Environmental Issues and Construction

Maine DOT

Regulatory Agencies

- Maine DEP
  - Erosion and Sedimentation Control Law
  - NRPA (Natural Resources Protection Act)
  - Stormwater Law
  - Protection and Improvement of Waters Act
- Army Corps of Engineers
  - Section 10, Rivers and Harbors Act
  - Section 404, Clean Water Act
  - Section 103, Marine Protection, Research and Sanctuaries Act (Dredge transport)

Maine DEP

- **Erosion and Sedimentation Control Law**
  - When filling or displacing soil or other earthen materials, measures must be taken to prevent unreasonable erosion of soil or sediment beyond the project site or a protected natural resource (as defined by NRPA).
  - Must be in place before activity begins, remain in place and functional until the site is permanently stabilized
  - No permit required, applies to all projects

Maine DEP

- **Natural Resources Protection Act (NRPA)**
  - Permit required for certain activities involving:
    - "Dredging, bulldozing, removing or displacing soil, sand, vegetation or other materials , construction, repair or alteration of any structure (including roads) located in, on, over or within 75 feet of certain protected natural resources,
      - Freshwater wetlands
      - River Stream or Brook
      - Great Pond
      - Peatlands
      - Significant wildlife habitat (vernal pools, deer wintering areas, bird habitats)

Maine DEP

- Protection and Improvement of Waters Act
  - Prevents unlicensed discharges of pollutants to "Waters of the State"
  - Soil is a pollutant
- Stormwater Law
  - Related to amount of Impervious area, this will be taken care of prior to bid process
  - Potential for permit conditions, so just be aware
- Memorandum of Agreement

Federal Regulations

- Army Corps of Engineers
  - Work in navigable waterways
  - Regulates fill in regulated resources / Waters of the US (hydrologic connection) *Fill includes sandbags, other temporary fill
  - Regulates transport of dredged materials for ocean disposal (other regulations with dredge)

- Endangered Species Act / USFWS / Federal nexus

Permit Conditions

- In addition to SEWPCP and SPCCP requirements, contractor must follow ALL conditions outlined in State or Federal permits
- May not have any, but may have dozens of special conditions. Be aware of all additional conditions, not following can jeopardize permit compliance
- Documentation – compliance reports

Contract Materials

- SEWPCP & SPCCP
  - Standard Specification 656 vs. Special Provision
  - Submitted by Contractor, approved by Dept. prior to start of work
  - Must follow plan submitted
  - Controls certified before work commences
  - MaineDOT BMP Manual
  - Violations based on failure to follow approved plan or BMP Manual

"What does their plan say?"

Spill Control and Containment

- Comply with applicable Federal, State and locals laws related to prevention and abatement of water pollution
- Handling, transfer, containment of hazardous matter/substances (oil, gas, tack etc.)
  - Refueling at least 100 feet from resources or contained
  - Emergency Procedures
  - Response Plan
  - **No minimum reportable spill anymore**
- Follow the approved SPCCP

Erosion Control Plan (SEWPCP)

- Environmental Coordinator – (contractor responsible person)
- Controls certified before work commences
- Schedule and sequence of soil disturbance
- Inspection and Maintenance Schedules
- Storm procedures, inspection before/after
- Contractors Log

MULCH, MULCH, MULCH

Erosion & Sediment Controls

Using the MaineDOT BMP Manual & Inspecting BMPs

EROSION AND SEDIMENTATION

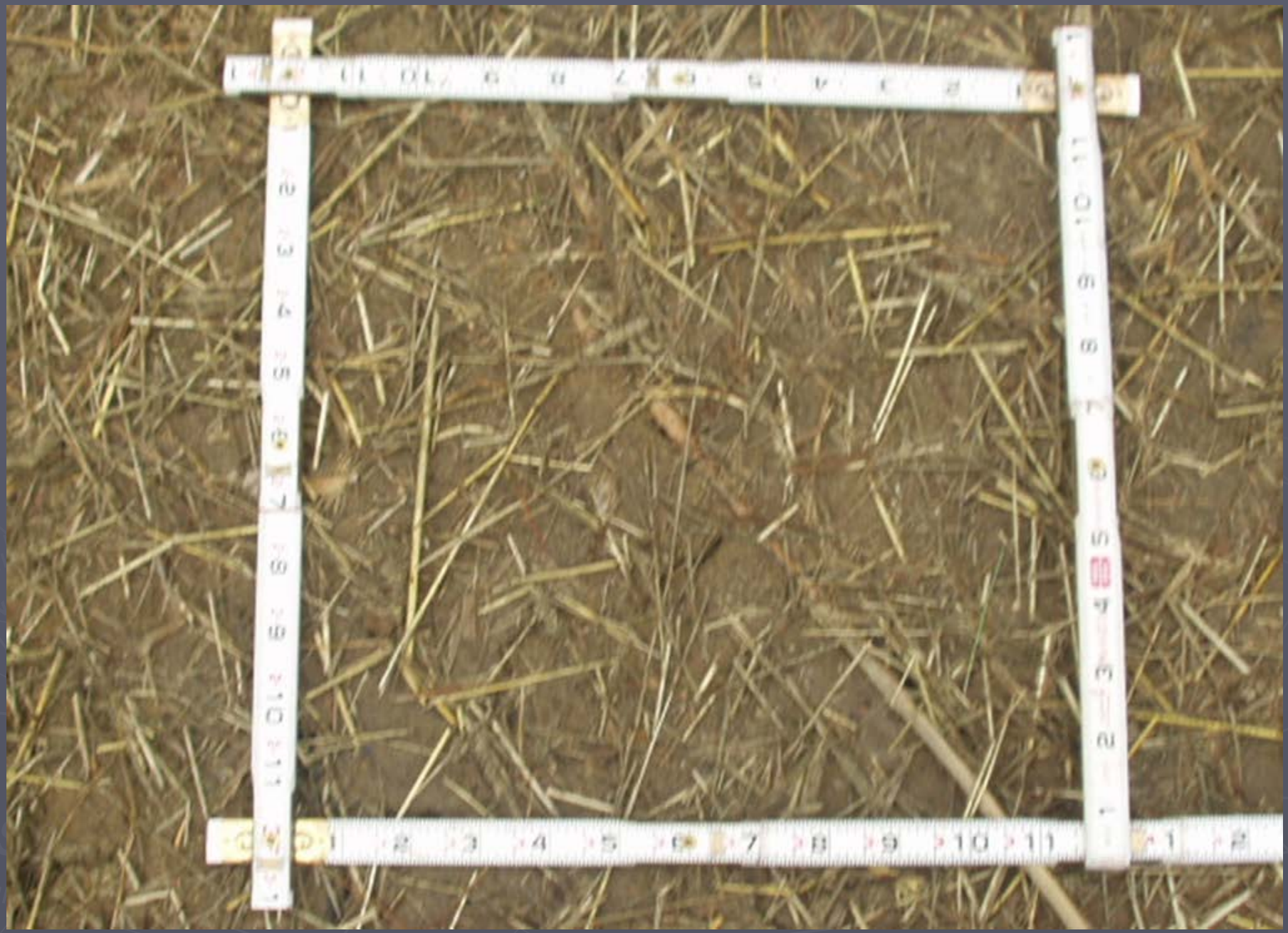
- Erosion = Movement of soil by action of water or wind.
  - Erosion is natural
  - Accelerated Erosion is not
- Sedimentation = “settling out” of soil particle from the water.

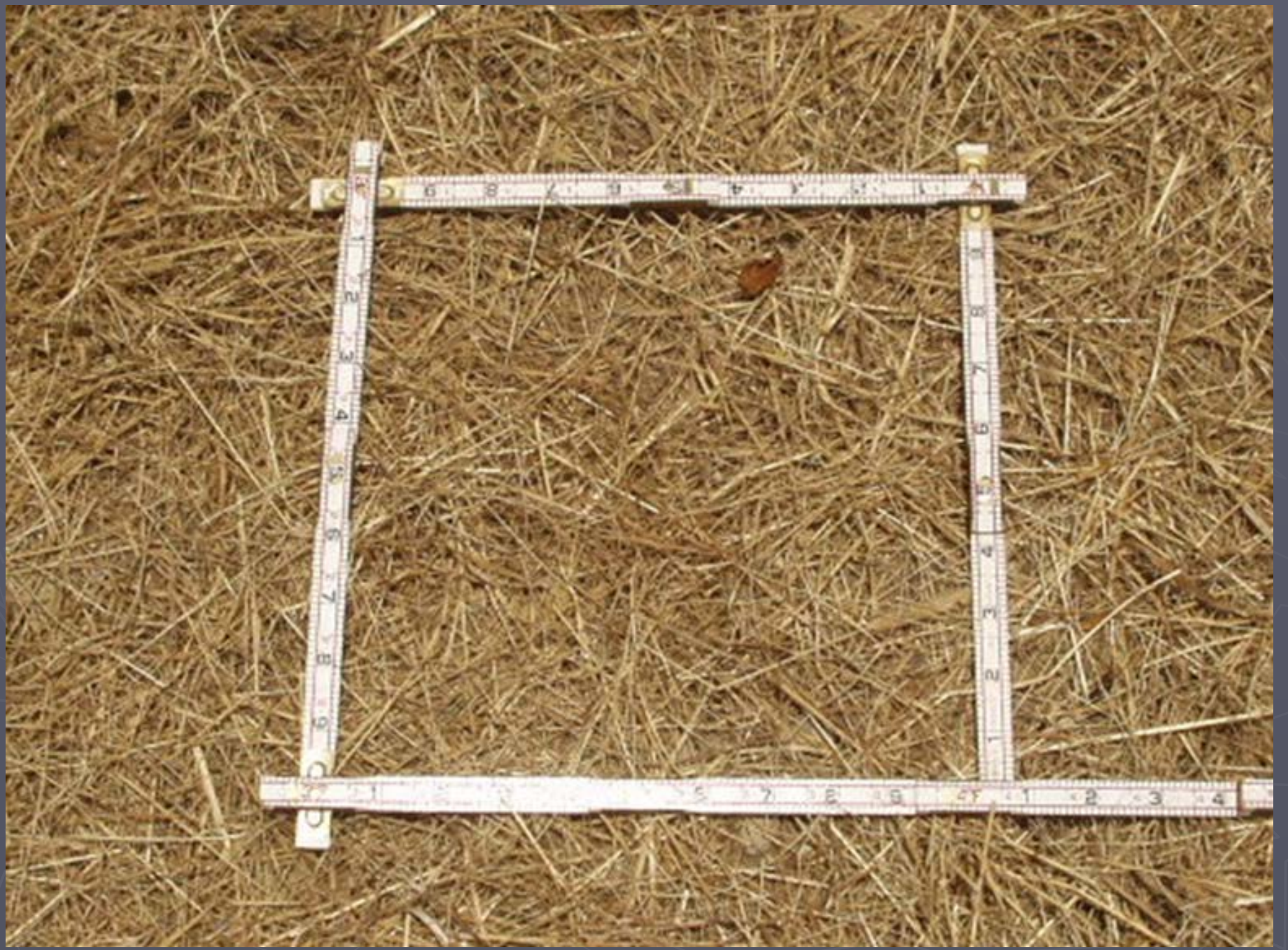
MaineDOT BMP Manual

Sheet and Rill – Erosion Control	(SR-EC)
Sheet and Rill – Sedimentation Control	(SR-SC)
Concentrated Flow – Erosion Control	(CF-EC)
Concentrated Flow – Sedimentation Control	(CF-SC)
In-Water Work	(IN-WATER)
Miscellaneous	(MISC)

Sheet and Rill Erosion Control (SR-EC)

- Hydraulic Mulch
- Hay and Straw Mulch
- Erosion Control Mix
- Erosion Control Blanket
- Turf Reinforced Matting
- Plastic Sheeting
- Riprap
- Seeding and Landscape Plantings
- Surface Roughening
- Gradient Terrace
- Hillside Diversion





Erosion Control Mix

- Erosion control mix can be manufactured on or off the project site.
- Erosion control mix is a dense, processed mixture of intertwining wood fragments and grit that form a stable, long lasting mulch. Common sources include paper mill flume grit, stump grindings, and aged wood waste.
- Wood or bark chips, ground construction debris or reprocessed wood products will not be acceptable as the organic component of the mix

Do not accept mix composed of wood chips, dry wood or ground construction debris

Appropriate Applications for ECM

- Slopes 2:1 or flatter where long-term stabilization is required. May be used on steeper slopes at the approval of the Resident.
- Slopes with unfavorable growing conditions for grass, e.g., heavy shade, or sandy, clay, or rocky soils.
- Sites with high wind conditions.
- Used for winter mulch between November 1st and April 1st.

Sheet and Rill Sedimentation Control (SR-SC)

- Silt Fence
- Erosion Control Mix Berm
- Continuous Contained Berms
- Vegetated Filter Strip

ECM Berms for Sedimentation Control

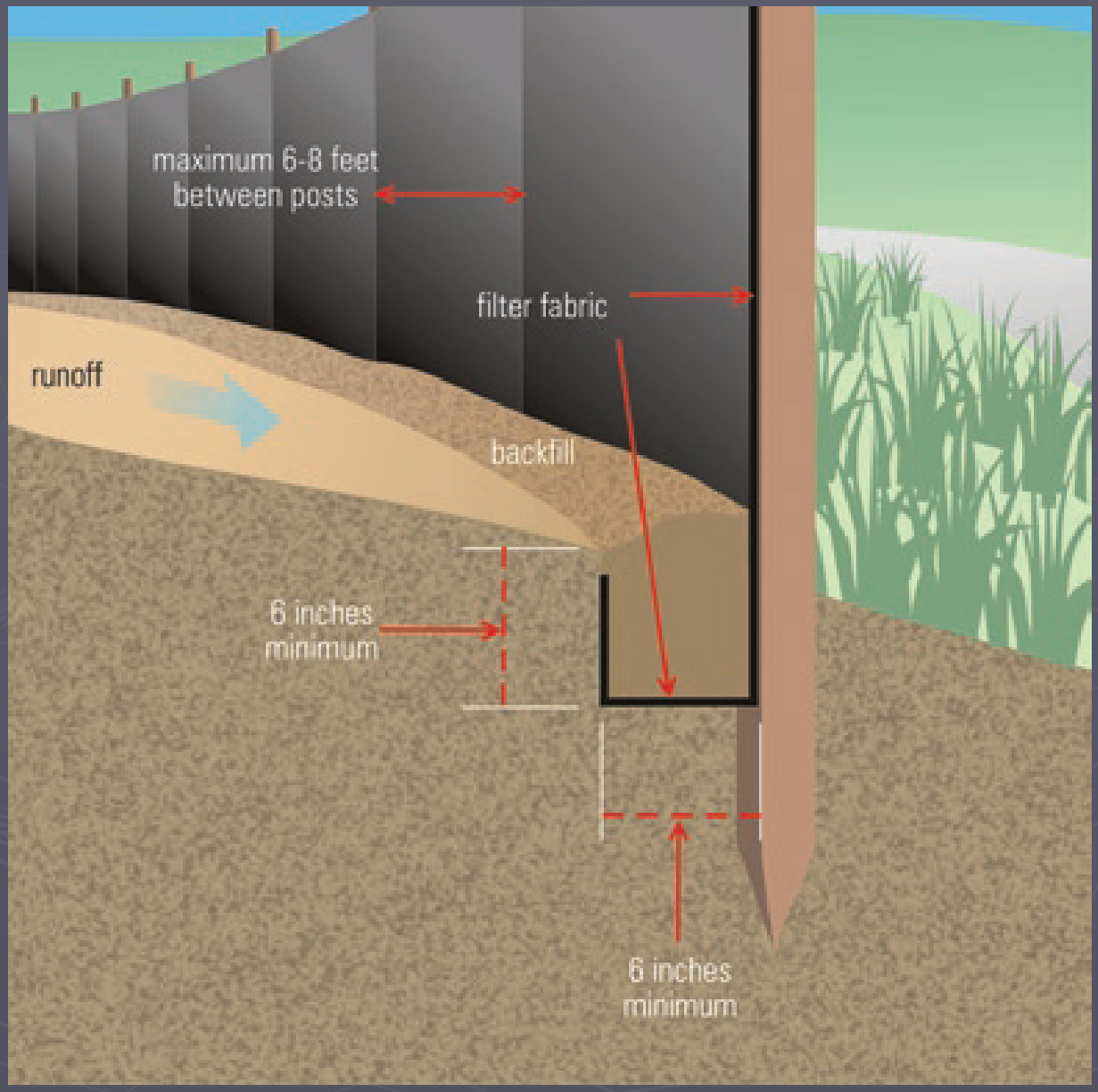
- ECM Berms should be 1 foot tall, 2 feet wide
- Placed on the contour
- Good soil contact, with no sticks or debris
- Can spread out or leave in place after permanent stabilization
- Maintenance...

Silt Fence

- Must be placed along contour, not following contour can lead to blowouts & other BMP failures
- Be keyed into the soil or otherwise hold down flap (ECM or crushed stone)

- Do not install in concentrated flows or streams

Silt Fence


maximum 6-8 feet
between posts
filter fabric
runoff
backfill
6 inches
minimum
6 inches
minimum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Concentrated Flow Erosion Control (CF-EC)

- Channel Linings
- Temporary Channel Lining - Plastic Sheeting
- Riprap Downspouts
- Temporary Slope Drains
- Energy Dissipators - Riprap Apron and Plunge Pool
- Culverts - Inlet and Outlet Protection

Temporary Channel Lining


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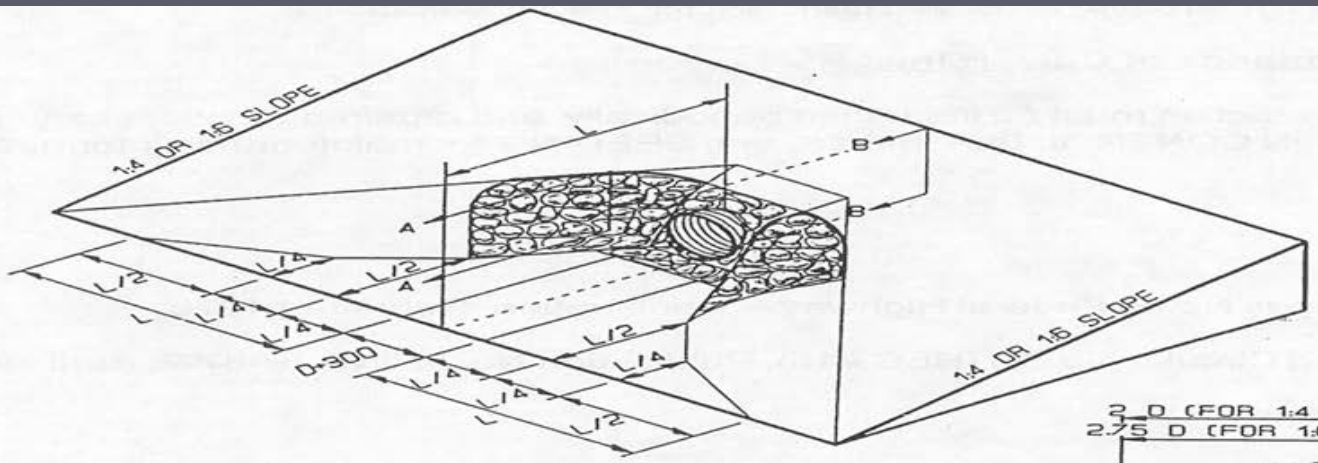
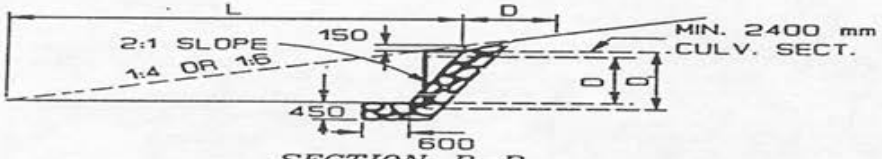
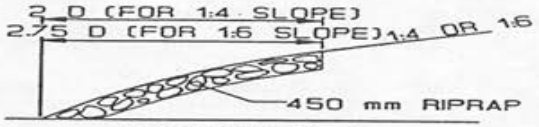




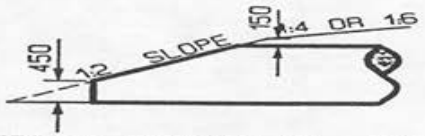
SECTION B–B



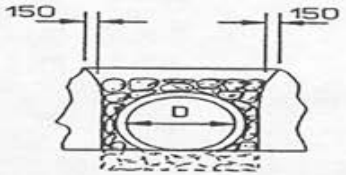
SECTION A–A
90° TO ROADWAY C.L.

TABLE B

CULVERT DIAMETER	L 1:4 SLOPE	L 1:6 SLOPE
450	2.7 m	3.9 m
525	3.0 m	4.5 m
600	3.3 m	5.0 m
750	3.9 m	6.0 m
900	4.6 m	6.9 m
1050	5.2 m	7.8 m
1200	5.8 m	8.8 m
1350	6.7 m	9.8 m
1500	7.3 m	10.8 m
1650	7.9 m	11.8 m
1800	8.7 m	12.8 m
2100	9.9 m	14.7 m

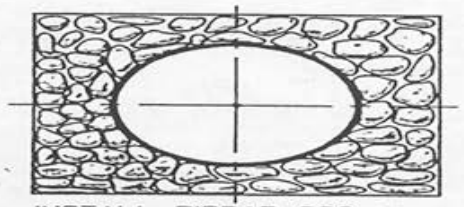


CULVERTS CUT ON 1:2 SLOPE



FRONT VIEW

1. THE DIMENSIONS SHOWN ARE APPROXIMATES AND MAY BE MODIFIED BY THE RESIDENT ENGINEER.
2. RIPRAP WILL BE REQUIRED ON PORTIONS OF THE CULVERT END TREATMENT 1:1 AND STEEPER. THE REMAINING PORTION SHALL BE LOAMED, SEEDED AND HAY MULCHED AS DIRECTED BY THE ENGINEER.
3. CULVERTS INSTALLED ON 1:2 SLOPES SHALL HAVE RIPRAP LAID ON 1:2 SLOPE AROUND THE INLET AND OUTLET.



INSTALL RIPRAP 600 mm AROUND DIAMETER OF PIPE ON 1:2 GUARD RAIL SLOPES.

REF: Best Management Practice for Erosion and Sediment Control - Culvert Inlet Protection, Culvert Outlet Protection

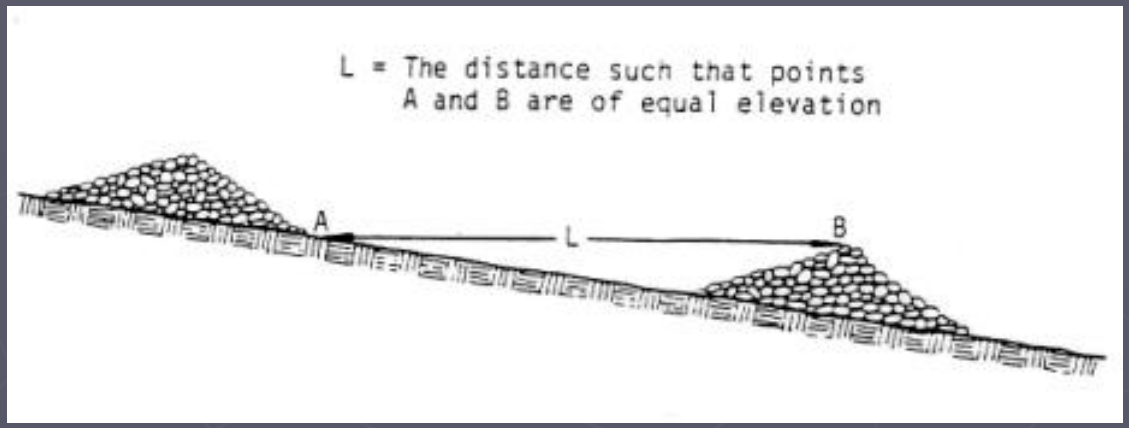
Roadway Culvert End Slope Treatment

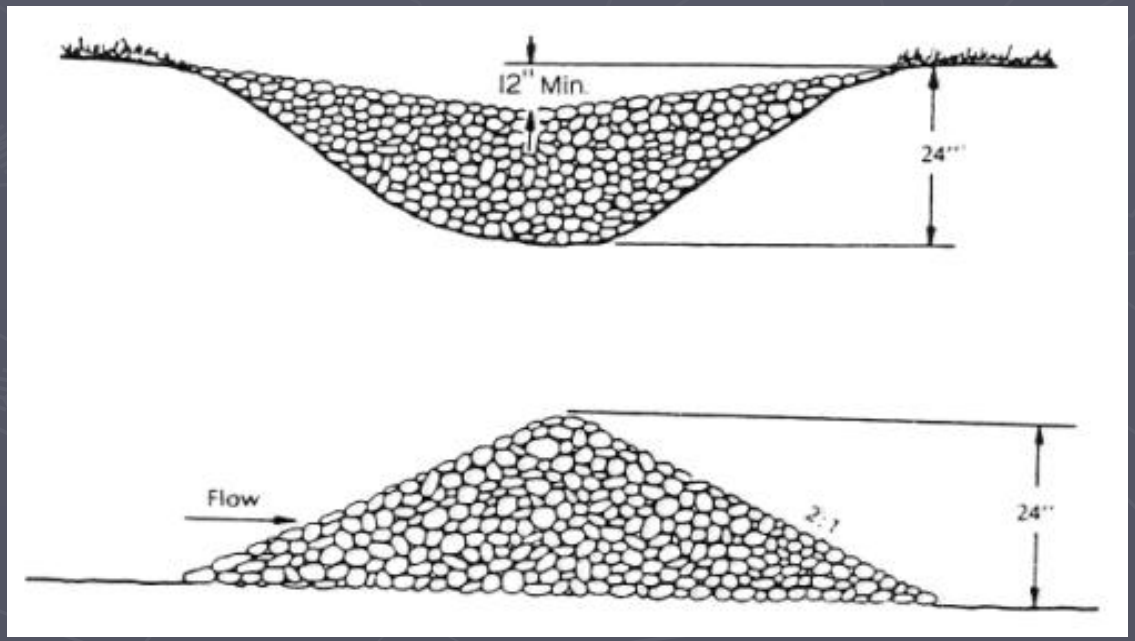
800(22)

Concentrated Flow Sedimentation Control (CF-SC)

- Check Dams
- Sediment Traps
- Storm Drain Inlet Protection

Stone Check Dams





Hay Bale Check Dams are NOT acceptable

Sediment Traps


11/09/2013

Miscellaneous (MISC)

- Dust Control
- Sweeping and Vacuuming
- Construction Entrance/Exit
- Winter Stabilization

Dust Control

EPA – Clean Air Act

Appropriate applications

- Apply on roadbed where wind and traffic can generate or do generate dust
- Application rates depend on the soil
- Watering and applying soil binders most commmon

Watering

- Effect for short-term applications
- Excessive water can cause erosion and sedimentation issues
- Use with some soil binders may require pre-wetting (see Manufacturer reccomendations), may also have 24-cure time

Soil Binders

- CaCl- Calcium Chloride
- MgCl – Magnesium Chloride
- Other Binders allowed by BMP Manual
  - Lignin sulfonate
  - Guar
  - Other products to be approved by resident
- Asphalt or oil-based binders are NOT permitted

Sweeping & Vacuuming

- To remove sediment tracked onto road surfaces
- Vacuuming is preferred option as sweeping can cause dust issues
- May not be as effective if sediment is muddy or wet
- Do not sweep into protected resources
- Be safe

Winter Stabilization Methods

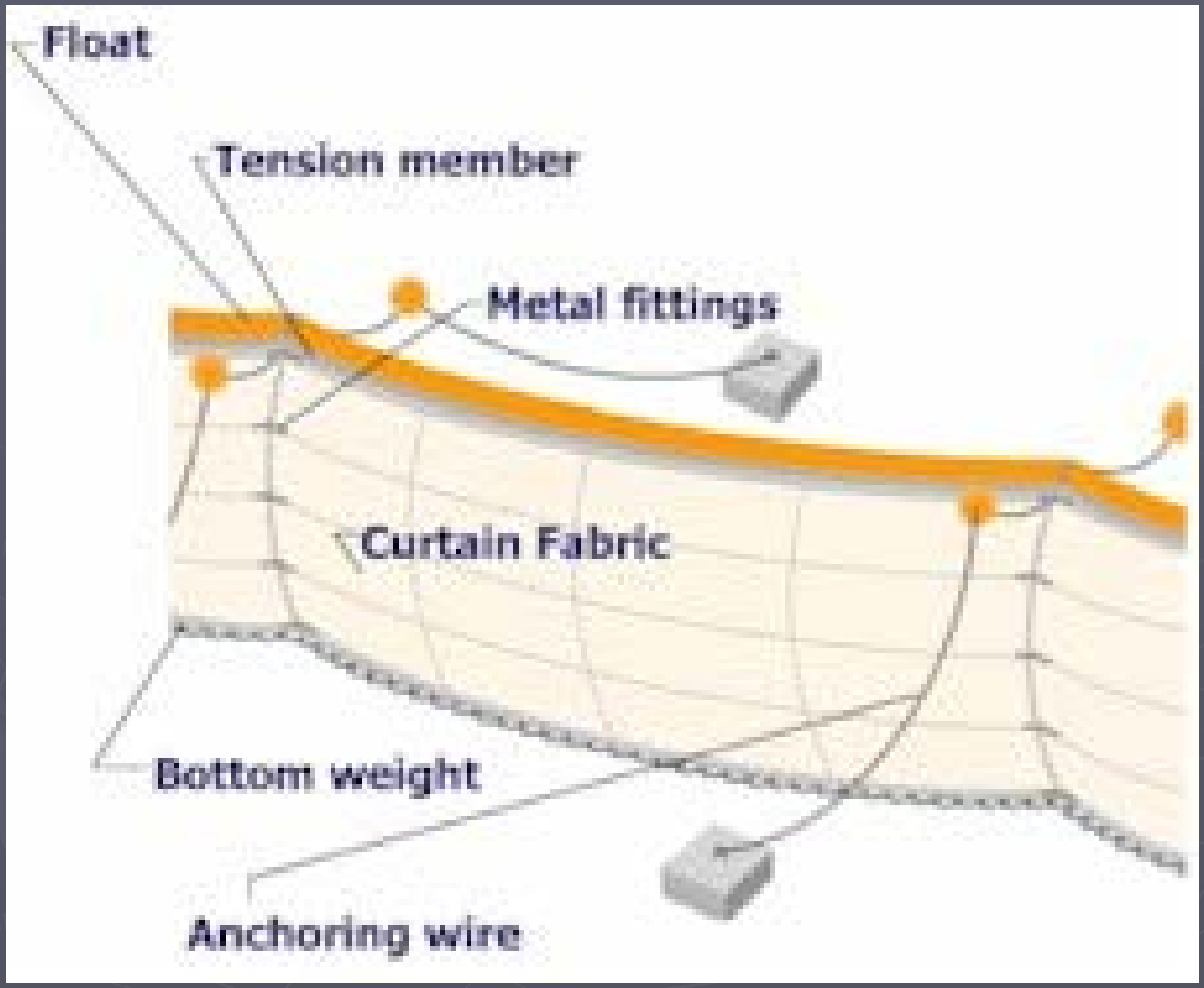
- November 1 - April 1
  - Use if less than 90% vegetative cover
  - Permanent stabilization preferred
  - Stabilize potential run-off areas and seeps
- Sheet & Rill Erosion Control
  - Double Hay Mulch application
  - ECM at a minimum of 4” if used as mulch
- Concentrated Flows
  - Permanent stabilization with stone or erosion control blankets
- Inspection

In Water Work (IN-WATER)

- Floating Turbidity Curtain
- Temporary Stream Crossing
- Temporary Stream Diversion
- Cofferdams
- Dewatering
- Temporary Sediment Basins
- Filter Bags

Water Quality?

Turbidity Curtains


Float
Tension member
Metal fittings
Curtain Fabric
Bottom weight
Anchoring wire

Maintaining Water Quality During Construction

- Handle the Water
- Install Erosion and Sediment Control BMPs
- Final Stabilization (Button It Up)

Handling the Water

- Dry Stream Bed – “Do it in the Dry”
  - Cofferdams
  - Bypass (Diversions)

In the Dry

Bypass
Temporary Channel Lining

Handle the Water - What Matters

- Project Scope
- Regulations
  - DEP
    - NRPA
    - Stormwater Law
    - Erosion Control Law
  - ACOE
    - Rivers & Harbors Act
    - Clean Water Act
- Hydrology
  - Time of Year
  - Watershed/Stream Characteristics

Handle the Water – Project Scope

- Site Conditions
  - Traffic
  - Access
- Full Replacement
  - Road opening
    - Depth and width of cut
    - Increase options for bypass
- Rehabilitation
  - Slip Lining and Invert Lining

Handle the Water – Regulations

- In Steam Work Window
  - Federal – Army Corps of Engineers
  - State - Maine Department of Environmental Protection

    July 15th through October 1st

- Other Regulations – MHPC, etc.

Handle the Water – Hydrology

- Rainfall / Runoff
  - Storms
  - Time of Year
- Watershed /Stream Characteristics
  - Grade of channel (Velocity)
  - Upstream Storage
  - Flashiness

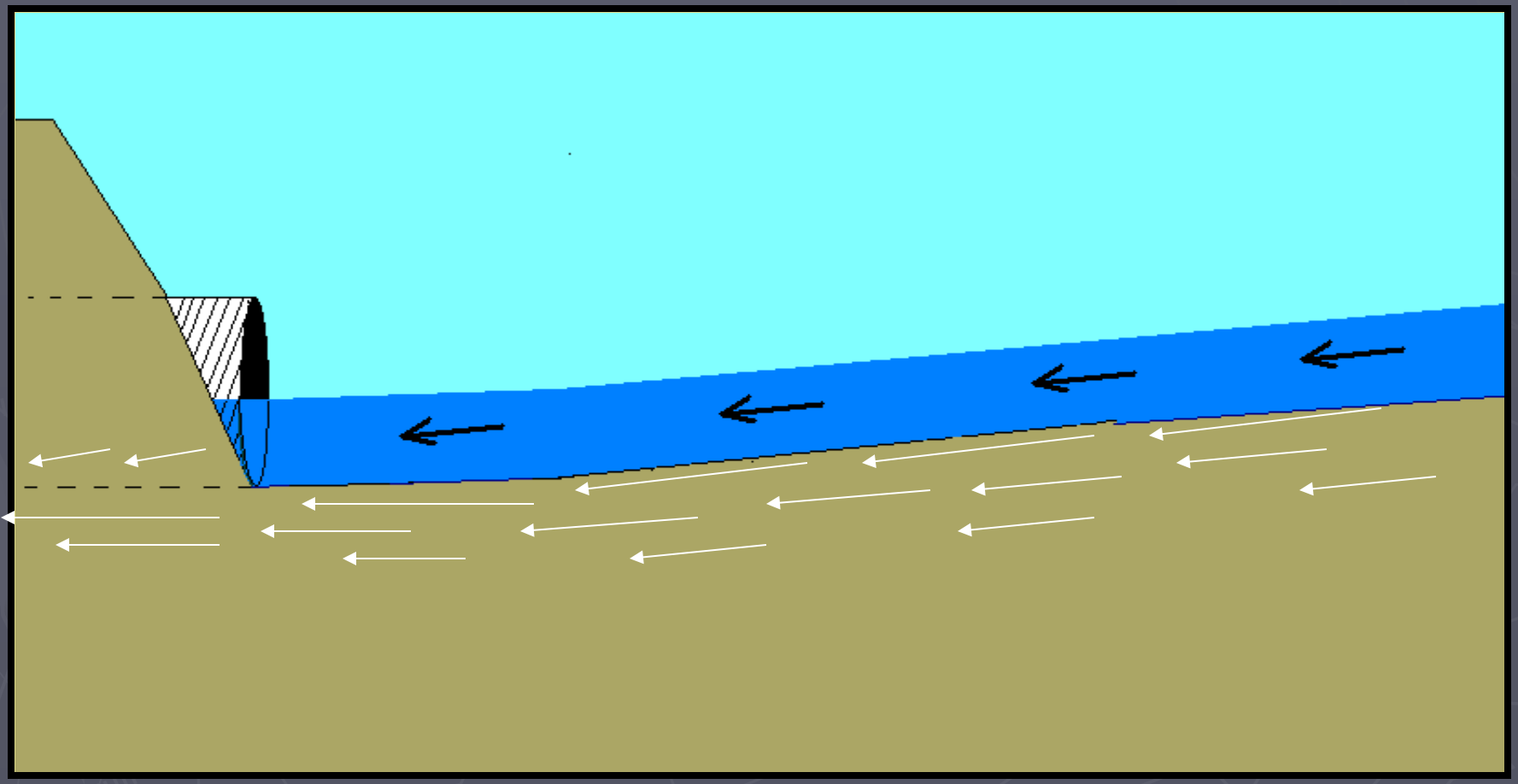
Rainfall / Runoff

- Summer Thunderstorms
- Hurricane Season
- Springtime – snowmelt and rain
- Freeze up – low probability of rain
- Is there vegetation to slow down the runoff? No leaves – quick response

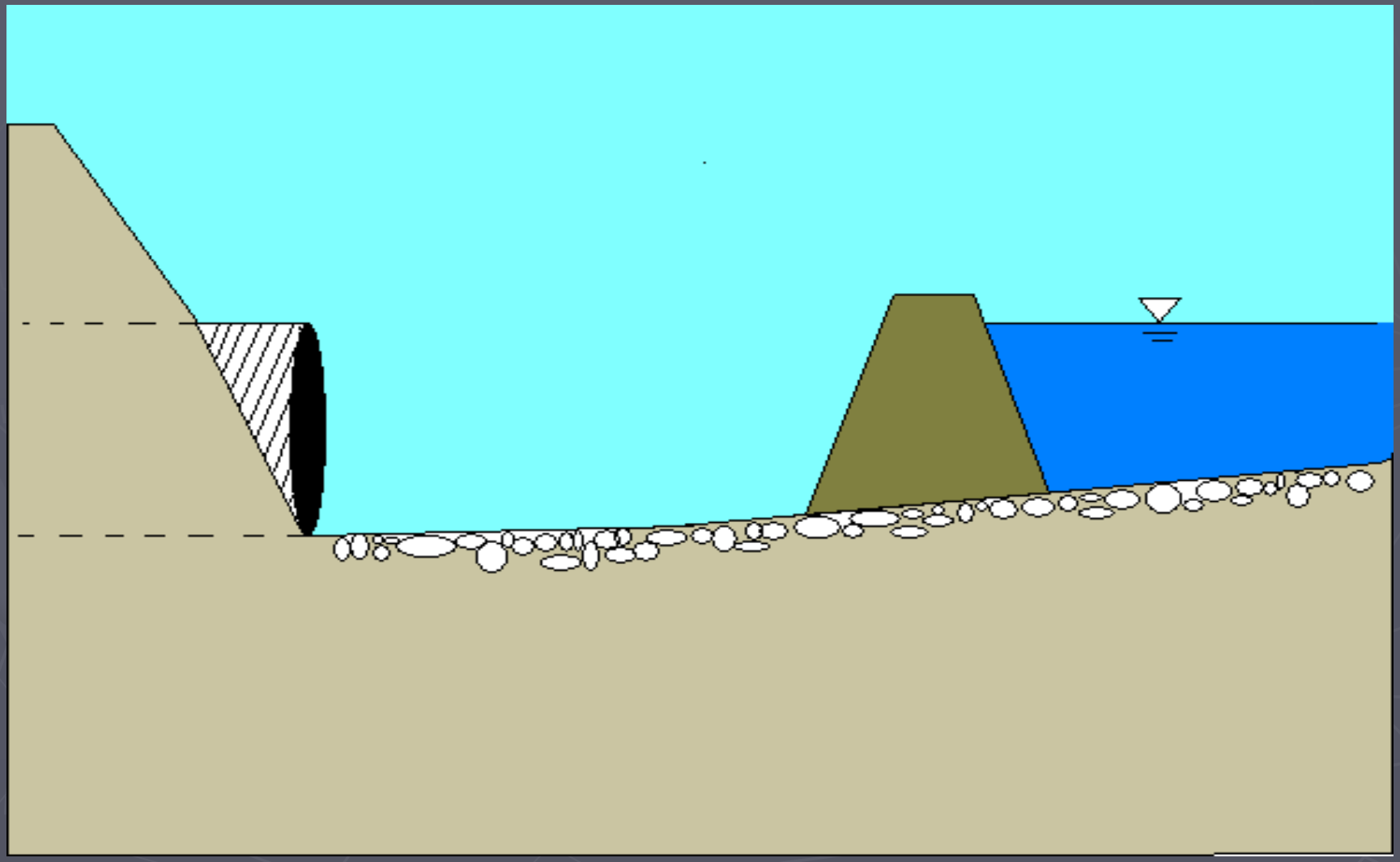
Cofferdams

How Do They Work?

Surface Flow and Subsurface Flow



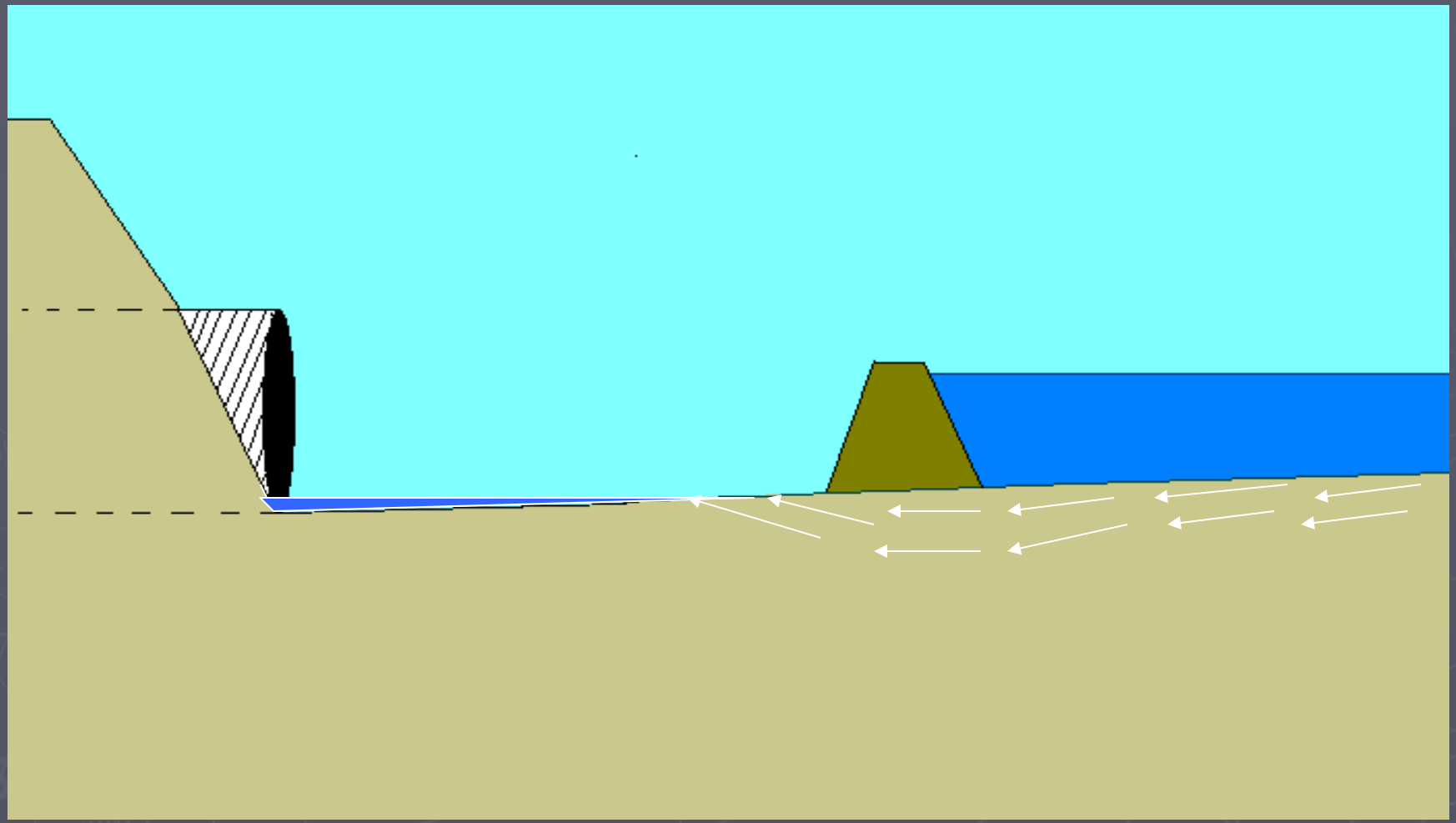
Stop the Flow of Water



Seepage Control

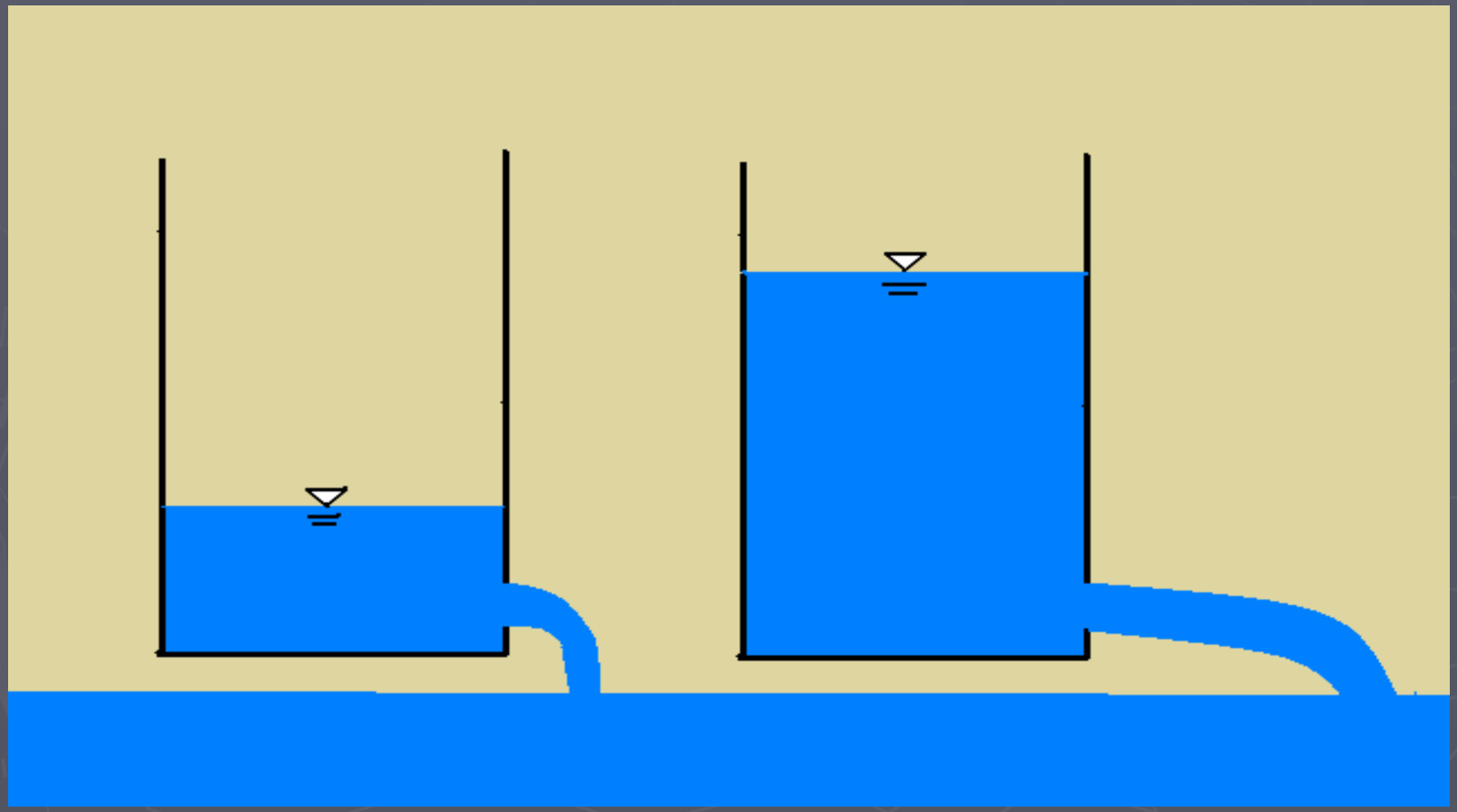
- Streambed Material
- Depth of Water Ponded
- Length of Flow Under Cofferdam

Subsurface Flow (Seepage)

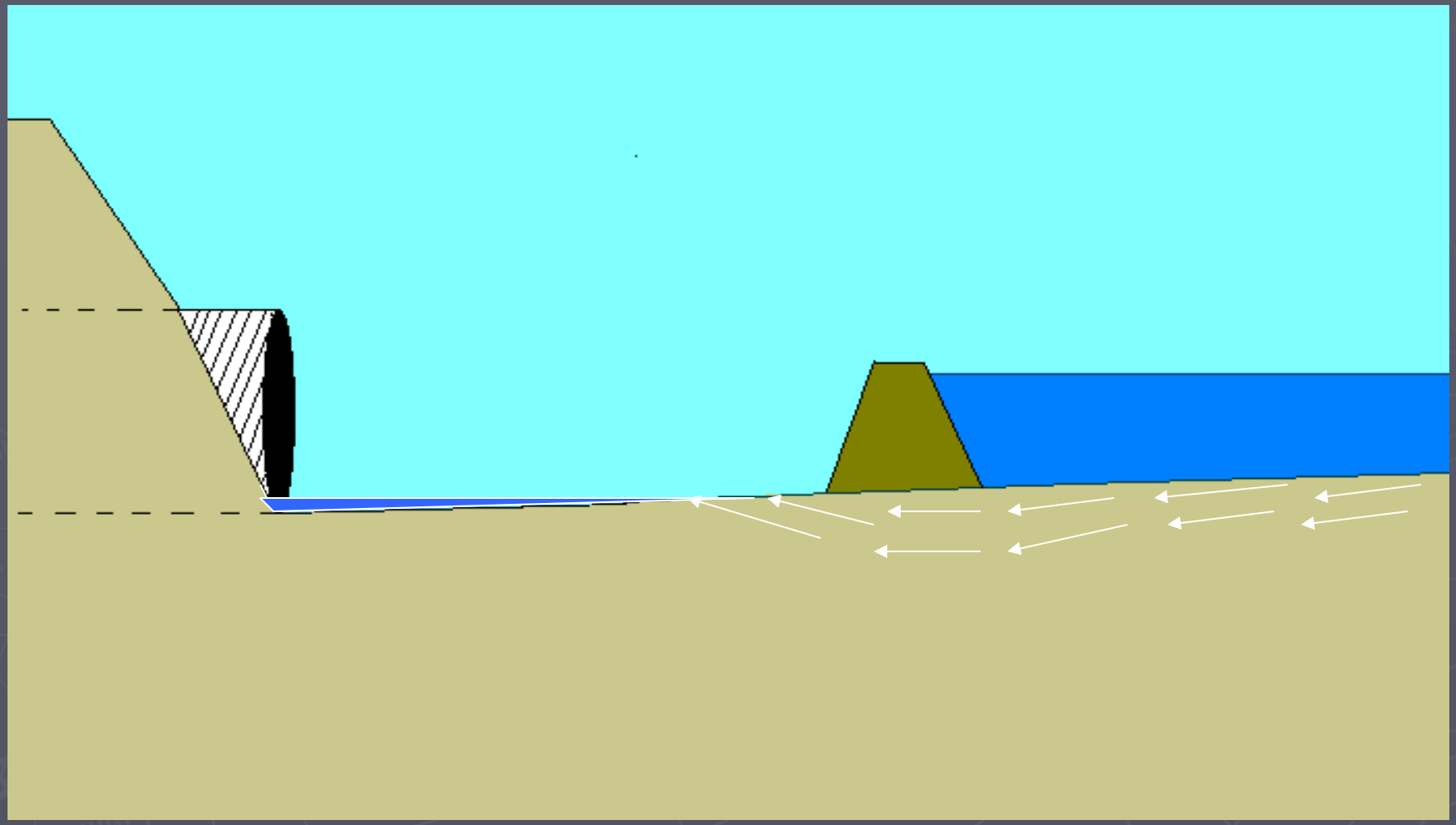


Water Depth

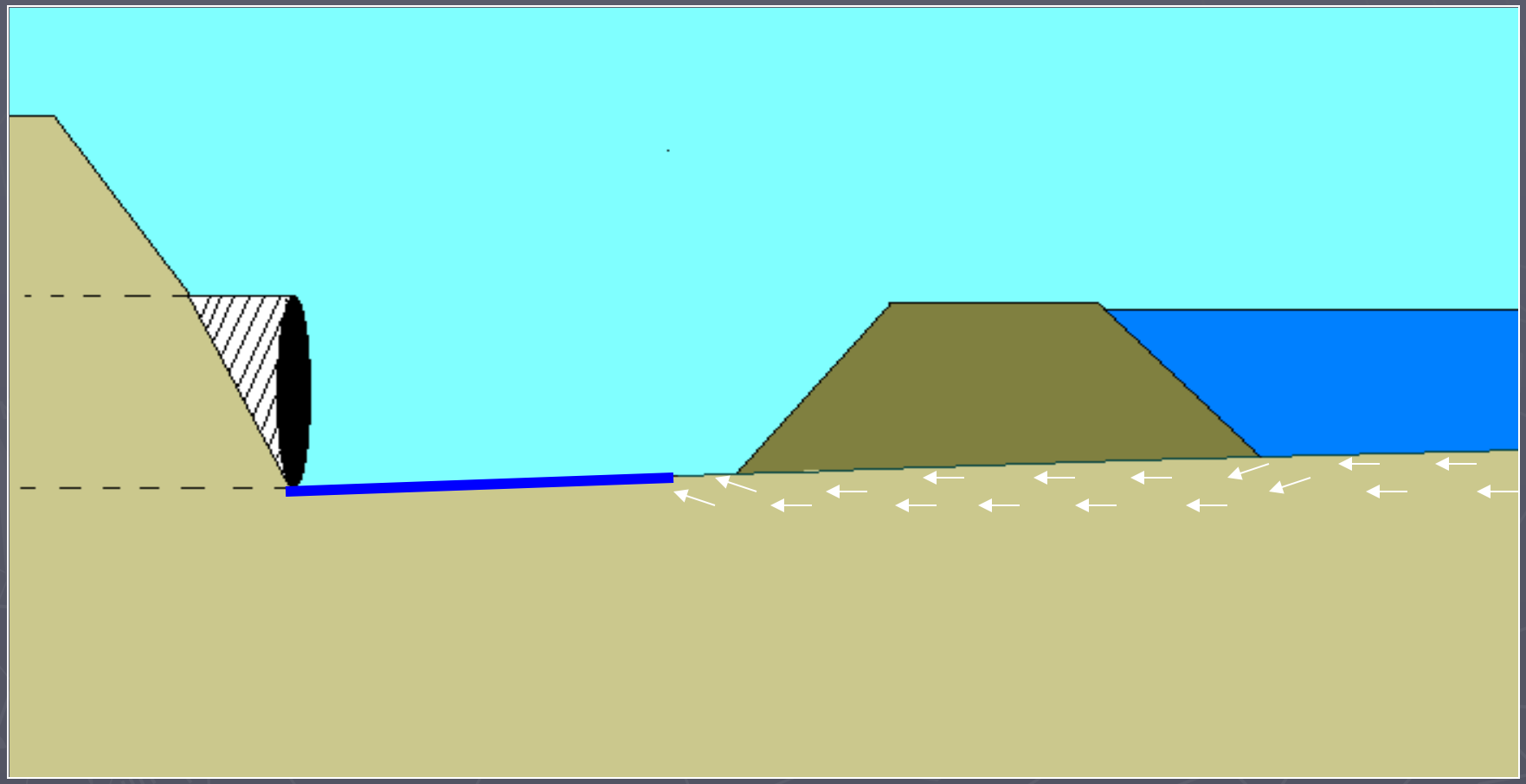
Increased Depth = Increased Pressure



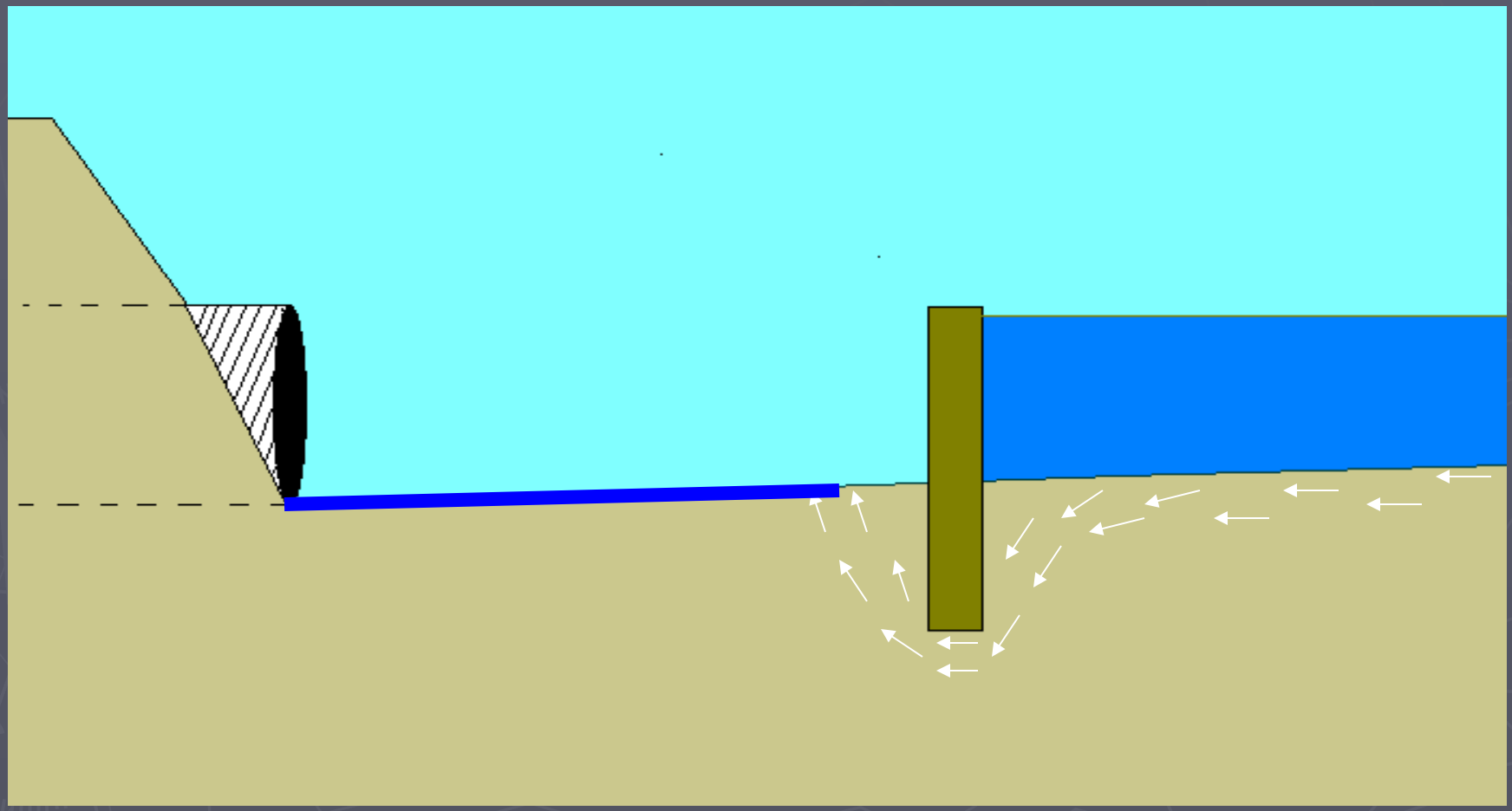
Flow Length



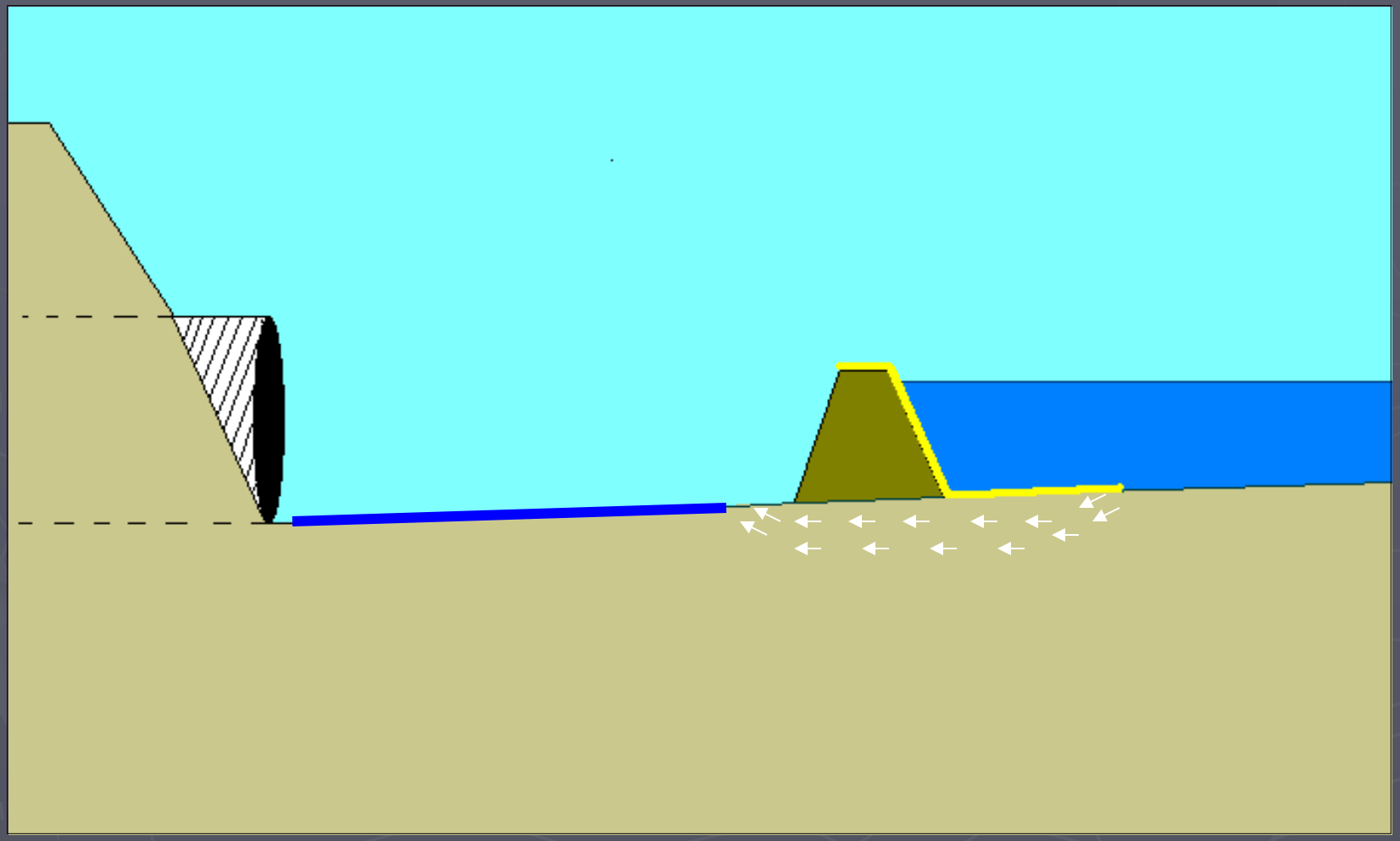
Increase Flow Length



Increase Flow Length



Increase Flow Length



Sandbag Cofferdam

Increase Flow Length

Jersey Barrier Cofferdam

Sheet Pile Cofferdam

Not A Cofferdam

If Cofferdam Overtops

- Flooding and scouring of bedding material and other structural elements within cofferdam
- Need to re-dewater area
- Construction Delays
- Downstream discharge of sediment
  - Fines?

Downstream Cofferdam

Typically backwater is not an issue

Need to have a dirty water sump

Size is not as critical

Usually insurance against failure

Bypass

Diverting the flow around the cofferdams

Types of Bypass

- Pumps
- Pipes
- Channels

Pump Diversion

Pumps

- Size 2” to 12” diameter
- Advantage
  - Clean, Quick, Flexible
- Disadvantage
  - Limited capacity
  - 24 hr monitoring
- Flow Example, 10 cfs – 2- 8” pumps

Protect the Intake from Erosion

Protect the Receiving Channel from Erosion

Temporary Pipe Through Road

Pipe Bypass

- Advantage
  - Wide range of flows
  - Low cost
  - Low maintenance
  - Long duration of construction – invert linings
- Disadvantage
  - Its in the way
  - Establishing a seal at upstream end
  - Usually undersized


CAT

Channel Bypass

- Typically match existing channel dimensions
- Line and anchor with sheet plastic, (6 mil)
- If multiple sheets are used overlap upstream end
- Anchor at all points, including stream bottom
- Provide smooth, non – erosive transition from and to natural channel

Sheet Plastic Diversion

Managing Seepage Water

Temporary Sedimentation Basin

Dirt Bag®

Erosion Control

Inlet/Outlet Protection

Recommended Procedure for In-Water Culverts

- Stream Diversion
- Cofferdam Installation
  - Upstream and Downstream
- Dirty Water Control – Sediment Basin
  - Dewater
  - Save the Critters

Recommended Procedure

- Install Pipe
- Install Headwalls and Stabilize Disturbed Soil
- Breach Upstream Cofferdam
- Catch First Flush Dirty Water
  - Pump to Sediment Basin
- Remove Cofferdams

When in doubt, ask for guidance