

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

**July 2005 – September 2005
Next report due: December 30, 2005**

ACCOMPLISHMENTS DURING THE QUARTER:

ERDC-CRREL:

The instrumentation has been completely wired. Previously noted problems with the Heavy Vehicle Simulator have been addressed, and the HVS is running; however, there will be a delay in the testing.

We have established that the subgrade of the test sections needs to be 'weakened,' and we are in the process of making arrangements to do so.

UNIVERSITY OF MAINE:

We have conducted a thorough literature review on critical FE modeling details such as geogrid-soil shear stress transfer, and the inclusion of construction sequence effects.

The FE code has been extended to allow the explicit consideration of a two-phase construction sequence. In the first phase, the geogrid, base, and sub-base are explicitly modeled, and the geogrid is pre-tensioned to simulate strains induced by compaction of the base. In the second phase, the asphalt weight and stiffness are added to the model, and wheel loads are applied on the paving surface.

We have begun conducting extensive FE mesh size and mesh density studies to establish the required level of FE mesh refinement and FE model dimensions to ensure convergence. The FE simulations have been based on the CRREL test-bed geometry.

PROPOSED ACTIVITIES:

ERDC-CRREL:

1. Conduct FWD testing of the test section to determine the subgrade modulus values.
2. Flood the test section by installing wells in the test section and adding water to the subgrade (the test section is a membrane-lined basin and can hold the water).
3. Periodically monitor the subgrade with FWD measurements until the desired modulus value is reached.

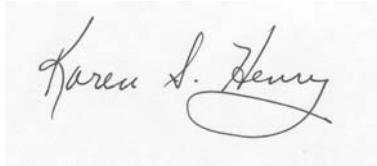
UNIVERSITY OF MAINE:

1. Complete the FE mesh density and geometry studies.
2. Begin conducting laboratory creep experiments on the geogrid mesh.

UNRESOLVED OR NOTABLE ISSUES:

None at this time. We expect to be able to start testing with the Heavy Vehicle Simulator in January 2006.

Respectfully submitted:

A handwritten signature in cursive script that reads "Karen S. Henry". The signature is written in black ink on a light-colored background.

Karen S. Henry, Ph.D., P.E.
Research Civil Engineer
U.S. Army Engineer Research and Development Center
Cold Regions Research and Engineering Laboratory
Hanover, NH 03755-1290

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.