

Project Title: Incorporating Probe Vehicle Data To Analyze Evacuation Route Resiliency

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Probe vehicle speed data has become an important data source for evaluating the congestion performance of highways and arterial roads. Predefined spatially located segments known as Traffic Message Channels (TMCs) are linked to commercially available, temporal anonymous probe vehicle speed data. This data has been used to develop performance measures for roadways to better plan and manage infrastructure assets.

An analysis of vehicle speed data before, during, and after Hurricane Sandy (a.k.a Super Storm Sandy), the second costliest hurricane in the United States, was used to demonstrate the methodologies presented in the paper. The evacuation analysis encompasses 1518 TMCs, including 13 evacuation routes, within 10-miles of the New Jersey coast (Figure 1). With only 13 out of the 32 coastal evacuation routes having some form of historic probe data available, it is apparent that not enough roadway segments are being monitored. An analysis of the decrease in available probe data and subsequent recovery was also conducted to evaluate the resiliency of the infrastructure during the hurricane. Based on the analysis, the TMCs collecting data, save one, were collecting data again within a week indicating that vehicles could at least traverse the infrastructure.

An additional analysis was conducted on a subset of the 1518 TMCs to develop a regional congestion visualization method using 614 TMCs. A measure of congestion called the Regional Increase in Mean Travel Time (RIMTT) was developed as part of this research. RIMTT, which provides a mechanism to gauge daily congestion in 15-minute intervals, 24-hours a day, 7-days a week along the New Jersey Coast for 2016 (Figure 2). From the visualization created by the RIMTT data, specific events could be observed throughout the year as well as the changes in congestion throughout the day. This type of visualization had not been applied on a regional level.

The results show that probe vehicle speed data, when aggregated can act as a performance measure for characterizing congestion on a dispersed transportation network as well as a method for visualizing regional congestion.

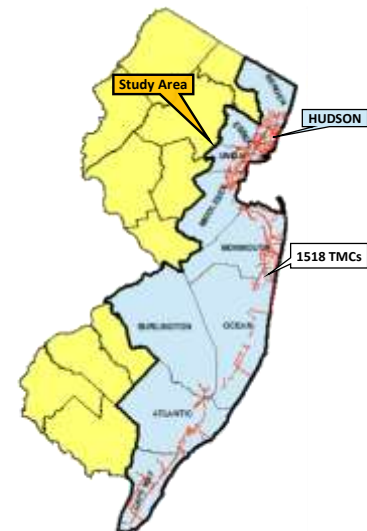


Figure 1. Study area along the Atlantic Coast of New Jersey with 1518 TMC segments receiving data (October 20, 2012).

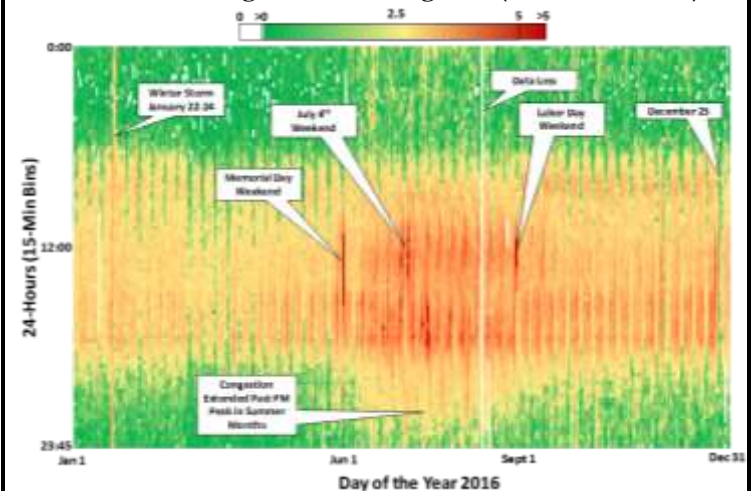


Figure 2. Daily Regional Increase in Mean Travel Time (RIMTT) for 2016 using 614 TMCs.

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Completion Date: **March 31, 2018**

University: **The College of New Jersey**



