

Quarterly Progress and Performance Indicators Report:

Project Number and Title: 3.15 Nonstructural Approaches to Reduce Pollutant Runoff in Urbanized Areas

Research Area: Thrust 3: New Systems For Longevity and Constructability

PI: Vinka Oyanedel-Craver; University of Rhode Island

Co-PI(s): Joseph Goodwill; University of Rhode Island

Reporting Period: 10/1/2021-12/31/2021

Submission Date: 12/31/21

*****IMPORTANT: Please fill out each section fully and reply with N/A for questions/sections with nothing to report. For ease of reporting to the USDOT, please do not remove, or change the order of, any sections/text. You may remove/add each rows in tables as needed. Thank you! *****
The report is due on the last day of the reporting period in .doc format to tidc@maine.edu.

Overview:

Provide **BRIEF** highlights of activities performed during the reporting period. This summary should be written in lay terms for a general audience to understand. This should not be an extensive write up of findings (those are to be included in the final report), but a high-level overview of the activities conducted during the last three months **no more than 3 bullet points at no more than 1 sentence each**

- Ongoing literature review.
- Method development for analysis of physical and chemical characteristics of pollutant loads, and selection of testing equipment
- Development of street sweeping optimization model.

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.

- Learning from previous studies gives us insight on how to best conduct our experiment.
- Ongoing method development gives us an opportunity to prepare analytical equipment and plan logistics to allow for a seamless experiment.
- The street sweeping optimization model will determine the optimal schedule for sweeping event to maximize pollution removed.

Accomplishments:

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

- Literature review in progress
- Framework of methodology map
- Working simplified optimization model

Task, Milestone, and Budget Progress:

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: Title	Start Date	End Date	% Complete
Task 1.1: Literature review	9/1/2021	12/31/2021	55%
Task 1.2: Identification of sampling locations	11/1/2021	3/1/2022	5%
Task 1.3: Methodology Design	10/15/21	12/31/21	50%
Task 2.1: Sampling preparation and testing	10/1/2021	3/1/2022	0%
Task 2.2: Analytical equipment preparation and testing	10/1/2021	3/1/2022	0%
Task 2.3: Site preparation and dry runs	3/1/2021	3/31/2022	0%
Task 3.1: Field sampling	3/15/2021	7/30/2023	0%
Task 3.2: Cost/Benefit analysis	12/1/2022	9/1/2023	0%
Task 3.3: Improved guidelines for street sweeping	12/1/2022	9/1/2023	0%
Phase 1 Overall	9/1/2021	3/1/2022	36%
Phase 2 Overall	10/1/2021	3/31/2022	0%
Phase 3 Overall	3/15/2022	9/1/2023	0%

Table 3: Budget Progress		
Project Budget	Spend – Project to Date	% Project to Date (include the date)
\$74,827	\$17,049	23%
\$112,240	Enter Phase 2 Full Spend Amount (Federal + Cost Share)	Enter Phase 2 % Spent
\$187,066	Enter Phase 3 Full Spend Amount (Federal + Cost Share)	Enter Phase 3 % Spent

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? (i.e. The research team provided an in the field training for the SAR technology for 3 maintenance crew members of the MassDOT on 3/31/2021. The members learned how to use the technology and interrupt the data.)*

The URI Analytical Core held training hosted by experts from Shimadzu on the HPLC, GCMS, and ICP-MS analytical instruments. HPLC training was on 11/4/21, GCMS training was on 12/7/21 and 12/8/21, and the ICP-MS training was on 12/14/21. In each training session, 4 URI students attended and learned how to prepare samples, operate the instrument, and interpret the data.

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? (i.e. The research team held a meeting with MaineDOT to update them on the progress of the research findings and how the findings can be implemented on 3/31/2021. 15 DOT maintenance members were present at the meeting.)*

The URI research team held a meeting with RIDOT on 11/18/21. This was the first meeting including graduate student Andrew Sheering, so it served as an introduction to him to the team members as well as an update on the progress of the research findings. We also discussed the next steps and some information that we need to gather. 2 RIDOT members attended the meeting.

3. *Did you host/participate 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? (i.e. 25 8th graders and 2 teachers visited the concrete lab and created small concrete trinkets like Legos on 3/31/2021. They learned about the different types of fibers that can be used in the concrete.)*

N/A

Technology Transfer:

Complete all of the tables below and provide additional information where requested. Please provide ALL requested information as this is one of the most important sections for reporting to the USDOT. **ONLY provide information relevant to this reporting period.**

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

Type	Title	Citation	Event & Intended Audience	Location	Date(s)
N/A					

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
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 it 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

Please add figures/images that can be included on the website and/or in marketing/social media materials to further clarify your research to the general public. This is very important to our Technology Transfer initiatives.

Insert figures here

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:

- Street sweeping optimization model was developed using python. The output of the model is to choose an optimal street sweeping schedule to maximize pollution removed. Although the current model is simplistic, it will serve as a framework for street sweeping decision making once more complex variables are introduced.

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:

- The street sweeping optimization model successful development is promising to choose and optimal schedule given its parameters. It has not yet been introduced into the field, but with further model development, we believe it will be a useful tool for street sweeping decision making.

Participants and Collaborators:

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

Table 5: Active Principal Investigators, faculty, administrators, and Management Team Members

Individual Name & Title	Dates involved	Email Address	Department	Role in Research
Dr. Vinka Oyanedel-Craver	10/1/21 – 12/31/21	craver@uri.edu	Civil and Environmental Engineering	PI
Dr. Joseph Goodwill	10/1/21 – 12/31/21	goodwill@uri.edu	Civil and Environmental Engineering	Co-PI
Andrew Sheerin	10/1/21 – 12/31/21	andrew_sheerin@uri.edu	Civil and Environmental Engineering	Graduate Research Assistant

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	Start Date	End Date	Advisor	Email Address	Level	Major	Funding Source	Role in research
Andrew Sheerin	10/1/21	12/31/21	Dr. Craver/ Dr. Goodwill		Master	Civil and Environmental Engineering	TIDC, URI	Literature review; methodology development; optimization model

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			

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			

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
RIDOT	Providence, RI					Progress update meeting, online exchanges, access to GIS database

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	Date(s) Involved	Contribution to Research
Steven Kowaleswki	sjkowalewski@shimadzu.com	Shimadzu	11/4/21	Training on HPLC
Arto Nyman	aknyman@shimadzu.com	Shimadzu	12/7/21 – 12/8/21	Training on GCMS
Brian Weitze	bcweitze@shimadzu.com	Shimadzu	12/14/21	Training on ICP-MS

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
N/A						

Changes:

List any actual or anticipated problems or delays and actions or plans to resolve them (list no-cost extension requests here)...

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

Planned Activities:

List the activities planned during the next quarter.

- Continue literature review
- Analyze stormwater GIS database to select sampling locations
- Continue development of street sweeping optimization model
- Practice use of analytical equipment (HPLC, GCMS, ICP-MS)
- Prepare autosampler equipment
- Perform dry runs to test equipment and dial in lab procedures