Manitoba’s Experience with Warm Mix Asphalt

Surfacing Materials Engineer
What is WMA?

• Warm Mix Asphalt (WMA)

  – A generic term used for various technologies that allow production and compaction of asphalt pavements at lower temperatures
Why WMA?

• Construction
  – Improve compaction
  – Introduce longer paving season
  – Allow longer haul distances
  – Increase use of RAP

• Environmental Benefits
  – Reduced energy consumption (fuel use)
  – Reduced emissions (plant, at the paver)
Manitoba’s Goals for WMA

- Obtain hands on experience with WMA technology
- Contractor friendly - little or no modifications to asphalt plant
- WMA to be an acceptable alternative to HMA
WMA Project Location

PTH 14
length - 12km (7.5 miles)
Project Details

• Tendered as a WMA project
• Rehabilitation project (mill and fill)
  – Mill
    • 35mm (1-1/2”)
  – Fill
    • Lower lift: 50mm (2”), 35% RAP
    • Top lift: 50mm (2”), virgin mix
Project Details

• No specification changes
  – HMA mix design = WMA mix design
  – Temperatures

• To reduce variables, add additive at the plant
Products Used

- Advera (zeolite)
  - 0.25% weight of total mix (will not vary with RAP)
Products Used

• Sasobit (wax)
  – 1.5% of total weight of asphalt cement
Products Used

• Evotherm DAT System (chemical)
  – 0.5% by weight of asphalt cement (with RAP)
  – 0.3% by weight of asphalt cement
## Project Layout

<table>
<thead>
<tr>
<th>Top Lift 50 mm (2”)</th>
<th>500 m (0.3 mi.)</th>
<th>3 km (2 mi.)</th>
<th>1 km (0.6 mi.)</th>
<th>3 km (2 mi.)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>HMA</td>
<td>Advera</td>
<td>HMA</td>
<td>Sasobit</td>
<td>HMA</td>
<td>Evotherm</td>
<td>HMA</td>
<td></td>
</tr>
<tr>
<td>Bottom Lift 50 mm (2”)</td>
<td>HMA 35% RAP</td>
<td>Advera 35% RAP</td>
<td>HMA 35% RAP</td>
<td>Sasobit 35% RAP</td>
<td>HMA 35% RAP</td>
<td>Evotherm 35% RAP</td>
<td>HMA 35% RAP</td>
</tr>
</tbody>
</table>
WMA Project Specifics

• Construction end of May – end of June

• Haul distance – 24 km (15 mi.)
  (time ~ 30 minutes)

• Temperatures
  – Air Temperature ~12–27°C (54–81°F)
Mixture Temperatures

- **Mixing (plant):**
  - 23°C (73°F)
  - 125°C (257°F)
  - 148°C (298°F)

- **Compaction (paver):**
  - 25°C (77°F)
  - 110°C (230°F)
  - 135°C (275°F)

Legend:
- **HMA**
- **WMA**
Emissions Testing

• Asphalt Plant Emission Testing
  – Stack tests – US EPA test methods
  – Confirmed reduction in concentration and emission rate of carbon monoxide
  – Correspondingly a reduction of fuel consumption
  – Other gas components were inconclusive due to variability
Emissions Testing

• Paving Site Air Quality Testing
  – Emissions were well below occupational exposure limits

• Emissions Testing on Fresh Asphalt
  – Emissions were low
Partnerships

Asphalt Research Consortium (ARC)

University of Nevada, Reno

The University of Wisconsin Madison

Western Research Institute

Advanced Asphalt Technologies

North Carolina State University
Monitoring Plan

• ARC will be monitoring the 150m (500’) sections annually (crack mapping)
• Manitoba collect annually
  – Ride (IRI)
  – Rut
  – FWD
  – 150mm (6”) cores
Future WMA Projects

• 2010 – Evotherm (additive in asphalt cement)
  – Long haul (170 km – 106 mi.)
  – Extended paving season

• 2011
  – Tender as WMA/HMA? Specify WMA? Approved Products List?
  – Foamed WMA
  – Other products
Thank You

Questions?