

RESEARCH PROBLEM STATEMENT

DATE: 09/25/2020	PROJECT AREA: Materials
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TITLE: Updating ARDOT Liquefaction Evaluation and Mitigation Procedures

PROBLEM STATEMENT:

There currently exists a significant amount of uncertainty when designing piles for bridge foundations in liquefiable soil. Currently ARDOT engineers use a Standard Penetration Test (SPT) based liquefaction spreadsheet develop 10 years ago to evaluate liquefaction triggering. Since this spreadsheet was developed, updates to the liquefaction triggering procedures in the spreadsheet have been published making the spreadsheet out-of-date. In addition, recommendations regarding skin friction and end bearing of piles in liquefiable soils have been published providing additional guidance regarding the design of these piles. More over additional methods of liquefaction evaluation using Cone Penetration Test (CPT) and shear wave velocity (Vs) provide additional means of evaluating liquefaction potential. This project plans to update ARDOT's liquefaction triggering evaluation methodology with the newest procedures and incorporate additional empirical liquefaction hazard estimates such as the liquefaction potential index (LPI). This will provide ARDOT with the tools necessary to design pile foundations in liquefiable soils using the most up-to-date guidance and methods.

- OBJECTIVES:**
- 1) Update the SPT liquefaction triggering spreadsheet with the most up-to-date triggering procedures.
 - 2) Investigate software or develop spreadsheets for CPT and Vs based liquefaction triggering evaluations.
 - 3) Incorporate empirical estimates of liquefaction surface manifestation such as LPI into the ARDOT methodology
 - 4) Include guidance on skin friction and end bearing of piles in liquefiable soils.
 - 5) Incorporate probability estimates of liquefaction for use with design values.

FORM OF RESEARCH IMPLEMENTATION AND RETURN ON INVESTMENT:

This project will result an updated spreadsheet/software packages which contain the most up-to-date liquefaction triggering procedures and provides guidance regarding the likelihood of liquefaction surface manifestations. It will also include information regarding adjustments for skin friction and end bearing for piles in liquefiable soils. The project is expected to provide more detailed guidance on the design of piles for liquefiable soils which will reduce the uncertainty in the designs leading to more efficient designs.

Estimated Project Duration: 24 Months

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Standing Subcommittee Ranking 1/4	Advisory Council Ranking 7	Statement Combined with Statement Number(s) _____
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