VTRC: Reflective Crack Mitigation: Current and Future Research

Benjamin F. Bowers, Ph.D., P.E.
Research Scientist
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Outline

• The problem
• Past research
• Current research
• Future research
The Problem

• Reflective cracking over jointed concrete is a major problem in Virginia
• Many major thoroughfares = no reconstruction
• Overlays are often 1.5-4 inches thick
• In some cases cracks propagate in only one year
• Are there tools we can use to mitigate reflective cracking?
There are many solutions:

- Binder modifiers
- Mixture additives such as fibers
- Interlayers (fabric, fiber, modified gradations, etc.)

Ideal solution will:
- Be applicable in many situations
- Easily specified
- Limit changes to construction practice
- Fall within normal QA/QC practices
Past research experience (Last 5-years)
High Polymer Mixtures

- Approximately 7.5% SBS (2-3x normal)
- Overlayed jointed concrete
  - I-95 / I-495 NoVa
  - I-95 Richmond
  - SM + SMA used
- Many lessons learned (See June VAA Mag)
- Overall districts have been happy with results
Overlay Test

- Simulates JCP
- Higher value = better perf
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Semi-Circular Bend (I-FIT)

- Intermediate temp crack test
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To date all sections have been performing very well
- The SMA sections in NoVa and Richmond have no reported cracking
- The SM-12.5 sections in NoVa have exhibited cracking
  - This cracking was approximately 1-year later than control (E) mixes
  - Cracks have remained “tight” – will continue to monitor

HP was used in THMACO and SMA on the I-64 widening project outside of Williamsburg
- There were difficulties with storage time
- Reference Va Asphalt Mag “Best Practices” article (June 2018) for insight
Current/ongoing research experience
Interlayer projects (2017)

- **Route 143 NB & SB, Hampton Roads**
  - Paving Grid Type III
  - On milled asphalt pavement over JCP
  - 1.5” overlay of SM-9.5D
  - Passed bond strength test
  - Performing well to date (1-year)

- **US-17 SB, Hampton Roads**
  - Un-milled asphalt pavement over JCP

- **US-13BUS – Fibermat as interlayer**
  - Summer 2017
  - Visual survey only
Heavy Vehicle Simulator Project

- Test length (constant wheel speed)
  - 45 feet
- Loads applied
  - Up to 22.5 kips
  - 4, 6.5, 9, 12.5, 15 kips
- Passes per day
  - Up to 12,000 bi-directional passes
- Instruments
  - Strain gauges in pavement and LVDT’s measuring slab movement
Heavy Vehicle Simulator Project
Heavy Vehicle Simulator Project

- Testing over jointed concrete
  - 8 inch thick
  - 10 feet wide
  - 300 feet long
  - 10 foot saw cut joints
  - On top of 1” SM-9.5
Heavy Vehicle Simulator Project

- Current test
  - SMA-12.5 (PG64E) Control mix
  - SMA-12.5 (PG64E) + Fiber

- Future tests
  - SMA-12.5 + HP
  - SMA-12.5 + Arizona Style Rubber
  - Others?

- Tests are ongoing – no results to date
Future research
Binder/Mix Modifications

• Arizona Style Asphalt Rubber
  • Gap-graded asphalt mix that looks much like an SMA
  • ~18-20% rubber, wet blend
  • I-81 Salem District (mid-summer)
• Also looking at Fiber modified asphalt alternatives
  • Working to solicit project for 2019 paving season
Interlayer

• US-460 – Hampton Roads District
  • Different fabric interlayer system
• Interest in interlayer project performance?
  Contact Dr. Hari Nair (VTRC)
  Hari.Nair@vdot.virginia.gov
Questions?

Benjamin F. Bowers, Ph.D., P.E.
Research Scientist
Ben.Bowers@vdot.virginia.gov