Cost-Effective Prevention of Reflective Cracking in Composite Pavements

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Introduction

• HMA overlays are not cost-effective against reflective cracking
• Louisiana had experienced with various crack control methods since 1970s
• Mixed experiences with the field performance of these methods
• Cost-effectiveness and performance of these methods had not been reliably evaluated
Research Objectives

• Evaluate and compare the performance, constructability, and cost-effectiveness of reflection cracking control treatments across the state.

• Develop a standard state-wide policy for control of this distress.
Reflective Cracking Mechanism

- Overlay
- Old pavement
- Subgrade Soil
- Stress concentration
- Horizontal opening
- Vertical differential
  Movement
Crack Control Benefits

- Delay the occurrence of cracks
- Reduce the number of cracks
- Limit crack severity
- Provide other benefits:
  - Reduce overlay thickness
  - Enhance waterproofing capabilities
Crack Control Treatments

- Paving Fabric (strip and area applications)
- Geocomposite
Crack Control Treatments

• Interlayer Systems:
  – Geogrid
  – Glass-grid
  – Reinforcing Mesh
Crack Control Treatments

- Chip Seal
- Stress-Absorbing Membrane Interlayer (SAMI)
- Stone-Matrix Asphalt (SMA)
- HMA Interlayer (STRATA)
- Saw and Seal
- Rubblization
Research Approach

- Nationwide survey
- Literature Review
- Survey of Practices in LA
- Cost Effectiveness
- Performance Data
- Cost Data
- TOPS PMS
- District Visits
Literature Review

• A detailed literature review was conducted with over 60 references.
• A nationwide survey was conducted:
  – Types of crack control treatments
  – Effectiveness in delaying reflection cracking
  – Cost-effectiveness
  – Constructability
  – Design consideration
  – State policies in controlling reflection cracking
Results of the Survey

• 20 Responses to the survey
• “We use or have used many of the treatments and practices that they list but we do not have a system to monitor performance…”
Performance of Treatment Methods

Chip Seal

Effectiveness

Crack Seal and Overlay

Effectiveness

Glassgrid

Effectiveness

Nova Chip

Effectiveness
Performance of Treatment Methods

Paving Fabric (area)

Number of Responses

Effectiveness

Cold in Place Recycling

Number of Responses

Effectiveness

Paving Fabric (strip)

Number of Responses

Effectiveness
Crack Control Treatments

- Crack treatments used in Louisiana:
  - Chip seal
  - Geogrid
  - Glasgrid
  - Fiber Glass
  - STRATA Interlayer
  - NOVA Chip
  - High Strain Asphalt Mixture
Sources of Data
• TOPS
• Content Manager
• Construction Site
• PMS Database
• Districts

Types of Data
• Primary data:
  – Project number
  – Length
  – District
  – Parish
  – Traffic
• Performance data:
  – Rutting
  – Fatigue cracking (ft²)
  – Transverse cracking (lin.ft)
  – Longitudinal cracking

269 Projects Incorporated in a Database
Test Section

- Project number: 001-08-0035
- District: 05
- Glasgrid
Test Section

- Project number: 013-09-0034
- District: 62
- Glasgrid
Test Section

- Project number: 017-04-0043
- District: 62
- Glasgrid
Test Section

- Project number: 051-01-0009
- District: 58
- 1in high strain asphalt mixture
Test Section

- Project number: 058-01-0024
- District: 62
- 1in high strain asphalt mixture
Future Plans

- Continue to compile data for identified sections
- Visit districts to collect additional performance and cost data
- Define performance trends for different treatment methods
- Determine cost-effectiveness for different treatment methods
Summary

• Louisiana had experienced with various crack control methods since 1970s
• **Cost-effectiveness and performance of these methods is unclear**
• Treatment methods used in Louisiana include: chip seal, glasgrid, fiberglass, HMA interlayer (STRATA, …)
• 269 Projects identified so far…
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