XVI ARGENTINE CONGRESS OF ROAD ADMINISTRATION AND TRAFFIC
7° EXPOVIAL ARGENTINA
OCTOBER 22nd to 26th, 2012

tecnologías de tibio mezcla asfalto (WMA)

La perspectiva de los Estados Unidos

Matthew Corrigan, P.E.
ingeniero pavimento de asfalto

Washington DC, Estados Unidos de América

WMA
WARM-MIX ASPHALT

U.S. Department of Transportation
Federal Highway Administration

"Los esfuerzos colectivos de los organismos viales y socios de la industria para avanzar en las tecnologías de tibio mezcla asfalto, como una práctica estándar ha sido enorme."

-Oficina de Tecnología de Pavimentos, FHWA

"[Nosotros] apoyar el desarrollo y la aplicación de tibio mezcla asfalto ... éste se convertirá inevitablemente en la práctica estándar para la producción de asfalto mezcla."

- Alianza Global de Asfalto Pavimento

Global Asphalt Pavement Alliance

NAPA
NATIONAL ASPHALT PAVEMENT ASSOCIATION

"Tibio mezcla asfalto es el futuro de pavimentos flexibles en los Estados Unidos. ... bajar la producción y pavimentación temperaturas promete mejorar el consumo de energía, operaciones y calidad."

-Mike Acott, Presidente, NAPA

"Tibio mezcla asfalto, proporciona una herramienta importante para el ingeniero pavimento ... diseñadores y contratistas por igual tienen ahora una gran oportunidad para aprender más acerca de esta práctica prometedora que está revolucionando la industria de la pavimentación en América del Norte."

asphalt institute

-Pete Grass, Presidente, Instituto de Asfalto

The “Every Day Counts” Initiative

INGENUITY IMAGINATION INVENTION INNOVATION

La iniciativa “Cada Día Cuenta”

Accelerating Technology Deployment

Warm Mix Asphalt (WMA)

WMA WARM-MIX ASPHALT

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.
   - ✓ ***40 States + all FLHD (Complete)***
2. By December 2012, at least 30 State DOTs will have achieved set targets for WMA usage.
   - ✓ **18 Total with set usage goals**

Factors Driving Development

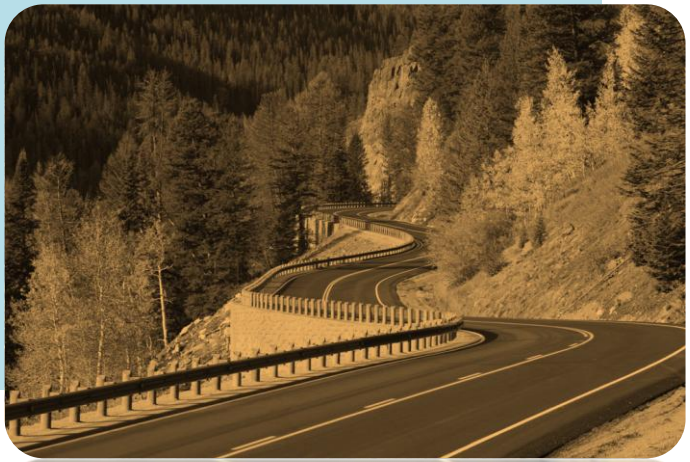
1. Improve field compaction (density) ····→ less variable ····→ better performance!!!
2. Environment- “Green Highway Construction”, reduce energy consumption and emissions
3. Worker comfort
4. Extend paving season and longer haul distances

Memorable Message

- **I.C. = I.P.**

  Improved Compaction = Improved Performance

- **F.E.W. key benefits**
  - Fuel
  - Emissions
  - Worker Comfort



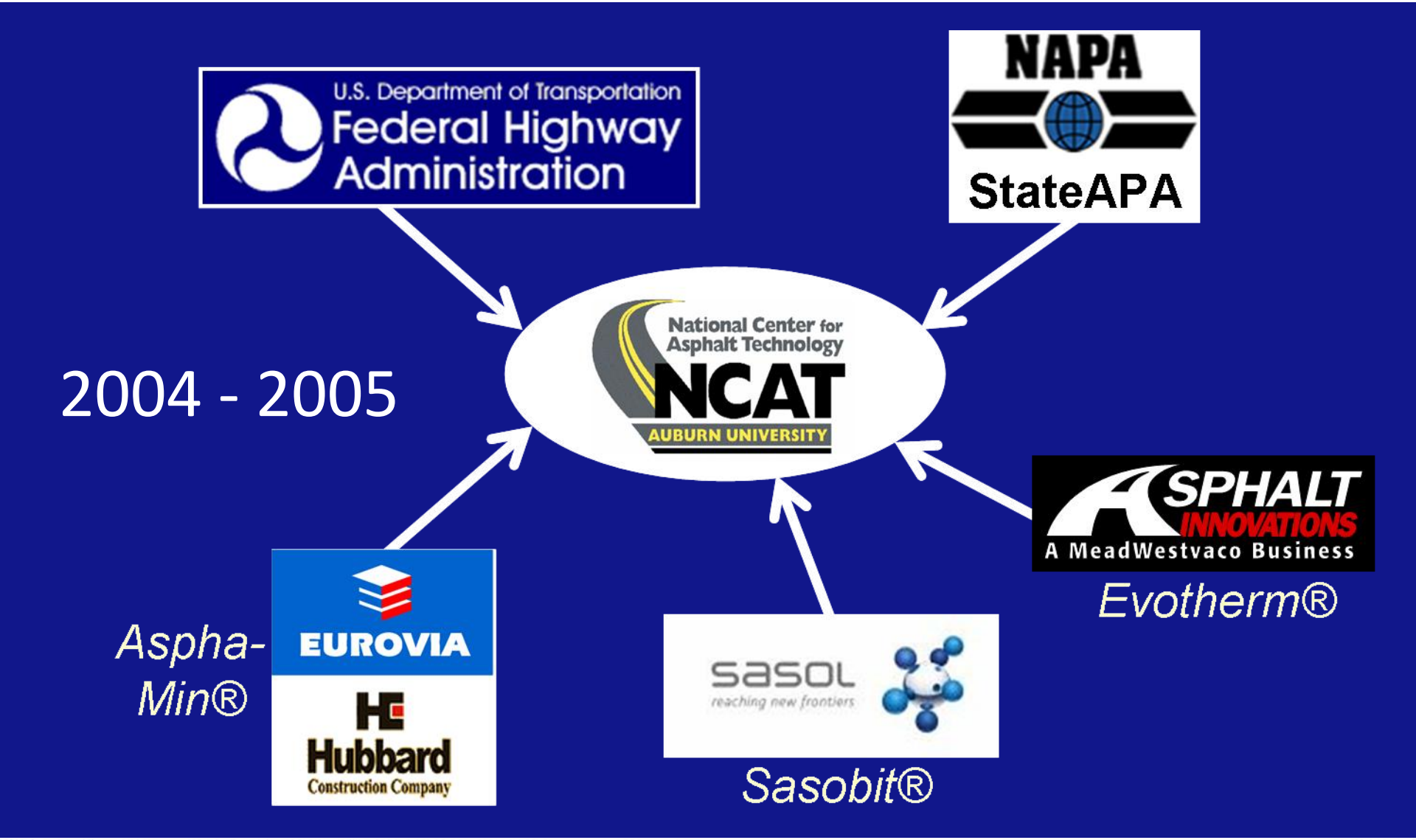
In 2010, use of WMA is estimated:

- We saved over 30 million gallons of fuel during production
- We reduced CO_2e by 800,000 tons
  - Equivalent to taking 150,000 vehicles off the road!
- If used 100% WMA … **10 x**

Hot Mix Asphalt
@ 320°F (160 °C)

Warm Mix Asphalt
@ 250°F (121 °C)

Initial USA Research Partners



Cuantas tecnologías WMA están disponibles en los Estados Unidos

Actualmente hay más de treinta (30 +) y comercializa las tecnologías disponibles en los Estados Unidos

General Technology Categories

Material Processing

- Ex. LEA (Hot Coated Coarse Agg + Moist Fine Agg + Additives)

Organic Additives

- Waxes, Zeolite

Chemical Additives

- Surfactants

Foaming Processing

- Water Injection, Zeolite

Hybrid Systems

Ex. H_20 + Surfactant

Technology Overview**

Materials Processing

- WAM-Foam
- Low Emission Asphalt

**Federal Highway Administration does not endorse or promote any particular proprietary product or technology.

Technology Overview**

Mix additives (Chemical)

- Evotherm (ET, DAT, 3G)
- REVIX (Evotherm 3G)

Mathy Tech. & Eng. Services and Paragon Technical Services, Inc

- Cecabase RT
- Iterlow-T; HyperTherm; QualiTherm
- Rediset LQ

**Federal Highway Administration does not endorse or promote any particular proprietary product or technology.

Technology Overview**

Mix additives (wax)

- Sasobit
- Rediset WMX
- SonneWarmix
- Thiopave
  - a sulphur extender used with WMA
- LEADCAP

**Federal Highway Administration does not endorse or promote any particular proprietary product or technology.

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Technology Overview**

Mix additives (water bearing filler)

- Aspha-Min
- Advera

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Technology Overview**

Water injection at the plant:

- Ultrafoam GX
- Terex
- Double Barrel Green & Green Pac
- Accu·shear
- Aquablack
- ECOFOAM-II
- Meeker WMA
- AquaFoam
- Tri-Mix

**Federal Highway Administration does not endorse or promote any particular proprietary product or technology.

Technology Overview**

Many US technologies' web-linked at:

http://warmmixasphalt.com/wmatechnologies.aspx

warmmixasphalt.com

"This listing does NOT constitute an endorsement or approval."

**Federal Highway Administration does not endorse or promote any particular proprietary product or technology.

Stakeholder Engagement: WMA Technical Working Group

Established in 2005
Adjourned in 2012

Co-Chairs:

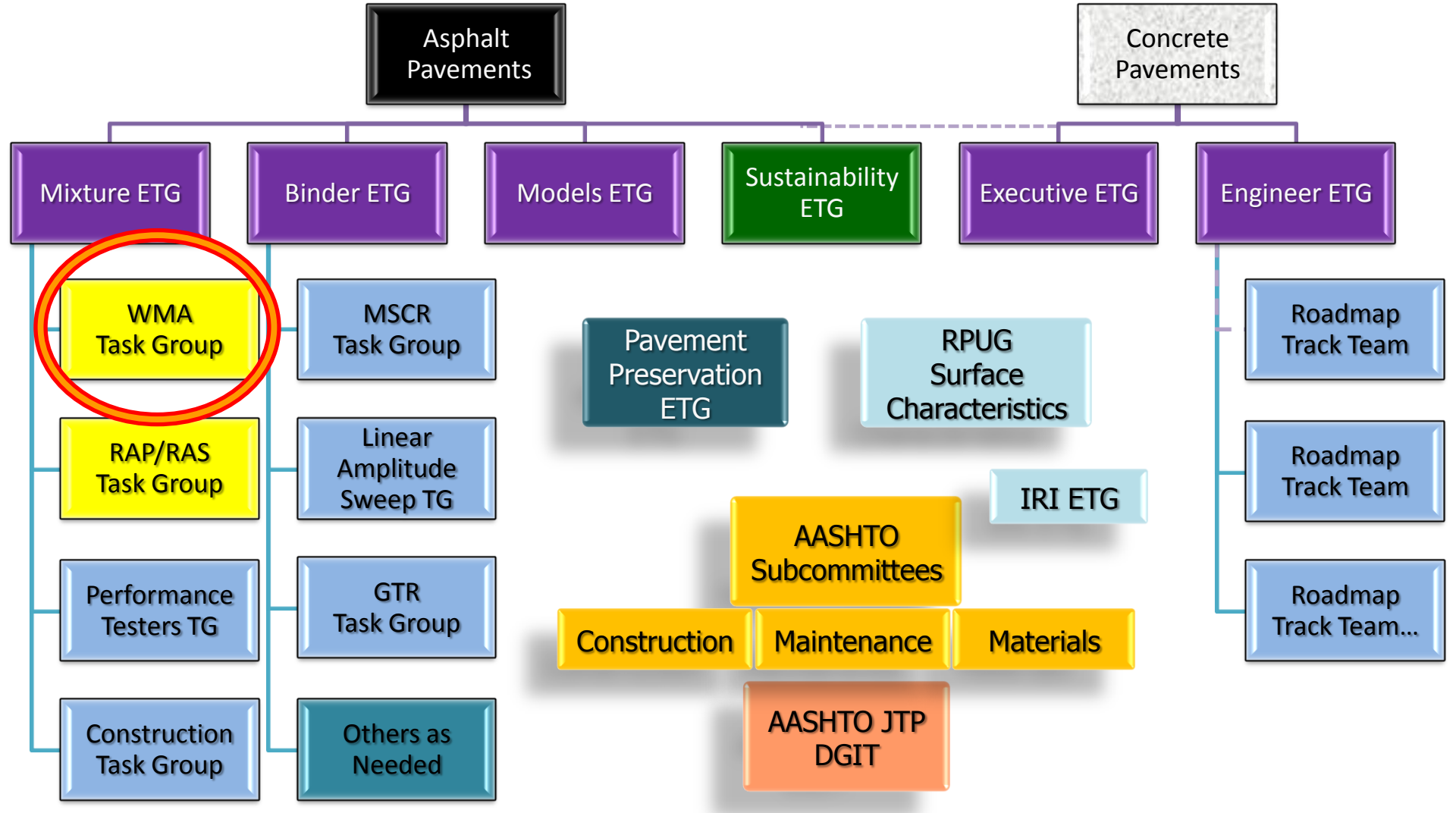
Matthew Corrigan

U.S. Department of Transportation Federal Highway Administration

Ron White

NAPA NATIONAL ASPHALT PAVEMENT ASSOCIATION

FHWA Commitment to Stakeholder Engagement in the Pavement & Materials Program



NCHRP Projects funded as a result of WMA TWG efforts:

9-43	--Mix Design Practices for WMA	$522,501	completed
9-47	--Engineering Properties, Emissions, and Field Performance of WMA Technologies	$79,000	completed
9-47A	--Properties and Performance of WMA Technologies	$1,121,000	Jan 2013
9-49	--Performance of WMA Technologies: Stage I--Moisture Susceptibility	$450,000	Jun 2013
9-49A	--Performance of WMA Technologies: Stage II--Long-Term Field Performance	$900,000	Jul 2016
9-52	--Short-Term Laboratory Conditioning of Asphalt Mixtures	$800,000	Dec 2014
9-53	--Properties of Foamed Asphalt for Warm Mix Asphalt Applications	$700,000	Sept 2014
9-54	--Long-Term Aging of Asphalt Mixtures for Performance Testing and Prediction	$800,000	begin 2013
9-55	--Recycled Asphalt Shingles in Asphalt Mixtures with WMA Technologies	$600,000	begin 2013
20-07 (311)	--Development of a WMA Tech. Evaluation Program	$50,000	completed

Total $6,022,501

National Research Initiatives

TRB TRANSPORTATION RESEARCH BOARD OF THE NATIONAL ACADEMIES

NCHRP 9-54: Long-Term Aging of Asphalt Mixtures for Performance Testing and Prediction

http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=3400

RFP close date: **10/18/2012**

NCHRP 9-55: Recycled Asphalt Shingles in Asphalt Mixtures with WMA Technologies

http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=3401

RFP close date: **11/14/2012**

National Research Initiatives

TRB TRANSPORTATION RESEARCH BOARD OF THE NATIONAL ACADEMIES

Research Needs Statement for proposed 2014 NCHRP 09-xx project:

"Recycling Agents Used For Asphalt Mixtures Containing High Recycled Asphalt Binder Ratios"

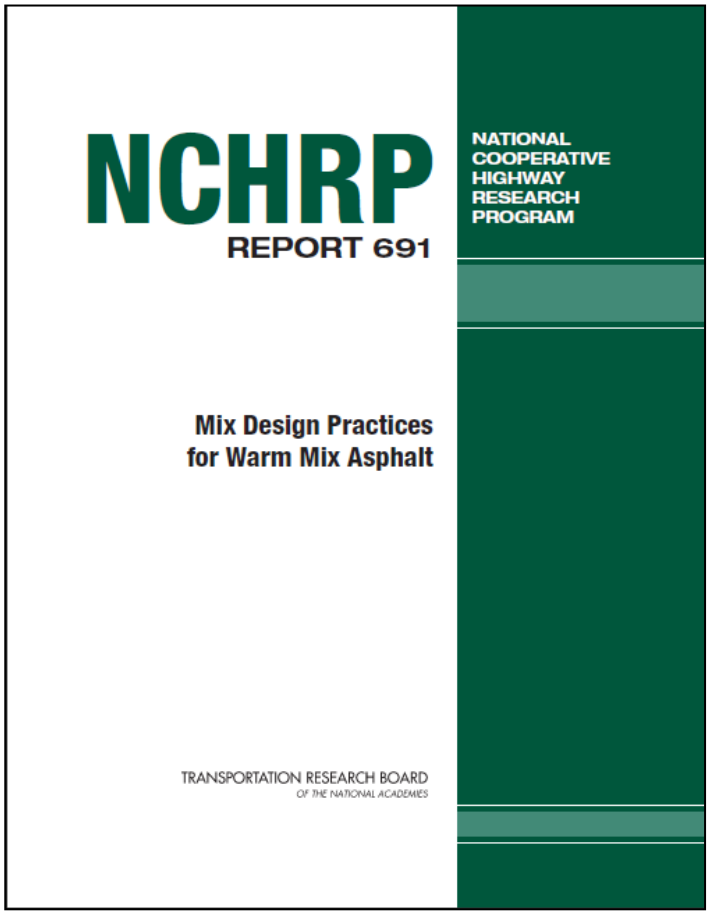
National Research Initiatives

TRB TRANSPORTATION RESEARCH BOARD OF THE NATIONAL ACADEMIES

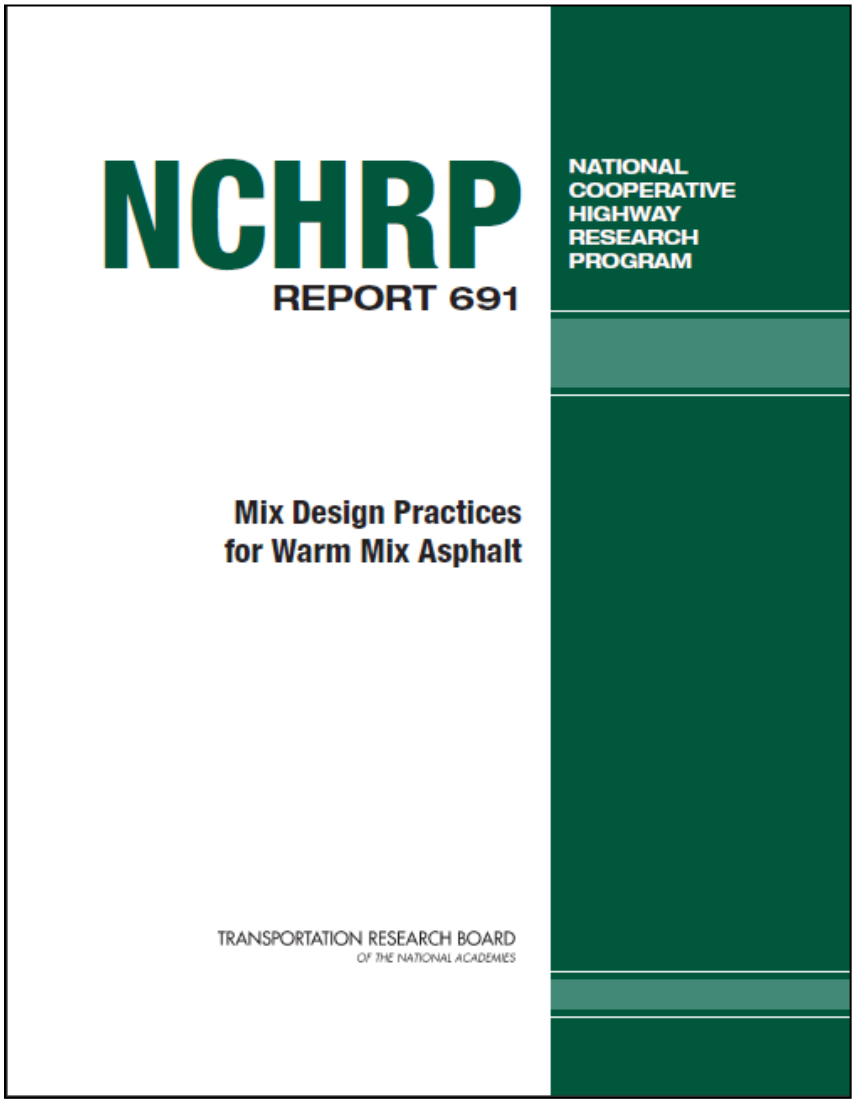
NCHRP 9-43 “Mix Design Practices for Warm Mix Asphalt” $500,000

NCHRP Report 691

COMPLETED



NCHRP Project 09-43



- Final report completed and published as NCHRP Report 691 "Mix Design Practices for Warm-Mix Asphalt"

- http://trb.org/Main/Blurbs/Mix_Design_Practices_for_WarmMix_Asphalt_165013.aspx

NCHRP Project 09-43

Products:

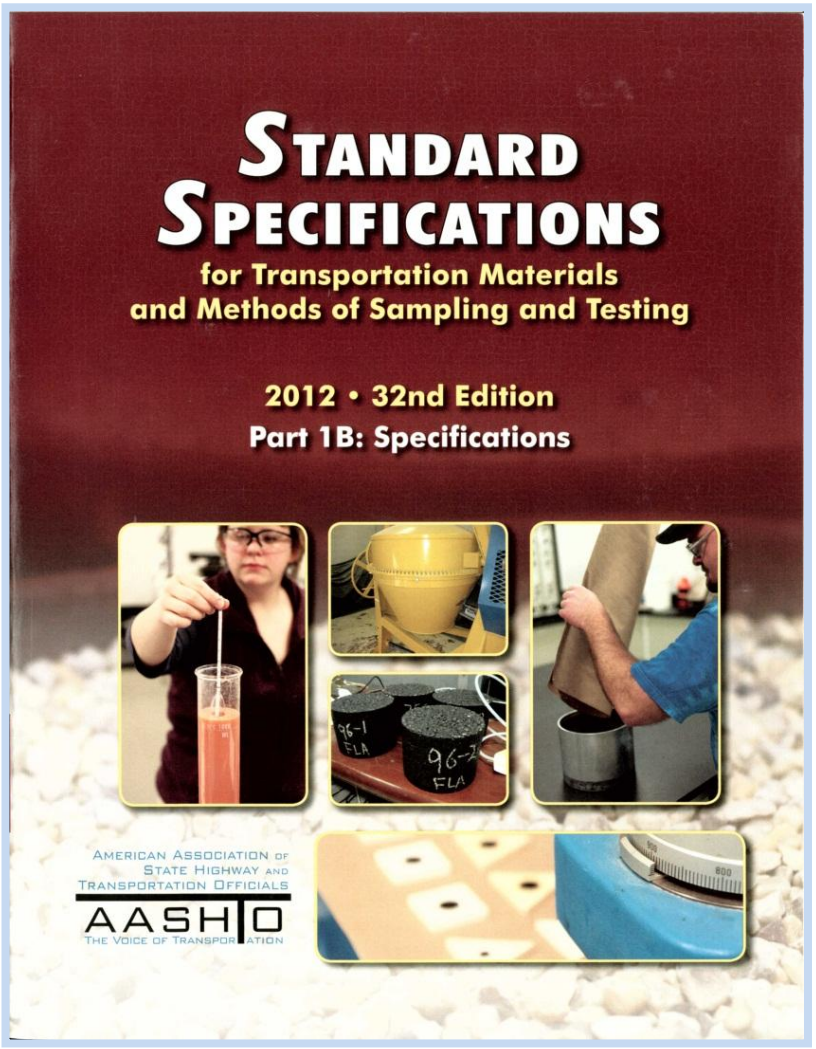
- Appendix to AASHTO R35 with commentary *"Special Mixture Design Considerations and Methods for Warm Mix Asphalt (WMA)"*
- WMA Mix Design Workshop/Training Module
  - Being converted to web based training thru NHI
- Chapter on WMA Mix Design for the NCHRP Project 09-33 Mix Design Manual
- *"Standard Practice For Measuring Properties of Warm Mix Asphalt (WMA) for Performance Analysis Using the AASHTO MEPDG" (AASHTO DARWin-ME™ Software)*

New Resource

www.ct.gov/dot/AASHTO-R35

Appendix to AASHTO R35 with commentary *"Special Mixture Design Considerations and Methods for Warm Mix Asphalt (WMA)"*

Approved by AASHTO Subcommittee on Materials and published:
Standard Specifications for Transportation Materials and Methods of Sampling and Testing (32nd Edition, 2012)



Course Description

Print Friendly Page

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:

Commercially Available Laboratory Foaming Devices

PTi – THE FOAMER

Wirtgen, WLB 10 S

InstroTek, Inc. – AccuFoamer

National Research Initiatives

TRB TRANSPORTATION RESEARCH BOARD OF THE NATIONAL ACADEMIES

- NCHRP 9-43 “Mix Design Practices for Warm Mix Asphalt” $500,000
- NCHRP 9-47A “Engineering Properties, Emissions, and Field Performance” $900,000
- NCHRP 9-49 “Performance of WMA Technologies: Stage I - Moisture Susceptibility” $450,000
- NCHRP 9-49A “Performance of WMA Technologies: Stage II - Long-Term Field Performance” $900,000

National Research Initiatives

TRB TRANSPORTATION RESEARCH BOARD OF THE NATIONAL ACADEMIES

Two WMA focused NCHRP projects for 2012:

- NCHRP 9-52 “Short-Term Laboratory Conditioning of Asphalt Mixtures” $800,000
  - includes short-term laboratory conditioning of WMA mixtures for mix design and performance testing
- NCHRP 9-53 “Asphalt Foaming Characteristics for Warm Mix Asphalt Applications” $700,000

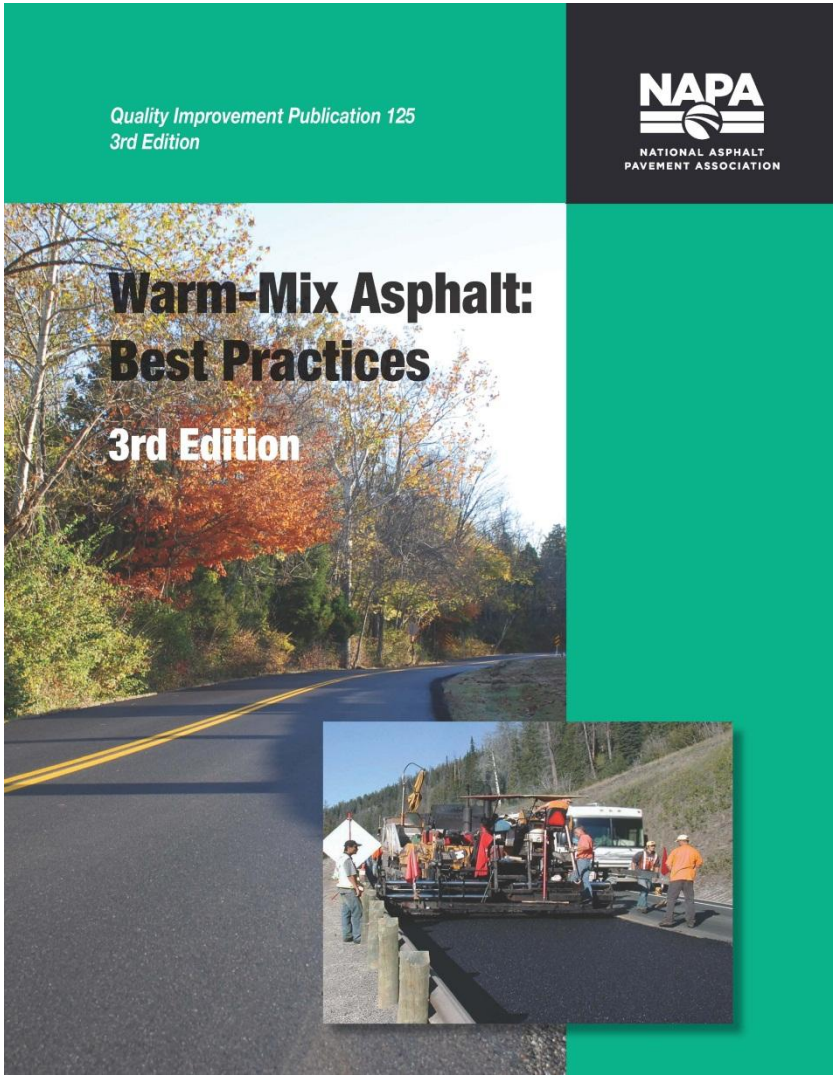
National Research Initiatives

TRB TRANSPORTATION RESEARCH BOARD OF THE NATIONAL ACADEMIES

Proposed NCHRP project for 2013:

- "Recycled Asphalt Shingles (RAS) and Recycled Asphalt Pavement (RAP) in HMA/WMA Mixtures"
- Endorsement by:
  - AASHTO SOM TS2c *Asphalt-Aggregate Mixtures*
  - FHWA WMA Technical Working Group
  - FHWA RAP Expert Task Group
  - TRB Committee AFK10 *General Issues in Asphalt Technology*

- NCHRP 20-07/ Task 311, **Development of a Warm Mix Asphalt Technology Evaluation Program** (complete)
  - Myers McCarthy Consulting Engineers, LLC
  - http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=3075
- AASHTO NTPEP Panel has been established to review findings: www.ntpep.org
- POC: Tom Baker, Washington State DOT



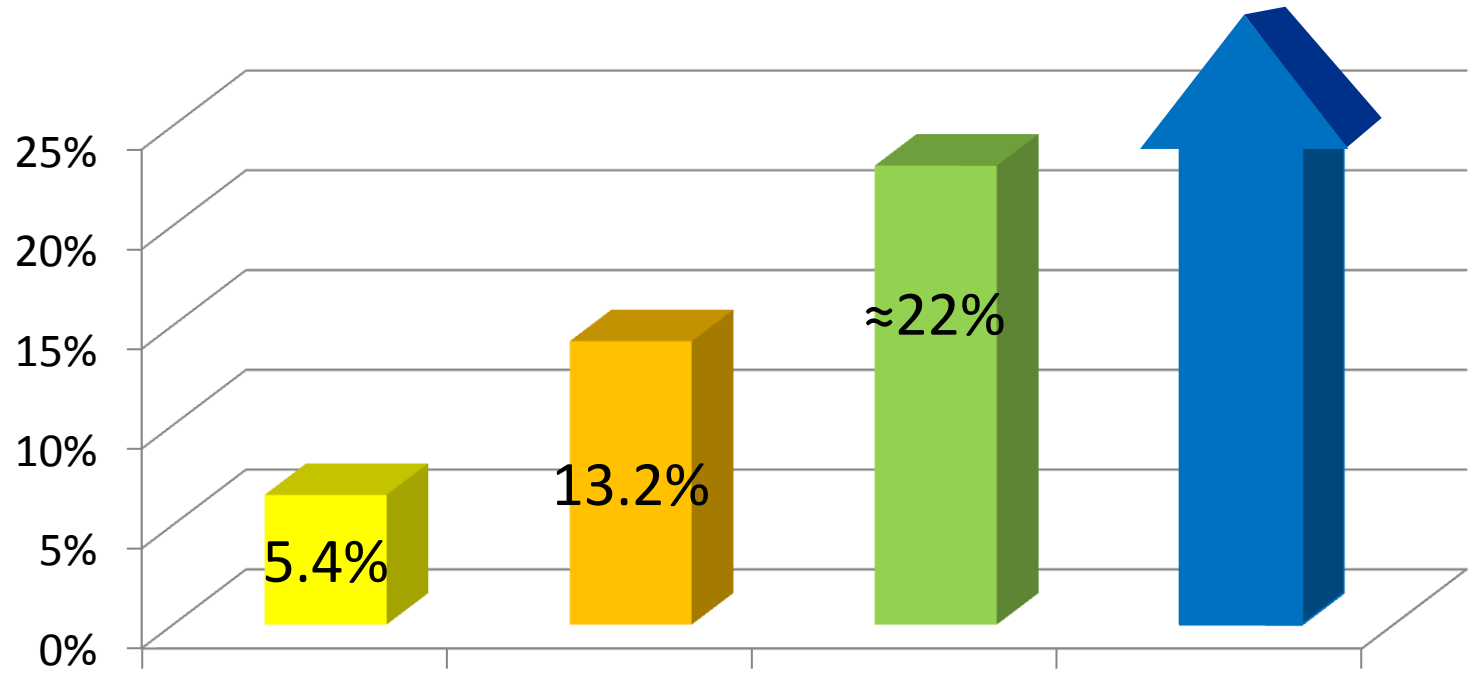
Quality Improvement Series 125

Warm-Mix Asphalt: Best Practices, 3nd Edition

- Stockpile Moisture Management
- Burner Adjustments and Efficiency
- Aggregate Drying and Baghouse Temperatures
- Drum Slope and Flighting
- Combustion Air
- RAP usage
- Placement Changes

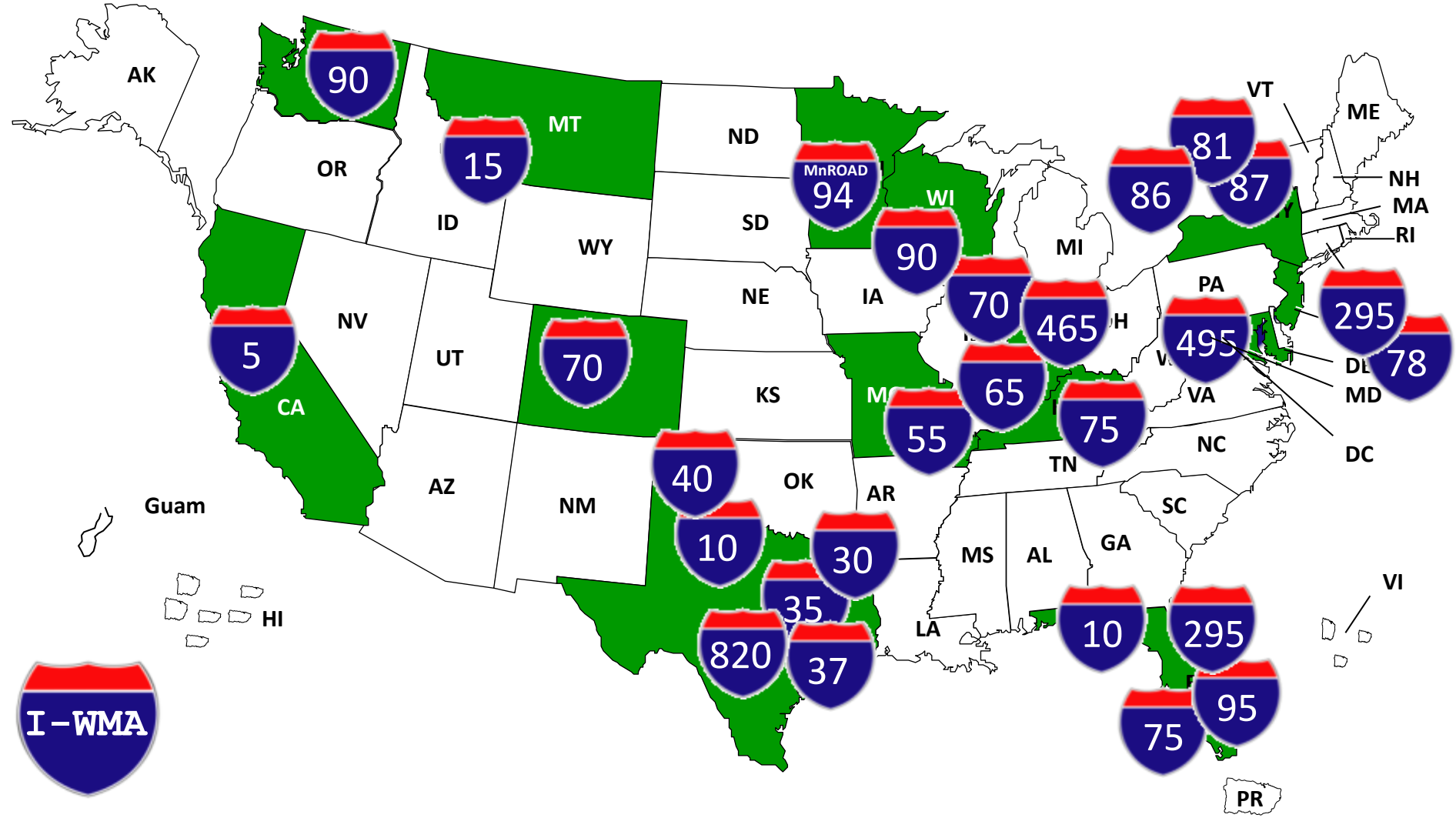
WMA Usage

*Percentage of **Total** Asphalt Production in USA*

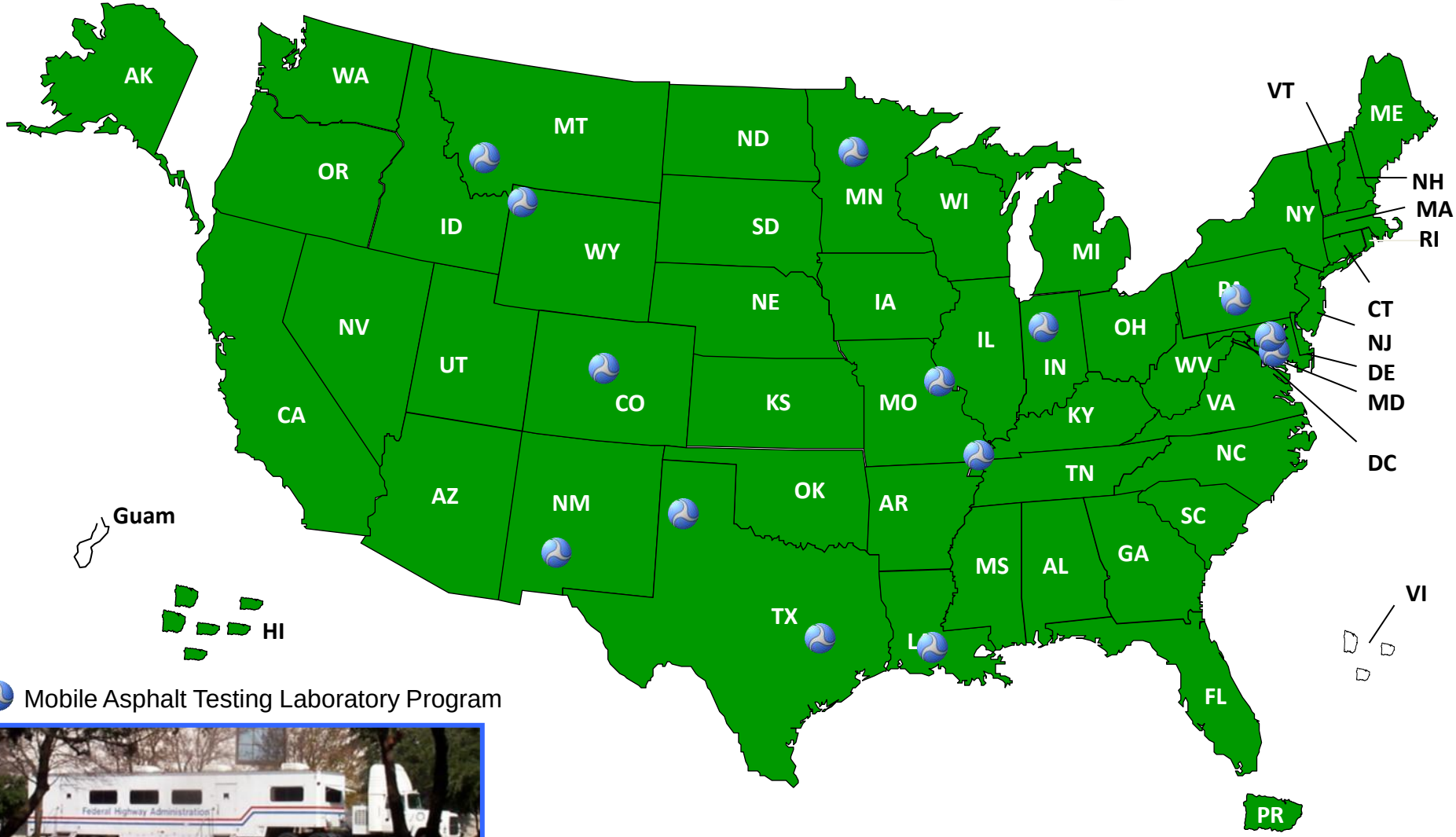


2006	2009	2010	2011	2012
WMA trials begin	19.20 million tons	47.60 million tons	79.64 million tons	data being collected

Interstate Highway WMA Usage



State DOT WMA Usage



Mobile Asphalt Testing Laboratory Program


Thank You!
Matthew Corrigan, P.E.
Asphalt Pavement Engineer
Washington D.C.