Quarterly Progress and Performance Indicators Report:
Project Number and Title: *4.9 Analysis of Covid-19 and Travel In Maine (ACTIME) – Validation Study*
Research Area: *Research Thrust Area: 4*
PI: *Dr. Jonathan Rubin, University of Maine*
Co-PI(s): *Kathryn Ballingall, University of Maine, Dr. Per Garder, University of Maine*
Reporting Period: *7/1/2021-9/30/2021*
Submission Date: *10/4/2021*

***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 <mark>high-level overview of the activities conducted during the last three months</mark> **no more than 3 bullet points at no more than 1 sentence each** ….*

- The accuracy and variance of Streetlight Insight traffic volume metrics were analyzed at a number of time scales – monthly, weekly, daily and hourly.
- The statistical significance of daily traffic and seasonal variation (MDOT factor group classification) on Streetlight's traffic volume metrics was tested.
- A methodology for validating turning count movements of 32 intersections was developed. The field count variance of the percentage of incoming volume for each intersection movement will be compared Streetlight over a 12hr period and the peak hour.

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.

- Analyzing traffic volume estimates at different time scales will help MDOT understand the accuracy and variance of Streetlight, and its applicability to various traffic studies.
- It was found that the traffic volume metric's accuracy improved as daily traffic increases, and the seasonality of the location impacts the variance of the traffic volume metric.
- This updated methodology will allow our team to analyze a large number of intersections across Maine.

Accomplishments:

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

- The analysis of the monthly Streetlight traffic volume metric's accuracy and variance was completed and reviewed by MDOT.
- The analysis of weekly, daily and hourly traffic volume metrics was conducted and drafted for review.
- Significant improvements in the data cleaning and processing of Streetlight outputs using the R programming language were made.

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: Validating the AADT data	October 1, 2020	October 30, 2021	90%
Task 2: Validating turning counts	April 1, 2021	November 30, 2021	30%
Task 3: Reporting	June 1, 2021	December 30, 2021	25%
Overall Project:	*October 1, 2020*	*December 30, 2021*	75%

Table 2: Budget Progress		
Project Budget	**Spend – Project to Date**	**% Project to Date (include the date)**
$26,112		15% (September 30, 2021)

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**
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 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. Based on project results, were any industrial contracts awarded for additional research and development activities? 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: N/A

Describe any additional activities involving the dissemination of research results not listed above under the following headings: N/A

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:

- The final project results are under review and will be completed during the next reporting period.
- The streamlined process for using Streetlight outputs using R will improve the efficiency and wider use of this data set for a variety of MDOT projects.

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:

- The validation of Streetlight Insight metrics will allow MDOT to significantly change how it collect traffic data.

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 validation of Streetlight Insight metrics will allow MDOT to significantly change how it collect traffic data, increasing the ability to better design all road and pedestrian infrastructure in the State, as well as decrease the cost and time required for field measurements – turning movements in particular.

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**
Sheldon Green	10/20 to 10/21	Sheldon.green@maine.edu	MCSC	Generate Streetlight AADT, comparative analysis with DOT counts, statistical tests
Kathryn Ballingall	10/20 to 12/21	Kathryn.ballingall@maine.edu	MCSC	Project management, review of analysis, report writing and meetings with DOT
Jonathan Rubin	10/20 to 12/21	rubinj@maine.edu	MCSC	Technical review of analysis and reports

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
Bruce Wyatt	06/2021	12/2021	N/A		Junior	Economics	TIDC Project 4.9	Validating turning count movements of 32 intersections

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?
Sheldon Green	Bachelor of Economics	May 2021	Masters of Data Science, The Roux Institute

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			

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
N/A						

*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
Ed Hanscom	Ed.hanscom@maine.gov	Maine DOT, Traffic Analysis	October 2020 – Dec 2021	Reviews research report and designed the updated TMC methodology.
Dale Peabody	dale.peabody@maine.gov	Director of Research, Maine Department of Transportation	October 2020 – Dec 2021	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:

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

- A no-cost extension to December 2021 was requested.
- The turning movement count validation will change to respond to the release of Streetlight's turning movements count metrics.

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

Planned Activities:

List the activities planned during the next quarter.
- Task 1: Finalize the review of the ADDT accuracy and variance analysis for different time periods.
- Task 2: Complete turning movement count analysis and submit for review
- Task 3: Complete final report and presentation to MDOT
- Project is projected to be complete during next quarter.