



Exiting the Freeway: Travel Time Reliability on Urban Arterials

Avinash Unnikrishnan, Ph.D., Sirisha Kothuri, Ph.D., Jason Anderson, Ph.D.

Researchers from Portland State University (PSU) partnered with Washington County, Oregon to offer data-driven strategies in prioritizing funding for travel time reliability improvements on their urban arterials. The vast majority of existing research on travel time reliability has focused exclusively on freeways. Funded by the National Institute for Transportation and Communities, PSU researchers Avinash Unnikrishnan, Sirisha Kothuri and Jason C. Anderson leveraged Bluetooth sensors provided and deployed by Bluemac Analytics to identify problem areas in the county.

Set up at intersections throughout Washington County, the sensors are able to calculate travel time from one intersection to another by matching Bluetooth signals from devices in people’s cars. The researchers evaluated the Bluetooth travel time data to understand the temporal variation in travel time reliability metrics on these urban arterials, including factors related to time of day, weather, and holidays.

VALIDATING TRAVEL TIME RECORDS: DATA QUALITY CONTROL

Washington County was particularly interested in ways to improve the quality of their data to account for outliers, or invalid travel time records. The research team provided the County with an automated process to clean up their data and remove outliers. The study addresses gaps in the literature by focusing exclusively on arterials, applying a previously unused parametric method, and quantifying the effects of specific variables on average interval travel time and travel time standard deviation.

COMPARING THREE MAJOR ARTERIALS IN WASHINGTON COUNTY, OR

Using Bluetooth data collected in 2017, the team compared travel time reliability for three major arterials in the Portland, Oregon area:

- OR 99W
- Tualatin-Sherwood Road
- Tualatin Valley Highway

The researchers determined that Tualatin-Sherwood Road has the lowest travel time reliability of the three corridors. They also found that the westbound directions of Tualatin Valley Highway and Tualatin-Sherwood Road have slightly higher reliability compared to their westbound directions. Of the selected corridors, OR 99W has the highest reliability, where the northbound is slightly more reliable than the southbound direction. In terms of time-of-day, mornings have the highest reliability and midday on weekends have the lowest reliability for all three corridors.

Through a bivariate modeling framework, significant factors on average travel time and travel time standard deviation were determined. Factors including morning, evening, and weekend peak hours, as well as nighttime hours, were found to be significant and have moderate to considerable effects on average travel time and travel time standard deviation. For nearly all factors, the largest effects (both positive and negative) on average travel time and travel time standard deviation were observed on Tualatin-Sherwood Road.

APPLYING ARTERIAL RELIABILITY PERFORMANCE METRICS

Now that Tualatin-Sherwood Road has been identified as having the most unreliable travel times out of the three arterials studied, the County is in a position to focus its efforts in that area. This work sets the groundwork for future work of identifying corridors with high unreliability, thus enabling transportation system engineers to prioritize funding in projects.

ABOUT THE AUTHORS

The research team consisted of Avinash Unnikrishnan, Sirisha Kothuri, and Jason Anderson of Portland State University.

ABOUT THE FUNDERS

This research was funded by the National Institute for Transportation and Communities, with additional support from Washington County and the Oregon Department of Transportation.

THE FULL REPORT and ONLINE RESOURCES

For more details about the study **Understanding Factors Affecting Arterial Reliability Performance Metrics**, download the full report at <https://nitc.trec.pdx.edu/research/project/1117>

Photo by CreativeNature_nl (istockphoto.com)

The National Institute for Transportation and Communities (NITC) is one of seven U.S. Department of Transportation national university transportation centers. NITC is a program of the Transportation Research and Education Center (TREC) at Portland State University. This PSU-led research partnership also includes the Oregon Institute of Technology, University of Arizona, University of Oregon, University of Texas at Arlington and University of Utah.

