Quarterly Progress Report:
Project Number and Title: Road Salt Impact Assessment
Research Area: Thrust Area 4
PI: Jonathan Rubin, Ph.D., Professor, University of Maine
Co-PI(s): Ali Shirazi, Ph.D., Assistant Professor, University of Maine
Reporting Period: 1/1/2021 to 3/31/2021
Submission Date: 3/31/2021

Overview: (Please answer each question individually)

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

During the reporting period, the research team completed collecting, cleaning and compiling the exposure, geometric characteristics and weather data by writing multiple codes and scripts in R and GIS, and created multiple uniform datasets for further analysis. The explanatory analysis of crash and weather condition has been conducted during the reporting period. Lane departure crashes in different regions and counties were investigated. Single and multi-unit crashes were explored in different conditions. Truck crashes were also investigated. Likewise, data were investigated for different conditions such as Urban vs. rural, Wet vs. Dry surface, age of the driver and the cost of crash. Different weather variables were also collected and investigated in tables, plots, and figures.

Since February 2021, the research team is working on modeling lane departure crashes using the Negative Binomial (NB) model. Multiple panel datasets were created with necessary volume, geometric characteristics and weather data for modeling. Initial models were developed for winter (November to April) and non-winter (May to October) periods. Different roadway facility types were considered for the analysis separately such as Interstates, Major collectors, Minor Collectors and Minor Arterials. Codes were written in SAS to develop models that correlate lane departure crashes with different weather variables (controlled for volume and geometric characteristics). Different goodness of fit and statistical measures and tests are currently being used to investigate the final models. The research team also started with documenting the literature review, data, explanatory analysis and modeling results. The text is under preparation, and results will be documented, reviewed and edited in the next few months.

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

Completing the data collection task (including data cleaning and compiling) was a major and important task before starting the data analysis. Preliminary or Explanatory analysis was also an important step to understand the data before modeling. For this purpose, the research team investigated data under different conditions such as Urban vs. rural and Wet vs. Dry conditions, age of the driver and the cost of crash. Accomplishments of analysis related to this task assisted the project team to understand the pattern in data before developing the models. For traffic safety analysis, it is also important to develop statistical models that correlate traffic collision data with contributing factors such as geometric characteristics and weather variables. Since February, a major effort by the research team was focused on developing Negative Binomial regression models to understand the contributing factors in lane departure crashes in Maine.

Describe any accomplishments achieved under the project goals…

During the previous reporting period, the research team completed the data collection and cleaning. Explanatory analyses also have been done using various analyses. A major leap has also been taken in building the initial

models that correlate lane departure crashes with weather variables. Task 1 and 2 are near completion and a major part of Task 3 was also accomplished.

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	**Start Date**	**End Date**	**% Complete**
Task 1	08/15/2020	12/31/2020	90%
Task 2	08/15/2020	12/31/2020	90%
Task 3	01/01/2021	05/31/2020	50%
Task 4	06/01/2021	07/31/2021	Not Started
Task 5	08/01/2021	08/31/2021	Not Started
Overall Project:	08/15/2020	08/31/2021	50%

Table 2: Budget Progress		
Project Budget	**Spend – Project to Date**	**% Project to Date***
$66,435.14		

***Include the date the budget is current to: March 31, 2021**

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

The project team included a graduate student (a master student in Transportation Engineering) from September 2020 to assist the research team in reviewing the studies in literature, collecting data, writing codes to clean, compile and analyze data, developing statistical models and interpreting the results.

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)**
N/A				

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

<u>Participants and Collaborators:</u>

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
Dr. Jonathan Rubin	rubinj@maine.edu	School of Economics	PI
Dr. Ali Shirazi	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. (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**
Alainie Sawtelle		Master Student	Civil Engineering (Transportation)	Graduate Research Assistant

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**
Maine Department of Transportation (Maine DOT)	Augusta, ME	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.)

No new collaborators have been added

Who is the Technical Champion for this project?

Name: Mr. Robert A Skehan
Title: Director, Office of Safety

Organization: Maine Department of Transportation
Location (City & State): Augusta, ME
Email Address: robert.skehan@maine.gov

Changes:

N/A

Planned Activities:

The research team will continue with modeling the lane departure crashes during the next reporting period. The negative binomial model will be used as a primary model for the analysis. The team will use different goodness of fit and statistical tests and measures to explore the final models. The research team will also continue with documenting, reviewing and editing some of the results.