

MarTREC UTC Project Information Form
 USDOT Tier 1 University Transportation Center
 Agency ID or Contract Number 69A3551747130

Project Title: Modifying Ramp Management Strategies to Enhance Resiliency of Freeway Facilities
Project Abstract (Brief Description): Increased traffic demand of coastal areas during emergency evacuations have been shown to affect transportation systems negatively. Constrained state and federal budgets to add system capacity suggests that the available transportation infrastructures should be utilized in a more efficient manner. Ramp management strategies have been shown to improve performance of freeway facilities by metering the vehicles at on-ramps through signalization. The number of vehicles prescribed to enter the freeway is usually calculated by an online adaptive traffic control that attempts to optimize the freeway performance by striking a balance between allowable turbulence of the mainline freeway and the vehicles waiting at the onramp. Despite the advancements in traffic flow analysis, few, if any, research has been carried out to modify a ramp metering algorithm and meter the on-ramps as a function of the mainline capacity based on stochastic approach. As a result, this research will aim to estimate the capacity distribution function of a real-world freeway section located in a coastal area and modify its ramp metering algorithm (i.e. activate the on-ramp signals as a function of the capacity of the mainline) to postpone freeway flow-breakdowns. To test the validity of the proposed modifications, a microsimulation software (e.g. VISSIM) will be used and Measures of Effectiveness (MOE) such as elapsed time until breakdown, mainline speed, average network delay, and total travel time will be used. Application of the ramp management algorithms modified by this method becomes increasingly important during emergency evacuation in which resilient and efficient operation of the freeways is of great interest to serve the increased demand of coastal areas.
Describe Implementation of Research Outcomes (or why not implemented) - Place any photos here <i>To be determined upon conclusion of the project:</i> Mathematical model that could be implemented in the Highway Capacity Manual and/or emergency planning and preparedness strategies.
Impacts/Benefits of Implementation (actual, not anticipated) <i>To be determined upon conclusion of the project:</i> Traffic flow breakdowns will be postponed and resiliency of freeways will be improved.
Web Links: martrec.uark.edu
Budget (Funding) Amounts & Source(s) (US DOT +Match(s) =Total Costs): \$87,232 USDOT + \$37,349 Matching funds =\$124,581
Project Start and End Dates: 7/01/2020-9/30/2023 Complete
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