**TRANSPORTATION POOLED FUND PROGRAM**

**QUARTERLY PROGRESS REPORT**

**Lead Agency: Utah Department of Transportation**

**INSTRUCTIONS:**

*Project Managers and/or research project investigators should complete a quarterly progress report for each calendar quarter during which the projects are active. Please provide a project schedule status of the research activities tied to each task that is defined in the proposal; a percentage completion of each task; a concise discussion (2 or 3 sentences) of the current status, including accomplishments and problems encountered, if any. List all tasks, even if no work was done during this period.*

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| **Transportation Pooled Fund Program Project #**  **TPF-5(350)** | | **Transportation Pooled Fund Program - Report Period:**  \_ Quarter 1 (January 1 – March 31, 2016)  **x Quarter 2 (April 1 – June 30, 2016)**  \_ Quarter 3 (July 1 – September 30, 2016)  \_ Quarter 4 (October 1 – December 31, 2016) | |
| **Project Title:**  Development of Next Generation Liquefaction (NGL) Database for Liquefaction-Induced Lateral Spread | | | |
| **Name of Project Manager(s):**  David Stevens | **Phone Number:**  801-589-8340 | | **E-Mail**  davidstevens@utah.gov |
| **Lead Agency Project ID:**  FINET 42080, ePM PIN 15017  UDOT PIC No. PL05.350 | **Other Project ID (i.e., contract #):**  UDOT Contract No. (pending) | | **Project Start Date:** |
| **Original Project End Date:** | **Current Project End Date:** | | **Number of Extensions:** |

Project schedule status:

**X** On schedule \_ On revised schedule \_ Ahead of schedule \_ Behind schedule

Overall Project Statistics:

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| **Total Project Budget** | **Total Cost to Date for Project** | **Percentage of Work**  **Completed to Date** |
| Pending (current contract)  $40,000.00 (total commitments) | $0 | 0% |

***Quarterly*** Project Statistics:

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| **Total Project Expenses**  **and Percentage This Quarter** | **Total Amount of Funds**  **Expended This Quarter** | **Total Percentage of**  **Time Used to Date** |
| 0% | $0 | 0% |

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| **Project Description**:  This research will be conducted in conjunction with the Pacific Earthquake Engineering Research (PEER) Center (<http://peer.berkeley.edu/about/what_is_peer.html>), the Mountain-Plains Consortium (MPC), and various state DOTs.  Liquefaction-induced lateral spread is a type of permanent ground deformation resulting from horizontal movement of surficial soil deposits due to liquefaction at depth. It is generally the most pervasive and damaging type of ground failure to transportation systems following major earthquakes, and is especially damaging to bridge structures located near river systems. Recent liquefaction-induced ground failures from earthquakes in Tohoku, Japan (2011) and Christchurch, New Zealand (2010) have raised questions about the engineering profession’s ability to assess, delineate and quantify the amount of lateral spread displacement in vulnerable locations. The best defense against such damage is to first, identify areas prone to lateral spread ground failure, estimate the expected amount of ground displacement, and establish planning or other engineering countermeasures to mitigate the hazard and ensure more earthquake resilient infrastructure. Nonetheless, the transportation systems of many regions in the U.S. (e.g., California, Pacific Northwest, Intermountain West, mid-America and Northeastern and Central Atlantic seaboard) remain vulnerable to lateral spread damage associated with future, major earthquakes.  This research topic addresses the need to improve the methodologies used to estimate the amount of permanent ground displacement associated with liquefaction-induced lateral spread. There is a need to update, validate and improve current empirical, semi-empirical, analytical and numerical methods using a peer-reviewed, community database of well-documented case histories of liquefaction-induced lateral spread. The project will be executed in two phases: Phase (I) case history database development, collection, and public dissemination; and Phase (II) predictive model development. This pooled fund study addresses the work to be completed under Phase (I) and consists of: (i) collecting, reporting, and assessing the sufficiency and quality of field case history observations as well as in situ field test data; and (ii) addressing the spatial variability and uncertainty of these data. This will be followed by Phase (II) which has the primary objective of developing more accurate tools for assessing liquefaction-induced lateral spread and its consequences.  Objectives for the Phase (I) study include:  1. Develop peer-reviewed and consistent methods for data documentation and archiving of case histories of liquefaction lateral spread  2. Develop methods/protocols to quantify uncertainties associated with the collected data  3. Disseminate this peer-reviewed database for general use using web-based software tools  Tasks for this study include:  *(Tasks are being formulated for the research contract and will be reflected here in later quarters.)*  The principal investigators for this study will be Drs. Steven Bartlett (U. of Utah), Steven Kramer (U. of Washington and PEER Research Executive Committee Member), Kevin Franke (Brigham Young University) and Daniel Gillins (Oregon State University). The technical advisory committee (TAC) for the study currently includes representatives from Utah, California, and Oregon DOTs. The MPC is providing additional funding for the study. |

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| **Progress this Quarter (includes meetings, work plan status, contract status, significant progress, etc.):**  Dr. Bartlett prepared a draft scope of work for the research contract with UDOT. UDOT communicated with various state DOTs about potential participation and funding contributions for the study. |
| **Anticipated work next quarter**:  UDOT and the rest of the TAC will review the draft contract scope. A pre-contract web conference will be held for the TAC and the research team to discuss the scope together. UDOT will work with the TAC members to transfer their funding commitments to Utah. The scope will be finalized, and the research prime contract with UDOT and the University of Utah will be executed. Dr. Bartlett and the research team will begin working on the initial tasks of the project. |

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| **Significant Results:**  None yet. |
| **Circumstance affecting project or budget. (Please describe any challenges encountered or anticipated that**  **might affect the completion of the project within the time, scope and fiscal constraints set forth in the**  **agreement, along with recommended solutions to those problems).**  None. |

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| **Potential Implementation:** |