

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: *01/01/2020 to 03/31/2020*

Date: *03/25/20*

Overview:

The work during the current period has included the following:

- Continued literature review on existing use of carbon fiber cables/strands in civil infrastructure; in excess of 50 sources processed to date.
- Assembling a team to work on the online interface for the data acquisition system.
- Background research on wireless data acquisition system options.
- Debugging of data acquisition computer issues.

The literature review on carbon fiber cables is part of the Durability Assessment (Task 4), while the remaining work is contributing to the upgrade of the data acquisition system (Task 1).

The current status of each task and the current state of the budget are presented in Tables 1 and 2, respectively.

Table 1: Task Progress			
Task Number	Start Date	End Date	Percent Complete
Task 1: Upgrade Data Acquisition System	6/1/2019	8/31/2020	35%
Task 2: External Environmental Sensing	1/1/2020	8/31/2020	0%
Task 3: Implement Analytical Model	11/1/2019	5/30/2021	10%
Task 4: Durability Assessment	11/1/2019	12/31/2021	15%

Table 2: Budget Progress		
Entire Project Budget	Spend Amount	Spend Percentage to Date
\$339,457	\$73,442	21.6% (3/31/2020)

During this current reporting cycle, there were no presentations given or publications submitted.

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				

Participants and Collaborators:

The principal investigators and graduate students that have participated in the project during the current reporting period are listed in Tables 5 and 6, respectively.

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		Master's	Mechanical Engineering	Modeling, programming and data acquisition

There were no students working on the project who graduated during the current reporting period.

Table 7: Student Graduates

Student Name	Role in Research	Degree	Graduation Date
N/A			

During the current reporting period the MaineDOT provided support, as indicated in Table 8. Their contribution has been to provide access to both the PNB work site and to relevant DOT engineering personnel.

The project also reached out to New England DOTs to identify the use of carbon fiber cables/strands in civil infrastructure in their states. Responses were received from Professor Mandar Dewoolkar of University of Vermont, and Dr. Emily Parkany, Jim Wild, and James Lacroix of the Vermont Agency of Transportation.

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			

Changes:

The schedule will be 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:

- Development of a safety protocol for performing bridge site visits while ensuring the safety of personnel.
- Continue to obtain continuous data from different stay anchorage locations at the PNB site.
- Complete background research on wireless data acquisition (DAQ) options.
- Select environmental sensors for external environment monitoring at the PNB site.
- Continue developing the online interface for the DAQ system.
- Purchase wireless DAQ hardware.
- Use the existing analytical model to process existing continuous data sets from prior years.
- Continue using existing analytical model to process continuous data sets as they are acquired.

- Continue with the literature review on the use of carbon fiber composite cables/rods in civil infrastructure.
- Complete a final draft of the literature review.