Research Project Statement  
Fiscal Year  2005

Project Number: 0-4829

Title: Quantify the Benefits of Using Geosynthetics for Unbound Base Courses

RMC Number: 1

Developed By: Mark McDaniel, P.E., (CST), revised by Darlene Goehl, P.E. (12-12-03) Revised by Dr Claros RTI

Project Statement Date: January 7, 2004

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Duration (# of years): 2

Total Budget: $

Budget by year:
- First Year FY $
- Second Year FY $
- Additional FYs $

Project Description:

A number of efforts have been undertaken to quantify the contribution of a geosynthetic to the performance of a pavement structure with unbound base. Although these studies have been somewhat successful, though limited, in ranking relative contribution to pavement performance, none of these efforts have produced the parameters needed to design and predict geosynthetic contribution. The research proposed is to determine the properties of geosynthetics used in unbound base that contribute toward enhancing the performance of the pavement structure and develop a material specification based on the properties of the geosynthetic or a combination of material properties and geosynthetic properties.

A number of manufacturers have come into the market in the past 20 years claiming that their product offers extraordinary benefits and are equivalent to other geosynthetic manufacturers’ products. Currently, there is no means by which to judge these claims, for there is very little data where the pavement performance enhancement has been verified much less monitored. Integral with the research, it will be necessary to establish pavement test sections with and without a variety of materials to collect verification data.

Use of geosynthetics in unbound base has been directed primarily at geogrid. In this regard, the primary goal has been base stabilization. The Bryan District, however, has demonstrated other uses where the primary intent is not necessarily structural improvement through direct loading. Their usage has been to create confinement of base so as not to reflect cracking presumably caused by subgrade movement (through shrinkage). This is but one additional use that geogrid can have that influences the performance of the pavement without requiring high strength materials. This research is to document other such uses and the properties that are most descriptive of performance enhancement.

Research needs to be performed to determine the following:
1) whether or not the use of geosynthetic material is a valid tool to enhance pavement performance and if so define the ways in which it enhances pavement performance,
2) the effects of geosynthetic material on the strength of the pavement structure,
3) the effects of geosynthetic material on pavement stability, (i.e. for areas with steep slopes and narrow pavements does the geosynthetic material provide edge support and/or prevent reflective cracking from subgrade movement, etc.)
4) based on the enhancement provided by the geosynthetic material, what are the minimum material requirements including requirements for constructability (i.e. make sure the material is not destroyed in the construction process),
5) whether existing specifications can be used or does a new specification needs to be developed. (Both material and construction specifications)

A literature survey should be performed to document the use and performance of geosynthetic material. A survey of the agencies that have used the geosynthetic material should be performed. The researchers should also include the evaluation of existing pavement sections constructed with geosynthetic material to see how they are performing. Several TxDOT districts have constructed pavement sections with these material that require evaluation of its performance. Once all this information is available, the researcher should determine if new pavement sections are needed to complete the evaluation or propose other ways to evaluate these materials.

Deliverable Products And Reports: The following products and reports should be submitted as a minimum:

- Guidelines for the use of geosynthetic material including different applications and material requirements based on those applications. These guidelines should also include a way to select the best application of these materials.
- Draft specifications (both material and construction)
- Research reports that fully document the research performed, findings and recommendations.
- A Project Summary Report (PSR) of a maximum of 4 pages to summarize work accomplished, findings and recommendations.

Implementation: The guidelines and specifications developed here have the potential to be implemented state-wide.

Pre-Proposal Meeting: Yes  ☐ No  Tuesday, February 10, 2004, 11:00 a.m. to 12:00 p.m. at 4000 Jackson Avenue, Bldg. 1, Austin, TX in the San Jacinto Conference Room, 3rd floor. Teleconferencing is available.

Additional Information:

Proposal Submission:

- Proposals are required to be submitted in both hard copy (4 copies) and PDF format (1 PDF file per proposal). Both formats are used within TxDOT for evaluating the proposals and must contain identical information.
- The “Background and Significance” portion of the proposal should be limited to 10 pages.
- All proposals from researchers should be sent directly to your university’s Research Liaison for submission to RTI. The Research Liaison is TxDOT’s official contact with the university.

Deadlines (for RTI use only):

1. All individuals interested in proposing are encouraged to contact the PC/PD by February 6, 2004.
2. Proposals are due to RTI by 4:00 p.m. CST on Wednesday, March 24, 2004.