

*Roadside & Roadway Drainage:
Maintenance & Pollution Prevention*



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Cornell Local Roads Program

Drainage



Drainage

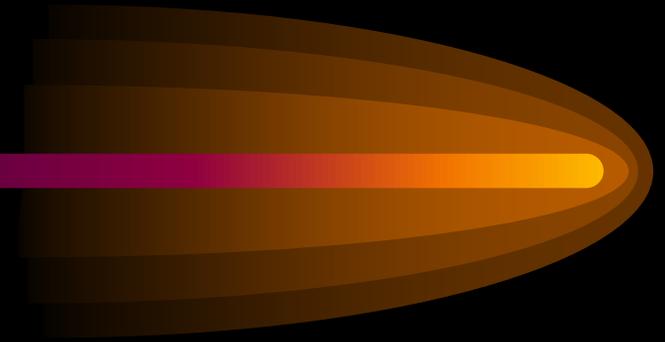
- If you can drain it,....
you can maintain it!
 - Controlling or removing
excess surface and
subsurface water to help
maintain roads and
streets



Roadway

Controlling Water

- from above
 - from the side
 - from below
 - from within



Roadside

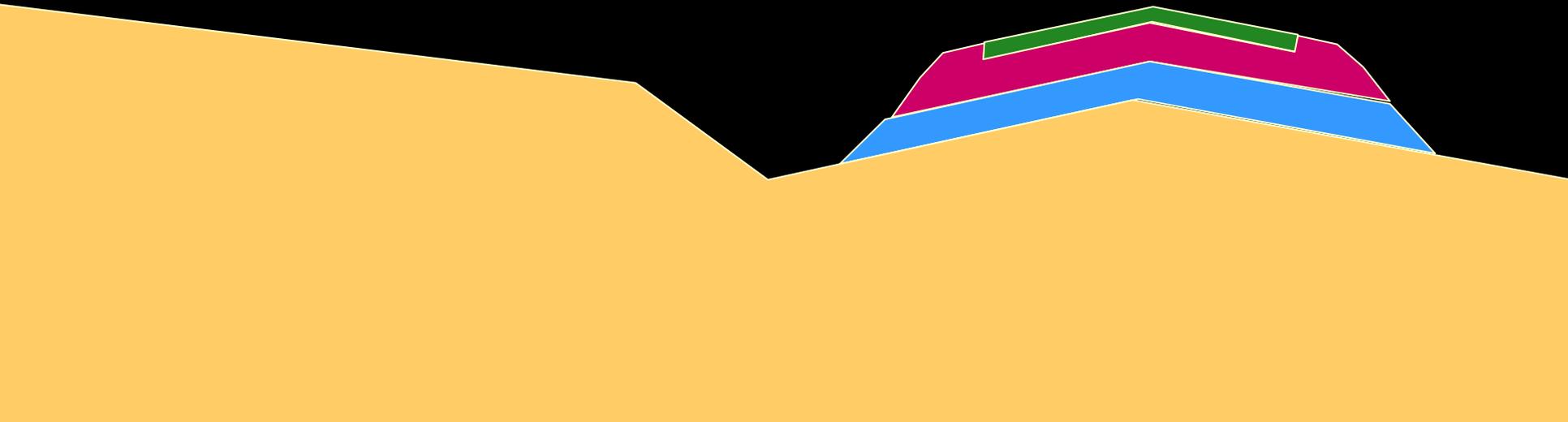
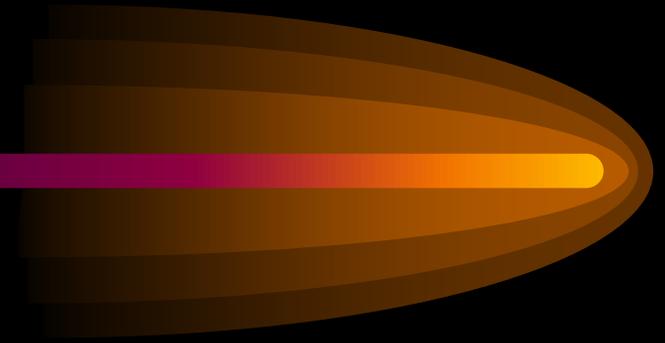
Controlling Water
and protecting the
environment

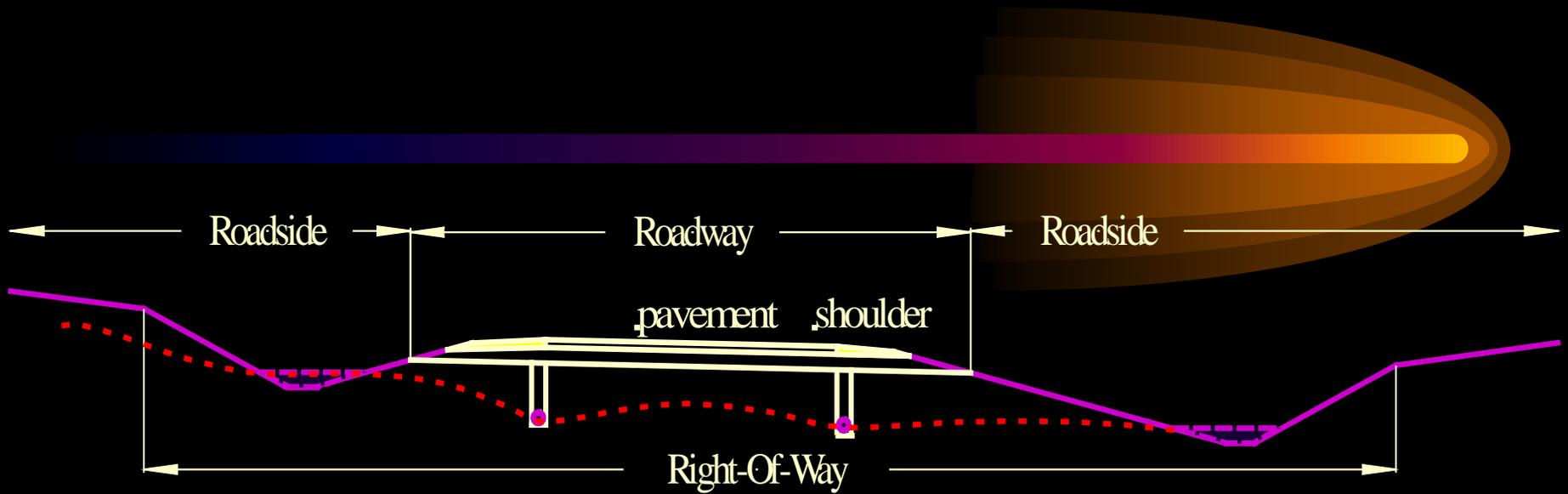
- Flowing down
ditches and curbs
- Moving through
storm sewers
- by reducing
erosion



Road Structure

- Surface
 - Base
 - Subbase
 - Subgrade





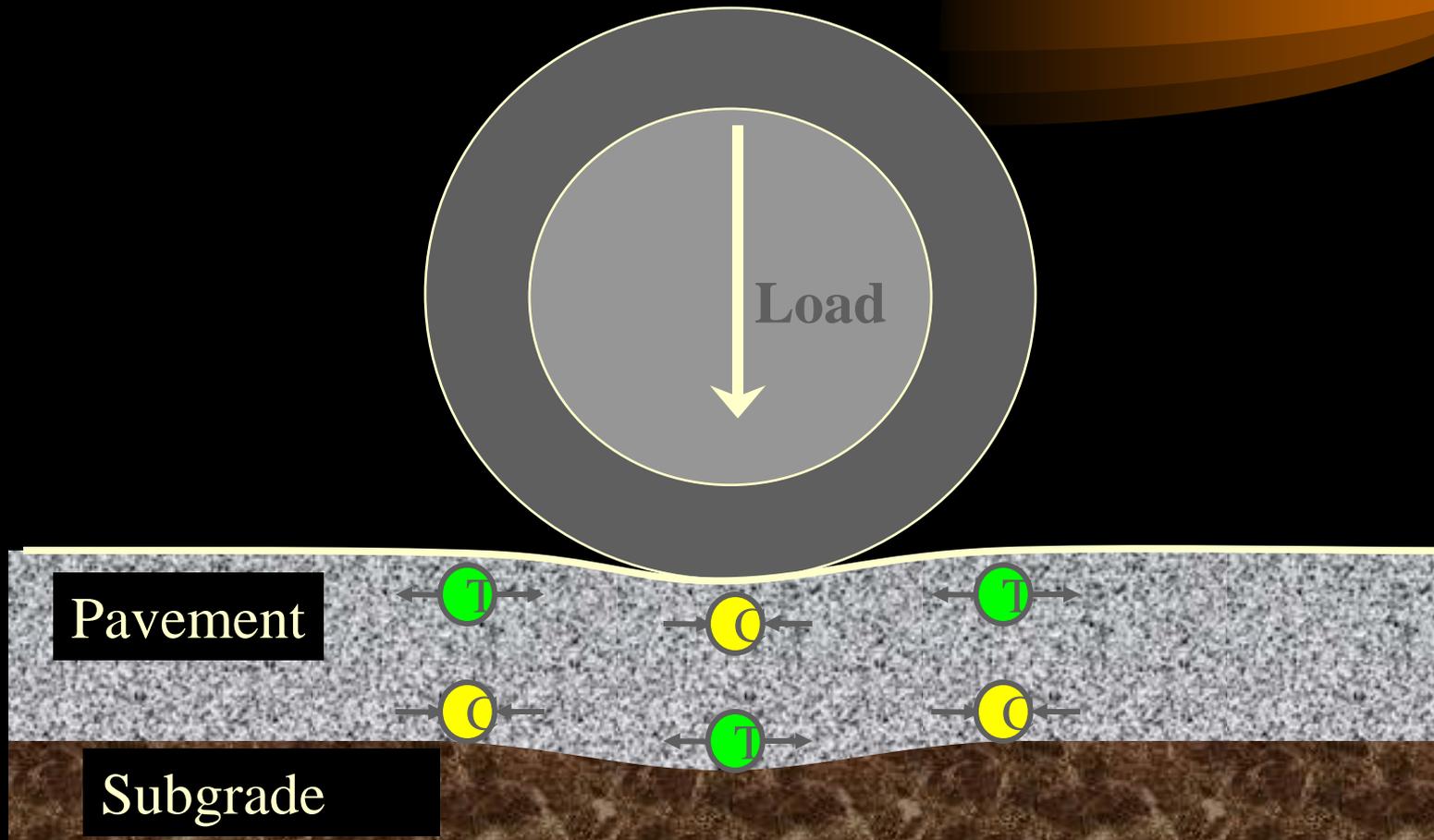
- Roadway

- Earth Materials
- Subsurface Water
- Subsurface Drains
- Cross Section Elements

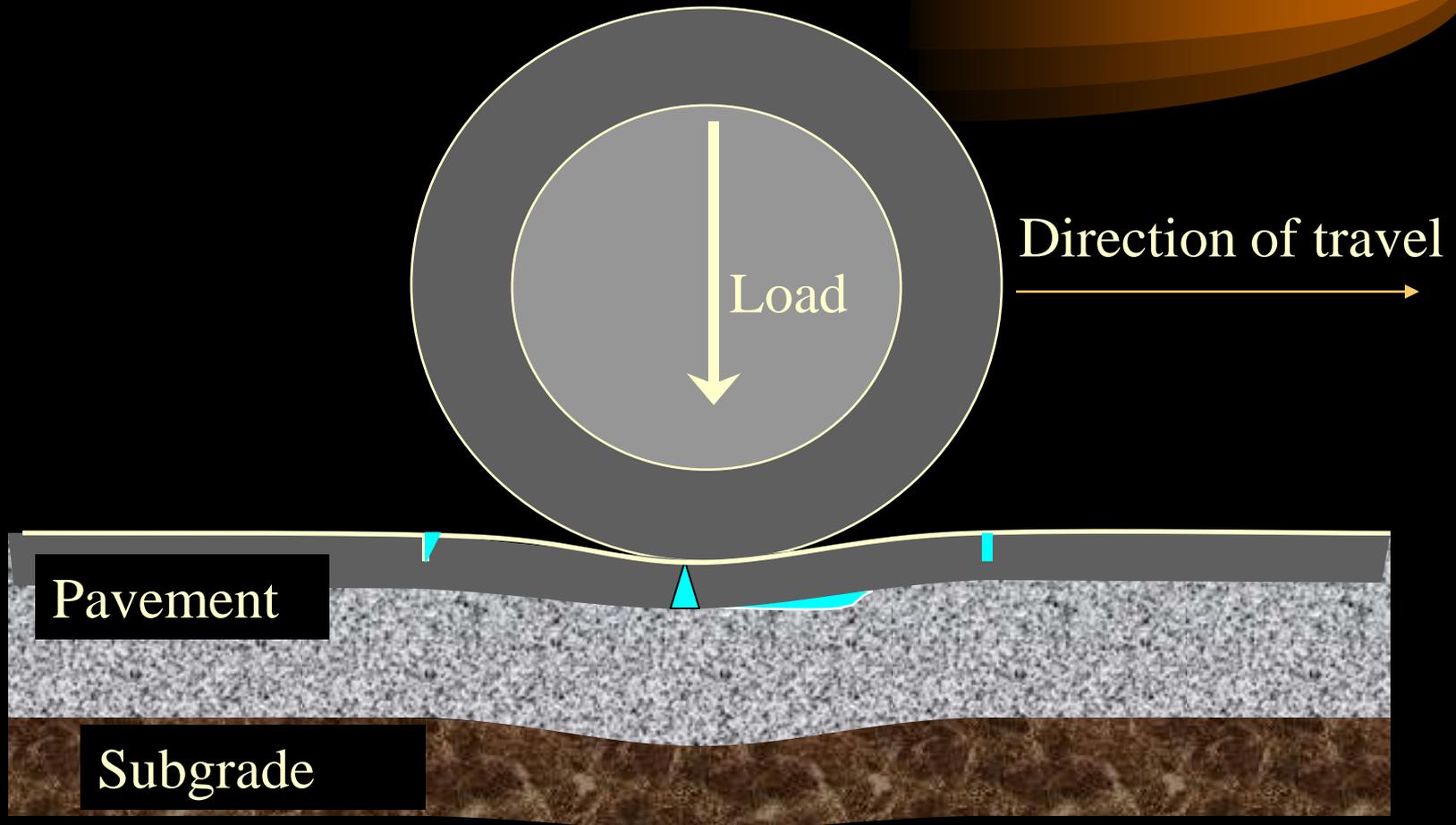
- Roadside

- Legal Issues
- Culverts and Storm Drains
- Ditches
- Erosion & Slopes

Pavement Deflection



Free Water in Pavement



Water

- Reduces soil strength
 - Erodes surface soils
 - Freezes and expands
 - Creates potholes

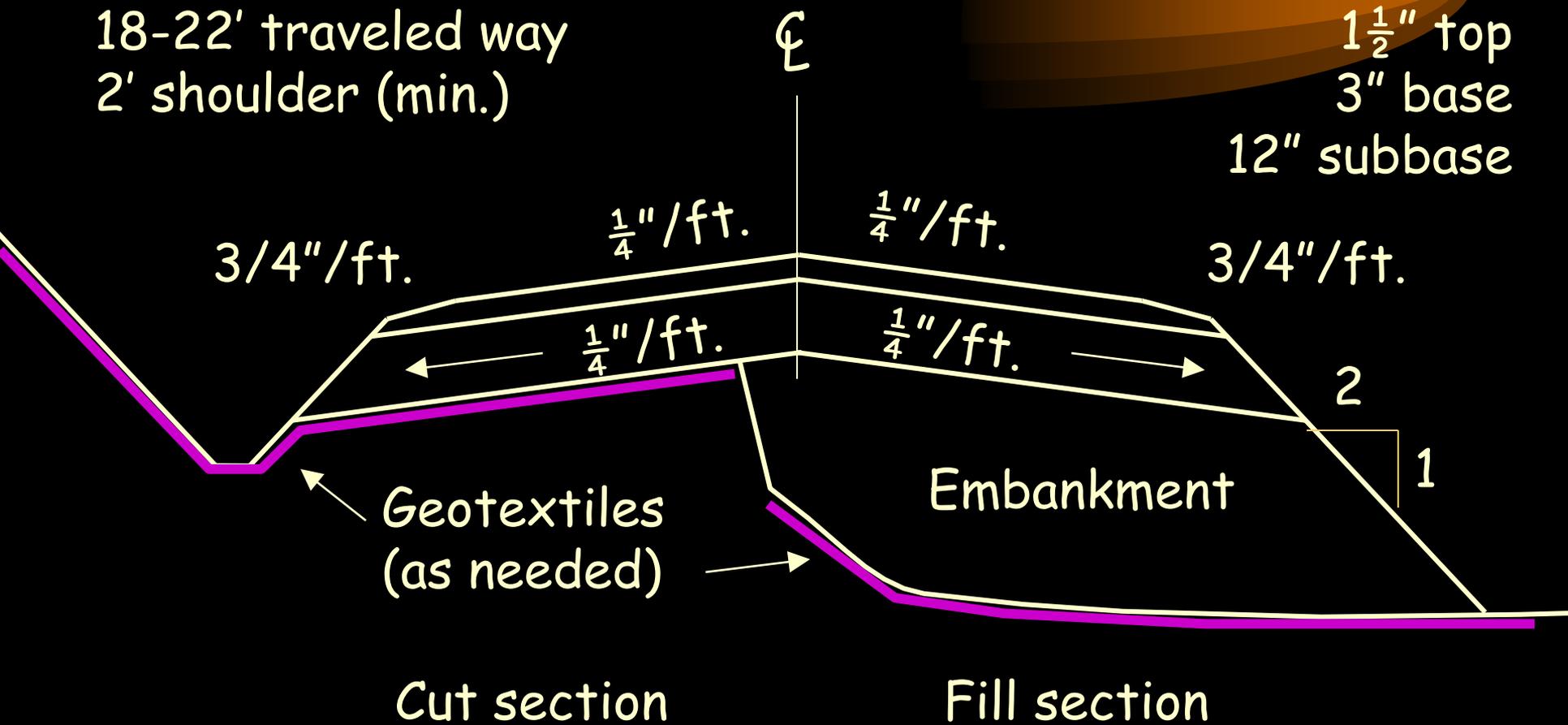




Paved Road Minimum Standards

18-22' traveled way
2' shoulder (min.)

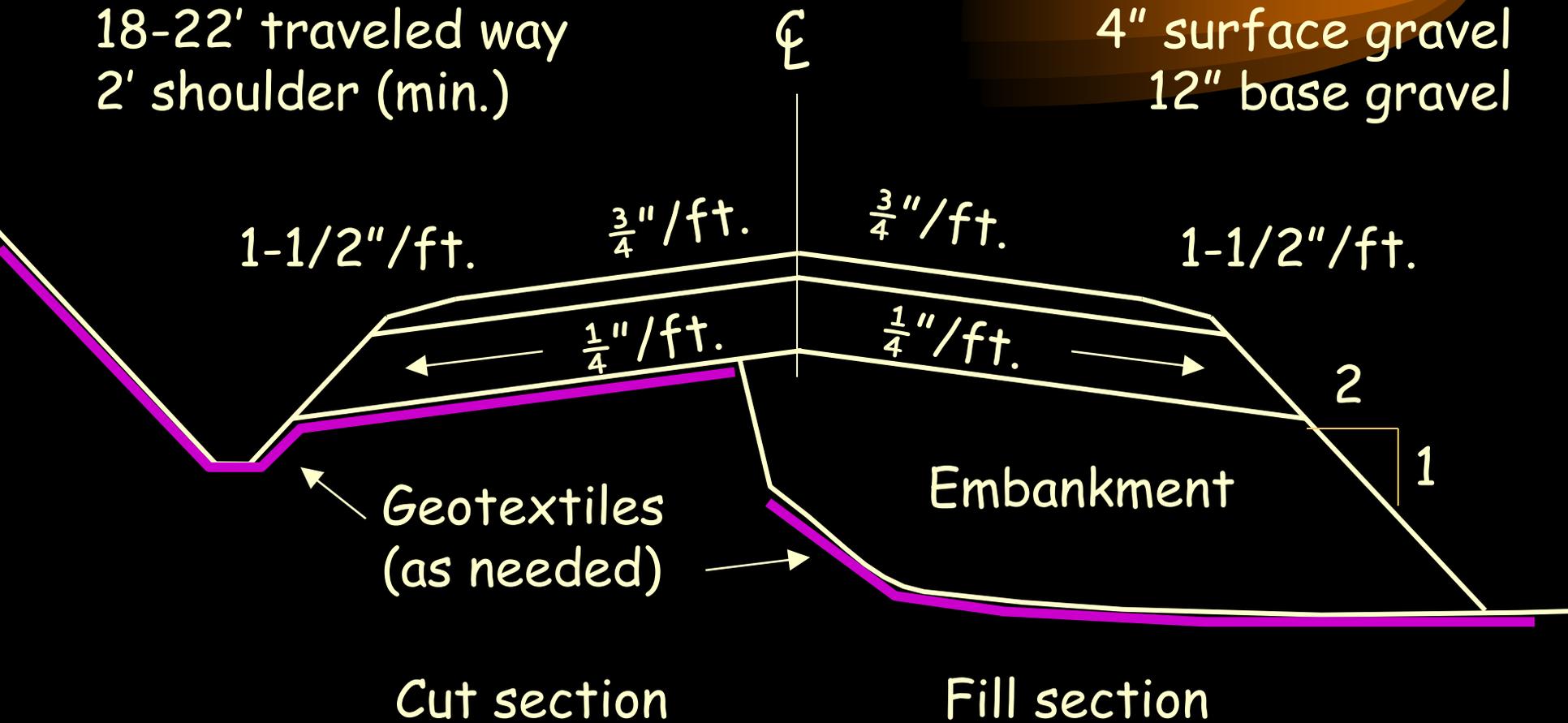
1½" top
3" base
12" subbase



Gravel Road Minimum Standards

18-22' traveled way
2' shoulder (min.)

4" surface gravel
12" base gravel



Shoulders

- Safety
- Snow Storage
- Surface Support
- Move Water
- Maintenance
 - Cut
 - Fill
 - Ruts

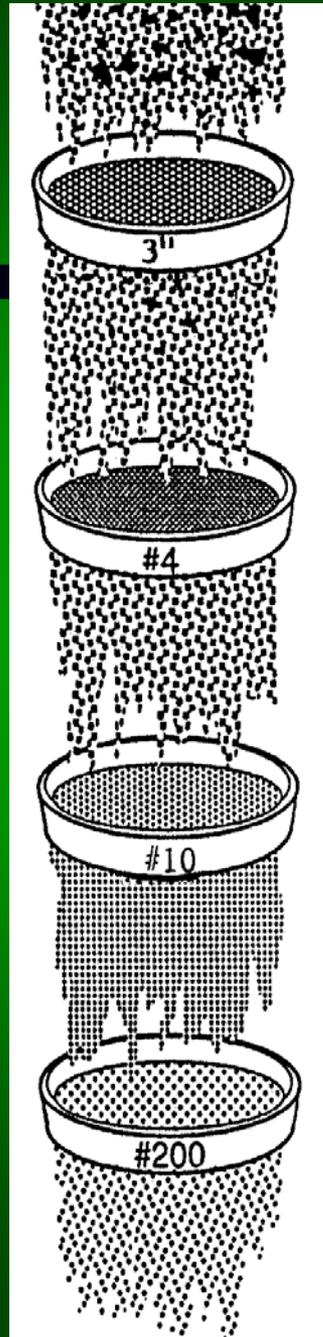


Earth Materials



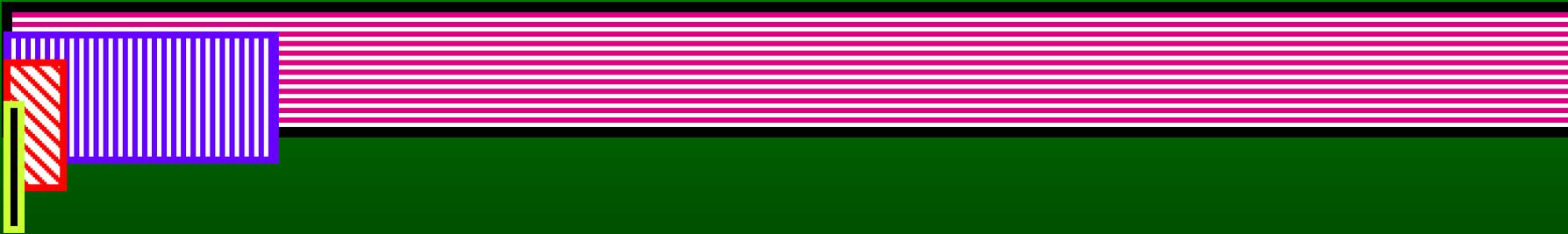
Earth Materials

- Gravel
 - Sand
- Silt
 - Clay



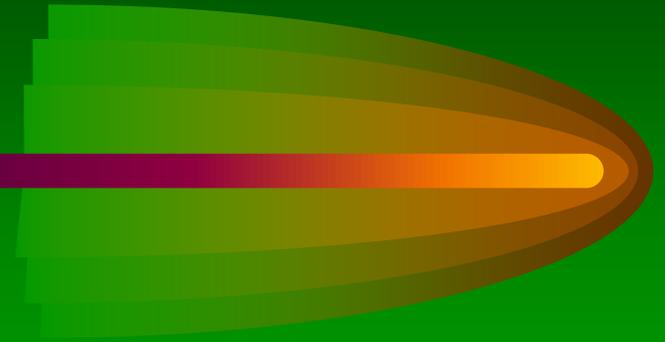
Permeability

- Gravel: ~ 2 miles per day
- Sand: ~ 10 feet per day
- Silt: ~ 1/8 inch per day
- Clay: ~ 1/2 inch per year!

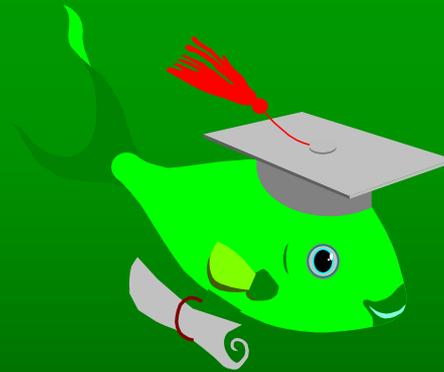


Capillarity

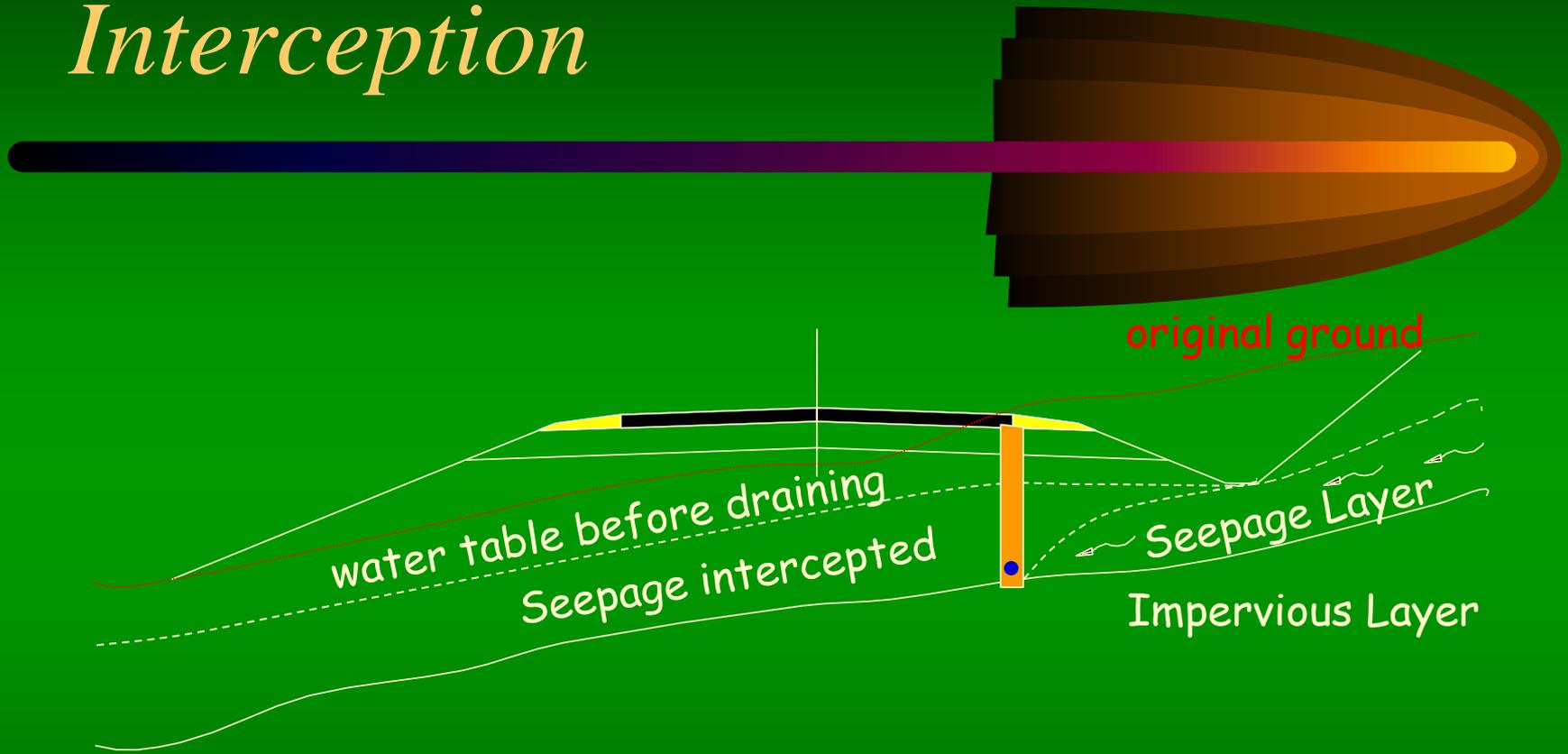
- Height of Rise:
 - Coarse sand: $\frac{1}{2}$ foot
 - Fine sand: 2 feet
 - Silt: 15 feet
 - Clay: 60 feet



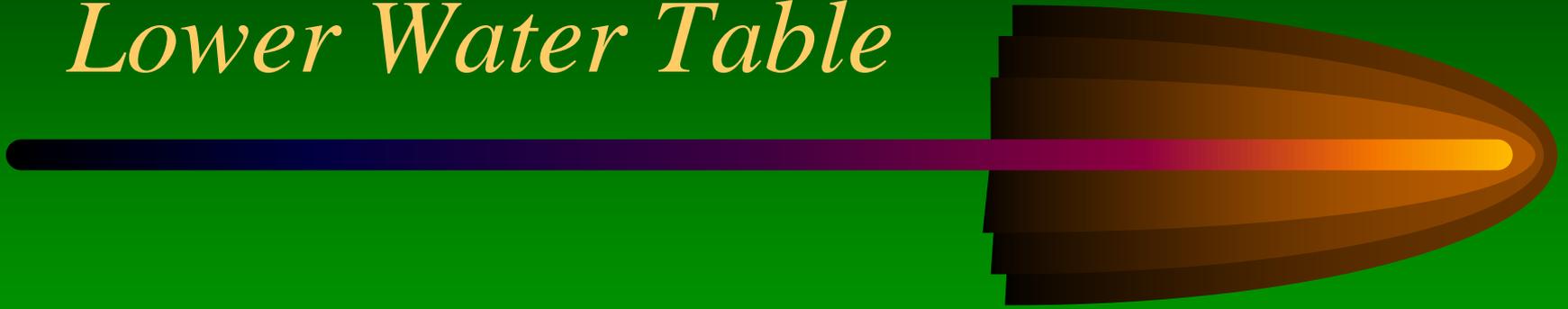
Subsurface Drains



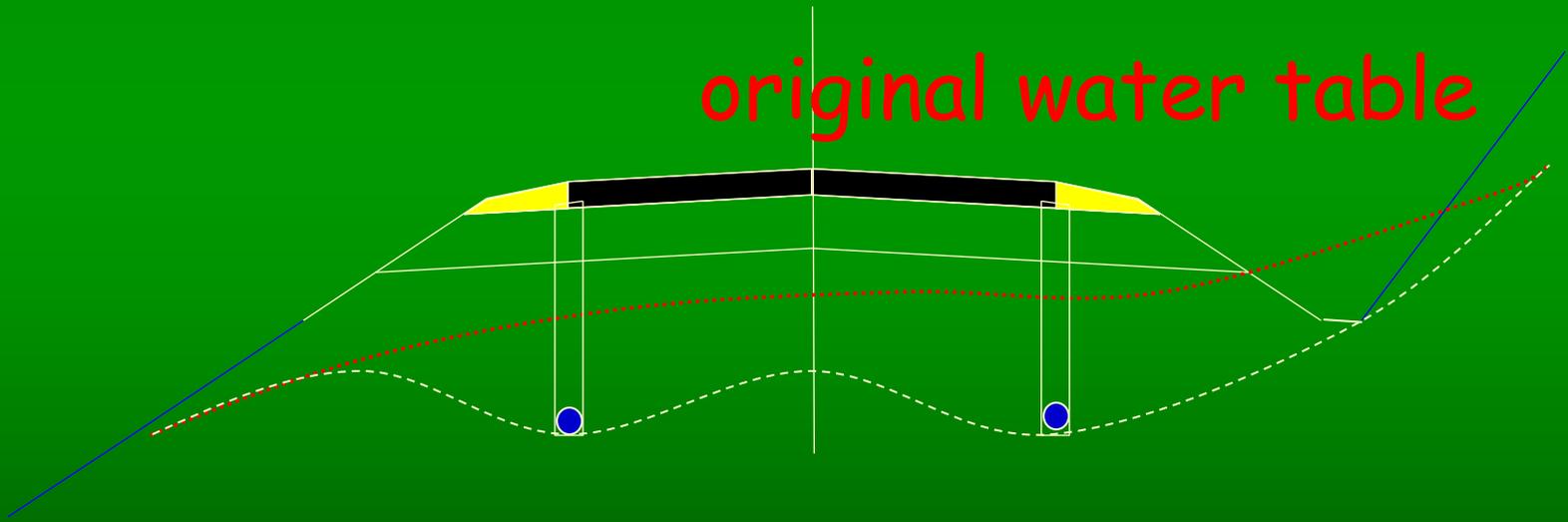
Interception



Lower Water Table



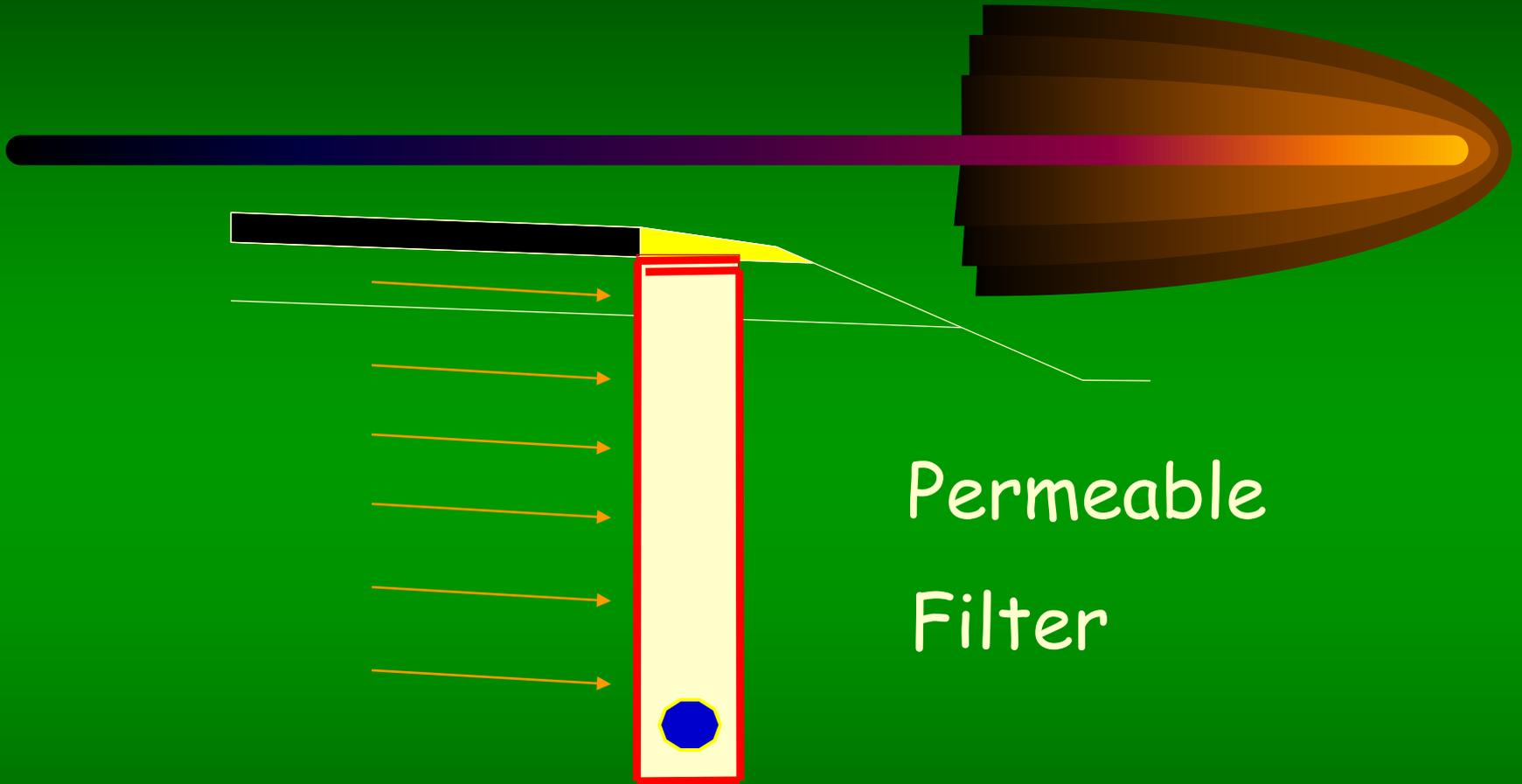
original water table



water table after draining

Remove Excess Moisture







Geotextiles

- Prevent fines from migrating into base gravel material.
- Non-woven: made under heat and pressure, texture similar to felt, used for paving and drainage applications.
- Woven: resemble burlap, used for separation, erosion control and reinforcement.

Stormwater Regulations

- EPA Phase 2
 - MS4
 - SWPPP
- NYSDEC
 - General Permits

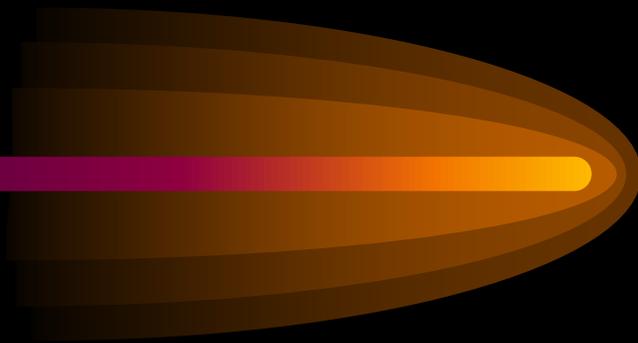


MS4

Minimum Control Measure #6

- Good Housekeeping & Pollution Prevention
 - Road Repairs & Maintenance
 - Street Sweeping
 - Catch Basins
 - Storm Drain System
 - Ditches
 - Vegetative Cover

Pollutant Concerns



- Sediment
- Hydrocarbons (Oil & Gas)
- Organics
- Debris
- Litter
- Road Salt

Road Repairs & Maintenance



- Good for Hay OK to Pave
- BMP's:
 - Planning Work
 - Prevent Migration
 - Concrete
 - Minimize Water Use
 - Refueling
 - Clean up

Street Sweeping

- Scheduling
- Equipment
- Effectiveness
- Sweepings
- Documentation
- Training



Catch Basins

- Sump
- Inspection
 - Frequency
 - Special Issues
- Cleaning
 - Methods
 - Sediment/Water
- Documentation



Storm Drain Systems

- Inspection
- Flushing
- Flush Water



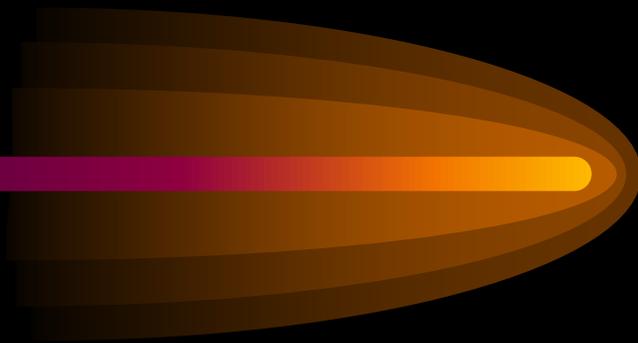
Ditches

- Design
- Maintenance
 - Modifications
 - Cleaning
 - Erosion Prevention
 - Geotextiles, hydroseeding, check dams, rip rap
- Side Slopes
- Documentation





Vegetative Cover



- Stabilization
- Sediment Transfer
- Maintenance
 - Critical Areas
 - Inspections
 - Herbicides/Fertilizers
 - Native Plants
- County S&W, Cornell Cooperative Ext., etc.

Summary

- Proximity to Water
- Inspections
- Maintenance
- Training
- Documentation



Thank You!

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