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 # *(i.e, SPR-2(XXX), SPR-3(XXX) or TPF-5(XXX)* TPF-5(464)	**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: Hydrologic and Hydraulic Software Enhancements (SMS, WMS, Hydraulic Toolbox, and HY-8)		
Name of Project Manager(s): Daniel Sharar-Salgado	**Phone Number:** 202-366-8791	**E-Mail** d.shararsalgado@dot.gov
Lead Agency Project ID: N/A	**Other Project ID (i.e., contract #):** N/A	**Project Start Date:** October 1, 2020
Original Project End Date: December 31, 2025	**Current Project End Date:** December 31, 2025	**Number of Extensions:** N/A

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
To Date: $1,132,000 ($922k from FHWA; $215	$420,000 ($400k FHWA funds; $20k	37%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
$300,000 and 27%	$300,000	37%

Project Description:

Perform needed enhancements, feature additions, and maintenance to four FHWA sponsored hydraulic engineering software packages routinely used by State DOTs and their consultants across the Nation. The four applications are: 1) the Surface-water Modeling System (SMS), 2) the Watershed Modeling System (WMS), 3) the Hydraulic Toolbox (HTB), and 4) the HY-8 Culvert Hydraulic Analysis Program. This project supports continued development of SRH-2D (Sedimentation and River Hydraulics – Two-Dimension) hydraulic and mobile-bed sediment transport model for river systems. SRH-2D is developed at the U.S. Bureau of Reclamation and housed within the SMS software.

The contractor will also create/update the user's guides, help files, and release notes issued with new versions of each software package. New software executable files will be periodically posted to, or linked from the FHWA Hydraulic Engineering Discipline website: https://www.fhwa.dot.gov/engineering/hydraulics/. New software versions will be deployed through webinars, conference presentations, workshops, and training courses. Deployment activities will cover the use of new features and completed maintenance activities.

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

The TAC met November 16 to review accomplishments and plan next round of updates.

The HY-8 automated culvert size and shape selection tool has been completed.

SMS beta tool for automated bridge meshing with 3D structures was released in version 13.3.
Extraction of pressure flow variables for scour added to bridge scour tool in version 13.3

The TAC Chair posted Hydraulic Toolbox Version 5.3.0 to the FHWA Hydraulic Engineering website: https://www.fhwa.dot.gov/engineering/hydraulics/software/toolbox404.cfm.

Improvements made to this version of the software include the following:

Bridge Scour: Added HEC-18 variable names to the Bridge Scour Calculator's variable names.
Bridge Scour: Updated the Froude Number computation for a complex pier case 2.
Bridge Scour: Increased the precision of the initial Erosion Rate for pier scour.
Bridge Scour: Fixed a bug where pressure scour was not computed for over-bank areas.
Bridge Scour: Fixed a bug to consider pier scour independently under certain conditions when in a group of piers.
Bridge Scour: Reorganized the Contraction Scour calculator. The user can select between the Clear-water and Live-bed method or the Cohesive method. Pressure scour may be calculated for either method.
Bridge Scour: Fixed a bug with deleting scenarios.
Bridge Scour: Added lateral lines to the bridge scour plot to indicate the lateral movement of the river.
Bridge Scour: Changed the time rate of scour to use the governing scour and not just the cohesive scour.

Anticipated work next quarter:

The FHWA Technical liaisons and the contractor will plan and the contractor will continue work on the following HTB, HY-8, SMS, and WMS activities.

HY-8:
• 'Franken' culvert (barrels that change size and shape) analysis options (research and implementation).
• The HY-8 automated culvert size and shape selection tool testing and beta release.
• Size Riprap basins for culverts smaller than 66-in diameter.
• Add flexibility to report format and level of detail.

HTB:
• Add new curb opening inlet methodology.
• Add linking for rational method flows to the channel analysis calculator and the curb and gutter analysis.
• Add option to design a continuous run of inlets.
• Add access to the time of concentration calculator outside of the rational method calculator.
• Add option to include multiple segments under "Shallow Concentrated Flow" and "Channel Flow".
• Change notes for Manning's n and intercept coefficient (k value).
• Automate the 2-year, 24-hour precipitation depth.
• Add option to reorder and move calculators within the project explorer.
• User Reference Manual updates.
• Initiate Summary report improvements.

SMS and SRH-2D:
• Research: blocked obstruction drag coefficients.
• Research: bridge low chord Manning's n assessments.
• SRH-2D model bug fixes and improvements.
• 3D bridge pressure flow improvements.

Significant Results:

Multiple software advancements are available or in progress as described in the previous section.

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 TAC did not identify any challenges or future obstacles that could affect project tasks and ultimate completion.

Potential Implementation:

When appropriate, the TAC anticipates deploying new software versions through a combination of: FHWA website posting, GovDelivery notifications to subscribers, release notes, presentations, and training courses. Future quarterly reports will provide additional details as new software versions become ready for release.