Test Track Studies

- Phase I--October 2000 to December 2002
- Phase II--January 2003 to December 2005
- Phase III--January 2006 to December 2008
Implementation of Results from Phase I
Alabama

- Increased use of fine-graded mixes
- Increased use of modified asphalt
- Use more SMA and OGFC mixes
- Increased asphalt contents by lower lab compaction effort
Florida

- Use more fine-graded mixes
- Use more modified asphalt
- Verification of HVS results
  - Looks reasonable for mixture comparisons
  - Still looking at structural comparisons
Georgia

- Compared SMA to Superpave
  - Have used SMA under OGFC on Interstates
  - Will begin to use Superpave under OGFC in some areas to reduce costs
  - SMA appears to be more durable
• Validation of accelerated loading device
  – Does not appear to work satisfactorily for structural work
  – Appeared to give reasonable answers for mixture studies
Mississippi

- Beginning to place SMA using gravel aggregate
- Increased allowance of limestone in surface from 30 to 50%
- Evaluating 4.75mm mix at track. Based on good performance they expect to use more of these mixes
Missouri

- Looking at using lower compactive effort for SMA
- Looking at using higher LA abrasion aggregates for SMA
- Evaluating mechanistic/empirical design procedures
North Carolina

• Use more fine-graded mixes
  – Required revising the initial requirements
Oklahoma

- Using track to adjust mechanistic/empirical design procedure
- Beginning to use SMA
- Gained confidence in specifying loaded wheel test
- Initial work at track made implementation of Superpave easier
South Carolina

- Approved one aggregate source with high LA abrasion based on work at track
- Another aggregate source was rejected because it polished under traffic
- Based on Mississippi work South Carolina has begun to used smaller max aggregate size mixes
Tennessee

- Building their first OGFC
- Beginning to place some SMA with gravel
- Beginning to use higher asphalt contents
Research Findings from Phase II
STRUCTURAL STUDY

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<th>N1</th>
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<th>N3</th>
<th>N4</th>
<th>N5</th>
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6" Dense Crushed Aggregate Base

| 200 ft | 200 ft | 200 ft | 200 ft | 200 ft | 200 ft | 200 ft | 200 ft |

- Mix run with modified binder at optimum
- Mix run with unmodified binder at optimum
- Mix run with unmodified binder at opt + 0.5%

Mixes 1 & 3: 3/6" ARZ Superpave in 1" Lifts
Mixes 2, 4 & 5: 3/4" ARZ Superpave in 2" Lifts
Mix 5: 3/6" SMA in 1" Lifts
MEASURED PAVEMENT RESPONSE

![Graph showing measured pavement response with time and longitudinal microstrain as axes. The graph includes lines for different conditions labeled as 'ALL', 'ALC', and 'ALR'.]
• Pavement Response Measured at Known Temperatures
• Mechanistic Pavement Analysis Approach Validated
• Pavement Response Predicted at All Temperatures
• Damage (Strains) Accumulated with Each Axle Pass
• Mechanistic-Empirical Pavement Design Calibrated
• Both 5” Sections Failed (Slightly Later than Expected)
• Fatigue Cracking Now Exists in 7” Sections (Much Later)
• No Cracking Observed in Either 9” Section
MIX STUDY FINDINGS

- Fine Graded Mix Performance Comparable to Coarse
- Change to Modified Asphalt Cuts Rutting in Half
- Bumping Modified AC ½ % Doesn’t Increase Rutting
- Experimental Mixes Field Proven (e.g., Gravel SMA)
- Aggregates Safely Evaluated (e.g., Polishing)
- Field Correlations Prove Laboratory Test Methods
SYNTHETIC FUEL STUDY
Warm Asphalt Test, 2005
QUIET PAVEMENTS (INSIDE LANE)
## Test Section Layout

### North Tangent

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<th>Layer 1 (1 ¼ inches)</th>
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<th>N 6</th>
<th>N 7</th>
<th>N 8</th>
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<td>AZ OGFC</td>
<td>PEM</td>
<td>PEM</td>
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</table>

| Layer 2 (1 ¼ inches) | Track | AZ OGFC | PEM | PEM | Track |

### South Tangent

<table>
<thead>
<tr>
<th>Layer 1 (1¼ inches)</th>
<th>S 4</th>
<th>S 5</th>
<th>S 6</th>
<th>S 7</th>
<th>S 8</th>
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<tbody>
<tr>
<td>&lt; 4.75 SMA</td>
<td>4.75 SMA</td>
<td>9.5 SMA</td>
<td>4.75 DGA</td>
<td>9.5 DGA</td>
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</tbody>
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| Layer 2             | Track |
Items to investigate in Phase III

• Mechanistic Pavement Design Procedure
  – Work with NCHRP 1-40
  – Overlay design concepts
• Mill and Overlay with various Mixtures
• Leave in place for additional traffic
Proposed Schedule for Phase III

• Approximately 12 sponsors on board at this time
• Test Plan finalized by January 2006
• Project advertised in February 2006
• Construction begins in April 2006
• Construction completed by October 2006
• Traffic starts immediately
• 10 million ESALs in 2 years
• Project completed in December 2008
• Website: pavetrack.com
  ncat.us
Other work with National Significance

- Effect of layer thickness on compaction
- Evaluation of performance tests
- Effect of mix type on noise
- Performance of warm mix asphalt
- Effect of aggregate and mix type on friction
- Calibration of profilographs and profilometers
Endurance Limit of Hot Mix Asphalt Mixtures to Prevent Fatigue Cracking in Flexible Pavements

NCHRP 9-38

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