Asphalt Performance Testing

National Asphalt Pavement Association
56th Annual Meeting
February 2011

Peter J. Stephanos, P.E.
Director, Office of Pavement Technology
Federal Highway Administration
Why Performance Testing?

- Volumetric design alone is not always sufficient
  - High traffic
  - Critical projects
  - Evaluate new materials and methods
- Engineering properties needed for structural analysis
  - MEPDG
Why Performance Testing?

- Improve mix designs
- Obtain fundamental engineering properties
- Directly relate to in-service performance
- Support performance based specifications
Superpave Mixture Tests

- Shear test AASHTO T320
  - Modulus
  - Permanent deformation
- Flexural fatigue AASHTO T321
  - Fatigue cracking
- Indirect tensile test AASHTO T322
  - Thermal cracking
Issues With SHRP Products

- High cost
  - Equipment
  - Training
- Prototype equipment
- Used with performance models
  - Errors
  - Not calibrated
  - Not user friendly
Performance Test Still Needed!

• FHWA and NCHRP Considered
  o Gyratory compactor modification
  o Asphalt pavement analyzer
  o Other Fundamental tests
Path for Test Development

1. Need
   - Research
   - Draft Test Method
   - Prototype Equipment
   - Verification

2. Critical Aspects
   - Ruggedness
   - Improve
   - Test Method Equipment

3. Precision and Bias
   - Round Robin Testing

4. Specification
   - Commercial Equipment
   - First Article Equipment

5. Production Equipment
   - Provisional AASHTO
   - Test Methods

6. Engineering Practice
Path for Test Development

Need

Superpave Performance Test

Verification

Precision and Bias

Ruggedness

Critical Aspects

Round Robin Testing

Precision and Bias

Engineering Practice

Production Equipment

Production/WAASHTO Test Methods

Commercial Equipment

Specification

First Article Equipment

Draft Test Method

Prototype Equipment

Improve Test Method

Equipment
Path for Test Development

Research
Draft Test Method
Prototype Equipment
Verification

[Flowchart]

Round Robin Testing
Precision and Bias

FHWA
research and
NCHRP 9-19

Premilinary Equipment

First Article Equipment

Production Equipment

Provisional AASHTO Test Methods

Engineering Practice

Ruggedness
Critical Aspects
Need
Path for Test Development

1. Draft Test Method
2. Prototype Equipment
3. Verification
4. Improve Test Method
5. Equipment
6. Ruggedness
7. Critical Aspects
8. Round Robin Testing
9. Precision and Bias
10. Engineering Practice
11. Commercial Equipment
12. Specification
13. First Article Equipment
14. Provisional AASHTO Test Methods
15. NCHRP 9-29

U.S. Department of Transportation
Federal Highway Administration
Recommended Tests

- Dynamic Modulus
  - Rutting
  - Cracking
- Flow Number (repeated load)
  - Rutting
Path for Test Development

- Critical Aspects
- Ruggedness
- Need
- Round Robin Testing
- Precision and Bias
- Engineering Practice
- NCHRP 9-29
  Asphalt Mix ETG
  AMPT Pooled Fund
- Path Test Method
- Prototype Equipment
- Verification
- Improve Test Method
- Equipment
- Commercial Equipment
- Specification
- First Article Equipment
- Provisional AASHTO Test Methods
- Production Equipment
Asphalt Mixture Performance Tester (AMPT)

Machine Specifically for Testing Engineering Properties of Asphalt Mixtures:
- Dynamic Modulus
- Flow Number
- Fatigue Test (potential)
AMPT Pooled Fund Study TPF-5(178)

- **Objectives**
  - Procure AMPT for highway agencies
  - Provide training on AMPT
  - Support national AMPT implementation

- **Progress and Schedule**
  - Four AMPTs delivered
  - More AMPTs to be ordered in 2011
  - One training course completed
  - Four additional courses scheduled in 2011
AMPT Pooled Fund Study TPF-5(178)

- Participants
  - Alabama
  - Colorado
  - Connecticut
  - Florida
  - Georgia
  - Illinois
  - Kansas
  - Kentucky

- Maine
- Maryland
- Nevada
- New Hampshire
- New Jersey
- New York
- North Carolina
- Oregon

- Pennsylvania
- Tennessee
- Utah
- Virginia
- Wisconsin
- Wyoming
- Ontario
- FHWA - Lead agency
Application of Performance Testing

- Mix Design and Evaluation
  - Identify potential performance issues
- Pavement Design
  - Engineering properties for MEPDG
- New Material Evaluation
- Construction Acceptance
  - Performance based specifications
  - Performance Monitoring