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Update on VDOT's Asphalt Research Activities

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2013 VDOT Asphalt Seminars

General Asphalt Research Topics

- Support of Asphalt Quality Task Force Initiatives
- Quiet Pavements
- Pavement Recycling
- Mixture Research

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

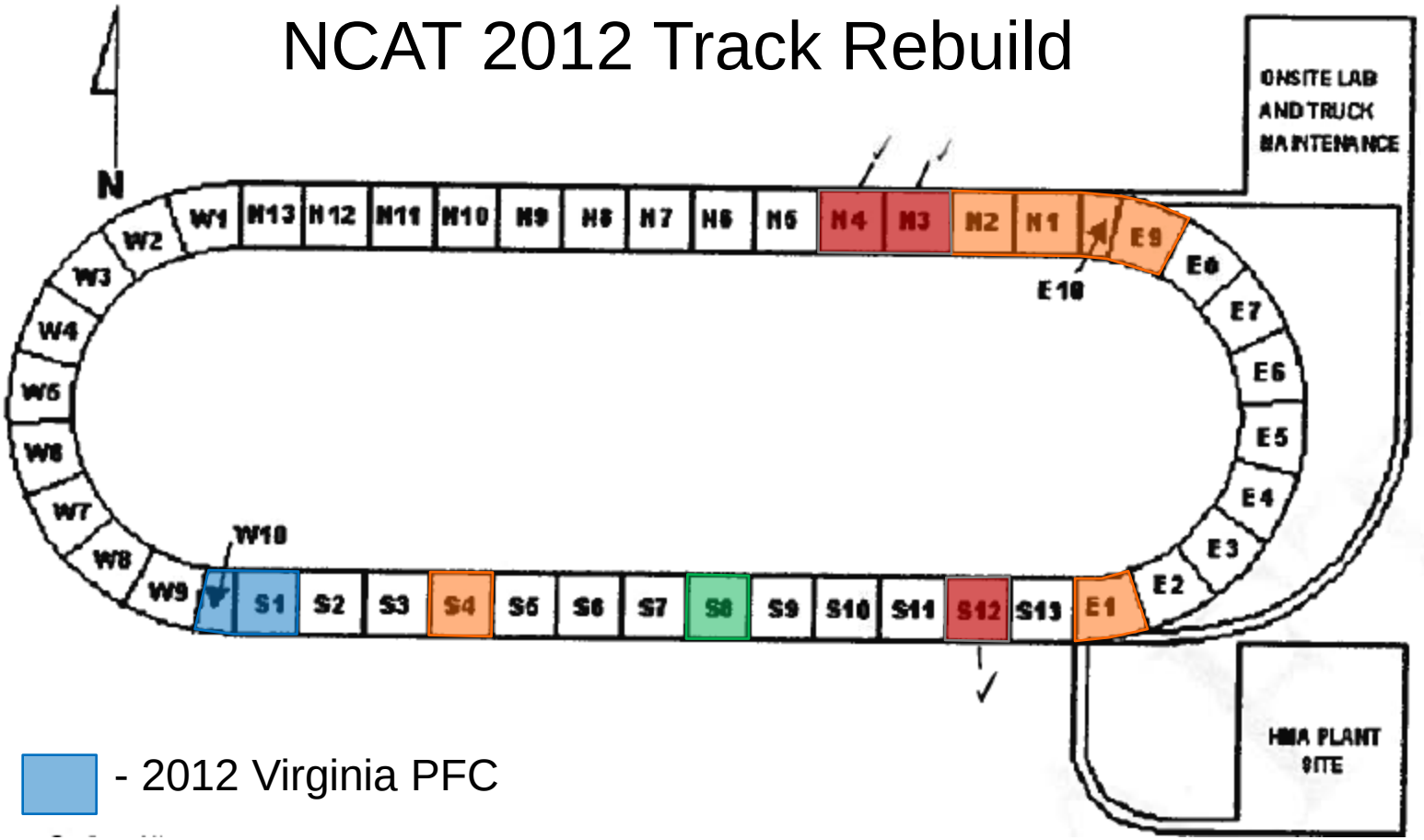
Quiet(er) Pavement

- 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

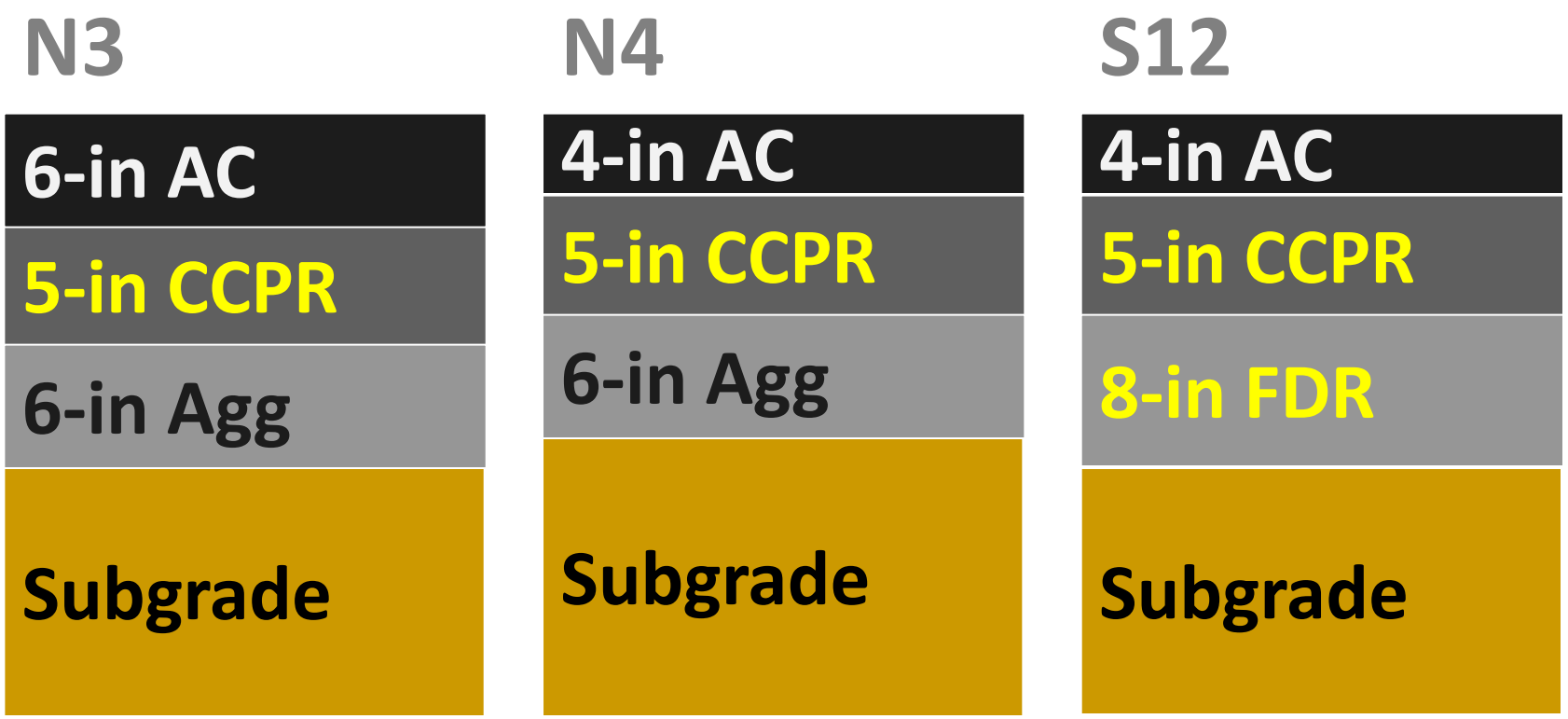
- Goal
  - Gain a better understanding of long-term performance under heavy truck loading
- Five test sections (3 recycling, 2 quiet pavement)
  - Construction completed in August
  - Test sections include instrumentation
  - 2 years of traffic = 10 million ESALs
- Researchers – B. Diefenderfer & McGhee

NCAT 2012 Track Rebuild



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

NCAT Recycled Sections



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
- Will these make a difference in performance? TBD
- 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

Technical Assistance

- Alternatives to PG76-22 Binder
  - Evaluation of alternative (non-SBS) binder modifiers to meet PG76-22
  - McGhee & S. Diefenderfer
- Mixtures Containing Shingles
  - Evaluation of mixtures containing RAP and RAS
  - S. Diefenderfer

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