

# Practical Guidelines for Application of Temporary BMPs

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**IAFSM**  
*Illinois Association for  
Floodplain and Stormwater Management*

# Chicken and the egg....

- Which comes first....
  - Erosion Control ?
  - Sediment Control ?
- Know the difference.



*"Chicken Erosion" by Norm Christiansen*



# Water Erosion

- Sheet erosion – topsoil removal
  - Rill erosion – small streams
  - Gully erosion – deeper depressions
  - Riparian erosion – streambanks
- 
- Reduce erosion with a strategic BMP plan!
    - Permanent measures
    - Temporary measures

# Permanent BMPs

- Infiltration Basin / Bioswale
- Permanent rock check dam
- Wet Detention Basin
- Turf Reinforcement Mat (TRM)





# Temporary BMPs – Know what works where!

- Silt Fence
- Hay Bale
- Sediment Trap
- Ditch Check
- Inlet Protection
- Erosion Control Blankets
- Polymers
- Turbidity Curtain / barrier
- Hydroseed
- Construction Entrance
- Concrete wash
- Dewatering bags



# SILT FENCE





# Silt Fence

- TEMPORARY barrier of entrenched filter fabric stretched across supporting posts to intercept sediment-laden runoff from small disturbed drainage areas
- Purpose: cause deposition of transported sediment from sheet flows from disturbed areas

# Silt Fence

- Maximum of 0.5 acres per 100 LF
- No concentrated flows to the barrier
- One construction season OR 6 months
  - Longer periods will require other measures
- Inlet protection (effective if done right)
- Culvert inlet protection
- T&E protection / guidance



# Silt Fence

## Allowable Slope Lengths

Slope (%)	Maximum Spacing (ft.)
25	50
20	75
15	125
10	175
Flatter than 10	200

(Maximum allowable slope length contributing runoff to the silt fence.)

- *Illinois Urban Manual Code 920*

# Illinois Urban Manual

<http://www.il.nrcs.usda.gov/technical/engineer/urban/listdraw.html#Alphabetical>

▸ Wildlife

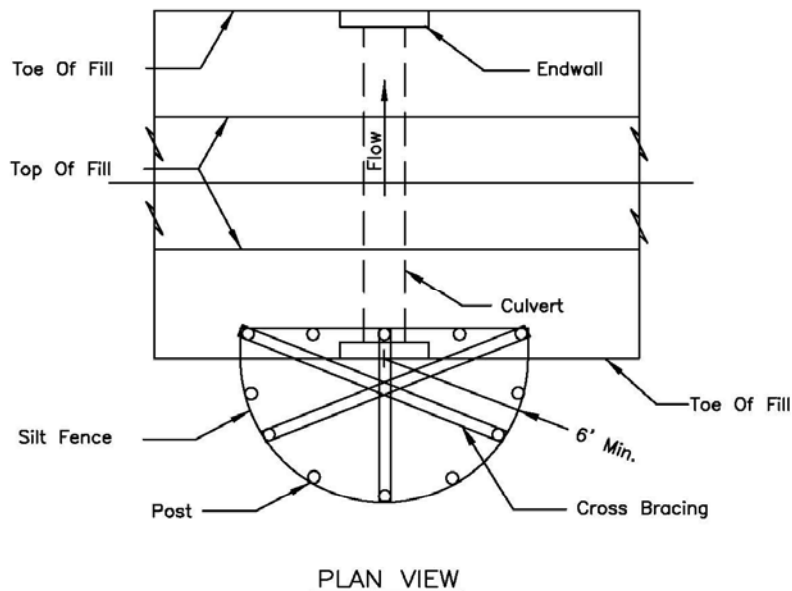
▸ Find a Service Center

▸ Central Region

## Alphabetical List of Standard Drawings

Drawing Name	Number	PDF	DXF	DWF	DWG
Bridge Scour Protection	IL-700	<a href="#">PDF</a>	<a href="#">DXF</a>	<a href="#">DWF</a>	<a href="#">DWG</a>
CMP Drop Inlet and Baffle (3 sheets)	IL-578 (A)	<a href="#">PDF</a>	<a href="#">DXF</a>	<a href="#">DWF</a>	<a href="#">DWG</a>
	IL-578 (B)	<a href="#">PDF</a>	<a href="#">DXF</a>	<a href="#">DWF</a>	<a href="#">DWG</a>
	IL-578 (C)	<a href="#">PDF</a>	<a href="#">DXF</a>	<a href="#">DWF</a>	<a href="#">DWG</a>
CMP Water Control Structure (2 sheets)	IL-594 (A)	<a href="#">PDF</a>	<a href="#">DXF</a>	<a href="#">DWF</a>	<a href="#">DWG</a>
	IL-594 (B)	<a href="#">PDF</a>	<a href="#">DXF</a>	<a href="#">DWF</a>	<a href="#">DWG</a>
Construction Road Stabilization	IL-506	<a href="#">PDF</a>	<a href="#">DXF</a>	<a href="#">DWF</a>	<a href="#">DWG</a>
Corrugated Metal Pipe Diaphragm (2 sheets)	IL-579 (A)	<a href="#">PDF</a>	<a href="#">DXF</a>	<a href="#">DWF</a>	<a href="#">DWG</a>
	IL-579 (B)	<a href="#">PDF</a>	<a href="#">DXF</a>	<a href="#">DWF</a>	<a href="#">DWG</a>
Corrugated Metal Pipe Support (2 sheets)	IL-586 (A)	<a href="#">PDF</a>	<a href="#">DXF</a>	<a href="#">DWF</a>	<a href="#">DWG</a>
	IL-586 (B)	<a href="#">PDF</a>	<a href="#">DXF</a>	<a href="#">DWF</a>	<a href="#">DWG</a>
Coupling Band for Corrugated Metal Pipe (2 sheets)	IL-580 (A)	<a href="#">PDF</a>	<a href="#">DXF</a>	<a href="#">DWF</a>	<a href="#">DWG</a>
	IL-580 (B)	<a href="#">PDF</a>	<a href="#">DXF</a>	<a href="#">DWF</a>	<a href="#">DWG</a>

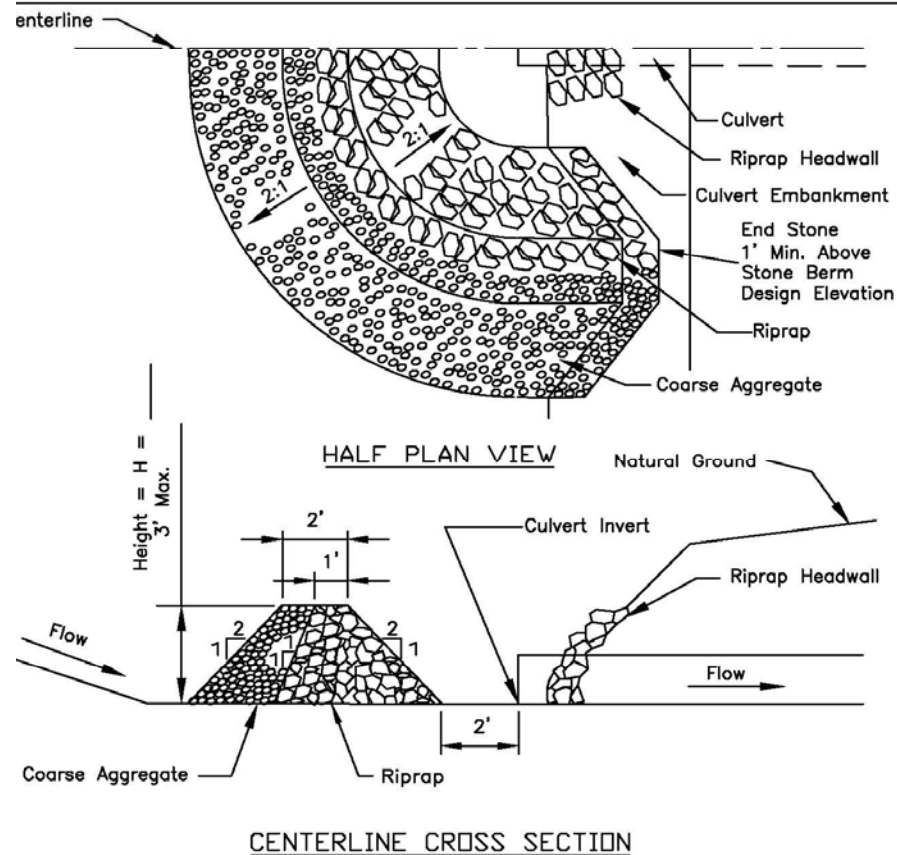
## CULVERT INLET PROTECTION - SILT FENCE



### NOTES:

1. The silt fence shall meet the requirements as shown on standard drawing IL-620 SILT FENCE except the maximum post spacing shall be 3 feet and the tops of posts shall be cross braced.
2. Sediment shall be removed when the sediment has accumulated to one-half the height of the silt fence.
3. The maximum drainage area to the culvert being protected is 1 acre.

## CULVERT INLET PROTECTION - STONE



### Notes:

- Sediment shall be removed when the sediment has accumulated to one-half the height of the stone berm.
- Coarse aggregate shall meet one of the following IDOT coarse aggregate gradations, CA-1, CA-2, CA-3 or CA-4.
- Riprap shall meet IDOT gradation RR-3 or RR-4. Any permanent riprap, such as for the culvert headwall, shall meet IDOT Quality Designation A.
- Coarse aggregate and riprap shall be placed according to construction specification 25 ROCKFILL using placement Method 1 and Class III compaction.
- The maximum drainage area to the culvert being protected is 3 acres.
- See plans for H dimension.
- Tie the stone berm into the culvert embankment a minimum of 1 foot above the design elevation of the stone berm.

### REFERENCE

Project \_\_\_\_\_  
 Designed \_\_\_\_\_ Date \_\_\_\_\_  
 Checked \_\_\_\_\_ Date \_\_\_\_\_  
 Approved \_\_\_\_\_ Date \_\_\_\_\_



### STANDARD DWG. NO.

IL-508SF  
 SHEET 1 OF 1  
 DATE 1-29-99

### REFERENCE

Project \_\_\_\_\_  
 Designed \_\_\_\_\_ Date \_\_\_\_\_  
 Checked \_\_\_\_\_ Date \_\_\_\_\_  
 Approved \_\_\_\_\_ Date \_\_\_\_\_



### STANDARD DWG. NO.

IL-508ST  
 SHEET 1 OF 1  
 DATE 1-29-99









Multiple runs break the control area into manageable storage areas.



J-hooks create smaller ponding areas.



Remove silt and install new fence





Not a good use of silt fence.







18 AUG 2009









Modify construction limits BEFORE starting construction.



***The Lake Jackson Ecopassage;*** Temporary Solution: Fences to direct turtles through a culvert under the road

# Hay Bales



## Not recommended in some areas

- Almost always a better alternative method
- Can be used in
  - Concrete washes
  - Sediment traps
  - Inlet protection
  - Baffle creation
  - Ditch checks











allsection.jpg

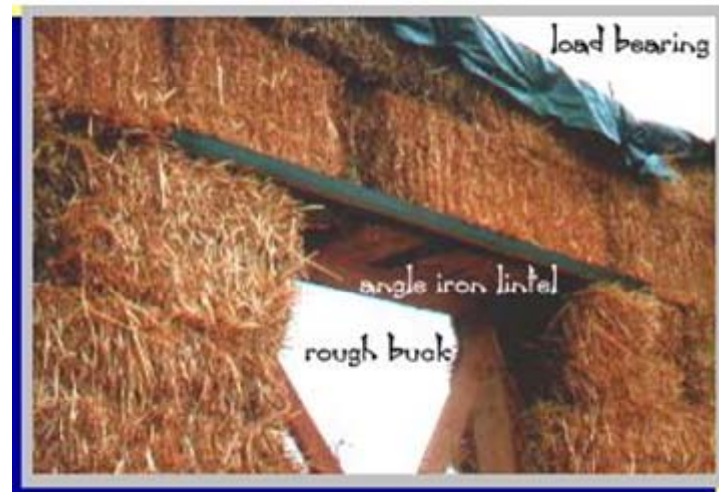
COMPROMISE FOR  
AND SOLAR GAIN

REQUIRED OVER WINDOWS  
PARTS BALES ABOVE WINDOWS

ED DIRECTLY TO POSTS AND  
ITS

TAL LATH ON ALL RADIUS CORNERS  
W SILL CONNECTED TO COLUMNS  
PLATES

OF BALES HELD IN PLACE BY  
ABOUT 8" CENTERS



METAL ROOF 0/30 LB MEMBRANE ON 7/16" OSB  
10/12 SLOPED WOOD TRUSSES  
PROVIDE DIAGONAL 2X4 LATERAL BRACING  
UNDERSIDE OF TOP CORD  
R 40 CELLULOSE BLOWN IN INSULATION

#### FRAMING

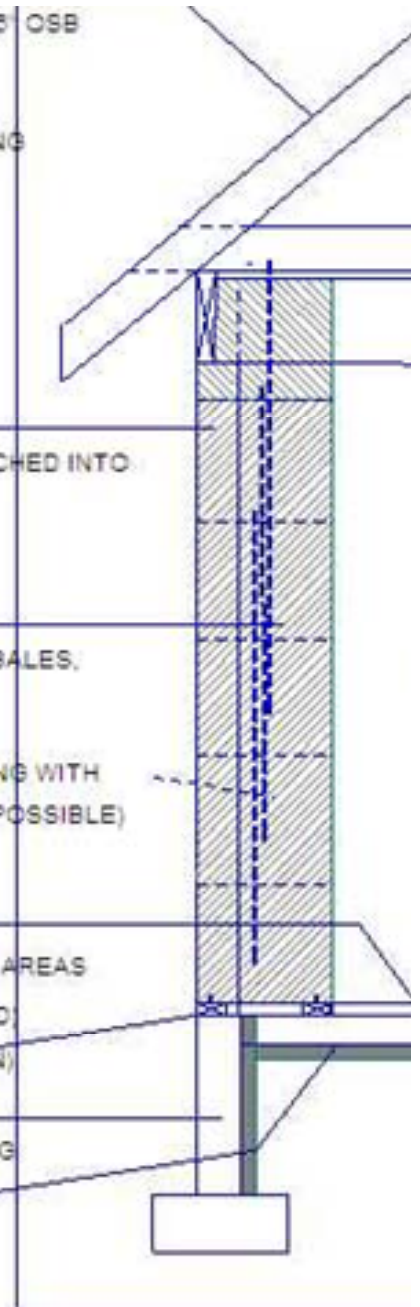
PERIMETER 11-7/8 MICROLAM BEAM NOTCHED INTO  
AND SUPPORTED BY 4X4 X 8' POSTS

#### WALLS

SIX COURSES OF "TWO STRING" STRAW BALES,  
18" WIDE, 16" HIGH, 36" LONG  
TWO 1/2" X 60" REBAR PER BALE STARTING WITH  
4TH COURSE (WIRED TO FRAME WHERE POSSIBLE)

#### FLOOR

4" CONC. SLAB WITH TILE OVER IN SOME AREAS  
2X4 TREATED PLATE BOLTED (OR NAILED)  
TO FOUNDATION (PEA GRAVEL BETWEEN)  
FOUNDATION  
6" CONC. STEM WALL ON 8" X 16" FOOTING  
2" RIGID FOAM INSULATION



[www.balewatch.com](http://www.balewatch.com)

# Sediment Traps





# Sediment Trap

- Detain sediment-laden runoff from disturbed area long enough to allow the majority of the sediment to settle out
- Used for concentrated flows / points of discharge
  - Pipe/culvert outlet
  - Dewatering device outlet
  - Can be used in conjunction with jute rolls and polymers
- In place until tributary area is stabilized



# Sediment Trap

- Maximum FIVE acres of tributary area
- For concentrated flow areas of ONE acre or less  
– install ditch checks
- For larger areas – consider a Sediment Basin /  
Wet Detention Basin
- Location should not interfere with construction activity
- Protect embankment to 10-year design
- 3' minimum depth desired (or equiv. volume)

# Sediment Trap

- Install prior to any up-slope disturbance
- Divert flows from anticipated drainage areas to the traps
- Size to be effective at trapping the medium and course grained
- Smaller fine-grained particles extracted by use of polymers or large areas
- Guide for sizing the trap, weir, and other design parameters
  - <http://dnr.wi.gov/runoff/pdf/stormwater/techstds/erosion/dnr1063-SedimentTrap.pdf>

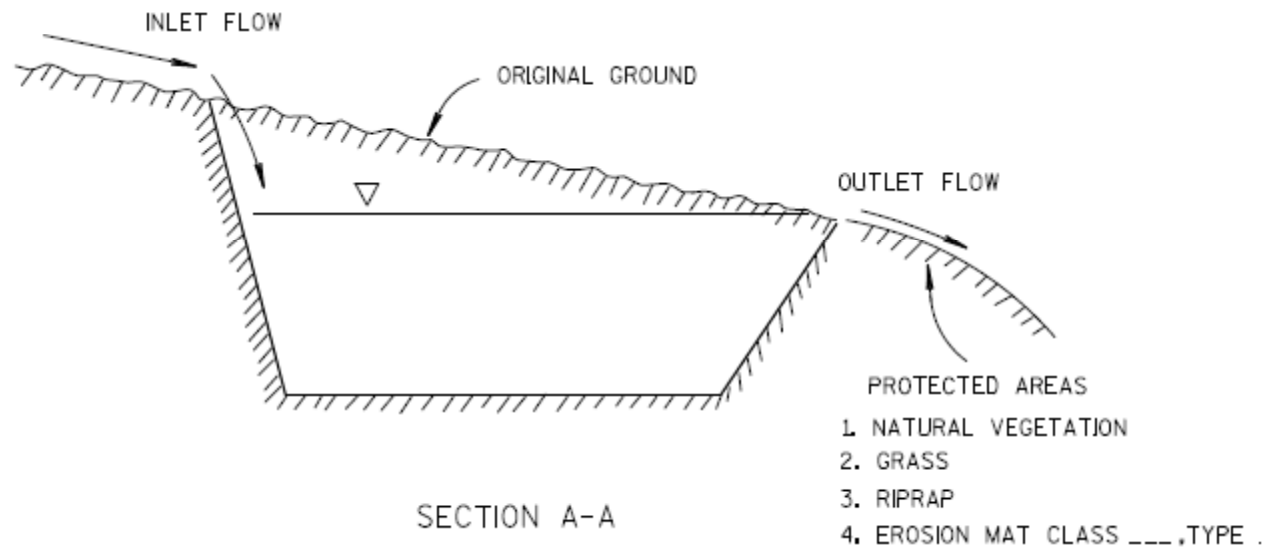
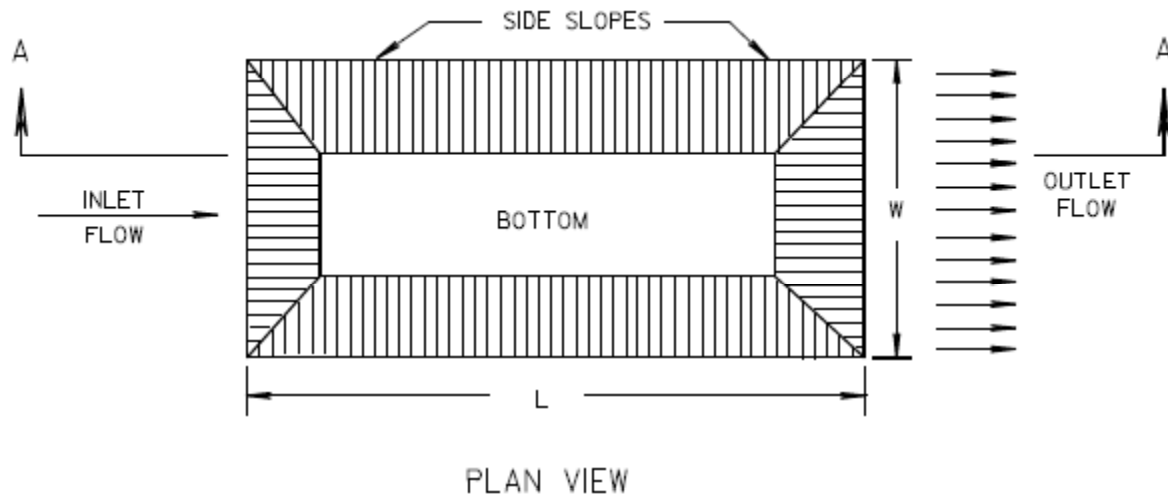


# Sediment Trap

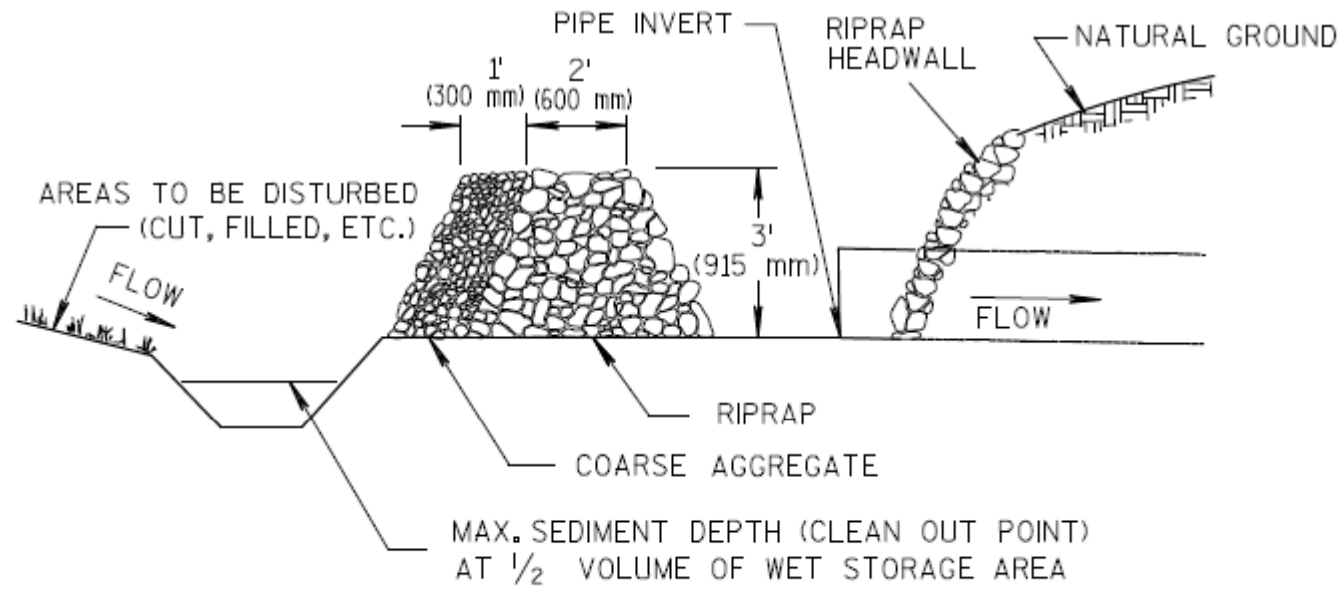
## Inspection / Maintenance

- Remove sediment deposits when they reach 1'
  - Stockpile / dry out / haul offsite
- Check for clogged outlet / clean
- Proper disposal of sediment removed from trap
- Remove trap and stabilize area if up-slope areas are stabilized
- *Stabilized = Land disturbing activities at site are complete and a uniform vegetation is established to 70% density for unpaved areas.*

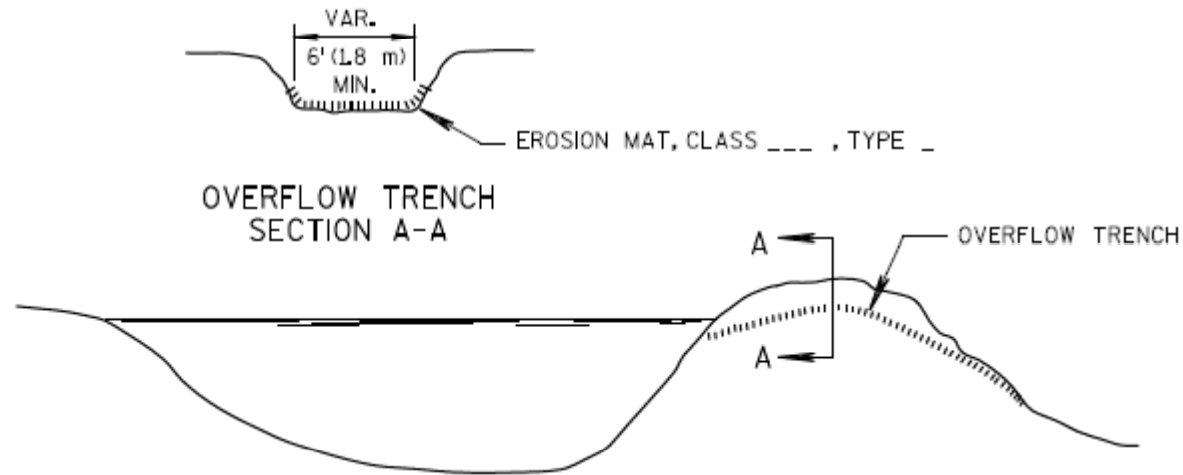




TYPICAL EXCAVATED SEDIMENT TRAP



## CULVERT INLET SEDIMENT TRAP



NOTE: EXCAVATION AND BACKFILL FOR SEDIMENT BASIN TO BE PAID FOR UNDER "UNCLASSIFIED EXCAVATION" ITEM. (EXACT DIMENSIONS TO BE AS DIRECTED BY THE ENGINEER.)

CLEANING OF SEDIMENT BASINS, WHEN DIRECTED BY THE ENGINEER, IS PAID FOR UNDER THE ITEM OF "CLEANING SEDIMENT BASINS" (C.Y.)

### SEDIMENT BASIN AND OUTLET DETAIL

# Ditch Checks

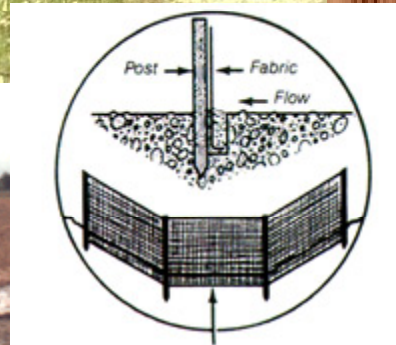
Silt Fence

Hay Bale

Rock Check























# Silt Fence Ditch Checks

- Water should be flowing THROUGH - not over!
- Perpendicular to flowline
- Ground level @ ends of fences = higher than the top of lowpoint in middle
  - Prevents erosion at edges
- Ditches less than 6%
- Use rock check dams for heavier flows or steeper grades



# Silt Fence Ditch Check Spacing Guideline



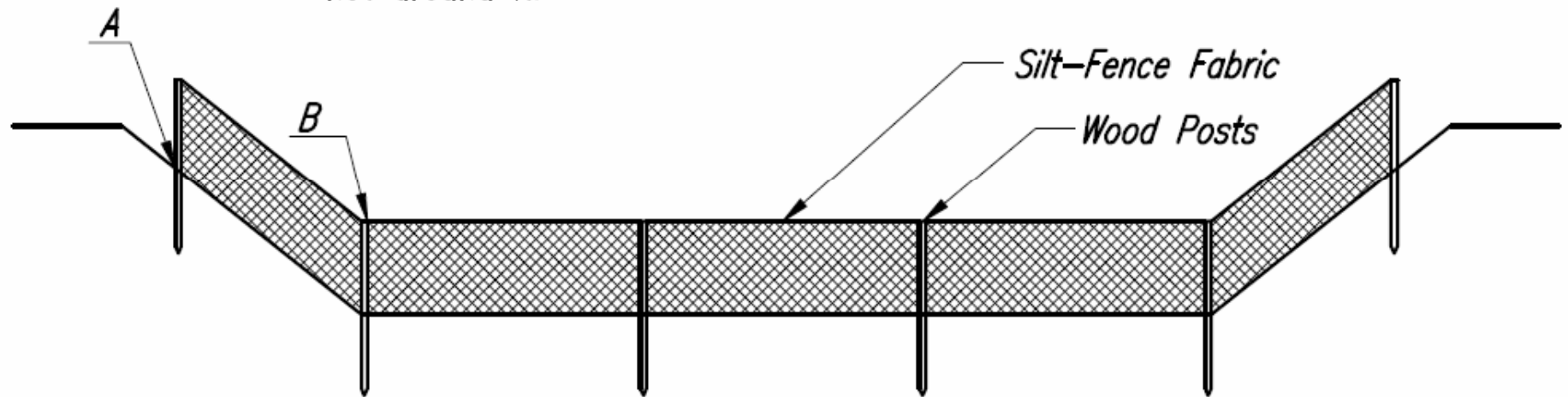
<b>Slope of Channel (Percent)</b>	<b>Spacing of Silt Fence Checks (Feet)</b>
0.5	200
1.0	200
2.0	100
3.0	65
4.0	50
5.0	40
6.0	30



# Silt Fence Ditch Check Installation Guide

- Trench perpendicular to flowline (12" deep)
- Lay edge of silt fence fabric on u/s and spoil on d/s
- Backfill over fabric leaving 2' to 3' exposed
- Drive in posts on d/s side min. of 24"
- Posts no more than 4' apart
- Silt fence fabric – AASHTO M288 96
- Posts typically 2" square wooden, 4' long
- Attach posts with ties, staples, wire, or nails

NOTE: Point A must be higher than Point B so that water flows over the silt fence fabric and not around it.



ELEVATION

SILT FENCE DITCH CHECKS  
(STREAM PROTECTION)



# Silt Fence Ditch Checks

## What not to do!

- Silt fence ditch checks not designed to overtop
- Posts are on the downstream side!
- Not in front of a culvert outlet
- Intended for low flow areas
- Follow spacing guidelines
- Make sure check is long enough to span ditch
- Anchor sufficiently





# Silt Fence Ditch Checks

## Routine Inspections

- Has been overtopped?
- Is there a silt deposit that needs to be removed?
- Does the silt fence sag excessively?
- Is the silt fence still attached to the posts?
- Is it still trenched in?



# Straw Bale Ditch Checks

- Downstream scour apron using a double-netted straw Erosion Control Blanket (ECB)
- Perpendicular to the flowline
- Extend far enough to cover ground elevation above the lowest middle point
- Slopes of 6% or less.
- Low flow areas

## Straw Bale Ditch Check

<b>Slope of Channel (Percent)</b>	<b>Spacing of Silt Fence Checks (Feet)</b>
0.5	200
1.0	200
2.0	100
3.0	65
4.0	50
5.0	40
6.0	30





# Straw Bale Ditch Check Install Guide

- Trench 4” deep by width of bale (straight line)
- Install ECB on upstream side at bottom u/s edge of trench
- Anchor ECB with 8” landscape staples @ 18” o.c.
- Anchor ECB’s apron portion @ 18” o.c. perpendicular to flow
- Insert bales into trench over ECB, butt tight
- Drive stakes 12” into ground
- Backfill excavated soil against u/s side & compact
  - No more than 3” to 4” deep and 24” u/s

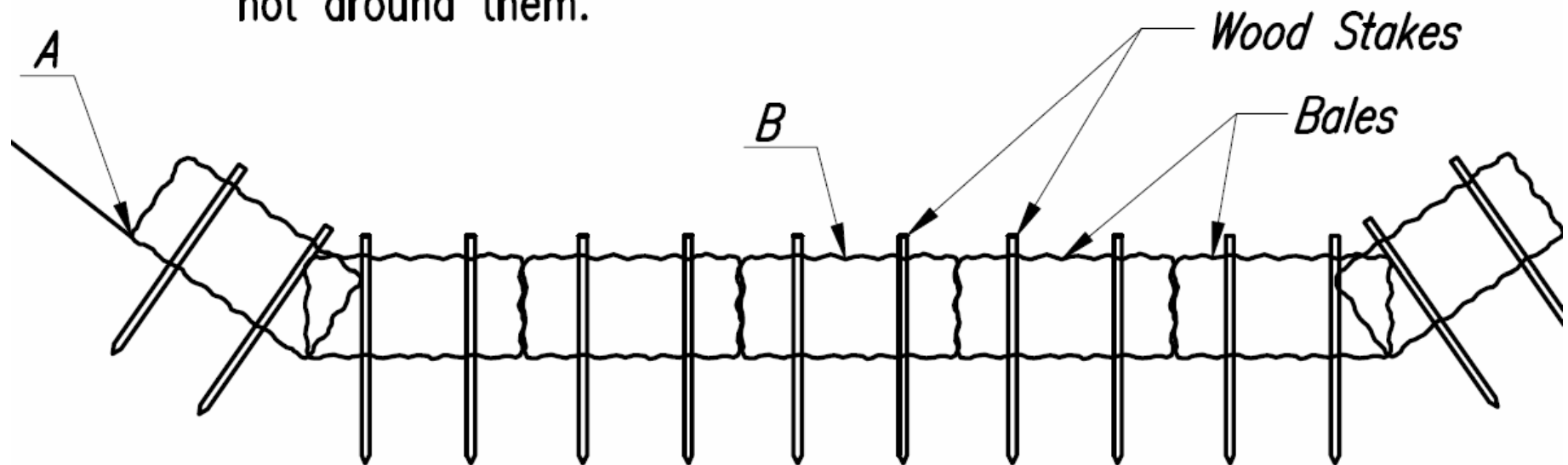


# Straw Bale Ditch Checks

## What not to do!

- Not in front of a culvert outlet
- Intended for low flow areas
- Follow spacing guidelines
- Make sure check is long enough to span ditch
- Anchor and trench sufficiently
- NOT at ground level
  - Water will flow under!

NOTE: Point A must be higher than Point B  
so that water flows over the bales and  
not around them.



## STRAW BALE DITCH CHECKS





# Straw Bale Ditch Checks

## Routine Inspections

- Does the water flow around the ditch check?
- Does the water flow under the ditch check?
- Is there a silt deposit that needs to be removed?
- Are the bales decomposing due to age/water damage?
- Water flowing between bales?

# Improper installation....





# Rock Ditch Checks

- Intercept and pond stormwater
- Energy dissipation allows large portion of sediment to be settled
- Water exits the ditch check by flowing over its crest
- Great for future rip-rap lined ditch



# Rock Ditch Checks Installation

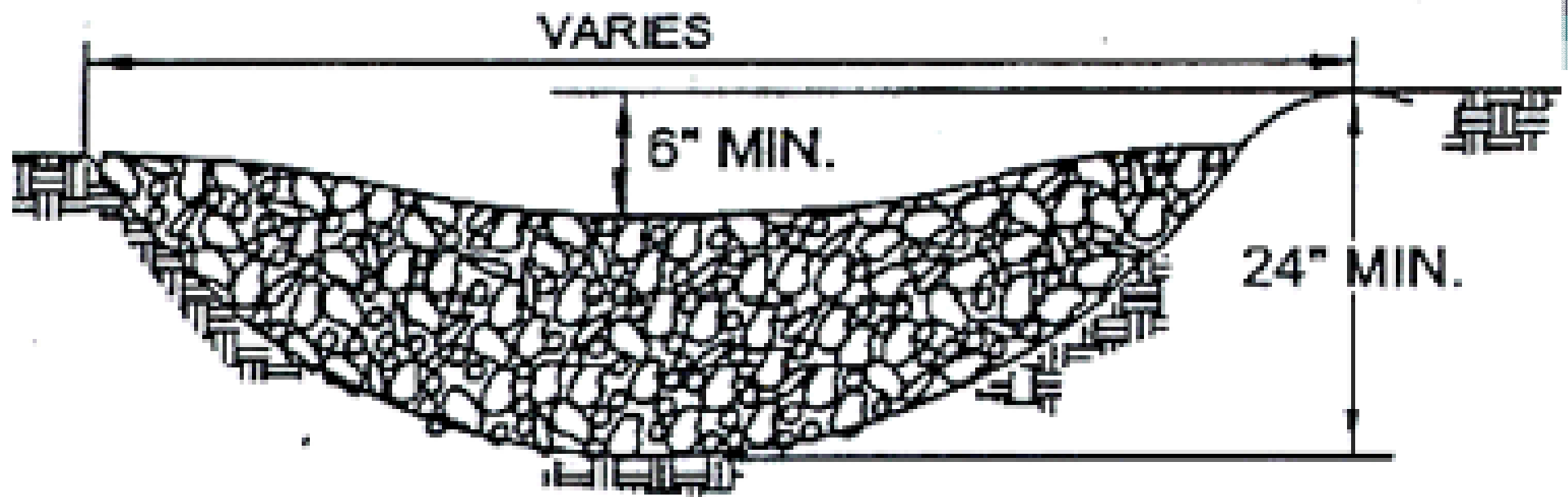
- 6" to 9" wide and 12" long with min. weight 50# per stone
- Recycled precast concrete blocks should not be used
- Perpendicular to flowline
- Designed for water to flow over not around
- Extend beyond point where ground elevation is higher than the lowest middle point



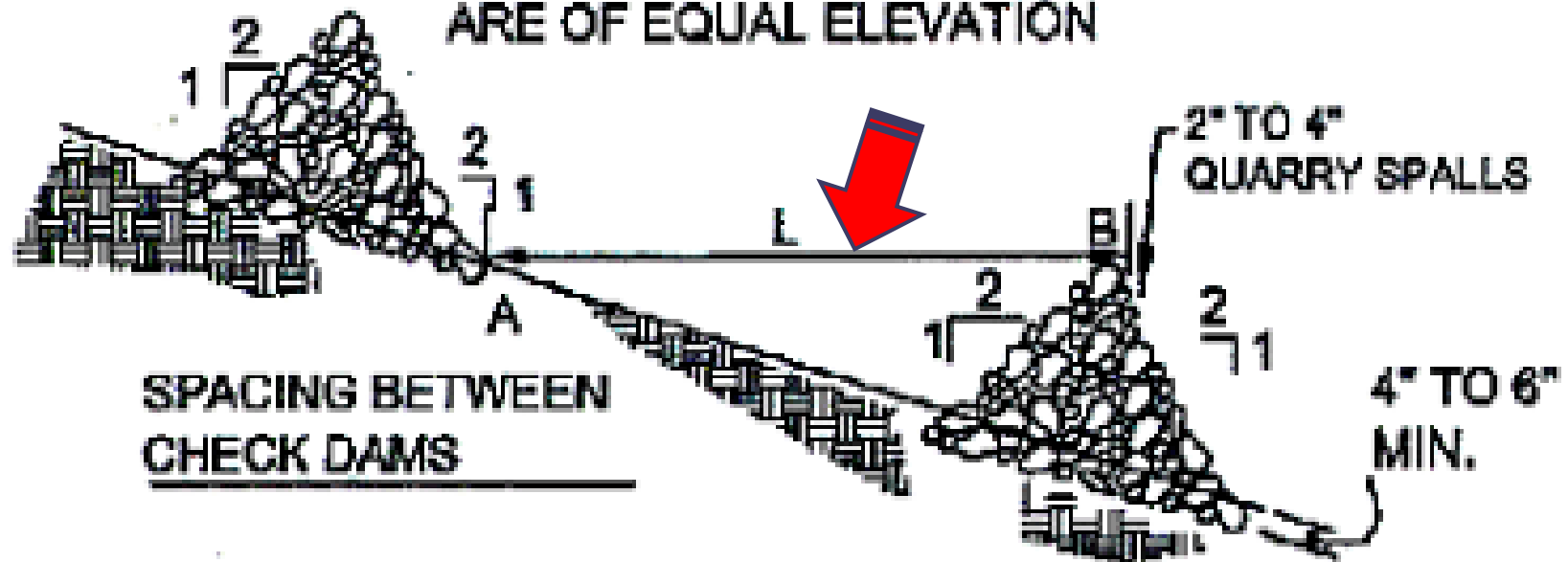


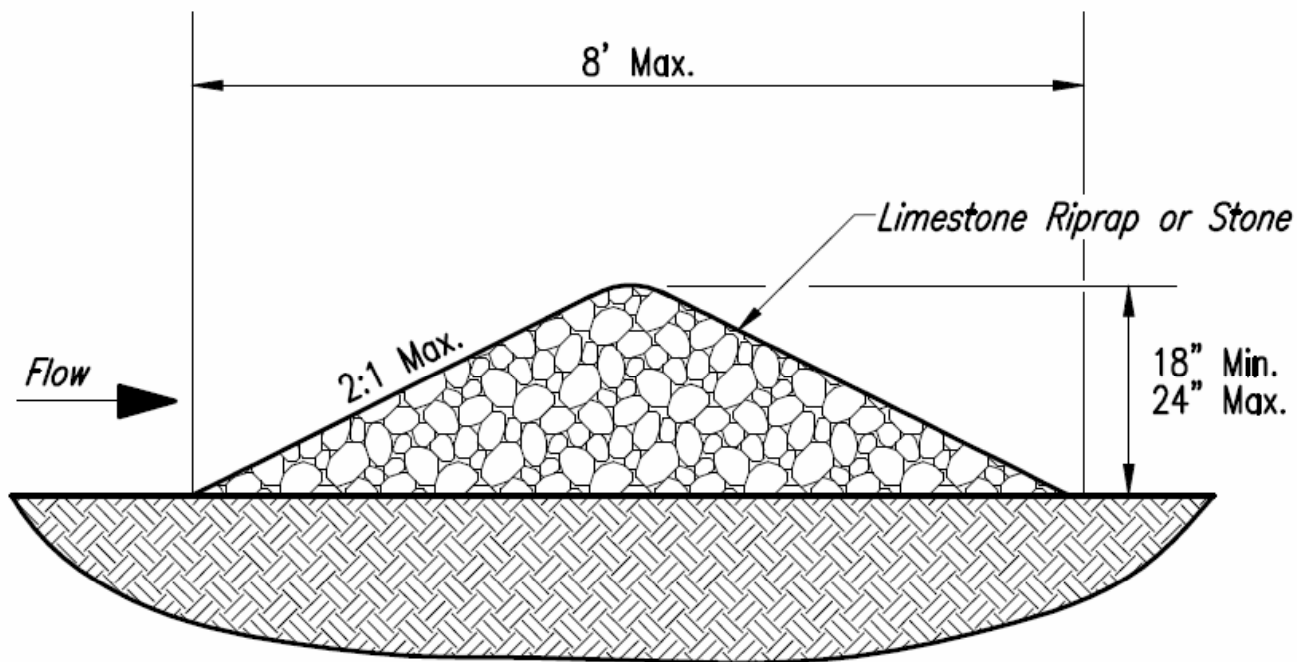
# Rock Ditch Checks Installation

- 18" – 24" high with max. 2:1
- Follow spacing guidelines
- Downstream top of ditch check = Upstream bottom of slope

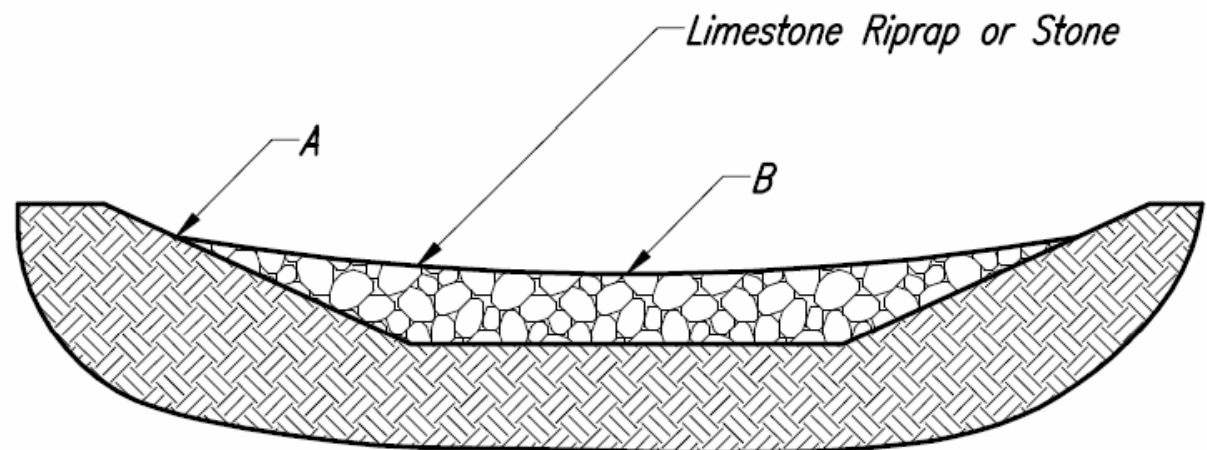


L = THE DISTANCE SUCH THAT POINTS A & B ARE OF EQUAL ELEVATION

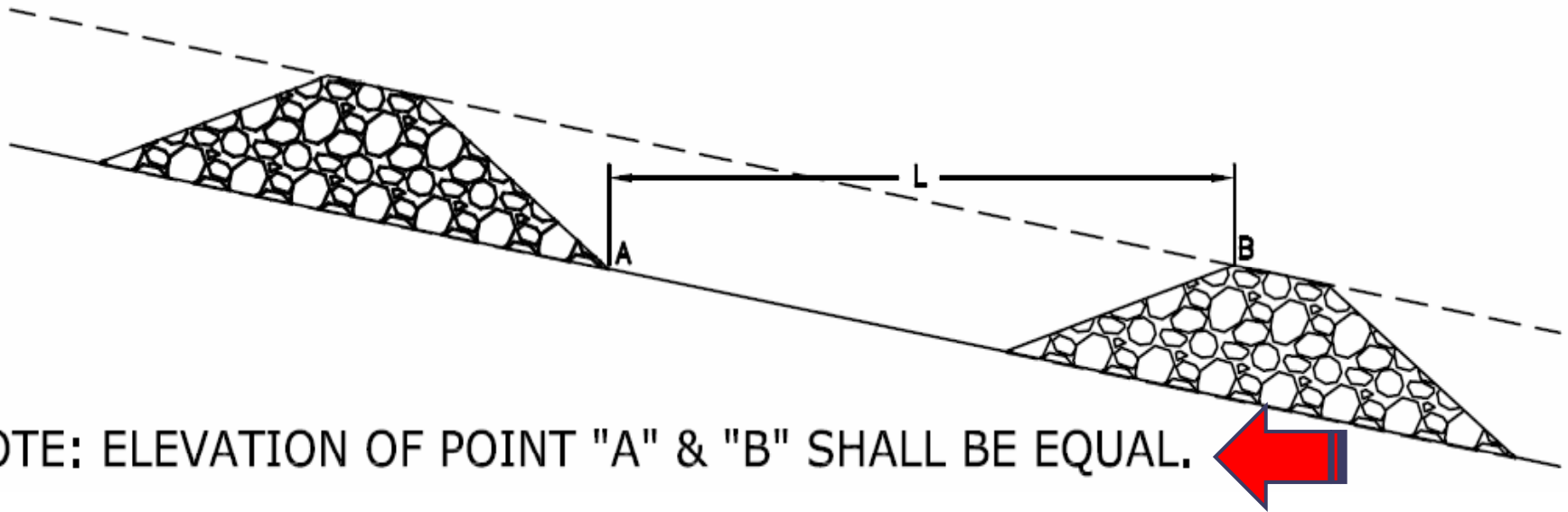




Note: Point A must be higher than point B so that water flows over the rock check not around it.



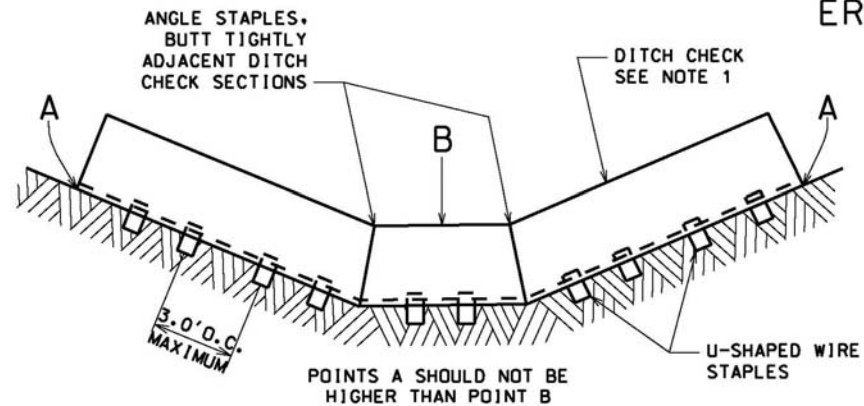
## DETAIL FOR CHECK DAM SPACING



City of Bowling Green, KY

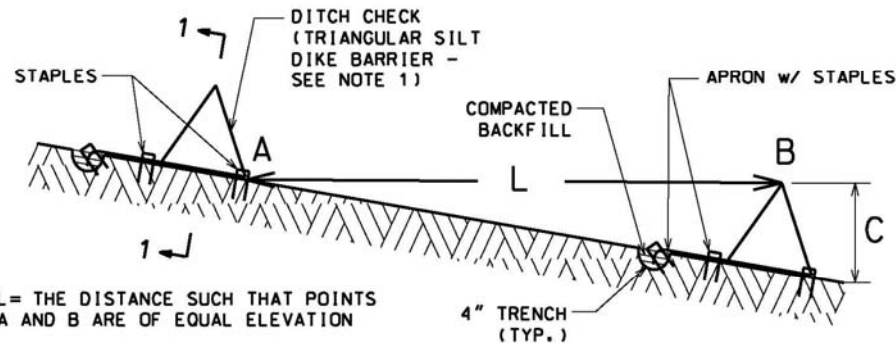
<http://www.bgky.org/stormwater/pdf/bmp/SMP-01CheckDamsCHECKDAMMISCDETAIL.pdf>





### SECTION 1-1

### PLACEMENT OF SILT DIKES IN DRAINAGEWAY



L = THE DISTANCE SUCH THAT POINTS A AND B ARE OF EQUAL ELEVATION

### SPACING BETWEEN TEMPORARY DITCH CHECKS

#### NOTES:

1. COIR LOGS, GEORIDGE OR SEDIMENT STOP FILTRATION SYSTEM MAY BE USED IN LIEU OF TRIANGULAR SILT DIKE BARRIER IF APPROVED BY THE ENGINEER.
2. INSPECTION OF SILT DIKES SHALL BE AT LEAST ONCE PER WEEK AND AFTER RAIN EVENTS IN EXCESS OF HALF INCH ( $\frac{1}{2}$ ") PER DAY OR EQUAL SNOW MELT. REPAIR OR REPLACEMENT OF DITCH CHECK SHALL BE MADE PROMPTLY AS NEEDED.
3. REMOVE SEDIMENT WHEN SEDIMENT DEPTH AT THE DITCH CHECK IS APPROXIMATELY EQUAL TO ONE-HALF OF DIKE'S HEIGHT (0.5C).
4. SILT DIKES SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION AND ONLY WHEN DIRECTED BY THE VILLAGE ENGINEERING.

NOT TO SCALE

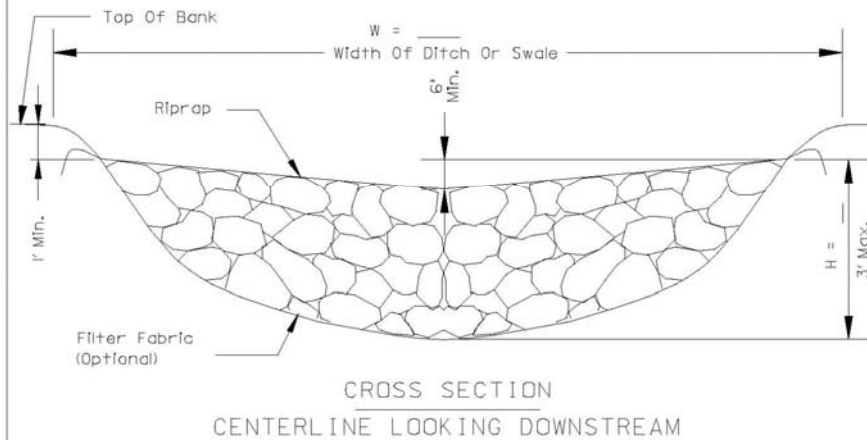
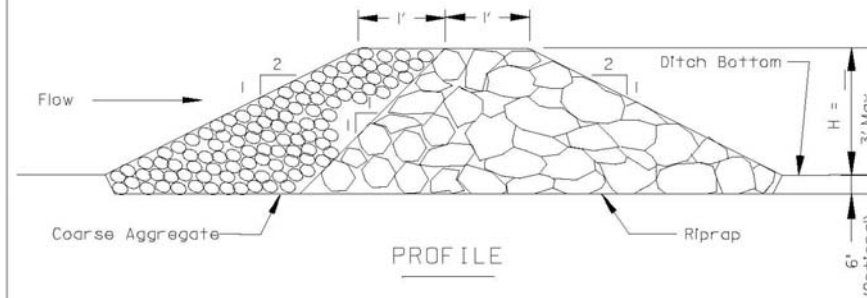
TEMPORARY  
DITCH CHECK  
DETAIL

REVISED:01-01-09

Glenview, IL

<http://www.glenview.il.us/departments/capital/engineering/reports/details/ER-6.pdf>

# ROCK DITCH CHECK - RIPRAP



## NOTES:

1. Filter fabric shall meet the requirements of material specification 592 GEOTEXTILE, Table 1 or 2, Class I, II, or IV and shall be placed over the cleared area prior to the placing of rock.
2. Coarse aggregate shall meet one of the following IDOT gradations, CA-1, CA-2, CA-3, or CA-4.
3. Riprap shall meet IDOT gradation RR-3 or RR-4 and meet Quality Designation A.
4. Coarse aggregate and riprap shall be placed according to construction specification 25 ROCKFILL using placement Method 1 and Class III compaction.
5. For added stability, the base of the dam may be keyed 6 inches into the soil.
6. See plans for spacing of dams and H dimensions.
7. Maximum drainage area to each dam is 10 acres.
8. ROCK CHECK DAM-COARSE AGGREGATE IL-605CA may be used for drainage areas under 2 acres.

DESIGN BY: DOUG GROVESTEEN	REVISED: 5/25/2005	APPROVED BY: DATE:	SCALE: NONE	CITY OF BLOOMINGTON ENGINEERING DEPARTMENT
ROCK DITCH CHECK - RIPRAP				
STANDARD DETAIL: 13.07-1				

Bloomington, IL

<http://www.cityblm.org/upload/images/eng/pdfs/erosion/1307i.pdf>



# Rock Ditch Checks

## Inspection / Maintenance

- Does the water flow around?
- Have rocks been displaced by higher velocities?
- Does sediment need to be removed from behind?
  - Can extensively reduce the effectiveness of the ditch check.



# Rock Ditch Check Spacing Guideline

<b>Slope of Channel (Percent)</b>	<b>Spacing of Rock Silt Checks (Feet)</b>
3	100
6	50
9	33
12	25
15	20



# Inlet Protection

A decorative horizontal bar at the bottom of the slide, featuring a teal background with a white grid pattern. The bar is composed of several segments of varying lengths, creating a stepped effect.



# Drop Inlet

- Surrounding area should be flat – 1% or less
- Less than 0.5 cfs to inlet
- Three months or less
- 1 acre per inlet maximum recommended
- Greater than one acre – consider other measures upslope of inlet
- Not good for fine sediment
- Or for large loads of sediment





# Inlet Protection Installation

- Trench 6" deep x 6" wide along silt fence location
- Drive 2" square, 4' long stakes 18" into ground, maximum 3' apart
- Staple/secure fabric to stakes with minimum 24" exposed silt fence
- Backfill with gravel and compacted soil



# More than adequate!



















# Erosion Control Blanket / TRM



# Erosion Control Blanket

- Turf Reinforcement Mat (TRM) - Permanent
- Erosion Control Blanket (ECB)- Temporary

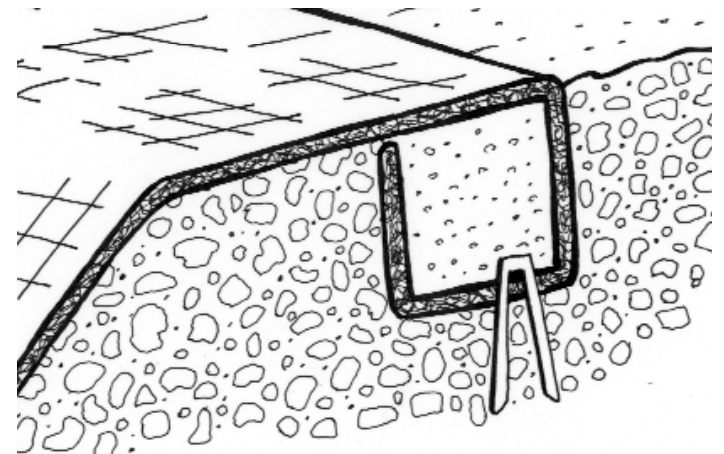


25 JUL 2009



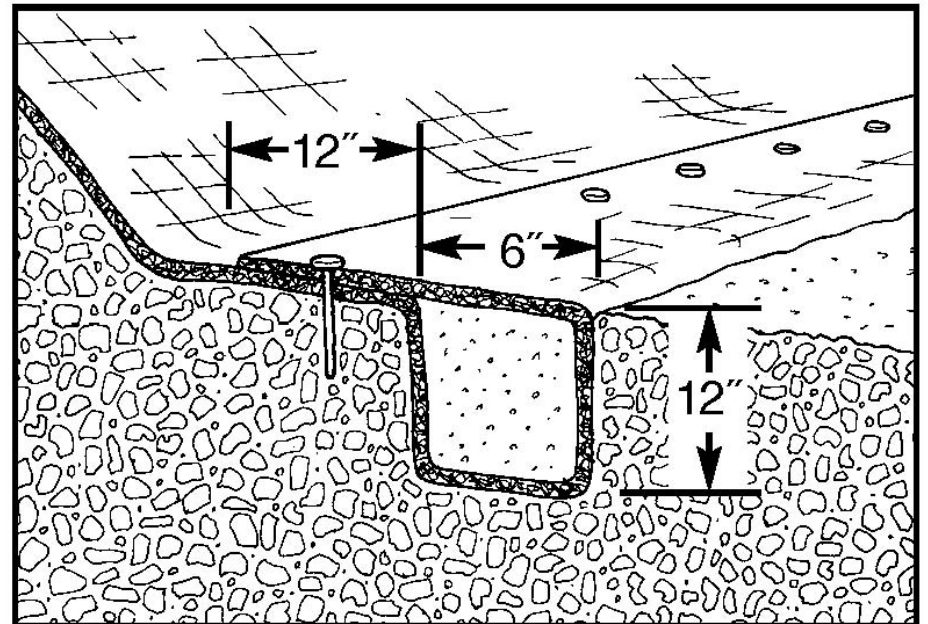
# Erosion Control Blanket - Installation

- Grade / compact area to be smooth
- Loosen top 2" to 3" for seeding
- Add fertilizer, etc. as specified
- Apply seeding per plans and specifications
- Excavate 12" x 6" at crest of slope
- Anchor @ 12" o.c.
- Unroll blanket along slope
- Overlap minimum 3"

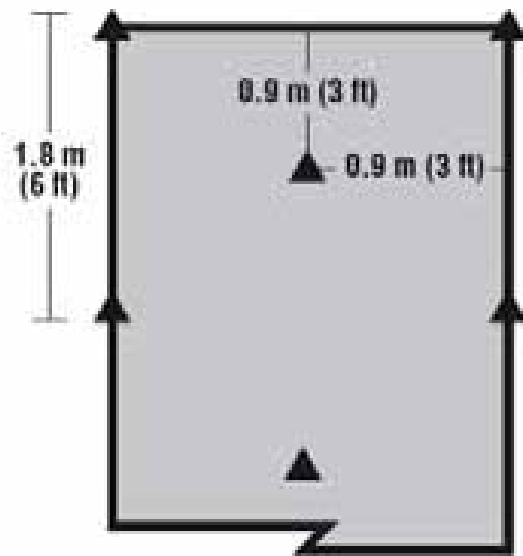


# Erosion Control Blanket - Installation

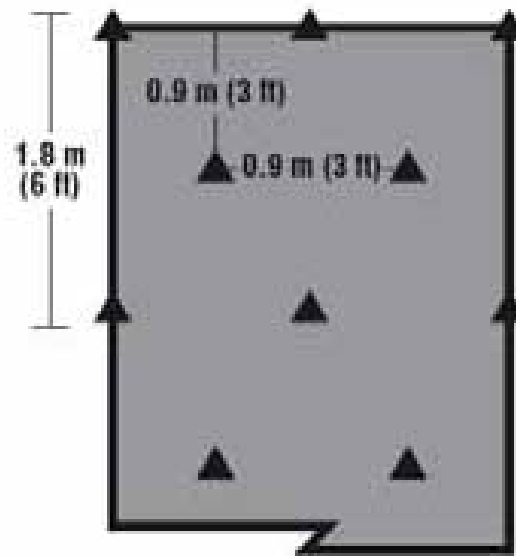
- Excavate 12" x 6" at toe of slope
- Secure using trench
- Anchor 12" o.c.



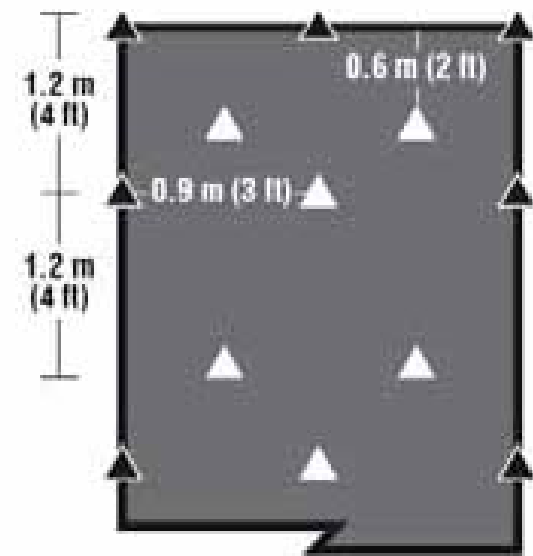
# Anchoring ECBs



**1.2 ANCHORS/m<sup>2</sup>**  
**(1 ANCHOR/yd<sup>2</sup>)**



**1.8 ANCHORS/m<sup>2</sup>**  
**(1½ ANCHORS/yd<sup>2</sup>)**



**2.5 ANCHORS/m<sup>2</sup>**  
**(2 ANCHORS/yd<sup>2</sup>)**





18 AUG 2009









# Polymer Use

# Polymers

- Proper selection
  - MUST be Anionic polyacrylamides
  - Negatively charged – does not effect aquatic life
  - Bench test for site specific applications
- Materials
  - Floc logs
    - 4 to 6 months
    - 7# block is approx. \$150
  - Baffle grids with jute net
  - Mix with hydroseed





# Polymer Use

- Step One: Polymer introduction
  - Existing storm system at exit pipes of manholes
- Step Two: Polymer / Water mixing
  - Need time
  - Need turbidity
- Step Three: Settlement
  - Enables floc removal
  - Create baffle grids
  - Turbidity barriers



19 JUN 2009









20 MAY 2009





14 MAY 2009





14 MAY 2009









# Polymer Information

[www.priceandcompany.com](http://www.priceandcompany.com)

[www.siltstop.com](http://www.siltstop.com)

[http://www.dcr.virginia.gov/soil and water/index.shtml](http://www.dcr.virginia.gov/soil_and_water/index.shtml)

# Turbidity Barrier



# Turbidity Barrier

- Parallel to flow not perpendicular in a stream
- Adequately contain the anticipated effected areas
- Ensure adequate design
- Various types
- Note the tide / flow changes





6 JAN 2010











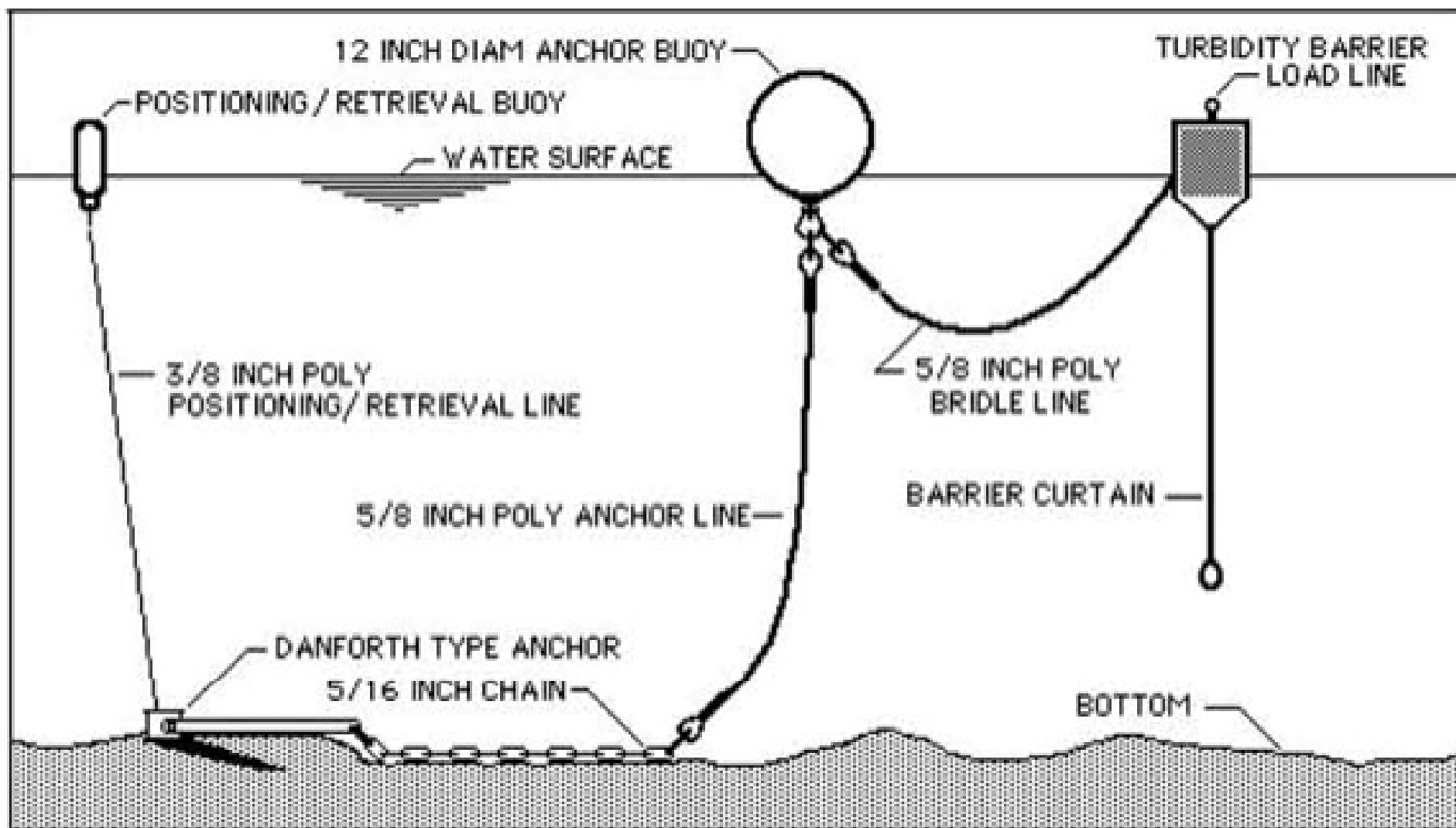








## ANCHOR KIT INSTALLED WITH FLOATING BARRIER



# Hydroseeding



# Hydroseeding

- Follow application rates in plans/specs
- Seeding mix per plans
- Steeper slopes – check both directions
- Consider applying seed first separately
  - Add mulch spray next – good during droughts





# Other Erosion Control / Sediment Control



# Other Erosion / Sediment Control

- Construction Entrance
  - Correct size stone in first place
  - Locate at appropriate locations
  - Replenish stone as necessary
- Concrete Wash
  - Provide on site if concrete trucks will frequent
  - Hay bales may be used
  - Use fabric liner to prevent seepage from hay bales

# Other Erosion / Sediment Control

- Dewatering Bags
  - Used in conjunction with polymers
  - Crucial to place on stabilized surface
  - Can pump uphill to maximize polymer contact and turbidity





QUESTIONS?

