

TRANSPORTATION POOLED FUND PROGRAM QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT): Iowa 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.

Transportation Pooled Fund Program Project # <i>(i.e., SPR-2(XXX), SPR-3(XXX) or TPF-5(445))</i>		Transportation Pooled Fund Program - Report Period: Quarter 1 (January 1 – March 31) Quarter 2 (April 1 – June 30) X Quarter 3 (July 1 – September 30) Quarter 4 (October 1 – December 31), 2021	
Project Title: Design Guidelines and Mitigation Strategies for Reducing Sedimentation of Multi-barrel Culverts			
Name of Project Manager(s): Marian Muste	Phone Number: 319-384-0624	E-Mail marian-muste@uiowa.edu	
Lead Agency Project ID:	Other Project ID (i.e., contract #):	Project Start Date: May 1, 2020	
Original Project End Date: April 30, 2023	Current Project End Date: April 30, 2023	Number of Extensions:	

Project schedule status:

- On schedule
 On revised schedule
 Ahead of schedule
 Behind schedule (see comments)

Overall Project Statistics:

Total Project Budget	Total Cost to Date for Project	Percentage of Work Completed to Date
\$300,000	\$132,295	87%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
	\$ 13,970	%

Project Description:

The overall goal of the TPF-5(445) project is to leverage the extensive research conducted in Iowa through a multi-state research effort leading to design guidelines and specifications for mitigation measures for reducing sedimentation at existing and proposed multi-barrel culvert locations. The guiding principles and best practices for mitigating sedimentation will complement the existing hydraulic design guidelines. The project entails laboratory, numerical, and field monitoring and analysis to determine the overall effect of the sedimentation-reduction designs on the hydrology and transport of sediment at culverts. The project outcomes will be assembled in a web-based platform with interactive parameters that can uniquely support the routine activities related to culverts.

The TPF-5(445) project objectives are:

1. Assemblage of data and knowledge on sedimentation at culverts and mitigation measures
2. Synthesis of the practical knowledge in guidelines for design and operations for reducing or eliminating sedimentation at culverts
3. Development of a web-based platform that will embed the formulated guidelines in easy-to-use interactive interfaces that will facilitate to retrieve design and operation information and to guide in the selection of a self-cleaning culvert design fit for the local flow and sediment transport conditions.

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

For the reference period (July 1-September 30, 2022), the research was focused on the following tasks:

- Following the first in-person meeting of the project TAC, held in Iowa City, December 1-2, 2021, the initial scope of the project was changed to include:
 - modifications to the culvert model's current configuration to better match the culvert design specifications and sediment transport conditions occurring in New Mexico and Utah environments.
 - Introduction of a methodology quantification of the amount of sediment accumulated in the sediment deposits after the execution of the experimental runs using an accurate instrumentation. IIHR-Hydroscience & Engineering possesses the equipment required for this purpose (a lidar-based scanning system) that can be used by paying an internally-established recovery rate.

This quarter, the project team was commissioning the flow for the experiments in the retrofitted New Mexico and Utah flume. Following the finalization on the new flume and preliminary flume checks, the research team has spent extended time to set the protocols for running the tests for various culvert configurations: a) as is flume; b) straight cross stream curtain; c) streamlined cross stream curtain; d) rectangular side-box curtains; e) streamlined side-box curtains (equal height and tapered)

Two flow scenarios were tested for each culvert configuration:

- Long, light storm with extended load of sediment
- Realistic hydrograph, i.e., with the flow ramping in the model and variable sediment quantities.

All tests were conducted for the same channel-to-culvert angle. Each case was documented with photo and webcam imagery and surveyed with the scanning lidar.

Anticipated work next quarter:

- Finalization of the tests described for two more channel-to-culvert angles

Significant Results:

Progress was made steadily to accomplish the experimental results above-described.

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 COVID-19 pandemic adversely affected the project developments in multiple ways. Despite the unforeseen circumstances created by the COVID-19 pandemic, we expect to deliver the tasks specified by TAC.
- We hope that by garnering additional funding provided by Missouri DOT and by intensifying the modeling efforts, we will be able to recover some of the time lost due to COVID pandemic and additional modeling tasks requested by TAC. At this time the research team anticipate the need for a no-cost-extension for accomplishing all the tasks of the project in good order.

Potential Implementation:

The developed self-cleaning solutions are recommended for in-situ implementation following cost-benefit analyses conducted by specialized DOT offices.