Hot Topics
Illinois

2015 Joint Annual Bituminous Conference / North Central Asphalt User Producer Group Technical Conference

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Maximizing Recycle & Durability
## Max Asphalt Binder Replacement

<table>
<thead>
<tr>
<th>HMA Mixtures ¹, ²</th>
<th>FRAP/RAS Maximum ABR %</th>
<th>Ndesign</th>
<th>Binder/Leveling Binder</th>
<th>Surface</th>
<th>Polymer Modified ³, ⁴</th>
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<td>90</td>
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Max RAS 5.0% BTWM
Max Asphalt Binder Replacement

- Max ABR in SMA 20%
- Max ABR in IL-4.75 30%
- Grade Bump High & Low Temp ↓ 1 Grade when ABR > 20% (Chicago District at 15%)
Maximizing Recycle & Durability

- Illinois Experiencing Early Reflective Cracking Related to:
  - High Levels of Recycle
  - Harsh Winter of 2014
  - Underlying Conditions
- FHWA directed IL to Follow PP-78 (i.e. Use Asphalt Binder Availability Factor between 70 & 85% for RAS)
New HMA Brittleness Test

  - Identify a Test Method to Measure Brittleness
    - Inexpensive
    - Simple to Run
  - Modified SCB
    - Room Temp
    - Fast Loading Rate
    - Split Tensile Loading Frame
    - “Flexibility Index” (FI)
Flexibility Index

Flexibility Index (FI) = \( A \times G_F / m \)
Which Mix is Less Brittle?

**N90 lab mix design (30%ABR)**
- Fracture Energy = 1780 J/m²
- Slope = -2.87 kN/mm
- Critical displacement = 2.19 mm

**N90 lab mix design (control)**
- Fracture Energy = 1790 J/m²
- Slope = -1.59 kN/mm
- Critical displacement = 2.84 mm

Courtesy of ICT
New Tack Coat Specification
Why?
Non-Uniform Application = Weak Bond
Two Illinois Center for Transportation (ICT) research projects:

- **Phase I:** Tack Coat Optimization for HMA Overlays
  - Lab Testing: ICT 08-023
  - Accelerated Pavement Testing: ICT 09-035

- **Phase II:** Best Practices for Implementation of Tack Coat
  - Lab Testing: ICT 12-004
  - Field Study: ICT 12-005
Researched Topics

- Residual Asphalt Binder Application Rates
- Surface types and textures
  - Concrete (tined, milled, smooth)
  - HMA (milled, smooth)
- Application Uniformity (i.e. zebra stripes vs uniform)
- Cure time
- Demonstrated Spray Paver
- Variety of Tack Coat Products
  - SS-1h, SS-1hp, PG64-22, RC-70, SS-1vh
- Cleaning Techniques
  - Brooming
  - Air Blasting
Researched Topics

- Bond Strength testing for all scenarios
  - Lab shear tester
  - ATLAS Sections equipped w/ Strain Gauges
Accelerated Pavement Testing

Compact HMA over strain gauge
Specification Features

- Adds new product SS-1vh (i.e. trackless tack)
- RC-70 limited to Temps < 60° F
- Allows Spray Paver in lieu of Conventional Pressure Distributor
- Deleted Requirement: “Dilute emulsion with equal volume of water”
- Contractor selects desired dilution
- Dilution can only be performed by emulsion supplier
**Cleaning:**
- Sweeping and Air Blasting or
- Sweeping and Vacuum Sweeping (Urban Areas)

**Application Rates:**
- Based on **Residual** Asphalt Binder
- **Much** Higher Rates than Before

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<tr>
<th>Type of Surface to be Primed</th>
<th>Residual Asphalt Rate</th>
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<tbody>
<tr>
<td>Milled HMA, Aged Non-Milled HMA, Milled Concrete, Non-Milled Concrete &amp; Tined Concrete</td>
<td>0.05</td>
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<tr>
<td>Fog Coat between HMA Lifts, IL-4.75 &amp; Brick</td>
<td>0.025</td>
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Specification Features

- Lane remains closed until tack coat is **fully cured** & **does not pickup** under traffic
- Paving must stop if pickup occurs & damaged areas repaired before proceeding
- Verification of Residual Binder Application Rate
  - Once /surface type being overlaid when ≥ 2,000 tons
- Payment is based on:
  - Truck weight
  - Net weight of Bituminous Material
Implementation

- Spec used on Voluntary Basis by Districts in 2013 & 2014
- Statewide Spec for 2015
Longitudinal Joints
Longitudinal Joint Seal
Longitudinal Joint Seal 12 Yrs Later
Longitudinal Joint Seal 12 Yrs Later
Future Longitudinal Joint Spec

- Contractor Option:
  - Longitudinal Joint Seal
  - Remove 8 in. of Unconfined Edge & Pave Adjacent Lane 8 in. wider
  - Utilize Confined Edge
  - Pave Full Width or Echelon