TRANSPORTATION POOLED FUND PROGRAM
QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT): Virginia 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(229)	☐Quarter 1 (January 1 – March 31) ☐Quarter 2 (April 1 – June 30) ☐Quarter 3 (July 1 – September 30) ☑Quarter 4 (October 4 – December 31)

Project Title: Characterization of Drainage Layer Properties for MEPDG		
Name of Project Manager(s): Brain K. Diefenderfer	**Phone Number:** (434)293-1944	**E-Mail** Brain.Diefenderfer@VDOT.Virginia.gov
Lead Agency Project ID:	**Other Project ID (i.e., contract #):** VTRC-MOA-11-005(98289)	**Project Start Date:** September 1, 2010
Original Project End Date: August 31,2013	**Current Project End Date:** August 31, 2013	**Number of Extensions:**

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
270,000.00	51.18%	55%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
$136,090/8%	11,348.25	75%

Project Description:

The objectives of this pooled fund study are to develop methods for characterizing the elastic modulus and strength of pavement drainage layers for the Mechanistic-Empirical Pavement Design Guide (MEPDG), to perform analysis of the stability and failure of the drainage layer in the pavement structure, and to develop specifications for required minimum porosity for effective drainage.

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

1. Prepared cement stabilized specimens using materials Oklahoma DOT and determined their compressive strength

Investigated the permeability and strength of cement treated permeable base, by testing cylindrical cement concrete specimens prepared for laboratory testing. The aggregates collected from Oklahoma which are typically used in the cement treated permeable base were used for specimen preparation. The air void content was determined by vacuum sealing method. Specimens were stored in the moisture room for 7 days and 21 days after compaction and then the compressive strength test was conducted on these specimens. Totally 6 cement-treated specimens were tested for compressive strength by now and more specimens will be prepared for testing in the future.

2. Determined the relationship between air void content and permeability for Oklahoma's DOT specimens

Dimensional method, parafilm method and vacuum sealing method were used to determine the VTM of specimens compacted for Oklahoma. The results from different methods were analyzed and compared with each other. The effective air void content has also been determined and the flexible wall falling head method was conducted to get the permeability of Oklahoma's specimens. The relationship between the permeability and the VTM, the permeability and effective air voids were investigated.

3. Determined the dynamic modulus of specimens for both Virginia and Oklahoma DOTs

Because the lowest temperature that can be reached by the environmental chamber at VTTI for the dynamic modulus testing is 4.4C, the dynamic modulus under -10C was unable to be completed. As a result only four temperatures, which are 4.4C,21.1C,37.8C and 54.4C, were determined to be used to construct the master curve. Under each temperature, six frequencies of 25Hz, 10Hz, 5Hz, 1Hz, 0.5Hz and 0.1Hz were chosen for the dynamic modulus testing. The magnitude of the loading pressure associated with each frequency was determined by testing dummy specimens to keep the strain within 50 to 150 microstrain as much as it possibly can. The conditioning time has also been determined by monitoring the temperature of a dummy specimen in the environmental chamber using a thermometer. Until now the dynamic modulus of specimens for both Virginia and Oklahoma were determinedat a temperature of 4.4C.

Anticipated work next quarter:

Prepare more cement stabilized specimens with 20% to 30% air void contents. Moisture curing will be applied on these specimens in accordance with Oklahoma specification. These specimens will be stored for 28 days in a moisture room and then tested for the compressive strength.

The laboratory compacted specimens for Virginia and Oklahoma will be tested for dynamic modulus in temperatures of 21.1C, 37.8C and 54.4C. the master curve will be constructed for each mixture and different air void content.

The IDT static compliance test will be conducted on Oklahoma's specimens and the testing data will be input into FEM simulation for further study.

Significant Results:

1.Cement stabilized open graded specimens of about 30% air void content were fabricated and the compressive strength was determined at 7-day and 28-day age.

2.The permeability of Oklahoma's specimens has been determined and the relationships between the permeability and VTM, the permeability and effective air void content have been investigated.

3.The temperature, frequency, pressure and conditioning time for dynamic modulus testing have been determined in accordance with the ASSHTO T342-11. The dynamic modulus and phase angle have been determined under 4.4C for all the laboratory compacted asphalt treated specimens for Virginia and Oklahoma.

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).

Our access to the facilities for the dynamic modulus testing is limited; there will be some delays in the dynamic modulus testing compared with our expected schedule. We will need to extend the time for laboratory testing and probably the follow up work will also be delayed.

Potential Implementation: