Title:	Development of Non-Fracture Critical Steel Box Straddle Caps
The Problem:	Steel boxes are often used for straddle bents in congested urban environments. The bents typically span highway on-ramps or other underpasses that prevent the use of conventional bridge pier systems. The high strength-to-weight ratio of steel is attractive since the box section can be easily erected with relatively small cranes; however, the single boxes are classified as fracture critical, which therefore require an increase in the level of inspection compared to non-fracture critical structures. Inspections of these boxes are very time-consuming and difficult due to the confined space and complex stiffening details that are often required inside the box. Developing a box section with improved redundancy and/or resiliency can substantially improve the long-term economy and safety of the straddle caps since the level of inspection and maintenance can be reduced.
Technical Objectives:	The researchers shall address the following: 1. Through full-scale laboratory testing and parametric finite element analysis, develop details and design recommendations to improve the redundancy and behavior of the boxes at resisting cracks. 2. The primary detail to be studied is the incorporation of post-tensioning to the steel box cap to provide redundancy as a fail-safe mechanism to preclude collapse in the event of cracking of the box section. 3. Investigate the impact of the modified details on the fatigue performance of the cap. 4. Consider different methods of retrofitting existing straddle caps, although the primary focus will be on new construction. The expectation of this project is that the end product will obtain a TRL level 6.
Desired Deliverables:	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 the feasibilities of the proposed steel box cap design modifications and construction, design and construction procedures, computational and experimental studies, and design recommendations and examples for design engineers. 5. Project Summary Report.
Proposal Requirements:	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.