FHWA
Asphalt Mixture ETG
2006

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Asphalt Expert Task Groups Update

- Initially created by FHWA in 1994
- ETGs Role focused on Superpave
- ETGs on Mixture & Binder Issues
- ETGs reformed 2006 (this week)
  - Asphalt Binder Properties
  - Asphalt Mix Design & Construction
  - Advanced Asphalt Modeling
Role of Asphalt Mix ETG

- Provide a forum for government and industry discussion of emerging issues;
- Review research and technology activities;
- Identify potential improvements to mixture & aggregate specification/standard test methods;
- Identify needed technology improvements.

Open meetings/public access to all records
Mixture Issues
Superpave Gyratory Compactor Calibration

Making Superpave Mixtures Consistent
AASHTO Designation: T 312-03

Preparing ... Specimens by ... SGC

4.1

Superpave Gyratory Compactor – ... The compactor shall tilt the specimen molds at an external angle of $1.25^\circ \pm 0.02^\circ$ or an average internal angle of $1.16^\circ \pm 0.02^\circ$ in accordance with AASHTO.
Internal Angle of Gyration

- **Internal Angle of Gyration**
  - Validate Differences in SGCs
    - Demonstrated that internal angle of gyration could be different even though external angle was the same.
  - Calibration
    - Potentially time-intensive
      - Up to 1 day for a calibration
    - Affected by mixture stiffness
      - Requiring recalibration for different mix types
  - **Mixless measuring devices**
Performance Tester
9-29: *Simple Performance Tester for Superpave Mix Design*

- Evaluation of 1st-article SPTs from Shedworks/IPC and Interlaken complete
- Ruggedness Underway

*Advanced Asphalt Technologies*
Performance Tests

- **Dynamic Modulus E***
  \[ |E^*| = \frac{\sigma_0}{\varepsilon_0} \]
  - \( \sigma_0 \) = dynamic stress
  - \( \varepsilon_0 \) = recoverable axial strain

- **Flow Number Test (Fn)**
  Number of load repetitions at which shear deformation occurs under constant volume

<table>
<thead>
<tr>
<th>Applied Stress (kPa)</th>
<th>600 (87 psi)</th>
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<tbody>
<tr>
<td>Temperature (°C)</td>
<td>54</td>
</tr>
<tr>
<td>Failure limits</td>
<td>10,000 cycles or 5% strain</td>
</tr>
<tr>
<td>Binder Grade</td>
<td>RAP Percentage</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>No change in binder selection</td>
<td>&lt; 15%</td>
</tr>
<tr>
<td>One grade softer than normal</td>
<td>15 – 25%</td>
</tr>
<tr>
<td>Blending charts</td>
<td>&gt; 25%</td>
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</tbody>
</table>
9-33: A Mix Design Manual for Hot Mix Asphalt

Update method in AI Manual SP-02:

- New volumetric criteria.
- N-design
- Simple performance test(s).
- Criteria developed with M-E design guide performance models and software.
- Framework for integrated mix and structural design.

Advanced Asphalt Technologies (August 2006)
Other NCHRP Projects

- **9-34**: Improved Conditioning Procedure for Moisture Susceptibility
- **9-38**: Endurance Limit of HMA Mixtures to Prevent Fatigue Cracking
- **9-39**: Determining Mixing and Compaction Temperatures of PG Binders in HMA
- **9-45**: Development of Specification Criteria for Mineral Fines Used in HMA
Warm Asphalt Technology

- Demo Field Projects Data
- 9-43: Mix Design Practices

HMA 312 °F

WAM 230 °F
Potential process at the HMA plant as part of a QA system?
In-line Viscometer

Computer recordation

Moisture Content
Intelligent Compaction

- Automatic adjustable compaction equipment
- Usage of Continuous Compaction Control
- Selection of the most suitable equipment
Surface Characteristics

- Noise Reducing HMA Mixes
- Improved Friction Characteristics
Thank You

http://www.fhwa.dot.gov/