ABSTRACT

Remias, Stephen M. Ph.D., Purdue University, August 2014. Characterizing Statewide Roadway Mobility Using Crowd Sourced Probe Vehicle Data. Major Professor: Darcy Bullock.

From a state and national perspective, it is critical that we have digestible quantitative performance measures that tell us how our interstates are operating. It is critical that these performance measures be developed in a cost effective manner allowing annual tabulation and longitudinal performance measurement. This dissertation describes performance metrics that were developed to assess the mobility of the interstate system using crowd sourced probe vehicle data. These measurements are illustrated in this dissertation using a series of case studies on both Indiana highways and Interstate 80 from coast to coast.

The proposed series of performance measures developed from crowd source data can be used to rank and prioritize decisions on all levels of roadway using mobility as the defining characteristic. The proposed performance measures have numerous use cases. The arterial performance measures can be used to determine reliability of a corridor, signal retiming needs for a corridor, and user cost savings from signal retiming of a corridor. The interstate corridor performance measures developed can be used to quickly assess conditions

temporally and spatially. The statewide performance measures can be used to identify capital project allocation and to locate and understand potential deficiencies of the network. Adhering to the scalability message, these performance measures were designed such that they could scale nationally. This scaling ability allows these measures to be utilized by the Federal Highway Administration or the United States Department of Transportation to assess network performance.

This dissertation outlines the performance measures and their scalability from the arterial roadway to the national interstate system. Using a series of case studies the performance measures are introduced and demonstrated. The dissertation concludes with recommendations on how to use the performance measures and proposing the development of a real time performance measure dashboard for agency use.