

# 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*

*Management Plans*

*Q&A*

# What is a road?

- A road is:
  - 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.



- 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.











# The Basics of Road Building

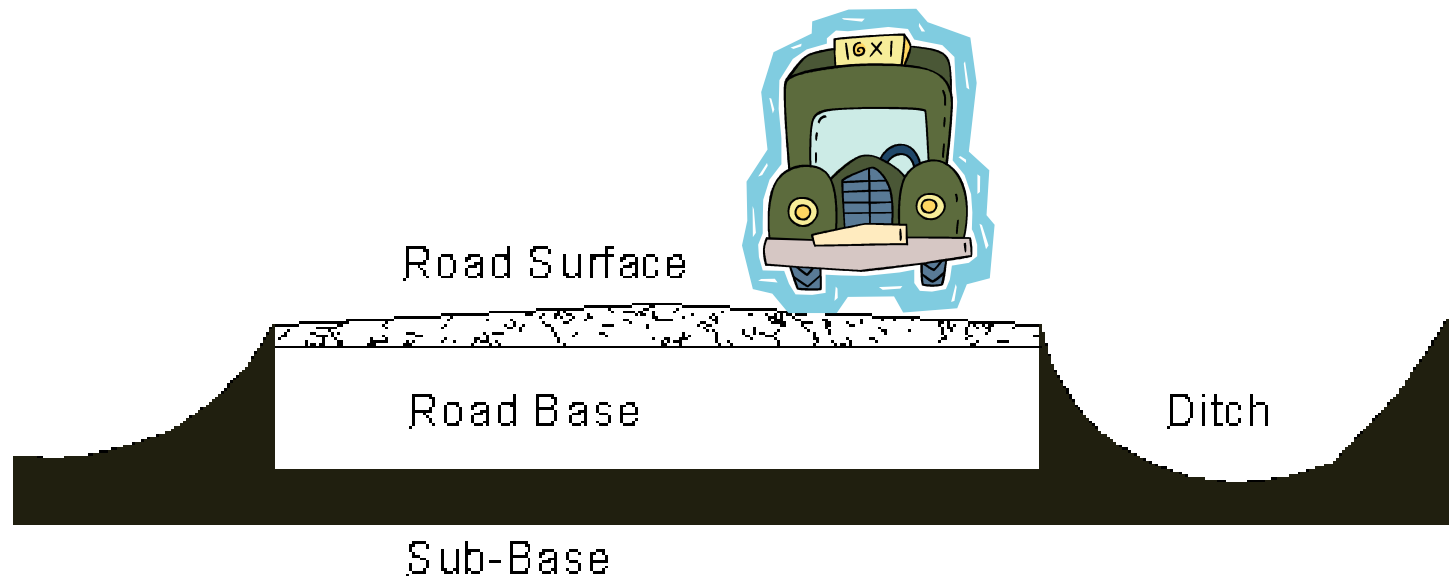
- All roads need to withstand the impacts of **vehicles** and **weather**.
- This is accomplished by:
  - Using the appropriate materials when constructing the road
  - Shaping the road to efficiently drain water

# Parts of a Road (surface)

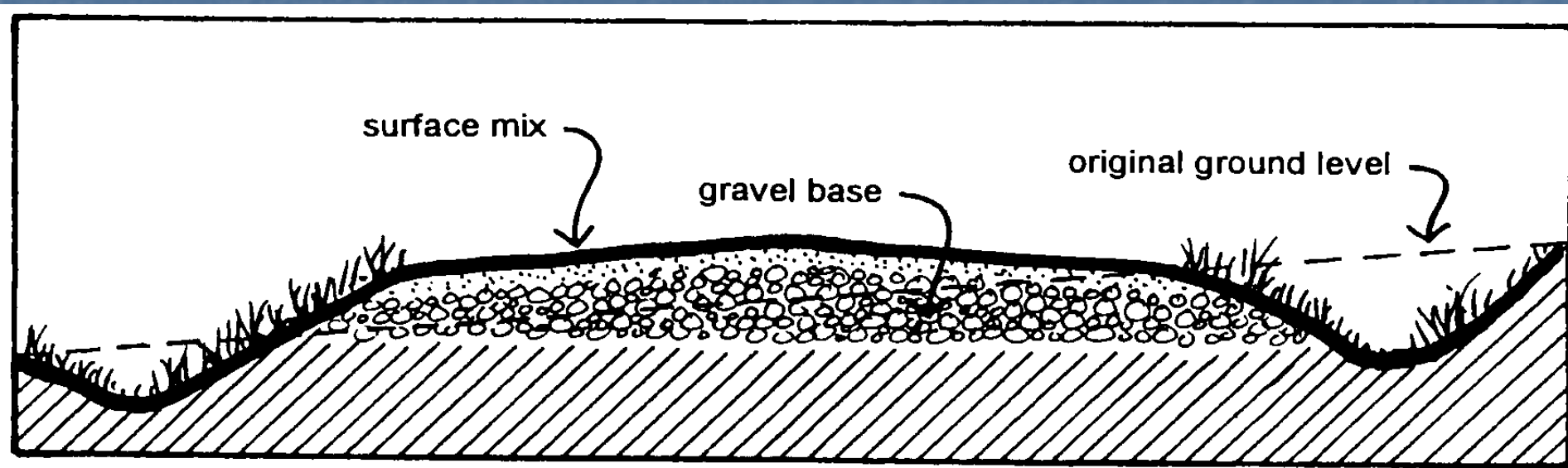




# Parts of a Road (profile)



# Base



- Sub-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





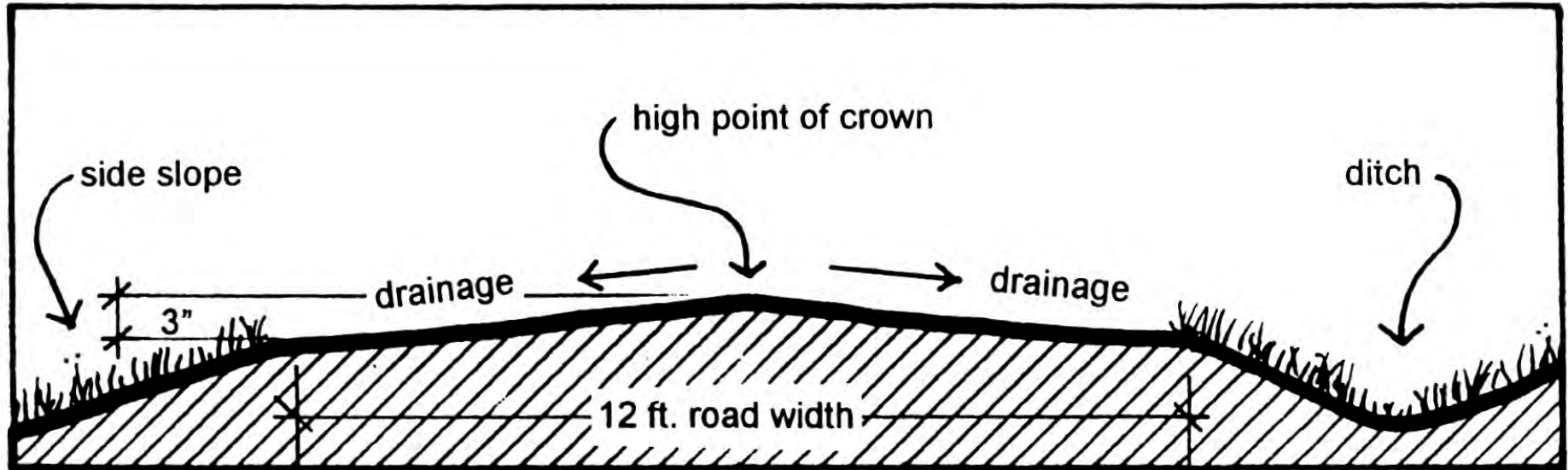
*No Fabric*

The image shows a road surface with a comparison between two areas. The top half, labeled 'No Fabric', shows a road with significant rutting and unevenness. The bottom half, labeled 'Fabric', shows a road with a smoother, more uniform surface. The text is in a yellow, italicized font.

*Fabric*



# 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

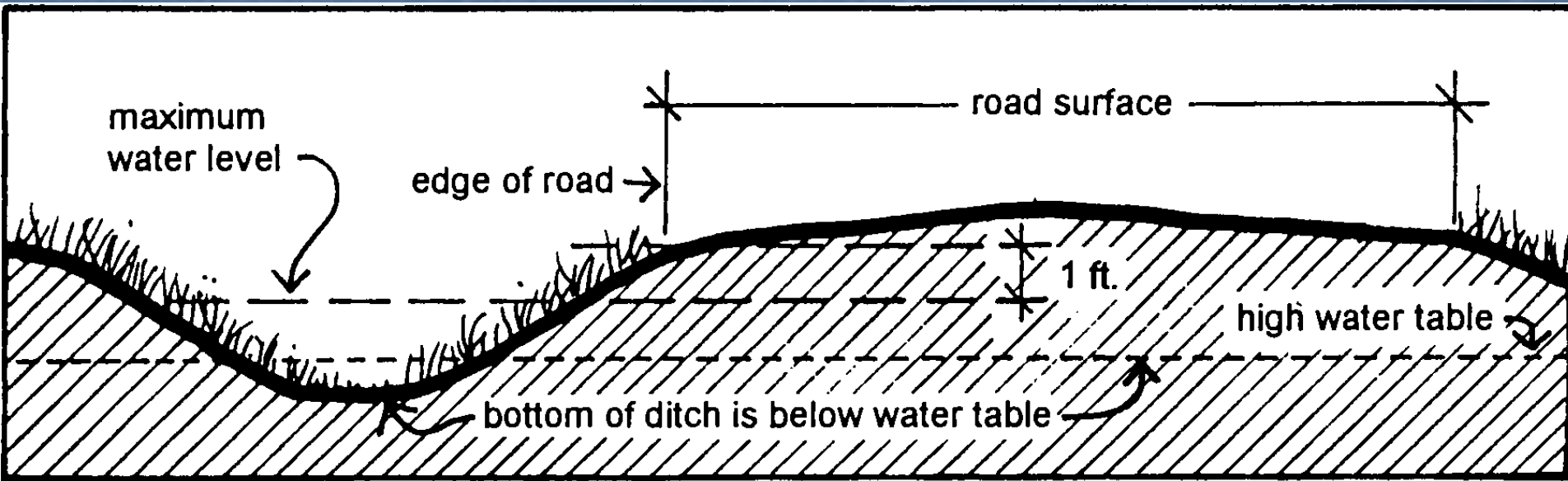
- 1.5 – 3/4" minus material with 7-12% fines

- Bluestone gravel

  - crushed bluestone or slate with crusher dust included. Still 7-12% fines



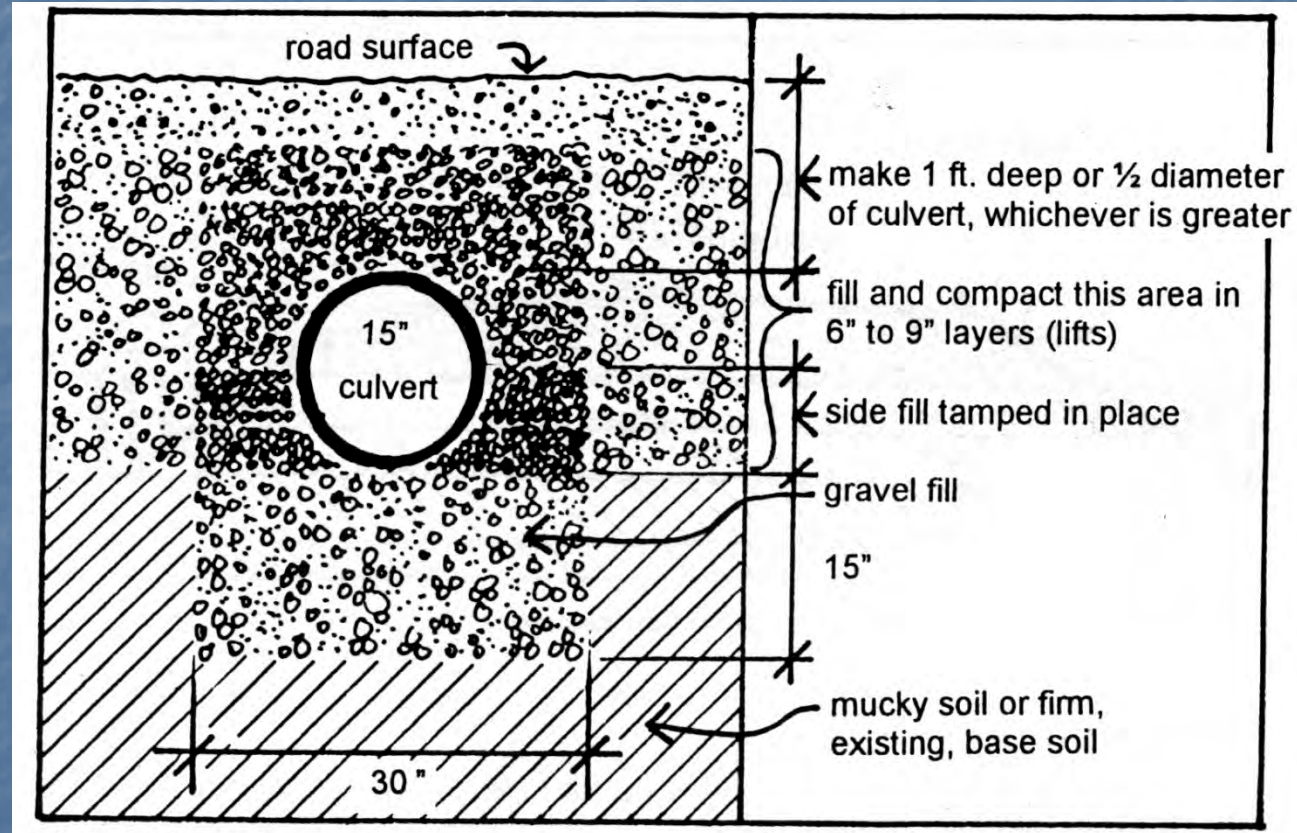
# Ditches



- 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*



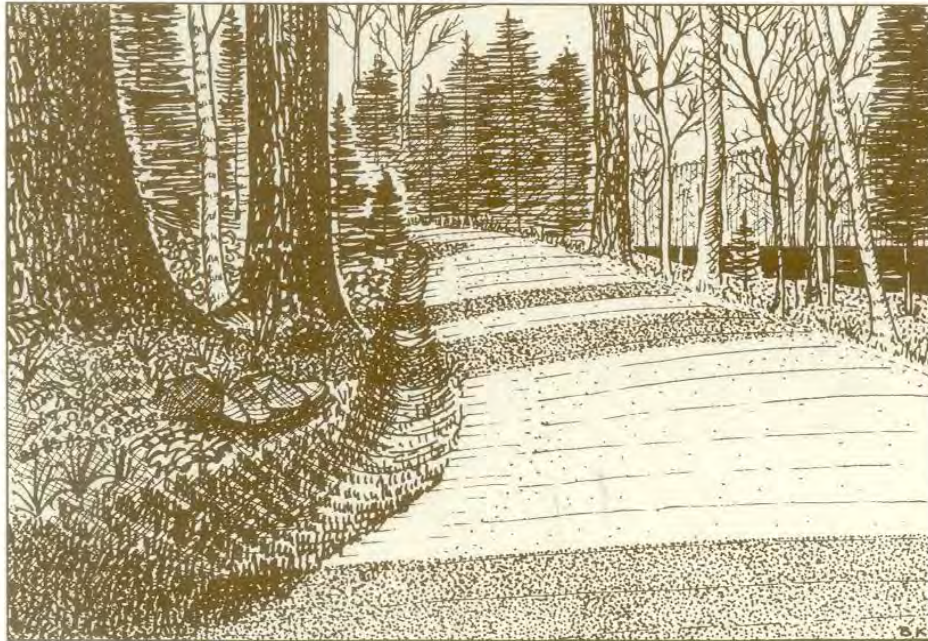
# Road Problems

- 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



# GRAVEL ROAD MAINTENANCE MANUAL

A Guide for Landowners on  
Camp and Other Gravel Roads



Kennebec County  
Soil and Water  
Conservation District



Maine Department of  
Environmental Protection  
Bureau of Land and  
Water Quality

April 2010

# A Guide to Forming Road Associations



**Links:**

<http://www.maine.gov/dep/land/watershed/materials.html>

October 2009

# GRAVEL ROAD MAINTENANCE MANUAL

A Guide for Landowners on  
Camp and Other Gravel Roads



Maine Department of  
Environmental Protection  
Division of Environmental Quality



Maine Department of  
Transportation  
Division of Road & Bridge



**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

					SCORE																										
	0 None	1 Some	2 Most	3 All	Stations	Average																									
1. Road constructed <u>above</u> original ground level to facilitate drainage/structural integrity of road base materials.					<table border="1"><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table>																										
2. Gravel road surface is at least 4 to 6 inches, is compacted, and is composed of a firmly packed aggregate. <i>(Refer to page 21 of the Gravel Road Maintenance Manual for road material information)</i>					<table border="1"><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table>																										
3. Gravel road surface provides good traction and is not highly erodible and dusty (too many fines).					<table border="1"><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table>																										
4. Level or low slope road surfaces are crowned to shed water at ½ 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). <i>(Refer to page 30 of the Gravel Road Maintenance Manual for information on road crowning)</i>					<table border="1"><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table>																										
5. Steep sloped road surfaces are crowned to shed water at ¾ 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. <i>(Refer to page 30 of the Gravel Road Maintenance Manual for information on road crowning)</i>					<table border="1"><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table>																										
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.					<table border="1"><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table>																										



# Road Inventory

## **Culvert**

- Unstable inlet / outlet
- Clogged
- Crushed / Broken

## **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





# Road Shoulder: Moderate Erosion





# Road Shoulder: Severe Erosion





# Road Surface: Mild Erosion





# Road Surface: Severe Erosion





# 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

# **Gravel Road Maintenance Planning**



## **MES Road Plans Include the Following Information**

- Evaluation of Existing Road
- Aggregate Sizes and Options
- Dust Control
- Contact Information
- Aerial Maps of Site Locations and Measurements
- Photos/Report of Site Specific Repairs and Ranking
- Construction Details
- Maintenance Recommendations
- Maintenance Log

## **Additional Management Plan Options**

- Road Profile
- Construction Oversight



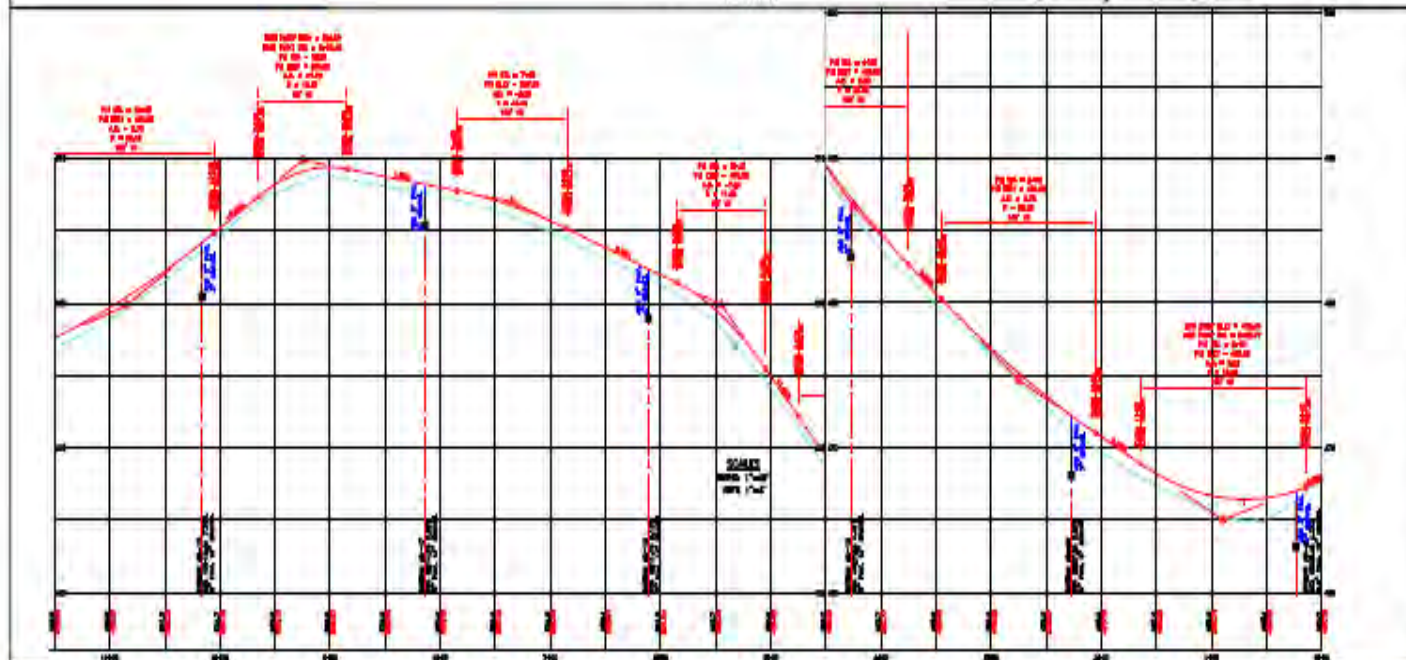
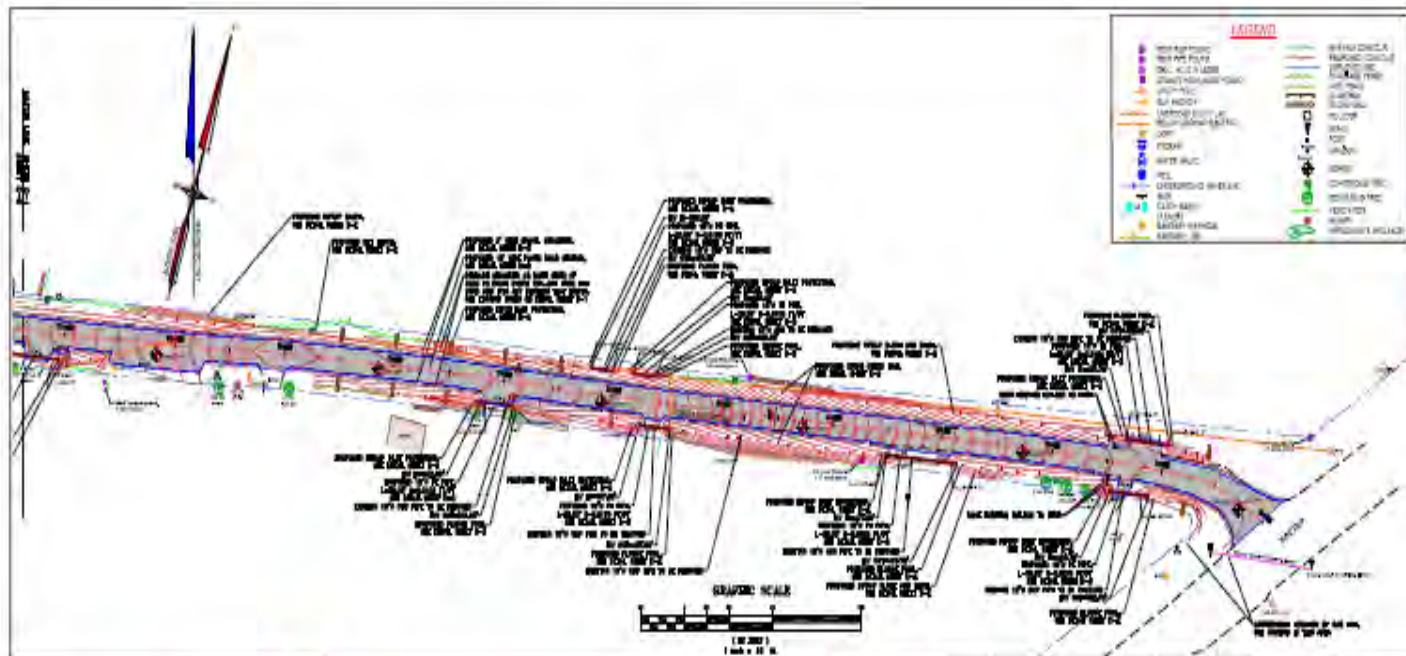
C-1	TOWN OF CHELSEA BIRMINGHAM ROAD MODIFICATIONS	SHEET NO. 10
DATE: 08-13-2019	SCALE: 1"=60'	DRAWN BY: MJD/JRD
	AS SHOWN BIRMINGHAM ROAD	AUGUST 18, 2019
	CHELSEA	



# Jamaica Point Road & West Point Lane, Rome, Maine







**ES CORFIN**  
Engineering & Surveying  
Consultants

NO.	DATE	REVISION
1	10/10/2011	ISSUED FOR PERMIT
2	10/10/2011	ISSUED FOR PERMIT
3	10/10/2011	ISSUED FOR PERMIT
4	10/10/2011	ISSUED FOR PERMIT
5	10/10/2011	ISSUED FOR PERMIT
6	10/10/2011	ISSUED FOR PERMIT
7	10/10/2011	ISSUED FOR PERMIT
8	10/10/2011	ISSUED FOR PERMIT
9	10/10/2011	ISSUED FOR PERMIT
10	10/10/2011	ISSUED FOR PERMIT

ROADWAY PLAN & PROFILE  
STA 0+00 TO STA 11+50  
DR. MANN ROAD  
CURELSEA, NORTH CAROLINA

TOWN OF CURELSEA  
DR. MANN ROAD  
CURELSEA, NORTH CAROLINA

C-1



## Young Road - Site # 1



**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**



## Cedar Point Road – Site # 4



**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





## Pine Point – Site # 5



**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 1/2" per foot and roll again. Add 3" of 1" or 1.5" minus surface gravel and crown to 1/2" per foot and roll a third time.

**Priority Ranking #: 3**



Same site following implementation of recommendations –  
Day after Hurricane Irene





## Dondero Road – Site # 4



**Site # 4:** From end of Site #3 - 420' to south.

**Issues:** Vegetation and debris buildup in left side ditch. Ditch also needs to be reshaped and deepened.

3-6" DBH (diameter breast height) trees encroaching road surface on right

Shoulder berms are present along the sides of road.

**Fix:** Clean and reshape left side ditch to increase capacity and ensure uninterrupted flows toward culverts. Remove closest trees on right side of road surface growing in shoulder. Shave shoulder berms & cut in several turnouts on right where trees and topography allow. Maintain crown

**Priority #: 4**



## Searls Mills Road – Site # 3



**Site # 3:** From Pole # 13 – 275' to Pole # 14

**Issues:** Lack of ditching and shoulder berms

A wet spring is weeping water through the road surface causing rutting, mud and saturated conditions.

Poor surface gravel with very high fine content and sandy

**Fix:** Continue right side ditch for 271y' to Pole # 14 and stabilize with seed and hay.

Box cut 75' saturated area and rebuild road. Install woven geotextile fabric and rebuild base with 1' of 4" minus base gravel rolled in 6" lifts. (Compacted depth will be approximately 6") Install 6" of 1" minus surface gravel (pre-compacted depth) and crown to a minimum of 1/4" per foot.

**Priority #: 1**

## Horse Point Road Construction Details

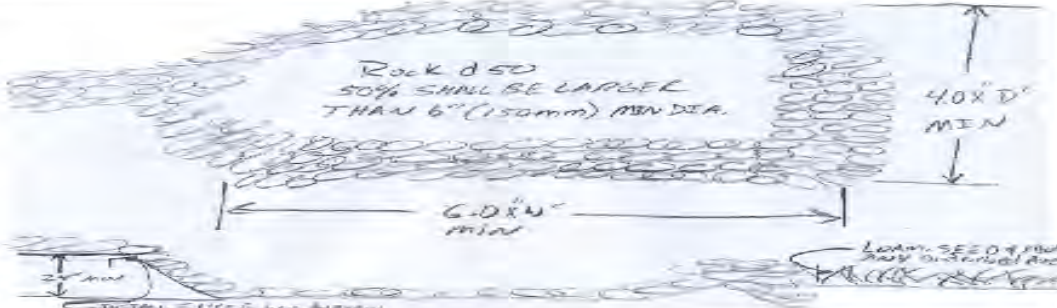
### Road Profile



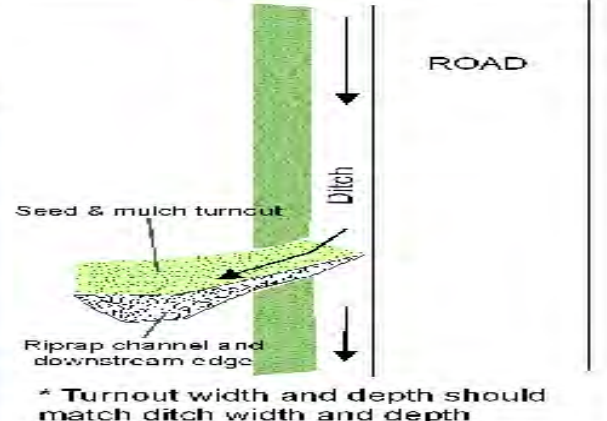
### Super-elevated Road Profile



### Plunge Pool Detail



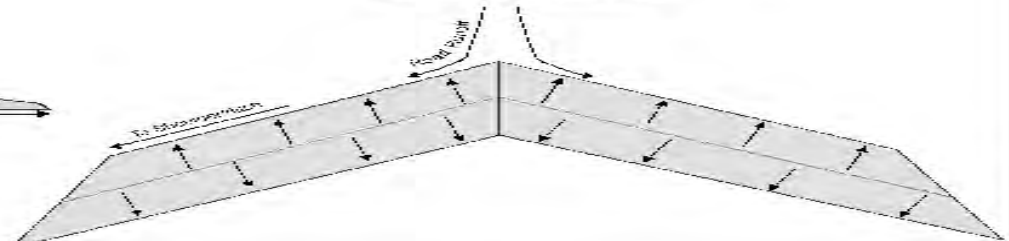
### Ditch Turnout Detail



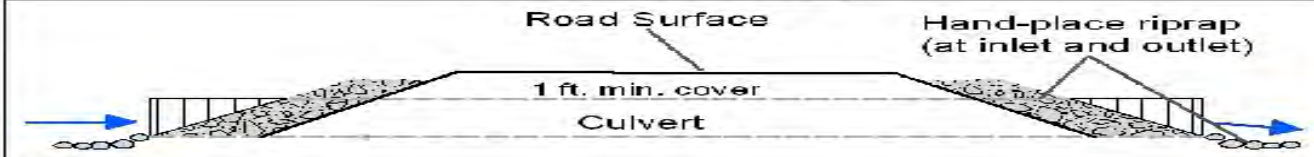
### Pavement Berm Cross Section



### Payment Term Top View



### Culvert Installation Detail





**Gravel road maintenance plans  
have proven to be the best  
investment  
a group can make in their gravel  
road.**

**Small investment to have a 10 year  
plan for properly maintaining a road,  
spending your money in the right areas  
and protecting your investment.**



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