LTRC Annual Research Program

Fiscal Year July 1, 2021 - June 30, 2022

FHWA Part B SPR Research Program
FAP Number SPR-0010(34)
&
FHWA Funded Research Program
&
FHWA LTAP Funded Program
&
FHWA STP Funded Program
&
Self-Generated Funded Research Program
&
Other DOTD Funded Projects

Conducted by:
Louisiana Department of Transportation and Development
Louisiana Transportation Research Center
In accordance with Louisiana R.S. 48.105
Which governs the creation and operation
Of the Louisiana Transportation Research Center

In cooperation with
United States Department of Transportation Federal Highway Administration
June 2021

LOUISIANA TRANSPORTATION RESEARCH CENTER
LTRC

Research, Technology Transfer, Education & Training

DOTD
LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

April 14, 2021

Mr. Charles W Bolinger
Division Administrator
Federal Highway Administration
5304 Flanders Drive, Suite A
Baton Rouge, LA 70808

Attention: Ms. Mary Stringfellow

RE: FY 2021-2022 Louisiana Transportation Research Center Annual Work Program

Dear Mr. Bolinger:

Enclosed please find the FY2021-2022 Louisiana Transportation Research Center (LTRC) Annual Work Program for your review and approval. You will note that the program is divided into multiple sections reflecting all funding sources.

As delegated by the Secretary, Louisiana Department of Transportation and Development (LADOTD), I, Samuel B. Cooper, Jr., Director, Louisiana Transportation Research Center, of the State of Louisiana, 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.

If I can provide additional information, please advise.

Sincerely,

Samuel B. Cooper, Jr., Ph.D., P.E.
Director

cc: Mr. Chrisptopher P. Knotts, P.E.
Dr. Tyson Rupnow, P.E.

U.S. Department of Transportation
Federal Highway Administration

Louisiana Division Office

5304 Flanders Drive, Suite A
Baton Rouge, LA 70808
225.757.7600
225.757.7601 (fax)

June 29, 2021

In Reply Refer To:
HDA-LA

Shawn D. Wilson, Ph.D.
Secretary
Louisiana Department of Transportation
and Development
Baton Rouge, LA

Subject: State Planning & Research (SPR) Work Program Subpart B FY 2020-2021

Attention: Mr. Chris Knotts, LDOTD

Dear Dr. Wilson:

This letter provides approval of the Louisiana Transportation Research Center (LTRC) Statewide Planning and Research (SPR) Work Program Subpart B, for State Fiscal Year (FY) 2021-2022.

A separate request from your Federal-aid section will be required to process the fiscal documents necessary to obligate the SPR & STP funds for this Work Program. Should you have any questions regarding this matter, please contact me at (225) 757-7610.

Sincerely yours,

Mary M. Stringfellow
Program Delivery Team Leader

cc: Mr. Sam Cooper, LTRC
Mr. Tyson Rupnow, LTRC
Ms. Mary Leah Coco, LTRC
Ms. Mary Elliot Bergeron, LDOTD

Abbreviations and Acronyms

Funding

SPR	State Planning and Research
NCHRP	National Cooperative Highway Research Program
TRB	Transportation Research Board
IBRD	Innovative Bridge Research Deployment
LTAP	Local Technical Assistance Program
STP	State Transportation Program
NSF	National Science Foundation
TT-Fed	Transportation Trust – Federal
TT-State	Transportation Trust – State

Project Types

ADM	Administrative
RS	Research Support
GT	Geotechnical
P	Pavements
B	Bituminous
SA	Safety
SS	Special Studies
C	Concrete
ST	Structures
TT	Technology Transfer
LTAP	Local Technical Assistance Program
PF	Pooled Fund (Louisiana Lead)

Project Status

A	Active
P	Proposed
RFP	Request for Proposal
SIO	Statistical Internal Order

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FHWA SPR Work Program
Part B

FAP Number SPR-0010(34)

FHWA Funding

SPR Research Budget Recap	H#	Federal	State	Total
Administrative Budget	H.927423	$686,508	$171,672	$858,135
Research Support Studies Budget	H.927423	$1,161,724	$290,431	$1,452,155
Active Studies Budget	H.927423	$3,274,392	$818,598	$4,092,990
Proposed Studies Budget	H.927423	$1,986,429.60	$496,607.40	$2,483,037
Pooled Fund Lead State Studies Budget	TBD	$180,000	$0	$180,000
Total SPR Budget		**$7,289,053.60**	**$1,777,263.40**	**$9,066,317**

SPR External Collaboration Budget Recap	H#	Federal	State	Total
Pool Funded Studies	N/A	$52,000	$0	$52,000
TRB Correlations	N/A	$118,058.40	$29,514.60	$147,573
NCHRP	N/A	$668,176.80	$167,044.20	$835,221
Total SPR External Collaboration Budget		**$838,235.20**	**$196,558.80**	**$1,034,794**

FHWA Funding

LTAP Budget Recap	H#	Federal	State	Total
LTAP	TBS	$542,938	$150,000	$692,938
LTAP Program Total		**$542,938**	**$150,000**	**$692,938**

STP: Technology Transfer Program Budget Recap	H#	Federal	Total
Technology Transfer Program and Operations	H.927423	$1,204,257	$1,204,257
Workforce Development Program	H.927423	$6,944,911	$6,944,911
Student Support Programs	H.927423	$210,000	$210,000
Total STP Budget		**$8,359,168**	**$8,359,168**

Self-Generated Funding

Self-Generated Budget Recap	H#	Federal	State	Total
Active Studies Budget	N/A	$0	$0	$47,312
Proposed Studies Budget	N/A	$0	$0	$0
Total Self-Generated Budget				$47,312

Other DOTD Sections Funding

Other DOTD Sections Budget Recap	H#	Federal	State	Total
Active Studies Budget	TBD	$34,585.60	$13,749.40	$48,335
Proposed Studies Budget	TBD	$379,989	$0	$379,989
Total Other DOTD Sections Budget		$414,574.60	$13,749.40	$428,324

LTRC ANNUAL RESEARCH PROGRAM

SPR: TT-Fed/TT-Reg (80% Federal / 20% State)

FISCAL YEAR 2021-2022

Funding	A/P	Project Type	SIO No.	Research No.	FY Budget	Total Cost	Agency	Principal Investigator	Project Title	Start Date	End Date	End Date (Rev)	Page No.
Project Type: Administrative (80% Federal / 20% State)													
SPR: TT-Fed/TT-Reg - 5	P	ADM	DOTLT1000394	22-1PM	$858,135	$858,135	LTRC	Tyson Rupnow	Program Management	7/1/2021	6/30/2022		C-2
					$858,135	**$858,135**	**ADMINISTRATIVE BUDGET TOTALS**						
Project Type: Research Support (80% Federal / 20% State)													
SPR: TT-Fed/TT-Reg - 5	P	RS	DOTLT1000397	22-1TTRI	$355,974	$355,974	LTRC	Tyson Rupnow	Technology Transfer and Research Implementation	7/1/2021	6/30/2022		C-3
SPR: TT-Fed/TT-Reg - 5	P	RS	DOTLT1000401	22-1TRS	$294,810	$294,810	LTRC	Tyson Rupnow	Technical Research Surveillance	7/1/2021	6/30/2022		C-4
SPR: TT-Fed/TT-Reg - 5	P	RS	DOTLT1000396	22-1TA	$365,504	$365,504	LTRC	Tyson Rupnow	Technical Assistance	7/1/2021	6/30/2022		C-5
SPR: TT-Fed/TT-Reg - 5	P	RS	DOTLT1000400	22-1SSR	$100,000	$100,000	LTRC	Tyson Rupnow	DOTD Staff Support for Research	7/1/2021	6/30/2022		C-6
SPR: TT-Fed/TT-Reg - 5	P	RS	DOTLT1000395	22-1LFT	$4,544	$4,544	LTRC	Tyson Rupnow	Research Laboratory and Field Test Support	7/1/2021	6/30/2022		C-7
SPR: TT-Fed/TT-Reg - 6	P	RS	DOTLT1000399	22-1NPE	$35,571	$35,571	LTRC	Tyson Rupnow	New Product Evaluation	7/1/2021	6/30/2022		C-8
SPR: TT-Fed/TT-Reg - 6	P	RS	DOTLT1000398	22-1EQM	$295,752	$295,752	LTRC	Tyson Rupnow	Equipment Management	7/1/2021	6/30/2022		C-9
					$1,452,155	**$1,452,155**	**RESEARCH SUPPORT BUDGET TOTALS**						

Funding	A/P	Project Type	SIO No.	Research No.	FY Budget	Total Cost	Agency	Principal Investigator	Project Title	Start Date	End Date	End Date (Rev)	Page No.
Project Type: Bituminous (80% Federal / 20% State)													
SPR: TT-Fed/TT-Reg - 5	A	B	DOTLT1000391	21-2B	$87,822	$326,936	LTRC	Louay Mohammad	Assessment of Long-Term Performance of Louisiana Asphalt Pavements	11/1/2020	10/31/2023		C-11
SPR: TT-Fed/TT-Reg - 5	A	B	DOTLT1000390	21-1B	$85,000	$299,944	LTRC	Louay Mohammad	Development of a Cyclic Semi-Circular Bend Test to Evaluate Asphalt Mixture Cracking Resistance at Intermediate Temperature.	1/1/2021	3/31/2023		C-12
SPR: TT-Fed/TT-Reg - 5	A	B	DOTLT1000374	20-4B	$85,000	$170,000	LTU	Nazimuddin Wasiuddin	Low and Intermediate Temperature Evaluation of Binders through Dynamic Shear Rheometer – Support Study	5/11/2020	5/10/2022		C-13
SPR: TT-Fed/TT-Reg - 5	A	B	DOTLT1000345	20-3B	$69,340	$262,246	LTRC	Saman Salari	Low and Intermediate Temperature Evaluation of Binders through Dynamic Shear Rheometer	5/11/2020	5/10/2022		C-14
SPR: TT-Fed/TT-Reg - 6	A	B	DOTLT1000386	21-6B	$55,000	$119,610	LSU	Mostafa Elseifi	A New Generation of Porous Asphalt Pavement - OGFC Support Study	9/1/2020	11/30/2022		C-15
SPR: TT-Fed/TT-Reg - 6	A	B	DOTLT1000385	21-5B	$42,500	$79,156	LTRC	Corey Mayeux	Improvement of Open-Graded Friction Course (OGFC) Performance and Durability through Materials, Design, and Maintenance	9/1/2020	11/30/2022		C-16
SPR: TT-Fed/TT-Reg - 6	A	B	DOTLT1000384	21-4B	$77,200	$203,393	LTRC	Louay Mohammad	Development of a Standard Practice for the Design of Durable Open-Graded Friction Course (OGFC) Mixtures with Epoxy Asphalt-Support Study	9/1/2020	11/30/2022		C-17
SPR: TT-Fed/TT-Reg - 6	A	B	DOTLT1000392	21-3B	$72,139	$249,609	LTRC	Louay Mohammad	Use of an Innovative Recycling Agent for Improving the Sustainability and Durability of Asphalt Pavements	2/1/2021	4/30/2023		C-18
SPR: TT-Fed/TT-Reg - 6	A	B	DOTLT1000329	20-2B	$4,800	$92,003	LTRC	Corey Mayeux	Feasibility and Performance of Low Volume Roadway Mixture Design	8/19/2019	8/18/2021		C-19
SPR: TT-Fed/TT-Reg - 6	A	B	DOTLT1000328	20-1B	$55,000	$140,085	LTRC	Corey Mayeux	Evaluate Performance and Life Cycle Cost of Asphalt (8/18 Specifications)	8/19/2019	8/18/2022		C-20
SPR: TT-Fed/TT-Reg - 6	A	B	DOTLT1000321	19-4B	$110,000	$512,939	LTRC	Louay Mohammad	Implementation of Semi Circular Bend Test for QC/QA of Asphalt Mixtures	5/1/2019	4/30/2022		C-21
SPR: TT-Fed/TT-Reg - 6	A	B	30000112	10-1EMCRF	$156,132	$17,657,579	LTRC	Louay Mohammad	Pavement Materials Research Using Special Equipment at the Engineering Materials Characterization Research Facility	7/1/2009	6/30/2015	6/30/2021	C-22
					$899,933	**$20,295,040**	**BITUMINOUS BUDGET TOTALS**						
Project Type: Concrete (80% Federal / 20% State)													
SPR: TT-Fed/TT-Reg - 5	A	C	DOTLT1000236	18-3C	$4,000	$27,404	LSU	Gabriel Arce	DOTD Support for UTC Project: Application of Engineered Cementitious Composites (ECC) for Jointless Ultrathin White-topping Overlay	3/15/2018	9/14/2020	9/15/2021	C-23
SPR: TT-Fed/TT-Reg - 6	A	C	DOTLT1000332	20-2C	$22,629	$82,419	LTRC	Jose Milla	Using the Portable XRF to identify/Verify Field Material Properties	10/1/2019	3/31/2021	9/30/2022	C-24
SPR: TT-Fed/TT-Reg - 6	A	C	DOTLT1000331	20-1C	$57,883	$162,768	LTRC	Jose Milla	Evaluation of the Miniature Concrete Prism Test (MCPT) for use in LADOTD	10/1/2019	9/30/2022		C-25
					$84,512	**$272,591**	**CONCRETE BUDGET TOTALS**						

Project Type: Geotechnical (80% Federal / 20% State)

SPR: TT-Fed/TT-Reg - 5	A	GT	DOTLT1000393	21-2GT	$100,000	$185,539	LTRC	Gavin Gautreau	Geotechnical Database, Phase IV	3/1/2021	2/28/2023		C-26
SPR: TT-Fed/TT-Reg - 5	A	GT	DOTLT1000375	21-1GT	$80,200	$146,690	LTRC	Murad Abu-Farsakh	Internal friction angle of sands with high fines content	8/1/2020	7/31/2022		C-28
SPR: TT-Fed/TT-Reg - 5	A	GT	DOTLT1000389	20-4GT	$34,082	$64,582	LTRC	Nick Ferguson	Feasibility Study on Geophysical Methods to Estimate Geotechnical Properties in Louisiana	12/1/2020	2/28/2022		C-30
SPR: TT-Fed/TT-Reg - 5	A	GT	DOTLT1000346	20-3GT	$84,300	$300,302	LTRC	Murad Abu-Farsakh	Development of a Design Methodology for Geosynthetic Reinforced Pavement using Finite Element Numerical Modeling	5/1/2020	4/30/2023		C-31
SPR: TT-Fed/TT-Reg - 5	A	GT	DOTLT1000337	20-2GT	$103,150	$300,331	LTRC	Murad Abu-Farsakh	Instrumentation and Modeling of Geosynthetic Load Transfer Platform Performance	1/1/2020	6/30/2022		C-33
SPR: TT-Fed/TT-Reg - 5	A	GT	DOTLT1000226	18-4GT	$0	$189,925	LTRC	Gavin Gautreau	Geotechnical Asset Management for Louisiana	5/1/2018	10/31/2019	12/31/2021	C-35
SPR: TT-Fed/TT-Reg - 5	A	GT	DOTLT1000165	17-2GT	$40,525	$416,887	LTRC	Murad Abu-Farsakh	Update the Pile Design by CPT Software to Incorporate Newly Developed Pile-CPT Methods and Other Design Features	6/1/2017	5/31/2019	12/31/2021	C-37
SPR: TT-Fed/TT-Reg - 5	A	GT	DOTLT1000112	16-6GT	$27,245	$549,616	LTRC	Murad Abu-Farsakh	Incorporating the Site Variability and Laboratory/In-situ Testing Variability of Soil Properties in Geotechnical Engineering Design	7/1/2016	12/31/2018	6/30/2021	C-39
SPR: TT-Fed/TT-Reg - 6	A	GT	30000111	10-1GERL	$166,838	$16,302,147	LTRC	Murad Abu-Farsakh	LTRC Support for Geotechnical Research at the Geotechnical Engineering Research Laboratory (GERL)	7/1/2010	6/30/2015	6/30/2021	C-41
					$636,340	**$18,456,019**	**GEOTECHNICAL BUDGET TOTALS**						

Project Type: Other (80% Federal / 20% State)

SPR: TT-Fed/TT-Reg - 5	A	Other	DOTLT1000215	18-1Other	$220,712	$856,869	LTRC	Adele Lee	LTRC Proposal for the Support of Software Development and GIS Applications in LTRC Research	7/1/2017	6/30/2020	6/30/2021	C-43
SPR: TT-Fed/TT-Reg - 5	A	Other	30000169	11-1AD	$306,412	$4,672,490	LTRC	Vijaya Gopu	Administration of LTRC External Funding Programs	1/1/2008	6/30/2009	6/30/2024	C-45
					$527,124	**$5,529,359**	**OTHER BUDGET TOTALS**						

Project Type: Pavements (80% Federal / 20% State)

SPR: TT-Fed/TT-Reg - 5	A	P	DOTLT1000376	21-1P	$91,000	$182,370	LTRC	Zhong Wu	Prediction of Road Conditions and Smoothness For Flexible and Rigid Pavements in Louisiana Using Neural Networks	8/1/2020	7/31/2022		C-47
SPR: TT-Fed/TT-Reg - 5	A	P	DOTLT1000271	19-1P	$44,500	$319,896	LTRC	Zhong Wu	Application of Mechanistic-Empirical Pavement Design Approach into RCC Pavement Thickness Design	6/1/2018	11/30/2020	5/31/2022	C-48
SPR: TT-Fed/TT-Reg - 5	A	P	DOTLT1000216	18-1P	$48,000	$150,000	LTRC	Zhongjie Zhang	Exploration of Drone and Remote Sensing Technologies in Highway Embankment Monitoring and Management	9/1/2017	8/31/2018	8/31/2022	C-49
SPR: TT-Fed/TT-Reg - 6	A	P	DOTLT1000387	21-2P	$61,540	$100,000	LTRC	Qiming Chen	Correlation of Rut Depths Measured by the Profilers of LTRC and DOTD PMS	11/16/2020	5/15/2022		C-50
SPR: TT-Fed/TT-Reg - 6	A	P	DOTLT1000340	20-4P	$140,000	$402,068	LTRC	Zhong Wu	Assessment of LADOTD's friction aggregate sources through laboratory and accelerated testing	1/1/2020	12/31/2022		C-51
SPR: TT-Fed/TT-Reg - 6	A	P	DOTLT1000272	19-2P	$20,000	$319,442	LTRC	Zhong Wu	Mechanistic Characterization of Asphalt Overlays for Pavement Rehabilitation and Preservation using Pavement ME Approach	8/1/2018	1/31/2021	7/31/2021	C-52

SPR: TT-Fed/TT-Reg - 6	A	P	DOTLT1000218	18-2P	$24,435	$210,000	LTRC	Qiming Chen	Mitigating Joint Reflective Cracks using Stone Interlayers: Case Study on Louisiana Highway 5, Desoto Parish	10/17/2017	10/16/2023		C-53
SPR: TT-Fed/TT-Reg - 6	A	P	30000141	10-1ALF	$472,000	$19,890,536	LTRC	Zhong Wu	Management and Operation of the Pavement Research Facility	7/1/2009	6/30/2015	6/30/2021	C-54
					$901,475	**$21,574,312**	**PAVEMENTS BUDGET TOTALS**						

Project Type: Safety (80% Federal / 20% State)

SPR: TT-Fed/TT-Reg - 5	A	SA	DOTLT1000341	20-1SA	$95,861	$196,166	LTRC	Julius Codjoe	Evaluation of Traffic Crash Characteristics on Elevated Sections of Interstates in Louisiana	8/3/2020	8/2/2022		C-56
SPR: TT-Fed/TT-Reg - 5	A	SA	DOTLT1000291	19-2SA	$87,474	$179,928	LTRC	Raju Thapa	Reduce Pedestrian Fatal Crashes in Louisiana by Improving Lighting Conditions	9/1/2020	5/31/2022		C-57
SPR: TT-Fed/TT-Reg - 6	A	SA	DOTLT1000297	19-3SA	$61,778	$288,520	UNO	Tara Tolford, MURP, AICP	Pedestrians and Bicyclists Count, Phase 2: Implementing and Applying Multimodal Demand Data	3/15/2019	3/14/2021	3/14/2022	C-58
					$245,113	**$664,614**	**SAFETY BUDGET TOTALS**						

Project Type: Special Studies (80% Federal / 20% State)

SPR: TT-Fed/TT-Reg - 5	A	SS	DOTLT1000380	21-5SS	$61,092	$149,303	LTRC	Ruijie "Rebecca" Bian	Determining the True Cost and Benefit for Collecting and Maintaining Non-Road and Non-Bridge Asset Data	11/1/2020	1/31/2022		C-60
SPR: TT-Fed/TT-Reg - 5	A	SS	DOTLT1000379	21-4SS	$67,801	$142,132	LTRC	Raju Thapa	Develop and Evaluate Performance Measures for Intelligent Transportation Systems (ITS) in Louisiana	8/1/2020	7/31/2022		C-61
SPR: TT-Fed/TT-Reg - 5	A	SS	DOTLT1000378	21-3SS	$76,445	$197,212	LTRC	Raju Thapa	Evaluating Permitted/Protected versus Protected Left Turn Signals in Louisiana	8/1/2020	7/31/2022		C-62
SPR: TT-Fed/TT-Reg - 5	A	SS	DOTLT1000325	19-5SS	$63,916	$295,790	LSU	Ruijie "Rebecca" Bian	Assessing the Economic Benefits of the TIMED Program	7/1/2019	6/30/2020	3/30/2022	C-63
SPR: TT-Fed/TT-Reg - 5	A	SS	DOTLT1000280	19-1SS	$126,711	$494,396	ULL	Elisabeta Mitran	LTRC Proposal for the Support of Research and Development in Special Studies	7/1/2019	6/30/2021	6/30/2024	C-64
SPR: TT-Fed/TT-Reg - 5	A	SS	DOTLT1000281	19-1ITS	$97,980	$2,367,433	ULL	Raju Thapa	LTRC Proposal for the Support of Research and Development in ITS/Traffic	7/1/2019	6/30/2021	6/30/2024	C-65
SPR: TT-Fed/TT-Reg - 5	A	SS	30000125	10-1PLAN	$64,483	$9,723,832	LTRC	Ruijie "Rebecca" Bian	LTRC Proposal for the Support of Research and Development in Transportation Planning	7/1/2010	6/30/2015	6/30/2024	C-67
SPR: TT-Fed/TT-Reg - 6	A	SS	DOTLT1000377	21-2SS	$90,838	$159,112	LTRC	Ruijie "Rebecca" Bian	Evaluate the Impacts of Complete Street Policy in Louisiana	1/1/2021	12/31/2022		C-68
					$649,266	**$13,529,210**	**SPECIAL STUDIES BUDGET TOTALS**						

Project Type: Structures (80% Federal / 20% State)

SPR: TT-Fed/TT-Reg - 5	A	ST	DOTLT1000342	20-1ST	$50,000	$99,989	LSU	Ayman Okeil	Developing The Load Distribution Formula for Louisiana Culverts	3/1/2020	8/31/2021		C-69
SPR: TT-Fed/TT-Reg - 5	A	ST	DOTLT1000099	16-1ST	$99,227	$578,912	Texas A&M Transportation Institute (TTI)	William Williams	Retrofit of Existing Statewide Louisiana Safety Walk Bridge Barrier Railing Systems	7/1/2016	6/30/2018	8/31/2021	C-70
					$149,227	**$678,901**	**STRUCTURES BUDGET TOTALS**						
					$4,092,990	**$81,000,046**	**SPR: TT-FED/TT-REG ACTIVE BUDGET TOTALS**						

LTRC ANNUAL RESEARCH PROGRAM

SPR: TT-Fed/TT-Reg ((80% Federal / 20% State)

Funding	A/P	Project Type	SIO No.	Research No.	FY Budget	Total Cost	Agency	Principal Investigator	Project Title	Start Date	End Date	End Date (Rev)	PageNo.
Project Type: Bituminous (80% Federal / 20% State)													
SPR: TT-Fed/TT-Reg - 5	P	B			$40,000	$85,000	LTRC	Louay Mohammad	Life-Cycle Assessment Framework for Pavements in Louisiana	7/1/2021	6/30/2023		C-72
SPR: TT-Fed/TT-Reg - 6	P	B			$60,000	$60,000	LTRC		Effect of Longitudinal Joint Construction and Density on Asphalt Pavement Performances	10/4/2021	5/20/2022		C-73
SPR: TT-Fed/TT-Reg - 6	P	B			$40,000	$85,000	LTRC	Louay Mohammad	Enhanced Interaction between Crumb Rubber Modifiers and Asphalt Binder to Improve Performance	7/1/2021	6/30/2023		C-74
SPR: TT-Fed/TT-Reg - 6	P	B			$102,000	$349,000	LTRC	Louay Mohammad	Enhancement of Mechanical Properties of Asphalt Cements and Asphalt Mixtures Containing Waste Plastic	7/1/2021	6/30/2023		C-75
SPR: TT-Fed/TT-Reg - 6	P	B			$40,000	$85,000	LTRC	Louay Mohammad	Enhancing Pavement Resiliency to Sea Level Rise Using Natural and Nature-Based Features in Louisiana	7/1/2021	6/30/2023		C-76
SPR: TT-Fed/TT-Reg - 6	P	B			$155,131	$155,131	LTRC	Louay Mohammad	Establishment of the Center for Sustainable Pavement Materials and Technologies	7/1/2021	6/30/2022		C-77
SPR: TT-Fed/TT-Reg - 6	P	B			$85,000	$180,000	LTRC	Corey Mayeux	Evaluation of the Use of Fly-Ash as a Mineral Filler in Asphalt Concrete	7/15/2021	6/30/2023		C-78
SPR: TT-Fed/TT-Reg - 6	P	B			$77,000	$350,000	LTRC	Louay Mohammad	Performance of Asphalt Pavements Containing Recycled Materials Under Accelerated Loading	7/1/2021	6/30/2023		C-79
					$599,131	**$1,349,131**	**BITUMINOUS BUDGET TOTALS**						
Project Type: Concrete (80% Federal / 20% State)													
SPR: TT-Fed/TT-Reg - 6	P	C			$105,075	$114,400		Jose Milla	Influence of Aggregate Gradation on Permeability	7/1/2020	6/30/2022		C-80
SPR: TT-Fed/TT-Reg - 6	P	C			$53,619	$97,000	LTRC	Jose Milla	Influence of Internal Curing on Concrete's Permeability in Simulated Field Conditions	7/1/2020	6/30/2022		C-81
					$158,694	**$211,400**	**CONCRETE BUDGET TOTALS**						
Project Type: Geotechnical (80% Federal / 20% State)													
SPR: TT-Fed/TT-Reg - 5	P	GT			$24,000	$50,000	LTRC	Murad Abu-Farsakh	Develop a Synthesis on the Application Of PCPT Technology for Geotechnical Engineering Design	10/2/2017			C-82
SPR: TT-Fed/TT-Reg - 5	P	GT			$40,000	$200,000	LTRC	Murad Abu-Farsakh	Use and Interpretation of Seismic Piezocone Penetration Testing (SCPTu) for Geotechnical Site Investigation	1/1/2018	12/31/2020		C-83
SPR: TT-Fed/TT-Reg - 6	P	GT			$10,000	$150,000	LTRC	Gavin Gautreau	LIDAR for Geotechnical Applications	3/1/2022	2/28/2024		C-84
					$74,000	**$400,000**	**GEOTECHNICAL BUDGET TOTALS**						

Project Type: Pavements (80% Federal / 20% State)

SPR: TT-Fed/TT-Reg - 5	P	P			$17,000	$65,000	LTRC	Qiming Chen	Drainage Condition	4/1/2022	6/30/2023		C-85
SPR: TT-Fed/TT-Reg - 5	P	P			$35,000	$50,000	LTRC	Qiming Chen	Performance Serviceability Rating and Maintenance Cost Assignment for Ramps, Acceleration and Deceleration Lanes in Louisiana	1/1/2022	12/31/2022		C-86
SPR: TT-Fed/TT-Reg - 6	P	P			$55,000	$200,000	LTRC	Zhong Wu	Evaluation of Louisiana Maintenance and Rehabilitation Treatment Decision Matrix for Cost-effective and Timely Pavement Preservation	1/1/2022	12/31/2023		C-87
SPR: TT-Fed/TT-Reg - 6	P	P			$74,500	$180,000	LTRC	Zhong Wu	Right-sizing Truck registration and Overweight Permit Fees	7/1/2020	12/31/2021		C-88
					$181,500	**$495,000**	**PAVEMENTS BUDGET TOTALS**						

Project Type: Safety (80% Federal / 20% State)

SPR: TT-Fed/TT-Reg - 5	P	SA	DOTLT10003 88	21-1SA	$94,234	$175,000			A mixed methodology study of driving behavior in Louisiana	10/1/2020	9/30/2022		C-89
SPR: TT-Fed/TT-Reg - 5	P	SA	DOTLT10003 73	20-3SA	$65,473	$99,623	LTRC	Hany Hassan	Minimum Intersection Illumination	1/2/2020	10/31/2022		C-90
SPR: TT-Fed/TT-Reg - 5	P	SA	DOTLT10003 44	20-2SA	$75,000	$175,000			Evaluation of Installed Low-Cost Safety Countermeasures for Reducing Severe Intersection Crash Types in Louisiana	11/1/2019	1/31/2023		C-91
SPR: TT-Fed/TT-Reg - 5	P	SA			$90,000	$190,000			Evaluation of Louisiana's Systemic Safety Projects for Roadway Departures on Rural Curves	9/1/2021	8/31/2023		C-92
SPR: TT-Fed/TT-Reg - 5	P	SA			$90,000	$175,000	LTRC	Elisabeta Mitran	Safety Effectiveness of Cable Median Barriers in Louisiana	8/2/2021	12/31/2022		C-93
SPR: TT-Fed/TT-Reg - 6	P	SA			$180,000	$180,000			Development of Statewide Guidelines for Provision of Pedestrian Facilities on High Speed Arterials in Louisiana	12/1/2021	5/31/2023		C-94
					$594,707	**$994,623**	**SAFETY BUDGET TOTALS**						

Project Type: Special Studies (80% Federal / 20% State)

SPR: TT-Fed/TT-Reg - 5	P	SS			$80,000	$125,000			Best Practices for Maintenance of Control of Access Fencing	10/1/2021	12/31/2022		C-95
SPR: TT-Fed/TT-Reg - 5	P	SS			$100,000	$200,000			Economic Impact of Access Management Treatments	9/1/2021	2/28/2023		C-96
SPR: TT-Fed/TT-Reg - 5	P	SS			$50,000	$150,000	LTRC	Raju Thapa	Estimating HCM Default Parameters for Louisiana	1/1/2022	6/30/2023		C-97
SPR: TT-Fed/TT-Reg - 5	P	SS			$39,000	$115,000	LTRC	Ruijie "Rebecca" Bian	Human Mobility during COVID-19 and Implications for Active Transportation Planning in Louisiana	2/1/2022	6/30/2023		C-98
SPR: TT-Fed/TT-Reg - 5	P	SS			$80,000	$150,000			Innovations in Pedestrian Counting Technology	12/1/2021	2/28/2023		C-99
SPR: TT-Fed/TT-Reg - 5	P	SS			$24,107	$50,000	LTRC	Adele Lee	Remote Sensing in Transportation and its Applicability at LaDOTD	2/1/2022	1/31/2024		C-100
SPR: TT-Fed/TT-Reg - 5	P	SS			$50,000	$150,000	LTRC	Raju Thapa	Safety and Traffic Operations at Cloverleaf Interchanges	1/1/2022	6/30/2023		C-101
SPR: TT-Fed/TT-Reg - 5	P	SS			$62,000	$115,000	LTRC	Ruijie "Rebecca" Bian	Testing the Hurricane Evacuation Modeling Package (HEMP)	2/1/2022	6/30/2023		C-102
					$485,107	**$1,055,000**	**SPECIAL STUDIES BUDGET TOTALS**						

Project Type: Structures (80% Federal / 20% State)

SPR: TT-Fed/TT-Reg - 5	P	ST			$40,000	$200,000	LSU	Murad Abu-Farsakh	Evaluation of Embedded Pile Resistance on Scour Critical Bridges	7/1/2021	6/30/2023		C-103
SPR: TT-Fed/TT-Reg - 5	P	ST			$30,000	$30,000	Texas A&M Transportation Institute (TTI)	William Williams	MASH TL-3 Thrie Beam Retrofit Bridge Rail for Existing Statewide Louisiana Statewide Safety walk Bridge Barrier Railing Systems Phase 1	7/1/2021	7/1/2022		C-104
SPR: TT-Fed/TT-Reg - 5	P	ST			$200,000	$250,000	Wiss, Janney, Elstner Associates, Inc.	Gareth Rees	Skew Detection System Replacement on Vertical Lift Bridges Phase 2	7/1/2021	9/30/2022		C-105
					$270,000	**$480,000**	**STRUCTURES BUDGET TOTALS**						

Project Type: TIRE (80% Federal / 20% State)

SPR: TT-Fed/TT-Reg - 5	P	TIRE	DOTLT1000417	22-4TIRE	$29,921	$29,921	ULL	Ling Fei	Design and Fabrication of Superhydrophobic Nanocomposite Coating for Steel Corrosion Protection	7/1/2021	6/30/2022		C-107
SPR: TT-Fed/TT-Reg - 5	P	TIRE	DOTLT1000416	22-3TIRE	$29,977	$29,977	ULL	Jorge Villa	Enhancing the Carbon Dioxide Sequestering Capacity of Louisiana Highway Right of Way Lands	7/1/2021	6/30/2022		C-108
SPR: TT-Fed/TT-Reg - 5	P	TIRE	DOTLT1000415	22-2TIRE	$30,000	$30,000	Southern University	Yasser Ismail	High-Fidelity Fatigue, Drowsiness, and Drunk Drivers Detection (FD4) System	7/1/2021	6/30/2022		C-109
SPR: TT-Fed/TT-Reg - 5	P	TIRE	DOTLT1000414	22-1TIRE	$30,000	$30,000	LSU	Hany Hassan	Studying the Impacts of Vehicle-to-Infrastructure (V2I) Technologies on Driver's Behaviors and Traffic Safety	7/1/2021	6/30/2022		C-110
					$119,898	**$119,898**	**TIRE BUDGET TOTALS**						
					$2,483,037	**$5,105,052**	**SPR: TT-FED/TT-REG PROPOSED BUDGET TOTALS**						

LTRC ANNUAL RESEARCH PROGRAM

SPR: Pooled Fund: TT-Fed (100% Federal)

FISCAL YEAR 2021-2022

Funding	A/P	Project Type	SIO No.	Research No.	FY Budget	Total Cost	Agency	Principal Investigator	Project Title	Start Date	End Date	End Date (Rev)	PageNo.
Project Type: Pooled Fund (100% Federal)													
SPR: Pooled Fund: TT-Fed	P	PF		21-1PF	$180,000	$900,000	LTRC	Tyson Rupnow	Southeast Transportation Consortium - Phase II	7/1/2020	6/30/2025		C-112
					$180,000	**$900,000**	**SPR: POOLED FUND: TT-FED PROPOSED BUDGET TOTALS**						
					$180,000	**$900,000**	**POOLED FUND BUDGET TOTALS**						

FISCAL YEAR 2021-2022

Funding	A/P	Project Type	SIO No.	Research No.	FY Budget	Total Cost	Agency	Principal Investigator	Project Title	Start Date	End Date	End Date (Rev)	Page No.
Project Type: LTAP (State = $150k / Federal = Remaining)													
LTAP: TT-Fed/TT-Reg	P	LTAP	DOTDLT1000403	22-LTAP	$692,938	$692,938	LTRC	Steve Strength	Local Technical Assistance Program (LTAP)	7/1/2020	6/30/2022		D-2
					$692,938	**$692,938**	**LTAP BUDGET TOTALS**						
					$692,938	**$692,938**	**LTAP: TT-FED/TT-REG PROPOSED BUDGET TOTALS**						
Project Type: Technology Transfer and Training (100% Federal)													
STP: TT-Fed	A	TT	DOTLT1000405	22-2TT	$147,600	$147,600	LTRC	MaryLeah Coco	LTRC Student Worker Program	7/1/2021	6/30/2022		E-2
STP: TT-Fed	A	TT	DOTLT1000278	19-TDSS	$147,288	$441,453	LTRC	Vijaya Gopu	Training and Development Support Services	7/1/2018	6/30/2021	6/30/2024	E-3
STP: TT-Fed	A	TT	30000241	10-4AD	$10,000	$100,000	LTRC	Tyson Rupnow	Technology Transfer & Research Implementation Support for Louisiana Universities	1/1/2010	12/31/2013	6/30/2022	E-5
STP: TT-Fed	A	TT	30000320	08-1TSQ	$396,831	$1,140,170	LTRC	MaryLeah Coco	Technology Transfer Program and Operations (LSU)	7/1/2015	6/30/2018	6/24/2024	E-6
					$701,719	**$1,829,223**	**TECHNOLOGY TRANSFER AND TRAINING BUDGET TOTALS**						
STP: TT-Fed	P	TT	DOTLT1000406	22-TTRF	$100,000	$100,000	LTRC	MaryLeah Coco	Technology Transfer Registration Fees	7/1/2021	6/30/2022		E-8
STP: TT-Fed	P	TT	DOTLT1000407	22-COOP	$200,000	$200,000	LTRC	MaryLeah Coco	LA DOTD CO-OP Program	7/1/2021	6/30/2022		E9
STP: TT-Fed	P	TT	DOTLT000404	22-1WDC	$4,262,407	$4,262,407	LTRC	MaryLeah Coco	Workforce Development Contracts	7/1/2021	6/30/2022		E-10
STP: TT-Fed	P	TT	DOTLT1000402	22-1WD	$1,162,504	$1,162,804	LTRC	MaryLeah Coco	Workforce Development	7/1/2021	6/30/2022		E-13
STP: TT-Fed	P	TT	DOTLT1000409	22-1TT	$37,500	$37,500	LTRC	MaryLeah Coco	Technology Transfer and Assistance for Senior Project Courses	7/1/2021	6/30/2022		E-16
STP: TT-Fed	P	TT	DOTLT1000408	22-1TSQ	$375,038	$375,038	LTRC	MaryLeah Coco	Technology Transfer Program and Operations (DOTD)	7/1/2021	6/30/2022		E-17
STP: TT-Fed	P	TT	DOTLT1000411	22-1SWD	$1,520,000	$1,520,000	LTRC	MaryLeah Coco	DOTD Staff Support for Workforce Development	7/1/2021	6/30/2022		E-19
					$7,657,449	**$7,657,749**	**TECHNOLOGY TRANSFER AND TRAINING BUDGET TOTALS**						
					$8,359,168	**$9,486,972**	**STP: TT-FED ACTIVE BUDGET TOTALS**						

LTRC ANNUAL RESEARCH PROGRAM

Self-Generated (100% Federal)

FISCAL YEAR 2021-2022

Funding	A/P	Project Type	SIO No.	Research No.	FY Budget	Total Cost	Agency	Principal Investigator	Project Title	Start Date	End Date	End Date (Rev)	Page No.
Project Type: Structures (100% Federal)													
NSF	A	ST	DOTLT1000101	16-2ST	$47,312	$337,312	LTRC	Vijaya Gopu	Field Monitoring and Measurements Education: A Model for Civil and Environmental Engineering	2/15/2016	8/14/2019	9/30/2021	F-2
					$47,312	**$337,312**	**STRUCTURES BUDGET TOTALS**						
					$47,312	**$337,312**	**SELF-GENERATED ACTIVE BUDGET TOTALS**						

LTRC ANNUAL RESEARCH PROGRAM

Other DOTD Sections (%Federal - Varies / %

State - Varies)

Funding	A/P	Project Type	SIO No.	Research No.	FY Budget	Total Cost	Agency	Principal Investigator	Project Title	Start Date	End Date	End Date (Rev)	Page No.
Project Type: Special Studies (%Federal - Varies / %State - Varies)													
Pavement Management	A	SS	000	22-1SS	$33,444	$38,982	Texas A&M Transportation Institute (TTI)	Lubinda Walubita	Portable WIM Installation and Site-Specific Traffic Data Collection for DOTD	10/12/2020	1/11/2021	6/30/2021	G-2
Planning	A	SS	DOTLT1000372	21-1SS	$9,788	$44,999	UNO	Guang Tian	The Impact of the Louisiana Grade Crossings: A Synthesis and System Analysis	5/14/2020	5/13/2021	11/13/2021	G-3
Office of Multimodal Commerce	A	SS	DOTLT1000330	20-1SS	$5,103	$284,499	Moffatt & Nichol	Ricardo Cruz	The Future of the Louisiana Waterways Transportation System: A System Analysis and Plan to Move Commerce by Water	1/21/2020	4/20/2021	8/20/2021	G-4
					$48,335	**$368,480**	**SPECIAL STUDIES BUDGET TOTALS**						
					$48,335	**$368,480**	**OTHER DOTD SECTIONS ACTIVE BUDGET TOTALS**						
Project Type: Other (100% Federal)													
Safety	P	Other	DOTLT1000412	22-LRSP	$379,989	$379,989	LTRC	Steve Strength	Louisiana Local Road Safety Program	7/1/2021	6/30/2022		G-5
					$379,989	**$379,989**	**OTHER BUDGET TOTALS**						
					$379,989	**$379,989**	**OTHER DOTD SECTIONS PROPOSED BUDGET TOTALS**						

FHWA

Part B SPR Funded Research Program

ADMINISTRATIVE LINE ITEMS AND RESEARCH SUPPORT STUDIES

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Program Management**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000394**	Project Start Date:		7/1/2021
Research Project Number:	22-1PM	Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow			

Total Budget		
Total Cost	(original)	$858,135
	(revised)	
Est. Expended to Date		
FY 2020 - 2021 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2021-2022 Budget		
Total		**$858,135**
Salaries		$858,135
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The purpose of this project is to provide for Louisiana Transportation Research Center (LTRC) executive staff salaries.

Objective(s): Employees charging to this line item include:
Tyson Rupnow, Associate Director, Research
Samuel B. Cooper, Jr., Director
Sheri Hughes, Administrative Assistant
Melissa Neyland, Administrative Assistant
Theresa Rankin, Administrative Specialist C
Kristina Kleinpeter, Accountant 3
Samuel Cooper, III, Engineer 7
Zongjie (Doc) Zhang, Engineer 7
Julius Codjoe, Engineer 7

Expected Benefits: This project allows LTRC to adequately track administrative costs for management of the research program.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Research Program Administration

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Research Program Administration

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Technology Transfer and Research Implementation**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000397**	Project Start Date:		7/1/2021
Research Project Number:	22-1TTRI	Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$355,974
	(revised)	
Est. Expended to Date		
FY 2020 - 2021 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2021-2022 Budget		
Total		**$355,974**
Salaries		$355,974
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The purpose of this project is to document the technology transfer and research implementation efforts of our research staff.

Objective(s): The objective is to document the various technology transfer and implementation efforts of the research staff including presentation of findings at seminars, preparation of journal articles, webinar presentations, etc.

Expected Benefits: Benefits of technology transfer and research implementation are unparalleled. By actively working to implement research results, the Department gains better products, processes, etc. Couple that with the various technology transfer activities the research staff are involved in, the transportation community at large has a resource to draw upon for Professional Development Hours (PDH's), etc.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

More than 35 papers were submitted for publication in various journals and/or presented at the virtual TRB Annual Meeting. Additionally, numerous other papers, journal articles, and final reports were prepared and presented to various audiences (mostly in a virtual format). Additionally, many LTRC employees participate in the specification writing and/or re-writing process as a result of completed LTRC research.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Technology transfer and research implementation

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Technical Research Surveillance**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000401**	Project Start Date:		7/1/2021
Research Project Number:	22-1TRS	Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$294,810
	(revised)	
Est. Expended to Date		
FY 2020 - 2021 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2021-2022 Budget		
Total		**$294,810**
Salaries		$294,810
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Technical research surveillance is for administration of Louisiana Transportation Research Center (LTRC) research contracts by project engineers and participation on a variety of research panels.

Objective(s): The objectives of this project are to track employee effort spent administrating LTRC contract research projects by our project engineers, participation on LTRC project and report review committees, and participation on/in external research activities and panels such as TRB, Airport Cooperative Research Program (ACRP), NCHRP, FHWA Expert Task Group (ETG), etc.

Expected Benefits: Benefits include accurate tracking of employee effort to provide a variety of services such as panel participation. Nearly all LTRC engineers participate on at least one TRB committee with many also serving on one or more NCHRP Project Panels as well as other such as American Concrete Institute (ACI), ASTM, etc.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Nearly all LTRC engineers participate on at least one TRB committee with many also serving on one or more NCHRP Panels.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Technical research surveillance

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Technical Assistance**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000396**	Project Start Date:		7/1/2021
Research Project Number:	22-1TA	Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$365,504
	(revised)	
Est. Expended to Date		
FY 2020 - 2021 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2021-2022 Budget		
Total		**$365,504**
Salaries		$365,504
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Technical assistance (TA) is any assistance provided by LTRC research staff to others in the transportation community and/or the travelling public.

Objective(s): Provide assistance on a variety of transportation topics to DOTD, local engineers, designers, materials suppliers, contractors, and the public.

Expected Benefits: Technical assistance allows for faster implementation and adoption of technologies, solutions to ongoing problems, and overall general relationship building. In FY 20-21, LTRC engineers and staff responded to over 90 different TA requests ranging from peer review of papers to local government pavement issues, to minimal amounts of specialized testing.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

LTRC engineers and staff responded to over 75 technical assistance requests from private engineers, departmental personnel, and industry encompassing a wide variety of topics.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Technical Assistance

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**DOTD Staff Support for Research**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000400**	Project Start Date:		7/1/2021
Research Project Number:	22-1SSR	Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$100,000
	(revised)	
Est. Expended to Date		
FY 2020 - 2021 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2021-2022 Budget		
Total		**$100,000**
Salaries		$100,000
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: This project is to provide a mechanism to show and document Louisiana Transportation Research Center (LTRC) staff support for research activities outside of LTRC, specifically University Transportation Center (UTC) support.

Objective(s): The objectives of this project are to document support for outside research entities activities that require matching monies where LTRC/DOTD use salaried employees time to meet that match.

Expected Benefits: Benefits of this project include meeting one of the legislative mandates for LTRS of Enhancing Higher Education and promoting interagency relationships between the Department/LTRC and our Louisiana Universities. In the last fiscal year, LTRC supported over 15 UTC projects for the TranSET Regional UTC held by LSU.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Supported over 18 UTC projects for the TranSET Regional UTC held by LSU

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Staff support for outside research activities.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Research Laboratory and Field Test Support**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000395**	Project Start Date:		7/1/2021
Research Project Number:	22-1LFT	Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$4,544
	(revised)	
Est. Expended to Date		
FY 2020 - 2021 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2021-2022 Budget		
Total		**$4,544**
Salaries		$4,544
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Research Laboratory and Field Test Support (LFT) is used to track specialized testing in field conditions and laboratory samples for the Department, usually the Districts.

Objective(s): Conduct specialized field and laboratory testing for the Districts.

Expected Benefits: Problem solving, generally these projects are forensic in nature to determine modes and/or causes of failure along with potential remediation strategies.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Research and laboratory field support on about 22 different projects.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Specialized laboratory and field testing.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**New Product Evaluation**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000399**	Project Start Date:		7/1/2021
Research Project Number:	22-1NPE	Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow			

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$35,571	**Total**		**$35,571**
	(revised)				
Est. Expended to Date			Salaries		$35,571
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The purpose of this project is to evaluate new, or specialty, products or equipment for potential Louisiana Department of Transportation and Development (DOTD) use.

Objective(s): The objective of this project to identify and test potential new / special products and equipment for use in/on DOTD construction projects.

Expected Benefits: Adoption of new innovative equipment and products can lead to cost and/or time savings to the Department. Additionally other benefits such as longer service life, etc. can be realized. Last fiscal year the Louisiana Transportation Research Center evaluated 5 different new and innovative products for potential use.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

- Veco Structural Base Blend; SPE 12.007
- LithTec Stabilization Product; SPE 26.062
- Honeywell, Mr. Brent Hill; Applications for Slag Stabilized BCS; March 2021
- FMT Synthetic Aggregate

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Evaluate new products and equipment for potential DOTD use.

Title:	**Equipment Management**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000398**	Project Start Date:		7/1/2021
Research Project Number:	22-1EQM	Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow			

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$295,752	**Total**		**$295,752**
	(revised)				
Est. Expended to Date			Salaries		$157,354
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	$138,398
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Equipment: Budget covers non-expendible equipment needed to cover routine maintenance of equipment including the following: purchase of replacement parts, installation of said parts, etc. for the asphalt, concrete, geotechnical, and pavements research laboratories. Replacement parts do not exceed the $5,000 threshold for FHWA reporting guidelines.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The purpose of this project is to track the management of the many laboratories/facilities that the Louisiana Transportation Research Center oversees.

Objective(s): The objectives of this project include the following: routine equipment repair/maintenance, small/hand tool replacement, and accreditation activities.

Expected Benefits: Properly functioning equipment and accredited facilities are expected when this project is underway.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

- Diagnoses of problems, maintenance, and calibrations of Loaded Wheel Test (LWT) test device
- Design and fabrication of asphalt binder bond strength test according to AASHTO T361
- Diagnoses of problems, maintenance, and calibrations Materials Testing System (MTSs) and other testing devices.
- Diagnoses of problems, maintenance, and calibrations of Moisture Induced Stress Tester
- Repair of ignition oven

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Equipment Management

FHWA

Part B SPR Funded Research Program

CONTINUING RESEARCH

Title:	**Assessment of Long-Term Performance of Louisiana Asphalt Pavements**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000391**	Project Start Date:		11/1/2020
Research Project Number:	21-2B	Completion Date	(original)	10/31/2023
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Louay Mohammad			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$326,936
	(revised)	
Est. Expended to Date		$51,000
FY 2020 - 2021 Budget		
FY Funds	(original)	$51,000
	(revised)	
Est. FY Expenditure		$51,000

Estimated 2021-2022 Budget		
Total		**$87,822**
Salaries		$87,822
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Studies completed at LTRC identified effects of various factors (recycled and waste materials, and construction technologies and practices, etc.) on the performance of asphalt pavements. Thus, tracking and assessing the long-term performance of those pavements is essential to validate and/or revise specification recommendation in mixture design and construction practices.

Objective(s): The objective of this study is to evaluate the long-term performance of field projects of LTRC completed studies by comparing field rutting, cracking, patching, and smoothness data collected in the Louisiana pavement management system (LA PMS) to the performance predictions made from the laboratory measured performance parameters.

Expected Benefits: The long-term field performance data collected from this study will provide a link between laboratory mechanical properties and field performance of new technologies used. It is anticipated that the updated lab and field performance relationship will result in refined recommendations for mixture design and construction practices in Louisiana.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1: Completed conduct of literature review;
Task 2: Identified four field projects that utilized warm mix asphalt Warm Mix Asphalt (Warm Mix Asphalt (WMA) technologies throughout the State;
Task 3: Completed familiarization with DOTD PMS contents. Acquired distress data from two field projects (US 61, US 90) that contained Warm Mix Asphalt (WMA) technologies; and
Task 4: Conducted analyses of PMS distress data for the two field projects from Task 3

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 3: Continue acquisition of distress data from field projects;
Task 4: Continue analyses of PMS distress data; and
Task 5: Continue the conduct field distress survey

Title:	**Development of a Cyclic Semi-Circular Bend Test to Evaluate Asphalt Mixture Cracking Resistance at Intermediate Temperature.**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000390**	Project Start Date:		1/1/2021
Research Project Number:	21-1B	Completion Date	(original)	3/31/2023
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Louay Mohammad			

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$299,944	**Total**		**$85,000**
	(revised)				
Est. Expended to Date		$73,812	Salaries		$85,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$74,000	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$74,000	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: DOTD asphalt specifications for roads and bridges require the use of Semi-Circular Bending test as a part of asphalt mixture design. SCB is conducted in a monotonic, displacement-controlled mode at intermediate temperature to assess asphalt mixture fatigue crack resistance. However, fatigue damage is essentially deterioration in material integrity as a result of repeated loading. Thus, monotonic loading may not realistically simulate the effects of traffic loading compared to cyclic loading.

Objective(s): The objectives of this study are to (1) acquire and set up a digital image correlation (DIC) system that is optimized for deformation and crack propagation measurements in asphalt mixture testing; and (2) develop a standard cyclic SCB test method coupled with the DIC technique for identification of fatigue crack propagation properties of asphalt concrete.

Expected Benefits: Findings from this research will improve reliability and fatigue prediction equation for fatigue cracking of asphalt mixtures in the Mechanistic-Empirical Pavement Design Guide (Pavement ME). Further, the developed cyclic SCB test procedure and analysis scheme will be a reliable and rigorous fatigue performance test in the phase of routine asphalt mixture design.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1 – Completed the conduct literature review;
Task 2 – Intimated subtask to identify and collect asphalt materials to be used in this project
Task 3 – Developed bid specification for the acquisition of Digital Image Correlation system (DIC). Started the set-up of the DIC system

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 3 – continue set-up and familiarization processes of the DIC system; and
Task 4 – Conduct laboratory experiment

Title:	**Low and Intermediate Temperature Evaluation of Binders through Dynamic Shear Rheometer – Support Study**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000374**		Project Start Date:		5/11/2020
Research Project Number:	20-4B		Completion Date	(original)	5/10/2022
Research Agency:	LTU		Completion Date	(revised)	
Principal Investigator:	Nazimuddin Wasiuddin				

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**		
Total Cost	(original)	$170,000		**Total**		**$85,000**
	(revised)					
Est. Expended to Date		$45,000		Salaries		$79,654
FY 2020 - 2021 Budget				Consumable Supplies & Materials		$5,102
FY Funds	(original)	$85,000		Equipment	(non-expendable)	
	(revised)			Travel		$244
Est. FY Expenditure		$40,000		Other		

BUDGET JUSTIFICATIONS

Supplies: 1) In this project liquid nitrogen is used heavily for low temperature DSR testing. One 160L refill usually costs about $120. About 12-15 refills will be needed this year. Yearly lease of the cylinder will cost another $350.
2) A melting pot and temperature probe will coast about $500.
3) Solvents will coast about $1,000.
4) Other routine supplies $1,500.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Determining the low and intermediate temperature characteristics of binders is critical to pavement performance. However, the use of these devices may not completely characterize binders with increased level of modification. Additionally, the time and numerous equipment requirements have a negative impact on the efficiency of material approval. In this study, new testing methods on asphalt binder will be investigated and compared with the currently specified methods.

Objective(s): The support study will evaluate the use of a SER (extensional rheometer) to determine the advanced characterization of low and intermediate behavior of asphalt binder as a potential replacement of standard ductility testing. This research will be performed on commonly used binders and additives used in the state of Louisiana, in order to introduce binder characterization methods for DOTD and reduce and/or replace current binder testing methods such as ductility.

Expected Benefits: The comparison between the results of these methods will determine the reliability of the new methods in order to replace the conventional methods and equipment. The evaluation of these tests will result in the ability of DOTD to screen and verify materials more efficiently and with fewer devices. The potential to improve testing results in less time will help the DOTD provide the reliability that the correct materials are being utilized.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Literature Review has been completed. Laboratory tests were conducted during this period. AASHTO R30 mixture aging at different durations and 1-Day forced-draft oven mixture aging at 135°C were performed to simulate long-term field aging of the SBS-modified binder. SER testing was performed on extracted binder to evaluate polymer degradation. The results of the findings have been reported in an ASCE conference paper submitted for review in late November. A conference paper titled "Degradation of SBS Polymer during Laboratory Aging of Asphalt Mixture" was submitted in late November to the ASCE International Airfield and Highway Pavement Conference and the paper has been accepted for the upcoming conference. The conference will be held in June, 2021.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

1- Extensional deformation test will be conducted on the same binder sources as the in-house research and will be compared to the results from ductility testing.
2- The effect of aging and polymer modification will be evaluated through extensional deformation.
3- Sentmanat Extensional Rheometer (SER) fixture will be used to determine the low and intermediate temperature behavior of asphalt binders. The current DSR tests will be conducted and compared.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Low and Intermediate Temperature Evaluation of Binders through Dynamic Shear Rheometer**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000345**		Project Start Date:		5/11/2020
Research Project Number:	20-3B		Completion Date	(original)	5/10/2022
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Saman Salari				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$262,246	**Total**		**$69,340**
	(revised)				
Est. Expended to Date		$37,796	Salaries		$69,340
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$45,000	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$36,379	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Researchers are trying to characterize asphalt binders with less equipment, more convenience and higher precision. This goal results in new applications which may replace Bending Beam Rheometer with Dynamic Shear Rheometer. This approach will reduce hours of sample preparation, reduce sample size significantly, and increase convenience.

Objective(s): Comparing Bending Beam Rheometer results to two different Dynamic Shear Rheometer results. Based on the results and process of testing, it may determine whether an alternative method can replace the Bending Beam Rheometer.

Expected Benefits: Application of Dynamic Shear Rheometer for low temperature testing will provide convenience, faster results, less material, higher precision, and possibly less variation to sample preparation.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

The following activities will be performed;
-Task 1: Comprehensive literature review for DSR methods and their potential to replace the low and intermediate testing equipment;
-Task 2: Gathering the commonly used binder materials for the study (around 50 samples gathered)
-Task 3: Binder testing with multiple equipment in order to be able to make a comparison with standard methods;
-Task 4: Analysis of the results of samples tested with different methods
-Task 5: Began writing report

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

The following activities will be performed;
-Task 1: Comprehensive literature review for DSR methods and their potential to replace the low and intermediate testing equipment;
-Task 2: Gathering the commonly used binder materials for the study (around 100 samples will be gathered);
-Task 3: Binder testing with multiple equipment in order to be able to make a comparison with standard methods;

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	A New Generation of Porous Asphalt Pavement - OGFC Support Study	Project Status:	Ongoing

Funding Source:	SPR: TT-Fed/TT-Reg - 6	Budget Category:	FHWA

SIO:	DOTLT1000386	Project Start Date:		9/1/2020
Research Project Number:	21-6B	Completion Date	(original)	11/30/2022
Research Agency:	LSU	Completion Date	(revised)	
Principal Investigator:	Mostafa Elseifi			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$119,610
	(revised)	
Est. Expended to Date		$3,000
FY 2020 - 2021 Budget		
FY Funds	(original)	$44,830
	(revised)	$35,000
Est. FY Expenditure		$3,000

Estimated 2021-2022 Budget		
Total		**$55,000**
Salaries		$50,000
Consumable Supplies & Materials		$5,000
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Supplies: Supplies are needed in the laboratory to purchase consumable items such as cans, storage bins, etc.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Open-Graded Friction Course (OGFC) provides some unique advantages such as dramatically reduced rainwater on the surface, resulting in improved visibility and wet skid resistance as well as eliminating the risk of hydroplaning. However, challenges reported by contractors and districts in Louisiana have seriously limited its use. The most critical shortcomings of OGFC include durability problems (raveling and stripping due to aging), which result in shorter service life and higher costs.

Objective(s): This study aims to develop a new generation of OGFC that would provide superior durability performance and reduced surface water accumulation. To achieve this objective, current practices including aggregate type and gradation, additives, and fiber type and content, will be reviewed and comprehensively evaluated in the laboratory. For all evaluated technologies, the research team will ensure that the new generation of OGFC will be environmentally friendly and cost-effective.

Expected Benefits: This research will result in new generation of OGFC that provides enhanced durability and life-time extension. In addition, it will develop a new generation of OGFC that ensures adequate performance under all weather conditions and improve pavement performance in the event of flooding by reducing surface water accumulation. The research team will also develop a strategy to incorporate the results into the state-of-the-practice and specifications.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

The research accomplishments for the project are as follows:
Task 1: The research team has worked on the literature review for the project and is expected to complete it during the summer.
Task 2: The researchers have successfully secured the main parts of the mix materials.
Task 3: The researchers have successfully designed and prepared two of the eight mixes.
Task 4: The researchers have successfully tested the Mechanistic Properties of two of the OGFC Mixes with the exception of the cracking resistance. The SCB test was not suitable for OGFC mixes and the researchers will attempt to use the Overlay Tester.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1: Finalize the literature review for the project.
Task 2: Finalize the test factorial for the project.
Task 3: Continue designing and preparing the OGFC mixes.
Task 4: Continue testing the prepared OGFC mixes in the laboratory.

Title:	**Improvement of Open-Graded Friction Course (OGFC) Performance and Durability through Materials, Design, and Maintenance**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000385**		Project Start Date:		9/1/2020
Research Project Number:	21-5B		Completion Date	(original)	11/30/2022
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Corey Mayeux				

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**		
Total Cost	(original)	$79,156		**Total**		**$42,500**
	(revised)					
Est. Expended to Date		$28,000		Salaries		$42,500
FY 2020 - 2021 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$79,156		Equipment	(non-expendable)	
	(revised)	$28,000		Travel		
Est. FY Expenditure		$28,000		Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Design of OGFC with extended life span would require innovative asphalt materials and a performance engineered mixture design procedure. DOTD specifications provide requirements on the physical properties of asphalt binders and aggregate for OGFC. In order to ensure OGFC durability, resistance to fatigue cracking and raveling should also be evaluated together with advanced modifiers and maintenance methods.

Objective(s): The objective of this research is to provide an implementable guideline on the design, performance, and maintenance of OGFC with extended service life to improve driving safety and cost-effectiveness. This will be accomplished through several different tasks. It will evaluate maintenance methods, alternative materials, and a new generation of permeable pavements with improved mechanical characteristics, and enhanced pavement performance by modifying the mixture with polymers and fibers.

Expected Benefits: In order to improve OGFC durability, research should take place on alternative materials and a performance engineered mixture design procedure. Guidelines or specifications could be recommended to extend the service life of OGFC. With the completion of this research, LTRC will provide guidelines or specifications on: maintenance of existing OGFC; the use of epoxy modified asphalt in OGFC mixtures; and performance engineered mixture design procedures to be used for OGFC pavements in Louisiana.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1-The literature has progressed for both support studies and the interim report.
Task 2-The multi-state survey has been conducted and is complete.
Task 3-The interim report is completed.
Task 4-The support study to evaluate alternative materials is progressing.
Task 5-The support study to evaluate a new generation of permeable pavements is progressing.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1-The literature review will continue through the next bi-annual period.
Task 4-The support study to evaluate alternative materials will continue to progress through the next biannual period.
Task 5-The support study to evaluate a new generation of permeable pavements will continue to progress through the next bi-annual period.
Task 6-Development of a Standard Practice in the AASHTO Format and recommendations for DOTD Specifications will begin in the next bi-annual period.
Task 7-A draft project report will begin in the next bi-annual period.

Title:	**Development of a Standard Practice for the Design of Durable Open-Graded Friction Course (OGFC) Mixtures with Epoxy Asphalt-Support Study**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000384**		Project Start Date:		9/1/2020
Research Project Number:	21-4B		Completion Date	(original)	11/30/2022
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Louay Mohammad				

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**		
Total Cost	(original)	$203,393		**Total**		**$77,200**
	(revised)					
Est. Expended to Date		$50,090		Salaries		$77,200
FY 2020 - 2021 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$50,090		Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure		$50,090		Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Open-graded friction course (OGFC) mixture is placed on asphalt pavement surfaces to increase safety with environmental benefits (reduce hydroplaning, splash and spray, noise, and increase friction resistance). However, high porosity raises concerns on the durability of OGFC as it reduces structural integrity of pavement. Thus, durability, resistance to fatigue cracking, and raveling of OGFC mixtures containing epoxy modified binders should be evaluated to ensure extended performance life.

Objective(s): The objective of this research is to develop a mixture design practice including comprehensive performance evaluation, based on the DOTD specifications, for epoxy modified open-graded asphalt mixture (OGFC) with the target service life of 15-20 years.

Expected Benefits: It is anticipated that the results of this study will provide recommendations on the design of durable OGFC using epoxy modified asphalt binders with the best cost effectiveness. Further, results will promote the use of sustainable technologies in Louisiana's flexible pavement construction.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1: Completed comprehensive literature review and survey questionnaire development analysis on the design and performance evaluation of OGFC mixtures.
Task 2: Completed materials selection and acquisition (asphalt binders, epoxy asphalt, aggregates). Completed Physical properties of aggregates and rheological properties of asphalt binders. Completed determination of optimum aggregate structure and development of 12.5 mm mixture design meeting DOTD specifications

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 2: Continue material selection and mixture design as per proposal test factorial
Task 3: Determine candidate optimum epoxy asphalt dilution rates based on performance
Task 4: Determine candidate optimum epoxy asphalt dilution rates based on life-cycle cost analysis

Title:	**Use of an Innovative Recycling Agent for Improving the Sustainability and Durability of Asphalt Pavements**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000392**		Project Start Date:		2/1/2021
Research Project Number:	21-3B		Completion Date	(original)	4/30/2023
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Louay Mohammad				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$249,609	**Total**		**$72,139**
	(revised)				
Est. Expended to Date		$29,960	Salaries		$72,139
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$29,960	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$29,960	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: There is an increasing need for improving the sustainability of asphalt pavement without compromising performance given the limited natural resources and budget allocation. One such approach is the use of recycled materials, such as reclaimed asphalt pavement (RAP) and recycled asphalt shingles (RAS), to substitute for part of the virgin materials. Use of an innovative rejuvenator has emerged as potential to modify the aged asphalt binders from RAP and RAS.

Objective(s): The objectives of this research are (1) Evaluate effectiveness of Lewis acids in increasing RAP percentage in asphalt mixtures; (2) Determine optimum dosage for Lewis acids catalyst; (3) Determine chemical and rheological performance of blends of RAP binders and virgin asphalts; and (4) Determine the mechanistic performance of asphalt mixtures containing high RAP contents and conventional mixtures.

Expected Benefits: Finding of this research will substantially promote the use of increased RAP in asphalt mixtures without compromising the performance against traffic and environmental loading. This research will benefit Louisiana as the state is planning to embrace sustainability and green technology for the benefits of low cost, clean environment, and energy. Further, results will promote the use of sustainable technologies in Louisiana's flexible pavement construction.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1: Completed conduct of literature review
Task 2: Acquired asphalt binders; RAP material, and FeCl3 Lewis acid catalyst
Task 3: Completed rheological characterization of virgin asphalt binder and asphalt binder extracted from RAP. Started chemical characterization of FeCl3 Lewis acid catalyst

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 2- Continue acquisition of iron chloride, RAP and RAS source materials, and component materials (asphalt binders and aggregate) for dense graded mixtures that are typically used in Louisiana;
Task 3- Determine the optimum FeCl3 dosage for RAP/RAS binders based on chemical, rheological, and microstructural characterization of the virgin asphalts, extracted asphalts from RAP and RAS, and blends of the asphalts with different dosages (0.1, 0.3, 0.5%) of FeCl3; and
Task 4- Determine the maximum percentage of RAP/RAS based on rheological, chemical, and microstructural characterization of the blends of virgin asphalts with different recycled asphalt percentages (15, 25, 35, 50%) and the respective optimum catalyst dosage.

Title:	**Feasibility and Performance of Low Volume Roadway Mixture Design**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000329**		Project Start Date:		8/19/2019
Research Project Number:	20-2B		Completion Date	(original)	8/18/2022
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Corey Mayeux				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$92,003	**Total**		**$4,800**
	(revised)				
Est. Expended to Date		$87,203	Salaries		$4,800
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$65,326	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$65,000	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: With the implementation of the low volume roadway mix design criteria and the revised payment adjustment schedule, LA DOTD proposes to evaluate the performance of these asphalt pavements and evaluate the effect that the new payment adjustment schedule may have on the performance. Once evaluated, we will be able to determine if the changes were cost effective.

Objective(s): The objective of this research is to evaluate the production practices and construction feasibility of DOTD's low volume roadway mixture design and to analyze the performance of roadways constructed with these mixtures. The research will also serve to analyze the revised payment schedule for Low ADT Mainline mixtures and its effect on these roadways.

Expected Benefits: DOTD specifications now offer revised asphalt concrete criteria for low volume roadways (<1000 ADT). Research needs to be conducted to ensure that the asphalt plants are producing acceptable mixtures, that construction crews are achieving the desired results and that these mixtures are performing well in the field. Additionally, the performance of these roads can be correlated to the revised payment schedule to assess its effect on the value of the asphalt pavements.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1-The literature review for this project has been progressing and is near completion
Task 2–Experimental program is developed and finalized.
Task 3–Data and asphalt sample collection is completed.
Task 4-Laboratory testing has progressed and is nearing completion.
Task 5-Data Analyses has progressed.
Task 6-Work on the Draft Project Report has begun

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 4-All Laboratory testing will be completed
Task 5-All Data Analyses will be completed.
Task 6-The Draft Project Report will be near completion.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Evaluate Performance and Life Cycle Cost of Asphalt (8/18 Specifications)**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000328**		Project Start Date:		8/19/2019
Research Project Number:	20-1B		Completion Date	(original)	8/18/2022
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Corey Mayeux				

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**		
Total Cost	(original)	$140,085		**Total**		**$55,000**
	(revised)					
Est. Expended to Date		$86,650		Salaries		$55,000
FY 2020 - 2021 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$57,352		Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure		$51,622		Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: With the implementation of the new specification in the 2016 LA DOTD Standard Specifications for Roads and Bridges and revisions made in special provision 8/18, it would be beneficial to measure and evaluate the performance and life cycle costs for the asphalt pavements. A thorough analysis is also necessary to ensure that the changes made to the specification are resulting in overall improvements.

Objective(s): The objective of this research is to analyze and compare the performance of asphalt pavements constructed using specifications from the 2006 LA SSRB to pavements built under the 2016 LA SRB and its accompanying special provision 8/18. The project will evaluate the density, volumetric, and performance data for various pavement sections. A life cycle cost analysis will also be performed to determine if the specifications changes have resulted in an increased value.

Expected Benefits: In an effort to improve the performance and value of its asphalt roadways, DOTD has implemented changes to its asphalt pavement specification. It is important to ensure that these changes are resulting in improvements to pavement performance. Additionally, it would be beneficial to analyze and compare the life cycle costs to determine if the specification changes are resulting in an improved value.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1–Literature review has progressed and is ongoing.
Task 2–The experimental program is complete. All of the new asphalt mixtures have been identified for sample collection. All of the old asphalt mixtures have been identified for data collection.
Task 3–Data and asphalt sample collection has progressed is continuing as more specimens become available.
Task 4-Laboratory testing has been completed on all collected samples.
Task 5-Data analyses has been completed on all of the new asphalt samples.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1–Literature review will be completed.
Task 2–The experimental program is complete. All of the new asphalt mixtures have been identified for sample collection. All of the old asphalt mixtures have been identified for data collection.
Task 3–Data and asphalt sample collection will be complete.
Task 4-Laboratory testing will be completed for all collected samples.
Task 5-Data analyses will be competed.
Task 6-Life-Cycle cost analysis will be nearing completion.
Task 7-Project report will be nearing completion.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	Implementation of Semi Circular Bend Test for QC/QA of Asphalt Mixtures	Project Status:	Ongoing

Funding Source:	SPR: TT-Fed/TT-Reg - 6	Budget Category:	FHWA

SIO:	DOTLT1000321	Project Start Date:		5/1/2019
Research Project Number:	19-4B	Completion Date	(original)	4/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Louay Mohammad			

BUDGET STATUS

Total Budget			Estimated 2021-2022 Budget		
Total Cost	(original)	$512,939	**Total**		**$110,000**
	(revised)				
Est. Expended to Date		$251,000	Salaries		$85,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$106,000	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$106,000	Other		$25,000

BUDGET JUSTIFICATIONS

Other: The other cost of $25,000 covers DOTD staff participation in the project

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The 2016 DOTD Specifications require a criterion for critical strain energy release rate, Jc, obtained from Semi Circular Bend (SCB) test as a part of its balanced asphalt mixture design. SCB test is performed on long term aged (LTA) compacted samples (5 days at 85°C). However, practices of QC/QA are time-sensitive. Thus, it is impractical to include LTA SCB samples during QC and QA testing.

Objective(s): The objective of this study is to develop a specification for implementation of the SCB test in field QC/QA phases of production and construction of asphalt mixtures. A scaling factor will be developed to predict LTA SCB Jc values from plant-produced unconditioned SCB Jc. In this process, the research team expects to explore and obtain a scaling model for Jc, a relationship between Jc and the aging state of the mixture that is tracked by a set of rheological and chemical aging indices.

Expected Benefits: The main product of this research will be an implementable specification for the use of the SCB test in QC/QA practices in the state of Louisiana. It is anticipated that findings will complement the current 2016 Louisiana DOTD Specifications for Roads and Bridges, and provide efficient proactive measures to ensure that mixtures are produced and compacted as expected for an extended service life against cracking.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1: Conduct Literature Review. This task is completed
Task 2: Identify field projects and collect mixtures and field cores. Due to COVID-19 stay at home order only three field projects were selected. Mixtures and component materials were collected.
Task 3: Conduct laboratory experiments and perform data analysis. Asphalt binders were extracted from mixtures of Task 2. Chemical tests (saturates, aromatics, resins, and asphaltenes; Fourier transform infrared) were performed. Rheological characterization was performed on these asphalt binders as well.
Task 4: Develop SCB Jc scaling model. Preliminary predictive model was developed. Based on preliminary findings, two journal papers were submitted and accepted for presentation at 2021 TRB annual meeting and in review for publication in the Transpiration Research Record. A third paper will be submitted for presentation at the 2021 AAPT meeting and publication in their journal.
Task 5: Prepare and submit an interim report. Interim report has been submitted

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 2: Continue identification of field projects
Task 3: Conduct laboratory experiments and perform data analysis.
Task 4: Continue the development of SCB Jc scaling model.
Task 5: Prepare and submit an interim report. Complete
Task 6: Validate the proposed scaling model of Task 4
Task 7: Prepare and submit draft final report

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Pavement Materials Research Using Special Equipment at the Engineering Materials Characterization Research Facility**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**		**Budget Category:**		**FHWA**
SIO:	**30000112**		Project Start Date:		7/1/2009
Research Project Number:	10-1EMCRF		Completion Date	(original)	6/30/2015
Research Agency:	LTRC		Completion Date	(revised)	6/30/2024
Principal Investigator:	Louay Mohammad				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$345,000	**Total**		**$156,132**
	(revised)	$17,657,579			
Est. Expended to Date		$345,000	Salaries		$141,232
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$100,000	Equipment	(non-expendable)	
	(revised)		Travel		$4,900
Est. FY Expenditure		$100,000	Other		$10,000

BUDGET JUSTIFICATIONS

Other: The $10,000 cost will cover subscription and purchase of several softwares (Statistical, Rheological, Sustainability tools, etc.) with an individual cost of each item not to exceed $5,000.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The Engineering Materials Characterization and Research Facility (EMCRF) provides a multi-disciplinary expertise and state-of-the-art research capabilities to assess the fundamental engineering properties of materials used in the transportation industry. EMCRF also explores innovative techniques for infrastructure preservation and rehabilitation with sustainable, resilient, and recyclable methods to have significant impact on longevity of our society.

Objective(s): The objectives of the facility are to maintain and advance state-of-the-art engineering pavement materials characterization and modeling research program at LTRC through identification and conduct of implementable research projects; initiate and/or participate in major research initiatives seeking external funding (UTC, etc.); Disseminate research findings; and develop and provide training for DOTD employees for implementing technology developed

Expected Benefits: Results of research conductus at EMCRF provides recommendations for implementations into DOTD's Specifications for Roads and Bridges to improve and solve materials, design, production, and construction specifications. EMCRF provides LTRC with an excellent position to pursue its quest for national and international excellence in research capability of all aspects of pavement materials.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Participated in the Louisiana DOTD Parts five and ten Specification Committee;
Developed and submitted proposals to NCHRP and FHWA;
Provided several technical assistance to Materials Laboratory staff and field projects.
Organized a TRB Webinar on Evaluating Tack Coat Materials' Durability in Asphalt Pavements

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Continue participation in the Louisiana DOTD Asphaltic Concrete Specification Committee;
Continue participation in technical assistance projects;
Develop and submit proposals for external funding; and
Conduct workshops and seminars.

Title:	**DOTD Support for UTC Project: Application of Engineered Cementitious Composites (ECC) for Jointless Ultrathin White-topping Overlay**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000236**		Project Start Date:		3/15/2018
Research Project Number:	18-3C		Completion Date	(original)	9/14/2020
Research Agency:	LSU		Completion Date	(revised)	9/15/2021
Principal Investigator:	Gabriel Arce				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$27,404	**Total**		**$4,000**
	(revised)				
Est. Expended to Date		$20,000	Salaries		
FY 2020 - 2021 Budget			Consumable Supplies & Materials		$4,000
FY Funds	(original)	$4,000	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$4,000	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: ECC materials exhibit excellent mechanical properties (i.e., high compressive and flexural strength, and exceptional ductility). As such, ECC materials are highly promising for the repair of pavements through Ultra-Thin Whitetopping (UTW). Nevertheless, full-scale evaluation of ECC-Ultra-Thin Whitetopping (UTW) is necessary prior to implementation in the field. This project will construct and evaluate for the first time a full-scale ECC-UTW.

Objective(s): To develop an ECC material utilizing local materials.
To evaluate the fatigue performance of the ECC developed.
To produce a UTW-ECC overlay performance prediction model.
To validate the UTW-ECC overlay performance prediction model by means of a full-scale test.
To conduct a cost analysis of UTW-ECC overlays.
To develop preliminary guidelines for UTW-ECC overlays in the state of Louisiana.

Expected Benefits: This project will develop a performance prediction model for ECC-Ultra-Thin Whitetopping (UTW) as well as a characterized ECC mixture produced with local materials that will be readily available for future research as well as for implementation in infrastructure projects. Due to ECCs' exceptional mechanical properties, ECC-Ultra-Thin Whitetopping (UTW) may offer a durable repair alternative for pavement infrastructure.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

The ECC overlay was monitored.
Two journal papers on the findings of the study were prepared and published.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Evaluate the ECC overlay under accelerated loading.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Using the Portable XRF to identify/Verify Field Material Properties**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000332**		Project Start Date:		10/1/2019
Research Project Number:	20-2C		Completion Date	(original)	3/31/2021
Research Agency:	LTRC		Completion Date	(revised)	9/30/2022
Principal Investigator:	Jose Milla				

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**		
Total Cost	(original)	$82,419		**Total**		**$22,629**
	(revised)					
Est. Expended to Date		$59,790		Salaries		$22,629
FY 2020 - 2021 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$21,500		Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure		$33,281		Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Certain materials must be sent to the central laboratory for characterization to verify that the materials meet project specifications. This can be a labor-intensive and expensive operation, with test results often delayed and some materials only receiving minimal testing. Portable X-ray Fluorescence (XRF) and Fourier-Transform infrared (ATR-FTIR) units have been proposed to quickly determine some of these properties in the field on in-place materials without sampling delays.

Objective(s): The objectives of this study are to develop a methodology to apply a portable XRF and ATR FTIR to Louisiana's material needs, and to evaluate the efficiency of the portable devices to characterize relevant materials for acceptance.

Expected Benefits: If successful, the portable XRF and ATR FTIR spectroscopy devices will become a viable tool for rapid materials testing in the field use. The results of this research may also be used by other states to further the state of field verification of material quality and fingerprinting to improve quality assurance.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 3: Complete methodology to use portable XRF device, and ATR FTIR device;
Task 4: Start evaluating portable XRF and ATR FTIR devices for field use

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 4: Evaluate portable XRF and ATR FTIR devices for field use

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Evaluation of the Miniature Concrete Prism Test (MCPT) for use in DOTD**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000331**		Project Start Date:		10/1/2019
Research Project Number:	20-1C		Completion Date	(original)	9/30/2022
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Jose Milla				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$162,768	**Total**		**$57,883**
	(revised)				
Est. Expended to Date		$104,885	Salaries		$57,883
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$59,000	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$64,676	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: ASTM C1293 is a robust test method that evaluates an aggregate's susceptibility to alkali-aggregate reaction (ASR), a process that damages concrete through detrimental expansion and cracking. However, ASTM C1293's long duration (1-2 years) makes it impractical for routine aggregate testing. The Miniature Concrete Prism Test (MCPT) was recently developed to speed up ASR testing, and as such, industry would like DOTD to explore its suitability for use and to implement if feasible.

Objective(s): The objective of this study is to evaluate the suitability of the MCPT method to assess alkali-silica reactivity, and to determine the level of implementation and/or continued research required for adopting this test method.

Expected Benefits: If strong correlations are determined between the MCPT and ASTM C1293, there is potential to adopt and implement AASHTO T380 for the acceptance of aggregates based on ASR reactivity. By adopting such standard, ASR reactivity can be evaluated in 56-84 days as opposed to 1-2 years, thereby significantly decreasing the test duration. This will facilitate routine inspection of aggregates and therefore enable DOTD to identify reactive aggregates more quickly and efficiently.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 2: Completed survey and acquired responses.
Task 3: Began comparative testing for both the miniature concrete prism test (MCPT) and the concrete prism test (CPT) methods.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 3: Continue comparative testing for both MCPT and CPT

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	Geotechnical Database, Phase IV	Project Status:	Ongoing

Funding Source:	SPR: TT-Fed/TT-Reg - 5	Budget Category:	FHWA

SIO:	DOTLT1000393	Project Start Date:		3/1/2021
Research Project Number:	21-2GT	Completion Date	(original)	2/28/2023
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Gavin Gautreau			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$185,539
	(revised)	
Est. Expended to Date		$5,000
FY 2020 - 2021 Budget		
FY Funds	(original)	$84,907
	(revised)	$5,000
Est. FY Expenditure		$5,000

Estimated 2021-2022 Budget		
Total		**$100,000**
Salaries		$85,000
Consumable Supplies & Materials		$15,000
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Supplies: The 15,000 budget may be necessary for software customizations to the HoleBASE/OpenGround Configuration. Coordination will be conducted through the project in association with HoleBASE contacts.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Phase I GIS work is no longer supported by ArcGIS software, and DOTD document management software (ContentManager) is moving to newer (File.NET). Additionally, increased computing power has changed the expectations for how geotechnical data should be stored and utilized.
Geotechnical software, HoleBASE, an all-in-one enterprise database/data management solution, is now available to DOTD. Deep soil borings and cone penetrometer (CPT) data have not yet been incorporated into HoleBASE.

Objective(s): This project will research and assist with DOTD's implementation of OpenGround, the Cloud-based version of HoleBASE. The implementation of Data Interchange for Geotechnical and Geo-Environmental Specialists (DIGGS) is a DOTD goal. DIGGS allows collection and transfer of geotechnical data from others through the (XML-based) geospatial standard schema. DIGGS is also a goal of the Federal Highway Administration (FHWA) and the American Society of Civil Engineers (ASCE) Geo-Institute.

Expected Benefits: A robust, all-in-one database/mapping/management solution is the next step in growing our geotechnical database, enhancing design, and managing information about DOTD geotechnical assets.
- Increased efficiency – unified data (deep boring, CPT, shallow boring, DCP, pile load test);
- Fewer new borings/tests, where data already exists;
- Time savings in generating soil borings, figures, and design profiles.;
- Reduced data input errors;
- More streamlined laboratory test reporting process.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

The project started on March 1.

Task 1 – Literature Review	Kickoff Meeting, Interactions with HQ, HoleBASE/OpenGround representative.
Task 2a – HoleBASE Configuration	Meetings with HQ regarding strategy, format, and connections.
Task 2b – Migrate data to new system	Procedures were reviewed to begin transferring data.
Task 3 – DIGGS Implementation Coordination	Monthly DIGGS Meetings
Task 4 – GIS Coordination	No Activity
Task 5 – Recommend and Implement Strategies	No Activity
Task 6 – Document the Research Effort	No Activity
Task 7 – Process through Editing	No Activity

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES	
Task 1 – Literature Review	Continued interactions with HQ, HoleBASE/OpenGround representative
Task 2a – HoleBASE Configuration	Work to populate and refine HoleBASE/OpenGround data/format.
Task 2b – Migrate data to new system	Continue working with Jesse Rauser regarding transfers/data research
Task 3 – DIGGS Implementation Coordination	Monthly DIGGS Meetings, evaluate DOTD round trip/schema.
Task 4 – GIS Coordination	Continue working with Adele Lee and Jesse Rauser (HQ)
Task 5 – Recommend and Implement Strategies	No Activity
Task 6 – Document the Research Effort	No Activity
Task 7 – Process through Editing	No Activity

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Internal friction angle of sands with high fines content**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000375**		Project Start Date:		8/1/2020
Research Project Number:	21-1GT		Completion Date	(original)	7/31/2022
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Murad Abu-Farsakh				

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**		
Total Cost	(original)	$146,690		**Total**		**$80,200**
	(revised)					
Est. Expended to Date		$56,000		Salaries		$80,200
FY 2020 - 2021 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$65,633		Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure		$56,000		Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Several projects in Louisiana with piles driven in sands with high fines content have lower resistances than the design values from static β-method, resulting on longer piles than designed. This may be due to uncertainty in estimating the friction angle ( ) of sands with high fines content from in-situ tests, or potential reduction of interface friction angle, δ, due to presence of high fines content. There is a need to modify the in-situ test correlations of for sands with high fine contents.

Objective(s): The main objectives of this project are: a) Evaluate the effect of fines content on the internal friction angle, ϕ, of sand mixed with fines; b) Evaluate the effect of fines content on the interface friction angle, δ, between sand soils mixed with fines and piles; c) Determine the threshold of fines content beyond which the sand mixed with fines will behave like cohesive soils, and c) Develop a design method to calculate the ultimate capacity of piles driven into sand mixed with fine contents.

Expected Benefits: It is anticipated that this study will provide new/modified correlations and updated Standard Penetration Test (Standard Penetration Test (SPT))/Cone Penetration Test (CPT) charts and tables for accurate estimation of ϕ for sands with fines content. The research team will propose design guidance for piles driven in sand soils mixed with fines content to enhance the safety of pile foundations design for infrastructures. In addition, the finding will include guidelines on evaluating the threshold of fines contest beyond which the sand-fine mixture behave like cohesive soils.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1: Conducted literature review on published works related to the effect of of fines content on the internal friction angle of sandy soils and the interface friction angle between sand-fine mixture and pile material.
internal friction angle of sand with fines and the in-situ Standard Penetration Test (SPT) and Cone Penetration Test (CPT) data.

Task 2: Collected sand soil material and fines for laboratory tests.
Conducted laboratory tests to characterize the soil parameters such as standard Proctor, gradation, maximum and minimum void ratios, liquid limit (LL), plastic limit (PL), etc.

Task 3: Started conducting small-scale direct shear tests on sand soil mixed with fines at different percentages and different moisture contents.

Task 4: Started conducting large-scale interface direct shear tests between sand mixed with fines and concrete at different percentages and different moisture contents.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES
Task 1: Continue literature review on published works related to the effect of of fines content on the internal friction angle of sandy soils and the interface friction angle between sand-fine mixture and pile material. Task 2: collecting more sand soil material and silt fines for laboratory small and large direct shear tests. Continue laboratory testing to characterize the soil parameters such as standard Proctor, gradation, maximum and minimum void ratios, liquid limit (LL), plastic limit (PL), etc. Task 3: Continue conducting small-scale direct shear tests on sand soil mixed with fines at different percentages and different moisture contents. Task 4: Continue conducting large-scale interface direct shear tests between sand mixed with fines and concrete at different percentages and different moisture contents. Task 5: Start analyzing the results of small and large direct shear tests for sands mixed with different percentages of fines and different moisture contents.

Title:	**Feasibility Study on Geophysical Methods to Estimate Geotechnical Properties in Louisiana**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000389**		Project Start Date:		12/1/2020
Research Project Number:	20-4GT		Completion Date	(original)	2/28/2022
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Nick Ferguson				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$64,582	**Total**		**$34,082**
	(revised)				
Est. Expended to Date		$2,029	Salaries		$34,082
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$30,500	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$30,500	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Current Geotechnical exploration practices in Louisiana rely on conventional soil borings with the aid of cone penetrometer test (Cone Penetration Test (CPT)) soundings. The characteristics of these technologies are site specific by providing discrete profile information, missing any information between soil borings. Subsurface investigations can be expensive. However, geophysical methods can aid in characterizing this missing information at a lower cost and could provide DOTD with benefits.

Objective(s): 1)Research existing state and federal efforts on geophysical testing methods. 2)List geophysical methods/technologies and describe their applications. 3)Synthesize the applicability of the geophysical methods for Louisiana soils. 4)Discuss with Headquarters a potential list of geophysical methods for Louisiana. 5)Recommendation of geophysical methods for Louisiana applications. 6)Preparation of Final Report.

Expected Benefits: By utilizing geophysical tools in addition to standard geotechnical exploration practices, the department can provide a more detailed pre-construction characterization of the geotechnical conditions at sites, and improve current QA/QC methods. Other potential benefits include shorter project delivery times, and reducing the risk within the areas between investigated subsurface site conditions.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1 & 2 - Presented a project start-up proposal to the PRC late 2020. Conducted a comprehensive literature review on available geophysical methods.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 3 - Identify the best geophysical methods for the different applications (shallow investigation, deep investigation, etc.) and include the pros and cons of each method, equipment needed, testing procedure, technology/sensor/software needed, feasibility of using it in Louisiana, potential benefit and cost saving of each method, etc.
Task 4 - Discuss with PRC and HQ to further refine this list of geophysical applications based on their experience and insight.
Task 5 -Provide specific recommendations and begin talks on starting a more hands-on project utilizing a preferred geophysical method for Louisiana.
Task 6 - Record and document efforts into a report.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Development of a Design Methodology for Geosynthetic Reinforced Pavement using Finite Element Numerical Modeling**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000346**		Project Start Date:		5/1/2020
Research Project Number:	20-3GT		Completion Date	(original)	4/30/2023
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Murad Abu-Farsakh				

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**		
Total Cost	(original)	$300,302		**Total**		**$84,300**
	(revised)					
Est. Expended to Date		$102,000		Salaries		$81,300
FY 2020 - 2021 Budget				Consumable Supplies & Materials		$3,000
FY Funds	(original)	$104,000		Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure		$85,200		Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Pavements build over weak subgrade soils are often associated with construction difficulties, which poses challenge to pavement engineers. The current practice in Louisiana is to stabilize weak subgrades with cement/lime to create a working platform. Geosynthetics can offer a cost-effective alternative solution to this problem by reinforcing the pavement. Although the benefits of geosynthetics in pavements are recognized, the mechanism of reinforcement is still not fully understood.

Objective(s): The objectives of this study: Develop finite element models to simulate the performance of geosynthetic reinforced pavements built over subgrades of different strengths; Evaluate the effect of different parameters on the benefits of geosynthetic reinforcement; Study the effect of reinforcement properties for low, medium, and high volume traffic sections; and Develop a design method for geosynthetic-reinforced pavements within the mechanistic-empirical pavement design guide (MEPDG).

Expected Benefits: It is anticipated that the research team will develop a cost-effective design methodology that incorporates the benefits of geosynthetic reinforcement in flexible pavements within the context of MEPDG. The results will help the design engineers to select the proper parameters that enhance the geosynthetic benefits. This study will help accelerate the construction of pavements over weak and problematic subgrades, and reduce the cost of pavements construction in Louisiana.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1: Conducted comprehensive literature review relevant to experimental, analytical and finite element analysis of geosynthetic-reinforced pavements, and mechanistic-empirical pavement design guideline (MEPDG),

Task 2: Developed a finite element numerical model to simulate the geosynthetic reinforcement of pavement sections built over soft and medium subgrade soils for low volume roads,

Task 3: Started verifying and calibrating the developed FE models using the results of in-box laboratory CPL tests, and the results of accelerated load tests conducted on geosynthetic-reinforced sections built at Accelerated Loading Facility (Accelerated Loading Facility (ALF)) site,

Task 4: Started conducting finite element parametric study to evaluate the effect of different variables and parameters on the benefit of geosynthetic reinforcement of pavement built over built over soft and medium subgrade soils for low volume roads.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1: Continue conducting literature review related to the experimental, analytical, and numerical modeling of geosynthetic-reinforced pavements and the design methodologies.

Task 2: Continue developing finite element numerical models to simulate the geosynthetic-reinforced of pavement sections built over stiff subgrade soil for low volume roads, and for soft, medium and stiff subgrade soils for medium and high volume roads.

Task 3: Continue the Verification and calibration of the FE models using the results of in-box laboratory cyclic plate load tests, and the results of accelerated load tests conducted on geosynthetic-reinforced sections built at Accelerated Loading Facility (ALF) site.

Task 4: Continue conducting the finite element parametric study to evaluate the effect of different variables and parameters on the benefit of geosynthetic reinforcement of pavement built over stiff subgrade soil for low volume roads, and for soft, medium and stiff subgrade soils for medium and high volume roads.

Task 4: Start analyzing the FE test sections using the ME AASHTOWare software.

Title:	**Instrumentation and Modeling of Geosynthetic Load Transfer Platform Performance**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000337**	Project Start Date:		1/1/2020
Research Project Number:	20-2GT	Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Murad Abu-Farsakh			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$300,331
	(revised)	
Est. Expended to Date		$155,762
FY 2020 - 2021 Budget		
FY Funds	(original)	$113,456
	(revised)	
Est. FY Expenditure		$96,220

Estimated 2021-2022 Budget		
Total		**$103,150**
Salaries		$98,350
Consumable Supplies & Materials		$4,800
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Imposing significant embankment load over soft clay can cause bearing capacity failures, large settlement, lateral movement, and slope instability. Driven pile, drilled shafts or stone columns are commonly used in the construction of embankment on soft clay to improve the capability of soft clay. To reduce the cost by reducing the number of piles, geosynthetic reinforcement platform can be added below the embankment to work as load transfer platform to the pile caps.

Objective(s): The objectives of this study are: Monitor the short-term and long-term behavior of geosynthetic load transfer platforms (GLTP) in Louisiana; Evaluate and verify (or modify) important design factors and parameters for GLTP: load distribution (between the piles, geogrid, and soft soil), settlement, and lateral thrust; Conduct finite element parametric study to evaluate the effect of different variables and parameters on the performance of GLTPs; and Propose a design and construction guidance.

Expected Benefits: The use of GLTP technology beneath the embankment and above the supporting piles has shown evidence to be a cost-effective design in many projects in USA and the world. To realize the potential benefits of using GLTP for pile-supported embankments in Louisiana, LA DOTD plans to build GLTP for three bridge projects. It is anticipated that the DOTD design method for GLTP will be improved based on the collected data from field instrumentations, and hence reduce the cost.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1: Conducted literature review on published works related to GLTP technology and its applications for approaching bridge embankment.

Task 2: Developed detailed instrumentation plans for two GLTP project sites: the first is the project No. 2375, Amite River, Baton Rouge; and the second is the Project No. 1234, Port Allen Canal Bridge, LA 1.

Task 3: Purchased the instrumentation set for the GLTP project No. 2375, Amite River, Baton Rouge. And we are waiting for the contractor to start instrumenting the GLTP project No. 2375, Amite River, Baton Rouge.

Task 6: Developed 2D finite element numerical models to simulate the behavior of GLTP in the piles-supported embankment for the case of piles tip on dense sand layer.

Task 8: Started conducting comprehensive finite element parametric study to evaluate the effect of different variables and parameters on the behavior of GLTP pile-supported embankments for the case of piles tip on dense sand layer.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1: Continue conducting literature review on published works related to the GLTP technology and its applications for approaching bridge embankment.

Task 3: Instrumenting the GLTP at the first project site No. 2375, Amite River, Baton Rouge. Purchase the instrumentation set for the GLTP project No. 1234, Port Allen Canal Bridge, LA 1. Possible instrumenting the GLTP at the second project site No. 1234, Port Allen Canal Bridge, LA 1.

Task 6: Continue developing finite element numerical models to simulate the behavior of GLTP in the piles-supported embankment for the cases of piles tip on sand and piles tip on stiff clay of different soil layering.

Task 7: Continue verifying and calibrating the the developed finite element models using the measurements of field monitoring of fully instrumented load transfer platform in piles-supported embankments from literature, and the instrumented site at Amite River, Baton Rouge.

Task 8: Continue conducting comprehensive finite element parametric study to evaluate the effect of different variables and parameters on the behavior of GLTP pile-supported embankments, for the cases of piles tip on sand and piles tip on stiff clay of different soil layering

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Title:	**Geotechnical Asset Management for Louisiana**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000226**		Project Start Date:		5/1/2018
Research Project Number:	18-4GT		Completion Date	(original)	10/31/2019
Research Agency:	LTRC		Completion Date	(revised)	12/31/2021
Principal Investigator:	Gavin Gautreau				

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**		
Total Cost	(original)	$138,244		**Total**		
	(revised)	$189,925				
Est. Expended to Date		$189,925		Salaries		
FY 2020 - 2021 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$78,485		Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure		$78,485		Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Geotechnical assets can affect traffic corridors, should they fail (e.g., a slope failure causing road blockage). In general, geotechnical assets include bridge approach embankments, slopes, retaining walls, culverts, and other elements. Inventories and assessments of an asset's condition, performance, and potential risk are needed to manage these assets throughout their design life.

Objective(s): Review state and federal efforts regarding geotechnical asset management; determine local compatibility issues and existing Louisiana systems; develop database parameters for storing geotechnical asset information; identify logical steps toward full implementation; recommend strategies for implementation; and document the research effort.

Expected Benefits: Findings from this project will result in tools that can be used to inventory Louisiana's geotechnical assets and collect information regarding their age, location, composition, and condition. This data can be used for decisions regarding where and how to allocate limited financial resources. Documentation of this knowledge will aid in proactive planning and decision-making for maintaining, repairing, or replacing these structures as they each reach their design life.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 2: Determine the Applicability and Implementation of GAM within Louisiana
GAM within Louisiana is possible and it will cover retaining walls, slopes, and other hazards. NCHRP Report 930 provided great insight on the implementation steps. GAM is necessary and the department is making progress on its implementation.

Task 3: An ArcGIS database was developed and includes retaining wall assets as a start. Other assets are also being located on separate layers. ArcGIS allows length and location, including GIS location information that allows for walls that are offset from the highway route data. Additionally are being collected. The researchers utilized retaining walls as a pilot project implementation.

Task 4: Identify Assessment Criteria and Management Strategies
A webApp was developed in Collector to allow the districts to rate assets according to the NCHRP criteria with simple 1 to 5 ratings, representing low to high risk. Factors include 1) Operation and Maintenance Condition 2) Safety Conseqense 3) Mobility/Economic Consequense. These factors combine to create risk scores and an overall level of risk. We have been communicating with maintenance to get permission to delegate these assessments to the districts. Maintenance appears reluctant to issue the order.

Task 5: Recommend and Implement Strategies
We are working with Section 42 to develop implementation strategies. The web app has been developed and is ready for the districts. HQ maintenance is working with LTRC to ensure a smooth implementation. This is taking more time than originally anticipated and will expanded as the project continues.
As the data is collected, the risk scores and overall ratings will be utilized to prioritize, identify risk, and focus attention and funding allocations where needed. Based on a recent meeting, the geotechnical group may be the "owner" of the data.

Task 6: Document the Research Effort
A draft report is underway and will be updated as the project continues. As the rating information is collected by the districts/added via the app we will have more data to crunch and include. A paper outlining the early portions of the research was submitted to and accepted by TRB for publication and presentation.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 5: Recommend and Implement Strategies
Efforts to finalize the recommendations with HQ will be finalized. A GAM Guide is being developed to assist with implementation.

Task 6: Document the Research Effort
The final report will be completed and sent through LTRC editing.

Title:	**Update the Pile Design by Cone Penetration Test (CPT) Software to Incorporate Newly Developed Pile-Cone Penetration Test (CPT) Methods and Other Design Features**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000165**	Project Start Date:		6/1/2017
Research Project Number:	17-2GT	Completion Date	(original)	5/31/2019
Research Agency:	LTRC	Completion Date	(revised)	12/31/2021
Principal Investigator:	Murad Abu-Farsakh			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$455,673
	(revised)	$416,887
Est. Expended to Date		$376,362
FY 2020 - 2021 Budget		
FY Funds	(original)	$52,251
	(revised)	
Est. FY Expenditure		$53,500

Estimated 2021-2022 Budget		
Total		**$40,525**
Salaries		$40,525
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The accurate estimation of ultimate resistance of piles is necessary for safe design of deep foundations. The cone penetration test (Cone Penetration Test (CPT)) has been effectively used for many geotechnical applications, including the estimation of pile resistance. A previous study was conducted at LTRC to identify the most appropriate Cone Penetration Test (CPT) methods. Since then, new Cone Penetration Test (CPT) methods have been developed, and many new pile load tests with electronic Cone Penetration Test (CPT) data are now available that warrant re-evaluating the Cone Penetration Test (CPT)-pile methods.

Objective(s): The objectives of this research project are: Evaluate the pile-Cone Penetration Test (CPT) method(s) for use in Louisiana soils, and select, modify or develop a new pile-Cone Penetration Test (CPT) method; Re-calibration the resistance factor (ϕ) for all selected pile-Cone Penetration Test (CPT) methods; Update the Louisiana Pile Design-Cone Penetration Test (LPD-Cone Penetration Test (CPT)) software to incorporate the newly selected pile-Cone Penetration Test (CPT) prediction methods; and Update the "LPD-Cone Penetration Test (CPT)" software to incorporate some aspects such as effect of scour and pile set-up empirical equations.

Expected Benefits: The use of Cone Penetration Test (CPT) data to evaluate the pile capacity will help design engineers to find the best method for estimating the pile capacity with greater accuracy. This will result in reducing the number pile load tests, reduce

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efficiently and remove the possibility of manual calculation.

Task 5: The resistance factors for the 22 direct Pile Cone Penetration Test (CPT) methods were calibrated using modified first order second moment method (FOSM), first order reliability method (FORM), and Monte Carlo simulation method. Calibration were conducted using target reliability = 2.33. The efficiency were calculated for the 22 direct Pile-Cone Penetration Test (CPT) methods

Task 6: Implemented the top rated Pile-Cone Penetration Test (CPT) methods into the LPD-Cone Penetration Test (CPT) software. Modified Schmertmann Pile-Cone Penetration Test (CPT) method. Developed and implemented an optimized combined design method from top 8 Pile-Cone Penetration Test (CPT) methods.

Task 7: The method proposed by FHWA for incorporating scour effect on the long-term pile capacity was adopted in this study for the Pile-Cone Penetration Test (CPT) methods, and implemented into the LPD-Cone Penetration Test (CPT) program.

Task 8: The resistance factors for the top 8 pile-Cone Penetration Test (CPT) method were calibrated.

Task 9: The computer Analyst worked on incorporating some features to the Pile-Cone Penetration Test (CPT) software with coordination with LA DOTD Geotechnical Group.

Task 10: Started working on cos/benefit analysis.

Task 11: Started drafting the final report.

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Task 9: Finalize the evaluation of the different techniques to generate synthetic Cone Penetration Test (CPT) profile and soil borings data from existing Cone Penetration Test (CPT) and soil borings in the same site. Task 10: Continue Working on evaluating the cost benefit of using the top-ranked direct Pile-Cone Penetration Test (CPT) methods for design of driven piles. Task 11: Prepare a final report.

Title:	**Incorporating the Site Variability and Laboratory/In-situ Testing Variability of Soil Properties in Geotechnical Engineering Design**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000112**	Project Start Date:		7/1/2016
Research Project Number:	16-6GT	Completion Date	(original)	12/31/2018
Research Agency:	LTRC	Completion Date	(revised)	12/31/2021
Principal Investigator:	Murad Abu-Farsakh			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$476,813
	(revised)	$549,616
Est. Expended to Date		$522,371
FY 2020 - 2021 Budget		
FY Funds	(original)	$73,190
	(revised)	$50,000
Est. FY Expenditure		$45,843

Estimated 2021-2022 Budget		
Total		**$27,245**
Salaries		$27,245
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Geotechnical engineering deals with high variability geomaterials with both horizontal and vertical spatial variation of soil properties leading to uncertainty in geotechnical design. The variation/ uncertainty in soil properties will affect the accuracy/reliability of measured soil data that can result in either underdesign (causing failure), or overdesign (extra cost) of geotechnical structures. Therefore, these uncertainties need to be considered properly in safe geotechnical design.

Objective(s): The objective of this study is to evaluate the different sources of geotechnical variability and quantify variability of soil properties for inclusion in analysis and design of geotechnical engineering. This includes: evaluating operator-induced variations; evaluating equipment-induced variations; evaluating site/spatial variations of design soil properties; and incorporating site variability into load and resistance factor design (LRFD) in geotechnical engineering.

Expected Benefits: This study is expected to provide the design engineers with the coefficient of variations (COV) of the spatial site variability for soil properties in the field, as well as COVs and errors of the measurement soil properties in the laboratory. This study will also provide means for incorporating the site/lab soil variability into load and resistance factored design of geotechnical structures. It is anticipated that this study will improve accuracy, safety and reduce risk of geotecgnical design.

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Task 4:
Worked on evaluating the observations from LA DOTD materials lab for sample handling/preparation and testing practice,
Worked on analyzing the collected data from LA DOTD for evaluating QC/QA and laboratory/site variability.
Task 5:
Worked on analyzing the site variability from the 6 Cone Penetration Test (CPT) and 4 soil boring sites using the Semi-variogram approach, and the update to LRFD design of piles.
Worked on developing a model based on Bayesian algorithm to evaluate the effect of site variability on LRFD design of pile foundation.
The effect of variability of soil properties on the slope stability was investigated by modeling typical embankments using Slope 2018 software.
Task 7:
Start working on preparing a draft report.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 4:
Continue evaluating the observations from LA DOTD materials lab for sample handling/preparation and testing practice,

Look into the QC/QA guidelines and practices of other states and federal agencies,

Continue analyzing the collected data from LA DOTD for evaluating QC/QA and laboratory/site variability.

Task 5:
Continue analyzing the site variability from the 6 Cone Penetration Test (CPT) and 4 soil boring sites using the semi-variogram approach,Bayesian algorithm, and probabilistic approach.

Finalize the effect of variability of soil properties on the slope stability of embankments.
Investigate the effects of coefficient of variation of cohesion and sampling location on the shallow foundation resistance factor.

Investigate the effects of coefficient variation of undrained shear strength and sampling location on the deep foundation resistance factor.

Task 7:
Prepare a final report.

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Title:	**LTRC Support for Geotechnical Research at the Geotechnical Engineering Research Laboratory (GERL)**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**		**Budget Category:**		**FHWA**
SIO:	**30000111**		Project Start Date:		7/1/2010
Research Project Number:	10-1GERL		Completion Date	(original)	6/30/2015
Research Agency:	LTRC		Completion Date	(revised)	6/30/2024
Principal Investigator:	Murad Abu-Farsakh				

BUDGET STATUS

Total Budget		
Total Cost	(original)	$523,000
	(revised)	$16,302,147
Est. Expended to Date		$2,148,000
FY 2020 - 2021 Budget		
FY Funds	(original)	$192,494
	(revised)	
Est. FY Expenditure		$159,000

Estimated 2021-2022 Budget		
Total		**$166,838**
Salaries		$121,838
Consumable Supplies & Materials		$30,000
Equipment	(non-expendable)	
Travel		$15,000
Other		

BUDGET JUSTIFICATIONS

Supplies: Calibration of triaxial and shear test machines: $3,500.
Calibrated of in-situ test devises (Geogauge, LFWD, etc.): $2,000.
Maintenance and supplies for Materials Testing System (Materials Testing System (MTS))
testing machine: $3,000.
Desktop computers for three graduate students: 2 x $1500 = $3,000.
Annual license for PLAXIS 2D finite element software: $1,500.
Misc/Replacement parts for Humboldt testing devise: $2,500.
Triaxial, direct shear and consolidation tests parts (Dial Gauges, cables, molds, etc.):
$4,000 Fixing the in-box cyclic plate load test (instruments, wires, cables, etc.): $4,000.
Pump filters, oil change, materials, etc. for Geotech Lab: $2,500.
General Laboratory supplies and materials: $4,000.

Travel: Attend TRB Conference for PI and one RAs: 2 x $2500 = $5000
Attend TRB for one graduate student: $2000
Attend Geocongress Conference: $3000
Attend Geocongress for one graduate student: $2000
Attend Geosynthetics conference: $3000

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Transportation infrastructures in Louisiana, such as bridges and highways, are very essential for the state's residents and businessmen. Many challenges are facing the state to improve/modernize their transportation infrastructures that need to be identified, addressed and solved. Improving analysis, design, and construction of the geotechnical aspects of infrastructures is very vital. Therefore, problem statements and proposals need to be developed to solve the challenges.

Objective(s): The objectives of this study are: perform studies to meet the beneficiary requirements for geotechnical testing, technical assistance and research; advance the state-of-the-art in geotechnical research; maintain laboratory testing equipment; maintain in-situ testing devises and monitoring instruments, provide development, support and training of new and innovative techniques, and software for advancing transportation system, and develop problem statements and research proposals.

Expected Benefits: It is anticipated that improving and maintaining modern and safe infrastructures will have a direct impact toward improving the quality of life and boost healthy economic growth in Louisiana. The development of new methodologies for geotechnical infrastructure's analysis, design and construction will help improve the accuracy/reliability of design, accelerate construction, and reduce material/labor cost, resulting in safer and more cost-effective infrastructure design.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

- Developed potential ideas and problem statements for future LTRC research projects,
- Provided geotechnical testing support and technical assistance for LA DOTD,
- Developed research proposal on "Development of a Design Methodology for Geosynthetic Reinforced Pavement using Finite Element Numerical Modeling",
- Developed research proposal on "Internal friction angle of sands with high fines content",
- Published several technical papers and proceedings on findings of LTRC research projects,
- Attended several engineering conferences,
- Maintained laboratory testing equipments,
- Maintained in-situ testing devises and measuring/monitoring instruments,
- Maintained softwares related to Cone Penetration Test (CPT) application.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

- Provide geotechnical and geosynthetic testing support and technical assistance for LA DOTD,
- Provide support and training for implementation of research results,
- Develop research proposals and problem statements for future activities,
- Develop research proposal on "Use and Interpretation of Seismic Piezocone Penetration Testing (SCPTu) for Geotechnical Site Investigation",
- Develop research proposal on "Evaluation of Embedded Pile Resistance on Scour Critical Bridges",
- Publish research findings on technical papers, proceedings and reports,
- Maintain laboratory testing equipments,
- Maintain in-situ testing devises and measuring/monitoring instruments,
- Maintain and upgrade the Cone Penetration Test (CPT) softwares.

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Title:	**LTRC Proposal for the Support of Software Development and GIS Applications in LTRC Research**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000215**		Project Start Date:		7/1/2017
Research Project Number:	18-1Other		Completion Date	(original)	6/30/2020
Research Agency:	LTRC		Completion Date	(revised)	6/30/2024
Principal Investigator:	Adele Lee				

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**		
Total Cost	(original)	$352,390		**Total**		**$220,712**
	(revised)	$856,869				
Est. Expended to Date		$484,001		Salaries		$204,072
FY 2020 - 2021 Budget				Consumable Supplies & Materials		$1,140
FY Funds	(original)	$291,141		Equipment	(non-expendable)	$2,000
	(revised)	$123,180		Travel		$9,200
Est. FY Expenditure		$118,345		Other		$4,300

BUDGET JUSTIFICATIONS

Travel: The $9,200 travel budget is for PI attendance at the following conferences:
-TRB $2,500
-AASHTO GIS-T $2,500
-ESRI User's Conference $3,000

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The purpose of this project is to provide a fiscal year structured resource allocation plan for transportation applications originally developed at Louisiana Transportation Research Center (LTRC).

Objective(s): The tasks will cover development, upgrading, implementation, and maintenance of customized software, relational databases, servers and GIS (Geographic Information Systems).

Expected Benefits: Provide IT and GIS solutions as applied research implemented into DOTD processes and procedures.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1- Project Management Tracking System corrected minor defects. Implemented FHWA annual work program requirements for problem statement, objectives and expected benefits. Improved database error tracking on submissions. Email changeover to la.gov email test period for separate desktop source code and analysis of transmission rates. Continued support for DOTD changeover from Content Manager to FileNet8.
Task 1- Maintain databases, website virtual server, all LTRC maintained source code and software development environments.
Task 1- Poster co-author and attendee at TRB 2021 conference.
Task 2- Initiated LTRC Crash Database query consolidation in MS Access to support all LTRC ITS and Safety projects.
Task 2- Customized software development for research project 17-2GT.
Task 3- Assisted LTRC IT personnel with COTS software installs. Provided PMTS requirements for network discussions/decisions between OTS and LSU ITS.
Task 4- GIS expertise and activities supporting research projects 18-4GT, 19-3SS, 20-1SS and 21-2GT.
Task 4- Serve as LTRC liaison to Section 21 and System of Engagement. Activities to transfer LTRC GIS footprint from ArcGIS Online framework to System of Engagement Portal online framework. Attended ESRI User's Conference 2020 and AASHTO GIS-T 2021.
Task 4- Maintained GIS server, geodatabases and web services as well as ArcGIS Online web maps, 8 GIS web applications and a Collector GIS fieldwork application.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES
Task 1- Project Management Tracking System correct defects and implement new capabilities. Refocus email change to use current LSU server interfacing with OTS email system. Task 1- Maintain databases, website virtual server, all LTRC maintained source code and software development environments. Task 1- PMTS server upgrade windows, SQL Server and website code versions. Task 1- Attend TRB 2022 conference. Task 2- Setup new development environment and upgrade the Visual Studio version for all LTRC development environments. Task 2- Customized software development for research project 17-2GT. Task 2- Customized software development and upgrade .NET framework for the Dynamic Cone Penetration (DCP) data processing. Task 2- Customized software development and upgrade .NET framework for Materials Testing System (MTS) Checker import functionality to match sensor output. Task 4- GIS expertise and activities supporting research projects 03-1GT upgrade, 18-4GT, 20-1SS, 21-2GT. Task 4- Serve as LTRC liaison to Section 21 and System of Engagement. Activities to transfer LTRC GIS footprint from ArcGIS Online framework to System of Engagement Portal online framework. Attend 2021 ESRI User's Conference and AASHTO GIS-T 2022. Task 4- Create GIS version of LTRC Crash Database with web apps for queries and spatial analysis. Task 4- Maintain GIS server, geodatabases and web services as well as ArcGIS Online web maps, 8 GIS web applications and a Collector GIS fieldwork application. Task 5- Hire and train graduate student(s) for LTRC software development. Manage, assign and review graduate student source code programming that supports LTRC research projects.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	Administration of LTRC External Funding Programs	Project Status:	Ongoing

Funding Source:	SPR: TT-Fed/TT-Reg - 5	Budget Category:	FHWA

SIO:	30000169	Project Start Date:		1/1/2008
Research Project Number:	11-1AD	Completion Date	(original)	6/30/2009
Research Agency:	LTRC	Completion Date	(revised)	6/30/2024
Principal Investigator:	Vijaya Gopu			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$211,428
	(revised)	$4,672,490
Est. Expended to Date		$3,070,000
FY 2020 - 2021 Budget		
FY Funds	(original)	$296,000
	(revised)	
Est. FY Expenditure		$269,014

Estimated 2021-2022 Budget		
Total		**$306,412**
Salaries		$295,912
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		$10,500
Other		

BUDGET JUSTIFICATIONS

Travel: Travel budget is for PI travel to TRB, NCHRP, NSF, etc. meetings.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Travel: TRB Annual Meeting (Airfare+Hotel+Meals) = $2,200
Council of University Transportation Centers (CUTC) Summer Meeting: $1,000
NSF Center for Integration of Composites in Infrastructure Adv.Board Meetings: $1,800
AASHTO (American Association of State Highway Transportation Officials) Bridge Committee Annual Meeting: $1,200
Allowance for other state DOT dissemination meetings: $3,800

Objective(s): To cover administrative costs handled under contract to support the Louisiana Transportation Research Center (LTRC) research,
development and technology transfer expansion funding program

Expected Benefits: The efforts of this program will generate external funding for university faculty and support the research needs of DOTD.
Participation in national level research efforts and programs enhance the stature of LTRC and address the critical needs of the state departments of transportation.
Tasks carried out with support of external agencies -- NSF, FHWA, etc. -- enable workforce development in critical areas of the transportation sector.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

-Continue to coordinate the LTRC UTC (University Transportation Center) site projects and the UTC support studies through their completion;
-Lay the groundwork to respond to the new UTC solicitation for national, regional and TIER 1 centers.
-Coordinate all activities on the NSF (National Science Foundation) project on field monitoring and measurement education and submit final report in September '21;
-Conduct the REU (Research Experience for Undergraduates) Summer program in 2021. Request extension of the REU project funding.
-Continue coordination of TIRE program and TIRE projects;
-Hold LTRC town-hall meetings at all state universities with engineering programs when COVID subsides and campuses are open for presentations;
--Manage the pool fund study on FRP durability in infrastructure application if the funding pool is established;
-Coordinate submission of a revised NSF MRI (Major Research Instrumentation) proposal in this fiscal year
-Review the work being conducted at the University of West Virginia on FRP (Fiber Reinforced Polymer) repair of timber piles and ensure project objectives are met.
-- Submit FHWA proposal since pre-proposal was accepted.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES
-Continue to coordinate the LTRC UTC (University Transportation Center) site projects and the UTC support studies through their completion; -Lay the groundwork to respond to the new UTC solicitation for TIER 1 centers. -Coordinate all activities on the NSF (National Science Foundation) project on field monitoring and measurement education; -Conduct the REU (Research Experience for Undergraduates) Summer program in 2021 since the 2020 program had to be cancelled. Request extension of the REU project funding. -Continue coordination of TIRE program and TIRE projects; -Hold LTRC town-hall meetings at all state universities with engineering programs; -Manage the pool fund study on FRP durability in infrastructure application if fund is established; -Coordinate submission of a revised NSF MRI (Major Research Instrumentation) proposal in this fiscal year -Review the work being conducted at the University of West Virginia on FRP (Fiber Reinforced Polymer) repair of timber piles and ensure project objectives are met. -- Conduct FHWA project tasks if proposal is funded.

Title:	**Prediction of Road Conditions and Smoothness For Flexible and Rigid Pavements in Louisiana Using Neural Networks**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000376**		Project Start Date:		8/1/2020
Research Project Number:	21-1P		Completion Date	(original)	7/31/2022
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Zhong Wu				

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**		
Total Cost	(original)	$182,370		**Total**		**$91,000**
	(revised)					
Est. Expended to Date		$5,000		Salaries		$91,000
FY 2020 - 2021 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$56,000		Equipment	(non-expendable)	
	(revised)	$10,000		Travel		
Est. FY Expenditure		$9,500		Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: DOTD currently uses pavement performance curves in its treatment selection and budget planning. The performance curves, developed using a non-linear curve-fitting regression method, usually contain low R-squared values. To improve the prediction accuracy of pavement performance used in budget planning, there is an urgent need to build an artificial neural networks (ANN) based pavement performance prediction system for DOTD.

Objective(s): The objective of this study is to develop an artificial neural network application system that can be used to estimate future pavement condition and smoothness for Louisiana flexible and rigid pavements based on LADOTD's PMS and other related pavement data collected. The developed ANN application is expected to address both short-term and long-term performance prediction.

Expected Benefits: It is anticipated that this study will provide DOTD two types of ANN model which can be used to (1) obtain reliable predicted pavement performance index/indicators for the treatment selection and budget planning; and (2) predict long-term pavement condition and smoothness for newly-built pavements as well as other road segments no able to perform the pavement condition survey.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1: Conducted literature Review on the state-of-the-practice of DOTD concerning pavement performance modeling and condition evaluation strategies, focused on pavement evaluation strategies using condition indicator parameters and available methods for short-term and long-term road condition prediction and cost-benefits of pavement condition modeling.
Task 2: Collected PMS pavement condition data from 2003 to 2019 and identified appropriate projects based on the availability of historical pavement performance data, such as cracking, roughness, patching and rutting, The selected projects were categorized based on pavement types (i.e. flexible and rigid), functional class, geographic location, and pavement structure. In addition, for the selected projects the temperature and precipitation data were also extracted from the National Oceanic and Atmospheric Administration (NOAA) database.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1: Continue literature on published work related ANN and pavement performance prediction
Task 2: Continue breakdown of the selected pavement projects and collected pavement structure and temperature and precipitation data. The design traffic data would be also collected.
Task 3: Start to develop of ANN models for predicting long and short term pavement smoothness (i.e. International Roughness Index (International Roughness Index (IRI)) and major distress indices (i.e. alligator cracking index, random cracking index, rutting index, patching index, faulting).
Task 4: Evaluation of Performance and Cost-Benefits of Developed ANN models

Title:	**Application of Mechanistic-Empirical Pavement Design Approach into RCC Pavement Thickness Design**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000271**	Project Start Date:		6/1/2018
Research Project Number:	19-1P	Completion Date	(original)	11/30/2020
Research Agency:	LTRC	Completion Date	(revised)	5/31/2022
Principal Investigator:	Zhong Wu			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$319,896
	(revised)	
Est. Expended to Date		$271,500
FY 2020 - 2021 Budget		
FY Funds	(original)	$93,900
	(revised)	
Est. FY Expenditure		$54,000

Estimated 2021-2022 Budget		
Total		**$44,500**
Salaries		$44,500
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The existing Roller compacted concrete (RCC) pavement design procedures are only applicable for heavy industrial pavements with thickness of 8 inches or more. Currently, there are no mechanistic-empirical (M-E) procedures for structural design of RCC pavements. As DOTD is in transitioning from the 1993 AASHTO pavement design procedure to the newly-calibrated Pavement ME methodology, there is a need to develop M-E thickness design procedures for RCC pavement applications

Objective(s): The objectives of this research are to investigate factors that may impact RCC pavement performance, evaluate the cracking mechanism and joint performance over different stabilized base materials, develop an M-E thickness design procedure for RCC pavements, and compare actual versus predicted performance of RCC pavements using the developed design procedure.

Expected Benefits: Anticipated results include useful tools for thickness design and performance evaluation of RCC pavements using an M-E approach. A detailed design manual will be established for DOTD implementation of RCC pavement applications.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 3: Both RCC sections have been loaded for more than 700000 passes (both estimated greater than 2.5 million ESALs); The collected instrumentation data were first extracted using MatLab and then analyzed according to sensor positions, load level and types (static, dynamic or HWD) and loading passes. A few initial fatigue cracks has been noticed.
Task 4: FWD tests were performed on both sections at a 5-ft interval along five longitudinal paths. Forensic investigation has begun by taking cores to verify as-built RCC thicknesses and load-induced strains measured by the fiber optic sensors. More than 10 beam fatigue tests have been performed.
Task 5: A finite element rigid pavement analysis model has been developed using ABAQUS to predict the RCC pavement responses under various ALTaS loads at different loading positions. Validation of the FE model results is currently underway.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 3: Continue the accelerated load testing and distress survey of test sections
Task 4: Continue conducting the forensic investigation of test sections and complete the Laboratory beam fatigue tests
Task 6: Complete the development of a mechanistic-empirical based RCC pavement thickness design procedure
Task 7: Prepare a final report

Title:	**Exploration of Drone and Remote Sensing Technologies in Highway Embankment Monitoring and Management**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000216**	Project Start Date:		9/1/2017
Research Project Number:	18-1P	Completion Date	(original)	8/31/2018
Research Agency:	LTRC	Completion Date	(revised)	8/31/2022
Principal Investigator:	Zhongjie Zhang			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$50,000
	(revised)	$150,000
Est. Expended to Date		$81,669
FY 2020 - 2021 Budget		
FY Funds	(original)	$38,800
	(revised)	$58,400
Est. FY Expenditure		$39,909

Estimated 2021-2022 Budget		
Total		**$48,000**
Salaries		$48,000
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Many Louisiana highway embankments were built with high plastic soils due to historical reasons. Many of them have been experiencing surface sliding failures, which become a safety issue and cause traffic disruptions. Since no warning system is available for this type of failures, the Louisiana Department of Transportation and Development (DOTD) can only respond to them after the fact with costly remediation.

Objective(s): Since the surface slide of embankment can only occur when the once compacted soils of slope close to be fully softened due to the dry and wet cycles of the climate, the capability of surface soils to store water (surface moisture) can be a good indicator of health condition of embankment slopes. A long term monitoring system on highway embankments can be built on this indicator and this challenging job can be accomplished using remote sensing and drone technologies with proper sensors.

Expected Benefits: A long term monitoring system for highway embankments will allow the Department to take proactive maintenances measures to prevent surface sliding failures from happening on highway soil embankments and save taxpayers' dollars.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1: Continued the literature search and review on the applications of remote sensing and drone technologies in civil and geotechnical engineering.
Task 3: Selected field embankment testing sites.
Task 4: Data Collection. have Continued working with the aviation section of LA DOTD and use their drone to test our cameras and collect field testing images at DOTD's highway embankment sites.
Task 5: Processed and analyzed the collected data. The preliminary results are promising for identifying potential sliding sites and we will have more flying times to collect more image data.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1: Continue the literature search and review on the applications of remote sensing and drone technologies in civil and geotechnical engineering.
Task 3: Continue selecting field embankment testing sites.
Task 4: Data Collection. We will continue our field testing flights and get more field images data, which will be correlated with moisture content on the ground surface.
Task 5: Process and analyze the collected data Based on the entire experiment experience, a testing protocol or procedure will be developed accordingly. Then several highway embankments with the potential surface sliding problem will be identified and selected for our further testing evaluation and validation.
Task 6: develop indicators for highway embankment safety in Louisiana If possible, a draft warning system for embankment surface sliding can later be developed for further evaluation. This project will be extended with a budget increase if needed.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	Correlation of Rut Depths Measured by the Profilers of LTRC and DOTD PMS	Project Status:	Ongoing

Funding Source:	SPR: TT-Fed/TT-Reg - 6	Budget Category:	FHWA

SIO:	DOTLT1000387	Project Start Date:		11/16/2020
Research Project Number:	21-2P	Completion Date	(original)	5/15/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Qiming Chen			

BUDGET STATUS

Total Budget			Estimated 2021-2022 Budget		
Total Cost	(original)	$100,000	**Total**		**$61,540**
	(revised)				
Est. Expended to Date		$16,500	Salaries		$61,540
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$44,834	Equipment	(non-expendable)	
	(revised)	$38,460	Travel		
Est. FY Expenditure		$38,460	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Louisiana Transportation Research Center (LTRC) currently owns a road profiler, which uses a 5-point rut bar system for pavement rut depth measurements. La DOTD is currently using a scanning laser system to collect rut depth data for its Pavement Management System (PMS). The two systems result in some differences of calculated rut depths. LTRC data is often requested, together with PMS data, for pavement performance evaluation and pavement management activities support.

Objective(s): The objective of this research is to develop a correlation of rut depths measured with LTRC's profiler with a 5-point laser system and DOTD PMS's profiler with a scanning laser system. A Standard Operating Procedure (SOP) of pavement rutting data collection, compilation, and delivery by LTRC will be developed so that DOTD pavement engineers can use LTRC data together with PMS data to evaluate the pavement performance and conduct/support pavement management activities.

Expected Benefits: A good correlation can help better understand the rutting data collected by LTRC and the rutting data in the DOTD PMS. A SOP of pavement rutting data collection, compilation, and delivery by LTRC will be created for DOTD pavement engineers to use when LTRC data is needed, together with PMS data, for pavement performance evaluation and pavement management activities support. The SOP can also serve as a training document for DOTD and LTRC engineers/researchers.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1: Conduct Literature Review (25% complete)
Task 2: Select Roads for Profile Data Collection (PMS calibration sites were selected to be included in this study as a starting point)
Task 3: Collect Profile Data (Profile data were collected at PMS calibration sites)
Task 4: Perform Analysis of the Collected Data (The data collected from PMS calibration sites were analyzed)

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1: Conduct Literature Review (continue working on literature review)
Task 2: Select Roads for Profile Data Collection (Additional roads will be selected based on the data from PMS calibration sites)
Task 3: Collect Profile Data (Profile data were collected from additional roads identified from Task 2)
Task 4: Perform Analysis of the Collected Data (all data will be analyzed)
Task 5: Develop a Standard Operating Procedure
Task 6: Prepare the Final Report

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Assessment of LADOTD's friction aggregate sources through laboratory and accelerated testing**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000340**		Project Start Date:		1/1/2020
Research Project Number:	20-4P		Completion Date	(original)	12/31/2022
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Zhong Wu				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$402,068	**Total**		**$140,000**
	(revised)				
Est. Expended to Date		$15,000	Salaries		$140,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$68,640	Equipment	(non-expendable)	
	(revised)	$5,000	Travel		
Est. FY Expenditure		$5,000	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Due to high variations in the aggregate production and shipments, it is common to get significantly different polished stone value (PSV) test results from a same aggregate source shipped in at a different time. Aggregate suppliers certainly have concerns when their product's PSV test results fail to meet DOTD's target. Therefore, there is an urgent need to formalize the use of aggregate friction testing to better utilize aggregates and achieve desirable skid values for the life of a pavement.

Objective(s): The research objectives are: to assess the PSV test variations in term of sources, shipment, and operators; evaluate a new aggregate friction testing procedure; determine the threshold friction design values for commonly-used wearing mixtures; validate and update a set of lab and field correlations of pavement surface friction characteristics measured and developed from projects of 09-2B and 12-5P.

Expected Benefits: A potential outcome of this project will provide DOTD a new and improved laboratory aggregate friction testing protocol that can be used for initial source approval as well as for predicting field friction performance.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1: Continued the literature review on the prediction of pavement surface friction characteristics based on dynamic friction tester (DFT), circular track meter (CTM) and other frictional parameters.
Task 2: The training for DFT/CTM have been scheduled in May. Currently ongoing is the process of acquiring the two steel molds and one steel testing base for the proposed laboratory coarse aggregate friction test. However, acquiring a three-wheeling aggregate publisher device has been delayed.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 3: Acquire coarse aggregates and execute the laboratory testing plan of DFT and PSV tests.
Task 4: In situ pavement surface friction measurements using DFT and CTM and the locked wheel skid trailer tests will be performed on twenty-two pre-selected pavement test sections and several other newly selected sections with wearing course mixtures of stone matrix asphalt (SMA) and open-graded friction course (OGFC).
Task 5: Analyze the collected laboratory and field experimental results using the statistical method as well as pavement modeling, e.g., Pavement ME, finite element.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Mechanistic Characterization of Asphalt Overlays for Pavement Rehabilitation and Preservation using Pavement ME Approach**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000272**		Project Start Date:		8/1/2018
Research Project Number:	19-2P		Completion Date	(original)	1/31/2021
Research Agency:	LTRC		Completion Date	(revised)	7/31/2021
Principal Investigator:	Zhong Wu				

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**		
Total Cost	(original)	$319,442		**Total**		**$20,000**
	(revised)					
Est. Expended to Date		$207,000		Salaries		$20,000
FY 2020 - 2021 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$81,828		Equipment	(non-expendable)	
	(revised)	$150,000		Travel		
Est. FY Expenditure		$145,000		Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: In the transition from the AASHTO 1993 design guide to the new Pavement-ME design, there is a need to perform local-calibration of distress models used for both pavement structural and preservation overlays in Louisiana. Also, DOTD pavement design engineers recently encountered several technique issues when using the locally calibrated Pavement ME software in new pavement design jobs.

Objective(s): The main objectives of this study are to address the existing Pavement ME's new pavement design issues encountered by the DOTD design engineers; to evaluate the performance and existing trigger system of possible pavement preservation overlay strategies using Pavement ME; to update local-calibration factors of Pavement ME and develop a set of optimum design inputs for both pavement rehabilitation and preservation asphalt overlays for DOTD implementation.

Expected Benefits: From this study DOTD will obtain (1) a detail implementation plan for Pavement ME's rehabilitation module with a set of updated, local calibration factors and Louisiana design inputs; (2) a set of recommended design inputs for pavement preservation overlay using the Pavement ME; and (3) solutions for the existing Pavement ME Design software issues currently encountered.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 4: Investigated the current design issues Implementing Pavement ME Design Software by DOTD.
Task 5: Analyzed the performance of structural overlays using Pavement ME and Update related Distress/International Roughness Index (International Roughness Index (IRI)) Models' Local Calibration Factors.
Task 6: Evaluated the performance and existing trigger system of possible preservation overlay strategies through investigating the best timing, cost benefits and statistical analysis of performance using the Pavement ME.
Task 7: Began developing implementation guidelines for DOTD to implement the Pavement ME in its daily pavement design by addressing the currently encountered design issues, providing local design input strategy, developing an analysis guide for using the Pavement ME software in the preservation overlay design.
Task 8: Started to prepare the final report and technical summary.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 7: Continue and finalize the Pavement ME Design Implementation Guidelines.
Task 8: Continue and submit a final report and technical summary.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Mitigating Joint Reflective Cracks using Stone Interlayers: Case Study on Louisiana Highway 5, Desoto Parish**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000218**		Project Start Date:		10/17/2017
Research Project Number:	18-2P		Completion Date	(original)	10/16/2023
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Qiming Chen				

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**		
Total Cost	(original)	$210,000		**Total**		**$24,435**
	(revised)					
Est. Expended to Date		$107,800		Salaries		$24,435
FY 2020 - 2021 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$27,402		Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure		$27,000		Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Reflective cracking in AC overlays represents a serious challenge associated with pavement rehabilitation. In 2011, LTRC completed a study to evaluate and compare the performance of different crack control treatments in Louisiana for composite pavements. Stone interlayers were not one of the treatments discovered from a survey of DOTD engineers in the study and therefore were not evaluated.

Objective(s): The purpose of this project is to monitor the effectiveness of stone interlayers in composite pavements, determine the effect of stone
depth in mitigating reflective cracks at the transverse and longitudinal joints, and measure the movement of the Portland cement concrete (PCC) transverse joints under traffic loading.

Expected Benefits: The results of the study may be used to recommend improved pavement design and preservation procedures.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1: Literature Review (60% complete)
Task 2: Conduct a statewide survey (Responses were received. 99% complete)
Task 3: Data mining the Pavement Management Systems database (two projects were identified from Task 2; the plans were collected)
Task 5: Interim Report (The AC wearing course has been placed; Instruments were read once with AC wearing course placed; started data analysis)

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1: Literature Review (continue working on literature review)
Task 3: Data mining the Pavement Management Systems database (collect distress information on the two projects identified from Task 2)
Task 5: Interim Report (We will take one more reading with AC wearing course placed. Continue data analysis)

Title:	Management and Operation of the Pavement Research Facility	Project Status:	Ongoing

Funding Source:	SPR: TT-Fed/TT-Reg - 6	Budget Category:	FHWA

SIO:	30000141	Project Start Date:		7/1/2009
Research Project Number:	10-1ALF	Completion Date	(original)	6/30/2015
Research Agency:	LTRC	Completion Date	(revised)	6/30/2024
Principal Investigator:	Zhong Wu			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$1,730,000
	(revised)	$19,890,536
Est. Expended to Date		$12,056,898
FY 2020 - 2021 Budget		
FY Funds	(original)	$495,000
	(revised)	$300,000
Est. FY Expenditure		$300,000

Estimated 2021-2022 Budget		
Total		**$472,000**
Salaries		$367,000
Consumable Supplies & Materials		$90,000
Equipment	(non-expendable)	
Travel		$10,000
Other		$5,000

BUDGET JUSTIFICATIONS

Supplies: The $90,000 budget will cover the routine maintenance supplies, mechanic repairing (parts and labor), and daily operational costs at the Pavement Research Facility. The following supplies and operational items are included in the budget:
Parts replacement and mechanic repairing of Accelerated Loading Facility (ALF), parts replacement and mechanic repairing of ATLaS, steel braided cable, pillow block bearing, hydraulic oil filters, electrical solenoids, din cables/connector, electrical fuses, electrical cable 480v and 240v, pressure relief valve, cable lube spray, poly grease, lawn weed killer, mouse/snake traps, toiletries, wasp spray, gasoline, scag and tractor, student worker assistance, etc

Travel: TRB Annual meeting (4 attendees) - $7,500
Attend a pavement conference (1 attendee) - $2,500

Other: Professional Services - $5000, e.g., move Accelerated Loading Facility (ALF), phone, internet and copier services.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The Pavement Research Facility (PRF) is a full scale test facility site designed to test any and all types of pavements using two heavy vehicle simulator loading devices, namely the Australian designed Accelerated Loading Facility (ALF) and ATLaS30. The purpose of the Louisiana Transportation Research Center's (LTRC's) Pavement Research Facility is to investigate and evaluate economic and practical alternatives to current design and construction practices.

Objective(s): The objective of this study is to provide for the management and operation structure of the PRF site in performing full-scale accelerated pavement testing for DOTD. A manager and two operators will be funded in this study. The scope of the work includes management of the facility, maintenance and operation, preparations of plans for individual experiments, construction and instrumentation activities and planning.

Expected Benefits: It is anticipated that, by completing the current APT experiments DOTD will obtain a mechanistic-empirical roller-compacted-concrete (RCC) pavement design procedure, a smart-sealant material for the pavement construction of expansion and contraction joints, and a ultra-thin concrete overlay using a new engineered cementitious composite (ECC) material.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

- Continued loading on the RCC sections; performed several rounds of falling weight deflectometer (FWD) test, collected and analyzed instrumentation data for RCC tets section;
- Tested the smart-sealant test sections and prepared a testing report;
- planned to begin loading on ECC overlay test sections
- Replaced two guide-wheels, fixed malfunction of electric VFD/directional sensors/encoder, and repaired the hydraulic oil leaking problems by replacing three control valves.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES
- Continue loading of ECC overlay sections - Complete testing of RCC sections - Fix Accelerated Loading Facility (ALF) cable and control problems - Continue improving the efficiency of using ATLaS device

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Evaluation of Traffic Crash Characteristics on Elevated Sections of Interstates in Louisiana**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000341**		Project Start Date:		8/3/2020
Research Project Number:	20-1SA		Completion Date	(original)	8/2/2022
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Julius Codjoe				

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**		
Total Cost	(original)	$196,166		**Total**		**$95,861**
	(revised)					
Est. Expended to Date		$82,215		Salaries		$95,361
FY 2020 - 2021 Budget				Consumable Supplies & Materials		$500
FY Funds	(original)	$114,833		Equipment	(non-expendable)	
	(revised)	$82,215		Travel		
Est. FY Expenditure		$82,215		Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Louisiana's elevated bridge sections have continued to experience high number of crashes, recording a yearly average of 247 crashes from 2015 to 2019.

Objective(s): The primary objective of this project is two-fold: first, to fully develop a video analytical software to classify and count vehicle stream, and have the capability of calculating vehicle speeds and/or headways; and secondly, to undertake crash analysis on selected elevated segments to look for characteristics of crashes, common issues, and similarities/differences in car and truck crashes.

Expected Benefits: It is anticipated that a software that can utilize publicly available traffic video streams could be used statewide to estimate traffic volumes and compliance with travel restrictions on not only elevated roadways, but all roadways with available video data. Knowing where and when the most serious violations occur would help law enforcement allocate resources to these hot spots.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1 Perform Literature Review – 100% completed.
Task 2 Select Representative Sites – 100% completed. Final sites were approved from the PRC members.
Task 3 Develop Video Analytical Tool – The task will be completed within a month.
Task 4 Undertake Crash Analysis – As the study already have sites from Task 2, this task is ongoing.
Task 5 Compile Traffic Flow Parameters – The task is still ongoing.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 5 Compile Traffic Flow Parameters
Task 6 Undertake Targeted Analysis of Atchafalaya Basin Bridge
Task 7 Undertake Combined Analysis of All Sites
Task 8 Submit Final Report

Title:	Reduce Pedestrian Fatal Crashes in Louisiana by Improving Lighting Conditions	Project Status:	Ongoing

Funding Source:	SPR: TT-Fed/TT-Reg - 5	Budget Category:	FHWA

SIO:	DOTLT1000291	Project Start Date:		9/1/2020
Research Project Number:	19-2SA	Completion Date	(original)	5/31/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Raju Thapa			

BUDGET STATUS

Total Budget			Estimated 2021-2022 Budget		
Total Cost	(original)	$179,928	**Total**		**$87,474**
	(revised)				
Est. Expended to Date		$91,718	Salaries		$87,420
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$80,000	Equipment	(non-expendable)	
	(revised)	$91,718	Travel		$54
Est. FY Expenditure		$91,718	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Pedestrian safety has been a long-standing problem in Louisiana. Although the total traffic deaths have declined significantly over a ten-year period (2009–2018), the progress in reducing pedestrian fatalities has been much less significant than that for total traffic fatalities. The growing prevalence of nighttime pedestrian crashes during the period advocates for prioritizing countermeasures that can improve pedestrian safety at night.

Objective(s): 1.Learning and documenting lighting policies/guideline/practice in Louisiana and other states 2.Investigating lighting conditions at intersection, crosswalk and locations (away from intersections) with frequent pedestrian crashes and its impact on the pedestrian safety in Louisiana; 3.Recommending the targeted practical lighting requirements based on the analysis; 4.Making suggestions on crash coding modification in the pedestrian crash report.

Expected Benefits: This research will provide insight into the factors that contribute to pedestrian crashes and the impact of lighting conditions on pedestrian crashes in Louisiana. Furthermore, the results of this research will help in guiding effective countermeasures to reduce crashes and minimize risk factors for pedestrians.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1. Literature review - It was completed.
Task 2. Pedestrian Crash Analysis and Modeling - It is still ongoing.
Task 3. Cost and Benefit Analysis- It will be started after Task 2.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 2. Pedestrian Crash Analysis and Modeling - It is still ongoing.
Task 3. Cost and Benefit Analysis.
Task 4. Final Report.

Title:	Pedestrians and Bicyclists Count, Phase 2: Implementing and Applying Multimodal Demand Data	Project Status:	Ongoing

Funding Source:	SPR: TT-Fed/TT-Reg - 6	Budget Category:	FHWA

SIO:	DOTLT1000297	Project Start Date:		3/15/2019
Research Project Number:	19-3SA	Completion Date	(original)	3/14/2021
Research Agency:	UNO	Completion Date	(revised)	3/14/2022
Principal Investigator:	Tara Tolford, MURP, AICP			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$240,704
	(revised)	$288,520
Est. Expended to Date		$203,460
FY 2020 - 2021 Budget		
FY Funds	(original)	$131,604
	(revised)	$93,128
Est. FY Expenditure		$93,128

Estimated 2021-2022 Budget		
Total		**$61,778**
Salaries		$50,803
Consumable Supplies & Materials		$3,125
Equipment	(non-expendable)	
Travel		$500
Other		$7,350

BUDGET JUSTIFICATIONS

Other: The remaining budget will cover the purchase of the following items.

- Additional year of EcoVisio data transmission service for permanent count units [other]- $7,350

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The results of LTRC 16-4SA indicate that incremental development of systematic active transportation monitoring is feasible and scalable. Non-motorized traffic is more variable than motorized traffic so more data is required in order to make inferences or conduct statistical analyses of count and/or crash data. Long-duration counts are necessary to understand active transportation demand, track complete streets policy implementation, and evaluate safety impacts.

Objective(s): To implement recommendations and address gaps in data availability by: 1)Install permanent counters at a set of pilot locations and collect one year of pedestrian and bicycle data representative of a variety of usage patterns and/or facility types, 2)Develop active transportation factor groups for Louisiana communities and preliminary expansion factors for adjusting short-duration multimodal counts, 3)Identify, support, and inform opportunities for coordinated local and MPO-led data collection

Expected Benefits: This study advances preliminary feasibility research (LTRC 16-4SA), initiates permanent counts, pilots and refines protocols for planning, installing, and validating counters and classifying factor groups, advances methods for applying count data to solve active transportation planning and safety problems, and advances coordinated local and regional multimodal data collection in support of statewide Complete Streets policy implementation and performance measurement.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1 – A literature review and inventory of existing count programs and methods was completed during the previous fiscal year; an update scan was completed during this Fiscal Year.
Task 2 – All necessary short-duration counts were completed during previous fiscal year.
Task 3 – A second set of count sites were vetted and approved by the PRC. Equipment for these sites was purchased, and installation was contracted and completed, followed by 8-hour validation counts to ensure accurate sensor function. A letter of no objection from the USACE was secured for the last outstanding original count location. A final count site was added to the scope of work (Government Street), for which equipment has been ordered and installation is pending.
Task 4 – Resources pertaining to best practices for supporting coordinated data collection and management are collected on an ongoing basis. A partnership with the City of Ruston was initiated developed to pilot coordinated, systematic and project-oriented multimodal data collection (including installation of one additional permanent count location).
Task 5 – Preliminary areawide exposure estimates for all Louisiana Parishes and MPOs, and the first 12 months of data for Batch 1 Counters has been analyzed to identify broad trends and QA/QC parameters. The PI continues to work with peer institutions and experts to develop methodologies for processing, storing, publishing, sharing, and utilizing count data as it is collected, particularly with regard to analysis of data collected during the COVID-19 pandemic.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES
Task 1 – Additional resources will be integrated into inventory as identified. Task 2 – Complete- no additional short-duration counts anticipated. Task 3 – The final remaining permanent counters (2) will be installed and validated pending authorization from relevant authorities. All counters will be routinely monitored. Task 4 – Work will continue to advance data collection with local partners, and resources developed to support coordinated efforts, including a planned partnership with New Orleans RPC to provide guidance and resources for encouraging long-term data collection in Jefferson Parish, as well as to require consultants to collect multimodal counts in project feasibility/traffic studies moving forward. This will also include development of MOUs with local partners (where needed) to ensure data collection continuity beyond the period of this research. Task 5 –Count data will be analyzed and applications developed for its use in safety analysis and planning. Task 6 – Prepare and submit final technical report and technical summary.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Determining the True Cost and Benefit for Collecting and Maintaining Non-Road and Non-Bridge Asset Data**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000380**	Project Start Date:		11/1/2020
Research Project Number:	21-5SS	Completion Date	(original)	1/31/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Ruijie "Rebecca" Bian			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$149,303
	(revised)	
Est. Expended to Date		$87,384
FY 2020 - 2021 Budget		
FY Funds	(original)	$126,045
	(revised)	$87,384
Est. FY Expenditure		$87,384

Estimated 2021-2022 Budget		
Total		**$61,092**
Salaries		$26,185
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		$34,907

BUDGET JUSTIFICATIONS

Other: Other budget is a sub-contract to a consultant. The breakout sheet is attached to the proposal. No equipment is to be purchased by the consultant.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: A cost is associated with collecting and maintaining non-road and non-bridge asset data. A need exists to determine the true cost of collecting the data as well as the benefit of collecting said data. A need exists to determine what assets should, or should not be collected as part of the effort.

Objective(s): The primary objective of this research is to identify the non-road, non-bridge assets that are candidates for inclusion in an internal asset management plan for the Louisiana Department of Transportation and Development (DOTD), determine the costs of data collection and maintenance associated with each asset class considered, and then determine the benefits of data collection and maintenance for each asset class.

Expected Benefits: Because of the interest of DOTD in the outcome of this research as well as the concerns expressed widely throughout the profession by other DOTs, the implementation of this project seem to be virtually certain. The results could be used for the development of future Transportation Asset Management Plan (TAMP) for the state of Louisiana, and similar procedures are likely to be adopted by other state DOTs as well as by various nations overseas that have also identified asset management planning as a major issue of importance.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

The research team has completed the following tasks:
Task 1: Undertake a Comprehensive Literature Review
Task 2: Compile Candidate Asset Classes for a Louisiana DOTD Asset Management Plan
Task 3: Review Available Data Bases in the State of Louisiana

All the findings were documented in a summary report. The report was delivered to the PRC for review. A PRC meeting was also held to present findings to date and discuss plan for the next step.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 4: Determine the Costs of Collecting Data for each Asset Class. The task is expected to start from April 2021.

Task 5: Determine the Benefits of Collecting Data for each Asset Class. The task is expected to start from June 2021.

Task 6: Final Report. The task is expected to start from September 2021.

Title:	**Develop and Evaluate Performance Measures for Intelligent Transportation Systems (ITS) in Louisiana**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000379**		Project Start Date:		8/1/2020
Research Project Number:	21-4SS		Completion Date	(original)	7/31/2022
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Raju Thapa				

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**		
Total Cost	(original)	$142,132		**Total**		**$67,801**
	(revised)					
Est. Expended to Date		$55,094		Salaries		$67,801
FY 2020 - 2021 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$76,720		Equipment	(non-expendable)	
	(revised)	$55,094		Travel		
Est. FY Expenditure		$55,094		Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The Louisiana Department of Transportation and Development (DOTD) established its ITS Program in 2000 and currently has various program areas. It is important that before Louisiana invests more resources to either expand or implement new ITS programs, DOTD should undertake a thorough study to demonstrate the benefits of its current ITS programs across transportation planning, traffic operation, safety, environmental quality and sustainability, and any other areas that can be evaluated.

Objective(s): The primary objective of this project is to develop a set of performance measures for each existing ITS application in Louisiana, and then collect data, evaluate and quantify the benefits achieved through their implementation across transportation planning, traffic operation, safety, environmental quality and sustainability, and any other areas that can be evaluated.

Expected Benefits: Potentially the results obtained from this study can lead to better assessments of the performance of LADOTD's ITS applications on the field. The gap analysis will help DOTD recognize its shortfalls and provide the necessary information for policy makers to address any needs.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1. Perform Literature Review - The task was finalized.
Task 2. Evaluate Efficiency of Current ITS Performance Measures - The task was completed. A national survey was done as a part of this task.
Task 3. Develop Initial List of Performance Measures - It is still ongoing.
Task 4. Undertake Stakeholder Workshop - The task is scheduled this month.
Task 5. Develop Final List of Performance Measures - It will be finalized after Task 4.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 6. Collect Data for Evaluation Study
Task 7. Undertake Data Analysis
Task 8. Submit Final Report

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Evaluating Permitted/Protected versus Protected Left Turn Signals in Louisiana**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000378**		Project Start Date:		8/1/2020
Research Project Number:	21-3SS		Completion Date	(original)	7/31/2022
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Raju Thapa				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$197,212	**Total**		**$76,445**
	(revised)				
Est. Expended to Date		$89,909	Salaries		$76,445
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$72,160	Equipment	(non-expendable)	
	(revised)	$89,909	Travel		
Est. FY Expenditure		$89,909	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The Louisiana Department of Transportation and Development (DOTD) has its own traffic signal manual which sets guidance for protected only or permitted/protected left turn movements. In general, the safety benefits for protected only left turns are obviously higher than permitted/protected left turns but then delays for the former are also greater. There is the need to balance the safety benefits of an intersection configuration with its operational benefits.

Objective(s): The primary objective of this project is to study the safety and operation of existing signal intersections (protected only versus permitted/protected left turns versus permitted only but with left turn lanes) along with their geometric features, as described in the DOTD Traffic Signal Manual, with the view to develop guidance on when it is appropriate to install each signal type.

Expected Benefits: Potentially the results obtained from this study can lead to better assessments of where to implement permitted, permitted/protected, or protected only signals throughout the state. Installing the right kind of signal at Louisiana intersections may not only benefit travelers by reducing time delays and providing improved safety, but may additionally lead to a more efficient use of fossil fuels and reduced air pollution.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1. Perform Literature Review - It was finalized
Task 2. Administer a Survey of State DOTs - A national survey was conducted as a part of this task. It was completed.
Task 3. Develop a Population List of Signalized Intersections - It was completed.
Task 4. Agree on a Sample List of Signalized Intersections - It was completed.
Task 5. Collect Video Data and Geographical Features - It is ongoing.
Task 6. Analyze Video Data - It is ongoing.
Task 7. Undertake Safety Analysis - It is still ongoing

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 7. Undertake Safety Analysis
Task 8. Undertake Combined Analysis of All Sites
Task 9. Submit Final Report

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	Assessing the Economic Benefits of the TIMED Program	Project Status:	Ongoing

Funding Source:	SPR: TT-Fed/TT-Reg - 5	Budget Category:	FHWA

SIO:	DOTLT1000325	Project Start Date:		7/1/2019
Research Project Number:	19-5SS	Completion Date	(original)	6/30/2020
Research Agency:	LSU	Completion Date	(revised)	3/30/2022
Principal Investigator:	Ruijie "Rebecca" Bian			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$125,490
	(revised)	$295,790
Est. Expended to Date		$237,882
FY 2020 - 2021 Budget		
FY Funds	(original)	$135,913
	(revised)	$137,490
Est. FY Expenditure		$137,490

Estimated 2021-2022 Budget		
Total		**$63,916**
Salaries		$33,666
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		$30,250

BUDGET JUSTIFICATIONS

Other: Other budget is a sub-contract to a consultant. The breakout sheet is attached to the proposal. No equipment is to be purchased by the consultant.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The TIMED program was designed to enhance economic development in Louisiana through investment in infrastructure. The program consisted of (16) capital improvement projects chosen by lawmakers in a package that included a four cent per gallon gas tax dedicated to funding the design and construction of the identified projects. Without being able to quantify economic benefits against a set of established criteria it is very difficult to prioritize projects from a list of needed improvements.

Objective(s): This proposed project plans to evaluate potential criteria to be used as surrogates for economic development. If direct criteria can be established all the better. The criteria will be evaluated against the (14) TIMED projects that have been completed to date to establish a baseline which can be compared against future projects being proposed to enhance economic development.

Expected Benefits: Establishing criteria for evaluating economic benefits can be used to aid decision-makers when determining the feasibility of undertaking projects identified as improving or creating economic development. In this way, proposed projects can be compared using actual data and analysis.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Five new tasks were added to the original project as requested by the PRC.
The research team proposed a methodology to determine actual construction costs (Task 1), actual maintenance costs (Task 2), and user benefits (Task 3).
The research team collected necessary crash data and HPMS data to improve the accident rate estimations (Task 4).

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Tasks 1, 2, and 3: The research team will apply the methodology on the eight TIMED projects that were assessed in the first phase.
Task 4: Improve the accident rate estimations. The research team will conduct temporal modeling with the collected data to estimate the accident rate.
Task 5: Combine all cost and benefit calculations into a Workbook. The research team will start this work once the previous tasks are completed.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	LTRC Proposal for the Support of Research and Development in Special Studies	Project Status:	Ongoing

Funding Source:	SPR: TT-Fed/TT-Reg - 5	Budget Category:	FHWA

SIO:	DOTLT1000280	Project Start Date:		7/1/2019
Research Project Number:	19-1SS	Completion Date	(original)	6/30/2021
Research Agency:	ULL	Completion Date	(revised)	6/30/2024
Principal Investigator:	Elisabeta Mitran			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$494,396
	(revised)	
Est. Expended to Date		$220,165
FY 2020 - 2021 Budget		
FY Funds	(original)	$222,887
	(revised)	$136,470
Est. FY Expenditure		$131,000

Estimated 2021-2022 Budget		
Total		**$126,711**
Salaries		$110,711
Consumable Supplies & Materials		$3,000
Equipment	(non-expendable)	$3,000
Travel		$10,000
Other		

BUDGET JUSTIFICATIONS

Travel: Travel:
- TRB annual meeting - $5,000 (2 attendees)
- Lifesavers Conference -$2,500
- GHSA - $2,500

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The focus of LTRC on highway safety-related research has increased over the past 10 years as Louisiana adopted the strategic vision “Destination Zero Deaths” and committed in 2009 to halve fatalities and severe injuries by 2030. The Louisiana Strategic Highway Safety Plan (SHSP) uses a comprehensive, data-driven, multidisciplinary approach to identify the most severe traffic safety problems and the most effective approaches to solve them.

Objective(s): The purpose of this project is to provide long-term professional assistance to the Louisiana Department of Transportation and Development (DOTD) on the management and conduct od research for special studies-related matters. Projects to be managed can include safety and other special studies, as necessary.

Expected Benefits: The benefits of this project include specialized technical expertise for the management of ongoing research program to investigate special studies questions, especially in the area of highway safety.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1. Plan, develop, and manage the assigned LTRC research work program in the special studies/safety is ongoing.
Task 2. Provide authoritative review of contract research in the area of special studies/safety . This task is ongoing.
Task 3. Coordinate efforts to disseminate and implement the research findings. This task is ongoing.
Task 4. Conduct transportation engineering research projects, as needed. This task is ongoing, conducting research for two projects.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1. Continue to plan, develop, and manage the assigned LTRC research work program in the special studies/safety.
Task 2. Continue to provide authoritative review of contract research in the area of special studies/safety.
Task 3. Continue to coordinate efforts to disseminate and implement the research findings.
Task 4. Continue to conduct transportation engineering research projects, as needed.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	LTRC Proposal for the Support of Research and Development in ITS/Traffic	Project Status:	Ongoing

Funding Source:	SPR: TT-Fed/TT-Reg - 5	Budget Category:	FHWA

SIO:	DOTLT1000281	Project Start Date:		7/1/2019
Research Project Number:	19-1ITS	Completion Date	(original)	6/30/2021
Research Agency:	ULL	Completion Date	(revised)	6/30/2024
Principal Investigator:	Raju Thapa			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$872,706
	(revised)	$2,367,433
Est. Expended to Date		$333,438
FY 2020 - 2021 Budget		
FY Funds	(original)	$487,925
	(revised)	$333,438
Est. FY Expenditure		$333,438

Estimated 2021-2022 Budget		
Total		**$97,980**
Salaries		
Consumable Supplies & Materials		$4,500
Equipment	(non-expendable)	$11,400
Travel		$18,240
Other		$63,840

BUDGET JUSTIFICATIONS

Equipment: Equipment: ITS equipment (cameras, wireless services, counting devices, etc.) with an individual cost of an item not to exceed $5,000

Travel: Travel: The $18,240 travel budget is for the following conferences:
1. TRB (4 attendees) - $9,690
2. AHFE - $2,850
3. GRITS (2 attendees) - $3,420
4. ITE (2 attendees) - $2,280

Other: Other: The $63,840 budget is for the following activities:
1. Deepmetrics - $5,700
2. INRIX NPMRDS data expansion - $39,900
3. SPSS - $1,140
4. Consultation - $17,100

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: To conduct research for special studies-related matters, specifically for Intelligent Transportation System (ITS) and traffic engineering related topics.

Objective(s): The objective is to provide long-term professional assistance to DOTD on the management and conduct of research for special studies-related matters, specifically for ITS and traffic engineering related topics. No specific research documents will be produced from this project. However, each study identified under this project will have its own proposal developed, complete with objectives, scope of work, deliverables, and amount/resources required to undertake the study.

Expected Benefits: It would benefit all the designers, planners, decision makers, and stakeholders specially in DOTD's ITS and traffic engineering area.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1: Re-Evaluate the Vision of LTRC's Intelligent Transportation Systems (ITS) Laboratory and Re-Align with the Transportation Needs of LTRC and DOTD to Better Serve the Public - 25% complete.
Task 2: Develop Research Protocols and Initiatives - 25% complete.
Task 3: Strategically Plan Own Project Schedules and Quantity of Resources to Participate in Research Projects - 25% complete.
Task 4: Coordinate Information - 25% complete.
Task 5: Assume Leadership Roles in Forming and Maintaining Productive Working Relationships - 25% complete.
Task 6: Build and Maintain a Strong Research Program - 25% complete

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES
Continue with Task 1: Re-Evaluate the Vision of LTRC's Intelligent Transportation Systems (ITS) Laboratory and Re-Align with the Transportation Needs of LTRC and DOTD to Better Serve the Public. Continue with Task 2: Develop Research Protocols and Initiatives Continue with Task 3: Strategically Plan Own Project Schedules and Quantity of Resources to Participate in Research Projects Continue with Task 4: Coordinate Information Continue with Task 5: Assume Leadership Roles in Forming and Maintaining Productive Working Relationships Continue with Task 6: Build and Maintain a Strong Research Program

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**LTRC Proposal for the Support of Research and Development in Transportation Planning**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:	**30000125**		Project Start Date:		7/1/2010
Research Project Number:	10-1PLAN		Completion Date	(original)	6/30/2015
Research Agency:	LTRC		Completion Date	(revised)	6/30/2024
Principal Investigator:	Ruijie "Rebecca" Bian				

BUDGET STATUS

Total Budget		
Total Cost	(original)	$358,462
	(revised)	$9,723,832
Est. Expended to Date		$8,871,349
FY 2020 - 2021 Budget		
FY Funds	(original)	$626,364
	(revised)	
Est. FY Expenditure		$341,172

Estimated 2021-2022 Budget		
Total		**$64,483**
Salaries		$53,283
Consumable Supplies & Materials		$1,240
Equipment	(non-expendable)	$3,720
Travel		$6,240
Other		

BUDGET JUSTIFICATIONS

Travel: The budget is for travel to conferences, such as the Transportation Research Board Annual meeting.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: This project provides long-term professional assistance to the Louisiana Department of Transportation and Development on transportation planning and other matters. Research is conducted on topics from LTRC's research program, technical assistance requests from DOTD, and external research solicitations.

Objective(s): This project is to satisfy research needs and requirements from DOTD. This project also encourages graduate students to participate in the LTRC research program.

Expected Benefits: The research results and technical assistance are expected to facilitate LADOTD's transportation planning activities. This project also affords LTRC the opportunity to support the enhancement of higher education.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1: Research activities. Supervised graduate students at LSU. Presented at the Transportation Research Board Annual Meeting. Helped finalize three LTRC reports.

Task 2: Project management. Managed projects 19-5SS, 21-2SS, and 21-5SS. Submitted problem statements to LTRC.

Task 4: Service. Served on RPIC-planning section for problem statement reviews. Served on Transportation Research Board Standing Committee on Disaster Response, Emergency Evacuations, and Business Continuity (AMR 20). Helped review NCHRP problem statements. Reviewed journal articles.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1: Research activities. Keep supervising students and publishing research results. Develop proposals for projects titled "Testing the Hurricane Evacuation Modeling Package" and "Human Mobility during COVID-19 and Implications for Active Transportation Planning in Louisiana".

Task 2: Project management. Keep managing projects 19-5SS, 21-2SS, and 21-5SS.

Task 4: Service. Serve on technical committees and professional societies.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	Evaluate the Impacts of Complete Street Policy in Louisiana	Project Status:	Ongoing

Funding Source:	SPR: TT-Fed/TT-Reg - 6	Budget Category:	FHWA

SIO:	DOTLT1000377	Project Start Date:		1/1/2021
Research Project Number:	21-2SS	Completion Date	(original)	12/31/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Ruijie "Rebecca" Bian			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$159,112
	(revised)	
Est. Expended to Date		$45,628
FY 2020 - 2021 Budget		
FY Funds	(original)	$39,831
	(revised)	$45,628
Est. FY Expenditure		$45,628

Estimated 2021-2022 Budget		
Total		**$90,838**
Salaries		$64,976
Consumable Supplies & Materials		$310
Equipment	(non-expendable)	
Travel		$620
Other		$24,932

BUDGET JUSTIFICATIONS

Other: Other budget is a task order to UNO. The breakout sheet is attached to the proposal.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Louisiana DOTD adopted the Complete Streets policy in 2010 and updated it in 2016. According to the updated version, "the intent of this policy is to . . . balance access, mobility, and safety needs" of all road users. State transportation agencies often struggle to meaningfully track and quantify implementation indicators, which makes it difficult to assess whether significant progress is being made toward the adopted policy goals or to evaluate return-on-investment.

Objective(s): The primary objective of this research project is to evaluate the impacts of the Complete Streets policy in Louisiana, including an assessment of changes made by DOTD to advance implementation of the policy, and a comprehensive review of impacts to project scoping, delivery, and outcomes to-date.

Expected Benefits: This research project will deliver a suite of recommendations for ongoing data collection and evaluation pertaining to the state's Complete Streets policy.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1: Conduct project scoping and delivery evaluations.
First, the research team has documented their screening criteria and summarized the list of screened projects. A preliminary summary report has been shared with the PRC members for comments. Second, the research team has started reviewing relevant documents of screened projects to assess whether the policy is being uniformly and thoroughly considered during the project scoping process.

Task 2: Review current practices.
First, the research team has started reviewing applicable policies, manuals, guidelines, and legislative reports from different divisions of DOTD to find out how the Complete Streets policy has been integrated and implemented in Louisiana. Second, the PI and co-PI attended a quarterly meeting of the Complete Streets Advisory Council. Third, the research team has started preparing the survey questions for interviewing DOTD personnel and other key stakeholders.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1: Continue conducting project scoping and delivery evaluations. The task is expected to be completed by the end of October 2021.

Task 2: Continue reviewing current practices. The task is expected to be completed by the end of October 2021.

Task 3: Prepare an interim report and present at a PRC meeting. The PRC meeting is expected to be in November or December 2021 to present major findings from Task 1 and Task 2.

Task 4: Conduct disaggregate evaluations. The task is expected to start from July 2021.

Task 5: Explore linking outputs with outcomes through statistical methods. The task is expected to start from January 2022.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	Developing The Load Distribution Formula for Louisiana Culverts	Project Status:	Ongoing

Funding Source:	SPR: TT-Fed/TT-Reg - 5	Budget Category:	FHWA

SIO:	DOTLT1000342	Project Start Date:		3/1/2020
Research Project Number:	20-1ST	Completion Date	(original)	8/31/2021
Research Agency:	LSU	Completion Date	(revised)	
Principal Investigator:	Ayman Okeil			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$99,989
	(revised)	
Est. Expended to Date		$10,000
FY 2020 - 2021 Budget		
FY Funds	(original)	$10,000
	(revised)	
Est. FY Expenditure		$10,000

Estimated 2021-2022 Budget		
Total		**$50,000**
Salaries		$50,000
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: In Louisiana, the bridge inventory includes approximately 2,600 culverts where cast-in-place (CIP) reinforced concrete (RC) box culverts constitute a sizeable portion of the overall culvert inventory which must be load rated. Current load rating procedures for these culverts often yields unacceptable results though their performance is acceptable with no apparent cracking or deformation. Unacceptable rating implies load posting or expensive upgrade.

Objective(s): The objective of this study is to develop live load distribution formulas that can be used to represent the dimensions of the affected area over buried CIP reinforced concrete box culverts The proposed formulas will take into account Louisiana standard details for negative moment reinforcement at exterior corners. The reliability resulting from these study will be compared with AASHTO LRFD target β values.

Expected Benefits: The findings of this study will help DOTD to make informed decisions about load rating and load posting of cast-in-place reinforced concrete box culverts. The newly developed formulas will take into account DOTD standard details that may not be within the scope of NCHRP Project 15-54 “Proposed Modifications to AASHTO Culvert Load Rating Specifications” and update conservative formulas from AASHTO-LRFD.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 1 Literature Search (95%)
Task 2 Review Current Analysis(80%)
Task 3 Parametric Study Plan(90%)
Task 4 Interim Report

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 5 Conduct Parametric Study
Task 6 Data Analysis
Task 7 Develop load distribution formulas

Title:	**Retrofit of Existing Statewide Louisiana Safety Walk Bridge Barrier Railing Systems**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000099**		Project Start Date:		7/1/2016
Research Project Number:	16-1ST		Completion Date	(original)	6/30/2018
Research Agency:	Texas A&M Transportation Institute (TTI)		Completion Date	(revised)	8/31/2021
Principal Investigator:	William Williams				

BUDGET STATUS

Total Budget		
Total Cost	(original)	$169,172
	(revised)	$578,912
Est. Expended to Date		$455,568
FY 2020 - 2021 Budget		
FY Funds	(original)	$288,747
	(revised)	$175,000
Est. FY Expenditure		$150,883

Estimated 2021-2022 Budget		
Total		**$99,227**
Salaries		$95,000
Consumable Supplies & Materials		$4,227
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The purpose of this research project is to design and test a new retrofit bridge rail meeting the crash performance requirements of Manual for Assessing Safety Hardware Test Level (MASH TL-3). This new design will be used throughout the state on existing safety walk barriers.

Objective(s): The purpose of this research project is to evaluate the strength and performance of the safety walk bridge barrier railing systems currently used by DOTD. The system designs will be evaluated with respect to MASH specifications. For the common barrier railing systems that do not meet the requirements, retrofit options will be engineered, designed, and detailed.

Expected Benefits: The research team will design crashworthy retrofit structural details for any bridge barrier railing system that requires modification in order to meet MASH specifications. These details will be ready for immediate implementation by the DOTD.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

The following activities are planned for 2020-2021:
Task 3 - Finalize Details for New Bridge Rail Retrofit Option 2
Task 3 - Send Final Details and Calculation to the project team for review and approval
Task 7A - Construct full-scale test installation for New DOTD Bridge Rail with safety walk with retrofit option 2.
Task 7A - Perform Full-scale crash testing on test installation.
Task 7A - Crash tests planned, MASH Test 3-11 and MASH Test 3-10.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 9 - Prepare and submit final report and technical summary

FHWA

Part B SPR Funded Research Program

PROPOSED RESEARCH

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Life-Cycle Assessment Framework for Pavements in Louisiana**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:		Project Start Date:		7/1/2021
Research Project Number:		Completion Date	(original)	6/30/2023
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Louay Mohammad			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$85,000
	(revised)	
Est. Expended to Date		
FY 2020 - 2021 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2021-2022 Budget		
Total		**$40,000**
Salaries		$40,000
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Principles of sustainability focus on goal of proactively bringing key environmental, social, and economic factors into decision-making process. Life-Cycle Assessment (LCA) is a technique used to analyze and quantify environmental impacts of a product, system, or process. LCA provides a comprehensive approach to evaluate total environmental burden of a product or process by examining all of the inputs and outputs over life cycle, from raw material production to end of life.

Objective(s): This research proposes to develop life-cycle assessment framework for asphalt mixtures and pavements in Louisiana, which will cover material production and initial construction, maintenance phase, in-service phase, and end-of-life phase.

Expected Benefits: The developed framework is expected to provide an immediately implementable guideline on the implementation of LCA for Louisiana pavements, which can help define pavement systems to support decision making regarding changes to policies and practices to reduce the impacts of pavements on humans and the environment, while identifying potential unintended negative consequences.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1: Conduct a comprehensive literature review on studies relevant to life-cycle assessment for pavements.
Task 2: Develop product category rule (PCA) for environmental production declaration used for asphalt mixtures.
Task 3. Develop a framework for performing an LCA specific to pavement systems along with guidance on the overall approach, methodology and system boundaries.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Effect of Longitudinal Joint Construction and Density on Asphalt Pavement Performances**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**		**Budget Category:**		**FHWA**
SIO:			Project Start Date:		10/4/2021
Research Project Number:			Completion Date	(original)	5/20/2022
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:					

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$60,000	**Total**		**$60,000**
	(revised)				
Est. Expended to Date			Salaries		$60,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Current DOTD specifications on asphalt longitudinal joint construction includes deviation in grade at joints, offsetting joints vertically between lift, and offsetting top layer joints for two-lane highways and lane lines for multi-lane highways. However, none of these joint construction requirements are intended to address the performance requirement related to the joint density.

Objective(s): The objective is to research the state of practice of the effect of longitudinal joint construction and density on the performance of asphalt pavement, and to identify two to three joint construction methods and compaction techniques. Upon completion these joints may be constructed using the techniques identified in the literature review and a density requirement for longitudinal joints may be considered for the DOTD specifications.

Expected Benefits: It is expected that the findings of this research will result in the modification of Louisiana Standard Specifications for Roads and Bridges to include asphalt longitudinal joint density specifications with payment adjustment schedules. It is also expected that the results of this research will lead to the improved pavement performance and extended pavement service life.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

This project will begin and end in Fiscal Year 2021-2022. Activities include:
-Request for Proposals (RFP)
-Literature Review
-Completion of a draft report & final report

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Enhanced Interaction between Crumb Rubber Modifiers and Asphalt Binder to Improve Performance**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**		**Budget Category:**		**FHWA**
SIO:			Project Start Date:		7/1/2021
Research Project Number:			Completion Date	(original)	6/30/2023
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Louay Mohammad				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$85,000	**Total**		**$40,000**
	(revised)				
Est. Expended to Date			Salaries		$40,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Addition of crumb rubber (CR) particles to asphalt binders and asphalt mixtures is a sustainable construction technology that ensures waste tires are disposed of in an environmentally sustainable manner. Crumb rubber modifiers have been found to improve durability of asphalt pavements through increased rutting and cracking performance.

Objective(s): Objectives of this study are to identify thermally stable aromatic oils (AOs) for enhancement of interaction between CR particles and asphalt binder during CR modification of asphalt binders; (2) evaluate effects of CR type (ambient, cryogenic, proprietaries) and dosage rate on asphalt binder and mixture performance, and (3) evaluate effects of AO type and dosage rate on asphalt binder and mixture performance.

Expected Benefits: Findings from this research will offer incorporation of high contents of CR particles into asphalt binders and asphalt mixtures. This will reduce cost of highway construction and the adoption of sustainable construction practices to protect the environment.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1: Conduct Literature Review
Task 2: Develop a Statistically Based Laboratory Experiment
- Subtask 2.1: Chemical Characterization of CR Particles and Aromatic Oils
- Subtask 2.2: Asphalt binder Experiment (Base Asphalt binder + soaked [CR + AO])
  - Chemical, rheological, microstructural characterization
- Subtask 2.3: Asphalt Mixture Experiment
  - Characterization at high-, intermediate-, and Low-temperatures
  - Moisture susceptibility evaluation

Task 3. Perform Laboratory Experiment of Task 2

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Enhancement of Mechanical Properties of Asphalt Cements and Asphalt Mixtures Containing Waste Plastic**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**			**Budget Category:**	**FHWA**
SIO:			Project Start Date:		7/1/2021
Research Project Number:			Completion Date	(original)	6/30/2023
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Louay Mohammad				

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**		
Total Cost	(original)	$349,000		**Total**		**$102,000**
	(revised)					
Est. Expended to Date				Salaries		$102,000
FY 2020 - 2021 Budget				Consumable Supplies & Materials		
FY Funds	(original)			Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure				Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: There is a growing interest in adoption of more sustainable technologies for road pavement design and construction in order to protect the environment and to provide other economic benefits. In 2017, US EPA reported that approximately 35.5M tons of waste plastic was generated, which represents over 100% increase in waste plastic generation in 27 years. Despite benefits obtained from waste plastics, there are many challenges associated with their use in asphalt pavements.

Objective(s): The objectives of the research are to (1) evaluate low-, intermediate- and high temperature properties of waste plastics in asphalt cements and asphalt mixtures; and (2) assess economic and environmental impacts, health and safety, and long-term durability associated with use of waste plastics materials in asphalt mixtures.

Expected Benefits: It is anticipated that results from this research will recommend revisions to Louisiana's asphalt specifications for incorporating waste plastics in asphalt cements and mixtures. Further, results will promote the use of sustainable technologies in Louisiana's flexible pavement construction.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1. Conduct Literature Review and Survey
Task 2- Develop Statistically Based Laboratory Experiment
Task 3- Develop Compatibilizers and Waste Plastic Experiment
Task 4- Perform Asphalt Cement Experiment

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Enhancing Pavement Resiliency to Sea Level Rise Using Natural and Nature-Based Features in Louisiana**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**		**Budget Category:**		**FHWA**
SIO:			Project Start Date:		7/1/2021
Research Project Number:			Completion Date	(original)	6/30/2023
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Louay Mohammad				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$85,000	**Total**		**$40,000**
	(revised)				
Est. Expended to Date			Salaries		$40,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Climate change and sea level rise (SLR) are significantly increasing risk of severe high tide flooding in many coastal and adjacent inland areas and exacerbating flood risk associated with hurricanes and coastal storms. Surface transportation systems in coastal areas, including roadway corridors, are becoming increasingly vulnerable to flooding, inundation and erosion. Inundation weakens pavement structure with varying degrees of structural deterioration that reduces pavements' service life.

Objective(s): The objective of this study is to evaluate the effectiveness of nature-based hybrid structures including dikes, wetlands and dunes incorporated with natural materials that are native to the area, with or without sheet piles, for reducing the impact of SLR and extreme events on roadways.

Expected Benefits: The developed practice is expected to provide an immediately implementable guideline on the design and construction of roads with the evaluated Natural and Nature-Based Features for achieving coastal roadways with enhanced resilience.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1: Conduct a comprehensive literature review on studies relevant to roadway damage caused by flooding events, and application of NNBF for improving the resilience of coastal roadways.
Task 2: Evaluate the effectiveness of nature-based hybrid structures such as dikes, wetlands and dunes incorporated with natural materials that are native to the area, with or without sheet piles.
Task 3: Quantify the frequency, magnitude and duration of inundation events with/without NNBF utilizing existing storm surge and wind wave models with flexible meshes.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Establishment of the Center for Sustainable Pavement Materials and Technologies**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**	**Budget Category:**	**FHWA**

SIO:		Project Start Date:		7/1/2021
Research Project Number:		Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Louay Mohammad			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$155,131
	(revised)	
Est. Expended to Date		
FY 2020 - 2021 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2021-2022 Budget		
Total		**$155,131**
Salaries		$140,132
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		$4,999
Other		$10,000

BUDGET JUSTIFICATIONS

Other: This cost will cover subscription and purchase of several softwares (Statistical, Rheological, Sustainability tools, etc.) with an individuals cost of each item not to exceed $5,000.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Climate change, and escalating costs of materials and energy provide motivation to explore innovative techniques for infrastructure preservation and rehabilitation with sustainable, resilient, and recyclable methods. Using recycled materials and sustainable alternatives methodologies can reduce energy consumption and greenhouse gas emission. Incorporating sustainable materials and technologies into transportation infrastructure will have a significant impact on longevity of our society.

Objective(s): The vision is to establish a multi-disciplinary research, education, and technology transfer center focused on evaluation and implementation of sustainable technologies in transportation industry. Interdisciplinary research will examine design, assessment, and repair for next generation of sustainable and resilience pavement infrastructure. Goals are to minimize non-renewable energy usage, reduce environmental impacts, and encourage use of emerging technologies including renewable energies.

Expected Benefits: To pursue the needs of DOTD to integrate cutting-edge cost-effective technologies and materials in current practices; place Louisiana on the leading edge of states in the area of transportation sustainability, resiliency, and provides LTRC with an excellent position to pursue its quest for national and international recognition in research capability of all aspects of sustainable, resilient, and recyclable pavement materials.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Establishment of the Center for Sustainable Pavement Materials and Technologies
Develop and submit proposals for external funding;
Continue participation in the Louisiana DOTD Asphaltic Concrete Specification Committee;
Continue participation in technical assistance projects;
Conduct research relevant to the Center theme and DOTD needs,
Develop and Promote effective Sustainable Pavement Technologies for managing and preserving the infrastructure, and
Conduct workshops and seminars.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Evaluation of the Use of Fly-Ash as a Mineral Filler in Asphalt Concrete**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**		**Budget Category:**		**FHWA**
SIO:			Project Start Date:		7/15/2021
Research Project Number:			Completion Date	(original)	6/30/2023
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Corey Mayeux				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$180,000	**Total**		**$85,000**
	(revised)				
Est. Expended to Date			Salaries		$85,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Fly ash, and other pozzolanic materials, may provide enhanced bond strength, anti-stripping potential, moisture resistance and reduced optimum binder content of asphalt concrete mixtures. Additional use of this by product will provide for less waste storage requirements. The hydrophobic properties of fly ash may also be beneficial in the presence of standing water (flooded roadways) during heavy rainfall events and storm surge.

Objective(s): The objective of the proposed research is to evaluate the effects of fly ash in the laboratory by conducting a binder and asphalt mixture studies. The effects of fly ash on the rheological and chemical properties of the binder will be investigated. Based on the results of the binder study, a mixture study will be conducted to assess the effects of fly ash on the mixture rutting, cracking, and moisture damage resistance.

Expected Benefits: If the results of the study are positive, DOTD may have a solution to several factors that cause distress to asphalt concrete pavements. Increased resistance to moisture and increased structural capacity are the two most expected benefits of the use of Fly Ash as a mineral filler.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1: Proposal Development
Task 2: Comprehensive Literature Review
Task 3: Develop experimental factorial
Task 4: Begin laboratory evaluation and data collection
Task 5: Begin preliminary data analysis.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Performance of Asphalt Pavements Containing Recycled Materials Under Accelerated Loading**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**		**Budget Category:**		**FHWA**
SIO:			Project Start Date:		7/1/2021
Research Project Number:			Completion Date	(original)	6/30/2023
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Louay Mohammad				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$350,000	**Total**		**$77,000**
	(revised)				
Est. Expended to Date			Salaries		$77,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Recycling of construction materials in flexible pavements is cost effective offers key element of sustainability in transportation infrastructure through reduction in use of virgin materials and eliminates needs for landfill areas. Reclaimed Asphalt Pavement (RAP) is commonly used because of its high compatibility with newly produced asphalt mixtures. Further, Reclaimed Asphalt Shingles (RAS) and waste plastics have become another promising candidate green construction materials.

Objective(s): The objective of this research is to assess the applicability of “green” construction and performance alternatives such as RAS, increased amount of RAP, and waste plastics in Louisiana asphalt paving projects under accelerated loading.

Expected Benefits: Findings from this research results will be used to update asphalt mixture specifications in the Louisiana Specifications for Roads and Bridges. Further, results will promote the use of sustainable technologies in Louisiana’s flexible pavement construction.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1 – Conduct Literature review
Task 2 – Develop experimental factorial,
Task 3 – Perform laboratory asphalt mixture design and performance testing for mixtures to be used in Task 4
Task 4 – Prepare construction documents for construction of test lanes
Task 5 – Monitor construction of test lanes as per bid documents

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Influence of Aggregate Gradation on Permeability**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**			**Budget Category:**	**FHWA**
SIO:			Project Start Date:		7/1/2021
Research Project Number:			Completion Date	(original)	6/30/2022
Research Agency:			Completion Date	(revised)	
Principal Investigator:	Jose Milla				

Total Cost	(original)	$114,400	**Total**		**$105,075**
	(revised)				
Est. Expended to Date			Salaries		$100,075
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	$5,000
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Equipment: The proposed equipment is a water permeability tester. This device will be extremely useful to characterize concrete mixtures for durability and will prove to be beneficial for a variety of projects that focus on durability

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Concrete durability has become increasingly important as state highway agencies seek to increase concrete's service life. However, the aggregate gradation has often been overlooked in this endeavor. While most concrete producers tend to use the grading limits specified in ASTM C33 for aggregates, those grading limits are too broad to guarantee optimum packing density. As such, there is a need to optimize aggregate gradations for concrete mixtures to maximize durability.

Objective(s): The objective of this study is to measure the influence of aggregate gradation on concrete's permeability and to optimize concrete mixture designs that meet strength, permeability, and workability criteria for construction using local materials.

Expected Benefits: This research study aims to measure the influence of aggregate gradation on concrete's workability, strength, and durability properties, and optimize gradations to deliver the best possible performance. This research will offer guidance on achieving high-quality concrete mixtures that achieve the best results with the lowest cement paste possible.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1: Literature review
Task 2: Survey aggregate gradations from DOTD approved concrete mixture designs
Task 3: Sample preparation
Task 4: Comparative testing
Task 5: Analysis
Task 5: Final Report and Technical Summary

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Influence of Internal Curing on Concrete's Permeability in Simulated Field Conditions**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**		**Budget Category:**		**FHWA**
SIO:			Project Start Date:		7/1/2021
Research Project Number:			Completion Date	(original)	6/30/2022
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Jose Milla				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$97,000	**Total**		**$53,619**
	(revised)				
Est. Expended to Date			Salaries		$53,619
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The implementation of internally cured concrete (ICC) has coincided with a push for performance-based specifications on concrete's transport properties, which prompted research to understand the impact of ICC on surface resistivity (AASHTO T 358). While LTRC has recently conducted a study examining the impact of pre-wetted lightweight aggregates on resistivity, the curing conditions established in AASHTO T 358 obscures the impact of internal curing and makes it difficult to assess its benefits.

Objective(s): The objective of this study is to assess the influence of internal curing on concrete's transport properties in more realistic curing conditions, and to validate the results from surface resistivity with bulk diffusion testing.

Expected Benefits: This research will provide a better assessment for ICC in more realistic field conditions. In addition, the inclusion of a bulk diffusion test will be beneficial to verify the results obtained from surface resistivity, thereby providing additional characterization of concrete's transport properties.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1: Literature Review
Task 2: Sample Preparation
Task 3: Comparative Testing
Task 4: Analysis
Task 5: Final Report and Technical Summary

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Develop a Synthesis on the Application Of PCPT Technology for Geotechnical Engineering Design**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:		Project Start Date:		10/2/2021
Research Project Number:		Completion Date	(original)	
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Murad Abu-Farsakh			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$50,000
	(revised)	
Est. Expended to Date		
FY 2020 - 2021 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2021-2022 Budget		
Total		**$24,000**
Salaries		$24,000
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Although the LA DOTD engineers have been using the cone penetration tests (Cone Penetration Test (CPT)) for many years, their use was limited to soil stratification to locate sand layer to tip the piles on, evaluate undrained shear strength, and estimating the pile capacity. The Cone Penetration Test (CPT) have the potential to be extended to more geotechnical engineering applications in Louisiana (i.e., slope stability, embankment settlement, bearing capacity), which requires accurate evaluation of critical geotechnical design parameters.

Objective(s): The objective of this project is to synthesize various applications of Cone Penetration Test (CPT) technology for geotechnical engineering analysis and design. This includes available methods/charts for evaluating soil classification; available correlations for estimating geotechnical design parameters for clay and sand; method for estimating total and rate of consolidation; methods for evaluating bearing capacity of shallow foundations; direct Cone Penetration Test (CPT) methods for estimating the ultimate pile capacity; etc.

Expected Benefits: It is anticipated that at end of this study, the Louisiana DOTD will extend the use of Cone Penetration Test (CPT) to more geotechnical applications, which will result in significant benefits in terms of reducing time, number of borings, and man labor, and hence reduce the cost of project. The Cone Penetration Test (CPT) can provide fast and more accurate estimation of soil

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1: Start conducting comprehensive literature review on the use of cone and piezocne penetration tests (Cone Penetration Test (CPT) and PCPT) technologies on various geotechnical engineering applications such as: evaluating the strength and consolidation properties of soils, evaluating pile resistance, evaluating embankment settlement, etc.

Task 2: Start evalyuating and synthesising the variorious applications of Cone Penetration Test (CPT)/PCPT.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Use and Interpretation of Seismic Piezocone Penetration Testing (SCPTu) for Geotechnical Site Investigation**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:			Project Start Date:		1/1/2021
Research Project Number:			Completion Date	(original)	12/31/2020
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Murad Abu-Farsakh				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$200,000	**Total**		**$40,000**
	(revised)				
Est. Expended to Date			Salaries		$40,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The piezocone penetration test (CPTu) is a preferred in-situ test for subsurface investigation. The addition of geophone to CPTu (SCPTu) will enhance the geotechnical investigation by providing four independent measurements: tip resistance, sleeve friction, porewater pressure, and shear wave velocity (Vs). The Vs can be used to evaluate small-strain shear modulus (Go), which is appropriate to analyses of foundation systems, retaining walls, and problems involving cyclic and seismic loadings.

Objective(s): The objective of this study are: identifying available methods to evaluate small-strain shear modulus (Go) and damping coefficient (C) from SCPTu; conducting SCPTu tests on selected sites; modify/develop models to evaluate Go and C for Louisiana soils; apply Go and C values to evaluate pile capacity using Pile Driving Analysis (PDA) and CAPWAP cases; develop load-deformation curves for selected test piles for comparison with measured data; and develop model to evaluate undrained shear strength (Su) from SCPTu data.

Expected Benefits: The proposed research project will help the LA DOTD to better evaluate the initial shear modulus (Go) and damping coefficient of subsurface soils for various design applications, such as the dynamic analysis of driven piles and the establishment of load deformation curves of piles. This is expected to result in cost effective and safer axial and lateral capacity design of piles.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

- Conduct comprehensive literature review on the use of Seismic Piezocone Penetration Testing (SCPTu) for geotechnical engineering applications such as evaluating the static and dynamic soil properties, evaluate small-strain shear modulus (Go) and damping coefficient (C), evaluate the undrained shear strength, Su, establish pile load-deformation curve, etc.

- Start collecting in-situ test data for selected sites using SCPTu,

- Start collecting soil samples for laboratory testing to evaluate the Go and C from samples retrieved from soil borings of same sites.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**LIDAR for Geotechnical Applications**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**		**Budget Category:**		**FHWA**
SIO:			Project Start Date:		3/1/2022
Research Project Number:			Completion Date	(original)	2/28/2024
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Gavin Gautreau				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$150,000	**Total**		**$10,000**
	(revised)				
Est. Expended to Date			Salaries		$10,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Light detection and radar (LIDAR) is a method for measuring distances. The data can be collected from drones and fixed wing airplanes. DOTD has begun collecting LIDAR on state highways. LIDAR data can be utilized for many purposes; the primary reasons are likely not geotechnical related. However, the data can be utilized for inventory purposes (Geotechnical Asset Management) and change detection of embankment slopes (inspections and problem identification).

Objective(s): Explore the utilization of LIDAR within DOTD and develop interfaces to tap into this data for geotechnical purposes. Recurring datasets of the same location could be compared to determine changing slopes. These large datasets may require Machine Learning or special software to open this data to the geotechnical section. Small scale drone-based LIDAR scans could be collected to supplement and define with more precision, problematic slopes that may be difficult, or hazardous, to access.

Expected Benefits: The proposed research would utilize an existing dataset within DOTD and provide a user interface for the Geotechnical Section to utilize this data for management of slopes and other geotechnical assets. More accurate location of soil boring elevations (from the office) would also be a benefit.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

The project is Proposed

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

The project is Proposed

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Drainage Condition**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**			**Budget Category:**	**FHWA**
SIO:			Project Start Date:		4/1/2022
Research Project Number:			Completion Date	(original)	6/30/2023
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Qiming Chen				

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**		
Total Cost	(original)	$65,000		**Total**		**$17,000**
	(revised)					
Est. Expended to Date				Salaries		$17,000
FY 2020 - 2021 Budget				Consumable Supplies & Materials		
FY Funds	(original)			Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure				Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: In most research, it is suggested that poor drainage is a cause of higher deterioration in a roadway performance but we don't have drainage condition data to compare with deterioration of a pavement to clarify or use in any of our research modeling.

Objective(s): The main objectives of this research are to investigate different methods for collecting drainage condition data on a statewide scale and to evaluate different drainage condition options and state the advantages and disadvantages of each.

Expected Benefits: It is expected that this data will be used by pavement management, highway needs, maintenance, and research in making better decisions, managing the selection of projects and cost-effective use of highway funds as well as helping make better deterioration models for pavement management.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Conduct a literature search to document the rating system used within highway needs for drainage condition data in the past and maintenance sections proposed level of service (LOS) for drainage, and any other drainage condition system within LA state or local government, and any other rating system in the US.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Performance Serviceability Rating and Maintenance Cost Assignment for Ramps, Acceleration and Deceleration Lanes in Louisiana**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:			Project Start Date:		1/1/2022
Research Project Number:			Completion Date	(original)	12/31/2022
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Qiming Chen				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$50,000	**Total**		**$35,000**
	(revised)				
Est. Expended to Date			Salaries		$35,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Currently, the Louisiana DOTD uses the average PSR value of the main lane to classify the ramps, deceleration and acceleration lanes. Since these sections of highway systems are frequently subjected to slow moving traffic, they may be subjected to distress rates at orders of magnitude greater than the main routes. Therefore, there is the need to develop a means for effectively rating these pavement sections for prompt maintenance and rehabilitation by various road agencies in Louisiana.

Objective(s): The main objective of the proposed study is to develop a guideline to effectively evaluate the International Roughness Index (International Roughness Index (IRI)) and PSR values of ramps, acceleration and deceleration lanes. The specific objective is to assign maintenance trigger and treatment cost values to these ramps at the network level for prompt and cost-effective maintenance.

Expected Benefits: It is anticipated that a guideline will be developed for the accurate determination of PSR and performance indices, and the assignment of maintenance costs to ramps, acceleration and deceleration lanes. This will assist engineers at the DOTD to select cost-effective treatment methods for the prompt performance of maintenance activities on Louisiana roads. In addition, accurate determination of the PSR will improve the DOTD reporting system of NHS roads to the FHWA.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Conduct a literature search to review the state of practice on performance serviceability rating for Ramps, Acceleration and Deceleration Lanes.

Title:	**Evaluation of Louisiana Maintenance and Rehabilitation Treatment Decision Matrix for Cost-effective and Timely Pavement Preservation**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**			**Budget Category:**	**FHWA**
SIO:			Project Start Date:		1/1/2022
Research Project Number:			Completion Date	(original)	12/31/2023
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Zhong Wu				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$200,000	**Total**		**$55,000**
	(revised)				
Est. Expended to Date			Salaries		$55,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Louisiana DOTD currently uses pavement condition index based decision matrix in its maintenance and rehabilitation treatment selection. However, some of the trigger index values adapted in the decision matrix table were developed from few projects with few years and log-miles of distress data. To ensure the optimum timing and cost-effective selection of various maintenance and rehabilitation treatments, there is a need to review, modify, and update the current decision matrix table adapted.

Objective(s): The objective of this study is two folds: Analyze PMS data and assess the optimum timing/cost-effectiveness for a number of treatment methods including thin overlays, microsurfacing, crack sealants, and in-depth stabilization; Provide modification recommendations to the PMS decision matrix in order to ensure optimum timing and cost-effectiveness selection of treatment methods.

Expected Benefits: The study will provide the DOTD Pavement preservation and PMS office updated triggers and performance models for cost-effective and timely maintenance and rehabilitation of pavements. Results of the study will immediately be implementable by pavement preservation and PMS office.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

- Literature review including the state-of-the-practice of LA DOTD districts as related to thin overlays, in-depth stabilization, microsurfacing, and crack sealant;
- Project selection, data gathering/mining the pavement sections, historical records regarding the types and costs of maintenance and rehabilitation activities;
- Analyze the before and after treatment performance of selected pavement sections.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Right-sizing Truck registration and Overweight Permit Fees**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**		**Budget Category:**		**FHWA**
SIO:			Project Start Date:		7/1/2021
Research Project Number:			Completion Date	(original)	12/31/2021
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Zhong Wu				

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**		
Total Cost	(original)	$180,000		**Total**		**$74,500**
	(revised)					
Est. Expended to Date				Salaries		$74,500
FY 2020 - 2021 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$56,000		Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure				Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Truck registration and overweight permit fees may not accurately reflect the user impacts of damage on highway infrastructures including roadway pavements and bridges. Considering DOTD is responsible for more than 16,000 miles of roadways including over 12,000 bridges, DOTD is interested in finding out if the collected revenue from the overweight permits and truck registration fees actually recoups the cost of the damage incurred on those roadways and bridges used by these very heavy trucks.

Objective(s): The objectives of this study are: Determine the appropriate annual registration fees for trucks, including agriculture and timber haulers, based on the impacts on road and bridge infrastructure; Determine the appropriate single trip and harvest season overweight permit fees based on the impacts on road and bridge infrastructure; and Identify tax credits that the legislature could offer industry to offset the increased registration fees/overweight permit fees.

Expected Benefits: It is anticipated that results will be presented for potential legislative action to adjust truck registration and overweight truck permit fees potentially to be offset by tax credits or after appropriate mechanisms

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1: Continue literature review
Task 2: Continue project selection and permit data collection
Task 3: Evaluation and modeling the effects of overweight trucks on Louisiana pavements
Task 4: Evaluation and modeling the effects of overweight trucks on Louisiana bridges

Title:	A mixed methodology study of driving behavior in Louisiana	Project Status:	Proposed

Funding Source:	SPR: TT-Fed/TT-Reg - 5	Budget Category:	FHWA

SIO:	DOTLT1000388	Project Start Date:		10/1/2021
Research Project Number:	21-1SA	Completion Date	(original)	9/30/2022
Research Agency:		Completion Date	(revised)	
Principal Investigator:				

BUDGET STATUS

Total Budget			Estimated 2021-2022 Budget		
Total Cost	(original)	$175,000	**Total**		**$94,234**
	(revised)				
Est. Expended to Date			Salaries		$62,651
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$75,000	Equipment	(non-expendable)	
	(revised)	$13,267	Travel		
Est. FY Expenditure		$13,267	Other		$31,583

BUDGET JUSTIFICATIONS

Other: The $31,583 is for the following activities:
Consultant - $11,300
Qualtrics Survey - $20,283

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: For Louisiana to reach the goal of a 50% reduction in highway fatalities by the year 2030, individual behavior must change. Having a more complete understanding of behavior at multiple levels can generate useful and relevant insights into driving behavior and the traffic safety culture, which can inform future strategies and messaging and communication efforts. Beyond individual differences, as noted previously, we will seek to gain an understanding of traffic safety culture within Louisiana

Objective(s): The objective of this research is to use a mixed approach that combines quantitative survey methodology with qualitative methods (such as focus groups, case studies, participant observation, etc.) to get top-down and bottom-up insight into driving behavior, perceptions, attitudes, and beliefs about traffic safety. Additionally, this research will assess the state of knowledge/awareness about specific issues such as distracted driving and aggressive driving.

Expected Benefits: The results of this study may be used by DOTD, Louisiana Highway Safety Commission, Louisiana State Police, and other SHSP stakeholders to inform strategies and program development. Additionally, the results can be used for more effective media outreach, improving policies/programs/laws, and more effective enforcement of legislations. It is expected that findings from the study would benefit the broader transportation community in addressing matters related to human behavior.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

The project review committee (PRC) met to develop the scope of work for this project. A research proposal was developed and approved by the PRC.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1- Literature review
Task 2- Secondary data identification
Task 3 - Secondary data collection
Task 4 - Interim report
Task 5 - Survey design
Task 6 - Data collection for survey

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	Minimum Intersection Illumination	Project Status:	Proposed

Funding Source:	SPR: TT-Fed/TT-Reg - 5	Budget Category:	FHWA

SIO:	DOTLT1000373	Project Start Date:		5/1/2021
Research Project Number:	20-3SA	Completion Date	(original)	10/31/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Hany Hassan			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$99,623
	(revised)	
Est. Expended to Date		
FY 2020 - 2021 Budget		
FY Funds	(original)	$69,062
	(revised)	$34,150
Est. FY Expenditure		$8,000

Estimated 2021-2022 Budget		
Total		**$65,473**
Salaries		$65,473
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: During the past decade, Louisiana has recorded 2,275 crashes at nighttime with some of them attributed to unlit roadway conditions. According to the current road design manual of Louisiana, lighting is not mandatory for intersections. The cost of lighting equipment, along with the cost of construction and maintenance may prove to be a very expensive solution. To reduce prohibitive costs, some states adopted “partial” lighting policies at intersections where they light only dark spots.

Objective(s): The primary objective of this project is to examine whether Louisiana has a traffic safety problem due to lack of lighting at its intersections, particularly at roundabouts and stop-controlled intersections, at rural and suburban areas.

Expected Benefits: The study will improve understanding of the relationship between intersection illumination and traffic safety. Findings from the crash data analysis, survey, driving simulator experiment and cost-benefit analysis will provide valuable insights regarding the benefits of providing partial versus full lighting at intersections. Also, the results will provide a better understanding of how such installations can be maintained considering a state’s limited budget.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

The project review committee (PRC)had two meetings to discuss the scope of work for this project. A research proposal was developed and approved by the project review committee (PRC).

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1. Perform literature review.
Task 2. Document state of the practice through surveys.
Task 3. Undertake crash analysis/additional feature analysis.
Task 4. Design and undertake a driving simulator experiment.
Task 5. Conduct cost-benefit analysis.

Title:	**Evaluation of Installed Low-Cost Safety Countermeasures for Reducing Severe Intersection Crash Types in Louisiana**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000344**		Project Start Date:		11/1/2021
Research Project Number:	20-2SA		Completion Date	(original)	1/31/2023
Research Agency:			Completion Date	(revised)	
Principal Investigator:					

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$175,000	**Total**		**$75,000**
	(revised)				
Est. Expended to Date			Salaries		$75,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$75,000	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: In recent years, DOTD has made significant progress in deploying various safety countermeasures at intersections across the state, however, despite these many safety countermeasures, intersection and intersection-related crashes sill make up 21% of all fatal crashes and almost 40 % of all severe injury crashes. Therefore, there is a need to continue to implement cost effective countermeasures to reduce and prevent intersection vehicle crashes.

Objective(s): The objectives of this proposed research are to conduct a comprehensive crash data analysis to identify the risk factors that contribute to crashes at intersections and to investigate safety effectiveness of related countermeasures installed at intersections to reduce severe intersection crash types in Louisiana.

Expected Benefits: The results can be used by DOTD in implementing cost effective countermeasures, making better and more informed decisions, and justifying highway safety investments to improve highway safety in Louisiana. The results will benefit the Louisiana Strategic Highway Safety Plan (SHSP) Infrastructure and Operations Emphasis Area Team' efforts to reach the goal of reducing the roadway departure, intersection, and non-motorized user fatalities and severe injuries by 50% by 2030.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

The project review committee (PRC) met to develop the scope of work for a request for proposals. A draft request for proposals was developed and approved by PRC.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

The task activities will be determined based on the approved research proposal.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Evaluation of Louisiana's Systemic Safety Projects for Roadway Departures on Rural Curves**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**			**Budget Category:**	**FHWA**
SIO:			Project Start Date:		9/1/2021
Research Project Number:			Completion Date	(original)	8/31/2023
Research Agency:			Completion Date	(revised)	
Principal Investigator:					

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**		
Total Cost	(original)	$190,000		**Total**		**$90,000**
	(revised)					
Est. Expended to Date				Salaries		$90,000
FY 2020 - 2021 Budget				Consumable Supplies & Materials		
FY Funds	(original)			Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure				Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Louisiana DOTD applied a systemic safety approach to reduce roadway departure target crashes. The two-lane rural curves throughout the state were systemically selected for safety improvements through crash data analysis and risk factors identification using roadway characteristics. In order to understand if the systemic safety approach is effective we need to evaluate the effectiveness of installed low-cost countermeasures in decreasing target crashes.

Objective(s): The purpose of this study is to evaluate the effectiveness of systemic low-cost safety countermeasures implemented on two-lane rural curves in reducing roadway departures crashes. Specifically, the research will identify all systemic safety projects on two-lane rural curves, perform before and after crash data analysis, perform economic appraisal, review the methodology used for systemic analysis, and provide recommendations for future implementation of systemic focused safety projects.

Expected Benefits: The findings of this study can benefit DOTD with future safety decision making to implement low-cost effective countermeasures on two-lane rural curves and in assessing the data needs to perform more systemic analyses. The results can be used to justify highway safety investments through systemic safety projects to improve safety in Louisiana.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

The activities will be determined based on the approved research proposal.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Safety Effectiveness of Cable Median Barriers in Louisiana**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**			**Budget Category:**	**FHWA**
SIO:			Project Start Date:		8/2/2021
Research Project Number:			Completion Date	(original)	12/31/2022
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Elisabeta Mitran				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$175,000	**Total**		**$90,000**
	(revised)				
Est. Expended to Date			Salaries		$90,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: DOTD has been installing cable median barriers to prevent cross-median crashes and installed approximately 355 miles of cable barriers throughout the state as of May 2019. By the end of 2022, DOTD plans to install cable barriers along all interstate highways. Although cable barrier is a proven safety countermeasure, research is needed to evaluate and quantify the safety benefit of cable barriers in Louisiana to assess how well these countermeasures have met their expected purpose.

Objective(s): The goal of this project is to conduct a comprehensive safety evaluation of cable median barriers installed on Louisiana highways. The research will identify study sites, perform crash data analysis, conduct analysis of median collisions before and after the installation of cable barriers, develop crash modification factors, and conduct cost-benefit analysis for all investigated safety cable barriers.

Expected Benefits: The results of this research will provide DOTD with necessary information to evaluate whether cable barriers are successful safety treatments in Louisiana and to guide future applications. The cost-benefits analysis of these crash countermeasures can help LA DOTD to make better and more informed decisions and justify highway safety investments essential for the Louisiana Highway Safety Improvement Program.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

To be determined based on the approved research proposal.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Development of Statewide Guidelines for Provision of Pedestrian Facilities on High Speed Arterials in Louisiana**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**		**Budget Category:**		**FHWA**
SIO:			Project Start Date:		12/1/2021
Research Project Number:			Completion Date	(original)	5/31/2023
Research Agency:			Completion Date	(revised)	
Principal Investigator:					

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$180,000	**Total**		**$180,000**
	(revised)				
Est. Expended to Date			Salaries		$180,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The Louisiana Department of Transportation and Development (DOTD) has expressed the need to have a system-wide solution that guides on provision of adequate pedestrian crossing facilities on the state's high speed arterials.

Objective(s): Build on previous study LTRC#18-5SA to develop a statewide guideline for provisions of pedestrian facilities on Louisiana's high-speed arterials. This may involve evaluating specific countermeasures on select roadways.

Expected Benefits: It is anticipated that this will lead to the development of a DOTD policy for implementing or excluding pedestrian crossing facilities on high speed urban arterials. With FHWA documenting that over 50% of all pedestrian fatalities and injuries occur on high-speed arterials, this guideline could have significant benefits in reducing pedestrian safety risks.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1: Conduct literature review and develop plan of action from LTRC 18-5SA report

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	Best Practices for Maintenance of Control of Access Fencing	Project Status:	Proposed

Funding Source:	SPR: TT-Fed/TT-Reg - 5	Budget Category:	FHWA

SIO:		Project Start Date:		10/1/2021
Research Project Number:		Completion Date	(original)	12/31/2022
Research Agency:		Completion Date	(revised)	
Principal Investigator:				

BUDGET STATUS

Total Budget			Estimated 2021-2022 Budget		
Total Cost	(original)	$125,000	**Total**		**$80,000**
	(revised)				
Est. Expended to Date			Salaries		$80,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Control of access fencing has been an ongoing maintenance issue for the department. This is especially true in High ADT urban areas where run off the road crashes into the fencing are common. It is common to have local governments request to replace the typical “ugly” fencing with ornamental fencing, or to remove it totally. There has been ongoing issues statewide where Districts are required to maintain or replace old fencing along the interstate system with limited or no budget to do so.

Objective(s): Research should be conducted to determine appropriate height requirements, and alternative practical and affordable alternatives that would require less maintenance that still deter pedestrian crossing (60” tall fencing). Are we as a state DOT required to provide control of access fencing or just to ensure control of access? Researchers would need to look into DOTD policies and national guidance at a minimum.

Expected Benefits: Implementation benefits include cost savings in terms of dollars and person power for maintenance of control of access fencing that is routinely hit and damaged.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

The task activities will be determined based on the approved research proposal.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Economic Impact of Access Management Treatments**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:			Project Start Date:		9/1/2021
Research Project Number:			Completion Date	(original)	2/28/2023
Research Agency:			Completion Date	(revised)	
Principal Investigator:					

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$200,000	**Total**		**$100,000**
	(revised)				
Est. Expended to Date			Salaries		$100,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Access management strategies are used by transportation agencies to improve efficiency and safety on roadways. These treatments concentrate on location, spacing, entrances design, intersections, traffic signals, and median openings to minimize the conflict points. We need to assess the economic effect these projects to understand the impact on the economic development of region, to foster better communications at DOTD public meetings, and to convey the impact to adjacent businesses owners.

Objective(s): The purpose of this study is to determine the impact of access management treatments in Louisiana on the economic activities of businesses in the surrounding areas. The research will be designed to document findings from other states, select representative projects for the study, conduct survey with the businesses operating in the immediate vicinity as well as with patrons of these businesses, and analyze sales taxes for selected businesses before and after the completion of projects.

Expected Benefits: DOTD and other stakeholders can use the findings for more effective deployment of access management treatments in Louisiana to improve traffic flow and safety. The study will also provide support for improved communication at DOTD public meetings about implications of access management projects.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

The task activities will be determined based on the approved research proposal.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Estimating HCM Default Parameters for Louisiana**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:		Project Start Date:		1/1/2022
Research Project Number:		Completion Date	(original)	6/30/2023
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Raju Thapa			

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$150,000	**Total**		**$50,000**
	(revised)				
Est. Expended to Date			Salaries		$50,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The default values from Highway Capacity Manual are more generic and may not suit the local driving conditions. For example, there is a need of a headway defaults for different roadways that suit the local driving conditions for the traffic analysis

Objective(s): To evaluate few HCM default parameters like saturation flow rate, headway, percentage of heavy vehicles for the level of service, and peak-hour factor and check if the HCM default values are applicable in Louisiana.

Expected Benefits: The values found will be used to help improve traffic analysis in the state which ultimately would benefit all decision makers and stakeholders.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1 – Literature Review
Task 2 – Make an inventory of HCM 2016 Default parameters
Task 3 – Organize a workshop to finalize the list of sensitive and essential parameters
Task 4 – Data collection on the finalized parameters
To be finalized after proposal has been developed.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Human Mobility during COVID-19 and Implications for Active Transportation Planning in Louisiana**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:			Project Start Date:		2/1/2022
Research Project Number:			Completion Date	(original)	6/30/2023
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Ruijie "Rebecca" Bian				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$115,000	**Total**		**$39,000**
	(revised)				
Est. Expended to Date			Salaries		$26,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		$13,000

BUDGET JUSTIFICATIONS

Other: Other budget is for a potential sub-contract to a consultant. The breakout sheet will be attached to the proposal.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Active transportation refers to any human-powered mode of transportation, such as walking and bicycling. Promoting active transportation for the benefits of current and future Louisiana residents is significant, in terms of improving chronic disease outcomes as well as mitigating traffic and safety impacts. The pandemic situation also calls our attention to provide more sustainable and resilient transportation infrastructure in response to public health crisis.

Objective(s): The proposed project would: (1) observe human mobility patterns in Louisiana and whether/how the patterns changed during COVID-19 and (2) develop an index showing hotspots needing active transportation infrastructures the most based on the observed mobility pattern.

Expected Benefits: The proposed research will be useful to future active transportation planning, project prioritization, and investment decisions. The proposed research approach is especially useful to states who have less active transportation infrastructure and where pedestrian/bicyclist count data are not sufficient.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

The project has not started yet.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

To be determined based on the approved proposal which has yet to be developed.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Innovations in Pedestrian Counting Technology**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:			Project Start Date:		12/1/2021
Research Project Number:			Completion Date	(original)	2/28/2023
Research Agency:			Completion Date	(revised)	
Principal Investigator:					

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$150,000	**Total**		**$80,000**
	(revised)				
Est. Expended to Date			Salaries		$80,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Recent developments in detection technology show the advantages of including AI functionality to improve performance of these detectors. The detection technology available for pedestrians has been lacking in part due to a much larger range of references, which would be classified as a person resulting in much higher rates of false and missed identifications. Recent improvements to technology could provide merit to DOTD for data collection and operations with regards to pedestrian movements.

Objective(s): This project would perform a functional analysis of the Hanwha Techwin Wisenet 7 series technology. Through the installation of cameras at highly pedestrian trafficked intersections or walkways, these devices could be researched to validate the performance of the pedestrian counting aspect. Video could be recorded of a sample and validated against metrics which the camera would output from its own identification and counting of pedestrians.

Expected Benefits: The results could be significant benefit to planning and operations, particularly the “Complete Streets” initiative and operations safety for pedestrians. The ability to quickly collect pedestrian data at a multitude of locations or warn a pedestrian about to step into a moving lane of traffic are two of the applicable uses of a reliable pedestrian monitoring system.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task activities will be determined based on the approved research proposal.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Remote Sensing in Transportation and its Applicability at DOTD**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:		Project Start Date:		2/1/2022
Research Project Number:		Completion Date	(original)	1/31/2024
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Adele Lee			

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$50,000	**Total**		**$24,107**
	(revised)				
Est. Expended to Date			Salaries		$24,107
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: DOTD collects LiDAR and aerial imagery for elevation surfaces and topographic mapping purposes. There are additional remote sensing dataset archives at USGS, ESA, and NASA with varying temporal scale and ground resolution (what level of detail can be realized on the earth's surface).
This project will provide an exploratory look into available datasets and applicability to DOTD work processes such as planning, operations, geotechnical asset management and emergency response.

Objective(s): Compile a list of relevant remote sensing datasets available at no or low cost identifying the resolution and sensor type. Research will include a comprehensive literature review of remote sensing use in the transportation industry in order to provide actionable guidance on which datasets and analysis techniques are most applicable to Louisiana environmental conditions.

Expected Benefits: This research will provide guidance on what remote sensing datasets and analysis techniques are scalable to DOTD sections and districts via identifying several pilot cases.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

To be determined based on the approved proposal which has yet to be developed.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Safety and Traffic Operations at Cloverleaf Interchanges**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:			Project Start Date:		1/1/2022
Research Project Number:			Completion Date	(original)	6/30/2023
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Raju Thapa				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$150,000	**Total**		**$50,000**
	(revised)				
Est. Expended to Date			Salaries		$50,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Cloverleaf and Diamond Interchanges are a few popular among the several interchange alternatives. However, the performance of both the interchange types from the perspective of safety and operation still needs more research.

Objective(s): Review crash data for a sample size of Cloverleaf Interchanges in Louisiana or the Southeast and review the traffic operation.
•Compare Traffic Volumes
•Compare location (Urban vs. Rural)
•Compare Geometry of the Interchange as well as the Interstate and cross street approaches
•Review external factors

Expected Benefits: Having a better understanding of cloverleaf performance vs. diamond Interchanges will provide research support for decision-makers and stakeholders.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1 - Literature Review
Task 2 - Developing a population list of such interchanges
Task 3 - Develop a sample list
To be finalized after proposal has been developed.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Testing the Hurricane Evacuation Modeling Package (HEMP)**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:			Project Start Date:		2/1/2022
Research Project Number:			Completion Date	(original)	6/30/2023
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Ruijie "Rebecca" Bian				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$115,000	**Total**		**$62,000**
	(revised)				
Est. Expended to Date			Salaries		$38,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		$24,000
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Supplies: The project needs to purchase two software license to test the package. One Standard TransCAD Single User License costs $12,000 per year. One TransModeler License costs $7,000 to $12,000 per year. The PI will contact Caliper before purchase to confirm the price.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: LTRC has developed a computer package that allows estimation of evacuation traffic depending on storm characteristics and decisions made by Emergency Managers. It has been set up to operate in the New Orleans area and requires testing to validate its ability to replicate past storms. Testing of the computer package is necessary to determine the accuracy and usefulness of the package.

Objective(s): 1. Test individual modules of the computer package. 2. Run package on past storms

Expected Benefits: A program that predicts the consequences of alternative management evacuation decisions allowing informed decision making.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

The project has not started yet.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

To be determined based on the approved proposal which has yet to be developed.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Evaluation of Embedded Pile Resistance on Scour Critical Bridges**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**			**Budget Category:**	**FHWA**
SIO:			Project Start Date:		7/1/2021
Research Project Number:			Completion Date	(original)	6/30/2023
Research Agency:	LSU		Completion Date	(revised)	
Principal Investigator:	Murad Abu-Farsakh				

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**	
Total Cost	(original)	$200,000		**Total**	**$40,000**
	(revised)				
Est. Expended to Date				Salaries	$40,000
FY 2020 - 2021 Budget				Consumable Supplies & Materials	
FY Funds	(original)			Equipment (non-expendable)	
	(revised)			Travel	
Est. FY Expenditure				Other	

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Louisiana DOTD frequently evaluates channel geometry to determine if scour has impact on embedded foundation. In many cases, the resistance of embedded piles' estimated using nearby soil borings and on same static analysis methods used to design piles have shown that the pile resistance in many cases is less than the dead load reaction for the given pile. It is possible that the static equilibrium design methods are not adequate for this type of bridge evaluation that needs investig.

Objective(s): The objectives of this study: Complete additional structural load tests to confirm whether a bridge is safe to load with a loaded dump trucks; Evaluate direct Cone Penetration Test (CPT) design methods to determine the best method for estimating the embedded pile resistance; Determine whether a correlation exists between Cone Penetration Test (CPT) parameters and the deflections measured during the structural load tests; And identify bridges that will be replaced and confirm the method by load testing pile prior to demolition.

Expected Benefits: A standardized method of estimating the geotechnical resistance of embedded piles will help provide a more rapid response in determining whether it is safe or not to load post a bridge after any scour event. This will help ensure the safety of bridges to vehicles and passengers prior to open the bridge to traffic, and help prioritize bridge replacement projects.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

1) Perform literature review to determine what other states have done to estimate pile resistance in similar situations,

2) Start performing additional structural load tests (including updated channel geometry evaluations),

3) Perform Cone Penetration Test (CPT) soundings through the bridge deck to obtain soil information as close as possible to the pile bent(s) in question,

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**MASH TL-3 Thrie Beam Retrofit Bridge Rail for Existing Statewide Louisiana Statewide Safety walk Bridge Barrier Railing Systems Phase 1**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**			**Budget Category:**	**FHWA**
SIO:			Project Start Date:		7/1/2021
Research Project Number:			Completion Date	(original)	7/1/2022
Research Agency:	Texas A&M Transportation Institute (TTI)		Completion Date	(revised)	
Principal Investigator:	William Williams				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$30,000	**Total**		**$30,000**
	(revised)				
Est. Expended to Date			Salaries		$25,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		$2,000
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		$2,000
Est. FY Expenditure			Other		$1,000

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Louisiana has approximately 200 miles of a 1960 vintage concrete safety walk bridge rail systems currently in use on bridges throughout Louisiana. Many of these systems do not meet the current crash performance requirements of the American Association of State Highways and Transportation Officials (AASHTO) Manual for Assessing Safety Hardware (MASH) Specifications for Test Level 3.

Objective(s): Review the DOTD data base to invetigate the type and numbers of those 1960 vintage safety walk bridge rail systems currently used throughout Louisiana.

Expected Benefits: There is no direct expected benefits except the DOTD engineer will have to select the most critical detail and perform a simulation modeling or crash testig in Phase 2 of this study.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

1. Perform the reveiw of DOTD Data base.
2. Submit a final report documenting the findings and recommending a critical detail to be tested for MASH TL-3.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Skew Detection System Replacement on Vertical Lift Bridges Phase 2**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:		Project Start Date:		7/1/2021
Research Project Number:		Completion Date	(original)	9/30/2022
Research Agency:	Wiss, Janney, Elstner Associates, Inc.	Completion Date	(revised)	
Principal Investigator:	Gareth Rees			

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$250,000	**Total**		**$200,000**
	(revised)				
Est. Expended to Date			Salaries		$50,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		$125,000
FY Funds	(original)		Equipment	(non-expendable)	$25,000
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Supplies: Mobilization $25,000
Marine Closure Coordination $10,000
Installation $40,000
Testing $50,000

Equipment: Equipment and Materials $25,000

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: For a tower drive vertical lift bridge, failure to maintain span longitudinal or transverse skew can lead to jamming of the movable span in its guides and, without adequate protection, can lead to a catastrophic bridge failure. Phase 1 of this study yielded some recommendations dor the replacement of the of the differential selsyn used with new electric / electronic components.

Objective(s): The objective of this of this project is to: (1) analyze the control system and determine how to interface the encoder system into the existing electrical ladder logic (2) determine the scope of work required to implement the installation (3) perform the installation (4) calibrate and test the installation (5) provide support personnel and time for troubleshooting the installation for a period of 6 months.

Expected Benefits: A reliable skew detection system with replacement components readily available in the market.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES
Task 1 Determine points of interface in the existing electrical system and provide plans and specifications detailing the alteration of the electrical system to accommodate the new equipment for the selected bridge located. Task 2 Determine how the alteration to the bridge will be performed and present a schedule as well as a cost for implementation. This should be broken down into sections and hours of work in detail enough for review by the LTRC committee. Task 3 Provide properly qualified personnel and equipment to safely and correctly perform the installation. Task 4 Adjust and calibrate the equipment to be able to correctly display skew as well as trip the electrical system when the bridge gets too far out of skew. DOTD engineers will be consulted and informed about how and why these adjustments are made. Provide the PRCCommittee with written instructions detailing these adjustments for future use.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Design and Fabrication of Superhydrophobic Nanocomposite Coating for Steel Corrosion Protection**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000417**		Project Start Date:		7/1/2021
Research Project Number:	22-4TIRE		Completion Date	(original)	6/30/2022
Research Agency:	ULL		Completion Date	(revised)	
Principal Investigator:	Ling Fei				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$29,921	**Total**		**$29,921**
	(revised)				
Est. Expended to Date			Salaries		$26,621
FY 2020 - 2021 Budget			Consumable Supplies & Materials		$2,700
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		$600

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Steel corrosion is consistently a problem for structural concrete applications. Corrosion of steel leads to loss of bond, spalling of concrete, and loss of service.

Objective(s): (1) Prepare steel rebar with fluorinated epoxy (hydrophobic) and titanium dioxide nanofibers. (2) Characterize the titanium dioxide nanofiber fluorinated epoxy coating. (3) Determine performance of the coating in a salt water permeability test.

Expected Benefits: The benefits of this study include an alternative to conventional steel rebar coatings that currently exist.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1: Epoxy fluorinating
Task 2: TiO2 nanofiber preparation
Task 3: Fluorinated epoxy/TiO2 graphene nanocomposite coating and characterization
Task 4: Water permeability study of the salt spray test
Task 5: electrochemical measurements
Task 6: Task structure and performance correlation

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Enhancing the Carbon Dioxide Sequestering Capacity of Louisiana Highway Right of Way Lands**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000416**		Project Start Date:		7/1/2021
Research Project Number:	22-3TIRE		Completion Date	(original)	6/30/2022
Research Agency:	ULL		Completion Date	(revised)	
Principal Investigator:	Jorge Villa				

BUDGET STATUS

Total Budget		
Total Cost	(original)	$29,977
	(revised)	
Est. Expended to Date		
FY 2020 - 2021 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2021-2022 Budget		
Total		**$29,977**
Salaries		$29,227
Consumable Supplies & Materials		$750
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: There exists a potential for Louisiana's right of way (ROW) lands to be utilized as areas for carefully designed reforestation zones using trees and shrubs with incrased carbon dioxide uptake capacities that would assist with Executive Order No. 2020-18.

Objective(s): (1) Evaluate available land areas for reforestation. (2) Select candidate trees and shrubs suited to the Louisiana climate. (3) Evaluate trees and shrubs for carbon dioxide uptake and safety. (4) Develop an implementation protocol for Department of Transportation and Development (DOTD) use.

Expected Benefits: This project will provide a model and management plan to achieve a highly efficient carbon dioxide sequestration system that assist in reaching green house gas reduction goals while enhancing roadside beauty.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1: Evaluate ROW land areas in Louisiana
Task 2: Research and identification of potential candidate trees and shrubs
Task 3: Determine appropriate considerations for using trees as safety barriers
Task 4: Develop reforestation design protocols
Task 5: Development of a ROW forest management plan
Task 6: Final report and publication of results

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**High-Fidelity Fatigue, Drowsiness, and Drunk Drivers Detection (FD4) System**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000415**		Project Start Date:		7/1/2021
Research Project Number:	22-2TIRE		Completion Date	(original)	6/30/2022
Research Agency:	Southern University		Completion Date	(revised)	
Principal Investigator:	Yasser Ismail				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$30,000	**Total**		**$30,000**
	(revised)				
Est. Expended to Date			Salaries		$28,169
FY 2020 - 2021 Budget			Consumable Supplies & Materials		$1,831
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Drowsiness, fatigue, and alcohol are major factors that deteriorate driving performance, threaten road safety and cause severe injuries, deaths, and economical loss in the United States.

Objective(s): (1) Develop a high-fidelity fatigue, drowsiness, and drunk drivers detection (FD4) algorithm. (2) Verify the accuracy of the proposed FD4 algorithm using video footage.

Expected Benefits: The developed FD4 algorithm could be deployed in real-time to render automated FD4 detection that could potentially benefit many user groups by saving lives.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1: Perform a wide study
Task 2: Develop a high-fidelity FD4 algorithm
Task 3: refine the proposed FD4 algorithm
Task 4: Data analysis and performance measurements
Task 5: Project dissemination, conclusions, and reporting

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Studying the Impacts of Vehicle-to-Infrastructure (V2I) Technologies on Driver's Behaviors and Traffic Safety**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:	**DOTLT1000414**		Project Start Date:		7/1/2021
Research Project Number:	22-1TIRE		Completion Date	(original)	6/30/2022
Research Agency:	LSU		Completion Date	(revised)	
Principal Investigator:	Hany Hassan				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$30,000	**Total**		**$30,000**
	(revised)				
Est. Expended to Date			Salaries		$25,600
FY 2020 - 2021 Budget			Consumable Supplies & Materials		$1,000
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		$3,400

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The impacts of vehicle to infrastructure (V2I) are unknown with regards to traffic operation and safety at different traffic and environmental conditions.

Objective(s): (1) A driving simulator study will be designed and conducted showcasing scenarios of various conditions and driver response to visual and audio advisories provided through V2I will be collected and analyzed. (2) A questionnaire will be developed targeting a sample of drivers in Louisiana with questions related to challenges, acceptance, and preferences towards visual and audio advisories received through the V2I.

Expected Benefits: The results of this study are expected to pave the road for better implementation of V2I.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 1: Literature review and stakeholder engagement
Task 2: Driving simulator experiment
Task 3: Questionnaire survey study
Task 4: Final report

FHWA

Part B SPR Funded Research Program

POOLED FUND
LOUISIANA
LEAD STATE RESEARCH

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Southeast Transportation Consortium - Phase II**	**Project Status:**	**Proposed**

Funding Source:	**SPR: Pooled Fund: TT-Fed**	**Budget Category:**	**FHWA**

SIO:		Project Start Date:		7/1/2020
Research Project Number:	21-1PF	Completion Date	(original)	6/30/2025
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow			

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$900,000	**Total**		**$180,000**
	(revised)				
Est. Expended to Date			Salaries		$180,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$180,000	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The current Southeast Transportation Consortium (STC) is nearing its second extension to round out 10 years of productive work. In that 10 year period at least 12 research products have been produced on a wide variety of topics of interest to the AASHTO Region 2 member states. Additionally, the technology transfer and idea sharing between the states has benefited all immensely.

Objective(s): (1) Discuss and screen potential research or synthesis projects; (2) Conduct research and synthesis studies; (3) Hold a multi-state peer exchange for up to five (5) STC member states on a topic of their choosing; (4) Communicate and disseminate research results and innovative practices through publications and other technology transfer activities;

Expected Benefits: Increased knowledge sharing as well as tackling common research interests between STC Member states.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Post the study to the pooled fund study website and start the solicitation process. Once funded, start the project and hold the first meeting.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Start the pooled fund project.
A meeting will be scheduled and held to discuss common research interests. At least one peer exchange will be conducted.

FHWA

LTAP Funded Program

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Local Technical Assistance Program (LTAP)**	**Project Status:**	**Proposed**

Funding Source:	**LTAP: TT-Fed/TT-Reg**	**Budget Category:**	**FHWA**

SIO:	**DOTDLT1000403**	Project Start Date:		7/1/2020
Research Project Number:	22-LTAP	Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Steve Strength			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$692,938
	(revised)	
Est. Expended to Date		
FY 2020 - 2021 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2021-2022 Budget		
Total		**$692,938**
Salaries		$420,658
Consumable Supplies & Materials		$22,000
Equipment	(non-expendable)	$8,000
Travel		$66,200
Other		$176,080

BUDGET JUSTIFICATIONS

Supplies: -Supplies necessary to conduct technology transfer and workforce development activities for the LA LTAP program.
-Supplies to be purchased for use only in research and technical activities.

Equipment: -No individual item will exceed $5,000

Travel: -Travel for statewide delivery of required courses for the transportation community
-Travel for professional development
-Travel for both pre and post event management activities
-Travel for assistance with onsite course registration and management
-Travel for statewide specification meetings
-Travel for statewide meetings

Other: -Professional Services (Special Projects)- $30,080
-Course material production (printing, copying, binding, etc)- $21,000
-Professional services (instructors)- $60,000
and-Professional services (LPA on Line/CBT Module)– $65,000.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: LTRC's Local Technical Assistance Program (LTAP) stimulates the progressive transfer of highway technology through training, work force development and technical assistance. A cooperative effort of DOTD, FHWA and LSU, LTAP leverages the expertise and resources of these organizations for the benefit of local transportation and public works agencies.

Objective(s): To provide cost effective transfer of technology and workforce development opportunities to Louisiana's parish and municipality public transportation and public works agencies through training, technical assistance, and information dissemination.

Expected Benefits: LTAP offers training, technical assistance, newsletters, and a multimedia lending library.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

-Converted in-person course to virtual offering of “Roads Scholar #3: Drainage - The Key to Roads That Last” - 61 attendees; delivered 4 in-person sessions around the State - 72 attendees
-Delivered 5 in-person sessions of “Roads Scholar #15: Operational Safety for Public Works First Responders” - 66 attendees
-Converted in-person course to virtual offering of "LPA Qualification Core Training Module" - 16 attendees
-Converted in-person course to virtual offering of "LPA Construction, Engineering & Inspection Module" - 29 attendees
-Delivered 10 mini-workshop sessions of "Basics of Work Zone Safety with Basic Flagger Training" - 151 attendees
-Created brand new monthly virtual learning series, “LPESA Virtual Showcase” and delivered 7 one-hour sessions - 150 attendees
-Sponsored 1 Louisiana Parish Engineers and Supervisors Association Statewide technical annual meeting in a hybrid in-person/virtual offering - 40 attendees
-Sponsored 1 Professionalism & Ethics training in a hybrid in-person/virtual offering - 43 attendees
-Hosted 3 SimCap Louisiana Educational Meetings – 98 attendees
-Scheduled Chainsaw Safety classes at 4 locations in March 2021, postponed due to Coronavirus pandemic
-Made presentations at the National LTAP/TTAP Conference, ITE 2020 Annual Meeting, 2020 Tran-SET Conference, and the Local Road Safety Peer Exchange Virtual Meeting
-Participated in the Louisiana Municipal Association 83rd Annual Virtual Meeting by sending out "Vendor Boxes" to all 305 municipalities with information on LTAP programs, training, and technical assistance
-Participated in the annual Police Jury Association of Louisiana Annual Convention in Baton Rouge, coordinating activities of the LPESA, and providing information on LTAP programs and access to training and technical assistance
-Participated on EDC-5 Implementation Teams for STEP, Roadway Departure, Project Bundling, and Value Capture
-Attended EDC-6 Virtual Summit; identified as Implementation Team Leaders for EDC–6 initiatives: Strategic Workforce Development, Crowdsourcing for Advancing Operations, Targeted Overlay Pavement Solutions, and Next Generation Traffic Incident Management
-Developed and produced in cooperation with LTRC a 24 minute WorkZone Flagger Setup Video

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

-Revise content for “Roads Scholar #13: Inspection of Local Bridges” and present as virtual offering with required follow-up in-person class component (9 locations around the State);
-Revise content for “Roads Scholar #6: Heavy Equipment Operations: Safety and Preventive Maintenance” and present at 8 locations around the State
-Conduct “Roads Scholar #5/5a: Creating a Safe Work Environment” class at 8 locations around the State
-Present “Basics of Work Zone Safety with Basic Flagger” mini workshops upon request – estimated 12 sessions-Conduct one-day sessions of “Chainsaw Safety and Precision Felling” class at six locations (rescheduled from Spring 2020)
-Conduct 2 series of Local Public Agency training workshops – 3 classes per series, including LPA Qualification Core Training; LPA Project Development and Design Process for the LPA Responsible Charge; and LPA Construction, Engineering, and Inspection(CE&I)
-Provide support and organize technical agenda for Fall and Spring conferences of the Louisiana Parish Engineers and Supervisors Association (LPESA) and produce monthly LPESA Showcase webinars.
-Serve as Implementation Team Leaders for EDC–6 initiatives, develop implementation tasks for local component of EDC-6, and promote activities for: Strategic Workforce Development, Crowdsourcing for Advancing Operations, Targeted Overlay Pavement Solutions and Next Generation Traffic Incident Management
-Support continuing EDC-5 initiatives such as FoRRRwD, STEP, and Value Capture
-Pilot or develop rollout strategy for new Transportation Leadership Program in one region, community or organization
-Participate in the virtual Louisiana Transportation Conference in 2022
-Continue implementation of 2021 Communication Plan to include LPA Program; EDC-5 Initiatives; Local Road Safety, and Leadership components
-Provide technical resource speakers for activities of local and regional affiliates of partner organizations such as American Public Works Association (APWA), Louisiana Municipal Association (LMA), Institute of Transportation Engineers (ITE), and the National Local Technical Assistance Program Association (NLTAPA)
-Conduct a survey of local agencies to identify how COVID-19 has impacted local transportation agency operations and a corresponding white paper
-Host 4 quarterly SimCap Meetings in support of Deep South ITE and partner organizations and Chair TRB Joint Subcommittee on Simulation (SimSub)

FHWA

STP Funded
Technology Transfer &
Education Program

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**LTRC Student Worker Program**	**Project Status:**	**Proposed**

Funding Source:	**STP: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000405**	Project Start Date:		7/1/2021
Research Project Number:	22-2TT	Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	MaryLeah Coco			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$147,600
	(revised)	
Est. Expended to Date		
FY 2020 - 2021 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2021-2022 Budget		
Total		**$147,600**
Salaries		$147,600
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: To pay salaries for undergraduate students employed to provide support in fulfilling necessary job tasks on various Louisiana Transportation Research Center (LTRC) projects.

Objective(s): Employee undergraduate students in the field of research, technology transfer, education, and training.

Expected Benefits: Offer undergraduate students employment experience in research, technology transfer, education, and training in state government, specifically transportation, that will expose them to public service opportunities post graduation.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Thirty (30) undergraduate students were employed by LTRC to provide support in fulfilling necessary job tasks on various LTRC projects, research, technology transfer, training, and education initiatives.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Continue to pay for salaries for undergraduate students employed to provide support to various LTRC projects.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Training and Development Support Services**	**Project Status:**	**Ongoing**

Funding Source:	**STP: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000278**	Project Start Date:		7/1/2018
Research Project Number:	19-TDSS	Completion Date	(original)	6/30/2021
Research Agency:	LTRC	Completion Date	(revised)	6/30/2024
Principal Investigator:	Vijaya Gopu			

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$441,453	**Total**		**$147,288**
	(revised)				
Est. Expended to Date		$150,000	Salaries		$135,888
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$151,502	Equipment	(non-expendable)	
	(revised)		Travel		$11,400
Est. FY Expenditure		$150,000	Other		

BUDGET JUSTIFICATIONS

Travel: -Travel for statewide delivery of required courses for the transportation community
-Travel for professional development
-Travel for both pre and post event management activities
-Travel for assistance with onsite course registration and management
-Travel for statewide specification meetings
-Travel for statewide meetings

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The Training and Development Support Services will be involved in the management of the Louisiana Department of Transportation and Development's Structured Training Unit Learning Management System (LMS), which is a mandated system by the State of Louisiana Division of Administration.

Objective(s): This project will be responsible for coordinating and maintaining the LEO/LSO (Louisiana Employees Online/Learning Solution Online) system for the Technology Transfer and Training programs as well as other related training. The project will assist in implementing programs that are time sensitive and critical to the DOTD meeting the various training and program requirements.

Expected Benefits: Meet internal and external customer needs in order to provide time sensitive programs for the Louisiana Department of Transportation and Development (DOTD).

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

-Maintenance of current IT technology transfer and training equipment on our campus
-Continued the process of upgrading all technology transfer and training to Windows 10 platform
-Recommended purchases of new technology transfer and training where needed
-Worked with CPTP to schedule people who had not completed Louisiana Civil Service mandated supervisory training.
-Made changes to LMS as needed by DOTD Construction Inspection Program Manager
-Phase 1 of automation for DOTD's new Equipment Operator Certification Program (EOCP) completed.
-Made changes to DOTD webpages due to changes in DOTD Training policy.
-Coordinated a training day for field people with training delivered by DOTD personnel.
-Conducted meetings on using statewide LMS for DOTD and began developing standards for use at DOTD.
-Reviewed and updated user instructions for the statewide LMS system.
-Restructured DOTD catalog in the LMS and made updates in DOTD website catalog.
-Ongoing support on the statewide LMS system provided to LTRC personnel and DOTD personnel across the state.
-Monitored and assisted with the meeting of training requirements for DOTD personnel. Statewide Yearly Training requirements (Sex Harassment/Ethics) completions at 99%. Office of Risk Management training that we monitor was over 99%. DOTD training program compliance approximately 93%.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES
-Continue all IT support services for LTRC campus and employees. -Continue with implementation of DOTD's EOCP program – recommend program modifications, modify automation as needed. -Continue to work with Loss Prevention for record keeping required by the state. -Continue documenting procedures and developing best practices relating to training records. -Continue to monitor and assist in efforts to maintain a high level of compliance with required training. -Look for alternate delivery types of DOTD mandated training and assist in providing training opportunities. -Update LMS user instructions as necessary and provide training to new Training Administrators and Coordinators. . -Rewrite DOTD Training website to use the most current standards for development.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Technology Transfer & Research Implementation Support for Louisiana Universities**	**Project Status:**	**Ongoing**

Funding Source:	**STP: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**30000241**	Project Start Date:		1/1/2010
Research Project Number:	10-4AD	Completion Date	(original)	12/31/2013
Research Agency:	LTRC	Completion Date	(revised)	6/30/2022
Principal Investigator:	Tyson Rupnow			

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$100,000	**Total**		**$10,000**
	(revised)				
Est. Expended to Date		$73,863	Salaries		
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$10,000	Equipment	(non-expendable)	
	(revised)		Travel		$10,000
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Travel: Individual travel reimbursements to contract research professors to pay for food, lodging, and airfare to venues such as TRB to present results on ongoing and completed LTRC Research projects.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: Controlling travel to present research results is a significant issue with many of our external contracts wanting to attend conferences in exotic locations such as Italy, France, etc. This project was created over 10 years ago to combat that very spending issue.

Objective(s): The purpose of the project is to provide travel funds to university research principal investigators for dissemination of research results at various technology transfer events. Travel funds are dispersed on a case by case basis as it applies to providing a benefit to Louisiana.

Expected Benefits: The benefits of this project are twofold: (1) presentation of Louisiana Research promotes the excellent research work conducted and completed utilizing LTRC funds, and (2) other entities are able to view these presentations and ask questions and even adopt portions or all of the research product as well.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

No contract researchers attended events to present findings on contract research projects in fiscal year 2020-2021 due to the ongoing COVID-19 pandemic.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Send contract researchers to present upon findings of LTRC contract research projects.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	Technology Transfer Program and Operations (LSU)	Project Status:	Ongoing

Funding Source:	STP: TT-Fed	Budget Category:	FHWA

SIO:	30000320	Project Start Date:		7/1/2015
Research Project Number:	08-1TSQ	Completion Date	(original)	6/30/2018
Research Agency:	LTRC	Completion Date	(revised)	6/30/2024
Principal Investigator:	MaryLeah Coco			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$361,546
	(revised)	$1,140,170
Est. Expended to Date		$704,934
FY 2020 - 2021 Budget		
FY Funds	(original)	$387,041
	(revised)	
Est. FY Expenditure		$337,000

Estimated 2021-2022 Budget		
Total		**$396,831**
Salaries		$350,651
Consumable Supplies & Materials		$17,360
Equipment	(non-expendable)	$15,000
Travel		$11,160
Other		$2,660

BUDGET JUSTIFICATIONS

Supplies: -Supplies necessary to conduct technology transfer and workforce development activities for the public information and media team.
-Supplies to be purchased for use only in research and technical activities.

Equipment: -This budget item is comprised of various items all not to exceed $5,000 on an individual basis.

Travel: -Travel for professional development
-Travel for both pre and post event management activities
-Travel for statewide photography and videography
-Travel for statewide meetings

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: This program is responsible for developing and maintaining publication design, graphic design, website, database maintenance, public relation press packages, Section 504 compliance, and editing of all media projects for the Louisiana Transportation Research Center and Louisiana Department of Transportation and Development on a statewide level. In addition, this program is responsible for the production of all reports and production pieces for the Louisiana Legislature.

Objective(s): The objectives of this study are to: Disseminate information on new technologies and methodologies to the Louisiana Department of Transportation and Development (DOTD) and other transportation-oriented agencies; improve communications on technical, transportation-related issues between the department and other agencies; encourage implementation of new procedures and technologies; and disseminate information on transportation subjects to appropriate managers and engineers in the department.

Expected Benefits: Dissemination of technology transfer, training, and research initiatives to the transportation community as a whole.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

-Published 4 Tech Today Newsletters;
-Edited 18 Final Reports/Technical Summaries
-Published 13 Project Capsules;
-Published 23 Final Reports/Technical Summaries;
-Published 1 Tech Assistance Report;
-Continued to apply accessibility requirements for all newly published work
-Continued to implemented new Word template;
-Published 2020 Annual Report;
-Completed redesign of LTAP site to be consistent with LTRC site (and improve mobile-friendliness and accessibility)
-Developed new section for Road Scholar on LTAP site; landing pages for each course with all pertinent information
-Created social media-friendly content for LTAP through Adobe Spark
-Designed 4 issues of Technology Exchange
-Provided web support for NSF project: Field Monitoring and Measurements (FMM) Education
-Working through backlog of document published prior to Oct. 2018 for accessibility issues
-Programmed a redesign for the interactive DOTD Project Manager's Manual (final revisions with HQ currently for review)
-Created and managed 4 surveys for section 19
-Compiled and produced LTRC annual report
-Maintained regular posting of all LTRC publications on website and social media channels
-Support for all Section 33 users managing the Registration Management System
-Photographed all LTRC events including LPESA General Membership Meeting, TRAnsportation and Civil engineering (TRAC) and Roadways in Developing Elementary Students;
-Filmed and Produced Flagger Instructional video for LTAP
-Filmed on-site road construction procedures for use in Technology Transfer courses
-Filmed and produced 25 DOTD informational videos;
-Produced 3 DOTD/LTRC Zoom Video Presentations;
-Filmed and produced 1 Transportation Talk video featuring Secretary Wilson consisting of 3 parts;
-Filmed and produced 5 videos for interdepartmental use; Secretary Wilson TRB and AASHTO virtual address, Dr. Kalivoda virtual address, LA Scrapyard video documentation for DEQ purposes;
-956 subscribers on YouTube
-Prepared 15 Draft Project Capsules
-Provided Technical Review for 18 Final Reports
-Provided Technology Transfer Manager comments for 59 biannual reports (period ending 6/30/20)
-Provided Technology Transfer Manager comments for 65 biannual reports (period ending 12/31/20)

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FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

-Continue to prepare project capsules, and review draft final reports
-Continue to provide Technology Transfer Manager comments for biannual reports
-Continue to serve as ERDP engineer-of-record (e.g. interview panels, experience verification)
-Continued web/graphics support in all current areas
-Continued work on 508 accessibility issues for PDFs
-Photograph all LTRC and DOTD events
-Video all LTRC and DOTD events
-Readily available for any special assistance requested from Secretary's office
-2022 Louisiana Transportation Conference Planning
-Continue training and support for online registration management system
-Continue to edit and distribute project capsules, technical summaries, final reports and technical assistance reports
-Publish 4 Tech Today newsletters
-Continue to investigate and research planning and organizing virtual events

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Technology Transfer Registration Fees**	**Project Status:**	**Proposed**

Funding Source:	**STP: TT-Fed**			**Budget Category:**	**FHWA**
SIO:	**DOTLT1000406**		Project Start Date:		7/1/2021
Research Project Number:	22-TTRF		Completion Date	(original)	6/30/2022
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	MaryLeah Coco				

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$100,000	**Total**		**$100,000**
	(revised)				
Est. Expended to Date			Salaries		
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		$100,000

BUDGET JUSTIFICATIONS

Other: Other: -Statewide technology transfer and research activities related to workforce development including purchase of specific software, workforce development/training courses, etc.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: To provide cost effective transfer of technology and workforce development opportunities to Louisiana's parish and municipality and public works agencies through training, technical assistance, and information dissemination.

Objective(s): Strengthen the technology transfer, training, education, and other opportunities to Louisiana's parish and municipality and public works agencies.

Expected Benefits: Provide access to cost effective workforce development activities that will lead to better trained public works agencies.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Provided cost effective transfer of technology and workforce development opportunities to Louisiana's parish and municipality and public works agencies through training, technical assistance, and information dissemination.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Continue to provide cost effective transfer of technology and workforce development opportunities to Louisiana's parish and municipality and public works agencies through training, technical assistance, and information dissemination.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**LA DOTD CO-OP Program**	**Project Status:**	**Proposed**

Funding Source:	**STP: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000407**		Project Start Date:	7/1/2021
Research Project Number:	22-COOP		Completion Date (original)	6/30/2022
Research Agency:	LTRC		Completion Date (revised)	
Principal Investigator:	MaryLeah Coco			

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**		
Total Cost	(original)	$200,000		**Total**		**$200,000**
	(revised)					
Est. Expended to Date				Salaries		$200,000
FY 2020 - 2021 Budget				Consumable Supplies & Materials		
FY Funds	(original)			Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure				Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The Louisiana Department of Transportation and Development (DOTD) Co-Op program is a cooperative endeavor between the DOTD and Louisiana universities with accredited engineering programs, providing practical experience to junior and senior level undergraduates through part-time employment in public transportation engineering work.

Objective(s): This program is intended to enhance the educational process by providing opportunities for participants to explore their interest in transportation engineering through practical experience; provide opportunities for DOTD to evaluate participants of this program as potential employees; and enhance the educational process by providing opportunities for students to explore their interest in transportation engineering through practical experience.

Expected Benefits: Student will have the opportunity to work in their related career field. Increase the students' employability in their career field of engineering.
Increase the students' potential to advance within their career field.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

-15 undergraduate students participated in the Co-op program at various DOTD districts/sections.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

-Place approximately 15 students in various DOTD districts/sections across the state;
-Continue end of semester presentations;
-Retain students in the Co-op program; and
-Attend engineering related career fairs held throughout the state.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Workforce Development Contracts**	**Project Status:**	**Proposed**

Funding Source:	**STP: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT000404**		Project Start Date:	7/1/2021
Research Project Number:	22-1WDC		Completion Date (original)	6/30/2022
Research Agency:	LTRC		Completion Date (revised)	
Principal Investigator:	MaryLeah Coco			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$4,262,407
	(revised)	
Est. Expended to Date		
FY 2020 - 2021 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2021-2022 Budget		
Total		**$4,262,407**
Salaries		$1,600,000
Consumable Supplies & Materials		$110,000
Equipment	(non-expendable)	$125,000
Travel		$40,000
Other		$2,387,407

BUDGET JUSTIFICATIONS

Supplies: -Supplies to be purchased for use only in research and technical activities.

Equipment: Equipment: Special purpose equipment to be purchased for use only in research and technical activities.
-17K: Wired Crestron Control Panels in TTEC Reserved Spaces and LTRC Conference Room
-$35K: PTZ Cameras in TTEC Reserved Spaces and LTRC Conference Room for video conferencing
-$70K: Lighting Upgrade for TTEC Auditorium
-$3K: Programming Computer Upgrade

Software/Licensing:
-$850: Visix Support Renewal
-$11K: Articulate Subscription Renewal
-$5K: Adobe License Renewal
-$9K: Video conferencing software renewal
-$9K: Accruent/EMS Software renewal
-$34K: ASTM Standards
-$25K: IHS Engineering Workbench
-$5K: EOS.web

Travel: Travel for statewide delivery of required courses for the transportation community.
-Travel for professional development
-Travel for both pre and post conference management activities
-Travel for assistance with onsite course registration and management
-Travel for statewide district trainer meetings
-Travel for course facilitation

Other: Contracts for external workforce development initiatives.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The purpose of this study is to provide contractual services through federal, university, and private sector suppliers for continuing education, professional development, technical skills, software, leadership, management, and supervisory training. The scope of this project also includes providing individual registration fees for Louisiana Department of Transportation and Development (DOTD) employees to attend workshops/courses/conferences.

Objective(s): Provide specialized support statewide to the LA DOTD as well as specialized services to departmental section heads in the delivery of training, creation of competency models, technology integration, technology transfer of technical and non-technical efforts, and special projects that represent a variety of stakeholders in Louisiana.

Expected Benefits: Develops a platform to share ideas. Promotes innovative technology implementation throughout the transportation community. Enhances collaboration between the state, local, federal, university, and transportation community partners.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

-Held over 383 events with 2300 attendees
-Used EMS to schedule and report classes and attendee numbers for LTRC
-A total of 15 undergraduate students participated in the Co-op program at various DOTD districts/sections throughout the School Year
-Hosted at the Transportation Training and Education Center (TTEC) end-of-the semester Co-op student presentations and video-conferenced in other DOTD areas in the fall and spring. Increased participation in attendance by advertising department wide, to universities, and with the LTRC Policy Committee
-Attended and participated in 10 career fairs
-Two (2) Engineer Intern (EI) carried over into the Engineer Resource Development Program (ERDP) from last FY rotated through various DOTD sections and districts throughout Louisiana. This number is low due to the COVID-19 pandemic
-One (1) Engineer Intern (EI) successfully hired into LA DOTD: Section 25 – Bridge and Structural Design
-EI's were not hired into the program during the first three quarters of this FY due to the COVID-19 pandemic. EI's will be hired into the ERDP before the end of this FY
-FHWA Grant awarded for TRAnsportation and Civil engineering (TRAC) and Roadways in Developing Elementary Students (RIDES) workshop $52,143.75
-Hosted one TRAnsportation and Civil engineering (TRAC) and Roadways in Developing Elementary Students (RIDES) workshops
-Attended the Louisiana Teachers Summit in New Orleans – TRAnsportation and Civil engineering (TRAC)&Roadways in Developing Elementary Students (RIDES) presentation
-Added 334 new titles to the LTRC library online catalog and updated 633 titles
-508 compliances: updates were made to the LTRC Library web site to further improve accessibility and informed subscription vendors of LSU's accessibility compliance rules, in preparation of next year's renewals re LSU's review and requirements.
-Renewed ASTM Standards
-Renewed IHS Engineering Workbench
-Renewed EOS.web
-NTKN – National Transportation Knowledge Network (the regional TKNs were merged into the National TKN – LTRC Library was a member of ETKN (Eastern TKN)
-SLA – Special Libraries Association, Transportation Division
-TRB-AJE45 – Standing Committee on Information and Knowledge Management – Member
-TRB-AJE15 – Standing Committee on Workforce Development and Organizational Excellence – Friend
-TRB-E0006 – TRB Information Services Committee – Friend
-TRB- E0006(1) – TRT (Transportation Research Thesaurus) – Member
-Member of the AASHTO's TRAnsportation and Civil engineering (TRAC) and Roadways in Developing Elementary Students (RIDES) Program Committee
-Held 10 NHI courses
-Requested and informed employees of available NHI Webinars
-Employees attended 129 individual registration events
-Conduct, host, plan, and present at virtual/hybrid 2022 LTC – March 2022 in Baton Rouge, LA;
-Submitted RFPs for meeting space, overnight rooms, food/beverage, etc. for the Transportation Safety Summit (LA DOTD Highway Safety) to be conducted in
2021 for about 350 attendees. (this summit will now be held virtually for 2021)
-Drafted LTC Conference Planning guide
-National and Louisiana Chapter of the Society of Government Meeting Professionals (SGMP) Member
-2019 – 2021 Louisiana Chapter of the Society of Government Meeting Professional (SGMP) 1st Vice President
-2019 – 2021 Louisiana Chapter of the Society of Government Meeting Professional (SGMP) 1st Vice President & Director
-October 2021 – Present Louisiana Chapter of the Society of Government Meeting Professional (SGMP) Treasurer
-Held Maintenance and Rehab of Historic Bridges course
-Hosted the PE Review 2020 Workshop – last session out of 4 completed 9/20/20)
-Held training for Traffic Engineering Process & Report
-Held training for Pile Dynamics (Pile Driving Analysis (PDA))
-Held AED/CPR – 4 classes
-Held 2 Adobe 2- day classes
-Held the PE Review 2021 Workshop – 12 days
-Used the Registration Management System (RMS) for registration and tracking
-Conduct Dynamic Friction Tester Training
-Host Voegle Asphalt Milling and Paver Machines Workshop
-Wired Crestron control panels installed in TTEC 100,101,175,179,160, LTRC 128
-PTZ Cameras in TTEC 100,101,175,179,160, LTRC 128 fed back to Room PC for Zoom type video conferencing
-Programmed for Computer Upgrade
-Held 90 Uno Microsoft Office classes
-Held 7 ArcGIS classes
-Held 12 ATTSA classes
-Held 11 mechanics classes
-Held 6 CADD classes
-Held 3 Truck Mounted Attenuator classes
-Facilitated 7 Foundations of Leadership Development classes
-Facilitated 4 Emotional Intelligence classes
-Facilitated 5 Organizational Culture classes

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

-Place approximately 15-16 students in the Co-op program in various LA DOTD districts/sections across the state
-Continue end of semester Co-op presentations in a face-to-face or virtual format
-Retain students in the Co-op program each semester/quarter and summer
-Attend/participate in engineering related career fairs held throughout the state
-Hire approximately 5 - 8 engineering interns to participate in the ERDP
-Host one (1) TRAnsportation and Civil engineering (TRAC) and one (1) Roadways in Developing Elementary Students (RIDES) Workshop in December 2021
-Host a 2021 summer Roadways in Developing Elementary Students (RIDES) workshop
-Continue to facilitate and host events at TTEC, approximately about 150 more
-Continue additions to and updating of library materials into the online catalog
-Continue to monitor 508 Compliance pertaining to the LTRC Library page
-Continue to schedule and use EMS reporting for LTRC
-Continue to register employees for professional development trainings/workshops/conferences
-Continue to suggest and schedule NHI courses
-Continue to offer NHI Webinars
-RFP, negotiate, and secure contract for meeting and exhibitor space for the 2023 and 2025 Louisiana Transportation Conference to be held in Baton Rouge, Louisiana. Approximately 1600 attendees and 185 vendors.
-RFP, negotiate and secure contracts for overnight accommodations for the 2023 and 2025 Louisiana Transportation conference to be held in Baton Rouge, Louisiana. Locations TBD. Approximately 800 room nights.
-Negotiate and secure assistance from Visit Baton Rouge to provide rental and transportation assistance for the 2023 and 2025
-Louisiana Transportation Conference to be held in Baton Rouge, Louisiana.
-Continue to update the LTRC Conference Planning Guide
-Attend the Society of Government Meeting Professionals 2021 National Education Conference
-Host Northwestern Traffic Transportation Eng Seminar 1 (2021-2022) class
-Host Northwestern Traffic Transportation Eng Seminar 2 (2021-2022) class
-Host Signcad software (2021-2022) class
-Host PE Review 2022
-Host Traffic Engineering Software Training (2021-2022) class
-Continue to deliver Leadership classes around the state as needed
-Deliver Performance Management class
-Facilitate Managing Across Generations course
-Conduct, host, plan, and present at virtual/hybrid 2022 LTC
-Begin preparations for the 2023 LTC in Baton Rouge, LA, March 2023
-Continue to offer UNO Microsoft Office courses
-Continue to offer GIS and CADD courses
-Continue to host ATTSA courses
-Continue to schedule Mechanics courses training
-Continue to suggest and conduct training through NHI and FHWA
-Submit RFP's as needed throughout the year (about 3 per year)
-Fulfill individual registration requests
-Continue to offer and conduct courses as needed and/or requested
-Continue to write contracts/proposals for required and/or requested training as needed
-Request PO's as warranted
-Continue to use the Registration Management System (RMS) for course registration and tracking
-Update student manual as needed
-Facilitate "Managing Across Generations"
-Complete course and offer Contract Negotiations Training
-Louisiana Transportation Conference (LTC) items
-PE Review Workshop – Four (4) sessions
-Room Schedule Display TTEC 100,101,175,179,160, LTRC 128
-Interactive Touch Panel Display TTEC Lobby (Info Kiosk)
-Lectern Upgrade
-Visix Support Renewal
-Articulate Subscription Renewal
-Continue to facilitate Foundations of Leadership Development classes
-Continue to facilitate Emotional Intelligence classes
-Continue to facilitate Organizational Culture
-Facilitate Transformational leadership classes
-Facilitate Lunch n' Learn classes
-Administrate the CO-OP program

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Workforce Development**	**Project Status:**	**Proposed**

Funding Source:	**STP: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000402**		Project Start Date:	7/1/2021
Research Project Number:	22-1WD		Completion Date (original)	6/30/2022
Research Agency:	LTRC		Completion Date (revised)	
Principal Investigator:	MaryLeah Coco			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$1,162,804
	(revised)	
Est. Expended to Date		
FY 2020 - 2021 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2021-2022 Budget		
Total		**$1,162,504**
Salaries		$1,142,504
Consumable Supplies & Materials		$10,000
Equipment	(non-expendable)	
Travel		$10,000
Other		

BUDGET JUSTIFICATIONS

Supplies: -Supplies for technology transfer activities - no single item to exceed $5,000

Travel: -Statewide travel for structure training program delivery.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The purpose of this study is to provide for the strategic planning, program development, and delivery management of the workforce development programs for the Louisiana Department of Transportation and Development (DOTD) personnel. The scope of this study also includes the development, delivery, and administration of the Louisiana Transportation Research Center's
(LTRC's) transportation outreach program.

Objective(s): Deliver structured training programs to Louisiana Department of Transportation and Development (DOTD) personnel and other transportation partners statewide.

Expected Benefits: Expand the knowledge base of all employees and give employees a greater understanding of their responsibilities within their role within the organization while offering professional growth opportunities.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

-Revised Base Course Inspection training course manual;
-Revised Project Management training course manual;
-Revised Basic Asphalt Plant course manual;
-Revised DOTD Fundamentals of PCC Mix Design course manual;
-Revised PCC Paving Inspection course manual;
-Revised Preventative Maintenance of Light Vehicles training course;
-Revised Project Delivery – Stage 3 training course;
-Revised Workplace Safety training course;
-Revised Ethics for Construction Personnel training course;
-Revised Introduction to Surveying training course;
-Revised Basic Flagging Refresher training course;
-Revised DOTD TR 645 - Dynamic Cone Penetrometer (DCP) Operation training course;
-Revised DOTD TR 322 - Determining the Effects of Moisture on Asphaltic Concrete Paving Mixtures training course;
-Revised Density Testing for Embankment and Base Course training course;
-Revised Sampling and Testing of Plastic Concrete training course;
-Revised DOTD TR 120 - Soils Sand Equivalent Test Procedure training course;
-Revised Sampling Soils and Aggregates training course;
-Revised Lowboy Trailer training course;
-Revised Transport Trailer Safety training course;
-Revised Handling Hazardous Chemicals training course;
-Revised Tort Liability for Maintenance training course;
-Revised Tort Liability Depositions training course;
-Revised Beating a Blowout training course;
-Revised Bees With an Attitude - Africanized Honey Bees training course;
-Revised Heat Stress training course;
-Revised Poisonous Plant Safety training course;
-Revised Power Hand Tool Safety training course;
-Revised One Step From Death training course;
-Revised Safety Made Simple, The ABCs of Work Zone Safety training course;
-Created Grammar and Writing Skills Part 3 WBT training course;
-Created Hot Mix Asphalt (HMA) Testing & Analysis 1 WBT training course;
-Created Hot Mix Asphalt (HMA) Testing & Analysis 2 WBT training course;
-Created Power Line Safety WBT training course;
-Created Project Delivery – Stage 4 WBT training course;
-Created Project Delivery – Stage 5 WBT training course;
-Created LTRC Workplace Safety WBT training course;
-Created Road Safety 101 – Module 1 WBT training course;
-Created Motor Grader/Roller Video Add-On;
-Created Hazardous Communications Refresher WBT training course;
-Assisted the Human Resources Section in creating Substance Abuse for Supervisors WBT training course;
-Created DOTD Course Catalog;
-Facilitated 7 Project Management training classes;
-Facilitated 6 Basic Flagging training classes;
-Facilitated 15 Cybersecurity Awareness training classes;
-Facilitated 4 Facilitation Skills training classes;
-Facilitated 3 Power Line Safety training classes;
-Facilitated 1 Chain Saw Safety Operations training class;
-Facilitated 1 Dump Truck Safety Operations training class;
-Facilitated 1 Asphalt Paving Inspection Certification training class;
-Finalized and Implemented revised PPM #59, Workforce Development;
-Conducted 34 testing sessions (14 at TTEC and 20 at Headquarters) and proctored 175 tests during those testing sessions;
-Entered 3 new tests into the Test.com system;
-Updated 8 existing tests in the Test.com system;
-Managed the Construction Certification Program;
-Processed 63 new certifications for Department and Non-Department employees;
-Processed 184 re-certifications for Department and Non-Department employees;
-Managed the Structured Training Program for the Department

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES
-Develop Stages 1 and 2 of Project Delivery WBT courses; -Develop Engineering-Centered Project Management training course; -Develop Introduction to Pile Driving Inspection training course; -Develop Math for Construction Personnel 1 training course; -Develop Road Safety 101 – Module 2 training course; -Develop Hazardous Communication Program Annual Review training course; -Develop Asphalt Surface Maintenance training course; -Revise Traffic Control Through Maintenance Work Areas training course and materials; -Revise Facilitation Skills training course and materials; -Revise Forklift Safety training course; -Participate in Needs Assessment Review of all Departmental Structured Training Programs (STPs); -Review and update training manuals to ensure materials and formatting are up to date; -Review, recommend, and implement training revisions where necessary; -Review DOTD Course Catalog annually and make updates as necessary; -Continue to facilitate training courses as they appear in structured training programs; -Continue to conduct testing sessions at TTEC and Headquarters; -Continue to enter new tests into the Test.com system as they are created; -Continue to update tests in the Test.com system as revisions are needed; -Continue to manage the Construction Certification Program to include the collection of certification fees; -Continue to process new certifications for Department and Non-Department employees; -Continue to process new re-certifications for Department and Non-Department employees; -Continue to manage the Structured Training Program for the Department

Title:	**Technology Transfer and Assistance for Senior Project Courses**	**Project Status:**	**Proposed**

Funding Source:	**STP: TT-Fed**			**Budget Category:**	**FHWA**
SIO:	**DOTLT1000409**		Project Start Date:		7/1/2021
Research Project Number:	22-1TT		Completion Date	(original)	6/30/2022
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	MaryLeah Coco				

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**		
Total Cost	(original)	$37,500		**Total**		**$37,500**
	(revised)					
Est. Expended to Date				Salaries		
FY 2020 - 2021 Budget				Consumable Supplies & Materials		
FY Funds	(original)			Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure				Other		$37,500

BUDGET JUSTIFICATIONS

Other: Other: -Items for research and technology transfer purposes only. Items that may be purchased include, but are not limited to, software, materials, publication costs, etc.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: To provide support for senior project engineering courses up to a maximum of $7,500/university/year.

Objective(s): Senior Design Projects allow students to sharpen learned engineering skills in a real-world environment. These include: problem analysis, design analysis, experimentation, use of leading CAD and analysis software, innovation, communication skills, and teamwork, often within an interdisciplinary team.

Expected Benefits: Through this senior design project, students will be exposed to products, engineering practices and culture, allowing them to assess the transferability of these skills into their future employability opportunities. This experience of collaborative problem solving, respectful interaction and coordination to achieve a shared goal allows engineers-to-be to develop important teamwork skills that are valued by employers.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Participation from one university: Louisiana Tech University (1 project).

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Other:
To provide technology transfer and assistance for senior project engineering courses up to a maximum of $7,500/university/year.

Proposed Activities:
Continue to provide technology transfer and assistance for senior project engineering courses.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Technology Transfer Program and Operations (DOTD)**	**Project Status:**	**Proposed**

Funding Source:	**STP: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000408**	Project Start Date:		7/1/2021
Research Project Number:	22-1TSQ	Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	MaryLeah Coco			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$375,038
	(revised)	
Est. Expended to Date		
FY 2020 - 2021 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2021-2022 Budget		
Total		**$375,038**
Salaries		$375,038
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: This program is responsible for developing and maintaining publication design, graphic design, website, database maintenance, public relation press packages, Section 504 compliance, and editing of all media projects for the Louisiana Transportation Research Center and Louisiana Department of Transportation and Development on a statewide level. In addition, this program is responsible for the production of all reports and production pieces for the Louisiana Legislature.

Objective(s): The objectives of this study are to: Disseminate information on new technologies and methodologies to the Louisiana Department of Transportation and Development (DOTD) and other transportation-oriented agencies; improve communications on technical, transportation-related issues between the department
and other agencies; encourage implementation of new procedures and technologies; and disseminate information on transportation subjects to appropriate managers and engineers in the department.

Expected Benefits: Dissemination of technology transfer, training, and research initiatives to the transportation community as a whole.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

-Published 4 Tech Today Newsletters;
-Edited 18 Final Reports/Technical Summaries
-Published 13 Project Capsules;
-Published 23 Final Reports/Technical Summaries;
-Published 1 Tech Assistance Report;
-Continued to apply accessibility requirements for all newly published work
-Continued to implemented new Word template;
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-Filmed and produced 5 videos for interdepartmental use; Secretary Wilson TRB and AASHTO virtual address, Dr. Kalivoda virtual address, LA Scrapyard video documentation for DEQ purposes;
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-Prepared 15 Draft Project Capsules
-Provided Technical Review for 18 Final Reports
-Provided Technology Transfer Manager comments for 59 biannual reports (period ending 6/30/20)
-Provided Technology Transfer Manager comments for 65 biannual reports (period ending 12/31/20)

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FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

-Continue to prepare project capsules, and review draft final reports
-Continue to provide Technology Transfer Manager comments for biannual reports
-Continue to serve as ERDP engineer-of-record (e.g. interview panels, experience verification)
-Continued web/graphics support in all current areas
-Continued work on 508 accessibility issues for PDFs
-Photograph all LTRC and DOTD events
-Video all LTRC and DOTD events
-Readily available for any special assistance requested from Secretary's office
-2022 Louisiana Transportation Conference Planning
-Continue training and support for online registration management system
-Continue to edit and distribute project capsules, technical summaries, final reports and technical assistance reports
-Publish 4 Tech Today newsletters
-Continue to investigate and research planning and organizing virtual events

Title:	**DOTD Staff Support for Workforce Development**	**Project Status:**	**Proposed**

Funding Source:	**STP: TT-Fed**			**Budget Category:**	**FHWA**
SIO:	**DOTLT1000411**		Project Start Date:		7/1/2021
Research Project Number:	22-1SWD		Completion Date	(original)	6/30/2022
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	MaryLeah Coco				

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**		
Total Cost	(original)	$1,520,000		**Total**		**$1,520,000**
	(revised)					
Est. Expended to Date				Salaries		$1,520,000
FY 2020 - 2021 Budget				Consumable Supplies & Materials		
FY Funds	(original)			Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure				Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The purpose of this study is to provide for the strategic planning, program development, and delivery management of the workforce development programs for the Louisiana Department of Transportation and Development (DOTD) personnel by non-LTRC employees. This project will not be utilized by LTRC's Section 19 or 33.

Objective(s): Provide for the strategic planning, program development, and delivery management of the workforce development programs for the Louisiana Department of Transportation and Development (DOTD) personnel by non-LTRC employees.

Expected Benefits: Development, implementation, and evaluation of human resource and organizational development initiatives for the Louisiana Department of Transportation and Development (DOTD).

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

-Course development and delivery of Local Public Agency (LPA) training;
-DOTD employee structured training;
-Human Resources training, maintenance related training; and
-Meeting involvement related to LA DOTD's Transportation Training Curriculum Council.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

-Course development and delivery of LPA training;
-DOTD employee structured training;
-Human Resources training, maintenance related training; and
-Meeting involvement related to LA DOTD's Transportation Training Curriculum Council.

Self-Generated Funded Research Program

Title:	**Field Monitoring and Measurements Education: A Model for Civil and Environmental Engineering**	**Project Status:**	**Ongoing**

Funding Source:	**NSF**		**Budget Category:**		**Self-Generated**
SIO:	**DOTLT1000101**		Project Start Date:		2/15/2016
Research Project Number:	16-2ST		Completion Date	(original)	8/14/2019
Research Agency:	LTRC		Completion Date	(revised)	9/30/2021
Principal Investigator:	Vijaya Gopu				

Total Budget		
Total Cost	(original)	$337,312
	(revised)	
Est. Expended to Date		$290,000
FY 2020 - 2021 Budget		
FY Funds	(original)	$47,312
	(revised)	
Est. FY Expenditure		$47,312

Estimated 2021-2022 Budget		
Total		**$47,312**
Salaries		$30,000
Consumable Supplies & Materials		$3,812
Equipment	(non-expendable)	$3,500
Travel		$10,000
Other		

BUDGET JUSTIFICATIONS

Travel: Travel: Education Modules Dissemination Effort at different sites: $10,000

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The goal of this project is to develop a model instructional program, using Structural Engineering and structural Health Monitoring as a
test bed, that can be used to educate civil and environmental engineering students in the fundamental principles and technology of field monitoring and measurements (FMM) and to utilize monitoring technologies and FMM data to evaluate performance and behavior, analyze problems and design civil and environmental engineering (CEE) systems.

Objective(s): This specific objectives of the project are to: (1) develop and implement a modular-based transportable Structural Engineering FMM Instructional Unit for CEE students in a manner that enhances the students' achievement of the traditional expected learning outcomes for the two affected courses and (2) develop a community of scholars that has an interest in and will contribute to the further development of FMM instructional materials.

Expected Benefits: The project will benefit the undergraduate students who will be exposed to the principles of structural health monitoring without having to take additional courses in the program. The faculty will benefit from having the tools to introduce the concepts of structural health monitoring in their regular analysis and design courses with modules made available to them by the project investigators.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

-PowerPoint versions of all the five foundational education modules were updated based on the input received from the collaborators at partner institutions;
-PowerPoint versions of all the four structural engineering education modules were completed and later updated;
-The readiness exams were developed and updated for all the four structural engineering education modules;
-The experimental set up that was fabricated for demonstrating the structural health monitoring (SHM) equipment to students and faculty partners was utilized at a workshop held in St. Louis, MO, for interested faculty;
-An instructor's planning guide was prepared and updated and is now being made available to the faculty at all institutions;
-Mastery exams and discussion questions were developed and updated for all the structural engineering education modules;
-A special workshop for faculty was held in St. Louis in conjunction with the ISHMII Conference. and
-Annual progress report was submitted to NSF and an extension request was approved by the project program officer

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

The project website will be updated to permit rapid dissemination of the modules to all engineering programs in the nation. The website will house the latest modules and will include videos and webinars.
-Workshops will be held at key cities around the country to disseminate the education modules. A workshop is planned to be held at the 2021 TRB meeting in the Health Monitoring Technical Committee meeting since it draws a large number of faculty interested in these modules.
- An advisory board meeting will be held to update the members on all the tasks completed in the project.

Other DOTD
Funded Projects

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Portable WIM Installation and Site-Specific Traffic Data Collection for DOTD**	**Project Status:**	**Ongoing**

Funding Source:	**Pavement Management**	**Budget Category:**	**Other DOTD Sections**

SIO:	**000**	Project Start Date:		10/12/2020
Research Project Number:	22-1SS	Completion Date	(original)	1/11/2021
Research Agency:	Texas A&M Transportation Institute (TTI)	Completion Date	(revised)	6/30/2021
Principal Investigator:	Lubinda Walubita			

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$38,982	**Total**		**$33,444**
	(revised)				
Est. Expended to Date			Salaries		$30,000
FY 2020 - 2021 Budget			Consumable Supplies & Materials		$3,444
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

to install and monitor portable Weigh In Motion (WIM) technology in Louisiana

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

to install and monitor portable Weigh In Motion (WIM) technology in Louisiana

Title:	**The Impact of the Louisiana Grade Crossings: A Synthesis and System Analysis**	**Project Status:**	**Ongoing**

Funding Source:	**Planning**			**Budget Category:**	**Other DOTD Sections**
SIO:	**DOTLT1000372**		Project Start Date:		5/14/2020
Research Project Number:	21-1SS		Completion Date	(original)	5/13/2021
Research Agency:	UNO		Completion Date	(revised)	11/13/2021
Principal Investigator:	Guang Tian				

BUDGET STATUS

Total Budget				**Estimated 2021-2022 Budget**		
Total Cost	(original)	$44,999		**Total**		**$9,788**
	(revised)					
Est. Expended to Date		$35,211		Salaries		$9,788
FY 2020 - 2021 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$35,211		Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure		$35,211		Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE AND EXPECTED BENEFITS

Problem Statement: At-grade crossings of public and private roads with railroads create a unique intersection where trains and vehicles and other users meet. These are different modes of transportation with distinct physical and operational characteristics, which create safety and efficiency concerns. The 2015 Louisiana Statewide Transportation Plan includes an element that calls for research into incentive programs that can be used to entice voluntary closure of public and/or private crossings.

Objective(s): investigate the crossing status in the state of Louisiana
conduct a thorough and comprehensive literature review
outline the funding sources and programs for improving grade crossing safety
conduct a state-wide survey and interview of stockholders to better understand the concerns, barriers, and solutions
identify incentive programs already being used and potential new programs
develop a model to predict the priority rating of individual crossings for closure or other decision making

Expected Benefits: This project will provide incentive programs that could be employed directly by LaDOTD, local governments, railroads companies, and industries that rely on rail service. Ultimately, it will help to improve the safety of all transportation users, improve the efficiency of Louisiana's transportation system and make it better to serve the needs of the economy, reduce the environmental impacts related to transportation improve the public health in general.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

Task 2: investigate the crossing status in the state of Louisiana
Task 3: conduct a thorough and comprehensive literature review
Task 4: conduct a state-wide survey and interview of stockholders to better understand the concerns, barriers, and solutions
Task 5: outline the funding sources and programs for improving grade crossing safety
Task 6: Begun analyzing data - identify incentive programs already being used and potential new programs

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 6: complete analyzing data - identify incentive programs already being used and potential new programs
Task 7: develop a model to predict the priority rating of individual crossings for closure or other decision making
Task 8: Write the final report
Task 9: Disseminate results

Form 1901 Rev. 02/08

Title:	**The Future of the Louisiana Waterways Transportation System: A System Analysis and Plan to Move Commerce by Water**	**Project Status:**	**Ongoing**

Funding Source:	**Office of Multimodal Commerce**		**Budget Category:**		**Other DOTD Sections**
SIO:	**DOTLT1000330**		Project Start Date:		1/21/2020
Research Project Number:	20-1SS		Completion Date	(original)	4/20/2021
Research Agency:	Moffatt & Nichol		Completion Date	(revised)	8/20/2021
Principal Investigator:	Ricardo Cruz				

Total Budget		
Total Cost	(original)	$284,499
	(revised)	
Est. Expended to Date		$106,145
FY 2020 - 2021 Budget		
FY Funds	(original)	$279,396
	(revised)	
Est. FY Expenditure		$173,251

Estimated 2021-2022 Budget		
Total		**$5,103**
Salaries		$4,603
Consumable Supplies & Materials		
Equipment	(non-expendable)	$500
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The purpose of this project is to provide DOTD Office of Multimodal Commerce (OMC) a means to plan for future development and investment. The OMC needs to develop a comprehensive, statewide waterways transportation system plan. In order to develop this plan, it is necessary to analyze and document the impact and importance of waterborne commerce on the State of Louisiana, its transportation system, and the nation.

Objective(s): The objective of this research is to (1) Identify the type and value of waterborne commerce, (2) Analyze and document the impact and importance of waterborne commerce, (3) Identify the improvements needed to achieve greater utilization of waterways, (4) Identify opportunities for alieving multimodal bottlenecks relative to waterways, (5) Develop a draft Waterways Transportation Plan that can be included in the Louisiana Statewide Transportation Plan.

Expected Benefits: In addition to a final report, the final deliverable will also include a draft of a Waterway Transportation Plan. A GIS platform provided that serves as a repository of spatial data, appropriate meta data, validated data sources and a system capable of serving the Department of Commerce for day to day operational waterway information. This data will be distribution to department agencies and public on demand.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

The list below represents the accomplishments for fiscal year 2020-2021:
Task 1- Identify the type and value of waterborne commerce - complete
Task 2- Analyze and document the impact and importance of waterborne commerce- complete
Task 3- Identify the improvements needed to achieve greater utilization of waterways- complete
Task 4- Identify opportunities for alieving multimodal bottlenecks relative to waterways - complete
Task 5- Develop a draft Waterways Transportation Plan that can be included in the Louisiana Statewide Transportation Plan. In addition to a final report, the final deliverable will also include a draft of a Waterway Transportation Plan. Complete

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

Task 6- Data management/GIS application, analysis and reporting - Finalize review and approval of report, waterway plan and acceptance of GIS platform.

LTRC Annual Research Program
Fiscal Year 2021-2022

Title:	**Louisiana Local Road Safety Program**	**Project Status:**	**Proposed**

Funding Source:	**Safety**	**Budget Category:**	**Other DOTD Sections**

SIO:	**DOTLT1000412**	Project Start Date:		7/1/2021
Research Project Number:	22-LRSP	Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Steve Strength			

BUDGET STATUS

Total Budget			**Estimated 2021-2022 Budget**		
Total Cost	(original)	$379,989	**Total**		**$379,989**
	(revised)				
Est. Expended to Date			Salaries		$317,989
FY 2020 - 2021 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		$62,000

BUDGET JUSTIFICATIONS

Other: -Contracts for special services for the Local Road Safety Program

PROBLEM STATEMENT, OBJECTIVE(S) AND EXPECTED BENEFITS

Problem Statement: The purpose of the Louisiana Local Road Safety Program (LRSP) is to identify key safety needs and guide investment decisions to achieve reductions in fatalities and serious injuries on local rural public roadways.

Objective(s): To work in cooperation with the Louisiana Department of Transportation and Development's (LADOTD's) Highway Safety Office to implement and manage the Local Road Safety Program (LRSP)in addition to providing support to other statewide road safety initiatives at both the state and local levels.

Expected Benefits: The LRSP offers a proactive approach for local road agencies to address safety issues. The LRSP can show the public and policy makers that something is being done to systematically reduce severe crashes, thereby, building trust with local government officials, key stakeholders, and the general public.

FISCAL YEAR 2020 - 2021 ACCOMPLISHMENTS

-Processed and evaluated 14 Local Road Safety Project applications providing recommendations for inclusion in Louisiana's Highway Safety Improvement Program and prepared packages for Project Selection Committee meeting April 14, 2021
-Attended all of the Regional Safety Coalition's Infrastructure and Operations Emphasis Area meetings in each of the nine coalition's regions virtually to provide assistance on implementing strategies in the Louisiana SHSP for the locally owned road networks;
-Reviewed Local Road Safety Program's processes and made proposals for revising the application, evaluation criteria, and a new Road Assessment form incorporating comments from the Local Road Safety Program team over the past two years and information from the state's new Roadway Departure Plan, standard cost estimating process and STEP and FoRRRwD initiatives. Rollout of the new forms is planned for May 1, 2021.
-Developed and conducted a Local Road Safety Plan Webinar (September 24, 2020) for Regional Safety Coalition Coordinators andMPO technical support staff with 21 attendees, plus limited in-person meetings with Coordinators and other stakeholders.
-Reviewed drafts of 6 new Local Road Safety Plans, making suggestions and recommendations. Currently there are 13 Parishes with finalized and/or adopted Local Road Safety Plans. 11 more Parishes are currently in the planning process with 6 Parishes nearing completion and 5 more in early stages of development. LTAP is providing technical assistance at each stage of development for all parishes as needed;
-LTAP and Local Road Safety Program staff provided training in the use of LADOTD's Crash 3 Database including specialized data queries, analyses and interpretation to multiple local agencies and Regional Safety Coalition coordinators. Regional Safety Coalition sand parish staff were assisted the use of the LTAP's Crash Profiles to identify problem areas and possible causes using a prescribed data driven method of analyzing crashes on their locally owned roadways leading to the development of Parish Local Road Safety Plans and ultimately Local Road Safety Projects.;
-LTAP Director served as Co-Chair of Louisiana's Strategic Highway Safety Plan Statewide Infrastructure and Operations team providing technical expertise and leadership;
-Spoke and exhibited at the virtual Louisiana Municipal Association convention, live Police Jury Association of Louisiana (May 12 & 132021) and Louisiana Professional Engineers and Supervisors Association meetings/conventions including providing information on the LA SHSP, LRSP Program, and Local Road Safety Plans and LRSP Projects;
-Presented at nine DOTD/SHSP 2021 Road Show webinars for DOTD District and SHSP Regional Infrastructure and Operations stakeholders;
-Participated as a core member of the team developing the new Road Safety 101 classes for Louisiana safety practitioners; reviewed first module and discussed next steps;
-Promoted Local Road Safety Program and Local Road Safety Plans through special bulletins and announcements on a monthly basis providing curated lists of training programs and other resources.
-Hosted "FoRRRwD: Focus on Reducing Rural Roadway Departures" webinar over 3 days with FHWA Resource Center – 28attendees
-Participated in the FHWA Safety Circuit Riders Group monthly group calls and presented at one Local Road Safety Circuit Rider PeerExchange for 50 attendees.
-Participated in LTRC safety related Research Committees: 19-4SA Impact of Center Line Rumble Strips and Shoulder Rumble Stripson All Roadway Departure Crashes in Louisiana Two-Lane Highways; and 18-4SA Intersections on Horizontal Curves: Problems and Potential Solutions;
-Participated in LTRC Research Committee LTRC 19-3SS Exploring Non-Traditional Methods of Obtaining Vehicle Volumes; also participated in product evaluations for two applications aimed at determining AADTs on local roads.-Participated on Traffic Records Coordinating Committee Executive Committee.
-Promoted road safety related online training to locals from other LTAP Centers on road topics including MUTCD signing, work zone safety, proven safety counter- measures, and low cost safety improvements for maintenance.
-Conducted or assisted with Road Safety Assessments (RSA) in
•Baton Rouge November 2, 2020 Workshop and December 14, 2020 Various locations
•New Orleans Elysian Fields Avenue April 1, 2021
•Houma various locations April 27, 2021
-Participated in the National Summit on Rural Road Safety Sept. 28 – Oct. 2, 2020.

FISCAL YEAR 2021-2022 PROPOSED ACTIVITIES

-Continue to promote and facilitate implementation of parish level road safety plans in at least 6 additional parishes.
-Manage the application submittal process of the Local Road Safety Program Highway Safety Improvement Program projects and conduct preliminary technical evaluation of applications, and tracking of projects through assignment of H numbers.
-Coordinate with DOTD Office of Safety to provide technical assistance and capacity building to the Regional Safety Coordinators and Coalitions and SHSP stakeholders, including on-site visits; participation in coalition meetings; RSA training, and other activities in the Strategic Highway Safety Plan and/or regional action plans;
-Review and provide information to stakeholders regarding training opportunities from AASHTO TC3; NHI; FHWA; ITE; TRB; etc.
-Assist DOTD in implementing the Roadway Departure Plan for local roads including training and technical assistance to local users;
-Present up to 6 Road Safety Assessment workshops upon request for Regional Safety Coalitions as part of the SHSP Strategic Plan.
-Develop and present revised LTAP Roadway Departure Workshop (based on FHWA Resource Center and EDC content) for Local Agency road owners and safety coalition partners at 9 locations.
-Partner with DOTD Safety Section to determine feasibility of systemic or system-wide safety projects using Fugro data; Louisiana Highway Safety Research Group analytical assistance; contract assistance, etc.;
-Continue to support SHSP and related Infrastructure and Operations initiatives, including serving as Statewide Emphasis Area co-chair, Work Zone Safety Task Force member, and Next Generation Traffic Incident Management EDC initiative co-leader.
-Continue participation as a core member of the team developing the new Road Safety 101 for Louisiana; and
-Promote Local Road Safety Program through special bulletins and announcements on a monthly basis providing curated lists of training programs and other resources, and partner group activities such as LPESA, ITE, and APWA.

LTRC Annual Research Program

Fiscal Year 2021-2022

	2021 RPIC PROBLEM STATEMENTS
Final Ranking	**PROBLEM STATEMENT TITLE**
1	Economic Impact of Access Management Treatments: Driveway Consolidation
2	Evaluation of Embedded Pile Resistance on Scour Critical Bridges
3	Best Practices for Maintenance of Control of Access Fencing
4	Improving the Performance of Concrete Expansion Joints in Pavements
5	Evaluation of Louisiana Maintenance and Rehabilitation Treatment Decision Matrix for Cost-effective and Timely Pavement Preservation
6	Statewide Calibration of CPT Direct Design Methods Using Static Load Test Data
7	Evaluation of Louisiana's Systemic Safety Projects for Roadway Departures on Rural Curves
8	HCM Default Parameters
9	Evaluating the Effectiveness of Crosswalk Striping Pattern at Signalized Intersections in Louisiana
10	Review of Bridge Deck Scupper Drains
11	Safety and Traffic Operations at Cloverleaf Interchanges
12	Effectiveness of Additives and Mix Design on the Moisture Resistance of Asphalt Mixtures
13	LIDAR for Geotechnical Applications
14	Evaluation of the Chemical and Rheological Properties of Asphalt Binder from Various Sources
15	Improved Incident Response through Coordinated, Interoperable Communications
16	Recycled polycarbonate as a partial sand replacement in concrete
17	Performance Serviceability Rating and Maintenance Cost Assignment for Ramps, Acceleration and Deceleration Lanes in Louisiana
18	Natural and Nature-based Features as Coastal Protection for Transportation Infrastructure
19	Human Mobility during COVID-19 and Implications for Active Transportation Planning in Louisiana
20	Innovations in Pedestrian Counting Technology