Gravel Road Design & Maintenance Planning

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In Partnership With
Kennebec County
Soil & Water Conservation District
Topics

- *Road Construction Basics*
- *Surveying/Inventorying gravel roads*
- *Maintenance Planning*
- *Q&A*
A Guide to Forming Road Associations

October 2009

GRAVEL ROAD MAINTENANCE MANUAL
A Guide for Landowners on Camp and Other Gravel Roads

Links:
http://www.maine.gov/dep/land/watershed/materials.html
What is a road?

- A way to get from Point A to Point B
- Clear of vegetation and other obstacles.
- Constructed of material that holds up against the forces of weather and traffic.
- Shaped to keep water off, and away from the traveled way.
• Is clear of vegetation and other obstacles.
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The Basics of Road Building

- All roads need to withstand the impacts of **vehicles** and **weather**.
- This is accomplished by:
  - Using the appropriate materials when constructing the road
  - Shaping the road to efficiently drain water
Parts of a Road (profile)

- Road Surface
- Road Base
- Sub-Base
- Ditch
Base

- Provides foundation for road, holds up vehicles
- Gravel contains lots of rock and drains well
- Larger aggregate size than surface gravel – 4” minus
Fabric

- Woven Geotextile
- 200 weight is best
- Use on new roads or in wet areas of chronic erosion that don’t dry
Surface

- Provides a smooth, easily gradable driving surface
- Keep water out of road base (roof)
- Directs water into ditches
- Crown – minimum of $\frac{1}{4}$" per foot
- Super-elevate
Surface Gravel

-1.5 – ¾” minus material with 7-12% fines
-Bluestone gravel
  -crushed bluestone or slate with crusher dust included. Still 7-12% fines
Ditches

- Control the runoff from the road surface
- Drains water out of the road base materials
- Shape of ditch should be a “rounded V”
- Stabilizing ditches
Culverts

- Used to convey water under a road
- Properly sized
- Proper compaction
Surveying Gravel Roads

Taking Inventory
Road Problems

- Common Problems:
  - Road Surface Erosion/Potholes
  - Mud
  - Road Shoulder Erosion
  - Ditch Erosion
  - Culvert Inlet/Outlet Erosion

- Most problems are due to poor road shape and/or poor materials
## Road Inventory

<table>
<thead>
<tr>
<th>Culvert</th>
<th>Road Shoulder Erosion</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Unstable inlet / outlet</td>
<td>• Slight</td>
</tr>
<tr>
<td>• Clogged</td>
<td>• Moderate</td>
</tr>
<tr>
<td>• Crushed / Broken</td>
<td>• Severe</td>
</tr>
<tr>
<td>Ditch</td>
<td>Surface Erosion</td>
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</tr>
<tr>
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<td>• Severe</td>
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<tr>
<td>• Bank Failure</td>
<td></td>
</tr>
<tr>
<td>• Inadequate Ditch</td>
<td></td>
</tr>
</tbody>
</table>

- **Ditch**
  - Slight Erosion
  - Moderate Erosion
  - Severe Erosion
  - Bank Failure
  - Inadequate Ditch

- **Road Shoulder Erosion**
  - Slight
  - Moderate
  - Severe

- **Surface Erosion**
  - Slight
  - Moderate
  - Severe
Culvert: Unstable inlet/outlet
Culvert: Unstable inlet/outlet
Culvert: Clogged
Culvert: Crushed
Ditch: Moderate Erosion
Ditch: Severe Erosion
Ditch: Bank Failure
Ditch: Inadequate Ditch
Road Shoulder: Mild Erosion
Road Shoulder: Moderate Erosion
Road Shoulder: Severe Erosion
Road Surface: Mild Erosion
Road Surface: Moderate Erosion
Road Surface: Severe Erosion
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Kennebec County
Soil and Water Conservation District

Maine Department of Environmental Protection
Bureau of Land and Water Quality

April 2010
Score Sheet Evaluating Gravel Roads For Drivability, Stability
And Maintenance of Water Quality

Road Name or Fire Lane Number: __________________________

Municipality: __________________________

Book and Page number of deed for road: Book: _______ Page: _______

Road is seasonal Road is year round _______
If year round, is it plowed in the winter? __________

Are winter and/or “mud season” use prohibited by owners or the Road
Association? ________________

Right of way width if known: _______

Approximate Road Length: _______

Number of culvert crossings: _______

What Lake Watershed is the road located in: __________________________

Is the road in the Shoreland Zone? __________
If yes, be sure to follow Shoreland Zoning and NRPA regulations
(Refer to page 71 of the Gravel Road Maintenance Manual for more
information)

Is there an active Road Association for the road? _______
If yes, Contact Person: __________________________
Telephone number: __________________________

Name of Evaluator: __________________________

Date of Evaluation: __________________________

Weather conditions: __________________________
# Section 1. Road Base and Surface Areas

<table>
<thead>
<tr>
<th></th>
<th>Score</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stations</td>
<td>Average</td>
</tr>
<tr>
<td>1. Road constructed above original ground level to facilitate drainage/structural integrity of road base materials.</td>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>2. Gravel road surface is at least 4 to 6 inches, is compacted, and is composed of a firmly packed aggregate. <em>(Refer to page 21 of the Gravel Road Maintenance Manual for road material information)</em></td>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>3. Gravel road surface provides good traction and is not highly erodible and dusty (too many fines).</td>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>4. Level or low slope road surfaces are crowned to shed water at 1/2 inch of rise per foot of road width, or contain alternative drainage structures, such as waterbars, or are otherwise designed to direct stormwater as sheet flow off of the road surface (insloped/outsloped). <em>(Refer to page 30 of the Gravel Road Maintenance Manual for information on road crowning)</em></td>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>5. Steep sloped road surfaces are crowned to shed water at 1/4 inch of rise per foot of road width, or contain alternative drainage structures or are otherwise designed to direct stormwater as sheet flow off of the road surface or are paved. <em>(Refer to page 30 of the Gravel Road Maintenance Manual for information on road crowning)</em></td>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>6. Stormwater flow from the road surface is directed to stable ditches, a vegetated buffer or stable vegetated areas (that are not wetlands) of at least 50 feet in width between the road and a waterbody.</td>
<td>0</td>
<td>None</td>
</tr>
</tbody>
</table>
8 Steps to Managing Your Gravel Road

1. Inventory road
2. Assess condition using score sheets
3. Determine specific road repairs
4. Determine costs
5. Establish priorities - 2 factors
6. Create inspection schedule & checklist
7. Establish yearly budget
8. Keep a journal
What is in the Toolbox?

- Crowning, super-elevating, armoring surface
- Box cutting, fabric
- Alternative materials
- Broad-base dips
- Rubber razors
- Armored swales, rock sandwiches
- Ditching, check dams, rip-rap, ECM blankets
- New or replacement culverts
**Site # 1**: 140’ section between Dick Harvey driveway & Pole # 23.

**Issue**: Water not reaching ditches, ground water coming up through road, lack of crown and insufficient ditching.

**Fix**: Box cut 140’ section and install US 200 woven filter fabric, 1’ of 3” minus base gravel compacted in 6” lifts and 4” of 1” minus surface gravel with 7-12% fines. Road surface should be shaped and compacted to a minimum of ¼” per foot crown.

Install 85’ of ditching on west side of road between poles #21 & #23 & tie into existing ditch to the north. Stabilize ditch with seed and hay.

**Priority #: 1**
Site # 4: 300’ section from turnout at the bottom of site # 3, around corner to Camp sign.

Issue: Lack of ditching, surface erosion, road material accumulation at bottom of hill.

Fix: Install ditch on east side of road (Approx 230’) where water cannot get to woods and stabilize with 6” angular rock. (ditching this section will be a challenge due to site conditions)
Super-elevate road surface (approx 300’) to east & direct water into new ditch that will end in a turnout at the bottom of the hill.

Priority Ranking #: 2
Same site following implementation of recommendations
Site # 9: From Pole 88 to Pole 91 for a distance of 630’

**Issue:** Road is lower than surrounding grade. Surface erosion is occurring and there is no way to get water off road surface.

**Fix:** This is the most challenging section of Horse Point Road to address. To significantly improve this section would require a complete rebuild to raise road 1’ above existing grade.

**Steps:** Install layer of Woven stabilization fabric like US 200, over road surface using specs provided. Add 5” of 4” minus material and compact with a roller. Add remaining 4” to a crown of ½” per foot and roll again. Add 3” of 1” or 1.5” minus surface gravel and crown to ½” per foot and roll a third time.

**Priority Ranking #: 3**

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**Pine Point – Site # 5**

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Same site following implementation of recommendations - Day after Hurricane Irene
Gravel road maintenance plans have proven to be the best investment a group can make in their gravel road.
$ COSTS $

-Most plans MES prepares cost $600 - $800

-An exceptionally long road with many complicated sites might cost $900 - $1200

-Small investment to have a 10 year plan for properly maintaining a road, spending your money in the right areas and protecting your investment.
www.mesmaine.com
207-441-9366

www.kcswcd.org
207-622-7847 x 3