

**Quarterly Progress Report:**

**Project Number and Title:** 3.1X FRP-Concrete Hybrid Composite Girder Systems: Web Shear Strength and Design Guide Development

**Research Area:** Thrust Area 3

**PI:** W. Davids, UMaine

**Co-PI(s):** H. Dagher, UMaine

**Reporting Period:** 7/1/2020 – 9/30/2020

**Submission Date:** 9/30/2020

**Overview: (Please answer each question individually)**

*Provide **BRIEF** overview and summary of activities performed during the reporting period.*

During the reporting period, a testing matrix consisting of four series of sandwich panel specimens was decided upon for testing by ASTM D8067-17. This matrix consists of two layups of woven  $\pm 45^\circ$  biaxial E-glass and two thicknesses of foam core, which can be easily manufactured from materials in stock at AIT Bridges and at the Center. These materials will be brought together at AIT for manufacturing into the 24 required test specimens, 6 of each series. In addition, a basic outline of the CT girder design guide has been created and some information (most notably a full and simplified technique for CT girder moment analysis) has been drafted, and literature review of composite design and analysis techniques has been conducted.

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

By selecting and locating the materials from which the ASTM D8067-17 test specimens will be manufactured, further test preparation and specimen manufacture can commence. This will allow testing to begin in the near future and conclusions on foam-core web shear strength to be drawn, as is one of the major goals of Task 1. Creation of an outline for the design guide, beginning to enter information, and researching previously described design and analysis techniques for possible incorporation moves toward the completion of the guide, the goal and deliverable product of Task 2.

*Describe any accomplishments achieved under the project goals...*

Funding for the project was acquired and, as detailed above, the test specimens for Task 1 have been selected and the major sections of the design guide for Task 2 has been drafted.

*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)...*

<b>Table 1: Task Progress</b>			
<b>Task Number</b>	<b>Start Date</b>	<b>End Date</b>	<b>% Complete</b>
Task 1:	6/1/2020	5/31/2021	5
Task 2:	6/1/2020	5/31/2022	5
Overall Project:	6/1/2019	5/31/2022	5

<b>Table 2: Budget Progress</b>		
<b>Project Budget</b>	<b>Spend – Project to Date</b>	<b>% Project to Date*</b>
\$98,775	????	????

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

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

No opportunities for training or professional development have yet arisen as a result of this project.

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)
N/A				

Table 4: Publications and Submitted Papers and Reports				
Type	Title	Citation	Date	Status
N/A				

No results have yet been created or disseminated due to the project being in its early stages.

#### 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
William Davids	william.davids@maine.edu	Civil and Environmental Engineering	Principal 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
Andrew Schanck		Ph.D	Civil Engineering	Conduct and coordinate testing, modeling, report results, design guide drafting

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
N/A			

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

<b>Table 8: Research Project Collaborators during the reporting period</b>						
<b>Organization</b>	<b>Location</b>	<b>Contribution to the Project</b>				
		<b>Financial Support</b>	<b>In-Kind Support</b>	<b>Facilities</b>	<b>Collaborative Research</b>	<b>Personnel Exchanges</b>
Advanced Infrastructure Technologies	Brewer, Maine	x		x		

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.

No technology transfers have occurred within the reporting period.

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.)

Who is the Technical Champion for this project?

Name: Dale Peabody

Title: Director of Research

Organization: MaineDOT

Location (City & State): Augusta, ME

Email Address: dale.peabody@maine.gov

**Changes:**

Discuss any actual or anticipated problems or delays and actions or plans to resolve them...

No problems are anticipated at the current time.

Discuss any changes in approach and the reasons for the change...

No changes in approach are planned for the foreseeable future.

**Planned Activities:**

Description of future activities over the coming months.

In the coming months, the ASTM D8067-17 specimens will be manufactured, post-processed, and tested, and the results from testing analyzed. Depending on availability of time, FEA models of tests may also be created and analyzed, and literature research of pertaining to CT girder design and analysis will continue, with particular attention paid to shear strength and stability design.