FY 2010 RESEARCH PROBLEM STATEMENT

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TITLE (*more info*)

Comparison of Liquefaction Mitigation Methodologies in Oregon

PROBLEM (Description of need) (*more info*)

Many bridges in Oregon are necessarily sited upon liquefiable and laterally spreading soils. This generally results in significant increases in construction costs through ground improvement or enhanced foundation design. While the profession has made significant progress in recent years in understanding the performance of deep foundations in liquefying and laterally spreading soils, much less is thoroughly understood about the performance of mitigation alternatives. There are a wide variety of alternatives to choose from (e.g.stone columns, prefabricated "earthquake" drains, deep-cement mixing), though determining the optimum combination of extent and technique for a desired performance level at a specific site is quite difficult. Many of the mitigation techniques have been partially validated in there development by various small scale centrifuge tests, medium-scale shake table tests, and limited field studies, though a comprehensive comparison and assessment of these methods are needed for effective design implementation.

PROPOSED RESEARCH, DEVELOPMENT OR TECHNOLOGY TRANSFER ACTIVITY (*more info*)

A research effort is proposed in collaboration with the Pacific Earthquake Engineering Research Center and Caltrans, aimed at providing recommendations for selection and design of the optimal site specific mitigation alternative for bridge foundations in liquefiable and laterally spreading soils. This would be a collaborative effort with Ross Boulanger at UC Davis and Ahmed Elgamal at UC San Diego, who are recieving separate funding from PEER/Caltrans.

The first phase of the research would be to work with ODOT to collect detailed information on past mitigation projects in Oregon, work with PEER researchers on similar information for California,and summarize the relevant parameters, as well set goals for the implementation of this research. This would then be used to scope the reminder of the project and the collaboration, building on the efforts of the other researchers while maintaining a focus on the needs of ODOT.

It is anticipated that the scoped project will include collaborative experimental work (e.g. on the UC Davis centrifuge or UC San Diego laminar box), review of case histories, as well as complementary analysis in order to develop validated recommendations.

BENEFITS (*more info*)

The benefit to ODOT of this research is more cost-effective bridge design through optimal use of mitigation alternatives.

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