

Research Needs Statement

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Title:	System wide Traffic Signal Performance Triaging using Big Data to Identify and Prioritize Deficient Locations for Improvement
Key Words:	Traffic Signal, Waze, HERES, Safety, Efficiency, Capacity
Research Problem Statement:	The thousands of traffic signals covering major metropolitan areas and dotting smaller cities and major arterials are an integral part of the State’s transportation mobility system. While TDOT does not typically own, operate, or maintain traffic signals, their performance or the lack thereof have direct and significant impacts on the operation efficiency, system capacity, and transportation safety on the State’s roadway system. While a very small number of traffic signal timing plans may be looked at by consultants due to repeated complaints or unusual crash numbers, the timing plan and operational performance of the majority of the traffic signals in the State are not evaluated on a continuing, systematic, and standardized basis. This is unacceptable but understandable due to costs, manpower, jurisdiction, and technology issues.
Research Objective:	This study will employ Big Data and deep learning techniques employing statewide data, e.g. WAZE, HERE, and traffic flow theory to rank and identify deficient traffic signals and trigger more advanced signal timing plan diagnostics to improve traffic safety and efficiency in an economical (no additional hardware/infrastructure investment) and timely (fast deployment) manner.
Related Research/Continuation of Past or Current Project:	<ul style="list-style-type: none"> • http://proceedings.esri.com/library/userconf/fed18/papers/fed-126.pdf • https://ops.fhwa.dot.gov/publications/fhwahop08024/chapter9.htm • Big Data Processing
Expected Deliverables:	A comparative analysis through case studies providing a better and more accurate understanding of how using big data can further our knowledge of advanced signal timings. The deliverable should include methods in which TDOT’s data sources could be leveraged in this endeavor.
Estimate of Problem Funding & Research Period:	The research period is estimated to be up to 24 months. The estimated funding is \$200,000.

Urgency and Potential Benefits:	Safety and economic impact drive the urgency behind this research need. With a better signal system there would be an expected increase in safety as it would better control the interaction between vehicles and themselves as well as with pedestrians. The economic impact would be seen by the more efficient delivery of commodities across the state.
Implementation Planning:	The measures, models, and scenarios developed in this research can be used as a tool to improve the policymaking, travel demand management, traffic signalization, safety, and overall transportation network efficiency in metropolitan areas in Tennessee.
Person(s) Developing the Problem Statement:	Planning Application Office in LRP, TDOT.Research@tn.gov
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