2012 NCAT Pavement Test Track: Pavement Preservation Study Overview

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2015 NEPPP
Wilmington, Delaware
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Overview

• 2012 PG Study
  – Background
  – Methodology for Life Extending Benefit Curves
  – Early Findings

• 2015 PG Study
  – Locations
  – Treatments
Lee Road 159
Pavement Preservation Experiment
to Reduce the Cost to Maintain Your Roads

Funding Provided by:
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2012 Preservation Group (PG) Study

• Quantify life extending benefit of study treatments
  – Time/traffic to return to pretreatment condition(s)
  – Test sections on the Track and Lee Road 159

• Sampling/testing for construction quality
Pavement Preservation on Lee Road 159

- Low ADT roadway
- Very high % trucks
- 14-year old 5½” pavement
- Diverse pavement condition
- Load data provided by quarry and asphalt plant
Preservation Group (PG) Experiment

• 25 sections on local county road (Lee Road 159)
  – ≈5½” thick paved access road to quarry/asphalt plant
  – 2 control, 23 sections with treatments/combinations, Pretreatment condition varied by WP and direction

• 14 sections on the NCAT Pavement Test Track
  – 7” pavements placed in the summer of 2009
  – Range of Surfaces: PFC sections, DGA sections (virgin, high RAP)
  – >10 million ESALs at time of application
Pavement Preservation on Lee Road 159
Pavement Preservation on Lee Road 159

Life Extending Benefit
Pavement Preservation on Lee Road 159
Pavement Preservation on Lee Road 159

- Prevention
- Rehabilitation
- Reconstruction

Time / Traffic

Life Extending Benefit
Condition Improving Benefit
1. Rejuvenating Fog Seal
2. Fibermat Chip Seal
3. Control
4. Control
5. Crack Seal (CS)
6. Single Layer Chip Seal
7. CS + Single Layer Chip Seal
8. Triple Layer Chip Seal
9. Double Layer Chip Seal
10. Single Chip + Microsurfacing (Cape)
11. Microsurfacing
12. CS + Microsurfacing
13. Double Layer Microsurfacing
14. Fibermat Chip + Microsurfacing (Cape)
15. Scrub Seal + Microsurfacing (Cape)
16. Scrub Seal
17. Distress Demo Section
18. Fibermat Chip + HMA thinlay (HMA Cape)
19. HMA Thinlay (PG 67-22)
20. HMA + 100% Foamed Recycle Inlay
21. HMA Thinlay (PG 76-22)
22. Ultra Thin Bonded Wearing Course
23. HMA Thinlay (50% RAP)
24. HMA Thinlay (5% PCRAS)
25. HMA Thinlay (High Polymer)
LR 159 Testing Overview

• Weekly
  – Inertial Profiler (roughness, texture, rutting)
  – Visual inspections with notes/pictures
LR 159 Testing Overview

• Monthly
  – Video for crack mapping
  – Rut depth
  – Wet ribbed surface friction
  – Subgrade moisture readings
  – Falling weight deflectometer (FWD)
Video Crack Mapping
PRETREATMENT CONDITION
Pretreatment Condition

![Graph Showing Average IRI (in/mile)]

- **Avg IRI**
- **Section**: 1 to 25
- **IRI (in/mile)**: 0 to 200
- Sections 11 and 25 have notably higher IRI values.
Pretreatment Condition

Avg Rut Depth

Rut Depth (mm)

Section
Percent of Lane Area Cracked

Avg Pretreatment Cracking

0% 10% 20% 30% 40% 50% 60%

Bar chart showing the percent of lane area cracked.
Percent of Lane Area Cracked

Avg Post-treatment Cracking
Truck Damage on Lee Road 159

Cumulative ESALs

Date

Aug-12 Jan-13 Jul-13 Dec-13 May-14 Oct-14

Inbound Outbound
LIFE EXTENDING BENEFIT CURVES
Benefit of Pavement Preservation
At time 1 ($t_1$) and time 2 ($t_2$)

At time 3 ($t_3$)

At time 4 ($t_4$)

At time 5 ($t_5$)
Pavement Preservation on Lee Road 159
QUANTIFYING BENEFITS
Subgrade Moisture vs Cracking

Change in Moisture Relative to Controls (%)

Average Subsection Cracking (SF)

- Crack Sealing
- Chip Seal
- Crack Seal then Chip Seal
Reduction in Cracking
Projection of Cracking – What if left untreated?

- Measured Prior to Treatment
- Projected without Treatment
- Less Cracking Control Section
- More Cracking Control Section
Ratio of Cracking – Treated vs Untreated

Crack Ratio = \( \frac{C_T}{C_U} \)
Treated Section – Cracking Ratio
PG15 Locations

- Continue traffic on 7” Track sections 2.6M ESALs
- Continue data collection on Lee Road 159
- MnROAD/NCAT Partnership
  - Duplicate LR 159 Sections in MN
  - Build new sections on nearby US-280
New Sections on US-280

- US-280 3 miles to east of Track
- 17,000 ADT, ≈ 9 year old surface
- Westbound outside lane
- ≥ MP 128.0 to MP 132.6
US 280 - Methodology

• Duplicate LR 159 + Additional treatments
• Apply same methodology
  – Subsection analysis for life-extending benefit curves
• Data Collection
  – Automated Distress Detection
  – FWD
  – Traffic
US-280 Pavement Condition

Rutting (inches), Roughness (m/km), and Texture (mm)

Total Lane Area with Some Type of Cracking (%)

[Graph showing data for US-280 Pavement Condition]
PG 15 Planning

• Consensus Plan
  – Every sponsor has a voice
• Discussions on possible treatments
  – CIR, HIR, HMA Cape (Chip + Thinlay); CS + HMA/WMA, OGFC thinlay....
• Construction to be completed on US 280 summer/fall 2015
Questions?

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