Texas Department of Transportation

Texas SPR Work Program

Annual Performance and Expenditures Report (APER)

State Planning and Research (SPR), Subpart B

September 1, 2023 - August 31, 2024

Certification and Disclaimer Statements

State Planning & Research Program, Subpart B - Research

Texas Department of Transportation
Research and Technology Implementation Division
125 E. 11TH Street
Austin, Texas 78701
Phone (512) 416-4730
EMAIL: RTIMAIN@TXDOT.GOV

In cooperation with:

U.S. Department of Transportation Federal Highway Administration

Research – SPR 0511(224)
Implementation Program – SPR 2024(322)
Fiscal Year 2024
(September 1, 2023 – August 31, 2024)

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 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...

1/24/2025

Director | Date

Disclaimer Statement

The FHWA's 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.

Table of Contents

List of Figures

List of Tables

Section 1 - Annual Report Summary and References

1.1 Approval and Authorization Process

1.1.1 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 (FHWA) 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.

The Texas Department of Transportation (TxDOT) funds research through its Research and Implementation Program, overseen by the TxDOT Research and Technology Implementation Division (RTI). RTI and the Texas state-supported universities conducting the research or implementation executed all project agreements.

RTI provided the fiscal year (FY) 2024 State Planning and Research (SPR), Subpart B Work Program to the Texas FHWA Division for review and approval. After the FHWA division administrator for the SPR program gave authorization, RTI executed the project agreements.

1.1.2 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 project managers to monitor the activities and performances of all subrecipients (state-supported universities) to assure that they are managing and performing the work satisfactorily and that they are meeting deadlines.

1.2 Comparison of Actual Performance with Established Goals and Program Overview

1.2.1 Overall Performance

In accordance with 49 CFR 18.40, RTI is fully responsible for managing the day-to-day operations of SPR Subpart B activities. RTI monitors program activities to assure compliance with applicable federal requirements and attainment of performance goals. Its monitoring covers each project, function, and activity.

In FY 2024, RTI managed one hundred thirty-four (134) active research projects with 16 universities. Of the 134 projects, seventy-six (76) remain active projects, fifty-eight (58) closed, one (1) cancelled and during this reporting period with zero (0) terminating early. Each of these projects met specific agency screening criteria and aligns with TxDOT's organizational strategic goals, which are:

- Maintaining a safe system.
- Connecting Texas communities.

- Addressing congestion.
- Becoming a best-in-class agency.

These projects impacted TxDOT's core transportation function/services, and added value and benefit to TxDOT, participating agencies/external partners, and Texas citizens.

RTI Guidance Documents

RTI executes a Cooperative Research and Implementation Agreement (CRIA) with each university or university system to conduct research projects. Under this CRIA, the university billings for an individual project agreement may exceed the university's fiscal year budget for that individual project agreement by up to 10 percent or $20,000 (whichever is less) without modification of the project agreement.

RTI has also published 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.

Performance Measures

The performance for FY 2024 is an overall 70.6% on-time receipt of project deliverables. Analyses at this level also provides insight into where the program can improve in project monitoring efforts. The data provided for the purpose of this report is accurate as of November 26, 2024.

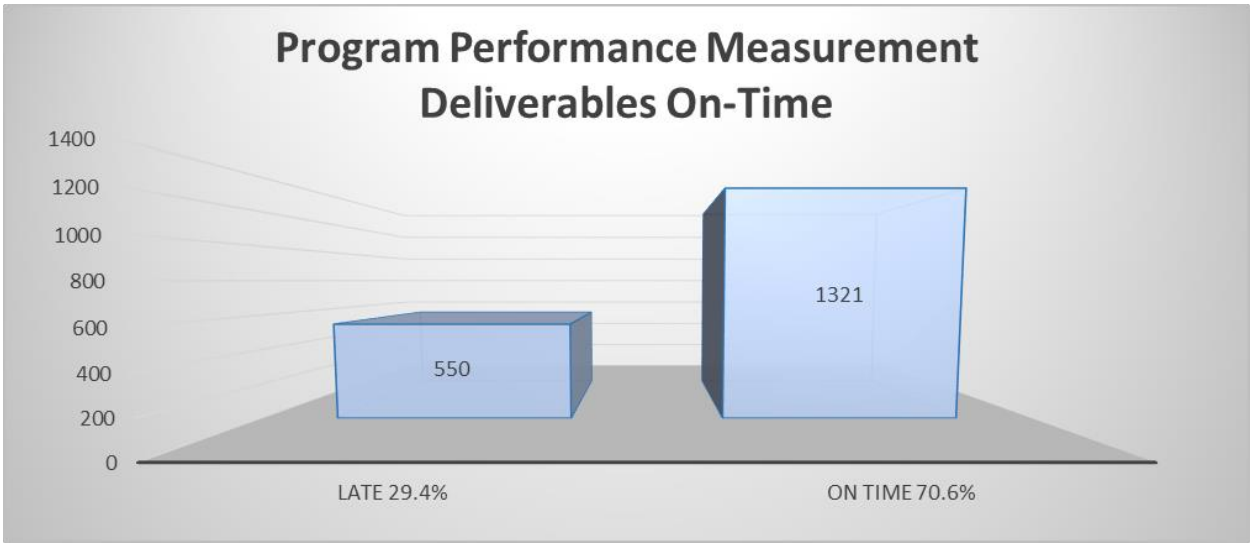


Figure 1. Bar chart of deliverables submitted on-time

1.2.2 Obligation of Funds

Toll or Transportation Development Credits (TDC) are a federal transportation funding tool that can be utilized by states as a means of meeting local and state matching requirements for federal funding.

Table 1 shows how the federal funds appropriated to the Texas Subpart B Program were obligated.

Table 1. Total Funding Obligated FY24

Program	SPR Program Number	Total Funding Obligated FY24	Federal 80%	State 20% TDC
Research Program	SPR 0511(224)	$23,747,057.58	$18,997,646.06	$4,749,411.52
RTI Division Program Management	SPR 0511(224)	$2,064,662.00	$1,651,729.60	$412,932.40
Subtotal - Research Program	SPR 0511(224)	$25,811,719.58	$20,649,375.66	$5,162,343.92
Implementation Program	SPR 2024(322)	$2,266,071.99	$1,812,857.59	$453,214.40
Innovation Program	SPR 2024(300)	$1,786,267.00	$1,429,013.60	$357,253.40
Grand Total	**N/A**	**$29,864,058.57**	**$23,891,246.86**	**$5,972,811.71**

Table 2. Contracting Entities Receiving SPR Funds

Entity That Received SPR Funds	SPR Contribution
Pooled-fund projects (lead agencies)	$1,779,667.00
National Cooperative Highway Research Program (NCHRP)	$5,550,502.00
Transportation Research Board (TRB) dues	$684,001.00

Table 3. Other Projects/Programs - 100% Federal

Program	Federal Project Number	Total Funding Obligated FY24	Federal 100%
ADS Demonstration	F 2021(463)	$1,503,743.00	$1,503,743.00

Table 4. Other Projects/Programs - 80/20% Federal

Program	Federal Project Number	Total Funding Obligated FY24	Federal 80%	State 20% TDC
STIC Incentive (5-9050-02)	F 2022(240)	$18,640.00	$14,912.00	$3,728.00
STIC Incentive (5-9055-01)	F 2B23(249)	$121,812.50	$97,450	$24,362.50

Table 5. Expenditures by Program for FY24

Program	Budgeted	Expended	Balance
Research	$25,593,050.78	$20,395,655.39	$5,197,395.39
Implementation	$742,355.11	$671,130.57	$71,224.54
Innovation	$1,786,267.00	$1,895,906.00	($109,639.00)
Pooled-Fund	$1,779,667.00	$1,779,667.00	$0.00
Support Projects	$2,439,748.59	$2,070,232.70	$369,515.89
Special Initiative	$1,503,743.00	$805,232.15	$698,510.85
Management and Administration	$2,064,662.00	$2,146,265.00	($81,603.00)
Total	**$35,909,493.48**	**$29,764,088.81**	**$6,145,404.67**

Table 6. Total Expenditures by Functional Area FY24

Functional Area	Budgeted	Expended	Balance
Construction, Maintenance & Materials	$8,125,641.50	$6,022,597.06	$2,103,044.44
Planning and Environmental	$3,481,658.19	$2,884,203.51	$597,454.68
Program Support	$2,439,748.59	$2,036,759.53	$402,989.06
Safety and Operations	$5,592,817.54	$3,906,638.11	$1,686,179.43
Strategy and Innovation	$3,437,263.15	$1,328,240.88	$2,109,022.27
Structures and Hydraulics	$8,988,035.51	$7,443,654.15	$1,544,381.36
Total	**$32,065,164.48**	**$23,622,093.24**	**$8,443,071.24**

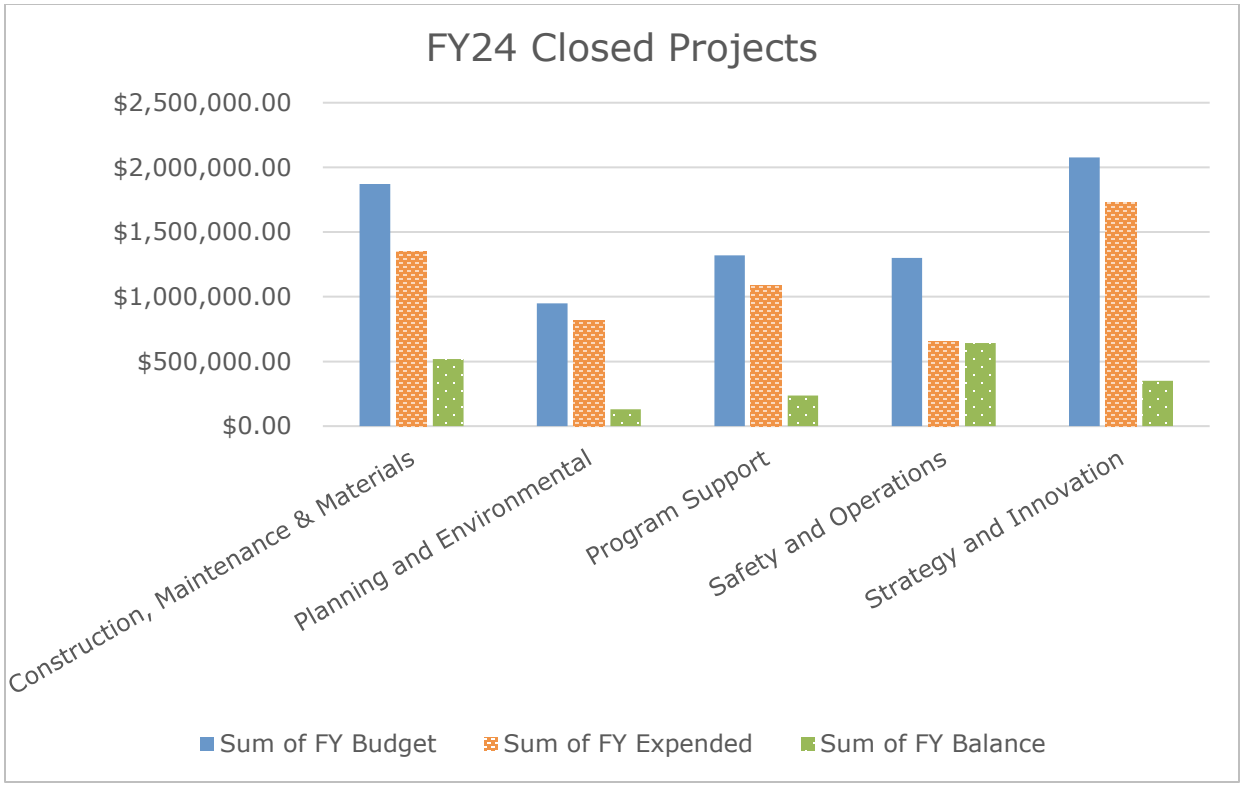


Figure 2. Funds expended by functional area for closed projects.

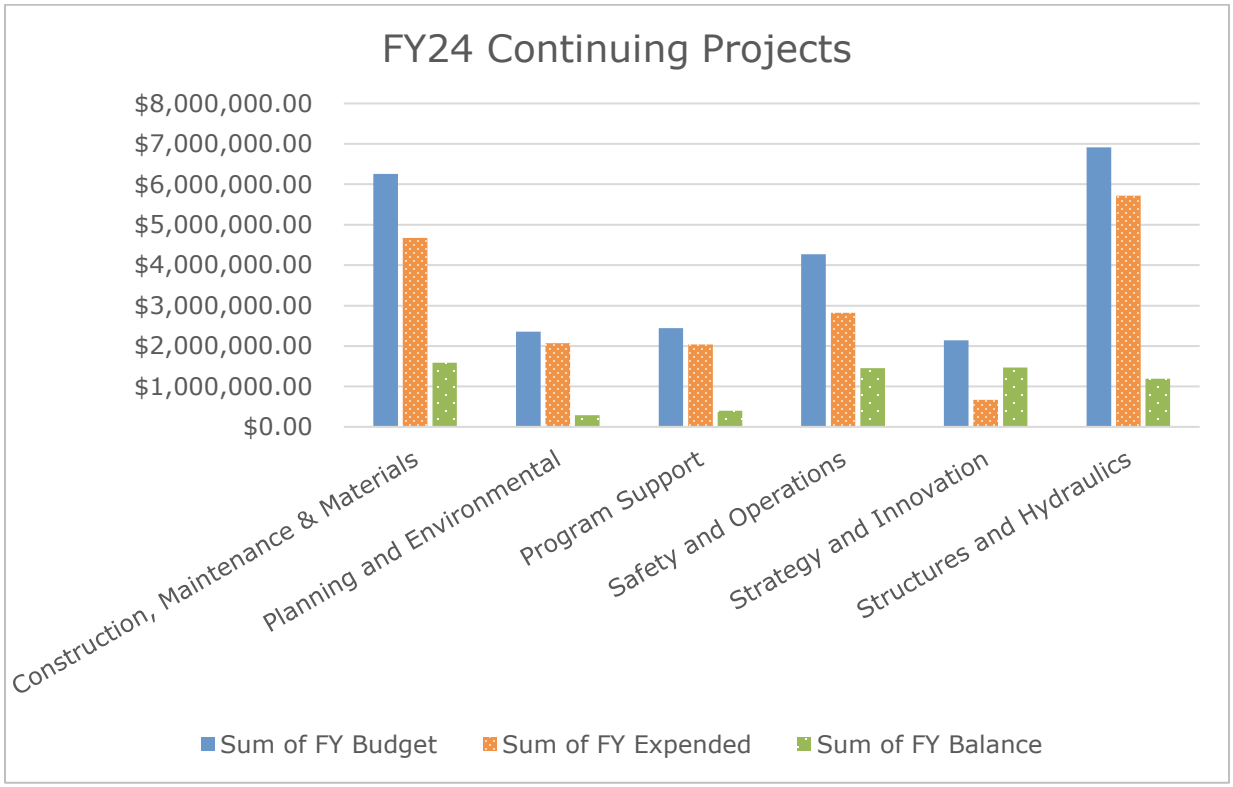


Figure 3. Funds expended by functional area for continuing projects.

Table 7. Total Funding by University FY24

University	FY24 Budget	FY24 Expended	FY24 Balance
CTR	$8,555,366.40	$6,204,007.12	$2,351,359.28
PVAMU	$11,202.50	$11,143.32	$59.18
TAMUCC	$276,528.00	$254,241.00	$22,287.00
TAR	$57,440.00	$29,002.08	$28,437.92
TARL	$161,505.00	$102,234.12	$59,270.88
TECH	$568,109.75	$488,114.25	$79,995.50
TEES	$1,503,743.00	$805,232.15	$698,510.85
TEEX	$19,402.38	$13,552.52	$5,849.86
TTI	$14,192,907.00	$10,559,525.90	$3,633,381.10
TXST	$951,173.83	$814,799.01	$136,374.82
UH	$240,086.00	$97,127.73	$142,958.27
USGS	$890,742.09	$669,252.23	$221,489.86
UTA	$2,786,054.67	$2,145,927.69	$640,126.98
UTEP	$595,495.00	$518,236.92	$77,258.08
UTSA	$1,248,086.36	$906,296.16	$341,790.20
UT-TYLER	$7,322.50	$3,401.04	$3,921.46
Grand Total	**$32,065,164.48**	**$23,622,093.24**	**$8,443,071.24**

1.3 Acronyms and Abbreviations

Table 8. Acronyms used in this document and what they stand for.

Acronym	What it Stands for
APER	Annual Performance and Expenditures Report
CFR	Code of Federal Regulations
CRIA	Cooperative Research and Implementation Agreement
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

Acronym	What it Stands for
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

1.4 Contact Information

Contact information for RTI personnel.

Table 9. RTI Personnel

Name	Position Title	Phone Number	Email Address
Kevin Pete	Division Director	512-416-4730	Kevin.Pete@txdot.gov
Phillip Hempel	Portfolio Section Director	512-416-4731	Phillip.Hempel@txdot.gov
Veronica Tello	Executive Assistant	512-416-4732	Veronica.Tijerina@txdot.gov
Chris Glancy	Portfolio Manager	512-416-4747	Chris.Glancy@txdot.gov
Ned Mattila	Project Specialist	512-416-4727	Ned.Mattila@txdot.gov
Laura Ludwig	Project Specialist	512-416-3041	Laura.Ludwig@txdot.gov
Annette Trevino	Contract Administrator	512-486-5362	Annette.Trevino@txdot.gov
Emily Ruiz	Contract Specialist	512-486-5810	Emily.Ruiz@txdot.gov
Tiki Smith	Contract Specialist	737-351-2163	Tiki Smith@txdot.gov
Tami Graham	Contract Specialist	512-416-2065	Tamara.Graham@txdot.gov
Tom Schwerdt	Project Manager	512-416-4748	Tom.Schwerdt@txdot.gov
Wade Odell	Project Manager	512-416-4737	Wade.Odell@txdot.gov
Darrin Jensen	Project Manager	512-783-5388	Darrin.Jensen@txdot.gov
Jade Adediwura	Project Manager	512-486-5061	Jade.Adediwura@txdot.gov
Martin Dassi	Project Manager	512-416-4738	Martin.Dassi@txdot.gov
Katelyn Kasberg	Project Manager	512-298-9928	Katelyn.Kasberg@txdot.gov
Danny Souraphath	Project Manager	512-568-4056	Danny.Souraphath@txdot.gov

Table 10. Personnel from Participating Universities

Name (Liaison**)	University	Phone#	Email Address
Ashley Williams**	CTR	512-232-3085	ashleyw@mail.utexas.edu
Erin K. Lovelady C. Jerry Lin Liv Haselbach Ph.D. Candy Cazares**	LAMAR	 409-880-8933 409-880-8760 	eklovelady@lamar.edu jerry.lin@lamar.edu lhaselbach@lamar.edu ccazares2@lamar.edu
Judy Perkins** Kimberly Cooks Bobby Melvin	PVAMU	936-261-1655 936-261-1686 936-261-1556	juperkins@pvamu.edu kicooks@pvamu.edu bdmelvin@pvamu.edu
Jennifer Hanlon**	SFASU	936-468-1805	hanlonjd@sfasu.edu
Chad Hargrave** Maegan McKerrow	SHSU	936-294-1538 936-294-4649	cwhargrave@shsu.edu mnm002@shsu.edu

Name (Liaison**)	University	Phone#	Email Address
Dr. Robert N. Coulson	TAMU	979-845-9725 Ofc 979-777-7064 Cell	r-coulson@tamu.edu
Cecelia Gassner** Dr. Brent Donham	TAMU-C	903-886-5172 903-886-5321	cece.gassner@tamuc.edu Brent.donham@tamuc.edu
Dr. Michael Starek Kimberly Hawkenson** Research Office	TAMUCC	361-825-3978, 361-825-2730	michael.starek@tamucc.edu kimberly.hawkenson@tamucc.edu research.office@tamucc.edu
Patricia A. Foster**	TAMUK	361-593-3344	osr@tamuk.edu
Julie Bishop, Debbie Danford**	TAR	979-458-8760 979-862-7205	jbishop@tamu.edu dedanford@ag.tamu.edu
Dr. Rupa Iyer** Maria Ross Dr. Deborah Roark Debbie Herrin Dulce Vidal	TARL	254-459-5449 254-459-5439 254-968-9583 254-968-9805 254-459-5448	iyer@tarleton.edu MROSS@tarleton.edu droark@tarleton.edu dherrin@tarleton.edu dvidal@tarleton.edu ospio@tarleton.edu
Moon Won Iris Balderas** Office of Research Services	TECH	806-317-2427 806-834-4192	Moon.Won@ttu.edu iribalde@ttu.edu ors@ttu.edu
Jennifer Jackson**	TEES	979-847-6100	jmjackson@tamu.edu
Kristen Maldonado Tony Crites**	TEEX	979-500-6645 979-458-3300	kristen.maldonado@teex.tamu.edu tony.crites@teex.tamu.edu
Adana Brown Dr. Yi (Grace) Qi** Dr. Fengxiang Qiao	TSU	713-313-7457 713-313-1915	Adana.Brown@tsu.edu Yi.Qi@tsu.edu Qiao_fg@tsu.edu
Mary Levien**	TTI	979-317-2047	m-levien@tti.tamu.edu
Joanne Palmer Marivel Alvarez** Evy Gonzales	TXST	512-245-4524 512-245-2101	jp57@txstate.edu ma17@txstate.edu eg13@txstate.edu grants@txstate.edu
Heather Willrich Shannon Gary** UH Proposals	UH	713-743-0268 713-743-6438	hjwillrich@central.uh.edu sgary@central.uh.edu uhproposals@listserv.uh.edu
Katie Herring** DeeAnna Oliveira Emiley Locey	UNT	940-565-3252 940-565-3246 940-369-8192	Katie.Herring@unt.edu DeeAnna.Oliveira@unt.edu Emiley.Locey@unt.edu, edu GCA@unt.edu, Proposals@unt.edu
Karen Beers Timothy Raines William H. Asquith	USGS	512-927-3580 806-742-3129	kabeers@usgs.gov thraines@usgs.gov wasquith@usgs.gov

Name (Liaison**)	University	Phone#	Email Address
Sarah Panepinto**	UTA	817-272-0243	Sarah.panepinto@uta.edu ogcs@uta.edu
Emily Lacy**	UT-Dallas	972-883-4572	emily.lacy@utdallas.edu
Zachariah Fierro** Dr. Roberto Osegueda Imad Abdallah (HSI)	UTEP	915-747-6274 915-747-8907	zfierro2@utep.edu orspra@utep.edu emadn@utep.edu
Carmen Martinez Kathy Kreidler	UTHSC	713-500-3091 713-500-3999	Carmen.martinez.1@uth.tmc.edu preaward@uth.tmc.edu
Justin Marmolejo** Jennifer Silver Ariana Aguillon	UTSA	210-458-7049 210-458-4234 210-458-8659	justin.marmolejo@utsa.edu jennifer.silver@utsa.edu ariana.aguillon@utsa.edu
Angela Nunez Dr. Carla Reichard**	UT-TYLER	903-539-8472 512-565-5670	anunez@uttyler.edu research@uttyler.edu
Steve McLean**	WTAMU	806-651-2983	smclean@wtamu.edu srs@wtamu.edu
Timothy Pierce**	UT-Permian Basin	432-552-2537	pierce_t@utpb.edu, orsp@utpb.edu
Tribbie Grimm** Constantine Tarawneh	UTRGV	956-665-5008 956-665-2607	sponpro@utrgv.edu constantine.tarawneh@utrgv.edu

Section 2 – Subrecipients

2.1 CTR – Univ. of Texas - Austin Center for Transportation Research

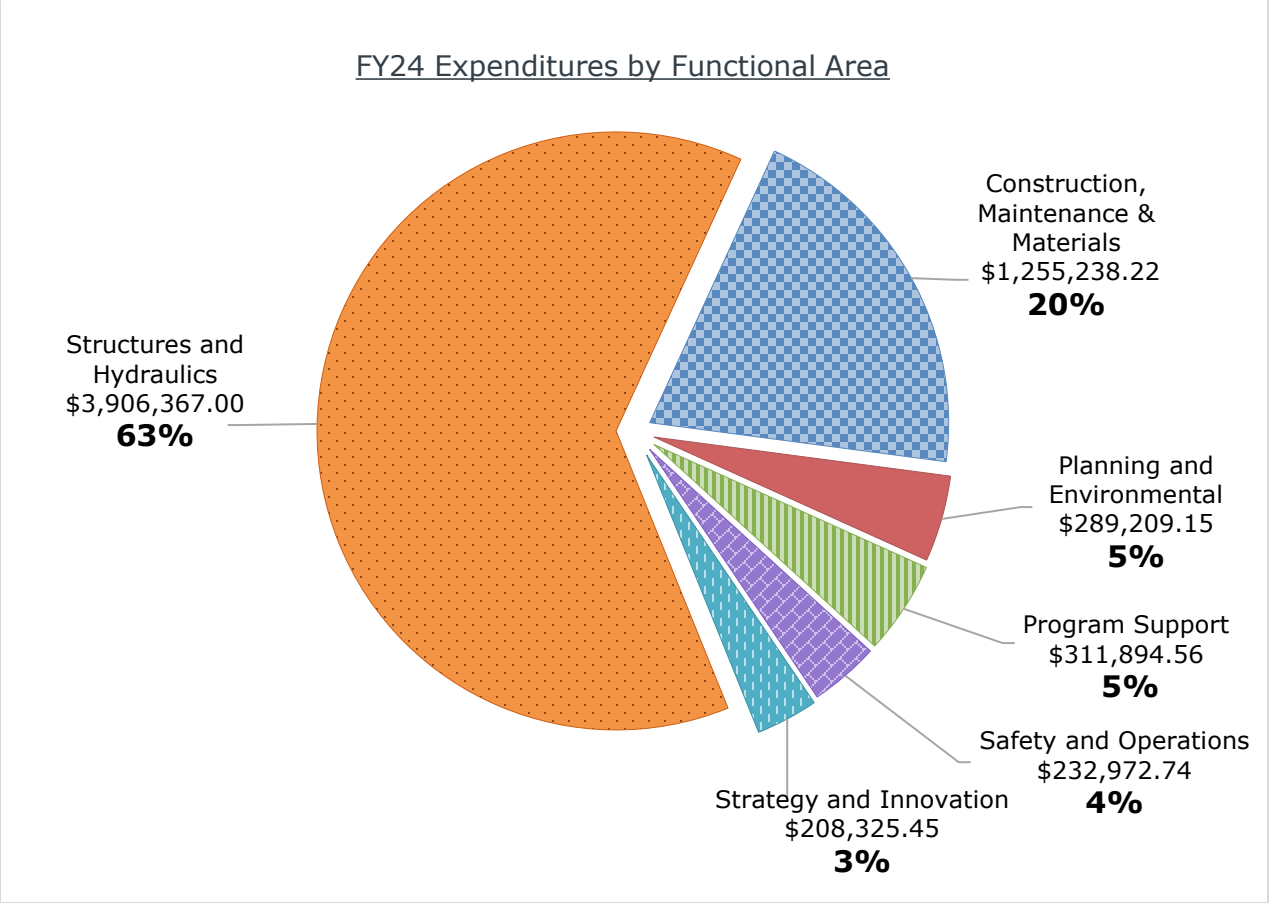


Figure 4. Pie chart of CTR expenditures by Functional Area

Project Number	Project Name	Status
0-6936	Development of Integral/Semi-integral Abutments for TxDOT bridges	Closed
0-7002	Evaluation of Geogrids for Asphalt Pavement Construction	Closed
0-7028-01	Integrated SiteManager and Pavement Analyst Database on an Online Platform	Closed
0-7031-01	Develop Efficient Prediction Model of Highway Friction on an Annual Basis	Closed
0-7034	Exploring the Use of Artificial Intelligence to Leverage TxDOT Data for Enhanced Corridor Management and Operations	Closed
0-7041	Develop NextGen Texas Bridge Decks	Closed

Project Number	Project Name	Status
0-7042	Use of Larger Diameter Shear Studs for Composite Steel Bridges	Closed
0-7073	Improving Testing Requirements in Item 300 Of TxDOT Standard Specifications	Active
0-7087	Develop Standards for Temporary Concrete Median Barrier in Flood-Prone Areas	Closed
0-7088	Develop Closure Joint Materials Specification and Evaluate Performance for Side-By-Side Accelerated Bridge Construction (ABC) Superstructure Systems	Closed
0-7089	Develop and Validate Precast Column Solutions for Texas Bridges	Closed
0-7090	Evaluate the Deployment of High Strength Reinforcing Steel in Texas	Active
0-7093	Develop Refined Design Methods for Lean-On Bracing	Closed
0-7095	Evaluate Improved Streamflow Measurement at TxDOT Bridges	Closed
0-7095-01	Flood Assessment System for TxDOT (FAST)	Active
0-7102	Develop Models for Field Performance of Friction and Skid Number	Closed
0-7113	Determine Service and Ultimate Behavior for Bent to Column Joints in TxDOT Substructures	Active
0-7115	Investigate Live Load Distribution and Stability of Prestressed Concrete Girders During Construction	Active
0-7116	Develop Deck and Overhang Design Guidelines for Sound Walls and Other Heavy Loads	Closed
0-7117	Investigate the Strength of Struts Crossing Cold Joints	Active
0-7123	Define a Statewide Plan for a Sustainable Real-Time Travel Time Network for Texas Hurricane Evacuations and Safe Citizen Return	Closed
0-7126	Synthesis on Automated Pedestrian Data Collecting Techniques and Applications in Transportation Planning, Design and Management	Closed
0-7137	Assessment of Austin, El Paso, and San Antonio HERO Incident Management Programs	Closed
0-7138	Driver Distraction in an Era of Rapid Technological Change, Digital Advertising Billboards	Active
0-7139	Determination of Pavement Surface Type	Closed
0-7141	Evaluation of Nano-Materials in Concrete for Improved Durability	Active
0-7145	Develop Rapid New Tests for Detecting Poor Quality Binders and RAP Materials	Active

FUNCTIONAL AREAS:
1. Structures and Hydraulics
2. Constr, Maint & Materials
3. Planning and Environmental
4. Program Support
5. Safety and Operations
6. Strategy and Innovation

Project Number	Project Name	Status
0-7149	Determine Feasibility and Methodologies of Incorporating Third-Party Traffic Data into Transportation	Closed
0-7164	Expanding Connected Vehicle Data Framework (CVDF) Data Sources to Increase Applications and Use on Texas Roadways	Closed
0-7165	Logistics Sprawl Impacts on E-commerce Travel Patterns	Closed
0-7168	Use of X-Ray Fluorescence (XRF) to Determine Tire Rubber Content in Asphalt Binders	Closed
0-7168-01	Support XRF determination of Tire Rubber content in asphalt binders	Closed
0-7178	Use Network Level Texture to Enhance Pavement Management	Active
0-7182	Determine Effectiveness of Construction Management Plans	Active
0-7186	Develop Next Generation of Hamburg Rutting Test for Asphalt Mixes	Active
0-7191	Develop Systematic and Quantitative Approach to Assess the Probability of Extreme Weather and Resilience Risks for TxDOT Highways and Bridges	Active
0-7193	Develop Assessment and Mitigation Guidance for Ancillary Highway Structures with Existing Cracks	Active
0-7195	Quantify Bridge and Pavement Consumption Due to Permitted Overweight/Oversized (OW/OS) Vehicles	Active
0-7197	Evaluate Effects of Recycled Asphalt Pavement (RAP) on Performance-Graded (PG) Binder Polymer Concentration	Active
0-9902-23	University of Texas Library Services	Active
5-6048-07	Implementation of Centrifuge Technology for Pavement Design on Expansive Clays – Phase 2	Active
5-6936-01	Implementation of Semi-integral Bridges in Texas	Active
5-7007-01	Weather Responsive Management Strategies Implementation	Active
5-7074-01	Implementation of Recycled Crushed Concrete Aggregate in Class P Concrete	Active
5-7081-01	Implementation of Understanding the Impact of Autonomous Vehicles on Long-distance Travel Mode and Destination Choice in Texas	Closed
5-9905-24	Innovation Consortium (TTTF, TxSTIC)	Active
9-1532	TPF-5(508) Concrete Bridge Engineering Institute (CBEI)	Active

FUNCTIONAL AREAS:
1. Structures and Hydraulics
2. Constr, Maint & Materials
3. Planning and Environmental
4. Program Support
5. Safety and Operations
6. Strategy and Innovation

CTR | Structures and Hydraulics

Project Number	Project Name	Status
0-6936	Development of Integral/Semi-integral Abutments for TxDOT bridges	Closed

Project Start Date: 09/01/2016
Completion Date: 12/31/2023
Lead University: CTR
University #2:
Project Status: Closed
Total Project Budget: $1,049,627.10
CTR Total Budget: $850,630.56
CTR FY24 Budget: $1,875.00
CTR Total Project Spend: $1,045,629.89
CTR FY24 Spend: $1,829.71

Project description: While the use of integral and semi-integral bridge abutments has reportedly been increasing nationwide, their construction in Texas has remained limited. These systems have been reported to minimize the costs associated with the installation, maintenance, and repair of bridge deck joints and bearings. In addition, they have the potential to minimize the "bump at the end of the bridge," which results in reduced maintenance costs. Although this technology has not been widely adopted in Texas, a reassessment of its potential cost and performance benefits is timely. This requires assessment of key design and construction aspects, including the characteristics of common soils in Texas, the details typically adopted for foundation, superstructure, and substructure, and the local pavement standards. Accordingly, this project proposes to assess the use of this technology in Texas by producing: (1) a review of US and international practices, as well as of existing data, to assess the applicability to conditions prevailing in Texas, (2) a thorough evaluation of structures already constructed in Texas, as well as of an integral bridge that will be constructed in 2016 in Texas by FHWA Federal Lands, and (3) a set of design details for using this technology in Texas conditions.

Approved Work Program Revisions

No. of FY24 Amendments: One

Amendment #6:
Amend the contract to extend the termination date, revise the budget, and update the project schedule to allow time to deliver the pilot short course for Task 10. The FY19-FY22 Budgets remain the same. The FY2023 Budget is decreased by $1,875.00 from $117,672.26 to $115,797.26; the FY2024 Budget is established at $1,875.00; the Itemized Project Budget Estimate remains $1,049,627.10.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-6936

CTR | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7002	Evaluation of Geogrids for Asphalt Pavement Construction	Closed

Project Start Date: 05/14/2019
Completion Date: 08/31/2024
Lead University: CTR
University #2:
Project Status: Closed
Total Project Budget: $1,194,503.05
CTR Total Budget: $1,194,503.05
CTR FY24 Budget: $217,976.47
CTR Total Project Spend: $1,002,963.09
CTR FY24 Spend: $188,988.55

Project description: Geogrids have been used in several Receiving Agency Districts to reinforce Hot-Mix Asphalt (HMA) with the objective of minimizing reflective cracking. Recent field evaluations have revealed that polymeric geogrids within HMA resulted in an additional promising benefit: increasing structural capacity and consequently reducing the required thickness of hot-mix overlays. Despite strong field evidence, important questions remain concerning proper geogrid selection criteria for this new application, what properties to specify, and how to quantify the increased structural capacity. The Performing Agency shall: (1) evaluate different types of polymeric and glass geogrids; (2) instrument field test sections along SH21 to validate constructability and assess long-term field performance; and (3) translate the research findings into practical specifications.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
Maintenance https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7002

CTR | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7028-01	Integrated SiteManager and Pavement Analyst Database on an Online Platform	Closed

Project Start Date: 09/01/2022
Completion Date: 08/31/2024
Lead University: CTR
University #2:
Project Status: Active
Total Project Budget: $139,964.98
CTR Total Budget: $139,964.98
CTR FY24 Budget: $43,942.73
CTR Total Project Spend: $103,600.50
CTR FY24 Spend: $28,934.52

Project description: The Receiving Agency maintains several databases to record materials, construction, and performance information for roadway projects: materials and test records in the SiteManager database; construction related information in TxDOT Connect or Design and Constructions Information System; and performance measures in the Pavement Analyst database. Data from these databases has been compiled in a recent project to identify relationships between the materials and construction records and observed long-term performance of hot mix asphalt pavements. The objective of this project is to implement this work through a visualization and analysis tool via a commercially available software and that can be accessed in near real time by the Receiving Agency on an ongoing basis. The Performing Agency shall utilize Tableau Prep Builder to integrate data from all data sources and develop the visualization and identification interface on Tableau Packaged Workbook. In addition to the aforementioned databases, maintenance history from Compass and GIS information from the Receiving Agency Open Portal to locate and map all projects shall be incorporated. A text and visual guide on how to use the Tableau interface shall be developed, and an online workshop shall be held to demonstrate the functionality of the interface to the Receiving Agency's Divisions and Districts. Such a tool shall allow the Receiving Agency to investigate all construction and maintenance projects performed on a pavement section and understand the effect of materials, design and construction processes on the long-term pavement performance.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7028-01

CTR | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7031-01	Develop Efficient Prediction Model of Highway Friction on an Annual Basis on Texas Network	Closed

Project Start Date: 09/01/2022
Completion Date: 08/31/2024
Lead University: CTR
University #2:
Project Status: Closed
Total Project Budget: $357,134.51
CTR Total Budget: $357,134.51
CTR FY24 Budget: $175,578.66
CTR Total Project Spend: $230,899.05
CTR FY24 Spend: $63,621.57

Project description: The number of wet-weather crashes is a significant problem in Texas, consequently, the provision of pavement surfaces with adequate skid resistance or friction is of utmost importance for promoting public safety and saving lives. Measuring skid numbers for the entire Texas roadway network on an annual basis is challenging and inefficient because of the regular stops necessary to refill the water tanks. Fortunately, recent laser technology allows the measurement of texture at high resolution and speed in an efficient manner. Today, a contractor collects only macrotexture for Receiving Agency and delivers mean profile depth (MPD), which is a very poor predictor of skid. Consequently, the Receiving Agency personnel have to go out and collect skid data at a high cost to calculate skid numbers. Currently the Receiving Agency collects skid resistance on about 33% of their network on an annual basis (approximately 50% of the Interstate system and 25% of the non-Interstate system). The objective of this project is to (i) continue the work that started under Receiving Agency's Project 0-7031, (ii) enhance the system that was developed as part of that project and (iii) update the models developed by collecting texture and skid on, at least 3,000 additional pavement sections distributed in at least six different Districts. This information shall be used to calibrate and validate equations to predict friction and skid numbers with a high degree of accuracy. This research would result in an enhanced system to collect texture data at highway speed for the entire Texas on-system network on an annual basis. The system is intended to be compact and capable of retrofitting to any surveying vehicle with minimal time and effort. This shall provide not only savings but additional safety to operations.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7031-01

CTR | Strategy and Innovation

Project Number	Project Name	Status
0-7034	Exploring the Use of Artificial Intelligence to Leverage TxDOT Data for Enhanced Corridor Management and Operations	Closed

Project Start Date: 08/01/2019
Completion Date: 10/31/2023
Lead University: CTR
University #2:
Project Status: Closed
Total Project Budget: $608,862.28
CTR Total Budget: $608,862.28
CTR FY24 Budget: $13,125.00
CTR Total Project Spend: $583,068.99
CTR FY24 Spend: $12,758.63

Project description: This project will develop a thorough understanding of the concrete and tangible benefits that artificial intelligence (AI) may offer to the Receiving Agency when considering the vast volumes of data currently collected and will explore emerging planning and operations applications. A twofold research approach will provide both a broad, high-level summary of the state of the art/practice in AI and its relevance to the Receiving Agency, and an in-depth analysis of one or two selected applications. The review of the state of the art will include a literature and data survey and creation of a prospectus summarizing the techniques and tools relevant to the Receiving Agency given data availability and planning/operation priorities. For the use cases, the Performing Agency will consider applications involving system performance estimation and system control using Markov and non-Markov decision processes. After completing a preliminary research phase, the Performing Agency will host a workshop for the Receiving Agency and its partners to demonstrate the explored concepts and collect feedback to inform the model application and testing. Project deliverables will include a comprehensive report, including a quantitative and qualitative evaluation of the selected use cases, and access to the datasets and code-base used in this project.

Approved Work Program Revisions
No. of FY24 Amendments: One

Amendment #5:
Amend the contract to update the project schedule, revise the budget and termination date to allow for additional research time for completion of the project. The FY23 Budget is decreased from $107,767.54 to $94,642.54; the FY24 Budget is established at $13,125.00; Total Project Budget Estimate will remain at $608,862.28.

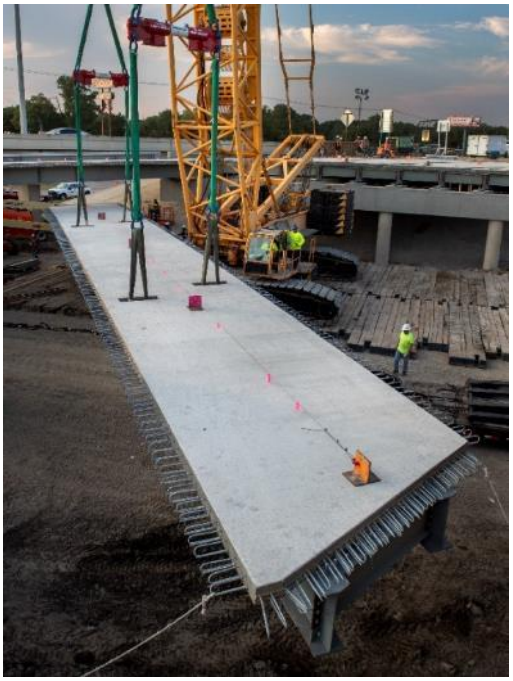
CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7034

CTR | Structures and Hydraulics

Project Number	Project Name	Status
0-7041	Develop NextGen Texas Bridge Decks	Closed

Project Start Date: 12/09/2019
Completion Date: 05/31/2024
Lead University: CTR
University #2:
Project Status: Closed
Total Project Budget: $1,195,069.27
CTR Total Budget: $1,195,069.27
CTR FY24 Budget: $68,536.48
CTR Total Project Spend: $1,147,259.20
CTR FY24 Spend: $68,535.72

Project description: The Performing Agency shall conduct a comprehensive experimental and analytical investigation to develop appropriate design criteria for using partial-depth precast panels that can span the full width of bridge superstructure. The Performing Agency shall develop and validate a precast deck panel system with wire trusses that will integrate with precast panel practices in Texas. The Performing Agency shall study the behavior of full-scale bridge superstructure models under design loads, typical overloads, and at ultimate conditions. The Performing Agency shall develop and test standard details for partial-depth deck panels in the laboratory for use in the Receiving Agency's standards for bridges constructed in Texas. The Performing Agency shall provide design guidelines that reflect the knowledge developed during the course of the project's experimental and analytical investigations.



Approved Work Program Revisions

No. of FY24 Amendments: One

Amendment #2:
Amend the contract to extend the period of agreement and update the project schedule and budget to allow for the completion of testing due to an unforeseen delay in the full-scale bridge deck testing (Task 4) and fatigue testing (Task 5). The FY2023 budget shall be increased by $59,834.61 from $156,452.18 to $216,286.79. An FY2024 budget is established for $68,536.48. The Total Itemized Project Budget Estimate is increased by $128,371.08 from $1,066,698.18 to $1,195,069.27.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7041

CTR | Structures and Hydraulics

Project Number	Project Name	Status
0-7042	Use of Larger Diameter Shear Studs for Composite Steel Bridges	Closed

Project Start Date: 12/17/2019
Completion Date: 10/31/2023
Lead University: CTR
University #2:
Project Status: Closed
Total Project Budget: $1,267,152.60
CTR Total Budget: $1,267,152.60
CTR FY24 Budget: $5,250.00
CTR Total Project Spend: $1,243,027.53
CTR FY24 Spend: $5,199.30

Project description: Efficient steel bridge girder design makes use of composite action between the concrete bridge deck and the steel girders. Shear studs welded to the girder top flange provide the critical link between the deck and girders. Satisfying AASHTO fatigue requirements normally leads to a very large number of shear studs, which makes placing partial-depth precast panels extremely difficult and results in a safety hazard for workers during erection or early construction stages. Using larger-diameter shear studs shall significantly reduce the number of studs required on composite steel girders. This project focuses on the feasibility of using shear stud diameters greater than 7/8 inch for composite steel bridge construction, and the development of design guidelines for evaluating the static and fatigue strength of larger diameter shear studs. The Performing Agency shall perform:

- laboratory testing using push-out or similar specimens to obtain data to evaluate both the static strength and fatigue strength of larger diameter shear studs.
- large-scale composite beam tests and associated computational studies to provide an evaluation of the performance of composite steel bridge girders with larger diameter shear studs.

Approved Work Program Revisions
No. of FY24 Amendments: One

Amendment #5:
Amend the contract to update the Work Plan, Budget, and Project Schedule to extend Task 7 to allow completion of the large-scale beam tests. The FY2023 budget is decreased by $5,250.00 from $344,400.00 to $339,150.00. The FY2024 budget is established at $5,250.00. The Itemized Project Budget Estimate remains $1,267,152.60.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7042

CTR | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7073	Improving Testing Requirements in Item 300 Of TxDOT Standard Specifications	Active

Project Start Date: 09/01/2020
Completion Date: 08/31/2025
Lead University: CTR
University #2: TTI
Project Status: Active
Total Project Budget: $1,130,000.00
CTR Total Budget: $565,000.00
CTR FY24 Budget: $134,889.57
CTR Total Project Spend: $390,209.24
CTR FY24 Spend: $123,098.82

Project description: 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.

Approved Work Program Revisions

No. of FY24 Amendments: One

Amendment #2:

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.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7073

CTR | Safety and Operations

Project Number	Project Name	Status
0-7087	Develop Standards for Temporary Concrete Median Barrier in Flood-Prone Areas	Closed

Project Start Date: 09/01/2020
Completion Date: 10/31/2023
Lead University: TTI
University #2: CTR
Project Status: Closed
Total Project Budget: $638,887.25
CTR Total Budget: $205,071.50
CTR FY24 Budget: $1,950.25
CTR Total Project Spend: $201,979.66
CTR FY24 Spend: $12,274.35

Project description: Portable concrete median barriers are used in work zones to prevent serious cross-median crashes and vehicle penetration in work zones. These barriers are used on highways to provide positive containment of vehicles and to reduce maintenance and repair needs. When implemented in flood-prone areas, portable concrete median barriers can act as a dam for flood waters until the damming of water causes the barrier to displace and break, as recently occurred in the Houston and Beaumont Districts during severe storms. These situations required significant repair before the highways could be reopened and the level of safety for motorists restored. Any required barrier maintenance or repair increases risk to maintenance personnel and can result in significant congestion if a lane closure is required. There is a need to develop and evaluate an appropriate portable concrete median barrier in compliance with the 2016 edition of the American Association of State Highway and Transportation (AASHTO) Manual for Assessing Safety Hardware (MASH) Test Level (TL-3) for implementation in flood-prone areas. To meet this objective, the Performing Agencies shall design such a barrier to accommodate passage of flood water, to decrease risk to motorists, and to reduce level of damage to the highway.

Approved Work Program Revisions
No. of FY24 Amendments: Two

Amendment #2:
Amend the contract to extend the termination date and to update the Project Schedule due to delays in the construction of the barriers needed for testing and to allow time for full-scale crash testing and project documentation.

Amendment #3:
Amend the contract to extend the termination date, to update the Project Schedule, and to revise Work Plan to perform additional testing. TTI: The FY 2021 budget remains $109,897.00; the FY 2022 budget remains $91,587.50; the FY 2023 budget increases by $65,885.00 from $150,233.75 to $216,118.75; the FY 2024 budget is established at $16,212.50; TTI's Total Project Budget increases by $82,097.50 from $351,718.25 to $433,815.75. CTR: The FY 2021 budget remains $105,554.50; the FY 2022 budget remains $80,493.59; the FY 2023 budget increases by $4,798.00 from 12,275.16 to $17,073.16; the FY

2024 budget is established at $1,950.25; CTR's Total Project Budget increases by $6,748.25 from $198,323.25 to $205,071.50. The Itemized Project Budget Estimate increases by $88,845.75 from $550,041.50 to $638,887.25.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7087

CTR | Structures and Hydraulics

Project Number	Project Name	Status
0-7088	Develop Closure Joint Materials Specification and Evaluate Performance for Side-By-Side Accelerated Bridge Construction (ABC) Superstructure Systems	Closed

Project Start Date: 09/01/2020
Completion Date: 05/31/2024
Lead University: CTR
University #2:
Project Status: Closed
Total Project Budget: $832,093.98
CTR Total Budget: $832,093.98
CTR FY24 Budget: $53,593.98
CTR Total Project Spend: $501,171.11
CTR FY24 Spend: $49,033.69

Project description: The Performing Agency shall develop, investigate, and implement optimized concrete mixtures to be used in closure pour connections between precast elements in side-by-side accelerated bridge construction (ABC) superstructure systems. The Performing Agency shall:

- Involve the use of innovative materials and mixture proportions that are intended to provide high early strengths to facilitate accelerated bridge construction, while ensuring that good long-term durability is also achieved.
- Develop mixtures including rapid-setting, fiber-reinforced concrete (RSFRC) and ultra-high-performance concrete (UHPC).
- Evaluate in the laboratory (materials and full-scale structural testing) and on outdoor exposures to fully characterize the critical fresh, hardened, structural, and durability properties that are need for closure pour connections.
- Select for full-scale implementation and monitoring in ABC projects scheduled for construction in the Amarillo, Bryan, and Dallas Districts based on the findings of the literature review and laboratory/exposure site tests, candidate RSFRC and UHPC mixtures.
- Develop a suite of mixtures by developing a wide range of mixtures with varying rheological properties, strength gain characteristics, and toughness values from which the Receiving Agency may select for any given closure pour connection.

Approved Work Program Revisions

No. of FY24 Amendments: Two

Amendment #1:

Amend the contract to update the project schedule to reflect Tasks 4 and 5 due to availability of ABC bridges under construction COVID related scheduling challenges and delays of the large-scale testing for Task 4.

Amendment #2:

Amend the contract to extend the termination date, and revise the budget and the project schedule to facilitate the completion of large-scale structural testing, the continuation of long-term durability testing, and additional monitoring of UHPC bridges in Amarillo and Bryan Districts. The FY 2023 Budget is remains $271,355.26; the FY 2024 budget is established at $53,593.98; the Itemized Project Budget Estimate is increased by $53,593.98 from $778,500.00 to $832,093.98.

CTR Library Project Link:

https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7088

CTR | Structures and Hydraulics

Project Number	Project Name	Status
0-7089	Develop and Validate Precast Column Solutions for Texas Bridges	Closed

Project Start Date: 09/01/2020
Completion Date: 08/31/2024
Lead University: CTR
University #2:
Project Status: Closed
Total Project Budget: $1,065,724.09
CTR Total Budget: $1,065,724.09
CTR FY24 Budget: $74,524.37
CTR Total Project Spend: $1,040,674.30
CTR FY24 Spend: $74,527.94

Project description: The Performing Agency shall develop and validate practical standard designs and connection details for precast concrete columns. The Performing Agency shall provide the following:

- Develop cost-effective bridge column solutions employing precast solid sections and precast hollow sections with a cast-in-place (CIP) core.
- Characterize the composite behavior between precast elements and CIP concrete in precast shell columns and socket connections.
- Conduct large-scale laboratory tests to validate the constructability and structural performance of the proposed precast column systems and connections.
- Develop design guidelines and draft specifications for implementation of precast columns in Texas bridges.

Approved Work Program Revisions
No. of FY24 Amendments: One

Amendment #1:
Amend the contract to extend the termination date, revise the project schedule and budget to allow the completion of full-scale testing due to an unforeseen delay in Task 5 and Task 7. The FY 2021 Budget remains $269,145.46. The FY 2022 Budget remains $367,742.98. The FY 2023 Budget remains $354,311.28. The FY 2024 Budget is established at $74,524.37. The Itemized Project Budget Estimate is increased by $74,524.37 from $991,199.72 to $1,065,724.09.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7089

CTR | Structures and Hydraulics

Project Number	Project Name	Status
0-7090	Evaluate the Deployment of High Strength Reinforcing Steel in Texas	Active

Project Start Date: 09/01/2020
Completion Date: 08/31/2024
Lead University: CTR
University #2:
Project Status: Active
Total Project Budget: $1,175,887.21
CTR Total Budget: $1,175,887.21
CTR FY24 Budget: $141,725.61
CTR Total Project Spend: $1,123,024.98
CTR FY24 Spend: $130,784.42

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7090

CTR | Structures and Hydraulics

Project Number	Project Name	Status
0-7093	Develop Refined Design Methods for Lean-On Bracing	Closed

Project Start Date: 09/01/2020
Completion Date: 01/31/2024
Lead University: CTR
University #2: TTI
Project Status: Closed
Total Project Budget: $980,000.00
CTR Total Budget: $600,000.00
CTR FY24 Budget: $39,062.00
CTR Total Project Spend: $563,738.80
CTR FY24 Spend: $34,760.18

Project description: The Performing Agencies shall instrument and conduct field monitoring of bridges with lean-on bracing identified in Task 3. The monitoring shall include bridges under construction and completed bridges subjected to controlled loading using trucks to better understand the behavior described in Tasks 2, 4 and 7. The Performing Agencies shall carry out parametric Finite Element Analyses (FEA) along with the field monitoring and develop improved guidelines to facilitate widespread use of lean-on bracing applications in Texas bridges.

Approved Work Program Revisions
No. of FY24 Amendments: Two

Amendment #1:
Amend the contract to revise the work plan and the budget to add a subcontractor due to the transfer of a research team member and student for Performing Agency 2. Performing Agency 1: The FY 2023 Budget remains $225,000.00. The Performing Agency 1 Total Project Budget remains $600,000.00. Performing Agency 2: The FY 2023 Budget remains $142,500.00. The Performing Agency 2 Total Project Budget remains $380,000.00. The Itemized Project Budget Estimate remains $980,000.00.

Amendment #2:
Amend the contract to to revise the term date, the FY23 and FY24 budgets and schedule to allow the research team to complete the parametric finite element analyses and to develop suitable design recommendations. Decrease CTR's FY23 budget by $39,062.00 from $225,000.00 to $185,938.00. Establish a FY24 budget for CTR of $39,062.00. CTR's Total Project Budget remains $600,000.00 Decrease TTI's FY23 budget by $33,767.00 from $142,500.00 to $108,733.00. Establish a FY24 budget for TTI of $33,767.00. TTI's Total Project Budget remains $380,000.00. The Itemized Project Budget Estimate remains the same.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7093

CTR | Structures and Hydraulics

Project Number	Project Name	Status
0-7095-01	Flood Assessment System for TxDOT (FAST)	Active

Project Start Date: 02/26/2024
Completion Date: 01/31/2027
Lead University: CTR
University #2: USGS
Project Status: Active
Total Project Budget: $5,850,241.20
CTR Total Budget: $3,009,622.73
CTR FY24 Budget: $663,649.65
CTR Total Project Spend: $657,055.16
CTR FY24 Spend: $657,055.16

Project description: 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."

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7095-01

CTR | Structures and Hydraulics

Project Number	Project Name	Status
0-7095	Evaluate Improved Streamflow Measurement at TxDOT Bridges	Closed

Project Start Date: 09/01/2020
Completion Date: 10/31/2023
Lead University: CTR
University #2: USGS
Project Status: Closed
Total Project Budget: $6,602,641.36
CTR Total Budget: $3,057,491.33
CTR FY24 Budget: $142,802.36
CTR Total Project Spend: $3,003,520.23
CTR FY24 Spend: $123,946.67

Project description: The Receiving Agency maintains 30,000 bridges, some of which have been threatened by flooding, especially during the past four years. Better information on forecast flood inundation would help anticipate bridge and road flooding; inform decisions before, during, and after flooding; and help deploy resources for bridge inspection after flooding is over. The National Weather Service began in August 2016 operating a National Water Model, continually providing real-time forecasting on 190,000 miles of Texas streams and rivers. This project shall establish and maintain a Receiving Agency Flood Monitoring Network that consists of 80 gauges—60 new gauges installed as part of this project and 20 existing gauges installed as part of a previous Receiving Agency project. The new gauges shall be located in watersheds as defined by the USGS or TWDB, selected to provide a range of observation on main stem and tributary rivers and on soil and slope conditions in Texas river and coastal basins, and shall be complementary to existing observation networks. Observational data from the gauges and flood forecast information shall be made accessible through a Receiving Agency Flood Forecast System and Operational Data Website.

Approved Work Program Revisions
No. of FY24 Amendments: Two

Amendment #3:
Amend the contract to revise the budget, scope, and project schedule and add a subcontractor due to roadway locations to accurately depict on-system roadways on flood related mapping tools during the flood emergency response exercises. Performing Agency 1 (CTR): The FY23 budget is increased by $78,250.00 from $542,495.01 to $620,745.01. The Performing Agency 1 Total Project Budget shall increase by $78.250.00 from $2,836,439.00 to $2,914,689.00. Performing Agency 2 (USGS): The FY2023 budget remains $1,334,000.00. The Total Budget for Performing Agency 2 remains $3,545,150.00. The Itemized Project Budget Estimate increased by $78,250.00 from $6,381,589.00 to $6,459,839.00.

Amendment #4:
Amend the contract to extend the termination date, add scope, revise the budget, and update the project schedule to complete the Streamflow II deliverables. CTR budget: The FY2021 budget remains

$1,728,999.21; The FY2022 budget remains $564,944.78; The FY2023 budget remains $620,745.01; The FY2024 budget is established for $142,802.36; CTR's Total Project Budget shall increase by $142,802.36 from $2,914,689.00 to $3,057,491.36. USGS budget: The FY2021 budget remains $893,350.00; The FY2022 budget remains $1,316,800.00; The FY2023 budget is decreased by $311,814.00 from $1,334,000.00 to $1,022,186.00; The FY2024 budget is established for $311,814.00. USGS's Total Project Budget remains $3,545,150.00. The Itemized Project Budget Estimate increased by $142,802.36 from $6,459,839.00 to $6,602,641.36.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7095

CTR | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7102	Develop Models for Field Performance of Friction and Skid Number	Closed

Project Start Date: 09/01/2020
Completion Date: 02/28/2024
Lead University: CTR
University #2:
Project Status: Closed
Total Project Budget: $471,872.25
CTR Total Budget: $471,872.25
CTR FY24 Budget: $122,654.92
CTR Total Project Spend: $391,131.03
CTR FY24 Spend: $113,607.59

Project description: The Receiving Agency's Maintenance Division has recently implemented a comprehensive and more powerful pavement management system known as Pavement Analyst (PA). The new system is capable of prioritizing maintenance and rehabilitation (M&R) activities for different time horizons based on a series of decision trees that account for current distress levels, scores, traffic, location, environment, etc. The decision trees incorporate new variables, such as skid and texture which are correlated to the number of wet weather crashes. Controlling these variables shall significantly improve the safety of the Texas highway network. There are no current models for the prediction of skid or texture that can be used on Pavement Analyst. The existing models are based on laboratory characterization and the exponential decay rate is estimated from laboratory performance. The objective of this research project is to develop a performance model to predict pavement skid number as a function of time, for use in the Receiving Agency's pavement management system, i.e. Pavement Analyst. The Performing Agency shall develop models that account for field prediction of skid and texture, to be incorporated into Pavement Analyst and to aid in the selection of optimal M&R activities. These models shall also account for treatment type: PM, LRhb, MRhb, and HRhb.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7102

CTR | Structures and Hydraulics

Project Number	Project Name	Status
0-7113	Determine Service and Ultimate Behavior for Bent to Column Joints in TxDOT Substructures	Active

Project Start Date: 09/01/2021
Completion Date: 08/31/2025
Lead University: CTR
University #2:
Project Status: Active
Total Project Budget: $1,275,132.89
CTR Total Budget: $1,275,132.89
CTR FY24 Budget: $359,434.81
CTR Total Project Spend: $1,006,593.74
CTR FY24 Spend: $378,306.94

Project description: 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.

Approved Work Program Revisions

No. of FY24 Amendments: One

Amendment #1:

Amend the contract to extend the termination date, revise the Work Plan to design and test three additional specimens in Task 4, add the FY 2025 budget, and extend the Project Schedule to allow for the additional testing. The FY 2022 Budget remains $262,221.79. The FY 2023 Budget remains $378,309.79. The FY 2024 Budget remains $359,434.81. The FY 2025 Budget is established for $275,166.50. The Itemized Project Budget Estimate is increased by $275,166.50 from $999,966.39 to $1,275,132.89.

CTR Library Project Link:

https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7113

CTR | Structures and Hydraulics

Project Number	Project Name	Status
0-7115	Investigate Live Load Distribution and Stability of Prestressed Concrete Girders During Construction	Active

Project Start Date: 09/01/2021
Completion Date: 01/15/2025
Lead University: CTR
University #2: CTR
Project Status: Active
Total Project Budget: $998,766.67
CTR Total Budget: $998,766.67
CTR FY24 Budget: $261,063.14
CTR Total Project Spend: $818,323.73
CTR FY24 Spend: $261,063.14

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7115

CTR | Structures and Hydraulics

Project Number	Project Name	Status
0-7116	Develop Deck and Overhang Design Guidelines for Sound Walls and Other Heavy Loads	Closed

Project Start Date: 09/01/2021
Completion Date: 08/31/2024
Lead University: CTR
University #2: TTI
Project Status: Closed
Total Project Budget: $599,347.64
CTR Total Budget: $599,347.64
CTR FY24 Budget: $207,766.34
CTR Total Project Spend: $505,672.48
CTR FY24 Spend: $180,991.40

Project description: Economic considerations typically encourage limiting the total number of girders across the width of most bridges. The width of bridge overhangs is normally proportioned so that the same girder sections can be used for both the interior and fascia girders. While many state transportation agencies have guidelines on sizing and detailing bridge overhangs, the current provisions are generally based on rules-of-thumb developed through experience. The Performing Agency shall develop guidelines for analyzing and designing bridge decks and overhangs to accommodate increased loads due to heavy rails or sound walls. Detailed computational models shall be developed and validated against available test data. A parametric study shall represent the range of design variables encountered for representative Texas bridges. The Performing Agency shall allow engineers to select the deck thickness, reinforcement detailing, and overhang geometry for a specific project given the bridge railing type, girder spacing, and total number of girders to which the load is distributed. The research shall consider commonly used girder systems and focus on identifying cross-sectional profiles that lead to improved performance for cases with heavier loads compared to standard overhangs.

Approved Work Program Revisions
No. of FY24 Amendments: One

Amendment #1:
Amend the contract to replace the Project Supervisor due to a leave of absence of the original Project Supervisor.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7116

CTR | Structures and Hydraulics

Project Number	Project Name	Status
0-7117	Investigate the Strength of Struts Crossing Cold Joints	Active

Project Start Date: 09/01/2021
Lead University: CTR
Project Status: Active
CTR Total Budget: $1,366,368.89
CTR Total Project Spend: $1,073,480.06

Completion Date: 06/30/2025
University #2:
Total Project Budget: $1,366,368.89
CTR FY24 Budget: $411,484.81
CTR FY24 Spend: $411,485.99

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7117

CTR | Safety and Operations

Project Number	Project Name	Status
0-7123	Define a Statewide Plan for a Sustainable Real-Time Travel Time Network for Texas Hurricane Evacuations and Safe Citizen Return	Closed

Project Start Date: 09/01/2021
Completion Date: 02/29/2024
Lead University: CTR
University #2:
Project Status: Closed
Total Project Budget: $399,868.11
CTR Total Budget: $425,332.58
CTR FY24 Budget: $25,464.47
CTR Total Project Spend: $370,448.93
CTR FY24 Spend: $25,402.47

Project description: Hurricanes in Texas have posed considerable challenges to the evacuation of large populations and the transmission of information from the real-time traffic monitoring infrastructure. Given the societal, economic, and strategic significance of the hurricane evacuation route network, ensuring sufficient coverage and resilience against disruptions is essential. The limited available resources and the expanded network size, which includes rural areas, presents several technical and economic difficulties. To implement an effective strategy to address these issues, it is crucial for the Receiving Agency to develop a statewide plan for the sustainability and sufficiency of the evacuation network. The Performing Agency shall provide guidance for decision-makers in assessing the needs for determining additional monitoring stations on an expanded evacuation network including major Texas cities. To do so, the Performing Agency shall assess the availability and maintainability of different resources by collecting input from multiple stakeholders and developing a prioritized list of interventions based on socioeconomic criteria. Based on the projected usage of information transfer technologies, the project shall explore and recommend alternatives for failsafe systems.

Approved Work Program Revisions
No. of FY24 Amendments: Two

Amendment #1:
Amend the contract to revise the project supervisor.

Amendment #2:
Amend the contract to extend the termination date, to revise the project schedule, and reallocate funds in the budget to allow additional time due to the recent change in Project Supervision. The FY2023 budget is decreased by $25,464.47 from $203,041.56 to $177,577.09. The FY 2024 budget is established at $25,464.47. The Total Itemized Project Budget Estimate remains $399,868.11.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7123

CTR | Strategy and Innovation

Project Number	Project Name	Status
0-7126	Synthesis on Automated Pedestrian Data Collecting Techniques and Applications in Transportation Planning, Design and Management	Closed

Project Start Date: 09/01/2021
Completion Date: 08/31/2023
Lead University: CTR
University #2:
Project Status: Closed
Total Project Budget: $65,000.00
CTR Total Budget: $115,689.04
CTR FY24 Budget: $50,689.04
CTR Total Project Spend: $64,668.92
CTR FY24 Spend: $0.00

Project description: Cities in the United States have been experiencing a significant increase in the number of pedestrian fatalities, even as the increased intensity of pedestrian movement. Thus, there is a critical need for accurate, reliable, and comprehensive information about pedestrian travel movements to support planning, design, and management of pedestrian infrastructure as part of a larger regional surface transportation system. In this project, the Performing Agency shall undertake a comprehensive literature review on the state-of-the-art and the state-of-the-practice of automated pedestrian detection techniques. Additional insights shall be solicited from nationwide surveys and interviews. The outcome is an assessment of the different automated data collection methods, including well established and emerging artificial intelligence (AI)- and sensor-based technologies, to evaluate their appropriateness and efficacy in different environments and for supporting data collection and usage efforts. In addition to generating a research report, the Performing Agency shall provide the Receiving Agency with a decision support system that compiles information gathered through the literature review, survey, interviews, and trainings while integrating economic analyses. The practical support tool shall be structured to directly and seamlessly feed into the Receiving Agency's strategic planning and design efforts and enhance current operations.

Approved Work Program Revisions
No. of FY24 Amendments: 0

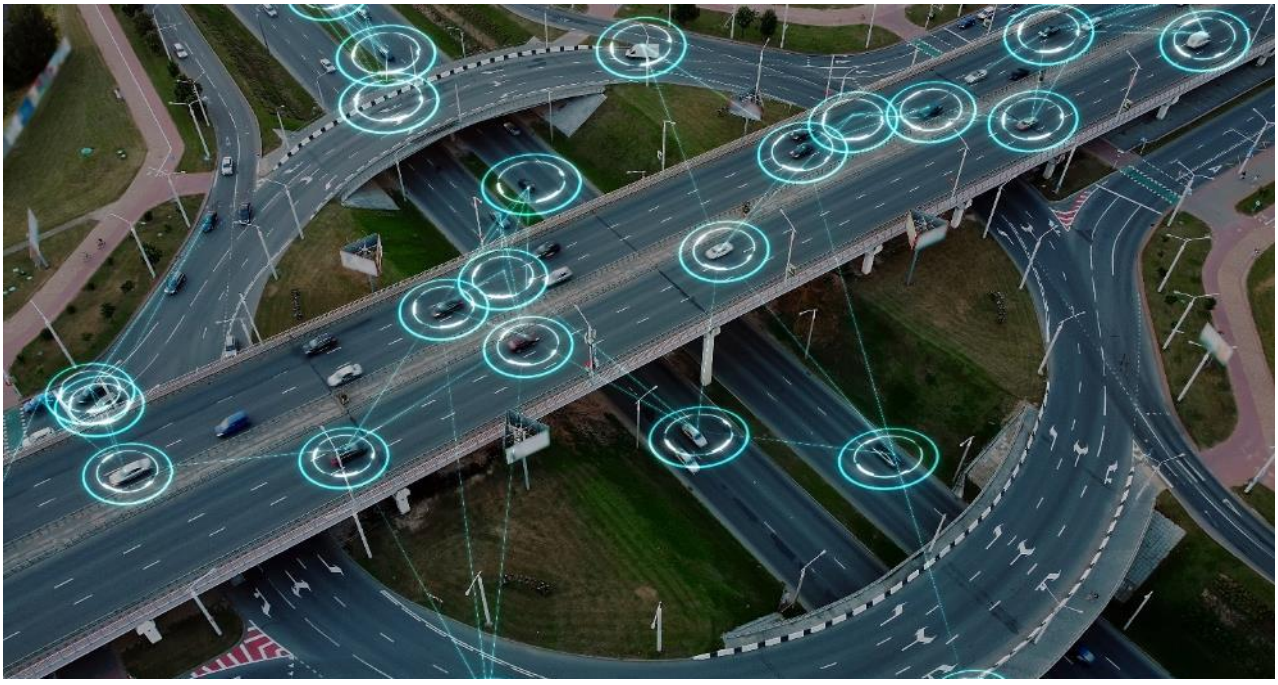
CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7126

CTR | Strategy and Innovation

Project Number	Project Name	Status
5-7081-01	Implementation of Understanding the Impact of Autonomous Vehicles on Long-distance Travel Mode and Destination Choice in Texas	Closed

Project Start Date: 11/04/2022
Completion Date: 12/31/2023
Lead University: CTR
University #2:
Project Status: Closed
Total Project Budget: $159,917.34
CTR Total Budget: $159,917.34
CTR FY24 Budget: $62,607.96
CTR Total Project Spend: $148,279.76
CTR FY24 Spend: $61,080.63

Project description: The 0-7081 research project produces a model that forecasts long-distance demand by autonomous passenger and freight vehicles. It combines rigorous insight gained from literature, survey results, and a variety of data sets to predict a future 20+ years from now, where autonomous vehicles are readily available for all ground-based travel. Key findings thus far include 15+% added VMT to the Texas and US networks, 10+% longer passenger-trip distances (within the state), and notable mode-share losses for freight rail and passenger air travel. While this project delivers complex long-distance travel-demand model specifications for passengers and freight, including all parameter estimates, the models are not yet ready for in-house applications by the Receiving Agency personnel. The research team proposes an implementation project to put all passenger and freight-based travel demand equations and parameters (and various input files, like network distances and travel times, export demand volumes by industry, weight per container by industry) into a user-friendly



TransCAD-based package for the Receiving Agency employees to use in coming years. The team also proposes hosting several training sessions for the Receiving Agency staff and stakeholders (like MPO staff and their consultants, across the state and nation). In this way, the Receiving Agency and its partners can run hundreds of diverse simulations over the coming years, thereby implementing this research work fully, while adding new forecasts and value for infrastructure maintenance and expansion, traffic management, and trade and travel support across the state and nation.

Approved Work Program Revisions

No. of FY24 Amendments: One

Amendment #1:

Amend the contract to extend the termination date and revise the budget and project schedule to allow the research team to produce a higher quality product. The FY 2023 Budget is decreased by $39,293.32 from $136,602.70 to $97,309.38. The FY 2024 Budget is increased by $39,293.32 from $23,314.64 to $62,607.96. The Itemized Project Budget Estimate remains $159,917.34.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=5-7081-01

CTR | Safety and Operations

Project Number	Project Name	Status
0-7137	Assessment of Austin, El Paso, and San Antonio HERO Incident Management Programs	Closed

Project Start Date: 09/01/2022
Lead University: CTR
Project Status: Closed
CTR Total Budget: $393,182.94
CTR Total Project Spend: $240,716.34

Completion Date: 08/31/2024
University #2:
Total Project Budget: $393,182.94
CTR FY24 Budget: $196,942.96
CTR FY24 Spend: $112,315.72

Project description: The Receiving Agency aimed at improving safety and keeping traffic flowing, the Highway Emergency Response Operator (HERO) program was established to clear minor crashes from roadways and assist motorists in need. Following the public's positive response, more districts have instituted HERO programs in recent years. Although HERO has proven popular, the program has not been formally assessed. The objective of this project is to conduct a systematic assessment of HERO in Austin, El Paso, and San Antonio. The Performing Agency shall perform comprehensive analyses in terms of operational efficiency, staffing and equipment levels, incident response and clearance time improvements, impacts on travel delay, and benefit to cost ratio through a series of on-site interviews, data analysis, and Dynamic Traffic Assignment micro-simulations. The Performing Agency shall compare clearance times on Safety Service Patrol (SSP) routes vs. non-SSP routes, and contract service vs. non-contract service. Recommendations and guidance shall be provided to the Receiving Agency's districts and Traffic Safety Division to improve HERO effectiveness and efficiency. This project shall give the Receiving Agency a thorough understanding of HERO as well as future improvement recommendations.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7137

CTR | Planning and Environmental

Project Number	Project Name	Status
0-7138	Driver Distraction in an Era of Rapid Technological Change, Digital Advertising Billboards	Active

Project Start Date: 09/01/2022
Lead University: TTI
Project Status: Active
CTR Total Budget: $78,914.14
CTR Total Project Spend: $69,035.49

Completion Date: 11/30/2024
University #2: CTR
Total Project Budget: $432,453.89
CTR FY24 Budget: $35,811.13
CTR FY24 Spend: $37,500.04

Project description: Outdoor advertising signs impact millions of travelers around the world every day. These signs are designed to attract driver attention thus taking it away from the driving task. Driver inattention and distraction are two of the most critical factors for road safety. Receiving Agency regulation of outdoor advertising signs must deal with changing technologies, including digital billboards, which allow for modifications to sign illumination, motion, and content. Regulations are not keeping pace with changing sign trends and must be updated to address potential impacts on road user safety. This research project focuses on the degree of driver distraction caused by typical and digital advertising sign contents. The project includes a comprehensive state-of-the-practice review, crash investigation, and an on road human factors evaluation. The illumination levels and content (including motion) during daytime and nighttime travel for dry and wet-weather conditions are considered. This research project shall provide the Receiving Agency with tools and resources to help manage outdoor digital advertising billboards by establishing practical criteria for sign illumination and content. These resources shall allow the Receiving Agency to manage the advertising signs such that road user safety is accounted for while maintaining the ability of sign owners to develop effective means of communicating with the public.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7138

CTR | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7139	Determination of Pavement Surface Type	Closed

Project Start Date: 09/01/2022
Completion Date: 08/31/2024
Lead University: CTR
University #2:
Project Status: Closed
Total Project Budget: $414,534.69
CTR Total Budget: $414,534.69
CTR FY24 Budget: $225,590.26
CTR Total Project Spend: $202,968.17
CTR FY24 Spend: $79,454.38

Project description: An accurate knowledge of the pavement surface type is fundamental to efficient pavement management. Knowledge of the surface type is important for tracking the performance of different surfaces and predicting skid numbers and noise. While surface type is already a data element in Pavement Analyst, it lacks the necessary accuracy. Previous Receiving Agency projects have attempted to populate this field by combining different data sources, but the results have not been implemented because of lack of accuracy. Laser, video, and 3D technologies have made it possible to scan large networks and obtain full coverage on an annual basis. Artificial intelligence and these technologies can be used to predict surface type with an accuracy higher than 90%. This research project shall utilize the latest technologies to develop equipment and a methodology for determining surface type. To accomplish this goal, the Performing Agency shall conduct a literature review to identify potential technologies, evaluate them and determine the technology with the highest potential, develop a set of technical specifications for the system, set a target for the degree of accuracy, develop an experimental design, use the system developed to determine surface type, evaluate its performance, and assemble and deliver a final system.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7139

CTR | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7141	Evaluation of Nano-Materials in Concrete for Improved Durability	Active

Project Start Date: 09/01/2022
Completion Date: 05/31/2026
Lead University: CTR
University #2:
Project Status: Active
Total Project Budget: $630,022.25
CTR Total Budget: $630,022.25
CTR FY24 Budget: $179,972.94
CTR Total Project Spend: $305,828.52
CTR FY24 Spend: $141,057.65

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7141

CTR | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7145	Develop Rapid New Tests for Detecting Poor Quality Binders and RAP Materials	Active

Project Start Date: 09/01/2022
Completion Date: 02/29/2028
Lead University: TTI
University #2: CTR
Project Status: Active
Total Project Budget: $1,725,534.03
CTR Total Budget: $517,632.54
CTR FY24 Budget: $102,034.58
CTR Total Project Spend: $206,708.85
CTR FY24 Spend: $85,542.89

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7145

CTR | Planning and Environmental

Project Number	Project Name	Status
0-7149	Determine Feasibility and Methodologies of Incorporating Third-Party Traffic Data into Transportation	Closed

Project Start Date: 09/01/2022

Completion Date: 02/29/2024

Lead University: CTR

University #2:

Project Status: Closed

Total Project Budget: $266,457.08

CTR Total Budget: $266,457.08

CTR FY24 Budget: $56,508.43

CTR Total Project Spend: $226,939.47

CTR FY24 Spend: $55,244.63

Project description: With the increasing availability of third-party traffic and transportation data, there is a growing interest among government agencies to incorporate these into planning and operations. These data can also provide valuable input to many other applications, such as improving traffic safety by identifying hotspots for traffic accidents, reducing intersection congestion by enabling smart traffic control, and streamlining the visualization of traffic maps. In this project, the Performing Agency shall synthesize various sources of third-party data and the Receiving Agency's current workflows in transportation planning, traffic management, and visualization capabilities that can benefit from their incorporation. Based on the evaluation of data source characteristics, historic usage, strengths and limitations, and possible context in the Receiving Agency's workflows, the Performing Agency shall develop pathways for data integration including effective public-private partnerships. In addition to a research report, this project shall provide a data integration decision support system that recommends the most appropriate implementation strategy given input parameters and query type (data-, application-, or policy-driven). Using the information gathered, the Performing Agency shall also design procedures for implementing proven technology (as determined through this research) that integrate third-party data sources within a range of Receiving Agency work environments.

Approved Work Program Revisions

No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7149

CTR | Strategy and Innovation

Project Number	Project Name	Status
0-7164	Expanding Connected Vehicle Data Framework (CVDF) Data Sources to Increase Applications and Use on Texas Roadways	Closed

Project Start Date: 09/01/2021
Completion Date: 08/31/2023
Lead University: CTR
University #2:
Project Status: Closed
Total Project Budget: $350,000.00
CTR Total Budget: $350,000.00
CTR FY24 Budget: $175,119.23
CTR Total Project Spend: $294,205.20
CTR FY24 Spend: $134,486.19

Project description: Connected vehicle (CV) technology is enabling transportation systems to become safer and smarter. Texas is assembling a robust CV ecosystem, with several CV deployments underway. At the heart is the Connected Vehicle Data Framework (CVDF), a data exchange that enables the Receiving Agency to publish key information, such as work zone locations and travel times, as well as ingest data from other public agencies and third parties regarding traffic characteristics, road weather conditions, and safety events. Constraints in data access and format standardization, however, limit the CVDF from realizing its full potential. This project shall leverage the existing CVDF that currently supports the Texas Connected Freight Corridors project to expand its efficacy through applications, data partners, and corridors. By expanding the CVDF, the Receiving Agency will unlock new benefits—improved real-time traveler information; increased CV adoption in passenger and freight markets; and more strategic infrastructure investments. This project shall deliver a CVDF Expansion Toolkit that includes:

- New applications that improve safety and mobility (e.g., truck parking availability, road weather warning, border wait times)
- Recommended data partners from local and regional agencies as well as third-party data providers to improve traffic operations
- Corridor investment strategies that identify Texas roadways for CV operations and describe infrastructure readiness tactics.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7164

CTR | Planning and Environmental

Project Number	Project Name	Status
0-7165	Logistics Sprawl Impacts on E-commerce Travel Patterns	Closed

Project Start Date: 09/01/2022
Completion Date: 02/29/2024
Lead University: CTR
University #2:
Project Status: Closed
Total Project Budget: $293,389.26
CTR Total Budget: $293,389.26
CTR FY24 Budget: 85,367.81
CTR Total Project Spend: $285,276.00
CTR FY24 Spend: $85,358.09

Project description: E-commerce services and facilities have the benefits of bringing new employment opportunities to communities and meeting consumer needs, but they also attract heavy traffic, which results in congestion and negative environmental and economic repercussions. In this context, the current project offers a new lens for studying future e-commerce facility siting, considering (1) current and projected consumer demands that will drive facility siting from the perspective of e-commerce companies. It also considers (2) the industry and workplace standards and the tax and zoning policies of governing bodies (including the Receiving Agency's own land-use regulation and standards) that can affect, and be proactively employed to influence, facility siting from the perspective of the Receiving Agency. This project shall provide a predictive mechanism that is not simply reactive to e-commerce companies' facility siting preferences but that can be proactively leveraged by the Receiving Agency, who can use land-use regulations and standards to influence the siting of e-commerce facilities in ways that bring home the positives of e-commerce to Texans while tempering negative repercussions for the transportation network.

Approved Work Program Revisions

No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7165

CTR | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7168-01	Support XRF determination of Tire Rubber content in asphalt binders	Closed

Project Start Date: 04/01/2024
Completion Date: 08/31/2024
Lead University: CTR
University #2:
Project Status: Closed
Total Project Budget: $60,205.98
CTR Total Budget: $60,205.98
CTR FY24 Budget: $60,205.98
CTR Total Project Spend: $23,139.11
CTR FY24 Spend: $23,139.11

Project description: Tire rubber (TR) is required in certain asphalt binders, e.g., AC-205TR, used for chip seal construction. These binders are specified and used in several districts across the state. Current Receiving Agency Standard Specification Item 300, Asphalts, Oils, and Emulsions, includes using test procedure Tex-533-C, Determining Polymer Additive Percentages in Polymer Modified Asphalt Cements. This test procedure has been only performed in the Receiving Agency Materials and Tests Division (MTD). In a previous project the Performing Agency provided a portable XRF device and training to three (3) selecteddistricts (including generating calibration curves to support determining TR content) for them to be able to conduct this testing at the district or field level. Under the previous project, the Performing Agency also revised Tex-553-C and initiated a round robin testing plan to determine the accuracy of the tire rubber determination. In this project, the Performing Agency shall provide three (3) districts with technical support in XRF TR determination for the 2024 seal coat season.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7168-01

CTR | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7168	Use of X-Ray Fluorescence (XRF) to Determine Tire Rubber Content in Asphalt Binders	Closed

Project Start Date: 10/05/2022
Completion Date: 12/31/2023
Lead University: CTR
University #2:
Project Status: Closed
Total Project Budget: $217,822.05
CTR Total Budget: $217,822.05
CTR FY24 Budget: $31,950.84
CTR Total Project Spend: $191,320.75
CTR FY24 Spend: $29,677.58

Project description: Tire rubber is required in certain asphalt binders, e.g., AC-205TR, used for chip seal construction. These binders are specified and used in several districts across the state. Current Receiving Agency Standard Specification Item 300, Asphalts, Oils, and Emulsions, includes using test procedure Tex-533-C, Determining Polymer Additive Percentages in Polymer Modified Asphalt Cements. This test procedure is only performed in the Receiving Agency Materials and Tests Division (MTD). This test can be implemented in the field with a portable XRF device and test procedure Tex-533-C can be used in conjunction with a calibration chart to test and obtain a quantitative estimate of tire rubber at the district level. The Performing Agency shall make this device available to district personnel and to train them to use the device on a routine basis. The Performing Agency shall revise test procedure Tex-533-C, if needed, to account for procedures to use in the field since the device is portable.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7168

CTR | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7178	Use Network Level Texture to Enhance Pavement Management	Active

Project Start Date: 09/01/2023
Completion Date: 08/31/2025
Lead University: CTR
University #2:
Project Status: Active
Total Project Budget: $399,814.26
CTR Total Budget: $302,923.37
CTR FY24 Budget: $142,653.13
CTR Total Project Spend: $55,332.97
CTR FY24 Spend: $55,332.97

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7178

CTR | Planning and Environmental

Project Number	Project Name	Status
0-7182	Determine Effectiveness of Construction Management Plans	Active

Project Start Date: 09/01/2023
Completion Date: 08/31/2025
Lead University: CTR
University #2:
Project Status: Active
Total Project Budget: $299,302.47
CTR Total Budget: $299,302.47
CTR FY24 Budget: $149,108.21
CTR Total Project Spend: $111,106.39
CTR FY24 Spend: $111,106.39

Project description: 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.

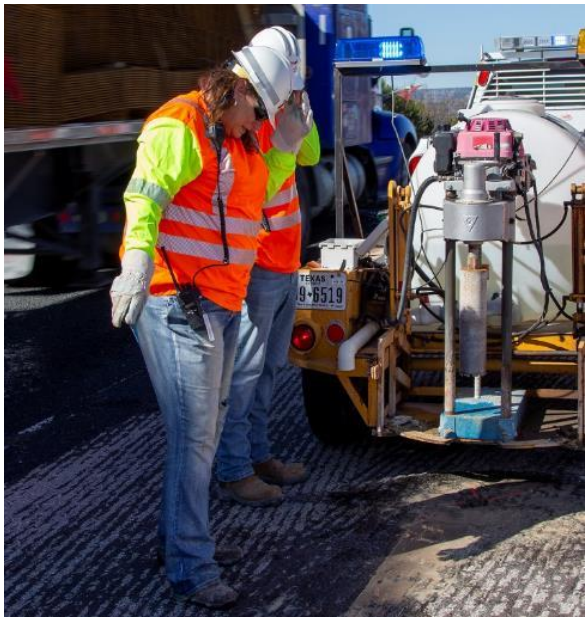
Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7182

CTR | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7186	Develop Next Generation of Hamburg Rutting Test for Asphalt Mixes	Active

Project Start Date: 09/01/2023
Completion Date: 08/31/2026
Lead University: TTI
University #2: CTR
Project Status: Active
Total Project Budget: $634,305.00
CTR Total Budget: $60,000.00
CTR FY24 Budget: $10,000.00
CTR Total Project Spend: $8,749.79
CTR FY24 Spend: $8,749.79



Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7186

CTR | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7191	Develop Systematic and Quantitative Approach to Assess the Probability of Extreme Weather and Resilience Risks for TxDOT Highways and Bridges	Active

Project Start Date: 12/05/2023
Completion Date: 08/31/2025
Lead University: TTI
University #2: CTR, UTSA, TXST
Project Status: Active
Total Project Budget: $796,520.38
CTR Total Budget: $313,917.55
CTR FY24 Budget: $156,720.80
CTR Total Project Spend: $39,458.73
CTR FY24 Spend: $39,458.73

Project description: 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).

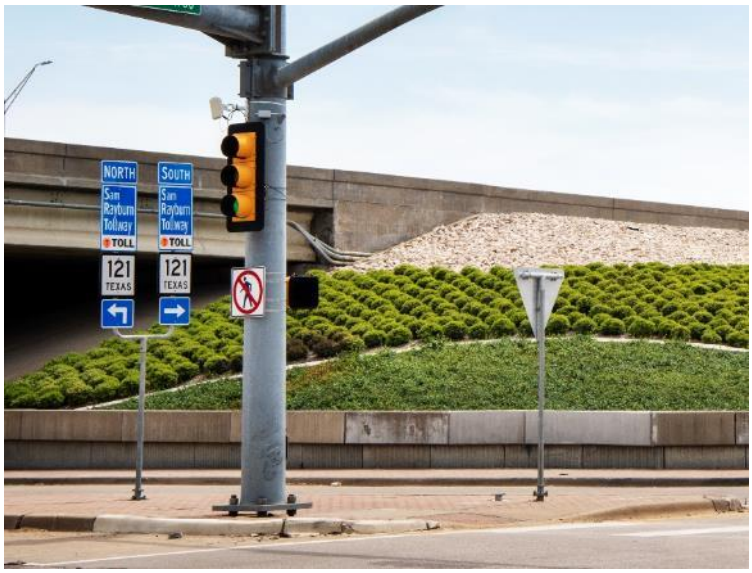
Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7191

CTR | Structures and Hydraulics

Project Number	Project Name	Status
0-7193	Develop Assessment and Mitigation Guidance for Ancillary Highway Structures with Existing Cracks	Active

Project Start Date: 09/01/2023
Completion Date: 08/31/2026
Lead University: CTR
University #2: TTI
Project Status: Active
Total Project Budget: $1,493,580.09
CTR Total Budget: $994,428.34
CTR FY24 Budget: $230,194.46
CTR Total Project Spend: $100,524.76
CTR FY24 Spend: $92,242.82



Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7193

CTR | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7195	Quantify Bridge and Pavement Consumption Due to Permitted O09/01/2023verweight/Oversized (OW/OS) Vehicles	Active

Project Start Date: 12/05/2023
Completion Date: 08/31/2025
Lead University: CTR
University #2: TTI, UTSA
Project Status: Active
Total Project Budget: $828,584.25
CTR Total Budget: $453,406.25
CTR FY24 Budget: $164,411.50
CTR Total Project Spend $95,853.92
CTR FY24 Spend: $95,853.92

Project description: 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.

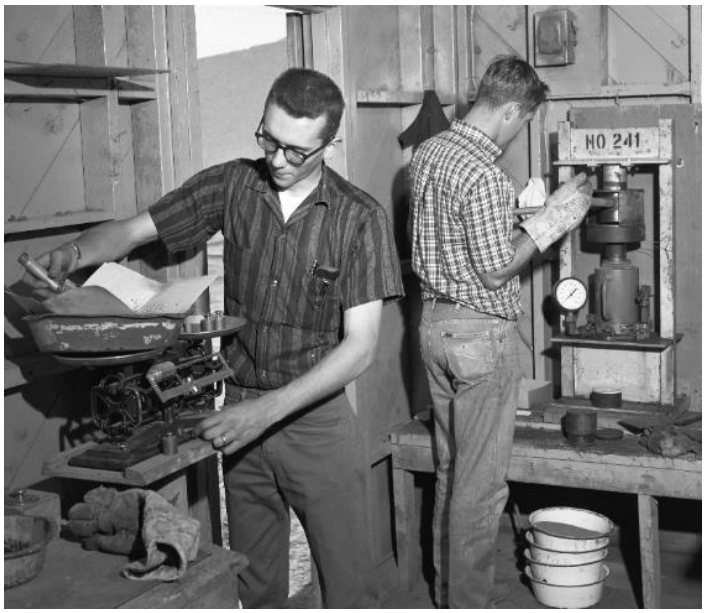
Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7195

CTR | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7197	Evaluate Effects of Recycled Asphalt Pavement (RAP) on Performance-Graded (PG) Binder Polymer Concentration	Active

Project Start Date: 10/06/2023
Completion Date: 04/30/2026
Lead University: CTR
University #2: TTI
Project Status: Active
Total Project Budget: $593,006.28
CTR Total Budget: $348,006.28
CTR FY24 Budget: $127,712.50
CTR Total Project Spend $109,519.50
CTR FY24 Spend: $109,519.50



Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

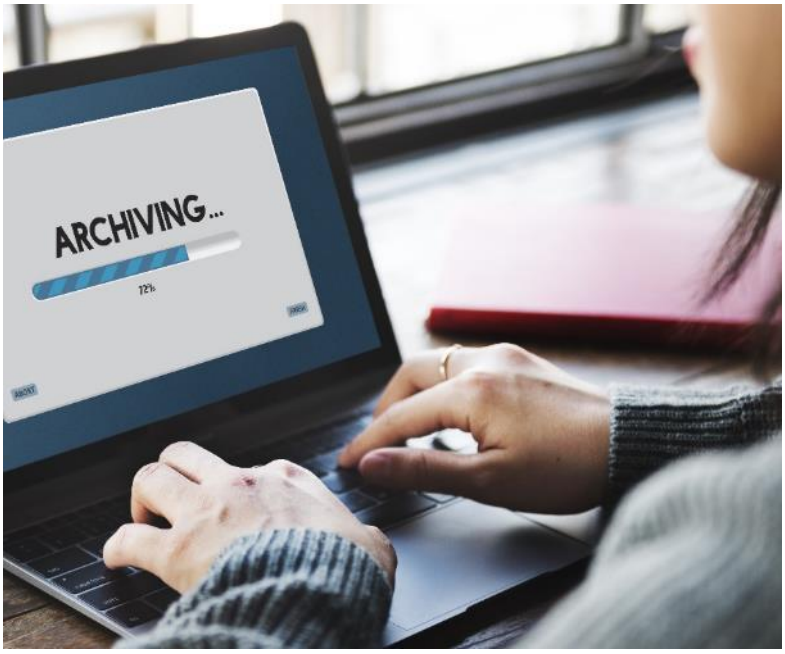
CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7197

CTR | Program Support

Project Number	Project Name	Status
0-9902-23	University of Texas Library Services	Active

Project Start Date: 08/31/2022
Completion Date: 08/31/2025
Lead University: CTR
University #2:
Project Status: Active
Total Project Budget: $1,313,756.18
CTR Total Budget: $1,313,756.17
CTR FY24 Budget: $438,580.71
CTR Total Project Spend $619,569.16
CTR FY24 Spend: $311,894.56

Project description: The Performing Agency shall provide publishing services, library information services, and collection management to support the federally funded State Planning and Research Part II (SPR II) 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 Part II 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.



Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-9902-23

CTR | Construction, Maintenance & Materials

Project Number	Project Name	Status
5-6048-07	Implementation of Centrifuge Technology for Pavement Design on Expansive Clays – Phase 2	Active

Project Start Date: 10/11/2023
Completion Date: 08/31/2027
Lead University: CTR
University #2:
Project Status: Active
Total Project Budget: $939,433.17
CTR Total Budget: $939,433.17
CTR FY24 Budget: $25,900.81
CTR Total Project Spend $19,405.18
CTR FY24 Spend: $19,405.18

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7195

CTR | Structures and Hydraulics

Project Number	Project Name	Status
5-6936-01	Implementation of Semi-integral Bridges in Texas	Active

Project Start Date: 02/15/2024
Lead University: CTR
Project Status: Active
CTR Total Budget: $780,032.31
CTR Total Project Spend: $111,710.87

Completion Date: 12/31/2026
University #2: TTI
Total Project Budget: $780,032.31
CTR FY24 Budget: $127,362.50
CTR FY24 Spend: $111,710.87

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=5-6936-01

CTR | Safety and Operations

Project Number	Project Name	Status
5-7007-01	Weather Responsive Management Strategies Implementation	Active

Project Start Date: 01/29/2024
Lead University: CTR
Project Status: Active
CTR Total Budget: $467,045.35
CTR Total Project Spend: $93,305.90

Completion Date: 01/31/2026
University #2:
Total Project Budget: $467,045.35
CTR FY24 Budget: $138,765.80
CTR FY24 Spend: $93,305.90

Project description: 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.

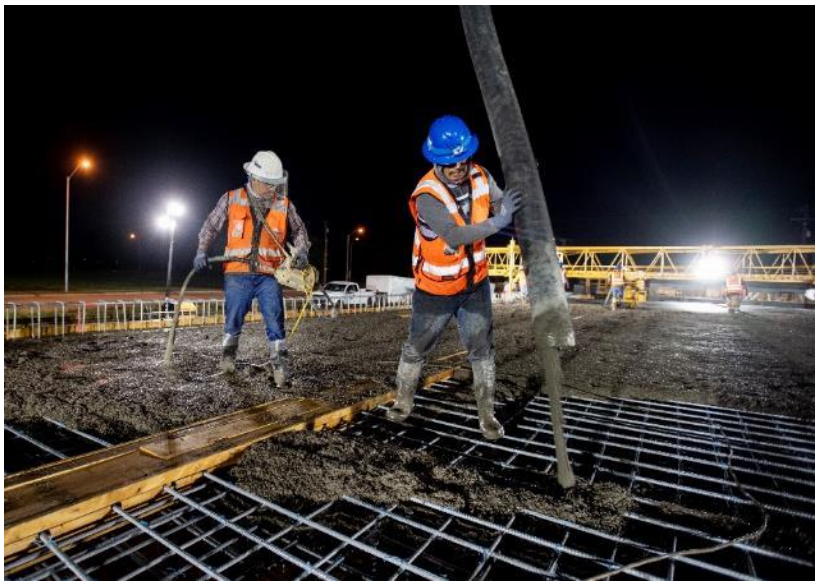
Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=5-7007-01

CTR | Construction, Maintenance & Materials

Project Number	Project Name	Status
5-7074-01	Implementation of Recycled Crushed Concrete Aggregate in Class P Concrete	Active

Project Start Date: 07/19/2024
Completion Date: 05/31/2027
Lead University: CTR
University #2:
Project Status: Active
Total Project Budget: $498,500.00
CTR Total Budget: $498,500.00
CTR FY24 Budget: $50,689.04
CTR Total Project Spend $49,878.60
CTR FY24 Spend: $49,795.47



Project description: The successful use of recycled concrete aggregate (RCA) in continuously reinforced concrete pavement (CRCP) in a field trial near Sealy, TX under TxDOT Project 0-7074 demonstrated the potential for increasing the sustainability of concrete paving while still achieving target performance. Based on the progress made under TxDOT 0-7074 and in line with ongoing TxDOT and FHWA initiatives to reduce the carbon footprint of new concrete construction, this implementation project aims to build upon the previous trial near Sealy, while expanding the depth and breadth of the implementation to include significantly longer trial sections with a wider range of RCA replacement levels. The Performing Agency shall facilitate implementation of the project findings by documenting the results of laboratory and field studies in the Research Report of the TxDOT Research project "Increase the Allowable Content of Recycled Crushed Concrete Fine Aggregate in Class P Concrete ". The Research Report shall include specific recommendations on the use of recycled crushed concrete fine and coarse aggregate into Class P concrete.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=5-7074-01

CTR | Strategy and Innovation

Project Number	Project Name	Status
5-7081-01	Implementation of Understanding the Impact of Autonomous Vehicles on Long-distance Travel Mode and Destination Choice in Texas	Closed

Project Start Date: 11/04/2022
Completion Date: 12/31/2023
Lead University: CTR
University #2:
Project Status: Closed
Total Project Budget: $159,917.34
CTR Total Budget: $159,917.34
CTR FY24 Budget: $62,607.96
CTR Total Project Spend: $148,279.76
CTR FY24 Spend: $61,080.63

Project description: The 0-7081 research project produces a model that forecasts long-distance demand by autonomous passenger and freight vehicles. It combines rigorous insight gained from literature, survey results, and a variety of data sets to predict a future 20+ years from now, where autonomous vehicles are readily available for all ground-based travel. Key findings thus far include 15+% added VMT to the Texas and US networks, 10+% longer passenger-trip distances (within the state), and notable mode-share losses for freight rail and passenger air travel. While this project delivers complex long-distance travel-demand model specifications for passengers and freight, including all parameter estimates, the models are not yet ready for in-house applications by the Receiving Agency personnel. The research team proposes an implementation project to put all passenger and freight-based travel demand equations and parameters (and various input files, like network distances and travel times, export demand volumes by industry, weight per container by industry) into a user-friendly TransCAD-based package for the Receiving Agency employees to use in coming years. The team also proposes hosting several training sessions for the Receiving Agency staff and stakeholders (like MPO staff and their consultants, across the state and nation). In this way, the Receiving Agency and its partners can run hundreds of diverse simulations over the coming years, thereby implementing this research work fully, while adding new forecasts and value for infrastructure maintenance and expansion, traffic management, and trade and travel support across the state and nation.

Approved Work Program Revisions

No. of FY24 Amendments: One

Amendment #1:
Amend the contract to extend the termination date, and revise the budget and project schedule to allow the research team to produce a higher quality product. The FY 2023 Budget is decreased by $39,293.32 from $136,602.70 to $97,309.38. The FY 2024 Budget is increased by $39,293.32 from $23,314.64 to $62,607.96. The Itemized Project Budget Estimate remains $159,917.34.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=5-7081-01

CTR | Strategy and Innovation

Project Number	Project Name	Status
5-9905-24	Innovation Consortium (TTTF, TxSTIC)	Active

Project Start Date: 09/01/2023
Completion Date: 08/31/2025
Lead University: CTR
University #2:
Project Status: Active
Total Project Budget: $998,124.00
CTR Total Budget: $998,124.00
CTR FY24 Budget: $494,628.00
CTR Total Project Spend: $0.00
CTR FY24 Spend: $0.00

Project description: The Texas Department of Transportation (TxDOT) needs support to manage the projects or programs that facilitate collaboration, dissemination, and development of innovative transportation technologies and practices. Texas Technology Task Force (TTTF), authorized by Texas's 83rd Legislature General Appropriations Bill, S.B. No. 1, Item 44, VII-31, was established in 2013 to enhance its vision for the future of Texas's transportation systems. The TTTF began with a core knowledge group of transportation experts and has grown into a successful program that is responsible for managing the Emerging Technology Portfolio, publishing white papers on critical topics, delivering strategic plans such as the Technology Utilization Plan, developing communication strategies, and conducting TTTF meetings with in-depth technical analysis. The TTTF program serves as a catalyst for rapid deployment of nationally and state identified new technologies, strategies, and methods that have already been demonstrated to be successful in real world applications and would lead to improved performance and effectiveness of the transportation system within the State of Texas.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=5-9905-24

CTR | Structures and Hydraulics

Project Number	Project Name	Status
9-1532	TPF-5(508) Concrete Bridge Engineering Institute (CBEI)	Active

Project Start Date: 06/21/2023
Lead University: CTR
Project Status: Active
CTR Total Budget: $6,354,048.90
CTR Total Project Spend: $1,530,107.20

Completion Date: 05/31/2027
University #2:
Total Project Budget: $780,032.31
CTR FY24 Budget: $127,362.50
CTR FY24 Spend: $111,710.87

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=5-6936-01

2.2 PVAMU – Prairie View A&M University

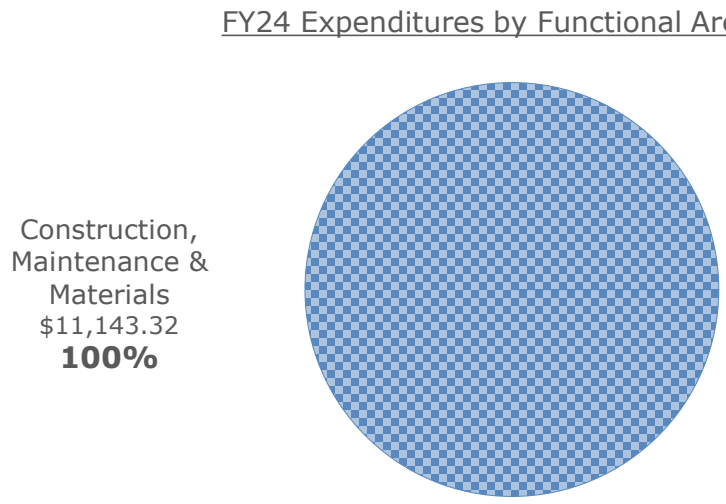


Figure 5. Pie chart of PVAMU expenditures by Functional Area

Project Number	Project Name	Status
0-7175	Develop Best Practices for Flexible Pavement Repairs	Active

PVAMU – Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7175	Develop Best Practices for Flexible Pavement Repairs	Active

Project Start Date: 09/01/2023
Completion Date: 02/28/2026
Lead University: TTI
University #2: PVAMU
Project Status: Active
Total Project Budget: $413,069.00
PVAMU Total Budget: $11,202.50
PVAMU FY24 Budget: $11,202.50
PVAMU Total Project Spend $11,143.32
PVAMU FY24 Spend: $11,143.32

Project description: 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.

Approved Work Program Revisions

No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7175

2.3 TAMUCC - Texas A&M University at Corpus Christi

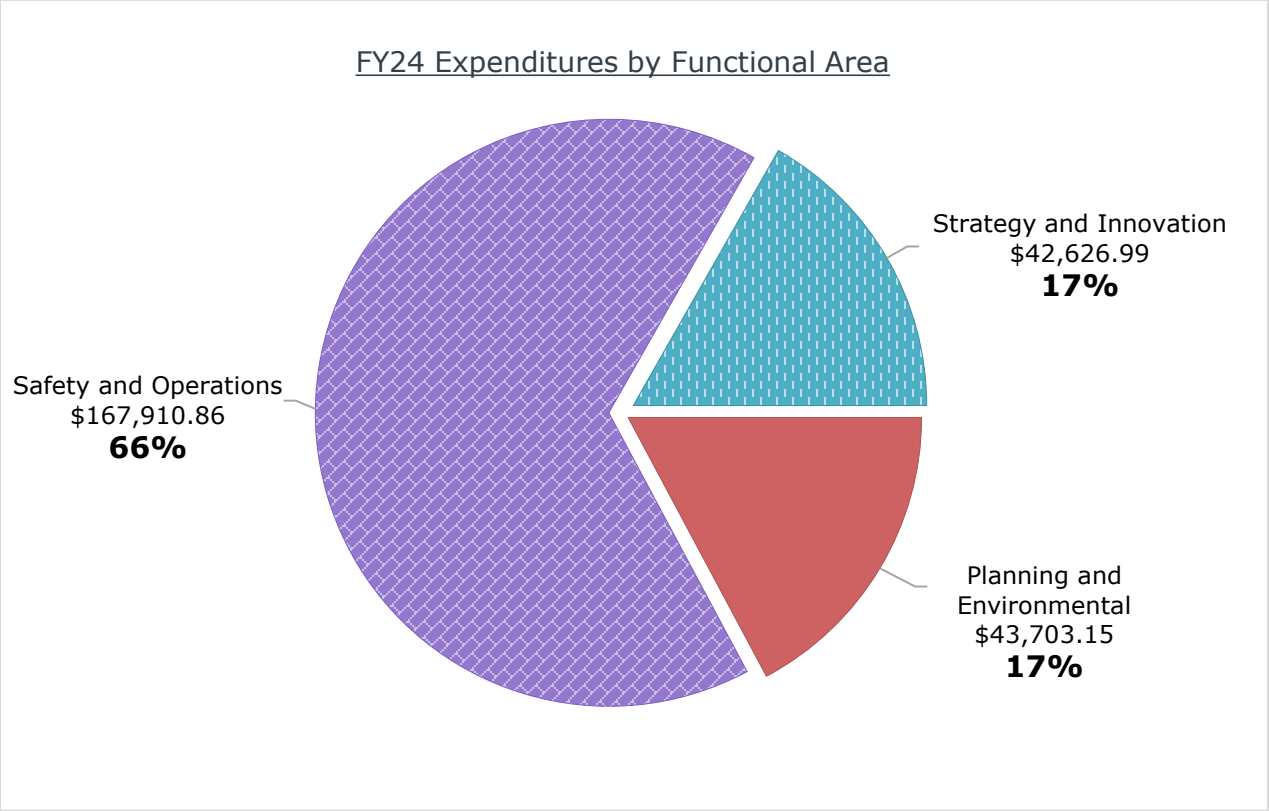


Figure 6. Pie chart of TAMUCC expenditures by Functional Area

Project Number	Project Name	Status
0-7127	Examine Reconnaissance Scanning of Underground Utilities in the ROW	Active
0-7157	Develop Guidelines for Integration of UAS LiDAR and Photogrammetry to Enhance Land Surveying Capabilities	Closed
0-7159	Develop Guidelines for the Use of Unmanned Aerial Systems (UASs) and Smartphones for Construction and Utility Inspections	Active

TAMUCC | Planning and Environmental

Project Number	Project Name	Status
0-7127	Examine Reconnaissance Scanning of Underground Utilities in the ROW	Active

Project Start Date: 09/21/2021
Completion Date: 02/28/2025
Lead University: TTI
University #2: TAMUCC
Project Status: Active
Total Project Budget: $1,264,144.00
TAMUCC Total Budget: $132,015.00
TAMUCC FY24 Budget: $49,610.00
TAMUCC Total Project Spend: $116,644.33
TAMUCC FY24 Spend: $43,703.15

Project description: Mapping of buried utilities using rigorous subsurface utility engineering (SUE) quality level B (QLB), as is frequently performed or recommended, can be costly. It can also be ineffective for unknown utilities (i.e., utilities that exist but for which no information is available). This is particularly common and problematic in areas of oil and gas operations. When undiscovered until construction, these unknown utilities may cause serious scheduling disruptions as well as higher construction costs, along with safety and environmental risks. There is a need for a faster, less expensive method of scanning the right of way (ROW) for these unknown utilities. This research shall evaluate, select and test the application of newly available geophysical measurement systems. These systems would allow quickly and cheaply detecting and mapping unknown pipelines or other utilities in the ROW. It compares the effectiveness and cost of deployment to standard QLB SUE and reports on technologies that are both technically and cost effective for identifying unknown utilities.

Approved Work Program Revisions

No. of FY24 Amendments: One

Amendment #2:
Amend the contract to extend the termination date, update the Project Schedule and Work Plan to revise Tasks 3-8 and revise the budget for the purpose of using the newly developed artificial intelligence data processing capability, gather data at new sites to complete the testing and evaluation of the technologies. TTI: The FY 2022 budget remains $364,873.75; the FY 2023 budget is decreased by $62,504.00 from $299,620.25 to $237,116.25; the FY 2024 budget is established at $401,875.75; TTI's Total Project Budget is increased by $339,371.75 from $664,494.00 to $1,003,865.75. TAMUCC: The FY 2022 budget remains $55,856.25; the FY 2023 budget remains $26,548.75; the FY 2024 budget is established at $49,610.00; TAMUCC's total Project Budget is increased by $49,610.00 from $82,405.00 to $132,015.00. The Itemized Project Budget Estimate is increased by $388,981.75 from $746,899.00 to $1,135,880.75.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7127

TAMUCC | Safety and Operations

Project Number	Project Name	Status
0-7157	Develop Guidelines for Integration of UAS LiDAR and Photogrammetry to Enhance Land Surveying Capabilities	Closed

Project Start Date: 09/01/2022
Completion Date: 10/31/2024
Lead University: TAMUCC
University #2: TTI
Project Status: Closed
Total Project Budget: $553,669.00
TAMUCC Total Budget: $374,453.50
TAMUCC FY24 Budget: $176,768.00
TAMUCC Total Project Spend: $355,335.32
TAMUCC FY24 Spend: $167,910.86

Project description: Unmanned aircraft systems (UASs) equipped with digital cameras, light detection and ranging (LiDAR) sensors, or both enable the collection of high spatial resolution three-dimensional (3D) quantitative geospatial data. This data may be used to support a variety of surveying and mapping activities, potentially with lower costs and greater safety than traditional survey methods. When using a camera, the technique is called Structure-from-Motion photogrammetry or UAS-SfM. In practice, there are important differences between UAS-SfM and UAS-LiDAR including measurement fidelity, operational considerations, post-processing workflows, and cost-effectiveness. With a lack of clear guidance on when UAS-SfM versus UAS-LiDAR is the best fit for a specific task, there is a need to evaluate the real-world performance capabilities and limitations of both technologies.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7157

TAMUCC | Strategy and Innovation

Project Number	Project Name	Status
0-7159	Develop Guidelines for the Use of Unmanned Aerial Systems (UASs) and Smartphones for Construction and Utility Inspections	Active

Project Start Date: 09/01/2022
Completion Date: 08/31/2025
Lead University: TTI
University #2: TAMUCC
Project Status: Active
Total Project Budget: $821,985.50
TAMUCC Total Budget: $200,726.25
TAMUCC FY24 Budget: $50,150.00
TAMUCC Total Project Spend: $84,166.23
TAMUCC FY24 Spend: $42,626.99

Project description: Unmanned aircraft systems (UASs) equipped with miniaturized cameras enable the collection of high resolution, three-dimensional (3D) geospatial data at lower costs than traditional techniques. New technologies also make it possible to gather pictures and video using smartphones, which can be fed to Structure from Motion (SfM) software to develop highly accurate 3D products. Operating UASs requires trained pilots and observers, but smartphones do not. There is a need to test whether construction contractor crews in the field can gather data using either of these technologies and upload the imagery and video to a server to enable inspectors to conduct inspections remotely. The Performing Agencies shall conduct a literature review of UAS-SfM and smartphone technologies; prepare a list of use cases and case studies to test relevant technologies; conduct field tests to document advantages, disadvantages, complementary capabilities, and potential implementation scenarios and costs; prepare recommended settings, procedures, use cases, and operational workflows to ensure repeatable data collection and processing; and prepare guidelines for quality assurance and control of inspections conducted with UAS- and smartphone-based SfM photogrammetry, as well as identify project suitability for the adoption of these technologies to support construction and utility inspection activities at the Receiving Agency.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7159

2.4 TAR - Texas A & M AgriLife Research

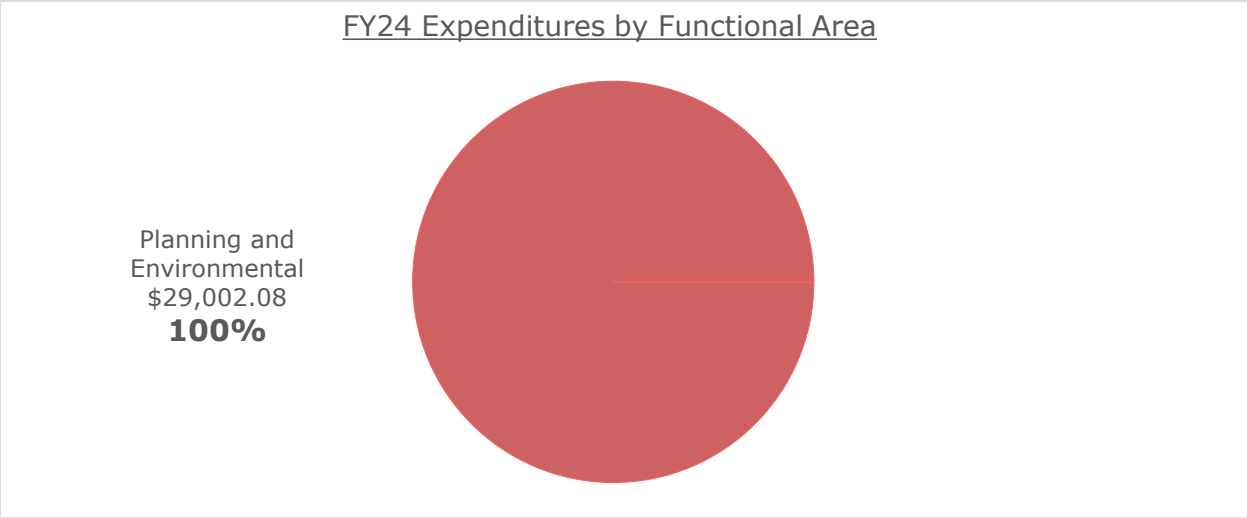


Figure 7. Pie chart of TAR expenditures by Functional Area

Project Number	Project Name	Status
0-7175	Develop Best Practices for Flexible Pavement Repairs	Active

TAR | Planning and Environmental

Project Number	Project Name	Status
0-7022-01	Monarch Conservation Strategies for Texas Roadways	Active

Project Start Date: 02/17/2023
Completion Date: 08/31/2025
Lead University: TTI
University #2: TAR
Project Status: Active
Total Project Budget: $580,659.50
TAR Total Budget: $179,685.00
TAR FY24 Budget: $57,440.00
TAR Total Project Spend $67,904.80
TAR FY24 Spend: $29,002.08

Project description: 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.

Approved Work Program Revisions

No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7022-01

2.5 TARL – Tarleton State University

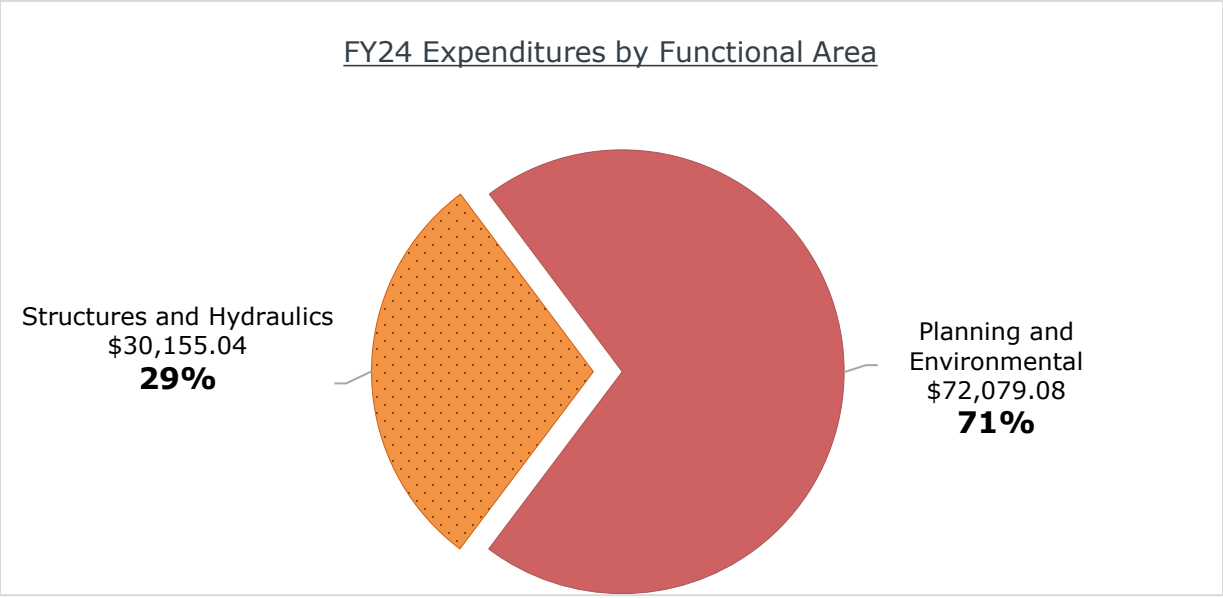


Figure 8. Pie chart of TARL expenditures by Functional Area

Project Number	Project Name	Status
0-7161	Settlement Criteria and Design Approach for Embankments and Retaining Walls Built on Compressible Soils	Closed
0-7194	Evaluating the Risks that Erosion Control Products Pose to Protected Species and Other Wildlife	Active

TARL | Structures and Hydraulics

Project Number	Project Name	Status
0-7161	Settlement Criteria and Design Approach for Embankments and Retaining Walls Built on Compressible Soils	Closed

Project Start Date: 09/12/2022
Completion Date: 08/31/2025
Lead University: UTSA
University #2: TARL
Project Status: Closed
Total Project Budget: $218,455.00
TARL Total Budget: $50,000.00
TARL FY24 Budget: $31,685.00
TARL Total Project Spend: $43,354.07
TARL FY24 Spend: $30,155.04

Project description: Soil improvement is essential for construction of embankments and retaining walls over highly compressible soils. However, due to diversity of soil improvement technologies, selection of

suitable technology is an important and demanding task. Especially, if more than one soil improvement methods need to be used jointly to meet settlement, cost, and time requirements. To facilitate the selection process, this project shall: (1) collect and compile performance data of constructed embankments and retaining walls to establish settlement criteria based on their functionality and relative locations to a bridge, (2) analyze most commonly-used soil improvement methods in Texas to generate cost vs. construction time charts that can be used for preliminary screening, (3) develop a calculator that can calculate cost and time based on the determined settlement criteria for various soil improvement methods as well as their combinations so cost and benefit can be assessed, and (4) identify optimal combination of preloading with other methods under different Texas soil conditions. The focus of this project shall be preloading with/without wick drain, pile/columns supported embankment and lightweight fills. This project shall provide not only charts and tables that are ready to use in design but also design tools to analyze complicated situations.

Approved Work Program Revisions

No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7161

TARL | Planning and Environment

Project Number	Project Name	Status
0-7194	Evaluating the Risks that Erosion Control Products Pose to Protected Species and Other Wildlife	Active

Project Start Date: 09/26/2023
Completion Date: 08/31/2025
Lead University: TARL
University #2: UTSA
Project Status: Active
Total Project Budget: $310,621.25
TARL Total Budget: $240,288.75
TARL FY24 Budget: $129,820.00
TARL Total Project Spend: $79,071.45
TARL FY24 Spend: $72,079.08

Project description: Although many erosion control products (ECPs) are marketed as wildlife friendly, few assessments of the risk such products to wildlife exist. Current knowledge focuses primarily reptiles, specifically snakes, thus, the effects on other species such as terrestrial arthropods, mammals, or birds remains unknown. This research would provide evaluations wildlife friendly ECPs from the Approved Product List (APL) based 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7194

2.6 TECH – Texas Tech University – Center for Multidisciplinary Research in Transportation

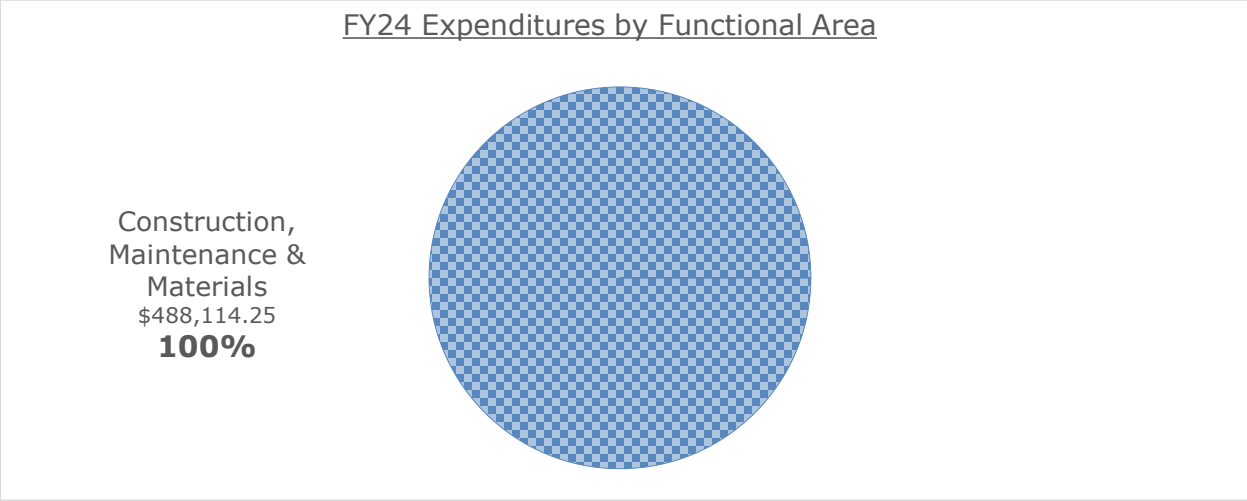


Figure 9. Pie chart of TECH expenditures by Functional Area

Project Number	Project Name	Status
0-7147	Project Level Performance Database for Rigid Pavements in Texas Phase III	Active
0-7148	Develop Design Details for CRCP Whitetopping at Intersections	Active
0-7173	Develop Guidelines for Evaluation of Embankment Conditions in Bridge Approach Slabs and Pavement Structures	Active

TECH | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7147	Project Level Performance Database for Rigid Pavements in Texas, Phase III	Active

Project Start Date: 09/01/2022
Completion Date: 08/31/2025
Lead University: TECH
University #2:
Project Status: Active
Total Project Budget: $749,999.55
TECH Total Budget: $749,999.55
TECH FY24 Budget: $249,858.09
TECH Total Project Spend $370,550.75
TECH FY24 Spend: $173,889.40

Project description: 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.

Approved Work Program Revisions

No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7147

TECH | Construction, Maintenance & Materials

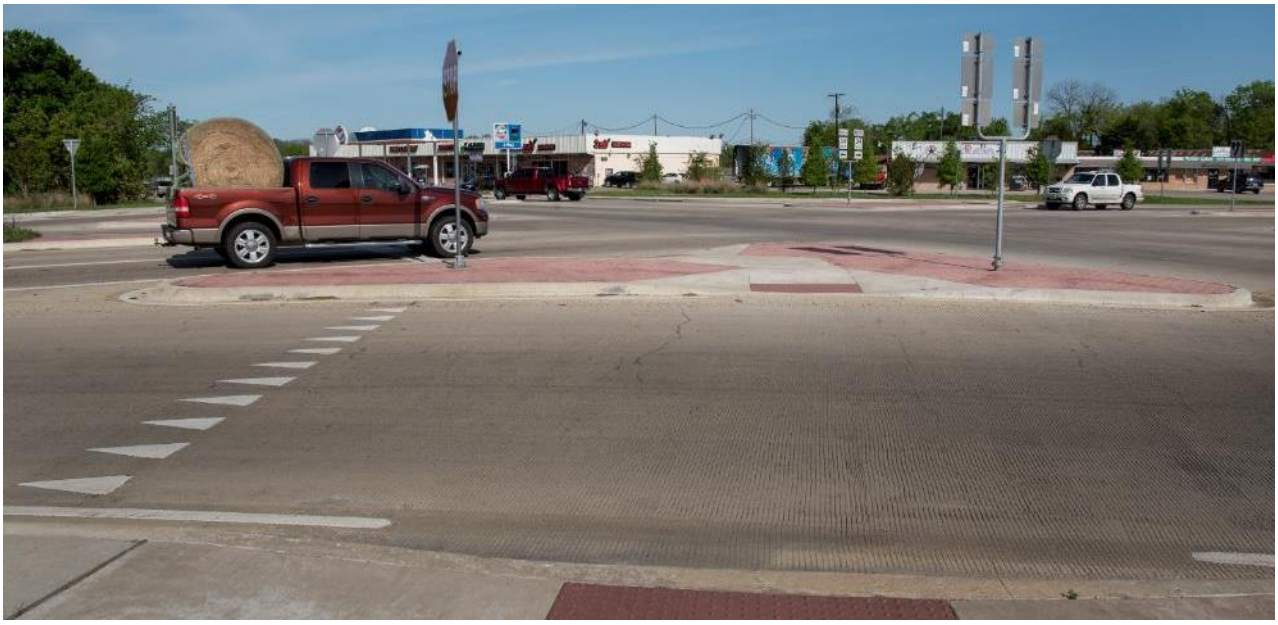
Project Number	Project Name	Status
0-7148	Develop Design Details for CRCP Whitetopping at Intersections	Active

Project Start Date: 09/01/2022
Completion Date: 08/31/2025
Lead University: TECH
University #2: TTI
Project Status: Active
Total Project Budget: $599,563.25
TECH Total Budget: $299,591.25
TECH FY24 Budget: $101,058.25
TECH Total Project Spend $176,968.49
TECH FY24 Spend: $101,016.55

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7148



TECH | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7173	Develop Guidelines for Evaluation of Embankment Conditions in Bridge Approach Slabs and Pavement Structures	Active

Project Start Date: 09/01/2023
Completion Date: 08/31/2026
Lead University: TECH
University #2:
Project Status: Active
Total Project Budget: $716,613.77
TECH Total Budget: $716,613.76
TECH FY24 Budget: $217,193.41
TECH Total Project Spend $213,208.30
TECH FY24 Spend: $213,208.30

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7173

2.7 TEES – A&M Engineering Experiment Station (TEES)

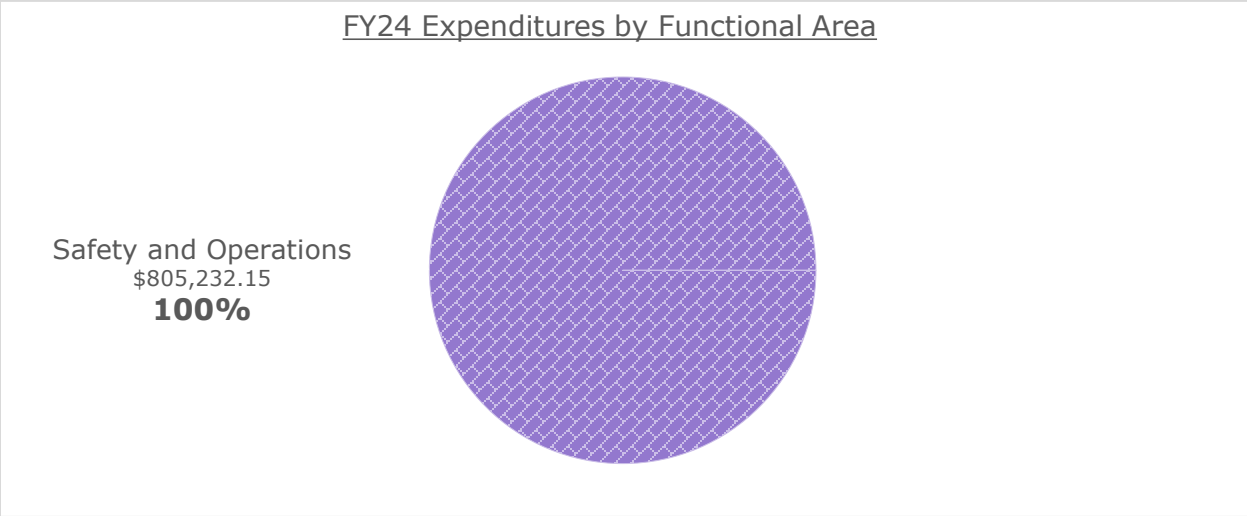


Figure 10. Pie chart of TEES expenditures by Functional Area

Project Number	Project Name	Status
0-7099	AVA: Automated Vehicles for All	Active

TEES | Safety and Operations

Project Number	Project Name	Status
0-7099	AVA: Automated Vehicles for All	Active

Project Start Date: 01/26/2021
Completion Date: 08/31/2025
Lead University: TEES
University #2:
Project Status: Active
Total Project Budget: $7,063,787.00
TEES Total Budget: $7,063,787.00
TEES FY24 Budget: $1,503,743.00
TEES Total Project Spend $4,444,394.73
TEES FY24 Spend: $805,232.15

Project description: 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.

Approved Work Program Revisions

No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7173

2.8 TEEX – Texas Engineering Extension Service

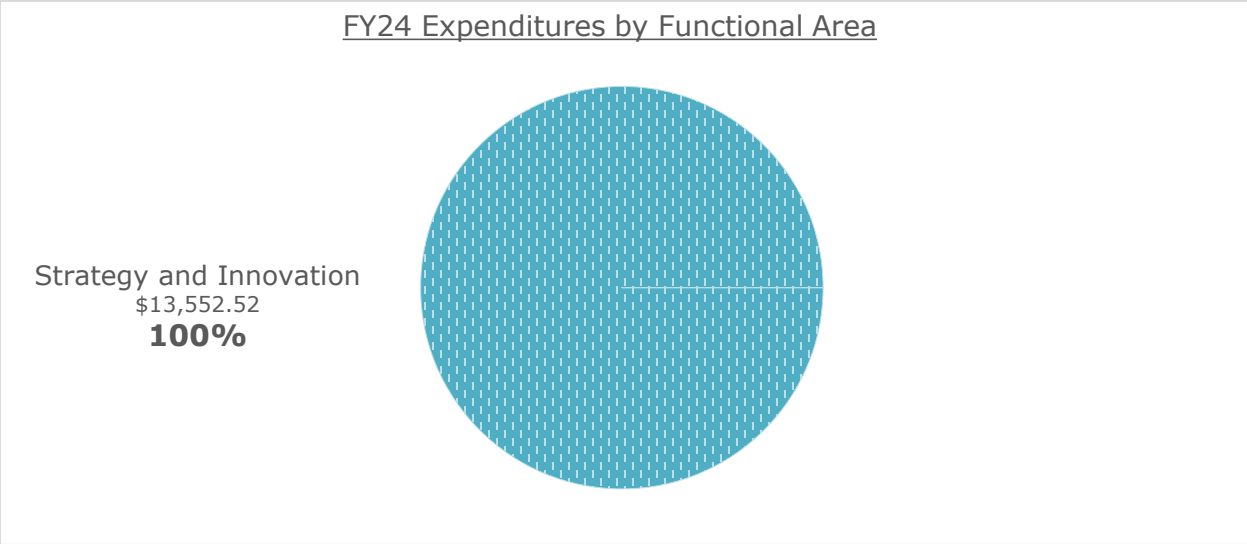


Figure 11. Pie chart of TEEX expenditures by Functional Area

Project Number	Project Name	Status
0-7199	Identification of Needs and Strategies for First Responder Interactions with Automated Vehicles (Avs)	Active

TEEX | Strategy and Innovation

Project Number	Project Name	Status
0-7199	Identification of Needs and Strategies for First Responder Interactions with Automated Vehicles (Avs)	Active

Project Start Date: 09/01/2023
Completion Date: 02/28/2025
Lead University: TTI
University #2:
Project Status: Closed
Total Project Budget: $310,814.13
TEEX Total Budget: $22,352.63
TEEX FY24 Budget: $19,402.38
TEEX Total Project Spend: $13,552.52
TEEX FY24 Spend: $13,552.52

Project description: 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.

Approved Work Program Revisions

No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7199

2.9 TTI – Texas A&M – Transportation Institute

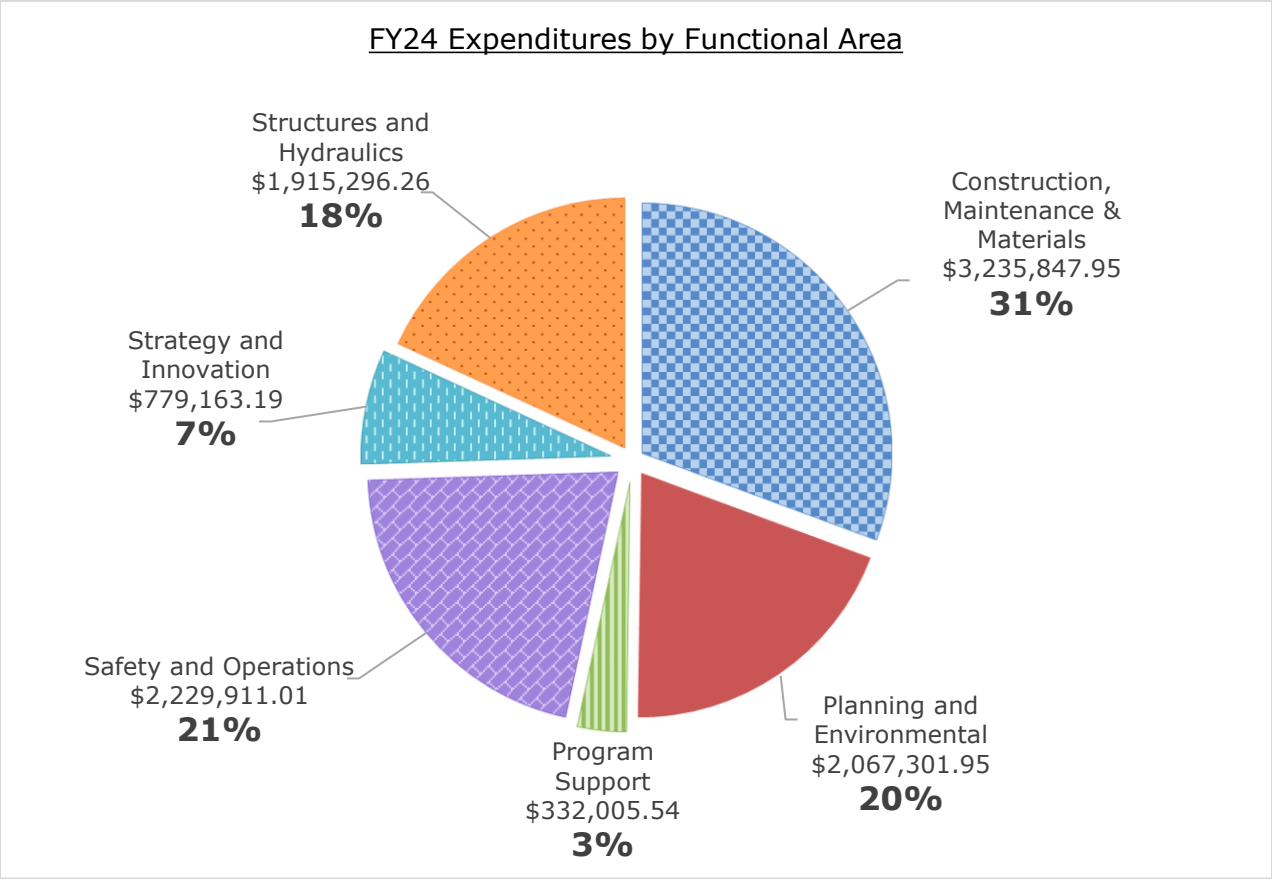


Figure 12. Pie chart of TTI expenditures by Functional Area

Project Number	Project Name	Status
0-6674-04	Automated IDEAL Cracking and Rutting Tests	Active
0-6701-02	Planning and Environmental Linkages Toolkit	Active
0-6872-01	Use of Geothermal Energy for De-icing Approach Pavement Slabs and Bridge Decks - Phase II	Closed
0-6958	Developing Performance Specification for High Performance Concrete	Closed
0-6974	Digital Publication and Outreach Services in Support of Research	Active
0-7004	Improve System Emergency Response Performance in the Houston District Using Connected Vehicle Technology	Closed
0-7006	Design, Construction, and Performance Monitoring of Stabilization of Expansive Soils and Cement	Active
0-7022-01	Monarch Conservation Strategies for Texas Roadways	Active

Project Number	Project Name	Status
0-7027	Accelerating Mix Designs for Base Materials	Closed
0-7037	Develop Models for Freight Flows and Commercial Travel Patterns within Texas Urban Regions	Closed
0-7040	Evaluation of Corrosion Prevention and Mitigation Approaches Used On Texas Bridges	Closed
0-7073	Improving Testing Requirements in Item 300 Of TxDOT Standard Specifications	Active
0-7076	Develop Laboratory Mix Design of Full Depth Reclamation (FDR) Projects Using Foamed Asphalt Binder and Emulsified Asphalt	Closed
0-7086	Roadside Safety Device Analysis, Testing, and Evaluation Program	Closed
0-7087	Develop Standards for Temporary Concrete Median Barrier in Flood-Prone Areas	Closed
0-7093	Develop Refined Design Methods for Lean-On Bracing	Closed
0-7100	Sediment Control Approved Products List	Closed
0-7103	Investigating Prime versus Curing: Where, When and Why	Active
0-7104	Establish Performance-Based Acceptable Lab-Molded Density Range for Mix Design and QC/QA	Active
0-7105	Measuring Seal Coat Rate Field Adjustments	Active
0-7106	Quantify Maximum Accumulated Seal Coat Layers for Stability	Active
0-7107	Determine Feasibility and Methodologies of Using Structural Data From Traffic Speed Deflection Devices in Network-Level Treatment Decision Making	Closed
0-7111	Determine Impact of Field Sands on Workability and Engineering Properties of Superpave Mixtures in Texas	Closed
0-7112	Development of a Continuous for Live Load Prefabricated Steel Accelerated Bridge Construction (ABC) Unit for Texas Bridges	Active
0-7114	Re-Examine Minimum Reinforcement Requirements for Shear Design	Closed
0-7122	Evaluate Alternative Methods to Examine Visibility of Pavement Markings	Closed
0-7124	Develop A New Tool for Evaluating Infrastructure and Planning Impacts from Changes in Truck Traffic and Truck Technologies	Closed

FUNCTIONAL AREAS:
1. Structures and Hydraulics
2. Constr, Maint & Materials
3. Planning and Environmental
4. Program Support
5. Safety and Operations
6. Strategy and Innovation

Project Number	Project Name	Status
0-7127	Examine Reconnaissance Scanning of Underground Utilities in the ROW	Active
0-7132	Quantify the Real Impact of Transportation Activity on Regional Ozone and Near-Road PM Concentrations	Active
0-7133	Develop Guidebook for Managing System Costs: Operational and Capital Cost Management at Rural and Small Urban Public Transit Systems	Closed
0-7138	Driver Distraction in an Era of Rapid Technological Change, Digital Advertising Billboards	Active
0-7140	Develop Improved Queue Warning System Combining Multiple Data Sources	Closed
0-7142	Develop Safety Scoring Tool for the Wet Surface Crash Reduction Program	Closed
0-7143	Develop Methodologies for Reducing Costs in Full Depth Reclamation (FDR) Construction	Active
0-7144	Develop a Real-time Decision Support Tool for Urban Roadway Safety Improvement	Active
0-7145	Develop Rapid New Tests for Detecting Poor Quality Binders and RAP Materials	Active
0-7148	Develop Design Details for CRCP Whitetopping at Intersections	Active
0-7151	Develop Recommendations for Evaluating Surface Types and Aggregate Properties to Minimize Wet Weather Crashes	Active
0-7152	Estimating Latent Bicyclist and Pedestrian Demand for Shared Use Path Design	Active
0-7153	Develop Design of Hot-Mix Cold-Laid (HMCL) Mixtures with the Superpave Gyratory Compactor	Closed
0-7155	Develop/Refine Design Provisions for Headed and Hooked Reinforcement	Active
0-7156	Using Vehicle Probe Data to Evaluate Speed Limits on Texas Highways	Closed
0-7157	Develop Guidelines for Integration of UAS LiDAR and Photogrammetry to Enhance Land Surveying Capabilities	Closed

FUNCTIONAL AREAS:
1. Structures and Hydraulics
2. Constr, Maint & Materials
3. Planning and Environmental
4. Program Support
5. Safety and Operations
6. Strategy and Innovation

Project Number	Project Name	Status
0-7159	Develop Guidelines for the Use of Unmanned Aerial Systems (UASs) and Smartphones for Construction and Utility Inspections	Active
0-7166	Leveraging Probe-Based Data to Enhance Long-Term Planning Models	Closed
0-7167	Evaluate Performance of Sealers and Coatings Applied to TxDOT Bridge Substructures	Closed
0-7169	Post-NEVI Electric Vehicle Infrastructure Research (Freight, Fleet, and Multi-family Housing	Closed
0-7170	Evaluate Bridge Deck Condition and Replacement Methods	Active
0-7171	Barrier Striping for the Reduction of Accidents	Active
0-7174	Develop an Interactive Statewide Production Rate Estimation Tool for Reliable Contract Time Determination	Active
0-7175	Develop Best Practices for Flexible Pavement Repairs	Active
0-7176	Develop and Updated Methodology for Calculation of Reimbursement Levels for Utility Relocations	Active
0-7177	Identifying Pavement Improvement Projects for Enhanced Safety	Active
0-7179	Evaluate Safety End Treatments for Roadside Drainage Structures	Active
0-7183	Develop Crash Modification Factors for Super 2 Highways	Active
0-7185	Develop Enhanced Cold Recycling Methods and Specifications	Active
0-7186	Develop Next Generation of Hamburg Rutting Test for Asphalt Mixes	Active
0-7187	Exploring and Developing Innovative Methods for Estimating VMT on Local Roads in Texas	Active
0-7188	Synthesis: Pavement Widening Best Practices	Closed
0-7189	Safety Assessment of Shared Use Paths at Roadway Crossings using Exposure-Based Models	Active
0-7190	Roadside Safety Device Analysis, Testing, and Evaluation Program	Active
0-7191	Develop Systematic and Quantitative Approach to Assess the Probability of Extreme Weather and Resilience Risks for TxDOT Highways and Bridges	Active
0-7192	Develop Performance of Baseplate Connections in COSS and Traffic Signal Structures	Active

FUNCTIONAL AREAS:
1. Structures and Hydraulics
2. Constr, Maint & Materials
3. Planning and Environmental
4. Program Support
5. Safety and Operations
6. Strategy and Innovation

Project Number	Project Name	Status
0-7193	Develop Assessment and Mitigation Guidance for Ancillary Highway Structures with Existing Cracks	Active
0-7195	Quantify Bridge and Pavement Consumption Due to Permitted Overweight/Oversized (OW/OS) Vehicles	Active
0-7197	Evaluate Effects of Recycled Asphalt Pavement (RAP) on Performance-Graded (PG) Binder Polymer Concentration	Active
0-7198	Traffic Control Device Analysis, Testing, and Evaluation Program	Active
0-7199	Identification of Needs and Strategies for First Responder Interactions with Automated Vehicles (Avs)	Active
0-7200	Utilizing Telematics to Understand Driving Behavior During Missed Exits and Wrong Turns	Active
0-7202	Synthesis: The State of Knowledge and State of Practice for Non-Contact Radar Stream Gauges in Texas, the United States, and Internationally	Closed
0-9908-22	Planning Innovation and Technology Deployments at TxDOT	Closed
5-7025-01	Pilot Implementation of Surface Aggregate Classification of Reclaimed Asphalt Pavement	Active
5-7049-01	Implementation of Improving and Communicating Speed Management Practices	Closed
5-7083-01	Implementation of Safety Prediction Methods Developed for Texas Highways	Closed
5-9050-02	Provision of Select Computer-Aided Dispatch Data to Traffic Management Centers for Enhanced Incident Detection and Tracking	Closed
5-9908-24	Innovative Transportation Projects at TxDOT	Active
9-1531	Development and Evaluation of Roadside Safety Systems for Motorcyclists	Active

FUNCTIONAL AREAS:
1. Structures and Hydraulics
2. Constr, Maint & Materials
3. Planning and Environmental
4. Program Support
5. Safety and Operations
6. Strategy and Innovation

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-6674-04	Automated IDEAL Cracking and Rutting Tests	Active

Project Start Date: 09/01/2023
Completion Date: 08/31/2026
Lead University: TTI
University #2:
Project Status: Active
Total Project Budget: $692,780.00
TTI Total Budget: $692,780.00
TTI FY24 Budget: $294,828.00
TTI Total Project Spend $169,272.52
TTI FY24 Spend: $153,374.79

Project description: 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.

Approved Work Program Revisions

No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-6674-04

TTI | Planning and Environment

Project Number	Project Name	Status
0-6701-02	Planning and Environmental Linkages Toolkit	Active

Project Start Date: 03/03/2023
Completion Date: 08/31/2025
Lead University: TTI
University #2:
Project Status: Active
Total Project Budget: $388,735.50
TTI Total Budget: $388,735.50
TTI FY24 Budget: $145,519.00
TTI Total Project Spend: $262,196.22
TTI FY24 Spend: $143,235.49

Project description: The Receiving Agency funded research project 0-6701 in FY 2012 to investigate potential methods of linking transportation planning in Texas with the environmental clearance process required of the National Environmental Policy Act (NEPA). The study approach and findings were documented in a guidance document entitled Texas Department of Transportation (TxDOT) Resource for Linking Planning with Project Planning in Support of NEPA (0-6701-P1). The research that produced 0-6701-P1 was developed a decade ago prior to the Receiving Agency's participation in the NEPA Assignment program under 23 U.S.C. 327 and the Memorandum of Understanding with FHWA. In early FY2022, the Performing Agency renewed this effort in 0-6701-01 by conducting structured interviews with the Receiving Agency's planning and environmental subject matter experts, five of the state's Metropolitan Planning Organizations (MPOs), and five state Departments of Transportation (DOTs) that pioneered Planning and Environmental Linkages (PEL) to determine the need for updated/new PEL guidance. The structured interviews conducted in 0-6701-01 revealed the need for updated/additional PEL guidance. In 0-6701-02 the Performing Agency shall develop a user-friendly PEL Toolkit that the Receiving Agency's Divisions and District staff, as well as transportation partners can reference when using PELs in the state of Texas.

Approved Work Program Revisions

No. of FY24 Amendments: One

Amendment #1:
Amend the contract to revise the budget and Project Schedule to accommodate a later than expected start date for the project and scheduling constraints for the workshop. The FY 2023 budget is decreased by $165,015.00 from $327,307.50 to $162,292.50. The FY 2024 budget is increased by $165,015.00 from $61,428.00 to $226,443.00. The Itemized Project Budget Estimate remains $388,735.50.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-6701-02

TTI | Structures and Hydraulics

Project Number	Project Name	Status
0-6872-01	Use of Geothermal Energy for De-icing Approach Pavement Slabs and Bridge Decks - Phase II	Closed

Project Start Date: 10/09/2020

Completion Date: 08/31/2024

Lead University: UTA

University #2: TTI

Project Status: Closed

Total Project Budget: $1,219,936.89

TTI Total Budget: $528,611.15

TTI FY24 Budget: $134,441.50

TTI Total Project Spend: $499,730.01

TTI FY24 Spend: $126,903.28

Project description: De-icing using geothermal energy can provide the Receiving Agency with a better alternative than the existing method of using deicing with sands and/or salts. This research project shall explore the potential for retrofitting bridges with a hydronic pipe geothermal heating system and achieve Technology Readiness Levels (TRL) level 6 through prototype demonstration in a relevant environment. At the end of the project, the geothermal deicing technology shall be ready for prototype demonstration in an operational environment (TRL level 7).

Approved Work Program Revisions

No. of FY24 Amendments: Two

Amendment #2:

Due to construction delay and increase material and labor costs, it has become necessary to amend the contract to extend the termination date, increase the total project cost for the completion of the pilot geothermal bridge, amend the scope to allow for installation and test a new geofoam insulation panel in comparison with the spray foam panel and update the Project Schedule. For UTA FY 2021 remains $96,259.27; FY 2022 remains $239,577.42; FY 2023 budget is increased by $151,767.93 from $68,781.80 to $220,549.72; UTA's total project budget is $556,386.42. For TTI FY 2021 remains $70,169.60; FY 2022 remains $165,020.90; FY 2023 budget is increased by $60,921.45 from $98,057.70 to $158,979.15; TTI's total project budget is $394,148.05. The Itemized Project Budget Estimate for the project is increased by $212,689.38 from $737,866.69 to $950,556.07.

Amendment #3:

Amend the contract to extend the termination, to revise the Project Schedule and the Project Work Plan to move testing the newly completed pilot geothermal bridge over one winter and add a new Task 11, Develop an Automatic and Optimized De-Icing Operation Control Strategy. The FY 2023 budget for CTR remains $220,549.73; an FY 2024 budget for CTR is established in the amount of $134,939.32; the Total Project Cost for CTR is increased by $134,939.32 from $556,386.42 to $691,325.74. The FY 2023 budget for TTI remains $158,979.15; an FY 2024 budget for TTI is established in the amount of $134,441.50; the Total Project Cost for Performing Agency 2 is increased by $134,441.50 from $394,169.65 to $528,611.15. The Total Itemized Project Budget Estimate is increased by $269,380.82 from $950,556.07 to $1,219,936.89.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-6872-01

TTI | Structures and Hydraulics

Project Number	Project Name	Status
0-6958	Developing Performance Specification for High Performance Concrete	Closed

Project Start Date: 09/01/2017
Completion Date: 08/31/2024
Lead University: TTI
University #2: TTI
Project Status: Closed
Total Project Budget: $1,142,586.00
TTI Total Budget: $1,142,586.00
TTI FY24 Budget: $133,333.00
TTI Total Project Spend: $1,147,062.07
TTI FY24 Spend: $146,048.86

Project description: In the past, achieving high strength was considered by the Receiving Agency as the main design criteria to formulate high performance concrete. The Receiving Agency considers mix design options 1-4 in item 421 as high-performance concrete (HPC) and these options were developed for ASR mitigation and not for other durability aspects. Very little work has been done to determine if these options are adequate to provide long-term durability often needed when HPC is specified. The main objective of this study is to develop performance specification for high performance concrete to ensure high performance in terms of durability. The Performing Agency will conduct a combination of both field investigation and laboratory study to achieve this objective. The Performing Agency shall use both conventional and innovative new lab testing methods to determine the key performance characteristics (i.e., prescribing acceptable limits of permeability, shrinkage, surface resistivity, and chloride ingress - basis for developing performance specification) followed by developing specific prescriptive requirements in order to formulate wide varieties of prescriptive mixes that can meet the durability requirements matching with different exposure conditions. A combined approach of relating mix design parameters, lab-based durability test results, mechanical properties, structural dimensions, climatic conditions, and / exposure conditions through suitable service life prediction model and predicting will be used to ensure long term durability (at least 75 years) for the HPCs in typical aggressive environments. This will lead to develop performance- and prescriptive-based concrete specifications for HPC. This could potentially encourage contractors to effectively use these fine-tuned prescriptive HPC mixtures without the need of conducing additional long duration testing and ensure making long lasting durable concrete and save taxpayers' dollars.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-6958

TTI | Program Support

Project Number	Project Name	Status
0-6974	Digital Publication and Outreach Services in Support of Research	Active

Project Start Date: 07/11/2018

Completion Date: 08/31/2025

Lead University: TTI

University #2:

Project Status: Active

Total Project Budget: $1,913,647.00

TTI Total Budget: $1,913,647.00

TTI FY24 Budget: $336,998.50

TTI Total Project Spend $1,458,849.36

TTI FY24 Spend: $332,005.54

Project description: 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.

Approved Work Program Revisions

No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-6974

TTI | Safety and Operations

Project Number	Project Name	Status
0-7004	Improve System Emergency Response Performance in the Houston District Using Connected Vehicle Technology	Closed

Project Start Date: 07/18/2019
Completion Date: 12/31/2023
Lead University: TTI
University #2:
Project Status: Closed
Total Project Budget: $480,124.25
TTI Total Budget: $480,124.25
TTI FY24 Budget: $12,067.75
TTI Total Project Spend $482,910.57
TTI FY24 Spend: $13,209.70

Project description: Emergency response services play a vital role in saving lives and minimizing property damage when major events or incidents happen. The Dedicated Short Range Communication (DSRC) and Bluetooth Low Energy (BLE) technologies have the potential to improve the efficiency and roadway safety related to emergency management services. The primary objective of this project is to develop and test DSRC- and BLE-based prototype systems for enhancing emergency preemption and notification. Another objective is to provide the Receiving Agency with guidelines for implementing DSRC and BLE technologies for supporting emergency response services. To this end, the Performing Agency shall: (1) Identify methodologies for improving emergency vehicle signal preemption in a connected environment; (2) Develop and test prototype DSRC-based and BLE-based systems to broadcast Signal Phase and Time (SPaT) messages, Emergency Vehicle Alerts (EVAs), and other notifications to emergency vehicles and other roadway users in the vicinity; (3) Enhance signal preemption performance; (4) Assist the Receiving Agency in implementing the prototype systems at selected Houston field sites; and (5) Identify anticipated cost and benefit of the connected emergency response system. The key products of the project include DSRC and BLE prototype systems that operate with the Receiving Agency's infrastructure and guidelines for implementing the system.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7004

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7006	Design, Construction, and Performance Monitoring of Stabilization of Expansive Soils and Cement	Active

Project Start Date: 04/24/2019
Completion Date: 08/31/2025
Lead University: TTI
University #2:
Project Status: Active
Total Project Budget: $2,095,912.75
TTI Total Budget: $2,095,912.75
TTI FY24 Budget: $382,898.75
TTI Total Project Spend $1,309,771.52
TTI FY24 Spend: $259,697.35

Project description: The Receiving Agency is actively looking for alternatives to stabilize expansive soils and cement treated bases with polypropylene fiber. Polypropylene fiber, hereafter is referred to as fiber. Many areas in Texas have problems stabilizing expansive soils with traditional stabilizers (i.e. lime, cement, fly ash, or in combination) because of the high levels of sulfates in the soil. Many major pavement failures have occurred due to lime/cement induced sulfate heaves. In addition, reflection cracks from cement treated bases have been reported in numerous projects. Expansive soils have caused extensive pavement heaves, bumps and longitudinal cracks. The repetitive shrinking and swelling is responsible for the development of cracks, heaves and bumps on Texas roads. Roadway surface cracks allow water intrusion which degrades underlying pavement layers, and prematurely fails the pavement structure. Surface heaves and bumps are a driver safety issue. Cracks, heaves, and bumps are extremely expensive to repair over the life of the pavement, and it would be more economical and safer to the public to mitigate their occurrences during construction. Previous research results indicate that the fiber-reinforced cement treated bases has shown to increase performance. Significant improvements in both shear and compressive strengths, as well as flexibility, have been reported in fiber reinforced soils and fiber reinforced cement treated bases. Also, fiber reinforced clays and sands were able to reduce volumetric shrinkage strains and swell pressures. It is expected that these types of improvements would directly mitigate the aforementioned distresses. There are huge potential benefits of applying polypropylene fiber to stabilize expansive soils and cement treated bases to (1) increase strength, (2) reduce shrinkage potential, (3) reduce chemical stabilizer content, and (4) increase flexibility/ductility. There is a critical need to incorporate fiber in the Receiving Agency's "Modification and Stabilization of Soils and Base for Use in Pavement Structures" guidelines. Therefore, this study will develop appropriate laboratory test methods to evaluate mix designs for (1) fiber reinforced cement treated base, (2) fiber reinforced clay, and (3) fiber reinforced sandy soil. In addition, this study will provide assistances to Receiving Agency Districts to develop optimum fiber application rates and establish specifications and construction QC/QA plans for uniform mixing. The Performing Agency shall conduct laboratory tests to determine optimum fiber application rates for cement treated base and 6 different subgrade soils: (1) PI < 15, (2) 15 ≤ PI < 35, (3) PI ≥ 35, (4) sulfate concentration > 3000 ppm but ≤ 8000 ppm, (5) sulfate concentration > 8000 ppm, and (6) organics content exceeds 1%. Over the last few years, the Receiving Agency has successfully

constructed several Full Depth Recycling (FDR) sections with foamed asphalt using innovative reclaiming equipment. One key issue that the Performing Agency shall address in this study is an evaluation of the mix technologies that ensure fibers are mixed uniformly in the field. The Performing Agency shall use the Wirtgen Reclaimer as the initial device for mixing fibers into the material being stabilized. The Performing Agency shall progress to other common construction equipment and processes to achieve the optimum mixing results. This study shall investigate innovative Nondestructive Testing (NDT) tools to (1) assist site characterization, (2) select candidate test sections, (3) identify sampling locations, (4) provide input on mix design process, (5) provide Input during QC/QA process, and (6) monitor field performance of the test section. The Performing Agency shall document the optimal construction techniques and identify time and cost savings.

Approved Work Program Revisions

No. of FY24 Amendments: Two

Amendment #4:

Amend the contract to revise the budget to postone the fiber purchase until FY24 due to construction delays. The FY19-FY22 Budgets remain the same. The FY 2023 budget is decreased by $85,000.00 from $401,623.75 to $316,623.75. The FY 2024 budget is increased by $85,000.00 from $397,898.75 to $482,898.75. The Itemized Project Budget Estimate remains $1,730,912.75.

CTR Library Project Link:

https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7006

TTI | Planning and Environment

Project Number	Project Name	Status
0-7022-01	Monarch Conservation Strategies for Texas Roadways	Active

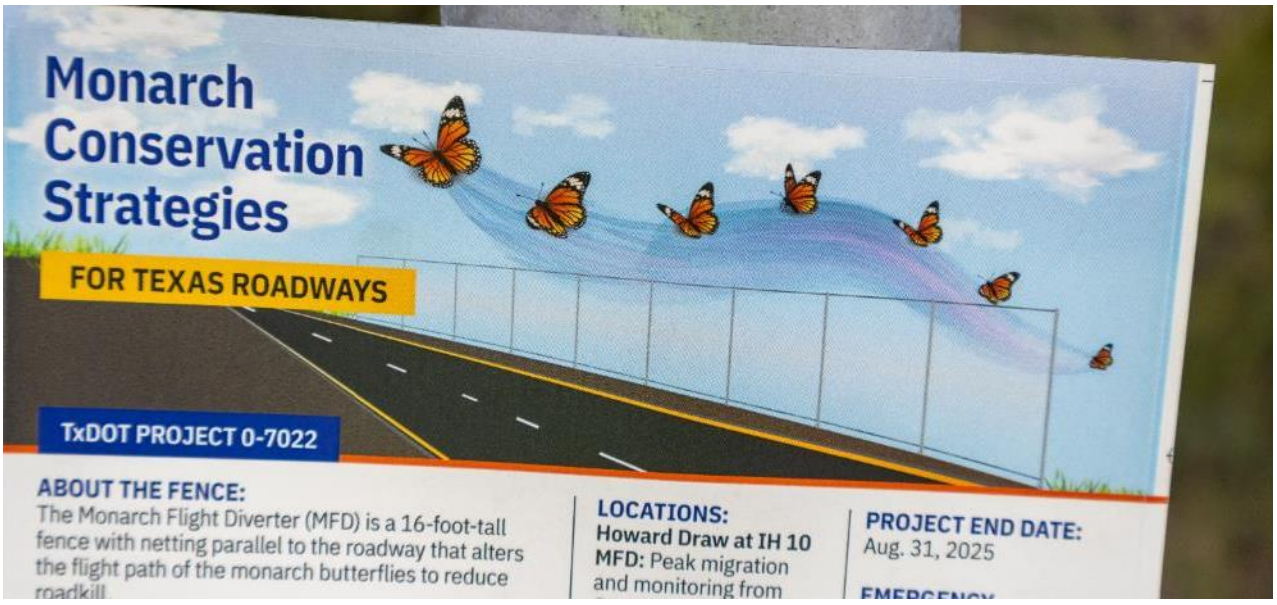
Project Start Date: 02/17/2023
Completion Date: 08/31/2025
Lead University: TTI
University #2: TAR
Project Status: Active
Total Project Budget: $580,659.50
TTI Total Budget: $400,974.50
TTI FY24 Budget: $116,893.25
TTI Total Project Spend: $220,313.22
TTI FY24 Spend: $105,133.42

Project description: 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.

Approved Work Program Revisions

No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7022-01



TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7027	Accelerating Mix Designs for Base Materials	Closed

Project Start Date: 07/10/2019
Completion Date: 10/31/2023
Lead University: TTI
University #2:
Project Status: Closed
Total Project Budget: $689,885.00
TTI Total Budget: $689,885.00
TTI FY24 Budget: $11,485.25
TTI Total Project Spend $579,292.89
TTI FY24 Spend: $10,784.37

Project description: Stabilization of roadway or stockpile materials allows for enhancing strength and stiffness properties of pavement base layers to meet structural requirements in a cost-effective and sustainable manner. Historically, stabilization mixture design criteria relied on compressive strength results and, depending on the treatment and test method, could take nearly a month to complete. Additionally, the different treatments currently require different preparation, curing, and acceptance criteria. This project will develop a harmonized accelerated design procedure for base materials with the objective of producing an acceptable design recommendation within seven (7) days. This project will include stabilizer types such as cement, lime, lime-fly-ash, asphalt emulsion, and foamed asphalt, and will focus on rapid test turnaround time, lab curing techniques to rapidly simulate cured field conditions, inclusion of moisture susceptibility in the mix design, and performance-related design criteria. This project will develop recommended harmonized test procedures, suggested specification modifications as applicable, and perform training workshops.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7027

TTI | Planning and Environment

Project Number	Project Name	Status
0-7037	Develop Models for Freight Flows and Commercial Travel Patterns within Texas Urban Regions	Closed

Project Start Date: 03/03/2020
Completion Date: 08/31/2024
Lead University: TTI
University #2:
Project Status: Closed
Total Project Budget: $1,654,330.00
TTI Total Budget: $1,654,330.00
TTI FY24 Budget: $350,004.25
TTI Total Project Spend: $1,526,886.20
TTI FY24 Spend: $268,158.25

Project description: This project will use a phased work plan to develop a freight model within one or more urban areas of the state of Texas using the most current state of the practice methods and data sources. The Performing Agency shall produce a freight model through an interactive and iterative process by the Performing Agency, Receiving Agency, and Metropolitan Planning Organizations (MPO) partners using the concept of first creating a "minimum viable product" as used in commercial software development. Key initial steps to this process will be investigation of similar recent freight modeling efforts in the United States (U.S.), early identification of freight model requirements for both Receiving Agency and local/regional planning efforts, selection of the type/function of model that will address those requirements, and an assessment of data availability and of any fatal flaws that might be encountered. The Performing Agency shall then work cooperatively with the selected MPO partner to build and implement a state-of-the-practice model that can be iteratively improved over time as additional data or methods emerge. Training for model users and an ongoing, web-based forum for users to share insights and questions are also part of the work plan. Reporting of results and transferability to diverse MPOs are other key features of the project.

Approved Work Program Revisions
No. of FY24 Amendments: One

Amendment #4:
Amend the contract to extend the termination date, revise the budget, and the Project Schedule due to delays completing Tasks 6-8. The FY 2020 budget remains $190,726.00. The FY 2021 budget remains $453,582.00. The FY 2022 budget remains $315,353.00. The FY 2023 budget is decreased by $350,004.25 from $694,669.00 to $344,664.75. The FY 2024 budget is established at $350,004.25. The Total Project Budget remains $1,654,330.00. CTR Library

Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7037

TTI | Structures and Hydraulics

Project Number	Project Name	Status
0-7040	Evaluation of Corrosion Prevention and Mitigation Approaches Used On Texas Bridges	Closed

Project Start Date: 12/01/2019
Completion Date: 11/30/2023
Lead University: TTI
University #2:
Project Status: Closed
Total Project Budget: $856,909.50
TTI Total Budget: $856,909.50
TTI FY24 Budget: $15,000.25
TTI Total Project Spend: $863,436.69
TTI FY24 Spend: $16,469.98

Project description: Corrosion of steel has been causing millions of dollars of loss in infrastructure to the state of Texas. The use of corrosion-resistant reinforcement in concrete structures and painting of steel elements have been the most common mitigation strategies. In addition, the use of weathering steel, metalizing on steel and concrete elements, and cathodic protection (sacrificial anode) have also been applied on the Receiving Agency bridges. The performances of different approaches vary with different bridges in different geographic areas; i.e., cold, arid, and humid districts. It is imperative for the Receiving Agency to have a decision tool to conduct effective corrosion prevention for new construction and corrosion mitigation for effective maintenance. The project objectives are to (1) conduct a synthesis of worldwide field investigations of the performance of corrosion mitigation, (2) perform field evaluations statewide to investigate the effectiveness of corrosion mitigation instrumented in the past, and to (3) perform lab tests, as necessary, to verify findings and to obtain a better understanding of corrosion mitigation approaches.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7040

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7073	Improving Testing Requirements in Item 300 Of TxDOT Standard Specifications	Active

Project Start Date: 09/01/2020
Completion Date: 08/31/2025
Lead University: CTR
University #2: TTI
Project Status: Closed
Total Project Budget: $1,130,000.00
TTI Total Budget: $565,000.00
TTI FY24 Budget: $125,000.00
TTI Total Project Spend $371,536.12
TTI FY24 Spend: $81,127.78

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: One

Amendment #2:
Amend the contract to extend the termination date, revise the Work Plan to correct task numbering and add additional tasks, add the FY 2024 and FY 2025 budgets, and extend the Project Schedule to advance the impact of the project with incorporating findings from other national research studies which were recently completed. Performing Agency 1: The FY 2021 budget remains $97,548.83. The FY 2022 budget remains $89,447.08. The FY 2023 budget remains $103,004.09. The FY 2024 budget is established at $134,889.57. The FY 2025 budget is established at $ $140,110.43. Total Project Budget is increased by $275,000.00 from $290,000.00 to $565,000.00. Performing Agency 2: The FY 2021 budget remains $100,000.00. The FY 2022 budget remains $100,000.00. The FY 2023 budget remains $90,000.00. The FY 2024 budget is established at $125,000.00. The FY 2025 budget is established at $150,000.00. Total Project Budget is increased by $275,000.00 from $290,000.00 to $565,000.00. The Itemized Project Budget Estimate is increased by $550,000.00 from $580,000.00 to $1,130,000.00.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7073

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7076	Develop Laboratory Mix Design of Full Depth Reclamation (FDR) Projects Using Foamed Asphalt Binder and Emulsified Asphalt	Closed

Project Start Date: 09/01/2020
Completion Date: 08/31/2024
Lead University: TTI
University #2:
Project Status: Closed
Total Project Budget: $885,286.25
TTI Total Budget: $885,286.25
TTI FY24 Budget: $234,116.00
TTI Total Project Spend $557,886.21
TTIv FY24 Spend: $110,372.15

Project description: Full depth reclamation (FDR) is a cost-effective recycling strategy that reuses both asphalt bound and unbound granular materials. FDR was implemented in Texas in the early 1990s in the Bryan and Lubbock Districts. In the past five years, the Receiving Agency has implemented FDR using either foamed asphalt or emulsions. The current specification allows for 4-inch diameter by 2-inch height specimens or 6-inch diameter by 3.75-inch height specimens to be tested, with identical acceptance criteria for both sample sizes. This practice has raised concern regarding the effect of sample size on the indirect tensile (IDT) strength because larger specimens have shown lower IDT strength compared to 4-inch diameter specimens regardless of material source, binder type, binder content, or conditioning procedure. The Performing Agency shall evaluate the strength differences between the two specimen sizes and provide acceptance criteria revisions, as appropriate. In addition, the effect of testing temperature is critical with regard to IDT strength of FDR specimens. Therefore, the Performing Agency shall evaluate the specimens at various testing temperatures and recommend a target temperature to substitute the more general test conditions currently specified. The Performing Agency shall validate the revised criteria by evaluating the performance of selected field projects.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7076

TTI | Safety and Operations

Project Number	Project Name	Status
0-7086	Roadside Safety Device Analysis, Testing, and Evaluation Program	Closed

Project Start Date: 09/01/2020
Completion Date: 10/31/2023
Lead University: TTI
University #2:
Project Status: Closed
Total Project Budget: $2,307,324.75
TTI Total Budget: $2,307,324.75
TTI FY24 Budget: $40,786.00
TTI Total Project Spend $1,826,392.08
TTI FY24 Spend: $41,882.82

Project description: Roadway departure crashes are the most common type of crash in Texas. These crashes represent over 45 percent of all fatal crashes and 34 percent of all serious injury crashes. Texas data shows that there were 9,560 fatal and 30,766 serious injury roadway departure crashes from 2010-2016. Roadside 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. To improve the safety of the motoring public, there is a need to develop new or improved safety devices that accommodate a variety of site conditions, placement locations, and a changing vehicle fleet. The Performing Agency shall provide the Receiving Agency with a mechanism to quickly and effectively address high priority issues related to roadside safety devices. The Performing Agency shall provide results in new and improved safety features that minimize the consequences of vehicles leaving the road and reduce injuries and fatalities associated with roadway departure crashes. The Performing Agency shall develop roadside safety devices to meet the 2016 edition of the American Association of State Highway and Transportation Officials (AASHTO) Manual for Assessing Safety Hardware (MASH) roadside safety criteria, to address the continuing trend of larger vehicles in the statewide vehicle fleet.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7086

TTI | Safety and Operations

Project Number	Project Name	Status
0-7087	Develop Standards for Temporary Concrete Median Barrier in Flood-Prone Areas	Closed

Project Start Date: 09/01/2020
Completion Date: 10/31/2023
Lead University: TTI
University #2: CTR
Project Status: Closed
Total Project Budget: $638,887.25
TTI Total Budget: $433,815.75
TTI FY24 Budget: $16,212.50
TTI Total Project Spend $349,602.31
TTI FY24 Spend: $15,064.47

Project description: Portable concrete median barriers are used in work zones to prevent serious cross-median crashes and vehicle penetration in work zones. These barriers are used on highways to provide positive containment of vehicles and to reduce maintenance and repair needs. When implemented in flood-prone areas, portable concrete median barriers can act as a dam for flood waters until the damming of water causes the barrier to displace and break, as recently occurred in the Houston and Beaumont Districts during severe storms. These situations required significant repair before the highways could be reopened and the level of safety for motorists restored. Any required barrier maintenance or repair increases risk to maintenance personnel and can result in significant congestion if a lane closure is required. There is a need to develop and evaluate an appropriate portable concrete median barrier in compliance with the 2016 edition of the American Association of State Highway and Transportation (AASHTO) Manual for Assessing Safety Hardware (MASH) Test Level (TL-3) for implementation in flood-prone areas. To meet this objective, the Performing Agencies shall design such a barrier to accommodate passage of flood water, to decrease risk to motorists, and to reduce level of damage to the highway.

Approved Work Program Revisions

No. of FY24 Amendments: Two

Amendment #2:

Amend the contract to extend the termination date and to update the Project Schedule due to delays in the construction of the barriers needed for testing and to allow time for full-scale crash testing and project documentation.

Amendment #3:

Amend the contract to extend the termination date, to update the Project Schedule, and to revise Work Plan to perform additional testing. TTI: The FY 2021 budget remains $109,897.00; the FY 2022 budget remains $91,587.50; the FY 2023 budget increases by $65,885.00 from $150,233.75 to $216,118.75; the FY 2024 budget is established at $16,212.50; TTI's Total Project Budget increases by $82,097.50 from $351,718.25 to $433,815.75. CTR: The FY 2021 budget remains $105,554.50; the FY 2022 budget remains $80,493.59; the FY 2023 budget increases by $4,798.00 from 12,275.16 to $17,073.16; the FY 2024 budget is established at $1,950.25; CTR's Total Project Budget increases by $6,748.25 from $198,323.25 to $205,071.50. The Itemized Project Budget Estimate increases by $88,845.75 from $550,041.50 to $638,887.25.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7087

TTI | Structures and Hydraulics

Project Number	Project Name	Status
0-7093	Develop Refined Design Methods for Lean-On Bracing	Closed

Project Start Date: 09/01/2020
Completion Date: 01/31/2024
Lead University: CTR
University #2: TTI
Project Status: Closed
Total Project Budget: $980,000.00
TTI Total Budget: $380,000.00
TTI FY24 Budget: $33,767.00
TTI Total Project Spend: $358,210.29
TTI FY24 Spend: $34,213.17

Project description: The Performing Agencies shall instrument and conduct field monitoring of bridges with lean-on bracing identified in Task 3. The monitoring shall include bridges under construction and also completed bridges subjected to controlled loading using trucks to better understand the behavior described in Tasks 2, 4 and 7. The Performing Agencies shall carry out parametric Finite Element Analyses (FEA) along with the field monitoring and develop improved guidelines to facilitate widespread use of lean-on bracing applications in Texas bridges.

Approved Work Program Revisions
No. of FY24 Amendments: Two

Amendment #1:
Amend the contract to revise the work plan and the budget to add a subcontractor due to the transfer of a research team member and student for Performing Agency 2. Performing Agency 1: The FY 2023 Budget remains $225,000.00. The Performing Agency 1 Total Project Budget remains $600,000.00. Performing Agency 2: The FY 2023 Budget remains $142,500.00. The Performing Agency 2 Total Project Budget remains $380,000.00. The Itemized Project Budget Estimate remains $980,000.00.

Amendment #2:
Amend the contract to to revise the term date, the FY23 and FY24 budgets and schedule to allow the research team to complete the parametric finite element analyses and to develop suitable design recommendations. Decrease CTR's FY23 budget by $39,062.00 from $225,000.00 to $185,938.00. Establish a FY24 budget for CTR of $39,062.00. CTR's Total Project Budget remains $600,000.00 Decrease TTI's FY23 budget by $33,767.00 from $142,500.00 to $108,733.00. Establish a FY24 budget for TTI of $33,767.00. TTI's Total Project Budget remains $380,000.00. The Itemized Project Budget Estimate remains the same.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7093

TTI | Planning and Environment

Project Number	Project Name	Status
0-7100	Sediment Control Approved Products List	Closed

Project Start Date: 09/01/2021
Completion Date: 10/31/2023
Lead University: TTI
University #2: SFASU
Project Status: Closed
Total Project Budget: $293,890.57
TTI Total Budget: $283,206.75
TTI FY24 Budget: $4,999.75
TTI Total Project Spend: $278,921.02
TTI FY24 Spend: $0.00

Project description: The Environmental Protection Agency (EPA) guidance document National Management Measure to Control Nonpoint Source Pollution from Urban Areas (November 2005, EPA-841-B-05-004) requires all construction site activities to reduce the amount of sediment generated (erosion control) and reduce the off-site transport of sediment and construction-related chemicals (sediment and chemical control). While there are several pollutants of concern (oils, gasoline, degreasers, paints, etc.), sediment from construction sites is by far the largest pollutant source (Canning, 1988). Eroded sediment from construction sites causes many problems, including adverse impacts on water quality as well as decreased capacity of reservoirs and streams, resulting in possible flooding. Sediment control devices (SCDs) are used on construction sites to retain sediment and prevent stormwater from adversely affecting adjacent waterways. SCDs include silt fences, wattles, sediment logs and basins, filter dams, and inlet protection devices. These products are designed to be installed for specific applications (curb inlets, drop inlets, perimeter protection, etc.) However, there is no scientifically sound, repeatable testing methodology that replicates field conditions to test and determine SCD performance. This project shall develop a formal testing protocol, test apparatus, and propose thresholds for a performance-based sediment control device testing program that will assist the designer/engineer in selecting the most effective sediment control best management practice.

Approved Work Program Revisions
No. of FY24 Amendments: Two

Amendment #1:
Amend the contract to update the project budget for Performing Agency 1 due to increased construction material/labor costs for additional work determined at the construction pre-bid meeting. TTI Budget: The FY 2022 budget remains $92,167.00. The FY 2023 budget is increased by $31,250.00 from $159,789.75 to $191,039.75. TTI's Total Project Budget is increased by $31,250.00 from $251,956.75 to $283,206.75. SFASU: Project Budget remains $10,683.82. The Itemized Project Budget Estimate is increased by $31,250.00 from $262,640.57 to $293,890.57.

Amendment #2:
Amend the contract to revise the budget for Performing Agency 1 (TTI) and Project Schedule to allow time to collect required performance data on the sediment control devices. TTI's FY 2022 budget remains $92,167.00; the FY 2023 budget is decreased by $4,999.75 from $191,039.75 to $186,040.00; the FY 2024 budget is established at $4,999.75. TTI's Total Project Budget remains $283,206.75. Performing Agency 2's (SFASU) FY 2022 budget remains $5,341.91; the FY 2023 budget remains $5,341.91; SFASU's Total Project Budget remains $10,683.82. The Itemized Project Budget Estimate remains 293,890.57.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7100

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7103	Investigating Prime versus Curing: Where, When and Why	Active

Project Start Date: 09/01/2021
Completion Date: 11/30/2024
Lead University: TTI
University #2:
Project Status: Active
Total Project Budget: $525,000.25
TTI Total Budget: $525,000.25
TTI FY24 Budget: $156,036.75
TTI Total Project Spend $361,028.88
TTI FY24 Spend: $136,908.03

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7103

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7104	Establish Performance-Based Acceptable Lab-Molded Density Range for Mix Design and QC/QA	Active

Project Start Date: 09/01/2021
Completion Date: 04/30/2025
Lead University: TTI
University #2: UTEP
Project Status: Active
Total Project Budget: $829,999.25
TTI Total Budget: $469,999.25
TTI FY24 Budget: $141,890.00
TTI Total Project Spend $329,962.90
TTI FY24 Spend: $75,059.49

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7104

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7105	Measuring Seal Coat Rate Field Adjustments	Active

Project Start Date: 09/01/2021
Completion Date: 11/30/2024
Lead University: TTI
University #2: UT-TYLER
Project Status: Active
Total Project Budget: $829,999.25
TTI Total Budget: $415,453.75
TTI FY24 Budget: $115,431.75
TTI Total Project Spend $377,664.21
TTI FY24 Spend: $118,969.66

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7105

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7106	Quantify Maximum Accumulated Seal Coat Layers for Stability	Active

Project Start Date: 09/01/2021
Completion Date: 11/30/2024
Lead University: TTI
University #2: UT-TYLER
Project Status: Active
Total Project Budget: $449,211.00
TTI Total Budget: $439,017.25
TTI FY24 Budget: $124,757.75
TTI Total Project Spend $399,324.13
TTI FY24 Spend: $110,807.44

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7106

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7107	Determine Feasibility and Methodologies of Using Structural Data from Traffic Speed Deflection Devices in Network-Level Treatment Decision Making	Closed

Project Start Date: 09/01/2021
Completion Date: 08/31/2024
Lead University: TTI
University #2:
Project Status: Closed
Total Project Budget: $449,941.00
TTI Total Budget: $449,941.00
TTI FY24 Budget: $152,041.00
TTI Total Project Spend $426,539.25
TTI FY24 Spend: $152,036.43

Project description: Traffic Speed Deflection Devices (TSDD) non-destructively measure structural condition while traveling at traffic speeds. Advancements in TSDD's have enabled these evaluations to be made with the benefit of reducing safety hazards associated with traditional stop and go Falling Weight Deflectometer (FWD) devices. The Receiving Agency is an active participant in the Transportation Pooled Fund TPF-5(385) "Pavement Structural Evaluation with Traffic Speed Deflection Devices". As a participant, the Receiving Agency has collected more than 1000 miles of TSDD data in several Receiving Agency Districts and is expected to continue to collect TSDD data for the next three (3) years. Recent interest from Receiving Agency Districts on using continuous structural data in network level treatment decisions has necessitated the need to verify TSDD measurements and provide guidelines and analysis methodologies to implement structural condition data for both network and project level pavement management applications. Incorporating a structural condition index into network level decisions has been a goal of the Receiving Agency's for over 30 years with the objective of providing Receiving Agency Districts a comprehensive integrated assessment of both visual and structural condition. Use of this tool shall provide Receiving Agency Districts with what level of pavement rehabilitation treatment is required as they develop their 4-year plans.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7107

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7111	Determine Impact of Field Sands on Workability and Engineering Properties of Superpave Mixtures in Texas	Closed

Project Start Date: 09/01/2021
Completion Date: 08/31/2024
Lead University: UTEP
University #2: TTI
Project Status: Closed
Total Project Budget: $500,001.50
TTI Total Budget: $105,001.50
TTI FY24 Budget: $35,000.50
TTI Total Project Spend $109,028.07
TTI FY24 Spend: $36,556.43

Project description: Field sands have been used in hot mix asphalt (HMA) pavements to reduce binder requirement since they are readily available and are less expensive than crushed materials. Considering their adverse effects on the performance, field sands are limited to 10% to 15% of the aggregates. The most common feature of field sand that can have a significant detrimental effect on the Asphalt Concrete (AC) performance is the presence of harmful clay particles. Understanding the impact of these clay particles on AC performance is the subject of this research. The upper limit of specific field sand, given the amount of active clay present in it, the process to determine the clay content, and how they affect the performance of AC mixes shall be evaluated. Since field sands are more round compared to the crushed aggregates, mixes containing more field sands can be compacted to a given density at lower binder contents. Given the less particle to particle interlocking of such mixes, however, they are more suspect to excessive rutting. Thus, this research shall investigate the effect of clay minerals as well as the sand properties independently on the performance of AC mixes (with a focus on Superpave mixtures) and evaluate their combined/interactive effects, as the natural sands are a combination of both. To that end, the Performing Agency shall provide interaction plots and/or charts that can be used to select the maximum allowable percentage of a given field sand.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7111

TTI | Structures and Hydraulics

Project Number	Project Name	Status
0-7112	Development of a Continuous for Live Load Prefabricated Steel Accelerated Bridge Construction (ABC) Unit for Texas Bridges	Active

Project Start Date: 09/01/2021
Completion Date: 02/28/2025
Lead University: TTI
University #2: UTEP
Project Status: Active
Total Project Budget: $759,994.50
TTI Total Budget: $640,375.75
TTI FY24 Budget: $191,254.50
TTI Total Project Spend: $552,593.70
TTI FY24 Spend: $196,728.52

Project description: The overall goal is to develop a system where prefabricated steel ABC unit perform continuous for live load. The system must be easily constructible, fast to assemble, durable long-term, safe, and cost-effective. The Performing Agencies shall conduct a literature review to first synthesize what has been done by state departments of transportation and other agencies. The Performing Agencies shall also evaluate the behavior of related Receiving Agency bridges through visual inspection and monitoring. The Performing Agencies shall perform a system development program utilizing this information in conjunction with expert feedback from an Industry Review Panel (IRP) workshop (including the Receiving Agency Panel). The three (3) best system designs shall be selected for full-scale laboratory testing followed by an analytical parametric study. The Performing Agencies shall compile and present the results at an IRP meeting with the Receiving Agency, where the final system shall be selected. The Performing Agencies shall develop full Microstation details and specifications along with a user-friendly design guide. The guide shall identify the following:

- Span length capabilities for girder sizes/depths/spacings.
- General details for establishing live load continuity.
- Closure pour details at interior bents and how to achieve acceptable deck stresses.
- Structural steel splice details and acceptable tolerances.
- Bearing layout to meet the Receiving Agency substructure details.

Approved Work Program Revisions
No. of FY24 Amendments: One

Amendment #1:
Amend the contract to replace the Project Supervisor, and to revise the work plan and budget to add a subcontractor due to the transfer of the Project Supervisor from Performing Agency 1 to the subcontractor. TTI: The FY 2022 Budget remains $103,593.50. The FY 2023 Budget remains $275,527.75. The FY 2024 Budget remains $191,254.50. Total Project Budget remains $570,375.75. UTEP: The FY 2022 Budget remains $20,845.00. The FY 2023 Budget remains $48,796.25. The FY

2024 Budget remains $49,977.50. Total Project Budget remains $119,618.75. The Itemized Project Budget Estimate remains $689,994.50.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7112

TTI | Structures and Hydraulics

Project Number	Project Name	Status
0-7114	Re-Examine Minimum Reinforcement Requirements for Shear Design	Closed

Project Start Date: 09/01/2021
Completion Date: 08/31/2024
Lead University: TTI
University #2:
Project Status: Closed
Total Project Budget: $930,904.25
TTI Total Budget: $930,904.25
TTI FY24 Budget: $269,051.00
TTI Total Project Spend: $907,378.16
TTI FY24 Spend: $281,322.50

Project description: Minimum shear reinforcement requirements in the Association of State Highway Transportation Officials (AASHTO) Load and Resistance Factor Design (LRFD) Bridge Design Specifications are based on tests conducted on reinforced concrete panels and beams. The extension of these requirements to prestressed concrete beams introduced significant conservatism in the current LRFD provisions for shear design. More accurate provisions are necessary to better predict the shear strength of prestressed beams. The objective of this project is to investigate the validity of the minimum shear reinforcement requirements and develop new/revised guideline specifications. The Performing Agency shall:

- Perform a literature review and outreach in order to synthesize a unique database of load tests for prestressed concrete beams, which the Performing Agency shall analyze using data driven methods to identify major design parameters and missing information that will inform an experimental program.
- Perform twenty (20) full scale tests on ten (10) commonly used prestressed girders combining a range of identified design parameters to comprehensively re-examine the minimum reinforcement requirements of AASHTO LRFD Bridge Design Specifications accounting for reserve strength and ductility and as well as performance under service conditions. The Performing Agency shall complement the experimental program by analytical modelling to expand its impact.
- Develop design guidelines for the minimum reinforcement requirements based on the synthesized comprehensive dataset complemented by the full-scale tests and analytical modeling. The Performing Agency shall also pursue integration of these guidelines in the AASHTO LRFD Bridge Design Specifications.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7114

TTI | Safety and Operations

Project Number	Project Name	Status
0-7122	Evaluate Alternative Methods to Examine Visibility of Pavement Markings	Closed

Project Start Date: 09/01/2021
Completion Date: 08/31/2024
Lead University: TTI
University #2: UTSA
Project Status: Closed
Total Project Budget: $467,604.25
TTI Total Budget: $394,712.00
TTI FY24 Budget: $112,272.25
TTI Total Project Spend $287,916.04
TTI FY24 Spend: $82,306.44

Project description: Pavement markings are the primary means for an agency to provide longitudinal guidance to drivers. Effective pavement markings can improve safety, improve driver comfort, and increase functionality/reliability of automated driving systems and Advanced Driver Assistance Systems (ADAS). To be effective, markings must be visible during all driving conditions, day and night. Markings are typically characterized by their retroreflectivity which is a surrogate measure for how visible the marking is at night. Retroreflectivity does not consider other factors that will impact the actual visibility of the markings such as the color or retroreflectivity of the pavement that the marking is applied to, the color or width of the marking, or the viewing conditions (i.e., observation vehicle, observer characteristics, weather conditions). Retroreflectivity is also a metric for nighttime visibility that may not relate to the marking visibility during the day. The objective of this project is to improve current pavement marking installation and maintenance practices, such that effective markings are continuously maintained. The Performing Agencies shall develop a tool to effectively assess the visibility of pavement markings and to make suggestions/recommendations for maintenance of markings. The Performing Agencies shall evaluate marking visibility for both human and automated drivers across a range of conditions. These evaluations shall be used to make recommendations to improve new marking installation specifications and techniques, improve marking maintenance practices, and evaluate other technologies that should be considered to improve pavement marking delineation.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7122

TTI | Planning and Environment

Project Number	Project Name	Status
0-7124	Develop A New Tool for Evaluating Infrastructure and Planning Impacts from Changes in Truck Traffic and Truck Technologies	Closed

Project Start Date: 09/01/2021
Completion Date: 12/31/2023
Lead University: TTI
University #2:
Project Status: Closed
Total Project Budget: $510,652.50
TTI Total Budget: $510,652.50
TTI FY24 Budget: $59,964.00
TTI Total Project Spend: $436,299.49
TTI FY24 Spend: $59,481.19

Project description: The overall project goal shall further improve freight planning and strategy tools used in Receiving Agency Research Project 0-6984, Evaluate Potential Impacts, Impediments, and Solutions of Automated Trucks and Truck Platooning on Texas Highway Infrastructure to better assess the operational and physical impacts of freight traffic on the Texas Highway Freight Network. The Performing Agency's tool enhancements shall allow for better evaluation of specific infrastructure impacts and resiliency considerations (bridges and pavements) from new truck automation and platooning technologies, as well as changes in truck loads, all of which are expected to increase over time, thus also allowing for analysis of alternative routes. The Performing Agency shall tailor the tool to perform detailed analysis of the heavy freight corridors designated for early adoption of autonomous and platooned truck traffic in Texas, such as IH-10, IH-35, and IH-45. The Performing Agency shall build a user interface allowing input of various planning strategies and scenarios giving planners a means to identify and evaluate potential design, operational, and physical hardening modifications that can minimize any negative impacts of new trucking technologies. The tool shall incorporate real-world condition histories from pavement and bridge asset management databases to identify infrastructure vulnerabilities due to changes in freight traffic and better prioritize future roadway maintenance project selection. Additionally, the Performing Agency shall perform targeted modeling to identify best lane use options for automated and platooned trucks under a variety of operational scenarios and at varying traffic levels.

Approved Work Program Revisions

No. of FY24 Amendments: One

Amendment #2:

Amend the contract to add a new task and revise the budget and the Project Schedule due to Task 5 delays and the addition of Task 6. The FY 2023 budget is decreased by $19,402.00 from $283,886.50 to $264,484.50; the FY 2024 budget is established at $59,964.00; the Itemized Project Budget Estimate is increased by $40,562.00 from $470,090.50 to $510,652.50.

CTR Library Project Link:

https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7124

TTI | Planning and Environment

Project Number	Project Name	Status
0-7127	Examine Reconnaissance Scanning of Underground Utilities in the ROW	Active

Project Start Date: 09/01/2021
Completion Date: 02/28/2025
Lead University: TTI
University #2: TAMUCC
Project Status: Active
Total Project Budget: $1,264,144.00
TTI Total Budget: $1,132,129.00
TTI FY24 Budget: $445,514.00
TTI Total Project Spend: $1,061,160.49
TTI FY24 Spend: $433,290.40

Project description: Mapping of buried utilities using rigorous subsurface utility engineering (SUE) quality level B (QLB), as is frequently performed or recommended, can be costly. It can also be ineffective for unknown utilities (i.e., utilities that exist but for which no information is available). This is particularly common and problematic in areas of oil and gas operations. When undiscovered until construction, these unknown utilities may cause serious scheduling disruptions as well as higher construction costs, along with safety and environmental risks. There is a need for a faster, less expensive method of scanning the right of way (ROW) for these unknown utilities. This research shall evaluate, select and test the application of newly available geophysical measurement systems. These systems would allow quickly and cheaply detecting and mapping unknown pipelines or other utilities in the ROW. It compares the effectiveness and cost of deployment to standard QLB SUE and reports on technologies that are both technically and cost effective for identifying unknown utilities.

Approved Work Program Revisions
No. of FY24 Amendments: One

Amendment #2:
Amend the contract to extend the termination date, update the Project Schedule and Work Plan to revise Tasks 3-8 and revise the budget for the purpose of using the newly developed artificial intelligence data processing capability, gather data at new sites to complete the testing and evaluation of the technologies. TTI: The FY 2022 budget remains $364,873.75; the FY 2023 budget is decreased by $62,504.00 from $299,620.25 to $237,116.25; the FY 2024 budget is established at $401,875.75; TTI's Total Project Budget is increased by $339,371.75 from $664,494.00 to $1,003,865.75. TAMUCC: The FY 2022 budget remains $55,856.25; the FY 2023 budget remains $26,548.75; the FY 2024 budget is established at $49,610.00; TAMUCC's total Project Budget is increased by $49,610.00 from $82,405.00 to $132,015.00. The Itemized Project Budget Estimate is increased by $388,981.75 from $746,899.00 to $1,135,880.75.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7127

TTI | Planning and Environment

Project Number	Project Name	Status
0-7132	Quantify the Real Impact of Transportation Activity on Regional Ozone and Near-Road PM Concentrations	Closed

Project Start Date: 09/07/2021
Completion Date: 08/31/2024
Lead University: TTI
University #2: UTEP
Project Status: Closed
Total Project Budget: $537,321.00
TTI Total Budget: $432,254.75
TTI FY24 Budget: $92,433.00
TTI Total Project Spend: $420,255.56
TTI FY24 Spend: $97,527.50

Project description: The Receiving Agency and its partner agencies are required to comply with the requirements of the transportation conformity requirement. Transportation conformity is an emissions control-centric process built on the assumption that that reducing emissions from transportation activities would lead to better air quality. However, the air quality observations collected since the onset of the COVID-19 pandemic shows ambient ozone and particulate matter of less than 2.5 micrometer in aerodynamic diameter (PM2.5), concentrations have a mixed response to the significant changes in traffic activities and emissions. This trend has raised questions regarding the extent of the transportation's impacts on air quality. This study will bridge the gap in the understanding of the actual extent of transportation activities' impacts on regional and near-road air quality. The Performing Agency shall study three major activities for selected case study areas:

- Analysis of before- and during-pandemic traffic activity and air quality monitoring data.
- Evaluate the performance of air dispersion modeling in capturing the changes of near-road PM2.5 concentrations in near-road environment resulting from traffic activity variations.
- Evaluate the performance of photochemical modeling in capturing the changes of regional ozone in response to changes of traffic activities. The study will also result in a characterization of COVID-19 restrictions' impacts on traffic activities and air quality.

Approved Work Program Revisions

No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7132

TTI | Planning and Environment

Project Number	Project Name	Status
0-7133	Develop Guidebook for Managing System Costs: Operational and Capital Cost Management at Rural and Small Urban Public Transit Systems	Closed

Project Start Date: 09/01/2021
Completion Date: 03/31/2024
Lead University: TTI
University #2: TAMUK
Project Status: Closed
Total Project Budget: $213,562.50
TTI Total Budget: $198,565.00
TTI FY24 Budget: $32,967.00
TTI Total Project Spend: $207,185.20
TTI FY24 Spend: $35,969.62

Project description: Rural and small urban transit systems across the United States face fiscal challenges caused by the growing gap between the cost of providing transit service and available federal, state, and local funding. In Texas, the fiscal challenges facing rural and small urban transit systems are compounded by not only an increasing population but also revenue and ridership impacts related to COVID-19. Rural and small urban transit systems also often face high levels of staff turnover and a lack of knowledge management procedures to sustain cost management practices over time. The Performing Agencies shall equip the Receiving Agency's transit systems to understand, predict, and manage operational/capital costs and provide a reliable go-to-resource for cost management best practices.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7133

TTI | Planning and Environment

Project Number	Project Name	Status
0-7138	Driver Distraction in an Era of Rapid Technological Change, Digital Advertising Billboards	Active

Project Start Date: 09/01/2022
Completion Date: 11/30/2024
Lead University: TTI
University #2: CTR
Project Status: Active
Total Project Budget: $432,453.89
TTI Total Budget: $353,539.75
TTI FY24 Budget: $177,798.25
TTI Total Project Spend: $306,175.11
TTI FY24 Spend: $174,125.41

Project description: Outdoor advertising signs impact millions of travelers around the world every day. These signs are designed to attract driver attention thus taking it away from the driving task. Driver inattention and distraction are two of the most critical factors for road safety. Receiving Agency regulation of outdoor advertising signs must deal with changing technologies, including digital billboards, which allow for modifications to sign illumination, motion, and content. Regulations are not keeping pace with changing sign trends and must be updated to address potential impacts on road user safety. This research project focuses on the degree of driver distraction caused by typical and digital advertising sign contents. The project includes a comprehensive state-of-the-practice review, crash investigation, and an on road human factors evaluation. The illumination levels and content (including motion) during daytime and nighttime travel for dry and wet-weather conditions are considered. This research project shall provide the Receiving Agency with tools and resources to help manage outdoor digital advertising billboards by establishing practical criteria for sign illumination and content. These resources shall allow the Receiving Agency to manage the advertising signs such that road user safety is accounted for while maintaining the ability of sign owners to develop effective means of communicating with the public.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7138

TTI | Safety and Operations

Project Number	Project Name	Status
0-7140	Develop Improved Queue Warning System Combining Multiple Data Sources	Closed

Project Start Date: 09/06/2022
Completion Date: 08/31/2024
Lead University: TTI
University #2:
Project Status: Closed
Total Project Budget: $379,728.75
TTI Total Budget: $379,728.75
TTI FY24 Budget: $187,585.50
TTI Total Project Spend $369,274.17
TTI FY24 Spend: $176,860.41

Project description: Existing queue warning (QW) systems predominantly use infrastructure-based sensors to detect the formation of queues and use dynamic message signs (DMS) to warn drivers. These QW systems, may be inadequate where the required number or density of sensors are not available. Research has shown that crowd sourced probe and connected vehicle (CV) trajectory data used in combination with sensor data can significantly improve the accuracy and latency of queue detection. Furthermore, because of gaps between fixed location of DMSs a subset of drivers can encounter a queue without seeing any warning. Sharing queue information through third-party providers and providing vehicle-specific queue warning in CVs can ensure provision of queue warning to a broader audience in a timely manner. The Performing Agency shall:

1. Develop detailed design of an enhanced queue detection and warning system that combine point-, probe-, and vehicle trajectory data.
2. Test and fine-tune the queue detection algorithm design using computer simulation.
3. Conduct a proof of concept, prototype deployment and field evaluation of the new QW system design on a freeway segment where vehicle queues frequently form.
4. Document the systems engineering and algorithm for the QW system as a potential enhancement to the Lonestar™ advanced traffic management system software application.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7140

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7142	Develop Safety Scoring Tool for the Wet Surface Crash Reduction Program	Closed

Project Start Date: 09/01/2022
Completion Date: 08/31/2024
Lead University: TTI
University #2:
Project Status: Closed
Total Project Budget: $200,001.75
TTI Total Budget: $200,001.75
TTI FY24 Budget: $75,110.75
TTI Total Project Spend $152,950.61
TTI FY24 Spend: $66,517.63

Project description: The Performing Agency shall develop a risk assessment procedure related to the reduction of wet weather crashes that incorporates pavement surface type and aggregate selection and will be integrated into the Safety Scoring Tool (SST). The developed scoring tool will bridge the gap between the approaches in the two current tools, the SST and Receiving Agency Form 2088. The Performing Agency shall leverage the inputs and framework of the SST and the communalities with Receiving Agency Form 2088 to improve the SST and the wet surface crash reduction program (WSCRP). Integration of the SST and Receiving Agency Form 2088 will provide the benefits of streamlining the data inputs already required for the SST to avoid duplication of efforts and will effectively improve the quality of the assessment of pavement friction safety.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7142

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7143	Develop Methodologies for Reducing Costs in Full Depth Reclamation (FDR) Construction	Active

Project Start Date: 09/01/2022
Completion Date: 11/30/2025
Lead University: TTI
University #2:
Project Status: Active
Total Project Budget: $679,483.50
TTI Total Budget: $679,483.50
TTI FY24 Budget: $228,483.75
TTI Total Project Spend $334,850.24
TTI FY24 Spend: $169,096.62

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7143

TTI | Safety and Operations

Project Number	Project Name	Status
0-7144	Develop a Real-time Decision Support Tool for Urban Roadway Safety Improvement	Active

Project Start Date: 01/09/2023
Completion Date: 06/30/2025
Lead University: TXST
University #2: TTI
Project Status: Active
Total Project Budget: $465,010.00
TTI Total Budget: $105,991.50
TTI FY24 Budget: $71,882.75
TTI Total Project Spend $80,568.52
TTI FY24 Spend: $56,163.41

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: One

Amendment #2:
The Project has been cancelled and is being re-RFP'd due to the departure of the lead University Project Supervisor, Subasish Das.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7144

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7145	Develop Rapid New Tests for Detecting Poor Quality Binders and RAP Materials	Active

Project Start Date: 09/01/2022
Completion Date: 02/29/2028
Lead University: TTI
University #2: CTR
Project Status: Active
Total Project Budget: $1,725,534.03
TTI Total Budget: $1,207,901.50
TTI FY24 Budget: $407,452.00
TTI Total Project Spend $526,556.96
TTI FY24 Spend: $335,254.92

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7145

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7148	Develop Design Details for CRCP Whitetopping at Intersections	Active

Project Start Date: 09/01/2022
Completion Date: 08/31/2025
Lead University: TECH
University #2: TTI
Project Status: Active
Total Project Budget: $599,563.25
TTI Total Budget: $1,207,901.50
TTI FY24 Budget: $104,106.50
TTI Total Project Spend $526,556.96
TTI FY24 Spend: $92,857.23

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7148

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7151	Develop Recommendations for Evaluating Surface Types and Aggregate Properties to Minimize Wet Weather Crashes	Active

Project Start Date: 11/10/2022
Completion Date: 02/28/2026
Lead University: TTI
University #2: UT-TYLER
Project Status: Active
Total Project Budget: $599,992.25
TTI Total Budget: $554,716.00
TTI FY24 Budget: $192,237.00
TTI Total Project Spend $282,787.52
TTI FY24 Spend: $182,447.81

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7151

TTI | Planning and Environment

Project Number	Project Name	Status
0-7152	Estimating Latent Bicyclist and Pedestrian Demand for Shared Use Path Design	Active

Project Start Date: 09/01/2022
Completion Date: 12/31/2024
Lead University: TTI
University #2:
Project Status: Active
Total Project Budget: $250,173.75
TTI Total Budget: $250,173.75
TTI FY24 Budget: $112,388.25
TTI Total Project Spend: $240,671.63
TTI FY24 Spend: $120,408.65

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: One

Amendment #1:
Amend the contract to revise the budget, Work Plan to add TASK 5 and TASK 6 and Project Schedule to determine the benefit of obtaining a tool based on a model and additional data visualization. The FY 2023 budget is decreased by $67,265.00 from $187,517.00 to $120,252.00. The FY 2024 budget is increased by $49,732.00 from $62,656.25 to $112,388.25. The FY 2025 budget is established at $17,533.50. The Itemized Project Budget Estimate remains $250,173.25.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7152

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7153	Develop Design of Hot-Mix Cold-Laid (HMCL) Mixtures with the Superpave Gyratory Compactor	Closed

Project Start Date: 090/01/2022
Completion Date: 11/30/2023
Lead University: TTI
University #2:
Project Status: Closed
Total Project Budget: $210,004.25
TTI Total Budget: $210,004.25
TTI FY24 Budget: $45,440.75
TTI Total Project Spend $208,960.95
TTI FY24 Spend: $43,316.89

Project description: Different from patching materials, hot-mix cold-laid (HMCL) asphalt mixes are often used as a blade-on/level up material in Texas. Currently, the HMCL asphalt mixes are designed with a Texas Gyratory Compactor (TGC) and checked with the Hveem stability test. The Materials and Tests Division (MTD) of the Receiving Agency is undertaking an initiative to design all asphalt mixes with the Superpave Gyratory Compactor (SGC) and officially phase out the TGC in the upcoming Standard Specifications Book update in 2024. As a result, there is an urgent need to study HMCL mix design with the SGC and replace the Hveem stability test with a new performance related test. The objective of this project is to establish a new HMCL mix design method with the SGC and new performance tests ensuring high quality and long-lasting HMCL mixes which will save millions of dollars of taxpayer money annually. To achieve this objective, the Performing Agency shall review the literature and conduct extensive laboratory TGC, SGC, and performance tests; then develop the SGC-based HMCL mix design method including performance tests and associated criteria; and finally recommend specifications changes.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7153

TTI | Structures and Hydraulics

Project Number	Project Name	Status
0-7155	Develop/Refine Design Provisions for Headed and Hooked Reinforcement	Active

Project Start Date: 09/01/2022
Completion Date: 02/28/2026
Lead University: TTI
University #2: UTSA
Project Status: Active
Total Project Budget: $999,401.25
TTI Total Budget: $680,187.50
TTI FY24 Budget: $250,590.50
TTI Total Project Spend: $471,339.36
TTI FY24 Spend: $253,939.16

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7155

TTI | Safety and Operations

Project Number	Project Name	Status
0-7156	Using Vehicle Probe Data to Evaluate Speed Limits on Texas Highways	Closed

Project Start Date: 09/01/2022
Completion Date: 08/31/2024
Lead University: TTI
University #2:
Project Status: Closed
Total Project Budget: $399,981.75
TTI Total Budget: $399,981.75
TTI FY24 Budget: $204,575.75
TTI Total Project Spend $417,811.30
TTI FY24 Spend: $221,598.22

Project description: The Receiving Agency's current practice is to conduct numerous speed studies throughout the year to determine if the speed limits should be changed due to new traffic patterns, development, crash history, and other factors. These studies are driven by stakeholder requests or as part of routine annual reviews. The number of studies performed at any given time is limited by staff and consultant resources, resulting in a process that can take several months to complete. Can the increasing availability of vehicle probe data, along with other big datasets, be used to reduce the level of effort and time needed to collect speed data? If so, what data can be readily obtained from big data sources and what procedure would be needed to refine the use of probe speed information and produce speed limit recommendations that are consistent with the sound engineering practices currently used by Receiving Agency staff? This project will explore if there are more efficient methods for conducting Texas speed limit studies that would allow Receiving Agency districts to be more pro-active and responsive with their speed zone program. Such a program would also provide a much safer method of collecting speed data, especially on high-speed and controlled access highways.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7156

TTI | Safety and Operations

Project Number	Project Name	Status
0-7157	Develop Guidelines for Integration of UAS LiDAR and Photogrammetry to Enhance Land Surveying Capabilities	Closed

Project Start Date: 09/01/2022
Completion Date: 10/31/2024
Lead University: TAMUCC
University #2: TTI
Project Status: Closed
Total Project Budget: $553,669.00
TTI Total Budget: $179,215.50
TTI FY24 Budget: $112,284.25
TTI Total Project Spend $124,276.88
TTI FY24 Spend: $63,410.66

Project description: Unmanned aircraft systems (UASs) equipped with digital cameras, light detection and ranging (LiDAR) sensors, or both enable the collection of high spatial resolution three-dimensional (3D) quantitative geospatial data. This data may be used to support a variety of surveying and mapping activities, potentially with lower costs and greater safety than traditional survey methods. When using a camera, the technique is called Structure-from-Motion photogrammetry or UAS-SfM. In practice, there are important differences between UAS-SfM and UAS-LiDAR including measurement fidelity, operational considerations, post-processing workflows, and cost-effectiveness. With a lack of clear guidance on when UAS-SfM versus UAS-LiDAR is the best fit for a specific task, there is a need to evaluate the real-world performance capabilities and limitations of both technologies.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7157

TTI | Strategy and Innovation

Project Number	Project Name	Status
0-7159	Develop Guidelines for the Use of Unmanned Aerial Systems (UASs) and Smartphones for Construction and Utility Inspections	Active

Project Start Date: 09/01/2022
Completion Date: 08/31/2025
Lead University: TTI
University #2: TAMUCC
Project Status: Active
Total Project Budget: $821,985.50
TTI Total Budget: $671,570.50
TTI FY24 Budget: $178,119.50
TTI Total Project Spend: $388,321.26
TTI FY24 Spend: $179,051.98

Project description: Unmanned aircraft systems (UASs) equipped with miniaturized cameras enable the collection of high resolution, three-dimensional (3D) geospatial data at lower costs than traditional techniques. New technologies also make it possible to gather pictures and video using smartphones, which can be fed to Structure from Motion (SfM) software to develop highly accurate 3D products. Operating UASs requires trained pilots and observers, but smartphones do not. There is a need to test whether construction contractor crews in the field can gather data using either of these technologies and upload the imagery and video to a server to enable inspectors to conduct inspections remotely. The Performing Agencies shall conduct a literature review of UAS-SfM and smartphone technologies; prepare a list of use cases and case studies to test relevant technologies; conduct field tests to document advantages, disadvantages, complementary capabilities, and potential implementation scenarios and costs; prepare recommended settings, procedures, use cases, and operational workflows to ensure repeatable data collection and processing; and prepare guidelines for quality assurance and control of inspections conducted with UAS- and smartphone-based SfM photogrammetry, as well as identify project suitability for the adoption of these technologies to support construction and utility inspection activities at the Receiving Agency.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7159

TTI | Strategy and Innovation

Project Number	Project Name	Status
0-7166	Leveraging Probe-Based Data to Enhance Long-Term Planning Models	Closed

Project Start Date: 09/06/2022
Completion Date: 08/31/2024
Lead University: TTI
University #2: UTSA
Project Status: Closed
Total Project Budget: $346,904.25
TTI Total Budget: $176,271.75
TTI FY24 Budget: $74,822.75
TTI Total Project Spend: $177,030.88
TTI FY24 Spend: $76,155.29

Project description: Long-range transportation planning (LRTP) and travel demand models (TDMs) play an important role in the planning process, which assists transportation agencies with prioritizing future transportation investments. Improved LRTP and TDMs can bring direct benefits to transportation planning in the state. Effective transportation planning and investment decision making depends on timely, comprehensive, and accurate data. However, traditional data collection methods only provide a "snapshot" of the travel information, which limits the performance of conventional LRTP and TDMs. In this regard, while these sources are still used, transportation planners at the state, metropolitan, and local levels are beginning to incorporate third-party traffic data into their planning processes. Planners also start to look at the opportunities afforded through third-party data and provide guidance on how to take advantage of that data to expand and improve planning practices. This project aims to utilize probe-based data to improve the LRTP process and TDMs used by the Receiving Agency, MPOs and other planning agencies in the state. The Performing Agencies shall study how probe-based and location-based data may be leveraged to facilitate the validation and calibration of existing planning models, enhance existing modeling tools, and incorporate advanced modeling techniques.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7166

TTI | Structures and Hydraulics

Project Number	Project Name	Status
0-7167	Evaluate Performance of Sealers and Coatings Applied to TxDOT Bridge Substructures	Closed

Project Start Date: 09/01/2022
Completion Date: 10/31/2024
Lead University: TTI
University #2:
Project Status: Closed
Total Project Budget: $519,972.00
TTI Total Budget: $519,972.00
TTI FY24 Budget: $249,988.50
TTI Total Project Spend: $491,277.17
TTI FY24 Spend: $219,868.42

Project description: The Performing Agency shall perform a comprehensive evaluation of concrete sealers and coatings applied to bridge substructure in the state of Texas. The Performing Agency shall investigate the need for and extent of surface preparation on both new and existing concrete surfaces including those with previously applied coatings. A focus is placed on material testing to evaluate the performance of coatings applied with various surface preparation methods and exposed to environmental conditions. The potential benefits are the development of recommendations for the level of surface preparation required for various sealer or coating systems and for the optimal coating type for the Receiving Agency's substructures with or without previously applied coatings.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7167

TTI | Strategy and Innovation

Project Number	Project Name	Status
0-7169	Post-NEVI Electric Vehicle Infrastructure Research (Freight, Fleet, and Multi-family Housing	Closed

Project Start Date: 09/12/2022
Completion Date: 08/31/2024
Lead University: TTI
University #2:
Project Status: Closed
Total Project Budget: $399,347.00
TTI Total Budget: $399,347.00
TTI FY24 Budget: $200,772.25
TTI Total Project Spend: $362,083.30
TTI FY24 Spend: $174,328.58

Project description: With the growing adoption of electric vehicles (EVs) in the United States and by Texans, Texas has a need for adequate and comprehensive coverage of EV charging infrastructure. While currently comprising less than one percent of all registered vehicles in Texas, projections forecast that EVs could comprise up to 55 percent of all vehicles by the year 2040. This significant industry shift will require considerable and proactive efforts to support this transition, focusing on infrastructure readiness; customer experience; interregional connectivity, equity, and economic impacts; and other consequences related to the closure or repurposing of gas stations. Texas needs to identify optimal places where infrastructure will be needed in advance of federal and local funding that will be available to build out EV charging infrastructure. Since implementation of EV charging infrastructure will occur in phases over multiple years, a long-term strategic plan is necessary to guide the development of EV infrastructure, ensure that the Receiving Agency meets the needs of EV stakeholders, and maximize financial opportunities available to the state. The long-term strategic plan will guide infrastructure investment across the state, with a goal of a stable and consistent EV charging network. The project will also help guide future charging infrastructure funding opportunities and provide guidance to effectively and equitably distribute available funding. The Performing Agency shall review the existing EV charging infrastructure state of practice to understand needs and challenges in EV infrastructure, including deployment models, grid connectivity and upgrades, and evolving technologies such as in-road charging, swappable batteries, and future-proofing existing technology; assess tools available to guide statewide EV planning analysis, such as EVI-Pro and other platforms; develop an analysis of projected EV charging demand based on adoption trends and projections; develop a policy analysis of the local, state, and federal statutory landscape to identify barriers and opportunities in comparison to peer states; analyze funding opportunities and develop frameworks for funding models, including private-public partnerships, that will consider the state of practice, federal funding opportunities, and alternative funding sources; and develop strategies to improve the EV charging infrastructure system in Texas over the course of 5 to 10 years, including an evaluation of variables that affect the placement of new EV charging locations and the necessity and viability of battery storage and off-grid capabilities. These efforts will result in an assessment of EV planning analysis tools, a policy analysis framework, and long-term statewide EV infrastructure strategies.

Approved Work Program Revisions

No. of FY24 Amendments: One

Amendment #1:

Amend the contract to revise the project title from "Develop Texas Electric Vehicle Charging Infrastructure Readiness Plan" to "Post-NEVI Electric Vehicle Infrastructure Research (Freight, Fleet, and Multi-family Housing)".

CTR Library Project Link:

https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7169

TTI | Structures and Hydraulics

Project Number	Project Name	Status
0-7170	Evaluate Bridge Deck Condition and Replacement Methods	Active

Project Start Date: 01/01/2023
Completion Date: 03/31/2026
Lead University: TTI
University #2:
Project Status: Active
Total Project Budget: $734,786.00
TTI Total Budget: $734,786.00
TTI FY24 Budget: $273,424.00
TTI Total Project Spend: $283,089.28
TTI FY24 Spend: $160,521.08

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7170

TTI | Safety and Operations

Project Number	Project Name	Status
0-7171	Barrier Striping for the Reduction of Accidents	Active

Project Start Date: 09/01/2023
Completion Date: 05/31/2025
Lead University: TTI
University #2: TXST
Project Status: Active
Total Project Budget: $301,179.00
TTI Total Budget: $233,247.75
TTI FY24 Budget: $179,630.75
TTI Total Project Spend $112,982.20
TTI FY24 Spend: $108,671.35

Project description: 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.

Approved Work Program Revisions

No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7171

TTI | Planning and Environment

Project Number	Project Name	Status
0-7174	Develop an Interactive Statewide Production Rate Estimation Tool for Reliable Contract Time Determination	Active

Project Start Date: 09/01/2023
Completion Date: 02/28/2026
Lead University: TTI
University #2:
Project Status: Active
Total Project Budget: $374,458.25
TTI Total Budget: $374,458.25
TTI FY24 Budget: $150,220.50
TTI Total Project Spend: $68,479.93
TTI FY24 Spend: $64,541.42

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7174

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7175	Develop Best Practices for Flexible Pavement Repairs	Active

Project Start Date: 09/01/2023
Completion Date: 02/28/2026
Lead University: TTI
University #2: PVAMU
Project Status: Active
Total Project Budget: $413,069.00
TTI Total Budget: $401,866.50
TTI FY24 Budget: $157,747.00
TTI Total Project Spend $112,634.84
TTI FY24 Spend: $109,794.66

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7175

TTI | Planning and Environment

Project Number	Project Name	Status
0-7176	Develop and Updated Methodology for Calculation of Reimbursement Levels for Utility Relocations	Active

Project Start Date: 09/01/2023
Completion Date: 08/31/2025
Lead University: TTI
University #2:
Project Status: Active
Total Project Budget: $423,896.25
TTI Total Budget: $423,896.25
TTI FY24 Budget: $250,971.50
TTI Total Project Spend: $241,232.56
TTI FY24 Spend: $220,298.91

Project description: Of the various situations in which a utility relocation is eligible for reimbursement at the Receiving Agency, one of the most complex situations is when parts of the existing utility facility involve a property interest. For utility facilities that involve a private property interest, the Receiving Agency uses an eligibility ratio, which is defined as the percentage of utility facilities that are reimbursable in relation to the total amount of utility facilities being relocated. In practice, eligibility calculations can be convoluted or complex, particularly in situations where the utility facility spans multiple property interest locations. The Performing Agency shall develop and test an improved methodology to determine reimbursement eligibility and calculate utility reimbursement amounts. The Performing Agency shall document a significant sample of utility relocations and their associated reimbursement costs to develop a reliable baseline of practices throughout the state, evaluate practices in other states, develop and test an updated methodology for utility reimbursement eligibility criteria and calculations, prepare a guidebook with examples on how to determine utility reimbursement criteria and calculate reimbursement amounts, and prepare and test training materials.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7176

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7177	Identifying Pavement Improvement Projects for Enhanced Safety	Active

Project Start Date: 09/18/2023
Completion Date: 02/28/2026
Lead University: TTI
University #2: UH
Project Status: Active
Total Project Budget: $478,160.00
TTI Total Budget: $368,491.25
TTI FY24 Budget: $141,647.50
TTI Total Project Spend $185,507.44
TTI FY24 Spend: $155,357.53

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7177

TTI | Structures and Hydraulics

Project Number	Project Name	Status
0-7179	Evaluate Safety End Treatments for Roadside Drainage Structures	Active

Project Start Date: 09/01/2023
Completion Date: 08/31/2026
Lead University: TTI
University #2:
Project Status: Active
Total Project Budget: $863,759.75
TTI Total Budget: $863,759.75
TTI FY24 Budget: $204,590.00
TTI Total Project Spend: $139,457.58
TTI FY24 Spend: $124,538.94

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7179

TTI | Safety and Operations

Project Number	Project Name	Status
0-7183	Develop Crash Modification Factors for Super 2 Highways	Active

Project Start Date: 09/01/2023
Completion Date: 11/30/2024
Lead University: TTI
University #2: TXST
Project Status: Active
Total Project Budget: $236,029.68
TTI Total Budget: $167,065.25
TTI FY24 Budget: $145,845.00
TTI Total Project Spend $150,129.48
TTI FY24 Spend: $143,907.80

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7183

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7185	Develop Enhanced Cold Recycling Methods and Specifications	Active

Project Start Date: 09/19/2023
Completion Date: 08/31/2026
Lead University: TTI
University #2:
Project Status: Active
Total Project Budget: $1,731,875.00
TTI Total Budget: $1,731,875.00
TTI FY24 Budget: $619,619.00
TTI Total Project Spend $291,752.31
TTI FY24 Spend: $291,752.31

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7185

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7186	Develop Next Generation of Hamburg Rutting Test for Asphalt Mixes	Active

Project Start Date: 09/01/2023
Completion Date: 08/31/2026
Lead University: TTI
University #2:
Project Status: Active
Total Project Budget: $634,305.00
TTI Total Budget: $574,305.00
TTI FY24 Budget: $174,326.00
TTI Total Project Spend $160,907.17
TTI FY24 Spend: $148,389.82

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7186

TTI | Planning and Environment

Project Number	Project Name	Status
0-7187	Exploring and Developing Innovative Methods for Estimating VMT on Local Roads in Texas	Active

Project Start Date: 09/05/2023
Completion Date: 08/31/2025
Lead University: TTI
University #2: TXST
Project Status: Active
Total Project Budget: $399,269.95
TTI Total Budget: $359,104.50
TTI FY24 Budget: $157,605.50
TTI Total Project Spend: $172,174.16
TTI FY24 Spend: $159,248.02

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7187

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7188	Synthesis: Pavement Widening Best Practices	Closed

Project Start Date: 09/01/2023
Completion Date: 08/31/2024
Lead University: TTI
University #2:
Project Status: Closed
Total Project Budget: $64,931.75
TTI Total Budget: $64,931.75
TTI FY24 Budget: $64,931.75
TTI Total Project Spend $47,341.15
TTI FY24 Spend: $47,341.15

Project description: The Receiving Agency has observed premature pavement failures on several widening projects, including shoulder widenings, conversion of two-lane roadways to Super 2 sections, and other safety enhancements. Repairing these early failures is time-consuming, expensive, disrupts traffic, and poses safety hazards. Key contributing factors include poor-quality materials, poor joint construction, inadequate drainage, differential settlement, etc. These issues could have been avoided through proper pre-evaluation, design, and construction practices; but detailed guidance which methods to employ, which can be project specific, is not readily available to district personnel. Therefore, there is a need to document and implement better widening practices. The Performing Agency shall synthesize the best practices for pavement widening by conducting the following research objectives:

- Reviewing the literature for effective widening practices.
- Reviewing current widening practices employed by the Receiving Agency, including:
  - Pre-design pavement evaluation
  - Pavement layer and cross-section design
  - Materials
  - Project plans, specifications and estimates
  - Construction practices.
- Evaluating previous widening projects both in good and poor condition. Identify issues and practices that can lead to premature failure, and practices that should be adopted more widely.
- Developing comprehensive guidelines and modifications to specifications.

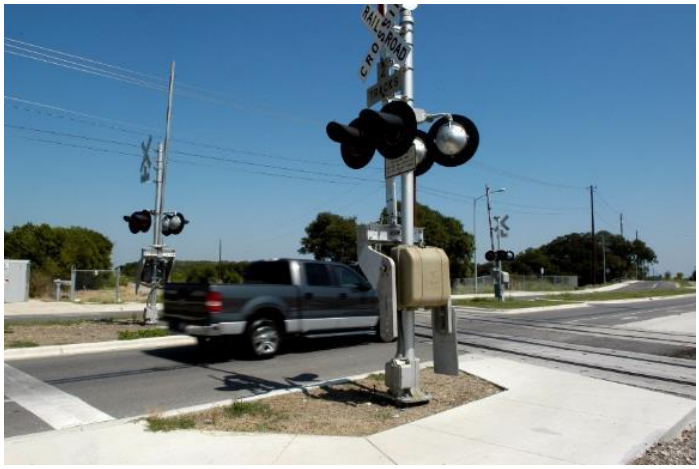
Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7188

TTI | Planning and Environment

Project Number	Project Name	Status
0-7189	Safety Assessment of Shared Use Paths at Roadway Crossings using Exposure-Based Models	Active

Project Start Date: 09/01/2023
Completion Date: 08/31/2025
Lead University: TTI
University #2: TXST
Project Status: Active
Total Project Budget: $349,999.35
TTI Total Budget: $295,686.00
TTI FY24 Budget: $185,614.25
TTI Total Project Spend: $201,683.46
TTI FY24 Spend: $185,883.67



Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7190

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7191	Develop Systematic and Quantitative Approach to Assess the Probability of Extreme Weather and Resilience Risks for TxDOT Highways and Bridges	Active

Project Start Date: 12/05/2023
Completion Date: 08/31/2025
Lead University: TTI
University #2: CTR, UTSA, TXST
Project Status: Active
Total Project Budget: $796,520.38
TTI Total Budget: $329,123.25
TTI FY24 Budget: $159,778.00
TTI Total Project Spend $141,545.58
TTI FY24 Spend: $141,545.58

Project description: 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:

1. Manage the project scope, budget, and timeline.
2. Conduct an extensive review of the literature.
3. Identify climate stressors to the Receiving Agency's pavements and bridges.
4. Assess the probability of such climate stressors and extreme weather events.
5. Quantify the impact on bridges.
6. Quantify the impact on pavements.
7. Develop an asset risk and resilience assessment framework.
8. Develop and quantify adaptation strategies.
9. Conduct scenario analysis.
10. Identify proxy indicators that can be tracked to monitor high-priority risks.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7191

TTI | Structures and Hydraulics

Project Number	Project Name	Status
0-7192	Develop Performance of Baseplate Connections in COSS and Traffic Signal Structures	Active

Project Start Date: 09/01/2023
Completion Date: 08/31/2026
Lead University: TTI
University #2: UTEP
Project Status: Active
Total Project Budget: $988,604.75
TTI Total Budget: $877,423.50
TTI FY24 Budget: $219,180.25
TTI Total Project Spend: $210,271.40
TTI FY24 Spend: $210,271.40

Project description: 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.
6. Provide recommendations for identifying fatigue-critical of existing inventory.

Approved Work Program Revisions

No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7192

TTI | Structures and Hydraulics

Project Number	Project Name	Status
0-7193	Develop Assessment and Mitigation Guidance for Ancillary Highway Structures with Existing Cracks	Active

Project Start Date: 09/01/2023
Completion Date: 08/31/2026
Lead University: CTR
University #2: TTI
Project Status: Active
Total Project Budget: $1,493,580.09
TTI Total Budget: $499,151.75
TTI FY24 Budget: $112,259.00
TTI Total Project Spend: $115,228.89
TTI FY24 Spend: $115,228.89

Project description: 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.

Approved Work Program Revisions

No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7193

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7195	Quantify Bridge and Pavement Consumption Due to Permitted Overweight/Oversized (OW/OS) Vehicles	Active

Project Start Date: 09/01/2023
Completion Date: 02/28/2026
Lead University: CTR
University #2: TTI, UTSA
Project Status: Active
Total Project Budget: $828,584.25
TTI Total Budget: $75,000.00
TTI FY24 Budget: $30,000.00
TTI Total Project Spend $29,915.62
TTI FY24 Spend: $29,915.62

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7195

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7197	Evaluate Effects of Recycled Asphalt Pavement (RAP) on Performance-Graded (PG) Binder Polymer Concentration	Active

Project Start Date: 10/06/2023
Completion Date: 04/30/2026
Lead University: CTR
University #2: TTI
Project Status: Active
Total Project Budget: $593,006.28
TTI Total Budget: $245,000.00
TTI FY24 Budget: $109,449.50
TTI Total Project Spend $87,506.47
TTI FY24 Spend: $80,543.92

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7197

TTI | Safety and Operations

Project Number	Project Name	Status
0-7198	Traffic Control Device Analysis, Testing, and Evaluation Program	Active

Project Start Date: 09/01/2023
Completion Date: 11/30/2024
Lead University: TTI
University #2:
Project Status: Active
Total Project Budget: $1,637,159.25
TTI Total Budget: $1,637,159.25
TTI FY24 Budget: $527,641.00
TTI Total Project Spend $457,753.18
TTI FY24 Spend: $436,779.05

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7198

TTI | Strategy and Innovation

Project Number	Project Name	Status
0-7199	Identification of Needs and Strategies for First Responder Interactions with Automated Vehicles (Avs)	Active

Project Start Date: 09/01/2023
Completion Date: 02/28/2025
Lead University: TTI
University #2: TEEX
Project Status: Active
Total Project Budget: $310,814.13
TTI Total Budget: $288,461.50
TTI FY24 Budget: $231,424.25
TTI Total Project Spend: $240,231.59
TTI FY24 Spend: $225,462.48

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7199

TTI | Strategy and Innovation

Project Number	Project Name	Status
0-7200	Utilizing Telematics to Understand Driving Behavior During Missed Exits and Wrong Turns	Active

Project Start Date: 09/01/2023
Completion Date: 08/31/2025
Lead University: TTI
University #2: UTA
Project Status: Active
Total Project Budget: $403,695.31
TTI Total Budget: $253,800.50
TTI FY24 Budget: $128,704.00
TTI Total Project Spend: $129,747.62
TTI FY24 Spend: $124,164.86

Project description: 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.

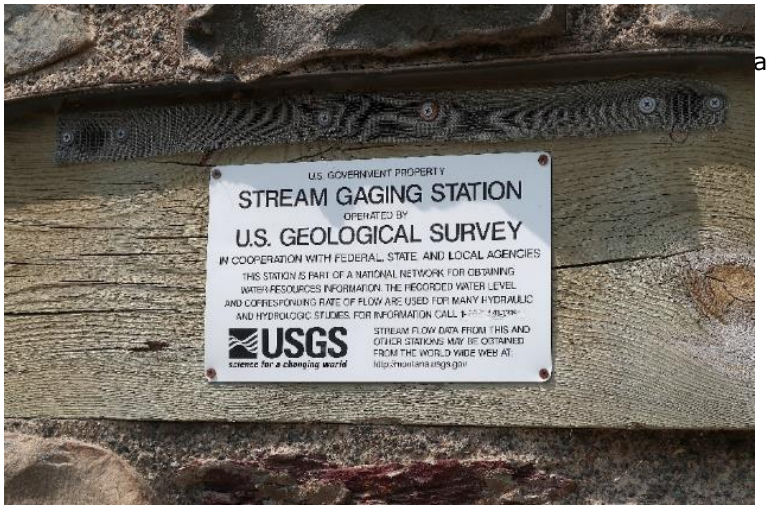
Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7200

TTI | Structures and Hydraulics

Project Number	Project Name	Status
0-7202	Synthesis: The State of Knowledge and State of Practice for Non-Contact Radar Stream Gauges in Texas, the United States, and Internationally	Closed

Project Start Date: 09/01/2023
Completion Date: 08/31/2024
Lead University: TTI
University #2: USGS
Project Status: Closed
Total Project Budget: $64,776.20
TTI Total Budget: $49,999.25
TTI FY24 Budget: $49,999.25
TTI Total Project Spend: $29,242.06
TTI FY24 Spend: $29,242.06



Project description: The United States Geological Survey (USGS) and other entities have begun to use non-contact radar for stream gauging to collect near-real-time stream velocity, discharge, and stage. Use of these devices is limited compared to traditional stream gauge methods that are typically used by the USGS and local government agencies in Texas. At the state level, TxDOT is leading the way, through partnership with the USGS, to deploy these stream gauges and is constantly learning how they can best be deployed. Because the gauges measure stream velocity and water level, they are easier and more useful to install in tidal areas than traditional gauges. In some streams, there is a peak in velocity wave in advance of a peak in water surface elevation, potentially acting as an advance warning of flood levels. Installation of these gauges is far simpler than traditional gauges in areas where channel vegetation, slope, or size, may affect equipment that must be installed down in the channel. While these gages appear to be less expensive to operate and maintain than traditional USGS gauging approaches, it would be beneficial to learn from experiences in other US states, agencies, and other countries who have used these devices for longer periods of time rather than solely learning by doing.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7202

TTI | Strategy and Innovation

Project Number	Project Name	Status
0-9908-22	Planning Innovation and Technology Deployments at TxDOT	Closed

Project Start Date: 03/10/2022
Completion Date: 12/31/2023
Lead University: TTI
University #2:
Project Status: Closed
Total Project Budget: $3,152,815.00
TTI Total Budget: $3,152,815.00
TTI FY24 Budget: $481,339.00
TTI Total Project Spend: $1,411,205.93
TTI FY24 Spend: $0.00

Project description: From time to time, TxDOT districts produce ITS and other technology innovations that improve roadway and/or worker safety, roadway efficiency and/or produce cost savings. By failing to recognize and scale these innovations across the state, TxDOT does not receive the full benefit of 25 diverse centers of excellence. This contract utilizes TTI, which is an organization that excels at innovation in and of itself, to investigate innovative district practices and to develop plans at a district and statewide level to share and scale innovation across the state. By harvesting the knowledge already contained within TxDOT, new avenues will open to improve roadway safety, efficiency and produce cost savings. Due to the breadth of TxDOT, these innovations may have very large impacts on the millions of Texans across the state and their visitors. Additionally, by cataloging and bringing together these innovations, divisions and districts can work together to make sure that solutions are developed in such a way that unified systems and interoperability occur throughout the state. This project also complements a wider effort to catalog, share and grow innovation at TxDOT. The end result for Planning for Innovation and Technology

Deployments at TxDOT is a programmatic set of documents that compile and recommend innovative ITS and advanced technology roadway projects and system improvements that TxDOT districts can execute, customized to each district. To arrive at this, the consultant team will interact with districts and industry professionals as unique stakeholders across the state and the nation to compile insights of innovative projects that may include data analysis, operational improvements, or deployment of advanced technologies along the roadway, among others. The consultant team will develop high level scope and cost estimates for each offered transportation project. The consultant may also be directed to develop a strategy blueprint (goal, purpose, scope, timeline, responsibilities) for how innovation and technology deployment can be progressed as an integral part of the Receiving Agency's functions and to develop evaluation plans and/or templates for Department innovation and technology deployment projects.

Approved Work Program Revisions

No. of FY24 Amendments: One

Amendment #1:

Amend the contract to revise the budget and the deliverables due dates due to start date being postponed as a result of funding complications. The FY23 budget is decreasing by $224,468.20 from $2,469.150.20 to $2,244,682.00. The FY24 budget remains the same at $481,339.00. The total amount of this contract remains unchanged at $3,152,815.00.

CTR Library Project Link:

https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-9908-22

TTI | Construction, Maintenance & Materials

Project Number	Project Name	Status
5-7025-01	Pilot Implementation of Surface Aggregate Classification of Reclaimed Asphalt Pavement	Active

Project Start Date: 02/01/2024
Completion Date: 08/31/2027
Lead University: TTI
University #2:
Project Status: Active
Total Project Budget: $660,716.00
TTI Total Budget: $660,716.00
TTI FY24 Budget: $131,549.00
TTI Total Project Spend $113,898.84
TTI FY24 Spend: $96,022.34

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=5-7025-01

TTI | Safety and Operations

Project Number	Project Name	Status
5-7049-01	Implementation of Improving and Communicating Speed Management Practices	Closed

Project Start Date: 03/24/2023
Completion Date: 08/31/2024
Lead University: TTI
University #2:
Project Status: Closed
Total Project Budget: $95,608.00
TTI Total Budget: $95,608.00
TTI FY24 Budget: $34,785.00
TTI Total Project Spend $65,900.09
TTI FY24 Spend: $35,829.55

Project description: This project shall increase the Receiving Agency's understanding of the fundamental relationships between posted and operating speed along with providing content to support external and internal Receiving Agency dialog about speed limits and their development for all roadway environments. This project shall include three (3) workshops along with developing Spanish versions of previously delivered materials (to include pamphlets and a short video) on speed limit setting practices oriented to the general public to meet the diverse needs of Texans.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=5-7049-01

TTI | Safety and Operations

Project Number	Project Name	Status
5-7083-01	Implementation of Safety Prediction Methods Developed for Texas Highways	Closed

Project Start Date: 02/28/2023
Completion Date: 02/29/2024
Lead University: TTI
University #2:
Project Status: Closed
Total Project Budget: $67,365.00
TTI Total Budget: $67,365.00
TTI FY24 Budget: $30,242.50
TTI Total Project Spend $69,158.94
TTI FY24 Spend: $32,746.91

Project description: The Receiving Agency Research Projects 0-7083 Develop Highway Safety Manual (HSM) Safety Performance Functions (SPFs) and Calibration Factors for Texas and 0-7067 Enhancing Freeway Safety Prediction Models developed safety prediction methods for all Texas highways. These methods are used to predict safety performance and help with the complex trade-offs between safety, operations, community impacts, and costs that are often necessary when planning and designing highway projects. These resources shall form a powerful tool for selecting Highway Safety Improvement Program projects and will support and defend safety decisions made by the Design Division and districts. The Performing Agency incorporated these methods into spreadsheet tools to implement the new models and facilitate analysis of all rural and urban roadway segments and intersections. The Performing Agency shall develop and present webinars and workshops for Receiving Agency personnel who are responsible for traffic safety analysis. The webinars and workshops will familiarize personnel with the safety prediction methods and the analysis tools.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=5-7083-01

TTI | Safety and Operations

Project Number	Project Name	Status
5-9050-02	Provision of Select Computer-Aided Dispatch Data to Traffic Management Centers for Enhanced Incident Detection and Tracking	Closed

Project Start Date: 11/09/2021
Completion Date: 12/31/2023
Lead University: TTI
University #2:
Project Status: Closed
Total Project Budget: $125,000.00
TTI Total Budget: $125,000.00
TTI FY24 Budget: $18,640.00
TTI Total Project Spend $122,012.26
TTI FY24 Spend: $18,443.63

Project description: The Receiving Agency's Traffic Management Centers (TMCs) are responsible for monitoring freeways within their respective metropolitan areas for crashes, stalls, and other incident impacting traffic flow, contacting the appropriate responding agencies (police/fire/emergency medical services/tow), and tracking incident progress. TMC staff predominantly use Closed Circuit television (CCTV) camera feeds to find incidents, as well as volume/speed detectors on the Receiving Agency Intelligent Transportation Systems (ITS) map, and the traffic layer on Google Maps. While these methods help to some degree, they are not always effective or efficient. CCTV tours (which show 5-10 second feeds of a freeway segment) can miss an incident if the camera is pointing in a different direction. TMC staff focusing on one freeway may miss an event on another freeway. Google traffic indicators only show the level of traffic but not incidents that caused the traffic. Often, those involved in incidents immediately contact 9-1-1 for assistance. The Performing Agency shall develop a system that collects essential incident management information from 9-1-1 systems and transmits said information to regional TMCs to speed up the identification and response to an incident and collect needed incident management data to better assess incident management programs in the region.

Approved Work Program Revisions
No. of FY24 Amendments: Two

Amendment #1:
Amend the contract to extend the contract and to revise the budget and project schedule due to delays in the law enforcement recruiting process between the Receiving Agency and local law enforcement agencies. Additional time is needed to address data transfer arrangements and concerns of all participating agencies. The FY 2022 budget is decreased by $46,395.75 from $79,030.75 to $32,635.00. The FY 2023 budget is increased by $46,395.75 from $45,969.25 to $92,365.00. The Itemized Project Budget Estimate remains $125,000.00.

Amendment #2:

Amend the contract to extend the contract and to revise the budget and project schedule due to delays in developing an Interlocal Agreement between the Receiving Agency and participating law enforcement entities, and subsequently, additional delays in the law enforcement recruiting process between the Receiving Agency and local law enforcement agencies. Additional time is needed to solidify agreements with law enforcement agencies to participate in the data provision. The FY 2023 budget is decreased by $18,640.00 from $92,365.00 to $73,725.00; the FY 2024 budget is established at $18,640.00; the Itemized Project Budget Estimate remains $125,000.00.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=5-9050-02

TTI | Strategy and Innovation

Project Number	Project Name	Status
5-9908-24	Innovative Transportation Projects at TxDOT	Active

Project Start Date: 01/01/2024
Completion Date: 02/28/2027
Lead University: TTI
University #2:
Project Status: Active
Total Project Budget: $7,108,387.00
TTI Total Budget: $7,108,387.00
TTI FY24 Budget: $810,300.00
TTI Total Project Spend: $0.00
TTI FY24 Spend: $0.00

Project description: From time to time, TxDOT districts produce ITS and other technology and process innovations that improve Roadway/worker safety, improve roadway efficiency, and/or produce cost savings. This contract leverages the capabilities of TTI to identify, develop, and scale district innovations that are ready to deploy across the state, so that TxDOT can capture the full benefit of 25 different districts with particular insights, creativity and innovative thinking. TTI will investigate innovative district practices and develop plans at a district and statewide level to share and scale innovation across the state. By harvesting the real-world knowledge already contained within TxDOT, new avenues will open to improve roadway safety, efficiency and produce cost savings impacting the millions of travelers across the state. Additionally, by cataloging and bringing together these innovations, divisions and districts can work together to make sure that solutions are developed in such a way that unified systems and interoperability occur throughout the state.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=5-9908-24

TTI | Safety and Operations

Project Number	Project Name	Status
9-1531	Development and Evaluation of Roadside Safety Systems for Motorcyclists	Active

Project Start Date: 09/01/2021
Completion Date: 08/31/2025
Lead University: TTI
University #2:
Project Status: Closed
Total Project Budget: $900,000.00
TTI Total Budget: $900,000.00
TTI FY24 Budget: $415,086.75
TTI Total Project Spend $687,337.28
TTI FY24 Spend: $403,386.75

Project description: This pooled fund study shall provide a cooperative approach to conducting research addressing roadside safety issues specifically related to improving motorcyclist safety. The study shall provide participating states an opportunity to collaborate on best practices, new regulatory issues, risk management strategies, and other research pertaining to roadside safety improvements for motorcyclists. The research activities shall include the identification, development, and evaluation of strategies and devices for mitigating the frequency and severity of roadway departure motorcyclist crashes.

Approved Work Program Revisions
No. of FY24 Amendments: Two

Amendment #4:
Amend the contract to replace the Principal Investigator due to the departure of the Project Supervisor.

Amendment #5:
Amend the contract to contract to revise the budget and update project schedule to modify Deliverables R2 to R2A and R2B. The FY 2022 budget remains $72,654.25; the FY 2023 budget is decreased by $121,028.50 from $413,287.50 to $292,259.00; the FY 2024 budget is increased by $121,028.50 from $294,058.25 to $415,086.75; the Total Project Budget remains at $780,000.00.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=9-1531

2.10 TXST – Texas State University – San Marcos

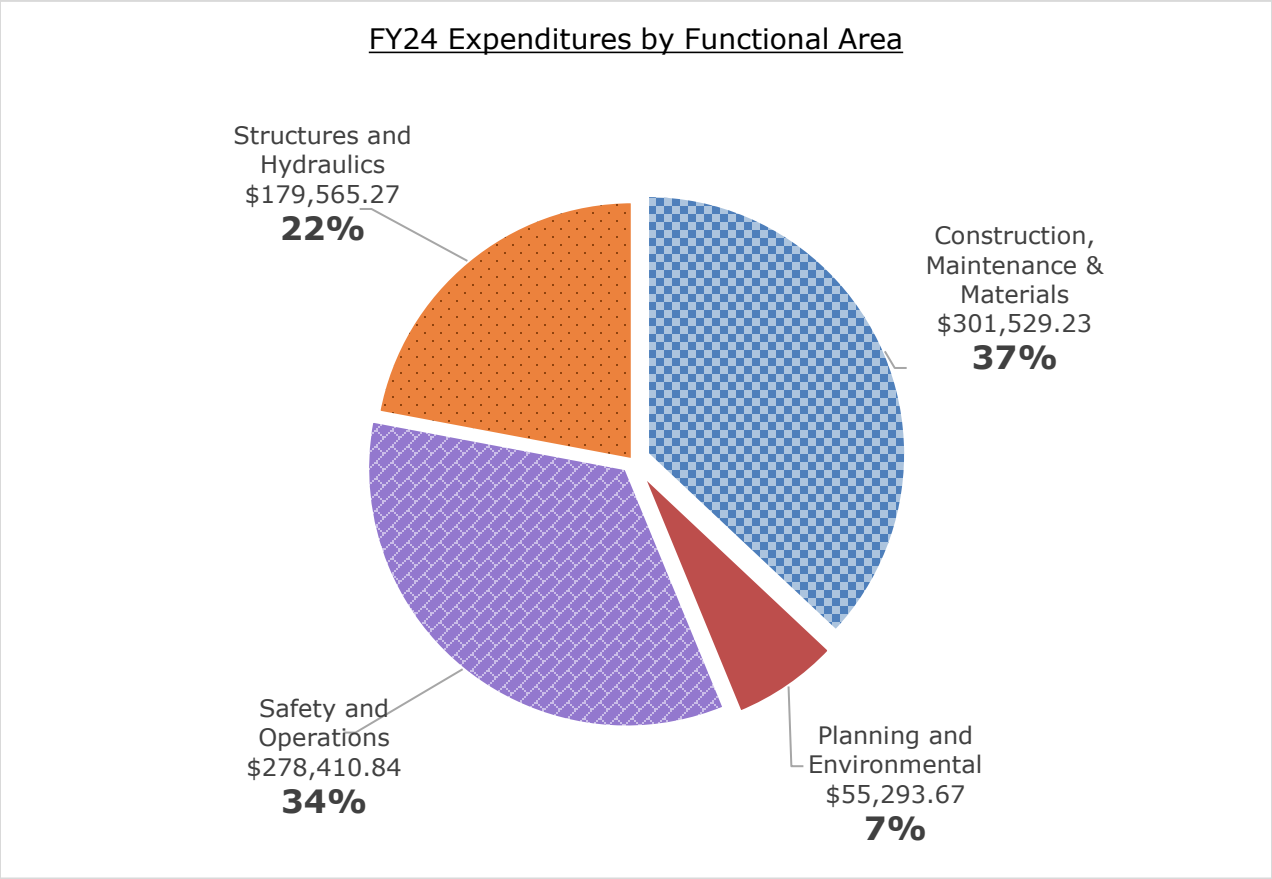


Figure 13. Pie chart of TXST expenditures by Functional Area

Project Number	Project Name	Status
0-7017	Use of Rapid Setting Hydraulic Cement (RSHC) for Structural Applications	Closed
0-7072	Improve Data Quality for Automated Pavement Distress Data Collection	Closed
0-7144	Develop a Real-time Decision Support Tool for Urban Roadway Safety Improvement	Active
0-7150	Artificial Intelligence for Pavement Condition Assessment from 2D/3D	Active
0-7171	Barrier Striping for the Reduction of Accidents	Active
0-7172	Developing a Performance-Based Concrete Overlay Mix Design for Improved Resistance to Early-Age Cracking and Increased Durability	Active
0-7178	Use Network Level Texture to Enhance Pavement Management	Active
0-7183	Develop Crash Modification Factors for Super 2 Highways	Active

Project Number	Project Name	Status
0-7187	Exploring and Developing Innovative Methods for Estimating VMT on Local Roads in Texas	Active
0-7189	Safety Assessment of Shared Use Paths at Roadway Crossings using Exposure-Based Models	Active
0-7191	Develop Systematic and Quantitative Approach to Assess the Probability of Extreme Weather and Resilience Risks for TxDOT Highways and Bridges	Active

FUNCTIONAL AREAS: 1. Structures and Hydraulics; 2. Constr, Maint & Materials; 3. Planning and Environmental; 4. Program Support; 5. Safety and Operations; 6. Strategy and Innovation

TXST | Structures and Hydraulics

Project Number	Project Name	Status
0-7017	Use of Rapid Setting Hydraulic Cement (RSHC) for Structural Applications	Closed

Project Start Date: 07/03/2019
Completion Date: 12/31/2023
Lead University: TXST
University #2:
Project Status: Closed
Total Project Budget: $572,509.00
TXST Total Budget: $0.00
TXST FY24 Budget: $23,790.00
TXST Total Project Spend: $0.00
TXST FY24 Spend: $142.50

Project description: The goal of this project is to determine feasibility of using rapid setting cements as a cost-effective solution for structural applications in Texas, specifically in bridge structural components and decks. The PERFORMING AGENCY, or "research team", will (1) synthesize relevant information available on rapid cements in published (and unpublished) literature, (2) conduct a survey of domestically available and structurally feasible rapid setting cements for use in TxDOT bridge deck construction, (3) perform a comprehensive experimental evaluation covering a range of fresh and hardened material properties for calcium sufloaluminate (CSA) cement, calcium aluminate cement (CAC), Type III cement, and combinations of all three,

(4) verify and demonstrate adequate performance characteristic and durability performance based on laboratory testing, (5) correlate performance characteristics with material and placement costs, and (6) develop guidelines and specification for implementation of rapid setting cements for bridge structures and decks in Texas.

Approved Work Program Revisions

No. of FY24 Amendments: One

Amendment #3:

Amend the contract to extend the termination date, and to revise the budget and the project schedule due to additional time needed for testing and final reporting of those results. The update to the project schedule will be done at no additional cost and support an extension to the project period. The FY19 Budget remains at $16,640.00; the FY20 Budget remains at $160,227.00; the FY21 Budget remains at $186,337.00; the FY22 Budget remains at $101,796.00; the FY23 Budget of $107,509.00 is decreased by $32,790.00 from $107,509.00 to $74,719.00; the FY24 Budget is established in the amount of $32,790.00; the Total project budget remains at $572,509.00.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7017

TXST | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7072	Improve Data Quality for Automated Pavement Distress Data Collection	Closed

Project Start Date: 09/08/2020
Completion Date: 08/31/2024
Lead University: TXST
University #2:
Project Status: Closed
Total Project Budget: $449,720.00
TXST Total Budget: $0.00
TXST FY24 Budget: $112,742.48
TXST Total Project Spend $0.00
TXST FY24 Spend: $98,349.73

Project description: Accuracy and precision issues associated with the reliability of the existing automated and semi-automated pavement condition data collection methods have existed since inception with the Receiving Agency. This research shall develop data quality assurance guidelines for the Receiving Agency to improve the quality of automated pavement condition data. The three components in the research are the development of an audit sampling method, a set of consistency check criteria for pre-analysis of new data, and data quality criteria in acceptance of new data. A pilot study for a selected Receiving Agency District shall be completed with the developed guidelines to evaluate the effectiveness of the proposed data quality assurance procedures for data quality improvement.

Approved Work Program Revisions
No. of FY24 Amendments: One

Amendment #3:
Amend the contract to extend the termination date, and to revise the budget and the project schedule due to additional time needed for testing and final reporting of those results. The update to the project schedule will be done at no additional cost and support an extension to the project period. The FY19 Budget remains at $16,640.00; the FY20 Budget remains at $160,227.00; the FY21 Budget remains at $186,337.00; the FY22 Budget remains at $101,796.00; the FY23 Budget of $107,509.00 is decreased by $32,790.00 from $107,509.00 to $74,719.00; the FY24 Budget is established in the amount of $32,790.00; the Total project budget remains at $572,509.00.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7072

TXST | Safety and Operations

Project Number	Project Name	Status
0-7144	Develop a Real-time Decision Support Tool for Urban Roadway Safety Improvement	Active

Project Start Date: 01/09/2023
Completion Date: 06/30/2025
Lead University: TXST
University #2: TTI
Project Status: Active
Total Project Budget: $465,010.00
TXST Total Budget: $359,018.50
TXST FY24 Budget: $172,507.50
TXST Total Project Spend $282,510.69
TXST FY24 Spend: $167,123.55

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: One

Amendment #1:
The Project has been cancelled and is being re-RFP'd due to the departure of the lead University Project Supervisor, Subasish Das.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7144

TXST | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7150	Artificial Intelligence for Pavement Condition Assessment from 2D/3D Surface Images	Active

Project Start Date: 09/01/2022
Completion Date: 08/31/2025
Lead University: TXST
University #2:
Project Status: Active
Total Project Budget: $451,875.00
TXST Total Budget: $451,875.00
TXST FY24 Budget: $148,057.50
TXST Total Project Spend $249,997.72
TXST FY24 Spend: $141,148.31

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7150

TXST | Safety and Operations

Project Number	Project Name	Status
0-7171	Barrier Striping for the Reduction of Accidents	Active

Project Start Date: 09/01/2023
Completion Date: 05/31/2025
Lead University: TTI
University #2: TXST
Project Status: Active
Total Project Budget: $301,179.00
TXST Total Budget: $67,931.25
TXST FY24 Budget: $48,753.75
TXST Total Project Spend $48,022.70
TXST FY24 Spend: $48,022.70

Project description: 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.

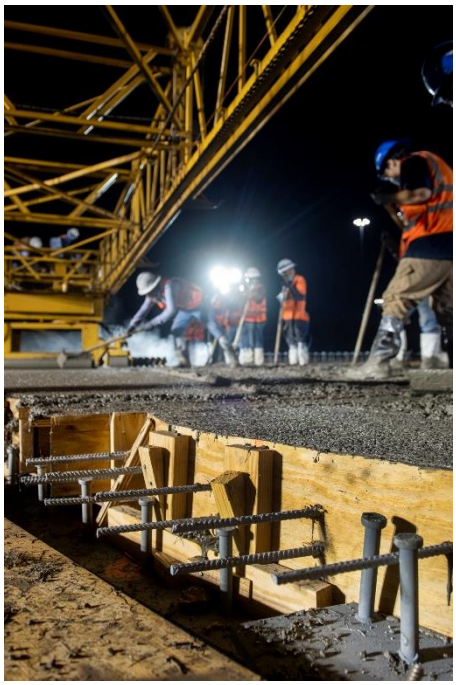
Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7171

TXST | Structures and Hydraulics

Project Number	Project Name	Status
0-7172	Developing a Performance-Based Concrete Overlay Mix Design for Improved Resistance to Early-Age Cracking and Increased Durability	Active

Project Start Date: 09/01/2023
Completion Date: 08/31/2026
Lead University: TXST
University #2:
Project Status: Active
Total Project Budget: $700,370.51
TXST Total Budget: $700,370.52
TXST FY24 Budget: $242,464.38
TXST Total Project Spend: $179,422.77
TXST FY24 Spend: $179,422.77



Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7172

TXST | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7178	Use Network Level Texture to Enhance Pavement Management	Active

Project Start Date: 09/01/2023
Completion Date: 08/31/2025
Lead University: CTR
University #2:
Project Status: Active
Total Project Budget: $399,814.26
TXST Total Budget: $96,890.89
TXST FY24 Budget: $46,831.25
TXST Total Project Spend $31,485.84
TXST FY24 Spend: $31,485.84

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7178

TXST | Safety and Operations

Project Number	Project Name	Status
0-7183	Develop Crash Modification Factors for Super 2 Highways	Active

Project Start Date: 09/01/2023
Completion Date: 11/30/2024
Lead University: TTI
University #2: TXST
Project Status: Active
Total Project Budget: $236,029.68
TXST Total Budget: $68,964.43
TXST FY24 Budget: $64,954.43
TXST Total Project Spend $63,264.59
TXST FY24 Spend: $63,264.59

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7183

TXST | Planning and Environment

Project Number	Project Name	Status
0-7187	Exploring and Developing Innovative Methods for Estimating VMT on Local Roads in Texas	Active

Project Start Date: 09/05/2023
Completion Date: 08/31/2025
Lead University: TTI
University #2: TXST
Project Status: Active
Total Project Budget: $399,269.95
TXST Total Budget: $40,165.45
TXST FY24 Budget: $25,018.20
TXST Total Project Spend: $24,313.37
TXST FY24 Spend: $24,313.37

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7187

TXST | Planning and Environment

Project Number	Project Name	Status
0-7189	Safety Assessment of Shared Use Paths at Roadway Crossings using Exposure-Based Models	Active

Project Start Date: 09/01/2023
Completion Date: 08/31/2025
Lead University: TTI
University #2: TXST
Project Status: Active
Total Project Budget: $349,999.35
TXST Total Budget: $54,313.35
TXST FY24 Budget: $31,040.30
TXST Total Project Spend: $30,980.30
TXST FY24 Spend: $30,980.30

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7189

TXST | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7191	Develop Systematic and Quantitative Approach to Assess the Probability of Extreme Weather and Resilience Risks for TxDOT Highways and Bridges	Active

Project Start Date: 12/05/2023
Completion Date: 08/31/2025
Lead University: TTI
University #2: CTR, UTSA, TXST
Project Status: Active
Total Project Budget: $796,520.38
TXST Total Budget: $70,639.58
TXST FY24 Budget: $35,014.04
TXST Total Project Spend $30,545.35
TXST FY24 Spend: $30,545.35

Project description: 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:

1. Manage the project scope, budget, and timeline.
2. Conduct an extensive review of the literature.
3. Identify climate stressors to the Receiving Agency's pavements and bridges.
4. Assess the probability of such climate stressors and extreme weather events.
5. Quantify the impact on bridges.
6. And pavements.
7. Develop an asset risk and resilience assessment framework.
8. Develop and quantify adaptation strategies.
9. Conduct scenario analysis.
10. Identify proxy indicators that can be tracked to monitor high-priority risks.

Approved Work Program Revisions

No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7191

2.11 UH – University of Houston

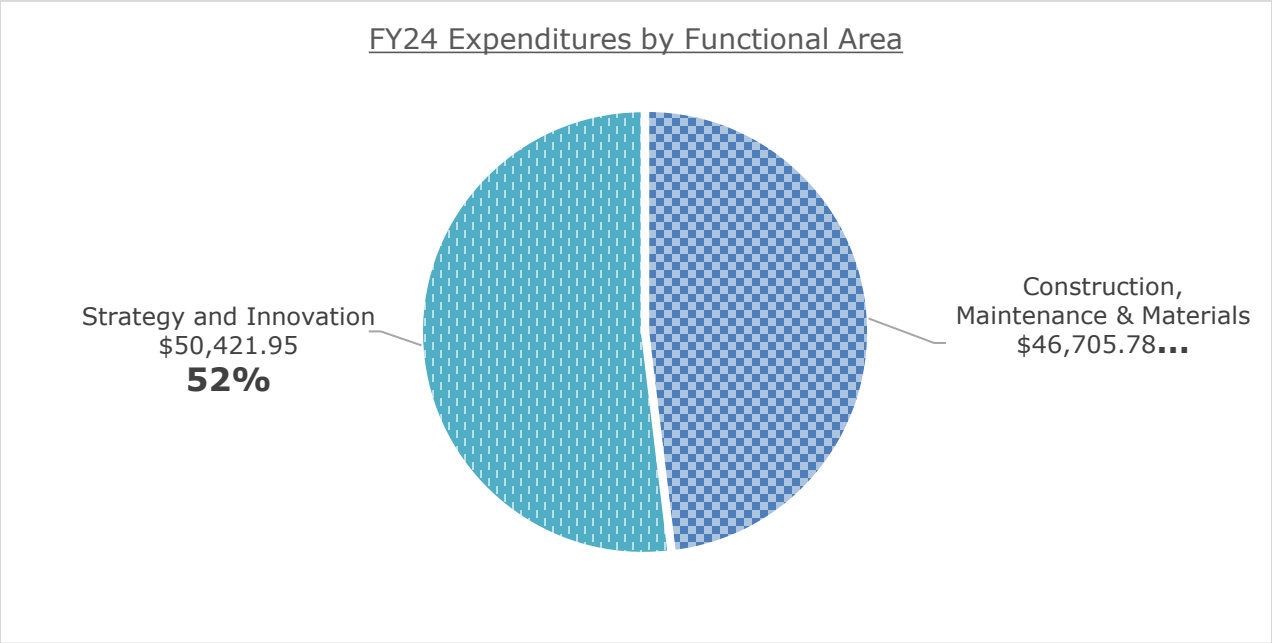


Figure 14. Pie chart of UH expenditures by Functional Area

Project Number	Project Name	Status
0-7177	Identifying Pavement Improvement Projects for Enhanced Safety	Active
0-7181	Development of Digital Twins for Texas Bridges	Active

UH | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7177	Identifying Pavement Improvement Projects for Enhanced Safety	Active

Project Start Date: 09/18/2023
Completion Date: 02/28/2026
Lead University: TTI
University #2: UH
Project Status: Active
Total Project Budget: $478,160.00
UH Total Budget: $109,668.75
UH FY24 Budget: $49,850.00
UH Total Project Spend $46,705.78
UH FY24 Spend: $46,705.78

Project description: 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.

Approved Work Program Revisions

No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7177

UH | Strategy and Innovation

Project Number	Project Name	Status
5-9908-24	Innovative Transportation Projects at TxDOT	Active

Project Start Date: 09/01/2023
Completion Date: 08/31/2026
Lead University: UH
University #2:
Project Status: Active
Total Project Budget: $505,286.00
UH Total Budget: $505,286.00
UH FY24 Budget: $190,236.00
UH Total Project Spend: $50,421.95
UH FY24 Spend: $50,421.95

Project description: 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.

Approved Work Program Revisions

No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=5-9908-24

2.12 USGS – United States Geological Survey

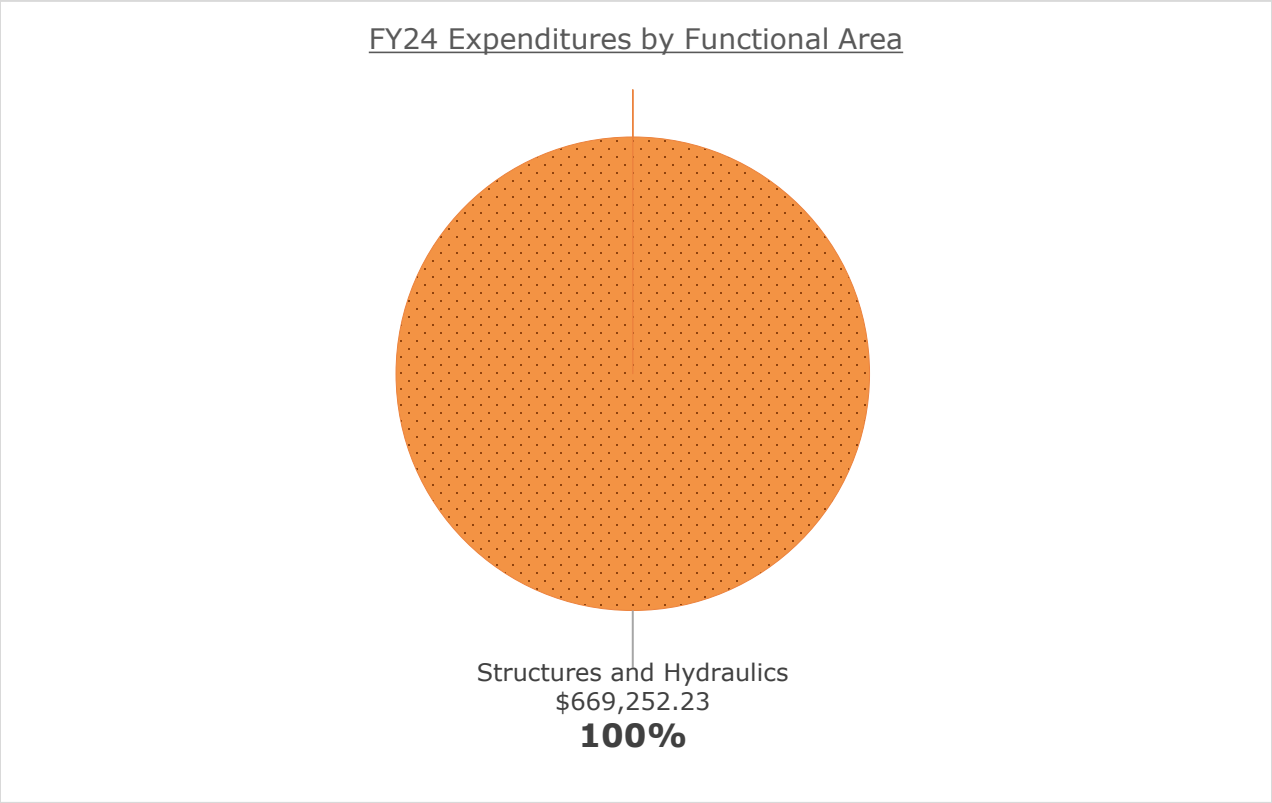


Figure 15. Pie chart of USGS expenditures by Functional Area

Project Number	Project Name	Status
0-7095	Evaluate Improved Streamflow Measurement at TxDOT Bridges	Closed
0-7095-01	Flood Assessment System for TxDOT (FAST)	Active
0-7202	Synthesis: The State of Knowledge and State of Practice for Non-Contact Radar Stream Gauges in Texas, the United States, and Internationally	Closed

USGS | Structures and Hydraulics

Project Number	Project Name	Status
0-7095	Evaluate Improved Streamflow Measurement at TxDOT Bridges	Closed

Project Start Date: 09/01/2020
Completion Date: 08/31/2026
Lead University: CTR
University #2: USGS
Project Status: Closed
Total Project Budget: $6,602,641.36
USGS Total Budget: $3,545,150.00
USGS FY24 Budget: $311,814.00
USGS Total Project Spend: $3,337,813.83
USGS FY24 Spend: $113,093.00

Project description: The Receiving Agency maintains 30,000 bridges, some of which have been threatened by flooding, especially during the past four years. Better information on forecast flood inundation would help anticipate bridge and road flooding; inform decisions before, during, and after flooding; and help deploy resources for bridge inspection after flooding is over. The National Weather Service began in August 2016 operating a National Water Model, continually providing real-time forecasting on 190,000 miles of Texas streams and rivers. This project shall establish and maintain a Receiving Agency Flood Monitoring Network that consists of 80 gauges—60 new gauges installed as part of this project and 20 existing gauges installed as part of a previous Receiving Agency project. The new gauges shall be located in watersheds as defined by the USGS or TWDB, selected to provide a range of observation on main stem and tributary rivers and on soil and slope conditions in Texas river and coastal basins, and shall be complementary to existing observation networks. Observational data from the gauges and flood forecast information shall be made accessible through a Receiving Agency Flood Forecast System and Operational Data Website.

Approved Work Program Revisions

No. of FY24 Amendments: Two

Amendment #3:
Amend the contract to revise the budget, scope, and project schedule and add a subcontractor due to roadway locations to accurately depict on-system roadways on flood related mapping tools during the flood emergency response exercises. Performing Agency 1 (CTR): The FY23 budget is increased by $78,250.00 from $542,495.01 to $620,745.01. The Performing Agency 1 Total Project Budget shall increase by $78.250.00 from $2,836,439.00 to $2,914,689.00. Performing Agency 2 (USGS): The FY2023 budget remains $1,334,000.00. The Total Budget for Performing Agency 2 remains $3,545,150.00. The Itemized Project Budget Estimate increased by $78,250.00 from $6,381,589.00 to $6,459,839.00.

Amendment #4:
Amend the contract to extend the termination date, add scope, revise the budget, and update the project schedule to complete the Streamflow II deliverables. CTR budget: The FY2021 budget remains $1,728,999.21; The FY2022 budget remains $564,944.78; The FY2023 budget remains $620,745.01;

The FY2024 budget is established for $142,802.36; CTR's Total Project Budget shall increase by $142,802.36 from $2,914,689.00 to $3,057,491.36. USGS budget: The FY2021 budget remains $893,350.00; The FY2022 budget remains $1,316,800.00; The FY2023 budget is decreased by $311,814.00 from $1,334,000.00 to $1,022,186.00; The FY2024 budget is established for $311,814.00. USGS's Total Project Budget remains $3,545,150.00. The Itemized Project Budget Estimate increased by $142,802.36 from $6,459,839.00 to $6,602,641.36.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7095

USGS | Structures and Hydraulics

Project Number	Project Name	Status
0-7095-01	Flood Assessment System for TxDOT (FAST)	Active

Project Start Date: 02/26/2024
Completion Date: 01/31/2027
Lead University: CTR
University #2: USGS
Project Status: Active
Total Project Budget: $5,850,241.20
USGS Total Budget: $2,840,618.45
USGS FY24 Budget: $564,151.14
USGS Total Project Spend: $556,159.23
USGS FY24 Spend: $556,159.23

Project description: 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."

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7095-01

USGS | Structures and Hydraulics

Project Number	Project Name	Status
0-7202	Synthesis: The State of Knowledge and State of Practice for Non-Contact Radar Stream Gauges in Texas, the United States, and Internationally	Closed

Project Start Date: 09/01/2023
Completion Date: 08/31/2024
Lead University: TTI
University #2: USGS
Project Status: Closed
Total Project Budget: $64,776.20
USGS Total Budget: $14,776.95
USGS FY24 Budget: $14,776.95
USGS Total Project Spend: $0.00
USGS FY24 Spend: $0.00

Project description: The United States Geological Survey (USGS) and other entities have begun to use non-contact radar for stream gauging to collect near-real-time stream velocity, discharge, and stage. Use of these devices is limited compared to traditional stream gauge methods that are typically used by the USGS and local government agencies in Texas. At the state level, TxDOT is leading the way, through partnership with the USGS, to deploy these stream gauges and is constantly learning how they can best be deployed. Because the gauges measure stream velocity and water level, they are easier and more useful to install in tidal areas than traditional gauges. In some streams, there is a peak in velocity wave in advance of a peak in water surface elevation, potentially acting as an advance warning of flood levels. Installation of these gauges is far simpler than traditional gauges in areas where channel vegetation, slope, or size, may affect equipment that must be installed down in the channel. While these gages appear to be less expensive to operate and maintain than traditional USGS gauging approaches, it would be beneficial to learn from experiences in other US states, agencies, and other countries who have used these devices for longer periods of time rather than solely learning by doing.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7202

2.13 UTA – University of Texas – Arlington

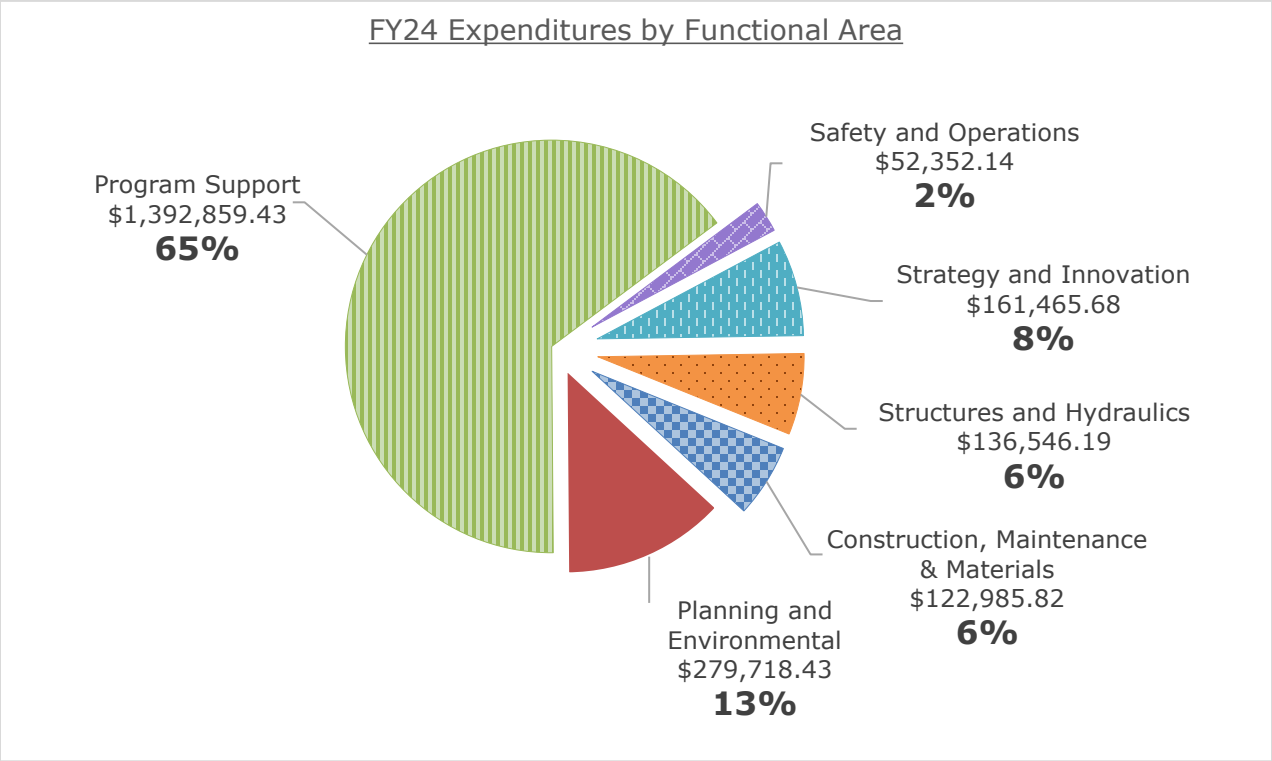


Figure 16. Pie chart of UTA expenditures by Functional Area

Project Number	Project Name	Status
0-6872-01	Use of Geothermal Energy for De-icing Approach Pavement Slabs and Bridge Decks - Phase II	Closed
0-7023-01	Determining Downstream Ecological Impacts of Sediment Derived from Bridge Construction	Closed
0-7045	Analyze the Use of Green Pavement Markings – Intersection Safety for Non-Motorized Users	Closed
0-7160	Improving Traffic Signal System Planning, Design and Management with Big-data-enhanced Automated Traffic Signal Performance Metrics (ATSPM) System	Closed
0-7162	Quantifying Benefits of Roadside Vegetation	Closed
0-7184	Develop an Interactive Unit Price Estimation and Visualization Tool	Active
0-7196	Data-Driven Prioritization of Roadway Segments for Treatment during Severe Weather Events	Cancelled
0-7200	Utilizing Telematics to Understand Driving Behavior During Missed Exits and Wrong Turns	Active

0-7201	Synthesis of Hydrologic Approaches to Playa Lakes, Areas of Significant Karst Geology, and Arid Regions	Active
5-7097-24	Texas Local Technical Assistance Program (TxLTAP)	Active
5-9055-01	Workforce Development Lifecycle for Road and Bridge Agencies	Closed

FUNCTIONAL AREAS:
1. Structures and Hydraulics
2. Constr, Maint & Materials
3. Planning and Environmental
4. Program Support
5. Safety and Operations
6. Strategy and Innovation

UTA | Structures and Hydraulics

Project Number	Project Name	Status
0-6872-01	Use of Geothermal Energy for De-icing Approach Pavement Slabs and Bridge Decks - Phase II	Closed

Project Start Date: 10/09/2020

Completion Date: 08/31/2024

Lead University: UTA

University #2: TTI

Project Status: Closed

Total Project Budget: $1,219,936.89

UTA Total Budget: $691,325.73

UTA FY24 Budget: $134,939.32

UTA Total Project Spend: $652,503.56

UTA FY24 Spend: $108,835.50

Project description: De-icing using geothermal energy can provide the Receiving Agency with a better alternative than the existing method of using deicing with sands and/or salts. This research project shall explore the potential for retrofitting bridges with a hydronic pipe geothermal heating system and achieve Technology Readiness Levels (TRL) level 6 through prototype demonstration in a relevant environment. At the end of the project, the geothermal deicing technology shall be ready for prototype demonstration in an operational environment (TRL level 7).

Approved Work Program Revisions

No. of FY24 Amendments: Two

Amendment #2:

Due to construction delay and increase material and labor costs, it has become necessary to amend the contract to extend the termination date, increase the total project cost for the completion of the pilot geothermal bridge, amend the scope to allow for installation and test a new geofoam insulation panel in comparison with the spray foam panel and update the Project Schedule. For UTA FY 2021 remains $96,259.27; FY 2022 remains $239,577.42; FY 2023 budget is increased by $151,767.93 from $68,781.80 to $220,549.72; UTA's total project budget is $556,386.42. For TTI FY 2021 remains $70,169.60; FY 2022 remains $165,020.90; FY 2023 budget is increased by $60,921.45 from $98,057.70 to $158,979.15; TTI's total project budget is $394,148.05. The Itemized Project Budget Estimate for the project is increased by $212,689.38 from $737,866.69 to $950,556.07.

Amendment #3:

Amend the contract to extend the termination, to revise the Project Schedule and the Project Work Plan to move testing the newly completed pilot geothermal bridge over one winter and add a new Task 11, Develop an Automatic and Optimized De-Icing Operation Control Strategy. The FY 2023 budget for CTR remains $220,549.73; an FY 2024 budget for CTR is established in the amount of $134,939.32; the Total Project Cost for CTR is increased by $134,939.32 from $556,386.42 to $691,325.74. The FY 2023 budget for TTI remains $158,979.15; an FY 2024 budget for TTI is established in the amount of $134,441.50; the Total Project Cost for Performing Agency 2 is increased by $134,441.50 from $394,169.65 to $528,611.15. The Total Itemized Project Budget Estimate is increased by $269,380.82 from $950,556.07 to $1,219,936.89.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-6872-01

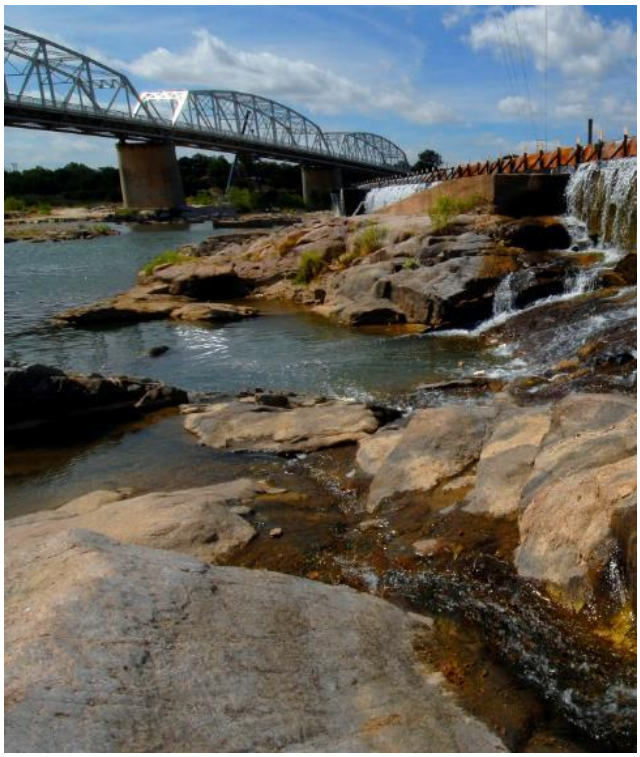
UTA | Planning and Environment

Project Number	Project Name	Status
0-7023-01	Determining Downstream Ecological Impacts of Sediment Derived from Bridge Construction	Closed

Project Start Date: 11/10/2022
Completion Date: 06/30/2024
Lead University: UTA
University #2: TXST
Project Status: Closed
Total Project Budget: $392,000.00
UTA Total Budget: $209,000.00
UTA FY24 Budget: $127,228.00
UTA Total Project Spend: $193,385.97
UTA FY24 Spend: $111,246.48

Project description: 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:

1. 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.
2. Develop a new 1D sediment transport model coupled with HEC-RAS 1D and add to the current GIS toolbar.
3. Investigate alternative methods for defining eroded sediment characteristics from a typical bridge replacement site and incorporate into the model.
4. 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.



Approved Work Program Revisions

No. of FY24 Amendments: One

Amendment #1:

Amend the contract to extend the termination date, revise the budget and update the project schedule due to delays in executing the agreement and additional time needed for field monitoring. The FY 2023 budget is decreased by $70,728.00 from $152,000.00 to $81,772.00. The FY 2024 budget is increased by $16,353.00 from $136,125.00 to $152,478.00. The FY 2025 budget is increased by $12,500.00 from $103,375.00 to $115,875.00. The FY 2026 budget is established at $33,125.00. The Total Itemized Project Budget Estimate is $392,000.00.

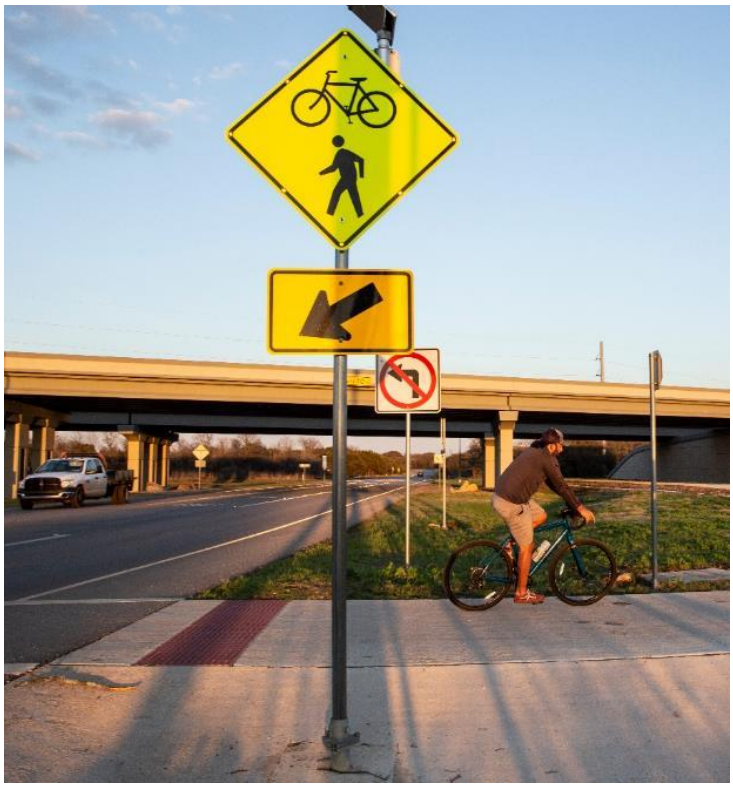
CTR Library Project Link:

https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7023-01

UTA | Safety and Operations

Project Number	Project Name	Status
0-7045	Analyze the Use of Green Pavement Markings – Intersection Safety for Non-Motorized Users	Closed

Project Start Date: 05/26/2020
Completion Date: 08/31/2024
Lead University: UTA
University #2:
Project Status: Closed
Total Project Budget: $596,258.63
UTA Total Budget: $596,258.63
UTA FY24 Budget: $124,808.63
UTA Total Project Spend $479,251.59
UTA FY24 Spend: $52,352.14



Project description: More communities are using green to delineate at intersections where cyclists should wait at a traffic signal, start a left turn, or cross the roadway. In 2011, the Federal Highway Administration issued a memo giving interim approval (IA-14) for the optional use of green colored pavement for bike lanes as a traffic control device for inclusion in the Manual on Uniform Traffic Control Devices (MUTCD). The FHWA indicated that they found the green to be successful for bicycle applications because cyclists felt safer and drivers felt more aware that cyclists may be present. In addition, the National Association of City Transportation Officials (NACTO) included green pavement in their Bikeway Design Guide. The Receiving Agency has requested research into the safety and behavioral implications of using green colored pavement and their performance to help inform an agency opinion on their use in Texas communities and possible inclusion in the Texas MUTCD.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7045

UTA | Strategy and Innovation

Project Number	Project Name	Status
0-7160	Improving Traffic Signal System Planning, Design and Management with Big-data-enhanced Automated Traffic Signal Performance Metrics (ATSPM) System	Closed

Project Start Date: 11/14/2022
Completion Date: 08/31/2026
Lead University: UTA
University #2:
Project Status: Closed
Total Project Budget: $292,009.75
UTA Total Budget: $292,009.75
UTA FY24 Budget: $158,157.50
UTA Total Project Spend: $244,952.51
UTA FY24 Spend: $126,310.64

Project description: This project provides a guideline accompanied with the necessary software tools for the Receiving Agency and local agencies to better use the Automated Traffic Signal Performance Metrics System (ATSPM) in arterial traffic management. The ATSPM system came to traffic signal operations years ago and can help agencies better understand arterial traffic signal performance. Many agencies are considering adopting the ATSPM systems because the ATSPM system(s) focuses on monitoring the traffic signal performance in the field. However, most traffic signal planning and design activities at present still rely on traditional methods, such as Synchro, Highway Capacity Manual, etc. If agencies adopt different criteria between the planning/design stage and implementation stage, confusion will form and grow the increase of ATSPM adoptions. To fill this gap, the Performing Agency plans to take a systematic approach to introduce the ATSPM concepts into all stages of traffic signal management. The Performing Agency shall develop a series of software tools to establish a new "ATSPM-In-The-Loop" traffic signal simulation framework, accompanied by case studies that public agents or consultants can use to evaluate their future traffic signal timing plans in simulation before deployment. The outcomes of this project will nationally be the first of its kind.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7160

UTA | Planning and Environment

Project Number	Project Name	Status
0-7162	Quantifying Benefits of Roadside Vegetation	Closed

Project Start Date: 10/12/2022
Completion Date: 08/31/2024
Lead University: UTA
University #2:
Project Status: Closed
Total Project Budget: $242,284.76
UTA Total Budget: $242,284.76
UTA FY24 Budget: $113,692.63
UTA Total Project Spend: $168,614.53
UTA FY24 Spend: $81,242.21

Project description: The Performing Agency shall develop a roadside vegetation evaluation toolkit for the sustainability, use, community, cost-effectiveness, and safety (RVET-SUCCES). The Performing Agency shall coordinate with the Receiving Agency districts to analyze a total of 6 pilot studies in one urban and one rural site in 3 different ecoregions. The Performing Agency shall particularly perform and combine real-world measurements of air quality, thermal environment, visibility, and safety in the pilot studies using sensors and drone in the analysis. For the evaluation of pre- and post-impacts of roadside vegetation, the Performing Agency shall employ five evaluation modules: environmental sustainability, visibility and safety, operations and maintenance, aesthetics, and life cycle costs. The project shall provide the roadside vegetation evaluation toolkit consisting of

1. Web-based and spreadsheet-based worksheets
2. A user guidebook describing the best practices for the evaluation and comparison, the evaluation procedures, a summary of the pilot studies as a sample and/or best practices, and fact sheets, to promote knowledge and skills for sustainable and cost-effective roadside vegetation.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7162

UTA | Planning and Environment

Project Number	Project Name	Status
0-7184	Develop an Interactive Unit Price Estimation and Visualization Tool	Active

Project Start Date: 09/01/2023
Completion Date: 08/31/2025
Lead University: UTA
University #2:
Project Status: Active
Total Project Budget: $199,997.00
UTA Total Budget: $199,997.00
UTA FY24 Budget: $99,605.50
UTA Total Project Spend: $87,229.74
UTA FY24 Spend: $87,229.74

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7184

UTA | Planning and Environment

Project Number	Project Name	Status
0-7196	Data-Driven Prioritization of Roadway Segments for Treatment during Severe Weather Events	Cancelled

Project Start Date: TBD
Completion Date: 08/31/2025
Lead University: UTA
University #2:
Project Status: Cancelled
Total Project Budget: $365,727.10
UTA Total Budget: $365,727.10
UTA FY24 Budget: $178,775.48
UTA Total Project Spend: $0.00
UTA FY24 Spend: $0.00

Project description: Effective maintenance is critical to ensure mobility, equity, and safety when roadways are experiencing severe weather events. Conventional approaches for prioritizing road segments for treatment (i) are empirical, (ii) are mostly based on static data about weather, traffic, road users, and road conditions, and (iii) do not account for important mobility, equity, and safety concerns. Therefore, conventional approaches (i) can lead to suboptimal road treatment effectiveness during extreme events, (ii) fail to prioritize the mobility of vulnerable populations and first responders, and (iii) may not guarantee a desired level of safety during extreme weather. To fill these gaps, the Performing Agency shall develop a risk-informed data-driven optimization (RIDDO) framework (Fig. 1) to enhance the effectiveness of the prioritization of road segments for treatment in response to weather extremes, accompanied by case studies that transportation authorities can use to improve their future road treatment prioritization. The Performing Agency shall leverage previous efforts on the Snowplow Operations Management System and Population Vulnerability Map to develop a software tool for the prioritization of roads for treatment during extreme weather events. This project will support the big data initiative by TxDOT to explore emerging data to improve traffic mobility, equity, and safety.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7196

UTA | Strategy and Innovation

Project Number	Project Name	Status
0-7200	Utilizing Telematics to Understand Driving Behavior During Missed Exits and Wrong Turns	Active

Project Start Date: 09/01/2023
Completion Date: 08/31/2025
Lead University: TTI
University #2: UTA
Project Status: Active
Total Project Budget: $403,695.31
UTA Total Budget: $149,894.81
UTA FY24 Budget: $35,155.04
UTA Total Project Spend: $35,155.04
UTA FY24 Spend: $35,155.04

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7200

UTA | Structures and Hydraulics

Project Number	Project Name	Status
0-7201	Synthesis of Hydrologic Approaches to Playa Lakes, Areas of Significant Karst Geology, and Arid Regions	Active

Project Start Date: 09/01/2023
Completion Date: 12/31/2024
Lead University: UTA
University #2:
Project Status: Closed
Total Project Budget: $54,322.00
UTA Total Budget: $54,322.00
UTA FY24 Budget: $27,710.69
UTA Total Project Spend: $35,784.44
UTA FY24 Spend: $27,710.69

Project description: Hydrology of karst terrains, playas, and arid zones is complex, and designing transportation infrastructure in these regions is challenging and requires a deep understanding of the unique hydrologic processes in these areas. In absence of consistent, scientifically based standards for hydrologic design of transportation infrastructures in these regions, designers consider the specific conditions in each region and adopt design measures and management strategies based on their judgment. The Performing Agency shall develop a summary of the state of knowledge, the state of practice, and approaches and models for flood forecasting and design of drainage structures in these regions. By adopting the outcomes of this project, the Receiving Agency can better understand the hydrological behavior of these regions and make informed decisions toward developing hydrological design guidance and standards of practice for these areas.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7201

UTA | Program Support

Project Number	Project Name	Status
5-7097-24	Texas Local Technical Assistance Program (TxLTAP)	Active

Project Start Date: 12/21/2023
Completion Date: 08/31/2025
Lead University: UTA
University #2:
Project Status: Active
Total Project Budget: $3,377,917.13
UTA Total Budget: $3,377,917.13
UTA FY24 Budget: $1,664,169.38
UTA Total Project Spend $1,392,859.43
UTA FY24 Spend: $1,392,859.43

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=5-7097-24

UTA | Construction, Maintenance & Materials

Project Number	Project Name	Status
5-9055-01	Workforce Development Lifecycle for Road and Bridge Agencies	Closed

Project Start Date: 07/21/2023
Completion Date: 10/31/2024
Lead University: UTA
University #2:
Project Status: Closed
Total Project Budget: $125,000.00
UTA Total Budget: $125,000.00
UTA FY24 Budget: $121,812.50
UTA Total Project Spend $126,173.32
UTA FY24 Spend: $122,985.82

Project description: The Workforce Development Lifecycle for Road and Bridge Agencies project proposes a multi-faceted approach to educate Texas Local Public Agencies (LPAs) about FHWA's Every Day Counts, Round 6 and Round 7 Strategic Workforce Development innovation, implementation methods, and valuable resources as well as encourage the adoption and implementation of recommended best practices at the local level. LPAs across the state are faced with the critical challenge of attracting and retaining Road and Bridge (R&B) personnel to maintain Texas local roadways. The proposed project builds on the successful FY21 Texas Local Technical Assistance Program (TxLTAP) Strategic Workforce Development, Texas State Transportation Innovation Council (TxSTIC) Incentive Program, project entitled Texas Transportation Workforce Development for Cities and Counties that reached 25 Texas counties who had not previously utilized TxLTAP's services. The project achieved an 87% statewide adoption rate of deliverables, products, and services.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=5-9055-01

2.14 UTEP – University of Texas – El Paso

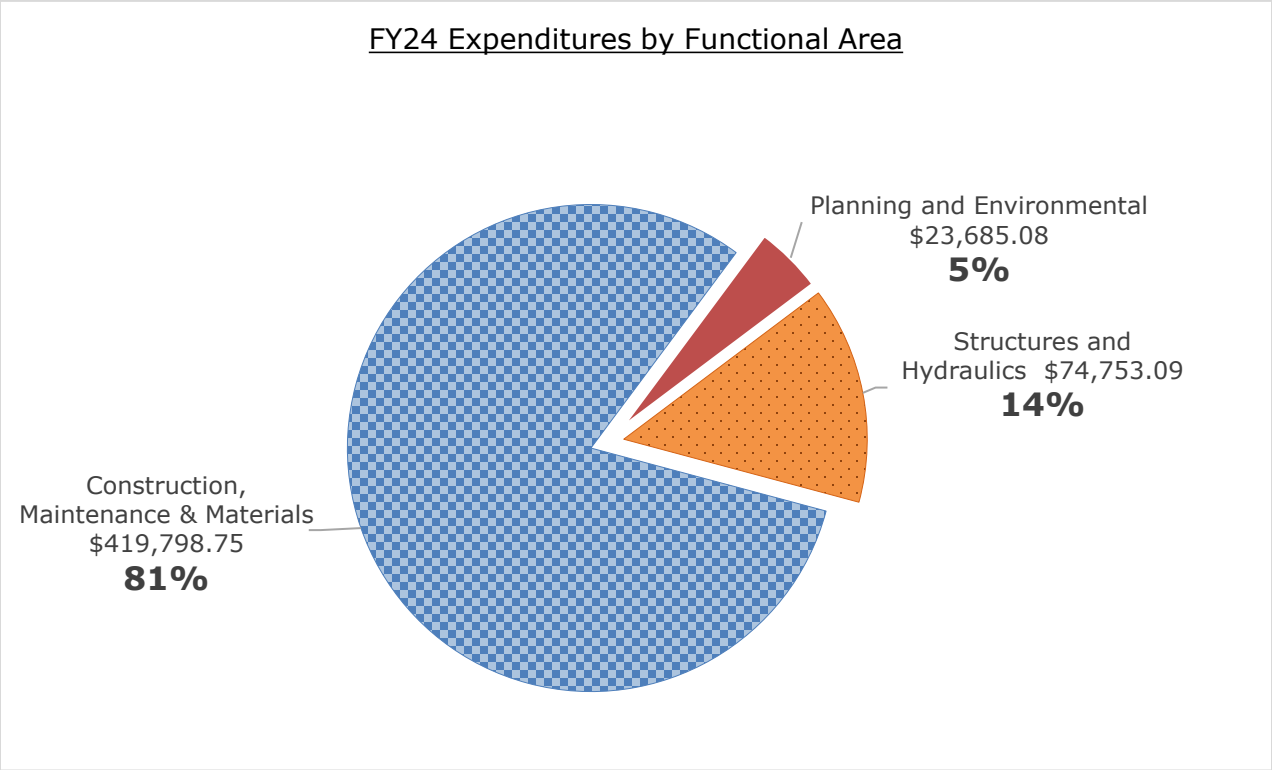


Figure 17. Pie chart of UTEP expenditures by Functional Area

Project Number	Project Name	Status
0-7104	Establish Performance-Based Acceptable Lab-Molded Density Range for Mix Design and QC/QA	Active
0-7108	Evaluate the Importance of Fine Aggregates in Achieving Adequate Skid Resistance in TxDOT Hot Mix Asphalt Mixtures	Active
0-7111	Determine Impact of Field Sands on Workability and Engineering Properties of Superpave Mixtures in Texas	Closed
0-7112	Development of a Continuous for Live Load Prefabricated Steel Accelerated Bridge Construction (ABC) Unit for Texas Bridges	Active
0-7132	Quantify the Real Impact of Transportation Activity on Regional Ozone and Near-Road PM Concentrations	Closed
0-7192	Develop Performance of Baseplate Connections in COSS and Traffic Signal Structures	Active

UTEP | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7104	Establish Performance-Based Acceptable Lab-Molded Density Range for Mix Design and QC/QA	Active

Project Start Date: 09/21/2021
Completion Date: 04/30/2025
Lead University: TTI
University #2: UTEP
Project Status: Active
Total Project Budget: $829,999.25
UTEP Total Budget: $360,000.00
UTEP FY24 Budget: $133,000.00
UTEP Total Project Spend $314,871.99
UTEP FY24 Spend: $124,244.62

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7104

UTEP | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7108	Evaluate the Importance of Fine Aggregates in Achieving Adequate Skid Resistance in TxDOT Hot Mix Asphalt Mixtures	Active

Project Start Date: 09/21/2021
Completion Date: 08/31/2026
Lead University: UTEP
University #2:
Project Status: Active
Total Project Budget: $515,000.00
UTEP Total Budget: $515,000.00
UTEP FY24 Budget: $202,000.00
UTEP Total Project Spend $462,693.61
UTEP FY24 Spend: $160,253.01

Project description: The lack of skid resistance has been an important issue for Receiving Agency pavement as many of them cannot hold adequate skid resistance in the long run, and even some newly constructed roads are observed to have poor skid resistance. Skid resistance is a function of the quality of the aggregate as well as the micro-and macro-texture of the surface. Those textures can be modified by using the appropriate type and amount of fine aggregates and fines in asphalt concrete. The main focus of the research is understanding the effects of fine aggregates and fines on the skid resistance of asphalt concrete since their impacts on the skid resistance and performance. The Performing Agency shall evaluate the current practices and research studies commissioned by Receiving Agency (in particular) and other states (in general) on the use of fine aggregates and fines in asphalt concrete to improve skid resistance. The major objective of this project shall be critical to evaluate the influence of fine aggregates and high-quality fines on the skid resistance of asphalt concrete.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7108

UTEP | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7111	Determine Impact of Field Sands on Workability and Engineering Properties of Superpave Mixtures in Texas	Closed

Project Start Date: 09/01/2021
Completion Date: 08/31/2024
Lead University: UTEP
University #2:
Project Status: Closed
Total Project Budget: $500,001.50
UTEP Total Budget: $395,000.00
UTEP FY24 Budget: $140,000.00
UTEP Total Project Spend $364,874.44
UTEP FY24 Spend: $135,301.12

Project description: Field sands have been used in hot mix asphalt (HMA) pavements to reduce binder requirement since they are readily available and are less expensive than crushed materials. Considering their adverse effects on the performance, field sands are limited to 10% to 15% of the aggregates. The most common feature of field sand that can have a significant detrimental effect on the Asphalt Concrete (AC) performance is the presence of harmful clay particles. Understanding the impact of these clay particles on AC performance is the subject of this research. The upper limit of specific field sand, given the amount of active clay present in it, the process to determine the clay content, and how they affect the performance of AC mixes shall be evaluated. Since field sands are more round compared to the crushed aggregates, mixes containing more field sands can be compacted to a given density at lower binder contents. Given the less particle to particle interlocking of such mixes, however, they are more suspect to excessive rutting. Thus, this research shall investigate the effect of clay minerals as well as the sand properties independently on the performance of AC mixes (with a focus on Superpave mixtures) and evaluate their combined/interactive effects, as the natural sands are a combination of both. To that end, the Performing Agency shall provide interaction plots and/or charts that can be used to select the maximum allowable percentage of a given field sand.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7111

UTEP | Structures and Hydraulics

Project Number	Project Name	Status
0-7112	Development of a Continuous for Live Load Prefabricated Steel Accelerated Bridge Construction (ABC) Unit for Texas Bridges	Active

Project Start Date: 09/01/2021
Completion Date: 02/28/2025
Lead University: TTI
University #2: UTEP
Project Status: Active
Total Project Budget: $759,994.50
UTEP Total Budget: $119,618.75
UTEP FY24 Budget: $49,977.50
UTEP Total Project Spend: $106,672.54
UTEP FY24 Spend: $44,559.64

Project description: The overall goal is to develop a system where prefabricated steel ABC unit perform continuous for live load. The system must be: easily constructible, fast to assemble, durable long-term, safe, and cost-effective. The Performing Agencies shall conduct a literature review to first synthesize what has been done by state departments of transportation and other agencies. The Performing Agencies shall also evaluate the behavior of related Receiving Agency bridges through visual inspection and monitoring. The Performing Agencies shall perform a system development program utilizing this information in conjunction with expert feedback from an Industry Review Panel (IRP) workshop (including the Receiving Agency Panel). The three (3) best system designs shall be selected for full-scale laboratory testing followed by an analytical parametric study. The Performing Agencies shall compile and present the results at an IRP meeting with the Receiving Agency, where the final system

shall be selected. The Performing Agencies shall develop full Microstation details and specifications along with a user-friendly design guide. The guide shall identify the following:

- Span length capabilities for girder sizes/depths/spacings.
- General details for establishing live load continuity.
- Closure pour details at interior bents and how to achieve acceptable deck stresses.
- Structural steel splice details and acceptable tolerances.
- Bearing layout to meet the Receiving Agency substructure details.

Approved Work Program Revisions

No. of FY24 Amendments: One

Amendment #1:

Amend the contract to replace the Project Supervisor, and to revise the work plan and budget to add a subcontractor due to the transfer of the Project Supervisor from Performing Agency 1 to the subcontractor. TTI: The FY 2022 Budget remains $103,593.50. The FY 2023 Budget remains $275,527.75. The FY 2024 Budget remains $191,254.50. Total Project Budget remains $570,375.75. UTEP: The FY 2022 Budget remains $20,845.00. The FY 2023 Budget remains $48,796.25. The FY 2024 Budget remains $49,977.50. Total Project Budget remains $119,618.75. The Itemized Project Budget Estimate remains $689,994.50.

CTR Library Project Link:

https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7112

UTEP | Planning and Environment

Project Number	Project Name	Status
0-7132	Quantify the Real Impact of Transportation Activity on Regional Ozone and Near-Road PM Concentrations	Closed

Project Start Date: 09/07/2021
Completion Date: 08/31/2024
Lead University: TTI
University #2: UTEP
Project Status: Closed
Total Project Budget: $537,321.00
UTEP Total Budget: $105,066.25
UTEP FY24 Budget: $25,016.25
UTEP Total Project Spend: $101,145.37
UTEP FY24 Spend: $23,685.08

Project description: The Receiving Agency and its partner agencies are required to comply with the requirements of the transportation conformity requirement. Transportation conformity is an emissions control-centric process built on the assumption that that reducing emissions from transportation activities would lead to better air quality. However, the air quality observations collected since the onset of the COVID-19 pandemic shows ambient ozone and particulate matter of less than 2.5 micrometer in aerodynamic diameter (PM2.5), concentrations have a mixed response to the significant changes in traffic activities and emissions. This trend has raised questions regarding the extent of the transportation's impacts on air quality. This study will bridge the gap in the understanding of the actual extent of transportation activities' impacts on regional and near-road air quality. The Performing Agency shall study three major activities for selected case study areas:

- Analysis of before- and during-pandemic traffic activity and air quality monitoring data.
- Evaluate the performance of air dispersion modeling in capturing the changes of near-road PM2.5 concentrations in near-road environment resulting from traffic activity variations.
- Evaluate the performance of photochemical modeling in capturing the changes of regional ozone in response to changes of traffic activities.

The study will also result in a characterization of COVID-19 restrictions' impacts on traffic activities and air quality.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7132

UTEP | Structures and Hydraulics

Project Number	Project Name	Status
0-7192	Develop Performance of Baseplate Connections in COSS and Traffic Signal Structures	Active

Project Start Date: 09/01/2023
Completion Date: 08/31/2026
Lead University: TTI
University #2: UTEP
Project Status: Active
Total Project Budget: $988,604.75
UTEP Total Budget: $111,181.25
UTEP FY24 Budget: $45,501.25
UTEP Total Project Spend: $30,193.45
UTEP FY24 Spend: $30,193.45

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7192

2.15 UTSA – University of Texas at San Antonio

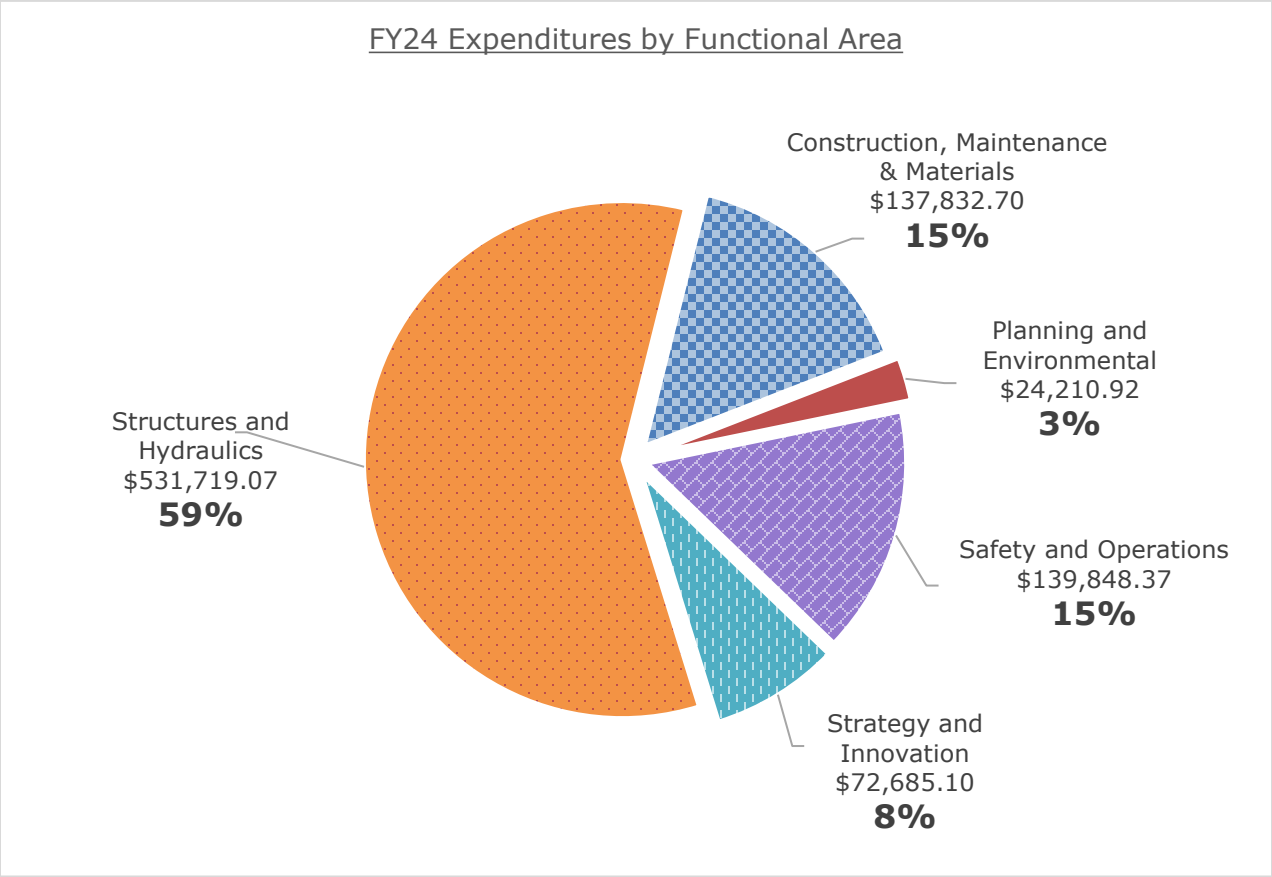
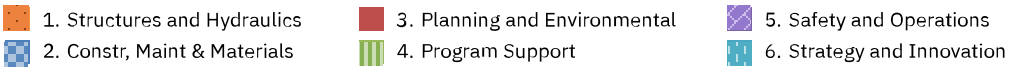


Figure 18. Pie chart of UTSA expenditures by Functional Area

Project Number	Project Name	Status
0-7122	Evaluate Alternative Methods to Examine Visibility of Pavement Markings	Closed
0-7154	Evaluate Use of 300ksi Strands for TxDOT Prestressed Girders	Active
0-7155	Develop/Refine Design Provisions for Headed and Hooked Reinforcement	Active
0-7158	Calibration of Bridge Performance Models Using Element Data	Active
0-7161	Settlement Criteria and Design Approach for Embankments and Retaining Walls Built on Compressible Soils	Closed
0-7166	Leveraging Probe-Based Data to Enhance Long-Term Planning Models	Closed
0-7180	Select High Risk Pedestrian Midblock Crossings and Perform Safety Evaluations for Developing Pedestrian Crossings Countermeasures	Active

	0-7191	Develop Systematic and Quantitative Approach to Assess the Probability of Extreme Weather and Resilience Risks for TxDOT Highways and Bridges	Active
	0-7194	Evaluating the Risks that Erosion Control Products Pose to Protected Species and Other Wildlife	Active
	0-7195	Quantify Bridge and Pavement Consumption Due to Permitted Overweight/Oversized (OW/OS) Vehicles	Active

FUNCTIONAL AREAS:



UTSA | Safety and Operations

Project Number	Project Name	Status
0-7122	Evaluate Alternative Methods to Examine Visibility of Pavement Markings	Closed

Project Start Date: 09/01/2021
Completion Date: 08/31/2024
Lead University: TTI
University #2: UTSA
Project Status: Closed
Total Project Budget: $467,604.25
UTSA Total Budget: $72,892.25
UTSA FY24 Budget: $24,726.25
UTSA Total Project Spend $69,387.55
UTSA FY24 Spend: $22,500.60

Project description: Pavement markings are the primary means for an agency to provide longitudinal guidance to drivers. Effective pavement markings can improve safety, improve driver comfort, and increase functionality/reliability of automated driving systems and Advanced Driver Assistance Systems (ADAS). To be effective, markings must be visible during all driving conditions, day and night. Markings are typically characterized by their retroreflectivity which is a surrogate measure for how visible the marking is at night. Retroreflectivity does not consider other factors that will impact the actual visibility of the markings such as the color or retroreflectivity of the pavement that the marking is applied to, the color or width of the marking, or the viewing conditions (i.e., observation vehicle, observer characteristics, weather conditions). Retroreflectivity is also a metric for nighttime visibility that may not relate to the marking visibility during the day. The objective of this project is to improve current pavement marking installation and maintenance practices, such that effective markings are continuously maintained. The Performing Agencies shall develop a tool to effectively assess the visibility of pavement markings and to make suggestions/recommendations for maintenance of markings. The Performing Agencies shall evaluate marking visibility for both human and automated drivers across a range of conditions. These evaluations shall be used to make recommendations to improve new marking installation specifications and techniques, improve marking maintenance practices, and evaluate other technologies that should be considered to improve pavement marking delineation.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7122

UTSA | Structures and Hydraulics

Project Number	Project Name	Status
0-7154	Evaluate Use of 300ksi Strands for TxDOT Prestressed Girders	Active

Project Start Date: 09/19/2022
Completion Date: 08/31/2026
Lead University: UTSA
University #2:
Project Status: Active
Total Project Budget: $849,245.00
UTSA Total Budget: $849,245.00
UTSA FY24 Budget: $372,947.61
UTSA Total Project Spend: $452,157.04
UTSA FY24 Spend: $241,159.14

Project description: 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.

Approved Work Program Revisions

No. of FY24 Amendments: Two

Amendment #2:

Amend the contract to revise the project budget due to regulatory delays and sourcing issues which have impacted the ability to purchase the 300ksi strands needed for tests. FY23 budget is decreased by $64,047.61 from $275,253.75 to $211,206.14. FY24 budget is increased by $64,047.61 from $308,900 to $372,947.61. FY25 budget remains $265,091.25. The Itemized Project Budget Estimate remains $849,245.00.

Amendment #1:

Amend the contract to correct references to prior fiscal years in the budget and project schedule to align with the Project Agreement period of performance since the agreement start date is in Fiscal Year 2023. FY22 budget is decreased from $275,253.75 to $0.00. FY23 budget is decreased by $33,646.25 from $308,900 to $275,253.75. FY24 budget is increased by $43,809.00 from $265,091.25 to $308,900.00. FY25 is established $265,091.25. The Total Project Cost Estimate will remain at $849,245.00.

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7154

UTSA | Structures and Hydraulics

Project Number	Project Name	Status
0-7155	Develop/Refine Design Provisions for Headed and Hooked Reinforcement	Active

Project Start Date: 09/01/2022
Completion Date: 02/28/2026
Lead University: TTI
University #2: UTSA
Project Status: Active
Total Project Budget: $999,401.25
UTSA Total Budget: $319,213.75
UTSA FY24 Budget: $114,723.75
UTSA Total Project Spend: $112,903.81
UTSA FY24 Spend: $38,139.37

Project description: 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.

Approved Work Program Revisions

No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7155

UTSA | Structures and Hydraulics

Project Number	Project Name	Status
0-7158	Calibration of Bridge Performance Models Using Element Data	Active

Project Start Date: 09/02/2022
Completion Date: 01/31/2024
Lead University: UTSA
University #2:
Project Status: Active
Total Project Budget: $393,835.00
UTSA Total Budget: $393,835.00
UTSA FY24 Budget: $178,130.00
UTSA Total Project Spend: $365,824.44
UTSA FY24 Spend: $172,192.65

Project description: The Performing Agency shall develop element deterioration models covering all bridge elements, including culverts, known as National Bridge Elements (NBEs) and Bridge Management Elements (BMEs), which shall forecast the probabilities that each statistically validated family of bridge elements and culverts will deteriorate to lower condition states within certain time frames. The Performing Agency shall also develop, test and validate Element Health Indices (EHIs), and aggregate them into a Texas Bridge Health Index (TxBHI) representing the entire bridge or culvert, ensuring that it prioritizes at-risk structures while balancing overall maintenance needs. These products shall have a Technology Readiness Level (TRL) of 8 or higher, and be easily implementable into AASHTOWare BrM software and/or other desired Receiving Agency software. The project shall also use the deterioration forecasts in conjunction with the historical inspection database to identify and recommend structural details that warrant further improvements on design and construction specifications at TRL 2 or 3. All products shall be based on statistical analyses of a historical database with combined NBE, CoRe, NBI, climatic and environmental data.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7158

UTSA | Structures and Hydraulics

Project Number	Project Name	Status
0-7161	Settlement Criteria and Design Approach for Embankments and Retaining Walls Built on Compressible Soils	Closed

Project Start Date: 09/12/2022
Completion Date: 08/31/2024
Lead University: UTSA
University #2: TARL
Project Status: Closed
Total Project Budget: $218,455.00
UTSA Total Budget: $168,455.00
UTSA FY24 Budget: $80,732.50
UTSA Total Project Spend: $147,000.60
UTSA FY24 Spend: $80,227.91

Project description: Soil improvement is essential for construction of embankments and retaining walls over highly compressible soils. However, due to diversity of soil improvement technologies, selection of suitable technology is an important and demanding task. Especially, if more than one soil improvement methods need to be used jointly to meet settlement, cost, and time requirements. To facilitate the selection process, this project shall: (1) collect and compile performance data of constructed embankments and retaining walls to establish settlement criteria based on their functionality and relative locations to a bridge, (2) analyze most commonly-used soil improvement methods in Texas to generate cost vs. construction time charts that can be used for preliminary screening, (3) develop a calculator that can calculate cost and time based on the determined settlement criteria for various soil improvement methods as well as their combinations so cost and benefit can be assessed, and (4) identify optimal combination of preloading with other methods under different Texas soil conditions. The focus of this project shall be preloading with/without wick drain, pile/columns supported embankment and lightweight fills. This project shall provide not only charts and tables that are ready to use in design but also design tools to analyze complicated situations.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7161

UTSA | Strategy and Innovation

Project Number	Project Name	Status
0-7166	Leveraging Probe-Based Data to Enhance Long-Term Planning Models	Closed

Project Start Date: 09/06/2022
Completion Date: 08/31/2024
Lead University: TTI
University #2: UTSA
Project Status: Closed
Total Project Budget: $346,904.25
UTSA Total Budget: $170,632.50
UTSA FY24 Budget: $82,511.25
UTSA Total Project Spend: $149,957.06
UTSA FY24 Spend: $72,685.10

Project description: Long-range transportation planning (LRTP) and travel demand models (TDMs) play an important role in the planning process, which assists transportation agencies with prioritizing future transportation investments. Improved LRTP and TDMs can bring direct benefits to transportation planning in the state. Effective transportation planning and investment decision making depends on timely, comprehensive, and accurate data. However, traditional data collection methods only provide a "snapshot" of the travel information, which limits the performance of conventional LRTP and TDMs. In this regard, while these sources are still used, transportation planners at the state, metropolitan, and local levels are beginning to incorporate third-party traffic data into their planning processes. Planners also start to look at the opportunities afforded through third-party data and provide guidance on how to take advantage of that data to expand and improve planning practices. This project aims to utilize probe-based data to improve the LRTP process and TDMs used by the Receiving Agency, MPOs and other planning agencies in the state. The Performing Agencies shall study how probe-based and location-based data may be leveraged to facilitate the validation and calibration of existing planning models, enhance existing modeling tools, and incorporate advanced modeling techniques.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7166

UTSA | Safety and Operations

Project Number	Project Name	Status
0-7180	Select High Risk Pedestrian Midblock Crossings and Perform Safety Evaluations for Developing Pedestrian Crossings Countermeasures	Active

Project Start Date: 09/14/2023
Completion Date: 08/31/2025
Lead University: UTSA
University #2:
Project Status: Active
Total Project Budget: $393,865.00
UTSA Total Budget: $393,865.00
UTSA FY24 Budget: $198,141.25
UTSA Total Project Spend $120,664.95
UTSA FY24 Spend: $117,347.77

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7180

UTSA | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7191	Develop Systematic and Quantitative Approach to Assess the Probability of Extreme Weather and Resilience Risks for TxDOT Highways and Bridges	Active

Project Start Date: 12/05/2023
Completion Date: 08/31/2025
Lead University: TTI
University #2: CTR, UTSA, TXST
Project Status: Active
Total Project Budget: $796,520.38
UTSA Total Budget: $82,840.00
UTSA FY24 Budget: $41,444.00
UTSA Total Project Spend $34,887.04
UTSA FY24 Spend: $34,887.04

Project description: 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:

1. Manage the project scope, budget, and timeline.
2. Conduct an extensive review of the literature.
3. Identify climate stressors to the Receiving Agency's pavements and bridges.
4. Assess the probability of such climate stressors and extreme weather events.
5. Quantify the impact on bridges.
6. Quantify the impact on pavements.
7. Develop an asset risk and resilience assessment framework.
8. Develop and quantify adaptation strategies.
9. Conduct scenario analysis.
10. Identify proxy indicators that can be tracked to monitor high-priority risks.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7191

UTSA | Planning and Environment

Project Number	Project Name	Status
0-7194	Evaluating the Risks that Erosion Control Products Pose to Protected Species and Other Wildlife	Active

Project Start Date: 09/26/2023
Completion Date: 08/31/2025
Lead University: TARL
University #2: UTSA
Project Status: Active
Total Project Budget: $310,621.25
UTSA Total Budget: $70,332.50
UTSA FY24 Budget: $34,723.75
UTSA Total Project Spend: $24,210.92
UTSA FY24 Spend: $24,210.92

Project description: 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.

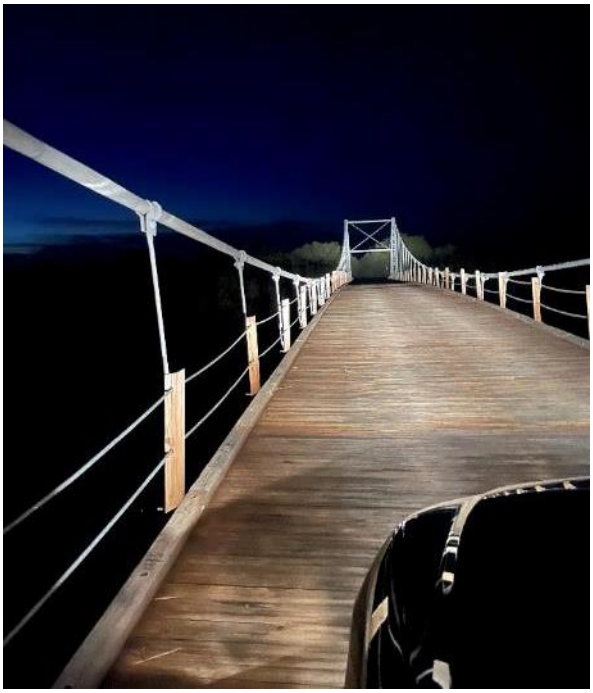
Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7194

UTSA | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7195	Quantify Bridge and Pavement Consumption Due to Permitted Overweight/Oversized (OW/OS) Vehicles	Active

Project Start Date: 09/01/2023
Completion Date: 02/28/2026
Lead University: TTI
University #2: TTI, UTSA
Project Status: Active
Total Project Budget: $828,584.25
UTSA Total Budget: $300,178.00
UTSA FY24 Budget: $120,006.00
UTSA Total Project Spend $110,264.19
UTSA FY24 Spend: $102,945.66



Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7195

2.16 UT-TYLER – University of Texas – Tyler

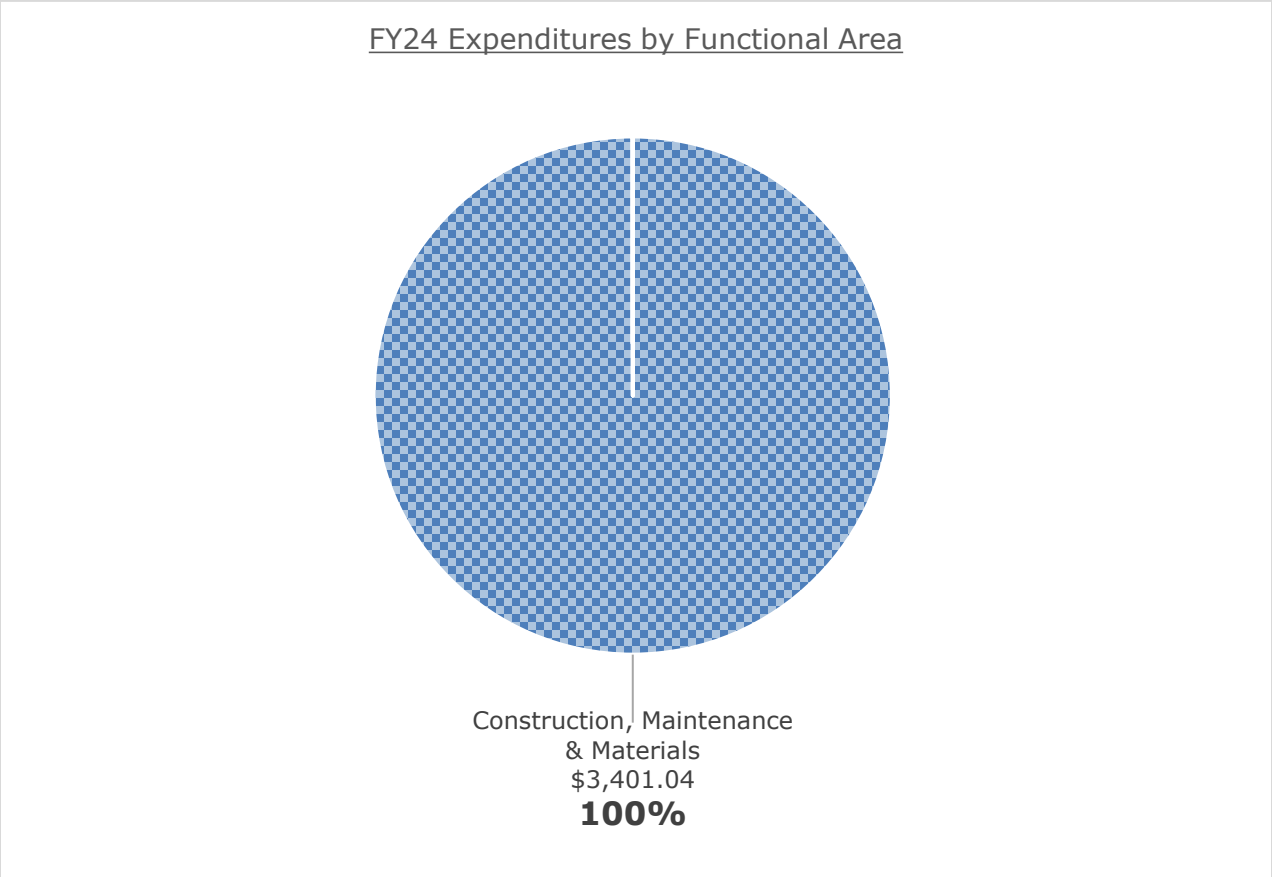


Figure 19. Pie chart of UT-TYLER expenditures by Functional Area

Project Number	Project Name	Status
0-7151	Develop Recommendations for Evaluating Surface Types and Aggregate Properties to Minimize Wet Weather Crashes	Active

UT-TYLER | Construction, Maintenance & Materials

Project Number	Project Name	Status
0-7151	Develop Recommendations for Evaluating Surface Types and Aggregate Properties to Minimize Wet Weather Crashes	Active

Project Start Date: 11/10/2022
Completion Date: 02/28/2026
Lead University: TTI
University #2: UT-TYLER
Project Status: Active
Total Project Budget: $599,992.25
UTSA Total Budget: $45,276.25
UTSA FY24 Budget: $7,322.50
UTSA Total Project Spend $18,466.58
UTSA FY24 Spend: $3,401.04

Project description: 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.

Approved Work Program Revisions
No. of FY24 Amendments: 0

CTR Library Project Link:
https://library.ctr.utexas.edu/Presto/search/SearchResults.aspx?q=0-7151

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 11. FY 2024 Pooled-Fund Projects

Project	Title	Study No.	Lead Agency	Start-End Date	FY24 Commitment
8-8515	Development and Evaluation of Roadside Safety Systems for Motorcyclists (TxDOT-Led)	TPF-5(482)	Texas Department of Transportation	2022-2025	$40,000.00
8-8531	Concrete Bridge Engineering Institute (CBEI)	TPF-5(508)	Texas Department of Transportation	2023-2026	$250,000.00
8-8458	Connecting the DOTs: Implementing ShakeCast Across Multiple State Departments of Transportation for Rapid Post-Earthquake Response	TPF-5(357)	California Department of Transportation	2017-2024	$15,000.00
8-8470	Improve pavement surface distress and transverse profile data collection and analysis, Phase II	TPF-5(399)	FHWA	2019-2024	$20,000.00

Project	Title	Study No.	Lead Agency	Start-End Date	FY24 Commitment
8-8482	Smart Work Zone Deployment Initiative (FY20-FY24)	TPF-5(438)	Iowa Department of Transportation	2020-2024	$25,000.00
8-8484	EconWorks - Improved Economic Insight	TPF-5(456)	Arkansas Department of Transportation	2020-2024	$4,000.00
8-8486	Technology Transfer Concrete Consortium (FY20-FY24)	TPF-5(437)	Iowa Department of Transportation	2020-2024	$20,000.00
8-8487	No Boundaries Transportation Maintenance Innovations	TPF-5(441)	Colorado Department of Transportation	2020-2024	$10,000.00
8-8490	Traffic Safety Culture - Phase 2	TPF-5(444)	Montana Department of Transportation	2020-2024	$50,000.00
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
8-8502	Hydrologic and Hydraulic Software Enhancements (SMS, WMS, Hydraulic Toolbox, and HY-8)	TPF-5(464)	FHWA	2020-2024	$10,000.00
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	FY24 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
8-8514	In-Service Performance Evaluation (ISPE) of Roadway Safety Features	TPF-5(481)	Arizona Department of Transportation	2022-2024	$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
8-8517	Center for the Aging Infrastructure: Steel Bridge Research, Inspection, Training and Education Engineering Center - SBRITE (Continuation)	TPF-5(486)	Indiana Department of Transportation	2022-2024	$75,000.00
8-8518	LTPP Forensic Investigations - Stage 2	TPF-5(500)	Washington State Department of Transportation	2022-2024	$20,000.00
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	2022-2026	$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
8-8524	2023 through 2025 Biennial Asset Management Conference and Training on Implementation Strategies	TPF-5(492)	Iowa Department of Transportation	2022-2024	$12,000.00

Project	Title	Study No.	Lead Agency	Start-End Date	FY24 Commitment
8-8526	Continuous Bituminous Pavement Stripping Assessment Through Non-destructive Testing	TPF-5(504)	Minnesota Department of Transportation	2022-2025	$25,000.00
8-8527	Emerging Data Streams for Pavement (Asset) Health Monitoring and Management	TPF-5(513)	Virginia Department of Transportation	2023-2027	$30,000.00
8-8528	2023 through 2025 Innovations in Freight Data Workshop	TPF-5(510)	Iowa State Department of Transportation	2023 - 2024	$14,000.00
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	2023-2027	$16,000.00
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	2024-2028	$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

Project	Title	Study No.	Lead Agency	Start-End Date	FY24 Commitment
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
8-8544	Improving Traffic Detection Through New Innovative i-LST Technology Demonstration Pilot	TPF-5(520)	FHWA	2023-2024	$15,000.00
8-8545	Western Transportation Research Consortium	TPF-5(526)	Kansas Department of Transportation	2024-2026	$15,000.00
8-8546	International Conference on Ecology and Transportation 2025	TPF-5(527)	Washington State Department of Transportation	2024-2025	$2,000.00
8-8547	Improving the Quality of Highway Profile Measurement	TPF-5(537)	Illinois Department of Transportation	2024-2028	$30,000.00
8-8548	Ahead of the Curve - Migration from NCHRP to AASHTO Technical Training Solutions (TTS)	TPF-5(536)	Louisiana Department of Transportation and Development	2024-2025	$10,000.00
8-8549	Accelerated Performance Testing on the 2024 NCAT Pavement Test Track with MnROAD Research Partnership	TPF-5(531)	Alabama Department of Transportation	2024-2026	$266,667.00

Section 3 - SPR Administrative Activities

3.1 Research Management and Administration

RTI performs the following management and administrative activities.

Project Number: 0-50

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 Work Program.

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

1. Develop, implement, and monitor the SPR Work Program, ensuring that all requirements of 23 CFR 420, 2 CFR 200, and other applicable federal and state statutes and regulations are followed.
    a. Prepare and submit the proposed 2024 SPR Work Program to FHWA.
    b. Prepare and submit the 2023 Annual Performance and Expenditures Report (APER) to FHWA.
    c. Hold quarterly status meetings with FHWA to report on the 2024 SPR Work Program.
    d. Prepare and submit amendments to the 2024 SPR 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. 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.

Financials	Budget	Expended	Balance
Division Travel	$75,000.00	$44,347.00	$30,653.00
Salary	$1,989,662.00	$2,101,918.00	($112,256.00)
Total RTI Division Program Management	$2,064,662.00	$2,146,265.00	($81,603.00)

Summary Statement

The Texas State Planning and Research (SPR), Subpart B 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.