Optimizing Use of Highway M&R Funds by Integrating RWD Data into PMS Decision Making

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Presentation Outline

Background
Study Objectives and Purpose
Data Collection
Pavement Management Analysis
Findings
Conclusions
Acknowledgements
Background

Traditional pavement performance monitoring

• Indices based on surface distress & ride quality

Pavement structural response

• Important indicator of performance

Rolling Wheel Deflectometer (RWD)

• Innovative device that efficiently measures structural response
Study Purpose

*Evaluate* the potential benefits of integrating RWD data into agency PMS

*Compare* PM analyses and results performed with and without RWD data

- Treatment selection
- Costs
- Performance
Data Collection
The RWD

System
• Laser-based system
• 18-kip, single-axle, dual-tire

Operation
• Operates at posted speeds
• No lane closures

Measurements
• Spatially-coincident method
• Averages deflections over 0.1-mile intervals
Test Roads

Test Network

- 1,000 miles (ODOT D-5)
- Primarily flexible pavements
- Wide range of functional classifications and traffic

Data Collection

- Continuous data collection
- Averaged data at 0.1-mile intervals
- Testing duration: 4.5 days
Agency PMS Data

Composition / Use

- Pavement age
- Layer types and thicknesses
- Classification, traffic (ADT)

Condition

- Pavement Quality Index (PQI):
  - Ride quality
  - Rutting
  - Distress
- Structural condition
  - FWD data (interstate only)
  - Structural rating (subjective)
Agency PMS Methodology

Software

• Deighton software (dTIMS)

Performance Modeling

• Defined sectioning
• Performance models for each pavement type

Decision Models

• 3 Treatment categories
  ➢ Preservation, rehabilitation, and replacement
• Decision trees
  ➢ PQI, traffic, and structural condition
Pavement Management Analysis
Approach

Evaluate multiple M&R treatment strategies

• Base strategy: PQI only
• Two modified strategies: add RWD data

Compare results

• Costs
• Performance (in terms of PQI)
PQI Only – Treatment Matrix

Preservation

Rehabilitation

Replacement

PQI

Low Traffic

Medium Traffic

High Traffic

88

75

55

80

65
RWD #1 – Treatment Matrix

RWD →

Preservation

Rehabilitation

Replacement

PQI

Low Traffic
Good Fair Poor

Medium Traffic
Good Fair Poor

High Traffic
Good Fair Poor

88
75
55
0

80
65

RWD #2 – Treatment Matrix

- Preservation
- Rehabilitation
- Replacement
Budget Scenarios

Target PQI Analysis

• Target network PQI = 92
• Compare costs of strategies

Unconstrained Funding Analysis

• Unlimited funds
• Select all triggered treatments
• Compare PQI performance and/or costs
Findings
## Results

<table>
<thead>
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Conclusions

RWD allows broader, more reliable use of pavement preservation

- Identifies candidate roads in GOOD and FAIR structural conditions
- Prevent use on roads in POOR structural condition

Cost savings can be significant

- More than 10 percent, in certain cases
- Depends on agency’s base case scenario and current road conditions
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Thank You

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Thank You!

Questions or Comments?