



FY 2025 Annual Program Research Project Statement 25-071

Title:	Develop Data Collection Requirements and Strategic Research Roadmap to Support the Digital Delivery Program
The Problem:	<p>TxDOT is transitioning from GeoPak to OpenRoads Designer (ORD) as part of the Digital Delivery initiative. The Department is also migrating bridge design, storm drain design, and survey as part of this transition. Recently, TxDOT engaged the services of a consultant to develop a strategic plan for the Digital Delivery initiative, as well as assist with its implementation. The consultant's contract runs through 2028 and has a clearly defined scope of work.</p> <p>Research is needed in several areas to facilitate the Digital Delivery initiative and the consultant's work. One of those areas is related to procedures for data collection and processing to support digital delivery and asset management. The consultant is developing 3D model standards and workspaces for typical 3D objects that are being designed. However, a critical research need is how to extract cost-effective 3D models (or digital twins) efficiently from a multiplicity of data sources, including, but not limited to aerial and underground imagery, LiDAR point clouds, and photogrammetry products. These digital twins must meet relevant requirements for both design and construction workflows.</p> <p>Research is also needed to identify software and other industry trends that might affect the Digital Delivery initiative and recommend strategies on how to anticipate and prepare for those trends. Building information modeling (BIM) and digital twin technology for horizontal infrastructure are evolving quickly in the United States, not just in terms of CAD software technology and capabilities, but also in terms of industry standards such as data exchange and software interoperability. These tools have enormous potential not just during all phases of project delivery but also for infrastructure condition monitoring as well as maintenance and improvement need assessments.</p>
Technical Objectives:	<p>The research objectives are:</p> <ul style="list-style-type: none">• Develop and test procedures to extract cost-effective 3D models (or digital twins) efficiently from a multiplicity of data sources, including, but not limited to aerial and underground imagery, LiDAR point clouds, photogrammetry products, etc.• Develop and test automated workflows for change detection, quality control, and updating of 3D models using results from repeat surveys.• Conduct a cost-benefit analysis of data collection/processing precision, accuracy, and density against the potential cost in construction change orders from a looser tolerance in those three parameters.• Conduct a review of software and other industry trends that might affect the Digital Delivery initiative.• Conduct peer exchanges with TxDOT division and district officials as well as the Digital Delivery consultant.• Develop and recommend strategies on how to anticipate, and prepare for, software and industry trends.• Develop a strategic research roadmap to support the Digital Delivery initiative through 2028 and beyond. <p>The expected technology readiness level (TRL) for this project is 8.</p>

<p>Anticipated Deliverables:</p>	<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"> • Procedures to extract cost-effective 3D models (or digital twins) efficiently from a multiplicity of data sources. • Strategies on how to anticipate, and prepare for, software and industry trends. • Strategic research roadmap to support the Digital Delivery initiative. • Methodology for more effective integration with ORD 3D-based tools both during design (e.g., to incorporate digital twins of existing features) and during construction (e.g., to conduct inspections and prepare as-builts). • Effective asset management capability at TxDOT by using reliable 3D as-builts. • Recommendations on cost-effective survey precision and accuracy standards based on potential construction change orders. • Implementation strategies of the Digital Delivery initiative. • Value of Research (VoR) that includes both qualitative and economic benefits.
<p>Proposal Requirements:</p>	<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. 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.