MODOT
2014 LAND DISTURBANCE TRAINING

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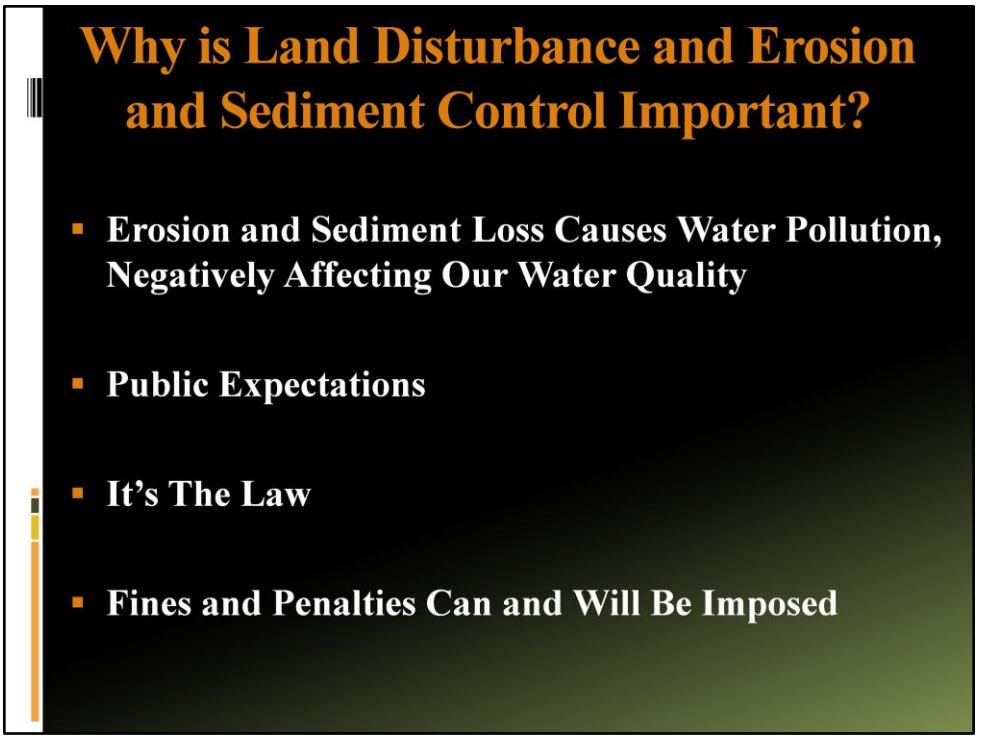
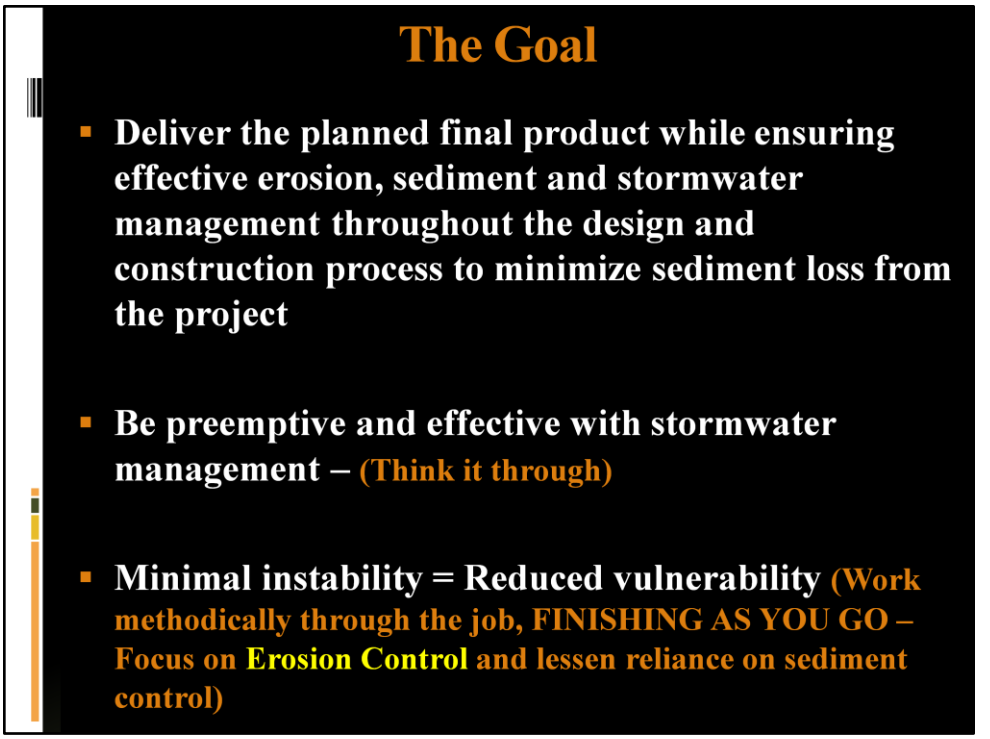


Public and regulatory scrutiny is ever increasing!



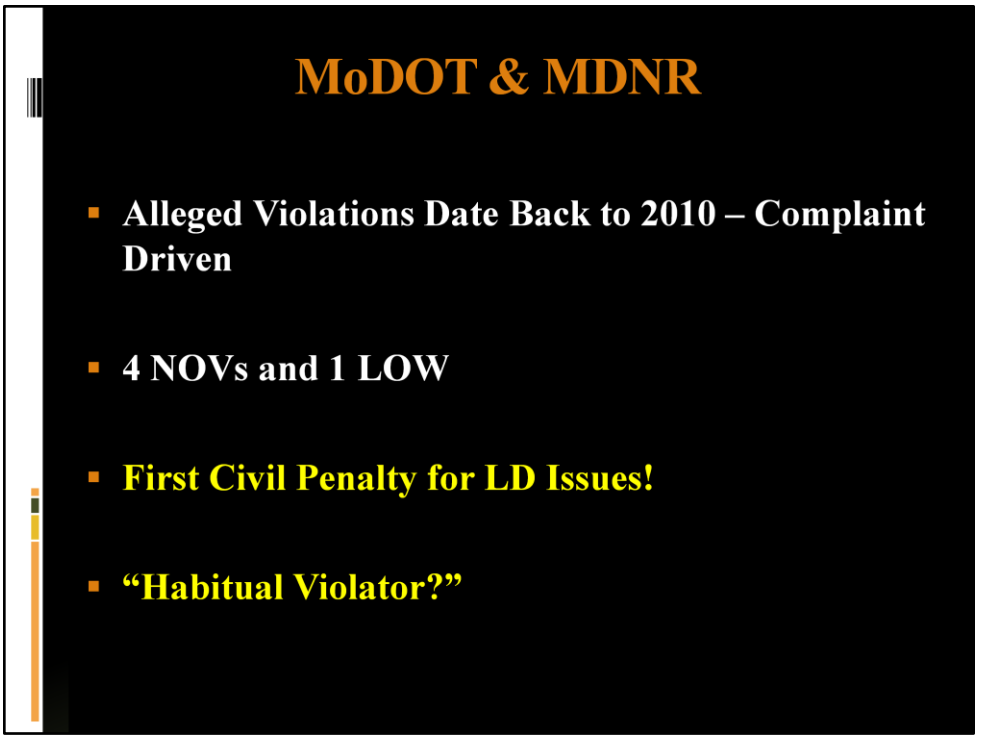
This is a drastic shift from traditional construction methods, but it is critical that we only disturb as much project area as needed and then finish what we can and re-establish vegetation as quickly as possible.

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



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

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.

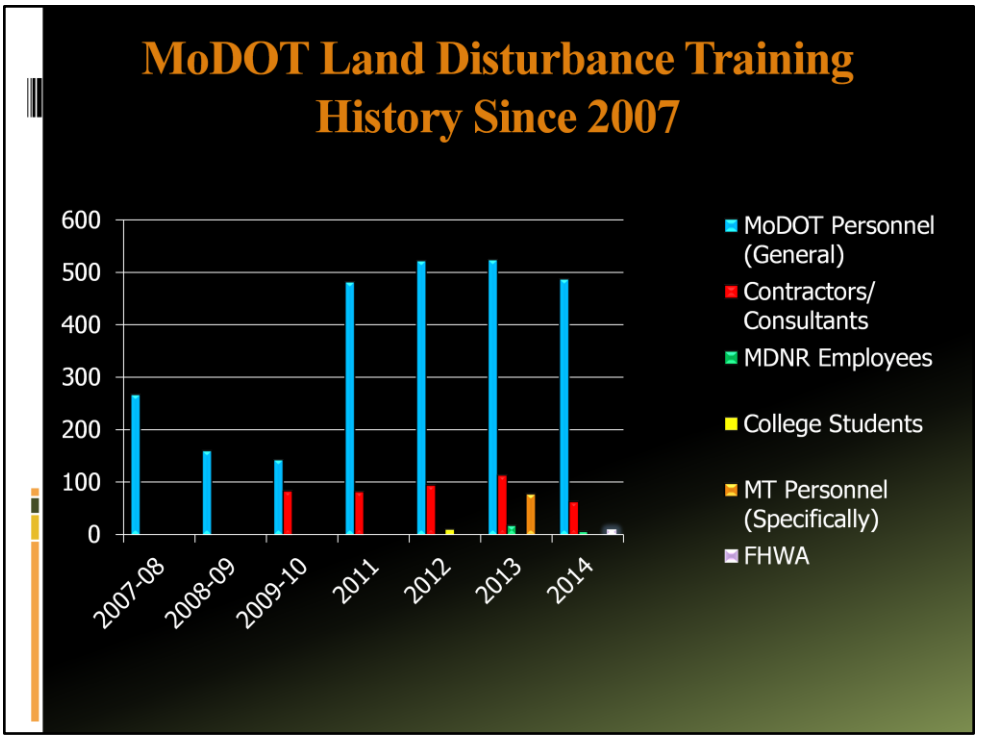
Whose Job Is It? – Collaboration!

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

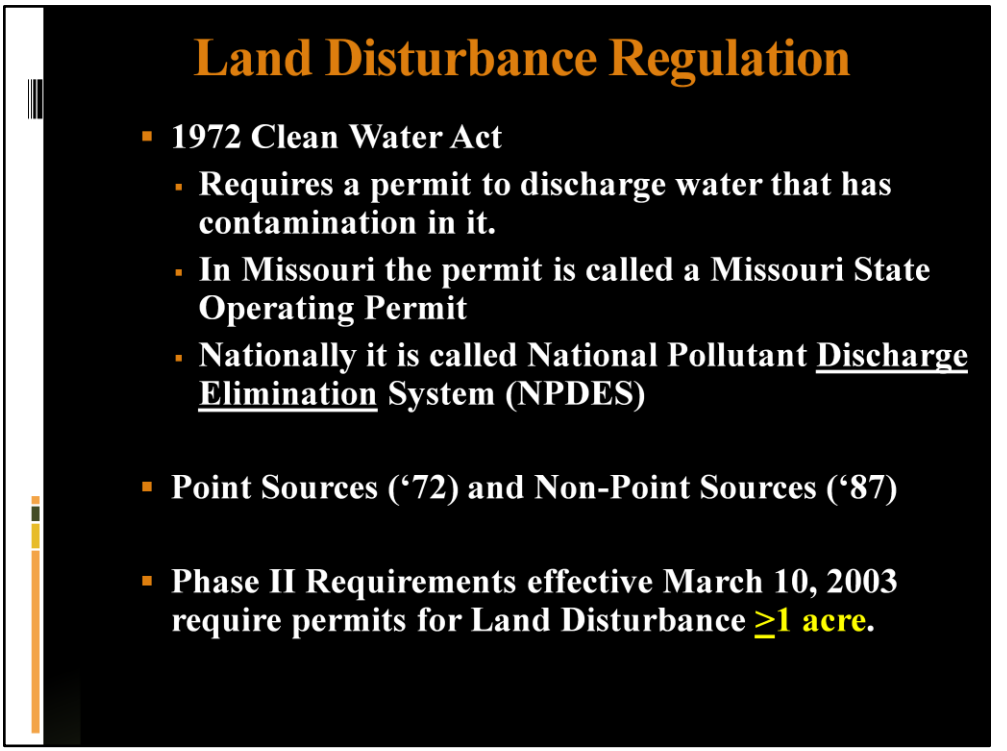
- **"That's the erosion control sub's job."**
- **"Well she does the inspections. Once it shows up on a report we'll take care of it."**
- **"I just install what the plans say, where they say."**

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

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.



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, 92nd Congress) as amended,

Permit No.	< MO-R100>
Owner:	< name >
Address:	< address >
Continuing Authority:	< name, or same as above >
Address:	< address, or same 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 Outfall:

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 stormwater 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 644.051.6 and 621.250 of the Law, and 10 CSR 20-6.020, and 10 CSR 20-1.020.

May 31, 2012
Effective Date

Sara Parker Pauley, Director Department of Natural Resources

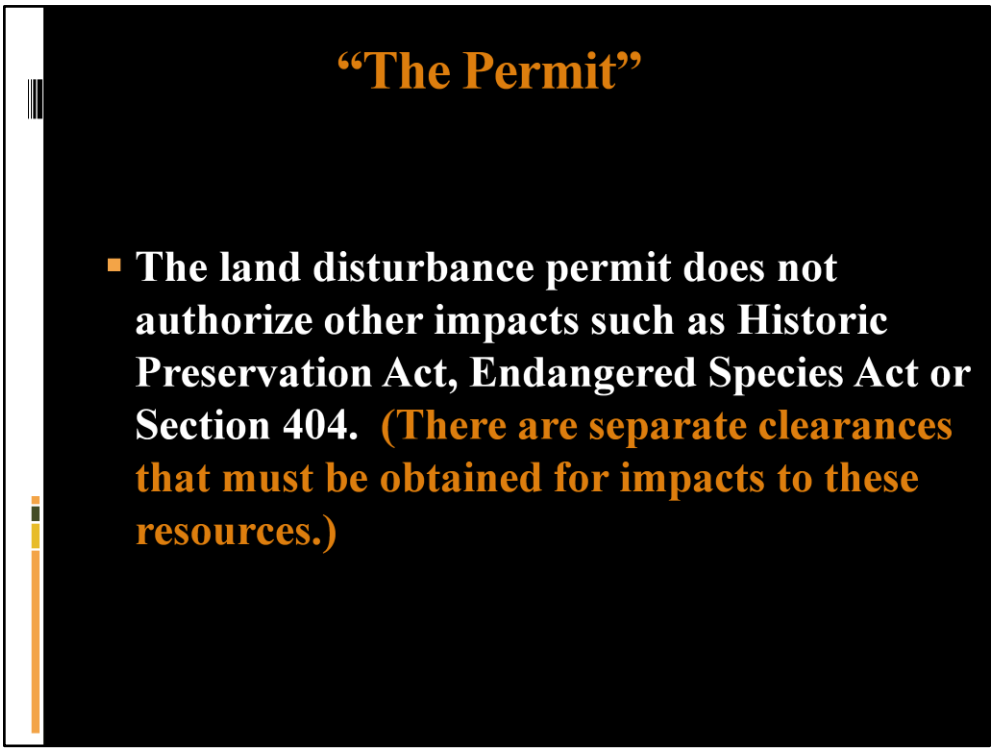
May 30, 2017
Expiration Date
MO 780-1481 (7-04)

John Madras, Director of Staff, Clean Water Commission

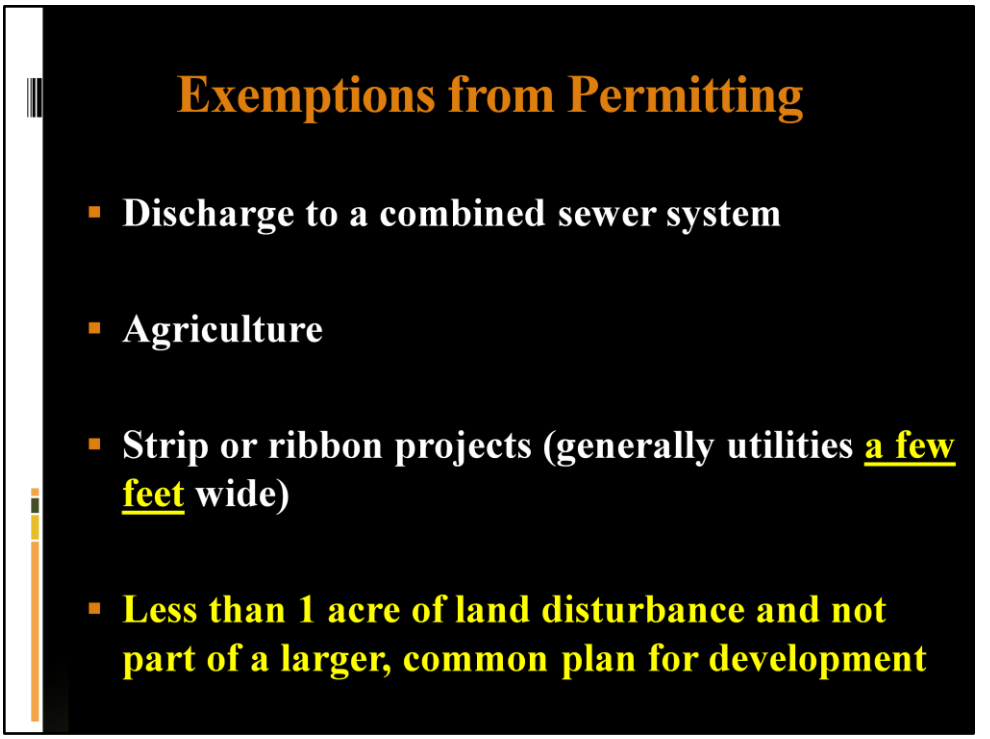
MODOT has a 5-yr permit to perform land disturbance activities. Our permit will expire in May of 2017.

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.

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.

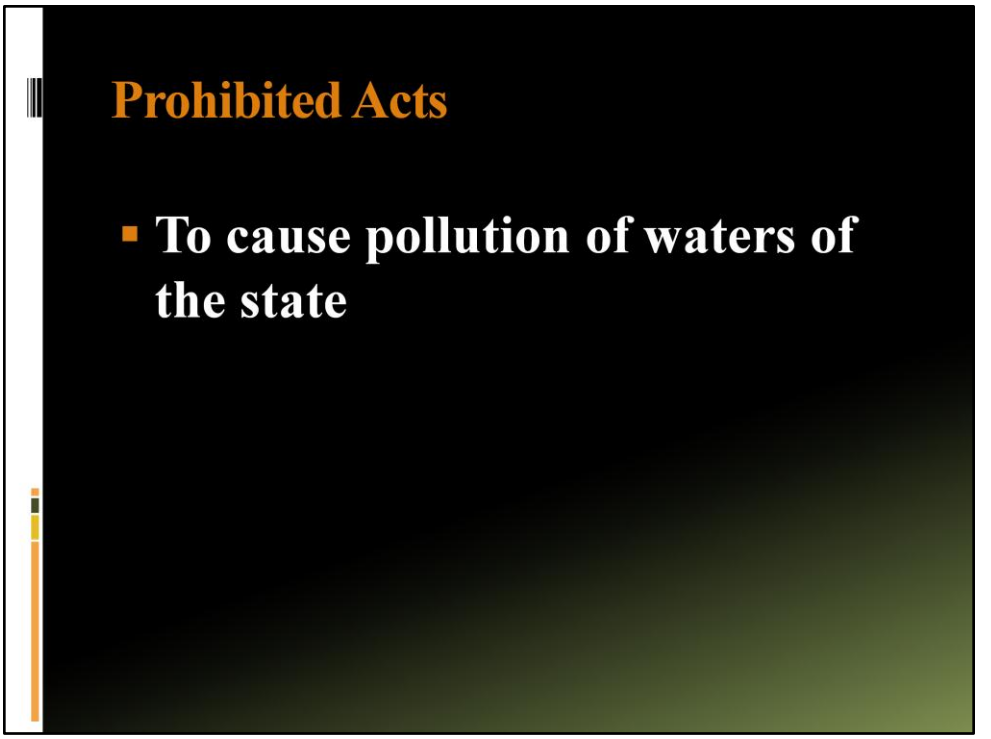


Understand the term "permit" in correct context. MODOT has a DNR land disturbance permit that allows land disturbance of one acre or more. The US ARMY Corps of Engineers also issues a different kind of "permit" for stream crossings and fills (Section 404). MODOT issues entrance and "break in access permits"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



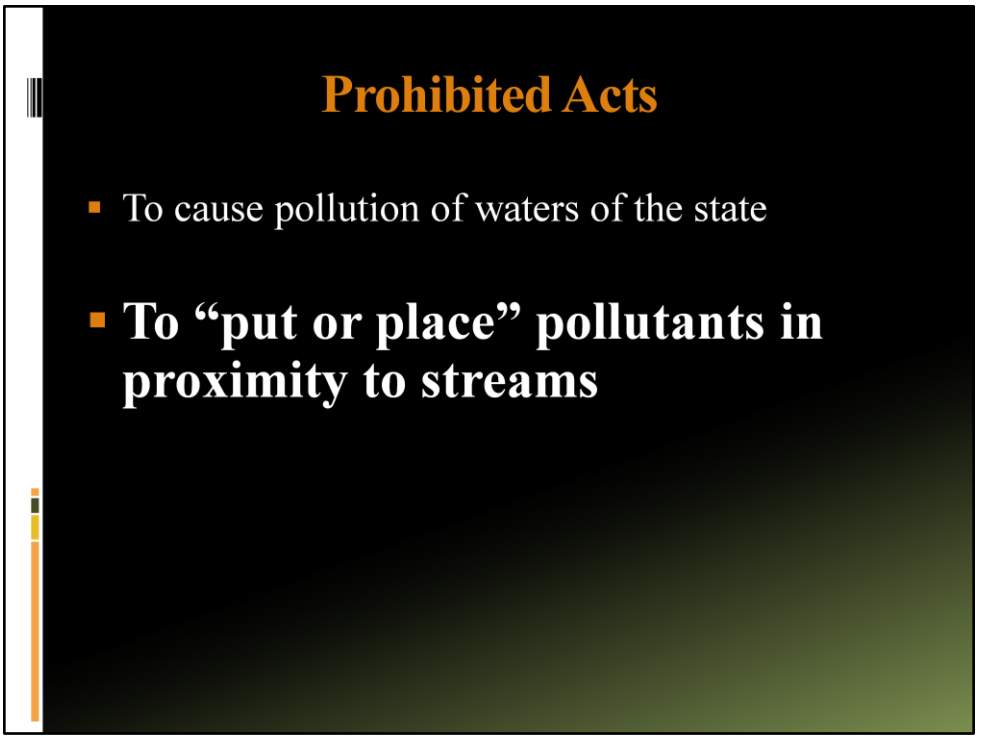
Regulatory agencies (EPA and DNR) have shown little interest in targeting utilities. Utilities rarely voluntarily approach DNR prior to land disturbance, and they generally escape regulation when operating near or on MODOT R/W.

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.



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

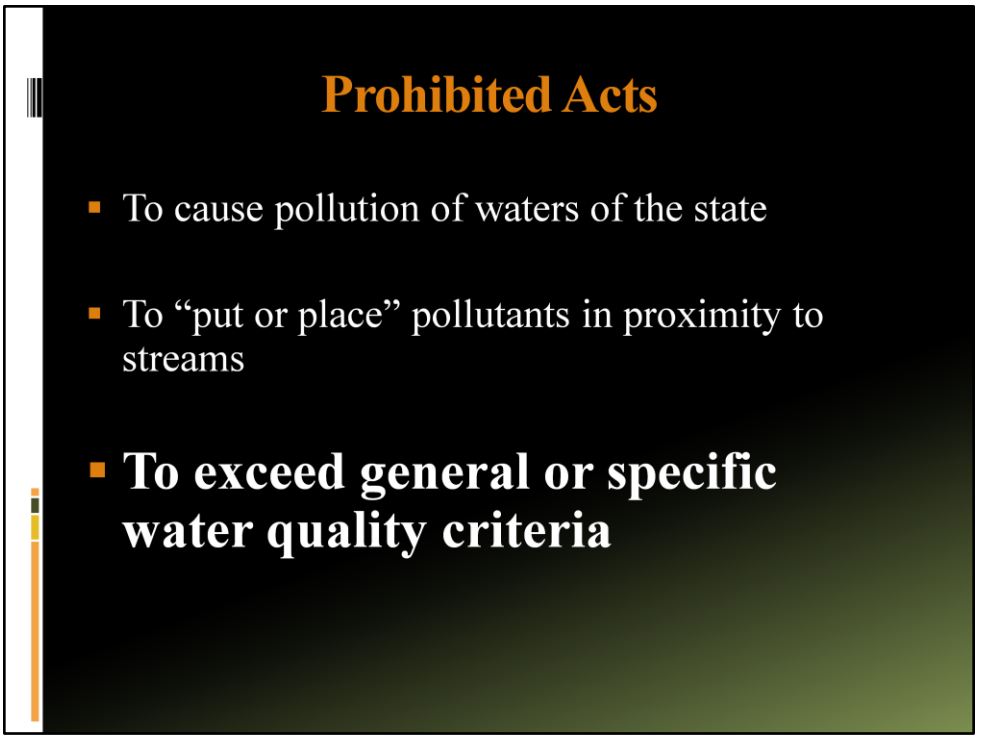
This dewatering operation is pumping turbid, brown, contaminated water from a drilled shaft directly into a clear stream. Clearly pollution because the stream is clear as it flows into the job.



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.

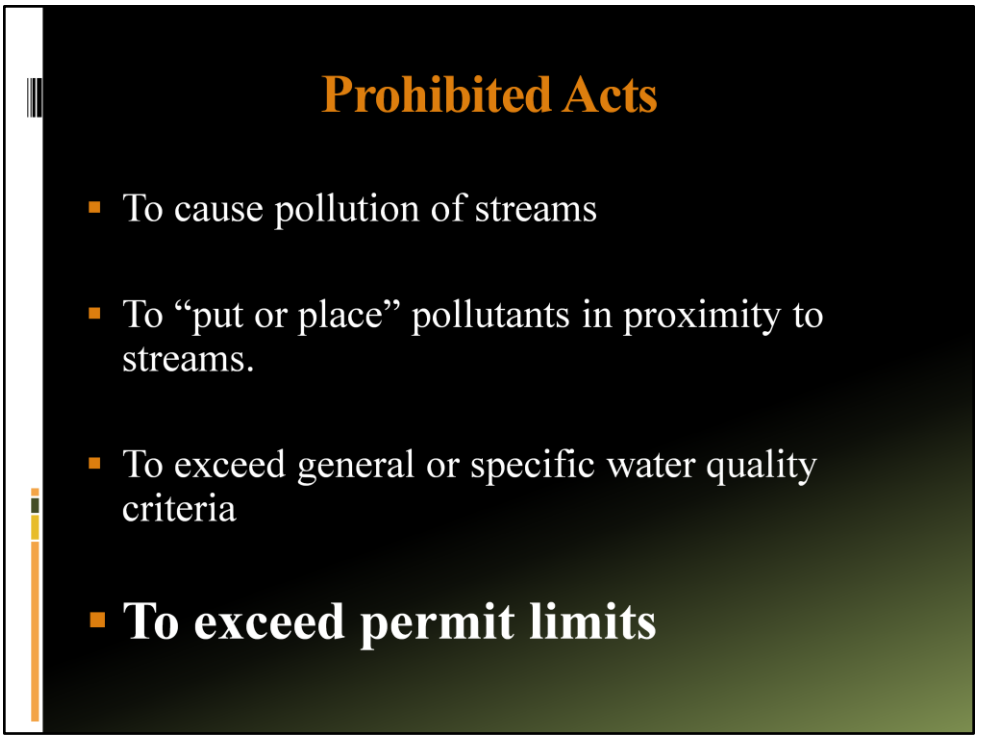
Stockpile material outside the floodplain if possible.



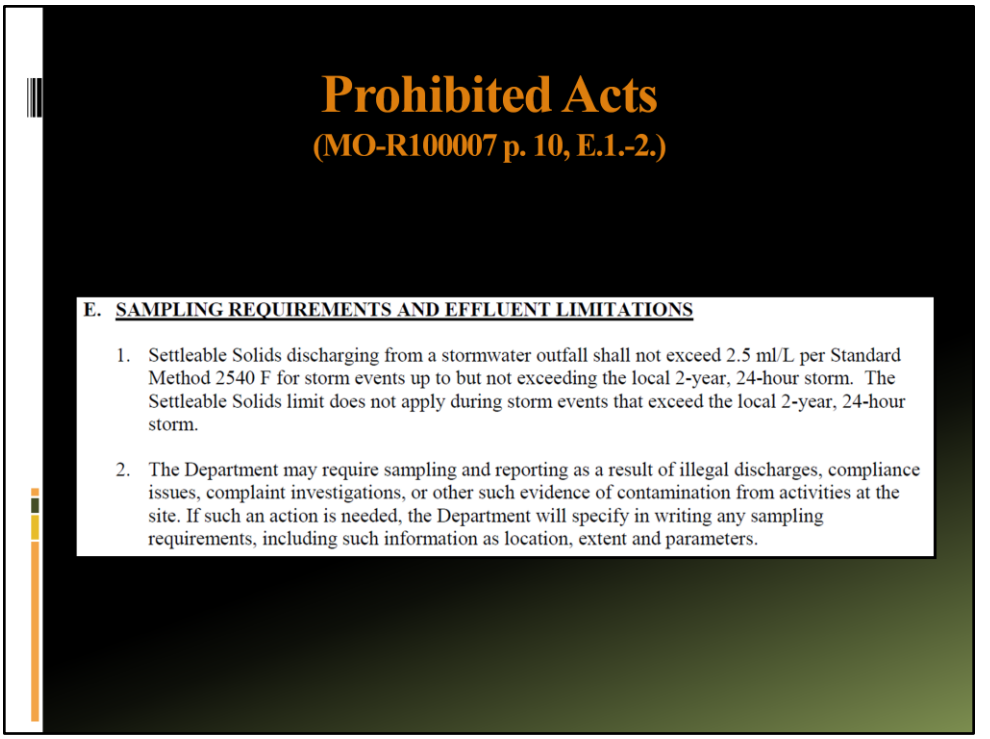
DNR water quality standards (10-CSR20-7.031(3) say "waters shall be <u>free from"</u> a number of conditions or pollutants.
These "free from" conditions are listed on page 3 of the DNR permit.
-unsightly bottom deposits
-oil, scum, floating debris
-unsightly color or turbidity
-harmful effect on human or aquatic life
-physical, chemical, or hydrologic changes that impair natural community

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

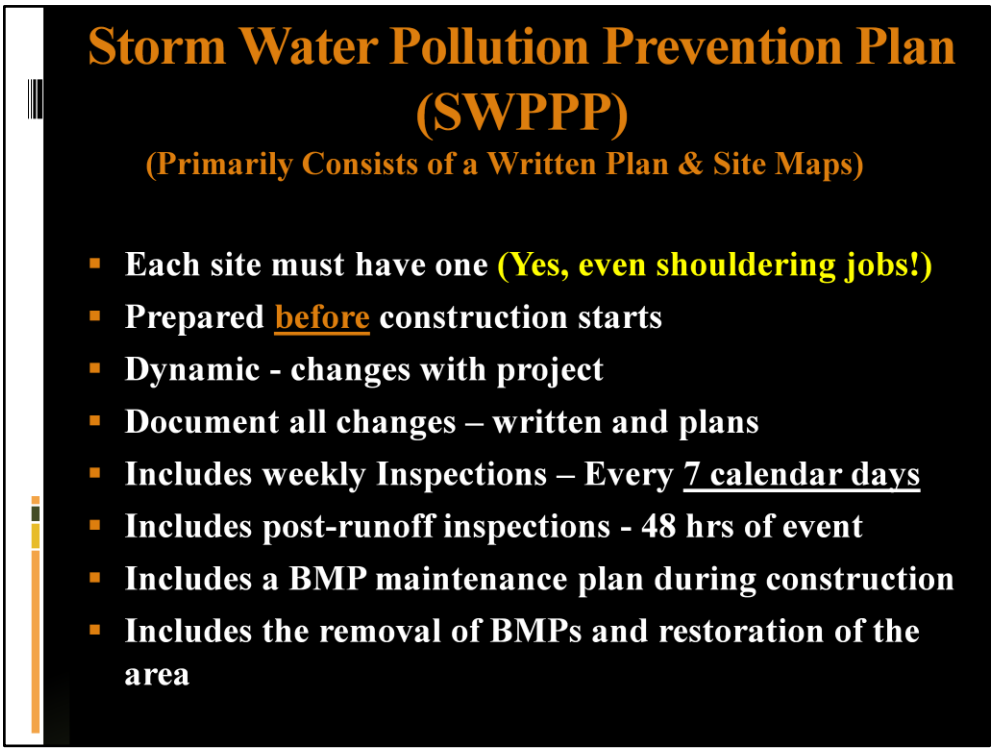
The first example in this slide is from a diamond grinding discharge and is simply intended to show the differential water clarity. The second example is utility bore slurry that traveled down a ditch line and deposited on this stream bottom, negatively affecting aquatic habitat.



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



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.



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.

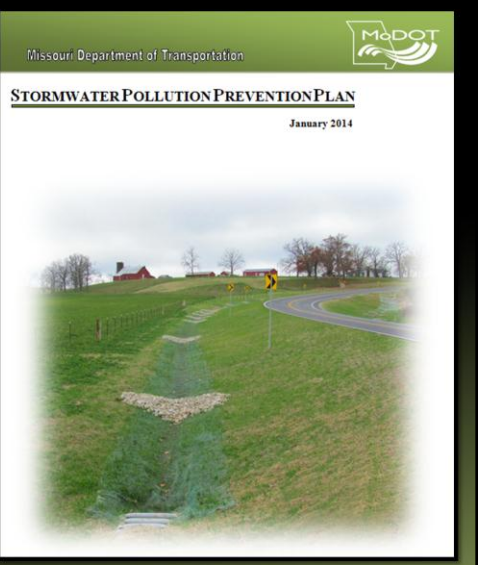
Stormwater Pollution Prevention Plan

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

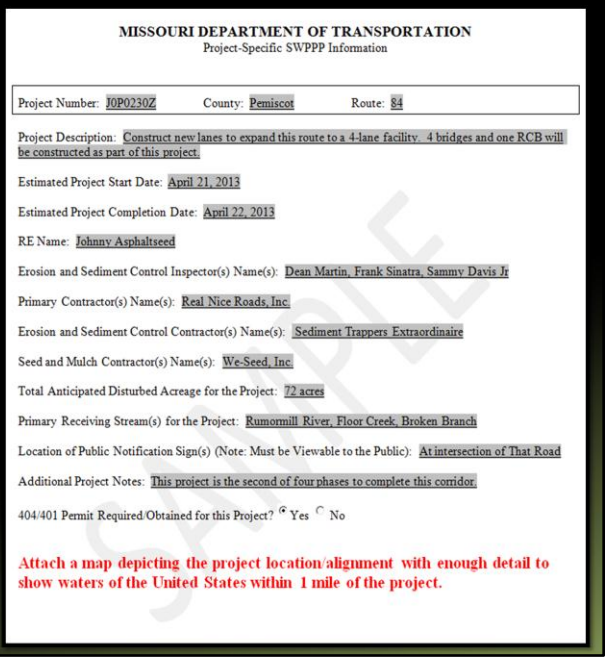


The MoDOT SWPPP is constantly evolving.

Stormwater Pollution Prevention Plan

Form 806.8.2

Project-Specific Info Sheet



MISSOURI DEPARTMENT OF TRANSPORTATION
Project-Specific SWPPP Information

Project Number: J0P0230Z 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.

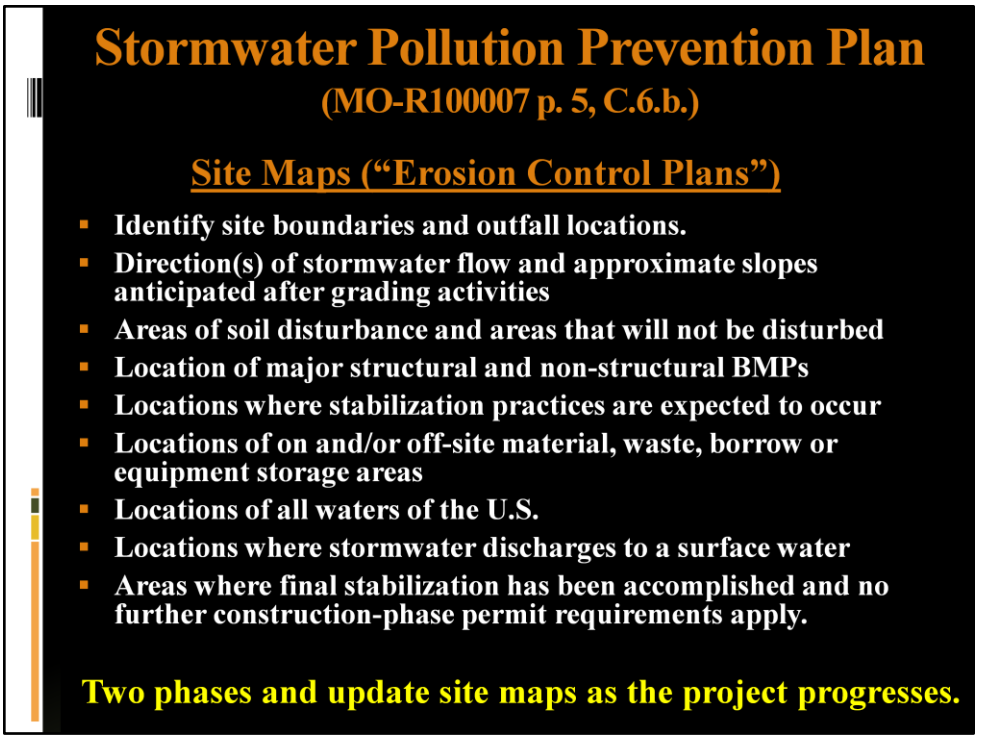
404/401 Permit Required/Obtained for this Project? (•) Yes ( ) No

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

SAMPLE

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!

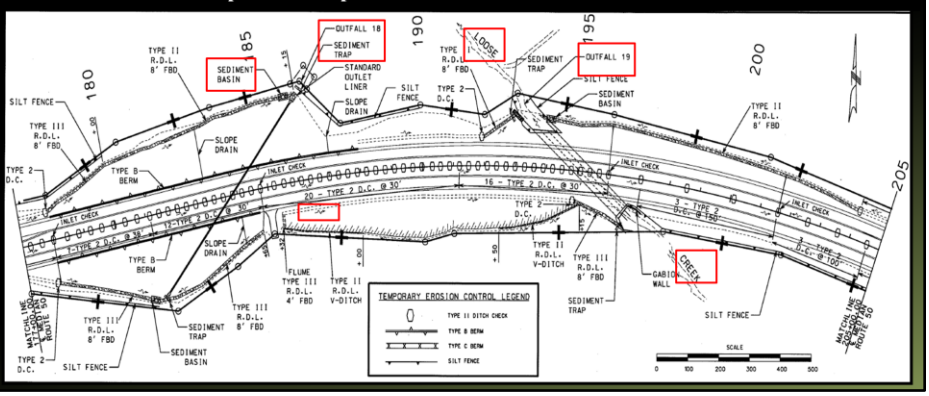
Regulators are very dependent on the SWPPP for enforcement purposes.
Many regulators do not like MODOT's statewide SWPPP.
Regulators often use the term "SWPPP" and "site plan" interchangeably.



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

SWPPP Site Map/E&SC Plan

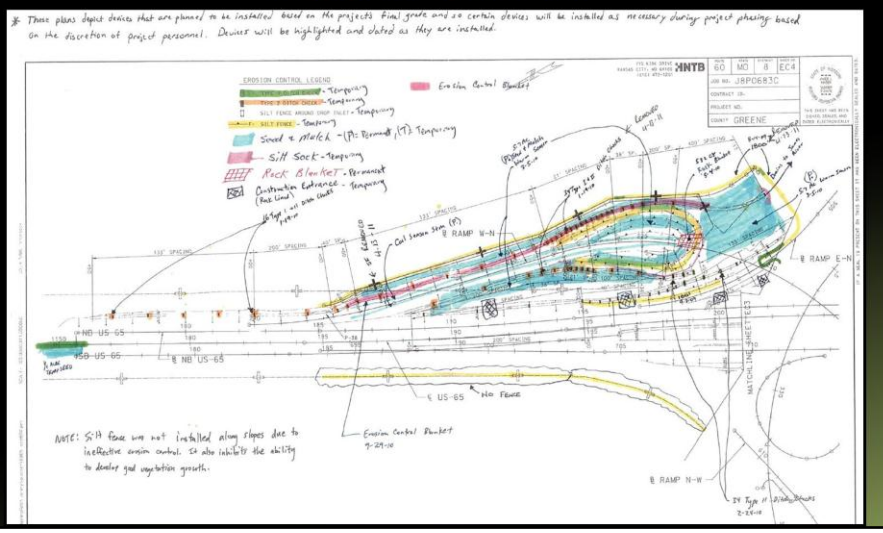
- Site boundaries, outfalls, direction(s) of stormwater flow, approximate slopes, structural and non-structural BMPs, waters of the U.S., etc.
- Take credit for all our R/W as a BMP! If you have 1,500 ft of vegetated ditch between your job and the next cross-road drainage, take credit for that entire ditch as a BMP and make a note that your true outfall is 1,500 ft away, even if outside project limits.
- These DE plans are an educated guess at what BMPs may be needed. We all need to be willing and able to make changes that may be necessary – Discuss it, select appropriate BMPs and ensure permit compliance.



Take credit for vegetation and install additional BMPs as you see fit!

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!**



Develop a legend and use color! It will help!

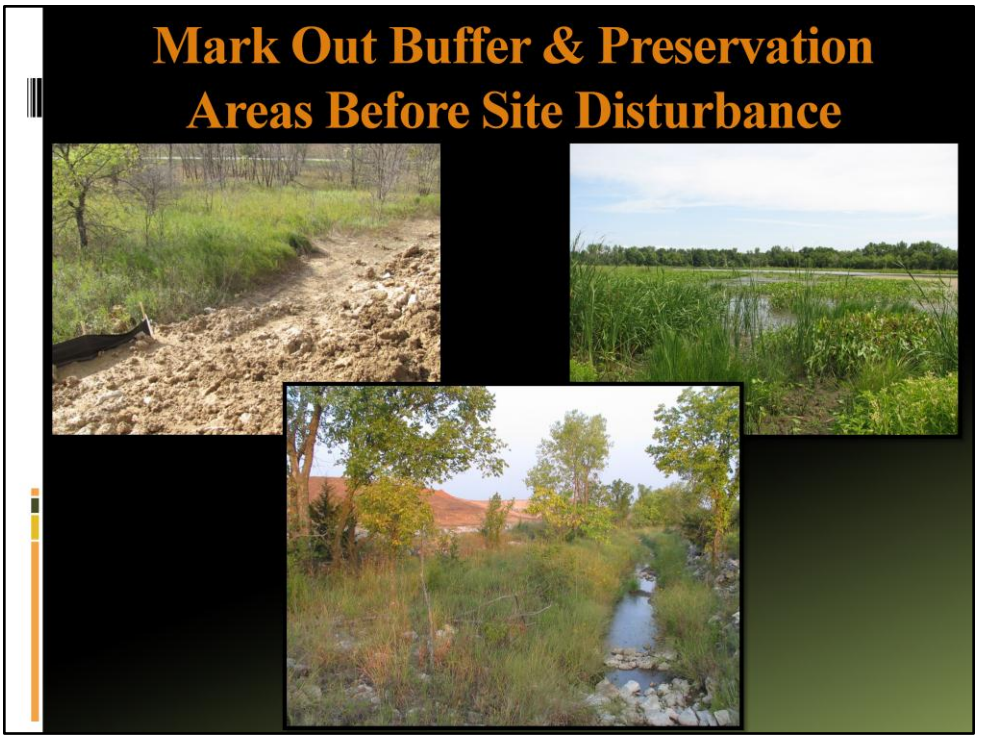
e.) Select "Non-Structural" BMPs

(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.



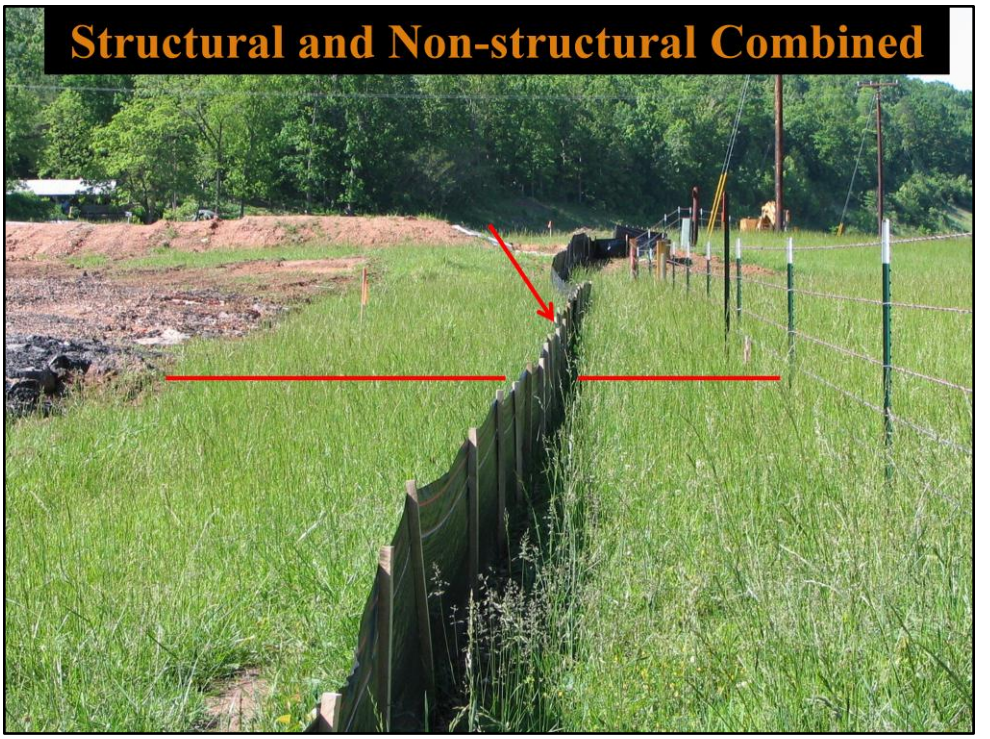
Preserve as much existing vegetation as possible and leave a buffer between the disturbance and waters of the state when possible.

f.) Select "Structural" BMPs

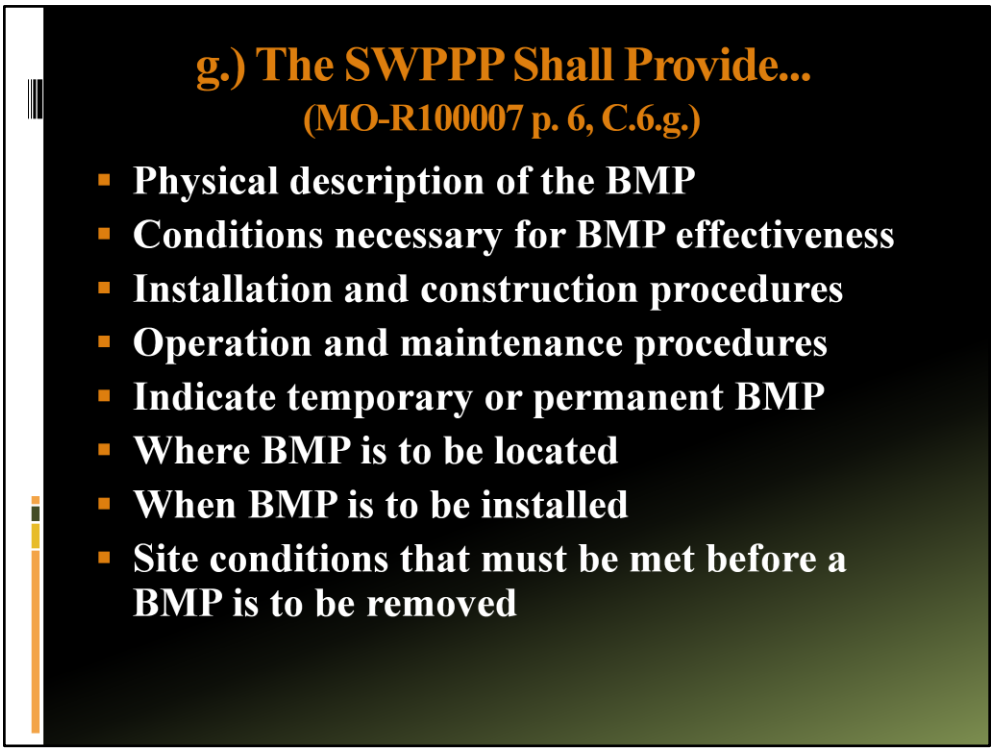
(MO-R100007 p. 6, C.6.f.)

- 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

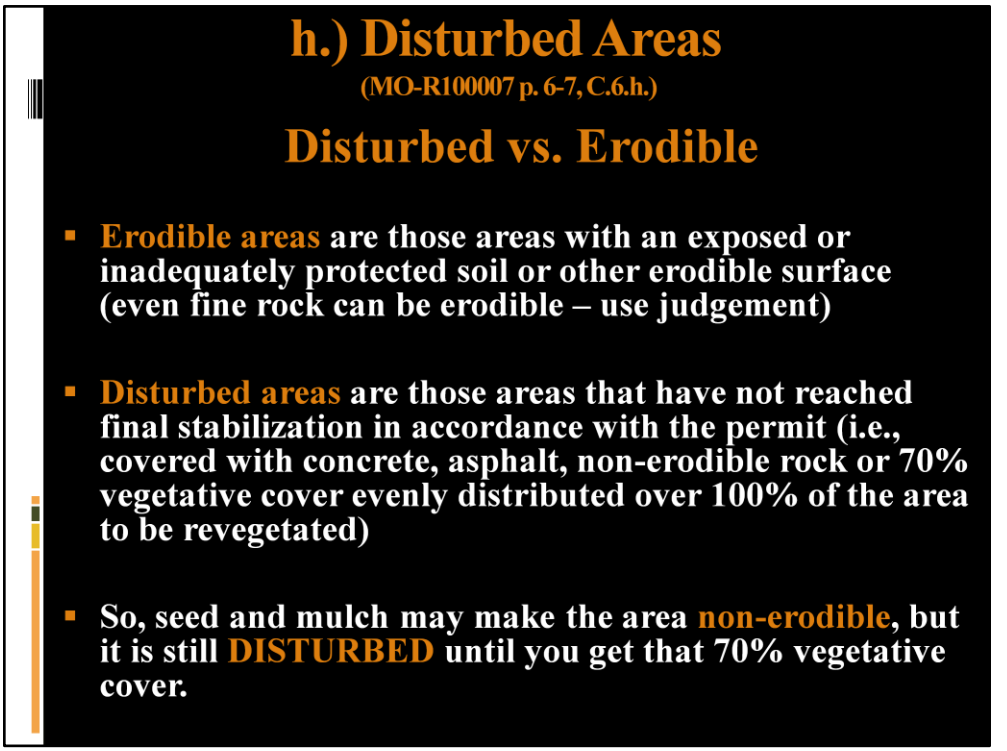
If any of these devices are used on the project they must be shown on the site map – both the date of installation and removal must be shown too.



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.

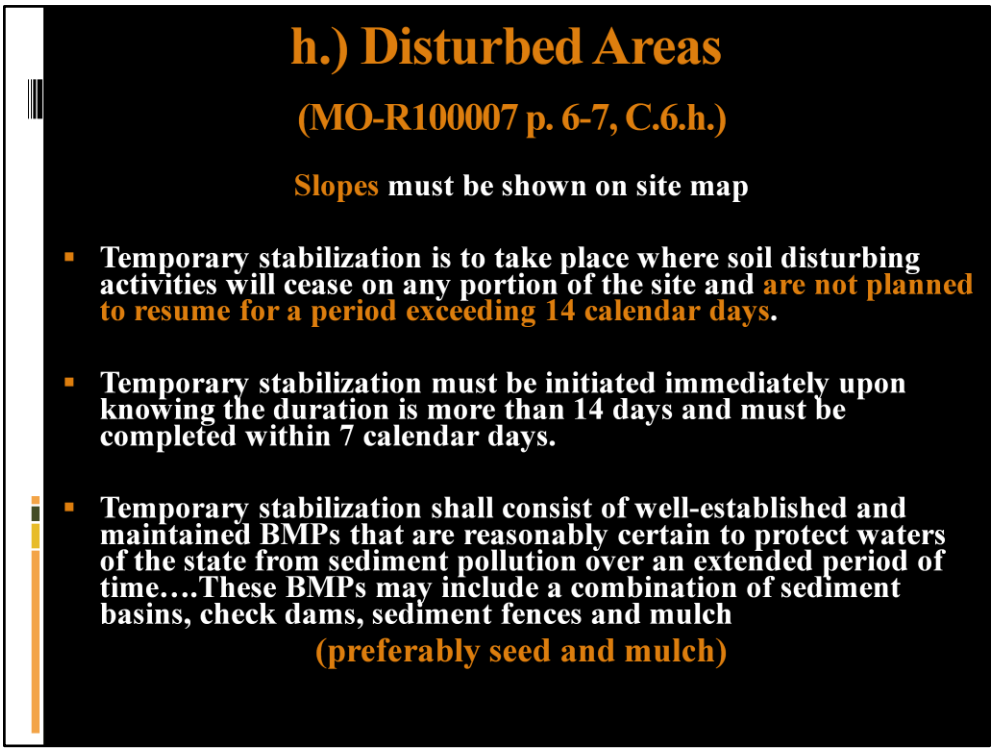


Design has recently updated the SWPPP in an effort to address each of these items. MODOT continues to update the statewide SWPPP as often as necessary to eliminate opportunities for "paper" NOVs.

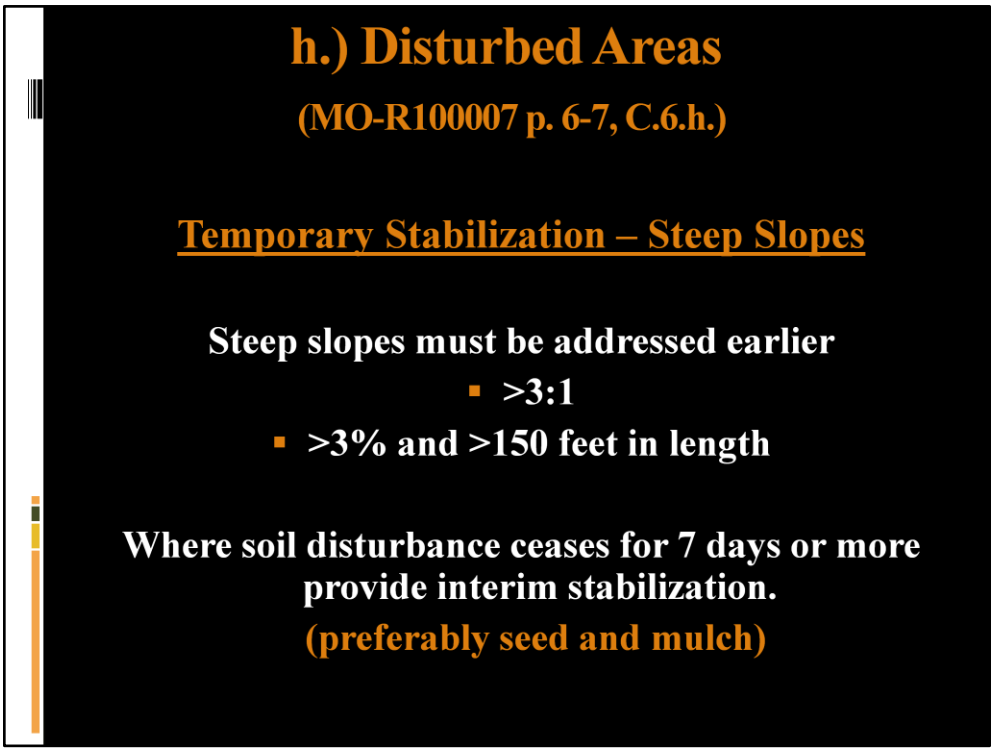


MoDOT base rock applications are typically considered non-erodible, however, depending on grade and storm intensity, even these applications can erode, and consequently, the soil under as well.

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.



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.



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.

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

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.

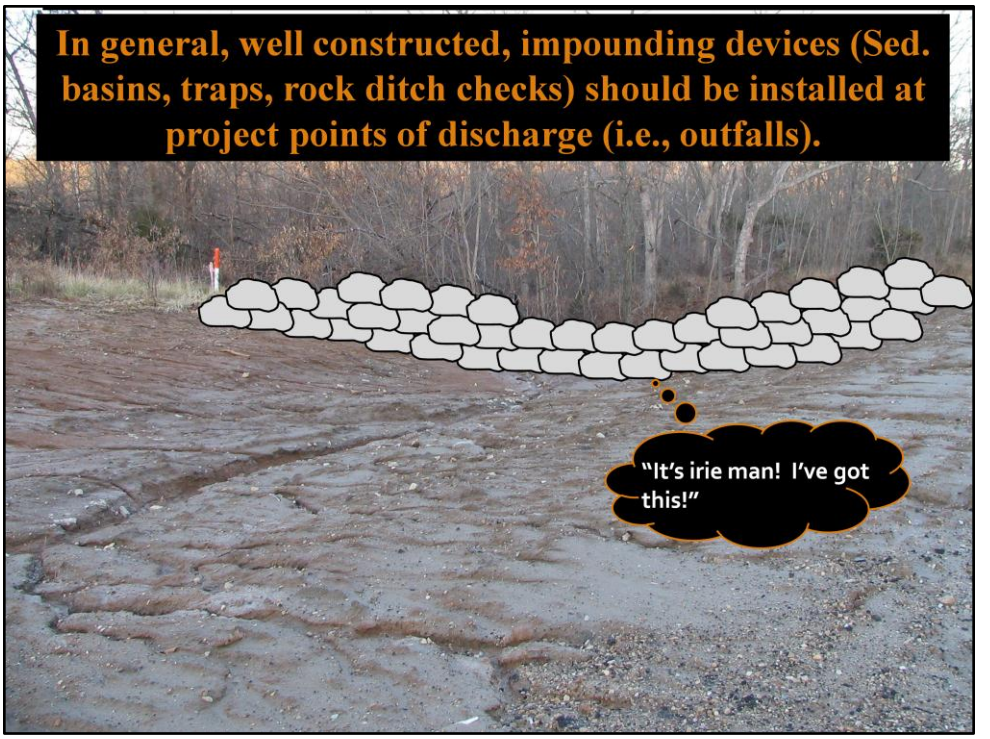
i.) Installation
(MO-R100007 p. 7, C.6.i.)

- 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

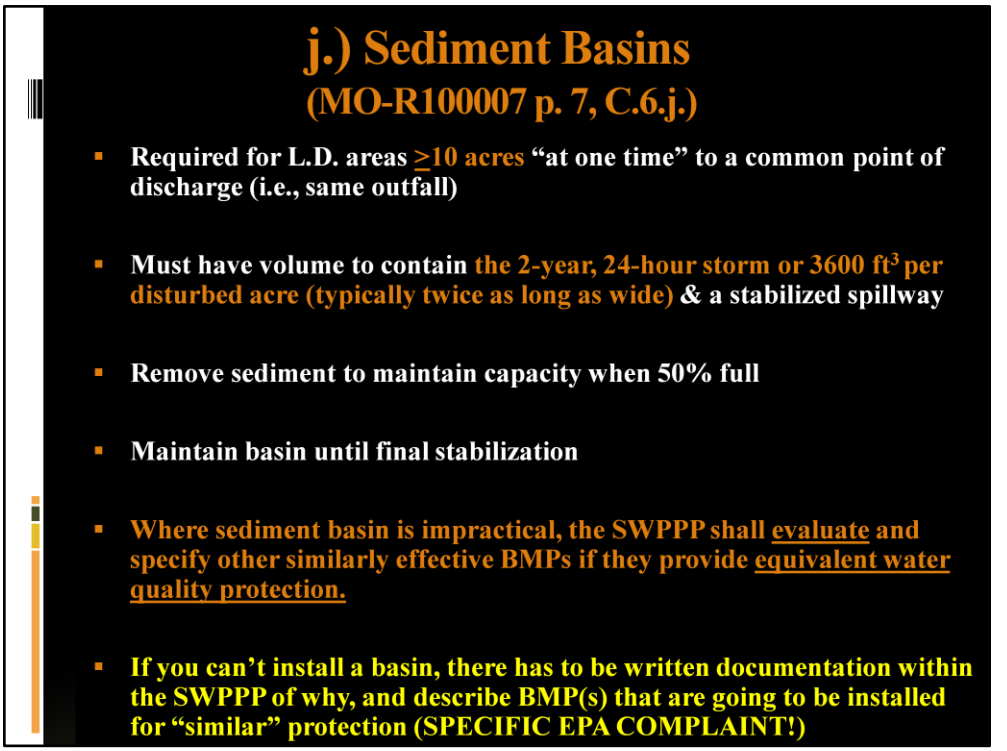
The land disturbance permit is very specific about installation. If you read anything in the permit you should read Section i.

Always install outfall and perimeter protection prior to grading.

No outfall controls…no slope stabilization….disaster!



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.



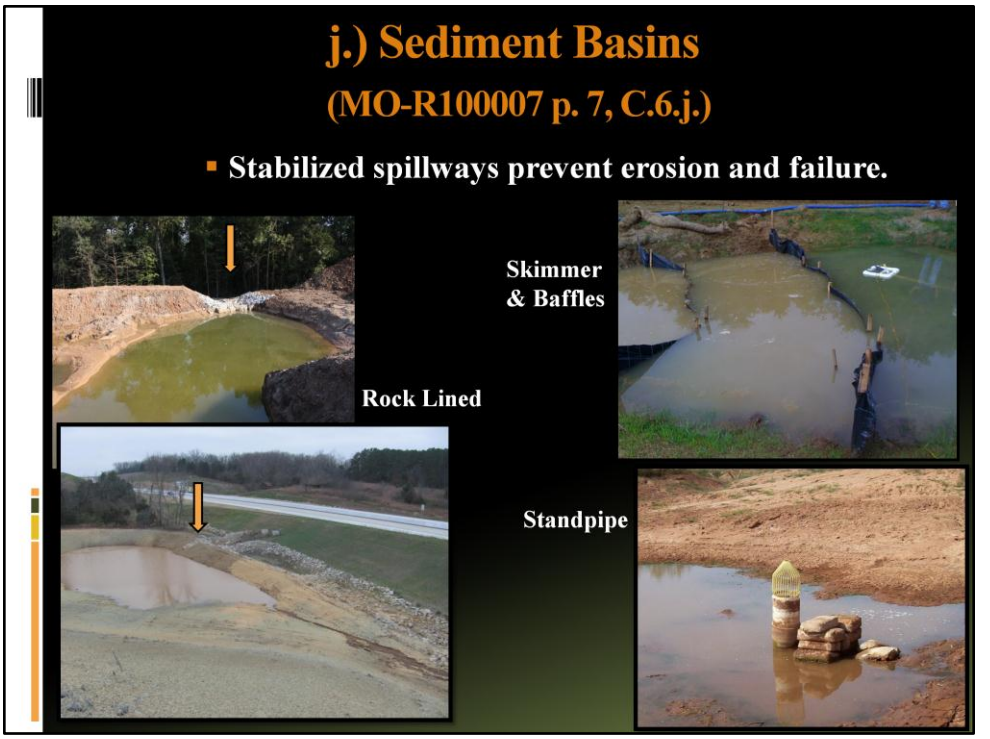
This is a contentious issue between regulators and MODOT, because we typically don't have the right of way or site geometry necessary to install a basin.

j.) Sediment Basins

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

Temporary

Permanent



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

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

- 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.

l.) 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?

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

I.) 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!)

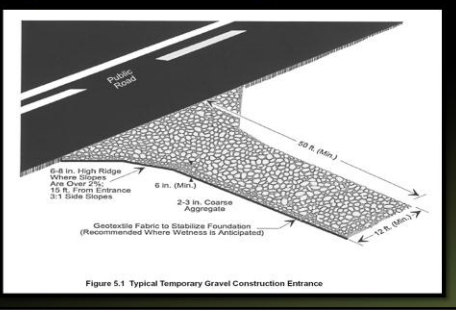
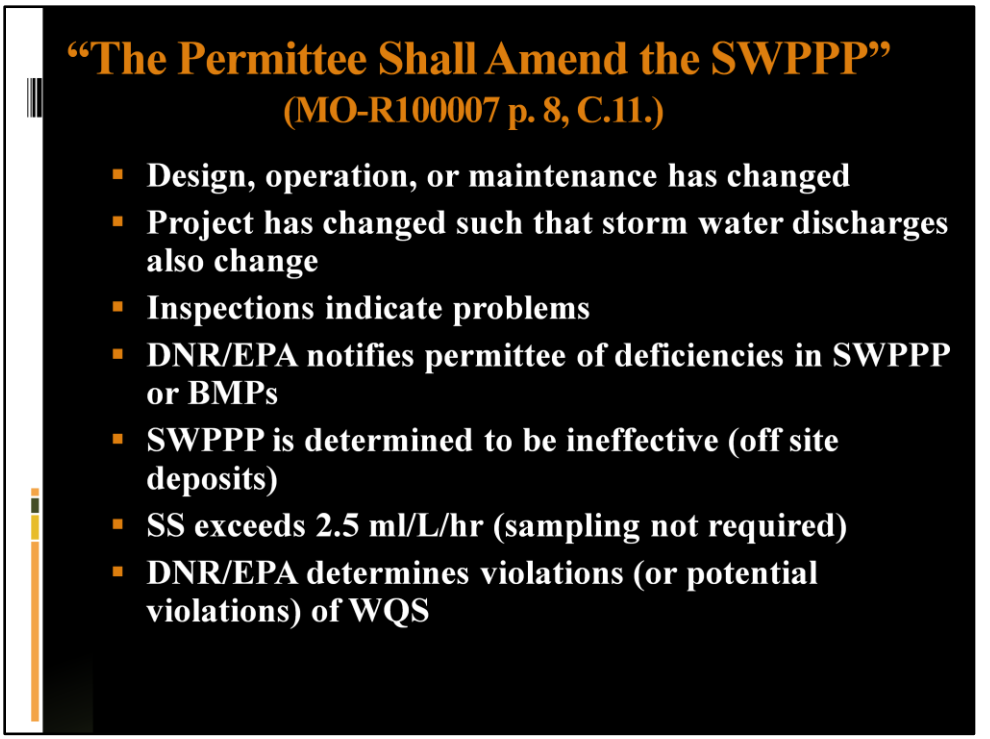


Figure 5.1 Typical Temporary Gravel Construction Entrance

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



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.)

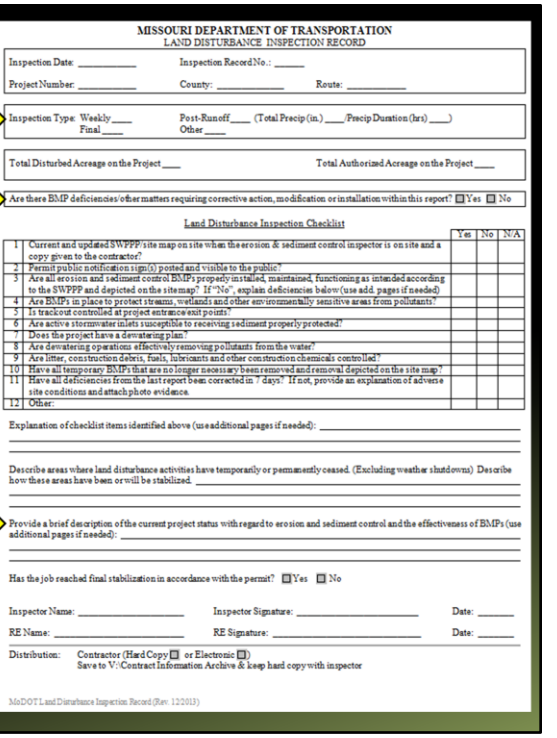
- Regular inspections at a minimum of once every 7 calendar days or within 48 hours of a runoff event or within 72 hours on the next business day if the rain event ceases during a non-business day such as weekends or holidays
- Conducted by a person responsible for environmental matters at the site or a person trained by the responsible person. E&SC inspector must be proficient with E&SC matters. (I recommend in-house 3rd 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 BMP's 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: _____

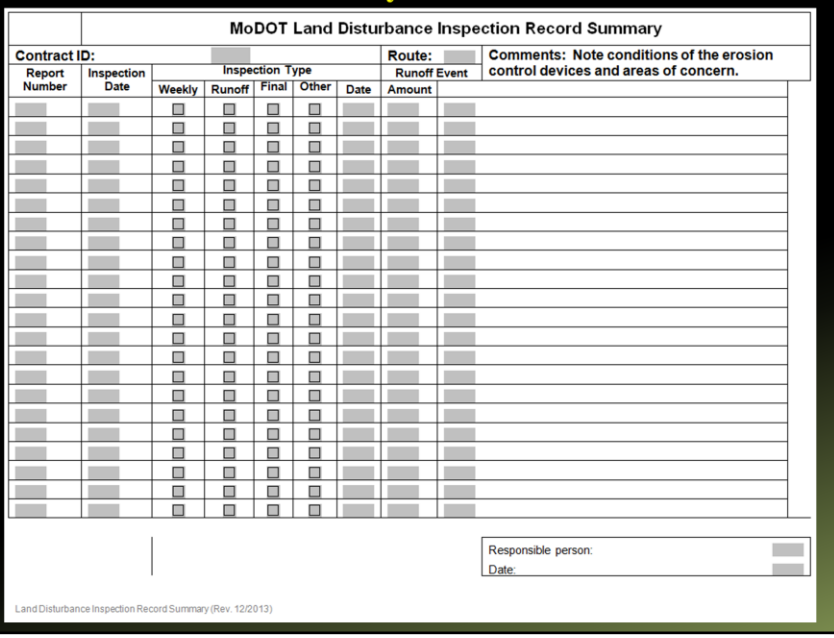
Distribution: Contractor (Hard Copy ☐ or Electronic ☐)
Save to V:\Contract Information Archive & keep hard copy with inspector

MoDOT Land Disturbance Inspection Record (Rev. 12/2013)

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

Inspection Report Log

Monthly Gone!



MoDOT Land Disturbance Inspection Record Summary

Contract ID:

Route:

Comments: Note conditions of the erosion control devices and areas of concern.

Report Number	Inspection Date	Inspection Type					Runoff Event	
		Weekly	Runoff	Final	Other	Date	Amount	
		☐	☐	☐	☐			
		☐	☐	☐	☐			
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		☐	☐	☐	☐			

Responsible person:

Date:

Land Disturbance Inspection Record Summary (Rev. 12/2013)

Permit says "a log of each inspection shall be kept".

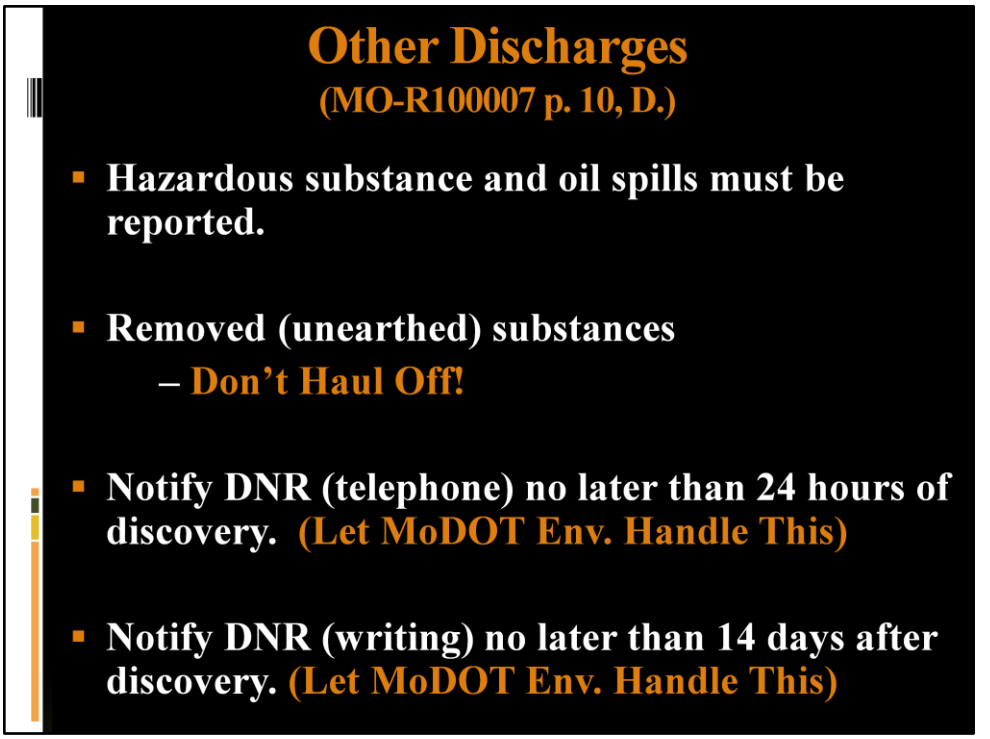
Inspections

- 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.



The land disturbance permit touches on other environmental regulations.

Additional Concerns

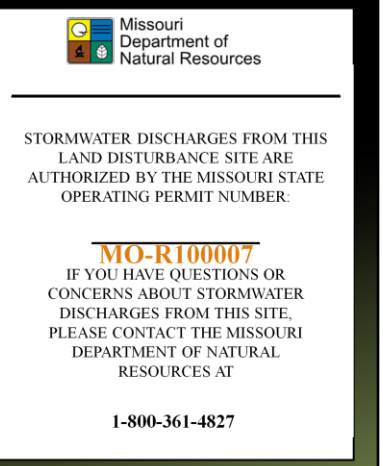
- Solid waste (trash containers for litter and debris).
- Portable toilets.
- Properly treat wash waters.

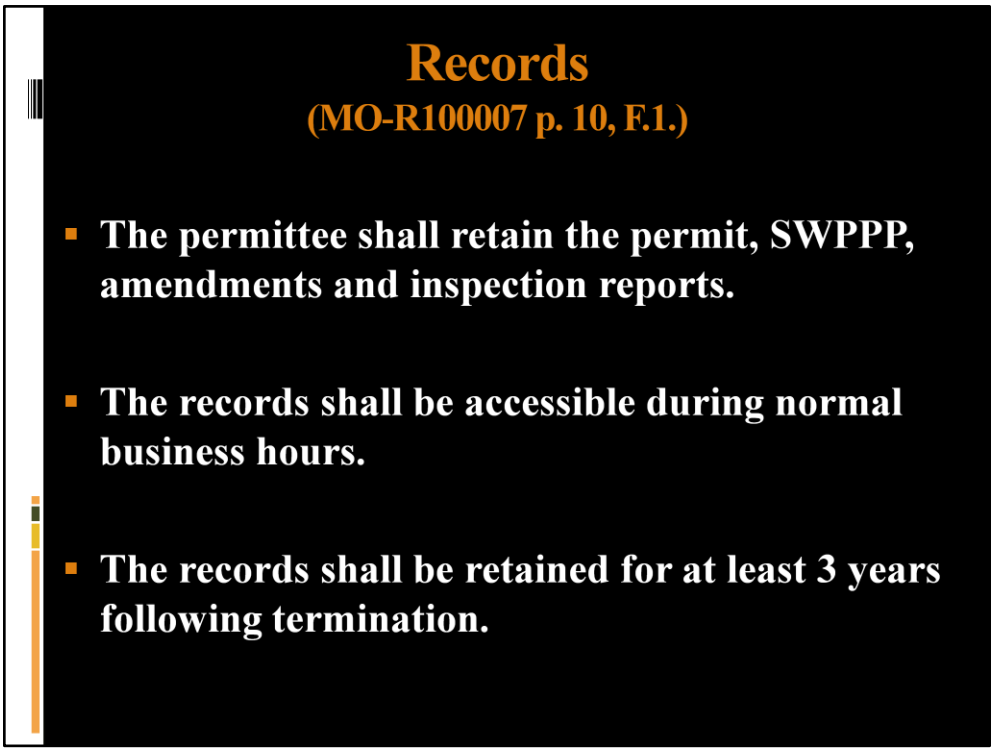
- Properly store construction materials to minimize exposure and potential release and away from drainage courses and low areas.
- Response to spills – SPCC concerns.
- Containment berms or drip pans at petroleum product and liquid storage tanks and containers.

Public Notification

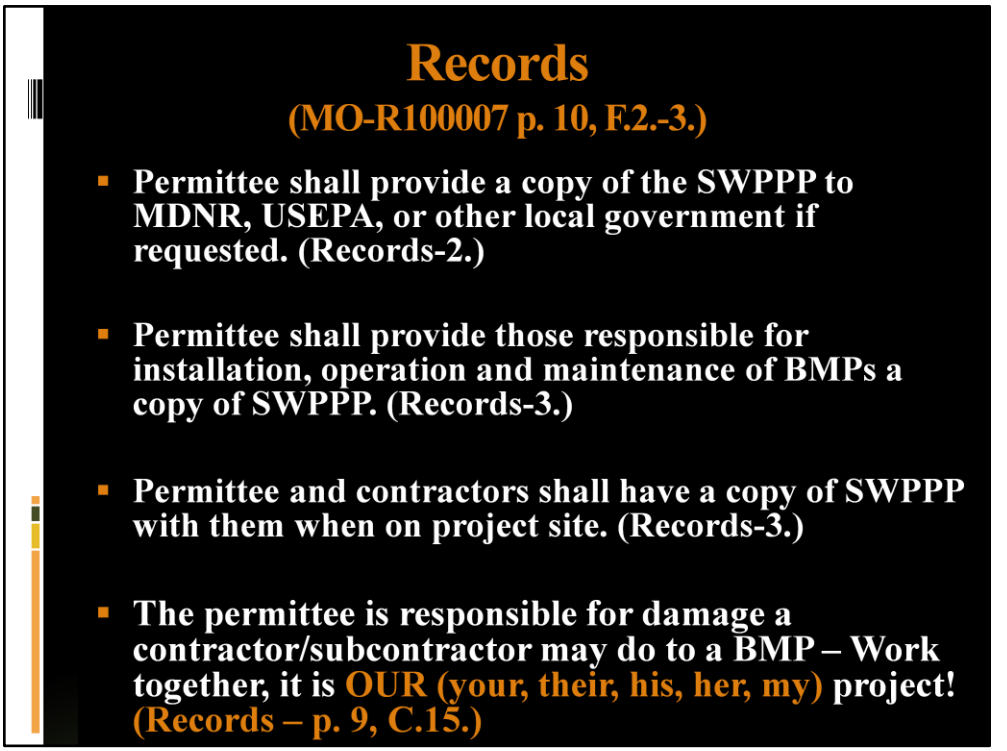
(MO-R100007 p. 10, C.16.)

- 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).

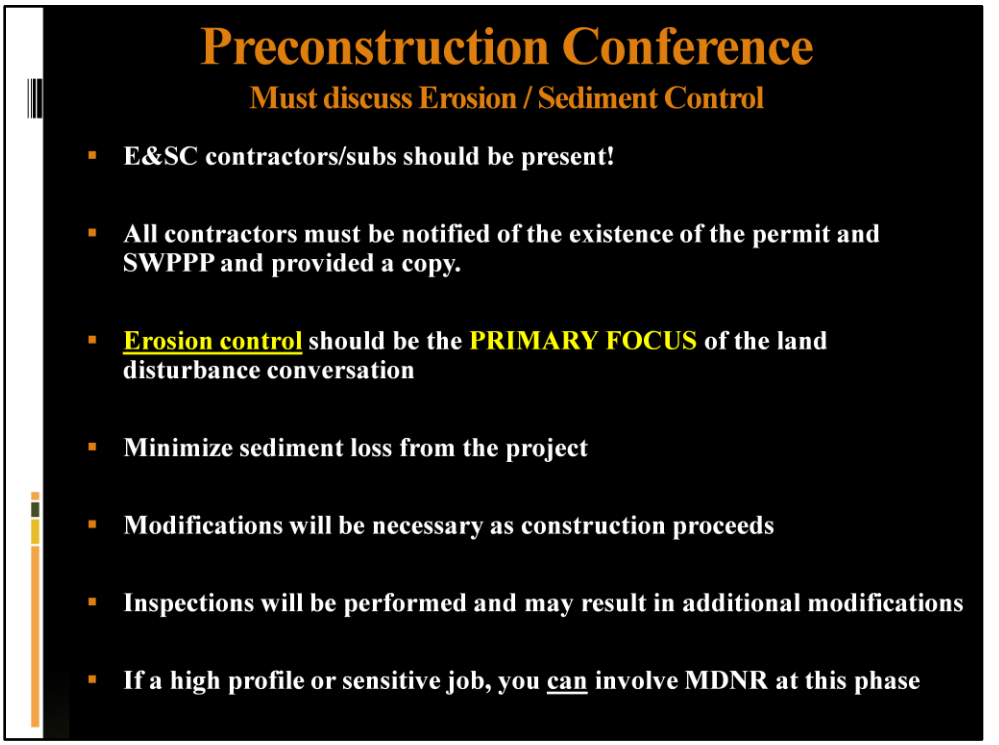




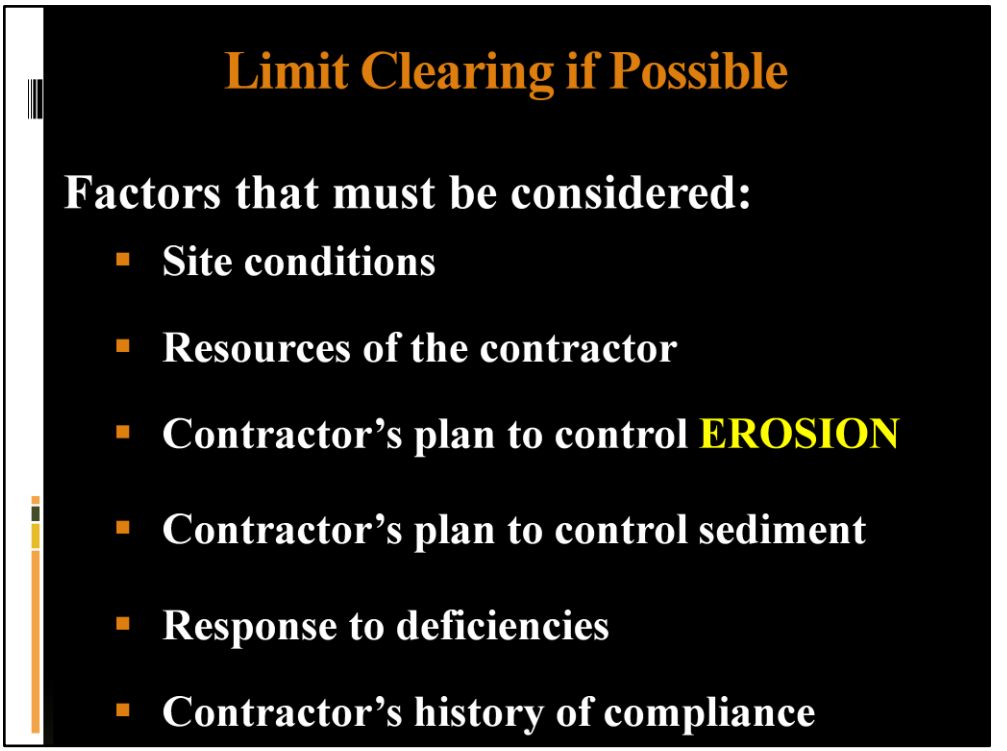
In previous EPA enforcement actions MODOT has been given ample time to collect appropriate records. Therefore inspection reports and "the inspection file" does not need to be kept on site. The only document that must be kept on site is the SWPPP and permit. "On site" means somewhere between the limits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



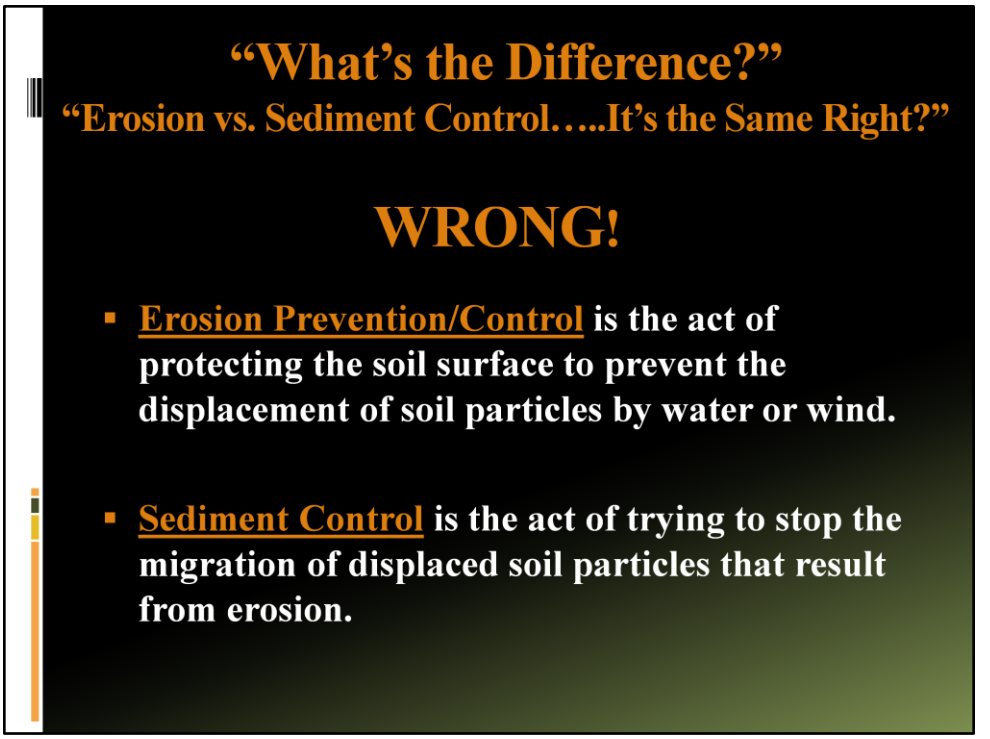
It is essential that the contractor and sub-contractors be advised of the SWPPP.



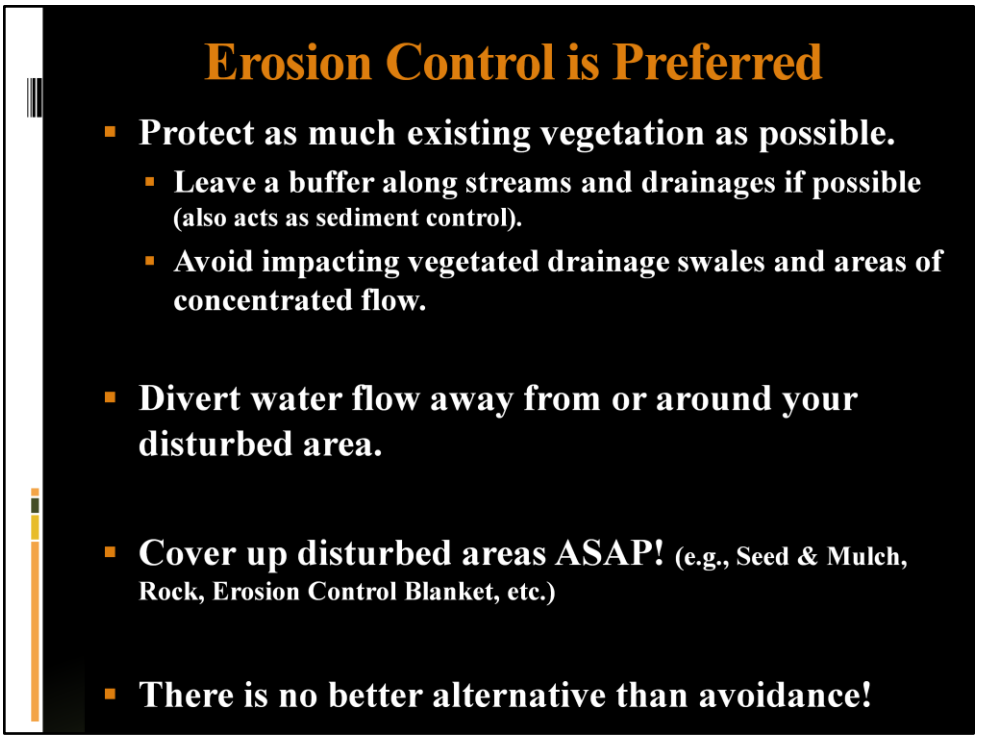
There has to be a discussion of erosion and sediment control at precons for grading jobs. It is important everyone knows what's expected.



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



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



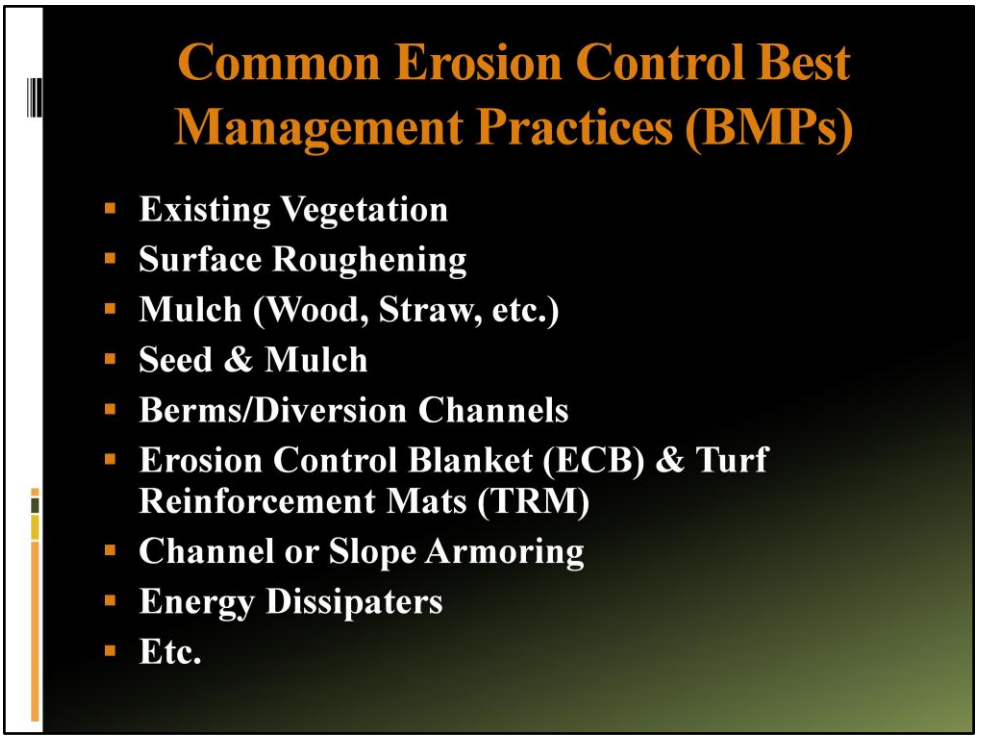
ONLY DISTURB WHAT IS ABSOLUTELY NECESSARY TO COMPLETE THE JOB!!! This will save you time, money and vulnerability!

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.



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 <u>very temporary</u> BMP. Do not try to use surface roughening as a stand alone BMP for extended periods of time.

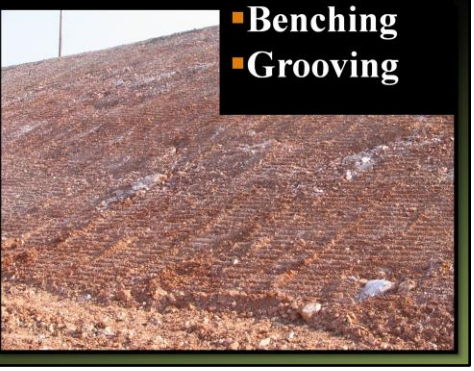
Surface Roughening

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



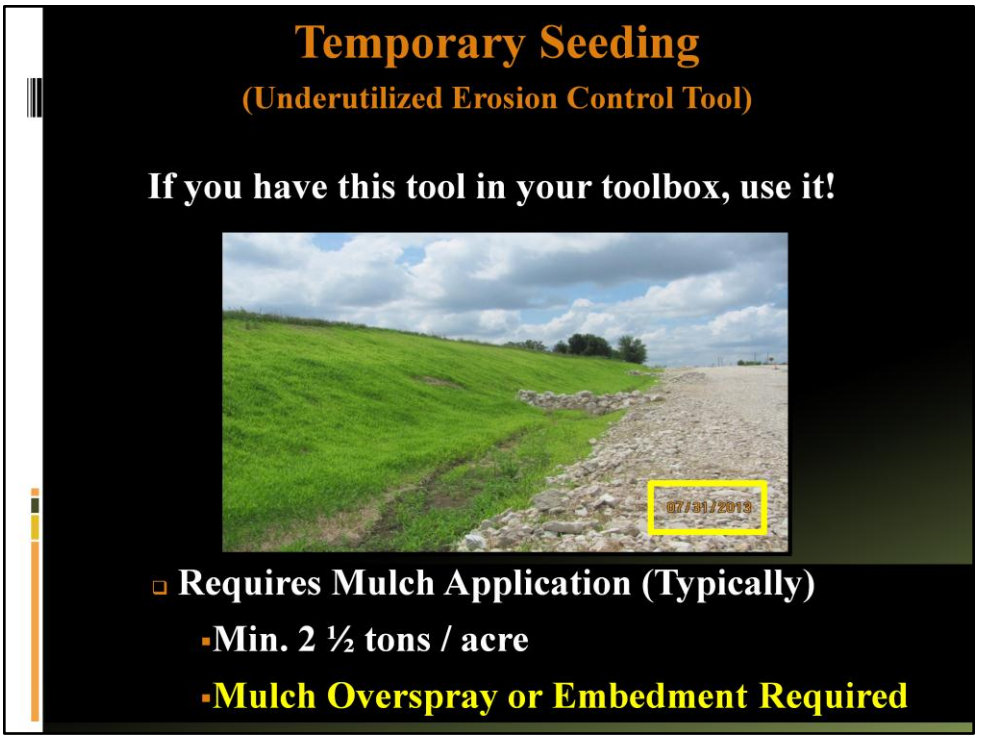
Surface Roughening

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!

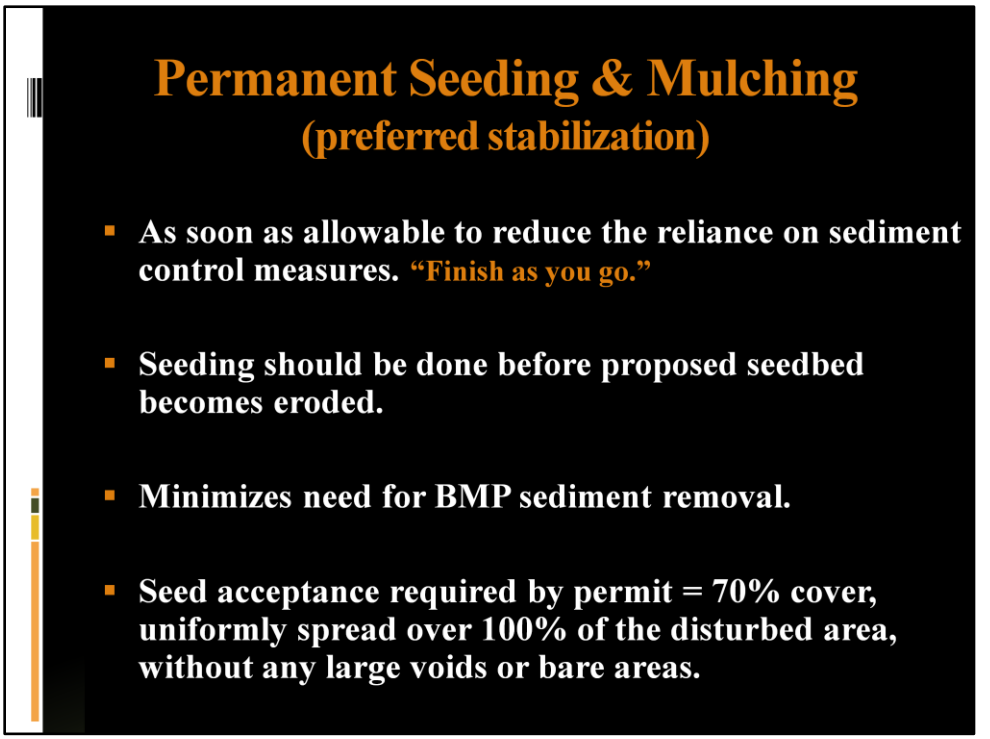
Crimped or tacked straw is considered interim stabilization when used in conjunction with sediment control devices.

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.



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 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……

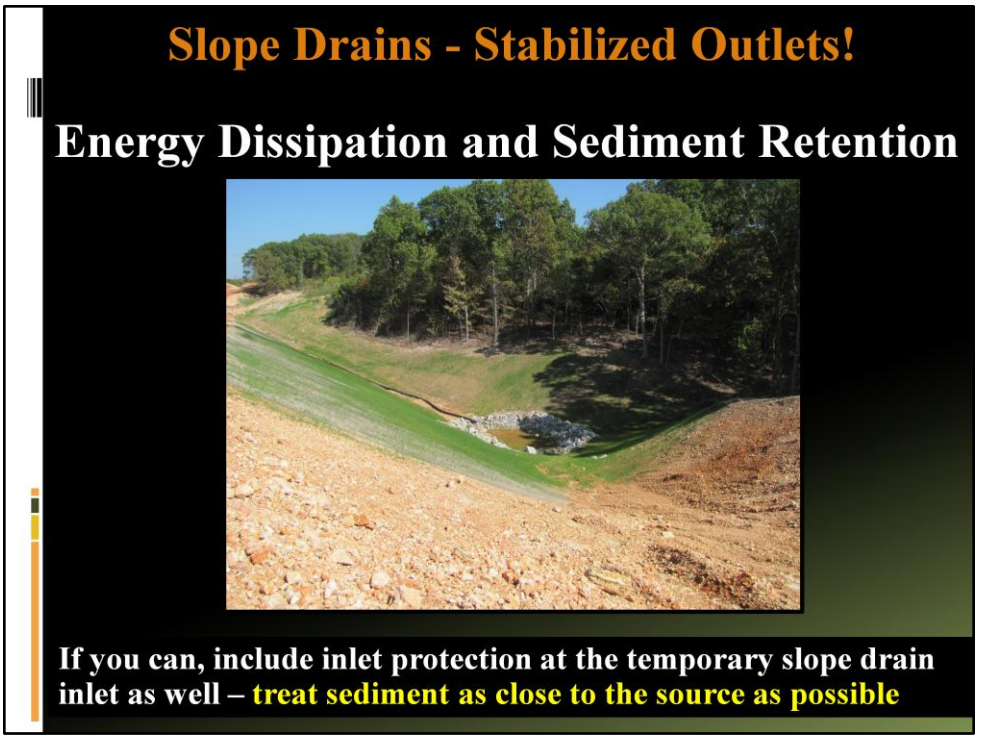
Welcome to MO

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



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 Me** **d in place of ECBs and**

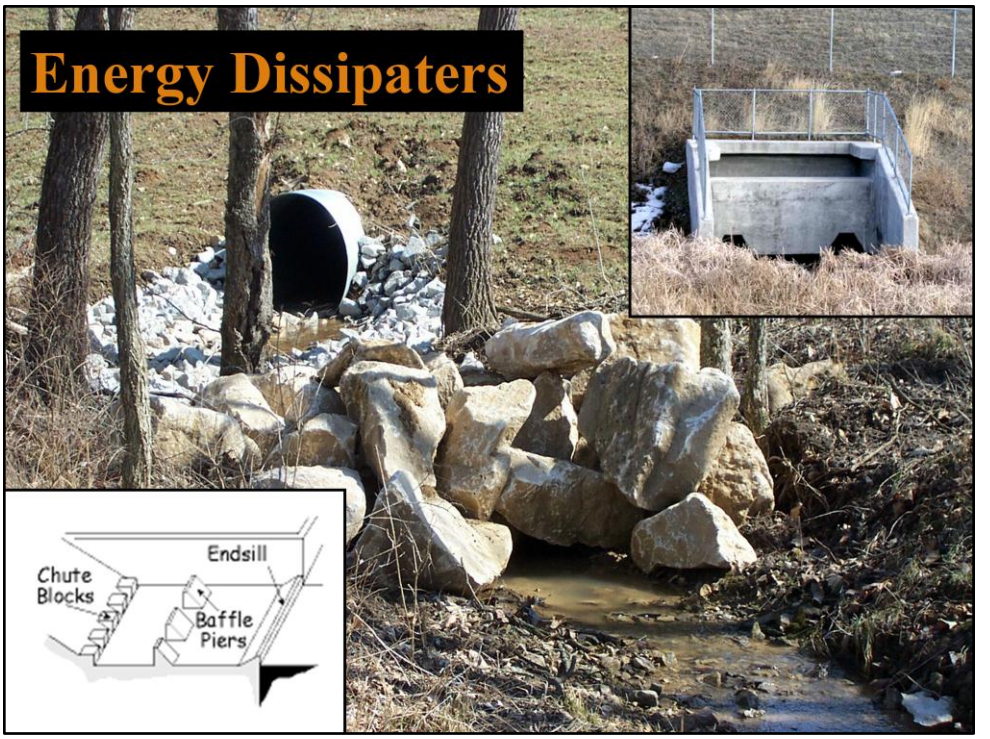
to soil and ed germination.

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

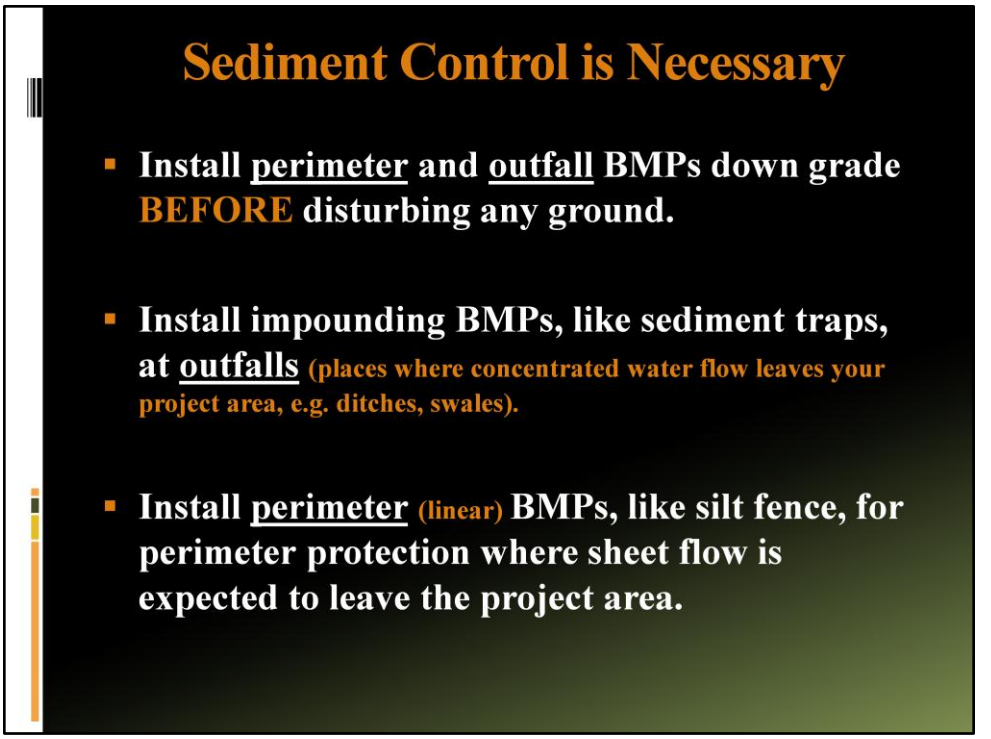
Sediment Control is Secondary, but Necessary

- 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.

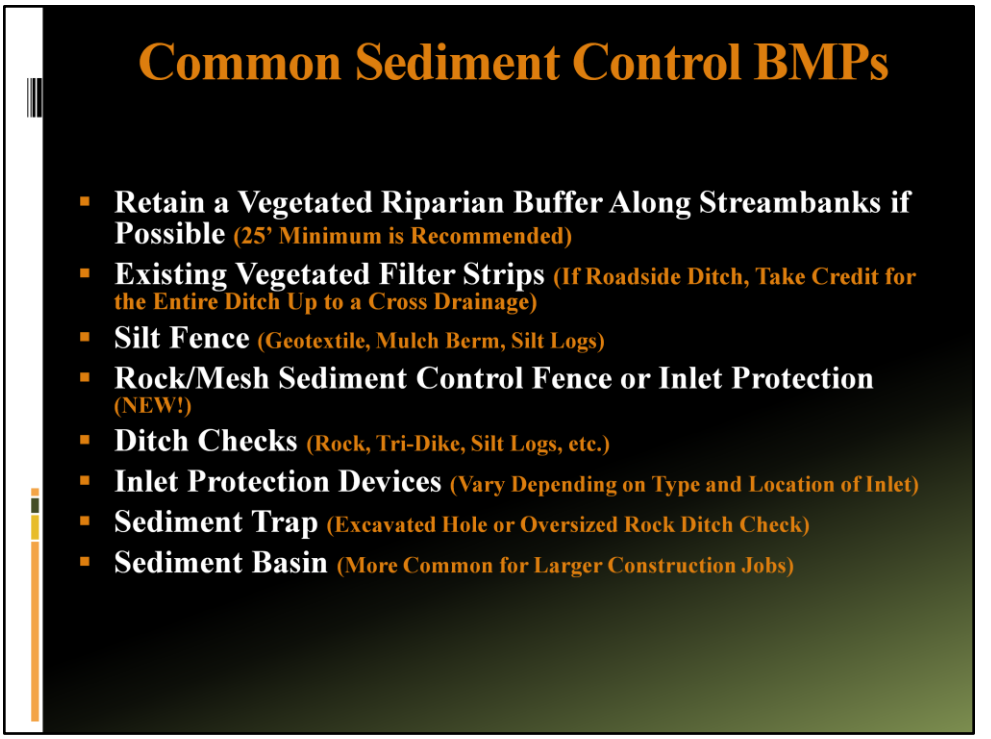
- Ensure you have designed and installed the proper protection depending on whether you are fighting sheet or concentrated flows.



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!



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

Streams, Ditches, Drainages, etc.

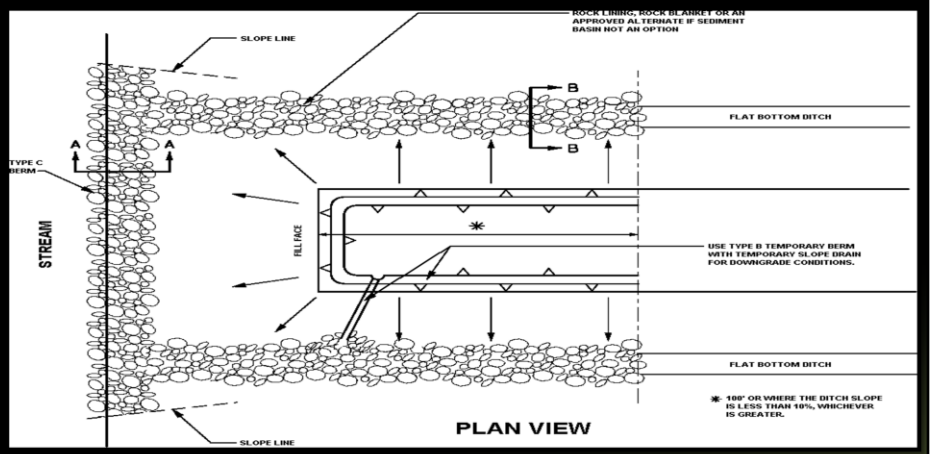
Our primary focus for erosion and sediment control should be holding and capturing sediment BEFORE it enters waters of the state/U.S.

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

Construction at Streams



- There must be an appropriate BMP between your work area and the stream/lake/wetland/etc.
- One common device is a rock filter berm (Type C).

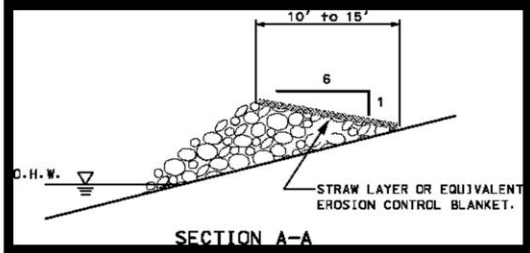
•Contractor's activity at stream presents the worst opportunity for Notices of Violation.

•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:

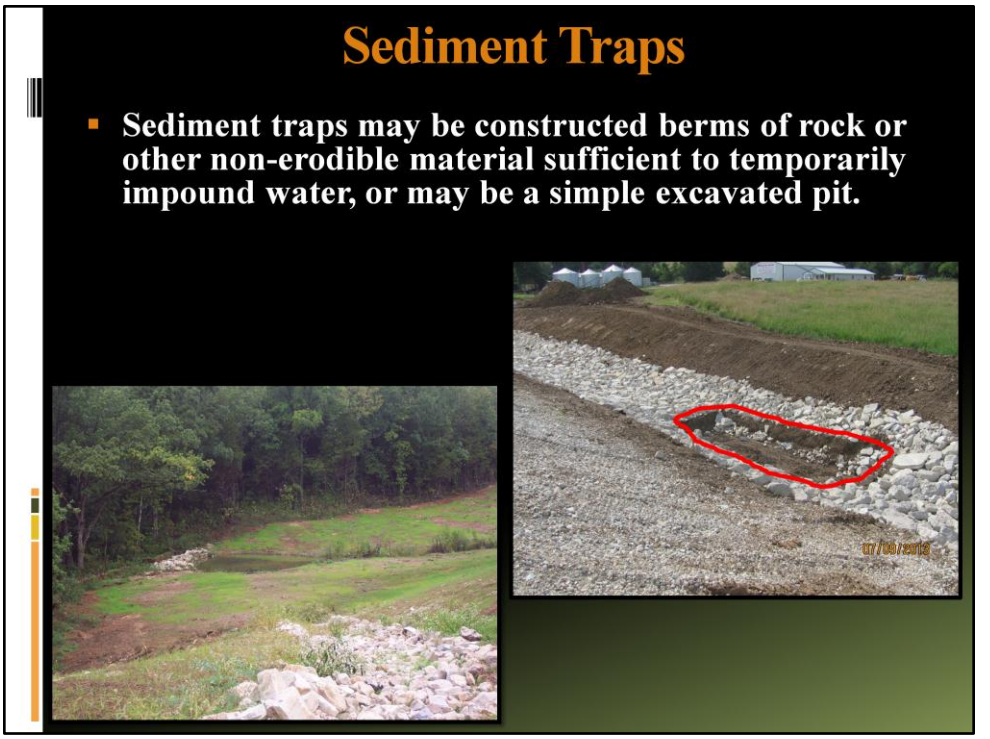
- At the top of the stream slope
- From ditch backslope to ditch backslope
- Berm across ditches serves as ditch check/sediment trap
- Straw/filter fabric serves as filter and can preserve rock effectiveness
- Contractor activity/minor flooding does not typically damage

Sediment Basins

- Where practical, sediment basins are required for land disturbance areas ≥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^3 per disturbed acre and a stabilized spillway.

Temporary

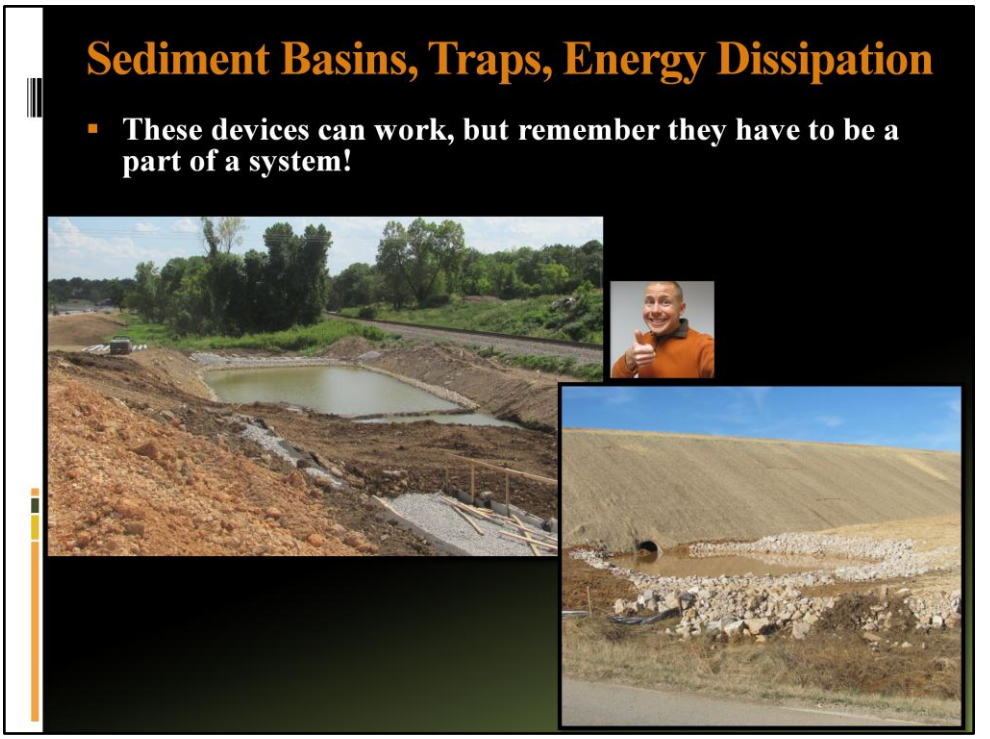
Permanent



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

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.

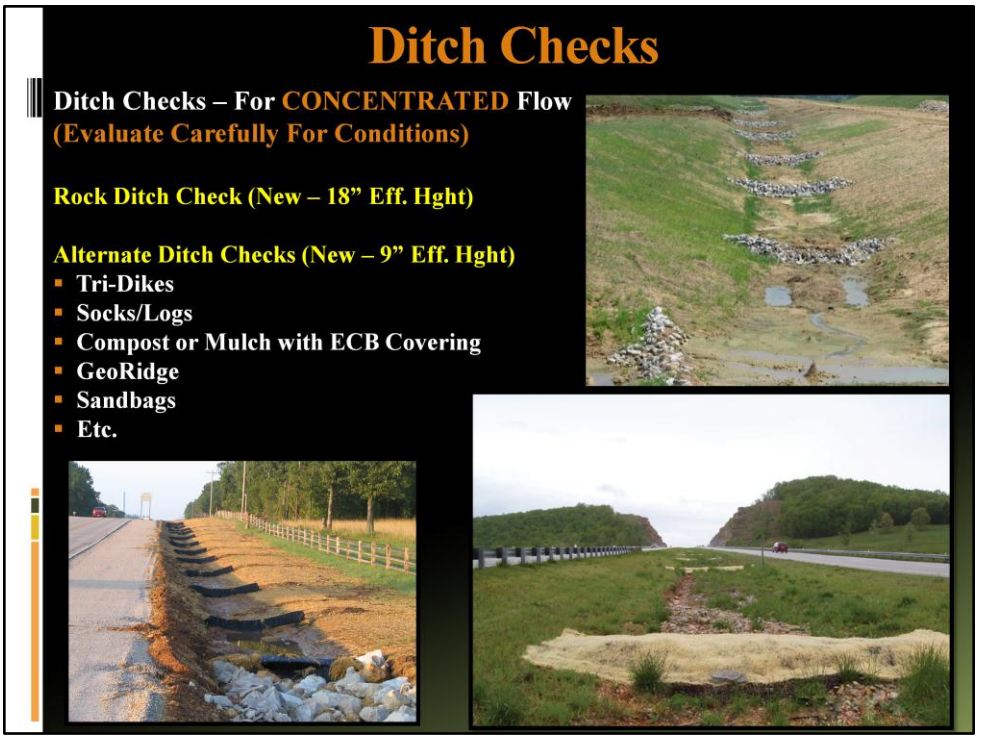
A more robust, filtering BMP should be installed either upgrade or downgrade of the brush pile as soon as possible, typically a rock sediment trap.



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 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.**

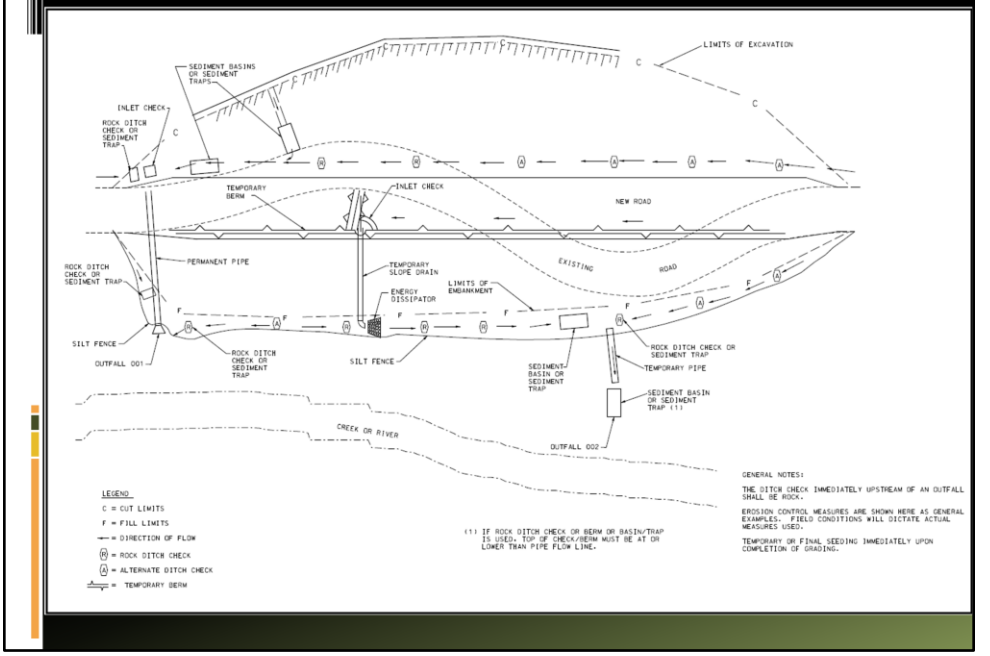


YOU WILL NEED TO UTILIZE DITCH CHECKS ON YOUR PROJECTS!! Ditch checks are probably the most commonly used BMP at MoDOT since we have so many water conveyance channels on our right of way.

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!

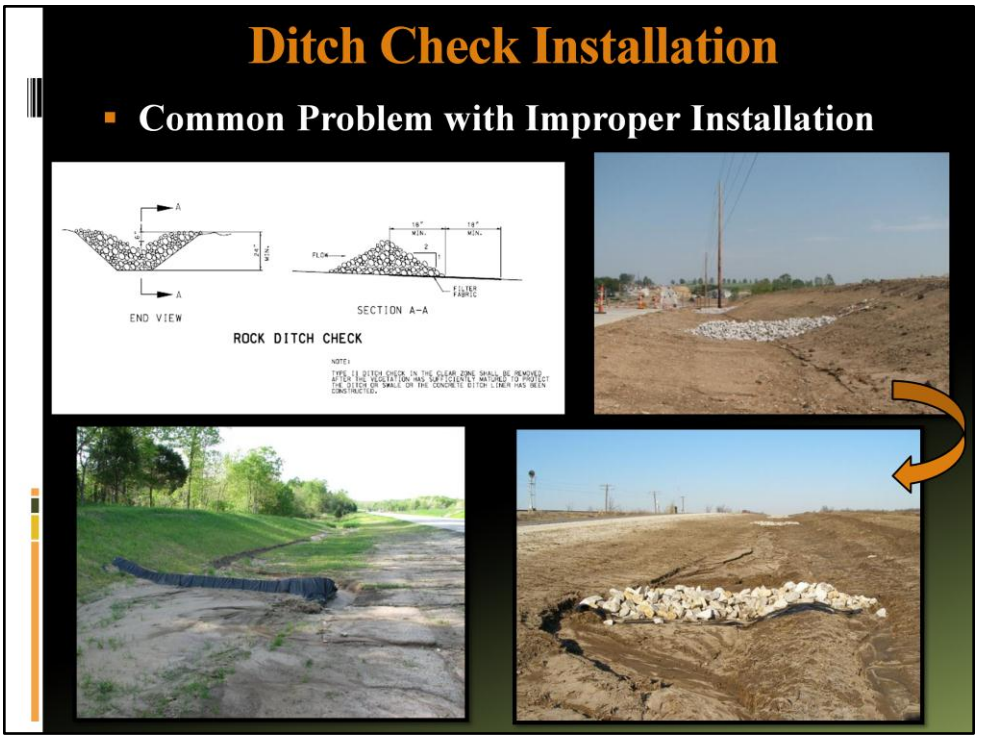
Ditch Checks



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.

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.



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 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.

Positive attributes.

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

Can be made to custom lengths, so no joints necessary

Potential negatives

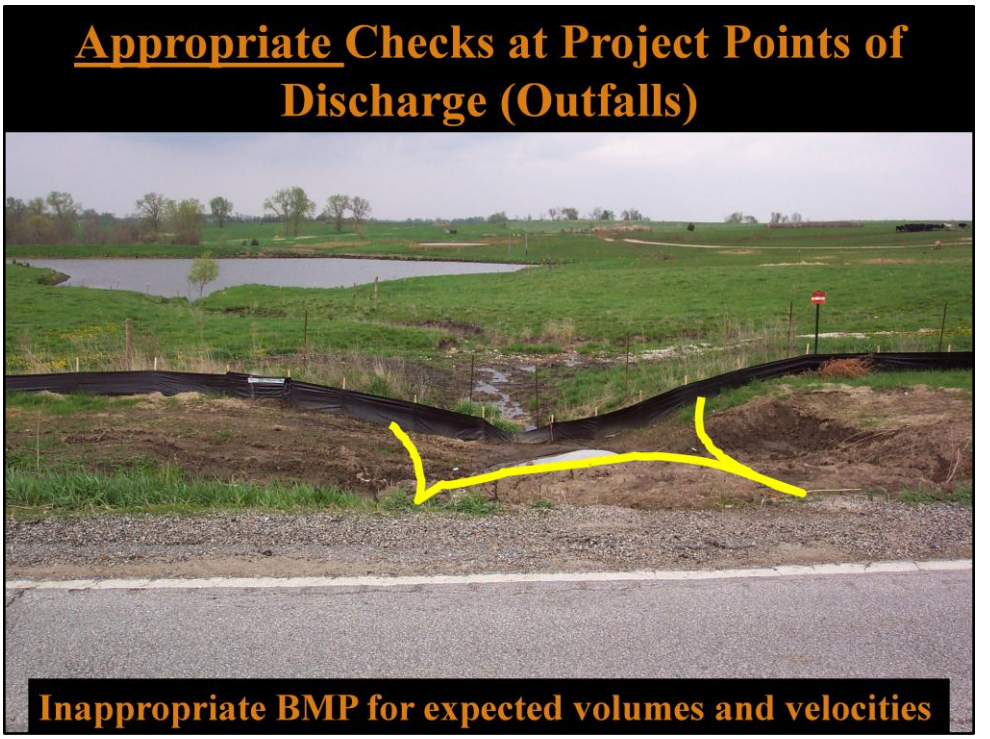
Installment issues – e.g., installed with insufficient staking or not flush to the ground

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?

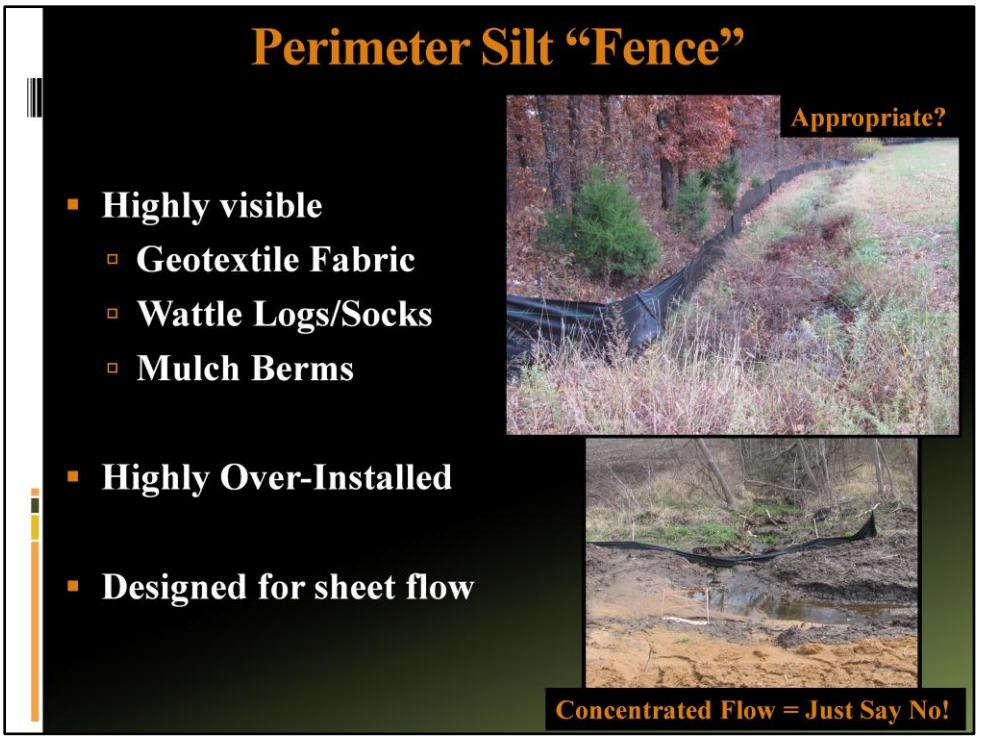


This is becoming more and more rare, which is a good thing.

BMPs at Project Points of Discharge

Large, Robust Checks or Sediment Traps or Basins

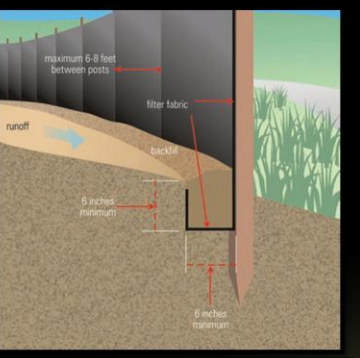
The last device in a series of ditch checks or BMP system before discharge should be a rock ditch check or a sediment trap or basin.



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!

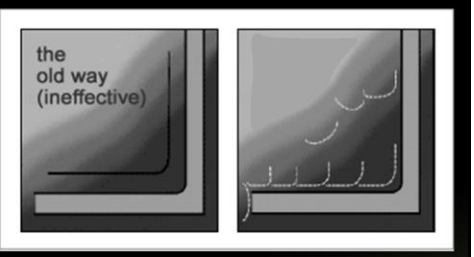


GEOTEXTILE SILT FENCE MUST BE KEYED INTO THE GROUND AT LEAST 6 INCHES AND HAVE A FLAP OF APPROXIMATELY 4 - 6 INCHES POINTED TOWARD THE UPGRADE SLOPE!!!! If you don't do this, it will likely undermine in short time!

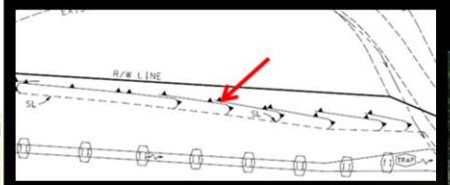
Silt Fence

Installed Down a Grade

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



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



Even the slightest grade can affect performance!

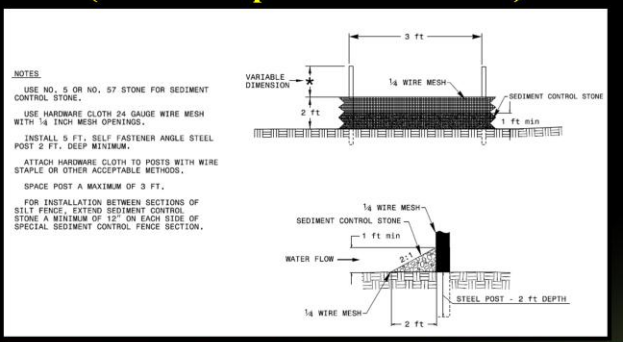
Limit the use of silt fence down a slope if possible.

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:

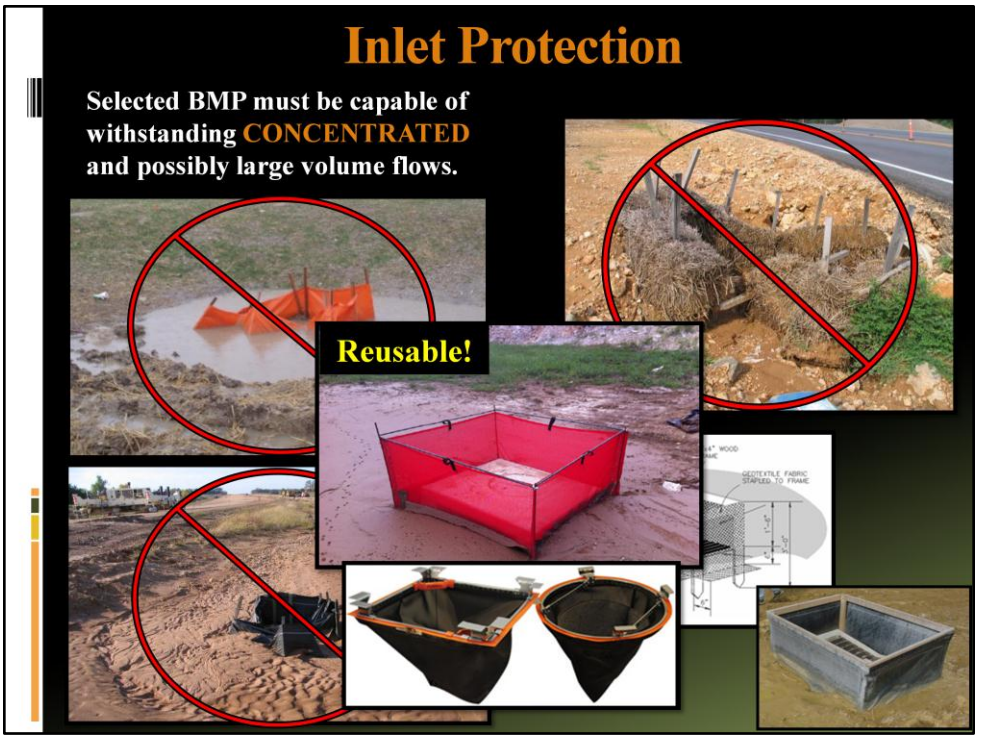
- Sand Bags/Rock Socks
- Wattles/Silt Socks/Silt Logs, etc.
- Various Filter Barriers and Inserts
- Wood, Steel or Other Barricades

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!



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.

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!

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.

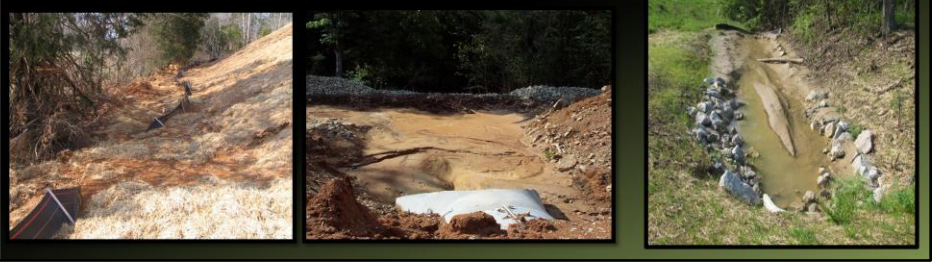
- In general, all impounding/filtering BMPs should be cleaned out when they reach 50% full (capacity for traps and basins - height for silt fence and ditch or inlet checks).

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.

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).

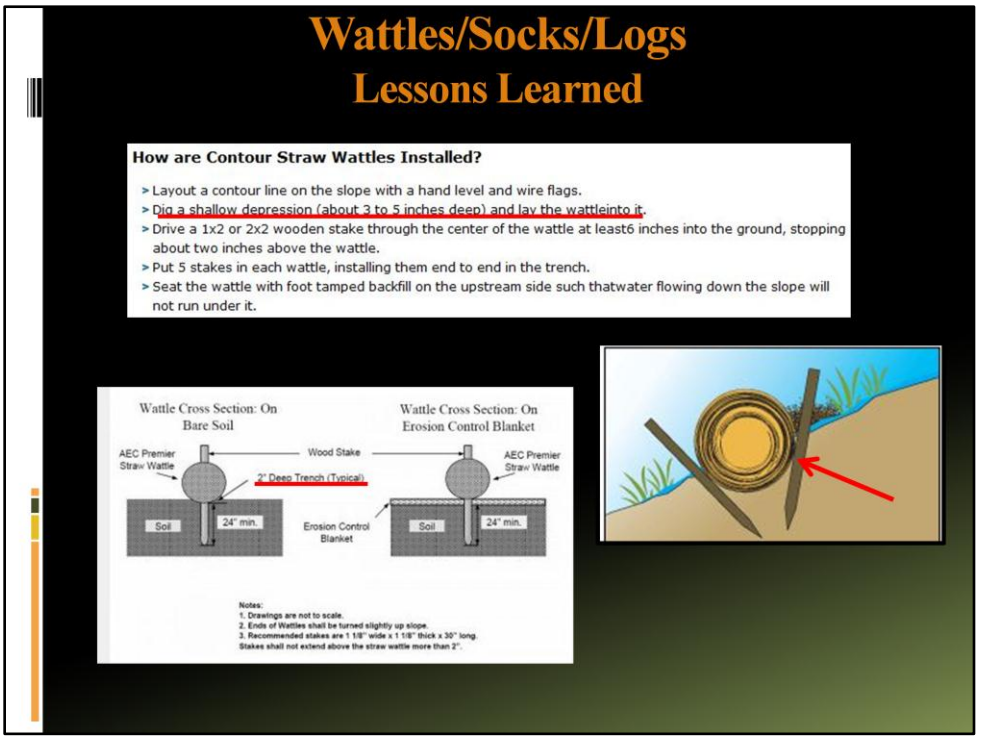
Don't remove your BMPs until you are comfortable that the area is no longer susceptible to erosion. But they must be removed if they are not biodegradable!

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

Same here.

ADDITIONAL CONCERNS TO CONSIDER

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



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.

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

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.

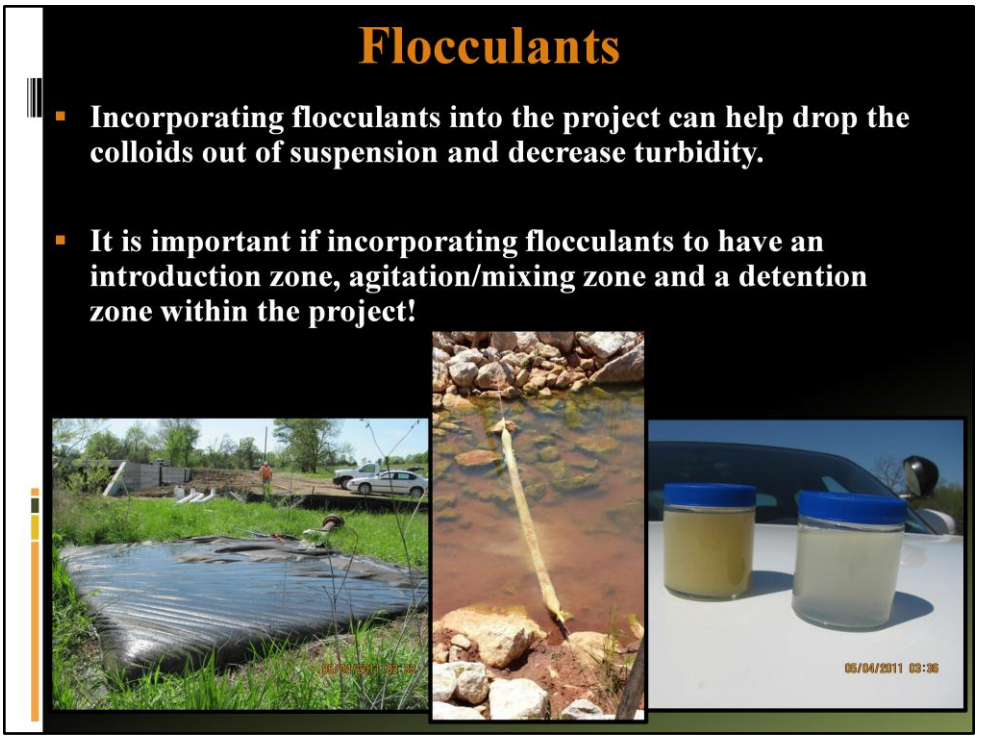
Soil Amendments (JSP?)

- 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.

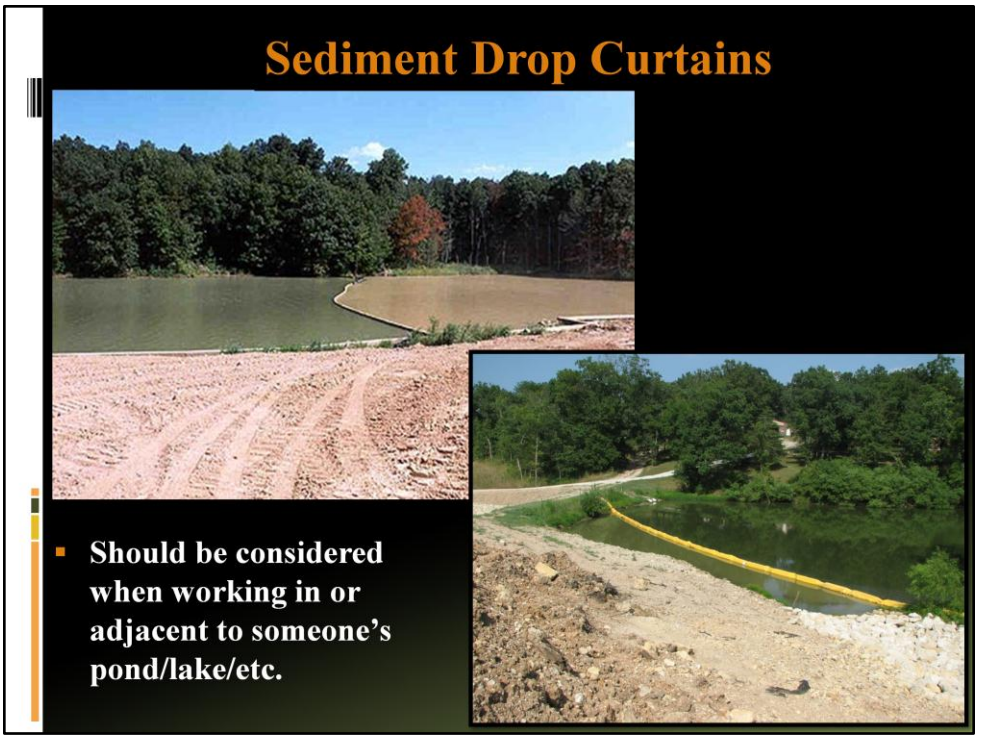
Flocculants

- 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.

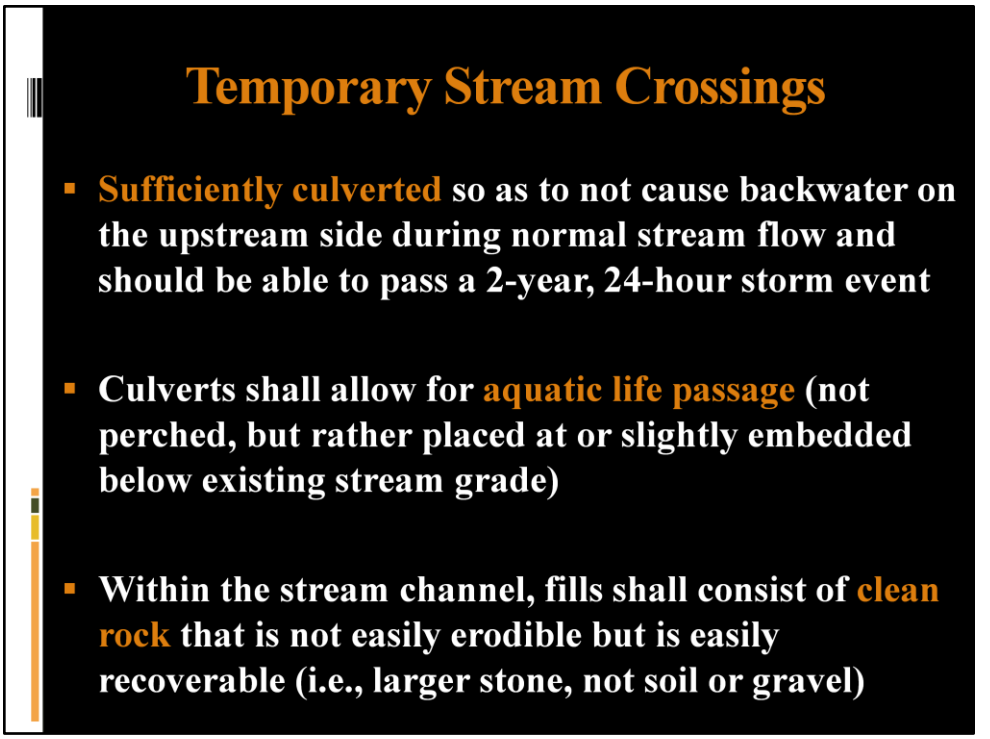


The thing with flocculants is you have to have time and space for them to do their thing, so you have to try to plan for that.



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.



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

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 Yourselves

- 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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