

Smart Work Zone Deployment Initiative Wisconsin Evaluations Summer 2001 Travel Time Prediction System (TIPS)

ABSTRACT

The present report is an evaluation of the Travel Time Prediction System (TIPS), a portable automated system for predicting and displaying travel time for motorists in advance of and through work zones, on a real-time basis. TIPS collects real-time traffic flow data using roadside sensors, computes estimated travel time between different points on the freeway and the end of the work zone, and displays this information on several Changeable Message Signs (CMS).

The system was deployed along the Southbound direction of Interstate 94 (I-94) in Milwaukee and Racine County, Wisconsin, in advance of a construction zone that required three lanes of traffic to be tapered to two. Four CMS were installed, at locations where drivers would have an opportunity to exit (or not enter) the freeway, if displayed travel times were excessive. Two were placed facing Southbound I-94 drivers and two on surface arterials, before ramps connecting to I-94. The evaluation measured the system's ability to accurately predict travel times to the end of the construction zone, using data for the two CMS that were installed on I-94. The system's impact on trip diversions when higher travel times were displayed was also evaluated.

Travel time accuracy was evaluated based on a comparison of Actual and TIPS-estimated travel times. Actual travel time data was collected by two-person teams, who drove through the construction zone continuously during hours of higher traffic volumes on selected Thursdays, Fridays and Sundays in June, July and August of 2001. TIPS information was provided in electronic form and also collected from CMS deployed in the field. A total of 210 travel time runs, performed on I-94, were available for analysis.

A comparison of Actual and TIPS travel times indicated that the evaluated system generally followed increases and decreases in Actual travel time. It predicted travel times quite accurately, on average, but a rather wide range of Actual travel times corresponded to each individual TIPS travel time estimate. Although the differences between Actual and predicted travel times were between two and three minutes, on average, the percentage of Actual travel times within +/-4 minutes of system-predicted times was 46% and 66% for the two evaluated CMS. Predicted travel times were within 30% of Actual travel times for 85% and 86% of the analyzed observations.

Two restrictions were imposed on the evaluated system, namely: i) displayed travel times should be multiples of four minutes; and, ii) travel times should be displayed for at least three minutes. Based on available information, the restrictions were found to have minimal impact on the accuracy of travel time predictions provided to motorists.

The evaluated system performed reliably throughout the data collection hours, with the exception of one day when an apparent communications problem did not allow predicted travel times to be conveyed to the CMS.

A comparison of crash statistics between the before and the after TIPS CMS installation periods did not identify statistically significant safety performance changes in the work zone downstream of the CMS. However, the injury crash frequency for the TIPS work zone was less after TIPS began operation than for a similar construction zone in the opposite direction of travel, which was used as a control site for the safety evaluation. But because the analysis periods were short - 69 days both before and after TIPS operation - results should not be viewed as conclusive.

Modest trip diversion changes were identified, during the period TIPS was operational, when displayed travel times exceeded their median value.