

North Central Asphalt User/Producer Group



An association for the development, improvement and advancement of quality asphalt pavement construction.

WARM MIX ASPHALT OHIO EXPERIENCE

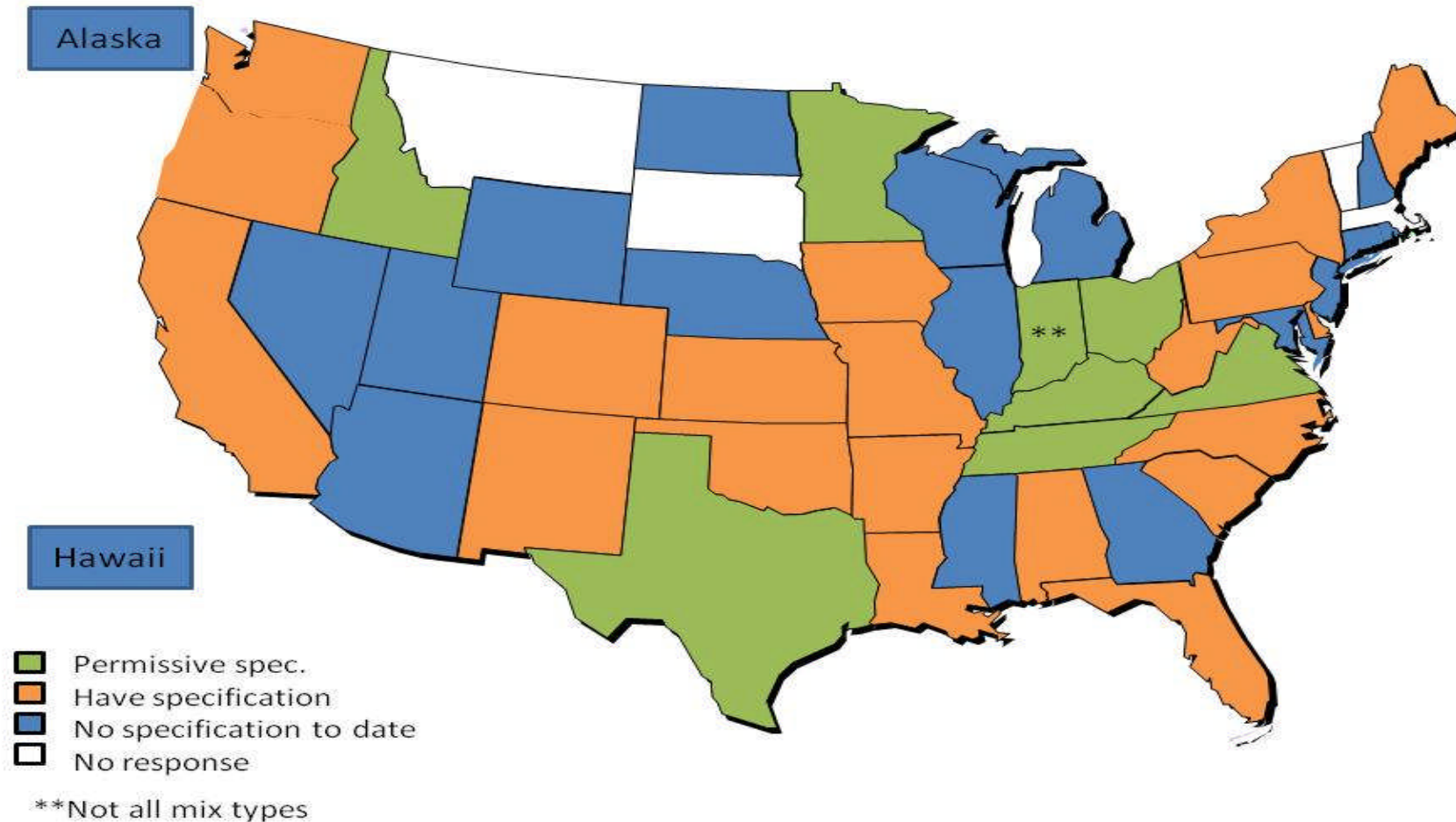
**LARRY SHIVELY
THE SHELLEY
COMPANY**



WMA IS A VALUABLE TOOL FOR THE ASPHALT INDUSTRY

- **PROGRESS IN OTHER STATES SUGGESTS THE EVOLUTION OF WMA HAS OCCURRED**
- **BENEFITS OF ENERGY SAVINGS, BETTER COMPACTION, ABILITY TO HAUL LONGER DISTANCES, AND ABILITY TO EXTEND PAVING SEASON IS DRIVING WMA IMPLEMENTATION**
- **ENVIRONMENTAL BENEFITS OF WMA HAS TO BE CONSIDERED AS EQUALLY IMPORTANT AS THE TECHNICAL BENEFITS!**

WMA in the US





OHIO WMA TIMELINE



- **9/06 FIRST WMA TRIAL PROJECT 3 METHODS (NO FOAMING)**
- **WMA RESEACH PROJECT WITH OU**
- **USED ASPHA-MIN, SASOBIT & EVOTHERM**

PERFORMANCE ASSESSMENT OF WARM MIX ASPHALT (WMA) PAVEMENTS

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Report FHWA/OH-2009/08

for the
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Office of Research and Development

and the
United States Department of Transportation
Federal Highway Administration

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OHIO
UNIVERSITY

Ohio Research Institute for
Transportation and the Environment



FHWA





OHIO WMA TIMELINE



(Continued)

**2008 ODOT DIRECTOR BEASLEY
DECIDES TO USE FOAMING OPTION FOR
WMA-SPECIFICATIONS WRITTEN**





OHIO WMA TIMELINE



(Continued)

- **2009 FIRST WIDE SPREAD USE OF FOAMED WMA-NO HEAVY TRAFFIC USE**
- **2010 INCREASED USE WMA-HEAVY TRAFFIC USE (4/10)**
- **SOME CONCERNS ABOUT HEAVY TRAFFIC USE**





WMA in Ohio



Year	Total Tons*	WMA tons	%WMA of total
2006	4,173,618	0	0
2007	4,677,966	0	0
2008	5,130,600	10,430	0.2
2009	4,953,472	148,576	3.0
2010	3,573,764	1,071,994	30.0



- Tons queried from CMS- actual tons paid during the year, not tons per projects sold.





The Shelly Company 2010

Approximately 54% of its total
production was foamed WMA.



ODOT SPECIFICATIONS

ITEM 402 ASPHALT CONCRETE MIXING PLANTS

[402.01 Description](#)

[402.02 General](#)

[402.03 Scales](#)

[402.04 Thermometers](#)

[402.05 Storage](#)

[402.06 Calibration](#)

[402.07 Computerized Plant System](#)

[402.08 Polymer Binders](#)

402.09 Water Injection System for Warm Mix Asphalt





WMA in Ohio SPECIFICATIONS



The ODOT allows the use of foaming for producing WMA.

402.09 Water Injection System for Warm Mix Asphalt.

When allowed by specification use a Department approved water injection system for the purpose of foaming the asphalt binder and lowering the mixture temperature. Only use equipment that has been proven stable and effective thru project use on non-ODOT projects. Ensure equipment for water injection meets the following requirements:





WMA in Ohio SPECIFICATIONS

(Continued)



- 1. Injection equipment computer controls are in the plant control room and are tied to the plant computer metering.**
- 2. Injection equipment has variable water injection control controlled by the plant operation rate and the water injection can never exceed 1.8% by weight of asphalt binder.**
- 3. Water injection rate cannot be manually overridden by the plant operator once in the computer.**
- 4. Injection equipment stops water flow when a control or equipment failure in the injection system occurs.**





WMA in Ohio SPECIFICATIONS



(Continued)

- 5. The water injects into the asphalt binder flow before the asphalt binder spray hits aggregate. Do not allow water to touch aggregate before the binder spray.**
- 6. Injection equipment includes water storage and pump control tied to the injection computer controls.**
- 7. Water storage low water alarm installed in the control room.**
- 8. Provide a PG binder sampling valve between the last piping tee on the tank side of the line and the injection equipment to sample PG binder before water is injected.**
- 9. Provide a PG Binder sampling valve at the injection equipment to sample binder prior to spray.**



ODOT 441.09

For hot mix asphalt use the JMF lab compaction temperature. For warm mix asphalt according to 402.09 use a lab compaction temperature 30.0 °F (16.7 °C) less than the JMF lab compaction temperature for hot mix asphalt. Use a compaction temperature tolerance of +/- 5.0 °F (3.0 °C). Record on the TE-199 if the mixture produced was ran at the asphalt plant as a hot mix asphalt (HMA) or as a warm mix asphalt (WMA) produced according to 402.09 or another approved method.

RAP AND WMA GO HAND IN HAND!



- **PLANT WMA RUNS BETTER WITH RAP**
- **LESS OXIDATION AT LOWER TEMPERATURES**
- **USE OF STANDARD BINDER**

ODOT 401.04

No grade change is required with RAP at 26% to 40% if Warm Mix Asphalt (WMA) technology is used in a manner to maintain the mix temperature below 275 °F (135°C). Use WMA technology meeting 402.09. Other WMA technologies must be approved by the laboratory. If desired, WMA may be used to control plant temperatures when producing mixes using RAP above 40%, but a grade change is required if shown necessary by the blending index.



ODOT Mix Designs

- **ODOT allows the use of existing HMA mix designs**
- **Track WMA mixes with “W” prefix**
- **Have not seen a volumetric issue**
- **Compact at 30 degrees less than HMA designs-ODOT 441.09**

WMA & HMA

- **NOT A COMPETITION**
- **WMA HELPS WITH QUALITY OF ASPHALT MIXES**
- **WMA IS A TOOL**
- **WMA CAN WORK FOR ALMOST ALL MIXES**
- **WMA TEMPERATURES MAY HAVE TO BE ADJUSTED TO ADAPT TO VARIOUS PRODUCTION AND MIX CONDITIONS**
- **CUSTOMER COMMUNICATION**
- **WMA MAY NOT REDUCE ROLLERS**
- **WMA MAY NOT REDUCE BINDER CONTENT**

WMA FOAMING OF BINDER

**“MODIFYING THE BINDER SO
IT TEMPORARILY LOWERS
ITS OVERALL VISCOSITY AND
INCREASES ITS VOLUME
WHILE REDUCING MIX
TEMPERATURE”**

WE HAVE THE SPECIFICATION WHAT HAVE WE LEARNED

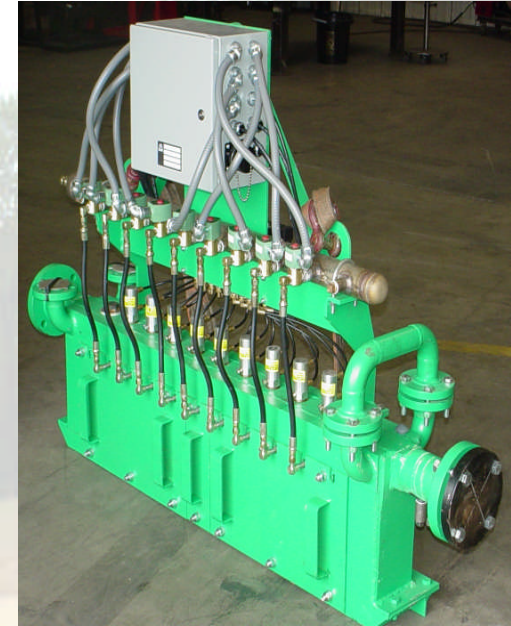
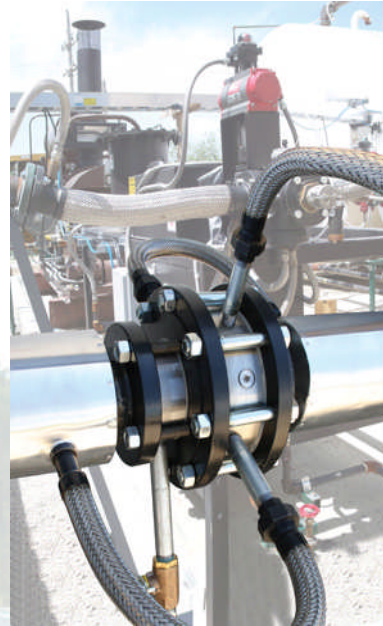
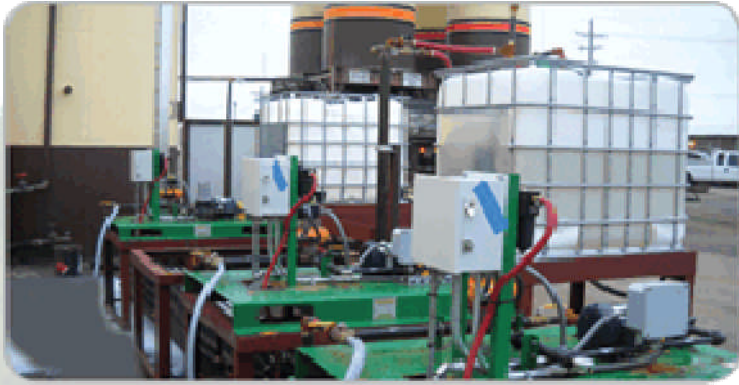
- **MORE WATER MAY NOT IMPROVE THE FOAMING**
- **IN SOME CASES EXCESSIVE WATER MAY CAUSE “GUMMY” MIX**
- **IT IS IMPORTANT TO CONTROL THE WATER DUE TO THE SMALL AMOUNT USED**
- **IT IS A BEST FIT PROCESS-MIX-WATER-PLANT**

WMA FOAMING PROCESS

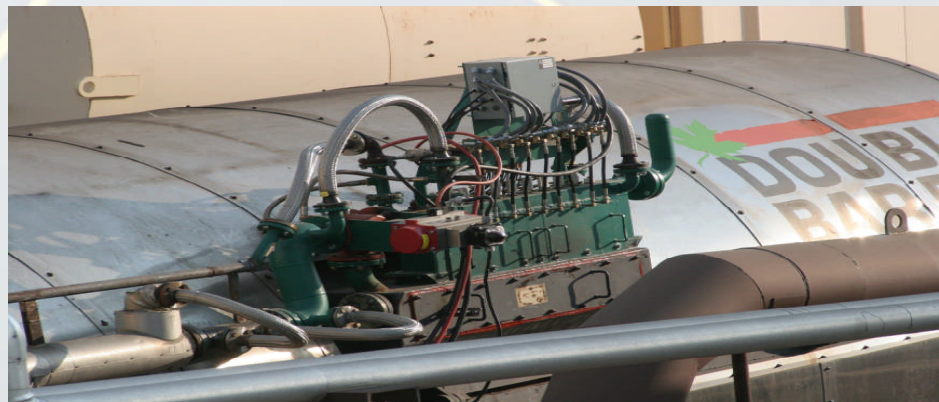
- Many manufacturers supplying the foaming equipment
- The Shelly Company currently uses 5 different WMA manufacturers
- Basically, concept the same-FOAMING
- Each plant and foaming device must be evaluated



DIFFERENT WMA DEVICES



DIFFERENT PLANT SETUPS



PLEASE NOTE

It is not the intent of this presentation to recommend, promote, or endorse any particular WMA foaming system!



FOAMED ASPHALT CAN HELP IN REDUCING BINDER ABSORPTION



**SINCE BINDER VOLUME IS
INCREASED!**



WMA TEMPERATURES

THE CORRECT TEMPERATURE DEPENDS ON MANY FACTORS:

- **MIX TYPE**
- **PLANT TYPE**
- **FOAMING DEVICE**
- **DISTANCE HAULED**
- **AMBIENT TEMPERATURES**



COMPACTION

- **SINCE THE VOLUME OF THE BINDER IS INCREASED ITS LUBRICATION IS IMPROVED THEN THE MIX SHOULD BE EASIER TO COMPACT.**
- **ITS VISCOSITY IS REDUCED!**
- **MUST BE CAREFUL ABOUT OVER ROLLING**





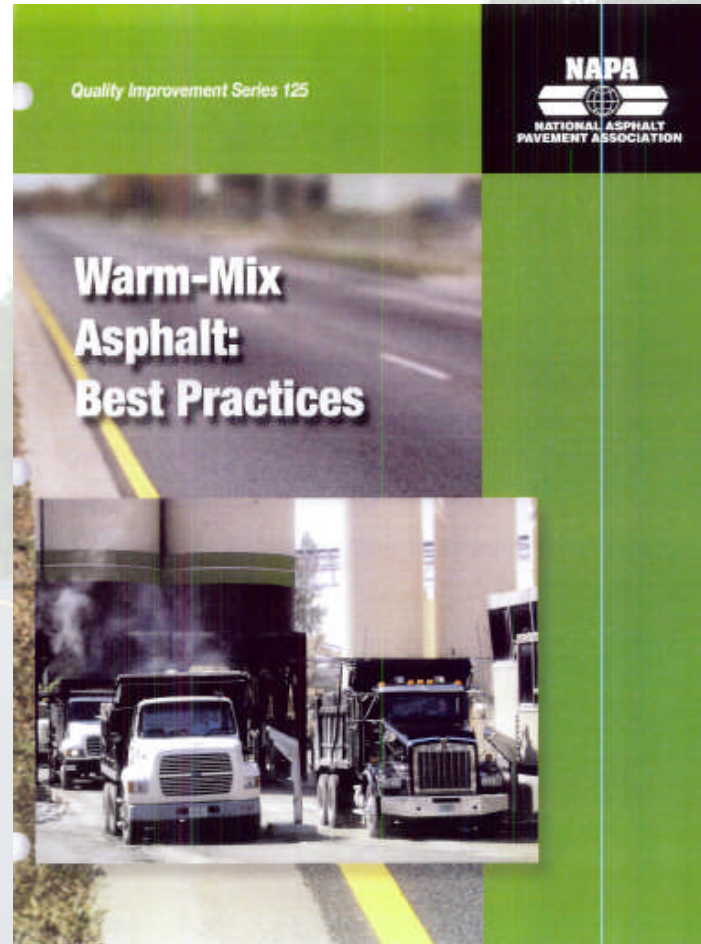
WMA SURFACES CAN HAVE A '*GLAZED*' LOOK!

**THIS IS NOT NECESSSSARILY FLUSHING,
DUE TO THE FOAMED ASPHALT AND IT'S
RETENTION OF THE LIGHT ENDS.**



WMA BEST PRACTICES

- The same BEST PRACTICES as HMA
- Calibrate the water delivery system
- Monitor coating
- Review mix designs
- Monitor compaction effort
- Review publications (new NAPA pub coming out)



Laboratory Foamers?



FOAMED WMA-GREEN?

- **Use less fuel due to lower temperature**
- **No volatiles-WATER**
- **Use more recycle**
- **Some lower emissions**



CHALLENGES THAT REMAIN!

- **Culture of paving crews**
- **Customer demands it-hotter is better**
- **Baghouse and drum flight concerns**
- **Possible low TSR results**
- **Watching out for rutting, flushing, excessive compaction.**

The Second International Conference on Warm Mix Asphalt will be held October 11-13, 2011 in St. Louis, Missouri at the Hyatt at the Arch.

This 2-1/2 day conference will provide a progress report on the implementation of warm mix asphalt. Since the early development of the technology in the late 1990s in Europe to the **wide-spread implementation throughout the U.S.**, numerous innovations in methods to reduce production and paving temperatures of asphalt mixtures as well as investigations of properties and performance have taken place. The National Asphalt Pavement Association and the Federal Highway Administration invite you to participate in this **exciting, rapid-developing, environmentally-friendly field of warm mix asphalt.**



PROGRAMS PRESENTED BY:  

Save the Date! • October 11-13, 2011

2ND INTERNATIONAL WARM-MIX CONFERENCE

Hyatt Regency at the Arch
St. Louis, Missouri, USA

This international conference will spotlight the advances in warm-mix technologies.

Warm-mix service providers and technical services have a unique opportunity to reach out to the international as well as expand their national markets through tabletop exhibiting. Call for more details on exhibiting or for registration questions.



The background of the slide is a photograph of a two-lane asphalt road with yellow double lines, curving into the distance. The road is flanked by green trees and grassy hills. Overlaid on the road is a white outline of the state of Ohio. Inside the Ohio outline, the text "WARM MIX ASPHALT" and "OHIO EXPERIENCE" is written in green, bold, sans-serif capital letters.

WARM MIX ASPHALT OHIO EXPERIENCE

THANK YOU

