2020 UDOT RESEARCH PROBLEM STATEMENT

Problem Statement deadline is March 16, 2020. Submit statements to UTRAC@utah.gov

All submitted problem statements become the property of UDOT and authors are not guaranteed a contract for related work.

Title: Determining Travel Time Reliability Using ATSPM Data **No. (Office Use): 20.05.04**

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Select ONE Subject Group ☐ Materials/Pavements ☐ Maintenance ☐ Traffic Mgmt/Safety ☐ Structures/Geotech ☒ Planning ☐ Aeronautics ☐ Public Transportation ☐ Other

1. Write a brief research project objective:

The objective of this project is to determine if Automatic Traffic Signal Performance Metric (ATSPM) data can be used to establish a correlation between the performance of traffic signals on a corridor and the reliability of travel time on the corridor, thru metrics such as vehicle throughput, average green time and green time utilization. This will allow ATSPM data to be used to determine travel time reliability on arterial corridors throughout Utah.

2. Explain the problem and why this research is important: (*Importance reflects 50% of the statement score*)

Unreliable travel times on arterial corridors throughout Utah can be a source of major frustration for drivers, including both commuter and commercial. Without knowing exactly how long it will take to get to their destination vehicle often have to leave earlier than needed or risk being late. This can lead to wasted time for driver and a decrease in productive. Conversely longer than expected travel times can lead to road rage and unsafe driving as drivers try to make up time. These driver behaviors in turn make travel times even less reliable creating a higher level of unpredictability. When planning and forecasting for future needs along Utah's roadways predictability and reliability is critical in determining where and why issues exist. Reliability is also important in the evaluation of future alternatives. More information on the reliability of travel time could be used to help UDOT determine locations where improvements can be made perhaps through infrastructure investment or public outreach.

Part of the issue in determining travel time reliability is the availability of reliable travel time data, which often relies on probe vehicles, this data can vary greatly depending on the number of vehicles with data available on a corridor. However, UDOT currently has a wealth of data available thru the ATSPM data, which is collection of information about signal performance, vehicle speeds, and even turning movement counts. This data can be used to help create an understanding of the changes in travel time from day to day along a corridor through correlating the signal performance data to the travel time. The performance of a corridor is often determined by the performance of the signals along that corridor, if the signal perform poorly the travel time will increase. Drawing a correlation between the signal performance and the travel times would allow for an evaluation of travel time reliability without the collection of additional travel time data. In addition, this data can be used with the HERE travel time data currently available to UDOT to provide a more detailed level of analysis, including providing more detail on the delays not associated with traffic signals and the extend of the delay impact. The combination of these data sources would provide historical data and allow for projects of future travel time reliability.

3. Describe how the research results will be implemented and benefit Utah: (*Implementation reflects 50% of the statement score*)

The findings of the project will allow for the UDOT to identify corridors that have unreliable travel times, or are expected to become unreliable, and determine what changes can or should be made to help improve the corridor. Additionally, the continued collection of ATSPM and HERE data will allow for this analysis to be continuously updated to provide insight into how incidents can affect travel times, particularly for locations on or with parallel routes, and how roadway projects can improve the reliability of travel times.

4. List the major research tasks:

1. Kickoff meeting to develop a project scope of work and cost estimates.
2. Conduct a literature review to determine available metrics and list potential measures for correlation to travel time.
3. Develop a design of experiment to collect travel time and signal performance data.
4. Carry out the experiment and collect travel time and signal performance data for corridors determined during Task 3.
5. Conduct statistical analyses on the correlation between travel time and signal performance data.

6. Develop tool to measure signal performance metric most closely related to travel time within UDOT departments.
7. Report results to UDOT in the form of a written report.

5. List the expected research deliverables (reports, manual, specification, design method, training, video, etc.):

1. Engineering report documenting the literature review and research results and technical publications in peer-reviewed journals.
2. Tool which determine signal performance measurement and the corresponding travel time reliability using the available ATSPM data for a corridor.

6. Requested from UDOT: $55,000 **Other/Matching Funds:** $ **Total Cost:** $
Briefly explain funding sources: UDOT Research

7. Outline the proposed schedule, including start and major event dates:
It is recommended that this project begin in summer or early Fall 2020 with the initial tasks of the project scope of work and detailed estimate, followed with the literature review. It is anticipated that the project would take 10-12 months, including 2-month final report review time.