MarTREC
Maritime Transportation Research & Education Center

MarTREC UTC Project Information Form
USDOT Tier 1 University Transportation Center
Agency ID or Contract Number DTRT13-G-UTC50

Project Title: Development of a Large-Scale Traffic Simulation Model for Hurricane Evacuation of Mississippi Coastal Region
Project Abstract (Brief Description): Hurricanes are one of the most catastrophic events resulting in severe consequences including loss of life and property damage. The magnitude of devastation was evident in the hurricanes Katrina and Rita in the Gulf coast. The Mississippi Gulf coast region generally refers to the Gulfport-Biloxi-Pascagoula Area that consists of the Gulfport-Biloxi Metropolitan Area and the Pascagoula Metropolitan Area, including five counties and a joint population of about 400 thousand residents and 150 thousand families. The casino industry and tourism in the region also attract thousands of tourists and travelers from everywhere. Emergency management teams play a huge role in safeguarding the lives of people in endangered areas by evacuating them to safer locations as efficiently as possible. An evacuation plan is an essential component of an emergency plan. The proposed research will study the effect of applying various traffic control plans (TCP) to the Mississippi coast region to provide the most efficient movement of vehicles out of the region during a hurricane evacuation.
Describe Implementation of Research Outcomes (or why not implemented) – The project demonstrates the effectiveness of using a gate control strategy for traffic management in an emergency evacuation when people within a localized Protective Action Zone (PAZ) must be evacuated with a short notice. Selected nodes on the PAZ boundary with access and volume capacities could be treated as gates for evacuation traffic to be guided through with a higher priority over traffic using the non-gate nodes. In the study, an optimization process is sought to minimize the total travel cost of the evacuation trips with a gate control strategy while traffic constraints and network equilibriums are considered. The effectiveness of the model is first tested by the computation results drawn from an assumed evacuation network. The computation results show that the gate control strategy could improve the performance of an evacuation by reducing the numbers of conflicts in trip routes and traffic movements. Then, the model is tested in a case study of a real evacuation network in the Mississippi Gulf Coast region with nodes and links in several counties, respectively. The experimental study results show that the gate control strategy could achieve an effective evacuation operation and improve the performance of the evacuation by reducing average travel time in trip routes and conflicting traffic movements compared with a non-gate situation where evacuation trips are conducted based on "shortest paths" without a gate control strategy.
Impacts/Benefits of Implementation (actual, not anticipated) This project studied improved traffic flow assignment within an evacuation network and indicates that implementation of a gate control strategy could effectively decrease the total travel cost and reduce the degree of conflicts related to traffic movements and trip routes inside the network and improve evacuation performance.
Web Links: http://www.jsums.edu/imtrans/
Budget (Funding) Amounts & Source(s) (US DOT +Match(s) =Total Costs): $50,000 MarTREC + $25,000 JSU matching = total cost of $75,000
Project Start and End Dates: Project Start and End Dates: 07/01/14 – 06/30/15 A no cost extension granted until 07/31/15. Project complete.
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