



# RESEARCH PROJECT CAPSULE [ 22-1ST ]

September 2021

TECHNOLOGY TRANSFER PROGRAM

## Investigating and Developing a MASH Compliant Contraflow Ramp Closure Gate

### JUST THE FACTS:

**Start Date:**

August 10, 2021

**Duration:**

5 months

**End Date:**

January 9, 2022

**Funding:**

SPR: TT-Fed/TT-Reg – 6

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### POINTS OF INTEREST:

Problem Addressed / Objective of  
Research / Methodology Used /  
Implementation Potential

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### PROBLEM

During hurricane evacuation and other emergencies for which contraflow is enabled, it becomes necessary to close some highway on/off ramps. The Louisiana Department of Transportation and Development (DOTD) developed a cost-effective portable swinging gate arm that can be installed and deployed with minimal effort. The gate arm can be brought to specific locations and installed parallel to traffic, then rotated into position to close a ramp when required. This ramp closure gate needs to be tested for compliance with the Manual for Assessing Safety Hardware (MASH).



Figure 1. DOTD contraflow ramp closure gate

### OBJECTIVE

The research objective is to investigate the MASH crashworthiness of the DOTD ramp closure gate through computer simulation. Using the current DOTD gate system as a model, this project will evaluate the design according to MASH test numbers 60, 61, and 62 criteria.

### METHODOLOGY

To achieve the objectives of this research, the research team will complete four tasks:

- **Task 1:** Conduct a review of the ramp-closure gate system. The team will identify the component sizes and materials for developing the explicit finite element model in the next task.
- **Task 2:** Construct the finite element model of the gate and the slip base support system.
- **Task 3:** Perform a finite element simulation under MASH Test Level 3 condition. The researchers will perform the computer simulation at three different impact angles to help identify the critical impact angle (CIA). In addition, the impact at three different locations of the gate will be simulated and evaluated.
- **Task 4:** Generate a final report of the simulations and summarize the performance of the ramp-closure gate system per MASH evaluation criteria. If the system underperforms, the researchers will provide design recommendations to improve the system performance based on the information gleaned from the simulation effort.

### IMPLEMENTATION POTENTIAL

This project will benefit the state of Louisiana as well as other members of the Roadside Safety Pooled Fund by providing crashworthiness assessment for a type of ramp-closure gate. The design may become a valuable option for members of the Roadside Safety Pooled Fund to implement when needed.