

Tech Brief

Evaluation of Incident Management Strategies

Need a solution?
Think Jersey DOT

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BACKGROUND

- Incidents can be categorized as accidents, vehicle breakdowns, spilled loads or any other events that reduce the roadway capacity. Incidents lead to congestion when the traffic demand exceeds the reduced roadway capacity at the incident location.
- Nationally, highway incidents account for approximately 60 percent of vehicle-hours lost to congestion. Therefore, quick detection, response, and removal of incidents are essential to maximizing the efficiency of the existing traffic networks. It is now widely accepted that these non-recurrent congestion problems can be reduced by the proper use of incident management procedures.

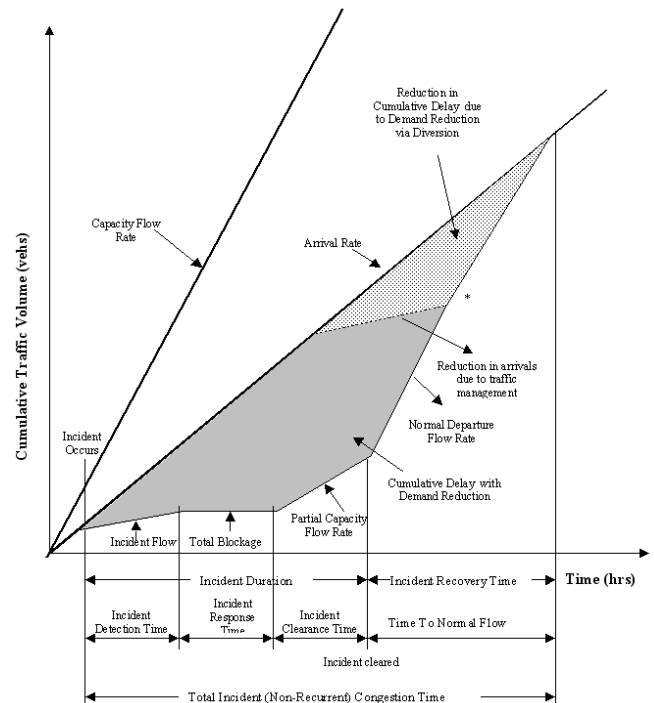


HERE'S THE PROBLEM

- However, there can be various different incident management strategies for a given highway network. For example, choosing the incident detection/verification technology, incident response and clearance rules, pre-planning for incidents are parts of incident management strategy. Evaluation of these alternative strategies is not straightforward.

AND, HERE'S THE SOLUTION

- Develop a microscopic simulation model of the network under consideration. Microscopic simulation is the most accurate way to capture the dynamic nature of traffic flow.



BUT HOW CAN IT BE DONE?

- A realistic traffic simulation model can be developed based on the cell transmission model. The developed software can also generate incidents and test various response strategies and technologies. This integrated incident management and traffic simulation tool can then be applied to the selected highway network using various scenarios ranging from simple to more complex.

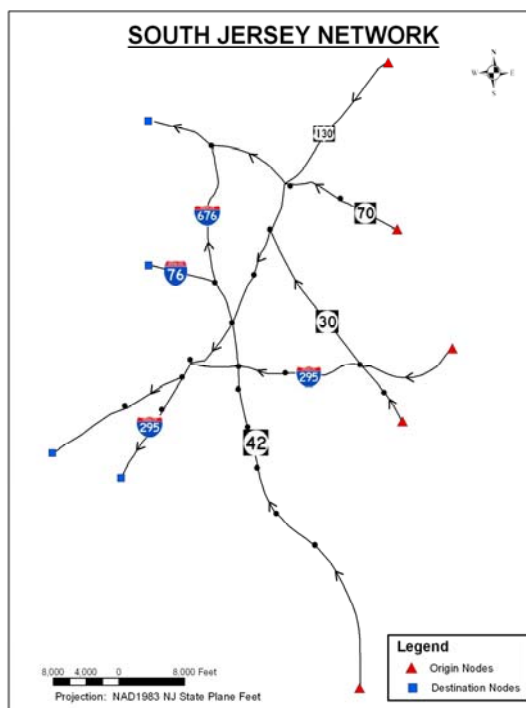


The simulation model was tested using for a simplified version of the south New Jersey Highway network.

THESE ARE THE OBJECTIVES...

- Obtain incident data from NJDOT related to the south New Jersey test network
- Analyze the incident data to understand the incident occurrence characteristics.
- Develop various incident occurrence\incident duration and severity models.
- Develop a comprehensive user-friendly incident management / traffic simulation software.
- Evaluate various incident management strategies using the developed simulation tool
- Finally, conduct a detailed cost benefit analysis for the selected incident management scenarios.

HERE IS WHAT WE DID...



First, we reviewed the related incident management related literature and determined the important incident management procedures and technologies currently used in the US.

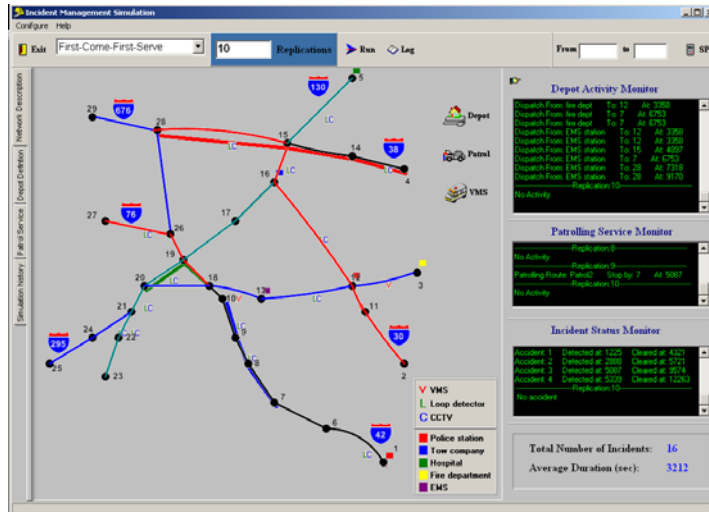
We then reviewed the available incident data specific to New Jersey, and identified various incident types and their characteristics, such as the number of lanes closed, number of injuries and fatalities, type of responses, etc. Based on this vast database, we developed incident occurrence and duration models for different incident types.

We developed a prototype computer model to simulate the various activities involved in incident management operation, including incident generation, incident response procedures such as patrolling service and

variable message signs, and incident detection. This prototype software is called Rutgers

Incident Management Systems (RIMS) software. In addition to the capability of simulating various incident management scenarios, RIMS uses cell transmission model to simulate network-wide traffic flows.

This model provides users with a powerful tool to assess current settings of an incident management system (IMS) or predict the effects of any changes to existing systems.



This prototype simulation software is implemented in C++ programming language with user-friendly interface and graphic output. A snapshot of RIMS is shown above.

Finally, the cost-benefit of various different incident management strategies is conducted. The results show that the benefit cost ratio of using closed circuit television (along route 295 for incident detection) is between 8.5 and 11. The benefit

cost ratio of using loop detectors along the same route is between 5.4 and 7. The results demonstrate the benefit cost ratio of various. Various incident detection technologies (closed circuit television, loop detectors), traffic management strategies (incident information using variable message signs) and incident response strategies (freeway service patrol) are evaluated in this comprehensive cost-benefit analysis.

FOR MORE INFORMATION CONTACT:

NJDOT PROJECT MANAGER:	Karl Brodtman
e-mail	@DOT.STATE.NJ.US
UNIVERSITY PRINCIPAL INVESTIGATOR:	Dr. Kaan Ozbay
UNIVERSITY:	Rutgers University -CAIT
PHONE NO.	(732) 445-2792
e-mail	kaan@rci.rutgers.edu