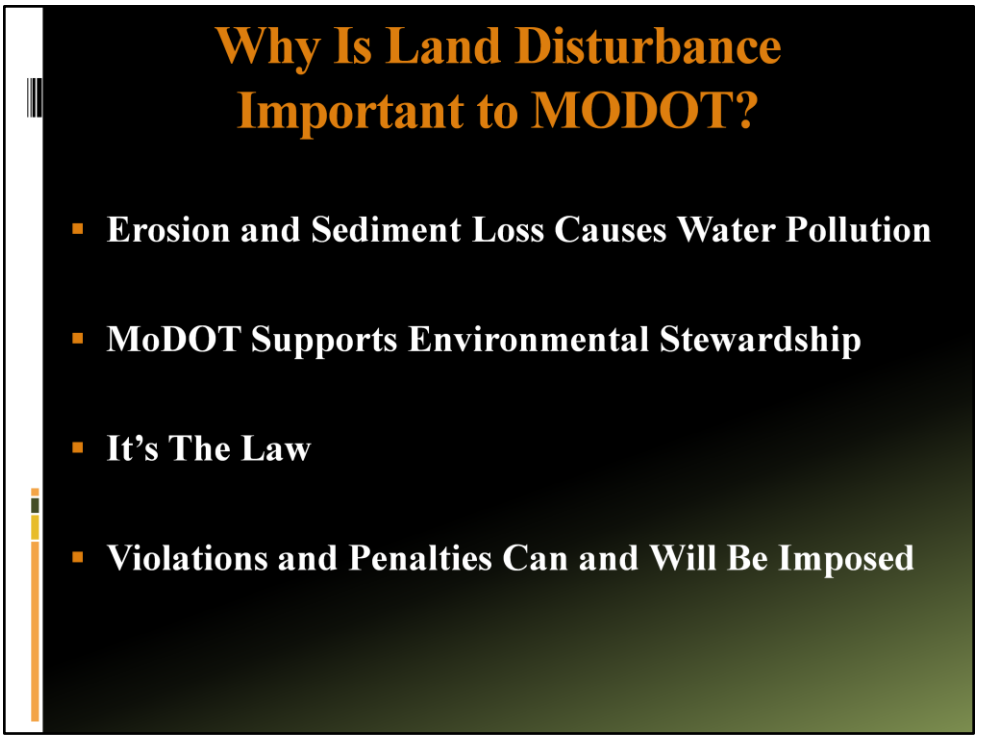
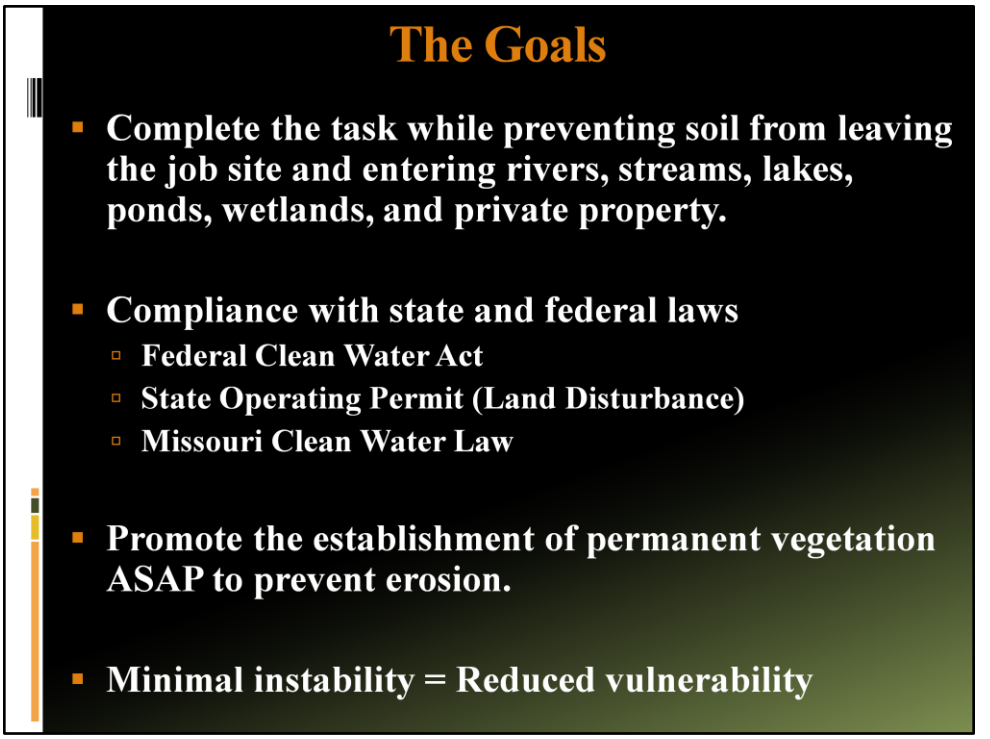
ELEMENTS OF A SUCCESSFUL EROSION & SEDIMENT CONTROL EXPERIENCE

MAINTENANCE OPERATIONS

Nate Muenks
MoDOT Design
Environmental & Historic Preservation Section

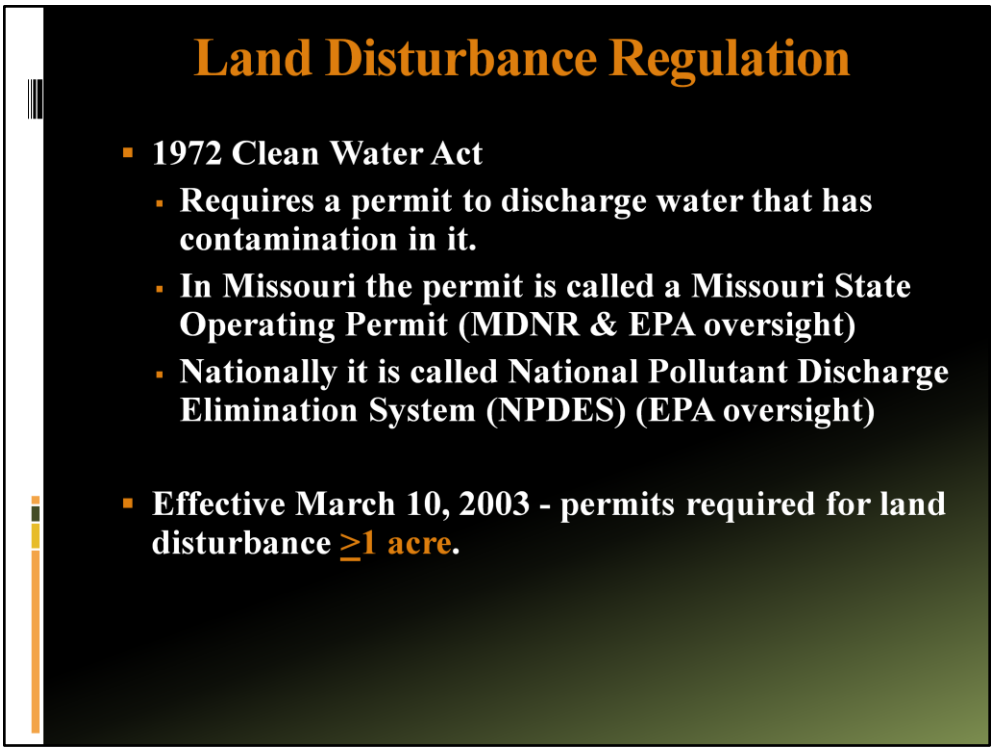


At this time (October 2013) MoDOT is potentially facing significant civil penalties and potential "institutional changes" from the EPA and MDNR resulting from erosion and sediment control violations on construction projects, some dating back to 2010.



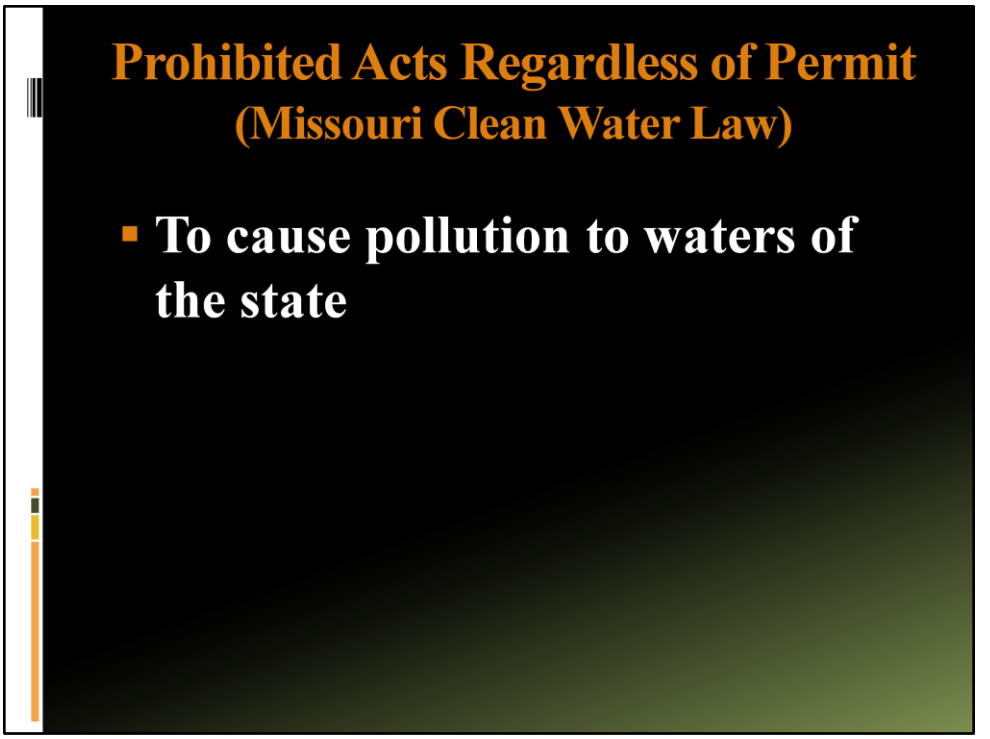
Don't disturb existing vegetation if you don't have to and be sure to cover up (seed and mulch, mulch, rock, etc.) and re-establish vegetation on disturbed soils as quickly as possible. This drastically reduces the risk of losing sediment from a job site.

Understanding The Law



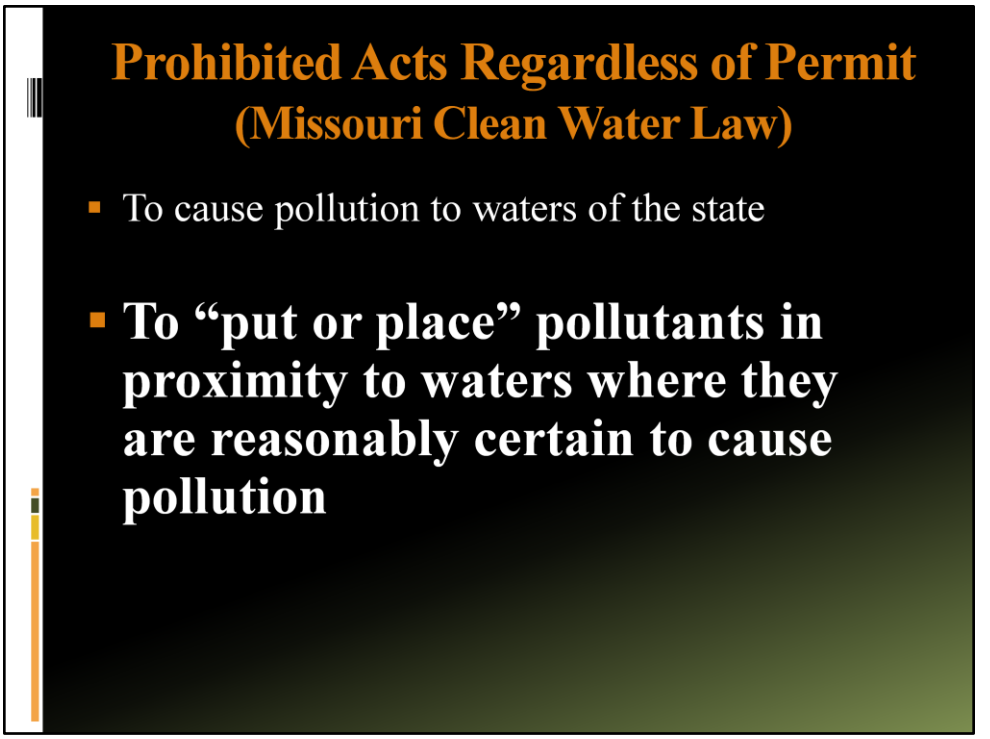
In 1972 the clean water act was passed to control discharges of polluted waste water from industries and cities. Discharge permits allowed these point sources to discharge treated wastewater.
EPA subsequently delegated Clean Water Authority to Missouri DNR. Since then DNR has issued discharge permits 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.

When we reach 1 acre of land disturbance on a job, we fall under the MoDOT permit and SWPPP, which carries many more requirements with it. Try to minimize your disturbance and limit clearing and soil disturbance to only those areas necessary to complete the task. But keep in mind that even for jobs that disturb less than 1 acre we can't cause pollution as will be seen in the next series of slides.



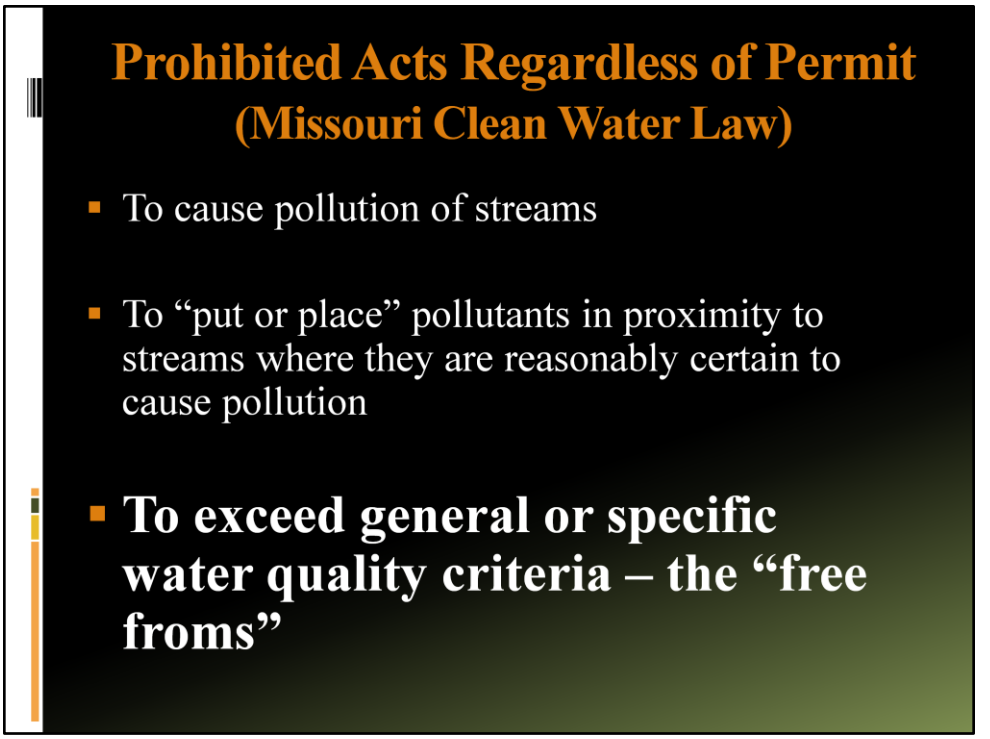
EPA continues to demonstrate, through inspection reports and pending enforcement, that "pollution" is whatever they say it is and the subjectivity of it often makes it difficult for us to comply.

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.)

Every bridge and many 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.

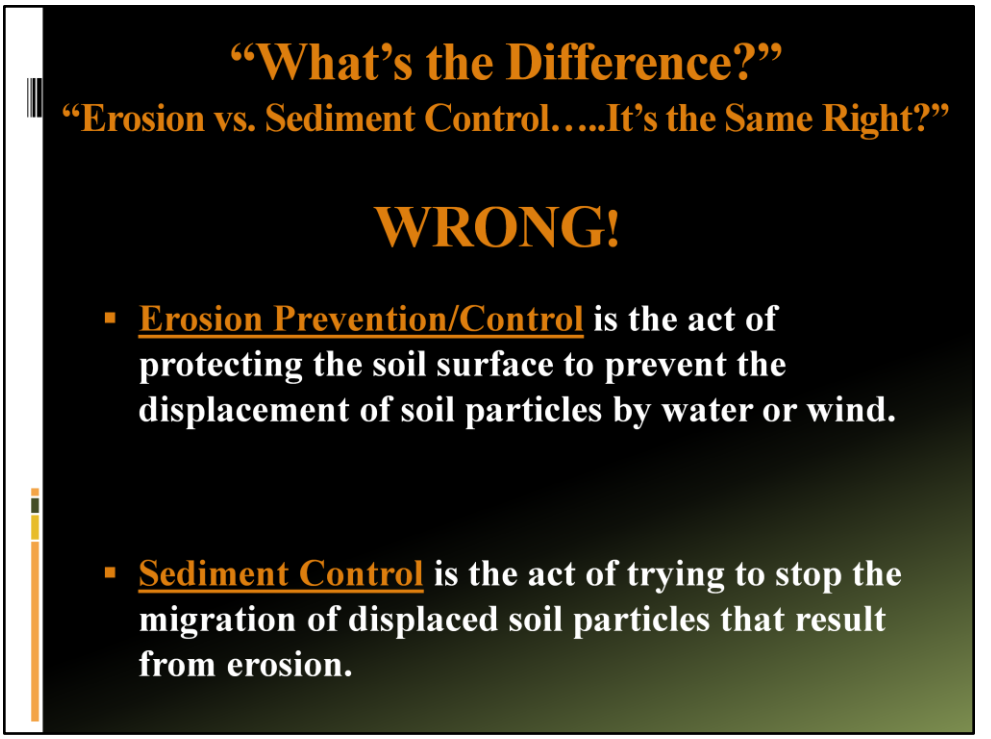


DNR water quality standards (10-CSR20-7.031(3) say "waters shall be <u>free from"</u> a number of conditions or pollutants.
These "free from" conditions include:
-unsightly bottom deposits
-oil, scum, floating debris
-unsightly color or turbidity
-harmful effect on human or aquatic life
-physical, chemical,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

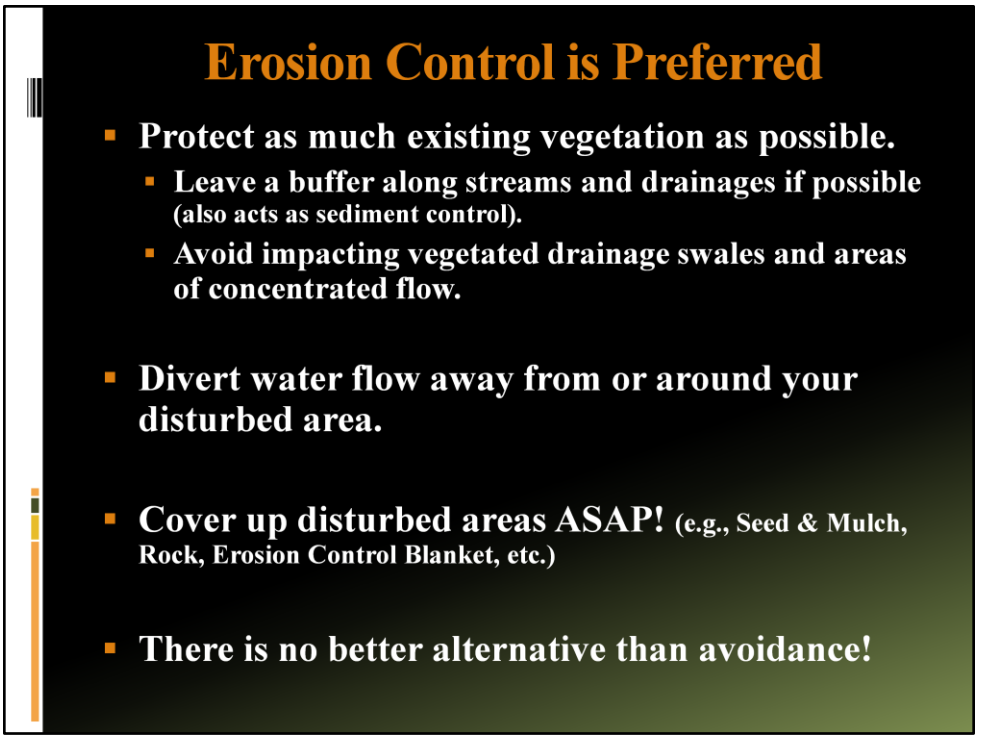
Regulatory enforcement personnel have demonstrated that “unsightly turbidity” is an extremely subjective condition that can be interpreted differently from one individual to the next.

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.

How do we go about controlling erosion and sediment on our projects?



It is extremely important to understand that erosion control and sediment control are not the same thing. We always prefer to utilize proper erosion control when possible, but also that we have sediment control devices in place to limit sediment transport and keep it on our job site.



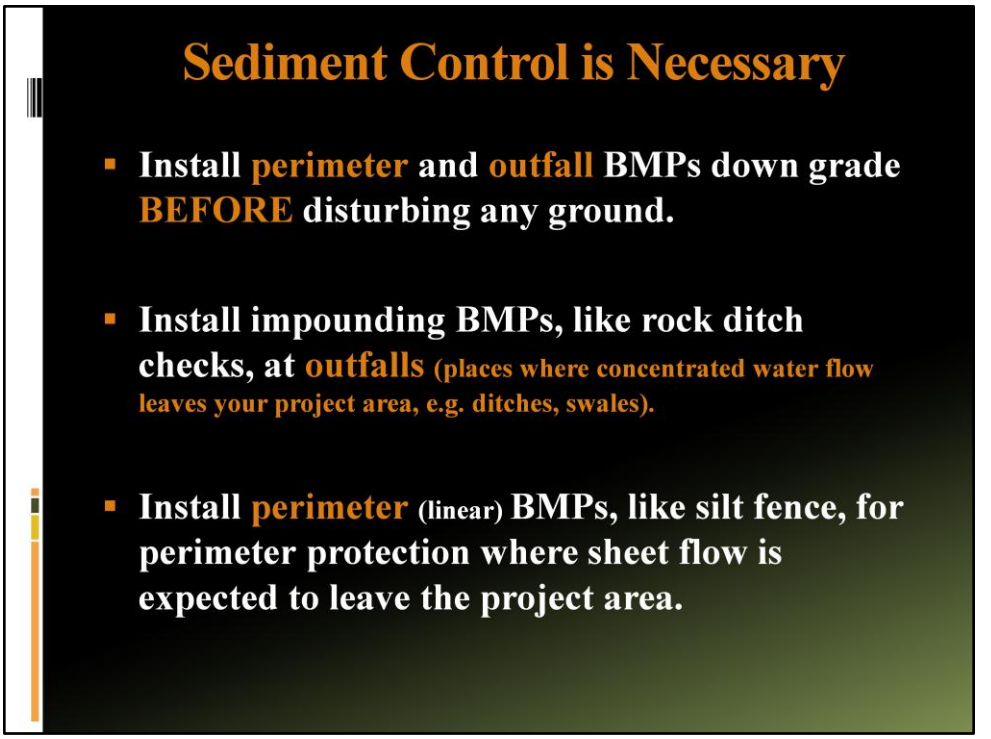
ONLY DISTURB WHAT IS ABSOLUTELY NECESSARY TO COMPLETE THE JOB!!! This will save you time, money and vulnerability!

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

Left Photo: Rock toe protection along this stream bank is erosion control. We need to be sure to seed and mulch down the disturbed ground above it ASAP so we don't lose that soil!

Top Right: You can use chipped wood mulch to temporarily cover disturbed soils. Stockpile the brush clearing and other clearing chippings from roadsides on a lot and use it as needed. It can also be used as a perimeter berm which is covered in the sediment control section. This is especially useful material in the winter, when no grass is going to grow anyway.

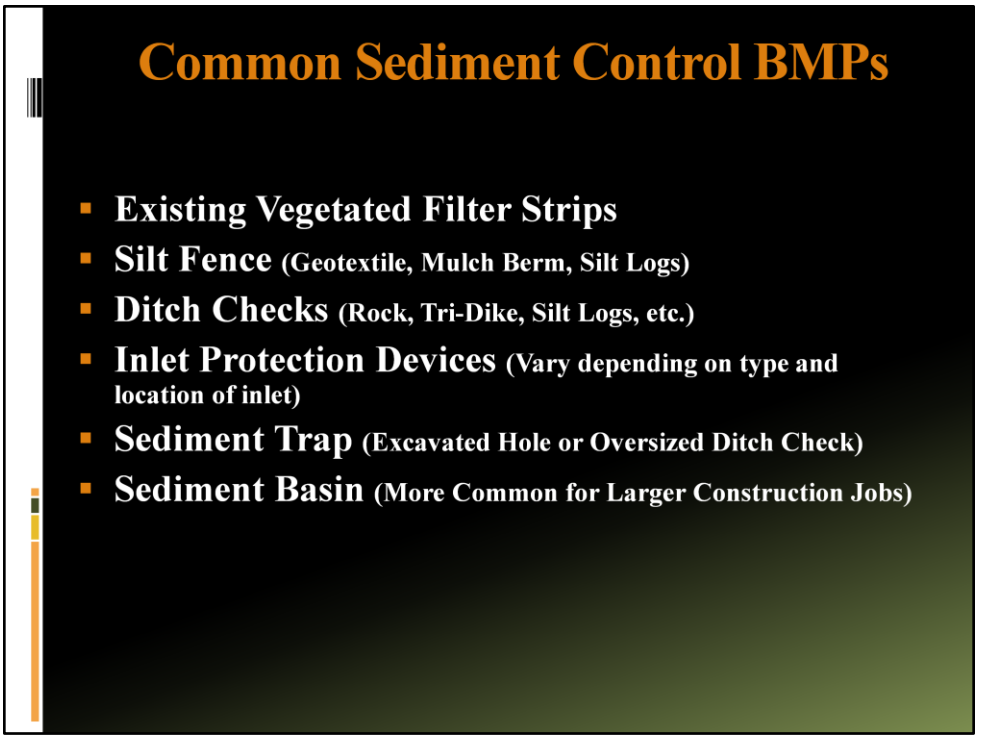
Bottom Right: Example of seed and mulch on a slope and a stabilized let down (diversion) ditch with erosion control blanket and ditch checks. This ditch protects against erosion on the steep slope!



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!

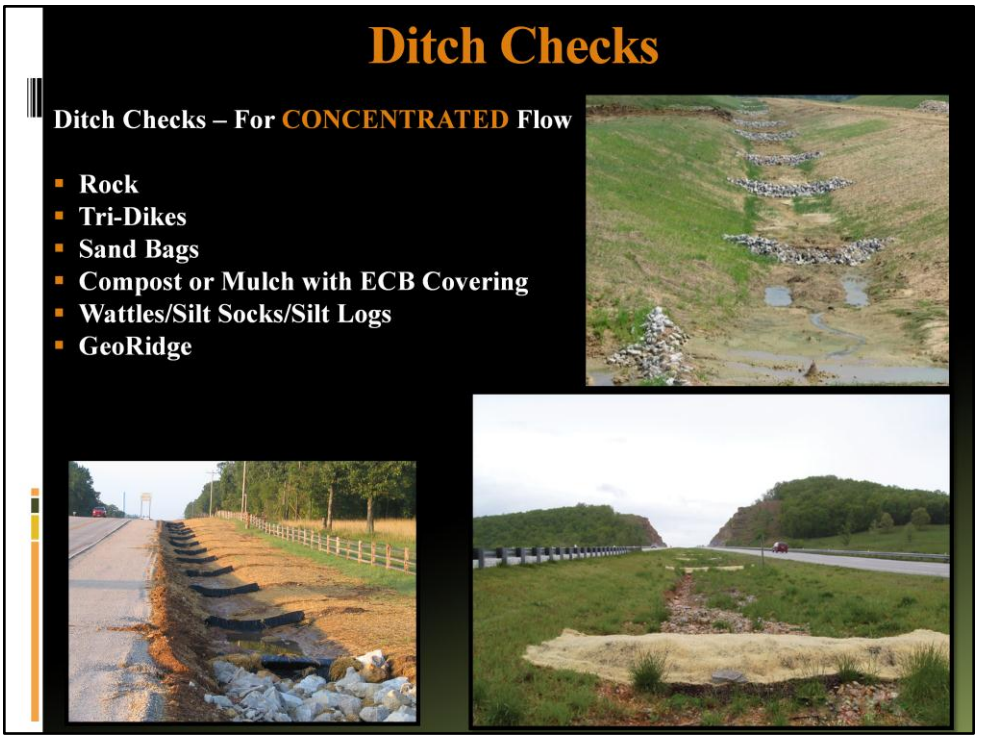


Example sediment control BMPs for you to consider. There are others out there as well.

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

The straw bales in the lower left photo are acting as additional support for the geotextile silt fence, which is the primary BMP. Straw bales should be a last resort and we would prefer to not use straw bales at all, unless for a mulch!

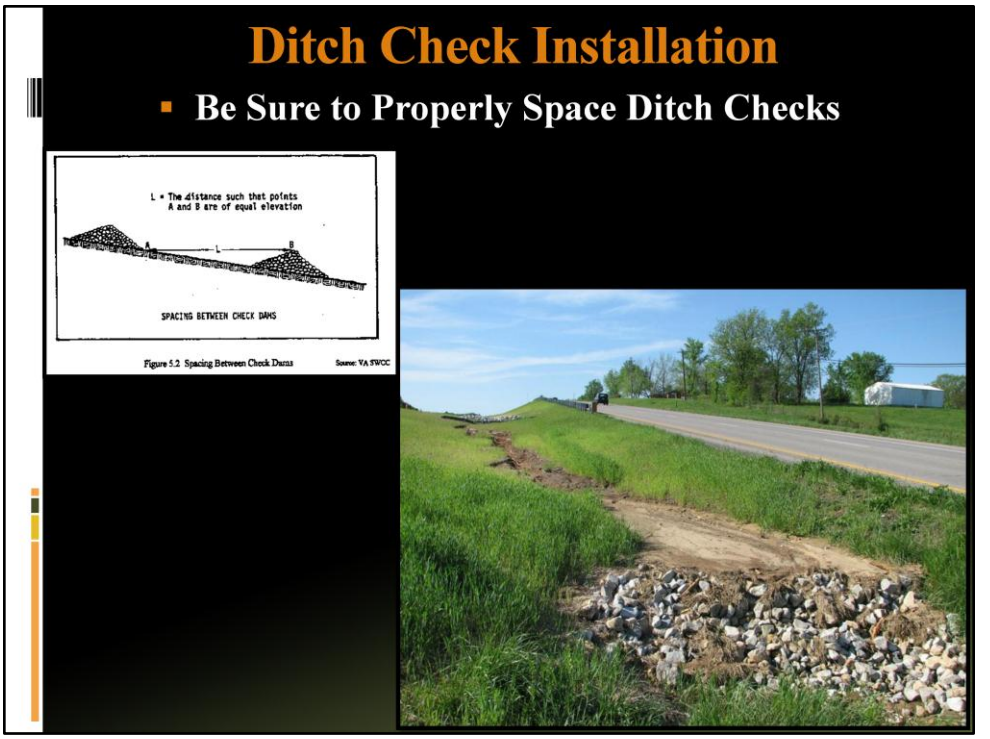
The lower right photo is illustrating the use of a chipped wood mulch berm for perimeter protection.



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.

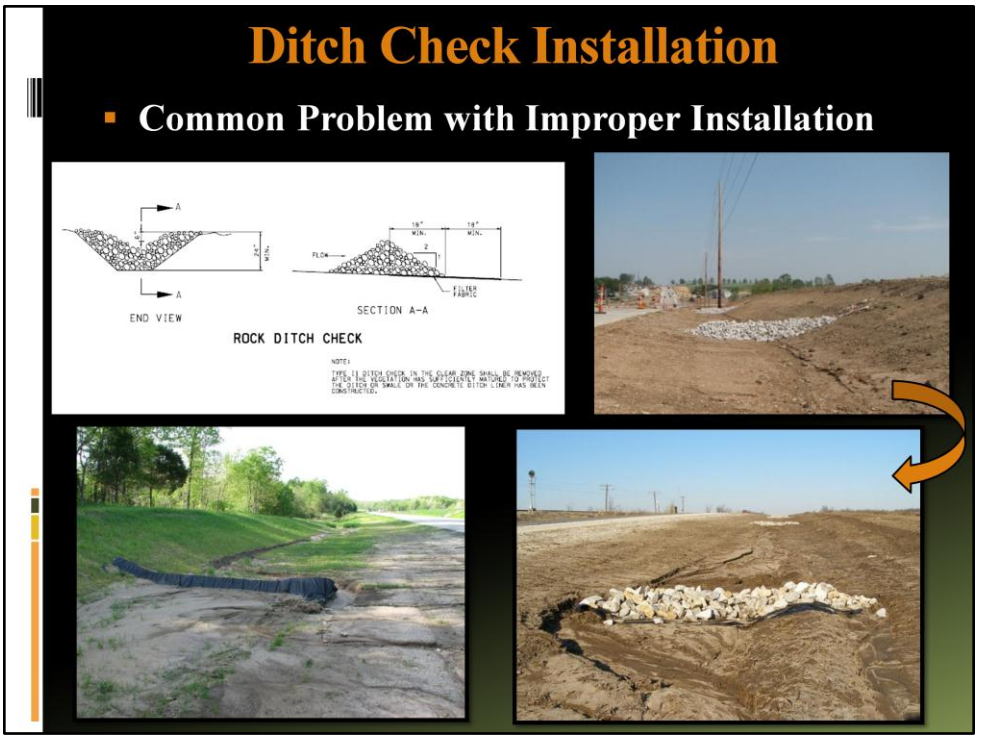
I always recommend rock as your very last check before water exits MoDOT property – it tends to withstand higher flows and filters well. Typically 6 – 9 inch rock works well and if you need it to filter out finer soil particles, like clay, you can cap the upgrade side of the check with a smaller stone, such as 1 inch clean.

Whatever you use, be sure to install them properly as demonstrated on the next slides!



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 annual 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.

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.

Inlet Protection

Curb Inlet Protection:

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

Drop or Pipe/Box Inlet Protection:

- Rock
- Tri-Dikes
- Sand Bags
- Various Filter 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.

Also, another illustration (top right) of straw bale failure. Use a different BMP if at all possible.

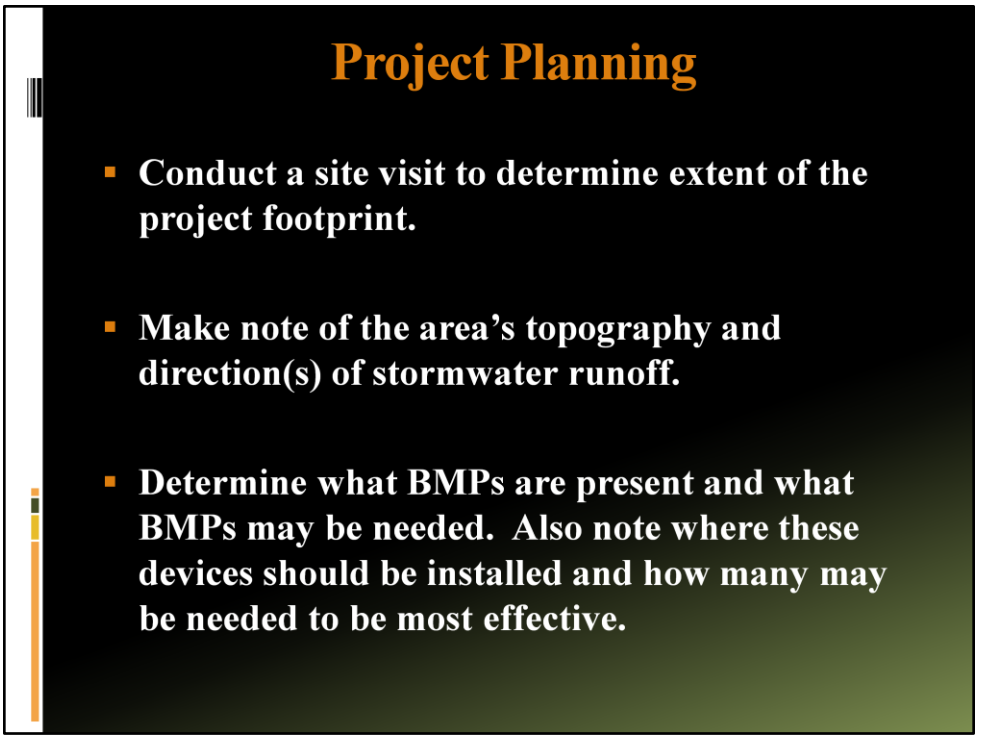
Proper erosion control is key. It will save you time, money and worry!

Sediment control can become a costly, time consuming maintenance nightmare. Try to re-stabilize areas with grass, rock, etc., quickly!

References for BMP Selection, Descriptions and Installation Guidance

- EPG 806: Pollution, Erosion & Sediment Control
- MoDOT SWPPP
  - Updated as needed
  - Found under EPG 806 (Printer friendly version!)

In order to be successful at erosion and sediment control, you have to plan ahead! This next section is about giving you the tools to be better prepared.

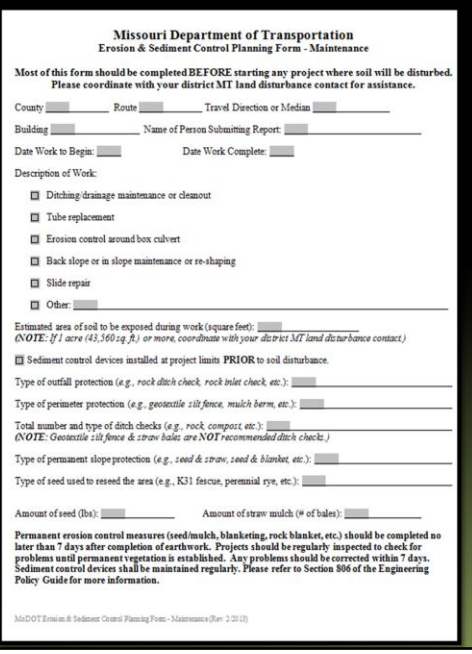


You have to be aware of how water is going to move on the site and where it will try to leave the site. Where it will try to escape, we need to have a barrier (BMP) in place to filter out the sediment to the best of our ability and release cleaner water offsite.

Be sure to look for tools Mother Nature has given you and utilize existing vegetation where possible. You may have to back it up with some other BMP, but the existing grasses and such will help!

Project Planning

- Fill out the NEWLY DEVELOPED **Erosion & Sediment Control Planning Form for Maintenance** prior to starting the project. (EPG 806)



Missouri Department of Transportation
Erosion & Sediment Control Planning Form - Maintenance

Most of this form should be completed BEFORE starting any project where soil will be disturbed. Please coordinate with your district MT land disturbance contact for assistance.

County _____ Route _____ Travel Direction or Median _____

Building _____ Name of Person Submitting Report: _____

Date Work to Begin: _____ Date Work Complete: _____

Description of Work:

- ☐ Ditching/drainage maintenance or cleanout
- ☐ Tube replacement
- ☐ Erosion control around box culvert
- ☐ Back slope or in slope maintenance or re-shaping
- ☐ Slide repair
- ☐ Other: _____

Estimated area of soil to be exposed during work (square feet): _____
(NOTE: If 1 acre (43,560 sq. ft.) or more, coordinate with your district MT land disturbance contact.)

☐ Sediment control devices installed at project limits **PRIOR** to soil disturbance.

Type of outfall protection (*e.g., rock ditch check, rock inlet check, etc.*): _____

Type of perimeter protection (*e.g., geotextile silt fence, mulch berm, etc.*): _____

Total number and type of ditch checks (*e.g., rock, compost, etc.*): _____
(NOTE: Geotextile silt fence & straw bales are NOT recommended ditch checks.)

Type of permanent slope protection (*e.g., seed & straw, seed & blanket, etc.*): _____

Type of seed used to reseed the area (e.g., K31 fescue, perennial rye, etc.): _____

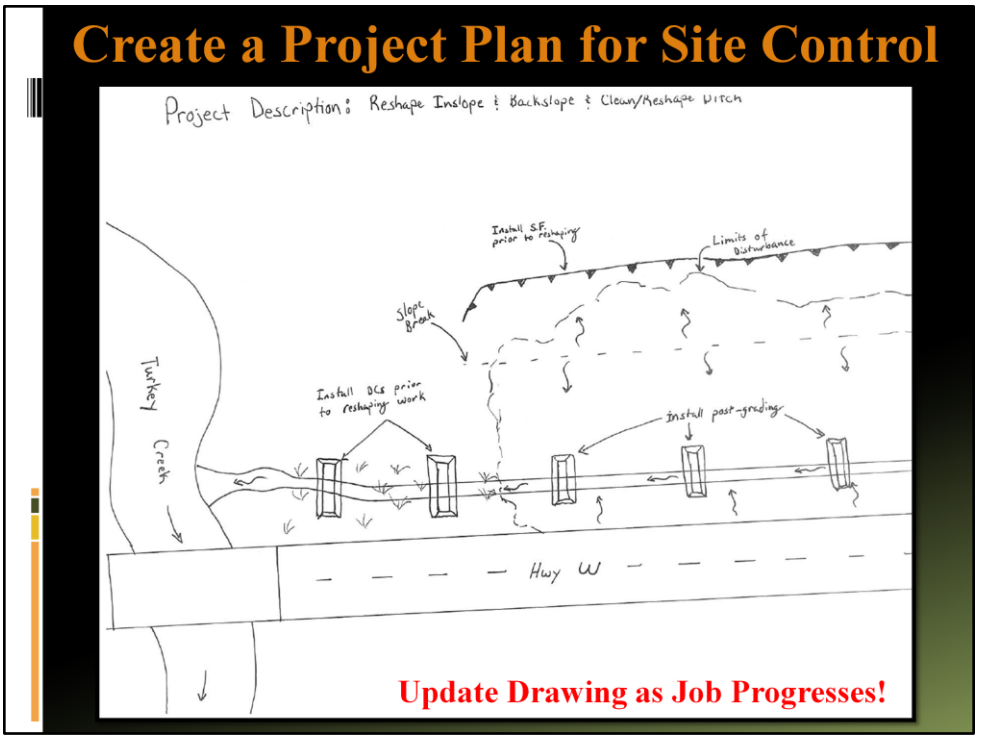
Amount of seed (lbs): _____ Amount of straw mulch (# of bales): _____

Permanent erosion control measures (seed/mulch, blanketing, rock blanket, etc.) should be completed no later than 7 days after completion of earthwork. Projects should be regularly inspected to check for problems until permanent vegetation is established. Any problems should be corrected within 7 days. Sediment control devices shall be maintained regularly. Please refer to Section 806 of the Engineering Policy Guide for more information.

MoDOT Erosion & Sediment Control Planning Form - Maintenance (Rev. 2 2013)

We developed this form as a tool to help you plan and keep track of your project. It is important that we utilize this form for consistency!

You should fill out much of this form before you turn dirt on the job.



You will need to create a site plan to go with the previous form (Erosion & Sediment Control Planning Form – MT).

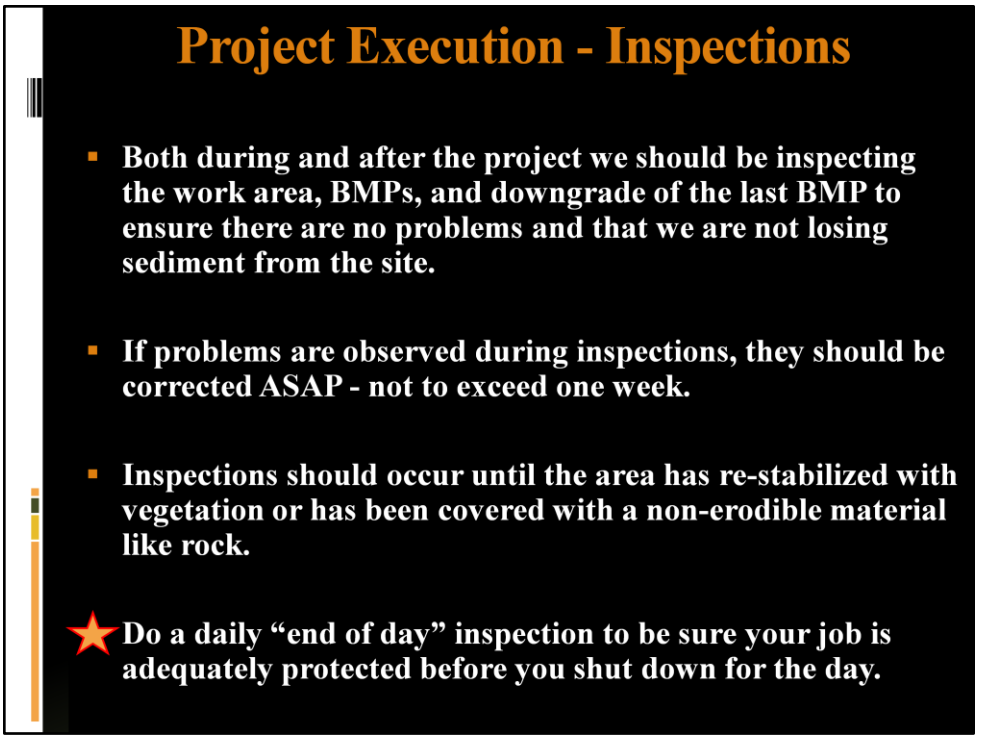
Draw this up before you begin the job and make changes as necessary as the job progresses.

Keep this with your planning form so all personnel working the job are aware of what is expected on the job.

INSTALL PERIMETER AND OUTFALL PROTECTION BMPs PRIOR TO TURNING DIRT.

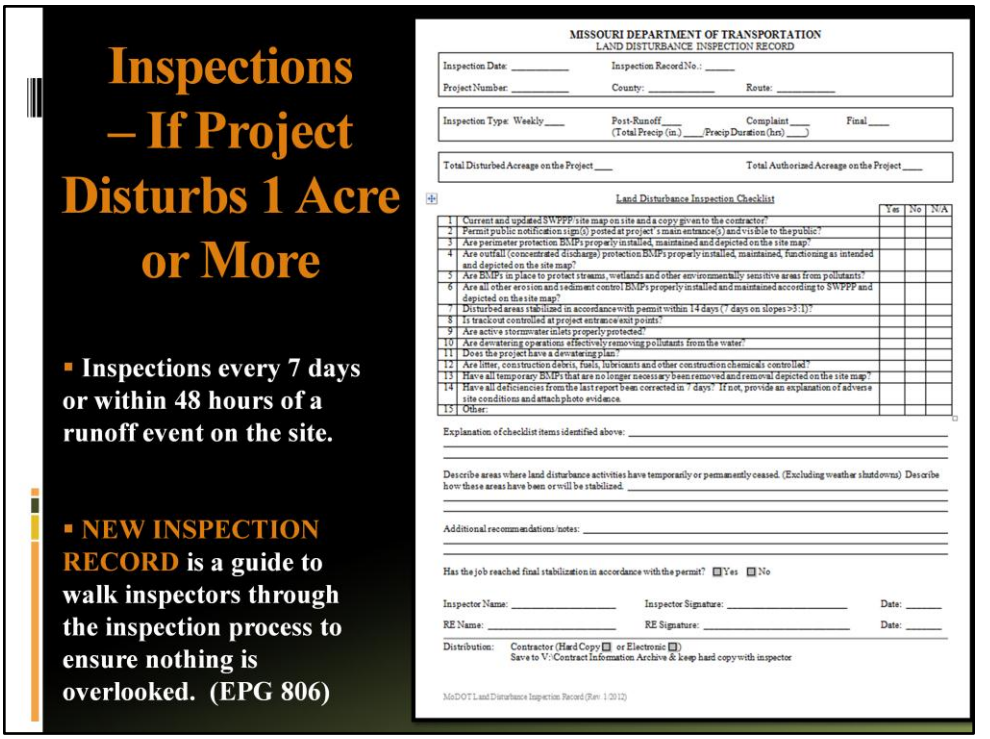
Also, leave yourself some room to work if you can. Put these devices far enough downgrade from your work area so you aren't having to work around them or damaging them. I always recommend leaving a little grass buffer between these devices and your work too, if possible.

Once you finish your work, you'll have to install BMPs in the area you were working in to control erosion and sediment. Be sure to space the checks properly if using ditch checks!



You've got to keep an eye on your job. If you start to notice erosion is occurring and/or sediment is moving on or off the site, you should react accordingly and make the proper adjustments to correct the situation.

Don't turn a blind eye to "small" problems, because they will grow with every rain event or snow melt. Correct the problem.



This inspection form is MoDOT's inspection form for projects that disturb an acre or more. It is a sort of "checklist to permit compliance".

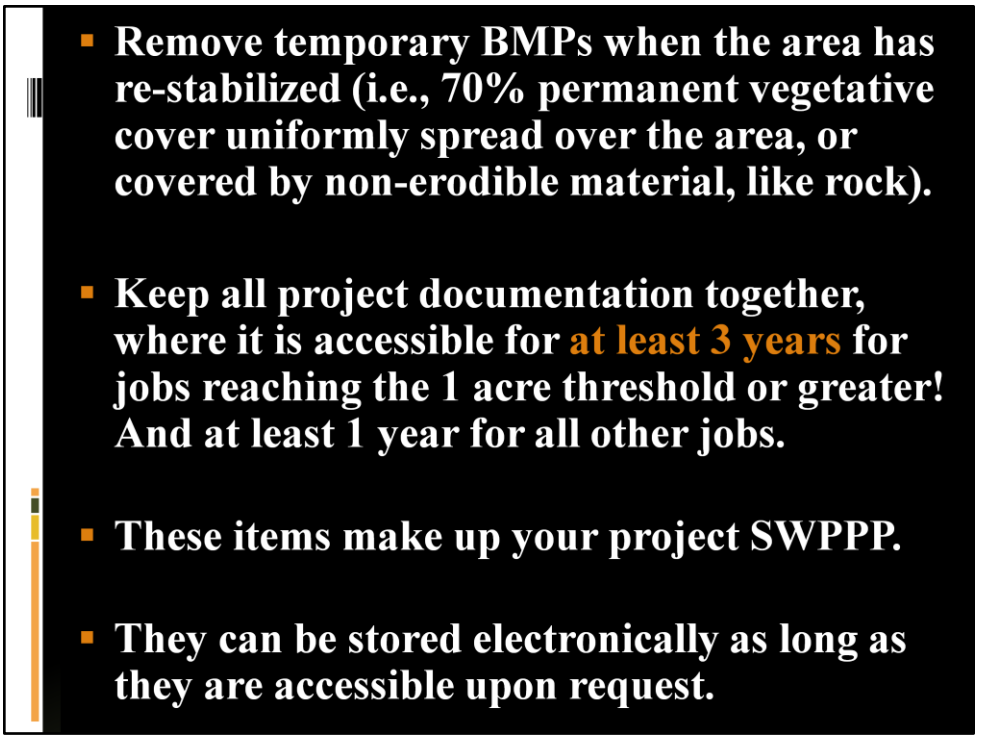
This form is used heavily by CM and MoDOT CM personnel are a great resource if you ever have a job disturbing an acre or more.

Any time you have a job disturbing an acre or more of land, contact your district MT erosion and sediment control contact for help with planning and permit compliance.

Keep sediment control BMPs cleaned out and in a proper working order. They must be functional to be ready to treat stormwater during the next storm event.

Clean out all sediment control devices when they are half full.

Remove BMPs when the area to be revegetated reaches 70% permanent vegetative cover uniformly spread over the area.



Don't remove your BMPs until you are comfortable that the area is no longer susceptible to erosion.

The following may not be a comprehensive list of MT projects that involve land disturbance, but it gives you an idea of what activities could result in sediment pollution.

Be very aware of sediment control in ditch work situations, because stormwater is concentrated and can be very erosive.

Ditch Maintenance & Shaping

- Be sure to place BMPs to protect pipes and/or cross drainages that can transport sediment from your job.
  (Also applies to other MT activities)

NOTE: Some ditches with minimal grades or flow that tend to pond water may not require ditch checks.

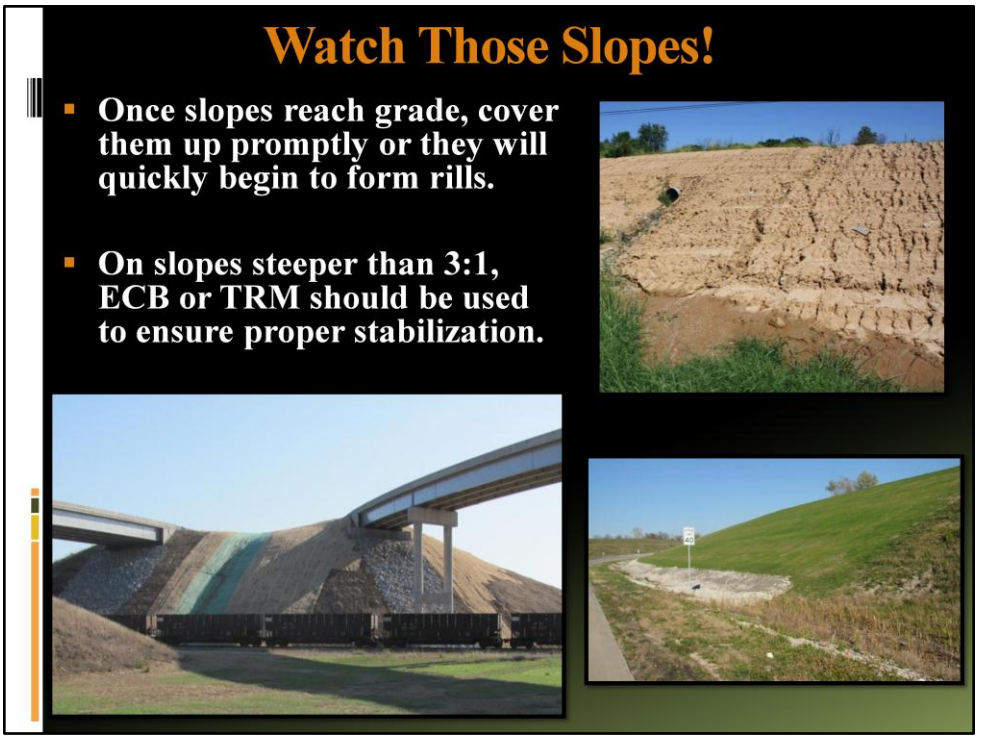
Remember, all surface water runoff leads eventually to larger and larger bodies of water. Have protection in place before starting work to retain sediment on MoDOT property.

These ditches have been lined with erosion control blanket (ECB), turf reinforcement mat (TRM) or, in the case of the top right, ScourStop, to ensure the vegetation is either temporarily or permanently reinforced so the ditch can stabilize.

Slopes, especially steeper slopes, are highly susceptible to erosion and the formation of rills and gullies.

Try to time your work to be completed in a timely manner and stabilize slopes ASAP upon completion of earth work. Don't let these areas stay disturbed and unprotected or we will regret it!

Slide repairs come in all shapes and sizes. As a rule of thumb, always plan to at a minimum to install outfall and perimeter protection prior to starting your work.

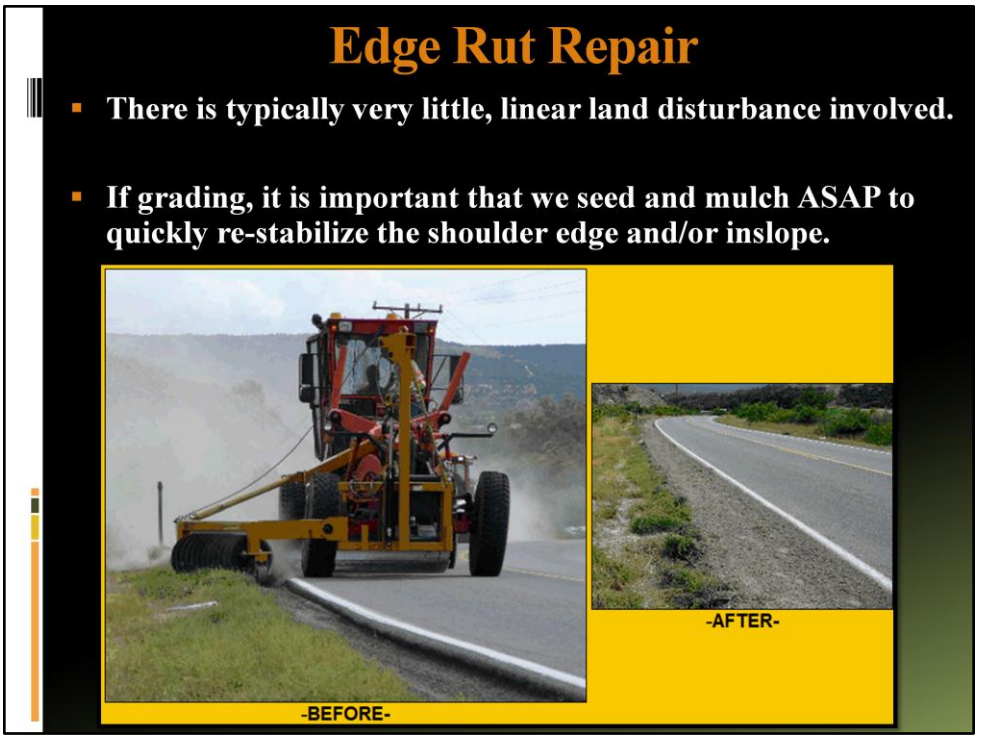


Stabilize slopes quickly or you'll be dealing with that sediment in your ditch or worse! TRUST ME, THIS I KNOW!

Tube Replacement

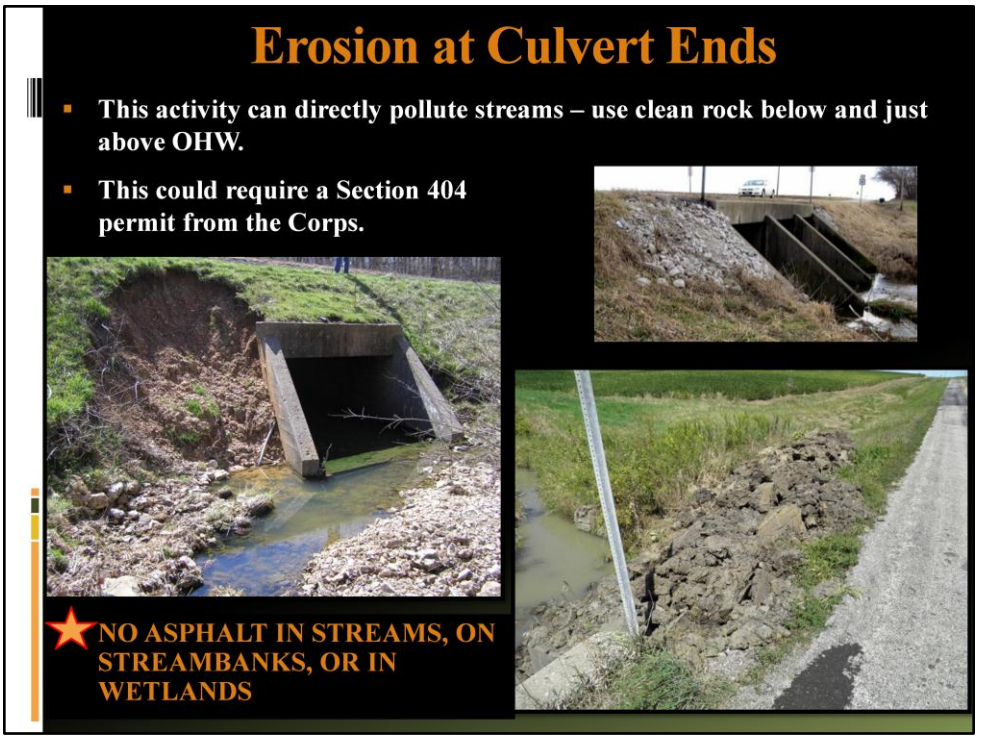
- Typically there is very little land disturbance involved.
- It's important that we seed and mulch or install ECB around the tube ends ASAP to quickly re-stabilize.

MT is very proficient at this task and these tube replacements happen fast. One way to quickly cover these areas up so we don't forget about them is to carry some seed, a hand seeder and some bales of straw (mulch) on the back of a truck and just have one or two folks stay behind to seed and mulch it down and then they can catch up at the next pipe and continue the cycle.



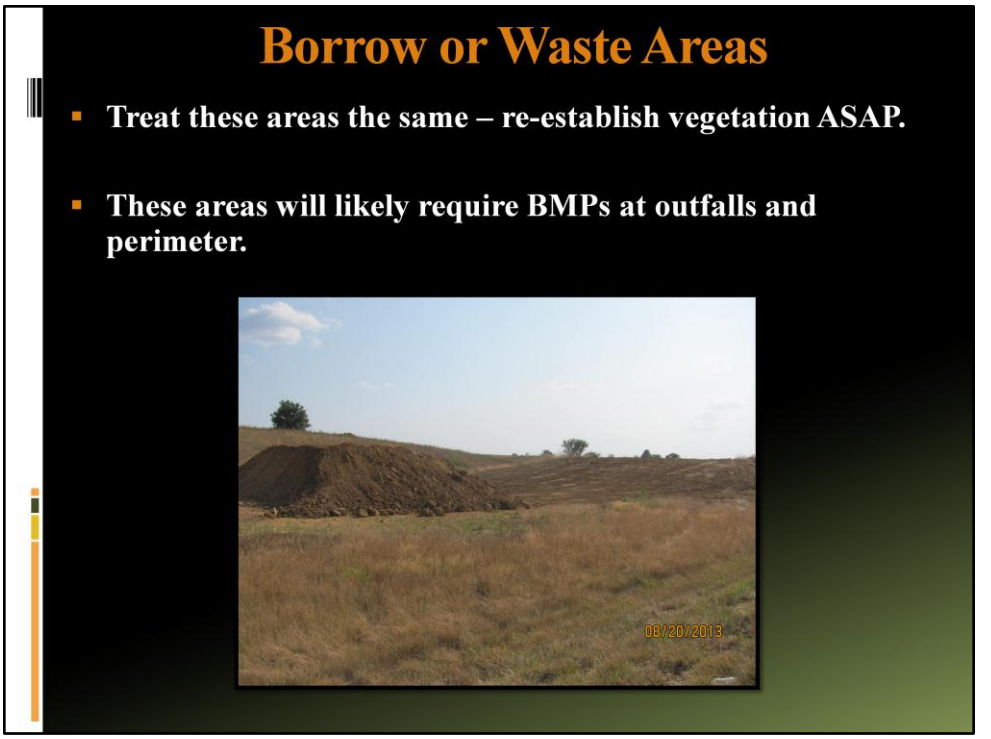
Edge rut repair can involve a number of various construction techniques. Some will have minimal disturbance, but other techniques may result in more extensive disturbance.

If there is minimal disturbance, you may need to do nothing more than possibly seeding and mulching the disturbed area. If the job results in more extensive disturbance, then you may have to think about installing ditch checks and/or perimeter protection.



Always be extra cautious when working around streams, ponds, lakes, wetlands, etc. People quickly take note when a stream or other body of water becomes turbid.

Most of the work around culvert ends will be covered by a Nationwide Section 404 permit, if a permit is required at all.



If you stockpile soil material and don't plan to use it for some time, it is best just to seed it down and establish vegetation on it so it's not constantly a source of potential sediment pollution.

ALWAYS SET UP YOUR PERIMETER AND OUTFALL PROTECTION BEFORE YOU START THE DIRT WORK!

If you are driving out onto pavement from these sites, you may have to establish a stabilized construction entrance (basically a rock lined drive for at least 50 feet) to ensure we are not tracking out sediment onto our roadways. This is an easy source of pollution and can be a hazard to the driving public.

Erosion from MT Lot Outfalls

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Stormwater Control on Maintenance Lots

Stormwater control is an issue that affects practically every single maintenance lot in Missouri. Stormwater can carry materials from our lots off our property. Erosion also becomes a concern when storm water leaves MoDOT property. Steps must be taken to slow erosion from our facilities to reduce the impact of storm water runoff:

- Rock lined ditches and/or ditch checks will slow water down and effectively drop the sediment load.
- Earthen berms constructed at select locations can help direct storm water to specific points where it can be controlled by ditch checks.
- Gabion baskets can be used to line ditches, line the edges of property, or be placed where the outfall leaves the property.

Remember to keep your storm water controls cleaned out when sediment builds up. Cleaning them helps the control system function as it should; keeping the materials on our property and not our neighbor's.

Our MT facilities receive a lot of environmental scrutiny both internally and from the regulators. It is important that we do our part to make sure we are comfortable that we are adequately controlling any potential pollutants from these sites.

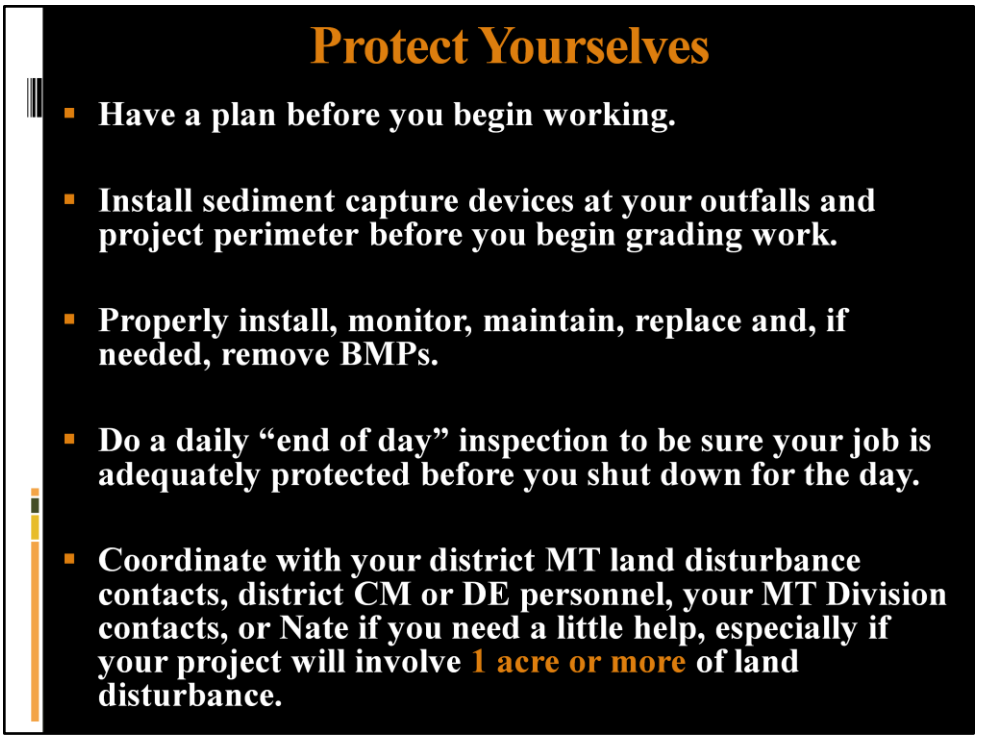
I stated this in the MT training in Fulton, and I mean it, MT personnel are one of the best, if not the best source of local information at MoDOT. I appreciate the way you all get in tuned with your coverage areas.

That being said, we really need your help with identifying when we have possible contaminants on our right of way. Keep an eye out for potential pollution concerns and inform district leadership or the MoDOT Environmental and Historic Preservation Section so the potential liability can be addressed. Thank you!

Other Things to Keep an Eye Out for that You May Come Across on ROW

If you see discharges that are causing, or are likely to cause pollution:

- Identify the source.
- Report location and pollutant to the MODOT Environmental & Historic Preservation Section at **(573) 526-4778.**
- Report the location to the County Health Department if raw sewage or similar wastewater is identified dumping onto our right of way.



I want you all to be prepared and feel comfortable with your plan for controlling erosion and sediment on your job sites.

I also want you to know that I'm not laying this info on you and then throwing you to the wolves. We've set up contacts to help you. Don't be afraid to seek some input from others who maybe have a bit more experience with this.

How Much Area is an Acre

- 1 Acre = 43,560 square feet
- A football field, from goal line to goal line (excluding end zones) equals 1.1 acres.

- If you are disturbing 15 feet of road slope on only one side of the road, you will reach an acre when you travel approximately 2,900 feet.
- If you are disturbing 15 feet of road slope on both sides of the road, you will reach an acre at approximately 1,450 feet.

Try to limit your disturbance where possible to stay under that 1 acre threshold. A lot more requirements and reporting kick in at that point.

Coordinate with your district or CO contacts!!!

These fine district folks are here to help you through this!

These fine CO folks are also here to help you through this!

Nothing worse than cattle that can't follow direction!