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Update on VDOT's Asphalt Research Activities

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VAA Annual Meeting

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General Asphalt Research Topics

- Support of Asphalt Quality Task Force Initiatives
- Quiet Pavements
- Pavement Recycling
- Mixture Research
- Materials Characterization in support of the MEPDG



Asphalt Quality Task Force

Background – Authorized by Chief Engineer

“The purpose of the Task Force is to discuss and suggest possible improvements to enhance asphalt quality by reviewing the VDOT rideability program and proposing other simple measures and positive contract language that would increase the quality of our projects and provide for a level playing field for our contractors. In other words, a simple workable contracting mechanism that would help encourage quality.”



Task Force Team

Industry

*David Helmick, Superior Paving
Company

David Branscome, Branscome
Paving Company

Trenton Clark, Virginia Asphalt
Association

Ed Dalrymple, Chemung Contracting
Company

David Horton, Virginia Paving
Company

Richard Schreck, Virginia Asphalt
Association

*Co-Chairman

VDOT/VCTIR

*David Shiells, NoVa District Materials
Engineer

Bill Bailey, Assistant State Materials
Engineer

Jon Dowell, Maintenance Contract
Manager

Rick Kibler, Construction Manager

David Lee, Salem District Materials
Engineer

Kevin McGhee, Associate Principal
Research Scientist



VCTIR Support of AQTF Initiatives

- Incentive-Only Smoothness Specifications
 - Review of 2012 Pilot - Fairfax County Pkwy
 - Expansion to 2013 Pilots – Nova and Culpeper
 - Researchers - Nair, McGhee, Habib, & Shetty
- Uniformity of Asphalt Construction
 - Coordination with SHRP2 R06C – GPR and IR profiling
 - 2013 field trials with uniformity measurement systems
 - Researchers - McGhee & B. Diefenderfer
- Smoothness Incentives/Disincentive Levels
 - Researchers - McGhee & Habib
- Effectiveness of Performance Milling - TBD



Quiet Pavement

- 2012 Activities
 - Thick PFC with rubberized binder (AR-PFC 12.5 @ 2-inches) – *lowest OBSI so far!*
 - Rubber-modified SMA (AR-SMA) – *no measurable effect*
 - NCAT Track - AR-PFC 12.5 and PFC12.5
- 2013 Activities
 - Monitoring and interim reporting
- Final Report/Use Plan – June 2015
- Researcher - McGhee

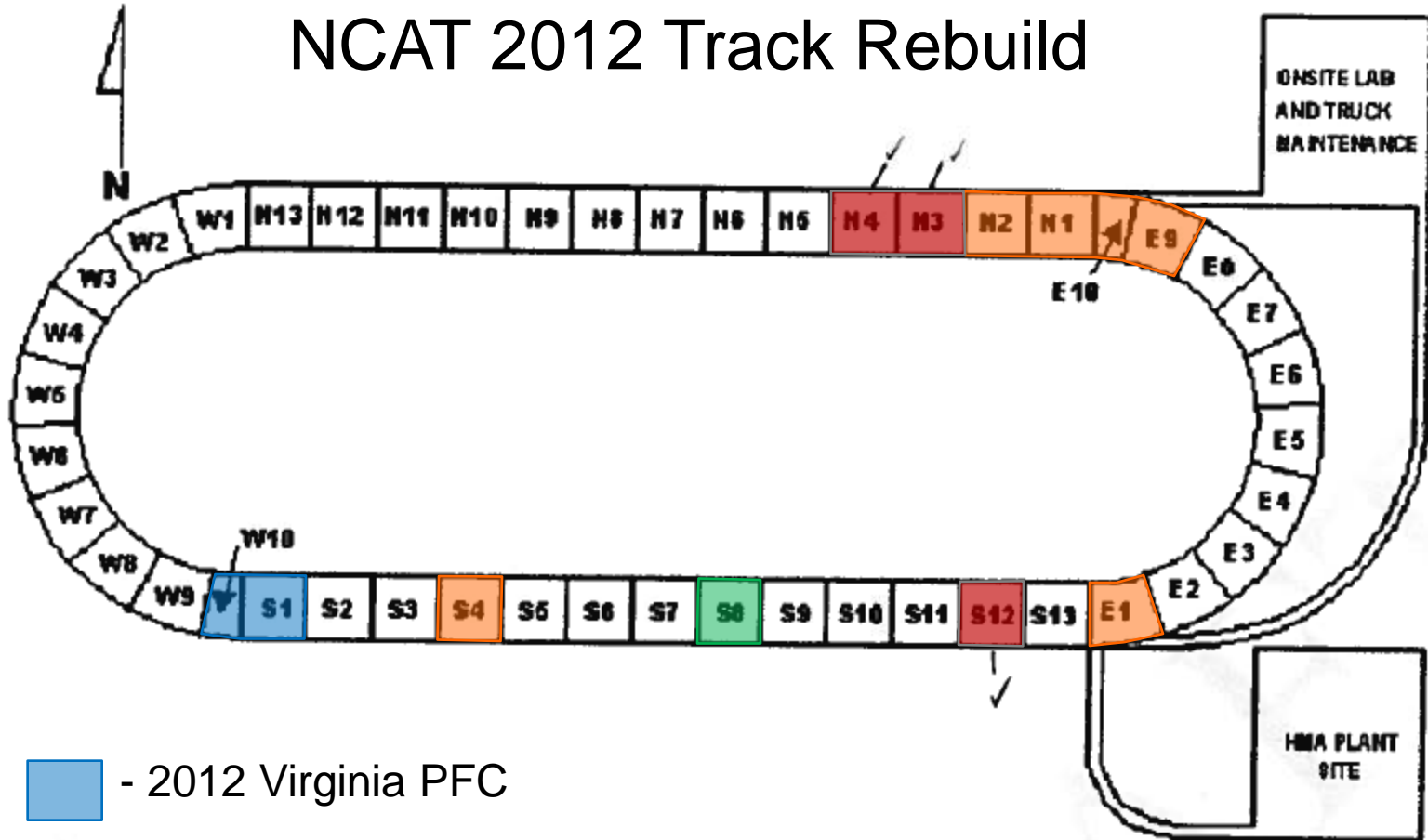


NCAT Test Sections

- Goal
 - Gain a better understanding of long-term performance under heavy truck loading
- Five test sections (3 recycling, 2 quiet pavement)
 - Construction completed in August
 - Test sections include instrumentation
 - 2 years of traffic = 10 million ESALs
- Researchers – B. Diefenderfer & McGhee



NCAT 2012 Track Rebuild



-  - 2012 Virginia PFC
-  - 2012 Other PFC
-  - 2009 Other PFC
-  - 2012 Virginia Recycle



NCAT Recycled Sections

N3

6-in AC

5-in CCPR

6-in Agg

Subgrade

N4

4-in AC

5-in CCPR

6-in Agg

Subgrade

S12

4-in AC

5-in CCPR

8-in FDR

Subgrade



NCAT Recycled Sections

- Results so far
 - Strain gauges at bottom of CCPR layer are showing a lower strain with 6-inch overlay than 4-inch overlay
 - Strain gauges are also showing the FDR base is reducing strains compared to aggregate base
- Researcher – B. Diefenderfer



NCHRP 09-51

- *Material Properties of CIR and FDR for Pavement Design*
- Investigators
 - PI, Charles Schwartz, University of Maryland
 - Co-PI, Brian Diefenderfer, VCTIR
- Objective
 - Propose material property inputs, test methods, and distress models for predicting the performance of CIR and FDR using asphalt-based materials



NCHRP 09-51

- Wrapping up Phase 1
 - Literature review
 - Recommendations for tests
- Phase 2
 - Proposing testing recycled materials similarly to HMA
 - Dynamic modulus and repeated-load permanent deformation tests
 - Proposing to test materials collected for already constructed projects (rather than creating samples in the lab)



I-81 Recycling Project

- Monitoring still on-going
- Periodic ride quality, rutting, and FWD measurements
- Ride quality and rutting
 - Still performing well
- FWD
 - Pavement increased in strength between 6 and 18 months (similar to 2008 FDR projects)
- Researcher - B. Diefenderfer



High RAP Efforts

- High RAP Mixtures
 - VTTI contract
 - Address binder contents of high RAP mixes
- TPF-5(230) Evaluation of Plant Produced High Percentage RAP Mixtures in the Northeast
 - Pooled fund – University of New Hampshire
 - Understand how RAP interacts with the virgin materials
 - Develop techniques and procedures to design and construct RAP mixtures with equal or better performance than all-virgin mixtures



In-Service Binder Aging and Performance: RAP Mixtures

- How does RAP content influence binder grade and mixture performance?
 - How do binder grades change over time? Is this influenced by the presence of RAP?
 - How does the depth within the surface layer affect aging of the binder?
 - Is there a relationship between deterioration and in-service binder grade?
- Evaluate performance of early high RAP sections constructed in 2007
- Evaluate additional RAP sections (new and existing)
- Researchers – S. Diefenderfer & Nair



WMA Performance

- Continuing effort to look at long-term performance of WMA
 - Evaluate long-term performance of early WMA sections constructed in 2006
 - Evaluate additional WMA sections (new and existing)
 - Provide technical assistance with new WMA technologies
- Researcher – S. Diefenderfer



Influence of Aggregate Morphology & Grading on Performance of Small-Size SMA Mixtures

- Goal: Examine grading specs for the design of small-size SMA mixtures and the impact of aggregate morphology on the structural stability of the mixture
- Characterize aggregate particle shape, angularity, and surface texture
 - Apply LADAR (laser-based imaging) system
 - Comparison with conventional methods
- Mixture stability evaluation
 - Model-mobile loading simulator (MMLS3), fatigue testing, dynamic modulus and flow number
- Researchers – Lane & Nair





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For more information:

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