and is highly alkaline. The pH of washout commonly exceeds 10 and may be as high as 12; more alkaline than ammonia. High pH waters are toxic to aquatic life, including fish.

OTHER ENVIRONMENTAL PERMITS

Dewatering, air quality or 404 permitting (from the Army Corps of Engineers) may be required during the construction activity. See the Contact Information on the back cover of this Field Guide.

THE FUNDAMENTALS OF STORM WATER MANAGEMENT DURING CONSTRUCTION

Permitted construction site operators are required to develop and implement a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP is required to describe all of the potential sources of pollution on the site and the BMPs to manage them. BMPs are required to be installed and implemented to manage discharges that can impact water quality. BMPs can be structural (physical, installed features) or procedural (administrative or other activities). BMPs also focus on erosion or sediment control.

Erosion Control

Operators should focus on erosion control measures first. These preventative practices and control measures include: planning, project phasing, managing vegetative cover, and grading controls.

Sediment Control

Sediment control measures are not as effective as erosion control practices and are considered secondary practices installed after all opportunities for erosion control have been implemented. Sediment control BMPs include: inlet protection, sediment traps, silt fencing and other perimeter control devices.

Housekeeping Practices

Aside from managing areas of disturbance during construction operations, there will typically be a range of other pollutant sources that need to be identified and monitored. These other sources of pollution can be listed in two general categories; materials handling and waste management practices.

Materials Handling

The storage and use of construction materials

needs to be managed and monitored to ensure appropriate controls are implemented. Particular attention should be focused on fuel storage, fueling operations, equipment staging, and maintenance activities. Batch plants, and storage areas for petroleum products and other chemicals require frequent monitoring to verify adequate controls. Spill prevention and response programs need to be functioning, with worker training to help facilitate timely responses.

Waste Management

Worker trash, portable sanitary facilities, demolition materials, remnants from construction, and sawing/cutting operations all require attention and controls to ensure that storm water run-off is not impacted.

Inspection and Maintenance Procedures

BMPs need to be implemented and maintained in effective operating condition. A routine of regularly scheduled inspections is necessary to verify that BMPs are installed correctly and can continue to function as intended.

Temporary and Final Stabilization Measures

Final or temporary stabilization of disturbed areas must, at a minimum, be initiated immediately whenever any clearing, grading, excavating or other earth disturbing activities have permanently ceased on any portion of the site, or temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days.

ACKNOWLEDGEMENTS

The Wyoming Department of Transportation expresses its appreciation to its employees, the Wyoming DEQ, and Altitude Training Associates for making this Field Guide possible. All BMP photography by Tom Gore, Altitude Training Associates.

TABLE OF CONTENTS

BMPs FOR EROSION CONTROL

GRADING TECHNIQUES

Surface Roughening	1
Diversion Ditches	5
Slope Drains	8
Ditch Checks	11
Rock Check Dike	14
Vegetative Buffers	16

BMPs FOR SEDIMENT CONTROL

PERIMETER CONTROL AND BARRIERS

Silt Fence	17
Earthen Berm	21
Inlet Protection	23
Sediment Traps	27

VEHICLE TRACKING CONTROL PADS 32

BMPs FOR RECLAMATION

Erosion Control Blankets	35
Hydraulic Mulch	38
Dry Mulch	39

BMPs FOR MATERIALS, EQUIPMENT AND WASTE HANDLING 41

Bulk Storage	42
Equipment Management	43
Spill Prevention and Response	45

WASTE MANAGEMENT 47

Concrete Washout Areas	48
Saw Cutting	50
Portable Toilets	51

CONTACT INFORMATION 52

BMPs FOR EROSION CONTROL

GRADING TECHNIQUES

Managing the size of areas of disturbance and how long areas remain open is referred to as *Phasing*. *Phasing* is a valuable planning tool during grading operations that executes a distinct thought process in the approach to the scope of work. Only opening areas that have a clear plan and schedule for completion, is an effective procedural BMP. This process limits the expense and liability of managing expansive areas of disturbance that have no work underway.

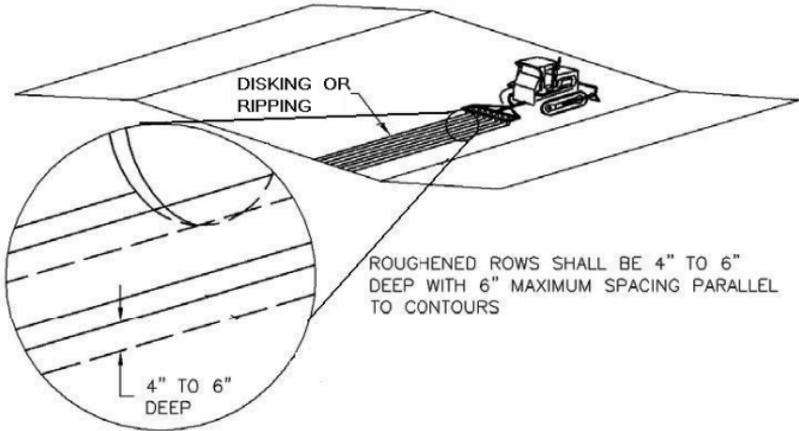
Implementing specific grading controls into the work can also be highly effective for erosion control. Evaluating your scope of work and including any of these techniques for implementation can provide effective storm water management. Consider what will happen during a precipitation event and how you can manage where the run-off will travel through or around your work. You can avoid property damage and keep flows off work zones, by determining where the run-off will go.

SURFACE ROUGHENING

The goal of *Surface Roughening* as an erosion control BMP is to avoid smooth, hard-packed surfaces by scarifying or breaking up the ground. Hard-packed surfaces aren't receptive to absorbing precipitation and actually facilitate accelerated run-off. By scarifying the ground, through disking or ripping, the surface area of the ground is increased and absorption rates are increased. When implemented correctly, surface roughening can also help to break up concentrated flows into less erosive sheet flows. A lower profile technique is to use equipment (dozer or other) tracking to create furrows and benches across the grade contours.

SURFACE ROUGHENING (continued)

Using equipment to install *Surface Roughening* for temporary erosion control in large or small areas.



Adapted from Urban Drainage and Flood Control District Criteria Manual, Vol. 3



Correct Installation Includes Installing This Grade Control Along the Grade Contours. Any Furrows, Ridges, or Channels That Are Created By the Equipment Should Move Across the Horizontal Plane Of the Slope.

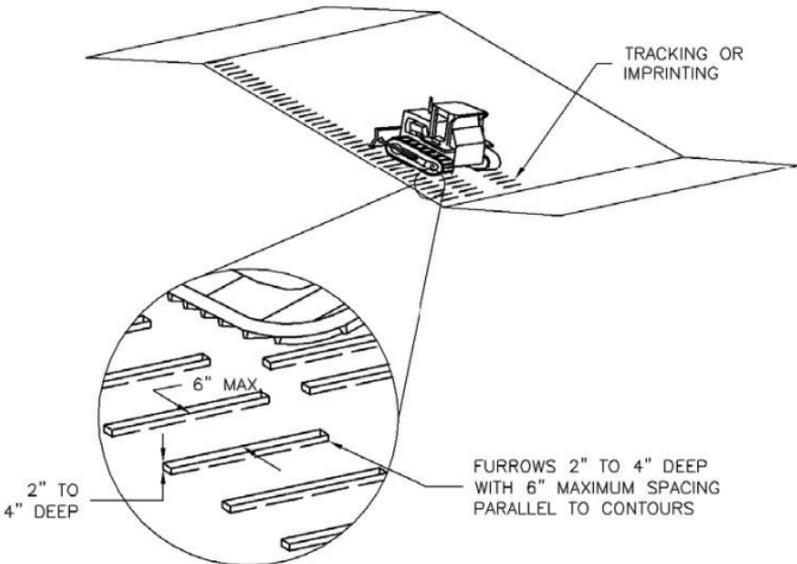
SURFACE ROUGHENING (continued)

Installing the *Surface Roughening Grading Technique* On the Vertical Plane (Up & Down A Slope) Will Only Channelize Flows Down the Grade, Facilitating Erosion.



Incorrect Example of Surface Roughening w/Furrows Running Up and Down the Slope

A lower profile installation of *Surface Roughening* can be installed by tracking.



Adapted from Urban Drainage and Flood Control District Criteria Manual, Vol. 3

SURFACE ROUGHENING (continued)

Correct Installation Includes Tracking the Equipment Up and Down the Grade. The Ridges That Are Created By the Equipment Will Move Along the Grade Contours Of the Slope.



Incorrect Example of Surface Roughening By Equipment Tracking. Driving the Dozer Along the Grade Contours Creates Grooving Running Up and Down the Slope.

BMPs FOR EROSION CONTROL

GRADING TECHNIQUES (continued)

DIVERSION DITCHES

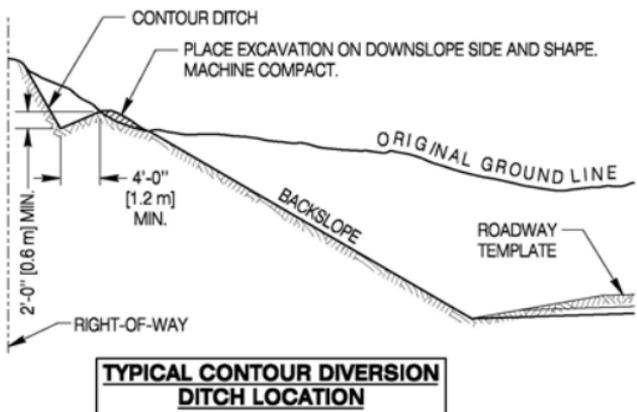
Cutting in *Diversion Ditches* or channels is an important site drainage BMP. The goal of the feature is to function as a storm water conveyance. Flows can be intercepted and then conveyed around work areas, away from areas of disturbance and discharged at a designed location or into an entrapment facility. When evaluating the selection of an appropriate diversion, consideration is given to:

- Size of Drainage Area/Area of Disturbance
- Soil Types
- Anticipated Precipitation Events For the Time of Year
- Other Upgradient BMPs That May Be Incorporated
- Current Pathway For Run-off

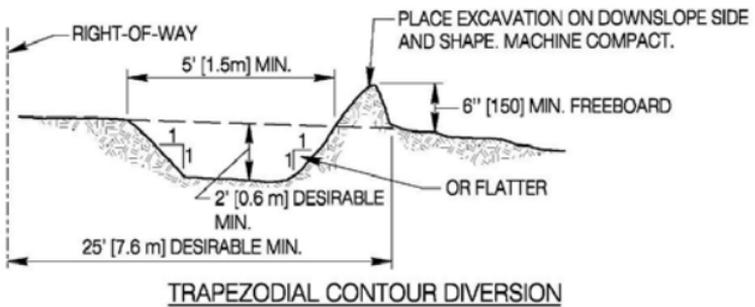
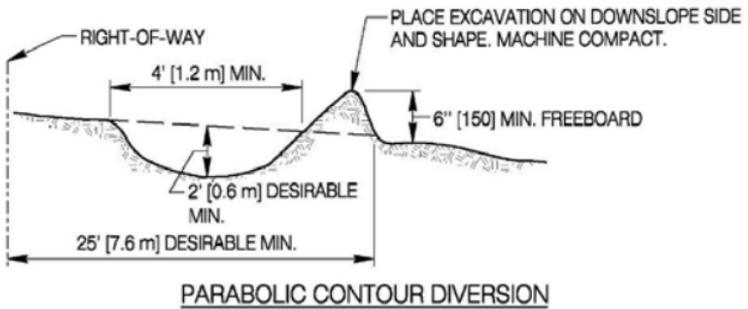
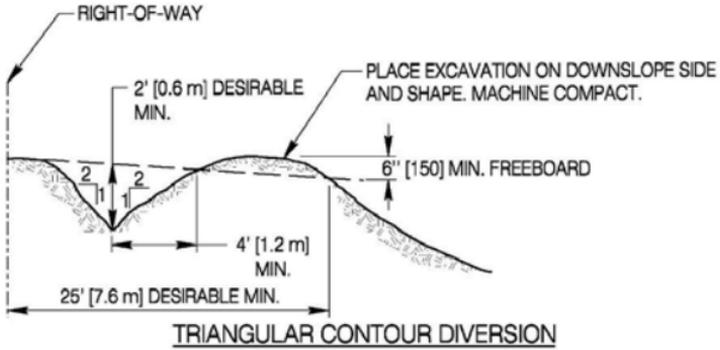
Assessing the above will help to correctly size the feature and determine if additional BMPs are needed for erosion control. Recognizing that these features will be temporary, they still need to function correctly. If the goal is to adequately intercept

run-off and transport it to a more desirable location, the features must be

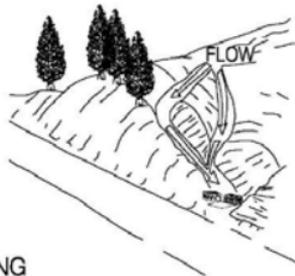
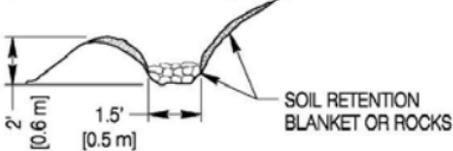
adequate for the application. *Diversion Ditches* that do not have positive drainage, are easily bypassed, overwhelmed, or filled in with sediment can create on-going maintenance issues.



DIVERSION DITCHES (continued)



TOPSOIL AND SEEDBED
(PROJECT SPECIFICATIONS)



INTERCEPTING

TYPES OF DITCHES

DIVERSION DITCHES (continued)



***Diversion Ditch* At the Top Of a Cut Slope To Control Run-On To the Slope and Protect Road Work Below.**



Ditch Checks or a Channel Liner May Be Necessary In the *Diversion Ditch*, If Flows Are Too Constricted, or Soils Too Sandy.

BMPs FOR EROSION CONTROL GRADING TECHNIQUES (continued)

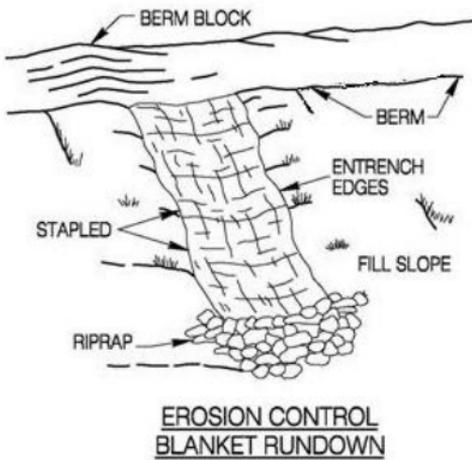
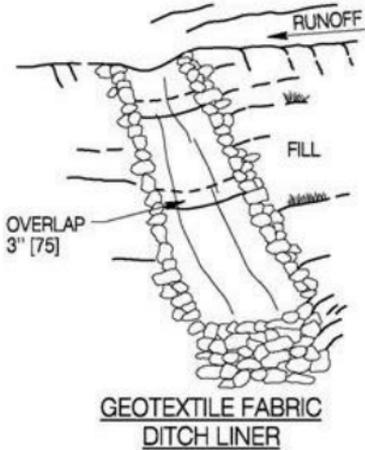
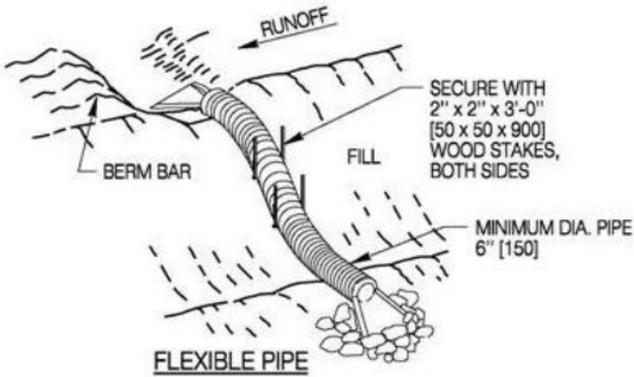
SLOPE DRAINS

The function of installing a *Slope Drain* is to safely convey run-off downgradient. Providing this conduit or stabilized conveyance is an erosion control measure to protect the grade from rill or gully erosion. *Slope Drains* are site drainage tools; they are a definitive means of determining where and how run-off is conveyed down a slope. Many styles can be implemented; from an open rundown or flexible piping, but they are all temporary BMPs that ultimately will be removed. The style of *Slope Drain* selected needs to adequately convey the anticipated run-off volume down the grade. Features need to be installed correctly to withstand the velocity and stress of concentrated flows.



Flexible Pipe Style Of *Slope Drain* Installed for Erosion Control, To Convey Flows Down an Embankment. Piping Needs To Be Properly Adjoined and Secured Down To Prevent By-Pass or Failure.

SLOPE DRAINS (continued)



TYPES OF SLOPE DRAINS

Construct slope drains at frequent intervals along continuous fill slopes and at low points on roadway grade.

SLOPE DRAINS (continued)



**Various Styles
Of Slope
Drains Can Be
Successfully
Implemented;
Half-Round
Pipe (above),
Ditch Liner
(right).**



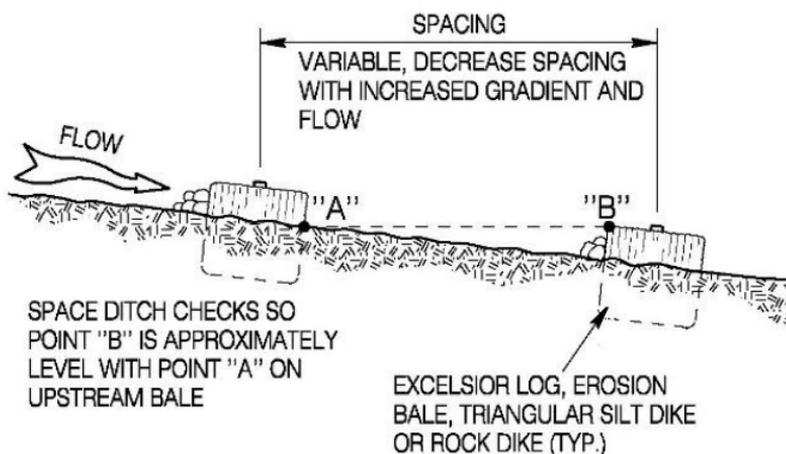
**Ditch Liner Run-downs Need To Be
Entrenched Along the Edges To Ensure
Integrity and Prevent Failures.**

BMPs FOR EROSION CONTROL

GRADING TECHNIQUES (continued)

DITCH CHECKS

Ditch Checks are designed to provide erosion control within man-made storm water conveyances such as ditches, channels, and swales. These conveyances, whether temporary or permanent, are BMPs and they need to be maintained in effective operating condition. Flows within these conveyances are concentrated, and they can cut and scour the bottom, if it is not stabilized. Installing *Ditch Checks* within these ditches, channels, or swales helps to protect the integrity of the feature by diffusing and breaking up the erosive velocity of the channelized flows. When installed correctly, *Ditch Checks* are barriers that block and slow the flows down to a non-erosive velocity. There may be some sediment removal with the use of *Ditch Checks*, but their primary function is erosion control. If there is a lot of sediment deposition behind a *Ditch Check*, it creates expensive maintenance concerns, but is also an indicator of a larger erosion control problem upgradient of the feature.



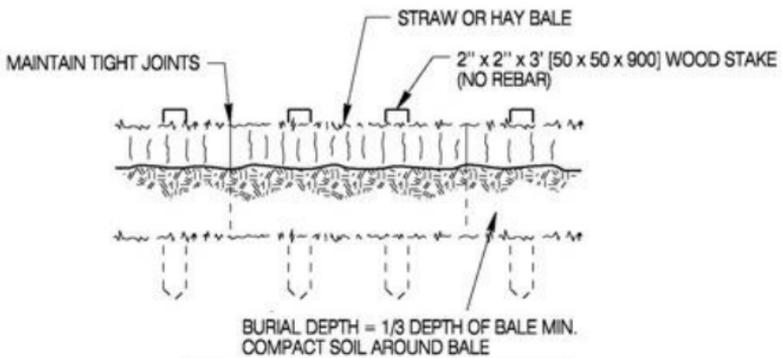
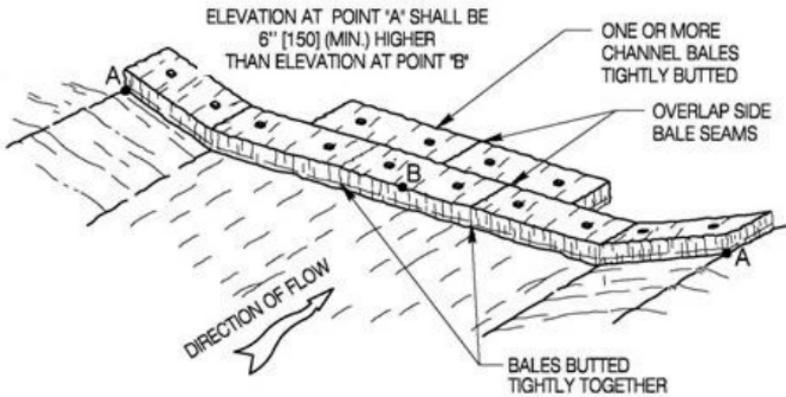
GENERAL DITCH CHECK SPACING DETAIL

WYDOT Temporary Erosion Control Measures for Storm Water Pollution Prevention – Standard Plan 215-1, Sheet 6

DITCH CHECKS

DITCH CHECKS (continued)

Many styles of *Ditch Checks* that can be implemented; however they all have fairly universal installation criteria to be followed. They need to be secured in place, trenched below grade, keyed back into the adjoining grade and appropriately spaced in series to prevent flows from attaining erosive velocity.

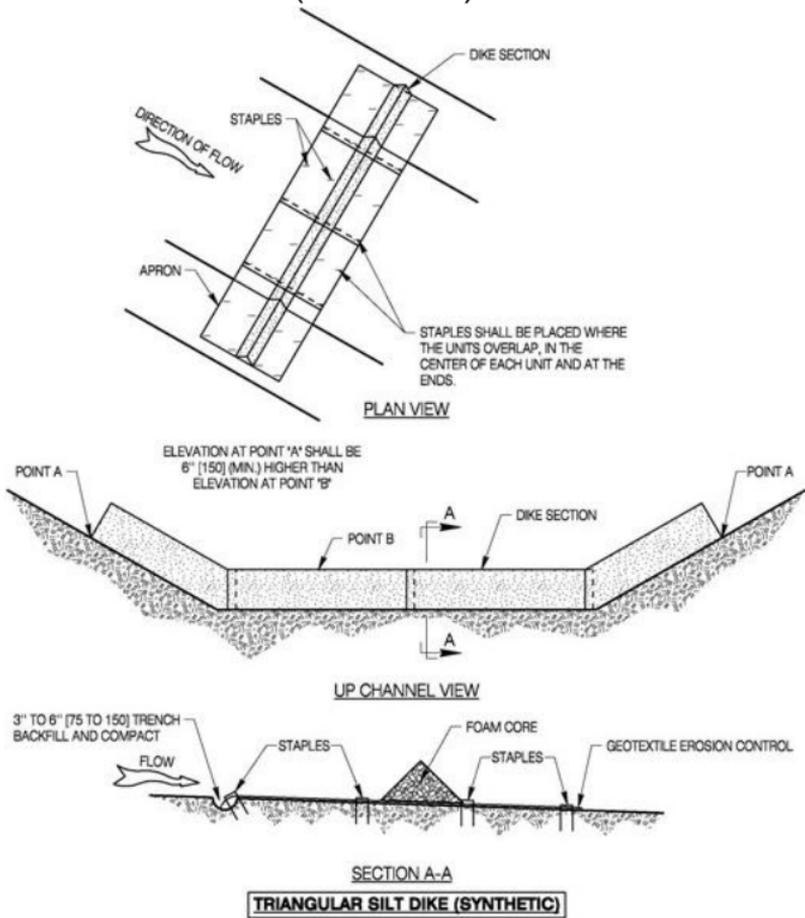


EROSION BALE DITCH CHECK

WYDOT Temporary Erosion Control Measures for Storm Water Pollution Prevention – Standard Plan 215-1, Sheet 6



DITCH CHECKS (continued)



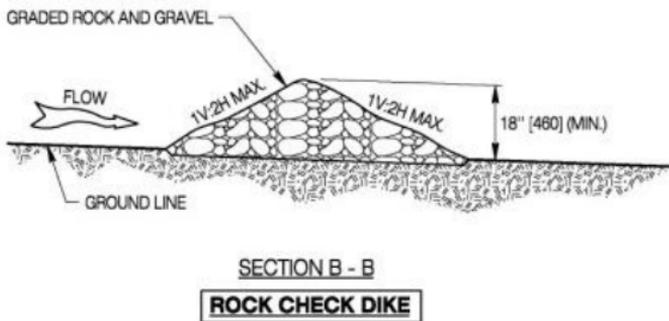
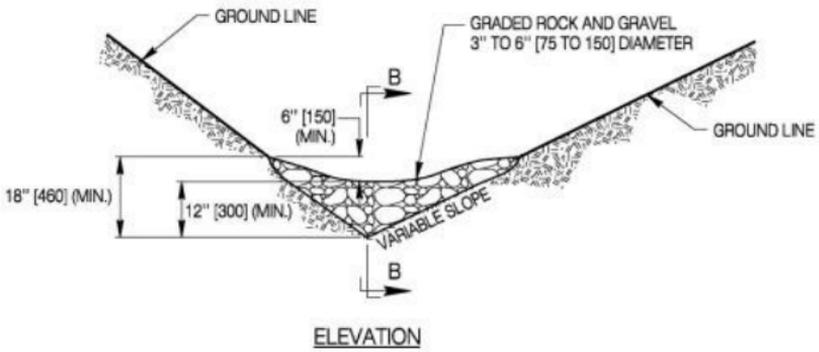
WYDOT Temporary Erosion Control Measures for Storm Water Pollution Prevention – Standard Plan 215-1, Sheet 7



Silt Dikes Do Not Need To Be Trenched In, But Still Need To Be Secured Down.

DITCH CHECKS

ROCK CHECK DIKE



WYDOT Temporary Erosion Control Measures for Storm Water Pollution Prevention – Standard Plan 215-1, Sheet 7



A Correct Installation of Rock Check Dike Intercepts/Slows Flows, Then Allows the Flows To Go Through the Rock or Overtop In the Middle.

DITCH & ROCK CHECKS (continued)

Ditch Checks Must Be Installed Correctly To Function. Flows Can Not Be Allowed To Bypass or Undermine the Features.



Rock Size and Spacing is Incorrect for These Rock Check Dikes To Function (above).



Note the Erosion Around the Sides Of These Bale Ditch Checks, Caused By By-pass. Correct Installation Will Allow Them To Overtop In the Middle.

BMPs FOR EROSION CONTROL GRADING TECHNIQUES (continued)

VEGETATIVE BUFFERS

Vegetative Buffers are areas of pre-existing vegetation that have been retained in place to serve as cover for erosion control. These areas may be temporary, recognizing that at some point during the construction they may need to be graded for construction. Considered a sub group of *Phasing* as a BMP, *Vegetative Buffers* implement the planning strategy that the entire project does not need to be graded all at once.



BMPs FOR SEDIMENT CONTROL

Perimeter Controls and Barriers

SILT FENCE

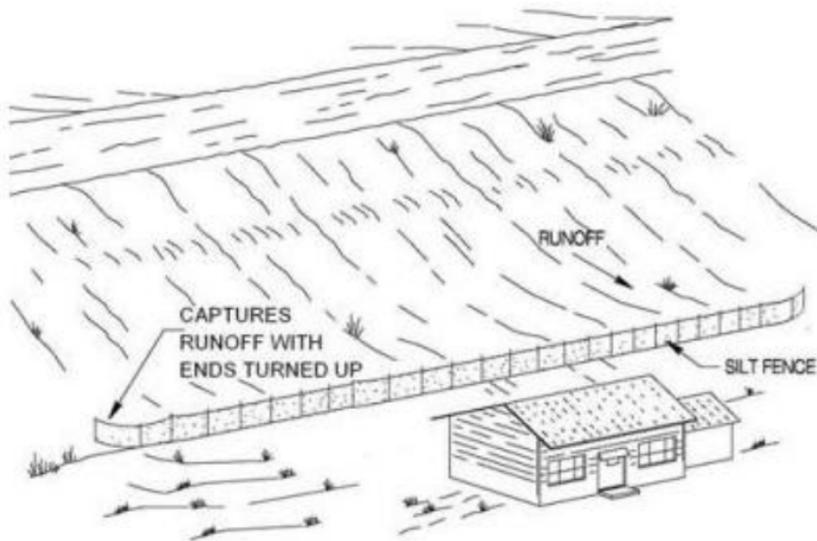
The function of *Silt Fence* is to act as a barrier for sediment-laden run-off. There are many grades of silt fencing, but they are not generally expected to discharge much water. *Silt Fence* will 'weep' or 'sweat', but does not perform as a filter. Depending on soil conditions, it can be expected some run-off entrapped by the Silt Fence will infiltrate. Some of this entrapped run-off may also migrate under the fencing. With properly functioning silt fence, the majority of the water will remain ponded behind it. *Silt Fence* has very specific installation details; that include correct application, location, and orientation.

Silt Fence cannot perform if it is:

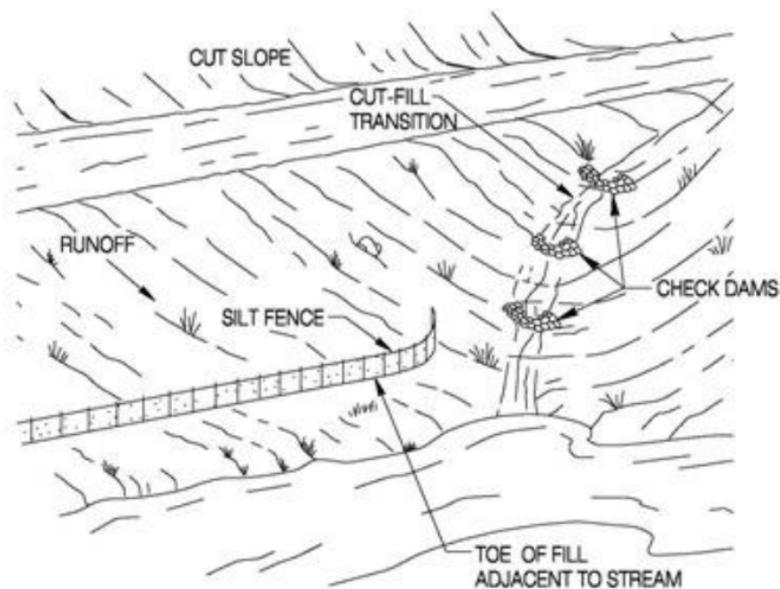
- installed in a concentrated flow
- not installed along the grade contour
- not trenched in
- not properly adjoined and/or sagging
- installed to manage site drainage

Silt Fence strength can be improved by using wire mesh backing, increasing the post frequency, and/or used in conjunction with other BMPs. ***Silt Fence* performance is not enhanced by adding additional rows of fencing.** Whatever storm event overwhelms one row of *silt fencing*, will certainly overwhelm each subsequent row. *Silt Fence* can be a very high maintenance BMP; it requires diligence to keep it fully functional and should be used sparingly. When installed it should be in conjunction with erosion control measures and with other BMPs to improve performance.

SILT FENCE (continued)



PROTECTION OF ADJACENT PROPERTY

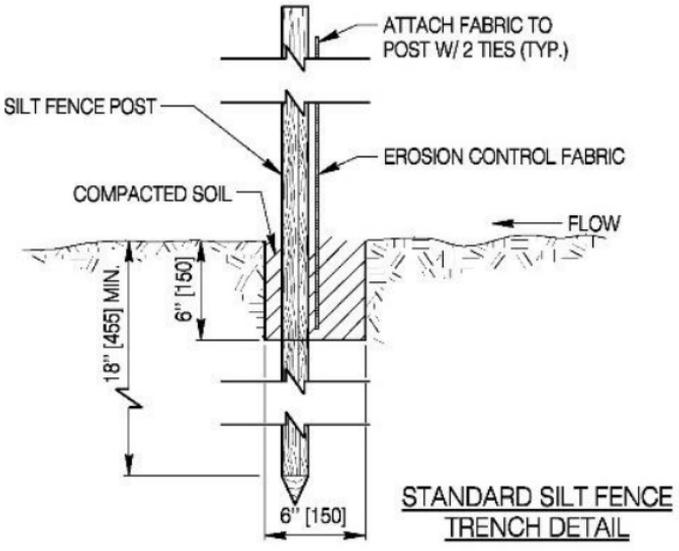
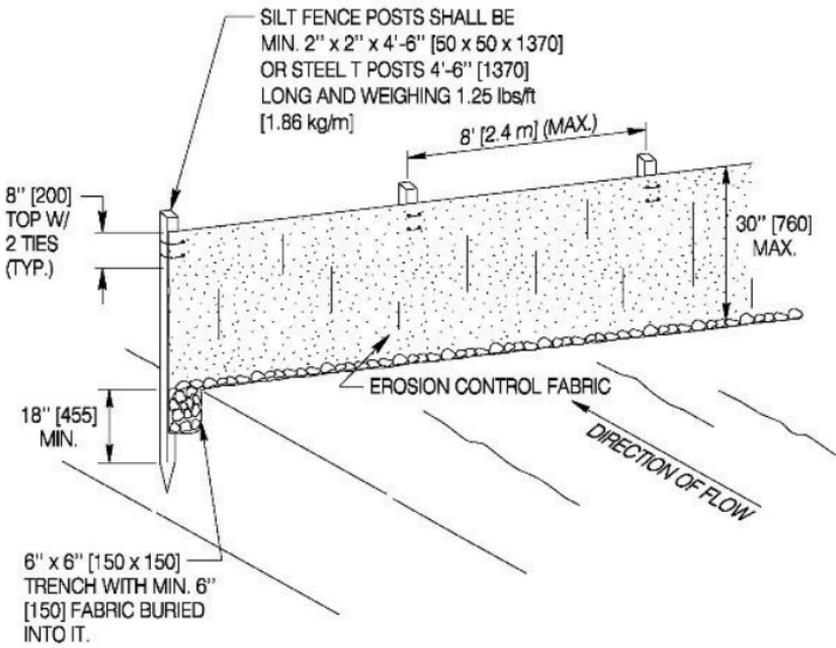


PROTECTION OF LIVE STREAM

SILT FENCE APPLICATIONS

Adapted from WYDOT Temporary Erosion Control Measures for Storm Water Pollution Prevention – Standard Plan 215-1, Sheet 5

SILT FENCE (continued)



STANDARD SILT FENCE

WYDOT Temporary Erosion Control Measures for Storm Water Pollution Prevention – Standard Plan 215-1, Sheet 5

DRAINAGE AREA FOR SILT FENCE SHOULD NOT EXCEED 1000 FT² FOR EVERY 10 LINEAR FEET OF INSTALLATION.

SILT FENCE (continued)



Silt Fence Can Be Effectively Implemented With Other BMPs To Improve Performance. Note the Turned Up End, To Create Ponding Volume.



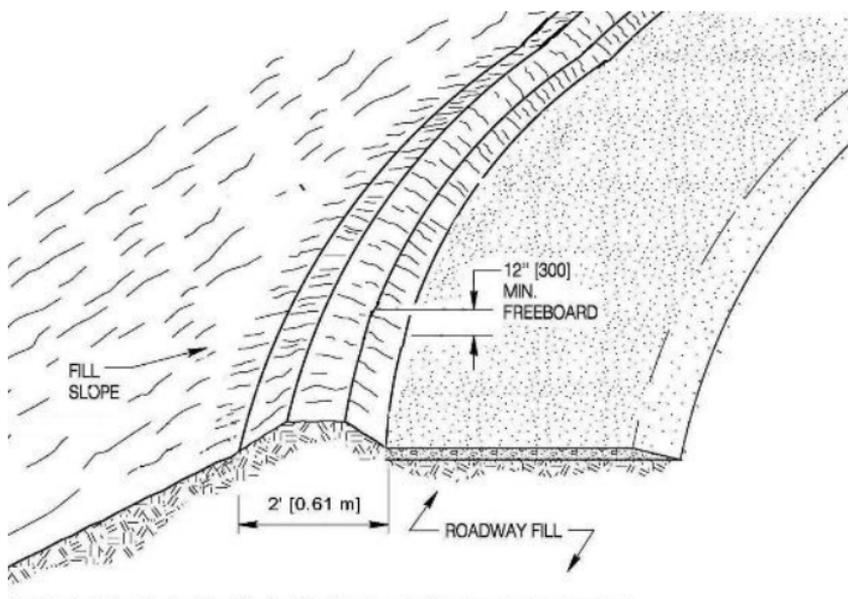
Silt Fencing Cannot Handle Large Drainage Areas. Other BMPs Are Needed To Function With the Silt Fence In This Application.

BMPs FOR SEDIMENT CONTROL

Perimeter Controls and Barriers

EARTHEN BERM

The *Earthen Berm* is another grading control, but by itself is used primarily as a barrier, as opposed to erosion control. When installed correctly, they can intercept and detain run-off. Similar to the selection of *Diversion Ditches*, *Earthen Berms* need to be sized correctly, based on the upgradient area of disturbance, predictable weather patterns, other BMPs implemented, etc. These features can be used to control run-on as well as run-off. They do have limitations based on detention capacity, so they will not be able to impound large quantities of sheet flows. If they need to discharge, the feature should be modified to function as a small *Sediment Trap* with a weir.



INTERIM EARTHWORK BERM

Determine height and width of temporary berms by the size of the run-off area. Compact berms with several passes of dozer or grader wheels as approved by the engineer.

Modified from WYDOT Temporary Erosion Control Measures for Storm Water Pollution Prevention – Standard Plan 215-1

EARTHEN BERM (continued)



**Good Application of Using a Compacted
Earthen Berm as Perimeter Control**



**All *Earthen Berms* Require Compaction In
Order To Have Integrity. The Loose Fill in This
Feature Cannot Provide Containment.**

BMPs FOR SEDIMENT CONTROL

INLET PROTECTION

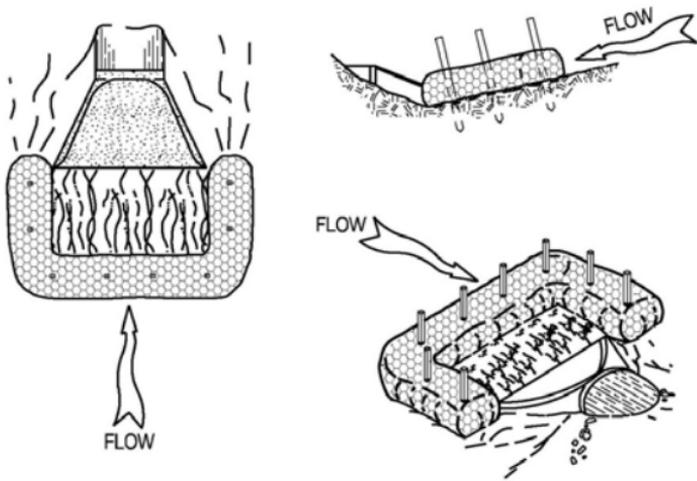
The goal of having installations of *Inlet Protection* is to prevent sediment-laden discharges to the storm sewer system, which would then convey to surface waters. *Inlet Protection* is often considered the 'last line of defense'. This is because, once a discharge has entered a storm drainage system the construction site operator has typically lost all control over that discharge and no longer has any further opportunity to treat or manage that discharge.

The task of treating storm water run-off is a difficult process, and depending on the style of *Inlet Protection* BMP implemented, it may not be very successful. *Inlet Protection*, like other sediment control BMPs, have severe limitations, and need to be used in conjunction with various other controls, especially erosion control measures.

It is critical to recognize the majority of *Inlet Protection* options will not treat contaminated run-off. Specifically, if the chemistry of the run-off has been changed by pollutants other than sediment (concrete, paints, petroleum products, etc.), *Inlet Protection* will not be able to provide adequate treatment to prevent a discharge of these types of pollutants to the storm sewer system.

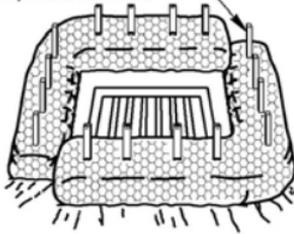
Recognizing that *Inlet Protection* functions as a filter, it is important to select a style of feature that can actually filter prior to discharge. Some *Inlet Protection* features do not filter. These features provide treatment by impounding run-off and allowing sediment particles to drop out, before overtopping. BMPs in this category may be *Silt Fencing* and *Straw Bales*.

INLET PROTECTION (continued)

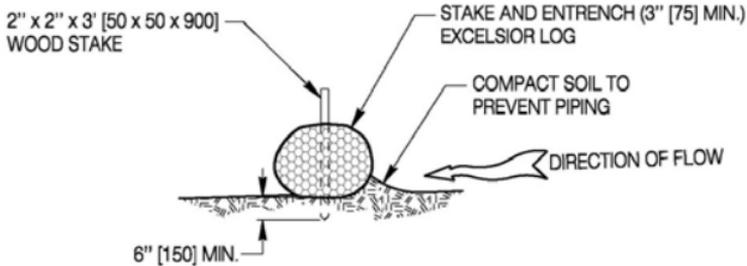


EXCELSIOR LOG CULVERT INLET TRAP FOR FLARED END INLETS

2" x 2" x 3' [50 x 50 x 900]
(NOMINAL) WOOD STAKES



EXCELSIOR LOG INLET TRAP FOR M1 INLETS



SECTION VIEW

INLET PROTECTION (continued)



Excelsior Logs Can Provide Adequate *Inlet Protection* For M1 Style Features. Logs Need To Be Tightly Abutted and Firmly Secured Down.



Poor Application For Excelsior Log *Inlet Protection*; Logs Cannot Be Secured Down With Staking On a Paved Section and Can Float.

INLET PROTECTION (continued)



Limit the Use Of Erosion Bales To Low Flow Applications. Install Bales Tightly and Compact the Soil All Around. Flows Should Not Be Able To By-Pass Under or Between.



Allowing Flows To Undermine Straw Bales Can Eventually Lead To Failure, Like This 'Blow-Out'.

BMPs FOR SEDIMENT CONTROL

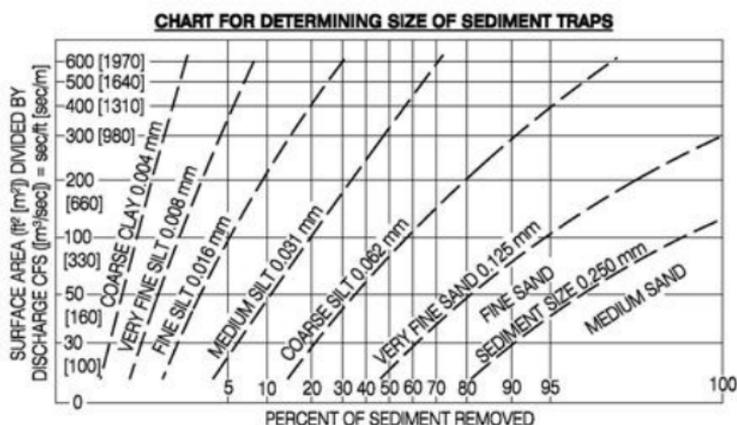
SEDIMENT TRAPS

Effective storm water management includes evaluations of where and how the construction site drains (where is the water coming from and where is it going). The next step entails determining where you want the run-off to go and, of course, keeping the run-off from areas you want to protect from the impacts of erosive flows. To achieve this goal, construction site drainage can be effectively managed by installing conveyance and entrapment features. Installing *Diversion Ditches* will provide the conveyance, but a termination point needs to be included. *Sediment Traps*, installed as that termination point, can provide storage capacity to manage small to medium quantities of run-off.

The function of installing these entrapment facilities to impound run-off can be two-fold. Having a *Sediment Trap* to capture and impound storm water run-off, especially large volumes, can help to solve a water quantity problem. Sediment removal is accomplished with detention time. During detention, heavy sand and sediment particulates will settle out and collect on the bottom of the trap. This leaves the less turbid water near the surface of the trap. Since the less turbid water is near the surface, this is where these *Sediment Traps* need to discharge.

Maintenance activities should ensure that these features can pond water and discharge effectively.

SEDIMENT TRAPS (continued)



PERCENT OF SEDIMENT REMOVED FOR DIFFERENT BASIN SIZES, SEDIMENT SIZES, AND DISCHARGES.

Sediment Traps

Sediment traps are small water detention basins which allow sediment to settle out before the water is allowed to enter streams or ditches.

Determine size and percentage of particles. Remove ninety percent of all particles larger than fine sand. Remove silt and clay particles with trap, chemical system, or both, as approved by the engineer.

The required surface area of the trap is computed using the above chart. The horizontal scale shows the percent of sediment load removed and the vertical axis gives the ratio of the required surface area divided by the discharge.

Example:

Given: 1. $Q_2 = 3$ CFS [0.08 m³/sec.]

2. Must remove 90% of particles larger than coarse silt.

Solution: 1. Read up from 90% removal to the coarse silt curve.

2. Read across to the ratio of surface Area/ $Q = 280$.

3. Use this number to compute the trap surface area.
Surface area = $3 \times 280 = 840$ ft² [78 m²]

4. The trap dimensions may be any combination which give this surface area, 25 ft x 34 ft [7.6 m x 10.4 m] or 15 ft x 57 ft [4.6 m x 17.4 m]. The terrain generally controls these dimensions.

Construct depth of trap from spillway to low point not to exceed 3 ft [0.9 m].

Construct a geotextile lined overflow channel for small design flows up to 3 CFS [0.08 m³/sec] over low dam.

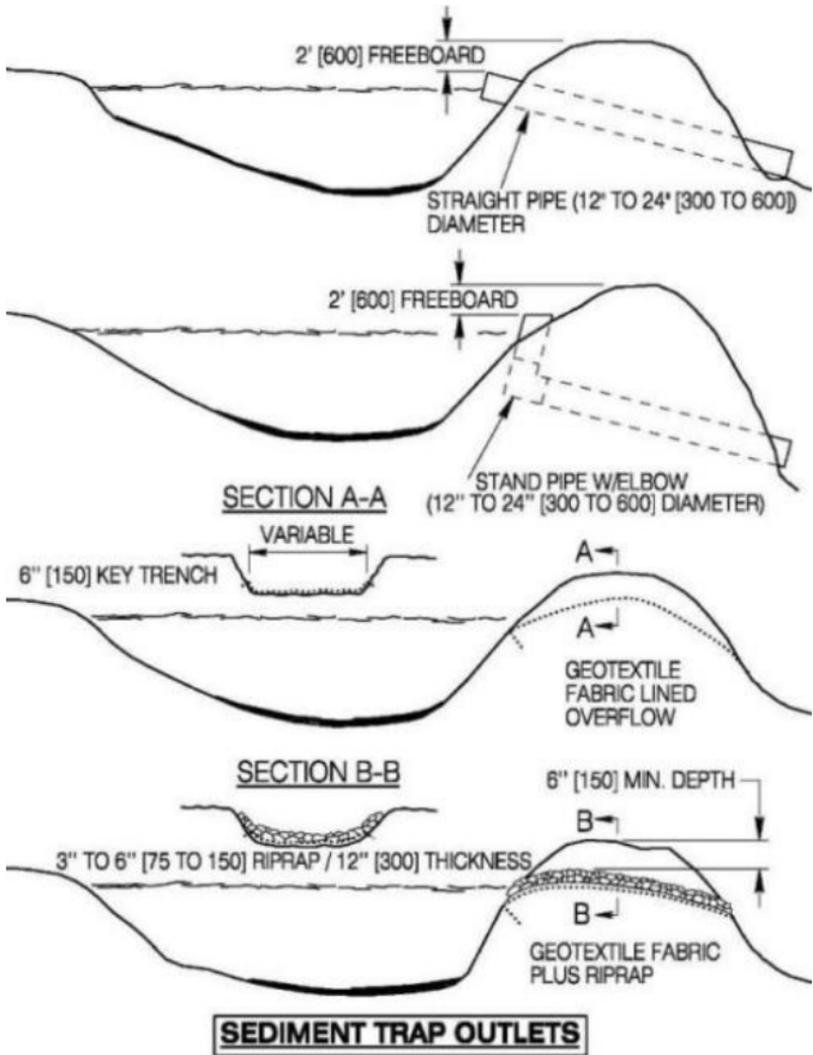
Add riprap for greater flows over higher dam embankments.

As approved by the engineer, place pipe outlets in overflow spillways.

Construct pipe outlet so that it provides a suitable freeboard to the dam crest and has suitable capacity to handle a two year frequency discharge.

Drain trap as approved by the engineer prior to storms that may inundate the trap system.

SEDIMENT TRAPS (continued)



WYDOT Temporary Erosion Control Measures for Storm Water Pollution Prevention – Standard Plan 215-1, Sheet 9

All *Sediment Traps* need to have designated means of discharge, to avoid potential embankment and containment failure.

Different means of discharge can be used for *Sediment Traps*, based on the style of outlet structure selected, from overflow weirs to pipes. Regardless of the style of discharge feature for the feature, the discharge location needs to be selected carefully and well managed.

SEDIMENT TRAPS (continued)



Good Installation Of a *Sediment Trap*, With an Armored Rip-Rap Weir For the Feature To Discharge Without Embankment Erosion.



Poorly Constructed *Sediment Trap* Without a Designated Means of Discharge. Note the Eroded Embankment Caused by Overtopping.

SEDIMENT TRAPS (continued)



Sediment Trap With Stand Pipe For Discharge Point. Trap Will Discharge When Elevation Of Pondered Water Reaches the Top Of the Pipe.



Inappropriate Stand Pipe Installation With Perforations and Top Of Pipe Extending Above Sediment Trap Embankment Elevation.

BMPs FOR SEDIMENT TRACKING

VEHICLE TRACKING CONTROL PADS

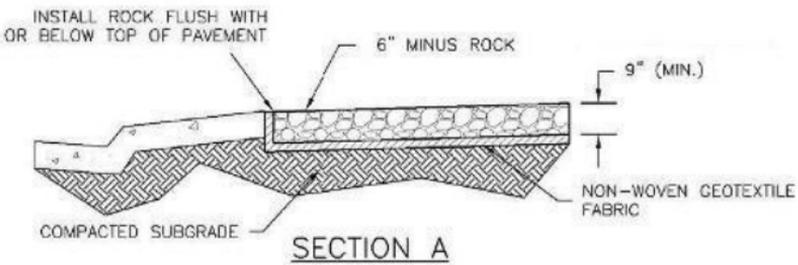
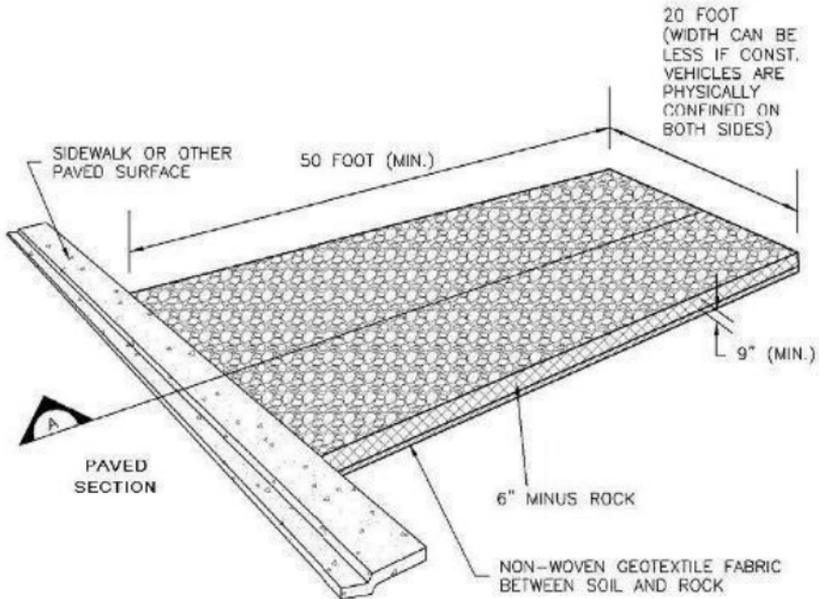
The WYPDES Large Construction General Permit for storm water discharges states: “*Vehicle tracking of sediment from the construction site to paved areas (either within or outside of the construction boundaries) must be minimized by BMPs.*” (Part 7.7), and “*This may include having a designated egress with aggregate surfacing from the site, or by designating off-site parking.*” (Appendix C – Part 2.2)

Sediment tracking, by vehicular traffic transitioning from disturbed areas to paved sections, can be minimized by installing aggregate pads at the egress point. These aggregate pads, referred to as *Vehicle Tracking Control Pads* or *Stabilized Construction Entrances*, can help to control sediment tracking and help prevent rutting by covering and stabilizing disturbed sections. It should be expected that even with the use of a *Vehicle Tracking Control Pad*, during inclement weather there will still be sediment tracking. Other tracking control BMPs, diligent monitoring, and an aggressive sweeping program will most likely be needed to ensure compliance with this permitting component.

It is important to understand that the potential for tracking sediment onto paved sections is not a roadway cleaning problem. Cleaning paved roads is a responsive action, after the damage has already been done. More appropriately, the first tracking control BMPs to be implemented should focus on prevention, controlling, avoiding, and greatly minimizing the potential for sediment tracking.

VEHICLE TRACKING CONTROL PADS

(continued)



VTC— AGGREGATE VEHICLE TRACKING CONTROL

Adapted from Urban Drainage and Flood Control District
Criteria Manual, Vol. 3

Installing an underlayment of fabric will prevent the rock from being pushed into the subgrade.

Inspections and maintenance procedures should ensure that the *Vehicle Tracking Control Pad* continues to match the dimensions of the installation detail. If the *Vehicle Tracking Control Pad* is not effective in managing sediment tracking, other BMPs need to be implemented. Additional BMPs may include: limiting site access, installing stabilized staging or parking areas and project scheduling modifications.

VEHICLE TRACKING CONTROLS

VEHICLE TRACKING CONTROL PADS

(continued)



Good Installation Of a *Vehicle Tracking Control Pad* With Evenly Placed Rock To Provide a Stabilized Transition Point For Vehicular Traffic.



Incorrectly Installed and Poorly Maintained *Vehicle Tracking Control Pad*. No Underlayment Of Fabric Was Installed, Rock Has Been Pushed Down Into the Subgrade, and the Feature Cannot Function as a Tracking Control BMP.

BMPs FOR RECLAMATION

EROSION CONTROL BLANKETS

The function of installing *Erosion Control Blankets* after seeding is to; provide erosion control, protect the seedbeds, and promote germination.

WYDOT allows several types of *Erosion Control Blankets* to provide cover and protection of seed beds, including; Jute, ST1, ST2, STC, EX1 and EX2.

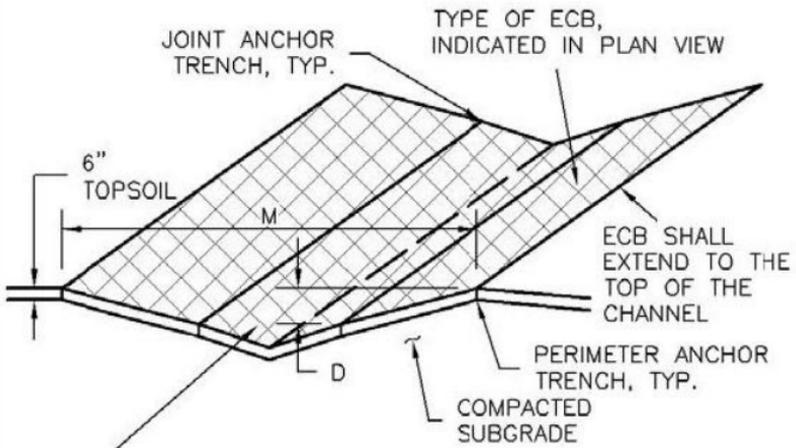
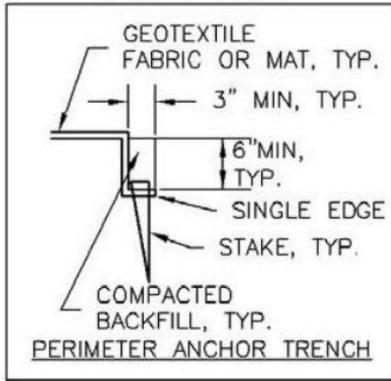
Use *Erosion Control Blankets* and ditch linings to prevent erosion in borrow ditches, drainages, and roadway slopes. Unroll blankets in the direction of water flow with ends overlapped at least 4 in and the uphill blanket on top.

Shape, finish, seed, and fertilize areas as specified before placing *Erosion Control Blankets* or ditch lining. To achieve maximum blanket-to-soil contact, roll out blankets evenly and smoothly without stretching. Overlap lengthwise blanket edges at least 2 in and with the direction of prevailing winds to minimize overturning. Embed the non-overlapping ends of the initial blankets in 6 in wide x 6 in deep check slots the full width of the blanket. Staple blankets to the ground using U-pin staples driven vertically through the material. Use a single staple common to both blankets at overlapped ends and edges. Place staples at intervals of 4 ft along overlapping lengthwise edges and at intervals of 3 ft along overlapping ends and the bottom of check slots.

Inspections and maintenance should ensure that the blankets are; stationary, continue to be in contact with the grade, providing full coverage, have not degraded prior to germination.

EROSION CONTROL BLANKETS (continued)

ANCHOR DETAILS



STAKING PATTERN PER MANUFACTURER SPEC. OR PATTERN BASED ON ECB AND/OR CHANNEL TYPE (SEE STAKING PATTERN DETAIL)

SMALL DITCH OR DRAINAGEWAY

Adapted from Urban Drainage and Flood Control District Criteria Manual, Vol. 3



EROSION CONTROL BLANKETS (continued)



Erosion Control Blankets Installed Running Along the Direction Of the Flow In This Swale.



Erosion Control Blankets Should Be Installed With Good Soil Contact, and Not With Tenting Or Voids That Can Stress the Fibers and Allow Undermining.

BMPs FOR RECLAMATION

HYDRAULIC MULCHING

Similar to *Erosion Control Blankets*, *Hydraulic Mulching* provides cover and erosion control for seedbeds.

For *Hydraulic Mulching* or in hydraulic seeding, provide and use mulch made of virgin wood fibers prepared so as to be free of growth- or germination-inhibiting factors. Ensure also that the mulch:

- Is appropriately colored to facilitate metering;
- Will remain in uniform suspension in water under agitation;
- Blends with seed, fertilizer, and other additives to form a homogenous slurry;
- Has been processed with heat and pressure to soften the wood chips so that the mechanical refining yields fibers of a suitable shape and size; and
- Will form a blotter-like ground cover after application, with moisture absorption and percolation properties and the ability to cover and hold seeds in intimate contact with the soil, without inhibiting the penetration of seedlings.



BMPs FOR RECLAMATION

DRY MULCH

Straw or hay mulch can be used to provide erosion control and promote germination for newly seeded areas. When installed correctly, the mulch is anchored in the ground, simulating a root system. This artificial root system provides wind and surface erosion control by stabilizing the soils. Germination is facilitated through moisture retention, from precipitation events or irrigation.

Application rates need to be adjusted according to slope, soil conditions, season, and other factors that may require longer term cover and protection. Adequate soil preparation is needed to ensure proper and significant depth of crimping. If not installed correctly, *Dry Mulch* can be susceptible to wind or surface erosion.

Spread dry mulch uniformly at the specified rate. Begin application at the top of the slopes, then proceed down the slope.

Where steep slopes or other factors prohibit the use of equipment, mulch may be spread by hand or blower and covered with erosion control netting or lightweight erosion control blankets to hold the mulch in place. Do not place mulch that cannot be covered with netting or blankets the same day.

Anchor mulch the day of placement and so that at least 25 percent of the stems are vertical after crimping.

Dry Mulch applications that have deteriorated prior to germination require reapplication to ensure on-going cover and protection.

DRY MULCH (continued)



***Dry Mulch* Should Be Installed Uniformly, With Good Coverage and Crimped So That At Least 25% Of the Stems Are Vertical.**



Re-application Will Be Required If the *Dry Mulch* Installation Has Deteriorated Prior To Vegetative Growth Being Established.

BMPs FOR MATERIALS, EQUIPMENT AND WASTE HANDLING

All sources of potential pollution on site during construction need to be evaluated for their potential to impact water quality. Pollution sources need controls to manage them, if there is the potential for them to be entrained in storm water run-off and conveyed off-site.

Other than exposed soils, there will most likely be other sources of pollution that need to be evaluated. These may include petroleum products, concrete waste, portable toilets, worker trash, remnants from construction, demolition debris, and a full range of other chemicals that may be used during construction.

Source reduction should always be considered, by eliminating excess/unnecessary materials and prompt waste disposal whenever possible. The next strategy should be siting considerations. Selecting a good location for waste storage is very important. Storage should be in a secure location, away from drainage areas.

WASTE

Waste cannot be abandoned on-site and must be appropriately stored for later, off-site disposal. This on-site storage will typically include some means of containment with a covered receptacle.

MATERIALS

The original container that a product is delivered in should not be considered adequate containment or control. Typically another means of containment will be required, referred to as secondary containment. Storage, utilizing secondary containment, may be achieved with storage containers, bermed excavations or purchased, specialized containment features.

MATERIALS HANDLING

BMPs FOR MATERIALS, EQUIPMENT AND WASTE HANDLING (continued)

BULK STORAGE



Bulk Storage Should Always Have Some Means Of Secondary Containment.



Drums and Pails Should Not Be Stored In the Open Without Some Means Of Control and Protection.

BMPs FOR MATERIALS, EQUIPMENT AND WASTE HANDLING

EQUIPMENT MANAGEMENT



Leaking Equipment Needs To Be Repaired Or Removed From the Project. Drip Pans Should Be Used In the Interim.



Care Needs To Be Exercised During Fueling Operations. Spills and Leaks Should Be Promptly Detected and Rapidly Addressed.

BMPs FOR MATERIALS, EQUIPMENT AND WASTE HANDLING

EQUIPMENT MANAGEMENT (continued)



Stationary Equipment, Such As Pumps and Generators, Require Secondary Containment, To Provide Protection In the Event Of Equipment Failure, Leaks Or Spills.



Leaks From Equipment With No Secondary Containment Are a Source Of Pollution That Can Impact Water Quality.

BMPs FOR MATERIALS, EQUIPMENT AND WASTE HANDLING

SPILL PREVENTION AND RESPONSE

The WYPDES Large Construction General Permit for storm water discharges requires Permittees to: *“Minimize the discharge of pollutants from spills and leaks and implement chemical spill and leak prevention and response procedures”* (Section 7.15.3) and states that, *“The SWPPP shall describe employee training to inform personnel of their responsibility in implementing the practices and controls included in the SWPPP such as spill response, good housekeeping and sediment control. Employee training must be provided at least annually”*. (Section 8.2.4.4, 5.e.)



Construction Site Operators Must Have Procedures In Place To Prevent Spills and Leaks and Have the Materials and Trained Personnel To Identify and Respond To Them.

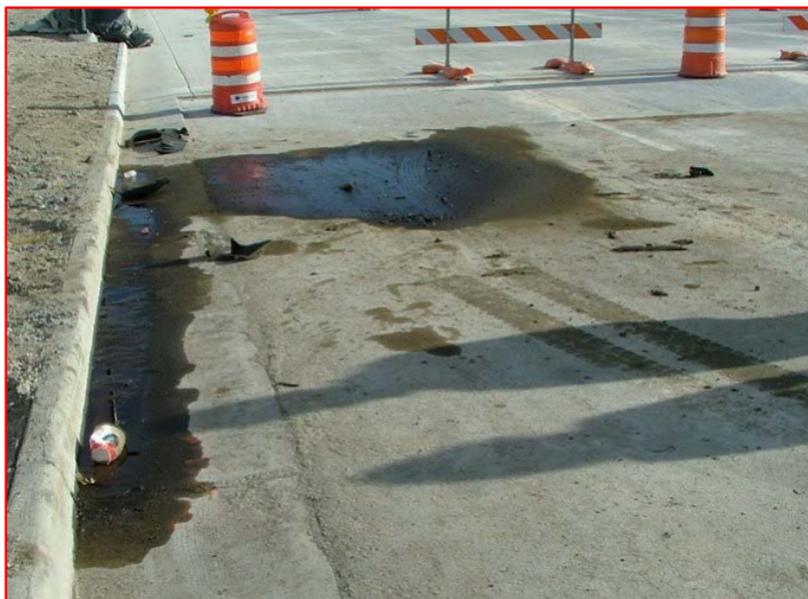


BMPs FOR MATERIALS, EQUIPMENT AND WASTE HANDLING

SPILL PREVENTION AND RESPONSE (continued)



Storage and Off-Site Disposal Needs To Be Established For Soils and Clean-up Materials Contaminated With Petroleum Products.



Spills Must Be Identified and Responded To Quickly, They Cannot Be Ignored Or Allowed To Convey Off-site, Into a Storm Drain Or Into State Waters.

BMPs FOR MATERIALS, EQUIPMENT AND WASTE HANDLING

WASTE MANAGEMENT



Good Housekeeping Practices Will Ensure a Work Zone Free Of Debris and Litter.

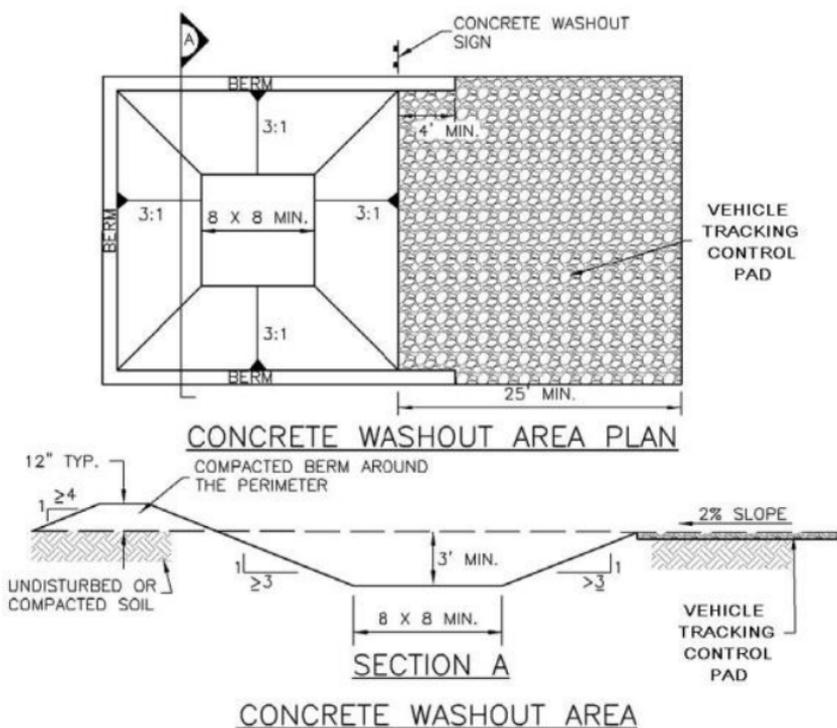


Trash Receptacles Need To Be Adequately Monitored and Serviced To Ensure Proper Waste Management. Fugitive and Wind Blown Debris Is a Source Of Pollution. Covered Containers May Be Required For Effective Management.

BMPs FOR MATERIALS, EQUIPMENT AND WASTE HANDLING (continued)

CONCRETE WASHOUT AREAS

Liquid and solid waste from concrete operations is a significant pollutant source with the high pH and array of chemicals it contains. Concrete washouts and slurry cannot be wasted to the ground without containment. A designated, functional *Concrete Washout Area* needs to be constructed and maintained in a fully functional condition to appropriately manage liquid wastes generated from concrete operations.



Adapted from Urban Drainage and Flood Control District Criteria Manual, Vol. 3

Concrete Washout Areas need to be maintained in good operating condition or decommissioned. Good maintenance will help ensure on-going proper use, prevent failures and loss of containment.

Concrete Washout Areas (continued)



Good Installation Of a *Concrete Washout Area*; With *Berming For Containment*, *Signage* and *Vehicle Tracking Control Pad*.



Liquid and Solid Concrete Waste Require Functional Controls To Manage Them. Containment Is Needed Until Off-site Disposal Is Completed.

BMPs FOR MATERIALS, EQUIPMENT AND WASTE HANDLING (continued)

SAW CUTTING OPERATIONS

Wet or dry sawing operations generate pollutants that must be managed. Wet saw cutting generates slurry and dry saw cutting generates particulates that are pollutant sources, and must be cleaned up.

The WYPDES Large Construction General Permit for storm water discharges states: *“The SWPPP must provide for specific practices that will protect surface waters and storm drains from discharge of concrete washout, grindings and/or slurry.”* (Section 8.2.4.4, 5.c.)



Slurry Created From Concrete Sawing Can Be Greatly Reduced By Catching It Close To the Source

Slurry Cannot Be Allowed To Get Out Of the Control Of the Construction Site Operator.



BMPs FOR MATERIALS, EQUIPMENT AND WASTE HANDLING (continued)

PORTABLE TOILETS

Portable sanitary facilities need to be recognized as potential pollutant sources and managed as such. Similar to many other pollutant sources, the location and monitoring of these units is critical. The siting of these units should be:

- on disturbed ground, and not on paved sections
- on level ground and staked down
- away from impervious areas and inlets
- away from heavy vehicular traffic areas

Monitoring should verify that the units are not leaking and have been properly serviced without spillage.



Toilet Properly Staked To Prevent Tipping.

Leaking Toilets On Impervious Areas Are More Difficult To Respond To, Than Units On Disturbed Ground. Note the Blue Bio-cide Flowing Across the Paved Section.



CONTACT INFORMATION

WYDOT NPDES Permit Information

307-777-4051

Hazardous Spills

Highway Patrol – 800-442-9090

WYDEQ – 307-777-7781

WYDEQ WYPDES Program

Storm Water Coordinator: 307-777-7570

US Army Corps of Engineers

Cheyenne – 307-772-2300

**WYOMING DEPARTMENT OF TRANSPORTATION
FIELD GUIDE**

