Florida Department of Transportation Research

Demand Based Signal Retiming Phase 2- Real World Implementation

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Project Manager
Melissa Ackert
FDOT Traffic Engineering and Operations

Principal Investigator
Aleksandar Stevanoic
Florida Atlantic University

Current Situation

Monitoring and managing the operation of arterial operations represents a significant challenge for many public agencies. While there are more arterial streets which cover a larger road network, arterials generally have less Intelligent Transportation Systems (ITS) infrastructure than freeways. Even when ITS data is available, agencies often lack developed procedures and strategies to handle and react to arterial data.

Research Objectives

In this project, Florida Atlantic University researchers sough to develop a set of strategies for monitoring and managing arterial streets using currently available or even third-party ITS data.

Project Activities

Several different methods and applications, which rely on differing levels of data, were developed to monitor and manage traffic operations on arterial networks.

First, researchers established a method to estimate signal performance based on link travel times. Using intersection-to-intersection travel times, the performance of traffic signals was estimated. Researchers were able to estimate a signal's through movement, Level of Service, and number of cycles to pass through the signal all based on link travel times. However, this method requires an ITS-data-rich environment and significant data validation efforts.

A method to evaluate the quality of signal timing plans based on traffic volumes as recorded by microwave vehicle detectors was developed. The optimum signal timing plan for the level of traffic detected can then be chosen from a library of plans. This method is again dependent on some ITS data availability.

Researchers also created a reliable simulation model to enable traffic engineers to test different signal timings in response to reoccurring and non reoccurring events in simulation before field application. Results show a decent level of correlation between simulation results and real-world conditions. This simulation model would require further research to refine and validate.

For agencies with limited or no ITS data, the researchers developed a program to monitor the level of traffic congestion and incident level in a particular traffic network using Google Maps. Google Maps displays a particular road section with a green, yellow, or red overlay to correlate to the current travel time delay on that road. The program developed uses this color-coding to estimate the percentage of congestion on the user's network. For larger regions, the program cycles through smaller subnetworks to provide an overall congestion assessment. This could also benefit from further research and field application to gather feedback from operators.

Project Benefits

Procedures and strategies to manage arterial networks could increase the efficiency of these roads and reduce travel times and congestion.

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