What MnDOT is Doing to Improve PM Treatments Performance

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MnDOT

Topics

- Brief look at MnDOT Spec's and Methods
- The Most Over Looked Factors for Building Successful PMT
- Micro Milling & PMT Update
- Micro Surfacing Research
- Texas Underseal Update
- NRRA

MnDOT Chip Seal Video

- Available at https://www.youtube.com/watch?v=Ol5R7n8zGoc

What Makes MnDOT Specification Work

- Micro Surfacing
  - Require calibration of all machines with all materials used
  - Night time test strip for all projects
  - Apply scratch course on all projects

What Makes MnDOT Specification Work

- Pay for aggregate by ton
- Emulsion by gallon
- Require yield spot check numerous time per day
- Both on aggregate and emulsion
- Check curing rate

What Makes MnDOT Specification Work

- Chip Sealing
  - Strict gradation requirement
    - < 1 % passing # 200 sieve
  - Crushing required on all natural gravels

What Makes MnDOT Specification Work

- Require a design to determine starting application rate of material to be completed
- Limitation on working season
- Pay items to encourage proper application

What Makes MnDOT Specification Work

- Sweep same day
- Fog seal all chip seal
- Contractor responsible for all vehicle damage until permeant pavement marks are placed

What Makes MnDOT Specification Work

- Crack Sealing / Filling
  - Use only pre-approved products
  - Sample from end of wand
  - Temperature
    - At recommend pouring
  - Pay by road station

The Most Over Looked Factors for Building Successful PMT

What is the goal of the project

- Is it a true PM project
- Correcting defects
  - Rutting
  - Raveling
  - Segregation

What is the goal of the project

- Safety enhancements
  - Friction
  - Hydroplaning
- Ride improvement

What is Success

- What measure will you use to determine success
  - Are your goals realistic for the roadway in question and the treatment you have choosen
- Just because you understand your goals doesn't mean the public does

What is the Right Treatment?

Evaluate Your Existing Pavement

Evaluate Your Existing Pavement

Pick the Correct Project

Bidding

- What is needed to succeed
  - How much aggregate
  - How much binder
  - # of layers
  - Combinations of treatments
- Does the specification insure wanted out comes

Project Planning

- Post letting
  - Do you have trained inspectors
  - Training sources
    - Upper Great Plains Transportation Institute
    - NCPP
    - Your State DOT
    - ISSA
  - MnDOT is developing PMT Experts in each District

Construction

- Pre-con meeting
  - Discuss special requirements with Contractor
  - Does the Contractor have trained employees that understand your requirements
  - Pick time and location for calibration of equipment
  - Make sure all designs are completed
  - Test strip if required

Outcome a Successful Project

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

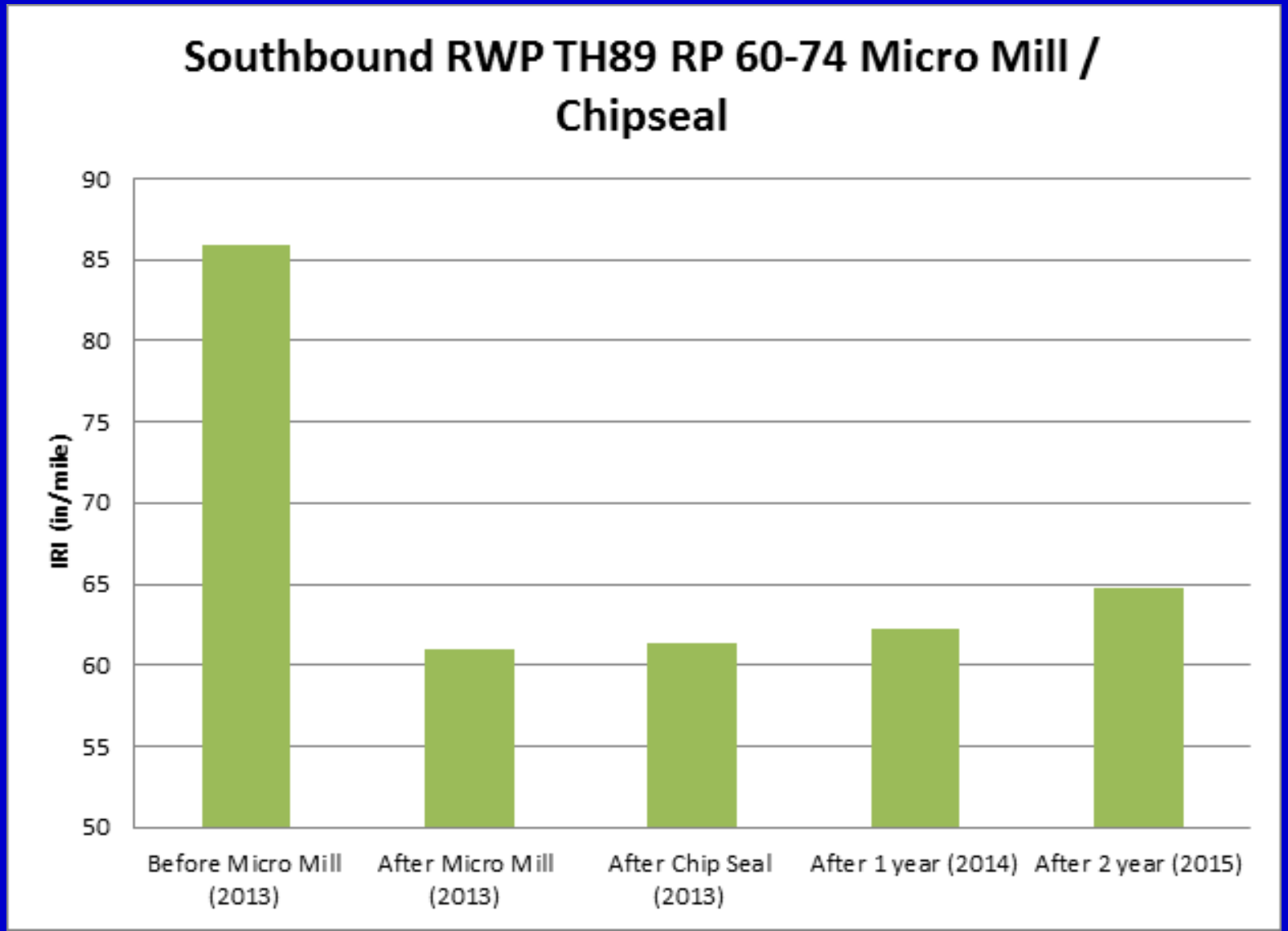
Micro Milling with Chip Seal or Micro Surfacing

- 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

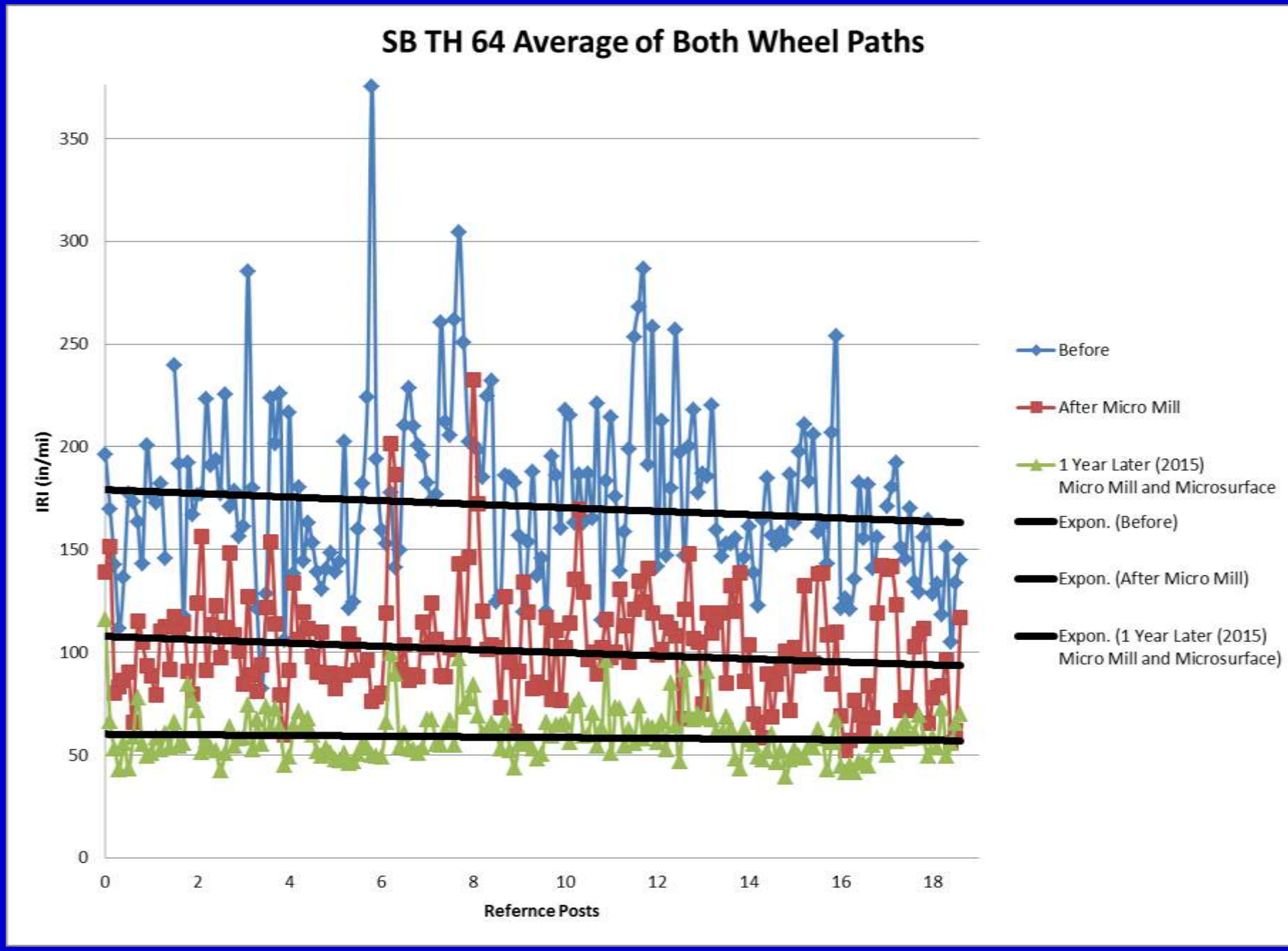
Results for Chip Seal



Micro Milling with Micro Surfacing


BUMP
09 09 2014 09 15

TH 64 Pre Condition


SB TH 64 Average of Both Wheel Paths
IRI (in/mi)
0
50
100
150
200
250
300
350
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

Micro Surfacing Research

Issues with Micro Surfacing

- Brittle Mixture
- All cracks reflect thru
- Delamination
- Snow plow damage
- Poor performance of pavement markings
- Wear off in 5 to 7 years on high volume roadways

Hypothesis

- Higher asphalt content will
  - Reduce reflective cracks
  - More durability/longer life
  - Help with delamination
  - Last longer
- Softer base asphalt will reduce reflective cracks

Where MnDOT Currently is

- Past hard based asphalt 40 – 90 Pen (PG 64-22) (CQS-1Hp)
- Current softer base asphalt 90 – 200 Pen (PG 58-28) (CQS-1p)
- 2017 Very soft base asphalt 200 – 300 Pen (PG 49-34) (CQS-1?p)

On Going Research Efforts

- Allowed PG 49-34 construction season 2015
  - Two project built successfully so far with PG 49-34
- Have seen less snow plow damage on pavement markings with softer based asphalt

On Going Research Efforts

- Smoother surface
- Allow use of SBS modified asphalt in place of latex modifications
  - Contractor/Supplier choice

On Going Research Efforts

- Working on higher asphalt content micro surfacing
  - Normal asphalt content 7 to 8%
  - Testing performance of micro with 9 to 12 % asphalt content
- Higher polymer loading
  - 4 ½ % verses 3 %

On Going Research Efforts

- Results
- No issue with tracking or rutting
- Appears to increase wear resistance
  - Less snow plow chatter marks
- Has greatly reduced # of cracks
- Seem to heal during hot weather
- Pavement marking perform similar to HMA over lay

TH 23 Pre-Condition
Hard Based Micro Surfacing

TH 23 Current Condition

TH 64 Pre Condition
Soft Based Micro Surfacing

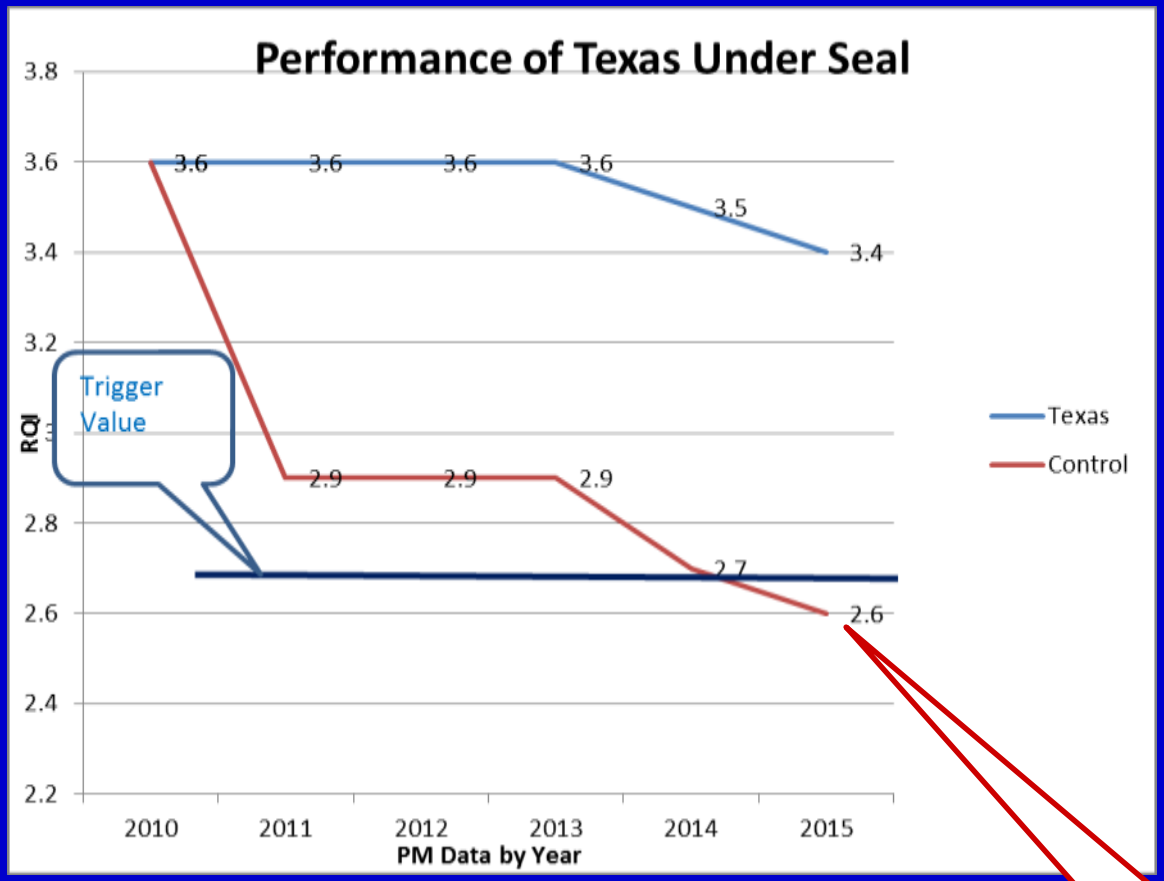
Current Condition

Texas Under Seal Update

Texas Under Seal

- Chip Seal applied before HMA Overlay
  - Milled surface
  - Non milled surface
- ⅜” minus chip
- CRS-2p
- Light on cover aggregate
- Can pave as soon as rolling & sweeping is completed

PM Performance Data



Control Section Performance

Texas Under Seal

- Lesson Learned
  - Lay out test sections to count existing cracks
  - Be careful with fog sealing
- Next Steps
  - Placing Ultra Thin Bonded Wearing Course directly over concrete then traditional over lay
  - Trying to substitute paving with a spray paver in place of under seal

NRRA

National Road Research Alliance

Strategic Implementation through Cooperative Pavement Research

Develop → Collaborate → Research → Implement

What is NRRA?

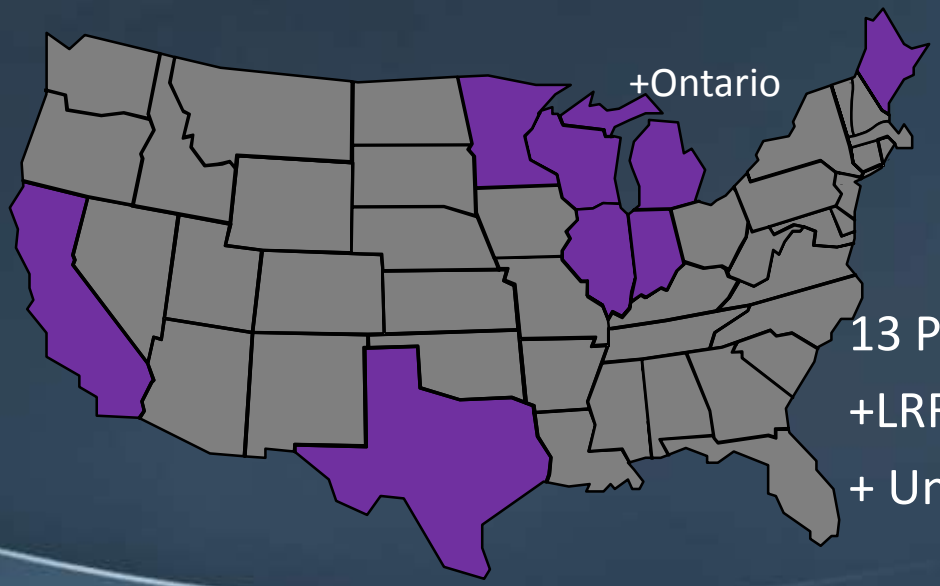
National Road Research Alliance

- Non-traditional pooled fund
- Collaboration between transportation agencies, industry, and academia.
- Direct the future of MnROAD research
  - $2.5 million in MnDOT construction funding

Initial Development

2014 National Peer Exchange

- Pavement experts focusing on
  - Quantifying & Communicating the Value of Research
  - Development of MnROAD's Future Research



13 Participating Agencies
+LRRB+FHWA+TRB
+ University of Washington

Develop → Collaborate → Research → Implement

Question?