



Research Project Statement 20-090 FY 2019 Annual Program

Title:	Develop Enhanced Protection of Median Openings Between Parallel Bridge Structures
The Problem:	<p>When a divided highway crosses over a lower roadway, river, or other obstacle, two separate parallel bridge structures are often used to span over the obstacle. TxDOT shields motorists from the underlying hazard and the bridge end hazard by installing an appropriate length of metal beam guard fence (MBGF) per current design standards. This creates a zone with a sloped median ditch with a length of MBGF on each side that can funnel errant vehicles toward the steep drop-off between the bridges and the obstacle the bridges are spanning. While MBGF is an effective method for containing passenger vehicles in close proximity to the bridge, there have been instances in which an errant vehicle has entered the median in advance of the MBGF and been directed into the median opening.</p> <p>This behavior can have serious consequences not only for the occupants of the errant vehicle, but also for any motorists below the structures if they are spanning another roadway. The hazard posed by these median openings is not limited to passenger cars, but also include trucks and buses. The National Transportation Safety Board (NTSB) is currently conducting an investigation into a fatal crash that involved a motorcoach encroaching into the median and traveling into a ravine underlying twin bridge structures. Because of the weight and high vertical center-of-gravity of a bus, this type of impact requires special attention in the design and deployment of a safety arresting system. Research is needed to evaluate safety devices for arresting errant vehicles in the median between parallel structures, and to identify high-risk locations suitable for their implementation.</p> <p>Wrap around MBGF systems, often referred to as "bullnose" systems, are only suitable for arresting a passenger vehicle and have many deployment limitations that include median width and flat median terrain in advance of and behind the system. Arresting nets, such as a Dragnet type system, offer potential for bringing errant vehicles, including buses and trucks, to a controlled and safe stop. These devices may provide an optimum solution to shielding these median openings, but their impact performance on sloped terrain and with a range of vehicles must be evaluated. A Dragnet type system could also possibly be used redundantly with a MBGF length-of-need (LON) application, thus offering an additional level of safety.</p>
Technical Objectives:	<p>The objective of this research is to develop a safe method for preventing errant motorists from entering median openings between parallel bridge structures.</p> <p>The researchers shall accomplish the following tasks:</p> <ol style="list-style-type: none">1. Perform analyses to determine what characteristics constitute a high-risk location.2. Critically evaluate currently available systems capable of arresting errant vehicles to determine their application based on design requirements and limitations.3. Develop a new systems capable of arresting errant vehicles, with preference for a system that offers a level of redundancy.4. Perform full-scale crash testing by an ISO 17025 accredited laboratory to evaluate the impact performance and containment capabilities of the selected technology. The testing will consider both passenger vehicles and a bus/motorcoach.5. Develop guidelines to assist designers with the identification of appropriate devices to be used for specific site requirements.6. Determine how the arresting technologies shall be deployed to prevent errant vehicles from entering the median opening zone. <p>The expectation of this project is that the end product will obtain a TRL level 6.</p>



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Desired Deliverables:	<ol style="list-style-type: none">1. Technical memorandum for each task completed.2. Monthly progress reports.3. Value of Research (VoR) that includes both qualitative and economic benefits, to be included in the final research report.4. Research report documenting the findings of the research, including:<ol style="list-style-type: none">a. Results of analyses to determine characteristics of high-risk median openings between parallel structures.b. Details of current devices on the market that can safely arrest errant vehicles of various sizes.c. Design and evaluation of vehicle arresting systems for shielding openings between parallel bridge structures.d. Guidelines for the identification of high-risk locations and the implementation of countermeasures.5. Project Summary Report.
Proposal Requirements:	<ol style="list-style-type: none">1. Utilize the "Proj/Agre" and "PA_Form" templates located at the TxDOT RTI website.2. Proposals will be considered non-responsive and will not be accepted for technical evaluation if they are not received by the deadline or do not meet the requirements stated in RTI's University Handbook, which is also located at the RTI website.3. Proposals should be submitted in PDF format, 1 PDF file per proposal. File name should include project name and university abbreviation.4. This project will be tracked during the life of the project using a Technology Readiness Level (TRL) scale. For more information about the use of a TRL, click.