Asphalt Issues Update
Mixture & Binder
Expert Task Groups

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Asphalt Mix ETG & Binder ETG

- Objective: To provide a forum for the discussion of ongoing asphalt binder/mixture technology and to provide technical input for current and future research, development and technology implementation related to asphalt mixtures design and construction.
- Initiated in 1994
- Government, Industry, Academia

Asphalt Mix Expert Task Group

- AASHTO SOM Input (Harvey)
- SGC Operational Issues (Dukatz/D'Angelo)
- AMPT Flow Number, NCHRP 9-29 (Bonaquist)
- Specific Gravity Task Force (West)
- Mix Design Manual, NCHRP 9-33 (Christensen)
- IDT E* Ruggedness (Kim)
- Longitudinal Joint Construction (LaFleur)
  National Survey Results (Harman)

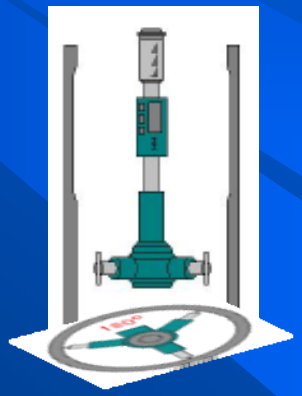
Subcommittee on Materials Standards Update – ETG Input

- T 312 – 08 Preparing and Determining the Density of HMA Specimens by SGC
  - Internal Angle Only (1.16 ± 0.02°)
  - Only TP 71 Simulated Loading
  - Precision and Bias Based on External Angle

- Asphalt Mixture Performance Tester (AMPT)
  - End Note Reference to NCHRP 9-29 and the Simple Performance Tester
  - Published as TP 79, PP 60, PP 61, and PP 62

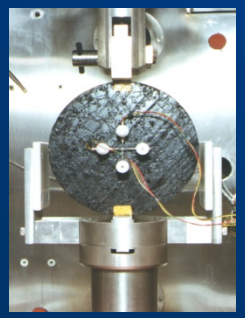
Superpave Gyratory Compactor Operational Issues

- Guidance document, publication as a TRB Circular through subcommittee AFK50 provide background information on the development of internal angle measurements.
- T312 Proposed Annex for Evaluating Molds



Superpave Gyratory Compactor Operational Issues

- N_{design} adjustments
- Latest study 9-9(1) recommendations
- 9-33 maintain existing N_{design} criteria
- Performance Testing Evaluation



Asphalt Mix Performance Tester

- NCHRP 9-29
- Evaluate mixture rutting (Fn) and fatigue response (E*)
- Relatively inexpensive and easy to use
- Provides MEPDG input

Asphalt Mix Performance Tester (2009/2010)

- Develop pooled fund for training and equipment purchase of the equipment
- Technician training for operation of the equipment (AAT contractor/NCAT Lab)
- Remaining issue with determination Flow Number

Asphalt Mix Performance Tester Flow Number (Fn)

- Developed as indicator of rutting potential
- 9-33 relationship flow number/maximum traffic with lab mixes (field mix issue-age)
- Issues
  - High temperature 50% reliability PG LTPPBind 3.1
  - Confined/unconfined
  - Load - various levels have been used

Flow Number -- What's Next

- Too early to prepare standard criteria
- Continue to monitor work in progress
- Encourage investigation of
  - Relationship to rutting performance
  - Sensitivity to mix design factors
  - Use of both confined and unconfined tests on the same materials

Specific Gravity Task Group

Task Group Objectives:

- Identify issues with current AASHTO standards - Recommendations regarding changes and/or new methods
- Evaluate alternate methods
- Guidance document, publication as a TRB Circular

Specific Gravity Task Group SOM Recommendations.....

- T166 (Bulk Specific Gravity)
  - Changes sent to replace reference to paraffin method with vacuum sealing method
  - Change water absorption limit to 1.0%
  - Precision estimates from NCHRP 9-26
- Effects on Volumetrics - possible:
  - Design VMA measurement increases by 0.5%
  - In-place density measurement (%Gmm) increases by 1.0% for mixes

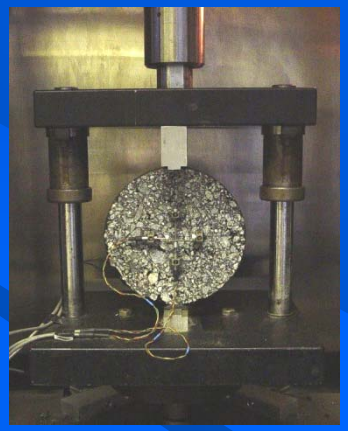
9-33: Mix Design Manual for HMA

Final report January 2010 (AAT)

- Test procedures for dense, gap and open graded mixes
- HMA performance tests
- Criteria developed with M-E Design Guide
- Final critical issues being evaluated:
  - FAA values and CAA values
  - Flat & elongated requirements
  - Performance Tests
  - Design VMA values
  - Design gyration levels
  - RAP

IDT Testing for E*

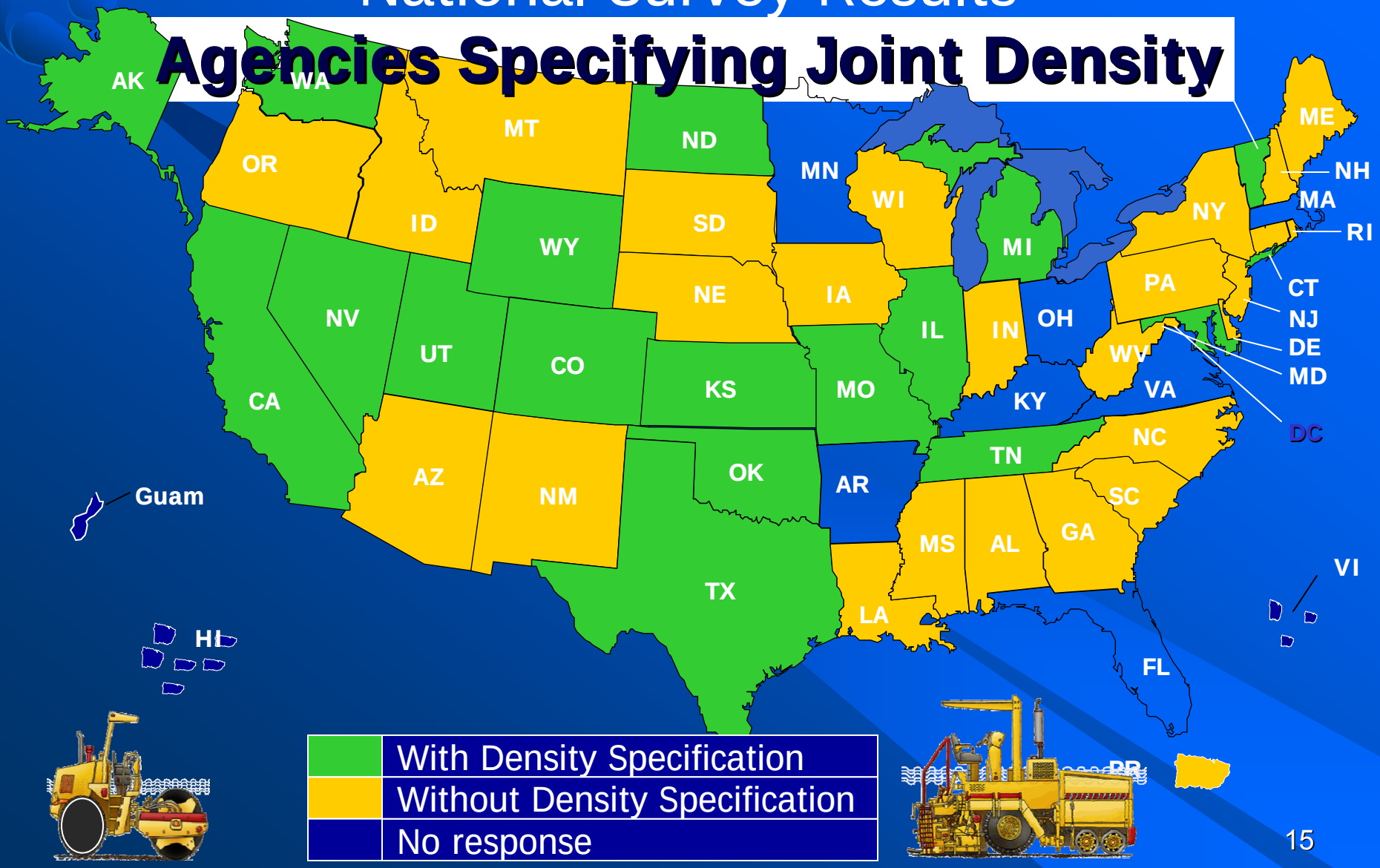
- Current E* test protocol not adequate for testing field cores for forensic studies and rehabilitation design
- Need for E* test protocol using IDT
- NC State developed IDT testing mode
- Draft specifications developed
  - Specimen fabrication
  - Master curve generation
  - IDT E* testing/procedural ruggedness



Longitudinal Joint Construction

National Survey Results

Agencies Specifying Joint Density



Improvement Efforts

- Benchmarking Survey – *Complete*
- Specification Evaluation & Summary of HMA Compaction Methodologies
- Implement Innovative Technologies
- Stakeholder Involvement
- Marketing/Educational Materials

Asphalt Mixture & Binder Expert Task Groups

Thank You !

Download ETG Presentations at:

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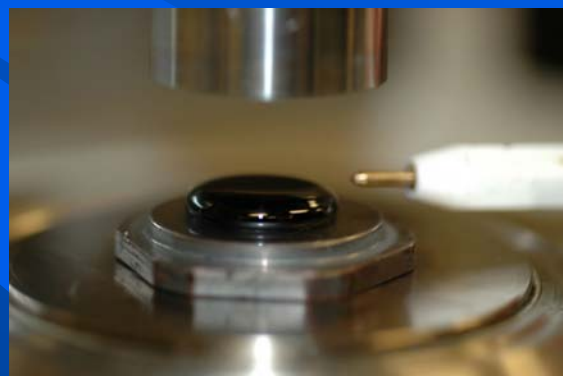
Binder ETG - Key Activities

- MSCR Test Method(D'Angelo/Anderson)
- Fatigue Response of Polymer Modified Binders
- Polyphosphoric Acid (D'Angelo)
- Recovered Motor Oil (Youtcheff)
- DSR Sample Preparation (VanFrank)
- ABCD Low Temperature alt. to DT (Kim)

Multi-Stress Creep and Recovery Test Method

- Inadequacy of Superpave high temp G*/sinδ to predict modifier behavior
- Testing is done at actual pavement temperatures
- New MSCR High Temperature Spec (M320 Table 3) correlates to rutting for both neat and polymer modified binders
- Various implementation efforts and specification refinement



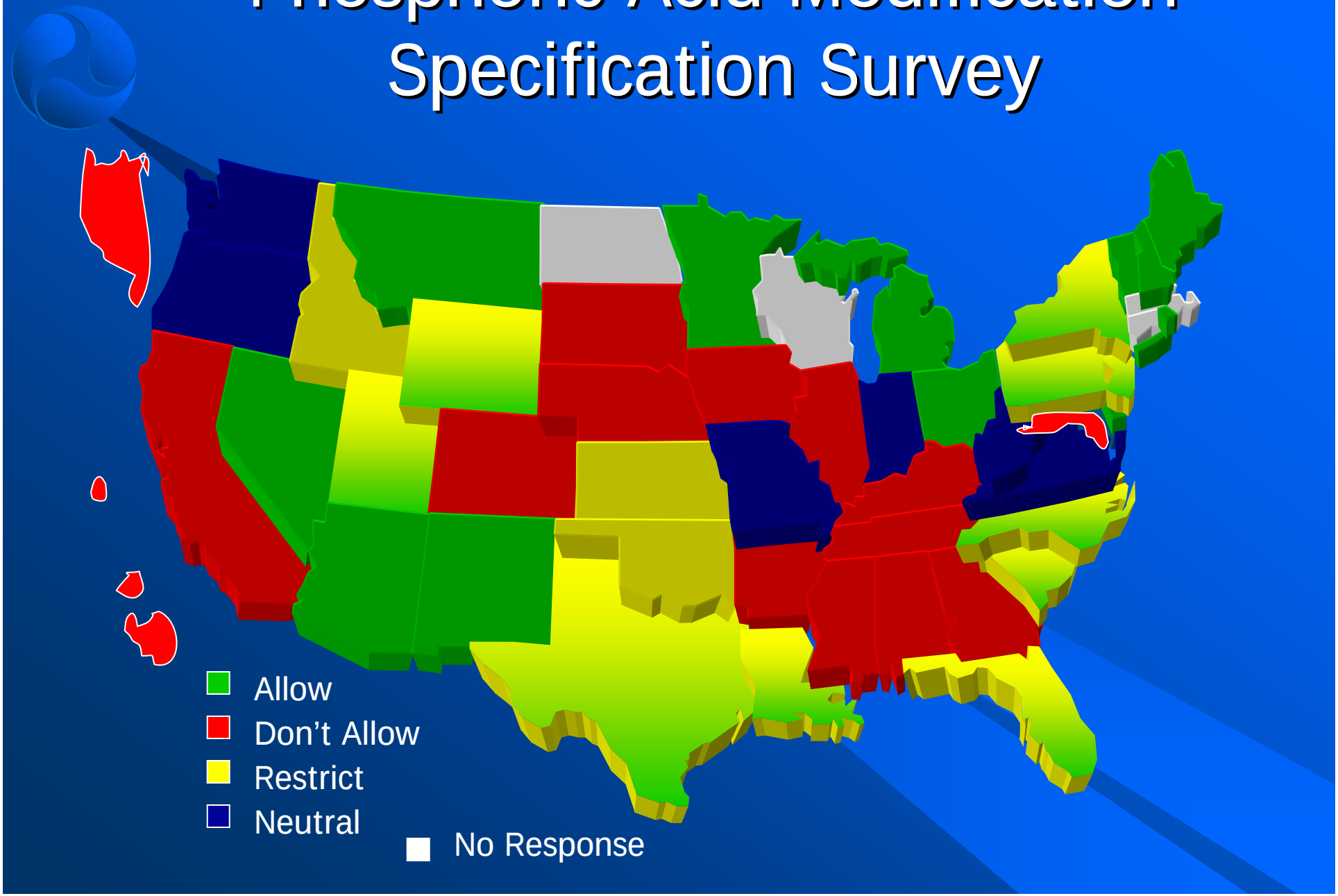
Polymer Modification and Fatigue

- Highway agencies use polymer modified binders for two primary reasons.
  - First to improve rut resistance and still be able to maintain low temperature properties.
  - Second to improve durability and fatigue response.

Fatigue Testing – one approach

- Fatigue testing on HMA samples in the DSR
- How does polymer modification effect fatigue properties of binders.
- Does the percentage of PM significantly change the fatigue response of binders.

Phosphoric Acid Modification Specification Survey



PPA Summary

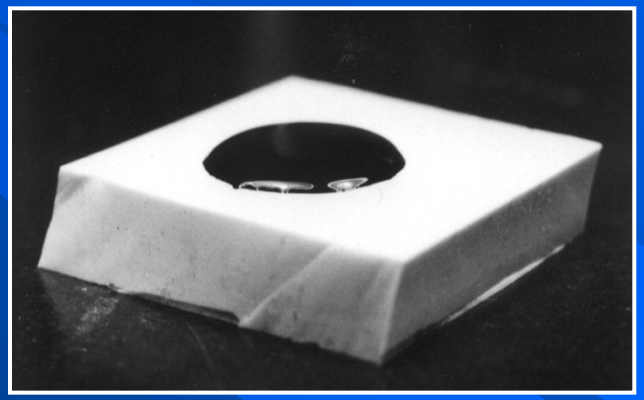
- PPA is a valuable tool to binder suppliers necessary to provide binders that meet current specifications and provide performance desired.
- It is the suppliers responsibility to investigate performance characteristics
- Effect of PPA on moisture damage is asphalt and aggregate dependant and is treatable with both lime and liquid anti-strips.

Detection of PPA and Trace Metals in Asphalt Binders

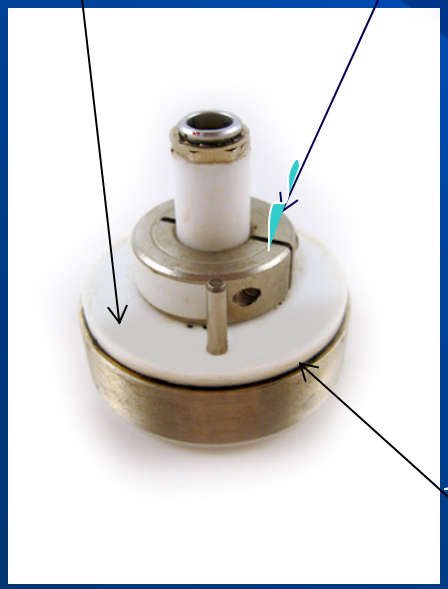
- Phosphoric Acid content of asphalt binders can be readily measured using XRF Spectroscopy.
- Presence of recycled Engine Oil Bottoms can be detected by measuring trace metals Cu, Mo, Ba, Ca, Pb and Zn levels.
- More Research is needed on effects

DSR Specimens

- T 315-08 maximum 2 hours time for specimen to held in molds
- AASHTO SOM tech section 2b requested ETG evaluation
- Asphalt Institute/FHWA to evaluate storage time



Asphalt Binder Cracking Device (ABCD)



- Evaluation of low temperature binder properties
- When temperature drops, asphalt shrinks 100 X more than the ABCD invar ring. Asphalt compresses the ring, strain gauge measures this compression.
- Evaluate Polymer Modified Binder
- Draft Specification under review

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