



Office of
**ENVIRONMENTAL
SERVICES**
INDOT




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Back to Basics: Erosion and
Sediment Control

FHWA – INDOT Quality Assurance
Review (QAR) Results

Office of
**ENVIRONMENTAL
SERVICES**
INDOT



Ecology and Waterway Permitting Unit



Current Role of OES' Landscape/Waterway Permits Unit

- Reviews INDOT projects impacting aquatic resources to determine appropriate type/level of waterway permitting needed.
- Perform Woody Re-vegetation Reviews
- Develop/Review/Process
 - Landscape Design Plans
 - Waterway Permits
 - Mitigation required with waterway permits applications
- Performs site visits to ensure proper enforcement of permits



Overview

- Describe Results of FHWA QAR Construction Site Investigations
 - Interviews
 - Site Inspections



Interview Findings

- Permits Are Not Usually Posted on the Work Site
 - Rule 5 (**327 IAC 15-5-7**) Requires Posting of the following
 - Rule 5 NOI Letter
 - Project Site Owner or Local Contact Info
 - Location of the Construction Plan
 - Jobsite Project Board is an Ideal Location



Interview Findings

- Knowledge of the Requirements of the Permit Conditions Ranged from Slight to Thorough
 - About 50% of those visited were aware of many of the Rule 5 conditions



Interview Findings

- Usually Projects had Erosion and Sediment Control Plans that Varied in Quality of Design
 - Some oversized/some underdesigned
 - PE/PSs suggestions
 - Use of undistributed quantities more
 - Include more standard items in the plans
 - Otherwise need a change order to include them



Interview Findings

- Most Projects had an Erosion and Sediment Control Supervisor Assigned by the Contractor
 - PE/PSs generally weren't aware whether this designee was "trained"
 - PE/PSs thought a majority of Contractors performing inspections
 - Only a few of the PE/PSs received inspection reports from Contractor



Interview Findings

- Locating, Constructing and Maintaining Proper Erosion and Sediment Control Measures Nearly Always Needed Improvement
 - Lack of knowledge of what permits or addendums were needed
 - Many didn't know if/when IDEM needed an update



Interview Findings

- Almost 100% indicated a lack of existing training and a desire for more training
 - Designer
 - the PE/PS
 - the contractor
 - the erosion and sediment control supervisor
 - INDOT project inspectors



Interview Findings

- Lack of sequencing plan, and understanding of why it is needed and what it is supposed to do. If it existed, it was at times poorly designed



Interview Findings

- Lack of understanding how erosion and sediment control features function



Interview Findings

- Lack of appropriate design of the erosion and sediment control features



Interview Findings

- Lack of timely inspections and maintenance of the erosion and sediment control features to ensure proper performance



Interview Findings

- Lack of timely inspections and maintenance of the erosion and sediment control features to ensure proper performance



Interview Findings

- Lack of knowledge of how to construct, locate and maintain the features



Interview Findings

- Perceived lack of a means to force the contractor to make changes when needed



Interview Findings

- Lack of control of utilities



Interview Findings

- The staging area for borrow/waste as well as the concrete washout area were located in conformance with the specifications



Interview Findings

- Expired permits
 - Before project was let
 - During construction



Interview Findings

- Erosion and Sediment Control Plan Lacks Pay Items for Necessary Features



Interview Findings

- There are often insufficient quantities of erosion and sediment control features in the plan



Interview Findings

- The Pre-construction Conference needs someone from either OES or district environmental to describe the permits, conditions, sensitive areas and mitigation.



Interview Findings

- The letting packages are now provided mostly online.



Interview Findings

- A good field manual for erosion and sediment control measures would be very helpful



Interview Findings

- NEPA Document Not at the Project Office. Neither were the Commitments Forms.
- NOT RULE 5



Site Inspection Findings

- Failure to fully meet the permit conditions in the field was a common occurrence – Especially Rule 5



Overview

- Erosion Vs. Sedimentation
- Example Projects
 - What are some of the problems INDOT and FHWA encountered on a majority of the sites?
 - Good vs. Bad Practices
 - Erosion and Sediment Control Sequencing



Construction Activities Expose Soil

- Grading
- Excavation
- Structure Replacements
- Pavement Replacement
- New Fill



Construction Activity Causes Sedimentation

- Frequency: Common
 - Sediment is the # 1 pollutant in IN waterways (by volume)
 - Construction sites erode at rates 100 x that of Ag land
- Activity
 - Erosion and subsequent sedimentation is allowed to discharge into streams and wetlands
- Conclusions
 - Rule 5 violation
 - Potential §404/§401 violation if it changes the bottom elev. of the stream



Examples of Sedimentation







What Can INDOT Do?

- Follow IDEM Rule 5 Notice of Intent (NOI)
 - INDOT **Intends** to
 - Reduce Erosion
 - Prevent Sedimentation
 - Install Erosion and Sediment Control Measures
 - Maintain Erosion and Sediment Control Measures
 - Permanently Stabilize Soils Post-construction



Erosion Control VS Sediment Control

- Reducing Erosion = Reducing Sedimentation
 - Erosion of bare, exposed soil
 - Mulch Cover Reduces Erosion by 90%!
 - Vegetation Reduces Erosion by 97%!!!
- Increase in Erosion Control Measures on site = Decreased need for Sediment Control Measures



Erosion Control Measures

- Minimize Vegetation Clearing
 - Retain Existing Vegetation
- Stabilize Exposed Areas ASAP
 - Temporary
 - Seeding within 15 days of Exposure
 - Anchored Mulches
 - Soil Treatments
 - Polyachrylamide (PAM)
 - Permanent
 - Final Seeding/Planting
 - As Designed Rip Rap Placement
 - Erosion Control Blankets and Matting



Erosion Control Measures (cont.)

- Others
 - Flumes
 - Temporary Slope Drains
 - Check Dams
 - Temporary Diversion Dikes
 - Diversion Channel
 - Dewatering
 - Temporary Pump Around
 - Cofferdams
 - Stable Diversion Channel



Sediment Control Measures

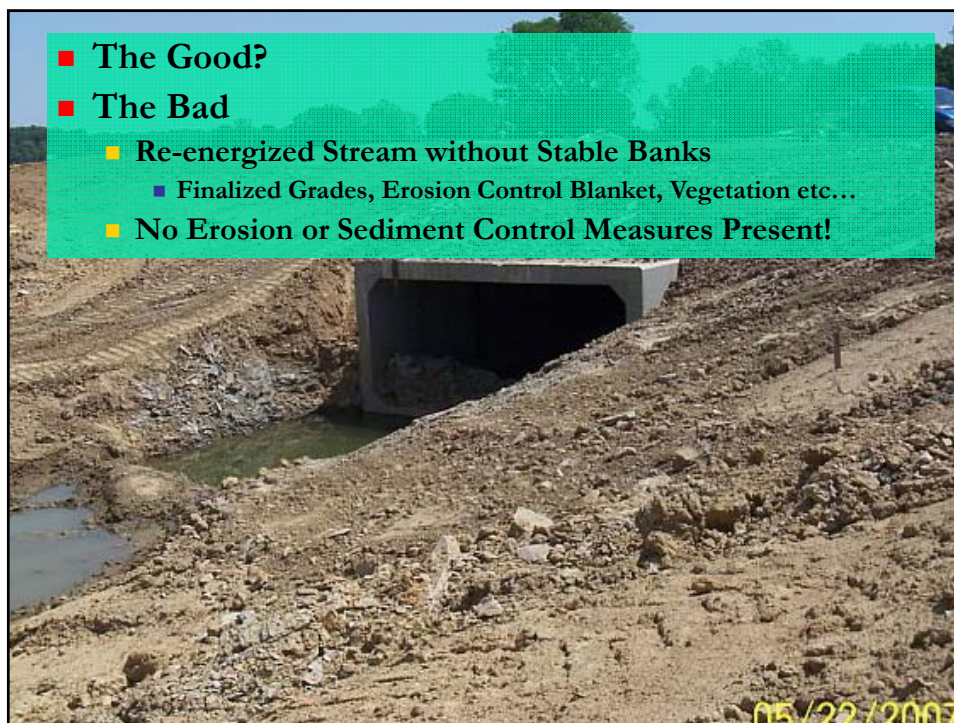
- Silt Fence
- Straw Bale Barrier
- Sediment Traps
- Turbidity Curtain
- Stable Construction Entrance
- De-watering Structures
 - Filter Bag
 - Straw Bale/Silt Fence Pit



Examples

- Example Projects
 - Erosion and Sediment Control Measure Recommendations
 - Sequencing Recommendations







- **Dry Retention Basin**
 - Stable Channel Flow Path
 - Must be Vegetated PRIOR to Energizing Stormwater Outlet



- **Dry Retention Basin Outlet**
 - Straw Bale Barriers won't last once channel is energized
 - Channel must be Vegetated PRIOR to Energizing Stormwater Outlet



- **Dry Retention Basin Outlet**
 - Outlets into this Stream Which is filling in with Sediment



- **Dry Retention Basin Outlet and Stream Meet**
 - Island of Fill
 - Stream is Sediment Laden
 - No channel
 - Worst Case Scenario is Dry Retention Basin is Energized and then all of this sediment goes downstream!!!

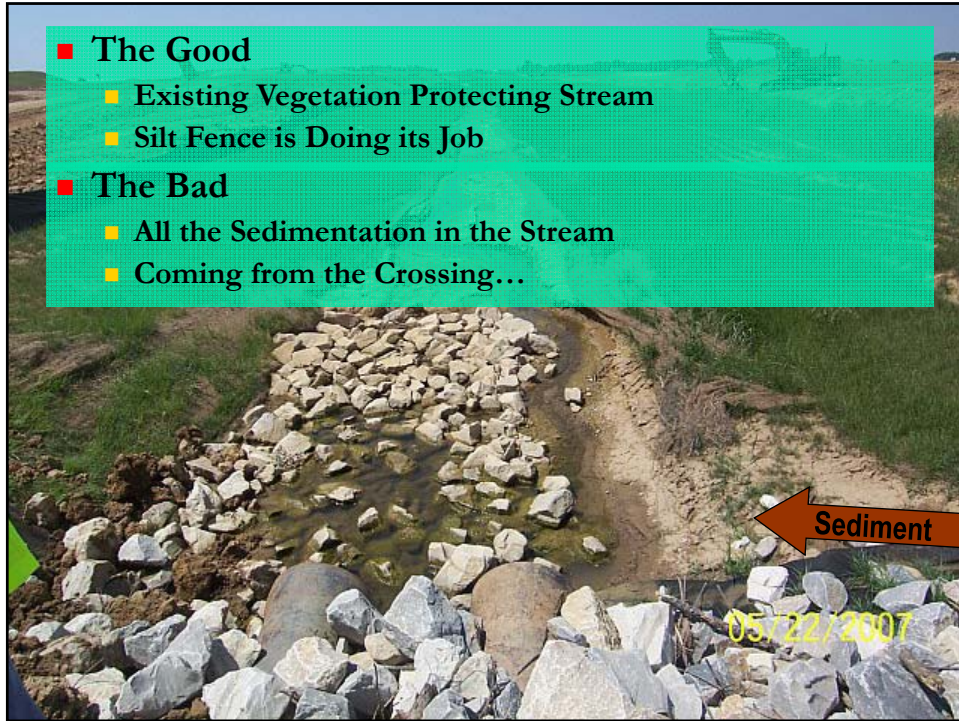


- **The Good?**
- **The Bad**
 - **Lots of Exposed Soil = Lots of Erosion Potential!!!**
 - Temporary Seeding, PAM Tackifier
 - **No Erosion or Sediment Control Measures Present!**



- **Erosion will Occur on the Exposed Soils**
- **Sediment will be Transported Downgrade**
 - **In this case it will follow this path to the creek crossing**
 - Next Slide





- **The Good**
 - Temporary Seeding is Providing Erosion Control
- **The Bad?**
 - Seeding the Rest of the Slopes?



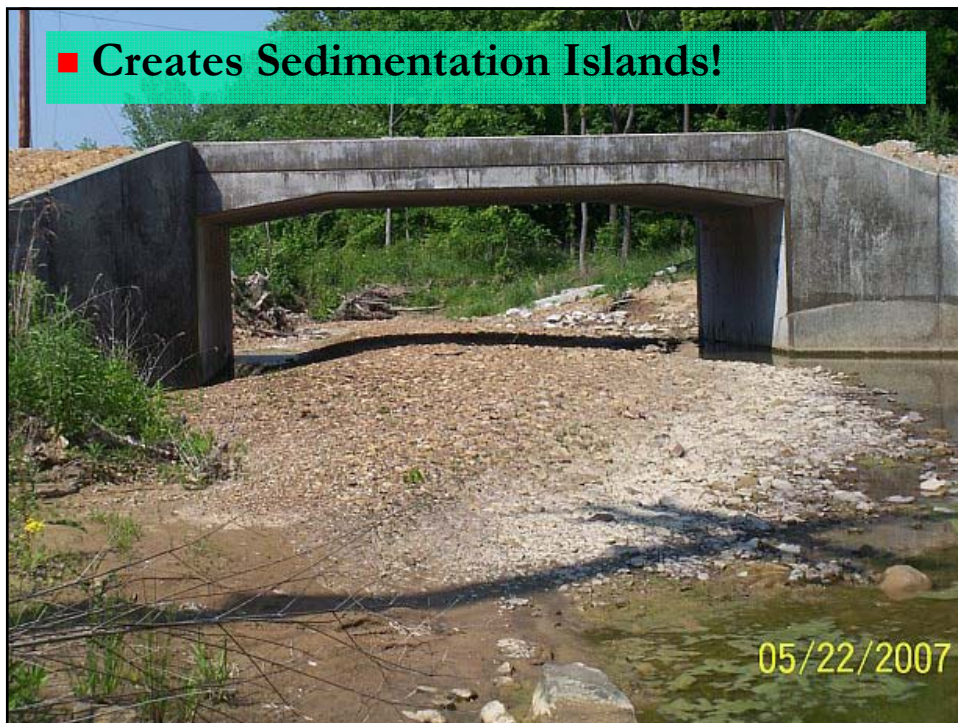
- **The Good**
 - Good Looking Silt Fence!
- **The Bad**
 - Good Looking Silt Fence!
 - Looks like it was installed after sedimentation into stream
 - Only on one side of stream
 - Temporary Seeding?



■ Lack of Erosion Control Measures...



■ Creates Sedimentation Islands!



Rock Check Dams for Erosion Control (Slow the Flow)

- Lowest in Center
- Filter Medium
- Geotextile Fabric
- Toe to Crest

Rock Check Dam Worksheet

S_0 = Spillway Depth
Minimum dimensions see the "Specifications" section of this measure.

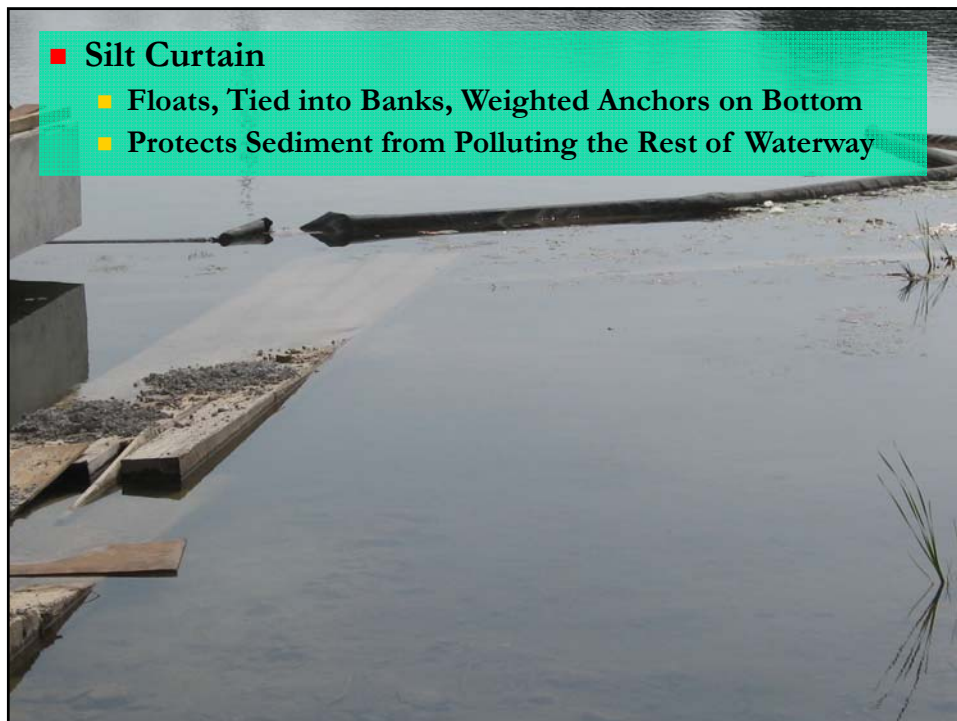
- **The Good**
 - Attempt at Reducing Erosion with Check Dams
- **The Bad**
 - Too Many Check Dams, Improper Construction, Waste of \$\$\$
 - Temporary Seeding and/or Mulch would work better!

- **Water Flows Around Dam at this Elevation**
 - Shallow Dam
 - Stone above elevation waste of \$\$\$

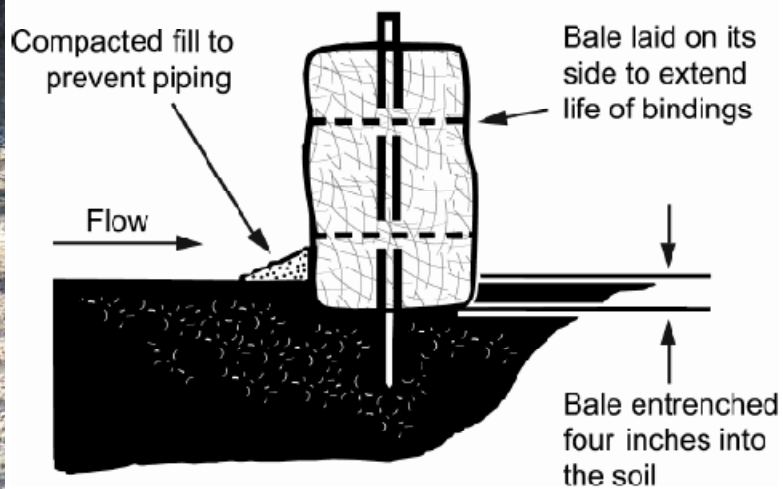
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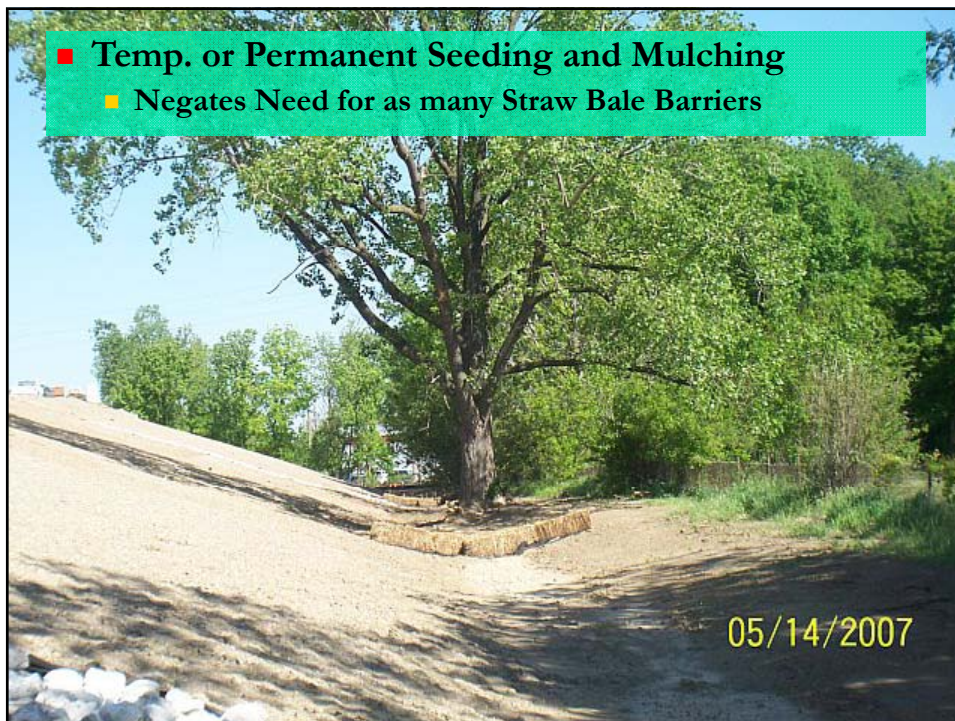




- **Straw Bale Barrier**
 - Sediment Control Measure
 - Recommend Straw Bales Lay on Their Side and Entrenched 4"



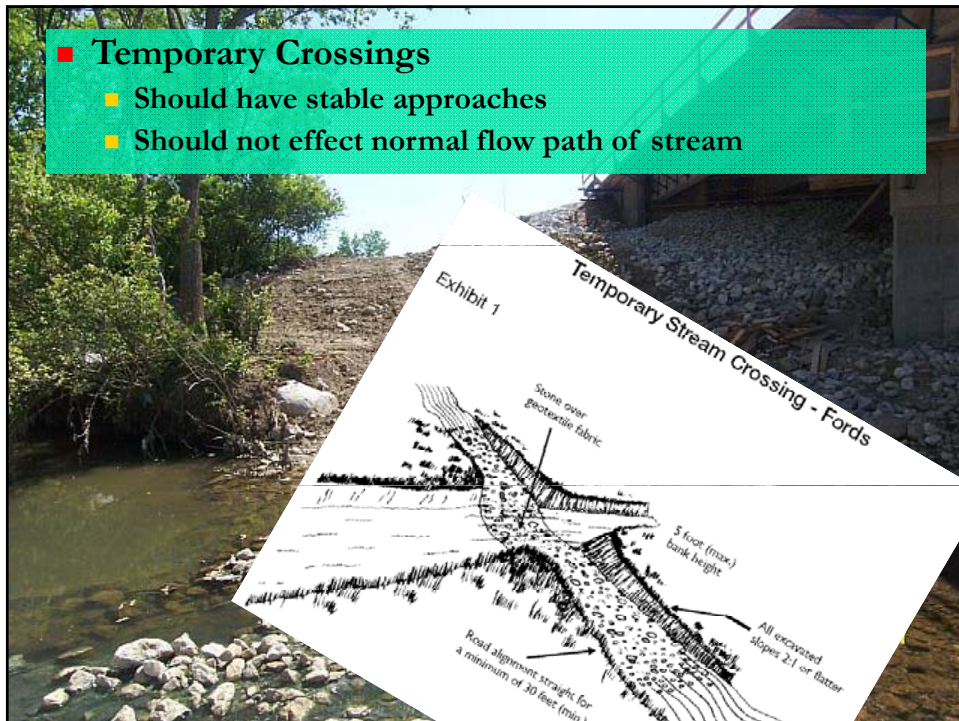
- **Temp. or Permanent Seeding and Mulching**
 - Negates Need for as many Straw Bale Barriers



■ **Keep Construction Debris out of the Channel!**

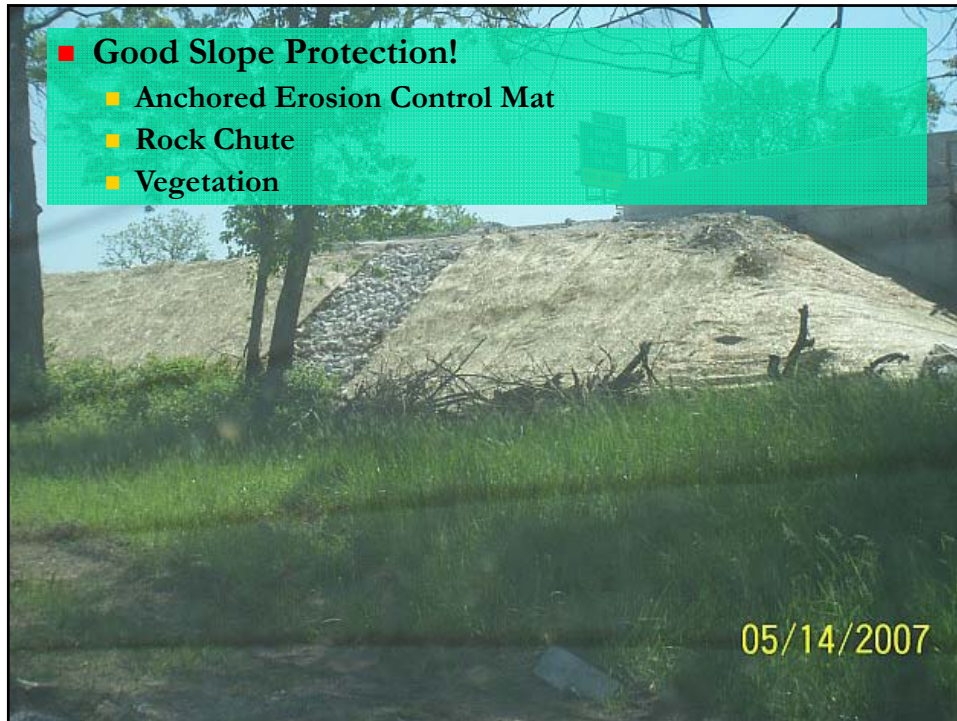


- **Temporary Crossings**
 - Should have stable approaches
 - Should not effect normal flow path of stream

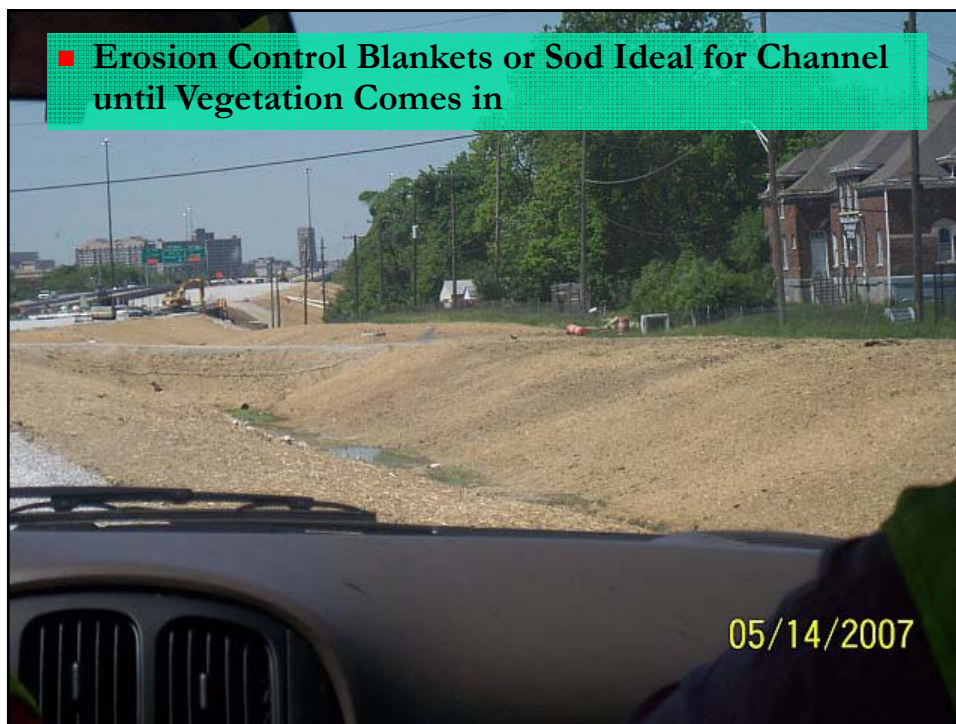








- Erosion Control Blankets or Sod Ideal for Channel until Vegetation Comes in



Dewatering

- INDOT Bridge, Structure Replacements
 - Temporary Pump Around
 - Diversion Channel
 - Dam and Pipe
 - Cofferdams







Sequencing

- Install Perimeter Sediment Control Features First!
 - Protect Areas Where Water Leaves ROW!!!
 - Construction Site Low Spots
 - Usually a Wetland and/or Stream
- Avoid Clearing Herbaceous Vegetation until Necessary
- Temporary Seed after 15 days of exposure!!!
- Install Temporary Diversion Dikes
 - Directs sediment-laden water where YOU want it.
- Inspect Erosion and Sediment Control Measures **Weekly!**

