cttp
Center for Training
Transportation Professionals

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

Erosion & Sediment Control for Highway Construction

1

Welcome!

- Introductions
- Facilities
- No tobacco products
- Cell Phones
  - Silent
  - Not allowed during exam

UNIVERSITY OF ARKANSAS

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NPDES Class

- Course Notebook & Spiral
- 1-day – Classroom Instruction
- ½ - day – Review and written exam
  - 60 Questions
  - Closed book
  - 2 – hour time limit
  - 70% minimum score
- Results in ~ 1 week
  - www.cttp.org
  - Certificate, Pocket Card
  - 5-yr Certification

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Which Is Better?

Simple goal of stormwater management: Protect water by reducing pollutants in stormwater discharges

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Course Outline

- Background & Basic Principles
- Laws, Regulations, Responsibilities
- Stormwater Pollution Prevention Plan (SWPPP)
- Erosion and Sediment Control Measures
  - Temporary Controls
  - Permanent Controls
- Designs
- Inspections
- Reading Erosion Control Plans

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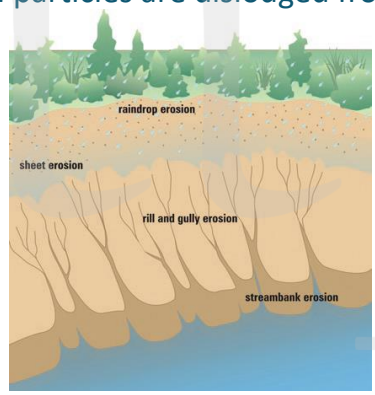
Erosion

- The process by which the land surface is worn away by the action of water or wind.
  - Individual soil particles are dislodged from the natural location



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Types of Erosion

Raindrop Erosion (impact)

Sheet Erosion (movement of loosened particles)

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Types of Erosion (cont.)

Rill Erosion (small, defined flow channels)

Gully Erosion (concentrated flow)

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Types of Erosion (cont.)

Wind Erosion (weather dependent)

Streambank Erosion (naturally occurring)

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Sedimentation

- The movement and settling out of soil particles that have been in suspension

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Where Does the Dirt Go?

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Basic Truth

- Water flows downhill
- Erosion increases with:
  - Higher flow volume
  - Higher velocity
    - Steeper slopes
- Sedimentation happens when water slows down

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We Can't Predict Storms!

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Construction Creates Erosion/Sediment

- Construction sites are the most significant source of sediment in stormwater runoff.
- Approximately 2.4 billion cubic yards of lakes and reservoirs are filled each year with sediment. *(Forrest, 1990)*

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Plan Ahead. . .

- Anticipate potential problems before they happen
- Protect water bodies
- Prevent Erosion
- Control Sediment

It is easier to

PREVENT EROSION

than to

CONTROL SEDIMENT!!

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Laws
Regulations
Responsibilities

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Clean Water Act (1972)

- Original legislation to protect health of U.S. waters
- National Pollutant Discharge Elimination System (NPDES) Stormwater Program
  - Administered by the EPA
    - Environmental Protection Agency
  - Delegated to the State of Arkansas (ADEQ)
    - Arkansas Dept. of Environmental Quality
    - Issue Stormwater permits

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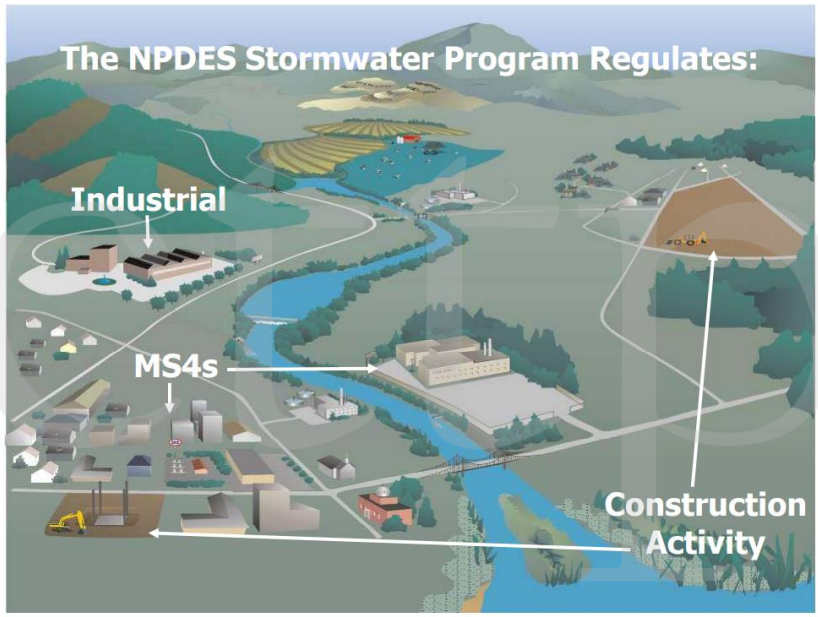

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Authorities

- Arkansas Department of Environmental Quality (ADEQ)
- Environmental Protection Agency (EPA)
- U.S. Army Corps of Engineers (USACE)
- U.S. Fish & Wildlife
- Arkansas Game & Fish Commission (AGFC)

ADEQ ARKANSAS Department of Environmental Quality

US Army Corps of Engineers

U.S. FISH & WILDLIFE SERVICE

Arkansas Game & Fish Commission

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Arkansas Law

- Arkansas Law (8-2-217)
  - "It shall be unlawful for a person to:
    - Place or cause to be placed any . . . industrial waste or other wastes in a location where it is likely to cause pollution of any waters of this state"
- Arkansas Law (8-4-103)
  - "It shall be unlawful for a person to:
    - Purposely, knowingly, or recklessly cause pollution of the water . . . In a manner not otherwise permitted by law"
    - Purposely or knowingly make any false statement, representation, or certification in any document required to be maintained"

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NPDES Permits

- Administered by ADEQ, subject to the EPA
  - The state's primary way to implement pollutant limits and water quality standards
- NPDES Construction General Permit (CGP)
  - ARR150000
  - Revised Nov. 1, 2016 (5-year permit)
- Required for all activities disturbing 1 acre or more
  - Clearing, grubbing, grading, excavation, demolition, and construction of haul roads

**Permit not required for overlays or for routine maintenance activities on existing roads where the line and grade of the road is not being altered.*

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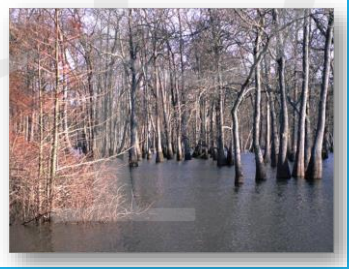
NPDES Requirements

- Sites are classified as small or large
  - Small = less than 5 acres
  - Large = 5 acres or more
- Requirements essentially same for all sites
  - Only paperwork differs
    - Fees
  - ARDOT policy: treat all as large site



Primary goal is to limit sediment and pollutants that may enter the Waters of the United States

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Waters of the State

- All accumulations of water contained within, flow through, or border upon this state or any portion of the state, including:
  - Lakes, rivers, streams, creeks, natural ponds
  - Wetlands, prairie potholes, wet meadows
  - Intermittent streams, drainage systems
  - Wells, springs, irrigation systems
- Includes:
  - Public or Private
  - Surface or Underground
  - Natural or Artificial

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Waters of the State

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Waters of the State

- Waters of the State **DO NOT** include:
  - Sediment basins
  - Sewage lagoons, water treatment systems
  - Farm reservoirs

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Work in a Waterbody

- Work in (or in the immediate vicinity of) a Waterbody
  - Bridge or culvert construction, channel alterations, debris removal, maintenance activities
- Section 404 of the Clean Water Act ***USACE***
  - Waters of the United States
- Section 401 Water Quality Certification ***ADEQ***
  - Must be issued before a 404 is valid
- Short Term Activity Authorization (STAA) ***ADEQ***
  - Likely to require turbidity testing
  - Valid for 6 months from date of initial work in stream
  - May renew

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Additional Permits

- If work is within jurisdiction of another permitting body, additional permits may be necessary
- MS4 – Municipal Separate Storm Sewer System
  - Urbanized area
  - A system of storm drains, ditches, etc..
  - Used to collect and convey stormwater
  - Discharge into Waters of U.S.
  - In addition to ADEQ

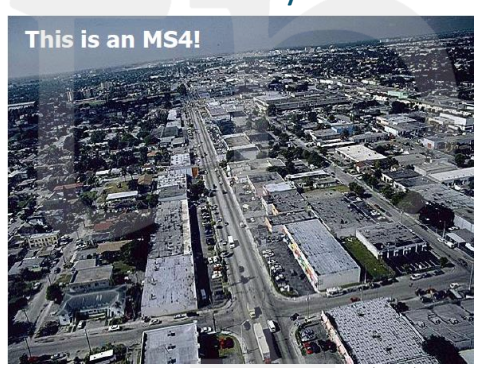

Photo Credit: US EPA

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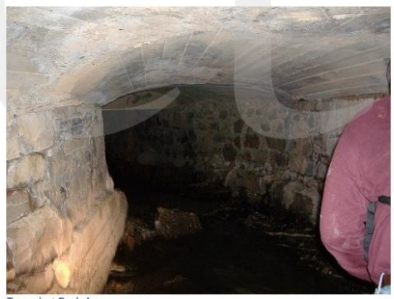
Additional Permits

- QLP – Qualifying Local Program
  - For small sites – in lieu of ADEQ
    - Exceeds EPA guidelines
    - Separate inspector certification
    - Separate inspection report



Tunnel at Park Ave.

Tunnel Exit at Whittington Ave.

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Penalties

- No permit or serious violation
  - Up to $10,000 per violation
  - Each additional day of a violation may be considered to be a separate violation
  - Can result in Cease and Desist order
- Endangered Species violation
  - Up to $25,000 per violation
- Failure to acquire STAA
  - May result in fines or penalties for violations
  - Revocation of the STAA

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Special Protection Designations

- Extraordinary Resource Waters (ERWs)
  - Scenic beauty, scientific value, intangible social value
- Ecologically Sensitive Waterbodies (ESWs)
  - Provide habitat for threatened, endangered, or sensitive species of plants and animals
- Natural and Scenic Waterways (NSWs)
  - Special natural, scenic, or recreational qualities
- Public Water Supply (PWS)
  - Public drinking water intakes and wellhead protection areas
  - Regulated by Arkansas Dept. of Health

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Special Protection

- The CGP cannot provide coverage if the site discharges directly into an ERW, NSW, or ESW *UNLESS* SWPPP includes additional BMP's needed to prevent to maximum extent possible impact by pollutants

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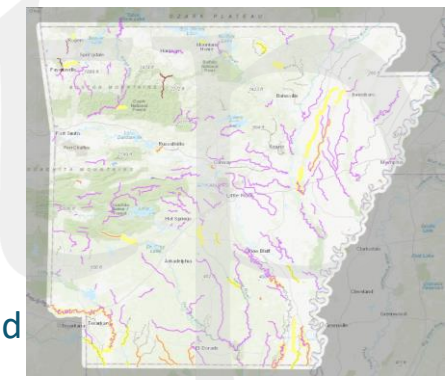
Impaired Waters – 303(d) List

- Waters that already have issues
- 2018 303(d) List
  - ADEQ website
- Maps by County
- Category 5 – impaired
- Category 4a – impaired, TMDL has been established
- Primary Considerations
  - Turbidity, sediment, oil & grease



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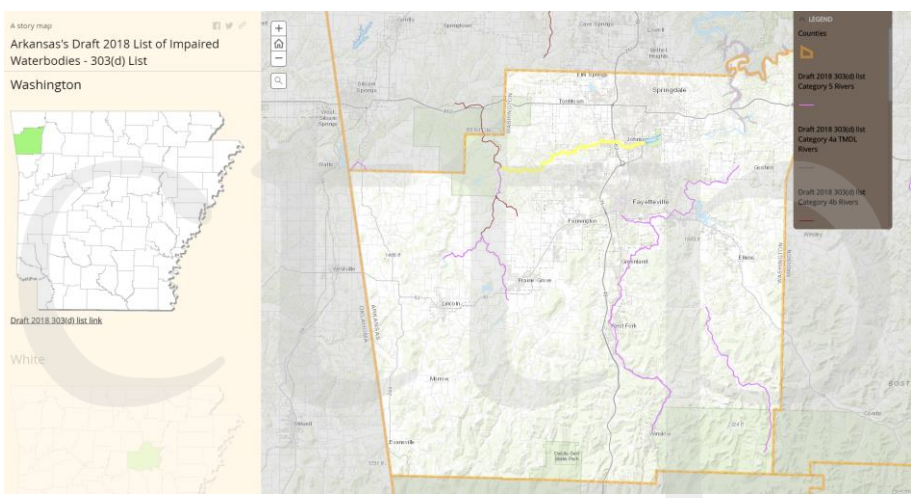
Impaired Waters – 303(d) List



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Impaired Waters – 303(d) List

Draft 2018 Category 5

Stream Name	Assessment Unit	PLNG SEG	Miles	Monitoring Stations	Designated Use Not Supported						Water Quality Standard Non-Attainment											Source of Contamination						Priority
					FC	AL	PC	SC	DW	AI	DO	pH	Tm	Tb	Cl	SO4	TDS	PA	Cu	Pb	Zn	Other	IP	MP	SE	AG	UR	Other	
Spring River	AR_11010010_006	4H	5.2	WHI0022									x														UN	L
Crooked Creek	AR_11010003_049	4I	20.6	[illegible]									x														UN	L
Leatherwood Creek	AR_11010001_916	4K	5.5	LC02							x																UN	M
Town Branch	AR_11010001_959	4K	2.6	UAA													x						x	x				L
Holman Creek	AR_11010001_059	4K	10.6	WHI0070					x														x	x				L
Kings River	AR_11010001_037	4K	38.2	WHI0009A													x										UN	L
Kings River	AR_11010001_542	4K	23.0	BUFET004							x																UN	M
White River	AR_11010001_023	4K	7.4	[illegible]												x											UN	L
Town Branch	AR_11010001_824	4K	3.0	TB62, TBN01, TB										x											x			L
Middle Fork White River	AR_11010001_926	4K	15.5	WHI0101 MFW01							x																UN	M
West Fork White River	AR_11010001_024	4K	10.7	WHI0051, WHI0100, Tilly Willy, Dead Horse, Molly Wagon, Harvey Dowell, Stonebridge, UAA, WHW03, 04, 05		x								x		x	x	x										UN	L
West Fork White River	AR_11010001_624	4K	19.2	WHI0097, WHI0098, Airport							x					x												UN	M
St. Francis River	AR_08020201_009	5A	13.7	e - FPA2013							x				x													UN	L

AL – aluminum
Tb – turbidity
S04 – sulfates
TDS – total dissolved solids

DO – dissolved oxgen
UN - unknown

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Total Maximum Daily Load (TMDL)

- The maximum amount of pollution a waterbody can receive and still meet standards
- Sum of wasteload allocations and load allocations
  - Natural background + effects of construction
- Can be expressed in various terms
  - Mass per time
  - NTU (Nephelometric Turbidity Unit)
  - Toxicity
  - Other
- TMDL allocation for turbidity, oil & grease, other
- If a TMDL is approved based on construction, quarterly reports must be submitted to ADEQ

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Storm Water Pollution Prevention Plan (SWPPP)

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SWPPP

- Storm Water Pollution Prevention Plan
  - Implementation document (book) for the CGP
  - Contains documents required by the CGP
  - Must be kept on site and readily available
  - Use ARDOT SWPPP Special Provision / template
- Goal is to remove 80% of total suspended solids from flows that exceed predevelopment levels
- Failure to implement the SWPPP can result in fines!

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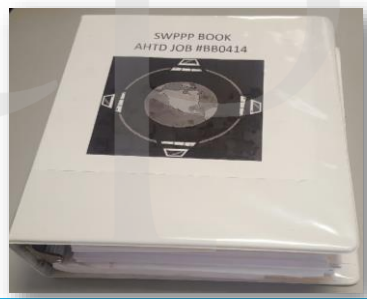
SWPPP

- A SWPPP IS REQUIRED FOR ALL SITES!
- Large sites
  - SWPPP will be submitted to ADEQ prior to project start
  - Subject to approval by ADEQ
- Small sites
  - SWPPP prepared and kept on site
  - Not submitted to ADEQ
  - Prior approval not necessary



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Purpose of the SWPPP

- Ensure compliance with the NPDES permit
- Provide a plan
  - Identify potential sources of stormwater pollution
  - Describe practices (BMPs) for reducing pollutants
- Provide ADEQ with information
- Assist the designer
  - Communicate erosion and sediment control plans
- Assist construction personnel
  - Manage stormwater runoff

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SWPPP Development

- Responsibility of the designer
  - Construction General Permit gives guidance
  - SWPPP Special Provision provides a template
- Include project details, drainage info, disturbance areas, receiving waters, BMPs
- ARDOT projects use typical / approved BMPs

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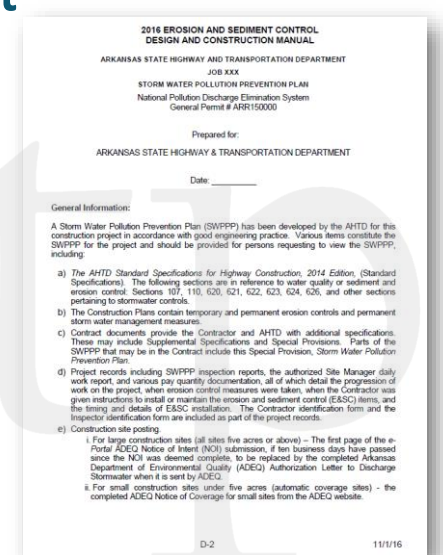
SWPPP Development

- Goals:
  - Protect waterbodies
  - Prevent erosion
  - Control sediment
- Use SWPPP-SP
  - Key component of SWPPP
  - Appendix D



2016 EROSION AND SEDIMENT CONTROL DESIGN AND CONSTRUCTION MANUAL

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT
JOB XXX
STORM WATER POLLUTION PREVENTION PLAN
National Pollution Discharge Elimination System
General Permit # ARR150000

Prepared for:

ARKANSAS STATE HIGHWAY & TRANSPORTATION DEPARTMENT

Date: _____

General Information:

A Storm Water Pollution Prevention Plan (SWPPP) has been developed by the AHTD for this construction project in accordance with good engineering practice. Various items constitute the SWPPP for the project and should be provided for persons requesting to view the SWPPP, including:

a) *The AHTD Standard Specifications for Highway Construction, 2014 Edition*, (Standard Specifications). The following sections are in reference to water quality or sediment and erosion control: Sections 107, 110, 620, 621, 622, 623, 624, 626, and other sections pertaining to stormwater controls.
b) The Construction Plans contain temporary and permanent erosion controls and permanent storm water management measures.
c) Contract documents provide the Contractor and AHTD with additional specifications. These may include Supplemental Specifications and Special Provisions. Parts of the SWPPP that may be in the Contract include this Special Provision, *Storm Water Pollution Prevention Plan*.
d) Project records including SWPPP inspection reports, the authorized Site Manager daily work report, and various pay quantity documentation, all of which detail the progression of work on the project, when erosion control measures were taken, when the Contractor was given instructions to install or maintain the erosion and sediment control (E&SC) items, and the timing and details of E&SC installation. The Contractor identification form and the Inspector identification form are included as part of the project records.
e) Construction site posting.
   i. For large construction sites (all sites five acres or above) – The first page of the e-Portal ADEQ Notice of Intent (NOI) submission, if ten business days have passed since the NOI was deemed complete, to be replaced by the completed Arkansas Department of Environmental Quality (ADEQ) Authorization Letter to Discharge Stormwater when it is sent by ADEQ.
   ii. For small construction sites under five acres (automatic coverage sites) – the completed ADEQ Notice of Coverage for small sites from the ADEQ website.

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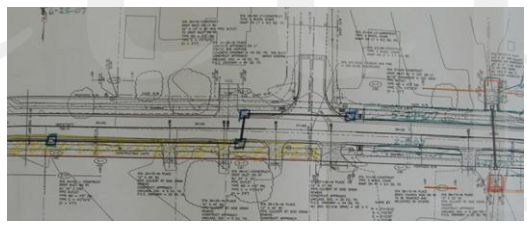
SWPPP Development

- Assistance from Environmental Division (Water Quality Section)
  - TMDL's
  - 303(d) waters
  - Special Category waters for vegetated buffer zones
  - MS4's



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SWPPP Components Maintained on Project

- Project Contract
- SWPPP Special Provision (from contract)
  - Contractor and inspector information
    - Contractors (and subs) must sign the SWPPP SP
    - Inspectors responsible for inspection reports must sign
  - Hazardous materials handling (also in Std. specs and SS)
  - Approved state or local plans
  - TMDL information
  - Short Term Activity Authorization (STAA)
  - Other permit information (404, 401, MS4)

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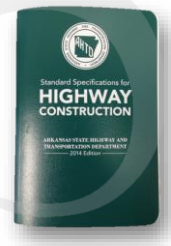
SWPPP Components (cont.)

- ARDOT Erosion & Sediment Control Design & Construction Manual (2016)
  - NPDES Construction General Permit (Appendix C)
  - Description of all BMPs (Appendix B)
- Standard Specifications (Green Book)
  - Sections 107, 110, 620, 621, 622, 623, 624, 626, other
- Additional SPs related to water quality/ endangered species



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SWPPP Components (cont.)

- Notice of Coverage
- Project Plans
  - Quantity listing for all erosion & sediment control devices
- Updated as-built E&SC control plans
- SWPPP inspection reports
- SWPPP-related correspondence or change orders
- RE Construction Diary
  - *SiteManager* files

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Required Project Plan Items

- Waters of the state, natural buffer boundary lines, flood plain boundary
- Storm drain inlet locations (on site and immediate vicinity)
- Locations where stormwater is discharged to waters of the state or to a municipal separate storm sewer system (MS4)
- Legend for all BMPs

- ARDOT Project Plan Sheets
  - Temporary Erosion Control Details
    - Specific items and locations for project
  - Temporary Erosion Control Devices
    - Standard drawings for typical items
    - Order of placement for various activities

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Project Name & Location

Project Name and Location:

Insert Project name and job number from Contract

Operator Name and Address:
Arkansas Highway and Transportation Department

Name of District Engineer _____

Address of District Headquarters

_____

_____

Name of Resident Engineer (Contact Person)_____

Contact Number _____

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Site Description

- Pre-Construction View
- Project Description
- Sequence of Activities
  - Total Acres
  - Total Disturbed Area
- Existing Site Info
  - Runoff Coefficient
  - Soil information

A. Site Description

1) Pre-construction Topographic view: Refer to the plan and profile sheets for topographic and waterbody information.

2) Project Description and Intended Use after Notice of Termination (NOT) is filed: *Insert description from Contract.*

3) Sequence of Activities:

The sequence of Major Soil Disturbing Activities is shown below. Be aware **that the sequence below is provided as a general course of action for the progression of construction activities. Actual sequence of construction will be determined by the Contractor's schedule and field conditions.**

a. _____
b. _____
c. _____
d. _____
e. _____

4) Total Acres Available: _____ Total Disturbed Area _____

(*Note: Any off-site borrow or waste areas are operated by the Contractor, who is responsible for obtaining any required NPDES permits for the sites. The "total acres available" and "total disturbed areas" shown here do not include areas covered under permits obtained by another operator. The Contractor is also responsible for meeting local regulations regarding these sites, including those of a Qualifying Local Program).

5) Existing Site Information:

a. Runoff Coefficient Based on attachment C:

Before construction starts. the site has a runoff coefficient of

After construction is completed, the site will have a runoff coefficient of _____

b. Soil Information _____

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Responsible Parties

B. Responsible Parties-General Contractors, Inspectors, etc:

Refer to Contractor identification form in Section Q and the Inspector identification form in Section R. This information will be completed after the Pre-construction conference.

- Contractors

Q. Contractors: (Permit pg 3 of Part II)
All contractors should be identified in the plan. (a page should be included for each subcontractor).

THE CERTIFICATION BELOW SHALL BE COMPLETED AND INCLUDED IN EACH SUBCONTRACT. Copies of these certifications must be inserted at this location.

The Contractor/Subcontractor indicated below shall have responsibility for implementation of the pay items as listed below.

Item	Item

All Contractors operating on the site shall have the responsibility for compliance with Section 110 of the Standard Specifications for their operations, including, but not limited to: Good housekeeping practices, spill prevention, spill reporting and clean-up, and product specific practices such as limiting the discharge of concrete waste water to areas specified in the SWPPP.

Contractor Printed Name:_____
Signature: _____ Title: _____
Company Name: _____ Date: _____
Company Address: _____
Telephone No.: _____ AHTD Job Number: _____

- Inspectors

R. Inspectors: (Permit pg 3 of Part II)
Site inspectors should be identified in the plan.

AHTD inspectors performing the erosion and sediment control inspection must complete the information below.

Printed Name of AHTD Inspector	Signature	Contact Number	Date

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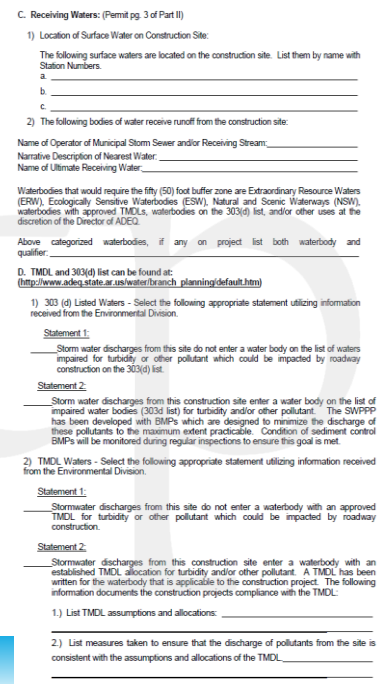
Receiving Waters

- Where does the water (and sediment) go?
  - Nearest water
  - Ultimate receiving water
    - There is ALWAYS a receiving water
- 303(d) & TMDL info
  - How to address special or impaired waters



C. **Receiving Waters:** (Permit pg. 3 of Part II)

1) Location of Surface Water on Construction Site:

The following surface waters are located on the construction site. List them by name with Station Numbers.

a. _____

b. _____

c. _____

2) The following bodies of water receive runoff from the construction site:

Name of Operator of Municipal Storm Sewer and/or Receiving Stream:_____

Narrative Description of Nearest Water: _____

Name of Ultimate Receiving Water:_____

Waterbodies that would require the fifty (50) foot buffer zone are Extraordinary Resource Waters (ERW), Ecologically Sensitive Waterbodies (ESW), Natural and Scenic Waterways (NSW), waterbodies with approved TMDLs, waterbodies on the 303(d) list, and/or other uses at the discretion of the Director of ADEQ.

Above categorized waterbodies, if any on project list both waterbody and qualifier: _____

D. TMDL and 303(d) list can be found at: (http://www.adeq.state.ar.us/water/branch_planning/default.htm)

1) 303 (d) Listed Waters - Select the following appropriate statement utilizing information received from the Environmental Division.

Statement 1:

_____Storm water discharges from this site do not enter a water body on the list of waters impaired for turbidity or other pollutant which could be impacted by roadway construction on the 303(d) list.

Statement 2:

_____Storm water discharges from this construction site enter a water body on the list of impaired water bodies (303d list) for turbidity and/or other pollutant. The SWPPP has been developed with BMPs which are designed to minimize the discharge of these pollutants to the maximum extent practicable. Condition of sediment control BMPs will be monitored during regular inspections to ensure this goal is met.

2) TMDL Waters - Select the following appropriate statement utilizing information received from the Environmental Division.

Statement 1:

_____Stormwater discharges from this site do not enter a waterbody with an approved TMDL for turbidity or other pollutant which could be impacted by roadway construction.

Statement 2:

_____Stormwater discharges from this construction site enter a waterbody with an established TMDL allocation for turbidity and/or other pollutant. A TMDL has been written for the waterbody that is applicable to the construction project. The following information documents the construction projects compliance with the TMDL:

1.) List TMDL assumptions and allocations: _____

_____

2.) List measures taken to ensure that the discharge of pollutants from the site is consistent with the assumptions and allocations of the TMDL._____

_____

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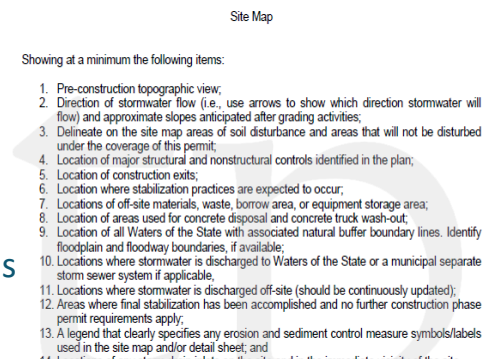
Site Map

- Pre-construction topo
  - Estimated slopes after construction
- Direction of flow
- Areas of disturbance
- Undisturbed areas
- Location of major controls
  - Construction exits
  - Concrete wash-out
- Off-site materials, etc.
- Stormwater discharge
- Areas where final stabilization is complete



Site Map

Showing at a minimum the following items:

1. Pre-construction topographic view;
2. Direction of stormwater flow (i.e., use arrows to show which direction stormwater will flow) and approximate slopes anticipated after grading activities;
3. Delineate on the site map areas of soil disturbance and areas that will not be disturbed under the coverage of this permit;
4. Location of major structural and nonstructural controls identified in the plan;
5. Location of construction exits;
6. Location where stabilization practices are expected to occur;
7. Locations of off-site materials, waste, borrow area, or equipment storage area;
8. Location of areas used for concrete disposal and concrete truck wash-out;
9. Location of all Waters of the State with associated natural buffer boundary lines. Identify floodplain and floodway boundaries, if available;
10. Locations where stormwater is discharged to Waters of the State or a municipal separate storm sewer system if applicable,
11. Locations where stormwater is discharged off-site (should be continuously updated);
12. Areas where final stabilization has been accomplished and no further construction phase permit requirements apply;
13. A legend that clearly specifies any erosion and sediment control measure symbols/labels used in the site map and/or detail sheet; and
14. Locations of any storm drain inlets on the site and in the immediate vicinity of the site.

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See Erosion Control Manual p. 15

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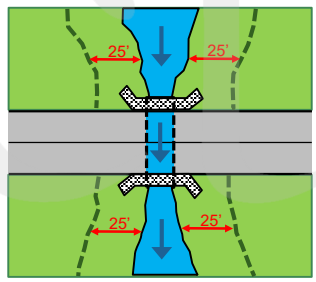
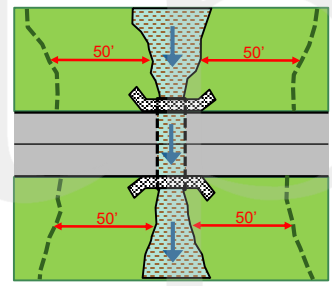
Vegetated Buffer Zones

- Areas where natural vegetation must be preserved
- Typical waters – 25’
  - Lakes, rivers, streams, etc.
- Impaired waters – 50’
  - Special or 303(d) listed





- Other limits at discretion of ADEQ Director
- Encroachment must be justified in SWPPP

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Vegetated Buffer Zones

- Encroachments may be allowed
  - Water crossings
  - Water access
  - Restoration process
- Prior approval is required
- Must justify in SWPPP!!!
- Contractor must stabilize the disturbed buffer zone area within 5 business days of completion of work

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Stormwater Controls During Construction

- Site stabilization
- Erosion & sediment controls
- Construction activities and timeline (general)
- List of stabilization practices and structural practices
  - Limiting disturbance, tracking controls, seeding, etc.
  - Sediment basins, silt fence, diversion ditches, slope drains, retaining walls, ditch checks, wattles, etc.
- Other controls
  - Debris and waste, hazardous materials, sanitary facilities
  - Offsite vehicle tracking, concrete waste

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Choosing Controls

- Know the site!
  - Identify receiving waters, sensitive waterbodies
    - Water bodies on project site?
  - Topographical features – steep slopes, flat areas
  - Where does water leave the site (runoff)?
  - Where does water enter the site (run-on)?
  - Is water concentrated in channels?
  - Is water distributed as overland flow?
  - Is there a storm drain system with inlets?
- Choose controls that fit the situation!

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Choosing Controls (cont.)

- Effectiveness – will it work?
- Feasibility – good fit for the location?
- Durability – will it last?
- Cost – materials, installation + maintenance
- Availability – will it ship when you need it?
- Operation – easy to maintain?
- Compatibility – aesthetics and safety?
- Sequence of activities – is it practical?
- Consider state and local regulations

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Stormwater Controls After Construction

- Permanent controls
  - Will stay in place when construction is complete
  - Must manage all stormwater with no sediment discharge
  - Channel linings, culverts, riprap, sodding, ditch paving
- Spread out the water and slow it down
  - Velocity dissipation devices
  - Concrete spillways, grouted riprap, underdrains, ditch paving, wetland infiltration

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Other SWPPP Items

- Endangered Species
- Employee Training
- Maintenance
  - Maintain all controls
- Inspections
  - Every 7 days (*ARDOT)
  - Every 14 days & within 24 hrs after ¼" rainfall event

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Endangered Species

- US Fish & Wildlife Form
  - Must submit final letter from survey with SWPPP
  - (501) 513-4489
- ARDOT Environmental Division
  - Special Studies Section

Endangered and Threatened Species Evaluation Form

Note: This form is not to be used for any Oil and/or Gas extraction or pipeline projects

The enclosed endangered and threatened species evaluation form may be used to obtain clearance, in most instances, from the U.S. Fish and Wildlife Service when applying for a NPDES or SWPPP permit from the Arkansas Department of Environmental Quality (ADEQ). Incomplete packages may delay evaluation of the proposed project and ultimately the issuance of your ADEQ permit.

Return the completed form and following information to:

U. S. Fish and Wildlife Service
Arkansas Field Office
110 South Amity Road, Suite 300
Conway, Arkansas 72032

Forms will not be accepted unless they include the following information:

1. A letter detailing the proposed project, a project name, the county in which the project occurs, the estimated disturbance area, geographic coordinates of the project location.
2. High quality detailed maps (preferably a USGS quadrangle map and aerial photo) that contain an outline/polygon of the proposed project area.
3. Contact information. Please include name, mailing address, e-mail and phone number.

If there is a question that you cannot answer on this evaluation form or a concurrence letter is required from the U.S. Fish and Wildlife Service, send the above information to the U.S. Fish and Wildlife Service's Arkansas Field Office, via Fax, mail, e-mail, or phone call. (Fax number (501) 513-4480, e-mail address FW4ESConway@fws.gov, phone number (501) 513-4470).

Include the completed form in your request for an ADEQ storm water or NPDES permit.

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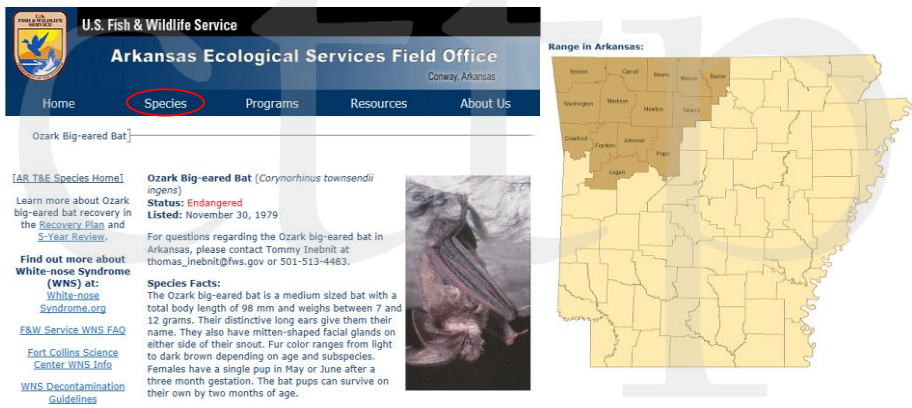
Endangered Species Information

- www.fws.gov/arkansas-es



61

Notice of Intent (NOI)

- Application with all essential project information
  - Owner / operator information
  - Site location
  - Receiving waters
  - Existing NPDES number
  - Quantitative data
  - Project description
- Application fee
  - $200
  - Modification fee if total acreage increases

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Notice of Intent (NOI)

- Large sites
  - Submit NOI with SWPPP at least 10 business days prior to anticipated start date
  - Submit using ADEQ's *ePortal*
- Small sites
  - Receive automatic coverage
    - RE will complete and post the small site NOC
  - NOI is not necessary

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Notice of Coverage (NOC)

- Authorization to Discharge
- Acceptance of NOI
  - Acknowledgment from ADEQ that SWPPP has been reviewed and the authorization is granted to perform work
  - MUST be posted on jobsite
  - MUST be readable
- If no response to NOI within 10 days, work may begin
  - Post 1st page of *ePortal* NOI submission

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See Erosion Control Manual p. 22

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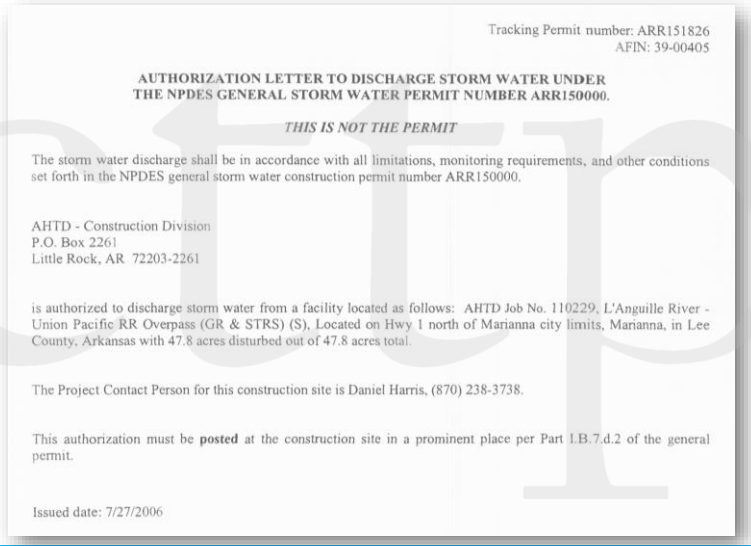
Notice of Coverage (NOC)



Tracking Permit number: ARR151826
AFIN: 39-00405

AUTHORIZATION LETTER TO DISCHARGE STORM WATER UNDER THE NPDES GENERAL STORM WATER PERMIT NUMBER ARR150000.

THIS IS NOT THE PERMIT

The storm water discharge shall be in accordance with all limitations, monitoring requirements, and other conditions set forth in the NPDES general storm water construction permit number ARR150000.

AHTD - Construction Division
P.O. Box 2261
Little Rock, AR 72203-2261

is authorized to discharge storm water from a facility located as follows: AHTD Job No. 110229, L'Anguille River - Union Pacific RR Overpass (GR & STRS) (S), Located on Hwy 1 north of Marianna city limits, Marianna, in Lee County, Arkansas with 47.8 acres disturbed out of 47.8 acres total.

The Project Contact Person for this construction site is Daniel Harris, (870) 238-3738.

This authorization must be **posted** at the construction site in a prominent place per Part I.B.7.d.2 of the general permit.

Issued date: 7/27/2006

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Before Work Begins

- Discuss SWPPP questions at preconstruction conference
- Be familiar with plans and specifications
- Check SWPPP for errors and problems BEFORE construction begins
- Determine how situations will be handled
  - Subcontractor
  - If Subcontractor is a DBE, Prime contractor is encouraged to withhold some quantities for E&SC items

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During Construction

- Success of the SWPPP is dependent on cooperation
  - Contractor must perform the work
  - Resident Engineer provides inspections
  - Contractor must make changes when needed
  - Resident Engineer is responsible for taking action for non-compliance
- Comply with Specifications
  - Requires compliance with all applicable permits and requirements
- Follow the Plan (i.e., SWPPP)
  - Properly install and maintain controls
    - Specifications, manufacturer's instructions
  - Keep the site clean
  - Remember general public can initiate action

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See Erosion Control Manual p. 23

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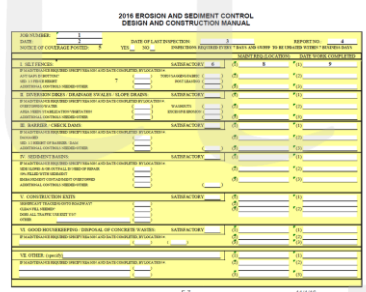
During Construction

- Perform inspections
  - ARDOT – notify contractor of problems
  - Contractor – complete fixes within 3 days of discovery
  - Document, document, document!!
  - Promptly correct deficiencies


2016 EROSION AND SEDIMENT CONTROL
DESIGN AND CONSTRUCTION MANUAL

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During Construction

- SWPPP must be updated within 7 days of on-site changes
- Adjust the Plan**
- Confirm the presence and accuracy of the plan
  - Areas of soil disturbance
  - Actual location of controls
  - Areas where final stabilization has been completed
  - Etc.
- Perform good housekeeping throughout jobsite

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Short Term Activity Authorization (STAA)

- Effective date is 1st date of in-stream activity
  - Expires after 6 months
  - If no water, it is not considered in-stream activity
  - Notify ADEQ 24 hrs before in-stream work
    - For each stream
  - 2-week turbidity testing cycle
- In-stream work = activity that increases turbidity
  - Equipment in water
  - Dumping riprap in water
  - Building work road
- Must cease work during precipitation

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Turbidity

- A measure of water clarity
- Measured by light passing through water sample
  - More solids mean "cloudier" water
- Suspended solids can:
  - Affect water clarity and color
  - Increase water temperature
  - Decrease dissolved oxygen
  - Increase disease in fish
- Reported in NTUs
  - Nephelometric Turbidity Unit

5 NTU 50 NTU 500 NTU

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Turbid Stream

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Turbidity Testing

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Turbidity Testing (cont.)

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Turbidity Testing (cont.)

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Turbidity Testing Requirements

- Begin testing on 1st day of in-stream work
  - Suspend testing if no in-stream work
- Samples should represent stream conditions throughout test period
  - STAA will indicate sample locations
- Avoid sampling while:
  - Machinery is working
  - During or immediately after a significant rainfall event
- Requirements may be:
  - Not more than 20% > upstream
  - Numerical value (i.e., 10 NTU)

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Final Stabilization

- Uniform perennial vegetative cover
  - Evenly distributed (no large bare areas)
  - 100% stabilization, 80% density
    - Consider native vegetation
  - All unpaved areas not covered by permanent structures
- Can use equivalent permanent stabilization measures
  - Riprap, gabions, ditch paving, etc.

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Native Background Vegetation

- Native vegetation may not provide 100% cover
  - If not, adjust the 80% density criteria
  - If no natural vegetation, no stabilization required

Example:
Assume native vegetation covers 50% of ground
Adjusted criteria:

0.80 X 0.50 = 0.40

40% total required for final stabilization

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Notice of Termination (NOT)

- Notice to inform ADEQ that all construction activities are finished and final stabilization is complete
  - Permanent stabilization is in place and functioning
  - All soil disturbing activities are completed
  - Discharges are eliminated
  - Temporary controls are removed
- NOT should not be submitted until at least 30 days after end of work to ensure successful stabilization
- Final inspection
- Include photos of the jobsite

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Records Retention

- Project records must be maintained for at least 3 years
- Maintain photos

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Temporary Erosion and Sediment Control Measures

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Temporary Measures

- Best Management Practices (BMPs) used during construction to control erosion and sediment until permanent measures can be provided
  - Direct protection to soil surface *(prevent erosion)*
  - Remove *(control)* sediment
  - Control of run-on
  - Control of run-off

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Scheduling

- Sequencing of construction activities
- Minimize area and duration of exposure
- Request information from the contractor
  - Scheduling
  - Phasing

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Limit Disturbed Area

- Should be a primary objective for erosion and sediment control
- Area of disturbed ground on each construction site is limited to 20 acres at a time
  - Engineer has authority to increase or decrease
  - Includes borrow pits
  - Areas abandoned shall be stabilized within 14 days
  - Cut and fill slopes not to exceed 25 feet
  - Begin stabilization immediately when construction activity has permanently ceased

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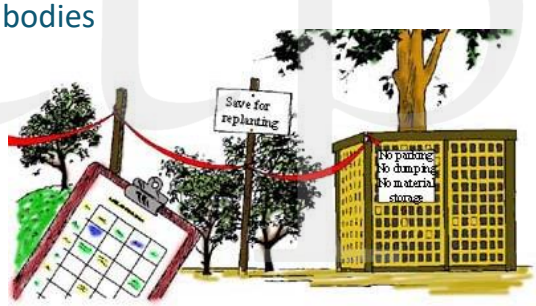
Preserve Existing Vegetation

- Areas where no construction occurs
- Areas where clearing can be delayed
- Vegetated buffer zones
  - 25 ft – named and unnamed streams, etc.
  - 50 ft – special water bodies



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Ground Cover - Temporary

- Temporary cover on areas not at final grade

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Ground Cover – Temporary

- Vegetation, mulch or combination of both
- Used on all exposed areas that will be exposed for a period of time
- Where seasonal limitations preclude permanent seeding
- Delay in construction
- Maximum of 14 days

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Watering for Temporary Seeding

- Initial application
  - 20,400 gallons / acre - equal to ¾ inch of rainfall

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Ground Cover - Temporary

- Mulch Control Netting
  - Steep slopes
  - Dry or cold periods
  - Slow establishment

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Erosion Control Matting

- Steep slopes
  - 2:1 or steeper
- Problem areas

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Erosion Control Matting

- Type of matting will depend on water velocity expected
- Ensure good contact with ground

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DATES OF MAJOR CONSTRUCTION ACTIVITY

Show locations and dates when *major* construction activities begin or cease in an area. Stabilization of areas where construction has permanently ceased shall begin immediately and be completed within 14 calendar days. In areas where construction activities have temporarily ceased stabilization shall being as soon as practicable but in no case more than 14 calendar days after cessation of construction activity. Disturbed areas within buffer zones shall have stabilization completed within 5 business days of work permanently ceasing.

FROM STATION	TO STATION	DATE WORK BEGAN/RESUMED	DATE WORK CEASED
10			11

STABILIZATION

REQUIRED WORK TO BE PERFORMED

FROM STATION	TO STATION		TEMP. SEEDING	PERM. SEEDING	MULCH COVER	SOLID SODDING	EROSION MATTING	WATER	SEED REPAIR
		12	( )	( )	13 ( )	( )	( )	( )	( )
			( )	( )	( )	( )	( )	( )	( )

REMARKS/OTHER WORK REQUIRED: 14

STORMWATER DISCHARGE OBSERVATIONS

	STATION	STATION	STATION	STATION
Discharges contained little or no visible turbidity with the exceptions of locations shown at right. If all were satisfactory or there was no discharge, enter "N/A". 15				
Locations where sediment or other pollutants had been or were being discharged are shown at right (if none, enter "N/A"). 16				

If significant rain event(s) (approximately 1/2" or greater) occurred **during normal work hours**, show approximate beginning (time/date) and duration of event(s). If none, enter "N/A".

Beginning time/date of event: 17

Duration of event (hours): 18

AHTD INSPECTOR NAME: 19 TITLE: DATE:

I certify under penalty of law that this document and all attachments such as Inspection Form were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

RES. ENGR. / DIST.MAINT. ENGR. SIGNATURE: 20 DATE:

NOTE: The Contractor, upon receipt of a copy of this Report, is hereby formally instructed to perform the above work within three (3) business days.

Distribution: Orig. - RE files, Copy - Field Office & Contractor*

* The Contractor is to receive a copy of this report immediately when work is required.

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See Erosion Control Manual p. F-8

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Tracking

- "Track walking"
- Surface roughening achieved by operating tracked machinery
- Reduce flow velocity
- Reduce erosion
- Trap seed, sediment

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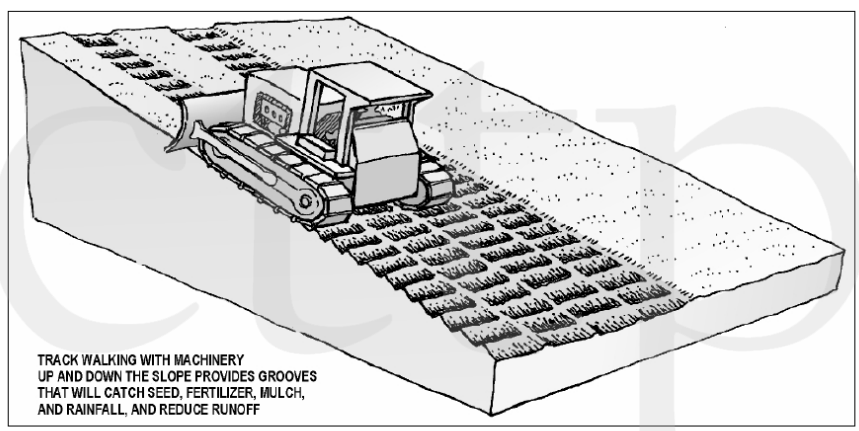
Tracking



Track Walking

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Encourages Seed Growth

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Must Maintain Slopes

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Tracking - Wrong

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2016 EROSION AND SEDIMENT CONTROL
DESIGN AND CONSTRUCTION MANUAL

JOB NUMBER: 1
DATE: 2
NOTICE OF COVERAGE POSTED: 5 YES __ NO __
DATE OF LAST INSPECTION: 3
REPORT NO.: 4
INSPECTIONS REQUIRED EVERY 7 DAYS AND SWPPP TO BE UPDATED WITHIN 7 BUSINESS DAYS

		MAINT.REQ.(LOCATION)	DATE WORK COMPLETED
I. SILT FENCES:	SATISFACTORY 6	(1) 8	(1) 9
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED, BY LOCATION #.		(2)	(2)
ANY GAPS IN BOTTOM? ( ) TORN/SAGGING FABRIC ( )		(3)	(3)
SED. 1/3 FENCE HEIGHT 7 ( ) POST LEANING ( )			
ADDITIONAL CONTROLS NEEDED/OTHER ( ) ( )			
II. DIVERSION DIKES / DRAINAGE SWALES / SLOPE DRAINS:	SATISFACTORY ___	(1)	(1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED BY LOCATION #.		(2)	(2)
OVERTOPPING WATER ( ) WASHOUTS ( )		(3)	(3)
AREA NEEDS STABILIZATION/VEGETATION ( ) EXCESSIVE EROSION ( )			
ADDITIONAL CONTROLS NEEDED/OTHER ( ) ( )			
III. BARRIER / CHECK DAMS:	SATISFACTORY ___	(1)	(1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED BY LOCATION #.		(2)	(2)
DAMAGED ( )		(3)	(3)
SED. 1/2 HEIGHT OF BARRIER / DAM ( )			
ADDITIONAL CONTROLS NEEDED/OTHER ( ) ( )			
IV. SEDIMENT BASINS:	SATISFACTORY ___	(1)	(1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED BY LOCATION #.		(2)	(2)
SIDE SLOPES &/OR OUTFALL IN NEED OF REPAIR ( )		(3)	(3)
50% FILLED WITH SEDIMENT ( )			
EMBANKMENT CONTAINMENT OVERTOPPED ( )			
ADDITIONAL CONTROLS NEEDED/OTHER ( ) ( )			
V. CONSTRUCTION EXITS	SATISFACTORY ___	(1)	(1)
SIGNIFICANT TRACKING ONTO ROADWAY? ( )		(2)	(2)
CLEAN FILL NEEDED? ( )			
DOES ALL TRAFFIC USE EXIT Y/N? ( )			
OTHER: ( )			
VI. GOOD HOUSEKEEPING / DISPOSAL OF CONCRETE WASTES:	SATISFACTORY ___	(1)	(1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED, BY LOCATION #.		(2)	(2)
( ) ( )		(3)	(3)
VII. OTHER: (specify)		(1)	(1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED, BY LOCATION #.		(2)	(2)
( )		(3)	(3)
( )			

F-7 11/1/16

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See Erosion Control Manual p. F-7

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Dust Control

- Moisture limits the movement of surface particles
- Seed
- Mulch
- Adhesives

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99

Silt Fence

- Vertical barrier of filter fabric used to contain sediment
- For overland and sheet flow
- NOT for concentrated flow

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See Erosion Control Manual p. B-13

100

Silt Fence

- Establish perimeter control
- At toe of fill slopes
  - Slope up grade perpendicular to fence not > 1:1
- Around drop inlets
- Along streams and wetlands
- No more than ¼ acre drainage area per 100’ of fence

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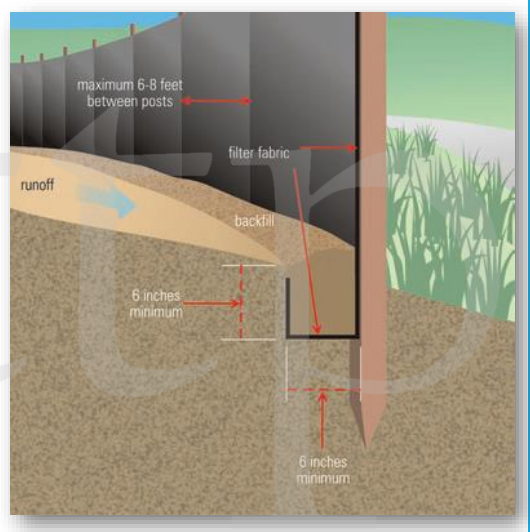
101

Silt Fence

- Water flow must be toward fabric side
- Bottom must be “trenched in”
- Should follow contour of land
- Ends should angle up the slope



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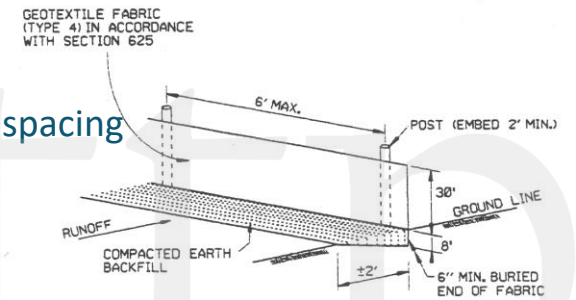
Silt Fence

- Bury 6” of fabric
- Stakes at 6’ max spacing



SILT FENCE (E-11)

GENERAL NOTES

GEOTEXTILE FABRIC SHALL BE SPLICED TOGETHER WITH A SEWN SEAM ONLY AT A SUPPORT POST, OR TWO SECTIONS OF FENCE MAY BE OVERLAPPED INSTEAD. PAYMENT OF ADDITIONAL MATERIAL FOR OVERLAP WILL NOT BE MADE.

E-11

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103

Wrap the Ends

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104

Silt Fence: J-Hooking

- Should follow contour

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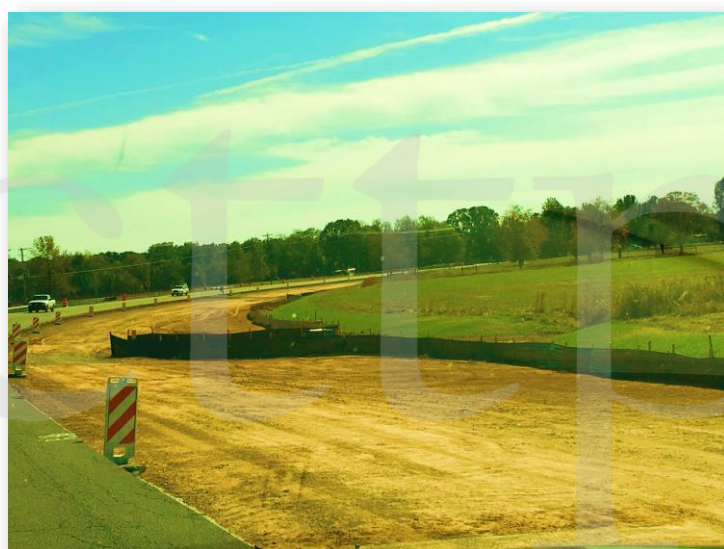
105

Silt Fence



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106

Stream Protection

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107

Silt Fence

- Clean out when approaching 30% capacity

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108

Silt Fence

- Ensure proper trenching and inspect material for tears

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109

Silt Fence

- Additional controls needed
- Posts leaning
- NOT for concentrated flow areas

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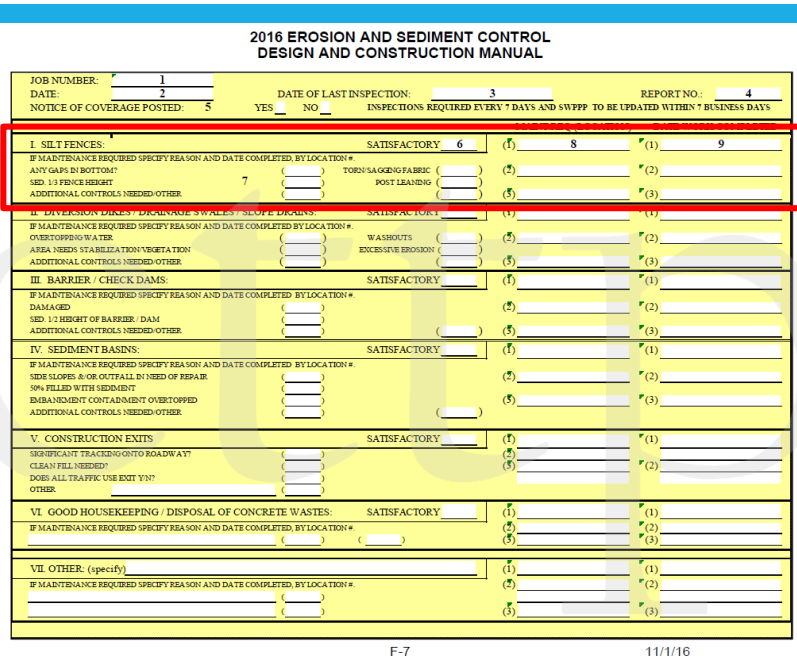
110



2016 EROSION AND SEDIMENT CONTROL
DESIGN AND CONSTRUCTION MANUAL

JOB NUMBER: 1
DATE: 2 DATE OF LAST INSPECTION: 3 REPORT NO.: 4
NOTICE OF COVERAGE POSTED: 5 YES__ NO__ INSPECTIONS REQUIRED EVERY 7 DAYS AND SWPPP TO BE UPDATED WITHIN 7 BUSINESS DAYS

I. SILT FENCES: SATISFACTORY 6 (1) 8 (1) 9
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED, BY LOCATION #.
ANY GAPS IN BOTTOM? ( ) TORN/SAGGING FABRIC ( ) (2) (2)
SED. 1/3 FENCE HEIGHT 7 ( ) POST LEANING ( )
ADDITIONAL CONTROLS NEEDED/OTHER ( ) ( ) (3) (3)

II. DIVERSION DIKES / DRAINAGE SWALES / SLOPE DRAINS: SATISFACTORY ___ (1) (1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED BY LOCATION #.
OVERTOPPING/WATER ( ) WASHOUTS ( ) (2) (2)
AREA NEEDS STABILIZATION/VEGETATION ( ) EXCESSIVE EROSION ( )
ADDITIONAL CONTROLS NEEDED/OTHER ( ) ( ) (3) (3)

III. BARRIER / CHECK DAMS: SATISFACTORY ___ (1) (1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED BY LOCATION #.
DAMAGED ( ) (2) (2)
SED. 1/2 HEIGHT OF BARRIER / DAM ( )
ADDITIONAL CONTROLS NEEDED/OTHER ( ) ( ) (3) (3)

IV. SEDIMENT BASINS: SATISFACTORY ___ (1) (1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED BY LOCATION #.
SIDE SLOPES &/OR OUTFALL IN NEED OF REPAIR ( ) (2) (2)
50% FILLED WITH SEDIMENT ( )
EMBANKMENT CONTAINMENT OVERTOPPED ( ) (3) (3)
ADDITIONAL CONTROLS NEEDED/OTHER ( ) ( )

V. CONSTRUCTION EXITS SATISFACTORY ___ (1) (1)
SIGNIFICANT TRACKING ONTO ROADWAY? ( ) (2) (2)
CLEAN FILL NEEDED? ( )
DOES ALL TRAFFIC USE EXIT Y/N? ( )
OTHER ( )

VI. GOOD HOUSEKEEPING / DISPOSAL OF CONCRETE WASTES: SATISFACTORY ___ (1) (1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED, BY LOCATION #. (2) (2)
( ) ( ) (3) (3)

VII. OTHER: (specify) (1) (1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED, BY LOCATION #. (2) (2)
( ) (3) (3)

F-7 11/1/16

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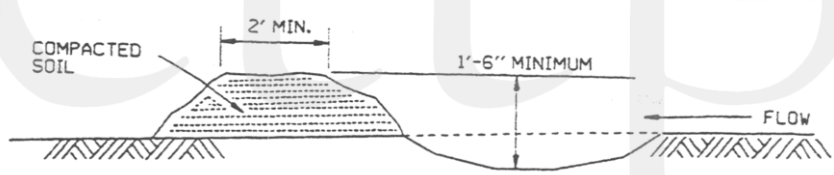
See Erosion Control Manual p. F-7

111

Diversion Ditches & Berms

- Used to divert water to or away from an area
  - Collect clean water and divert flow away from disturbed areas
  - Contain sediment-laden water and direct to a desirable location



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See Erosion Control Manual p. B-5

112

Diversion Ditches & Berms Location

- Above disturbed slopes
  - Place at top of embankment when fill height > 20 ft
  - Place in areas of erodible soils

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Diversion Ditches & Berms Location

- Across unprotected slopes as slope breaks

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Diversion Ditches & Berms Location

- Below slopes to direct flow to stabilized outlets or to sediment basins

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Diversion Ditches & Berms Location

- Near perimeter of site to prevent sediment escape

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Diversion Ditches & Berms

- Can be formed of earthen dams, sandbags, wattles, Δ silt dikes
- Max drainage area = 5 ac.

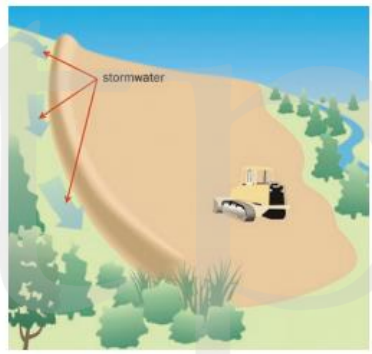

Photo Credit: epa.gov

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Diversion Ditch Linings

Channel Grade	Type of Treatment
0.5% – 5%	Seed & Mulch
5% - 8%	Seed + Erosion Control Matting
8% or more	Dumped Riprap

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Diversion Ditch - Maintenance

- Maintenance
  - Inspect after rainfall
  - Remove debris
  - Remove sediment when traps become 50% full

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2016 EROSION AND SEDIMENT CONTROL
DESIGN AND CONSTRUCTION MANUAL

JOB NUMBER: 1
DATE: 2
NOTICE OF COVERAGE POSTED: 5 YES __ NO __
DATE OF LAST INSPECTION: 3
REPORT NO.: 4
INSPECTIONS REQUIRED EVERY 7 DAYS AND SWPPP TO BE UPDATED WITHIN 7 BUSINESS DAYS

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I. SILT FENCES:	SATISFACTORY 6	(1) 8	(1) 9
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED, BY LOCATION #.			
ANY GAPS IN BOTTOM? ( )	TORN/SAGGING FABRIC ( )	(2)	(2)
SED. 1/3 FENCE HEIGHT 7 ( )	POST LEANING ( )		
ADDITIONAL CONTROLS NEEDED/OTHER ( )	( )	(3)	(3)
II. DIVERSION DIKES / DRAINAGE SWALES / SLOPE DRAINS:	SATISFACTORY ___	(1)	(1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED BY LOCATION #.			
OVERTOPPING WATER ( )	WASHOUTS ( )	(2)	(2)
AREA NEEDS STABILIZATION/VEGETATION ( )	EXCESSIVE EROSION ( )		
ADDITIONAL CONTROLS NEEDED/OTHER ( )	( )	(3)	(3)
III. BARRIER / CHECK DAMS:	SATISFACTORY ___	(1)	(1)
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DAMAGED ( )		(2)	(2)
SED. 1/2 HEIGHT OF BARRIER / DAM ( )			
ADDITIONAL CONTROLS NEEDED/OTHER ( )	( )	(3)	(3)
IV. SEDIMENT BASINS:	SATISFACTORY ___	(1)	(1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED BY LOCATION #.			
SIDE SLOPES &/OR OUTFALL IN NEED OF REPAIR ( )		(2)	(2)
50% FILLED WITH SEDIMENT ( )			
EMBANKMENT CONTAINMENT OVERTOPPED ( )		(3)	(3)
ADDITIONAL CONTROLS NEEDED/OTHER ( )	( )		
V. CONSTRUCTION EXITS	SATISFACTORY ___	(1)	(1)
SIGNIFICANT TRACKING ONTO ROADWAY? ( )		(2)	(2)
CLEAN FILL NEEDED? ( )			
DOES ALL TRAFFIC USE EXIT Y/N? ( )			
OTHER: ( )			
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( )	( )	(3)	(3)
VII. OTHER: (specify)		(1)	(1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED, BY LOCATION #.		(2)	(2)
( )			
( )		(3)	(3)

F-7 11/1/16

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See Erosion Control Manual p. F-7

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Slope Drains

- Device used to confine and transport surface water from one elevation to another, normally down an unprotected slope

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See Erosion Control Manual p. B-8

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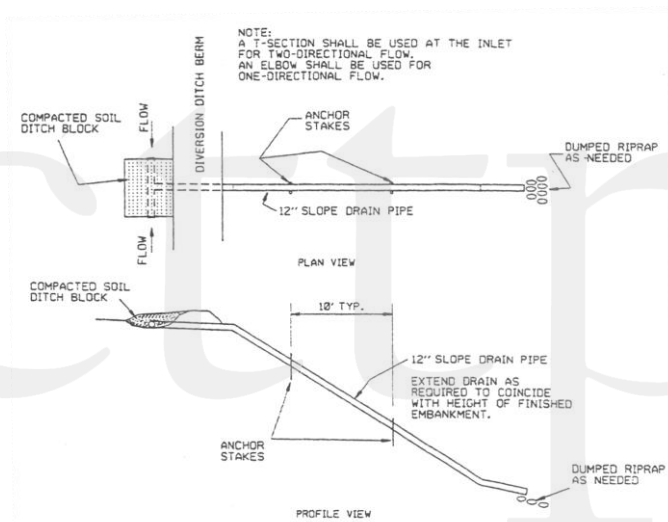
Slope Drains



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Slope Drains

- Maximum spacing is 500 ft for draining diversion ditches
- Can be made of triangular silt dikes or sand bags and plastic sheeting
- Max drainage area = 5 acres

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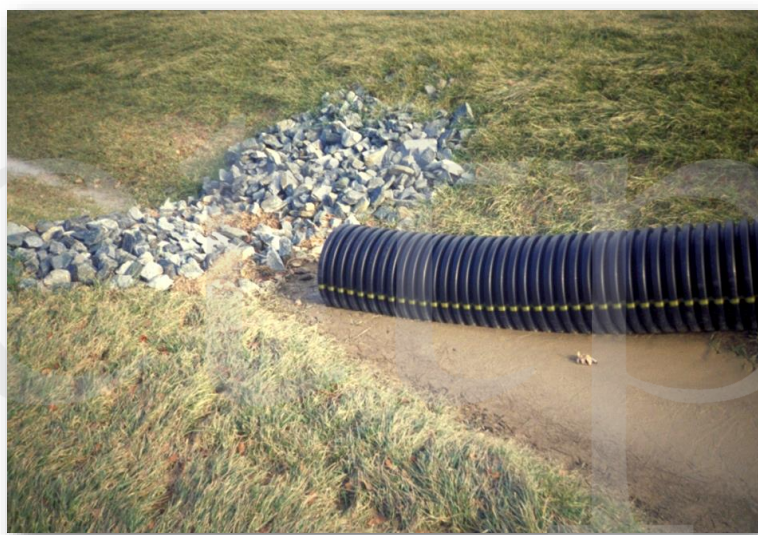
Slope Drains



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Slope Drains

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Slope Drains

- Install/check outlet protection
- Clean sediment basin at 50% full

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Slope Drains

- Ensure water will enter drain
- Check for washouts/excessive erosion

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Slope Drains

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2016 EROSION AND SEDIMENT CONTROL DESIGN AND CONSTRUCTION MANUAL

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ANY GAPS IN BOTTOM? ( )	TORN/SAGGING FABRIC ( )	(2)	(2)
SED. 1/3 FENCE HEIGHT 7 ( )	POST LEANING ( )		
ADDITIONAL CONTROLS NEEDED/OTHER ( )	( )	(3)	(3)
II. DIVERSION DIKES / DRAINAGE SWALES / SLOPE DRAINS:	SATISFACTORY ____	(1)	(1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED BY LOCATION #.			
OVERTOPPING/WATER ( )	WASHOUTS ( )	(2)	(2)
AREA NEEDS STABILIZATION/VEGETATION ( )	EXCESSIVE EROSION ( )		
ADDITIONAL CONTROLS NEEDED/OTHER ( )	( )	(3)	(3)
III. BARRIER / CHECK DAMS:	SATISFACTORY ____	(1)	(1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED BY LOCATION #.			
DAMAGED ( )		(2)	(2)
SED. 1/2 HEIGHT OF BARRIER / DAM ( )			
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SIGNIFICANT TRACKING ONTO ROADWAY? ( )		(2)	(2)
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VII. OTHER: (specify)		(1)	(1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED, BY LOCATION #.		(2)	(2)
( )		(3)	(3)
( )			

F-7 11/1/16

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See Erosion Control Manual p. F-7

129

Ditch Checks

- Temporary barriers constructed of rock, sand bags, wattles, triangular silt dikes, or filter socks
- Placed across channel
- Reduce velocity of concentrated flow
- NEVER in a live stream

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See Erosion Control Manual p. B-9

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Ditch Check Installation

- 6” notch in top
  - Keeps water in flowline
- Extend up slopes
  - So water doesn’t go around
- Material to reinforce toe
- Use appropriate sized material
  - Larger rock is stronger
- Max drainage area = 10 acres

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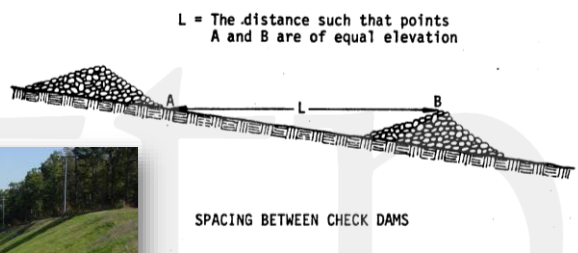
Ditch Check Spacing



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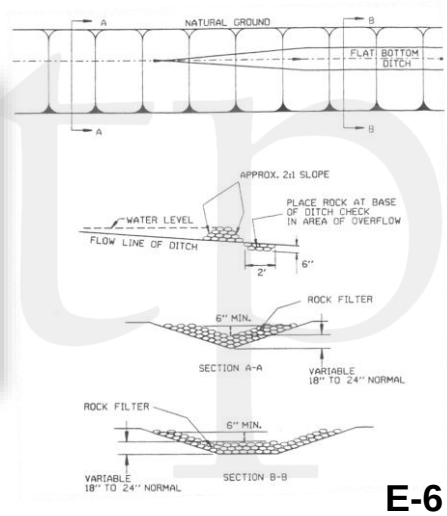
Rock Ditch Checks



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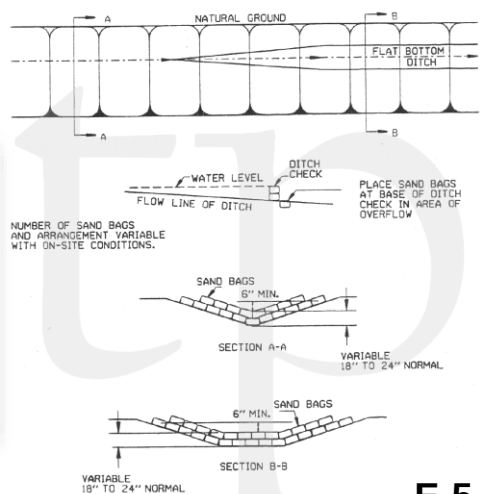
Sand Bag Ditch Checks

- May turn middle bags parallel to flow



E-5

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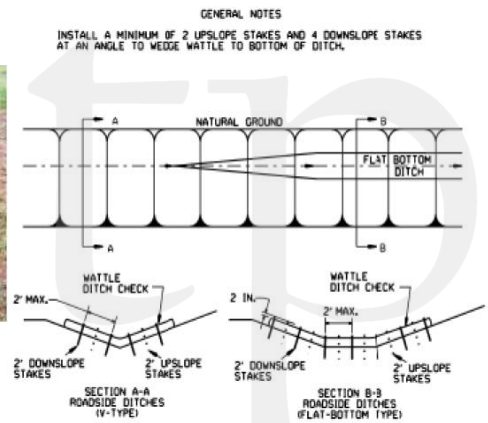
Wattle Ditch Checks

Photo Credit: RoLanka International, Inc.



E-1

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135

Ditch Checks – Alternating Materials

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Ditch Check Maintenance

- Inspect after rainfall
- Check toe for erosion
- If high velocity blow-out, use substantially larger rock
- Sediment traps may be excavated behind ditch checks

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Ditch Check Maintenance

- Clean out when 50% full

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Ditch Check Maintenance

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Do Not Use Straw Bales

- In NPDES General Construction Permit

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See Erosion Control Manual p. C-5

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Ditch Check Location

- Never place in a live stream

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2016 EROSION AND SEDIMENT CONTROL
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V. CONSTRUCTION EXITS	SATISFACTORY ___	(1)	(1)
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( )			
( )		(3)	(3)

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See Erosion Control Manual p. F-7

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Sediment Basin

- A water storage area created by excavating a pond or placing an earthen embankment across a low area or drainage swale

See Erosion Control Manual p. B-18

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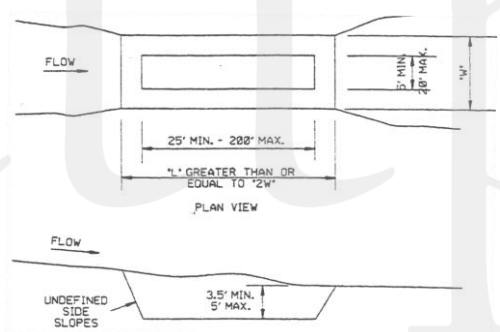
Sediment Basin

- Drainage area up to 10 acres
- Storage area = 3600 cf/acre
- Larger sediment basins may be specially designed



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Sediment Basin Location

- Ditch outlets
  - Periodically along or at end
- End of drainage structures
- Slope drain outlets
- Any location necessary to trap sediment prior to discharge offsite
- NEVER in a live stream

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Sediment Basin - Safety

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Sediment Basin - Maintenance

- Side slopes/outlet need repair
- 50% filled with sediment
- Embankment overtopped
- Additional controls needed

2016 EROSION AND SEDIMENT CONTROL
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( )			
( )		(3)	(3)

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See Erosion Control Manual p. F-7

Sediment Traps

- Small confinement area to allow sediment to settle
  - Commonly used at outlets of diversion structures
  - Do not use for areas greater than 5 acres

Photo Credit: U.S. EPA

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Sediment Traps

Photo Credit: arunwesterstreams.org

Photo Credit: 1st Resource Solutions, LLC

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Sediment Traps - Maintenance

- Repair needed
- 50% filled with sediment
- Embankment overtopped
- Additional controls needed

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2016 EROSION AND SEDIMENT CONTROL
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( )			
( )		(3)	(3)

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See Erosion Control Manual p. F-7

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Construction Exits

- At locations where construction traffic moves to the public road
- Limit offsite tracking
  - Green Book - 110
  - CGP
- Responsibility of the Contractor
- Sweeping is not a substitute

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See Erosion Control Manual p. B-22

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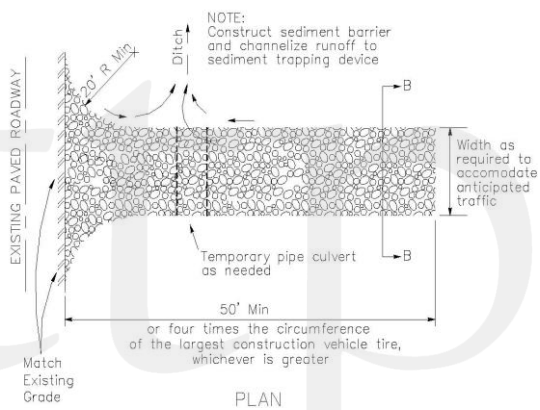
Construction Exit Dimensions

- Minimum width
  - 12 ft
- Minimum length
  - 50 ft
  - Or 4x the circumference of largest vehicle tire
- Coarse aggregate (3 inch stone or larger)
- Filter cloth below aggregate
- Slope
  - Sediment should not wash into public roadway
  - Use berm if slope is greater than 2%
    - 15 feet from exit
    - 6-8 inches high



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Washing/Shaker Plates

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155

Construction Exits - Maintenance

- Check for sediment being tracked onto roadway
- Caked dirt on aggregate should be scraped and new rock added

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2016 EROSION AND SEDIMENT CONTROL
DESIGN AND CONSTRUCTION MANUAL

JOB NUMBER: 1
DATE: 2
DATE OF LAST INSPECTION: 3
REPORT NO.: 4
NOTICE OF COVERAGE POSTED: 5 YES__ NO__
INSPECTIONS REQUIRED EVERY 7 DAYS AND SWPPP TO BE UPDATED WITHIN 7 BUSINESS DAYS

		MAINT.REQ.(LOCATION)	DATE WORK COMPLETED
I. SILT FENCES:	SATISFACTORY 6	(1) 8	(1) 9
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED, BY LOCATION #.			
ANY GAPS IN BOTTOM? ( )	TORN/SAGGING FABRIC ( )	(2)	(2)
SED. 1/3 FENCE HEIGHT 7 ( )	POST LEANING ( )		
ADDITIONAL CONTROLS NEEDED/OTHER ( )	( )	(3)	(3)
II. DIVERSION DIKES / DRAINAGE SWALES / SLOPE DRAINS:	SATISFACTORY	(1)	(1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED BY LOCATION #.			
OVERTOPPING/WATER ( )	WASHOUTS ( )	(2)	(2)
AREA NEEDS STABILIZATION/VEGETATION ( )	EXCESSIVE EROSION ( )		
ADDITIONAL CONTROLS NEEDED/OTHER ( )	( )	(3)	(3)
III. BARRIER / CHECK DAMS:	SATISFACTORY	(1)	(1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED BY LOCATION #.			
DAMAGED ( )		(2)	(2)
SED. 1/2 HEIGHT OF BARRIER / DAM ( )			
ADDITIONAL CONTROLS NEEDED/OTHER ( )	( )	(3)	(3)
IV. SEDIMENT BASINS:	SATISFACTORY	(1)	(1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED BY LOCATION #.			
SIDE SLOPES &/OR OUTFALL IN NEED OF REPAIR ( )		(2)	(2)
50% FILLED WITH SEDIMENT ( )			
EMBANKMENT CONTAINMENT OVERTOPPED ( )		(3)	(3)
ADDITIONAL CONTROLS NEEDED/OTHER ( )	( )		
V. CONSTRUCTION EXITS	SATISFACTORY	(1)	(1)
SIGNIFICANT TRACKING ONTO ROADWAY? ( )		(2)	(2)
CLEAN FILL NEEDED? ( )			
DOES ALL TRAFFIC USE EXIT Y/N? ( )			
OTHER ( )			
VI. GOOD HOUSEKEEPING / DISPOSAL OF CONCRETE WASTES:	SATISFACTORY	(1)	(1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED, BY LOCATION #.		(2)	(2)
( ) ( )		(3)	(3)
VII. OTHER: (specify)		(1)	(1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED, BY LOCATION #.		(2)	(2)
( )		(3)	(3)

F-7 11/1/16

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See Erosion Control Manual p. F-7

157

Wattles

- Tube of netting filled with coconut fiber, wood fiber, mulch, straw, or other organic material
- Diameters
  - 12”, 18”, 20”
- Used to divert or block stormwater
  - Silt Fence
  - Ditch Check
  - Diversion

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See Erosion Control Manual p. B-23

158

Wattles

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159

Wattle Installation

- Stake in place
  - "Teepee" effect
- Trench slightly

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160

Wattle - Maintenance

- Ensure flow is not undermining
- Remove sediment when 50% full

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161

Wattles Are Tasty!!

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162

Triangular Silt Dikes

- Lightweight foam
- Reusable
- Durable
  - Can drive over them
- Can be used for:
  - Ditch checks
  - Diversion Ridges
  - Drop Inlet Silt Fence
  - Temporary Slope Drain

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See Erosion Control Manual p. B-24

163

Triangular Silt Dike Installation

- Dimensions
  - Typical 7’ length
    - Attach additional sections using sleeve
  - 8 – 14” high
  - 16 – 20” base
- Follow mfr’s directions
- Bury apron in 3” trench
- Anchor w/ 8 to 10 staples
  - 6 – 8” long
- Anchor to pavement with liquid asphalt or adhesive

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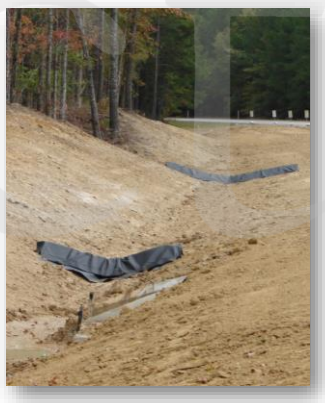
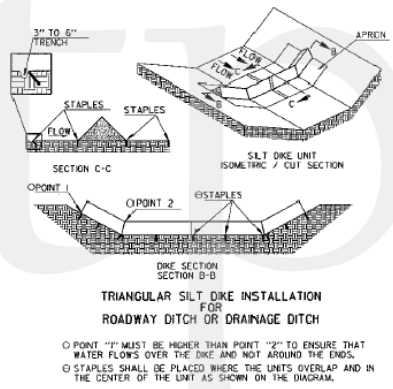
Triangular Silt Dike - Maintenance

- Additional inspection after rain
- Remove sediment at 50%





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165

Filter Socks

- Compost or non-treated wood encased in a 3-dimensional synthetic mesh tube
  - Typical diameters = 8 to 24 inches
- Serve as a filter (not a diverter)
  - Good protection for sensitive waters
- Heavy when wet
  - Don't have to trench
- Uses
  - Ditch checks
  - Perimeter/stockpile protection
  - Inlet protection

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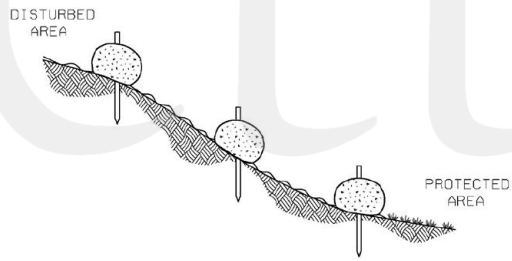
See Erosion Control Manual p. B-29

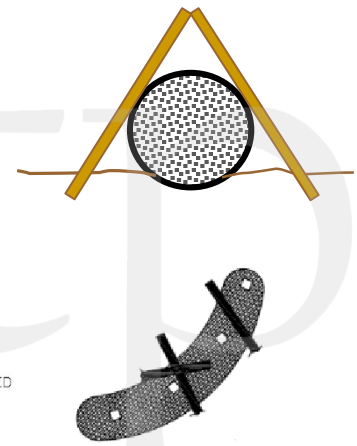
166

Filter Sock Installation

- Place perpendicular to flow
- Remove sediment at ½ height
- Repair/stitch with zip ties



SLOPE INTERUPTION



DITCH CHECK

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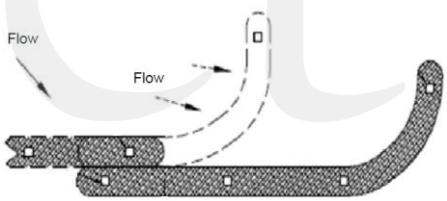
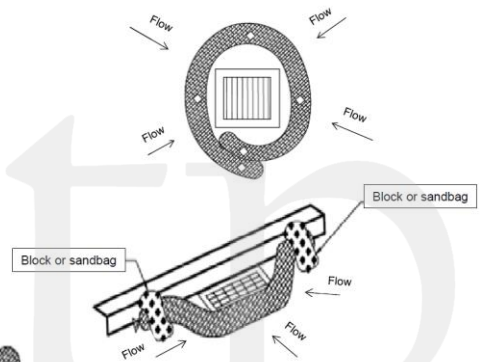
167

Filter Sock Installation

- Overlap lengths
- Secure with block or sandbag
- Ends should be directed upslope



PERIMETER CONTROL



DROP INLET (top) and CURB INLET PROTECTION (bottom)

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168

Filter Sock - Maintenance

- Additional inspections after rainfall
- If overtopped, add additional controls
- Repair any damage
- Remove sediment at 50%

Photo Credit: epa.gov

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169

Erosion Eels

- Woven exterior
- Shredded rubber fill
- Silt fence or check dam alternative
- Inlet protection
- No trenching

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170

Erosion Eels

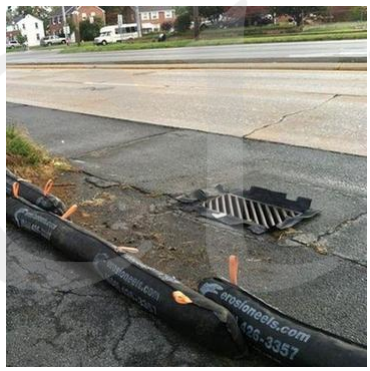

Photo Credit: bmpstore.com

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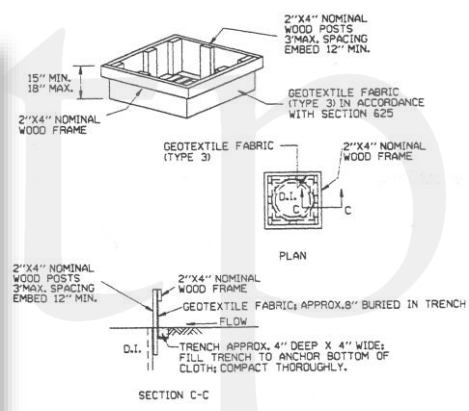
171

Inlet Protection

- Keep sediment from entering drainage structures, storm sewers, etc.



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See Erosion Control Manual p. B-17

172

Inlet Protection

- Silt fence is a dam . . . not a filter
- Drainage area should not exceed 1 acre

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Inlet Protection

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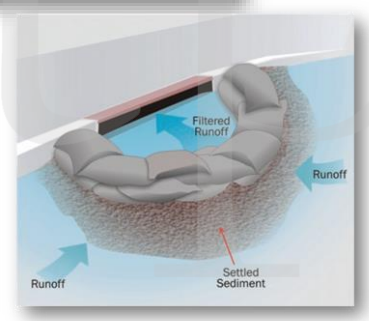
Inlet Protection



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175

Inlet Protection

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Inlet Protection

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Inlet Protection

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178

Outlet Protection

- Prevent scour at outlet of drainage structure
- Remove sediment from drainage structure
- Prevent sediment from traveling further
- Keep sediment away from water bodies

Photo Credit: dep.wv.gov

Photo Credit: Tetra Tech

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Outlet Protection

- Wrap protection around entire outlet

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Outlet Protection

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181

Outlet Protection

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Outlet Protection

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183

Temporary Work Road/Stream Crossing

- Must have ADEQ approval to violate buffer zone

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Temporary Work Road/Stream Crossing

- Maintain natural flow and habitats
- Clean rock on top to filter sediment

Photo Credit: wcdpa.com

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Temporary Stream Crossing

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186

Temporary Stream Crossing?

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187

Temporary Stream Crossing?

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Stream Diversions

- Separate the stream from the work area
  - Decrease potential for sediment discharge

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Stream Diversions

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Stream Diversions

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Stream Diversions

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192

Concrete Waste

- Types of concrete waste
  - Surplus concrete
  - Concrete wash water
  - Concrete grinding slurry
    - Sawcutting, coring, grooving
    - Can be considered hazardous due to high pH
  - Concrete dust from demolition
- Never within 50 ft of waterbody
  - Storm drains, inlets, open drainage areas
- Waste areas must be designated on plans

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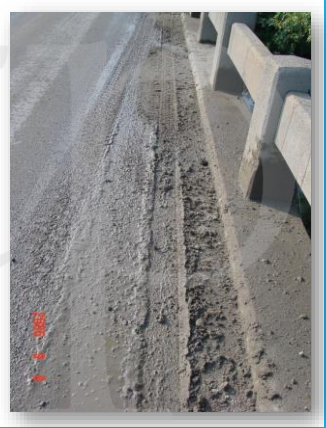
193

Temporary Concrete Washout Facilities

- Must have adequate holding capacity
- Impermeable bag or containment device
- After hardening, concrete may be broken up, removed, and disposed of
- Residue from coring/grinding operations will be picked up by vacuum device
  - Do not leave on pavement surface



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Concrete Washout Areas

- Above ground facilities
  - Minimum 4” freeboard

- Below ground facilities
  - Minimum 12” freeboard

- Remove material when filled to 75% capacity

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195

No Concrete Within 50’ of Waterbody

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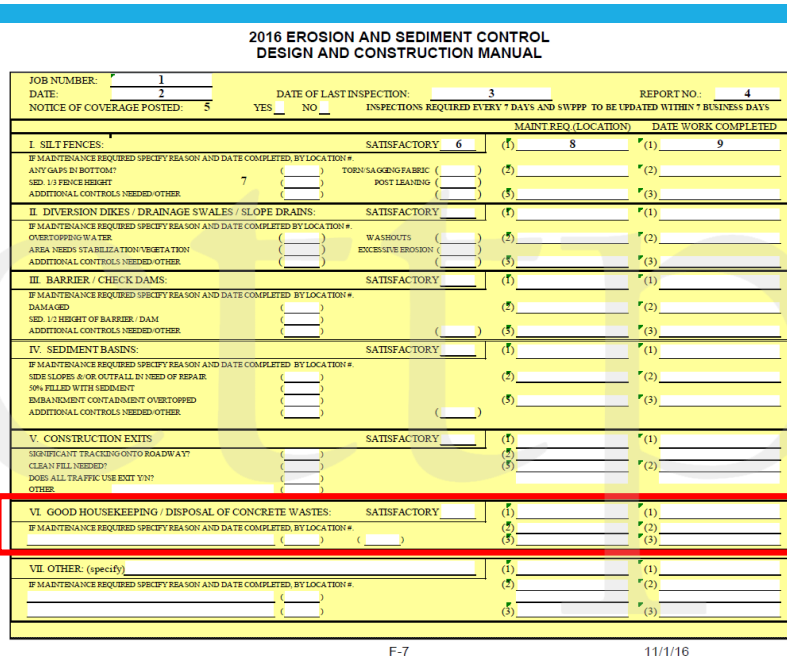
196



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F-7 11/1/16

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See Erosion Control Manual p. F-7

197

Permanent Erosion and Sediment Control Measures

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198

Permanent Controls

- Stay in place after construction is complete

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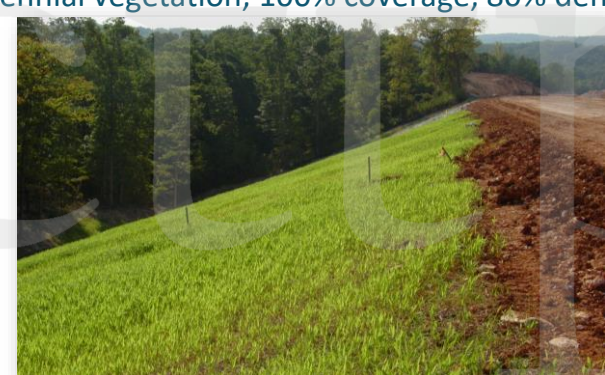
199

Vegetative Cover

- Best Erosion control measure available
- Permanent seeding
  - Perennial vegetation, 100% coverage, 80% density



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200

Seeding and Mulching

- Seeding and mulching
- Sod mulch with overseeding
- Solid sodding

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See Erosion Control Manual p. B-32

201

Hydroseeding

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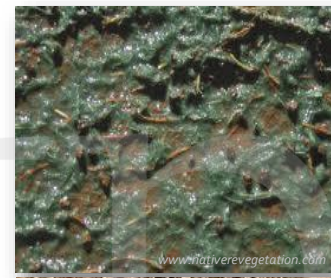
202

Encourage Seed Growth

- Mulching, tackifiers, adhesives
- Mesh, blankets
- Mulch Control Netting
- Topsoil
  - Stockpile stripped materials



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203

Watering (Std. Specs Section 620)

- Permanent Seeding
  - April 1 through December 31
  - Initial application
    - 20,400 gallons of water per acre
  - Weekly application (at least 4 weeks)
    - ¾" per week, deduct rainfall
- Solid Sod
  - Initial application
    - 20,400 gallons of water per acre
  - Weekly application (at least 3 weeks)
    - ¾" per week, deduct rainfall

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Erosion Control Matting Installation

- Install in vertical strips on slope
- Follow mfr's instructions for tacks/staples

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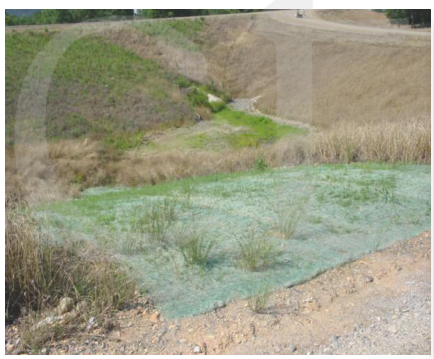
205

Erosion Control Matting

- Class 2 or Class 3 (typical)
- Extend to toe of slope



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206

Matting "Disappears"

Or does it?

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207

Slope Design

- Flat slopes are better (2:1 or flatter)
  - More seeding area but safer and more stable

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See Erosion Control Manual p. B-32

208

Benching

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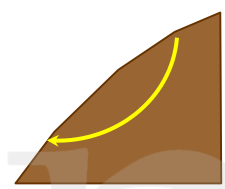
209

Structural Slope Stabilization



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210

Alternative Slope Materials

- Riprap

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211

Alternative Slope Materials

- Gabions

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212

Grouted Riprap

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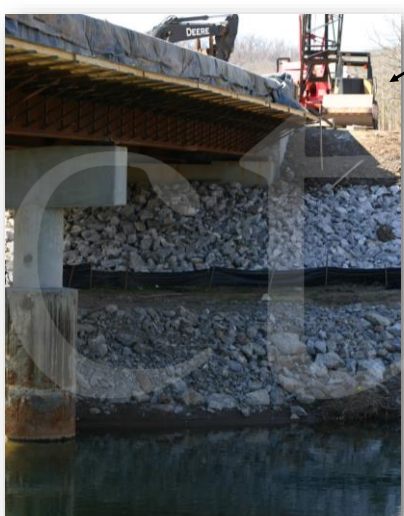
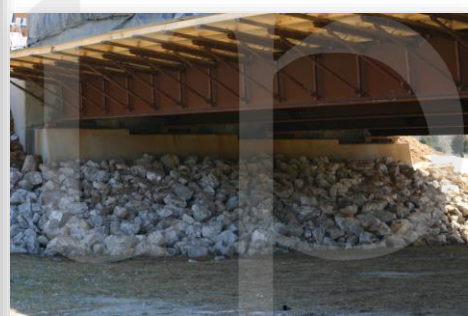
213

Riprap for Bridge Scour



During Construction



After Construction

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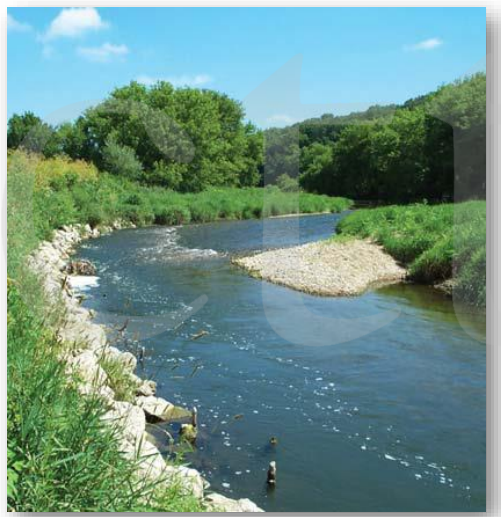
214

Streambank Stabilization



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215

Channel Linings

- When velocity, depth of flow or channel features will cause scour
  - Erosion control matting
  - Solid sod

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See Erosion Control Manual p. B-33

216

Channel Linings

- Ditch paving

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217

Channel Linings

- Riprap

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218

Culverts

- Designed specifically for the site
- Can constrict water flow

- May need outlet protection

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See Erosion Control Manual p. B-33

219

Bottomless Culverts

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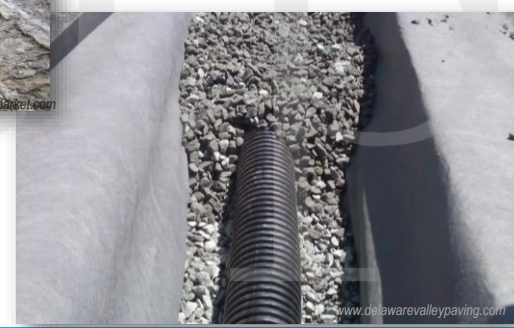
220

Underdrains

- Help alleviate unstable soil conditions by preventing soils form becoming excessively wet



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See Erosion Control Manual p. B-33

221

Review of BMPs

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222

Design Problem

223

Inspections

224

Inspections

- Performed by qualified personnel
  - Provided by the "operator" (ARDOT)
  - Inspect all disturbed areas, storage areas, affected areas, discharge locations, waterbodies, construction exits, downstream locations
- Frequency
  - Every 7 calendar days, or
  - Every 14 days *AND* within 24 hours of ¼" rainfall event
    - Rain gauge required on site
  - Except when frozen or during adverse weather conditions
- Complete repairs within 3 business days of discovery

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225

ADEQ Inspection Report Form

ARR150000 Inspection Form – Stormwater Pollution Prevention Plan

Inspector Name: _____ Date of Inspection: _____

Inspector Title: _____

Days Since Last Rain Event: _____ days Rainfall Since Last Rain Event: _____ inches

Description of any Discharges During Inspection: _____

Location of Discharges of Sediment/Other Pollutant (specify pollutant & location): _____

Locations in Need of Additional BMPs: _____

Information on Location of Construction Activities

Location	Activity Begin Date	Activity Occuring Now (y/n)?	Activity Ceased Date	Stabilization Initiated Date	Stabilization Complete Date

Information on BMPs in Need of Maintenance

Location	In Working Order?	Maintenance Scheduled Date	Maintenance Completed Date	Maintenance to be Performed By

Changes required to the SWPPP: _____ Reasons for changes: _____

SWPPP changes completed (date): _____

"I certify under penalty of law that this document and all attachments such as Inspection Form were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Responsible or Cognizant Official: _____ Date: _____

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Inspections by ARDOT

- Completed by a "knowledgeable" person
  - CTTP certification (5-yr certification)
  - Annual refresher by NPDES Section
- Must be performed every 7 days (minimum)
  - Check all BMPs, note items to be addressed
  - Identify additional BMPs needed
  - Describe discharge locations
  - Identify locations of sediment
  - Off-site impacts
- Complete inspection report

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2016 EROSION AND SEDIMENT CONTROL DESIGN AND CONSTRUCTION MANUAL

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50% FILLED WITH SEDIMENT ( )		
EMBANKMENT CONTAINMENT OVERTOPPED ( )	(3)	(3)
ADDITIONAL CONTROLS NEEDED/OTHER ( ) ( )		
V. CONSTRUCTION EXITS SATISFACTORY ___	(1)	(1)
SIGNIFICANT TRACKING ONTO ROADWAY? ( )	(2)	(2)
CLEAN FILL NEEDED? ( )		
DOES ALL TRAFFIC USE EXIT Y/N? ( )		
OTHER: ( )		
VI. GOOD HOUSEKEEPING / DISPOSAL OF CONCRETE WASTES: SATISFACTORY ___	(1)	(1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED, BY LOCATION #.	(2)	(2)
( ) ( )	(3)	(3)
VII. OTHER: (specify)	(1)	(1)
IF MAINTENANCE REQUIRED SPECIFY REASON AND DATE COMPLETED, BY LOCATION #.	(2)	(2)
( )	(3)	(3)
( )		

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See Erosion Control Manual p. F-4

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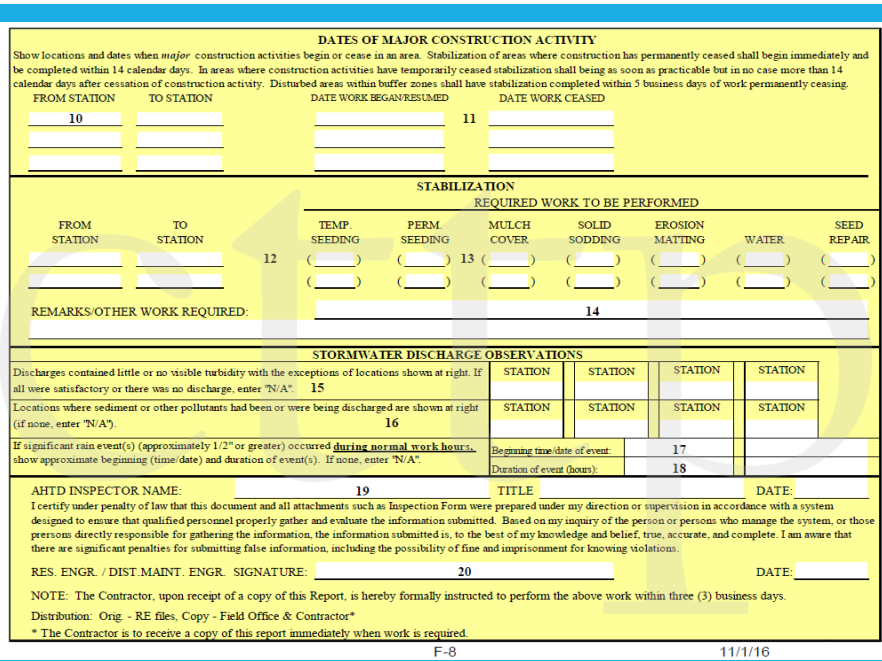

DATES OF MAJOR CONSTRUCTION ACTIVITY

Show locations and dates when *major* construction activities begin or cease in an area. Stabilization of areas where construction has permanently ceased shall begin immediately and be completed within 14 calendar days. In areas where construction activities have temporarily ceased stabilization shall being as soon as practicable but in no case more than 14 calendar days after cessation of construction activity. Disturbed areas within buffer zones shall have stabilization completed within 5 business days of work permanently ceasing.

FROM STATION	TO STATION	DATE WORK BEGAN/RESUMED	DATE WORK CEASED
10			11

STABILIZATION

REQUIRED WORK TO BE PERFORMED

FROM STATION	TO STATION	TEMP. SEEDING	PERM. SEEDING	MULCH COVER	SOLID SODDING	EROSION MATTING	WATER	SEED REPAIR
		12 ( )	( )	13 ( )	( )	( )	( )	( )
		( )	( )	( )	( )	( )	( )	( )

REMARKS/OTHER WORK REQUIRED: 14

STORMWATER DISCHARGE OBSERVATIONS

	STATION	STATION	STATION	STATION
Discharges contained little or no visible turbidity with the exceptions of locations shown at right. If all were satisfactory or there was no discharge, enter "N/A". 15				
Locations where sediment or other pollutants had been or were being discharged are shown at right (if none, enter "N/A"). 16				

If significant rain event(s) (approximately 1/2" or greater) occurred **during normal work hours**, show approximate beginning (time/date) and duration of event(s). If none, enter "N/A".

Beginning time/date of event: 17

Duration of event (hours): 18

AHTD INSPECTOR NAME: 19 TITLE DATE:

I certify under penalty of law that this document and all attachments such as Inspection Form were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

RES. ENGR. / DIST.MAINT. ENGR. SIGNATURE: 20 DATE:

NOTE: The Contractor, upon receipt of a copy of this Report, is hereby formally instructed to perform the above work within three (3) business days.

Distribution: Orig. - RE files, Copy - Field Office & Contractor*

* The Contractor is to receive a copy of this report immediately when work is required.

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Inspection Report

- Complete and give to Contractor on day of inspection
  - Print and deliver
  - Enter in DocExpress and email
- Contractor must *complete* repairs within 3 business days of discovery
- Update as-built plans within 7 business days
- Document rainfall events
  - ½" or greater
  - During normal work hours

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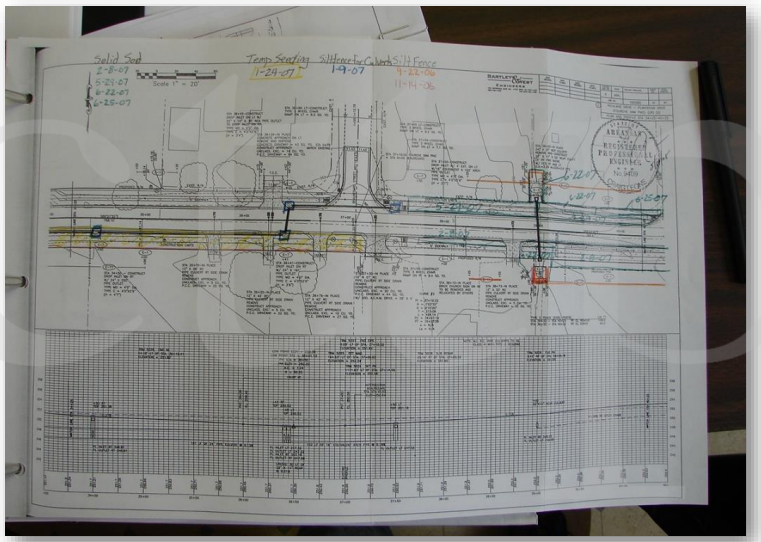
Continuously Update SWPPP



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Supplemental Inspections

- Required when Contractor is halting work in an area
- Additional checks to verify Contractor is addressing deficiencies
  - Be familiar with Contractor schedules
- After significant storm event

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Inspections by ADEQ

- Performed by ADEQ at any time
  - During normal business hours
- EPA has authority to inspect at any time
- USF&W, USACE
- Usually the result of complaints

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Inspections by ADEQ

- Direct to ARDOT project inspector
- Notify Resident Engineer as soon as possible
- All parts of SWPPP must be available
  - *SiteManager* records
- Be "pleasant, cooperative, and honest"
  - Just the facts
- Write a summary of the inspection
- Take pictures of any problems
- Respond to complaints in a timely manner
- Keep contractor informed

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Good Housekeeping

- NPDES permit also restricts discharge of waste
  - Keep applicable Safety Data Sheets (SDS) available
  - Keep wastes away from waterbodies
- Oil, transmission fluid, fuel, etc.
  - Store 100' from waterbody
- Concrete waste
  - SP for grinding, if required
- Flammable trade waste (lumber, plywood, etc.)
  - Cannot be burned unless used for warming
- Reportable quantity spills must be reported to ADEQ

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Good Housekeeping

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Utility Work

- Utility companies are responsible for:
  - Developing and implementing own SWPPP
  - Obtaining own NPDES Permits
  - Minimizing erosion and sediment on project
- Responsibility rests with ARDOT if utility work is on ROW and ARDOT has NPDES permit
  - Depends on contract language
- Encourage utilities to be responsible for their work
- RE may stop work if necessary
  - Advise and document

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Inspection Problem

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Reading Plans

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Homework & Study Guide

Breakfast @ 8:00a
Class begins @ 8:30a

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