Quarterly Progress Report:
Project Number and Title: C3. Condition Assessment of Corroded Prestressed Concrete Bridge Girders
Research Area: Thrust #1: Transportation Infrastructure Monitoring and Assessment for Enhanced Life
PI: Tzuyang Yu (UMass Lowell)
Co-PI(s): Susan Faraji (UMass Lowell), Chang Hoon Lee and Moochul Shin (Western New England University or WNEU)
Reporting Period: 04/01/2021 ~ 06/30/2021
Submission Date: 06/23/2021

Overview:

The objective of this project is to assess the condition of corroded prestressed concrete (PC) bridge girders in New England by performing multiplysical field inspection and developing an integrated assessment framework. During the reporting period, our focus is on

- Task 2: Radar data processing at UML for predicting corrosion level in reinforced concrete (RC) cylinders, and
- Tasks 2 & 3: Experimental data collection at WNEU for calibrating a corrosion model for RC structures.

These tasks will help us to correlate non-contact electromagnetic/radar images with mechanical strength reduction of corroded RC structures.

In the last quarter, we have further processed synthetic aperture radar (SAR) images for corrosion level estimation at UML and built a new corrosion chamber in which multiple specimens an be simultaneously tested at WNEU. Figure 1 shows the RC cylinder specimens used for SAR imaging at UML. Figure 2 illustrates the new corrosion chamber built at WNEU.

Table 1: Task Progress

Task Number	Start Date	End Date	% Complete
Task 1:	3/1/19	9/31/19	100%
Task 2:	9/1/19	9/31/21	92%
Task 3:	10/1/19	9/31/21	67%
Overall Project:	6/1/19	9/31/21	86%

Table 2: Budget Progress

Project Budget	Spend – Project to Date	% Project to Date*
$89,403 (UML)	$84,932 (UML)	95% (6/30/2021)
$85,000 (WNEU)	$67,800.91(WNEU)	79.8% (6/30/2021)

Include the date the budget is current to.

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

Title	Event	Type	Location	Date(s)

Table 4: Publications and Submitted Papers and Reports

Type	Title	Citation	Date	Status

Fig. 1: *Intact (0% corrosion) RC cylinder (left) and fully corroded (100% corrosion) RC cylinder (right)*

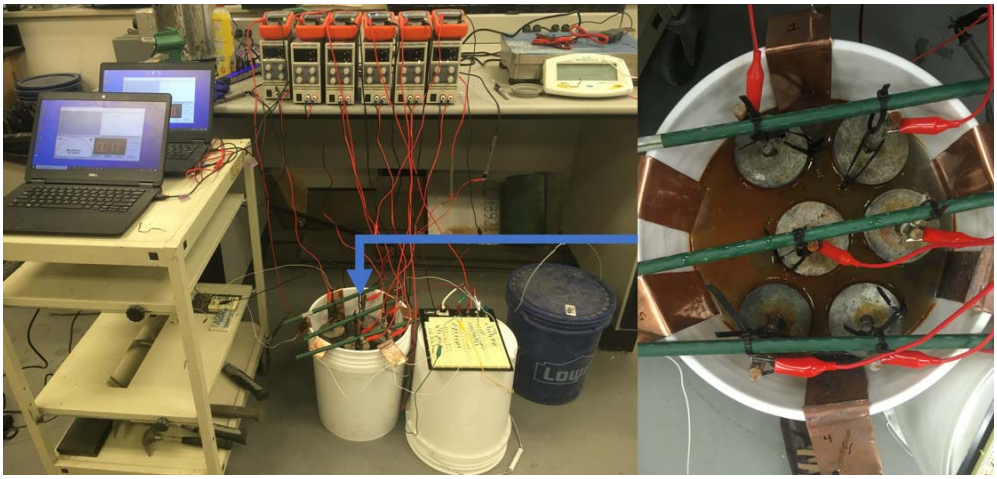

Fig. 2: *New accelerated corrosion chamber for testing multiple specimens*

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**
Tzuyang Yu	tzuyang_yu @uml.edu	Civil and Environmental Engineering	Project principle investigator and Institutional Lead at UML; overseeing all projects and working on radar imaging and interpretation
Susan Faraji	susan_faraji @uml.edu	Civil and Environmental Engineering	Structural analysis and design of bridge girders
Chang Hoon Lee	changhoon.lee@wne.edu	Civil & Environmental Engineering	Development of degradation model and design concrete for pull out test specimen.
Moochul Shin	moochul.shin@wne.edu	Civil and Environmental Engineering	Data analysis of the pull-out test results.

Table 6: Student Participants during the reporting period				
Student Name	**Email Address**	**Class**	**Major**	**Role in research**
Harsh Gandhi		Doctoral	Civil and Environmental Engineering	Manufacturing of laboratory specimens, laboratory radar imaging

Ronan Bates		Senior	Civil and Environmental Engineering	Manufacturing of laboratory specimens, laboratory radar imaging
Andrew Masullo		Senior	Civil and Environmental Engineering	Construction of Corrosion Chamber.
Cameron Cox		Senior	Civil and Environmental Engineering	Construction of Corrosion Chamber.
Jacob Eberli		Senior	Civil and Environmental Engineering	Construction of Corrosion Chamber.
Tyler Yesu		Junior	Civil and Environmental Engineering	Construction of Corrosion Chamber.
Daniel Doyle		Junior	Civil and Environmental Engineering	Construction of Corrosion Chamber.
Christa Cicerone		Sophomore	Civil and Environmental Engineering	Construction of Corrosion Chamber.
Archer Parker		Sophomore	Civil and Environmental Engineering	Construction of Corrosion Chamber.
Brian LeClair		Sophomore	Civil and Environmental Engineering	Construction of Corrosion Chamber.
Adam Garstka		Freshmen	Civil and Environmental Engineering	Construction of Corrosion Chamber

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
Ronan Bates	Preparation of specimens	B.S. in CEE at UML	05/12/2021
Cameron Cox	Preparation of specimens	B.S. in CEE at WNEU	05/14/2021
Andrew Masullo	Preparation of specimens	B.S. in CEE at WNEU	05/14/2021
Jacob Eberli	Preparation of specimens	B.S. in CEE at WNEU	05/14/2021

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
Massachusetts Department of Transportation (MassDOT)	Boston, Massachusetts				X	X
City of Lowell	Lowell, Massachusetts			X	X	X
LeHigh Cement Company	Glen Falls, NY		X			

Table 9: Other Collaborators			
Collaborator Name and Title	**Contact Information**	**Organization and Department**	**Contribution to Research**
			(i.e. Technical Champion)

Name: Gregory Krikokis
Title: Bridge engineer
Organization: MassDOT
Location (City & State): Boston, MA
Email Address:

Changes:

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

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

Planned Activities:

Description of future activities over the coming months.