Where Are We Headed with Pavement Recycling?

*I-64 Widening, Segment II*

Brian Diefenderfer, PhD, PE
Associate Principal Research Scientist

October 4, 2016
Acknowledgements

- Hampton Roads Materials
- Hampton Roads Project Management
- Alternative Project Delivery Division
- CO Materials Division
Recycling on the Interstate
Multi-Process Recycling on the Interstate
Scope

242

247
Scope

• I-64
  – Newport News, James City, and York Counties

• 7.08 miles, both directions
  – Add a travel lane and a 12ft shoulder to the inside
  – Reconstruct existing lanes and outside shoulder
  – $189.7 Million

• Traffic
  – 3,000+ trucks per day (per direction)
Scope

• Construct new travel lane and 12ft shoulder
  – Prepare subgrade
  – CTA foundation
  – CCPR base
  – Asphalt surface layers

• Reconstruct existing lanes
  – Remove existing concrete
  – FDR foundation
  – CCPR base
  – Asphalt surface layers
Scope

PAVEMENT DESIGN (NEW ROADWAY)

1. 2" Asphalt Concrete, SMA-12.5 PG76-22
2. 2" Asphalt Concrete, SMA-19.0 PG76-22
3. 6" Cold Central Plant Recycling Material (CCPRM)
4. 2" Open Graded Drainage Layer - Asphalt or Cement Stabilized
5. 12" Cement Treated Crushed Concrete or Cement Treated Recycled Asphalt Pavemnt (RAP)
6. 2" Asphalt Concrete, SM-12.5D
7. 2" Asphalt Concrete, IM-19.0A

Shoulder only
Scope

**PAVEMENT DESIGN (RECONSTRUCTED)**

1. 2" Asphalt Concrete SMA-12.5 PG76-22
2. 2" Asphalt Concrete SMA-19.0 PG76-22
3. 6" Cold Central Plant Recycling Material (CCPRM)
4. 2" Open Graded Drainage Layer - Asphalt or Cement Stabilized
5. 12" Full Depth Reclamation (FDR) Existing Aggregate and Stabilized Subgrade
6. 2" Asphalt Concrete, SM-12.5D
7. 2" Asphalt Concrete Type IM-19.0A

Shoulder only
Full-Depth Reclamation
FDR

• Bound and unbound materials are combined with a stabilizing agent(s) to create a foundation
• Typically 4 to 12 inches thick

• I-64 Segment II
  – FDR layer is 12 inches thick
  – XXX was proposed as the stabilizing agent
Cold Central-Plant Recycling
CCPR

• Milled or stockpiled RAP is combined with a recycling agent (and possibly a chemical additive) to create an asphalt base layer

• Typically 2 to 6 inches thick
  – Multiple lifts can be placed for thicker sections

• I-64 Segment II
  – CCPR layer is 6 inches thick
  – XXX is planned as the recycling agent
Preconstruction Activities

• Mix design and QC plan

• 2 quality workshops
  – One well in advance of work (September 2016)
  – One closer to start of recycling work (Fall 2017?)

• Trial sections
Performance Examples of Similar Sections

I-81, Augusta County, 2011

- **Right lane**
- **Summer 2016**
  - 10 million ESALs
  - 0.10 inches rutting
  - IRI 44 inches per mile

<table>
<thead>
<tr>
<th>Segment II, 13 years to 10 million ESALs</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>4 &amp; 6-in AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-in CCPR</td>
</tr>
<tr>
<td>12-in FDR</td>
</tr>
<tr>
<td>Subgrade</td>
</tr>
</tbody>
</table>
Performance Examples of Similar Sections

NCAT Test Track, 2012
- Section S12
- Fall 2016
  - 15 million ESALs
  - 0.2 inches rutting

Segment II, 19 years to 15 million ESALs
Segment II, Alternative Sections

$71 / SY

2-in SM + 2-in IM
4-in BM
8-in CTA
Subgrade

$45 / SY

2-in IM + 2-in IM
6-in CCPR
12-in FDR
Subgrade

Same structural value
36% lower cost
Potential Cost Savings

• Segment II
  – 7.08 miles x 3 lanes x 2 shoulders
  – 168,000 tons of CCPR
  – Cost savings using recycling > $10 million
    • as awarded

• Segment III?
  – 7.6 miles x 3 lanes x 2 shoulders
  – 180,000+ tons of CCPR?
  – Cost savings could exceed $12-14 million