

dirt and gravel gazette

Winter 2010-11

The Newsletter of the Center for Dirt and Gravel Roads at Penn State

PENNSTATE



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www.dirtandgravelroads.org



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PA Bureau of Forestry's Dirt and Gravel Road Program

The bulk of this newsletter focuses on the PA Bureau of Forestry's efforts to implement the Dirt and Gravel Road Maintenance Program on public unpaved roads in the State Forest. The Bureau of Forestry was instrumental in establishing the Program, and has been a steadfast partner to the Program and Center ever since. Continued cooperation between the State Conservation Commission, the Bureau of Forestry, and the Center for Dirt and Gravel Roads will increase the effectiveness and efficiency of the Dirt



A bottomless arch pipe installed in the Tiadaghton State Forest in 2009.

and Gravel Road Maintenance Program. Please take this opportunity to read the details inside that highlight Forestry's Dirt and Gravel Road Program.

OTHER NEWS:

Mark Your Calendars: 2011 Maintenance Workshop

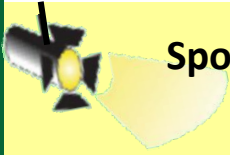
The Center's Annual Maintenance Workshop will be held in the Scranton Wilkes-Barre area on September 27-28, 2011. This location will allow potential field trips to some Bureau of Forestry project sites to the south, and to some Marcellus-impacted road sites to the north.

2010 Annual Reports due from Conservation Districts

Conservation Districts should remember to submit their Annual Summary Reports to the Center by January 15th, 2011. The reports should be updated to include all contracted and completed projects and need to be submitted using the DGRoads GIS system. The reports will be compiled by the Center and used to generate summaries for the State Conservation Commission and PA Legislature.

Marcellus Watch

The Center recently created a dedicated webpage to the various Marcellus efforts that we are involved in. For now, the webpage can be reached by clicking on the "Marcellus Page" link on the Center's main website at www.dirtandgravelroads.org. Items available on the Marcellus Page include the 102/105 clarification document, and summaries of the Conference Calls that the Center has been hosting about road-related Marcellus issues. Look for the Marcellus Page on the Center's website to continue to grow over time. The Center is also holding a one-day training for gas road maintenance crews February 22, 2011 in Williamsport, PA. More details on the Center's "Marcellus Page".



Q

How does Forestry distribute its annual D&G funding?

A

State Forest Public Use Roads (Class Z1), comprised of improved dirt and gravel surfaced roads that receive routine maintenance and are open year-round for travel by licensed motor vehicles, are considered for Dirt & Gravel Funding. The road must also be within a High Quality and Exceptional Value watershed, as identified in Chapter 93, Water Quality Standards, and have a direct impact to waters through runoff or dust. In addition, the aggregate purchased for the road must be DSA.

All forest districts are contacted in late March for D&G funding requests that are due the first week of May. After these funding requests are reviewed and revised, allocations are made based on the miles of Z1 roads in each district, also known as the district's "fair share". Roads outside of protected watersheds, drivable trails, and administrative roads are not eligible.

Have a question? Submit it to smb201@psu.edu

Too often when discussing the accomplishments of Pennsylvania's Dirt and Gravel Road Maintenance Program, the contributions of the PA Bureau of Forestry are overlooked. Forestry has put its annual \$1 Million allocation to good use by implementing Environmentally Sensitive Maintenance Practices on their roads and by supporting the educational mission of the Program and Center.

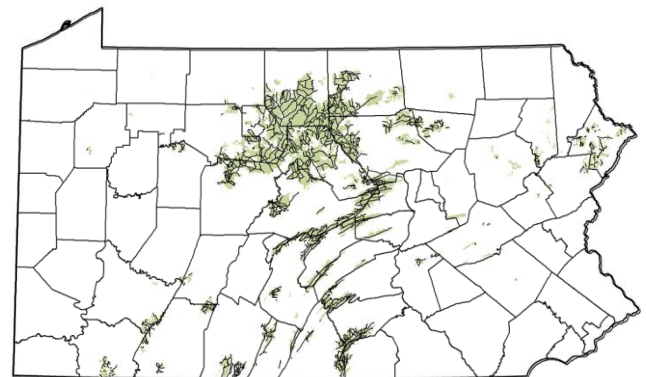
The Pennsylvania Bureau of Forestry (Forestry) currently maintains 2,250 miles of public use roadways, distributed throughout its 16 forest districts. Approximately 97% of those roads are maintained as dirt or gravel, with only 70 miles currently having a bituminous surface.

HISTORY:

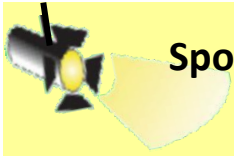
Forestry was an active participant in the Dirt & Gravel Task Force in the mid 1990's, which led to the establishment of the Dirt and Gravel Road Maintenance Program in 1997. Forestry has been a long-standing partner in the development of the Environmentally Sensitive Road Maintenance practices used in the Program. As a cooperating agency with the SCC and local County Conservation Districts, Forestry continues to work to implement pollution prevention procedures and road maintenance practices on their roads. Forestry has allocated \$13,000,000 through the Dirt and Gravel Road Maintenance Program since 1997 to reduce sediment pollution from unpaved roads by funding road improvement projects and providing Environmentally Sensitive Maintenance (ESM) education.

STRUCTURE:

Matt Beaver, Forest Program Manager, administers the program for the Bureau and is in charge of allocating the funds to the forest districts. Along with his other duties, Matt insures that the Forestry staff is properly trained under the same 5 year ESM training renewal format utilized by the SCC program. Over 1,000 Forestry personnel have attended an ESM training since the Program began. The Center's responsibilities to Forestry include providing ESM training to BOF personnel, technical assistance on specific road projects, oversight of annual demonstration projects, and other general Program support. Forestry uses a Geographic Information System, similar to the DGRoads system used by Conservation Districts, to track project work. The GIS reporting system enables Forestry to inventory, prioritize, evaluate, manage and report its road maintenance activities in an automated manner.



The location of the State Forest and their 2,180 miles of unpaved roads.



Spotlight
on

Bureau of Forestry's Dirt and Gravel Road Program

a word from
Forestry:

PROJECT WORK:

Forestry's projects implement the same ESM principles and practices used by Conservation Districts on Municipal roads including pipes, underdrain, French mattresses, raising the road, Driving Surface Aggregate, road relocation, and more. For example: over the past 5 years, Forestry's Dirt and Gravel Road Program has installed over 900 crosspipes, and placed over 51 miles of Driving Surface Aggregate in some of the most pristine watersheds in the Commonwealth.



This section of State Forest road in Tioga county was closed and relocated away from an adjacent stream in 2005.

DEMONSTRATION PROJECTS:

Each year, one of Forestry's biggest priorities is to fund a demonstration project to showcase some new or innovative practices on one of their roads. Forestry and Center staff work together to develop the scope of work and project location. Center staff provide oversight of project design and implementation. These projects utilize ESM techniques and procedures that are outside the realm of "normal projects", and provide new information and educational tools for inclusion into the ESM training modules.

Past projects include: several road re-locations where highly erosive roads directly adjacent to HQ and EV watersheds were moved to a more suitable location utilizing site specific ESM techniques; Comparative analysis and cost benefit analysis of the use of limestone vs. sandstone DSA; Sediment reduction analysis on native road surface vs. DSA surface (See "*Chesapeake Bay Commission Sediment Study*" under "*Research*" on Center's Website). Two separate Forestry demonstration projects have focused on turning paved roads back into gravel surfaced roadways that can be more easily and cost-effectively maintained. Mini-stabilization was utilized in the Forbes Forest district. This project is highlighted in the 2008 "Worksites in Focus - Linn Run Road" and was visited during the Center's 2008 Maintenance Workshop. The second project, located in the Tuscarora Forest District, utilized a modified Full Depth Reclamation procedure to return 1.5 miles of asphalt to a maintainable DSA surface.

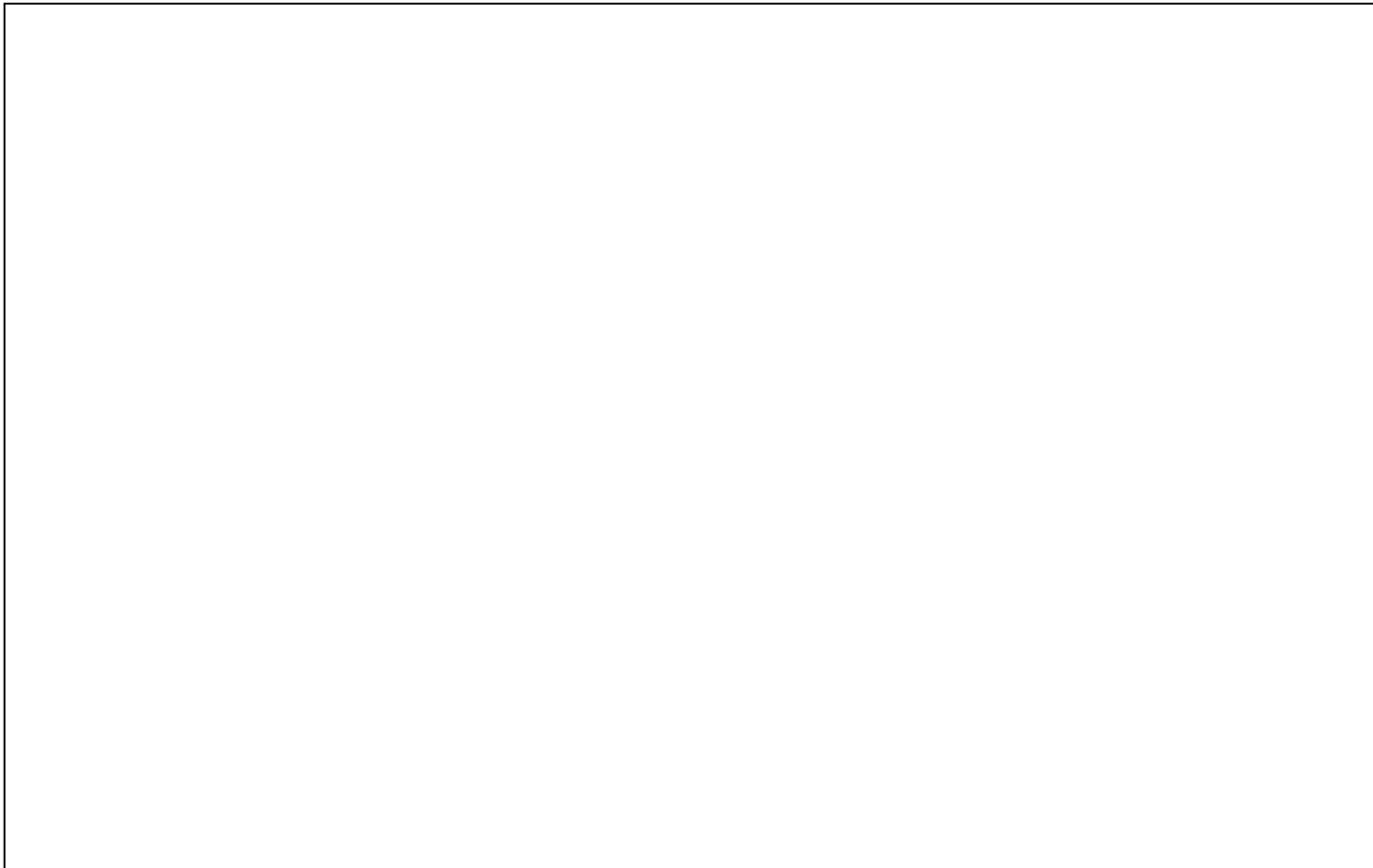
This year's demonstration project entailed the use of Soil Nail technology to stabilize two bank sections along Slate Run, in the Tiadaghton Forest District. This project is highlighted in the enclosed 2010 "Worksites in Focus - Slate Run and Francis Road". In addition to the innovative practices described above, standard ESM drainage techniques have been utilized in all of the demonstration projects including: installation of a bottomless arch culvert; multiple shallow pipe installations; over 6000' of underdrain; several high water by-passes; French Mattresses, Vegetative Management techniques; paver placed DSA, bank and base stabilization, etc.

Both the Center and the Program appreciate the work that the Bureau of Forestry has done, and look forward to continued cooperation in the future.

"Pennsylvania's Dirt and Gravel Road Maintenance Program has proven to be an innovative and successful approach to minimizing pollution from dirt and gravel roads with a minimal amount of funding. The Center has also been a leader in seeking out and applying environmentally sensitive techniques and materials for use on dirt and gravel roads, and taken vital steps in changing the attitudes and behaviors of both public and private road owners to reduce sediment pollution and road maintenance costs.

The DCNR-Bureau of Forestry staff have found the ESM trainings and annual workshops to be very successful in delivering information about innovative and effective road maintenance practices. The "technical bulletins" have also proven to be valuable and practical guides to our personnel in their field operations. For the Bureau, the ability to provide quality, upgraded, and enhanced state forest roads serve to please forest visitors and boost the Bureau's public relations while maintaining ecological processes. We shall continue to orchestrate our state forest road maintenance activities and "lessons learned" with the Center's committed staff."

-Matt Beaver
DCNR Bureau of Forestry



environmentally sensitive maintenance (ESM) training

events calendar

The two-day ESM training covers many aspects of road maintenance and focuses on practices to reduce maintenance costs and environmental impact from unpaved roads.

Have questions or want to schedule an ESM training? Want to receive future newsletters?

Contact Kathy Moir at:
1-866-No-To-Mud
(1-866-668-6683)
dirtandgravel@psu.edu
www.dirtandgravelroads.org

Two-Day ESM Training Schedule

Sullivan: Feb 2-3 **Jefferson:** March 22-23 **Susq/Wyoming:** April 6-7
Fulton: May 10-11 **Columbia:** Nov 15-16

*2011 Training requests are currently being taken.
Contact the Center to register for a training, or to discuss hosting one (814-865-5355).*

Other Events

PACD: Jan 19-20 Winter Meeting, State College

Marcellus Gas Road Training: Feb 22, Williamsport, PA

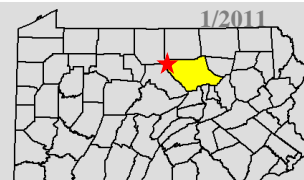
PSATS (Twp. Supervisor Assn.) Conference: April 17-20, 2011, Hershey
Visit the Center's booth and hear Tim Ziegler's Marcellus Presentation

2011 Dirt and Gravel Maintenance Workshop: September 27-28, Wilkes-Barre, PA

Worksite in Focus

Slate Run & Francis Roads

DCNR Bureau of Forestry



Project Overview:

The PA Bureau of Forestry completes a demonstration project every year with funding from their Dirt and Gravel Road Maintenance Program. The purpose of these demonstration projects is to showcase new and innovative ideas in Environmentally Sensitive Road Maintenance to other road maintenance professionals. The 2010 demonstration project involved the use of innovative bank stabilization techniques to address two recurring landslide issues in the northwest corner of Lycoming county. Slate Run and Francis Roads are two of the most highly traveled State Forest roads in the region due to their access to popular fishing and recreation sites, and because they link State Routes 414 and 44.

The Problem:

Two sections of roadway, one on Slate Run Road and one on Francis Road, have been continual problems for maintenance crews due to the threat of landslides. The landslide problem on Francis Road was caused by the road's proximity to a stream, while the problem on Slate Run Road was caused by steep side slopes and saturated soil conditions.



Francis Road (before): The bank instability here was caused by the proximity to the stream.



Slate Run Road (before): The bank instability here is caused by the many springs and seeps that saturate the site every year.

The Solution:

An innovative bank stabilization technique was used on the two unstable road sections to reinforce the downslope road bank. Soil Nail Launcher Inc. (SNL) was contracted to stabilize the failing slopes. SNL uses long "soil nails" that are driven into the bank to anchor it in place. These nails can either be shot into the bank with an air cannon, or cemented into a pre-drilled hole. The pattern, depth, and density of the nails depends on the nature of each slide prone area. If desired or needed, the surface of the slope can be faced in concrete. In addition to this unique slope stabilization process, a 3,000 foot section of Slate Run Road was rehabilitated using traditional ESM practices such as underdrain, crosspipes, and Driving Surface Aggregate.

Project Facts

Project: Slate Run & Francis Roads
Project Owner: Tiadaghton State Forest
Watershed: Slate Run (EV watershed)
Pine Creek Tributary
Project Length: 3,000 feet
Date Completed: June 2010

Cost Summary:

Slope Stabilization: ~\$64,500
Utilization of "Soil Nail Launcher" technology.
Driving Surface Aggregate: ~\$23,800
1,100 tons of paver-placed Driving Surface Aggregate
Drainage and Base Work: ~\$11,700
Included underdrain, crosspipes, and geotextile.
TOTAL: ~\$100,000

For More Information:

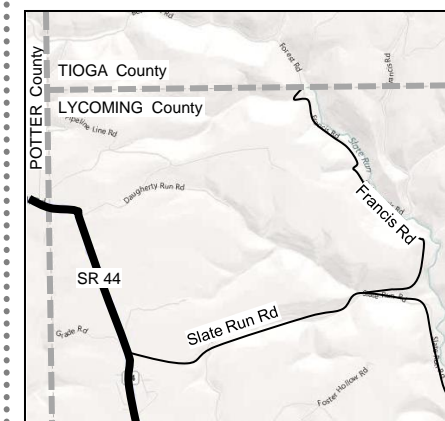
Center for Dirt and Gravel Road Studies
(814)865-5355 www.dirtandgravelroads.org

Tiadaghton State Forest District
(570)753-5721 www.dcnr.state.pa.us/forestry

Soil Nail Launcher
(970)245-7737 <http://soilnaillauncher.com/>
This does not constitute an endorsement of Soil Nail Launcher Inc. by the Center or the Program. The contact info is being provided as part of this educational resource.

Site Location:

Francis and Slate Run Roads are located in the northwest corner of Lycoming County, east off of State Route 44.



The publishers of this publication gratefully acknowledge the financial support of the Pennsylvania Bureau of Forestry. For additional information or assistance, contact: Center for Dirt & Gravel Roads Studies, Penn State University, 207 Research Unit D, University Park, PA 16802 (Toll-Free Phone: 1-866-668-6683, Fax: 814-863-6787, Email: dirtandgravel@psu.edu). Additional copies available on our website at: www.dirtandgravelroads.org



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Slope Stabilization on Slate Run and Francis Roads

The Soil Nail Launcher process involves the use of long steel rods that are either driven or drilled into the failing slope. Image 1 to the right shows a specialized excavator attachment being used to install soil nails on Slate Run Road. One of the advantages of this process is that it can usually be done almost entirely from the road surface without disturbing the bank or land below. This minimizes stream impacts and may eliminate the need for certain permits. The soil nails serve as anchor pins to tie the various layers of soil and rock underneath the road into a cohesive unit.

Sometimes the soil nails can be “shot” into the road base with a large air cannon. However, the base on these roads prevented the soil nails from being “shot” into the ground. Instead, holes were pre-drilled into the slope with a carbide bit drill mounted on the excavator. The rods were then placed into the holes, and grout was pumped through the hollow rod until it filled the entire cavity, both inside and outside the rod, cementing it in place (Image 2).

In some cases, such as Slate Run Road, the soil nails alone are enough to reinforce the slope. In such situations, the exposed soil nails are trimmed at the surface and the stabilization is complete. In other cases, such as Francis Road, additional surface reinforcement is needed. The extremely steep slope and proximity to the stream required that the slope stabilization site on Francis Road be covered in “shotcrete” (pumpable concrete). The exposed ends of the soil nails on Francis road were attached to a wire mesh to create a form on which to apply the concrete. The shotcrete is then sprayed over the mesh and nails to create a facing on the slope (Image 3). If desired, the concrete can be dyed a variety of colors to provide a more natural looking surface.

*This type of slope stabilization is **not** a practice that is suited to every situation. It may, however, be worth consideration if you have a slide prone section of roadway where other slope stabilization methods are not feasible. Please note that information on this project is provided as an educational resource. It does not constitute an endorsement of Soil Nail Launcher Inc. by the Center or the Program.*

Other ESM Practices on Slate Run Road

In addition to the slope stabilization on both roads, many other Environmentally Sensitive Maintenance Practices were implemented on Slate Run Road. Six new crosspipes were installed to reduce concentrated drainage along the roadway. Approximately 2,000 feet of underdrain was installed to drain the numerous springs and seeps that frequently saturated the road banks, ditches, and surface (Image 4). Geotextile fabric was placed on the road surface to provide support in many traditionally wet areas. Driving Surface Aggregate was then paver placed on the road at a 14 foot width and 6” compacted depth.



Slate Run Rd: Soil nail holes are drilled into the road slope.



Slate Run Rd: Grout is pumped through a hollow soil nail to fill the hole from the bottom up.



Francis Road: Wire mesh is tied into the exposed ends of the soil nails, then a “shotcrete” facing is added.



Slate Run Rd: 2,000 feet of underdrain was installed due to the many springs and seeps that kept the road area saturated for much of the year.