NCHRP Project 20-44(01)

Increasing WMA Implementation by Leveraging the State-of-Knowledge

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Principal Investigator

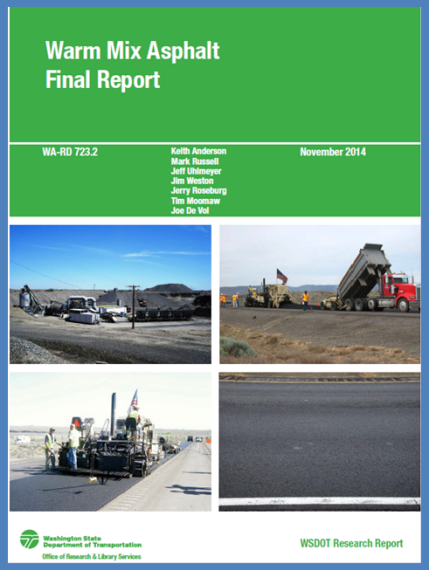
PAPA

Midyear Meeting

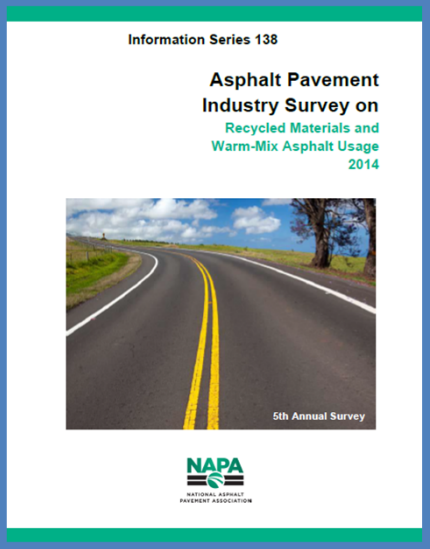
August 2, 2017

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!

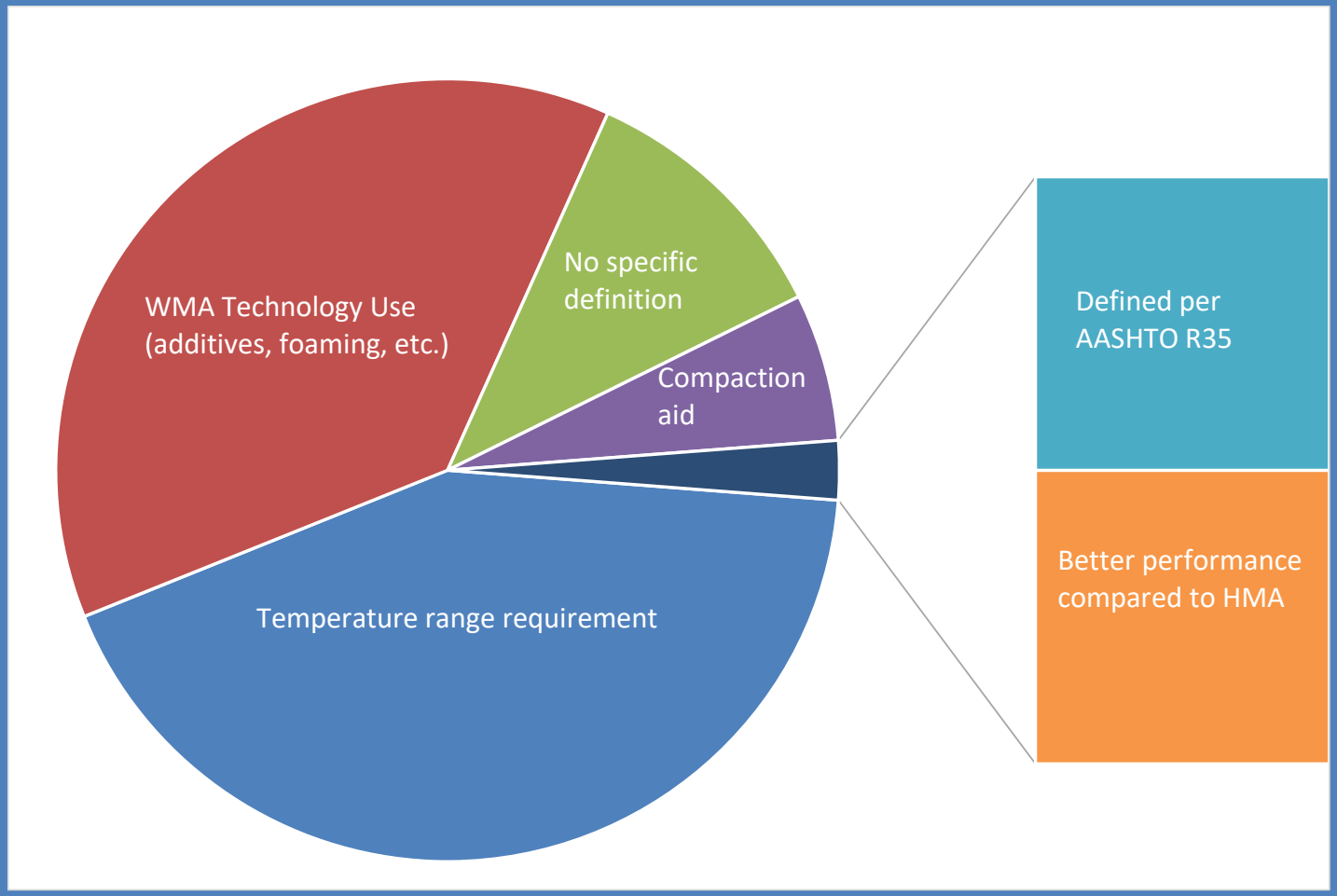
- Producing at lower temperatures for energy/enviro. benefits OR producing at HMA temperatures for late season paving compaction aid

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

Dr. Leslie Myers McCarthy

Dr. Jo Daniel

Ms. Lee Friess

Project Panel Members

Mr. Harold (Skip) Paul, Consultant

Dr. Audrey Copeland, NAPA

Mr. Tim Aschenbrener, FHWA

Dr. Rebecca McDaniel, Purdue Univ.

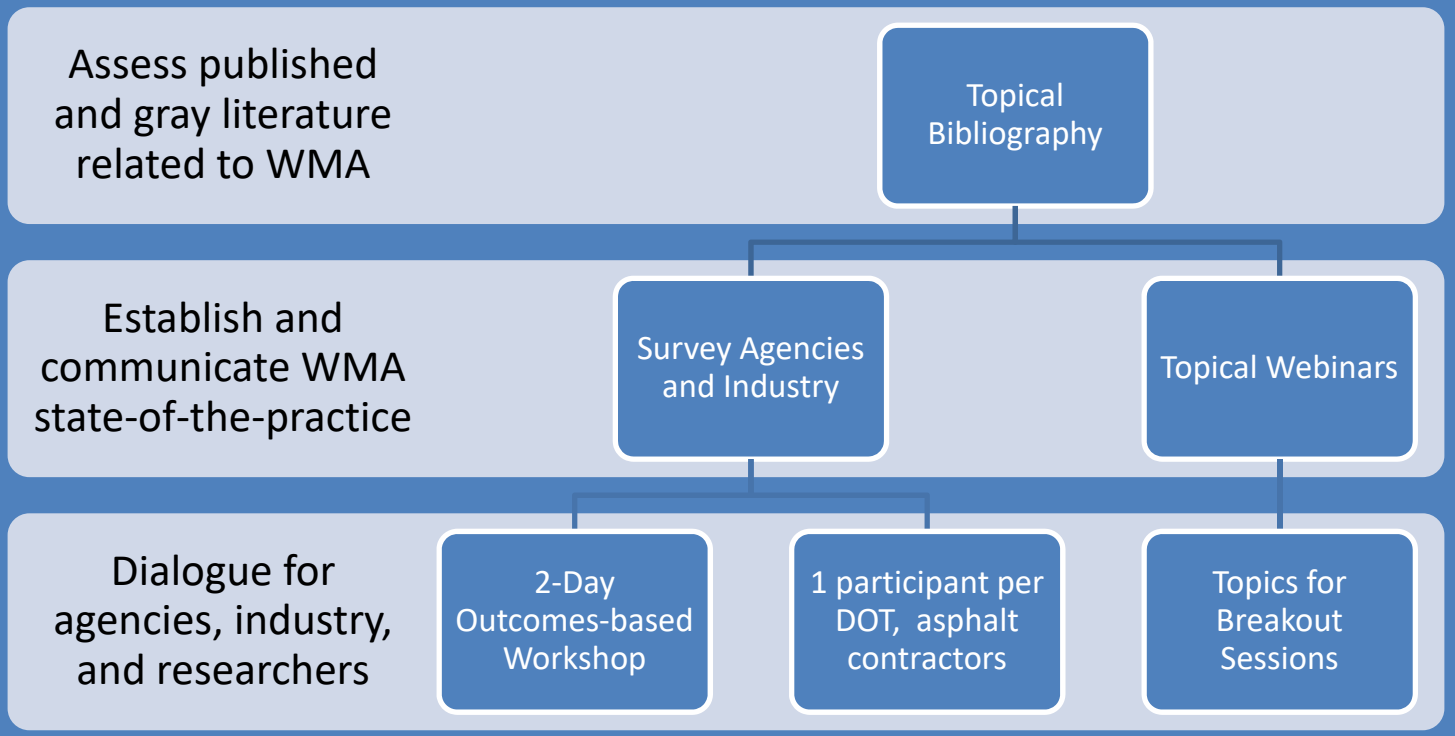
Dr. Ervin Dukatz Jr., Mathy Construction

Mr. Frank Fee, Consultant

Dr. Nelson Gibson, TRB

Project Approach

NCHRP 20-44(01) Elements: *Project Approach*



Topical Bibliography

Establish State-of-the-Knowledge:

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

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)

Warm Mix Briefs

Opening and Closing Statements by Skip Paul, TRB AFK-10 Chair

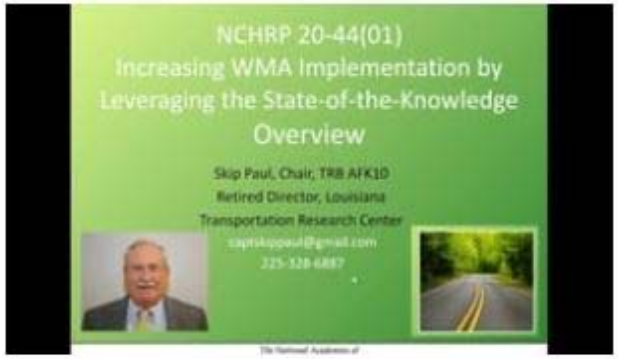
Warm Mix Brief 1 Overview of WMA History, Development & Technologies	**1-1** Leslie McCarthy 20-44 Project PI	**1-2** Matthew Corrigan FHWA	**1-3** Audrey Copeland NAPA		
Warm Mix Brief 2 WMA Mix Design and Properties	**2-1** Don Christensen AAT	**2-2** David Newcomb TTI	**2-3** Louay Mohamed LTRC	**2-4** **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:
http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectI

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

Sort: Preset | Date | Alphabetical | Plays | Likes | Comments | Duration



Introduction to NCHRP Series

1 week ago

NCHRP Project 20-44, Module 1: Overvie...

1 month ago

ALBUMS

There are 21 videos in this album. Albums make it easy to organize a collection of videos. They can be used to display videos together, or sent to friends as a playlist. You can even arrange the order of videos in each album.

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

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

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More stuff from The National Academies

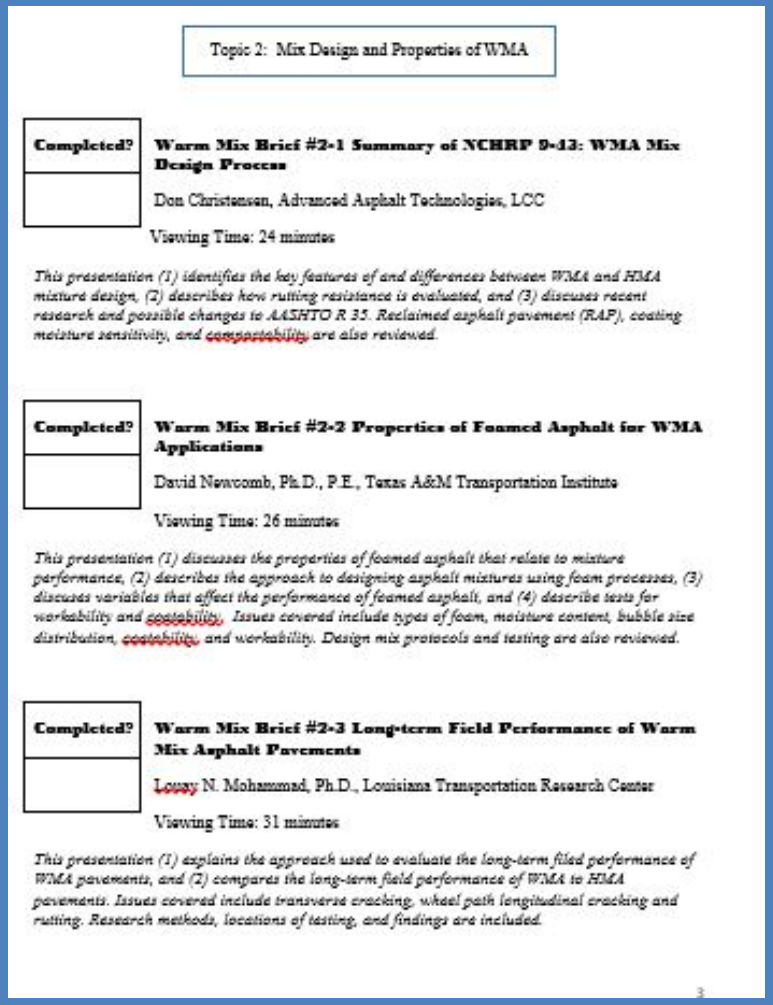
3,519 Videos

243 Collections

1 Following

Warm Mix Briefs

Includes PDFs with note-taking areas for participants as they view the recorded videos & index / assessment to track progress



Topic 2: Mix Design and Properties of WMA

Completed?	Warm Mix Brief #2-1 Summary of NCHRP 9-43: WMA Mix Design Process
	Don Christensen, Advanced Asphalt Technologies, LCC
	Viewing Time: 24 minutes

This presentation (1) identifies the key features of and differences between WMA and HMA mixture design, (2) describes how rutting resistance is evaluated, and (3) discusses recent research and possible changes to AASHTO R 35. Reclaimed asphalt pavement (RAP), coating moisture sensitivity, and compatability are also reviewed.

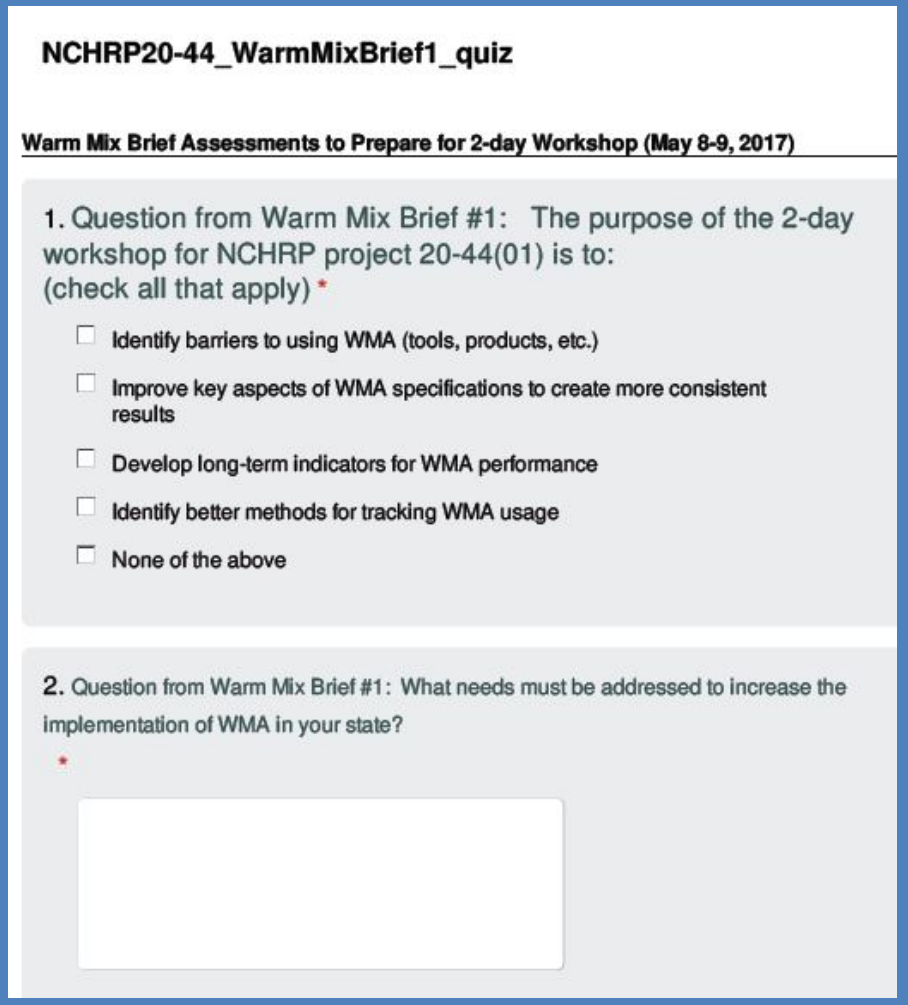
Completed?	Warm Mix Brief #2-2 Properties of Foamed Asphalt for WMA Applications
	David Newcomb, Ph.D., P.E., Texas A&M Transportation Institute
	Viewing Time: 26 minutes

This presentation (1) discusses the properties of foamed asphalt that relate to mixture performance, (2) describes the approach to designing asphalt mixtures using foam processes, (3) discusses variables that affect the performance of foamed asphalt, and (4) describe tests for workability and coatability. Issues covered include types of foam, moisture content, bubble size distribution, coatability, and workability. Design mix protocols and testing are also reviewed.

Completed?	Warm Mix Brief #2-3 Long-term Field Performance of Warm Mix Asphalt Pavements
	Louay N. Mohammad, Ph.D., Louisiana Transportation Research Center
	Viewing Time: 31 minutes

This presentation (1) explains the approach used to evaluate the long-term filed performance of WMA pavements, and (2) compares the long-term field performance of WMA to HMA pavements. Issues covered include transverse cracking, wheel path longitudinal cracking and rutting. Research methods, locations of testing, and findings are included.

3



NCHRP20-44_WarmMixBrief1_quiz

Warm Mix Brief Assessments to Prepare for 2-day Workshop (May 8-9, 2017)

1. Question from Warm Mix Brief #1: The purpose of the 2-day workshop for NCHRP project 20-44(01) is to: (check all that apply) *

- ☐ Identify barriers to using WMA (tools, products, etc.)
- ☐ Improve key aspects of WMA specifications to create more consistent results
- ☐ Develop long-term indicators for WMA performance
- ☐ Identify better methods for tracking WMA usage
- ☐ None of the above

2. Question from Warm Mix Brief #1: What needs must be addressed to increase the implementation of WMA in your state? *

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

NCHRP Project 20-44(01)

RFP Description of 2-Day Workshop

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?

NCHRP Project 20-44(01)

SURVEY RESULTS INDICATED:

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

GOAL:
What do State DOTs need to advance in truly implementing 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

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

3.

Cooperative Actions by Agency and Industry to Expand the Future Use of WMA (continued)

- 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.

Survey of Agencies and Industry

Outcomes of Survey:

- Definitions of WMA
- Update 2011 Survey for AASHTO NTPEP and 2014, 2015 FHWA-NAPA Survey
- 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

PROVIDE FEEDBACK!

- 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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