



FY 2025 Annual Program Research Project Statement 25-026

Title:	Develop Concrete Girder Splice Details with Application of Ultra-High-Performance Fiber-Reinforced Concrete (UHPFRC)
The Problem:	<p>Ultra-High-Performance Fiber-Reinforced Concrete (UHPFRC) provides superior bond between concrete and reinforcing bars and significantly reduces the development length of reinforcement, which can be used to connect precast girder elements and provide enough moment and shear resistance by the UHPFRC splices. The girder splices could be at pier locations to provide negative bending resistance or within the span to provide positive bending resistance along with shear resistance. However, this project shall focus on girder splices at pier locations only. The length of girder splices is envisioned to be significantly reduced due to the use of UHPFRC. Both girder splice and deck should be designed appropriately. The joint cracking-resistant performance against leakage and durability shall be evaluated.</p> <p>This project shall develop UHPFRC connection details for TxDOT precast girder and composite deck bridges using the Simple for Dead and Continuous for Live Load (SDCL) concept. SDCL has been widely used to eliminate bridge joints, reduce midspan positive moment and lower maintenance costs for joints. The advantages of UHPFRC will be used to splice TxDOT girders at ends with appropriate details to be developed. The spliced girders and composite deck, without the need of casting transverse diaphragms, is expected to satisfy structural requirements. Regular concrete deck through joints is supposed to be used since deck concrete pour length over joint is not limited. The elimination of joints will improve bridge durability and riding experience, provide some structural redundancy, and reduce maintenance cost.</p>
Technical Objectives:	<p>The objectives of this project are:</p> <ul style="list-style-type: none"> • Conduct a literature review and summarize state-of-the practice and key findings. • Develop UHPFRC mix design, delivery and construction methods for project implementation. • For TxDOT girders, develop appropriate reinforcing details for both joint and girder ends, determine joint length and details to meet the demand for live load continuous with appropriate bearing configuration and pier cap geometry. The joint length should be controlled to be short to fully utilize the advantages of UHPFRC. Constructability should also be considered during splice design. • Evaluate the performance of the connection to satisfy the live load continuous requirement. The joint should also provide some positive moment resistance for the continuous girder to provide a certain structural redundancy. • Provide appropriate splice construction guidelines for TxDOT girder and composite deck bridges. <p>The expected technology readiness level (TRL) for this project is 8.</p>
Anticipated Deliverables:	<ol style="list-style-type: none"> 1. Technical memorandum for each task completed. 2. Monthly progress reports. 3. Project Summary Report 4. Research report documenting the findings of this research, including: <ul style="list-style-type: none"> • Details of proposed design, testing, analyses and construction means and methods. • Detailed girder splice connection design. • Summary of splice design and construction guidelines. • Value of Research (VoR) that includes both qualitative and economic benefits.

Proposal Requirements:	<ol style="list-style-type: none">1. RFP#1 Q&A Deadline: 12:00 p.m. Central Time, Tuesday, February 20, 2024.2. Proposal Deadline: 12:00 p.m. Central Time, Thursday, March 21, 2024.3. Use the current “ProjAgre” and “PA Forms” templates located at the RTI Forms webpage.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 University Handbook.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.6. This project will be tracked during the life of the project using the Technology Readiness Level (TRL) scale.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 RTIMAIN@txdot.gov in advance of a proposal submission. 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.
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