



HMA Preservation: Seal Coat and Micro Surfacing

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Background

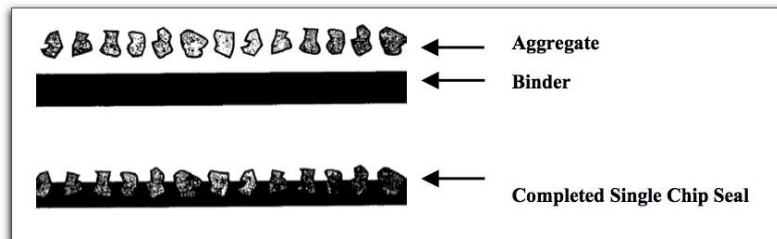
- Seal coats and micro surfaces are some of the most popular treatments
- Relatively inexpensive
- Can be very effective
- Cost-effectiveness is maximized with proper treatment selection



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Seal Coat

- Application of asphalt binder (hot or emulsion) immediately followed by application of an aggregate
- Seal is then rolled to sit the aggregate in the binder
- “Chip seal”



Caltrans, 2008



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Seal Coat



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Seal Coat



- Cracking
- Weathering
- Raveling
- Friction



- Loose chips
- Noise
- Weather limitations



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Micro Surfacing

- Mixture of polymer modified emulsified asphalt, dense-graded crushed fine aggregate, mineral filler, break control additives and water
- High performance enhanced slurry seal
- Allows for quick return to traffic (~ 1 hour)



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Micro Surfacing



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Micro Surfacing



- Weathering
- Raveling
- Friction
- Rutting
- Irregular profile



- Special equipment
- Cost



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What to Expect

- SHRP 2 Report S2-R26-RR-2 (2011)

Treatment	Expected Performance	
	Treatment Life (yr)	Pavement Life Extension (yr)
Microsurfacing		
Single course	3-6	3-5
Double course	4-7	4-6
Chip seal		
Single course	3-7	5-6
Double course	5-10	8-10



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LESSONS LEARNED FROM NCAT-MnROAD RESEARCH



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TPF-5(375)

TPF TRANSPORTATION POOLED FUND PROGRAM

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Study Detail View

National Partnership to Determine the Life Extending Benefit Curves of Pavement Preservation Techniques (MnROAD/NCAT Joint Study – Phase II)

General Information

Study Number: TPF-5(375) [View Commitment Details](#)

Status: Cleared by FHWA

Contract/Other Number:

Lead Agency: Minnesota Department of Transportation

Est. Completion Date: Dec 30, 2023

Last Updated: Jan 31, 2019

Contract Start Date: Jan 1, 2019

Contract End Date:

Solicitation Number: 1461

Partners: AL, AR, CO, FHWA, FP2, GDOT, IL, KS, KY, MDOT SHA, MI, MN, MO, MS, NC, NY, OK, PA, SC, TN, TX, WI, WV

Related Study Number(s): 1459 - ACCELERATED PERFORMANCE TESTING ON THE 2018

Contact Information:

Lead Agency Contact(s):

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FHWA Technical Liaison(s):

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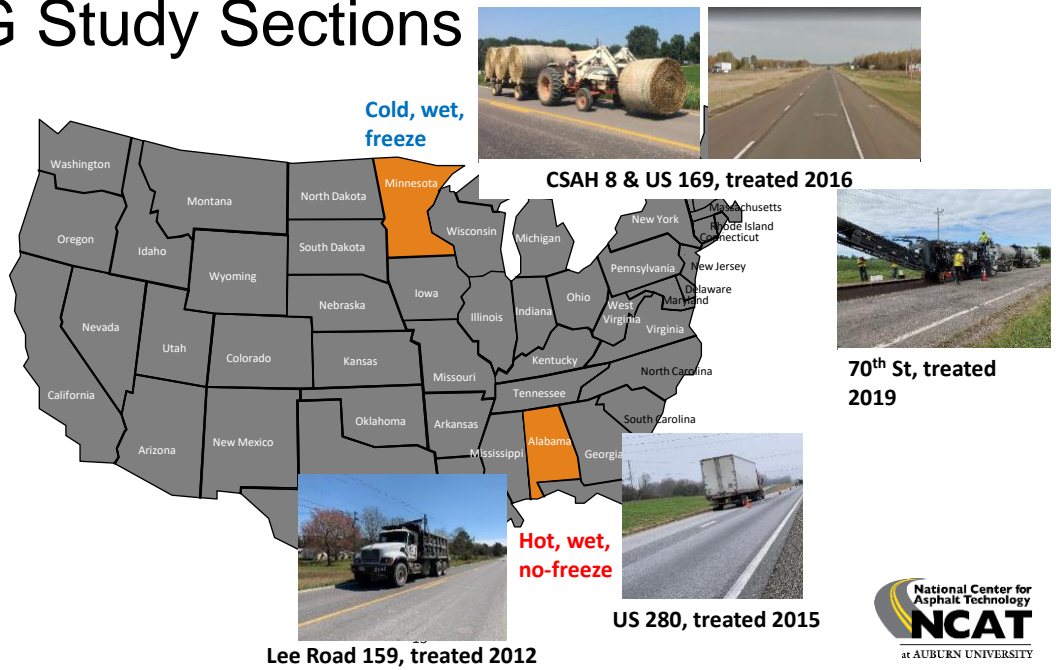
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Sponsors



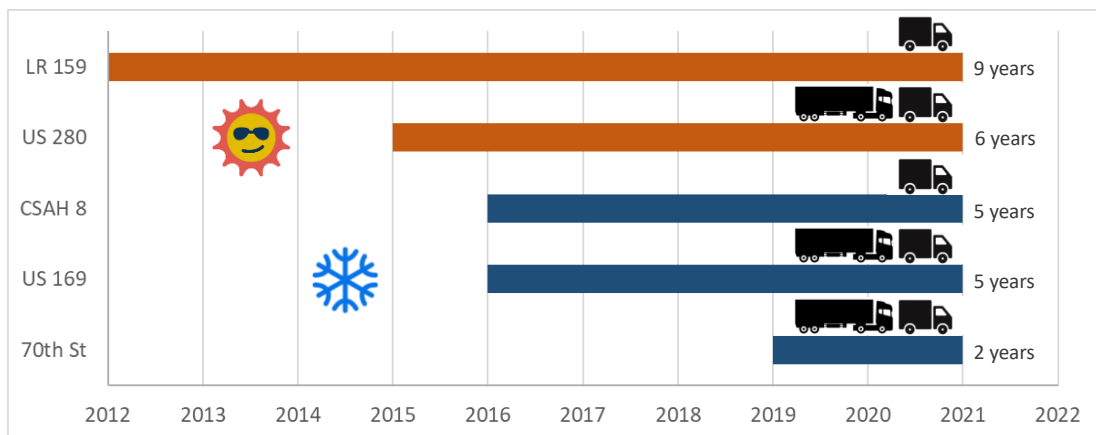
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PG Study Sections



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Time in Service



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PG Study Sections

CHIP SEALS

- Single layer
- Double layer
- Triple layer
- Single layers with crack sealing
- Fibermat
- Scrub seals*

MICRO SURFACES

- Single layer
- Double layer
- Single layers with crack sealing
- Fibers
- HiMA



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Fibermat Chip Seal



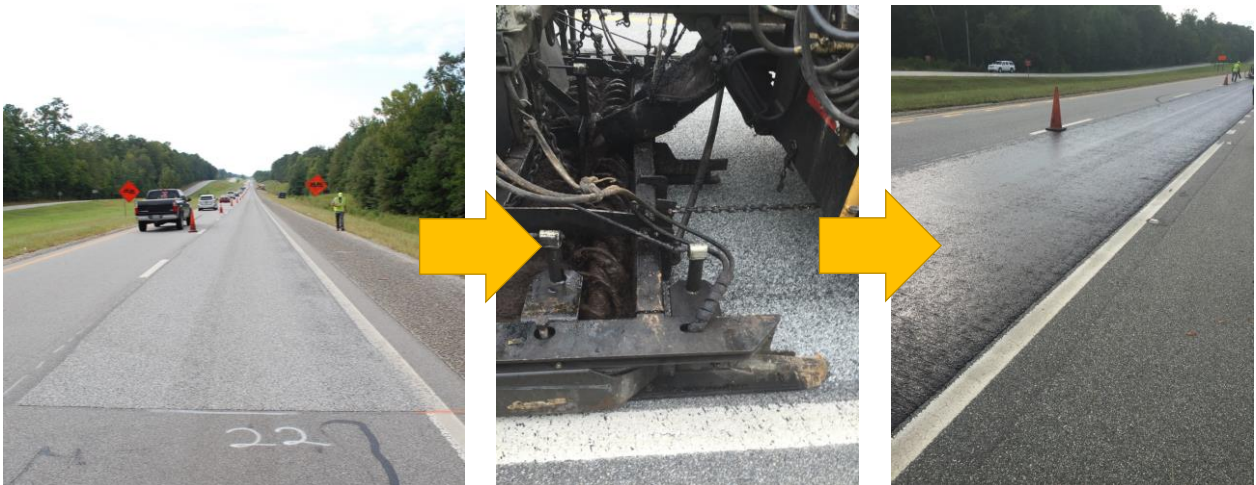
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Scrub Seal



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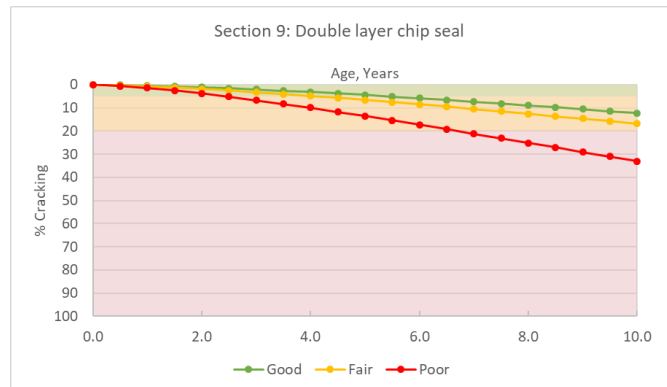
Cape Seals



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What We've Learned

- Target GOOD pavements
- There's always *some* benefit even if pavement is in poor condition
 - Not cost-effective



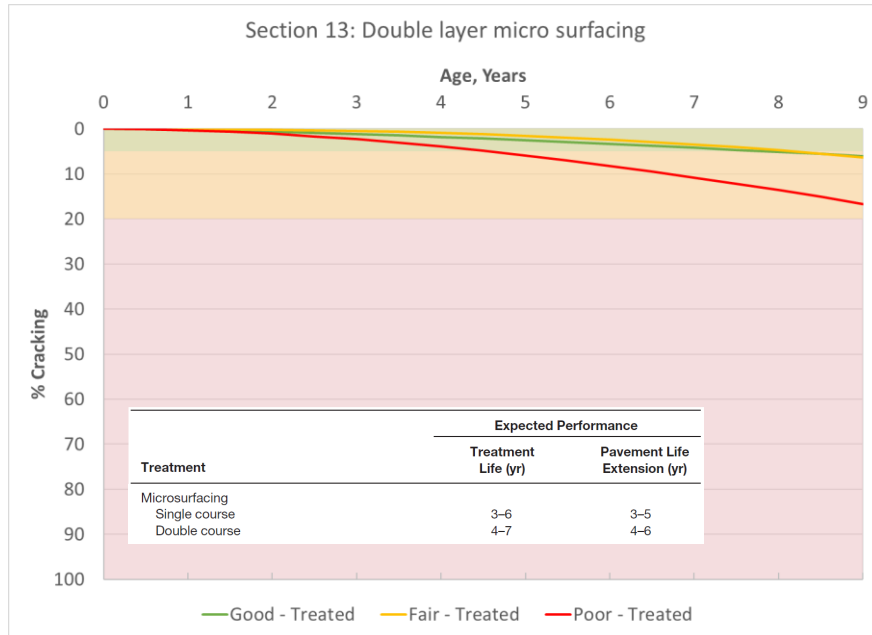
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What We've Learned

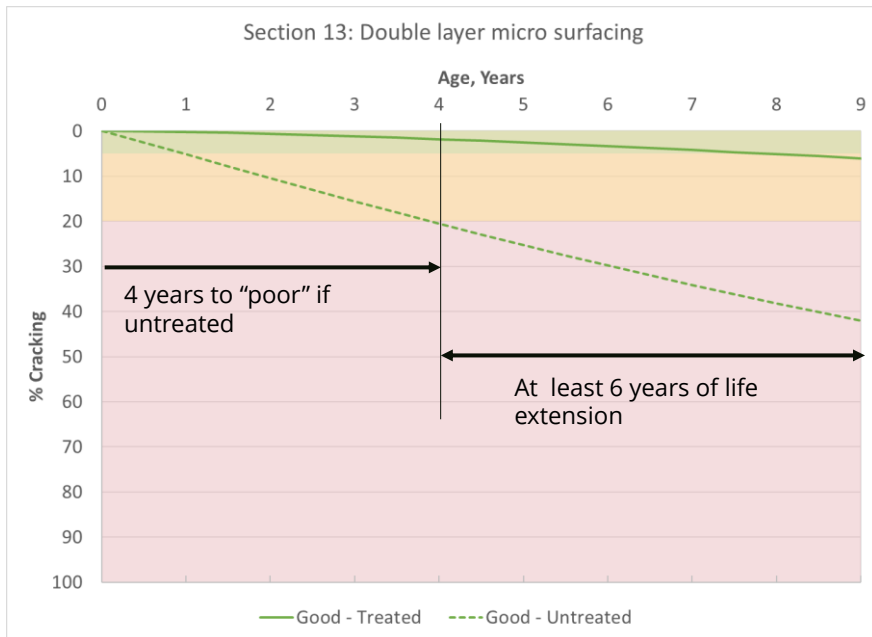
- Life extension may be higher than typically reported
 - Good materials
 - Good designs
 - Good treatment selection
 - Good construction



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At year 9, treated pavement is barely transitioning to "fair" condition



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What We've Learned

- The more you do, the more you get
 - Multiple layers
 - Crack sealing
 - Treatment combinations (Cape seals)



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UNTREATED



SINGLE LAYER CHIP SEAL



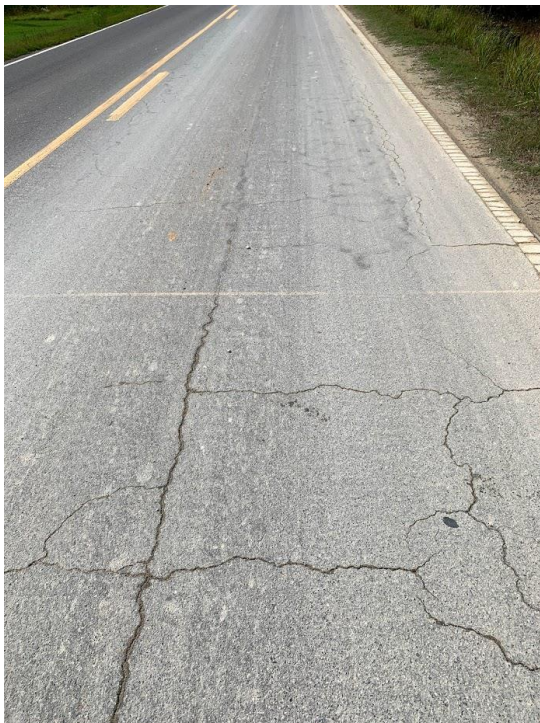
SINGLE LAYER CHIP SEAL
+ CRACK SEAL



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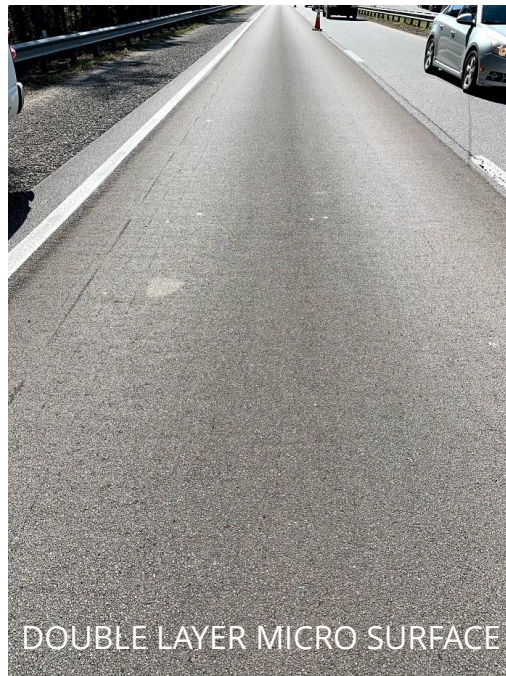
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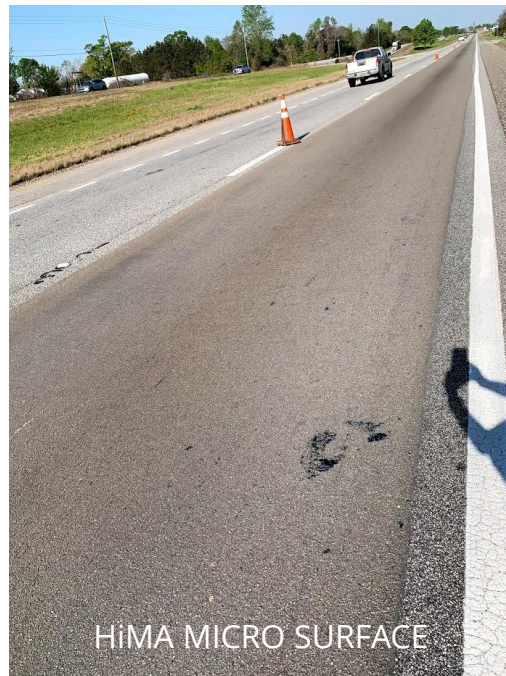
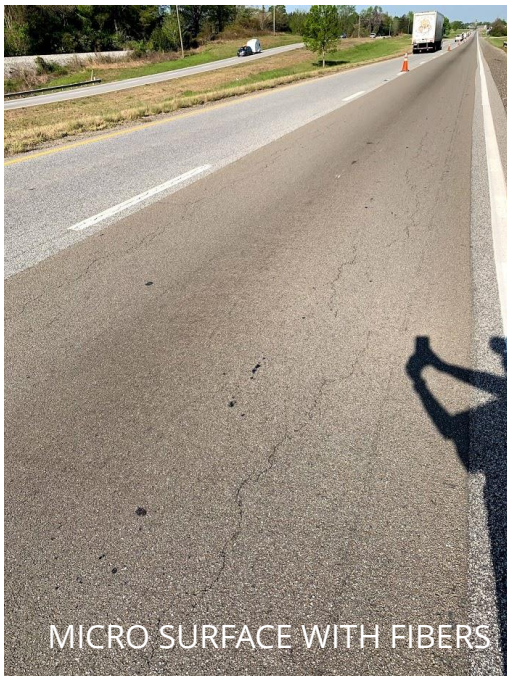
SINGLE MICRO SURFACE
WITH CRACK SEALING

SINGLE MICRO SURFACE

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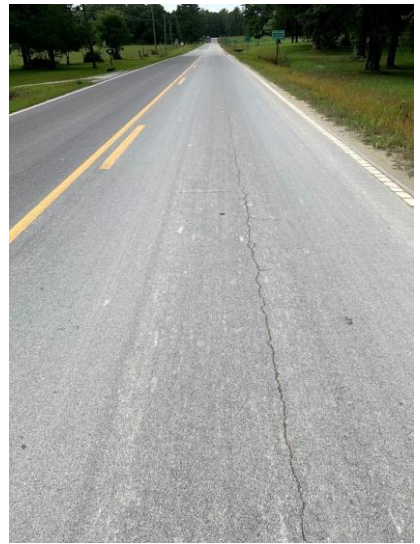
CAPE SEAL



SCRUB CAPE SEAL



FIBERMAT CAPE SEAL



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CAPE SEAL



SCRUB CAPE SEAL



FIBERMAT CAPE SEAL



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What We've Learned

- Treatments can work under different conditions
 - Don't immediately rule out based on traffic or climate

BUT...

- Be cautious



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FIBERMAT CHIP SEALS

Observations:

- Better cracking performance compared to single chip seals
- Better chip retention

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CHIP SEAL



FIBERMAT CHIP SEAL



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CHIP SEAL



FIBERMAT CHIP SEAL



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LOW TRAFFIC



HIGH TRAFFIC



TRIPLE CHIP SEALS

Observations:

- Good cracking performance
- Bleeding, especially in high traffic sections – may require action if friction is affected

NORTH

SOUTH



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What We've Learned

- Cracking reduction is most notable benefit
 - Easy to see
 - It is not the only parameter
- What are you targeting?



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Time to 20% Cracking – Lee Road 159

Treatment	Poor	Fair	Good
Single chip seal	4.4	7.7	7.7
Single chip seal + crack seal	7.3	7.3	8.6
Double chip seal	6.7	9+	9+
Triple chip seal	9+	9+	9+
Fibermat chip seal	7.0	8.7	9+
Scrub seal	9+	9+	9+



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% Crack Reduction at Year 9 – Lee Road 159

Treatment	Poor	Fair	Good
Single chip seal	14	20	19
Single chip seal + crack seal	20	31	17
Double chip seal	38	46	35
Triple chip seal	56	54	39
Fibermat chip seal	41	39	30
Scrub seal	55	46	32



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Time to 20% Cracking – Lee Road 159

Treatment	Poor	Fair	Good
Single micro surface	1.7	4.5	5.0
Single micro + crack seal	4.6	6.1	5.1
Double micro surface	9+	9+	9+
Cape seal	9+	9+	9+
Fibermat cape seal	9+	9+	9+
Scrub cape seal	9+	9+	9+



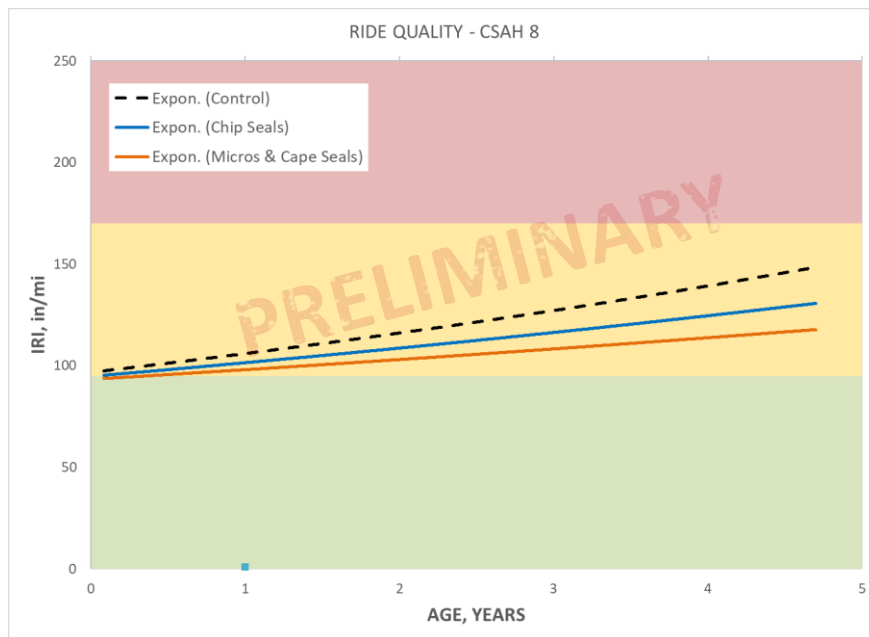
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% Crack Reduction at Year 9 – Lee Road 159

Treatment	Poor	Fair	Good
Single micro surface	6	18	11
Single micro + crack seal	31	27	2
Double micro surface	59	55	40
Cape seal	61	56	40
Fibermat cape seal	72	64	43
Scrub cape seal	68	56	40



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Summary

- Chip seals and micro surfacing extend pavement life
 - Combinations = added benefits
- Some treatments within same category have similar performance
 - Unit costs for each agency will determine cost-effectiveness
- No major issues in any location
 - Adjust to your particular conditions



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Summary

- More information: www.ncat.us



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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



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Thank you!

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