Oregon Department of Transportation

Stage 1 Research Problem Statement

Number 25-53

Proposed Title: Seismic Performance and Numerical Modeling of Diatomaceous Deposits in Oregon.

1. Concisely describe the **transportation issue** (including problems, improvements, or untested solutions) that Oregon needs to research.

Oregon has many lakebed basins with diatomaceous deposits. ODOT has constructed several bridges over these deposits that exhibit distinctly different engineering properties compared to traditional soils. However, the performance of diatomaceous deposits during earthquakes is largely unknown. Current design standards do not provide guidance for the selection of appropriate methodologies and numerical models that reliably predict the behavior of diatomaceous deposits during earthquakes.

2. Document how this **transportation issue** is important to Oregon and will meet the Oregon Research Advisory Committee Priorities.

Oregon has the potential for a 9.0+ magnitude earthquake caused by Cascadia Subduction Zone. With several lakebed basins with diatomaceous deposits in Oregon, some within essential lifeline corridors (such as US 97), an understanding of the seismic behavior of this material is critical for the safety of the infrastructure in Oregon. The findings from this project will serve to increase the practitioner's confidence in seismic design and evaluation of structures over diatomaceous deposits.

3. What **final product or information** needs to be produced to enable this research to be implemented?

This project will provide critical guidance for the seismic design and evaluation of existing infrastructure and potential projects over diatomaceous deposits. Predicted project products useable by agency staff and practitioners include:

- Published research report summarizing: 1) the seismic performances of diatomaceous deposit from Oregon under earthquake loading; 2) recommendations regarding the selection of constitutive model that will best capture the seismic behavior of diatomaceous deposit.
- A full-scale numerical model that can be modified and used to predict the seismic performance of diatomaceous deposits under various infrastructure.
- A project roll-out short course including presentation materials.

4. (Optional) Are there any individuals in Oregon who will be instrumental to the success of implementing any solution that is identified by this research? If so, please list them below.

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Susan Ortiz, P.E., G.E.	ODOT Senior Bridge Geotechnical Engineer	susan.c.ortiz@odot.state.or.us	503-986-3377
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5. Other comments:

The proposed tasks include:

- A comprehensive review of existing data on seismic behavior of diatomaceous deposits, including those from the active ODOT research project (SPR 820).
- A series of laboratory testing (cyclic triaxial test) of diatomaceous deposits from Oregon under different conditions (diatoms percentage, confining pressure, and seismic loading).
- A selection of numerical constitutive model that will best capture the seismic behavior of diatomaceous deposits.
- A development of full-scale numerical modeling to predict the performances of diatomaceous deposits under earthquakes.

6. Corresponding Submitter's Contact Information:

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