Arkansas State Highway and Transportation Department
Transportation Research Committee

RESEARCH PROBLEM STATEMENT

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

TITLE: Geotechnical Seismic Manual

PROBLEM STATEMENT:

Past research has indicated significant vulnerability of the transportation infrastructure in Northeast Arkansas during large earthquake events. The most recent AASHTO manual (AASHTO Guide Specifications for LRFD Seismic Bridge Design) has resulted in a significant increase in the coefficients used in the seismic design of bridges and liquefaction hazard evaluation. Significant damage to embankment slopes and retaining walls are also expected. Although the AASHTO manual mentioned above allows the designer to take advantage of a certain reduction in the seismic coefficients by performing site-specific seismic studies, it does not provide enough guidance to when or how such studies should be performed. The current state of practice does not have a unified method or guidelines of performing geotechnical investigations, design, or analysis in high-rick seismic zones.

The purpose of this work is to develop a Geotechnical Seismic Manual (GSM) to provide uniform design practices for the Arkansas Highway & Transportation Department (AHTD) and consultant personnel preparing geotechnical reports and contract plans for AHTD projects. The proposed manual will be used in conjunction with the Seismic Design Specifications for Highway Bridges (AASHTO LRFD and Seismic Specifications).

OBJECTIVES:

The GSM will provide for performing geotechnical investigations, site-specific seismic studies, seismic slope stability analysis, seismic design of retaining walls, liquefaction analysis (implementing the work completed by the University of Arkansas) and mitigation for transportation projects. Recommended safety factors will be provided. When seismic stability analysis of regular embankments, bridge approaches, and bridge abutments indicate potential instability, the GSM will provide recommendations for mitigation techniques using an LRFD approach, if available, as well as QA/QC measures for adapting these techniques.

Form of Research Implementation:

AHTD will be provided with a comprehensive report. A one-day seminar will be hosted to discuss the findings, procedure, and methodology. If feasible, the research team will work with AHTD personnel on implementing the manual procedures on a real project.

Total Estimated Cost and Project Duration: **$** 120,000 **and** 18 **months.**

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