Arkansas State Highway and Transportation Department
Transportation Research Committee

RESEARCH PROBLEM STATEMENT

DATE: 08/27/2010	**PROJECT AREA:** Materials

TITLE: LRFD Site Specific Variability in Laboratory and Field Measurements and Correlations

PROBLEM STATEMENT:

The implementation of Load Resistance Factor Design (LRFD) as used in geotechnical engineering designs has resulted in a need to establish site specific and regional specific variability in laboratory and field measurements and correlations associated with site characterization. The current AHTD design practice of using blow count correlations for geotechnical engineering design contains uncertainty and bias, which are not accounted for in LRFD. The uncertainty and bias may result in overly conservative designs and increased cost in design implementation on a system-wide basis.

A geotechnical site investigation was conducted at the site of the proposed Tilly Willy Bridge across the White River in Northwest Arkansas. The bridge is currently being designed with drilled shaft foundations. The design is based on correlations with blow count data obtained from standard penetration tests and compressive strengths obtained from unconfined compression tests. Significant cost savings may be obtained if the design were based on advanced laboratory testing (direct simple shear, consolidated-undrained triaxial compression/extension and constant-rate-of-strain consolidation laboratory tests on the undisturbed samples) and full-scale load tests (Osterberg load cell tests).

OBJECTIVES:

The objective of this study is to determine uncertainty and bias associated with current site characterization (drilling, sampling, handling, and laboratory testing) techniques, as compared with state-of-the-art site characterization techniques (advanced laboratory testing techniques and full-scale load tests). The uncertainty and bias associated with the geotechnical engineering properties (of soil, rock, and soil-structure interaction) obtained from both techniques will be analyzed to determine how the uncertainty and bias affect LRFD based geotechnical engineering designs in terms of safety and cost.

Form of Research Implementation:

This research will provide design guidelines which ATHD can use in combination with LRFD for geotechnical engineering projects. The guidelines will include a commentary and guidance for implementation of improved site characterization practices.

Total Estimated Cost and Project Duration: **$** 350,000 **and** 36 **months.**

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ADVISORY COUNCIL RANKING	TRC RANKING	Statement Combined with Statement Number(s)
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