

Quarterly Progress Report:

Project Number and Title: 4.4 Bridge-Stream Network Assessments to Identify Sensitive Structural, Hydraulic, and Landscape Parameters for Planning Flood Mitigation

Research Area: Thrust 4 Connectivity for Enhanced Asset and Performance Management

PI: Mandar Dewoolkar, University of Vermont

Co-PI(s): Donna Rizzo and Arne Bomblies, University of Vermont

Reporting Period: 01.01.2021 to 03.31.2021

Submission Date: 03.31.2021

Overview: (Please answer each question individually)

Provide **BRIEF** overview and summary of activities performed during the reporting period. This summary should be written in lay terms for a general audience to understand. This should not be an extensive write up of findings (those are to be included in the final report), but a **high-level overview of the activities conducted during the last three months no more than 3 bullet points no more than 1 sentence each**

- A framework that combined geomorphic, hydraulic and structural characteristics of the bridge-stream interaction was developed to determine the network’s sensitivity to floods.
- The framework in conjunction with the 2-D hydraulic modeling was used to identify best intervention locations for improving the network’s flood resilience.
- Feedback from VTrans and VTDEC engineers was sought on the feasibility of modeled interventions.

Provide context as to how these activities are helping achieve the overarching goal(s) of the project...

- The identified geomorphic, hydraulic and structural sensitivities lead to the selection of best locations for intervention to minimize the flood impacts throughout the network improving flood resilience and protecting transportation assets.

Complete the following tables to document the work toward each task and budget (add rows/remove rows as needed, make sure you complete the Overall Project progress row and include all tasks even if they have ended or have not been started)...

Table 1: Task Progress			
Task Number	Start Date	End Date	% Complete
Task 1: Data Collection	07/01/2018	09/30/2019	100%
Task 2: Sensitivity Analysis	06/01/2019	03/31/2020	75%
Task 3: Network Model Development	01/01/2020	06/30/2020	95%
Task 4: Transferability	03/01/2020	06/30/2020	40%
Overall Project:	07/01/2018	05/01/2021	80%

Table 2: Budget Progress		
Project Budget	Spend – Project to Date	% Project to Date*
\$374,716	\$329,879	88.03%

**Include the date the budget is current to.*

Describe any opportunities for training/professional development that have been provided...

Describe any activities involving the dissemination of research results (be sure to include outputs, outcomes, and the ways in which the outcomes/outputs have had an impact during the reporting period. Please use the tables below for any Publications and Presentations in addition to the description of any other technology transfer efforts that took place during the reporting period.)... Use the tables below to complete information about conferences, workshops, publications, etc. **List all other outputs, outcomes, and impacts after the tables** (i.e. patent applications, technologies, techniques, licenses issued, and/or website addresses used to disseminate research findings).

Table 3: Presentations at Conferences, Workshops, Seminars, and Other Events				
Title	Event	Type	Location	Date(s)
Identifying Sensitive Structural and Hydraulic Parameters for Floodplain Intervention Across Multiple Sites in a Bridge-Stream Network Analysis	Civil and Environmental Engineering Graduate Student Seminar at the University of Vermont	Live Presentation	Online	03/19/2021

Table 4: Publications and Submitted Papers and Reports				
Type	Title	Citation	Date	Status
No new publications.				

Participants and Collaborators:

Use the table below to list all individuals who have worked on the project.

Table 5: Active Principal Investigators, faculty, administrators, and Management Team Members			
Individual Name	Email Address	Department	Role in Research
Mandar Dewoolkar	Mandar.Dewoolkar@uvm.edu	Civil and Environmental Engineering	Primary Investigator
Donna Rizzo	Donna.Rizzo@uvm.edu	Civil and Environmental Engineering	Co-Primary Investigator
Arne Bomblies	Arne.Bomblies@uvm.edu	Civil and Environmental Engineering	Co-Primary Investigator

Use the table below to list all students who have participated in the project during the reporting. (This includes all paid, unpaid, intern, independent study, or any other student that participated in this project.)

Table 6: Student Participants during the reporting period				
Student Name	Email Address	Class	Major	Role in research
Rachel Seigel		Master's	Environmental Engineering	Graduate Research Assistant
Eight civil engineering and environmental engineering undergraduate students are working on two capstone design projects using the Mad River model developed as part of this research. Their projects are on protecting two historic covered bridges from future floods.				

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Use the table below to list any students who worked on this project and graduated during this reporting period.

Table 7: Student Graduates			
Student Name	Role in Research	Degree	Graduation Date

Use the table below to list organizations have been involved as partners on this project and their contribution to the project.

Table 8: Research Project Collaborators during the reporting period						
Organization	Location	Contribution to the Project				
		Financial Support	In-Kind Support	Facilities	Collaborative Research	Personnel Exchanges

List all other outputs, outcomes, and impacts here (i.e. patent applications, technologies, techniques, licenses issued, and/or website addresses used to disseminate research findings). Please be sure to provide detailed information about each item as with the tables above.

Have other collaborators or contacts been involved? If so, who and how? (This would include collaborations with others within the lead or partner universities; especially interdepartmental or interdisciplinary collaborations.)

Table 9: Other Collaborators			
Collaborator Name and Title	Contact Information	Organization and Department	Contribution to Research
Jaron Borg	Vermont Department of Environmental Conservation, 1 National Life Drive, Main 2, Montpelier, VT 05620-3522	River Management Engineer, Watershed Management Division, Rivers Program	VT-DEC's representative on the technical advisory committee

Who is the Technical Champion for this project?

Name: Cassidy Cote (Cassidy has left VTrans and we are in the process of finding a replacement from VTrans)
 Title: Hydraulics and Structures Engineer
 Organization: Vermont Agency of Transportation
 Location (City & State): Montpelier, Vermont
 Email Address: Cassidy.Cote@vermont.gov

Changes:

No changes were made during this quarter

Planned Activities:

Modeling flood mitigation scenarios will continue for the Mad River to determine bridge-river network sensitivities. The different scenarios on the high gradient river (Mad River), will be compared to the medium gradient (Black Creek) and low gradient (Otter Creek) will continue.