



Responsible Renewal. Reliable Results.

Pavement Preservation: Make the Most of Your New Road

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In-Place Recycling & Reclaiming Seminar | Fargo, ND | June 27-28, 2017



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Topics

- Crack Sealing
- Chip Sealing
- Fog Sealing
- Micro Surfacing
- Other stuff

Why you need to crack seal!





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Why Crack Treatment?

- Prevents water intrusion into subbase
- Prevents incompressible intrusion
- Improves ride quality smoothness
- Slows down pavement deterioration
- **COST-EFFECTIVE**



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Why You Should Treat Cracks

- Protect your largest investment
- Pavement failure imminent
- Crack treatments are cost-effective, up to 9 years of (75% effectiveness) performance
- Extends pavement life



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What cracks to treat?

- All cracks soon after they appear... any crack opening will allow moisture penetration into pavement foundation (subbase)
 - At minimum all cracks $\geq 1/8$ "
- Rout and Seal
- Clean and Fill



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How to Seal Cracks

- Rout & Seal use on newer pavements with transverse crack spacing greater than 20'
- Clean & Seal older pavements and longitudinal cracks



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Don't forget edge joints





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Use the Proper PG Binder



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Chip Sealing





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Chip Sealing

- It is a heavy asphalt membrane followed with layer of aggregate chips
- Strengths
 - Very tough
 - Fast
 - Improves friction characteristics
 - Long lasting



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Chip Sealing

- Weakness
 - Vehicle damage
 - Damage from turning traffic
 - Too rough
 - Does not fix structural issues
 - Does not improve ride



Chip Sealing

- How to do it right
 - Design it
 - Use quality Materials
 - Clean Aggregate
 - No extra Aggregate
 - Polymer modified emulsion

Chip Sealing

- Construction Practices
 - Place Aggregate immediately
 - Rolling
 - < 2 minutes
 - Minimum 3 passes
 - Minimum 3 rollers
 - Sweep ASAP

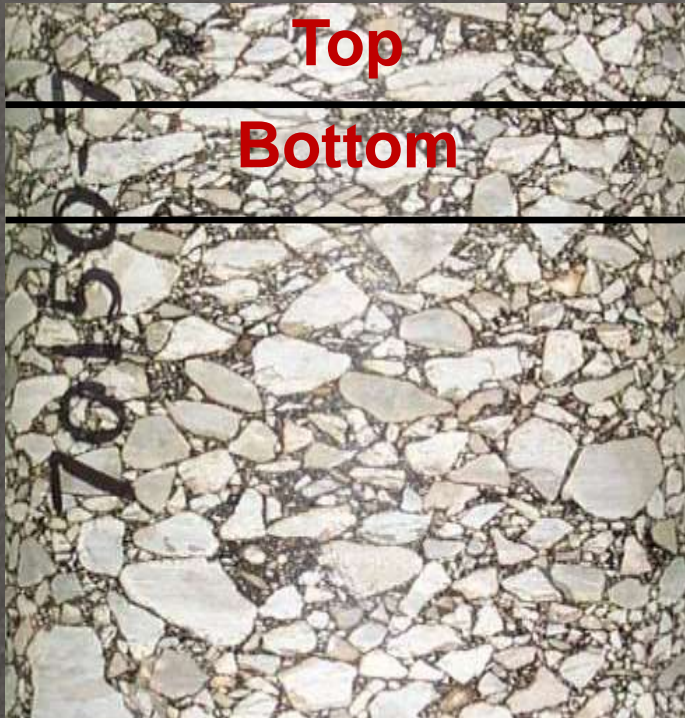


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When to Apply Chip Seal

- Built aging study
 - Because 15 years take 15 years
- 3 inch Mill & Fill 1999
 - PG 58-28 binder
 - Chip seal 1 mile section each year starting in 2000
 - Last sections was chip seal 2004

TH56 Cores



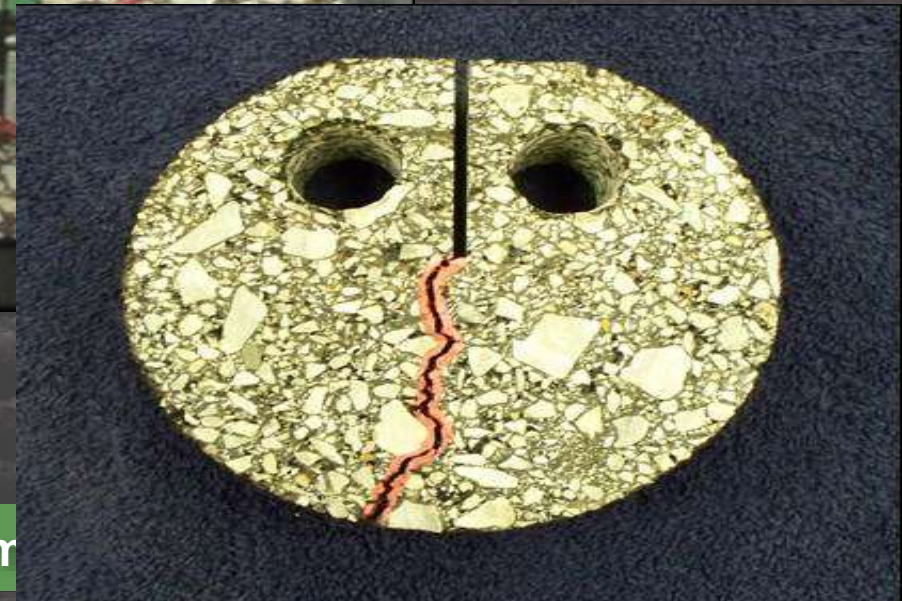
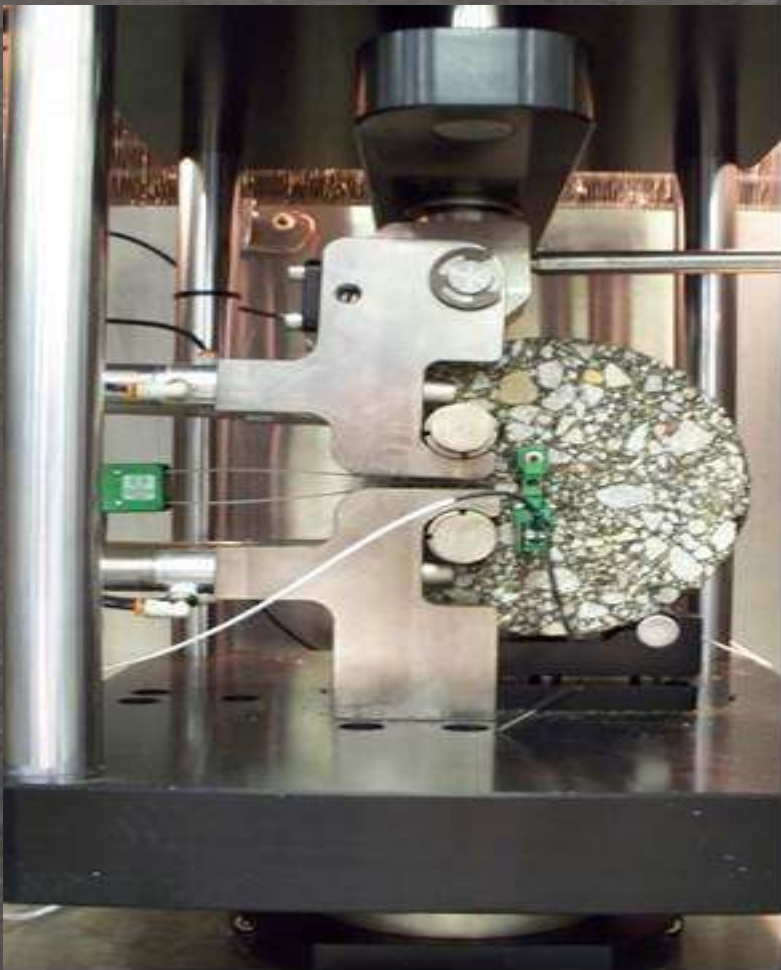
- Cores

- Remove chip seal (if any)
- Cut into two 25-mm layers
- Test for fracture energy (cracking potential)
- Recover component asphalt to check aging



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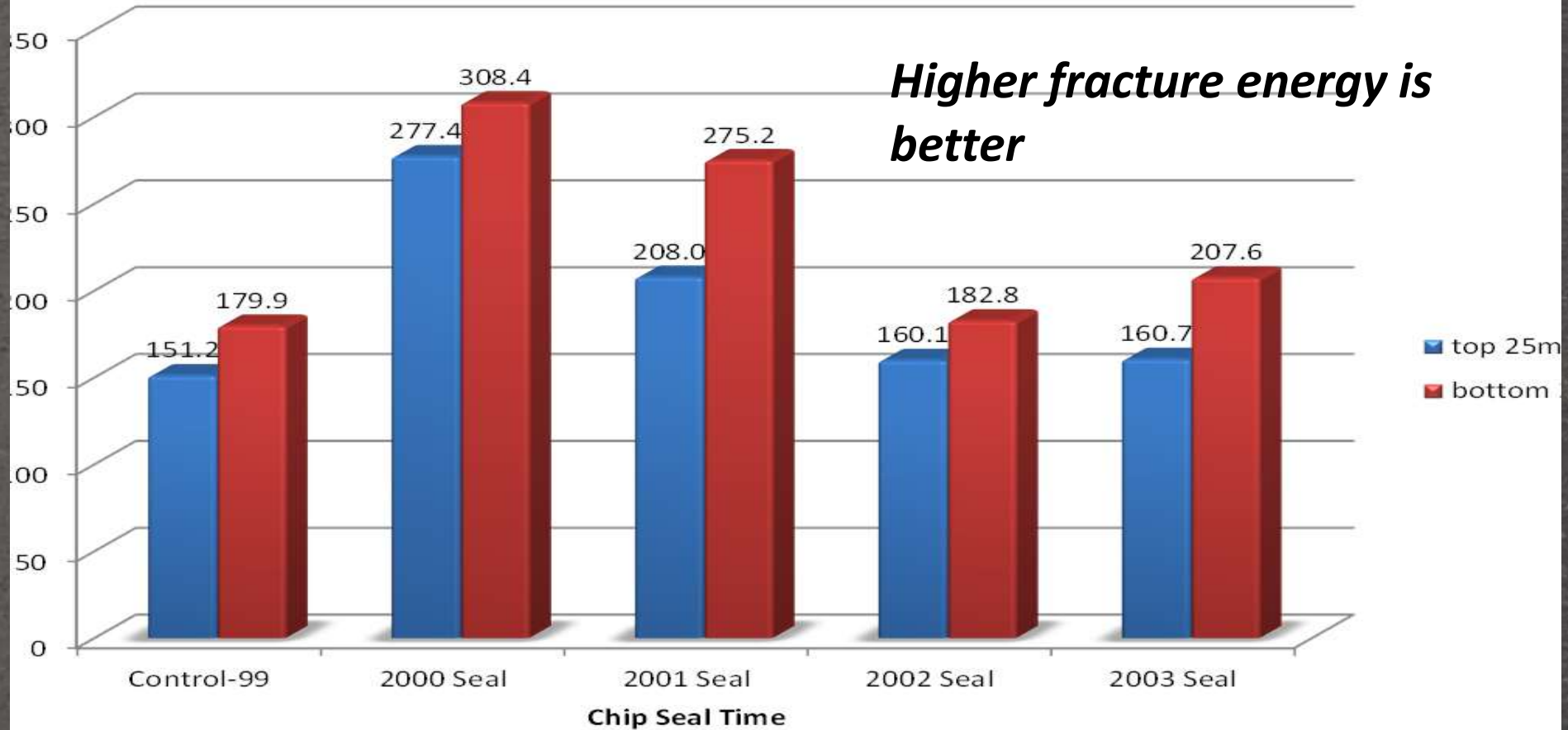
Disk-Shaped Compact Tension Test: DC(T)



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DC(T) Results: TH-56

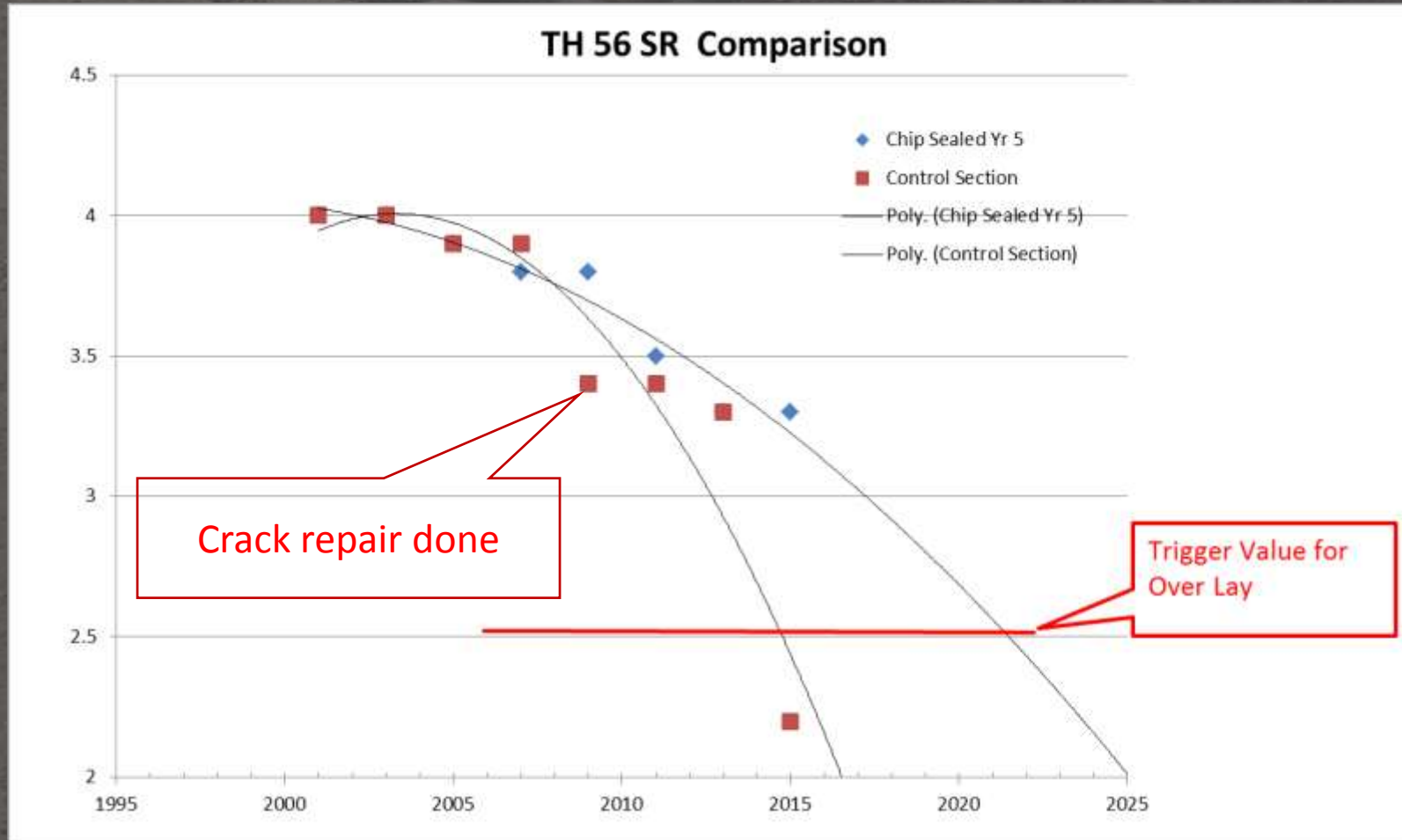
TH56: DC(t) Data @ -24°C



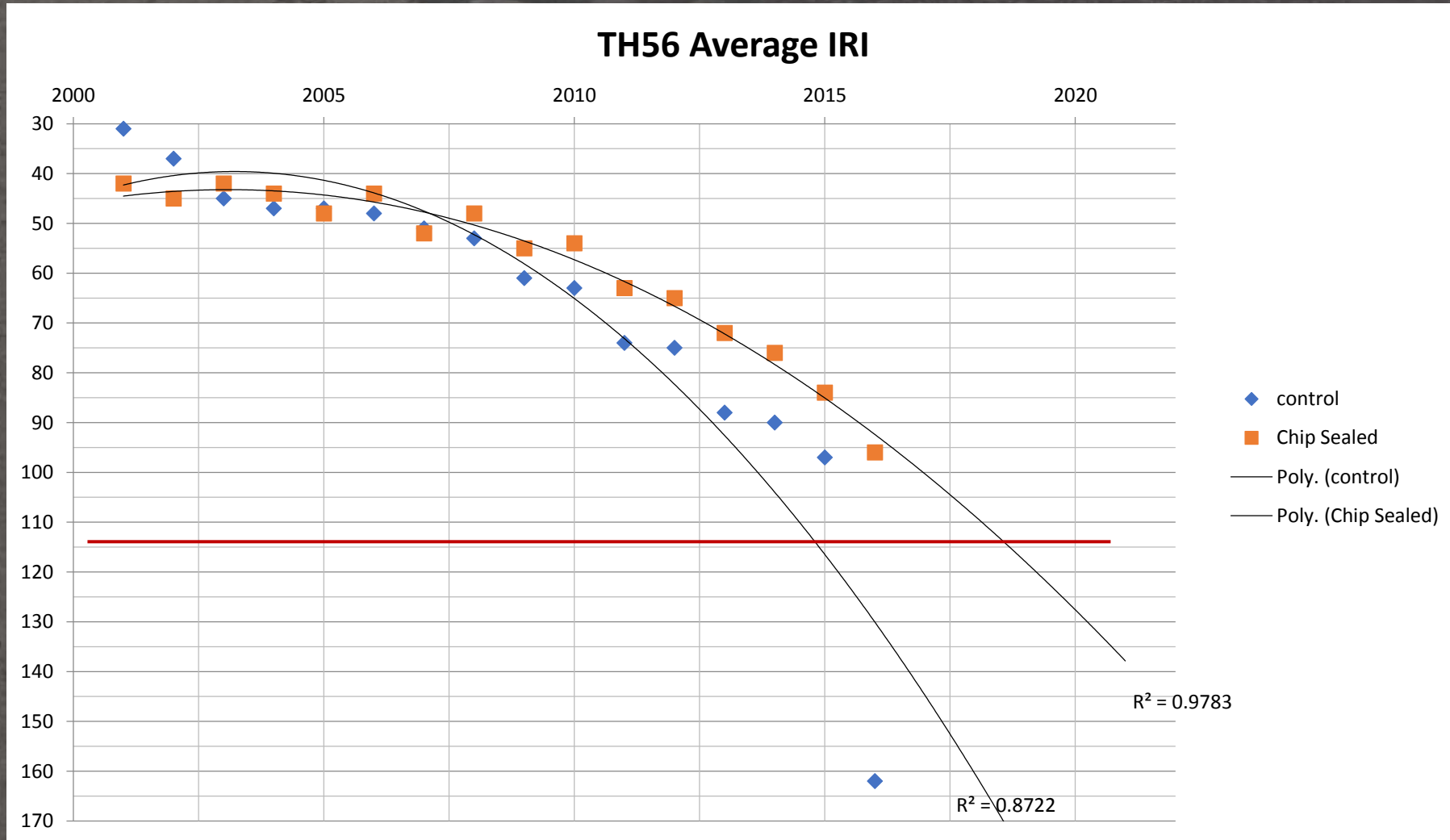
Asphalt Institute's Findings

- Sealing improves resistance to aging (cracking)
- Sooner is better when sealing
 - Waiting for 3 or more years to seal after construction produced similar results as unsealed pavement related to DCT
 - Sealing after 1 or 2 years showed improvement in resistance to aging (cracking)

Surface Rating



International Roughness Index Ride





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Control Section Never Chip Sealed



Last Section Chip Sealed 2004



Fog Sealing





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Fog Sealing

- Light uniform application asphalt emulsion
- Materials
 - Cms-1h diluted
 - Diluted one part water to one part emulsion
 - 29% residual asphalt
 - Better penetration



Fog Sealing

- Strengths
 - Easy
 - Minimum equipment
 - Great job water proofing surface
 - Fill pop outs and micro cracks
 - Protects HMA from
 - UV, oxidation, & de-ice chemicals



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Value of Fog Sealing



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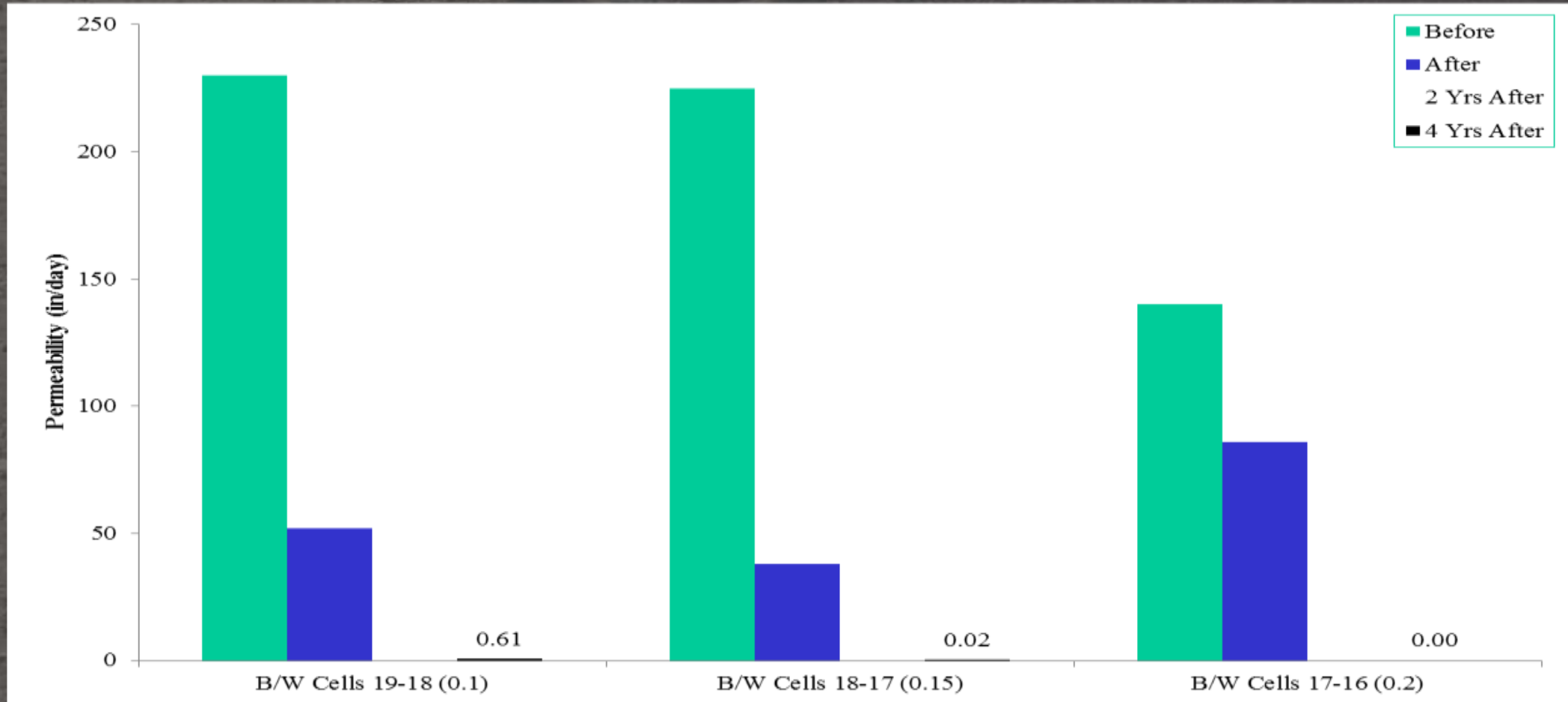
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Why Fog Sealing Shoulders



Fog Seal applied
2001

Fog Sealing still working after 4 years





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Micro Surfacing





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What is Micro/Slurry

- Homogenous mixture of aggregate and asphalt emulsion
 - Like a Dairy Queen Blizzard
- Slurry cure by air drying
 - Top down
- Micro Surfacing chemical cure
 - Will cure and set at night



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What is Micro/Slurry

- Used for Surface treatments
- Rut filling
- Ride improvement
- Improve Friction
- Used both on concrete and HMA



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Project Selection

- Structurally sound
- Small potholes ok
- Raveling ok
- Flushing ok
- Aged and oxidized ok
- Slurry should only be used for surface treatment
 - One layer thick



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Project Selection

- Micro
- Surface treatment
- Developed by Germans in the late 70'ies
- Rut filling
 - Up to 1 ½ inches in one pass
- Restore Cross Section
- More durable then slurry



Good Candidate





Rut Filling





Mobil

Mobil





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Possible Candidate for Micro



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NOT a Good Candidate for Micro





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Micro Milling with PM Treatments



Micro Milling with Chip Seal or Micro Surfacing

- Why?
 - Need lower cost alternative to 1 ½ inch over lay
 - To improve ride
- What are the performance targets
 - Equal to 1½ inch over lay



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Micro Milling with Chip Seal or Micro Surfacing

- Quicker than overlay
- Less costly overlay
 - Chip seal 40% of the cost of 1½ inch over lay
 - Micro Surfacing 60% cost of 1 ½ inch over lay



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Micro Milling

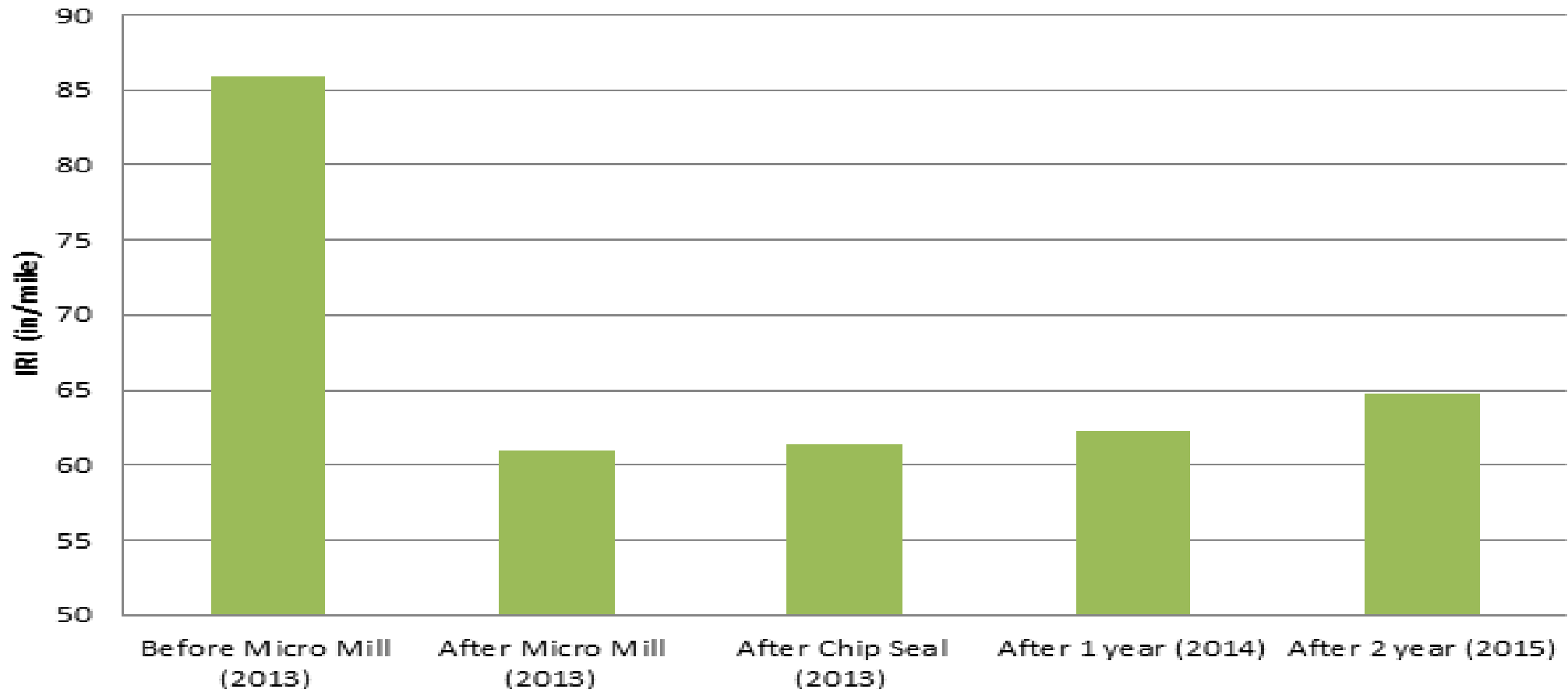


Micro Milling with Chip Seal



Results for Chip Seal

**Southbound RWP TH89 RP 60-74 Micro Mill /
Chipseal**





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Micro Milling with Micro Surfacing





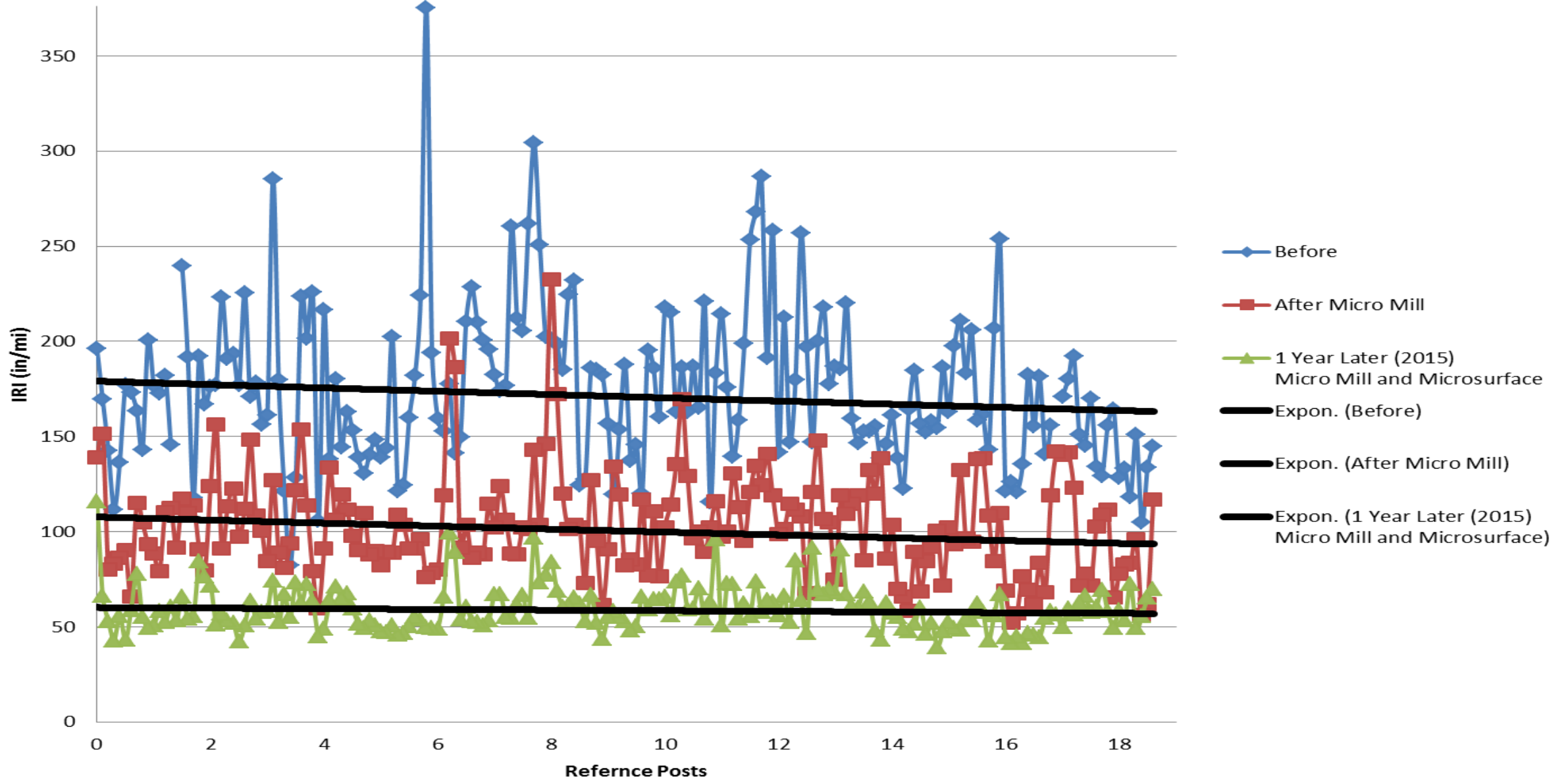
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TH 64 Pre Condition



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SB TH 64 Average of Both Wheel Paths





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Current Condition



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7-28, 2017



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Micro Surfacing Research



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Micro Surfacing Research

- Issues
 - Reflective cracking
 - Snow plow chatter
 - Wear off in 5 to 7 years on high ADT roadways

Micro Surfacing Research

Hypothesis

- Softer asphalt should reduce cracking
- CQS-1h 40 to 90 pen or PG 64-22 normally used
- Used softer base Asphalts
 - 90 to 200 pen (PG 58-28) CQS-1
 - 200 to 300 pen (PG 49-34) CQS-1S

Micro Surfacing Research

Hypothesis

- More asphalt = increased durability
- Increased emulsion from national ave. 12% to as high as 16%
- No bleeding or shoving



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Micro Surfacing Research

- Asphalt to Fines ratio
 - .74 A to 1.0 F Normal
 - .87 A to 1.0 F 14% emulsion
 - .99 A to 1.0 F 16% emulsion
- HMA normally has asphalt to fines ratio of 1 to 1
- Looks more like HMA than Micro



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SFDR



Stabilized Full Depth Reclamation		
2	3	4
1" TBWC	1" TBWC	1" 64-34
2" 64-34	2" 64-34	2" 64-34
6" FDR + EE	6" FDR + EE	8" FDR + EE
6" FDR	2" FDR	9" FDR + Fly Ash
	2" CI 5	
26" Class 4	33" Class 3	Clay
Clay		

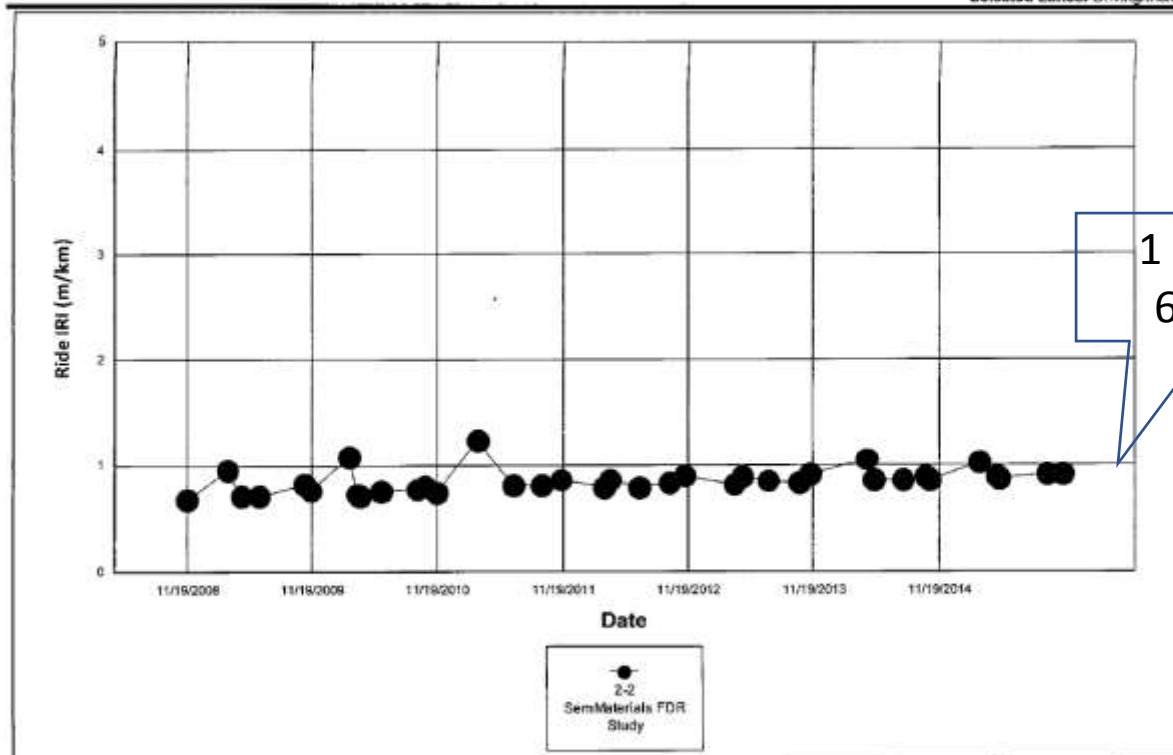


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IRI M/KM

MnROAD Pavement Performance (Ride-IRI) Report

Selected Lanes: Driving/Inside



NOTE: This is only a summary of the MnROAD data. Please contact Ben Word at ben.word@state.mn.us for a complete set of data for any analysis work.

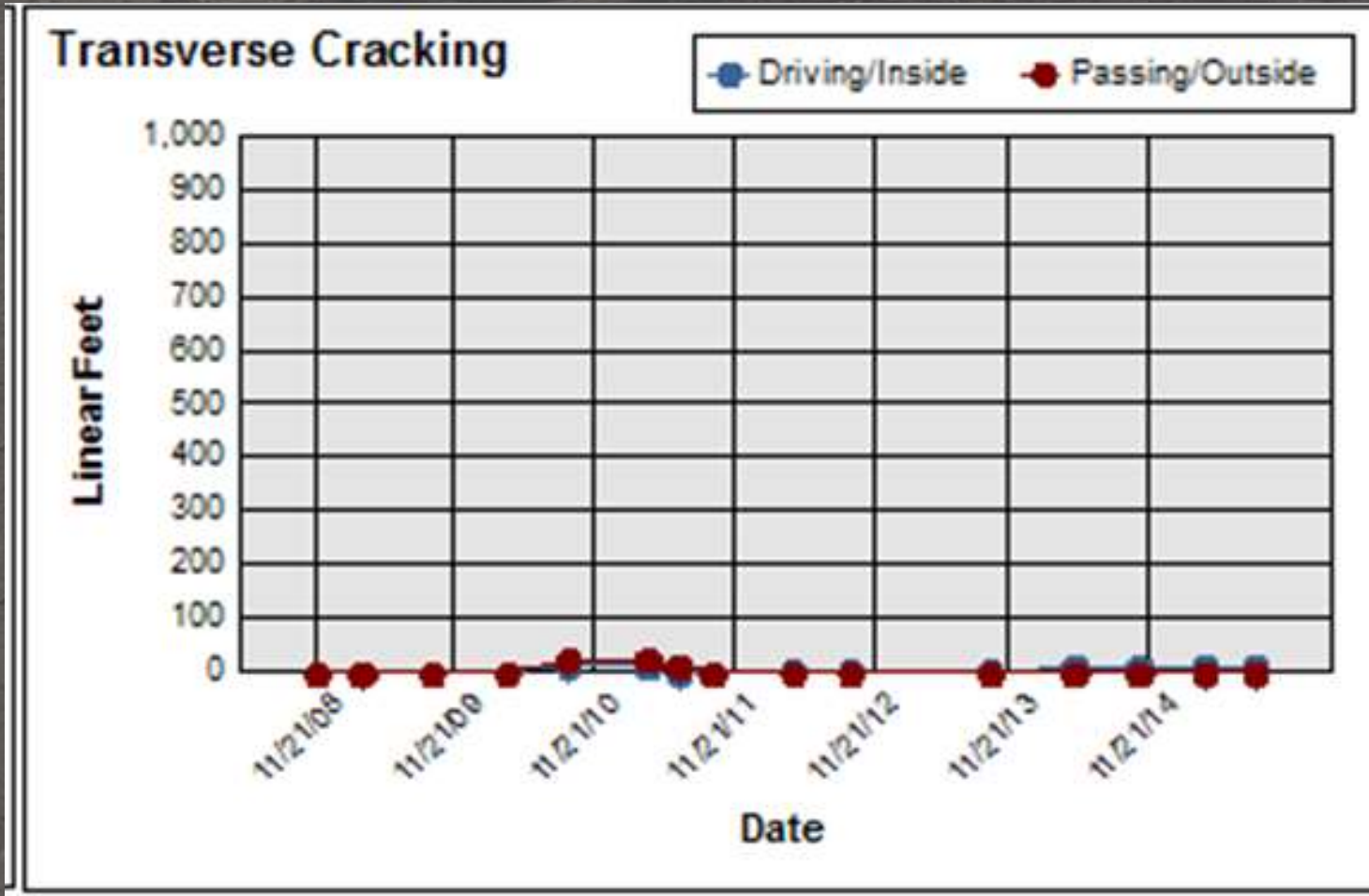
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Transverse Cracking





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Rutting





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3.5 million BESAL Design

MnROAD Mainline WB Lanes			
	Passing	Driving	Total
All Vehicles	29,479,935	28,966,801	58,446,736
Trucks	1,853,728	6,423,768	8,277,496
MnROAD AADT Adjusted (1-way)	9,983	9,809	19,792
HCADT	628	2,175	2,803
BESALs	1,499,926	5,896,628	7,396,554
CESALs	2,245,017	8,927,017	11,172,034
Percent of Total Westbound Traffic			72.2%

Emulsion Stabilized FDR



Modified Double Chip Surface





Responsible Re...

70 to 90 laps per day at 80K





- Two localized areas of failure easily patched
- 50,000+ ESAL
- Comment from Staff “seem to improve with time and traffic”

My New Role





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ISSA Executive Technical Director

- Out reach
- Update Technical Information
- Training
- Support
- Promote Preventive Maintenance



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Questions

Light Limited Super Stock





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Thank you

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