

WMA in Minnesota



Motivation to Use WMA

Environmental

- ★ Lower greenhouse gas emissions
- ★ Lower fuel consumption

Operational

- ★ Better compaction
- ★ More comfortable working conditions

Performance

- ★ Can use RAP and/or shingles with WMA
- ★ Eliminates bumps in overlays
- ★ Reduced binder aging – reduced cracking

Technology Overview**

- WAM-Foam  
- Low Emission Asphalt  
- Aspha-Min 
- AquaFoam 
- Advera 
- Ultrafoam GX 
- Sasobit 
- Terex 
- REVIX 
- Accu•Shear 
- Evotherm 
- Aquablack 
- Cecabase RT 
- Double Barrel Green 
- Thiopave  

**FHWA does not endorse any particular proprietary product or technology.

*WMA EXPERIENCE IN
MINNESOTA*

Olmsted & Goodhue Counties

- First known true WMA jobs in MN (2007)
 - ★ Revix (Evotherm 3G) technology
 - ★ Olmsted CR 104
 - ★ 5 mile stretch
 - ★ Goodhue CSAH11
 - ★ 537 tons placed in 4,200 feet of the EB lane



Crow Wing County

- County Road 108 (2008)
 - Evotherm 3G
 - ★ 2913 tons WMA, 272 tons HMA
 - ★ 58-34 HMA vs. 58-28 WMA
- County now allows alternate bids on several projects
 - ★ 20,000 tons WMA in 2009 (CR 2)

DNR

- Bemidji: Paul Bunyan Trail – Fall 2008

2008 MnROAD Construction

- 6 Cells on Mainline
- Wear and Non-Wear
- 12.5 mm NMAS
- Traffic Level 4
- PG 58-34
- 20% RAP from MnROAD
- No requirements for WMA technology



MnROAD Field Performance

- 1 transverse crack in 5 test sections
 - ★ Over instrumentation area (inadequate compaction)
- 25% reflective cracking on 3” WMA overlay
- Ride quality: all cells < 1.1 m/km (“good”)
- Rutting: all cells < 0.2 inches rutting
- So far, so good



Mn/DOT Trunk Highway 95

- Late season paving (2009)
 - ★ Contractor was delayed, needed to finish paving before winter
 - ★ Supplemental Agreement – Mn/DOT paid extra \$0.60 per ton for WMA
 - ★ Business as usual (mostly)
 - ★ Good density 2nd day after going back to HMA rolling pattern



Mn/DOT District 3 and 7 Projects in 2010

■ First “regular” Mn/DOT projects requiring WMA



S-1 (2360) PLANT MIXED ASPHALT PAVEMENT – USE OF WARM MIX ASPHALT TECHNOLOGIES

The provisions of the attached 2360 Plant Mixed Asphalt Pavement (Gyratory Design) Specification is hereby modified as follows in order to use Warm Mix Asphalt (WMA)

All provisions for the production and placement of WMA will be the same as the conventional HMA mixtures as stipulated in 2360 Plant Mixed Asphalt Pavement (Gyratory Design) Specification except as noted below.

S-2.1 MIXTURE DESIGN

The contractor is responsible to use the same design used to produce the Hot Mix Asphalt, then modifying it to accommodate products or processes to meet the Warm mix criteria. This modification process will be limited to the same as described by the WMA Technical Working Group and found at <http://www.warmmixasphalt.com/WmaTechnologies.aspx>

Recycled Asphalt Shingles will not be allowed in any mixes on this project.

S-3.1 MIXTURE QUALITY MANAGEMENT

The Warm Mix Asphalt produced will not be allowed to exceed temperatures greater than 275 °F. Any WMA over that temperature will not be allowed to be used.

2011 Wright Co. Alternate Bid WMA Project

S-1.1 Mix Designation Numbers for the bituminous mixtures on this Project are as follows:

Type SP 12.5 Wearing Course Mixture (3,C)	SPWEB340C	(CSAH 34)
Type SP 12.5 Wearing Course Mixture (2,B)	SPWEB240B	(CR 117 and Lot Paving)

CSAH 12 & CSAH 35 (Hot Mix & Warm Mix Alternate Bids)

Alt 1 (HMA) – Type SP 12.5 Wearing Course Mixture (3,C)	SPWEB340C
Alt 2 (WMA) – Type SP 12.5 Wearing Course Mixture (3,B)	SPWEB340B

Type 12.5 Wearing Course Mixture (3,B) Warm Mix Asphalt

Alternate bid 2 involves producing a warm mix asphalt using WMA technologies that incorporates one (or a combination) of the products and processes, as listed under the “WMA Technologies” tab found at: www.warmmixasphalt.com

Warm mix asphalt, for this contract, shall be produced at a temperature lower than 240 degrees (at the plant).

2011 Construction Season

- > 200,000 tons WMA



WMA Technologies Used in MN



- Maxam AquaBlack
 - ★ Installed on several plants
 - ★ 15~100% of production was WMA



- EvoTherm 3G
 - ★ Easy for contractors



- Advera
 - ★ 1 project

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MnDOT Policy & Specification

- 2009 & 2011 Position Memos
- Permissive Spec
 - ★ RAP & RAS are allowed
 - ★ No changes in mix design
 - ★ Labs must be aware of compaction temps for QA
 - ★ No pre-approved products list
- www.dot.state.mn.us/materials/bituminous.html

Lingering Questions

- Have not heard of any catastrophic failures with WMA
- How much RAP / RAS can be used?
 - ★ Inadequate blending
 - ★ Long term durability
- Long term performance
 - ★ Moisture damage, thermal cracking, rutting, reflective cracking

Summary

- WMA should meet all Superpave requirements
- Warm mix is the future of asphalt mixtures
- Technology providers coming forward
- Industry and agencies must work together to make it happen
- Advantages far outweigh concerns

Thank You

