IDOT HMA Tech Briefs

62nd Annual Bituminous Conference

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Engineer of HMA, Aggregate & Chemical Tests
Illinois Dept. of Transportation
Topics

- Binder Usage & Trends
- HMA & Binder Research
- FLS & FLSWS
- I-FIT Implementation
- HMA Specifications
- BDE Special Provisions
- Paver Segregation Process Review
- Miscellaneous Topics
PERCENT POLYMER USED VS. TIME

Year of Use


Percent Polymer Used

22 34.7 39.1 33.2 34.1 31.5 25.3 42.8 40.5 38.8 35.8 36.2
Asphalt Binder and HMA Research Timeline

2017 – R27-175 Development LTA Protocol for I-FIT Begins


  – R27-216 Use of Local Aggregates in SMA Begins


Full Lane Sealant

Three Years Later:

- No visible difference between controls and FLS applications
- All sites are performing well
FLS Waterproofing System

• Waterproofing system for bridge decks
• Uses FLS and low permeability HMA mixtures that are easier to achieve a higher density with static rolling
• Prevents the ingress of water and chlorides
• Provides an improved wearing surface
• More efficient & cost-effective means of construction than System in 581
Full Lane Sealant Waterproofing System (FLS)

#1
Tack Coat
0.05 lb./sq. ft.

#2
Full Lane Sealant Interlayer
0.25 lb./sq. ft.

#3
HMA IL-4.75
¾ Inches

#4
Full Lane Sealant Tack
0.15 lb./sq. Ft.

#5
9.5 SMA
1 ½ Inches
Annual Chloride Ingress Testing
<table>
<thead>
<tr>
<th>Hole Depth</th>
<th>Initial ppm</th>
<th>Year 1 ppm</th>
<th>Year 2 ppm</th>
<th>Year 3 ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5”-1.5”</td>
<td>4637.2</td>
<td>3373.7</td>
<td>3543.3</td>
<td>3509.7</td>
</tr>
<tr>
<td>1.5”-2.5”</td>
<td>2241.1</td>
<td>1915.7</td>
<td>2397.3</td>
<td>2547.1</td>
</tr>
<tr>
<td>2.5”-3.5”</td>
<td>1848.1</td>
<td>1721.7</td>
<td>1975.7</td>
<td>2055.2</td>
</tr>
</tbody>
</table>
FLS Waterproofing System

- FLSWS is working well on all sites applied. Chloride ingress has been stopped.
- Pavement surfaces are holding up very well.
- Pending one more year of positive test results, FLSWS will be removed from experimental status.
I-FIT Implementation
Research wasn’t far enough along to complete the new Asphalt Binder Performance Testing Suite.

- No Binder Modifiers in 2021
- No LTA I-FIT Testing Requirement for Surface Mixes in 2021

As-Produced I-FIT Testing required for All Mixes

Long Term Aged I-FIT Testing for All Surface Mixes (For Informational Purposes Only)
As-Produced I-FIT Testing requirements in place for All Mixes

Long Term Aged I-FIT Testing requirements in place for All Surface Mixes

Begin Allowing Asphalt Binder Modifiers January 2022

- 2-PAV $\Delta T_{cr} \geq -5^\circ C$ for Neat and Softener Modified asphalt binders - in effect beginning January Letting
- 2-PAV Large Strain Parameter $\Delta|G^*|_{peak} \tau \geq 54\%$ for Softener Modified asphalt binders - in effect beginning April Letting

(Allows extra 4 months for producers to acquire testing software & characterize their Softener-Modifiers)
HMA Specifications
2022 Spec Book

- QC/QA Revised to meet Federal Regulations
- PFP & QCP added to Section 1030
- 40+ Documents updated for Clarity & Consistency
  - Std Specs, Special Provisions, Policy Memos, Procedures, Des. Manual etc...
- District 1 & Statewide RAP/RAS Special Provision Consolidated & Incorporated into Section 1031
Hamburg Wheel Changes

- **2021**
  - Relaxed minimum # wheel passes for IL-4.75 by 5,000 passes
    - Plan PG 70-XX – 10,000 passes
    - Plan PG 76-XX – 15,000 passes
- **2022**
  - Moving to average rut depth failure approach
  - Max rut depth difference between wheels at failure < 6.25 mm
2022 BDE Special Provisions
## Material Transfer Devices

- Removed Fill-In the Blanks for Mix Designation
  - Moved to Mix Requirements Table in BDE Manual

<table>
<thead>
<tr>
<th>Location(s):</th>
<th></th>
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<tbody>
<tr>
<td>Mixture Use(s):</td>
<td></td>
</tr>
<tr>
<td>PG:</td>
<td></td>
</tr>
<tr>
<td>Design Air Voids:</td>
<td></td>
</tr>
<tr>
<td>Mixture Composition:</td>
<td></td>
</tr>
<tr>
<td>Friction Aggregate:</td>
<td></td>
</tr>
<tr>
<td>Mixture Weight:</td>
<td></td>
</tr>
<tr>
<td>Quality Management Program:</td>
<td></td>
</tr>
<tr>
<td>Sublot Size:</td>
<td></td>
</tr>
<tr>
<td>Material Transfer Device (Required?):</td>
<td></td>
</tr>
</tbody>
</table>
Material Transfer Devices

- Separated MTD’s into Two Categories:
  - **Cat 1** – Heavyweight (better remixing capability)
  - **Cat 2** – Lightweight – Only where **Cat 1** can’t be used

- Added Category Application Requirements:

<table>
<thead>
<tr>
<th>MTD Category</th>
<th>Usage</th>
</tr>
</thead>
</table>
| Category I   | Any resurfacing application
              | Full-Depth HMA where the in-place binder thickness is ≥ 10 in. (250 mm) |
| Category II  | Full-Depth HMA where the in-place binder thickness is < 10 in. (250 mm) |
## Material Transfer Devices

- Created New MTD Qualified Product List

<table>
<thead>
<tr>
<th>Category I Devices</th>
<th>Manufacturer</th>
<th>Manufacturer Address</th>
<th>MTD Model No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Astec Industries Co.</td>
<td>800 Manufacturers Road Chattanooga, Tennessee, 37405 USA</td>
<td>Roadtec SB-2500</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Roadtec SB-1500</td>
</tr>
<tr>
<td></td>
<td>Weiler Inc.</td>
<td>815 Weiler Dr. Knoxville, Iowa, 50138 USA</td>
<td>Weiler E2850B</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Weiler E1650A</td>
</tr>
<tr>
<td></td>
<td>BOMAG Americas Inc.</td>
<td>125 Blue Granite Pkwy Ridgeway, South Carolina, 29130 USA</td>
<td>Cedarapids CR662RM</td>
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## Material Transfer Devices

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<td>Astec Industries Co.</td>
<td>800 Manufacturers Road Chattanooga, Tennessee, 37405 USA</td>
<td>Roadtec MTV-1105e</td>
</tr>
<tr>
<td>Wirtgen Group Inc.</td>
<td>6030 Dana Way Antioch, Tennessee, 37013 USA</td>
<td>Vögele MT 3000-2i Offset</td>
</tr>
<tr>
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Each mixture ≥ 3,000 tons requires sampling for Performance Tests in Test Strip or 1\textsuperscript{st} day of Production

- I-FIT and Hamburg wheel testing for \textbf{High ESAL}
- I-FIT for \textbf{Low ESAL}
- Tensile Strength & TSR testing \textbf{in 1\textsuperscript{st} test strip of year per mix design}
Paver Segregation Process Review
Process Review Timeline & Purpose

- **Timeline**
  - Began – August 2018
  - Completed – June 2021

- **Purpose**
  - Study paver segregation & gain understanding of how current paving machinery & anti-segregation components perform
Process Review - Select Observations

- Paver manufacturers have incorporated many anti-segregation components
Process Review - Select Observations

- Forcing (Pushing) vs. Sweeping Material Beneath the HMA Paver Gearbox

*Pushing Material Under Gear Box*

*Sweeping Material Under Gear Box*
Process Review - Select Observations

Coarse Particles

Conical Pile in Paver Hopper Insert

Coarse Particles
Select Recommendations/Resolutions

- Meet with paver manufacturers to review observations & offer suggestions
- Increase emphasis in training courses & professional development opportunities
- Implement segregation crack analysis to ID paver segregation ASAP after construction
- Pursue Quick Action Review of MTD’s & paver hopper inserts to ID segregation tendencies
Miscellaneous Topics
2021 ARA Field Testing Summary

- 40 samples submitted
  - 6 different ARA manufacturers and 11 different products
  - Multiples from different Contractors submitted
  - 112 individual Ultrasonic Strip Tests completed
  - **ALL tests passed Ultrasonic Strip Test**
All approved products have FTIR fingerprint now

CBM currently has threshold limit of 85%

34 of 40 samples within 85% limit

4 samples did not meet 85% limit

2 samples not tested because of dilution issues
Lake Land QMP Training

- All IDOT QMTP courses this year in-person only
- Students must wear masks and self-evaluate to Attend
- If running fever or showing COVID symptoms **Do Not Attend**
  - For refund or reschedule to another section:
    - Be tested & provide Positive test results or
    - Documentation that you were Quarantined
Recertification:

- Continuing to work with LLC to set up QMP Recert Program beginning in Fall of 2022
- 2-3 year Phase-In with most recent being lowest priority (15 or longer, 10-15, 5-10)
- Required every 5 years
- Written exams for highest Level taken but will include material from lower levels
- Lab Proficiency Testing required for 5-Day Aggregate & Level I Techs
- Self-Paced Online Review Sessions
- Draft policy will be sent to Districts & Industry for review & comment
Thank You For Your Attention

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