



Illinois Department of Transportation

2300 South Dirksen Parkway / Springfield, Illinois / 62764

May 21, 2009

CIRCULAR LETTER 2009-09

WARM MIX ASPHALT EXPERIMENTAL FEATURES

COUNTY ENGINEERS/SUPERINTENDENTS OF HIGHWAYS
MUNICIPAL ENGINEERS/DIRECTORS OF PUBLIC WORKS/MAYORS
CONSULTING ENGINEERS

The central Bureau of Materials and Physical Research (BMPR) and the central Bureau of Construction (BC) have issued a joint memorandum outlining the use of warm mix asphalt (WMA) through the experimental feature program. There are several modifications to the normal experimental feature program:

- Experimental feature is initiated by the contractor after the contract has been awarded;
- BMPR has completed the work plan for all projects (See attachment.);
- The BC must concur with substitution of WMA for Hot Mix Asphalt (HMA); and
- Attachment 3 of the work plan shall be completed by the contractor within 30 days of completion of paving.

If the local agency accepts the contractor's offer to substitute WMA for HMA, the local agency shall complete Attachment 2 of the work plan with the assistance of the district office. The district office shall forward Attachment 2 of the work plan to Mark Gawedzinski (mark.gawedzinski@illinois.gov) of the BMPR with a carbon copy to the central Bureau of Local Roads and Streets and the BC. The contractor shall not be allowed to start paving until approval is received by the BMPR and the BC.

Please contact the Local Policy and Technology Unit at DOT.LocalPolicy@illinois.gov with any questions.

Sincerely,

A handwritten signature in cursive script that reads "Darrell Lewis".

Darrell W. Lewis, P. E.
Acting Engineer of Local Roads and Streets

Attachment

cc: Matt Mueller, BMPR
Jim Trepanier, BMPR
Mark Gawedzinski, BMPR
Marvin Traylor, IAPA
Hal Wakefield, FHWA
Brian Pfeifer, FHWA



Illinois Department of Transportation

Division of Highways / Bureau of Materials and Physical Research
126 East Ash Street / Springfield, Illinois / 62704-4766

May 8, 2009

Mr. Norman R. Stoner
Division of Administrator
Federal Highway Administration
Attn: Brian Pfeifer
Springfield, Illinois 62703

SUBJECT: Experimental Feature # IL 09-02
Warm Mix Asphalt
Contract: Various
District: Various

Dear Mr. Pfeifer:

Enclosed are two copies of the generic template Experimental Feature Work Plan. Since this process will be initiated by the contractor after the contract has been awarded, we propose an alternate method of reporting in lieu of Form 1461 for each project. Our proposal is to periodically provide summary tables that will include information provided on Form 1461. We request your approval of the subject Experimental Feature template and this method of submitting information.

The Experimental Feature will be using Warm Mix Asphalt (WMA) as a contractor substitute for Hot Mix Asphalt (HMA). It is our intention that the contractor will also use HMA on the project to serve as a control section for the project.

Projects are scheduled for 2009 and 2010 lettings. Your early consideration of this request is appreciated.

Sincerely,

Christine Reed
Director of Highways

A handwritten signature in black ink, appearing to read 'D. L. Lippert'.

By:
David L. Lippert, P.E.
Engineer of Materials and Physical Research

JV:jy

Atts.

cc: Patty Broers
Amy Schutzbach

Mark Gawedzinski
Jim Trepanier

Eric E. Harm

Experimental Work Plan for Warm Mix Asphalt in Illinois

Introduction Warm Mix Asphalt (WMA) was introduced from a joint owner industry scan of European asphalt production practices. It promises reduced emission and energy usage. Several technologies are used to produce WMA. Background and advice on technologies can be found at <http://www.warmmixasphalt.com/> and <http://www.fhwa.dot.gov/pavement/asphalt/wma.cfm>. There are some differences in production compared to Hot Mix Asphalt (HMA) that may be advisable to consider with WMA such as assuring aggregate drying at lower production temperatures. WMA is an acceptable alternative to HMA provided that it meets the specification requirements of HMA.

Objective This project is designed to assess the performance of the various WMA technologies and allow the Illinois Department of Transportation (IDOT) to build on experience with this product. This experience will allow IDOT to develop specifications and a policy for WMA.

Projects IDOT has been entertaining proposals from contractors to substitute WMA for HMA on an individual project basis. This practice will be continued for future warm mix projects. Warm mix proposals for state or local projects will be evaluated using the list of criteria (Attachment 1) to assure equivalency. Local agencies should coordinate warm mix proposals through their IDOT districts. Projects will be limited to mainline usage on facilities with less than 10 million ESALS until further experience is gained with specific warm mix technologies. A copy of a project background form completed by the district/local agency (Attachment 2), as well as the contractor's QC plan addressing the key items in Attachment 1, will be submitted to the Bureau of Materials and Physical Research (BMPR) as soon as the use of WMA is approved by the district. A copy of a production and construction information form completed by the contractor and approved by the district (Attachment 3) will be submitted to the BMPR within 30 days of completion of paving. Control sections of HMA (minimum of 0.5 mile in each lane and in each direction) will be required on all WMA projects for performance comparisons.

Estimated Cost It is anticipated that use of WMA in place of HMA will be a no-cost substitution. Potential savings may be realized if RAP is used in the WMA as binder grade bumping is reduced. Any cost savings will be documented as part of this research.

Evaluation BMPR, with the districts'/local agencies' assistance, will maintain a record of warm mix usage throughout the state and monitor statewide performance of specific technologies and their performance. Evaluation will consist of images and sensor data (ride quality and rut data) and CRS collected by the department, either annually (interstate) or biennially (state system), as well as general observations from the district/local agency on an annual basis. The evaluation period for each project will be 5 years from completion of construction.

Considerations for WMA Use

1. Expected net cost savings

What is the monetary value (fuel savings minus WMA technology) of this proposal? What level of risk is the district willing to accept considering the facility, traffic levels and potential reduction in service life?

2. Climate Limitations

It has been reported that Sasobit may decrease the pavements resistance to thermal cracking and therefore may not be appropriate for full depth pavements in the northern districts. Likewise, foaming technologies (water or additive) may not be suitable for cold temps or long haul distances where mix may “crust over” due to temperature loss.

3. Traffic Limitations

Concern has been expressed by a national expert regarding use of WMA on high volume facilities. (Currently limited to ≤ 10 million ESALs)

4. RAP / Grade Bumping * (Required)

If the contractor intends to use $\geq 20\%$ RAP they should indicate their proposed RAP % and proposed PG binder grade bump reduction in their QC Addendum. They also need to indicate how they will handle switching to a double bump PG binder grade if they need to increase the production temperature above 275° F or switch to HMA. This may require having two binder grades on hand.

5. Mix verification * (Required)

Some WMA technologies cannot be replicated and therefore verified in the laboratory. What steps will the contractor take to verify this mix will be suitable for the proposed application?

6. Determination of moisture sensitivity * (Required)

Discuss what efforts the contractor will make to ensure the WMA will not be susceptible to moisture damage (i.e., how HMA TSR criteria of 0.85 will be met). This may include preliminary moisture sensitivity testing and production split sample moisture sensitivity testing by contractor and district. This should also be addressed in the QC Addendum.

7. Proposed mix production temperature

Determine what WMA technology is being proposed, what temperature reduction is expected and what production temperature range the contractor anticipates running the WMA to make sure the application is appropriate.

8. Payment for Anti-Strip (A-S) Additive

Most WMA mixtures are more moisture sensitive and therefore require anti-strip additives. How will the anti-strip additive be paid for?

9. How will VMA be maintained? * (Required)

Some of the WMA technologies are known to decrease VMA by up to 1%. What steps will the contractor take to ensure the minimum VMA requirement is met?

10. Length of storage * (Required)

Discuss with the contractor whether the proposed WMA technology benefits are time sensitive (i.e. will the mix still be compactable at the reduced temperature after being stored for several hours?).

11. Haul time * (Required)

Determine the anticipated production temperature and haul time. Longer Haul times for WMA produced at the lower temperatures have caused laydown problems due to crusting of the mix.

12. Manufacturer's Representative

Will a representative for the WMA technology/equipment be available during mix production?

13. At what point will WMA production temperature be increased?

Contractor should indicate in the QC Addendum what conditions would necessitate increasing WMA production temperature. Keep in mind, reduced binder grade bumping for 20 to 30% RAP will not allow WMA production temperature to exceed 275° F. One condition should be hotter initial loads to heat up laydown equipment. This should also be addressed in the QC Addendum.

14. At what point do you switch back to HMA?

Contractor should indicate in the QC Addendum what conditions would necessitate switching back to HMA. Keep in mind, reduced binder grade bumping for WMA containing 20 to 30% RAP will not apply to the HMA. This should also be addressed in the QC Addendum.

15. Opening to Traffic * (Required)

Some mix tenderness has been reported for some WMA technologies. What is the manufacturer's recommendation on the appropriate time/temperature for opening to traffic to minimize risk of rutting?

**WMA EXPERIMENTAL FEATURE
PROJECT BACKGROUND FORM
(To be filled out by District/Local Agency)**

Contract Number	
District/Local Agency	
Month/Year of Construction	
Route	
Facility Type	
ADT for year of construction	
Project Limits – in-place stationing	
Project Limits – key route stationing (not needed for Local Agency projects)	
Existing cross-section, including rehabilitation history	
WMA Technology	
Which lifts were WMA used in (surface/binder)	
District/Local Agency HMA Design Verification TSR value	
If value engineering criteria was assessed, indicate how (Attachment 1)	
Was credit given for use of WMA?	
If Yes, what was amount of credit?	
District Contact (name, title, phone no., e-mail address)	

**Warm Mix Asphalt Experimental Feature
Contractor Documentation**

This form is to be filled out by the QC Manager and submitted to the District office for signature and submittal to the Bureau of Materials and Physical Research.

Locations: Contract #: _____ Route: _____

Limits of WMA (lane, <u>exact</u> in-place stationing begin/end in each direction)	
Limits of HMA Control Section (lane, <u>exact</u> in-place stationing begin/end in each direction)	

Production Temperature: WMA Technology: _____ Plant Type: _____

	Target °F	Min °F	Max °F	Average °F
HMA				
WMA				

Placement Temperature:

	Target °F	Min °F	Max °F	Average °F
HMA				
WMA				

Production Testing: Mix Design # _____, QC - Testing Temp: _____ °F, QA - Testing Temp: _____ °F

	Conditioned Tensile Strength (psi)	Unconditioned Tensile Strength (psi)	TSR	Visual Strip Rating Coarse/Fine
HMA				
WMA				

	VMA (% nearest tenth)			Voids (% nearest tenth)			Density (% nearest tenth)		
	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave
HMA									
WMA									

Ignition Moisture Correction: HMA _____% WMA _____%

Anti-Strip A-S Used? _____ Brand: _____ Rate: _____

Precision Limits: 1 - never met 2 - sometimes met 3 - met half the time 4 - usually met 5 -always met

Rate the following QC vs QA: Air Voids _____ Asphalt Binder Content _____ VMA _____

