ARDOT TRC TRANSPORTATION RESEARCH COMMITTEE

PROBLEM STATEMENT
No. 13

RESEARCH PROBLEM STATEMENT

DATE: 09/06/2018	**PROJECT AREA:** Materials

TITLE: Development of More Reliable Liquefaction Resistance Estimates Using CPT and Vs

PROBLEM STATEMENT:

Currently the ARDOT conducts liquefaction analyses for embankment and deep foundation design for bridges using Standard Penetration Test (SPT) data. SPT data is one of the most common methods for assessing liquefaction resistance because of the prevalent use of SPT by most geotechnical engineering. However, significant variability can exist in the SPT data which can lead to layers of soil which are estimated to be potentially liquefiable, which may not liquefy during a design earthquake. Including these potentially false positive requires deeper foundation elements, but just as important if any subsurface layers are determined to be liquefiable, the bridge has to be designed to seismic category 4 or D requirements. This can lead to significant cost increases for bridge construction. However, because ARDOT has recently purchased a Cone Penetration Test (CPT) cone for their drill rigs, more accuracy and continuous estimates of liquefaction resistance can be estimated using CPT and possible Vs from Seismic CPT for bridge projects leading to large potential cost savings for sites where more accurate estimates of liquefaction resistances can be obtained.

OBJECTIVES:

The main objective of this research is to investigate the use of CPT and Vs for estimating liquefaction resistance of soils in Arkansas. User friendly spreadsheets will be developed that estimate liquefaction resistance based on CPT and Vs similar to spreadsheet developed for MBTC 3017 using SPT. Multiple bridge sites across Arkansas will be investigated using SPT, CPT, and Vs with the liquefaction resistance of each site estimated using each of methods. Benefits of conducting additional CPT and Vs will be determined.

FORM OF RESEARCH IMPLEMENTATION AND RETURN ON INVESTMENT:

Development of a user friendly spreadsheet for the calculations of liquefaction resistance of CPT and Vs. Spatial and economic estimation of benefits of conducting CPT and Vs testing at sites across Arkansas. Final report detailing methods used and user guide on how to utilize the spreadsheet for design.

Estimated Project Duration: 24 **Months**

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Standing Subcommittee Ranking	Advisory Council Ranking	Statement Combined with Statement Number(s)
7/7	33/37	