VDOT Experiences with Pavement Recycling

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Overview

1. Pavement recycling techniques
2. Benefits
3. Major projects
   1. I-81
   2. NCAT
   3. I-64
4. Summary
Pavement Recycling Processes

- Full-depth reclamation
  - Pavement foundation
  - Mixed in the road
- Cold in-place recycling
  - Upper portions of the asphalt layers
  - Mixed in the road
- Cold central plant recycling
  - Similar to CIR but prepared at a mobile plant
  - Can be placed in multiple layers
I-81 (2011)
Why VDOT Should Recycle Pavements

• Costs
  – 30-50% reduction

• Greenhouse gases
  – Up to 50% reduction

• Address causes rather than symptoms

• Accumulating RAP
More than 10 million tons of RAP stockpiled in Virginia
Could pave a 12-foot wide lane, 12 inches deep for more than 2,300 miles
I-81

- 2011
- AADT = 24,000
- 29% trucks (about 6,900 per day)
- First project in US to combine recycling processes on the interstate system
- About 17 million ESALs
Left Lane

4-in Asphalt
5-in CIR
~4-in Exist. Asphalt
8-in Agg Base
Subgrade

Right Lane

4 & 6-in Asphalt
6 & 8-in CCPR
12-in FDR
Subgrade
National Center for Asphalt Technology

- 2012
- Auburn University
- Fleet of trucks drive 6 days per week for 2 year test cycles
- 2 cycles at 10 million ESALs per test cycle
- Instrumented pavement sections
NCAT Test Track Sections

N3
- 6-inch AC
- 5-inch CCPR
- 6-inch Agg Base
- Subgrade

N4
- 4-inch AC
- 5-inch CCPR
- 6-inch Agg Base
- Subgrade

S12
- 4-inch AC
- 5-inch CCPR
- 6-inch Agg Base
- 8-inch FDR
- Subgrade
Tensile Microstrain Normalized to 68°F

- N3-6" AC
  \[ y = 5.1641x + 242.61 \]
  \[ R^2 = 0.2687 \]
- N4-4" AC
  \[ y = 7.0714x + 382.13 \]
  \[ R^2 = 0.095 \]
- S12-4" AC SB
  \[ y = 0.2851x + 134.79 \]
  \[ R^2 = 0.0029 \]
Section S12

- Recycled content
  - Layer 1 = 12.5%
  - Layer 2 = 30%
  - Layer 3 = 100%
  - Layer 4 = 100%

- Entire cross section
  - 80% recycled
I-64 Lane Widening Recycle Designs

- **New lanes**
  - 4 inches asphalt surface
  - CCPR
  - OGDL
  - Import crushed concrete or RAP, stabilize using FDR process

- **Existing lanes**
  - 4 inches asphalt surface, CCPR, OGDL
  - FDR existing base materials
Considering Segments 2 and 3

• Using CCPR and FDR
  – More than a million tons of material will be recycled
  – Compared to a traditional design, cost savings will exceed $15 million

• Future work
  – Instrumentation mid-October
  – Calculations to quantify greenhouse gas reductions
Thank you!

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