TIDC Transportation Infrastructure Durability Center AT THE UNIVERSITY OF MAINE

Quarterly Progress Report:

Project Number and Title: 2.10 Durability Evaluation of Carbon Fiber Composite Strands in Highway Bridges
Research Area 2: New materials for longevity and constructability
PI: *Roberto Lopez-Anido, University of Maine*
Co-PI(s): *Keith Berube and Andrew Goupee, University of Maine*
Reporting Period: *07/01/2020 to 09/30/2020*
Date: *09/30/20*

Overview:

Work performed during the reporting period:

- The literature review on existing use of carbon fiber cables/strands in civil infrastructure was completed.
- The wireless system has been purchased. Currently, we are integrating the wireless system with the current LabView program.
- We coordinated with MaineDOT having the network switch installed at the Penobscot-Narrows Bridge site, which would provide online access for our monitoring systems.
- The hardware installation plan was submitted to MaineDOT Bridge Engineering and it was approved. MaineDOT has contracted the electrical work to provide power for the systems at the Bridge based on our instrumentation plan.
- We conducted weekly trips to the Penobscot Narrows Bridge to install the necessary hardware for the implementation of the wireless system. We have completed 25% of the hardware installation work.
- We acquired continuous monitoring data from one stay anchorage location during July and August. The instrumentation interface was removed in September for implementation of the new wireless system. Continuous data will resume after the wireless system installation is completed.

Table 1: Task Progress

Task Number	Start Date	End Date	Percent Complete
Task 1: Upgrade Data Acquisition System	6/1/2019	12/31/2020	50%
Task 2: External Environmental Sensing	1/1/2020	12/31/2020	10%
Task 3: Implement Analytical Model	11/1/2019	8/30/2021	25%
Task 4: Durability Assessment	11/1/2019	12/31/2021	25%

Table 2: Budget Progress

Entire Project Budget	Spend Amount	Spend Percentage to Date
To be completed by Grant/Fiscal Manager, Advanced Structures and Composites Center, UMaine		

Table 3: Presentations at Conferences, Workshops, Seminars, and Other Events

Title	Event	Type	Location	Date(s)
Durability Evaluation of Carbon Fiber Composite Strands in Highway Bridges	2020 TIDC Annual Conference	Abstract	Virtual	August 12-13, 2020
TIDC 2.10 Durability Evaluation of Carbon Fiber Composite Strands in Highway Bridges	2020 Student Poster Contest	Poster	Virtual	September 25, 2020

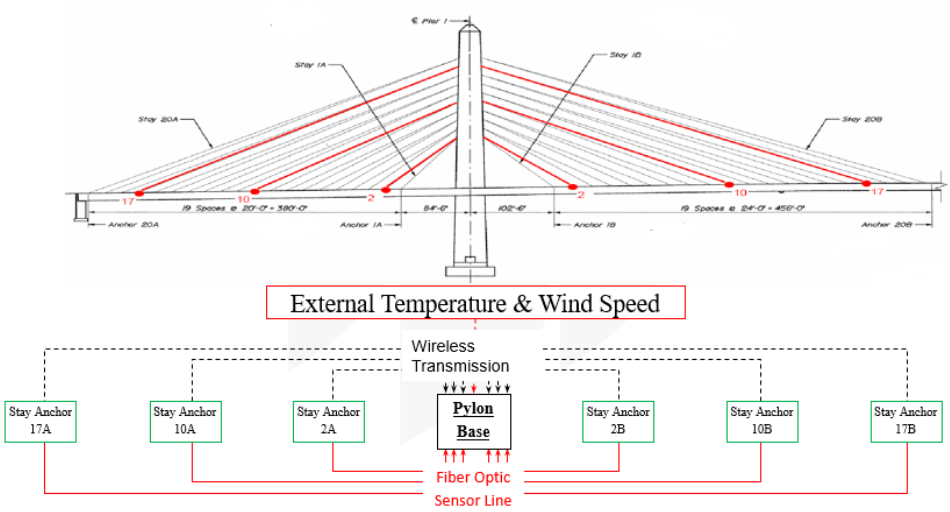

Figure 1: Data acquisition layout for carbon fiber composite strands in the Penobscot-Narrows Bridge

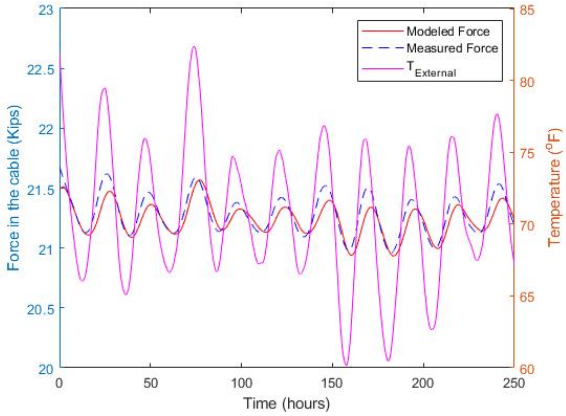

Figure 2: Predictive model of cable forces and temperature

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

Participants and Collaborators:

Table 5: Active Principal Investigators, faculty, administrators, and Management Team Members			
Individual Name	**Email Address**	**Department**	**Role in Research**
Roberto Lopez-Anido	RLA@maine.edu	UMaine Civil and Environmental Engineering	Project PI, Graduate student co-advisor, and Structural lead.
Keith Berube	keith.berube@maine.edu	UMaine Mechanical Engineering Technology	Project Co-PI and Data acquisition instrumentation lead.
Andrew Goupee	Andrew.goupee@maine.edu	UMaine Mechanical Engineering	Project Co-PI, Graduate student co-advisor, and Modeling lead.

Table 6: Student Participants during the reporting period				
Student Name	**Email Address**	**Class**	**Major**	**Role in research**
Braedon Kohler		Masters	Mechanical Engineering	Modeling, programming and data acquisition

Table 7: Student Graduates			
Student Name	**Role in Research**	**Degree**	**Graduation Date**
N/A			

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**
Maine DOT	Augusta, ME		x			

Technical Champion:
Name: Dale Peabody
Title: Director, Transportation Research
Organization: MaineDOT
Location (City & State): Augusta, ME
Email: Dale.Peabody@maine.gov

Changes:

The schedule has been affected by disruptions of day-to-day campus and field work due to the University shutdown in response to COVID-19 health safety precautions.

Planned Activities:

The following activities are planned for the next three month period:

- Complete the hardware installation at the Bridge site.
- Coordinate with the electrical contractor the steps to complete the power installation.
- Integrate our LabView program with the wireless and fiber optic systems.
- Procure and install the temperature and wind speed sensors.