

Implementable Findings from the 2012 NCAT Pavement Test Track



**National Center for
Asphalt Technology**
NCAT

at AUBURN UNIVERSITY

Track Research Sponsors



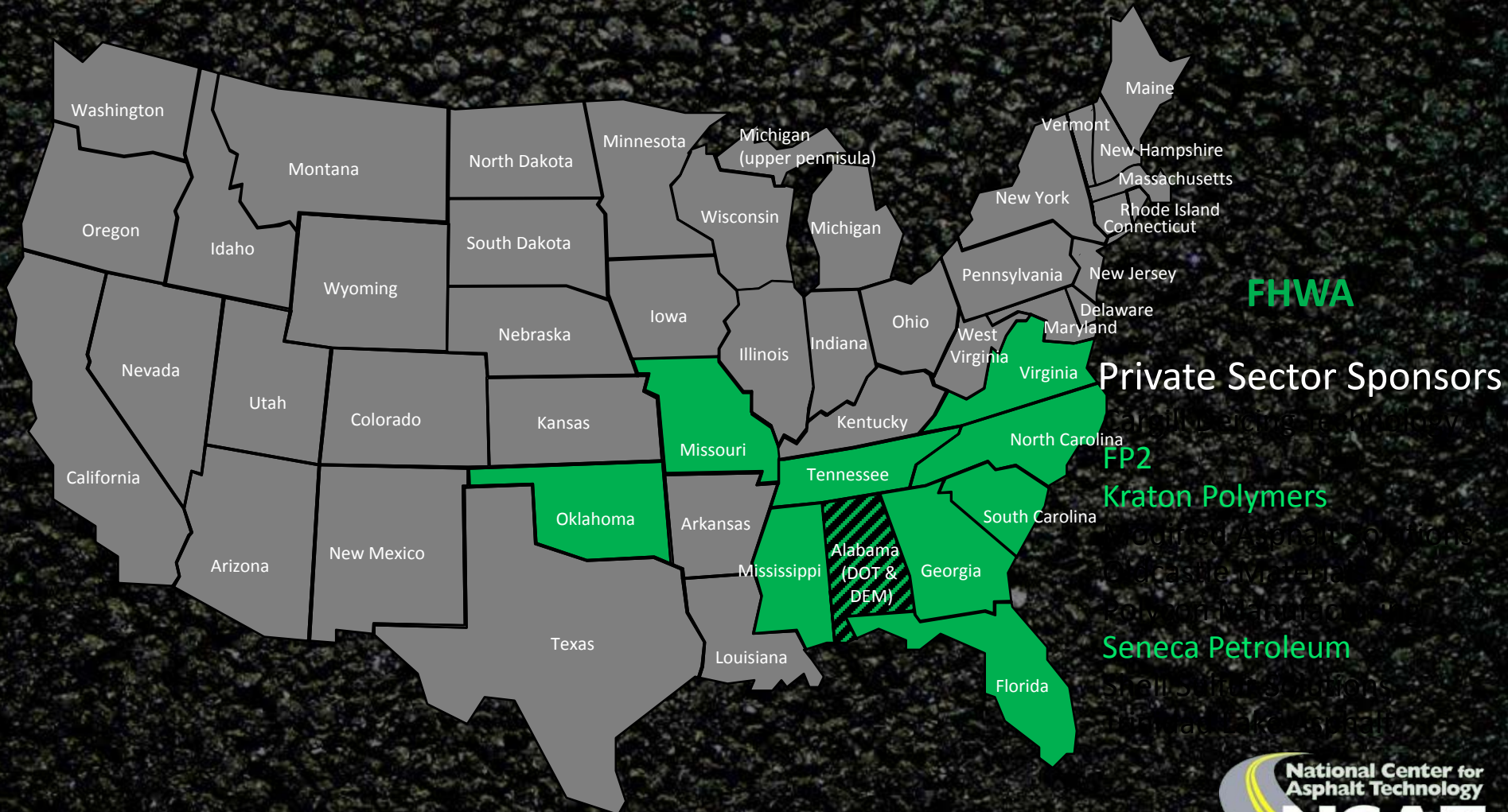
FHWA

Private Sector Sponsors

- Cargill Deicing Technology
- FP2
- Kraton Polymers
- Modified Asphalt Solutions
- Oldcastle Materials
- Polycon Manufacturing
- Seneca Petroleum
- Shell Sulfur Solutions
- Trinidad Lake Asphalt

Pre-2012, 2012

2012 Track Research Sponsors



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FP2

Kraton Polymers

Seneca Petroleum



at AUBURN UNIVERSITY

2015 Pavement Test Track Conference

March 3-5, 2015

The Hotel at Auburn University
and Dixon Conference Center
Auburn, Alabama

- ▶ WMA & High RAP/RAS/GTR Mixes
- ▶ Optimized Structural Design
- ▶ Pavement Preservation
- ▶ Implementation

Official registration information will soon be available at www.ncat.us



at AUBURN UNIVERSITY

Content

- Materials
- Mixes
- Structures
- Construction
- Preservation

Materials

- Cost of crude & virgin binder is disconnected
- Utilization of fractionated RAP & processed RAS
- Need enough “healthy” binder for mix durability
- Compatibility of additives for WMA & antistrip
- Sustainable binder modifiers (GTR, biopolymers)
- Kevlar fibers to improve mix durability (OGFC)
- Highly polymer modified asphalt (HiMA).

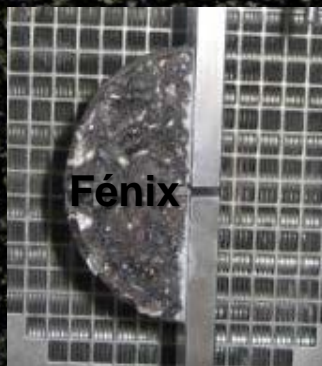
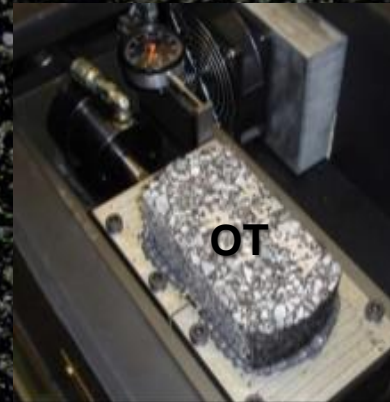
Materials



Mixes

- Higher binder contents in balanced mix designs
- Benefits of smaller NMAS and/or finer mixes
- Expanded use of otherwise wasted stockpiles
- Aged binder ratio (ABR) mix design references
- Differentiated designs ($ABR = RAPBR + RASBR$)
- Cracking test needed for design approval & QC (!).

2015 Cracking Group (CG)



Smaller NMAS Mix in S3



Structures

- “M-E” versus “E” pavement buildup design
- Need for local calibration & strain thresholds
- Consideration for alternative materials
- Layer coefficient increase from 0.44 to 0.54
- Reduces to ≥ 0.15 for OGFC/PFC surfaces
- Fog sealing prolongs OGFC/PFC surface life
- $0.36 \leq 100\% \text{ RAP CCPR base mix} \leq 0.39$.

100% RAP Foamed CR Base Mix

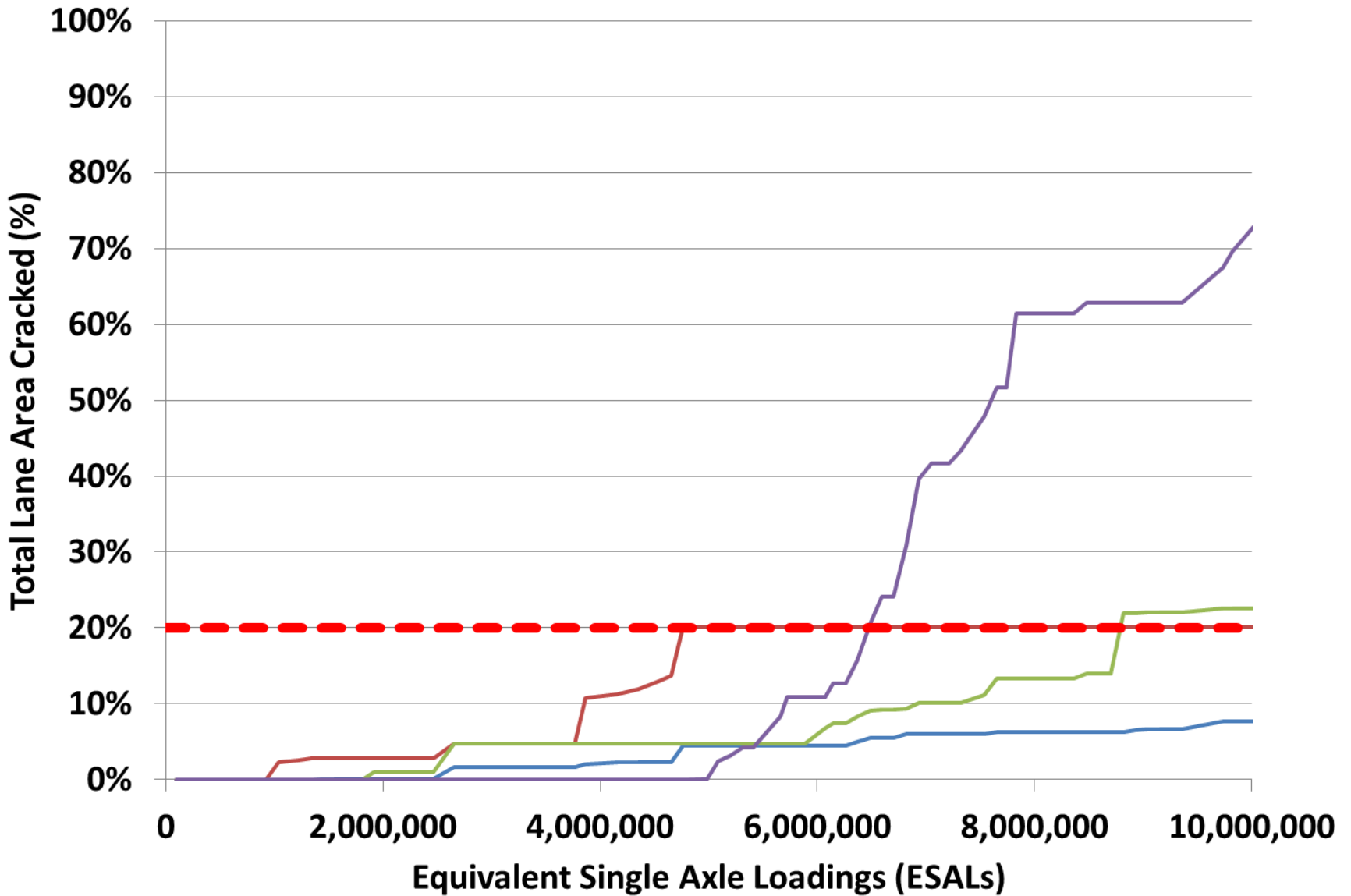


100% RAP Foamed CR Base Mix



Construction

- WMA and higher aged binder ratio (ABR) mixes
- Less distinction between HMA and WMA
- Smaller NMAS and/or finer mixes
- Longitudinal joint quality/performance
- Prevention of premature/reflective distresses
- Tack coat is critical to pavement performance (!).



— E7A-SBS — E7B-GTR — E8A-RAP — E8B-RAS - - - Trigger

2012 Green Group (GG) Study

Purpose of Each Layer	N5 Control	S5 Higher RAP	S6 RAP+RAS	S13 Recyc Tires
Durable, Rut Resistant Surface	20% RAP ₂₀ 67-22/82-16 DG	25% RAP ₁₁ 67-22/16-22 SMA	5% RAS ₂₁ 67-22/88-16 SMA	VIRGIN 82-22 ₁₂ SMA
Stiff, Strain Reducing Middle	35% RAP ₃₉ 67-22/88-10 DG	50% RAP ₄₁ 67-22/82-16 DG	50% AGED ₂₆₋₂₄ 67-22/94-10 DG	35% RAP ₃₇ 82-22 ₁₂ DG
Fatigue Resistant Base Layer	35% RAP ₃₉ 67-22/88-10 DG	35% RAP ₃₄ 94-28/94-10 DG	25% RAP ₂₄ +76-22/88-16 DG	VIRGIN 88-22 ₂₀ AZ

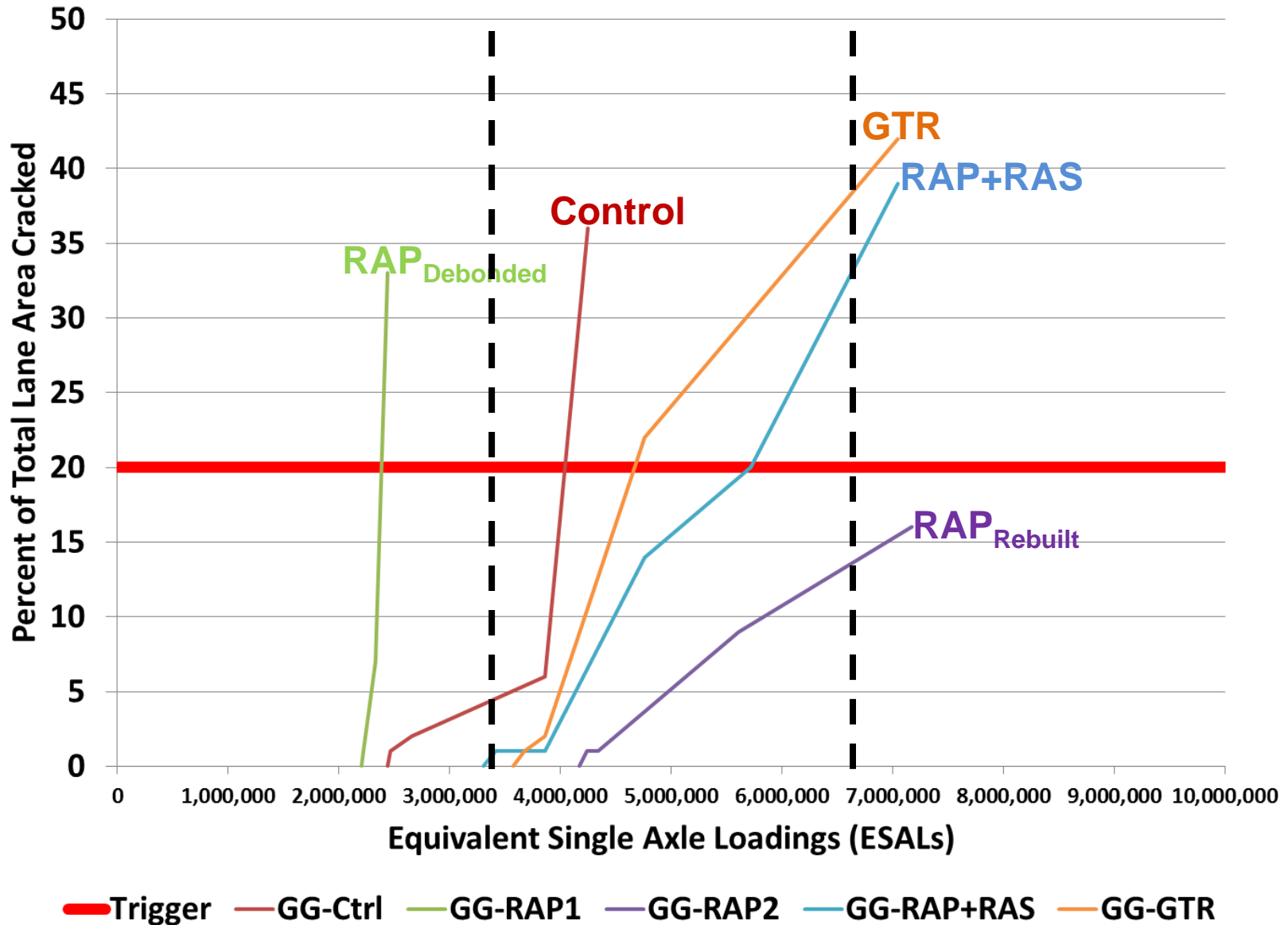
Green = Evotherm Q1 Additive, Blue = Astec Green Foamer

2012 Green Group (GG) Study

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2012 Green Group (GG) Study



Preservation

- Crack sealing improves cracking performance
- Differences between route/fill and blow/band
- Scrub seals exhibit both crack & chip seal benefit
- Treatments reduce subgrade moisture, but...
- Robust treatments provide more life extension
- Objective selection of preservation alternatives.

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Objective Treatment Selection

Martin Marietta Quarry

Asphalt Plant

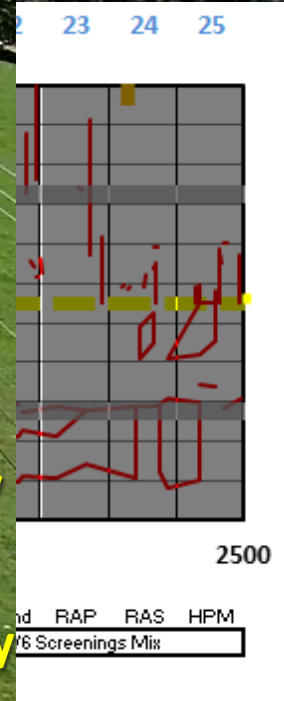
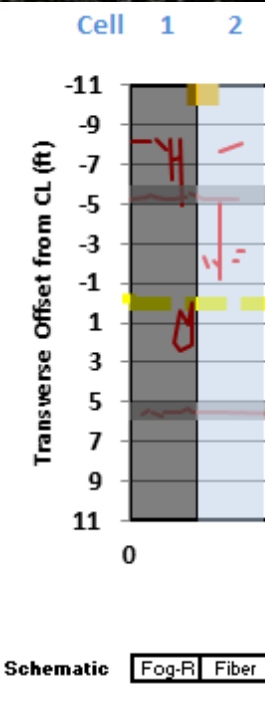
Lee Road 159

Lee Road 159

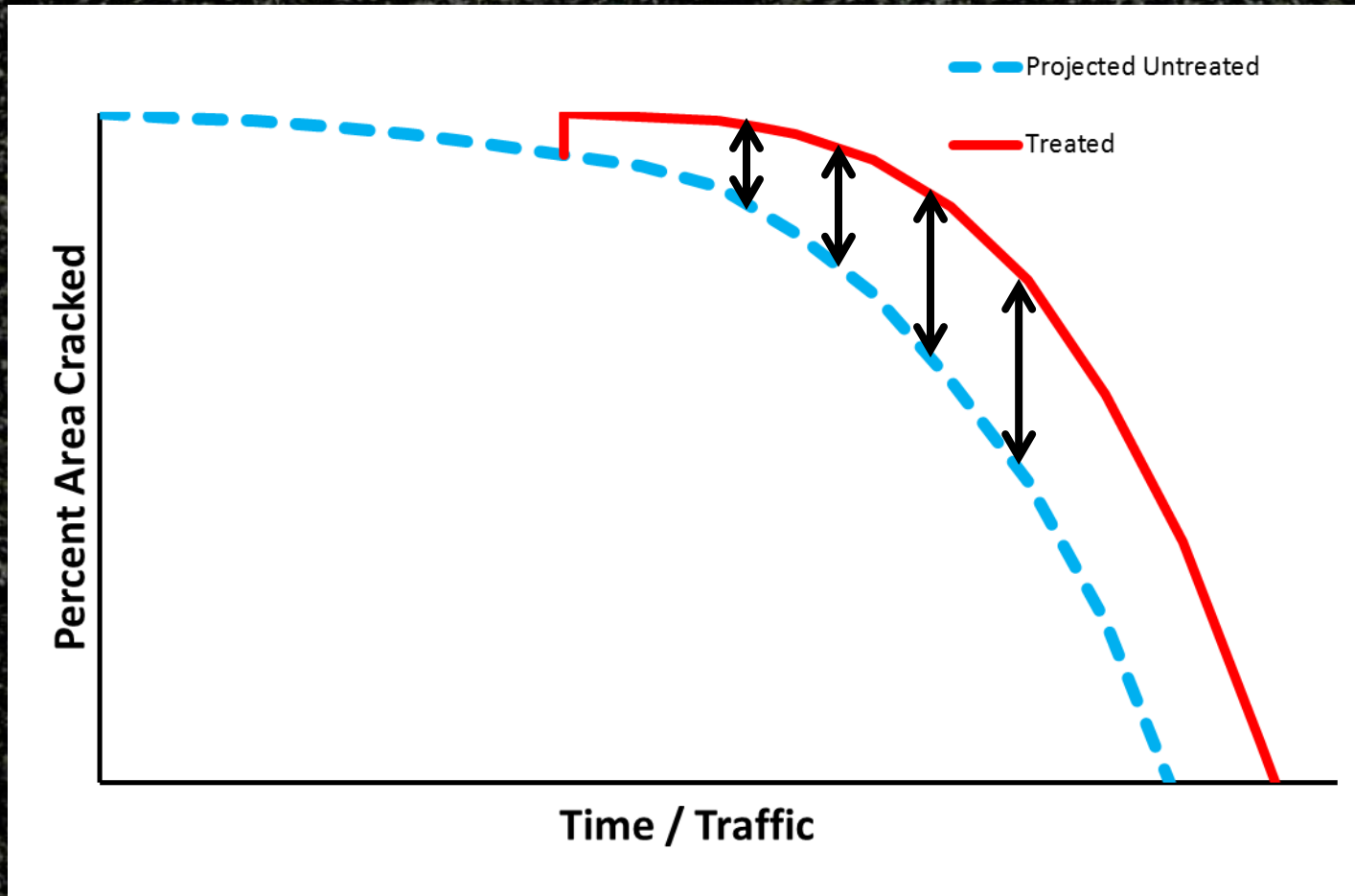
- Low ADT roadway
- Very high % trucks
- 14-year old 5½" pavement
- Diverse pavement condition
- Load data provided by quarry and asphalt plant

Objective Treatment Selection

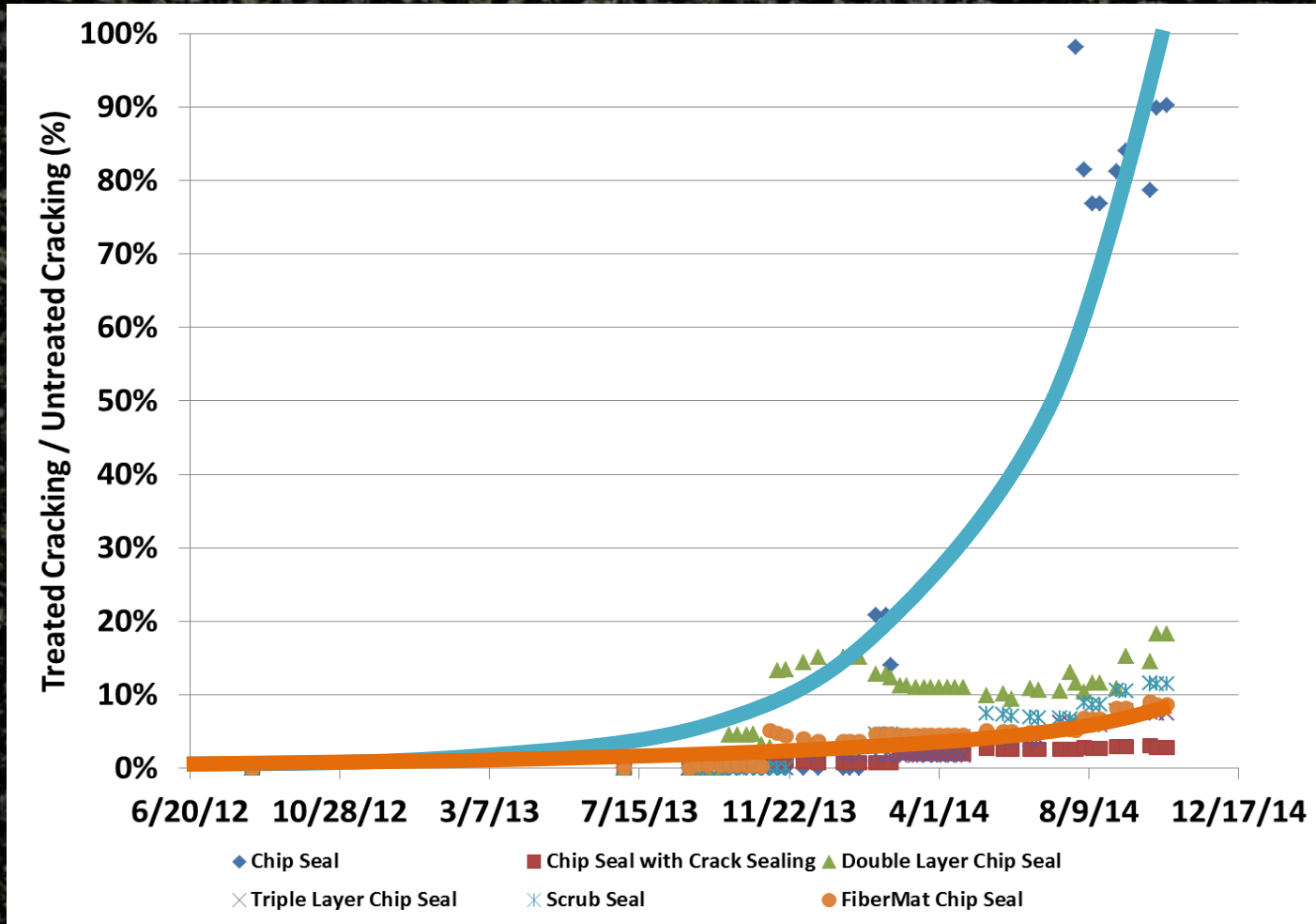
1. Rejuvenating Fog Seal
2. Fibermat
3. Control with Less Cracking
4. Control with More Cracking
5. Crack Seal (CS)
6. Single Layer Chip Seal
7. CS + Single Layer Chip Seal
8. Triple Layer Chip Seal
9. Double Layer Chip Seal
10. Cape Seal
11. Micro Surface
12. CS + Micro Surface
13. Double Layer Micro Surface
14. Fibermat Cape Seal
15. Scrub Cape Seal
16. Scrub Seal
17. Fibermat Chip Seal
18. Fibermat HMA Cape
19. HMA Thinlay
20. Thinlay on CCPR Base
21. HMA Polymer Thinlay
22. NovaChip
23. HMA 50% RAP Thinlay
24. HMA 5% RAS Thinlay
25. HMA HiMA Thinlay



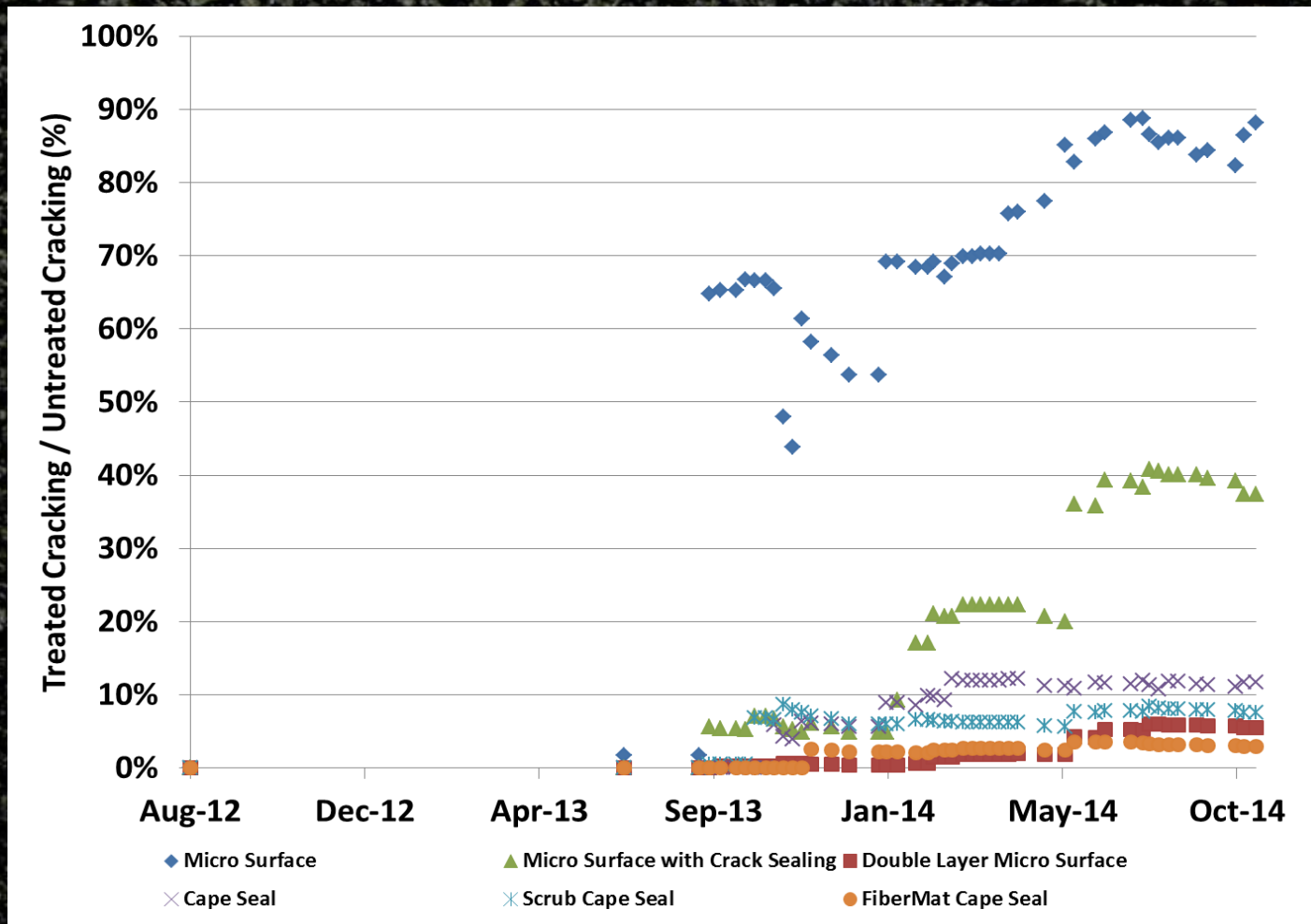
Reduction in Cracking



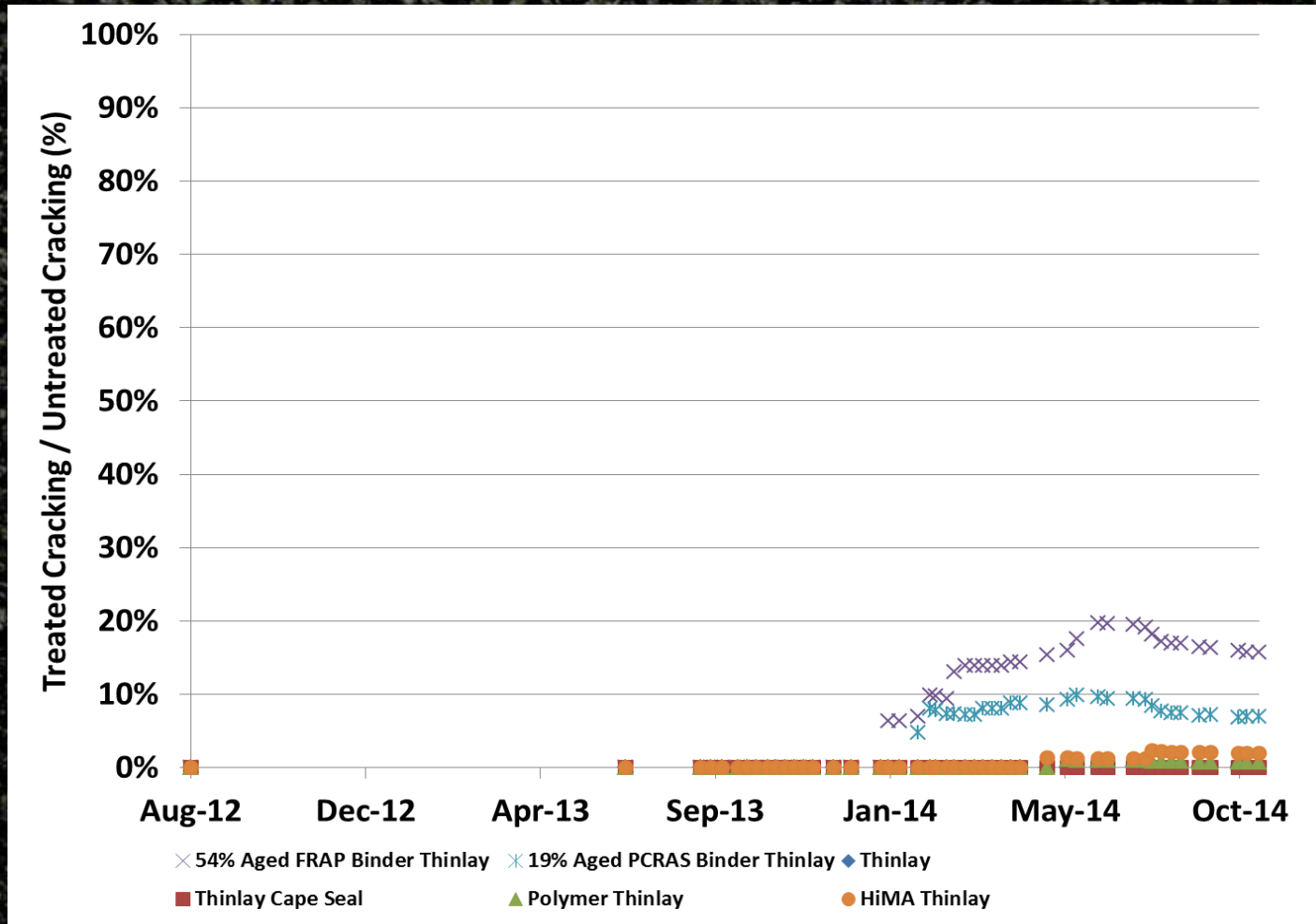
Reduction in Cracking



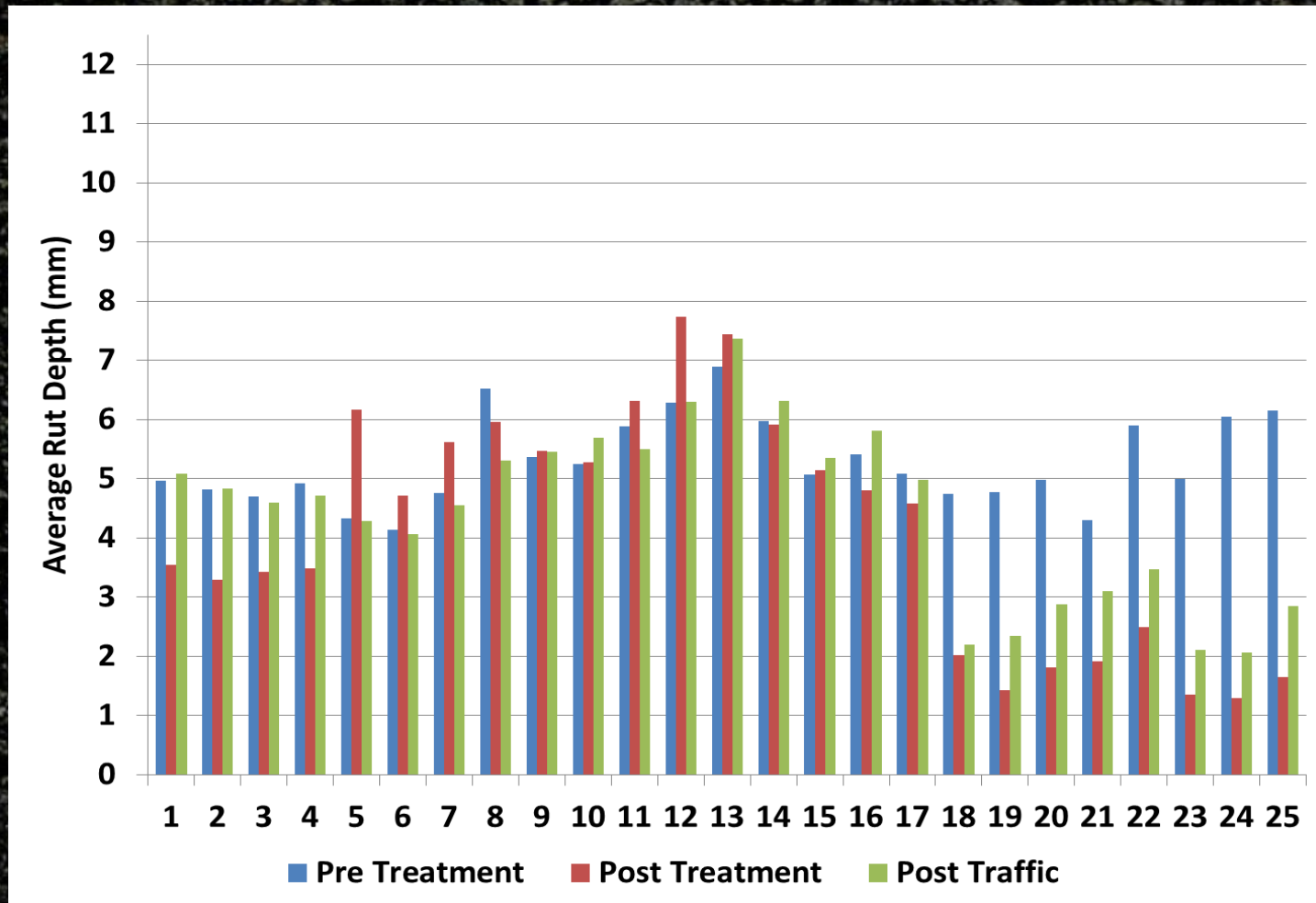
Reduction in Cracking



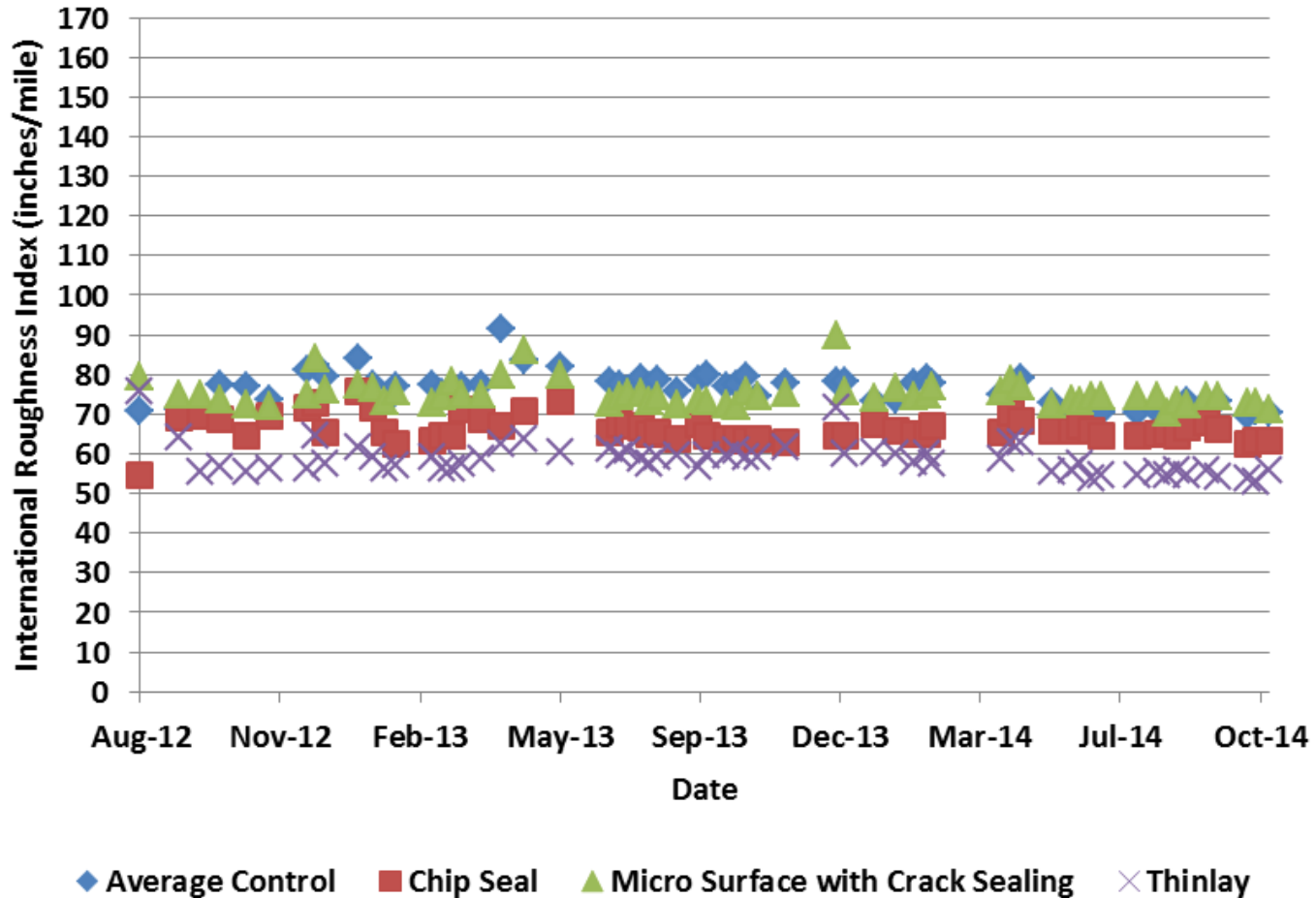
Reduction in Cracking



Rutting Performance



Roughness Performance



Track Preservation



Track Preservation



Track Preservation



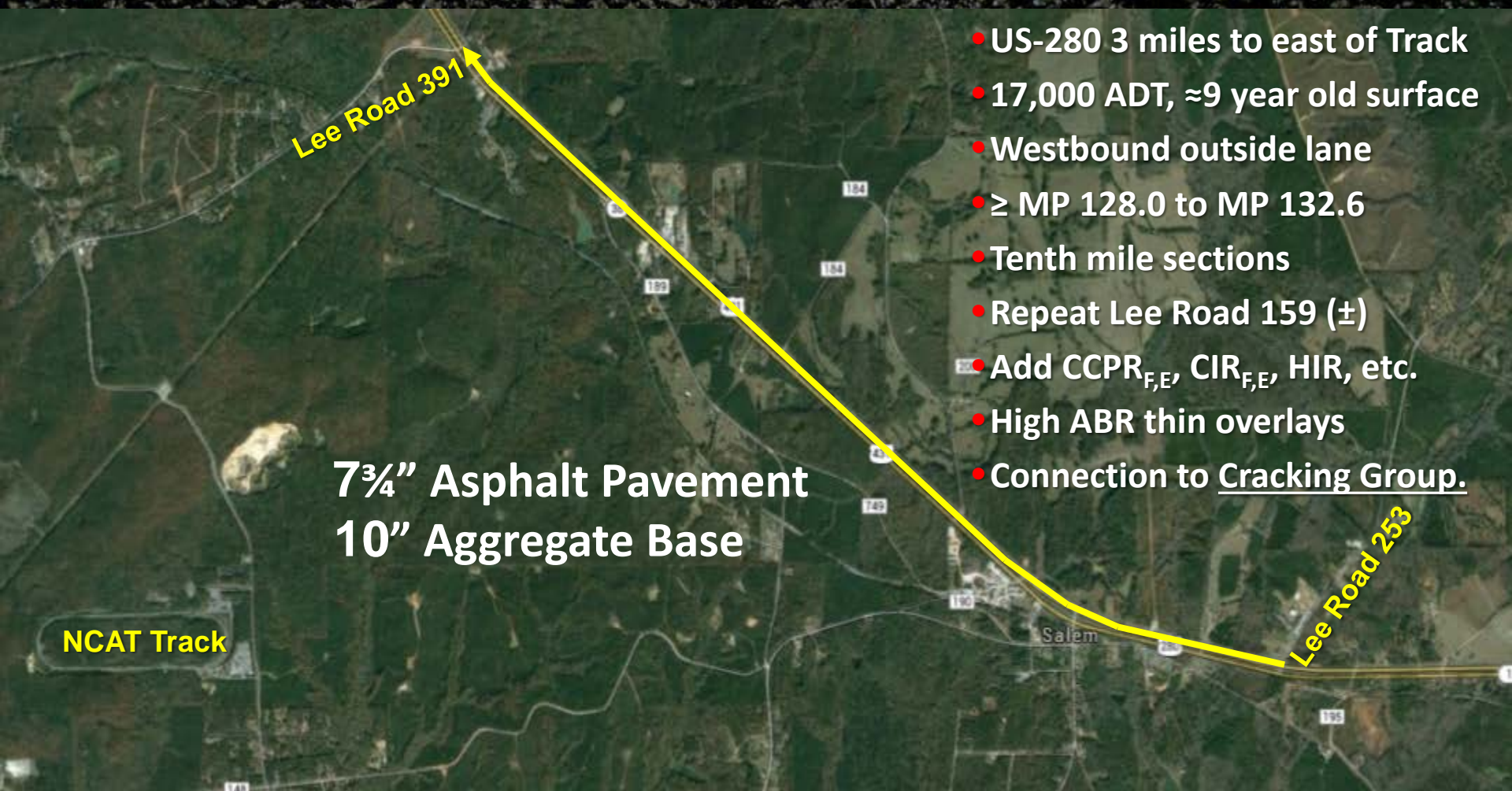
Track Preservation



Track Preservation



2015 Preservation Group (PG15)



7¾" Asphalt Pavement
10" Aggregate Base

- US-280 3 miles to east of Track
- 17,000 ADT, ≈9 year old surface
- Westbound outside lane
- ≥ MP 128.0 to MP 132.6
- Tenth mile sections
- Repeat Lee Road 159 (±)
- Add CCPR_{F,E}, CIR_{F,E}, HIR, etc.
- High ABR thin overlays
- Connection to Cracking Group.

NCAT Track

NCAT+MnROAD Preservation Partnership

To facilitate high value pavement research that addresses national needs using full-scale pavement testing facilities in both warm and cold climates on flexible, rigid, and composite pavement structures.



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www.pavetrack.com



Performance



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- Sponsors
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- Construction
- Trucking
- Performance

Click here for [the official NCAT web site](#), [Tracks in US](#), or [Tracks Worldwide](#)

Opelika, AL
Get the 10 day forecast

61°F
Cloudy

Feels Like: 61°F
Humidity: 81%
Wind: SE at 8 mph

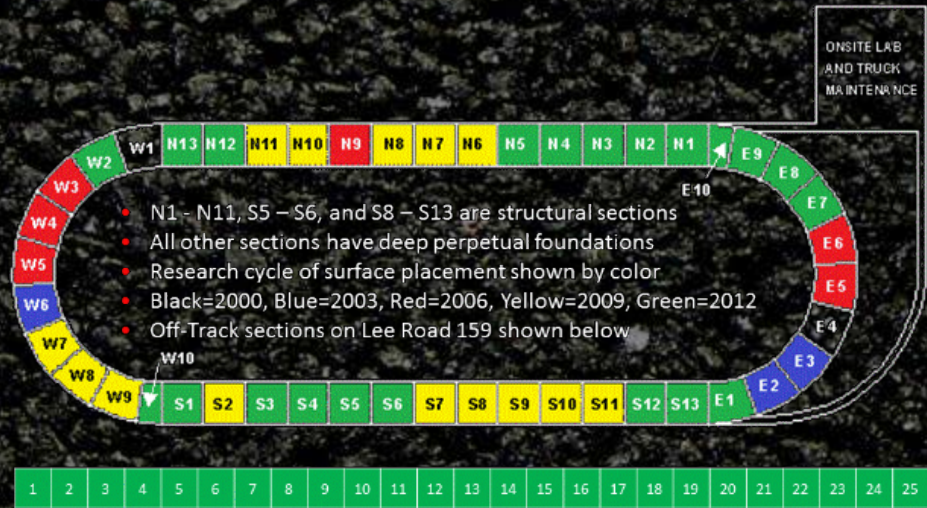
Enter city/zip **GO!**

The Weather Channel
Hit the Road
weather.com Travel Top 10s
Weather at 30,000 feet

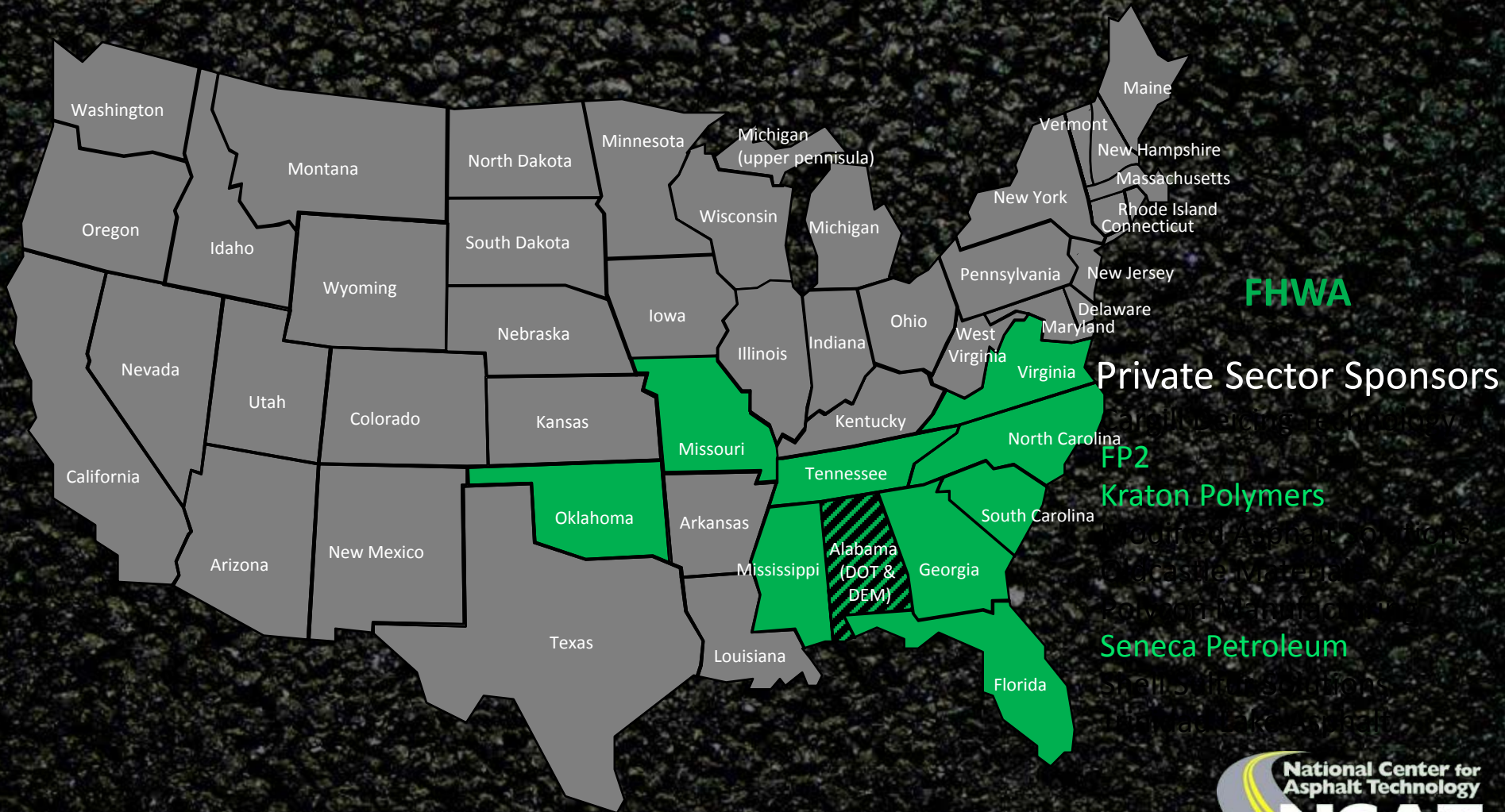
HOTLINKS to download PAVE reports, review upcoming NCAT training courses, query historical weather data, view current color radar or preview local forecast.

0. ESALs as of 2300 hours on

Performance data for each section can be viewed by positioning your mouse over the section in question and left-clicking. Based on feedback from our research sponsors, the performance reports have been revised to include crack maps. The 2009 performance reports are now a fully integrated and active part of the web presentation.



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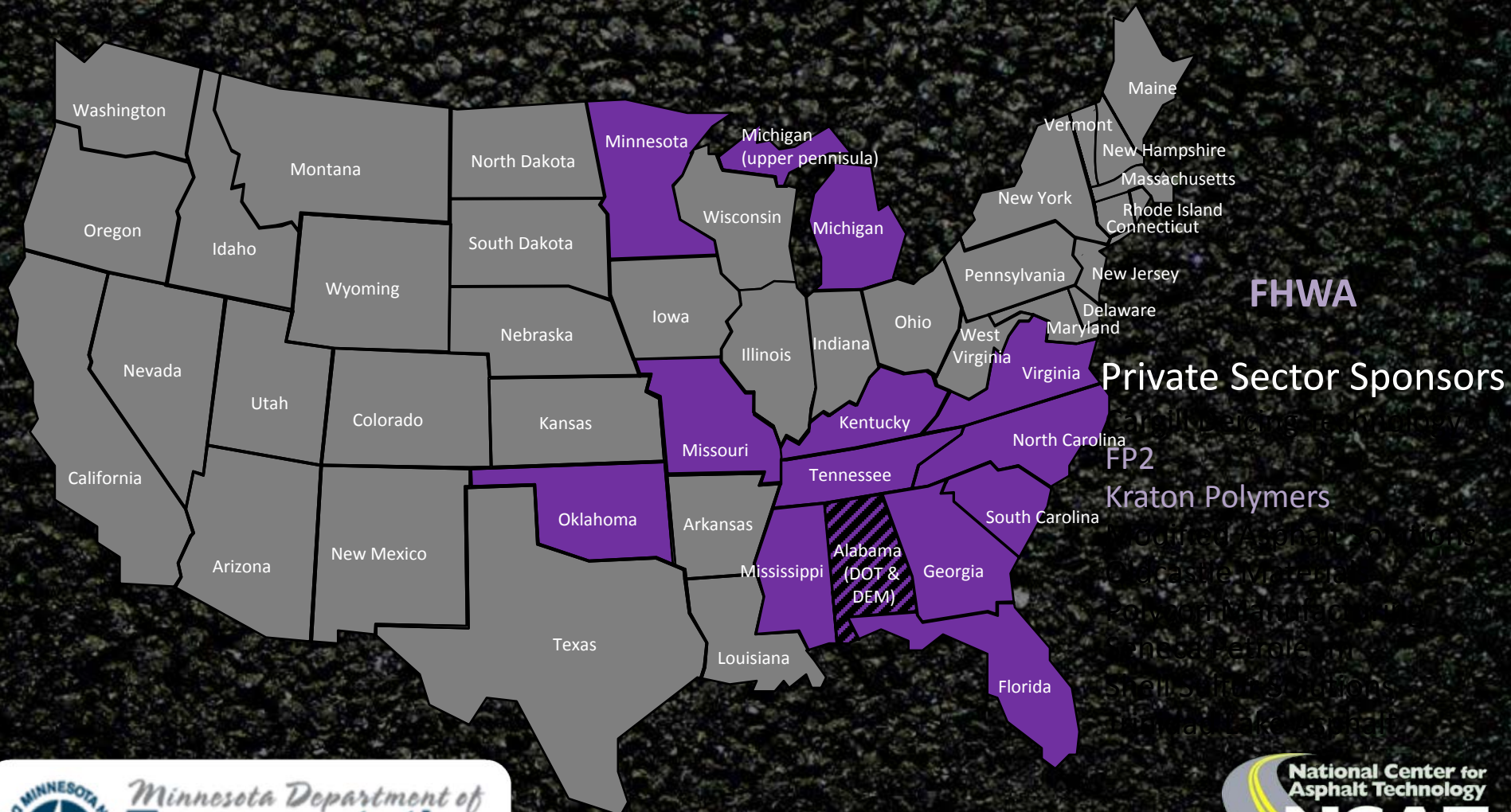
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Seneca Petroleum



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Next Track/MnROAD Conference



- High RAP/RAS balanced mix designs
- Nationwide pavement preservation
- Preventing reflective distresses
- Optimized structural design
- Implementation

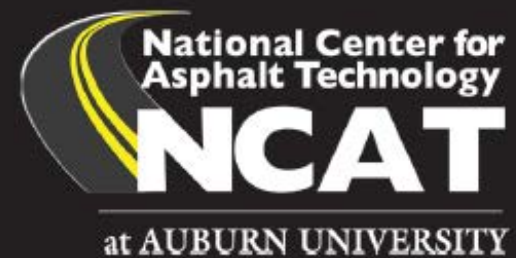


Pavement Test Track Conference

March 6-8, 2018

The Hotel at Auburn University
and Dixon Conference Center

www.ncat.us





www.ncat.us

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