

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.

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| Transportation Pooled Fund Program Project # TPF-5(210) | Transportation Pooled Fund Program - Report Period: <input checked="" type="checkbox"/> Quarter 1 (January 1 – March 31) 2014 <input type="checkbox"/> Quarter 2 (April 1 – June 30) 2014 <input type="checkbox"/> Quarter 3 (July 1 – September 30) 2014 <input type="checkbox"/> Quarter 4 (October 1 – December 31) 2014 | |
| Project Title: <i>In-situ Scour Testing Device</i> | | |
| Name of Project Manager(s): <i>Kornel Kerenyi</i> | Phone Number: <i>(202) 493-3142</i> | E-Mail <i>kornel.kerenyi@fhwa.dot.gov</i> |
| 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 |
|----------------------|--------------------------------|--------------------------------------|
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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.):

- A laboratory device using cylindrical erosion head (LC-ISTD) was delivered. It utilizes an erosion head having little or no motion and a piston that feeds the soil sample. This is expected to be a robust testing/calibration unit that can provide critical information in the detailed erosion process in the device and for improvement of ISTD design.
- A large scale lab device was built into the 12' sump of the Hydraulics Laboratory at TFHRC. Tests were done with this device to further explore and confirm necessary feature and design parameters of the field device.
- Refined control scheme of the flow and erosion head was developed. The improved concept includes better control of the erosion chamber size on different bed materials.
- Potential deployment rigs were investigated. Most commonly used and owned subsurface exploration equipment is among the preferred options to maintain high reliability and low cost.

Anticipated work next quarter:

- Design erosion testing payload for the select subsurface exploration equipment.
- Program the LC-ISTD device and conduct testing in the lab to find potential issues and corresponding solutions.

Significant Results:

More detailed deployment schemes were developed.

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: