

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, PE Ph. #: (334) 844-6857	SPR Project No: TPF-5(208) ALDOT Research Project No. 930-754P	Project is: <input type="checkbox"/> PLANNING <input checked="" type="checkbox"/> RESEARCH & DEVELOPMENT
Annual Budget \$5,781,000.00	Multi Year Project Total Budget for Project: \$5,781,000.00 Total Cost to Date for Project: \$2,066,432.52	

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.

A total of 1.6 million ESALs (16 percent of the 10 million ESAL goal) have been safely applied to the surface of the 2009 NCAT Pavement Test Track. This means that the six sections originally placed in 2000 had been subjected to over 31 million ESALs and the thirteen sections built in 2003 had been subjected to over 21 million ESALs. The nine sections built in 2006 have been loaded to over 11 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 is undergoing performance grading. Upon completion of this test, the Multiple Stress Creep and Recovery test will be conducted.

Laboratory testing of mixtures using the Asphalt Pavement Analyzer has been completed. Upon completion of trafficking, laboratory and field performance will be correlated. Dynamic modulus samples have been completed. Testing will commence in the near future. Bending beam sample production will begin in the coming weeks.

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 the end of December 2009. Using the collected data, relationships between pavement response and temperature have been developed and will continue to be updated as additional cold weather data are obtained. FWD testing, as described in the previous progress report has continued and the data have been added to the FWD database. Back calculation is scheduled to begin in January 2010.

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 are now available via the "Performance" page on the project web (www.pavetrack.com). Performance reports will be updated regularly as traffic damage accumulates in the 2009 research cycle. As seen in Figure 1, early performance of new experimental pavements has been very good thus far.

Cycle of Construction by Color (Blue=2003, Red=2006, Yellow=2009); High RAP with Texture; WMA with Green Outline; Thinner Structural Sections in Brown Boxes (Others on Perpetual Foundations); Trucking Percent Complete via Height of Gray Test Date Box

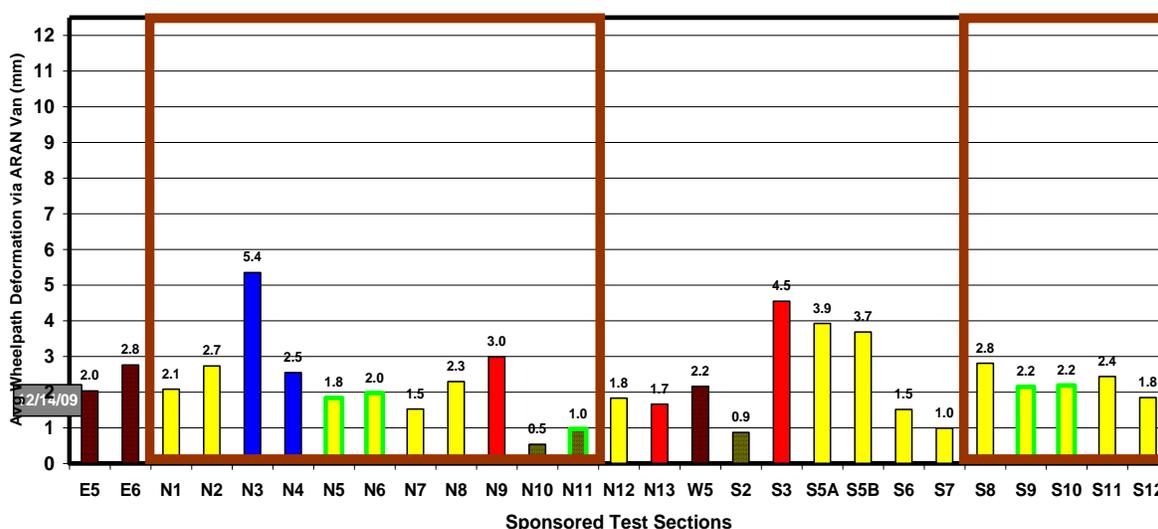


Figure 1 – Rutting Performance on the 2009 NCAT Pavement Test Track

STATUS AND COMPLETION DATE

Percentage of work completed to date for total project 42 %

Project is:
X on schedule behind schedule, explain:

Expected Completion Date: 9/30/2012

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.