Title:	Determine Service and Ultimate Behavior for Bent to Column Joints in TxDOT Substructures
The Problem:	TxDOT has long used very simple column to cap connection details in cast-in-place (CIP) bent construction. The most common has been the round column and rectangular bent caps of multi-column bents. Columns typically range from 24 inches to 42 inches diameter and project vertical reinforcing terminating nominally 6 inches from the top of a bent cap depth with no hooks, 180 degree bends, or headed terminators. In some previous cases, bar extension was less than standard development length. Bent cap shear reinforcement typically starts with a stirrup positioned over the edges of the column and no additional reinforcement in between. Consequently, no confining reinforcement exists within these joints. These structures are commonly exposed to limit states from significant lateral stream forces and debris accumulation in flood or loss of a column support due to vehicle collision. Improved joint details can provide additional improvement in system behavior at such extreme event limit states. In addition, improved joint details might show modest improvements in serviceability behavior with less joint cracking.
Technical Objectives:	This research will demonstrate the effectiveness of low cost improvements in joint detailing in ultimate and service level behavior in these elements. To achieve these objectives, the work to be performed shall include: 1. Conduct literature review that provides range of techniques used with this type of system. 2. Develop an experimental test program to examine joint details. 3. Use a combination of physical testing and analytical methods. Compare past/current/proposed joint details, including stiffness effects that might improve the load carrying capacity the bent caps and columns. 4. Analyze the results of the physical testing and analytical methods. 5. Recommend the most effective details for incorporation in standard TxDOT detailing practice, including detailing updates, design methods, and demonstrated system behavior improvements. The expectation of the project end product(s) shall attain a Technology Readiness Level of 8.
Anticipated 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; not a stand-alone deliverable. 4. Research report documenting the findings of the research, including recommendations for the most effective details for incorporation in standard TxDOT detailing practice, including detailing updates, design methods, and demonstrated system behavior improvements. 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.