Quarterly Progress Report:
Project Number and Title: 2.5 - Development and Testing of High / Ultra-High Early Strength Concrete for durable Bridge Components and Connections
Research Area New materials for longevity and constructability
PI: Kay Wille, Ph.D., Associate Professor, University of Connecticut, Department of Civil & Environmental Engineering, Storrs, CT
Co-PI Ramesh Malla, Ph.D., F. ASCE, Professor, University of Connecticut, Department of Civil & Environmental Engineering, Storrs, CT
Reporting Period: 03/31/2019– 06/30/2020
Submission Date: 06/30/2020

Overview: (Please answer each question individually)

- Emphasis has been placed on preliminary mixes.
- Setting up test equipment and machines for compression, fiber pullout test and direct tensile test.

Provide context as to how these activities are helping achieve the overarching goal(s) of the project…
The research has been progressed towards preliminary concrete mixes using a resonance frequency mixer. These mixes are based upon locally available materials in the New England area. This is an essential steps towards the goal of this project to develop a non-proprietary cost-efficient UHPC for the New England area. The preliminary results are promising and confirm that we are heading in the right direction. A few promising mixes have been identified so far based on the spread and compression strength values. The research will be continued by investigating other parameters such as fiber pullout strength and direct tension behavior.

Describe any accomplishments achieved under the project goals…
The most important accomplishment is that we did several preliminary concrete mixtures, investigated some basic parameters such as spread of fresh concrete, density and compressive strength of the hardened concrete at 28 days. Other than that, we are setting up the test equipment for compression test especially for concrete cubes, fiber pullout test, and direct tension test. The consequences of COVID19 significantly set back our research activities and continues to impact us in our efficiency to carry out lab experiments and having fruitful in person discussions.

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	Start Date	End Date	% Complete
Task 1: Literature review	01/01/2019	01/01/2021	70%
Task 2: Testing and Investigating the Performance of current HES	03/01/2019	01/01/2021	100%
Task 3: Developing the next generation of HES mixture designs (Shifting towards New England UHPC)	01/01/2020	01/01/2021	15%
Task 4: Knowledge transfer and practical application	12/01/2019	05/31/2021	5%
Overall Project:	*Enter Actual Start*	*Enter Planned/Actual End*	

Table 2: Budget Progress		
Project Budget	**Spend – Project to Date**	**% Project to Date***

Include the date the budget is current to.** **Information in Table 2 is to be determined.

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

Due to COVID19 the lab has been shut down for the majority of the time and graduate student activities were shifted to virtual activities, such as writing reports, analyzing data, preparing presentations and literature research. The following undergraduate students, previously involved in this research, had to take a break with the lab activities and are not allowed to return to the lab until the end of summer. This includes Cydney-Alexis Delarosa, Bradley Kelle, Ethan Beattie, Jeet Rosa and Alex Distelman. This significantly impacts the lab activities. On June 1st the concrete lab was re-opened under strict COVID19 measures. Christopher Boisvert-Cotulio, graduate student in the master degree program, continued to support the research activities.

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)**
Fiber Efficiency for the Non-Proprietary Ultra High Performance Concrete (UHPC) – planned to be submitted to TIDC – unfortunately due to COVID19 all supporting data and letters of support were not obtained in time	N/A	Proposal	N/A	Planned submission day: 06/15/2020
Meeting with Robert Lauzen, John Giannini and Carrington J Klopfer from ConnDOT	Update and discussion of research project		webEx – virtual meeting	6/19/2020

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

Encouraged to add figures that may be useful (especially for the website)…

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**
Kay Wille, Ph.D., Associate Professor	Kay.wille@uconn.edu	Civil Engineering	Principal Investigator
Ramesh Malla, Ph.D., F. ASCE, Professor	Ramesh.malla@uconn.edu	Civil Engineering	Co- 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**
Christopher Boisvert-Cotulio		Master Student	Civil Engineering	Grad-RA
Alex Distelman		Undergraduate-Junior	Material Science	Undergrad-RA
Jeet Rosa		Undergraduate-Junior	Material Science	Undergrad-RA
Ethan Beattie		Undergraduate-Junior	Material Science	Undergrad-RA
Bradley Kelle		Undergraduate-Junior	Civil Engineering	Undergrad-RA
Cydney Alexis		Undergraduate-Junior	Biomedical Engineering	Undergrad-RA

Use the table below to list any students who worked on this project and graduated during this reporting period.

Student Name	**Role in Research**	**Degree**	**Graduation Date**
Bijaya Rai	Leading the research works	Ph.D.	TBD

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

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**
Connecticut Department of Transportation	Division of Material Testing, Central Laboratory	NO	Providing of tests data			

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.
Not applicable at this time.

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.)
No contacts have been made this time. All the materials that have been gathered before the lock down are currently being used.

Who is the Technical Champion for this project?
Name: Mary Baker
Title:
Organization: Connecticut DOT
Location (City & State): Newington, CT
Email Address: Mary.Baker@ct.gov

Changes:

Discuss any actual or anticipated problems or delays and actions or plans to resolve them…
Research work was paused because of the COVID19 pandemic from mid of March until last week of May. The university had been locked down including the advanced cementitious materials, composites (ACMC) lab, and the structural lab at UConn during that period. Significant time and effort had been invested to develop a safety plan and implement COVID19 measure to be able to re-open the lab on June 1st. This has highly impacted the ongoing research projects and continues to have a significant impact since undergraduate students are not allowed to support the research activities in the lab.

Discuss any changes in approach and the reasons for the change…
Research activities had been shifted towards addressing the consequences due to the COVID19 pandemic.

Planned Activities:

Description of future activities over the coming months.
Right now, the research is mainly focused on developing the preliminary concrete mixes. Therefore, other planned activities include as follows:

- Characterizing the pull out behavior of various fibers embedded in UHPC
- Continue investigating the workability of various UHPC
- Continue obtaining locally available materials for developing a Connecticut UHPC