

A Review of Regional Superpave Validation Activities



Dave Anderson

NECEPT - Penn State University
NEAU/PG October 26th 2000

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

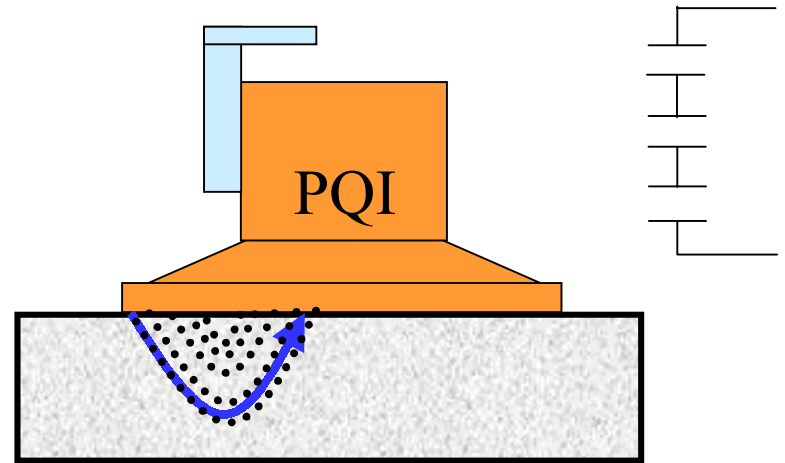
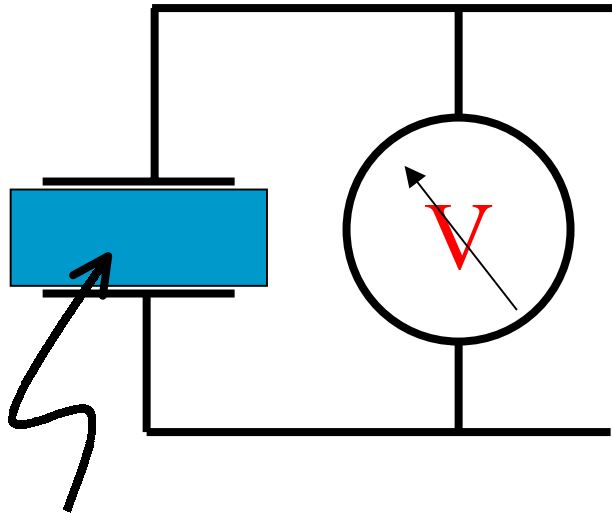
TransTech and PaveTracker



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



Dielectric

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

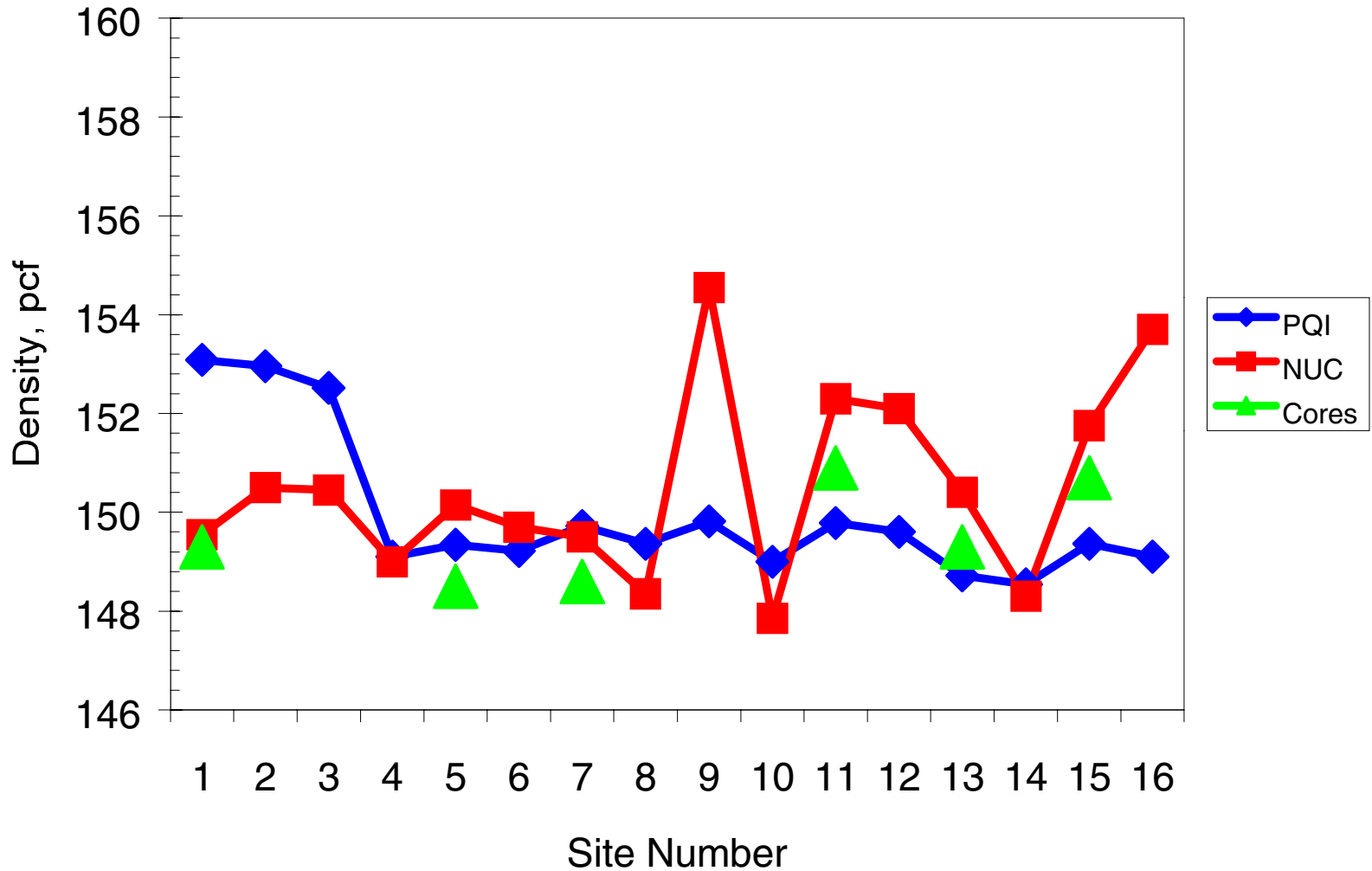




Initial Laboratory Study: Conclusions

- 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

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

Development of A Rational and Practical Mix Design System for Full Depth Reclamation

Rajib Mallick, Richard Bradbury, Ken Kandhal



Worcester Polytechnic Institute (WPI)
Maine DOT, NCAT

Recycled Materials Resource Center



Study Objectives

- Develop guidelines for using Superpave gyratory compactor for sample preparation
- Determine proper compactive effort for selection of optimum additive content
- Determine proper curing procedure before and after compaction
- Evaluate the in-place performance of four different types of additive used in FDR
- Recommend structural numbers



Preliminary Results

- The Superpave gyratory compactor can be used successfully for compacting full depth reclamation mixes
- Use of a slotted mold is recommended to allow squeezing out of water
- Use of samples in sealed bags (CoreLok™ method) is recommended
- Recommendations regarding sample preparation and testing details

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



Lateral Pressure Indicator

NEAU/PG October 26th, 2000




Anticipated Results

- The end product from this study will include:
 - ✓ A procedure that can be used to determine the effect of aggregate quality on performance of HMA, and
 - ✓ A method of selecting aggregates and aggregate gradations
 - ✓ A method for evaluating rutting potential of mixes

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.

SuperPave Validation

D. Anderson, D. Christensen



NECEPT

Pennsylvania Department of
Transportation



Workplan

- Characterize binder and mixture properties for SuperPave projects and relate to performance
- Characterized 14 sites in PA
 - ✓ Developed database
 - ✓ Characterized binders and mixtures
- Report due February 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



Scope: Long-Term Project

- Instrument and characterize 12 pavement sections
 - ✓ 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
- Developed data acquisition scheme
 - ✓ Pavement response, traffic, weather
- Generate baseline measurements




Future Work

- Instrument remaining 9 pavements
- Characterize materials
- Monitor performance
 - ✓ Complete database
- Analyze data
- Make recommendations
- Contract for future work is pending

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 data but not with rut rates in field
- 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, apply to thin lifts



Regional Training and Certification Resources

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



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
 - ✓ December 11-15, 2001 @ PTI/NECEPT
 - ✓ February 5-9, 2001 @CAP Lab
- Binder Technician Workshops for Experienced Technicians
 - ✓ January 25-26, 2001 @ 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