FULL-DEPTH RECLAMATION SYMPOSIUM

THE MISSING LINK IN PAVEMENT MANAGEMENT

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PRESENTED BY:
STEVE LANDER, P.E.
Agenda

• Complexity of Managing Pavement Networks
• Pavement Condition Surveys (PCS)
• Pavement Management Software
• Case Studies
• Summary
• Questions
Managing Pavements

• **Goal**
  - Spend the least amount of money to maintain the roadway network at the highest LOS

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**Easy to say!**

**Hard to achieve!**

• **Right Treatment**
• **Right Roadway**
• **Right Time**
Utilize the Entire Tool Box

Crack Sealing
Patching
Rejuvenation
Scrub Seal
Microsurfacing
HIR
CIR
FDR

There is a most Cost-effective Treatment for every combination of Distresses

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Size and Complexity of Network

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Many Variables

- Functional Class
- Truck Traffic
- Speed Limits

- Pavement Types
- Soils
- Drainage
- Pavement Condition
- Repair Alternatives

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Many Constraints/Challenges

Performance Goals

Needs (Backlog)

Other Assets

Funding Sources
Timing, Timing, Timing

Timing is Very Critical !!!
Timing of Maintenance

- **Excellent**
  - Rt. Maintenance
- **Good**
  - Preventive Maintenance: $30,000
- **Fair**
  - Minor Rehabilitation: $100,000
- **Poor**
  - Major Rehabilitation: $225,000
- **Very Poor**
  - Reconstruction: $350,000

Optimal Timing:
- 5
- 10
- 15
- 20
- 25

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CRITICAL PAVEMENT MANAGEMENT SYSTEM (PMS) ISSUES

1. **Is your PMS adequately funded?**

2. **Does your PMS demonstrate to key decision makers the consequence of today’s and future funding decisions over time?**

3. **Are you selecting the right mix of projects to maximize performance with the available revenue?**
PAVEMENT CONDITION SURVEYS (PCS)
Pavement Condition Surveys

- Measures the deterioration produced by use, environment, and material aging.

**Goal: Quality Data, Not Quantity!**

- Condition $\rightarrow$ Repairs $\rightarrow$ Costs $\rightarrow$ Ranking

- Collect only the Data that is required:
Required Data Characteristics

• It should be as simple as possible, focusing on the critical data required for analysis.

  • Accuracy

  • Consistency (Repeatability)

  • Validity (QA/QC)

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Pavement Condition Surveys

• Comprehensive Rating System
  • Must reasonably reflect the true level of deterioration
  • Distress Identification
  • Distress Severity
  • Distress Extent
PCS Methods

• ASTM D6433 (Physical Measurement)
• Automated Data Collection (Van)
• Visual Surveys (Windshield)
PCS Frequency

FHWA Recommends:

Every 2 to 3 Years
PAVEMENT MANAGEMENT SOFTWARE
Pavement Management Software

- Predictive Modelling ("What If Scenarios")
- Multi-Constraint Integer Optimization
- Tremendous Flexibility
  - DOTs/Large Municipalities/Counties
  - Small Municipalities
- Construction History
- Full Asset Management Capabilities
Most Pavement Management Software

• Limited Flexibility
• Ranking Prioritization
• Not Capable of Expanding to Other Assets
• Utilize a Single Composite Index (e.g. PCI)
“Intelligent” Condition Indices

**Single Index**
- 100: No Maintenance
- 85: Maintenance
- 65: Preservation/Rehabilitation
- 35: Reconstruction/FDR/CIR

**Structural Index**
- 100: No Maintenance
- 90: Maintenance
- 70: Minor Rehab
- 55: Major Rehab
- 35: Reconstruction/FDR

**Environmental Index**
- 100: No Maintenance
- 95: Rejuvenator
- 90: Crack Seal
- 80: Preservation
- 65: Minor Rehab
- 30: Major Rehab/CIR

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OPTIMIZATION

Ensuring that the Utilization of Resources is Maximized to achieve Desired Goals
“Benefit” Over Time

Delaying Treatment

Threshold Line

Proper Timing:
• Better Performance
• Lasts Longer
• Less Cost
Optimization – Picks The Winners

Reconstruction
Minor Rehabilitation
Preservation
Maintenance

Optimal Timing

Excellent
$100,000/mile

Good
$30,000/mile

Fair
Minor Rehabilitation
$100,000/mile

Poor
Major Rehabilitation
$225,000/mile

Very Poor
Reconstruction
$350,000/mile

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Results of Optimization Analysis

The **Right Mix of Fixes**

[Graph showing annual mileage by treatment from 2015 to 2024, with bars for Recon, Thin Rehab, and Preservation.

Work Plan for the Scenario

Right Mix of Fixes (Optimized)
Monroe, NC Project Case Study
Monroe, NC

• Ranking vs. Optimization Comparison
• Data Source: Monroe, NC
• 170 Centerline Miles
• Scenario: $2.1 Million/Year for 10 Years
• Metric 1: Average Network Condition (PCI)
• Metric 2: Backlog Cost of Untreated Network
• Metric 3: % of Network Treated

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Ranking vs. Optimization Results

6 Point Difference in PCI by Year 10

Difference in Backlog Cost in Year 10 = $4.2 Million
Ranking vs. Optimization Results

% of the Network Treated

Ranked Prioritization

Optimization

Ranking 10 Year Treated Length = 123 Miles

Optimized 10 Year Treated Length = 234 Miles
Carroll County, MD Project Case Study
Comparison of Utilizing Reconstruction vs. FDR

- Scenario: $10 Million/Year for 10 Years
- Data Source: Carroll County, MD
- 900 Centerline Miles
- Metric 1: Average Network Condition (PCI)
- Metric 2: Backlog Cost of Untreated Network
Reconstruction vs. FDR Results

3 Point Difference in PCI by Year 10

Difference in Backlog Cost in Year 10 = $35 Million
Summary

- Pavement Evaluation - Every 2 to 3 Years
- Pavement Management Software
- Understanding the Long-term Consequences of Today's Funding Decisions
- Regular Funding Source
- Optimizing the Right Mix of Fixes
Steve Lander, P.E.
The Kercher Group, Inc.
336-215-5521
SLANDER@KERCHERGROUP.COM
WWW.KERCHERGROUP.COM

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