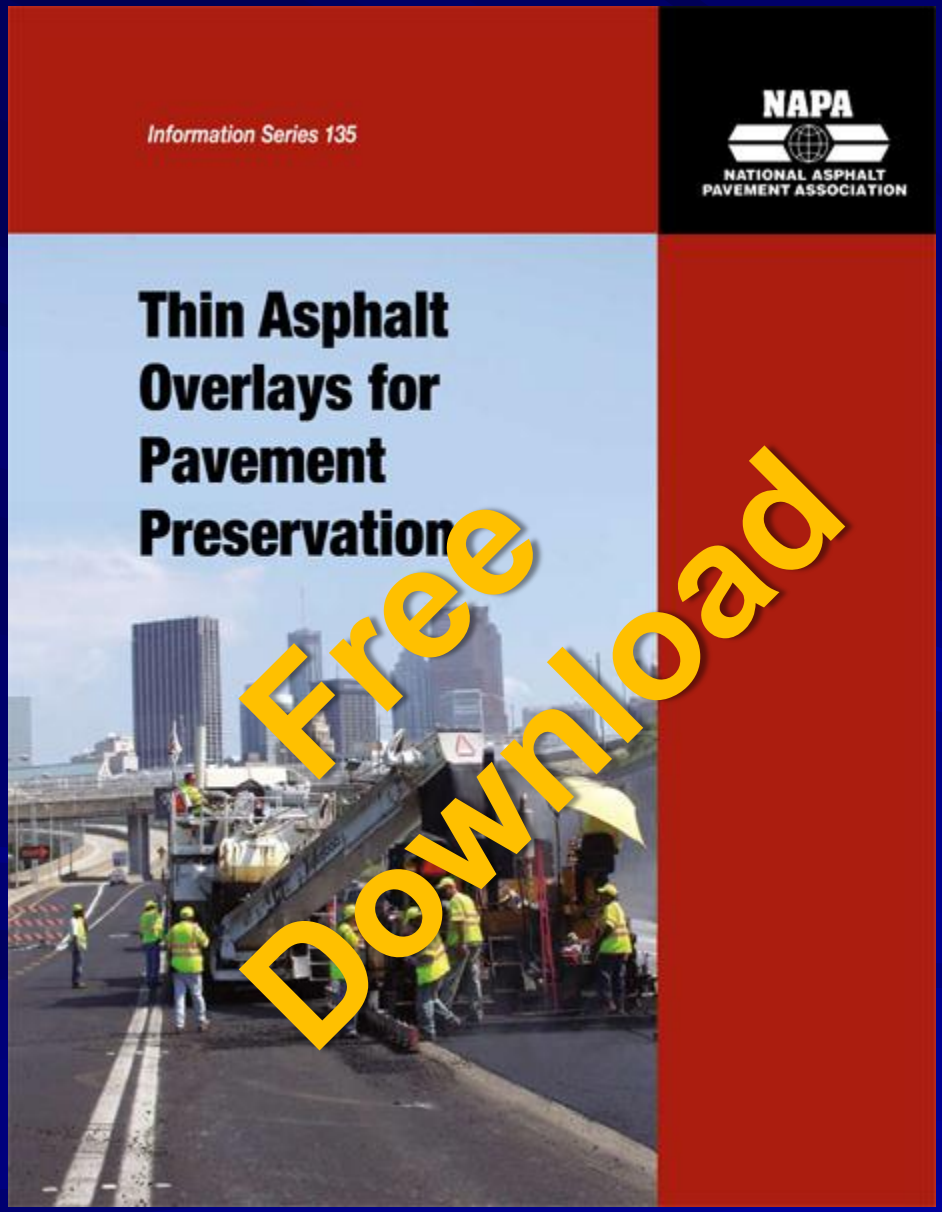
HMA & WMA Technologies

Kent R. Hansen, P.E.
Director of Engineering
National Asphalt Pavement Association

www.store.asphaltpavement.org



- Pavement evaluation and project selection
- Materials and Mix Design
- Construction & Quality Control
- Performance

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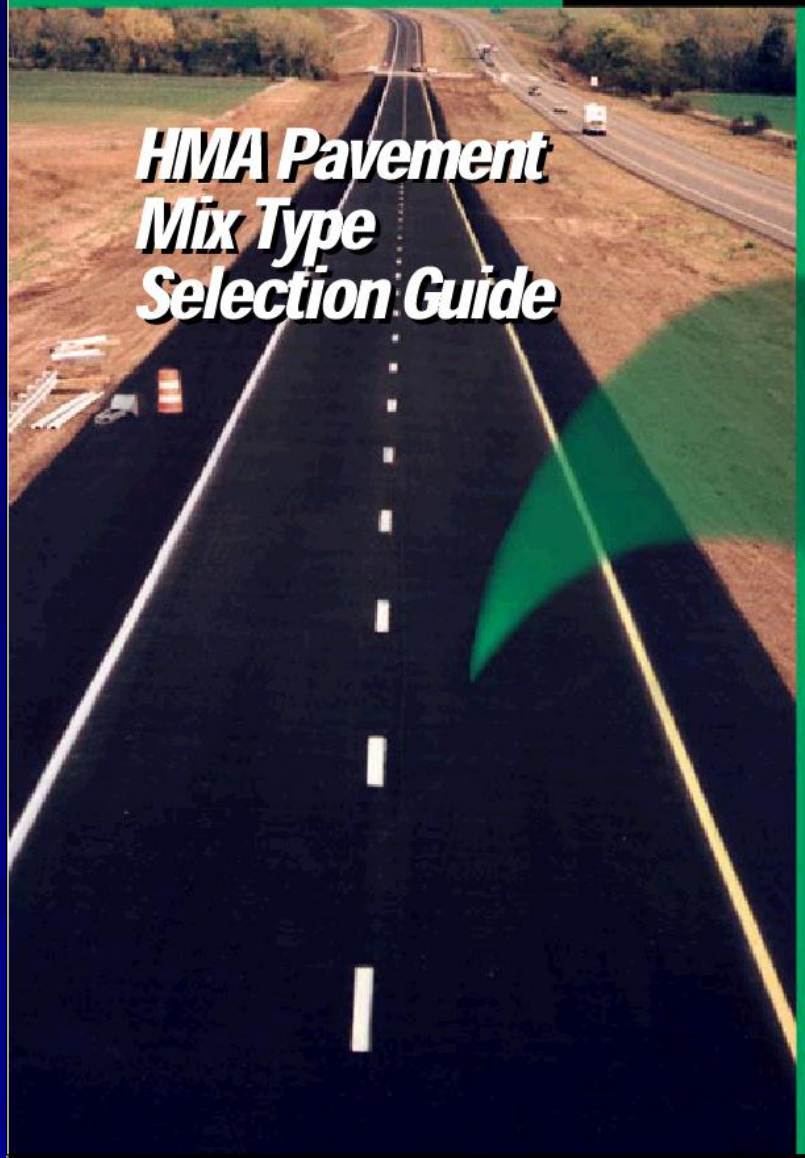
HMA Pavement Mix Type Selection Guide



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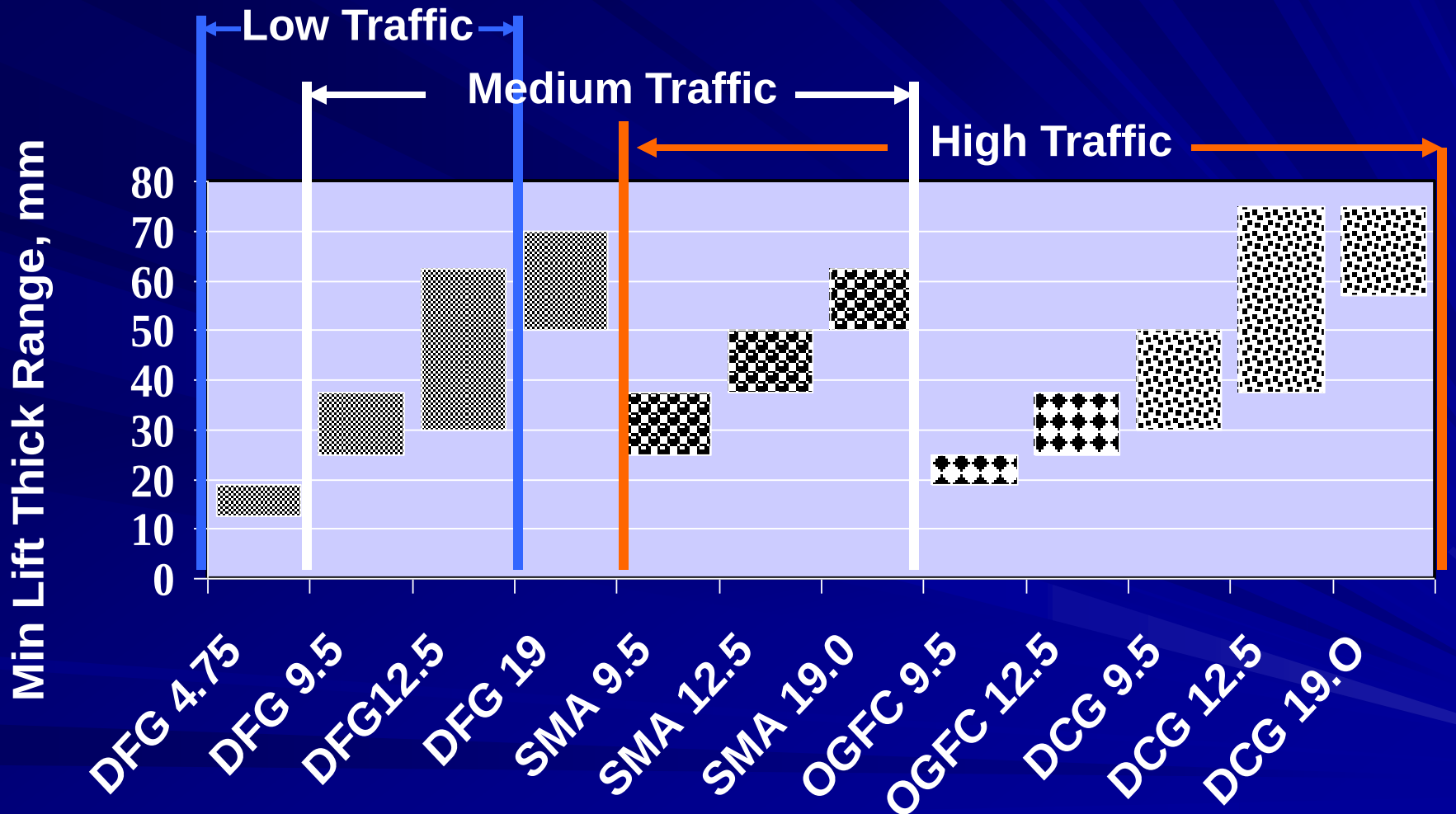
Recommended Mix Types
Surface Courses



TECHBRIEF

Results of Long-Term Pavement Performance SPS-3 Analysis: Preventive Maintenance of Flexible Pavements

FHWA Publication No.: FHWA-HRT-11-049

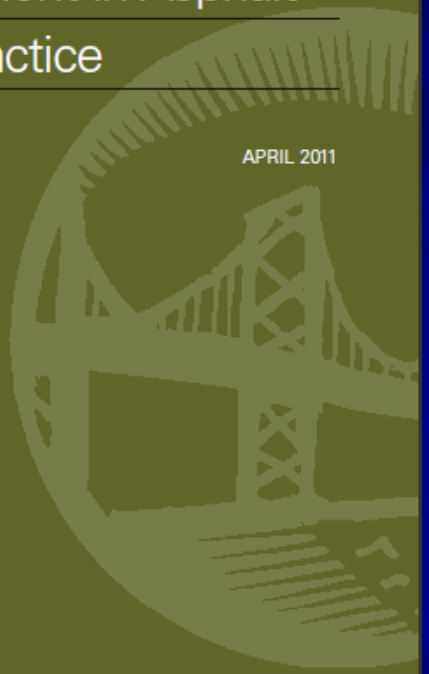
FHWA Contact: Larry Wiser, HRDI-30, (202) 493-3079, larry.wiser@dot.gov

Recycling
RAP & RAS

Reclaimed Asphalt Pavement in Asphalt Mixtures: State of the Practice

PUBLICATION NO. FHWA-HRT-11-021

APRIL 2011



U.S. Department of Transportation
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Research, Development, and Technology
Turner-Fairbank Highway Research Center
6300 Georgetown Pike
McLean, VA 22101-2296

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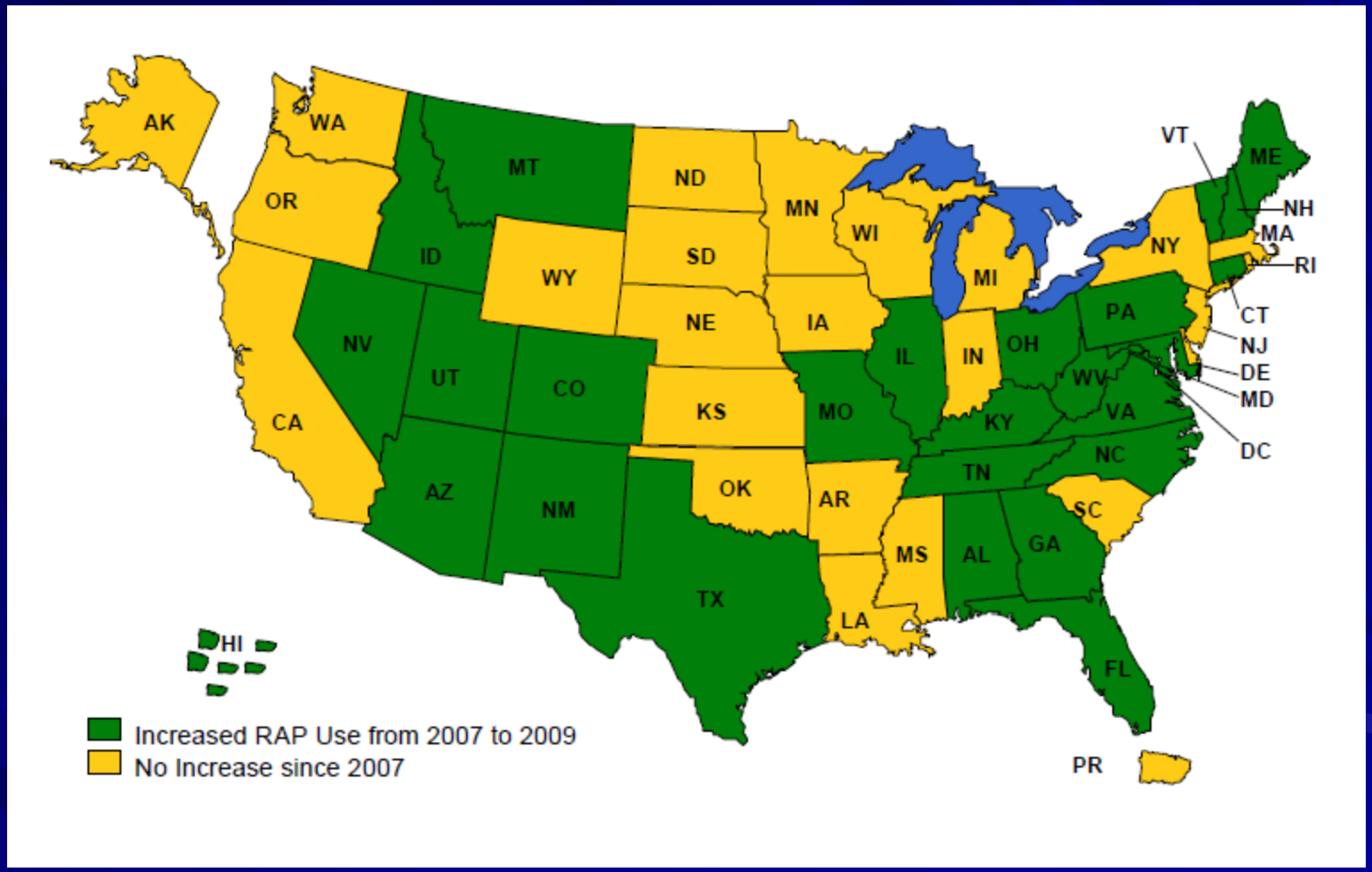
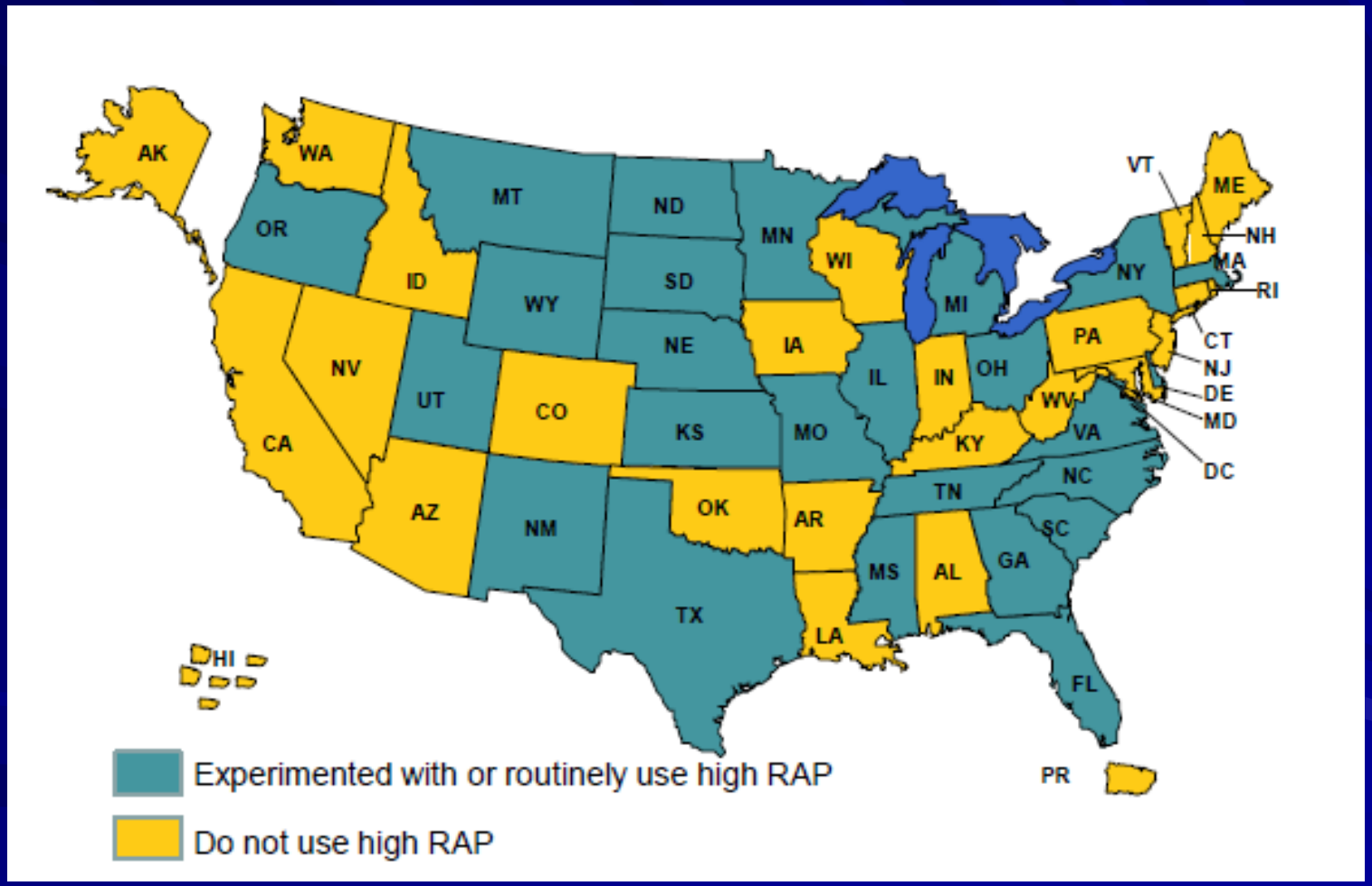
States increasing RAP use



States that have experimented with or routinely use high RAP mixtures



High RAP Performance

- The performance and life of pavement containing up to 30 percent RAP is similar to virgin pavements with no RAP. A survey of LTPP sections containing at least 30 percent RAP showed similar performance to virgin sections.

The Value of Milling

- Removes cracked and aged pavement surface
- Improves pavement smoothness
- Maintains curb height, drainage inlets, and bridge clearances
- Improves bond with overlay

Ref: Randy West, NCAT

Quality Improvement Series 124

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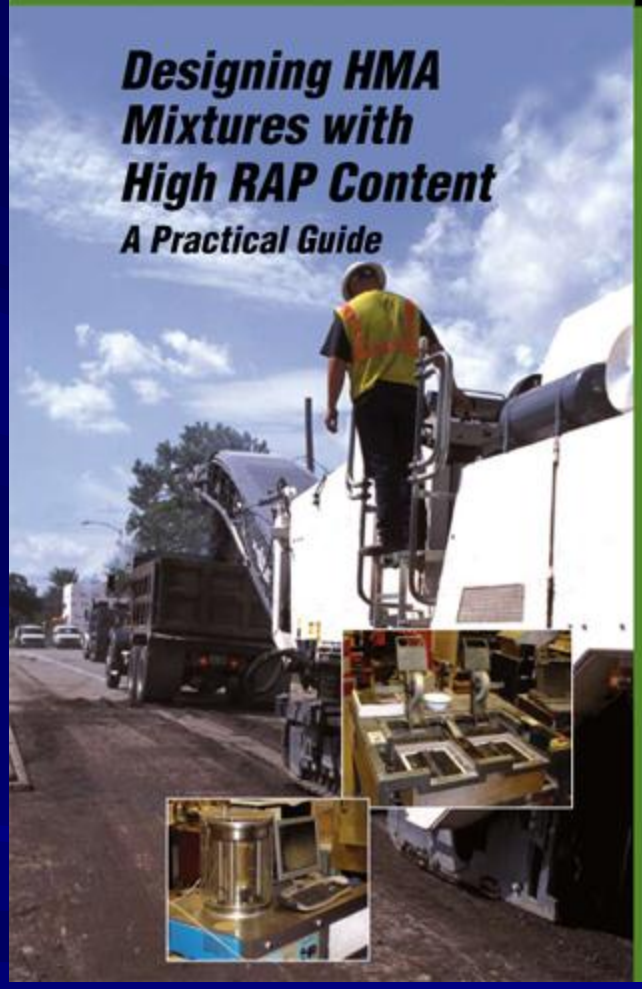
Designing HMA Mixtures with High RAP Content

A Practical Guide



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Recycling Hot-Mix Asphalt Pavements

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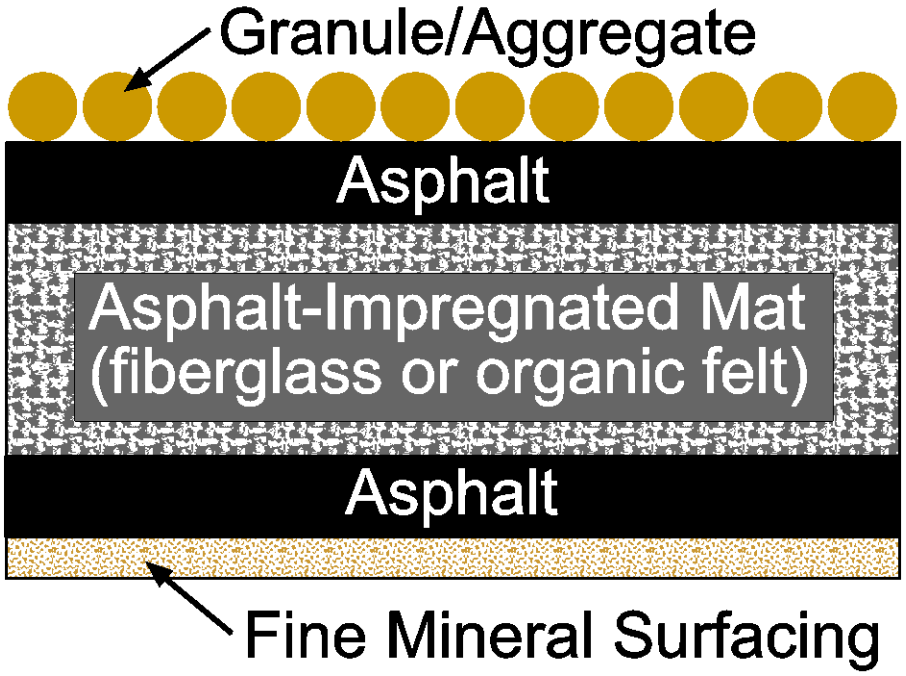
RAS

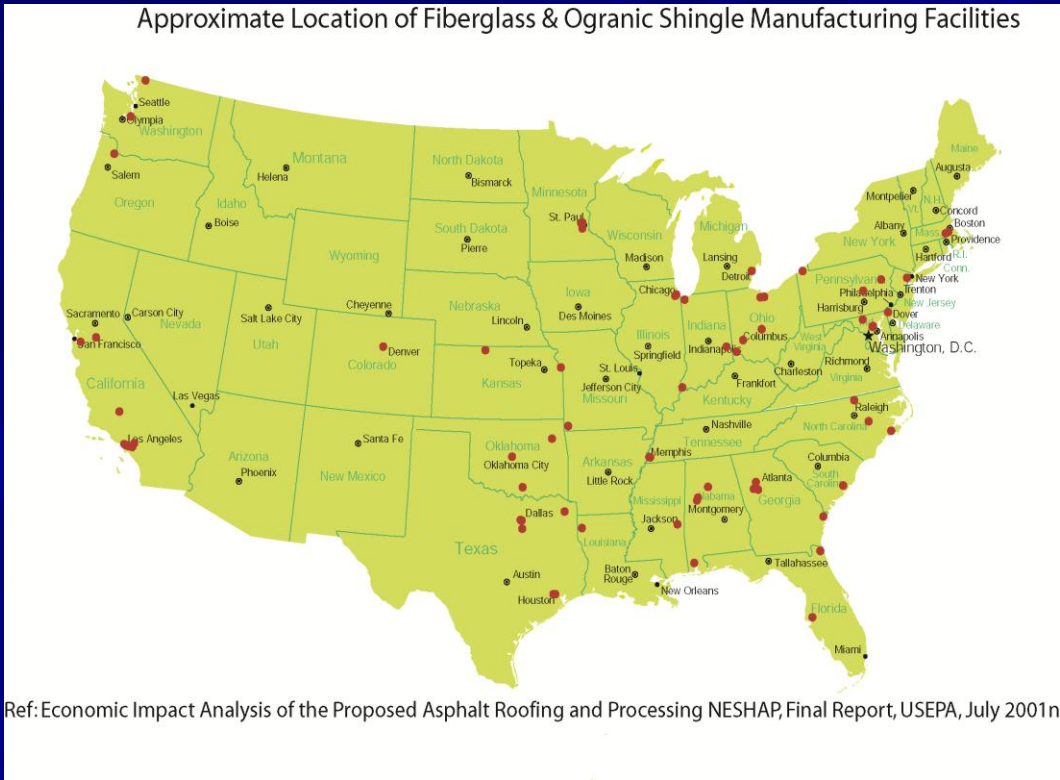
Why use asphalt shingles in asphalt pavement?



All materials commonly used in asphalt pavements

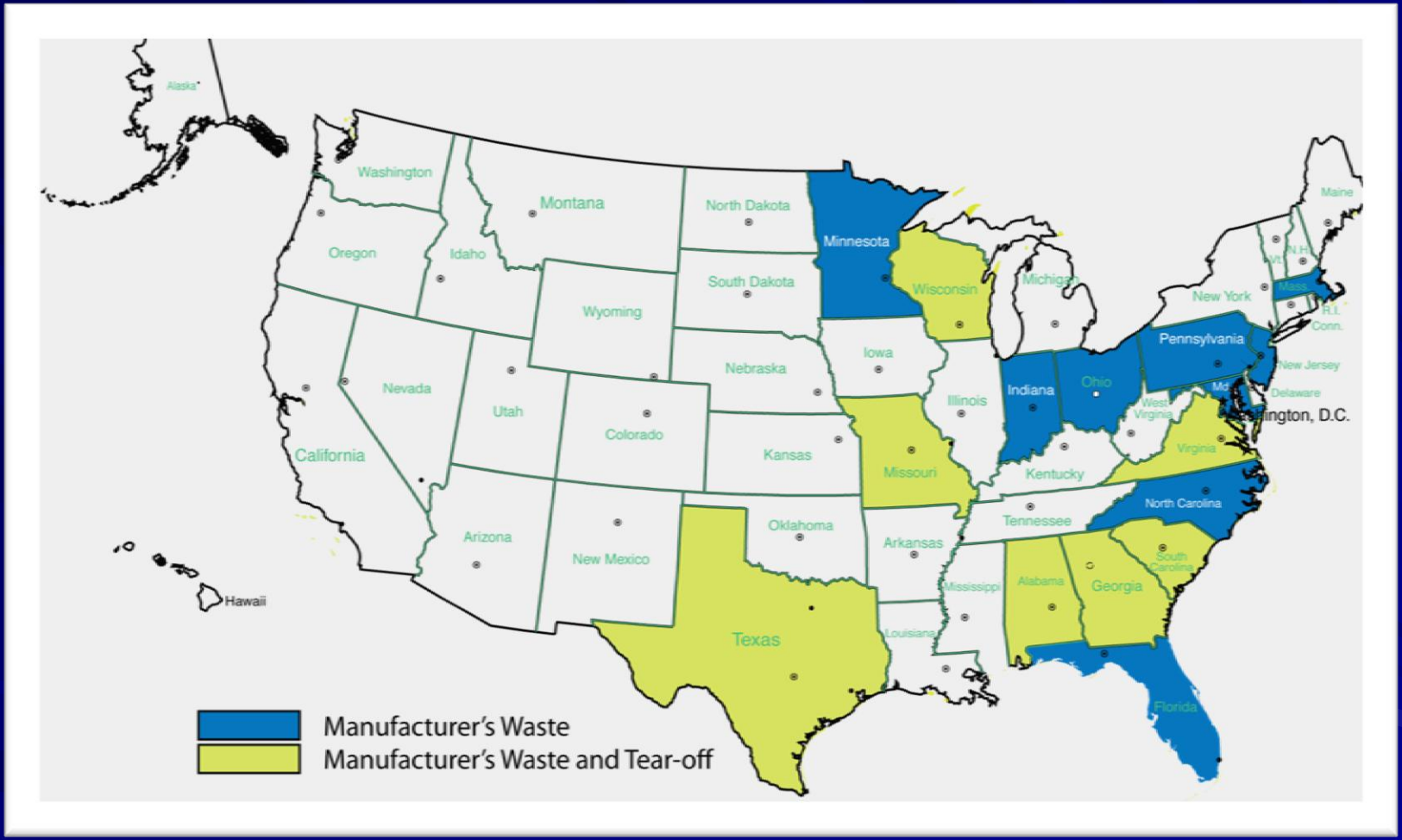
Sources

- Manufactures' waste
  - Limited ~1 MT annual
  - Not in every state
- Tear-offs
  - ~10 MT annual
  - Everywhere?
    - State regulations
    - Processors



Ref: Economic Impact Analysis of the Proposed Asphalt Roofing and Processing NESHAP, Final Report, USEPA, July 2001n

States Allowing RAS in Asphalt Mixes



Pooled Fund Study

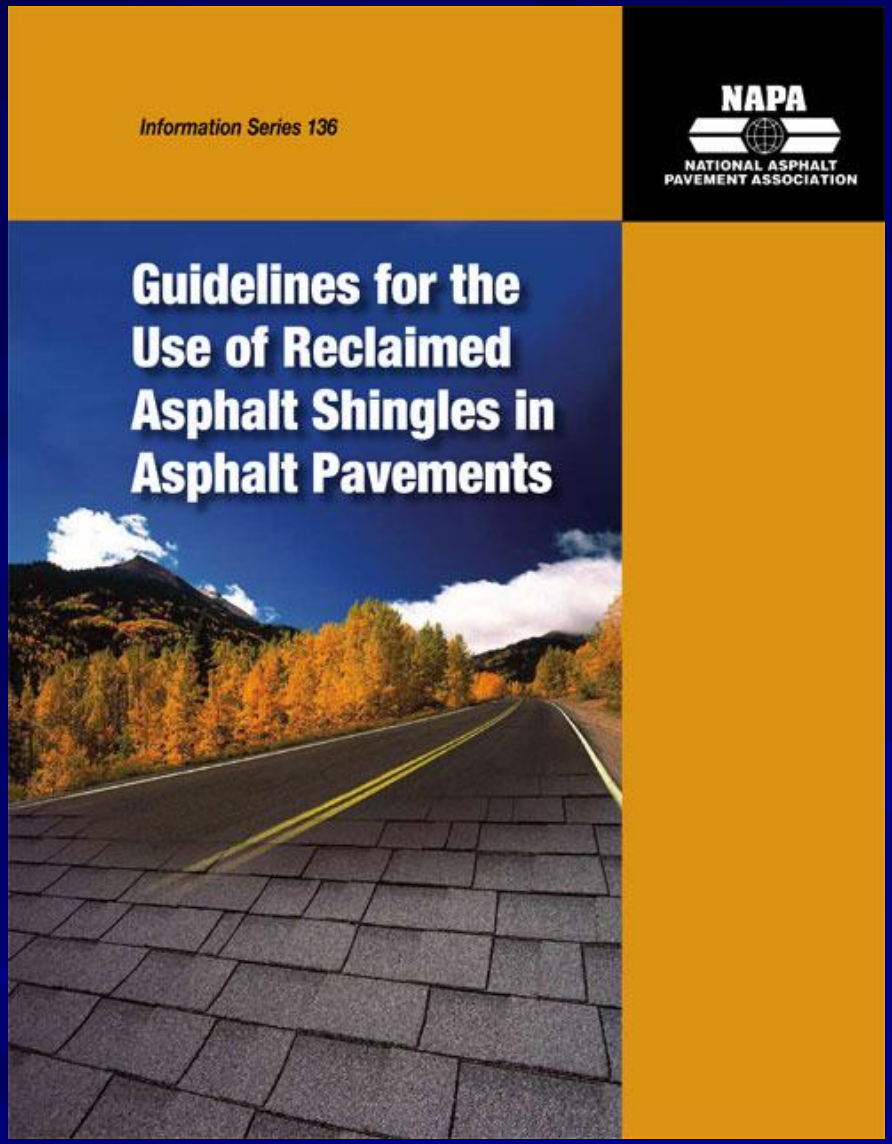
- TPF-5(213) Performance of Recycled Asphalt Shingles in Hot Mix Asphalt
- Sponsoring Agency – Missouri DOT
- Partners – CA, CO, IA, IN, MN, MO
- http://www.pooledfund.org/projectdetails.asp?id=441&status=4

RAS Summary

- Shingles are too valuable to throw away.
- Use manufacturers' waste if available
- Tear-offs
  - Work with roofers to get clean material.
  - Work with local agencies on sampling plan
- Performance
  - Improved rutting resistance
  - Reduced temperature susceptibility
  - Minimum affect on cold temperature properties

RAS Summary (cont)

- Mix AC Content
  - Will reduce the amount of new asphalt required
  - Total asphalt contents often higher (0.2-0.4%)
- Plant production
  - Similar to RAP
- Mix design
  - Similar to RAP
- Construction
  - Use conventional equipment
  - Some contractors report easier density



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www.morerap.us

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Recycling Asphalt Pavement Expert Task Group

DEPARTMENT OF TRANSPORTATION UNITED STATES OF AMERICA

RAP HOME | ASPHALT RECYCLING EVENTS | PAST RAP MEETINGS | ASPHALT RECYCLING RESOURCES

The purpose of this Expert Task Group (ETG) is to coordinate, develop, and improve national guidance and recommendations for the asphalt pavement recycling program. This group will provide feedback as well as encourage correct utilization of recycling technologies and address construction problems with current state-of-the-practice solutions.

The members consist of representatives from highway agencies, industry, and academia.

The ETG is sponsored by FHWA.

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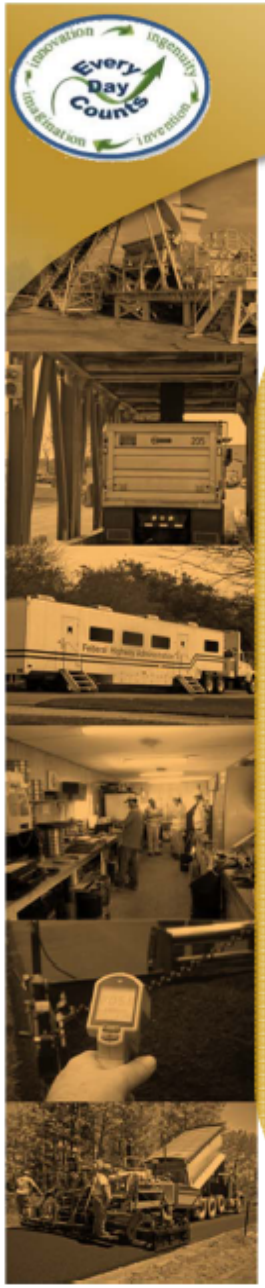
What is WMA?

- Allows a reduction in the temperatures at which asphalt mixes are produced and placed.



WMA Technologies Available in U.S.

In 2005

3

WMA Technologies Available in U.S.

In 2011

30+

WMA Technologies Available in U.S.

... and beyond

2nd International WMA Conference

- 550 persons
- 24 countries

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Stakeholder Engagement: WMA Technical Working Group

Established 2005

Co-Chairs:

Matthew Corrigan

U.S. Department of Transportation Federal Highway Administration

Ron White

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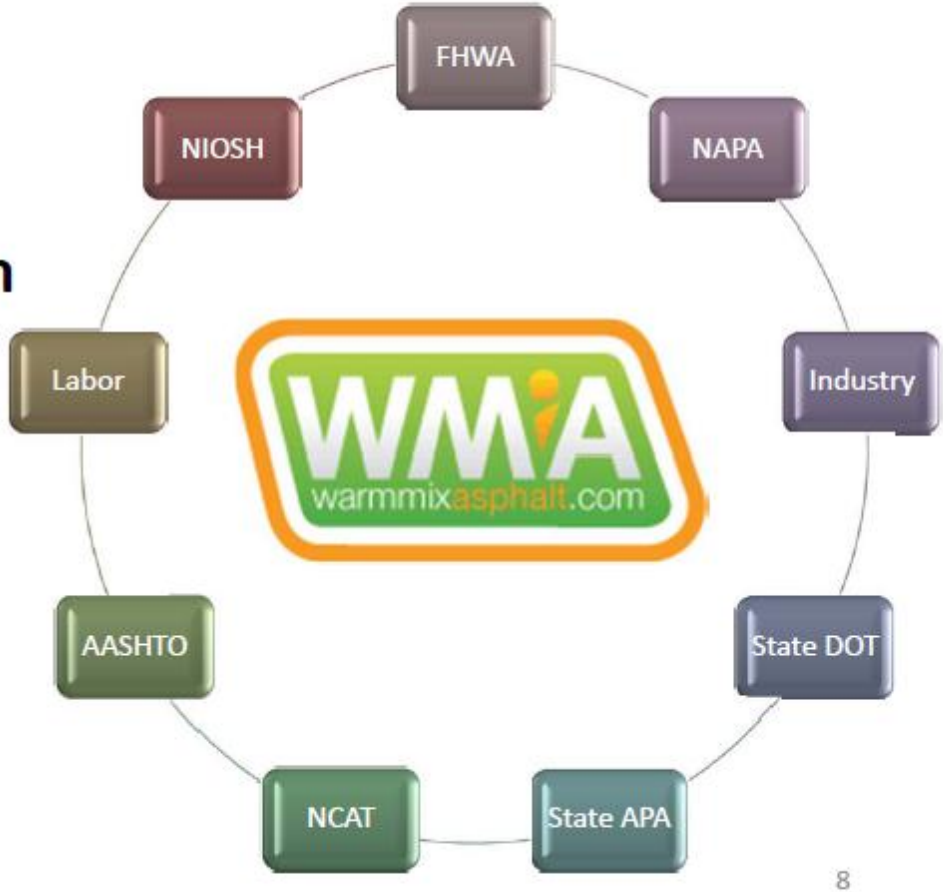

Warm-Mix Asphalt

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The Every Day Counts Initiative

INGENUITY IMAGINATION INVENTION INNOVATION

Accelerating Technology Deployment

Warm Mix Asphalt (WMA)

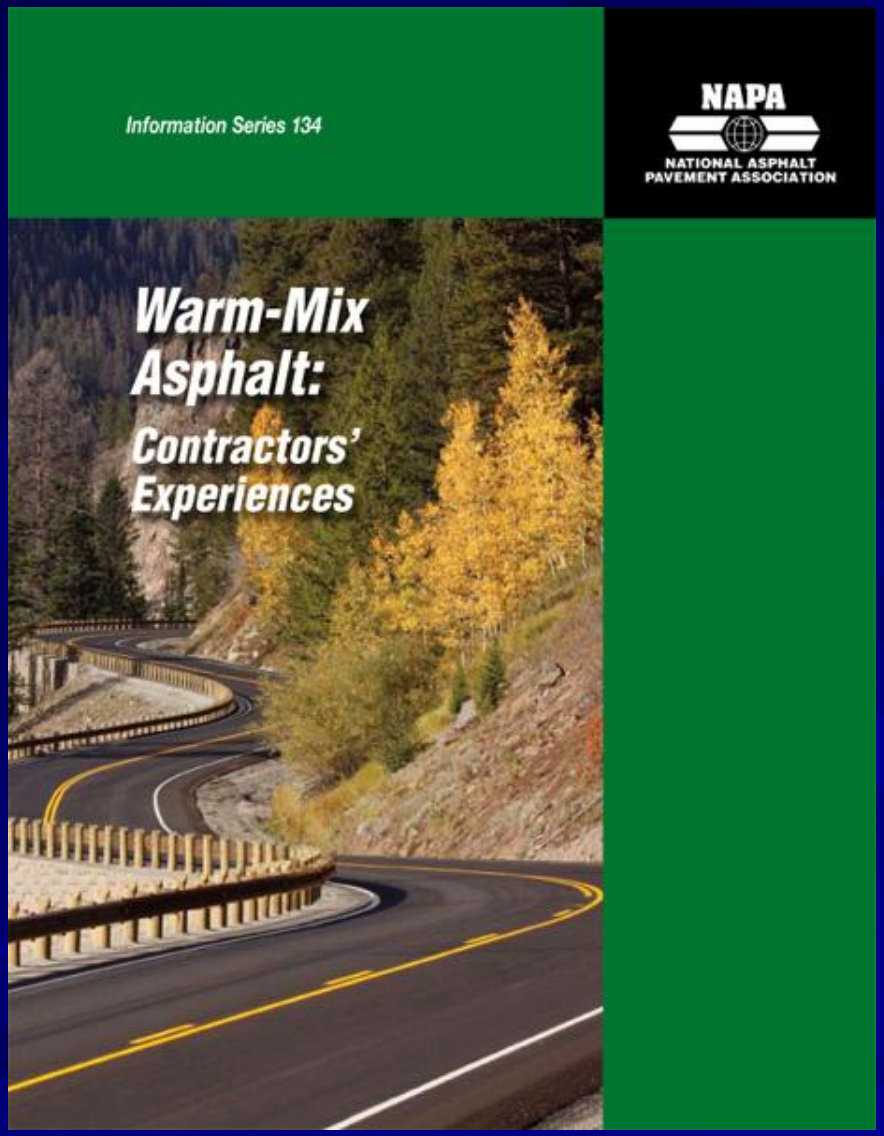
www.fhwa.dot.gov/everydaycounts

Performance Metrics

INGENUITY IMAGINATION INVENTION INNOVATION

1. By December 2011, 40 State DOTs and all Federal Lands Divisions will have a specification &/or contractual language that allows WMA on Federal-aid or Federal Lands projects.

2. By December 2012, at least 30 State DOTs will have achieved set targets for WMA usage.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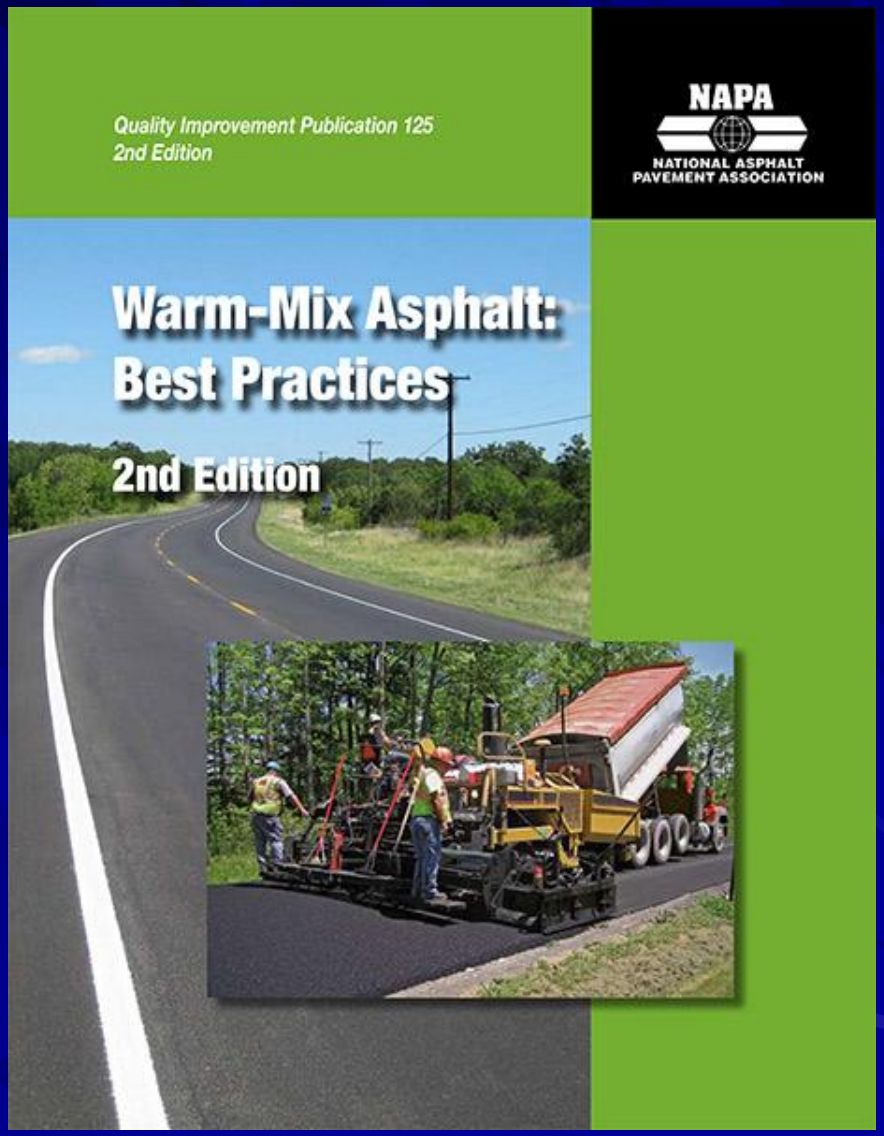
NAPA
NATIONAL ASPHALT PAVEMENT ASSOCIATION
Warm-Mix Asphalt:
Contractors' Experiences


Quality Improvement Publication 125
2nd Edition
NAPA
NATIONAL ASPHALT PAVEMENT ASSOCIATION
Warm-Mix Asphalt:
Best Practices
2nd Edition

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NATIONAL HIGHWAY INSTITUTE

Improving the Performance of the Transportation Industry Through Training

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Course Number: FHWA-NHI-131137

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Special Mixture Design Considerations and Methods for Warm Mix Asphalt - WEB-BASED

PROGRAM AREA: Pavements and Materials

COURSE NUMBER: FHWA-NHI-131137

CALENDAR YEAR	LENGTH	CEU	FEE
2011	2 Hours	0 Units	$0 Per Participant
2012	2 Hours	0 Units	$0 Per Participant

TRAINING LEVEL: Basic

CLASS SIZE: Minimum:1; Maximum:1

DESCRIPTION:

Highway transportation agencies are exploring the use of warm mix asphalt (WMA) for pavement projects. One of their main questions, particularly for agency mixture design technicians and engineers, is how WMA design differs from hot mix asphalt (HMA) design. "Mixture Design for Warm Mix Asphalt" is a Web-based training that presents the modifications to the current Superpave volumetric design procedure, as described in AASHTO R35, that are needed to complete a WMA mixture design. The training highlights key differences in WMA and HMA design procedures, and provides an opportunity to apply the AASHTO R35 standard practice to a WMA design modification.

OUTCOMES:

Upon completion of the course, participants will be able to:

RAP/RAS/WMA Survey
RAP

	Total Estimated Tons Million	
Year	2009	2010
Tons Accepted	67.2	73.5
Tons use in HMA/WMA	56.1	62.1
Tons used in Aggregate	6.2	7.3
Tons used in Cold Mix	1.5	1.6
Tons used in Other	0.7	0.8
Tons Landfilled	0.1	0.004
Avg. RAP %	16.2	18.0

RAP/RAS/WMA Survey
RAS

	Total Estimated Tons Thousand	
	2009	2010
Companies/branches reporting using RAS	44	61
Tons Accepted	957	1,851
Tons use in HMA/WMA	701	1,099
Tons used in Aggregate	6	3
Tons used in Cold Mix	-	-
Tons used in Other	123	124
Tons Landfilled	-	6

57% increase

RAP/RAS/WMA Survey
WMA

	Estimated Total Tons, million	
	2009	2010
Companies/branches reporting using WMA	85	121
DOT	10.7	25.8
Other Agency	3.7	10.1
Commercial & Residential	4.8	11.7
Total	19.2	47.6

Percent increase = 148%

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