Pavement Maintenance Best Practices

Thomas J. Wood
Agenda

• Why pavement maintenance / preservation is important
• Dealing with cracks
• When to apply a surface treatment
• Fog Sealing
• Micro Milling
• UTBWC
• Thin Lays
Why Pavement Preservation is Important

• Condition of pavements are declining
• Costs are rising
• Revenues are flat
• Natural resources are being depleted
Why Pavement Preservation is Important

• Traffic volume are increasing
• More trucks
  – Heavier trucks
• Roadway need to be updated to carry higher traffic levels
Dealing With Cracks
Dealing With Cracks

- Starts with using proper PG grade binder
- MnDOT uses -34 new construction
- See delay in cracking over -28
- MnDOT is studying Fracture Energy to see if the test can determine resistance to cracking of mixture
Dealing With Cracks
Using a Texas Under Seal
Texas Under Seal (TUS)

- Chip Seal applied before HMA Overlay
  - Milled surface
  - Non milled surface
- ³⁄₈” minus chip
- CRS-2p
- Light on cover aggregate
- Can pave as soon as rolling & sweeping is completed
TUS Performance Data

Performance of Texas Under Seal

Control Section Performance
Why does it perform

- Acts as stress relief membrane?
- Super Tack?
  - Have had other tack methods with higher peak strengths
- Limits water infiltration from base?
TUS

- As of end of 2015 construction year 10+ projects have been built
- Seeing 30 to 40% reduction in reflective cracks after one year
- Not sure how long effect will last but appears to be cost effective
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
When to Apply Surface Treatment (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

Higher fracture energy is better

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)
MnDOT’s Pavement Management Ride Data

TH 56 IRI Average

Crack Leveling Done

5 to 6 years
Control Section Never Chip Sealed
Last Section Chip Sealed 2004
Value of Fog Sealing
Why Fog Sealing Shoulders
(Picture taken in 2009)
Fog Sealing still working after 4 years
Micro Milling with PP Treatments
Micro Milling with Pavement Preservation Treatments

• Why?
  – PM treatment normal have limited ride improvement

• What are the performance targets
  – Equal to 2 inch mill & overlay
  – Quicker than overlay
  – Less costly overlay
Micro Milling with Pavement Preservation Treatments

• Cost comparison
  – Chip seal 40% of the cost of 2 inch M & L
  – Micro Surfacing 60% cost of 2 inch M & L
  – UTBWC 90% cost of 2 inch M & L
Micro Milling
Micro Milling with Chip Seal
Results for Chip Seal

Southbound RWP TH89 RP 60-74 Micro Mill / Chipseal

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<th>IRI (in/mile)</th>
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<tr>
<td>Before Micro Mill (2013)</td>
<td>85</td>
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<tr>
<td>After Micro Mill (2013)</td>
<td>60</td>
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<tr>
<td>After Chip Seal (2013)</td>
<td>65</td>
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<tr>
<td>After 1 year (2014)</td>
<td>60</td>
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<tr>
<td>After 2 year (2015)</td>
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Micro Milling with Micro Surfacing
TH 64 Pre Condition
Current Condition
MM with UTBWC

TH10 NB Driving Lane (RP 116.2-131.3)

IRI (in/mi)

Reference Posts

Before
After UTBWC
After 1 Year (2015)
UTBWC Performance As Wearing Course

- I-35
  - MP 18 to 12
- Paved 2001
- Old concrete pavement
  - Jointed 27’ panels
- Plan to overlay with 4.5 inches level 5 Super Pave
- Center 2 miles received ¾ inch of UTBWC also
UTBWC Performance

I-35 Ride comparison

- Control
- UTBWC
UTBWC
Control Section
Thin Lays HMA

- 4.75 mm mixture
- Placed ¾ inch or less
- MnDOT has limited experiences
- Will be building 5 test sections next summer as part of NCAT Partnership
Thin Lays HMA

- Will use different binders PG 58-28, PG 58-34, and high polymer loading
- 50% RAP
- 5% RAS
- Will use spray paver to apply all sections
- Will evaluate same as all other PP treatments in study
Goals of PP

- To maximize value of pavement
- To extend useful life of pavement
- To allow saving to be used to do right fix on pavement at end of their life
- To pay for expansion of system as needed
- To save the environment
Thank You!