IDOT HMA Update

Illinois Asphalt Paving Association
Annual Meeting
March 17, 2008
Topics

- Rubblization
- Pavement Warranties
- Extended Life Pavements
- Asphalt Usage
- PPA
- State Highway Program
- RAP
- WMA Demonstration Projects
- Specifications
RUBBLIZATION
Rubblization with
HMA Overlay
Performance

- Overall performance has been good, but have had some problems
  - Tufa – a form of Calcium Carbonate
  - Underdrain outlets getting covered during final shoulder shaping and causing water to be trapped in pavement.
Rubblizing Future

- Rubblizing remains a specialized design requiring approval for use
- Future projects planned for 2008 and beyond
  - Expect 1-3 projects/yr between State and Locals
PAVEMENT WARRANTIES
Pavement Warranties

- Legislative Mandate:
  - 20 Contracts
    - 10 Contracts to have **30-year life cycle**
  - 5-years in length
  - Transfers risk from the Department to the contractor.
Warranty Specifications

- Full-depth Bituminous Pavements
- Bituminous Overlays
- Concrete Pavements (Jointed and CRC)
- Concrete Bridge Decks and Bridge Approach Pavement
For 30 Year Life Cycle:

- Extended Life Concrete (30 and 40 Year)
- Extended Life HMA
## Warranty Projects by Project Type

<table>
<thead>
<tr>
<th>Project Type</th>
<th>Number of Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bituminous Overlay</td>
<td>3</td>
</tr>
<tr>
<td>Bituminous (20-yr.)</td>
<td>2</td>
</tr>
<tr>
<td>Bituminous (30-yr.)</td>
<td>7</td>
</tr>
<tr>
<td>Concrete (20-yr.)</td>
<td>3</td>
</tr>
<tr>
<td>Concrete (30-yr.)</td>
<td>12</td>
</tr>
<tr>
<td>Concrete (40-yr.)</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>28</strong></td>
</tr>
</tbody>
</table>
Warranty Project Status

- Construction complete on all projects.
- 7 out of 28 (25%) projects have reached the end of the 5-year warranty period.
- 3 of the 7 required corrective action at the end of the warranty period.
  - Crack sealing done on one other project.
- Repair work also performed on other projects where warranty has not expired.
Future Efforts

- Majority do not expire until 2010 or 11.
- Will Continue to monitor sections.
- Look for renewed interest due to harsh winter and needed repairs.
Extended Life HMA Design in Illinois
Extended Life HMA Design

- In standard HMA design, as traffic increases, pavement thickness increases.
- Extended Life Design based on Fatigue Endurance Limit.
- Keep strain at bottom of HMA layer low enough to prevent damage.
- Result is long-life pavement.
- Will need to renew surface.
IHR-39-1, Validation Of Extended Life HMA Pavement Design Concepts

- Characterize dynamic modulus and fatigue for current IDOT mixes
- Determine existence/magnitude of Fatigue Endurance Limit (FEL)
- Of all IDOT mixes tested, none had FEL below 70 microstrain
Extended Life HMA Design

- Develop maximum HMA thickness using FEL = 70 microstrain
- Design for worst-case scenario
- Develop standard extended life HMA cross-section and policy for use
- Meet with industry
Now something really different
ASPHALT
Happenings and Usage
New Certified Sources

Interstate Asphalt Corporation, Chicago PG 64-22

FLINT Hills Resources, Rosemont, MN PG 64-22
  PG 58-28

Flint Hills Resources, Savage MN SBSPG 64-28

TexPar Energy, LLC, Davenport, IA PG 64-22,
  PG 58-28,
  PG 46-28

Name Change
Peoria River Terminal, Peoria, IL is now
Interstate Asphalt Corporation
Bituminous Price Index
Index Usage

- Projects $\geq 1,200$ tons total mix
  - Contractor option
  - Adjustment applied to months tonnage
- How many took option?
  - 2007: 130 of 242
HMA QUANTITIES
## Summary of HMA Quantities

<table>
<thead>
<tr>
<th>Year</th>
<th>HMA (tons)</th>
</tr>
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<tbody>
<tr>
<td>2007</td>
<td>4,811,640</td>
</tr>
<tr>
<td>2006</td>
<td>4,287,573</td>
</tr>
<tr>
<td>2005</td>
<td>5,125,137</td>
</tr>
<tr>
<td>2004</td>
<td>4,303,764</td>
</tr>
<tr>
<td>2003</td>
<td>7,960,262</td>
</tr>
<tr>
<td>2002</td>
<td>8,162,904</td>
</tr>
</tbody>
</table>
## Manpower

<table>
<thead>
<tr>
<th>Year</th>
<th>Technical DOH</th>
<th>Total DOH</th>
<th>Total IDOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td>3,144</td>
<td>6,296</td>
<td>7,428</td>
</tr>
<tr>
<td>2000</td>
<td>3,016</td>
<td>5,695</td>
<td>6,768</td>
</tr>
<tr>
<td>2003</td>
<td>2,865</td>
<td>5,441</td>
<td>6,337</td>
</tr>
<tr>
<td>2006</td>
<td>2,469</td>
<td>4,801</td>
<td>5,602</td>
</tr>
<tr>
<td>2007</td>
<td>2360</td>
<td>4719</td>
<td>5377</td>
</tr>
</tbody>
</table>
Polyphosphoric Acid (PPA) Modification of PG Binders
What does PPA do?

- Moves the high temperature PG grade
- May allow less polymer
- May reduce cost of PG binder
- Main concern: Can make mix moisture sensitive
- Compatibility with Anti-strips??
Current Status

- Awaiting FHWA ongoing Research Investigation
- Discussing performance with agencies actively using PPA
- Section 1032.05(b) “Air blown asphalts, acid modification, and other modifiers will not be allowed.”
- Of 36 states responding to survey, 19 do not allow PPA
STATE HIGHWAY
PROGRAM
- History-
## 2007 Max RAP % Changes

<table>
<thead>
<tr>
<th>N-Design</th>
<th>Binder/Level Binder</th>
<th>Surface</th>
<th>With Polymer</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>30</td>
<td>30</td>
<td>NA</td>
</tr>
<tr>
<td>50</td>
<td>25</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>70</td>
<td><strong>15/25</strong></td>
<td><strong>10/15</strong></td>
<td>10</td>
</tr>
<tr>
<td>90</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>105</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

Shoulders up to 50%

*RAP Max Percentage if Crushed to -3/8”

New in 2007
RAP Usage

- Overall, RAP usage up, but still have issues
- District 1 area still has significant RAP surplus
- New Effort to Increase Recycling Usage
  - North East Illinois Recycling Forum “NEIRF”
NEIRF
NorthEast Illinois Recycling Forum

- IDOT (Chicago Metro Area), Tollway, Local Agencies, & Asphalt Industry
- Initial Focus on addressing barriers preventing increased RAP usage
  - Fractionalization of RAP
  - Double PG grade bump down for higher RAP contents
  - High Minus #200
  - Other uses for RAP
NEIRF Future

- Long term look at RAP and other materials to be recycled.
  - Shingles
  - Tire rubber
  - Foundry Sand

- Intend to be long standing group
What is WMA?

Allows reduction in

- production temps
- placement temps
How is it done?

a) Two Component Asphalt
b) Emulsion Technology
c) Mix Additives
   • Mineral
   • Organic
d) Foaming
Hot Mix Asphalt
275 - 325º F

Warm Mix Asphalt
200 - 275º F

Cold Mix Asphalt
60º F
Warm Mix Asphalt Demonstration Projects
District #1 Sasobit Demo

- Gallager Asphalt
- 1000 tons of Stabilized Sub-Base Layer under the new CRC on Dan Ryan Expressway
- IL 19 mm N-50 @ 3% voids
- Placed in 2 - 3" lifts
- Mix produced at 260 °F & compacted started ≈ 230 °F
- At 175 °F, 1% additional density was possible
District #1 Sasobit Demo

- Sasobit Technology has merits:
  - Mix can be placed and compacted a mix at significantly lower temps.
  - Same equipment was used w/ no changes to the paving train.
  - Estimated 8% fuel savings not enough to offset cost of Sasobit
District #7  Evotherm Demo

- Ambraw Asphalt
- 2000 tons N70 Surface mix
- Evotherm concentrate sprayed simultaneously with liquid AC
- Mix produced at 210 - 225 °F & compacted at 200 - 215 °F (roughly 80 °F cooler)
- No significant change in the rolling pattern
District #7  Evotherm Demo

- **Evotherm Technology**: 
  - Mix can be placed and compacted a mix at significantly lower temps.
  - Same equipment was used w/ no changes to the paving train.
  - Evotherm results in lower voids & VMA

- Estimated 6% fuel savings not enough to offset cost of Evotherm
High RAP with Warm Mix Asphalt (WMA)

LOOKING FOR A FEW GOOD PROJECTS
Why Warm Mix Asphalt?

- Conventional HMA temperature requirement causes “burn” off lighter oils – why grade bump down is needed
- Lower temperature mix easier to produce with high RAP percents
- WMA – ability to compact mix
- Being looked at Nationally by FHWA Expert Task Group – Other states have demos started in 2007
High RAP WMA Demo

- Surface Mix (N 50 or N 70)
- 30% RAP (10 to 15% now)
- PG 64-22 No Grade Bumping
- Fractionation of RAP required
  - 1/2” to #4
  - #4

- WMA
  - Astec Double-Barrel with Foamed Asphalt
  - Warm mix additives
2008 HIGH RAP Demo

- Would like to have 1-2 projects
- If viable, expand usage
- Bureau of Materials and Physical Research takes lead
Specification Update 2008
Specification Update

- **Field VMA Specification**
  - Effective April 2008

- **Longitudinal Joint Density Specification**
  - Retracted for 2008
  - Trial projects in each District w/2007 BMPR spec.
Specification Update, cont.

- Discontinue reduced voids testing frequency after 2nd day of production for projects $\geq 1200$ tons
- Begin Efforts on Pay for Performance Spec
  - $8,000$ tons or more
  - Incentive / Disincentive Pay
  - PWL
  - Jobsite sampling
THE END