

## ***EVALUATION OF DYNAMIC MESSAGE SIGNS AND THEIR POTENTIAL IMPACT ON TRAFFIC FLOW***

### **Problem**

The Maryland State Highway Administration's Coordinated Highways Action Response Team (CHART) routinely posts messages on both portable and fixed DMS. While most agree that DMS are a valuable way to reach motorists and convey important information, there has long been speculation that DMS messages may adversely affect traffic conditions. Recent publicity surrounding the travel time messages on DMS have rekindled this debate. The question remains: Will a message posted onto a DMS adversely affect traffic? If so, do all types and lengths of messages have this potential, or do only certain types and lengths of messages pose a threat? This study attempted to answer this important question.

Another important measure of the value of a DMS message is its credibility. It is vital that travelers believe messages displayed on a DMS are factual and accurately describe roadway conditions. Without consistently valid information, road users will begin to ignore DMS messages. In the case of travel-delay messages, phrases such as "Major Delays," "Heavy Delays," and "Expect Congestion" have been used to describe traffic conditions. The most recent trend has been to post messages containing travel-time estimates.

### **Objective**

The objective of this research was to understand the potential impact of DMS messages on traffic flow and evaluate their accuracy, timeliness, relevance and usefulness. Additionally, Bluetooth sensors were used to track and analyze the diversion of traffic to the alternative routes as suggested by the messages.

### **Description**

In order to determine the accuracy of DMS messages, this study examined the traffic conditions under which they were displayed. Specifically, Bluetooth travel-time and route-diversion data were collected for the analysis. This project took advantage of a data analysis framework equipped with a database capable of importing data from various sources and employing data-mining techniques to perform before-and-after analysis of traffic conditions with respect to a message display. In addition to traffic pattern analysis, the system can visualize data in accordance with message timelines.

To determine whether DMS messages cause localized effects (i.e., drivers changing speed), 2,268 cases of message activation (off-on), removal (on-off) and switching were analyzed using RTMS speed data. In addition, the cases were sorted into categories to determine if any trends exist with respect to message types. Messages were categorized into three types: Danger/Warning (Type 1), Informative/Common Road Conditions (Type 2) and Regulatory/Non-Traffic-Related (Type 3).

## Results

The results showed that when messages were activated (off-on), users slowed down most often in response to Type 1 messages, followed by Type 2, and then Type 3. The average decrease in speed over all off-on cases was -3 mph; decreases occurred in 17 % of cases. Speeds increased or were unaffected in 83% of cases. Also, DMS displaying travel time messages did not show a higher propensity for slow-downs than DMS displaying other types of messages. The on-off analysis indicated that average speeds increased more often than they decreased in response to message removal. When broken down by message type, no clear pattern was observed. Under message-switching condition, average traffic speeds increased as often as they decreased. The overall findings from the before-after analysis indicate traffic is unaffected by message appearance, removal or switching in the majority of cases, with the remaining cases representing relatively small effects on traffic speeds.

The secondary analysis which examined average speeds over 12 two-week periods to determine aggregate effects of message display on traffic speeds, found that in most cases, average speeds were higher during these messages than during times of no messages. The results of this analysis indicate that DMS message display is not likely to cause congestion.

The research team also evaluated localized safety effects of highway DMS. The accident data from 2007 to 2010 served as the baseline for analyzing road collisions in Maryland. The accident data, DMS locations and AADT database were projected to Maryland roadway maps to perform spot analysis and to evaluate DMS influence on drivers' operational performance. An impact area of 900 feet was defined for each DMS based on the average character size on electronic signs and maximum visibility distance for the signs. The findings from all evaluations converge to indicate that DMS do not have significant adverse effects on driver's operation and traffic safety.

In summary, the findings from these evaluations indicate DMS can be an accurate, effective, and safe tool for disseminating real-time travel information to motorists. This research focused on Maryland DMS, so the findings may not extend to DMS operations in other states. Nevertheless, the methodology for evaluating data is applicable beyond Maryland's borders.

## Report Information

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