

RSMS

Road Surface Management System



CNHRPC
Transportation Advisory Committee
6/1/12



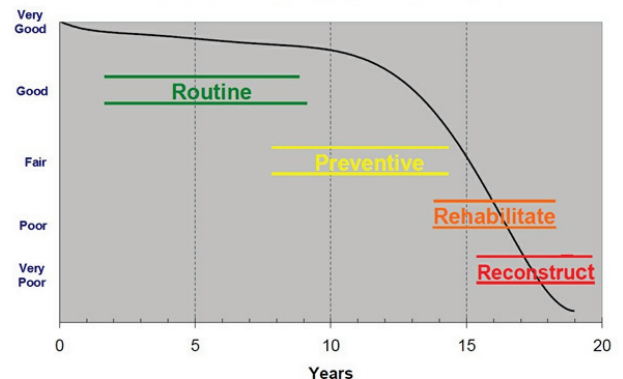
RSMS is....

2

- a methodology intended to provide an overview and estimate of a road system's condition and the approximate costs for future improvements.
- The RSMS system utilized by CNHRPC is based on the Road Condition Decline Curve.
- Roads in good condition cost less to maintain than those in poor condition.
- According to the American Association of State Highway and Transportation Officials (AASHTO), every \$1 spent to keep a road in good condition avoids \$6-14 needed later to rebuild the same road once it has deteriorated significantly.

3

Road Condition Decline Curve



4

Road Surface Management Goals - Municipal

- Maximize Return on Investment (ROI) for each dollar spent on road maintenance.
- Maintain highest possible road quality.
- Create a transparent, systematic, and non-biased methodology for road repairs.
- Generate short and long term budgetary estimates and work plans

5

Road Surface Management Goals - CNHRPC

- Build awareness of the program in the region.
- Assist in the set-up of the program with interested communities.
- Ensure local ownership of the program and continued interest in maintenance and development
- Have RSMS be a tool to assist with transportation planning at the local and regional level

6

Surveying - windshield

- An RSMS analysis is a cost effective network level budgetary planning tool
- An RSMS analysis does not provide project level engineering plans

•Distresses (7 for paved roadways, 8 for gravel roads)

Paved

- Alligator cracking
- Longitudinal and transverse cracking
- Edge cracking
- Patching, potholes
- Roughness
- Rutting
- Roadside drainage

Gravel

- Rock/Clay
- Rutting
- Loose Aggregate
- Corrugations
- Potholes
- Dust
- Cross section
- Roadside drainage

7

Essential Components

• **Severity** (only for paved roads)

- Scale
 - None
 - Low
 - Medium
 - High

• **Extent**

- Scale
 - None: no distress is visible
 - Low: the distress covers less than 10% of the road section.
 - Medium: the distress covers between 10% and 30% of the road section.
 - High: the distress covers more than 30% of the road section.

8

Pavement Distresses

9

Paved Road Survey Form

Road Name: _____
 Section ID: _____
 From Road: _____ To Road: _____
 From Milepost: _____ To Milepost: _____
 Width (ft.): _____
 Shoulder Width (ft.): _____
 Importance (1-5): _____
 Traffic (1-5): _____

Alligator Cracking	
Extent	
	Severity
none	low
low	med
med	high

Long/Trans Cracking	
Extent	
	Severity
none	low
low	med
med	high

Edge Cracking	
Extent	
	Severity
none	low
low	med
med	high

Patches/Potholes	
Extent	
	Severity
none	low
low	med
med	high

Roughness	
Extent	
	Severity
none	low
low	med
med	high

Rutting	
Extent	
	Severity
none	low
low	med
med	high

Roadside Drainage	
Extent	
	Severity
none	low
low	med
med	high

10

Alligator Cracking

Interconnected cracks resembling alligator skin or chicken wire.

None: No visible distress

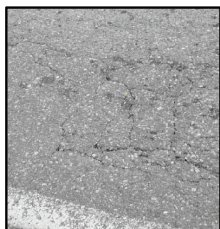
Low: Cracks barely visible, less than 1/4" wide.

Medium: Cracks up to 3/4" wide.

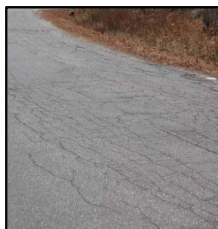
High: Cracks are wider than 3/4", and/or break-up has occurred.

Note: Alligator cracks within 24" of the pavement edge are scored as edge cracks, not alligator cracks.

Low



Medium



High



11

Longitudinal Cracking

Cracks running parallel and/or perpendicular to the roadway.

None: No visible distress

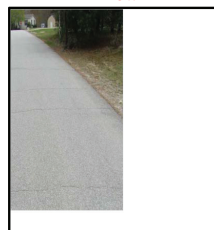
Low: Cracks barely visible, less than 1/4" wide.

Medium: Cracks up to 3/4" wide.

High: Cracks are wider than 3/4", and/or break-up has occurred.

Note: Longitudinal cracks within 24" of the pavement edge are scored as edge cracks.

Low



Medium



High



12

Edge Cracking

Cracks in pavement within 24" of the edge of the roadway.

None: No visible distress

Low: Cracks barely visible, less than 1/4" wide.

Medium: Cracks up to 3/4" wide.

High: Cracks are wider than 3/4", and/or break-up has occurred.

Low



Medium



High



13

Patching/Potholes

Patching: Areas where original pavement has been replaced, but patch is failing.

Potholes: Areas where pavement has broken, leaving a bowl-shaped depression. Pothole is either not patched, or the patch is failing.

None: No visible patches/potholes.

Low: Defect is less than 3/4" deep.

Medium: Defect is between 3/4" and 3" in depth.

High: Defect is greater than 3" deep.

Low



Medium



High



14

Roughness

Uneven roadway surface that affects the comfort of the ride.

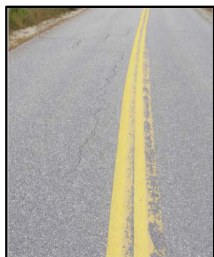
None: Surface is smooth; provides a comfortable ride.

Low: Slight roughness, does not significantly affect ride quality.

Medium: Noticeable roughness, but can be driven safely at posted speed.

High: Serious roughness, can not be driven safely at posted speed.

Low



Medium



High



15

Rutting

Channels in the wheel path caused by displacement of pavement material.

None: No visible rutting

Low: Ruts less than 1" deep

Medium: Ruts with depth between 1" and 3"

High: Ruts deeper than 3"

Low



Medium



High



16

Drainage

Can water move freely from the shoulders to the ditches and out of the ditches?

None: No flaws exist in the drainage system.

Low: Drainage is in generally good shape; water is getting off the road and into the ditch and traveling towards the culverts or catch basins

Medium: Drainage is in fair shape; water is getting off the road and into the ditch, but is ponding and/or moving slowly due to winter sand, vegetation etc...

High: Drainage is in poor shape; water can't get to the ditch and/or what gets to the ditch stays there until dissipated through evaporation or slow seepage.

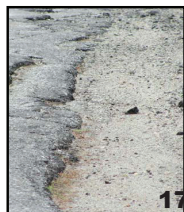
Low



Medium



High



17

Gravel Distresses

18

Gravel Road Survey Form

Road Name: _____ Notes: _____
 Section ID: _____
 From Road: _____
 To Road: _____
 From Milepost: _____ To Milepost: _____
 Width (ft.): _____ (Include shoulders)
 Importance (1-5): _____ (1=low; 5=high)
 Traffic (1-5): _____ (1=low; 5=high)

Rock/Clay					Rutting				
Extent					Extent				
<10%	10-30%	>30%			<10%	10-30%	>30%		
none	low	med	high		none	low	med	high	

Loose Aggregate					Corrugations				
Extent					Extent				
<10%	10-30%	>30%			<10%	10-30%	>30%		
none	low	med	high		none	low	med	high	

Potholes					Dust				
Extent					Extent				
<10%	10-30%	>30%			<10%	10-30%	>30%		
none	low	med	high		none	low	med	high	

Cross Section					Roadside Drainage				
Extent					Extent				
<10%	10-30%	>30%			<10%	10-30%	>30%		
none	low	med	high		none	low	med	high	

19

Rock/Clay

Rocks larger than 6" and/or areas of clay in the road surface. Road lacks any apparent and suitable base material, and/or natural materials provide no support for anticipated traffic loading.



Rutting

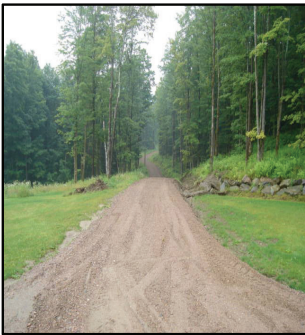
Long, narrow depressions caused by vehicles' tires.



20

Loose Aggregate

Loose material on the road surface.



Corrugations

A series of bumps perpendicular to the road surface, resembling a washboard.



21

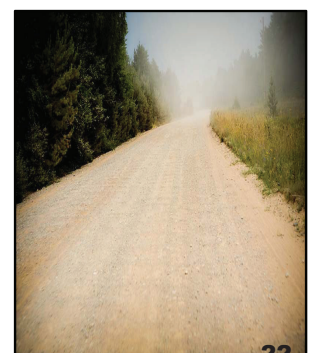
Potholes

Areas where the road surface has eroded leaving a bowl-shaped depression.



Dust

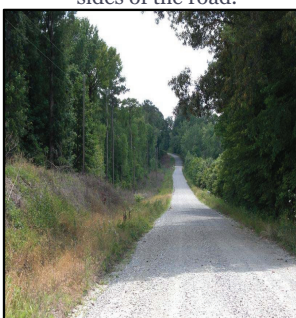
Fine particles that are raised by wind or vehicular traffic, reducing visibility.



22

Cross Section

Loss of crown, inhibiting natural drainage of water from the center to the sides of the road.



23

Roadside Drainage

Same as for paved roads.



Condition Survey Accuracy

- **Be Consistent**
 - Establish guidelines and use them
- **Be Objective**
 - Count or measure
- **Minimize Subjectiveness**
 - Get everyone on the same page

24

Here is a description of how the survey process works with the software to provide meaningful results:

•The survey process is dependent upon each road having been previously broken into sections. This task is normally performed during the initial RSMS 11 inventory phase. As a result, the survey process focuses on each individual road section rather than the road as a whole.

•The severity and extent of 7 distresses (6 surface, 1 drainage) are each measured on scales of none/low/medium/high, creating (literally) 10,000,000 possible survey outcomes for each roadway section.

•An analysis engine within the software reduces these permutations to 10 broad maintenance categories in which each road section is placed (No Maintenance, Routine, Preventive, Rehabilitate, Reconstruct, each with Good or Poor Drainage).

25

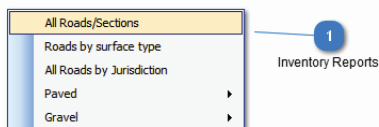
Inventory Reports

RSMS 11 offers a number of inventory reports, including:

- All roads/sections
- All roads by surface type (paved/gravel)
- All roads by jurisdiction
- Paved roads by surface maintenance category
- Gravel roads by surface maintenance category
- Paved roads by drainage maintenance category
- Gravel roads by drainage maintenance category

26

Inventory Reports



3/17/2011
5:43:05PM

Road Network Inventory 2011

Road/Section Name	Sec	From Road/Section	To Road/Section	Length	Import	Traffic	Jurisdiction	Surface	Last Survey Date
Alpha Avenue	1	Bravo Road	Charlie Street	0.25	low	low	Townway	Paved	03/07/2011
Alpha Avenue	2	Charlie Street	Delta Road	0.45	medium	low-med	Townway	Paved	03/01/2011
Beach Boulevard		Hotel Avenue	Charlie Street	0.12	low	low	Townway	Paved	03/01/2011

27

Budget Data and Development

Actions: Edit Add New Delete

Budget Data

Work Focus	Year	C/M	Recommended Repair	Other	Budget	Actual
Surface	2011	Maint.	Other		0	0
			Sand seal (S)			
			Chip seal (latex modified) (S)			
			Thick (> 1") overlay (S)			
			Thin (3/4 - 1") overlay (S)			
			Shim with 1" overlay (S)			
			Overlay w/ 2" cold mix, top w/ 1" HMA (S)			
			Mill and Fill 1.25" (S)			
			Other			

OK Cancel

28

Financial Reports

3/18/2011
2:34:04PM

Maintenance Financial Plan 2011

Road/Section Name	#	From	To	Length	Recommended Repair	Other	Budget	Actual
Gravel								
Gravel Road	3	Juliet Road	Kilo Avenue	0.20	Routine grading		400	0
Gravel Road	3	Juliet Road	Kilo Avenue	0.20		Horse guard	500	0
Total Gravel							900	0
Paved								
Alpha Avenue	1	Bravo Road	Charlie Street	0.25	Ditching		1,125	0
Alpha Avenue	1	Bravo Road	Charlie Street	0.25	Replace/New culverts		500	0
Alpha Avenue	2	Charlie Street	Delta Road	0.45		Repair guard rail	180	0
Total Paved							1,805	0
Total 2011							2,705	0
2012								
Gravel								
Gravel Road	3	Juliet Road	Kilo Avenue	0.20	Ditching		800	0
Total Gravel							800	0
Total 2012							800	0
2013								
Paved								
Alpha Avenue	2	Charlie Street	Delta Road	0.45	Shim with 1" overlay	Brushing	300	0
Alpha Avenue	2	Charlie Street	Delta Road	0.45	Shim with 1" overlay		29,250	0
Total Paved							29,550	0
Total 2013							29,550	0

29

Notes and Photos



30

Closing...

- The methodology and software for this system is flexible enough to accommodate the needs of all users in a simple, direct, and easily applied manner.
- The system is generic and is simply a tool to manage a local road network. Its optimum value is when a town "**customizes**" the system with its own repair techniques and local costs.
- CNHRPC's role is to facilitate the implementation of the program in our member communities. We are not local road network experts, we don't have the knowledge that Road Agent/Road Advisory Committee does. **Local ownership is key!!!**

31

For questions, please contact a Transportation Planner
at the CNHRPC:

Central New Hampshire Regional Planning Commission
28 Commercial Street, Suite 3
Concord, NH 03301
phone: 226-6020 fax: 226-6023
www.cnhrpc.org