Title:	Use of Larger Diameter Shear Studs for Composite Steel Bridges
The Problem:	Composite steel bridges normally use 7/8 inch diameter shear studs welded to the top flange of the beam in a fabrication shop. A very large number of shear studs are typically needed to satisfy AASHTO fatigue requirements. The large number of shear studs on beams can interfere with placement of partial depth precast concrete deck panels. The large number of shear studs can also pose a safety hazard for workers during field construction since there is little space available on the beam top flange for a worker to safety stand or walk. Using larger diameter shear studs will significantly reduce the number of studs required on composite steel girders. For example, a 1-1/4 inch diameter shear stud has twice the area of a 7/8 inch stud. The use of 1-1/4 inch studs can potentially reduce the required number of shear studs in half. This large reduction in the number of shear studs may allow the use of a single line of studs along the center of the beam. This will simplify the placement of precast deck panels, thereby simplifying construction, and leaving more space for workers to stand on the flange, increasing worker safety. Reducing the number of shear studs will also help facilitate the use of precast deck systems where shear studs are placed in grout pockets.
Technical Objectives:	The objectives of this project are to evaluate the feasibility of using larger diameter shear studs for composite steel bridge construction, and to develop design guidelines for evaluating the static and fatigue strength of larger diameter studs. The researchers shall address the following: 1. Evaluate shear studs with a diameter greater than the currently used 7/8 inch stud, with diameters up to 1-1/4 inch. 2. Perform testing to develop data on fatigue strength and ultimate strength of the large diameter shear connectors using push-out tests, and to evaluate girder performance using large-scale girder tests. 3. Calibrate the finite element (FE) model based on testing results and then use the validated FE model to investigate behavior under a range of girder sizes and spans, and other design variables. 4. Work with bridge fabricators, bridge erectors, and stud welding manufacturers to evaluate practical advantages and difficulties of using larger diameter shear studs. The expectation of this project is that the end product will obtain a TRL level 5.
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 design recommendations for the use of 1-1/4 inch shear studs. The research report should also include specification language for possible adoption in the ASHTO LRFD Bridge Design Specifications. 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.