
Problem
Although the Eastern Shore region of Maryland comprises more than one third of Maryland's land area, it has only about 8 percent of the total state population. The main activities on the Eastern Shore are farming, seafood, chicken breeding, and more importantly, services related to tourism. Ocean City is the most famous resort destination in the Eastern Shore region. Its population in the summer peak season can reach up to 300,000, compared with 7,000 to 25,000 during the off-peak season. This large population size in the summer season and the potential threat of hurricanes during the same period justify the need for design of effective hurricane evacuation plans.

Objectives
The objectives of this study are to design of effective algorithms for both planning analysis prior to the hurricane attacks, and for real-time control operations during the actual evacuations.

Description
This report presents the research methodology of the developed simulation/optimization system that has been under field operations since 2005. The entire methodology consists of three primary models. Its first method is designed for evacuation planning with dynamic traffic assignment algorithms. The second and third models are developed for optimizing the evacuation operations at the network level, including the designation of critical control points, the locations of intersections and ramps to be closed, and the optimized cycle length as well as signal timings for each intersection on the evacuation route.

Results
The study has produced a simulation/optimization system that can exert the following functions for traffic management: (1) a set of optimal route algorithms that allow responsible staff to optimally direct evacuation populations under different allowable evacuation time windows and traffic conditions; (2) a microscopic traffic simulator that covers the entire network from Ocean City to the Bay Bridge; (3) a customized interface that allows target users to conveniently model all pre-planned traffic management strategies (such as using shoulders as traffic lanes) during any emergency evacuation; and (4) a customized output module that can display the simulated traffic conditions based on the request of users and the proposed traffic management plan, such as the travel time and speed for a selected highway segment over a target time window.

Report Information
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