Optimizing Highway 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 lane-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
PMS 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

Low Traffic

Medium Traffic

High Traffic

PQI

88

75

55

80

65
RWD #1 – Treatment Matrix

Preservation

Rehabilitation

Replacement

RWD →

PQI

88

75

55

Low Traffic

Good

Fair

Poor

Medium Traffic

Good

Fair

Poor

High Traffic

Good

Fair

Poor

80

65
RWD #2 – Treatment Matrix

Preservation

Rehabilitation

Replacement

RWD →

Low Traffic
Good  Fair  Poor
88

Medium Traffic
Good  Fair  Poor
75

High Traffic
Good  Fair  Poor
65

80

55

60
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

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<thead>
<tr>
<th>Budget Scenario</th>
<th>Percent change in cost (relative to “PQI Only” base case)</th>
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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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