Application of Warm Mix Asphalt on Non-Typical Paving Projects

Steve Jackson
NB West Contracting
St. Louis, MO
Outline

- Warm Mix Asphalt (WMA) using polymer modified asphalt cement, Reclaimed Asphalt Pavement (RAP), and Reclaimed Asphalt Shingles (RAS)
- Cold Weather Paving with WMA
- Bonded Dense Graded WMA
- Ultra Thin Bonded Asphalt Wearing Course WMA
Definitions

- **SP 125** - Superpave 12.5 mm nominal max aggregate size – surface mix

- **RAS** – Recycled Asphalt Shingles
  - Tear off shingles not factory rejects

- **MoDOT** – Missouri Department of Transportation
Why Warm Mix?

- Moisture – Surfactant in Evotherm
- Longer haul distances
- Compaction aid
- Joint bump prevention
- Higher recycled percentages
Why Warm Mix?

- Reduced emissions
  - Non-Attainment Area
- Less heat on workers
- Consistency in Pay Factors
Rte. 50, Gasconade County

- SP 125C, PG 64-22
  - RAP
  - Shingles
  - Hot Mix Asphalt
- 60 minute haul to the job
- Experienced VMA collapse.
  - Deducts, we shut the job down
Route 50
Warm Mix Asphalt
1st Test

- Air voids: 3.5%
- Density: 95.9%, 96.1%
- Joint Density: 95.0%
- Average density (Job): 93.5%
- 19.1% DEDUCT on density
Route 50
Route 50
Route 50
I-44 Maintenance
I-70 Maintenance

- SP 125CLP
  - PG 64-22 Evotherm 3G M1
  - Shingles
  - RAP
- 60 mile haul
- Cold weather paving, ~23 F
Ease of Use
I-70

- 94.2% Density
- Good Paving Practices
  - Transfer machine
  - Tarp and strap
Cold Weather Paving

- City of Rolla
- December 2010
- Occupancy Permit needed to be issued for a new housing development
Fresh Concrete
Good Paving Practices
TSR Bonus in Missouri

- 3% bonus for field TSR over 90.0%
- Evotherm is an adhesion promoter
- No anti-strip needed
- $0.75 - $1.00 per ton savings by removing the anti-strip agent
Thermal Segregation
Density

◆ Consistent mat temperature gives more consistent density
  ■ Pay factor

◆ Unconfined joint density
  ■ Less heat – Less lateral movement
  ■ Joint density spec trumps all other specs in Missouri. Removal if joint density is not obtained.
Other Benefits

- Mix starts at a lower temperature
  - Open the road quicker
  - Less delay to motorists

- Green Technology
  - St. Louis “Non-Attainment” Area
    - DNR CO₂ emissions
Reduced Plant Wear
Recycle Issues –
Superheating Aggregates
Warm Mix Asphalt

- Yes you can use RAP and shingles with Warm Mix Asphalt
- Lower temperature may decrease drum heat issues
Increased Recycled Content

- MoDOT allows up to 40% Effective Binder replacement
  - PG 64-22 in the contract
  - PG 58-28 for high recycle
MoDOT RAP RAS Effective Asphalt Workbook

### Contribution of Binder from Recycled Materials

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<th>Type</th>
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<th>Psr1</th>
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<th>Pbmv</th>
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Warm Mix Asphalt

- Start the day at an elevated temperature
  - Heats bag house
  - Heats transfer machine and screed
  - Hot mix when pulling off your header
Warm Mix Asphalt

- Finish the day at an elevated temperature
  - Keeps transfer machine clean
  - Hot mix for header/end
  - Dries bag house moisture
  - Keeps dryer flights cleaner
Dryer Flights
Warm Mix Asphalt

- Works with AC used in Missouri
  - PG 58-22
  - PG 58-28
  - PG 64-22
  - PG 70-22 PMA
  - PG 76-22 PMA
2010 Innovations

- PG 70-22 PMA with RAP and Shingles with Evotherm 3G
  - Missouri does not allow PMA & RAS
- Permeability along with cores
- MoDOT modified Pay Factors to allow for increased compaction.
  - Old: 94.0% +/- 2.0%
  - New: 94.5% +/- 2.5%
Rte.. 47 Franklin County

- **Scratch Course – ¾” thick**
  - SP095C Hot Mix
  - No density requirement
  - RAP, Shingles

- **Surface Mix – SP125CLP**
  - 5% Shingles, 10% RAP
  - PG 70-22 PMA
  - Evotherm 3G M1

[Image]
Missouri Contractor Exemplifies Environmental Excellence

ASPHALT PRO
production professionals products

Heat Recovery Protects LAM’s Baghouse
New Tech for Crumb Rubber
How-to for Heater Uptime

Green Specs
August/September 2010
2010 Innovations

- Evotherm 3G M1 with Nova Chip
- Evotherm 3G M1 with Bonded Dense Graded Asphalt through Spray Paver
  - Increased bond strength
  - “Clean” tack coat
  - Evotherm + Water from emulsion
Clayton Road
MAPA Quality Award
Bonded Dense Graded Warm Mix Asphalt
Bonded Dense Graded Warm Mix Asphalt
2011 Innovations

- West Contracting has moved to ~95% asphalt mixes using Evotherm 3G M1
- Worked with Road Science to develop a 9.5mm Thin Bonded Overlay
Route 100

- Looking for a crack-resistant, thin overlay with long term performance

- High quality materials
  - High polymer asphalt
  - Rhyolite – Trap Rock aggregate
Thin Bonded Overlay
Thin Bonded Overlay
What do we need to fully implement WMA?

- Education – Commercial applicators, Cities and Counties
- Implement the best paving practices
- WMA doesn’t fix bad paving techniques
Thank You
Contact Information

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www.nbwest.com
Rock On!