Cold In-Place Recycling in Virginia

Southeastern States In-Place Recycling Conference
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Acknowledgements

• Conference sponsors

• Industry
  – Dunn Co.
  – E.J. Breneman
  – Slurry Pavers (Virginia)
  – Lanford Brothers (Virginia)
  – Wirtgen America
  – RoadScience
  – Parsons
  – ARRA

• VDOT
  – Richmond and Staunton Districts
  – Materials Division
  – Public Affairs
  – Research

• Other Agencies
  – Delaware, Maryland, Nevada, Ontario, Pennsylvania, South Carolina
VDOT Project Selection Criteria

• Developing usage guidelines
  – Deterioration type
  – Existing pavement thickness
  – Maintenance history

• Informal criteria
  – Ability to address distress that would be more difficult by traditional processes
    • Allowable work hours
    • Traffic control
    • Location of deterioration within pavement section
CIR Pavement Design

• Not yet standardized by VDOT

• AASHTO
  – layer coefficient around 0.30

• Mechanistic (catalog in progress)
  – Resilient Modulus
  – Flow Number
  – Dynamic Modulus
Cost Effectiveness

• Not yet quantified by VDOT

• What is the recycling process compared to?
  – What normally would be done
    • Mill and overlay up to 4 inches
  – What should be done
    • In some cases, we need to go deeper

• Literature shows up to 45% cost savings
Challenges with Decision Makers

• Experience & familiarity
  – We are relying on the experience of others
    • Is their knowledge “transferable”? 

• How do we move forward?
  – Point out potential for cost and time savings
  – Show ability to address causes, not just symptoms
  – Research to characterize performance
VDOT CIR Projects

• 2011
  – US Route 60
  – State Route 35
  – Interstate 81

• 2012
  – US Route 17
VDOT CIR Projects, US Route 60

• 3.7 lane miles
  – 3 lanes at 1.24 miles each
• 3-5 inch depth
• Asphalt emulsion (2.5-3.0%)  
• 3.5 inch asphalt overlay
  – 2 inch intermediate, 1.5 inch surface
• AADT = 9,000 (7% trucks)
• 3 days to complete CIR work
VDOT CIR Projects, State Route 35

- 4.7 lane miles
  - 2 lanes at < 2.4 miles each
- 3-5 inch depth
- Asphalt emulsion (3.5%)
- 4.0 inch asphalt overlay
  - 2 inch surface, 2 inch intermediate
  - Scratch course placed prior to overlay
- AADT = 2,400 (20% trucks)
- 6 days to complete CIR work
VDOT CIR Projects, I-81

- CIR + CCPR + FDR
- 7.2 lane miles (2 lanes at 3.6 miles each)
- Foamed asphalt, portland cement, calciment
- AADT = 21,000 (28% trucks)
- Right lane
  - 4 closures periods, 17 days
  - 12 inches FDR, 6 inches CCPR, and 6 inches AC
- Left lane
  - 1 closure, 3 days
  - 5 inches CIR and 4 inches AC
Original structure = 12 inches AC over 10-12 inches aggregate base
20 to 30 ft per minute
Why recycle?

• Economic
  – Nevada DOT saved $600 million over 20 years
  – Other studies show a 30 to 50% cost savings per project

• Environment
  – MTO (Ontario) estimated that the process emits 50% less greenhouse gases

• Construction
  – Address distress causes rather than symptoms
VDOT Pavement Recycling Summary

• Research
  – Characterize stress/strain behavior
    • MEPDG inputs
  – Laboratory prepared samples
    • Influence of different curing procedures & stabilizing agents

• Implementation
  – Develop specs and standard test methods
  – Develop usage guidelines
Where are we headed?

- Go forth and recycle (where appropriate)
  - Specs
  - Usage guidelines
  - Materials characterization catalog

- 2012
  - US Route 17, Isle of Wight County
  - 19.5 lane miles
    - 4 lanes at 4.8 miles each
  - Urban arterial (AADT = 29,000 w/ 2% trucks)
    - Numerous crossovers and stoplights