2020 UDOT RESEARCH PROBLEM STATEMENT

<u>**Problem Statement deadline is March 16, 2020. Submit statements to UTRAC@utah.gov**</u>

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Title: Forecasting Travel Time Reliability **No. (Office Use): 20.05.02**

Written By: R. Chamberlin, N. Haghighi **Organization:** RSG **Email:** rchamberlin@rsginc.com **Phone:** 802-356-9161

Submitted By UDOT Employee: Jordan Backman **Email:** jbackman@utah.gov **Phone:** 385-226-4255

UDOT Champion (if different): Richard Brockmyer **Email:** rbrockmyer@utah.gov **Phone:** 385-258-4178

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

1. Write a brief research project objective:

UDOT currently measures travel time reliability using the "buffer time index" for one-mile segments of I-15 within the Wasatch Front urban area. UDOT is interested in forecasting the buffer time index for other highways under its jurisdiction. This research will develop a method for forecasting travel time reliability using historically-derived buffer time indices and associating them with v/c ratios obtained from the Wasatch Front travel model for a range of functional classes.

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

UDOT is currently updating its project prioritization process which will include a travel time reliability component. This research will enable UDOT to forecast a level of improvement in travel time reliability for a proposed improvement project, using the Wasatch Front Travel Demand Model. This will enable UDOT to appropriately prioritize projects based on their contribution to improving reliability.

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

The research team proposes to develop lookup tables associating buffer time indices with v/c ratios for specified functional classes. These lookup tables will be based on historically matched travel time (HERE) and volume (CCS, ATSPM) data. The research team will develop an output script for the WF Travel Model to enable reporting of the buffer time index for selected model links with any model forecast run. UDOT can use this additional model functionality to determine how different improvement plans or strategies lead to greater reliability improvements.

The findings of this study help UDOT to forecast travel time reliability of different road segments, pinpoint segments with the highest need for improvements, and ultimately identify strategies to improve reliability.

4. List the major research tasks:

The research will be implemented in six tasks.

For Task 1, the research team, in collaboration with the TAC, will select a set of highway segments that have one-to-one correspondence with highways represented in the Wasatch Front Travel Model. These selections should cover a range of functional classes, capacity and speeds.

In Task 2, the research team will collect historic travel time data from iPems (HERE) for the selected highway segments from Task 1. Using the historic HERE data, the research team will estimate the buffer time index for the selected highway segments. In collaboration with the TAC, the travel time data will be assembled for some specified period (e.g. one year) and will be segmented by peak/non-peak or other time-based classification. The HERE travel time data may be filtered for weather and/or crash events to remove sources of non-recurring congestion and thereby estimate a buffer time index based on recurring congestion (as opposed to non-recurring congestion). This, in turn, will make the estimated buffer time index most directly related to standard outputs of the WF Travel Model. A side product of this analysis will be to compare the buffer time index of the entire HERE dataset (for each segment) to the buffer time index with weather and crash events filtered out.

For Task 3, the research team will estimate a V/C ratio, by time slice, for each highway segment. Volumes will be estimated using actual volumes from CCS sites or from the UDOT ATSPM system (using lane-by-lane volume data from Matrix detectors). Capacity will be estimated using standard HCM procedures.

In Task 4, the research team will develop a look-up table that associates the buffer time index to the V/C ratio of the facility. This lookup table will be programmed into the Wasatch Front Travel Model to forecast the buffer time index for the corresponding model links.

In Task 5, the research team will develop the model scripts to enable reporting of the buffer time index as a model output for interim and final forecast years.

Task 6 will involve normal project management duties, three meetings with the TAC and reporting. It is anticipated that reporting will include 1-2 interim technical memoranda and a final report/user guide for using the buffer index script.

5. List the expected research deliverables (reports, manual, specification, design method, training, video, etc.):
The research project will generate two key deliverables:
1) BTI lookup tables and associated WF Travel Model scripts plus installation instructions.
2) Final report summarizing the HERE analysis, development of BTI tables, and a narrative for inclusion in the WF Travel Model documentation.

6. Requested from UDOT: $68,000   **Other/Matching Funds:** $ **Total Cost:** $68,000
Briefly explain funding sources:

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

No.	Major Task	Q3 2020			Q4 2020			Q1 2021			Q2 2021		
1	Select Test Locations	▓					▓			▓			
2	HERE Buffer Time Analysis		▓	▓									
3	HCM Analysis				▓	▓	▓						
4	Development of BTI Lookup Tables							▓	▓				
5	WF Model Scripting									▓			
6	Meetings and Reports										▓		