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 Verrmont*
Co-PI(s): *Donna Rizzo and Arne Bomblies, University of Vermont*
Reporting Period: *10.01.2020 to 12.31.2020*
Submission Date:

<u>**Overview:**</u> **(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* <mark>high-level overview of the activities conducted during the last three months</mark> **<mark>no more than 3 bullet points no more than 1 sentence each</mark>** *….*

- Perturbations on the Mad River and Black Creek two-dimensional (2D) hydraulic models were performed to investigate how changes in transportation infrastructure affect other structures up and downstream in the river network.

- Sensitivity analyses continued in all three models (Otter Creek, Mad River, and Black Creek study sites) to examine how localized perturbations to bridge, road, culvert and stream landscape features affect velocity and stream power up and downstream in the river network.
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Provide context as to how these activities are helping achieve the overarching goal(s) of the project…

- Different model scenarios allow sensitivity analyses for all three selected rivers for the project. This will help us understand how river corridors with low to high gradients react differently under similar scenarios.

- This analysis helps in identifying similar features between the different bridge-stream networks to identify sensitivities that can be used for a flood risk analysis that can be applied to other river corridors under similar geographic and climatic conditions.

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	55%
Task 3: Network Model Development	01/01/2020	06/30/2020	0%
Task 4: Transferability	03/01/2020	06/30/2020	0%
Overall Project:	*07/01/2018*	*05/01/2021*	60%

Table 2: Budget Progress		
Project Budget	**Spend – Project to Date**	**% Project to Date***
$374,716	$278,880	74.4%

Rev: 02.03.2020

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)**
Bridge-Stream Network Analysis across Multiple Sites to Identify Sensitive Structural and Hydraulic Parameters for Flood Risk Assessment and Floodplain Reconnection	Civil and Environmental Engineering Graduate Student Seminar at the University of Vermont	Live Presentation	Online	11/06/2020
Bridge-Stream Network Modeling for Bridge Risk Assessment and Flood Mitigation	TIDC Student Poster Contest	Recorded Poster Presentation	Online	10/05/2020 – 10/18/2020

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.				

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:

Sensitivity analyses will continue for the three river reaches to identify at risk structures. Comparisons of the different scenarios will be made across the low, medium and high river gradients to identify key features that can be used for a network model and transferability for other river corridors.