Texas SPR

Subpart B
Work Program

September 1, 2024 – August 31, 2025

Certification and Disclaimer Statements

State Planning & Research Subpart B,
Research, Development, and Technology Transfer Program
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In cooperation with:
U.S. Department of Transportation
Federal Highway Administration

Research Program - SPR 0511(225)
Implementation Program - SPR 2025(002)

Fiscal Year 2025
(September 1, 2024 – August 31, 2025)

Certification Statement

"I Kevin Pete, Director, of the Research and Technology Implementation Division (RTI), Texas Department of Transportation (TxDOT), do hereby certify that the State is in compliance with all requirements of 2 CFR 200 Uniform Guidance, 23 U.S.C. 505 and its implementing regulations with respect to the research, development, and technology transfer program, and contemplate no changes in statutes, regulations, or administrative procedures, which would affect such compliance."

DocuSigned by:
Kevin Pete
D77263CBF1F9429...

Director

5/20/2024

Date

Disclaimer Statement

The Federal Highway Administration's (FHWA) approval of reports constitutes acceptance of such reports as evidence of work performed but does not imply endorsement of a report's findings or recommendations. This report is prepared for FHWA-funded work and includes appropriate credit references and disclaimer statements. The preparation of this report has been financed in part through grant(s) from the Federal Highway Administration, U.S. Department of Transportation, under the State Planning and Research Program, Section 505 of Title 23, U.S. Code. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation.

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1. Texas Department of Transportation Mission, Goals, and Values

The Research and Technology Implementation Division is an office in the Texas Department of Transportation (TxDOT) and supports the department's Mission, Goals and Values, and the TxDOT 2023-2027 Strategic Plan adopted by the Texas Transportation Commission.

TxDOT's Mission, Goals, and Values guide RTI in their desire for excellence. They are as follows:

Mission Statement

Connecting You with Texas.

Vision

A forward-thinking leader delivering mobility, enabling economic opportunity, and enhancing quality of life for all Texans.

Values

- People
- Accountability
- Trust
- Honesty

Goals

- Promote Safety
- Deliver the Right Projects
- Focus on the Customer
- Foster Stewardship
- Optimize system Performance
- Preserve our Assets
- Value our Employees

2. Approval and Authorization Process

2.1. Funding Research-23 CFR 420.115(b)

The Code of Federal Regulations (CFR)—specifically 23 CFR 420.115(b)—says that the federal government is contractually obligated to authorize work funded by the Federal Highway Administration in whole or in part, pursuant to 23 U.S. Code (USC) 106. The CFR requires that appropriate funds be available for the full federal share of the cost of work authorized.

TxDOT funds research through its Research and Implementation Program, overseen by the TxDOT RTI Division. RTI and the Texas state-supported universities conducting the research or implementation executes all project agreements.

RTI provides the fiscal year (FY) 2025 State Planning and Research (SPR) Subpart B Work Program to the Texas FHWA Division Office for review and approval. After the FHWA division administrator for the SPR program gives authorization, RTI executes the project agreements.

2.2. Reporting Requirements-23 CFR 420.117

The CFR, specifically 23 CFR 420.117, requires that TxDOT issue a report for FHWA approval to continue the agreement between TxDOT and FHWA to carry out statewide transportation planning activities as authorized.

According to 23 CFR 420.117, RTI is responsible for program monitoring and reporting requirements. RTI assigns a team of subject matter experts and research project managers that forms the project monitoring committee (PMC) to monitor the activities and performances of all sub-recipients (state-supported universities) to assure that they are managing and performing the work satisfactorily and that they are meeting deadlines.

3. Program Overview

RTI executes a Cooperative Research and Implementation Agreement (CRIA) with each university or university system to conduct research projects. A CRIA contains a set of standard provisions required by state or federal law or agreed to between TxDOT and universities. To participate in the program, each must first execute a CRIA with TxDOT. RTI also publishes the Research Manual and the University Handbook. These two documents and the CRIA outline the provisions and processes of TxDOT's Research and Implementation Program. These documents can be found on our internet Site: http://www.txdot.gov/inside-txdot/forms-publications/publications/research.html

3.1 Types of Projects - Research and Implementation

Detailed information on the types of projects can be found in the Research Manual.

Both types of projects are conducted by Texas state-supported universities. The university identifies a Research Team that consists of a Project Supervisor and other university researchers, or graduate students who will conduct the project's work plan.

Each university participating in the program assigns a central point of contact (Liaison) to handle communication and administration for their projects.

3.1.1. Research Projects

A Research Project is a systematic controlled inquiry, often involving analytical or experimental activities, which seek to gain new knowledge, and which may involve development of new or revised products. The research types includes Basic Research - the study of phenomena, and of observable facts, without specific applications towards processes or products in mind; the primary purpose of this kind of research is to increase knowledge; Applied Research - the study of phenomena to gain knowledge or understanding necessary for determining the means by which a recognized need may be met; the primary purpose of this kind of research is to answer a question or solve a problem; or Development - the systematic use of the knowledge or understanding gained from research, directed toward the production of useful materials, devices, systems or methods, including design and development of prototypes and processes.

3.1.2. Implementation Projects

An Implementation Project is the adoption of a product for use, including Technology Transfer activities that lead to the adoption of a new technique or product by users and involves dissemination, demonstration, training, and other activities that lead to eventual innovation.

3.2. RTI Personnel and Contact Information

Table 1. RTI Personnel

Name	Position Title	Phone Number	Email Address
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3.3 Obligation of Funds

Table 2. Shows how the federal funds appropriated to the Texas SPR Subpart B program are obligated.

Table 2. Obligation of Federal Funds to SPR Subpart B

Program	Funding Available	Federal Project	80% Federal	20% State
Research Program	$23,677,168.61	SPR 0511(225)	$18,941,734.89	$4,735,433.72
RTI Division Program Management	$2,796,887.83	SPR 0511(225)	$2,237,510.26	$559,377.57
Subtotal - Research Program	$26,474,056.44	SPR 0511(225)	$21,179,245.15	$5,294,811.29
Implementation Program	$4,011,418.79	SPR 2025(002)	$3,209,135.03	$802,283.76
Grand Total	**$30,485,475.23**	N/A	**$24,388,380.19**	**$6,097,095.05**

Table 3. Contracting Entities Receiving SPR Subpart B Funds

Entity That Received SPR Funds	SPR Contribution
National Cooperative Highway Research Program (NCHRP)	$5,900,183.63
Pooled-fund projects (lead agencies)	$1,497,667.00
Transportation Research Board (TRB) dues	$725,041.06

3.4 Distribution of Funds to Universities

Figure 1. Distribution of Funds shows the funds budgeted for the Research Program.

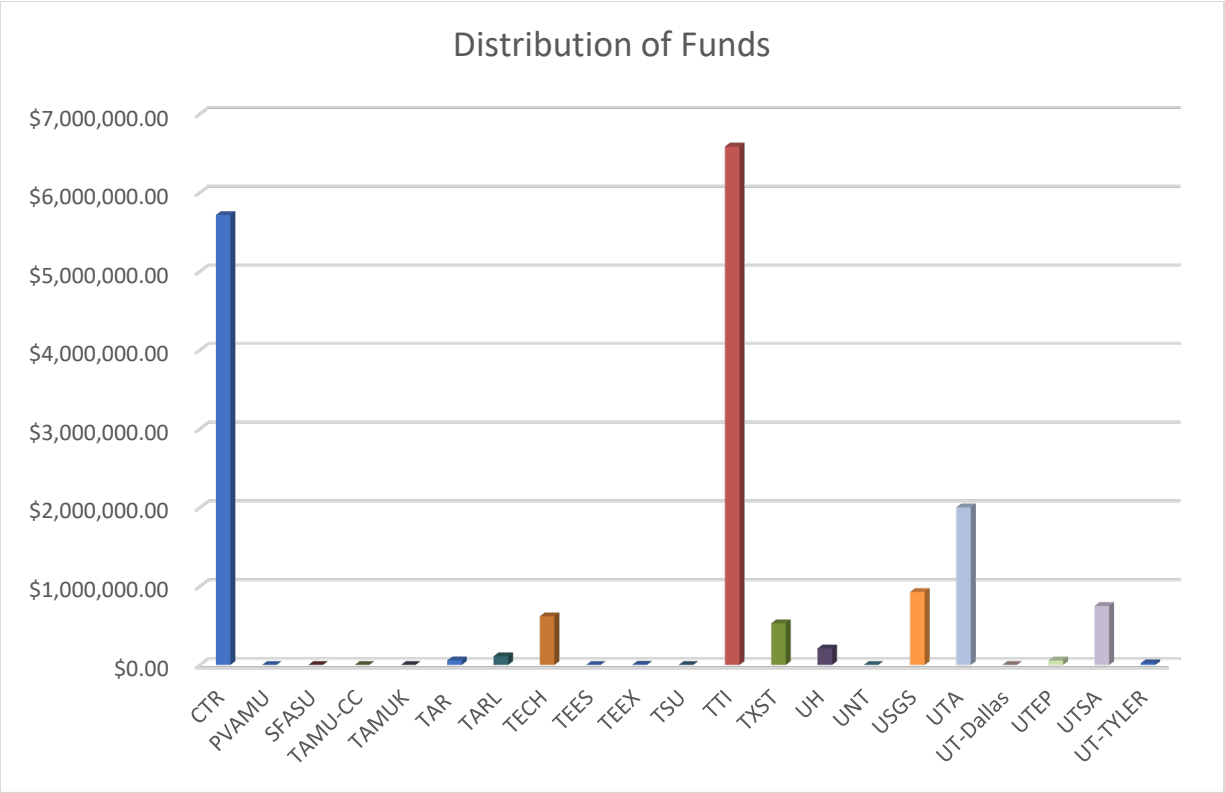


Table 4. Awards by University for Continuing Projects

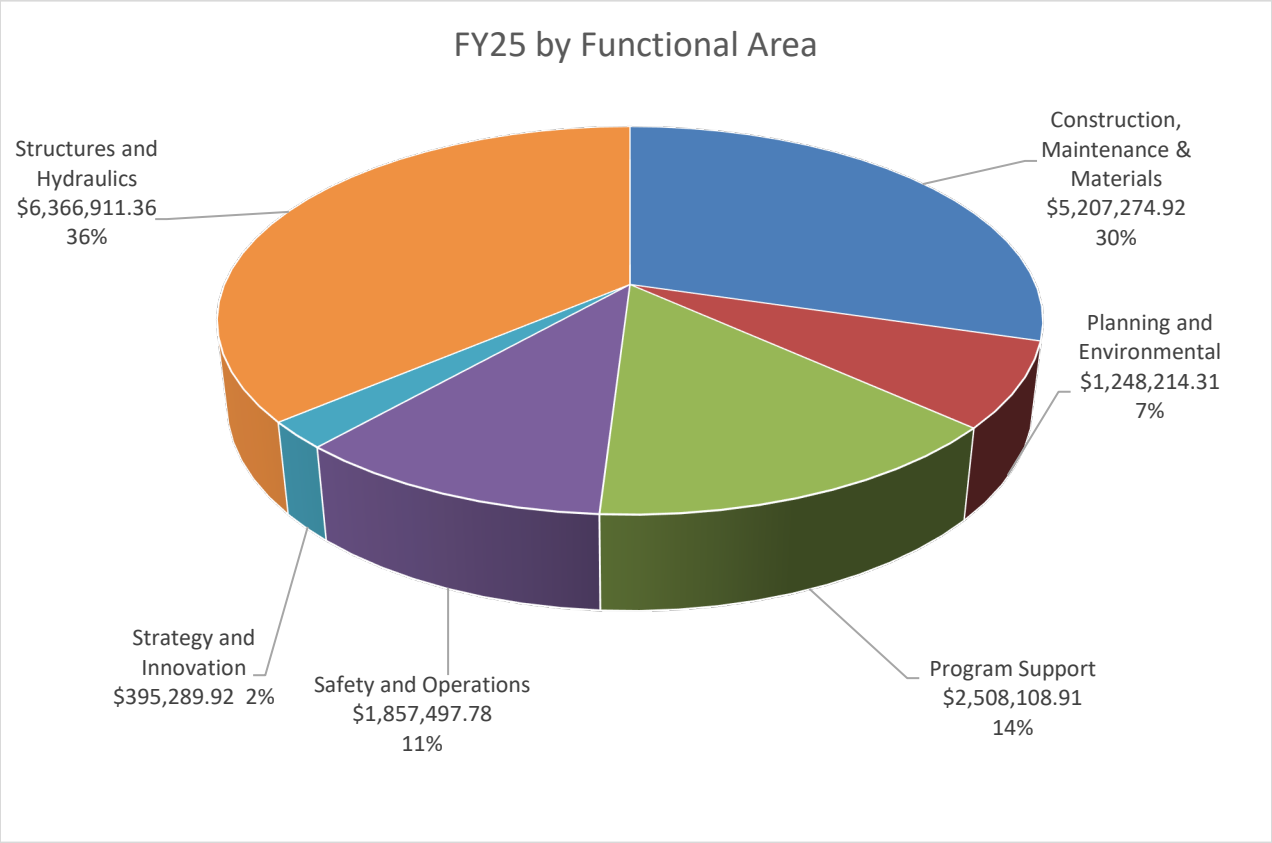
University	Budget for FY25
CTR	$5,715,211.44
TAR	$57,752.50
TARL	$110,468.75
TECH	$617,853.47
TEEX	$2,950.25
TTI	$6,585,775.50
TXST	$528,906.94
UH	$209,683.75
USGS	$926,533.43
UTA	$2,001,132.42
UTEP	$55,991.25
UTSA	$749,068.75
UT-TYLER	$21,968.75
Grand Total	**$17,583,297.20**

3.5 Distribution of Funds by Functional Area

Table 5. Shows the funds budgeted to each research area for continuing projects in FY25

Functional Area	Budget	80% Federal	20% State
Construction, Maintenance & Materials	$5,207,274.92	$4,165,819.94	$1,041,454.98
Planning and Environmental	$1,248,214.31	$998,571.45	$249,642.86
Program Support	$2,508,108.91	$2,006,487.13	$501,621.78
Safety and Operations	$1,857,497.78	$1,485,998.22	$371,499.56
Strategy and Innovation	$395,289.92	$316,231.94	$79,057.98
Structures and Hydraulics	$6,366,911.36	$5,093,529.09	$1,273,382.27
Total	$17,583,297.20	$14,066,637.76	$3,516,659.44

Figure 2. Annual SPR Subpart B Work Program Budget by Functional Area



3.6 Acronyms and Abbreviations

Table 6. Lists acronyms used in this document.

Acronym	Definition
APER	Annual Performance and Expenditures Report
CFR	Code of Federal Regulations
CRIA	Cooperative Research and Implementation Agreement
CTR	University of Texas at Austin's Center for Transportation Research
FAC	Functional Area Committee
FHWA	Federal Highway Administration
FY	Fiscal Year
LAMAR	Lamar University
PVAMU	Prairie View A&M University
RFA	Request for Research Fund Authorization
RTI	Research and Technology Implementation Division
SFASU	Stephen F. Austin State University
SHSU	Sam Houston State University
SPR	State Planning and Research
TAMU	Texas A&M University
TAMU-C	Texas A&M University at Commerce
TAMU-CC	Texas A&M University at Corpus Christi
TAMUK	Texas A&M University–Kingsville
TAR	Texas A&M AgriLife Research
TARL	Tarleton State University
TECH	Texas Tech Univ Ctr for Multidisciplinary Transportation Research
TEES	Texas A&M Engineering Experiment Station
TEEX	Texas A&M Engineering Extension Service
TSU	Texas Southern University
TTI	Texas A&M Transportation Institute
TxDOT	Texas Department of Transportation
TXST	Texas State University
UH	University of Houston
UNT	University of North Texas
USC	U.S. Code
USDOT	U.S. Department of Transportation
USGS	United States Geological Survey
UTA	University of Texas at Arlington
UT-Dallas	University of Texas at Dallas
UTEP	University of Texas at El Paso
UTHSC	University of Texas Health Science Center
UT-Permian Basin	University of Texas Permian Basin
UTSA	University of Texas at San Antonio
UT-Tyler	The University of Texas at Tyler
WTAMU	West Texas A&M University

3.7 University Contact Information

Contact information for the contact persons from universities participating in the RTI research program.

Table 7. Personnel from Participating Universities

Name (Liaison**)	University	Phone#	Email Address
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4. Fiscal Year 2025 Research and Implementation Program

RTI will execute additional projects identified in the FY 25 Request for Proposals (RFP) and hold project kick-off meetings for new projects. RTI Project Managers will oversee active projects to ensure the project's work plans are being executed by the awarded universities. Throughout the year, project progress meetings are held to discuss project status and gain advisement and guidance from the project monitoring committees. Close-out meetings will also occur throughout the year as projects close and contracts terminate. RTI will perform annual calls for research ideas and conduct project selection meetings with the various research committees consisting of subject matter experts throughout the state. Universities will also be invited to hear information regarding the Program and discuss potential research ideas. RTI will also publish video summary reports for most research projects, research digests, newsletters and a Program Book detailing information about the project's research results. In December, the Annual Performance and Expenditures Report (APER) will be developed and submitted to FHWA.

4.1 General Overview*

4.1.1. Research Program

- There are fifty-six (56) Research Projects that are continuations of active projects.
- New Research Projects will be added as modifications to the Work Program with FHWA approval.
- There are five (5) Implementation Projects that are continuations of active projects.
- There are thirty-three (33) Pooled Fund Projects; one (1) is Texas-led.

4.1.2. RTI Administration and University Support Projects

- There is one project that funds the Administration of the SPR Program (0-0050)
- There is one project that funds the Local Technical Assistance Program (5-7097-24)
- There is one project that funds the Research Transportation Library (0-9902-23)
- There is one project that funds the Digital Publication and Outreach Services in Support of Research (0-6974)

4.1.3. RTI Administration and FHWA Grant Supported Projects

- There is one USDOT ADS grant project administered by the division with non-SPR funds (0-7099)

4.2 List of Implementation Projects

Functional Area	Project No.	Project Title	Status
Construction, Maintenance & Materials	5-6048-07	Implementation of Centrifuge Technology for Pavement Design on Expansive Clays – Phase 2	Continuing
Construction, Maintenance & Materials	5-7025-01	Pilot Implementation of Surface Aggregate Classification of Reclaimed Asphalt Pavement	Continuing
Program Support	5-7097-24	Texas Local Technical Assistance Program (TxLTAP)	Continuing
Safety and Operations	5-7007-01	Weather Responsive Management Strategies Implementation	Continuing
Structures and Hydraulics	5-6936-01	Implementation of Semi-integral Bridges in Texas	Continuing

4.3 List of Continuing Research Projects

Functional Area	Project No.	Project Title	Status
Construction, Maintenance & Materials	0-6674-04	Automated IDEAL Cracking and Rutting Tests	Continuing
Construction, Maintenance & Materials	0-7073	Improving Testing Requirements in Item 300 Of TxDOT Standard Specifications	Continuing
Construction, Maintenance & Materials	0-7103	Investigating Prime versus Curing: Where, When and Why	Continuing
Construction, Maintenance & Materials	0-7104	Establish Performance-Based Acceptable Lab-Molded Density Range for Mix Design and QC/QA	Continuing
Construction, Maintenance & Materials	0-7105	Measuring Seal Coat Rate Field Adjustments	Continuing
Construction, Maintenance & Materials	0-7106	Quantify Maximum Accumulated Seal Coat Layers for Stability	Continuing
Construction, Maintenance & Materials	0-7141	Evaluation of Nano-Materials in Concrete for Improved Durability	Continuing
Construction, Maintenance & Materials	0-7143	Develop Methodologies for Reducing Costs in Full Depth Reclamation (FDR) Construction	Continuing
Construction, Maintenance & Materials	0-7145	Develop Rapid New Tests for Detecting Poor Quality Binders and RAP Materials	Continuing
Construction, Maintenance & Materials	0-7147	Project Level Performance Database for Rigid Pavements in Texas, Phase III	Continuing
Construction, Maintenance & Materials	0-7148	Develop Design Details for CRCP Whitetopping at Intersections	Continuing
Construction, Maintenance & Materials	0-7150	Artificial Intelligence for Pavement Condition Assessment from 2D/3D Surface Images	Continuing

Functional Area	Project No.	Project Title	Status
Construction, Maintenance & Materials	0-7151	Develop Recommendations for Evaluating Surface Types and Aggregate Properties to Minimize Wet Weather Crashes	Continuing
Construction, Maintenance & Materials	0-7173	Develop Guidelines for Evaluation of Embankment Conditions in Bridge Approach Slabs and Pavement Structures	Continuing
Construction, Maintenance & Materials	0-7175	Develop Best Practices for Flexible Pavement Repairs	Continuing
Construction, Maintenance & Materials	0-7177	Identifying Pavement Improvement Projects for Enhanced Safety	Continuing
Construction, Maintenance & Materials	0-7178	Use Network Level Texture to Enhance Pavement Management	Continuing
Construction, Maintenance & Materials	0-7185	Develop Enhanced Cold Recycling Methods and Specifications	Continuing
Construction, Maintenance & Materials	0-7186	Develop Next Generation of Hamburg Rutting Test for Asphalt Mixes	Continuing
Construction, Maintenance & Materials	0-7191	Develop Systematic and Quantitative Approach to Assess the Probability of Extreme Weather and Resilience Risks for TxDOT Highways and Bridges	Continuing
Construction, Maintenance & Materials	0-7195	Quantify Bridge and Pavement Consumption Due to Permitted Overweight/Oversized (OW/OS) Vehicles	Continuing
Construction, Maintenance & Materials	0-7197	Evaluate Effects of Recycled Asphalt Pavement (RAP) on Performance-Graded (PG) Binder Polymer Concentration	Continuing
Planning and Environmental	0-7022-01	Monarch Conservation Strategies for Texas Roadways	Continuing
Planning and Environmental	0-7023-01	Determining Downstream Ecological Impacts of Sediment Derived from Bridge Construction	Continuing
Planning and Environmental	0-7152	Estimating Latent Bicyclist and Pedestrian Demand for Shared Use Path Design	Continuing

Functional Area	Project No.	Project Title	Status
Planning and Environmental	0-7174	Develop an Interactive Statewide Production Rate Estimation Tool for Reliable Contract Time Determination	Continuing
Planning and Environmental	0-7182	Determine Effectiveness of Construction Management Plans	Continuing
Planning and Environmental	0-7184	Develop an Interactive Unit Price Estimation and Visualization Tool	Continuing
Planning and Environmental	0-7187	Exploring and Developing Innovative Methods for Estimating VMT on Local Roads in Texas	Continuing
Planning and Environmental	0-7189	Safety Assessment of Shared Use Paths at Roadway Crossings using Exposure-Based Models	Continuing
Planning and Environmental	0-7194	Evaluating the Risks that Erosion Control Products Pose to Protected Species and Other Wildlife	Continuing
Program Support	0-6974	Digital Publication and Outreach Services in Support of Research	Continuing
Program Support	0-9902-23	University of Texas Library Services	Continuing
Safety and Operations	0-7144	Develop a Real-time Decision Support Tool for Urban Roadway Safety Improvement	Continuing
Safety and Operations	0-7171	Barrier Striping for the Reduction of Accidents	Continuing
Safety and Operations	0-7180	Select High Risk Pedestrian Midblock Crossings and Perform Safety Evaluations for Developing Pedestrian Crossings Countermeasures	Continuing
Safety and Operations	0-7183	Develop Crash Modification Factors for Super 2 Highways	Continuing
Safety and Operations	0-7190	Roadside Safety Device Analysis, Testing, and Evaluation Program	Continuing

Functional Area	Project No.	Project Title	Status
Safety and Operations	0-7198	Traffic Control Device Analysis, Testing, and Evaluation Program	Continuing
Strategy and Innovation	0-7181	Development of Digital Twins for Texas Bridges	Continuing
Strategy and Innovation	0-7199	Identification of Needs and Strategies for First Responder Interactions with Automated Vehicles (Avs)	Continuing
Strategy and Innovation	0-7200	Utilizing Telematics to Understand Driving Behavior During Missed Exits and Wrong Turns	Continuing
Structures and Hydraulics	0-7090	Evaluate the Deployment of High Strength Reinforcing Steel in Texas	Continuing
Structures and Hydraulics	0-7095-01	Flood Assessment System for TxDOT (FAST)	Continuing
Structures and Hydraulics	0-7113	Determine Service and Ultimate Behavior for Bent to Column Joints in TxDOT Substructures	Continuing
Structures and Hydraulics	0-7115	Investigate Live Load Distribution and Stability of Prestressed Concrete Girders During Construction	Continuing
Structures and Hydraulics	0-7117	Investigate the Strength of Struts Crossing Cold Joints	Continuing
Structures and Hydraulics	0-7154	Evaluate Use of 300ksi Strands for TxDOT Prestressed Girders	Continuing
Structures and Hydraulics	0-7155	Develop/Refine Design Provisions for Headed and Hooked Reinforcement	Continuing
Structures and Hydraulics	0-7170	Evaluate Bridge Deck Condition and Replacement Methods	Continuing
Structures and Hydraulics	0-7172	Developing a Performance-Based Concrete Overlay Mix Design for Improved Resistance to Early-Age Cracking and Increased Durability	Continuing

Functional Area	Project No.	Project Title	Status
Structures and Hydraulics	0-7179	Evaluate Safety End Treatments for Roadside Drainage Structures	Continuing
Structures and Hydraulics	0-7192	Develop Performance of Baseplate Connections in COSS and Traffic Signal Structures	Continuing
Structures and Hydraulics	0-7193	Develop Assessment and Mitigation Guidance for Ancillary Highway Structures with Existing Cracks	Continuing
Structures and Hydraulics	9-1532	TPF-5(508) Concrete Bridge Engineering Institute (CBEI)	Continuing

4.4 List of Other Projects

Functional Area	Project No.	Project Title	Status
Safety and Operations	0-7099	AVA: Automated Vehicles for All	Continuing

4.5 List of New Research Projects Pending Award & Approval

Functional Area	Project No.	Project Title	Status
Construction, Maintenance & Materials	0-7205	Evaluation of Adhesive Anchors in Concrete Pavement Applications	New
Construction, Maintenance & Materials	0-7206	Develop Optimum 2-Mat Reinforcement Design in Continuously Reinforced Concrete Pavement (CRCP)	New
Construction, Maintenance & Materials	0-7208	Evaluating Minimum Virgin Binder Contents for Durable Recycled Asphalt Pavement (RAP) Mixes	New
Construction, Maintenance & Materials	0-7210	Evaluation of Low-Speed Profiler for Network-Level Pavement Management	New
Construction, Maintenance & Materials	0-7211	Determine Hydroplaning Potential Using Existing Pavement Asset Data	New
Construction, Maintenance & Materials	0-7212	Incorporating Lab Skid measurements into the Balanced Mix Design process	New
Construction, Maintenance & Materials	0-7215	Predicting Field Performance of Pavement Markings Across the State of Texas	New
Construction, Maintenance & Materials	0-7216	Enhancing Texas Mechanistic-Empirical Flexible Pavement Design System (TxME) Practice: Develop Enhanced Mix Aging Model and District-Level Calibration Guidance	New
Construction, Maintenance & Materials	0-7217	Synthesis: Commercial Air-Coupled Ground Penetrating Radar Systems to Be Used for Pavement Evaluations in Texas	New
Construction, Maintenance & Materials	0-7218	Revisions for the TxDOT Pavement Management Information System (PMIS) Rater's Manual	New
Construction, Maintenance & Materials	0-7225	Evaluation of Rapid Mix Design for Lime Treated Materials	New
Construction, Maintenance & Materials	0-7227	Exploring the Use of Anti-oxidants to Substantially Increase Cracking Life of Asphalt Pavements	New

Functional Area	Project No.	Project Title	Status
Planning and Environmental	0-7219	Developing and Assessing eDNA Survey Methodology for Protected Mussel Species in Texas	New
Planning and Environmental	0-7229	Develop an Intelligent Digital Assistant for Project Planning	New
Planning and Environmental	0-7231	Synthesis: Carbon Capture and Repurposing By-Products	New
Planning and Environmental	0-7233	Incorporating Resilience Considerations in Transportation Asset Management Planning and Project Selection Process	New
Safety and Operations	0-7204	Synthesis: Prevention of Unauthorized Freeway Exits and Entrances	New
Safety and Operations	0-7209	Develop Guidance for Sustainable Traffic Signal Operation Strategies to Support All Intersection Users	New
Safety and Operations	0-7220	Develop Countermeasures to Lower Operating Speeds and Collisions on Arterial Roadways, and Reduce Vulnerable User Injuries	New
Safety and Operations	0-7222	Develop Crash Predictive Methods for Frontage Roads including ramp terminals, and intersections with crossroads in Texas	New
Safety and Operations	0-7223	Conduct MASH Test Level 3 (TL-3) Evaluations of Concrete Barriers on Roadside Slopes	New
Safety and Operations	0-7226	Analyze Operational and Safety Improvements Associated with Implemented Innovative Intersections in Texas	New
Safety and Operations	0-7228	Identify and Evaluate Innovative Pedestrian Safety Countermeasures for Rural and Nighttime Environments	New
Safety and Operations	0-7230	Develop Data Collection Requirements and Strategic Research Roadmap to Support the Digital Delivery Program	New
Strategy and Innovation	0-7221	Develop Data Collection Requirements and Strategic Research Roadmap to Support the Digital Delivery Program	New

Functional Area	Project No.	Project Title	Status
Strategy and Innovation	0-7224	Improve Utility Investigations through AI Data Fusion and Reliable Quality Assessments	New
Strategy and Innovation	0-7232	Improve Safety of Vehicles and Vulnerable Road Users at Intersections Integrating C-V2X and LiDAR Sensing Technologies	New
Strategy and Innovation	0-7235	Leverage AI for Asset Inventories & Management	New
Structures and Hydraulics	0-7203	Evaluate the Effectiveness of Dowels for Lateral Restraint of Prestressed Concrete Beams	New
Structures and Hydraulics	0-7207	Determine Feasibility and Efficacy of Hollow Precast Straddle Bents	New
Structures and Hydraulics	0-7213	Develop Design Methodologies and Efficient Details for Triple I-Girder Steel Straddle Caps	New
Structures and Hydraulics	0-7214	Develop Concrete Girder Splice Details with Application of Ultra-High-Performance Fiber-Reinforced Concrete (UHPFRC)	New
Structures and Hydraulics	0-7234	Address Knowledge Gaps in Scour Analyses for Cohesive and Other Challenging Channel Materials	New
Structures and Hydraulics	0-7236	Develop Standardized LRFD Design Methods for Ancillary Highway Structure Foundations	New
Structures and Hydraulics	0-7237	Synthesis: Develop Design Guidelines for Applications of Light Weight Aggregate in Embankments and Mechanically Stabilized Earth (MSE) Walls -- Evaluate Cost Benefit & Performance	New

5. Continuing Projects by Functional Area

5.1 Construction, Maintenance and Materials

Project Number: 0-6674-04 University: TTI

Project Title: Automated IDEAL Cracking and Rutting Tests

Project Start Date: 09/01/2023 Termination Date: 08/31/2026

Project Status: Active Total Project Budget: $692,780.00

Project Manager: Martin Dassi Researcher: Fujie Zhou

Project Objectives: The objective of this project is to complete the design and construction of the automated test system and to deliver an automated IDEAL cracking and rutting test system working unit to the Receiving Agency's MTD lab. The automated test system, includes (1) specimen rapid cooling unit, (2) auto-air void measurement unit, (3) specimen conditioning unit for both room and high temperature, (4) automation arm unit, and (5) automated IDEAL cracking test (IDEAL-CT), IDEAL rutting test (IDEAL-RT), and indirect tensile (IDT) strength test unit, and (6) waste disposal unit. This automated test system shall shorten test time and improve lab safety, test efficiency and accuracy. The Performing Agency shall work closely with the Receiving Agency to build one automated lab test system. The Performing Agency shall conduct comprehensive parallel comparison with the standard (manual) test system to ensure that the automated test results align with the current standard tests. The Performing Agency shall develop a user manual for the automated test system. Additionally, the Performing Agency shall provide training and demonstrations to Receiving Agency lab technicians after delivering the automated test system.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$198,440.00	$158,752.00	$39,688.00

Project Number: 0-7073 University: CTR/TTI

Project Title: Improving Testing Requirements in Item 300 Of TxDOT Standard Specifications

Project Start Date: 09/01/2020 Termination Date: 08/31/2025

Project Status: Active Total Project Budget: $1,130,000.00

Project Manager: Tom Schwerdt Researcher: Amit Bhasin

Project Objectives: The Receiving Agency's standard specification Item 300, Asphalts, Oils, and Emulsions, includes more than 48 different test procedures or conditioning procedures for asphalt concrete (AC) graded binders (12), cutbacks (8), emulsified binders (17), and performance-graded (PG) binders (11) used in different pavement construction and maintenance applications. This does not include testing requirements for recycling agents, crack sealants, or asphalt rubber binder. The Receiving Agency regularly performs many of these tests for quality management or quality assurance purposes. This test schedule presents a challenge for the binder lab in terms of maintaining test procedures, acquiring and maintaining test equipment, calibrating equipment, and training personnel. Some specification tests are legacy tests that once were the state-of-the-art and thought to be related to asphalt binder performance. Many of these legacy tests are not used in more recently developed specifications, as other tests are now available and may be more indicative of performance. This project seeks to review the Receiving Agency's Item 300 binder specifications and tests for relevance; determine whether they assess safety, performance, or constructability; and take into account accuracy, efficiency, and environmental considerations. The project shall also make recommendations for changes.

Financials	FY25 Total Budget	80% Federal	20% State
CTR	$140,110.43	$112,088.34	$28,022.09
TTI	$150,000.00	$120,000.00	$30,000.00

Project Number: 0-7103 University: TTI

Project Title: Investigating Prime versus Curing: Where, When and Why

Project Start Date: 09/01/2021 Termination Date: 11/30/2024

Project Status: Active Total Project Budget: $525,000.25

Project Manager: Martin Dassi Researcher: Darlene Goehl

Project Objectives: The objective of this research project is to determine where, when, and why a prime or cure is needed for a pavement layer. Materials such as prime coats, curing materials, seal coats, and tack coat are typically considered non-structural, but integral to the pavement structure. Some materials can be used for multiple purposes: prime, bond or help cure; however, the rates and timing of use may change depending on why the material is being used. Guidance is needed to help designers, inspectors and construction personnel understand the materials and where, when, and why to use them. The Performing Agency shall develop guidelines for prime and curing through a series of laboratory and field testing and develop tests and procedures to determine the best materials for a prime, cure or a combination. These guidelines shall aid decision makers in determining whether a prime, cure or bonding material is needed, and where, when and why to design and use the appropriate materials.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$21,269.25	$17,015.40	$4,253.85

Project Number: 0-7104 University: TTI/UTEP

Project Title: Establish Performance-Based Acceptable Lab-Molded Density Range for Mix Design and QC/QA

Project Start Date: 09/01/2021 Termination Date: 04/30/2025

Project Status: Active Total Project Budget: $829,999.25

Project Manager: Martin Dassi Researcher: Fujie Zhou

Project Objectives: Lab-molded density of asphalt mixes is a critical factor for laboratory mix design, plant production, and field performance. Current mix design and production quality control and quality assurance (QC/QA) are developed around a fixed lab-molded density of 96 percent. Adherence to a fixed lab-molded density is not only one of the main factors leading to drier, more crack susceptible mixes where low asphalt binder content is often caused by balancing high lab-molded density values at plant production, but it also impacts the implementation of the Balanced Mix Design approach. Furthermore, various field test sections designed with densities ranging from 96.5 to 98 percent were previously constructed in different areas of Texas, and they performed well in the field with no observed rutting problems. Thus, the objective of this project is to establish an acceptable range of lab-molded densities for laboratory mix design and production QC/QA testing. To achieve the objective, the Performing Agencies shall review the literature, conduct extensive laboratory performance tests, construct test sections and monitor their performance, and finally recommend an acceptable range of lab-molded density based on all the information and data collected.

Financials	FY25 Total Budget	80% Federal	20% State
TTI	$76,107.75	$60,886.20	$15,221.55
UTEP	$10,000.00	$8,000.00	$2,000.00

Project Number: 0-7105 University: TTI

Project Title: Measuring Seal Coat Rate Field Adjustments

Project Start Date: 09/01/2021 Termination Date: 11/30/2024

Project Status: Active Total Project Budget: $450,000.00

Project Manager: Tom Schwerdt Researcher: Darlene Goehl

Project Objectives: The objective of this research project is to develop measurable and repeatable adjustment criteria for seal coat application rates based on pavement condition, traffic and material properties for the design method developed in research project 0-6989 Update Seal Coat Application Rate Design Method (TxDM6989). Current practice requires experienced personnel to understand the adjustments needed for application rates, including changing the adjustments as conditions on the pavement change. The adjustments in the TxDM6989 combine multiple pavement conditions into one description. By measuring the conditions, a combined adjustment based upon measured parameters will remove subjectivity from the procedure. This will lead to more consistently constructed projects that meet the objectives of designing the rates so that the resulting seal will not have too much binder so that it flushes or bleeds in the summer; but there is enough binder to prevent rock loss over the winter. This research project will produce measurable methods for adjustments to the rate design procedures that will help engineers and inspectors make better decisions resulting in successful projects.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$15,113.00	$12,090.40	$3,022.60

Project Number: 0-7106 University: TTI

Project Title: Quantify Maximum Accumulated Seal Coat Layers for Stability

Project Start Date: 09/01/2021 Termination Date: 11/30/2024

Project Status: Active Total Project Budget: $449,211.00

Project Manager: Jade Adediwura Researcher: Darlene Goehl

Project Objectives: The Receiving Agency invests over $250 million annually on seal coats, it is therefore critical to apply the right treatment to the right road at the right time. Projects are typically selected based on the time since the last seal coat (an average of 7 years) with little to no testing performed to ensure that the section is a good candidate for seal coat and how many seal coats to apply. The objective of this research is to determine the maximum number of seal coats that can be applied to a pavement surface before the accumulated layers of seal coats become unstable. The Performing Agencies shall evaluate the stability of existing accumulated seal coat substrate layers through a series of laboratory and field testing and develop tests and procedures to determine when an additional seal coat may not perform well. The Performing Agencies shall develop guidelines to select candidate seal coat projects with multiple seal coat layers ensuring that a new seal coat is used on a good candidate pavement will lower risk to the Receiving Agency, improve life cycle costs and lead to better performing sections of pavement.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$17,330.25	$13,864.20	$3,466.05

Project Number: 0-7141 University: CTR

Project Title: Evaluation of Nano-Materials in Concrete for Improved Durability

Project Start Date: 09/01/2022 Termination Date: 05/31/2026

Project Status: Active Total Project Budget: $611,267.44

Project Manager: Jade Adediwura Researcher: Raissa Ferron

Project Objectives: The application of nanotechnology in the construction industry has led to significant advancements in enhancing the mechanical properties of concrete through changing concrete's structure at the nanolevel. However, advancements in understanding how to leverage nanomaterials to combat durability issues has lagged behind the progress made on the mechanical property side. Concrete is susceptible to various physical and chemical degradation mechanisms that can reduce its service life. Historically, Class F fly ash has been used to address many of these degradation issues. However, with changes in fly ash quality and availability, identifying other materials that the Receiving Agency can use to protect concrete against durability issues are needed. Over the last 20 years, much progress has been made in using nanomaterials in concrete mixtures, for example, nanoparticles have even been used in high-volume fly ash cementitious systems to offset the negative effects of fly ash on rate of hydration and early-age strength gain. This project shall investigate the use of nanomaterials on the properties of concrete mixtures, with special emphasis placed on durability properties and self-healing capabilities. Various nanomaterials shall be used, alone and in combination with supplementary cementing materials (SCMs). The most promising mixtures shall be selected for field trails to validate laboratory findings.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$164,630.45	$131,704.36	$32,926.09

Project Number: 0-7143 University: TTI

Project Title: Develop Methodologies for Reducing Costs in Full Depth Reclamation (FDR) Construction

Project Start Date: 09/01/2022 Termination Date: 11/30/2025

Project Status: Active Total Project Budget: $679,483.50

Project Manager: Darrin Jensen Researcher: Stephen Sebesta

Project Objectives: Full depth reclamation (FDR) using emulsified asphalt or foamed asphalt continues to grow in usage throughout Texas. To date, almost all mixtures use a cement additive in the mix design. The cement additive reportedly contributes to early strength gain which can be particularly important for projects that require daily opening to heavy traffic. However, not all construction projects require daily opening to traffic, and some materials may provide adequate performance without the cement additive. Additionally, with potential cement supply shortages, design and construction of FDR layers using only the asphalt treatments could save materials cost, reduce schedule risk, and increase daily productivity since one less step would be required in the treatment process. The Performing Agency shall analyze the performance of asphalt-based FDR materials with and without the cement additive and evaluate the strength and stiffness properties of those mixes in the early, intermediate, and final curing stages. The Performing Agency shall leverage those results to determine the operational benefits and acceptability of placing traffic on the section for traffic control and construction staging, evaluate how the long-term performance of the layer may be impacted for pavement design, and make recommendations for mix design and construction specification updates.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$232,618.50	$186,094.80	$46,523.70

Project Number: 0-7145 University: CTR/TTI

Project Title: Develop Rapid New Tests for Detecting Poor Quality Binders and RAP Materials

Project Start Date: 09/01/2022 Termination Date: 08/31/2025

Project Status: Active Total Project Budget: $1,054,240.28

Project Manager: Darrin Jensen Researcher: Fujie Zhou

Project Objectives: Asphalt binders are one of the most expensive and critical materials used in the construction of the roadways in Texas, costing taxpayers hundreds of millions of dollars annually. It has been widely recognized that asphalt binders with the same performance grade (PG) can perform very differently due to changes in crude source, refining processes used, modification technique, and other factors. Several districts recently reported early cracking issues with some mixes which had historically performed well, while other districts had mix design and quality assurance (QA) problems when the binder source was switched and/or a different recycled asphalt pavement (RAP) stockpile was used. Thus, the objective of this project is to develop rapid new tests for detecting poor quality binders and RAP materials. To achieve this objective, the Performing Agencies shall review the literature to identify candidate tests that can be used for screening binders and RAP materials. The Performing Agencies shall further refine the most promising tests using laboratory mixture performance tests as a benchmark. The Performing Agencies shall also provide a standard test method and specification limit for each of the final test methods.

Financials	FY25 Total Budget	80% Federal	20% State
CTR	$94,897.92	$75,918.34	$18,979.58
TTI	$153,355.00	$122,684.00	$30,671.00

Project Number: 0-7147 University: TECH

Project Title: Project Level Performance Database for Rigid Pavements in Texas, Phase III

Project Start Date: 09/01/2022 Termination Date: 08/31/2025

Project Status: Active Total Project Budget: $749,999.55

Project Manager: Wade Odell Researcher: Moon Won

Project Objectives: The primary tasks in this project will consist of: •Collecting field performance information on rigid pavements. •Gathering field performance information on experimental and special sections in Texas. •Evaluating the effectiveness of special or innovative techniques tried in Texas. •Developing a platform for storing all the information collected in this study in a central server with various features imbedded so that the information could be easily accessible in a systematic way.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$258,597.17	$206,877.74	$51,719.43

Project Number: 0-7148 University: TECH/TTI

Project Title: Develop Design Details for CRCP Whitetopping at Intersections

Project Start Date: 09/01/2022 Termination Date: 08/31/2025

Project Status: Active Total Project Budget: $599,563.25

Project Manager: Katelyn Kasberg Researcher: Moon Won

Project Objectives: The Performing Agencies shall establish a method to evaluate the existing pavement structural condition and design continuously reinforced concrete pavement (CRCP) overlays, both thin and thick. The design methods will include non-destructive (NDT) pavement evaluation techniques and tools, deflection based CRCP slab thickness design procedures, and CRCP reinforcing design details. The Performing Agencies shall identify state-of-the-art practices that can be implemented as well as areas that need additional research. The findings from this research will result in procedures that will be used to design CRCP overlays, both thin and thick.

Financials	FY25 Total Budget	80% Federal	20% State
TECH	$104,317.00	$83,453.60	$20,863.40
TTI	$92,738.25	$74,190.60	$18,547.65

Project Number: 0-7150 University: TXST

Project Title: Artificial Intelligence for Pavement Condition Assessment from 2D/3D Surface Images

Project Start Date: 09/01/2022 Termination Date: 08/31/2025

Project Status: Active Total Project Budget: $451,875.00

Project Manager: Jade Adediwura Researcher: Feng Wang

Project Objectives: While manual quality assurance is inefficient and expensive, the proprietary data storing and processing methods have prevented the Receiving Agency from developing automated methods for data validation. Recently, with the national initialization of standard format for two-dimensional/three-dimensional (2D/3D) pavement surface images and the development of Artificial Intelligence (AI)/Machine Learning (ML) in Computer Vision, the Receiving Agency sees the opportunity of developing new methods for automated pavement condition assessment, with more independence from vendors and their equipment. The main objective of this research is to develop ML-based application software to assess pavement conditions using the standard format 2D/3D pavement surface images. The three main components of this research include the development of a standard format 2D/3D pavement surface image library, a set of ML models for pavement distress measurement, and application software for pavement condition evaluation. The proposed project will assist the Receiving Agency to enhance the quality of the automated pavement condition data, which would eventually help the State of Texas improve its pavement performance.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$150,625.00	$120,500.00	$30,125.00

Project Number: 0-7151 University: TTI/UT-TYLER

Project Title: Develop Recommendations for Evaluating Surface Types and Aggregate Properties to Minimize Wet Weather Crashes

Project Start Date: 11/10/2022 Termination Date: 02/28/2026

Project Status: Active Total Project Budget: $599,992.25

Project Manager: Wade Odell Researcher: Bryan Wilson

Project Objectives: The current design methodology for asphalt and seal coat surfaces is limited when considering safety aspects like friction and surface texture, also known as skid resistance. The only requirement for asphalt or seal coats placed on high demand areas is that they use surface aggregate classification (SAC) A coarse aggregates. This approach has several shortcomings:
• Does not consider the friction and texture of the final surface. • Does not consider the change in skid resistance versus trafficking. • SAC system is defined by the acid insolubility test, not a direct measurement of aggregate properties that mechanically generate skid resistance. • SAC categories are very broad with no distinction of the best and worst performing aggregates in each class. Consequently, some recent resurfacing projects have resulted in unacceptable skid resistance shortly after construction, even when SAC A aggregates were used. As such, there is a serious need to improve the current design process for asphalt and seal coat to ensure that the surfaces will have acceptable long-term skid resistance. The Performing Agencies shall develop a laboratory-based system to select the pavement surface type and coarse aggregate types that will provide adequate skid resistance over the life of the pavement surface.

Financials	FY25 Total Budget	80% Federal	20% State
TTI	$169,354.75	$135,483.80	$33,870.95
UT-TYLER	$21,968.75	$17,575.00	$4,393.75

Project Number: 0-7173 University: TECH

Project Title: Develop Guidelines for Evaluation of Embankment Conditions in Bridge Approach Slabs and Pavement Structures

Project Start Date: 09/01/2023 Termination Date: 08/31/2026

Project Status: Active Total Project Budget: $716,613.77

Project Manager: Darrin Jensen Researcher: Hoyoung Seo

Project Objectives: Distresses of bridge approach slabs (BAS) and nearby pavement structures on roadway embankments are often caused by poor conditions in the embankments. The goal of this project is to develop guidelines for (1) evaluations of roadway embankment conditions and (2) maintenance strategies. The Performing Agency shall (a) conduct literature review and survey to synthesize information about the current state of the practice for embankment evaluations and repairs, (b) locate field test sections for new evaluations and monitoring of past repair performance, (c) conduct field investigations of the test sections and develop evaluation guidelines for embankment conditions, (d) identify causes of distresses and classify them, (e) develop maintenance strategies for the classified distress types and mechanisms, and conduct pilot field applications, and (f) develop training materials for the Receiving Agency.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$254,939.30	$203,951.44	$50,987.86

Project Number: 0-7175 University: TTI

Project Title: Develop Best Practices for Flexible Pavement Repairs

Project Start Date: 09/01/2023 Termination Date: 02/28/2026

Project Status: Active Total Project Budget: $413,069.00

Project Manager: Martin Dassi Researcher: Tito Nyamuhokya

Project Objectives: This research study aims to perform a study focusing on best practices for performing pavement preparatory work in advance of preventive maintenance (PM) surfacing contracts. The study shall respond to answer, "What are the best practices for repairing a roadway before a new surface is placed?" Seal coats or thin overlays are typical PM surfacing projects. The preparatory work performed by in-house maintenance forces or maintenance contracts may include crack sealing, fog seal, repairs, milling, and level-up. The preparatory work should be completed well before the PM contract. This study will identify the main flexible pavement repair types and investigate best practices for performing both in-house and contracted repairs. A procedure will be developed to determine the limits and type of flexible pavement repair. An evaluation process of the repair, including its performance and effects on the PM surfacing, will be developed.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$181,152.25	$144,921.80	$36,230.45

Project Number: 0-7177 University: TTI/UH

Project Title: Identifying Pavement Improvement Projects for Enhanced Safety

Project Start Date: 09/18/2023 Termination Date: 02/28/2026

Project Status: Active Total Project Budget: $478,160.00

Project Manager: Jade Adediwura Researcher: Nasir Gharaibeh

Project Objectives: The Performing Agencies shall develop a method and tool for analyzing safety-related pavement data to identify candidate pavement safety projects, such as cross-slope improvement projects and flushing treatment projects. The Performing Agencies shall assemble a dataset containing comprehensive data on the pavement, site condition, and crashes for a representative sample of on-system roadways. The Performing Agencies shall conduct a comprehensive analysis of the integrated dataset to identify critical combinations and thresholds of pavement conditions that may pose a safety hazard and use these factors to assess pavement susceptibility to crashes. The Performing Agencies shall quantify the pavement crash susceptibility based on measurable pavement characteristics such as cross-slope, geometrics, distresses (e.g., rutting, flushing), skid resistance, and roughness. Finally, the Performing Agencies shall develop a data analysis and visualization tool for assessing pavement crash susceptibility and recommending solutions to reduce crash risks. The Receiving Agency's districts will be able to use this tool to identify potential site-specific crash contributing factors and proactively select appropriate pavement safety improvement projects.

Financials	FY25 Total Budget	80% Federal	20% State
TTI	$148,018.00	$118,414.40	$29,603.60
UH	$49,850.00	$39,880.00	$9,970.00

Project Number: 0-7178 University: CTR/TXST

Project Title: Use Network Level Texture to Enhance Pavement Management

Project Start Date: 09/01/2023 Termination Date: 08/31/2025

Project Status: Active Total Project Budget: $399,814.26

Project Manager: Darrin Jensen Researcher: Jorge A. Prozzi

Project Objectives: The Performing Agencies shall evaluate the use of texture data currently available in the Receiving Agency Pavement Analyst software as collected by the Receiving Agency's third-party vendor (the vendor), and shall assess the accuracy of data (mean profile depth (MPD) and raw profile used to calculate MPD) and provide guidance on applications and uses of the data.

Financials	FY25 Total Budget	80% Federal	20% State
CTR	$160,270.24	$128,216.19	$32,054.05
TXST	$50,059.64	$40,047.71	$10,011.93

Project Number: 0-7185 University: TTI

Project Title: Develop Enhanced Cold Recycling Methods and Specifications

Project Start Date: 09/19/2023 Termination Date: 08/31/2026

Project Status: Active Total Project Budget: $1,731,875.00

Project Manager: Katelyn Kasberg Researcher: Stephen Sebesta

Project Objectives: Texas continues to use cold recycling for pavement rehabilitation and performs a significant amount of full depth reclamation (FDR). While cement remains the most widely used treatment, use of asphalt emulsion and foamed asphalt continues to grow. This project shall identify and evaluate topics to strategically enhance cold recycling practices in Texas. This project shall perform a comprehensive performance analysis of recent as-built projects to identify strengths and opportunities for process enhancement. For cement, this project shall evaluate how cement type may influence mixture properties, analyze the Texas Flexible Pavement System (FPS) structural design assumptions based on current mix design and construction practices, and summarize methods to improve early trafficking. For emulsified and foamed asphalt, this project shall develop cold-in-place recycling (CIR) applications for Texas and identify, evaluate, and recommend enhanced pavement design procedures for cold recycling with asphalt binders. This project shall use all results to develop enhanced cold recycling project selection procedures, recommend updates to the Receiving Agency's specifications, and develop and perform training.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$551,853.00	$441,482.40	$110,370.60

Project Number: 0-7186 University: CTR/TTI

Project Title: Develop Next Generation of Hamburg Rutting Test for Asphalt Mixes

Project Start Date: 09/01/2023 Termination Date: 08/31/2026

Project Status: Active Total Project Budget: $634,305.00

Project Manager: Tom Schwerdt Researcher: Fujie Zhou

Project Objectives: The Hamburg Wheel Track (HWT) rutting test generally serves well as the standard rutting test for asphalt mixes in Texas; however, in the last several years, some premium mixes (i.e. stone matrix asphalt), designed with PG76-22 and low HWT rut depth, have experienced premature rutting failures under slow moving (or stop/ go) traffic in several Receiving Agency Districts. Such failures burden the Receiving Agency with extra cost. Furthermore, it was reported that the HWT test cannot accurately quantify the better rutting performance of some tougher mixes with highly modified asphalt (HiMA). Thus, the Performing Agency shall develop the next generation of HWT test to accurately screen out asphalt mixes that are prone to rutting failures. The Performing Agencies shall review the literature, survey Districts, and other state departments of transportation (DOTs) to identify the proper rutting test(s) and asphalt mixes for addressing the rutting failure caused by the slow-moving traffic. The Performing Agencies shall further develop the next generation of HWT test and associated acceptance criteria through finite element analysis, laboratory testing, field accelerated pavement testing and survey of in-service pavement intersections, round robin test, and recommendation of specification changes.

Financials	FY25 Total Budget	80% Federal	20% State
CTR	$30,000.00	$24,000.00	$6,000.00
TTI	$197,673.00	$158,138.40	$39,534.60

Project Number: 0-7191 University: CTR/TTI/TXST/UTSA

Project Title: Develop Systematic and Quantitative Approach to Assess the Probability of Extreme Weather and Resilience Risks for TxDOT Highways and Bridges

Project Start Date: 12/05/2023 Termination Date: 08/31/2025

Project Status: Active Total Project Budget: $796,520.38

Project Manager: Katelyn Kasberg Researcher: Andrew Birt

Project Objectives: Climate stressors pose a significant threat to transportation infrastructure. Recognizing this, Federal Highway Administration (FHWA) requires State Departments of Transportation (DOTs) to consider extreme weather and resilience in life cycle planning and risk management analyses within a State's Transportation Asset Management Plan (TAMP). The 2022 Texas TAMP identified risk categories that could impact the Receiving Agency's infrastructure (specifically, highways and bridges). Extreme weather and resilience were discussed extensively, but the 2022 TAMP lacked a systematic and quantitative approach to assess climate-related risks to infrastructure and in life cycle planning analysis. The objective of this research is to develop a robust quantitative risk framework that can be implemented in subsequent Texas TAMPs. To successfully accomplish this objective, the Performing Agencies shall: manage the project scope, budget, and timeline (1), conduct an extensive review of the literature (2), identify climate stressors to the Receiving Agency's pavements and bridges (3), assess the probability of such climate stressors and extreme weather events (4), quantify the impact on bridges (5) and pavements (6), develop an asset risk and resilience assessment framework (7), develop and quantify adaptation strategies (8), conduct scenario analysis (9), and identify proxy indicators that can be tracked to monitor high-priority risks (10).

Financials	FY25 Total Budget	80% Federal	20% State
CTR	$157,196.75	$125,757.40	$31,439.35
TTI	$169,345.25	$135,476.20	$33,869.05
TXST	$35,625.54	$28,500.43	$7,125.11
UTSA	$41,396.00	$33,116.80	$8,279.20

Project Number: 0-7195 University: CTR/TTI/UTSA

Project Title: Quantify Bridge and Pavement Consumption Due to Permitted Overweight/Oversized (OW/OS) Vehicles

Project Start Date: 09/01/2023 Termination Date: 02/28/2026

Project Status: Active Total Project Budget: $828,584.25

Project Manager: Chris Glancy Researcher: Jorge Prozzi

Project Objectives: In 2012, the Rider 36 study indicated that damage caused to bridges and pavements by overweight (OW) vehicles surpassed the revenue collected by permit fees by approximately $200 million annually. This finding was corroborated by a recent 2022 study mandated by House Bill 2223, which quantified this gap at $168 million. Besides the revenue shortage to cover bridge and pavement maintenance and rehabilitation costs due to the damage cause by OW vehicles, the 2022 study also identified additional shortcomings that need to be urgently addressed. These shortcomings include: 1) lack of a methodology for periodically adjusting permit fees to account for changes in traffic patterns and configurations and higher inflation rates; 2) lack of accurate data and process for calculating annual vehicles-miles-travelled (VMT) by each permit type; 3) uncertainty in the identification of routes and number of trips for monthly, quarterly, or annual permits; 4) absence of a method and process to assess the damage caused by OW vehicles to the off-system bridges and highways. The Performing Agencies shall develop, recommend, and provide the Receiving Agency a well-established and documented step-by-step method to periodically update the permit fee structure.

Financials	FY25 Total Budget	80% Federal	20% State
CTR	$169,000.12	$135,200.10	$33,800.02
TTI	$30,000.00	$24,000.00	$6,000.00
UTSA	$120,019.00	$96,015.20	$24,003.80

Project Number: 0-7197 University: CTR/TTI

Project Title: Evaluate Effects of Recycled Asphalt Pavement (RAP) on Performance-Graded (PG) Binder Polymer Concentration

Project Start Date: 10/06/2023 Termination Date: 02/28/2026

Project Status: Active Total Project Budget: $593,006.28

Project Manager: Tom Schwerdt Researcher: Amit Bhasin

Project Objectives: Polymer additives are used to design high PG virgin binders that meet the PG requirements to protect the mix against rutting and cracking under the climate and traffic conditions of an HMA project. When RAP is added to the mixture, the effective binder may not meet the desired grade. This project shall quantify the extent to which polymer dilution is a problem that should be addressed in the Receiving Agency's HMA specifications and if so, develop specification language to address it. This project involves evaluating binder blends and mixtures with RAP. Both lab blended and commercial PG binders shall be evaluated for continuous grade, elasticity, polymer content, and other rheological parameters. Then these binders shall be mixed with recovered RAP binders at several percentages and retested to determine the same properties. Standard mixtures(s) shall also be used with several of these binders and various RAP percentages to measure mixture performance-related properties (cracking and rutting). The Performing Agency shall use the results from binder and mixture results on the impact of "virgin binder – RAP binder dilution" and work with the Receiving Agency to develop specification language for inclusion in the Receiving Agency's HMA specifications, as needed.

Financials	FY25 Total Budget	80% Federal	20% State
CTR	$166,472.56	$133,178.05	$33,294.51
TTI	$120,243.50	$96,194.80	$24,048.70

Project Number: 5-6048-07 University: CTR

Project Title: Implementation of Centrifuge Technology for Pavement Design on Expansive Clays – Phase 2

Project Start Date: 10/11/2023 Termination Date: 08/31/2026

Project Status: Active Total Project Budget: $939,433.17

Project Manager: Darrin Jensen Researcher: Jorge Zornberg

Project Objectives: The Receiving Agency Pavement Manual establishes thresholds of the Potential Vertical Rise (PVR) that shall not be exceeded in the design of roads founded on expansive clays (e.g., a maximum allowable PVR of 1.5 in. for main lanes). Using the PVR as an index, these thresholds have been established from field empirical evidence collected over decades to identify roads with excessive levels of distress triggered by the presence of expansive clays. However, there are two significant sources of uncertainty in the thresholds adopted by the Pavement Manual, which have heavily compromised roadway designs: (1) Inaccuracies in the determination of the PVR, the original version of which relies heavily on outdated data and correlations, and (2) Inconsistencies in the documentation of the levels of distress typical of roadways founded on expansive clays. The Receiving Agency has developed technology for accurate determination of PVR and has also developed adequate protocols for roadway performance over expansive clays. The primary objective of this implementation project is to generate accurately determined PVR data and calibrate it against consistently obtained levels of roadway distress.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$303,626.30	$242,901.04	$60,725.26

Project Number: 5-7025-01 University: TTI

Project Title: Pilot Implementation of Surface Aggregate Classification of Reclaimed Asphalt Pavement

Project Start Date: 02/01/2024 Termination Date: 08/31/2027

Project Status: Active Total Project Budget: $660,716.00

Project Manager: Darrin Jensen Researcher: Sheng Hu

Project Objectives: The Performing Agency shall assist the Receiving Agency with implementing the surface aggregate classification (SAC) for reclaimed asphalt pavement (RAP) developed in research project 0-7025, Develop Surface Aggregate Classification of Reclaimed Asphalt Pavement. The Performing Agency shall implement and verify the methodology of SAC-A RAP classification in a minimum of four (4) Receiving Agency Districts. In each selected Receiving Agency District, the Performing Agency shall work with lab and pavement engineers and their staff to characterize the RAP in terms of SAC, design surface mixtures with the RAP, evaluate the friction and skid resistance of mixtures, and construct and monitor the selected test sections in each Receiving Agency District. The Performing Agency shall then use the data generated in these test sections to develop and teach implementation workshops for Receiving Agency Districts.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$199,061.00	$159,248.80	$39,812.20

5.2 Planning and Environmental

Project Number: 0-7022-01 University: TAR/TTI

Project Title: Monarch Conservation Strategies for Texas Roadways

Project Start Date: 02/17/2023 Termination Date: 08/31/2025

Project Status: Active Total Project Budget: $580,659.50

Project Manager: Tom Schwerdt Researcher: Darlene Goehl

Project Objectives: The US Fish and Wildlife Service (USFWS) supported federal listing of the monarch butterfly (Danaus plexippus) in December 2020, but listing is currently delayed due to other higher priority listing actions. Texas roadways play a critical role in the successful spring and fall migrations of the eastern monarch butterfly population. Receiving Agency project 0-7022, "Evaluating Fall Monarch Butterfly Roadkill Hotspot Incidence and Potential Roadkill Mitigation" has revealed perennial hotspots for fall monarch butterfly roadkill in Texas. Yearly roadkill can comprise up to 2.5% of the Mexican overwintering population. Spring and fall roadside milkweed and monarch-preferred nectar plant hotspots have also been identified which provide critical resources to monarchs in terms of both milkweed larval food and flower nectar for adults.

Financials	FY25 Total Budget	80% Federal	20% State
TAR	$57,752.50	$46,202.00	$11,550.50
TTI	$112,119.25	$89,695.40	$22,423.85

Project Number: 0-7023-01 University: UTA

Project Title: Determining Downstream Ecological Impacts of Sediment Derived from Bridge Construction

Project Start Date: 11/10/2022 Termination Date: 12/31/2025

Project Status: Active Total Project Budget: $392,000.00

Project Manager: Jade Adediwura Researcher: Habib Ahmari

Project Objectives: The release of sediment due to bridge construction may change the sediment regime and geomorphology of receiving streams causing short- and long-term effects on aquatic habitat. A GIS-based Predictive Sediment Toolbar is already developed and coupled with the Hydraulic Engineering Center's River Analysis System (HEC-RAS) 2D to determine the potential depositional area and suspended sediment concentration at bridge construction sites. The toolbar was submitted to the Receiving Agency in Phase I. The performance of the toolbar was assessed using field data and observations at a bridge construction site. The toolbar showed a promising performance; however, to reduce modeling uncertainties and develop an understanding of the uncertainties, and increase the accuracy of the approaches and model capabilities, the Performing Agency shall perform following tasks: i. develop a guideline for selecting stream flow events to be used in HEC-RAS 1D model and for determining the extent of modeling downstream of the bridge; ii. develop a new 1D sediment transport model coupled with HEC-RAS 1D and add to the current GIS toolbar; iii. investigate alternative methods for defining eroded sediment characteristics from a typical bridge replacement site and incorporate into the model; iv. examine the performance of the new tool using field data collected from a number of bridge sites with a wide range of flow and sediment characteristics. In this Phase II of the project, the Performing Agency shall conduct this research at a Technology Readiness Level (TRL) of 7.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$122,125.00	$97,700.00	$24,425.00

Project Number: 0-7152 University: TTI

Project Title: Estimating Latent Bicyclist and Pedestrian Demand for Shared Use Path Design

Project Start Date: 09/01/2022 Termination Date: 12/31/2024

Project Status: Active Total Project Budget: $250,173.75

Project Manager: Tom Schwerdt Researcher: Ipek Nese Sener

Project Objectives: The Receiving Agency's Roadway Design Manual was updated in July 2020 and incorporates considerations for and accommodations of bicyclists and pedestrians, including preferred design order toward Shared Use Paths (SUPs) compared to bicycle lanes and shared lanes. However, the Guidance does not include specific procedures to estimate the anticipated volumes of non-motorized path users. The Receiving Agency's Bicycle Accommodation Design Guidance makes it clear that anticipated user volumes should be considered when designing facilities. Performing Agency shall develop a simple sketch planning-level demand estimation tool that provides anticipated user volumes for SUPs. The project shall also incorporate the results into the future editions of The Receiving Agency's design guidance/manuals. Given the uncertainty in resources, Performing Agency shall not use an overly complicated method or a method that requires complex data or data architecture. The project shall benefit from existing data sources, including The Receiving Agency's Texas Bicycle and Pedestrian Count Exchange and other count data resources in the State as well as other secondary and spatial data sources. Performing Agency shall develop an easy-to-use tool responding to the needs and requirements of the intended audience while incorporating advancements to improve the accuracy of the demand estimation.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$17,533.50	$14,026.80	$3,506.70

Project Number: 0-7174 University: TTI

Project Title: Develop an Interactive Statewide Production Rate Estimation Tool for Reliable Contract Time Determination

Project Start Date: 09/01/2023 Termination Date: 02/28/2026

Project Status: Active Total Project Budget: $374,458.25

Project Manager: Darrin Jensen Researcher: David Jeong

Project Objectives: Understanding and estimating realistic production rates of major work items in a highway project are critical to determining a reasonable project contract time, evaluating the contractor's baseline schedule, monitoring progress schedules, and ultimately completing the project on time. The Performing Agency shall leverage the Receiving Agency's historical project data to obtain the as-built information of production rates of various work items, and shall develop a) an expanded version of the Receiving Agency's construction production rates table, b) an interactive tool that can generate color-coded heat maps to visualize feasible ranges of production rates of major work items across Texas, and c) implementation guidance and recommendations. An advanced and interactive production rate estimation tool could significantly help the Receiving Agency achieve the goal of completing highway projects on time. The Performing Agency's decision-aid tool could significantly improve the Receiving Agency's practice in determining more accurate production rates, resulting in more accurate contract time determination, the contractor's baseline schedule evaluation, and progress schedule monitoring. The Performing Agency shall aid in providing higher certainty and reliability of data-driven and practical production rates to expand the Receiving Agency's current construction production rates table.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$151,631.00	$121,304.80	$30,326.20

Project Number: 0-7182 University: CTR

Project Title: Determine Effectiveness of Construction Management Plans

Project Start Date: 09/01/2023 Termination Date: 08/31/2025

Project Status: Active Total Project Budget: $299,302.47

Project Manager: Martin Dassi Researcher: Carlos Caldas

Project Objectives: A Construction Management Plan (CMP) is a document that describes the project execution plan and sequence of construction activities that can be performed in the project considering pending clearances related to unclear utility conflicts, right-of-way (ROW) acquisition, ROW encroachments, ROW relocation, and/or outstanding railroad agreements. the Receiving Agency CMPs are required for projects where the estimates for certification and permit clearance extend beyond three months after letting. One of the main goals of CMPs is to mitigate the risk of construction delays. Since the implementation of CMPs a few years ago, the Receiving Agency has not conducted a thorough review of their effectiveness to date. Therefore, the main objectives of this research project are to conduct a review of the Receiving Agency CMPs, verify the potential impact of the Receiving Agency CMPs on change orders and claims, compile lessons learned, and develop recommendations to make the Receiving Agency CMPs more effective. A guidebook and training materials shall be developed to facilitate implementation by districts, divisions, consultants, and contractors.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$150,194.26	$120,155.41	$30,038.85

Project Number: 0-7184 University: UTA

Project Title: Develop an Interactive Unit Price Estimation and Visualization Tool

Project Start Date: 09/01/2023 Termination Date: 08/31/2025

Project Status: Active Total Project Budget: $199,997.00

Project Manager: Chris Glancy Researcher: Mohsen Shahandashti

Project Objectives: The unit prices could be significantly different for various Receiving Agency's districts considering several factors (e.g., soil conditions, weather conditions, urban vs. rural conditions, regional construction market conditions) impacting construction costs in these districts. The objectives of this project are to (1) conduct an overview analysis of factors affecting unit prices, (2) identify factors affecting unit prices in Texas, (3) create a unit price estimation database, (4) create a geospatial statistical unit price estimation model considering the factors affecting unit prices, the interactions between factors, and the factors' spatial variability, (5) develop the GIS-based visualization tool with color-coded map, and automatic data updating function, and (6) implement, demonstrate, and validate the interactive unit price estimation and GIS-based visualization tool on five ongoing Receiving Agency's projects (located in 5 different districts in North, South, East, West, and Center of Texas) to cover for different project-specific factors (e.g., urban vs. rural conditions, geotechnical site conditions, weather conditions) and external factors (e.g., regional construction market conditions). The deliverables shall provide the Receiving Agency with implementation details of the interactive unit price estimation and visualization tool, enabling their workforce to quickly and accurately estimate unit prices based on the estimation and visualization tool.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$100,391.50	$80,313.20	$20,078.30

Project Number: 0-7187 University: TTI/TXST

Project Title: Exploring and Developing Innovative Methods for Estimating VMT on Local Roads in Texas

Project Start Date: 09/05/2023 Termination Date: 08/31/2025

Project Status: Active Total Project Budget: $399,269.95

Project Manager: Tom Schwerdt Researcher: Sushant Sharma

Project Objectives: State agencies must report vehicle miles traveled (VMT) estimates for local roads compiled in the statewide summaries dataset of the Highway Performance Monitoring System (HPMS) database. While the VMTs for higher functional class roads are the product of annual average daily traffic (AADT) with the corresponding roadway segment length (L); the states produce the VMT estimates for local roads as an aggregate measure using a variety of methods. Currently, the local road network accounts for more than two-thirds (67%) of the total roadway mileage in Texas and is the largest in the United States. Conducting short-term counts (STCs) (e.g., for a few hours up to a few weeks) on an extensive local road network to develop VMT is financially challenging; hence, the Receiving Agency uses statistical methods to obtain aggregated VMT. Although the current methods are statistically verified, they are yet to be revised and validated. The Performing Agencies shall investigate and develop data-driven methods for VMT estimation that can be implemented in Texas and provide significant savings to the Receiving Agency. The developed methods shall also reduce any bias in the estimation of VMTs on local roads that can lead to the overestimation or underestimation of travel demand.

Financials	FY25 Total Budget	80% Federal	20% State
TTI	$201,499.00	$161,199.20	$40,299.80
TXST	$15,147.25	$12,117.80	$3,029.45

Project Number: 0-7189 University: TTI/TXST

Project Title: Safety Assessment of Shared Use Paths at Roadway Crossings using Exposure-Based Models

Project Start Date: 09/01/2023 Termination Date: 08/31/2025

Project Status: Active Total Project Budget: $349,999.35

Project Manager: Wade Odell Researcher: Bahar Dadashova

Project Objectives: Shared or multiuse paths invite a wide range of users, including pedestrians, bicyclists, and other wheeled users, with a range of transportation purposes such as commuting, exercise, and recreation. Although shared use path (SUP) users are physically separated from traffic, they remain vulnerable at roadway crossings. In the absence of roadway cross-section designs for accommodating pedestrians and bicyclists, SUP crossings can present users with complex tasks including gap selection, scanning for turning vehicles, and interacting with other path users. Ensuring safe crossings for all users at these locations is essential. Pedestrian and bicycle treatments have been developed and their safety effectiveness has been assessed in several studies and practices. Although technically these designs can be applied to SUPs, it is not clear how to integrate treatments for different types of path users, road classifications, land-use contexts, and crossing geometries. With the increasing implementation practices of SUPs across Texas, there is a need to assess the potential safety concerns involving pedestrians, bicyclists, micromobility users, and people with disabilities at these locations and develop guidance for treatment selection, including for paths next to railroads. The Performing Agencies shall explore the pedestrian and bicyclist crashes at the vicinity of SUPs and develop design and planning guidance for implementation purposes.

Financials	FY25 Total Budget	80% Federal	20% State
TTI	$150,470.50	$120,376.40	$30,094.10
TXST	$23,273.05	$18,618.44	$4,654.61

Project Number: 0-7194 University: TARL/UTSA

Project Title: Evaluating the Risks that Erosion Control Products Pose to Protected Species and Other Wildlife

Project Start Date: 09/26/2023 Termination Date: 08/31/2025

Project Status: Active Total Project Budget: $310,621.25

Project Manager: Katelyn Kasberg Researcher: Heather Mathewson

Project Objectives: Although many erosion control products (ECPs) are marketed as wildlife friendly, few assessments of the risk of such products to wildlife exist. Current knowledge focuses primarily on reptiles, specifically snakes, thus, the effects on other species such as terrestrial arthropods, mammals, or birds remains unknown. This research would provide evaluations on wildlife friendly ECPs from the Approved Product List (APL) based on their risk of wildlife entanglement. Our objectives are to (1) determine entanglement potential for different sizes and categories of animals in different products on APL, (2) evaluate the temporal window in which an erosion control blanket poses a risk to wildlife entanglement from pre-vegetative growth through post-vegetative growth, (3) determine which types of materials pose greater and lesser risk to protected species and other wildlife, (4) determine if weaving type or mesh size impacts entanglement, and (5) identify which products contain non-biodegradable materials. We shall address these objectives through the integration of wildlife camera trapping, surveys of construction workers for observational data, and controlled field experiments. We shall cross-reference species of concern within TxDOT districts with our study results, to produce a region-specific list of rankings of ECPs and risk to wildlife specific to each district's ecological region.

Financials	FY25 Total Budget	80% Federal	20% State
TARL	$110,468.75	$88,375.00	$22,093.75
UTSA	$35,608.75	$28,487.00	$7,121.75

5.3 Safety and Operations

Project Number: 0-7144 University: TTI/TXST

Project Title: Develop a Real-time Decision Support Tool for Urban Roadway Safety Improvement

Project Start Date: 01/09/2023 Termination Date: 12/31/2024

Project Status: Active Total Project Budget: $465,010.00

Project Manager: Katelyn Kasberg Researcher: Subasish Das

Project Objectives: Due to the complex nature of urban roadways, conventional crash prediction models are limited as these models omit operating speed, short-duration volume, and weather data. To mitigate this research gap, the following three national databases can be utilized: (1) National Performance Management Research Data Set (NPMRDS) with passenger and freight speed data, (2) Travel Monitoring Analysis System (TMAS) data with both temporary traffic counting and continuous traffic counting programs, and (3) real-time weather data from the National Oceanic and Atmospheric Administration (NOAA). The fatality rate on Texas roadways for 2020 was 1.50 deaths per hundred million vehicle miles traveled, which is an 18.94% increase from 1.26 in 2019. From 2011 to 2020, the fatalities on rural roadways increased by 19%, and this increase on urban roadways is disproportionately high (31%). Research and a supporting decision support tool are necessary to improve urban safety. The Performing Agencies shall leverage ongoing staff leadership and engagement in several national and state Department of Transportation (DOT) speed-safety projects. The Performing Agencies shall provide updated safety performance functions (SPFs) for urban roadways and a real-time decision support tool on risk scoring with the applicability of new data input and model updating pipeline.

Financials	FY25 Total Budget	80% Federal	20% State
TTI	$10,609.50	$8,487.60	$2,121.90
TXST	$17,613.50	$14,090.80	$3,522.70

Project Number: 0-7171 University: TTI/TXST

Project Title: Barrier Striping for the Reduction of Accidents

Project Start Date: 09/01/2023 Termination Date: 11/30/2024

Project Status: Active Total Project Budget: $288,679.00

Project Manager: Katelyn Kasberg Researcher: Boniphace Kutela

Project Objectives: The Traffic Safety Division (TRF) of the Receiving Agency drafted a special specification (SS) for the vertical application of a retroreflective solid stripe on concrete barriers, approximately six (6) inches below the barrier's top. During the phase of new product approval, this SS describes an application similar to three (3) locations already installed on Texas roadways in previous years. Barrier striping increases motorist awareness of the roadway's edge and the barrier itself, particularly in low-visibility conditions (i.e., heavy rain and snow). These existing implementation sites have not been formally evaluated. Furthermore, the short-term effectiveness of the treatments has not been investigated; therefore, there is a need for long-term and short-term safety effectiveness evaluation of these treatments. The Performing Agencies shall collect before-and-after collision data from Crash Record Information System (CRIS) and near-collision data from connected vehicle data vendor (e.g., Wejo) to evaluate the effectiveness of vertical application of a retroreflective solid stripe on concrete barriers. Furthermore, the Performing Agencies shall install these treatments at six (6) high crash locations with different barrier types including, but not limited to concrete barriers and metal beam guard fences to evaluate their short-term effectiveness using non-traditional safety evaluation approaches. The Performing Agencies shall utilize the findings to update the drafted SS for the future use across the state and beyond.

Financials	FY25 Total Budget	80% Federal	20% State
TTI	$6,308.00	$5,046.40	$1,261.60
TXST	$5,257.50	$4,206.00	$1,051.50

Project Number: 0-7180 University: UTSA

Project Title: Select High Risk Pedestrian Midblock Crossings and Perform Safety Evaluations for Developing Pedestrian Crossings Countermeasures

Project Start Date: 09/14/2023 Termination Date: 02/28/2025

Project Status: Active Total Project Budget: $393,865.00

Project Manager: Katelyn Kasberg Researcher: Hatim Sharif

Project Objectives: In 2018, there were 6,227 pedestrian fatalities in the United States. Of those, 4,612 (74%) occurred outside of intersections, including midblock locations. This means that nearly 3 out of every 4 pedestrian deaths in the U.S. occur at midblock locations. Midblock pedestrian crashes are often more severe than crashes that occur at intersections. This is because drivers are not expecting pedestrians to cross at midblock locations, and they may not be paying as close attention. San Antonio, Houston, and Dallas have historically had the highest number of pedestrian crashes annually; consequently, there is a need to identify the high-risk locations within these cities and their optimal countermeasures. Several pedestrian midblock treatments can be implemented to improve pedestrian safety; however, there is a need to better understand the safety effects of some of the more promising treatments on pedestrian crashes in Texas. There is a need to develop crash modification factors (CMFs) specific to Texas for appropriate types of treatments at midblock crossings to guide the development of countermeasures. The goal of this research is to develop a system for Texas Department of Transportation districts to help identify high-risk pedestrian midblock crossings and select the most effective treatments for them. The project tasks include an information search on midblock pedestrian crossing safety, the collection and analysis of safety and operational data, the identification of high-risk locations for occurrence of midblock crossings and appropriate treatments, the development of crash modification factors for midblock crossings, including benefit-cost ratios.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$195,723.75	$156,579.00	$39,144.75

Project Number: 0-7183 University: TTI/TXST

Project Title: Develop Crash Modification Factors for Super 2 Highways

Project Start Date: 09/01/2023 Termination Date: 11/30/2024

Project Status: Active Total Project Budget: $236,029.68

Project Manager: Martin Dassi Researcher: Marcus Brewer

Project Objectives: Super 2 highways have been used across Texas for over 20 years, providing operational and safety benefits to rural two-lane highways at lower cost than widening to four-lane, and more are planned as the demand increases on the state highway system. Previous Super 2 research has provided insights on safety improvements, but the Receiving Agency would benefit from an updated crash modification factor (CMF) based on a rigorous review and analysis of recent crash data from the state's many Super 2 highways. This CMF would provide additional support for installing Super 2 corridors throughout the state and complement existing guidance. The Performing Agencies shall use their existing database of Super 2 highways and site characteristics, combined with additional data on traffic volumes, crashes, and other relevant factors, to develop a comprehensive Super 2 dataset for analysis and identification of relationships between crashes and other characteristics. Using the results of this analysis, the Performing Agencies shall define one (1) or more CMFs or crash modification functions (CMFunctions) that the Receiving Agency and other practitioners can use to make decisions on installing future Super 2 corridors. The Performing Agencies shall disseminate these CMFs to the Federal Highway Administration's (FHWA's) CMF Clearinghouse for inclusion in their database.

Financials	FY25 Total Budget	80% Federal	20% State
TTI	$21,220.25	$16,976.20	$4,244.05
TXST	$4,010.00	$3,208.00	$802.00

Project Number: 0-7190 University: TTI

Project Title: Roadside Safety Device Analysis, Testing, and Evaluation Program

Project Start Date: 09/01/2023 Termination Date: 11/30/2026

Project Status: Active Total Project Budget: $2,542,402.75

Project Manager: Darrin Jensen Researcher: Roger Bligh

Project Objectives: The Road to Zero has targeted a goal of zero deaths and serious injuries on Texas roadways. Recent trends in Texas indicate a continued increase in highway fatalities each of the past three years. In 2021, roadway departure crashes were responsible for 40 percent of all crash-related fatalities in Texas, which is the largest single category by crash type. In October 2021, Federal Highway Administration (FHWA) designated Texas as one of 16 Roadway Departure Focus States based on being over-represented on three (3) different roadway departure crash fatality metrics. Roadside safety devices are a key element of an effective roadway departure safety strategy. These safety devices shield motorists from roadside hazards such as non-traversable terrain and fixed objects, thereby reducing injuries and fatalities associated with roadway departure crashes.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$822,643.50	$658,114.80	$164,528.70

Project Number: 0-7198 University: TTI

Project Title: Traffic Control Device Analysis, Testing, and Evaluation Program

Project Start Date: 09/01/2023 Termination Date: 11/30/2026

Project Status: Active Total Project Budget: $1,637,159.25

Project Manager: Tom Schwerdt Researcher: Melissa Finley

Project Objectives: Traffic control devices (TCDs) are the primary means of communicating highway information to road users and play a key role in highway automation. The design, application, and maintenance of TCDs is under constant transformation as new technologies, methodologies, and policies are introduced. In addition, vehicle technologies and the roadway infrastructure industry are rapidly evolving, spurred by technology advancements, customer demand, changes in the vehicle fleet, and changes in national and state policies. The Performing Agency shall provide the Receiving Agency a mechanism to quickly and effectively conduct high priority evaluations of issues related to TCDs. The TCD issues to be evaluated in this project could represent new devices or technologies, new applications of an existing device or technology, TCD material performance, changes in the Receiving Agency's practices regarding a TCD, or other TCD related needs. Examples of various evaluations include human factors, machine vision performance, safety and operational effects, visibility assessments, and cost effectiveness analyses. The activities conducted through this project shall support the development of TCD related policy, specifications, guidelines, handbooks, and training.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$538,838.50	$431,070.80	$107,767.70

Project Number: 5-7007-01 University: CTR

Project Title: Weather Responsive Management Strategies Implementation

Project Start Date: 01/29/2024 Termination Date: 01/31/2026

Project Status: Active Total Project Budget: $467,045.35

Project Manager: Darrin Jensen Researcher: Chandra Bhat

Project Objectives: Receiving Agency personnel who work in responding to extreme weather can greatly benefit from the ability to monitor live activities and analyze recent treatment progress. Handwritten brine logs can be supplemented with automated recordkeeping. Sensing of winter operations (WinterOps) such as plowing, brine spraying, and gravel spreading is accomplished through the use of the GPS fleet tracking system already equipped in all Receiving Agency vehicles, along with the installation of a few low-cost items. WinterOps activities are then tracked without any special interaction required from the driver or operations personnel. Integration of visualizations with GIS systems provide powerful ways to use the collected data for improving safety, operations, and public communications.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$235,273.28	$188,218.62	$47,054.66

5.4 Structures and Hydraulics

Project Number: 0-7090 University: CTR

Project Title: Evaluate the Deployment of High Strength Reinforcing Steel in Texas

Project Start Date: 09/01/2020 Termination Date: 08/31/2024

Project Status: Active Total Project Budget: $1,175,887.21

Project Manager: Martin Dassi Researcher: Oguzhan Bayrak

Project Objectives: The Performing Agency shall: • Demystify the use of high strength reinforcing steel in Texas bridge design in Phase 1. This shall be accomplished through examination of Texas bridge components and systems. Phase 1 shall address where and when it makes sense to use high strength reinforcing, what benefits can be realized, who else is using high strength reinforcing and how they are using it. • Supplement Phase 1 through a series of analytical and experimental test programs covering a wide range of structural bridge components in Phase 2. This shall include realistically scaled structural testing in combination with numerical modeling to address data gaps related to serviceability performance and ultimate strength behavior.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$34,263.30	$27,410.64	$6,852.66

Project Number: 0-7095-01 University: CTR/USGS

Project Title: Flood Assessment System for TxDOT (FAST)

Project Start Date: 02/26/2024 Termination Date: 01/31/2027

Project Status: Active Total Project Budget: $5,850,241.20

Project Manager: Jade Adediwura Researcher: David R. Maidment

Project Objectives: The Receiving Agency wishes to move from a reactive to a proactive response during flood emergency operations. Real-time flood map services provide valuable information for the Receiving Agency flood decision making. The National Weather Service initiated the operation of real-time flood inundation maps for Texas in October 2023. Performing Agency 1 shall create a Flood Assessment System for TxDOT (FAST) as an additional set of real-time flood maps to describe flood impact on the road and bridge system. These maps will be distributed to the Receiving Agency Maintenance staff as web services and tested in large scale flood emergency response exercises conducted with The Receiving Agency Districts. Performing Agency 2 shall operate and maintain 80 RQ-30 stream gages to support flood forecasting and decision making. Performing Agency 2 shall refine the targeted approach for RQ-30 velocity sensor calibrations to support timely rating development using velocimetry. As many of the 80 RQ-30 gauges as possible will be added to the Interagency Flood Risk Management (InFRM) Flood Decision Support Toolbox. Combining novel gauging techniques with inundation mapping provides real-time streamflow information and transportation flood impacts that enable scenario planning and proactive actions to flood events. This project will be a continuation of Project 0-7095 “Evaluating Improved Streamflow Measurement at TxDOT Bridges.”

Financials	FY25 Total Budget	80% Federal	20% State
CTR	$874,163.55	$699,330.84	$174,832.71
USGS	$926,533.43	$741,226.74	$185,306.69

Project Number: 0-7113 University: CTR

Project Title: Determine Service and Ultimate Behavior for Bent to Column Joints in TxDOT Substructures

Project Start Date: 09/01/2021 Termination Date: 08/31/2025

Project Status: Active Total Project Budget: $1,275,132.89

Project Manager: Katelyn Kasberg Researcher: Oguzhan Bayrak

Project Objectives: The Bridge Design Manual requires consideration of various extreme events such as lateral stream loads and debris accumulation during flooding, severe scouring, and loss of supports due to collision for multi-column bent cap design. Typically, column-to-cap connections are designed as simple supports. As a result, current/past details have no confinement in bent cap joints, and the longitudinal column reinforcement is not always fully developed into the cap. Detailing joints for developing plastic capacity, as well as to permit sufficient load redistribution, is a common strategy in design for extreme loading scenarios (e.g., seismic design). To accommodate this increased moment demand, the standard column-to-cap connection requires improved detailing techniques. The Performing Agency shall utilize analytical/computational methods and an experimental program to investigate the performance of bent cap connections with traditional and improved details. The Performing Agency shall provide practical, easily implementable design recommendations for column-bent connections through these activities: • Reviewing literature to identify state-of-the-art detailing techniques and design parameters • Performing analytical or computational analysis to determine moment demand induced by extreme events • Developing improved detailing methods and retrofitting methods • Conducting large-scale structural experiments to investigate the performance of various details • Providing design guidelines for designers to account for the extreme events.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$275,166.50	$220,133.20	$55,033.30

Project Number: 0-7115 University: CTR

Project Title: Investigate Live Load Distribution and Stability of Prestressed Concrete Girders During Construction

Project Start Date: 09/01/2021 Termination Date: 01/15/2025

Project Status: Active Total Project Budget: $998,766.67

Project Manager: Martin Dassi Researcher: Todd Helwig

Project Objectives: The Performing Agency shall focus on the stability of long-span prestressed concrete I- and U-girders during erection and construction. The Performing Agency shall consider the distribution of live load in the completed bridge as well the role of diaphragms in stability and live load distribution and develop methods of analysis of the girder behavior. The Performing Agency shall focus on the stability of long-span prestressed concrete I- and U-girders during erection and construction. The Performing Agency shall consider the distribution of live load in the completed bridge as well the role of diaphragms in stability and live load distribution and develop methods of analysis of the girder behavior.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$75,113.89	$60,091.11	$15,022.78

Project Number: 0-7117 University: CTR

Project Title: Investigate the Strength of Struts Crossing Cold Joints

Project Start Date: 09/01/2021 Termination Date: 06/30/2025

Project Status: Active Total Project Budget: $1,366,368.89

Project Manager: Jade Adediwura Researcher: Oguzhan Bayrak

Project Objectives: Cold joints commonly occur in concrete structures, whether they are a part of new construction (e.g., staged construction, roadway expansion projects, spliced girder bridges) or retrofit efforts (e.g., interface between the new structural elements and the older concrete components). In many cases, the cold joints occur within “disturbed regions” of a structure. The preferred design method in the AASHTO LRFD Bridge Design Specifications for disturbed regions is the strut-and-tie design method. While the commentary states that the capacity of cold joints should be checked in addition to traditional strut-and-tie design checks, there is no specific guidance provided for how to include shear-interface resistance in the context of the strut-and-tie design provisions. Thus, there is a need to develop specific design recommendations for use in the AASHTO LRFD Bridge Design Specifications, as well as the TxDOT Bridge Design Manual. The Performing Agency shall investigate the strength of struts crossing cold joints through a comprehensive analytical and experimental test program informed by a literature review and examination of common cold joint cases encountered by bridge designers. The design recommendations developed shall provide the guidance for implementing the necessary design checks at cold joints encountered in Texas bridge design practice.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$299,430.78	$239,544.62	$59,886.16

Project Number: 0-7154 University: UTSA

Project Title: Evaluate Use of 300ksi Strands for TxDOT Prestressed Girders

Project Start Date: 09/19/2022 Termination Date: 08/31/2025

Project Status: Active Total Project Budget: $849,245.00

Project Manager: Tom Schwerdt Researcher: Wassim M. Ghannoum

Project Objectives: Advances in material and fabrication processes have allowed the prestressing-strand industry to increase the strength of strands from 270 ksi to 300 ksi. Several state DOTs around the nation are already considering incorporating higher strength strands into their designs. The impetus is to obtain longer bridge span lengths for a given section depth. The main goal of this research project is to update the designs of standard Texas DOT prestress girders to incorporate 300 ksi 0.6 inch diameter strands. The main concern for upgrading to 300 ksi strands revolves around the increased spalling and bursting stresses associated with higher prestressing forces. Such increases in stresses can cause increased cracking in girders at prestress transfer. The Performing Agency will conduct tests on full-scale prestressed girders for all standard TX girder section sizes. These tests will allow the research team to hone in on optimal detailing for girders using 300 ksi strands. As a result, new designs for all TX girder sections shall be produced for 300 ksi strands. Updates to design specifications shall also be proposed to reflect research findings. The expected benefits are more economical bridges that can span longer distances for a given section depth.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$265,091.25	$212,073.00	$53,018.25

Project Number: 0-7155 University: TTI/UTSA

Project Title: Develop/Refine Design Provisions for Headed and Hooked Reinforcement

Project Start Date: 09/01/2022 Termination Date: 02/28/2026

Project Status: Active Total Project Budget: $999,401.25

Project Manager: Tom Schwerdt Researcher: Kinsey Skillen

Project Objectives: The usefulness of reinforced concrete is dependent on sufficient anchorage between concrete and reinforcing steel. Sufficient anchorage occurs when reinforcing steel is embedded into the concrete a distance referred to as the development length. When this length of embedment is achieved the reinforcing steel is expected to reach or exceed stresses beyond yield. Geometric constraints within structural members may prevent straight lengths of reinforcement from developing their yield strength, such as straight bars being terminated within a beam-column joint. In these cases, the addition of a hook or headed bar attachment provides a more efficient anchorage mechanism compared to straight bars. Both hooked and headed bars have shorter development lengths than straight bars. However, the current American Association of State Highway and Transportation Officials (AASHTO) Load and Resistance Factor Design Bridge Design Specifications (LRFD) Bridge Design Specification (9th edition) has not developed standard details for headed reinforcement in bridge structures. In addition, current AASHTO LRFD design provisions for hooked bars are adapted from the American Concrete Institute (ACI) 318-14 Building Code Requirements for Structural Concrete. Considerable revisions to the current ACI 318-19 specification for the design of hooked reinforcement, which require increased lengths (50 to 70 percent longer) relative to previous code cycles, necessitates the Receiving Agency to revisit its current design practice for hooked reinforcement. This research seeks to provide the Receiving Agency with clear and concise design guidance for engineers to use both hooked and headed bar attachments in Receiving Agency bridge structures. The Performing Agencies shall accomplish this through large-scale experimental testing of specimens with hooked and headed bars representative of Receiving Agency bridge structures and current design practice.

Financials	FY25 Total Budget	80% Federal	20% State
TTI	$167,913.50	$134,330.80	$33,582.70
UTSA	$91,230.00	$72,984.00	$18,246.00

Project Number: 0-7170 University: TTI

Project Title: Evaluate Bridge Deck Condition and Replacement Methods

Project Start Date: 01/01/2023 Termination Date: 03/31/2026

Project Status: Active Total Project Budget: $734,786.00

Project Manager: Wade Odell Researcher: Anna Birely

Project Objectives: Bridge decks usually have a minimum service life of 50 years but many bridge decks in Texas far exceed that value and are showing concerning signs of deck soffit cracking. Deck replacement is performed to take advantage of the good existing condition of the super- and sub-structures; however, since replacement is expensive (up to 40% of the cost of a new bridge), especially over concrete girders, it is critical to have sound decision and appropriate design and construction methods for this work to protect public safety and use bridge preservation funds wisely. While life-cycle cost analysis can be beneficial when assessing the overall deck condition relative to the condition of the rest of the deck, it does not address the risk of a punch through failure. The outcomes of this project will aid the Receiving Agency's Bridge Division and districts to have accurate assessments of cast-in-place (CIP) bridge deck conditions to make sound decisions about emergency repairs, regular repairs, deck overlay, and deck replacement to preserve bridge assets while minimizing the risk of punch through.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$237,894.50	$190,315.60	$47,578.90

Project Number: 0-7172 University: TXST

Project Title: Developing a Performance-Based Concrete Overlay Mix Design for Improved Resistance to Early-Age Cracking and Increased Durability

Project Start Date: 09/01/2023 Termination Date: 08/31/2026

Project Status: Active Total Project Budget: $700,370.51

Project Manager: Darrin Jensen Researcher: Anthony Torres

Project Objectives: Concrete bridge decks are exposed to a wide range of environmental and mechanical distress that can lead to severe deterioration. Typical bridge deck deterioration starts with shrinkage cracks, and additional cracks may occur due to traffic loads and effects such as temperature and moisture fluctuations. Cracking can lead to water and chloride ingress, causing corrosion of the reinforcement and further damage to the structure. In Texas, several concrete overlay mix design options are available, however, they are prescriptive-based. Although convenient, prescriptive-based designs have led to inconsistencies between mixtures and batches during placement, especially when mobile mixers are used. Additionally, as individual materials in prescriptive concrete overlay mix designs evolve and newer or alternative materials become available; e.g., Type IL cements and alternative supplementary cementitious materials (SCMs), unexpected and unanticipated behavior can occur. Furthermore, as bridge decks age there will be a need to preserve service life and ensure long-term performance of concrete overlay mix designs through performance-based specifications. This project aims at developing a robust performance-based, non-UHPC, mix design specification for concrete overlays to achieve low cracking and superior long-term durability. Developing such a specification that is adaptable to shifts in material technology will ensure long-term success in practice.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$227,295.46	$181,836.37	$45,459.09

Project Number: 0-7179 University: TTI

Project Title: Evaluate Safety End Treatments for Roadside Drainage Structures

Project Start Date: 09/01/2023 Termination Date: 08/31/2026

Project Status: Active Total Project Budget: $863,759.75

Project Manager: Martin Dassi Researcher: Sofokli Caskalli

Project Objectives: Drainage is a critical element of roadside design and often calls for the use of cross-drainage and parallel-drainage culverts. If untreated, the ends of the drainage structures can become roadside hazards that can result in serious injury when an errant vehicle leaves the roadway. The most cost-effective strategy is often to make the culvert end traversable using grates comprised of pipe runners across the culvert end. The Performing Agency shall investigate the safety performance of traversable cross-drainage and parallel-drainage culvert end treatments installed on roadside slopes. The Performing Agency shall address the various design variations of safety end treatments supported by current standards to investigate the safety performance. The Performing Agency shall develop design guidance to recommend slopes and size, length, and spacing of the pipe runners for both cross-drainage and parallel-drainage culverts that comply with the American Association of State Highway and Transportation Officials (AASHTO) Manual for Assessing Safety Hardware (MASH). The Performing Agency shall use full-scale crash testing to aid with validating the design guidance.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$368,299.75	$294,639.80	$73,659.95

Project Number: 0-7192 University: TTI/UTEP

Project Title: Develop Performance of Baseplate Connections in COSS and Traffic Signal Structures

Project Start Date: 09/01/2023 Termination Date: 08/31/2026

Project Status: Active Total Project Budget: $988,604.75

Project Manager: Wade Odell Researcher: Stefan Hurlebaus

Project Objectives: The Receiving Agency cantilever overhead sign structures (COSS) and traffic signal pole structures have a socketed fillet welded connection between the column and the baseplate. While economical, this connection has a low fatigue-resistance threshold. Some current and past Receiving Agency designs and contractor submitted alternates involving multi-sided bent plate columns were not designed using fatigue provisions. Fatigue provisions did not exist in the design specification of the time. The Receiving Agency is currently updating various ancillary structure standards for Load and Resistance Factor Design - Luminaires and Traffic Signals (LRFD-LTS) specifications, which does include fatigue provisions. Research is needed to ascertain the best connection type and design, while balancing economy and performance for new structures. The Performing Agencies shall identify the fatigue life of existing structures, including critical cases and means of repair and retrofit, in this research. The results of this research will lead to improved ancillary structure details with mitigated fatigue risk, as well as a method of identifying existing inventory with fatigue risks. The objectives of this research are to (1) outline fabrication practices and economic considerations that may affect proposed connection type and design, (2) develop an inventory database of COSS and traffic signal pole structures that are representative, (3) utilize structural modeling to identify from within the inventory critical cases that should be advanced to a testing program, (4) develop and execute a targeted testing program that isolates critical design parameters for the fatigue performance of both the critical cases found in the inventory and recommended connection types and designs, (5) provide recommendations for connection types and designs based on fatigue provisions, and (6) provide recommendations for identifying fatigue-critical of existing inventory

Financials	FY25 Total Budget	80% Federal	20% State
TTI	$342,947.50	$274,358.00	$68,589.50
UTEP	$45,991.25	$36,793.00	$9,198.25

Project Number: 0-7193 University: CTR/TTI

Project Title: Develop Assessment and Mitigation Guidance for Ancillary Highway Structures with Existing Cracks

Project Start Date: 09/01/2023 Termination Date: 08/31/2026

Project Status: Active Total Project Budget: $1,493,580.09

Project Manager: Wade Odell Researcher: Todd Helwig

Project Objectives: Ancillary structures (AS) exist in a wide variety of applications critical to safety and daily needs of the travelling public (e.g. HMIP, COSS, and traffic signals). The long-term corrosion performance of these structures is of utmost importance to prevent deterioration and extend the structural design life and safety. While hot-dipped galvanizing provides excellent long-term behavior for corrosion control of these critical structures, over the past 20 years this process has been found to create extensive cracking of welds on base plate connections that is detrimental to the fatigue lives of these poles. Although improved details are used in new designs, thousands of HMIP, COSS, and signal poles exist in Texas with varying levels of cracking in the welds between the baseplates and pole shafts. The research outlined in this proposal identifies and provides critical assessment parameters and guidance for the Receiving Agency to determine if cracks should be monitored, repaired, or the structural component replaced. The proposed research includes a representative assessment of weld cracking in the AS inventory, the development of monitoring hardware and techniques, the development and assessment of repair techniques, and the development of certification methods/standards for inspection personnel.

Financials	FY25 Total Budget	80% Federal	20% State
CTR	$381,213.48	$304,970.78	$76,242.70
TTI	$203,309.00	$162,647.20	$40,661.80

Project Number: 5-6936-01 University: CTR

Project Title: Implementation of Semi-integral Bridges in Texas

Project Start Date: 02/15/2024 Termination Date: 12/31/2026

Project Status: Active Total Project Budget: $780,032.31

Project Manager: Jade Adediwura Researcher: Jorge Zornberg

Project Objectives: The Performing Agency shall validate predicted semi-integral bridge performance against actual semi-integral bridge performance; particularly regarding backfill placement requirements. In particular, the geotextile-confined backfill will be monitored to assess its impact on (1) the lateral earth pressures induced due to cycles of temperature-induced backfill movements and (2) the settlements of the backfill material. The new approach, developed in research project 0-6936, is expected to reduce lateral earth pressures and decrease settlements. This validation of field performance shall facilitate the development of a standard detail and commentary for the Bridge Design Manual as well as the compilation of additional design and construction guidelines. The Performing Agency shall also monitor the semi-integral bridge at China Creek, in the Wichita Falls District using the wireless field monitoring system installed during research project 0-6936.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$235,587.51	$188,470.01	$47,117.50

Project Number: 9-1532 University: CTR

Project Title: TPF-5(508) Concrete Bridge Engineering Institute (CBEI)

Project Start Date: 06/21/2023 Termination Date: 05/31/2027

Project Status: Active Total Project Budget: $5,313,706.25

Project Manager: Darrin Jensen Researcher: Oguzhan Bayrak

Project Objectives: The objective of TPF-5(508) Concrete Bridge Engineering Institute (CBEI) Transportation Pooled Fund (TPF) is to create a national resource for innovative workforce development programs and implementation of new technologies in the field of concrete bridges, establishing a consortium of member states. CBEI shall be the center of concrete bridge related research, education, and training at the Performing Agency, the University of Texas at Austin in the Cockrell School of Engineering. The Performing Agency shall work with bridge stakeholders (primarily state and federal transportation agencies) and seek input from industry groups representing the concrete bridge community to develop pioneering, practical, and effective programs that will have national impact with the goal of addressing issues encountered in concrete bridges and implementing plans to work toward ensuring resiliency expectations for concrete bridges. The Performing Agency's specific objectives are to develop and implement the following services with coordinated input from members of the pooled fund: • Three training programs which will include both classroom and hands-on training Concrete Bridge Deck Construction Inspection Program Concrete Materials for Bridges Program Post-tensioning (PT) Laboratory •The Concrete Solutions Center •The Bridge Component Collection •The Technology Development Program The Performing Agency shall also implement the components of the Concrete Solutions Center comprised of workshops, seminars, and project technical support. The Performing Agency shall develop and administer the Technology Development Program for the evaluation and implementation of new and emerging technologies in the field of concrete bridges.

Financials	FY25 Total Budget	100% Federal*	80% Federal**	20% State***
Contract Total	$1,315,466.71	$1,023,961.27	$233,204.40	$58,301.09

* Corresponds to the states' FY '25 contributions (100% federal share) and Texas' special project.
** Corresponds to FHWA's FY '25 contributions, including a regular contribution a special project.
***Corresponds to Texas' state match

5.5 Strategy and Innovation

Project Number: 0-7181 University: UH

Project Title: Development of Digital Twins for Texas Bridges

Project Start Date: 09/01/2023 Termination Date: 08/31/2026

Project Status: Active Total Project Budget: $505,286.00

Project Manager: Wade Odell Researcher: Vedhus Hoskere

Project Objectives: Bridges are a critical component of transportation infrastructure, providing safe and efficient travel for millions of people every day. However, bridge maintenance can be complex and expensive, and it is challenging to detect problems early before they become more significant and costly to repair. Digital twins offer a solution to this challenge, providing a comprehensive and efficient means of obtaining, integrating, processing, and storing high-fidelity information about the current geometry and condition of a bridge. Developing digital twins of Texas bridges is a significant undertaking, as it requires collecting and integrating data from multiple sources, including sensors and unmanned aerial systems (UASs). Moreover, the resulting data must be complete and usable without overtaxing existing computer systems at TxDOT, which presents challenges related to data compression and redundancy. To address these challenges, this research proposes an outcome-based framework for the development of digital twins of TxDOT bridges. This framework will be extensively validated across real-world conditions through data collection and digital twin construction efforts from 30 (or as many as requested and agreed to) TxDOT bridges. The resulting guidelines and procedures will provide a means for comprehensively and efficiently collecting, integrating, processing, and storing geo-referenced, multi-sensor, and high-fidelity information about the current geometry and condition of a bridge. To enable early identification of bridge maintenance needs, the researchers will investigate and assess feasibility and requirements for aligning multi-temporal models and detecting and quantifying changes over time both with manual observation and automatically. The prototype routines for alignment and change detection developed will be integrated into the digital twinning framework for direct use by TxDOT. Additionally, the performing agency will prepare and test training materials to teach project managers, maintenance supervisors, and other personnel on field collection and planning of 3D data, digital twin development, and data processing and modeling. These training materials will include operational recommendations and guidance on data collection plans, reviews and approval, and safety. The proposed research will provide a clear path for the digital transformation and integration of TxDOT bridge inspections, design, and maintenance activities, enabling more scientific decision-making and bridge management practices with broad impacts to TxDOT operations.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$159,833.75	$127,867.00	$31,966.75

Project Number: 0-7199 University: TEEX/TTI

Project Title: Identification of Needs and Strategies for First Responder Interactions with Automated Vehicles (Avs)

Project Start Date: 09/01/2023 Termination Date: 02/28/2025

Project Status: Active Total Project Budget: $310,814.13

Project Manager: Chris Glancy Researcher: Brad Trefz

Project Objectives: The number of vehicles with automated functions continues to increase on Texas roadways. Several companies are testing or will soon deploy demonstrations of Level 4 automated vehicles or connected automated vehicles (CAV/AVs) within the state, with no notification requirements. Additionally, several automated commercial motor vehicle (ACMV) projects are testing Level 4 automation. While safety goals are aimed at minimizing the number of adverse incidents that occur, it is inevitable that a crash or other adverse operations will happen involving one (1) of these automated vehicles. The Receiving Agency's Highway Emergency Response Operator (HERO) program and other first responders are part of the front line that must be prepared to encounter a CAV/AV or ACMV during a routine interaction or adverse event/accident. This project will identify needs and strategies for first responders to understand how these vehicles operate, how to safely approach and disable these vehicles as needed during routine and adverse incident interactions and how to interact with AVs during an accident or emergency.

Financials	FY25 Total Budget	80% Federal	20% State
TEEX	$2,950.25	$2,360.20	$590.05
TTI	$57,037.25	$45,629.80	$11,407.45

Project Number: 0-7200 University: TTI/UTA

Project Title: Utilizing Telematics to Understand Driving Behavior During Missed Exits and Wrong Turns

Project Start Date: 09/01/2023 Termination Date: 08/31/2025

Project Status: Active Total Project Budget: $306,215.21

Project Manager: Jade Adediwura Researcher: Jason Wu

Project Objectives: Texas is currently experiencing its largest population growth in decades. More and more lands are being urbanized and complex design methods are often adopted. As a result, drivers are likely confused at certain locations such as ramps, roadway exits and intersections. The overarching goal of this project is to identify unsafe and inefficient locations of Texas state highways, where driving behaviors often reveal excessive abnormities (e.g., hard brakes, control stops and/or missing of road entrances/exits). Problematic locations are due to misleading roadway designs or signage configurations in many cases. In the past, the Receiving Agency could not identify such locations until either a driver called to complain or crashes occurred frequently. The emerging telematics data from connected vehicles (CVs) will enable such possibility to identify and fix problematic locations proactively. Applying the state-of-the-art big data analytics and Artificial Intelligence (AI) techniques on the emerging vehicle telematics data (delivered by Wejo and INRIX), the Performing Agencies shall demonstrate how to identify problematic locations within the selected area. The Performing Agencies shall also integrate multiple advanced computing techniques (e.g., high-performance computing, cloud-computing etc.) to cost-effectively streamline the process of traffic big data fusion, cleaning, and reduction for the Receiving Agency' future practices.

Financials	FY25 Total Budget	80% Federal	20% State
TTI	$110,600.50	$88,480.40	$22,120.10
UTA	$64,868.17	$51,894.54	$12,973.63

5.6 Program Support

Project Number: 0-6974 University: TTI

Project Title: Digital Publication and Outreach Services in Support of Research

Project Start Date: 07/11/2018 Termination Date: 08/31/2025

Project Status: Active Total Project Budget: $1,913,647.00

Project Manager: Phillip Hempel Researcher: Kelly West

Project Objectives: The Performing Agency shall produce Video Summary Report's (VSRs) for the Receiving Agency which summarize transportation research and implementation projects. Additionally, the Performing Agency shall also produce outreach materials for the Receiving Agency that will be transportation research related material and may include additional related subjects of interest.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$341,227.75	$272,982.20	$68,245.55

Project Number: 0-9902-23 University: CTR

Project Title: University of Texas Library Services

Project Start Date: 08/31/2022 Termination Date: 08/31/2025

Project Status: Active Total Project Budget: $1,313,756.18

Project Manager: Tom Schwerdt Researcher: Michael Nugent

Project Objectives: The Performing Agency shall provide publishing services, library information services, and collection management to support the federally-funded State Planning and Research Subpart B Work Program managed by the Receiving Agency's Research and Technology Implementation Division (RTI). The Performing Agency shall provide the facilities, technical oversight, and trained professional, technical, and clerical staff needed to respond to the Receiving Agency's research information needs and to update, preserve, and facilitate public access to the collection of published resources contained in the Receiving Agency's transportation research library (TxDOT Research Library). The U.S. Department of Transportation (USDOT) Public Access Plan ensures public access to unclassified publications and digital data sets arising from the USDOT's research and development funding, which includes the SPR Subpart B Work Program (Research Program). The Performing Agency shall support transparency and long-term stewardship of Research Program results by providing online public access to Research Program information, performing services that ensure the Receiving Agency follows USDOT Public Access Plan guidelines, and serving as the Receiving Agency's official repository for all Research Program deliverables.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$453,133.41	$362,506.73	$90,626.68

Project Number: 5-7097-24 University: UTA

Project Title: Texas Local Technical Assistance Program (TxLTAP)

Project Start Date: 12/21/2023 Termination Date: 09/30/2025

Project Status: Active Total Project Budget: $3,377,917.13

Project Manager: Katelyn Kasberg Researcher: N/A

Project Objectives: The Local Technical Assistance Program (LTAP) is a nationwide effort financed by the Federal Highway Administration and individual state departments of transportation. Its purpose is to translate into understandable terms the best available technology for roadways, bridges, bicycle and pedestrian facilities, and public transportation for city and county roadway and transportation personnel. The TxLTAP, operated by the Performing Agency, is sponsored by the Receiving Agency and the Federal Highway Administration. TxLTAP is focused on preserving and enhancing the local road system by delivering quality training and technical assistance to local city and county road agencies in Texas. The training provided through this program will increase the performance of the transportation workers in Texas by ensuring they conduct their duties in a safe, efficient, environmentally sound, and cost-effective manner. This program will also allow city and county agencies to maximize benefits from their often limited fiscal and staffing resources. Through training geared to local government circumstances, customized technical assistance, advice provided at events, and a library of resources, TxLTAP provides relevant and impactful information focused on road and bridge/culvert maintenance, the use of traffic control devices, and other techniques to promote traffic safety.

Financials	FY25 Total Budget	80% Federal	20% State
Contract Total	$1,713,747.75	$1,370,998.20	$342,749.55

6. Pooled Fund Projects

Pooled-fund projects are for planning, research, development, or technology transfer project activities administered by FHWA and are supported by two or more participants. These projects address an issue of significant or widespread interest related to highway, public, or intermodal transportation. The research is intended to address a new area or provide information that will complement or advance previous investigations of the subject matter.

As 23 CFR 420.205 describes, "To promote effective use of available resources, the State DOTs are encouraged to cooperate with other State DOTs, the FHWA, and other appropriate agencies to achieve RD&T objectives established at the national level and to develop a technology transfer program to promote and use those results. This includes contributing to cooperative RD&T programs such as the NCHRP, the TRB, and transportation pooled fund studies as a means of addressing national and regional issues and as a means of leveraging funds."

Pooled-fund projects are a very effective means of leveraging precious research funds.
Table 8. shows the pooled-fund projects that Texas participates in.
The following are project descriptions of the pooled-fund projects where Texas is contributing funds:

Table 8. FY 2025 Pooled-Fund Projects.

Project	Title	Study No.	Lead Agency	Start-End Date	FY25 Commitment
8-8491	National Accessibility Evaluation Phase II Access Across America	TPF-5(455)	Minnesota Department of Transportation	2021-2025	$40,000.00
8-8492	Automated Vehicle Pooled Fund Study	TPF-5(453)	Ohio Department of Transportation	2021-2025	$50,000.00
8-8499	Road Usage Charge (RUC) America	TPF-5(451)	Oregon Department of Transportation	2020-2025	$25,000.00
8-8504	Traffic Control Device (TCD) Consortium (3)	TPF-5(447)	FHWA	2020-2025	$25,000.00
8-8506	Pavement Surface Properties Consortium: Phase III - Managing the Pavement Properties for Improved Safety	TPF-5(463)	Virginia Department of Transportation	2021-2025	$20,000.00
8-8508	Soil and Erosion Testing Services for Bridge Scour Evaluations	TPF-5(461)	FHWA	2021-2025	$15,000.00

Project	Title	Study No.	Lead Agency	Start-End Date	FY25 Commitment
8-8510	Demonstration to Advance New Pavement Technologies Pooled Fund	TPF-5(478)	FHWA	2021-2025	$10,000.00
8-8513	Building Information Modeling (BIM) for Infrastructure	TPF-5(480)	Iowa Department of Transportation	2021-2025	$30,000.00
8-8516	Clear Roads Winter Highway Operations Phase III Pooled Fund	TPF-5(479)	Minnesota Department of Transportation	2022-2026	$25,000.00
8-8519	ENTERPRISE- PHASE III (Phase II Continuation)	TPF-5(490)	Michigan Department of Transportation	2022-2026	$30,000.00
8-8520	Safety Service Patrol Standardization and Management Practices	TPF-5(489)	FHWA	2021-2025	$25,000.00
8-8522	Transportation Management Centers Pooled Fund Study Phase II	TPF-5(487)	FHWA	2022-2027	$50,000.00
8-8523	Roadside Safety Pooled Fund - Phase 3	TPF-5(501)	Washington Department of Transportation	2023-2027	$65,000.00
8-8526	Continuous Bituminous Pavement Stripping Assessment Through Non-destructive Testing	TPF-5(504)	Minnesota Department of Transportation	2023-2027	$25,000.00
8-8527	Emerging Data Streams for Pavement (Asset) Health Monitoring and Management	TPF-5(513)	Virginia Department of Transportation	2023-2028	$30,000.00
8-8529	Standardizing Rigid Inclusions for Transportation Projects – Phase I	TPF-5(503)	Kansas Department of Transportation	2023-2025	$30,000.00
8-8530	Highway Safety Manual 2nd Edition (HSM2) Implementation	TPF-5(516)	FHWA	2023-2028	$16,000.00
8-8531	Concrete Bridge Engineering Institute (CBEI)	TPF-5(508)	Texas Department of Transportation	2023-2026	$250,000.00

Project	Title	Study No.	Lead Agency	Start-End Date	FY25 Commitment
8-8532	National Partnership to Improve the Quality of Preventive Maintenance Treatment Construction & Data Collection Practices (PG Phase III)	TPF-5(522)	Minnesota Department of Transportation	2023-2027	$50,000.00
8-8533	National Hydraulic Engineering Conference	TPF-5(507)	FHWA	2022-2027	$1,000.00
8-8534	Building Information Modeling (BIM) for Bridges and Structures - Phase II	TPF-5(523)	Iowa Department of Transportation	2023-2027	$20,000.00
8-8535	New Performance Approach to Evaluate ASR in Concrete	TPF-5(521)	FHWA	2023-2027	$5,000.00
8-8536	Consortium for Asphalt Pavement Research and Implementation (CAPRI)	TPF-5(465)	Alabama Department of Transportation	2021-2025	$10,000.00
8-8537	Expansion: Enhanced Traffic Signal Performance Measures	TPF-5(519)	Indiana Department of Transportation	2023-2025	$40,000.00
8-8538	Resiliance Approaches for Pavements and Geotechnical Assets	TPF-5(512)	Virginia Department of Transportation	2023-2027	$20,000.00
8-8540	Work Zone Analytics	TPF-5(514)	Indiana Department of Transportation	2023-2025	$30,000.00
8-8541	Evaluation of Low-Cost Safety Improvements (ELCSI-PFS)	TPF-5(515)	FHWA	2023-2027	$10,000.00
8-8542	Implementation of Structural Data from Traffic Speed Deflection Devices	TPF-5(518)	Virginia Department of Transportation	2024-2028	$149,000.00
8-8543	Human-Centered Steel Bridge Inspection Enabled by Augmented Reality and Artificial Intelligence	TBD	Kansas Department of Transportation	2024-2026	$40,000.00

Project	Title	Study No.	Lead Agency	Start-End Date	FY25 Commitment
8-8545	Western Transportation Research Consortium	TPF-5(526)	Utah Department of Transportation	2024-2026	$15,000.00
8-8547	Improving the Quality of Highway Profile Measurement	TBD	Illinois Department of Transportation	2024-2028	$30,000.00
8-8548	Ahead of the Curve - Migration from NCHRP to AASHTO Technical Training Solutions (TTS)	TBD	Louisiana Department of Transportation	2024-2025	$10,000.00
8-8549	Accelerated Performance Testing on the 2024 NCAT Pavement Test Track with MnROAD Research Partnership	TBD	Alabama Department of Transportation	2024-2026	$266,667.00

6.1 Pooled Funds Where Texas is Not the Lead State

Project Number: 8-8491

Study Number: TPF-5(455)

Title: National Accessibility Evaluation Phase II Access Across America

Lead Agency: Minnesota Department of Transportation

Status: Contract signed

Project Objectives: This project has two main objectives. First, it will create a new, national Census block-level accessibility dataset that can be used by partners in local transportation system evaluation, performance management, planning, and research efforts. Second, it will produce and publish a series of annual reports describing accessibility to jobs by auto, transit, and biking in metropolitan areas across America. Accessibility Dataset This project will create a national Census-block level dataset describing accessibility to jobs from locations across the county, updated annually. Accessibility calculations will rely on detailed travel time calculations for both driving and transit, which will be implemented using commercially-available GPS-based speed measurements, published transit schedules, and detailed bike and pedestrian networks. Each Access Across America partner will have direct digital access to the accessibility datasets covering the jurisdictions of all partners. Annual Report The annual Access Across America series of annual reports will provide summaries of the detailed accessibility datasets for the 50 largest metropolitan areas across America. These will be released to national and local media outlets and supported by publicity and communications efforts. Partners will be recognized in the report for their sponsorship and support. Optional Goals The accessibility evaluation tools and expertise developed in this project can also support optional goals for interested agencies: 1. Include destinations from local data sources - Local destination datasets from your organization can be included in the annual accessibility calculations. Cost: $5,000 2. Accessibility Data Workshop - Researchers can lead an on-site or remote workshop to provide transportation agency staff hands-on experience with accessibility data and training on accessibility concepts. Cost: $5,000. 3. Scenario Evaluation - Using annual accessibility data as a baseline, researchers can develop an accessibility evaluation of highway, transit, bike, or pedestrian scenarios based on planning data from your organization. Cost varies with scenario complexity and objectives.

Financials	Commitment Years	FY25 Commitment
TxDOT	2021-2025	$40,000.00

Project Number: 8-8492

Study Number: TPF-5(453)

Title: Automated Vehicle Pooled Fund Study

Lead Agency: Ohio Department of Transportation

Status: Cleared by FHWA

Project Objectives: Through this pooled fund, the Ohio Department of Transportation (ODOT) will work with federal and state departments of transportation to establish multiple projects to research vehicle-roadway interaction including data failures and mitigation methods, identify and define standards, and encourage interoperability across state borders.

Financials	Commitment Years	FY25 Commitment
TxDOT	2021-2025	$50,000.00

Project Number: 8-8499

Study Number: TPF-5(451)

Title: Road Usage Charge (RUC) America

Lead Agency: Oregon Department of Transportation

Status: Cleared by FHWA

Project Objectives: Explore the technical and operational feasibility of a multi-jurisdictional roadusage charge system. • Investigate public and key decision maker criteria for acceptance and share experience and lessons learned to foster positive outcomes. • Develop standards and protocols for how road use charges could best be collected and remitted among the various jurisdictions. • Develop preliminary operational concepts for how a multi-jurisdictional road usage charge systemcould be administered. • Develop a model for regional cooperation and interoperability that can be used in the Western region and potentially across North America. • Engage the automotive manufacturing and technology sector to encourage the ability for mileage reporting to occur in conjunction with other products and services the sector provides in the marketplace. • Share knowledge to maximize the preparedness for and efficiency of policy and program development for road usage charging among the members.

Financials	Commitment Years	FY25 Commitment
TxDOT	2020-2025	$25,000.00

Project Number: 8-8504

Study Number: TPF-5(447)

Title: Traffic Control Device (TCD) Consortium (3)

Lead Agency: FHWA

Status: Cleared by FHWA

Project Objectives: To assemble a consortium composed of State Departments of Transportation; additional interested entities or organizations; County, regional, and/or local transportation agencies; and FHWA program offices to meet national and state needs in support of the MUTCD. Activities of the consortium include:

a) Identify human factors, safety, and operational issues related to TCDs;

b) Select new and existing TCDs for evaluation;

c) Initiate and monitor research projects;

d) Disseminate results; and

e) Facilitate collaboration and information sharing among members.

Financials	Commitment Years	FY25 Commitment
TxDOT	2020-2025	$25,000.00

Project Number: 8-8506

Study Number: TPF-5(463)

Title: Pavement Surface Properties Consortium: Phase III - Managing the Pavement Properties for Improved Safety

Lead Agency: Virginia Department of Transportation

Status: Cleared by FHWA

Project Objectives: The mission of the Surface Properties Consortium has been to conduct applied research focused on enhancing the level of service provided by the roadway transportation system by optimizing pavement surface characteristics. Phase I [TPF-5(141)] included regular verification and validation of the participants' equipment, opportunities for technology transfer, and the accumulation of a significant body of knowledge on the measurement of pavement surface properties. Phase II [TPF-5(345)] continued to support the members' effort to produce high-quality surface properties measurements, but focused mainly on emerging friction and macrotexture measurement technologies and the integration of these measurements into the next generation of pavement asset management systems. Practical and tangible results were well documented and disseminated. The focus of Phase III will be on continuing to support the implementation of asset management approaches and tools that help improve the safety of our road networks by reducing the number of crashes and related fatalities. It will represent a concerted effort to bring pavement design and evaluation experts together with maintenance and safety professionals to maximize the contribution of the pavement community Towards Zero Deaths on US highways. It will also seek participation of industry through the pooled-fund or an industrial affiliate program.

Financials	Commitment Years	FY25 Commitment
TxDOT	2021-2025	$20,000.00

Project Number: 8-8508

Study Number: TPF-5(461)

Title: Soil and Erosion Testing Services for Bridge Scour Evaluations

Lead Agency: FHWA

Status: Cleared by FHWA

Project Objectives: The objective of these pooled funds is to provide and/or support soil and erosion testing services for bridge projects over water crossings managed or coordinated by State DOTs, to provide technical assistance to design, fabricate, and install erosion testing devices to support and seek to broaden the use of erosion testing devices among State Department of Transportations, and to compile and analyze the collected soil and erosion testing data in a broader research effort to more accurately estimate reliable scour design depths given the soil conditions and hydraulic load during a given storm event.

Financials	Commitment Years	FY25 Commitment
TxDOT	2021-2025	$15,000.00

Project Number: 8-8510

Study Number: TPF-5(478)

Title: Demonstration to Advance New Pavement Technologies Pooled Fund

Lead Agency: FHWA

Status: Cleared by FHWA

Project Objectives: This pooled fund seeks to support and showcase the implementation of innovative pavement technologies, products, and processes by State DOTs by leveraging of Federal investments with State DOT partnerships.

Financials	Commitment Years	FY25 Commitment
TxDOT	2021-2025	$10,000.00

Project Number: 8-8513

Study Number: TPF-5(480)

Title: Building Information Modeling (BIM) for Infrastructure

Lead Agency: Iowa Department of Transportation

Status: Contract Signed

Project Objectives: The pooled fund serves as the mechanism for stakeholders to work collaboratively to advance BIM for Infrastructure. This will involve building off the foundational work that was charted out in the BIM National Strategic Work Plan, with emphasis on increasing coordination and awareness of BIM technologies and activities. This pooled fund will coordinate with efforts of TPF-5(372) focusing on BIM for Bridges and Structures.

Financials	Commitment Years	FY25 Commitment
TxDOT	2021-2025	$30,000.00

Project Number: 8-8516

Study Number: TPF-5(479)

Title: Clear Roads Winter Highway Operations Phase III Pooled Fund

Lead Agency: Minnesota Department of Transportation

Status: Cleared by FHWA

Project Objectives: Objectives of the new phase of the Clear Roads pooled fund project will include: •Conduct structured field testing and evaluation across a range of winter conditions and different highway maintenance organizational structures to assess the practical effectiveness, ease of use, optimum application rates, barriers to use, durability, safety, environmental impact, and cost-effectiveness of innovative materials, equipment, and methods for improved winter highway maintenance. •Conduct research that explores the use of innovative materials, equipment, and processes that will promote environmentally sustainable winter maintenance operations. •Conduct cost-benefit analyses to ensure that new technologies, materials, or methods contribute to operational efficiency. •Investigate state agency uses of performance measures for winter operations and develop management tools that support effective analysis and reporting of the measures. •Establish industry standards and develop performance measures for evaluating and utilizing new materials and technologies. •Support technology transfer by developing and disseminating practical field guides and training curriculum and reference materials to promote the results of research projects. •Support the exchange of information and ideas among state agencies via peer exchanges, ad hoc internal surveys, and collaborative research efforts that provide opportunities for winter maintenance specialists to share experiences related to winter maintenance. •Conduct national surveys to compile and document agency practices on the latest operational issues (for example salt shortages, level of service requirements, or other "hot button" issues). •Conduct quick turnaround, low-cost synthesis projects to investigate the latest research and practices on pressing winter maintenance topics. •Coordinate with the Aurora Pooled Fund (http://www.aurora-program.org/) to enhance the impact, and avoid duplication, of winter road weather research. •Promote public education and outreach related to winter maintenance and winter driving safety.

Financials	Commitment Years	FY25 Commitment
TxDOT	2022-2026	$25,000.00

Project Number: 8-8519

Study Number: TPF-5(490)

Title: ENTERPRISE- PHASE III (Phase II Continuation)

Lead Agency: Michigan Department of Transportation

Status: Cleared by FHWA

Project Objectives: This proposed TPF study is a continuation of TPF-5(359) to enhance innovation in highway operations and intelligent transportation systems through research and technology transfer, as well as to continue assessing transformational technologies and their impact on the transportation industry.

Financials	Commitment Years	FY25 Commitment
TxDOT	2022-2026	$30,000.00

Project Number: 8-8520

Study Number: TPF-5(489)

Title: Safety Service Patrol Standardization and Management Practices

Lead Agency: FHWA

Status: Cleared by FHWA

Project Objectives: The primary objective of this PFS study will be to gain technical information related to SSP program management, standards associated with SSP response protocol and the implementation of traffic control, and references and guidance related to staffing, training, and resource allocations within SSP programs. The goals include: 1. Assemble best practices and lessons learned from existing programs 2. Develop guidance documents based on lessons learned from existing programs 3. Reference or create tools that will help agencies make informed program decisions such as route selection, staffing levels, and resource allocation.

Financials	Commitment Years	FY25 Commitment
TxDOT	2021-2025	$25,000.00

Project Number: 8-8522

Study Number: TPF-5(487)

Title: Transportation Management Centers Pooled Fund Study Phase II

Lead Agency: FHWA

Status: Cleared by FHWA

Project Objectives: The objectives of the Traffic Management Centers (TMC) Pooled Fund Study (PFS) is to assemble regional, state, and local transportation management agencies and FHWA to: (1) identify key issues and challenges agencies are facing with their traffic management systems (TMSs) or centers (TMCs); (2) suggest approaches to addressing identified issues; (3) initiate and monitor projects intended to address identified issues; (4) develop technical resources and disseminate results; (5) provide leadership and coordinate with others on TMC interests; and (6) promote and facilitate sharing information on TMC issues nationally.

The TMC Pooled PFS involves a group of public agencies and organizations who voluntarily pool funds each year to address the key challenges and issues they are facing in support of improving performance, capabilities, and how they manage and operate their TMSs. TMC PFS members collaborate by using funds they contribute for the pursuit of projects they agree to pursue and develop technical resources and advance activities to address the key challenges and issues they are collectively facing. This project is being created to establish a new number (Phase II of TPF- 5(319)) and allow for 5 additional years (April 17, 2022 to April 16, 2027) beyond the existing study (TPF-5(319)). Agencies can join and add their commitments to the TMC PFS at any time during each year the TMC PFS, which is approved through April 16, 2027.

Financials	Commitment Years	FY25 Commitment
TxDOT	2022-2027	$50,000.00

Project Number: 8-8523

Study Number: TPF-5(501)

Title: Roadside Safety Pooled Fund - Phase 3

Lead Agency: Washington Department of Transportation

Status: Cleared by FHWA

Project Objectives: The objective of this Pooled Fund is to assist transportation agencies in achieving their Roadway Departure (RwD) related all state Strategic Highway Safety Plans (SHSPs) goals through development, evaluation and deployment of life-saving roadside safety devices and countermeasures in accordance with AASHTO and Federal Highway Administration (FHWA) adopted standards such as the Manual for Assessing Safety Hardware (MASH). It will also support continuation of MASH implementation in roadside hardware categories that have lagged in achieving MASH compliance (special barrier applications, sign supports, work zone traffic control devices, luminaire poles, etc.) due to various design and performance challenges and other related factors. These activities will directly support and impact state efforts to achieve Target Zero by helping reduce the frequency and severity of roadway departure crashes.

Given their common interest in SHSP implementation, all states would benefit from participation in this Pooled Fund program. However, the FHWA Roadway Departure Focus States may particularly benefit from the roadside safety research, collaboration, and information sharing that will constitute the framework of the program.

Financials	Commitment Years	FY25 Commitment
TxDOT	2023-2027	$65,000.00

Project Number: 8-8526

Study Number: TPF-5(504)

Title: Continuous Bituminous Pavement Stripping Assessment Through Non-destructive Testing

Lead Agency: Minnesota Department of Transportation

Status: Cleared by FHWA

Project Objectives: The primary objective of the proposed pooled-fund project is to develop a methodology for rapid and automatic detection of stripping in bituminous pavements using 3D-GPR and other NDE technologies. As per the IAP and R06D findings and recommendations, particular emphasis will be placed on using 3D-GPR, which is particularly suitable for high-speed continuous and lane-width data collection and is already being incorporated in project scoping processes for thickness determination. Nevertheless, other NDE technologies, such as FWD and TSD, will also be considered to complement, evaluate, verify and validate the 3D-GPR findings. Similarly, recognizing that 3D-GPR alone cannot identify stripping all the time and at all subsurface moisture conditions, the study will also investigate using IE/SASW, MIRA, and Thermal Imaging for localized spot verifications. Furthermore, the proposed pool fund study will include contemporary 2D and 3D-GPR testing on limited projects to compare and identify advantages and disadvantages. The tools (i.e., equipment, testing procedures, data processing algorithms, specifications) advanced through this project will assist state transportation agencies in rapidly and confidently detecting the extent, depth, and severity of stripping in their roads. The set goals are to be accomplished by:

- Developing a methodology for rapid and automatic stripping detection based on 3D-GPR and other NDE technologies such as Falling Weight Deflectometer (FWD) and Traffic Speed Deflectometer (TSD). The development will be based on the experience and needs of participants so that the developed methodology can effectively and efficiently support their pavement evaluation program.
- Developing a software for automated processing of 3D-GPR data and detection of stripping
- Verifying and validating the developed methodology on projects selected by the participating agencies. The more states, the stronger the methodology
- Providing participating agencies guidelines on data collection and analysis protocols
- Drafting AASHTO specification.
- Facilitating and supporting communication between experts in NDE technologies, state engineers and vendors to advance the use of GPR for inspecting pavement subsurface issues
- Providing training and technical assistance that includes providing support for specification development and strategies for agency full implementation
- Conducting technology promotion for the technologies

Financials	Commitment Years	FY25 Commitment
TxDOT	2023-2027	$25,000.00

Project Number: 8-8527

Study Number: TPF-5(513)

Title: Emerging Data Streams for Pavement (Asset) Health Monitoring and Management

Lead Agency: Virginia Department of Transportation

Status: Cleared by FHWA

Project Objectives: The main objective of the pooled-fund program of research is to identify, test and evaluate emerging big data stream that may enhance the process we use to evaluate the performance and manage our pavement assets. The technologies considered will include at a minimum, vehicle response data collected by connected and automated vehicles, smart infrastructure sensors (e.g., internet of things), mobile devices and e-construction and BIM technologies (e.g., digital twins).

Financials	Commitment Years	FY25 Commitment
TxDOT	2023-2028	$30,000.00

Project Number: 8-8529

Study Number: TPF-5(503)

Title: Standardizing Rigid Inclusions for Transportation Projects – Phase I

Lead Agency: Kansas Department of Transportation

Status: Cleared by FHWA

Project Objectives: The main objectives of the Phase I study are to assess the state of the practice of rigid inclusions used for embankment and structure support, analyze existing data and design methods available in the literature or agencies, identify knowledge gaps and missing data and procedures, and develop a plan for full-scale field tests to be carried out in the Phase II study.

Financials	Commitment Years	FY25 Commitment
TxDOT	2023-2025	$30,000.00

Project Number: 8-8530

Study Number: TPF-5(516)

Title: Highway Safety Manual 2nd Edition (HSM2) Implementation

Lead Agency: FHWA

Status: Cleared by FHWA

Project Objectives: Accelerate implementation of HSM2 and related analytical tools to assess current and future safety performance of existing roadways and alternative designs, and help practitioners make more informed decisions, better target investments, and reduce fatalities and serious injuries on the nations roadways. This includes activities before and after publication of HSM2 (anticipated 2025).

Financials	Commitment Years	FY25 Commitment
TxDOT	2023-2028	$16,000.00

Project Number: 8-8532

Study Number: TPF-5(522)

Title: National Partnership to Improve the Quality of Preventive Maintenance Treatment Construction & Data Collection Practices (PG Phase III)

Lead Agency: Minnesota Department of Transportation

Status: Cleared by FHWA

Project Objectives: This pooled-fund study is being developed to assist SHAs and LPAs in reviewing and developing pavement PM treatments which can advance their pavement preservation programs. This study is also supplementing ongoing data analysis of existing pavement test sections in Minnesota (NRRA-MnROAD) and Alabama (NCAT) and support continued implementation activities established. Combining these efforts will establish a national construction and data collection effort of pavement PM treatments applied to roadways at the direction of the study's Technical Advisory Committee (TAC). Participation in the study is being encouraged by SHAs, LPAs, FHWA, Federal Lands Highway Division, academia and industry representatives. Collaboration with experts from these groups will help set criteria for identifying PM construction practices and data collection requirements, discuss optimal timing for placing of PM treatments and establishing the minimum number of pavement sections required for each type of PM treatment used for statistical analysis. Non-financial participants can provide technical knowledge and input; however, financial contributors will make final decision on treatments to be constructed.

Using the outcome from the above collaborative activities, the study partners will initiate and monitor State, local, and Federal PM treatments and projects to develop preventive maintenance solutions (i.e. decision trees, toolboxes, etc.). Implementation of practical research results from other PM cooperative projects (i.e. NCAT, MnROAD, NCPP) will be used to access the impact of preventive maintenance treatments on extending service life of pavements. Lessons learned will be documented and shared along with information to assist in the updating of the national pavement preservation research roadmap.

Financials	Commitment Years	FY25 Commitment
TxDOT	2023-2027	$50,000.00

Project Number: 8-8533

Study Number: TPF-5(507)

Title: National Hydraulic Engineering Conference

Lead Agency: FHWA

Status: Cleared by FHWA

Project Objectives: The next National Hydraulic Engineering Conference is proposed for Summer 2024, with subsequent conferences tentatively planned for 2026 and 2028.
The objectives of this study a:

1) Provide opportunities for communication and information sharing among state hydraulic engineers, federal agencies, and national technical organizations (AASHTO TCHH and TRB AFB60) through the National Hydraulic Engineering Conference.

2) Provide a technology and knowledge exchange forum to enhance the practical knowledge of member states concerning transportation hydraulic engineering, including advanced modeling technologies, FHWA initiatives, and best practices.

Financials	Commitment Years	FY25 Commitment
TxDOT	2022-2027	$1,000.00

Project Number: 8-8534

Study Number: TPF-5(523)

Title: Building Information Modeling (BIM) for Bridges and Structures - Phase II

Lead Agency: Iowa Department of Transportation

Status: Contract signed

Project Objectives: This pooled fund project will provide the primary mechanism for AASHTO COBS T-19 to expand and refine the outcomes of TPF-5(372) and developing additional guide specifications for open BIM national data standards to support model-based exchanges of workhorse bridges.

Financials	Commitment Years	FY25 Commitment
TxDOT	2023-2027	$20,000.00

Project Number: 8-8535

Study Number: TPF-5(521)

Title: New Performance Approach to Evaluate ASR in Concrete

Lead Agency: FHWA

Status: Cleared by FHWA

Project Objectives: To evaluate a wide selection of concrete mix designs to validate the use of the new AASHTO TP-144-21 (T-FAST) and alkali threshold test (ATT) methods in conjunction with mix design data, cement mill reports and SCM properties to determine the likelihood of ASR gel formation in concrete.

Financials	Commitment Years	FY25 Commitment
TxDOT	2023-2027	$5,000.00

Project Number: 8-8536

Study Number: TPF-5(465)

Title: Consortium for Asphalt Pavement Research and Implementation (CAPRI)

Lead Agency: Alabama Department of Transportation

Status: Cleared by FHWA

Project Objectives: The goals of CAPRI are to: • Provide technical guidance on current and evolving specifications for asphalt materials. • Develop asphalt pavement research needs. • Conduct small-scale studies to address knowledge gaps or explore new topics. • Foster the implementation of practical research findings to help improve the performance, sustainability, value, and safety of asphalt pavements. As a consortium of all asphalt pavement stakeholders, CAPRI will be a key resource to the AASHTO Committee on Materials and Pavements, state DOTs, FHWA, and industry.

Financials	Commitment Years	FY25 Commitment
TxDOT	2021-2025	$10,000.00

Project Number: 8-8537

Study Number: TPF-5(519)

Title: Expansion: Enhanced Traffic Signal Performance Measures

Lead Agency: Indiana Department of Transportation

Status: Cleared by FHWA

Project Objectives: During the April 2022 TPF-5(377) Pooled Fund Study Panel Meeting in Columbus, OH, participating states expressed interest in developing a new study led by a neutral state/academic partner in the following areas:

1. Broadening performance measures to additional modes that are impacted by traffic signal systems, particularly transit and pedestrians.

2. Identifying use cases for enhanced probe data beyond the current trajectory and hard braking/hard acceleration data.

3. Integrated Analysis of High-res Controller Data and Trajectory Probe Data

These initiatives would complement and expand the past work the multi-state team has done in the area of enhanced traffic signal performance measures using connected vehicle data.

Financials	Commitment Years	FY25 Commitment
TxDOT	2023-2025	$40,000.00

Project Number: 8-8538

Study Number: TPF-5(512)

Title: Resiliance Approaches for Pavements and Geotechnical Assets

Lead Agency: Virginia Department of Transportation

Status: Cleared by FHWA

Project Objectives: This pooled fund study seeks to support and showcase the research, development, and implementation of resilience approaches in the areas of pavement and geotechnical design, maintenance, preservation, and rehabilitations by various state DOTs. This would also provide platform for the agencies to share ideas and plans related to resiliency that would eventually help agencies to implement their resilience plans without duplicate and wasteful efforts.

Financials	Commitment Years	FY25 Commitment
TxDOT	2023-2027	$20,000.00

Project Number: 8-8540

Study Number: TPF-5(514)

Title: Work Zone Analytics

Lead Agency: Indiana Department of Transportation

Status: Cleared by FHWA

Project Objectives: For the past 3 years, Purdue University and the Indiana Department of transportation have been monitoring congestion and hard braking data across all 2600 miles of Indiana Interstates using connected vehicle data. Figure 1 illustrates one such report for I-465 that shows the impact of the 2021 construction activities on congestion.

These reports have evolved over the past 3 years in Indiana and there is a need to develop a multi-state consensus on the most effective reports. This will provide a framework to formalize the reporting models, data reduction processes and decision making process so these techniques can be scaled to other states so they can pro-actively identify emerging safety concerns in their work zones, conduct effective after action reviews of past work zones, and ultimately identify best practices for future work zones that minimize congestion, hard braking and ultimately crashes.

Financials	Commitment Years	FY25 Commitment
TxDOT	2023-2025	$30,000.00

Project Number: 8-8541

Study Number: TPF-5(515)

Title: Evaluation of Low-Cost Safety Improvements (ELCSI-PFS)

Lead Agency: FHWA

Status: Cleared by FHWA

Project Objectives: The goal of this research is to develop reliable estimates of the effectiveness of the safety improvements identified as strategies, including but not limited to, those in the National Cooperative Highway Research Program (NCHRP) Report 500 Guidebooks. These estimates will be determined by conducting scientifically rigorous before-and-after evaluations at sites in the United States where these strategies are being implemented. This work will support efforts towards Vision Zero and the Safe Systems Approach.

Financials	Commitment Years	FY25 Commitment
TxDOT	2023-2027	$10,000.00

Project Number: 8-8542

Study Number: TPF-5(518)

Title: Implementation of Structural Data from Traffic Speed Deflection Devices

Lead Agency: Virginia Department of Transportation

Status: Cleared by FHWA

Project Objectives: The objectives of this follow-on pooled fund study include continuation of an existing research consortium that focuses on providing participating agencies guidance on how to specify and implement TSDD data within their respective pavement management systems and processes. Specific tasks within this multi-year program will be developed in cooperation with the partner agencies.

Financials	Commitment Years	FY25 Commitment
TxDOT	2024-2028	$149,000.00

Project Number: 8-8543

Study Number:

Title: Human-Centered Steel Bridge Inspection Enabled by Augmented Reality and Artificial Intelligence

Lead Agency: Kansas Department of Transportation

Status: (Solicitation 1597)

Project Objectives: The main objective of this proposed research is to provide state DOTs practical tools for supporting human-centered steel bridge inspection with real-time defect (e.g., fatigue cracks and corrosion) detection, documentation, tracking, and decision making. The proposed research will not only bridge the gaps identified in the IDEA project, but also expand the existing capability by developing AI algorithms for crack and corrosion detection. In addition to AR headsets, the project will also develop AR-based inspection capability using tablet devices. The tablet device can be used to perform AR-based inspection directly in a similar way to the AR headset. It can also leverage Unmanned Aerial Vehicles (UAV) for remote image and video acquisition during inspections, enabling bridge inspections from a distance in a human-centered manner, as illustrated in Figure 2.

Financials	Commitment Years	FY25 Commitment
TxDOT	2024-2026	$40,000.00

Project Number: 8-8545

Study Number: TPF-5(526)

Title: Western Transportation Research Consortium

Lead Agency: Utah Department of Transportation

Status: Cleared by FHWA

Project Objectives: Address high priority transportation research topics of common interest and for which expertise exists in these states.

Financials	Commitment Years	FY25 Commitment
TxDOT	2024-2026	$15,000.00

Project Number: 8-8547

Study Number:

Title: Improving the Quality of Highway Profile Measurement

Lead Agency: Illinois Department of Transportation

Status: (Solicitation 1605)

Project Objectives: 1) Deliver sample procurement specifications and maintenance guidelines

2) Direct and support development and maintenance of pavement profile analysis software

3) Implement criteria for profile verification that include emerging technologies (e.g., low-speed profilers, start and stop profilers, and non-inertial profilers)

4) Verify pavement profile reference devices

5) Develop and deliver profiler operation and profile analysis training

6) Implement methods for maximizing the use of pavement profiles for network, project, and forensic analysis, with a focus on cutting-edge methodologies.

7) Provide technical support for the Road Profile Users' Group and conduct annual face-to-face meetings in conjunction with the group.

Financials	Commitment Years	FY25 Commitment
TxDOT	2024-2028	$30,000.00

Project Number: 8-8548

Study Number:

Title: Ahead of the Curve - Migration from NCHRP to AASHTO Technical Training Solutions (TTS)

Lead Agency: Louisiana Department of Transportation

Status: (Solicitation 1606)

Project Objectives: The primary objectives of this pooled fund study are as follows:

- Transfer AOTC information from NCHRP to AASHTO
- Update and transfer existing information into AASHTO Technical Training Solutions (TTS) format
- Make all courses 508 compliant

Financials	Commitment Years	FY25 Commitment
TxDOT	2024-2025	$10,000.00

Project Number: 8-8549

Study Number:

Title: Accelerated Performance Testing on the 2024 NCAT Pavement Test Track with MnROAD Research Partnership

Lead Agency: Alabama Department of Transportation

Status: (Solicitation 1601)

Project Objectives: The primary objectives of the pooled fund project described herein will be:

1. Constructing, maintaining, and/or rebuilding experimental pavements on the existing 1.7-mile NCAT test oval and the MnROAD mainline bypass that are representative of in-service roadways on the open transportation infrastructure;

2. Applying accelerated performance truck traffic after construction for the duration of the 3-year research cycle;

3. Assessing/comparing the functional and structural field performance of trafficked sections on a regular basis via surface and subsurface measures;

4. Validating/calibrating new and existing methodologies for analysis and design using pavement surface condition, pavement load response, precise traffic and environmental logging, and cumulative damage;

5. Correlating field results with laboratory data for both mix and structural performance; and

6. Answering practical questions posed by research sponsors through formal (i.e., reports and technical papers) and informal (e.g., one-on-one responses to sponsor inquiries) technology transfer. For example, can pavement thickness be reduced as a result of the addition of mix additives, and if so does the thickness reduction offset any additional cost of construction?

Financials	Commitment Years	FY25 Commitment
TxDOT	2024-2026	$266,667.00

6.2 Pooled Funds Where Texas is the Lead State

Project Number: 8-8531 RTI Project No: 9-1532

Study Number: TPF-5(508)

Title: Concrete Bridge Engineering Institute (CBEI)

Lead Agency: Texas Department of Transportation

Status: Contract Signed

Project Objectives: The overall objective of this pooled fund is to implement specific programs within CBEI that address national workforce training needs through research, development, and technology transfer activities.

The specific objectives are to develop and implement the following programs with coordinated input of members of the pooled fund: Three initial specific training programs, a Concrete Solutions Center, and a Bridge Component Collection. The scope of each is further defined below.

The technology transfer through training programs will draw on the latest technologies and provide an innovative approach by utilizing a hands-on intensive curriculum. The training programs will draw from the best, and most current, state of the art methods. CBEI will serve to continually gather emerging or underutilized technologies such as those above, and provide research, development, and technology transfer activities in partnership with the originators of the technology. This will result in training curricula and technology transfer documents for the concrete bridge workforce. Non-destructive Evaluation (NDE) techniques will be an overarching component included in each of the programs.

Financials	Commitment Years	FY25 Commitment
TxDOT	2023-2026	$250,000.00

7. Non-Project Activities

7.1 Research Management and Administration

RTI performs the following non-SPR activities.

Project Number: 0-0050

Project Title: Research Management and Administration

Project Objectives: RTI provides administrative oversight for support functions including budgeting, purchasing, contract administration, legislative analysis, mapping, and the SPR Subpart B Research, Development, and Technology Transfer Work Program.

Planned Activities: Develop, implement, and monitor the division's biennium budget.

1. Develop, implement, and monitor the SPR Subpart B Research, Development, and Technology Transfer Work Program, ensuring that all requirements of 2 CFR 200, 23 CFR 420 and other applicable federal and state statutes and regulations are followed.
    a. Prepare and submit the proposed 2025 SPR Subpart B Research, Development, and Technology Transfer Work Program to FHWA.
    b. Prepare and submit the 2024 Annual Performance and Expenditures Report (APER) to FHWA.
    c. Hold quarterly status meetings with FHWA to report on the 2025 SPR Subpart B Work Program.
    d. Prepare and submit amendments to the 2025 SPR Subpart B Work Program as needed.
2. Administer and ensure that all the division's agreements/contracts are approved, procured, monitored, and closed out in accordance with the provisions of 2 CFR 200.318-327. In addition, this function ensures that program monitoring and reporting requirements of FHWA planning and research funds are in compliance with 23 CFR 420.117.

Project Number: 0-9710

Project Title: Research Committee Support - FY2025

Project Objectives: RTI provides support to research committee members participating in research prioritization and subject matter experts' participating in the research program as advisors and technical leads.

Financials:	FY25 Budget	80% Federal	20% State
Contract Total	$20,000.00	$16,000.00	$4,000.00

Table 9. FY 2025 RTI Division Financials

Financials		Budget
Division Travel		$25,000.00
Program Committee Support		$35,000.00
Salary		$2,691,887.83
Request For Research Fund Authorization*		$45,000.00
RTI Office Program Management		$2,796,887.83

* Coordinate with the District(s) for TxDOT's assistance to provide Traffic Control or other support as needed for projects in the Program.

7.2 FHWA & USDOT Grant Support (Non-SPR Funded)

RTI provides management and FHWA support of the following pass-through grant.

Project Number: 0-7099 University: TEES

Project Title: AVA: Automated Vehicles for All

Project Start Date: 1/26/2021 Termination Date: 8/31/2025

Project Status: Active Total Project Budget: $7,063,787.00

RTI Project Manager: Tom Schwerdt Researcher: Reza Langari

Project Objectives: USDOT awarded federal funds to Texas A&M Engineering Experiment Station (TEES) to take the lead on and subcontract with George Washington University, University of California at Davis, University of Illinois at Urbana-Champaign to study and test the safe integration of automated driving systems on rural Texas roadways for the purpose of the Automated Driving System Demonstration Grants program. TxDOT through RTI will help foster these efforts in partnership with FHWA and govern reimbursement of this project, in a separate Grant Subrecipient Agreement with TEES. All necessary Grant documents that outline the details of this agreement have been completed and attached.

Financials:	FY25 Total Budget
Contract Total	$1,069,278.00

*100% Federally Funded Grant Project

8. Summary Statement

The Texas State Planning and Research (SPR) Subpart B Research, Development, and Technology Transfer activities identified within the work program demonstrates the states commitment to addressing transportation challenges within the state and those common across the nation. The innovative ideas for meeting those challenges have been thoroughly vetted by the research committees within TxDOT to ensure only the best ideas are submitted with success in mind.

Our continued partnership and collaboration with FHWA Texas Division, university researchers, Metropolitan Planning Organizations, and other state DOTs, positions Texas to remain at the forefront for advancing new and innovative technologies and solutions. Many of the solutions will meet both near term and future surface transportation challenges and aid with meeting the aim of the Infrastructure Investment and Jobs Act.

TxDOT Research and Technology Implementation (RTI) Division will continue to manage and foster good stewardship of the federal State Planning and Research (SPR)Subpart B, Research, Development and Technology Transfer Program, for the state of Texas. RTI will submit amendments to this work program by way of Round Templates throughout the fiscal year to address new project start dates, project modifications, and any cancelled projects as needed.

Appendix – FHWA Approved Modifications to Work Program