Innovations in Asphalt: Soil Stabilization, Perpetual Pavements, and Pavement Preservation

Buzz Powell

APA ASPHALT PAVEMENT ALLIANCE
25 Years
2001-2026


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State Asphalt Pavement A
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25
Years
2001-2026

NCAT Pavement Test Track

Research Focus Areas

1. Mix/material combinations
2. Structural design/construction
3. Pavement preservation

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Our Challenge

- Multi-trillion $ investment in roadway infrastructure
- Responsibility to preserve and increase capacity
- New lanes for the best possible life cycle value
- Perpetual pavements from subgrade to surface
- Existing lanes for the lowest possible cost per mile
- Preserve, maintain, rehabilitate, and reconstruct
- Safe, sustainable asphalt at the lowest life cycle cost!

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State of Oregon

Valley:
I-5 corridor, mild temps, winter rains, dry summers, aggs/subgrades better north

Coast:
landslides & culvert failures, good aggs (better north), seasonal traffic, cool & wet

East:
High desert temp extremes, stripping aggs, localized subgrade weakness (better towards west)

Mountains:
Extreme weather, mountain pass issues, volcanic aggs (questionable south)

Subgrade Quality/Consistency

Aggregate Quality

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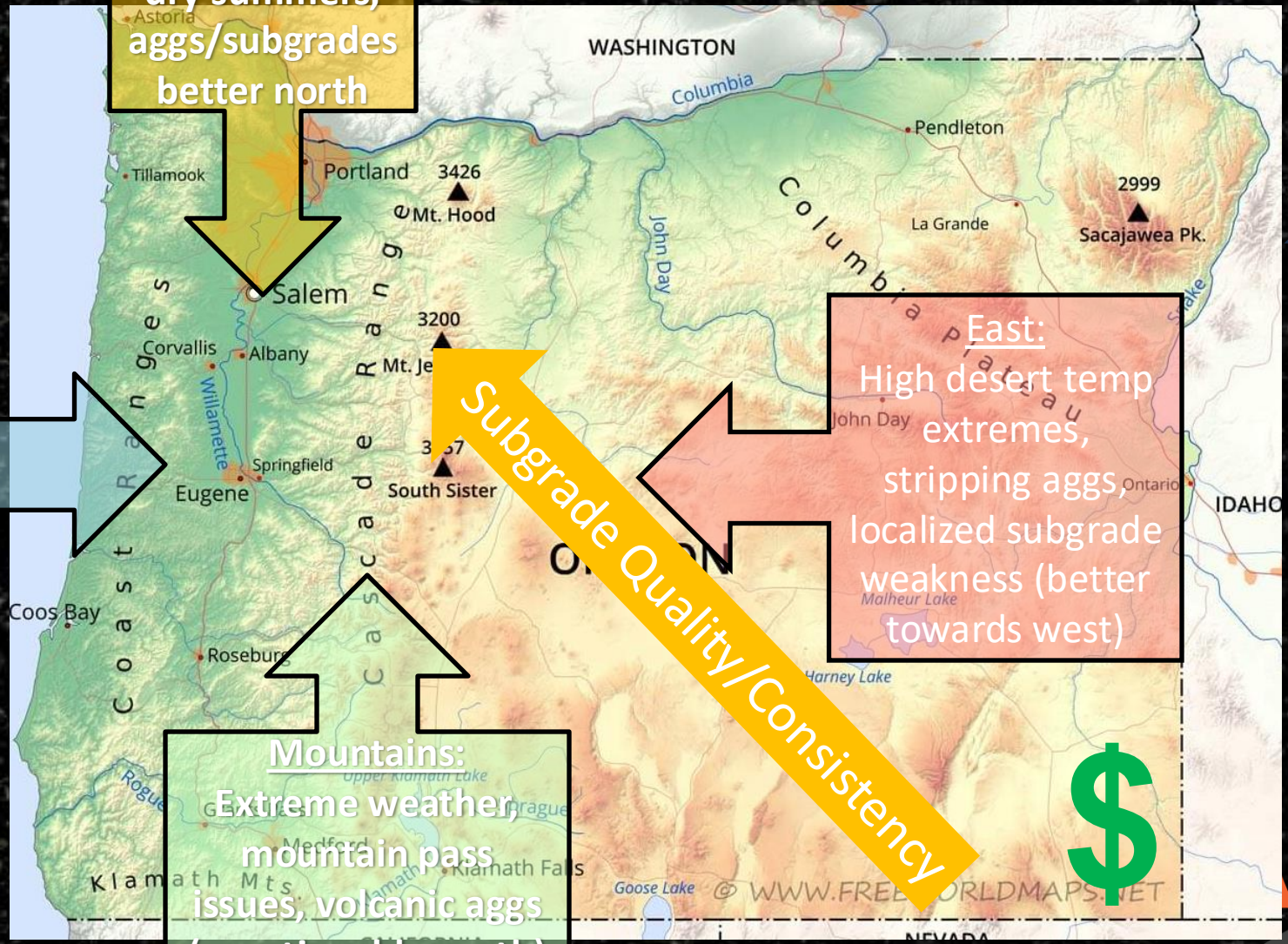

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NAPA
NATIONAL ASPHALT PAVEMENT ASSOCIATION

XBE

Welcome to Hey NAPA

What asphalt pavement questions can I answer for you?

I've been trained on hundreds of NAPA publications and have broad general knowledge of asphalt pavement topics. Ask me anything that you'd like and I'll do my best to provide a concise answer and point you to additional resources.

In Oregon with limited funds, what strategies can you recommend for preserving, maintaining, rehabilitating, and rebuilding existing roads as well as for adding capacity with safe and sustainable asphalt pavement at the lowest possible life cycle cost?

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HeyNAPA.com

- Implement a pavement preservation system
- Cost effective, smooth, fuel efficient thinlays
- Rehab with CIR, FDR, & high RAP in new mix
- New/rebuild with optimized perpetual design
- WMA for sustainability & seasonal/climate flexibility
- Porous asphalt for both stormwater$_{deep}$ & safety$_{surface}$
- Sustainable additives for healthy mix via BMD
- Life cycle “value” via PMS, LCCA, & LCA.

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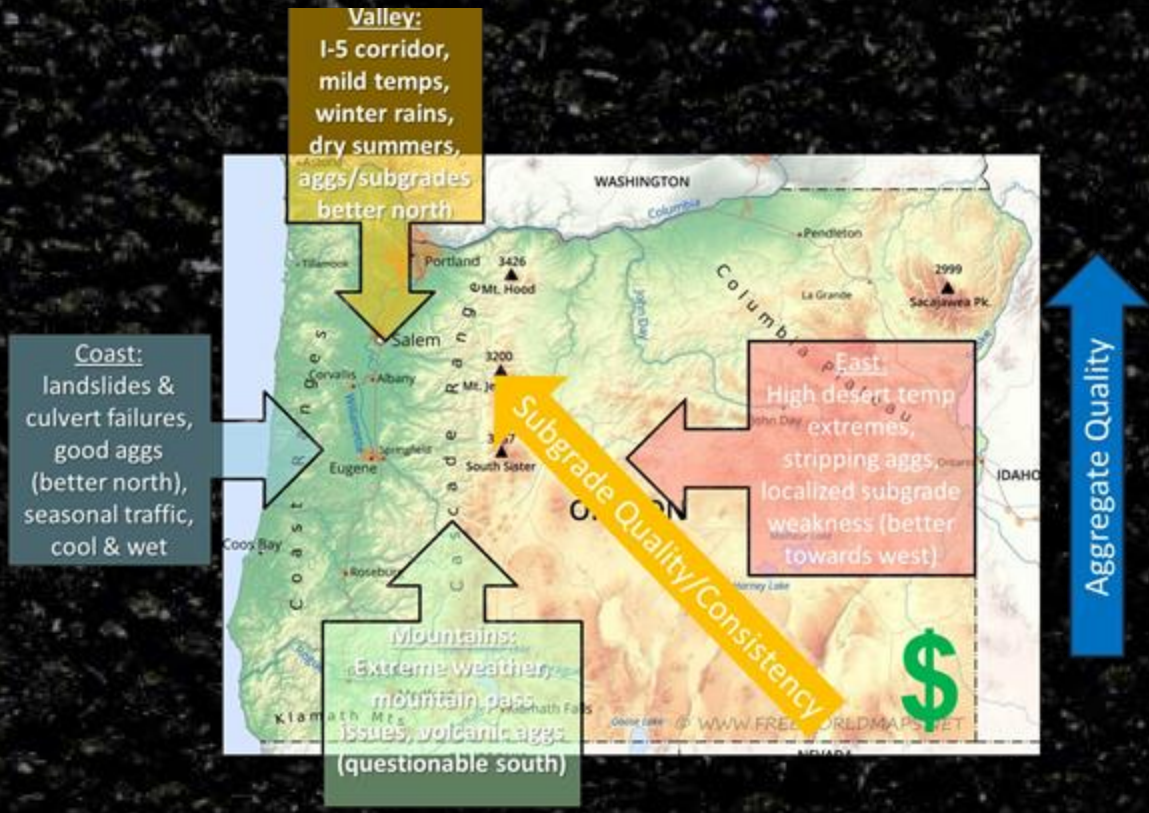
Asphalt Innovation Content

- Preservation
- Maintenance
- Rehabilitation
- Reconstruction
- Capacity expansion.



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Pavement Preservation

National Center for Asphalt Technology NCAT AT AUBURN UNIVERSITY

About NCAT | Test Track | Pavement Preservation | Education & Training | Our Research

www.NCAT.us

Pavement Preservation Group Study

National Center for Asphalt Technology NCAT AT AUBURN UNIVERSITY | MnROAD SAFER, SMARTER, SUSTAINABLE PAVEMENTS THROUGH INNOVATIVE RESEARCH

This study includes a series of pavement preservation treatments placed under different climate and traffic conditions.

Select the scenario to display observed long-term performance data*, then use the Treatment, Condition, and Time menus to filter the results based on treatment type, existing pavement condition, and time period of interest.

For detailed instructions, visit the Observed Performance Dashboard - User Manual.

**The data shown is preliminary and subject to change*

Warm Climatic Region

- Low-Traffic Volume
- High-Traffic Volume

Cold Climatic Region

- Low-Traffic Volume
- High-Traffic Volume

Pavement Preservation

Treatment

- 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

Condition

- Fair
- Good
- Poor

Time

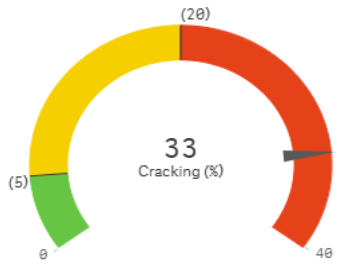
0.0
0.5
1.0
1.5
2.0
2.5

Treatments Location (Google Maps)

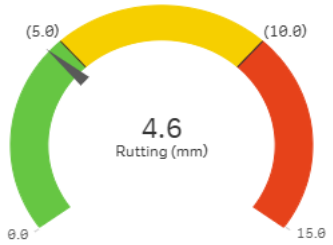
Overall Section Condition

FAIR

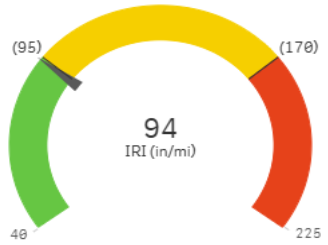
Cracking % of Area



Rutting (mm)



IRI (in/mile)



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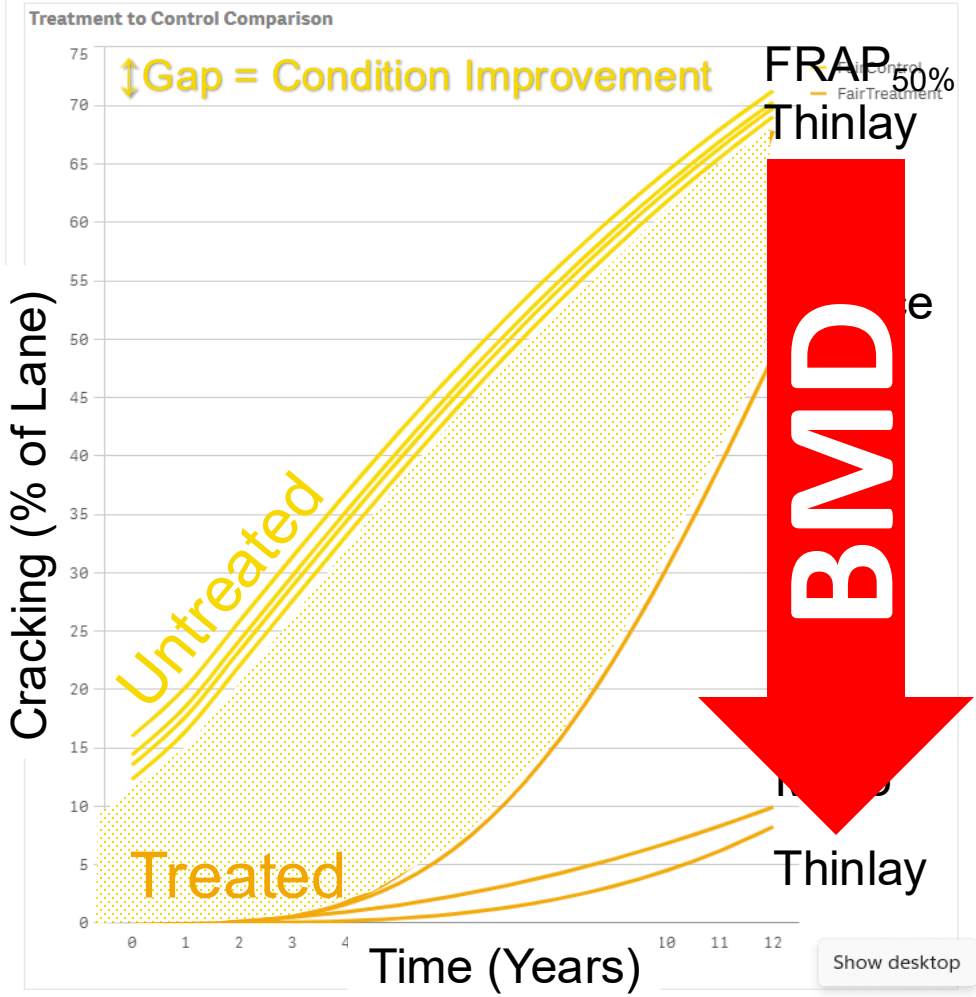
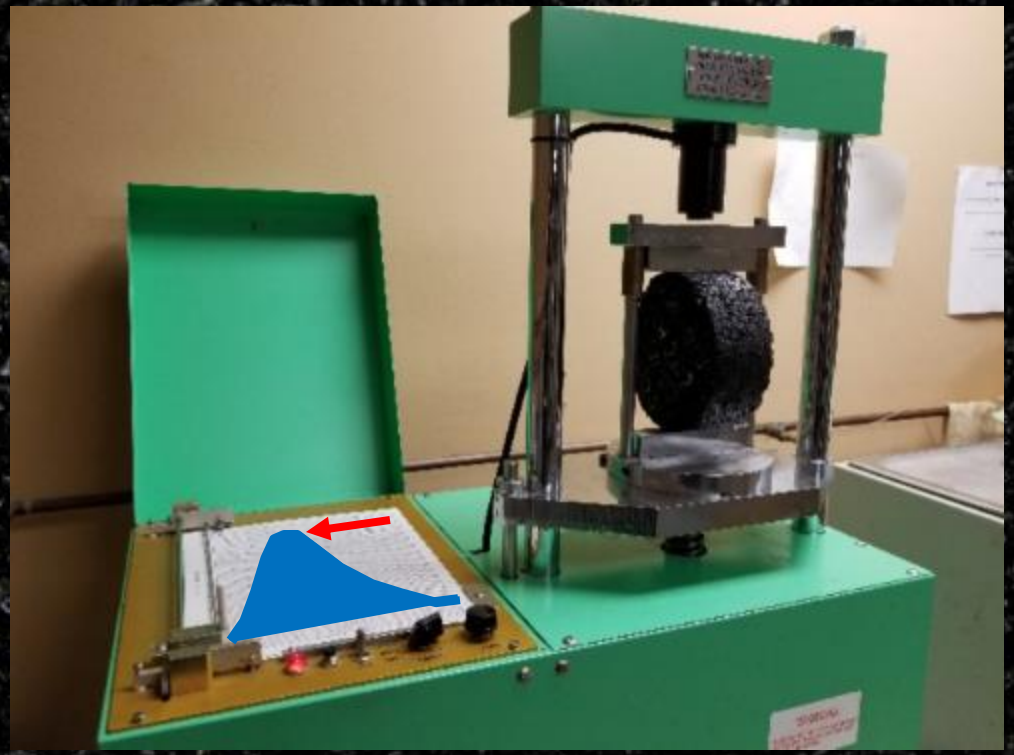


Balanced Mix Design (BMD)



Maintenance

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Maintenance

Map Unit Legend

Lee County, Alabama (AL081)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
10	Cecil cobbly loam, 10 to 25 percent slopes	2.4	1.7%
11	Cowarts loamy sand, 2 to 6 percent slopes	7.5	5.1%
12	Cowarts loamy sand, 6 to 10 percent slopes	30.1	20.6%
24	Marvyn loamy sand, 1 to 6 percent slopes	61.4	42.1%
40	Uchee loamy sand, 0 to 6 percent slopes	13.7	9.4%
41	Uchee loamy sand, 6 to 10 percent slopes	30.8	21.1%
Totals for Area of Interest		**145.8**	**100.0%**

https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

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Maintenance

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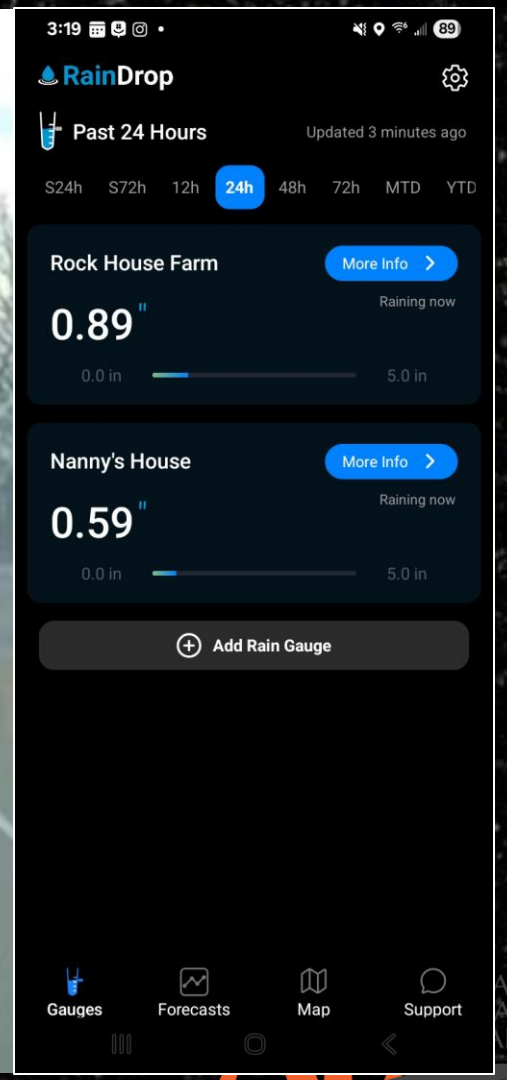

https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

High Polymer Mastic Patching

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Crack Sealing

Rehabilitation

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Rehabilitation

Friction, Safety, Drainability

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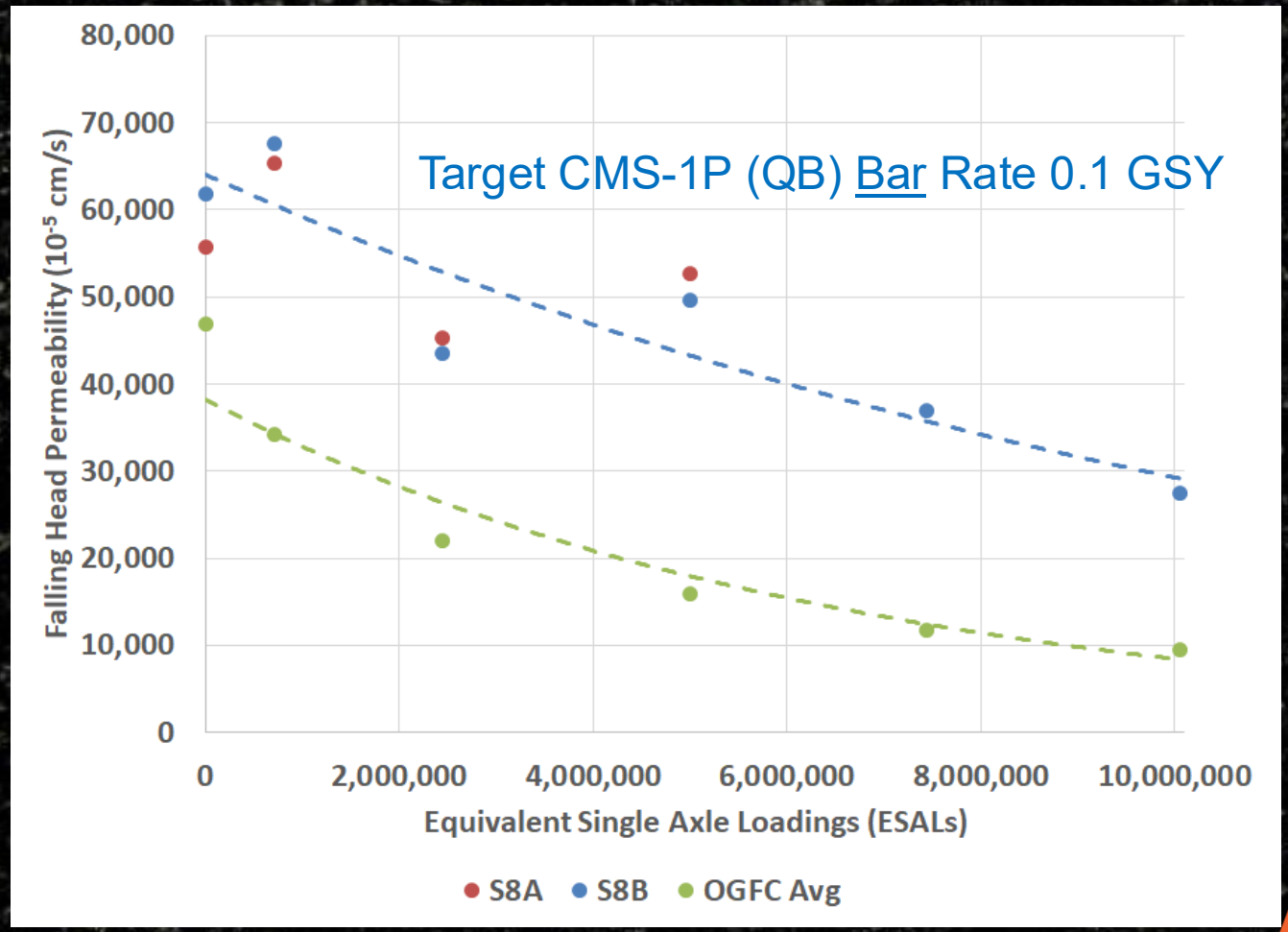
Permeability & Rejuvenation



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Perpetual Pavements

3 (or more) lifts
2 lifts (smooth thinlay over less smooth thicklay)
1 lift (smooth thicklay)

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2000 NCAT Pavement Test Track

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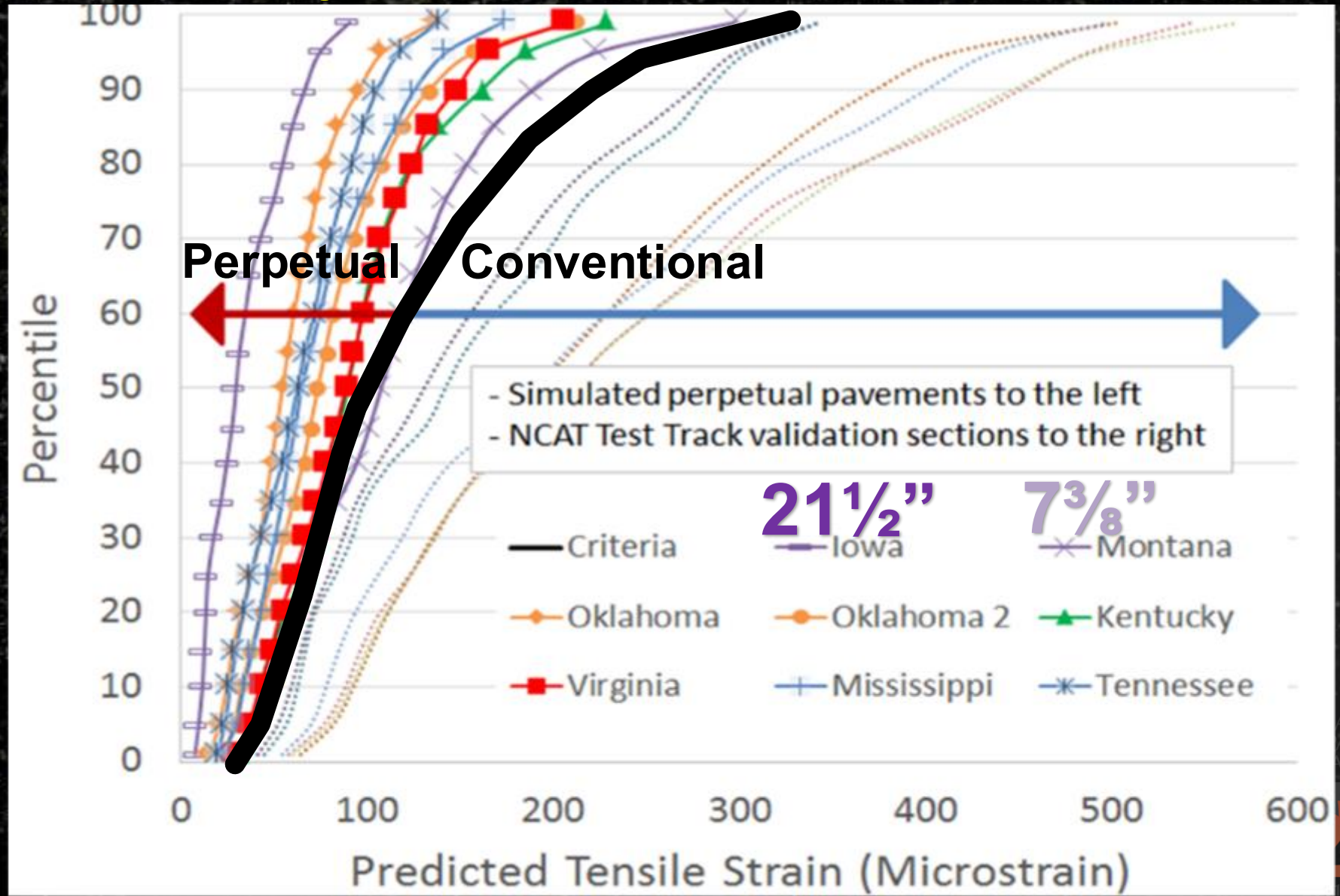
Perpetual Pavements



NCAT Report 25-01

NCAT Report 25-01
November 2025

National Center for Asphalt Technology
NCAT
at AUBURN UNIVERSITY

Determining Structural Layer Coefficient and Comparative Life Cycle Assessment for Asphalt Mixtures with HiMA™ Technology

x 1.7 !

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Low Va + HP + WMA + Thicklay

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Reclaimed & Recycled Materials

- **Portland cement**
  - Plastic/unstable subgrade
  - High/unpredictable moisture
  - High early strength need
  - Semi-rigid base platform
- **Engineered emulsion**
  - Nonplastic/stable subgrade
  - Crack mitigation is critical
  - Flexibility is essential to design
  - Sustainability is emphasized

"Cement is a soil modifier first and structural stabilizer second.
Engineered emulsion is a structural asphalt layer first and soil stabilizer second."

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Reclaimed & Recycled Materials

Asphalt Innovation Takeaways

- Preservation – www.NCAT.us, healthy thinlays
- Maintenance – safety, user cost, corrective actions
- Rehabilitation – mill depth, interlayers, thicklay
- Reconstruction - cold recycling, cement vs emulsion
- Capacity expansion - perpetual, HiMod, safety

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Innovation Workshops

#BuzzOnAsphalt

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