

# MODOT 2014 LAND DISTURBANCE TRAINING



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## **Why is Land Disturbance and Erosion and Sediment Control Important?**

- **Erosion and Sediment Loss Causes Water Pollution, Negatively Affecting Our Water Quality**
- **Public Expectations**
- **It's The Law**
- **Fines and Penalties Can and Will Be Imposed**

**Public and regulatory scrutiny is ever increasing!**

## The Goal

- **Deliver the planned final product while ensuring effective erosion, sediment and stormwater management throughout the design and construction process to minimize sediment loss from the project**
- **Be preemptive and effective with stormwater management – (Think it through)**
- **Minimal instability = Reduced vulnerability (Work methodically through the job, FINISHING AS YOU GO – Focus on Erosion Control and lessen reliance on sediment control)**

This is a drastic shift from traditional construction methods, but it is critical that we only disturb as much project area as needed and then finish what we can and re-establish vegetation as quickly as possible.

## **MoDOT & the EPA/DOJ**

- **Alleged Violations Date Back to 2010 – Complaint Driven**
- **MoDOT has Internal and Outside Counsel**
- **Several Meetings/Phone Conversations at this Point**
- **MoDOT was Required to Submit 5 Project-Specific SWPPPs for EPA/DOJ Review**
- **Countless Hours Spent and Resources Gathered – WE DO NOT WANT TO BE HERE AGAIN!!!!**

## What May Happen?

- **Civil Penalties**
  - (ITD = \$895K, HiDOT = \$1M, AkDOT = \$850K, KDOT = \$477K)
- **Changes to Specifications & Standards** (We are changing regardless)
- **Development of Site Specific Written SWPPPs to Accompany Site Maps** (Boo)
- **Centralized Database for All Land Disturbance Projects**
- **Personnel Commitments**
- **Reporting**

## **MoDOT & MDNR**

- **Alleged Violations Date Back to 2010 – Complaint Driven**
- **4 NOVs and 1 LOW**
- **First Civil Penalty for LD Issues!**
- **“Habitual Violator?”**

**We do not want to be labeled as a “habitual violator”. With this label, penalties can increase and an entity could lose its permit.**

## Regardless

- **Regardless of the outcome of our dealings with the EPA/DOJ, there are things we need to improve on **TOGETHER!****

The only way to tackle this erosion and sediment control “beast” is for everyone to be educated, make it a priority and then work together toward the common goal.

## Whose Job Is It? – Collaboration!

It's time to embrace the fact that these projects are a shared responsibility, especially when it comes to erosion and sediment control.

- “That’s the erosion control sub’s job.”
- “Well she does the inspections. Once it shows up on a report we’ll take care of it.”
- “I just install what the plans say, where they say.”

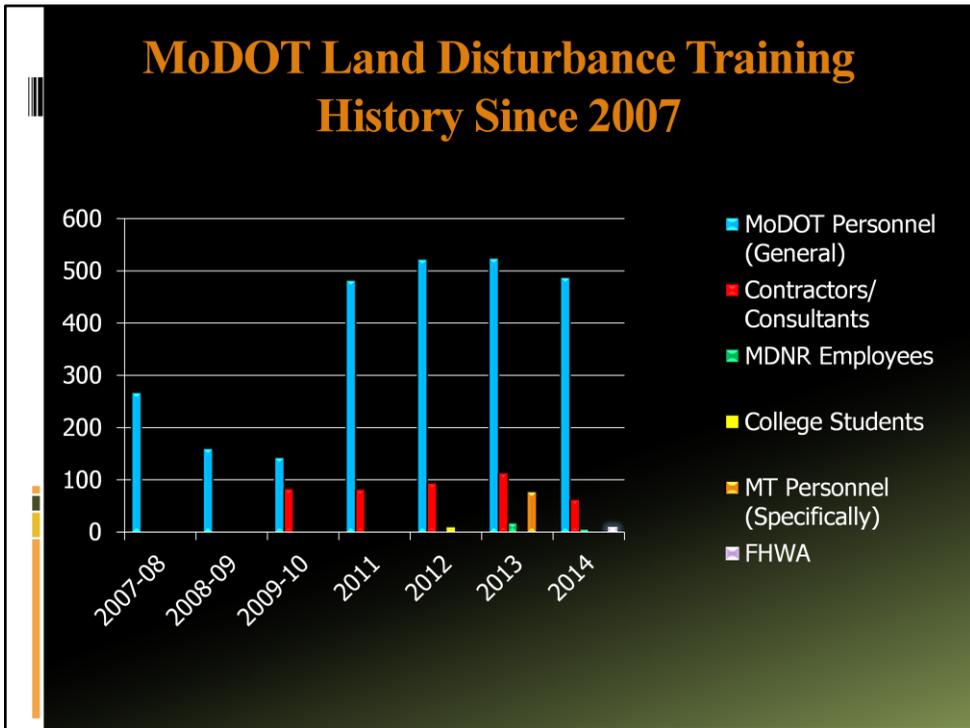


Collaboration – shared ownership of a collective vision. – Barry Fagan, ALDOT

## **Education & Awareness**

- **Since it is everyone's responsibility, we need everyone to be educated and aware of requirements.**
- **Make the effort, there are ample opportunities to gain some knowledge.**

**Everyone from DE, CM, MT, Management, contractors and consultants needs to be aware of the importance of proper land disturbance practices.**



**MoDOT has greatly ramped up its education and awareness since 2010.**

## Land Disturbance Regulation

- **1972 Clean Water Act**
  - Requires a permit to discharge water that has contamination in it.
  - In Missouri the permit is called a Missouri State Operating Permit
  - Nationally it is called National Pollutant Discharge Elimination System (NPDES)
- **Point Sources ('72) and Non-Point Sources ('87)**
- **Phase II Requirements effective March 10, 2003 require permits for Land Disturbance  $\geq 1$  acre.**

In 1972 the clean water act was passed to control discharges of polluted waste water from industries and cities. Discharge permits allowed these point sources to discharge treated wastewater.

EPA subsequently delegated Clean Water Authority to Missouri DNR. Since then DNR has issued discharge permits to cities, industries, and other waste water treatment operations.

In 1987 environmental groups sued EPA to regulate non-point source discharges. These are discharges that do not have a single point of discharge.

**Missouri State  
Operating Permit  
For  
Land Disturbance**

**Revised/Renewed  
Every 5 Years**

STATE OF MISSOURI  
DEPARTMENT OF NATURAL RESOURCES  
MISSOURI CLEAN WATER COMMISSION



**MISSOURI STATE OPERATING PERMIT**  
GENERAL OPERATING PERMIT

In compliance with the Missouri Clean Water Law (Chapter 644 R.S. Mo. as amended, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92<sup>nd</sup> Congress) as amended.

Permit No. - MO-R100 -  
Owner - name -  
Address - address -  
Continuing Authority - name, or state as above -  
Address - address, or state as above -  
Facility Name - name -  
Facility Address - physical address -  
Covered Area:

is authorized to discharge from the facility described herein, in accordance with the effluent limitations, inspection, reporting, and any monitoring requirements as set forth herein.

**FACILITY DESCRIPTION**  
All Outfalls  
Construction or land disturbance activity (e.g., clearing, grubbing, excavating, grading and other activities that result in the destruction of the root zone and/or land disturbance activity that is reasonably certain to cause pollution to waters of the state).

This permit authorizes streamwater discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System; it does not apply to other regulated areas. This permit may be appealed in accordance with Section 644.091.6 and 671.250 of the Law, and 10 CSR 20-6.020, and 10 CSR 20-1.020.

May 31, 2017  
Expiration Date

May 30, 2017  
Issuance Date  
MO 785-1481 (7-94)

Lisa Parker Faulkner  
Lisa Parker Faulkner, Director, Department of Natural Resources

John Madras  
John Madras, Director of Staff, Clean Water Commission

**MODOT has a 5-yr permit to perform land disturbance activities. Our permit will expire in May of 2017.**

**MODOT expects to participate in the new permit development; however, EPA will have ultimate “veto” authority over anything that DNR and MODOT may agree to.**

## **WHAT YOU NEED TO DO!**

### **BE FAMILIAR WITH YOUR PERMIT!**

([www.dnr.mo.gov/env/wpp/permits/issued/R100000.pdf](http://www.dnr.mo.gov/env/wpp/permits/issued/R100000.pdf))

- **The permit is a legal agreement between the applicant and DNR.**
- **The applicant will be held responsible for ensuring that land disturbance activities are in compliance with all permit conditions and applicable regulations.**
- **For MoDOT, MDNR receives a quarterly report of all MoDOT LD jobs one acre or more.**

Since DNR and EPA enforcement actions always begin with an evaluation of MODOT's permit conditions, it makes sense that MODOT and contractor personnel would want to be familiar with the permit.

## **“The Permit”**

- **The land disturbance permit does not authorize other impacts such as Historic Preservation Act, Endangered Species Act or Section 404. (There are separate clearances that must be obtained for impacts to these resources.)**

Understand the term “permit” in correct context. MODOT has a DNR land disturbance permit that allows land disturbance of one acre or more. The US ARMY Corps of Engineers also issues a different kind of “permit” for stream crossings and fills (Section 404). MODOT issues entrance and “break in access permits” to cities, businesses, and others who wish to gain access to our roads. Understand the differences.

## Exemptions from Permitting

- Discharge to a combined sewer system
- Agriculture
- Strip or ribbon projects (generally utilities a few feet wide)
- **Less than 1 acre of land disturbance and not part of a larger, common plan for development**

Regulatory agencies (EPA and DNR) have shown little interest in targeting utilities. Utilities rarely voluntarily approach DNR prior to land disturbance, and they generally escape regulation when operating near or on MODOT R/W.

The Clean Water Act exempted agriculture because the original law would not have passed if farmers were to be regulated for tillage and grazing operations.

## **Prohibited Acts**

- **To cause pollution of waters of the state**

**The subjectivity of what is a pollutant and at what level it becomes pollution often makes it difficult for us to comply..**



**This dewatering operation is pumping turbid, brown, contaminated water from a drilled shaft directly into a clear stream. Clearly pollution because the stream is clear as it flows into the job.**

## Prohibited Acts

- To cause pollution of waters of the state
- **To “put or place” pollutants in proximity to streams**

**Note- this says “in proximity to” streams. MODOT does not have to cause contamination to be in violation of this provision in the law. We should always have a BMP barrier between our disturbance and resources that we could possibly impact (e.g., streams, ponds, lakes, wetlands, adjacent property, etc.)**



**Many bridge and culvert projects involve some type of work on a stream bank, or in a stream channel. The “put or place” provision in the law is seldom used as the sole reason for enforcement, but is usually referenced as an “add on” in most Notices of Violation (NOVs). Always ensure that a barrier is placed between the potential contaminant and the stream or other resource.**

**Stockpile material outside the floodplain if possible.**

## Prohibited Acts

- To cause pollution of waters of the state
- To “put or place” pollutants in proximity to streams
- **To exceed general or specific water quality criteria**

DNR water quality standards (10-CSR20-7.031(3)) say “waters shall be free from” a number of conditions or pollutants.

These “free from” conditions are listed on page 3 of the DNR permit.

- unsightly bottom deposits
- oil, scum, floating debris
- unsightly color or turbidity
- harmful effect on human or aquatic life
- physical, chemical, or hydrologic changes that impair natural community

**“free from unsightly turbidity”**

Regulator –  
“Now how do we find  
where this came from?”

**Can be highly  
subjective!**

**“free from harmful bottom deposits”**

Regulatory enforcement personnel have demonstrated that “unsightly turbidity” is an extremely subjective condition that can be interpreted differently from one individual to the next.

The first example in this slide is from a diamond grinding discharge and is simply intended to show the differential water clarity. The second example is utility bore slurry that traveled down a ditch line and deposited on this stream bottom, negatively affecting aquatic habitat.

## Prohibited Acts

- To cause pollution of streams
- To “put or place” pollutants in proximity to streams.
- To exceed general or specific water quality criteria
- **To exceed permit limits**

The present permit contains a discharge limit of 2.5 ml/L/hr for Total Settleable Solids as measured by the Imhoff Cone test.

## Prohibited Acts

(MO-R100007 p. 10, E.1.-2.)

### E. SAMPLING REQUIREMENTS AND EFFLUENT LIMITATIONS

1. Settleable Solids discharging from a stormwater outfall shall not exceed 2.5 ml/L per Standard Method 2540 F for storm events up to but not exceeding the local 2-year, 24-hour storm. The Settleable Solids limit does not apply during storm events that exceed the local 2-year, 24-hour storm.
2. The Department may require sampling and reporting as a result of illegal discharges, compliance issues, complaint investigations, or other such evidence of contamination from activities at the site. If such an action is needed, the Department will specify in writing any sampling requirements, including such information as location, extent and parameters.

**The present permit contains a discharge limit of 2.5 ml/L/hr for Total Settleable Solids as measured by the Imhoff Cone test, but note the storm limit.**

# Storm Water Pollution Prevention Plan (SWPPP)

(Primarily Consists of a Written Plan & Site Maps)

- Each site must have one **(Yes, even shouldering jobs!)**
- Prepared **before** construction starts
- Dynamic - changes with project
- Document all changes – written and plans
- Includes weekly Inspections – Every 7 calendar days
- Includes post-runoff inspections - 48 hrs of event
- Includes a BMP maintenance plan during construction
- Includes the removal of BMPs and restoration of the area

All land disturbance permits require the operator/permit holder to have a Storm Water Pollution Prevention Plan.

The SWPPP has become the primary target for enforcement by regulators.

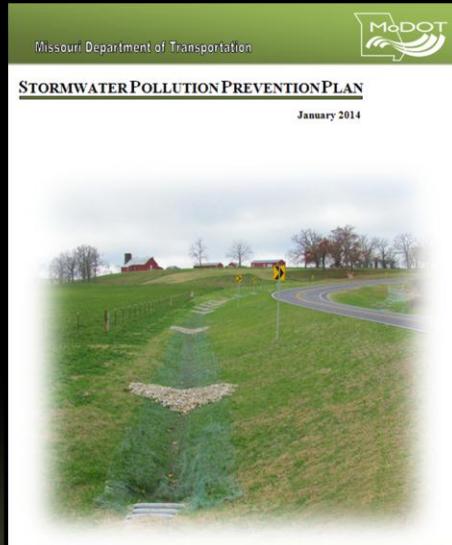
# Stormwater Pollution Prevention Plan

## SWPPP Requirements

(MO-R100007 p. 6, C.6.a./c.)

The written plan should be of sufficient detail to be of practical use to field personnel and should include:

- Facility and receiving waters information
- Function of the project
- Intended sequence and timing of soil disturbing activities
- Estimates of the total area of expected disturbance
- A general area map showing all waters of the U.S. within 1 mile of the project



The MoDOT SWPPP is constantly evolving.

# Stormwater Pollution Prevention Plan

## Form 806.8.2 Project-Specific Info Sheet

### MISSOURI DEPARTMENT OF TRANSPORTATION Project-Specific SWPPP Information

Project Number: 10P0230Z County: Pemiscot Route: 84

Project Description: Construct new lanes to expand this route to a 4-lane facility. 4 bridges and one RCB will be constructed as part of this project.

Estimated Project Start Date: April 21, 2013

Estimated Project Completion Date: April 22, 2013

RE Name: Johnny Asphaltseed

Erosion and Sediment Control Inspector(s) Name(s): Dean Martin, Frank Sinatra, Sammy Davis Jr

Primary Contractor(s) Name(s): Real Nice Roads, Inc

Erosion and Sediment Control Contractor(s) Name(s): Sediment Trappers Extraordinaire

Seed and Mulch Contractor(s) Name(s): We-Seed, Inc

Total Anticipated Disturbed Acreage for the Project: 72 acres

Primary Receiving Stream(s) for the Project: Rumormill River, Floor Creek, Broken Branch

Location of Public Notification Sign(s) (Note: Must be Viewable to the Public): At intersection of That Road

Additional Project Notes: This project is the second of four phases to complete this corridor.

404/401 Permit Required/Obtained for this Project?  Yes  No

**Attach a map depicting the project location/alignment with enough detail to show waters of the United States within 1 mile of the project.**

**This form must be filled out by DE or CM and attached to the project SWPPP to ensure permit compliance. This form will be specific to each project!**

## **Regulatory Enforcement can Focus Heavily on the SWPPP**

- **“Failure to Develop” an adequate SWPPP**
- **“Failure to Properly Implement” an adequate SWPPP**
- **“Failure to Update or Amend” the SWPPP**
- **“Failure to Properly Operate & Maintain BMPs” in accordance with the SWPPP**

**Regulators are very dependent on the SWPPP for enforcement purposes. Many regulators do not like MODOT’s statewide SWPPP. Regulators often use the term “SWPPP” and “site plan” interchangeably.**

# **Stormwater Pollution Prevention Plan**

**(MO-R100007 p. 5, C.6.b.)**

## **Site Maps (“Erosion Control Plans”)**

- **Identify site boundaries and outfall locations.**
- **Direction(s) of stormwater flow and approximate slopes anticipated after grading activities**
- **Areas of soil disturbance and areas that will not be disturbed**
- **Location of major structural and non-structural BMPs**
- **Locations where stabilization practices are expected to occur**
- **Locations of on and/or off-site material, waste, borrow or equipment storage areas**
- **Locations of all waters of the U.S.**
- **Locations where stormwater discharges to a surface water**
- **Areas where final stabilization has been accomplished and no further construction-phase permit requirements apply.**

**Two phases and update site maps as the project progresses.**

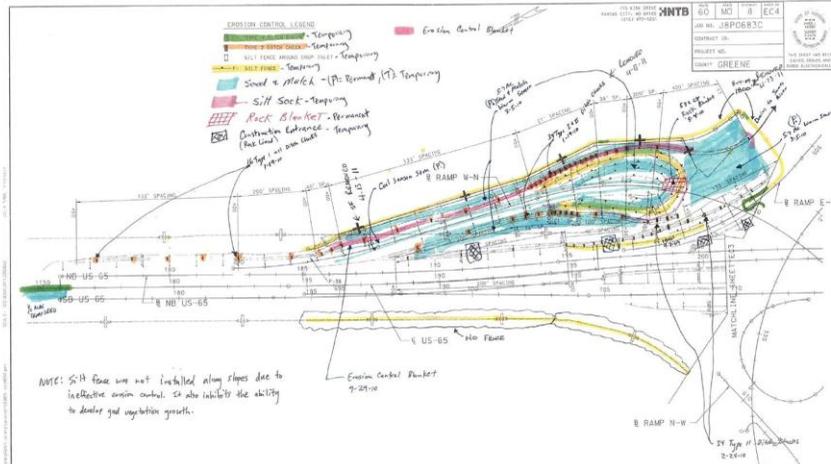
**We should try to develop an initial clearing and grubbing erosion and sediment control plan (site map) and then our typical finished condition plan.**



# Update & Amend SWPPP Site Map/E&SC Plan

- Whatever BMPs you have on the ground had better be on your site plans – **Keep plans up to date!**

\* These plans depict devices that are planned to be installed based on the project's final grade and so certain devices will be installed as necessary during project phasing based on the discretion of project personnel. Devices will be highlighted and dated as they are installed.



**Develop a legend and use color! It will help!**

## **e.) Select “Non-Structural” BMPs**

**(MO-R100007 p. 5-6, C.6.e.)**

- Temporary or permanent
- Minimize amount of **time** soil is disturbed
- Inactivity for > 14 days should include vegetative cover
- Preservation of trees
- Protect vegetation (buffer strips)
- Mulch
- Sod
- Temporary or final seed
- Geotextiles
- Soil stabilizing emulsions/tackifiers
- Stabilized construction entrances

**Non-Structural BMPs Must Be Monitored As Well**

If MODOT is going to take credit for permanent vegetation as a BMP, then these filter strips must be shown on the site map.

## Mark Out Buffer & Preservation Areas Before Site Disturbance



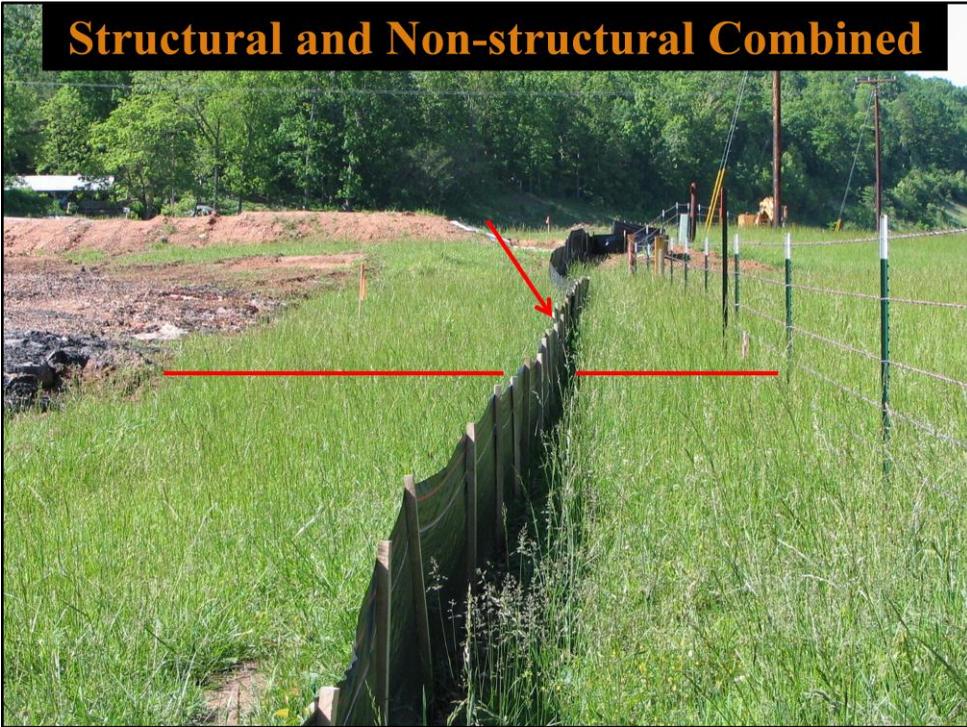
Preserve as much existing vegetation as possible and leave a buffer between the disturbance and waters of the state when possible.

## **f.) Select “Structural” BMPs** **(MO-R100007 p. 6, C.6.f.)**

- **Control/Divert flows**
- **Silt fence (filter fabric, mulch berm, logs/socks)**
- **Earthen dikes (berms)**
- **Ditch checks (rock or alternate types)**
- **Subsurface drains**
- **Pipe slope drains**
- **Sediment traps**
- **Sediment basins**

If any of these devices are used on the project they must be shown on the site map – both the date of installation and removal must be shown too.

## Structural and Non-structural Combined



**Good installation of a “structural” feature in a “non-structural” BMP. Vegetation such as that shown in this slide should not be used as a stand alone where large flows are expected.**

**g.) The SWPPP Shall Provide...**  
**(MO-R100007 p. 6, C.6.g.)**

- **Physical description of the BMP**
- **Conditions necessary for BMP effectiveness**
- **Installation and construction procedures**
- **Operation and maintenance procedures**
- **Indicate temporary or permanent BMP**
- **Where BMP is to be located**
- **When BMP is to be installed**
- **Site conditions that must be met before a BMP is to be removed**

Design has recently updated the SWPPP in an effort to address each of these items. MODOT continues to update the statewide SWPPP as often as necessary to eliminate opportunities for “paper” NOVs.

## **h.) Disturbed Areas**

(MO-R100007 p. 6-7, C.6.h.)

### **Disturbed vs. Erodible**

- **Erodible areas** are those areas with an exposed or inadequately protected soil or other erodible surface (even fine rock can be erodible – use judgement)
- **Disturbed areas** are those areas that have not reached final stabilization in accordance with the permit (i.e., covered with concrete, asphalt, non-erodible rock or 70% vegetative cover evenly distributed over 100% of the area to be revegetated)
- So, seed and mulch may make the area **non-erodible**, but it is still **DISTURBED** until you get that 70% vegetative cover.

MoDOT base rock applications are typically considered non-erodible, however, depending on grade and storm intensity, even these applications can erode, and consequently, the soil under as well.

Also be careful using fine rock alone as shoulder treatment or edge rut repair. Runoff from impervious roadways can have a lot of energy and erode this application very quickly, leaving gullies along the edge of the pavement and inslope, which can become a hazard.

## **h.) Disturbed Areas**

**(MO-R100007 p. 6-7, C.6.h.)**

**Slopes** must be shown on site map

- Temporary stabilization is to take place where soil disturbing activities will cease on any portion of the site and **are not planned to resume for a period exceeding 14 calendar days.**
- Temporary stabilization must be initiated immediately upon knowing the duration is more than 14 days and must be completed within 7 calendar days.
- Temporary stabilization shall consist of well-established and maintained BMPs that are reasonably certain to protect waters of the state from sediment pollution over an extended period of time....These BMPs may include a combination of sediment basins, check dams, sediment fences and mulch **(preferably seed and mulch)**

The permit is encouraging us to stabilize (temp or perm) disturbed areas ASAP, preferably with seed and mulch and to not rely solely on sediment control devices.

## **h.) Disturbed Areas**

**(MO-R100007 p. 6-7, C.6.h.)**

### **Temporary Stabilization – Steep Slopes**

**Steep slopes must be addressed earlier**

- **>3:1**
- **>3% and >150 feet in length**

**Where soil disturbance ceases for 7 days or more  
provide interim stabilization.**

**(preferably seed and mulch)**

Regardless of 14 days or 7 days, MODOT must always push for cover and always ensure that “interim stabilization” (sediment basins, check dams, sediment fences, and/or mulch) is in place.

## **h.) Disturbed Areas**

**(MO-R100007 p. 6-7, C.6.h.)**

### **Final Stabilization**

**Final stabilization of disturbed areas must be initiated immediately and completed within 7 calendar days whenever any clearing, grading, excavating or other earth disturbing activities have permanently ceased on any portion of the site.**

### **Exemption to the 7 days:**

**Allowances to the 7 day completion period for temp or final stabilization may be made due to weather and/or equipment malfunctions but these must be documented in the SWPPP.**

# Permanent Seeding

## Always the Preferred Stabilization



**Make seed/mulch measurement prior to reaching final seedbed prep!**



**Seed ID?**

The permit says 70% cover is acceptable cover, but does not provide specifics as to how % cover is measured. Again, highly subjective.

**Do Not Delay, Seed and Mulch Today!**  
**TIMING is a BMP!**



**Obviously this site is awaiting seed and mulch. We and our contractors need to ensure we are planning and timing grading and seeding operations so they happen in immediate succession if possible.**

## **i.) Installation**

**(MO-R100007 p. 7, C.6.i.)**

- Proper BMP Installation (when, where and how)
- Install peripheral or border BMPs **BEFORE** general site clearing if possible -- if not, “immediately” after
- Discharges must pass through an appropriate impediment before leaving the site – **If you feel what is on the plans or on the ground is not appropriate, replace it with what you know will work for the situation – it may cost more, but it won’t cost as much as a fine!**
- Location of all BMPs must be included on the site map, including buffer areas

The land disturbance permit is very specific about installation. If you read anything in the permit you should read Section i.

## **Install Perimeter & Outfall BMPs Before General Site Disturbance**



**Always install outfall and perimeter protection prior to grading.**

**If a BMP is absent, INSTALL IT! If it was not included in the original SWPPP, add it and amend the SWPPP**



**No outfall controls...no slope stabilization....disaster!**

**In general, well constructed, impounding devices (Sed. basins, traps, rock ditch checks) should be installed at project points of discharge (i.e., outfalls).**



**Silt fence is NOT an “appropriate impediment” to sediment movement at an outfall location. An outfall location such as this must be identified on the site plan. Site plans with “silt fence” shown at the “outfall location” should raise a red flag to anyone who reads the plans (site map). Install robust devices at outfall locations.**

## **j.) Sediment Basins** **(MO-R100007 p. 7, C.6.j.)**

- Required for L.D. areas  $\geq 10$  acres “at one time” to a common point of discharge (i.e., same outfall)
- Must have volume to contain the 2-year, 24-hour storm or 3600 ft<sup>3</sup> per disturbed acre (typically twice as long as wide) & a stabilized spillway
- Remove sediment to maintain capacity when 50% full
- Maintain basin until final stabilization
- Where sediment basin is impractical, the SWPPP shall evaluate and specify other similarly effective BMPs if they provide equivalent water quality protection.
- **If you can't install a basin, there has to be written documentation within the SWPPP of why, and describe BMP(s) that are going to be installed for “similar” protection (SPECIFIC EPA COMPLAINT!)**

This is a contentious issue between regulators and MODOT, because we typically don't have the right of way or site geometry necessary to install a basin.

## j.) Sediment Basins (MO-R100007 p. 7, C.6.j.)



Temporary



Permanent

## j.) Sediment Basins (MO-R100007 p. 7, C.6.j.)

- Stabilized spillways prevent erosion and failure.



Rock Lined

Skimmer  
& Baffles



Standpipe



When using flocculants surface skimmers should definitely be considered to draw clean water from the top of the water column.

## I.) Dewatering (MO-R100007 p. 8, C.6.I.)

- SWPPP shall describe anticipated dewatering methods (dewatering plan)
- Include anticipated volumes
- Anticipated maximum flow (gpm)
- Specific BMP(s) that will be used to control sediment
- In no case shall water be pumped off site without being treated by the specified BMP



Each of these points is specified in the permit.

## 1.) Dewatering

- Develop a dewatering plan before you turn on the pump or dig the ditch.
- What path will the water take & where will it end up?



**Think it through. Where is this water going to end up and do I really think it will be clean when it gets there with what I have in place?**

## 1.) Dewatering

- Dewatering plans can be simple. They just have to effectively remove pollutants from discharge water.



**This ain't rocket surgery! Just put some thought into it.**

## 1.) Dewatering

- Make sure you aren't causing additional problems with your return water.



## **m.) Roadways**

**(MO-R100007 p. 8, C.6.m.)**

- **All efforts shall be made to prevent deposition of sediment onto roadways.**
- **Where sediment is expected provide curb inlet protection.**
- **At the terminus of a roadway install a BMP (gravel berm, silt fence, etc.).**
- **Roadways and curb inlets shall be regularly cleaned (weekly or more if necessary).**

**Track out is very difficult to control. We do our best to keep it to a minimum and keep roadway surfaces clean.**

## m.) Roadways

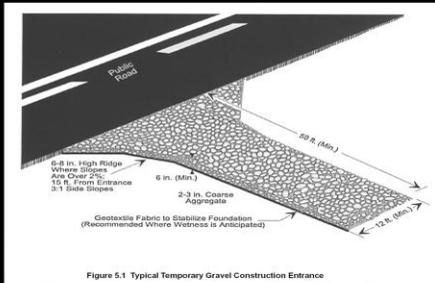
- Stabilized construction entrances should be used to limit track-out onto public roadways. (EPA!)



- Highly visible
- Highly mobile
- Safety concerns

## m.) Roadways

- How can you limit, or even prevent track-out?
- Design entrances into jobs if possible, though not typical. Regardless, they should be identified on E&SC plans. **(Specific EPA Complaint!)**



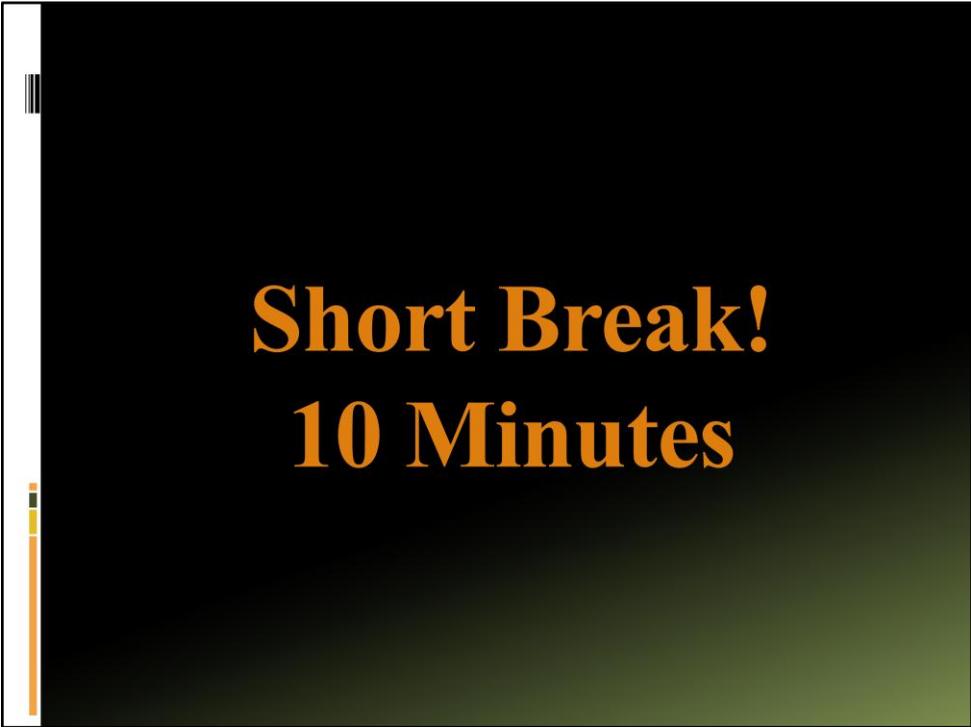
The most commonly used is a rocked construction entrance, but it takes a lot of maintenance to keep it functional under heavy traffic.

## **“The Permittee Shall Amend the SWPPP”** **(MO-R100007 p. 8, C.11.)**

- **Design, operation, or maintenance has changed**
- **Project has changed such that storm water discharges also change**
- **Inspections indicate problems**
- **DNR/EPA notifies permittee of deficiencies in SWPPP or BMPs**
- **SWPPP is determined to be ineffective (off site deposits)**
- **SS exceeds 2.5 ml/L/hr (sampling not required)**
- **DNR/EPA determines violations (or potential violations) of WQS**

The SWPPP includes both the Statewide MODOT document, as well as the project “site plan”. Modifications of either of these items constitutes a revision.

MODOT asserts that Doc Records, change orders, Order Records, memos and letters to contractor are also components of a SWPPP.



**Short Break!**  
**10 Minutes**

## Inspections (MO-R100007 p. 9, C.13.)

- Regular inspections at a minimum of once every **7 calendar days** or within 48 hours of a runoff event or within 72 hours on the next business day if the rain event ceases during a non-business day such as weekends or holidays
- Conducted by a person responsible for environmental matters at the site or a person trained by the responsible person. E&SC inspector must be proficient with E&SC matters. **(I recommend in-house 3<sup>rd</sup> party inspections from time to time!)**
- Inspections must occur until final stabilization.
- Deficiencies noted **must be corrected in 7 calendar days. Do some follow-up with contractor to ensure corrections are made.** By all means, get them done sooner if possible – Work together with contractor to ensure this!
- If weather or site conditions preclude fixing deficiencies in 7 days, a written justification **(including pictures)** must be documented.
- Inspection reports must be signed and filed.

**Proper inspection procedures by trained personnel are critical!**

# Inspections

▪ Inspections every 7 days or within 48 hours of a runoff event on the site.

▪ **INSPECTION RECORD** should be a guide to walk inspectors through the inspection process to ensure nothing is overlooked, but also evoke thought about proper erosion and sediment control for the project.

**MISSOURI DEPARTMENT OF TRANSPORTATION  
LAND DISTURBANCE INSPECTION RECORD**

Inspection Date: \_\_\_\_\_ Inspection Record No.: \_\_\_\_\_  
 Project Number: \_\_\_\_\_ County: \_\_\_\_\_ Route: \_\_\_\_\_

Inspection Type: Weekly \_\_\_\_\_ Post-Runoff \_\_\_\_\_ (Total Precip (in.) \_\_\_\_\_ Precip Duration (hrs) \_\_\_\_\_)  
 Final \_\_\_\_\_ Other \_\_\_\_\_

Total Disturbed Acreage on the Project \_\_\_\_\_ Total Authorized Acreage on the Project \_\_\_\_\_

Are there BMP deficiencies/other matters requiring corrective action, modification or installation within this report?  Yes  No

**Land Disturbance Inspection Checklist**

	Yes	No	N/A
1 Current and updated SWPPP/site map on site when the erosion & sediment control inspector is on site and a copy given to the contractor?			
2 Permit public notification sign(s) posted and visible to the public?			
3 Are all erosion and sediment control BMPs properly installed, maintained, functioning as intended according to the SWPPP and depicted on the site map? If "No", explain deficiencies below (use add. pages if needed)			
4 Are BMPs in place to protect streams, wetlands and other environmentally sensitive areas from pollutants?			
5 Is trackout controlled at project entrance/exit points?			
6 Are active stormwater inlets susceptible to receiving sediment properly protected?			
7 Does the project have a dewatering plan?			
8 Are dewatering operations effectively removing pollutants from the water?			
9 Are litter, construction debris, fuels, lubricants and other construction chemicals controlled?			
10 Have all temporary BMPs that are no longer necessary been removed and removal depicted on the site map?			
11 Have all deficiencies from the last report been corrected in 7 days? If not, provide an explanation of adverse site conditions and attach photo evidence.			
12 Other:			

Explanation of checklist items identified above (use additional pages if needed): \_\_\_\_\_

Describe areas where land disturbance activities have temporarily or permanently ceased. (Excluding weather shutdowns) Describe how these areas have been or will be stabilized \_\_\_\_\_

Provide a brief description of the current project status with regard to erosion and sediment control and the effectiveness of BMPs (use additional pages if needed): \_\_\_\_\_

Has the job reached final stabilization in accordance with the permit?  Yes  No

Inspector Name: \_\_\_\_\_ Inspector Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
 RE Name: \_\_\_\_\_ RE Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Distribution: Contractor (Hard Copy  or Electronic   
 Save to V:\Contract Information Archive & keep hard copy with inspector

MoDOT Land Disturbance Inspection Record (Rev. 122013)

The MoDOT inspection record is updated as needed just like the SWPPP.



## Inspections

- Be sure to inspect receiving streams, lakes, ditches, etc. for off-site contamination and make adjustments if needed.
- Permit says look 50' downstream of last outfall BMP – if possible!



**GOOD!**



**Oh Momma!**

We should only retrieve off-site deposits when doing so won't cause further damage to the environment.

## **Other Discharges**

**(MO-R100007 p. 10, D.)**

- **Hazardous substance and oil spills must be reported.**
- **Removed (unearthed) substances**
  - **Don't Haul Off!**
- **Notify DNR (telephone) no later than 24 hours of discovery. (Let MoDOT Env. Handle This)**
- **Notify DNR (writing) no later than 14 days after discovery. (Let MoDOT Env. Handle This)**

The land disturbance permit touches on other environmental regulations.

## Additional Concerns

- Solid waste (trash containers for litter and debris).
- Portable toilets.
- Properly treat wash waters.
- Properly store construction materials to minimize exposure and potential release and away from drainage courses and low areas.
- Response to spills – SPCC concerns.
- Containment berms or drip pans at petroleum product and liquid storage tanks and containers.



# Public Notification

(MO-R100007 p. 10, C.16.)

- The permittee shall post a copy of the public notification sign provided by MDNR at the main entrance to the site or an alternate location if viewable to the public.
- This public notification sign must remain posted at the site until the permit has been terminated (i.e., the job is stabilized).



Missouri  
Department of  
Natural Resources

---

STORMWATER DISCHARGES FROM THIS  
LAND DISTURBANCE SITE ARE  
AUTHORIZED BY THE MISSOURI STATE  
OPERATING PERMIT NUMBER:

**MO-R100007**

IF YOU HAVE QUESTIONS OR  
CONCERNS ABOUT STORMWATER  
DISCHARGES FROM THIS SITE,  
PLEASE CONTACT THE MISSOURI  
DEPARTMENT OF NATURAL  
RESOURCES AT

1-800-361-4827

## **Records**

**(MO-R100007 p. 10, F.1.)**

- **The permittee shall retain the permit, SWPPP, amendments and inspection reports.**
- **The records shall be accessible during normal business hours.**
- **The records shall be retained for at least 3 years following termination.**

**In previous EPA enforcement actions MODOT has been given ample time to collect appropriate records. Therefore inspection reports and “the inspection file” does not need to be kept on site. The only document that must be kept on site is the SWPPP and permit. “On site” means somewhere between the limits of the job (ie truck or trailer).**

## Records

(MO-R100007 p. 10, F.2.-3.)

- Permittee shall provide a copy of the SWPPP to MDNR, USEPA, or other local government if requested. (Records-2.)
- Permittee shall provide those responsible for installation, operation and maintenance of BMPs a copy of SWPPP. (Records-3.)
- Permittee and contractors shall have a copy of SWPPP with them when on project site. (Records-3.)
- The permittee is responsible for damage a contractor/subcontractor may do to a BMP – Work together, it is **OUR (your, their, his, her, my) project!** (Records – p. 9, C.15.)

It is essential that the contractor and sub-contractors be advised of the SWPPP.

# Preconstruction Conference

## Must discuss Erosion / Sediment Control

- E&SC contractors/subs should be present!
- All contractors must be notified of the existence of the permit and SWPPP and provided a copy.
- **Erosion control** should be the **PRIMARY FOCUS** of the land disturbance conversation
- Minimize sediment loss from the project
- Modifications will be necessary as construction proceeds
- Inspections will be performed and may result in additional modifications
- If a high profile or sensitive job, you can involve MDNR at this phase

There has to be a discussion of erosion and sediment control at precons for grading jobs. It is important everyone knows what's expected.

## **Limit Clearing if Possible**

### **Factors that must be considered:**

- **Site conditions**
- **Resources of the contractor**
- **Contractor's plan to control **EROSION****
- **Contractor's plan to control sediment**
- **Response to deficiencies**
- **Contractor's history of compliance**

Allowing the contractor to open expansive acreage is a gamble. Resident engineers should consider these items before authorizing additional acreage.

## “What’s the Difference?”

“Erosion vs. Sediment Control....It’s the Same Right?”

**WRONG!**

- **Erosion Prevention/Control** is the act of protecting the soil surface to prevent the displacement of soil particles by water or wind.
- **Sediment Control** is the act of trying to stop the migration of displaced soil particles that result from erosion.

These are two completely different concepts and have distinct BMPs for each.

## **Erosion Control is Preferred**

- **Protect as much existing vegetation as possible.**
  - **Leave a buffer along streams and drainages if possible (also acts as sediment control).**
  - **Avoid impacting vegetated drainage swales and areas of concentrated flow.**
- **Divert water flow away from or around your disturbed area.**
- **Cover up disturbed areas ASAP! (e.g., Seed & Mulch, Rock, Erosion Control Blanket, etc.)**
- **There is no better alternative than avoidance!**

**ONLY DISTURB WHAT IS ABSOLUTELY NECESSARY TO COMPLETE THE JOB!!! This will save you time, money and vulnerability!**

## Erosion Control is Preferred

- Control stormwater run-on before it becomes problematic. (Intercept, divert, pipe across, spread out, slow down.)



## Erosion Control is Preferred

- Apply permanent stabilization to disturbed areas as soon as possible or use temporary cover until permanent protection can be applied.



## **Common Erosion Control Best Management Practices (BMPs)**

- Existing Vegetation
- Surface Roughening
- Mulch (Wood, Straw, etc.)
- Seed & Mulch
- Berms/Diversion Channels
- Erosion Control Blanket (ECB) & Turf Reinforcement Mats (TRM)
- Channel or Slope Armoring
- Energy Dissipaters
- Etc.

Example erosion control BMPs you can choose to utilize on your projects.

## Surface Roughening

Short term erosion control – will require sediment control BMPs in combination



Surface roughening is a very temporary BMP. Do not try to use surface roughening as a stand alone BMP for extended periods of time.

## Surface Roughening

Vertically tracking slopes can be an effective **short term** BMP (Still need to cover up promptly and have sediment control BMPs installed downgrade)

Not required by spec (yet). If you want it on your job, may have to develop a JSP



**Inlet Check  
Required!**

- Tracking
- Benching
- Grooving



## Surface Roughening

Horizontally tracking across slopes is like prefabricating rills to promote erosion!



Be sure the last pass runs the equipment up and down the slopes vertically, leaving horizontal depressions!



**Crimped or tacked straw is considered interim stabilization when used in conjunction with sediment control devices.**



**Bark mulch, in combination with downgrade ditch check, sediment trap, sediment basin or silt fence is considered interim stabilization. Be careful with fresh mulch on a job, as it can affect soil pH as it breaks down.**

## Temporary Seeding

(Underutilized Erosion Control Tool)

If you have this tool in your toolbox, use it!



- ▣ **Requires Mulch Application (Typically)**
  - **Min. 2 ½ tons / acre**
  - **Mulch Overspray or Embedment Required**

Contractors have told us that temporary seed is similar in cost to permanent seed. If MODOT tells contractor to apply seed then we will pay for it.

If contractor chooses to apply cereal grain (without mulch) as a form of temporary erosion control to remove acreage from “erodible” he/she can do that, but MODOT will not pay for it, and will not remove the acreage until it “turns green.”

## **Permanent Seeding & Mulching (preferred stabilization)**

- **As soon as allowable to reduce the reliance on sediment control measures. “Finish as you go.”**
- **Seeding should be done before proposed seedbed becomes eroded.**
- **Minimizes need for BMP sediment removal.**
- **Seed acceptance required by permit = 70% cover, uniformly spread over 100% of the disturbed area, without any large voids or bare areas.**

**Permanent erosion control measures are installed to reduce maintenance costs and to improve project appearance.**

**Measures should be constructed as soon as practicable to reduce need for temporary sediment control measures.**

# Those Vulnerable Slopes!

Once slopes reach grade, cover them up promptly.....



Welcome to MO



My, my!



Cry, cry!!!



## Those Vulnerable Slopes!

.....and then use berms to divert runoff, and stabilized ditches or slope drains to carry stormwater down the slopes



## **Slope Drains - Stabilized Outlets!**

### **Energy Dissipation and Sediment Retention**



**If you can, include inlet protection at the temporary slope drain inlet as well – *treat sediment as close to the source as possible***

**Stabilized outlet and sediment capture device.**

## Those Vulnerable Slopes!

- We can't just cover up rills and gullies with new seed and mulch and expect them to perform!
- We have to **RE-GRADE** the areas and then reseed and mulch.



## Those Vulnerable Slopes!

I recommend ECBs or TRMs (or an equivalent) on slopes steeper than 3:1 and in ditches/drainageways with erosive shear stresses. (Try not to plan in these steep slopes!)





**Don't forget to stabilize the surrounding slopes!**

# Alternative to ECBs

Fiber Reinforced Matrix (FRM), sometimes called Flexible Growth Media, is used in place of ECBs and...



...to soil and seed germination.

**Shadowing!**

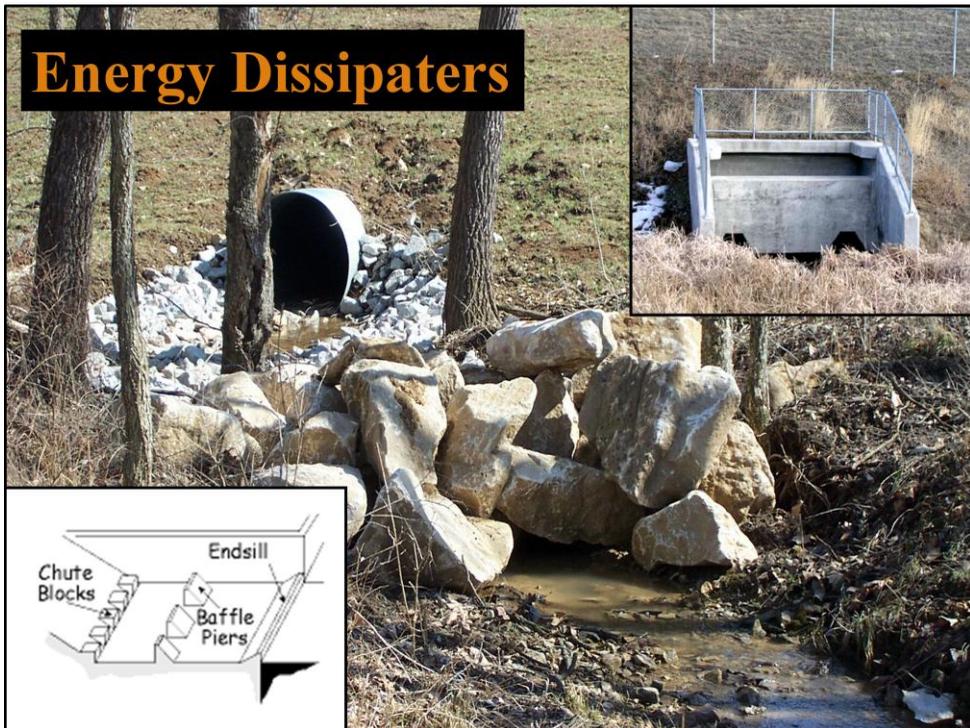
- **FRM** is not for use in drainage channels, only for slope protection!



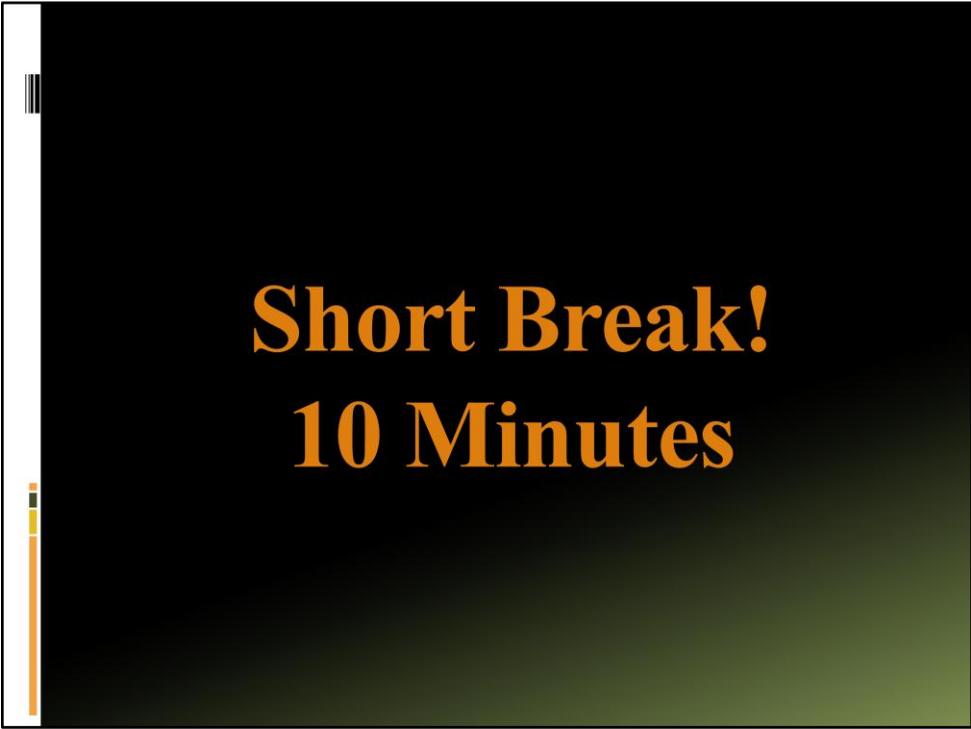
## Channel & Slope Armoring

- Sometimes it may be necessary to add hard armor to protect channels or even steep slopes!
- Just remember that rip rap is not your only option...evaluate your goals and find the best BMP for the circumstances.





**These features are designed to reduce velocities at pipe outlets in order to combat bank erosion. Do not assume that an energy dissipater is a “sediment capture” device.**



**Short Break!**  
**10 Minutes**

## **Sediment Control is Secondary, but Necessary**

- Sediment control should be your secondary line of defense.
- It is easier to prevent soil particles from moving (**erosion control**) than it is stop them once they start moving (**sediment control**).
- Sediment control typically requires much more monitoring and maintenance than proper erosion control.

## Sediment Control

- When combatting sediment-contaminated runoff you must first establish a strong **perimeter**.



- Ensure you have designed and installed the proper protection depending on whether you are fighting sheet or concentrated flows.

## Sediment Control is Necessary

- Install perimeter and outfall BMPs down grade **BEFORE** disturbing any ground.
- Install impounding BMPs, like sediment traps, at outfalls (places where concentrated water flow leaves your project area, e.g. ditches, swales).
- Install perimeter (*linear*) BMPs, like silt fence, for perimeter protection where sheet flow is expected to leave the project area.

Even with excellent erosion control practices in place, we will likely need to rely somewhat on sediment control devices since we can't hold every soil particle in place.

**ALWAYS INSTALL SEDIMENT CONTROL BMPS AROUND YOUR PERIMETER AND AT YOUR OUTFALLS BEFORE YOU TURN ANY DIRT!!!!**

Remember to think about whether you are going to have sheet flow or concentrated flow. There are different BMPs for each!

## Common Sediment Control BMPs

- **Retain a Vegetated Riparian Buffer Along Streambanks if Possible** (25' Minimum is Recommended)
- **Existing Vegetated Filter Strips** (If Roadside Ditch, Take Credit for the Entire Ditch Up to a Cross Drainage)
- **Silt Fence** (Geotextile, Mulch Berm, Silt Logs)
- **Rock/Mesh Sediment Control Fence or Inlet Protection** (NEW!)
- **Ditch Checks** (Rock, Tri-Dike, Silt Logs, etc.)
- **Inlet Protection Devices** (Vary Depending on Type and Location of Inlet)
- **Sediment Trap** (Excavated Hole or Oversized Rock Ditch Check)
- **Sediment Basin** (More Common for Larger Construction Jobs)

Example sediment control BMPs for you to consider. There are others out there as well.

## Streams, Ditches, Drainages, etc.

Our primary focus for erosion and sediment control should be holding and capturing sediment **BEFORE** it enters waters of the state/U.S.





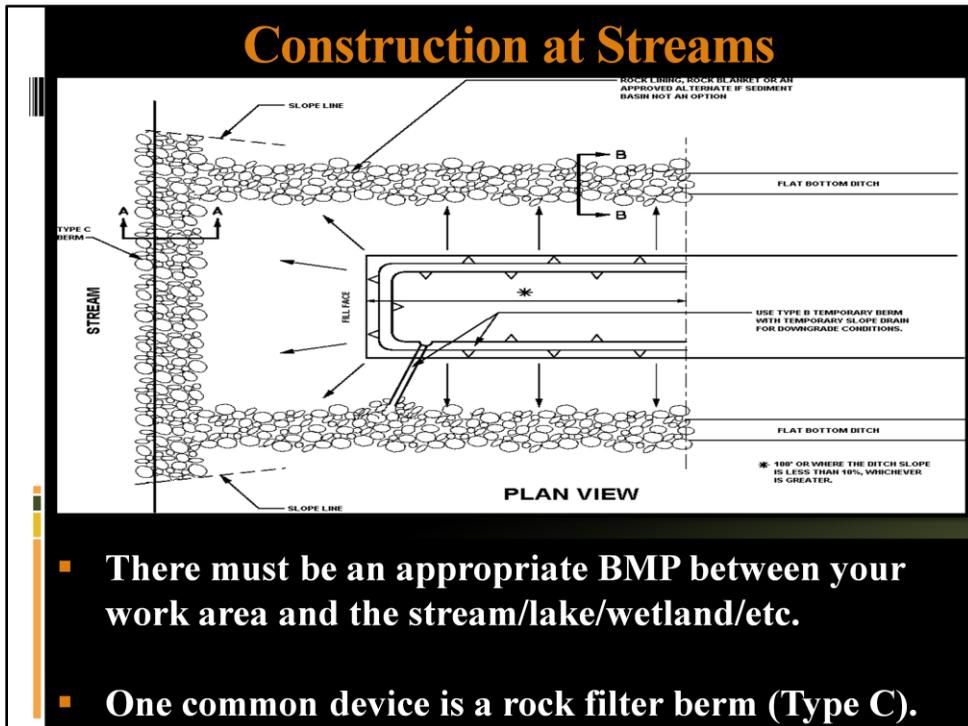
## **In Stream BMPs Helpful or Harmful? (Section 404 Permit?)**

**We can use in-stream BMPs when working in-stream, but our primary focus should be keeping sediment out of these features in the first place by selecting and placing proper BMPs.**

## In-Stream BMPs (Jurisdictional Streams)

- MDNR has mixed feelings about this practice
- **Only** during construction of in-stream boxes or pipes – Then remove ASAP
- **Must** be used in conjunction with BMPs in the ditches and along the banks, catching sediment **BEFORE** it enters the stream

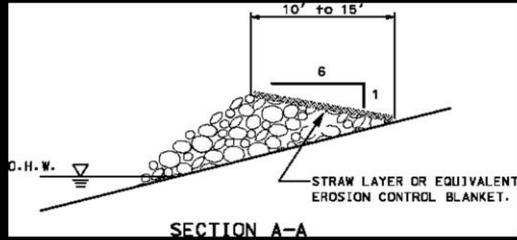




- Contractor's activity at stream presents the worst opportunity for Notices of Violation.
- Standard offers best management practice to minimize detrimental effects of construction.
  - Standard utilizes:
    - Type C Berm
    - Rock lined ditch
    - Type B Berm w/ slope drains

# Rock Filter Berm

(MoDOT = Type C Berm)



## Filter Berm is constructed:

- At the top of the stream slope
- From ditch backslope to ditch backslope
- Berm across ditches serves as ditch check/sediment trap
- Straw/filter fabric serves as filter and can preserve rock effectiveness
- Contractor activity/minor flooding does not typically damage

## Sediment Basins

- Where practical, sediment basins are required for land disturbance areas  $\geq 10$  acres disturbed at one time and draining to a common outfall, but can be used for smaller drainage areas as well.
- They are required to have a minimum volume of the 2-year, 24-hour storm, or 3600 ft<sup>3</sup> per disturbed acre and a stabilized spillway.



Temporary



Permanent

## Sediment Traps

- Sediment traps may be constructed berms of rock or other non-erodible material sufficient to temporarily impound water, or may be a simple excavated pit.



Sediment traps are very common outfall devices on MoDOT projects due to right of way constraints.

## **Brush Pile and Sediment Trap Combo – Non-Jurisdictional Drainages!**



**Brush piles can help impound and filter stormwater. Following installation make certain that the structure is “tight” enough together and to the ground to impound water and sediment.**

**A more robust, filtering BMP should be installed either upgrade or downgrade of the brush pile as soon as possible, typically a rock sediment trap.**

## Sediment Basins, Traps, Energy Dissipation

- These devices can work, but remember they have to be a part of a system!



**There should be a system of BMPs upgrade of these structures is possible to increase effectiveness. Try not to ever put all your hopes in a single BMP.**

## Ditch Checks

- One of the most visible items on a project
- Toe to top installation
- Correct distance up inslope and backslope
- Choose a type based on drainage areas and expected flow volumes and velocities

Ditch check effectiveness is limited by flow volumes and velocities:

- Correct installation & maintenance are mandatory.
- Once flows become excessive, a combination of erosion control items are necessary to control erosive effects.

# Ditch Checks

**Ditch Checks – For CONCENTRATED Flow**  
(Evaluate Carefully For Conditions)

**Rock Ditch Check (New – 18” Eff. Hght)**

**Alternate Ditch Checks (New – 9” Eff. Hght)**

- Tri-Dikes
- Socks/Logs
- Compost or Mulch with ECB Covering
- GeoRidge
- Sandbags
- Etc.

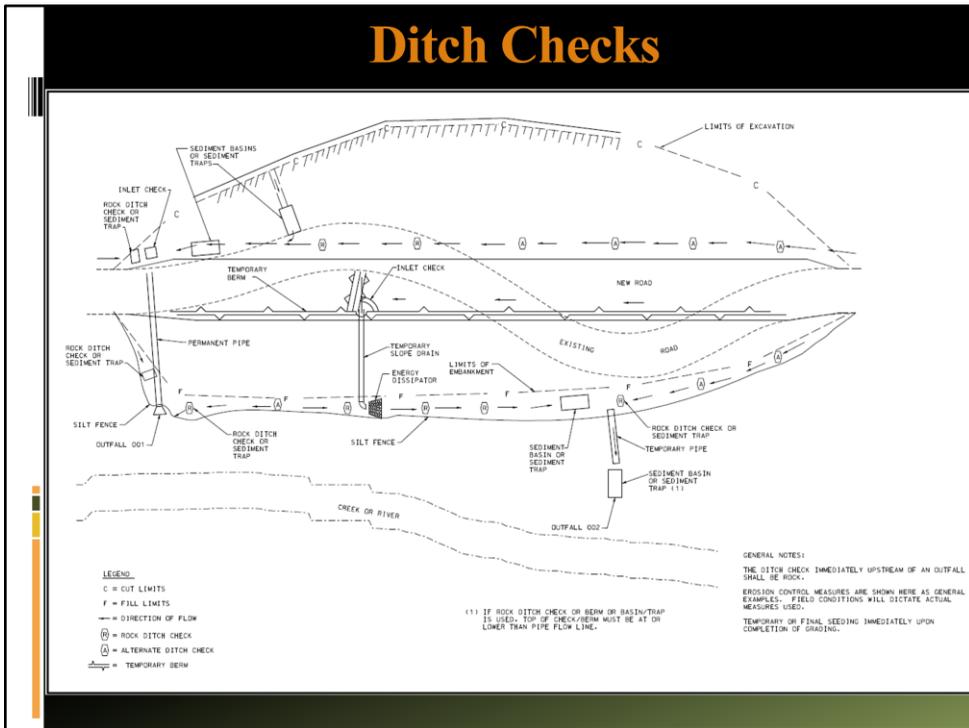


**YOU WILL NEED TO UTILIZE DITCH CHECKS ON YOUR PROJECTS!!** Ditch checks are probably the most commonly used BMP at MoDOT since we have so many water conveyance channels on our right of way.

I always recommend rock as your very last check or last two checks before water exits MoDOT property – it tends to withstand higher flows and filters well. Typically a mix of variable sized stones from 4 – 12 inch rock (6 – 9 inch is most common) works well and if you need it to filter out finer soil particles, like clay, you can cap the upgrade side of the check with a smaller stone, such as 1 inch clean.

**Whatever you use, be sure to install them properly!**

# Ditch Checks



MoDOT is currently working on better guidance for our designers and consultants to help them select appropriate BMPs! This sheet is in-progress, but it gives an idea of the new direction.

## Ditch Check Installation

- Be Sure to Properly Space Ditch Checks

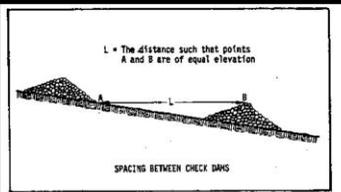


Figure 5.2 Spacing Between Check Dams Source: VA SWOC

- Toe to Top if Possible

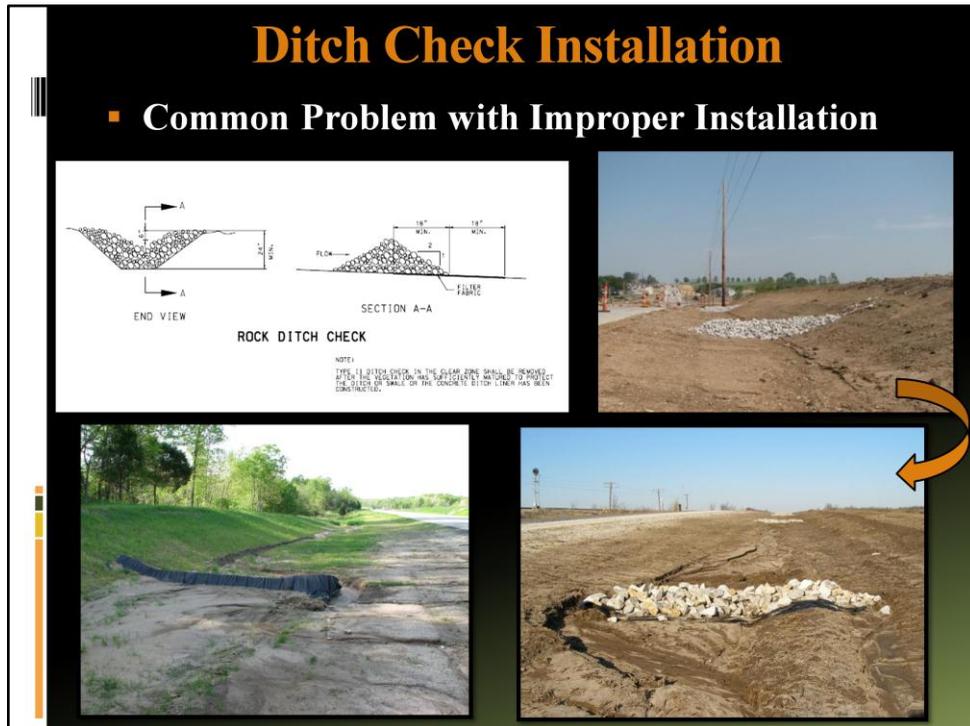


Always try your best to space ditch checks “toe to top” down your ditch grade (the top of the down grade check should be equal in elevation to the toe of the one immediately upgrade from it as shown in Figure 5.2). This will prevent scour and erosion within your ditch line and help limit the likelihood of overwhelming the downgrade checks with sediment.

The photo on the bottom right is a poor installation. The checks are too far apart and the result, even with heavy vegetation, is a severely eroded ditch and an overwhelmed and non-functional rock ditch check in the foreground.

# Ditch Check Installation

## Common Problem with Improper Installation



Also on ditch check installation, always ensure the low point on the check is in the middle. This is the point you want the water to overtop the check, so be sure to direct it there. To do this properly, be sure to go far enough up the inslope and backslope. (If it's a flat bottom ditch, the low point should be the entire flat bottom of the ditch to spread out the flow.)

The photos show checks where the low point was on the inslope side and as a result, all were bypassed. This is simply a waist of time, effort and money and now the ditch has to be regraded and the checks have to be redone properly. (Keep in mind, you can always curve ditch checks to force water to over top the low point too.)



**Commonly used Alternate Ditch Check, along with compost or excelsior socks.**

# Triangular Silt Dike



Triangular silt dike has many positive attributes.

When wet they are heavy and tend to remain in place

Downgrade “flap” prohibits cutting and erosion at bottom of

spill-over

Down side

They only come in 7-foot lengths

They impound water so well that evaporation takes long time, causing death of grass.

## Sediment Control Socks/Logs Use Appropriately!

- If installed as ditch check I recommend fabric beneath, preferably biodegradable, and in relatively flat (<4%), low flow ditches. (Note: If the ditch already has established vegetation, the fabric may not be necessary.)



### Positive attributes.

Some are biodegradable, therefore not requiring removal or only partial removal

Can be made to custom lengths, so no joints necessary

### Potential negatives

Installation issues – e.g., installed with insufficient staking or not flush to the ground

Some require staking through the device which can compress the effective height, which must be accounted for

## Ditch Checks

**Geotextile silt fence,  
straw bales/wattles no  
longer allowed!**



**Also, are we really protecting  
these streams?**



## **Appropriate Checks at Project Points of Discharge (Outfalls)**



This is becoming more and more rare, which is a good thing.

## **BMPs at Project Points of Discharge**

**Large, Robust  
Checks or Sediment  
Traps or Basins**



**The last device in a series of  
ditch checks or BMP system  
before discharge should be a  
rock ditch check or a sediment  
trap or basin.**

## Perimeter Silt “Fence”

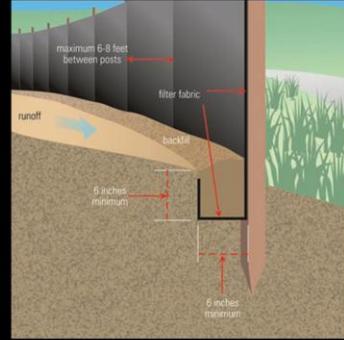
- **Highly visible**
  - **Geotextile Fabric**
  - **Wattle Logs/Socks**
  - **Mulch Berms**
- **Highly Over-Installed**
- **Designed for sheet flow**



Typically staked geotextile is synonymous with silt fence, but there are other devices that can meet the silt fence requirement. Understand the difference between perimeter controls and ditch controls.

## Geotextile Silt Fence

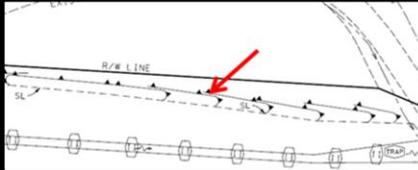
- Ensure proper installation and leave some space if placing it at the base of slopes - vegetated space if possible!
- Metal “T” posts may be a better support in many cases!



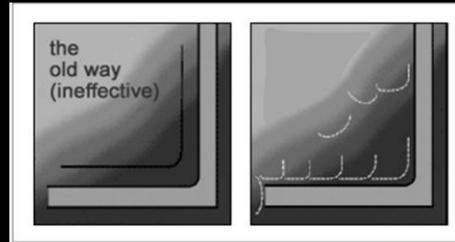
**GEOTEXTILE SILT FENCE MUST BE KEYED INTO THE GROUND AT LEAST 6 INCHES AND HAVE A FLAP OF APPROXIMATELY 4 - 6 INCHES POINTED TOWARD THE UPGRADE SLOPE!!!! If you don't do this, it will likely undermine in short time!**

# Silt Fence Installed Down a Grade

Requires J-hooks if being placed down a grade to prevent stormwater concentration and resultant linear flow erosion.



Even the slightest grade can affect performance!



(<http://www.tommy-sfm.com/pages/tommy/slicing/tommy.html>)



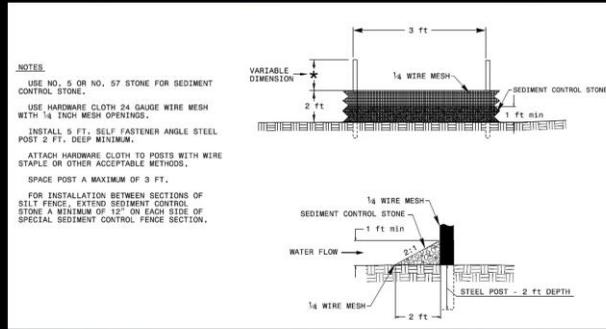
Limit the use of silt fence down a slope if possible.



**Wood mulch produced on the job can be used for erosion control or sediment control. The MoDOT SWPPP allows for the use of perimeter mulch berms as a “silt fence” application.**

**Mulch berms should not be used in concentrated flow.**

# Rock/Mesh Sediment Control Fence & Inlet Protection (New! - Adopted from NCDOT)



This is an introduction to this device that was added to the MoDOT SWPPP. It will stand up to heavy flows and filter stormwater with the small stone, which makes it a good perimeter or inlet protection BMP.

# Inlet Protection

## Curb Inlet Protection:

- Sand Bags/Rock Socks
- Wattles/Silt Socks/Silt Logs, etc.
- Various Filter Barriers and Inserts
- Wood, Steel or Other Barricades

## Drop or Pipe/Box Inlet Protection:

- Rock
- Rock/Mesh Inlet Check (New!)
- Tri-Dikes
- Sand Bags
- Various Filter Barriers, Inserts or Covers
- Wood, Steel or Other Barricades



You must think about what you are trying to accomplish and select a BMP depending on the type of inlets and terrain you are dealing with.

**INSTALL INLET PROTECTION BEFORE YOU TURN ANY DIRT ON THE JOB!!!** Inlets should be treated as outfalls at all times!

## Inlet Protection

Selected BMP must be capable of withstanding **CONCENTRATED** and possibly large volume flows.



Inlets are places of concentrated flow and should never have “silt fence” type devices installed around them that utilize non-reinforced frames, such as these staked geotextiles and straw bales.

There are reinforced (framed) filter devices out there that are much more effective. You can also utilize rock and other BMP listed on the previous slide.

# Inlet Protection (Stand-Pipe)

Temporary measure during active grading.



“Riser pipe” is described in SWPPP in the section on Inlet Controls. Clean out will be necessary.

**No longer a standpipe!**

**Now protect with a structural BMP and apply permanent erosion control ASAP.**



**Carefully evaluate all inlet protection for desired performance, safety and potential ponding/flooding concerns.**

Once grade is achieved and back fill/compaction has occurred, there is no longer a sediment trap. Inlet protection is necessary.

**IMPORTANT!!! If the outlet of this pipe drains to a system of ditch checks, sediment trap, or sediment basin, then protection of the inlet is less important and the regulatory concern is lessened. However, it makes little sense to allow sediment to enter the subsurface system.....treat it as close to the source as possible!**



**Consider Effective  
Height of any BMP  
You Choose!**

**When selecting any BMPs, consider effective height, maintenance, longevity, ability to withstand expected flow and sediment loading, etc.**



**Short Break!**  
**10 Minutes**

## Proper Operation and Maintenance (MO-R100007 p. 9, C.14.)

- The permittee shall at all times maintain all pollution control measures and systems in good order to achieve compliance with the terms of this general permit.
- In general, all impounding/filtering BMPs should be **cleaned out when they reach 50% full** (capacity for traps and basins - height for silt fence and ditch or inlet checks).

## **Inspect, Maintain, Replace & Remove BMPs**

All BMPs must be maintained to a functional state:

- If it's half full, clean it out (applies to almost all).
- If it's broken, fix it.
- If it leaks, plug it.
- If it failed, replace it with something better.
- If it's no longer necessary, remove it!

**Turns out all these BMPs do no good if they are nonfunctional!**



**We have to maintain our BMPs so they are functional and ready for the next storm event.**

## Inspect, Maintain, Replace & Remove BMPs



**These devices are definitely in a state of disrepair.**

## Temporary BMP Removal (Yes, They Must be Removed!)

- Remove temporary BMPs when the area has re-stabilized (i.e., 70% permanent vegetative cover uniformly spread over the area, or covered by non-erodible material, like rock or concrete).



**Don't remove your BMPs until you are comfortable that the area is no longer susceptible to erosion. But they must be removed if they are not biodegradable!**

## BMPs – Think Them Through



**We need to think through what we are trying to accomplish. Take a step back and get a better perspective once in a while.**

## BMPs – Think Them Through



Same here.



## **ADDITIONAL CONCERNS TO CONSIDER**

## Coming Back To Socks/Logs Lessons Learned

- Be sure it is the appropriate BMP and correct installation!

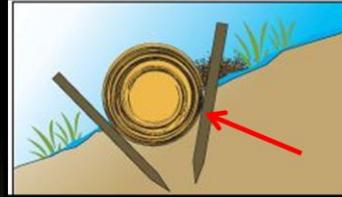
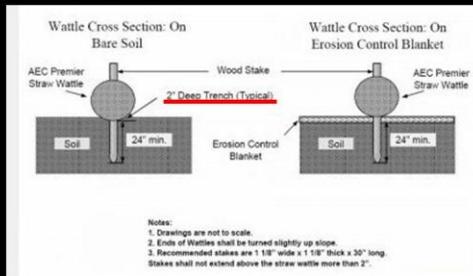


These devices can be effective, we just need to use them appropriately.

# Wattles/Socks/Logs Lessons Learned

## How are Contour Straw Wattles Installed?

- > Layout a contour line on the slope with a hand level and wire flags.
- > Dig a shallow depression (about 3 to 5 inches deep) and lay the wattle into it.
- > Drive a 1x2 or 2x2 wooden stake through the center of the wattle to least 6 inches into the ground, stopping about two inches above the wattle.
- > Put 5 stakes in each wattle, installing them end to end in the trench.
- > Seat the wattle with foot tamped backfill on the upstream side such that water flowing down the slope will not run under it.



Entrenchment is a good practice for socks/logs used as a perimeter “silt fence” application. Blanket beneath is a good practice for socks/logs used as a ditch check application. I would recommend using a biodegradable erosion control blanket beneath them that can be left in place to help protect the ditch bottom. Lining the entire ditch bottom with blanket or turf reinforcement mat will be more beneficial than just placing sections of blanket down.

## Concrete Washout Slurry & DGR

Concrete washout and diamond grinding residue needs to be controlled on the job site and should never be allowed to reach surface or groundwater.



There should be designated controlled concrete washout areas on the job site.

# Concrete Washout



Lined!



MoDOT now requires our concrete washout pits to be lined with plastic or clay.

## Soils

- We often point at seed mix, poor planting time, extreme temperatures and precipitation as factors affecting vegetative establishment, while overlooking soil fertility.
- To accurately prepare a seedbed on grading jobs, post-grading or active grading soils tests should be taken!



**You have to have decent soils to grow grass that will persist. This needs to be taken into account during design and construction. Amendments may be necessary.**

## Soil Amendments (JSP?)

- Preserve topsoil for reuse when possible.
- In areas of poor soils, soil amendments (composts or other materials containing the necessary organic matter) may be necessary to get the desired/required growth.



## Flocculants

- When dealing with clay soils, it is “darn near” impossible to get the fine particles (soil colloids) to fall out of suspension with “traditional” BMPs.



The clay soils in this water will take a long time to drop out of suspension on their own.

## Flocculants

- Incorporating flocculants into the project can help drop the colloids out of suspension and decrease turbidity.
- It is important if incorporating flocculants to have an introduction zone, agitation/mixing zone and a detention zone within the project!



The thing with flocculants is you have to have time and space for them to do their thing, so you have to try to plan for that.

## Sediment Drop Curtains



- Should be considered when working in or adjacent to someone's pond/lake/etc.

MODOT has now used sediment drop curtains with general success. Only appropriate in situations where there is no linear flow (don't install in rivers or streams).

**They can work when applied/installed correctly!**

- **Not for use in flowing water.**



## Temporary Stream Crossings

- **Sufficiently culverted** so as to not cause backwater on the upstream side during normal stream flow and should be able to pass a 2-year, 24-hour storm event
- Culverts shall allow for **aquatic life passage** (not perched, but rather placed at or slightly embedded below existing stream grade)
- Within the stream channel, fills shall consist of **clean rock** that is not easily erodible but is easily recoverable (i.e., larger stone, not soil or gravel)

The Section 404 permits obtained by MoDOT allow the use of temporary stream crossings, but they must be used appropriately.

## Temporary Stream Crossings

You Can Almost Taste the NOV!



Try Again!



Pretty Much There



Keep Going

Even on the last one, there should be some gapping with rock between the pipes to better lock them in place.

## Borrow & Excess Disposal Areas

- Don't overlook borrow and excess material disposal areas when developing a SWPPP.
- Disturbances on these areas are allowed under a land disturbance permit, but they must be shown on the site maps (New – Borrow and excess areas must be on MoDOT ROW or easements to utilize the MoDOT permit and SWPPP)
- Install, inspect and maintain BMPs on these areas until final stabilization has been achieved in accordance with the permit.



## **Protect Yourself**

- **Become Familiar with Your Permit**
- **Develop & Take Ownership of Your Stormwater Pollution Prevention Plan (SWPPP)**
- **Update Site Maps and Amend BMPs as the Project Progresses**
- **Properly Install, Monitor, Maintain, Replace and Remove BMPs**
- **Focus on Erosion Control, but Plan Appropriate Sediment Control**
- **Communicate and Give Feedback on BMP Effectiveness**

# QUESTIONS?



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