

Quarterly Progress Report:

Project Number and Title: 3.6 Recycling Infrastructure Assets and Reduction of Transportation System Greenhouse Gas Emissions

Research Area: Thrust 3 New Systems for Longevity and Constructability

PI: *Natacha Thomas, University of Rhode Island*

Co-PI(s): *K. Wayne Lee, University of Rhode Island*

Reporting Period: 9/1/19 to 12/31/19

Submission Date: 12/27/19

Overview: (Please answer each question individually)

A final software product was selected for the analysis, i.e., “LCA Pavement.” The Canadian software was found to be flexible enough to accommodate new and tailored data. In addition, it is free of charge. There exists an extensive library of demonstration videos for the product, which makes handling the software very easy. There also exist sample projects loaded for this software with some revealing as highly relevant to the project. Foremost, as a software product tailored for pavement rather than just any product, the overwhelming majority of the data and data collection templates encompassed are highly relevant to the project conduct.

A team of undergraduate students, Alex Appolonia and Tam Tram, is in the process of collecting data from Rhode Island Department of Transportation (RIDOT) for an initial software run. Dr. Kate Wilson will be their contact person at RIDOT. Dr. Wilson anticipates pointing the students to the right reports or data sources, thereby enabling their data acquisition efforts. Two sections of Highway 165 are targeted for the initial runs. To facilitate data collection, the students are designing a form that summarizes the data that is absolutely necessary to study conduct. For a large variety of data entries default values will be used at first. Sensitivity analyses of initial run outputs to these default values will further help sort out those for which to pursue actual project values.

A graduate student, Ali Joubani in the meanwhile is looking into the possibility and the need to update the dataset utilized by LCA Pavement in its environmental derivations to possibly enhance its regional relevance. The possibilities for modifying the actual models utilized in the derivations will also be investigated. The inspiration for the model modifications will be obtained from “*Hybrid Input-Output Life Cycle Assessment of Warm Mix Asphalt Mixtures,*” by Rodriguez-Alloza, Malik, Lenzen and Gallego, 2015. Purely regional data sources will be collected and compared with those within model. This effort should result in a hybrid model much suited to study conduct.

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

Software selection is germane to study conduct and the determination of optimal software pavement designs that maximize performance while minimizing environmental footprint and overall project cost.

Describe any accomplishments achieved under the project goals...

The study team rejoices over the selection of software adequate for study conduct, albeit still eyeing its modification. And also rejoices over the derivation of an approach to weed out of the data collection effort the variables that may not be highly significant. It further looks forward to the derivation by the undergraduate students of a data collection form, be it a survey instrument or of another nature.

Complete the following tables to document the work toward each task and budget (add rows/remove rows as needed)...

Table 1: Task Progress			
Task Number	Start Date	End Date	Percent Complete
Task 1:	7/1/18	12/31/18	95%
Task 2:	1/1/19	6/30/19	75%
Task 3:	7/1/19	10/31/19	50%
Task 4:	11/1/19	2/29/20	10%
Task 5:	3/1/20	6/30/20	0%
Task 6:	7/1/20	9/30/20	0%

Table 2: Budget Progress		
Entire Project Budget	Spend Amount	Spend Percentage to Date
\$250,169	\$125,000	50%

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

Two undergraduate students are being given the opportunity to learn about pavement systems, their designs and sustainability. Within the They are also extended the opportunity to work during the semester break at RIDOT and under experienced supervision. A graduate student as well is being trained in assessing the performance of various asphalt pavement systems under Dr. Lee.

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)
New Pavement Systems for Sustainability	32 nd Rhode Island Transportation Forum	Conference	URI	10/25/2019

Table 4: Publications and Submitted Papers and Reports				
Type	Title	Citation	Date	Status
N/A				

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
Natacha Thomas	thomas@uri.edu	Civil and Environmental Engineering	Principal Investigator
K. Wayne Lee	leekw@uri.edu	Civil and Environmental Engineering	Co-Principal Investigator

Use the table below to list all students who have participated in the project.

Table 6: Student Participants during the reporting period				
Student Name	Email Address	Class	Major	Role in research
Appy Appolonia	_____	Senior	Civil and	Independent Study
Tam Tram	_____	Senior	Environmental	Independent Study
Ali Sharai	_____	PHD	Engineering	Part-time Researcher

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
N/A			

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
Dr. Kate Wilson	RIDOT				X	
Dr. Wilfred Hernandez	FHWA – RI Division				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.

N/A

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).

N/A

Changes:

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

None anticipated

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

Staying the course with the utilization of volunteer labor, undergraduate students keen on being part of a research effort for credit.

Planned Activities:

Upon completing the initial runs for RIDOT sections, the study team intends to utilize the derive instruments to collect data for other regional DOTs. Sustainable optimized mix and or pavement system designs are sure to float from comparisons of the regional sections analyzed.

Reference:

Rodriguez-Alloza; A. M., Malik; A; Lenzen, M; and J. Gallego, “Hybrid Input-Output Life Cycle Assessment of Warm Mix Asphalt Mixtures” 2015, Journal of Cleaner Production 90, pp 171 – 182.