NCHRP Project 20-44(01)

Increasing WMA Implementation by Leveraging the State-of-Knowledge

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Principal Investigator

PAPA
Midyear Meeting
August 2, 2017
Vast Investment in Tools Related to WMA

- State
- Industry
- NCHRP

- RAP
- Additives & recycling agents
- RAS
What really is Warm Mix Asphalt?

- Consensus on the definition of **Warm Mix Asphalt** - - a key outcome of 2-day Workshop!

- Producing at lower temperatures for energy/enviro. benefits OR producing at HMA temperatures for late season paving compaction aid

There needs to be consensus on the definition of WMA (or does there?) e.g., warm mix can be placed at warm temperatures when used to reduce emissions or extend haul distances (or durations) ... and... it could be placed at hot temperatures when used as a compaction aid.
What really is Warm Mix Asphalt?

- **Agency survey**

55 agencies - 51 different definitions for WMA
What really is Warm Mix Asphalt?

- **Industry survey**

  41 Industry members - - definition of WMA:
  - 38% defined WMA as mixture production at a specific reduced temperature
  - 19% defined it as the use of WMA technology
  - 17% defined WMA as a mix produced with the use of additives
  - 8% defined WMA as a compaction aid

  The rest are some combination of above, or are unclear
NCHRP Project 20-44(01): Increasing WMA Implementation by Leveraging the State-of-Knowledge

OBJECTIVES

• Identify barriers to broader use and implementation of WMA
• Review definition for WMA and details of WMA specifications
• Update performance criteria for WMA based on feedback from agencies and industry
• Improve and expand tracking mechanisms for WMA usage
# Project Team and Panel

## Project Team

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<tr>
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<tr>
<td>Dr. Leslie Myers McCarthy</td>
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<td>Dr. Jo Daniel</td>
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<td>Ms. Lee Friess</td>
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## Project Panel Members

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<td>Mr. Harold (Skip) Paul, Consultant</td>
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<td>Dr. Audrey Copeland, NAPA</td>
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<td>Mr. Tim Aschenbrener, FHWA</td>
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<td>Dr. Rebecca McDaniel, Purdue Univ.</td>
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<td>Dr. Ervin Dukatz Jr., Mathy Construction</td>
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<td>Mr. Frank Fee, Consultant</td>
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<td>Dr. Nelson Gibson, TRB</td>
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NCHRP 20-44(01) Elements: *Project Approach*

Assess published and gray literature related to WMA

Establish and communicate WMA state-of-the-practice

Dialogue for agencies, industry, and researchers

- Topical Bibliography
- Survey Agencies and Industry
- Topical Webinars
- 2-Day Outcomes-based Workshop
- 1 participant per DOT, asphalt contractors
- Topics for Breakout Sessions
Topical Bibliography

Establish State-of-the-Knowledge:

- NCHRP reports
- NAPA reports
- State DOT specifications and APLs
- State DOT/univ. reports
- USACE reports
- FHWA reports
- Case studies

Format of Topical Bibliography:

- General Findings
- Benefits and Challenges
- Gaps in Knowledge

Common Themes: lack of documented long term performance of WMA mixes, need for evaluation of cracking properties of WMA mixtures.
Survey of Agencies and Industry

Establish the State-of-the-Practice:

• Definitions of WMA
• Update 2011 Survey for AASHTO NTPEP and 2014, 2015 FHWA-NAPA Surveys
• Practices related to use and performance of WMA
• Identify barriers to better adoption of tools for WMA implementation
• Identify observed or perceived challenges to increased usage of WMA
Topical Webinars

*Warm Mix Briefs are individual, recorded, standalone presentations*

TRB Straight to Recordings (STR) are similar in structure and content to webinars
Unlike live webinars, STRs are available on demand and free to view
Can be consumed in smaller increments than 90-minute live webinars
Email addresses of the presenters are provided if questions arise from the materials

**Purposes of Warm Mix Briefs:**

- Provides the audience with same knowledge basis and background on WMA
- Each presentation may spark ideas to bring forward to the 2-day workshop (please consider taking notes)
Opening and Closing Statements by Skip Paul, TRB AFK-10 Chair

Warm Mix Brief 1
Overview of WMA History, Development & Technologies
1-1 Leslie McCarthy 20-44 Project PI
1-2 Matthew Corrigan FHWA
1-3 Audrey Copeland NAPA

Warm Mix Brief 2
WMA Mix Design and Properties
2-1 Don Christensen AAT
2-2 David Newcomb TTI
2-3 Louay Mohamed LTRC
2-4 Berry Hall Blythe Construction
2-5 Howard Moseley Florida DOT

Warm Mix Brief 3
Lab Conditioning and Aging of WMA
3-1 David Newcomb TTI
3-2 Richard Kim NCSU

Warm Mix Brief 4
WMA Additives and Recycled Materials
4-1 Amy Epps-Martin TAMU
4-2 Richard Willis NAPA
4-3 David Jones UC-Davis

Warm Mix Brief 5
Field Performance and Implementation of WMA
5-1 Amy Epps-Martin TAMU
5-2 Eric Biehl Ohio DOT
5-3 Tom Clayton Colorado APA
Warm Mix Briefs

Available online at:

NCHRP Project 20-44: Increasing WMA Implementation by Leveraging the State-of-the-Knowledge

ALBUMS

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You can add a video to one of your albums or create a new album from the "+Add to..." tab on video pages.

Albums can also be used to show videos on other sites using Vimeo Widgets.

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1 Following
Warm Mix Briefs

Includes PDFs with note-taking areas for participants as they view the recorded videos & index / assessment to track progress
2-Day Workshop: WMA Usage & Implementation

May 8 and 9, 2017
Beckman Center
Irvine, California

- State DOT travel and lodging costs will be sponsored by NCHRP Project 20-44(01)
- Paving Industry involvement in workshop is critical to its success
- Ideas for coordination and communication between agencies and industry will be documented; necessary for improved WMA implementation moving forward

Format of Workshop:
- Will include 4 major topics, as a result of the topical webinar discussion, literature review, & survey results
- Smaller groups will form breakout sessions, guides post-workshop actions
OBJECTIVES OF WORKSHOP

1. *Identify the barriers encountered by those state DOTs where WMA specifications remain to be implemented and proportional WMA tonnage has lagged.*
   - Why isn’t WMA being used more consistently and extensively?

2. *Establish and update implementation performance indicators that better measure WMA implementation as its usage is increased nationwide.*
   - What do we need to provide to the State DOTs to get them to want to truly implement WMA?
GOAL OF WORKSHOP

• Address high level issues related to WMA!

1. Define the problem of why WMA isn’t being used more consistently and extensively.

2. Identify potential actions (through breakout sessions) that lead to more effective and prevalent use of WMA.

3. Answer the question: What do we need to provide to the State DOTs & industry to get them to want to use WMA?
4 Topics in 2 Days

- Defining Warm Mix Asphalt: Past and Future
- Barriers to and Disincentives Against Expanding the Use of WMA
- Cooperative Actions by Agencies and Industry to Expand the Future Use of WMA
- Quantifying the Impacts of WMA over the Long Term: Ways and Means

GOAL: What do State DOTs need to advance in truly implementing WMA?
1. Defining Warm Mix Asphalt: Past and Future

- Consensus on definition of WMA or new approach to defining WMA (pages 40-42 and 56 from Quarterly Report)
  - Green Technology or Compaction Aid? Energy Savings or Engineering Tool?

- Producing at lower temperatures for energy benefits OR producing at hot-mix asphalt temperatures for late season paving compaction aid. What benefits can contractors achieve easily and consistently?
  - Discussion points on research needs, based on gaps, needs, ideas resulting from the surveys

- Lingering needs on mix design issues ("drop in"?, optimum AC or production temperatures)
  - Discussion points based on gaps, needs, ideas resulting from the surveys
2. Barriers to and Disincentives Against Expanding the Use of WMA

• The Real Economics of WMA: *Industry Panel (2 contractors from California and Greg Brouse from Pennsylvania)*
  
  - Discuss the reality of the economics of implementing WMA from an industry perspective. What is the savings documented; what are the challenges from business perspective (what customers willing to pay for vs. what contractor bids); what are the needs in terms of specifications, agency contractual practices, and education/outreach to customers.

• WMA and the Other Customers: *Fritz Anthony (APWA), Lance Malburg (NACE), Dave Aver (City of Santa Rosa, CA)*
  
  - Describe the perspective of WMA by local agencies nationally, in terms of experience with WMA; training needs; environmental goals or requirements in non-attainment air quality zones; partnerships with DOTs and industry; use of APWA Greenroads community of practice; quality and clarity of DOT approved product lists re: WMA; and, contract or incentive types.
3. Cooperative Actions by Agency and Industry to Expand the Future Use of WMA

• Specifications and APL: Jesse Doyle, USACE
  – Discussion of how the outcomes from the USACE experiments, documents, and experience with airfields might be further adapted to better quantify and track Warm Mix Asphalt long-term field performance for highway applications. Discuss the implementation of WMA and field monitoring, and development of appropriate specifications and approved product list (APL) modifications.

• Contract Incentives
  – Contract incentives and bidding issues
  – What type of policies or contracting mechanisms can promote the use of WMA by contractors and local agencies, to support implementation by DOTs?
3. Cooperative Actions by Agency and Industry to Expand the Future Use of WMA (continued)

- Publicizing past WMA performance
  - Research and preliminary trials reported WMA gives equivalent or better performance (compared to HMA). What benefits are DOTs looking for?
  - BMPs reported in surveys
  - What benefits can Contractors achieve easily and consistently?

- Develop upper management support
  - How to develop upper management support at DOTs? Through AASHTO, FHWA, NCHRP?
  - Implementation and education of all stakeholders
  - Equipment needs and costs; costs of chemical additives
• Research needs: long-term performance; LCCA; quantifying energy savings and air quality improvements
  – Obtaining long-term field performance data to run LCCA & substantiate claim that WMA is equivalent to HMA performance
  – Quantifying energy savings & assigning a value to air quality improvement
  – Discussion points on field performance metrics, based on gaps, needs, ideas resulting from the surveys, such as impacts on safety, operations (user delays, etc.), and LCCA
4. Quantifying the Impacts of WMA over the Long Term: Ways & Means?

- FHWA LTPP SPS-10 WMA Experiments: Jack Springer (FHWA)
  - Development of the LTPP SPS-10 WMA field experiments, performance monitoring of the experimental pavement sections, and any preliminary results.
  - How might the outcomes from the FHWA experiments might be further adapted to better quantify and track Warm Mix Asphalt long-term field performance?
  - FHWA currently has a variety of tracking tools, which have been updated in current years, in use as part of the Federal-aid program. How might HPMS or other tools be adapted to document long-term performance (distress history) of flexible pavements constructed with WMA on Federal-aid roadways?
4. Quantifying the Impacts of WMA over the Long Term: Ways & Means? (continued)

- Pavement Performance Management Systems – Adapting for Better Evaluating WMA Over Time: Dave Luhr (WashDOT)
  
  – Share details with the group about the Washington DOT's enhancement of its Pavement Performance Management system, revised to meet post-MAP-21 performance monitoring for pavements.
  
  – How might this system be adapted in some way for more project-level tracking of WMA? Ideas for adjustments to PMS to include WMA element.
  
  – Quantifying impacts of WMA over long term through performance monitoring.
  
  – Tracking WMA (state? industry? federal?) and what should be tracked? Who is responsible for data management?
Outcomes for 2-day Workshop

Set of actions to move forward with WMA implementation and incentivize the use of WMA

Suggested actions for tracking WMA usage
• E.g., tracking WMA tonnage placed per year per state; comparison between how much WMA is placed by DOT vs. local agencies; improved working conditions in the field (reduction in “blue smoke” and perceived better health of workers); perceived improvement or challenge of compaction during placement; documented fuel savings at the plant (reduction in electric or energy bills); and, documented extension of paving season (less strict weather limitations for paving).

Suggestions for tools for tracking long-term performance of WMA
• E.g., tracking distress history by tying into the state PMS database; potential use of enhanced tracking of its use; through an online portal maintained by state asphalt-user producer groups.
Outcomes of Survey:

- Definitions of WMA
- BMPs related to use and performance of WMA
- Identified barriers to better adoption of tools for WMA implementation
- Identified observed or perceived challenges to increased usage of WMA
- Ideas for how to overcome barriers to implementing WMA
POST-WORKSHOP ACTIVITIES

**Products & Outcomes of 2-Day Workshop:**

- Workshop proceedings, including results and a vision for the future of WMA
- Suggested plan of action for implementation of WMA
- Suggestions for establishing a WMA Community of Practice
- Develop research needs statements for TRB, AASHTO, NAPA and FHWA
• Identify needs that you feel must be met in order to better support the implementation of WMA.

Jot down 2 ideas that can contribute to the project

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