TRANSPORTATION POOLED FUND PROGRAM
QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT): Alabama Department of Transportation

INSTRUCTIONS:

Project Managers and/or research project investigators should complete a quarterly progress report for each calendar quarter during which the projects are active. Please provide a project schedule status of the research activities tied to each task that is defined in the proposal; a percentage completion of each task; a concise discussion (2 or 3 sentences) of the current status, including accomplishments and problems encountered, if any. List all tasks, even if no work was done during this period.

Transportation Pooled Fund Program Project # *(i.e, SPR-2(XXX), SPR-3(XXX) or TPF-5(XXX)*	**Transportation Pooled Fund Program - Report Period:**
TPF-5(267)	☐ Quarter 1 (January 1 – March 31) ☐ Quarter 2 (April 1 – June 30) ■ Quarter 3 (July 1 – September 30) ☐ Quarter 4 (October 1 – December 31)

Project Title: Accelerated Performance Testing for the NCAT Pavement Test Track		
Name of Project Manager(s): Dr. R. Buzz Powell, P.E.	**Phone Number:** 334-844-6857	**E-Mail** buzz@auburn.edu
Lead Agency Project ID: 930-822P	**Other Project ID (i.e., contract #):**	**Project Start Date:** May 8, 2012
Original Project End Date: September 30, 2015	**Current Project End Date:** March 31, 2020	**Number of Extensions:** 2 (next 3-year cycle, closeout time)

Project schedule status:

■ On schedule ☐ On revised schedule ☐ Ahead of schedule ☐ Behind schedule

Overall Project Statistics:

Total Project Budget	**Total Cost to Date for Project**	**Percentage of Work Completed to Date**
$27,979,706	$27,815,552	98%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	**Total Amount of Funds Expended This Quarter**	**Total Percentage of Time Used to Date**
99%	$31,841	94%

Project Description:

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 100 and 200-foot test sections around the 1.7-mile oval test track. Each test section is constructed utilizing imported asphalt materials and design methods. A fleet of heavy trucks is operated on the Track in a highly controlled manner in order to apply a design lifetime of truck traffic (10 million equivalent single axle loads, or ESALs) in two years. Select Track test sections were replaced in the summer of 2015 to facilitate a new research cycle in which preservation test sections were also built on nearby high traffic US-280 (to complement the existing low traffic test sections on Lee County Road 159) and at MnROAD in on- and off-track locations (with both low and high traffic) similiar to those at NCAT.

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 the 2 years following construction;
3. Assessing/comparing the functional and structural field performance of trafficked sections;
4. Validating the M-E approach to pavement analysis and design using 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. Supplementing Track research with test sections on Lee County Road 159, US-280, MnROAD, Mille Lacs County Road 8, and US-169 in order to precisely quantify the life extending benefit of various pavement preservation alternatives on low and high traffic roadways in hot and cold climates;
7. Correlating field results from both the NCAT and MnROAD test sections with laboratory data; and
8. 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.

Progress this Quarter (includes meetings, work plan status, contract status, significant progress, etc.):

Detailed pavement condition assessments consisting of roughness, rutting, macrotexture, and cracking are performed weekly on the NCAT Pavement Test Track. Additional measurements are made monthly (e.g., wet ribbed surface friction) and quarterly (e.g., noise).

Precisely 10,009,457 ESALs had been applied to the surface of the 2015 NCAT Pavement Test Track as of the date of this report.

The 2015 Track represents the 6th research cycle. Approximately 10 million ESALs can be added for test sections built in previous 3-year research cycles. For example, sections built on the original 2000 Track have now supported a total of 60 million ESALs.

1,090,000 ESALs have been applied by loaded trucks to the outbound lane on Lee County Road 159 since the summer of 2012.

90,000 ESALs have been applied by empty trucks to the inbound lane on Lee County Road 159 since the summer of 2012.

2,510,000 ESALs have been applied to the westbound truck lane on US-280 by approximately 8,620,000 vehicles since summer 2015.

The MnROAD partnership consists of Cracking Group (CG) test sections on the MnROAD Mainline as well as Preservation Group (PG) test sections on (low traffic) Mille Lacs County Road 8 and (high traffic) US-169 in Pease, MN (about 45 minutes north of MnROAD).

Mille Lacs County Road 8, otherwise known as County State Aid Highway (CSAH) 8, supported 710 ADT with 8% "heavy commercial" traffic in 2014. In that same year, US-169 supported 16,500 ADT with approximately 3% "heavy commercial" traffic. New cold recycle test sections were built on the access road to MnROAD (70th Street) in the summer of 2019.

A 6-month sponsor meeting is hosted each spring and fall. Spring meetings are held at NCAT (typically in May or June) and fall meetings are held at MnROAD (typically in September or October). At both locations, meetings consist of technical presentations and test section inspections. Project personnel also travel to sponsor states on demand to promote deployment through meetings, presentations, and field projects.

Anticipated work next quarter:

One and a quarter million ESALs a quarter are applied to the surface of the NCAT Pavement Test Track when the fleet is operational during the middle 2 years of each 3-year research cycle. Weekly, monthly, and quarterly pavement surface condition data collection is conducted. Web performance reports are updated to reflect the most recent vetted data.

Approximately 39,000 ESALs a quarter are applied to the heavily loaded outbound lane on Lee County Road 159. The more lightly loaded inbound lane only supports about 8 percent of the ESALs in the outbound lane, which is just over 3,000 ESALs a quarter.

US-280 supports approximately 159,000 ESALs a quarter over a 544,000 vehicle load spectra consisting of 16 percent trucks.

Mille Lacs County Road 8, otherwise known as County State Aid Highway (CSAH) 8, supported 710 ADT with 8% "heavy commercial" traffic in 2014. In that same year, US-169 supported 16,500 ADT with approximately 3% "heavy commercial" traffic.

Pretreatment data collection is foundational to the pavement preservation effort to relate the performance of the various treatments and treatment combinations to the pretreatment condition of every subsection. Thereafter, the collection of regular MAP-21 related pavement condition data makes it possible to quantify the life extending and condition imroving benefits as a function of varying levels of pretreatment condition. Data collection practices for the southern sections do not change seasonally, but winter weather reduces the data collection frequency for the northern sections. New cold recycle sections were built in the summer of 2019 in Minnesota.

Technology transfer and implementation of findings are very important to this effort. A 6-month sponsor meeting is hosted each spring and fall. Spring meetings are held at NCAT (typically in May or June) and fall meetings are held at MnROAD (typically in September or October). At both locations, meetings consist of technical presentations and test section inspections. Doodle polls are used to determine the dates for these meetings that work best for the majority of attendees. Project personnel also travel to sponsor states on demand to promote deployment through meetings, presentations, and field projects.

Significant Results:

The 2015 research cycle on the NCAT Pavement Test Track includes high RAP content mixes, RAS mixes, high binder replacement (RAP+RAS) mixes, rejuvenators, high recycled ground tire rubber mixes, 100 percent RAP cold recycle mixes, high durability porous friction course mixes, alternative binder modifiers, interlayers for the prevention of reflective cracking, surplus sand and screenings stockpile mixes, asphalt based enhanced friction surfaces, and an array of pavement preservation treatments and treatment combinations (on the Track as well as on Lee Road 159 and US-280 in Alabama's southern climate and Mille Lacs County Road 8 and US-169 in Minnesota's northern climate). Additionally, a mix performance test experiment consisting of numerous sections with an intentionally broad range of expected cracking performance (e.g., low aged binder replacement, high aged binder replacement, highly polymer modified binder, etc.) were built on the NCAT Pavement Test Track as well as on the MnROAD Mainline. High construction quality was essential in both locations in order to avoid confounding experimental outcomes. It was a significant preliminary finding to note that no premature failures were induced and all sections exhibited good performance; however, cracking was mapped in half the sections in the final months of fleet operations on the 2015 Track. Smaller nominal maximum aggregate size (NMAS) mixes and mixes designed on the fine side of the maximum density line that are commonly relegated to low volume road applications have proven to be some of the most durable and crack resistant surface mix options. Although more time and traffic are necessary to fully construct multi-distress life extending benefit curves for pavement preservation, control section comparisons have facilitated the construction of real time crack reducing benefit curves for all treatments and treatment combinations. A methodology has been developed to produce benefit curves that are related to the MAP-21 performance criteria.

Circumstance affecting project or budget. (Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints set forth in the agreement, along with recommended solutions to those problems).

The project is expected to be completed on time and within the allotted budget.

Potential Implementation:

It is expected that the findings previously mentioned will be implemented by sponsoring state DOTs. The 2015 research cycle includes a significant focus on sustainability and rapid implementation. Included experiments are designed to study high RAP content mixes, RAS mixes, high aged binder (RAP+RAS) content mixes, rejuvenators, high recycled ground tire rubber mixes, high durability porous friction course mixes, alternative binder modifiers, interlayers for the prevention of reflective cracking, surplus sand and screenings thinlay mixes, and an array of pavement preservation treatments and treatment combinations (on the Track as well as on Lee Road 159 and US-280 in Alabama's southern climate and Mille Lacs County Road 8 and US-169 in Minnesota's northern climate) with an emphasis on implementation. Life extending benefit curves from all the treatments and combinations will provide DOTs with an objective, MAP-21 related selection process for pavement preservation that can be calibrated to local conditions, materials, contractors, etc. using feedback from their own pavement management system. Findings from the mix performance experiment will facilitate true sustainability innovation for states in both climate extremes. Arbitrary limits placed on mix designs can be eliminated, DOTs can approve mix designs with the expection of good performance potential, and projects can be monitored during production to make sure the performance expectation of produced mix closely matches the expectation of the approved mix design. Emphasis will be placed on tests that have the most potential for rapid implementation for both mix design approval and quality control testing. The theme of the 6-month sponsor meetings and end-of-cycle conferences is deployment of significant findings.