Quarterly Progress and Performance Indicators Report:
Project Number and Title: C9.2019: A new method of determining payment for in-place concrete with double-bounded compressive strength pay factors
Research Area: Thrust 3: New systems for longevity and constructability
PI: James L. Sullivan, UVM Transportation Research Center
Co-PI(s): David C. Novak, UVM Grossman School of Business
Eric Hernandez, UVM College of Engineering and Mathematical Sciences
Reporting Period: 1/1/2022 - 3/31/2022
Submission Date: March 25, 2022

Overview:

*Provide **BRIEF** highlights of activities performed during the reporting period.*

- The final project report was completed during this reporting period, but it has not been published yet
- A journal article was completed during this reporting period, but it has not been submitted for publication yet

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.

- The final project report will advance the technology transfer goals of the project once published.
- The journal article will advance the technology transfer goals of the project once published.

Accomplishments:

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

- The MS Excel tool that is needed to put the new approach into practice is complete and ready to use.

Task, Milestone, and Budget Progress:

Complete the following tables to document the work toward each task and budget

Table 1: Task Progress			
Task Number	**Start Date**	**End Date**	**% Complete**
Task 1:	October 1, 2020	March 31, 2021	100
Task 2:	April 1, 2021	September 30, 2021	100
Task 3:	October 1, 2021	March 31, 2022	100
Reporting:	January 1, 2022	March 31, 2022	100
Overall Project:	October 1, 2020	March 31, 2022	100

Table 2: Milestone Progress			
Milestone #: Description	**Corresponding Deliverable**	**Start Date**	**End Date**
Milestone 1: N/A			
Milestone 2:			
Milestone 3:			
Milestone 4:			
Milestone 5:			
Milestone 6:			
Milestone 7:			
Milestone 8:			
etc.			

Table 3: Budget Progress		
Project Budget	**Spend – Project to Date**	**% Project to Date***
$166k	$166k	100%

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.)*

Education and Workforce Development:

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

1. Did you provide any workforce development or training opportunities to transportation professionals (already in the field)? If so, what was the training? When was it offered? How many people attended?
   N/A

2. Did you hold meetings with any transportation industry organizations or DOTs? If so, what was the meeting's purpose? When was it offered? How many people attended?
   N/A

3. Did you host/participant in any K-12 education outreach activities? If so, what was the activity? What was the target age/grade level of the participants? How many students/teachers attended? When was the activity held?
   N/A

Technology Transfer:

Complete all of the tables below and provide additional information where requested.

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 4: Presentations at Conferences, Workshops, Seminars, and Other Events

Title	Event	Type	Location	Date(s)
Double-bounded compressive strength pay factors for determining payment of in-place concrete	2020 VTrans Research and Innovation Symposium	Symposium	Virtual	September 9, 2020
A new method of determining payment for in-place concrete with double-bounded compressive strength pay factors	2021 VTrans Research and Innovation Symposium	Symposium	Virtual	September 8-9, 2021

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 5: Submitted/Accepted Publications, Technical Reports, Theses, Dissertations, Papers, and Reports				
Type	**Title**	**Citation**	**Date**	**Status**
i.e. Peer-reviewed journal, conference paper, book, policy paper, magazine/newspaper article	Publication title	Full citation		i.e. Submitted, accepted, under review (by org. submitted to)
N/A	N/A	N/A	N/A	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 is 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? N/A

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. Did industry organizations or DOTs provide cost-share (cash or in-kind) to your research during the reporting period? Who was the organization? Please provide an in-kind support invoice from the organization with your report (this is kept confidential and used for record keeping purposes only). N/A

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:

N/A

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:

N/A

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:

N/A

Participants and Collaborators:

Use the table below to list individuals (compensated or not) who have worked on the project other than students.

Table 6: Active Principal Investigators, faculty, administrators, and Management Team Members

Individual Name	Email Address	Department	Role in Research
James L. Sullivan	james.sullivan@uvm.edu	Transportation Research Center	Primary analyst & principal investigator
David C. Novak	david.novak@uvm.edu	Grossman School of Business	Technical advisor & co-principal investigator
Eric Hernandez	eric.hernandez@uvm.edu	College of Engineering and Mathematical Sciences	Technical advisor & co-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 7: Student Participants during the reporting period				
Student Name	**Email Address**	**Class**	**Major**	**Role in research**
James L. Sullivan		Ph.D.	Civil Engineering	Primary analyst & principal investigator

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 during the reporting period (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 8: 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	N/A	N/A	N/A

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

Table 9: 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	N/A	N/A	N/A

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

Table 10: Research Project Collaborators during the reporting period						
Organization	**Location**	**Contribution to the Project**				
		Financial Support	**In-Kind Support**	**Facilities**	**Collaborative Research**	**Personnel Exchanges**
Vermont Agency of Transportation, Materials & Certification Section	Barre, Vermont		X			

*Use the table below to list **individuals** that have been involved as partners on this project and their contribution to the project during the reporting period. (**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 11: Other Collaborators			
Collaborator Name and Title	**Contact Information**	**Organization and Department**	**Contribution to Research**
Nicholas Van Den Berg, Materials & Certification Manager		VTrans Materials & Certification Section (Construction & Materials Bureau)	Technical Champion

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

Table 12: Course List						
Course Code	**Course Title**	**Level**	**University**	**Professor**	**Semester**	**# of Students**
i.e. CE 123		Grad or undergrad?	Where was the course taught?	Who taught the course?	Enter Spring, Fall, Summer, Winter and the year	How many students were enrolled in the class?
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Changes:

*List any actual or anticipated problems or delays and actions or plans to resolve them (list no-cost extension requests here)…*None
*List any changes in approach and the reasons for the change…*None

Planned Activities:

List the activities planned during the next quarter.

- We also plan to convene the final meeting of the project TAC in the next quarter.