Quarterly Progress and Performance Indicators Report:
Project Number and Title: 3.14 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): N/A
Reporting Period: 7/1/2021 - 9/30/2021
Submission Date: 9/30/2021

******IMPORTANT: Please fill out each section fully and reply with N/A for questions/sections with nothing to report. For ease of reporting to the USDOT, please do not remove, or change the order of, any sections/text. You may remove/add each rows in tables as needed. Thank you! ******
The report is due on the last day of the reporting period in .doc format to tidc@maine.edu.

Overview:

*Provide **BRIEF** highlights 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 at no more than 1 sentence each** ….*

- Testing and data analysis of web shear test specimens was completed
- Advanced numerical modeling of web shear test results and full bridge shear distribution was completed
- Significant progress was made toward drafting the design specification for CT girder bridges

Meeting the Overarching Goals of the Project:
How did the previous items help you achieve the project goals and objects? Please give one bullet point for each bullet point listed above.

- Critical data on web shear behavior of CT girder bridges was gathered, allowing conclusions to be drawn regarding web shear strength and behavior
- Results of numerical modeling allowed significant additional information regarding shear buckling and bridge shear distribution and design conservatism to be determined
- A document outlining the design basis for CT girder bridges is closer to being finalized

Accomplishments:
List any accomplishments achieved under the project goals in bullet point form…

- A final milestone report for Task 1 was completed and submitted to the MaineDOT, closing out the task

Task Progress and Budget:
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: Title	**Start Date**	**End Date**	**% Complete**

Task 1:	6/1/2020	5/31/2021	100
Task 2:	6/1/2020	5/31/2022	60
Overall Project:	6/1/2019	5/31/2022	80

Table 2: Budget Progress		
Project Budget	**Spend – Project to Date**	**% Project to Date (include the date)**
$98,775		

Is your Research Project Applied or Advanced?

☒ **Applied** (*The systematic study to gain knowledge or understanding necessary for determining the means by which a recognized and specific need may be met.)*

☐ **Advanced** *(An intermediate research effort between basic research and applied research. This study bridges basic (study to understand fundamental aspects of phenomena without specific applications in mind) and applied research and includes transformative change rather than incremental advances. The investigation into the use of basic research results to an area of application without a specific problem to resolve.)*

Professional Development/Training Opportunities:

Describe any opportunities for training/professional development that have been provided. Did you provide a training to a State DOT/AOT or industry organization? What was the training? When was it offered? How many people attended? Did you meet with a State DOT/AOT or industry organization to inform them of your findings and how these findings could help their organization? When? How many attended the meeting?

- During the reporting period, project personnel attended the 2021 TIDC Annual Conference. This gave an increased perspective on other TIDC projects and ways to incorporate other researchers' experience into this and other projects.

Technology Transfer:

Complete all of the tables below and provide additional information where requested. Please provide ALL requested information as this is one of the most important sections for reporting to the USDOT. ***ONLY provide information relevant to this reporting period.***

Use the table below to complete information about conference sessions, workshops, webinars, seminars, or other events you led/attended where you shared findings as a result of the work you conducted on this project:

Table 3: Presentations at Conferences, Workshops, Seminars, and Other Events					
Type	**Title**	**Citation**	**Event**	**Location**	**Date(s)**
N/A					

Use the table below to report any publications, technical reports, peer-reviewed articles, newspaper articles referencing your work, graduate papers, dissertations, etc. written as a result of the work you conducted on this project. Please list only completed items and exclude work in progress.

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

Answer the following questions (N/A if there is nothing to report):

1. Did you deploy any technology during the reporting period through pilot or demonstration studies as a result of this work? If so, what was the technology? When was it deployed?

   N/A

2. Was any technology adopted by industry or transportation agencies as a result of this work? If so, what was the technology? When was it adopted? Who adopted the technology?

   N/A

3. Did findings from this research project result in changing industry or transportation agency practices, decision making, or policies? If so, what was the change? When was the change implemented? Who adopted the change?

   The results presented as a result of Task 1 has influenced the web shear design of FRP CT girder bridges by Advanced Infrastructure Technologies

4. Were any licenses granted to industry as a result of findings from this work? If so, when? To whom was the license granted?

   N/A

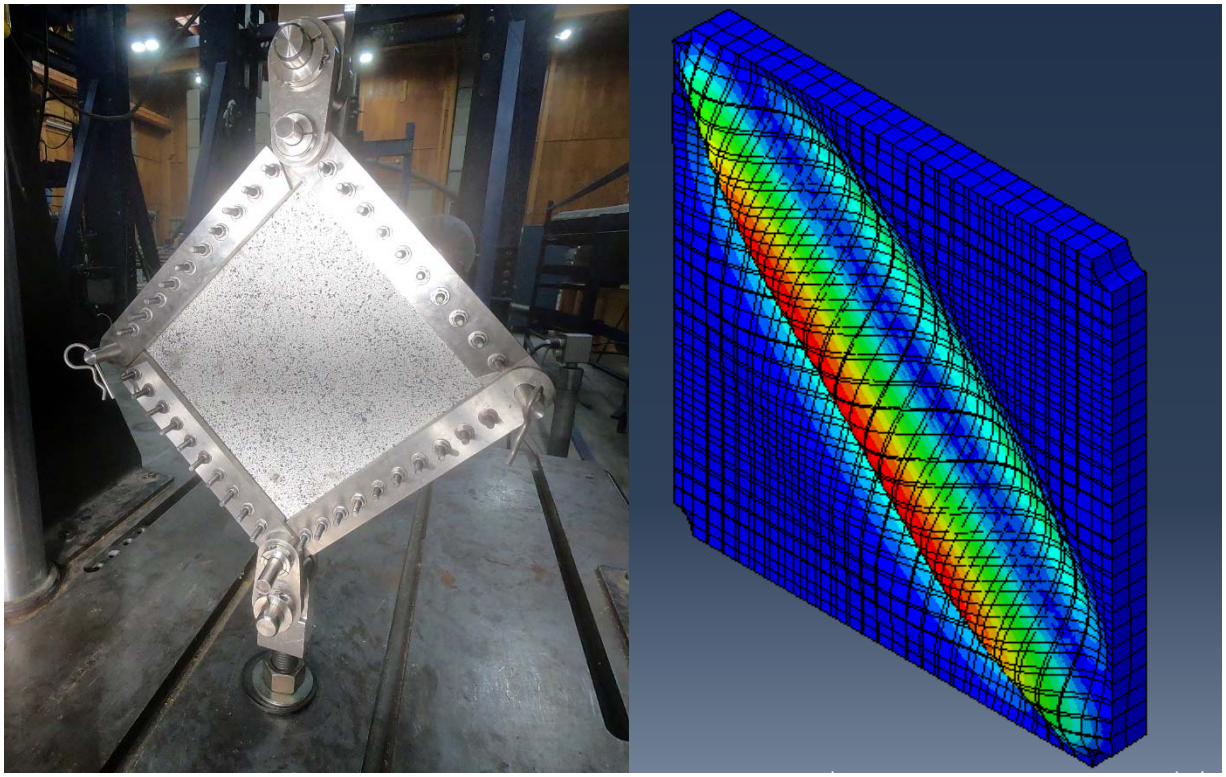
5. Were any patent applications submitted as a result of findings from this research? If so, please provide a copy of the patent application with your report.

   N/A

6. Were any industrial contracts awarded base on furthering planned research and development activities as a result of findings from this work? If so, when? How much was awarded? Who awarded the contract?

   N/A

Please add figures/images that can be included on the website and/or in marketing/social media materials to further clarify your research to the general public.



Describe any additional activities involving the dissemination of research results not listed above under the following headings:

Outputs:

Definition: Any new or improved process, practice, technology, software, training aid, or other tangible product resulting from research and development activities. They are used to improve the efficiency, effectiveness, and safety of transportation systems. List any outputs accomplished during this reporting period:

- As a result of the completion of Phase 1 of this project, the design strengths and practices for webs of CT girder bridges have been significantly improved. This will help to improve the efficiency and accuracy of future designs.
- Although still in progress, the design guide resulting from the completion of Phase 2 of this project will establish a design-basis for CT girder bridges which can be relied upon for future designs.

Outcomes:

Definition: The application of outputs; any changes made to the transportation system, or its regulatory, legislative, or policy framework resulting from research and development activities. List any outcomes accomplished during this reporting period:

- No associated outcomes have yet occurred

Impacts:

Definition: The effects of the outcomes on the transportation system such as reduced fatalities, decreased capital or operating costs, community impacts, or environmental benefits. The reported impacts from UTCs are used for the assessment of each UTC and to make a case for Federal funding of research and education by demonstrating the impacts that UTC funding has had on technology and education. NOTE: The U.S. DOT uses this information to assess how the research and education programs (a) improve the operation and safety of the transportation system; (b) increase the body of knowledge and technologies; (c) enlarge the pool of people trained to develop knowledge and utilize technologies; and (d) improves the physical, institutional, and information resources that enable people to have access to training and new technologies. List any outcomes accomplished during this reporting period:

- The information gathered and conclusions drawn in Task 1 of this research will help to reduce costs and increase durability of future CT girder bridge construction, increasing confidence in the technology by practitioners. This will be further improved by the draft of a design guide, which is the main deliverable for Task 2.

Participants and Collaborators:

*Use the table below to list **all** individuals (compensated or not) who have worked on the project.*

Table 5: Active Principal Investigators, faculty, administrators, and Management Team Members				
Individual Name & Title	**Dates involved**	**Email Address**	**Department**	**Role in Research**
William Davids	5/31/2019 – Current	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 period. (This includes all paid, unpaid, intern, independent study, or any other student that participated in this project.) **ALL FIELDS ARE REQUIRED.***

Table 6: Student Participants during the reporting period								
Student Name	**Start Date**	**End Date**	**Advisor**	**Email Address**	**Level**	**Major**	**Funding Source**	**Role in research**
Andrew Schanck	5/31/2019	Current	William Davids		Ph.D	Civil Engineering	N/A	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 or received a certificate during this reporting period. Include information about the student's accepted employment (i.e. the student is now working at MaineDOT) or if they are continuing their students through an advanced degree (list the degree and where they are attending).

Table 7: Students who Graduated During the Reporting Period

Student Name	Degree/Certificate Earned	Graduation/Certification Date	Did the student enter the transportation field or continue another degree at your university?
N/A			

Use the table below to list any students that participated in Industrial Internships:

Table 8: Industrial Internships			
Student Name	**Degree/Certificate Earned**	**Graduation/Certification Date**	**Did the student enter the transportation field or continue another degree at your university?**
N/A			

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

Table 9: Research Project Collaborators during the reporting period						
Organization	**Location**	**Contribution to the Project**				
		Financial Support	**In-Kind Support**	**Facilities**	**Collaborative Research**	**Personnel Exchanges**
Advanced Infrastructure Technologies	Brewer, Maine	X		x		

*Use the table below to list **individuals** that have been involved as partners on this project and their contribution to the project.*
*(**List your technical champion(s) in this table.** This also includes collaborations within the lead or partner universities who are not already listed as PIs; especially interdepartmental or interdisciplinary collaborations.)*

Table 10: Other Collaborators				
Collaborator Name and Title	**Contact Information**	**Organization and Department**	**Date(s) Involved**	**Contribution to Research**
Anthony Diba	anthony@aitbridges.com	Advanced Infrastructure Technologies – AIT Bridges	5/312019-Present	Technical Champion

Use the following table to list any transportation related course that were taught or led by researchers associated with this research project:

Table 11: Course List						
Course Code	**Course Title**	**Level**	**University**	**Professor**	**Semester**	**# of Students**

N/A						

Changes:

List any actual or anticipated problems or delays and actions or plans to resolve them (list no-cost extension requests here)…

No significant problems or delays have arisen during the current reporting period

List any changes in approach and the reasons for the change…

No significant changes to approach have ordure during the current reporting period or are anticipated for the next

Planned Activities:

List the activities planned during the next quarter.
During the next reporting period progress will continue toward completion of a final design guide for CT girder bridges