

# National Seminar on Moisture Sensitivity of Asphalt Pavements

## Breakout Session 1

### *Fundamentals*



# Basic Influences on Moisture Sensitivity

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*Chemical*

*Physical*

*Mechanical*



# Basic Influences on Moisture Sensitivity

## *Chemical*

*Bonding/De-bonding*

*Adhesive*

*Cohesive – Asphalt or Aggregate*

## *Physical*

*Rugosity-Surface Area-Absorption*

## *Mechanical*

*Stone Breaking*

*Scrubbing*



# Chemical

*Clay – Dust – Filler*

*Mastic Failure*

*Salt in Binder*

*Aggregate Aging*

*Molecular Orientation - Time*



# Physical

**Water Transport/Permeability  
Environment**

**Aggregate Morphology Absorptivity**

**Diffusion of Moisture**

**Stiffening – Viscosity – Diffusivity**

**Stiffening - Aging**



# Mechanical /Construction

Density Issues

Drainage

Film Thickness

Trapped Moisture

Mechanical Working – Cracking  
Under Compaction



# Mechanisms of Moisture Damage

*Emulsification*

*Adhesive Failure*

*Cohesive Failure*



# Mechanisms of Moisture Damage

## *Emulsification*

*Clay, Dust, Filler*

*Salts in Asphalt*

## *Adhesive Failure*

*Aggregate Aging*

*Molecular Orientation at Interface*

## *Cohesive Failure*

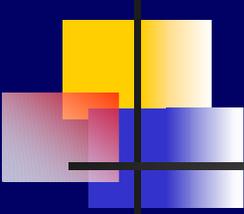
*Water Absorption – Molecular Orientation*

*Mastic*

*Aggregate*



# Best Practices



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## *Testing and Specifications*

*Hamburg – Addresses all Mechanisms  
Aggregate*



*Methylene Blue*

*Hydrometer*

*Soundness*

*Sand Equivalent*

*PG After Additives*

# Best Practices

## *Prevention*



*Density – Drainage*

*Avoid Marginal Material Combinations*

*Mix Design – Including Additives*

*QC/QA Including Behind Paver Sampling*

# Research to Address Gaps and Barriers

*Hamburg – Optimize/Standardize  
New /Existing Test Methods for Research  
Methylene Blue – Optimize/Standardize  
Testing Protocol for Aggregate  
Emulsifiability of Asphalt  
Funnel – Bitumatic  
Salts – NAPT, ICP  
Pessimimum Voids – Emulsification*



# Research to Address Gaps and Barriers

*Adhesive Failure*

*Surface Energy – Measurement Method*

*Cohesive Failure*

*Bitumen or Mastic*

*Heithaus*

*Pull Off*

*Water Absorption and Diffusion Test*

*Aggregate*

*ECS – ICP - Solubility*



# Strategic Plan

*Circulate Results for Comment/Suggestion*  
*Establish TWGs to Address Research Needs*  
*TRB Synthesis*  
*Field Sections for Validation*  
*AASHTO Presentation*  
*TRB/ASTM Symposium*  
*Additional Technology Transfer*

