

# Asphalt Emulsions in Pavement Preservation

## ETF Lessons & Status

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**AASHTO TSP2 ETF**  
**Graduate Providence**  
**Providence, RI**  
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# Pavement Preservation AASHTO Emulsion Task Force (ETF)

- An AASHTO TSP-2 sponsored program
- It is an all-volunteer stake holder working group
- 2008-Originally part of the FHWA Pavement Preservation Expert Task Group (ETG)



# ETF is part of AASHTO TSP2



## 9 Regional Bridge & Pavement Preservation Partnerships



# ETF – Original Mandate

## A. Develop Performance Based Stds and Specifications for Emulsions (EAPG)

- 1) Develop a Surface Performance Grade Specification for Emulsion Binders (EAPG)
- 2) Develop Performance Based Specifications for Emulsion Treatments in AASHTO Format
  - Materials (M) - Specifications and Tests
  - Materials (R) - Design Practices
  - Construction - Guide Specs
  - QA Specifications

## ETF – Original Mandate (Cont.)

### B. Encourage Adoption of Uniform National Standards by DOTs/Local Agencies

#### 1) AASHTO -

- TSP-2 Regional Partnerships
- Committee on Materials and Pavements
- Committee on Maintenance

#### 2) FHWA – Pavement Preservation ETG

#### 3) TRB (Webinars)

#### 4) FP2-Industry / Academia (Workshops & Webinars)

# ETF Members

## States

Illinois DOT  
Minnesota DOT  
Montana DOT  
Ohio DOT  
Oregon DOT  
Rhode Island DOT

## Testing Labs

Heritage  
MTE Services  
PRI Asphalt

## Academia

Chico State University  
Colorado State U.  
NCAT  
Texas A&M University  
University of Texas

## FHWA

Direct Federal Lands  
Highway Division

## AASHTO

AASHTO Re:source

## Producers

Asphalt Materials  
Associated Asphalt  
Ergon  
Flint Hills Resource  
Husky Energy  
Kraton Polymers  
Marathon Petroleum  
MTE Services

## TSP-2

NCPP



# ETF Members

## Associations

- Asphalt Institute
- Asphalt Emulsion Manufacturers Association
- Asphalt Reclaiming and Recycling Association
- FP<sup>2</sup> (Foundation for Pavement Preservation)
- International Slurry Surfacing Association

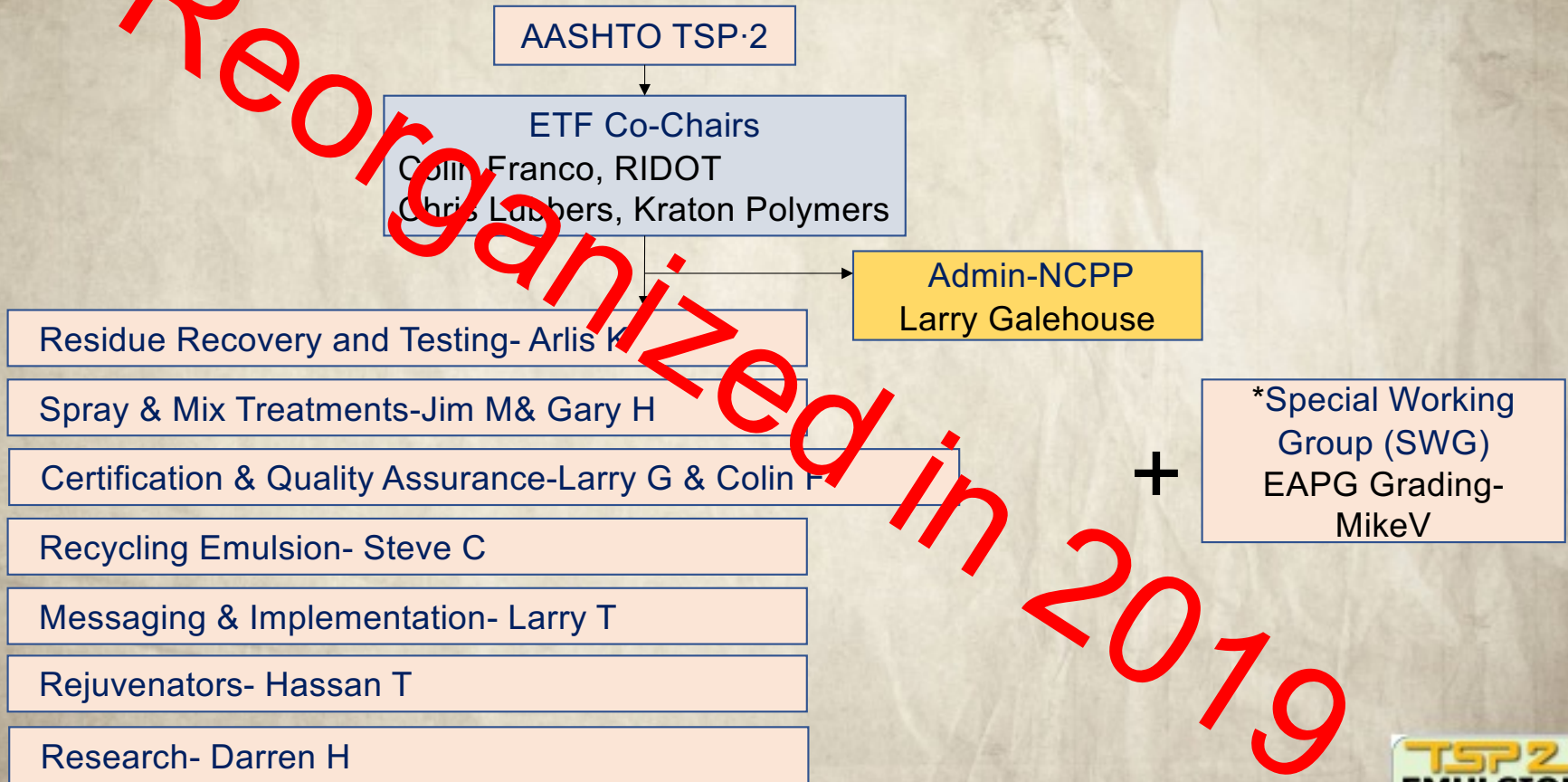
Total ETF Members = 32

Total ETF Friends = 31



# ETF - Original Organization-2008

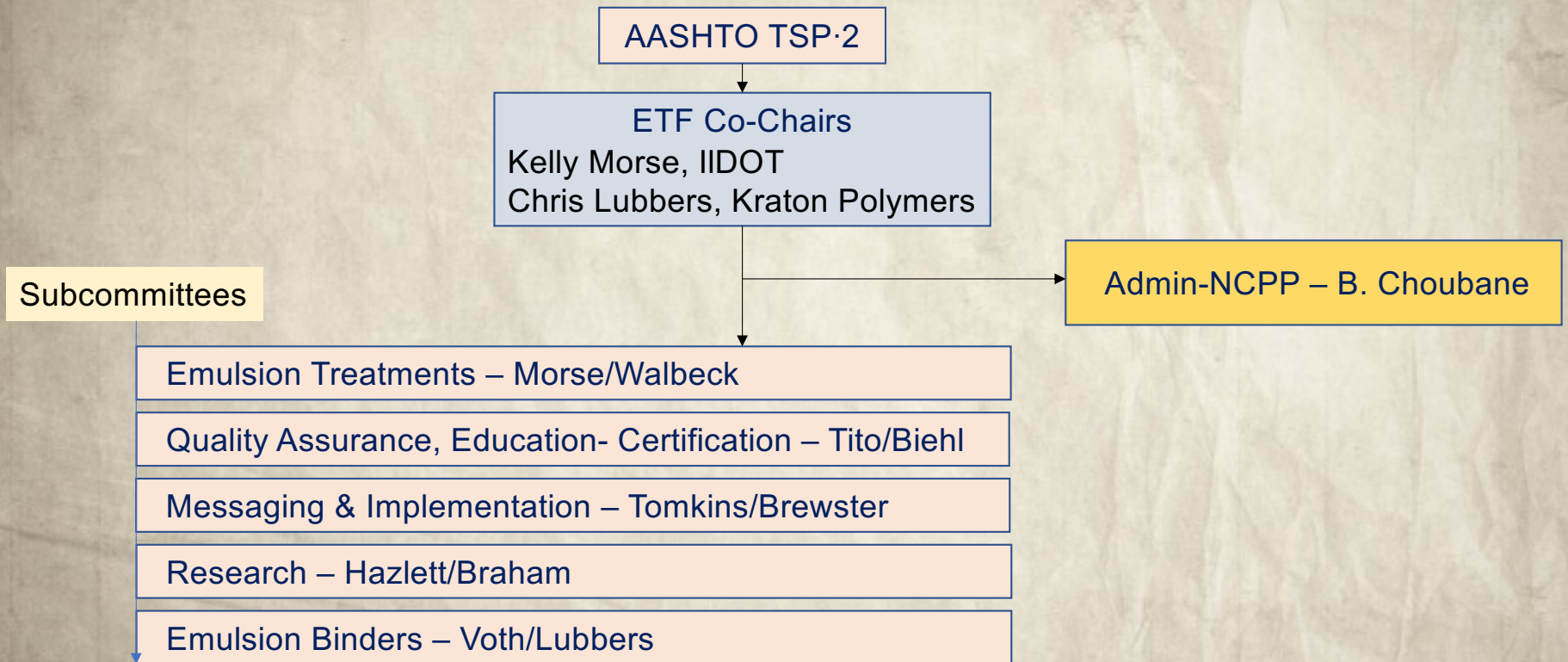
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Reorganized in 2019



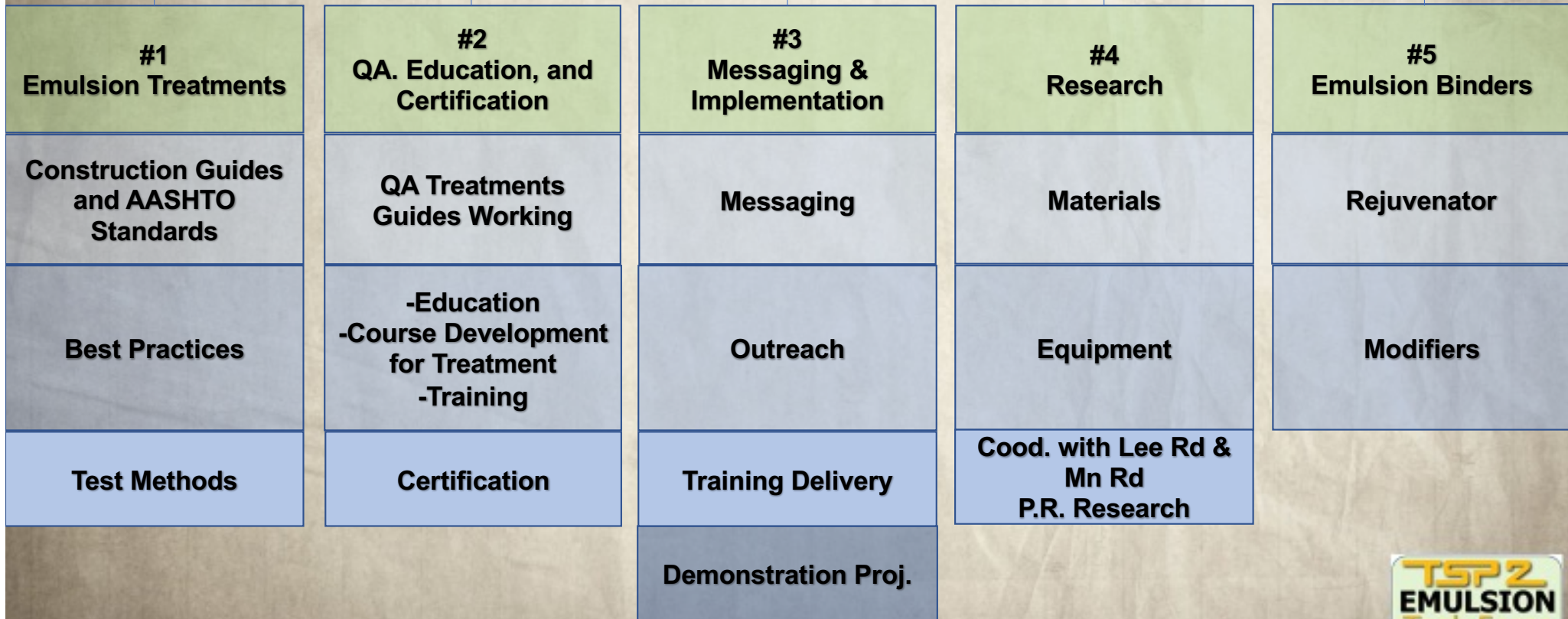
# ETF - Reorganization



# ETF Subcommittee Tasks

**ETF Co-Chairs**  
Kelly Morse  
Chris Lubbers

**NCPP Administrator**  
B. Choubane



# ETF Subcommittee Tasks – Emulsion Treatments

<b>#1 Emulsion Treatments</b>
<b>Construction Guides and AASHTO Standards</b>
<b>Dev. Best Practices</b>
<b>Dev. Test Stds</b>

## Immediate Needs

- 1) Complete construction guides specs for rest of Emulsion treatments**
- 2) Develop Best Practices documents for each treatment**
- 3) Identify new test methods that focus on performance**

# ETF Subcommittee Tasks – QA Education & Certification

#2

QA. Education, and  
Certification

QA Treatment Guides

Education Course  
Development  
Treatment  
Certification

Certification

## Immediate Needs

- 1) Develop QA guides for remaining treatments
- 2) Use Best Practices document to develop training, syllabus, and media
- 3) Promote the need for ***national certification*** for emulsion treatments

# ETF Subcommittee Tasks – Messaging & Implementation

## #3 Messaging & Implementation

Messaging

Outreach

Training Dev /Delivery

Demonstration

## Immediate Needs

- 1) Direct support of NCHRP 20-44(26) – Implementation Project
- 2) Initiate training on new AASHTO Standards
- 3) Develop a ‘ Primer ’ for the implementation of all emulsion treatment standards.

## ETF Subcommittee Tasks - Research

**#4  
Research**

**Materials**

**Equipment**

**Liase With Lee Rd &  
Mn Rd  
P.R. Research**

### Immediate Needs

- 1) Develop RNS for NCHRP - Review the TSP research roadmap on the NCPP website**
- 2) Review pavement preservation related research that has been completed within the last 5 years (TRIS/TRID)**
- 3) Review needs and enhancements for PP construction equipment and pavement condition assessment vehicles**
- 4) Cood. With Mn Rd and Lee Rd (NCAT Research) on PP research.**

## ETF Subcommittee Tasks - Binders

**#5  
Emulsion Binders**

**Rejuvenator**

**Modifiers**

### Immediate Needs

- 1) Assist AASHTO Comp with MI40, M208, M316**
- 2) Support of NCHRP 9-63 emulsion EAPG spec**
- 3) Develop specific outcomes expected for NCHRP 10-114 (Rejuvenators) for all mix and surface spray applied petroleum and non-petroleum rejuvenators**

# Accomplishments-NCHRP Research Projects

## . ETF- RESEARCH INITIATIVES

### A. NCHRP – Ongoing/Completed/ New research projects submitted by ETF

1. NCHRP 14-37, Construction guide specs for Chip seal, Micro Surfacing and Fog seal. (Shuler Consultants; Completed 7-13-2018)
2. NCHRP 20-50(18), CIR, FDR and CCPR reclamation specifications and test methods.
3. NCHRP 9-62, Rapid Test and Specifications for Construction of Asphalt Treated Cold Recycled pavements (VTRC; Completed 8-31-2022)
4. NCHRP 9-63, Performance Grade Specification (EPG) for Emulsion Binders. (Asphalt Institute; Estimated Completion 3-20-2027)
5. NCHRP 14-43, Construction Guide Specs for CIR (NCAT; Completed 8-31-2022)
6. NCHRP 14-44, Guide Specifications for the Construction of Slurry Seals, Scrub Seals, and Tack Coats; (University of Arkansas, Completed 3-1-2022)
7. NCHRP 20-44(26), Implementing Guide Specifications for Construction of Chip seals and Micro Surfacing (NCPPI; Estimated Completion 9-23-2023)
8. NCHRP 10-114, Performance and Safety Specs for Rejuvenating Seals (Auburn University, In Progress)
9. NCHRP 10-124, Development of Field Test to determine Actual Percent Embedment of Chip Seal Aggregate (Auburn University, In Progress)
10. NCHRP 10-134, Performance Based Test for Asphalt Emulsion Treatments for Agency Acceptance and Incentive Programs **NEW**

**B. Special Research Project:** Testing of Asphalt Emulsion was conducted by several Emulsion Labs to Calibrate/validate certain tenets of the EAPG specification. This effort was coordinated by the Asphalt Institute and funded by Husky Asphalt of Canada.

Colin Franco & Darren Hazlett

Updated Oct. 2023





# Accomplishments – Emulsion Treatment Standards

Status: AASHTO Emulsion STDs (2023)

AASHTO Standards Update: 2023	M/MP	T/TP	R/PP	NCHRP Projects	Best Practices	Construction Guide Spec #	QA Guide
Chip Seal	M340		R102	NCHRP 14-37	Published	Section 406	
Micro Surfacing	M341		R103	NCHRP 14-37	Published	Section 408	
Tack Coat	M349		R112	NCHRP 14-44		Section 404	5b COMP
Fog Seal	M343		R105	NCHRP 14-37	Published	Section 410	
Asphalt Rejuvenators				NCHRP 10-114			
Scrub Seal	M345		R107	NCHRP 14-44			5b COMP
Sand Seal	M344		R106	NCHRP 14-48			
Slurry Seal	M342		R104	NCHRP 14-44	Published		5b COMP
Cold Recycled Mixtures with Foamed Asphalt	MP38		PP94				
Ultrathin Bonded Wearing Course	M346		R108	NCHRP 14-48			
Cold Recycled Mixtures with Emulsified Asphalt	MP31		PP86	NCHRP 9-62 NCHRP 14-43	Published	Section 411	5b COMP
Emulsified Asphalt	M140-16						
Cationic Emulsified Asphalt	M208-16						
Polymer-Modified Cationic Emulsified Asphalt	M316-16						
Emulsion/Surface Performance Grades (E/SPG)				NCHRP 9-63			



## Accomplishments – New EAPG Draft Specification

- The ETF Special Working Group ( M. Voth) developed a draft **Emulsified Asphalt Performance Grade (EAPG)** specification.
  - Based on work by Drs. A Epps, Texas A&M and R Kim, NC State
- This draft was the basis for project **NCHRP 9-63**, “A Calibrated and Validated National Performance-Related Specification for Emulsified Asphalt Binder”.
- PI is the Asphalt Institute & NCAT.
- The project will formally validate the EAPG specification.

# Accomplishments -EAPG Draft Specification

**Table 1 - Performance Graded Emulsified Asphalt Specification**

Performance Grade	EPG 49				EPG 55					EPG 61				
	-25	-31	-37	-43	-19	-25	-31	-37	-43	-19	-25	-31	-37	-43
Average 7-day max pavement surface design temperature <sup>a</sup> , °C	< 49				< 55					< 61				
Min pavement surface design temperature <sup>a</sup> , °C	> -25	> -31	> -37	> -43	> -19	> -25	> -31	> -37	> -43	> -19	> -25	> -31	> -37	> -43
<b>Tests on Residue Recovered Using AASHTO R 78, Procedure B</b>														
High Temperature Performance Parameter														
Dynamic shear, T 315: G*/sinδ, min 0.65 kPa, test temp @ 10 rad/s, °C	49				55					61				
Low Temperature Performance Parameter														
Critical phase angle, δ <sub>c</sub> , degree	45	42	39	36	48	45	42	39	36	48	45	42	39	36
DSR Temperature Frequency Sweep, NCHRP Report 837 <sup>c</sup>	5°C, 15°C, and 25°C													
Low <sup>b</sup> traffic max G* at δ <sub>c</sub> , MPa	30	30	30	30	30	30	30	30	30	30	30	30	30	30
High <sup>c</sup> traffic max G* at δ <sub>c</sub> , MPa	20	20	20	20	15	20	20	20	20	15	20	20	20	20
OPTIONAL: polymer identification parameter														
Max. phase angle <sup>d</sup> (δ) @ temp. where G*/sin δ = 0.65 kPa	-	-	84°	84°	-	-	84°	84°	84°	-	84°	84°	84°	84°
<p><sup>a</sup> Temperatures are at the surface of the pavement structure. These may be determined from experience or may be estimated using equations developed by SHRP or LTPP, but modified to represent surface temperatures. Surface-grade high temperatures are generally 3°C to 4°C greater than those determined for Superpave PG binders.</p> <p><sup>b</sup> Low traffic is defined as any roadway with an AADT between 0 and 1000 vehicles.</p> <p><sup>c</sup> High traffic is defined as any roadway with an AADT between 1001 and 20,000 vehicles.</p> <p><sup>d</sup> Phase angle is determined at the temperature where G*/sin δ = 0.65 kPa. For routine testing and quality assurance, the phase angle can be interpolated from testing at two temperatures, one above and one below where G*/sin δ = 0.65 kPa</p> <p><sup>e</sup> If required by the buyer, change to 80° for SBS/SB modified emulsions.</p>														

# Looking Ahead

## Remaining Work

1. Keep progressing the state of the Science in Emulsion Technology through Research to create new and better Emulsion Products.
2. Encourage state DOTs and local agencies to use the new PP AASHTO Standards for Emulsion Treatments:-
  - Pavement Preservation Materials AASHTO Standards
  - Construction Guides and Quality Assurance Standards
  - New Test Methods

## Remaining Work (Cont.)

3. Work with state DOTs and local agencies to host demonstration projects where treatments are constructed using the new AASHTO specifications.

[ NCHRP Project 20-44(26) ]

4. Develop New 'Performance related' tests to support the new Emulsion Treatment standards

# ETF- Future Considerations (1)

## 1) Emulsion Surface Treatments -Surface Functional Characteristics:

Take a Look at the surface Characteristic ( positive and Negative) of all Emulsion Treatments and how they can be utilized and/or improved . Characteristics such as:

- a) **Friction** – this directly affects safety- improving friction numbers and slowing friction loss
- b) **Ride Quality**- Smoothness which includes mitigating wash boarding , delamination's , and shelling
- c) **Noise**- Internal to the vehicle
- d) **Sealing of Pavements** – especially smaller cracks < 1/8 inch
- e) **Visual** – Improve overall pavement visibility especially nighttime /wet condition visibility
- f) **Spray/splash** reduction under wet conditions.
- g) **Pavement marking** compatibility
- h) **Aging protection** and mitigation for HMA pavements

# ETF- Future Considerations (2)

## 2) Progressing the state of the Science.

- a) Good Adhesion with substrate ( Asphalt or concrete)
- b) Additives to enhance properties that effect performance and durability
- c) Improved adhesion for aggregate in emulsion mixes - Agg Pretreatment?
- d) Reliable predictability/control for Emulsion breaks/set
- e) Performance tests for Emulsion Treatments
- f) Modernize Construction equipment (Sensors) to better control and apply the treatments

# ETF- Future Considerations (3)

## 3) Special Non-Traditional Uses for Asphalt Emulsions.

- a) Surfacing of Concrete roads to reduce noise and joint rideability
- b) Surfacing for concrete bridge decks to “flex” seal cracks , stop corrosion.
- c) Light Weight solution for Bridge deck overlays/Suspension Bridges
- d) Bike paths preservation treatments.



# ETF – Closing Thoughts

## MOVING FWD ON IMPLEMENTATION OF EMULSION TREATMENTS:

- **The growth of emulsion use** is still in the early stages though it is encouraging to see that more agencies are beginning to use these treatments. To expand the use of Emulsions Treatments there must be a concerted , continuing and relentless effort by all stake holders to work together and partner to achieve this end .
- **Partnering** between FHWA , AASHTO,AWPA , Industry ( FP2) and Academia will be critical. The message to be broadcasted , is that Emulsions treatments have progressed to the point that they – Perform well; Have QA standards that ensure Quality job; Construction operations/ applications are expeditious ; are cost effective , and environmentally friendly.
- **Quality Assurance** plays a huge part in the successful placement of a treatment. This builds credibility and confidence in getting owners to use these treatments , with training and certification being the cornerstones of the QA effort.

## ETG & ETF – Founding Father (19xx-2009)



**Jim Sorenson - FHWA**

# Questions

