Quarterly Progress and Performance Indicators Report:
Project Number and Title: Road Salt Impact Assessment (Safety Study)
Research Area: Thrust Area 4
PI: Jonathan Rubin, Ph.D., Professor, University of Maine
Co-PI(s): Mohammadali Shirazi, Ph.D., Assistant Professor, University of Maine
Reporting Period: 7/1/2021 to 9/30/2021
Submission Date: 9/30/2021

******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** ….*

- The research team finalized models developed to understand the impact of contributing weather factors on frequency of lane departure crashes.
- The research team continued modeling crash severities.
- Currently the research team is working on analyzing, interpreting, improving and editing the results of severity models.

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.

- Using crash frequency models, we can understand the relationship between the frequency of lane departure crashes and different weather factors.
- Using crash severity models, we can understand the impact of driver, roadway, and weather factors on severity of crashes.
- We documented part of the results in a research paper.

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

- We finalized the frequency models in Task 3.
- We also developed initial severity models in Task 3.
- Overall, 85% of Task 3 is completed.

Task Progress and Budget:

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	08/15/2020	12/31/2020	95%
Task 2	08/15/2020	12/31/2020	95%
Task 3	01/01/2021	10/31/2021	85%
Task 4	10/15/2021	11/15/2021	20%
Task 5	11/15/2021	12/31/2021	50%
Overall Project:	08/15/2020	12/31/2021	80%

*This table revised to reflect the no cost extension.

Table 2: Budget Progress		
Project Budget	**Spend – Project to Date**	**% Project to Date (include the date)**
Enter Phase 1 Full Budget	$66,435.14*	

*This table revised to reflect the no cost extension.

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.)*

Professional Development/Training Opportunities:

Describe any opportunities for training/professional development that have been provided. Did you provide a training to a State DOT/AOT or industry organization? What was the training? When was it offered? How many people attended? Did you meet with a State DOT/AOT or industry organization to inform them of your findings and how these findings could help their organization? When? How many attended the meeting?

- *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 3: Presentations at Conferences, Workshops, Seminars, and Other Events

Type	Title	Citation	Event	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 4: Publications and Submitted 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 (2021)	8/15/2021	Under review.
Conference	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 (2021)	7/31/2021	Under review.

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. Were any industrial contracts awarded base on furthering planned research and development activities as a result of findings from this work? If so, when? How much was awarded? Who awarded the contract?
   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.

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:

- We modeled frequency and severity of lane departure crashes in Maine.

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 **all** individuals (compensated or not) who have worked on the project.*

Table 5: 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 6: 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 (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 7: 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			Please list the organization or degree

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

Table 8: 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			Please list the organization or degree

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

Table 9: 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.*
*(**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 10: Other Collaborators				
Collaborator Name and Title	**Contact Information**	**Organization and Department**	**Date(s) Involved**	**Contribution to Research**
Mr. Robert A Skehan	robert.skehan@maine.gov	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:

Table 11: Course List						
Course Code	**Course Title**	**Level**	**University**	**Professor**	**Semester**	**# of Students**
N/A						

Changes:

-Timeline was changed to reflect the no cost extension.

Planned Activities:

The research team will analyze and interpret the results of the initial severity models. We will then continue modeling the severity of lane departure crashes and finalizing the results during the next reporting period. We may consider application of mixed logit as well and compare the results with those obtained from multinomial logit. The research team will also continue with documenting, reviewing, and editing the results.