FHWA Program Update

GINA AHLSTROM AND MIKE PRAUL

FHWA OFFICE OF ASSET MANAGEMENT, PAVEMENTS, AND CONSTRUCTION

PAVEMENT MATERIALS TEAM

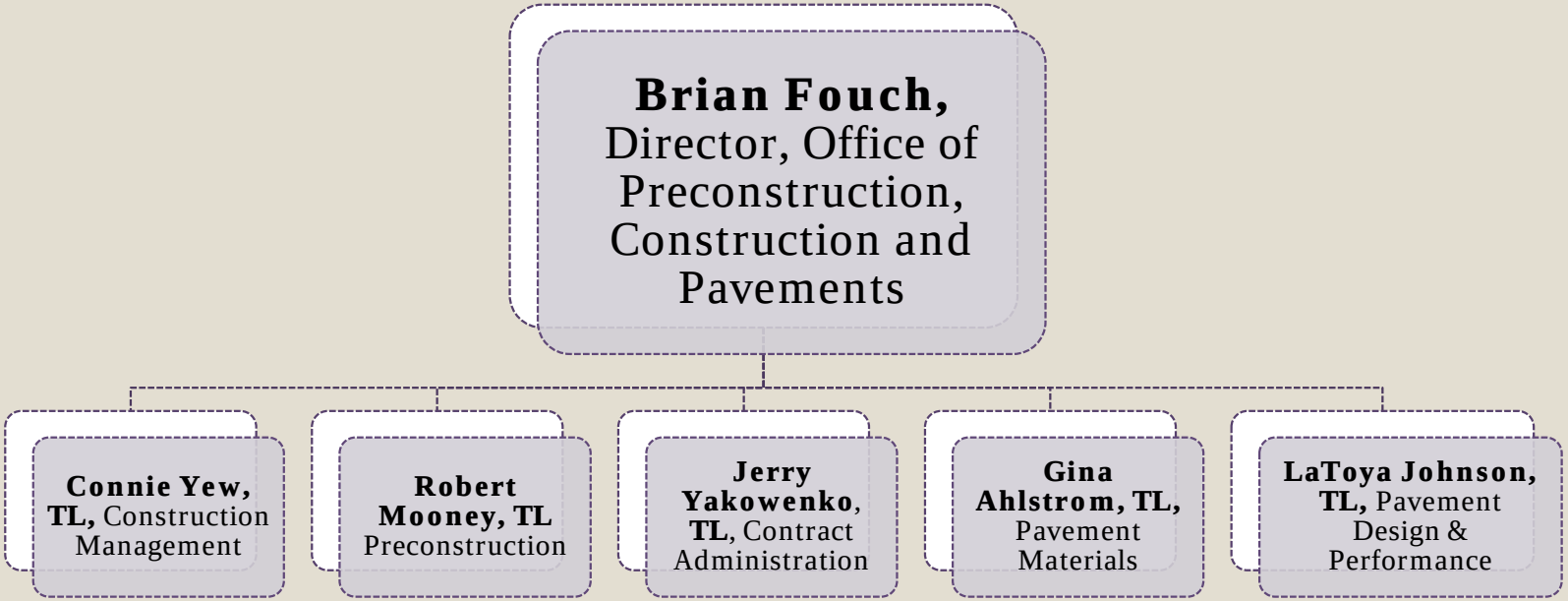
National Concrete Consortium

September 18, 2018 • Saratoga Springs, NY

U.S. Department of Transportation
Federal Highway Administration
Office of Infrastructure

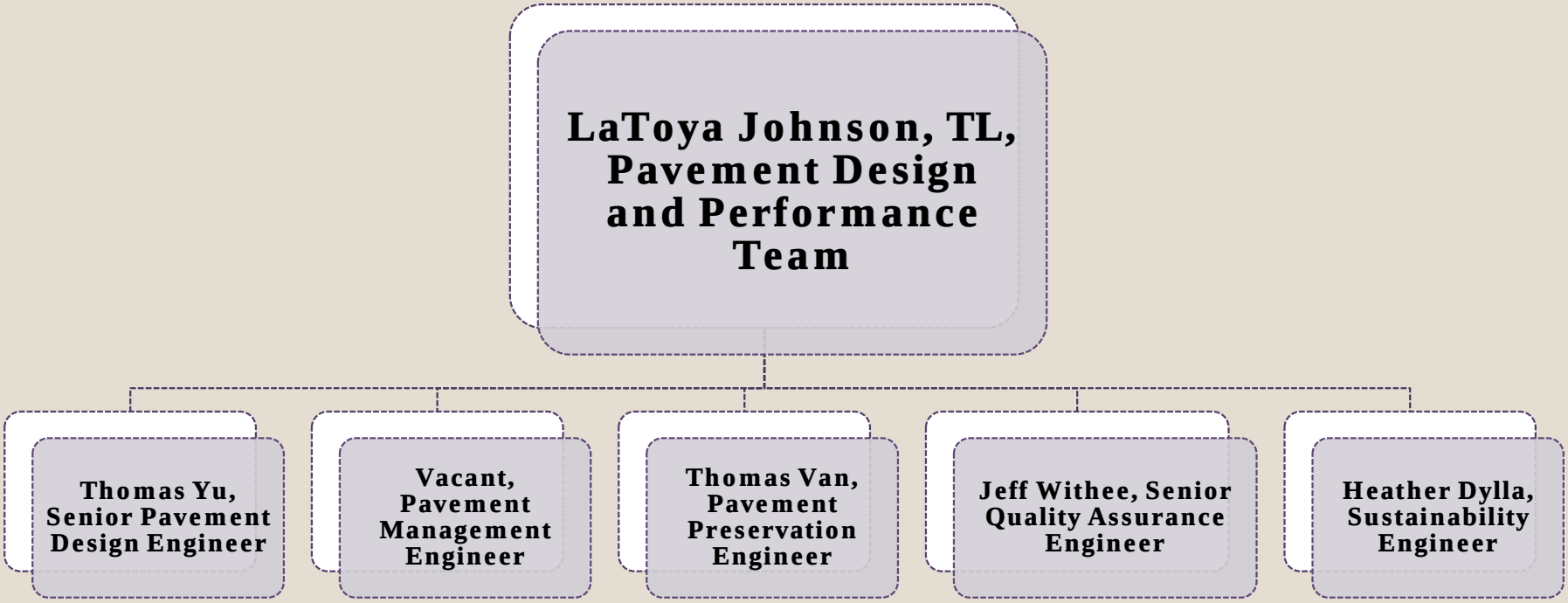
All images FHWA unless otherwise noted

Office of Infrastructure



Pavement Materials Team

Pavement Design and Performance Team



Other Key FHWA Contacts

Turner Fairbank Highway Research Center (TFHRC)

Cheryl Richter, Director- Office of Infrastructure Research & Development
Jack Youtcheff, Team Leader- Infrastructure Material Team
Ahmad Ardani, Concrete Research Engineer
Katherine Petros, Team Leader- Infrastructure Analysis & Construction Team
Matthew Corrigan- Construction Research Engineer

Office of Technical Services (TST)

Bernetta Collins, Director- Resource Center
Christopher Wagner, Team Manager- Pavement & Materials TST
Robert Conway, Sr. Pavements & Materials Engineer
Stephen Cooper, SHRP2 Pavement Renewal Engineer

Who We Are: FHWA Pavement Materials Team

- Richard Duval- program coordination for Performance Engineered Mixtures and Design and Performance Related Specifications
- Tim Aschenbrener- asphalt pavements, Asphalt QA, increased density, asphalt recycling
- Vacant- asphalt engineer, Mobile Asphalt Testing Trailer
- Mike Praul- concrete pavements and materials, Mobile Concrete Trailer, PEM concrete, concrete QA,
- Sam Tyson- long-life concrete pavement strategies (CRCP, PCP), concrete repair strategies, concrete recycling and industrial byproducts, concrete overlays

What We Do

- All things Asphalt Materials
- All things Concrete Materials
- Technologies for pavements and materials
- Movement toward Performance Engineered Mixture Design--Asphalt and Concrete

Accelerated Implementation and Deployment of Pavement Technologies Program

- FAST Act Section 6003
- 6 Goals
- Focus on deployment of innovative technologies, practices, performance, and benefits
- Annual reports can be found at: www.fhwa.pavements.gov

Our Main Programmatic Focus

- Performance Engineered Mixtures

- Performance Engineered Mixture Design

Concrete Admixture Workshop

- Building off success of prior two versions
- Last update was over a decade ago
- Suitable for state and industry construction and materials personnel
- Stay tuned…details to come!

MCT Schedule

- CO, IA*, MN* visits completed
- TX and FL remaining for 2018
- Roadway Management Conference (PA)
- Concrete Works Conference (CT)
- 2019 commitments with KS, NC*, VT, SC
- UT and NM discussions occurring
- National Road Research Alliance Conference (MN)
- World of Concrete?

Equipment Loan Program

- Recently purchased new equipment
- First come, first served
- Training upon request
- Program criteria
  - Return equipment in good condition
  - Return it on the agreed date
  - Share data*
- SAMs and SR tests are readily available
- MIT Scan T2
- Calorimeter (newly available for loan)

PEM Implementation Incentive Funds

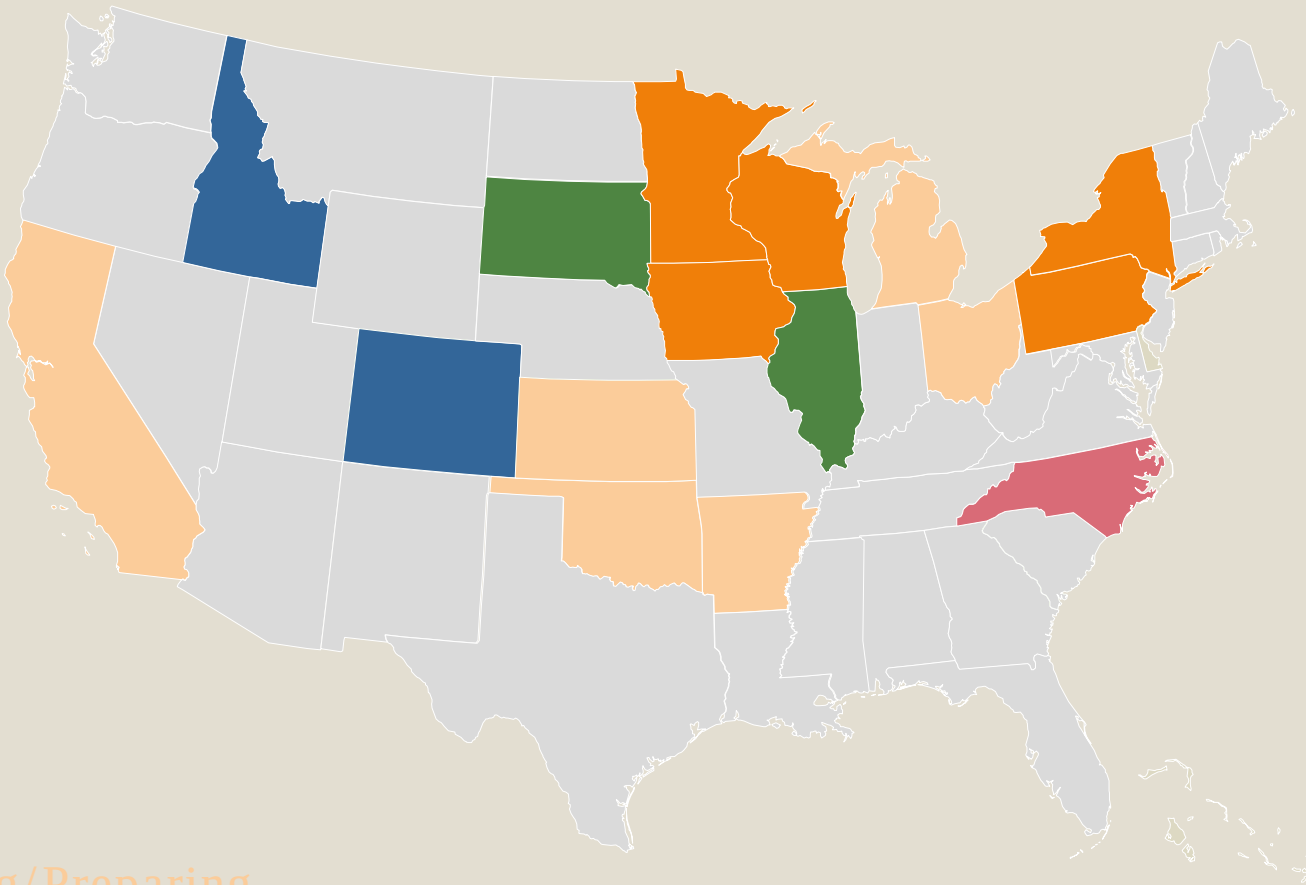
- Available to pooled fund participating states
- $40,000 for two or more new tests in the mix design/approval process (shadow testing acceptable)
- $20,000 for one or more new tests in the acceptance process (shadow testing acceptable)
- $20,000 for requiring an “enhanced” QC Plan from the contractor
- $20,000 for requiring the use of control charts
- Report required within 4 months of construction

PEM Incentive Implementation Funds

- Five states: Categories A, B, C, and D
- One state: A, B, D
- Two states: A, B
- Six states: Currently considering/working on application
- Two states: No submittal (no concrete paving)

- Kudos to Maria Masten and Minnesota!
- Kudos to Don Streeter and New York!

Implementation Incentive Funding



A, B, C, D
A, B, D
A, B
Considering/Preparing
No applicable project

Questions?

Image Pixabay

- Contact info

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TFHRC Update

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CONCRETE RESEARCH, PROGRAM MANAGER

INFRASTRUCTURE MATERIALS TEAM

U.S. Department of Transportation

Federal Highway Administration

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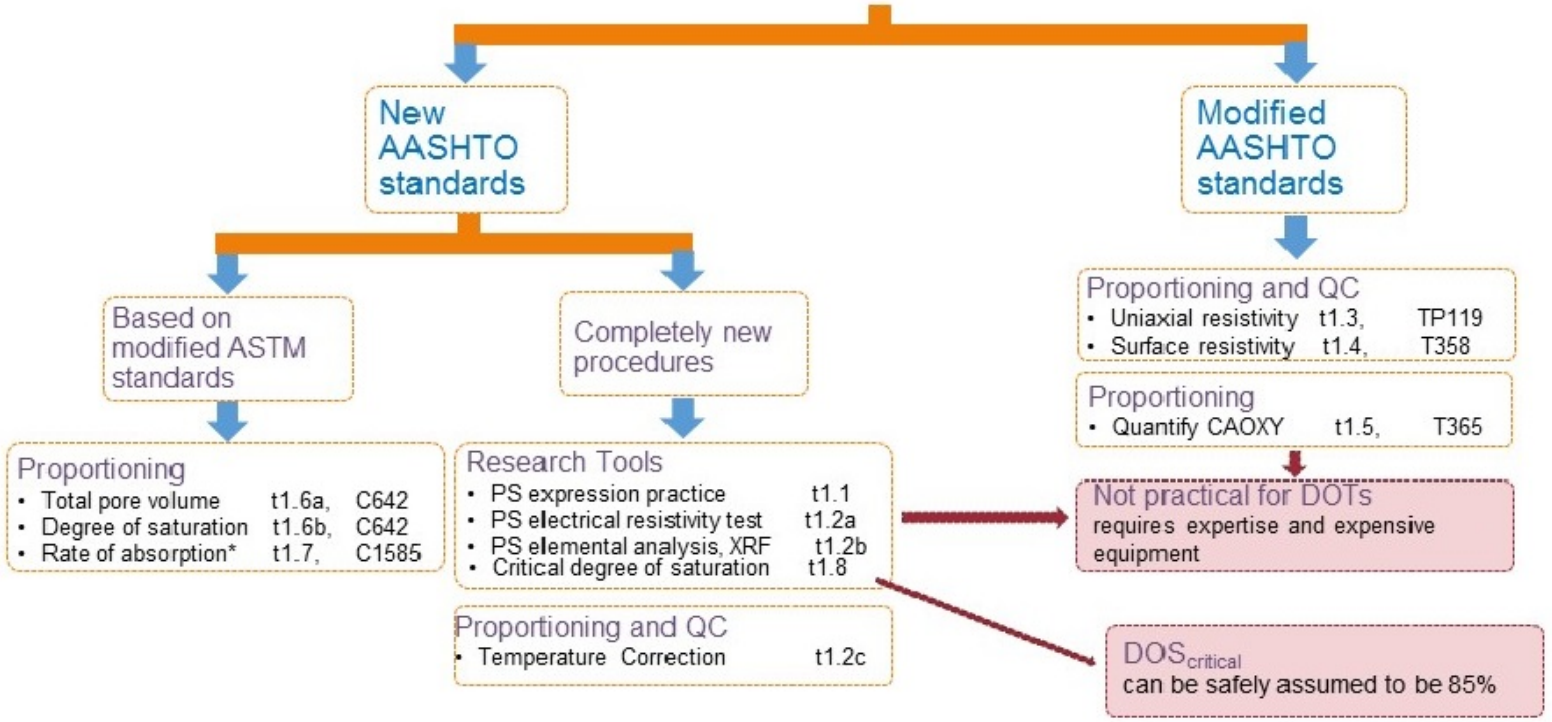
TFHRC PEM Activities in Support of AASHTO PP84-17

- FHWA's PEM categories:
  - Durability related testing procedures at TFHRC:
    - Transport properties; F-T/salt damage related
  - Aggregate stability
  - Cracking and volume change
  - Shrinkage
  - Workability, Strength

Validation of Durability Testing Procedures

- FHWA/OSU Collaboration: Developing draft of the procedures ✓
  - Concrete lab to assess/validate
- Integration into PRS
- Equipment needs!
- PS Expression apparatus, XRF, LTDSC..
- 11 concrete durability-related tests

Validation of Durability Testing Procedures



* May be replaced by the bucket test.
  - When using modified C1585 (task 1.7), task 1.6b is applied.
  - When modified C1585 is replaced by the bucket test, task 1.6a is applied.

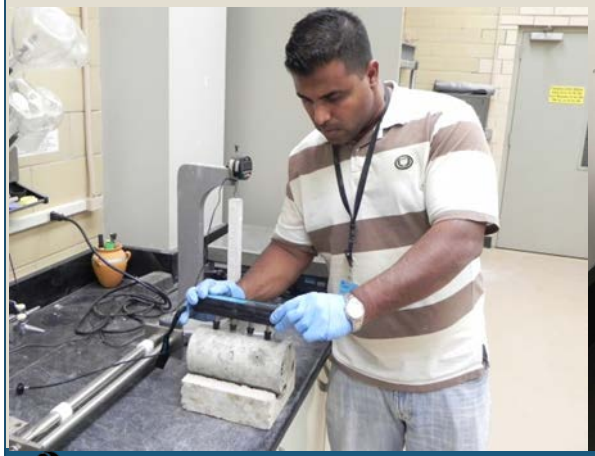
Stage 1: Transport Properties, F Factor Related Tests

- PS expression practice*
- PS resistivity test*
- PS elemental analysis, XRF*
- Temperature correction of resistivity*
- Uniaxial resistivity, TP119
- Surface resistivity, T358

$$F = \frac{\rho}{\rho_0}$$

ρ: Conc. resistivity

ρ_0: PS resistivity



Stage 1: TFHRC/NRMCA Collaboration

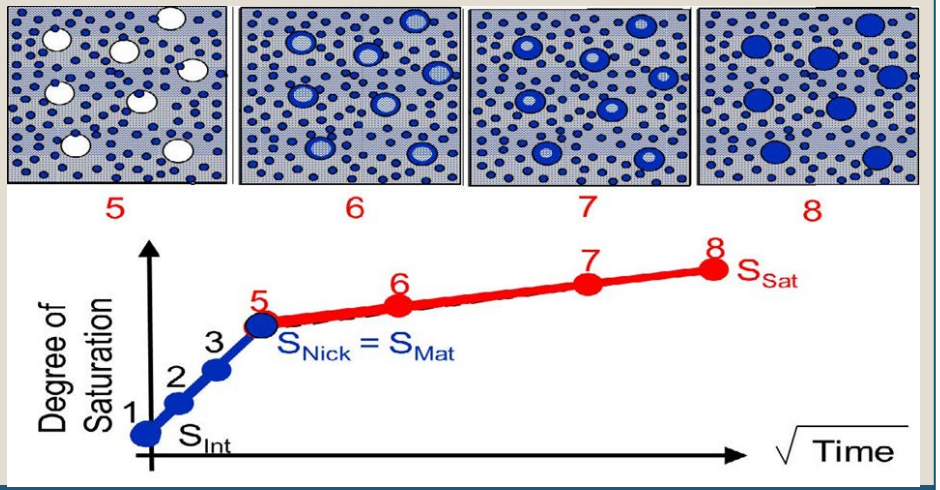
- Impact of conditioning regimes on transport properties:
  - 56d Limewater, 2:1 solution to specimen ratio
  - 56d Moist room
  - 56d Moist room, followed by VS (c1202)
  - 56d Sealed curing, mold caped in moist room
  - 56d sealed, followed by 1 week bucket curing
  - 56d pore solution curing
  - 28d Accelerated curing (c1202)
- W/c: 0.45; 0.50; 0.55
- PC, F ash, SL

Stage 2: F-T Durability, Salt Damage Related Tests

- Quantify CAOXY using LTDSC (T365):
  - Cement paste; concrete!
- Modified ASTM C642
  - Total pore volume
  - Degree of saturation
- Modified C1585, rate of absorption
- Time to critical degree of saturation*

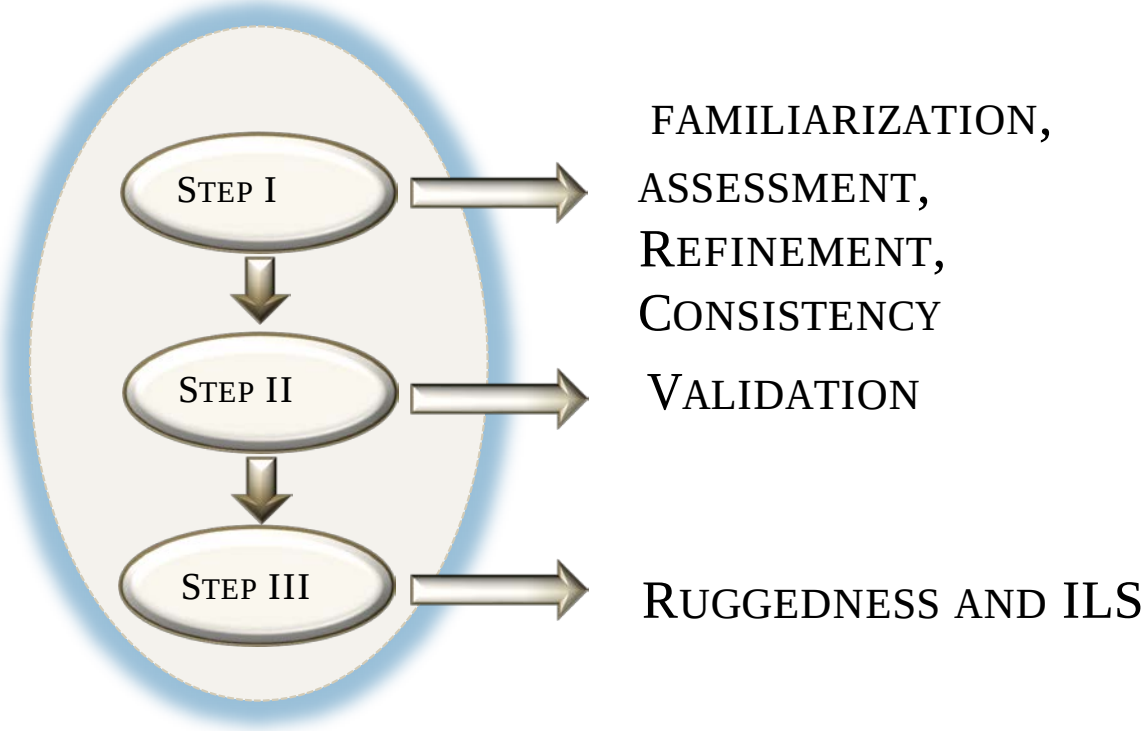
$$DOS_{critical} = 85\%$$

$$S(t) = S_{Nick} + \emptyset \cdot S_2 \cdot \sqrt{t} \leq DOS_{critical}$$



Validation Process for Each Test

Each Test in Stage I

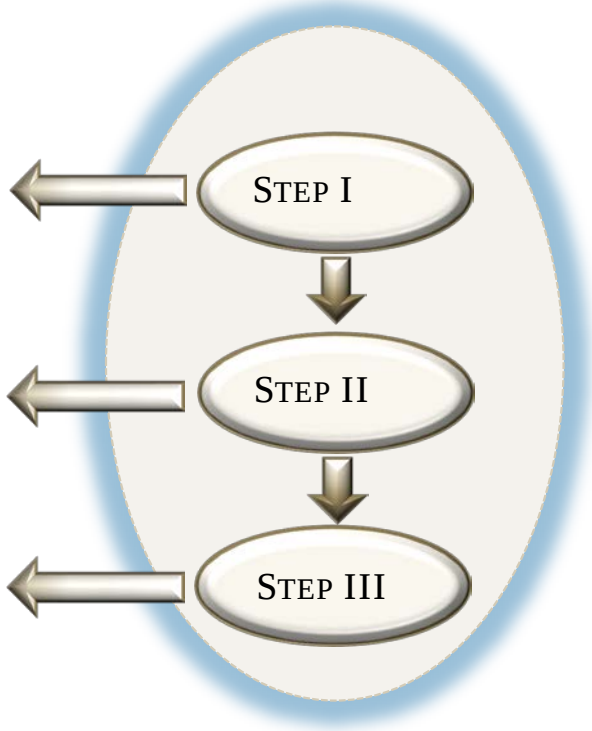


Familiarization, Assessment, Refinement, Consistency

Validation

Ruggedness and ILS

Each Test in Stage II



Transport Properties – Formation Factor related

Freeze-thaw Durability and Salt Damage

TFHRC Concrete Lab Research Team

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- Haejin Kim, PhD
- Luca Montanari
- Mihai Nicolaescu
- John Leavitt