Period Covered: October 1, 2010 through December 31, 2010 (Quarterly Report)

ALDOT Progress Report for the

State Planning and Research Program

PROJECT TITLE: Accelerated Performance Testing on the 2009 NCAT Pavement Test Track		
PROJECT MANAGER(S): R. Buzz Powell, PhD, P.E. Ph #: (334) 844-6857	**SPR Project No:** TPF-5(208) ALDOT Research Project No. 930-754P	**Project is:** ____ PLANNING __X__ RESEARCH & DEVELOPMENT
Annual Budget	**Multi Year Project** Total Budget for Project: $7,216,000.00 Total Cost to Date for Project: $3,942,775.08	

Background

The Pavement Test Track is a full-scale accelerated performance test (APT) facility managed by the National Center for Asphalt Technology (NCAT) at Auburn University. The project is funded and directed by a multi-state research cooperative program in which the construction, trafficking, and pavement evaluation are carried out on 46 different 200-foot test sections around the 1.7-mile oval test track. Each test section is constructed utilizing the asphalt materials and design methods used by individual sponsors. A fleet of heavy trucks is operated on the track in a highly controlled manner in order to apply a design life-time of truck traffic (10 million equivalent single axle loads, or ESALs) in two years. The current project represents the fourth three-year research cycle of the NCAT Pavement Test Track.

Objectives

The primary objectives of the pooled fund project are as follows:

1. Constructing 200 ft test sections on the existing 1.7 mile NCAT test oval that are representative of in-service roadways on the open transportation infrastructure;
2. Applying accelerated performance truck traffic in 2 years following the construction;
3. Assessing/comparing the functional and structural field performance of trafficked sections on a regular basis via surface and subsurface measures;
4. Validating the M-E approach to pavement analysis and design using both surface and subsurface measures;
5. Calibrating new and existing M-E approaches to pavement analysis and design using pavement surface condition, pavement load response, precise traffic and environmental logging, and cumulative damage;
6. Correlating field results with laboratory data; and

7. Answering practical questions posed by research sponsors through formal (i.e., reports and technical papers) and informal (e.g., one-on-one responses to sponsor inquiries) technology transfer. For example, can high RAP content mixes provide the same level of performance as virgin mixes? If so, can they be used in both deep and shallow layers? Although warm mix is better for the environment, will it provide the same level of rut and moisture damage resistance as conventional mixes?

Design and Construction of Test Sections

When each research cycle is completed, test sections are either left in place for the application of additional traffic or rebuilt in the manner that best meets the needs of sponsors. The fourth research cycle includes: 18 sections built in 2009 (13 structural sections, four mix performance sections, and one surface treatment section), nine sections built in 2006 (one structural section and eight mix performance sections), 13 sections built in 2003 (two structural sections and 11 mix performance sections), and six sections built in 2000 (all mix performance sections). Mix performance sections are perpetual pavements in which distresses are confined to various combinations of experimental surface mixes. Structural sections are typically thinner, highly instrumented pavements that are intended to provide information for the MEPDG. The reconstruction of the test track for the fourth research cycle was completed in August of 2009.

Trucking Operations

Trucking operations for this research cycle of the NCAT Pavement Test Track began after the completion of the reconstruction activities in August of 2009. A fleet of five trucks is currently running two shifts a day, five days a week (Tuesday through Saturday). An AM driver shift runs from 5:00 AM until approximately 2:00 PM, and a PM driver shift runs from 2:00 PM until approximately 11:00 PM.

Approximately 6.2 million ESALs (62 percent of the 10 million ESAL goal) have been safely applied to the surface of the 2009 NCAT Pavement Test Track as of the end of the reporting period. This means that the three sections originally placed in 2000 have been subjected to over 36 million ESALs and the eleven sections built in 2003 have been subjected to over 26 million ESALs. The nine sections built in 2006 have been loaded to over 16 million ESALs. All mixes in the previous studies were designed for 10 million ESALs.

Laboratory Performance Testing

Laboratory testing will be conducted over this cycle of testing to develop correlations between laboratory tests and field performance. To adequately characterize the performance properties of the mixtures, both the binder and HMA mixtures will be tested. Currently, each binder used at the 2009 NCAT Pavement Test Track has been tested to determine its performance grade. The Multiple Stress Creep and Recovery test and frequency sweeps have also been completed at this time.

Laboratory testing of mixtures using the Asphalt Pavement Analyzer has been completed. Upon completion of trafficking, laboratory and field performance will be correlated. Testing to determine the dynamic modulus in

confined and unconfined states for each mix placed on the 2009 Test Track using AMPT according to AASHTO TP 79-09 is complete. Currently, beam fatigue testing is underway. Each mixture requires one more beam to be tested at each strain magnitude. Indirect tension testing of the 2009 surface mixtures has been completed in accordance with AASHTO T322. Energy ratio samples to characterize surface cracking susceptibility have also been fabricated.

To characterize the moisture susceptibility of the mixtures, testing has been initiated using the Hamburg Wheel Tracking Device and AASHTO T 283.

Structural Pavement Study

Weekly testing has continued to measure strain and pressure in each of the structural pavement test sections (N1-N11; S8-S12). Processing of the strain and pressure signals has continued and the database is complete through September 30, 2010. Using the collected data, relationships between pavement response and temperature have been developed and will continue to be updated as additional data are obtained. These relationships represent longitudinal and transverse strain in addition to vertical base and subgrade pressure caused by steer, tandem and single axle loadings. FWD testing, as described in the previous progress report has continued and the data have been added to the FWD database. Backcalculation began in January 2010 and the backcalculated moduli database has been developed. Backcalculated moduli are current through July, 2010. Data collection, analysis and backcalculation will continue into the next quarter.

Pavement Performance Evaluation

Every Monday, trucking is suspended so that vehicle maintenance can be performed and pavement performance can be quantified. An inertial profiler equipped with a full lane width dual scanning laser "rutbar" is run weekly around the entire track in order to determine individual wheelpath roughness, right wheelpath macrotexture and individual wheelpath rutting for every experimental section. Additionally, three random locations were selected within each section in a stratified manner to serve as the fixed test location for nondestructive wheelpath densities. Transverse profiles are measured along these same locations regularly so that rutting can be calibrated with a contact method. Weekly crack mapping is conducted to complement pavement response measurements in structural test sections for the purpose of validating and calibrating mechanistic pavement design methodologies. Surface friction and permeability are also measured on a periodic basis. Results from these performance measures will be reported as traffic damage accumulates in the 2009 research cycle.

Performance of new experimental pavements has been very good thus far. The average rut depth in the middle 150 feet (research) portion of all test sections (both old and new) is 5.5 mm. Average roughness was measured at 82.1 inches per mile. The rehabilitation of section N8 back in August with a high polymer mill/inlay is performing well so far. The thin porous friction course (PFC) mix on section N2 appears to have retarded the recurrence of surface cracking in the underlying crack susceptible Superpave mix; however, the use of the spray paver in the otherwise identical section N1 has apparently enhanced this crack retarding effect. Maps of cracking in all experimental pavements, as well as a record of rutting, roughness and texture versus traffic, are available on the project website (www.pavetrack.com).

STATUS AND COMPLETION DATE

Percentage of work completed to date for total project 72.1%

Project is:
X on schedule _____ behind schedule, explain:

Expected Completion Date: September 30, 2012

Please note that this project has continued with renewed requests for services and additional funding obligations and may be extended beyond the current Expected Completion Date listed above.