NATIONAL ACADEMIES Sciences Engineering Medicine

TRB TRANSPORTATION RESEARCH BOARD

TRB Webinar: Maintenance Practices for Wide Cracks in Asphalt-Surfaced Pavements

December 8, 2025

12:00 – 1:30 PM

PDH Certification Information

1.5 Professional Development Hours (PDH) – see follow-up email

You must attend the entire webinar.

Questions? Contact Andie Pitchford at TRBwebinar@nas.edu

The Transportation Research Board has met the standards and requirements of the Registered Continuing Education Program. Credit earned on completion of this program will be reported to RCEP at RCEP.net. A certificate of completion will be issued to each participant. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the RCEP.

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Purpose Statement

This webinar will explore how agencies define and address wide cracks in asphalt-surfaced pavements. The session will highlight current maintenance practices and feature examples from state departments of transportation (DOTs) with well-defined wide crack maintenance procedures.

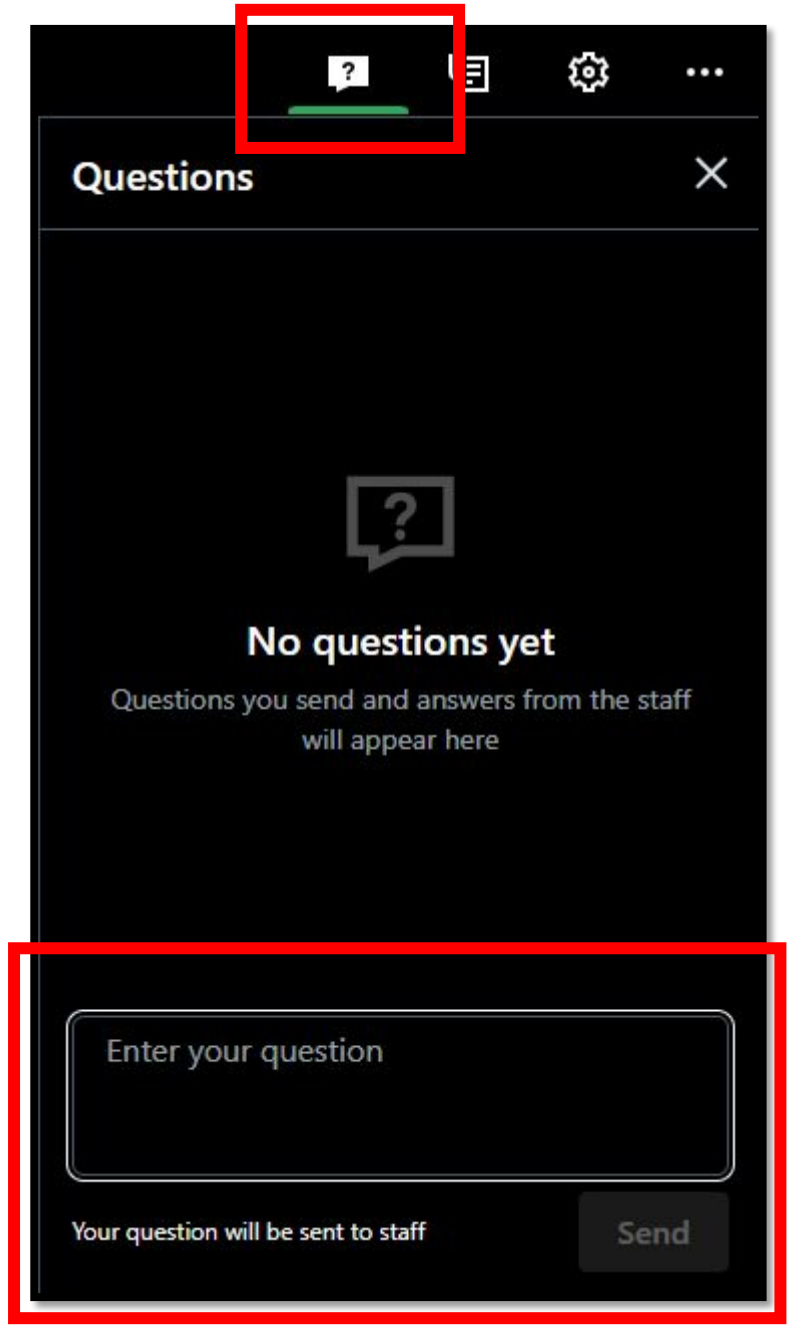
Learning Objectives

At the end of this webinar, you will be able to:

- (1) Define wide cracks and the components of DOT guidelines that specifically address wide crack maintenance
- (2) Define and plan implementation of the various materials and procedures used to maintain those cracks in asphalt-surfaced pavements

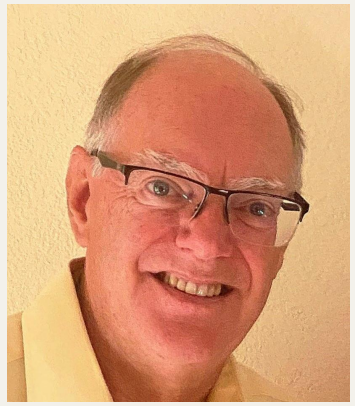
Questions and Answers

- Please type your questions into your webinar control panel
- We will read your questions out loud, and answer as many as time allows



Today's Presenters

David Peshkin
david.peshkin@gmail.com
David Peshkin PLLC



Joel Ulring
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DEPARTMENT OF TRANSPORTATION

Jim Weston
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Washington State Department of Transportation

Amy Beise
abeise@nd.gov
NORTH Dakota | Transportation
Be Legendary.

Maintenance Practices for Wide Cracks in Asphalt-Surfaced Pavements

A WEBINAR BASED ON THE FINDINGS OF NCHRP PROJECT 20-05, TOPIC 55-14

NCHRP SYNTHESIS 640

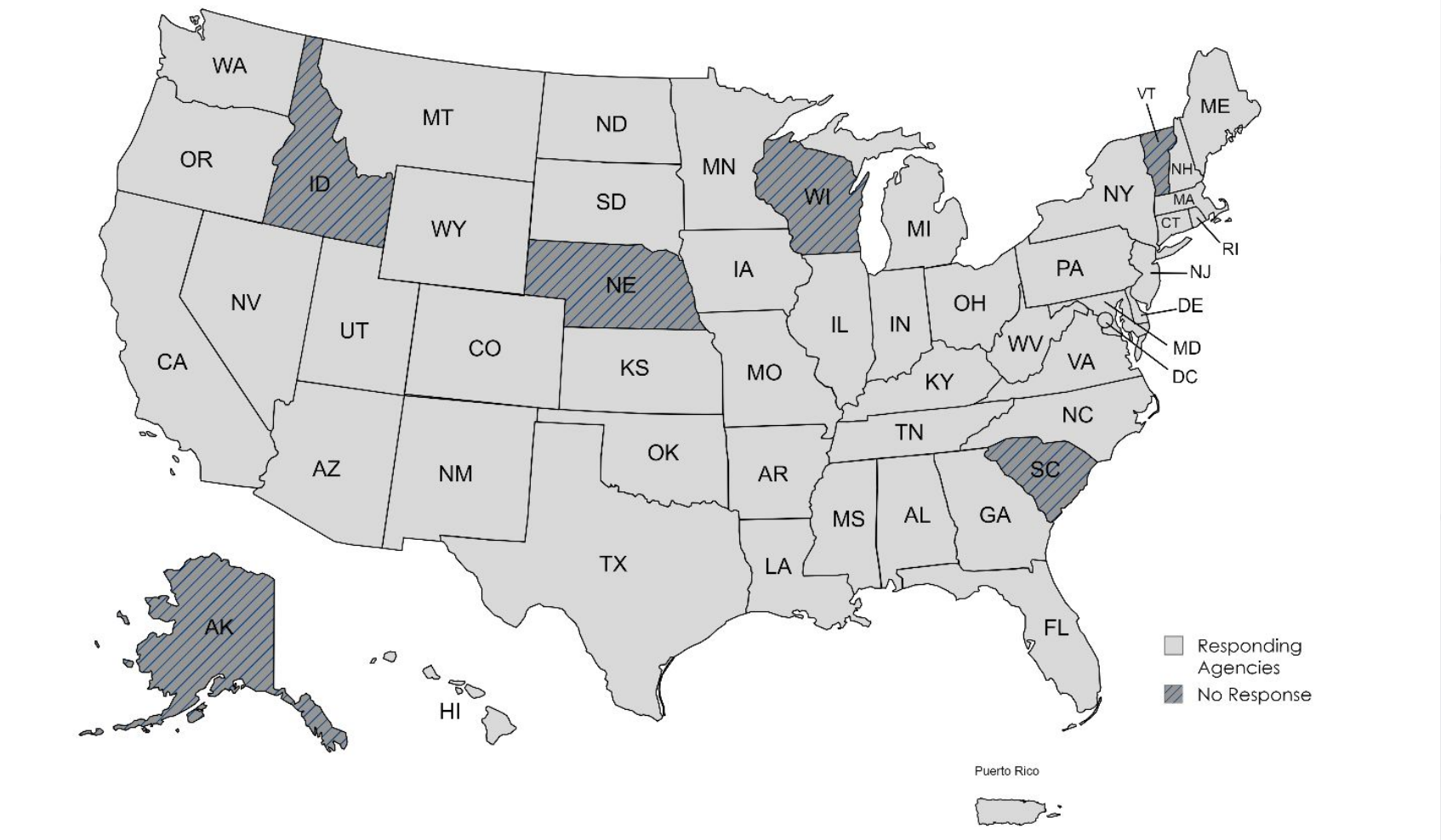
Introduction and Study Findings

- Overview of the study
- Collected data
- Case examples
- Future research opportunities

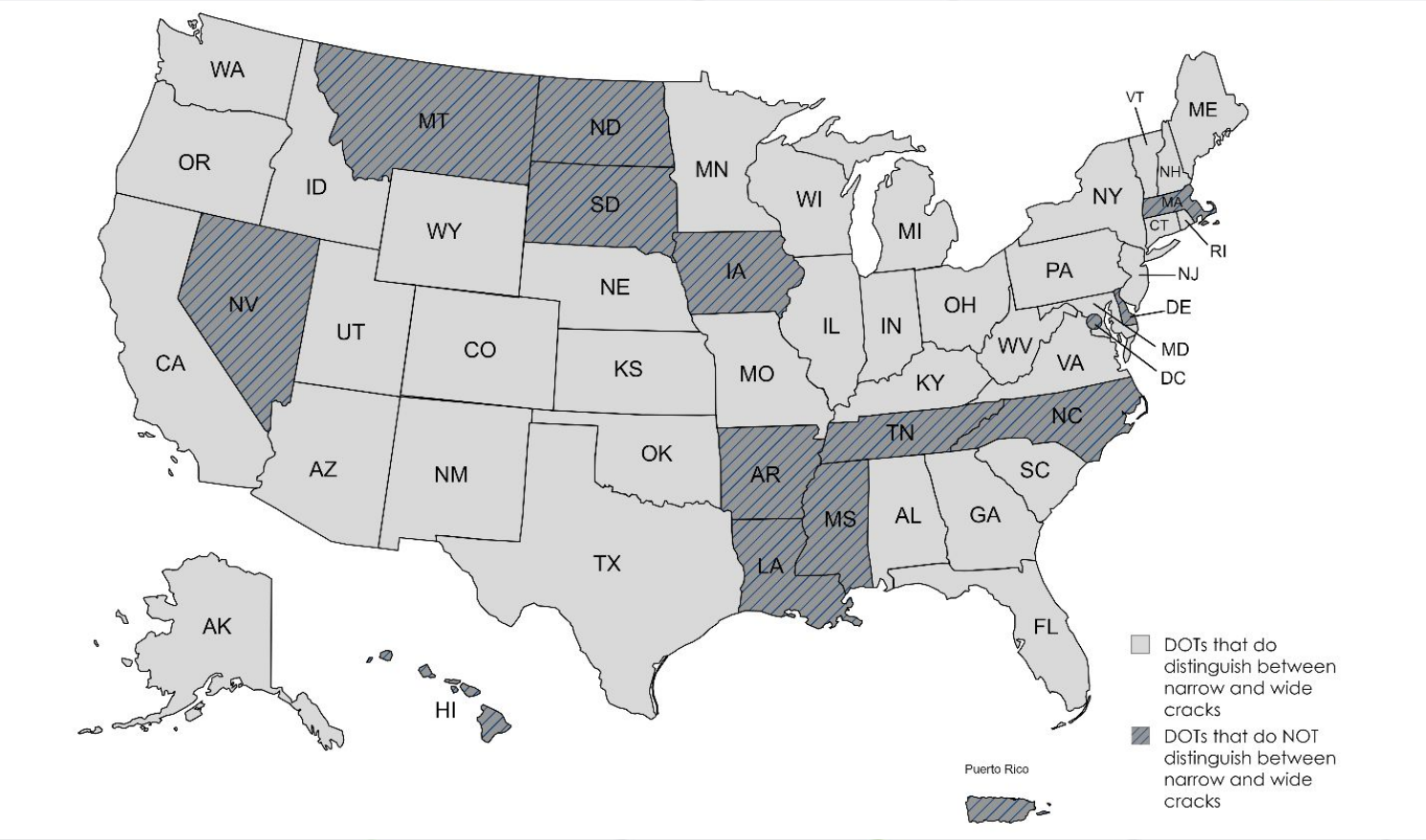
Overview

- Objective: Document state DOT practices for wide crack maintenance
  - Products and methods
  - Policies, specifications, guidelines
  - Application/use data
  - Costs and cost effectiveness
  - Performance
- Approach
  - Literature review
  - State agency survey
  - Case examples

Responding Agencies – 44 of 52 (85%)

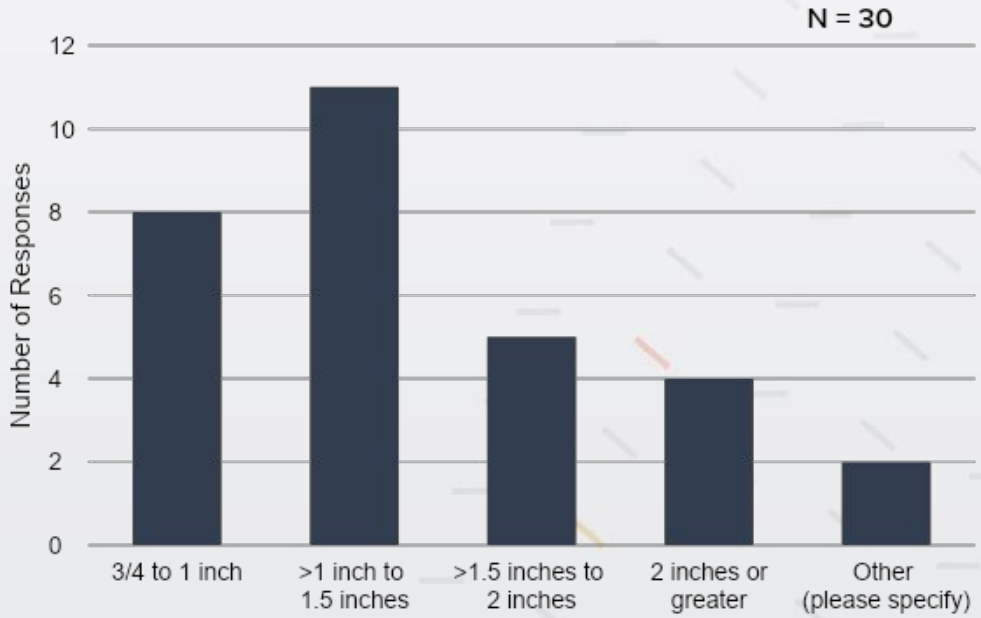


Responding Agencies Distinguishing Between Narrow and Wide Cracks for Maintenance Purposes



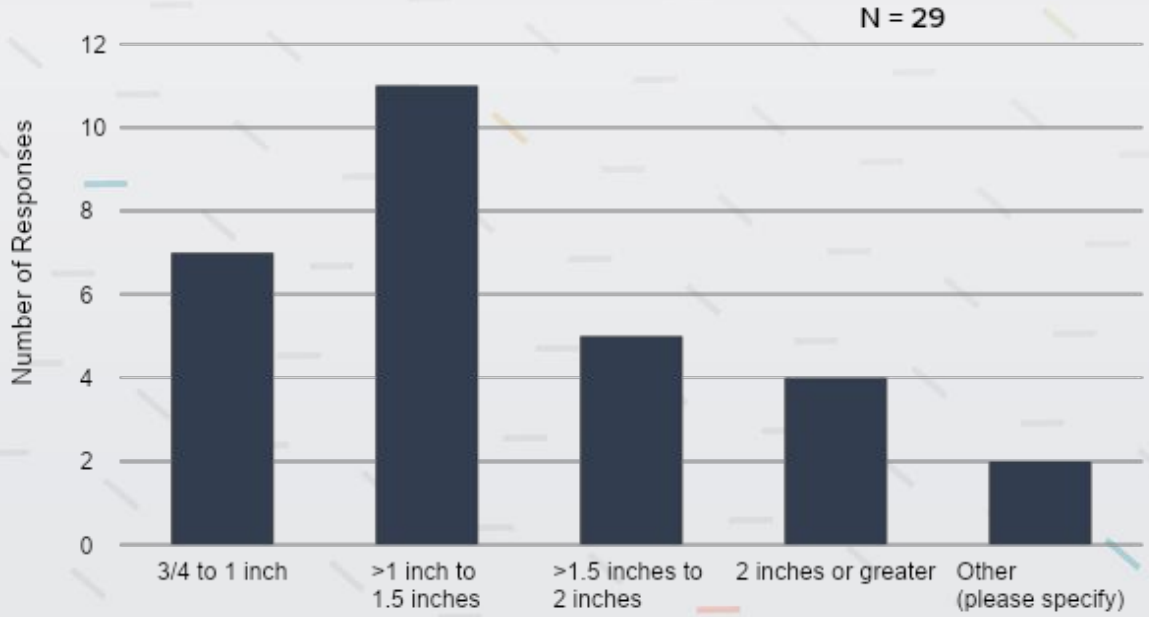
- 31 of 46 make a distinction
- Common width defined as wide is between 1 and 2 inches
- 69% of 36 responses did not identify cracks too wide

What's a Wide Crack?

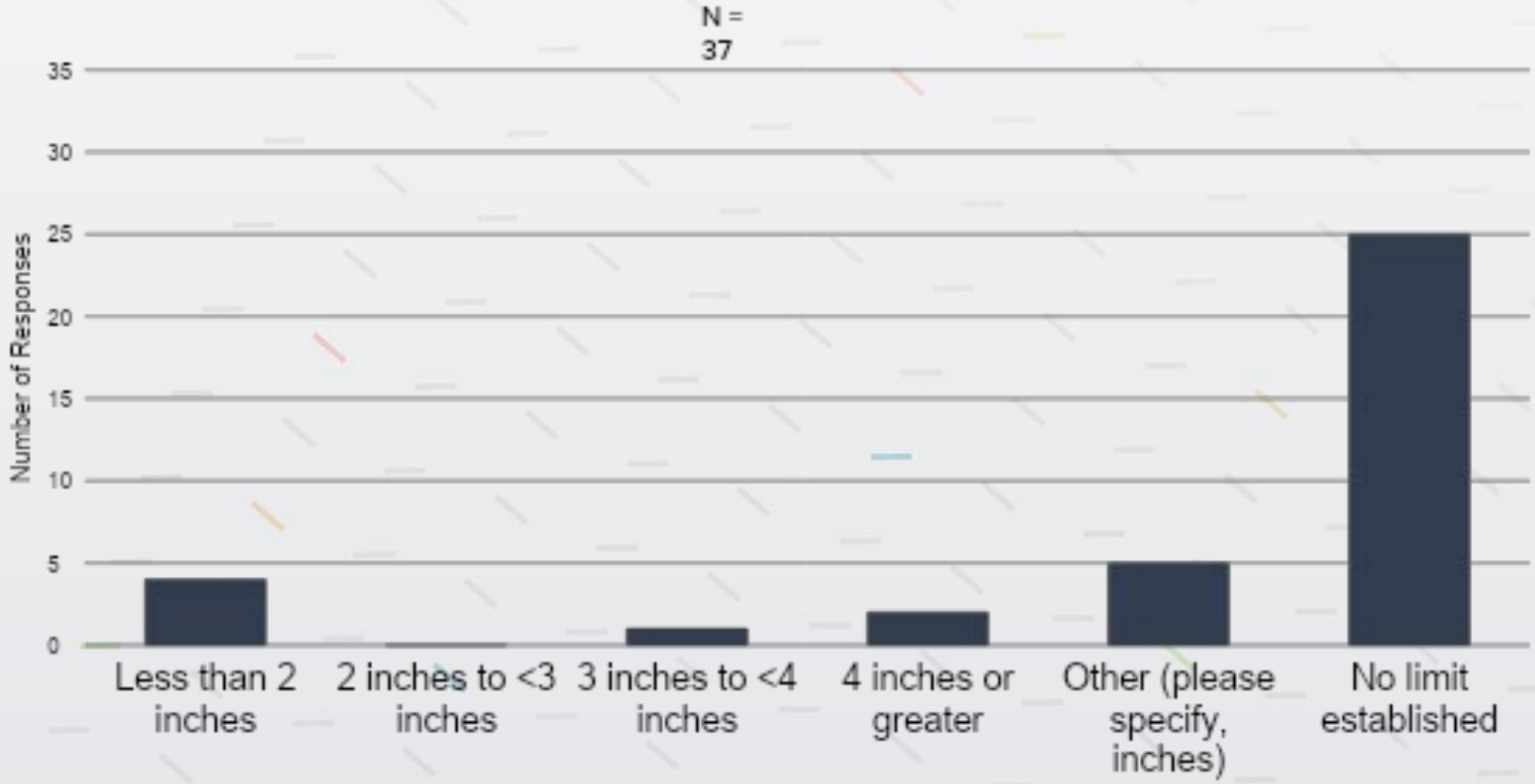


Transverse Crack

Longitudinal Crack



When is a Transverse Crack Too Wide for Wide Crack Repair Techniques?



Most Common Materials/Procedures

- Mastic complying with ASTM D8260 or DOT spec (43%)
- Crack sealant or filler complying with ASTM D6690 or D5078 (32%)
- Asphalt concrete in mill-and-patch procedure (32%)
- Micro surface or slurry in mill-and-patch (24%)

Mastic Applications

Crack Sealing/Filling

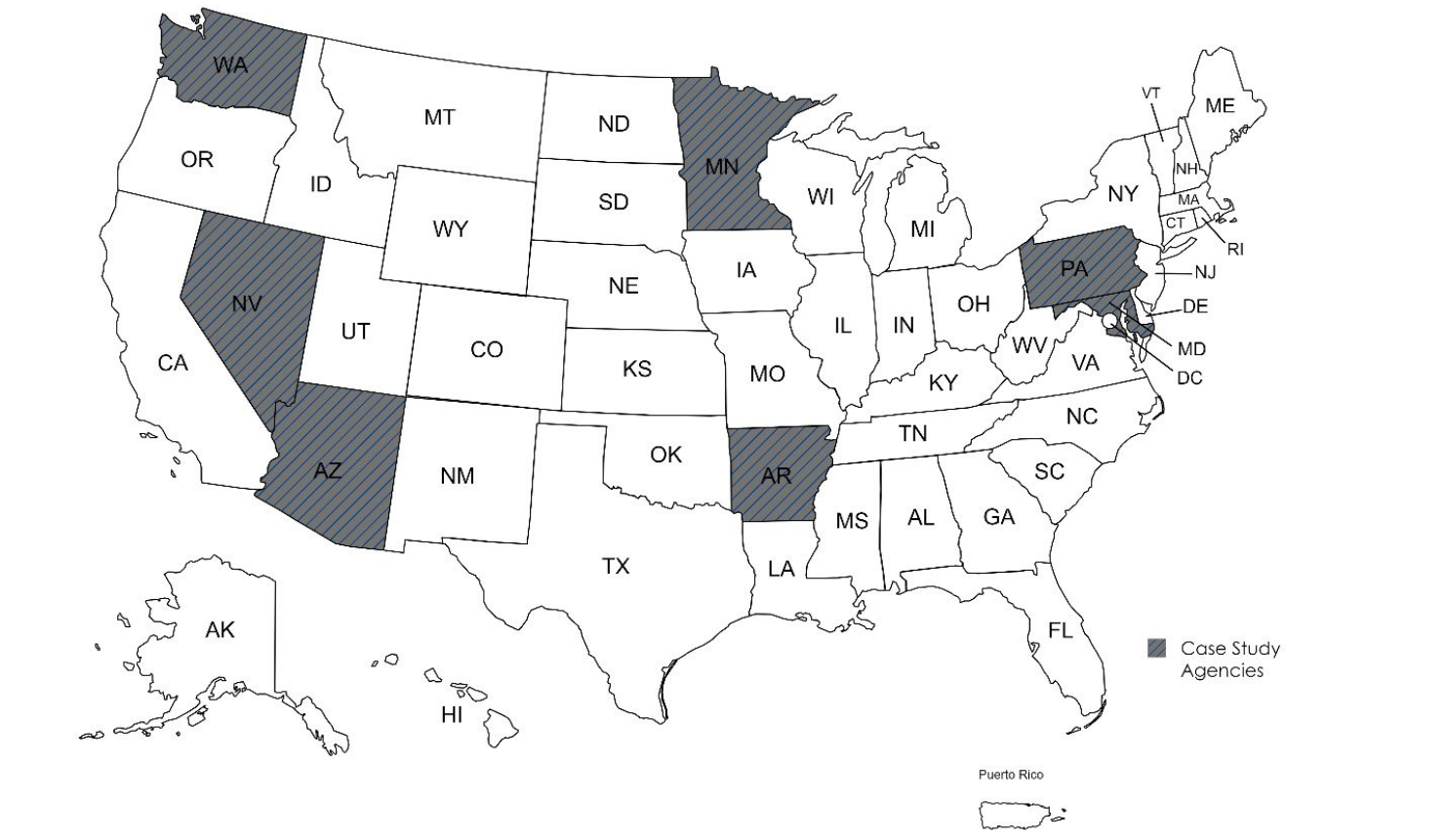
Micro Surface

Spray Patching

Other Survey Questions

- Crack repair steps
- Typical performance of crack repairs
- What repair failure looks like
- Crack repair costs

Case Example Agencies



- Industry has led the introduction of mastics
- Range of expertise
- Guidance on when, how to use needed

Future Opportunities for Study

- What crack width is too wide for conventional sealants/fillers?
- What are the performance characteristics, treatment life, and limitations of mastics?
- What's the effect of wide crack repairs on pavement performance?

Future Opportunities for Study (continued)

- What are feasible pavement M&R strategies after mastics are used?
- Consolidated guidance on use of available strategies (i.e., mastics, AC mill and replace, slurry/micro, spray patching, and sealing/filling) for transverse and longitudinal cracks (e.g., when, how)
- Do we need to differentiate between proactive and end-of-life maintenance on wide cracks and joints?

Thank You!

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DEPARTMENT OF TRANSPORTATION

Maintenance Practices for Wide Cracks in Asphalt-Surfaced Pavements

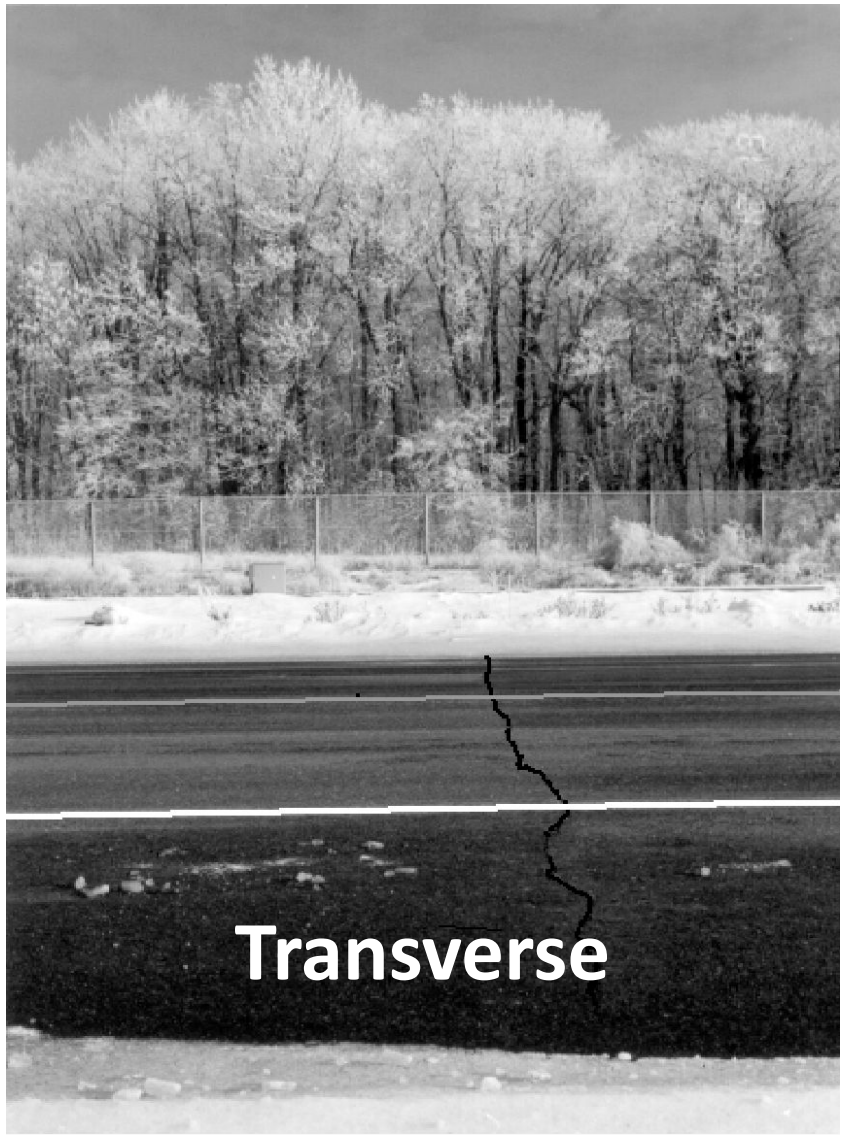
Joel Ulring, Pavement Preservation Engineer
MnDOT Office of Materials and Road Research - OMRR
December 8, 2025

Wide Crack Maintenance Practices

Outline

- MnDOT's Description of a Wide Crack
- Types of Wide Cracks in Minnesota
- MnDOT's Approach to Wide Crack Repair
- MnDOT's Research on Pavement Crack Repair

Wide Crack Maintenance Practices



In Minnesota Pavements Crack!

Wide Crack Maintenance Practices

What is a Wide Crack?

- For Minnesota DOT, a wide crack is any crack (tranverse or longitudinal)

≥ 1½ inches wide.

Wide Crack Maintenance Practices

What is a Wide Crack?

- Older pavements often approaching rehabilitation stage.
- Pavement may be in fair condition but has wide cupped cracks.
- Standard crack filling treatments don't work.

Wide Crack Maintenance Practices

MnDOT Maintenance Manual

- Chapter 3: Smooth Roads
- Puts crack repair as “First Priority”

3-4.01 MAINTENANCE PRIORITIES

3-4.01.01 FIRST PRIORITY

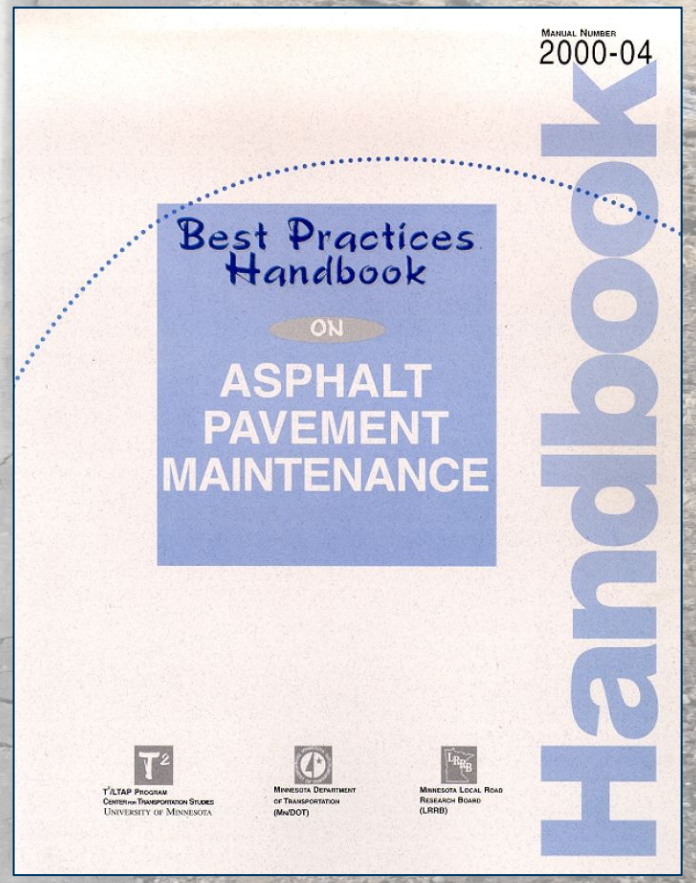
First priority should be given to repairing road surface deficiencies (pavement and shoulder) which immediately affect the safety of the traveling public. Typical defects in this category are potholes, cupping at transverse cracks and abrupt vertical variations, “blow-ups” in PCC pavement, excessive raveling, surfaces with low skid resistance, rutting, expanded longitudinal joints on widened lanes and turn lanes, and pavement cracking.

The MnDOT Maintenance Manual provides guidance on many aspects of highway maintenance.

Wide Crack Maintenance Practices

How does MnDOT Treat Wide Cracks?

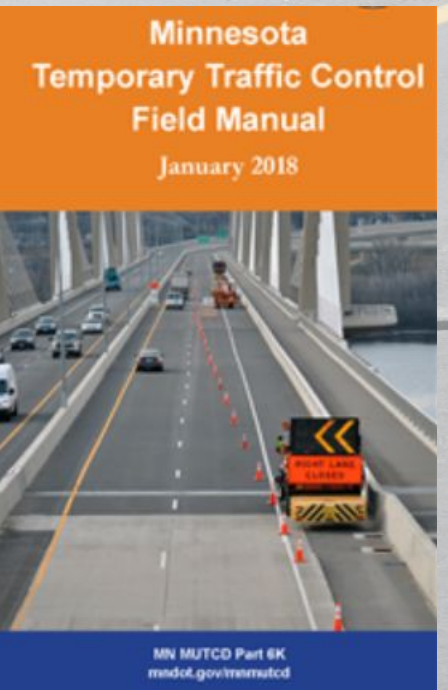
- Cold patch
- Micro-surfacing/slurry seal
- Narrow mill and patch/slot paving (HMA)
- Fine mix HMA repair
- Mastic repair



Wide Crack Maintenance Practices

Safety First!

- Temporary Traffic Control
- MN-MUTCD Part 6 – Temp. Traf. Control



mndot.gov

Minnesota Manual on Uniform Traffic Control Devices

MN MUTCD

June, 2023

Updated and approved by FHWA
Effective Date January 2026

Wide Crack Maintenance Practices

Cold Patch Repair

- Emergency repair
- No temperature restriction
- Low initial cost
- Low durability

Wide Crack Maintenance Practices

Micro-surfacing/slurry Crack Fill

- Micro surfacing/slurry produced in Minimac machine.
- Transferred to a small wheeled vehicle with a hopper.
- Material placed over the crack.
- Wide and cupped cracks.
- Minimac retired so not done anymore.

Wide Crack Maintenance Practices

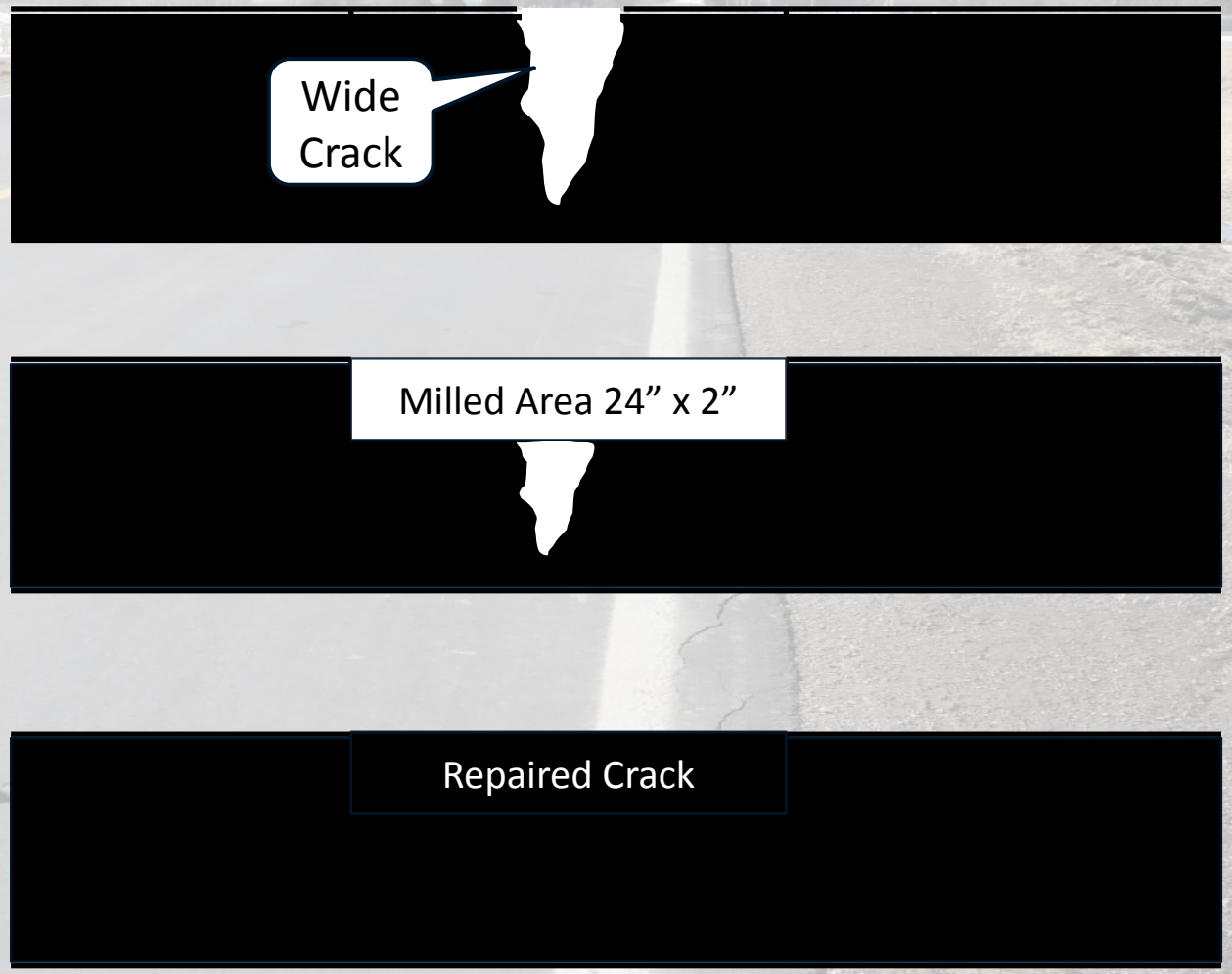
Micro-surfacing over Crack Fill

- Prefill wide cracks to ½” of surface
  - Use a mixture of Mastic 1 and crumb rubber
    - 2 crumb rubber bricks to 12 Mastic bricks
    - Softer more flexible material
  - Cold mix
  - Fine mix HMA
- Micro-surfacing placed over the cracks in two lifts

Wide Crack Maintenance Practices

Narrow Mill and Pave

- MnDOT historically did this for longitudinal crack repair.
- Mill a 24” wide by 2” deep strip over the wide crack.
- Clean and tack.
- Fill with HMA and compact it.
- Not commonly done.
- Downside: Have two joints instead of one.



Wide Crack Maintenance Practices

Narrow Mill and Pave

Repair process

- Mill over longitudinal or transverse wide crack 24 inches. Depth about 2 inches
- Clean by sweeping and using compressed air
- Tack
- Place HMA material
- Compact

Wide Crack Maintenance Practices

Narrow Mill and Pave (Slot Paving)

- **Completed repairs**

Wide Crack Maintenance Practices

Fine Mix HMA Repair

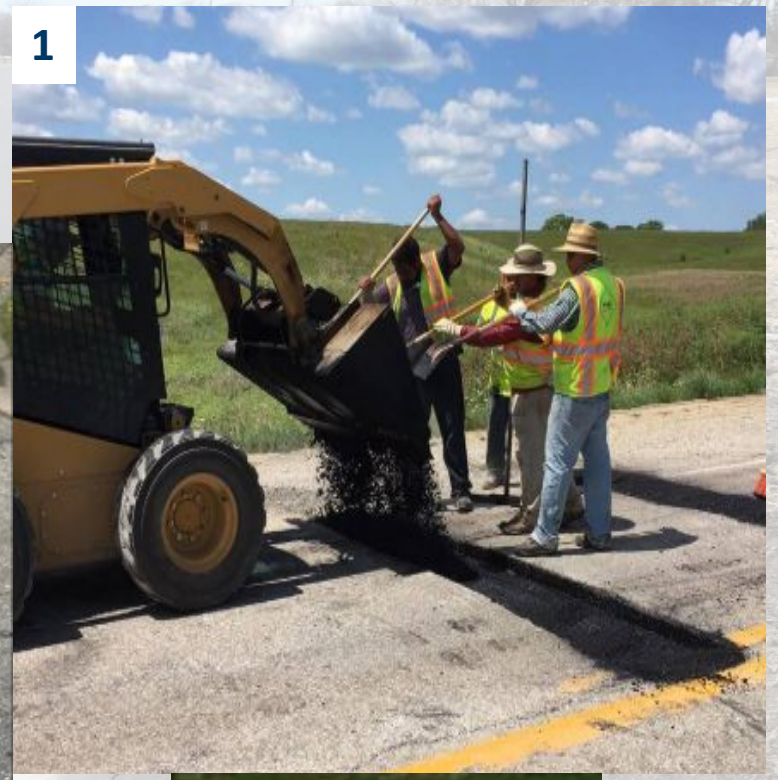
- Easy
- Cost effective
- Fine mix HMA not always available
- Used mainly for wide cracks that are depressed (cupped)

Wide Crack Maintenance Practices

Fine Mix HMA Repair Process

- Clean the surface and crack by sweeping and compressed air
- Tack the pavement
- Place HMA material
- Compact

1



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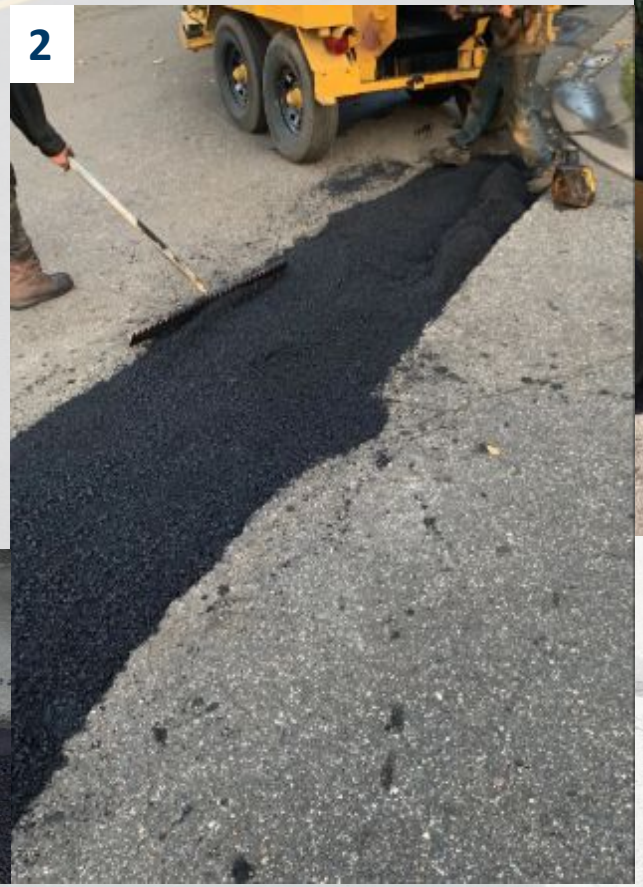


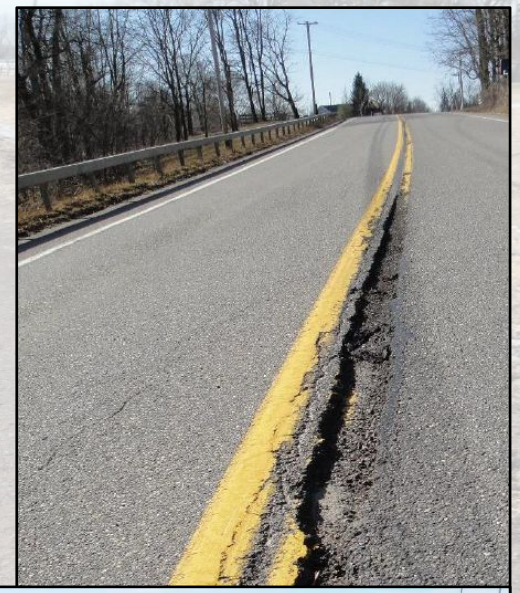
3

Wide Crack Maintenance Practices

Mastic Repair

MnDOT's most common wide crack repair method

- Longitudinal cracks
- Shoulder separation
- Transverse cracks



Wide Crack Maintenance Practices

Mastic Repair Pros

- No Temp Restrictions.
- Good adhesion & flexibility.
- Durable (5+ year performance).
- Aggregate provides mass & Stability.
- Impermeable.
- Good material for repair of wide and depressed (cupped) cracks.
- Good cost/benefit ratio.

Wide Crack Maintenance Practices

Mastic Repair Cons

- Time to melt material.
- Two melters required per crew for full day of patching.
- Hot weather requires time to cool.
- May crack in cold environment.
- Limited workability time.
- Can cause bumps if not careful.
- High initial cost.

Wide Crack Maintenance Practices

Mastic Repair Equipment

Wide Crack Maintenance Practices

Mastic Repair Process

- Clean crack with compressed air.
- Heat with lance if cold.
- Place mastic material.
- Level (no compaction required).
- Keep traffic off until it cools.
- Placement workmanship.
  - Limited workability time.
  - Can cause roughness.

MnDOT Mastic Usage

Fiscal Year	Pounds of Mastic Used	Total Cost	Cost/Pound
2021	2,153,985	$3,030,067	$1.41
2022	1,460,446	$2,052,037	$1.41
2023	1,777,691	$2,477,155	$1.39
2024	1,665,892	$2,415,543	$1.45

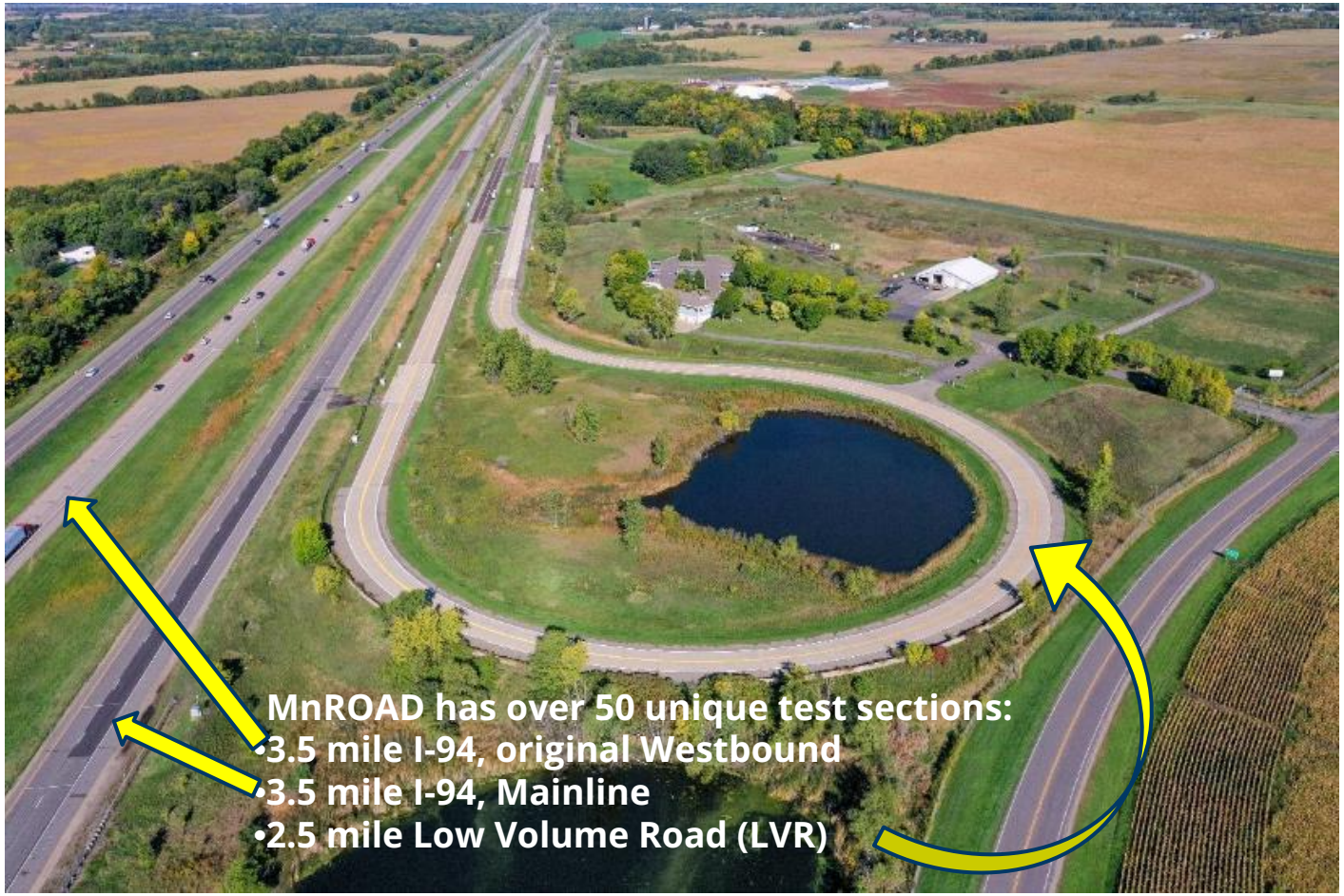
MnDOT has state-wide procurement contracts allowing Maintenance Districts to direct purchase mastic material.

Wide Crack Maintenance Practices

Mastic Repair Finished Projects

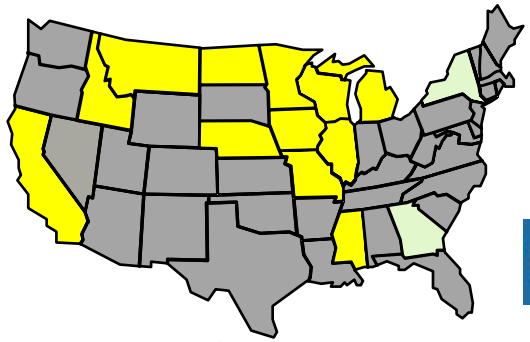
Wide Crack Maintenance Practices

MnDOT likes to study pavement stuff!



MnROAD
SAFER, SMARTER, SUSTAINABLE PAVEMENTS
THROUGH INNOVATIVE RESEARCH

NRRA
National Road Research Alliance



Illinois Tollway

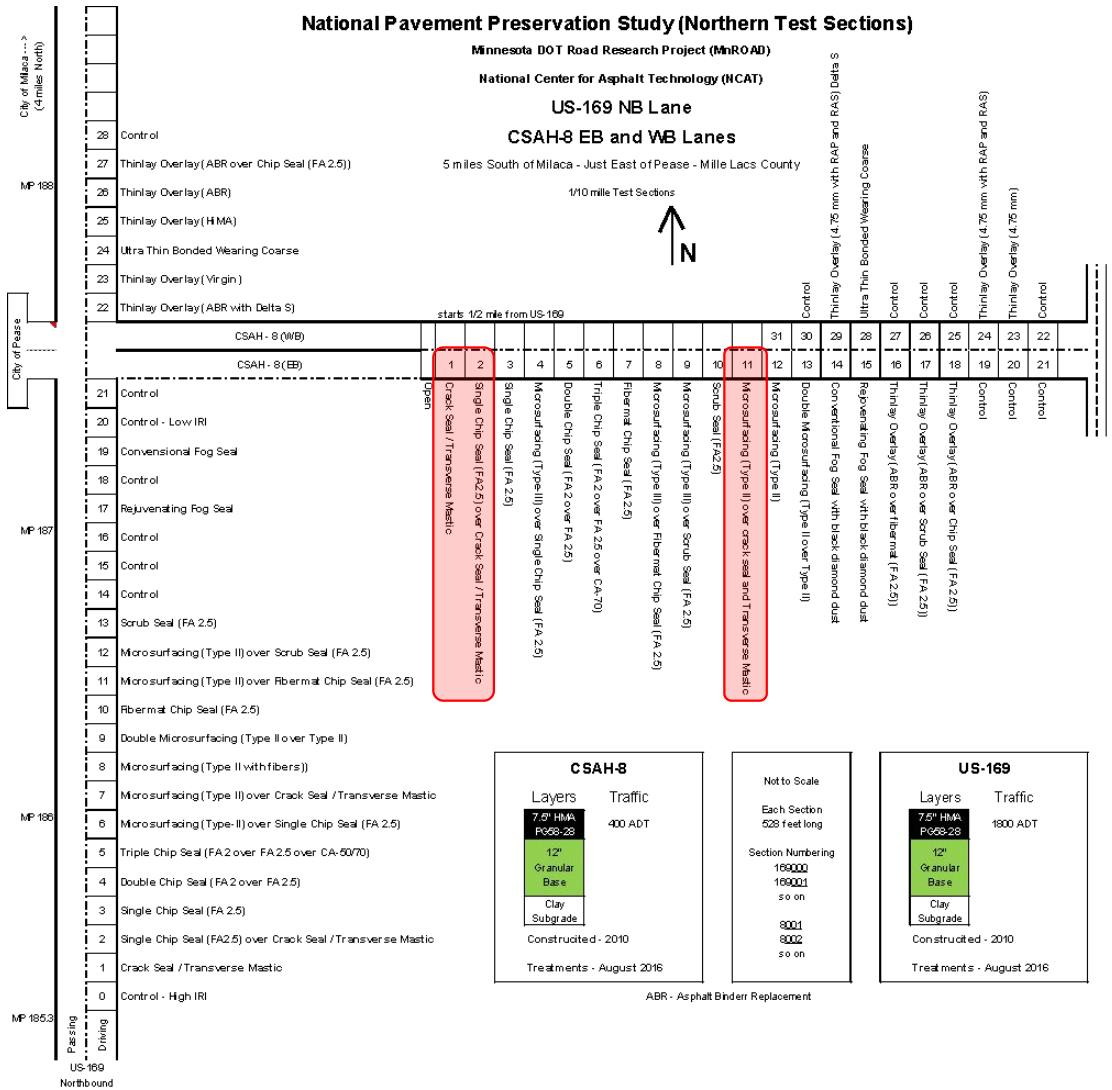
U.S. Department of Transportation
Federal Highway Administration

LRRB
LOCAL ROAD RESEARCH BOARD

Wide Crack Maintenance Practices

Pavement Preservation Test Sections Built in 2016.

Northern
High Traffic
Preservation
on US-169



Northern
Low Traffic
Preservation
Mille Lacs County
CSAH-8

Wide Crack Maintenance Practices

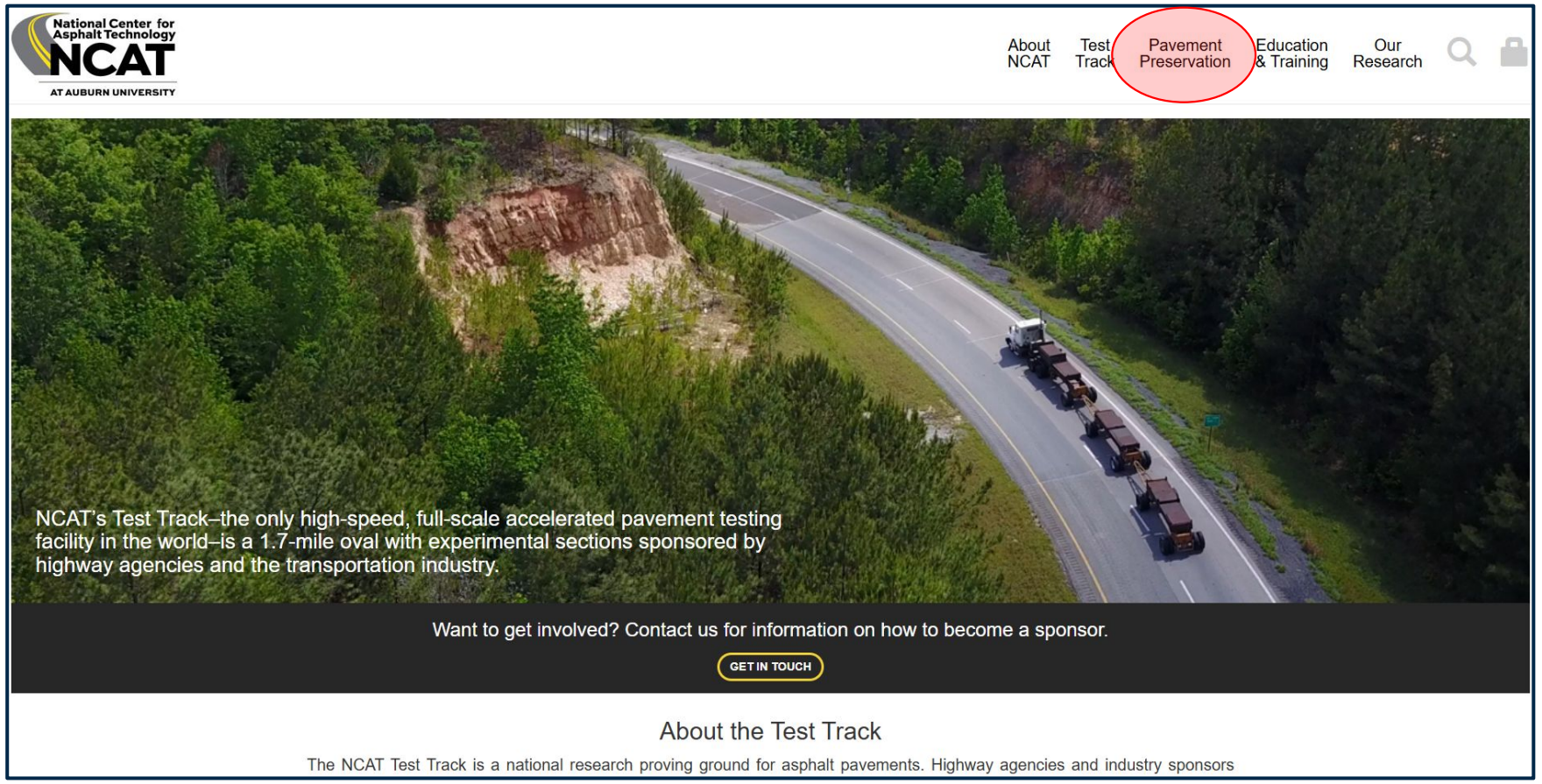
MnDOT studied wide crack treatments

Northern
Low Traffic
Preservation
CSAH-8

1 **Crack Seal / Transverse Mastic**
2 **Single Chip Seal (FA2.5) over Crack Seal / Transverse Mastic**
3 Single Chip Seal (FA 2.5)
4 Micro-surfacing (Type-III) over Single Chip Seal (FA 2.5)
5 Double Chip Seal (FA 2 over FA 2.5)
6 Triple Chip Seal (FA 2 over FA 2.5 over CA-70)
7 Fibermat Chip Seal (FA 2.5)
8 Micro-surfacing (Type III) over Fibermat Chip Seal (FA 2.5)
9 Micro-surfacing (Type III) over Scrub Seal (FA 2.5)
10 Scrub Seal (FA2.5)
11 **Microsurfacing (Type II) over crack seal and Transverse Mastic**
12 Microsurfacing (Type II)
13 Double Microsurfacing (Type II over Type II)
14 Conventional Fog Seal with black diamond dust
15 Rejuvenating Fog Seal with black diamond dust
16 Thinlay Overlay (ABR over fibermat (FA 2.5))
17 Thinlay Overlay (ABR over Scrub Seal (FA 2.5))
18 Thinlay Overlay (ABR over Chip Seal (FA 2.5))
19 Control
20 Control
21 Control
22 Control
23 Thinlay Overlay (4.75 mm)
24 Thinlay Overlay (4.75 mm with RAP and RAS)
25 Control
26 Control
27 Control
28 Ultra Thin Bonded Wearing Coarse
29 Thinlay Overlay (4.75 mm with RAP and RAS) Delta S
30 Control

Wide Crack Maintenance Practices

Long-term performance for these preservation treatment test cells is located on NCAT Test Track Website:



Thank you!
Questions?

DEPARTMENT OF TRANSPORTATION

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MAINTENANCE PRACTICES FOR WIDE CRACKS IN ASPHALT-SURFACED PAVEMENTS

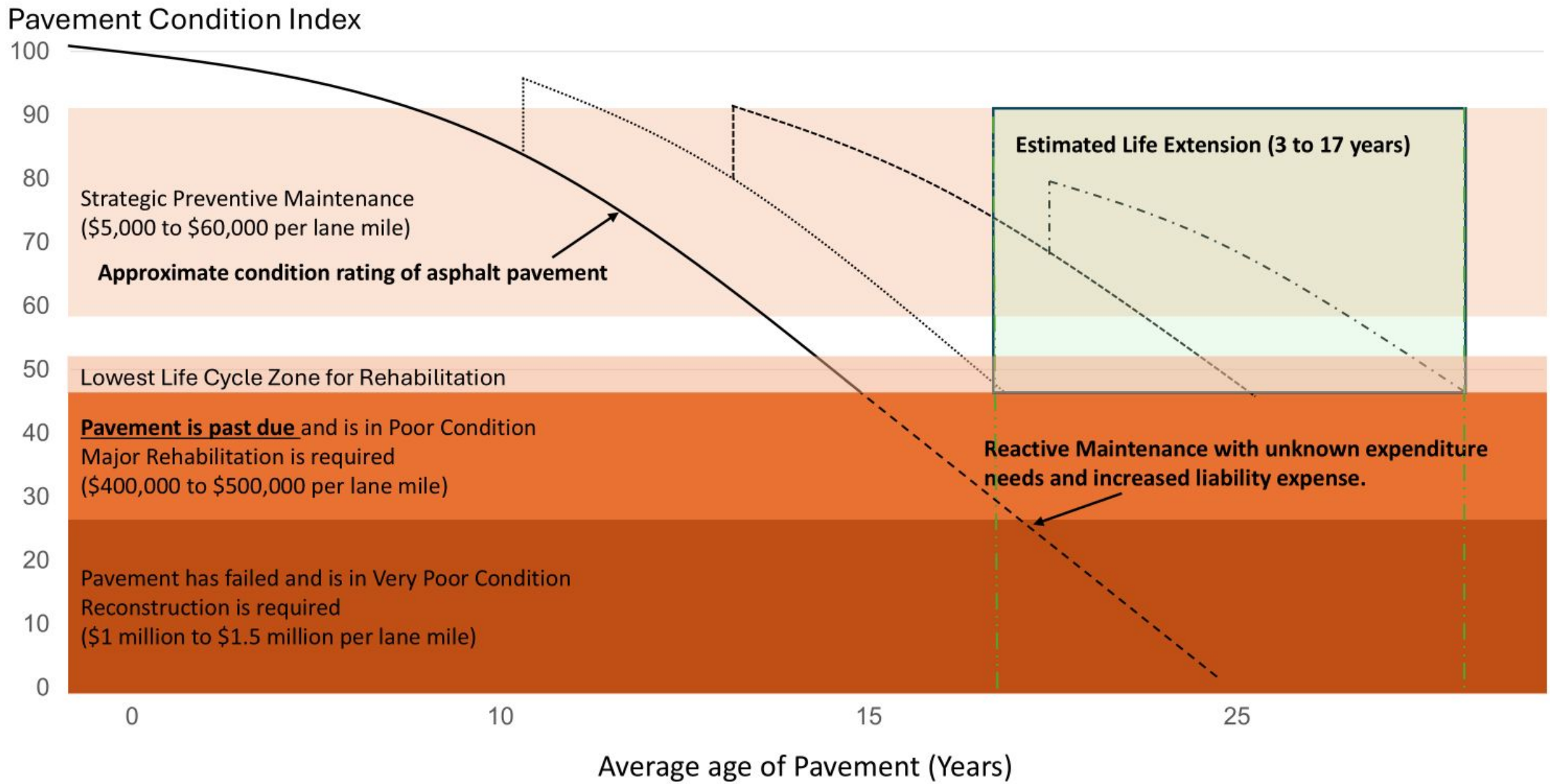
NCHRP SYNTHESIS REPORT 640: Wide Cracks and Joints in Flexible and Composite Pavements: State DOT Maintenance Practices

JIM WESTON, ROADWAY OPERATION MANAGER, WSDOT
December 8, 2025

Outline

- Pavement Service Life
- Monitoring Performance
- Current Practice
- WSDOT Guidelines
- Application Examples
- Training
- Future Research

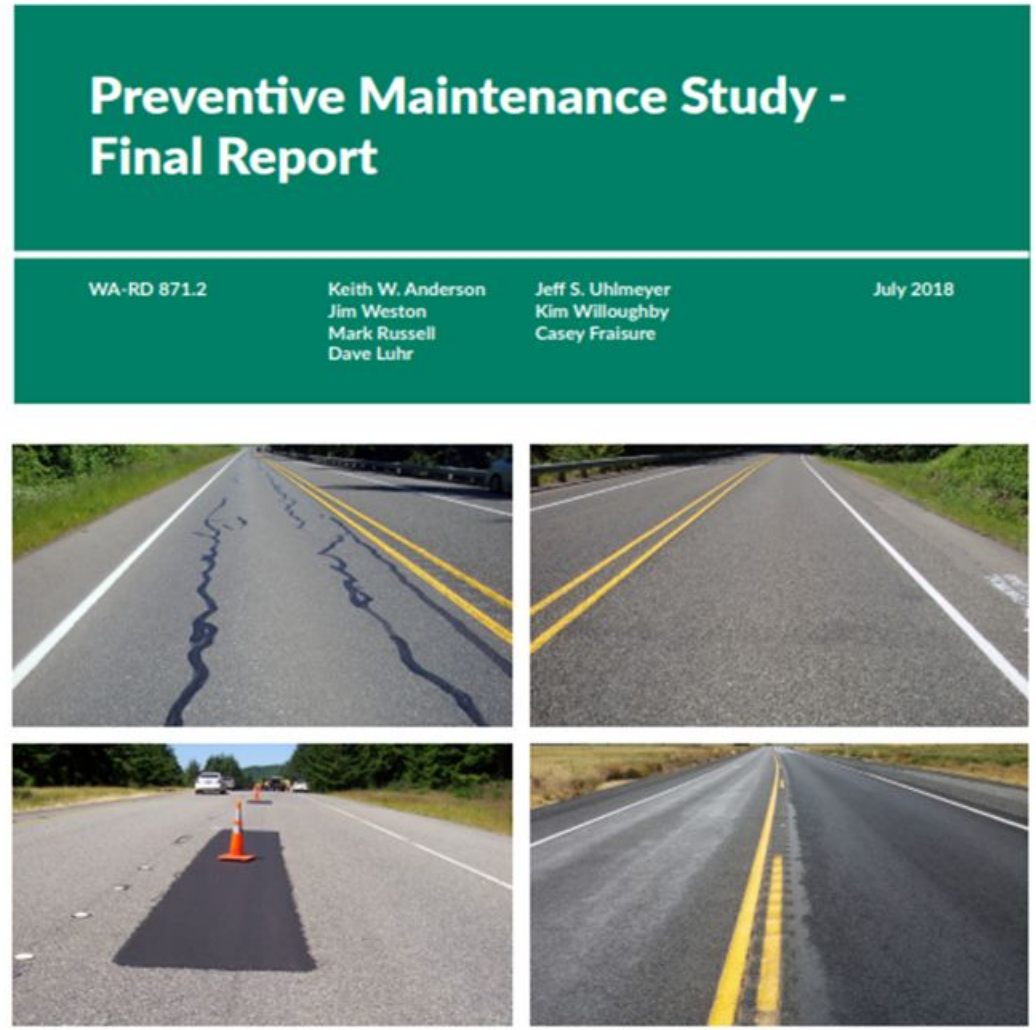
Pavement Condition and Strategic Maintenance Life Extension



Monitoring & Performance Tracking

- 2012-2017
  - Integrated with WSPMS
- Crack Seal
- Chip Seal (Full lane, WP-rut fill, WP-patch)
- Blade Patch
- Patching (grind/inlay, digout)

- First Mastic Project
  - SR 155, 2014
  - BST, 2015



Preventive Treatment Costs

Treatment	Cost (1' length of pavement – 12' wide lane)	Expected Service Life Extension in years (max study)
Crack Seal	$1.14 ($1.43*)	3-4+ (5)
Chip Seal (WP-rut fill)	$2.76 ($3.47)	2-5+ (4)
Chip Seal (WP-patch)	$4.44 ($5.58)	4-6+ (4)
Chip Seal (full lane)	$7.08 ($8.89)	4-6+ (5)
Blade Patch	$10.00 ($12.56)	2-3+ (3)
Patching (digout)	$12.49 ($15.69)	4-6+ (5)

(*2025 Dollars)

2018 Report https://www.wsdot.wa.gov/research/reports/fullreports/871-2.pdf

Current WSDOT Practice

- Annual pavement inspections
- Hot-pour sealant with and without routing
  - Rubberized 1/4” to 1” width (Strategic)
  - Mastic 1” and greater width (Emerging)
- Guidance from Maintenance Manual (M 51-01) and within our MMS File Library

Strategic Preservation

Distress Types

- Low to medium severity longitudinal cracking (<1/4”)
- Low severity alligator cracking
  - Wheel path or full pavement surface (no depressed pavement)

Emergent Preservation

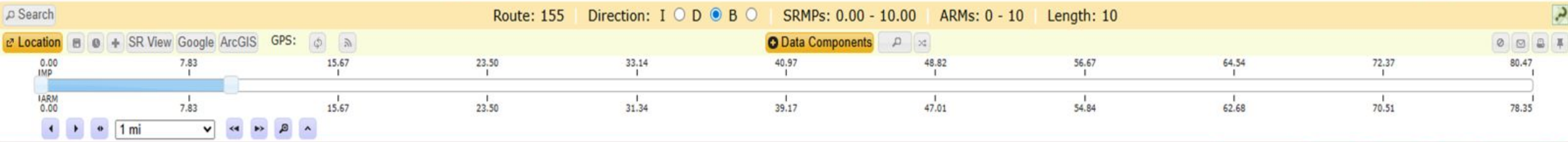
Distress Types

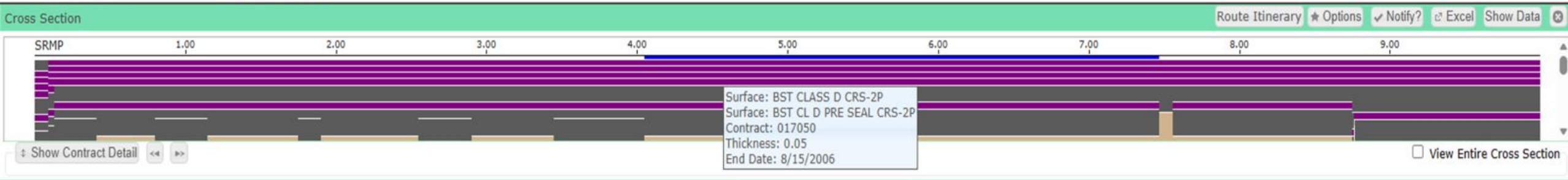
- Medium to high severity longitudinal cracking (<1”).
- Low to medium severity alligator cracking.
  - Wheel path or full pavement surface (no depressed pavement).

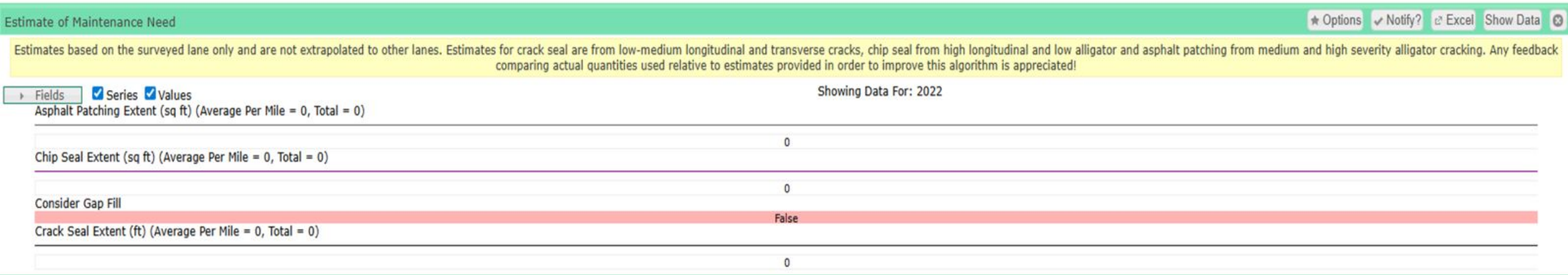
Treatment Selection

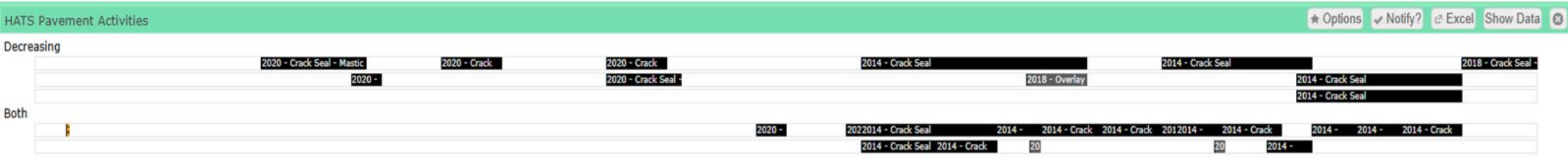
- Working transverse: mastic or patch.
- Longitudinal: routed + sealant.

Monitoring & Performance Tracking









WSDOT Maintenance Guidelines

Description of Defect	Severity		Crack Seal[1]			Chip Seal		Mill and Fill Patch	Grader Patch	Thin Overlay	Hand Patch	DuraPatch	Fog Seal
			Rubberized	Mastic[2]	Sand Slurry Seal[3]	Full-Width	Wheelpath						
Alligator Cracking	Low	<1/4"	•	X	•	✓	✓	X	X	•	X	•	✓
	Moderate	1/4"-1/2"	✓	X	•	✓	✓	✓	X	✓	X	•	•
	High	>1/2"	X	X	X	X	X	✓	•	•	X	X	X
Transverse Cracking	Low	<1/4"	✓	X	•	•	X	X	X	•	X	X	•
	Moderate	1/4"-1"	✓	X	•	•	X	•	X	X	X	X	X
	High	>1"	•	✓	•	X	X	•	X	X	X	X	X
Longitudinal Cracking	Low	<1/4"	✓	X	•	✓	✓	X	X	•	X	X	✓
	Moderate	1/4"-1"	✓	X	•	✓	✓	✓	X	•	X	X	•
	High	>1"	•	✓	•	•	•	✓	•	X	X	X	X
Potholes			X	X	X	X	X	✓	X	X	✓	•	X
Raveling			X	X	X	✓	✓	X	X	•	X	X	✓[4]
Rutting[5]			X	X	X	X	•	✓	•[7]	•[7]	X	X	X
Studded Tire Wear[6]			X	X	X	X	✓	✓	•[7]	•[7]	X	X	X
Settlement			X	X	X	X	X	✓	✓	✓	•	X	X
Life Extension, range			3-6 years			2-6 years		4+ years	<3 years	4+ years	<1 year	1 year	1-2 years
General Cost			Low			Medium		Medium	High	High	Low	Low	Low

	✓		Best Choice(s) for defect			•	Possible Choice(s) for defect			X	Not a Good Choice for defect		

WSDOT Maintenance Guidelines

Description of Defect	Severity		Crack Seal[1]		Sand Slurry Seal[3]	Chip Seal		Mill and Fill Patch	Grader Patch	Thin Overlay	Hand Patch	DuraPatch	Fog Seal
			Rubberized	Mastic[2]		Full-Width	Wheelpath						
Alligator Cracking	Low	<1/4"	•	X	•	✓	✓	X	X	•	X	•	✓
	Moderate	1/4"-1/2"	✓	X	•	✓	✓	✓	X	✓	X	•	•
	High	>1/2"	X	X	X	X	X	✓	•	•	X	X	X
Transverse Cracking	Low	<1/4"	✓	X	•	•	X	X	X	•	X	X	•
	Moderate	1/4"-1"	✓	X	•	•	X	•	X	X	X	X	X
	High	>1"	•	✓	•	X	X	•	X	X	X	X	X
Longitudinal Cracking	Low	<1/4"	✓	X	•	✓	✓	X	X	•	X	X	✓
	Moderate	1/4"-1"	✓	X	•	✓	✓	✓	X	•	X	X	•
	High	>1"	•	✓	•	•	•	✓	•	X	X	X	X
Potholes			X	X	X	X	X	✓	X	X	✓	•	X
Raveling			X	X	X	✓	✓	X	X	•	X	X	✓[4]
Rutting[5]			X	X	X	X	•	✓	•[7]	•[7]	X	X	X
Studded Tire Wear[6]			X	X	X	X	✓	✓	•[7]	•[7]	X	X	X
Settlement			X	X	X	X	X	✓	✓	✓	•	X	X
Life Extension, range			3-6 years			2-6 years		4+ years	<3 years	4+ years	<1 year	1 year	1-2 years
General Cost			Low			Medium		Medium	High	High	Low	Low	Low

	✓		Best Choice(s) for defect			•	Possible Choice(s) for defect			X	Not a Good Choice for defect		

WSDOT Maintenance Guidelines

- Life extension
  - 3-6 years
- Low general cost
  - ~$2.0 - $4.0 lb.
- Maintenance Manual need
  - Add Mastic

Description of Defect	Severity		Crack Seal[1]	
			Rubberized	Mastic[2]
Alligator Cracking	Low	<1/4"	•	X
	Moderate	1/4"-1/2"	✓	X
	High	>1/2"	X	X
Transverse Cracking	Low	<1/4"	✓	X
	Moderate	1/4"-1"	✓	X
	High	>1"	•	✓
Longitudinal Cracking	Low	<1/4"	✓	X
	Moderate	1/4"-1"	✓	X
	High	>1"	•	✓

Mastic Asphalt

“hot-applied asphalt-based product combined with aggregates, polymers, and other modifiers to produce a flowable, load-bearing material that can be used to fill voids in the road surface.” (MnDOT 2020)

Standard Specification for Hot-Applied Asphalt Aggregate-Filled Mastic D8260 (ASTM 2020)

- Type 1, Type 2 and Type 3
  - Type 1 materials more suitable for warm climates while Type 3 materials are more suitable for colder climates.

Mastic Crack Sealing Projects

Year	Number of Projects
2020	26
2021	15
2022	25
2023	66
2024	48
2025	43
Grand Total	**223**

Equipment & Field Operations

- Use routers, melters, saws, applicators.
- Ensure proper temperature and safety controls.

Mastic Applications - 2014

Mastic Applications - 2014

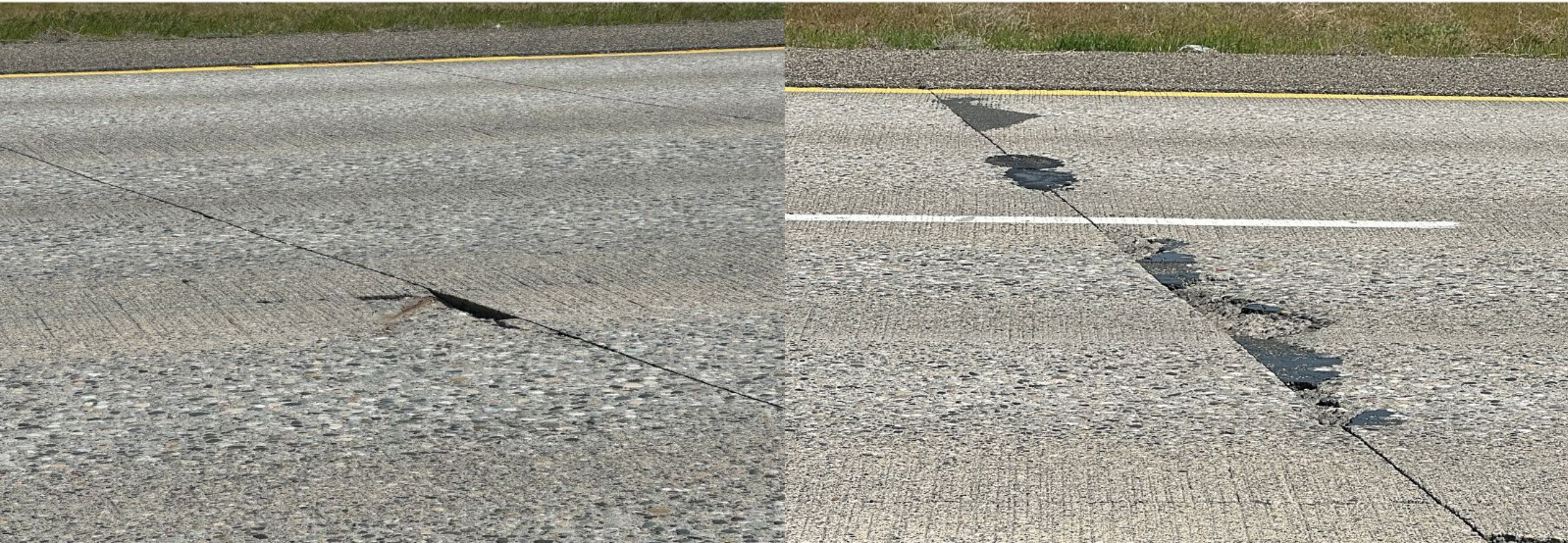
Mastic Applications - 2022

Mastic Applications - 2023

Mastic Applications - 2023

PCCP Applications

- Only apply mastic to any cracks that are 1-inch or greater.
- Have applied to spalls, or corner breaks, or DBR pop outs.
- Avoid mastic use for cracks less than 1-inch in width.



Mastic Applications - 2020

Mastic Applications - 2024

What to avoid

Long-Term Strategy - Training

- Better integrate pavement management into treatment selection.
- Differentiate the importance of strategic and emergent vs. reactive treatments.
- Increase communications at the area level.
  - Pre-season roadway reviews.
- Technical Checklists.
  - Material type and temperature information.
- Track QA and performance.

Future Research - Performance

- How is pavement management being integrated?
- Monitoring performance criteria.
- How does traffic and climate affect performance?
- Installation information.
- Integration with preservation lifecycle.
- How are mastic materials performing in PCCP applications?

Thank you!

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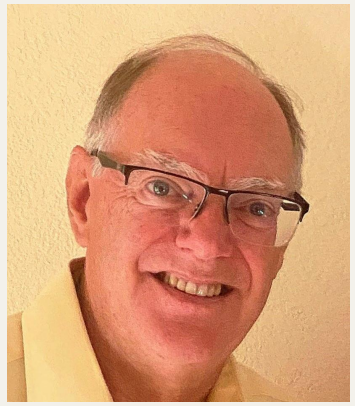

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June 23-26, 2025

2nd International Roadside Safety Conference

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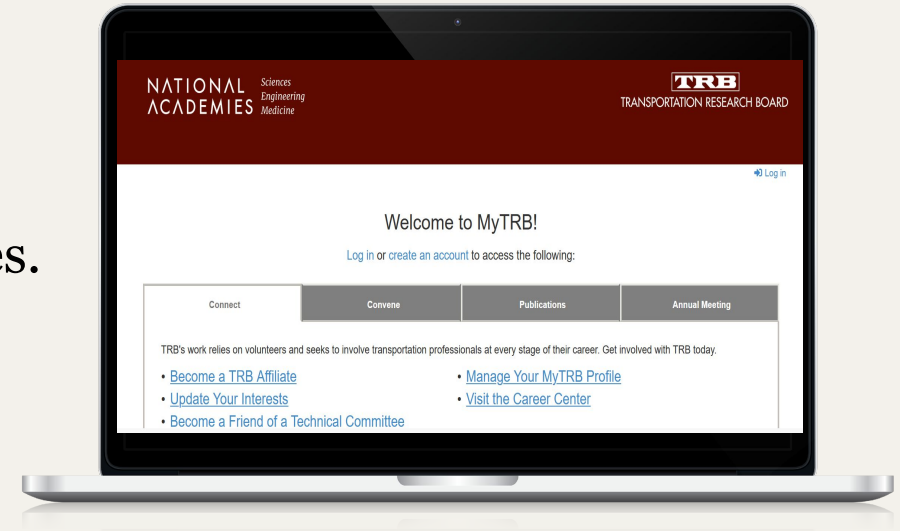

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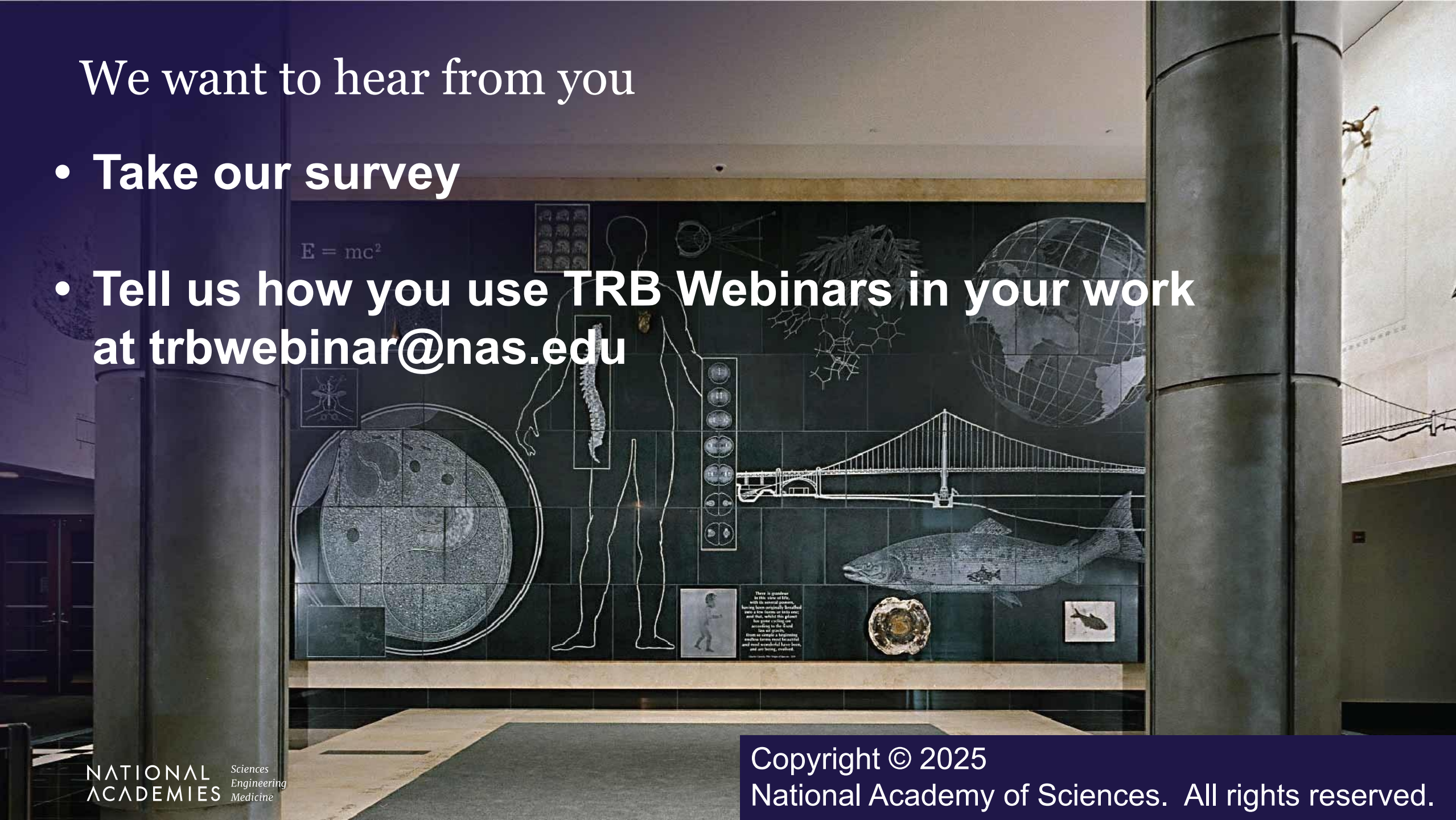

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