Pavement Preservation Why and How

THOMAS J. WOOD
TWOOD@WSBENG.COM
612/419/4013
WSB & ASSOCIATES INC.

Topics

- Crack Sealing
- Chip Sealing
- Fog Sealing
- Micro Surfacing

Why you need to crack seal!

Why Crack Treatment?

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

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

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 ≥1/8”
- Rout and Seal
- Clean and Fill

How to Seal Cracks

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

Don’t forget edge joints

Chip Sealing

Chip Sealing

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

Chip Sealing

- Weakness
  - Loose rock
  - Damage from turning traffic
  - Too rough
  - Too heavy equipment
  - 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

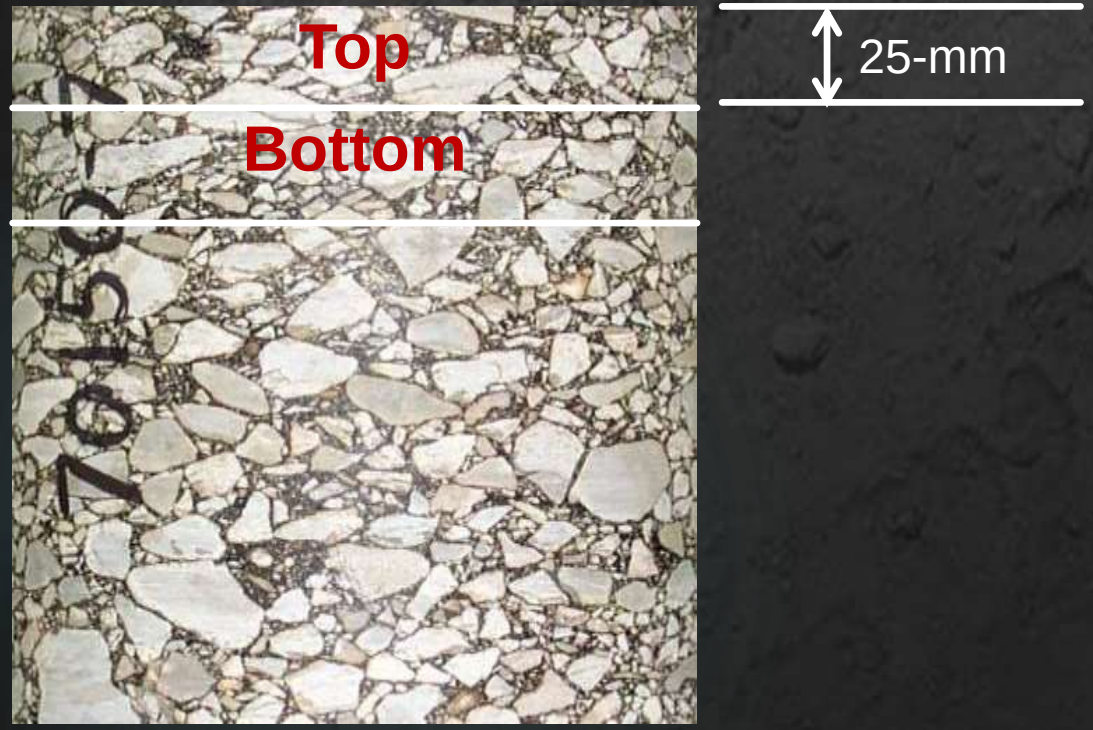
Chip Sealing

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

When to Apply Chip Seal

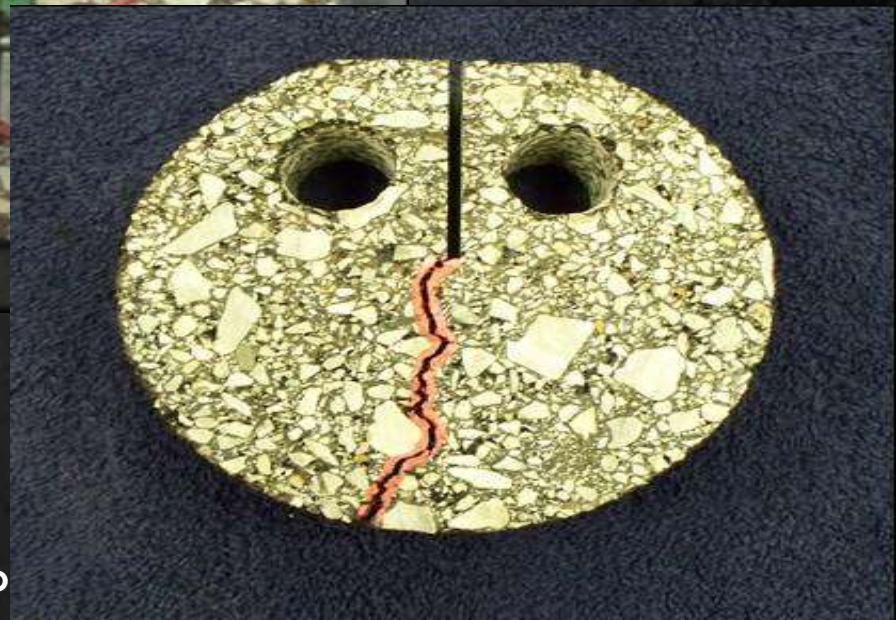
- Built aging study
  - Because 15 years take 15 years
- 3 inch Mill & Fill 1999
  - PG 58-28 binder
  - Chip seal 1 mile section each year starting in 2000
  - Last sections was chip seal 2004

TH56 Cores

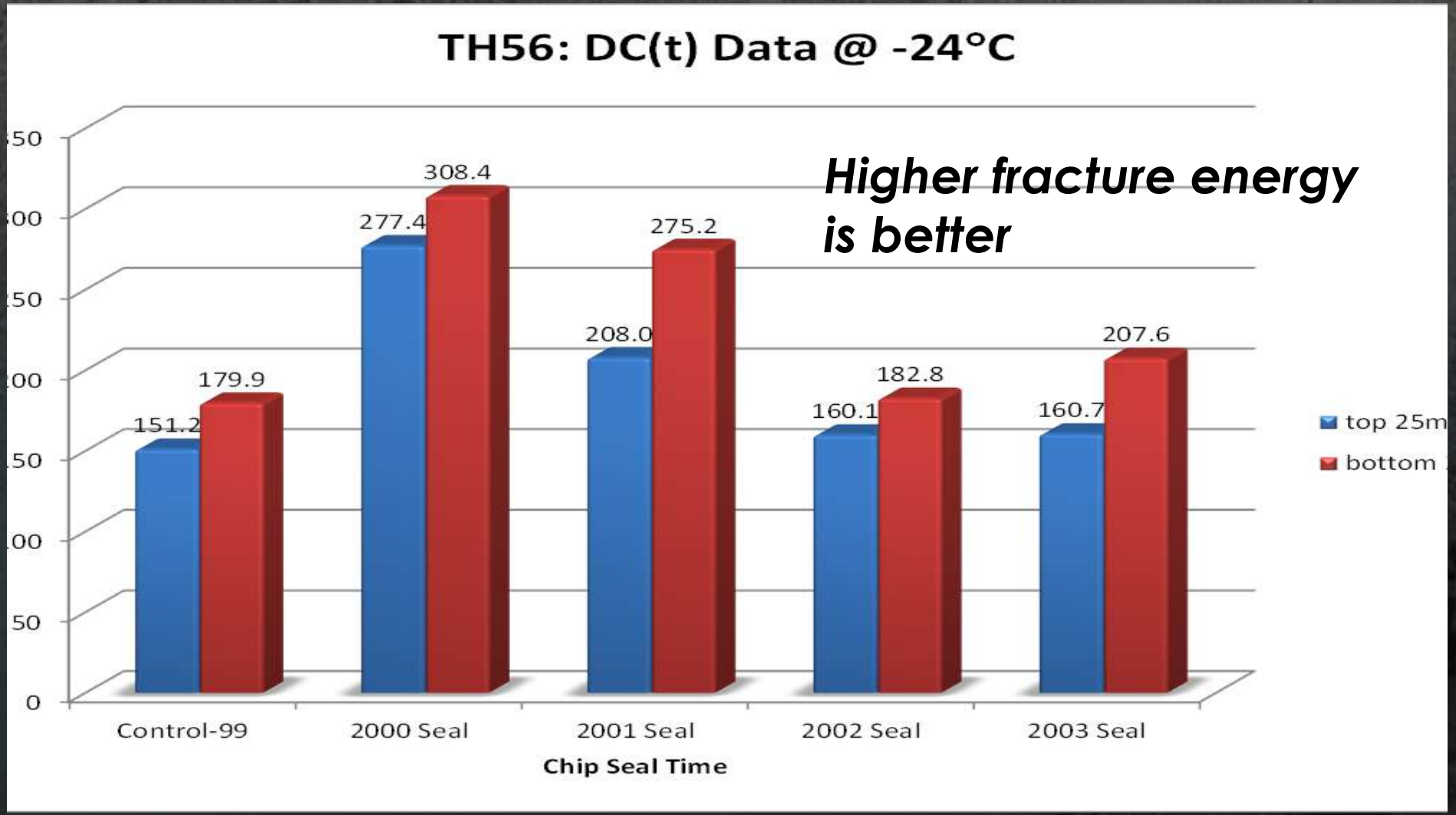


- Cores
  - Remove chip seal (if any)
  - Cut into two 25-mm layers
  - Test for fracture energy (cracking potential)
  - Recover component asphalt to check aging

Disk-Shaped Compact Tension Test: DC(T)



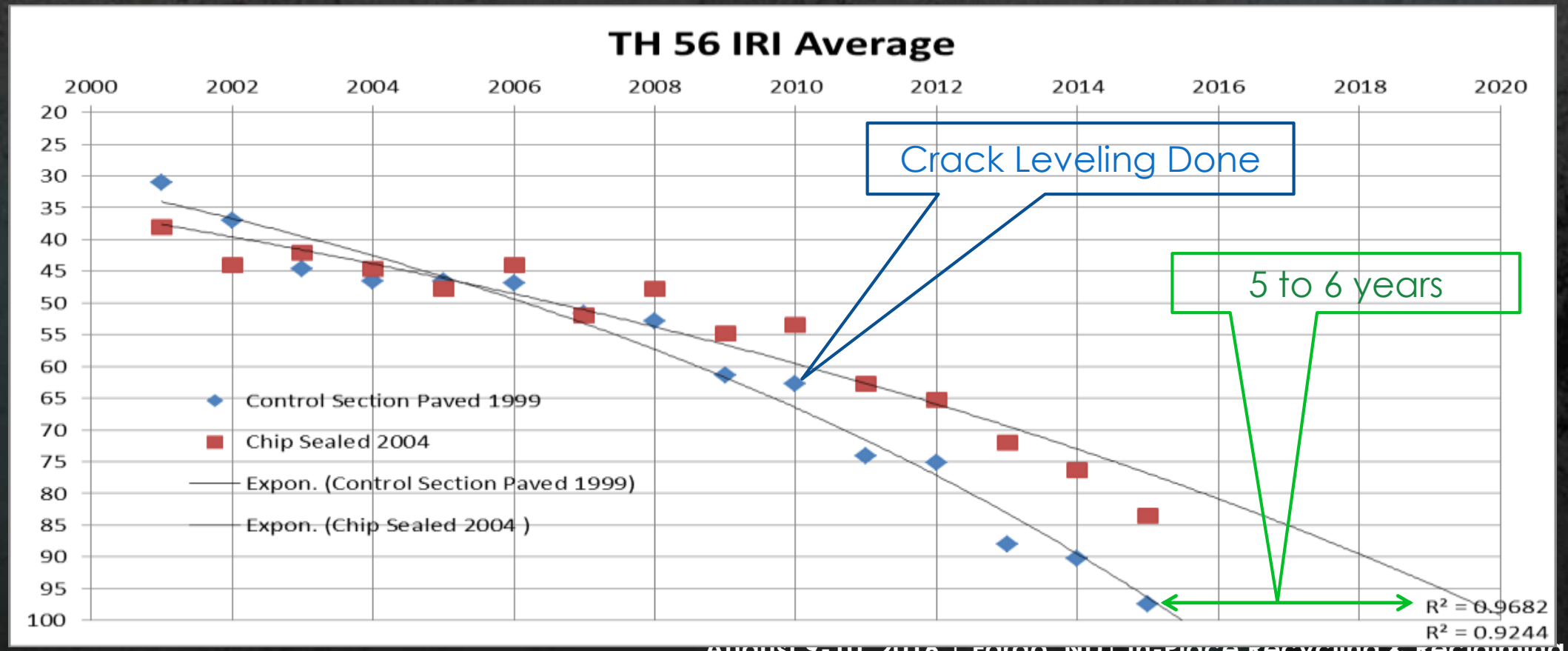
DC(T) Results: TH-56



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)

MnDOT's Pavement Management Ride Data



Control Section Never Chip Sealed

Last Section Chip Sealed 2004

Fog Sealing

Fog Sealing

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

Fog Sealing

- Crs-2p diluted
  - Diluted one part water to three parts emulsion
  - 50% residual asphalt
  - Does not penetrate as good
  - Stays black longer

Fog Sealing

- Application
  - Spray applied
  - Rate 0.07 to 0.12 gl./y²

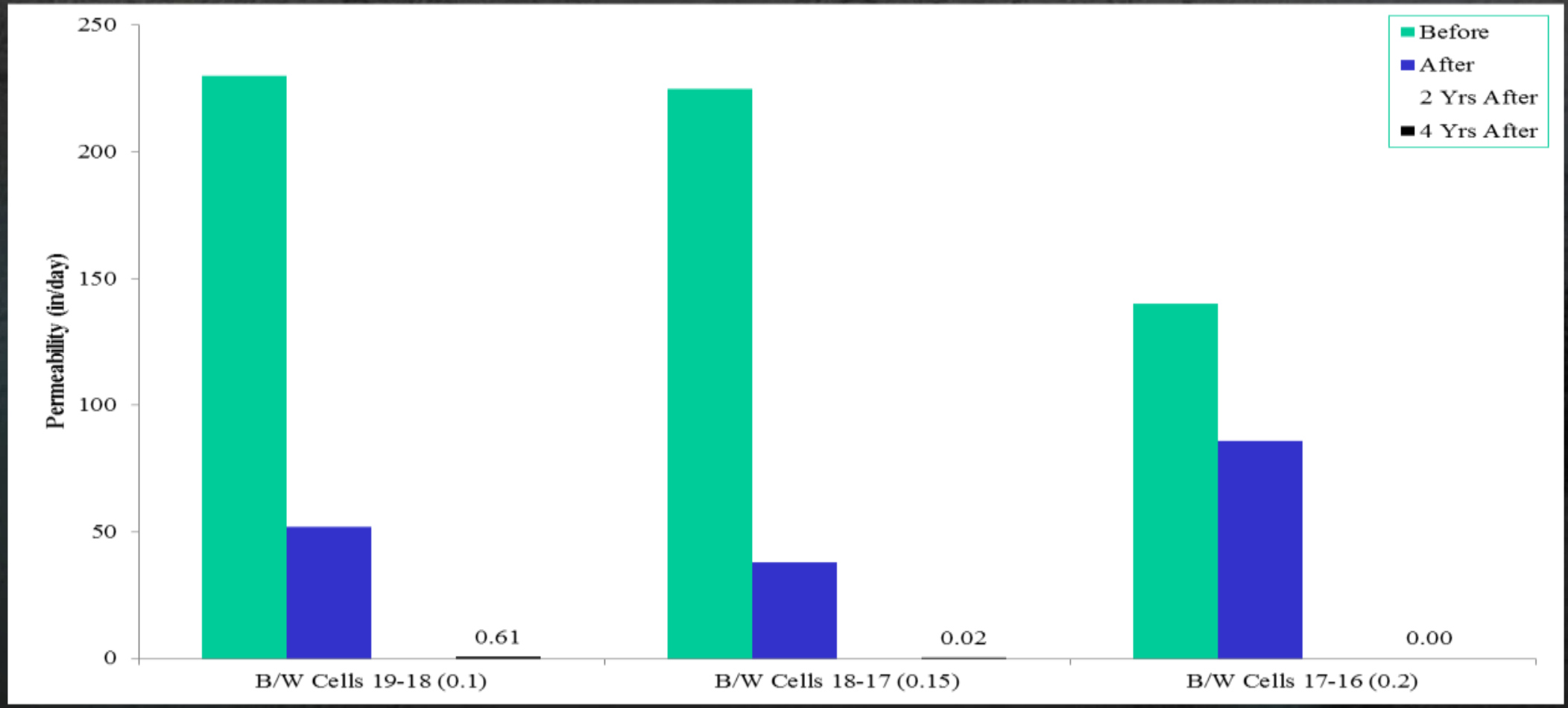
Fog Sealing

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

Value of Fog Sealing

Why Fog Sealing Shoulders (Picture taken in 2009)

Fog Sealing still working after 4 years



Micro Surfacing

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

What is Micro/Slurry

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

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

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

Possible Candidate for Micro

NOT a Good Candidate for Micro

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

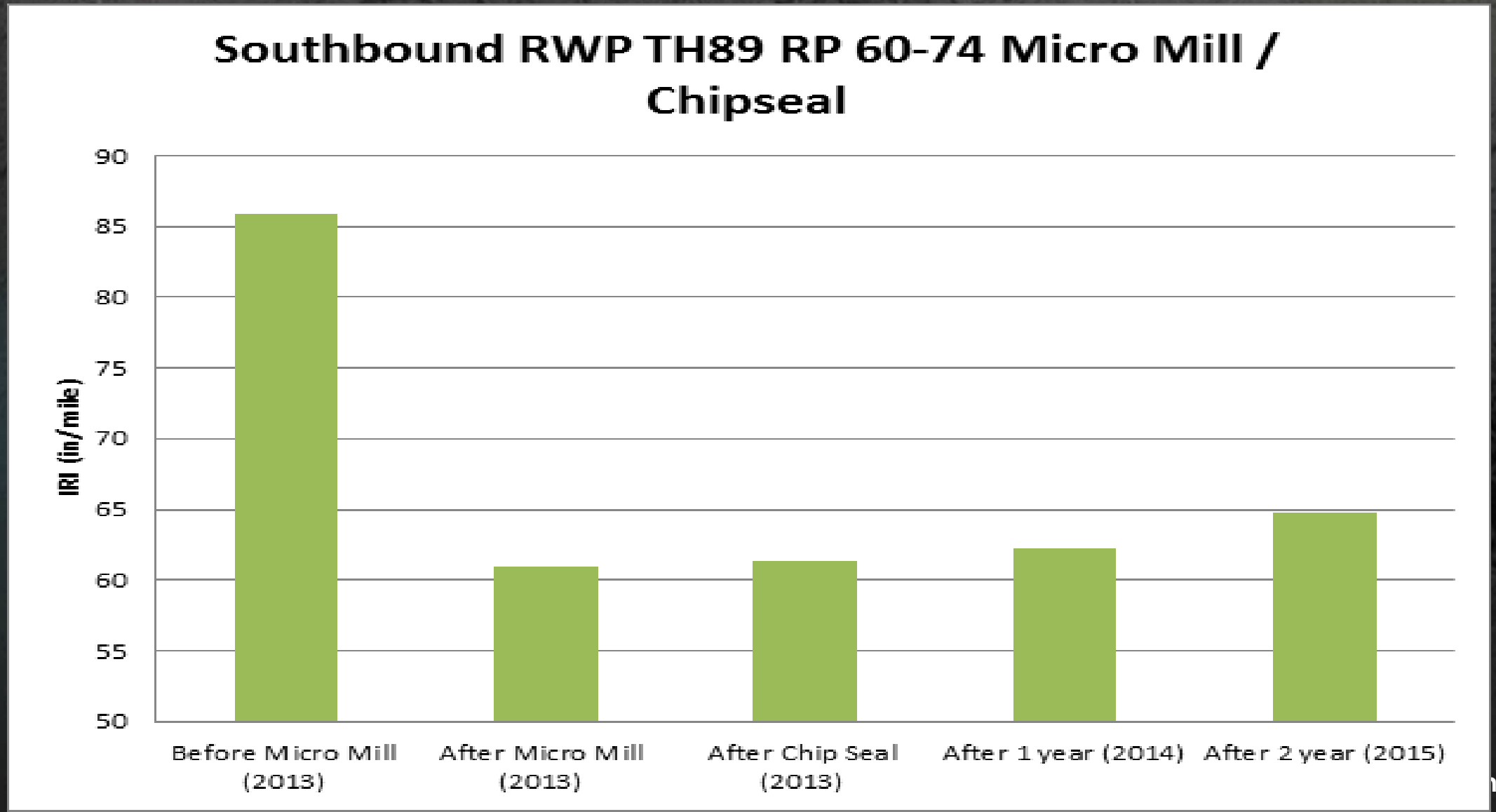
Micro Milling with Chip Seal or Micro Surfacing

- 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

Micro Milling

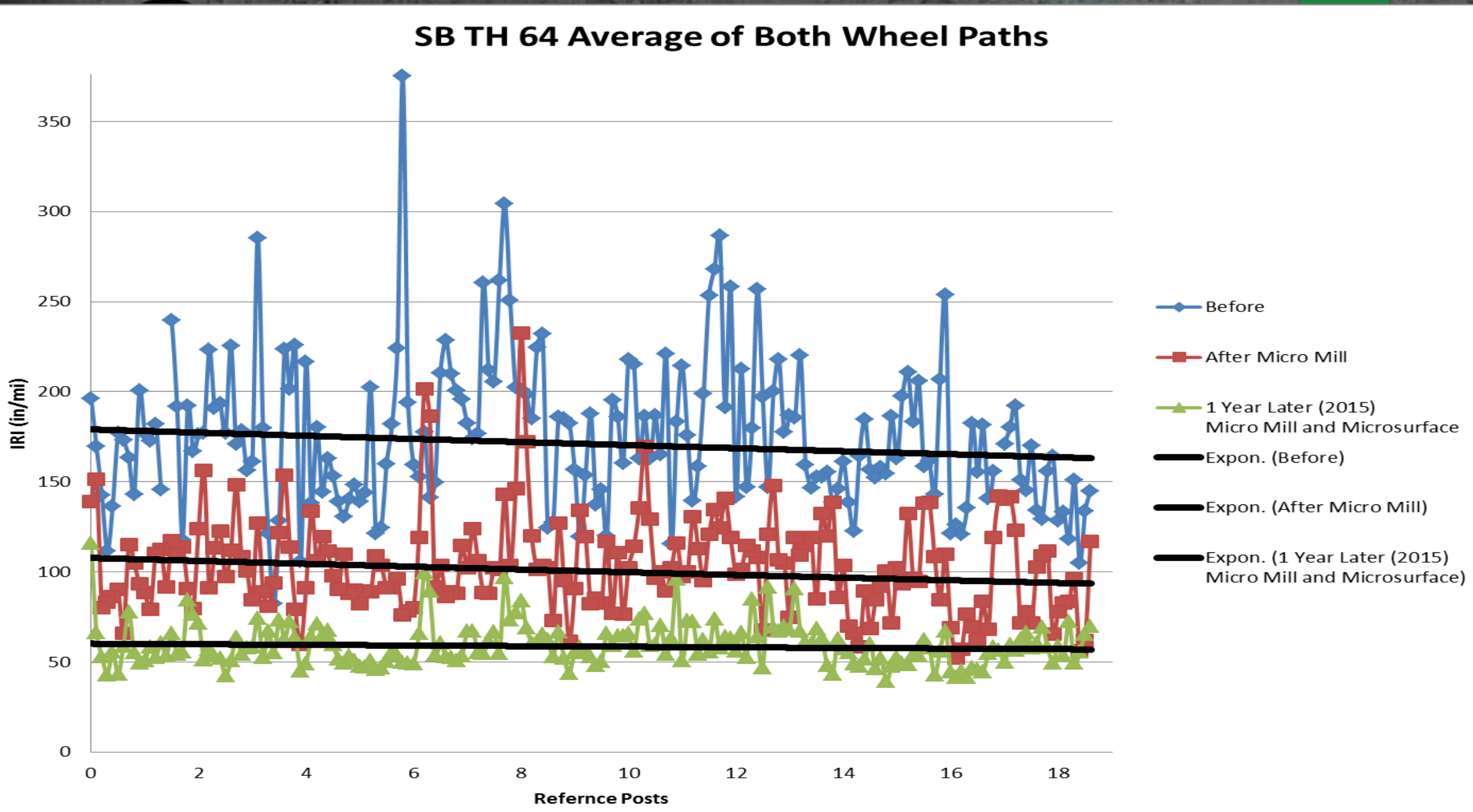
Micro Milling with Chip Seal

Results for Chip Seal



Micro Milling with Micro Surfacing

TH 64 Pre Condition


SB TH 64 Average of Both Wheel Paths
IRI (in/mi)
350
300
250
200
150
100
50
0
0
2
4
6
8
10
12
14
16
18
Refernce Posts
Before
After Micro Mill
1 Year Later (2015) Micro Mill and Microsurface
Expon. (Before)
Expon. (After Micro Mill)
Expon. (1 Year Later (2015) Micro Mill and Microsurface)

Current Condition

Question?

Thank You

Thomas Wood WSB & Associates Inc.