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Research Title:
System Management and Monitoring-Providing a Continuous, Real-Time Evaluation of the Columbus Metropolitan Freeway Management System

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Research Summary Series

A series to disseminate results of research being conducted by the Midwest Regional University Transportation Center, Federal Highway Administration, and Wisconsin Department of Transportation

System Management and Monitoring of the Columbus Metropolitan Freeway Management System

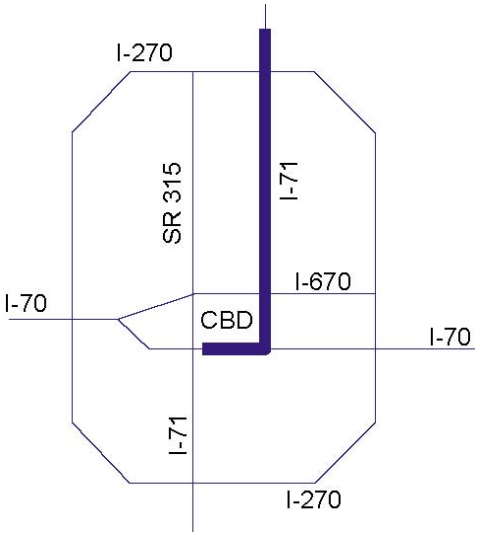
Project 04-02

Project Overview

Virtually every major metropolitan area in the US has a traffic monitoring system to help increase traffic throughput, decrease the number of accidents, decrease the time required to clear incidents that disrupt flow, and provide travelers information. Almost all of these systems are myopic, focusing strictly on current conditions. Yet the data collected by the sensors can provide considerable information when viewed over time. This study investigated several applications that employ traffic monitoring system data over time to show the added benefit of the given system. Many of these tools have been demonstrated in real time using data from the Columbus Metropolitan Freeway Management System (CMFMS).

CMFMS

The Ohio Department of Transportation (ODOT), in conjunction with the city of Columbus and the Federal Highway Administration, had deployed the first phase of the CMFMS. The figure shows a schematic of the currently deployed system along I-70 and I-71, covering roughly 14 miles of freeway with detector stations every third of a mile, ramp meters, 4 changeable message signs (CMS), and an integrated traffic management center (TMC) to coordinate different government agencies and the media.



This research employed data from numerous sources, including the detectors in the CMFMS. dedicated GPS equipped robe vehicle runs and transit AVL data in the corridor. Many performance measures were developed in the course of this research, although many of these measures were simply refinements on earlier techniques, there were several small but significant advances.

The first performance measure was the summary plots, showing directional conditions along the entire corridor over time and space.

The next performance measure estimated travel time and delay. Then we measured average daily travel (ADT), vehicle miles traveled (VMT), and hours of delay. With these latter metrics, the most significant contribution were filters to allow one to clearly view trends over several years of data. Provided an operating agency archives real time traffic data, all of these measures can be generated either in real time or off line. An example summary plot can be seen below displays the evolution of traffic conditions over the entire corridor over 24 hours (higher speeds are green, lower are red).

Conclusions

This project examined the value of information collected over time from a conventional traffic system deployed for real time control. Several metrics were generated and those data were used to illustrate different means of presentation, such as statistical measures throughout the "typical day" and curves of equi-travel time. From the travel time, it was simple to measure and quantify delay. VMT, ADT, hours, and delay were examined on each link. Most of these results were expressed in a daily measure per station, temporal measure across all stations, or a daily measure across many stations. Due to results varying from day to day, a weekly-median filter was used to show evolving conditions over many years. Finally, a prototype was deployed in real time.