



# NCAT Update

## Kentucky Transportation Cabinet PMA Fall Meeting

Travis B Walbeck, PE  
Training Manager / Engineer



National Center  
For  
Asphalt Technology





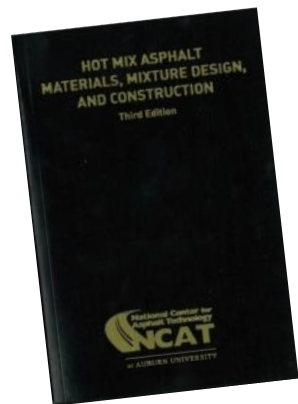
# MISSION STATEMENT

Provide innovative, relevant, and implementable research, technology development and education that advances safe, durable, and sustainable asphalt pavements.



# National Center for Asphalt Technology

- Created in 1986 through agreement with NAPA and Auburn University
- Annual budget about \$13 million
- 22,400 square foot laboratory
- Approximately 40 personnel (and about 20 college students and graduate students)



Our Website  
[NCAT.us](http://NCAT.us)





# NCAT Test Track





# Pavement Test Track

- 1.7 mile oval track
- 46 Test Sections, 200 ft. each
- 5 trucks each pulling 3 heavily loaded trailers
- Test sections are evaluated continuously
- 2021 started 8<sup>th</sup> research cycle
- 2024 begins the 9<sup>th</sup> cycle

# How heavy is this truck...?



## ESAL

- Equivalent Single Axel Load
- 18,000 lbs



2.4 ESAL



0.0002 ESAL



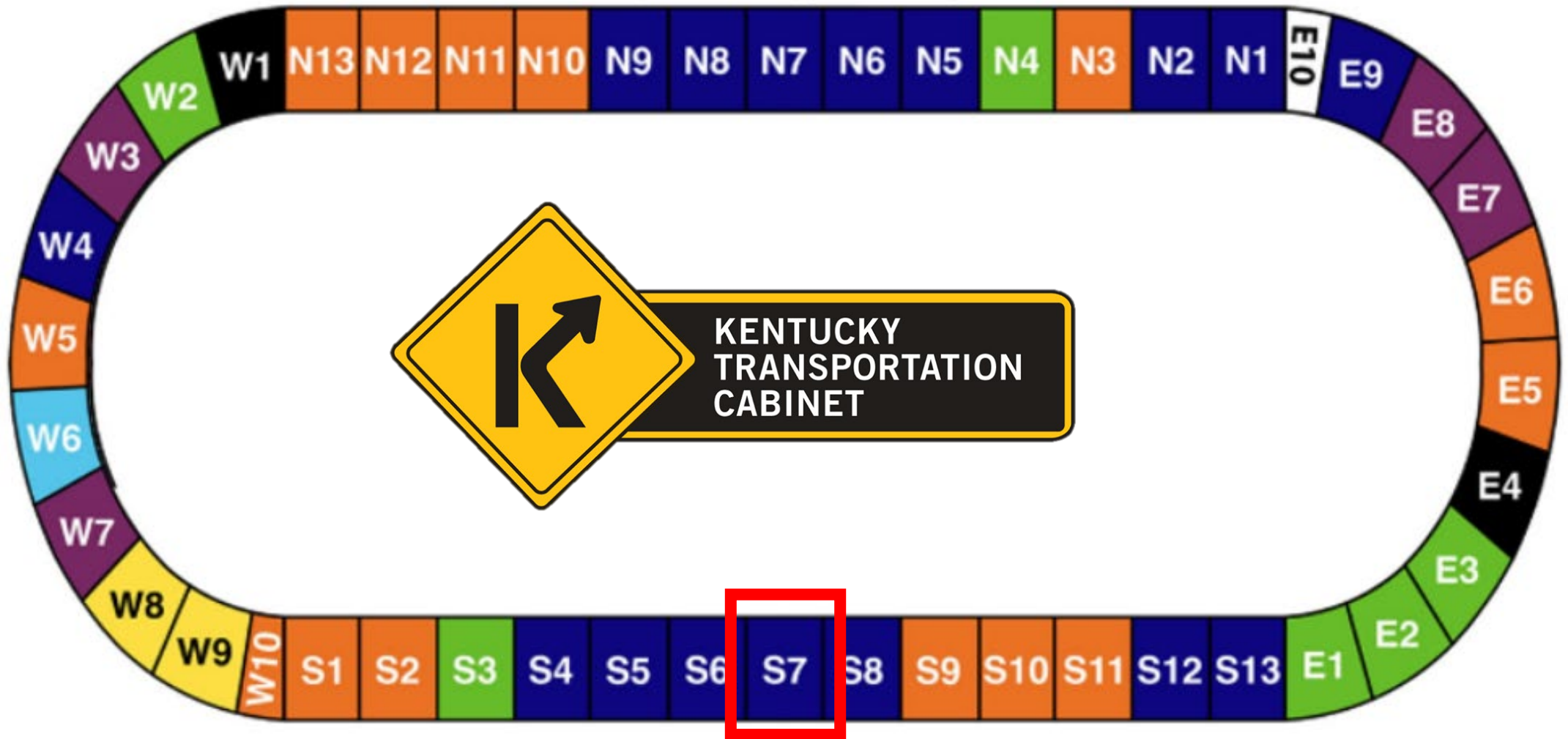
# 2021 Test Track Summary

- 8<sup>th</sup> Cycle
- Funding:
  - 11 State DOTs
  - 8 Private Sector partners
  - FHWA
- 32 Sponsored Sections
  - 16 Traffic continuations
  - 7 Mill/inlay sections
  - 9 Structural sections





# Does KYTC Sponsor a TT Section?



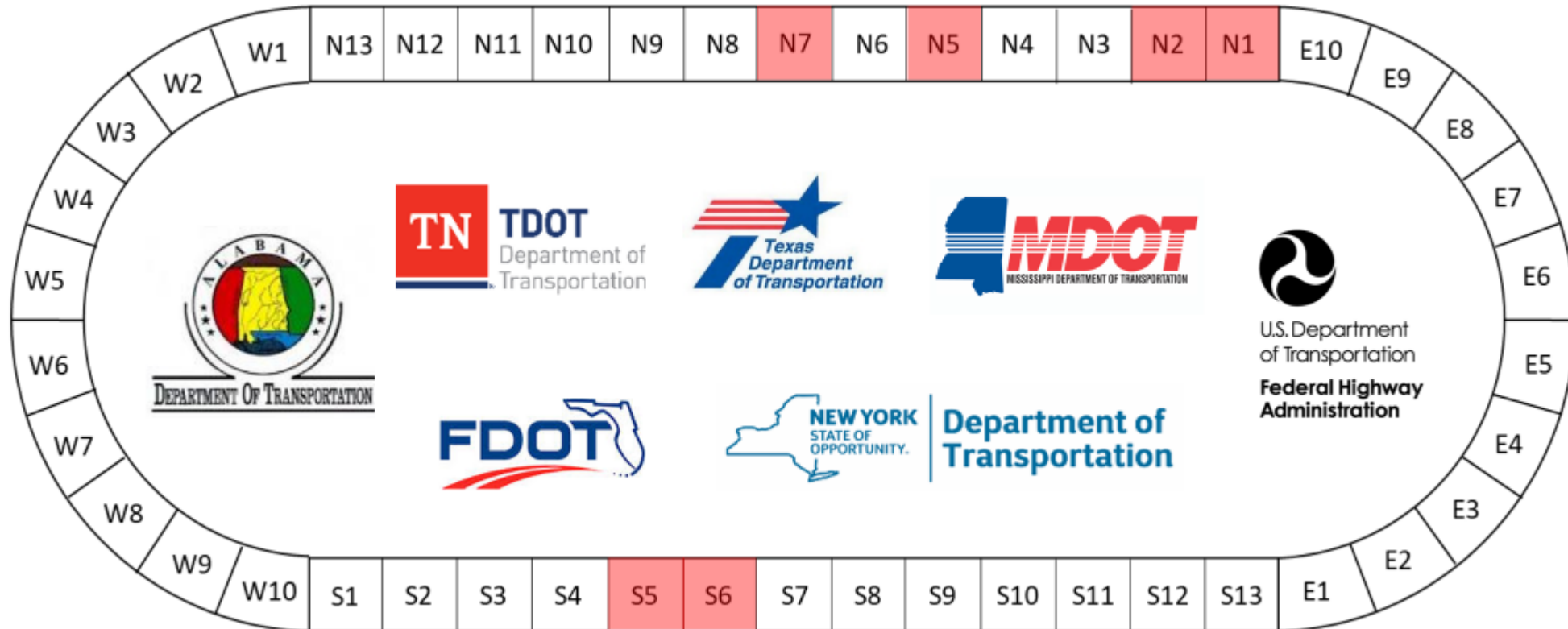
# KYTC Section

- Friction performance mix optimization –  $KY_{S7}$ 
  - A. BMD+Friction Mix Design with
    - Intentionally Moderate Terminal Friction Performance
  - B. BMD+Friction Mix Design with
    - Intentionally Higher Terminal Friction Performance





# 2021 Additive Group (AG) Study



# 2021 Additive Group (AG) Study

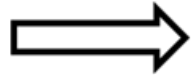
- Phase 1 BMD + performance testing/modeling
- Phase 2 NCAT Pavement Test Track 5½ inch sections
  - Recycled tire rubber (N1 “Dry” Smart Mix, N2 “Wet” Entech)
  - Recycled low density plastic (S5 “Dry” pellets, S6 “Wet” Dow)
  - High strength aramid fibers (N5 Surface Tech ACE XP)
  - N7 “All American” Control with 20% RAP using PG 76-22
- Phase 3 MnROAD “Cracking Challenge” (summer 2022)



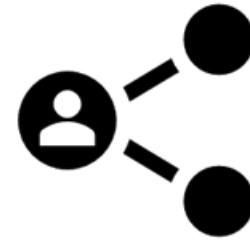
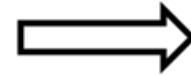
# 2021 Additive Group (AG) Study



FHWA & state DOTs commit to sponsoring the AG experiment



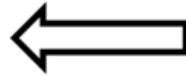
NCAT conducts Phase I lab study to evaluate potential additive products



NCAT shares Phase I results with state DOTs



NCAT constructs AG test sections on Test Track



State DOTs select additives for the AG experiment

# NCAT TEST TRACK



2000-2018

RESEARCH  
FINDINGS

NCAT Report 21-03

September 2021



## Phase VII (2018-2021) NCAT Test Track Findings

Randy West, David Timm, Buzz Powell, Nam Tran, Fan Yin,  
Benjamin Bowers, Carolina Rodezno, Fabricio Leiva, Adriana  
Vargas, Fan Gu, Raquel Moraes, Mostafa Nakhaei



ncat.us



# NCAT TEST TRACK CONFERENCE

MAY 7-9, 2024



[aub.ie/2024TTC](http://aub.ie/2024TTC)





# Hot Issues

- Test Track
- Preservation
- FAA State Specs
- BMD Implementation
- AAPT Projects
- Density Profiling System
- Recycled plastics
- CAPRI
- Training Programs





# Balanced Mix Design Implementation

- Developed NAPA BMD Resource Guide
  - <https://www.asphaltpavement.org/expertise/engineering/resources/bmd-resource-guide>
- Developing BMD Implementation Guide (NCHRP 10-107)
- Working with states on benchmarking their existing mixes
  - AL, GA, ND, WI
- Looking at surrogate performance tests during production
- Developing field test sections to verify performance criteria
  - WI, AL, ND

# BALANCED MIX DESIGN RESOURCE GUIDE

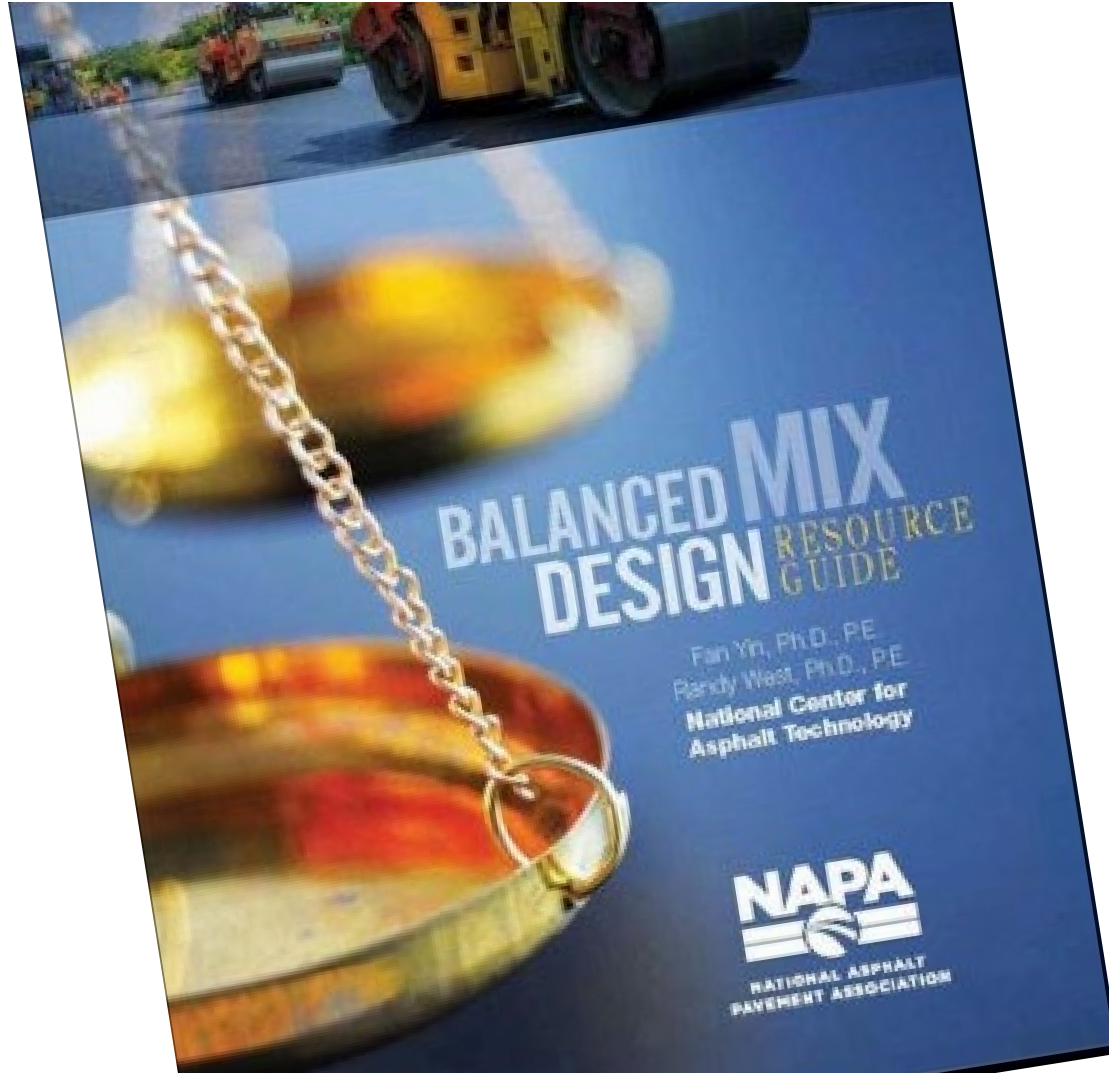
APPROACHES

PERFORMANCE TESTS

IMPLEMENTATION EFFORTS

TRAINING & RESOURCES

TOOLS





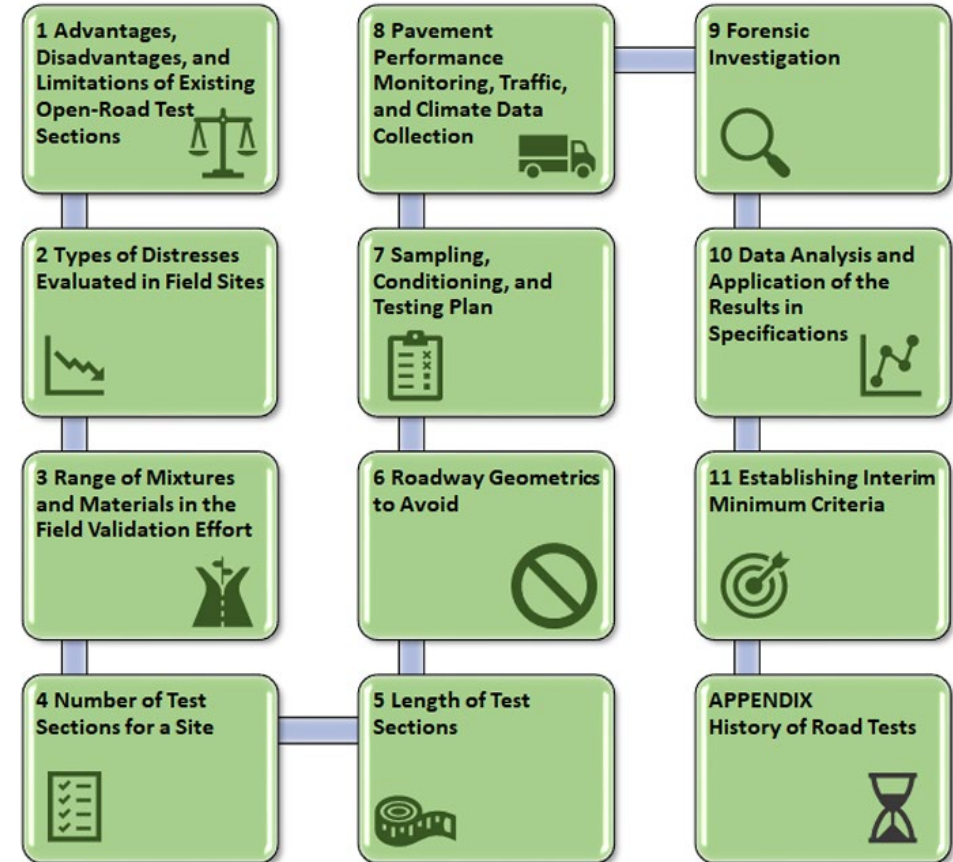
## *Consortium for Asphalt Pavement Research and Implementation*

A new forum that engages all stakeholders to advance asphalt pavement technologies through the development of national research needs and implementation strategies.

### Goals:

1. Develop asphalt pavement research needs
2. Provide technical guidance on current and evolving issues
3. Facilitate small-scale studies to address gaps and explore new topics
4. Foster implementation of practical research findings from any source

## Guidelines and Recommendations for Field Validation of Test Criteria for Balanced Mixture Design (BMD) Implementation





## Longitudinal Joints

Welcome to the CAPRI page dedicated to the topic of the Longitudinal Joints on asphalt pavements. Longitudinal joints (when parallel lanes of hot mix asphalt pavement are laid at different times, with cooling of the first lane happening before the adjacent lane is placed) can be more vulnerable to issues like cracking, raveling, and water infiltration, especially if there is a significant difference in densities on either side of the joint. The joints can have different performance characteristics. Here, you will find valuable information, techniques, and best practices to enhance pavement performance and ensure safer, more sustainable transportation infrastructure.

### Longitudinal Joint Resources

This list contains links to external pages that have valuable information about Longitudinal Joints on asphalt pavements.

[The Best Way to Roll a Joint And Everything Else You Should Know About Constructing Longitudinal Joints](#)

[Longitudinal Joint Information](#)

[Materials-Based Methods to Improve Rumble Strip Durability](#)  
(NRRRA Preventive Maintenance and Flexible Teams)

[FHWA Tech Brief: Improving Longitudinal Joint Performance](#)

[Pavinar: Longitudinal Joints in Asphalt Pavements](#) (Video)

[Constructing a quality bituminous longitudinal paving joint](#) (Video)

### Meeting Presentations

Click on the images below to view or download presentations.



[Ohio's Longitudinal Joint Specifications](#),

presented by Eric Biehl, P.E., asphalt materials engineer, ODOT Office of Materials Management, at the Fall 2023 CAPRI meeting, October 2023.

## Density

Welcome to the CAPRI page dedicated to the topic of the increased density of asphalt pavements. Increasing the in-place density of asphalt pavement has a significant positive impact on its overall lifespan. By achieving higher density, the pavement becomes more resistant to moisture infiltration, minimizing the risk of cracking and potholes. Enhanced density also improves the pavement's load-bearing capacity, reducing rutting and deformation caused by heavy traffic. Ultimately, denser asphalt pavement can withstand greater stresses, resulting in increased durability, extended service life, and reduced maintenance requirements. Here, you will find valuable information, techniques, and best practices to enhance pavement performance and ensure safer, more sustainable transportation infrastructure.

## Density Resources

This list contains links to external pages that have valuable asphalt pavement density information.

[FHWA Tech Brief: Overcoming Obstacles to Achieving Density \(HIF 21-022\)](#)

[FHWA Tech Brief: Techniques and Tools for Improving Density \(HIF 21-021\)](#)

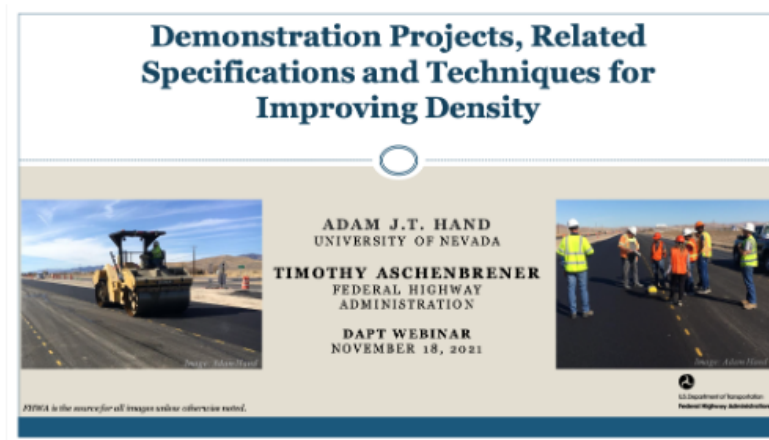
[FHWA Tech Brief: Density Demonstration Projects and Related Specifications \(HIF 21-020\)](#)

NCAT Report: FHWA Demonstration Project for Enhanced Durability of Asphalt Pavements Through Increased In-Place Pavement Density

- [Phase 1: \(NCAT Report 17-05\)](#)

## Meeting Presentations

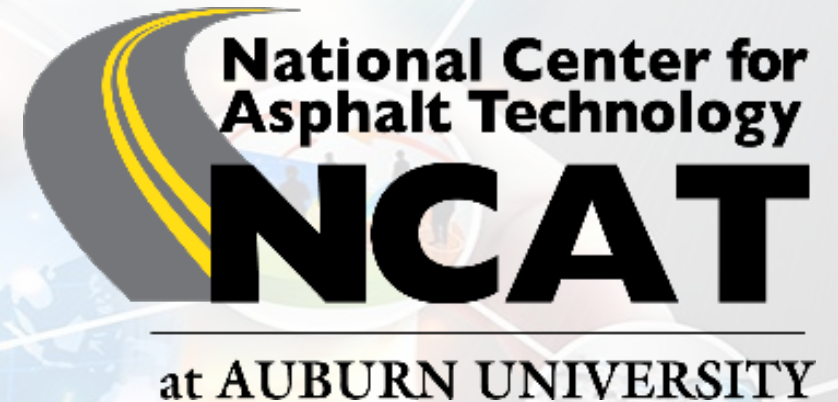
Click on the images below to view or download presentations.





# NCAT Training Programs

- NCAT Courses
- AL DOT Courses
- Puerto Rico DTOP Courses
- GDOT Courses
- AACP Courses
- Qatar Courses
- Webinar Series
- Training In Your Pocket



# Asphalt Engineers Workshop

**ASPHALT TRAINING**

BEST PRACTICES @ YOUR LAB  
HANDS ON FIELD  
WMA  
RAP  
LAB TESTING @NCAT  
MIX DESIGN  
BMD

**EXPAND KNOWLEDGE**

SCAN ME

**National Center for Asphalt Technology**  
**NCAT**  
at AUBURN UNIVERSITY

**ASPHALT ENGINEERS WORKSHOP**

**CUSTOM TRAINING ALSO AVAILABLE**

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

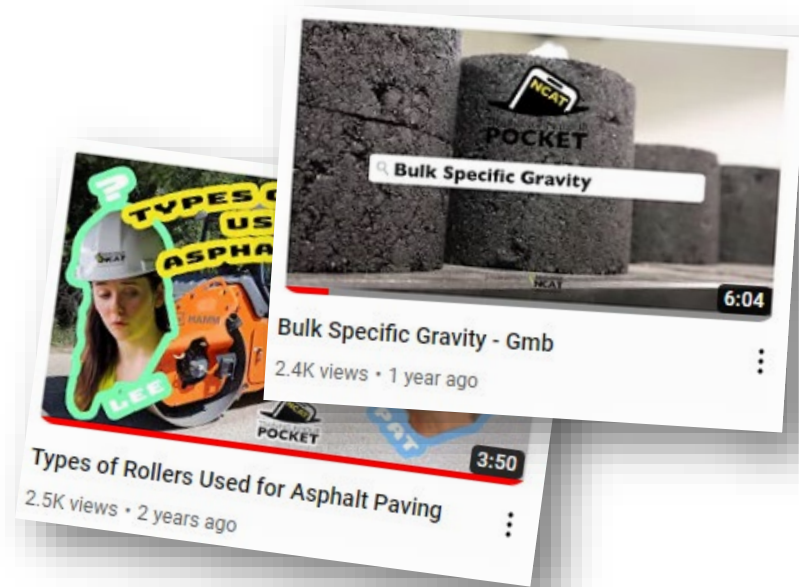
- Focused on transportation agency engineers
- Topics include:
  - Binders, aggregates, mix design, construction, pavement performance, design, and preservation
- Currently Scheduled
  - NCAT hosted - February 2024





# TRAINING IN YOUR POCKET

- YouTube based short asphalt videos
- Subscribers – 900+







# Training In Your Pocket

SUBSCRIBED



HOME

VIDEOS

PLAYLISTS

CHANNELS

ABOUT



Types of Rollers Used for Asphalt Paving

5K views • 2 years ago



Bulk Specific Gravity - Gmb

2.4K views • 1 year ago



Training in Your Pocket

2.1K views • 2 years ago



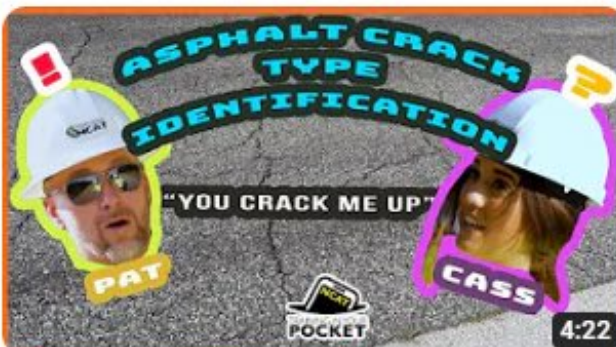
Asphalt Paver

1.9K views • 2 years ago



Hamburg Wheel Track Test

5K views • 2 years ago



Asphalt Crack Type Identification

1.2K views • 2 years ago



PG Binder Grading Explained

1.2K views • 2 years ago



Ideal Cracking Test (ICT)

973 views • 2 years ago



# NCAT Webinars

- Implementation Series
  - Held every third Thursday
  - Free to sponsors
- Preservation Group Series
  - Held every other month
  - Free
- Others
  - Sponsored
  - Spanish

**National Center for Asphalt Technology**  
**NCAT**  
at AUBURN UNIVERSITY  
presents

**FROM RESEARCH TO IMPLEMENTATION**  
**WEBINAR SERIES**

Topic:  
**BMD Lessons and Tips**  
October 19, 2023 : 10-11am CT

**REGISTER TODAY**

**Buzz Powell (NCAT), Nathan Moore (NCAT),** and a guest will be discussing lessons learned from assisting agencies and contractors with adjusting mix designs to meeting BMD testing.

Free to Test Track Sponsors : \$25 for Non-Sponsors

**National Center for Asphalt Technology**  
**NCAT**  
at AUBURN UNIVERSITY  
presents

**FROM RESEARCH TO IMPLEMENTATION**  
**WEBINAR SERIES**

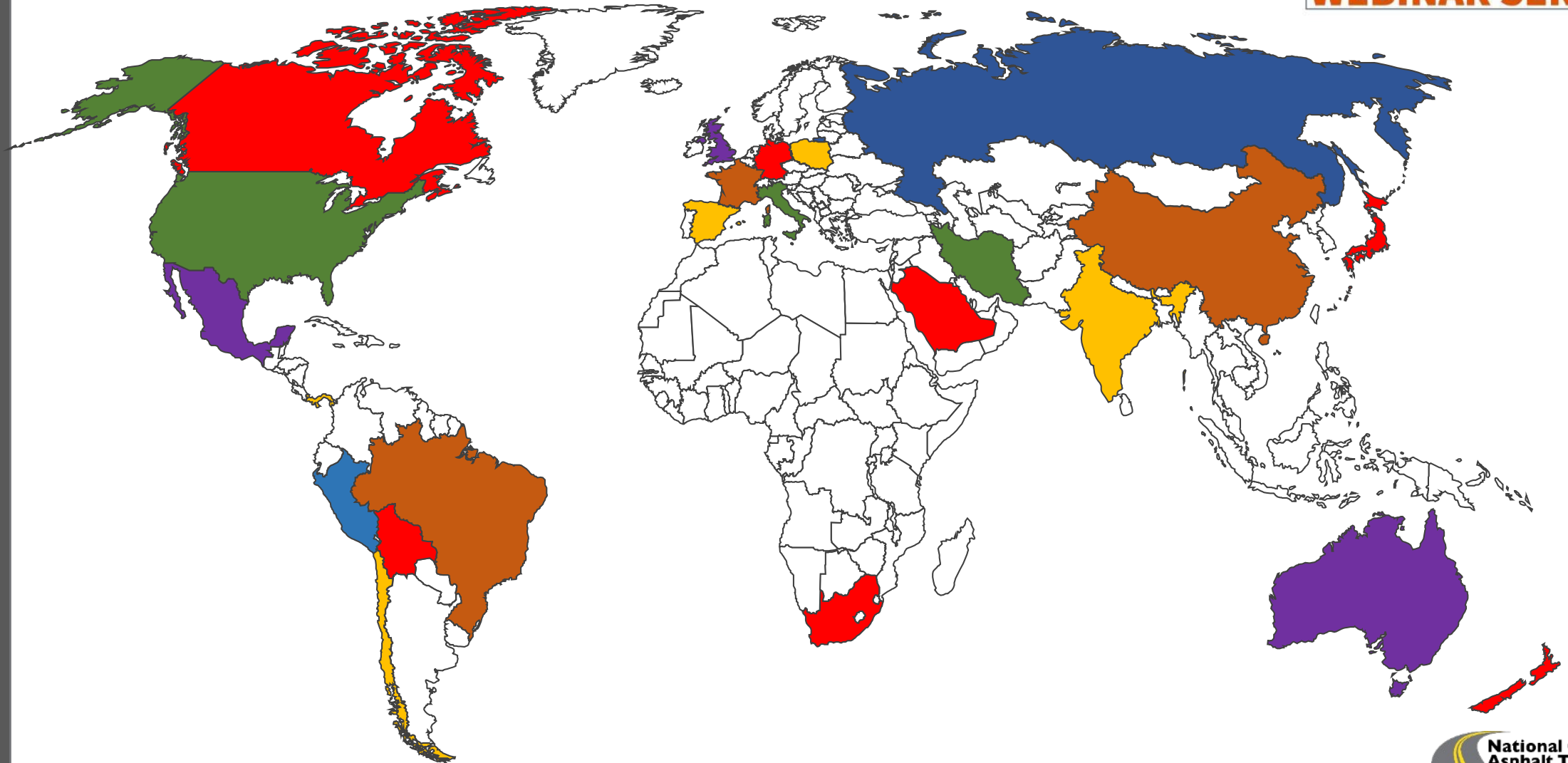
Topic:  
**Strategic Use of Polymer Modification for Lower Life Cycle Cost**  
July 20, 2023 : 10-11am CT

**REGISTER TODAY**

**Buzz Powell (NCAT)** and guest will discuss how the use of polymer-modified asphalt binders can be used in targeted areas to increase the pavement life and reduce maintenance.

Free to Test Track Sponsors : \$25 for Non-Sponsors

# Countries that have attended:





# We all know...

Right treatment

Right pavement

Right time



# Timeline

2012

Treatments placed on Lee Road 159

2015

NCAT-MnROAD Partnership  
Treatments placed on US280

2016

North Treatments placed on CSAH 8 and US 169

2019

North cold recycled treatments placed on 70<sup>th</sup> Street

2020

Control sections resurfaced in US 169

2022

18 month extension

2024

12



# Test Locations



Roadway	LR-159	US-280	CSAH-8	US-169	70 <sup>th</sup> St
Traffic volume	Low	High	Low	High	High
Avg. thickness, in	5.5	9.9	7.0	6.5	4.0
Section length, ft	100	528	528	528	500
No. Treated sections	23	34	22	21	16
Years in service	10	7	6	6	3

# Current Status



**145 Test Sections**



**~ 13 lane miles**



**~81 lane mile-years  
worth of data**

# Going Forward

- Tools for sharing information
  - [www.ncat.us](http://www.ncat.us) → Pavement Preservation
    - Pavement Preservation Group Study Resources
      - Latest findings report and list of printed papers regarding the PG
    - Observed Performance
      - Dashboard web-tool for Lee Road 159, section by section
- Beyond 2023
  - New pooled fund **“Improving the Quality of Preventive Maintenance Construction and Data Collection Practices”**
    - Solicitation Number 1581



# Observed Performance - Lee Road 159

The data shown below is preliminary and subject to change.

*\*Use the Treatment, Condition, and Time menus to filter the results based on treatment type, existing pavement condition, and time period of interest.*

## Q Treatment

- Single layer chip seal ✓
- Rejuvenating fog seal
- Crack sealing only
- Single layer chip seal with crack sealing
- Triple layer chip seal

## Q Condition

- Good ✓ 0.0
- Fair 0.5
- Poor 1.0
- 1.5
- 2.0

Help Treatments Location (Google Maps)

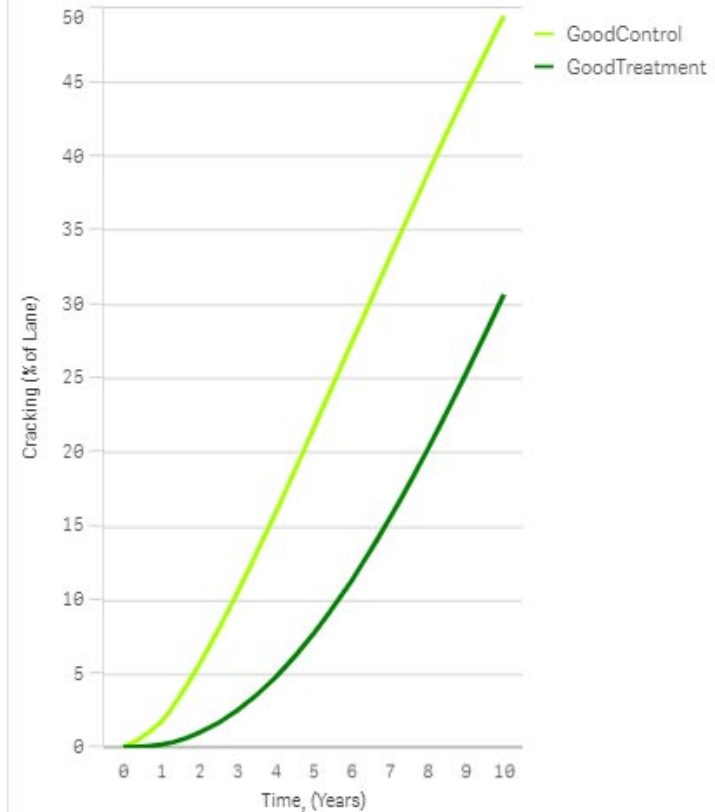
Single layer chip ... IRI (in/mile) for Treatm... Rutting (mm) for Treatm...



Time to Poor (Control) 4.5  
Crack Reduction (Average) 12.3  
Time to Poor (Treatment) 7.7

Treatment to Control Com...

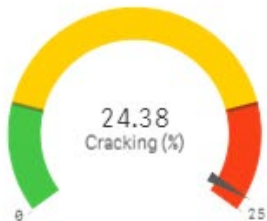
## Treatment to Control Comparison



## Overall Section Condition

FAIR

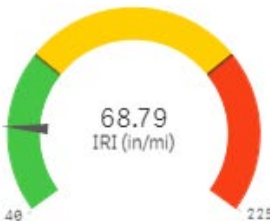
## Cracking % of Area



## Rutting (mm)



## IRI (in/mile)



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

Pavement  
Preservation

Observed  
Performance





Preservation Treatments

- Rejuvenating Fog Seal
- FiberMat Chip Seal
- Control Section with Low Cracking
- Control Section with High Cracking
- Crack Sealing Only
- Single Layer Chip Seal
- Single Layer Chip Seal with Crack Sealing
- Triple Layer Chip Seal
- Double Layer Chip Seal
- Cape Seal
- Single Layer Micro Surfacing
- Single Layer Micro Surfacing with Crack Sea...
- Double Layer Micro Surfacing
- FiberMat Cape seal
- Scrub Cape Seal
- Scrub Seal
- FiberMat Chip Seal (Data Collection Demons...
- HMA Cape Seal
- Thin HMA Overlay
- Thin HMA Overlay on 100% RAP Mix Base
- Polymer Thin HMA Overlay
- Bonded Thin HMA Overlay
- 50% RAP Thinlay
- 5% RAS Thinlay
- HIMA Thinlay

Single Layer Chip Seal with Crack Se...

Treatment

Single Layer Chip Seal with Crack Sealing

Section Number

7

Construction Info.

**\*\*CHIP SEAL\*\*:** 89 Chip Seal // Emulsion: CRS-2HP // Target Emulsion Rate (GSY): 0.3 // Measured Emulsion Rate (GSY): 0.29 // Aggregate type: Granite // Aggregate Rate (PSY): 16.

**\*\*CRACK SEAL\*\*:** Crack Sealing method: Rout & Seal // Sealant material: ASTM D-6690 // Rate (lbs/LF): 0.2 // Width of sealed crack: 5/8"



# Takeaways

- Treatments continue to be effective
- If “poor” condition is the threshold, many sections are still far from target
- Benefit is evident and can be quantified using relevant parameters
- Crack sealing before other treatments perform better
- Combo treatments perform well





# **End-of-Cycle Conference for the 2021 NCAT Pavement Test Track and the MnROAD Pavement Research Partnership**

---

**May 7-9, 2024**

**Auburn, AL**

# Thank You

Our Website

[NCAT.us](http://NCAT.us)



TRAINING IN YOUR  
**POCKET**



Travis Walbeck, PE

[travis.walbeck@auburn.edu](mailto:travis.walbeck@auburn.edu)

(334) 740-9176



Thank You

travis.walbeck@auburn.edu