ALDOT's Investment in the NCAT Test Track

NCAT Test Track Facts

- The only full-scale, accelerated-loading pavement facility in USA
- Nearly 10 million miles have been driven on the Test Track
- 10 million Equivalent Single Axle Loads are applied each cycle
- Auburn's Autonomous Vehicle Research Building on site
- 22 state DOTs have participated in NCAT Test Track research

2021 Test Track Sponsors

Types of Test Track Experiments

1. Structural Experiments
   - Full depth reconstruction of cross-section
   - Instrumented with stress & strain sensors and temperature probes
   - FWD testing throughout experiment

2. Surface-layer Experiments
   - Only upper layer(s) replaced
   - No instrumentation
Cost of NCAT Track Experiments

- Traffic continuations ($250-$300k over 3 years)
- New mill/inlay sections ($500k over 3 years)
- New structural sections ($750k over 3 years).

ALDOT Funded Experiments

  - Superpave test stations
  - Unmodified versus polymer modified binders
  - Effect of 5% higher asphalt content
  - Structural Study (Highways)
  - Continuation of numerous 2000 test sections
- 3rd Cycle (2006-2008)
  - Added structural section w/PS 87-22 in lower layers
  - 45% PAV surface mixtures
- 4th Cycle (2009-2011)
  - RAP & WMA Group Experiment
  - Continuation of 45% PAV surface mix experiment
- 5th Cycle (2012-2014)
  - Green Group Experiment
  - GSPC Experiment - fiber type, GTR, WMA

ALDOT Funded Experiments - Research Findings

  - Rutting testing performance criteria
  - Binder grade bumping validation
  - Diamond grinding used to improve smoothness
  - Combination between AASHTO and rutting, 1st cycle.
  - Performance criteria developed between performance vs service life criteria
  - Lewis Rb:
  - Measured critical stress and strain values theoretical calculations
- 3rd Cycle (2006-2008)
  - Green Group experiment
  - Field more resistant to fatigue cracking than conventional asphalt
  - Field backcalculated model matched test results with actual damage
  - New, published asphalt mixtures

Revised Asphalt Layer Coefficient, a₁

- 1993 AASHTO Pavement Design Guide
- Analysis based on...
  - Lab Modulus
  - Field deflections and backcalculation
  - Field Performance

- Implemented in Alabama in 2010
- Annual Savings between $25 and $50 million

Improving Open-Graded Friction Course

- Reclaimed asphalt production
- Labor cost for laborers
- Improved cost efficiency
- Field testing and evaluation
- Field performance

ALDOT’s Investment in the NCAT Test Track
Open-Graded Friction Course Durability & Performance
- Gradation and thickness
- Layer coefficient
- Recycled materials and fibers
- Tack coat type and application rate
- Validate refined mix design procedure

High RAP Experiments
- 45% RAP Surface Mix
- Test of Cooling

High RAP & WMA Experiment
- 50% RAP versus All Virgin mix in each layer
- Cracking after 16 million FSAAs

ALDOT Profiler Certification Program
- Established 2012
- Required for profilers used on ALDOT contracts
- AASHTO R-56 Certification
  - 3 dense-graded sections
  - 1 OGFC section
- 45 profilers annually
- 70 technicians

For more information...visit: www.ncat.us

Aggregate Specifications
- Elimination of the Restricted Zone
- Evaluation of marginal aggregate
- Gravel suitability in SMA & OGFC
- Higher F&E content for SMA & OGFC
- Maximum limestone content for friction
Mechanistic-Empirical Design Procedures

- All of these programs have used NCAT test sections for model calibration.
- MEPDG over-predicted rutting by 50-100% using default national calibration coefficients.
- MEPDG fatigue prediction was poor even after adjusting coefficients.
- Several non-traditional asphalt mixtures and other materials have been validated.

Highly Modified HMA Structural Assessment

- 5.75 inches vs 7 inches
- Same mix designs in surface, intermediate, and base layers
- Control section: 10% of lane area fatigue cracking
- HMA section: 6% of lane area top-down cracking

Cracking Group Experiment

Which Tests Correlate to Field the Best?

Balanced Mix Design

- Comparison of BMD vs. Superpave
- Preliminary validation of BMD criteria
- Evaluation of innovative additives for improving mix performance and increasing sustainability
- Combining BMD and friction assessment for predicting performance
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