NCAT + MnROAD
Pavement Preservation Study

2016 Ohio Asphalt Paving Conference
Columbus, Ohio
February 3, 2016
Mary Robbins, PhD
One Project, Two Climates, Four Sites
2015 Preservation Group

One Project

Develop independent life-extending benefit curves for a range of pavement preservation treatments, under varying traffic levels and climates

Two Climates

Alabama: Hot, wet, no-freeze
Minnesota: Cold, wet, freeze

Four Sites

AL - LR 159 (Low Vol); US 280 (High Vol)
MN – CR 8 (Low Vol); US 169 (High Vol)
Preservation Group Experiment: History

- **Summer/Fall 2012:** Start 2012 Cycle Treatments placed on LR 159
- **Spring 2014:** Treatments placed on Track
- **Summer 2015:** Start 2015 Cycle “South” Treatments Placed
- **Summer 2016:** “North” Treatments will be placed in MN

Years:
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
Lee Road 159 – Low Volume

- Martin Marietta Quarry
- Asphalt Plant
- Lee Road 159
US 280 - Higher Volume

Lee Road 391

NCAT Track

Lee Road 253
County Road 146
RP 185.3

Rum River Bridge
RP 189.9

US 169
High Volume Road
4 Mile Section

County Road 8
Low Volume Road
2-3 Mile Section

County Road 146
RP 185.3
Pavement Preservation
Pavement Preservation

- Prevention
- Rehabilitation
- Reconstruction

Life Extending Benefit

Time / Traffic
Pavement Preservation

Time / Traffic

- Prevention
- Rehabilitation
- Reconstruction

Life Extending Benefit
Condition Improving Benefit
Life Extending Benefit Curves
## Monitoring Plan

### Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Track</th>
<th>US-280</th>
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</thead>
<tbody>
<tr>
<td>Roughness</td>
<td>Weekly</td>
<td>Weekly</td>
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<tr>
<td>Rutting</td>
<td>Weekly</td>
<td>Weekly</td>
</tr>
<tr>
<td>Macrotexture</td>
<td>Weekly</td>
<td>Monthly+</td>
</tr>
<tr>
<td>Crack Mapping</td>
<td>Weekly</td>
<td>Monthly</td>
</tr>
<tr>
<td>FWD</td>
<td>Monthly</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Surface Friction</td>
<td>Monthly</td>
<td>Monthly</td>
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<tr>
<td>Permeability</td>
<td>Quarterly</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Noise</td>
<td>Quarterly</td>
<td>Quarterly</td>
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</tbody>
</table>

![Graph 1](image1.png)

![Graph 2](image2.png)

![Graph 3](image3.png)
PG - South

TREATMENT TYPES
Test Track “PG”

2012 Cycle:
• Thin Overlay
• Micro Surface
• Scrub seal
• Scrub cape
• CS + chip seal
• Untreated control

2015 Cycle:
• N10A = Untreated control
• N10B = Thinlay (ABR) Scrub Cape
• N11A = Thinlay (Virgin) Scrub Cape
• N11B = Untreated control
US 280 Build

- Completed September 14, 2015
  - 6 untreated control sections
  - 34 treated sections placed
  - 5 empty sections
  - 1 empty – traffic loop
US 280

Control Sections:

Cracking
Rutting
IRI
Texture
US 280
Surface Treatments

Crack Seal
Fog Seals
Chip Seal
Scrub Seal
FiberMat Chip Seal
Micro Surface*
Combination of Surface Treatments

- Crack seal + Chip seal
- Crack Seal + Micro Surface
- Surface Treatment + Micro Surface = Cape Seal
- Chip Seal (Double, Triple)
- Double Micro Surface
Thin Overlays

Lee Road 159:
- 4.75 mm Mixes
  - 50% RAP
  - 5% PCRAS
  - Standard binder grades
  - Highly polymer modified
- Ultra-thin bonded wearing course

US 280:
- 4.75 mm Mixes
  - High ABR
  - Virgin
- Ultra-thin bonded Wearing course
- OGFC
  - Varying tack types/rates
Combinations – Thin Overlays

- Micro Surface on Thin overlay
- Thin Overlay + Surface Treatment = Thin Overlay Cape
  - Chip Seal
  - FiberMat Chip Seal
  - Scrub Seal
Cold Recycling
BENEFITS OF PAVEMENT PRESERVATION
# Current Life Extension Based on Ranges

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Reported Extended Service Life Range (Years)</th>
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<tbody>
<tr>
<td>Thin Overlay</td>
<td>3-23</td>
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<tr>
<td>Chip Seal</td>
<td>3-8</td>
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<tr>
<td>Microsurfacing</td>
<td>3-8</td>
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<td>Crack Sealing</td>
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<td>Mill and Resurfacing</td>
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<tr>
<td>Hot In-place Recycling</td>
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<td>Slurry Seal</td>
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<td>Fog Seal</td>
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<td>Cold In-place Recycling</td>
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<td>Full Depth Reclamation</td>
<td>10-20</td>
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<td>Structural Overlay (Mill and Fill)</td>
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<tr>
<td>Whitetopping</td>
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FHWA-HIF-10-020, January 2010,  
http://www.fhwa.dot.gov/pavement/preservation/pubs/perfeval/chap00.cfm
Quantifying Benefits of Pavement Preservation
Pavement Preservation

- Prevention
- Rehabilitation
- Reconstruction

Life Extending Benefit
Condition Improving Benefit

Time / Traffic

Logo: Minnesota Department of Transportation
Logo: National Center for Asphalt Technology (NCAT)
Reduction in Cracking

![Graph showing the reduction in cracking over time/traffic, with a dashed line for projected untreated and a solid line for treated.](image-url)
Projection of Cracking – What if left untreated?
2015 Preservation Group (PG15)

- Graph showing percent area cracked over time/traffic with two curves: Projected Untreated and Treated.

- Arrows indicating comparison between the two curves.

- Logos for Minnesota Department of Transportation and National Center for Asphalt Technology (NCAT) at Auburn University.
Ratio of Cracking – Treated vs Untreated

Crack Ratio = \( \frac{C_T}{C_U} \)
Ratio of Cracking – Treated vs Untreated
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