Roadside & Roadway Drainage: Maintenance & Pollution Prevention

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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

Pavement

Subgrade

Load
Free Water in Pavement

Load

Direction of travel

Pavement

Subgrade
Water

- Reduces soil strength
  - Erodes surface soils
- Freezes and expands
  - Creates potholes
Paved Road Minimum Standards

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

Geotextiles (as needed)

Cut section

Embankment

Fill section

1 1/2" top
3" base
12" subbase

3/4"/ft.
1/4"/ft.
1/4"/ft.
3/4"/ft.
Gravel Road Minimum Standards

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

4” surface gravel
12” base gravel

Geotextiles (as needed)

Cut section

Embankment

Fill section
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: ~ ½ inch per year!
Capillarity

- Height of Rise:
  - Coarse sand: ½ foot
  - Fine sand: 2 feet
  - Silt: 15 feet
  - Clay: 60 feet
Subsurface Drains
Interception

- Impervious Layer
- Original ground

- Water table before draining
- Seepage intercepted
- Seepage Layer
- Impervious Layer
Lower Water Table

original water table

water table after draining
Remove Excess Moisture
Permeable Filter
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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