TRANSPORTATION POLLED 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.

<table>
<tr><td>Transportation Pooled Fund Program Project #
TPF-5(229)</td><td colspan="2">Transportation Pooled Fund Program-Report Period:
Quarterly 1 (January 1—March 31)
√Quarterly 2 (April 1—June 30)
Quarterly 3 (July 1—September 30)
Quarterly 4 (October 4—December 31)</td></tr>
<tr><td colspan="3">Project Title:
Characterization of Drainage Layer Properties for MEPDG</td></tr>
<tr><td>Name of Project Manager(s):
Brian K. Diefenderfer</td><td>Phone Number:
(434)293-1944</td><td>E-Mail:
Brian.Diefenderfer@VDOT.Virginia.gov</td></tr>
<tr><td>Lead Agency Project ID:</td><td>Other Project ID (i.e., contract #):
VTRC-MOA-11-005(98289)</td><td>Project Start Date:
September 1, 2010</td></tr>
<tr><td>Original Project End Date:
August 31,2013</td><td>Current Project End Date:
August 31,2013</td><td>Number of Extensions:</td></tr>
</table>

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	180,000	60%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
70%	$15,600	66%

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.Determine the theoretical maximum specific gravity of asphalt stabilized aggregates from Oklahoma

The theoretical maximum specific gravity (Gmm) of the material from Oklahoma was determined to be 2.524 by following the AASHTO T209. The Gmm is then used to determine the amount of material needed for compacting a specimen in gyratory compactor to attain the air void content of 20% to 30%. Volumetric properties such as the Gmb, air void content of each specimen will also be calculated according to the Gmm.

2. Conduct the permeability test on Virginia's specimens

The permeability of Virginia's specimen was tested by following VTM-84 method, which is a constant head method. The relationship between the air void content and the permeability was analyzed. It is found that the permeability varies a lot for different specimens, even though they are of similar air void contents. The permeability also varies a lot with different degrees of saturation of the specimen. In order to obtain comparative results, all the permeability was tested from saturated specimens by submerging the specimens in water for 24 hours before testing.

3. Conduct FEM simulation

The FEM simulation was used to investigate the structural contribution as well as the position effect of the drainage layer. A typical pavement structure model with ATPB located above the base course was simulated by the FEM method. The results were analyzed and compared with the results of the model where the ATPB was located below the base course, which were achieved last quarter.

4. Prepare for the dynamic modulus test

The equipment was fixed and calibrated for the dynamic modulus test. All of the 30 specimens of ATPB from Virginia were ready for the dynamic modulus test

Anticipated work next quarter:

We will continue to compact specimens for the other participating states. More specimens with air void content ranging from 20% to 35% will be made by the gyratory compactor using the asphalt stabilized aggregates from Oklahoma. Specimens of the cement treated permeable aggregates will also be made using the loose aggregates from Oklahoma.

The dynamic modulus test will be conducted on the laboratory compacted specimens of typical asphalt stabilized aggregates for Virginia. The Gmbs of specimens of the typical asphalt stabilized material for Oklahoma will also be determined by the parafilm method and the permeability test will be conducted on these specimens.

The data acquired from laboratory testing will be analyzed. The relationship between the dynamic modulus, the permeability and the air void content of ATPB will continue to be investigated. The empirical formulas used to estimate the modulus of stabilized aggregates will be investigated.

Significant Results:

1. The theoretical maximum specific gravity (Gmm) of the asphalt stabilized aggregates from Oklahoma was determined. The Gmm was used to determine the amount of material needed to compact each specimen by the gyratory compactor.

2. The permeability of all the 30 specimens of the typical ATPB from Virginia was tested by following VTM-84 method. The relationship between the permeability and the air void content was investigated.

3. FEM simulation was conducted to investigate the structural contribution and the location effect of the drainage layer. The pavement model with a drainage layer located above the base course was simulated by FEM method during this quarter. Results of the FEM simulation for two different pavement structures with the drainage layer located above and below the base course were compared.

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

No problems have been encountered to date.

Potential Implementation:

Structural contributions of the drainage layer may be evaluated and the design criteria of the drainage layer may be established.