Statement No. 6

Arkansas Department of Transportation

Transportation Research Committee

RESEARCH PROBLEM STATEMENT

DATE: 09/13/2017 | **PROJECT AREA:** Design

TITLE: Spatial Analysis of Benefits of Site Specific Ground Motion Response Analysis

PROBLEM STATEMENT:

Preliminary results from TRC 1603 and results from MBTC 3032 indicate that seismic demands can be reduced in portion of Arkansas by conducting a site specific ground motion response analysis (SSGMRA), which is expected to have economic benefits regarding the construction of bridges. However, the single SSGMRA and bridge redesign from TRC 1603 only provides a discrete estimation of the potential cost savings of conducting a SSGMRA for bridge projects. Variables such as distance from the fault (i.e., initial SD1 and PGA), which influences seismic design category, soil conditions, liquefaction analysis, initial bridge specifications, and embankment requirements vary across the state. The geographic locations and conditions where cost savings from SSGMRA can be realized is unknown and needs to be determined to provide the most economic benefit for bridge design and prevent conducting SSGMRA when economic benefits would not be likely. To fully understand when conducting a SSGMRA would be economically beneficial and where it would be cost prohibitive, a spatial sensitivity analysis needs to be conducted to fully understand where and under what site specific conditions a SSGMRA would be economically beneficial for bridge design.

OBJECTIVES:

The main objective of this research is to conduct SSGMRA and bridge redesign at previous bridge construction sites across the state to develop a map/decision tree of conditions where conducting SSGMRA for bridge construction would be beneficial. In addition, sensitivity analysis will be conducted regarding the influence of potential soil conditions, initial bridge costs, liquefaction potential, embankment requirements, and other site specific conditions which have a direct influence on bridge design and the potential benefits of conducting a SSGMRA.

FORM OF RESEARCH IMPLEMENTATION:

Development of decision tree for whether to conduct a SSGMRA based on spatial location in Arkansas, initial ground motion conditions, site specific soil conditions, liquefaction potential, embankment requirements, bridge specifications, other site specific conditions that maybe present at future bridge sites. This can be directly used by the bridge division to determine if a SSGMRA should be conducted for a particular project.

Estimated Project Duration: 24 **months**

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Standing Subcommittee Ranking	Advisory Council Ranking	Statement Combined with Statement Number(s)
1 / 5	4 / 44	