


# Asphalt Mixture Performance Tester National Implementation

SEAUPG – November 2014  
Jeff Withee


1



## Outline


- AMPT Equipment
- Pooled Fund Project TPF-5(178)
- Implementation Activities
- AASHTO Standards
- Questions

2




## AMPT

- Multiple Test Protocols
  - Dynamic Modulus |E\*|
  - Flow Number (FN)
  - Axial Fatigue
- Results for
  - PavementME Design inputs
  - Asphalt mixture evaluation
- AASHTO Provisional Standards




3



## NCHRP Project 9-29

- AMPT Development
- Equipment Specification
- Ruggedness Study
- Test Procedures
- Inter-Lab Study
  - Precision Statements

4




## TPF-5(178) Objectives

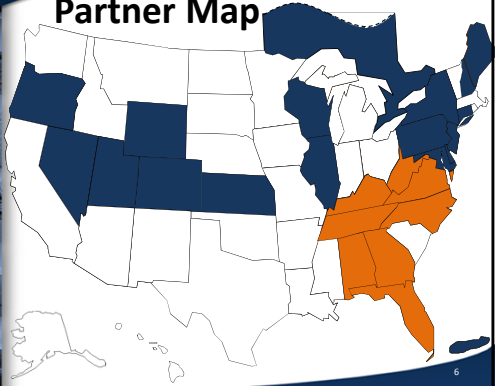
Implementation of the Asphalt Mixture Performance Tester (AMPT) for Superpave Validation

- Nationally procure the AMPT equipment
- Provide training for technicians and engineers
- Support national implementation

5



## Partner Map



6




## Agency Partners



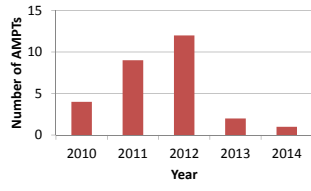
- Alabama
- Colorado
- Connecticut
- Delaware
- Florida
- Georgia
- Illinois
- Kansas
- Kentucky
- Maine
- Maryland
- Nevada
- New Hampshire
- New Jersey
- New York
- North Carolina
- Ontario
- Oregon
- Pennsylvania
- Puerto Rico
- Tennessee
- Utah
- Virginia
- West Virginia
- Wisconsin
- Wyoming
- FHWA

7




## AMPT Equipment

- AMPTs Delivered (28)



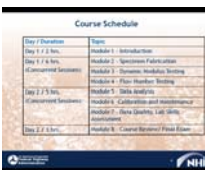
- Supplemental Equipment List
  - NHI 131118 - Workbook Appendix F

8




## AMPT Training

- NHI #131118 - *Asphalt Mixture Performance Tester (AMPT)*
- Classroom Instruction
  - Theory
  - Data Evaluation
- Sample Preparation Video
- Hands-on Experience
  - Sample Evaluation
  - Test Procedures
  - Equipment Operation
- Course Video




9



## Implementation Goals

- Advance state of the practice with AMPT
- Share implementation plans and experiences
- Identify and address implementation hurdles
- Conduct coordinated study on pooled results
- Build user testing proficiency


10



## Implementation Support

- Asphalt Mixture Expert Task Group
- National Center for Asphalt Technology
- Asphalt Institute
- SEAUPG AMPT User Group

11



## Asphalt Inputs for MEPDG

- Summarize Data Requirements by Input Level
- Document Successful Practices
  - Library of Asphalt Material Inputs
  - Representative Materials for Testing
  - Using AMPT for Determining Mixture Inputs
- NCAT Report 13-04
- FHWA TechBrief – FHWA-HIF-13-060

12

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## AMPT Workshops

- National Pooled Fund Workshop
  - Atlanta, GA – September 2012
- Western Workshop
  - Carson City, NV – September 2013
- AMPT Development & Uses
- Equipment & Testing
- Roundtable Discussion of Current Issues
- Summary Reports

13

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## Flow Number Test Protocol

- Appendix in AASHTO TP 79-13

**X1. EVALUATE RUTTING RESISTANCE USING THE FLOW NUMBER TEST**

X1.1 Scope

X1.1.1 This procedure establishes a method to evaluate the rutting resistance of asphalt paving mixtures using the TP 79 Flow Number test in the AMPT.

X1.2 Procedure

X1.2.1 Input the test parameters listed in Table X1.2.1 into the AMPT control software for the Flow Number test.

**Table X1.2.1 – TP 79 Flow Number Test Conditions**

| Test Parameters   | HMA                   | WMA                   |
|-------------------|-----------------------|-----------------------|
| Test Temperature  | 2                     | 2                     |
| Deviator Stress   | 87 psi (600 kPa)      | 87 psi (600 kPa)      |
| Contact Stress    | 5% of deviator stress | 5% of deviator stress |
| Compacting Stress | 2 psi (138 kPa)       | 2 psi (138 kPa)       |

X1.2.2 Determine the project design temperature using LTPP (2002) version 3.1, computed using 50% reliability, a 20 mm depth for surface courses and the type of the pavement layer for intermediate and base courses.

X1.2.3 Determine the flow number for each specimen, and average the results. Compare the average flow number with the criteria in Table X1.2.2.

**Table X1.2.2 – Minimum Flow Number Requirements**


| Traffic Level, million EMV's | HMA, minimum Flow Number | WMA, minimum Flow Number |
|------------------------------|--------------------------|--------------------------|
| < 3                          | 50                       | 40                       |
| 3 to < 10                    | 100                      | 100                      |
| 10 to < 30                   | 150                      | 150                      |
| > 30                         | 200                      | 150                      |

14

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## Pooled Fund Interlab Study

- Build testing proficiency ✓
  - 22 participating labs
- Compare to NCHRP 9-29 ILS precision ✓
- Build dataset on specimen air voids ?
- Dynamic Modulus
- Flow Number
- Final Report – NCAT 14-01



15

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## Specimen Fabrication Study


- NCHRP 9-29 ILS Finding
  - Specimen preparation → significant test variability
- Ruggedness on Specimen Fabrication - PP60
- Significant Factors
  - Mixture conditioning temperature
  - Loose mixture stirring
  - Specimen air voids
- Evaluation by Dynamic Modulus Testing

16

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## Friction Reducer Study

- TP 79 – Annex A
  - Required for Flow Number testing
  - Paste silicone grease
- Study Parameters
  - Flow Number testing
  - Silicone spray/grease types (3)
  - Application rates (2)
  - Dynamic Modulus check
- Evaluation of:
  - Test result variability
  - Fabrication practicality




17


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## S-VECD Fatigue using AMPT

- Simplified Viscoelastic Continuum Damage (S-VECD) Model
- AASHTO TP 107-14 *Determining the Damage Characteristic Curve of Asphalt Mixtures from Direct Tension Cyclic Fatigue Tests*
  - $|E^*|$  Dynamic Modulus (Finger Print) Test
  - Pull-Pull Fatigue Test




18



## Fatigue/Cracking Evaluation

- Multiple Test Methods
  - AMPT Direct Tension Fatigue Test
  - Bending Beam Fatigue
  - Semi-Circular Bend - SCB
- Consideration Factors
  - Performance indicator
  - Sensitivity
  - Specimen fabrication
  - Test equipment




19



## AASHTO Standards

- PP 60 Specimen Fabrication
  - 2014: Specimen height for tension tests
  - 2016: Specimen Fabrication Ruggedness Recommendations?
- PP 61 Master Curve Development


20



## TP 79 Dynamic Modulus & Flow Number

- 2013 version: Most recent updates
  - Precision statements
  - Flow Number appendix
- 2015 version: Revisions on SOM ballot
  - Small scale specimens - Appendix
  - Equipment specification references
- 2016 version: Recommendations from Friction Reducer Study?


21



## AASHTO Standards

- Provisionals first published in 2009
- Action on permanent status by 2016
  - Split TP 79: E\* and FN?
- NCHRP Equipment Specification
  - Incorporate into AASHTO standard?

22



## Additional Information

- Contact: Jeff Withee
  - [jeff.withee@dot.gov](mailto:jeff.withee@dot.gov)
  - 202-366-6429
- Pooled Fund Study
  - <http://www.pooledfund.org/Details/Study/405>
- FHWA AMPT Webpage
  - <http://www.fhwa.dot.gov/pavement/asphalt/tester.cfm>

23