2019 UDOT RESEARCH PROBLEM STATEMENT

Title: Forecasting Travel Reliability   **No. (Office Use):** 19.05.03

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☒ Planning   ☐ Perf Mgmt/Data Analytics ☐ Public Transportation ☐ Other

1. Describe the problem to be addressed:

"Optimize Mobility" is one of UDOT's strategic goals, which is a composite of four performance measures: mode split, delay, reliability and snow and ice removal. The reliability measure is currently defined by the "buffer time index" for one-mile segments of I-15 within the urbanized area. UDOT is interested in calculating and forecasting the buffer time index for measuring reliability along other highways under its jurisdiction.

This research will leverage UDOT's HERE data set to calculate a buffer time index for selected origin-destination pairs on selected surface arterials. Further, the research will develop a method to forecast future reliability using the Wasatch Front model combined with an analysis of the HERE data and UDOT's CCS and ATR traffic data. For the forecasting effort, this research will extend work originally conducted for the Wasatch Front Central Corridor Study, which correlated the buffer time index with v/c ratios for select OD pairs along I-15.

2. Write the project objective (25 words or less):

1. To estimate the buffer time index for OD pairs along selected surface street arterials using UDOT's HERE data and other data sources.
2. To develop a function to forecast reliability based on v/c ratio, link speed and functional classification.
3. To build the reliability performance measured into the WF Travel Model for use by UDOT and others.

3. Explain why this research is important:
(In response, consider addressing specific UDOT goals, applicability in Utah or other states, etc.)

1. This research will enable UDOT to more broadly apply its definition of reliability to highways other than I-15.

2. To give UDOT the tools necessary for calculating reliability from near real-time data sources (e.g. HERE and CCS/ATR data).

3. A reliability function within the WF Travel Model has been developed for I-15 within the urbanized area. This research proposes to forecast this performance measure across a much broader range of highways, including surface street arterials. The developed functions will utilize UDOT's HERE data to as a key input for estimating reliability.

4. The results of this research will be applicable for all of the MPOs in Utah and to other states that have a passive data product such as HERE providing highway segment speed profiles.

4. List the major tasks:

1. Stakeholder meetings: assemble a group of stakeholders from UDOT, WFRC, MAG, and other transportation planning organizations to advice the research. A total of four meetings is envisioned: 1) project kick off; 2) present the reliability estimation functions; 3) review WF model implementation and, 4) presentation of findings.

2. Data collection: in this task we will collect road characteristics data (e.g. functional class and number of lanes), and corresponding data from iPeMS, ATR, and HERE.

3. Develop Buffer Time Index models using HERE data and ATR/CCS data to apply to selected ODs on selected surface street arterials.

4. Develop reliability estimation function: following the data collection, the research team will develop functions that estimates reliability based on speed, v/c ratio, functional class, etc. An additional set of functions will be also developed that estimates reliability solely based on road characteristics and HERE data. These functions can be used to estimate reliability on all Utah roads. Before proceeding to Task 5, implement reliability functions in WF travel model and model testing, the research team will meet with the stakeholder group (meeting #2) to present the functions and their accuracy in predicting the reliability.

5. Implement reliability functions in the WF travel model and model testing: after finalizing the reliability functions with the stakeholder group, we will implement these functions in WF travel model. The updated the WF travel model will have an additional output that shows the reliability of each network segment for various time periods. The research team will also run couple of test scenario to ensure that the model works correctly. The research team will meet with stakeholder group to present the updated WF travel model and testing results.

6. Final report

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

1. Technical memorandum on buffer time index calculations for select OD segments on select arterials. Memorandum will outline how these calculations can be ported into the Wasatch Front model to enable forecasting of Reliability.

2. Updated WF travel model with Forecast Buffer Time Index functionality.

3. Final report

6. Describe how the research results will be implemented:
(In response, consider addressing UDOT leader support, process or standard improvement, etc.)

The research will provide UDOT with a model to calculate the Buffer Time Index for selected OD segments on selected surface street arterials. This model will utilize near real-time data from HERE and from CCS/ATR traffic data.

The research will provide UDOT the capability to forecast reliability using the Wasatch Front travel model. This functionality can be ported to other urban models in Utah (Cache, Dixie) and to the Utah Statewide Model (USTM).

7. Requested from UDOT: $50,000   **Other/Matching Funds:** $ **Total Cost:** $50,000
(or UTA for Public Transportation)

8. Outline the proposed schedule, including start and major event dates:

The schedule assumes a July 2019 start date and a 9- to 10- month research plan, with final report delivery in March 2020.

Task 1: Stakeholder Outreach – 4 meetings over 9 months:
i)   Kick-off and introduce the project (July 2019);
ii)   Presentation of the reliability estimation functions (Oct 2019);
iii)   Presentation of the updated WF travel model (Jan 2020);
iv)   Presentation of final results (Feb 2020).
Task 2: Data collection – 2 months (July-August 2019)
Task 3: Review analytical methods – 2 months (September-October 2019).
Task 4: Develop reliability estimation (buffer time index) function – 3 months (October-November 2019)
Task 5: Implement reliability functions in WF travel model and model testing -- 2 months (Dec-Jan 2020)

Task 6: Final Report – 2 months (Feb-March 2020)