Quarterly Progress Report:
Project Number and Title: Safety Assessment of New England Roadways during the COVID-19 Pandemic
Research Area: Thrust Area 4
PI: Ali Shirazi, Ph.D., Assistant Professor, University of Maine
Reporting Period: 4/1/2021 to 6/30/2021
Submission Date: 6/30/2021

Overview: (Please answer each question individually)

Provide BRIEF overview and summary of activities performed during the reporting period.
During the previous reporting period, the research team continued the literature review. In particular several studies related to traffic speeding is currently under review. The research team explored two sources of traffic speed data for the proposed analysis. (1) Permanent count stations, and (2) data from the Streetlight Company. Both datasets were extracted for the analysis. Significant effort has been placed to download, clean, and reduce the volume, speed, and speeding data. The research team conducted different preliminary analysis to understand the change in speed (and speeding data) during the stay-at-home order in Maine. Multiple summary tables were created to observe the speed change. The speed data before and after stay-at home order were plotted and the speed distribution was analyzed using finite mixture and K-means models.

Since April 2021, the research team worked on developing speeding models. Speeding models were developed for Major Collectors and Minor Arterials using the fractional logit model. Multiple variables such as traffic volume, time of the day, time of the week, speed limit, and months of the year were used along with two dummy variables indicating the stay-at-home-order period (April and May 2020) and post stay at home order period (April and May 2021) in the model. The initial model shows significant increase in speeding percentage during the stay at home order. The model shows that even after a year, still the number of vehicles with speeding behavior is high on major collectors and minor arterials.

The research team used GIS to modify/edit a map for Maine interstate roadway network and downloaded data (volume, speed and speeding percentage) from the Streetlight platform for the month of February, April and May of 2019, 2020, and 2021. Multiple R and Python scripts were written to clean the speeding data. Summary tables were created for further analysis. Data were combined with network and crash data using several R and Python codes. During the next reporting period, the research team will use the streetlight data to analyze speeding on Maine interstates and model crash data.

Provide context as to how these activities are helping achieve the overarching goal(s) of the project…
Data preparation and preliminary analysis were an essential component of the analysis. Developing fractional logit models assist the research team to understand the impact of the reduction in traffic volume as well as other factors (e.g.: reduction in enforcement) on increasing the traffic speed during the stay-at-home order in Maine. Research results show that the impact on traffic speed still exists even after a year from the stay-at-home order. Extracting data from streetlight and combining that with network and crash data was also an essential step before modeling traffic speeding and crashes on interstates.

Describe any accomplishments achieved under the project goals…
We collected and prepared count stations data for the analysis. We developed speeding models for Major Collectors and Minor Arterials. We collected and cleaned the volume, speed and speeding data from streetlight and combined with other data sources (network and crash data). These data are essential for modeling speed and crash on interstates. We also developed fractional logit models for two facility types to understand the impact of different factors (variables) on speeding data.

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	Nov 1, 2020	Jan 30, 2021	85%
Task 2	Nov 1, 2020	Feb 28, 2021	70%
Task 3	Mar 1, 2021	June 15, 2021	50%
Task 4	June 16, 2021	July 31, 2021	30%
Task 5	Aug 1, 2021	Sep 15, 2021	Not Started
Task 6	Sep 16, 2021	Oct 31, 2021	Not Started
Overall Project:	Nov 1, 2020	Oct 31, 2021	50%

Table 2: Budget Progress		
Project Budget	**Spend – Project to Date**	**% Project to Date***
$70,000		

***Include the date the budget is current to: June 30, 2021**

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

Two students are currently working on this project. Mr. Amirhossein Shahlaeegilan, a grad student, assists in literature review, data collection, writing statistical and machine learning codes, analyzing data, interpreting the results and preparation of the final report. Mr. Ennis Marshall, an undergrad student, assists in literature review, data collection, and data analysis, and documenting 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				

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**
Dr. Ali Shirazi	shirazi@maine.edu	Civil and Environmental Engineering	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**
Ennis Marshall		Undergrad Student	Civil Engineering	Student worker
Amirhossein Shahlaeegilan		Grad Student	Civil Engineering	Graduate Assistant Research

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						
		Contribution to the Project				
Organization	**Location**	**Financial Support**	**In-Kind Support**	**Facilities**	**Collaborative Research**	**Personnel Exchanges**
Maine Department of Transportation (Maine DOT)	Augusta, ME					
University of Connecticut*	Storrs, CT					

*University of Connecticut will assist the research team with collecting data in Connecticut.

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. Dennis Emidy

Title: State Safety Engineer
Organization: Maine Department of Transportation
Mailing Address: 16 State House Station, Augusta, Maine 04333
Phone number: (207) 624-3309
Email Address: dennis.emidy@maine.gov

Changes:

N/A

Planned Activities:

The research team plans to complete traffic speed models using the count stations data (for major collectors and minor arterials) in the next reporting period and start on developing speeding and crash data models for interstates. University of Connecticut is currently working on extracting the data from streetlight platform for Connecticut roadways and provide the data to the research team.