Implementation of Network Level Cracking Performance Measures

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In association with
Maryland State Highway Administration
Overview

- MD SHA PMS Capabilities
- Problem Statement
- Approach
- Network Level Cracking Process
- Keys to Success
Performance Models: The Heart of PMS

Data
MD Expertise

Performance Modeling
Preprograms Analysis
Network Optimization

Management Process

Project Selection
Treatment Assignment
Life Cycle Analysis

Decisions
Reports

Benefit/Cost Ratio
Example Models

Expert Knowledge

Thick Overlay Matrix

Performance Data

**Thick Overlay Matrix**

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**Performance Modeling: Deterministic Curves**

(Flexible Pavement with High Level of Traffic)

- Excellent
- Very Good
- Good
- Fair
- Poor

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Problem Statement

• Cracking data not collected recently

• Data needed for PMS performance modeling

• Very limited resources

• Existing technology not proven

• Quality is #1
Existing Resources

- ARAN data collection vehicle
- WiseCrax crack detection software
- AASHTO Cracking Protocol and PCI Procedures
- Pavement Management Division staff
- Consultant resources
Process

- Affirmation from Connecticut DOT
- Pilot Study
- Benchmark Survey
- Production Testing
Pilot Study
Goals

• Goals
  – Gain experience with Wisecrax
  – Gain experience with AASHTO cracking protocol
  – Determine condition rating scheme
  – Compare automated versus manual surveys

Bottom Line: Can we obtain quality network level cracking data using existing tools?
Pilot Study

• Process
  – Developed crack detection procedure
  – Used data from 1999 data collection season
  – FY2002 “Fund 77” projects
  – Developed sampling template to assure diverse sample population
  – Performed automated cracking evaluation
  – Output data in AASHTO and PCI format
  – Reviewed results
Pilot Study

• Results
  ✓ Gained experience with Wisecrax
  ✓ Gained experience with AASHTO cracking protocol
  ✓ Determined tentative condition rating scheme
  ✓ Hardware problems
  ✓ More work to be done!!!
Benchmark Survey

• Goals
  – Benchmark performance of ARAN
  – Benchmark performance of WX
  – Verify MD process was comparable to manufacturer
  – Decide on final performance rating scheme
  – Verify automated versus field results
Benchmark Survey

• Process
  – 29 projects selected (220 miles)
  – Central portion of state
  – Manufacturer collected data
  – Data collected in September 2000
  – Processed by MD SHA staff and manufacturer independently
  – Subsection (11) verified in the field
Benchmark Survey

• Results
  – ARAN is viable data collection platform
  – WX is viable processing tool
  – Manufacturer versus MD SHA results similar
  – AASHTO protocol “with a twist” chosen as data processing method
  – Field versus automated comparison very encouraging
Production Testing

- Goals
  - Dry run of procedures
  - Iron out bugs
  - Prepare for 2001 data collection
Production Testing

• Process
  – Perform crack survey for one district
  – Submit to district personnel for validation

• Results
  – Validated processes
  – Data deemed reasonable
  – Ready to Roll!
5 Step Process

Data Collection -> Crack Detection -> QC/QA -> Classify/Rate -> Post Processing
Data Collection

10,000 lane miles

State Equipment/Personnel

6 month period +/-
Crack Detection

13 – 17 mph

Semi-automated

30 mile batches
QC/QA

Sampling Approach

Completeness

Quality (> 80% crack detection)

Trends
Classify/Rate

Long/Trans, Low, Med, High

Fully Automated, 800 mph

AASHTO Protocol
Post Processing

Summarize to 0.1 mile
Assign Condition State
Output to PMS
Progress Reports
QA/QC

✓ Data Completeness
✓ Range Checks
✓ Logic Checks
✓ Trend Analysis

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Processing/Progress Reports

ADAT

Data Collection Year: 2002

- Process Data
- Generate Progress Report

Exit

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Lessons Learned

• “Automated” crack detection viable
• Large resource commitment
• Rigorous QC/QA a must
• AASHTO cracking protocol viable
• Sealed cracks a problem
Keys to Success

- Phased approach
- Commitment from above
- Partnering approach
  - State forces, manufacturer, consultant
- Keep it simple
Questions?