

Quarterly Progress 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: 10/1/2020 - 12/31/2020

Submission Date: December 23, 2020

Overview: (Please answer each question individually)

Provide **BRIEF** overview and summary of activities performed during the reporting period.

A kickoff meeting for the project was held with the project TAC, including the UVM PIs, the VTrans Technical Champion, the VTrans Research Section, and the TIDC Project Manager, on October 7, 2020. Task 1 of the project scope was substantially completed during this reporting period. A new approach for calculating percent within limits (PWL) from a sample was developed. The new approach takes the parameters and type of a target probability distribution function (PDF) as inputs, and calculates a PWL for as few as one sample using Bayesian updating. The PWL is calculated by the fraction of the PDF suggested by the sample that falls within the target PDF.

Provide context as to how these activities are helping achieve the overarching goal(s) of the project...

Task 1 was the technical approach for the project, so it was critical to complete it first. The second and third tasks will utilize the new approach.

Describe any accomplishments achieved under the project goals...

The core technical analysis and code development needed to achieve the first project objective was completed. The first objective of the research is to:

- I. Develop a new method of enforcing pay factors for payment of in-place CCS that does not rely on the assumption of symmetry implied by the Gaussian distribution for the industry response, and allows for the use of an asymmetrical set of pay factors

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	90
Task 2:	April 1, 2021	September 30, 2021	0
Task 3:	October 1, 2021	March 31, 2022	0
Reporting	January 1, 2022	March 31, 2022	10
Overall Project:	October 1, 2020	March 31, 2022	30

Table 2: Budget Progress		
Project Budget	Spend – Project to Date	% Project to Date*
\$166k	\$48k	29

Describe any opportunities for training/professional development that have been provided...None

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)
Presentation title	Name of event (i.e. TIDC 1 st Annual Conference)	i.e. Conference, Symposium, Seminar,		

Table 4: Publications and Submitted Papers and Reports				
Type	Title	Citation	Date	Status
i.e. Peer-reviewed journal, conference paper, book, policy paper	Publication title	Full citation		I.e. Submitted, accepted, under review

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
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. (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
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 during this reporting period.

Table 7: Student Graduates

Student Name	Role in Research	Degree	Graduation Date

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
Vermont Agency of Transportation, Materials & Certification Section	Barre, Vermont		X			

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.

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.)

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

Who is the Technical Champion for this project?

Name: Nicholas Van Den Berg,

Title: Materials & Certification Manager

Organization: VTrans Materials & Certification Section (Construction & Materials Bureau)

Location: Barre, Vermont

Email: Nick.VanDenBerg@vermont.gov

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:

We plan to begin work on Tasks 2 and 3 concurrently in the next quarter.

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