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: *04.01.2021 to 06.30.2021*
Submission Date: 03.30.2021

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 and hydraulic characteristics of the bridge-stream interaction(s) 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 resilience to flooding on the three study sites.

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

- The results of modeling the three study sites are compared and contrasted to understand common features of bridge-stream interactions in mountainous settings with temperate climates.

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	100%
Task 3: Network Model Development	01/01/2020	06/30/2020	100%
Task 4: Transferability	03/01/2020	06/30/2020	80%
Overall Project:	07/01/2018	05/01/2021	95%

Table 2: Budget Progress		
Project Budget	**Spend – Project to Date**	**% Project to Date***
$374,716	$359,897	95.5%

Include the date the budget is current to: 06/24/21

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)
Two-Dimensional Model Development and Flood Analysis for Understanding Bridge-Stream Interactions	Civil and Environmental Engineering, University of Vermont	Live Thesis Presentation	Online	05/12/2021
Mad River Waitsfield Bridge Flood Hazard Mitigation	Civil and Environmental Engineering, University of Vermont	Capstone Project Presentation	Online	05/10/2021
Warren Covered Bridge Flood Hazard Mitigation	Civil and Environmental Engineering, University of Vermont	Capstone Project Presentation	Online	05/05/2021

Table 4: Publications and Submitted Papers and Reports

Type	Title	Citation	Date	Status
Capstone Project Design Report, Waitsfield Covered Bridge Flood Mitigation, Lane Feldeisen, Nick Giallombardo, Harrison Lucas, Kyle Murphy, Brandon Nimberger, Department of Civil and Environmental Engineering, University of Vermont, May 10, 2021. *Capstone Design Project Design Report, Warren Covered Bridge Rehabilitation*, Sam Langeleh, Ashlie Mercado, Linh Nguyen, Colin Palmer, Reed Winter, Department of Civil and Environmental Engineering, University of Vermont, May 10, 2021.				

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
Ten civil engineering and environmental engineering undergraduate students worked on two capstone design projects using the Mad River model developed as part of this research. Their projects focused on protecting two historic covered bridges from future floods.				

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**
Lane Feldeisen	Senior – capstone project	BS in Civil Engineering	May 2021
Nick Giallombardo	Senior – capstone project	BS in Civil Engineering	May 2021
Kyle Murphy	Senior – capstone project	BS in Civil Engineering	May 2021
Brandon Nimberger	Senior – capstone project	BS in Civil Engineering	May 2021
Sam Langeleh	Senior – capstone project	BS in Civil Engineering	May 2021
Ashlie Mercado	Senior – capstone project	BS in Civil Engineering	May 2021
Linh Nguyen	Senior – capstone project	BS in Civil Engineering	May 2021
Colin Palmer	Senior – capstone project	BS in Civil Engineering	May 2021
Reed Winter	Senior – capstone project	BS in Environmental Engineering	May 2021

Commented [MD1]: Just wanted to let TIDC know that these students may not be explicitly aware that they worked on part of the TIDC project.

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,	River Management Engineer, Watershed Management Division, Rivers Program	VT-DEC's representative on the technical advisory committee

	Montpelier, VT 05620-3522		
Prof. John Lens	33 Colchester Ave., Burlington, VT 05405	Civil and Environmental Engineering Department, University of Vermont	Faculty collaborator - Capstone course instructor
Prof. Kristen Underwood	33 Colchester Ave., Burlington, VT 05405	Civil and Environmental Engineering Department, University of Vermont	Faculty collaborator
Lindsay Worley	33 Colchester Ave., Burlington, VT 05405	Civil and Environmental Engineering Department, University of Vermont	Graduate student collaborator
Matthew Trueheart	231 Main St. Suite 102 New Paltz, NY 12561	Water Resource Engineer, Milone & MacBroom, Inc.	Collaborator

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:

Most of the project work has been completed and the final report is being written.