



# FY 2025 Annual Program Research Project Statement 25-025

<b>Title:</b>	Develop Design Methodologies and Efficient Details for Triple I-Girder Steel Straddle Caps
<b>The Problem:</b>	<p>Steel straddle caps are efficient alternatives to concrete straddle caps due to steel's high strength to weight ratio. Traditionally, steel straddle caps have been comprised of closed box sections and are typically designated as non-redundant steel tension members (NSTM), requiring significant design, fabrication, and inspection effort.</p> <p>The triple I-girder steel straddle cap is a relatively new concept that avoids the NSTM designation by providing load-path redundancy. This cap type has been recently designed and constructed in Texas with another currently in the design phase.</p> <p>The triple I-girder steel straddle cap system is typically detailed to have the bridge girders bear on the top of the cap's center girder (stacked configuration). However, an alternative system configuration is being designed which frames the bridge girders into the exterior cap girders (integral configuration), complicating the design and detailing.</p> <p>A third possible configuration supports bridge girders on brackets that are attached to the web of the exterior cap girders (corbeled configuration). Integral and corbeled configurations are beneficial because they can dramatically reduce vertical clearance since the bridge girders are in-line with the cap girders.</p> <p>These systems have the potential to be widely used in Texas due to their efficiency and redundancy. The triple I-girder concept alleviates the redundancy concern and will promote the use of an efficient system that might have otherwise been considered cost prohibitive. Developing efficient details that allow designers to employ this system for both stacked and integral configurations would help promote its use.</p>
<b>Technical Objectives:</b>	<p>The objectives of this project are:</p> <ul style="list-style-type: none"> <li>• Conduct a literature search and survey of DOTs for national/international designs.</li> <li>• Assemble an industry advisory group (IAG) to identify fabrication and constructability constraints.</li> <li>• Develop and execute an experimental testing and parametric FEA study program for bolted triple I-girder straddle caps (considering stacked, integral, and corbeled configurations) which considers all applicable design limit states.</li> <li>• Develop design methodologies and efficient details to allow designers to employ this system which are informed by the IAG, experimental testing and FEA studies for stacked, integral, and corbeled configurations.</li> <li>• Provide design and detailing recommendations for new designs to be incorporated in the TxDOT LRFD Bridge Design Manual and Preferred Practices for Steel Bridge Design, Fabrication, and Erection.</li> </ul> <p>The expected technology readiness level (TRL) for this project is 8.</p>
<b>Anticipated Deliverables:</b>	<ol style="list-style-type: none"> <li>1. Technical memorandum for each task completed.</li> <li>2. Monthly progress reports.</li> <li>3. Project Summary Report</li> <li>4. Research report documenting the findings of this research, including: <ul style="list-style-type: none"> <li>• Information from Advisory Group on fabrication and construction constraints.</li> <li>• Detailed design methodologies.</li> <li>• Results and findings from testing program.</li> <li>• Design/detailing recommendations.</li> <li>• Value of Research (VoR) that includes both qualitative and economic benefits.</li> </ul> </li> </ol>

<b>Proposal Requirements:</b>	<ol style="list-style-type: none"><li>1. RFP#1 Q&amp;A Deadline: 12:00 p.m. Central Time, <b>Tuesday, February 20, 2024.</b></li><li>2. Proposal Deadline: 12:00 p.m. Central Time, <b>Thursday, March 21, 2024.</b></li><li>3. Use the current “ProjAgre” and “PA Forms” templates located at the <a href="#">RTI Forms webpage</a>.</li><li>4. 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 <a href="#">University Handbook</a>.</li><li>5. Proposals should be submitted by the University Liaison in PDF format; (1) PDF file per proposal. File name should include project name and university abbreviation.</li><li>6. This project will be tracked during the life of the project using the Technology Readiness Level (<a href="#">TRL</a>) scale.</li><li>7. The 2021 Texas Legislative Session requires that universities be in compliance with Senate Bill 475 by submitting a completed and signed TxDOT Security Questionnaire (TSQ) to <a href="mailto:RTIMAIN@txdot.gov">RTIMAIN@txdot.gov</a>. Universities that have not submitted a completed and signed TSQ one week after award will be considered non-compliant and unable to participate in the Program.</li></ol>
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