

## TRANSPORTATION POOLED FUND PROGRAM QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT): Alabama DOT

**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.*

<b>Transportation Pooled Fund Program Project #</b> <i>(i.e., SPR-2(XXX), SPR-3(XXX) or TPF-5(XXX))</i>  <p style="text-align: center;">TPF-5(228)</p>	<b>Transportation Pooled Fund Program - Report Period:</b>  Quarter 1 (January 1 – March 31) 2012 Quarter 2 (April 1 – June 30) Quarter 3 (July 1 – September 30) <input checked="" type="checkbox"/> -Quarter 4 (October 1 – December 31)	
<b>Project Title:</b> <p style="text-align: center;">Superpave Regional Center, Southeastern Region</p>		
<b>Name of Project Manager(s):</b> Don Watson and Randy West	<b>Phone Number:</b> (334) 844-7306	<b>E-Mail</b> watsode@auburn.edu
<b>Lead Agency Project ID:</b> ALDOT Research Project No. 930-763P	<b>Other Project ID (i.e., contract #):</b> 224574	<b>Project Start Date:</b> April 28, 2010
<b>Original Project End Date:</b> September 30, 2012	<b>Current Project End Date:</b> September 30, 2013	<b>Number of Extensions:</b> 1

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
\$972,129	\$315,399	32

**Quarterly** Project Statistics:

Total Project Expenses and Percentage as of This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
\$315,399 (32.4% of budget)	\$37,378	77

**Project Description:**

The Southeastern Superpave Center has been supported by state agencies through a pooled-fund project that has been largely used to provide training, verify ruggedness of equipment, check equipment calibrations, provide materials research, and aid in keeping agency personnel abreast of changes in asphalt technology. In order to continue the efforts in training, technology transfer, and implementable research, it is essential that the pooled-fund effort be continued.

**NOTE:** *This pooled-fund project is not limited to states located in the southeast. Agencies throughout the country are invited to participate and take advantage of the research and training opportunities provided by the Southeastern Superpave Center.*

**OBJECTIVES**

Several short-term and long-term objectives of the Southeastern Superpave Center are listed below. Several objectives deal with evaluating recently-developed performance test equipment and conducting research to address materials and tests issues. Objectives of the Center are:

1. Conduct training in regard to Superpave binders, mix design, and performance testing. Provide training on special topics as requested by participating agencies at their on-site locations.
2. Perform research, both cooperatively and agency-specific, sponsored by members of the pooled-fund.
3. Perform precision and bias testing for asphalt-related performance test equipment.
4. Conduct noise studies in an effort to develop quieter pavements.
5. Perform forensic evaluations on materials or projects that have experienced premature distress.
6. Prepare research articles of regional and national interest.

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

**Management Committee Meeting:**

A meeting of Southeast Superpave Center sponsors was held in conjunction with the annual meeting of the Southeastern Asphalt User/Producer Group in November. Current research was discussed and presentations given to provide updates of the research. A brief description of proposed research projects for 2013 was presented and discussed, and attendees also provided additional suggestions for research topics. Twenty six persons were in attendance.

**MEPDG CLIMATE DATABASE:**

The research team coordinated with LTRC to identify three representative pavement sections for use in verifying the climate files.

The team assembled the available climate data for the State and surrounding States. The data was processed to achieve quality 40-year historic hourly input values. The processed database was formatted into MEPDG input files for each of the 64 parishes in the State. Each file was checked to verify it runs in MEPDG using a previously selected pavement section.

The team is currently processing one 40-year historic climate database in each of the nine State Climate Zones into a randomly sorted 40-year future climate database. The team will incorporate the predictions of the global/regional model into the 40-year historic database and into the randomly sorted 40-year future database to achieve two sets of 40-year future climate databases. The processed databases will be converted into MEPDG input file format for each of the 64 parishes in the State and verified in MEPDG runs using a selected pavement section.

The additional work involves defining a high-impact high-temperature (HIT) scenario by dividing the historic climate file into short multi-year climate cycles of about 3 to 5 years, each containing a maximum temperature occurring within the cycle. These cycles will be sorted from high to low based on the extreme annual value of the segment. Once the segments are sorted, the climate trend produced by the global-regional model will be added. A similar process will be used to develop a low-impact high temperature (LIT) scenario, high-impact precipitation (HIP) scenario, and low-impact precipitation (LIP) scenario.

All of the climate files will be used with the three selected pavement structures as input into the MEPDG software. The sensitivity analysis will include the MEPDG output from all eight types of climate files (MEPDG, historic, future, future-random, HIT, LIT, HIP and LIP) on the three designated pavement structures.

The deliverables to LA DOTD are:

- 40-year historic climate (1970-2010) files for every parish (64 total) formatted for MEPDG input
- 40-year regional future climate (2010-2050) files for every parish formatted for MEPDG input
- 40-year regional randomly sorted future climate (2010-2050) files for every parish formatted for MEPDG input
- 40-year regional high-impact high temperature future climate MEPDG input files
- 40-year regional low-impact high temperature future climate MEPDG input files
- 40-year regional high-impact precipitation future climate MEPDG input files
- 40-year regional low-impact precipitation future climate MEPDG input files
- Final study report

The budget for the study is \$62,223+\$26,224. The subcontract for the Climate Science Program at Iowa State University is \$36,408+\$13,320. Progress on the project is delayed while the pooled fund administrative process clears the funding for the additional tasks. The project is scheduled to be completed in August-September 2013. A time extension may be requested depending on the project re-start date.

**AGGREGATE FRICTION STUDY:**

NCAT built test slabs with the common aggregates used in the JMF of a 9.5 mm mixture and ultra-thin mixture and with the alternative friction aggregates, slag and granite. NCAT used the two MDOT approved mix designs to prepare eight mixtures. The baseline "control" mixture will replicate the approved job mix formula aggregate proportions and

gradation. The second mixture substituted 33% of the coarse aggregate with a comparable proportion and gradation of the coarse aggregate from the alternative friction aggregate source. The third mixture substituted 60% of the coarse aggregate. For the ultra-thin baseline "control" mixture the substitution was based on total aggregate portion. The substitution rates were 30% and 60%. The lab prepared 3 replicate slabs of each mix. All slabs used a PG 67 -22 binder and were compacted to 7% air voids.

NCAT tested two replicate slabs of each mix with the dynamic friction tester (DFT) and circular texture meter (CTM). The slabs were conditioned (polished) with the NCAT Three Wheel Polishing Device (TWPD). The testing creates a surface friction performance history curve for each mix. NCAT analyzed the data for testing quality and determined the impact of the amount of friction aggregate on the friction performance of the mixture surface.

The cost of the study was \$38,000 and took one year to complete. The final report was delivered to the sponsor on December 19, 2012. A meeting to discuss the study is scheduled for February 7, 2013.

#### **HIGH RAP STUDY:**

Four states have sponsored a study of the use of high RAP proportions in asphalt mixtures. The RAP proportion was varied so that the RAP binder replaced 10, 25, and 50 percent of the virgin binder. This research was developed to assess whether increasing volume of effective virgin binder, using a softer binder, or using a warm-mix asphalt (WMA) technology aided in improving the durability of mixtures containing high percentages of RAP. In addition to changing the grade of the virgin binder, a warm mix additive was added to the control RAP mixtures to assess how using this WMA technology affected the mixture's durability and rutting performance.

Multiple laboratory tests were conducted to quantify how increasing the volume of effective virgin binder or decreasing the performance grade of the virgin asphalt binder affected the durability of RAP mixtures. The linear amplitude sweep (LAS) was utilized to characterize the fatigue properties of the blended RAP and virgin binder while the overlay tester (OT) was conducted to assess the resistance to reflection cracking of the RAP mixtures. The energy ratio testing procedure was used to evaluate each mixture's resistance to surface cracking. Finally, the rutting resistance of the most durable mixtures was assessed using the asphalt pavement analyzer (APA) to ensure that increasing mixture durability did not cause the asphalt mixture to become susceptible to rutting.

Using a softer binder and use of warm mix additive generally helped improve mixture durability. However, use of a softer binder also increased the rutting potential of mixes. OT results were not statistically affected by either of the alternatives, and increasing asphalt content had little effect on the LAS test results. Based on the ER test, adding a half percent additional asphalt or use of a warm mix additive showed the greatest increase in performance at 10 and 50 percent RAP proportions.

#### **COMPOSITE SPECIMEN INTERFACE CRACKING (CSIC)**

The overall objective of this research funded by Florida DOT is to test 1) control, and 2) experimental pavement sections constructed at NCAT's Pavement Test Track which have undergone live heavy vehicle Traffic for a three year traffic cycle. The purpose is to determine whether a thick proprietary interlayer contributes to a delay in cracking by using the CSIC test developed at the University of Florida. Results of these tests can be used to identify interface conditions which may improve cracking performance and/or to optimize bonding materials and application rates for enhanced cracking performance. Work by University of Florida is well underway on this study and work should be completed within the next quarter.

#### **TECHNOLOGY TRANSFER/TECHNICAL MEETINGS:**

Several agencies used funds this period to pay travel and registration expenses for employees to attend technical meetings such as ASTM and AASHTO meetings. Six persons from NCAT attended and made presentations at the SEAUPG annual meeting.

**Anticipated work next quarter:**

During the next quarter, work should resume on the LA DOTD project. The research panel has met and decided the types of pavement distress to be Included in the analysis. For the Aggregate Friction Study, the analysis will be completed and draft report prepared. Work will continue on the CSIC research regarding cracking resistance.

**Significant Results:**

N/A

**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).**

N/A

**Potential Implementation:**

The climate data being obtained will be useful for one agency by providing specific climate data that is more comprehensive and more accurate than the original data used in the MEPDG development.

The high RAP study will provide information to agencies that will give increased confidence for decision-making in regard to whether increased RAP proportions can be used without fear of cracking failure.