LTRC Annual Research Program

Fiscal Year July 1, 2020 - June 30, 2021

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 2020

May 21, 2020

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

Attention: Ms. Mary Stringfellow

RE: FY 2020-2021 Louisiana Transportation Research Center Annual Work Program

Dear Mr. Bolinger:

Enclosed please find the FY2020-2021 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 administratie 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 17, 2020

In Reply Refer To:
HDA-LA

Shawn D. Wilson, PhD.
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's (LTRC) Statewide Planning and Research (SPR) Work Program Subpart B, for Fiscal Year (FY) 2020-2021. FHWA reviewed the draft Work Program and provided comments to Mr. Tyson Rupnow in early June. FHWA received the revised Work Program on June 16, 2020 and found that all comments were addressed. This final version of the LTRC Work Program is now approved, and all the projects in the Work Program can move forward.

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

Table of Contents

FHWA SPR Work Program
Part B

FAP Number SPR-0010(34)

FHWA Funding

SPR Research Budget Recap	H#	Federal	State	Total
Administrative Budget	H.972383	$680,107.20	$170,026.80	$850,134
Research Support Studies Budget	H.972383	$1,142,936	$285,734	$1,428,670
Active Studies Budget	H.972383	$3,362,660.80	$840,665.20	$4,203,326
Proposed Studies Budget	H.972383	$2,514,988.80	$628,747.20	$3,143,736
Pooled Fund Lead State Studies Budget	TBD	$180,000	$0	$180,000
Total SPR Budget		**$7,880,692.80**	**$1,925,173.20**	**$9,805,866**

SPR External Collaboration Budget Recap	H#	Federal	State	Total
Pool Funded Studies	N/A	$100,000	$0	$100,000
TRB Correlations	N/A	$118,308	$29,577	$147,885
NCHRP	N/A	$672,403.20	$168,100.80	$840,504
Total SPR External Collaboration Budget		**$890,711.20**	**$197,677.80**	**$1,088,389**

FHWA Funding

LTAP Budget Recap	H#	Federal	State	Total
LTAP	TBD	$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.972383	$1,313,533	$1,313,533
Workforce Development Program	H.972383	$7,052,087	$7,052,087
Student Support Programs	H.972383	$210,000	$210,000
Total STP Budget		**$8,575,620**	**$8,575,620**

Self-Generated Funding

Self-Generated Budget Recap	H#	Federal	State	Total
Active Studies Budget	N/A	$0	$0	$60,000
Proposed Studies Budget	N/A	$0	$0	$0
Total Self-Generated Budget				**$60,000**

Other DOTD Sections Funding

Other DOTD Sections Budget Recap	H#	Federal	State	Total
Active Studies Budget	TBD	N/A	$113,214	$113,214
	H.972327.1	$36,000	$9,000	$45,000
Proposed Studies Budget	TBD	$379,989	$0	$379,989
Total Other DOTD Sections Budget		**$380,025**	**$122,214**	**$538,203**

LTRC ANNUAL RESEARCH PROGRAM

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

FISCAL_YEAR 2020-2021

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	DOTLT10003 59	21-1PM	$850,134	$850,134	LTRC	Tyson Rupnow	Program Management	7/1/2020	6/30/2021		C-2
					$850,134	**$850,134**	**ADMINISTRATIVE BUDGET TOTALS**						
Project Type: Research Support (80% Federal / 20% State)													
SPR: TT-Fed/TT-Reg - 5	P	RS	DOTLT10003 62	21-1TTRI	$382,896	$382,896	LTRC	Tyson Rupnow	Technology Transfer and Research Implementation	7/1/2020	6/30/2021		C-3
SPR: TT-Fed/TT-Reg - 5	P	RS	DOTLT10003 65	21-1TRS	$299,874	$299,874	LTRC	Tyson Rupnow	Technical Research Surveillance	7/1/2020	6/30/2021		C-4
SPR: TT-Fed/TT-Reg - 5	P	RS	DOTLT10003 61	21-1TA	$301,963	$301,963	LTRC	Tyson Rupnow	Technical Assistance	7/1/2020	6/30/2021		C-5
SPR: TT-Fed/TT-Reg - 5	P	RS	DOTLT10003 66	21-1SSR	$100,000	$100,000	LTRC	Tyson Rupnow	DOTD Staff Support for Research	7/1/2020	6/30/2021		C-7
SPR: TT-Fed/TT-Reg - 5	P	RS	DOTLT10003 60	21-1LFT	$19,712	$19,712	LTRC	Tyson Rupnow	Research Laboratory and Field Test Support	7/1/2020	7/1/2021		C-8
SPR: TT-Fed/TT-Reg - 6	P	RS	DOTLT10003 64	21-1NPE	$43,135	$43,135	LTRC	Tyson Rupnow	New Product Evaluation	7/1/2020	6/30/2021		C-9
SPR: TT-Fed/TT-Reg - 6	P	RS	DOTLT10003 63	21-1EQM	$281,089	$281,089	LTRC	Tyson Rupnow	Equipment Management	7/1/2020	6/30/2021		C-10
					$1,428,670	**$1,428,670**	**RESEARCH SUPPORT BUDGET TOTALS**						

LTRC ANNUAL RESEARCH PROGRAM

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

FISCAL YEAR 2020-2021

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	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-12
SPR: TT-Fed/TT-Reg - 5	A	B	DOTLT1000345	20-3B	$45,000	$262,246	LTRC	Saman Salari	Low and Intermediate Temperature Evaluation of Binders through Dynamic Shear Rheometer	5/11/2020	5/10/2022		C-13
SPR: TT-Fed/TT-Reg - 5	A	B	DOTLT1000195	17-4B	$22,000	$181,540	LTRC	Saman Salari	Development of a 4.75mm Asphalt Mixture Design	6/14/2017	6/13/2019	6/30/2021	C-14
SPR: TT-Fed/TT-Reg - 6	A	B	DOTLT1000329	20-2B	$65,326	$92,003	LTRC	Corey Mayeux	Feasibility and Performance of Low Volume Roadway Mixture Design	8/19/2019	8/18/2021		C-15
SPR: TT-Fed/TT-Reg - 6	A	B	DOTLT1000328	20-1B	$57,352	$140,085	LTRC	Corey Mayeux	Evaluate Performance and Life Cycle Cost of Asphalt (8/18 Specifications)	8/19/2019	8/18/2022		C-16
SPR: TT-Fed/TT-Reg - 6	A	B	DOTLT1000321	19-4B	$98,000	$512,939	LTRC	Louay Mohammad	Implementation of Semi Circular Bend Test for QC/QA of Asphalt Mixtures	5/1/2019	4/30/2022		C-17
SPR: TT-Fed/TT-Reg - 6	A	B	DOTLT1000275	19-2B	$87,000	$257,903	LTRC	Louay Mohammad	Development of a Moisture Sensitivity Test for Asphalt Mixtures	5/1/2019	4/30/2021		C-19
SPR: TT-Fed/TT-Reg - 6	A	B	DOTLT1000244	18-5B	$35,000	$132,995	LSU	Mostafa Elseifi	Evaluation of Asphalt Rubber and Reclaimed Tire Rubber in Chip Seal Applications	5/14/2018	5/13/2020	5/31/2021	C-20
SPR: TT-Fed/TT-Reg - 6	A	B	30000112	10-1EMCRF	$130,000	$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-21
					$624,678	**$19,407,290**	**BITUMINOUS BUDGET TOTALS**						
Project Type: Concrete (80% Federal / 20% State)													
SPR: TT-Fed/TT-Reg - 5	A	C	DOTLT1000236	18-3C	$12,000	$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-22
SPR: TT-Fed/TT-Reg - 6	A	C	DOTLT1000333	20-3C	$3,500	$16,557	LTRC	William Saunders	Feasibility and Advantages of Accepting Concrete Other Than 28 Days	10/28/2019	7/27/2020		C-23
SPR: TT-Fed/TT-Reg - 6	A	C	DOTLT1000332	20-2C	$21,500	$82,419	LTRC	Jose Milla	Using the Portable XRF to identify/Verify Field Material Properties	10/1/2019	3/31/2021		C-24
SPR: TT-Fed/TT-Reg - 6	A	C	DOTLT1000331	20-1C	$59,000	$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
SPR: TT-Fed/TT-Reg - 6	A	C	DOTLT1000155	17-1C	$84,000	$467,176	LTRC	Jose Milla	Effect of Clay Content on Alkali-Carbonate Reactive (ACR) Dolomitic Limestone	11/1/2016	6/29/2018	2/28/2021	C-26
					$180,000	**$756,324**	**CONCRETE BUDGET TOTALS**						
Project Type: Geotechnical (80% Federal / 20% State)													
SPR: TT-Fed/TT-Reg - 5	A	GT	DOTLT1000346	20-3GT	$104,000	$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-27
SPR: TT-Fed/TT-Reg - 5	A	GT	DOTLT1000337	20-2GT	$100,700	$300,331	LTRC	Murad Abu-Farsakh	Instrumentation and Modeling of Geosynthetic Load Transfer Platform Performance	1/1/2020	6/30/2022		C-29

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

SPR: TT-Fed/TT-Reg - 5	A	GT	DOTLT1000285	19-2GT	$55,551	$184,108	LTRC	Nick Ferguson	Quality Control/Assurance on Base Course and Embankment with the Dynamic Cone Penetrometer	9/1/2018	2/29/2020	2/28/2021	C-31
SPR: TT-Fed/TT-Reg - 5	A	GT	DOTLT1000226	18-4GT	$78,485	$189,925	LTRC	Gavin Gautreau	Geotechnical Asset Management for Louisiana	5/1/2018	10/31/2019	6/30/2021	C-32
SPR: TT-Fed/TT-Reg - 5	A	GT	DOTLT1000165	17-2GT	$49,000	$380,015	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	3/31/2021	C-34
SPR: TT-Fed/TT-Reg - 5	A	GT	DOTLT1000112	16-6GT	$74,200	$476,813	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-36
SPR: TT-Fed/TT-Reg - 5	A	GT	DOTLT1000103	13-3GT	$35,000	$367,990	LTRC	Murad Abu-Farsakh	Finite Element Analysis of the Lateral Load Test on Battered Pile Group at I-10 Twin Span Bridge	3/1/2016	5/31/2018	9/30/2020	C-38
SPR: TT-Fed/TT-Reg - 6	A	GT	30000111	10-1GERL	$182,000	$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-40
					$678,936	**$18,501,631**	**GEOTECHNICAL BUDGET TOTALS**						

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

SPR: TT-Fed/TT-Reg - 5	A	Other	DOTLT1000215	18-1Other	$291,141	$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-42
SPR: TT-Fed/TT-Reg - 5	A	Other	30000169	11-1AD	$296,000	$3,726,356	LTRC	Vijaya Gopu	Administration of LTRC External Funding Programs	1/1/2008	6/30/2009	6/30/2021	C-44
					$587,141	**$4,583,225**	**OTHER BUDGET TOTALS**						

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

SPR: TT-Fed/TT-Reg - 5	A	P	DOTLT1000271	19-1P	$93,900	$319,896	LTRC	Zhong Wu	Application of Mechanistic-Empirical Pavement Design Approach into RCC Pavement Thickness Design	6/1/2018	11/30/2020		C-46
SPR: TT-Fed/TT-Reg - 5	A	P	DOTLT1000241	18-4P	$53,000	$177,371	LSU	Mostafa Elseifi	Cost-Effective Detection and Repair of Moisture Damage in Pavements	5/1/2018	7/31/2020	5/31/2021	C-47
SPR: TT-Fed/TT-Reg - 5	A	P	DOTLT1000216	18-1P	$38,800	$100,000	LTRC	Zhongjie Zhang	Exploration of Drone and Remote Sensing Technologies in Highway Embankment Monitoring and Management	9/1/2017	8/31/2018	8/31/2020	C-48
SPR: TT-Fed/TT-Reg - 5	A	P	DOTLT1000107	16-6P	$30,000	$220,588	LTRC	Zhong Wu	Quality Management of Cracking Distress Survey in Flexible Pavements Using LTRC Digital Highway Data Vehicle	4/1/2016	3/31/2018	6/30/2021	C-49
SPR: TT-Fed/TT-Reg - 6	A	P	DOTLT1000340	20-4P	$93,864	$402,068	LTRC	Zhong Wu	Assessment of LADOTD's friction aggregate sources through laboratory and accelerated testing	1/1/2020	12/31/2022		C-50
SPR: TT-Fed/TT-Reg - 6	A	P	DOTLT1000272	19-2P	$82,000	$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		C-51
SPR: TT-Fed/TT-Reg - 6	A	P	DOTLT1000218	18-2P	$27,402	$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-52
SPR: TT-Fed/TT-Reg - 6	A	P	30000141	10-1ALF	$495,000	$19,890,536	LTRC	Zhong Wu	Management and Operation of the Pavement Research Facility	7/1/2009	6/30/2015	6/30/2021	C-53
					$913,966	**$21,639,901**	**PAVEMENTS BUDGET TOTALS**						

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

SPR: TT-Fed/TT-Reg - 5	A	SA	DOTLT1000296	19-5SA	$75,282	$151,403	ULL	Elisabeta Mitran	Young Driver Crashes in Louisiana: Understanding the Contributing Factors to Decrease the Numbers	8/1/2019	4/30/2021		C-55
SPR: TT-Fed/TT-Reg - 5	A	SA	DOTLT1000295	19-4SA	$60,173	$116,570	ULL	Xiaoduan Sun	Impact of Center Line Rumble Strips And Shoulder Rumble Strips On All Roadway Departure Crashes in Louisiana Two-Lane Highways	7/1/2019	12/31/2020		C-56
SPR: TT-Fed/TT-Reg - 5	A	SA	DOTLT1000209	18-2SA	$44,733	$175,000	Texas A&M Transportation Institute (TTI)	Eva Shipp	Louisiana's Alcohol-Impaired Driving Problem: An Analysis of Crash and Cultural Factors	8/1/2018	7/31/2020	12/31/2020	C-57
SPR: TT-Fed/TT-Reg - 6	A	SA	DOTLT1000297	19-3SA	$131,604	$240,704	UNO	Tara Tolford, MURP, AICP	Pedestrians and Bicyclists Count, Phase 2: Implementing and Applying Multimodal Demand Data	3/15/2019	3/14/2021		C-58
					$311,792	**$683,677**	**SAFETY BUDGET TOTALS**						

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

SPR: TT-Fed/TT-Reg - 5	A	SS	DOTLT1000280	19-1SS	$222,887	$494,396	ULL	Elisabeta Mitran	LTRC Proposal for the Support of Research and Development in Special Studies	7/1/2019	6/30/2021		C-60
SPR: TT-Fed/TT-Reg - 5	A	SS	DOTLT1000281	19-1ITS	$93,043	$872,706	ULL	Julius Codjoe	LTRC Proposal for the Support of Research and Development in ITS/Traffic	7/1/2019	6/30/2021		C-61
SPR: TT-Fed/TT-Reg - 5	A	SS	30000125	10-1PLAN	$200,000	$8,871,349	LTRC	Chester Wilmot	LTRC Proposal for the Support of Research and Development in Transportation Planning	7/1/2010	6/30/2015	6/30/2021	C-63
					$515,930	**$10,238,451**	**SPECIAL STUDIES BUDGET TOTALS**						

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

SPR: TT-Fed/TT-Reg - 5	A	ST	DOTLT1000343	20-2ST	$14,000	$50,000	Wiss, Janney, Elstner Associates, Inc.	Gareth Rees	Skew Detection System Replacement on Vertical Lift Bridges (Phase 1)	3/9/2020	12/8/2020		C-64
SPR: TT-Fed/TT-Reg - 5	A	ST	DOTLT1000342	20-1ST	$70,000	$99,989	LSU	Ayman Okeil	Developing The Load Distribution Formula for Louisiana Culverts	3/1/2020	8/31/2021		C-65
SPR: TT-Fed/TT-Reg - 5	A	ST	DOTLT1000222	18-4ST	$6,520	$137,781	LTU	C. Shawn Sun	Load Rating of Existing Continuous Stringers on Louisiana's Bridges	6/1/2018	8/31/2019	3/1/2021	C-67
SPR: TT-Fed/TT-Reg - 5	A	ST	DOTLT1000099	16-1ST	$288,747	$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	12/28/2020	C-68
SPR: TT-Fed/TT-Reg - 5	A	ST	DOTLT1000043	15-3ST	$11,616	$233,069	West Virginia University	Hota GangaRao	Rehabilitation of Deteriorated Timber Piles using Fiber Reinforced Polymer (FRP) Composites	11/2/2015	11/1/2017	12/31/2020	C-69
					$390,883	**$1,099,751**	**STRUCTURES BUDGET TOTALS**						
					$4,203,326	**$76,910,250**	**SPR: TT-FED/TT-REG ACTIVE BUDGET TOTALS**						

LTRC ANNUAL RESEARCH PROGRAM

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

FISCAL YEAR 2020-2021

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	P	B			$71,000	$270,000	LTRC	Louay Mohammad	Assessment of Long-Term Performance of Louisiana Asphalt Pavements	7/1/2017	6/30/2019		C-71
SPR: TT-Fed/TT-Reg - 5	P	B			$67,000	$135,000	LTRC	Saman Salari	Bonding Evaluation of Asphalt Surface Treatment	7/1/2020	6/30/2022		C-73
SPR: TT-Fed/TT-Reg - 5	P	B			$150,300	$279,000	LTRC	Louay Mohammad	Development of a Cyclic Semi-Circular Bend Test to Evaluate Asphalt Mixture Cracking Resistance at Intermediate Temperature.	7/1/2017	6/30/2019		C-74
SPR: TT-Fed/TT-Reg - 5	P	B			$95,000	$130,000	LTRC	Saman Salari	Evaluation of Saturates/Aromatics/Resins/Asphaltenes (SARA) Fractionation of asphalt binders in Louisiana	7/1/2020	6/30/2022		C-75
SPR: TT-Fed/TT-Reg - 5	P	B			$77,000	$350,000	LTRC	Louay Mohammad	Performance Of Asphalt Pavements Containing Recycled Materials Under Accelerated Loading	1/1/2018	6/30/2020		C-76
SPR: TT-Fed/TT-Reg - 6	P	B			$60,000	$120,000	LSU	Corey Mayeux	A New Generation of Porous Asphalt Pavement - OGFC Support Study	7/1/2020	6/30/2022		C-77
SPR: TT-Fed/TT-Reg - 6	P	B			$113,300	$280,000	LTRC	Louay Mohammad	Development of a Standard Practice for the Design of Durable Open-Graded Friction Course (OGFC) Mixtures with Epoxy Asphalt-Support Study	7/1/2020	6/30/2022		C-78
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	7/1/2020	6/30/2022		C-80
SPR: TT-Fed/TT-Reg - 6	P	B			$213,300	$464,000	LTRC	Corey Mayeux	Improvement of Open-Graded Friction Course (OGFC) Performance and Durability through Materials, Design, and Maintenance	7/1/2019	6/30/2022		C-81
SPR: TT-Fed/TT-Reg - 6	P	B			$113,500	$280,000	LTRC	Louay Mohammad	Use of an Innovative Recycling Agent for Improving the Sustainability and Durability of Asphalt Pavements	7/1/2020	6/30/2022		C-82
					$1,062,400	**$2,657,000**	**BITUMINOUS BUDGET TOTALS**						
Project Type: Concrete (80% Federal / 20% State)													
SPR: TT-Fed/TT-Reg - 6	P	C			$27,957	$27,957	LTRC	William Saunders	Field Evaluation of Existing Concrete Overlays	7/1/2020	6/30/2021		C-84
SPR: TT-Fed/TT-Reg - 6	P	C			$57,200	$114,400		Jose Milla	Influence of Aggregate Gradation on Permeability	7/1/2020	6/30/2022		C-85
SPR: TT-Fed/TT-Reg - 6	P	C			$48,500	$97,000	LTRC	Jose Milla	Influence of Internal Curing on Concrete's Permeability in Simulated Field Conditions	7/1/2020	6/30/2022		C-86
SPR: TT-Fed/TT-Reg - 6	P	C			$18,751	$18,751	LTRC	William Saunders	Joint Deterioration Synthesis	7/1/2020	6/30/2021		C-87
					$152,408	**$258,108**	**CONCRETE BUDGET TOTALS**						

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

SPR: TT-Fed/TT-Reg - 5	P	GT	DOTLT1000375	21-1GT	$65,600	$80,000	LTRC	Murad Abu-Farsakh	Internal friction angle of sands with high fines content	7/1/2019	6/30/2020		C-88
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-90
SPR: TT-Fed/TT-Reg - 5	P	GT			$64,580	$64,580	LTRC	Nick Ferguson	Evaluation of Effectiveness of Geophysical Methods in Estimating the Geotechnical Properties of Louisiana Soils	7/1/2020	6/30/2021		C-92
SPR: TT-Fed/TT-Reg - 5	P	GT			$84,907	$200,000	LTRC	Gavin Gautreau	Geotechnical Database, Phase IV	7/1/2020	6/30/2022		C-93
					$239,087	**$394,580**	**GEOTECHNICAL BUDGET TOTALS**						

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

SPR: TT-Fed/TT-Reg - 5	P	P	DOTLT1000376	21-1P	$56,000	$200,000	LTRC	Zhong Wu	Prediction of Road Conditions and Smoothness Using Neural Networks	7/1/2019	6/30/2021		C-95
SPR: TT-Fed/TT-Reg - 5	P	P	DOTLT1000326	20-2P	$80,000	$120,000	LSU	Yong-Cheol Lee	Identifying Flood Prone Roadways in Louisiana using Hydrologic Contour Modeling and Mapping	7/1/2019	12/31/2020		C-97
SPR: TT-Fed/TT-Reg - 5	P	P			$24,924	$50,000	LTRC	Qiming Chen	Synthesis on Pavement Repair/Rehabilitation/Replacement Criteria	7/1/2020	6/30/2022		C-98
SPR: TT-Fed/TT-Reg - 5	P	P			$41,428	$100,000	LTRC	Qiming Chen	The distresses in pavement adjacent to bridge approach slab	7/1/2020	6/30/2022		C-99
SPR: TT-Fed/TT-Reg - 5	P	P			$60,000	$180,000	LTRC	Qiming Chen	Vertical Pavement Movement on Heavy Clay Caused by the Variation of Real Time Climate Data	9/1/2020	3/31/2022		C-100
SPR: TT-Fed/TT-Reg - 6	P	P			$44,834	$100,000	LTRC	Qiming Chen	Correlation of rut depths measured by LTRC's road profiler and Fugro's profiler	7/1/2020	6/30/2022		C-101
SPR: TT-Fed/TT-Reg - 6	P	P			$56,000	$180,000	LTRC	Zhong Wu	Right-sizing Truck registration and Overweight Permit Fees	7/1/2020	12/31/2021		C-102
SPR: TT-Fed/TT-Reg - 6	P	P			$44,409	$150,000	LTRC	Qiming Chen	The quality control of longitudinal joint of asphalt pavement and its effect on pavement performance	7/1/2020	6/30/2024		C-103
					$407,595	**$1,080,000**	**PAVEMENTS BUDGET TOTALS**						

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

SPR: TT-Fed/TT-Reg - 5	P	SA	DOTLT1000373	20-3SA	$69,062	$120,000	LTRC	Julius Codjoe	Minimum Intersection Illumination	1/2/2020	6/30/2021		C-104
SPR: TT-Fed/TT-Reg - 5	P	SA	DOTLT1000344	20-2SA	$75,000	$175,000			Evaluation of Installed Low-Cost Safety Countermeasures for Reducing Severe Intersection Crash Types in Louisiana	11/1/2019	1/31/2021		C-105
SPR: TT-Fed/TT-Reg - 5	P	SA	DOTLT1000341	20-1SA	$77,954	$150,000		Julius Codjoe	Evaluation of Traffic Crash Characteristics on Elevated Sections of Interstates in Louisiana	10/1/2019	3/30/2021		C-107
SPR: TT-Fed/TT-Reg - 5	P	SA	DOTLT1000291	19-2SA	$80,000	$125,000			Determine the Relationship between Lighting Conditions and Fatal and Severe Pedestrian Crashes in Louisiana	10/1/2018	6/30/2022		C-108
SPR: TT-Fed/TT-Reg - 5	P	SA			$75,000	$175,000			A mixed methodology study of driving behavior in Louisiana	10/1/2020	9/30/2022		C-109
					$377,016	**$745,000**	**SAFETY BUDGET TOTALS**						

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

SPR: TT-Fed/TT-Reg - 5	P	SS	DOTLT100037 8	21-3SS	$72,160	$134,209	LTRC	Julius Codjoe	Permitted/Protected versus Protected Left Turns	1/1/2018	12/31/2018		C-110
SPR: TT-Fed/TT-Reg - 5	P	SS			$100,000	$125,000	LSU	Chester Wilmot	Attracting Public Involvement to the Transportation Planning Process and Enhancing Communication of Highway Programming Decisions in Louisiana	1/1/2020	6/30/2021		C-111
SPR: TT-Fed/TT-Reg - 5	P	SS			$76,720	$120,000	LTRC	Julius Codjoe	Develop and Evaluate Performance Measures for Intelligent Transportation Systems (ITS) in Louisiana	1/2/2020	6/30/2021		C-113
SPR: TT-Fed/TT-Reg - 5	P	SS			$60,000	$90,000			Evaluating the Safety, Mobility, and Cost of Work Zone Queue Detection and Warning Systems in Louisiana	7/1/2020	12/31/2021		C-114
SPR: TT-Fed/TT-Reg - 5	P	SS			$80,000	$110,000			Probe Data-Based Work Zone Queue Detection and Warning and Pilot	7/1/2020	12/31/2020		C-115
SPR: TT-Fed/TT-Reg - 5	P	SS			$40,000	$45,000	LTRC	Chester Wilmot	Review of Current Practices in Highway Program Development	9/1/2020	8/31/2021		C-116
SPR: TT-Fed/TT-Reg - 5	P	SS			$218,000	$225,000	LTRC	Chester Wilmot	Testing the Hurricane Evacuation Modeling Package	6/1/2020	9/30/2021		C-117
SPR: TT-Fed/TT-Reg - 5	P	SS			$60,000	$90,000	LTRC	Chester Wilmot	What is the Cost and Benefit of Collecting and Maintaining Non-road and Non-bridge Asset Data?	9/1/2020	11/30/2021		C-118
SPR: TT-Fed/TT-Reg - 6	P	SS	DOTLT100037 7	21-2SS	$80,000	$175,000	LTRC		Evaluate the Impacts of Complete Street Policy in Louisiana	10/1/2020	9/30/2022		C-119
					$786,881	**$1,114,209**	**SPECIAL STUDIES BUDGET TOTALS**						

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

SPR: TT-Fed/TT-Reg - 5	P	TIRE	DOTLT100037 1	21-5TIRE	$28,749	$28,749	ULL		Development of Green Concrete Reinforced with Renewable Chitin Nanowhiskers	7/1/2020	6/30/2021		C-120
SPR: TT-Fed/TT-Reg - 5	P	TIRE	DOTLT100037 0	21-4TIRE	$29,600	$29,600	LSU		Quantifying and Improving Time-Dependent Extreme Event Resilience of Road Networks	7/1/2020	6/30/2021		C-121
SPR: TT-Fed/TT-Reg - 5	P	TIRE	DOTLT100036 9	21-3TIRE	$30,000	$30,000	LTU		Real-Time Monitoring of Health Conditions of Highway Infrastructure in Louisiana Using Self-Powered Damage Identification System	7/1/2020	6/30/2021		C-122
SPR: TT-Fed/TT-Reg - 5	P	TIRE	DOTLT100036 8	21-2TIRE	$30,000	$30,000	LTU		Improving Asphalt Binder Properties Using Recycled Plastics and Crosslinking Agents/Additives	7/1/2020	6/30/2021		C-123
					$118,349	**$118,349**	**TIRE BUDGET TOTALS**						
					$3,143,736	**$6,367,246**	**SPR: TT-FED/TT-REG PROPOSED 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: Pooled Fund (100% Federal)													
SPR: TT-Fed/TT-Reg - 5	P	PF		21-1PF	$180,000	$900,000	LTRC	Tyson Rupnow	Southeast Transportation Consortium - Phase II	7/1/2020	6/30/2025		C-124
					$180,000	**$900,000**	**SPR: TT-FED/TT-REG - 5 PROPOSED BUDGET TOTALS**						
					$180,000	**$900,000**	**POOLED FUND BUDGET TOTALS**						

FISCAL YEAR 2020-2021

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	DOTDLT1000349	21-LTAP	$692,938	$692,938	LTRC	Steve Strength	Local Technical Assistance Program (LTAP)	7/1/2020	6/30/2021		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	DOTLT1000278	19-TDSS	$151,502	$441,453	LTRC	Vijaya Gopu	Training and Development Support Services	7/1/2018	6/30/2021		E-2
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-4
STP: TT-Fed	A	TT	30000320	08-1TSQ	$387,041	$1,140,170	LTRC	MaryLeah Coco	Technology Transfer Program and Operations (LSU)	7/1/2015	6/30/2018	6/30/2021	E-5
					$548,543	**$1,681,623**	**TECHNOLOGY TRANSFER AND TRAINING BUDGET TOTALS**						
STP: TT-Fed	P	TT	DOTLT1000352	21-TTRF	$100,000	$100,000	LTRC	MaryLeah Coco	Technology Transfer Registration Fees	7/1/2020	6/30/2021		E-7
STP: TT-Fed	P	TT	DOTLT1000356	21-PONTIS	$125,000	$125,000	LTRC	MaryLeah Coco	AASHTO PONTIS Agreement	7/1/2020	6/30/2021		E-8
STP: TT-Fed	P	TT	DOTLT1000353	21-COOP	$200,000	$200,000	LTRC	MaryLeah Coco	LA DOTD CO-OP Program	7/1/2020	6/30/2021		E-9
STP: TT-Fed	P	TT	DOTLT1000351	21-2TT	$147,600	$147,600	LTRC	Sam Cooper, Jr.	LTRC Student Worker Program	7/1/2020	6/30/2021		E-10
STP: TT-Fed	P	TT	DOTLT1000350	21-1WDC	$4,262,407	$4,262,407	LTRC	MaryLeah Coco	Workforce Development Contracts	7/1/2020	6/30/2021		E-11
STP: TT-Fed	P	TT	DOTLT1000348	21-1WD	$1,269,680	$1,269,680	LTRC	MaryLeah Coco	Workforce Development	7/1/2020	6/30/2021		E-13
STP: TT-Fed	P	TT	DOTLT1000355	21-1TT	$37,500	$37,500	LTRC	MaryLeah Coco	Technology Transfer and Assistance for Senior Project Courses	7/1/2020	6/30/2021		E-16
STP: TT-Fed	P	TT	DOTLT1000354	21-1TSQ	$364,890	$364,890	LTRC	MaryLeah Coco	Technology Transfer Program and Operations (DOTD)	7/1/2020	6/30/2021		E-17
STP: TT-Fed	P	TT	DOTLT1000357	21-1SWD	$1,520,000	$1,520,000	LTRC	MaryLeah Coco	DOTD Staff Support for Workforce Development	7/1/2020	6/30/2021		E-19
					$8,027,077	**$8,027,077**	**TECHNOLOGY TRANSFER AND TRAINING BUDGET TOTALS**						
					$8,575,620	**$9,708,700**	**STP: TT-FED ACTIVE 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: Structures (100% Federal)													
NSF	A	ST	DOTLT1000101	16-2ST	$60,000	$337,312	LTRC	Vijaya Gopu	Field Monitoring and Measurements Education: A Model for Civil and Environmental Engineering	2/15/2016	8/14/2019	1/31/2020	F-2
					$60,000	**$337,312**	**STRUCTURES BUDGET TOTALS**						
					$60,000	**$337,312**	**SELF-GENERATED ACTIVE BUDGET TOTALS**						

LTRC ANNUAL RESEARCH PROGRAM

Other DOTD Sections (%Federal - Varies / %State - Varies)

FISCAL YEAR 2020-2021

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)													
Planning	A	SS	DOTLT1000372	21-1SS	$45,000	$44,999	UNO	Guang Tian	The Impact of the Louisiana Grade Crossings: A Synthesis and System Analysis	5/14/2020	5/13/2021		G-2
Office of Multimodal Commerce	A	SS	DOTLT1000330	20-1SS	$113,214	$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		G-3
					$158,214	**$329,498**	**SPECIAL STUDIES BUDGET TOTALS**						
					$158,214	**$329,498**	**OTHER DOTD SECTIONS ACTIVE BUDGET TOTALS**						
Project Type: Other (100% Federal)													
Safety	P	Other	DOTLT1000358	21-LRSP	$379,989	$379,989	LTRC	Steve Strength	Louisiana Local Road Safety Program	7/1/2020	6/30/2021		G-4
					$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 2020-2021

Title:	Program Management	Project Status:	Proposed

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

SIO:	DOTLT1000359	Project Start Date:		7/1/2020
Research Project Number:	21-1PM	Completion Date	(original)	6/30/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow			

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$850,134	**Total**		**$850,134**
	(revised)				
Est. Expended to Date			Salaries		$850,134
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

The purpose of this project is to provide for Louisiana Transportation Research Center (LTRC) executive staff salaries. 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
Samuel Cooper, III, Engineer 7
Zhongjie (Doc) Zhang, Engineer 7
Kirk Zeringue, Engineer 7

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Research Program Administration

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Research Program Administration

LTRC Annual Research Program
Fiscal Year 2020-2021

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

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

SIO:	**DOTLT1000362**	Project Start Date:		7/1/2020
Research Project Number:	21-1TTRI	Completion Date	(original)	6/30/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$382,896
	(revised)	
Est. Expended to Date		
FY 2019 - 2020 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2020-2021 Budget		
Total		**$382,896**
Salaries		$382,896
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

The purpose of this project is to document the technology transfer and research implementation efforts of our research staff. Work items include presentation of findings at conferences, presentation of research findings at seminars, preparation of journal articles, webinar presentations, etc.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

More than 30 papers were submitted for publication in various journals and/or presented at the TRB Annual Meeting in Washington, D.C. and other various conferences around the country. Additionally, numerous other papers, journal articles, and final reports were prepared and presented upon to various audiences at multiple venues. Additionally, many LTRC employees participate in specification writing to revise specifications based upon completed LTRC research.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Technology Transfer and Research Implementation

LTRC Annual Research Program
Fiscal Year 2020-2021

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

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

SIO:	**DOTLT1000365**	Project Start Date:		7/1/2020
Research Project Number:	21-1TRS	Completion Date	(original)	6/30/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$299,874
	(revised)	
Est. Expended to Date		
FY 2019 - 2020 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2020-2021 Budget		
Total		**$299,874**
Salaries		$299,874
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Technical Research Surveillance is for administration of LTRC Research Contracts by project engineers, participation on LTRC Project and Report Review Committees, and participation on/in external research activities (panels) such as TRB, ACRP, NCHRP, FHWA, etc.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Technical Research Surveillance. Nearly all LTRC engineers participate on at least on TRB Committee with many also serving on one or more NCHRP Project Panel.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Technical Research Surveillance.

LTRC Annual Research Program
Fiscal Year 2020-2021

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

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

SIO:	**DOTLT1000361**	Project Start Date:		7/1/2020
Research Project Number:	21-1TA	Completion Date	(original)	6/30/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$301,963	**Total**		**$301,963**
	(revised)				
Est. Expended to Date			Salaries		$301,963
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Technical assistance is any assistance provided by LTRC research staff to others in the transportation community and/or the travelling public. The transportation community includes members of DOTD, local engineers, designers, materials suppliers, contractors, etc.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

•19-01TA-SA Impact of Crosswalks Lighting Improvements on Pedestrian Safety - A Literature Review
•19-02TA-SA Golf Carts on Public Roads – Literature Review of Legislation and State of the Practice in the United States
•Self-Consolidating Concrete specification
•902 High Early Strength Concrete specification
•Internally Cured Concrete specification
•Standard plan review
•Geopolymer concrete pipe liner specification
•Roller Compacted Concrete evaluation for Lafayette Consolidated Government
•LA 28 friction testing
•LA 3276 District 04 pavement failure investigation
•LA 1262 District 04 investigation of PCC joint failures
•Livingston Parish flooded roadway investigation
•Bridge deck evaluation manual review
•Laboratory tours
•Bond strength testing on I-20 District 04
•Effect of tack coat materials for OGFC mixtures
•LWT TR procedure
•Trackless Tack coat specification
•Evotherm warm mix asphalt additives as anti-strip product
•pipe corrosion maps
•soil cement cubes, coring & sawing
•Item 401 Aggregate Surface Course Clarification for Sand Clay Gravel
•Consolidation Test Instruction
•HQ Sample extrusion discussion
•Type IL Cement Sources
•Class 2 base stone vs. soil cement
•Large Direct Shear
•Design Build in Shreveport
•Compressive Strength Requirement for Sand Clay Gravel
•Surface Aggregate Stone (AML vs. Contractor Supplied).
•Mosaic Pleistocene
•cement treated base (CTB) and cement stabilized soil for mold and compaction insight – Evaluation of Asphalt Mixtures Resistance to CTB reflective Cracking in the Laboratory.
•Deep Uretek Injection (Free) Vs. Lime injection
•“Iron Ore” Stone with apparent organics.
•Boring log Questions
•Soil Water Characterization Cell (SWCC)
•Rock Testing Questions.
•CORS station connectivity at DOTD HQ
•20-02TA-SS Literature Review of Mileage-Based Road User Fees
•20-01TA-SS Brief Literature Review on the Safety Benefits of Grade Crossing Pavement Markings
•19-03TA-SS Work Zone Queue Detection/Warning Systems
•19-02TA-SS Assessment of Interstate Congestion Based on the NPMRDS: A Case Study of I-12 Near Covington, LA
•19-01TA-SS Evaluating the Effects of Barrier Height on Opposite Direction Rubbernecking
•Ongoing support for DOTD Use Cases of NOMRDS Data and Analytics
•Emulsion and RAP studied for Geotech group in asphalt lab (19-1GT)
•Meeting with Ergon Asphalt and Emulsions, Inc. for issues of emulsion mixes by Saman Salari
•Cores mixture analyzed for MATLAB in asphalt lab – H.010241
•Extraction performed for MATLAB in asphalt lab – H.010241
•Extraction and LWT test for Barry Nunez in asphalt lab
•Variability of In-Line RAP Crushing vs. Pre-Screened RAP Stockpiles
•Coring at Lafayette RCC lanes
•NCHRP 1-61 Site Evaluations in Winnfield, LA
•Materials testing for graduate students from LSU:
•Class demonstration on surface resistivity for CE 4660 class (Infrastructure Condition Assessment)
•Preparation of House Resolution response on surface resistivity specifications (Final Report No. FHWA/LA.19/19-01TA-C)

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Technical Assistance

LTRC Annual Research Program
Fiscal Year 2020-2021

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

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

SIO:	**DOTLT1000366**	Project Start Date:		7/1/2020
Research Project Number:	21-1SSR	Completion Date	(original)	6/30/2021
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 2019 - 2020 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2020-2021 Budget		
Total		**$100,000**
Salaries		$100,000
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

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.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

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

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Staff support for outside research activities.

LTRC Annual Research Program
Fiscal Year 2020-2021

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

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

SIO:	DOTLT1000360	Project Start Date:		7/1/2020
Research Project Number:	21-1LFT	Completion Date	(original)	7/1/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow			

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$19,712	**Total**		**$19,712**
	(revised)				
Est. Expended to Date			Salaries		$19,712
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Research Laboratory and Field Test Support (LFT) is used to track specialized field testing support for the Department, usually the Districts.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Research Laboratory and Field Test Support on about 20 different projects.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Research Laboratory and Field Test Support

LTRC Annual Research Program
Fiscal Year 2020-2021

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

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

SIO:	**DOTLT1000364**	Project Start Date:		7/1/2020
Research Project Number:	21-1NPE	Completion Date	(original)	6/30/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$43,135
	(revised)	
Est. Expended to Date		
FY 2019 - 2020 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2020-2021 Budget		
Total		**$43,135**
Salaries		$43,135
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

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

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

•Cantsink Helical Piles
•Class C Fly Ash
•Soil Chem
•Tire Chips
•Meeting with BASF company representatives for their new products
•Ergon Emulsions
•Isocyanate asphalt modifier
•Protectosil 300S

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Evaluate new products for potential DOTD use.

LTRC Annual Research Program
Fiscal Year 2020-2021

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

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

SIO:	**DOTLT1000363**	Project Start Date:		7/1/2020
Research Project Number:	21-1EQM	Completion Date	(original)	6/30/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$281,089	**Total**		**$281,089**
	(revised)				
Est. Expended to Date			Salaries		$211,089
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	$70,000
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Equipment: Budget covers non-expendable 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 as well as the pavement research facility. Replacement parts do not exceed the $5,000 threshold for FHWA reporting guidelines.

PURPOSE AND SCOPE

The purpose of this project is to track the management of the many research laboratories/facilities that the Louisiana Transportation Research Center (LTRC) oversees. Included in the management of the facilities is accreditation activities and equipment maintenance and upkeep.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

-Maintained accreditation in the Geotechnical, Asphalt, and Concrete research laboratories (Cement and Concrete Reference Laboratory (CCRL) and AASHTO Materials Reference Laboratory (AMRL))
-Maintained equipment in working order per CCRL and AMRL requirements including repair and purchase of replacement equipment as needed
-Completed required Louisiana Department of Transportation (DOTD) Materials Laboratory CO-OP Samples

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Equipment Management

FHWA

Part B SPR Funded Research Program

CONTINUING RESEARCH

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

CSIO:	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 2020-2021 Budget		
Total Cost	(original)	$170,000	**Total**		**$85,000**
	(revised)				
Est. Expended to Date		$23,500	Salaries		$80,574
FY 2019 - 2020 Budget			Consumable Supplies & Materials		$4,182
FY Funds	(original)	$23,500	Equipment	(non-expendable)	
	(revised)		Travel		$244
Est. FY Expenditure		$23,500	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

The support study will evaluate the use of a SER 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.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Project was started in the spring of 2020
Task 1 literature review was started
Task 2 a list of potential asphalt binder suppliers was compiled.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 1 literature review will be continued
Task 2 a list of potential asphalt binder suppliers will be evaluated and modified to collect material for testing.
Task 3 Begin Laboratory DSR-SER testing
Task 4 Begin preliminary Data Analyses

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 2020-2021 Budget**		
Total Cost	(original)	$262,246	**Total**		**$45,000**
	(revised)				
Est. Expended to Date			Salaries		$45,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$10,000	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$10,000	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

In recent years, the asphalt binder industry has aggressively investigated multiple different substitutes as modifiers in asphalt binders such as polymers. The current Superpave PG grading system does not address polymer identification and aging-related polymer degradation issue, while low and intermediate temperature performance grading of asphalt binders requires the use of several specialized equipment, such as, the Dynamic Shear Rheometer (DSR), Bending Beam Rheometer (BBR), ductilometer, Pressure Aging Vessel (PAV), and the Rolling Thin Film Oven (RTFO). Therefore, national research activities have focused on the reduction of equipment, time, material, and effort required to determine the low and intermediate temperature properties of asphalt binders with modifiers. This research is proposed to evaluate alternative methods of testing and specifying low and intermediate temperature properties of asphalt binders with the Dynamic Shear Rheometer.

FISCAL YEAR 2019 - 2020 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: Binder materials is gathered from producers;
-Task 3: Start and progress the binder testing with standard methods in order to be able to make a comparison
-Task 4: Purchasing the required equipment (4mm Spindle) for the low temperature testing with DSR device.

FISCAL YEAR 2020-2021 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;
-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 2020-2021

Title:	**Development of a 4.75mm Asphalt Mixture Design**	**Project Status:**	**Ongoing**

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

SIO:	**DOTLT1000195**	Project Start Date:		6/14/2017
Research Project Number:	17-4B	Completion Date	(original)	6/13/2019
Research Agency:	LTRC	Completion Date	(revised)	6/30/2021
Principal Investigator:	Saman Salari			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$140,674
	(revised)	$181,540
Est. Expended to Date		$159,552
FY 2019 - 2020 Budget		
FY Funds	(original)	$40,866
	(revised)	
Est. FY Expenditure		$18,866

Estimated 2020-2021 Budget		
Total		**$22,000**
Salaries		
Consumable Supplies & Materials		
Equipment	(non-expendable)	$22,000
Travel		
Other		

BUDGET JUSTIFICATIONS

Equipment: The friction tester device will be purchased in the amount of $22,000

PURPOSE AND SCOPE

The objective of this research is to develop a mix design criteria for 4.75 mm NMAS (Nominal maximum aggregate size) mixtures. Criteria targeted in the research will be gradation controls, volumetric property requirements and mechanical tests. The mechanical tests include the Loaded Wheel Track (LWT) test, Semi-Circular Bend (SCB) test, Dynamic Modulus and friction test. Local aggregates and asphalt cements will be evaluated to determine the most economical mix. The primary aggregate types that will be examined are gravel and limestone because of their prevalence in Louisiana. Asphalt binder grades tested will follow Louisiana standard specifications which include, PG 64-22, PG 76-22, and PG 82-22crm (Crumb rubber modified).

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

-Task 1: Literature review completed;
-Task 2: Mixture with Gravel and limestone has been tested for mechanical tests completed;
-Task 3: Report started; and
-Task 4: Majority of the Results have been analyzed.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

-Task 1: report will be submitted;
-Task 2: Analysis of the results will be completed;
-Task 3: Friction polisher will be purchased and mixtures the mixtures will be tested for friction; and
-Task 4: Economical analysis of 4.75 mm nominal maximum aggregate size mixtures will be performed.

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)	8/18/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Corey Mayeux			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$92,003	**Total**		**$65,326**
	(revised)				
Est. Expended to Date		$20,992	Salaries		$65,326
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$48,690	Equipment	(non-expendable)	
	(revised)	$26,676	Travel		
Est. FY Expenditure		$26,676	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

The objective of this research is to evaluate the production practices and construction feasibility of the Louisiana Department of Transportation and Development's (LADOTD'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.

Several different resources will be employed to obtain the data to sufficiently analyze the various aspects of the project. In order to evaluate the production practices of the asphalt mix, samples will be collected from various contractors for laboratory testing; an assessment of construction feasibility can be made based on these findings. The performance data for the low volume roadway pavements will be obtained via window surveys and visual inspections made by the research team. Once the performance of these roadways is analyzed, a correlation may be able to be established with the revised payment schedule.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 1–Literature review has begun and is ongoing.
Task 2–Experimental program was developed and finalized.
Task 3–Data and asphalt sample collection has begun and is ongoing.
Task 4-Laboratory testing has begun and is ongoing.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 1–Continue literature review.
Task 3–Continue data and asphalt sample collection as new mixes are produced for construction.
Task 4-Continue laboratory testing for new mixes that are acquired.
Task 5-Perform data analysis after laboratory testing has been conducted.
Task 6–Preparation of a draft project report

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 2020-2021 Budget		
Total Cost	(original)	$140,085	**Total**		**$57,352**
	(revised)				
Est. Expended to Date		$18,295	Salaries		$57,352
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$48,690	Equipment	(non-expendable)	
	(revised)	$24,000	Travel		
Est. FY Expenditure		$24,000	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

The objective of this research is to analyze and compare the performance of asphalt pavements constructed using specifications from the 2006 LA SRB to pavements built under the 2016 LA SRB specifications 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 to determine if the specifications changes have resulted in an increased value.

In order to sufficiently analyze the various aspects of the project, several different resources will need to be employed to obtain the data. The volumetric information for asphalt pavements that utilized the 2006 specification for construction will be obtained from LA DOTD laboratory engineers throughout the state. The performance data for these pavements will be obtained through the Pavement Management System (PMS) along with the Visiweb roadware program. The online pavement management system known as LaPave will be utilized to gather volumetric data for the roadways constructed per the 2016 specification and special provision 8/18. The long-term performance of these paved sections will have to be forecast based on current assessments performed by the PMS. Additionally, asphalt samples will be collected from various contractors in order to conduct volumetric and performance testing in a laboratory setting.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 1–Literature review has begun and is ongoing.
Task 2–Experimental program was developed and finalized.
Task 3–Data and asphalt sample collection has begun and is ongoing.
Task 4-Laboratory testing has begun and is ongoing.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 1–Continue literature review.
Task 3–Continue data and asphalt sample collection as new mixes are produced for construction.
Task 4-Continue laboratory testing for new mixes that are acquired.
Task 5-Perform data analysis after laboratory testing has been conducted.

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 2020-2021 Budget		
Total Cost	(original)	$512,939	**Total**		**$98,000**
	(revised)				
Est. Expended to Date		$150,000	Salaries		$88,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$130,000	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$130,000	Other		$10,000

BUDGET JUSTIFICATIONS

Other: These fund will cover the cost of DOTD laboratory technicians for securing cores amd loose mixtures from projects throughout the state as per the scope of the study.

PURPOSE AND SCOPE

During asphalt mixture design, the 2016 Louisiana DOTD Specifications for Roads and Bridges (hereinafter referred to as the Specifications) specify a criteria for the critical strain energy release rate (denoted as Jc) obtained from the SCB test for different traffic levels. Typically, the SCB test is performed on compacted samples that are conditioned according to AASHTO R 30, Standard Practice for Mixture Conditioning of Hot Mix Asphalt (5 days at 85°C). The purpose of this conditioning process is to simulate the long-term aging (LTA) in the laboratory of the mixture that occurs during the service life of the pavement in the field. However, the practices of QC/QA are time-sensitive. Thus, it is impractical to include LTA SCB samples during QC and QA testing. It is anticipated that this research will develop a scaling scheme to transfer the SCB Jc of unconditioned samples to that of the R30 LTA samples. The proposed approach requires no conditioning procedure for plant-produced asphalt mixture samples, which makes it practical for implementation of SCB in QC/QA testing. A minimum of 15 field projects throughout the State with a good plant record of mixture consistency will be identified and selected. The selected projects are expected to encompass a range of material types. Laboratory compacted and field cores will be conditioned to obtain a series of progressive aging intensities and then evaluated using the SCB test. A suite of bonder and mixture experiments wil be performed to achieve the objective of the study

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 1 - Conduct Literature Review: Collected data from a variety of sources to review the completed and on-going studies pertaining to the evolution of rheology and chemistry of asphalt binders subjected to progressive oxidative aging.
Task 2: Identify field projects and collect mixtures and field cores: Five field projects were selected. Mixtures and component materials were collected
Task 3 - Conduct laboratory experiments and perform data analysis: the five asphalt mixtures of Tsk 2 were conditioned (aged) 85ºC or 0-, 2-, 5-, 7-, and 10-days. Conditioned samples were subjected to Semi Circular Bend test according to ASTM D 8044. Asphalt binders were extracted and recovered from each aged mixture (0-, 2-, 5-, 7-, and 10-days). Recovered asphalt binders were then subjected to a suite of rheological tests including performance grading, frequency sweep, Linear Amplitude Sweep, and Multiple Stress Creep and Recovery tests. Data analysis were performed and relevant material parameters were computed and will be used in the development of the SCB critical strain energy release parameter, Jc.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES
Task 1 – Conduct Literature review: Continue reviewing the existing findings related to oxidative aging of asphalt binders and mixtures, especially the parameters or indices that have been used to track the material state under aging. Task 2 – Identify Field Projects and Collect Mixtures and Cores: Continue to identify and collect the materials and samples as per the scope and factorial of the study. Task 3 – Conduct of Laboratory Experiments and Perform Data Analysis: Continue conduct the laboratory long-term aging, SCB test, asphalt extraction and recovery, and rheological and chemical characterization on the recovered asphalt binders. A database will be created and continue to be updated with Jc and all the parameters for the asphalt binder properties, aggregate characteristics, and asphalt mixture volumetrics. Task 4 – Develop SCB Jc scaling model: Both statistical regression and artificial neural network (ANN) techniques will be explored with the attempt to develop predictive models for the SCB Jc.

Title:	Development of a Moisture Sensitivity Test for Asphalt Mixtures	Project Status:	Ongoing

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

SIO:	DOTLT1000275	Project Start Date:		5/1/2019
Research Project Number:	19-2B	Completion Date	(original)	4/30/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Louay Mohammad			

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$257,903	**Total**		**$87,000**
	(revised)				
Est. Expended to Date		$158,000	Salaries		$87,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$137,500	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$137,100	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Moisture induced damage of asphalt mixtures is a significant distress affecting not only the long-term performance of asphalt pavements, but also the safety of traveling public. The issue has been studied extensively for decades by numerous researchers), and standard test methods have been used to evaluate the moisture sensitivity of asphalt mixtures. The modified Lottman test (AASHTO T283-Standard Method of Test for Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage) is one of the most widely used methods, which uses the tensile strength ratio (TSR) of moisture conditioned specimen to dry specimen to evaluate the moisture sensitivity. Several studies indicated that the TSR is not a consistent and reliable indicator of moisture sensitivity of asphalt mixtures. Moreover, the moisture conditioning procedure of the modified Lottman test have been also criticized for the impracticality and incapability of simulating the moisture damage in field. The objective of this study is to develop a new standardized fracture mechanics-based laboratory test procedure to evaluate the moisture of asphalt mixtures

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 1- Conduct Literature Review: This task is complete;
Task 2- Perform material selection and mixture design: Four 12.5mm Level 2 asphalt mixtures have been designed;
Task 3- Prepare compacted laboratory test specimens: Samples from Task 2 mixtures were prepared and conditioned (1 and 3 freeze/thaw cycles, 3500 and 7000 MIST cycles);
Task 4- Perform Laboratory Tests – TSR Modified Lottman, Semi Circular Bend, and Loaded Wheel Tracking Tests were conducted on mixtures of Task 2. Further, Boil and calorimeter test were conducted as per project scope. In addition, rheological and chemical tests were performed on binders of Task 2 mixtures; and
Task 5- Perform data analysis: Preliminary statistical analysis has been performed on asphalt mixture and asphalt binder test data to identify influencing factors considered in the project scope

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 2- Perform material selection and mixture design
Continue Conduct of material selection and mixture design as per test factorial;
Task 3- Prepare compacted laboratory test specimens
Continue to prepare asphalt mixtures samples as proposed in the experimental factorial;
Task 4- Perform Laboratory Tests
Continue to conduct experiments on laboratory compacted mixtures; and
Task 5- Perform data Analysis
Continue to compile laboratory test data for subsequent data analysis.

Title:	Evaluation of Asphalt Rubber and Reclaimed Tire Rubber in Chip Seal Applications	Project Status:	Ongoing

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

SIO:	DOTLT1000244	Project Start Date:		5/14/2018
Research Project Number:	18-5B	Completion Date	(original)	5/13/2020
Research Agency:	LSU	Completion Date	(revised)	11/30/2020
Principal Investigator:	Mostafa Elseifi			

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$113,000	**Total**		**$35,000**
	(revised)				
Est. Expended to Date		$74,000	Salaries		$34,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		$1,000
FY Funds	(original)	$50,000	Equipment	(non-expendable)	
	(revised)	$55,000	Travel		
Est. FY Expenditure		$31,000	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

The objective of this study is to improve the durability and to extend the life of chip seal applications in Louisiana using rubber-modified emulsion and reclaimed rubber tires in the aggregate layer. To achieve the objectives of this study, the proposed research activities are divided into seven research tasks as follows:
-Task 1: Review of state practices in the use of asphalt rubber chip seals;
-Task 2: Development of job mix formula for rubberized chip seal;
-Task 3: Laboratory performance evaluation of asphalt rubber chip seals;
-Task 4: Field trials of asphalt rubber chip seals in pavement preservation;
-Task 5: Evaluation of construction and short-term performance of rubberized chip seals;
-Task 6: Cost-benefit analysis of rubberized chip seal; and
-Task 7: Prepare and submit final report.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

The following milestones have been completed during the 2019/2020 fiscal year:
- The original laboratory program is complete. The research team has decided to expand the original experimental program and is currently evaluating a high-performing asphalt emulsion (CHFRS-2P) with crumb rubber. In addition, a second source of aggregate from District 05 will be evaluated to ensure that the results are applicable to the different districts and conditions in Louisiana.
- A test section was constructed in District 58. The short-term performance of this test section is currently being evaluated periodically.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

The following research activities are proposed for the 2020/2021 fiscal year:
- The modified laboratory experimental program will be completed including the additional emulsion and the second source of aggregate.
- The performance of the test section will be monitored and reported to the PRC.
- The cost-effectiveness of the different emulsions will be estimated based on the results of the study.

LTRC Annual Research Program
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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)	6/30/2021
Principal Investigator:	Louay Mohammad			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$345,000
	(revised)	$17,657,579
Est. Expended to Date		$142,000
FY 2019 - 2020 Budget		
FY Funds	(original)	$147,000
	(revised)	
Est. FY Expenditure		$142,000

Estimated 2020-2021 Budget		
Total		**$130,000**
Salaries		$124,000
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		$6,000
Other		

BUDGET JUSTIFICATIONS

Travel: EMCRF staff to attend the following conferences
TRB: PI and twos Research Associates (3*1,500) = 4,500
AAPT: $1,500

PURPOSE AND SCOPE

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 in Louisiana. EMCRF plays an important role in the evaluation of the engineering properties of materials used in the LTRC's regional pavement testing facility, ALF. In addition, EMCRF provides specialized analytical expertise for on-going as well as newly initiated in-house research projects; develops new software to be used by DOTD engineers; provides experimental design and analysis; provide training for DOTD employees for the purpose of adopting newly developed technology and implementation methodology into the daily operations of DOTD, and, assists in-house LTRC investigators to develop thorough research programs.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Participated in the Louisiana DOTD Part five and ten Specifications Committee;
Developed and submitted proposals to LEQSF, NCHRP and FHWA; and
Participated in several technical assistance projects.

FISCAL YEAR 2020-2021 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)	
Principal Investigator:	Gabriel Arce			

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$27,404	**Total**		**$12,000**
	(revised)				
Est. Expended to Date		$15,000	Salaries		$10,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$10,000	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$10,000	Other		$2,000

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

The proposed project is focused on the development of a performance prediction model as a tool for the design of UTW-ECC systems. The performance prediction model will be validated through a full-scale test. Moreover, a cost-effective Engineered Cementitious Composites (ECC) mix design utilizing locally available materials will be produced to address the deficiencies in ordinary concrete materials utilized in UTW systems. Furthermore, the study will focus on the implementation of ECC in the transportation sector by conducting a cost analysis contrasting current UTW systems with the proposed UTW-ECC system.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 1: We developed an ECC material for specific UTW overlay applications utilizing local materials.
Task 2: We evaluated the fatigue performance of the UTW-ECC material produced.
Task 3: We worked on developing an UTW-ECC overlay performance prediction model based on the integration of fatigue performance data and finite element analysis (FEA).
Task 4: We constructed a full-scale UTW-ECC overlay system in the DOTD Pavement Research Facility.
Task 5: We conducted a cost analysis of the construction of jointless UTW-ECC compared to traditional jointed UTW overlays.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 3: Continue the development of the UTW-ECC overlay performance prediction model based on the integration of fatigue performance data and finite element analysis (FEA).
Task 4: Evaluate the full-scale UTW-ECC overlay system in the DOTD Pavement Research Facility.
Task 6: Develop preliminary guidelines for a specification on UTW-ECC overlays in the state of Louisiana.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	Feasibility and Advantages of Accepting Concrete Other Than 28 Days	Project Status:	Ongoing

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

SIO:	DOTLT1000333	Project Start Date:		10/28/2019
Research Project Number:	20-3C	Completion Date	(original)	7/27/2020
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	William Saunders			

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$16,557	**Total**		**$3,500**
	(revised)				
Est. Expended to Date		$9,637	Salaries		$3,500
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$13,000	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$13,000	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

This study seeks to thoroughly document and evaluate the current state of knowledge and best practices for investigating the acceptance of concrete at times other than 28 days, which could potentially improve the understanding of concrete performance and service life. The scope of the research will include an overview of both the private and public sector and consider important material properties and test methods of concrete as they relate to strength and durability.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

-Task 1: Literature Review
-Task 2: Determination of Best Practices

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

-Task 3: Compilation of Methodologies
-Task 4: Final Report and Technical Summary

LTRC Annual Research Program
Fiscal Year 2020-2021

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)	
Principal Investigator:	Jose Milla			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$82,419
	(revised)	
Est. Expended to Date		$17,251
FY 2019 - 2020 Budget		
FY Funds	(original)	$70,000
	(revised)	$60,650
Est. FY Expenditure		$59,651

Estimated 2020-2021 Budget		
Total		**$21,500**
Salaries		$21,500
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Certain materials such as cement / concrete, limestone, thermoplastic, glass beads, and bridge coatings must be sent into the central laboratory for further characterization. These tests can be time-consuming, expensive, and in some cases use hazardous chemicals and methods. This study will utilize a portable X-ray Fluorescence (XRF) unit as a potential solution to quickly determine some of these properties in the field on in-place materials, and report on its efficiency compared to the traditional benchtop XRF. In addition, the use of a portable Attenuated Total Reflection Fourier Transform Infrared (ATR FTIR) spectrometer will be explored for in-situ concrete characterization.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 1: Started literature review; and
Task 2: Started developing a methodology to use a portable XRF device
XRF equipment was also purchased.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

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

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	Evaluation of the Miniature Concrete Prism Test (MCPT) for use in LADOTD	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 2020-2021 Budget		
Total Cost	(original)	$162,768	**Total**		**$59,000**
	(revised)				
Est. Expended to Date		$27,200	Salaries		$58,750
FY 2019 - 2020 Budget			Consumable Supplies & Materials		$250
FY Funds	(original)	$52,500	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$44,193	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

The Miniature Concrete Prism Test (MCPT) was developed to speed the time required to run the concrete prism test (CPT) per ASTM C1293. Industry would like the Louisiana Department of Transportation and Development (LADOTD) to explore its suitability for use and to implement if feasible. In addition, performance information is needed to determine the presence and or extent of any Alkali-Silica Reaction (ASR) deterioration of concrete. Performance history is first consideration in the AASHTO PP65 process.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 1: Started literature review; and
Task 2: Initiated a survey to assess how stakeholders have mitigated or addressed ASR issues

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 2: Complete survey and disseminate to stakeholders for responses
Task 3: Prepare mixes and begin comparative testing for both MCPT and CPT methods.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Effect of Clay Content on Alkali-Carbonate Reactive (ACR) Dolomitic Limestone**	**Project Status:**	**Ongoing**

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

SIO:	**DOTLT1000155**	Project Start Date:		11/1/2016
Research Project Number:	17-1C	Completion Date	(original)	6/29/2018
Research Agency:	LTRC	Completion Date	(revised)	2/28/2021
Principal Investigator:	Jose Milla			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$467,176	**Total**		**$84,000**
	(revised)				
Est. Expended to Date		$178,500	Salaries		$84,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$60,000	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$55,500	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

This project will investigate the hypothesis that clay content plays and overarching role in ACR expansion and deterioration. Concrete beams will be produced and tested in long term ACR expansion.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

-Task 3: screened and acquire more aggregate sources as they become available; and
-Task 4: prepared mixtures and conducted length change testing. Most length change testing is complete.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

-Task 3: screen and acquire more aggregate sources as they become available; and
-Task 4: prepare mixtures and length change testing.
-Task 5: continue data analysis and organization for final report.

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 2020-2021 Budget		
Total Cost	(original)	$300,302	**Total**		**$104,000**
	(revised)				
Est. Expended to Date			Salaries		$101,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		$3,000
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement
Due soft nature of Louisiana soils, pavements are often build over weak subgrade soils, which is often associated with many construction difficulties, which poses challenge to pavement engineers. The current practice in Louisiana is to stabilize/treat the weak subgrade with cement or lime to create a working platform through improving the strength/stiffness of subgrade. Geosynthetics can offer a cost-effective alternative solution to this problem by reinforcing/stabilizing base/subgrade of roads. Although the benefits of using geosynthetics in pavements as base reinforcement or subgrade stabilization, have been widely recognized, the mechanism of reinforcement is still not fully understood. There is no nationally accepted design method for flexible pavements with geosynthetic reinforcement due to lack of proper understanding the mechanisms of geosynthetic reinforcement in pavements, especially in quantifying the geosynthetic benefits.

Objectives
The objectives of this are: a) Develop finite element models to simulate the performance of geosynthetic reinforced pavements of different traffic sections built over subgrade soils of different strength conditions; b) Conduct FE parametric study to evaluate/quantify the effect of different parameters on the benefits of geosynthetic reinforced pavements; c) Conduct sensitivity analysis on the effect of reinforcement properties for pavement sections of low-, medium-, and high-volume traffic; and d) Develop a design method for geosynthetic-reinforced pavements that falls within the context of 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. The findings of this study will help accelerate the construction of pavements over weak and problematic subgrades, and eventually reduce the cost of pavements construction in Louisiana.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 1: Started conducting literature review relevant to experimental, analytical and finite element analysis of geosynthetic reinforced pavements,

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES
Task 1: Conduct comprehensive literature review relevant to experimental, analytical and finite element analysis of geosynthetic-reinforced pavements, and mechanistic-empirical pavement design guideline (MEPDG), Task 2: Develop a finite element numerical model to simulate geosynthetic reinforcement of pavements with different sections and traffic conditions, Task 3: Verify and calibrate the developed FE models using the results of in-box laboratory CPL tests, and results of accelerated load tests conducted on geosynthetic-reinforced sections built at ALF site, Task 4: Start the finite element parametric study.

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				Estimated 2020-2021 Budget		
Total Cost	(original)	$300,331		**Total**		**$100,700**
	(revised)					
Est. Expended to Date		$72,000		Salaries		$97,700
FY 2019 - 2020 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$88,700		Equipment	(non-expendable)	
	(revised)			Travel		$3,000
Est. FY Expenditure		$72,000		Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

A geosynthetic load transfer platform (GLTP) consists of layers of compacted aggregate reinforced with multidirectional geogrids, constructed to transfer embankment loads to deep foundation elements below. Recent projects have necessitated the need for GLTPs in conditions where high embankments build on weak, compressible soils that created concerns of slope stability and excessive settlements over long periods of time. Another example includes an MSE wall where foundation soils would have failed in bearing capacity based on design analyses. The GLTPs are selected to allow for the construction of this wall. In both cases, timber piles are usually used to transfer loads to the foundation soils.

Currently, there are few references available to aid engineers in the design of GLTPs. Guidance was found on the SHRP 2 website, Geotech Tools, as well as a final research paper titled “Design of Bridging Layers in Geosynthetic-Reinforced Column Supported Embankments” published by the Virginia Transportation Research Council by George Filz and Miriam Smith. Filz and Smith produced an Excel spreadsheet to design the reinforcement for the GLTP, which is available for download on VTRC’s website. The GLTP system is a promising solution for use in Louisiana soils. The main objectives of the proposed research study are:

• Monitor the short-term and long-term behavior and performance of GLTPs in the state of Louisiana,
• Evaluate and verify (and may be 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 GLTP for embankment,
• Propose design and construction guidance that are needed to establish the department’s design policies and specification.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 1: Conducted extensive literature review on published works related to GLTP technology and its applications for approaching bridge embankment.
Task 2: Prepared detailed instrumentation plans for two bridge embankment sites: project No. 2375 (Amite R. BR project), and Project No. 1234 (Port Allen Canal Bridge, LA 1).
Task 6: We purchased the PLAXIS 2D software, and started developing finite element (FE) models to simulate the behavior of GLTP on the piles-supported embankment.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES
Task 1: Complete the literature review on published works related to GLTP. Task 2: Look for a third bridge embankment sites for monitoring, and develop the instrumentation plan. Task 3: Instrument the GLTP, embankment, pile foundations at the project site No. 2375 (Amite R. BR project). Task 4: Start monitoring the GLTP at the Amite R. BR project site. Task 5: If construction time allows, we will conduct load tests using heavy weight trucks at Amite R. BR project site. Task 6: Continue developing FE models to simulate the behavior of GLTP on the piles-supported embankment. Task 7: If construction time allows, we will try to verify the FE models using the monitoring results of Amite R. BR project site. Task 8: Start the finite element parametric study.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	Quality Control/Assurance on Base Course and Embankment with the Dynamic Cone Penetrometer	Project Status:	Ongoing

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

SIO:	DOTLT1000285	Project Start Date:		9/1/2018
Research Project Number:	19-2GT	Completion Date	(original)	2/29/2020
Research Agency:	LTRC	Completion Date	(revised)	2/28/2021
Principal Investigator:	Nick Ferguson			

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$125,708	**Total**		**$55,551**
	(revised)	$184,108			
Est. Expended to Date		$129,391	Salaries		$55,551
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$62,852	Equipment	(non-expendable)	
	(revised)	$62,622	Travel		
Est. FY Expenditure		$62,622	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

The purpose of this project is to determine if and how the Louisiana Department of Transportation and development (LADOTD) could utilize the Dynamic Cone Penetrometer (DCP) as a compaction acceptance tool to possibly replace the Nuclear Density Gauge (NDG) for certain pavement layer applications. The project will evaluate and establish appropriate Quality Assurance (QA) specifications for Louisiana. The DCP is a non-nuclear and easy-to-use device that has minimal initial and training costs compared to the NDG. Transitioning away from the nuclear-based device could improve safety, reduce training costs, and reporting efforts.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 1 & 2-A Louisiana DCP specification was developed in comparison of established specifications in other states' Department of Transportation.
Task 3-The project collected site information and created a draft report for the Project Review Committee (PRC).
Task 4-Site information was valuable and compared favorably with other states' DCP acceptance criteria.
Task 5-A draft specification was developed for Louisiana in comparison to two other already established specifications in InDOT (Indiana) and MnDOT (Minnesota).
Task 6-Submitted Technical Report for review and presented to the PRC.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 3-Continue to collect field DCP data from construction projects including embankments.
Task 4-Perform data analysis and further validate Louisiana conclusion/recommendation.
Task 5-Review and finalize a DCP QA specification.
Task 6-Prepare and submit Final Technical Report and Technical Summary.

LTRC Annual Research Program
Fiscal Year 2020-2021

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)	6/30/2021
Principal Investigator:	Gavin Gautreau			

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$138,244	**Total**		**$78,485**
	(revised)	$189,925			
Est. Expended to Date		$111,440	Salaries		$78,485
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$66,053	Equipment	(non-expendable)	
	(revised)	$44,256	Travel		
Est. FY Expenditure		$44,256	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

The Louisiana Department of Transportation and Development (LADOTD) has many elements that compose the transportation system. A management system for assets like retaining walls, slopes, and other geotechnical elements that could affect our highway corridors does not exist within the state.
This project will search how other states manage these items, and develop a system to inventory and store information into a Geotechnical Asset Management Database. The goal is to track the design life of these structures to be more proactive in their life's maintenance.

Starting with low hanging fruit the project will document existing wall locations. Secondly, a rough assessment of how they are performing, then basic construction parameters. Ideally, the research will establish a system to identify and catalog items within the state utilizing the resources of the Districts and Headquarters. The research will identify sensitive elements like: location, height, slope, construction, structure integrity and stability, etc. These elements must be quantified and statistically analyzed to determine the level of risk and repair priority associated with each. Certain elements will have more detailed and complex sensitivity levels, based on available data/method. The researcher will evaluate the sensitivity of each element to identify critical elements and methods for level analysis (ex. Level 1 has no data, Level 2 has some data, Level 3 has good data, Level 4 recommended data level). Then, provide LADOTD with a logical method to evaluate and rate the elements of their existing system and compare those ratings against associated risks as compared to minimum safety standards.

This action plan will guide the LADOTD through a phased implementation of a comprehensive geotechnical asset management system to analyze and manage elements/data. The analysis/management tool will be used to rate and evaluate elements as a highway network, and identify locations of risk (red flags) based on existing and collected information when compared against best practices and acceptable standards.

When the threat analysis/management tool combines the socio-economic consequence of failure, the tool will be used to prioritize risks (red flags) and allocate available funding, and more detailed engineering analysis, to the most critical areas of the highway system in Louisiana.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 1- Meetings were held with departmental staff, including Bridge, Data Collection, and Operations & Maintenance. NCHRP Report 903, Geotechnical Asset Management for Transportation Agencies was received and reviewed. FHWA/ARA/GeoComp also released a report on GAM risk; it was reviewed.

Task 2- The existing DOTD Agile Assets does not have GIS capability and may not be the final home for the GAM data. ArcGIS is proving to be the most logical format with potential to push to Agile in the future. GAM within Louisiana is possible and it will cover Retaining walls, problematic slopes, and other hazards. NCHRP Report 930 provided great insight on the implementation steps.

Task 3- An ArcGIS database was developed and includes retaining walls as a start. Other assets are also being located on separate layers. ArcGIS allows length and location, including Linear Reference System (LRSID) information that allows for walls that are offset from the highway or LRSID data. Additionally wall type, traffic, and height are being collected.

Task 4- An ArcGIS 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 Consequence 3) Mobility/Economic Consequence. These factors combine to create risk scores and an overall level of risk.

Task 5- The webapp 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. This work will be 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.

Task 6- A draft report is underway and will be updated as the project continues. As the rating information is added, we will have more data to crunch and include.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 1- Continue and complete the literature review.
Task 2- Apply Geotechnical Asset Management logic within Louisiana
Task 3- Continue to develop the database.
Task 4- Identify and analyze collected criteria regarding risk ratings and remediation prioritization efforts.
Task 5- Work with Maintenance and Operations regarding implementation strategies.
Task 6- Refine, complete, and submit the Technical Summary and Final Report

Title:	Update the Pile Design by CPT Software to Incorporate Newly Developed Pile-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)	3/31/2021
Principal Investigator:	Murad Abu-Farsakh			

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$455,673	**Total**		**$49,000**
	(revised)				
Est. Expended to Date		$304,200	Salaries		$49,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$105,500	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$102,000	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

A research project (FHWA/LA.99/334) was completed in 1999 to evaluate eight different direct cone penetration test (CPT) methods for estimating the pile resistance in Louisiana, which resulted in implementing three CPT methods into a visual basic software, Louisiana Pile Design based on CPT (LPD-CPT). However, the evaluation was based on estimating the total pile resistance using scanned CPT data (no electronic files), which recently showed discrepancy in estimating frictional and end bearing components of instrumented piles. Since 1999, many new CPT methods have been developed (Eslami & Fellenius, Almeida et al., Powell et al., UWA-05, UF, etc.), and many new pile load tests with electronic CPT data are available that warrant re-evaluating the CPT – pile estimation methods. The effect of scour on pile resistance was not considered. In addition, it is to use data from multi-CPT tests (spatial variation) to estimate the nominal resistance of all piles in the specific project and incorporating the resistance factors needed in the load and resistance factor design (LRFD) for pile design in the LPD-CPT software.

There is a need to re-evaluate the CPT methods including previously evaluated and recent developments for estimating the nominal end bearing resistance, nominal side friction resistance and total resistance of driven piles in Louisiana using the updated pile load test - CPT databases including instrumented piles. The research study will identify the best CPT method, modifications or developing a different CPT method, if needed, to best estimate the pile resistance in Louisiana. The effect of scour depth on pile resistance (overburden pressure) will be incorporated into the selected/developed CPT methods that will be implemented into the LPD-CPT. The LPD-CPT will be modified to include the capability of using multi-CPT data (and possibly soil borings and SPT data) to estimate the nominal pile resistances of all piles in a specific project considering site variation. The LPD-CPT method will also be updated to incorporate the default and user selectable resistance factors for LRFD design of piles. Other software usability enhancements such as cone factor override and batch processing will be implemented.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 1: The literature review on the application of CPT data to estimate pile resistance was completed.
Task 2: We collected a database of 80 pile load tests from LA DOTD along with the CPT data and soil borings, which were used for evaluating the pile-CPT methods.
Task 3: We completed he evaluation of 21 direct pile-CPT methods to estimate pile resistance from CPT data. The methods were ranked based on three different criteria: 1) Mathematical and statistical analysis, 2) multiDimensional unfolding and 3) efficiency from LRFD reliability analysis.
Task 4: An interim report was previously submitted.
Task 5: Resistance factors (ϕ) were calibrated for the top 8 performed pile-CPT methods, in addition to Schmertmann method. An optimized combined design method was developed from the top 8 Pile-CPT methods.
Task 6: Start plan of implementing setup into the Louisiana Pile Design based on CPT (LPD-CPT) software.
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-CPT methods, and started implementing it into the LPD-CPT program.
Task 8: We modified the Schmertmann method. The resistance factors (ϕ) for the top rated 8 pile-CPT methods in addition to Schmertmann and modified Schmertmann were calibrated and implemented into the LPD-CPT software.
Task 9: The computer Analyst worked incorporating some features to the Pile-CPT software with coordination with LA DOTD Geotechnical Group. We collected multi CPT data from 6 sites and multi soil borings from 4 sites for evaluating the different techniques to generate synthetic CPT profile and soil borings data from existing CPT and soil borings.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 6: Work on incorporating the pile-setup into LPD-CPT Software based on results of a previous research study (11-2GT).
Task 8: Calibrate the resistance factor (ϕ) and implement the developed optimized combined design method from the top 8 Pile-CPT methods into the LPD-CPT software.
Task 9: The computer Analyst will continue to incorporate some features to the Pile-CPT software with coordination with LA DOTD Geotechnical Group.
Task 10: Work on evaluating the cost benefit of using the top-ranked direct Pile-CPT methods for design of driven piles in Louisiana.
Task 11: We will prepare a final report and user guide to LA DOTD.

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)	6/30/2021
Principal Investigator:	Murad Abu-Farsakh			

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$476,813	**Total**		**$74,200**
	(revised)				
Est. Expended to Date		$411,743	Salaries		$74,200
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$104,000	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$98,000	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

While structure engineering deals with mostly homogeneous man-made materials, such as concrete and steel, the geotechnical engineering has to cope with highly varied natural materials, soil and/or rock. As a result, high variance of the resistance of geotechnical structures (e.g., foundation, slope, earth retaining structures) is expected due to the horizontal and vertical spatial variation of soil properties at the site. Generally, the in-situ/laboratory testing is carried out at a fixed spacing (e.g., 100 ft), which may be hundreds of feet away from the final constructed geotechnical structures. Compounding this variability problem is the fact that the accuracy and reliability of the measured data sets to be used in the design is sometimes unknown and not controlled. Therefore, geotechnical engineering often deals with many kinds of uncertainties which may result in the either underdesign that can cause failure of geotechnical structures or overdesign with extra cost, if these uncertainties are not considered properly in the design.

The main objective of this research is to evaluate the different sources of geotechnical variability and quantify the variability of soil properties for inclusion in the analysis and design of different geotechnical engineering systems. This generally includes:
1. Evaluating operator-induced variations on design soil properties
2. Evaluating equipment-induced variations on design soil properties
3. Evaluating site/spatial variations of design soil properties
4. Developing QA/QC guidelines for laboratories
5. Incorporating site variability and measurement error into the load and resistance factor design, LRFD, in geotechnical engineering.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 1: Completed literature review relevant to site variability, lab/in-situ testing variability and in-situ testing devices.
Task 2: Conducted 12 in-box tests to study measurement variation of shallow in-situ tests in the lab. Conducted field tests on four project site sections to study measurement variation of shallow in-situ tests in the field. Evaluated lab test variability through conducting selected geotechnical lab tests (e.g., California bearing ratio tests, CBR, unconsolidated undrained, UU, triaxial tests, direct shear tests, DST, consolidation tests, etc.).
Task 3: Collected data from 6 cone penetration test (CPT) sites and 4 soil boring data sites from LA DOTD headquarter for deep foundation site variability evaluation. Conducted field tests on four sections using shallow in-situ testing devices to evaluate site variability. Constructed and tested 12 field sections in the ALF site to study measurement variation of shallow in-situ tests in the field.
Task 4: Evaluated the observations from LA DOTD materials lab for sample handling/preparation and testing practice. Collected data from LA DOTD headquarter for evaluating QC/QA and laboratory/site variability.
Task 5: Conducted analysis on the collected lab and field test data to study site variability. Analyzed the site variability from the 6 CPT and 4 soil boring sites using the Semivariogram approach, and the update to the load and resistance factor design, LRFD, of piles. Started developing a model based on Bayesian algorithm to evaluate the effect of site variability on load and resistance factor design, LRFD, of pile foundations.
Task 6: Collected CPT data and corresponding soil borings from 80 locations. Developed statistical regression correlations between undrained shear strength and cone penetration test, CPT, data. Developed Artificial Neural Network, ANN, models for evaluating the undrained shear strength of soil from CPT Data.

FISCAL YEAR 2020-2021 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 agencies. Task 5: Complete analyzing the site variability from the 6 cone penetration test (CPT) sites and 4 soil boring sites using the semivariogram approach and Bayesian algorithm for applications to deep foundations, slope stability, and shallow foundations. Task 7: Prepare a final report.

Title:	Finite Element Analysis of the Lateral Load Test on Battered Pile Group at I-10 Twin Span Bridge	Project Status:	Ongoing

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

SIO:	DOTLT1000103		Project Start Date:		3/1/2016
Research Project Number:	13-3GT		Completion Date	(original)	5/31/2018
Research Agency:	LTRC		Completion Date	(revised)	9/30/2020
Principal Investigator:	Murad Abu-Farsakh				

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$260,368	**Total**		**$35,000**
	(revised)	$367,990			
Est. Expended to Date		$310,292	Salaries		$35,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$42,000	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$44,000	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

A unique full-scale lateral load test was conducted at M19 pier of the new I-10 Twin Span Bridge over Lake Pontchartrain to assess the current methodology used in the design and analysis of batter pile group foundations and to evaluate their performance under lateral loading. Measurements obtained from instrumentations (inclination and strains) can provide valuable information for use in the analysis of lateral behavior of battered pile foundations and for back-calculating the soils' p-y curves. Two approaches can be used to analyze the lateral behavior of piles: simplified p-y methods and continuum-based FE methods. The simplified methods are based on the theory of subgrade reaction, in which soils surrounding piles are simplified as a set of linear or nonlinear springs resenting the soils' resistances (assumed p-y curves) to lateral movement of piles. With the development of computer softwares, such as LPile and FB-MultiPier, this approach has been widely used for design of laterally loaded piles. However, the p-y method cannot describe the three dimensional nature of the problem, pile geometry, different boundary conditions, continuum behavior of soil, soil-structure interface effect and soil-porewater pressure interaction. The continuum-based FE analysis is desirable for a better understanding of the problem. The continuum-based methods treat the soils surrounding piles as elastic or elasto-plastic continuums using constitutive models that can describe the actual behavior of soils under any loading.

In order to better understand the behavior of batter pile group foundations subjected to lateral loading, we propose to develop a three-dimensional finite element model to analyze the lateral load test that was conducted at M19 pier. The finite element technique is a powerful tool that can simulate the behavior of complex soil-structure interaction problems. The piles and foundation (pile cap) will be simulated as solid elements. The surrounding soils will be treated as a continuum media (instead of springs), representing the actual soil properties and their behavior will be described using the elasto-plastic anisotropic modified cam clay model. The soil-pile interaction will be also simulated using Mohr Coulomb frictional criteria. The finite element model will be first calibrated using the results of full-scale test at M19 pier. Once the model is calibrated, it will then be used to conduct a comprehensive finite element parametric study to evaluate the effect of different variables and parameters on the lateral performance of batter pile group foundations. The results from parametric study will be used to evaluate the group effect of piles (p-multipliers), evaluate the contribution of lateral loads transferred to battered piled in axial direction, and develop p-y curve models that represent the different soil type and conditions in Louisiana for implementing in the FB-MultiPier and other programs for future analysis and design of batter pile group foundations.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 1: Completed the literature review relevant to the lateral behavior of single and group of piles, p-y curves and p-multipliers.
Task 2: Developed several three-dimensional (3D) finite element (FE) models using ABAQUS siftware to simulate the lateral behavior of vertical and battered pile group foundations.
Task 3: The 3D FE numerical models were verified using the results of a full-scale static lateral load test that was conducted at M19 Eastbound pier of the I-10 Twin Span Bridge.
Task 4: Completed the comprehensive FE parametric study to evaluate the effect of several variables on the lateral behavior of battered and vertical pile group foundations as compared to a single vertical pile, in terms of p-y curves and group effect p-multipliers.
Task 5: Developed a 3D FE numerical model using ABAQUS software to study the lateral response of battered pile group foundations subjected to dynamic barge impact.
Task 6: Collected information and literature on developing p-y curves from experimental results and finite element analysis. Developed p-y curves for clayey soils and p-y curves for sandy soils for use in FB-Multipier and Midas softwares.
Task 7: Prepared guidance for the analysis and design of vertical and battered piles subjected to lateral loading.
Task 8: Performed FE analysis to evaluate the contribution of lateral load transferred to the battered piles in axial pile direction.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 9: Prepare and submit the final report.

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)	6/30/2021
Principal Investigator:	Murad Abu-Farsakh			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$523,000
	(revised)	$16,302,147
Est. Expended to Date		$1,989,000
FY 2019 - 2020 Budget		
FY Funds	(original)	$216,300
	(revised)	
Est. FY Expenditure		$223,000

Estimated 2020-2021 Budget		
Total		**$182,000**
Salaries		$137,000
Consumable Supplies & Materials		$30,000
Equipment	(non-expendable)	
Travel		$15,000
Other		

BUDGET JUSTIFICATIONS

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

Travel: Attend TRB Conference for PI and two RAs: 3 x $2250 = $6750
Attend TRB for one graduate student: $2250
Attend Geocongress Conference: $3000
Attend Geosynthetics conference: $3000

PURPOSE AND SCOPE

The objectives of this research are to:
- Perform support studies to meet the beneficiary requirements for geotechnical and geosynthetic testing, technical assistance and research,
- Advance the state-of-the-art in geotechnical and geosynthetic research,
- Maintain laboratory testing equipment,
- Maintain in-situ testing devises and measuring/monitoring instruments,
- Provide development, support and training of new and innovative techniques, software and equipment for advancing the performance of the transportation system, and
- Develop problem statements and research proposals.

FISCAL YEAR 2019 - 2020 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 "Instrumentation and Modeling of Geosynthetic Load Transfer Platform Performance",
- Developed research proposal on "Development of a Design Methodology for Geosynthetic Reinforced Pavement using Finite Element Numerical Modeling",
- Published several technical papers and proceedings on findings of LTRC research projects,
- Attended several engineering workshops and conferences,
- Maintained laboratory testing equipment,
- Maintained in-situ testing devises and measuring/monitoring instruments,
- Maintained software related to CPT application.

FISCAL YEAR 2020-2021 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 " Internal Friction Angle of Sands with High Fines Content", - Develop research proposal on "Evaluation of Effectiveness of Geophysical Methods in Estimating the Geotechnical Properties of Louisiana Soils", - Publish research findings on technical papers, proceedings and reports, - Maintain laboratory testing equipment, - Maintain in-situ testing devises and measuring/monitoring instruments, - Maintain and upgrade the CPT software.

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)	6/30/2021
Principal Investigator:	Adele Lee			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$352,390
	(revised)	$856,869
Est. Expended to Date		$306,678
FY 2019 - 2020 Budget		
FY Funds	(original)	$285,587
	(revised)	$124,000
Est. FY Expenditure		$120,000

Estimated 2020-2021 Budget		
Total		**$291,141**
Salaries		$281,441
Consumable Supplies & Materials		$1,140
Equipment	(non-expendable)	$4,000
Travel		$4,560
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

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

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 1- Project Management Tracking System corrected minor defects. Implemented FHWA annual work program budgetary justification requirements. Improved database error tracking on submissions.
Task 1- Maintained databases, website virtual server, and all LTRC maintained source code and software development environments.
Task 2- Customized software development for research project 17-2GT.
Task 3- Assisted Section 33 personnel with Visual Studio licensing and learning the development environment.
Task 4- Louisiana Transportation Conference 2020 Information Technology Committee Member.
Task 4- GIS expertise and activities supporting research projects 03-1GT upgrade, 16-5GT, 18-3GT, 18-4GT, 18-4SS and 19-3SS.
Task 4- Serve as LTRC liaison to Section 21 and System of Engagement.
Task 4- Maintained GIS server, geodatabases and web services as well as ArcGIS Online web maps, 10 GIS web applications and a Collector GIS fieldwork application.
Task 4- Presented LTRC GIS implementations at the Louisiana Transportation Conference March 2020.
Task 5- Trained, assigned and reviewed source code programming for graduate student on research project 17-2GT.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES
Task 1- Project Management Tracking System correct defects and implement new capabilities. Task 1- Maintain databases, website virtual server, and all LTRC maintained source code and software development environments. Task 1- Upgrade all LTRC maintained custom software source code to the latest Visual Studio development environment version. Task 2- Customized software development for research project 17-2GT. Task 2- Customized software development and upgrade framework for the Dynamic Cone Penetration (DCP) data processing software. Task 3- GIS activities for LTRC project 21-LTAP. Task 4- GIS expertise and activities supporting research projects 03-1GT upgrade, 18-4GT, 17-4SS, 18-4SS, 20-2P and 20-1SS. Task 4- Serve as LTRC liaison to Section 21 and System of Engagement. Begin activities to transfer LTRC GIS footprint from ArcGIS Online framework to System of Engagement Portal online framework. Task 4- Maintain GIS server, geodatabases and web services as well as ArcGIS Online web maps, 10 GIS web applications and a Collector GIS fieldwork application. Task 5- Assign and review source code programming for graduate student on research project 17-2GT. Train and/or hire software development research associate and/or gaduate student(s) on source codes for multiple LTRC software applications.

LTRC Annual Research Program
Fiscal Year 2020-2021

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)	6/30/2021
Principal Investigator:	Vijaya Gopu			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$211,428
	(revised)	$3,726,356
Est. Expended to Date		$2,580,000
FY 2019 - 2020 Budget		
FY Funds	(original)	$286,000
	(revised)	
Est. FY Expenditure		$280,000

Estimated 2020-2021 Budget		
Total		**$296,000**
Salaries		$286,000
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		$10,000
Other		

BUDGET JUSTIFICATIONS

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

PURPOSE AND SCOPE

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

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

- Coordinated the preparation and submission of an NSF EPSCOR Track 2 (National Science Foundation - Established Program to Stimulate Competitive Research) proposal in collaboration with the University of South Carolina and University of Puerto Rico.

- Collaborated with a consortium of universities (Florida International Universy, University of Maine, University of Washington, University of San Diego, and University of Oklahoma) to develop a white paper to enable Congress to establish a program focused on resilience of coastal infrastructure and communities.

- Coordinated the TIRE (Transportation Innovation and Research Exploration) Program and managed the five TIRE projects awarded in 2019;

- Serving as the PI on a NSF award dealing with field monitoring and measurement (FMM) education. Developed educational modules for delivery in CE classes; held a workshop for registered attendees at the ISHMII (International Society for Structural Health Monitoring and Intelligent Infrastructure) Conference held in St. Louis.

-Serving as the PI on a NSF REU site proposal that supports the research experience of ten students during the summer term;

-Served on several NSF proposal review panels and site visit teams dealing w ith CMMI unsolicited program and Engineering Hazard Research Infrastructure Programs at NSF;

-Presented several technical papers dealing with timber bridge performance, fiber reinforced polymer, wind effects on structures, tall timber construction, composites application in infrastructure rehabilitation, and hazard mitigation at national and international conferences.

FISCAL YEAR 2020-2021 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; -Participate in a big data proposal with University of South Carolina research group; -Manage the pool fund study on FRP durability in infrastructure application; -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.

LTRC Annual Research Program
Fiscal Year 2020-2021

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)	
Principal Investigator:	Zhong Wu			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$319,896	**Total**		**$93,900**
	(revised)				
Est. Expended to Date		$217,500	Salaries		$93,900
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$116,700	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$98,000	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

The study will focus on the development of a mechanistic-empirical (M-E) based RCC (roller compacted concrete) pavement thickness design procedure. Results from the study will present design engineers and pavement researchers with tools on the thickness design and performance evaluation of RCC pavements using an M-E pavement design approach. The fatigue damage under different truck axle loads can be quantified as the corresponding load equivalent factors. A detailed design manual will be established, including key input parameters and associated pavement distresses involved in each design steps.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 3: Completed loading on both RCC test sections for more than 300,000 passes. Instrumentation data were collected at different loading cycles using varied load magnitude of static and dynamic loads (e.g. 9, 16, 20, 25 kips). The current estimated equivalent single axle loads (ESALs) for the two RCC sections were 12.3 and 8.9 million, respectively.
Task 4: Cores used to verified as-built RCC thicknesses; Pavement surface distress survey was performed and cracks on one test section (8" RCC + 12" cement treated base) was mapped.
Task 5: Continued to develop RCC pavement prediction model using the finite element approach (FEA). The results from the FEA model were compared to those measured from the embedded fiber optic sensors; Submitted one technical paper to an international conference.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 1: More literature will be reviewed on instrumentation and M-E design of RCC pavements.
Task 3: Continue loading of RCC test section till pavements reach to the threshold of fatigue cracking failure.
Task 4: Cut trenches on failed RCC pavements and investigate possible failure modes and cracking initiation. Perform lab fatigue beam tests to determine the fatigue endurance of RCC mixtures used.
Task 5: Complete the development of Mechanistic-Empirical based FEA models for RCC pavements.
Task 6: Develop a M-E base RCC pavement thickness design and analysis approach.
Task 7: Prepare and submit final report and technical summary.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	Cost-Effective Detection and Repair of Moisture Damage in Pavements	Project Status:	Ongoing

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

SIO:	DOTLT1000241	Project Start Date:		5/1/2018
Research Project Number:	18-4P	Completion Date	(original)	7/31/2020
Research Agency:	LSU	Completion Date	(revised)	5/31/2021
Principal Investigator:	Mostafa Elseifi			

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$157,376	**Total**		**$53,000**
	(revised)	$177,371			
Est. Expended to Date		$124,365	Salaries		$53,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$58,000	Equipment	(non-expendable)	
	(revised)	$80,000	Travel		
Est. FY Expenditure		$89,587	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

The objective of this research is to evaluate existing Ground Penetrating Radar (GPR), Rolling Wheel Deflectometer (RWD), and Traffic Speed Deflectometer (TSD) data in order to detect stripping and moisture-induced damage in pavements. In addition, the researchers will evaluate test
methods including Ground Penetrating Radar (GPR) and that may identify top-down cracking without coring. Furthermore, the researchers will analyze the performance and cost-effectiveness of treatment methods against moisture-induced damage. Maintenance and rehabilitation methods will include an overlay of stripped pavements with and without removal, chip seal, and micro surfacing. Performance of past projects as depicted from the Pavement Management System (PMS) data will be used to assess the effectiveness of these techniques.
Research Tasks:
-Task 1: A literature review of methods of detection and repair of moisture damage in pavements;
-Task 2: Review available Pavement Management System (PMS) and GPR data for stripping and top-down/bottom-up cracking;
-Task 3: Analysis of RWD and TSD measurements for stripping detection and other types of distress;
-Task 4: Analysis of PMS data to assess performance and cost-efficiency of pavement maintenance and rehabilitation techniques against moisture damage; and
-Task 5: Prepare the final report to present the results and recommendations of the study.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

The following milestones have been achieved in the fiscal year 2019/2020:
- Task 2: A methodology was developed for the detection of top-down cracking based on surface image analysis and pavement characteristics. A software interface was also developed to assist in the implementation of the methodology by LaDOTD.
- Task 3: The use of RWD and TSD measurements for the detection of stripping is completed. A paper was prepared and is currently under review.
- Task 4: The cost-effectiveness of different maintenance and rehabilitation methods was evaluated with and without stripping. A paper will be prepared this summer.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

The following research activities will be completed in the 2020/2021 fiscal year:
Task 2: A complete analysis of the GPR data for flexible pavements and their use in detecting subsurface stripping.
Task 2: Analysis of GPR data for rigid pavement and their use in detecting air voids.
Task 2: Analysis of digital images to estimate pavement roughness.

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)	8/31/2020
Principal Investigator:	Zhongjie Zhang			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$50,000
	(revised)	$100,000
Est. Expended to Date		$61,200
FY 2019 - 2020 Budget		
FY Funds	(original)	$35,000
	(revised)	$51,000
Est. FY Expenditure		$51,000

Estimated 2020-2021 Budget		
Total		**$38,800**
Salaries		$38,800
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

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 (LADOTD) can only respond to them after the fact with costly remediation. 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.
The budget of this project is for LTRC Lab technicians' activities.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 1: Continued the literature search and review on the applications of remote sensing and drone technologies in civil and geotechnical engineering.
Task 2: Identified available remote sensing/sensors technologies with potential to be used in this study.
Task 4: Data Collection. Have finished the lab evaluation of two cameras and better understand the performance of the cameras and how the cameras' reading related to soil moisture content. Now we are working with the aviation section of LA DOTD and use their drone to test our cameras and collect field testing images at our testing site.
Task 5: Processed and analyzed the collected data. The preliminary results are promising and we will have more flying times to collect more image data.

FISCAL YEAR 2020-2021 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: Select field embankment testing sites.
Task 4: Data Collection. We will continue our field testing flights at our site 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.

Title:	Quality Management of Cracking Distress Survey in Flexible Pavements Using LTRC Digital Highway Data Vehicle	Project Status:	Ongoing

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

SIO:	DOTLT1000107		Project Start Date:		4/1/2016
Research Project Number:	16-6P		Completion Date	(original)	3/31/2018
Research Agency:	LTRC		Completion Date	(revised)	6/30/2021
Principal Investigator:	Zhong Wu				

BUDGET STATUS

Total Budget				Estimated 2020-2021 Budget		
Total Cost	(original)	$170,588		**Total**		**$30,000**
	(revised)	$220,588				
Est. Expended to Date		$189,138		Salaries		$30,000
FY 2019 - 2020 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$13,990		Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure		$13,000		Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

The primary objectives of this research are to compare and validate cracking survey results on selected flexible pavements obtained from the LTRC data collection system and from the Louisiana current contracted application; to investigate the feasibility of converting the existing PMS cracking data to comply with the MEPDG definition of cracking; and to recommend a cracking analysis procedure for flexible pavements using LTRC's Digital Highway Data Collection System.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 4: Completed the validation between the manual vs. LTRC automated cracking measurements, and between the manual and DOTD's pavement management system (PMS) cracking measurements; The analyses including the False Positive and Missing Cracks as well as Precision vs. Accuracy were conducted and recommendations were provided.

Task 6: Conducted an analysis of comparing the automated 3-D cracking data to related automated 2-D cracking data for a group of selected projects in PMS.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 7: Provide Recommendations to DOTD engineers on how to incorporate PMS automated cracking data into a project-level pavement performance analysis possibly by providing the manual vs. automated adjust factors or coefficients; Develop and implement a cracking analysis program for LTRC's high-speed data vehicle system for future cracking data collection.

Task 8: Prepare and submit final report and technical summary

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 2020-2021 Budget		
Total Cost	(original)	$402,068	**Total**		**$93,864**
	(revised)				
Est. Expended to Date		$10,000	Salaries		$90,864
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$82,500	Equipment	(non-expendable)	$3,000
	(revised)	$50,000	Travel		
Est. FY Expenditure		$43,000	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

The proposed study will focus on the formalization of the use of pavement skid testing to better utilize aggregates and achieve a desirable skid value for the life of the pavement. Additionally, this study will determine if the Dynamic friction tester (DFT) provides more reliable friction characteristics of aggregates than the British Pendulum tester (BPT) which is currently used by DOTD. To achieve the objectives, a comprehensive laboratory and field friction test program will be proposed and conducted in this research project. Results of this study will provide a list of threshold friction design values (i.e., DFT and mean profile/texture depth values) for commonly-used wearing course mixtures in Louisiana, and lead to propose a new aggregate friction testing procedure for DOTD, which can be used for initial source approval as well as for predicting field friction performance of aggregates used in a wearing course mixture.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

-Task 1: A comprehensive literature review was conducted on surface friction requirement /characteristics, lab and field friction evaluation, and prediction of related friction parameters.
-Task 2: Acquired two pieces of portable friction measurement devices: a Dynamic Friction Tester (DFT) device and a Circular Track Meter (CTM). A training course on operating both DFT and CTM has been scheduled.
-Task 3: A laboratory testing plan has been set up for the DFT and polish stone value (PSV) tests; One coarse aggregate source has been identified and ready for picking up materials.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

- Task 1: Continue the literature review on the prediction of pavement surface friction characteristics based on DFT, CTM and other parameters.
- Task 2: Complete the training course on operating both DFT and CTM, and fabricate two steel molds and one steel testing base for coarse aggregate friction test using DFT.
- 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.

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)	
Principal Investigator:	Zhong Wu				

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$319,442	**Total**		**$82,000**
	(revised)				
Est. Expended to Date		$150,000	Salaries		$82,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$93,200	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$84,000	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

DOTD pavement design engineers have encountered several issues with the locally calibrated Pavement ME software, including apparent inability to accommodate stone interlayer; reflective cracking criterion cannot be satisfied for overlay on cement stabilized base; and unreasonable predicted performance for rigid pavement with widened slab or reduced thickness. This research will address these issues. In addition, this study will characterize the performance of various asphalt overlays using both the 1993 AASHTO procedure and Pavement ME method, including an effort to identify approaches for considering the effects of preservation treatments in Pavement ME design.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 1: Performed and completed an in-depth literature review on the history development of the Pavement ME Design software and version changes, structural overlays and pavement preservation strategies;
Task 2: Completed the project selection including roadway segments of new flexible, new rigid and rehabilitation (structural overlay) pavements as well as preservation overlays.
Task 3: Completed pavement manage system (PMS) data collection and analysis; surveyed one pavement preservation project using the LTRC's high speed data vehicle.
Task 4: Re-visited and locally calibrated the Pavement ME version 2.5's new pavement design distress models based on Louisiana pavement condition and performance data; developed a design input strategy for the stone interlayer design used in semi-rigid pavements.
Task 5: Re-calibrated the structural overlay design distress models in Pavement ME 2.5;
Task 6: Evaluated the pavement preservation strategy currently used by DOTD (i.e., 2-in overlay with 2-in milling).

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 3: Continue to perform the pavement performance survey on selected pavement preservation projects using the LTRC's high-speed data vehicle.
Task 4: Continue to investigate the current design issues related to rigid pavement design with widen slabs and reflective cracking issues in soil cement pavements;
Task 6: Evaluate 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: Develop 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: Prepare and submit the final report and technical summary.

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 2020-2021 Budget**		
Total Cost	(original)	$210,000	**Total**		**$27,402**
	(revised)				
Est. Expended to Date		$88,000	Salaries		$27,402
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$38,888	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$36,000	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

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

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 2: Conduct a statewide survey (40% complete)
Task 3: Data mining the Pavement Management Systems database (no work, we need complete Task 2 first)
Task 5. Interim Report (70% complete, instruments have been read twice with only the binder asphalt concrete (AC) course placed. The placement of the AC wearing course has been delayed due to wet weather. A summary of work that occurred during construction has been written)

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 2: Conduct a statewide survey (write survey questions and send to the districts. The survey is to locate previously constructed roadways where stone or rap was placed on top of concrete and then overlaid with AC)
Task 3: Data mining the Pavement Management Systems database (collect distress information on the locations discovered during the statewide survey from Task 2)
Task 5: Interim Report (Once the AC wearing course placed, we will take two more readings: immediately after placement and one year after)

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)	6/30/2021
Principal Investigator:	Zhong Wu			

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$1,730,000	**Total**		**$495,000**
	(revised)	$19,890,536			
Est. Expended to Date		$1,509,000	Salaries		$389,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		$96,000
FY Funds	(original)	$644,500	Equipment	(non-expendable)	
	(revised)	$600,000	Travel		$10,000
Est. FY Expenditure		$500,000	Other		

BUDGET JUSTIFICATIONS

Supplies: The $96,000 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 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, telecommunication, Xerox copier service, student worker assistance, etc.

Travel: -TRB Annual meeting (4 attendees) - $7,500
-The 6th International Conference on Accelerated Pavement Testing (APT) (1 attendee) - $2,500

PURPOSE AND SCOPE

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 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. 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 LADOTD. 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.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

- Completed the ATLaS loading test on three bonded overlay full-scale pavement test sections and submit a final report and technical summary for Project 14-4C; Conducted bond strength tests and trench-cutting on failed pavement sections.
- Conducted loading test on both roller compacted concrete (RCC) test sections for more than 300,000 dual-tire passes of ATLaS30 under a load magnitude of 9, 16 or 18-kips, which would be equivalent to 12.3 and 8.9 million equivalent single axle loads (ESALs) of 18-kip for the two RCC pavements tested.
- Load-induced pavement strain responses were collected at different loading cycles under varied load magnitude of static and dynamic loads (e.g. 9, 16, 20, 25 kips) using the pre-installed fiber-optical strain plate instrumentation on two RCC pavement sections.
-Constructed three ultra-thin engineered cementitious composite (ECC) overlay test sections with embedded instrumentation gages; performed falling weight deflectometer (FWD) and other non-destructive tests on finished ECC test sections.
-Installed the smart two-way shape memory crack sealing sealants on multiple saw-cut expansion and contraction joints for a collaboration project that is to evaluate the effectiveness of crack sealing using a special polymer based smart sealant.
-Checked-up and diagnosed potential problems in ALF cabling and control system, and provided preservation and repairing recommendations.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES
- Continue loading on the RCC sections; perform FWD and crack-mapping test periodically; collect instrumentation data every 100,000 passes; complete the loading tests of RCC test section till pavement reach to a threshold of cracking failure. - Start the loading test on the smart sealant sections and complete the loading within two months and prepare a final testing report with data analysis included. - Start the loading test on ECC test sections. - Perform part replacement and repair the ALF machine. - Fix the internet problems at PRF.

Title:	Young Driver Crashes in Louisiana: Understanding the Contributing Factors to Decrease the Numbers	Project Status:	Ongoing

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

SIO:	DOTLT1000296		Project Start Date:		8/1/2019
Research Project Number:	19-5SA		Completion Date	(original)	4/30/2021
Research Agency:	ULL		Completion Date	(revised)	
Principal Investigator:	Elisabeta Mitran				

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$151,403	**Total**		**$75,282**
	(revised)				
Est. Expended to Date		$17,816	Salaries		$74,988
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$71,735	Equipment	(non-expendable)	
	(revised)	$76,121	Travel		$294
Est. FY Expenditure		$76,121	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

The purpose of this study is to fulfill two major objectives: identifying underlying contributing factors associated with young driver crashes and evaluating Louisiana's Graduated Driver's License (GDL) program. The research will be designed to perform extensive analysis on existing crash data to identify age-related as well as experience-related factors associated with young driver crashes in Louisiana. Secondly, the research study would evaluate the effectiveness of Louisiana's GDL program in connection with key contributing factors.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 1- Literature review was completed.
Task 2- Identifying contributing factors through crash data analysis is almost completed. Preparation of the progress report is ongoing.
Task 3- Evaluation of GDL program is ongoing.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 3- Complete evaluation of GDL program.
Task 4- Development of countermeasures specific to Louisiana based on the identified contributing factors from crash data and GDL evaluation.
Task 5- Prepare and submit final report and technical summary.

Title:	Impact of Center Line Rumble Strips And Shoulder Rumble Strips On All Roadway Departure Crashes in Louisiana Two-Lane Highways	Project Status:	Ongoing

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

SIO:	DOTLT1000295	Project Start Date:		7/1/2019
Research Project Number:	19-4SA	Completion Date	(original)	12/31/2020
Research Agency:	ULL	Completion Date	(revised)	
Principal Investigator:	Xiaoduan Sun			

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$116,570	**Total**		**$60,173**
	(revised)				
Est. Expended to Date		$48,317	Salaries		$59,133
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$78,000	Equipment	(non-expendable)	
	(revised)	$56,397	Travel		$50
Est. FY Expenditure		$56,397	Other		$990

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

The goal of this project is to evaluate the safety impact of centerline rumble strips (CLRS) and shoulder rumble strips (SRS) on two-lane highways under the Louisiana Department of Transportation and Development system. Specifically, the objectives are to:
-Investigate safety effectiveness CLRS and SRS (in single or combination) on two-lane highways under the La DOTD system; and
-Estimate the benefit-cost ratio of the countermeasures.

The scope of this project is limited to the two-lane highways under the state system.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 1: Information Review – comprehensive review on roadway departure and safety impact assessment of CLRS and SRS has been performed.
Task 2: Location Selection – The presence of CLRS and SRS on segments has been identified and verified using Google Maps and DOTD's iVisionRoadware tool.
Task 3: Database Development and General Crash Characteristics Analysis – Crash data have been extracted and merged with location data for the selected segments on both rural two-lane and urban two-lane highways.
Task 4: Selecting Segments for In-Depth Crash Analysis – We selected segments that have both CLRS and SRS for in-depth crash analysis.
Task 5: Interim Progress Meeting – to be held before the end of the fiscal year.
Task 6: Safety Evaluation – Work on cross-sectional analysis and time series analysis are already underway.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 3: Database Development and General Crash Characteristics Analysis – For the purpose of cross-sectional analysis in safety evaluation in Task 6, new sections without and CLRS or SRS treatments will be identified and added to the database.
Task 6: Safety Evaluation – Before-after safety evaluation with Empirical Bayes of the selected locations, and also cross-sectional and time-series analysis will be performed.
Task 7: Benefit-Cost Analysis.
Task 8: Final Report.

Title:	**Louisiana's Alcohol-Impaired Driving Problem: An Analysis of Crash and Cultural Factors**	**Project Status:**	**Ongoing**

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

SIO:	**DOTLT1000209**	Project Start Date:		8/1/2018
Research Project Number:	18-2SA	Completion Date	(original)	7/31/2020
Research Agency:	Texas A&M Transportation Institute (TTI)	Completion Date	(revised)	12/31/2020
Principal Investigator:	Eva Shipp			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$175,000	**Total**		**$44,733**
	(revised)				
Est. Expended to Date		$101,573	Salaries		$15,706
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$39,028	Equipment	(non-expendable)	
	(revised)	$84,541	Travel		
Est. FY Expenditure		$84,541	Other		$29,027

BUDGET JUSTIFICATIONS

Other: The $29,027.00 budget is for a subcontract to Dr. Theodore Scott Smith at the University of Louisiana at Lafayette.

PURPOSE AND SCOPE

The purpose of this research is to use multiple approaches to identify underlying individual, community, and cultural influences that contribute to drinking alcohol and driving in Louisiana. The different approaches for the analysis of risk factors include a literature review, systemic crash analysis and analysis of other data sources, an online survey, focus groups, and tool for visualizing alcohol-involved crashes and related issues. The three specific objectives are to: (1) synthesize and document existing resources that agencies can use to assess alcohol-involved driving, (2) identify influential individual, community, and cultural factors that contribute to alcohol-involved driving in Louisiana, and (3) provide a final detailed report with an interactive, internet-based tool for systemic risk assessment.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 1-Completed the literature and data systems review including edits to address the panel's comments.
Task 2-Revised the systemic data analysis based on the panel's comments and to include a corrected data file from the Louisiana Department of Transportation and Development.
Task 3-Created the survey on alcohol-involved driving in Louisiana and received approval from the Texas A&M Institutional Review Board and from the Panel.
Task 4-Developed a draft of the interim report for Tasks 1-2.
Task 5-Developed an outline for the focus group protocol.
Task 6-Developed a prototype of the interactive web tool for systemic risk assessment.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 3-Administer and analyze the online survey of alcohol-involved driving in Louisiana.
Task 4-Complete the interim report comprised of the summary and findings for Tasks 1-3 and submit for review.
Task 5-Conduct the focus groups and analyze the data.
Task 6-Complete final report, technical summary, and internet-based tool and submit for review.

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)	
Principal Investigator:	Tara Tolford, MURP, AICP				

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$240,704	**Total**		**$131,604**
	(revised)				
Est. Expended to Date		$109,100	Salaries		$78,108
FY 2019 - 2020 Budget			Consumable Supplies & Materials		$4,346
FY Funds	(original)	$158,658	Equipment	(non-expendable)	$22,550
	(revised)	$109,100	Travel		$1,575
Est. FY Expenditure		$109,100	Other		$25,025

BUDGET JUSTIFICATIONS

Equipment: -$22,550 to purchase 3-5 additional EcoCounter Pedestrian and/or bicycle count units (quantity depending on sensor type and site specifications)

Other: -Installation of remaining equipment - $18,150
-Additional year of EcoVisio data transmission service for up to 12 units - $6,875

PURPOSE AND SCOPE

The purpose of this project is to implement key recommendations and address remaining gaps in data availability identified in the final report for Louisiana Transportation Research Center (LTRC) Project 16-4SA "Pedestrians and Bicyclists Count: Developing a Statewide Multimodal Count Program", in order to provide the Louisiana Department of Transportation and Development (DOTD) with a practical foundation for an efficient, cost-effective bicycle and pedestrian count program and continue to collect and use multimodal count data.

Specifically, the scope of the study includes the following key activities and objectives:
1. To 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. To develop active transportation factor groups for Louisiana communities and preliminary expansion factors for adjusting short-duration multimodal counts
3. To identify, support, and inform opportunities for coordinated local and MPO-led data collection

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 1 – Literature review and inventory completed.
Task 2 - Short-duration counts were conducted at 17 locations in order to inform the development of preliminary factor groups and refine potential permanent count locations.
Task 3 – Initial count sites were reviewed and selected. Equipment was ordered and installation contracted. Equipment was installed at the first four of these locations and 8-hour validation counts were completed.
Task 4 – Resources pertaining to best practices for supporting coordinated data collection and management are collected on an ongoing basis. A new partnership with the City of Ruston has been developed to pilot coordinated, systematic and project-oriented multimodal data collection.
Task 5 – Preliminary area wide exposure estimates for all Louisiana Parishes and MPOs have been developed in accordance with FHWA Scalable Risk Assessment Methodology guidance. 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.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES
Task 1 – Additional resources will be integrated into inventory as identified. Task 2 – Additional short-duration counts will be ongoing as remaining permanent count sites are finalized. Task 3 – The remaining permanent count sites will be finalized, and equipment ordered and installed, pending authorization from relevant authorities. All counters will be validated and monitored. Task 4 – Work will continue to advance data collection with local partners, and resources developed to support coordinated efforts. 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 2020-2021

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)	
Principal Investigator:	Elisabeta Mitran			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$494,396
	(revised)	
Est. Expended to Date		$95,835
FY 2019 - 2020 Budget		
FY Funds	(original)	$194,878
	(revised)	
Est. FY Expenditure		$165,000

Estimated 2020-2021 Budget		
Total		**$222,887**
Salaries		$202,487
Consumable Supplies & Materials		$4,500
Equipment	(non-expendable)	$4,500
Travel		$11,400
Other		

BUDGET JUSTIFICATIONS

Travel: -TRB - $5000 (2 attendees)
-Lifesavers Conference - $2,500
-GHSA - $2,000
-ATSIP - $1,900

PURPOSE AND SCOPE

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

Research can be conducted on topics from the Louisiana Transportation Research Center's (LTRC's) biennial project priority list, technical assistance requests from LADOTD, and external research solicitations.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 1. Plan, develop, and manage the assigned LTRC research work program in the special studies/safety. This task 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. This task is ongoing. Have conducted research as a principal investigator for three research projects and as a co-principal investigator for one research project.

FISCAL YEAR 2020-2021 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 2020-2021

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)	
Principal Investigator:	Julius Codjoe			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$872,706
	(revised)	
Est. Expended to Date		$292,359
FY 2019 - 2020 Budget		
FY Funds	(original)	$432,269
	(revised)	
Est. FY Expenditure		$430,000

Estimated 2020-2021 Budget		
Total		**$93,043**
Salaries		
Consumable Supplies & Materials		$2,103
Equipment	(non-expendable)	$10,000
Travel		$18,240
Other		$62,700

BUDGET JUSTIFICATIONS

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

Travel:
1. TRB (4 attendees) - $9,690
2. AHFE - $2,850
3. GRITS (2 attendees) - $3,420
4. ITE (2 attendees) - $2,280

Other:
1. Sub-consultants - $17,100
2. Probe data and analytics - $45,600

PURPOSE AND SCOPE

The objective of this research 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. Funding for such studies will be assigned from funds approved for this "umbrella contract".

FISCAL YEAR 2019 - 2020 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 LADOTD 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 2020-2021 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 LADOTD 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 2020-2021

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)	6/30/2021
Principal Investigator:	Chester Wilmot			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$358,462
	(revised)	$8,871,349
Est. Expended to Date		$7,278,811
FY 2019 - 2020 Budget		
FY Funds	(original)	$240,000
	(revised)	
Est. FY Expenditure		$240,000

Estimated 2020-2021 Budget		
Total		**$200,000**
Salaries		$184,000
Consumable Supplies & Materials		$1,000
Equipment	(non-expendable)	$3,000
Travel		$12,000
Other		

BUDGET JUSTIFICATIONS

Travel: 1. Attend 2021 TRB Annual Meeting (4 attendees) - $9,000
2. Attend National Hurricane Conference (2 attendees) - $3000

PURPOSE AND SCOPE

This project provides long-term professional assistance to the Louisiana Department of Transportation and Development (LADOTD) on transportation planning and other matters, has supported the management responsibility of the Special Studies section of the Louisiana Transportation Research Center (LTRC). Such exposure encourages graduate students to participate in the LTRC research program and affords LTRC the opportunity to support the enhancement of higher education. The Principal Investigator of this project reports to the Director, LTRC. Research is conducted on topics from LTRC's research program, technical assistance requests from LADOTD, and external research solicitations.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Taught CE 7621 "Mass Transit Systems" in F19.
Taught CE 7640 "Transportation Policy and Planning" in S20.
Managed projects 17-3SS, 18-4SS, 19-5SS.
Served on LOOP Advisory Committee.
Served on Southeastern Louisiana Flood Protection Advisory Committee

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Teach CE 7641 "Travel Demand Modeling" in F20.
Teach CE 7600 "Transportation Data Collection" in S21.
Manage project titled "Testing the Hurricane Modeling Package"
Manage project titled "What is the true cost and benefit for collecting and maintaining non-road and non-bridge assets data".
Manage project titled "Review of current practices in Highway Program Development"
Assist in conducting project titled "Evaluate the impacts of Complete Streets policy in Louisiana"
Serve on LOOP Advisory Committee.
Serve on Southeastern Louisiana Flood Protection Advisory Committee

Title:	Skew Detection System Replacement on Vertical Lift Bridges (Phase 1)	Project Status:	Ongoing

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

SIO:	DOTLT1000343	Project Start Date:		3/9/2020
Research Project Number:	20-2ST	Completion Date	(original)	12/8/2020
Research Agency:	Wiss, Janney, Elstner Associates, Inc.	Completion Date	(revised)	
Principal Investigator:	Gareth Rees			

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$50,000	**Total**		**$14,000**
	(revised)				
Est. Expended to Date		$6,100	Salaries		$14,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$36,000	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$36,000	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

The purpose of this research project is to provide a literature search and evaluation of alternatives for the replacement of legacy technology skew detection and monitoring systems. The objectives include a review of industry skew systems and selection of a system requiring minimal expertise for use and maintenance, but with the required accuracy and reliability to maintain or improve existing skew control effectiveness. The deliverable will be a detailed report summarizing the research and providing appropriate recommendations.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Preliminary work has been started:
Task 1 - The study criteria have been partially assembled.
Task 1 - Research, including initial literature review and vendor product review has been started.
Task 1 - Interim Study Report incomplete - to be submitted before the end of the fiscal year (incomplete at this time)

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 2 - Prepare and submit the technical summary and the draft final report (final report will be Section 508 compliant).
Task 2 - Incorporate PRC's.
Task 2 - Incorporate all editorial corrections.

LTRC Annual Research Program
Fiscal Year 2020-2021

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			Estimated 2020-2021 Budget		
Total Cost	(original)	$99,989	**Total**		**$70,000**
	(revised)				
Est. Expended to Date			Salaries		$65,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		$4,000
FY Funds	(original)	$25,000	Equipment	(non-expendable)	
	(revised)	$10,000	Travel		$1,000
Est. FY Expenditure		$10,000	Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

The National Bridge Inventory (NBI) shows that almost one quarter of the nation's 611,845 bridges are classified as culverts. NBI also lists over 2,500 culverts in Louisiana. A significant portion of these culverts are concrete box culverts; of which many older ones are cast-in-place (CIP) reinforced concrete (RC) box culverts. Departments of Transportation (DOTs) around the nation are currently required to load rate culverts in their inventory using AASHTO-LRFR. Because of excessive conservatism inherent in the live load distribution formulas, many of these culverts produce low rating factors and, hence, need to be posted even though the performance of these culverts is typically acceptable, and they rarely show signs of distress. Furthermore, Louisiana standard details for CIP-RC box culverts introduce an additional challenge due to the lack of negative moment reinforcement at exterior corners.

In 2016, the Louisiana Transportation Research Center (LTRC) funded Project 16-3ST to assess the load rating of a representative group of CIP-RC box culverts from the Louisiana DOTD inventory. Eight culverts with low fill heights and different pavement types were selected for the study. Following AASHTO live load distribution formulas, it was clear that the culverts' rating factors were less than 1.0. However, calibrated three-dimensional (3D) finite element models revealed that the rating factors were all acceptable; i.e., over 1.0. This showed that the live load distribution formulas are a major cause of this outcome. Ongoing NCHRP Project 15-54 is tasked with developing new live load distribution formulas to alleviate some of the issues faced by DOTs all over the country. Finding from this NCHRP project may help, however, it will not address the special configurations of Louisiana due to old standard details. The goal of this project is to develop live load distribution formulas suitable for Louisiana CIP-RC box culverts with their special reinforcement detailing. A workshop, demonstrating the application of the developed load rating formula(s), will be held at the end of the study.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

This project has started 3/1/20 and as such is still at a very early stage of the literature review task.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES
It is expected that during the next fiscal year (FY20-21) Task 1 Literature Search: the task on conducting a literature review of research relevant to live load distribution in concrete box culverts be completed. Task 2 Review Current Analysis: A 3D finite element models for representative culverts will be developed and calibrated. Task 3 Parametric Study Plan: A plan for the parametric study will be developed to be approved by PRC. The parametric study plan will encompass a wide range of the parameters that affect the design of CIP RC culverts and load distribution. Task 4 Interim Report: The parametric study plan will be submitted to the project's PRC for approval. It will be part of an interim report that also summarizes the outcomes of the first two tasks. A presentation will also be prepared for the PRC to document the research efforts done for the three first tasks. Task 5 Conduct Parametric Study: Perform a parametric study over a wide range of parameters that cover the design space for which CIP-RC box culverts are often used will be conducted. Task 6 Data Analysis: Live load distribution formulas that account for the major parameters know to influence the behavior of culverts will be derived.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	Load Rating of Existing Continuous Stringers on Louisiana's Bridges	Project Status:	Ongoing

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

SIO:	DOTLT1000222	Project Start Date:		6/1/2018
Research Project Number:	18-4ST	Completion Date	(original)	8/31/2019
Research Agency:	LTU	Completion Date	(revised)	9/1/2020
Principal Investigator:	C. Shawn Sun			

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$124,999	**Total**		**$6,520**
	(revised)	$137,781			
Est. Expended to Date		$127,713	Salaries		$3,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$74,999	Equipment	(non-expendable)	
	(revised)	$87,781	Travel		$2,520
Est. FY Expenditure		$87,781	Other		$1,000

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Several of Louisiana's most important bridges were built using floor beams between main members and continuous stringers that are supported by the floor beams. These stringers are steel rolled I-beam sections. On some of these bridges when the stringers are load rated by the LRFR code using BrR software. The rating comes out very low requiring extremely restrictive load posting of these members and sometimes even requiring them to be closed. DOTD feels that these rating values do not represent reality. The accuracy of these results must be checked, what the true capacity of the stringers needs to be determined, and an analytical approach needs to be developed so the stringers can be rated without extremely restrictive load postings.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

The research team has made good progress on Task 4 related to lab testing and analysis. The team has completed all tests that do not involve deck and are working on the tests with non-composite deck. The team has developed finite element models to simulate the lab testing results and calibrated most of the completed tests.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

The team will complete Tasks 4 and 5 and submit the draft final report.

Complete Task 4: Methodology for a reasonable moment gradient factor

The research team will summarize the proposed methodology and associated justification on how to determine a reasonable moment gradient factor. This methodology will be submitted to the PRC for review and approval. Once the PRC approves it, the research team will perform load rating of the provided bridges and submit the developed Excel spreadsheets to the PRC for review.

Complete Task 5: Final report, technical summary, and summary presentation

The research team will submit a final report, technical summary, and summary presentation to the PRC three months prior to the project completion date. The final report will include recommendations on how to implement the research findings to the LADOTD load rating policy. Excel spreadsheets and load rating examples also will be submitted. PI will address technical comments and perform editorial corrections.

LTRC Annual Research Program
Fiscal Year 2020-2021

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)	12/28/2020
Principal Investigator:	William Williams			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$169,172	**Total**		**$288,747**
	(revised)	$578,912			
Est. Expended to Date		$290,165	Salaries		$75,572
FY 2019 - 2020 Budget			Consumable Supplies & Materials		$210,175
FY Funds	(original)	$88,833	Equipment	(non-expendable)	
	(revised)	$88,833	Travel		$2,000
Est. FY Expenditure		$13,000	Other		$1,000

BUDGET JUSTIFICATIONS

Supplies: Estimated value of $210,175 will be for ground proofing materials, instrumentation, crash test vehicles, etc...

PURPOSE AND SCOPE

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.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Task 3 - Developed a new retrofit bridge rail design based on the information learned from the previous unsuccessful full scale crash testing performed in Late 2018. Several new retrofit bridge rail options were developed this fiscal year. One retrofit design was selected for engineering strength calculations and detailing. Structural drawings, details were developed this fiscal year. Engineering drawings and details have been developed for fiscal year 2019-2020 and finalized in early 2020-2021.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

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 LADOTD 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.
Task 9 - Prepare and submit final report and technical summary

Title:	Rehabilitation of Deteriorated Timber Piles using Fiber Reinforced Polymer (FRP) Composites	Project Status:	Ongoing

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

SIO:	DOTLT1000043	Project Start Date:		11/2/2015
Research Project Number:	15-3ST	Completion Date	(original)	11/1/2017
Research Agency:	West Virginia University	Completion Date	(revised)	6/30/2020
Principal Investigator:	Hota GangaRao			

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$150,000	**Total**		**$11,616**
	(revised)	$233,069			
Est. Expended to Date		$183,854	Salaries		$5,858
FY 2019 - 2020 Budget			Consumable Supplies & Materials		$1,601
FY Funds	(original)	$4,144	Equipment	(non-expendable)	
	(revised)	$72,732	Travel		$2,295
Est. FY Expenditure		$72,732	Other		$1,862

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

The timber piles in the timber bridges in Louisiana are succumbing to the effects of aging. Replacing deteriorated piles is a costly process and in-situ repair of the piles with Fiber Reinforced Polymers (FRP) is an economic alternative. The purpose of this research project is to evaluate the axial load capacity of FRP strengthened deteriorated timber piles with different lengths of deterioration zone; determine the bond strength between the FRP and the in-service timber pile; develop a simplified design method for the FRP reinforcement for deteriorated timber piles; develop specifications for the materials, repair method, and evaluation for FRP strengthening of timber piles; and conduct one or two workshops that includes field demonstration and to train bridge maintenance personnel in the FRP repair methods. The successful completion of the project will provide LADOTD the tools needed to strengthen deteriorated timber piles with FRP in lieu of replacing these deteriorated piles.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Tasks 1-5- Completed in previous fiscal years.
Task 6 - Workshops have been delayed until the completion of the additional splice testing work.
Task 7 - The final report was submitted in 2018 and revisions made based on LTRC comment
Task 8 – Fabrication of the legacy splices was underway, but is currently on hold due to the WVU lab shut down due to Covid-19. Work will resume when the labs reopen.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 6 - Workshops will be conducted after comments are received on the revised final report.
Task 8 - Testing of splices will continue into fiscal year 2020-2021.
Task 9 - A revised final report will be submitted.

FHWA

Part B SPR Funded Research Program

PROPOSED RESEARCH

LTRC Annual Research Program
Fiscal Year 2020-2021

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

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

SIO:		Project Start Date:		7/1/2017
Research Project Number:		Completion Date	(original)	6/30/2019
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Louay Mohammad			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$270,000	**Total**		**$71,000**
	(revised)				
Est. Expended to Date			Salaries		$71,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: Several research studies conducted at the Louisiana Transportation Research Center in the past decade identified the effects of various factors (recycled and waste materials, and construction technologies and practices, etc.) on the performance of asphalt pavements. In many cases, the initial performance was evaluated based on laboratory mixture mechanical properties such as dynamic modulus, loaded wheel tracking rut depth, indirect tensile strength, interface shear strength, and semi-circular bending Jc fracture resistance. Results of these laboratory-measured mechanical properties were used to provide specification recommendations for mixture design and construction practices in the Louisiana Standard Specifications for Roads and Bridges. Thus, tracking and assessing the long-term performance of those pavements considered in the earlier research is essential to validate and/or revise that specification recommendation in mixture design and construction practices.

Objectives: The objective of this study is to evaluate the long-term performance of field projects investigated in previous LTRC research 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 supplemental data for better understanding of the 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 asphalt paving. Implementing the refined recommendations will improve the durability and long-term performance of Louisiana asphalt pavements.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES
Task 1: Conduct literature review; Task 2: Identify field projects; Task 3: Acquire and review Louisiana Pavement Management System (PMS) data; and Task 4: Conduct field survey and forensic investigation.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Bonding Evaluation of Asphalt Surface Treatment**	**Project Status:**	**Proposed**

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

SIO:		Project Start Date:		7/1/2020
Research Project Number:		Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Saman Salari			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$135,000	**Total**		**$67,000**
	(revised)				
Est. Expended to Date			Salaries		$67,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: The sweep test, along with rheological tests, can be applied to research practical behavior of chip seals while the rates of emulsion can be changed for normally distributed and segregated aggregate types. In addition, the effect of excessive dust in the aggregates will be investigated on debonding and performance.

Objective: The outcome should be able to introduce a list of correction factors for surface emulsion application rates to mitigate aggregate de-bonding.

Expected Benefits: It is expected that through application of new introduced correction factors, better performance and durability can be observed for chip seals and other Bituminous Surface Treatments.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

-Task 1: literature review will be performed;
-Task 2: Different aggregate and emulsions will be collected from suppliers in Louisiana
-Task 3: chip seals samples will be made and tested ; and
-Task 4: Results will be analyzed for the report

LTRC Annual Research Program
Fiscal Year 2020-2021

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

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

SIO:		Project Start Date:		7/1/2017
Research Project Number:		Completion Date	(original)	6/30/2019
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Louay Mohammad			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$279,000	**Total**		**$150,300**
	(revised)				
Est. Expended to Date			Salaries		$85,300
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	$65,000
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Equipment: $65,000 is budgeted for a Digital image correlation (DIC) techniques

PURPOSE AND SCOPE

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

Objectives: 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 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 1 – Conduct literature review;
Task 2 – Identify and collect asphalt materials;
Task 3 – Acquire and set up the Digital Image Correlation system; and
Task 4 – Conduct laboratory experiment

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Evaluation of Saturates/Aromatics/Resins/Asphaltenes (SARA) Fractionation of asphalt binders in Louisiana**	**Project Status:**	**Proposed**

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

SIO:		Project Start Date:		7/1/2020
Research Project Number:		Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Saman Salari			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$130,000	**Total**		**$95,000**
	(revised)				
Est. Expended to Date			Salaries		$45,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	$50,000
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Equipment: SARA analysis device. The device will be purchased for $50000 and will be Joint usage between LTRC and the materials laboratory.

PURPOSE AND SCOPE

Problem Statement: Due to everyday changes to chemical compositions of asphalt binders, it is essential to characterize the asphalt binder chemical fractions through fast and reliable methods such as SARA method.

Objectives: The main purpose is to investigate the capabilities of SARA method comparing to the other chemical characterization methods such as GPC.

Expected Benefits: New SARA testing devices has the capability of testing in as few as 20 minutes. This capability in addition with lower testing materials (specifically solvents) can advance the ability of agencies and industry groups to chemically characterize the asphalt binder in fast and reliable method.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

-Task 1: literature review will be performed;
-Task 2: Asphalt binders will be collected from suppliers in Louisiana
-Task 3: Asphalt binders will be tested with SARA device ; and
-Task 4: Results of SARA will be analyzed and compared with GPC and other available results from the binders.

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

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

SIO:		Project Start Date:		1/1/2018
Research Project Number:		Completion Date	(original)	6/30/2020
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Louay Mohammad			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$350,000	**Total**		**$77,000**
	(revised)				
Est. Expended to Date			Salaries		$77,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: Recycling of construction materials in flexible pavements is not only a cost-saving alternative, but also is a key element in the sustainability of transportation infrastructure, since it reduces the use of virgin materials and eliminates the needs for landfill areas. One of the most recycled materials in pavements is the Reclaimed Asphalt Pavement (RAP) because of its high compatibility with the newly produce asphalt mixtures. Further, Reclaimed Asphalt Shingles (RAS) and waste plastics have become another promising candidate green construction materials.

Objectives: 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 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 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 2020-2021

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

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

SIO:		Project Start Date:		7/1/2020
Research Project Number:		Completion Date	(original)	6/30/2022
Research Agency:	LSU	Completion Date	(revised)	
Principal Investigator:	Corey Mayeux			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$120,000	**Total**		**$60,000**
	(revised)				
Est. Expended to Date			Salaries		$60,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

PROBLEM STATEMENT: Porous Asphalt Concrete (PAC) is a type of road surface allowing quick drainage of rainwater, improved visibility and wet skid resistance as well as eliminating the risk of hydroplaning. Its high void content also provides a certain water storage capacity that may reduce the risk of flooding. However, challenges reported by practitioners and highway agencies have seriously limited its use. The most critical shortcomings of PAC include premature durability problems (raveling and stripping) and clogging of voids by dirt, which result in shorter service life and higher costs.

OBJECTIVES: This study aims to formulate a new generation of Porous Asphalt Concrete (PAC) that would provide superior durability performance and reduced surface water accumulation by using super-hydrophobic nanomaterials and other modification. Furthermore, the new generation of PAC will be formulated to provide luminescence during nighttime. In addition, it will be environmentally friendly and cost-effective by testing and evaluating different blends of polymers, recycled products such as crumb rubber, and other additives such as Evotherm as an anti-stripping agent.

EXPECTED BENEFITS: This research will develop an implementation-ready new generation of PAC that provides enhanced durability and life-time extension. In addition, it will develop a new generation of PAC that ensures adequate infrastructure performance under all weather conditions. It will also improve pavement performance in the event of flooding by reducing surface water accumulation while facilitating drainage to the sides of the road.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Begin study
Task 1 - Conduct Literature Review
Task 2 - Develop experimental factorial
Task 3 - Conduct mixture design
Task 4 - Begin laboratory evaluation

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

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

SIO:		Project Start Date:		7/1/2020
Research Project Number:		Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Louay Mohammad			

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$280,000	**Total**		**$113,300**
	(revised)				
Est. Expended to Date			Salaries		$113,300
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: Open-graded friction course (OGFC) mixture is commonly placed on asphalt pavement surfaces to reduce hydroplaning and remove water from roadway surface due to its high permeability. However, the high porosity raises concerns on the durability of OGFC as it reduces the structural integrity of pavement. Currently, LADOTD specifications for roads and bridges provide requirements on the physical properties of asphalt binders and aggregate with performance criteria from loaded wheel tracking rut depth and moisture susceptibility via the Boil Test. The epoxy modifiers have been shown to improve the elasticity of asphalt mixtures and prevent premature failure. Thus, durability, resistance to fatigue cracking, and raveling of OGFC mixtures containing epoxy modified asphalt binders should be evaluated to ensure their extended performance life.

Objectives: The objective of this research is to develop a mixture design practice including comprehensive performance evaluation, based on the LADOTD 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 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES
Task 1- Conduct a comprehensive literature review on the design and performance evaluation of OGFC mixtures, epoxy modified asphalt binders, and epoxy mixtures; Task 2- Select and obtain the component materials, including epoxy, a base binder (PG 67-22) to be modified by the epoxy, two polymer modified binders, two aggregate types, and anti-strip additives. Task 3- Determine the optimum aggregate gradation and optimum asphalt content for each aggregate type according to LADOTD specifications and ASTM D7064. Task 4- Determine the optimum epoxy dosage. This task will evaluate the rheological and mechanistic properties with regard to durability of epoxy asphalt binders and epoxy OGFC mixtures, respectively, at different modification dosages (25, 30, 35, 40%), and compare the results to those of the polymer modified asphalt binders and OGFC mixtures through statistical analysis.

LTRC Annual Research Program
Fiscal Year 2020-2021

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:		7/1/2020
Research Project Number:		Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Louay Mohammad			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$349,000	**Total**		**$102,000**
	(revised)				
Est. Expended to Date			Salaries		$102,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: There is a growing interest in the 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, which include additional energy consumption; thermal degradation of polymer in waste plastics and asphalt cement; life cycle costs; recyclability; economic, environmental impacts, health and safety, constructability issues; storage stability issues; compatibility issues; and many others.

Objectives: 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 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 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 2020-2021

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

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

SIO:		Project Start Date:		7/1/2019
Research Project Number:		Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Corey Mayeux			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$464,000	**Total**		**$213,300**
	(revised)				
Est. Expended to Date			Salaries		$40,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		$173,300

BUDGET JUSTIFICATIONS

Other: The $173,300 budget is for the following activities:
-Subcontract for support study (Dr. Louay Mohammad) - $113,000
-Subcontract for support study (Dr. Mostafa Elseifi) - $60,000

PURPOSE AND SCOPE

Problem Statement: The most critical shortcomings of OGFC mixtures include durability problems (raveling and stripping due to aging), and clogging of voids by dirt. These issues result in shorter service life and higher costs to maintain the OGFC mixtures. The high porosity raises concern on the durability of OGFC as it reduces the structural integrity of pavement. Design of OGFC with extended life span would require innovative asphalt materials and a performance engineered mixture design procedure.

Objective: The objective of this research is to provide an implementable guideline on the design, performance, and maintenance of Open Graded Fiction Course (OGFC) with extended service life to improve driving safety and cost-effectiveness.

Expected Benefits: With the completion of this research, LTRC will provide guidelines and/or specifications on materials and performance engineered mixture design procedures to be used for OGFC pavements in Louisiana.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

none

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 1 – Conducting Literature review
Task 2 – Conduct multi-state survey about their OGFC maintenance practices and durability issues
Task 3 – Preparation of an interim report on findings from tasks 1 and 2
Task 4 – Begin support study to evaluate alternative materials
Task 5 – Begin support study to evaluate a new generation of OGFC

LTRC Annual Research Program
Fiscal Year 2020-2021

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

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

SIO:		Project Start Date:		7/1/2020
Research Project Number:		Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Louay Mohammad			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$280,000	**Total**		**$113,500**
	(revised)				
Est. Expended to Date			Salaries		$113,500
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: There is an increasing need for improving the sustainability of asphalt pavement without compromising the 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 compensate for part of the virgin materials. However, asphalt binders in RAP/RAS are oxidatively aged with reduced ductility and cracking resistance. Their incorporation especially at high content (> 25%) may raise concerns on mixture production (blending between recycled and virgin materials) and performance against cracking. In order to promote their use, the Lewis acid catalysts such as iron chloride (FeCl3) have emerged as an innovative rejuvenating agent with great potential to modify the recycled asphalt binders' chemical composition.

Objectives: The objective of this research is to evaluate the effectiveness of Lewis acids recycling agent in increasing the reclaimed asphalt pavements (RAP) percentage incorporated in asphalt mixtures as well as recycled asphalt shingles (RAS) by promoting the interaction of RAP/RAS aged asphalt binders with virgin asphalt binders.

Expected Benefits: The outcome 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 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES
Task 1- Conduct a comprehensive literature review on asphalt chemistry, effect of oxidative aging on rheological and chemical properties of asphalt binders, and related research on the use of Lewis acid catalysts in asphalt modification; Task 2- Collect materials which include 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:	**Field Evaluation of Existing Concrete Overlays**	**Project Status:**	**Proposed**

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

SIO:		Project Start Date:		7/1/2020
Research Project Number:		Completion Date	(original)	6/30/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	William Saunders			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$27,957	**Total**		**$27,957**
	(revised)				
Est. Expended to Date			Salaries		$27,957
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: The Louisiana Department of Transportation and Development (DOTD) has resurfaced several sections of the roadway system with concrete overlays. However, the performance of these overlays has not been thoroughly documented and evaluated to determine if these solutions are efficient and cost-effective.

Objectives: The objective of this study is to conduct an evaluation involving the use of pavement management databases, the analysis of visual images obtained from DOTD's Automatic Road Analyzer (ARAN) system, and the performance of field investigations of existing concrete overlays.

Expected Benefits: This research seeks to provide DOTD with guidance on the use of concrete overlays by summarizing the findings and thoroughly documenting bonded concrete overlay technologies.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Conduct an evaluation, including querying the pavement management database, analyzing visual images from the Automatic Road Analyzer (ARAN) system, and performing field investigations of existing bonded concrete overlays. Summarize the results and document overlay technologies which performed well and those which did not.

LTRC Annual Research Program
Fiscal Year 2020-2021

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:		7/1/2020
Research Project Number:		Completion Date	(original)	6/30/2022
Research Agency:		Completion Date	(revised)	
Principal Investigator:	Jose Milla			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$114,400	**Total**		**$57,200**
	(revised)				
Est. Expended to Date			Salaries		$57,200
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: In practice, most producers tend to use the grading limits specified in ASTM C33 for aggregate gradation. However, the use of these limits may not necessarily produce durable concrete mixtures, because these specifications may be too broad to guarantee optimum packing density.

Objectives: This study will focus on preparing concrete mixtures with optimal gradations based on varying theoretical packing densities in order to minimize the void space and lower cement demand. In addition, permeability tests through surface resistivity and water permeability are proposed to test how significant optimal gradation mixtures perform versus conventional gap-graded mixtures (per ASTM C33) that are prevalent in the concrete field practice.

Expected Benefits: This research can provide guidance for the Louisiana Department of Transportation and Development (DOTD) in optimizing gradations for concrete mixtures. Optimum packing densities can reduce required cement content, lower permeability, and increase concrete durability.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

The following tasks are proposed for FY 2020-2021 for this two-year study:

Task 1: Literature review
Task 2: Preparation of concrete mixtures with different aggregate gradations for comparative testing.
Task 3: Initialize performance testing (compressive strength, water permeability, and surface resistivity).

LTRC Annual Research Program
Fiscal Year 2020-2021

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:		7/1/2020
Research Project Number:		Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Jose Milla			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$97,000	**Total**		**$48,500**
	(revised)				
Est. Expended to Date			Salaries		$48,500
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: There is limited research on how concrete transport properties are influenced by internal curing and most studies require a strict sample conditioning regime where specimens must remain in a 100% relative humidity (RH) environment. There is a need to quantify and assess concrete's transport properties in more realistic field conditions in order to determine the extent to which internal curing affects concrete's durability.

Objectives: This study proposes evaluating internally cured concrete by limiting 100% RH curing conditions only to the first 7 days. Surface resistivity tests will be conducted by saturating the samples 48 hours prior to the test date and collecting data until 56 days. An additional test method, bulk diffusion (ASTM C1556) is proposed to validate the results from the surface resistivity evaluation.

Expected Benefits: This research will provide a better assessment in realistic field conditions and a better understanding the potential benefits of internal curing. The results can provide the Louisiana Department of Transportation and Development (DOTD) further guidance on expanding the integration of internal curing to increase concrete durability. In addition, the inclusion of a bulk diffusion test will be beneficial to verify the results obtained from surface resistivity, providing additional characterization of concrete's transport properties.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

The following tasks are proposed for FY 2020-2021 for this two-year study:

Task 1: Literature review
Task 2: Initialize preparation of concrete mixtures
Task 3: Begin performance testing (surface resistivity, bulk diffusion, compressive strength)

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Joint Deterioration Synthesis**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 6**		**Budget Category:**	**FHWA**	
SIO:			Project Start Date:		7/1/2020
Research Project Number:			Completion Date	(original)	6/30/2021
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	William Saunders				

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$18,751	**Total**		**$18,751**
	(revised)				
Est. Expended to Date			Salaries		$18,751
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: Designers typically place expansion joints to relieve compressive forces in portland cement concrete (PCC) pavements and bridge decks for temperature cycles. Early joint deterioration reduces efficiency while posing performance problems for concrete and maintenance problems for state highway agencies (SHAs).

Objectives: Determine the extent to which joint deterioration is a problem for the Louisiana Department of Transportation and Development (DOTD) and conduct research to determine what other states specify in regard to joint deterioration mitigation.

Expected Benefits: Research findings from this synthesis along with information obtained through American Concrete Paving Association (ACPA) can lead to the improved design and construction of concrete expansion joints for DOTD.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

The following tasks are proposed for FY 2020-2021 for this one-year study:

Task 1: Literature review
Task 2: Evaluate joint deterioration in Louisiana
Task 3: Evaluate other state specifications
Task 4:Compile findings
Task 5: Write final report

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

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

SIO:	DOTLT1000375	Project Start Date:		7/1/2019
Research Project Number:	21-1GT	Completion Date	(original)	6/30/2020
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Murad Abu-Farsakh			

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$80,000	**Total**		**$65,600**
	(revised)				
Est. Expended to Date			Salaries		$65,600
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: Several projects in Louisiana with piles driven in sandy soils with high fines content have considerably lower resistances than the design values from the static β-effective stress method, resulting on production pile lengths of 15 to 30 ft. longer than plan lengths. The potential cause of overestimated pile resistance can be attributed to uncertainty in estimating the internal friction angle (ϕ) of sands with high fines content from in-situ tests using either Standard Penetration Test (SPT) or Cone Penetration Test (CPT) correlations, or potential reduction of interface friction angle, δ, due to presence of high fines content. Most of the available correlations between SPT (and CPT) and ϕ were established based on test results in clean sands (< 5% fines), which is essential to be re-developed/modified for sands with high fine contents.

Objectives: 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 SPT/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 local design of pile foundations 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 2019 - 2020 ACCOMPLISHMENTS

NA

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES
Task 1: Conduct comprehensive literature review on relevant published works related on the effect of fines content on the mechanical behavior of sandy soils and the interface mechanical behavior. Task 2: Outline laboratory testing preparation and planning, Task 3: Start conducting small-size direct shear tests on sand-fines mixtures, Task 4: Start conducting large-size direct shear tests of soil-concrete/steel interface.

LTRC Annual Research Program
Fiscal Year 2020-2021

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:		10/2/2017
Research Project Number:		Completion Date	(original)	
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Murad Abu-Farsakh			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$50,000	**Total**		**$24,000**
	(revised)				
Est. Expended to Date			Salaries		$24,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: The cone and piezocone penetration tests (CPT and PCPT) has been widely considered as useful in situ tests for subsurface investigation, soil characterization and evaluation of different soil properties. Although the Louisiana Department of Transportation and Development (DOTD) engineers have been using the CPT/PCPT for many years, their use was limited to soil stratification to locate sand layer(s) to tip the piles on, evaluate undrained shear strength, and recently for estimating the ultimate pile capacity. The CPT/PCPT have the potential to be extended to many more geotechnical engineering applications in Louisiana, which requires accurate evaluation of critical geotechnical design parameters, such as undrained shear strength (Su), overconsoldation ratio (OCR), coefficient of lateral earth pressure (ko), constrained modulus (M), and coefficient of consolidation (Cv). Direct CPT data and valuable correlated parameters can be effectively implemented to improve the design of shallow and deep foundations, slope stability analysis, estimating embankment settlement, estimating bearing capacity, and evaluating settlement and stability of Mechanically Stabilized Earth (MSE) walls

Objectives: The objective of this project is to synthesize various applications of CPT technology for geotechnical engineering analysis and design. This includes available methods and charts for evaluating soil stratification/classification; available correlations for estimating geotechnical design parameters such as Su, OCR, ko, M, Cv, and relative density and friction angle of sands. Available method for estimating total and rate of consolidation. Available methods for evaluating bearing capacity of shallow foundations and MSE walls; direct CPT methods for estimating the ultimate pile capacity; procedures for slope stability analysis; means for identifying problematic soil layers.

Expected Benefits: It is anticipated that at the end of this study, the Louisiana DOTD will consider extending the use of CPT/PCPT to include more geotechnical engineering applications, which will result in significant benefits in terms of reducing time, reducing number of soil borings, reducing man labor, and hence reducing the cost of project. Under certain circumstances, reviewing real-time CPT data will give the chance to site engineers to add more CPT soundings 'on the spot' to fill the gaps between tested spots in sites with high variability, and help to detect any subsurface anomalous condition. The CPT/PCPT can provide fast and more accurate estimation of soil properties under in-situ stresses, drainage conditions and in-situ deposit orientation (anisotropy), which will result on safer design of infrastructures.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

NA

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES
Task 1: Start conducting comprehensive literature review on the use of cone and piezocone penetration tests (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 evaluating and synthesizing the various applications of CPT/PCPT.

Title:	**Evaluation of Effectiveness of Geophysical Methods in Estimating the Geotechnical Properties of Louisiana Soils**	**Project Status:**	**Proposed**

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

SIO:		Project Start Date:		7/1/2020
Research Project Number:		Completion Date	(original)	6/30/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Nick Ferguson			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$64,580	**Total**		**$64,580**
	(revised)				
Est. Expended to Date			Salaries		$64,580
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: Current Geotechnical exploration practices in Louisiana rely on conventional soil borings with the aid of cone penetrometer test (CPT) soundings. Geophysical methods, if properly applied, can be used to compliment standard geotechnical explorations. The current FHWA Every Day Counts (EDC-5) recommends geophysical methods as part of their Advanced Geotechnical Methods in Exploration (A-GaME).

Objective: This research will evaluate the effectiveness of available geophysical methods, and provide detailed descriptions of each. The research will examine cost/benefit scenarios, and determine the suitability and applicability of those with the most potential for Louisiana's alluvial soils, high groundwater, and salinity near the coast. The research will recommend a short list of those methods that show the most benefit and promise for Louisiana.

Expected Benefits: Geophysical information can improve designs by providing information between more expensive soil borings. Improved designs can, ideally produce more efficient and cost effective designs that can reduce overall construction costs. Other benefits include shorter project delivery times, reducing possible setbacks, and reducing risks within the areas between investigated subsurface site conditions.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 1: Research existing state and federal efforts on geophysical testing methods
The Louisiana Transportation Research Center (LTRC) will conduct a thorough literature review to investigate other previous and ongoing research regarding advancements in geophysical testing practices. This research is in line with FHWA's Every Day Counts 5 (EDC-5) initiative for geotechnical explorations called "Advanced Geotechnical Methods in Exploration" (a-GAME).

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Geotechnical Database, Phase IV**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**		**FHWA**
SIO:			Project Start Date:		7/1/2020
Research Project Number:			Completion Date	(original)	6/30/2022
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Gavin Gautreau				

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$200,000	**Total**		**$84,907**
	(revised)				
Est. Expended to Date			Salaries		$84,907
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: Though DOTD has made great efforts to create and upgrade its geotechnical database (LTRC Projects 03-1GT, 10-2GT, and 15-1GT), there is still work to accomplish. The existing geotechnical data management software, gINT, is outdated and Bentley recently purchased Keynetix and its all-in-one enterprise database/data management solution, HoleBase SI (HBSI). HBSI was implemented during 15-1GT for shallow boring applications. This software is well-suited for managing the DOTD deep soil boring database, but migrating the existing database over from gINT and pLog Enterprise was not part of that project's scope.

Objectives: 1) Upgrade the DOTD Geotechnical Database deep boring log templates and structure to the newer Keynetix platform, HBSI, already owned by the Department. 2) Ensure our data is compatible with the Data Interchange for Geotechnical and Geoenvironmental Specialists (DIGGS) to allow easy transfer from consultants. 3) Retrieve DOTD geotechnical data from consultants via DIGGS platform (historical and newer retainer contracts). 4) Utilize the Geographic Information System (GIS) services of HBSI and the Department to share soil boring information graphically both internally at HQ and externally to the general public.

Expected Benefits: Updating the database to utilize the newer HBSI platform will create an up-to-date, efficient, all-in-one (mapping, database, and data management) solution that is less reliant on IT support for routine operation. The functionality of DIGGS will also allow for ready acquisition of geotechnical information from partnering consultants. The newer functionality and GIS apps will allow for the visualization of geotechnical data in and outside the department walls.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

The work is proposed and not yet started.

- Identify LADOTD's geotechnical testing, design, visualization, analysis, and data interchange needs;
- Identify the best all-in-one database/mapping/data management solution for those needs;
- Implement and configure the software solution that best fits the Department's needs;
- Migrate the existing pLog Enterprise database into the new database;
- Provide tools and training for LADOTD personnel to migrate old gINT projects and new laboratory testing into the new database;
- Work with LADOTD and consultants to update the Department's standards for geotechnical deliverables (retainer contracts, etc.);
- Develop boring logs and Excel dashboards to satisfy the Department's data visualization needs;
- Provide tools to help consultants provide standardized geotechnical data to the department, even if the consultant does not use the implemented all-in-one solution;
- Ensure DIGGS (Data Interchange for Geotechnical and Geoenvironmental Specialists) compatibility; and
- Ensure the Department's data management practices are compatible with applicable FHWA requirements and developments.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	Prediction of Road Conditions and Smoothness Using Neural Networks	Project Status:	Proposed

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

SIO:	DOTLT1000376	Project Start Date:		7/1/2019
Research Project Number:	21-1P	Completion Date	(original)	6/30/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Zhong Wu			

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$200,000	**Total**		**$56,000**
	(revised)				
Est. Expended to Date			Salaries		$56,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

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.

Objectives: to develop an ANN-based application(s) that can be used to estimate future pavement conditions and smoothness for DOTD.

Expected Benefits: DOTD can use the developed ANN application(s) to obtain: (1) more reliable pavement performance prediction results in its budget planning, and (2) pavement condition and smoothness predictions for road segments without existing pavement performance data.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES
Task 1: Literature Review. The study will begin by comprehensive assessment of the state-of-the-practice by DOTD concerning pavement performance modeling and condition evaluation strategies. Published research will be studied which are mainly focused on: Pavement evaluation strategies using condition indicator parameters; Available methods for short-term and long-term road condition prediction; Factors that may influence the estimation of road condition and smoothness; Cost-benefits of pavement condition modeling. Task 2: Data Collection and Preparation. This task will identify appropriate projects based on the availability of historical pavement performance data stored in DOTD's pavement management system (PMS). The pavement performance condition data, such as cracking, roughness, patching and rutting measurements are recorded biennially for every 0.1 miles. Selected projects will be categorized based on pavement types (i.e. flexible and rigid), functional class (i.e. interstate, US highways, Louisiana highways, collector highways), layer thicknesses, material type, and rehabilitation actions. The temperature and precipitation data will be extracted from the National Oceanic and Atmospheric Administration (NOAA) database. The pavement layer composition and thickness information data will be obtained from latest core reports stored at dTIMS Management Dashboard for individual projects. Task 3: Development of ANN models for Smoothness Prediction. Task 4: Development of ANN models to Pavement Condition Prediction.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Identifying Flood Prone Roadways in Louisiana using Hydrologic Contour Modeling and Mapping**	**Project Status:**	**Proposed**

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

SIO:	**DOTLT1000326**	Project Start Date:		7/1/2019
Research Project Number:	20-2P	Completion Date	(original)	12/31/2020
Research Agency:	LSU	Completion Date	(revised)	
Principal Investigator:	Yong-Cheol Lee			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$120,000
	(revised)	
Est. Expended to Date		
FY 2019 - 2020 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2020-2021 Budget		
Total		**$80,000**
Salaries		$76,000
Consumable Supplies & Materials		$4,000
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: Louisiana needs a reliable system to predict roadway flooding in the future.

Objectives: Develop a system to aid the Louisiana Department of Transportation and Development (LADOTD) in dealing with inundated roads for future flooding events.

Expected Benefits: It will identify the most critical locations of flooded highways and can be used for proper response, recovery and maintenance prioritization.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

none

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Develop proposal and hold kickoff project review committee meeting. Start working on tasks contained in the accepted proposal.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Synthesis on Pavement Repair/Rehabilitation/Replacement Criteria**	**Project Status:**	**Proposed**

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

SIO:		Project Start Date:		7/1/2020
Research Project Number:		Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Qiming Chen			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$50,000	**Total**		**$24,924**
	(revised)				
Est. Expended to Date			Salaries		$24,924
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: 25% roads in Louisiana are in poor condition which means the riding quality of the pavement is not that so good in Louisiana. Meanwhile, state and local agency (parish and city) are struggling to allocate the limited financial resources to cover the needed repair/replacement costs. To overcome these challenges and help Louisiana deal with aged roads, it is necessary to optimize criteria for make decisions on pavement project scope: maintenance, rehabilitation, or replacement.

Objectives: The main objective of this research is to document current practice in Louisiana and other state agencies and also the latest technologies on pavement maintenance/rehabilitation/replacement.

Expected Benefits: This synthesis will provide brief summary of state-of-the-practice and state-of-the-art on pavement repair/rehabilitation/replacement, which can be served as a reference for DOTD.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Start to collect information from PMS engineer at HQ and conduct literature research.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**The distresses in pavement adjacent to bridge approach slab**	**Project Status:**	**Proposed**

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

SIO:		Project Start Date:		7/1/2020
Research Project Number:		Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Qiming Chen			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$100,000	**Total**		**$41,428**
	(revised)				
Est. Expended to Date			Salaries		$41,428
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: More distresses are normally observed in asphalt pavement adjacent to bridge approach slabs than on regular roadways. This bridge bump problem is traditionally looked into and dealt with by bridge engineers in Louisiana. It may also be beneficial for us to look at this problem from pavement side.

Objectives: The purpose of this research is to identify the main causes of distresses in pavement adjacent to bridge approach slab. A correlation between pavement distress and various factors will also be examined.

Expected Benefits: The results of this research may help better understand the bridge bump problem in Louisiana.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Data mine the PMS database to collect distress information (e.g., RI, cracking width, rut depth, etc.)

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Vertical Pavement Movement on Heavy Clay Caused by the Variation of Real Time Climate Data**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**		**Budget Category:**	**FHWA**	
SIO:			Project Start Date:		9/1/2020
Research Project Number:			Completion Date	(original)	3/31/2022
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Qiming Chen				

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$180,000	**Total**		**$60,000**
	(revised)				
Est. Expended to Date			Salaries		$60,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: LTRC has conducted several research projects, like 12-1P and 12-2P, to investigate the pavement distresses caused by environmental factors for Louisiana low volume roads and have collected a lot of field testing data.

Objectives: The purpose of this research is to use a commercial 2D FEM software with the capability of modeling water flowing in soil mass and provide a way to simulate the water flow in and out soil mass caused by the variation of real time climate data.

Expected Benefits: The result of this research has the potential to provide a more accurate prediction of vertical movement on heavy clay (expansive) soils. It will help pavement design engineers better understand how the climatic conditions affect pavement performance and designing a durable pavement system.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Conduct a literature search and prepare a research proposal.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Correlation of rut depths measured by LTRC's road profiler and Fugro's profiler**	**Project Status:**	**Proposed**

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

SIO:		Project Start Date:		7/1/2020
Research Project Number:		Completion Date	(original)	6/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Qiming Chen			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$100,000
	(revised)	
Est. Expended to Date		
FY 2019 - 2020 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2020-2021 Budget		
Total		**$44,834**
Salaries		$44,834
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: The technologies to obtain pavement rutting measurements have been evolved in the last decades. Current LTRC's roadway profiler uses a point-based rut bar system for pavement rutting measurement, while DOTD has contracted with Fugro to obtain pavement rutting measurements with latest 3D range-based system. It is believed in the long run that LTRC is going to move to this latest 3D range-based technology.

Objectives: The purpose of this research is to develop a correlation between LTRC's profiler and Fugro's profiler based on the data collected.

Expected Benefits: A good correlation will help better understand the data LTRC collected and the data in Pavement Management Systems (PMS). It will also help LTRC keep old data meaningful and have a smooth transition to the latest 3D range-based technology in the future.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Coordinate with Fugro to determine roads for measurements comparison. Start to go out take measurements when Fugro is out on the road for pavement condition survey for DOTD.

LTRC Annual Research Program
Fiscal Year 2020-2021

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:		7/1/2020
Research Project Number:		Completion Date	(original)	12/31/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Zhong Wu			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$180,000
	(revised)	
Est. Expended to Date		
FY 2019 - 2020 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2020-2021 Budget		
Total		**$56,000**
Salaries		$56,000
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: Truck registration and overweight permit fees may not accurately reflect the user impacts on highway infrastructure. If industry subsidies are desirable from a public policy perspective, then they should be accomplished in an overt manner rather than via artificially low user fees.

Objectives: (1) determine the appropriate annual registration fees for trucks, including agriculture and timber haulers, based on the impacts on road and bridge infrastructure; and (2) determine the appropriate single trip and harvest season overweight permit fees based on the impacts on road and bridge infrastructure.

Expected Benefits: This study will evaluate the increased costs of pavement and bridge consumption by oversize and/or overweight (OS/OW) trucks in Louisiana, which could not be recovered by the state's current OS/OW permit structure. It will recommend an updated permit fee and fee structure adjustments to DOTD, including the annual registration fees for OS/OW trucks, and appropriate single trip and harvest season overweight permit fees based on the impacts on road and bridge infrastructure.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 1: literature review on truck registration and permit fees, impacts of overweight trucks on roadway and bridge damages, recovery cost estimation and tax credit that may offer industry to offset the increased registration fees/overweight permit fees;
Task 2: Investigate on the current Louisiana fee schedules of truck registration and overweight permit fees; identify primary categories of heavy truck types and usage (agriculture, shale oil and gas, or timber) and retrieve historical truck registration and overweight permit fees from the DOTD's Permit Office.
Task 3: Project selection and roadway damage analysis. Identify roadway segments including bridge segments from DOTD's pavement management system (PMS) which are known abundantly used by a certain or multiple types of heavy or overweight trucks to perform road damage analysis using Pavement ME, and to perform bridge damage analysis based on a numerical analysis method. The results will be compared to PMS recorded performance data and used in further damage cost analysis in Task 4.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**The quality control of longitudinal joint of asphalt pavement and its effect on pavement performance**	**Project Status:**	**Proposed**

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

SIO:		Project Start Date:		7/1/2020
Research Project Number:		Completion Date	(original)	6/30/2024
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Qiming Chen			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$150,000	**Total**		**$44,409**
	(revised)				
Est. Expended to Date			Salaries		$44,409
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: Low density is common in the longitudinal joint of asphalt pavement since the edge of the first paved lane is unconfined. Current DOTD specs has no minimum density requirement for HMA construction at the joint area. This creates weak points in multilane HMA pavement and causes cracking and raveling, which can propagate to the travel lane.

Objectives: The purpose of this research is to evaluate the effect of the quality control of longitudinal joint on the performance of pavement.

Expected Benefits: The results of the study may be used to recommend improved DOTD specs for pavement construction.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Start to data mine the PMS database to collect pavement distress information needed for this research.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Minimum Intersection Illumination**	**Project Status:**	**Proposed**

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

SIO:	**DOTLT1000373**	Project Start Date:		1/2/2020
Research Project Number:	20-3SA	Completion Date	(original)	6/30/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Julius Codjoe			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$120,000
	(revised)	
Est. Expended to Date		
FY 2019 - 2020 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2020-2021 Budget		
Total		**$69,062**
Salaries		$67,922
Consumable Supplies & Materials		$1,140
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: Would Louisiana benefit from having an intersection lighting policy in terms of crashes vs. night time crashes? Is a partial lighting plan policy appropriate for Louisiana in terms of cost of full vs. partial?

Objectives: The primary objective is to determine if LADOTD can eliminate or reduce the cost of engineering the illumination plan, as well as reduce the number of light posts, which would be required at intersections. Particularly, the study will provide guidance on minimum illumination requirements to produce some safety benefits at intersections, what other low-cost safety countermeasures can be used to improve visibility at intersections, and what will be the implementation and maintenance costs.

Expected Benefits: If it is determined, that lighting would significantly add a safety benefit in terms of reducing crashes, it could lead to an intersection lighting policy, including roundabouts. The study will also provide guidance on how best to implement such a policy such that it does not become cost prohibitive. This will provide significant cost savings for the taxpayer while saving lives.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

This project has not begun yet. A Project Review Committee (PRC) meeting will be scheduled to develop the scope of work.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Proposed activities will be listed when Project Proposal is developed.

LTRC Annual Research Program
Fiscal Year 2020-2021

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:		11/1/2019
Research Project Number:	20-2SA	Completion Date	(original)	1/31/2021
Research Agency:		Completion Date	(revised)	
Principal Investigator:				

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$175,000	**Total**		**$75,000**
	(revised)				
Est. Expended to Date			Salaries		$75,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$43,750	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: In recent years, Louisiana 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. In 2015, Louisiana was identified as an Intersection Focus State by FHWA Office of Safety based on the intersection fatality rate being higher than the expected fatality rate based on VMT, population, and center line miles of roadway. Therefore, there is a need to continue to implement cost effective countermeasures to reduce and prevent intersection vehicle crashes.

Objectives: 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. Depending on the magnitude of the problem the research would focus either on signalized or stop control intersections.

Expected Benefits: The research 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 of this project can be also used as part of 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 2019 - 2020 ACCOMPLISHMENTS

A Project Review Committee (PRC) meeting has been scheduled to develop the scope of work.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES
The task activities will be determined based on the approved research proposal.

LTRC Annual Research Program
Fiscal Year 2020-2021

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

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

SIO:	**DOTLT1000341**	Project Start Date:		10/1/2019
Research Project Number:	20-1SA	Completion Date	(original)	3/30/2021
Research Agency:		Completion Date	(revised)	
Principal Investigator:	Julius Codjoe			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$150,000	**Total**		**$77,954**
	(revised)				
Est. Expended to Date			Salaries		$76,814
FY 2019 - 2020 Budget			Consumable Supplies & Materials		$1,140
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: Due to increased crashes, analysis of the crash characteristics and compliance with the lane and speed limit restrictions along the Atchafalaya Basin Bridge is needed to understand the cause of the increase crashes. It may be beneficial to also review other elevated interstate segments across Louisiana.

Objectives: 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. The video analytical software is expected to be used to analyze video footage from selected sites.

Expected Benefits: The software tool can be used statewide in research work to estimate traffic volumes. The speed study on elevated sections will provide law enforcement agencies information on where and when the most serious violations occur. Data about the magnitude and effects of crashes would inform policy makers so they could make better decisions about how to reduce this problem.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

This project has not yet began. An initial Project Review Committee (PRC) meeting was held to develop the scope of work. The research proposal is under development.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Activities will be defined after developing the Project Proposal.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Determine the Relationship between Lighting Conditions and Fatal and Severe Pedestrian Crashes in Louisiana**	**Project Status:**	**Proposed**

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

SIO:	**DOTLT1000291**	Project Start Date:		10/1/2018
Research Project Number:	19-2SA	Completion Date	(original)	6/30/2022
Research Agency:		Completion Date	(revised)	
Principal Investigator:				

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$125,000	**Total**		**$80,000**
	(revised)				
Est. Expended to Date			Salaries		$80,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$125,000	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: Louisiana experiences a significantly higher pedestrian fatalities rate compared to the national average. By investigating pedestrian fatalities and severe injury crashes in Louisiana, it is indicated that most of them occurred under dark conditions. These high proportions reveal strong impact of lighting conditions on pedestrian fatal and severe injury crashes.

Objectives: The objective of this proposed research is to investigate the relationship between lighting conditions and pedestrian crashes and how to reduce them by improving lighting conditions in Louisiana. The research will perform pedestrian crash analysis, explore existing lighting conditions at these locations, identify the options to improve lighting conditions, and conduct the cost/benefit analyses.

Expected Benefits: This research will provide insight into the factors that contribute to pedestrian crashes, the impact of lighting conditions on pedestrian crashes in Louisiana, and guide effective countermeasures to reduce crashes and minimize risk factors for pedestrians. The research results could be used to establish a new DOTD lighting policy which will be implemented and enforced to improve pedestrian safety in Louisiana.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

A Project Review Committee (PRC) meeting was held to develop the scope of work. The research proposal is under development.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Task 1. Perform literature review.
Task 2. Pedestrian crash analysis in Louisiana.
Task 3. Cost and benefit analysis.

LTRC Annual Research Program
Fiscal Year 2020-2021

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:		Project Start Date:		10/1/2020
Research Project Number:		Completion Date	(original)	9/30/2022
Research Agency:		Completion Date	(revised)	
Principal Investigator:				

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$175,000	**Total**		**$75,000**
	(revised)				
Est. Expended to Date			Salaries		$75,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: As outlined in Louisiana's 2017 Strategic Highway Safety Plan (SHSP), the state has selected five areas of emphasis representing the highest percent of road fatalities in the state, with four of the five priorities involving human behavior: Infrastructure and Operations, Impaired Driving, Occupant Protection, Distracted Driving, and Young Drivers. In order 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.

Objectives: 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 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Activities will be determined based on the approved research proposal.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Permitted/Protected versus Protected Left Turns**	**Project Status:**	**Proposed**

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

SIO:	**DOTLT1000378**	Project Start Date:		1/1/2018
Research Project Number:	21-3SS	Completion Date	(original)	12/31/2018
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Julius Codjoe			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$134,209
	(revised)	
Est. Expended to Date		
FY 2019 - 2020 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2020-2021 Budget		
Total		**$72,160**
Salaries		$71,020
Consumable Supplies & Materials		$1,140
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

T Problem Statement: There is the need to balance the safety benefits of an intersection configuration (permitted/protected versus protected only) with its operational benefits (delay and capacity).

Objectives: The primary objective of this project is to study the safety and operation of existing signal intersections (with protected only versus protected/permitted left turns) along with their geometric features, as described in the DOTD Traffic Signal Manual, with the view to develop guidance on when protected/permitted is to be implemented versus protected only.

Expected Benefits: Potentially the results obtained from this study can lead to better assessments of where to implement permitted, protected/permitted, 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 2019 - 2020 ACCOMPLISHMENTS

This project has not yet begun.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Proposed activities will be listed after the Project Proposal is developed

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Attracting Public Involvement to the Transportation Planning Process and Enhancing Communication of Highway Programming Decisions in Louisiana**	**Project Status:**	**Proposed**

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

SIO:		Project Start Date:		1/1/2020
Research Project Number:		Completion Date	(original)	6/30/2021
Research Agency:	LSU	Completion Date	(revised)	
Principal Investigator:	Chester Wilmot			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$125,000	**Total**		**$100,000**
	(revised)				
Est. Expended to Date			Salaries		$100,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: Long range transportation planning can capture the public's imagination with grand visions for the future. While it is DOTD's responsibility to facilitate the involvement of the public in the planning process through events like public meetings, it isn't always successful in attracting involvement and perspectives that are representative of the affected population as a whole. There are opportunities to engage the general public and other stakeholders (elected officials) through a number of newer techniques (e.g., visualization, real-time polling and online meetings) that allow for meaningful consideration and input. Transportation programming, however, is a critical part of the process of developing projects from planning to implementation, as it establishes fundamental priorities, but in spite of this, it is an aspect of the process of which the general public is relatively unfamiliar as it is often portrayed in large spreadsheets, data summaries, and other means that are less captivating to the general public.

Objectives: The proposed project would (1) synthesize and evaluate the effectiveness of DOTD's existing approaches; (2) investigate and document successful practices in peer states/MPOs; and (3) examine and propose alternative ways to attract public involvement and present the programming process/decisions that would be more engaging.

Expected Benefits: Increasing public involvement to the planning and programming process allows DOTD to: (1) Obtain Quality Input and Involvement; (2) Provide Opportunities to Build Consensus; (3) Ensure Accessibility and Diversity; (4) Establish and Maintain Partnerships; (5) Foster Participant Satisfaction; (6) Clearly Define the Potential for Influence; and (7) Establish the Department's Commitment and Establish Relevance.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

The project has not started yet.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES
To be determined based on the approved proposal which has yet to be developed.

LTRC Annual Research Program
Fiscal Year 2020-2021

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

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

SIO:		Project Start Date:		1/2/2020
Research Project Number:		Completion Date	(original)	6/30/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Julius Codjoe			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$120,000	**Total**		**$76,720**
	(revised)				
Est. Expended to Date			Salaries		$75,580
FY 2019 - 2020 Budget			Consumable Supplies & Materials		$1,140
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: Before Louisiana invests more resources to Intelligent Transportation Systems (ITS), it will benefit the taxpayer if a thorough study is undertaken to demonstrate the benefits of the current ITS programs across transportation planning, traffic operation, safety, environmental quality and sustainability, and any other areas that can be evaluated.

Objectives: 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 LADOTD recognize its shortfalls and provide the necessary information for policy makers to address any needs. Ultimately, the study results will provide the foundation for the generation of a reporting tool that will be used to generate reports to help show status and trends of the benefits of ITS for the state of Louisiana.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

This project has not yet begun.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Proposed activities will be listed after the Project Proposal has been developed

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Evaluating the Safety, Mobility, and Cost of Work Zone Queue Detection and Warning Systems in Louisiana**	**Project Status:**	**Proposed**

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

SIO:		Project Start Date:		7/1/2020
Research Project Number:		Completion Date	(original)	12/31/2021
Research Agency:		Completion Date	(revised)	
Principal Investigator:				

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$90,000	**Total**		**$60,000**
	(revised)				
Est. Expended to Date			Salaries		$60,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: In recent years, DOTD has employed queue detection and warning systems to warn motorist of slowing or stopping conditions ahead as they approach a work zone. These systems incur significant cost to DOTD, but their effectiveness has not been comprehensively studied in Louisiana. With the impending procurement of 1-minute sub-TMC (traffic message channel) level vehicle probe data by DOTD, the Department will now be in a position to have comprehensive ground truth data to conduct this type of study.

Objective: The purpose of this project is to evaluate the safety impacts, mobility impacts, and cost of work zone queue detection and warning systems in Louisiana.

Expected Benefit: This results of this study could inform future decision-making regarding the deployment of queue detection and warning systems in work zones.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

To be determined based on the approved proposal which has yet to be developed.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Probe Data-Based Work Zone Queue Detection and Warning and Pilot**	**Project Status:**	**Proposed**

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

SIO:		Project Start Date:		7/1/2020
Research Project Number:		Completion Date	(original)	12/31/2020
Research Agency:		Completion Date	(revised)	
Principal Investigator:				

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$110,000	**Total**		**$80,000**
	(revised)				
Est. Expended to Date			Salaries		$60,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		$20,000

BUDGET JUSTIFICATIONS

Other: Traffic/ITS subcontractor to install/uninstall field equipment - $20,000

PURPOSE AND SCOPE

Problem Statement: In recent years, DOTD has employed queue detection and warning systems to warn motorist of slowing or stopping conditions ahead as they approach a work zone. These systems incur significant cost to DOTD, a portion of that cost is due to the acquisition and deployment of detection equipment. With the impending procurement of real-time 1-minute sub-TMC (traffic message channel) level vehicle probe data by DOTD, the Department will now be in a position to explore and pilot the use of that data for detection purposes in lieu of deploying field equipment.

Objectives: The purpose of this project is to study and pilot the use of real-time probe data for work zone queue detection and warning systems in Louisiana.

Expected Benefits: If the pilot proves to be successful, then the expected benefits to DOTD would be cost savings on individual construction projects, which could, in turn, allow more project to employ work zone queue warning systems without deploying detection systems.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

To be determined based on the approved proposal which has yet to be developed.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Review of Current Practices in Highway Program Development**	**Project Status:**	**Proposed**

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

SIO:		Project Start Date:		9/1/2020
Research Project Number:		Completion Date	(original)	8/31/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Chester Wilmot			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$45,000	**Total**		**$40,000**
	(revised)				
Est. Expended to Date			Salaries		$40,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: Future turnover in key positions associated with DOTD's planning functions are likely to create a need to revisit how we develop our capital program. Further, during recent sessions, the Legislature has expressed interest in making changes to the statute governing the Highway Priority Program, and in otherwise directing how current or future revenues are spent. Research is needed to inform the discussion.

Objective: The purpose of this project is to determine the best practices used by state DOTs in developing their highway programs. The project will review processes used by state DOTs to develop their respective highway programs, noting strengths and weaknesses of each approach. Each approach will include characterized based on its ability to develop and deliver on long-term transportation plans that result in long-run benefits for transportation infrastructure. Also the best practices identified will be evaluated for possible incorporation into DOTD, noting whether such practices could be accomplished through internal procedural changes or would require state legislative/regulatory changes.

Expected Benefits: Identification and documentation of best practices among other state DOTs could both improve current DOTD practices and provide information that could be supplied to the legislature to guide any future changes that might be proposed towards methodologies that have actually proven effective in peer states.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

To be determined based on the approved proposal which has yet to be developed.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Testing the Hurricane Evacuation Modeling Package**	**Project Status:**	**Proposed**

Funding Source:	**SPR: TT-Fed/TT-Reg - 5**			**Budget Category:**	**FHWA**
SIO:			Project Start Date:		6/1/2020
Research Project Number:			Completion Date	(original)	9/30/2021
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Chester Wilmot				

BUDGET STATUS

Total Budget				**Estimated 2020-2021 Budget**		
Total Cost	(original)	$225,000		**Total**		**$218,000**
	(revised)					
Est. Expended to Date				Salaries		$218,000
FY 2019 - 2020 Budget				Consumable Supplies & Materials		
FY Funds	(original)			Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure				Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

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.

Objectives: 1. Test individual modules of the computer package. 2. Run package on past storms.

Expected Benefits: 1. A program that predicts the consequences of alternative management evacuation decisions allowing informed decision making.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

To be determined based on the approved proposal which has yet to be developed.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**What is the Cost and Benefit of Collecting and Maintaining Non-road and Non-bridge Asset Data?**	**Project Status:**	**Proposed**

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

SIO:		Project Start Date:		9/1/2020
Research Project Number:		Completion Date	(original)	11/30/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Chester Wilmot			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$90,000	**Total**		**$60,000**
	(revised)				
Est. Expended to Date			Salaries		$60,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem statement: A need exists to determine the true cost of collecting and maintaining non-road and non-bridge asset 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: 1. Review recent peer exchange (Fall 2018) on asset management. 2. Review NCHRP and other research reports. 3. Compile a state-of-the practice of State DOT's asset management collection and maintenance data.

Expected benefit: Reduction in wasteful manpower and resource allocation.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

N/A

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

To be determined based on the approved proposal which has yet to be developed.

LTRC Annual Research Program
Fiscal Year 2020-2021

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

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

SIO:	DOTLT1000377	Project Start Date:		10/1/2020
Research Project Number:	21-2SS	Completion Date	(original)	9/30/2022
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:				

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$175,000	**Total**		**$80,000**
	(revised)				
Est. Expended to Date			Salaries		$80,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: LA DOTD Complete Street Policy is to create a comprehensive, integrated, connected transportation network for Louisiana that balances access, mobility and safety needs of all users. LA DOTD adopted a Complete Streets policy in 2010 and now this policy is required on all transportation projects that involve federal or state funding or approval. Therefore, we need to evaluate the impact of this policy on the transportation system.

Objectives: The purpose of this project is to investigate the impact of complete street policy in Louisiana by conducting data collection and analyses, before and after studies, surveys, and interviews. The locations where complete street policy has been implemented will be evaluated from various perspectives including traffic operation, safety performance, access availability, and community engagement. Comparisons among locations with and without the policy implementation will also be conducted.

Expected Benefits: The findings of the study can determine the benefit of complete street policy from various perspectives and also be used to improve and better implement the policy in the future.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Activities will be determined based on the approved research proposal.

Title:	**Development of Green Concrete Reinforced with Renewable Chitin Nanowhiskers**	**Project Status:**	**Proposed**

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

SIO:	**DOTLT1000371**	Project Start Date:		7/1/2020
Research Project Number:	21-5TIRE	Completion Date	(original)	6/30/2021
Research Agency:	ULL	Completion Date	(revised)	
Principal Investigator:				

BUDGET STATUS

Total Budget		
Total Cost	(original)	$28,749
	(revised)	
Est. Expended to Date		
FY 2019 - 2020 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2020-2021 Budget		
Total		**$28,749**
Salaries		$26,287
Consumable Supplies & Materials		$1,000
Equipment	(non-expendable)	
Travel		$110
Other		$1,352

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: The purpose of the TIRE program at LTRC is to advance the state of knowledge through basic research (i.e. research that may not rapidly lead to implementation. “Green Concrete” is not a new item, but the use of superplassticizers and reinforcement is not necessarily a “green” practice due to their inherent manufacturing processes. The use of a byproduct in their place will increase the “green” nature of resulting concrete.

Objective: The objective of this project is to develop a new generation of high performance green concrete using chitin nanowhiskers acting as superplasticizer and reinforcement.

Potential Benefits: The potential benefit of this work is a new "green" high performance material for use in concrete production.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Start and complete the study.

Title:	Quantifying and Improving Time-Dependent Extreme Event Resilience of Road Networks	Project Status:	Proposed

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

SIO:	DOTLT1000370		Project Start Date:		7/1/2020
Research Project Number:	21-4TIRE		Completion Date	(original)	6/30/2021
Research Agency:	LSU		Completion Date	(revised)	
Principal Investigator:					

BUDGET STATUS

Total Budget				Estimated 2020-2021 Budget		
Total Cost	(original)	$29,600		**Total**		**$29,600**
	(revised)					
Est. Expended to Date				Salaries		$29,600
FY 2019 - 2020 Budget				Consumable Supplies & Materials		
FY Funds	(original)			Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure				Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: The purpose of the TIRE program at LTRC is to advance the state of knowledge through basic research (i.e. research that may not rapidly lead to implementation. DOT's have difficulty in planning for and quantifying roadway network resilience to extreme events such as flooding, fire, etc.

Objective: The objective of this project is to quantify the long-term time evolving extreme event resilience of road networks, with an end goal of identifying strategies needed to be implemented during planning stages to maximize resilience at all times considering economic and resource constraints.

Potential Benefits: The potential benefit of this work is stakeholders may be able to pick and choose the best strategies to optimize a road network's resilience in real time.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Start and complete the project.

Title:	Real-Time Monitoring of Health Conditions of Highway Infrastructure in Louisiana Using Self-Powered Damage Identification System	Project Status:	Proposed

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

SIO:	DOTLT1000369	Project Start Date:		7/1/2020
Research Project Number:	21-3TIRE	Completion Date	(original)	6/30/2021
Research Agency:	LTU	Completion Date	(revised)	
Principal Investigator:				

BUDGET STATUS

Total Budget			Estimated 2020-2021 Budget		
Total Cost	(original)	$30,000	**Total**		**$30,000**
	(revised)				
Est. Expended to Date			Salaries		$26,758
FY 2019 - 2020 Budget			Consumable Supplies & Materials		$2,925
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		$317

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: The purpose of the TIRE program at LTRC is to advance the state of knowledge through basic research (i.e. research that may not rapidly lead to implementation. Nationwide bridge infrastructure is rapidly deteriorating creating the need for increased monitoring of the bridge condition. A need for real-time monitoring of bridge conditions exists.

Objective: The objective of this project is to develop a prototype of a self-powered wireless vibration-based structural damage detection system for monitoring the health conditions of highway bridges.

Potential Benefits: The potential benefit of this work is to advance the state of the knowledge in the area of self-powered vibration-based structural damage sensors for real-time structural health monitoring.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Start and complete the project.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Improving Asphalt Binder Properties Using Recycled Plastics and Crosslinking Agents/Additives**	**Project Status:**	**Proposed**

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

SIO:	**DOTLT1000368**	Project Start Date:		7/1/2020
Research Project Number:	21-2TIRE	Completion Date	(original)	6/30/2021
Research Agency:	LTU	Completion Date	(revised)	
Principal Investigator:				

BUDGET STATUS

Total Budget		
Total Cost	(original)	$30,000
	(revised)	
Est. Expended to Date		
FY 2019 - 2020 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2020-2021 Budget		
Total		**$30,000**
Salaries		$28,284
Consumable Supplies & Materials		$1,516
Equipment	(non-expendable)	
Travel		$200
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

Problem Statement: The purpose of the TIRE program at LTRC is to advance the state of knowledge through basic research (i.e. research that may not rapidly lead to implementation. The use of plastic modified binders would create a market for recycled plastic thus increasing the “greenness” of our roadway infrastructure. A need exist to characterize the both the short and long term performance and stability of these new generation plastic modified binders.

Objective: The objective of this project is investigate the effectiveness of various additives/crosslinkers on the performance and stability of plastic modified asphalt binder.

Potential Benefits: The potential benefit of this work is to advance the state of the knowledge in the area of plastic modified asphalt binders.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Start and complete the project

FHWA

Part B SPR Funded Research Program

POOLED FUND
LOUISIANA
LEAD STATE RESEARCH

LTRC Annual Research Program
Fiscal Year 2020-2021

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 2020-2021 Budget		
Total Cost	(original)	$900,000	**Total**		**$180,000**
	(revised)				
Est. Expended to Date			Salaries		$165,000
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		$15,000
Est. FY Expenditure			Other		

BUDGET JUSTIFICATIONS

Travel: Travel for Southeast Transportation Consortium (STC) members to annual meeting

PURPOSE AND SCOPE

This pooled fund study aims to accomplish the following objectives: (1) Plan and conduct potential research or synthesis projects of interest to Southeast Transportation Consortium (STC) member states, (2) Hold one multi-state peer exchange per year for up to three member states on a topic of their choosing in conjunction with the STC Annual Meeting, and (3) Communicate and disseminate research results and innovative practices through publications and other technology transfer activities while communicating the impacts to national leaders in transportation.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Post the study to the pooled fund study website and start the solicitation process. Once funded, start the project and hold the first meeting.

FHWA

LTAP Funded Program

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Local Technical Assistance Program (LTAP)**	**Project Status:**	**Proposed**

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

SIO:	**DOTDLT1000349**	Project Start Date:		7/1/2020
Research Project Number:	21-LTAP	Completion Date	(original)	6/30/2021
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 2019 - 2020 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2020-2021 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) - $11,000;
-Professional services (instructors) - $60,000; and
-Professional services (LPA on Line/CBT Module) – $75,000.

PURPOSE AND SCOPE

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.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

-Sponsored 2 Louisiana Parish Engineers and Supervisors Association Statewide technical conferences for over 208 participants
Organized and conducted the NLTAPA South Central and Great Lakes Joint Regional Meeting in Arlington, Texas for 40 participants
-Delivered 1 LPA Qualification Core Training Module in Alexandria to 14 people; delivered 1 LPA "Project Development and Design Process for the LPA Responsible Charge" Module to 10 people; delivered 1 "CE&I Training Module to 13 people; second series scheduled for June 2020 in New Orleans
-Conducted 13 sessions of Basics Work Zone Safety to 290 local agency participants
-Revised content for Roads Scholar #4 - Temporary Traffic Control for Local Agencies and presented at 6 locations around the State with 116 attendees
-Delivered 8 sessions of the "Roads Scholar #8: Successful Supervision for Local Road Supervisors" class to 133 people
-Coordinated 2nd Annual "Day of Trees" Workshop in Opelousas to 47 attendees
-Revised content and delivered 8 sessions of Roads Scholar #1: Basics of a Good Road class to 189 People
-Revised content and prepared to deliver 9 sessions of Roads Scholar #15: Operational Safety for Public Works First Responders – scheduling April-May 2020, modified by Coronavirus pandemic
-Scheduled Chain Safety classes at 4 locations in March, postponed due to Coronavirus pandemic
-Participated on STIC and EDC-4 Implementation Teams for Pavement Preservation; Safe Transportation for Every Pedestrian (STEP); and Data-Driven Safety Analysis (DDSA)
-Participated on EDC-5 Implementation Teams for STEP, Roadway Departure, Project Bundling, and Value Capture.
-Participated in the Louisiana Municipal Association 82nd Annual Meeting in Monroe, LA
-Participated in the annual Police Jury Association of Louisiana Annual Convention in Shreveport, coordinating activities of the LPESA, and providing information on LTAP programs and access to training and technical assistance

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

-Revise content for Roads Scholar #13 - Inspection of Local Bridges (2-day workshop) and present at 8 locations around the State
-Revise content for Roads Scholar #3: Drainage – The Key to Roads That Last – and present at 8 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
-Present Roads Scholar #5 - Safety: A Common Sense Approach for the Public Works Employee at 8 locations around the State
-Develop LTAP Roadway Departure Workshop (based on FHWA Resource Center and EDC content) for Local Agency road owners and safety coalition partners in nine locations around the State
-Present up to 6 Road Safety Assessment workshops upon request for Regional Safety Coalitions as part of the SHSP Strategic Plan
-Present Basics of Work Zone Safety with Basic Flagger mini workshops upon request – estimated 12 sessions
-Conduct 4 sessions of "Chainsaw Safety and Precision Felling" class at four locations (rescheduled from Spring 2020)
-Conduct two 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)
-Attend FHWA EDC-6 Regional Summit. Develop implementation tasks for local component of EDC-6 Initiatives when determined. Support continuing EDC 5 initiatives such as FoRRWD; STEP and Value Capture
-Pilot or develop rollout strategy for new Transportation Leadership Program in one region, community or organization
-Continue implementation of 2019 Communication Plan to include LPA Program; EDC-5 Initiatives; LRSP 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)

FHWA

STP Funded
Technology Transfer &
Education Program

LTRC Annual Research Program
Fiscal Year 2020-2021

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)	
Principal Investigator:	Vijaya Gopu			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$441,453	**Total**		**$151,502**
	(revised)				
Est. Expended to Date		$264,502	Salaries		$131,502
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$147,151	Equipment	(non-expendable)	
	(revised)		Travel		$20,000
Est. FY Expenditure		$131,502	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

PURPOSE AND SCOPE

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. 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.

FISCAL YEAR 2019 - 2020 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 provide classes for DOTD people at LTRC. Contacting employees directly resulted in better compliance with signing up for and attending required courses.
-Worked with DOTD Loss Prevention section and Marine group on ways to require and track training unique to special situations. Full implementation of the requirements is expected in FY 20-21.
-Worked with DOTD Construction Inspection Program Manager to implement several different changes including creating walkover data.
-Modified DOTD system for daily automatic update of personnel using LaGov file.
-Developed written procedures for data extraction from LSO and trained two employees to be able to run the extractions.
-Began work with DOTD team to implement record keeping for DOTD's new Equipment Operator Certification Program (EOCP). Over 100 new qualifications were defined in LSO.
-Ongoing support on the statewide LMS system provided to LTRC personnel and DOTD personnel across the state. Attend meetings representing DOTD with other agency representatives to provide input on changes needed to improve the statewide LMS.
-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 2020-2021 PROPOSED ACTIVITIES
-Continue all IT support services for LTRC campus and employees. -Continue with implementation of DOTD's EOCP program – make recommendations for training program modifications. Modify automation as needed to support program. -Continue to full implementation of requirements for Loss Prevention and Marine group. -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. Review training policy and recommend modifications as needed. -Work with DOTD LSO Training Administrators on standards for definitions in LSO. -Rewrite DOTD Training website to use the most current standards for development.

LTRC Annual Research Program
Fiscal Year 2020-2021

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 2020-2021 Budget**		
Total Cost	(original)	$100,000	**Total**		**$10,000**
	(revised)				
Est. Expended to Date		$74,000	Salaries		
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$10,000	Equipment	(non-expendable)	
	(revised)	$5,000	Travel		$10,000
Est. FY Expenditure		$4,279	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.

PURPOSE AND SCOPE

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. This project provides a mechanism to fund technology transfer travel for university faculty to deliver research results to state and national audiences such as Transportation Research Board (TRB) Annual Meeting, Louisiana Transportation Conference (LTC), Louisiana Transportation Research Center (LTRC) Seminar Series, and Louisiana Department of Transportation and Development (LADOTD) Implementation meetings and training. Travel funds are dispersed on a case by case basis as it applies to providing a benefit to Louisiana.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Sent 5 professors to the TRB Annual meeting to present results.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Send contract researchers to present upon findings of LTRC contract research projects.

LTRC Annual Research Program
Fiscal Year 2020-2021

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)	6/30/2021
Principal Investigator:	MaryLeah Coco			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$361,546
	(revised)	$1,140,170
Est. Expended to Date		$367,934
FY 2019 - 2020 Budget		
FY Funds	(original)	$379,911
	(revised)	
Est. FY Expenditure		$367,934

Estimated 2020-2021 Budget		
Total		**$387,041**
Salaries		$336,041
Consumable Supplies & Materials		$15,000
Equipment	(non-expendable)	$15,000
Travel		$12,000
Other		$9,000

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

Other: License renewals for LTRC registration management, publication processing, program creation, and software.

PURPOSE AND SCOPE

The objectives of this study are to:
-Disseminate information on new technologies and methodologies to Louisiana Department of Transportation and Development (LADOTD) 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.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

-Published 4 Tech Today Newsletters
-Published 2019 Annual Report
-Launched redesign of LTRC website for improved accessibility and mobile-friendly navigation
-Support for all Section 33 users managing the Registration Management System
-Produced templates for Section 33 training materials (reports, PPT)
-Provided web support for NSF project: Field Monitoring and Measurements (FMM) Education
-Updated all current forms/documents on LTRC and LTAP site for 508 compliance (research forms, resources, etc.)
-Compiled list of backlog accessibility issues; working through the list of documents published prior to October 2018
-Publication chair for 2020 Transportation Conference
-Industry Relations chair for 2020 Transportation Conference
-Sponsorship chair for 2020 Transportation Conference
-Assist all 2020 Transportation Conference committees
-Edited 12 Final Reports/Technical Summaries
-Published 13 Project Capsules
-Published 19 Final Reports/Technical Summaries
-Published 4 Tech Assistance Reports
-Learning/maintaining accessibility software
-Implemented new Word template
-Photographed all LTRC events including LTC 2020
-Filmed and produced 21 DOTD informational videos
-Filmed and produced 1 DOTD nuclear calibration instructional video
-Filmed and produced 3 Transportation Talk videos featuring Secretary Wilson
-Filmed and produced approx. 50 math/instructional videos
-Up to 630 subscribers on YouTube

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

-Continue web/graphics support in all current areas
-Update LTAP site to match new LTRC template
-Continued work on 508 accessibility issues for PDFs
-Assist in 2020 AASHTO Agency Administration Conference
-Assist in development of all publications, website, registration, e-commerce and mobile application
-Develop training and support online registration management system
-Continue maintenance of LTRC and LTAP website
-Continue to edit and distribute project capsules, technical summaries, final reports and technical assistance reports
-Publish 4 Tech Today newsletters
-Photograph all LTRC events
-Video all LTRC events
-Readily available for any special assistance requested from Secretary's office
-Attend professional development and leadership training

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Technology Transfer Registration Fees**	**Project Status:**	**Proposed**

Funding Source:	**STP: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000352**	Project Start Date:		7/1/2020
Research Project Number:	21-TTRF	Completion Date	(original)	6/30/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	MaryLeah Coco			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$100,000
	(revised)	
Est. Expended to Date		
FY 2019 - 2020 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2020-2021 Budget		
Total		**$100,000**
Salaries		
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		$100,000

BUDGET JUSTIFICATIONS

Other: -Statewide technology transfer and research activities related to workforce development.

PURPOSE AND SCOPE

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.

FISCAL YEAR 2019 - 2020 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 2020-2021 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 2020-2021

Title:	**AASHTO PONTIS Agreement**	**Project Status:**	**Proposed**

Funding Source:	**STP: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000356**	Project Start Date:		7/1/2020
Research Project Number:	21-PONTIS	Completion Date	(original)	6/30/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	MaryLeah Coco			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$125,000
	(revised)	
Est. Expended to Date		
FY 2019 - 2020 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2020-2021 Budget		
Total		**$125,000**
Salaries		
Consumable Supplies & Materials		
Equipment	(non-expendable)	$125,000
Travel		
Other		

BUDGET JUSTIFICATIONS

Equipment: AASHTOware which is utilized for bridge management for technical activities.

PURPOSE AND SCOPE

AASHTO PONTIS Agreement.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

AASHTOware, PONTIS, was utilized for bridge management.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Equipment:
AASHTOware product for bridge management which is used only for technical activities.

Proposed Activities:
AASHTOware that is utilized for bridge management.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**LA DOTD CO-OP Program**	**Project Status:**	**Proposed**

Funding Source:	**STP: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000353**	Project Start Date:		7/1/2020
Research Project Number:	21-COOP	Completion Date	(original)	6/30/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	MaryLeah Coco			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$200,000
	(revised)	
Est. Expended to Date		
FY 2019 - 2020 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2020-2021 Budget		
Total		**$200,000**
Salaries		$200,000
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

The Louisiana Department of Transportation and Development (LADOTD) Co-op program is a cooperative endeavor between the LADOTD 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. This program is intended to enhance the educational process by providing opportunities for participants too explore their interest in transportation engineering through practical experience. This program also provides opportunities for LADOTD to evaluate participants of this program as potential employees.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

-15 students participated in the Co-op Program at various LADOTD districts/sections throughout.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

-Place approximately 15 students in various LADOTD 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 2020-2021

Title:	**LTRC Student Worker Program**	**Project Status:**	**Proposed**

Funding Source:	**STP: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000351**	Project Start Date:		7/1/2020
Research Project Number:	21-2TT	Completion Date	(original)	6/30/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Sam Cooper, Jr.			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$147,600
	(revised)	
Est. Expended to Date		
FY 2019 - 2020 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2020-2021 Budget		
Total		**$147,600**
Salaries		$147,600
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

To pay salaries for undergraduate students employed to provide support in fulfilling necessary job tasks on various Louisiana Transportation Research Center (LTRC) projects.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Thirty (30) undergraduate students were employed by LTRC to provide support in fulfilling necessary job tasks on various LTRC projects.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Continue to pay for salaries for undergraduate students employed to provide support to various LTRC projects.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	Workforce Development Contracts	Project Status:	Proposed

Funding Source:	STP: TT-Fed	Budget Category:	FHWA

SIO:	DOTLT1000350	Project Start Date:		7/1/2020
Research Project Number:	21-1WDC	Completion Date	(original)	6/30/2021
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 2019 - 2020 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2020-2021 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: Special purpose equipment to be purchased for use only in research and technical activities.
-5K-10K: Interactive Touch Screen Video Wall TTEC Lobby; - no individual piece over 5K;
-5K-10K: Upgrade remaining Confidence Monitors to Commercial Grade - no individual piece over 5K;
-1K: PTZ HD Web Capable Video Cameras for each room to use during Lifesize Web Conferences - no individual piece over 5K;
-3K-5K: Screen Upgrades for TTEC 175,179, 101, Computer Lab - no individual piece over 5K;
-3K: Projector Bulb Replacements (All rooms); - no individual piece over 5K;
-10K: Emergency Lighting Replacement throughout building - no individual piece over 5K;
-10K: Video conferencing software renewal.

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 specification meetings
-Travel for statewide district trainer meetings

Other: -Contracts for external workforce development initiatives.

PURPOSE AND SCOPE

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 (LADOTD) employees to attend workshops, courses, and conferences to enhance their professional and technical development.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

- Held over 400 events with almost 4,400 attendees
- 15-16 students participated in the Co-op Program at various LA DOTD districts/sections throughout Louisiana
- Hosted at Transportation Training and Education Center (TTEC) end-of-the semester Co-op student presentations and video-conferenced in outlying areas in the fall. Due to COVID-19, spring presentations will be done via written report. Increased participation attendance by advertising department wide, to universities, and with the LTRC Policy Committee
-Attended 9 Career Fairs at LA engineering schools
-7 EI's were hired into the Engineer Resource Development Program (ERDP) and rotated through various LA DOTD sections and districts throughout Louisiana
-2 ERDP EI's successfully hired into LA DOTD districts or sections: 24 – Road Design, District 62 – Hammond
-4 ERDP EI's are still in the rotation
-FHWA Grant awarded for $51,794. Implementation and evaluation of TRAC (Transportation and Civil Engineering) and RIDES (Roadways Into Developing Elementary Students) programs for schools in the State of Louisiana. Federally funded grant – 8/1/2019-12/31/2019
-TRAC and RIDES December Workshop - 15 schools, 21 teachers
-RIDES Workshop to be held June 2020
-Added 569 titles catalogued to the LTRC Library online catalog
-TRB ABG40 - Standing Committee on Library and Information Science for Transportation – Member
-TRB AB010T - Task Force on Knowledge Management – Friend; -TRB ABG20 - Standing Committee on Transportation Education and Training – Friend; TRB B0002 - TRB Information Services Committee; TRB Committee ABG30 – Friend; TRB Committee ABG20-Friend; Friend of TRB Committee ABR30; Friend of TRB Committee ABE 70; Member TRB Committee B0002
-AASHTO's TRAC and RIDES Technical Service Program Service Committee member
-Member of National Transportation Training Directors (NTTD)
-Emerging Technology Chair of National Transportation Training Directors
-Member of Special Libraries Association (SLA) Transportation division
-NTKN (National Transportation Knowledge Network)
-Member AASHTO RAC CCTF TKNWG (Coordination and Collaboration Task Force – Transportation –
-Knowledge Network Working Group), formerly AASHTO RAC TKN TF
-Member of Association for Talent Development
-Member of Louisiana Chapter of SGMP and Louisiana Chapter of SGMP Board of Directors
-2017– 2019 Louisiana Chapter of SGMP Board of Directors 1st Vice President
-Member National Council on Workforce Education (NCWE)
-Highway Safety Competency Model Meetings
-Highway Safety Competency Model and deliverables (competencies and trainings)
-Start on the third section of DOTD for competency model
-Presentation for Performance Management Class
-Work on (finalize as much as possible) Managing Across Generations class
-Schedule/deliver face-to-face Leadership classes as possible
-AASHTO Committee on Knowledge Management (CKM) Conference
-Microphone upgrade in TTEC 100 Auditorium
-LTRC Conference Room system upgraded to digital
-Signage Firmware Upgraded
-Added and trained 12 new Lifesize Users
-Seven Leadership Development classes were held at TTEC
-Organized Lunch n' Learn classes
-Conducted training through NHI and FHWA
-Planned the 2020 Louisiana Transportation Conference
-2020 Louisiana Transportation Conference held March 1-4, 2020 in Baton Rouge, LA for over 1,700 participants and 185 vendors
-Negotiated overnight rooms for the 2020 Louisiana Transportation Conference (LTC) in Baton Rouge, LA, Marriot Courtyard Downtown Baton Rouge for March 1-4, 2020
-Negotiated for overnight rooms for the 2020 LTC in Baton Rouge, LA
-Transportation Safety Summit (LA DOTD Highway Safety) -2018– Baton Rouge, LA – Crowne
-Sent RFPs/contract process, negotiated hotel meeting space, overnight rooms, food/beverages, etc. (3)
-Secured the 2022, 2024, and 2026 dates for the Louisiana Transportation Conference with the Raising Cane River Center in Baton Rouge, LA
-Contracted and requested classes facilitated at TTEC (8)
-PE Review was at held at TTEC – January – February 2020; 3 out of 4 sessions held, 4th session postponed due to the COVID-19
-Worked with the LSU accessibility compliance office to determine compliance of databases the LTRC Library subscribes to and utilizes
-Updated the LTRC Library web site to address major compliance issues at the suggestion of the LSU accessibility compliance office
-Updated the LTRC Library web site to further improve accessibility
-Seminar Series – Geotechnical Topics
-Microsoft Office PC, Mechanics, GIS, ATSSA, and CADD Courses
-Individual Registrations
-Attended and presented at the 2020 TRB Conference in Washington, DC.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

- Continued additions of library materials into the online catalog;
- 508 Compliance;
- Deliver Leadership classes around the state as needed, online and virtual;
- Continue Competency Model project (up to 2-5 sections/year);
- Finalize and deliver Performance Management class;
- Finalize and deliver Managing Across Generations Class;
- Potentially attend and Present at 2021 TRB;
- 2022 Louisiana Transportation Conference – March 2022, Baton Rouge, LA;
- Member of Louisiana Chapter of SGMP;
- Place approximately 15 students in the Co-op Program in various LA DOTD districts/sections across the state;
- Hire approximately 6-7 employees to participate in the ERDP;
- Host two (2) TRAC and one (1) RIDES Workshop – December 2020;
- Conduct, host, plan, and present at 2020 LTC in Baton Rouge, LA;
- Continue to schedule Microsoft Office courses;
- Continue to offer GIS and CADD courses;
- Continue to host ATTSA courses;
- Continue to offer Mechanics courses training;
- Continue to conduct training through NHI and FHWA;
- Continue to conduct courses as needed and/or requested;
- Continue to write contracts/proposals for training as needed;
- Fulfill individual registration requests;
- RFP's as needed (3-5 per year);
- Maintenance and Rehabilitation of Historic Bridges (no cost) and Dynamic Friction Tester Training;
- Resiliency Peer Exchange (no cost) was rescheduled from May 27-28 to October 7-8 due to the COVID -19;
- Update student manual;
- Dynamic Friction Tester Training was postponed from April 7-8;
- Attend Crestron Training School (CTS) prep Course;
- Gain CTS certification;
- Implement "Contract Negotiations";
- Facilitate "Managing Across Generations";
- Complete work on the Competency Model with Traffic department;
- Begin work on Competency Model Safety department;
- Louisiana Transportation Conference items;
- Create an LTRC Conference Planning Guide
- PE Review – Session 4 (postponed due to COVID-19)

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Workforce Development**	**Project Status:**	**Proposed**
Funding Source:	**STP: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000348**	Project Start Date:		7/1/2020
Research Project Number:	21-1WD	Completion Date	(original)	6/30/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	MaryLeah Coco			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$1,269,680
	(revised)	
Est. Expended to Date		
FY 2019 - 2020 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2020-2021 Budget		
Total		**$1,269,680**
Salaries		$1,249,680
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.

PURPOSE AND SCOPE

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 (LADOTD) 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.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

-Completed revision of Asphaltic Concrete Paving Inspection course
-Revised Grammar 1-3 training courses
-Implemented 16 Maintenance Equipment Operation and Safety videos with tests in LTRC's test.com system
-Implemented/Reviewed/Revised/Maintained tests in LTRC's test.com system
-Reviewed and revised PPM #59, Workforce Development
-Implemented Radiation Safety training package approved by Department of Environmental Quality (DEQ)
-Updated the Single-Phase Motors manual
-Updated the Maintenance of Small Signs manual
-Updated the JLG 600 Boom Lift Equipment Operator Certification
-Developed the Spray Injection Patcher Equipment Operator Certification
-Updated Portland Concrete Cement (PCC) Paving Inspection Manual and Supporting Training Materials
-Updated PCC Mix Design Manual and Supporting Training Materials
-Implemented Aggregate Tester Authorization Training Courses and Authorization
-Implemented Hot Mix Asphalt (HMA) Plant Technician Authorization
-Implemented HMA Plant Certification Process Revisions
-Converted ILT Asphalt Paving 1Training Course to Articulate Web-Based Training (WBT) Platform
-Converted ILT Asphalt Paving 2 Training Course to Articulate WBT Platform
-Created Course Catalog
-Created Stage 4 Project Delivery WBT Course
-Created Stage 5 Project Delivery WBT Course
-Created Compliance for Construction WBT Course
-Created Compliance for Local Public Agencies (LPA) Reporting WBT Course
-Created Project Management Instructor-Led Training (ILT) Course
-Taught 3 Basic Flagging Procedures classes
-Taught 4 Project Management classes
-Taught 1 Hot Mix Asphalt Mix Design Class
-Taught 1 Testing and Analysis 1&2 Class
-Taught 1 Structural Concrete Inspection class
-Taught 2 PCC Paving classes
-Taught 4 Facilitation Skills classes
-Managed the Construction Certification Program
-Managed the Structured Training Program for the Department

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

-Develop Stages 0, 1, 2, and 6 of Project Delivery WBT courses
-Develop engineering-centered Project Management training course
-Develop a minimum of three new courses
-Develop health-related WBT course
-Review and update 15-20 training manuals to ensure materials and formatting are up to date
-Coordinate with Human Resources to transition Substance Abuse for Supervisors ILT to WBT format
-Review, recommend, and implement training revisions where necessary

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Technology Transfer and Assistance for Senior Project Courses**	**Project Status:**	**Proposed**

Funding Source:	**STP: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000355**	Project Start Date:		7/1/2020
Research Project Number:	21-1TT	Completion Date	(original)	6/30/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	MaryLeah Coco			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$37,500	**Total**		**$37,500**
	(revised)				
Est. Expended to Date			Salaries		
FY 2019 - 2020 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		$37,500

BUDGET JUSTIFICATIONS

Other: -Items for research and technology transfer purposes only.

PURPOSE AND SCOPE

To provide support for senior project engineering courses up to a maximum of $7,500/university/year.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

Participation from two universities: Louisiana State University (1 project) and the University of Louisiana at Lafayette (1 project).

FISCAL YEAR 2020-2021 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 2020-2021

Title:	Technology Transfer Program and Operations (DOTD)	Project Status:	Proposed

Funding Source:	STP: TT-Fed	Budget Category:	FHWA

SIO:	DOTLT1000354	Project Start Date:		7/1/2020
Research Project Number:	21-1TSQ	Completion Date	(original)	6/30/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	MaryLeah Coco			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$364,890
	(revised)	
Est. Expended to Date		
FY 2019 - 2020 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2020-2021 Budget		
Total		**$364,890**
Salaries		$364,890
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

The objectives of this study are to:
-Disseminate information on new technologies and methodologies to the Louisiana Department of Transportation and Development (LADOTD) and other transportation-oriented;
-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.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

-Published 4 Tech Today Newsletters;
-Published 2019 Annual Report;
-Launched redesign of LTRC website for improved accessibility and mobile-friendly navigation
-Support for all Section 33 users managing the Registration Management System
-Produced templates for Section 33 training materials (reports, PPT)
-Provided web support for NSF project: Field Monitoring and Measurements (FMM) Education
-Updated all current forms/documents on LTRC and LTAP site for 508 compliance (research forms, resources, etc.)
-Compiled list of backlog accessibility issues; working through the list of documents published prior to October 2018
-Publication chair for 2020 Transportation Conference;
-Industry Relations chair for 2020 Transportation Conference;
-Sponsorship chair for 2020 Transportation Conference;
-Assist all 2020 Transportation Conference committees;
-Edited 12 Final Reports/Technical Summaries
-Published 13 Project Capsules;
-Published 19 Final Reports/Technical Summaries;
-Published 4 Tech Assistance Reports;
-Learning/maintaining accessibility software;
-Implemented new Word template;
-Photographed all LTRC events including LTC 2020,
-Filmed and produced 21 DOTD informational videos;
-Filmed and produced 1 DOTD nuclear calibration instructional video;
-Filmed and produced 3 Transportation Talk videos featuring Secretary Wilson;
-Filmed and produced approx. 50 math/instructional videos;
-Up to 630 subscribers on YouTube
-Prepared 14 Draft Project Capsules
-Provided Technical Review for 9 Final Reports
-Provided Review for 2 Technical Assistance Reports
-Provided Technology Transfer Manager comments for 56 biannual reports (period ending 6/30/19)
-Provided Technology Transfer Manager comments for 61 biannual reports (period ending 12/31/2019)
-Served as 2020 LTC Program Committee co-chair
-Served on interview panel for several Engineer Resource Development Program (ERDP) applicants
-Provided engineering experience verification for former ERDP interns seeking PE licensure

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

-Continue web/graphics support in all current areas
-Update LTAP site to match new LTRC template
-Continued work on 508 accessibility issues for PDFs
-Assist in 2020 AASHTO Agency Administration Conference
-Assist in development of all publications, website, registration, e-commerce and mobile application
-Develop training and support online registration management system
-Continue maintenance of LTRC and LTAP website
-Continue to edit and distribute project capsules, technical summaries, final reports and technical assistance reports
-Publish 4 Tech Today newsletters
-Photograph all LTRC events
-Video all LTRC events
-Readily available for any special assistance requested from Secretary's office
-Attend professional development and leadership training
-Continue to prepare project capsules, and review draft final reports and technical assistance reports
-Continue to provide Technology Transfer Manager comments for biannual reports
-Technology Transfer efforts for the 2022 Louisiana Transportation Conference
-Continue to serve as ERDP engineer-of-record (e.g. interview panels, experience verification

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**DOTD Staff Support for Workforce Development**	**Project Status:**	**Proposed**

Funding Source:	**STP: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000357**	Project Start Date:		7/1/2020
Research Project Number:	21-1SWD	Completion Date	(original)	6/30/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	MaryLeah Coco			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$1,520,000
	(revised)	
Est. Expended to Date		
FY 2019 - 2020 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2020-2021 Budget		
Total		**$1,520,000**
Salaries		$1,520,000
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

BUDGET JUSTIFICATIONS

Budget amounts do not require justifications.

PURPOSE AND SCOPE

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 (LADOTD) personnel by non-LTRC employees. This project will not be utilized by LTRC's Section 19 or 33.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

-Course development and delivery of Local Public Agency (LPA) training;
-LADOTD employee structured training;
-Human Resources training, maintenance related training; and
-Meeting involvement related to LA DOTD's Transportation Training Curriculum Council.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

-Course development and delivery of LPA training;
-LADOTD 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

LTRC Annual Research Program
Fiscal Year 2020-2021

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)	1/31/2020
Principal Investigator:	Vijaya Gopu				

BUDGET STATUS

Total Budget				**Estimated 2020-2021 Budget**		
Total Cost	(original)	$337,312		**Total**		**$60,000**
	(revised)					
Est. Expended to Date		$260,000		Salaries		$30,000
FY 2019 - 2020 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$97,000		Equipment	(non-expendable)	
	(revised)			Travel		$5,000
Est. FY Expenditure		$80,000		Other		$25,000

BUDGET JUSTIFICATIONS

Travel: Education Modules Dissemination Effort at different sites: $5,000

Other: This NSF project involves two consultants and a sub-awardee that will have to be paid a combined total of $25,000 during the fiscal year.

PURPOSE AND SCOPE

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. This goal will be achieved by: (1) developing and implementing 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 tw o affected courses and (2) developing a community of scholars that has an interest in and will contribute to the further development of FMM instructional materials.

FISCAL YEAR 2019 - 2020 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 2020-2021 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 2020-2021

Title:	**The Impact of the Louisiana Grade Crossings: A Synthesis and System Analysis**	**Project Status:**	**Proposed**

Funding Source:	**Planning**	**Budget Category:**	**Other DOTD Sections**

SIO:	**DOTLT1000372**	Project Start Date:		5/1/2020
Research Project Number:	21-1SS	Completion Date	(original)	4/30/2021
Research Agency:	UNO	Completion Date	(revised)	
Principal Investigator:				

BUDGET STATUS

Total Budget		
Total Cost	(original)	$45,000
	(revised)	
Est. Expended to Date		
FY 2019 - 2020 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2020-2021 Budget		
Total		**$45,000**
Salaries		$38,000
Consumable Supplies & Materials		$5,400
Equipment	(non-expendable)	
Travel		$1,600
Other		

BUDGET JUSTIFICATIONS

Supplies: $5000 for IMPLAN software; $400 for printing

PURPOSE AND SCOPE

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. In addition to present safety concerns, at-grade crossings also hamper railroad operations and efficiency. 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. The specific objectives of the research are to:

- investigate the (both publicly and privately owned) crossing status in the state of Louisiana
- conduct a thorough and comprehensive literature review to summarize the current knowledge and practice
- outline the funding sources (such as FHWA, Federal Railroad Administration (FRA)) 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 that offer promise in reducing the number of crossings in Louisiana
- develop a model that can predict the priority rating of individual crossings for closure or other decision making

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

To be determined based on the approved proposal.

LTRC Annual Research Program
Fiscal Year 2020-2021

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)	
Principal Investigator:	Ricardo Cruz			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$284,499
	(revised)	
Est. Expended to Date		$31,285
FY 2019 - 2020 Budget		
FY Funds	(original)	$171,285
	(revised)	
Est. FY Expenditure		$140,000

Estimated 2020-2021 Budget		
Total		**$113,214**
Salaries		$53,509
Consumable Supplies & Materials		$1,000
Equipment	(non-expendable)	
Travel		$16,000
Other		$42,705

BUDGET JUSTIFICATIONS

Travel: The $16,000 travel budget is for SME's travel from various office across country to make specific On-sight analysis and study of available data. Those estimates are divided as follows:
Airfare-$4,800
Rental car- $5,280
Lodging- $3,880
Per diem- $2,040

Other: $42,705.00 Paid to subcontract for Co-PI (Dr Stephen Barnes and associates)

PURPOSE AND SCOPE

The purpose of this project is to provide LADOTD 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. 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. In addition, to a final report, the final deliverable will also include a draft of a Waterway Transportation Plan.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

The following tasks are currently underway in this fiscal year:
Task 1 - Identify the type and value of waterborne commerce
Task 2 - Analyze and document the impact and importance of waterborne commerce

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

Complete Tasks 1 thru 5 and submit final report and draft Waterway Transportation Plan for review.
Task 1 - Identify the type and value of waterborne commerce
Task 2 - Analyze and document the impact and importance of waterborne commerce
Task 3 - Identify the improvements needed to achieve greater utilization of waterways
Task 4 - Identify opportunities for alieving multimodal bottlenecks relative to waterways
Task 5 - Develop a draft Waterways Transportation Plan that can be included in the Louisiana Statewide Transportation Plan.

LTRC Annual Research Program
Fiscal Year 2020-2021

Title:	**Louisiana Local Road Safety Program**	**Project Status:**	**Proposed**

Funding Source:	**Safety**	**Budget Category:**	**Other DOTD Sections**

SIO:	**DOTLT1000358**	Project Start Date:		7/1/2020
Research Project Number:	21-LRSP	Completion Date	(original)	6/30/2021
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Steve Strength			

BUDGET STATUS

Total Budget			**Estimated 2020-2021 Budget**		
Total Cost	(original)	$379,989	**Total**		**$379,989**
	(revised)				
Est. Expended to Date			Salaries		$317,989
FY 2019 - 2020 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

PURPOSE AND SCOPE

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.

FISCAL YEAR 2019 - 2020 ACCOMPLISHMENTS

-Received, processed and evaluated 14 Local Road Safety Project applications and provided recommendations for inclusion in Louisiana's Highway Safety Improvement Program or additional assessment as appropriate
-Local Technical Assistance Program staff attended at least one Regional Safety Coalition meeting in each of the nine coalition areas to provide assistance on implementing strategies in the Louisiana Strategic Highway Safety Plan at the local road network
-Developed and conducted one Local Road Safety Plan Webinar for our Louisiana Regional Safety Coalition Coordinators and the MPO technical support staff with 21 attendees, and one in-person meeting with Coordinators with 12 attendees.
- Presented two sessions at the Louisiana Transportation Safety Summit on Local Road Safety Plans and Safety Countermeasures for a total of 55 attendees.
-Reviewed drafts of Local Road Safety Plans, making suggestions and recommendations. Currently there are 14 Parishes with Local Road Safety Plans and 6 more are under development that LTAP is providing technical assistance 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 Coalitions and 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 Louisiana Municipal Association, Police Jury Association of Louisiana and Louisiana Professional Engineers and Supervisors Association meetings/conventions providing information on the LA Strategic Highway Safety Plan (SHSP), LRSP Program, and Local Road Safety Plans and LRSP Projects
-Participated as a core member of the team developing the new Road Safety 101 classes for Louisiana safety practitioners
-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.
-LTAP facilitated a special services contract for stationing an LRSP Engineer position at DOTD Headquarters to continue processing of LRSP and Safe Routes to Public Places projects.
-Assisted FHWA and DOTD in the conduct of one Local Road Safety Plan Development Peer Exchange for 35 people from 6 States, and one EDC Rural Roadway Departure (FoRRRwD) peer exchange for 45 people from seven States and two Federal agencies.

FISCAL YEAR 2020-2021 PROPOSED ACTIVITIES

-Promote and facilitate implementation of parish level road safety plans. The goal will be to assist in the completion or initiation of plans in at least six more of the top 20 parishes and begin discussion of planning in the urbanized areas
-Manage the application submittal process of the Local Road Safety Program Highway Safety Improvement Program projects and conduct preliminary technical evaluation of applications.
-Track applications through final assignment of H Numbers and initial project development steps at LADOTD
-Coordinate with LADOTD Office of Safety and to provide technical assistance and capacity building to the Regional Safety Coordinators and Coalitions and SHSP stakeholders. This may include on-site visits; participation in coalition meetings; assistance with local road safety plan development; RSA training, and other activities in the Strategic Highway Safety Plan and/or regional action plans
-Review training and workforce development opportunities available through other sources such as the Transportation Curriculum Coordination Council (TC3); NHI; FHWA; Institute of Transportation Engineers (ITE); TRB; etc. and provide registration information to appropriate stakeholders
-Assist DOTD in implementing the Roadway Departure Plan currently being developed as it relates to the local road network
-Present up to 6 Road Safety Assessment workshops upon request for Regional Safety Coalitions as part of the SHSP Strategic Plan.
-Develop and present, in conjunction with the FHWA Resource Center, two Roadway Departure with Systemic Safety workshops and carry on with presentation of LTAP Roadway Departure Workshops for Local Agency road owners in seven additional locations around the State
-Participate in LADOTD led EDC – 5 Safety related deployment teams on Reducing Rural Roadway Departures and Safe Transportation for Every Pedestrian (STEP)
-Coordinate with LADOTD on the strategic approach and annual goals for the Local Road Safety Program including consideration of systemic analysis and project implementation; focus on roadway departure mitigation; data integration and accessibility, etc.
-Determine feasibility of systemic or system-wide curve projects using Fugro data; Louisiana Highway Safety Research Group analytical assistance; contract assistance, etc.
-Participate 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.

LTRC Annual Research Program

Fiscal Year 2019-2020

Final Ranking	2019 RPIC PROBLEM STATEMENTS
1	DEVELOPING LIVE LOAD DISTRIBUTION FORMULAS FOR LOUISIANA CULVERTS
2	Improvement of Open-Graded Friction Course (OGFC) Performance and Durability through Materials, Design, and Maintenance
3	Evaluation of Traffic Crash Characteristics on Elevated Sections of Interstates in Louisiana
4	Skew Detection System Replacement on Vertical Lift Bridges
5	What is the True Cost and Benefit for Collecting and Maintaining Non-road and Non-bridge Asset Data?
6	Evaluation of Effectiveness of Geophysical Methods in Estimating the Geotechnical Properties of Louisiana Soils
7	Internal Friction Angle of Sands with High Fines Content
8	Attracting Public Involvement to the Transportation Planning Process and Enhancing Communication of Highway Programming Decisions in Louisiana
9	Geotechnical Database, Phase IV
10	Evaluation of Installed Low-Cost Safety Countermeasures for Reducing Severe Intersection Crash Types in Louisiana
11	Conversion of Abandoned Rail lines in Louisiana into Trail Systems
12	Testing the Hurricane Evacuation Modeling Package
13	A Comprehensive Framework for Corrosion/Damage Evolution Management in Reinforced Concrete Structures
14	Develop and Evaluate Performance Measures for Intelligent Transportation Systems (ITS) in Louisiana
15	A Mixed Methodology Study of Driving Behavior in Louisiana
16	Evaluation of the Miniature Concrete Prism Test (MCPT) for use in LADOTD
17	Assessment of LADOTD's Friction Aggregate Sources, Laboratory Friction Testing Equipment and Validation of Pavement Friction Characteristics with Field (lock wheel testing) and Accelerated Loading Testing.
18	Evaluate the Impacts of Complete Street Policy in Louisiana
19	Instrumentation and Modeling of Geosynthetic Load Transfer Platform Performance
20	Using the Portable XRF to Identify / Verify Field Material Properties
21	Review of Current Practices in Highway Program Development
22	Assessments of Concrete Pavements, Approach slabs, and Bridge decks with Multichannel Multifrequency Radar (3D radar)
23	Minimum Intersection Illumination
24	Developing Phase Change Materials with Resistant Coating Systems for Concrete and Asphalt Applications
25	Automated Traffic Counting Using Machine Learning
26	Study the Appropriate Role for LADOTD in Developing Policies and Budgets Related to Inter-city Passenger Rail Service in Louisiana: A Baton Rouge to New Orleans Case Study
27	An Assessment of Funding and Infrastructure needs for Ports and Waterways in Louisiana
28	Autonomous vehicle detection (cameras) vs RPM
29	Improved Transverse Expansion Joints for Concrete Pavements
30	Low and Intermediate Temperature Evaluation of Binders through Dynamic Shear Rheometer
31	Feasibility Study to Develop a United States Coast Guard Third Mates License Program

LTRC Annual Research Program

Fiscal Year 2019-2020

Final Ranking	2019 RPIC PROBLEM STATEMENTS
32	A Comparative Analysis of Intermodal Ship-to-Rail Connections and Truck Chassis Access at Louisiana Deep Water Ports
33	Use of an Innovative Recycling Agent for Improving the Sustainability and Durability of Asphalt Pavements
34	Evaluation of the Corrosion Inhibition of Self-healing Concrete through Microbial Induced Calcite Precipitation (MICP)
35	Defining Best Practices for Low Maintenance Green Infrastructure Landscape Design in the Public Right of Way that can be Accommodated by Existing Budget and Baintenance Regimes
36	Aging-Resistant And Fire–Resistant Fiber Reinforced Inorganic Polymer Composite
37	Use of Specially-Modified Asphalt Mixes to Reduce Reflective Cracking on High-Traffic Routes
38	Evaluate Performance and Life Cycle Cost of Asphalt (8/18 Specifications)
39	Evaluating the Effectiveness of Crosswalk Striping Pattern at Signalized Intersections in Louisiana
40	Synthesis on the Longevity and Durability of OGFC