Title: Potential Cost-saving of seismic design of typical bridges in Northeast Arkansas

Problem Statement:

For the seismic design of most bridges, the general procedure of the AASHTO Guide Specification suffices is used. However, it is appropriate and may be necessary to perform site-specific ground motion response analyses (SSGMRA) to determine a set of seismic design loads and possibly achieve some cost-saving if SSGMRA results are used. The results of SSGMRA may be used as justification for the reduction in seismic demand. Results from TRC1901 indicated that seismic demands can be reduced at some locations, which is expected to have economic benefits regarding the construction of new bridges.

In a recently completed TRC 1901, SSGMRA was performed at 51 sites distributed within Northeast Arkansas (NEA), which fall within the Mississippi embayment. A series of maps were developed based on these 51 sites to identify the reduction of seismic demand based on SSGMRA. TRC1901 covered most of NEA, but some gaps still existed. Furthermore, the potential cost savings were based on concrete bridges in California. It is also known that current steel prices keep getting higher.

A Two-Objective approach of this research to attempt to overcome this problem is described below.

Potential Solution to Problem:

For the first objective, is a series of SSGMRA studies in NEA will be added to current TRC1901 maps to identify areas where there would be a potential cost saving. The spatial analysis will include site characterization for 10 new sites, which will cover gaps that existed in TRC1901. The second objective is to identify potential cost savings for different types of bridges in NEA. Three typical bridges will be selected in consultation with ARDOT and will be designed at five sites (a total of 15 designs based on AASHTO Guide Specification and 15 designs based on SSGMRA results). Designs will include associated cost and will allow ARDOT designers to make better decisions regarding the need for SSGMRA and choice of bridge type.

Estimated Project Duration: 30 Months

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