A Review of Regional Superpave Validation Research Activities

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NECEPT - Penn State University
NEAU/PG -- February 14th 2001

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Evaluation of SuperPave Aggregate Test Methods

A. Stonex, G. Vadakpat, D. Anderson

NECEPT
- sponsored by -
Department of Transportation
Commonwealth of Pennsylvania

Study Objectives

- Evaluate overall suitability of PA aggregates for use in Superpave mixtures
- Assess compliance of PA aggregates with Superpave aggregate consensus tests
- Identify and address possible problems

Findings

- Aggregates in PA generally meet Superpave consensus requirements
  - ✓Manufactured fines needed for FAA >45
- Highly absorptive fine aggregates (> 2%) show the greatest variability in SSD specific gravity
  - ✓Determination of SSD greatest source of variation in specific gravity measurements
  - ✓TXDOT methods for determining SSD gave more consistent specific gravity results

Evaluation of Permeability of Superpave Mixes

Walaa Mogawer, Rajib Mallick, Bill Crockford

University of Massachusetts at Dartmouth
Worcester Polytechnic Institute (WPI)
Shedworks

New England Transportation Consortium (NETC)

Study Objectives

- Evaluate the permeability of hot mix asphalt mixes with fine and coarse gradations
- Evaluate the permeability of hot mix asphalt mixes with different nominal maximum aggregate size
- Prepare recommended design criteria for permeability values and in-place and laboratory permeability testing methods

Anticipated results

Conclusions and recommendations will:

- ✓Facilitate the use of proper gradation and size of aggregate, to avoid excessive permeability
- ✓Facilitate the use of proper specification of construction density, and lift thickness
- ✓Provide simple yet effective laboratory and field permeability test method

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Development of A Tool for Predicting Rutting Potential of Asphalt Paving Mixes

Ray Brown, Rajib Mallick

National Center for Asphalt Technology
Worcester Polytechnic Institute (WPI)

National Asphalt Pavement Association
(NAPA)Foundation

Study Objectives

- To develop a simple yet effective test procedure for determining the:
  - ✓Effect of aggregate quality on the quality of asphalt paving mixes
  - ✓Rutting potential of asphalt paving mixes

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NECEPT Pooled Fund Study

D. Anderson, A. Stonex, J. Mahoney, J. Stephens

Penn State (NECEPT) and CAP Lab UConn)

Sponsored by Northeast States
Pennsylvania as Host State

NECEPT Pooled Fund Study

- Task 2: Workshop on SuperPave for Low-Capacity Roads
- Task 3: Regional Database for Binders
  - ✓Standardized database
  - ✓Standardized COA for Binders
- Task 4: QA Specification for Binders
- Task 5: Binder Technician Workshops
- Task 6: Tank Uniformity
- Task 7: Evaluation of Low Temp. Spec.

Low-Capacity Road Workshop

- April 2001, Hartford-Springfield
- Purpose:
  - ✓Identify issues with respect to implementation of SuperPave in non-interstate situations
  - ✓Identify solutions
  - ✓Produce proceedings

SuperPave Validation

D. Anderson, D. Christensen, S. Stoffels

NECEPT

Pennsylvania Department of Transportation

Workplan

- Characterize binder and mixture properties for SuperPave projects and relate to performance
- Characterized 14 sites in PA
  - ✓Variety of study variables included
  - ✓Developed database of properties
  - ✓Characterized binders and mixtures
- Report due March 2001

PennDOT Instrumentation Studies: Start-UP

D. Anderson, S. Stoffels

NECEPT

SISSI Task Force

Pennsylvania Department of Transportation

Objective

Produce database of materials, construction, pavement response, and performance data for validating SuperPave and AASHTO 2002 Guides ……

- ✓Materials characterization
- ✓Construction documentation
- ✓Pavement instrumentation
- ✓Traffic and weather information
- ✓Performance history
- ✓Database

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Scope: Long-Term Project

- Instrument and characterize 12 pavement sections
  - ✓Frost, moisture, temperature
  - ✓Pressure, strain, deflection transducers
  - ✓Full depth, Structural and Functional Overlays
- Collect data for 5 – 10 years
- Validate SuperPave
- Validate 2002 Guide

Work to Date

- Instrumented three sections in 2000
  - ✓Two full depth and one structural OL
  - ✓More than 200 transducers
- Developed data acquisition scheme
  - ✓Pavement response, traffic, weather
- Developed loading protocol
- Generate baseline measurements

Future Work

- Instrument remaining 9 pavements
- Characterize materials
- Monitor performance
  - ✓Complete database
- Analyze data
  - ✓Life-cycle cost
- Make recommendations
- Contract for 2001 - 2001 study is pending

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Triaxial Strength as Predictor of Rutting

D. Christensen, R. Bonaquist

NECEPT (PennState) and Advanced Asphalt Technologies (AAT)

Federal Highway Administration

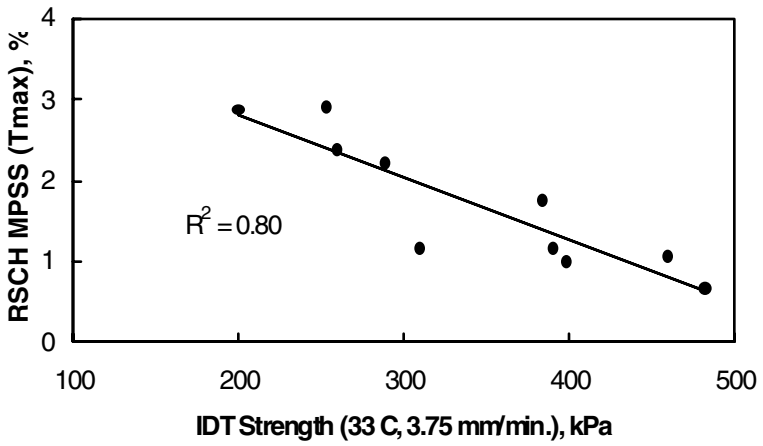
Objectives

- Examine simple easy-to perform test methods for predicting sensitivity of HMA to rutting
- Test methods
  - ✓Triaxial strength
  - ✓Indirect tension test
  - ✓Repeated Shear Constant Height (RSCH)
- Examined ten mixtures from field
  - ✓Performance data for pavements

Results

- Unconfined and confined compressive strength correlated well with RSCH
- Results indicate rutting depends more on mix cohesion than internal friction
- Indirect tensile strength test, when properly conducted, can be a good indicator of rutting
  - ✓Simple, east to perform
  - ✓Applicable to thin lifts

Correlation – RSCH vs. IDT



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Training and Certification Regional Resources

- NECEPT (PennState)
- CAP Lab (UConn)
- Rutgers
- Worcester Polytechnic
- U Mass Dartmouth
- VA Transportation Research Council

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Regional Training and Certification Programs

- New England Transportation Technician Certification Program (NETTCP)
  CT, MA, ME, NH, NY(?), RI, VT
- Mid-Atlantic Region Technician Certification Program (MARTCP)
  DE, MD, NJ, NY(?), PA, VA, WV, DC

Volumetric Mixture Training

NECEPT, CAP Lab, UMass, Rutgers, MDSHA, and others

- ✓Relatively consistent throughout the region
- ✓Based on FHWA model
- ✓MDSHA offers certification for Superpave Technician I and II. 2-1/2 day course including laboratory proficiency demonstration and written examination - accepted by MARTCP

Binder Training - Workshops

- Introductory Course for Entry-level Binder Technicians
  - ✓ April 9-13 @ PTI/NECEPT
- Binder Technician Workshops for Experienced Technicians
  - ✓ February 27-28 @ PTI/NECEPT
  - ✓ February 1-2, 2001 @ CAP Lab

NETTCP Binder Technician Certification

- Offered at PTI/NECEPT
  - ✓February 13-15, 2001
  - ✓March 13-15, 2001
  - ✓April 3-5, 2001
- Offered at CAP Lab
  - ✓January 17-19, 2001
  - ✓February 27- March 1, 2001
  - ✓March 20-22, 2002
- Recognized by MARTCP

National Highway Institute (NHI)

- No. 13153, Superpave Fundamentals (1-day)
  Replaces previous courses: Superpave for the Generalist Engineer and Project Staff, and Superpave for Local Governments
- No. 13151, Superpave for Senior Managers (1/2-day)
- Order through NHI for delivery by NECEPT

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Pooled-Fund Study on the Pavement Quality Indicator

Pedro Romero, Ph.D., P.E.

Turner-Fairbanks Highway Research Center

NCHRP-IDEA Project

Initiated by MD

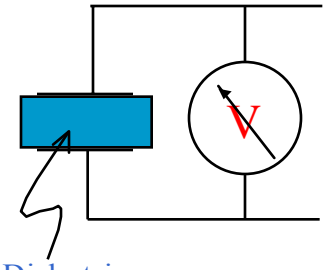
Funded by NY, CT, PA, MN, OR

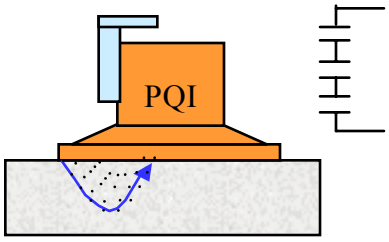
TransTech and PaveTracker

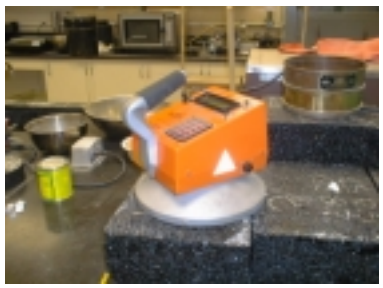
Pavement Quality Indicator

- Used to measure pavement density
  - ✓Non destructive
- Does not use a radioactive source
  - ✓No special license
  - ✓No special handling
- Uses electromagnetic signals
- But…..Does it work?

Principle of Operation: Changes in Dielectric Properties





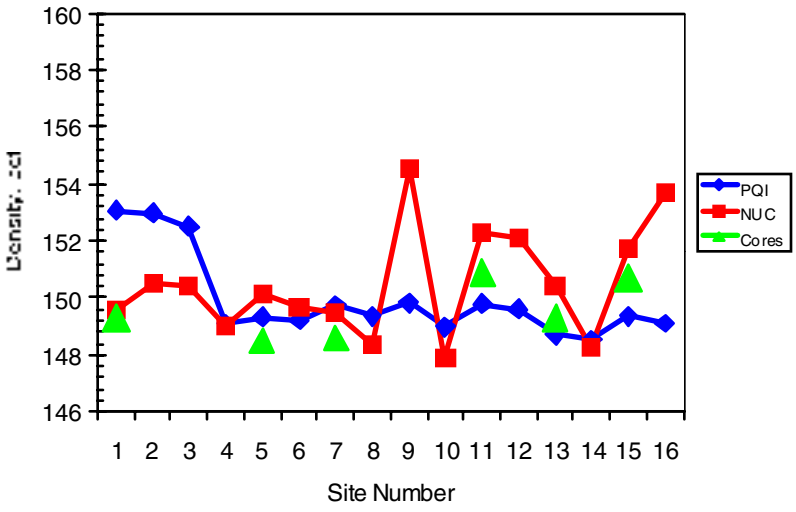


Air	~1
Mica	~6
Porcelain	6-7
Dist. Water	80

Initial Laboratory Study: Conclusions

- Calibration should be done using the same materials and under the same conditions as the intended use.
  - ✓Fourth generation now in use
  - ✓Temperature and moisture compensated
- Recommendation:
  - ✓Proceed with field evaluation

Field Data: Maryland 113



Preliminary Conclusions

- PQI results are within accepted error of measurement, but…….
- PQI does not consistently agree with cores or nuclear gage
- In most cases, PQI is not as sensitive as nuclear gage
- Calibration of PQI is still case specific
- Differences between PQI, Nuclear, Cores?
  - ✓Differences but w/in testing error
- Report forthcoming late 2000

Other Projects

- MD working with pooled fund study on merging materials database with PMS system
- Connecticut working on pooled fund IRI study