Lockatong and Wickecheoke Creek Watersheds
Roadside Drainage Retrofits
Franklin, Raritan, Delaware, and Kingwood Townships
Hunterdon County, New Jersey
Statement of Problems

- Lockatong and Wickecheoke Creeks are impaired by sediment loads from surrounding land uses
- Streams have flashy hydrology which increase stream bank erosion and channel downcutting
- Majority of roads use drainage ditches as stormwater management and conveyance
- Roadside ditches move water and sediment quickly to streams contributing to the flashy hydrology
- Many ditches need improvements, through design and maintenance to reduce velocity and sediment transport

- Improvements must provide cost-effective solutions for municipalities
Project Goals

• Develop cost-effective designs strategies to address the roadside drainage issues associated with these watersheds
• Develop cost-effective routine maintenance practices to reduce sediment loads
• Build capacity within the local municipalities to implement the design and maintenance strategies in a cost-effective manner
Design Parameters

• Where possible, ditches and swales should be reconstructed to meet the design requirements set forth in the NJ Soil Erosion and Sediment Control Standards and guidance provide in the NJDEP Stormwater BMP Manual.

• In general ditches and swales should have wider bottom widths and maximum side slopes of 3:1. These dimensions can sustain a healthy grassy cover.

• In addition to stabilizing eroding soils and reconstructing the ditches, opportunities exist to retrofit many sites for water quality protection.

• The design of ditches and swales will depend on site-specific parameters, such as the right of way width, depth to groundwater, nearby vegetation, and topography. In general, water quality retrofits should promote infiltration by incorporating bioretention media, native plantings and vegetation, and periodic stone check dams to detain flows.
Roadside Projects
Location Map

Kingwood Twp: Barbertown-Point Breeze Road

Raritan Twp: Goose Island Road, Oak Grove Road,

Delaware Twp: Pine Hill Road

Franklin Twp: County Route 579, Slacktown Road, Lower Oak Grove Road, Allen Corner Road
Kingwood Township

Barbertown-Point Breeze Road @ Fitzer Road

- Drainage area ~ 80 acres (row crops and woodland)
- Right of Way = 12-16 Ft. (available for swale design)
- Soils: C/D Hydrologic Soil Group
- Slope: 1 – 1.5%

- Proposing 300 linear foot ditch improvements along both Fitzer Road and Barbertown-Point Breeze Road with 8 – 10 ft. bottom width and 2 – 3 ft. depth.
- Integrating sand/infiltration media and stone check dams to capture/remove sediment and increasing swale slope to 2% minimum.
Proposed Drainage Swale Characteristics:

~40 acres draining to each swale

WQ Storm Peak ~ 5.6 cfs
Max. Depth in Swale ~ 0.84 ft.
Max. Velocity ~ 0.52 fps

25-Yr Storm Peak ~ 91 cfs
Max. Depth in Swale ~ 1.35 ft.
Max. Velocity ~ 4.8 fps
PROPOSED SWALE CROSS-SECTION
Barbertown-Point Breeze Road @ Fitzer Road

TYPICAL CONCRETE SEDIMENT FOREBAY DETAIL
Oak Grove Road

- Drainage area ~ 1.1 acres (grass/woodland)
- Right of Way = 16 Ft. (available for swale design)
- Soils: C Hydrologic Soil Group
- Slope: 1%

- Proposing 200 linear foot water quality swale with 3 ft. bottom width and 1.5 ft. depth.
- Integrating infiltration media and stone check dam with treatment cell to remove sediment.
Oak Grove Road

Proposed Swale Location
Oak Grove Road


PROPOSED SWALE CROSS-SECTION
(Minimum 2% slope)
Modified Check Dam Designs

NOTE: Treatment cell can be filled with material to remove nutrients

Profile

Cross Section

Courtesy of Washington State, King County DOT
Pine Hill Road

- Existing Dirt road
- ~ 2 ft.-wide ditch drains to culvert underneath road and discharging 5-8 feet to 40%-50% slope
- Gully/Ditches from upland areas experiencing extreme erosion
- No headwall or protection where runoff discharges from outlet

Proposed Drainage Swale Characteristics:

- ~100 acres draining to outlet
- WQ Storm Peak ~ 5.6 cfs
  Max. Depth in Swale ~ 0.84 ft.
  Max. Velocity ~ 0.52 fps
- 25-Yr Storm Peak ~ 91 cfs
  Max. Depth in Swale ~ 1.35 ft.
  Max. Velocity ~ 4.8 fps
Pine Hill Road

- Drainage area ~ 100 acres (grass/woodland, farmsteads, row crops)
- Right of Way = 4-10 Ft. (available for swale design)
- Soils: B Hydrologic Soil Group
- Slope: 2%

- Proposing 500-700 linear foot swale with 4 ft. bottom width and 1.5 ft. depth.
- Precast drop structure and outlet protection.
Solution:

Install a pre-cast drop structure with concrete, rip rap, or gabion outlet protection to reduce velocity of runoff and capture sediment from road runoff.
Pine Hill Road

TYPICAL DROP STRUCTURE DETAIL
Croton Road/County Route 579

- Drainage area ~ 32 acres (agricultural/meadow/grass/ungrazed)
- Right of Way = 14-18 Ft. (available for swale design)
- Soils: C/D Hydrologic Soil Group
- Slope: 1.5 - 2%

- Proposing 300 linear foot water quality swale with 8-10 ft. bottom width and 2-3 ft. depth.
- Integrating concrete forebay/stone check dams and sand/infiltration media for sediment removal.
Croton Road
County Route 579

Proposed Swale Location
Proposed Drainage Swale Characteristics:

- ~32 acres draining to outlet
- WQ Storm Peak ~ 1.1 cfs
- Max. Depth in Swale ~ 0.29 ft.
- Max. Velocity ~ 0.35 fps
- 25-Yr Storm Peak ~ 43 cfs
- Max. Depth in Swale ~ 2.25 ft.
- Max. Velocity ~ 1.1 fps
• Mowing – vegetation within swales should be kept between 4” to 6”. For grass swales, the higher the grass, the lower the velocity

• Cleaning – swales with check dams will have to be cleaned of sediment from the concrete sedimentation basin using a backhoe.
References


