Applied Research Activities

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VAA Fall Conference - October 2013
Quiet(er) Pavements
(Code of Virginia § 33.1-223.2:21)
Asphalt Technologies

PFC 9.5 (1”)

PFC 12.5/12.5RM(2”)

PFC 9.5 RM(1”)

Control - SMA-9.5
Demonstration Projects 2011/12

1. SR 7 By-Pass in Leesburg (A)
2. SR199 west of Williamsburg (A)
3. SR 288 near Chester (A)
4. I-64 Virginia Beach (C)
5. SR 76 Richmond (C)
6. Fairfax County Parkway near Chantilly (A)
7. US 17 Near Marshall (A)
8. NCAT
Noise Intensity vs. Time (VA Sites)
Status of Program

• Difference between lowest-noise QP and control surfaces - readily noticeable after one winter (≥ 5dB difference)

• Ongoing:
  – Functional Testing (noise, ride, friction)
  – Winter performance/maint. requirements
  – Structural Condition (spring coring?)
  – Monitor related national/international activities
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Final Report  - **Now due June 2015** (2013 Legislation)

**Interim Report 2013:**
http://leg2.state.va.us/dls/h&sdocs.nsf/By+Year/HD92013/$file/HD9.pdf
Fiber-less SMA
SMA without Fiber – SP

• Section 248 – SMA Concrete
  – “Fiber Additive” references deleted
  – Table II-25 (SMA Composition) – amended to reduce minimum AC from 6.3% to 6.0%
  – Mixing Temps – “recommendations of WM additive supplier”

• Section 317 – SMA Pavement
  – “Fiber Additive” references deleted
  – Haul/Placement temps – “recommendations of WM additive supplier”
Mix Design

Control
• SMA 12.5 (76-22)
• 15% RAP
• 6.3% Asphalt Cement
• Additives – 0.6% Evotherm
• Comp. Temp - 300º F

No-Fiber
• SMA 12.5 (76-22)
• 15% RAP
• 6.3% (and 6.0%?) Asphalt Cement
• Additives – 0.6% Evotherm
• Comp. Temp - 275º F
Notes on Mix Design (w/o fibers)

- Standard lab procedures → a “Screamin’ Mess!”
- Procedure that worked:
  - Mixed at 320° F
  - Compacted at 275° F (~5 minutes later)
- Drain down (6.3% AC):
  - 0.19% (300° F), 0.13 (275° F), 0.0 (250° F)
Notes on Production (w/o fibers)

• Original Plan $\rightarrow$ divide day/night into half with 6.0% and half with 6.3% AC
• Actual (July 23/24) $\rightarrow$ 1,202 tons at 6.0%
• Shipped/sampled/specimen prep:
  – 275\(^\circ\) F – all good
  – 250\(^\circ\) F – slow feed
• Visual observation – thicker liquid asphalt coating
Preliminary Lab Results

**APA Rut**
- Control: 1.47 mm
- No-Fiber: 2.95 mm

**Flow Number**
- Spec. 1: 107
- Spec. 2: 126
- Spec. 3: 149
Saved 0.3% liquid and fibers, but...

• Long-term performance?
• QA/monitoring – reheats not “business as usual”
• Production → haul → placement:
  – *Continuous* process @ uniform temps
  – Reasonable haul distances
  – Sufficient trucks
• Storage – not for long
• General fault tolerance – not much
Scaled Accelerated Testing
Research Objective

• Evaluate stability and durability of:
  • SM-4.75 mixture (HR) – 1” (lab and field)
  • THMACO mixtures – ¾” (1”)
  • SM-9.5 A & D mixtures (HR) - 1 ½”
  • SM-12.5 D (HR) – 2” (1 ¾”)

• Assess capability of MMLS3 - 1/3 scaled accelerated trafficking machine
“Field” & Laboratory Testing

FHWA ALF Pads

Lab Testing Frames

Un-trafficked

Trafficked
Conclusions - Preliminary

• SM 4.75 mixes very rut resistant (when adequately compacted)
• Rut-resistance of dense-graded mixes inadequate when void level > 10%
• THMACO (gap-grade mix) exhibited good stone-on-stone contact despite high voids
• The MMLS3 – good tool to assess relative performance of thin wearing course materials
Uniformity – Virginia Case Studies (Support for Asphalt Quality Task Force)
Thermal Profile – Operation A

- Blaw-Knox MTV
- Paver ~ 50% idle time
- Truck-end patterns
- Temp. diff 40-60 F
- 46% of profiles > 50 F

Example 500’ of Thermal Profile from Operation A
Thermal Profile – Operation B

• Roadtec MTV
  – Capacity ~ 1 truck
• Truck patterns visible
• Paver ~ 12% idle time
• Temp diff 23 – 32 F
• 45% of profiles < 25
Thermal Profile – Operation A

Thermal Profile – Operation B
Stay Tuned…