**TRANSPORTATION POOLED FUND PROGRAM**

**QUARTERLY PROGRESS REPORT**

Date: \_\_\_\_\_\_4/29/2016\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Lead Agency (FHWA or State DOT): \_\_\_\_\_\_Washington State DOT\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**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(276)* | | **Transportation Pooled Fund Program - Report Period:**  Quarter 1 (January 1 – March 31)  Quarter 2 (April 1 – June 30)  Quarter 3 (July 1 – September 30)  Quarter 4 (October 1 – December 31) | |
| **Project Title:**  **Full-Scale Shake Table Testing to Evaluate Seismic Performance of Reinforced Soil Walls** | | | |
| **Name of Project Manager(s):**  **Lu Saechao** | **Phone Number:**  **360.705.7260** | | **E-Mail**  saechal@wsdot.wa.gov |
| **Lead Agency Project ID:** | **Other Project ID (i.e., contract #):**  **GCB1359** | | **Project Start Date:**  2012 |
| **Original Project End Date:** | **Current Project End Date:**  **6/30/2018** | | **Number of Extensions:**  0 |

Project schedule status:

* 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** |
| $289,937  (Ph1 $49,938 & Ph2 $239,999) | $223,252.88  (Ph1 $49,938 & Ph2 $173,314.88) |  |

***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** |
|  | $4,575.52 |  |

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| **Project Description**:   |  | | --- | | Phase 1 (completed)  The objective of this project is to perform numerical studies and use the LHPOST to investigate the dynamic performance of one or two full-scale (7 m) reinforced soil retaining walls constructed using realistic materials and methods. Considering that these walls will be substantially taller than for any similar previous research (by a factor of 2), a key focus of the proposed research will be on the influence of wall height on overall system response (i.e., stability/deformation) and the distribution of dynamic tensile forces (i.e., seismic demand) in the soil reinforcement. Other focus areas will include dynamic earth pressure on facing elements, effects of dynamic loading on soil-reinforcement stress transfer mechanisms, and permanent deformations after dynamic loading.  The tests will be conducted using a unique large soil confinement box (LSCB) that is currently under construction as part of a recently funded NSF grant. The scale of these tests will permit wall construction using realistic soil types, compaction methods, and structural elements. The box will also have a unique design that permits different boundary conditions at the rear of the soil mass, including a water-filled bladder or geofoam layer.  Phase 2 (current work)  The objective of Phase II is to perform reduced-scale shake table tests and numerical studies to further characterize the seismic performance of MSE abutments. Numerical modeling work will be conducted using FLAC-3D and allow us to extrapolate results from the reduced-scale physical tests to simulate seismic performance of MSE abutments for bridges with spans up to 150 ft. The results of this work will be used to assess whether or not a Phase III investigation, consisting of full-scale MSE abutment tests, will be conducted on the UCSD large outdoor shake table. | |  | |

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| **Progress this Quarter (includes meetings, work plan status, contract status, significant progress, etc.):**  Work is continuing for Phase 2. The PI is continuing the literature review (ongoing throughout the duration of the project) and Task 2 (detailed design) was completed. The main efforts this quarter were focused on Task 3 (MSE abutment testing program). The bearing system for the shaking table upgraded and tested for operation. The experimental setup was assembled and the first experiment (Test 1) was performed. Testing reports on this test were developed, including the instrumentation plan, the pre-test numerical simulation (Task 5), the reports on the proposed motions, and preliminary analyses of the results (Task 4).  Expenses this quarter included salaries to support the main PhD student on the project and the Powell laboratory staff.  A summary of the specific tasks completed:   1. Perform tensile tests on the model-scale geogrid and verifying strain gage measurements (Task 2). 2. Assemble the system on the shaking table (Task 3). 3. Perform the first baseline test (Task 3). 4. Prepared test reports on the Test 1 for review by CalTrans and pooled fund partners (Task 3). 5. Performed preliminary pre-test numerical simulations of Test 1 (Task 5). 6. Prepared preliminary analysis of the data (Task 4). |
| **Anticipated work next quarter**:  Work in the next quarter will include:   * Finalize the shear strength testing on the sand (Task 2). * Perform the test with increased bridge deck load, labeled as Test 4 in the proposed program document (Task 3). * Perform the test with increased reinforcement spacing, labeled as Test 2 in the proposed testing program document (Task 3). * Perform preliminary pre-test numerical simulations of Tests 4 and 2 (Task 5). * Prepare preliminary analyses of the data from Tests 4 and 2 (Task 4). * Prepare associated test reports on Tests 4 and 2 for review by Caltrans and pooled fund partners (Task 3). |

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| **Significant Results:** |
| **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).** |

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| **Potential Implementation:** |