Environmentally Sensitive Maintenance for Dirt, Gravel and Low Volume Roads

Follow-along and take-home reference book

2021

Pennsylvania Dirt, Gravel, and Low Volume Road Maintenance Program

Pennsylvania SCC State Conservation Commission

PennState Center for Dirt and Gravel Road Studies

DCNR pennsylvania DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

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The Pennsylvania Dirt, Gravel and Low Volume Road Maintenance Program

Environmentally **S**ensitive **M**aintenance for Dirt, Gravel and Low Volume Roads

Purpose of The Pennsylvania Dirt, Gravel & Low Volume Road Maintenance Program (DGLVRP):

- Reduce sediment pollution entering Pennsylvania's streams from unpaved roads.
- Educate and empower local road-owning entities on the use of **cost-effective** and **environmentally sound** maintenance practices for unpaved roads.
- Provide grant funding to local road-owning entities in order to correct erosion and pollution problems caused by dirt, gravel and low volume roads.

Environmentally Sensitive Maintenance (ESM) Training:

- Designed to provide road maintenance professionals with knowledge and techniques to maintain roads in a manner that reduces both maintenance costs and environmental damage.
- Funded by the PA State Conservation Commission's Dirt and Gravel Road Maintenance Program.
- Taught by professionals from Penn State's Center for Dirt and Gravel Road Studies (CDGRS).
- The following individuals must have attended the training within the past (5) calendar years:
  - at least one person representing the entity that has applied for grant funds from The Pennsylvania Dirt, Gravel & Low Volume Road Program;
  - the person or persons responsible for administering The Pennsylvania Dirt, Gravel & Low Volume Road Program in each County Conservation District;
  - at least one of the two members of the Quality Assurance Board who represent the county conservation district. (can be same person who runs the program)

ESM Reference Guide:

This document provides take-home resources and guidance on procedures within The Pennsylvania Dirt, Gravel & Low Volume Road Maintenance Program and documentation of environmentally sensitive maintenance practices (ESMPs).

Contact Information:

ESM Training Created and Delivered by:
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Funding for ESM training in PA provided by: **The Pennsylvania Dirt, Gravel & Low Volume Road Maintenance Program**
Through:
The PA State Conservation Commission &
The PA Department of Conservation and Natural Resources

The Pennsylvania Dirt, Gravel & Low Volume Road Maintenance Program

Environmentally Sensitive Maintenance for Dirt, Gravel and Low Volume Roads

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The Pennsylvania Dirt, Gravel & Low Volume Road Maintenance Program

Environmentally **S**ensitive **M**aintenance for Dirt, Gravel and Low Volume Roads

County Conservation District Contact Information

Emphasis is placed on “local control” within The Pennsylvania Dirt, Gravel & Low Volume Road Maintenance Program. For that reason, local County Conservation Districts administer the Program in each individual County. **Your local Conservation District should be your primary point of contact for information or questions about the Dirt, Gravel and Low Volume Road Program.**

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Allegheny	(412) 291-8004
Armstrong	(724) 545-3610
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Berks	(610) 372-4657
Blair	(814) 696-0877
Bradford	(570) 265-5539
Bucks	(215) 345-7577
Butler	(724) 284-5270
Cambria	(814) 472-2120
Cameron	(814) 486-2244
Carbon	(610) 377-4894
Centre	(814) 355-6817
Chester	(610) 925-4920
Clarion	(814) 297-7812
Clearfield	(814) 765-2629
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Columbia	(570) 784-1310
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Cumberland	(717) 240-5358
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Delaware	(610) 892-9484
Elk	(814) 776-5373
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Forest	(814) 755-3450
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Juniata	(717) 436-8953
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Lancaster	(717) 299-5361
Lawrence	(724) 652-4512
Lebanon	(717) 277-5275
Lehigh	(610) 391-9583
Luzerne	(570) 938-3018
Lycoming	(570) 433-3003
McKean	(814) 887-4002
Mercer	(724) 662-2242
Mifflin	(717) 248-4695
Monroe	(570) 629-3060
Montgomery	(610) 489-4506
Montour	(570) 271-1140
Northampton	(610) 829-6276
N’umberland	(570) 495-4665
Perry	(717) 582-5119
Pike	(570) 226-8220
Potter	(814) 320-4011
Schuylkill	(570) 622-3742
Snyder	(570) 837-3000
Somerset	(814) 445-4652
Sullivan	(570) 928-7057
Susquehanna	(570) 278-2105
Tioga	(570) 724-1801
Union	(570) 524-3861
Venango	(814) 676-2832
Warren	(814) 726-1441
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The publishers of this publication gratefully acknowledge the financial support of the Pennsylvania State Conservation Commission. For additional information or assistance, contact: Center for Dirt & Gravel Roads Studies, Penn State University, 215 Transportation Research Bldg, 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

PRESENTATION MODULES:

Chapter 1
Introduction

1) Unpaved roads serve Pennsylvania's 5 major industries of tourism, forestry, mining, oil & gas extraction, and recreation.

2) Roads affect streams by:
- interrupting natural drainage patterns
- concentrating runoff
- generating additional sediment
- transporting sediment and other pollutants into streams

3) Erosion: A loss of soil caused by wind, gravity, water lubrication, freeze & thaw, rainfall, and flowing water. Erosion potential depends on soil, slope, cover, water and US!

4) Streams:

a) **A complicated food web** exists in streams including algae, insects, fish, birds, and humans. Everything in the "food web" is tied together. Trout are used as an "indicator species" of stream health, like a canary in a coal mine.

b) **Sediment affects streams and fish by:**
- blocking sunlight.
- damaging the gills of fish.
- filling in streambeds.
    - Suffocates insects and destroys food web.
    - Fills in "nooks and crannies" young fish need.
- carrying other pollutants into waterways.
- limiting the available oxygen in the water.

Clean streams provide a big economic benefit to PA!

NOTES:

5) **Wetlands:** A wetland is an area that is wet enough to saturate the soil and grow plants that are adapted to wet conditions.

a) **Three basic types of wetlands:**
- **Floodplain**: located along lakes and streams
- **Depression**: low lying areas with no outlet
- **Sloped**: spring or seep that surfaces on a hillside

<u>Often wetlands are connected to streams and affect stream water quality. Road sections affected by wetlands are often the most difficult and expensive areas to maintain.</u>

b) **Wetlands are valuable and important:**
- act as natural water pollution filters
- store water and reduce flood flows
- create habitat for plants, animals and game
- provide economically important recreation for people

Notes:

Chapter 2
Program Orientation

1) Program Background

a) In the early 1990s, volunteers from Trout Unlimited provided the foundation for the Dirt and Gravel Road Maintenance Program by conducting a statewide pollution assessment of unpaved roads in protected watersheds.

b) Over 16,000 verified pollution sites have been identified statewide on unpaved public roads. Many more exist on paved low volume roads.

c) **PROGRAM GOAL:** "To fund safe, efficient, and environmentally sound practices and procedures which prevent dust and sediment pollution!"

2) Program Structure

a) **State Conservation Commission:**
- administers statewide program
- allocates money to County Conservation Districts
- monitors compliance with state law

b) **County Conservation Districts:**
- Administer program on local level
- Work with applicants on projects and permitting.
- Receive money based on allocation formula.
- Conduct inspection after work is completed.
- Keep records and report to State annually.
- Each county has a Quality Assurance Board (QAB) that develops local priorities and provides funding recommendations to District Board

c) **Grant Recipients**:
- Entities that own/maintain public roads are eligible.

- Apply to Conservation District for project funding.
- Can complete work themselves or hire contractor.
- Must attend ESM training within previous 5 years to apply for funding.

Notes:

3) Grant Application Procedure

Notes:

a) **Attend ESM training:** The person in charge of work plan development and project implementation for the applying entity must have attended environmentally sensitive maintenance (ESM) training within the past five (5) calendar years to become "ESM Certified.

b) **Locate worksite:** Conservation District has identified pollution worksites throughout the county. Ask about possible unidentified unpaved and LVR sites.

c) **Pre-application meeting:** Discuss project ideas with your Conservation District DGLVR coordinator

d) **Complete Grant application:** Submit the plan that was discussed with the Conservation District. Include plan details with cost estimates and a project sketch on the back.

e) **Sign Contract:** Grant application and other documents become attachments to contract.

f) **Complete Work**: Complete work as specified in contract. Work with District to complete Project Performance Report for each finished worksite.

<u>YOUR CONSERVATION</u> <u>DISTRICT</u> administers the program in your county and should be your first point of contact for the Program.

Chapter 3
Principles of ESM Practices

Environmentally Sensitive Maintenance Practice: A maintenance practice or technique that works with natural systems to create a better road and a better environment.

Notes:

1) Avoid Concentrating Drainage:
- Encourage sheet flow
- Remove berms
- Eliminate ditches
- Raise road profile
- Reduce run-on flow

2) Minimize Flow Volumes:
- Reduce flow (ditch) lengths
- Create more frequent ditch outlets (crosspipes and turnouts)
- Do not route springs into road ditch
- Use underdrains in ditches
- Address water coming from off ROW

3) Reduce Effect of Concentrated Drainage:
- Wider, shallower ditches
- Ditch protection
- Outlet drainage to stable filter areas
- Outlet protection (headwalls, endwalls, aprons)

4) Prevent Surface Erosion:
- Vegetative cover over soil
- Road surface improvements
- Reduce concentrated flow/promote sheet flow.

5) Reduce Cost and Frequency of Road Maintenance!
- Reducing erosion will REDUCE MAINTENANCE COSTS and promote cleaner streams.

Chapter 4
Off Right-of-Way Influences

1) Off ROW influences come from driveways, access roads, pipe-lines, ATV trails, field drain outlets, wet-weather channels, drain tile, and other waterways. Off ROW influences affect your roads by bringing excess water to the road that can cause saturated road base, potholes, increased ditch erosion, and increased sediment to the road area. Unlike Liquid Fuel funds, **DIRT AND GRAVEL FUNDS CAN BE USED OUTSIDE OF THE RIGHT-OF-WAY!**

2) Shortcomings of Traditional Maintenance Practices

a) **Ignore the problem**: If we ignore problems, they tend to get worse, not better, and cost more in the long run.

b) **Ordinances**: Should include language to prevent driveways from draining onto public road surface.

3) ESMPs

a) **Public Relations and Planning:** Is key to the successful implementation of off ROW practices. Prior to working off of the right-of-way, talk to the landowner(s). Explain what you want to do and why. Explain the benefits **to them**.
Announce intentions at a public meeting. Explain benefit for the township, landowners and environment.
Anticipate development and land use changes and have a plan to address associated drainage issues.

b) **Diversion Swales:** A stable channel that intercepts water before it reaches the road and carries it to a safe outlet.

c) **Bank Benches** (99): A flat step or terrace constructed on a road bank to prevent bank erosion and reduce the amount of water reaching the road.

Notes:

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d) **Through-Drains:** A dedicated pipe that keeps concentrated run-on flows from springs or storm drainage out of the road ditch. The through-drain passes under the road while the road ditch continues over the pipe.

e) **Addressing Access Road Drainage:** Address the water before it reaches the public road.
- Reshape the access road: with crown or cross-slope.
- **Broad Based Dips** (38) divert water off drive.
- **Grade Breaks** (35) divert water off drive.
- **Conveyor Belt Diversions** (41): simple and cheap structures to divert water off the drive/access.
- Properly handle intersection drainage: pipes, open- top pipes, drivable ditch

f) **Vegetation Management:**
- **Advantages of vegetation**
  - Reduce Erosion
  - Increase soil/bank stability
  - Reduce Dust
- **Improved Roadside vegetation**
  - Selective thinning: remove unwanted, dead, diseased, and dying
  - Selective mowing and spraying: only where needed
  - Revegetation: seed and mulch disturbed areas

To address off right-of-way drainage problems, use your knowledge of the situation and employ practical and effective practices that can be maintained.

All DGLVR Program work done outside of the right-of-way must include a signed and dated Off Right-of-Way Consent Form prior to the start of any work.

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Notes:

Chapter 5
Geo-Synthetics

All geo-synthetics use in road maintenance are intended to be permanent and buried below ground.

Notes:

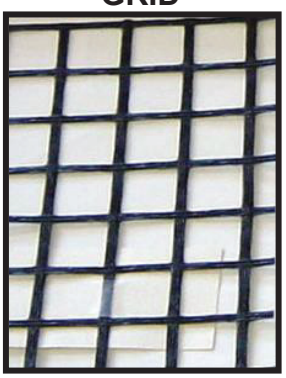
1) **Separation Fabric:**
   a) Separates different types of material and provides support by distributing loads
   b) **Woven fabric** (like basket weave)
      i) Low flow-through rate for water
      ii) Good for support and separation in areas exposed to vehicle loads.
   c) **Non-woven** fabric (felt-like)
      i) High flow-through rate for water
      ii) Best where a lot of water needs to pass through fabric such as underdrains.

2) **Geo-grid:**
   a) Provides support and strength, not separation.
   b) Used to add structural support, since it distributes weight similar to using snowshoes.
   c) Reduces the depth of fill needed to achieve the same level of structural support.

3) **Geo-cell:**
   a) Provides 3-dimensional confinement for a wide variety of fill material.
   b) Provides maximum structural support.
   c) Used for containment and maximum reinforcement in structures such as fords or high water bypasses.

FABRIC

GRID



CELL

Chapter 6
Road Base

The foundation of the road that provides strength to carry traffic loads (think footer).

Notes:

1) **Geology**: Rocks vary by region across the state and have different properties, such as hardness, that are important for use as road material.

2) **Soils**: Soil is the mixture of sand, silt, and clay that makes up the surface of the earth. The design and makeup of the imported road base largely depends on the type of soil (the subgrade) that the road is built on. Depth to groundwater is another key factor in determining road base composition.

   a) **Frost:** Frost pulls groundwater to the surface using a process known as “capillary rise”. Water frozen near the surface draws in more water, and when the ground thaws the supersaturated road breaks down and ruts under traffic loads.

3) **Road Base ESMP’s**

   a) **Filling the road Cross-Section (52)**: Filling an entrenched or sunken roadway back to natural elevation. A LONG TERM solution that reduces bank height, eliminates ditches, allows for crosspipes, and avoids collecting water.

   b) **Sectional Fill option:** Filling sections of the entrenched or sunken roadway back to natural elevation. This can be done when you can’t fill the entire roadway. The short fill sections create ditch outlet opportunities and can provide cover for a new crosspipes.

   c) **Structural Reinforcement:** Make a good road base where the other guys didn’t, by adding rock and/or geosynthetics to establish a solid foundation.

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d) **French Mattress** (17): A type of structural reinforcement that uses clean rock and geotextile, designed to allow water to freely pass under the road.

- Well suited for use in wetlands.
- Lacks concentrated outlet.
- Fools beavers
- Are **NOT** pipe replacements and should **NOT** be used for concentrated stream flow!

e) **Underdrains (12)**: Keeps subsurface water clean and off of road. Dries consistently wet ditches and banks. Reduces problems with road base saturation and strengthens weak road shoulders.

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Notes:

Chapter 7
Low Volume Roads

1) What is a Low Volume Road in the DGLVR Program?

a) Must be **"sealed or paved"** with asphalt, tar & chip, bitumen, concrete, or other asphalt-like coating
b) Traffic count must be less than 500 ADT[1] and verified by a traffic count prior to signing a contract.[2]

2) The three types of traffic counts are:

a) Use of existing data (PennDOT, County Planning Commission, etc.)
b) Level 1 Count – 2 hour estimation of ADT[1]
c) Level 2 Count – 24 hour count

3) **Full Depth Reclamation** – Is an eligible DGLVR Program practice on low volume roads. It is the total rehabilitation of the existing surface and road base. It involves adding water and other materials (when necessary), mixing, shaping, and re-compaction to create a stable road base.

4) **Urban projects:** projects in more urban settings involving infiltration practices are acceptable, but must be in association with improvements on a public road

[1]ADT is the Average Daily Traffic, or the total number of vehicle passes per day.

[2]Traffic count instructions/validation form found in appendix E of this manual.

Notes:

Chapter 8
Road Banks

1) Introduction:

a) If a bank is stable, DON'T FOOL WITH IT!

b) Stability of banks depends on several factors:
- Material/soil type
- Slope/steepness
- Hydrology (presence of surface and sub-surface water)
- Vegetation (existence of, type, effectiveness)

2) Shortcomings of Traditional Maintenance Practices

a) **Bank Gouging:** Cutting the toe of the bank will cause the bank to collapse, which sets up a cycle of required maintenance.

b) **Laying Back Banks:** Cutting into the bank can expose infertile subsoil that will erode easily and is difficult to re-vegetate.

c) **Vegetation Removal:** Non-selective vegetation removal can destabilize a bank, promotes invasive and colonizer species, and increase maintenance.

3) ESMPs

a) **Avoid the banks:** When possible, do not, either intentionally or as part of other maintenance (ditch cleaning), cut the toe of the road banks.

Notes:

b) **Organic Topsoil and Seeding**: Adding living topsoil, seeding and mulching of disturbed areas to reduce erosion and promote growth.

c) **Filling the road Cross-Section (52)**: * See **Road Base** section. A LONG TERM solution that promotes stable road banks by reducing bank height, or by eliminating banks altogether.

d) **Naturalize Bank Shape**: Leave banks rough, not smooth, to slow water and create seed pockets.

e) **Slope reinforcement**: If vegetation is not enough, steeper banks can be reinforced with rock, pre-cast blocks, geo-synthetics, or more aggressive practices.

f) **Underdrains (12)**: Dries and stabilizes consistently wet ditches and the toe of the upslope road bank. Reduces problems with saturated road base and strengthens weak road shoulders.

g) **These Practices introduced in the "Off ROW" section can be implemented on to improve road bank stability.**

h) **Diversion Swales:** A swale that intercepts water before it reaches the road and carries it to a safe outlet.

i) **Through-Drains:** A pipe that carries concentrated run-on flow from upslope under the road without mixing the flow with road drainage.

ii) **Bank Benches (99)**: A step or terrace constructed on a road bank that reduces rill erosion on an up-slope bank and reduces run-on water reaching the road.

Notes:

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Chapter 9
Road/Stream Interface
Part 1: Structures

1) Shortcomings of Traditional Maintenance Practices

a) **Pipe cover or Bridge deck is low point in the road**: Causes ditches to drain into stream and water to degrade bridge.

b) **Insufficient Structures:** Often done to save money in the short term. Lead to long term maintenance headaches.*

**Structures meeting hydraulic permit requirements can still lack sufficient opening size and characteristics to perform important functions such as the movement of gravel though the stream crossing.*

2) DGLVR Stream Crossing Replacement Policy

a) Policy only applies to replacing the structural stream crossing. You can always do work around an existing stream crossing with Program funds.

b) Replacement eligibility is based on the **environmental impacts** caused by the existing structure, not the structural condition of the bridge or pipe.

c) Undersized structures lead to gravel deposition upstream that requires constant cleanout. Road damage from overtopping, as well as bed and bank erosion downstream are additional impacts of an undersized structure.

d) The DGLVR Stream Crossing Replacement Policy ensures that a new stream crossing will not only allow water to pass the structure, but everything the water carries with it, especially during high water events.

3) Better Stream Structures to meet Bankfull Width

a) Elliptical pipes
b) Bottomless arch culverts
c) Structural plate arch culverts
d) GRS-IBS bridges

Notes:

4) **Stable Fords:** Get drainage off roadway before reaching the ford. Consider options to stabilize ford with rock or geo-synthetics and rock.

5) Improved Stream Crossings:

a) Structure should span entire natural stream channel (minimum bankfull width), with no in-stream restrictions to natural flows.

b) Structures should comply to DEP permit where applicable, and include appropriate grade controls and stream substrate through crossing.

Notes:

Chapter 10
Road/Stream Interface
Part 2: Drainage & Stabilization

1) Shortcomings of Traditional Maintenance Practices:

a) **Ditches empty into stream**: Increases erosion, increases pollution, increases flood flows, and delivers sediment directly into the stream.

b) **Bank and channel "modifications":** Destabilizes channels, and works against the stream. Usually creates problems upstream or downstream and results in more maintenance long term.

c) **Rip-rap Fix**: Expensive short-term "solution" that addresses the symptom, not the problem.

2) ESMPs:

a) **High Water Bypass** (82): A flat, low-lying section of road that is reinforced serve as an overflow to allow water to cross the road with minimal damage during extreme flow events. Like an "emergency spillway".

b) Streambank Stabilization:

- **Bioengineering:** Planting beneficial Plants! Examples include: Live stakes, brushlayers, brush packing, and joint planting.
- **Natural Stream Design:** Use of in-stream structures that work WITH the stream to create a stable stream corridor. Natural stream design practices are often used in conjunction with eligible stream crossing replacement structures and can be used to improve stream crossings where an existing structure does not meet Program eligibility requirements.

c) **Road Relocation:** In some cases, moving the road away from the stream is the only LONG TERM solution for both the road and the stream. Relocating the road is an eligible expense under the Dirt and Gravel Road Program, but cost for obtaining right-of-way is not.

Notes:

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Chapter 11
Surface Drainage

Goals of good road surface drainage are to improve drivability, reduce surface material loss, and lower environmental impact by reducing dust and sediment.

Notes:

1) Shortcomings of Traditional Maintenance Practices:

a) Lack of effective crown (side-slope)
- modelled after paved roads
- crown lost between grading cycles

b) Artificial berms
- result from traffic, grading, and plowing

c) Poor transitions
- without a smooth transition, traffic will damage unpaved road surfaces

2) ESMPs:

a) Establish and maintain effective crown (a 4%-6% side-slope)
- Keeps water off road surface and from saturating road base

b) Remove artificial berms to allow water to leave roadway

c) Adjust transitions to allow traffic to move smoothly

d) Add surface drainage controls (grade breaks and broad based dips) to remove water flowing on the roadway. May be especially useful on low priority roads.

Chapter 12
Ditches

1) **Considerations:**
   - intended to transport runoff parallel to road to the nearest outlet
   - intended to keep water off the road
   - **do we always need a ditch?**

2) **Shortcomings of Traditional Maintenance Practices:**

   a) **Draining ditches to stream**: Largest source of sediment pollution to many streams!

   b) **Unnecessary ditches**: Unnecessary ditches create unnecessary maintenance. Artificial berms and a traditional mindset are often the reason for unnecessary ditches.

   c) **Unnecessary maintenance:** Maintenance costs money and can increase erosion. If your sink isn't clogged, would you plunge it anyway?

   d) **Lack of ditch outlets**: Long ditches lead to increased flow volume, increased erosion and stream pollution.

   e) **Ditch armoring**: Armored ditches are expensive and difficult to maintain. Without sufficient outlets, they can still drain water into streams and increase flood flows.

3) **ESMPs:**

   a) **Ditch Elimination**: Removing an unnecessary ditch to achieve sheet flow by:
      - berm removal
      - filling the road profile (52)
      - outsloping the road (32)

   b) **Creating low maintenance ditches:** Shallower and wider ditches create less erosion and maintenance.

Notes:

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c) **Alternative cleaning methods:**
- clean only when needed
- when possible, skip “critical areas” near the stream
- consider a leaf blower or a leaf vacuum
- consider innovative equipment attachments

d) **Re-vegetation:** A vegetated ditch reduces maintenance and erosion. Required by PennDOT!

e) **Underdrains** (12): Keeps subsurface water clean and separate from ditch flow. Dries saturated ditches and wet banks (see “Road Base” section).

f) **Through-Drains:** Pipe that carries concentrated run-on flow under road without mixing it with road drainage (also in “Off-ROW” section).

g) **Ditch Outlet Frequency:** Instead of using standard tables, make observations and “Read the Ditch” to determine how often crosspipes and turnouts are needed.

Observe and CONSIDER:

- Off ROW water (run-on flow)**:** Locate crosspipes and through-drains to carry water under road as soon as possible.
- Subsurface Water: Underdrains can be used to keep this water clean and out of road drainage system.
- Road Surface Drainage: Make sure wheel tracks and grader berms don’t keep water from reaching the ditch.
- Road Slope: Steeper roads will require more aggressive crown and more frequent crosspipes and turnouts.
- Grade Changes: Make all efforts to outlet ditches before road grade gets steeper.
- Curves: Make all efforts to outlet ditches before curves in road.
- Native soils: Erosion potential of native soils will have large effect on necessary crosspipe spacing.
- Available outlets: Outlet ditches where possible. Whenever outlets are available and stable.

Remember, more ditch outlets means less water at e
outlet. If you can, eliminate ditches altogether!

Notes:

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Chapter 13
Ditch Outlets

To increase sheet flow is the goal of good road drainage. You can't have "too many" crosspipes and turn-outs.

Notes:

1) **Considerations:**
   - this section deals with ditch drainage, not streams
   - "Ditch outlets" include crosspipes and turnouts

2) A **watershed** is all of the land area that drains to a specific point.

3) **Shortcomings of Traditional Maintenance Practices for CROSSPIPES:**

   a) **Poor pipe location:** draining pipes to the stream increases erosion, pipe failure, and stream pollution. Pipes installed only at low points may not be enough to reduce ditch flow, ditch erosion, and stop damage.

   b) **Improper pipe installation**: common problems:
   - no headwalls and endwalls
   - Inlet too far off road or too close to driving lane
   - pipe straight across road instead of with flow
   - inadequate compaction or cover

   c) **Installing pipes too deep:** Using the existing road surface elevation to determine crosspipe depth can lead to an overly deep pipe. This can cause long term maintenance and pollution problems due to an unstable bank at the pipe inlet as well as a long outlet trench.

4) **ESMPs for CROSSPIPES:**

   a) **Selecting a good pipe location**: Whenever possible, discharge pipes into stable soil with stable vegetation away from streams.

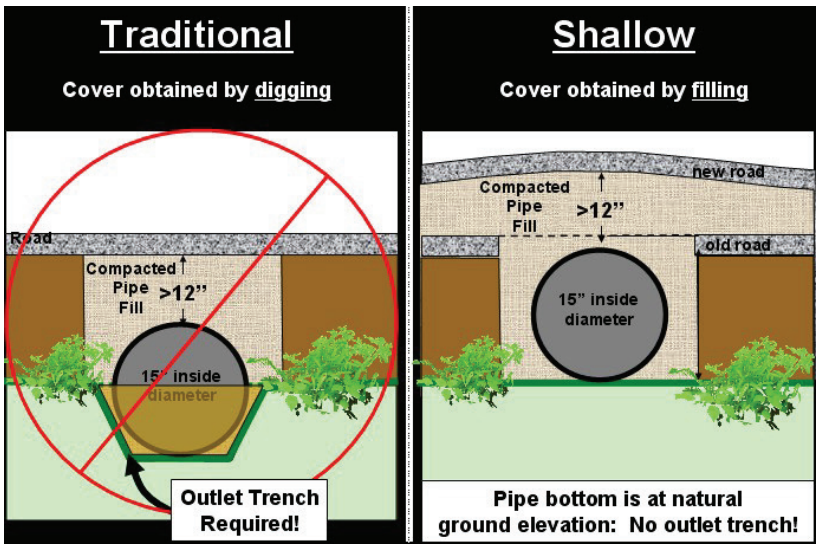
General information about Crosspipes (68)

White text indicates where related material can be found in Field Guide Book (page #)

b) **Proper pipe alignment**: Align pipes with the flow of water instead of straight across road. This will increase pipe efficiency, reduce erosion at the inlet, and help to keep the pipe open.

c) **Proper pipe Installation** (68):
- Excavate trench:
  - wide enough for pipes and compaction equipment
  - to proper depth based on outlet elevation (see below)
  - with min 2% (¼" per foot)fall to outlet
- Place pipe in trench:
  - use bedding to level trench if needed
  - check pipe for fall and uniform support
- Backfill and compaction:
  - fill material should be similar to excavated material
  - fill material should be free of large stone
  - secure pipe and place and compact fill in 8"-12" lifts
  - never fill above pipe mid-point before compaction
  - use jumping jack or vibratory plate for compaction
  - provide at least 12" of compacted cover over pipe (not including surface aggregate)
- Inlet and outlet protection:
  - every pipe should have headwalls and endwalls
  - properly constructed outlet aprons reduce erosion
  - "Big Chunky Rock" under pipe provides pipe support and outlet protection on steep slopes

d) **Shallow pipe installations** (68): A crosspipe installed to outlet at natural ground elevation. This involves a shallower trench and additional imported cover as compared to a traditional installation. Shallow installations eliminate the constant maintenance, erosion, and potential negative landowner issues associated with outlet trenches on deep pipes.



Notes:

White text indicates where related material can be found in Field Guide Book (page #)

5) Shortcomings of Traditional Maintenance Practices for TURNOUTS:

a) **Poor turnout location:** draining turnouts to the stream causes erosion and stream pollution. Draining a turnout at a crosspipe outlet can cause erosion around the pipe, endwall failure, and it concentrates flow volume at one outlet.

b) **Turnouts too narrow:** Narrow turnouts constrict flow and cause more maintenance and pollution.

c) **Disconnected Turnouts:** Elevated or plugged turnouts that no longer carry water away from the roadside are easily by-passed by ditch flow.

6) ESMPs for TURNOUTS:

a) **Selecting a good turnout location:** Outlet turnouts into stable vegetation, not streams. Outlet turnouts separately from crosspipes when possible.

b) **Creating low-maintenance turnouts:**
- Wide with a level bottom is better
- Must have fall away from road
- Should be shallow and vegetated
- Ensure water does not come back to road downslope.

7) Innovative Outlet Techniques:

a) **Through the bank Pipes** (72): A pipe placed in the down-slope road bank to carry ditch drainage through the bank and away from the road. Provides a ditch outlet where a large berm or entrenched road prevents the use of a standard turnout. Consider where excavation, aesthetics, and landowner apprehension are a concern.

b) **French Mattress** (17): A structure under a road consisting of clean coarse rock wrapped in fabric through which water can freely pass.
- Well suited for use in wetlands.
- Can stabilize wet ditches saturated by springs.
- Not a concentrated outlet like a pipe.
- Not for flow that carries sediment (need a pipe).

Notes:

White text indicates where related material can be found in Field Guide Book (page #)

Chapter 14
Driving Surface Aggregate (DSA)

1) **The goal of a good surface aggregate**:
   - Provide a durable driving surface for vehicles
   - Resist wear and erosion to save time and money
   - Resist wear and erosion to reduce pollution

2) **Shortcomings of Traditional Maintenance Practices:**

   a) **Other Specifications**: 2A, 2RC, Bank-run gravel. Highly variable and not designed as driving surfaces.

   b) **Other Placement Methods**: **Tailgating**:
   - Aggregate is placed by a dump truck through a restricted tailgate and then spread and shaped by a motor grader.
   - Tailgating tends to segregate aggregate by size, and it is difficult to get even coverage over the road.

   c) **Thickness**: Thin "cosmetic" top coats of aggregate will not compact and will simply ravel off.

3) **ESMPs:** **Driving Surface Aggregate (DSA):** DSA is PROCESS, not just a PRODUCT. It must be prepared, purchased, placed, and compacted according to the specification.

   a) **What is DSA?** (Appendix G) in this book):
   Aggregate specified for use as wearing course on unpaved roads. Designed for maximum durability and compaction. Available in most of PA.

   b) **DSA Specification & Certification** (available online and from your Conservation District: Specific size gradation is what makes DSA work. See DSA spec sheet for details of size, moisture, hardness, and pH. Optimum moisture and compaction are critical!

DSA is the only surface aggregate the Dirt, Gravel and Low Volume Road Program will pay for. However, the use of surface aggregate on all projects is NOT a Program requirement.

Notes:

c) Purchasing DSA:

i) **Visit Quarry:** Inspect the quarry capability and the quality of the product. It is better to discover material problems before the truck arrives on your road! Establishing a relationship with the quarry will get better results!

ii) All DSA purchased by the DGLVR Program **must be sampled and tested by your Conservation District** or **The Center for Dirt and Gravel Roads at Penn State prior to purchase**.

iii) **How much DSA is needed?**
For 8" compacted to 6": *[rd width (ft)]* ***X*** *[rd length (ft)]* ***X*** *0.040 = DSA needed (tons)]*

For 6" compacted to 4½": *[rd width (ft)]* ***X*** *[rd length (ft)]* ***X*** *0.030 = DSA needed (tons)]*

iv) **Certification**: Require certification from quarry for each day aggregate is delivered, or if the aggregate source changes. See DSA Handbook online for: SCC DSA Specification (appx. A) Sample RFQ (appx. E),

d) DSA Placement:

i) **Road Preparation:**
- Insure drainage and base stability issues are addressed before placing DSA.
- Establish proper crown or cross-slope in road base before placement (½" to ¾" per ft).
- Cut key in road edge to provide support for aggregate and eliminate berm. Also key aggregate into existing road on both ends of placement.

ii) **Placement**: DSA placements in excess of 1,000 tons must be done using a pave in a single pass.

iii) **Compaction:** Proper compaction is very important!
- Begin at supported edge if one exists
- If material sticks to roller drum, allow surface stone to dry first.
- Roll up to, but not directly on the crown
- Use vibratory roller with a min10 ton static weight.
- Turn vibration off for first pass or two
- Never vibrate when going down steep grades
- Always turn off vibe prior to changing directions.

Notes:

Chapter 15
Surface Maintenance

1) **Shortcomings of Traditional Maintenance Practices:**

   a) **Insufficient depth of surface material** won't compact and won't hold crown under traffic
   b) **Insufficient grading frequency** results in water trapped on the road
   c) **Insufficient compaction** allows material to deform and hold water on the road or move material off of the road
   d) **Insufficient surface drainage** traps water on the road and is the main reason for poor road condition

2) **ESMP's:**

   a) **Maintain Surface as Needed**: Read the road to determine its grading needs instead of grading on a schedule. Surface should have continuous side slope to the road edge/ditch.

      Grading is needed when:
      -Excessive Dust
      -Loose stone on the road surface
      -Stone windrows form along the edge/middle of road
      -Water is flowing in the wheel tracks
      -Potholes and ruts are present

   b) **Maintain quality aggregate** with a carbide toothed grader blade. All grading should be done when some moisture is present in the roadbed, such as after a rainfall or with the use of a water truck.

      Proper Maintenance Grading of DSA:
      -Use a rotating carbide toothed grader blade
      -Break pothole/washboard structure and fill holes
      -Mix aggregate uniformly and spread evenly on road
      -Re-establish proper crown/cross-slope (4%-6%)
      -Compact for a tight surface with few loose stones

      After grading or resurfacing, always compact with a roller!

Notes:

c) **Winter Maintenance**: Treat your unpaved roads differently than your paved roads.
-Avoid plowing out crown.
-Be especially careful when the road surface is thawed and soft.
-Use anti-skid and avoid salt on unpaved roads.

d) **Surface Stabilization**: Stabilization Products and Dust Suppressants must be approved to be eligible for use on a DGLVR project.

The recommended grading sequence with a carbide toothed grader blade is outlined in the Technical Bulletin “Suggested Grading Sequence with a Carbide-Tipped Blade” found on the Center for Dirt and Gravel Road Studies website at https://www.dirtandgravel.psu.edu/sites/default/files/General%20Resources/Technical%20Bulletins/TB_Grading_with_Carbide_Blade.pdf

Notes:

ADDITIONAL REFERENCE MATERIAL:

The following references, documents, and tools can be found at https://www.dirtandgravel.psu.edu/ under PA PROGRAM RESOURCES >Program Resources >Blank Forms:

Grant Application Packet

- **Grant Application**: One-page application submitted by the road-owning entity to the Conservation District. This becomes "Attachment A" to the contract between the Conservation District and the Grant recipient.
- **Work Plan**: Project sketch detailing proposed work. Can be on the back of the grant application. This becomes "Attachment B" to the contract between the Conservation District and the Grant recipient.
- **Expenditure Sheets**: Two optional sheets, one for grant requested funds and one for inkind contributions, that can be attached to the grant application if needed.
- Grant Application Packet (683 KB): Includes the four forms mentioned above. Note that these forms are fillable pdfs. Thanks to Allegheny County for creating the fillable forms.
    - Grant Application Instructions (1.54 MB): Instructions to complete the above forms.

Standard Program Forms

- Traffic Count Validation (111 KB): Form for recording traffic counts to insure that paved Low Volume Roads have traffic counts of ≤500 vehicles per day in order to be eligible for funding.
    - Traffic Count Validation Instructions (99.6 KB): Instructions to complete the traffic count validation form.
- Stream Crossing Evaluation (291 KB): Form used to evaluate stream crossings for potential structural replacement with Program funds.
    - Stream Crossing Evaluation Instructions (388 KB): Instructions to complete the stream crossing evaluation form.
- DSA Specification and Certification (125 KB): Driving Surface Aggregate specification and certification form. A certification form is required from the aggregate supplier with the first load of stone delivered. Please contact the Center for Dirt and Gravel Road Studies to notify them of planned DSA placements.(more DSA info here)

Example Forms

The following forms are provided only as an example. While the information is required, these particular forms are to act as a guide that the Conservation Districts can use. Note that all examples are in the Microsoft Word docx format.

- Approved DGLVR E&S Plan (30.5 KB): The final, approved, erosion and sediment control plan to be used with the DGLVR program. This plan was coordinated with DEP's E&S Program. This form is in Microsoft Word docx format.
- Off ROW Consent Form (17.6 KB): Example consent form to obtain permission from a landowner to perform work and/or outlet water onto their property.

The following references, documents, and tools can be found at https://www.dirtandgravel.psu.edu/ under GENERAL RESOURCES >General Resources >Technical Bulletins:

Pipes

- Headwalls and Endwalls (188 KB): General information on the benefits of headwalls and endwalls at pipes (3/04)
- Natural Stone Headwalls (170 KB): Details on how to construct headwalls and endwalls out of native stone (2/04)
- Pipes: An Overview (71 KB): General information on both stream and cross pipes (10/06)
- Proper Crosspipe Installation (216 KB): Important considerations and a walkthrough of a typical crosspipe installation. (10/06)
- Shallow Crosspipe Installation (1.5 MB): Installing pipes based on outlet elevation, not road elevation, to eliminate outlet trenches. (9/08)

Sub-surface Drainage

- French Mattress (297 KB): French mattresses allow water to pass under a road through coarse stone. (2/13)
- Underdrains (97 KB): General information on underdrain and where and why to use it. (4/06)
- Constructed Stone Underdrains (146 KB): Walkthrough of creating your own underdrain with of perforated pipe, clean stone, and fabric. (4/06)

Streams

- High-Water Bypass (468 KB): Hardened overflow area where water can safely flow over road during extreme events. (3/06)

Driving Surface Aggregate (DSA)

- DSA (508 KB): A summary of the Center-developed DSA. Includes material specification, sampling and testing, preparation for placement, placement, compaction, maintenance, and other considerations.
- Road Aggregates 101 (401 KB): A summary of size, gradation, and typical use for some of the more common aggregates for road maintenance in Pennsylvania. Includes course aggregates and rip-rap.
- Trail Surface Aggregate and general Aggregate Information: Visit the DSA information page

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Surface Drainage

- Crown and Cross-Slope (138 KB): Different types of crown and proper cross-slope for unpaved roads. (4/04)
- Grade Breaks (210 KB): Grade breaks are surface drainage features that stop concentrated flow and road erosion. (3/04)
- Broad-Based Dips (1.6 MB): Surface dips that transport water across the surface of a low volume road. (9/08)
- Conveyor Belt Diversion (260 KB): Used conveyor belts embedded in the road to prevent water from flowing down the road. (9/09)
- Surface Maintenance (171 KB): General information on maintaining unpaved road surfaces. (4/7/04)
- The Road Profile (212 KB): The importance of the road elevation relative to the surrounding terrain. (7/04)
- Raising the Road Profile (121 KB): Raising the elevation of the road to achieve better drainage. (7/04)
- Tire Bales as Road Fill (152 KB): Use of baled waste tires to fill entrenched roads and restore natural drainage. (4/07)

Road Surface Maintenance

- Carbide-Tipped Blade (142 KB): Benefits of a carbide-tipped blade for surface maintenance operations. (2/04)
- Grading Sequence with a Carbide-Tipped Blade (118 KB): Surface maintenance using carbide-tipped grader blades. (2/04)

Road Banks

- Bank Benches (83 KB): Steps created in a road bank to slow and control the flow of water over the bank.
- "Through-the-bank" Pipes (128 KB): A pipe placed through the downhill road bank to get water out of the road profile. (10/06)

Dust Monitoring

- Real-time Dust Monitoring (615 KB): Informational bulletin about dust monitoring with a vehicle-mounted monitoring system. (2/16)

Photo Tips

- DGLVR Photo Tips (488 KB): Informational bulletin for taking more effective project photos for use in education and outreach efforts for the Program. (9/17

The following references, documents, and tools can be found at https://www.dirtandgravel.psu.edu/ under GENERAL RESOURCES >General Resources >DSA:

Reference Documents

- DSA Handbook (3.59 MB): A comprehensive guide to using Driving Surface Aggregate and understanding the SCC DSA specification. Topics include site prep, purchasing, sampling, placement, compaction, maintenance, and more. (8/21/17)
- DSA Handbook Appendices: Provided here separately for download/printing convenience.
    - Appendix A: SCC DSA Standard and Specification (141 KB): 3-page Specification for Driving Surface Aggregate to be used by Conservation Districts in the PA DGLVR Program. (5/10/16)

    - Appendix B: DSA Certification Form (78.4 KB): Form for supplier to verify DSA meets specifications.
    - Appendix C: Sample Collection Form (96.7 KB): Form for CD or Center Staff that serves as a record of DSA sampling.
    - Appendix D: DSA Notification Form (162 KB): Form for CDs to use to notify Center of upcoming DSA placement.
    - Appendix F: Road Aggregates 101 (401 KB): A summary of size, gradation, and typical use for some of the more common aggregates for road maintenance in Pennsylvania. Includes course aggregates and rip-rap.
    - Appendix G: Municipal DSA Guide (185 KB): An abridged 2-page guide to DSA meant for townships and other applicants.
- DSA Informational Bulletin (508 KB): A summary of the Center-developed DSA. Includes material specification, sampling and testing, preparation for placement, placement, compaction, maintenance, and other considerations

ESM Field Guide

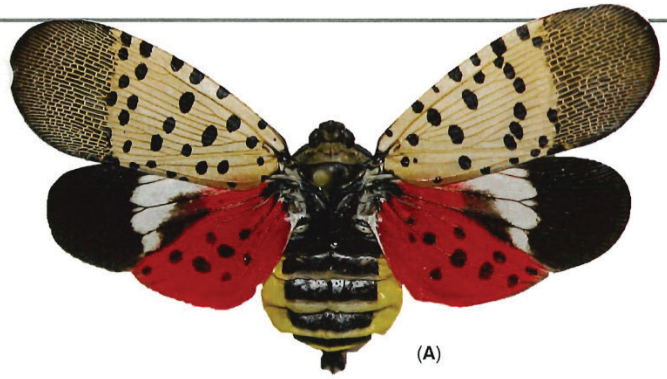
The smaller spiral bound ESM Field Guide can be downloaded and printed free of charge at the Forest Service website below. If you wish to order additional hard copies, contact the USFS Technology and Development Center in San Dimas, California at (909) 599-1267 x239.

- **Website:** http://www.fs.fed.us/eng/php/eng_search.php - Technology & Development Publication number (1177 1802P)
- **Direct link:** http://www.fs.fed.us/eng/php/library_card.php?p_num=1177%201802P

This guide serves as a great "dashboard reference" for many of the practices presented in the 2-day ESM training.

More information about the Spotted Lanternfly can be found at: http://www.agriculture.pa.gov/plants_land_water/plantindustry/entomology/spotted_lanternfly/pages/default.aspx

Pest Alert

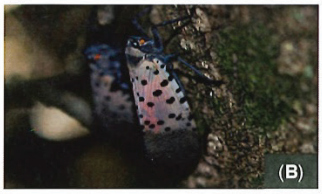


(A)

Spotted Lanternfly

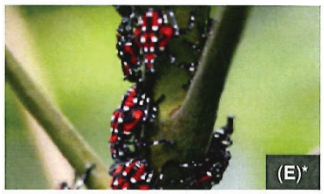
***Lycorma delicatula* (WHITE)**
(Hemiptera: Fulgoridae)

The Spotted Lanternfly, *Lycorma delicatula* (White), an invasive planthopper, has been discovered in Berks County, Pennsylvania. It is native to China, India, Vietnam, and introduced to Korea where it has become a major pest. This insect attacks many hosts including grapes, apples, stone fruits, and tree of heaven and has the potential to greatly impact the grape, fruit tree, and logging industries. Early detection is vital for the protection of Pennsylvania businesses and agriculture.


(B)


(C)


(D)*


(E)*


(F)


(G)


(H)


(I)

*Photos courtesy of Park et al. 2009, Biological Characteristics of Lycorma delicatula and the Control Effects of Some Insecticides.

(A) Spotted Lanternfly showing the fore and hind wings (B) Resting against bark (C) Lateral view (D) Early nymphs (E) Late nymphs (F) Feeding on wild *Vitis* sp. (G) Weeping sap trail on tree (H) Egg mass covered in waxy coating (I) Old hatched egg mass on a trunk.

Identification:

The Spotted Lanternfly adult is approximately 1" long and 1/2" wide at rest. The forewing is grey with black spots and the wings tips are reticulated black blocks outlined in grey (A, B, C). The hind wings have contrasting patches of red and black with a white band (A). The legs and head are black; the abdomen is yellow with broad black bands. Immature stages are black with white spots, and develop red patches as they grow (D,E).

Hosts:

In the fall, adults congregate on tree of heaven (*Ailanthus altissima*) (F), willows (*Salix* sp.), and other trees, in groups of up to 20. Egg masses will be laid on medium to large trees, on trunk, branches, and limb bases. After hatching in the spring, nymphs will move off the tree and search out new hosts, including several kinds of agricultural crops. In Korea, it has been reported to attack 65 different species, 25+ of which are known to grow in Pennsylvania.

Signs and Symptoms:

Trees, such as tree of heaven and willow, will develop weeping wounds. These wounds will leave a greyish or black trail along the trunk (G). This sap will attract other insects to feed, notably wasps and ants. In late fall, adults will lay egg masses on host trees and nearby smooth surfaces like stone, outdoor furniture, vehicles, and structures. Newly laid egg masses have a grey mud-like covering which can take on a dry cracked appearance over time (H). Old egg masses appear as rows of 30-50 brownish seed-like deposits in 4-7 columns on the trunk, roughly an inch long (I).

What to do:

If you see egg masses, scrape them off, double bag them and throw them away. You can also place the eggs into alcohol or hand sanitizer to kill t[illegible] Please report all destroyed egg [illegible]es on our website listed below.

Collect a specimen: Specimens of any life stage can be turned in to the Pennsylvania Department of Agriculture's Entomology lab for verification. Directions for submission are on the reverse side of this alert.

Take a picture: A photograph of any life stage (including egg masses) can be submitted to Badbug@pa.gov.

Report a site: If you can't take a specimen or photograph, call the Automated Invasive Species Report Line at 1-866-253-7189 and leave a message detailing your sighting and contact information.

For up to date information, visit:
www.pda.state.pa.us/spottedlanternfly

By: Lawrence Barringer, Entomologist
Pennsylvania Department of Agriculture

pennsylvania
DEPARTMENT OF AGRICULTURE

pennsylvania
DEPARTMENT OF AGRICULTURE

ENTOMOLOGY PROGRAM SAMPLE SUBMISSION FORM

The Entomology Program at the Pennsylvania Department of Agriculture can provide identification.
Please complete this form to be submitted with the specimen(s).

SPECIMEN REQUIREMENTS:

1. All specimens should be dead.
2. Most specimens should be placed in 70-80% Ethyl or Isopropyl Alcohol in a leak proof vial.
   (Moths, Butterflies, and Mealy bugs should be frozen and placed in a hard plastic container with dry paper toweling)
3. The vial should be placed in a zipper style bag.
4. Specimens from different locations (if applicable) should be placed in different vials.
5. A completed sample submission form must accompany the vial/container.

REQUIRED INFORMATION:

Name of Submitter: _____

Contact Information: Telephone: _____ Email: _____

Address where specimen was collected: _____

_____

Date Collected: _____ Plant Host/Habitat: _____

Name of Person Who Collected Specimen: _____

Comments/Special Instruction: _____

_____

_____

Mail the vial/container and completed form, or deliver in person to:

Pennsylvania Department of Agriculture
Entomology - Room 111
2301 North Cameron Street
Harrisburg, PA 17110

Contact: Sven-Erik Spichiger at 717-772-5229 or Leo Donovall at 717-772-5225

APPENDICIES:

Appendix A: Program Overview and History
(Administrative Manual - Chapter 1: Introduction)

1. INTRODUCTION

This manual is intended to outline policy and provide guidance to participants of the Dirt, Gravel, and Low-Volume Road Maintenance Program (Program). The primary audience of this manual is county conservation district (district) personnel who work with the administration of the Dirt, Gravel, and Low-Volume Road Maintenance Program. This includes not only district managers and staff but Quality Assurance Board (QAB) members and district directors as well. Grant applicants may find sections of the manual, Chapter 5 in particular, useful when developing projects and preparing grant applications.

1.1 Program Purpose

The purpose of the Program is to create a better public road system with a reduced environmental impact. The Program focuses on "Environmentally Sensitive Road Maintenance Practices" that reduce the impact of road runoff and sediment to local streams, while reducing long term road maintenance costs.

It is the intent and purpose of this Program:
(1) to fund safe, efficient and environmentally sound maintenance of sections of dirt and gravel roads which have been identified as sources of dust and sediment pollution.
(3) to fund safe, efficient and environmentally sound maintenance of sections of low-volume roads that are sealed or paved with an average daily traffic count of 500 vehicles or

1.2 Program Structure

Statewide funding and guidance comes from the State Conservation Commission (Commission). Local districts, and their associated Quality Assurance Boards, develop local policies and award grants to public road-owning entities. Public entities such as townships and boroughs apply to the districts for funding and complete the project work.

1.2.1 State Conservation Commission

The Commission, a departmental administrative commission under the concurrent authority of the PA Department of Environmental Protection (DEP) and the PA Department of Agriculture (PDA), administers the Dirt, Gravel, and Low-Volume Road Program. The Commission determines statewide Program policies, allocates funds to districts, and implements a quality assurance / quality control effort. The role of the Commission is detailed in Chapter 2 of this manual.

1.2.2 Conservation Districts and Quality Assurance Boards (QABs)

Conservation districts administer and implement the Program at the county level. Districts accept applications for funding from potential applicants, and award grants to local road owning entities. District staff is responsible for working with grant applicants to develop projects, project oversight, financial tracking and reporting, and general administration of the Program at the county level. District staff should work closely with the QAB described below. The role of districts is detailed in Chapter 3 of this manual.

Each district is required to form a Quality Assurance Board (QAB) made up of four members including district staff, PA Fish and Boat Commission, and Natural Resource Conservation Service. The QAB acts in an advisory capacity to the district board. The QAB, working closely with district staff, is responsible for recommending local Program policies, developing application ranking criteria, and recommending projects for funding. All policies and funding recommendations by the QAB must be adopted by the district board. The role of the QAB is detailed in Chapter 4 of this manual.

1.2.3 Grant Applicants

Any state or local public entity that owns and maintains public roads is eligible to apply for Program funding. The majority of applicants are townships, but other entities such as boroughs, cities, counties, PA Game Commission, PennDOT, PA Fish and Boat Commission, and others are eligible to apply. Applicants are encouraged to work closely with districts, starting with a pre application meeting. Successful applicants will enter into contracts with county districts to complete project work. Applicants can complete project work themselves, or by hiring contractors. The role of grant applicants is detailed in Chapter 5 of this manual.

1.2.4 Penn State Center for Dirt and Gravel Road Studies (Center)

The Center was formally created in 2001 to address the education, training, and technical assistance needs of the Dirt, and Gravel Road Maintenance Program. The duties of the Center include: development and delivery of a two-day training course for Program eligibility, holding annual maintenance workshops, providing technical and administrative assistance to Program stakeholders, approval of new products, maintenance of GIS project tracking system, development of technical reference material, and supplying general support to the Commission and districts. The role of the Center is detailed in Chapter 6 of this manual.

1.3 Program History

1.3.1 Unpaved Roads and Sediment

Sediment is the largest pollutant by volume to the waters of the commonwealth. Pennsylvania's 20,000 miles of publicly owned unpaved roads are a prime example of non-point source pollution. Unpaved roads not only generate sediment, but also act as collectors for runoff and sediment from adjacent land uses. Traditional practice in road maintenance has been to convey water along roads and deposit it into streams by the quickest means possible. This practice results in increased flood flows in streams and transports sediment and a host of other pollutant into local waterways.

1.3.2 Unpaved Road Inventory

The Pennsylvania Chapter of Trout Unlimited (TU) first brought the problem of unpaved road runoff into the spotlight in 1991. TU sportsmen in Centre and Potter County State Forests were the driving force behind the developing grassroots effort to reduce sediment pollution from dirt and gravel roads.

A Task Force on Dirt and Gravel Roads was created in 1993 to investigate, research and document the significance of sediment and dust, as well as other forms of water pollution resulting from dirt and gravel road maintenance practices. This private-public partnership enlisted members representing nonprofit organizations, businesses and local, state, and federal government agencies.

In the summers of 1996-1998, volunteers from TU went out at their own expense and drove thousands of miles of roads in an effort to identify pollution sites on Pennsylvania's dirt and gravel roads. TU inventory volunteers recorded locations where roads were adversely impacting a stream, concentrating on Pennsylvania's High Quality and Exceptional Value watersheds. The efforts put forth by the volunteers resulted in the identification and assessment of over 900 sites in protected watersheds statewide. These sites became the basis for creating the Dirt and Gravel Road Maintenance Program.

1.3.3 Section 9106 of the PA Vehicle Code

The Task Force achieved its goal in 1997 when a law (Section 9106 of the PA Vehicle Code) was enacted establishing the Pennsylvania Dirt and Gravel Road Maintenance Program. The law provided a non-lapsing annual allocation of $5Million, with $4Million going to the State Conservation Commission

and $1M going to the Department of Conservation and Natural Resources. The Program follows a few key concepts including: local control over projects and decision making; education and training to local stakeholders; simplified grant applications; and implementing long-term road and environmental improvements

1.3.4 Program Timeline

1998: First funding available. Projects begin on 900 pollution sites, or worksites, identified in protected watersheds statewide.
2000: Conservation districts complete assessment of all watersheds, identifying over 12,000 pollution sites statewide.
2001: Center for Dirt and Gravel Road Studies formally created at Penn State University to handle the training, outreach, and technical assistance aspects of the Program.
2003: Conservation districts complete the 1,000th funded worksite through the Program.
2008: A second statewide assessment of unpaved roads in all watersheds increases the inventory to over 16,500 pollution sites statewide.
2009: Conservation districts complete the 2,000th funded worksite through the Program.
2013: Act 89 of 2013 is enacted, effectively increasing the funding for the Program from $5Million to $35Million annually in 2014-15. The Act dedicates $28Million of this to the Commission, and also mandates that $8M of that money be used for the maintenance of low-volume paved roads with less than 500 vehicles per day.
2015: The Program completes its first 74 paved LVR contracts with new funding, Dirt and Gravel completed contracts hit the 3,000 mark
2018: The first 5-year contract under increased funding is completed, with over 4,300 Dirt and Gravel and 500 LVR contracts completed since the Program began.

1.3.5 Low-Volume Roads

Act 89 of 2013 specifies that "A minimum of $8,000,000 of the total appropriated annually shall be for maintenance and improvement of (paved) low-volume roads." The act further defined low-volume roads as "sealed or paved with an average daily traffic count of 500 vehicles or less." The low-volume road portion of the Program focuses on the same environmental improvements as the Dirt and Gravel Road portion, not just paving and re-paving roads. For more information on the low-volume road specific issues, see Section 7.4.

1.4 Environmentally Sensitive Maintenance Overview

1.4.1 Worksites

***Worksite**: A worksite is an identified portion of road that impacts water quality. The Program uses worksites to focus funding to improve water*

A worksite is an identified portion of a road that impacts water quality. The Program has both paved Low-Volume Road (LVR) worksites and Dirt and Gravel (D&G) worksites. A worksite has an identified beginning and end that demarks the limits of the section of road impacting the stream and other water bodies. The Program uses worksites to ensure project funding is focused only on those sections of road that impact water quality. The areas outside of worksites may be in need of repair or be generating sediment, but do not have a direct connection to a stream or water body (typically on higher ground away from water).

Districts have identified over 17,000 D&G worksites statewide on unpaved roads. The majority of these D&G worksites were identified in statewide "assessments" completed in 2000 and 2008. These assessments also evaluated each worksite according to the "pollution potential" on the site and provided it with a score. Districts may use this assessment score in their application rankings. Worksites have also been added over time as needed. Districts may add worksites to their inventory at any time. Worksites range in size from a single stream crossing to over a mile in length. The average D&G worksite size funded in the first 17 years of the Program is 0.45 miles in length.

There is no established database of potential LVR worksites. LVR worksites should be identified by applicants and confirmed by the districts using similar principles as the D&G worksites (identifying limits of water quality impact).

1.4.2 Environmentally Sensitive Maintenance (ESM)

Because this is an "administrative" manual, only a brief overview of ESM practices is given here. For complete information and documentation of ESM practices, attend the Program's ESM training or see the technical documentation on the Program's website at www.dirtandgravelroads.org.

***ESM**: **Environmentally Sensitive Maintenance** promotes permanent road improvements that reduce concentrated drainage, prevent erosion, and reduce long-term*

ESM is a term used to describe a suite of principles and practices that are designed to create a more environmentally and financially sustainable public road system. They are long term practices designed to reduce erosion and maintenance within the road area.

Long-term environmental benefits are achieved by attempting to "restore natural drainage" to a state similar to how it was before the road existed. In contrast to traditional "stormwater systems" that are designed to collect and convey large volumes of runoff, ESM practices focus on diffusing flow at the source, encouraging infiltration and reducing concentrated flow volumes. Environmental benefits of this approach to waterways include reduced sediment and other pollutant delivery, and reduced flood flows by "disconnecting" the road drainage system.

Long-term financial benefits are achieved because the same forces of erosion that cause environmental damage translate into increased maintenance costs as well. Every time a road, ditch, or bank washes out, it requires a large time and money investment by the local road owning entity. Some ESM practices may have higher than average up-front costs, but they save money over their lifetime by reducing future maintenance needs and costs.

1.4.2.1 ESM Principles

- Avoid concentrating drainage where possible
- Minimize Flow Volumes
- Reduce effects of concentrated drainage
- Reduce surface erosion
- Reduce cost and frequency of road maintenance

1.4.2.2 Example ESM Practices

The following is a **very brief** summary of some of the Program's most common ESM practices taught in the two-day ESM training course:

- **Road/Stream Interactions:** ESM practices for stream crossings focus on reducing the sediment delivery to the stream, stream stability issues, and the stream crossing itself. Practices such as highwater bypasses, French mattresses, proper stream crossing sizing, better bridge

and pipe design, and in-stream flow control structures can be effectively used to stabilize the road/stream interface.

- **Road Surface:** ESM practices for the road surface include drainage control and improved aggregate. Drainage control starts with proper crown and cross-slope, but also includes practices such as grade breaks, berm removal, and broad-based dips. Improved surface aggregate focuses on the Program's Driving Surface Aggregate and includes maintenance concerns such as grading and pothole repair.
- **Road Base:** Practices that improve the base of a road include mechanical base improvements, underdrains, French mattresses, and in some cases full-depth reclamation.
- **Vegetation management practices:** Practices that manage vegetation in a sustainable manner will reduce erosion from the road area and save on future maintenance costs associated with tree trimming and cleanup. Practices include selective thinning, proper pruning, seeding and mulching, and managing vegetation for long term stability.
- **Road Bank management practices:** Practices that stabilize the upslope or downslope road bank include slope reinforcement, filling the road profile, naturalizing bank shape, and natural or mechanical slope reinforcement.
- **Road Ditch and Outlet Stabilization:** ESM practices for ditches include anything that reduces the flow in the ditch. The simplest of these practices is to provide more drainage outlets in the form of new turnouts and crosspipes. Selecting locations to outlet water and choosing the proper outlet stabilization methods is also important. Other practices such as berm removal and filling the road profile attempt to eliminate ditches completely and promote sheet flow. Practices to reduce the effect of subsurface flow such as underdrains are also important.
- **Off right-of way practices:** Practices that start outside the road area in an effort to reduce the amount of water coming to the public road. Interceptor swales and bank benches reduce the amount of overland flow coming to the road. Driveways and access lanes are often large contributors of water to the public road and can be addressed by re-profiling or with surface control features such as grade breaks, water bars, or conveyor belt diverters.
- **Paved Low-Volume Road Specific Practices:** Low-volume roads may require an added set of ESM practices, especially those located in urban areas where traditional drainage dispersal and infiltration practices may not be practical. LVR-specific practices will evolve over time, but should focus on making improvements to both the environment and the road.

Appendix B: Administrative Manual

(Administrative Manual - Chapter 5: Township Applicant Role)

5. APPLICANT ROLE

This section of the manual is intended to serve as a primer for potential applicants. While this section should serve as a guide for potential applicants, communication with the local district is vital to becoming a successful applicant.

5.1 Before Applying for Funds

5.1.1 Local Procedures and Policies

There are currently 65 counties participating in the Program. As much as is practical, control of the Program is driven down to individual County Conservation Districts (Districts). Each district is governed by a district board, and is advised by a local Quality Assurance Board (QAB) that develops county specific policies and procedures. These local policies can address many county specific issues such as the following:

- Application periods
- Training requirements and training incentives
- Types of projects accepted
- Maximum amount of funds allocated to a specific project
- Maximum number of applications accepted from an applicant
- Ranking criteria
- Maintenance requirements

It is imperative that any potential applicant contact their local district early in the process. This initial contact should occur well in advance of submitting an application.

5.1.2 Eligibility

Potential applicants must meet certain eligibility requirements as follows:

- The person in charge of work plan development and project implementation for the applying entity must have attended environmentally sensitive maintenance (ESM) training within the past five calendar years to become "ESM Certified". Individuals not directly involved with the project design and implementation (interns, secretaries, etc.) do not qualify an applicant to be eligible for funding. Engineers on retainer or others who serve multiple municipalities are welcome to attend the ESM training, but their attendance does not count as "ESM Certification" for the municipalities they represent
- The road must be publicly owned, not simply open to the public. For Program eligibility, the entity that owns the road "right of way" is the determining factor, not who owns the land adjacent to the road. For example, a township may own a road that is surrounded by state or national forest on both sides. Contracts and payments can only be made with the entity that owns the road. In some cases, the ownership of a road may be in question or unknown. Some considerations in determining road ownership of "orphaned" roads:
    - If a municipality receives "Liquid Fuels" funding for the road, then it is eligible.

Typical project timeline:

1. *Identify potential project.*
2. *Site visit with District.*
3. *Submit application to District.*
4. *If funded, enter into contract.*
5. *Acquire any necessary permits and permission.*
6. *Perform, or have contractor perform work.*
7. *Final site inspection with District*

- Most public roads will have courthouse records of ownership.
- It is the responsibility of the potential applicant to prove road ownership to the satisfaction of the district.
- Local solicitors may be able to help with road ownership determinations.

- In addition to being publicly owned, the road must be open to public vehicle travel a minimum of two consecutive weeks out of the year.
- The project in the application must adequately address any environmental concern.

Refer to Section 3.7.2 of this manual for more detailed information on eligible projects.

5.1.3 Pre-application Site Visit

A pre-application site visit with the district is strongly encouraged, and in some counties is required. Districts are encouraged to rank projects higher if a pre-application site visit has occurred. The purpose of the visit is to provide a potential applicant the opportunity to discuss the size and scope of a potential project with the district. District input at this time can save time, and it can avoid the frustration of taking time to prepare an application only to find out the project may be considered ineligible or low priority. District staff may provide input during the visit that could make the application more likely to be approved. Districts may also be knowledgeable on other aspects of the project, such as permit requirements, one call notifications, erosion and sedimentation control planning, etc. Potential landowner issues, discussed in Section 3.7.4.7, should be a part of the initial site visit.

5.1.4 Combined Funds

Program funds may be combined with other funds to pay for a road maintenance project. If Program funds are combined with other funding sources, detailed accounting of which funds were spent on which portions of the project must be maintained. The other funding sources may be used as matching funds for Program projects, provided the Program funds are used on identified pollution worksites. Projects funded with combined funding sources must still adhere to the Program's non-pollution standards and Environmentally Sensitive Maintenance Practices. Should other funding sources have requirements in conflict with the Program's non-pollution standards, funds cannot be combined. It may be possible to complete a project in stages where the Program funds one phase of a project (i.e. drainage and base improvements) and another funding source funds a different phase (i.e. improving the road surface).

5.2 Applying for Funds

Districts develop their own procedures for accepting applications. Some districts may establish application deadlines while others may continually accept applications. The following are general Program requirements, but districts may add additional requirements:

- One grant application should be received for each project site. Multiple project sites will require multiple applications. Districts may suggest funding larger projects in multiple phases using a single or multiple contracts. The grant application is provided in Appendix C.
- Applicants shall submit applications to the district who will forward it to the local Quality Assurance Board (QAB) for review and prioritization.
- The QAB will review the applications and make funding recommendations to the district board.
- The district board will act on the QAB recommendations and award funding based upon previously defined local priorities and available funding.

- The district shall keep a copy of the completed application, project sketch, and location map on file.
- Applicants should keep a copy of the completed application on file.

Projects funded by Dirt, Gravel, and Low-Volume Road funds that are bid out to contractors in which the estimated cost of the total project (materials, equipment and labor), exceeds prevailing wage limits (currently $25,000) are subject to provisions of Pennsylvania's Prevailing Wage Act (1961, August 15, P. L. 987, No. 442), 43 P. S. Section 165-1 et seq. Where prevailing wage applies, it is the responsibility of the grant recipient to register the project with the PA Department of Labor and Industry, and include prevailing wage notification in any proposal to solicit bids for the contract. Prevailing wage scale can be obtained from the Prevailing Wage Division of the Pennsylvania Department of Labor and Industry. Note that owner-operators / sole-proprietors are not exempt from prevailing wage requirements. Contact your county solicitor or the Pennsylvania Department of Labor and Industry for additional guidance and questions. A "Frequently Asked Questions" document concerning prevailing wage can be found on the Center's website at www.dirtandgravelroads.org Additional information available from the PA Department of Labor and Industry at http://www.dli.pa.gov/Individuals/Labor-Management-Relations/llc/prevailing-wage/Pages/default.aspx.

A prevailing wage "Notification letter", attachment F to the DGLVR Contract, must be completed and returned to the Conservation District.

For projects where prevailing wage is required, a notarized "Certified Statement of Compliance", attachment G to the DGLVR contract, must be completed before final payment can be made.

Districts may make minor changes to the application and have the applicant show concurrence by initialing and dating the correction. Unfunded grant applications may be retained for future grant rounds, or may need to be resubmitted. Check with your district for their policies and procedures regarding unfunded grant applications.

5.3 Pre-contract Documentation

It is not necessary for an applicant to have all required permits, traffic counts, and other requirements in hand prior to submitting an application, but many of these requirements must be met before funding is advanced to the grant recipient or before project work can begin. While districts may develop more stringent requirements, the following is a list of general pre-contract requirements:

- PA One Call must be notified at various stages of the project, including the design phase and also prior to construction. One Call assigns a serial number to each call they receive. These serial numbers must be recorded and kept in the project file.
- Many projects will require some type of environmental permit. Applicants are encouraged to work with the district to determine what environmental permits, if any, may be required. Any required permits must be obtained by the grant recipient before work can begin on the portion of the project related to the permit. See Chapter 8 for more permit guidance.
- Some projects may require an Erosion and Sediment Control (E&S) plan. Your district can help you to determine if an E&S plan is necessary. A sample E&S plan is available on the Center's website.
- Low-volume road projects require that a traffic count be conducted. This traffic count must show that the worksite has a traffic count of 500 vehicles a day or less, and the count must be provided to the district for review prior to entering into a contract. See Section 7.5 for traffic count guidance.

5.4 Entering Into a Contract

Before project work can start, the district must enter into a contract with the successful applicant. The contract will specify the location, a description of the work to be performed, and the time frame within which the work will be performed. Documents such as the grant application, project sketch, location map, and project estimates become attachments to the contract. The contract will also specify the amount of funding available for the project upon completion, as well as any provisions for advance payments, payments during construction, and provisions for final payment after the work has been completed. The contract must be signed by the district chairman (or appointed designee) and a person authorized to sign for the successful applicant.

5.5 Project Work

5.5.1 Notification of Project Work

Grant recipients MUST notify the district before beginning work on a project. The amount of notice needed must be spelled out in the contract with the district. This will allow the district to meet in person with the grant recipient and any contractors or sub-contractors who will be implementing the plan to determine the phase and sequence of the project and discuss other project elements. The district must also be notified before beginning a new phase of the project (for example, drainage work is completed and aggregate placement will begin). The district may withhold payments and/or request reimbursement of advanced funds and cancelation of the contract if a grant recipient fails to comply with notification requirements.

5.5.2 Performing Project Work

Grant recipients should follow their standard operating procedures when performing project work such as: bidding procedures for contractors and materials, standard safety requirements, traffic control, road closure, etc. Municipalities should use their municipal codes and other appropriate standards as guidance. Other grant recipients should follow normal purchasing procedures and normal contract procedures using advertising and bidding as warranted. Project expenditures should be tracked following normal bookkeeping and audit procedures, and retained for seven years from project completion. Copies of all receipts for project expenditures to be reimbursed by grant funds must be submitted to the district.

Work must be performed in accordance with the accepted application and work plan unless both parties agree to project changes in writing. The grant recipient is responsible for oversight of any contractors or subcontractors working on the project. Work must be performed within the contracted scope, budget, and timeframe.

If an increase in costs or extension of time is required, the district must be contacted as soon as possible. At the district's discretion based on existing policies and funding availability, contracts may be amended for cost overruns up to 20 percent of the original contract amount, or to extend the timeframe for completion. When cost over-runs exceed 20 percent of the original contracted amount, an additional or new contract will be required. Keep in mind that if a contract is between $20,800 and $25,000 (barely under the prevailing wage threshold for contracted work), an amendment may increase the total value of the project so that prevailing wage would apply to contractor costs. More on prevailing wage in section 3.7.4.4

5.5.3 Project Completion and Reporting

When a project is completed, the district and the grant recipient will meet on site to perform a final inspection. This is documented on a project completion report. The purpose of the final inspection is to assure that all contracted items have been satisfactorily completed. Grant recipients are encouraged to schedule a final inspection immediately after work is complete, so any remediation can be done while equipment is still on site if needed. Upon completion, the grant recipient may submit detailed financial records documenting project costs. The district will then issue a final payment. The project completion report and instructions can be found Appendix G.

5.5.4 Future Maintenance

There are no statewide requirements for maintenance after projects have been completed. Local Districts, however, may set policy on maintenance requirements for completed projects in their county. Maintenance of past projects may be considerations in a district's application ranking criteria.

Appendix C: Administrative Manual

(Administrative Manual - Chapter 7: Stream X-ing, DSA, FDR and LVR)

7. ADDITIONAL PROGRAM POLICIES

The purpose of this chapter is to address more complex Program policies that are not necessarily applicable to every project. This chapter contains policies and guidance on:

- 7.1: Stream Crossing Replacement
- 7.2: Driving Surface Aggregate
- 7.3: Full Depth Reclamation
- 7.4: Low-Volume Road Specific Guidance
- 7.5: Low-Volume Road Traffic Counts

7.1 Stream Crossing Structural Replacement (Bankfull) Policy

This section applies to stream crossing replacements (not road drainage "crosspipes") on **both Low-Volume funds and Dirt and Gravel roads**.

7.1.1 Background

The goal of this policy is to limit the replacement of stream crossing structures to those which are negatively impacting streams. The best quantification of stream impact is the size of the existing structure related to the bankfull width of the channel. A channel's bankfull width is the width of flow at a "dominate channel forming flow stage" where sediment and bed material is moved most effectively through the stream system. Although it varies, bankfull is typically associated with a flow level between one and two year recurrence. Stream crossing structures that are significantly less than the channel's bankfull width are typically associated with many problems including gravel deposition above the road and excessive stream scour and erosion below the road. The policy below limits paying for structural replacement on pipes over 4' in diameter to only those locations where the existing structure is less than 75 percent of the bankfull channel width. These structures are most likely to be causing negative stream impacts, and are most likely to be sources of perpetual maintenance and road impacts to local municipalities (gravel bar removal, erosion, etc.). In addition, any new structures must have a width at least equal to the channel's bankfull width. Bankfull structures have been shown to be both cost-effective over their lifetime and provide significant aquatic benefits. In addition, installing bankfull structures helps reduce annual maintenance costs, and can prevent road damage and road closures due to flooding.

7.1.2 Replacement of Road/stream Crossing Structures

The purpose of this policy is to determine eligibility for stream crossing structural replacement with Program funds. Environmentally Sensitive Maintenance practices applied to the surrounding stream crossing structure area (road, stream banks, ditches, headwalls, wingwalls, high water bypass etc.) are still eligible Program expenses around all stream crossings regardless of bankfull measurements. Within the limits described below, the final decision on funding structure replacement, along with the type of structure used (pipe, box, etc.), is at the discretion of local QABs. Individual QABs can enact stricter polices within their counties, for example requiring structures to be 50 percent bankfull instead of 75 percent to be eligible for replacement, or requiring new structures to be 1.2 times bankfull width. These qualifications for replacement with Program funds do not exempt projects from any permitting or engineering requirements. Engineers should be made aware of this policy early in the planning process, as stream crossing designed solely based on hydraulic capacity are typically smaller than a bankfull structure. Districts should hold an on-site pre-design meeting with the applicant and their engineer prior to the structure design process and application development. Districts may develop local polices requiring pre-application or pre-design meetings.

Bankfull structures will not only accommodate the hydraulic capacity of the stream, but will allow for better stream function through the road in regards to bedload movement, sediment and debris transport, and aquatic organism passage. Stream crossing replacements can be funded as standalone projects, or as part of a larger Program project. The Program's "Stream Crossing Evaluation Form", along with guidelines on bankfull determination, can be found in Appendix E.

Stream Crossing Replacement Policy:

EXISTING stream crossing structures with an opening equal to or less than 13 square feet *(equivalent to a 48" diameter round pipe):*

- **Are eligible to be replaced with Program funds.**
- **The NEW REPLACEMENT structure must** *(all four)***:**
  1. Have a structure width at least equal to bankfull width (100 percent ratio).
  2. Be properly aligned with the channel when possible.
  3. Consider additional floodplain connectivity when possible.
  4. Be designed and constructed to accommodate the passage of aquatic organisms through the structure.

EXISTING stream crossing structures with an opening of more than 13 square feet *(equivalent to a 48" diameter round pipe)***:**

- **In order to be eligible for replacement, EXISTING structures must** *(all three)***:**
  1. Have a structure to bankfull width ratio of 75 percent or less.
  2. Show signs of streambank erosion.
  3. Show signs of streambed erosion/aggradation.
- **The NEW REPLACEMENT structure must** *(all four)***:**
  1. Have a structure width at least equal to bankfull width (100 percent ratio).
  2. Be properly aligned with the channel when possible.
  3. Consider additional floodplain connectivity when possible.
  4. Be designed and constructed to accommodate the passage of aquatic organisms through the structure.

Round pipes over 36" in diameter are not permitted for use in DGLVR funded stream crossings. Oval or squash pipes are acceptable. This applies only to stream crossing replacements. Round crosspipes are standard and acceptable for road drainage.

Existing structures that do not meet the above criteria are not eligible for replacement (materials, equipment, or labor) with Program funds. This policy applies to replacement of structures and does not prohibit work adjacent to the structure.

Considerations for multiple pipes

Stream crossings consisting of multiple "side-by-side" pipes are associated with a wide variety of problems including clogging and channel stability issues. Installation of multiple pipe structures is NOT permitted with Program funds (high-water or overflow pipes are permitted, but do not count towards bankfull capacity). In addition, existing stream crossings consisting of multiple pipes are eligible for replacement regardless of their relationship to the bankfull measurement, as long as they are replaced with a single opening structure of at least bankfull width. This policy applies to multiple pipes only, not multi-cell bridges.

Policy Application to Small Streams

For Program purposes, the stream crossing policy applies to situations where streams, including intermittent channels, with identified bed and banks are flowing into the road or the uphill ditch. Contact the State Conservation Commission in questionable circumstances. In order for policy exceptions on "questionable stream" channels, Districts must obtain written approval from the Commission prior to contracting the project.

Routine Maintenance

The Program has never paid for "routine or regular maintenance" such as simply grading roads. Similarly, regular maintenance of stream crossing structures is not eligible for funding. This includes work items such as culvert lining, extending undersized stream crossings, bridge deck repair, etc. that provide minimal environmental improvements.

7.2 Driving Surface Aggregate (DSA)

This section applies **primarily to Dirt and Gravel funds**, but DSA may have limited use under Low-Volume funds, such as the conversion of a paved road back to gravel. Technical details for DSA including placement and purchasing specifications are not included in this administrative manual. See the Center's Aggregate Handbook for technical documentation.

For D&G projects, surface aggregate is not a required part of a project. However, if surface aggregate is purchased with Program funds, Driving Surface Aggregate (DSA) must be used.

7.2.1 DSA Overview

DSA is a crushed stone mixture developed by the Center in 2001 to be used as a wearing course for unpaved roads. DSA is designed to achieve maximum density compared to other aggregates in order to resist erosion and support traffic. DSA has a few key differences compared to traditional aggregates such as PennDOT 2A or 2RC:

- Well graded to include a range of rock sizes from 1.5" to "stone dust".
- 10-15 percent of the material is composed of "rock fines" that bind the material together.
- Placement by motor paver is highly encouraged.
- Several other requirements including a maximum plasticity limit, a pH range, a minimum hardness specification, and optimum moisture requirements.

Driving surface aggregate meeting the Commission's specification is the only approved road surface material that may be purchased (for D&G projects) with Program funds. The only exception to this is on road fill projects. Projects that involve an average thickness of one foot or more (including surface) of road fill material may utilize an alternative aggregate to cap the newly added road base.

7.2.2 Use of DSA

The Program goal is to improve water quality. DSA is designed to resist erosion and stand up to the forces of traffic. DSA has been proven to reduce sediment loads compared to traditional aggregates by as much as 90 percent, and reduce dust by as much as 75 percent. Since DSA was designed to resist erosion, it was originally intended to be placed on sections of road adjacent to streams where draining road runoff to the waterway is unavoidable. Over the years, DSA has evolved into a "standard practice" on projects in many districts, and is being overused. DSA is NOT a required component of every Program project. The extent to which DSA is used on projects is at the discretion of individual Districts and QABs. When

DSA is used as part of a project, it should be the very last phase of the project. DSA alone does not constitute a comprehensive Program project. All possible base and drainage improvements (new pipes, underdrain, road fill, French mattresses, etc.) must be completed first to reduce environmental impacts of the road and extend the longevity of the DSA. Avoid placing DSA on entrenched roads, or on roads where surface drainage issues are not resolved.

7.2.3 DSA Certification

DSA must be placed in accordance with the DSA specification and certification found in the DSA Handbook at www.dirtandgravelroads.org. A DSA certification is required for every project where DSA is used. The DSA certification does not apply to an entire quarry. The DSA certification applies only to a particular source or pile of DSA that is being purchased. Additional certifications are required if the quarry changes the DSA production process (for example switching to a different seam of stone). The DSA certification must be obtained by the grant recipient before aggregate is placed, and must be kept with project files.

7.2.4 DSA Quality Control

DSA must be sampled and tested by an independent lab before it is delivered to a project site. Sampling can be done by district representatives following the guidelines in the Aggregate handbook. **DSA sampling, testing, and approval is "pile-specific", not "quarry-specific".** Testing must be done on the aggregate pile that is directly supplying the job. The costs of testing can be incorporated into project costs, or paid out of a district's admin/education funds. Sampling can also be done by the Center's "DSA Clearinghouse".

The Center will act as a "DSA Clearinghouse" for DSA projects. The purpose of this DSA Clearinghouse is to ensure quality DSA purchase and placements for districts statewide by:

- Visiting and talking with quarries to ensure they understand the DSA requirements.
- Collecting samples and performing testing to ensure DSA meets all material requirements before delivery and placement.
- Keeping records of aggregate testing to avoid duplicating efforts.
- Establishing a central point of contact for quarries on DSA issues.
- Assistance with contractor coordination.
- On-site assistance during DSA placement.

If districts plan to use the DSA Clearinghouse, it is recommended that they contact the Center when a potential DSA supplier is chosen, at least 30 days before placement. Notification can be made utilizing the DSA Purchase Notification Form, provided in the Aggregate Handbook, or on the Center's website. **If districts choose to sample their own DSA, they should share testing results with the Center** in order to provide a more comprehensive statewide database and avoid duplicate testing.

7.3 Full-Depth Reclamation (FDR)

7.3.1 Program Eligibility:

FDR is an eligible expense in the Program, at the discretion of individual districts, for use on paved Low-Volume Road (LVR) projects. FDR is not an eligible expense on unpaved roads. FDR shall not be funded on paved LVR roads with DGLVR Program funds unless all applicable drainage improvements and Environmentally Sensitive Maintenance practices have been employed, as road owners are hesitant to install drainage practices at a later point when it would disturb the new road base. Shallow surface

grinds for the purpose of road resurfacing are not considered FDR projects. FDR is a major rehabilitation technique in which the full depth (minimum 6") of the surface and predetermined portion of the underlying base is uniformly pulverized and blended to provide a stronger, homogeneous road base.

7.3.2 Alternatives to FDR

FDR is an expensive process that may not be necessary everywhere it is proposed. When considering funding FDR projects, consider alternative base improvement techniques such as:

Imported fill: Importing fill to raise the elevation of a road can be less expensive than FDR in some cases. Entrenched roads in particular will benefit from road fill to eliminate drainage issues while providing a sound road base.

French Mattress: In some cases, road base instabilities are a direct result of spring and seeps coming up near or under the road. French mattresses provide excellent road base while insuring that wet areas around and under the road will not affect the road above.

Geo-synthetics: The use of geo-synthetics such as geogrid can increase the structural strength and stability of the road base. Geogrid is an excellent solution to fix base problems and is cost effective on small projects.

7.3.3 Program FDR Requirements:

If a district chooses to fund an FDR project, the following requirements apply:

The Center must be made aware of the proposed FDR project before a contract is signed. A site visit from Commission or Center staff may be requested.

FDR must follow specifications in PennDOT Publication 447 (Approved Products for Lower Volume Local Roads)

The mix design for FDR projects must be determined by an independent third-party.

FDR is a base stabilization technique and does not provide a final running surface. Consideration for asphalt, "tar and chip", or some other final running surface must be part of the planning for FDR projects.

Any additives or binding agents used in chemical stabilization must be on the Program's "Approved Products" list, detailed on the Center's website.

7.4 Low-Volume Road Specific Guidance

This section applies **only to Low-Volume funds**, not Dirt and Gravel funds. The previous guidance and policy in this manual also applies to LVR projects and funds. For the purposes of the LVR Program, a "paved" road is defined to include any road surfaced with asphalt, "tar and chip", "chip seal", bitumen, concrete, or other asphalt-like coating.

7.4.1 LVR Guiding Principals

7.4.1.1 Project Focus

The focus of road projects in the LVR portion of the Program should be on similar ESM principles that have been used in the Program since its inception. Projects in the LVR Program must contain benefits to both the road systems (improved drainage, reduced surface, ditch and bank erosion, smoother surface, more durable surface, reduced maintenance costs, etc.) and the environmental systems (water quality, stream quality, reduced storm water flows, improved air quality, increased infiltration). The balance between road improvements and environment benefits should be considered in the local QAB/district project ranking criteria and funding decisions.

7.4.1.2 Long Term Benefits

Similar to Dirt and Gravel Projects, the focus of LVR projects should be on long-term road and environmental improvement projects.

- Routine maintenance of LVR or storm water systems such as cleaning inlets, street sweeping, crack sealing, etc. is not eligible for funding under this Program.
- Program funds should not be used to pay for deferred or neglected maintenance on drainage/storm water systems without road improvements.
- Program funds should not be used to fund any LVR issues that do not provide a long term benefit to the road and to the environment.

7.4.1.3 Mistakes/design Errors

Program funds should not be used to correct recent mistakes and or design errors on LVRs that are the responsibility of the original project engineer or construction firm. If recent (within its reasonable design lifespan) LVR construction projects contain design or construction flaws, correction of these problems should be the duty of the project's engineer or contractor of record, and LVR funds should not be allocated for these purposes.

7.4.1.4 Project Eligibility

In order to be eligible for LVR funding, a road must have an existing paved (including chip sealed) surface, and it must have a verified average daily traffic count of less than 500 vehicles per day (according to Commission guidance). For more information on traffic count guidance, see Section 7.5.

All projects must apply ESM principles and practices to address an environmental concern directly related to the road, make improvements to the road system, or to meet all other Program requirements (ie. permits or approvals). The project eligibility requirements in section 3.7 of this manual apply to Low-Volume Roads.

7.4.2 LVR Project Guidelines

7.4.2.1 Paying for Asphalt or Other Surfacing

Resurfacing paved roads (sealing or paving) is not a primary focus of the LVR Program component. Resurfacing costs can be considered by a district as a component part of a larger ESM project. It is at the discretion of individual districts and QABs whether resurfacing costs (sealing or paving) will be funded through the Program, either on individual projects or as countywide policy. Before funding any resurfacing work on projects, the following ESM principles must be addressed:

Drainage issues
Base instability issues
Other necessary and appropriate issues such as bank stability, road entrenchment, vegetation, etc.

7.4.2.2 Surfacing Unpaved Roads

It is not the intent of the Program to encourage the sealing or paving of existing dirt or gravel roads and converting them to sealed or paved low-volume roads. While eligible entities may choose to seal or pave a DGR project on their own at some future point in time, no Program funds should be utilized for the specific purpose of converting unpaved roads to paved or "tar and chip", unless otherwise approved by the Commission.

7.4.2.3 Reclaiming Paved or Sealed Roads to Gravel

The Program recognizes the value of converting a poorly constructed or poorly maintained paved low-volume road into a high quality gravel through full depth reclamation or other similar processes.

Districts may utilize either dirt and gravel, or low-volume road program component funds for these purposes.

7.4.3 LVRs in Urban Areas

Many ESM principles and practices in use by the Program can be readily adapted to paved LVRs in a rural environments. LVR funding, however, is not limited to rural roads or rural environments. LVR projects in urban areas will require a new set of best management practices (BMPs) that will take some time to develop and disseminate through the Program. The level of focus in rural and urban environments will be at the discretion of districts and QABs.

In order to increase the knowledge base of potential urban LVR BMPS, district should contact the Center when planning to fund an urban LVR project that is outside of "traditional ESM practices". This will give the Center opportunity to provide input to these urban projects prior to QAB approval, and will help the Center to increase the knowledge base of urban BMPs for statewide education purposes.

The LVR portion of the Program is not JUST a storm water program. Projects, especially in urban areas, need to strike a balance between environmental improvements and road improvements. It will be up to districts and QABs to determine the proper balance for projects in their counties.

7.4.4 Safety Considerations

The Commission recognizes the fact that many LVR component projects will have higher levels of daily traffic and higher levels of posted speed than projects on unpaved roads. Grant recipients are required to follow the same safety protocols as with all other road work (flaggers, signs, etc). The funding of any traffic control and safety components of a Program project is at the discretion of the district.

7.5 Traffic Counts for Low-Volume Roads

Before a contract can be signed for a low-volume road project, the applicant is responsible for validating that the road has 500 vehicles per day or less consistent with Commission and any local QAB policy. The Program's "Traffic Count Validation form and Instructions" can be found in Appendix F.

- Applicant is responsible for providing traffic counts before a contract can be signed.
- A traffic count is not required in order to submit an application, unless required by local QAB policy.
- The district is responsible for verifying that a count exists, and that the count meets the criteria established in state and local policy.
- Traffic counts are considered valid for a period of five years, provided there are no new significant changes in traffic flow volumes or patterns.
- Documentation of traffic counts using a signed "Traffic Count Validation Form" must be retained with project files according to the Commission's record retention policy. Districts may opt to include the completed traffic count validation form as an attachment to the project contract.
- Districts may, at their discretion, use administrative and education funding to facilitate or support traffic counts for applicants. Districts should ensure that all potential applicants have equal access to any traffic count facilitation measures they may employ.
- Traffic counts only apply to a segment of road between intersections, not to an entire length of road. Application sites that include intersections may require multiple counts.
- Traffic counts should be done on the proposed project location, or on a road that ensures that traffic on the project location can be determined.

7.5.1 OPTION A: Validate with Existing Traffic Count Data or Extrapolation

7.5.1.1 Use of Existing Data

Existing traffic counts can be used to verify road eligibility for LVR funding. Existing data must have been collected within the previous five years and conform to the Program's Level 2 count protocol at a minimum. "Estimated" traffic counts that exist for many municipal roads cannot be used.

7.5.1.2 Extrapolation of Existing Data

It is permissible to use existing data for roads with 500 vehicles per day or less to logically extrapolate to subsidiary roads. (For example, a spur road between two state roads where both state roads have less than 500 vehicles per day must also have less than 500.) This extrapolation of data can be used to verify that a road has 500 vehicles per day or less without performing a count. This extrapolation of traffic counts must prove the ADT on the road is 500 or less to be eligible for LVR funding. Potential sources of existing traffic count data include:

- State Roads: http://www.penndot.gov/ProjectAndPrograms/Planning/Maps/Pages/Traffic-Volume.aspx
- Local Roads: PennDOT regional offices or County Planning Commissions.

7.5.2 OPTION B: Validate with Level 1 Count: 2 Hour Count

An applicant may do a Level 1 count to determine the traffic count on a potential project site. This involves counting traffic for a two hour period, either by hand tally, video recording, or an automated traffic counter. A Level 1 count of 500 vehicles per day or less will qualify the road for LVR funding. A Level 1 count must meet the following criteria:

- It must be conducted between March 1 and the week before Thanksgiving.
- It cannot be conducted on a holiday, or the day before or after a holiday.
- It must be conducted on a Tuesday, Wednesday, or Thursday
- It must be conducted for a minimum of two consecutive hours between 3:00 pm and 6:00 pm.
- Only the number of vehicle passes is counted, regardless of direction of travel or type of vehicle.
- The traffic count for the time period will be adjusted to a 24 hour period by simply multiplying the 2 hour count volume times twelve (12)
- Applicants may skip the Level 1 count and go straight to a Level 2 count if desired
- Only licensed motor vehicles should be counted.

If a Level 1 count produces a count of 500 vehicles per day or less, the project on the road is considered eligible without a Level 2 count. If a Level 1 count produces a count of more than 500 vehicles per day, it does not disqualify the road, but necessitates a Level 2 count because of its increased accuracy. The purpose of a Level 1 count is to provide a reasonably accurate traffic count with minimal time investment.

7.5.2.1 Level 1 Count Examples

Example 1: A traffic count for two consecutive hours between 4:00 pm and 6:00 pm produces a count of 25 vehicles. 24hours (per day) / 2hours (per study) = 12

12 x 25 =300 average daily count.

This worksite would be eligible (no Level 2 count needed).

Example 2: A traffic count for two consecutive hours between 3:30 pm and 5:30 pm produces a count of 53 vehicles. 24hours (per day) / 2hours (per study) = 12

12 x 53 = 636 average daily count.

This does not disqualify the road. It simply means that a more accurate Level 2 count is required if the applicant wants to continue to pursue Program funding.

7.5.3 OPTION C: Validate with Level 2 Count: 24 hour Automated Count

A Level 2 count involves the placement of an automated traffic counter on the road for a minimum period of 24 hours. Note that these are the minimum criteria for a count. More comprehensive or longer counts can be substituted as long as they meet the minimum requirements below for a "Level 2 count". A Level 2 count of 500 vehicles per day or less will qualify the road for LVR funding. Level 2 counts supersede Level 1 counts if there is a discrepancy. A level 2 count must meet the following criteria:

- It must be conducted between March 1 and the week before Thanksgiving.
- It cannot be conducted on a holiday, or the day before or after a holiday.
- It must be conducted between 12 AM Tuesday and 12 AM Friday.
- It must be conducted for a minimum of 24 consecutive hours.
- Only the number of vehicle passes is counted, regardless of direction of travel or type of vehicle.

If a Level 2 count produces a count of 500 vehicles per day or less, the project on the road is considered eligible. If a Level 2 count produces a count of more than 500 vehicles per day, a project on that road is not eligible for LVR funding. 24 hour counts do not have be broken up by hour or any smaller time unit.

The criteria described in the Level 2 count represent a "minimum acceptable criteria". Counties may use or adopt more stringent traffic count requirements as long as it meets or exceeds the requirements here. (A more stringent requirement is a count that provides more statistically accurate data. For example: requiring Level 2 counts for all roads, requiring 48 hour counts, or requiring hourly totals on counts to provide information to PennDOT.)

7.5.4 Seasonal Activities and Special Circumstances

A traffic count survey cannot be conducted in a timeframe or manner that intentionally causes artificially low average daily traffic counts on a particular road segment. This includes conducting a traffic count during summer recess for a school access road, or conducting a traffic count when access to a road segment is temporarily or partially restricted or reduced (i.e. detoured, weight, or size restricted, etc.) or conducting a traffic count in any other timeframe or manner that intentionally causes low average daily traffic counts.

Appendix D: Grant Application, w/Cost Sheets & Instructions

Attachment A
To Contract

SECTION 9106 OF THE PENNSYLVANIA VEHICLE CODE

DIRT, GRAVEL AND LOW VOLUME ROAD MAINTENANCE GRANT APPLICATION

Project Location: County	Project Location: Municipality	**District Use Only** Application Type: ☐ DGR ☐ LVR Work Site ID: _____ Date Received: _____
ESM Certified Person	Position	Certification Date
Official Name of Applying Agency		
Mailing Address		
Contact Person	Phone / Fax	E-Mail

Road Name / ID Number	Affected Stream or Tributary	
Proposed Project Start Date	Proposed Project Completion Date	Existing Road Surface Type: ☐ Unpaved ☐ Paved Is project considered an emergency? ☐ Yes ☐ No

1. The applicant is required to identify and obtain all necessary permits before starting the project.

2. Identify the proposed work elements: ☐ Ditches Improved ☐ Ditch Outlets Added ☐ Off Right-of-Way Improvements
☐ Road Banks Improved ☐ Road Base Improved ☐ Road Surface Stabilized
☐ Stream Crossings Improved ☐ Storm Water Improvements ☐ Vegetative Management ☐ Other _____

3. The applicant is required to obtain the DSA Specification and Certification form prior to DSA placement.

4. Complete Attachment B "Project Work Plan" including a sketch of proposed project. Attach a locational map with the project highlighted.

5. Project cost estimate: (summarize costs here and attach detailed documentation if needed)

Grant Requested Funds			In-Kind Contributions		
Materials	Equipment	Labor	Materials	Equipment	Labor
See Attachment A1			See Attachment A2		

Grant Requested……. $_____

In-Kind Contributions….. $_____

Total Project Value…….. $_____

_____ _____
Applicant Signature Date

Attachment A
To Contract

SECTION 9106 OF THE PENNSYLVANIA VEHICLE CODE

DIRT, GRAVEL AND LOW VOLUME ROAD MAINTENANCE PROJECT WORK PLAN

Applicant	Road Name / ID Numb	Date

Instructions:

- Draw a sketch of the proposed project that includes:
  - All Proposed Work (i.e., Cross Pipes, Stream Crossings, Other ESM Practices)
  - Project Road Length in Feet or Miles
  - Nearest Intersection and/or Reference Landmarks
  - Known Utilities
  - North Arrow
- Attach a copy of a locational map with the project highlighted
- Attach additional project details as necessary

811

Dial 8-1-1 or 1-800-242-1776 not less than 3 business days nor more than 10 business days prior to the start of excavation.

Project Length = _____ feet / miles (circle one)

North Arrow

Attachment A1
to Contract
(optional)

SECTION 9106 OF THE PENNSYLVANIA VEHICLE CODE

DIRT, GRAVEL AND LOW VOLUME ROAD MAINTENANCE
DETAILED ESTIMATED PROJECT EXPENDITURES
GRANT REQUESTED FUNDS

Use best estimates and complete as much info as possible.

Materials			
Type	Unit Cost	Qty	Cost $
Total Materials $			

Equipment			
Type	Hours	FEMA* Rate/Hr	Cost $
Total Equipment $			

Labor			
Type	Rate/Hr	Hours	Cost $
Total Labor $			

* FEMA rates are only applicable where municipality-owned equipment is used otherwise use contracted rates.

*Prevailing wage may apply to projects over $25,000 when a contractor is involved.

Total Grant Requested: $_____ (materials + equipment + labor)

_____	_____	_____	_____
Applicant	County	Road Name / ID Number	Date

Attachment A2
to Contract
(optional)

SECTION 9106 OF THE PENNSYLVANIA VEHICLE CODE

DIRT, GRAVEL AND LOW VOLUME ROAD MAINTENANCE
DETAILED ESTIMATED PROJECT EXPENDITURES
IN-KIND FUNDS

Use best estimates and complete as much info as possible.

Materials			
Type	Unit Cost	Qty	Cost $
Total Materials $			

Equipment			
Type	Hours	FEMA* Rate/Hr	Cost $
Total Equipment $			

Labor			
Type	Rate/Hr	Hours	Cost $
Total Labor $			

* FEMA rates are only applicable where municipality-owned equipment is used otherwise use contracted rates.

*Prevailing wage may apply to projects over $25,000 when a contractor is involved.

Total In-Kind Contributions: $_____ (materials + equipment + labor)

Applicant	County	Road Name / ID Number	Date

SECTION 9106 OF THE PENNSYLVANIA VEHICLE CODE

DIRT, GRAVEL AND LOW VOLUME ROAD MAINTENANCE
Grant Application/Project Work Plan Instructions

The following instructions pertain to the Dirt, Gravel and Low Volume Maintenance Program **Grant Application** and **Project Work Plan** forms. These instructions are to act as a guide only. Note that all fields are required unless indicated otherwise.

It is strongly recommended grant applicant and Conservation District representatives hold an on-site meeting to discuss a potential project plan before an application is submitted.

Grant Application Instructions

"District Use Only":

- Applicant DOES NOT fill out any of the information within this box.

General Information:

- **County** – The County the road project in question is within.
- **Municipality** – The Municipality (township, borough, or city) the road project in question is within.
- **ESM Certified Person** – List the person who will oversee the project who is currently ESM certified.
- **Position** – The current position of the ESM Certified Person.
- **Certification Date** – The date the ESM Certified Person completed their ESM training. Applicant may need to contact their Conservation District if the date is unknown. The person responsible for project design and oversight for applying entity must be ESM certified within last 5 years to be eligible for funding.
- **Official Name of Applying Agency** – The name of the agency who is applying for Dirt, Gravel and Low Volume Maintenance funding.
- **Mailing Address** – The mailing address of the applying agency. Include street address, state, and zip code.
- **Contact Person** – The official contact person of the applying agency.
- **Phone** – The phone number of the official contact person or the applying agency.
- **Fax** – The fax number of the official contact person or the applying agency. *Optional*
- **E-Mail** – The e-mail address of the official contact person or the applying agency. *Optional*

Affected Road Information:

- **Road Name / ID Number** – The name and identification number of the road in question. List both if available.
- **Affected Stream or Tributary** – The name of the stream or tributary that the road project in question is currently affecting. If project affects a small unnamed tributary (UNT), list the first named stream downstream of the tributary, such as “UNT to Trout Run”..
- **Proposed Project Start Date** – The proposed date that applicant expects the project to begin.
- **Proposed Project Completion Date** – The proposed date that applicant expects the project to be finished.
- **Existing Road Surface Type** – Check the appropriate CURRENT surface type of the road project in question. “tar & chip” or “chip sealed” roads are considered paved.
- **Is project considered an emergency** – Check if the project would be considered an emergency. For example, a road that is washed out and is unpassable due to a storm would be considered an emergency.

Additional Questions, Proposed Work Elements, and Cost Estimates:

1) **Applicant is required to identify and obtain all necessary permits before starting the project:**
   - By signing the application, the applicant acknowledges they understand that they will be required to identify and obtain all required permits before starting the project. Applicant is not required to identify and obtain these permits prior to submitting the grant application.
2) **Identify the proposed work elements:** Check all that apply
   - **Ditches Improved** – Stabilizing ditches through elimination, vegetation, armoring, flow reduction, etc.
   - **Ditch Outlets Added** – Addition of drainage outlets such as pipes, turnouts, etc.
   - **Off Right-of-Way Improvements** – Improvements to access roads, lanes, etc. that affect the public roadway.
   - **Road Banks Improved** – Stabilizing of banks through reprofiling, armoring, vegetation, etc.

- **Road Base Improved** – Improvements to road base through material addition, milling, geo-synthetics, etc.
- **Road Surface Stabilized** – Improvements to the road surface through new material, stabilizers, etc.
- **Stream Crossings Improved** – Replacement or stabilization of road/stream crossings.
- **Storm Water Improvements** – Improvements to or disconnection of traditional storm water collection systems.
- **Vegetative Management** – Vegetation work such as tree thinning, selective thinning, seeding, etc.
- **Other** – List any other proposed work elements not covered by the above choices.

3) **Applicant is required to obtain the DSA Specification and Certification form Prior to DSA placement.**
   - Applies to any projects using Driving Surface Aggregate (DSA).
   - By signing the application, applicant acknowledges that they understand that they will be required to obtain the Specification and Certification from the aggregate supplier prior to aggregate placement.

4) **Complete Attachment B by drawing a sketch of the proposed project. Attach a copy of a locational map with the project highlighted:**
   - This project sketch is part of the Project Work Plan that is addressed at the end of the Grant Application help.

5) **Project cost estimate:**
   - **Applicant must provide estimates for both grant requested funds and in-kind services.**
     - **"Grant Requested Funds":** summarizes the project costs that the applicant is requesting from the Program through the Conservation District.
     - **"In-Kind Contributions":** summarizes the costs incurred by the applicant in project implementation where no reimbursement will be requested or made through the Program.
   - **Cost estimates** - Cost estimates for simple projects may fit in the space provided on the Grant Application. Many projects, however, may require a separate worksheet. The optional "Detailed Estimated Project Expenditures" and "Detailed Estimated In-Kind Contributions" worksheets (Attachments A1 and A2) can be used to summarize cost details.
   - **Grant Requested** – The project costs that the applicant is requesting from the Program through the Conservation District.
   - **In-Kind Contributions** – The costs that will be borne by the applicant where no reimbursement will be requested or made through the Program.
   - **Total Project Value** – Grant Requested + In-Kind Contributions. This is the total estimated cost of the project.

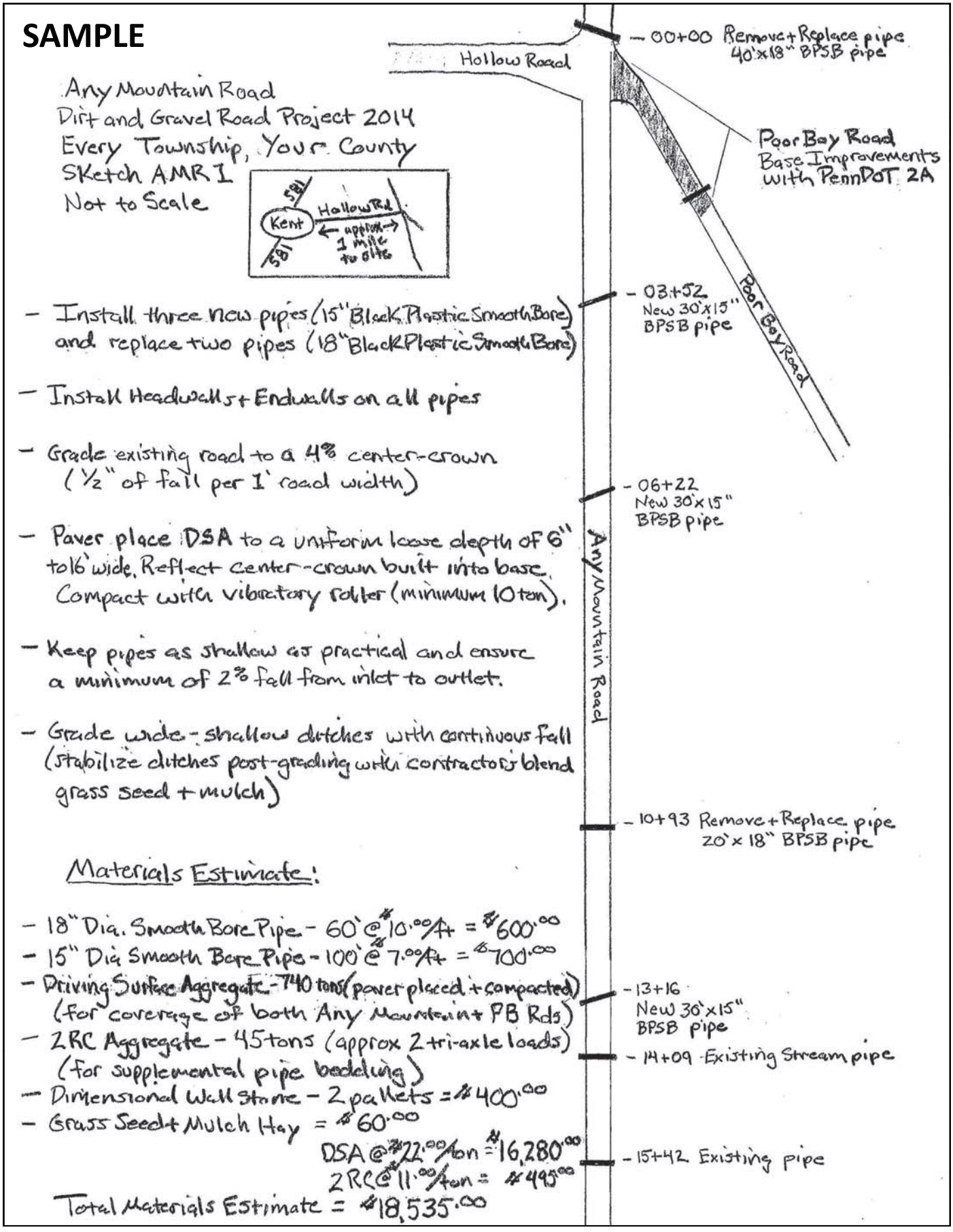
Finalizing the Application:
- **Applicant Signature** – The signature of the applicant.
- **Date** – The date the Grant Application was completed.

Project Work Plan Instructions

General Information:
- **Applicant** – The entity applying for the grant.
- **Road Name / ID Number** – The name and identification number of the road in question. List both if available.
- **Date** – The date the project work plan was completed.
- **North Arrow** – Draw a locational north arrow that identifies where north is as related to the sketch.
- **Project Length** – Enter the length of the proposed work area (not necessarily entire road length). Then circle the appropriate unit of "feet" or "miles". If the total proposed work length is less than 1 mile, then it is recommended to enter the work length in feet.

Attach a copy of a locational map with the project highlighted:
- Highlight or circle the project location on a map such as township map, topographic map, photocopied atlas map, GIS map, PennDOT map, etc. Do not include any project work items on the location map (they go on the workplan). The purpose of this map is to allow the project site to be easily found.

Project Work Sketch: The project sketch should detail the practices to be implemented on the road in plan view. Items such as new culverts, turnouts, streams, etc. should be identified on the sketch. Hand drawn sketches are acceptable. Below is a sample work sketch that could be placed in the body of the Project Work Plan.



DETAILED ESTIMATED PROJECT EXPENDITURES WORKSHEETS
INSTRUCTIONS

OPTIONAL - (attachments A1 and A2) - OPTIONAL

Included with the Grant Application packet are two additional project expenditure worksheets. These two worksheets, Grant Requested Funds and In-Kind Contributions, are referred to in the Grant Application as Attachment A1 and Attachment A2, respectively. These are not required but are recommended if the applicant needs more space than what is provided in the Grant Application. Since they are nearly identical, general help is provided below.

- **Grant Requested Funds/In-Kind Contributions Worksheets:**
- **Materials** – List the type, unit cost, quantity, and total cost for each proposed material.
- **Equipment** – List the type, hours, FEMA Rate/Hour if applicable, and cost for each piece of equipment proposed. Note that FEMA rates are only applicable where township-owned equipment if used otherwise applicant should use contracted rates.
- **Labor** – List the rate, hours, and cost per type of laborer.
- **Total** – The total cost of materials, equipment, and labor.
- **Applicant** – The Grant Application applicant.
- **County** – The County the road project in question is within.
- **Municipality** – The Municipality (township, borough, or city) the road project in question is within.
- **Road Name / ID Number** – The name and identification number of the road in question. List both if available.
- **Date** – The date the project expenditures form was completed.

Appendix E: Completed Sample Grant Application and Sketch

EXAMPLE ONLY

N 9106 OF THE PENNSYLVANIA VEHICLE CODE
ND LOW VOLUME ROAD MAINTENANCE
GRANT APPLICATION

Your County, PA Project Location: County	Every Township Project Location: Municipality	**District Use Only** Application Type: X DGR ☐ LVR
Joe Roadguy ESM Certified Person	Twp. Roadmaster Position	Nov. 2014 Certification Date
		Work Site ID: A001
		Date Received: 3/15/2015

Every Township, Your County, PA
Official Name of Applying Agency

811 Wispering Pine Rd, Pastaville, PA 16555
Mailing Address

Dixie Wise Contact Person	814-795-5155 Phone	814-795-5152 Fax	dwise@hootmail.com E-Mail

Any Mountain Road / TR 301 Road Name / ID Number	tributary Cold Bottom Creek Affected Stream or Tributary	
5-18-2015 Proposed Project Start Date	5-1-2016 Proposed Project Completion Date	Existing Road Surface Type: X Unpaved ☐ Paved Is project considered an emergency? ☐ Yes X No

1. The applicant is required to identify and obtain all necessary permits before starting the project.

2. Identify the proposed work elements: X Ditches Improved X Ditch Outlets Added X Off Right-of-Way Improvements
☐ Road Banks Improved ☐ Road Base Improved X Road Surface Stabilized
☐ Stream Crossings Improved ☐ Storm Water Improvements ☐ Vegetative Management ☐ Other _____

3. The applicant is required to obtain the DSA Specification and Certification form prior to DSA placement.

4. Complete Attachment B "Project Work Plan" including a sketch of proposed project. Attach a locational map with the project highlighted.

5. Project cost estimate: (summarize costs here and attach detailed documentation if needed)

Grant Requested Funds			In-Kind Contributions		
Materials	Equipment	Labor	Materials	Equipment	Labor
$19,666.00 See attached Sheet			$400.00	$2,700.00 See Attachment Sheet	$1,600.00
See Attachment A1			See Attachment A2		

Grant Requested..... $	19,666.00
In-Kind Contributions..... $	4,700.00
Total Project Value..... $	24,366.00

Dixie Wise
Applicant Signature

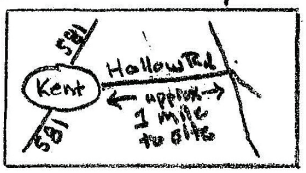
3-6-15
Date

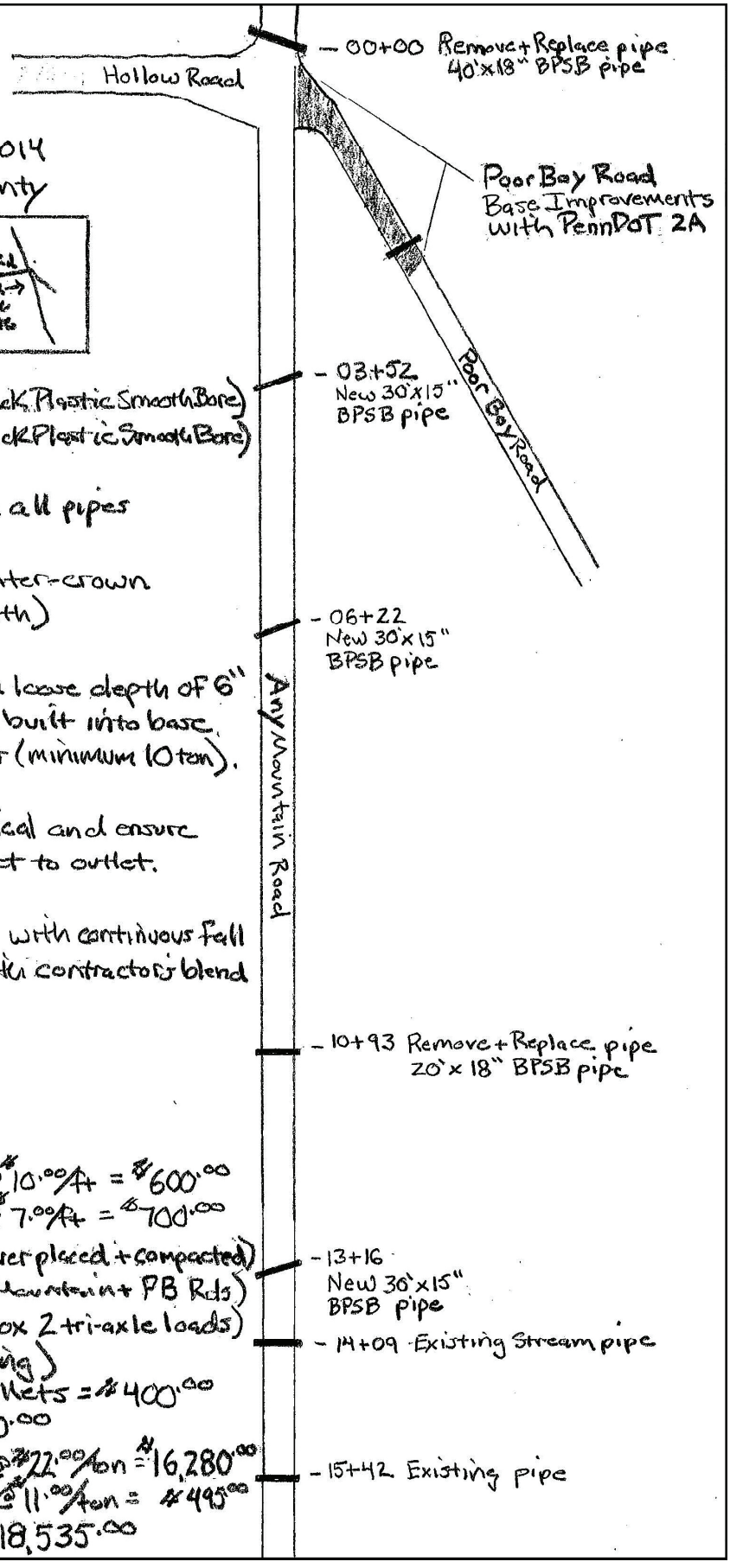
SECTION 9106 OF THE PENNSYLVANIA VEHICLE CODE

DIRT, GRAVEL AND LOW VOLUME ROAD MAINTENANCE

EXAMPLE ONLY

Any Mountain Road
Dirt and Gravel Road Project 2014
Every Township, Your County
Sketch AMR 1
Not to Scale





- Install three new pipes (15" Black Plastic Smooth Bore) and replace two pipes (18" Black Plastic Smooth Bore)
- Install Headwalls + Endwalls on all pipes
- Grade existing road to a 4% center-crown (½" of fall per 1' road width)
- Paver place DSA to a uniform loose depth of 6" to 16' wide. Reflect center-crown built into base. Compact with vibratory roller (minimum 10 ton).
- Keep pipes as shallow as practical and ensure a minimum of 2% fall from inlet to outlet.
- Grade wide-shallow ditches with continuous fall (stabilize ditches post-grading with contractor's blend grass seed + mulch)

Materials Estimate:

- 18" Dia. Smooth Bore Pipe - 60' @ $10.00/ft = $600.00
- 15" Dia Smooth Bore Pipe - 100' @ $7.00/ft = $700.00
- Driving Surface Aggregate - 740 tons (paver placed + compacted) (for coverage of both Any Mountain + PB Rds)
- 2RC Aggregate - 45 tons (approx 2 tri-axle loads) (for supplemental pipe bedding)
- Dimensional Wall Stone - 2 pallets = $400.00
- Grass Seed + Mulch Hay = $60.00

DSA @ $22.00/ton = $16,280.00
2RC @ 11.00/ton = $495.00

Total Materials Estimate = $18,535.00

Attachment A1
to Contract
(optional)

SECTION 9106 OF THE PENNSYLVANIA VEHICLE CODE

DIRT, GRAVEL AND LOW VOLUME ROAD MAINTENANCE
DETAILED ESTIMATED PROJECT EXPENDITURES
GRANT REQUESTED FUNDS

EXAMPLE ONLY

Use best estimates and complete as much info as possible.

Materials				Equipment				Labor			
Type	Unit Cost	Qty	Cost $	Type	Hours	FEMA* Rate/Hr	Cost $	Type	Rate/Hr	Hours	Cost
18" Plastic Pipe	8.50/ft	60	$ 510.00								
15" Plastic Pipe	7.00/ft	100	$ 700.00								
DSA	22.00/ton	740	$ 16,280.00	— includes all equipment and labor				and in-out fees			
2A	12.00/ton	110	$ 1,320.00								
2RC	11.00/ton	45	$ 495.00								
Wall Stone	$150.00 pallet	2	$ 300.00								
Ryegrass Seed	3.00/lb	7	$ 21.00								
Straw	5.00/bale	8	40.00								
Total Materials $			19,666.00	Total Equipment $				Total Labor $			

* FEMA rates are only applicable where municipality-owned equipment is used otherwise use contracted rates.

*Prevailing wage may apply to projects over $25,000 when a contractor is involved.

Total Grant Requested: $ 19,666.00 (materials + equipment + labor)

Applicant	County	Road Name / ID Number	Date
Every Township	Your	Any Mountain Road / TR 301	3-6-15

Attachment A2
to Contract
(optional)

SECTION 9106 OF THE PENNSYLVANIA VEHICLE CODE

DIRT, GRAVEL AND LOW VOLUME ROAD MAINTENANCE
DETAILED ESTIMATED PROJECT EXPENDITURES
IN-KIND FUNDS

Use best estimates and complete as much info as possible.

Materials

Type	Unit Cost	Qty	Cost $
Sandstone Fill	4.00/ton	100	$400.00
Total Materials $			$400.00

Equipment

Type	Hours	FEMA* Rate/Hr	Cost $
Backhoe	40	33.00/hr	$1,320.00
Dump Truck	16	65/hr	$1,040.00
Jumping Jack	68.00/day		$340.00
Total Equipment $			$2,700.00

Labor

Type	Rate/Hr	Hours	Cost $
Township	20.00	80	$1,600.00
Total Labor $			$1,600.00

EXAMPLE ONLY

* FEMA rates are only applicable where municipality-owned equipment is used otherwise use contracted rates.

*Prevailing wage may apply to projects over $25,000 when a contractor is involved.

Total In-Kind Contributions: $ 4,700.00 (materials + equipment + labor)

Applicant	County	Road Name / ID Number	Date
Every Township	Your	Any Mountain Road / TR301	3-6-15

Appendix F: Traffic Count Validation / Instructions

Dirt, Gravel, and Low Volume Road Maintenance Program (DGLVRP)

Traffic Count Instructions for Applicants

10/20/14

This document is intended to provide instructions to applicants for performing traffic counts. For details of the Program's Traffic Count Policy, see the Program's administrative manual chapter 7.4.

Traffic Count Location – This section is to enter basic information about the location of the traffic count such as the name and location of the road, county and township, and the name of the road owning entity. GIS coordinates are helpful to locate the project on a map, but if this is not known, please describe the location so that it can be easily found (i.e. Intersection of Elk Lane and Beaver Creek Road).

Choose one of the 3 methods below to determining traffic count:

- Existing Data or Extrapolation - Indicate whether this traffic count is taken from existing data, or extrapolated from existing data. See Chapter 7.4 of the administrative manual for more details on data extrapolation. Page two of the form can be used to describe the methodology used to extrapolate from existing traffic data.

- Level 1 Traffic count details – Record the date and time the count was performed, describe what method was used to take the count (i.e. camcorder). Indicate the name of the person taking the count, and who they work for. For a 2 hour count, multiply the number of cars counted by 12 to determine the average daily traffic (ADT).

- Level2 traffic count details – Record the length of the count, the dates and times of the count, and the type of counter used, including the make and model of the counter. Indicate the name of the person taking the count, and who they work for. Record the total count, then adjust to a 24 hour count if needed (i.e. 800 cars counted in 48 hours = 400 ADT).

Applicant Validation – Applicant must print and sign and date the validation form. Indicate the position held by the person signing the validation.

Conservation District Validation - Conservation District must print and sign and date the validation form. Indicate the position held by the person signing the validation.

Dirt, Gravel, and Low Volume Road Maintenance Program (DGLVRP)
Traffic Count Validation Form

TRAFFIC COUNT LOCATION

Road Name and #:_____ Road Owner:_____

County: _____ Township: _____

GPS Location (if available):_____W, _____N

If GPS location not available, describe count location here: _____

_____

(for example: Traffic count on Smith road, ½ mile north of intersection with SR180, Maple road.)

Traffic Counts can be validated by use of existing data, a level 1 two-hour count, or a level 2 twenty-four-hour counts. Select the method used below and complete that section of the form.

Select method used

☐ **Existing Data or Extrapolation:** For existing traffic data, or extrapolation of existing data, describe the data used and extrapolation method on the back of this page. If necessary, attach a description of the data and extrapolation methodology, source and date of traffic counts used, and maps.

☐ **LEVEL 1 TRAFFIC COUNT DETAILS** (2 hour count)

Count Performed From __/__/____, _____ to _____
Date *Time* *Time*

Describe Count Method: (hand/camera/counter/etc.)_____

Count Performed by: _____ of _____
(name) (organization)

Total Count = _____ vehicles x 12 = _____ ADT

☐ **LEVEL 2 TRAFFIC COUNT DETAILS** (24 hour (minimum) automatic count)

Count Length: **24hr** 48hr 72 hour other: _____

Count Performed From __/__/____, _____ to __/__/____, _____
Date *Time* *Date* *Time*

Counter Used: air tube other:_____ Counter Make/Model:_____

Count Performed by: _____ of _____
(name) (organization)

Total Count = _____ 24 hour count = _____ ADT

Applicant Validation: I hereby swear that this count is accurate as reported here and done in accordance with State Conservation Commission specifications.

_____,_____ _____, _____
print name *position* *signature* *date*

Conservation District Validation: The traffic count data supplied by the applicant is acceptable to the Conservation District in accordance with SCC and county policy.

_____,_____ _____, _____
print name *position* *signature* *date*

This form verifies eligibility of a sealed road for LVR funding as having a traffic count of 500 vehicles per day or less. It must be signed and retained in the project files.

Details for use of existing data or extrapolation from existing data:

Existing Data must have been collected within the previous 5 years and conform to the Program's Level 2 count protocol at a minimum. "Estimated" traffic counts that exist for many municipal roads cannot be used.

It is possible to use existing data for roads with 500 vehicles per day or less to extrapolate logically to subsidiary roads. For example, a spur road between two State Roads where both state roads have less than 500 vehicles per day must also have less than 500. This extrapolation of data can be used to verify that a road has 500 vehicles per day or less without performing a count. This extrapolation of traffic counts must prove the ADT on the road is 500 or less to the satisfaction of the Conservation District.

Describe existing data used and extrapolation methodology below. Attach additional material and maps if needed.

_____

_____

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Appendix G: DSA for Eligible Applicants Summary from Aggregate Handbook

Municipal Quick-Guide to Driving Surface Aggregate

The purpose of this document is to briefly outline the requirements and recommendations regarding placement of Driving Surface Aggregate (DSA) through the PA Dirt, Gravel, and Low Volume Road Maintenance Program (DGLVRP). Additional details can be found in the "DSA Handbook". Since the DGLVR Program emphasizes "local control", potential applicants should always check with their local Conservation District for county-specific policies regarding DSA and other aspects of the Program.

Pre-project Logistics *(Full Details in chapter 4 of DSA Handbook)*

- Notify Conservation District of intent to apply.
- Conduct pre-application site-visit with Conservation District.
- The DGLVR Program focuses on long-term road and environmental improvements. Projects are Required to focus on drainage, road base, and environmental issues prior to DSA placement. DSA is NOT required on every project.

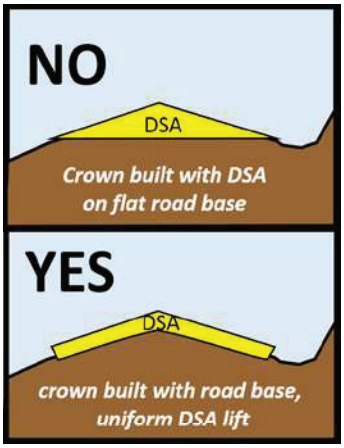
  Purchasing DSA:
  - Normal bidding procedures apply.
  - Prevailing Wage applies to DGLVR projects over $25,000. Required
  - Sample DSA "Request for Quote" in DSA handbook. Contact local Conservation District to determine any county specific requirements for DSA material or bidding procedures.
  - Notify Conservation District once DSA supplier is chosen. District and/or Program representative will test DSA to ensure it meets Program standards. Required

How much DSA should I order?

DSA Needed (tons) = Road Width (ft) x Road Length (ft) x (0.04 for 8" loose depth compacted to 6" / 0.03 for 6" loose depth compacted to 4½")

Road Preparation *(Full Details in chapter 5 of DSA Handbook)*

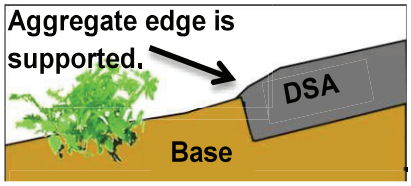
- Make provisions for road closure if possible (during placement and drying), and notify any residents.
- Drainage and base improvements must be done before DSA placement. Required
- Establish proper crown or cross-slope (½ to ¾ inch per horizontal foot (4% - 6% slope)) in the road base if necessary by grading. Required
- Scarify existing road if surface has adequate crown but is extremely tight.
- Cut 3"- 4" key along edge of DSA placement site to support the edge of aggregate when possible.
- Cut a "paving notch" across the road at ends of planned DSA placement to butt edge of DSA into existing road instead of trailing it off. Required
- Placement of DSA directly on separation fabric is not recommended. If fabric is used, consider placing a few inches of other aggregate before placing DSA.



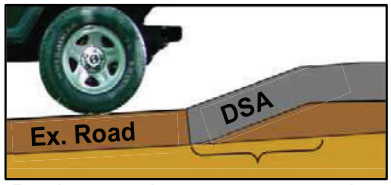
Reflect cross-slope in road base.

DSA Placement *(Full Details in chapter 6 of DSA Handbook)*

- Aggregate must be delivered at optimum moisture in tarped trucks. Required
- DSA Certification must accompany the first truck of aggregate to the jobsite. Required
- DSA should be allowed to dry or "cure" before being exposed to traffic, otherwise deformations or rutting may occur.
- If freezing temperatures or precipitation are forecast that may cause the material to freeze, or prevent the material from drying out, placement shall be postponed at the discretion of the road owner, Conservation District, or aggregate supplier. Required
- **Paver placement recommended on all jobs, and** Required **on jobs over 1,000 tons.**



Key cut lengthwise along road to support edge.



Paving notch cut across road to transition DSA to existing road.

Paver Considerations:

- Track pavers are recommended, especially on steeper slopes.
- Paver should be capable of placing entire road width in one pass. Avoid multiple lane placements if possible.
- Paver must be able to match crown or cross-slope previously established in road base (½ to ¾ inch per horizontal foot (4% - 6% slope)). Required
- Place DSA in one uniform lift. Required

Tailgating Considerations:

- Tailgate material in as uniform of a lift as possible, avoiding large piles.
- Handle the material as little as possible with grader in attempting to establish road shape. Overworking DSA will cause it to segregate by size and it will not perform as desired.

Paver placement of DSA.

DSA Compaction *(Full Details in chapter 6 of DSA Handbook)*

- Maximum compaction requires optimum moisture Required. Insure compaction occurs before aggregate dries out. If excess material sticks to the roller drum, it may be too wet and some drying time may be required before continuing compaction.
- A minimum 10-ton vibratory roller is required for DSA compaction.

  Compaction Sequence:
  - Initial passes should be done in static (non-vibratory) mode.
  - Subsequent passes should be done in vibratory mode.
  - Do not use vibratory mode when going down steep sections of road or if it brings excessive water and fines to the surface.
  - Overlap passes from the road edge towards the crown.
  - Compact the crown from both sides, but do not "straddle" the crown with the roller.
  - Compaction testing using a density gauge is recommended, and the cost of testing can be incorporated into the DGLVRP grant.

DSA Maintenance *(Full Details in chapter 7 of DSA Handbook)*

- **Grading**: DSA behaves differently than other materials and requires special considerations:
  - DSA requires adequate moisture to avoid segregation and insure proper compaction.
    - Grading **MUST** be done when adequate moisture is in the road.
    - Water should be added during grading if the road is too dry.
    - Compaction after grading is critical to ensure DSA functions as designed.
  - Carbide-tipped grader blades are highly encouraged for grading DSA
    - It provides extra cutting force to cut deeper into the tightly compacted surface.
    - It reduces aggregate segregation by size.
  - DSA should not be graded "on a schedule" if it is not necessary. The decision to grade DSA should be based on the condition of the road.
  - See "DSA Handbook" for grading sequence and additional information.
- **Winter Maintenance:**
  - **Plowing**:
    - Use shoes or a rubber blade when possible to avoid gouging the DSA surface.
    - Consider leaving a "skiff" of snow on less traveled roads.
    - Be sure to take crown or cross-slope into account while plowing. Avoid plowing straight down the middle of a crowned road.
  - **Salts**: The use of chloride-based ice melt products is not recommended on DSA or other aggregate roads if it can be avoided, as they will retain moisture, worsen freeze/thaw issues, and extend the "mud season".

Appendix H: FEMA Rates
(August 15, 2019)

FEMA's SCHEDULE OF EQUIPMENT RATES

DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY
RECOVERY DIRECTORATE
PUBLIC ASSISTANCE DIVISION
WASHINGTON, DC 20472

-

The rates on this Schedule of Equipment Rates are for applicant owned equipment in good mechanical condition, complete with all required attachments. Each rate covers all costs eligible under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. § 5121, et seq., for ownership and operation of equipment, including depreciation, overhead, all maintenance, field repairs, fuel, lubricants, tires, OSHA equipment and other costs incidental to operation. Standby equipment costs are not eligible.

Equipment must be in actual operation performing eligible work in order for reimbursement to be eligible. LABOR COSTS OF OPERATOR ARE NOT INCLUDED in the rates and should be approved separately from equipment costs.

Information regarding the use of the Schedule is contained in 44 CFR § 206.228 Allowable Costs. Rates for equipment not listed will be furnished by FEMA upon request. Any appeals shall be in accordance with 44 CFR § 206.206 Appeals.

THESE RATES ARE APPLICABLE TO MAJOR DISASTERS AND EMERGENCIES DECLARED BY THE PRESIDENT ON OR AFTER August 15, 2019.

FEMA Code ID		Equipment Description					
Cost Code	Equipment	Specifications	Capacity or Size	HP	Notes	Unit	2019 Updated Rate
8010	Air Compressor	Air Delivery	41 CFM	to 10	Hoses included.	hour	$ 1.62
8011	Air Compressor	Air Delivery	103 CFM	to 30	Hoses included.	hour	$ 9.86
8012	Air Compressor	Air Delivery	130 CFM	to 50	Hoses included.	hour	$ 12.49
8013	Air Compressor	Air Delivery	175 CFM	to 90	Hoses included.	hour	$ 20.98
8014	Air Compressor	Air Delivery	400 CFM	to 145	Hoses included.	hour	$ 32.13
8015	Air Compressor	Air Delivery	575 CFM	to 230	Hoses included.	hour	$ 57.05
8016	Air Compressor	Air Delivery	1100 CFM	to 355	Hoses included.	hour	$ 95.60
8017	Air Compressor	Air Delivery	1600 CFM	to 500	Hoses included.	hour	$ 98.55
8040	Ambulance			to 150		hour	$ 28.09
8041	Ambulance			to 210		hour	$ 41.18
8050	Board, Arrow			to 8	Trailer Mounted.	hour	$ 4.53
8051	Board, Message			to 5	Trailer Mounted.	hour	$ 11.60
8060	Auger, Portable	Hole Diameter	16 In	to 6		hour	$ 2.34
8061	Auger, Portable	Hole Diameter	18 In	to 13		hour	$ 4.65
8062	Auger, Tractor Mntd	Max. Auger Diameter	36 In	to 13	Includes digger, boom and mounting hardware.	hour	$ 3.25
8063	Auger, Truck Mntd	Max. Auger Size	24 In	to 100	Includes digger, boom and mounting hardware. Add this rate to tractor rate for total auger and tractor rate.	hour	$ 34.93
8064	Hydraulic Post Driver					hour	$ 35.27
8065	Auger	Horizontal Directional Boring Machine	250 X 100	300	DD-140B YR-2003	hour	$ 172.29
8066	Auger	Horizontal Directional Boring Machine	50 X 100	24	Average to 7,000 lbs	hour	$ 33.83
8067	Auger, Directional Boring Machine	Auger, Directional Boring Machine	7,000 - 10,000 lbs	45	JT920L (2013)	hour	$ 41.04
8068	Bush Hog	Bush Hog - Model 326	Single Spindle Rotary Cutters			hour	$ 20.61
8068-1	Bush Hog	Bush Hog - Model 3210	Lift, Pull, Semi-Mount & Offset Model			hour	$ 28.74
8068-2	Bush Hog	Bush Hog - Model 2815	Flex Wing Rotary Cutters			hour	$ 43.17
8070	Automobile			to 130	Transporting people.	mile	$ 0.545
8071	Automobile			to 130	Transporting cargo.	hour	$ 12.43
8072	Automobile, Police			to 250	Patrolling.	mile	$ 0.545
8073	Automobile, Police			to 250	Stationary with engine running.	hour	$ 16.05
8075	Motorcycle, Police					mile	$ 0.505
8076	Automibile - Chevy Trailblazer	6 or 8 cl		285 to 300		hour	$ 23.99
8077	Automobile - Ford Expedition	Fire Command Center	EcoBoost V-6	360	2015 Model	hour	$ 19.62
8078	MRAP Armored Rescue Vehicle	Search and Rescue	Military Suplus Vehicle	375-450	Qualified foe operational rate on	Hr.	$ 51.80
8079	MRAP C-MTV	Multi-Theater (Military Surplus)Vehicle	gvwr 55000 Lbs	to 350	Qualified foe operational rate on	Hr.	$ 48.35

8080	All Terrain Vehicle (ATV)	Engine 110cc, 4-Wheel; 20" tyre		6.5-7.5		hour	$ 8.23
8081	All Terrain Vehicle (ATV)	Engine 125cc, 4-Wheel; 21" tyre		7.6-8.6		hour	$ 8.67
8082	All Terrain Vehicle (ATV)	Engine 150cc, 4-Wheel; 22" tyre		9.0-10.0		hour	$ 8.68
8083	All Terrain Vehicle (ATV)	Engine 200cc, 4-Wheel; 24" tyre		12-14.0		hour	$ 9.23
8084	All Terrain Vehicle (ATV)	Engine 250cc, 4-Wheel; 24" tyre		15-17		hour	$ 9.81
8085	All Terrain Vehicle (ATV)	Engine 300cc, 4-Wheel; 24" tyre		18-20		hour	$ 10.66
8086	All Terrain Vehicle (ATV)	Engine 400cc. 4-Wheel; 25" tyre		26-28		hour	$ 12.20
8087	All Terrain Vehicle (ATV)	Engine 450cc, 4-Wheel; 25" tyre		26-28		hour	$ 13.07
8088	All Terrain Vehicle (ATV)	Engine 650cc, 4-Wheel; 25" tyre		38-40		hour	$ 13.86
8089	All Terrain Vehicle (ATV)	Engine 750cc, 4-Wheel; 25" tyre		44-46		hour	$ 14.79
8110	Barge, Deck	Size	50'x35'x7.25'	0	Push by Tug-Boat	hour	$ 52.00
8111	Barge, Deck	Size	50'x35'x9'	0	Push by Tug-Boat	hour	$ 61.96
8112	Barge, Deck	Size	120'x45'x10'	0	Push by Tug-Boat	hour	$ 109.97
8113	Barge, Deck	Size	160'x45'x11''	0	Push by Tug-Boat	hour	$ 136.90
8120	Boat, Tow	Size	55'x20'x5'	to 870	Steel.	hour	$ 352.71
8121	Boat, Tow	Size	60'x21'x5'	to 1050	Steel.	hour	$ 400.32
8122	Boat, Tow	Size	70'x30'x7.5'	to 1350	Steel.	hour	$ 624.56
8123	Boat, Tow	Size	120'x34'x8'	to 2000	Steel.	hour	$ 1,181.86
8124	Airboat	815AGIS Airboat w/spray unit	15'x8'	400		hour	$ 32.70
8125	Airboat	815AGIS Airboat w/spray unit	15'x8'	425		hour	$ 33.06
8126	Swamp Buggy	Conquest		360		hour	$ 41.35
8130	Boat, Row			0	Heavy duty.	hour	$ 1.46
8131	Boat, Runabout	Size	13'x5'	to 50	Outboard.	hour	$ 12.55
8132	Boat, Tender	Size	14'x7'	to 100	Inboard with 360 degree drive.	hour	$ 16.58
8133	Boat, Push	Size	45'x21'x6'	to 435	Flat hull.	hour	$ 235.03
8134	Boat, Push	Size	54'x21'x6'	to 525	Flat hull.	hour	$ 290.74
8135	Boat, Push	Size	58'x24'x7.5'	to 705	Flat hull.	hour	$ 355.70
8136	Boat, Push	Size	64'x25'x8'	to 870	Flat hull.	hour	$ 359.36
8140	Boat, Tug	Length	16 Ft	to 100		hour	$ 47.35
8141	Boat, Tug	Length	18 Ft	to 175		hour	$ 70.55
8142	Boat, Tug	Length	26 Ft	to 250		hour	$ 90.10
8143	Boat, Tug	Length	40 Ft	to 380		hour	$ 215.09
8144	Boat, Tug	Length	51 Ft	to 700		hour	$ 302.01
8145	Jet Ski	3-seater				hour	$ 27.70
8146	Jet Ski					hour	$ 8.60
8147	Boat, Inflatable Rescue Raft	Zodiac		0		hour	$ 1.13
8148	Boat, Runabout	1544 lbs	11 passenger capacity	190-250		hour	$ 65.51
8149	Boat, removable engine	2000 Johnson Outboard Motor w 15" shaft		15		hour	$ 1.58
8151	Broom, Pavement	Broom Length	96 In	to 100		hour	$ 30.41
8153	Broom, Pavement, Mntd	Broom Length	72 In	to 18	Add Prime Mover cost for total rate	hour	$ 6.24
8154	Broom, Pavement, Pull	Broom Length	84 In	to 20	Add Prime Mover cost for total rate	hour	$ 23.75
8155	Broom, Pavement	Broom Length	72 In	to 35		hour	$ 25.28
8157	Sweeper, Pavement			to 110		hour	$ 78.79
8158	Sweeper, Pavement			to 230		hour	$ 102.03
8180	Bus			to 150		hour	$ 21.60
8181	Bus			to 210		hour	$ 25.82
8182	Bus			to 300		hour	$ 39.65
8183	Blower	Gasoline powered Toro Pro Force		27		hour	$ 15.40
8183x	Mosquito Sprayer	2015 Adapco Guardian 95 ES	15-gal; 350 lbs			hour	$ 18.83
8184	Back-Pack Blower			to 4.4		hour	$ 1.53
8185	Walk-Behind Blower			13		hour	$ 6.83
8187	Chainsaw	Bar Length = 20 in	3.0 cu in	2.7		hour	$ 1.91
8188	Chainsaw	Bar Length = 20 in	5.0 cu in			hour	$ 2.59
8189	Chainsaw	Bar Length = 20 in	6.0 cu in	3.4		hour	$ 2.77

8190	Chain Saw	Bar Length = 16 in	2.5 cu in	2.4		hour	$ 1.80
8191	Chain Saw (STIHL)	Bar Length = 25 in	7.5 cu in	3.62		hour	$ 3.73
8192	Chain Saw, Pole	Bar Length = 18 in	4.0 cu in	3.2		hour	$ 2.10
8193	Skidder	model 748 E		to 173		hour	$ 56.25
8194	Skidder	model 648 G11		to 177		hour	$ 105.44
8195	Cutter, Brush	Cutter Size	8 ft	to 150		hour	$ 119.52
8196	Cutter, Brush	Cutter Size	8 ft	to 190		hour	$ 134.74
8197	Cutter, Brush	Cutter Size	10 ft	to 245		hour	$ 142.31
8198	Bruncher Cutter	Cutter, Brush - 247 hp, 1997 Model 511 Feller		to 247		hour	$ 193.95
8199	Log Trailer	40 ft		0		hour	$ 10.15
8200	Chipper, Brush	Chipping Capacity	6 In	to 35	Trailer Mounted.	hour	$ 8.97
8201	Chipper, Brush	Chipping Capacity	9 In	to 65	Trailer Mounted.	hour	$ 17.06
8202	Chipper, Brush	Chipping Capacity	12 In	to 100	Trailer Mounted.	hour	$ 24.89
8203	Chipper, Brush	Chipping Capacity	15 In	to 125	Trailer Mounted.	hour	$ 35.75
8204	Chipper, Brush	Chipping Capacity	18 In	to 200	Trailer Mounted.	hour	$ 50.41
8208	Loader - Tractor - Knuckleboom	model Barko 595 ML		to 173		hour	$ 169.74
8209	Loader - Wheel	model 210 w/ Buck Saw 50 inch Bar		to 240		hour	$ 98.48
8210	Clamshell & Dragline, Crawler		149,999 lbs	to 235	Bucket not included in rate.	hour	$ 134.68
8211	Clamshell & Dragline, Crawler		250,000 lbs	to 520	Bucket not included in rate.	hour	$ 178.82
8212	Clamshell & Dragline, Truck			to 240	Bucket not included in rate.	hour	$ 147.05
8218	BOMAG Compactor	BW100AD-3		33		Hour	$ 24.80
8219	Compactor -2-Ton Pavement Roller	Single Drum Vibratoty Compactor	to 2.9 Ton	28		hour	$ 28.72
8220	Compactor			to 10		hour	$ 15.92
8221	Compactor, towed, Vibratory Drum			to 45	Plus tow Truck	hour	$ 33.56
8222	Compactor, Vibratory, Drum			to 75		hour	$ 24.09
8223	Compactor, pneumatic, wheel			to 100		hour	$ 26.90
8225	Compactor, Sanitation			to 300		hour	$ 96.11
8226	Compactor, Sanitation			to 400		hour	$ 154.63
8227	Compactor, Sanitation			535		hour	$ 264.25
8228	Compactor, towed, Pneumatic, Wheel	Hercules PT-11,	10,000 lbs		11-Wheels (Towed)	hour	$ 18.48
8229	Compactor,Towed Steel Drum Static Compactor	GTD-54120	20,000 lbs		Grid Drum (Towed)	hour	$ 16.22
8240	Feeder, Grizzly			to 35		hour	$ 25.47
8241	Feeder, Grizzly			to 55		hour	$ 33.55
8242	Feeder, Grizzly			to 75		hour	$ 65.18
8250	Dozer, Crawler	Deere 450J LT		to 75		hour	$ 54.20
8251	Dozer, Crawler	Deere 650K LGP; ROPS/FOPS		to 105		hour	$ 65.14
8252	Dozer, Crawler			to 160		hour	$ 98.77
8253	Dozer, Crawler			to 250		hour	$ 153.35
8254	Dozer, Crawler			to 360		hour	$ 218.47
8255	Dozer, Crawler	Make/Model: CAT D10T (disc. 2014); Protection: EROPS; Type Semi-U		to 574		hour	$ 317.49
8256	Dozer, Crawler			to 850		hour	$ 358.48
8260	Dozer, Wheel			to 300		hour	$ 66.26
8261	Dozer, Wheel			to 400		hour	$ 101.22
8262	Dozer, Wheel			to 500		hour	$ 184.08
8263	Dozer, Wheel			to 625		hour	$ 239.31
8269	Box Scraper	3 hitch attach for tractor; 2007 Befco		0		hour	$ 3.65
8270	Bucket, Clamshell	Capacity	1.0 CY	0	Includes teeth. Does not include Clamshell & Dragline	hour	$ 4.64
8271	Bucket, Clamshell	Capacity	2.5 CY	0	Includes teeth. Does not include Clamshell & Dragline	hour	$ 8.81
8272	Bucket, Clamshell	Capacity	5.0 CY	0	Includes teeth. Does not include Clamshell & Dragline	hour	$ 13.19
8273	Bucket, Clamshell	Capacity	7.5 CY	0	Includes teeth. Does not include Clamshell & Dragline	hour	$ 23.31
8275	Bucket, Dragline	Capacity	2.0 CY	0	Does not include Clamshell & Dragline	hour	$ 3.98
8276	Bucket, Dragline	Capacity	5.0 CY	0	Does not include Clamshell & Dragline	hour	$ 9.93

8277	Bucket, Dragline	Capacity	10 CY	0	Does not include Clamshell & Dragline	hour	$ 14.19
8278	Bucket, Dragline	Capacity	14 CY	0	Does not include Clamshell & Dragline	hour	$ 18.72
8280	Excavator, Hydraulic	Bucket Capacity	0.5 CY	to 45	Crawler, Truck & Wheel. Includes bucket.	hour	$ 18.97
8281	Excavator, Hydraulic	Bucket Capacity	1.0 CY	to 90	Crawler, Truck & Wheel. Includes bucket.	hour	$ 36.06
8282	Excavator, Hydraulic	Bucket Capacity	1.5 CY	to 160	Crawler, Truck & Wheel. Includes bucket.	hour	$ 55.30
8283	Excavator, Hydraulic	Bucket Capacity	2.5 CY	to 265	Crawler, Truck & Wheel. Includes bucket.	hour	$ 158.86
8284	Excavator, Hydraulic	Bucket Capacity	4.5 CY	to 420	Crawler, Truck & Wheel. Includes bucket.	hour	$ 264.64
8285	Excavator, Hydraulic	Bucket Capacity	7.5 CY	to 650	Crawler, Truck & Wheel. Includes bucket.	hour	$ 304.91
8286	Excavator, Hydraulic	Bucket Capacity	12 CY	to 1000	Crawler, Truck & Wheel. Includes bucket.	hour	$ 466.41
8287	Excavator	2007 model Gradall XL3100 III		184		hour	$ 102.62
8288	Excavator	2003 model Gradall XL4100 III		238		hour	$ 117.66
8289	Excavator	2006 model Gradall XL5100		230		hour	$ 109.03
8290	Trowel, Concrete	Diameter	48 In	to 12		hour	$ 4.94
8300	Fork Lift	Capacity	6000 Lbs	to 60		hour	$ 14.73
8301	Fork Lift	Capacity	12000 Lbs	to 90		hour	$ 21.12
8302	Fork Lift	Capacity	18000 Lbs	to 140		hour	$ 28.79
8303	Fork Lift	Capacity	50000 Lbs	to 215		hour	$ 63.25
8306	Fork Lift Material handler	Diesel, CAT TH360B	6600-11500 gvwr lbs	94.9	3.1- 3.5 Mton	hour	$ 44.62
8307	Fork Lift Material handler	Diesel, CAT TH460B	9000 Lbs	94.9	4.5 - 4.9 Mton	hour	$ 51.93
8308	Fork Lift Material handler	Diesel, CAT TH560B	10000 Lbs	117.5	4.5 - 4.9 Mton	hour	$ 56.14
8309	Fork Lift Accessory	2003 ACS Paddle Fork		0		hour	$ 3.53
8310	Generator	Prime Output	5.5 KW	to 10		hour	$ 5.36
8311	Generator	Prime Output	16 KW	to 25		hour	$ 7.81
8312	Generator	Prime Output	60KW	to 88		hour	$ 25.56
8313	Generator	Prime Output	100 KW	to 125		hour	$ 43.60
8314	Generator	Prime Output	150 KW	to 240		hour	$ 62.83
8315	Generator	Prime Output	210 KW	to 300		hour	$ 85.70
8316	Generator	Prime Output	280 KW	to 400		hour	$ 103.34
8317	Generator	Prime Output	350 KW	to 500		hour	$ 114.23
8318	Generator	Prime Output	530 KW	to 750		hour	$ 202.00
8319	Generator	Prime Output	710 KW	to 1000		hour	$ 225.34
8327	Generator	Prime Output	800 KW	1065		hour	$ 232.46
8328	Generator	Prime Output	900 KW	1355		hour	$ 295.15
8329	Generator	Prime Output	1000 KW	1000	Open	hour	$ 356.94
8320	Generator	Prime Output	1100 KW	1645	Open	hour	$ 393.43
8321	Generator	Prime Output	2500 KW	to 3000		hour	$ 553.78
8322	Generator	Prime Output	1,000 KW	to 1645	Enclosed	hour	$ 450.78
8323	Generator	Prime Output	1,500 KW	to 2500	Enclosed	hour	$ 583.01
8324	Generator	Prime Output	1100KW	2500	Enclosed	hour	$ 567.48
8325	Generator	Prime Output	40KW	63	Open	hour	$ 23.16
8326	Generator	Prime Output	20KW	35	Open/Closeed	hour	$ 18.05
8327	Generator Large	Prime Output	80 KW	120		Hr.	$ 31.65
8328	Generator Heavy Duty	Prime Output	2000KW		Open	Hr.	$ 490.00
8330	Graders	Moldboard Size	10 Ft	to 110	Includes Rigid and Articulate equipment.	hour	$ 43.98
8331	Graders	Moldboard Size	12 Ft	to 150	Includes Rigid and Articulate equipment.	hour	$ 63.63
8332	Graders	Moldboard Size	14 Ft	to 225	Includes Rigid and Articulate equipment.	hour	$ 80.43
8350	Hose, Discharge	Diameter	3 In	0	Per 25 foot length. Includes couplings.	hour	$ 0.16
8351	Hose, Discharge	Diameter	4 In	0	Per 25 foot length. Includes couplings.	hour	$ 0.24
8352	Hose, Discharge	Diameter	6 In	0	Per 25 foot length. Includes couplings.	hour	$ 0.62
8353	Hose, Discharge	Diameter	8 In	0	Per 25 foot length. Includes couplings.	hour	$ 0.62

8354	Hose, Discharge	Diameter	12 In	0	Per 25 foot length. Includes couplings.	hour	$ 0.92
8355	Hose, Discharge	Diameter	16 In	0	Per 25 foot length. Includes couplings.	hour	$ 1.71
8356	Hose, Suction	Diameter	3 In	0	Per 25 foot length. Includes couplings.	hour	$ 0.31
8357	Hose, Suction	Diameter	4 In	0	Per 25 foot length. Includes couplings.	hour	$ 0.37
8358	Hose, Suction	Diameter	6 In	0	Per 25 foot length. Includes couplings.	hour	$ 1.17
8359	Hose, Suction	Diameter	8 In	0	Per 25 foot length. Includes couplings.	hour	$ 1.11
8360	Hose, Suction	Diameter	12 In	0	Per 25 foot length. Includes couplings.	hour	$ 1.73
8361	Hose, Suction	Diameter	16 In	0	Per 25 foot length. Includes couplings.	hour	$ 3.29
8380	Loader, Crawler	Bucket Capacity	0.5 CY	to 32	Includes bucket.	hour	$ 19.59
8381	Loader, Crawler	Bucket Capacity	1 CY	to 60	Includes bucket.	hour	$ 36.87
8382	Loader, Crawler	Bucket Capacity	2 CY	to 118	Includes bucket.	hour	$ 69.24
8383	Loader, Crawler	Bucket Capacity	3 CY	to 178	Includes bucket.	hour	$ 103.22
8384	Loader, Crawler	Bucket Capacity	4 CY	to 238	Includes bucket.	hour	$ 123.73
8390	Loader, Wheel	Bucket Capacity	0.5 CY	to 38		hour	$ 20.80
8391	Loader, Wheel	Bucket Capacity	1 CY	to 60		hour	$ 41.33
8392	Loader, Wheel	Bucket Capacity	2 CY	to 105	CAT-926	hour	$ 38.10
8393	Loader, Wheel	Bucket Capacity	3 CY	to 152		hour	$ 46.17
8394	Loader, Wheel	Bucket Capacity	4 CY	232		hour	$ 76.27
8395	Loader, Wheel	Bucket Capacity	5 CY	255		hour	$ 79.50
8396	Loader, Wheel	Bucket Capacity	6 CY	to 305		hour	$ 116.12
8397	Loader, Wheel	Bucket Capacity	7 CY	to 360		hour	$ 129.40
8398	Loader, Wheel	Bucket Capacity	8 CY	to 530		hour	$ 188.87
8401	Loader, Tractor, Wheel	Bucket Capacity	0.87 CY	to 80	Case 580 Super L	hour	$ 37.13
8410	Mixer, Concrete Portable	Batching Capacity	10 Cft	8	Diesel Powered	hour	$ 3.13
8411	Mixer, Concrete Portable	Batching Capacity	12 Cft	11	Gasoline Powered	hour	$ 4.31
8412	Mixer, Concrete, Trailer Mntd	Batching Capacity	11 Cft	to 10		hour	$ 15.32
8413	Mixer, Concrete, Trailer Mntd	Batching Capacity	16 Cft	to 25		hour	$ 20.47
8414	Truck, Concrete Mixer	Mixer Capacity	13 CY	to 300		hour	$ 84.71
8419	Hand-Held, Pavement Breakers	Weight	25~90 Lbs	0	Air Tool/Electric Power	hour	$ 1.12
8420	Self-Propelled Pavement Breaker,			to 70-80	Self-Propelled (Diesel)	hour	$ 59.54
8421	Vibrator, Concrete	Hand Held		to 4		hour	$ 1.63
8423	Spreader, Chip	Spread Hopper Width	12.5 Ft	to 152		hour	$ 90.67
8424	Spreader, Chip	Spread Hopper Width	16.5 Ft	to 215		hour	$ 125.19
8425	Spreader, Chip, Mntd	Hopper Size	8 Ft	to 8	Trailer & truck mounted.	hour	$ 4.77
8430	Paver, Asphalt, Towed			0	Does not include Prime Mover.	hour	$ 12.67
8431	Paver, Asphalt	Crawler		to 50	Includes wheel and crawler equipment.	hour	$ 76.41
8432	Paver, Asphalt	Crawler		to 125	Includes wheel and crawler equipment.	hour	$ 96.52
8433	Paver, Asphalt	Crawler		to 175	Includes wheel and crawler equipment.	hour	$ 144.69
8434	Paver, Asphalt		35,000Lbs & Over	to 250	Includes wheel and crawler equipment.	hour	$ 224.01
8436	Pick-up, Asphalt			to 110		hour	$ 98.06
8437	Pick-up, Asphalt	Cederapids	CR MS-2	113 to 140	Asphalt-Pick-up Machine	hour	$ 140.59
8438	Pick-up, Asphalt	Blaw-Knox	MC-330	184 to 200	Asphalt-Pick-up Machine	hour	$ 189.75
8439	Pick-up, Asphalt		MTV 1000C	to 275	Asphalt-Pick-up Machine	hour	$ 214.03
8440	Striper	Paint Capacity	40 Gal	to 22		hour	$ 16.92
8441	Striper	Paint Capacity	90 Gal	to 60		hour	$ 24.24
8442	Striper	Paint Capacity	120 Gal	to 122		hour	$ 45.28
8445	Striper, Truck Mntd	Paint Capacity	120 Gal	to 460		hour	$ 83.35
8446	Striper, Walk-behind	Paint Capacity	12 Gal	5		hour	$ 4.23
8447	Paver accessory -Belt Extension	2002 Leeboy Conveyor Belt Extension	24' X 50'	0	crawler	hour	$ 33.48
8450	Plow, Snow, Grader Mntd	Width	to 10 Ft	0	Include Grader for total cost	hour	$ 28.28
8451	Plow, Snow, Grader Mntd	Width	to 14 Ft	0	Include Grader for total cost	hour	$ 33.21

8452	Plow, Truck Mntd	Width	to 15 Ft	0	Include truck for total cost	hour	$ 25.23
8453	Plow, Truck Mntd	Width	to 15 Ft	0	With leveling wing. Include truck for total cost	hour	$ 41.04
8455	Spreader, Sand	Mounting	Tailgate, Chassis	0	Truck not included	hour	$ 8.24
8456	Spreader, Sand	Mounting	Dump Body	0	Truck not included	hour	$ 10.55
8457	Spreader, Sand	Mounting	Truck (10yd)	0	Truck not included	hour	$ 13.41
8458	Spreader, Chemical	Capacity	5 CY	to 4	Trailer & truck mounted.	hour	$ 6.30
8469	Pump - Trash Pump	10 MTC	2" Pump	to 7	10,000 gph	hour	$ 7.87
8470	Pump	Centrifugal, 8M pump	2" - 10,000 gal/hr.	to 4.5	Hoses not included.	hour	$ 6.31
8471	Pump	Diaphragm pump	2" - 3,000 gal/hr.	to 6	Hoses not included.	hour	$ 6.98
8472	Pump	Centrifugal, 18M pump	3" - 18,000 gal/hr. pump	to 10	Hoses not included.	hour	$ 8.05
8473	Pump			to 15	Hoses not included.	hour	$ 12.08
8474	Pump			to 25	Hoses not included.	hour	$ 13.77
8475	Pump			to 40	Hoses not included.	hour	$ 16.98
8476	Pump	4" - 40,000 gal/hr.	4" - 40,000 gal/hr.	to 60	Hoses not included.	hour	$ 27.45
8477	Pump			to 95	Hoses not included.	hour	$ 32.77
8478	Pump			to 140	Hoses not included.	hour	$ 41.84
8479	Pump			to 200	Hoses not included.	hour	$ 50.79
8480	Pump			to 275	Does not include Hoses.	hour	$ 68.33
8481	Pump			to 350	Does not include Hoses.	hour	$ 81.66
8482	Pump			to 425	Does not include Hoses.	hour	$ 99.01
8483	Pump			to 500	Does not include Hoses.	hour	$ 117.21
8484	Pump			to 575	Does not include Hoses.	hour	$ 136.53
8485	Pump			to 650	Does not include Hoses.	hour	$ 154.88
8486	Aerial Lift, Truck Mntd	Max. Platform Height	40 Ft		Add this rate to truck rate for total lift and truck rate	hour	$ 11.63
8487	Aerial Lift, Truck Mntd	Max. Platform Height	61 Ft		Add this rate to truck rate for total lift and truck rate	hour	$ 21.99
8488	Aerial Lift, Truck Mntd	Max. Platform Height	80 Ft		Add this rate to truck rate for total lift and truck rate	hour	$ 39.80
8489	Aerial Lift, Truck Mntd	Max. Platform Load - 600Lbs	81 Ft -100 Ft. Ht.		Articulated and Telescoping. Add this rate to truck rate for total lift and truck rate	hour	$ 42.16
8490	Aerial Lift, Self-Propelled	Max. Platform Height	37 Ft. Ht.	to 15	Articulated, Telescoping, Scissor.	hour	$ 9.02
8491	Aerial Lift, Self-Propelled	Max. Platform Height	60 Ft. Ht.	to 30	Articulated, Telescoping, Scissor.	hour	$ 17.39
8492	Aerial Lift, Self-Propelled	Max. Platform Height	70 Ft. Ht.	to 50	Articulated, Telescoping, Scissor.	hour	$ 31.57
8493	Aerial Lift, Self-Propelled	Max. Platform Height	125 Ft. Ht.	to 85	Articulated and Telescoping.	hour	$ 56.70
8494	Aerial Lift, Self-Propelled	Max. Platform Height	150 Ft. Ht.	to 130	Articulated and Telescoping.	hour	$ 73.90
8495	I.C. Aerial Lift, Self-Propelled	Max. Platform Load - 500 Lbs	75"x155", 40Ft Ht.	to 80	2000 Lbs Capacity	hour	$ 29.71
8496	Crane, Truck Mntd	Max. Lift Capacity	24000 Lbs	0	Include truck rate for total cost	hour	$ 16.54
8497	Crane, Truck Mntd	Max. Lift Capacity	36000 Lbs	0	Include truck rate for total cost	hour	$ 23.17
8498	Crane, Truck Mntd	Max. Lift Capacity	60000 Lbs	0	Include truck rate for total cost	hour	$ 37.46
8499	Pump - Trash-Pump	CPB Rating - 10MTC	10000 gal/Hr	7	Self- Priming Trash Pump	hour	$ 7.76
8500	Crane	Max. Lift Capacity	8 MT	to 80		hour	$ 40.75
8501	Crane	Max. Lift Capacity	15 MT	to 150		hour	$ 67.83
8502	Crane	Max. Lift Capacity	50 MT	to 200		hour	$ 93.95
8503	Crane	Max. Lift Capacity	70 MT	to 300		hour	$ 180.23
8504	Crane	Max. Lift Capacity	110 MT	to 350		hour	$ 258.23
8510	Saw, Concrete	Blade Diameter	14 In	to 14		hour	$ 7.62
8511	Saw, Concrete	Blade Diameter	26 In	to 35		hour	$ 12.47
8512	Saw, Concrete	Blade Diameter	48 In	to 65		hour	$ 26.81
8513	Saw, Rock	Blade Diameter		to 100		hour	$ 35.13
8514	Saw, Rock	Blade Diameter		to 200		hour	$ 68.85
8517	Jackhammer (Dry)	Weight Class	25-45 Lbs	0	Pneumatic Powered	hour	$ 1.77
8518	Jackhammer (Wet)	Weight Class	30-55 Lbs	0	Pneumatic Powered	hour	$ 2.02
8521	Scraper	Scraper Capacity	15 CY	to 262		hour	$ 133.80
8522	Scraper	Scraper Capacity	22 CY	to 365		hour	$ 174.30
8523	Scraper	Scraper Capacity	34 CY	to 500		hour	$ 322.77

8524	Scraper	Scraper Capacity	44 CY	to 604		hour	$ 354.84
8540	Loader, Skid-Steer	Operating Capacity	976 - 1250 Lbs	to 36		hour	$ 26.83
8541	Loader, Skid-Steer	Operating Capacity	1751 - 2200 Lbs	to 66		hour	$ 35.47
8542	Loader, Skid-Steer	Operating Capacity	2901 to 3300 Lbs	to 81		hour	$ 38.72
8550	Snow Blower, Truck Mntd	Capacity	600 Tph	to 75	Does not include truck	hour	$ 35.39
8551	Snow Blower, Truck Mntd	Capacity	1400 Tph	to 200	Does not include truck	hour	$ 94.72
8552	Snow Blower, Truck Mntd	Capacity	2000 Tph	to 340	Does not include truck	hour	$ 143.88
8553	Snow Blower, Truck Mntd	Capacity	2500 Tph	to 400	Does not include truck	hour	$ 156.93
8558	Snow Thrower, Walk Behind	Cutting Width	25 in	to 5		hour	$ 2.97
8559	Snow Thrower, Walk Behind	Cutting Width	60 in	to 15		hour	$ 14.47
8560	Snow Blower	Capacity	2,000 Tph	to 400		hour	$ 234.49
8561	Snow Blower	Capacity	2,500 Tph	to 500		hour	$ 256.20
8562	Snow Blower	Capacity	3,500 Tph	to 600		hour	$ 285.56
8563	The Vammas 4500	Snow Remover	26ft Plow, 20ft Broom + Airblast	428	Equip with Plow & Broom	hour	$ 260.00
8564	The Vammas 5500	RM300	96"W x 20"D	350	Soil Stabilization, Reclaimer	hour	$ 212.00
8565	Oshkosh Pavement Sweeper	H-Series		420	Equip with Broom	hour	$ 229.00
8569	Dust Control De-Ice Unit	1300-2000 gal	173"Lx98"Wx51"H	5.5	Hydro Pump w/100' 1/2" hose	hour	$ 3.54
8570	Loader-Backhoe, Wheel	Loader Bucket Capacity	0.5 CY	to 40	Loader and Backhoe Buckets included.	hour	$ 23.95
8571	Loader-Backhoe, Wheel	Loader Bucket Capacity	1 CY	to 70	Loader and Backhoe Buckets included.	hour	$ 33.36
8572	Loader-Backhoe, Wheel	Loader Bucket Capacity	1.5 CY	to 95	Loader and Backhoe Buckets included.	hour	$ 43.46
8573	Loader-Backhoe, Wheel	Loader Bucket Capacity	1.75 CY	to 115	Loader and Backhoe Buckets included.	hour	$ 49.55
8580	Distributor, Asphalt	Tank Capacity Mounted on Trailer	550 Gal	16	burners, insulated tank, and circulating spray bar.	hour	$ 14.97
8581	Distributor, Asphalt	Tank Capacity Mounted on Trailer	1000 Gal	38	Truck Mounted. Includes burners, insulated tank, and circulating spray bar. Include truck rate.	hour	$ 22.45
8582	Distributor, Asphalt	Tank Capacity Mounted on Truck	4000 Gal		Truck Mounted. Includes burners, insulated tank, and circulating spray bar. Include truck rate.	hour	$ 32.52
8583	Distributor	ETNYRE Oil Distributor Model - PB348		300		hour	$ 43.57
8584	Distributor	ETNYRE Quad Chip Spreader		280		hour	$ 90.67
8590	Trailer, Dump	Capacity	20 CY	0	Does not include Prime Mover.	hour	$ 13.13
8591	Trailer, Dump	Capacity	30 CY	0	Does not include Prime Mover.	hour	$ 13.37
8600	Trailer, Equipment	Capacity	30 Tons	0		hour	$ 16.71
8601	Trailer, Equipment	Capacity	40 Tons	0		hour	$ 18.49
8602	Trailer, Equipment	Capacity	60 Tons	0		hour	$ 19.30
8603	Trailer, Equipment	Capacity	120 Tons	0		hour	$ 30.52
8610	Trailer, Water	Tank Capacity	4000 Gal	0	Includes a centrifugal pump with sump and a rear spraybar.	hour	$ 15.85
8611	Trailer, Water	Tank Capacity	6000 Gal	0	Includes a centrifugal pump with sump and a rear spraybar.	hour	$ 19.49
8612	Trailer, Water	Tank Capacity	10000 Gal	0	Includes a centrifugal pump with sump and a rear spraybar.	hour	$ 22.76
8613	Trailer, Water	Tank Capacity	14000 Gal	0	Includes a centrifugal pump with sump and a rear spraybar.	hour	$ 28.39
8614	Truck- Water Tanker	1000 gal. tank		175		hour	$ 35.84
8620	Tub Grinder			to 440		hour	$ 98.30
8621	Tub Grinder			to 630		hour	$ 148.62
8622	Tub Grinder			to 760		hour	$ 189.56
8623	Tub Grinder			to 1000		hour	$ 332.79
8627	Horizontal Grinder	Model HG6000		630		hour	$ 59.12
8628	Stump Grinder	1988 Vermeer SC-112		102		hour	$ 48.59
8629	Stump Grinder	24" grinding wheel		110		hour	$ 46.31
8630	Sprayer, Seed	Working Capacity	750 Gal	to 30	Trailer & truck mounted. Does not include Prime Mover.	hour	$ 14.78
8631	Sprayer, Seed	Working Capacity	1250 Gal	to 50	Trailer & truck mounted. Does not include Prime Mover.	hour	$ 19.74
8632	Sprayer, Seed	Working Capacity	3500 Gal	to 115	Trailer & truck mounted. Does not include Prime Mover.	hour	$ 32.52
8633	Mulcher, Trailer Mntd	Working Capacity	7 TPH	to 35		hour	$ 15.59

8634	Mulcher, Trailer Mntd	Working Capacity	10 TPH	to 55		hour	$ 23.12
8635	Mulcher, Trailer Mntd	Working Capacity	20 TPH	to 120		hour	$ 33.58
8636	Scraper	Soil Recycler WR 2400	w 317 gal fuel tank	563		hour	$ 265.76
8637	Trailer CAT	Double Belly Bottom-dump Trailer	26 CY of soil in one dump	330	13 CY of soil each berry	hour	$ 95.10
8638	Rake	Barber Beach Sand Rake 600HDr, towed		0	Towed by Beach vehicle	hour	$ 15.78
8639	Chipper	Wildcat 626 Cougar Trommel Screen chipper w belt		125		hour	$ 35.38
8640	Trailer, Office	Trailer Size	8' x 24'	0	Cargo Size 16ft	hour	$ 2.31
8641	Trailer, Office	Trailer Size	8' x 32'	0	Cargo Size 24ft	hour	$ 2.76
8642	Trailer, Office	Trailer Size	10' x 32'	0	Cargo Size 20ft	hour	$ 3.69
8643	Trailer	Haz-Mat Equipment trailer	8'x18'	0	Move by Tractor to Location	hour	$ 38.88
8644	Trailer, Covered Utility Trailer	(7' X 16')		0	Move by Tractor to Location	hour	$ 5.88
8645	Trailer, Dodge Ram	8' x 24' shower trailer- 12 showers		101		hour	$ 30.33
8646	Trailer, Dodge	8' x 32' flatbed water	25,000 MGVW	200	4x2-Axle	hour	$ 28.60
8650	Trencher			to 40	Walk-behind, Crawler & Wheel Mounted. Chain and Wheel.	hour	$ 16.91
8651	Trencher			to 85	Walk-behind, Crawler & Wheel Mounted. Chain and Wheel.	hour	$ 29.53
8654	Trencher accessories	2008 Griswold Trenchbox		0		hour	$ 1.96
8660	Plow, Cable	Plow Depth	24 in	to 30		hour	$ 13.77
8661	Plow, Cable	Plow Depth	36 in	to 65		hour	$ 40.07
8662	Plow, Cable	Plow Depth	48 in	to 110		hour	$ 44.60
8670	Derrick, Hydraulic Digger	Max. Boom = 60 Ft, 12,000 Ft-Lb Hydraulic	Lift Capacity 15,500 Lbs	275	Includes hydraulic pole alignment attachment. Include truck rate	hour	$ 35.07
8671	Derrick, Hydraulic Digger	Max. Boom = 90 Ft, 14000 Ft-Lb Hydraulic	Lift Capacity 26,700 Lbs	310	Includes hydraulic pole alignment attachment. Include truck rate	hour	$ 56.12
8672	Movax SP-60	28-32 ton Head	134KW	178	Sonic Sidegrip Vibratory Pile Driver	Hour	$ 109.20
8680	Truck, Fire -Industrial -112Ft Ladder Aerial Platform	Pump/Tank Capacity	3000gpm/1000 gal Water or Foam	600	2-1000gpm Nozzles 1-Each side of Platform	Hour	$ 198.30
8681	Truck, Fire, Engine Type-1	Pump/Tank Capacity	1000GPM/300gal		Engine, with Pump & Roll	hour	$ 140.00
8682	Truck, Fire, Engine Type-2	Pump/Tank Capacity	500GPM/300gal		Engine, with Pump & Roll	hour	$ 132.00
8683	Truck, Fire, Ladder(48ft)(Type-III)	Pump/Tank Capacity	150gpm/500gal,	115-149	Hose 1-1/2"D 500' Long	hour	$ 119.30
8684	Truck, Fire, Aerial (Cummins IXL9)100Ft Ladder	Pump/Tank Capacity	2000gpm/500gal	450	1500gpm Monitor/nozzle	hour	$ 178.00
8685	Truck, Fire, Ladder(48ft)(Type-I)	Pump/Tank Capacity	1000gpm/400gal, 500gpm Master Stream	200-250	Hose 2-1/2"D 1200' Long	hour	$ 154.00
8686	Truck, Fire, Ladder(48ft)(Type-II)	Pump/Tank Capacity	500gpm/300gal,	100-199	Hose 2-1/2"D 1000' Long	hour	$ 131.50
8687	Truck, Fire, Support Water Tender S1	Pump/Tank Capacity	300GPM/4000+gal	115-149	S1 Water Tender	hour	$ 114.50
8688	Truck, Fire, Support Water Tender S2	Pump/Tank Capacity	200GPM/2500+gal		S2 Water Tender	hour	$ 103.50
8689	Truck, Fire, Support Water Tender S3	Pump/Tank Capacity	200GPM/1000+gal		S3 Water Tender	hour	$ 79.00
8690	Truck, Fire - Water Tender	Pump Capacity	1000 GPM @150 psi			hour	$ 70.33
8691	Truck, Fire, Tanker	Pump/Tank Capacity	1250 GPM/2500 gal	500		hour	$ 74.57
8692	Truck, Fire, Pumper	Pump/Tank Capacity	1500 GPM/1000 gal	500		hour	$ 81.10
8693	Truck, Fire, Pumper	Pump Capacity	2000 GPM			hour	$ 84.04
8694	Truck, Fire Aerial Ladder (75Ft)	Pump/Tank Capacity	1500GPM/600 gal	475		hour	$ 121.00
8695	Truck, Fire Aerial Ladder (150Ft)	Ladder length	150 FT		No Platform,	hour	$ 146.43
8696	Truck, Fire (Rescure)	No Ladder		330	Rescure Equipment	hour	$ 96.36
8697	Truck, Fire, Tactical Water Tender T1	Pump/Tank Capacity	250GPM/2000+gal	175		hour	$ 119.50
8698	Truck, Fire, Tactical Water Tender T2	Pump/Tank Capacity	250GPM/1000+gal			hour	$ 102.67
8699	Truck, Fire, Engine Type-3	Pump/Tank Capacity	150GPM/500gal		Engine, with Pump & Roll	hour	$ 126.50
8700	Truck, Flatbed	Maximum Gvw	15000 Lbs	to 200	Diesel Engine	hour	$ 25.46
8701	Truck, Flatbed	Maximum Gvw	25000 Lbs	to 275	Gasoline Engine	hour	$ 40.36
8701-1	Truck, Flatbed	Maximum Gvw	25000 Lbs	200	Diesel Engine	hour	$ 28.55
8702	Truck, Flatbed	Maximum Gvw	30000 Lbs	217	Diesel Engine	hour	$ 32.90
8703	Truck, Flatbed	Maximum Gvw	45000 Lbs	to 380	Diesel Engine	hour	$ 52.73
8708	Trailer, semi	48ft to 53ft, flat-bed, freight, two axle	50,000+ gvwr	0		hour	$ 8.67
8709	Trailer, semi	enclosed 48 ft to 53 ft, two axles	50,000+ gvwr	0	Enclosed	hour	$ 9.82
8710	Trailer, semi	28ft, single axle, freight	25,000 gvwr	0		hour	$ 10.01

8711	Flat bed utility trailer	6 ton		0		hour	$ 3.21
8712	Cleaner, Sewer/Catch Basin	Hopper Capacity	5 CY	50	Truck Mounted. (350 gal)	hour	$ 25.51
8713	Cleaner, Sewer/Catch Basin	Hopper Capacity	14 CY	60	Truck Mounted. (1500 Gal)	hour	$ 32.02
8714	Vactor-Combined Sewer Cleaning	800 Gal Spoils/400 Gal Water	500/800 gal	190	with water & waste Tanks	hour	$ 85.10
8714-1	Vector Combine Vaccum Truck	1500 gal Water	15 Cu Yd	330	with water & waste Tanks	hour	$ 86.94
8715	Truck, Hydro Vac	model LP555DT	36 - Hp pump	36	Towed by tractor	hour	$ 18.50
8716	Leaf Vac	Tow by Truck 22,000 cfm capacity		85	Leaf Vac + Truck Code 8811	hour	$ 52.93
8717	Truck, Vacuum	60,000 GVW		400		hour	$ 76.72
8719	Litter Picker	model 2007 Barber		0	Towed by tractor	hour	$ 9.60
8720	Truck, Dump	Struck Capacity	8 CY	to 220		hour	$ 57.70
8721	Truck, Dump	Struck Capacity	10 CY	to 320		hour	$ 72.05
8722	Truck, Dump	Struck Capacity	12 CY	to 400		hour	$ 79.62
8723	Truck, Dump	Struck Capacity	14 CY	to 400		hour	$ 77.50
8724	Truck, Dump, Off Highway	Struck Capacity	28 CY	to 450		hour	$ 136.57
8725	Truck, Dump	Struck Capacity	18 CY	to 400		hour	$ 91.65
8730	Truck, Garbage	Capacity	25 CY	to 255		hour	$ 49.79
8731	Truck, Garbage	Capacity	32 CY	to 325		hour	$ 57.06
8733	E-BAM Services	Environmental Beta Attenuation Air Monitor		0	Powered by Solar System	hour	$ 3.07
8734	Attenuator, safety	that can stop a vehicle at 60 mph		0		hour	$ 5.64
8735	Truck, Attenuator	2004 Truck Mounted for 60 mph		0		hour	$ 3.89
8736	Truck, tow	1987 Chevy Kodiak 70		175		hour	$ 28.73
8744	Van, Custom	Special Service Canteen Truck		350		hour	$ 18.35
8745	Van, step	model MT10FD		300		hour	$ 22.05
8746	Van-up to 15 passenger	light duty, class 1		225-300		hour	$ 20.48
8747	Van-up to 15 passenger	light duty, class 2		225-300		hour	$ 20.77
8748	Van-cargo	light duty, class 1		225 - 300		hour	$ 22.44
8749	Van-cargo	light duty, class 2		225-300		hour	$ 22.68
8750	Vehicle, Small			to 30		hour	$ 6.41
8753	Vehicle, Recreational			to 10		hour	$ 2.87
8754	Motor Coach	GVW=50534	56 Passenger + 1-Driver	430	Passenger Transportation	Hour	$ 63.94
8755	Golf Cart	Capacity	2 person	0	Battery operated	hour	$ 3.80
8770	Welder, Portable			to 16	Includes ground cable and lead cable.	hour	$ 4.11
8771	Welder, Portable			to 34	Includes ground cable and lead cable.	hour	$ 7.21
8772	Welder, Portable			to 50	Includes ground cable and lead cable.	hour	$ 13.66
8773	Welder, Portable			to 80	Includes ground cable and lead cable.	hour	$ 13.75
8780	Truck, Water	Tank Capacity	2500 Gal	to 175	Include pump and rear spray system.	hour	$ 31.05
8781	Truck, Water	Tank Capacity	4000 Gal	to 250	Include pump and rear spray system.	hour	$ 56.57
8788	Container & roll off truck	Roll off Truck	30 yds,	200	Roll-off-Truck only	hour	$ 23.73
8789	Truck, Tractor	1997 Freightliner F120		430		hour	$ 56.81
8790	Truck, Tractor	4 x 2	25000 lbs	to 210		hour	$ 43.43
8791	Truck, Tractor	4 x 2	35000 lbs	to 330		hour	$ 47.57
8792	Truck, Tractor	6 x 2	45000 lbs	to 360		hour	$ 52.98
8794	Truck, freight	Enclosed w/lift gate. Medium duty class 5	gvwr 16000-19500 Lbs	200	4 X 2 Axle (D)	hour	$ 27.25
8795	Truck, backhoe carrier	Three axle, class 8, heavy duty	over 33000Lbs	280		hour	$ 34.56
8796	Truck, freight	Eenclosed w/lift gate. Heavy duty, class 7	26,001 to 33,000 lbs gvwr	217	4 X 2 Axle (D)	hour	$ 31.43
8798	Truck	Tilt and roll-back, two axle, class 7 heavy duty,	to 33,000 gvwr	217	4 X 2 Axle (D)	hour	$ 32.13
8799	Truck,	Tilt and roll back, three axle. class 8 heavy duty	over 33,001+ gvwr	280	6 X 4 Axle (D)	hour	$ 42.33
8800	Truck, Pickup				When transporting people.	mile	$ 0.545
8801	Truck, Pickup	1/2-ton Pickup Truck	4x2-Axle	160		hour	$ 12.78
8802	Truck, Pickup	1-ton Pickup Truck	4x2-Axle	234		hour	$ 17.91
8803	Truck, Pickup	1 1/4-ton Pickup Truck	4x2-Axle	260		hour	$ 21.10
8804	Truck, Pickup	1 1/2-ton Pickup Truck	4x2-Axle	300		hour	$ 23.22

8805	Truck, Pickup	1 3/4-ton Pickup Truck	4x2-Axle	300		hour	$ 24.85
8806	Truck, Pickup	3/4-ton Pickup Truck	4x2-Axle	165		hour	$ 14.32
8807	Truck, Pickup	3/4-ton Pickup Truck	4x4-Axle	285	Crew	hour	$ 22.64
8808	Truck, Pickup	1-ton Pickup Truck	4x4-Axle	340	Crew	hour	$ 22.99
8809	Truck, Pickup	1 1/4-ton Pickup Truck	4x4-Axle	360	Crew	hour	$ 26.55
8810	Truck, Pickup	1 1/2-ton Pickup Truck	4x4-Axle	362	Crew	hour	$ 26.82
8811	Truck, Pickup	1 3/4-ton Pickup Truck	4x4-Axle	362	Crew	hour	$ 27.55
8820	Skidder accessory	2005 JCB Grapple Claw		0		hour	$ 1.75
8821	Forklift, accessory	2005 ACS Grapple Bucket		0		hour	$ 1.56
8822	Truck, Loader	Debris/Log (Knuckleboom Loader/Truck)		230		hour	$ 53.22
8823	Chipper- Wood Recycler	Cat 16 engine		700		hour	$ 118.50
8824	Skidder	model Cat 525B		up to 160		hour	$ 64.79
8825	Skidder	40K lbs- model Cat 525C		161 and up		hour	$ 128.67
8840	Truck, service	fuel and lube	up to 26,000 gvwr	215-225		hour	$ 40.19
8841	Truck, fuel	2009 International 1,800 gal. storage tank		200		hour	$ 32.01
8842	Mobile Command Trailer	(8' X 28') with 7.5 KW Generator		0	Move to Location by Tractor	hour	$ 14.73
8843	Mobile Response Trailer	(8' X 31') with 4.5 KW Generator?		0	Move to Location by Tractor	hour	$ 13.87
8844	Mobile Command Center	(unified) (RV) Ulitimaster MP-35	43 FT Long with Generator	400		hour	$ 86.10
8845	Mobile Command Post Vehicle	(RV) (In- Motion)	22-Ft Long	340		hour	$ 31.55
8846	Mobile Command Post Vehicle	(RV) (Stationary) w/9.6 KW Generator	22-Ft Long	340		hour	$ 20.33
8847	Mobile Command Center (Trailer)	48'x8' Trailer, Fully Equiped Mobile Command Center	48-Ft Long	0	Move to Location by Tractor	hour	$ 31.69
8848	Mobile Command Center (Trailer)	48'x8' When being Moved w/Truck Tractor		310		hour	$ 50.69
8849	Mobile Command Center	43'x8.5' x 13.5'H with self 30kw Generator		280	Generator Rate not included	hour	$ 55.37
8850	Mobile Command Center	2007-Freightliner MT-55, (RV)		260		hour	$ 47.12
8851	Mobile Command Van	1990- Ford Econoline-Communication Van		230	Communication Equipment	hour	$ 42.78
8852	Mobile Command Center	47.5' X 8.75 Fully Equip' (In motion) (RV)		410		hour	$ 68.04
8853	Mobile Command Center	47.5' X 8.75 Fully Equip' (Stationary)		410		hour	$ 45.89
8854	Mobile Command Vehicle	53' X 8.75 Fully Equip		480-550		hour	$ 98.84
8870	Light Tower	Terex/Amida AL 4000. with (4) 500 watt lights	w/10kw power unit	13.5		hour	$ 11.11
8871	Light Tower	2004 Allmand				hour	$ 6.93
8872	SandBagger Machine	(Spider) automatic	w/Vibration & Conveyor Motors	2-4.5		hour	$ 49.42
8900	Helicopter	OH-58 KIOWA (Military) is the same as "Bell-206B3		420		hour	$ 467.00
8901	Helicopter	OH-58 KIOWA (Military) is the same as "Bell-206BR		420		hour	$ 489.00
8902	Helicopter	Model Bell 206-L3 Jet Range Helicopter		650	Jet Range III-Helicopter	hour	$ 575.00
8903	Helicopter	Model Bell 206L1 Long Ranger		650	Long Ranger	hour	$ 585.47
8904	Helicopter	Model Bell 206LT Long Range Twinranger		450	Twinranger	hour	$ 763.30
8905	Helicopter	Model Bell 407 EMS- Ambulance		250		hour	$ 625.35
8906	Piper-Fixed wing	Model Navajo PA-31		310		hour	$ 476.60
8907	Piper-Fixed wing	PA-31-350, Navajo Chieftn twin engine		350		hour	$ 507.20
8908	Sikorsky Helicopter	Model UH-60 (Blackhawk) medium lift	Medium Lift	1890	Fire Fighter Same as S70C	hour	$ 2,974.45
8909	Helicopter	Model UH-A (Blackhawk) Medium lift	Medium Lift	1890	Fire Fighter	hour	$ 5,559.04
8910	Boeing Helicopter	Model CH-47 (Chinook) heavy lift	Heavy Lift	2850	Fire Fighter	hour	$ 10,857.50
8911	Helicopter- light utility	Model Bell 407GX - 7 seater	7-Seaters	675	Passenger Aircraft	hour	$ 620.38
8912	Helicopter- light utility	Modle Bell 206L- 7 seater	7-Seaters	420	Passenger Aircraft	hour	$ 607.92
8913	Helicopter	Model Bell-206L4		726		hour	$ 570.24
8914	King Air 200 Turboprop Aircraft	Blackhawk King Air B200XP61		669		hour	$ 1,318.11
8915	Turboprops Blackhawk Aircraft	Blackhawk Caravan XP42 A		850		hour	$ 738.12
8916	Turboprops Blackhawk Aircraft	King Air C90 XP135 A		550		hour	$ 1,108.33
8917	Aerostar Piston Aircraft	Aerostar 601P		290		hour	$ 466.67
8918	Bell UH -1H Huey Helicopter II	Engine:1 × Lycoming T53-L-11 turboshaft		1100	Travel Range 253 Nautical Miles	hour	$ 1,376.74

8943	Wire Puller Machine	Overhead Wire Pulling Machine		30	Overhead/Underground Wire Pulling Machine	hour	$ 20.16
8944	Wire Tensioning Machine	3000 Lbs			Overhead Wire Tensioning Machine	hour	$ 14.84
8945	Aerial Lift - 20 Ft High	model 2008 Genie Scissor Lift	1000 Lbs		24 Volt	hour	$ 6.44

Appendix I: DGLVR Porgram Approved Products Lists
October 1, 2019

Approved Products List – 12/9/2020

The Dirt & Gravel Road Maintenance Program was founded on solid environmental principles. One of these principles is the program's strict limitations on the use of products that may cause damage to the environment in any way. Listed here are the products approved for purchase and use with program funding. The program does not endorse these or any other individual products.

PETROLEUM EMULSION DUST SUPPRESSANT			
PRODUCT NAME	**DISTRIBUTOR**	**TYPE**	**APPROVED APPLICATION RATE**
Dust Clear G	Midland Asphalt Materials, Inc. 88 Barrett Road Woodland, PA 16881 Phone: (814) 857-7635 www.midlandasphalt.com	Tall Oil Emulsion	2 applications of 0.2 gal/yd² 15 minutes apart
Resinator	West Gary Momar Incorporated 1830 Ellsworth Industrial Dr. Atlanta Georgia, 30318 Phone: (404) 355-4580 West.gary@momar.com	Petroleum Emulsion	0.5 gal/yd² of 1:4 emulsion to water or more dilute
Ultrabond 2000	Scott Reefer Environmental Energy Solutions, LLC 10027 Rte. 403 Hwy South Seward, PA 15954 Phone: (814) 446-5625 sreefer@eesolutionsllc.com	Petroleum Emulsion	2 applications of 0.25 gal/yd² of 1:5 emulsion to water or more dilute

SYNTHETIC FLUID DUST SUPPRESSANT			
PRODUCT NAME	**DISTRIBUTOR**	**TYPE**	**APPROVED APPLICATION RATE**
EnviroKleen	Lynn Cielec Midwest Ind. Supply 1101 3rd Street S.E. Canton, OH 44711 Phone: (800) 321-0699 Cell: (303) 417-2069 Fax: (330) 456-3247 www.midwestind.com	Synthetic Fluid	0.125 gal/yd² Two passes are required for a total application rate of 0.250 gal/yd². No dilution.
DustLess	Rose Cyr Global Environmental Solutions, LLC 395 Main St., Unit 7 Salem, NH 03079 Phone: (978) 388-3312 Fax: (603) 362-9207 www.GlobalEnvironmentalSolutions.com	Synthetic Fluid	Min = 0.18 gal/yd². Max = 0.45 gal/yd² No dilution.

ACRYLIC POLYMER DUST SUPPRESSANT			
PRODUCT NAME	**DISTRIBUTOR**	**TYPE**	**APPROVED APPLICATION RATE**
DustREADY 49	Tim Drake Zinkan Enterprises, Inc. 1919 Case Pkwy North Twinsburg, OH 44087 sales@zinkan.com Phone: (800) 229-6801	Acrylic	1:4 dilution of product to water. Two applications of 0.25 gal/yd^2
SOIL STABLIZER			
PRODUCT NAME	**DISTRIBUTOR**	**TYPE**	**APPROVED APPLICATION RATE**
EcoRoads	Colby Price EnviRemend Construction 6480 Beach Dr. SW Ocean Isle Beach, NC 28469 Phone: (910) 712-1081 cprice@enviremed.net	Enzyme	diluted with water at ratio of not < 250 to 1 evenly mixed with subgrade to optimum moisture

ROAD FILL MATERIALS			
PRODUCT NAME	**DISTRIBUTOR**	**TYPE**	
Harsco Minerals	Bob Onyshko Harsco Minerals Phone: (717) 506-2071 1-800-850-0527 ronyshko@harsco.com	Recycled Steel Slag	Road Fill Material

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