

# National Pavement Preservation Research Initiative



at AUBURN UNIVERSITY



# Content

- Introduction to NCAT Pavement Test Track
- NCAT pavement preservation research
- Introduction to MnROAD research program
- MnROAD pavement preservation research
- MnROAD+NCAT national preservation study.

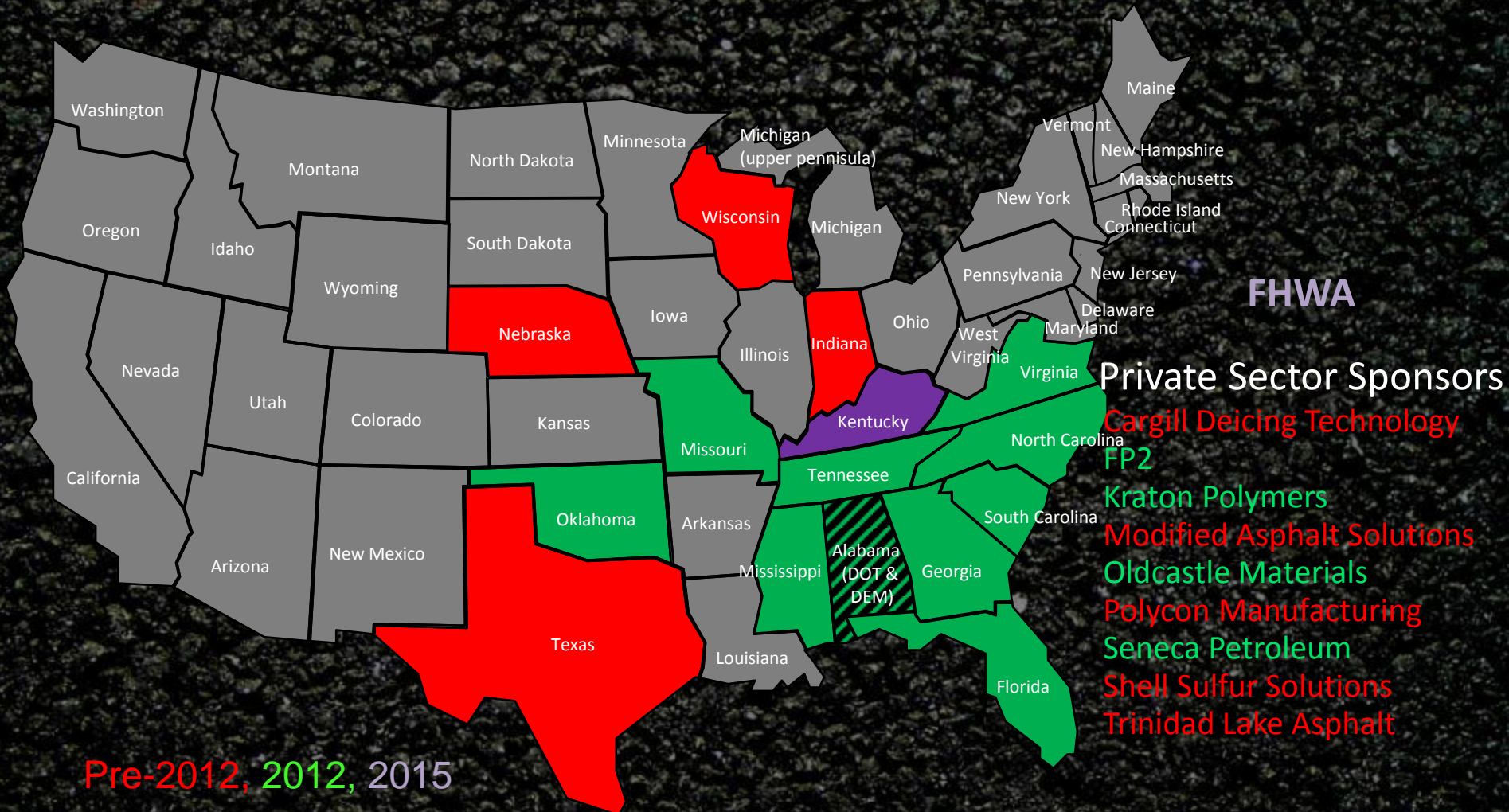
# NCAT Pavement Test Track



**National Center for  
Asphalt Technology**  
**NCAT**

at AUBURN UNIVERSITY

# NCAT Research Sponsors



# Implemented NCAT Findings

- Innovation in mix design methodologies
  - Coarse vs fine vs lower NMAS (thin overlay) mixes
  - Reduced gyration level compactive efforts
- Optimized use of constituent materials
  - Neat vs standard vs GTR vs high polymer modification
  - Reduced aggregate quality construction/performance
- Promote innovative new technologies
  - Short, mid, and long term performance of WMA
  - Virgin vs high(er) RAP (& RAS) pavements/structures.

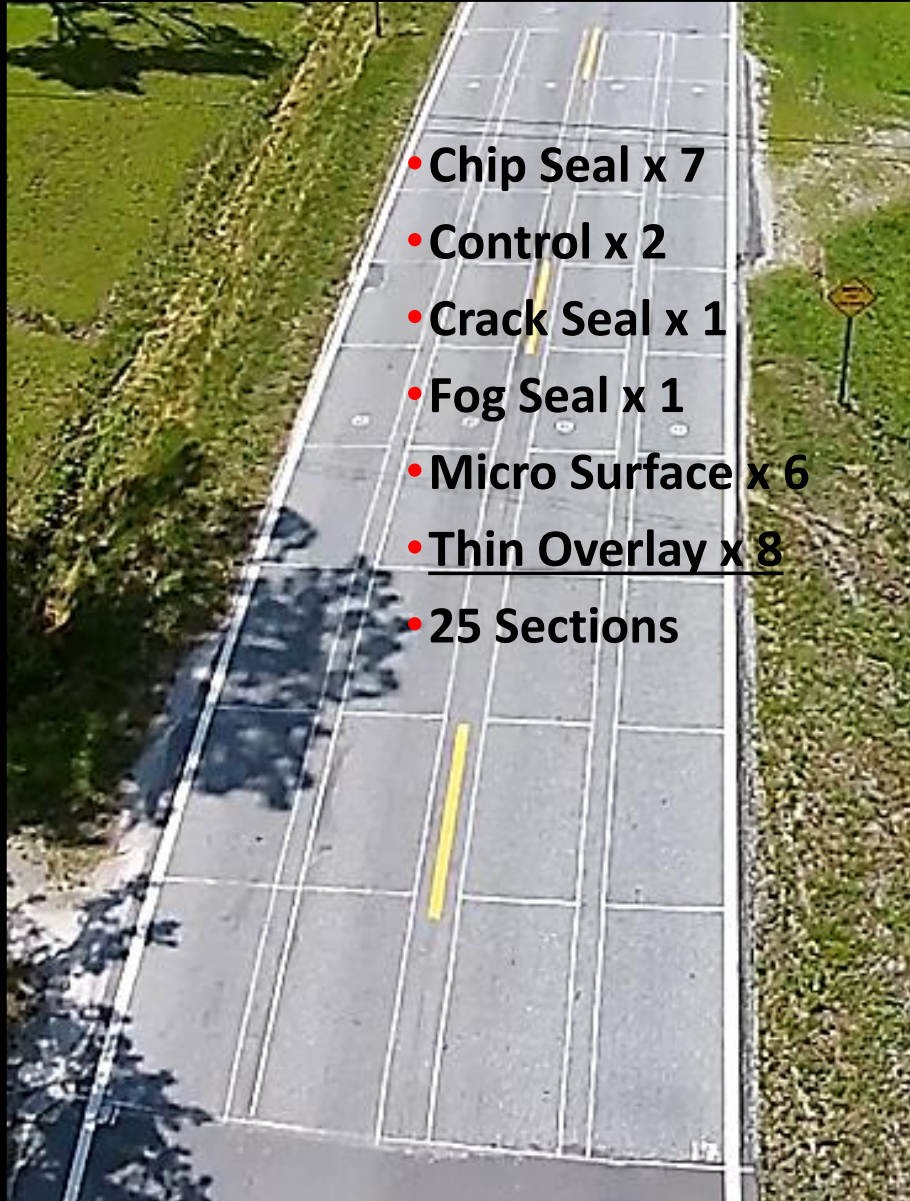
# Implemented NCAT Findings

- Mechanistic-Empirical pavement design
  - Need for local calibrations to reduce overdesign
  - Contribution of alternative mixes/materials
- Empirical pavement design
  - Recalibration/update of AASHO layer coefficients
  - Contribution of porous friction course (PFC) surfaces.

# Track Preservation Sections (+)

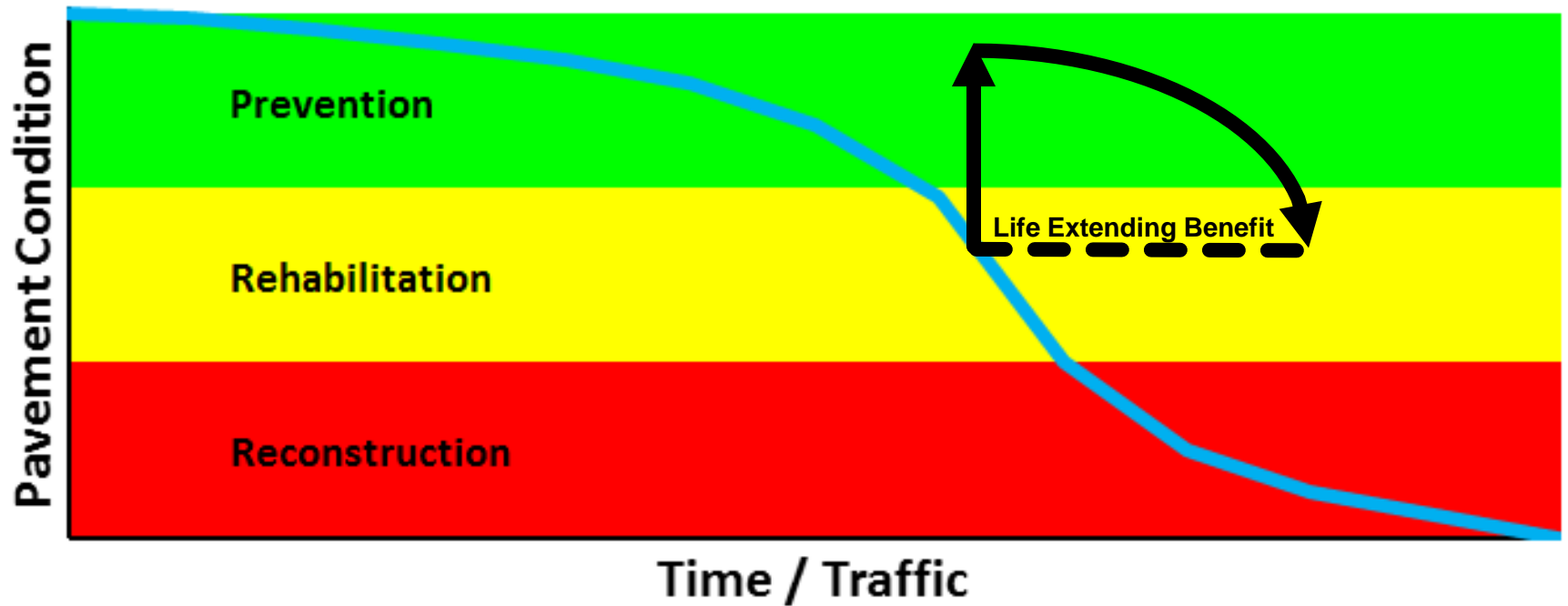


# Pavement Preservation

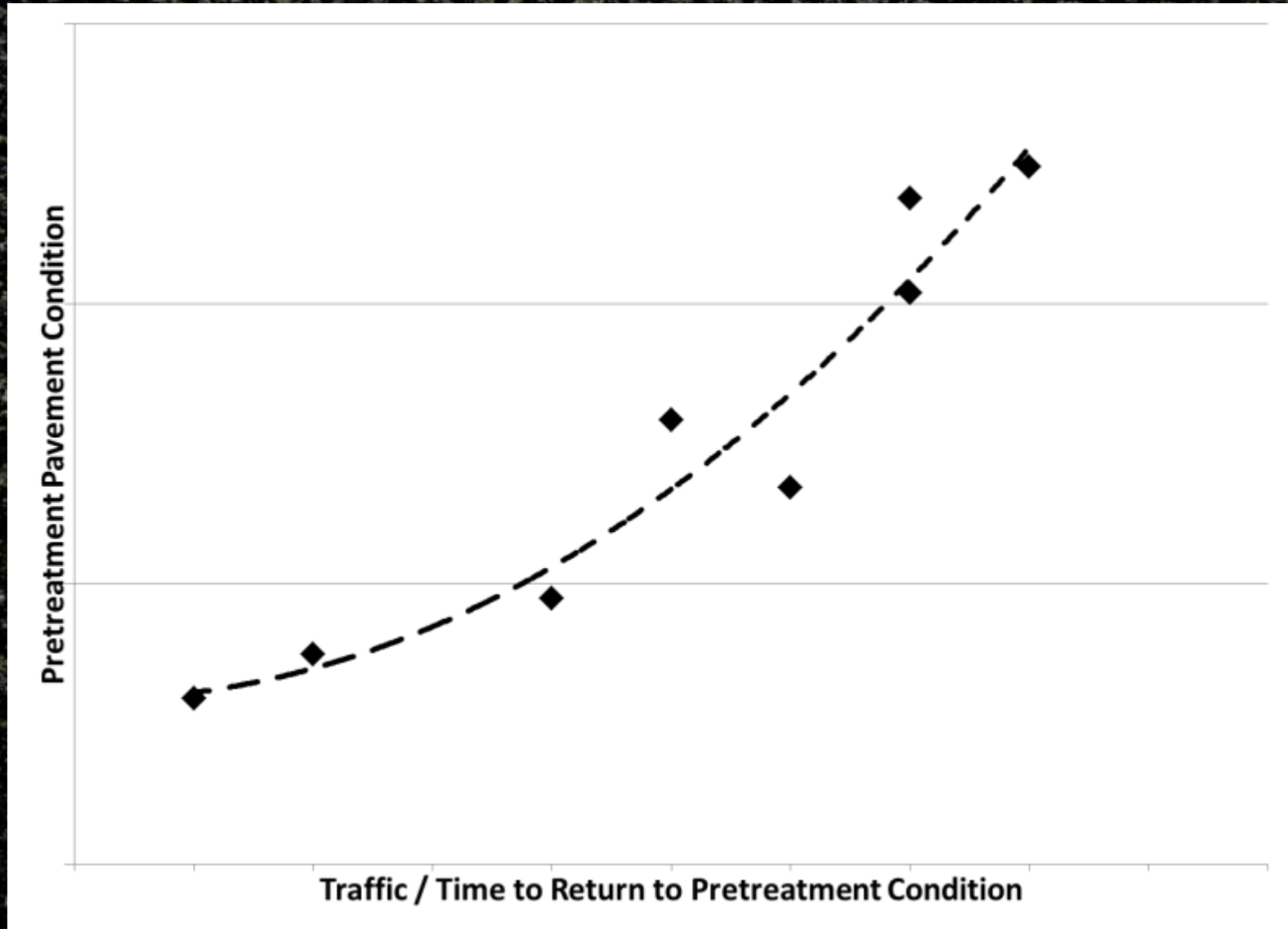
- 
- Chip Seal x 7
  - Control x 2
  - Crack Seal x 1
  - Fog Seal x 1
  - Micro Surface x 6
  - Thin Overlay x 8
  - 25 Sections



# Pavement Preservation



# Pavement Preservation





# Outbound Cracking Thru 7/24/14



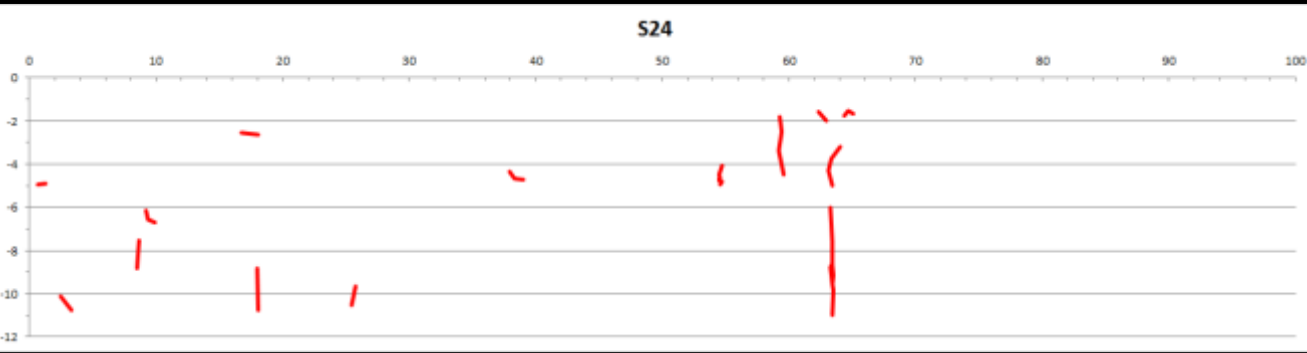
- Virgin Mix PG76-22 from 2003 Track



- Virgin Mix PG67-22

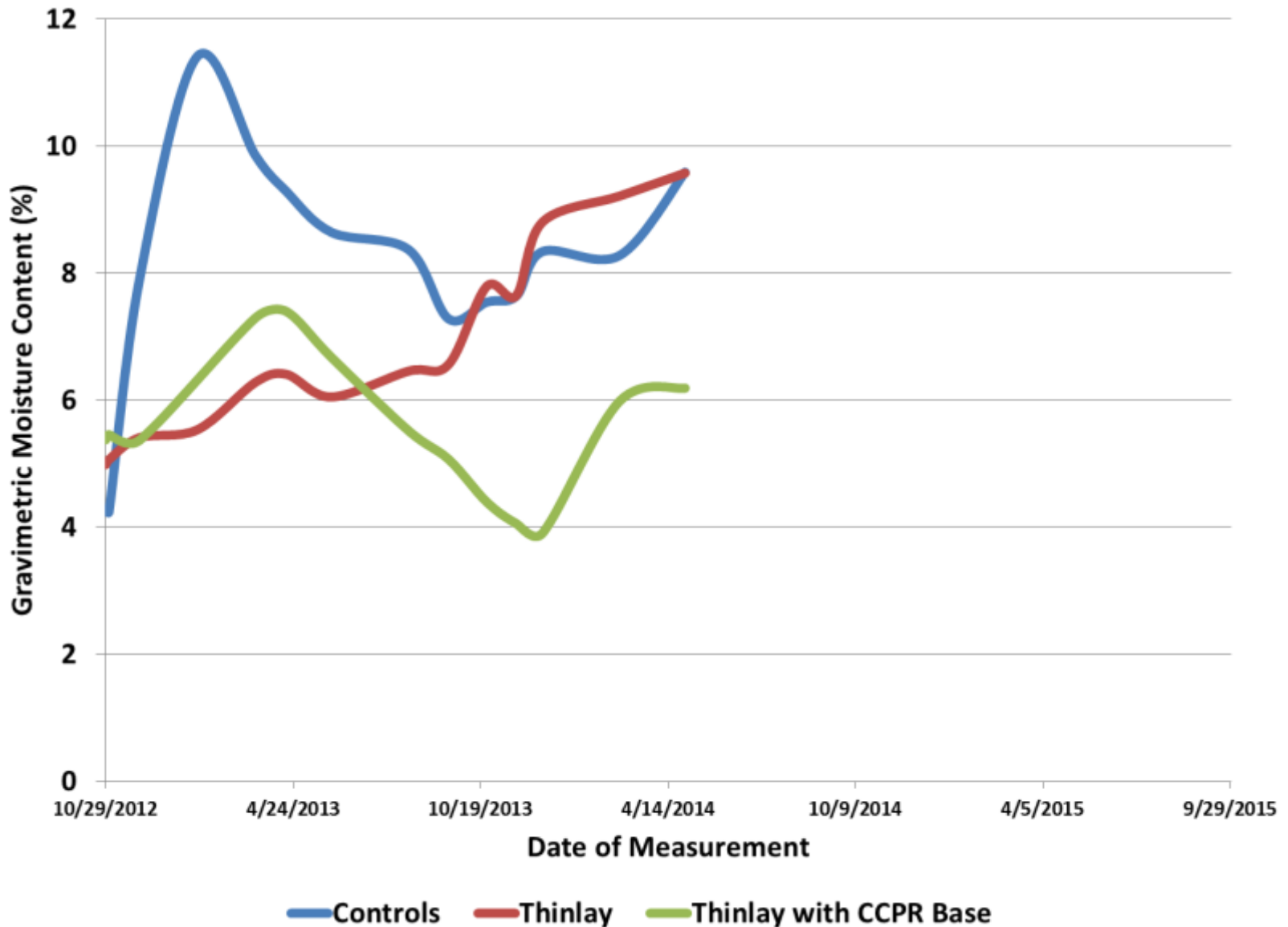


- 54% RAP BR PG67-22



- 19% RAS BR PG67-22

# Subgrade Moisture Contents



# NCAT Preservation Summary

- Crack sealing appears to be beneficial in all cases
- Differences between route/seal and blow/band
- Scrub seal appears to exhibit crack seal benefit
- Preservation treatments reduce subgrade moisture
- Durability of micro surface in accelerated traffic
- Objective life extending benefit curves expected
- “Final” results presented at 2015 Track Conference.

# 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](http://www.ncat.us)



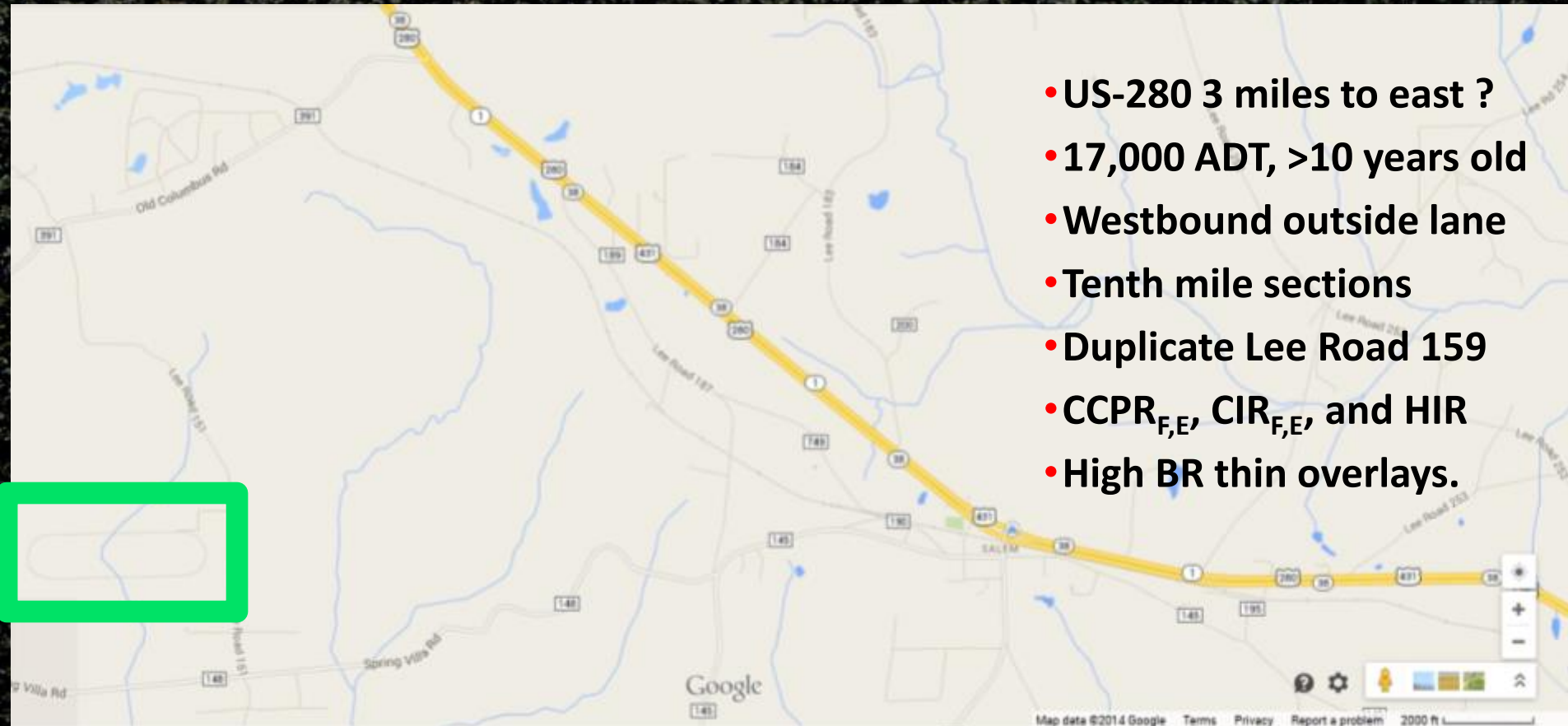
# Preservation Group (PG15) Study

- Continue monitoring '12 sections (Track & 159)
- Capture entire life extending benefit curve(s)
- Build new sections on higher ADT roadway
- Partnership with MnROAD for nationwide scope.



# Higher ADT Off-Track Preservation

- US-280 3 miles to east ?
- 17,000 ADT, >10 years old
- Westbound outside lane
- Tenth mile sections
- Duplicate Lee Road 159
- CCPR<sub>F,E</sub>, CIR<sub>F,E</sub>, and HIR
- High BR thin overlays.





# *Future Partnering of MnROAD and NCAT*



***Ben Worel***

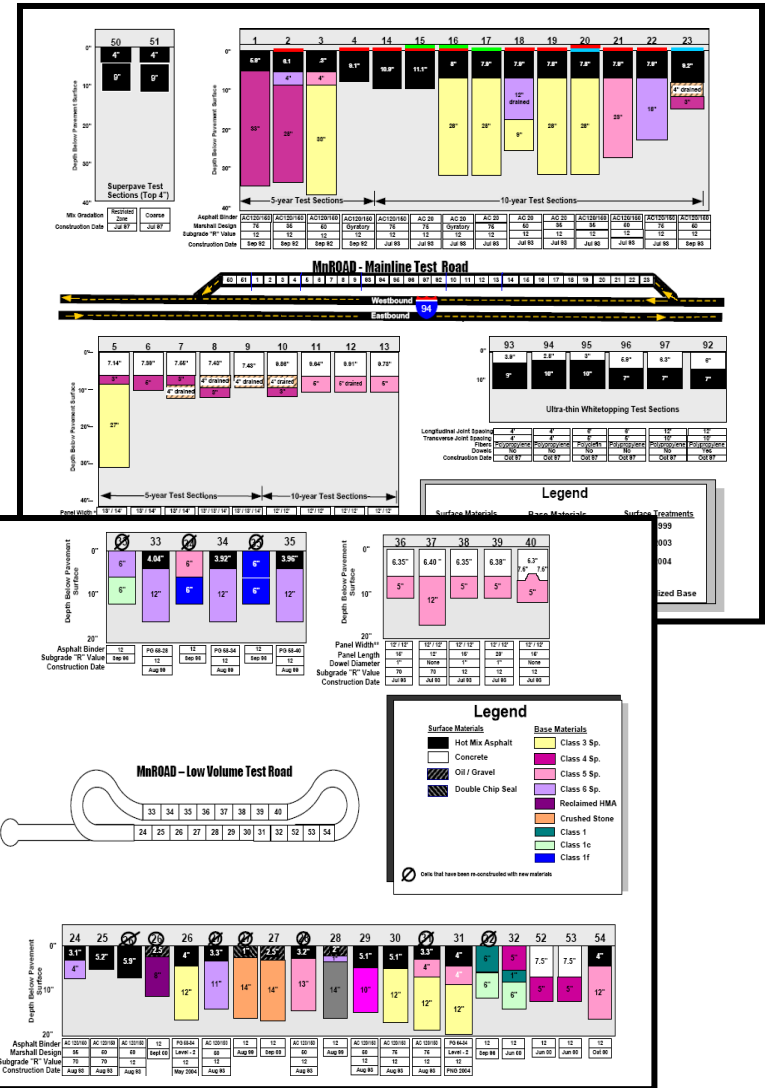
Rocky Mountain West Pavement Preservation Partnership Meeting  
October 9, 2014

We all have a stake in **A  B**



# MnROAD Original Construction

- **History**
  - Original Funding (\$25 million)
  - Original Construction (1992-1993)
  - Open to Traffic (1994)
- **Major Experiments**
  - Phase I (1994-2006)
  - Phase II (2007-present)
  - Phase III (planning for 2016)
- **Layout and Designs**
  - Mainline / Low Volume
  - Asphalt / Concrete / Aggregate
  - 3,5,10 Year Designs





*Office of Materials and Road Research*

**A long-term accelerated pavement testing facility that gives researchers a unique, real-life laboratory to study and evaluate the performance of materials used in roadway construction.**





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**Existing I-94**





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**Interstate-94  
"Mainline"  
Westbound**





*Office of Materials and Road Research*

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**Low Volume Road**



# MnROAD Traffic Loadings



## Low Volume Road

MnROAD 5-axle Semi  
80,000 Inside Lane = 5 days/week  
Outside Lane Environmental  
PCC ~ 300,000 ESALs  
HMA ~ 200,000 ESALs

## Interstate Mainline

I-94 WB Public Traffic  
29,700 AADT -- 13% HCAADT  
PCC = ~ 1.2 Million ESALs/year  
HMA = ~ 0.8 Million ESALs/year





# MnROAD Operations

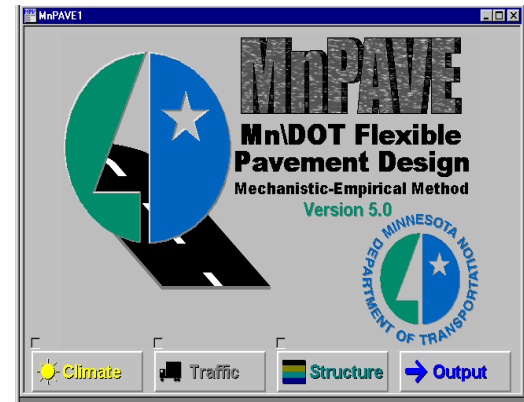
- Research project development and support
- Partnerships
- Construction coordination
- Sensors (9,000+ installed)
  - Static (Environmental)
  - Dynamic (Traffic Loading)
  - Install - Maintain
- Traffic loadings
  - LVR 80K Truck
  - ML Traffic Switches
- Performance monitoring
- Database (20 years data)



# MnROAD Phase-I (1994-2006) Benefits

**Saves 33 million Annually  
BC ~ 9/1  
(Savings from 2006-2018)**

- **Seasonal Load Limits**
  - Spring Restrictions / Winter Overloads
- **Improved Design Methods**
  - Flexible & Rigid Updated Designs
    - Environment Drives Pavement Performance
    - Current Designs are too Conservative
- **Sealing Pavement / Shoulder Joints**



# MnROAD Phase-II (2007-2016) Benefits

- **Low Temperature Cracking Test**
- **Stabilized Full Depth Reclamation**
- **Concrete Overlays**
  - Whitetopping and Unbonded
- **Importance of Drainage**
- **Recycled Unbound Bases**
- **Implements of Husbandry**



# MnROAD Pavement Preservation

- 1998 Crack Sealing / Route and Seal
- 1999-2003 MicroSurfacing Experiment
- 2006 Flexible MicroSurfacing
- Diamond Grinding (pooled fund)
- Timing of Preventative Maintenance (pooled fund)
- Lightly Surfaced Roadways / Chip Seals
- 2011 Flexible Microsurfacing
- 2013 Thin Concrete Repairs Techniques
- 2014 High Volume Chip Seal



# MnROAD Phase-III Development

(Local – National – International)

## 2013

### Collect Ideas

- MEO
- TERRA
- Industry
- States
- CTS
- Infrastructure Council

## 2014

### Prioritize – Best Fit

- TRB
- Peer Exchange
- Subcommittees
- MnDOT
- Pooled Fund Development
- R-26 Conf.

October 2014

Timeline

## 2015

### Funding – Designing

- TRB
- Pooled Fund Refinement
- Subcommittees
- Designs

## 2016

Letting  
Construction  
Research

2016 – 2021?



Phase-III

# Agency Directed Focus Areas

- **Concentrate on cost-effectively improving pavement performance**
  - Currently MnDOT like other agencies have a number of roadways in “poor” condition
  - Not enough funding to solve the problem.
  - The right fit may not always be the best fix.
- **We need to concentrate our efforts on new methods and materials**
  - New technologies with the capabilities of making great leaps forward are encouraged.
  - We must bold.
- **Some research is more easily implemented than others**
  - Our efforts should improve field performance and make work more effective for office, lab, and field personnel.
- **Large return on investment will be given a higher priority**
  - Each project will be analyzed separately to determine its effectiveness potential.



# MnDOT and NCAT Partnership



- Partnership to Advance Research and Implementation
- National Effort to Validate Pavement Performance
- Knowledgeable Technical Staff
- Established Test Tracks
- Building on Successful Research and Implementation
- Pavement Preservation
- Asphalt Pavement Advancements



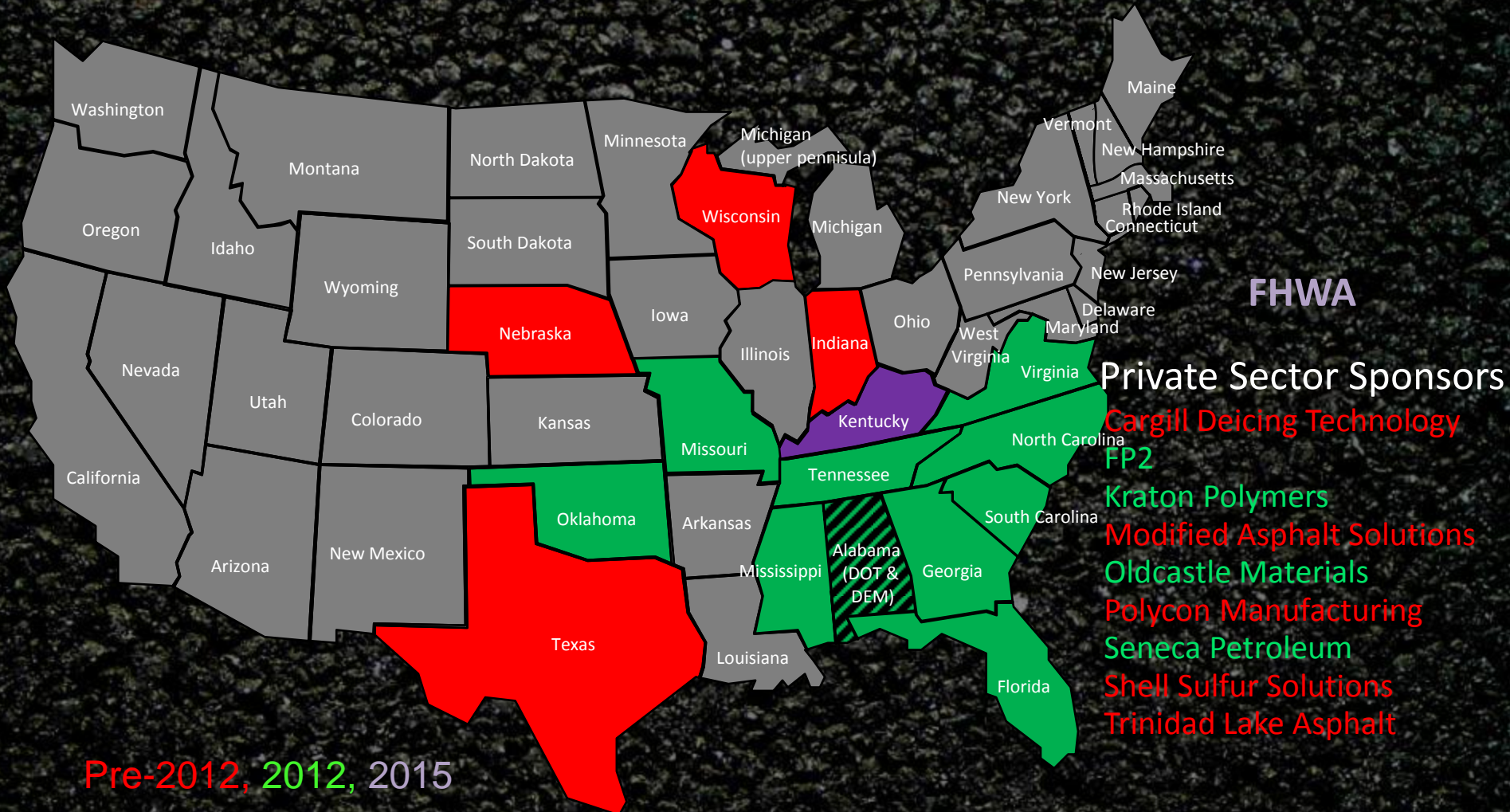
# Pooled Fund Development

- **Pavement Preservation Pooled Fund**
  - NCAT Partnership
  - NCAT and MnROAD Facilities
  - North / South Offsite Low/High Volume Installations
  - Possible Tie to FHWA Efforts
- **2016 MnROAD Test Track Pooled Fund – Phase III**
  - Use existing ideas developed so far for proposal
    - LVR – Mainline – Old Concrete Westbound
  - Agencies once they join - select research to pursue
- **2015 NCAT Test Track Pooled Fund (Alabama)**

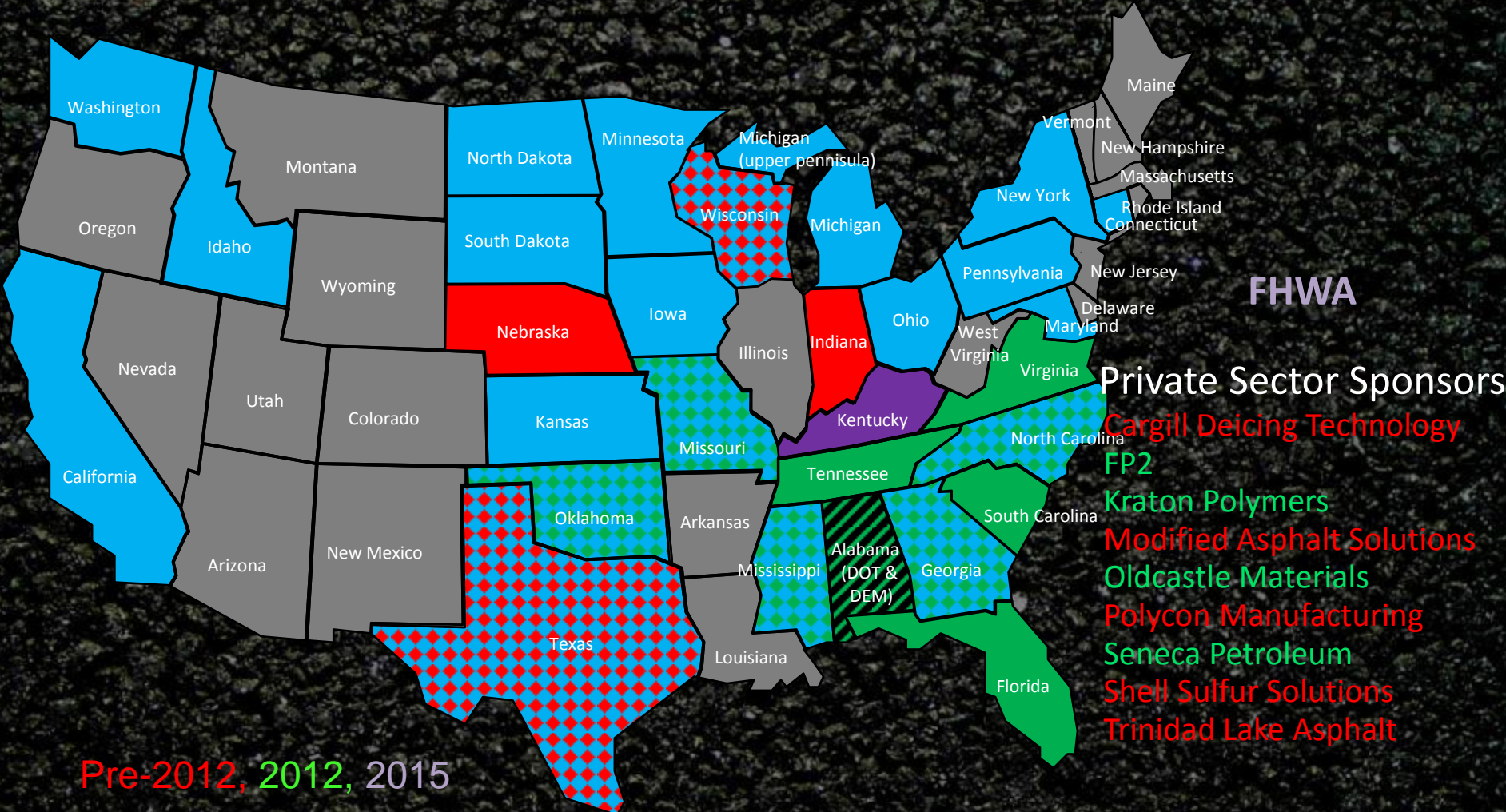




# NCAT Research Sponsors



# NCAT+MnROAD Research Sponsors



Pre-2012, 2012, 2015



## - Discussion -

Buzz and Ben

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