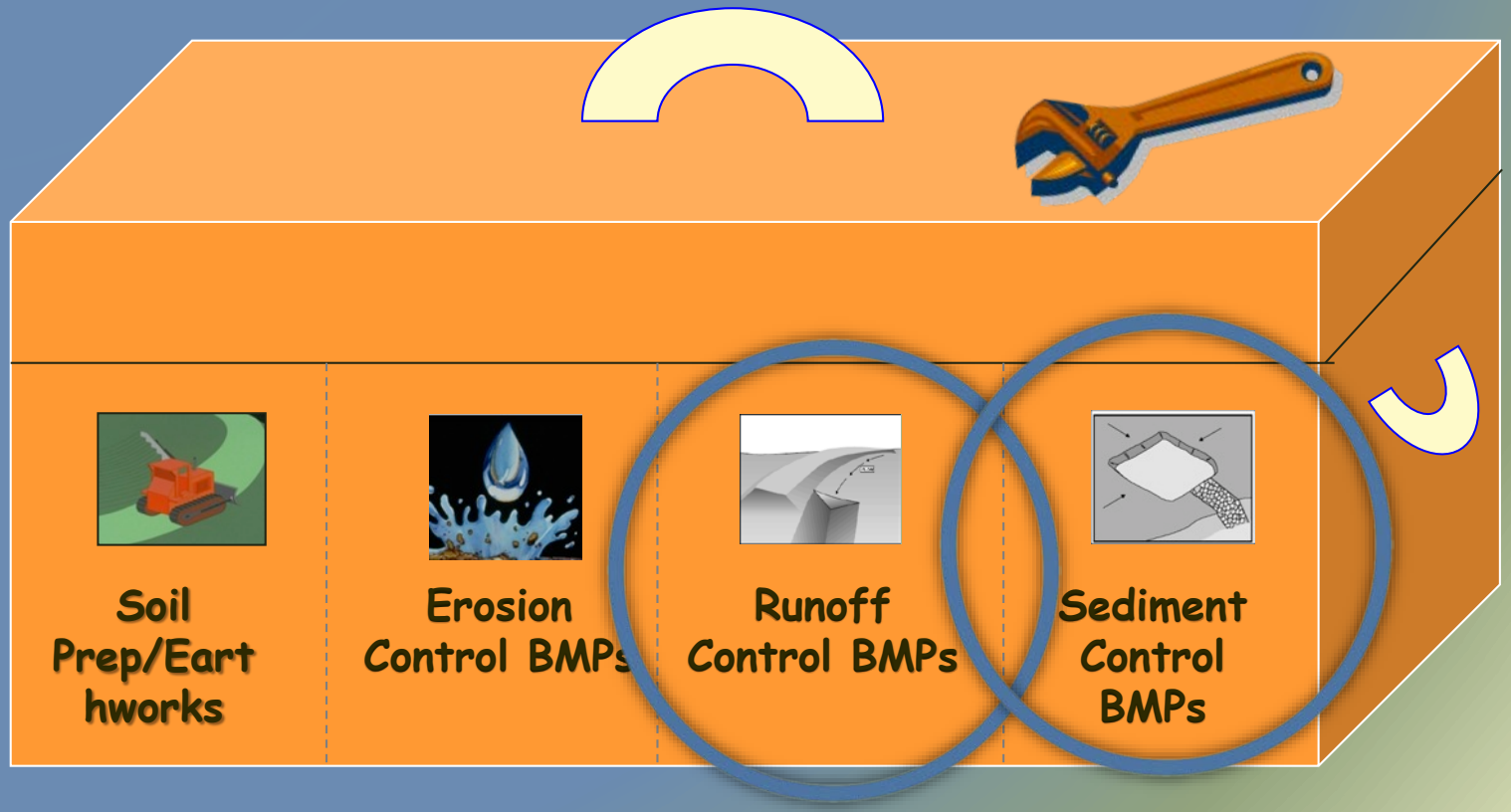
No Where to Run

And More

Runoff Control BMPs

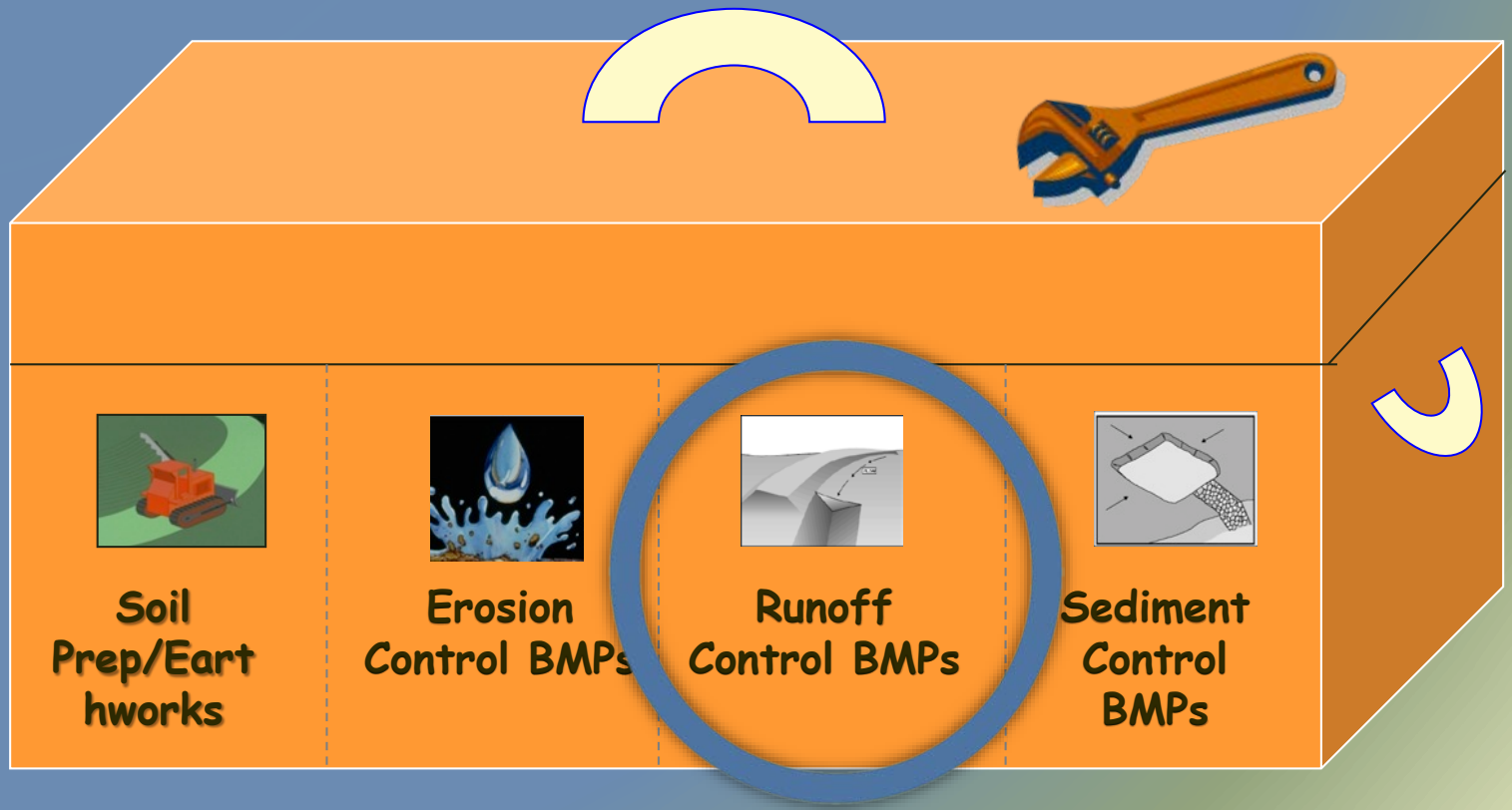
Sediment Control BMPs

Stabilized Construction Entrance



Module 4

Runoff Control BMPs



Runoff Control

- Methods that resist the tractive forces of flowing water

Shear Stress

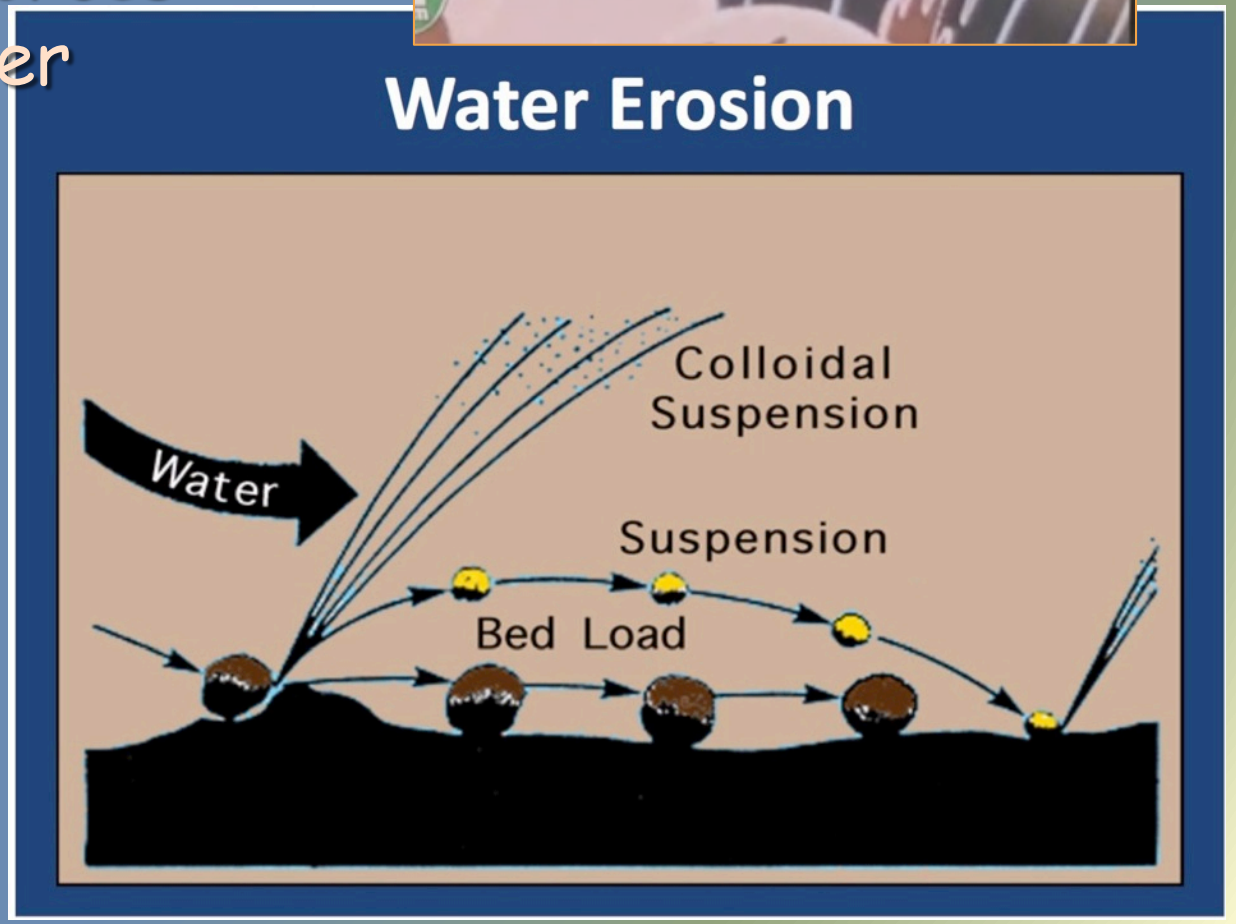
$\tau = \gamma DS$

Where:

γ is specific wt of fluid

D is mean depth

S is water surface slope



Runoff Control BMPs

- Name Some ???

- ✓ Culverts
- ✓ Energy Dissipators
- ✓ Rock-lined ditch
- ✓ Over-side drains
- ✓ Water bars
- ✓ Turf Reinforced Mats (TRMs)
- ✓ Grass-lined ditch
- ✓ Riprap
- ✓ Dikes and berms
- ✓ Brow ditches
- ✓ Swales
- ✓ Water bars
- ✓ Rolling dips
- ✓ Curbs and gutters

Run Off Control

Runoff Control

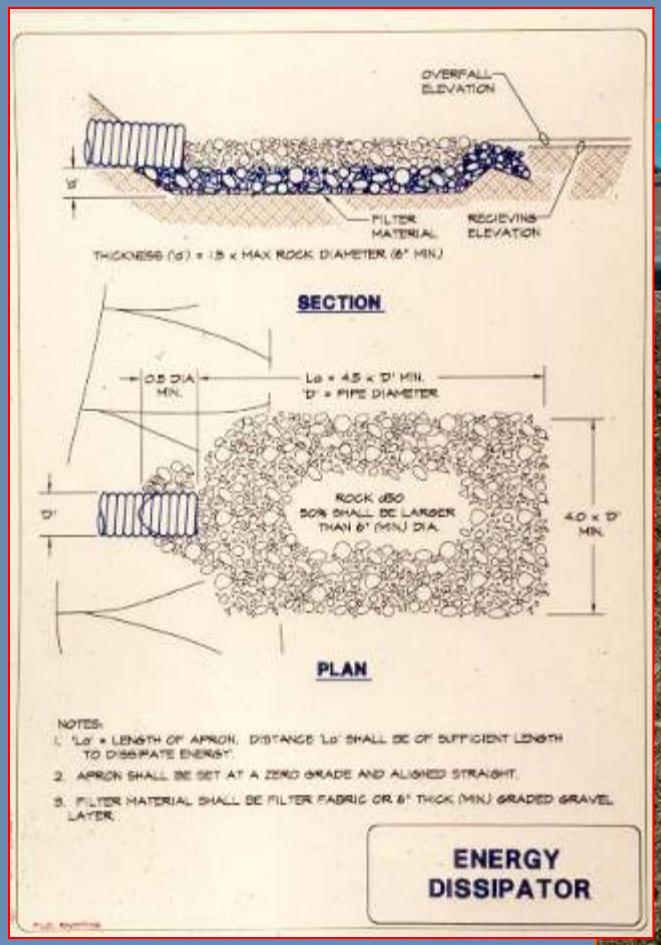
- Sometimes the hydraulic forces and velocities are predicted to be very high

Alberta Highways

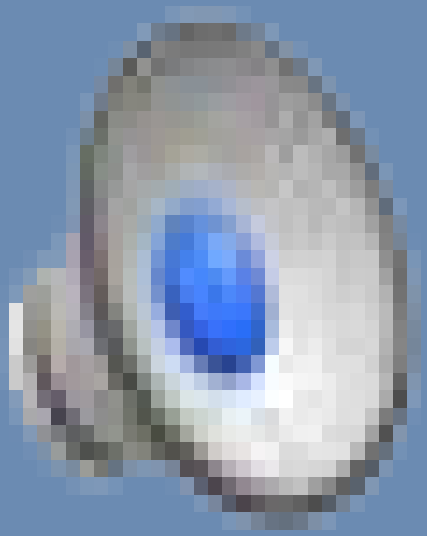
Run Off Control

Overside drain and energy dissipator

Energy Dissipator



Energy Dissipator and Scour Stop



Scour Stop Mats

Overside Drains - Alberta

Runoff Control

porous velocity check

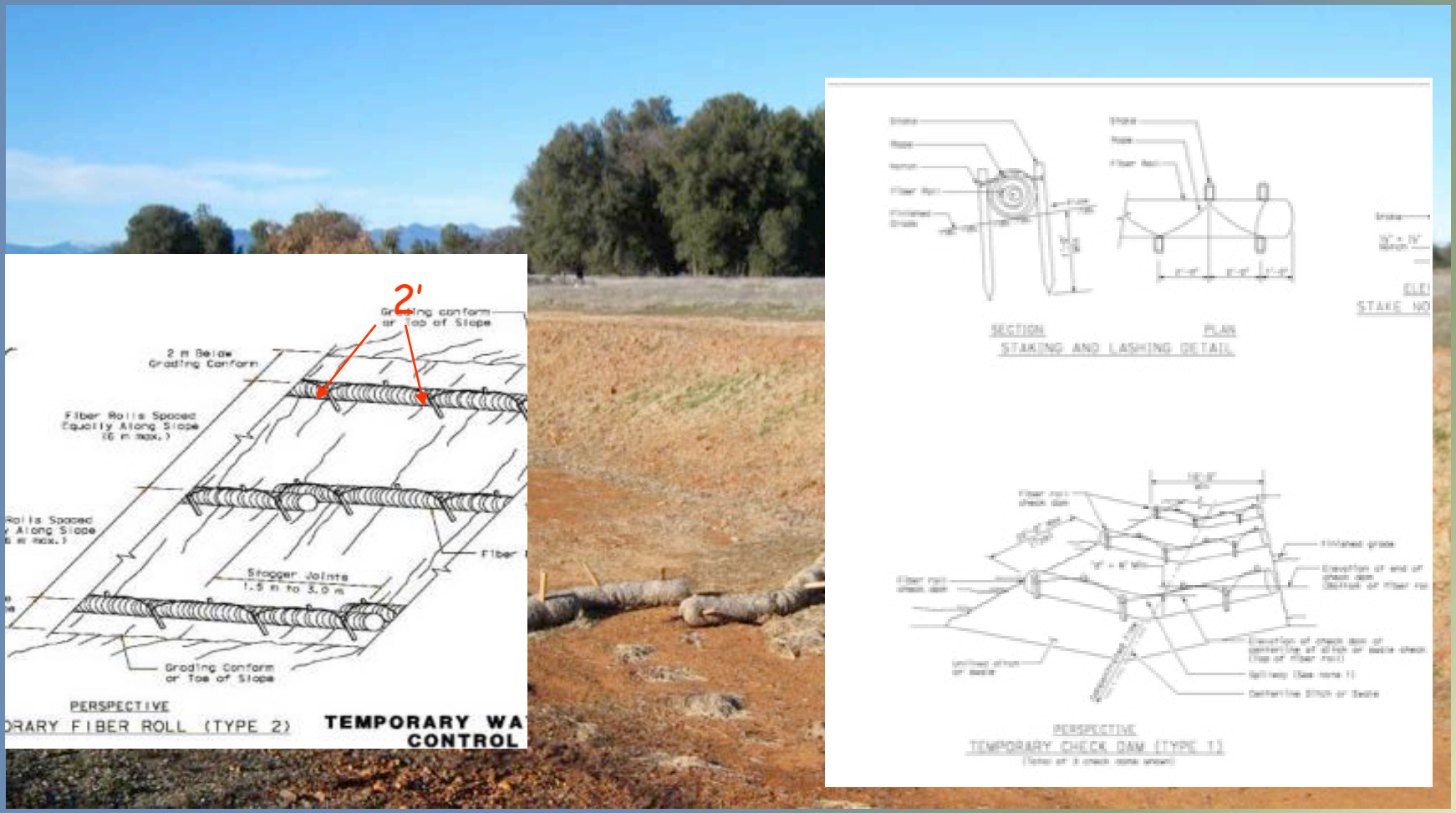
Velocity checks

- ✓ Velocity checks are intended to reduce erosive energy until channel can be permanently armored

Highway 5 Median w/ out TRM

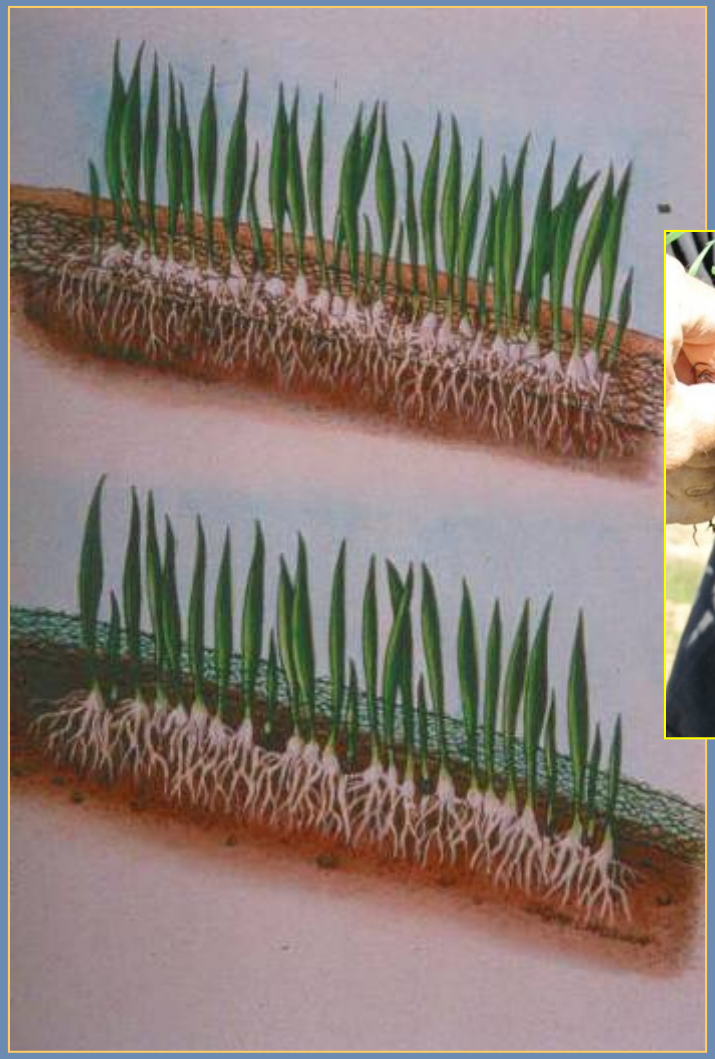
- Shallow, low gradient – no high velocities anticipated

Sometimes we should just line channel the channel? In channels the hydrostatic pressure requires "stake and rope lashing"



So what do we "line" channels with?

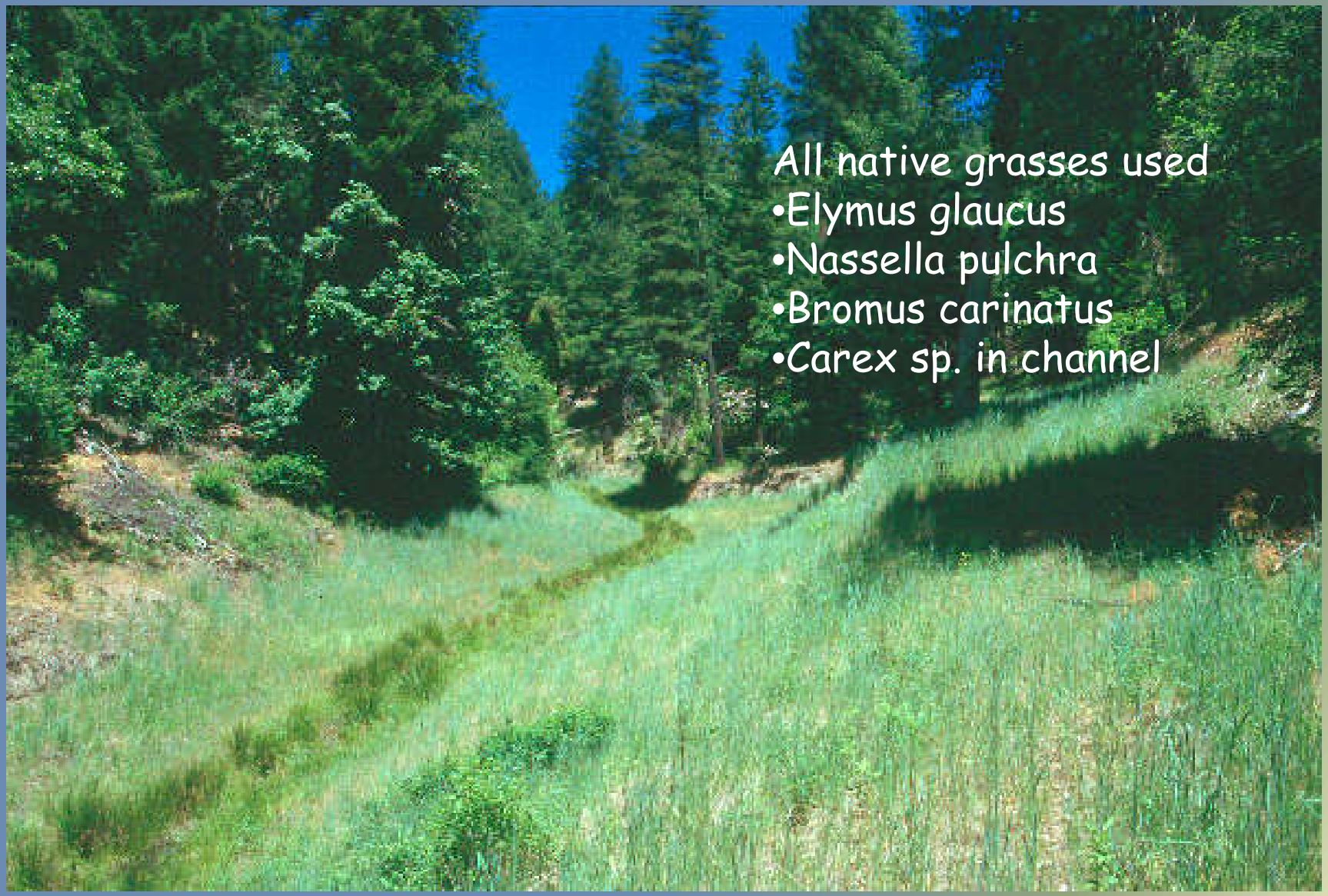
Turf Reinforcement Mats



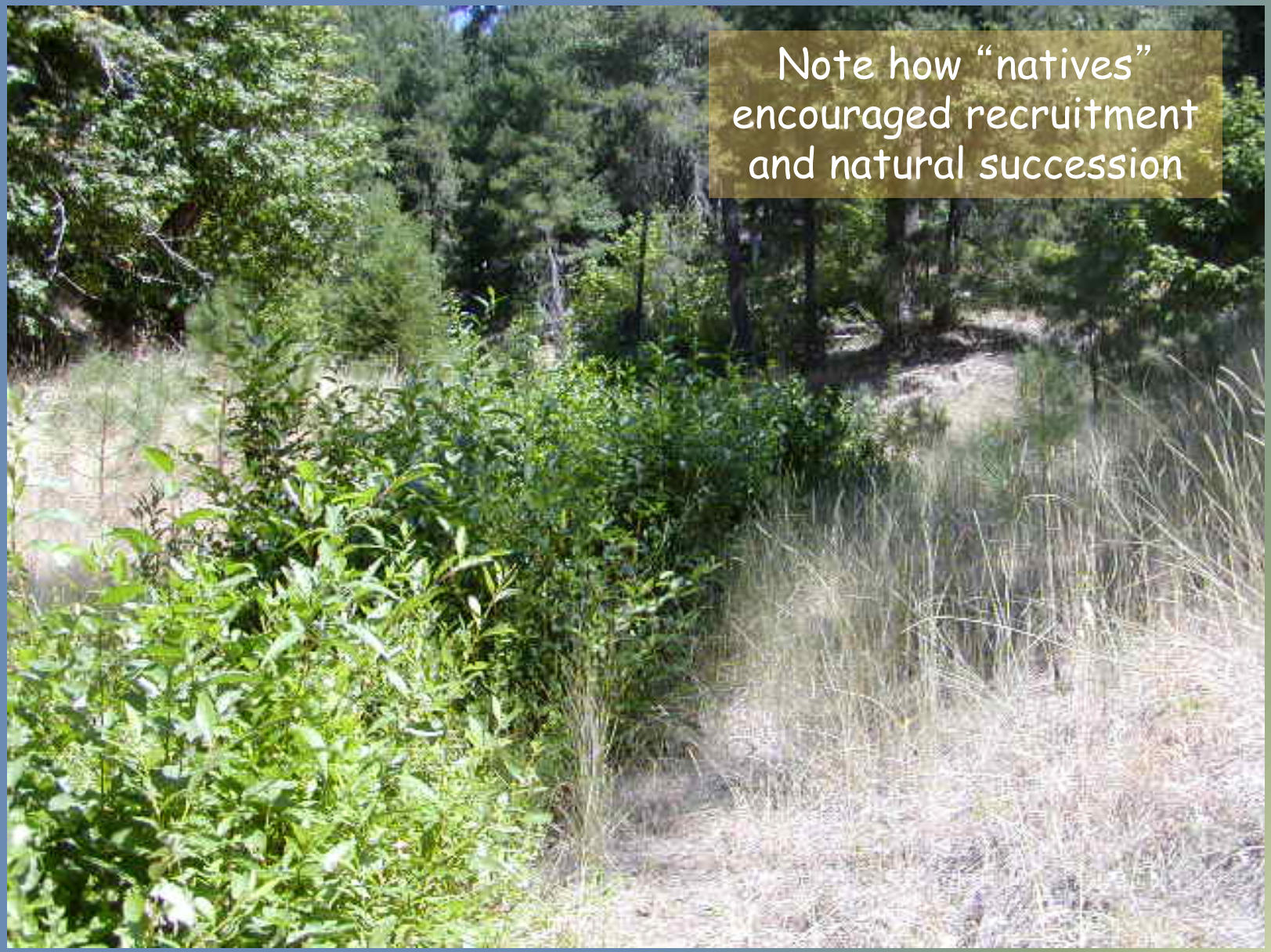
Let water flow !!!

Grass Valley Creek Watershed Restoration
Trinity River Restoration Program 1984-1994

- Hundreds of gullies (logging practices) treated in this 24,0000 ac watershed
- "worst Decomposed Granite in nation"
- This site the huge gully was filled (3 m) with DG !
- Channel designed for 10 yr RI (width)
- Lined with Enka Mat
- "soil filled"
- * check slots were soil/cement mixture



September 1994


Note how "natives" encouraged recruitment and natural succession

August 2002

TRMs as Channel Liner

May 2002

SS-7 Temporary Erosion Control Blanket/Temporary Cover (Plastic Covers)
(SSPs 07-390 and 07-395)

July 2003

TRMs as Channel Liner

Fall 2001

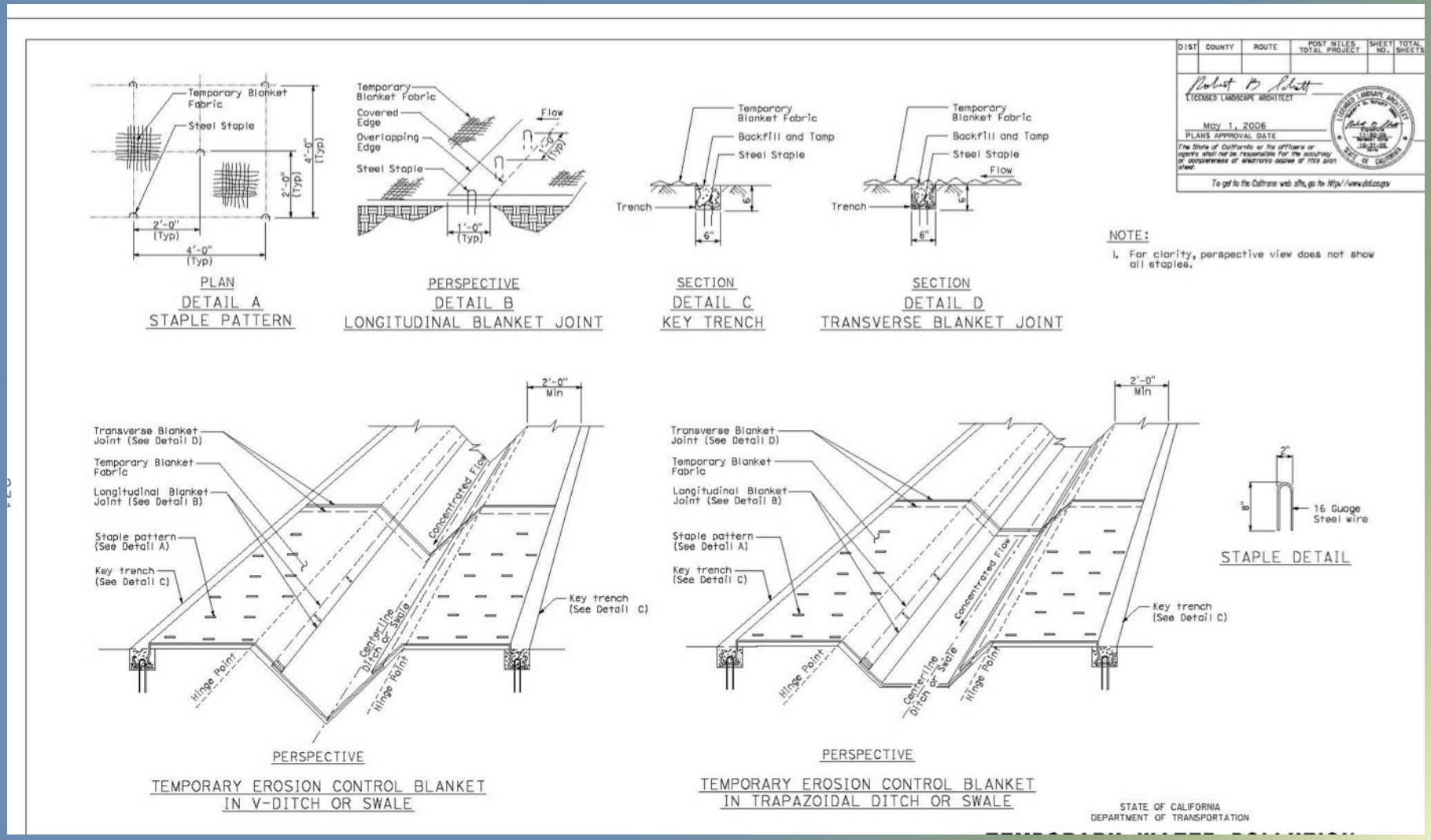
TRMs as Channel Liner

June 2002

TRMs as Channel Liner

June 2003

SS-7 Temporary Erosion Control Blanket/Temporary Cover (Plastic Covers)
(SSPs 07-390 and 07-395)



TRMs Anchored

- Fasteners

TRMs

Green Armor System

Testing Green Armor System
Our test ditch only went to 4fps

Note 6” erosion on unprotected ditch section

Overside Drain

- Scour Stop over side drain in Alberta Ca

Willow Creek Highway Project , Southern Alberta

Articulated Concrete Blocks as stabilized fords – low water crossings

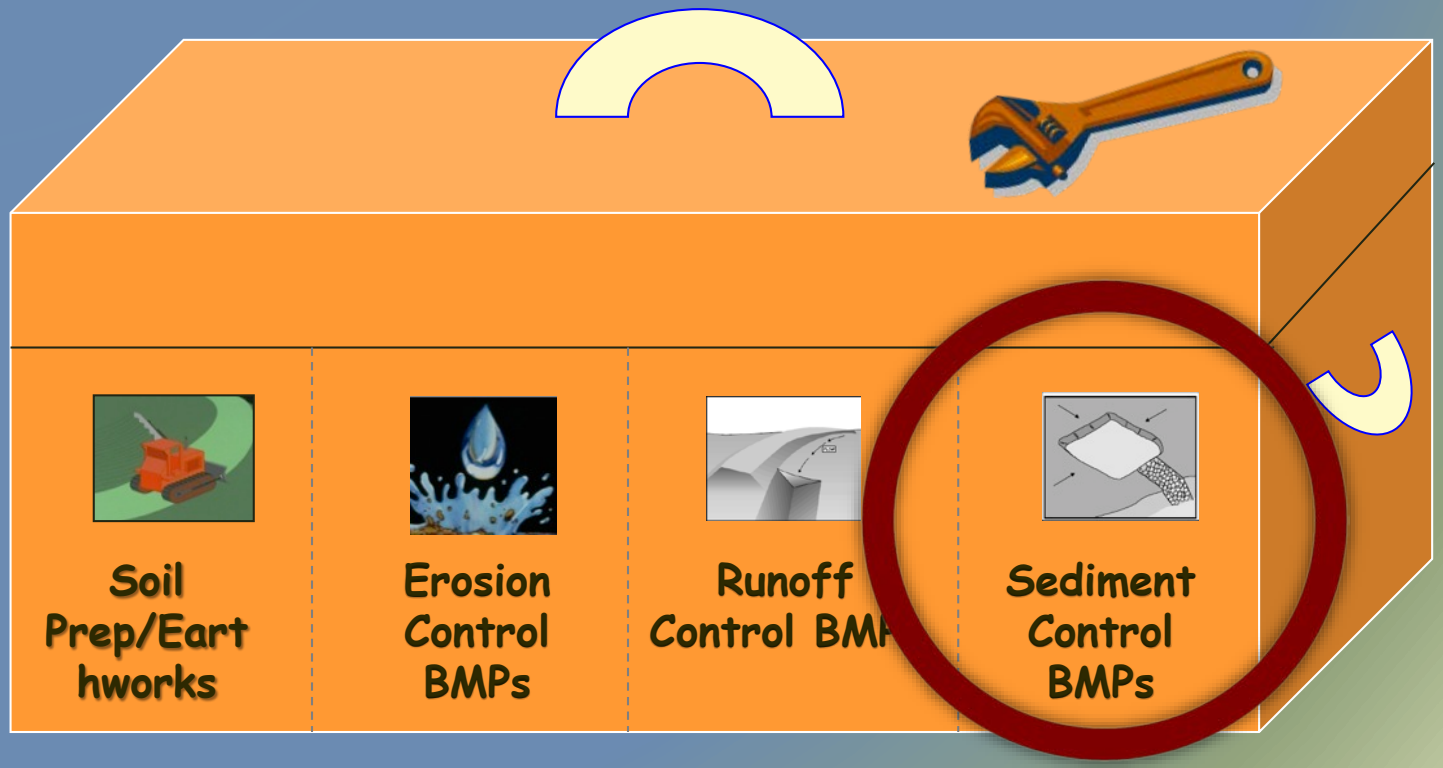
Articulated Concrete Blocks – transition mat – TRM (Vegetated)

8" in 4 hr storm

7 years after install – infiltration

Module 5

Sediment Control BMPs



KEY POINT – Stokes's Law Predicts How Sediment is Separated From Water

Stokes Law: Sediment control requires the 'ponding' of sediment-laden water (under nascent conditions) long enough for the desired size of sediment to 'fall out' of suspension. Sand-size particles have a settling velocity of 0.017 ft/sec; this is an order of magnitude faster than the settling velocity of silt (SV =.00096 ft/sec), for example. The ability to pond water, especially at the onset of the storm event, is critical. Therefore, the outlet structure is one of the most important elements of the pond design.

- Water
- Detention Time
- Travel distance
- What is the detention time of a check dam in a ditch?

Question: Do you see a potential problem with this application?

Note: How much sediment that silt fence is holding! How is that possible?

Tracking Controls

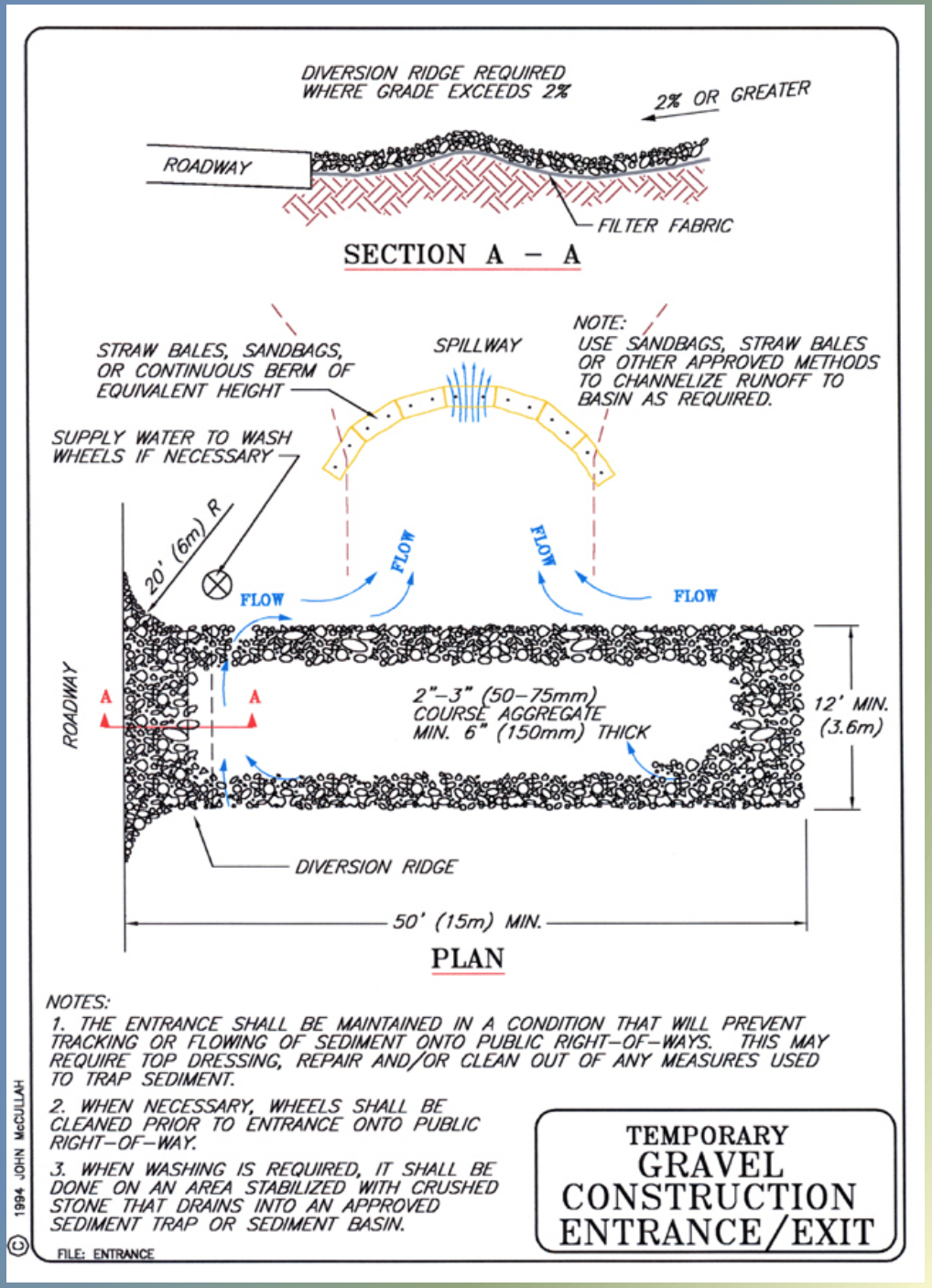
Tracking Controls

- CGP specifically requires Tracking Controls

Tracking Controls

BMP Hierarchy

- Sweeping
- Stabilized (Rock) Entrance
- Add Rumble Strip
- Wheel Wash



Rumble Strip

Gravel Bag Curb Inlet Protection

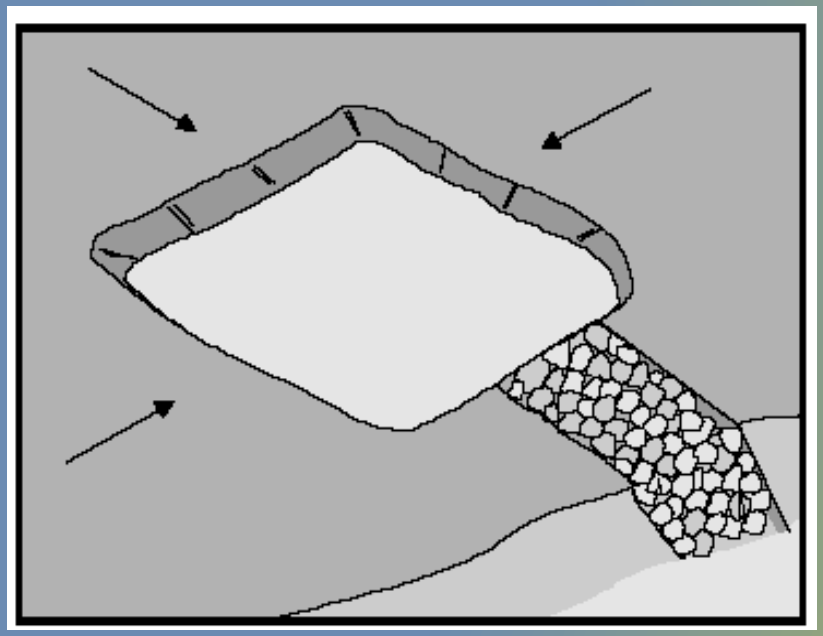
- This is a CalTrans preferred – will not block inlet
- Must use clean gravel and strong polypropylene w/ UV inhibitors

EFFECTIVE Ponds are Going to be necessary

Skimmer Outlet Pond
Hwy 5 and 299E

Sediment Traps

- Small size, limited effectiveness
- Usually for less than 2 acres
- Only removes large and medium sized particles
- Requires upstream controls
- May need dewatering (permit?)



- Baffles can increase effectivness

Sediment Trap

Specific guidelines for sediment trap:

- DSAs < 2 ha (5 ac)
- Settling zone = 130 m^3/ha
- Sediment storage = 65 m^3/ha
- Length $\geq$ 3 x Width
- Depth 1 to 1.5 m

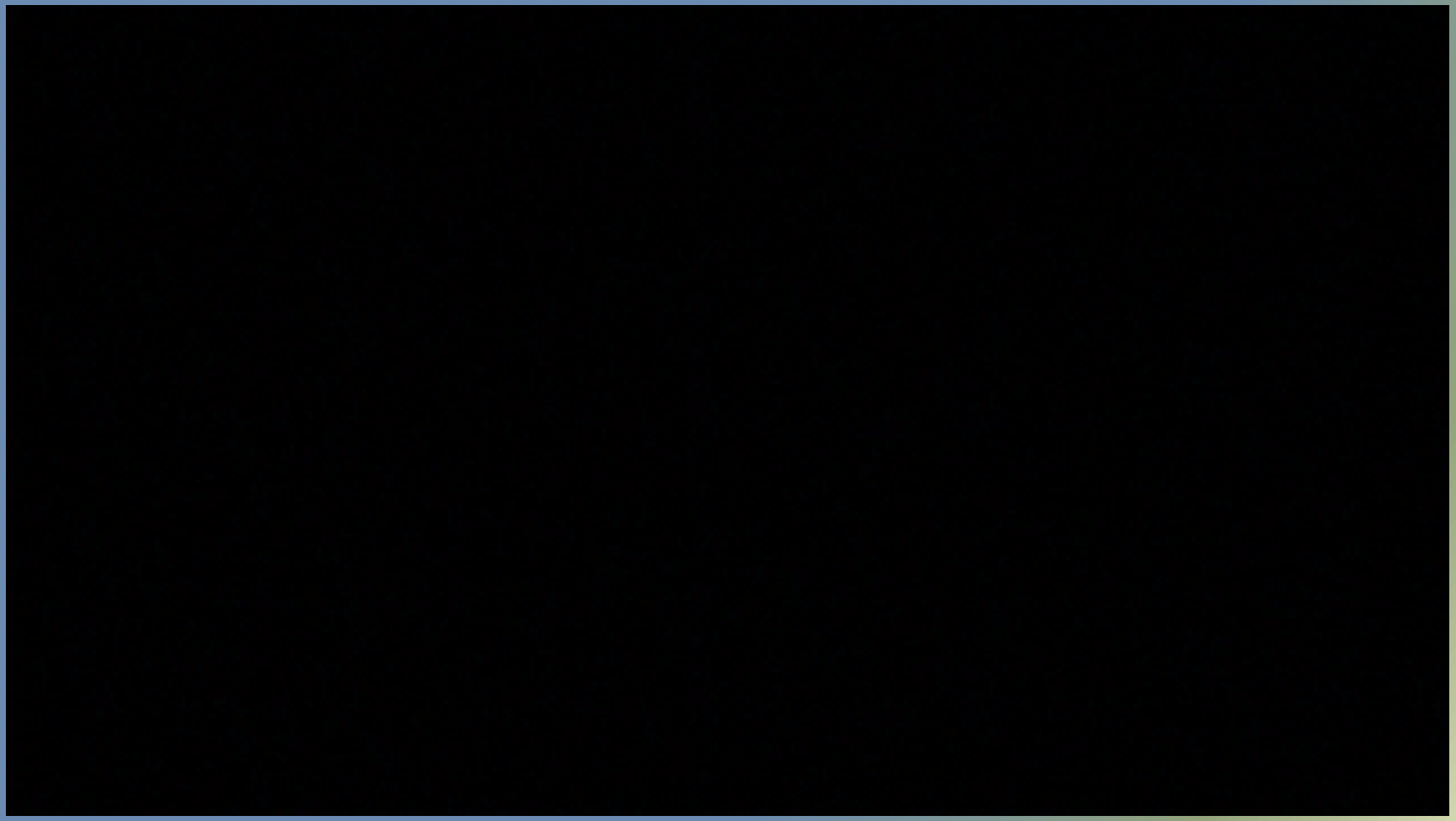
Sediment Trap with Baffles

Baffles

Baffles in sediment Basins

Or a Skimmer Basin can be easily built (and moved) at the active construction site

Skimmer Pond w/ Baffles



"proofs in the puddin"

Caltrans permanent spoil facility at Hwy 5 and Hwy 299 E

- The Worlds Longest Fiber Roll
- 176' long