



## Florida Department of Transportation Research

### Effective and Efficient Deployment of Dynamic Message Signs to Display Travel Time

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The dynamic message sign (DMS) is becoming a more common sight on the nation's highways. These signs can display timely messages related to travel. In typical workday traffic, DMSs can tell drivers how long it is likely to take them to reach a specific point further down the highway. Under special circumstances, a DMS can make drivers aware of incidents that affect traffic flow, and the signs can instruct drivers about detours. In the event of a large-scale event, DMSs can guide drivers along evacuation routes.

DMSs are part of the Intelligent Traffic System, which ties together traffic monitoring devices of various kinds, traffic management centers, and driver alert services, like DMSs and 5-1-1 phone service. An important question is how the placement of DMSs affects travel flow. Considering the expense of this infrastructure component, it would be wise to understand, for example, how drivers respond to the signs and what placement of the signs best influences traffic flow.

Researchers from the University of Florida's Transportation Research Center addressed these questions in this research project. In preparation for the study, they examined the current literature related to DMSs. They found studies that assessed public perception of DMSs and the impact of the signs on driver's route choices. They also found studies of approaches to optimal placement of DMSs to maximize their benefits after an incident. However, they found no studies that examined the optimal destination for which to present travel times on DMSs.

The researchers took as a starting point that one of the main sources of driver anxiety is the uncertainty in travel time caused by its variability, and therefore, that DMSs that gave travel time information on more variable routes would be of more benefit to drivers. They calculated the variability of travel time along 60 segments of I-95 and I-595 using existing data. They developed a benefit index and calculated this for the segments



*This dynamic message sign in south Florida displays the distance and approximate travel time to an important exit.*

and for current DMS placements. Using linear programming techniques, the researchers then used their benefit measure to determine the optimum destinations for which to display travel times.

An analytical model was developed to turn these findings into a tool useful when the designer's objective is to maximize driver benefit. This can then be added to the range of considerations that lead to the placement of DMSs. A final model was developed that applies a robust optimization approach to using travel demand uncertainty in deploying DMSs. The model can be used when uncertainty is a major concern in the planning stage of a DMS deployment, and is general enough to accommodate other types of uncertainty.