Structural improvements of flexible pavements using geosynthetics for base course reinforcement
Quarterly Progress Report

October – December 2006
Next report due: March 31, 2007

ACCOMPLISHMENTS DURING THE QUARTER:

We held technical advisory committee meeting on Monday, 30 October via webcast/telecon, in which University of Maine and CRREL presented interim results generated by the project to day. The meeting was hosted by the Maine Department of Transportation. Dr. Henry of CRREL presented the project overview and timeline. Mr. Joshua Clapp of the University of Maine presented results of the testing of Test Sections 2 & 4. The geogrid reinforcement provided significant measurable benefit for the test sections that comprise 4 in. of asphalt and 12 in. of base over a subgrade of resilient modulus of approximately 7 ksi.

ERDC-CRREL:

HVS testing of Test Section 1 (6" asphalt, 12" base, no grid) began on 7 December 2007. (Heavy vehicle simulation trafficking was being performed for another FHWA-pooled-fund project from August-November 2006). Unfortunately, the HVS began leaking oil from one of the hydraulic cylinders on 15 December, and it was shut down shortly after 12000 passes were applied to permit the cylinder and piston from which the oil was leaking to be repaired. Static load tests were performed at 60, 250 and 12000 passes. Delivery of the repaired piston was received in early January 2007, and testing resumed.

Initial FWD analysis was performed using PCASE software; however, due to lack of documentation regarding use of the software and some uncertainty about the results, Dr. Henry decided to explore the use of different software for the purposes of FWD analysis, and either ELMOD (available from Dynatest) or EVERSTRESS (available from the Washington DOT) will be used for subsequent analyses. She is currently using ELMOD to provide results to University of Maine.

UNIVERSITY OF MAINE:

Layer moduli were back-calculated with the FE model using the strains measured by the εmu coils in the static load tests. The FE strains are in agreement with the εmu coils when using soil layer moduli back-calculated from FWD data provided by CRREL. It is important to consider the viscoelastic effects of the asphalt concrete layer during the static load tests. Within this context, the effect of wheel misalignment and asphalt concrete/base layer debonding were examined.

Reinforcement parameters of the FE model have been calibrated together with preliminary rutting models. These models are able to reflect the improvement seen in rutting behavior with geogrid reinforcement, while only using the strains from the static FE model. The dynamic modulus is used for the asphalt concrete to represent the stiffness of the pavement system under moving wheel loads.

PROPOSED ACTIVITIES:

ERDC-CRREL:

1. Perform FWD analyses for all tests run to date, and provide to University of Maine.
2. Write detailed test protocol and make available to participating states.
3. Complete draft of construction report.

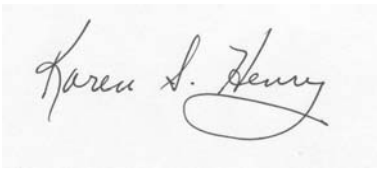
UNIVERSITY OF MAINE:

1. Finalize layer moduli with current FWD data.
2. Continue calibrating rutting models as data becomes available.
3. Begin parametric study.

UNRESOLVED OR NOTABLE ISSUES:

An assessment of the current project funding indicates that approximately $73,000 more will be needed to complete the project.

Respectfully submitted:



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PURPOSE AND SCOPE:

This study will provide missing data required to help determine whether geosynthetic reinforcement is beneficial at conditions typically experienced in state highway construction. If the geogrid does provide benefit, the study will develop an AASHTO specification for geosynthetic reinforcement of the aggregate base course of flexible pavement structures. Furthermore, the results will be published in a format to conform with future modifications to the AASHTO Pavement Design Guide.

The objectives of this study are:

1.To determine whether and under what conditions geosynthetics (geogrids and geotextiles) increase the structural capacity of pavements typically constructed by state DOTs.
2.To determine whether and under what conditions geosynthetics increase the service life of pavements typically constructed by state DOTs.
3.To measure in-situ stress/strain response of the reinforced material for use in current or future pavement design processes.