Research Project: SP208B4K
Date: October 23, 2003

RESEARCH SUMMARY

DEVELOPMENT OF AN INTEGRATED NETWORK SIMULATOR FOR REAL TIME TRAFFIC MANAGEMENT: I-95/US-1 TRAFFIC SIMULATOR

Problem

In contending with both recurrent and non-recurrent congestion in urban traffic networks, responsible traffic professionals are often short of effective tools to estimate the impact of a detected incident, evaluate the needs of implementing detour operations, and assess the resulting social as well as environmental impact costs associated with incident response and congestion management.

Objective

The primary objective of this study is to develop a reliable and effctive tool for traffic engineers to perform the following tasks during congestion management:

- Estimating the travel time associated with different departure times during recurrent and non-recurrent congestion;
- Assessing traffic impacts due to a detected incident, including the queue length, average speed, and travel time during the period of incident response and management; and
- Evaluating the needs and costs associated with implementing detour operations during severe non-recurrent congestion.

Description

This study has developed an integrated network simulator for traffic management. The developed system offers three main functions: incident management, work-zone operations, and recurrent congestion monitoring. The knowledge base is used to inventory the operational experience and traffic impacts associated with all previously recorded incidents. Such information will be used along with an embedded prediction module to estimate the duration of a detected incident. The simulation module, developed with design plans for construction, contains traffic volumes and detailed geometric features for both mainline segments and interchanges. The proposed system will enable traffic control operators to perform critical tasks during the incident management period, including traffic impact assessment and evaluation of available traffic management or control strategies.

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Results

This study has produced the I-95/Route-1 Simulator that consists of I-95 freeway segment and Route-1 between Baltimore and Washington Beltways, including all detouring routes and streets in the corridor. The developed simulator has an intelligent interface for users to effectively take advantage of its simulation functions and all embedded traffic information such as volume, speed, and roadway geometry related data. The simulator can also provide an estimate of the approximate duration for a detected incident in the I-95 corridor with its knowledge-based module constructed from the incident management record of MSHA between 1999 and 2002.

Report Information

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