TRANSPORTATION POOLED FUND PROGRAM
QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT): __FHWA____

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.

Transportation Pooled Fund Program Project #		**Transportation Pooled Fund Program - Report Period:**
TPF-5(210)		√Quarter 1 (January 1 – March 31) 2017 ☐Quarter 2 (April 1 – June 30) 2017 ☐Quarter 3 (July 1 – September 30) 2017 ☐Quarter 4 (October 1 – December 31) 2017
Project Title: *In-situ Scour Testing Device*		
Name of Project Manager(s): *Kornel Kerenyi*	**Phone Number:** *(202) 493-3142*	**E-Mail** *kornel.kerenyi@fhwa.dot.gov*
Lead Agency Project ID:	**Other Project ID (i.e., contract #):**	**Project Start Date:**
Original Project End Date:	**Current Project End Date:**	**Number of Extensions:**

Project schedule status:

√ On schedule ☐ On revised schedule ☐ Ahead of schedule ☐ Behind schedule

Overall Project Statistics:

Total Project Budget	Total Cost to Date for Project	Percentage of Work Completed to Date

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date

Project Description:
The contractor shall work with federal personnel from the Hazard Mitigation team at the Turner-Fairbank Highway Research Center (TFHRC) to demonstrate the feasibility of using an in-situ scour testing device to for use as a foundation design aid by the highway and bridge engineering community. The research will be based on a combination of data obtained from the historical scour research literature, laboratory experiments, and data collection.
The work includes:

- Fabricate Laboratory Device. Identify a practical combination of prototype device components (size of confining column, piping, etc.) and variable speed pumps (or throttles) that can be appropriately scaled down for laboratory testing. Acquire and/or manufacture the scaled-down device for laboratory use. Consider using CFD modeling to supplement developing the laboratory device.
- Calibrate and Test Laboratory Device. Correlate the discharge rate through the device with the viscous shear that is generated at the head of the device. Create a laboratory setting that will accommodate the sediment and flowing water necessary to conduct the tests both in the dry and submerged by varying depths of water.
- Run Experiments with the Laboratory Device. Identify the critical shear of the easily erodible, fine sand to be used in the tests and the appropriate shear decay function needed to define the reduction in flow rate with scour depth. Run a series of tests using the device in the easily erodible sand with initial shear stresses at the head of the device being multiples of the critical shear. Measure the resultant equilibrium scour depth. Run tests with successively higher initial shear stresses until an equilibrium scour depth on the order of 60-100 ft is attained for the prototype scale. The resulting data point pairs will define the relationship between initial shear and resulting scour depth for a given shear decay function.
- Run Experiments with the Laboratory Device for Different Sand Sizes. Repeat the test using a different sand size to determine the potential impact of gradation.
- Final Report. A detailed final report shall be submitted documenting all laboratory and field for the use of recycled concrete for smart armoring countermeasure.

Progress this Quarter (includes meetings, work plan status, contract status, significant progress, etc.):

- Increased the capacity of the ISTD by integrating a new pump which doubles the flow rate.
- Improved the ISTD erosion gap measurement by integrating a new 8-channel multiplexer. It enables using 4 UDV sensors in the ISTD erosion head.
- Had meeting with USGS about the ISTD field test procedure and test schedules for 2017.
- Analyzed soil boring logs from EFL, CFL and University of Huston. They provided clay percentage of each category (different unconfined compressive strength) for about 7000 soil layers in 12 states. This sets the testing limit of the ISTD to be category 4 soils with an upper limit of 200 kPa of unconfined compressive strength.
- Tested the lab prepared category 4 soils with the lab drill-rig setup to verify the testing limit.

Anticipated work next quarter:

- Improve the precision of collecting the location of the ISTD erosion head by designing a more reliable system which can be mounted on the sampling casing.
- Introducing thin-wall sampling shoes to minimize the tube's disturbance to the field soil which in turn improves the accuracy of ISTD erosion tests.
- Continue the erosion calibration with other erosion testing devices to convert the ISTD erosion result into erosion rate vs shear stress for practice applications.
- Field tests to prove the robustness and reliability of the ISTD system.

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).

None to report.

Potential Implementation: