

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 # TPF-5(211)	Transportation Pooled Fund Program - Report Period: <input type="checkbox"/> Quarter 1 (January 1 – March 31) 2014 <input checked="" 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: Bridge Pier Scour Research		
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 present evaluation shows that, while the individual scour influences of the many bridge waterway variables are now well understood for simple or standard pier designs, and that recently developed scour estimation methods attempt to encompass these influences, there are several sources of substantial complexity that complicate the development of reliable comprehensive design relationship for estimating scour depth at piers:

- Complexity of flow field
- The fundamental problem of simultaneously scaling three scales (flow depth, bed material size and, structure size)
- Variations in channel boundary materials
- Differences in pier structure
- The complicating interaction of pier scour and other boundary erosion processes , such as accumulation of woody debris, ice bridge over-topping, abutment proximity, channel morphology, bedforms
- The large number of parameters involved

The TFHRC Hydraulics Laboratory will collaborate on this proposed research and will provide Lab capabilities and technical assistance.

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

- The flow conditions and stress/power imposed onto the bed at different stages of the pier scour were analyzed using the results from CFD simulation based on experimental bathymetry.
- Full scale CFD modeling was carried out using the bathymetry from field investigation to study the scour mechanisms during a design flood event and a real flood event that produced significant scour. The full-scale CFD modeling can also potentially provide valuable information on evaluation of skew for rectangular piers.

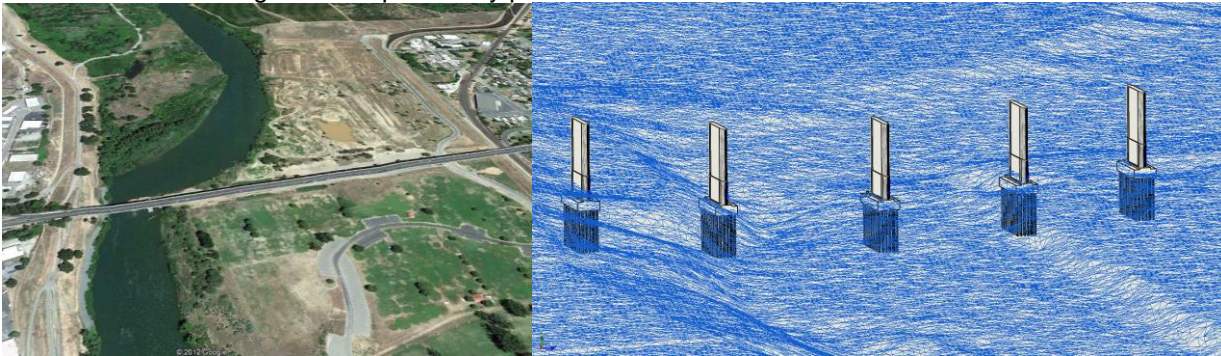


Figure 1 Full-scale CFD modeling

- There are several significant challenges in full-scale CFD modeling:
 - Multi-scale meshing
 - Bathymetry creation from field data
 - Significant variation in flow domain size and shape under different flood events.
 - Computational power consumption

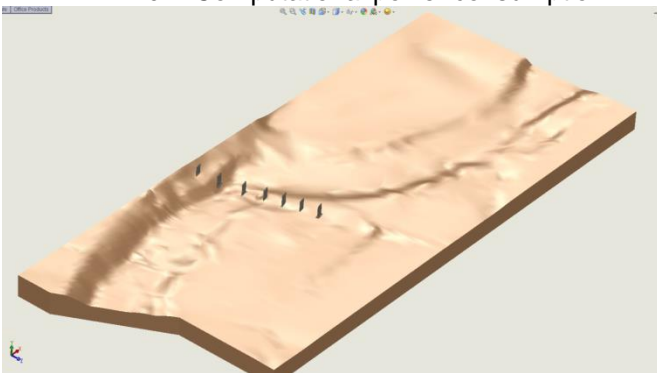


Figure 2 Stream model-bridge model assembly after interpolation, smoothing, and deviation analysis



Figure 3 Flow domain of a 2011 flood

Anticipated work next quarter:

- Comparison and analysis of lab data, CFD data, and field data.
- Generalize results to provide future guidance in scour evaluation.

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:

None from this period.