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)* TPF-5(208)	**Transportation Pooled Fund Program - Report Period:** ☐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 on the 2009 NCAT Pavement Test Track

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Lead Agency Project ID: 930-754P	**Other Project ID (i.e., contract #):**	**Project Start Date:** May 14, 2009
Original Project End Date: September 30, 2012	**Current Project End Date:** September 30, 2012	**Number of Extensions:** None

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
$7,131,000	$6,560,996	92%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
7%	$512,049	70%

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 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.

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. 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.

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

The 10 million ESAL goal for traffic damage on the 2009 NCAT Pavement Test Track was completed by the end of the reporting period, as planned. This means that the three sections originally placed in 2000 have been subjected to 40 million ESALs and the nine sections built in 2003 have been subjected to 30 million ESALs. The nine sections built in 2006 have been loaded to 20 million ESALs. All the mixes in the previous studies were designed for 10 million ESALs.

Laboratory testing of mixtures and materials has been completed. With the completion of trafficking, laboratory results and field performance measurements will be fully reconciled. The average rut depth in the middle 150 feet (research) portion of all test sections (both old and new) is approximately 5 mm. Roughness continued to increase as a function of traffic, with measurements at the end of the reporting period averaging 91 inches per mile. Traffic on the high polymer inlay placed in section N8 in August of last year has now survived 5.5 million ESALs, significantly surpassing the traffic level that induced the failure. The thin open graded friction course (OGFC) in sections N1 and N2 continued to retard the recurrence of surface cracking in the underlying crack susceptible Superpave mix; however, the OGFC surface placed with a spray paver in the otherwise identical section N1 still provided the best performance. Minor surface cracking in perpetual section N9, verified with coring to be very shallow top-down cracking, developed very slowly and did not become a significant problem. Surface cracking in section S2, which was paved with mix containing a high percentage of RAP, did not grow over the summer. No cracking has been mapped in any Group Experiment (GE) sections, including the two sections produced with 50 percent RAP.

Anticipated work next quarter:

With the completion of truck traffic, it will now be possible to engage in the forensics necessary to fully integrate field performance and laboratory results. Final performance measures will consist of both longitudinal and transverse profiles using frequencies that are not possible while the fleet is running. Cores will be cut from all test sections and trenches will be selectively cut in sections that are scheduled for replacement in the next (2012) research cycle. Trenching will facilitate the determination of rutting within the pavement structure as a function of depth. Analysis of results will continue in preparation for the final report, which will be distributed to research sponsors in draft form during the Track Conference that will be hosted in February of 2012.

Significant Results:

No cracking was observed in any GE test sections. The structural contribution of OGFC has been quantified, and it has been shown to improve the cracking performance of underlying Superpave mix with a proven susceptibility to surface cracking (an effect that was optimized with the use of a spray paver). Measured field strain levels were used to develop fatigue life expectations for all GE sections via multi-strain laboratory beam fatigue data. A consistently higher fatigue expectation is projected for warm mix. The highest fatigue expectations within the six section core GE study are for the high RAP test sections. Perpetual performance has been observed in structures built with 9 inches of asphalt pavement on a stiff base/subgrade, while 14 inches of asphalt pavement is required on a weak subgrade. The same high polymer technology that has shown good structural performance in a privately sponsored thinner pavement was used to rehabilitate a failed pavement on a weak subgrade. Higher flat and elongated particles have exhibited good performance in both SMA and OGFC applications. Gravel has exhibited good performance in both an OGFC and in a 45 percent RAP surface mix. Equivalent performance has been observed in the same mix produced with SBS versus GTR modified PG76-22. A Polycon surface treatment was observed to be durable and resistant to delamination while significantly reducing the performance temperature of underlying asphalt pavement.

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 significant findings previously mentioned will be implemented by sponsoring state DOTs. Safer OGFC surfaces can be cost justified because of the proven structural contribution and protection from surface cracking. The layer coefficient for asphalt pavements has been recalibrated from 0.44 to 0.54 to reduce the cost of construction and rehabilitation until DARWin-ME can be implemented. The use of alternative binders and binder modifiers provides some amount of protection from future price increases. Thinner high polymer pavements are selectively being used to reduce the cost of construction and/ or rehabilitation when it is not feasible to provide additional thickness. Perpetual pavement methodologies have been proven and optimized using mixes, materials, bases, and subgrades from many different states, with thickness ranging between 9 inches on a stiff foundation to 14 inches on a soft foundation. Aggregate specifications are carefully being relaxed (e.g., higher F&E stone in some states, more gravel in other states, etc.) in order to reduce the initial cost of construction without negatively impacting service life. Lower temperatures needed for warm mix production have been shown to reduce age hardening of asphalt binder, which prevents temperature related cracking in surface mixes and fatigue cracking in base mixes.