

Overview of MTC StreetSaver Pavement Management System



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Pavement Management Is a Decision Making Process

- ◆ Find Cost-effective Treatments
- ◆ At Designated Times
- ◆ To Give a Desired Level of Service

PMS Principles

- ◆ It Costs the Maintaining Agencies Less to Have Good Roads Than Bad Roads
- ◆ Providing:
 - Reasonable Level of Service Provided
 - Pavements Will Respond to Preventive Maintenance
 - » Structurally Adequate

Need Balance

- ◆ Keep Better Pavements in Good Condition
 - Preventive Maintenance
- ◆ Repair Those That Are Deficient
 - Rehabilitation or Reconstruction

StreetSaver Pavement Management System or PMS Software

- ◆ Decision Support Tool
 - Stores Data
 - Provides Information
 - Prepares Reports & Graphs
- ◆ Supports Making Cost-effective Decisions
 - Network- & Project-Selection Levels
 - Existing Pavement System

MTC StreetSaver Addresses

- ◆ Programmed (Preventive) Maintenance
- ◆ Rehabilitation
- ◆ Reconstruction

Of Existing Pavements

PMS Management Levels

- ◆ Network - Planning & Programming for Entire Set of Pavements Managed
- ◆ Project Selection - Programming a Subset
- ◆ Project - Designing a Specific Section

Purpose of Network-Level

- ◆ Related to the Budget Process
- ◆ Identify Maintenance and Rehabilitation Needs
- ◆ Show Impact of Funding Options
- ◆ Communicate With Funding Authorities

Purpose of Project-Selection-Level

- ◆ Refine Alternative Treatments
- ◆ Select Sections for Funding
- ◆ Refine Cost Estimates

Input from Network-level

Purpose of Project-Level

- ◆ Develop Cost-effective Strategy For:
 - Original Construction
 - Maintenance
 - Rehabilitation
 - Reconstruction
- ◆ Within Imposed Constraints

Input from Project Selection-level

MTC SteetSaver Software - Primarily Network-Level

- ◆ Need Decisions About Funding Levels, Allocation, and Policies
- ◆ PMS Software Used to Develop Recommendations
- ◆ Staff Use These to Prepare Recommendations to Senior Management & Funding Authorities

Project-Selection Level

- ◆ Completed by Staff - Some Help From SteetSaver Software
 - Finalize Candidate Project List
 - Add & Remove Projects
 - Consider Constraints
 - Adjust Limits
 - Adjust Dates
 - Adjust Cost Estimates

Project-Level

- ◆ Completed by Engineering or Public Works
 - Use Available Design Procedures
 - Consider Life Cycle Costs and Impacts
 - Adjust for Constraints
 - Within Available Funds

Differences in Data

- ◆ Project-level
 - Detailed Data Needed to Complete Design
- ◆ Project-selection Level
 - Enough to Compare Preliminary Alternatives for Some Sections
- ◆ Network-level
 - Enough to Identify Best Group of Candidate Sections & Funding Impacts

Network-Level Elements

- ◆ Inventory
- ◆ Condition Assessment
- ◆ Determination of Needed Work & Funds
- ◆ Identification of Candidate Projects
- ◆ Determination of Impacts of Funding Alternatives
- ◆ Feedback

Inventory

- ◆ What Agency Is Responsible for
- ◆ Where It Is Located
- ◆ Basic Information

Network-Level

- ◆ Absolute Minimum Data
 - Collect Only the Data Needed When It Is Needed
 - To Address Broad Funding Questions
- ◆ Required
 - Identification
 - Location (beginning & ending)
 - Area (length & width)
 - Surface type
 - Dates constructed & maintained
 - Functional classification
- ◆ Optional

Breaking Network

- ◆ Important First Step
- ◆ All Data Stored by Management Section
- ◆ Inspections Conducted on Management Sections
- ◆ MTC Training on That Topic Available

Network-Level Elements

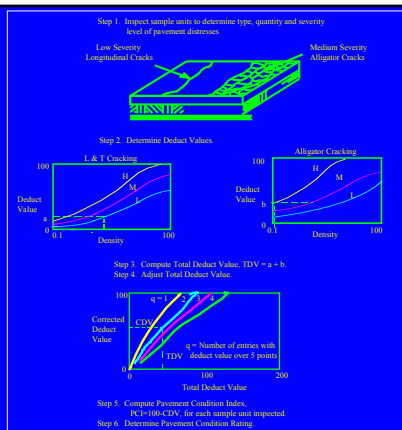
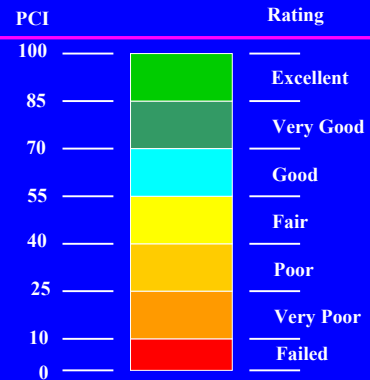
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Condition Assessment

- ◆ Health of Individual Segments
 - Engineering
 - Functional
 - Safety
- ◆ Collectively Define Health of Network

StreetSaver Uses PCI

- ◆ Pavement Condition Index Basic Measure of Condition
- ◆ Method to Uniformly Characterize Condition of Paved Surface
 - Along Road/street
 - Over Time
 - Among Raters



PCI Values Used

- ◆ To Identify Level of Work Needed
- ◆ Amount of Funding Needed
- ◆ Project Future Condition

PCI

- ◆ PCI Drives Many Recommendations
- ◆ Accurate PCI Depends on Accurate Distress Identification
- ◆ Quality Control During Inspection Needed
- ◆ MTC Provides Training

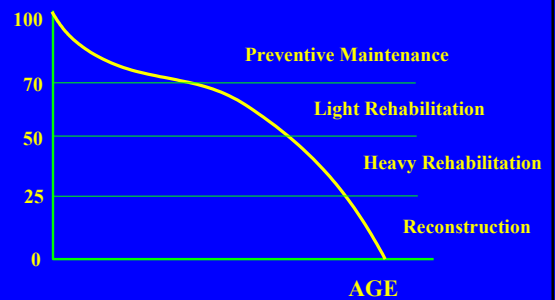
Network-Level Elements

- ◆ Inventory
- ◆ Condition Assessment
- ◆ **Determination of Needed Work & Funds**
- ◆ Identification of Candidate Projects
- ◆ Determination of Impacts of Funding Alternatives
- ◆ Feedback

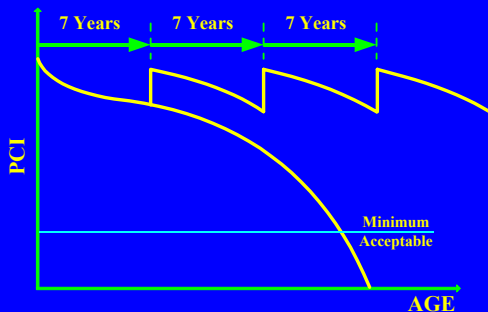
Needs Analysis

- ◆ Identify Sections Needing Work
- ◆ Estimate Funds Needed
- ◆ Rehabilitation - Condition Driven
- ◆ Preventive Maintenance
 - Minimum Condition &
 - Time Interval

Rehab – Condition Driven

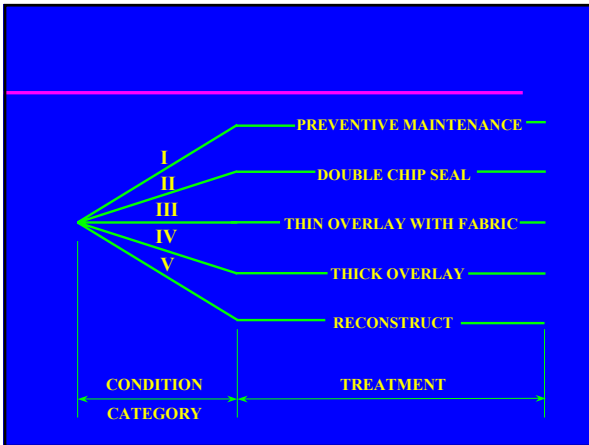
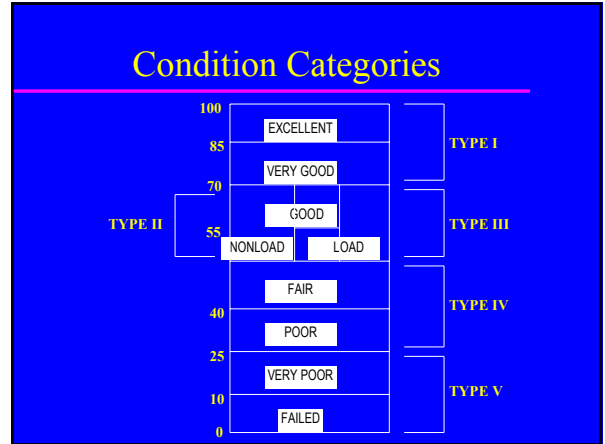
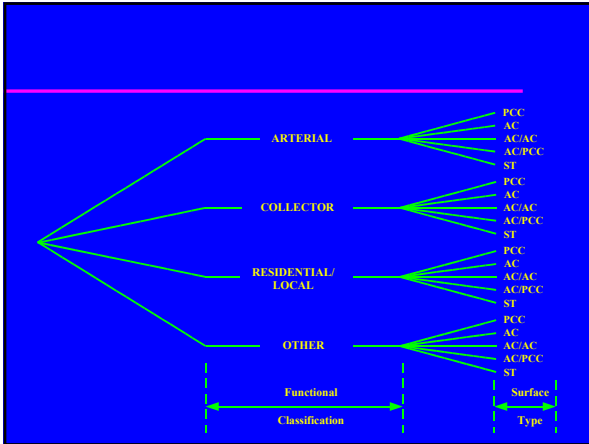


PM – Time Sequenced



Decision Tree Approach

- ◆ Network-level planning treatment
 - Assigned each section needing work
 - During analysis period (5 to 20 yrs)
- ◆ Factors considered:
 - Condition
 - » Projected PCI
 - » Cause of damage
 - Functional Classification
 - » Usage & construction
 - Surface type



Planning Treatment / Cost Category

- ◆ Treatment Generally Applied
- ◆ Cost More Important Than Actual Treatment
- ◆ Actual Treatment Selected Later

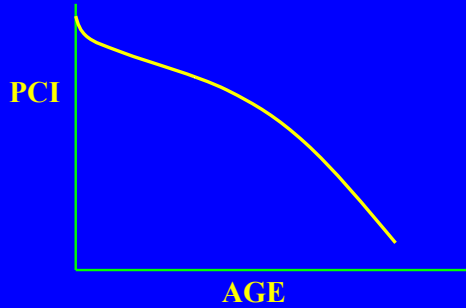
Treatments and Unit Costs

- ◆ Default – User Modifiable
- ◆ Agencies Need to Modify to Reflect Their:
 - Treatments
 - Unit Costs
- ◆ Cost Will Affect the Calculated Needs

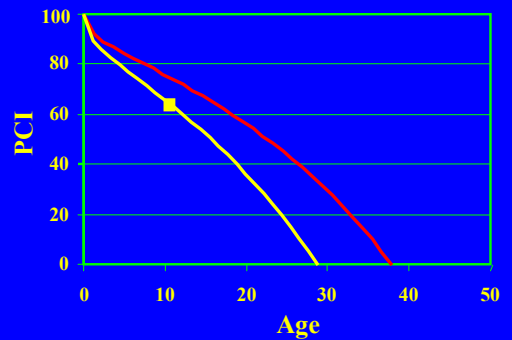
Needs Analysis Process

- ◆ For Each Management Section
 - Project Condition With and Without Treatments
 - Project Condition One Year at a Time and Apply Treatment If Needed
- ◆ Calculate
 - Average Condition (Weighted for Area)
 - Grouped Costs

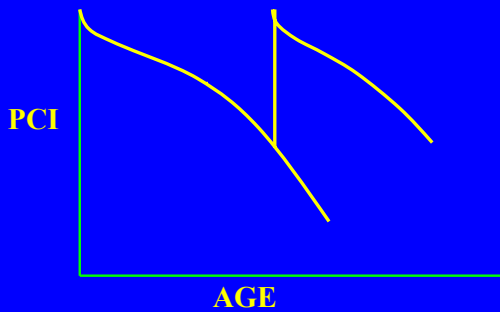
Family Curve for Each FC-ST Group



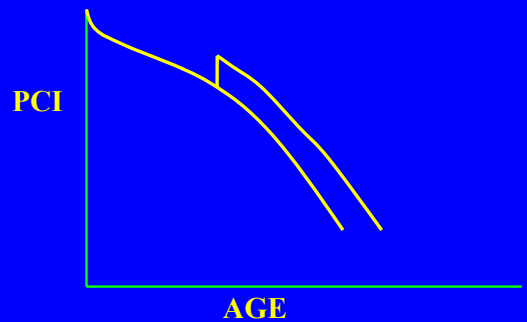
Projected PCI Adjusted for Observed



Projected with Rehab Treatment



Projected with PM Treatment



Must Go Thru Calculation Process

- ◆ Interest
 - Used in Scenarios
- ◆ Inflation
 - Treatment Costs Escalated by This Value
- ◆ Analysis Year
 - First Year Treatment Applied
- ◆ Number of Years - Scenario Affected

Needs Results

- ◆ List of Sections Needing Work
- ◆ Approximate Funds Needed
- ◆ Based on Your Goals

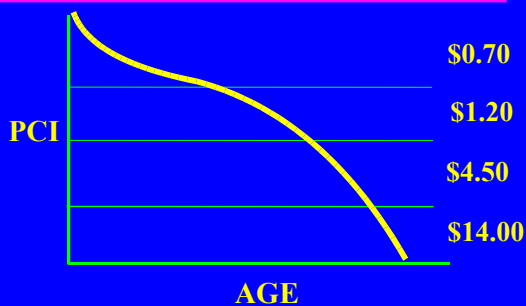
Network-Level Elements

- ◆ Inventory
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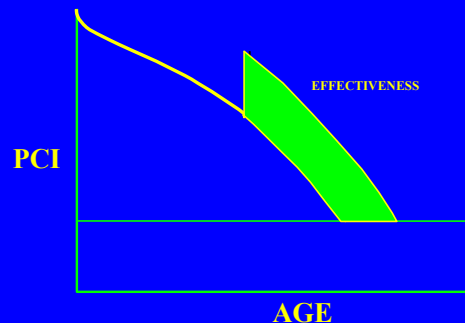
Prioritizing Candidate Projects

- ◆ Considers Effect of Available Funds
- ◆ Prioritized Listings of Projects Needing Work
- ◆ Goal - Best Pavement Network Over Time for Available Funds

Best Return on \$'s Spent



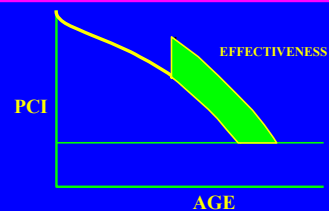
Prioritization Based on Cost-Effectiveness



Cost-Effectiveness

- ◆ Sections That Will Be in the Best Condition for the Longest Time for Least Cost
- ◆ Give Best Return on Funds
- ◆ Should Be Repaired First

Weighted Cost-Effectiveness Ratio



$$\text{Weighted Cost-Effectiveness Ratio} = \frac{\text{AREA} / \text{YR}}{\text{EUAC} / \text{SY}} \times \text{WF}$$

Prioritization Process

- ◆ Go Thru Calculation Process
- ◆ User Sets :
 - Available Funds
 - Amount PM
 - Increase Factor (Inflation of Funds)

Prioritization Results

- ◆ Ranked Listings of Candidates for Funding
- ◆ Changes in Network If This Selection Process Occurs

Caution

- ◆ Network-level
 - Recommended Budget Planning Treatment
- ◆ Project Selection-level
 - Better Definition of Treatment, Costs, & Constraints
- ◆ Project-level
 - Used to Define Best Treatment & Final Cost Estimate

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- ◆ Inventory
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Impact of Funding Alternatives

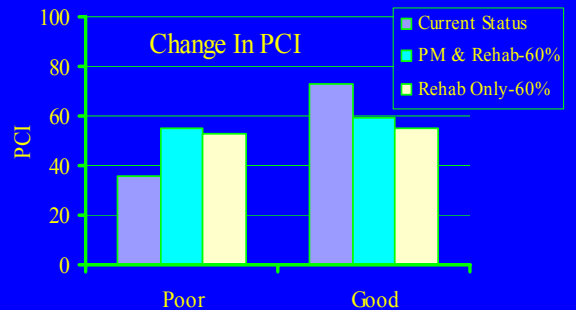
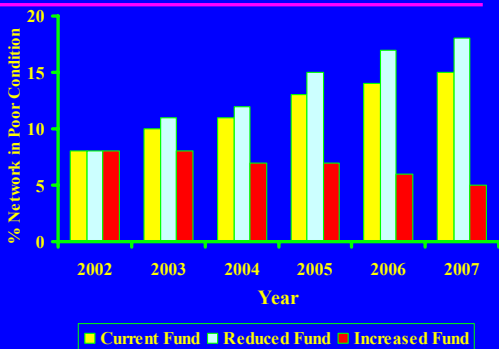
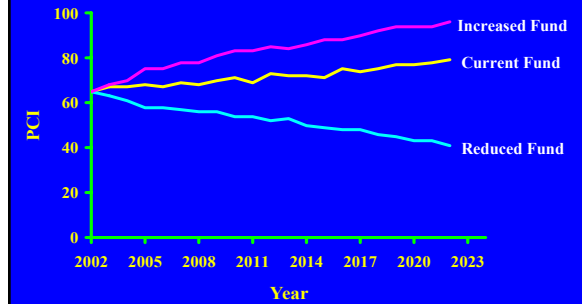
- ◆ Connect PMS to Funding Decisions
- ◆ Justify Fund Requests
- ◆ Support of Allocation Decisions
 - Fix Worst First
 - Apply PM

Not a Different Module

- ◆ Run Scenarios for Different Alternatives
- ◆ Select the Group & Compare Results
- ◆ Information From Reports Used to Prepare Graphs, Tables, etc.

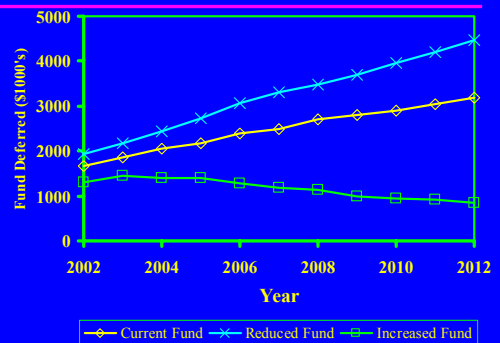
Projected Condition

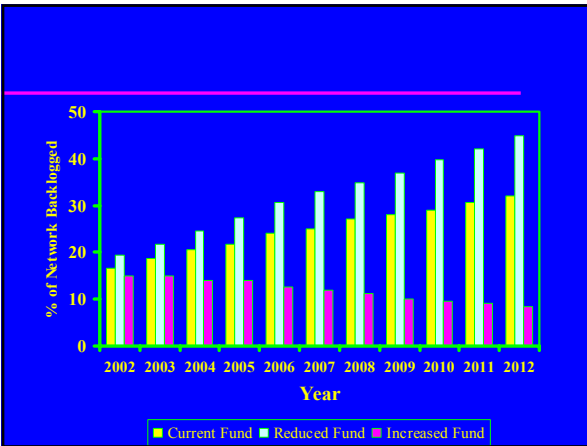
- ◆ How Condition Changes With Alternatives
- ◆ May Wish to Use Condition Categories
- ◆ Caution:
 - Don't Rely Only on Changes in Average PCI



Deferred or Back-Logged

- ◆ Deferred Fund Needs
 - Needs Minus Spend
- ◆ Back-logged
 - Sections That Needed Work That Was Not Recommended





Other Impacts

- ◆ Stop-gap Maintenance Needs
- ◆ Remaining Life
- ◆ Others

Results of Impact Analysis

- ◆ Ability to Compare Impacts of Different Funding Scenarios
 - Different Funding Levels
 - Different Allocation Approaches
 - Different Approaches to Treatment
- ◆ Answer “What If?”
- ◆ Select Desired Scenario for Network-Level Recommendations

Project-Selection Level

- ◆ Software used to evaluate results
 - Most work requires staff input
 - Finalize candidate project list
 - » Add & Remove projects
 - » Combine projects
 - Change dates
 - Adjust limits of projects
 - Revise cost estimates

Possible Changes to Network-level Recommendations

- ◆ Consider constraints
 - Conflict analysis – delay work
 - Additional costs
- ◆ Develop construction & contract packages
- ◆ Add or delay sections
- ◆ Plan work over multiple years
- ◆ Refine treatment and costs

Modified Scenario Analysis

- ◆ Each year, both selected and non-selected sections are analyzed
- ◆ Selected sections are funded first
- ◆ Non-selected sections can only be funded if the selected sections are funded
 - Exception, when selected sections cannot be funded with remaining funds and non-selected sections can, they can be funded

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Feedback

- ◆ MTC Periodically Reviews Prediction Curves
- ◆ Agency Must Review & Update:
 - Treatment Costs
 - Treatments

Upkeep

- ◆ Enter Work Completed
- ◆ Periodically Re-inspect Sections
 - Quality control during inspections

Results of Network-Level

- ◆ Maintenance and Rehabilitation Needs
 - List of Sections
 - Planning Treatment
 - Average Costs
- ◆ Prioritized Listing of Candidate Projects
- ◆ Impact of Funding Options

Results of Project-Selection Level

- ◆ Adjusted Maintenance and Rehabilitation Needs
 - Modified List of Sections
 - Refined Treatments
 - Adjusted Costs
- ◆ Revised Prioritized Listing of Candidate Projects
- ◆ Impact of Adjusted Funding Options

Benefits of Having a PMS

- ◆ Better Return on Funds Spent
- ◆ Ability to Answer “What If”
- ◆ Supportable Answers
- ◆ Coordination With Other Work
- ◆ Improved Communication
- ◆ Doing Best Job Possible

Questions

