Quarterly Progress and Performance Indicators Report:
Project Number and Title: 4-10- Road Salt Impact Assessment (Safety Study)
Research Area: Thrust Area 4
PI: Jonathan Rubin, Ph.D., Professor, University of Maine
Co-PI: Mohammadali Shirazi, Ph.D., Assistant Professor, University of Maine
Reporting Period: 1/1/2022 to 3/31/2022
Submission Date: 3/31/2022

Overview:

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

- We finalized crash severity models for four facility types: minor collectors, major collectors, minor arterials, and Interstates.
- We drafted and submitted a journal paper based on our results.
- We worked on drafting the report.

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.

- We finalized the results related to the odds of crash severities based on different factors
- We documented the results and shared them with the DOT.

Accomplishments:

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

- We finalized the crash severity models.
- A paper on crash severity was drafted and submitted for publication.
- We documented our results and shared that with Maine DOT

Task, Milestone, and Budget Progress:

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

Table 1: Task Progress*			
Task Number: Title*	**Start Date**	**End Date**	**% Complete**
1. Literature Review	08/15/2020	12/31/2020	100%
2. Data Collection	08/15/2020	12/31/2020	100%
3. Statistical Analysis	01/01/2021	10/31/2021	100%
4. Hotspots (cost of crashes)	10/15/2021	11/15/2021	100%
5. Final Report	11/15/2021	12/31/2021	80%
Overall Project:	08/15/2020	12/31/2021	90%

Table 2: Milestone Progress			
Milestone #: Description	**Corresponding Deliverable**	**Start Date**	**End Date**
1. Literature Review	Brief Summary of literature review	08/15/2020	12/31/2020
2. Data Collection	Brief summary about the data collection process	08/15/2020	12/31/2020
3. Statistical Analysis	Brief summary about the statistical analysis results	01/01/2021	10/31/2021
4. Hotspots (cost of crashes)	Brief summary about the hotspots	10/15/2021	11/15/2021
5. Final Report	Final Report	11/15/2021	12/31/2021 (delayed)

Table 3: Budget Progress*		
Project Budget*	**Spend – Project to Date**	**% Project to Date (include the date)**
$170,072.14	$57,945	34.07%

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.)

   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? (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.)

- We met with DOT in January (met with the Technical Champion) and in March (with 4 people from DOT) to discuss the results. We shared our papers and report with DOT and asked for their comments.

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? (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.

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	N/A	N/A	N/A	N/A	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
Journal	Exploring the Impact of Seasonal Weather Factors on Frequency of Rural Lane Departure Crashes in Maine	Sawtelle, A, Shirazi M, Garder, P, and Rubin, J (2022)	3/31/2022	Under review (Major revision)
Journal	Driver, Roadway and Weather Factors on Severity of Lane Departure Crashes in Maine	Sawtelle, A, Shirazi M, Garder, P, and Rubin, J (2022)	3/31/2022	Under review (Major revision)

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).

- This research supports a project from Maine DOT (road salt assessment). The budget from that project was used a cost share.

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:

- No changes in policies, etc., but our results can provide safety analysts and practitioners at Maine DOT insights about factors that influence the severity of crashes in Maine at different facilities. These results can help the state in providing improved maintenance strategies, or enhance safety using proper safety countermeasures, or increase awareness across the state.

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:

- No specific changes in policies, etc., but the outcomes of this study can provide insights to the safety analysts and practitioners at the department of transportation in Maine to better understand the factors impacting crash severities in Maine, at four rural facility types (i.e., minor collectors, major collectors, minor arterials, principal arterials- Interstates), to allocate necessary funds or develop countermeasures or improve safety across the state.

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 & Title	Dates involved	Email Address	Department	Role in Research
Dr. Jonathan Rubin	08/15/2020	rubinj@maine.edu	School of Economics	PI
Dr. Mohamamdali Shirazi	08/15/2020	shirazi@maine.edu	Civil and Environmental Engineering	Co-PI

*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**
Alainie Sawtelle	9/1/2020		Dr. Shirazi		Master Student	Civil Engineering (Transportation)	TIDC	Graduate Research Assistant

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**
Maine Department of Transportation (Maine DOT)	Augusta, ME	X			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	Date(s) Involved	Contribution to Research
Mr. Robert A Skehan		Maine DOT	08/ 15/ 2020	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
CE 225	Transportation Engineering	Undergrad	UMaine	Dr. Shirazi	Spring 2022	56
CIE 598	Advanced Transportation Planning	Grad	UMaine	Dr. Shirazi	Spring 2022	5

Changes:

- N/A

Planned Activities:

- Finalizing the report.