

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> TPF-5(445)		Transportation Pooled Fund Program - Report Period: <input checked="" type="checkbox"/> 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: 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: February 1, 2020	
Original Project End Date: January 31, 2023	Current Project End Date: January 31, 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	\$39,334	28%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
	\$ 10,189	%

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 will entail 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 (January 1- March 31, 2021), the work has been focused on the following tasks:

T#2. Survey of partnering State DOT's on the types, extent and degree of sedimentation at multi-box culverts to account for regional issues related to culvert sedimentation. A list of final self-mitigation was created in the project meeting on February 8, 2021. In the absence of the annual meeting, a new survey (Survey #3) was released on February 16, 2021 to prioritize the testing of the modeling scenarios and to obtain more information on the type of sediment accumulations and the nature of the deposited materials at the state partners' silted culverts.

T#3. Screening and compiling culvert-related data resources (e.g., aerial photos, culvert National Bridge Inventory databases, etc) for assessment of the degree of sedimentation of selected culverts at the project partnering states. The compilation of data was initiated for the state of Iowa to provide a template of the benefits of accessing such resources. Note: Tasks #2 and #3 were originally planned to be discussed in the annual project meeting scheduled for the Summer of 2020. Due to the circumstances created by the COVID-19 pandemic, the scheduling of the in person meeting has been continuously postponed. A new survey (Survey #3) was launched on February 16, 2021. Currently, the survey inputs are synthesized.

T#4. Development of metrics for assessment of sediment transfer/removal efficiency for the identified self-cleaning solutions. This task involves conduct of laboratory experiments to assess the efficiency of the designed self-mitigation solutions. During the reference period, the series of reference tests using mono-size and multi-size sediment were finalized and presented to the project partners in the February 8 meeting. Subsequently, the tests for the first self-mitigation solution were started and currently those tests are almost finalized.

Despite the unforeseen circumstances created by the COVID-19 pandemic (i.e., total interruption of the laboratory work and issues found in the debugging stage of the model), starting with mid-December we recovered some of the delay in project progress. Currently, we are almost in pace with the original schedule.

Anticipated work next quarter:

- Synthesis of the input provided by partners for Survey #3.
- Continuation of the laboratory experiments for a new self-mitigation configuration: culverts with higher side-box inverts
- Setup of an additional virtual meeting with the Project TAC to report progress and discuss other specific aspects of the project development.

Significant Results:

The tests associated with setting the reference benchmark for the study (the “as is” culvert design) and for testing the performance of the “Straight-wingwall” self-cleaning solution have been completed. The results reveal the improvements brought by the first tested self-mitigating sediment solution.

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:

- We could not held the 1st face-to-face meeting. Besides the importance of having live meeting rather than virtual communication, the initial meeting (planned to be held in Iowa City, IA) was supposed to include a site visit to the four demonstration culverts investigated by the Iowa research team during 2017-2020.
- The IIHR shop was closed for two weeks (from November 9 to 20) due to facility infestation with COVID. The shop personnel was available only partially.

During the debugging stage of the project, the model showed a flow instability due to the formation of the “Stall-flow regime”, a very rare situation in hydraulic modeling. The modeling problem was solved by delayed the initial scheduling of the project.

We are confided that if the general situation with COVID remains at the current state, we can recover the time lost due to COVID pandemic and additional modeling issues, therefore we do not ask for any change in the project scheduling at this time.

Potential Implementation: