MARYLAND DEPARTMENT OF TRANSPORTATION

STATE HIGHWAY ADMINISTRATION

RESEARCH SUMMARY

Development of a Traffic Management Decision Support Tool for Freeway Incident Traffic Management (FITM) Plan Deployment - *Phase 3: An Incident Duration and Impact Prediction (IDIP) System*

WHAT WAS THE NEED?

To effectively contend with day-to-day non-recurrent congestion due to traffic incidents, the State Highway Administration (SHA) has worked with the research team from the Traffic Safety and Operations Laboratory over the past three years to develop a traffic management decision support tool, known as the Incident Duration and Impacts Prediction (IDIP) system for Freeway Incident Traffic Management (FITM) plan deployment. As with most technological products, the development process for an innovative IDIP system started from its initial phase of concept proof with I-95, followed by the prototype construction in Phase II, based on CHART's incident records for I-495, I-695, I-70, and US 29. Promising results from the first two phases offer support for the IDIP system's development to progress to its third phase of refinement, generalization, and deployment.

WHAT WAS THE GOAL?

The primary goal of this study is to finalize the IDIP system's development so that CHART can reliably project the impacts of a detected incident, from detection to clearance, on its target freeway and neighboring local networks. With all essential functions developed in this phase for IDIP, CHART's incident response team can conveniently estimate the required clearance duration for a detected incident, reliably project its maximum traffic queue distance during the response operations, and project the likely distribution of the freeway traffic detouring to the local streets during the same period. Note that IDIP's functions are developed with all field operational and information constraints in mind so that they can provide reliable and robust estimation for freeway segments with insufficient or unreliable surveillance systems.

PUBLICATION MONTH, YEAR

FEBRUARY 2025

REPORT NUMBER:

MD-21-SHA/UM/6-1

START DATE:

FEB. 2021

COMPLETION DATE:

APRIL 2023

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WHAT DID THE RESEARCH TEAM DO?

The research team has conducted the following tasks for this study: (1) develop a generalized incident duration prediction system for the entire network covered by CHART; (2) a traffic queue evolution model for estimating the maximum queue distance during the incident clearance period; and (3) a robust system for estimating the detouring traffic volumes and their impacts on the neighboring local network during the incident clearance period. The developed IDIP with all such three primary functions is capable of functioning effectively for highway segments with insufficient coverage of traffic detectors.

WHAT WAS THE OUTCOME?

The innovative method of transferability analysis developed in this study has proved its effectiveness in coping with the insufficient data issue, allowing the responsible agency to take advantage of some quality data and well-calibrated models from some regions/districts to generate the estimated clearance time for a detected incident in all highway segments covered responded to by the incident response team. Using the speed data from probing vehicles integrated with a set of off-line reliably calibrated models, the developed system can produce an acceptable approximation of a detected incident's traffic impact range during incident clearance period, and its potential impacts to neighboring local networks. Such information is sufficiently reliable for use in advanced traveler information systems and the selection of responsive traffic management strategies.

HOW WILL MDOT SHA USE THE RESULTS?

This research will help with the decision making of other departments. The project results will allow others to make better decisions for crash incidents, because there are no prediction tools that are built into the ATMS. So, this development gives statistical data to make predictions about when an accident will clear and what next steps should be taken afterwards for traffic management on freeways as well as arterial roadways. The ability to predict and estimate the queue and the clearance of an incident will significantly improve the center operations ability to actively monitor manage and provide travelers information. The tool will provide better travelling through dynamic message signs (DMS), highway advisory radios, or media to the traveling public for how long a queue will take, as well as proactively initiating signal timing plans for arterials and coordination with local jurisdiction partners. As a result, this will help with the safety, mobility, and environmental sustainability through the use of technology.

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