National Center for Asphalt Technology
NCAT
at AUBURN UNIVERSITY

Recent Discoveries in Asphalt

2021 (Eighth) Research Cycle

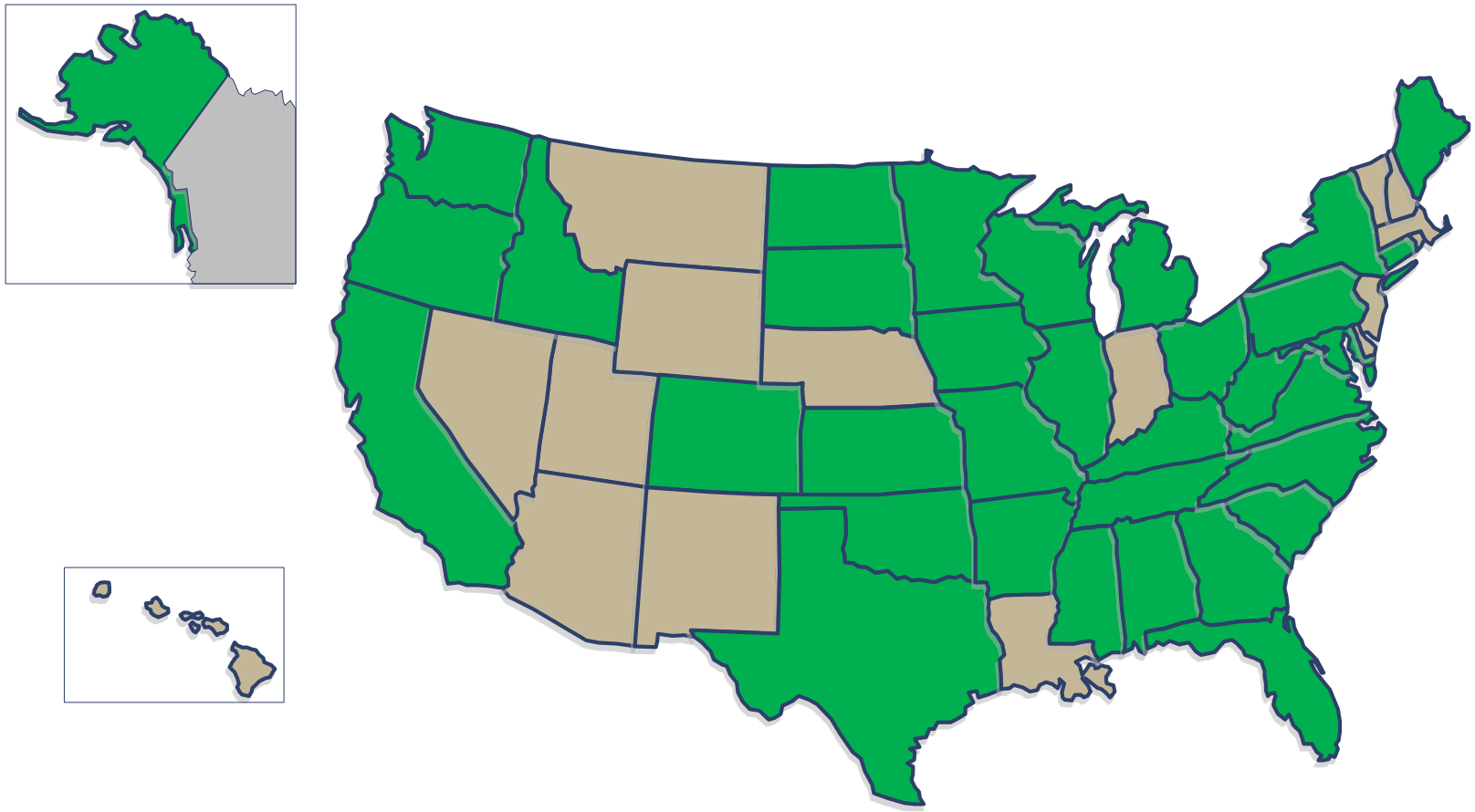
NCAT Pavement Test Track

Content

- Background
- Mix/materials
- Structural design
- Preservation
- Takeaways

NCAT Pavement Test Track

- National Center for Asphalt Technology @ Auburn since 1986
- Innovative, relevant, and implementable research projects
- Advancement of safe and sustainable asphalt pavements
- Mix/materials$_{86}$, structural pavement design$_{03}$, and preservation$_{12}$
- 1.7-mile nonprofit Track since ‘00, Lee County since summer 2012.



2021 (Eighth) Research Cycle

NCAT Pavement Test Track

2021 NCAT Pavement Test Track

- 46 total test sections
- 32 sponsored sections
  - 16 traffic continuations
  - 7 mill/inlay sections
  - 9 structural sections
- 16 repaved/rebuilt sections
  - ~1/3 of the Track (typical).

Traffic Continuations$_{16}$

- Higher RAP with recycling agents – CA_{N3}
- Foamed cold central plant recycle (CCPR) base – VA_{N4}
- High performance thinlays (DGA, SMA) – $AL_{N10,N11}$
- Crack prevention interlayer strategies – $GA_{N12,N13}$
- Soybean based polymer modified asphalt – SB_{W10}
- BMD via recycling agents, gradation change, etc. – OK_{S1}, $TX_{S10,S11}$
- Impact of base stabilization, subgrade modification – MS_{S2}
- Long term benefit of surface rejuvenators – MS_{S3}
- Full depth rapid rebuilds (grinding vs thinlays, HiMA) – SC_{S9}
- Open graded friction surface rejuvenation – SR_{E1}
- Impact of density on performance – $FL_{E5,E6}$

New Mill/Inlay Sections$_7$

- BMD via recycling agents, gradation, etc. – $OK_{N8,N9}$, TX_{N6}
- BMD with SGC and Marshall for QC – TN_{S4}
- Bond strength with different tack products and/or rates – NC_{W4}
- "BMD+Friction" mix optimization – KY_{S7}
- High performance OGFC surface – AL_{E9}

High Friction Road Patch

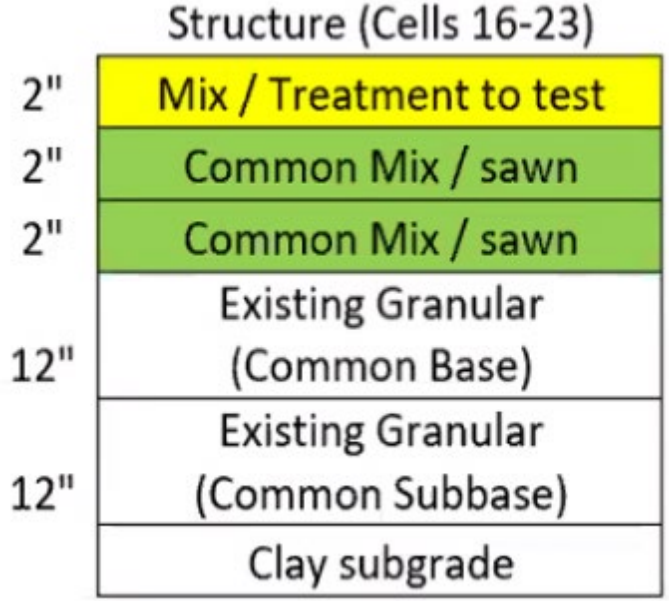
New Structural Sections$_9$

- Minimum HMA thickness over cold (re)recycling – VA$_{S12}$
- Additive Group (AG) for 1) performance, 2) framework
- "AG+" New polymer from old recycled tire rubber – Sigmabond HP$_{S8}$
- "AG+" High polymer performance with reduced viscosity – BASF$_{S13}$

Agency Selected AG Treatments

- Recycled tire rubber
  - "Wet" Entech PG76-22$_{N2}$
  - "Dry" Smart Mix in PG67-22$_{N1}$
- Recycled low density plastic
  - "Wet" Dow with Elvaloy PG76-22$_{S6}$
  - "Dry" pellets with PG76-22$_{S5}$
- High strength aramid fibers
  - Surface Tech ACE XP with PG76-22$_{N5}$
- Control with PG76-22$_{N7}$

- MnROAD in 2022



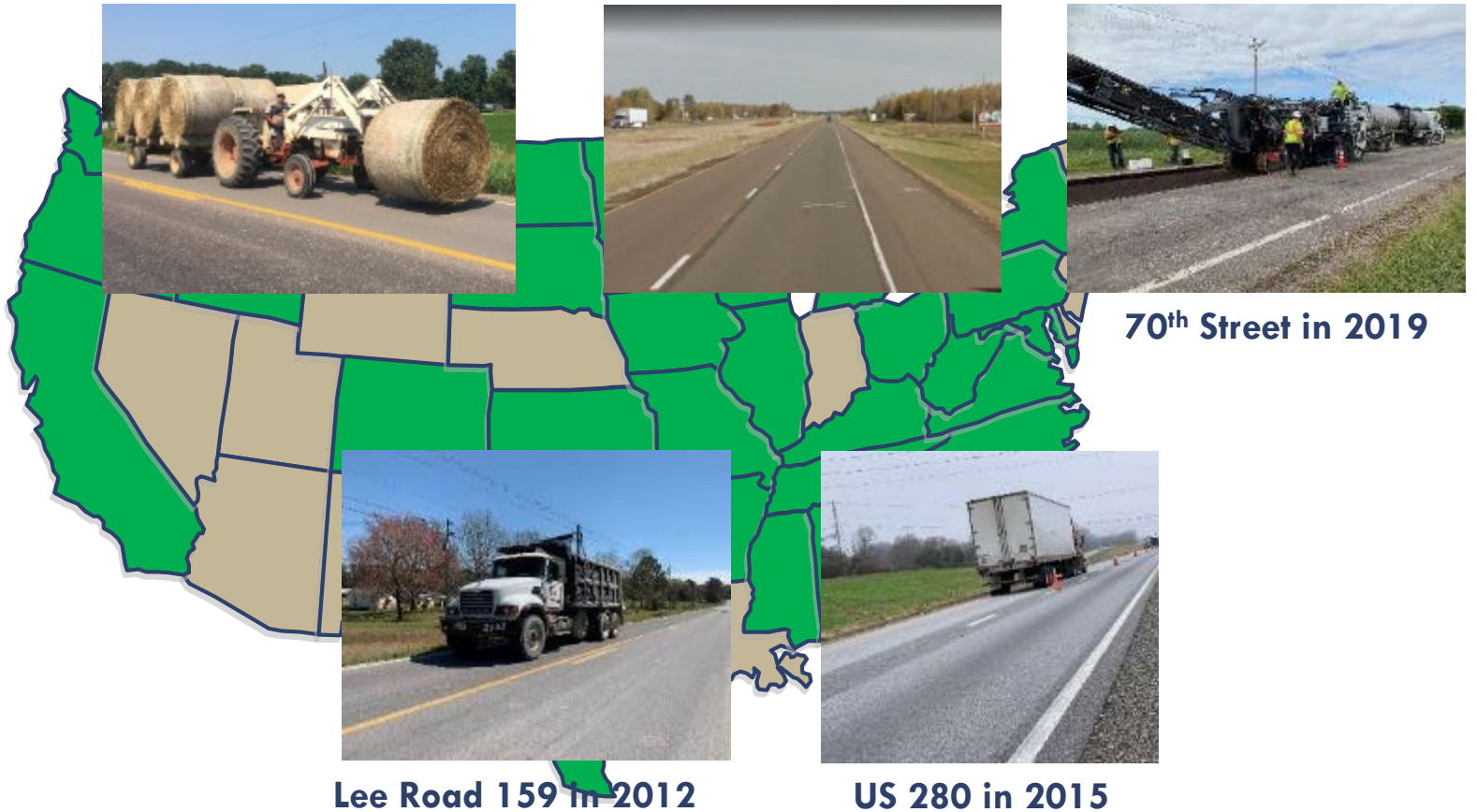
Hi-Tech Asphalt Solutions Feed System

← Smart Mix_{12}

Dry $Plastic_{8½}$ →

← $Asphalt\ Plus_{12}$

Off-Track Preservation

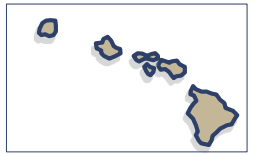


CSAH 8 and US 169 in 2016

70th Street in 2019

Lee Road 159 in 2012

US 280 in 2015



National Center for Asphalt Technology NCAT at AUBURN UNIVERSITY

www.pavetrack.com

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

Test Track

- Pavement Preservation
  - Construction Data
  - Observed Performance
  - Sponsors (2012-2020)
  - Pavement Preservation Group Study Resources

Pavement Preservation

The Moving Ahead for Progress in the 21st Century Act (MAP-21) defines pavement preservation as programs and activities employing a network level, long-term strategy that enhances pavement performance by using an integrated, cost-effective set of practices that extend pavement life, improve safety, and meet road user expectations.

When the right treatment is applied to the right road at the right time, roads can be kept in good condition instead of performing costly rehabilitation and reconstruction alternatives later in the pavement's life when the structure has deteriorated.

Pavement Preservation Group Study

The pavement preservation group study is quantifying the life-extending and condition-improving benefits of different pavement preservation treatments and treatment combinations on low-volume and high-volume roadways in both northern and southern climates. By determining the field performance of treatments applied at various stages of pavement life and decay, historically broad performance expectations for various preservation options will be discretely quantified to allow agencies to make objective decisions regarding treatment selection. A second focus of the study is to develop specifications and recommended guidelines for quality assurance testing and inspection of pavement preservation treatments.

Southern Test Locations

NCAT Test Track

Lee County Road 159

U.S. Route 280

asphaltresearch

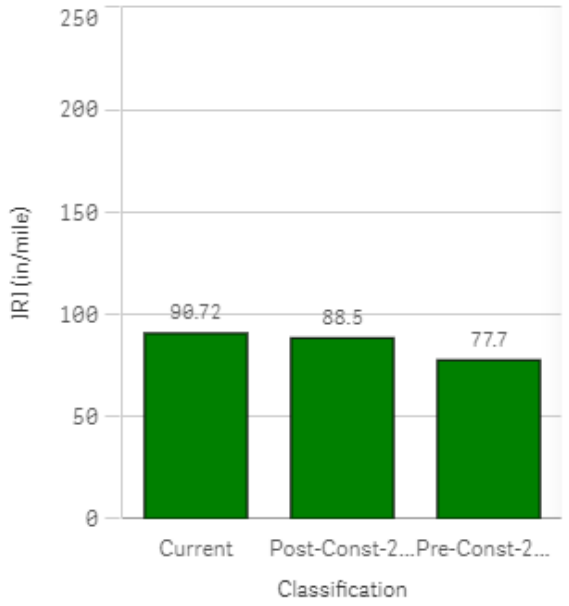
2018Track

Treatment	Condition	Time
Double layer micro surfacing ✓	Fair	0.0
5% RAS Thinlay	Good ✓	0.5
50% RAP thinlay	Poor	1.0
Cape seal		1.5
Crack sealing only		2.0

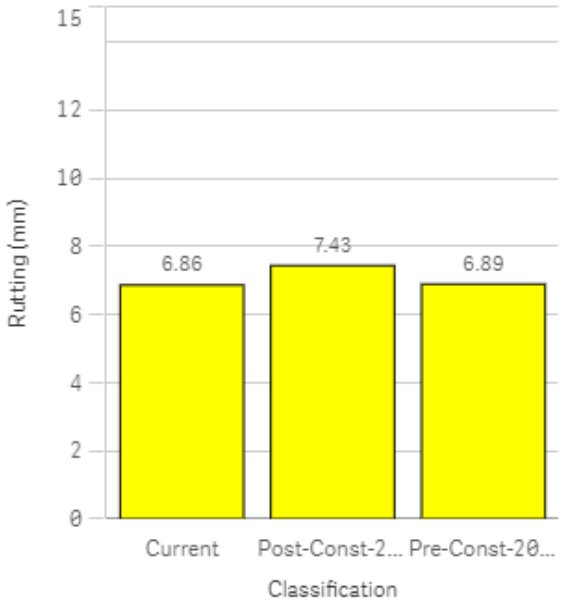
Time to Poor (Control)	Time to Poor (Treatment)	Crack Reduction (Average)
4.5	-	20.7

Pick a treatment, condition, and time to see a specific Crack Reduction.

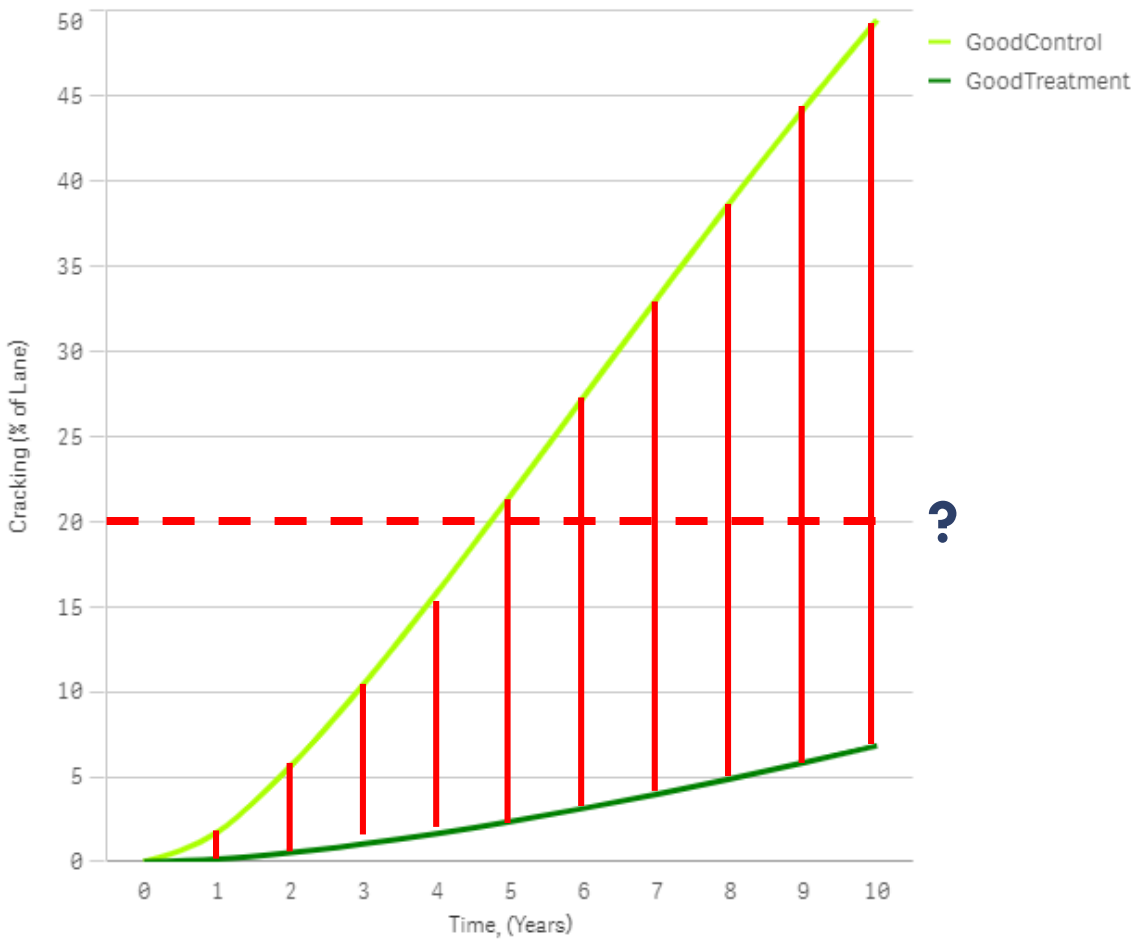
IRI (in/mile) for Treatment



Rutting (mm) for Treatment



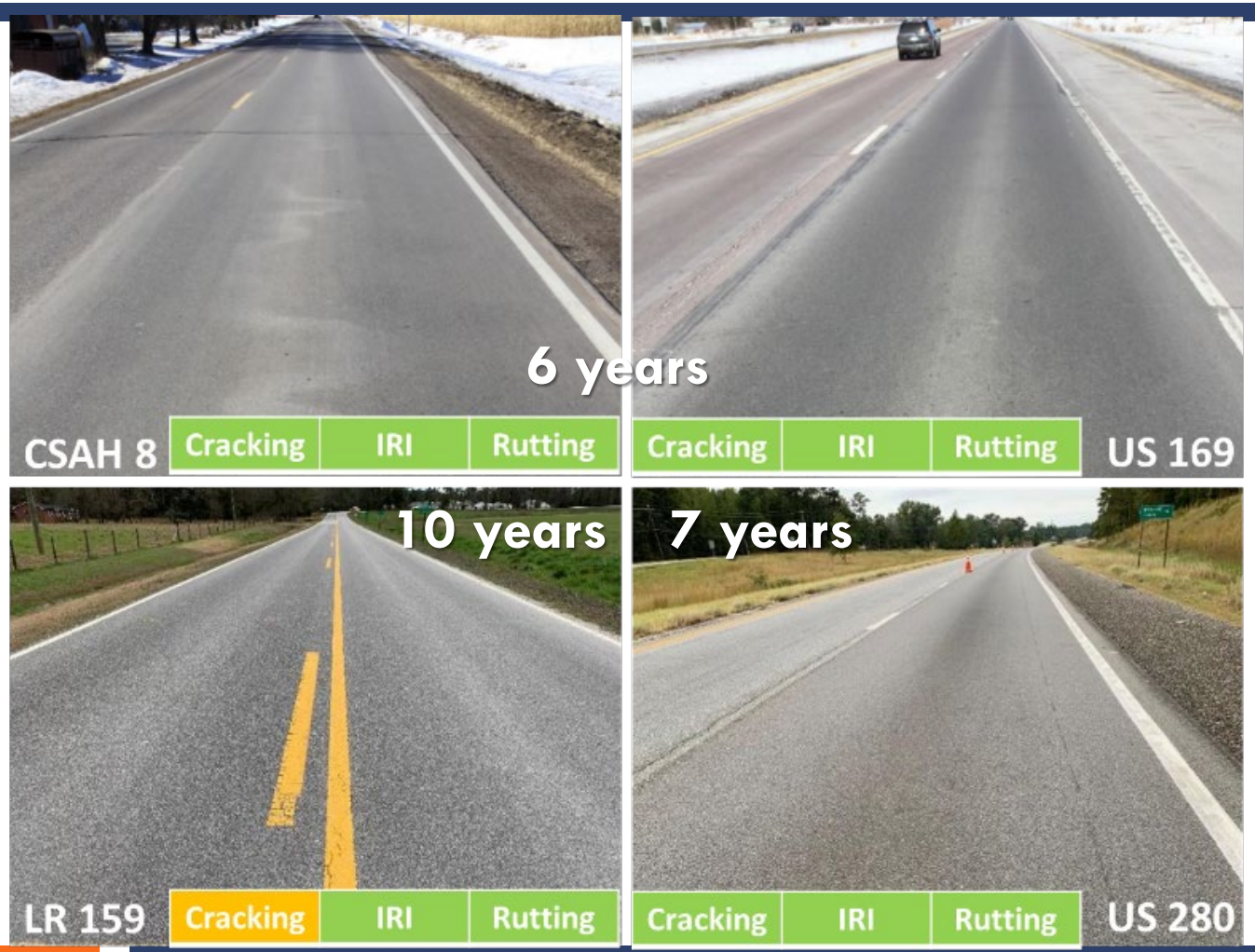
Treatment to Control Comparison



Overall Section Performance

Treatment	Parameter	Value	Rating	Ove Cor
Double layer micro surfacing	IRI (in/mile)	90.72	GOOD	FAI
Double layer micro surfacing	Cracking (%)	9.49	FAIR	FAI
Double layer micro surfacing	Rutting (mm)	6.86	FAIR	FAI

Off-Track Preservation



“100% RAP” Cold Recycle Ramp Sections

- Recycle Group (RG) study in 2024?
- Foam, emulsion, recycling agents
- ~98% RAP cold vs ~80% hot/warm
- Recycling, re-recycling, combinations
- With and without HMA surfaces…

Takeaways

- Background
- Mix/materials
- Structural design
- Preservation
- Takeaways

duction/performance
P) in base, binder, surface
ndition improvement

Questions and Answers

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