Florida Department of Transportation Research

Integrated Freeway/Arterial Active Traffic Management

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Current Situation

As Florida's continues to grow, its roads become more crowded. In some cases, adding new lanes or roads is not possible and better management of existing roads is the only solution. Active traffic management (ATM) uses methods such as ramp metering, adaptive traffic signal controls, dynamic shoulder lanes, and others to reduce congestion and increase throughput. ATM has been successfully implemented on many busy Florida roadways, often as part of a larger strategy called integrated corridor management (ICM) which focuses on a central highway and the arterials that feed it. ICM is complex, involving coordination among agencies, analysis of both historical and real-time traffic data, and a selection of traffic management strategies. A decision support system is needed that can assist managers in locating areas of congestion and selecting the best set of responses to them.

Bumper-to-bumper traffic during evening rush hour on I-4 near downtown Orlando

Research Objectives

University of Central Florida researchers developed a decision support system (DSS) to help traffic managers apply integrated active traffic management (IATM) to improve traffic conditions on both highways and associated arterials.

Project Activities

The researchers selected the Greater Downtown Orlando Metropolitan Area as the study area, based on data availability and its roadway network. Data were collected from a wide variety of sources including HERE, the National Performance Management Research Data Set, microwave vehicle detection systems, automatic vehicle identification, BlueTOAD, BlueMAC, etc. Data were correlated for road segment and time and evaluated for accuracy and availability. Around 600 miles of roadways with 1,200 segments were identified based on serious traffic congestion and travel time unreliability.

Two critical corridors – the I-4 corridor in Downtown Orlando and the SR-417 corridor in East Orlando – were selected developing the integrated active traffic management (IATM) decision support system (DSS). The researchers developed an extensive simulation of the study corridors as a basis for the DSS. IATM control strategies, including variable speed limit, queue warning, ramp metering, and combinations, were tested under three different congestion levels on both corridors. The DSS used the IATM controls to balance the traffic on both highways and arterials. Several hundred simulation runs were conducted to evaluate the DSS and to develop generic rules for the DSS's use of IATM controls. Results suggested that the DSS could successfully reduce traffic congestion and improve travel time reliability.

Project Benefits

Decision support systems can be an invaluable aid in using advanced traffic management tools to improve the efficiency and safety of Florida highway corridors.

For more information, please see www.fdot.gov/research/.