**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, 2017)  **x Quarter 2 (April 1 – June 30, 2017)**  \_ Quarter 3 (July 1 – September 30, 2017)  \_ Quarter 4 (October 1 – December 31, 2017) | |
| **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. 17-8236 | | **Project Start Date:**  September 8, 2016 |
| **Original Project End Date:**  March 31, 2019 | **Current Project End Date:**  March 31, 2019 (31 months) | | **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** |
| $110,354.93 (current contract)  $140,000.00 (total TPF commitments) | $20,000.00 (paid by UDOT)  $16,750.00 (at the U. of Utah) | 18% |

***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** |
| This Quarter = 18% (paid by UDOT)  This Quarter = 0% (at the U. of Utah)  Total Project = 18% (paid by UDOT)  Total Project = 15% (at the U. of Utah) | $20,000.00 (paid by UDOT)  $0 (at the U. of Utah) (Funding for U of U student from MPC funds) | 33% |

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| **Project Description**:  This research will be conducted in conjunction with the Pacific Earthquake Engineering Research (PEER) Center and various state DOTs via a pool-fund study managed by the Utah Department of Transportation (UDOT). The Mountain Plains Consortium (MPC) is also providing funding for certain aspects of this study, under separate contract with the University of Utah. The research topic addresses the need to improve empirical, semi-empirical, analytical and numerical methods to estimate the amount of permanent ground displacement associated with liquefaction-induced lateral spread resulting from several major earthquakes. This scope of work addresses the development of a lateral spread community database as part of the PEER Next Generation Liquefaction Project (<http://peer.berkeley.edu/lifelines/projects/ngl/>). It does not address predictive model development for lateral spread evaluations, which is future effort planned by PEER, but not included in this work plan.  The primary outcome of this research is a vetted and community database of seismic, topographical, geotechnical and horizontal displacement measurements pertaining to case histories of liquefaction-induced lateral spread for further research and model development by other researchers and investigators under the auspices of the PEER Center (http://peer.berkeley.edu/). Secondary outcomes will be web host and publishing required to house and disseminate this database and its supporting information.  Phase I Tasks include (funded):  (1) Kickoff meeting and procurement of software  (2) Development of data quality indicators/metrics, quality assurance and database population protocols  (3) Defining methods for quantifying uncertainty of key inputs  (4) Development and structuring of database  (5) Selection of case histories  (6) Obtaining and screening of case history information  (7) Population of case history database  (8) Phase I Reporting  (9) Database dissemination  Phase II Tasks include (not yet funded):  (10) Review and Development of Screening Criteria for Lateral Spread Potential  (11) Phase II Reporting  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 (NOAA and consultant). The technical advisory committee (TAC) for the study currently includes representatives from Utah, California, Oregon, and Washington State 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.):**  **Task 1** – Working meetings were held. Final contract documents were submitted by BYU. Some of the researchers met on May 18 (BYU and U of U); the notes from the meeting were distributed to the TAC.  **Task 2** – Completed. The work flow / Q&A/QC protocols will be further refined and implemented by BYU students for data entry.  **Task 3** – In progress. Spatial uncertainty for Niigata, Japan case histories was completed. The task will continue as other data are added to the dataset.  **Task 4** – In progress. Major changes to the data structure planned as a result of changes to the NGL triggering database by UCLA (Jon Stewart). Rev. 0 of this database is attached (posted on the TPF website). We are reviewing these changes and making our database compatible with this effort. The triggering database is now a SQL database, and will be housed with the DESIGN SAFE website.  **Task 5** – In progress. Working on data issues associated with Christ Church New Zealand dataset.  **Task 6** – Completed for Niigata, Japan. Working on Noshiro, Japan  **Task 7** – Continuing.  **Task 8** – Sections of report completed, but not ready for release.  **Task 9** – Not started.  TAC meetings – None were held this quarter.  Contract – Remaining funding commitments were transferred to Utah, including from Questar Gas Company, and applied to the project funds. |
| **Anticipated work next quarter**:  **Task 1** – BYU students will begin populating the database with other case histories.  **Task 2** – Database entry and review protocols will be developed and implemented by BYU and U of U students.  **Task 3** – Continue to inventory methods of quantifying uncertainty and data quality.  **Task 4** – Restructure part of our current database, so to be consistent as possible with NGL triggering database (see attachment posted on the TPF website).  **Task 5** – Prioritize case histories for database entry.  **Task 6** – Finalize database list.  **Task 7** – Continue population of data set.  **Task 8** – Release Interim Phase I Report.  **Task 9** – Not started. Database dissemination is planned through DESIGN SAFE. The decision to use DESIGN SAFE as a data repository affects Phase I Deliverable 1c – Instructions for use of ARCGIS for desktop tools. This will not be needed due to the new platform (<https://www.designsafe-ci.org/>).  TAC meetings – None are planned this quarter. Steve Bartlett and Kevin Franke will attend a NGL coordination meeting on July 12th at UC Berkeley.  Contract – Consider amending the research contract to include Phase II Tasks and the available funds. |

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| **Significant Results:**  Working meetings were held. Final contract documents were submitted by BYU. U of U and BYU researchers met on May 18. The work flow / Q&A/QC protocols were reviewed and will be further refined and implemented by BYU and U of U students for data entry. |
| **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).**  The restricting of the NGL triggering database by UCLA has made it necessary for us to restructure our database to be consistent with their efforts; hence the database structure is still not finalized. Rev. 0 of the NGL triggering database is shown in the attachment posted on the TPF website. |

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| **Potential Implementation:**  None yet. |