Road Surface Management Using PWS RSMS Software

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Introduction

- Road Surface Management
  - What it is
  - Why to do it
  - What is involved

Learning Objectives:
- The steps to implement a Road Surface Management System
  - Inventory
  - Condition Assessment / Surveys / Distresses
  - Repairs
  - Decisionmaking
    - Analysis
    - Management Plans
- Using RSMS Software to implement your PMS
Agenda

- Road Surface Management
  - Background 1 hr
  - Distresses 1.5 hrs
  - Lunch 1 hr
  - Repairs 1 hrs
  - Decision Strategies and Budgets 1.5 hrs

- RSMS
  - Overview and the Interface 1 hr
  - Inventory 1 hr
  - Condition Assessment / Surveys 1 hrs
  - Repairs ½ hr
  - Reports and Discussion 1.5 hr
  - Individual practice ???
Vocabulary

- **Road Surface - / Pavement Management System (PMS)**
- **Condition Assessment / Windshield Survey**
  - What shape are your roads in? Determine the distresses and ratings
- **Distress**
  - *Indicators* of stress or strain in the road surface such as cracks, potholes, rutting, etc.
- **Network**
  - The collection of assets (roads) in an agency (town)
- **Project**
  - A repair confined to a specific, limited area such as a single road, neighborhood, or subdivision
Lifecycle of a Road

- 40% QUALITY DROP
- 75% TIME
- 40% QUALITY DROP
- 12% TIME

- EACH $1 OF REPAIR COST HERE...

- WILL COST $4-8 IF DELAYED TO HERE
Lifecycle of a Road

REPAIR LEVEL

- Defer
- Routine
- Preventive
- Rehabilitate
- Rebuild

Years

Very Good

Good

Fair

Poor

Very Poor
Lifecycle of a Road

Repairs do not return the road condition to 100% until the road is **rebuilt**.

Very Good

Good

Fair

Poor

Very Poor

Years

Routine

Preventive

Rebuild
Overview - Road Surface Management

- **What is it?**
  - A management system for road maintenance to provide effective, safe roads cost effectively.

- **Why?**
  - Save $$$
  - Reduce long-term maintenance costs
  - Improve road quality
  - Short and long term repair plans
  - Justification for budgets and capital reserve funds
  - Good customer relations
Guiding Principles

- Apply best technical and management practices
- Plan maintenance and repair of network roads
- Usable by all sizes of agencies
- Flexible for specific considerations
  - Exceptions from normal practices based on specific conditions
    - High Roughness = shim and overlay, not just overlay
    - Curb reveal minimum = mill and overlay
Scope of Work

Network

- ALL of the roads
- The WHOLE town
- The BIG picture
- Costs are “in the ball park”
- Repair lengths in ## miles
- Details are few
  - Name, length, surface, repair, year to complete repair

Project

- ONE or a FEW roads
- A neighborhood or area
- A closeup view of a road
- Costs are detailed
- Repair lengths in yards
- Details are many
  - Assess causes of deterioration, determine best design and repairs for that section
Road Surface Management

- What is involved?
  - Inventory – what you maintain
    - Roads – surface type, length, width, name, other physical identifiers
  - Condition Assessment – what shape it is in
    - Distresses - Cracks, rutting, potholes, patching, dust, roughness
  - Repairs – what to do to it
    - What is used in your agency
  - Management Plan:
    - Which repairs are highest priority?
    - How do I best expend my budget?
      - Keep my good roads good?
      - Worst first?
      - Mix it up?
      - Play politics?
      - Complaints (‘My road is worse than your road’)?

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Inventory

- The list of roads in your agency
  - Identifying information for each road
    - Name, ID, from and to intersections, division, etc.
  - Physical information
    - Width, length, surface type, shoulder type, etc.
  - Can inventory roads you do not maintain
    - Class 6, private, emergency access

- Sources for inventory
  - GRANIT, the NH GIS warehouse [www.granit.unh.edu](http://www.granit.unh.edu)
  - NHDOT, RPCs, town
  - Prior inventory lists

- Once you have inventory done, you just need to maintain it
Inventory

Sectioning

- Inventory may not come in the way you want it
  - NH and ME break each section between intersections
    - Can result in very short sections, impractical to contract each (more later)

- Use the length that you would issue a workorder for
  - Typically up to about 1 mile in length
    - Max distance you can travel before forgetting conditions at the start
  - End section at a physical change (# lanes, pavement width, type)
  - End section at a logical place
    - Serpentine path straightens out
    - Change in residential density or Compact Zone
    - Maintenance division, ward, other political boundary
Distresses

- An **indicator** of a problem stressing the road surface
  - Cracks
  - Potholes
  - Rutting
  - Dust
  - Washboarding
Distresses

- **Identify** = which?
- **Severity** = how bad?
- **Extent** = how much?
Distresses

Ratings for distresses

Numeric vs. Descriptive

1-2-3 or Low – Med – High

Establish a numerical range for descriptive ratings

- Low = <10%, Med = 10-30%, High = >30%
- When in doubt, count, but better to train your eyeballs = Practice

Note the direction for descriptive ratings (high might be a good thing)

Objective vs Subjective

Objective = count, measure, determine = Exact

Subjective = judgment call, opinion, guesstimate, relative = open to interpretation

- Establish guidelines and document them
- Be consistent: double check your prior or another’s ratings
Asphalt Road Surface Distresses

- Alligator Cracking
- Longitudinal/Transverse Cracking
- Edge Cracking
- Patching/Potholes
- Roughness
- Rutting
Alligator Cracking

- Interconnected or interlaced cracks forming connected irregular shaped polygons

Causes

- Repeated Heavy Loads
- Poor Drainage
Alligator Cracking

**Severity**

- Low = cracks just visible
- Medium = crack width < 1/8”, no displaced pieces
- High = crack width > 1/8” and/or displaced pieces
Alligator Cracking

Low Severity
Alligator Cracking

Medium Severity
Alligator Cracking

High Severity
Alligator Cracking

- **Extent (percent of surface area)**
  - Low = <10%
  - Medium = 10% to 30%
  - High = 30+%
Alligator Cracking

Low Extent
Alligator Cracking

Medium Extent
Alligator Cracking

High Extent
Longitudinal Cracking

- Cracks/breaks parallel to center line
- Causes
  - Poorly Constructed Paving Joints
  - Shrinkage/Temperature
  - Reflection
  - Settlement
Transverse Cracking

- Cracks/breaks across roadway

Causes

- Shrinkage/Temperature
- Reflection
- Culverts
- Utility Cuts
Longitudinal/Transverse Cracking

- **Severity**
  - Low = none or very narrow
  - Medium = $\frac{1}{4}$”
  - High = $\frac{1}{4}$” or larger
Longitudinal / Transverse Cracking

Low Severity
Longitudinal / Transverse Cracking

Medium Severity
Longitudinal / Transverse Cracking

High Severity
Longitudinal / Transverse Cracking

Extent (Longitudinal Cracking)
- Low = <10%
- Medium = 10% to 30%
- High = 30+%
Longitudinal / Transverse Cracking

- **Extent (Transverse Cracking)**
  - Low = cracks > 50’ apart
  - Medium = cracks 25’ to 50’ apart
  - High = cracks < 25’ apart
Longitudinal / Transverse Cracking

- **Extent (longitudinal and transverse)**
  - **Low** - If both occur, crack sealing is the best solution
  - **Medium** - If both occur to a degree that surface treatment is the best maintenance option
  - **High** - If both occur to a degree that rehabilitation is the best solution
Low Extent
Longitudinal / Transverse Cracking

Medium Extent
Longitudinal / Transverse Cracking

High Extent
Edge Cracking

- Cracking and/or loss of pavement edges

Causes

- Loads on Edge of Pavement
- Lack of Edge Support (Shoulders)
- Materials
- Moisture
- Thermal (snow piles)
Edge Cracking

Severity

- Low - thin cracks, < 12” from pavement edge
- Medium - larger cracks, < 24” from pavement edge
- High - breakup, > 24” from edge
Edge Cracking

Low Severity
Edge Cracking

Medium Severity
Edge Cracking

High Severity
Edge Cracking

- **Extent**
  - Low = < 10%
  - Medium = 10% to 30%
  - High = 30+%
Edge Cracking

Low Extent
Edge Cracking

Medium Extent
Edge Cracking

High Extent
Patching

- Isolated small areas of new paving material placed over a previous distress or in place of removed materials

**Causes**

- Highway Departments
- Utility Cuts
Patching

- Extent (percent of road length)
  - Low = <10%
  - Medium = 10% to 30%
  - High = 30+%
Potholes

- Bowl-shaped voids in pavement surface, full or partial depth

Causes

- Loads
- Water in Base
- Materials/Construction
Potholes

- Extent - number per road length
  - Low = < 5 per 100 ft
  - Medium = 5-10 per 100 ft
  - High = 10+ per 100 ft
Patching/ Potholes

Low Condition
Patching/ Potholes

Medium Condition
Patching/ Potholes

High Condition
Roughness

- All irregularities in the pavement surface that interfere with a smooth ride

Causes
- Shoulders
- Ditch depth and slope
- Soils
- Erosion and obstructions
Roughness

- The “ride” at posted speed.
- Good - water on dash only ripples.
- Fair - water on dash splashes within glass.
- Poor - water on dash splashes out of glass.
Roughness

Good Condition
Roughness

Fair Condition
Roughness

Poor Condition
Rutting

- Longitudinal depressions in one or both wheel paths

**Causes**
- Loads
- Improper compaction of mix
- Poor subgrade structure

- Can be easier to see when the road is wet (puddles)
Rutting

- Good = depth of ruts < 1”
- Fair = depth 1” to 2”
- Poor = depth > 2”
Rutting

Good Condition
Rutting

Fair Condition
Rutting

Poor Condition
Distress Rating Summary

- **Severity** - Low - Med - High
  - Alligator Cracks
    - 1/16” – 1/8” – 1/8”+
  - Long / Transverse Cracks
    - <1/8” - <1/4” – 1/4”+
  - Edge Cracks
    - <1/8” less than 12” from edge
    - <1/4” less than 24” from edge
    - 1/4”+ more than 24” from edge, breakup of surface

- **Extent** - Low - Med - High
  - All Cracks but Transverse
    - <10% - 10-30% - 30%+
  - Transverse Cracks
    - 50ft - 25-50ft - <25ft spacing
  - Patching
    - <10% - 10-30% - 30%+
  - Potholes
    - <5 – 5-10 – 10+ per 100ft
  - Roughness
    - best guess / use photos
Unpaved Roads
Surface Distresses

- Primary Distresses
  - Cross Section
  - Roadside Drainage
  - Dust

- Traffic Induced Distresses
  - Corrugations
  - Potholes
  - Rutting
  - Loose Aggregate
Cross Section

- Does water drain off of road surface?

- Condition
  - Good - good crown, water flows off roadway
  - Fair - minimal crown and/or moderate amounts of ponding on roadway
  - Poor - water flows on roadway and/or large amounts of ponding
Cross Section

Good Condition
Cross Section

Fair Condition
Cross Section

Poor Condition
Roadside Drainage

- Does water drain away from *roadway*?

- Condition
  - Good - water flows in ditches & culverts
  - Fair - moderate amounts of water remains along *roadside*
  - Poor - large amounts of water remains along roadside

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Roadside Drainage

Good Condition
Roadside Drainage

Fair Condition
Roadside Drainage

Poor Condition
Corrugations

- Washboard surface, ridges and valleys perpendicular to direction of travel

Causes
- Traffic
- Moisture
- Loose Aggregate
Corrugations

- **Severity**
  - Low - < 1” deep
  - Medium - 1” to 3” deep
  - High - > 3” deep
Corrugations

Low Severity
Corrugations

Medium Severity
Corrugations

High Severity
Corrugations

**Extent**
- Low - < 10%
- Medium - 10% to 30%
- High - > 30%
Corrugations

Low Extent
Corrugations

Medium Extent
Corrugations

High Extent
Potholes

- Bowl shaped depressions in road surface

Causes
- Loads
- Moisture
- Loose Aggregates
Potholes

Severity

- Low - < 1” deep and/or < 1’ diameter
- Medium - 1-3 “ deep and/or 1’ to 2’ diameter
- High - > 3” deep and/or > 2’ diameter
Potholes

Low Severity
Potholes

Medium Severity
Potholes

High Severity
Potholes

**Extent**

- **Low** - <10% and/or <5 per 100’ section
- **Medium** - 10-30% and/or 5-10 per 100’ section
- **High** - >30% and/or >10 per 100’ section
Potholes

Low Extent
Potholes

Medium Extent
Potholes

High Extent
Rutting

- Channels in wheel paths
- Water flows along road rather than off it.

Causes
  - Traffic
  - Moisture
Rutting Depth Check
Rutting

- **Severity**
  - Low - < 1” deep
  - Medium - 1” to 3”
  - High - > 3”
Rutting

Low Severity
Rutting

Medium Severity
Rutting

High Severity
Rutting

- **Extent**
  - **Low** - <10%
  - **Medium** - 10% to 30%
  - **High** - > 30%

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Rutting

Low Extent
Rutting

Medium Extent
Rutting

High Extent
Loose Aggregate

- Loose material, along shoulder or centerline

Causes

- Improper Gradation
- Traffic
Loose Aggregate

- **Severity**
  - Low - < 2” deep
  - Medium - 2-4”
  - High - > 4”
Loose Aggregate

Low Severity
Loose Aggregate

Medium Severity
Loose Aggregate

High Severity
Loose Aggregate

**Extent**

- Low - < 10%
- Medium - 10% to 30%
- High - > 30%
Loose Aggregate

Low Extent
Loose Aggregate

Medium Extent
Loose Aggregate

High Extent
Dust

- Loss of fine materials from road surface
- Larger particles become unstable

Causes
- Improper gradation
- Traffic
Dust

- Light - normal traffic produces thin dust
- Medium - normal traffic produces moderately thick cloud
- Heavy - normal traffic produces thick cloud
Dust

Light Condition
Dust

Medium Condition
Dust

Heavy Condition
Exercise – Identifying and rating distresses

- Use paper forms in your pack
- Inventory and survey Thomas Street
- Discuss repair options (what would you do?)
Distresses - Summary

- Distresses: factors that affect the road surface
- Practice identifying and rating them
  - Consistent ratings make for accurate repairs

- Questions?
Repair Levels

- RSMS uses a hierarchy for repairs:
  - Level – strategy for repair (Preventive, Routine, etc.)
    - Category – a group of related repairs (Dust Control, Overlay)
      - Repair – what is done to the road (apply CaCl liquid, 2” HMA overlay)
  - Each Category has a Level
  - Each Repair has a Category
Repair Levels

- The Top grouping
  - Deferred maintenance
  - Routine maintenance (highest value)
  - Preventive maintenance
  - Rehabilitation
  - Rebuild (lowest value)

- The values follow the ‘Best First’ strategy
- RSMS determines this from the survey data
Deferred Maintenance

- No action other than needed for dangerous or emergency situation
- No intent to extend useful life of road
- Even without significant traffic, road will deteriorate
Routine Maintenance

- Cleaning ditches and culverts
- Asphalt Roads: Sealing cracks or patching potholes or repairs to small areas
- Unpaved Roads: Spot regraveling and grading
- Usually performed by municipal crews
Preventive Maintenance

- Repairs to prevent increased deterioration
- Asphalt Roads: surface coats - chip seals or thin overlays
- Unpaved Roads: Shaping and grading, add minor amounts of gravel
- Usually performed by municipal crews
Rehabilitation

- Major repairs to the road surface
- Asphalt Roads: Usually an overlay after surface preparation
- Unpaved Roads: Adding major amounts of gravel, reshaping and compacting
- Usually performed by contractors
Rebuild

- Major repairs to structure and geometry
- Excavate and replace subbase
- New paved or gravel wearing surface
- Major drainage repairs and construction
- Performed by contractors
- Funded by bonds or CRF
Exercise: group unpaved repairs into the appropriate Level:
Defer, Routine, Preventive, Rehabilitate, Rebuild

- Regrade, add major gravel
- Spot regravel
- Grade Surface 2x / year
- Reshape – blade
- No Maintenance
- Spot Regravel, add CaCl
- Apply CaCl liquid

- Rebuild
- Routine
- Routine (Defer)
- Rehabilitate
- Defer
- Routine
- Preventive / Routine
Repair Levels

Exercise: group asphalt repairs into the appropriate Level:
Defer, Routine, Preventive, Rehabilitate, Rebuild

- Rout, fill, crack seal
- Double chip seal
- 3” HMA overlay
- Hot patch
- Surface coat
- 1.5” HMA overlay
- Ditch, 6” base, 2” overlay
- 2” HMA overlay

- Routine
- Preventive
- Rebuild
- Routine
- Preventive
- Preventive
- Preventive
- Rebuild
- Preventive
Repair Categories

- A group of related repairs (e.g. ‘overlay’)
- The Middle grouping
- RSMS recommends one for each road

Repair Value (RV)

- This category fixes all other distresses
  - An overlay will fill all types of cracks so no need to crack seal
  - RV follows cost (roughly)

Priority Value (PV)

- The order that repairs should be scheduled
  - Routine Maintenance is higher priority than Rebuild (why?)
  - PV goes opposite cost (roughly)
Lifecycle of a Road

Very Good
Good
Fair
Poor
Very Poor

Years

75% TIME

40% QUALITY DROP

40% QUALITY DROP

12% TIME

EACH $1 OF REPAIR COST HERE...

WILL COST $4-8 IF DELAYED TO HERE

Repair Level
Defer
Routine
Preventive
Rehab
Rebuild

Years

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Repair Categories

- A group of related repairs (e.g. ‘overlay’)
- The Middle grouping
- RSMS recommends one for each road

**Repair Value (RV)**
- This category fixes all other distresses
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**Priority Value (PV)**
- The order that repairs should be scheduled
  - Routine Maintenance is higher priority than Rebuild
  - PV goes opposite cost (roughly)
Repairs

- What you or RSMS automatically selects for each road
- Information for each repair
  - Surface Type
  - Category and Level it belongs to
  - Life Improvement - how long the repair will last
  - PCI Improvement - the jump in road quality from the repair
  - Units - the repair is measured how? Square feet, linear feet, etc.
  - Cost - the unit cost for the repair ($ per unit)
  - Year – the year this data was last updated

At the office, you must Verify / Update / Add / Delete the list:
- Include only the repairs you use in your agency
  - Delete ones not used, or change the name (add ‘—’ to the front)
- Use your costs, not necessarily what came supplied
Repairs

PCI Improvement (percentage)

Repair Lifetime

Very Good

Good

Fair

Poor

Very Poor

Years
1. A distress is ______________ of a ______________ with the road.

2. All repairs fall into in both a _______ and a _______.

3. Distresses can be rated how?
   - A) Severity
   - B) Extent
   - C) Both
   - D) All

4. Which is the most expensive repair level?

5. Define ‘Best First’ and Worst First’.
Repairs - Summary

- Repairs are grouped into a Level and Category
- Review and edit your repair listing to what you use
  - Adjust costs and descriptions

- Questions?
Decisionmaking

- The RSMS Process:
  1) Inventory – what roads do you maintain
  2) Condition Survey – what shape are they in
     - distresses, severity and extent, other factors
  3) Repairs – what repairs do I use
  4) Analysis – match the repair to the road
  5) Management Plan – the repair schedule and budget

- Decisions to be made by you!
Decisionmaking

Distress and Ratings

- Med / Low Longitudinal / Transverse Cracks
- Med / Med Alligator Cracks
- Med / Med Edge Cracks
- Med Patching / Potholes
- Med Roughness
- Low Rutting

Repair Category

- Crack Seal
- Overlay
- Crack Seal
- Patch
- Satisfactory
- Satisfactory
The RSMS Process

- Lets take a look at each step in more detail

- Inventory
- Condition Rating
- Analysis
- Management Plan
Inventory

- Generating Inventory
- Use a map (SHP) file as the source
- Available from GRANIT, MassGIS, MEGIS for free
  - [www.granit.unh.edu](http://www.granit.unh.edu)
  - [www.mass.gov/mgis](http://www.mass.gov/mgis)
  - [http://www.edc.uri.edu/RIGIS/](http://www.edc.uri.edu/RIGIS/)
- Concord data is already loaded on your PC
- On your CDs will be data for your town
Inventory

- You must know some information about your source SHP
  - Each column contains data you may want to use in RSMS
  - Most SHP files contain metadata, a description file (HTML) of what the SHP file contains for data, source, when collected, by whom, etc.
    - Contains descriptions of the fields and their values / content
    - SHP files contain a LOT of unusable fields ([DYNSEGID], counters)
    - Contains unmatchable fields ([SHLDTYPE], [SURFTYPE] are numbers)
      - These numbers may not be the numbers you need
  - RSMS pulls in the road list from a digital map file (SHP)
    - Add the SHP file to the map first
    - Then convert it to the RSMS table
Inventory – Field matching (NH)

NH SHP – Road data

- [STREET] contains the name of the road
- [WIDTH]
- [LANES]
- [LENGTH] (not SLEN)
- [FROM_MP]
- [TO_MP]

RSMS

- [SNAME] contains the name of the road
- [ROADWIDTH]
- [LANES]
- [LENGTH]
- [MILEPOST]
- [ENDPOST]
Inventory

- Required information:
  - SNAME – section name / identifier

- Considerations:
  - How you would describe that section of road to a person
    - “Main St between 1st and 2nd” = “Main St 1-2” or “Main1-2”
  - Use supplemental fields:
    - [FROMSTREET] and [TOSTREET] = “1st” and “2nd”
    - Milepost and Endpost = measured from the town line
  - How the name will appear in a list – which section is intended?
  - Remember: this is a map based program …(coming up)
Inventory

- **Break** – split one mapped section into two
  - Select the road
  - Select the break point
  - **Break**
  - **Inventory** data is saved for both sections

- **Merge** – join two adjacent sections into one
  - Select the roads
  - **Merge**
  - Choose one road’s **Inventory** data to save to the new section
    - Width, surface type, notes, etc. are transferred

- All **survey** data for BOTH sections is **abandoned**
Inventory

- Required information:
  - WIDTH
  - LENGTH of the section
  - SURFACE TYPE (may be a number – lookup metadata)
  - TRAFFIC
  - IMPORTANCE

- Additional, optional info:
  - Shoulder type and width, division, from/to street, class, lanes, RIN, jurisdiction, inventory year
Inventory

- **TRAFFIC - relative scale**
  - Scale used is up to you for your town
  - Use a reference road for ‘high’
  - Can translate ADT counts into a scale (tool coming)

- **IMPORTANCE – relative scale**
  - School, emergency service, municipal service locations
  - How many people affected?
  - EMD can supply ratings as well
Inventory

- Other items of interest
  - Add additional fields of use for your agency
    - Political district / ward
    - Urban Compact Zone
    - Watershed / Environmental/ Reduced Salt Usage
    - Sidewalks

- Collect the data that you need to make your arguments
  - Coordinate with your management plan
Surveys

- Distresses
  - Severity AND Extent

- Severity OR Extent = Low / Med / High (listbox)
Surveys

- Distresses – the key distress determines the CATEGORY
- Surveys are where you collect the information that affects the repair selection
- You still have to select the best repair within the category

Some other factors in determining which repair:
- Shim and overlay or just overlay?
- Do I have a minimum curb reveal? Do I mill AND overlay?
- While I am contracting this section, should I add in sidewalk ramps to the work so I save costs?
Surveys - Flags

- **Flag** – question with a Yes / No answer
  - Do I have ADA issues in this section?
  - Do I have poor drainage here?

- If ‘Yes’ then:
  - Consider adding ramps and bumps to sidewalks
  - Fix drainage before fixing the road

- Logic: ‘Yes’ values can apply a percentage change in the selected repair
  - Poor Drainage = ‘Yes’ = fix drainage = costs increase 25%
Surveys – Factors

- **Factors** – a rating scale or a numerical value
  - Drainage = Good / Fair / Poor
  - Roughness = Teethknocker / Rough / Smooth / Sheet of glass
  - Curb reveal = under 2” / 2”+
  - Patching = percentage needed

- Appears as a listbox or an text entry box

- Logic: Factors affect the decisionmaking process by:
  - switching repairs (‘overlay’ becomes ‘mill and overlay’ or ‘shim and overlay’)
  - Calculating costs (if repair selection = patching, calculate the percentage needed * length * width * cost)
Surveys – Info

- **Info** – a text or listbox to record notes for a section
  - Notes pertaining to the **condition** of the section typed in
    - ‘Need sidewalk ramps at Main and 1st’
    - Road rater recommendations for repair = “crack seal”
  - Notes that occur often and appear in a listbox
    - Sidewalk condition = ‘None / Good / Fair / Poor’

- Does **not** enter into decisionmaking
Surveys – New Features

- Flags, factors, info are user determined
  - You configure what you want to collect, what it looks like, what and how it affects the repair choice
  - Turn on / off whether they are collected
  - Collected as part of the survey so is date stamped

- Can be used in reports and queries
  - Print a list of non-ADA compliant roads
  - Print a list of roads with poor drainage
Surveys - Discussion

- What are some other decision-makers that you use when determining which repairs to select?

- What information do you need to collect to use them?
Analysis

- We have recorded:
  - Inventory – what you have
  - Conditions – what shape it is in

- The last steps:
  - Analysis
  - Management Plans
Analysis

- The easy part since RSMS does it for you
  - For each section, RSMS:
    - Finds the key distress
    - Looks up the repair category for that distress
    - Records the repair category

- What you need to do:
  - Inventory
  - Condition surveys
  - Pick the repair from the category afterward (maybe…)

- Analysis is done at the close of the survey automatically or through a menu command
Decisionmaking

- How RSMS determines the repair category:
  1) Lookup each distress and list the corresponding repair category.
  2) Lookup the RV for each category on the list.
  3) The largest RV becomes the repair category.
Management Plan

- This is where YOUR skills in decisionmaking come foremost
- RSMS provides you with a bunch of info to make decisions easier, but you still have to make them.
Management Plan

- What is a management plan?
  - A multiyear plan for maintenance of roads to maintain / improve their performance in a cost effective manner
  - Typically a 5 / 10 / 15 / 20 year plan
  - Network level (remember this?)
  - A guideline for budgets and project scheduling
Management Plan - Discussion

- Discuss how you develop a management plan:
  - How many years do you plan?
  - What determines the timeframe?
  - Does the plan determine the budget or vice versa?
  - What considerations do you include for the budget?
    - Tax rate / resident or council approval rate / warrant process
  - How do you determine your priority roads to repair?
  - How do you allocate funds to repairs? By repair type? repair level (routine, preventive, etc.)?
Management Plan

To consider:

- Apply best technical and management practices
- Roads that are not repaired will continue to deteriorate
- ‘Keep good roads good’ or ‘Best First’
- Routine maintenance gives the most bang for the buck
- Bad roads will remain bad
- You cannot predict needed repairs than 5 years in advance
- You can budget for repair level 5-20 years
- Roughly, you want to apply no more than 2 preventive repairs (crack seals, surface coat) before a rehab/rebuild is due
Management Plan

Repairs do not return the road condition to 100% until the road is rebuilt.

Years

Very Good

Good

Fair

Poor

Very Poor

Routine

Preventive

Rebuild
Management Plan

- Allocate by Level, sort by priority
  
  1. Routine: complete all that can be scheduled
  2. Preventive: complete all that can be scheduled
  3. Rehab: use majority of leftover funds
  4. Rebuild: use remaining funds
  5. Repeat each year to year 5
  6. Look at the repair lifetime to determine the next needed repair for each road; budget accordingly
  7. Remember the curve: budget for routine and preventive repairs when they are due
Management Plan

- Capital Improvement Plan
  - Used mainly for rebuilding roads and for major repairs
  - Limited lifetime; usually bonded
  - Used to build an acceptable road performance level

- Can determine CIP requirements using the maintenance backlog
  - Roads that are not rehab/rebuilt when needed are added to the backlog
Summary – RSMS Process

- Inventory – what you have
- Condition Survey – distress identification and rating
- Repairs – what you do to stop the distresses
- Management Plan – multi-year repair plan to optimize road performance and costs
More Information on CD

- RSMS general manual
- Distress identification manual 03031
- Cost effectiveness of pavement maintenance