LTRC Annual Research Program

Fiscal Year July 1, 2019 - June 30, 2020

FHWA Part B SPR Research Program
FAP Number SPR-0010(34)
&
FHWA Funded Research Program
&
FHWA LTAP Funded Program
&
FHWA STP Funded Program
&
Federal
&
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

In cooperation with
United States Department of Transportation Federal Highway Administration
June 2019

LOUISIANA TRANSPORTATION RESEARCH CENTER
LTRC
Research, Technology Transfer, Education & Training
DOTD
LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

May 13, 2019

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

Attention: Ms. Mary Stringfellow

RE: FY 2019-2020 Louisiana Transportation Research Center Annual Work Program

Dear Mr. Bolinger:

Enclosed please find the FY 2019-2020 Louisiana Transportation Research Center (LTRC) Annual Work Program for your review and approval. You will note that the program is divided into multiple sections reflecting all funding sources.

As delegated by the Secretary, Louisiana Department of Transportation and Development (LADOTD), I, Samuel B. Cooper, Jr., Director, Louisiana Transportation Research Center, of the State of Louisiana, do hereby certify, that the State is in compliance with all requirements of 23 U.S.C. 505 and its implementing regulations with respect to the research, development, and technology transfer program, and contemplate no changes in statutes, regulations, or administrative procedures which would affect such compliance.

If I can provide additional information, please advise.

Sincerely,

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

Enclosure
c: Ms. Chris Knotts
Mr. Tyson Rupnow

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 28, 2019

In Reply Refer To:
HDA-LA

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

Subject: **FY 2019-2020 State Planning & Research (SPR) Work Program Part B**

Attention: Mr. Chris Knotts, LDOTD

Dear Dr. Wilson:

This letter is in response to Mr. Sam Cooper's May 13, 2019, letter regarding the review and approval of the Fiscal Year (FY) 2019-2020 Statewide Planning and Research (SPR) Work Program Part B for the Louisiana Transportation Research Center (LTRC.) We have reviewed the subject Work Program, provided comments to Mr. Cooper, Mr. Rupnow, and Ms. Coco and met with them on June 11, 2019, to discuss the comments. The revised Work Program was delivered to the FHWA office on June 28, 2019. This revised Work Program has been reviewed and all comments have been addressed, thus all the projects in the Work Program can move forward.

Please provide an electronic version of this revised and approved Work Program to FHWA as soon as possible.

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

Sincerely yours,

Digitally signed by MARY M STRINGFELLOW
Date: 2019.06.28 15:10:48 -05'00'

Mary M. Stringfellow
Program Delivery Team Leader

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

Abbreviations and Acronyms

Funding

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

Project Types

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

Project Status

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

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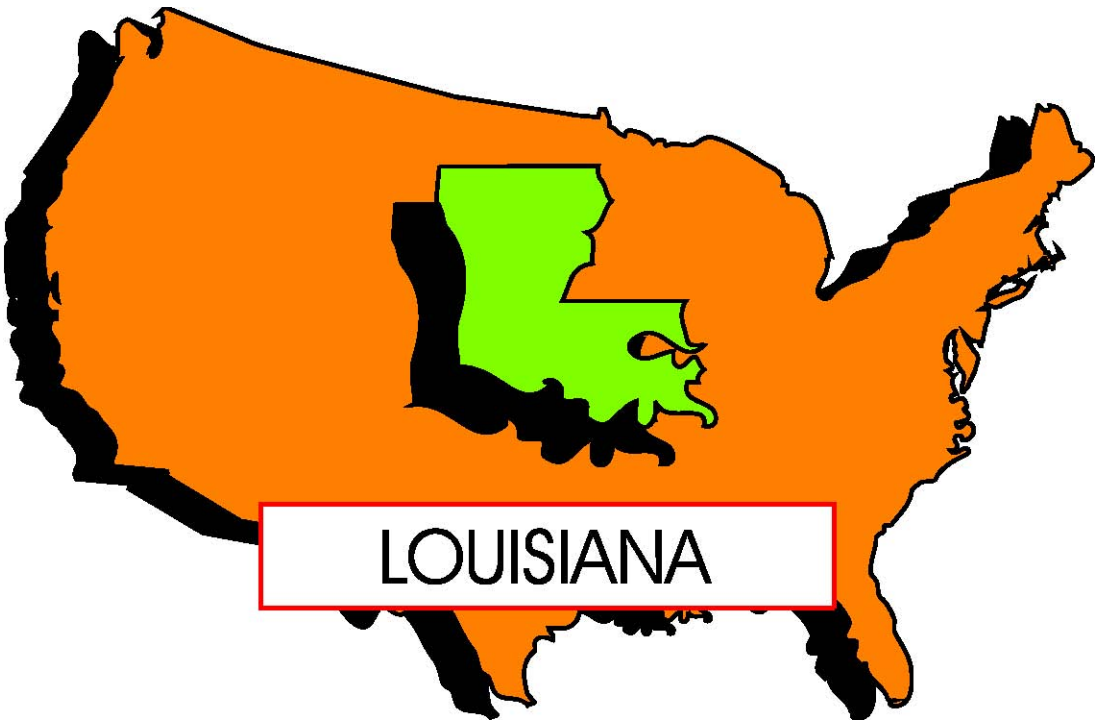
FHWA SPR Work Program
Part B

FAP Number SPR-0010(34)



FHWA Funding

SPR Research Budget Recap	H#	Federal	State	Total
Administrative Budget	H.972354.1	$665,556	$166,389	$831,945
Research Support Studies Budget	H.972354.1	$1,292,913.60	$323,228.40	$1,616,142
Active Studies Budget	H.972354.1	$3,257,816	$814,454	$4,072,270
Proposed Studies Budget	H.972354.1	$2,843,569.60	$710,892.40	$3,554,462
Pooled Fund Lead State Studies Budget	H.972198.1	$98,595	$0	$98,595
Total SPR Budget		**$8,250,720.20**	**$2,014,963.80**	**$10,265,684**

SPR External Collaboration Budget Recap	H#	Federal	State	Total
Pool Funded Studies	N/A	$193,000	$0	$193,000
TRB Correlations	N/A	$115,574.40	$28,893.60	$144,468
NCHRP	N/A	$659,146.40	$164,786.60	$823,933
Total SPR External Collaboration Budget		**$967,720.80**	**$193,680.20**	**$1,161,401**

FHWA Funding

LTAP Budget Recap	H#	Federal	State	Total
LTAP	H.972135.1	$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.972354.1	$1,292,183	$1,292,183
Workforce Development Program	H.972354.1	$6,954,166	$6,954,166
Student Support Programs	H.972354.1	$210,000	$210,000
Total STP Budget		$8,456,349	$8,456,349

Federal Funding

Federal Budget Recap	H#	Federal	State	Total
Active Studies Budget	H.009549	$20,000	$0	$20,000
Proposed Studies Budget	N/A	$0	$0	$0
Total Federal Budget		$20,000		$20,000

Self-Generated Funding

Self-Generated Budget Recap	H#	Federal	State	Total
Active Studies Budget	N/A	$0	$0	$97,000
Proposed Studies Budget	N/A	$0	$0	$0
Total Self-Generated Budget				$97,000

Other DOTD Sections Funding

Other DOTD Sections Budget Recap	H#	Federal	State	Total
Active Studies Budget	H.012331.1	$750,000	N/A	$750,000
	H.010083	N/A	$41,868	$41,868
Proposed Studies Budget	TBD	$503.991.20	$125,977.80	$629,989
Total Other DOTD Sections Budget		$1,137,485.60	$284,351.40	$1,421,857

LTRC ANNUAL RESEARCH PROGRAM

SPR: Pooled Fund: TT-Fed

FISCAL YEAR 2019-2020

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													
SPR: TT-Fed/TT-Reg - 5	P	ADM	DOTLT1000303	20-1PM	$831,945	$831,945	LTRC	Tyson Rupnow	Program Management	7/1/2019	6/30/2020		C-2
					$831,945	**$831,945**	**ADMINISTRATIVE BUDGET TOTALS**						
Project Type: Research Support													
SPR: TT-Fed/TT-Reg - 5	P	RS	DOTLT1000306	20-1TTRI	$498,947	$498,947	LTRC	Tyson Rupnow	Technology Transfer and Research Implementation	7/1/2019	6/30/2020		C-3
SPR: TT-Fed/TT-Reg - 5	P	RS	DOTLT1000309	20-1TRS	$328,449	$328,449	LTRC	Tyson Rupnow	Technical Research Surveillance	7/1/2019	6/30/2020		C-4
SPR: TT-Fed/TT-Reg - 5	P	RS	DOTLT1000305	20-1TA	$302,186	$302,186	LTRC	Tyson Rupnow	Technical Assistance	7/1/2019	6/30/2020		C-5
SPR: TT-Fed/TT-Reg - 5	P	RS	DOTLT1000310	20-1SSR	$100,000	$100,000	LTRC	Tyson Rupnow	DOTD Staff Support for Research	7/1/2019	6/30/2020		C-7
SPR: TT-Fed/TT-Reg - 5	P	RS	DOTLT1000304	20-1LFT	$39,848	$39,848	LTRC	Tyson Rupnow	Research Laboratory and Field Test Support	7/1/2019	6/30/2020		C-8
SPR: TT-Fed/TT-Reg - 6	P	RS	DOTLT1000308	20-1NPE	$57,636	$57,636	LTRC	Tyson Rupnow	New Product Evaluation	7/1/2019	6/30/2020		C-9
SPR: TT-Fed/TT-Reg - 6	P	RS	DOTLT1000307	20-1EQM	$289,076	$289,076	LTRC	Tyson Rupnow	Equipment Management	7/1/2019	6/30/2020		C-10
					$1,616,142	**$1,616,142**	**RESEARCH SUPPORT BUDGET TOTALS**						

LTRC ANNUAL RESEARCH PROGRAM

SPR: TT-Fed/TT-Reg

FISCAL YEAR 2019-2020

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													
SPR: TT-Fed/TT-Reg - 5	A	B	DOTLT1000195	17-4B	$40,866	$181,540	LTRC	Saman Salari	Development of a 4.75mm Asphalt Mixture Design	6/14/2017	6/13/2019	12/13/2019	C-12
SPR: TT-Fed/TT-Reg - 6	A	B	DOTLT1000321	19-4B	$147,864	$474,347	LTRC	Louay Mohammad	Implementation of Semi Circular Bend Test for QC/QA of Asphalt Mixtures	5/2/2019	4/30/2022		C-13
SPR: TT-Fed/TT-Reg - 6	A	B	DOTLT1000275	19-2B	$107,000	$257,903	LTRC	Louay Mohammad	Development of a Moisture Sensitivity Test for Asphalt Mixtures	5/1/2019	4/30/2021		C-14
SPR: TT-Fed/TT-Reg - 6	A	B	DOTLT1000244	18-5B	$50,000	$113,000	LSU	Mostafa Elseifi	Evaluation of Asphalt Rubber and Reclaimed Tire Rubber in Chip Seal Applications	5/14/2018	5/13/2020		C-15
SPR: TT-Fed/TT-Reg - 6	A	B	DOTLT1000161	17-1B	$44,987	$200,000	LTU	Nazimuddin Wasiuddin	Field Implementation of Handheld FTIR Spectrometer for Polymer Content Determination and for Quality Control of RAP Mixtures	7/14/2017	7/13/2019	1/13/2020	C-16
SPR: TT-Fed/TT-Reg - 6	A	B	30000112	10-1EMCRF	$147,000	$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-17
					$537,717	**$18,884,369**	**BITUMINOUS BUDGET TOTALS**						
SPR: TT-Fed/TT-Reg - 5	A	C	DOTLT1000239	18-4C	$11,200	$15,189	LSU	Gabriel Arce	DOTD Support for UTC Project: Use of Bagasse Ash as a Concrete Additive for Road Pavement Applications	3/15/2018	9/14/2019		C-18
SPR: TT-Fed/TT-Reg - 5	A	C	DOTLT1000236	18-3C	$22,404	$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		C-19
SPR: TT-Fed/TT-Reg - 6	A	C	DOTLT1000245	18-6C	$27,000	$83,113	LTRC	Jose Milla	Influence of Internal Curing on Measured Resistivity	4/1/2018	3/31/2019	12/31/2019	C-20
SPR: TT-Fed/TT-Reg - 6	A	C	DOTLT1000155	17-1C	$60,000	$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-21
					$120,604	**$592,882**	**CONCRETE BUDGET TOTALS**						
Project Type: Geotechnical													
SPR: TT-Fed/TT-Reg - 5	A	GT	DOTLT1000285	19-2GT	$62,852	$125,708	LTRC	Nick Ferguson	Quality Control/Assurance on Base Course and Embankment with the Dynamic Cone Penetrometer	9/1/2018	2/29/2020		C-22
SPR: TT-Fed/TT-Reg - 5	A	GT	DOTLT1000226	18-4GT	$66,053	$138,244	LTRC	Gavin Gautreau	Geotechnical Asset Management for Louisiana	5/1/2018	10/31/2019		C-23
SPR: TT-Fed/TT-Reg - 5	A	GT	DOTLT1000208	18-1GT	$0	$129,159	LSU	Shengli Chen	Analysis of Driven Pile Capacity within Pre-bored Soil	9/1/2017	2/28/2019	8/31/2019	C-25
SPR: TT-Fed/TT-Reg - 5	A	GT	DOTLT1000165	17-2GT	$105,500	$455,673	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	6/30/2020	C-26

LTRC ANNUAL RESEARCH PROGRAM

SPR: TT-Fed/TT-Reg

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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.
SPR: TT-Fed/TT-Reg - 5	A	GT	DOTLT1000112	16-6GT	$104,000	$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	6/30/2020	C-28
SPR: TT-Fed/TT-Reg - 5	A	GT	DOTLT1000048	15-1GT	$20,000	$200,000	Dataforensics, LLC	Scott Deaton	pLog Enterprise - Enterprise GIS-Based Geotechnical Data Management System Enhancements	7/31/2015	8/1/2017	2/1/2020	C-29
SPR: TT-Fed/TT-Reg - 5	A	GT	DOTLT1000103	13-3GT	$42,000	$308,292	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	12/31/2019	C-30
SPR: TT-Fed/TT-Reg - 5	A	GT	30000661	11-1GT	$14,524	$354,679	LTRC	Murad Abu-Farsakh	In Situ Evaluation of Design Parameters and Procedures for Cementitiously Treated Weak Subgrades using Cyclic Plate Load Tests	3/18/2013	9/17/2015	8/30/2019	C-32
SPR: TT-Fed/TT-Reg - 6	A	GT	30000111	10-1GERL	$216,300	$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-33
					$631,229	**$18,490,715**	**GEOTECHNICAL BUDGET TOTALS**						
SPR: TT-Fed/TT-Reg - 5	A	Other	DOTLT1000215	18-1Other	$285,587	$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-34
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-35
					$581,587	**$4,583,225**	**OTHER BUDGET TOTALS**						
Project Type: Pavements													
SPR: TT-Fed/TT-Reg - 5	A	P	DOTLT1000271	19-1P	$116,740	$319,896	LTRC	Zhong Wu	Application of Mechanistic-Empirical Pavement Design Approach into RCC Pavement Thickness Design	6/1/2018	11/30/2020		C-36
SPR: TT-Fed/TT-Reg - 5	A	P	DOTLT1000241	18-4P	$58,000	$157,376	LSU	Mostafa Elseifi	Cost-Effective Detection and Repair of Moisture Damage in Pavements	5/1/2018	7/31/2020		C-37
SPR: TT-Fed/TT-Reg - 5	A	P	DOTLT1000216	18-1P	$35,000	$50,000	LTRC	Zhongjie Zhang	Exploration of Drone and Remote Sensing Technologies in Highway Embankment Monitoring and Management	9/1/2017	8/31/2018	8/31/2019	C-39
SPR: TT-Fed/TT-Reg - 5	A	P	DOTLT1000107	16-6P	$14,000	$170,588	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-40
SPR: TT-Fed/TT-Reg - 6	A	P	DOTLT1000272	19-2P	$93,200	$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-41
SPR: TT-Fed/TT-Reg - 6	A	P	DOTLT1000218	18-2P	$38,888	$210,000	LTRC	Kevin Gaspard	Mitigating Joint Reflective Cracks using Stone Interlayers: Case Study on Louisiana Highway 5, Desoto Parish	10/17/2017	10/16/2023		C-42

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.
SPR: TT-Fed/TT-Reg - 6	A	P	30000141	10-1ALF	$644,500	$19,890,536	LTRC	Zhong Wu	Management and Operation of the Pavement Research Facility	7/1/2009	6/30/2015	6/30/2021	C-43
					$1,000,328	**$21,117,838**	**PAVEMENTS BUDGET TOTALS**						
Project Type: Safety													
SPR: TT-Fed/TT-Reg - 5	A	SA	DOTLT1000284	19-1SA	$24,038	$85,792	Southern University Engineering	Yasser Ismail	Evaluation of Counting Device for Pedestrians and Bicyclists	9/3/2018	12/2/2019	2/2/2020	C-44
SPR: TT-Fed/TT-Reg - 5	A	SA	DOTLT1000225	18-5SA	$35,947	$105,506	LTRC	Julius Codjoe	Evaluating Pedestrian Crossings on High Speed Urban Arterials	8/1/2018	10/31/2019		C-46
SPR: TT-Fed/TT-Reg - 5	A	SA	DOTLT1000217	18-4SA	$80,000	$150,000	ULL	Xiaoduan Sun	Intersection on Horizontal Curves: Problems and Potential Solutions	9/17/2018	3/16/2020		C-47
SPR: TT-Fed/TT-Reg - 5	A	SA	DOTLT1000209	18-2SA	$77,049	$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		C-48
SPR: TT-Fed/TT-Reg - 6	A	SA	DOTLT1000297	19-3SA	$136,679	$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-50
					$353,713	**$757,002**	**SAFETY BUDGET TOTALS**						
Project Type: Special Studies													
SPR: TT-Fed/TT-Reg - 5	A	SS	DOTLT1000325	19-5SS	$115,000	$125,490	LSU	Chester Wilmot	Assessing the Economic Benefits of the TIMED Program	7/1/2019	6/30/2020		C-52
SPR: TT-Fed/TT-Reg - 5	A	SS	DOTLT1000290	19-4SS	$66,734	$149,999	UNO	Bethany Stich	The Impact of the Louisiana Rail Infrastructure: A System Analysis and Plan	10/4/2018	1/3/2020		C-54
SPR: TT-Fed/TT-Reg - 5	A	SS	DOTLT1000282	19-2SS	$75,874	$113,811	LTRC	Julius Codjoe	Determining Louisiana's Roundabout Capacity	1/1/2019	6/30/2020		C-55
SPR: TT-Fed/TT-Reg - 5	A	SS	DOTLT1000224	18-6SS	$12,255	$202,255	Dye Management Group, Inc.	Ron Hamilton	An Assessment of LADOTD'S Consultant Plan Development and Performance Rating Process	9/24/2018	11/23/2019		C-56
SPR: TT-Fed/TT-Reg - 5	A	SS	DOTLT1000221	18-5SS	$4,000	$28,734	Old Dominion University	Sherif Ishak	Support Study for the Development of Guidelines for Ramp Metering Implementation and Performance Evaluation on I-12	11/1/2017	8/31/2019		C-57
SPR: TT-Fed/TT-Reg - 5	A	SS	DOTLT1000211	18-3SS	$58,430	$141,077	LTRC	Julius Codjoe	Evaluation of DOTD's Existing Queue Estimation Procedures	8/1/2017	7/31/2019	5/30/2020	C-58
SPR: TT-Fed/TT-Reg - 5	A	SS	30000125	10-1PLAN	$240,000	$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-59
					$572,293	**$9,632,715**	**SPECIAL STUDIES BUDGET TOTALS**						

LTRC ANNUAL RESEARCH PROGRAM

SPR: TT-Fed/TT-Reg

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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													
SPR: TT-Fed/TT-Reg - 5	A	ST	DOTLT1000222	18-4ST	$74,999	$137,781	LTU	C. Shawn Sun	Load Rating of Existing Continuous Stringers on Louisiana's Bridges	6/1/2018	8/31/2019	6/1/2020	C-60
SPR: TT-Fed/TT-Reg - 5	A	ST	DOTLT1000109	16-4ST	$24,800	$239,709	LSU	George Voyiadjis	Overheight Impact Avoidance and Incident Detection System	7/1/2016	6/30/2018	12/31/2019	C-61
SPR: TT-Fed/TT-Reg - 5	A	ST	DOTLT1000099	16-1ST	$100,000	$400,658	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	2/28/2020	C-62
SPR: TT-Fed/TT-Reg - 5	A	ST	DOTLT1000043	15-3ST	$75,000	$150,000	West Virginia University	Hota-WVU GangaRao	Rehabilitation of Deteriorated Timber Piles using Fiber Reinforced Polymer (FRP) Composites	11/2/2015	11/1/2017	6/30/2020	C-63
SPR: TT-Fed/TT-Reg - 5	A	ST	30001660	14-1ST	$0	$179,991	LSU	Ayman Okeil	Evaluating Louisiana New Continuity Detail for Girder Bridges	4/21/2014	12/31/2016	8/31/2019	C-64
					$274,799	**$1,108,139**	**STRUCTURES BUDGET TOTALS**						
					$4,072,270	**$75,166,885**	**SPR: TT-FED/TT-REG ACTIVE BUDGET TOTALS**						

LTRC ANNUAL RESEARCH PROGRAM

SPR: TT-Fed/TT-Reg

FISCAL YEAR 2019-2020

Funding	A/P	Project Type	SIO No.	Research No.	FY Budget	Total Cost	Agency	Principal Investigator	Project Title	Start Date	End Date	End Date (Rev)	PageNo.
Project Type: Bituminous													
SPR: TT-Fed/TT-Reg - 5	P	B			$84,000	$270,000	LTRC	Louay Mohammad	Assessment of Long-Term Performance of Louisiana Asphalt Pavements	7/1/2017	6/30/2019		C-66
SPR: TT-Fed/TT-Reg - 5	P	B			$160,000	$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-67
SPR: TT-Fed/TT-Reg - 5	P	B			$185,000	$365,000	LTRC	Saman Salari	Low and Intermediate Temperature Evaluation of Binders through Dynamic Shear Rheometer	7/1/2019	6/30/2021		C-69
SPR: TT-Fed/TT-Reg - 5	P	B			$81,000	$350,000	LTRC	Louay Mohammad	Performance Of Asphalt Pavements Containing Recycled Materials Under Accelerated Loading	1/1/2018	6/30/2020		C-70
SPR: TT-Fed/TT-Reg - 6	P	B			$48,690	$136,571	LTRC	Corey Mayeux	Evaluate Performance and Life Cycle Cost of Asphalt (8/18 Specifications)	7/1/2019	6/30/2022		C-71
SPR: TT-Fed/TT-Reg - 6	P	B			$48,690	$91,167	LTRC	Corey Mayeux	Feasibility and Performance of Low Volume Roadway Mixture Design	7/1/2019	6/30/2021		C-72
SPR: TT-Fed/TT-Reg - 6	P	B			$232,000	$464,000	LTRC	Samuel Cooper, III	Improvement of Open-Graded Friction Course (OGFC) Performance and Durability through Materials, Design, and Maintenance	7/1/2019	6/30/2021		C-73
					$839,380	**$1,955,738**	**BITUMINOUS BUDGET TOTALS**						
Project Type: Concrete													
SPR: TT-Fed/TT-Reg - 6	P	C			$173,500	$347,000	LTRC	Jose Milla	Developing Phase Change Materials with Resistant Coating Systems for Concrete and Asphalt Applications	7/1/2019	6/30/2021		C-75
SPR: TT-Fed/TT-Reg - 6	P	C			$40,500	$81,000	LTRC	Jose Milla	Evaluation of the Miniature Concrete Prism Test (MCPT) for use in LADOTD	7/1/2019	6/30/2021		C-77
SPR: TT-Fed/TT-Reg - 6	P	C			$25,500	$51,000	LTRC	William Saunders	Feasibility and Advantages of Acceptance of Concrete Beyond 28 Days	7/1/2019	6/30/2020		C-78
SPR: TT-Fed/TT-Reg - 6	P	C			$70,000	$120,000	LTRC	Jose Milla	Using the Portable XRF to Identify/Verify Field Material Properties	7/1/2019	6/30/2021		C-79
					$309,500	**$599,000**	**CONCRETE BUDGET TOTALS**						
Project Type: Geotechnical													
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-80
SPR: TT-Fed/TT-Reg - 5	P	GT			$68,000	$250,000	LTRC	Murad Abu-Farsakh	Development of a Design Methodology for Geosynthetic Reinforced Pavement using Finite Element Numerical Modeling	9/1/2017	8/31/2020		C-81
SPR: TT-Fed/TT-Reg - 5	P	GT			$35,300	$250,000	LTRC	Murad Abu-Farsakh	Evaluation of Effectiveness of Geophysical Methods in Estimating the Geotechnical Properties of Louisiana Soils	7/1/2019	6/30/2020		C-83

Funding	A/P	Project Type	SIO No.	Research No.	FY Budget	Total Cost	Agency	Principal Investigator	Project Title	Start Date	End Date	End Date (Rev)	PageNo.
SPR: TT-Fed/TT-Reg - 5	P	GT			$88,700	$300,000	LTRC	Murad Abu-Farsakh	Instrumentation and Modeling of Geosynthetic Load Transfer Platform Performance	7/1/2019	6/30/2020		C-85
SPR: TT-Fed/TT-Reg - 5	P	GT			$34,000	$80,000	LTRC	Murad Abu-Farsakh	Internal Friction Angle of Sands with High Fines Content	7/1/2019	6/30/2020		C-87
SPR: TT-Fed/TT-Reg - 5	P	GT			$37,000	$200,000	LTRC	Murad Abu-Farsakh	Use and Interpretation of Seismic Piezocone Penetration Testing (SCPTu) for Geotechnical Site Investigation	1/1/2018	12/31/2020		C-88
SPR: TT-Fed/TT-Reg - 6	P	GT	DOTLT10003 23	20-1GT	$60,000	$60,000	LSU	Navid Jafari	Literature Search on Use of Flexible Pipes in Highway Engineering for DOTD's Needs	5/1/2019	1/31/2020		C-90
					$347,000	**$1,190,000**	**GEOTECHNICAL BUDGET TOTALS**						

Project Type: Pavements

SPR: TT-Fed/TT-Reg - 5	P	P	DOTLT10003 26	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-91
SPR: TT-Fed/TT-Reg - 5	P	P	DOTLT10003 24	20-1P	$65,000	$70,000	LSU	Mostafa Elseifi	Critical Soaking Time for Moisture Damage of AC Mixtures	8/1/2019	7/31/2020		C-92
SPR: TT-Fed/TT-Reg - 5	P	P			$80,000	$80,000	ULL	Xiaoduan Sun	Funding Priority to Address Edge –Drop Problem on Distressed Roadways in DOTD Environment	7/1/2019	6/30/2020		C-93
SPR: TT-Fed/TT-Reg - 5	P	P			$40,000	$70,000	LSU	Mingxuan Sun	Improvement of Pavement Deterioration Prediction Using Deep Learning Technologies	10/1/2019	9/30/2020		C-94
SPR: TT-Fed/TT-Reg - 5	P	P			$40,000	$70,000	LSU	Sun Chao	Pavement Surface Crack Identification and Classification of Low Volume Roads Using Unmanned Aerial Vehicles (UAV) Images	10/1/2019	9/30/2020		C-95
SPR: TT-Fed/TT-Reg - 5	P	P			$65,000	$200,000	LTRC	Zhong Wu	Prediction of Road Conditions and Smoothness Using Neural Networks	7/1/2019	6/30/2021		C-96
SPR: TT-Fed/TT-Reg - 6	P	P			$162,051	$210,000	LTRC	Kevin Gaspard	Assessment of Concrete Pavements, Approach Slabs, and Bridge Decks with Multichannel-Multifrequency Ground Penetrating Radar	7/1/2019	12/31/2020		C-97
SPR: TT-Fed/TT-Reg - 6	P	P			$85,000	$450,000	LTRC	Zhong Wu	Assessment of LADOTD's Friction Aggregate Sources Through Laboratory and Accelerated Testing	7/1/2019	6/30/2022		C-98
					$617,051	**$1,270,000**	**PAVEMENTS BUDGET TOTALS**						

Project Type: Safety

Funding	A/P	Project Type	SIO No.	Research No.	FY Budget	Total Cost	Agency	Principal Investigator	Project Title	Start Date	End Date	End Date (Rev)	PageNo.
SPR: TT-Fed/TT-Reg - 5	P	SA	DOTLT1000296	19-5SA	$71,735	$175,000			Young Driver Crashes in Louisiana: Understanding the Contributing Factors to Decrease the Numbers	8/1/2018	7/31/2020		C-99
SPR: TT-Fed/TT-Reg - 5	P	SA	DOTLT1000295	19-4SA	$78,000	$116,709	ULL	Xiaoduan Sun	Impact of Edge Line, Center Line Rumble Strips, And Shoulder Rumble Strips On All Roadway Departure Crashes in Louisiana Two-Lane Highways	2/1/2019	7/31/2020		C-100
SPR: TT-Fed/TT-Reg - 5	P	SA	DOTLT1000291	19-2SA	$125,000	$125,000			Determine the Relationship between Lighting Conditions and Fatal and Severe Pedestrian Crashes in Louisiana	10/1/2018	3/31/2020		C-101
SPR: TT-Fed/TT-Reg - 5	P	SA			$43,750	$175,000			Evaluation of Installed Low-Cost Safety Countermeasures for Reducing Severe Intersection Crash Types in Louisiana	11/1/2019	1/31/2021		C-102
SPR: TT-Fed/TT-Reg - 5	P	SA			$70,000	$150,000			Evaluation of Traffic Crash Characteristics on Elevated Sections of Interstates in Louisiana	10/1/2019	3/30/2021		C-103
SPR: TT-Fed/TT-Reg - 5	P	SA			$80,000	$120,000	LTRC	Julius Codjoe	Minimum Intersection Illumination	1/2/2020	6/30/2021		C-104
					$468,485	**$861,709**	**SAFETY BUDGET TOTALS**						

Project Type: Special Studies

SPR: TT-Fed/TT-Reg - 5	P	SS	DOTLT1000289	19-3SS	$51,496	$51,496	LTRC	Julius Codjoe	Evaluating Cell Phone Data for AADT Estimation: Phase II	7/2/2018	6/28/2019		C-105
SPR: TT-Fed/TT-Reg - 5	P	SS	DOTLT1000280	19-1SS	$194,878	$840,000	ULL	Elisabeta Mitran	LTRC Proposal for the Support of Research and Development in Special Studies	7/1/2018	6/30/2021		C-106
SPR: TT-Fed/TT-Reg - 5	P	SS	DOTLT1000281	19-1ITS	$45,468	$500,000	ULL	Julius Codjoe	LTRC Proposal for the Support of Research and Development in ITS/Traffic	7/1/2018	6/30/2021		C-107
SPR: TT-Fed/TT-Reg - 5	P	SS			$40,000	$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-108
SPR: TT-Fed/TT-Reg - 5	P	SS			$56,000	$150,000		Mark Martinez	Benefit Cost Analysis of Interstate Roadway Striping in Louisiana	9/1/2018	2/29/2020		C-109
SPR: TT-Fed/TT-Reg - 5	P	SS			$100,000	$150,000			Comprehensive State of the Practice for Managing Sedimentation in Navigable Waterways	9/1/2018	2/29/2020		C-110
SPR: TT-Fed/TT-Reg - 5	P	SS			$85,430	$120,000	LTRC	Julius Codjoe	Develop and Evaluate Performance Measures for Intelligent Transportation Systems (ITS) in Louisiana	1/2/2020	6/30/2021		C-111
SPR: TT-Fed/TT-Reg - 5	P	SS			$75,000	$75,000	LSU	Chester Wilmot	Testing the Hurricane Evacuation Modeling Package	9/1/2019	12/31/2020		C-112
					$648,272	**$2,011,496**	**SPECIAL STUDIES BUDGET TOTALS**						

LTRC ANNUAL RESEARCH PROGRAM

SPR: TT-Fed/TT-Reg

FISCAL YEAR 2019-2020

Funding	A/P	Project Type	SIO No.	Research No.	FY Budget	Total Cost	Agency	Principal Investigator	Project Title	Start Date	End Date	End Date (Rev)	PageNo.
Project Type: Structures													
SPR: TT-Fed/TT-Reg - 5	P	ST			$75,000	$125,000			Developing The Load Distribution Formula for Louisiana Culverts	7/22/2019	10/22/2020		C-113
SPR: TT-Fed/TT-Reg - 5	P	ST			$100,000	$125,000			Skew Detection System Replacement on Vertical Lift Bridges	7/22/2019	10/22/2020		C-115
					$175,000	**$250,000**	**STRUCTURES BUDGET TOTALS**						
Project Type: TIRE													
SPR: TT-Fed/TT-Reg - 5	P	TIRE	DOTLT10003 02	20-5TIRE	$30,000	$30,000	LSU	Hai (Thomas) Lin	Stabilizing Blended Calcium Sulfate (BCS) Using Biologically-Mediated Method for Application in Base Course	7/1/2019	6/30/2020		C-116
SPR: TT-Fed/TT-Reg - 5	P	TIRE	DOTLT10003 01	20-4TIRE	$30,000	$30,000	LTU	C. Shawn Sun	Elimination of End zone Cracks in Precast Prestressed Concrete Girders Using Memory Shape Alloys	7/1/2019	6/30/2020		C-117
SPR: TT-Fed/TT-Reg - 5	P	TIRE	DOTLT10003 00	20-3TIRE	$30,000	$30,000	LSU	Sun Chao	An Automatic Deep Learning-based Crack Identification Methodology for Bridges Using UAV Images	7/1/2019	6/30/2020		C-118
SPR: TT-Fed/TT-Reg - 5	P	TIRE	DOTLT10002 99	20-2TIRE	$29,774	$29,774	ULL	Pengfei Zhang	Analysis of Carbon Nanotube Reinforced Shape Memory Composites for Pavement Joints	7/1/2019	6/30/2020		C-119
SPR: TT-Fed/TT-Reg - 5	P	TIRE	DOTLT10002 98	20-1TIRE	$30,000	$30,000	LSU	Mingxuan Sun	Deep Learning Based Multi-Sensor Integration for Pavement Crack Detection	7/1/2019	6/30/2020		C-120
					$149,774	**$149,774**	**TIRE BUDGET TOTALS**						
					$3,554,462	**$8,287,717**	**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													
SPR: Pooled Fund: TT-Fed	A	PF	DOTLT1000287	19-3PF	$19,592	$39,183	LSU	Amirhosein Jafari	Synthesis on the Best Practices for State DOTs to Determine Project Delivery Time, Project Management, and Ratio of Consultant to In-House Design	1/1/2019	9/30/2019		C-122
SPR: Pooled Fund: TT-Fed	A	PF	DOTLT1000288	19-2PF	$32,003	$39,997	University of Kentucky Research Foundation	Nikiforos Stamatiadis	Synthesis on the Contributing Factors and Effective Countermeasures for Low Volume Roadway Fatality Rates in the Southeast	3/1/2019	11/30/2019		C-123
SPR: Pooled Fund: TT-Fed	A	PF	DOTLT1000286	19-1PF	$20,000	$40,000	LSU	Husam Sadek	Synthesis on Documenting and Tracking Research Implementation	12/1/2018	8/31/2019		C-124
SPR: Pooled Fund: TT-Fed	A	PF	DOTLT1000002	14-5PF	$27,000	$506,812	LTRC	Louay Mohammad	Design and Analysis Procedures for Asphalt Mixtures Containing High-RAP Contents and/or RAS	11/1/2014	10/31/2017	10/31/2019	C-125
					$98,595	**$625,992**	**SPR: POOLED FUND: TT-FED ACTIVE BUDGET TOTALS**						
					$98,595	**$625,992**	**POOLED FUND BUDGET TOTALS**						

LTRC ANNUAL RESEARCH PROGRAM

LTAP: TT-Fed/TT-Reg

FISCAL YEAR 2019-2020

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													
LTAP: TT-Fed/TT-Reg	P	LTAP	DOTLT1000312	20-LTAP	$692,938	$692,938	LTRC	Marie Walsh	Local Technical Assistance Program (LTAP)	7/1/2019	6/30/2020		D-2
					$692,938	**$692,938**	**LTAP BUDGET TOTALS**						
					$692,938	**$692,938**	**LTAP: TT-FED/TT-REG PROPOSED BUDGET TOTALS**						

LTRC ANNUAL RESEARCH PROGRAM

Technology Transfer and Training STP: TT-Fed

FISCAL YEAR 2019-2020

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: Technology Transfer and Training													
STP: TT-Fed	A	TT	DOTLT1000314	20-2TT	$147,600	$147,600	LTRC	Sam Cooper, Jr.	LTRC Student Worker Program	7/1/2019	6/30/2020		E-2
STP: TT-Fed	A	TT	DOTLT1000278	19-TDSS	$147,151	$441,453	LTRC	Vijaya Gopu	Training and Development Support Services	7/1/2018	6/30/2021		E-3
STP: TT-Fed	A	TT	30000241	10-4AD	$10,000	$100,000	LTRC	Tyson Rupnow	Technology Transfer & Research Implementation Support for Louisiana Universities	1/1/2010	12/31/2013	6/30/2022	E-5
STP: TT-Fed	A	TT	30000320	08-1TSQ	$379,911	$1,140,170	LTRC	MaryLeah Coco	Technology Transfer Program and Operations (LSU)	7/1/2015	6/30/2018	6/30/2021	E-6
					$684,662	**$1,829,223**	**TECHNOLOGY TRANSFER AND TRAINING BUDGET TOTALS**						
STP: TT-Fed	P	TT	DOTLT1000315	20-TTRF	$100,000	$100,000	LTRC	MaryLeah Coco	Technology Transfer Registration Fees	7/1/2019	6/30/2020		E-8
STP: TT-Fed	P	TT	DOTLT1000319	20-PONTIS	$125,000	$125,000	LTRC	MaryLeah Coco	AASHTO PONTIS Agreement	7/1/2019	6/30/2020		E-9
STP: TT-Fed	P	TT	DOTLT1000316	20-COOP	$200,000	$200,000	LTRC	MaryLeah Coco	LA DOTD CO-OP Program	7/1/2019	6/30/2020		E-10
STP: TT-Fed	P	TT	DOTLT1000313	20-1WDC	$4,212,407	$4,212,407	LTRC	MaryLeah Coco	Workforce Development Contracts	7/1/2019	6/30/2020		E-11
STP: TT-Fed	P	TT	DOTLT1000311	20-1WD	$1,221,759	$1,221,759	LTRC	MaryLeah Coco	Workforce Development	7/1/2019	6/30/2020		E-14
STP: TT-Fed	P	TT	DOTLT1000318	20-1TT	$37,500	$37,500	LTRC	MaryLeah Coco	Technology Transfer and Assistance for Senior Project Courses	7/1/2019	6/30/2020		E-16
STP: TT-Fed	P	TT	DOTLT1000317	20-1TSQ	$355,021	$355,021	LTRC	MaryLeah Coco	Technology Transfer Program and Operations (DOTD)	7/1/2019	6/30/2020		E-17
STP: TT-Fed	P	TT	DOTLT1000320	20-1SWD	$1,520,000	$1,520,000	LTRC	MaryLeah Coco	DOTD Staff Support for Workforce Development	7/1/2019	6/30/2020		E-19
					$7,771,687	**$7,771,687**	**TECHNOLOGY TRANSFER AND TRAINING BUDGET TOTALS**						
					$8,456,349	**$9,600,910**	**STP: TT-FED ACTIVE BUDGET TOTALS**						

LTRC ANNUAL RESEARCH PROGRAM

100% Federal

FISCAL YEAR 2019-2020

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													
100% Federal	A	B	DOTLT1000214	18-4B	$20,000	$50,000	LSU	Louay Mohammad	Effect of Increased Asphalt Pavement Density on its Durability	10/1/2018	9/30/2019		F-2
					$20,000	**$50,000**		**BITUMINOUS BUDGET TOTALS**					
					$20,000	**$50,000**		**100% FEDERAL ACTIVE BUDGET TOTALS**					

LTRC ANNUAL RESEARCH PROGRAM

Self-Generated

FISCAL YEAR 2019-2020

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													
NSF	A	ST	DOTLT1000101	16-2ST	$97,000	$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	G-2
					$97,000	**$337,312**	**STRUCTURES BUDGET TOTALS**						
					$97,000	**$337,312**	**SELF-GENERATED ACTIVE BUDGET TOTALS**						

LTRC ANNUAL RESEARCH PROGRAM

Other DOTD Sections

FISCAL YEAR 2019-2020

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													
Safety	A	SS	DOTLT1000151	17-2SS	$750,000	$8,291,932	Highway Safety Research	Helmut Schneider	Louisiana Traffic Records Management System Support	10/1/2016	9/30/2019		H-2
Port Priority Program	A	SS	DOTLT1000148	17-1SS	$41,868	$167,464	LSU	James Richardson	Economic Evaluation of Applicants to the Port Construction and Development Priority Program	7/1/2016	12/31/2017	6/30/2020	H-4
					$791,868	**$8,459,396**	**SPECIAL STUDIES BUDGET TOTALS**						
					$791,868	**$8,459,396**	**OTHER DOTD SECTIONS ACTIVE BUDGET TOTALS**						
Project Type: Other													
Safety	P	Other	DOTLT1000322	20-LRSP	$379,989	$379,989	LTRC	Marie Walsh	Louisiana Local Road Safety Program	7/1/2019	6/30/2020		H-5
					$379,989	**$379,989**	**OTHER BUDGET TOTALS**						
					$379,989	**$379,989**	**OTHER DOTD SECTIONS PROPOSED BUDGET TOTALS**						
Project Type: Special Studies													
Office of Multimodal Commerce	P	SS			$250,000	$290,000			The Future of the Louisiana Marine Transportation System: A System Analysis and Plan to Move Freight by Water	9/1/2019	8/31/2020		H-7
					$250,000	**$290,000**	**SPECIAL STUDIES BUDGET TOTALS**						
					$629,989	**$669,989**	**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 2019-2020

Title:	**Program Management**	**Project Status:**	**Proposed**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000303**		Project Start Date:		7/1/2019
Research Project Number:	20-1PM		Completion Date	(original)	6/30/2020
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$831,945		**Total**		**$831,945**
	(revised)					
Est. Expended to Date				Salaries		$831,945
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)			Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure				Other		

PURPOSE AND SCOPE

Research Program Administration

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

Research Program Administration

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Research Program Administration

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	Technology Transfer and Research Implementation	Project Status:	Proposed
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000306**		Project Start Date:		7/1/2019
Research Project Number:	20-1TTRI		Completion Date	(original)	6/30/2020
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow				

BUDGET STATUS

Total Budget				Estimated 2019-2020 Budget		
Total Cost	(original)	$498,947		**Total**		**$498,947**
	(revised)					
Est. Expended to Date				Salaries		$498,947
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)			Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure				Other		

PURPOSE AND SCOPE

Technology Transfer and Research Implementation

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

Twenty papers were submitted and presented at the TRB Annual Meeting in Washington, D.C. Additionally, numerous other papers, journal articles, and final reports were prepared and presented upon.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Technology Transfer and Research Implementation

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	**Technical Research Surveillance**	**Project Status:**	**Proposed**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000309**	Project Start Date:		7/1/2019
Research Project Number:	20-1TRS	Completion Date	(original)	6/30/2020
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$328,449
	(revised)	
Est. Expended to Date		
FY 2018 - 2019 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2019-2020 Budget		
Total		**$328,449**
Salaries		$328,449
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

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 2018 - 2019 ACCOMPLISHMENTS

Technical Research Surveillance

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Technical Research Surveillance

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	**Technical Assistance**	**Project Status:**	**Proposed**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000305**		Project Start Date:		7/1/2019
Research Project Number:	20-1TA		Completion Date	(original)	6/30/2020
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$302,186		**Total**		**$302,186**
	(revised)					
Est. Expended to Date				Salaries		$302,186
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)			Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure				Other		

PURPOSE AND SCOPE

Technical Assistance

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-LA 3276 pavement failures;
-LA 28 issues;
-LA 16 noise study;
-LA 22 Noise assessment for rumble striping and crown cookies;
-Deep South Conference Concrete Canoe Judge;
-Various job references for graduating graduate students;
-Various letters of recommendation;
-Review of SiteManager upgrade plan;
-Tour of LTRC facilities for Scotlandville Magnet Introduce a Teacher to Engineering;
-LA 454 Inundation analysis;
-19-01TA-SS: Evaluating the Effects of Barrier Height on Opposite Direction Rubbernecking;
-19-02-TA-SS: Assessment of Interstate Congestion Based on the NPMRDS: A Case Study of I-12 Near Covington, LA;
-19-01TA-SA: Impact of Crosswalks Lighting Improvements on Pedestrian Safety - A Literature Review;
-18-03TA-SS: Evaluation of Planning-Level Cost Estimation;
-18-01-TA-SS: Comparative Analysis of Performance of Bluetooth Devices;
-LSU, Mostafa Elseifi and Momen R. Mousa – Soil Water Characterization Cell (SWCC) Asphalt Permeability;
-LSU, Hai Lin, Questions about Ground Granulated Blast Furnace Slag (GGBFS);
-District 61: Randy Thevenot/Scott Lobell – Slag Stabilized BCS in Shoulders – Laboratory testing for LA 22;
-DOTD Greg Coco/Jesse Rauser, Slope failure, Bluebonnet & Interstate 10;
-DOTD, Jennifer Fontenot, The Soils Exploration Shallow Borings book utilization/and publishing need;
-NCHRP, Evaluation of US 167 NB in Winnfield, LA – Conduct of DCP tests;
-DOTD, H.012574 LA 96: LA 182 - 0.56 MI W LA 31 Typical Section - Marcia Granger & Kyle Taylor – Testing requirements and possible white-topping;
LSU, Hossein Alimohammadi, Laboratory Assistance – Consolidation and Tri-axial;
-LSU, Abedalqader A Idries, Laboratory Assistance - Direct Shear Box - Box modifications questions and assistance;
-Angelle Concrete - Super Slurry Breaks / Calibration tests for internal staff;
-LSU, Khadhr Altarabulsi, Ph.D. Student, Questions/attempt to measure the bulk modulus of elasticity of silicone fluid under high pressures;
-DOTD, Location & Survey, CORS 911 relocation to District Maintenance offices;
-Consultant, Glynn Gautreau, P.E., Questions about minimum spacing of borings for roadways;
-Gulf South Engineering, Chad Poche, Questions about who conducts Marshall Stability and Aggregate Water Absorption ;
-Gulf South Engineering, Chad Poche, Questions about minimum spacing of borings for roadways;
-LSU, Chester & Ravi, Data Collector Installation and vehicle utilization;
-CJ GEO, Nathan Hackney, Presentation on geotechnical polyurethane grout, cellular concrete, and helical piers;
-Carmeuse Lime, Jon Long, Modification of material with lime that does not meet current specifications;
-DOTD, Tyson & Mike Vosburg, BCS as an interlayer, laboratory testing and insight;
-DOTD, Carl Harwell, Ferrous Nodule Organics affecting cement percentages;
-Don Weathers, Geosynthetic specifications questions, the G designation stand;
-LSU, Laboratory Assistance: Prep Room Crusher and other equipment;
-Dr.Navid Jafari and Brian Harris GEER Report on Hurricane Harvey;
-Washington State University, Xianming Shi, BCS Slag reaction samples and insight;
-US 80 H.013156: Separation issues observed on US 80 in district 05. Roadway cores tested at LTRC asphalt lab and results reported to the district;
-18-4P: Assisted the LSU personnel in coring multiple locations for project 18-4P;
-Low Volume Mix Design: Technical assistance have been performed to recommend mix design characteristics for low volume roads;
-High Density for EMCRF: assisted EMCRF for high density research by obtaining density gauge readings and cores and performing testing on the cores;
-Danziger Bridge Deck asphalt special provision District 02;
-2018 Chapter 5 LSSRB special provision;
-I-20 Exit Ramp (3/5) expert witness review;
-LA 3160 shear test analysis (H.012552);
-I-10 SMA Rut Testing District 03;
-CRM rubber characterization for 15-2B; and
-Bond Testing; H.012170 I-20, Bossier Parish; H.012552 LA 3160

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Technical Assistance

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	DOTD Staff Support for Research	Project Status:	Proposed
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000310**		Project Start Date:		7/1/2019
Research Project Number:	20-1SSR		Completion Date	(original)	6/30/2020
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow				

BUDGET STATUS

Total Budget				Estimated 2019-2020 Budget		
Total Cost	(original)	$100,000		**Total**		**$100,000**
	(revised)					
Est. Expended to Date				Salaries		$100,000
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)			Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure				Other		

PURPOSE AND SCOPE

Provide a mechanism to show and document Louisiana Transportation Research Center (LTRC) staff support for outside research activities, specifically UTC Support.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

Supported over 15 UTC projects from two different State Universities.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Staff support for outside research activities.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	Research Laboratory and Field Test Support	Project Status:	Proposed
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000304**		Project Start Date:		7/1/2019
Research Project Number:	20-1LFT		Completion Date	(original)	6/30/2020
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow				

BUDGET STATUS

Total Budget			**Estimated 2019-2020 Budget**		
Total Cost	(original)	$39,848	**Total**		**$39,848**
	(revised)				
Est. Expended to Date			Salaries		$39,848
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

Research Laboratory and Field Test Support

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

Research Laboratory and Field Test Support

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Research Laboratory and Field Test Support

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	New Product Evaluation	Project Status:	Proposed
Funding Source:	**SPR: TT-Fed/TT-Reg - 6**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000308**		Project Start Date:		7/1/2019
Research Project Number:	20-1NPE		Completion Date	(original)	6/30/2020
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow				

BUDGET STATUS

Total Budget				Estimated 2019-2020 Budget		
Total Cost	(original)	$57,636		**Total**		**$57,636**
	(revised)					
Est. Expended to Date				Salaries		$57,636
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)			Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure				Other		

PURPOSE AND SCOPE

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

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-Marine Geocrete;
-MCI admixtures;
-Master Dowel;
-Color Safe;
-FODS Trackout Control System;
-Siloxa-Tek 8500;
-Gravix Wall;
-Micron 33;
-Super Slurry;
-Velco structural blend;
-Zydex stabilization product demonstration;
-Lithified technology; and
-Class C fly ash as a base course.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Evaluate new products for potential LADOTD use.

Title:	**Equipment Management**	**Project Status:**	**Proposed**
Funding Source:	**SPR: TT-Fed/TT-Reg - 6**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000307**		Project Start Date:		7/1/2019
Research Project Number:	20-1EQM		Completion Date	(original)	6/30/2020
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Tyson Rupnow				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$289,076		**Total**		**$289,076**
	(revised)					
Est. Expended to Date				Salaries		$219,076
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)			Equipment	(non-expendable)	$70,000
	(revised)			Travel		
Est. FY Expenditure				Other		

PURPOSE AND SCOPE

Equipment Management

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

Equipment Management:
-Maintained accreditation in the Geotechnical, Asphalt, and Concrete research laboratories (CCRL and AMRL); and
-Maintained equipment in working order per CCRL and AMRL requirements including repair and purchase of replacement equipment as needed.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Equipment Management:
-$70,000 non-expendable equipment generally covers routine maintenance of equipment, purchase of replacement parts, installation of said replacement parts, etc. Replacement parts generally do not exceed the $5,000 threshold for FHWA reporting guidelines.

FHWA

Part B SPR Funded Research Program

CONTINUING RESEARCH

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)	12/13/2019
Principal Investigator:	Saman Salari				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$140,674		**Total**		**$40,866**
	(revised)	$181,540				
Est. Expended to Date		$134,245		Salaries		$18,866
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$87,975		Equipment	(non-expendable)	$22,000
	(revised)			Travel		
Est. FY Expenditure		$70,380		Other		

PURPOSE AND SCOPE

The objective of this research is to develop a mix design criteria for 4.75 mm NMAS mixtures. Criteria targeted in the research will be gradation controls, volumetric property requirements (air voids, VMA, VFA, and dust-to-binder ratio) 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.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-Continue literature review;
-Mixture with Gravel and limestone has been tested for mechanical tests;
-Report started; and
-Results have been analyzed.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Writing the report;
-Analysis of the results;
-Testing the mixtures for friction; and
-Economical analysis of 4.75 mm nominal maximum aggregate size mixtures will be performed.

Equipment budget adjustment;
$22000 will be spent on a new Asphalt Surface Friction Tester.

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:		5/2/2019
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		
Total Cost	(original)	$474,347
	(revised)	
Est. Expended to Date		$40,000
FY 2018 - 2019 Budget		
FY Funds	(original)	$40,000
	(revised)	
Est. FY Expenditure		$40,000

Estimated 2019-2020 Budget		
Total		**$147,864**
Salaries		$135,000
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		$12,864

PURPOSE AND SCOPE

Louisiana's Quality Control and Quality Assurance (QC/QA) practice for asphalt mixtures in pavement construction is mainly based on controlling physical properties of plant produced asphalt mixtures that include gradation and asphalt content, voids filled with asphalt, air voids, moisture susceptibility tests, and roadway density. These physical properties have served Louisiana well, however, with the increase use of recycled materials in asphalt mixtures such as crumb rubber modified asphalts, reclaimed asphalt pavement (RAP), and recycled asphalt shingles, the Louisiana Department of Transportation and Development (LADOTD) has recently proposed specification changes to incorporate the use of the semi circular bend (SCB) test at intermediate temperature (ASTM d 8044, LA DOTD TR 330) in order to ensure cracking resistance of the designed mixtures. The objective of this study is to evaluate the SCB test results from several pilot projects selected for the implementation of the new specifications.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-Performed literature review; and
-Initiated formation of advisory panel to assist in field project identification as per experimental factorial.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Task 1 – Continue Conduct Literature review;
-Task 2 – Identify Field Projects and Material Collection; and
-Task 3 – Conduct of Laboratory Experiment as per proposed factorial.

The other cost reflects efforts required by the DOTD LTRC staff salaries in support of task 2.

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 2019-2020 Budget**		
Total Cost	(original)	$257,903		**Total**		**$107,000**
	(revised)					
Est. Expended to Date		$35,000		Salaries		$98,000
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$35,000		Equipment	(non-expendable)	
	(revised)			Travel		$1,000
Est. FY Expenditure		$35,000		Other		$8,000

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 2018 - 2019 ACCOMPLISHMENTS

-Conducted literature review; and
-Initiated the Evaluation of existing moisture damage test methods.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Continue the evaluation of existing moisture damage test methods;
-Develop laboratory test procedure for moisture damage; and
-Develop laboratory experimental plan.

The other cost reflect consultant effort for Atomic Force Microscopy (AFM) testing as per experimental factorial.
$7,500 for salaries; $500 consumables for the subcontract.

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)	
Principal Investigator:	Mostafa Elseifi			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$113,000
	(revised)	
Est. Expended to Date		$35,000
FY 2018 - 2019 Budget		
FY Funds	(original)	$43,000
	(revised)	$35,000
Est. FY Expenditure		$35,000

Estimated 2019-2020 Budget		
Total		**$50,000**
Salaries		$48,000
Consumable Supplies & Materials		$2,000
Equipment	(non-expendable)	
Travel		
Other		

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 2018 - 2019 ACCOMPLISHMENTS

-A literature review is currently being finalized and will be completed by summer 2019;
-Job mix formula has been developed for regular and rubberized chip seal; additional mix formula will be developed when crumb rubber is used as part of the aggregate;
-Laboratory performance evaluation is underway using the sweep test; and
-The research team is working in coordination with District 58 to construct trial sections.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-The literature review will be completed and finalized;
-Job mix formula will be finalized.
-Laboratory performance evaluation will be completed;
-Field trials will be constructed in collaboration with District 58; and
-Constructability and short-term field performance will be evaluated for the constructed test sections.

Title:	**Field Implementation of Handheld FTIR Spectrometer for Polymer Content Determination and for Quality Control of RAP Mixtures**	**Project Status:**	**Ongoing**
Funding Source:	**SPR: TT-Fed/TT-Reg - 6**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000161**	Project Start Date:		7/14/2017
Research Project Number:	17-1B	Completion Date	(original)	7/13/2019
Research Agency:	LTU	Completion Date	(revised)	1/13/2020
Principal Investigator:	Nazimuddin Wasiuddin			

BUDGET STATUS

Total Budget			**Estimated 2019-2020 Budget**		
Total Cost	(original)	$200,000	**Total**		**$44,987**
	(revised)				
Est. Expended to Date		$113,712	Salaries		$35,554
FY 2018 - 2019 Budget			Consumable Supplies & Materials		$3,821
FY Funds	(original)	$158,700	Equipment	(non-expendable)	$4,999
	(revised)	$113,712	Travel		$613
Est. FY Expenditure		$113,712	Other		

PURPOSE AND SCOPE

The purpose of this research project is to determine if the FTIR can be implemented in Louisiana for polymer content determination and for quality control of recycled mixtures. The FTIR spectrometer has the advantage of being faster, easier to handle, and inexpensive than current testing methods, but requires further researching of its capabilities. The FTIR will need to be tested for precision, testing time, and cost effectiveness versus the other asphalt binder testing devices.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-A handheld FT-IR was purchased;
-The handheld FTIR (fourrier transform infrared spectrometer) was used for polymer content determination and a reproducible test method has been developed;
-A calibration curve has been developed that can determine styrene-butadiene-styrene content irrespective of binder grade with +/-1% accuracy level;
-Diffuse reflectance (DR) method has been compared with ATR method (touch method);
-Four field studies were performed;
-Four test parameters that include both peak value and area value have been included in the final list of test parameters; and
-Aging indices were developed for rolling thin film oven, pressure aging vessel, twice pressure aged vessel and RAP content.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Four more field (plant) studies will be performed;
-Some manufacturers will be contacted and their binders will be tested for polymer content determination;
-Atenuated total reflection(touch) method has more accuracy than DR method; more lab studies will be performed to increase the reproducibility of DR method;
-Standard method of tests (ASTM/AASHTO Format) will be developed for field RAP content determination and polymer content determination with handheld FT-IRS; and
-Final report will be completed.

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				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$345,000		**Total**		**$147,000**
	(revised)	$17,657,579				
Est. Expended to Date		$14,544,503		Salaries		$141,000
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$157,000		Equipment	(non-expendable)	
	(revised)			Travel		$6,000
Est. FY Expenditure		$157,000		Other		

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 Louisiana Transportation Research Center's (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 the Louisiana Department of Transportation and Development (LADOTD) 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 2018 - 2019 ACCOMPLISHMENTS

-Participated in the Louisiana DOTD Parts five and ten Specification Committee;
-Developed and submitted proposals to NCHRP and FHWA; and
-Participated in several technical assistance projects.

FISCAL YEAR 2019-2020 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: Use of Bagasse Ash as a Concrete Additive for Road Pavement Applications**	**Project Status:**	**Ongoing**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000239**		Project Start Date:		3/15/2018
Research Project Number:	18-4C		Completion Date	(original)	9/14/2019
Research Agency:	LSU		Completion Date	(revised)	
Principal Investigator:	Gabriel Arce				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$15,189		**Total**		**$11,200**
	(revised)					
Est. Expended to Date		$3,989		Salaries		$11,200
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$15,189		Equipment	(non-expendable)	
	(revised)	$3,989		Travel		
Est. FY Expenditure		$3,989		Other		

PURPOSE AND SCOPE

The goal and purpose of this project is to develop new uses for bagasse as as an additive for concrete, especially as a partial replacement of portland cement.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

The technical phase have been completed (all tasks in the proposal were completed). A comprehensive characterization of different bagasse ash products has being conducted and their effect in concrete properties has been evaluated.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

The future work in the implementation phase will be to produce a small-scale implementation project of the Bagasse Admixed Concrete.

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 2019-2020 Budget**		
Total Cost	(original)	$27,404	**Total**		**$22,404**
	(revised)				
Est. Expended to Date		$8,425	Salaries		$22,404
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$14,260	Equipment	(non-expendable)	
	(revised)	$5,000	Travel		
Est. FY Expenditure		$5,000	Other		

PURPOSE AND SCOPE

The purpose of this project is to determine the failure mechanism of UTW produced with an ECC material under accelerated loading. Three test sections will be built and tested to determine failure mechanisms.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

The engineered cementitious composite material for the overlay was developed. The material was evaluated in tension, compression, bending. Also, the flexural fatigue performance of this material has been evaluated. Furthermore, the asphalt section to be overlaid with engineered cementitous composite at the PRF has been prepared and instrumentation is currently being installed.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

The future work will be the construction and evaluation of the engineered cementitious composite overlay.

Title:	**Influence of Internal Curing on measured resistivity**	**Project Status:**	**Ongoing**
Funding Source:	**SPR: TT-Fed/TT-Reg - 6**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000245**		Project Start Date:		4/1/2018
Research Project Number:	18-6C		Completion Date	(original)	3/31/2019
Research Agency:	LTRC		Completion Date	(revised)	12/31/2019
Principal Investigator:	Jose Milla				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$53,113		**Total**		**$27,000**
	(revised)	$83,113				
Est. Expended to Date		$55,752		Salaries		$27,000
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$39,835		Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure		$42,474		Other		

PURPOSE AND SCOPE

The density of concrete can be influenced by a number of factors. Previous research conducted at the Louisiana Transportation Research Center (LTRC) showed a general increase in resistivity values with an increase in the content of lightweight fine aggregate. With interest in Internally Cured Concrete for structural concrete applications, research is needed to better understand the effect of internal curing on surface resistivity.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-Task 2: Test and monitor fresh and hardened properties, including surface resistivity of the developed mixtures; and
-Task 3: Complete analysis up to 56 days of surface resistivity readings for all specimen groups.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Task 2: Continue testing for surface resistivity of the developed mixtures; and
-Task 3: Complete analysis; and
-Task 4: Publish final report.

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 2019-2020 Budget**		
Total Cost	(original)	$467,176		**Total**		**$60,000**
	(revised)					
Est. Expended to Date		$130,000		Salaries		$60,000
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$83,918		Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure		$68,000		Other		

PURPOSE AND SCOPE

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

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

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

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

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

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)	
Principal Investigator:	Nick Ferguson			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$125,708
	(revised)	
Est. Expended to Date		$44,426
FY 2018 - 2019 Budget		
FY Funds	(original)	$125,708
	(revised)	$62,856
Est. FY Expenditure		$62,856

Estimated 2019-2020 Budget		
Total		**$62,852**
Salaries		$62,852
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

PURPOSE AND SCOPE

The purpose of this project is to determine if and how the Louisiana Department of Transportation and development (LADOTD) can utilize the Dynamic Cone Penetrometer(DCP)as a compaction acceptance tool to replace the Nuclear Density Gauge (NDG) and establish appropriate QA specifications for Louisiana. The scope is to lead to improvements of safety and efficiency by reducing the use of nuclear devices within LADOTD.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

The Louisiana Transportation Research Center (LTRC) acquired a new auto-reader, the Smart DCP by Vertek. The Smart Dynamic Cone Penetrometer (DCP) was compared to another auto-reader already utilized by the DOTD, the Mag Ruler by Kessler. We began tests with the DCP adjacent to the Nuclear Density Gauge (NDG) at a few construction sites to search for a correlation. Other sites are scheduled for later in the FY 2018-19.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Continue to collect field DCP data from construction projects;
-Perform data analysis and compare results with other state transportation departments;
-Develop and finalize a DCP QA specification; and
-Preparation of the Final Report.

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)	
Principal Investigator:	Gavin Gautreau				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$138,244		**Total**		**$66,053**
	(revised)					
Est. Expended to Date		$45,000		Salaries		$66,053
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$93,458		Equipment	(non-expendable)	
	(revised)	$72,191		Travel		
Est. FY Expenditure		$72,191		Other		

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 2018 - 2019 ACCOMPLISHMENTS
Starting with low hanging fruit the project documented existing wall locations in GIS. Additionally, construction parameters and assessment of how they are performing is ongoing.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES
-The database and GIS for Retaining Walls will be complete including other layers like hazards, and problematic slopes; and -The research will summarize ongoing efforts and give direction and recommendations on how the LADOTD should proceed with the implementation of Geotechnical Asset Management.

Title:	**Analysis of Driven Pile Capacity within Pre-bored Soil**	**Project Status:**	**Ongoing**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000208**		Project Start Date:		9/1/2017
Research Project Number:	18-1GT		Completion Date	(original)	2/28/2019
Research Agency:	LSU		Completion Date	(revised)	8/31/2019
Principal Investigator:	Shengli Chen				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$129,159		**Total**		
	(revised)					
Est. Expended to Date		$87,877		Salaries		
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$50,000		Equipment	(non-expendable)	
	(revised)	$86,080		Travel		
Est. FY Expenditure		$44,798		Other		

PURPOSE AND SCOPE

It is expected that the relative strength of the soil as well as the diameter of the pilot hole relative to the pile will have an impact on pile drivability and its long-term load carrying capacity. Quantifying such an impact will greatly help geotechnical design engineers to understand the interactions among the factors of pre-boring, pile size, soil conditions, pile driving, etc. and improve the design and construction qualities of pile foundations in hard/dense soils. Since the field testing data is not readily available, a finite element analysis on pre-bored piles will be conducted for a sensitivity analysis based on various field conditions.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-Developed ABAQUS finite element model and conducted parametric analyses for the pre-boring impacts on the long-term pile capacity;
-Proposed the concept of shaft resistance reduction factor in association with the alpha and beta methods; generated the reduction factor curves for typical soil conditions in Louisiana state, for a wide range of pre-bored size; and
-Have been working on the proposition of a simplified analytical method for estimating the desired reduction factor, which will be general enough to be applicable for different soil profiles encountered in Louisiana.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Submit a final report and technical summary of this research project to Louisiana Research Center (LTRC).

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)	6/30/2020
Principal Investigator:	Murad Abu-Farsakh				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$455,673		**Total**		**$105,500**
	(revised)					
Est. Expended to Date		$205,500		Salaries		$103,020
FY 2018 - 2019 Budget				Consumable Supplies & Materials		$2,480
FY Funds	(original)	$116,208		Equipment	(non-expendable)	
	(revised)	$96,000		Travel		
Est. FY Expenditure		$93,000		Other		

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 (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 a lot of 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 Load and Resistance Factored Design (LRFD) resistance factors 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 2018 - 2019 ACCOMPLISHMENTS

-Completed literature review on available articles, journal papers, thesis, and dissertations on available direct CPT methods to estimate pile resistance. About twenty Pile-CPT design methods were collected;
-Completed literature review on methods and interpretation techniques (such as Kriging) to generate synthetic CPT profile and soil borings data from existing CPT and soil borings;
-Collected 80 pile load test database from LA DOTD archives along with the corresponding CPT data, soil borings, and pile information data;
-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;
-Implemented Robertson 2010 CPT classification method (in addition to probabilistic method) to the draft Pile-CPT software;
-Developed 21 excel sheet templates for the 21 direct CPT methods to evaluate the ultimate pile capacity from CPT data. Two CPT classification methods were adopted: Probabilistic method and Robertson 2010 CPT classification methods;
-Calculated the ultimate pile capacities for the 80 pile load cases using the 21 different direct CPT methods. The estimated pile capacity values were compared with the measured values as interpreted using Davison methods;
-Conducted sensitivity analysis on the effect of using soil classification (i.e., Probabilistic method versus Robertson 2010) on estimating the ultimate pile capacities;
-Started evaluating the performance of the 21 Pile-CPT methods using three approaches: mathematical and statistical analysis, using MultiDimensional Unfolding, and using efficiency from LRFD reliability analysis;
-Started incorporating some features to the Pile-CPT software with coordination with LADOTD Geotechnical Group; and
-Prepared interim draft report.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Complete evaluating the performance of the 21 Pile-CPT methods using the three approaches (mathematical and statistical analysis, using MultiDimensional Unfolding, and using efficiency from LRFD reliability analysis), and through dividing the database into soil type/classification groups;
-Calibrate the resistance factors for the selected Pile-CPT Methods;
-Start implementing the selected best performed Pile-CPT methods into "LPD-CPT" software;
-Adopt and implement the FHWA method to incorporate the effect of scour on the long-term capacity of piles estimated using Pile-CPT methods;
Continue incorporating features into the "LPD-CPT" software with coordination with LADOTD Geotechnical Group;
-Complete evaluating the different techniques to generate synthetic CPT profile and soil borings data from existing CPT and soil borings; and
-Prepare final report.

Title:	**Incorporating the Site Variability and Laboratory/In-situ Testing Variability of Soil Properties in Geotechnical Engineering Design**	**Project Status:**	**Ongoing**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000112**	Project Start Date:		7/1/2016
Research Project Number:	16-6GT	Completion Date	(original)	12/31/2018
Research Agency:	LTRC	Completion Date	(revised)	6/30/2020
Principal Investigator:	Murad Abu-Farsakh			

BUDGET STATUS

Total Budget			**Estimated 2019-2020 Budget**		
Total Cost	(original)	$476,813	**Total**		**$104,000**
	(revised)				
Est. Expended to Date		$313,743	Salaries		$104,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$100,000	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$86,300	Other		

PURPOSE AND SCOPE

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:
-Evaluating operator-induced variations on design soil properties;
-Evaluating equipment-induced variations on design soil properties;
-Evaluating site/spatial variations of design soil properties;
-Developing QA/QC guidelines for laboratories; and
-Incorporating site variability and measurement error into LRFD geotechnical design.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-Completed the lab variability task by conducting selected geotechnical lab tests (e.g., CBR, UU, consolidation etc.) on different soil types;
-Completed the in-situ testing of the constructed sections at ALF to study measurement variation of shallow in-situ tests (DCP, LWD, DSPA, Geogauge, and NDG) in the field;
-Developed correlation(s) between undrained shear strength and CPT data;
-Worked on evaluating the effect of site variability for deep foundation application; and
-Started the implementation of site variability for LRFD design of deep foundations.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Continue analyzing the collected lab and field test data to study site variability;
-Continue evaluating the effect of site variability for deep foundation application;
-Continue implementing the site variability for LRFD design of deep foundations; and
-Prepare a draft report.

Title:	**pLog Enterprise - Enterprise GIS-Based Geotechnical Data Management System Enhancements**	**Project Status:**	**Ongoing**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000048**		Project Start Date:		7/31/2015
Research Project Number:	15-1GT		Completion Date	(original)	8/1/2017
Research Agency:	Dataforensics, LLC		Completion Date	(revised)	2/1/2020
Principal Investigator:	Scott Deaton				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$200,000		**Total**		**$20,000**
	(revised)					
Est. Expended to Date		$119,000		Salaries		$17,000
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$50,000		Equipment	(non-expendable)	
	(revised)	$80,000		Travel		$3,000
Est. FY Expenditure		$80,000		Other		

PURPOSE AND SCOPE

The research will address the needs of HQ Pavement and Geotechnical and expand on work developed under the initial and Phase 2 projects. The research would add modules to the system. Specifically: shallow soil subgrade survey data, including Dynamic Cone Penetrometer (DCP) data, and district auger boring information. This data should be incorporated into the database; and like deep borings, be plotted and added to the plans, via a standardized template accessible to districts and designers for analysis. There will likely be some linkage to ongoing work by the Materials Lab on Materials Manager/ Laboratory Information Management System (LIMS) in order to access the data without replication or duplication of data. Pile load test data and other information could also be added to the database and be made digitally available and accessible via GIS systems. A tracking system/template, incorporated with SharePoint (a software already within the department) will also be addressed.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-The Pile Load Test database schema was finalized, data migration was completed, the configuration of the pile load test data spreadsheet was completed. Accordingly, all configuration of the system has been completed. We are awaiting the official release of HoleBASE software that has the capabilities added to facilitate this project which is scheduled for late April, 2019;
-A draft of the final report will be completed in April, 2019. Additional details will be added to it based on feedback from the users during the training; and
-Training of the first district lab will be completed in May/June 2019 and the remaining labs will be trained between June, 2019 and July, 2019.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Additional training will be completed in July 2019 and the final Project Review Committee (PRC) presentation and report will be delivered in July 2019.

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)	12/31/2019
Principal Investigator:	Murad Abu-Farsakh				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$260,368		**Total**		**$42,000**
	(revised)	$308,292				
Est. Expended to Date		$266,292		Salaries		$42,000
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$80,248		Equipment	(non-expendable)	
	(revised)	$54,000		Travel		
Est. FY Expenditure		$53,320		Other		

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 2018 - 2019 ACCOMPLISHMENTS
-Worked on the development of p-y curves for clay soils for use in analysis and design of battered pile group foundations subjected to lateral loads; and -Worked on the development of p-y curves for sand soils for use in analysis and design of battered pile group foundations subjected to lateral loads.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES
-Complete the development of p-y curves for clay and sand soils for use in analysis and design of battered pile group foundations subjected to lateral loads; and -Prepare a final report.

Title:	**In Situ Evaluation of Design Parameters and Procedures for Cementitiously Treated Weak Subgrades using Cyclic Plate Load Tests**	**Project Status:**	**Ongoing**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**30000661**		Project Start Date:		3/18/2013
Research Project Number:	11-1GT		Completion Date	(original)	9/17/2015
Research Agency:	LTRC		Completion Date	(revised)	8/30/2019
Principal Investigator:	Murad Abu-Farsakh				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$294,679		**Total**		**$14,524**
	(revised)	$354,679				
Est. Expended to Date		$340,155		Salaries		$14,524
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$14,524		Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure		$30,500		Other		

PURPOSE AND SCOPE

The purpose of this research study is to evaluate the design parameters and procedures for cementitious treated soft subgrade soil using cyclic plate load tests. This includes evaluating the composite resilient modulus (Mr)of various cementitious (cement, lime, flyash)treated soft subgrade materials for inclusion in the pavement design. A treated subgrade soil has many characteristics that contribute to the performance of the pavement structure. As such, an adequate evaluation of the design parameters of treated subgrade soils is necessary in pavement analysis and design. The resilient modulus is a key input parameter for subgrade soil in both the 1993 AASHTO and the Mechanistic-Empirical Pavement Design Guide (MEPDG). Therefore, the determination and use of the "composite" resilient modulus of cementitious treated soft subgrades can provide a more suitable pavement structure design responsive to site conditions and projected loading is crucial in pavement design process. The work program includes conducting in-box resilient and permanent deformation tests using cyclic plate load tests on sections build inside a steel test box with dimensions of 6.5 ft (length) × 6.5 ft (width) × 5.5 ft (height. Laboratory unconfined compression tests, resilient mod repeated plate load tests will be also conducted on cementatious treated soft subgrade samples. In addition, Dynamic Cone Penetrometer (DCP), Light Falling Weight Deflectometer (LFWD), Geogauge, Portable Seismic Pavement Analyzer (PSPA) tests, and repeated triaxial load tests will be conducted.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-Worked on analyzing the results of cyclic plate load tests conducted on the different ALF cementitious test sections.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Complete analyzing the results of cyclic plate load tests conducted on the different ALF cementitious test sections; and
-Prepare 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				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$523,000		**Total**		**$216,300**
	(revised)	$16,302,147				
Est. Expended to Date		$1,766,000		Salaries		$160,500
FY 2018 - 2019 Budget				Consumable Supplies & Materials		$37,200
FY Funds	(original)	$199,000		Equipment	(non-expendable)	
	(revised)			Travel		$18,600
Est. FY Expenditure		$193,000		Other		

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;
-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 2018 - 2019 ACCOMPLISHMENTS

-Developed potential ideas and problem statements for future LTRC research projects;
-Provided geotechnical testing support and technical assistance for LADOTD;
-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; and
-Maintained softwares related to CPT application.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

- Provide geotechnical and geosynthetic testing support and technical assistance for LADOTD;
- Provide support and training for implementation of research results;
-Develop research proposals and problem statements for future activities;
-Develop research proposal on "Instrumentation and Modeling of Geosynthetic Load Transfer Platform Performance";
-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; and
-Maintain and upgrade the CPT software's.

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			Estimated 2019-2020 Budget		
Total Cost	(original)	$352,390	**Total**		**$285,587**
	(revised)	$856,869			
Est. Expended to Date		$158,580	Salaries		$278,167
FY 2018 - 2019 Budget			Consumable Supplies & Materials		$1,140
FY Funds	(original)	$116,803	Equipment	(non-expendable)	$4,000
	(revised)	$120,820	Travel		$2,280
Est. FY Expenditure		$120,040	Other		

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.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-Software programming to update capabilities and resolve issues on PMTS;
-Software programming on 17-2GT, ITS Lab projects;
-Hiring, training, and technical supervision of graduate student computer programming;
-GIS liaison to LADOTD Section 21 for LTRC GIS implementation procedures;
-GIS data and implementations for LTRC Projects 16-5GT, 17-4SS, 18-3GT, 18-4GT, 19-1GT, TCM layer, GeoTech GIS;
-LADOTD Headquarters ESRI System of Engagement team member; attended 8 formal training courses (geodatabase, javascript, web applications, managing geospatial data);
-Maintain Server Frameworks (GIS, PMTS) and offsite source code repository (TFS); and
-Set-up and upgrade development environments for software development to Windows 10.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Software programming to update capabilities and resolve issues on PMTS;
-Software programming on 17-2GT, ITS Lab projects, Flood Prone Roadway proposed study;
-Hiring, training, and technical supervision of graduate student computer programming and/or research associate;
-GIS liaison to LADOTD Section 21 for LTRC GIS implementation procedures;
-GIS data and implementations for LTRC Projects 17-4SS, 18-3GT, 18-4GT, 19-1GT, GeoTech GIS;
-LADOTD Headquarters ESRI System of Engagement team member; and
-Maintain Server Frameworks (GIS, PMTS) and offsite source code repository (TFS).

LTRC Annual Research Program
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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			Estimated 2019-2020 Budget		
Total Cost	(original)	$211,428	**Total**		**$296,000**
	(revised)	$3,726,356			
Est. Expended to Date		$2,372,000	Salaries		$286,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$286,000	Equipment	(non-expendable)	
	(revised)		Travel		$10,000
Est. FY Expenditure		$280,000	Other		

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 programs.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-Coordinated the preparation and submission of four site proposals for a National UTC (Michigan Tech, W. Virginia, S. Carolina and Florida International University);
-Collaborated in the submission of a NSF proposal with a Southern University professor;
-Coordinated the TIRE Program and managed the five TIRE projects awarded in 2018;
-Serving as the PI on a NSF award dealing with FMM education. Developed educational modules for delivery in CE classes; held workshops for partner universities;
-Serving as co-PI on a NSF REU site proposal that supports the research experience of ten students during the summer term;
- Coordinated and completed the literature review for FRP removable bridges;
-Served on several NSF proposal review panels and site visit teams dealing with 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, composites application in infrastructure rehabilitation, and hazard mitigation at national and international meetings; and
-Coordinated/chaired two technical sessions at the Tulane Engineering Forum.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Continue to coordinate the LTRC UTC site projects and the UTC support studies through their completion;
-Coordinate all activities on the NSF project on FMM education;
-Continue coordination of TIRE program and TIRE projects;
-Hold LTRC townhall 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 proposal in the event the current proposal is not funded;
-Initiate work on NDE of capacity of deteriorated timber piles; and
-Review the work being conducted at the University of West Virginia on FRP repair of timber piles and ensure project objectives are met.

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		
Total Cost	(original)	$319,896
	(revised)	
Est. Expended to Date		$120,000
FY 2018 - 2019 Budget		
FY Funds	(original)	$116,121
	(revised)	
Est. FY Expenditure		$116,000

Estimated 2019-2020 Budget		
Total		**$116,740**
Salaries		$116,740
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

PURPOSE AND SCOPE

The study will focus on the development of a mechanistic-empirical (M-E) based Roller Compacted Concrete (RCC) 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 2018 - 2019 ACCOMPLISHMENTS

-Conducted literature review on post-installation of pavement sensors and prediction of concrete pavement performance;
-Installed two instrumentation plates on RCC test sections embedded with various fiber optical straingage and temperature gages;
-Installed a dial-gage based device on one RCC test section to monitor potential slab curling and warping; and
-Started loading test on RCC test sections.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Continue the loading test;
-Analyze load-induced RCC pavement strain responses and perform fatigue analysis under different ATLaS wheel loads;
-Monitor slab curling and warping of RCC test sections; and
-Conduct fatigue test on RCC beams.

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)	
Principal Investigator:	Mostafa Elseifi				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$157,376		**Total**		**$58,000**
	(revised)					
Est. Expended to Date		$100,000		Salaries		$58,000
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$84,000		Equipment	(non-expendable)	
	(revised)	$84,000		Travel		
Est. FY Expenditure		$51,000		Other		

PURPOSE AND SCOPE

The objective of this research is to evaluate existing 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 overlay of stripped pavements with and without removal, chip seal, and microsurfacing. Performance of past projects as depicted from Pavement Management System (PMS) data will be used to assess the effectiveness of these techniques.
Research Tasks:
-Task 1: 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 2018 - 2019 ACCOMPLISHMENTS

The following activities have been achieved in the project:
-A literature review has been conducted by the research team and is being finalized;
-A methodology for detecting top-down cracking is being developed based on digital image analysis. Results are promising but more analysis is underway;
-Analysis of RWD data with respect to stripping damage is underway; A model is being developed to assess stripping potential based on RWD data; and
-Part of the GPR data were analyzed to detect moisture damage in the pavement. Rest of the data will be analyzed in the coming months. The research team is working on new techniques for using GPR data in moisture damage detection.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES
The research team expects to complete the following activities: - The literature review will be finalized; - The methodology for detecting top-down cracking will be completed; - The use of RWD data for detecting stripping will be completed with a model to assess stripping potential based on RWD measurements; - The rest of the GPR data will be analyzed for detecting moisture damage.

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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)	8/31/2019
Principal Investigator:	Zhongjie Zhang				

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$50,000	**Total**		**$35,000**
	(revised)				
Est. Expended to Date		$15,000	Salaries		$35,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$49,000	Equipment	(non-expendable)	
	(revised)	$15,000	Travel		
Est. FY Expenditure		$15,000	Other		

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 2018 - 2019 ACCOMPLISHMENTS

Continued the Literature Search and Review on the Applications of Remote Sensing and Drone Technologies in Civil and Geotechnical Engineering. We selected the subcontractor from the Department of Geography & Anthropology at LSU and helped the research team of finalized their research proposal and got the proposal approved by LADOTD. The research work on the validation of current remote sensing technologies started on July 15, 2018. We also prepared soil samples for lab calibration tests conducted by the subcontractor in their lab.

Due to the delay of the progress by subcontractor, we are still waiting for the preliminary results of calibration on moisture curves. The current target date for her to submit the interim report is April 15, 2019.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

If we get satisfactory results, we will go ahead and implement them in-situ and collect data from various embankments.
-Task 1:Continue the literature search and review on the applications of remote sensing and drone technologies in civil and geotechnical engineering as needed;
-Task 3:Select sites for controlled experiments of remote technologies and other field embankment testing sites, continue supporting subcontractor's lab testing, review calibration results, select field testing sites, etc.; and
-Task 4:If possible, we will work with subcontractor and collect field testing data from native and failed embankments.

Due to the uncertainty and delay of subcontractor's work, this project needs to be extended for another year with a possible budget increase. This budget is for our lab technicians to support field testing.

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 2019-2020 Budget**		
Total Cost	(original)	$170,588		**Total**		**$14,000**
	(revised)					
Est. Expended to Date		$145,000		Salaries		$14,000
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$100,000		Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure		$95,000		Other		

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 Pavement Management System (PMS) cracking data to comply with the MEPDG definition of cracking; and to recommend a cracking analysis procedure for flexible pavements using the Louisiana Transportation Research Center's (LTRC's) Digital Highway Data Collection System.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-Develop a MatLab-based crack detection and reporting software for the newly upgraded LTRC high-speed data vehicle;
-Install iVersion software at LTRC and conducted semi-automatic analysis on cracking images colllected in PMS; and
-Analyze manually the cracking image data obtained in PMS and compared with the automatic cracking analysis results.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Collect pavement images using LTRC's digital highway data vehicle;
-Perform the cracking analysis using the Matlab-based cracking report software;
-Manually identify the cracking distress in terms of type, length, and severity; and
-Compare the manual and automatic cracking results using statistical analysis tools.

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 2019-2020 Budget**		
Total Cost	(original)	$319,442	**Total**		**$93,200**
	(revised)				
Est. Expended to Date		$81,437	Salaries		$93,200
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$81,437	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$81,437	Other		

PURPOSE AND SCOPE

The Louisiana Department of Transportation and Development (LADOTD) 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 2018 - 2019 ACCOMPLISHMENTS

-Conducted Literature review regarding newly updates on Pavement ME Software (version 2.5);
-Preformed local calibration on MEPDG distress models for Pavement ME Software (version 2.5); and
-Selected Asphalt overlay and pavement preservation projects throughout Louisiana and collected PMS data related those selected projects.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Continue the literature review and location calibration;
-Address the design issues related to locally-calibrated Pavement ME Software (version 2.5); and
-Analyze the performance of structural overlays;

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:	Kevin Gaspard			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$210,000
	(revised)	
Est. Expended to Date		$53,000
FY 2018 - 2019 Budget		
FY Funds	(original)	$53,000
	(revised)	
Est. FY Expenditure		$50,000

Estimated 2019-2020 Budget		
Total		**$38,888**
Salaries		$34,888
Consumable Supplies & Materials		
Equipment	(non-expendable)	$4,000
Travel		
Other		

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 PCC transverse joints under traffic loading. The results of the study may be used to recommend improved pavement design and preservation procedures.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-Task 1: Literature review. We have completed the literature review and selected the appropriate instrumentation for the project.
-Task 2: We are about 30 percent complete on developing the state wide survey questions.
-Task 3 No work. We must first complete task 2 in order to data mine the PMS database.
-Task 4: The laboratory program to calibrate the instrumentation is complete. The instrumentation has been installed on the test sections. This task is now complete.
-Task 5. Now that the instrumentation has been installed, the data collection will begin once the test sections have had asphaltic concrete placed on them. This (placement of AC) should occur by December 2019. After one year of monitoring, an interim report will be composed.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Task 2: Conduct and complete the statewide survey.
-Task 3: Data mine the PMS database to collect distress information on the locations discovered during the statewide survey (Task 2)
-Task 5. Write a construction report on the instrumentation installation which is one portion of the Interim report.

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		
Total Cost	(original)	$1,730,000
	(revised)	$19,890,536
Est. Expended to Date		$1,009,000
FY 2018 - 2019 Budget		
FY Funds	(original)	$647,691
	(revised)	
Est. FY Expenditure		$647,691

Estimated 2019-2020 Budget		
Total		**$644,500**
Salaries		$460,000
Consumable Supplies & Materials		
Equipment	(non-expendable)	$100,000
Travel		$12,000
Other		$72,500

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 the Australian designed ALF. 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 inperforming full-scale accelerated pavement testing.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 andinstrumentation activities and planning.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-Completed loading test on all bonded concrete overlay sections;
-Conducted bond strength tests and trench-cutting on failed overlay sections;
-Installed fiber-optical Strain-Gage instrumentation plates on RCC test sections;
-Started loading on 8-in RCC section;
-Performed saw-cutting and created joints for the smart sealant testing project; and
-Coordinated in the ECC project's activities (e.g. milling the existing surface, instrumentation planning, etc.).

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Continue testing on RCC test sections;
-Apply the smart sealant on the cutting joints and monitor the sealant performance;
-Construction of ECC test sections and perform the loading test;
-Continue preparing testing plans for next ALF projects;
-Continue developing pre-maintenance inventory plan for both ALF and ATLaS devices; and
-Justification for the equipment budget and other budget: (1) For both ATLaS and ALF devices, re-design (e.g. winch, dolly);manufacturing and replacement components; (2) For moving ALF machine (3) For Pavement Unit to acquire in situ testing equipment.

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Title:	**Evaluation of Counting Device for Pedestrians and Bicyclists**	**Project Status:**	**Ongoing**

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

SIO:	**DOTLT1000284**	Project Start Date:		9/3/2018
Research Project Number:	19-1SA	Completion Date	(original)	12/2/2019
Research Agency:	Southern University Engineering	Completion Date	(revised)	2/2/2020
Principal Investigator:	Yasser Ismail			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$77,666
	(revised)	$85,792
Est. Expended to Date		$32,568
FY 2018 - 2019 Budget		
FY Funds	(original)	$77,666
	(revised)	$61,754
Est. FY Expenditure		$32,568

Estimated 2019-2020 Budget		
Total		**$24,038**
Salaries		$19,230
Consumable Supplies & Materials		
Equipment	(non-expendable)	$4,808
Travel		
Other		

PURPOSE AND SCOPE

The primary objective of this study is to evaluate Numina's capability of accurately detecting, tracking, and counting pedestrians and cyclists under varying conditions (weather, time of day, and density). This study will use two video cameras and a professional WISENET camera. The Wireless and Sensor ?Networks Consortium (WISENET) camera is capable of automatically counting objects in addition to capturing videos. The video cameras will be used to provide video and images that will be used to manually validate the Numina and WISENET devices. Finally, the performance of the professional WISENET camera will be compared to the performance of the Numina sensors. It is anticipated that the results will lay the foundation for the development of a more robust automated system that will replace manual counting statewide.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

Task 1:Perform Literature Review:
The PI with his research team performed a review of Numina documentation to better understand the capabilities of the device. The documents that were reviewed included device manuals and technical briefings. The review process analyzed the followings:
-Installation and data retrieval process;
-The technology/algorithm behind the Numina devices;
-The graphical interface unit (GUI) used by Numina;
-Studies that have used Numina devices and reported accuracy levels; and
-Practical cases where the Numina devices can be utilized.

Task 2:Acquire Numina Devices and Video Cameras:
-Six sites were selected in New Orleans and Baton Rouge and these sites were approved by LTRC. The sites were carefully selected to represent a variety of preliminary contexts and/or to represent conditions in urbanized areas. These types of areas provide low and high levels of pedestrians and cyclist, and they offer a variety of facility configurations; and
-Three Numina sensors were leased from the manufacturer. Additionally, three video cameras (video detection system) were obtained from LTRC and will be used to obtain ground truth data. Manual counting will be performed by utilizing recorded videos from the three video cameras. These results will be used to evaluate the accuracy of Numina sensors.

Task 3:Collect Pedestrian and Cyclist Data:
-Three Numina sensors were installed, at the agreed test locations, in New Orleans on January 8. A professional WISENET camera and two other video cameras were installed to collect video data for manual validation purposes. Counting and validating the accuracy of both Numina sensors and the professional WISENET camera is on-going. All video cameras and Numina sensors will be moved to the new locations in the Baton Rouge area by May 10. Results will be tabulated, and a conclusion will be drawn for all locations.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES
Task 4:Perform Comparative Analysis between Numina and WISENET Cameras: -The research team will assess the capability of the Numina device and the WISENET camera in providing accurate pedestrian and cyclist data. Data from Numina devices and the WISENET camera will be compared to each other as well as manual counts obtained from the two video cameras. Task 5:Document Findings: -The research team will document all research procedures and results into a comprehensive report. In addition, recommendations and a technical summary will also be produced. Task 6: PRC Review and Issue of Final Report: -This task involves collaborating with the PRC review team so that they can evaluate the draft report (as discussed in the previous task). The report will then be modified and finalized by the research team.

Title:	**Evaluating Pedestrian Crossings on High Speed Urban Arterials**	**Project Status:**	**Ongoing**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000225**		Project Start Date:		8/1/2018
Research Project Number:	18-5SA		Completion Date	(original)	10/31/2019
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Julius Codjoe				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$105,506		**Total**		**$35,947**
	(revised)					
Est. Expended to Date		$69,559		Salaries		$35,567
FY 2018 - 2019 Budget				Consumable Supplies & Materials		$380
FY Funds	(original)	$74,000		Equipment	(non-expendable)	
	(revised)	$69,559		Travel		
Est. FY Expenditure		$69,559		Other		

PURPOSE AND SCOPE

The purpose of this study is to provide a preliminary assessment of Louisiana's roadways in terms of existing pedestrian crossing facilities, identify any associations of pedestrian crashes with the presence or lack of such pedestrian crossing facilities, and provide information on studies needed to be undertaken to provide DOTD with a system-wide solution for pedestrian crossing facilities on its high speed arterials.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-Literature review completed;
-Began study of pedestrian crashes to identify any associations with the lack or presence of pedestrian crossing facilities; and
-Began review of definition of urban/rural classification.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Conduct a literature review of state legislation on the provision of pedestrian crossing facilities on arterials;
-Undertake a study of pedestrian crashes to identify any associations with the lack or presence of pedestrian crossing facilities; and
-Determine and review the types of traffic studies that need to be conducted in order to provide appropriate pedestrian crossing facilities on urban arterials.

Title:	**Intersection on Horizontal Curves: Problems and Potential Solutions**	**Project Status:**	**Ongoing**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000217**		Project Start Date:		9/17/2018
Research Project Number:	18-4SA		Completion Date	(original)	3/16/2020
Research Agency:	ULL		Completion Date	(revised)	
Principal Investigator:	Xiaoduan Sun				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$150,000		**Total**		**$80,000**
	(revised)					
Est. Expended to Date		$70,000		Salaries		$75,000
FY 2018 - 2019 Budget				Consumable Supplies & Materials		$1,500
FY Funds	(original)	$70,000		Equipment	(non-expendable)	
	(revised)			Travel		$3,500
Est. FY Expenditure		$70,000		Other		

PURPOSE AND SCOPE

The purpose of this research is to quantify safety performance at unsignalized intersections on horizontal curves for Louisiana public roads, prioritize sites, identify risk factors that contribute to crashes, and develop possible countermeasures to reduce crashes.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-Completed 100% of information review of previous studies on safety and risk factors associated with intersections on curves; and
-Completed 80% of the location identification and development of intersection database containing identified intersections with their attributes and crash information.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Complete Task 3:Crash analysis;
-Complete Task 4:Interim report;
-Complete Task 5:Safety performance modeling;
-Complete Task 6:Countermeasures development; and
-Complete Task 7: 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)	
Principal Investigator:	Eva Shipp			

BUDGET STATUS

Total Budget			**Estimated 2019-2020 Budget**		
Total Cost	(original)	$175,000	**Total**		**$77,049**
	(revised)				
Est. Expended to Date		$24,969	Salaries		$30,509
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$58,923	Equipment	(non-expendable)	
	(revised)		Travel		$3,126
Est. FY Expenditure		$58,923	Other		$43,414

PURPOSE AND SCOPE

The objective of this research is to use multiple risk factors analysis approaches to identify underlying individual, community, and cultural influences that contribute to drinking and driving in Louisiana.

The specific objectives are to:
-Synthesize and document existing resources that agencies can use to assess alcohol-impaired driving;
-Identify influential individual, community, and cultural factors that contribute to impaired driving in Louisiana; and
-Provide a final detailed report with interactive web tool for systemic risk assessment.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

Task 1:Review of Literature and Data Systems:
-Completed the literature review and data systems review. We will submit to LTRC for comment, approximately at the same time as the submission of this report. The literature review was based on using keywords to search a variety of databases (e.g., PsychInfo, PubMed, Google Scholar, TRID) for peer-reviewed research and other literature pertaining to culture, drinking, and driving over at least the past 10 years. Conference proceedings also were reviewed from events during 2014-2017 to identify research that had not yet been published. The literature review is organized around the following domains: age, driving and drinking behaviors across the lifespan, sex, religion, race/ethnicity, military, geography, festivals, and trip planning. The state of knowledge is summarized along with the identification of research gaps; and
-Conducted a search of data systems/sources that could be used to inform the present project. These were identified using internet searches, citations from published reports and articles, and researcher knowledge. The data sets were described including their strengths and limitations. Data sources include but are not limited to: LA crash data, alcohol outlet data, citation data, roadway inventory, population-based behavioral surveillance data (e.g., Alcohol Epidemiological Data System, Behavioral Risk Factor Surveillance System, Caring Communities Youth Survey, and Core Alcohol and Drug Survey), demographic data from the Census/American Community Survey, geographic information, school and health data, and festival data. A considerable amount of the behavioral surveillance data and geographic data was obtained by the UL team from the Picard Center and Center for Louisiana Studies.

Task 2:Identify the Risk Factors using a Systemic Approach:
-Developed a definition of alcohol impaired, drug impaired, and alcohol or drug impaired crashes for analysis of the LA crash data. Next, we requested and received data as described in Task 1 above. We completed data editing and cleaning in order to be able to analyze and visualize the data. This included (1) geocoding alcohol business sellers and prepared parish level alcohol seller data, (2) developing an alcohol impaired crash database for five years (2013-2017), (3) beginning integration of different data sources, and (4) selection of specific variables for inclusion in the systemic analysis. We conducted an exploratory data analysis by parish to begin to understand the relationships between culture and impaired driving. This included using GIS to visualize variables and the computation of frequency distributions. Finally we developed a draft version of the interactive tool for visualizing crash locations integrated with other data sources. It is available at: https://rpubs.com/subasish/474276.

Task 3:Create and Administer a Survey Based on the Identified Risk Factors:
-Identified content domains for the survey including: (1) demographics, (2) alcohol consumption, (3) knowledge attitudes and beliefs regarding alcohol, driving, and crashing, and (4) trip planning.

Task 4:Interim Report:
-A draft of findings from Task 1 was completed.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Task 1:Review of Literature and Data Systems: Finalize Task 1 during the next reporting period based on feedback from LTRC;
-Task 2:Identify the Risk Factors using a Systemic Approach: Complete Task 2 during the next reporting period;
-Task 3:Create and Administer a Survey Based on the Identified Risk Factors: Anticipate completion of Task 3 during the next reporting period;
-Task 4: Interim Report: Anticipate completion of Task 4 during the next reporting period.
-Task 5:Qualitative Research Project to Investigate Identified Risk Factors of Sub-groups: During the next reporting period, we will develop a methodological approach for Task 5 and plan for data collection; and
-Task 6:Final Report and Technical Summary: To be completed after the next reporting period.

ULL tasks include contributions to Task 1: Literature Review, Task 2 - Identification of risk factors using a systematic approach, Task 4 - preparation of an interim report, Task 5 - Qualitative research - ULL to lead focus group teams in New Orleans and Lafayette, and Task 6 - Final report.

Itemized list for the other budget category
-computer operations $653
-participant payments $800
-subcontract with University of Louisiana at Lafayette $41,961
Subcontract Details: Salaries - $40.094.75; Travel - $500; Consumable Supplies and Materials - $1366.25

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 2019-2020 Budget**		
Total Cost	(original)	$240,704		**Total**		**$136,679**
	(revised)					
Est. Expended to Date		$10,000		Salaries		$47,091
FY 2018 - 2019 Budget				Consumable Supplies & Materials		$1,563
FY Funds	(original)	$86,500		Equipment	(non-expendable)	$56,000
	(revised)	$10,000		Travel		$1,250
Est. FY Expenditure		$10,000		Other		$30,775

PURPOSE AND SCOPE

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

Specifically, the objectives of the study include:
-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;
-To develop roadway factor groups for Louisiana communities and preliminary expansion factors for adjusting short-duration multimodal counts; and
-To identify, support, and inform opportunities for coordinated local and MPO-led data collection.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-Developed the research proposal, which was reviewed and approved by the PRC;
-Held the kick-off meeting; and
-Task 1: Bicycle and Pedestrian Research Methods Update. The research team has started updating the literature review.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES
-Task 1:Bicycle and Pedestrian Research Methods Update. The research team will complete the literature review and the count technology/vendor database from phase 1; -Task 2:Preliminary Factor Group Identification and Short-Term Count Verification; -Task 3:Long-Duration Count Data Collection Initiation; and -Task 4:Coordinated Statewide Data Collection Support. Equipment is for nine EcoCounter 2-Loop Urban/Trail Loop Multi Permanent Counters ($54,000) and replacement components for existing EcoMulti Counters ($2,000). Other expenses are for Operating Services - EcoCounter GSM Data Transmission services ($5,775) and for Contractor inductive loop installation for 9 units ($25,000).

Title:	**Assessing the Economic Benefits of the TIMED Program**	**Project Status:**	**Ongoing**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000325**		Project Start Date:		7/1/2019
Research Project Number:	19-5SS		Completion Date	(original)	6/30/2020
Research Agency:	LSU		Completion Date	(revised)	
Principal Investigator:	Chester Wilmot				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$125,490		**Total**		**$115,000**
	(revised)					
Est. Expended to Date				Salaries		$63,000
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$75,000		Equipment	(non-expendable)	
	(revised)	$10,000		Travel		
Est. FY Expenditure				Other		$52,000

PURPOSE AND SCOPE

The TIMED program was created by Act 16 of the Louisiana Legislature and was voted for by the citizens of the state. The program was designed to enhance economic development in Louisiana through investment in infrastructure. The program consisted of (16) capital improvement projects chosen by lawmakers in a package that included a four cent per gallon gas tax dedicated to funding the design and construction of the identified projects.
Economic development is a nebulous term with no widely accepted criteria to quantify the benefits. Without being able to quantify benefits against a set of established criteria it is very difficult to prioritize projects from a list of needed improvements.

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

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

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

The project will be conducted by Dr. Chester Wilmot. The PRC has approved the Proposal and the project is in the approval stage. Based on the (yet-to-be-approved) proposal, Task 1 will be completed in FY 2018/2019.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES
To be determined based on the final approved proposal. Based on the (yet-to-be-approved) proposal, all remaining tasks (Task 2 - 6) will be completed in FY 2019/2020. "Other" budget category includes a subcontract in the amount of $52,000 for the Co-PI (Dr. Peter Stopher). Breakdown - Computer software - $10,000 (actual software to be determined according to the findings of the Task 1 Literature review Travel - $2000 (travel for Dr. Stopher from his residence in the US to Baton Rouge for project meetings) Salary - $40,000 Task Titles and Breakdown Task 1 - Literature Review (Stopher) Task 2 - Review of available measures (Stopher and Wilmot) Task 3 - Testing of Input/Output (I/O) and General Equilibrium (GE) models (Stopher and Wilmot) Task 4 - testing of direct and surrogate measures (Wilmot) Task 5 - application to completed TIMED projects (Stopher and Wilmot) Task 6 - final report (Wilmot)

Title:	**The Impact of the Louisiana Rail Infrastructure: A System Analysis and Plan**	**Project Status:**	**Ongoing**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000290**		Project Start Date:		10/4/2018
Research Project Number:	19-4SS		Completion Date	(original)	1/3/2020
Research Agency:	UNO		Completion Date	(revised)	
Principal Investigator:	Bethany Stich				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$149,999		**Total**		**$66,734**
	(revised)					
Est. Expended to Date		$20,000		Salaries		$62,672
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$114,000		Equipment	(non-expendable)	
	(revised)	$83,265		Travel		$3,125
Est. FY Expenditure		$20,000		Other		$937

PURPOSE AND SCOPE

Rail in Louisiana is in a state of transition from both a passenger and freight standpoint. In order to best plan for future investment, an impact analysis is required to understand how to best incorporate rail infrastructure into the state's multimodal transportation vision. This research will address this issue by answering:
- What is the current state of rail in Louisiana?
- What is the potential for development of Louisiana's rail system? What key corridors should be targeted for investment based on benefit/cost analysis, safety, congestion mitigation, etc.?
- Which rail lines in the state are eligible for federal assistance, which are liable to be abandoned, and which ones are in negotiations regarding abandonment or discontinuance?
- How could funding be obtained for key corridors, economic development, rural development, and/or shortline railroads?

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

Tasks 1, 2, and 3 are nearly complete including acquisitions of the Surface Transportation Board (STB) Waybill data for Louisiana. Tasks 4 and Tasks 5 are underway. Stakeholder interviews are also underway, including the Federal Railroad Administration (FRA).

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Completion of all tasks and submission of the Final Report by November of 2019.

Title:	**Determining Louisiana's Roundabout Capacity**	**Project Status:**	**Ongoing**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000282**		Project Start Date:		1/1/2019
Research Project Number:	19-2SS		Completion Date	(original)	6/30/2020
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Julius Codjoe				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$113,811		**Total**		**$75,874**
	(revised)					
Est. Expended to Date		$30,052		Salaries		$73,494
FY 2018 - 2019 Budget				Consumable Supplies & Materials		$380
FY Funds	(original)	$45,300		Equipment	(non-expendable)	$2,000
	(revised)	$30,052		Travel		
Est. FY Expenditure		$30,052		Other		

PURPOSE AND SCOPE

The primary objective of this project is to use local data to determine Louisiana's roundabout capacity and compare to software outcomes which are currently being used in the planning and design of modern roundabouts in Louisiana.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-Literature review complete; and
-Data collection ongoing.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Conduct a literature review on the roundabout capacity models as presented in the HCM 2010 and HCM 6, highlighting differences and similarities and comparing to Sidra capacity estimation methods;
-Select candidate sites for local data collection to be used for parameter estimation;
-Compare parameters obtained from site observations to HCM 2010, HCM 6, and Sidra outputs; and
-Make a recommendation on best practices to be followed in determining parameters that best reflect local driver behavior.

Title:	**An Assessment of LADOTD'S Consultant Plan Development and Performance Rating Process**	**Project Status:**	**Ongoing**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000224**	Project Start Date:		9/24/2018
Research Project Number:	18-6SS	Completion Date	(original)	11/23/2019
Research Agency:	Dye Management Group, Inc.	Completion Date	(revised)	
Principal Investigator:	Ron Hamilton			

BUDGET STATUS

Total Budget			**Estimated 2019-2020 Budget**		
Total Cost	(original)	$170,250	**Total**		**$12,255**
	(revised)	$202,255			
Est. Expended to Date		$150,917	Salaries		$8,255
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$170,250	Equipment	(non-expendable)	
	(revised)	$190,000	Travel		$4,000
Est. FY Expenditure		$150,917	Other		

PURPOSE AND SCOPE

The purpose of this project is to conduct a thorough assessment of the Louisiana Department of Transportation and Development's (LADOTD's) consultant plan development practices and identify practical implementable solutions. The project involves the following key work elements:
-A comprehensive literature search to identify current and relevant literature on measuring and managing consultant plan delivery quality;
-A best practice review to identify peer state practices that could be implementable in the LADOTD; and
-An assessment of DOTD's current practices through interviews with stakeholders, internal and external; reviews of internal manuals, directives, and SOPs; and evaluations of current or potential software and technology applications to support quality control of plan delivery
The project will result in a set of recommendations for improving consultant plan quality. The recommendations will identify potential updates or enhancement to policies, business processes, organizational development, and software/technologies. The recommendations will address potential
updates or changes to manuals and Standard Operating Procedures (SOPs) such as the Engineering Directives and Standards Manual (EDSM), Consultant Past Performance Rating System (CPPR), and the Consultant Technical Evaluation form and its content. The recommendations will be contained in the project Final Report.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

Tasks 1 - 5 are complete (as of April 18) and Task 6 will be complete by the end of the fiscal year. At the request of the PRC, four focus groups were added to the scope of work (ACEC, Bridge Design, Road Design, and District Design) and an accompanying contract modification was approved. To date (4-18-2019), all stakeholder interviews have been completed and Task 3 and 4 reports have been submitted for PRC review.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Completion of the remaining tasks (7-10), including final PRC meeting and agency presentation(s).

Title:	**Support Study for the Development of Guidelines for Ramp Metering Implementation and Performance Evaluation on I-12**	**Project Status:**	**Ongoing**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000221**	Project Start Date:		11/1/2017
Research Project Number:	18-5SS	Completion Date	(original)	8/31/2019
Research Agency:	Old Dominion University	Completion Date	(revised)	
Principal Investigator:	Sherif Ishak			

BUDGET STATUS

Total Budget			**Estimated 2019-2020 Budget**		
Total Cost	(original)	$28,734	**Total**		**$4,000**
	(revised)				
Est. Expended to Date		$10,000	Salaries		$4,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$13,934	Equipment	(non-expendable)	
	(revised)	$24,734	Travel		
Est. FY Expenditure		$10,000	Other		

PURPOSE AND SCOPE

The main focus of the research is the development of guidelines for ramp metering implementation and performance evaluation along I-12 in Baton Rouge, LA.

This support study facilitates the continued involvement Dr. Sherif Ishak since his departure from LSU. For more information on the project, see the work program sheet for the parent project, 17-5SS.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

During the FY, the PI of the parent project (17-5SS) departed LSU. LTRC decided to terminate that project and shift the responsibility for the remaining work solely to Dr. Ishak's support study (18-5SS). The remaining work included the finalizing of the implementation guidelines and the final report. A PRC meeting is scheduled for May 2019 to present both documents to the PRC.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Provide responses to PRC comments on both documents and revise them accordingly.

Title:	**Evaluation of DOTD's Existing Queue Estimation Procedures**	**Project Status:**	**Ongoing**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000211**		Project Start Date:		8/1/2017
Research Project Number:	18-3SS		Completion Date	(original)	7/31/2019
Research Agency:	LTRC		Completion Date	(revised)	5/30/2020
Principal Investigator:	Julius Codjoe				

BUDGET STATUS

Total Budget		
Total Cost	(original)	$96,928
	(revised)	$141,077
Est. Expended to Date		$59,928
FY 2018 - 2019 Budget		
FY Funds	(original)	$59,928
	(revised)	
Est. FY Expenditure		$59,928

Estimated 2019-2020 Budget		
Total		**$58,430**
Salaries		$54,050
Consumable Supplies & Materials		$380
Equipment	(non-expendable)	$4,000
Travel		
Other		

PURPOSE AND SCOPE

This project will review and evaluate the Louisiana Department of Transportation and Development's (LADOTD's) existing queue estimation procedures by comparing to actual queue data.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

The project team was unable to collect any useful data in the original data collection period. It therefore became necessary to hire the services of a contractor to undertake the data collection task. This is currently ongoing. A 10-month time extension and additional funds of $44,149 have been requested for the data collection effort, to cover for contractor cost and project management (including indirect cost) required to complete the tasks and incorporate findings into a Final Report.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Complete data collection;
-Complete data analysis;
-Complete Final Report;
-Complete Technical Report; and
-Complete project.

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				Estimated 2019-2020 Budget		
Total Cost	(original)	$358,462		**Total**		**$240,000**
	(revised)	$8,871,349				
Est. Expended to Date		$350,000		Salaries		$232,000
FY 2018 - 2019 Budget				Consumable Supplies & Materials		$4,000
FY Funds	(original)	$120,000		Equipment	(non-expendable)	
	(revised)	$350,000		Travel		$4,000
Est. FY Expenditure		$350,000		Other		

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), and permits teaching of courses in the Department of Civil and Environmental Engineering at the Louisiana State University (LSU) on a case by case basis depending on the work schedule. 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 2018 - 2019 ACCOMPLISHMENTS

-Taught CE 7640 "Transportation Policy and Planning", Fall 2018;
-Taught CE 7621 "Mass Transit Systems", Spring, 2019;
-Managed LTRC projects 17-3SS and 18-4SS;
-Served on LOOP Advisory Committee; and
-Served on Southeastern Louisiana Flood Protection Advisory Committee.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Teach CE 7640 "Transportation Policy and Planning", Fall 2018;
-Teach CE 7621 "Mass Transit Systems", Spring, 2019;
-Manage LTRC projects 17-3SS, 18-4SS, TIMED (19-5SS), and HEMP Implementation;
-Serve on LOOP Advisory Committee; and
-Serve on Southeastern Louisiana Flood Protection Advisory Committee.

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)	6/1/2020
Principal Investigator:	C. Shawn Sun				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$124,999		**Total**		**$74,999**
	(revised)	$137,781				
Est. Expended to Date		$50,000		Salaries		$14,999
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$10,000		Equipment	(non-expendable)	
	(revised)	$50,000		Travel		$2,000
Est. FY Expenditure		$50,000		Other		$58,000

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. LaDoTD 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 2018 - 2019 ACCOMPLISHMENTS

The research team has completed the first three tasks (Task 1: Literature Review; Task 2: Review current analysis; Task 3: Prepare interim report of findings) following the project schedule and submitted an Interim Report to the PRC for review/approval. The PI has given a presentation to the PRC after the first three tasks were completed. Also, the team has submitted the plan of lab testing and started the finite element analysis. The PI has given a presentation to the PRC on the plan of lab testing and the research team has revised the plan of lab testing following the instructions and comments from the PRC.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

The research team will work on the last two tasks,
Task 4: Perform the lab testing, conduct the finite element analysis, and
Task 5: Submit the final report as well as the technical summary and give a presentation to the PRC after the project is completed.

Other budget justification: The $58,000 is to cover the salaries of UNL employees.

Title:	**Overheight Impact Avoidance and Incident Detection System**	**Project Status:**	**Ongoing**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000109**		Project Start Date:		7/1/2016
Research Project Number:	16-4ST		Completion Date	(original)	6/30/2018
Research Agency:	LSU		Completion Date	(revised)	12/31/2019
Principal Investigator:	George Voyiadjis				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$172,589		**Total**		**$24,800**
	(revised)	$239,709				
Est. Expended to Date		$210,000		Salaries		$24,800
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$30,000		Equipment	(non-expendable)	
	(revised)	$60,000		Travel		
Est. FY Expenditure		$50,000		Other		

PURPOSE AND SCOPE

During construction there is a tendency for construction containment and work platforms with reduced vertical clearance to be impacted by overheight loads. This may also be true for select truck routes where the bridge superstructure is legal, but lower than expected. The impact vehicle is usually not loaded correctly and can damage the members hit and put workers at risk.
The proposed research would investigate and pilot a laser device that could be set up well in advance of a construction site to identify vehicles that will impact the overhead obstacle. This device, when triggered, would set off an alert system (flashing lights and warning information) that would notify the vehicle of an impending collision and direct them to pull over to the shoulder, stop and the system calls the police. The system would include a camera recording system to document any damage the may occur to the bridge and identify the vehicle causing the damage.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-Install systems;
-Task 4:Monitor System(s); and
-Task 5:Final Report.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Task 4:Monitor System(s); and
-Task 5:Final Report.

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)	2/28/2020
Principal Investigator:	William Williams			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$169,172
	(revised)	$400,658
Est. Expended to Date		$263,713
FY 2018 - 2019 Budget		
FY Funds	(original)	$150,000
	(revised)	$200,000
Est. FY Expenditure		$200,000

Estimated 2019-2020 Budget		
Total		**$100,000**
Salaries		$50,000
Consumable Supplies & Materials		$50,000
Equipment	(non-expendable)	
Travel		
Other		

PURPOSE AND SCOPE

Design, develop and perform full-scale crash testing on a retrofit design for use on the common type of safety walk barriers used by the Louisiana Department of Transportation and Development (LADOTD). This retrofit design should meet the crash performance requirements of Manual for Assessing Safety Hardware (MASH) Test Level 3 requirements (minimum). It is desirable that the retrofit option meet the performance requirements of MASH TL-4.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-Task 3-Completion of the design was finalized;
-Task 4-Interim report was completed previously;
-Task 5-Performed and completed from analytical analyses;
--Task 6-Based on Final design computer simulation not performed;
-Task 7-Completed this reporting period. Full-scale test installation was constructed;
-Task 7-Based on the retrofit design and the strength of the existing concrete bridge rail system, MASH TL-4 could not be achieved;
-Task 7-Performed MASH TL-3 2 crash tests on the new retrofit design. MASH Test 3-11 was acceptable. MASH Test 3-10 was not acceptable;
-Task 8-Completed Retrofitting Method and details; and
-Task 9-Submitted Technical Report for review.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Task 3-Finalize new retrofit details based on crash testing results from previous testing;
-Task 7-Construct full-scale test installation;
-Task 7-Perform full-scale crash tests, MASH Test 3-11 and MASH Test 3-10 (funding to be reviewed for Task 7-9);
-Task 8-Develop Retrofitting Methods for New Design; and
-Task 9-Prepare and submit final technical report and Technical Summary.

The $50,000 consumables budget is for retrofit rail materials and instrumented vehicles to crash into said rail.

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-WVU GangaRao			

BUDGET STATUS

Total Budget			**Estimated 2019-2020 Budget**		
Total Cost	(original)	$150,000	**Total**		**$75,000**
	(revised)				
Est. Expended to Date		$144,793	Salaries		$40,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		$29,000
FY Funds	(original)	$4,144	Equipment	(non-expendable)	
	(revised)		Travel		$3,000
Est. FY Expenditure		$2,905	Other		$3,000

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 2018 - 2019 ACCOMPLISHMENTS

The study has been completed and the PI gave a presentation at the end of the study. The final report was sent to the PRC for review and comments. The PI addressed all comments. The PI is yet to hold the two demonstration workshops as listed in the approved project contract.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

The PRC has requested this study be extended to cover an additional new task that was not a part of the original study. The tasks pertain to testing of stubbed sections -a common approach by most state dots to repair damaged piles- (4 differently stubbed sections x 3 modes of testing x 3 repeated test for each stubbed section) to be tested in axial, shear, and flexure. The PI will be working on:
-Cost and time for the additional task as well;
-Acquiring old and new timber pile sections;
-Conducting 36 tests on stubbed sections;
-Analyzing collected data,;
-Updating the final report; and
-Conducting two (2) workshops showing the application of FRP to repair damaged timber piles (as per original contract).

The $29,000 consumables is for acquiring and testing timber rehabilitation splices. Cost also includes shipping of materials from LA to WV.

Title:	**Evaluating Louisiana New Continuity Detail for Girder Bridges**	**Project Status:**	**Ongoing**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**30001660**		Project Start Date:		4/21/2014
Research Project Number:	14-1ST		Completion Date	(original)	12/31/2016
Research Agency:	LSU		Completion Date	(revised)	8/31/2019
Principal Investigator:	Ayman Okeil				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$179,991		**Total**		
	(revised)					
Est. Expended to Date		$179,300		Salaries		
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$34,991		Equipment	(non-expendable)	
	(revised)	$34,991		Travel		
Est. FY Expenditure		$34,991		Other		

PURPOSE AND SCOPE

The main objective of the proposed research is to evaluate the field performance of a continuity detail that will be included in the new Louisiana Bridge Design and Evaluation Manual (BDEM). The new detail is different from the standard continuity detail in the current Bridge Design manual (BDM).

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

The structural health monitoring system is completed.

The following task is currently ongoing:
-Task 5:Data Collection, processing, and link slab evaluation, and
-Task 6: Prepare a draft of the Final Report.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

During the next FY (2019-2020), it is proposed that the following tasks continue:
-Task 6:Address PRC comments on the draft final report. and
-Task 7:Train of LADOTD personnel on using the SHM system and transfer control to LTRC/LADOTD.

There is no budget since the project was extended to 8-31-19 as a no cost extension.

FHWA

Part B SPR Funded Research Program

PROPOSED RESEARCH

LTRC Annual Research Program
Fiscal Year 2019-2020

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 2019-2020 Budget		
Total Cost	(original)	$270,000	**Total**		**$84,000**
	(revised)				
Est. Expended to Date			Salaries		$84,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

Recent Louisiana Transportation Research Center (LTRC) research studies identified effects of various asphalt pavement construction factors on the mixture mechanical properties such as dynamic modulus (|E*|), rut depth (RD) measured by a Hamburg Wheel-Tracking device, indirect tensile strength (ITS), and fracture resistance at intermediate temperature measured by the semi-circular bend (SCB Jc) test.

LTRC study FHWA/LA.15/553 “Evaluation of Warm Mix Asphalt Technology in Flexible Pavements,” evaluated several warm mix asphalt (WMA) technologies that showed WMAs mixtures exhibited similar or better laboratory performance as compared to conventional hot-mix asphalts (HMAs).
LTRC study 14-1B “Effects of Temperature Segregation on Volumetric and Mechanistic Properties of Asphalt Mixtures,” ascertained temperature zones that negatively affected laboratory measured properties such as density, rut depth, and SCB Jc of field cores collected after construction.
The objective of this proposed study is to re-visit field projects included in these two studies to collect field performance data (rutting, cracking, etc.) in order to link and verify laboratory-measured properties to field performances.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Review the two previous LTRC studies: LTRC Projects 07-1B and 14-1B;
-Obtain PMS data and analyzing: mapping of distress trends in the field projects; and
-Perform field forensic investigations and distress surveys on select field projects: for verification of PMS distress database and/or to acquire the initial distress data from recently constructed pavement sections

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 2019-2020 Budget**		
Total Cost	(original)	$279,000	**Total**		**$160,000**
	(revised)				
Est. Expended to Date			Salaries		$95,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	$65,000
	(revised)		Travel		
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

Currently, the Louisiana Transportation and Development (LADOTD) specifications for roads and bridges, Section 502, require the use of Semi-Circular Bending (SCB) test as a part of asphalt mixture design (Table 502-6). This test is traditionally 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. Notched beams under cyclic loading has been used to investigate fracture propagation characteristics in asphalt concrete. Compared to beam, use of SCB specimens has the advantages of less material use, simpler test set-up, and absence of the sagging problem. It is proposed to use cyclic SCB test coupled with fracture mechanics principles to establish crack propagation laws and quantify material's crack resistance in a more realistic manner.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

This following tasked will be performed:
-Conduct a comprehensive literature review on notched beam fatigue test, cyclic SCB test, and mechanistic modelling effort related to fatigue cracking;
-Acquire and set up a Digital Image Correlation (DIC) measurement system that is optimized for cyclic SCB testing;
-Develop and conduct experimental factorial; and
-Use finite element analysis to obtain the critical strain energy release rate (Jc) for each cycle.

Equipment fund will be used to purchase Digital Image Correlation (DIC) measurement system. Digital image correlation (DIC) techniques provide a full-field, non-contact measurement of displacement and deformation of materials in testing. Compared to the traditional use of extensometer, strain gauge, and linear variable differential transducer (LVDT), the DIC system can accommodate very large deformations without concerns on damaging the measuring equipment. DIC also makes it possible to have strain distributions over a full region rather than locally. These features makes it particularly appropriate for fatigue/cracking test (such as the cyclic SCB test) in which material is highly strained to induce damage.
Vic-3D is a powerful system for measurements in three dimensions. It is equipped with two cameras and more advanced image processing algorithms is capable of measuring deformations at two surfaces including curved ones. Data interpretation for the cyclic SCB test is based on fracture mechanics principles, which places a high demand on the accurate determination of crack propagation length. Due to practical difficulties in identifying the progressing crack front within the material body, crack propagation should be measured at both sides of the SCB specimen for accuracy. Hence, the Vic-3D system is required. In addition, the Fulcrum module is required to precisely trigger the cameras to acquire images at peaks and valleys of the cyclic loading in SCB, which considerably reduces the data volume. It is noted that the peak and valley data are the key to accurately understanding and modeling material's behavior under cyclic loading.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	Low and Intermediate Temperature Evaluation of Binders through Dynamic Shear Rheometer	Project Status:	Proposed
Funding Source:	SPR: TT-Fed/TT-Reg - 5	Budget Category:	FHWA

SIO:			Project Start Date:		7/1/2019
Research Project Number:			Completion Date	(original)	6/30/2021
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Saman Salari				

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$365,000	**Total**		**$185,000**
	(revised)				
Est. Expended to Date			Salaries		$80,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	$5,000
	(revised)		Travel		
Est. FY Expenditure			Other		$100,000

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 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

The following activities will be performed;
-Comprehensive literature review for DSR methods and their potential to replace the low and intermediate testing equipment;
-Gathering the commonly used binder materials for the study;
-Start and progress the binder testing with multiple equipment in order to be able to make a comparison; and
-Purchasing the required equipment for the low temperature testing with DSR device.

Other Budget justification:
A support study (specialized testing contract for testing LTRC is not able to conduct - recipient to be determined during proposal development) will be conducted toward determining the modified asphalt binder characteristics with alternative binder testing methods estimated to be 100,000 per year. Also, an additional spindle will be purchased for the DSR. This equipment costs $5,000.

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 2019-2020 Budget**		
Total Cost	(original)	$350,000	**Total**		**$81,000**
	(revised)				
Est. Expended to Date			Salaries		$81,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

Recycling of construction materials in pavements is not only a cost-saving alternative, but also 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) have become another promising candidate of recycling also because of the high compatibility with paving asphalt mixtures. The objective of the proposed ALF experiments is to assess the applicability of "green" construction alternatives such as RAS and increased amount of RAP in Louisiana asphalt paving projects. The applicability will be evaluated by comparing the long-term performance of asphalt pavement sections constructed with combinations of RAS and/or RAP to that of conventional pavement under accelerated loading. Five test lanes with various percentages of RAP and/or RAS are proposed to be constructed.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 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; and
-Task 4–Prepare construction documents for construction of test lanes.

Title:	**Evaluate Performance and Life Cycle Cost of Asphalt (8/18 Specifications)**	**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 2019-2020 Budget**		
Total Cost	(original)	$136,571	**Total**		**$48,690**
	(revised)				
Est. Expended to Date			Salaries		$48,690
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

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 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Task 1–Conduct Literature review;
-Task 2–Develop experimental program; and
-Task 3–Data and asphalt sample collection.

Title:	**Feasibility and Performance of Low Volume Roadway Mixture Design**	**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)	6/30/2021
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Corey Mayeux				

BUDGET STATUS

Total Budget			**Estimated 2019-2020 Budget**		
Total Cost	(original)	$91,167	**Total**		**$48,690**
	(revised)				
Est. Expended to Date			Salaries		$48,690
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

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 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

–Conduct Literature Review;
–Evaluate Production and Construction Feasibility; and
–Evaluate Short-Term Performance.

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)	6/30/2021
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Samuel Cooper, III				

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$464,000	**Total**		**$232,000**
	(revised)				
Est. Expended to Date			Salaries		$50,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		$182,000

PURPOSE AND SCOPE

The most critical shortcomings of OGFC mixtures include durability problems (raveling and stripping due to aging), and clogging of voids by dirt, which result in shorter service life and higher costs. The high porosity raises concern on the durability of OGFC as it reduces the structural integrity of pavement. The polymer modified OGFC mixtures are expected to have a typical service life of only 8 to 10 years. Design of OGFC with extended life span would require innovative asphalt materials and a performance engineered mixture design procedure. Currently, LADOTD specifications for roads and bridges, Section 502, provide requirements on the physical properties of asphalt binders and aggregate for OGFC.

This study can be carried out through the following tasks:
(1) evaluating alternative materials, such as, epoxy asphalt to improve the elasticity of asphalt mixtures and prevent premature failure (cracking, raveling, and structural collapse of the void structure);
(2) evaluating a new generation of OGFC with improved mechanical characteristics, superior drainage capacity, and enhanced pavement performance by modifying the mixture with polymers and fibers; and
(3) evaluating maintenance methods, such as, micro-milling or shot abrasion followed by a rejuvenator to extend the service life and/or "clean-out" the pores of the mixture.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES
Submit proposal and begin project. Other Budget Justification: -$92,000 - Support study (contractor to be determined) to evaluate the alternative materials that may improve the durability of OGFCs; and - Estimated Breakdown: Salaries: $83,500 ; Consumables: $3000 ; Travel: $1500 -$90,000 - Support study (contractor to be determined) to evaluate alternative designs to improve efficiency and durability of OGFCs. - Estimated Breakdown: Salaries: $81,500 ; Consumables: $3000 ; Travel: $1500

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	Developing Phase Change Materials with Resistant Coating Systems for Concrete and Asphalt Applications	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)	6/30/2021
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Jose Milla				

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$347,000	**Total**		**$173,500**
	(revised)				
Est. Expended to Date			Salaries		$53,500
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		$120,000

PURPOSE AND SCOPE

Phase Change Materials (PCM) have been experimentally used in concrete slabs using Lightweight Aggregate (LWA) recently in order to store thermal energy from environment during heating events and release the stored heat autonomously to deice the surface of the slabs. The concept of PCM can be implemented in southern state pavements including Louisiana since very few snowstorms and deicing events have resulted major traffic disruptions and shutdowns due to limited access to winter equipment and machinery. Additionally, Louisiana experiences suitable annual temperature variations making PCM pavement more than 50% effective. PCM pavement design, however, needs further research in the design of PCM to practically implement PCM in existing concrete and asphalt pavements in the state of Louisiana. PCM thermal properties (including enthalpy of fusion and solidification temperature), mechanical properties (resistant to mechanical mixing/shear/compacting/thermal loadings), and long-term durability properties (chemical stability over its service-life) need to be tailored and adjusted for both concrete and asphalt materials in Louisiana. Therefore, it is required to study the suitable PCM materials as well as the proper delivery systems to successfully incorporate PCM materials into/on concrete and asphalt materials.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

A literature review will first be conducted on the properties of various PCM materials, and encapsulation procedures. Next, the thermal properties of various types of PCM materials will be studied experimentally. Numerical simulations will be used to select the PCM for Louisiana's environmental conditions. Next, the selected PCM will be encapsulated, and if time allows, concrete and asphalt samples with embedded PCM capsules will be prepared for initial testing.

Other budget justification: $120,000 has been budgeted for a support study tasked to Drexel university.
The university will provide expertise in phase changing materials (PCM), assessment of PCM thermal properties, and numerical simulations for this project.
- Estimated Breakdown: Salaries: $72,000 ; Equipment: $7,000 ; Consumables: $13,000 ; Travel: $3000 ; Other: $4,000 (Research Facility Fee: $1500;
Shipping Costs: $1500; Machine Shop: $1000). Indirect: $21,000.

Title:	**Evaluation of the Miniature Concrete Prism Test (MCPT) for use in LADOTD**	**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)	6/30/2021
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Jose Milla				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$81,000		**Total**		**$40,500**
	(revised)					
Est. Expended to Date				Salaries		$40,000
FY 2018 - 2019 Budget				Consumable Supplies & Materials		$500
FY Funds	(original)			Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure				Other		

PURPOSE AND SCOPE

The Miniature Concrete Prism Test (MCPT) was developed to speed the time required to run 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 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Proposed activities include surveying District Maintenance personnel, records, bridge inspection reports, performance management systems, along with engineers in private sector that conduct forensic evaluations of damaged residential and commercial concrete construction to determine whether ASR is an issue of concern.

Additional literature review and discussions with FHWA, AASHTO and researchers from Clemson University is proposed for the application of the MCPT method. Finally, the level of implementation for MCPT will be assessed for LADOTD.

Title:	**Feasibility and Advantages of Acceptance of Concrete Beyond 28 Days**	**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)	6/30/2020
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	William Saunders				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$51,000		**Total**		**$25,500**
	(revised)					
Est. Expended to Date				Salaries		$25,500
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)			Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure				Other		

PURPOSE AND SCOPE

In regard to concrete applications, this research seeks to study the challenging parameters of strength development and permeability. The scope will include an extensive literature review and best practices determinations for the acceptance criteria of PCC materials and the feasibility of the potential increase in cement substitution.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

The proposed activities outlined for the fiscal year will include accessing various databases and resources for developing the research as well as speaking with various experts in the fields of design, construction, and maintenance pertaining to the topic.

In addition, a final report will be written and published through the Louisiana Transportation Research Center (LTRC), with the possibility of publishing in other outlets.

Title:	**Using the Portable XRF to identify/verify field material properties**	**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)	6/30/2021
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Jose Milla				

BUDGET STATUS

Total Budget			**Estimated 2019-2020 Budget**		
Total Cost	(original)	$120,000	**Total**		**$70,000**
	(revised)				
Est. Expended to Date			Salaries		$50,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	$20,000
	(revised)		Travel		
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

Certain materials such as cement / concrete, limestone, thermoplastic, glass beads, and bridge coatings must be sent into the central laboratory for testing for properties such as chloride content of bridge deck cores, silica content of aggregates, titanium dioxide content in thermoplastic, and lead content of existing bridge coatings. Tests for heavy metals in glass beads are expensive and use hazardous chemicals and methods. The SHRP2 R06B identified the portable X-ray Fluorescence (XRF) unit as a potential solution to quickly determine some of these properties in the field on in-place materials.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Initiate literature review on other states' findings and recommendations regarding what portable XRF instruments show the most promise for efficient implementation, and identify the next steps to use the portable XRF technology in the field. In addition, a methodology to apply the XRF to Louisiana's material needs will begin to be developed.
Equipment budget: $20,000 to purchase a portable XRF device.

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 2019-2020 Budget**		
Total Cost	(original)	$50,000		**Total**		**$24,000**
	(revised)					
Est. Expended to Date				Salaries		$24,000
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)			Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure				Other		

PURPOSE AND SCOPE

Situ testing device for subsurface investigation and soil characterization. The CPT is a robust, simple, fast, reliable, and economical test that can provide continuous soundings of subsurface soil with depth. The piezocone cone penetration test (PCPT) is capable of measuring the cone tip resistance (qc), sleeve friction (fs), and pore pressures at different locations, depending on the location of the pressure transducer (at the cone face (u1) or behind the base (u2)). These measurements can be effectively utilized for soil stratification and identification, evaluation of different soil properties such as strength and consolidation design parameters of soils, and direct applications to geotechnical engineering design such as the estimation of ultimate pile resistance. The main objective of this research project is to synthesize the various applications of the CPT technology for geotechnical engineering analysis and design. This includes evaluating soil classification, undrained shear strength, preconsolidation pressure (or OCR), coefficient of lateral earth pressure (ko), constrained modulus (M), small-strain shear modulus (Go), coefficient of consolidation (Cv), relative density and friction angle of sands, etc.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Start the project with conducting comprehensive literature review on the use of 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.

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

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

SIO:		Project Start Date:		9/1/2017
Research Project Number:		Completion Date	(original)	8/31/2020
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Murad Abu-Farsakh			

BUDGET STATUS

Total Budget			**Estimated 2019-2020 Budget**		
Total Cost	(original)	$250,000	**Total**		**$68,000**
	(revised)				
Est. Expended to Date			Salaries		$68,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

Gesynthetic reinforcement has been used for the past three decades or so to improve the performance of paved and unpaved roadways. Although the benefits of geosynthetics reinforcement have been well-realized in terms of increasing the pavement's service life, reducing the thickness of base course layer, and stabilizing and allowing construction over soft subgrade layer, unfortunately, there is no nationally acceptable design method until now for geosynthetic reinforcement/stabilization of pavement. There are several design methods proposed by the geosynthetic manufacturers that need to be verified, modified and/or develop new design methods. The MEPDG did not consider geosynthetic reinforced pavement due to the lack of understanding the geosynthetic mechanism and lack of quantifying the benefits of geosynthetic.

Two experimental research projects (05-5GT, 11-3GT) had been conducted at LTRC using cyclic plate load testing and accelerated load testing on geosynthetic reinforced test sections for the purpose of evaluating the benefits of geosynthetic reinforcement in flexible pavements constructed over weak subgrades. However, the tested sections in these studied included only 2 and 3 inch thick AC layers and 12 and 18 inch thick base course layers build over weak subgrade, which will make it difficult to develop a generalized design methodology for geosynthetic reinforced pavement involved sections with different AC and base layers thicknesses, and different subgrade strength/stiffness condition.

The finite element method is a powerful technique that can be used to simulate and model difficult geotechnical and pavement engineering problems. The objective of this study is to develop a finite element numerical model to study geosynthetic reinforced pavement. The numerical model will be first verified and calibrated using the results of experimental test sections conducted at LTRC. The model will then be used to perform comprehensive parametric study on the effect of different variables and parameters contributing to the benefits of geosynthetic reinforcement of pavement including stiffness and thickness of AC layer, stiffness and thickness of base layer, tensile modulus and location of geosynthetics and strength of subgarde layer (for low volume to high volume roads). The results of finite element parametric study can be used to quantify the geosynthetic benefits and develop a comprehensive design method for geosynthetic reinforced pavement that can be incorporated into the context of AASHTO 1993 Design Guide and MEPDG.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS
None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES
-Conduct literature review relevant to experimental, analytical and finite element analysis of geosynthetic reinforced pavements; -Develop a finite element numerical model to simulate geosynthetic reinforcement of pavement;, -Verify the model using the results of in-box and field accelerated load testing on geosynthetic reinforced pavements; and -Start the parametric study.

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

BUDGET STATUS

Total Budget			**Estimated 2019-2020 Budget**		
Total Cost	(original)	$250,000	**Total**		**$35,300**
	(revised)				
Est. Expended to Date			Salaries		$30,500
FY 2018 - 2019 Budget			Consumable Supplies & Materials		$4,800
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

Current geotechnical exploration practices in Louisiana rely on conventional soil borings with the aid of cone penetrometer (CPT) soundings. It is well known that, if properly applied, geophysical methods can be used to compliment standard geotechnical exploration to either supplement the discrete soil boring and CPT soundings or to enhance these exploration methods (Transportation Research Circular EC - 130, 2008). In several cases, the use of geophysical methods might have saved the department significant construction costs and schedule time. One such case is the I-10 Twin Span project. During construction, it was found that the soil stratigraphy varies within the same pile group thus causing significant cut offs on many piles. Additional borings had to be added during construction, which incurred significant cost and schedule setback. The addition of geophysical testing during geotechnical exploration could have detected this problem. Even with this history, rarely do the practitioners, including the engineers at LADOTD, consider using geophysical methods in geotechnical projects. The primary reason is due to a lack of understanding in the methods and the applicability of these methods. A second issue is that some of these methods may not be applicable to the Louisiana soils. Other obstacles include the costs of equipment and socialized knowledge required to interpret the data.

The objectives of the proposed research study will focused on the following items:
-Conduct literature review on available geophysical methods for evaluating soil properties, and provide detailed descriptions of each method;
-Evaluate the applicability of geophysics methods in Louisiana soils;
-Apply geophysical methods to several case studies;
-Evaluate the cost benefits of using geophysics methods in Louisiana;
-Other Louisiana specific concerns such as the salinity of coastal soils;
-Recommend policy for implementation; and
-Develop a training course for LADOTD Engineers.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES
-Conduct comprehensive literature review on available geophysical methods for evaluating soil properties; -Start providing detailed descriptions of each method; and -Look into potential field sites for applying the geophysical methods for evaluating soil properties.

Title:	**Instrumentation and Modeling of Geosynthetic Load Transfer Platform Performance**	**Project Status:**	**Proposed**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

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

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$300,000		**Total**		**$88,700**
	(revised)					
Est. Expended to Date				Salaries		$61,420
FY 2018 - 2019 Budget				Consumable Supplies & Materials		$24,800
FY Funds	(original)	$88,700		Equipment	(non-expendable)	
	(revised)			Travel		$2,480
Est. FY Expenditure				Other		

PURPOSE AND SCOPE

A geosynthetic load transfer platform consists of layers of compacted aggregate reinforced with a multidirectional geogrid, constructed to transfer embankment loads to deep foundation elements below. Recent projects have necessitated the need for geosynthetic load transfer platforms in instances where high embankments were to be built on weak, compressible soils that created concerns of slope stability and excessive settlements over long periods of time. Another example includes an Mechanically Stabilized Earth (MSE) wall where foundation soils would have failed in bearing capacity based on design analyses. A geosynthetic load transfer platform was selected to allow for the construction of this wall. In both cases, timber piles were used to transfer loads to the foundation soils.

Currently, there are only a few references available to aid engineers in the design of a geosynthetic load transfer platform. 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 load transfer platform, which is available for download on VTRC’s website. The geosynthetic load transfer platform system is a promising solution for use in Louisiana soils. The objectives of the proposed research study will focused on the following tasks:
-The existing literature (design methodology, modeling, and case studies), is limited when compared to other geotechnical solutions;
-The design spreadsheet (GeogridBridge), can be hard to follow and utilized some material parameters that are not readily available to design engineers; and
-LADOTD lacks experience in the design and construction of load transfer platforms; therefore, additional guidance is needed in order to establish the Department’s design policies and specifications.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES
-Conduct extensive literature review on relevant research studies of geosynthetic load transfer platform systems. This will include field instrumentation and monitoring, design, finite element numerical modeling, etc.; -Look for field sites for potential instrumentation and monitoring; and -Start purchase the needed instruments and sensors.

LTRC Annual Research Program
Fiscal Year 2019-2020

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

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$80,000	**Total**		**$34,000**
	(revised)				
Est. Expended to Date			Salaries		$34,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$34,000	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

Recent projects with piles driven in sandy soils with higher fines content have had resistances that were considerably less than estimated during design using static resistance calculations. The lower resistances resulted in production pile lengths that were 15 to 30 feet longer than the plan pile lengths. A potential cause of overestimated resistance may be the overestimation of the internal angle of friction (ϕ) due the fines content of the sands. Due to the difficulty associated with obtaining undisturbed samples, ϕ is typically estimated correlations with in-situ testing. The most commonly used in-situ test is the Standard Penetration Test (SPT). Most correlations between SPT and ϕ published in literature were established based on test results in clean sands (<5% fines). The source material for these correlations usually include language cautioning their use in sands with fines.

The main objective of this proposed study is to evaluate the effect of fines content on the value of internal friction angle, ϕ, in sands typically encountered in Louisiana, and hence the sand-pile interface friction angle, delta. Small and Large direct shear (or triaxial tests) will be performed on sand soils with different fines content at varying relative densities, moisture contents, and confining stresses to determine the effect of fines content on ϕ, and delta. The results of these tests will then be used to develop relationships between relative density, fines content, moisture content and ϕ/delta.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

- Conduct literature review in relevant topics;
- Identify the laboratory testing factorials: range and number of % fines, range and number of relative densities, range and number of moisture contents, range and number of confining stresses, etc.; and
-Start performing direct shear tests.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	**Use and Interpretation of Seismic Piezocone Penetration Testing (SCPTu) for Geotechnical Site Investigation**	**Project Status:**	**Proposed**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:			Project Start Date:		1/1/2018
Research Project Number:			Completion Date	(original)	12/31/2020
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Murad Abu-Farsakh				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$200,000		**Total**		**$37,000**
	(revised)					
Est. Expended to Date				Salaries		$22,000
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)			Equipment	(non-expendable)	$15,000
	(revised)			Travel		
Est. FY Expenditure				Other		

PURPOSE AND SCOPE

The piezocone penetration test (PCPT or CPTu) has been recognized as the most common in-situ testing for subsurface soil characterization, especially for clayey soils. It provides continuous measurements of tip resistance (qc), sleeve friction (fs) and excess porewater pressure (u) that can be interpreted for soil stratification and evaluation of different soil properties, such as strength, stiffness and consolidation parameters. The addition of geophone sensor to the piezocone body (seismic piezocone penetration test, SCPTu) will enhance the geotechnical site investigation by providing vertical profiles of four independent measurements with depth: qc, fs, u, in addition to downhole shear wave velocity (Vs). The shear wave is a fundamental nondestructive property of geomaterials that corresponds to the small-strain stiffness of the material. The Vs can be used to evaluate the small-strain shear modulus (Go), constrained modulus (M) and damping coefficient (C). The Go (also known as maximum modulus, Gmax, or initial tangent dynamic shear modulus, Gdyn) can be applies to both static and dynamic properties, as well as to both undrained and drained loading conditions. Evaluating the initial stiffness in terms of Go is appropriate to analyses involving foundation systems, retaining walls, and problems involving cyclic and seismic loading conditions such as evaluating foundations for vibrating equipment. The current practice of the Louisiana Department of Transportation and Development (LADOTD) in analyzing PDA and CAPWAP is based on estimating the Go and damping coefficients based on soil classification, which can lead to variations and inaccurate interpretations. With the use of CPT-qc data and the hyperbolic degradation of stiffness approach, the axial load deformation curves and lateral p-y curves for piles/drilled shafts can be established. The Spectral Ratio Slope (SRS) method in combination with Fourier transforms of measured Vs can be used to determine the variation of soil damping ratio with depth for application in dynamic analysis of piles.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES
-Conduct comprehensive literature review on the use of Seismic Piezocone Penetration Testing (SCPTu) for geotechnical engineering applications such as evaluating the static and dynamic soil properties, establish pile load-deformation curve, etc.; -Purchase the Seismic Piezocone Penetration Test device ($15,000); -Incorporate and start using the SCPTu for field investigation; and -Start collecting in-situ data from SCPTu.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	Literature Search on Use of Flexible Pipes in Highway Engineering for DOTD's Needs	Project Status:	Proposed
Funding Source:	**SPR: TT-Fed/TT-Reg - 6**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000323**		Project Start Date:		5/1/2019
Research Project Number:	20-1GT		Completion Date	(original)	1/31/2020
Research Agency:	LSU		Completion Date	(revised)	
Principal Investigator:	Navid Jafari				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$60,000		**Total**		**$60,000**
	(revised)					
Est. Expended to Date				Salaries		$60,000
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)			Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure				Other		

PURPOSE AND SCOPE

Conduct the literature search on the policies and practice of flexible pipes usage in highway engineering both within the Louisiana Department of Transportation and Development (LADOTD) and nationwide to meet DOT's needs.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Conduct and complete the literature review and produce and submit a final report noting the findings of the literature review.

LTRC Annual Research Program
Fiscal Year 2019-2020

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			Estimated 2019-2020 Budget		
Total Cost	(original)	$120,000	**Total**		**$80,000**
	(revised)				
Est. Expended to Date			Salaries		$76,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		$4,000
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

Develop a system to aid the Louisiana Department of Transportation and Development (LADOTD) in dealing with inundated roads for future flooding events. It will identify the most critical locations of flooded highways and can be used for proper response, recovery and maintenance prioritization.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 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 2019-2020

Title:	Critical Soaking Time for Moisture Damage of AC Mixtures	Project Status:	Proposed
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000324**		Project Start Date:		8/1/2019
Research Project Number:	20-1P		Completion Date	(original)	7/31/2020
Research Agency:	LSU		Completion Date	(revised)	
Principal Investigator:	Mostafa Elseifi				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$70,000		**Total**		**$65,000**
	(revised)					
Est. Expended to Date				Salaries		$60,000
FY 2018 - 2019 Budget				Consumable Supplies & Materials		$5,000
FY Funds	(original)			Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure				Other		

PURPOSE AND SCOPE

Determine Critical Soaking Time for Moisture Damage of various AC Mixtures and their influential factors. The results can be used to determine the moisture damage caused by flooding. Some research results indicated that this critical soaking time is around 1.3 day for one type of AC mixture. We need to expand these findings.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Prepare research proposal and conduct the research.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	Funding Priority to Address Edge –Drop Problem on Distressed Roadways in DOTD Environment	Project Status:	Proposed
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:			Project Start Date:		7/1/2019
Research Project Number:			Completion Date	(original)	6/30/2020
Research Agency:	ULL		Completion Date	(revised)	
Principal Investigator:	Xiaoduan Sun				

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$80,000	**Total**		**$80,000**
	(revised)				
Est. Expended to Date			Salaries		$78,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		$2,000
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

The objective of this study is to develop a protocol that can be implemented by the Louisiana Department of Transportation and Development (LADOTD) to assess the risk of an edge drop-off condition for low volume roads. The results of the risk assessment can be used by various funding programs within the department.

This research will help the department take proactive actions to reach the state's Destination Zero Deaths by looking into the financial requirement that is a necessity to address the edge-drop-off problem holistically. It is critical to exam the system as a whole in order to isolate a particular roadway feature that will lead to a high crash risk. Systemic safety approach uses risk to drive actions, and can works efficiently to identify roadway safety problems for roadways with low AADT.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Develop a proposal, hold a project review committee meeting for evaluation. Start initial tasks to be determined in the accepted proposal by the project review committee.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	Improvement of Pavement Deterioration Prediction Using Deep Learning Technologies	Project Status:	Proposed
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:			Project Start Date:		10/1/2019
Research Project Number:			Completion Date	(original)	9/30/2020
Research Agency:	LSU		Completion Date	(revised)	
Principal Investigator:	Mingxuan Sun				

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$70,000	**Total**		**$40,000**
	(revised)				
Est. Expended to Date			Salaries		$40,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

The objective of this study is to explore the potential of deep learning technologies and improve the accuracy and reliability of pavement deterioration prediction in Pavement Management System. In this way, more projects based predictions can be developed reliably so that pavement maintenance can be used wisely.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Develop the scope of study and begin work.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	**Pavement Surface Crack Identification and Classification of Low Volume Roads Using Unmanned Aerial Vehicles (UAV) Images**	**Project Status:**	**Proposed**

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

SIO:		Project Start Date:		10/1/2019
Research Project Number:		Completion Date	(original)	9/30/2020
Research Agency:	LSU	Completion Date	(revised)	
Principal Investigator:	Sun Chao			

BUDGET STATUS

Total Budget			**Estimated 2019-2020 Budget**		
Total Cost	(original)	$70,000	**Total**		**$40,000**
	(revised)				
Est. Expended to Date			Salaries		$38,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		$2,000
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

The objective is to develop the methodology to implement crack detection and quantification of low-volume pavement using UAV images. This technology will be useful for agencies with limited funding, but having local roadways prone to heavy loads or adverse environment.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Develop research proposal and begin work.

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

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$200,000		**Total**		**$65,000**
	(revised)					
Est. Expended to Date				Salaries		$65,000
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)			Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure				Other		

PURPOSE AND SCOPE

Since 1990, the Federal Highway Administration (FHWA) has mandated that state departments of transportation report pavement roughness in their pavement management systems on the scale of the International Roughness Index (IRI) for inclusion in the Highway Performance Monitoring System. A recent trend is to use soft computing techniques such as Artificial Neural Networks (ANN) and Genetic Algorithms (GA) to predict IRI using structural, traffic, and climatic factors. The study will categorize road segments into six categories based on pavement types (e.g., flexible or rigid) and road hierarchies (e.g., interstate, US highways and Louisiana arterial and collector highways). Historic PMS data including all distress and condition measurements, GPS locations, pavement age, AADT, truck percentage, and pavement structure will be collected for each selected projects. It is anticipated that two types of ANN-based prediction models will be developed for predicting predict pavement condition and smoothness in both short- and long- terms.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Conduct literature review;
-Evaluate pavement structure and PMS data including all distress and condition measurements, GPS locations, pavement age, AADT, truck percentage on selected projects; and
-Start to create ANN prediction models based on existing pavement condition data only and based on pavement structural, traffic, and climate data to predict pavement condition and smoothness in short and long terms.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	**Assessment of Concrete Pavements, Approach Slabs, and Bridge Decks with Multichannel-Multifrequency Ground Penetrating Radar**	**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)	12/31/2020
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Kevin Gaspard			

BUDGET STATUS

Total Budget			**Estimated 2019-2020 Budget**		
Total Cost	(original)	$210,000	**Total**		**$162,051**
	(revised)				
Est. Expended to Date			Salaries		$104,851
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	$7,200
	(revised)		Travel		
Est. FY Expenditure			Other		$50,000

PURPOSE AND SCOPE

The purpose of this process is assess Concrete Pavements, Approach slabs and Bridge Decks with Multichannel-Multifrequency Ground Penetrating radar. Three bridge decks will selected and evaluated for deficiencies and will be varied with cores. Regarding Concrete Pavements and Approach slabs, they will be assessed to determine if voids are present as well as locating the size and depth of the void. All assessments will include coring to verify the findings of the GPR.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

The GPR equipment will be rented for five weeks. During that period all field assessments will be completed. Following that, sites will be selected for coring to verify the results. Work shall also begin on composing the report.

Justification of equipment and other:
-7,200 will be spent to purchase 24 core barrels at $300 per barrel; and
-$50,000 will be spent to rent the equipment and receive 1 week of training.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	**Assessment of LADOTD's friction aggregate sources through laboratory and accelerated testing**	**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:	Zhong Wu			

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$450,000	**Total**		**$85,000**
	(revised)				
Est. Expended to Date			Salaries		$85,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

Current Louisiana Transportation and Development's (LADOTD's) aggregate friction rating system is solely dependent on the PSV of individual aggregates. However, due to the fact that there are high variations between aggregate shipments from each individual quarry, we often do not obtain the same PSV value even when testing is done from the same sample batch. The purpose of this study is to formalize the use of pavement skid testing to better utilize aggregates and achieve a desirable skid value for the life of the pavement.

The Scope of the project will include the following tasks:
-Long-term monitoring of the friction in those projects used in the 12-5P study as well as new projects. Take core samples of as many projects as possible, and separate the coarse aggregate for PSV Testing to corroborate equation results;
-Regarding OGFC and SMA 12.5 mm, 19mm, more data is needed to for the long-term correlation and prediction models. This may be done with new projects and new mixes may be added as well;
-Determine if there exists a more reliable and quicker test to obtain friction value of aggregates which the LADOTD can use for initial source approval. Specifically, the test used in the predicting of the aggregate friction performance in the field. This test could be used in lot shipment since aggregate's properties vary over time;
-Conduct a comprehensive evaluation of the Dynamic Friction Tester (DFT) and if it provides more accurate and reliable results than the Briditsh Pendulum Tester (BPT), change DOTD's specifications to reflect that.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Acquire one Dynamic Friction Tester (DFT) device and one Circular Track Meter (CTM)to be funded under DOTD acquisition budget;
-Conduct field friction tests using skid trailer, DFT and CTM on selected asphalt pavements of using OGFC, SMA and other mixes;
-Take cores and separate the coarse aggregate for PSV testing; and
-Prepare laboratory slabs for laboratory friction/polishing testing.

Title:	**Young Driver Crashes in Louisiana: Understanding the Contributing Factors to Decrease the Numbers**	**Project Status:**	**Proposed**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000296**		Project Start Date:		8/1/2018
Research Project Number:	19-5SA		Completion Date	(original)	7/31/2020
Research Agency:			Completion Date	(revised)	
Principal Investigator:					

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$175,000		**Total**		**$71,735**
	(revised)					
Est. Expended to Date				Salaries		$71,435
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$75,000		Equipment	(non-expendable)	
	(revised)			Travel		$300
Est. FY Expenditure				Other		

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 Drivers 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 2018 - 2019 ACCOMPLISHMENTS

Developed a draft research proposal to be reviewed by the PRC.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

- Literature review of relevant studies;
- Identifying contributing factors through crash data analysis; and
- Evaluation of GDL program.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	Impact of Edge Line, Center Line Rumble Strips, And Shoulder Rumble Strips On All Roadway Departure Crashes in Louisiana Two-Lane Highways	Project Status:	Proposed
Funding Source:	SPR: TT-Fed/TT-Reg - 5	Budget Category:	FHWA

SIO:	DOTLT1000295	Project Start Date:		2/1/2019
Research Project Number:	19-4SA	Completion Date	(original)	7/31/2020
Research Agency:	ULL	Completion Date	(revised)	
Principal Investigator:	Xiaoduan Sun			

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$116,709	**Total**		**$78,000**
	(revised)				
Est. Expended to Date			Salaries		$77,950
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$38,321	Equipment	(non-expendable)	
	(revised)		Travel		$50
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

The goal of this project is to evaluate the safety impact of center line rumble strips (CLRS) and shoulder rumble strips (SRS) on two-lane highways under 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 2018 - 2019 ACCOMPLISHMENTS

-Developed a draft research proposal;
-Held a PRC meeting to discuss the research proposal; and
-The research proposal was reviewed by the PRC.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Task 1:Information Review;
-Task 2:Location Selection;
-Task 3:Database Development and General Crash Characteristics Analysis;
-Task 4:Interim Progress Meeting; and
-Task 5:Safety Evaluation.

LTRC Annual Research Program
Fiscal Year 2019-2020

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)	3/31/2020
Research Agency:			Completion Date	(revised)	
Principal Investigator:					

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$125,000	**Total**		**$125,000**
	(revised)				
Est. Expended to Date			Salaries		$124,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		$500
FY Funds	(original)	$50,000	Equipment	(non-expendable)	
	(revised)		Travel		$500
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

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

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

Held an initial PRC meeting. The PRC recommended to perform a literature review study, as a technical assistance project (research in progress), to document what has been done at the national level and then have a follow-up meeting to develop the scope of work.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

To be determined based on the research proposal.

LTRC Annual Research Program
Fiscal Year 2019-2020

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:			Project Start Date:		11/1/2019
Research Project Number:			Completion Date	(original)	1/31/2021
Research Agency:			Completion Date	(revised)	
Principal Investigator:					

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$175,000	**Total**		**$43,750**
	(revised)				
Est. Expended to Date			Salaries		$43,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		$750
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

The purpose of this proposed research is to conduct a comprehensive safety evaluation of multiple safety countermeasures installed at intersections to reduce severe intersection crash types in Louisiana. Specifically, the following issues, at the minimum, are expected to be conducted: comprehensive literature review of relevant studies, identification of all intersections with safety improvements, performing crash data analysis to investigate safety effectiveness of related countermeasures, identification of risk factors that contribute to fatalities and serious injuries crashes at intersections, estimating the benefit-cost ratio, and providing recommendation including a list of other countermeasures that can be used in conjunction with present countermeasures for improving safety and mobility at intersections.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

To be determined based on the research proposal.

LTRC Annual Research Program
Fiscal Year 2019-2020

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:			Project Start Date:		10/1/2019
Research Project Number:			Completion Date	(original)	3/30/2021
Research Agency:			Completion Date	(revised)	
Principal Investigator:					

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$150,000	**Total**		**$70,000**
	(revised)				
Est. Expended to Date			Salaries		$68,800
FY 2018 - 2019 Budget			Consumable Supplies & Materials		$500
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		$700
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

The purpose of this project is to use a multi-faceted approach to examine all vehicle types crashes, including trucks, and compliance with speed and lane restrictions on elevated interstate sections in Louisiana.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

The proposed activities for this fiscal year are:
-Literature review of relevant studies; and
-Crash data and narratives review.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	Minimum Intersection Illumination	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 2019-2020 Budget**		
Total Cost	(original)	$120,000	**Total**		**$80,000**
	(revised)				
Est. Expended to Date			Salaries		$79,620
FY 2018 - 2019 Budget			Consumable Supplies & Materials		$380
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

The purpose of this project would be to determine if we could eliminate or reduce the cost of engineering the illumination plan as well as reduce the number of light post that would be required to reduce lighting construction costs, what will be the 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 cost.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

To be determined based on the research proposal.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	Evaluating Cell Phone Data for AADT Estimation: Phase II	Project Status:	Proposed
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000289**		Project Start Date:		7/2/2018
Research Project Number:	19-3SS		Completion Date	(original)	6/28/2019
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	Julius Codjoe				

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$51,496	**Total**		**$51,496**
	(revised)				
Est. Expended to Date			Salaries		$47,116
FY 2018 - 2019 Budget			Consumable Supplies & Materials		$380
FY Funds	(original)		Equipment	(non-expendable)	$4,000
	(revised)		Travel		
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

The primary objective of this project is to evaluate the accuracy of Streetlytics volume counts for rural roads with counts under 500 vpd and to make a recommendation as to whether the state of Louisiana can adopt this tool to provide accurate AADT for these areas.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Conduct a review of all available big data AADT estimation tools, including Streetlytics, documenting their pros and cons as well as their differences and how each can serve Louisiana's needs better;
-Develop a list of rural roads with counts under 500 vpd to be used for the comparative study;
-Obtain Streetlytics volume counts for the selected sample. Also, obtain corresponding traditional volume counts for the selected sample;
-Undertake comparative analysis to evaluate accuracy of Streetlytics volume counts, using traditional counts as ground truth; and
-Make a recommendation on whether Streetlytics can provide volume counts for the State of Louisiana based on the results obtained and state whether it offers more value than undertaking manual counts.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	LTRC Proposal for the Support of Research and Development in Special Studies	Project Status:	Proposed
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000280**		Project Start Date:		7/1/2018
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			Estimated 2019-2020 Budget		
Total Cost	(original)	$840,000	**Total**		**$194,878**
	(revised)				
Est. Expended to Date			Salaries		$177,338
FY 2018 - 2019 Budget			Consumable Supplies & Materials		$1,140
FY Funds	(original)	$280,000	Equipment	(non-expendable)	$5,000
	(revised)		Travel		$11,400
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

This project provides long-term professional assistance to the Louisiana Department of Transportation and Development (LADOTD) on the management and conduct od 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 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Manage assigned research projects;
-Provide authoritative review of contract research in in the area of special studies/safety;
-Conduct transportation engineering research projects (as PI or co-PI);
-Supervise Graduate Research Assistants in their execution of research duties;
-Disseminate research findings;
-Promote SS and SA research throughout Louisiana and nationally (as requested); and
-Travel amount allows for attendance at TRB (PI and GRA), and other events deemed necessary by LTRC.

Equipment for software and GIS development is included in non-expendable funds for $5,000 with each piece of equipment not to exceed $5000.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	LTRC Proposal for the Support of Research and Development in ITS/Traffic	Project Status:	Proposed
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000281**		Project Start Date:		7/1/2018
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			Estimated 2019-2020 Budget		
Total Cost	(original)	$500,000	**Total**		**$45,468**
	(revised)				
Est. Expended to Date			Salaries		$27,228
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		$18,240
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

The objective of this research proposal 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, specifically for ITS and traffic engineering related topics. No specific research documents will be produced from this project. However, all studies identified under this proposal 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 proposal, herein referred to as the Umbrella Contract.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

The Research Assistant Professor position will provide specialized technical expertise for the ongoing research program to investigate special studies questions, especially in the area of ITS and traffic engineering

Travel
-Funds are requested for the PI to attend and present at TRB, AHFE, GRITS, ITE, and local meetings; and
-Funds are requested for the Research Associate to attend TRB and local meetings. Funds are requested for four Graduate Research Assistants to attend and present at TRB.

LTRC Annual Research Program
Fiscal Year 2019-2020

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 2019-2020 Budget**		
Total Cost	(original)	$125,000	**Total**		**$40,000**
	(revised)				
Est. Expended to Date			Salaries		$40,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

Long range transportation planning can capture the public's imagination with grand visions for the future. Highway project planning can capture people's interest as they express their interests in localized benefits and costs of a particular project. While it is the Louisiana Department of Transportation and Development's (LADOTD'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. While the state and MPOs are developing long-range transportation plans and while they are taking highway projects through the planning and NEPA processes, 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 is a critical part of the process of developing projects from planning to implementation, as it establishes fundamental priorities. 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.

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.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

To be determined based on PRC and LSU proposal development.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	Benefit Cost Analysis of Interstate Roadway Striping in Louisiana	Project Status:	Proposed
Funding Source:	SPR: TT-Fed/TT-Reg - 5	Budget Category:	FHWA

SIO:			Project Start Date:		9/1/2018
Research Project Number:			Completion Date	(original)	2/29/2020
Research Agency:			Completion Date	(revised)	
Principal Investigator:	Mark Martinez				

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$150,000	**Total**		**$56,000**
	(revised)				
Est. Expended to Date			Salaries		$51,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		$1,000
FY Funds	(original)		Equipment	(non-expendable)	$3,000
	(revised)		Travel		$1,000
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

With money being tight the Louisiana Department of Transportation and Development (LADOTD) needs to determine the most cost effective striping for rural, urban, and suburban interstates. This proposed project will evaluate LADOTD's existing striping data and collect new data using LTRC's mobile retroreflectometer to determine a benefit-cost ratio for different materials, ADT, roadway types, and minimum retro reflectivity levels.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

To be determined based on the proposal developed by the Louisiana Transportation Research Center (LTRC).

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	**Comprehensive State of the Practice for Managing Sedimentation in Navigable Waterways**	**Project Status:**	**Proposed**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:		Project Start Date:		9/1/2018
Research Project Number:		Completion Date	(original)	2/29/2020
Research Agency:		Completion Date	(revised)	
Principal Investigator:				

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$150,000	**Total**		**$100,000**
	(revised)				
Est. Expended to Date			Salaries		$96,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$75,000	Equipment	(non-expendable)	
	(revised)		Travel		$4,000
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

Annual sedimentation deposits pose serious problems for Louisiana ports. The lack of frequent maintenance dredging of our navigation channels has threatened the commercial viability of coastal and inland ports in Louisiana. Areas in the state's navigable waterways that are regularly dredged are simply moving sediment around, to have the water currents move it back to where it is in the way again; this creates an expensive negative feedback loop. There is currently no motivation for innovative thinking when it comes to keeping our waterways at their authorized dimensions.

This proposed research project could investigate the following potential tasks:
-Develop a grant-funded competition to develop and award 1-3 pilot projects that provide an alternative approach/new technologies to keeping the navigable waterways and ports open at authorized depths;
-Creating a program that sells leases to sediment rich locations in the river (crossings) to mining companies, charge companies/projects fees from depositing in river (408s);
-Build upon the previous work conducted by the UNO Transportation Institute (that focused on the Port of Lake Providence and the Madison Parish Port) to access the varying degrees of how all of Louisiana ports are affected by seasonal sedimentation and what options there are to address these issues including cost and implementation potential);
-Develop alternatives to depositing dredged material in the river - opportunities might include such measures as new borrow areas, bank/batcher deposition, barging, pumping to a mining site, potential for march creation (using fluff); and
-Investigate creating an assistance program that links with creating a dredge disposal location out-of-river (future mining site) - people would apply for receiving the sediments to elevate their homes; sell sediment to developers, etc.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

PRC has begun developing the scope of work for inclusion in the RFP.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

To be determined from the results of the RFP.

LTRC Annual Research Program
Fiscal Year 2019-2020

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 2019-2020 Budget		
Total Cost	(original)	$120,000	**Total**		**$85,430**
	(revised)				
Est. Expended to Date			Salaries		$81,050
FY 2018 - 2019 Budget			Consumable Supplies & Materials		$380
FY Funds	(original)		Equipment	(non-expendable)	$4,000
	(revised)		Travel		
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

The purpose of this research study would be to develop a set of performance measures for each ITS application, and then evaluate and quantify the impacts of ITS in Louisiana by conducting data collection and analysis, before and after studies, traffic studies, safety analysis, cost/benefit analysis, and environmental impact analysis. In addition, the study will develop a gap analysis that will show where Louisiana lacks data for evaluation of performance measures for specific applications. The ultimate goal would be a list of agreed upon performance measures for each application, a process to follow to make the currently available data accessible for reporting, and a reporting tool to use to generate reports to help show status and trends of the benefits of ITS.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

To be determined based on the approved research proposal.

LTRC Annual Research Program
Fiscal Year 2019-2020

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:		9/1/2019
Research Project Number:			Completion Date	(original)	12/31/2020
Research Agency:	LSU		Completion Date	(revised)	
Principal Investigator:	Chester Wilmot				

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$75,000	**Total**		**$75,000**
	(revised)				
Est. Expended to Date			Salaries		$70,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		$2,000
FY Funds	(original)		Equipment	(non-expendable)	$2,000
	(revised)		Travel		$1,000
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

The Louisiana Transportation Research Center (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 be replicate past storms. Testing of the computer package is necessary to determine the accuracy and usefulness of this package.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

To be determined based on approved proposal.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	Developing The Load Distribution Formula for Louisiana Culverts	Project Status:	Proposed
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:			Project Start Date:		7/22/2019
Research Project Number:			Completion Date	(original)	10/22/2020
Research Agency:			Completion Date	(revised)	
Principal Investigator:					

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$125,000	**Total**		**$75,000**
	(revised)				
Est. Expended to Date			Salaries		$50,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		$20,000
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		$3,000
Est. FY Expenditure			Other		$2,000

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 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES
In this proposal, live load distribution formulas for Louisiana CIP-RC box culverts will be developed. The major tasks needed to achieve the project's goal can be summarized as follows : -Conducting literature review of research on live load distribution in concrete box culverts; -Developing and calibrating 3D finite element models for representative culverts; -Conducting a parametric study over a wide range of parameters that cover the design space for which CIP-RC box culverts are often used; -Extracting live load distribution formulas that account for the major parameters know to influence the behavior of culverts; and -Reporting the findings of the project and demonstrating the advantage of the developed formula(s). -Holding a workshop to demonstrate the use of formula(s) in culvert rating.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	Skew Detection System Replacement on Vertical Lift Bridges	Project Status:	Proposed
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:			Project Start Date:		7/22/2019
Research Project Number:			Completion Date	(original)	10/22/2020
Research Agency:			Completion Date	(revised)	
Principal Investigator:					

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$125,000	**Total**		**$100,000**
	(revised)				
Est. Expended to Date			Salaries		$75,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		$20,000
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		$2,000
Est. FY Expenditure			Other		$3,000

PURPOSE AND SCOPE

Components mounted on vertical lift bridges for the purpose of tracking height differences between opposite corners are either obsolete or no longer manufactured.

This is an ongoing problem for the majority of on vertical bridges. Since manufacture of the components has ceased, it is nearly impossible to find replacement parts. Other states have turned to programmable logic controllers (PLC's) for this functionality. These PLCs are prone to power surges and EMP from lightening strikes with Louisiana having the second highest rate of lightening strikes in the US.

The bridge maintenance and design sections have determined that a potential solution exists by using paired wound motors or stepper motors electrically tied together. This system could be developed using "off-the-shelf" components. This system will need to be developed and tested within a testing environment prior to deployment on an existing bridges.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Perform a literature search for potential solution implemented in other state;
-Report of finding to the project review committee (PRC);
-Develop a system that would tracking hight differences between opposite corners, if such system does not exist;
-If a system exists, it would be mounted on an existing bridge and testes for purpose of performance and reliability; and
-Based on performance, the end product will be implemented.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	**Stabilizing Blended Calcium Sulfate (BCS) Using Biologically-Mediated Method for Application in Base Course**	**Project Status:**	**Proposed**
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000302**	Project Start Date:		7/1/2019
Research Project Number:	20-5TIRE	Completion Date	(original)	6/30/2020
Research Agency:	LSU	Completion Date	(revised)	
Principal Investigator:	Hai (Thomas) Lin			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$30,000
	(revised)	
Est. Expended to Date		
FY 2018 - 2019 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2019-2020 Budget		
Total		**$30,000**
Salaries		$28,000
Consumable Supplies & Materials		$1,500
Equipment	(non-expendable)	
Travel		
Other		$500

PURPOSE AND SCOPE

The purpose of this experimental research is to investigate whether or not a biologically-mediated soil improvement method can be used to stabilize BCS to mitigate issues.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Start and finish the project.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	**Elimination of End zone Cracks in Precast Prestressed Concrete Girders Using Memory Shape Alloys**	**Project Status:**	**Proposed**

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

SIO:	**DOTLT1000301**	Project Start Date:		7/1/2019
Research Project Number:	20-4TIRE	Completion Date	(original)	6/30/2020
Research Agency:	LTU	Completion Date	(revised)	
Principal Investigator:	C. Shawn Sun			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$30,000
	(revised)	
Est. Expended to Date		
FY 2018 - 2019 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2019-2020 Budget		
Total		**$30,000**
Salaries		$22,400
Consumable Supplies & Materials		$7,600
Equipment	(non-expendable)	
Travel		
Other		

PURPOSE AND SCOPE

This project is exploratory in nature and aims to examine the feasibility of using shape memory alloys to eliminate end zone cracks in precast prestressed concrete girders.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Justification of Budget:
-$7,600 is for test Specimens.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	**An Automatic Deep Learning-based Crack Identification Methodology for Bridges Using UAV Images**	**Project Status:**	**Proposed**

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

SIO:	**DOTLT1000300**	Project Start Date:		7/1/2019
Research Project Number:	20-3TIRE	Completion Date	(original)	6/30/2020
Research Agency:	LSU	Completion Date	(revised)	
Principal Investigator:	Sun Chao			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$30,000
	(revised)	
Est. Expended to Date		
FY 2018 - 2019 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2019-2020 Budget		
Total		**$30,000**
Salaries		$30,000
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

PURPOSE AND SCOPE

This exploratory research project aims to develop an automatic deep learning based crack identification methodology to implement crack detection and quantification for concrete and steel bridges using UAV images of the bridge structural components.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Start and finish the project

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	Analysis of Carbon Nanotube Reinforced Shape Memory Composites for Pavement Joints	Project Status:	Proposed
Funding Source:	**SPR: TT-Fed/TT-Reg - 5**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000299**		Project Start Date:		7/1/2019
Research Project Number:	20-2TIRE		Completion Date	(original)	6/30/2020
Research Agency:	ULL		Completion Date	(revised)	
Principal Investigator:	Pengfei Zhang				

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$29,774	**Total**		**$29,774**
	(revised)				
Est. Expended to Date			Salaries		$22,099
FY 2018 - 2019 Budget			Consumable Supplies & Materials		$4,900
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		$1,800
Est. FY Expenditure			Other		$975

PURPOSE AND SCOPE

The main objective of this experimental research is to design, synthesize, characterize, and test a carbon nanotube reinforced shape memory polymer as a sealant.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Start and finish project.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	**Deep Learning Based Multi-Sensor Integration for Pavement Crack Detection**	**Project Status:**	**Proposed**

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

SIO:	**DOTLT1000298**		Project Start Date:		7/1/2019
Research Project Number:	20-1TIRE		Completion Date	(original)	6/30/2020
Research Agency:	LSU		Completion Date	(revised)	
Principal Investigator:	Mingxuan Sun				

BUDGET STATUS

Total Budget			**Estimated 2019-2020 Budget**		
Total Cost	(original)	$30,000	**Total**		**$30,000**
	(revised)				
Est. Expended to Date			Salaries		$30,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

The objective of this exploratory research is to develop an elaborate deep learning system to automatically extract useful information from multi-sensor data for more accurate and efficient pavement crack detection.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Start and complete the project.

FHWA

Part B SPR Funded Research Program

POOLED FUND
LOUISIANA
LEAD STATE RESEARCH

Title:	**Synthesis on the Best Practices for State DOTs to Determine Project Delivery Time, Project Management, and Ratio of Consultant to In-House Design**	**Project Status:**	**Ongoing**
Funding Source:	**SPR: Pooled Fund: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000287**	Project Start Date:		1/1/2019
Research Project Number:	19-3PF	Completion Date	(original)	9/30/2019
Research Agency:	LSU	Completion Date	(revised)	
Principal Investigator:	Amirhosein Jafari			

BUDGET STATUS

Total Budget			**Estimated 2019-2020 Budget**		
Total Cost	(original)	$39,183	**Total**		**$19,592**
	(revised)				
Est. Expended to Date		$5,000	Salaries		$19,592
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$19,591	Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure		$5,000	Other		

PURPOSE AND SCOPE

With increasing restraints upon budgets and large workloads, DOTs are contracting portions of their project design and delivery. General discussion between the Southeast Transportation Consortium (STC) member states noted many differences in how delivery times are determined as well as how projects are managed. States generally differ on the ratio of consultant to in-house design. The primary objective of this synthesis project is to document the best practices for Departments of Transportation (DOT) project delivery processes looking at all factors of project delivery including time estimation, project management, and suggested ratios of in-house versus consultant design for project delivery.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

The following tasks have commenced:
-Task 1:Literature review and discovery search;
-Task 2:Survey Development;
-Task 3:Pilot Test Survey; and
-Task 4: Survey Distribution and Data Collection.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Complete all remaining tasks.

Title:	**Synthesis on the Contributing Factors and Effective Countermeasures for Low Volume Roadway Fatality Rates in the Southeast**	**Project Status:**	**Ongoing**
Funding Source:	**SPR: Pooled Fund: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000288**	Project Start Date:		3/1/2019
Research Project Number:	19-2PF	Completion Date	(original)	11/30/2019
Research Agency:	University of Kentucky Research Foundation	Completion Date	(revised)	
Principal Investigator:	Nikiforos Stamatiadis			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$39,997
	(revised)	
Est. Expended to Date		
FY 2018 - 2019 Budget		
FY Funds	(original)	$7,994
	(revised)	
Est. FY Expenditure		$7,994

Estimated 2019-2020 Budget		
Total		**$32,003**
Salaries		$29,160
Consumable Supplies & Materials		$343
Equipment	(non-expendable)	
Travel		$2,500
Other		

PURPOSE AND SCOPE

The purpose of this synthesis study is to summarize contributing factors on Low-Volume Roadway (LVR) crashes based on prior domestic and international research; identify countermeasures implemented to address LVR safety; and document countermeasure effectiveness in addressing LVR safety.

The scope of work includes a literature review, a state highway agency survey, and the development of a matrix pairing of countermeasures with contributing factors to identify the most effective treatments in addressing LVR safety. An interim and final report will be submitted and a prevention will be delivered during an STC meeting.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-Conduct literature review;
-Develop and conduct a state highway agency survey; and
-Prepare an interim report.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Develop the countermeasure and effectiveness matrix;
-Submit a final report; and
-Present the findings during an STC meeting.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	Synthesis on Documenting and Tracking Research Implementation	Project Status:	Ongoing
Funding Source:	**SPR: Pooled Fund: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000286**		Project Start Date:		12/1/2018
Research Project Number:	19-1PF		Completion Date	(original)	8/31/2019
Research Agency:	LSU		Completion Date	(revised)	
Principal Investigator:	Husam Sadek				

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$40,000	**Total**		**$20,000**
	(revised)				
Est. Expended to Date		$5,000	Salaries		$20,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$40,000	Equipment	(non-expendable)	
	(revised)	$20,000	Travel		
Est. FY Expenditure		$20,000	Other		

PURPOSE AND SCOPE

The primary objective of this synthesis project is to document the best practices by SHAs and others for documenting and tracking research implementation efforts. It is anticipated that the results of this effort will be used by STC and other SHAs research sections to formalize their implementation documentation and tracking efforts.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-Task 1:Literature review;
-Task 2:Online Survey;
-Task 3:Documentation of Implementation; and
-Task 4:Documentation of Tracking have commenced.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Complete all remaining tasks, including submission of final report.

Title:	**Design and Analysis Procedures for Asphalt Mixtures Containing High-RAP Contents and/or RAS**	**Project Status:**	**Ongoing**

Funding Source:	**SPR: Pooled Fund: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000002**	Project Start Date:		11/1/2014
Research Project Number:	14-5PF	Completion Date	(original)	10/31/2017
Research Agency:	LTRC	Completion Date	(revised)	10/31/2019
Principal Investigator:	Louay Mohammad			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$306,812
	(revised)	$506,812
Est. Expended to Date		$479,812
FY 2018 - 2019 Budget		
FY Funds	(original)	$123,000
	(revised)	
Est. FY Expenditure		$123,000

Estimated 2019-2020 Budget		
Total		**$27,000**
Salaries		$27,000
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

PURPOSE AND SCOPE

Despite recent advancements in the design of asphalt mixtures containing Reclaimed Asphalt Pavement (RAP), many states are still cautious in their regulations to avoid durability problems related to the recycling process. In many states, RAP is currently not allowed in highest-class asphalt mixtures and in polymer-modified asphalt products. In addition, high percentages of RAP exceeding 25% are not commonly used in practice. On the other hand, many state agencies are taking a more aggressive approach by considering increasing the allowable percentages of RAP in asphalt mixture to take full advantage of this promising technology. For instance, up to 50% RAP has been used in some asphalt mixtures, which produced an acceptable level of performance. In addition, reclaimed asphalt shingles (RAS), defined by the The American Association of State Highways and Transportation Officials (AASHTO) MP 15-09 "Standard Specification for Use of Reclaimed Asphalt Shingles as an Additive in Hot-Mix Asphalt (HMA)" as "any type of waste roofing asphalt shingles that have been processed into a recyclable product," have become another promising candidate of recycling, also because of the high compatibility with paving asphalt mixtures. However, to ensure successful use of RAP and/or RAS, confidences in the mixture design procedure require addressing many concerns related to the interaction between virgin and recycled materials and durability of the produced mixture. Current AASHTO recommendations make it difficult to design asphalt mixtures with high-RAP and/or RAS contents. Modifications to the current specifications are needed to assure agencies that satisfactory performance will result from the use of high-RAP and/or RAS content asphalt mixes. The objectives of this study are to 1) establish mechanistic test criteria for asphalt mixtures (warm and hot) containing high-RAP content and/or reclaimed asphalt shingles (RAS); and 2) propose asphalt mixture specifications that incorporate the mechanistic test criteria as tested on plant produced specimen and/or roadway cores based on the results of the study.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

-Identified Louisiana field Project and Material Collection ;
-Conducted physical and chemical characterization of extracted binders as per experimental factorial;
-Performed preliminary data analysis; and
-Prepared Draft Project Final Report.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

-Continue conduct of physical and chemical characterization of extracted binders as per experimental factorial;
-Perform data analysis; and
-Submit draft Project Final Report.

FHWA

LTAP Funded Program

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	**Local Technical Assistance Program (LTAP)**	**Project Status:**	**Proposed**
Funding Source:	**LTAP: TT-Fed/TT-Reg**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000312**	Project Start Date:		7/1/2019
Research Project Number:	20-LTAP	Completion Date	(original)	6/30/2020
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Marie Walsh			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$692,938
	(revised)	
Est. Expended to Date		
FY 2018 - 2019 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2019-2020 Budget		
Total		**$692,938**
Salaries		$420,658
Consumable Supplies & Materials		$22,000
Equipment	(non-expendable)	$8,000
Travel		$66,200
Other		$176,080

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 2018 - 2019 ACCOMPLISHMENTS

-Sponsored 2 Louisiana Parish Engineers and Supervisors Association Statewide technical conferences for over 200 participants;
-Hosted the annual NLTAPA Conference in New Orleans;
-Co-hosted Emergency Disaster Recovery Process for Transportation Assets in cooperation with FHWA, GOHSEP, DOTD, LTAP, LMA, FEMA at 10 locations across the state for 440 participants;
-Presented 9 LTAP Intersection Basics: Safety, Operations & Accessibility workshops across the state to 164 participants;
-Piloted and delivered newly revised Roads Scholar #2: Maintenance of Asphalt Roads class in 9 locations and presented to 240 attendees;
-Delivered 1 LPA Qualification Core Training Module to 40 people; delivered 1 LPA Project Development and Design Process for the LPA Responsible Charge Modules to 40 people; delivered 2 CEI Training Modules to 60 people;
-Conducted 11 sessions of Basics Work Zone Safety to over 246 local agency participants;
-Presented Basics of Road Maintenance Mini-workshop in 1 location to 25 participants;
-Hosted 1 FHWA EDC-4 Pavement Preservation-How? Peer Exchange at 1 location to 50 people;
-Co-hosted an Extreme Winter Weather Planning & Response: South Louisiana Style workshop in conjunction with DOTD and APWA at 1 location to 30 participants; co-hosted on-site demonstration with LADOTD for 20 participants;
-Presented 2 RS#4 Temporary Traffic Control classes for local agencies in Shreveport and Lake Charles to 90 attendees;
-Hosted 2 FHWA Grant classes in Baton Rouge and Monroe – Implementing Safe Work Zone Operations Strategies Training Course and Instructing the Implementing Safe Work Zone Operation Strategies Training Course to 100 participants;
-Delivered 8 sessions of the newly revised Roads Scholar #7: Pavement Preservation & Road Surface Management class to 100 people;
-Participated on STIC and EDC-4 Implementation Teams for Pavement Preservation; Community Connections; Safe Transportation for Every Pedestrian (STEP); and Data-Driven Safety Analysis (DDSA); and
-Attended EDC-5 Summit and participated on EDC-5 Implementation Teams for STEP, Roadway Departure, Project Bundling, and Value Capture.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Equipment (Non-Expendable):

No individual item will exceed $5,000

-Computers – New Upgrade, Projection Equipment - $8,000.

LTAP 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.

Proposed Activities:
-Revise content for Roads Scholar #4 - Temporary Traffic Control for Local Agencies and present at 7 locations around the State. Additional locations may be presented upon request.
-Revise content for Roads Scholar #6 - Heavy Equipment Operations: Safety and Preventive Maintenance and present at 8 locations around the State.
-Revise content for Roads Scholar #13 - Inspection of Local Bridges (2-day workshop) 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.
-Present introduction to supervision at 6-8 locations.
-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 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).
-Participate in conference planning and technical sessions for the Louisiana Safety Summit in November 2019.
-Participate in conference planning and technical sessions for the Louisiana Transportation Conference in March 2020.
-Develop implementation tasks for local component of EDC-5 Initiatives for RWD; STEP and Project Bundling; Support other EDC-5 Initiatives such as Virtual Public Involvement, Crowd Sourcing, and Value Capture.
-Pilot or develop rollout strategy for new Transportation Leadership Program in one region, community or organization.
-Fully implement new 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 2019-2020

Title:	LTRC Student Worker Program	Project Status:	Ongoing
Funding Source:	**STP: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000314**	Project Start Date:		7/1/2019
Research Project Number:	20-2TT	Completion Date	(original)	6/30/2020
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 2018 - 2019 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2019-2020 Budget		
Total		**$147,600**
Salaries		$147,600
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

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 2018 - 2019 ACCOMPLISHMENTS

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

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

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

LTRC Annual Research Program
Fiscal Year 2019-2020

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 2019-2020 Budget		
Total Cost	(original)	$441,453	**Total**		**$147,151**
	(revised)				
Est. Expended to Date		$133,000	Salaries		$127,151
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$147,151	Equipment	(non-expendable)	
	(revised)		Travel		$20,000
Est. FY Expenditure		$133,000	Other		

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 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 2018 - 2019 ACCOMPLISHMENTS

Help prepare for and facilitate the NLTAPA National Conference in July of 2018;
-Started preparation for next year's Transportation Conference;
-Purchased equipment to aide in registration for future conferences;
-Installed our new server and began migration of data from our old server to the new one;
-Continuing support for DOTD learners and training developers in the state LMS – includes defining new courses as they are developed, scheduling classroom courses, giving credit for courses as taken, monitoring completion of LADOTD Structured Training programs and any other course programs as mandated by LADOTD or Louisiana Department of Civil Service. (about 80% of the job is support and data extracts);
-Monitoring completion of "safety" courses as mandated by the Louisiana Office of Risk Management and training to meet Federal Compliance Program requirements. At end of calendar year 2018 our compliance rate was 99.9% for our 4200+ employees;
-Revised the way we track the Specialty Areas and Certifications for LADOTD Construction Inspectors and Laboratory personnel to improve compliance with LADOTD requirements;
-Revised the training program for PC Computer training for Engineering Technicians; and
-Conducted training for our District Training Coordinators and Section Training Liaisons as relates to using the LMS and monitoring for training compliance.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES
-Maintenance of current IT technology transfer and training equipment on our campus; -Began the process of upgrading all technology transfer and training to Windows 10 platform; -Recommended purchases of new technology transfer and training where needed; and -Continue supporting the LMS for all departmental needs.

LTRC Annual Research Program
Fiscal Year 2019-2020

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 2019-2020 Budget		
Total Cost	(original)	$100,000	**Total**		**$10,000**
	(revised)				
Est. Expended to Date		$57,136	Salaries		
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$10,000	Equipment	(non-expendable)	
	(revised)		Travel		$10,000
Est. FY Expenditure		$10,000	Other		

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 2018 - 2019 ACCOMPLISHMENTS

Continue to provide support technology transfer travel for university faculty to deliver research results to state and national audiences.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Continue to provide support technology transfer travel for university faculty to deliver research results to state and national audiences.

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		$348,934
FY 2018 - 2019 Budget		
FY Funds	(original)	$361,546
	(revised)	
Est. FY Expenditure		$348,934

Estimated 2019-2020 Budget		
Total		**$379,911**
Salaries		$332,911
Consumable Supplies & Materials		$12,000
Equipment	(non-expendable)	$15,000
Travel		$11,000
Other		$9,000

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 2018 - 2019 ACCOMPLISHMENTS

-Published 4 Tech Today Newsletters;
-Published 2018 Annual Report;
-Set up online registration for 19 NHI/other training, and 15 LTAP training classes;
-Maintained LTAP website;
-Maintained Safety Center web pages;
-Maintained the LTRC website;
-Maintained 2018 LTC Website and Mobile Site;
-Photographed all LTRC events;
-Filmed and produced 12 LADOTD informational videos;
-Filmed and produced 7 sessions CEI/LTAP “Local Public Agency Qualification Program”;
-Filmed and produced 2 Transportation Talk videos featuring Secretary Wilson;
-Edited 5 LTRC videos;
-Up to 332 subscribers on YouTube;
-Published 16 Project Capsules;
-Published 6 Final Reports;
-Published 2 Tech Assistance Reports;
-Purchased new accessibility software;
-Finalized new Word template; and
-Implement and support online registration management system.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES
Non-Expendable Equipment: This budget item is comprised of various items all not to exceed $5,000 on an individual basis. Other: License renewals for LTRC registration management, publication processing, program creation, and software. Proposed Activities: -Publish 4 Tech Today Newsletters; -Publish 2018 Annual Report; -Set up online registration for 19 NHI/other training, and 15 LTAP training classes; -Maintain LTAP website; -Maintain Safety Center web pages; -Maintain the LTRC website; -Maintain 2020 LTC Website and Mobile Site; -Photograph all LTRC events; -Film and produce 12 LADOTD informational videos; -Film and produce 7 sessions CEI/LTAP “Local Public Agency Qualification Program”; -Film and produce 2 Transportation Talk videos featuring Secretary Wilson; -Edit 5 LTRC videos; -Publish 16 Project Capsules; -Publis 6 Final Reports; -Publish 2 Tech Assistance Reports; -Purchase new accessibility software; -Finalize new Word template; and -Implement and support online registration management system.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	Technology Transfer Registration Fees	Project Status:	Proposed
Funding Source:	**STP: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000315**		Project Start Date:		7/1/2019
Research Project Number:	20-TTRF		Completion Date	(original)	6/30/2020
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	MaryLeah Coco				

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$100,000	**Total**		**$100,000**
	(revised)				
Est. Expended to Date			Salaries		
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		$100,000

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 2018 - 2019 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 2019-2020 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 2019-2020

Title:	**AASHTO PONTIS Agreement**	**Project Status:**	**Proposed**
Funding Source:	**STP: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000319**	Project Start Date:		7/1/2019
Research Project Number:	20-PONTIS	Completion Date	(original)	6/30/2020
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	MaryLeah Coco			

BUDGET STATUS

Total Budget			**Estimated 2019-2020 Budget**		
Total Cost	(original)	$125,000	**Total**		**$125,000**
	(revised)				
Est. Expended to Date			Salaries		
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	$125,000
	(revised)		Travel		
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

AASHTO PONTIS Agreement.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

AASHTOware utilized for bridge management.

FISCAL YEAR 2019-2020 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 2019-2020

Title:	**LA DOTD CO-OP Program**	**Project Status:**	**Proposed**
Funding Source:	**STP: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000316**	Project Start Date:		7/1/2019
Research Project Number:	20-COOP	Completion Date	(original)	6/30/2020
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 2018 - 2019 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2019-2020 Budget		
Total		**$200,000**
Salaries		$200,000
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

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 LAOTD to evaluate participants of this program as potential employees.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

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

FISCAL YEAR 2019-2020 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 2019-2020

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

SIO:	**DOTLT1000313**		Project Start Date:		7/1/2019
Research Project Number:	20-1WDC		Completion Date	(original)	6/30/2020
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	MaryLeah Coco				

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$4,212,407	**Total**		**$4,212,407**
	(revised)				
Est. Expended to Date			Salaries		$1,550,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		$110,000
FY Funds	(original)		Equipment	(non-expendable)	$125,000
	(revised)		Travel		$40,000
Est. FY Expenditure			Other		$2,387,407

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 2018 - 2019 ACCOMPLISHMENTS

-Held over 547 events with over 6,100 attendees;
-15 students participated in the Co-op Program at various LA DOTD districts/sections throughout Louisiana;
-Hosted at TTEC end-of-the semester Co-op student presentations and video-conferenced in outlying areas. Increased participation attendance by advertising department wide, to universities, and with the LTRC Policy Committee;
-Attended 10 Career Fairs at LA engineering schools;
-8 EI's were hired into the ERDP and rotated through various LA DOTD sections and districts throughout Louisiana;
-5 ERDP EI's successfully hired into LA DOTD districts or sections: Section 19 –Research (LTRC), Section 21 – Data Coll. & Analysis, 24 – Road Design, Section 25 – Bridge and Structural Design, District 61 – Baton Rouge;
-3 ERDP EI's are still in the rotation;
-FHWA Grant awarded for $51,725. Implementation and evaluation of RIDES Programs for schools in the State of Louisiana. Federally funded grant – 8/1/2018-12/31/2018;
-TRAC and RIDES December Workshop - 15 schools, 21 teachers;
-Added 576 titles catalogued to the LTRC Library online catalog;
-TRB Committee ABG40- Friend;
-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;
-Member of Transportation and Civil Engineering (TRAC) and Roadways in Developing Elementary Students (RIDES) Advisory Board;
-Member of National Transportation Training Directors (NTTD);
-Emerging Technology Chair of National Transportation Training Directors;
-Member of TRB Committee B0002;
-Member of SLA Transportation division;
-ETKN (Eastern Transportation Knowledge Network);
-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;
-Friend of TRB Committee ABR30;
-Friend of TRB Committee ABE 70;
-Member of Association for Talent Development;
-Member of Louisiana Chapter of Society of Government Meeting Professionals (SGMP);
-2017 – 2019 Louisiana Chapter of SGMP Board of Directors 1st Vice President;
-2017 – 2019 Louisiana Chapter of SGMP Board Officers – Immediate Past President;
-Louisiana Chapter of SGMP Membership Committee Chair;
-Member NCWE;
-Continue course development for the following topics: Contract Negotiations – target date for completion is June 30, 2018; Critical Conversations and Being a Change Agent–work in progress;
-Developing training videos for the leadership development institute;
-Upgraded security camera system, expanding to 47 cameras;
-Upgraded LTRC conference room to all digital system with new displays and equipment;
-Sourced a new cloud video conferencing software solution and have implemented it. (Lifesize);
-Replaced microphones in TTEC 100 Auditorium to bring them in line with upcoming FCC regulations regarding public frequencies in use;
-Twenty-eight Leadership Development classes were held at TTEC;
-Planning activities for the 2020 Louisiana Transportation Conference;
-Negotiated and secured contracted for conference location, Raising Cane's River Center, for the 2020 Louisiana Transportation Conference to be held March 1-4, 2019 for Approximately 1,700 participants and 80 vendors;
-Negotiating for overnight rooms for the 2020 LTC in Baton Rouge, LA, Marriot Courtyard Downtown Baton Rouge for March 1-4, 2019 totaling 95 Room Nights;
-Negotiating for overnight rooms for the 2020 LTC in Baton Rouge, LA, Hilton Inn, Downtown as the conference host hotel for March 1-4, 2019 for 900 room nights;
-Negotiating for overnight rooms for the 2020 LTC in Baton Rouge, LA, Marriot Courtyard for March 1-4, 2019 totaling 95 Room Nights;
-Contract Negotiations Training has been developed;
-Managing Across Generations is almost complete;
-Began work on the Competency Model for Traffic;
-Transportation Safety Summit (LADOTD Highway Safety) -2018– Baton Rouge, LA – Crowne Plaza Baton Rouge – Sent our RFP and negotiating hotel for meeting space, overnight rooms,food/beverage, etc. Approximately 350 people;
-Sent RFPs and negotiated hotel meeting space, overnight rooms, food/beverages, etc. for the 2018 NLTAPA National Conference;
-Conducted, hosted, and presented at the 2018 NLTAPA National LTAP/TTTAP Conference in New Orleans, LA July 23-26, 2018 for approximately 160 attendees;
-Attend SGMP National Education Conference in Detroit, Michigan June 25-27, 2019;
-Contract written for Mobile Crane Operator Course;
-Contract written for Highway Capacity Analyses and Traffic Engineering Fundamentals;
-PE Review was at held at TTEC – January – March 2019;
-Seminar Series – Durable Asphalt;
-Microsoft Office PC Courses;
-Ran Individual Registration;
-RFP's and contracts (5);
-Planning with the LTC Program Committee for the 2020 LTC;
-Attended Crestron SMART GRAPHICS TRAINING (CTI— SG) in Denver, CO;
-Contributed to and participated in the 2018 5-Day National Transportation Training Directors conference in Chattanooga, Tennessee;
-Attended the National Council for Workforce Education (NCWE) 2018 Conference in Clearwater Beach, Florida; and
-District Training Coordinators (DTC) Meeting – Lake Charles, LA.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Budget Justification for Equipment:

Special purpose equipment to be purchased for use only in research and technical activities.

-5K-10K: Screen upgrades in TTEC 175, 179, 160 and 101 - no individual piece over 5K;
-5K-10K: Wired Crestron control panels in TTEC 100,101,175,179,160 - no individual piece over 5K;
-1K: Wire video conferencing microphone audio back into the Desktop PC's to improve sound quality on Lifesize VC in TTEC 175, 179 - no individual piece over 5K;
-3K-5K: Upgrade confidence monitors to Commercial grade in TTEC 175, 160 - no individual piece over 5K;
-3K: Connect Classroom VC systems to Lifesize - no individual piece over 5K;
-10K: Rack mounted audio conferencing solution for all technology transfer areas - no individual piece over 5K;
-10K: Video conferencing software renewal.

Budget Justification for Other:

-Contracts for external workforce development iniitiaves.

Proposed Activities:

-Continued additions of library materials into the online catalog;
-Conduct 5-Day National Transportation Training Directors conference in Stowe, Vermont, along with -NLTAPA for approximately 100+ participants and 10+ vendors;
-Complete development of "Being a Change Agent" for Section 17, QCIP;
-Complete development of "Crucial Conversations";
-Complete contract for overnight hotel accommodations for the 2020 Louisiana Transportation Conference – March 2020, Baton Rouge, LA – Approximately 1,700 participants and 80 vendors;
-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 employees to participate in the ERDP;
-Host one (1) TRAC and one (1) RIDES Workshop – December 2019;
-Leadership Development – 30 classes;
-Conduct, host, and present at 2020 LTC in Baton Rouge, LA
-Continue to schedule Microsoft Office Course and CADD courses;
-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 (5-10 per year)
-Attend Certified Technology Specialist (CTS) prep Course;
-Gain CTS certification;
-"Contract Negotiations" implementation
-Facilitate "Managing Across Generations";
-Complete work on the Competency Model with Traffic department;
-Begin work on Competency Model Safety department;
-LTC Program Committee planning;
-Conduct 200+ FHWA, NHI , Leadership, PC and External Training classes;
-Continue to enhance cloud based video conference solution.

LTRC Annual Research Program
Fiscal Year 2019-2020

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

SIO:	**DOTLT1000311**	Project Start Date:		7/1/2019
Research Project Number:	20-1WD	Completion Date	(original)	6/30/2020
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	MaryLeah Coco			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$1,221,759
	(revised)	
Est. Expended to Date		
FY 2018 - 2019 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2019-2020 Budget		
Total		**$1,221,759**
Salaries		$1,201,759
Consumable Supplies & Materials		$10,000
Equipment	(non-expendable)	
Travel		$10,000
Other		

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 2018 - 2019 ACCOMPLISHMENTS

-Revised Construction Specialty Area and Re-Certification tests and put into web-based testing platform;
-Completed Profiler Operator Certification training package;
-Completed Radiation Safety training package and sent for approval by DEQ;
-Completed Radiation Safety Recertification web-based training course;
-Completed Basic Flagging training course;
-Completed Compliance for LPA Reporting web-based training course;
-Completed Compliance for Construction web-based training course;
-Completed HMA 1, 2, &3 training package;
-Completed Roadway Design Workbook;
-Updated Mathematics 2 for Construction Personnel manual;
-Updated Mathematics 1 for Construction Personnel manual;
-Updated Asphalt Paving Volume 1 manual;
-Updated Asphalt Paving Volume 2 manual;
-Updated Excavation and Embankment manual;
-Updated Aggregate Tester manual;
-Updated Basic Electricity and Electronics manual;
-Updated Transformers and AC Circuits manual;
-Updated Bearings manual;
-Taught 1 Basic Flagging course;
-Taught 2 Highway Plan Reading Part 1 courses and 1 Highway Plan Reading Part 2 class;
-Taught 5 Project Management classes;
-Taught 3 Facilitation Skills classes;
-Managed the Structured Training Program for the department; and
-Managed the Construction Certification Program.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES
-Complete revision of Asphaltic Concrete Paving Inspection course; -Revise Grammar 1-3 training courses; -Implement 16 Maintenance Equipment Operation and Safety videos with tests in LTRC's test.com system; -Implement/Review/Revise/Maintain tests in LTRC's test.com system; -Review and update all construction and maintenance training material; and -Review and revise PPM #59, Workforce Development.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	Technology Transfer and Assistance for Senior Project Courses	Project Status:	Proposed
Funding Source:	**STP: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000318**		Project Start Date:		7/1/2019
Research Project Number:	20-1TT		Completion Date	(original)	6/30/2020
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	MaryLeah Coco				

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$37,500	**Total**		**$37,500**
	(revised)				
Est. Expended to Date			Salaries		
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		$37,500

PURPOSE AND SCOPE

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

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

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

FISCAL YEAR 2019-2020 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 2019-2020

Title:	Technology Transfer Program and Operations (DOTD)	Project Status:	Proposed
Funding Source:	**STP: TT-Fed**	**Budget Category:**	**FHWA**

SIO:	**DOTLT1000317**		Project Start Date:		7/1/2019
Research Project Number:	20-1TSQ		Completion Date	(original)	6/30/2020
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	MaryLeah Coco				

BUDGET STATUS

Total Budget				Estimated 2019-2020 Budget		
Total Cost	(original)	$355,021		**Total**		**$355,021**
	(revised)					
Est. Expended to Date				Salaries		$355,021
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)			Equipment	(non-expendable)	
	(revised)			Travel		
Est. FY Expenditure				Other		

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 2018 - 2019 ACCOMPLISHMENTS

-Prepared 14 Draft Project Capsules ;
-Provided Review for 20 Final Reports;
-Provided Review for 1 Technical Assistance Report;
-Continue to prepare project capsules, and review draft final reports and technical assistance reports;
-Published 4 Tech Today Newsletters;
-Published 2018 Annual Report;
-Set up online registration for 19 NHI/other training, and 15 LTAP training classes;
-Maintained LTAP website;
-Maintained Safety Center web pages;
-Maintained the LTRC website;
-Maintained 2018 LTC Website and Mobile Site;
-Photographed all LTRC events;
-Filmed and produced 12 LADOTD informational videos;
-Filmed and produced 7 sessions CEI/LTAP “Local Public Agency Qualification Program”;
-Filmed and produced 2 Transportation Talk videos featuring Secretary Wilson;
-Edited 5 LTRC videos;
-Up to 332 subscribers on YouTube;
-Published 16 Project Capsules;
-Published 6 Final Reports;
-Published 2 Tech Assistance Reports;
-Purchased new accessibility software;
-Finalized new Word template; and
-Implement and support online registration management system

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES
-Assist in development of all publications, website, registration, e-commerce and mobile application; -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; -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; and -Attend professional development and leadership training.

LTRC Annual Research Program
Fiscal Year 2019-2020

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

SIO:	**DOTLT1000320**		Project Start Date:		7/1/2019
Research Project Number:	20-1SWD		Completion Date	(original)	6/30/2020
Research Agency:	LTRC		Completion Date	(revised)	
Principal Investigator:	MaryLeah Coco				

BUDGET STATUS

Total Budget			Estimated 2019-2020 Budget		
Total Cost	(original)	$1,520,000	**Total**		**$1,520,000**
	(revised)				
Est. Expended to Date			Salaries		$1,520,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		
Est. FY Expenditure			Other		

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 2018 - 2019 ACCOMPLISHMENTS

-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.

FISCAL YEAR 2019-2020 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.

FHWA

100% Federal Funded Program

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	**Effect of Increased Asphalt Pavement Density on its Durability**	**Project Status:**	**Ongoing**

Funding Source:	**100% Federal**	**Budget Category:**	**Federal**

SIO:	**DOTLT1000214**	Project Start Date:		10/1/2018
Research Project Number:	18-4B	Completion Date	(original)	9/30/2019
Research Agency:	LSU	Completion Date	(revised)	
Principal Investigator:	Louay Mohammad			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$50,000
	(revised)	
Est. Expended to Date		$30,000
FY 2018 - 2019 Budget		
FY Funds	(original)	$30,000
	(revised)	
Est. FY Expenditure		$30,000

Estimated 2019-2020 Budget		
Total		**$20,000**
Salaries		$20,000
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		

PURPOSE AND SCOPE

In-place density is one of the most important factors influencing the performance of an asphalt pavement. The desired level of construction density in asphalt layers in the field is achieved by means of roller compaction. A freshly laid asphalt layer behind a paver is a loose and evenly distributed mat of hot asphalt mixture with a certain thickness (or depth). The asphalt layer after compaction is a denser layer with a reduced thickness, a smooth and uniform surface, and a homogenous appearance. In-place density of an asphalt pavement is achieved from a combination of proper design, production, placement, compaction, and quality control of the mixture. This density is typically stated as a percentage of the asphalt mixture's theoretical maximum specific gravity (Gmm). Past studies have shown that as little as one percent increase of in-place density can lead to a 10 - 30 percent increase in service life of asphalt pavements. Anticipated cost savings due to increased service life are significantly greater than the added costs for achieving increased density. Advancements in technology and pavement design/construction techniques yield the potential for increased asphalt pavement density, durability, and cost-effectiveness. Although these advancements are already being employed, standards for in-place density have remained unchanged. With enhanced density targets, improved durability and extended pavement service life is possible.

The objective of this project is to evaluate the effects of increased asphalt pavement density on field performance. A demonstration pavement will be constructed to include a control section meeting the current minimum density requirement and a test section having an average 1.5 percent density increase, with subsequent evaluation of volumetric properties and performance characteristics of laboratory and field asphalt samples.

The demonstration project is H.009549 - US 190 from W. Junction LA 16 to Junction LA 447.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS
-Task 1:Provided technical support for options to increase pavement density and collect relevant project data; -Task 2:Evaluated volumetric properties of both control and increased density designed asphalt mixtures; -Task 3:Collected relevant mixing plant and mixture production data; -Task 4:Monitored and collect relevant field construction data; -Task 5:Conduct in-situ density measurements and collect pavement cores from the measurement spots on both control and increased density sections; -Task 6:Conducted laboratory volumetric and performance tests (Loaded Wheel Track (LWT), Semi-Circular Bend Test (SCB), and E*) on field cores; -Task 7:Analyzed test data to determine the effect of increased density on volumetric properties and laboratory performance test results; -Task 8:Develop plans for monitoring long-term pavement performance; and -Task 9:Prepare a summary report.
FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES
-Task 7:Continue Analyses of test data to determine the effect of increased density on volumetric properties and laboratory performance test results; -Task 8:Develop plans for monitoring long-term pavement performance;, and -Task 9: Prepare a summary report.

Self-Generated Funded Research Program

LTRC Annual Research Program
Fiscal Year 2018-2019

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 2019-2020 Budget		
Total Cost	(original)	$337,312	**Total**		**$97,000**
	(revised)				
Est. Expended to Date		$202,504	Salaries		$35,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$100,000	Equipment	(non-expendable)	
	(revised)		Travel		$8,000
Est. FY Expenditure		$100,000	Other		$54,000

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 technologits and FMM data to evaluate performance and behavior, analyze problems and design 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 two 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 2018 - 2019 ACCOMPLISHMENTS

-PowerPoint versions of all the five foundational education modules were completed to assist the students;
-PowerPoint versions of all the four structural engineering education modules were completed;
-The readiness exams were developed for all the four structural engineering education modules.;
-The experimental set up was fabricated for demonstrating the SHM equipment to students and faculty partners;
-An instructor's planning guide was prepared and made available to the faculty at the partnering institutions;
-Mastery exams and discussion questions were developed for all the structural engineering education modules;
-A special workshop for gaining feedback from the faculty partners was held at LTRC; and
-Annual progress report was submitted to NSF and an extension request was made and approved.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES
-All the modules will be updated to reflect the feedback from the faculty partners; -A workshop for faculty will be held in conjunction with the International Structural Health Monitoring Conference to be held in St. Louis in August, 2019; -A summit sponsored by NSF for undergraduate and graduate education on structural health monitoring is planned for in August as a post conference activity; A white paper has been prepared for securing NSF support for the summit; - The project website will be updated and made available for all faculty to access and utilize the modules and the material developed in this project; and - An advisory board meeting is planned to update on all the tasks completed in the project. Justification for expenses in the "Other" category. This NSF project involves two consultants, four partner institutions (Case Western Univ., Virginia Tech, University of North Florida & Tuskegee University), and one sub-awardee (LSU). The total expenses for all these collaborators will be $54,000 in FY19-20.

Other DOTD
Funded Projects

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	**Louisiana Traffic Records Management System Support**	**Project Status:**	**Ongoing**
Funding Source:	**Safety**	**Budget Category:**	**Other DOTD Sections**

SIO:	**DOTLT1000151**	Project Start Date:		10/1/2016
Research Project Number:	17-2SS	Completion Date	(original)	9/30/2019
Research Agency:	Highway Safety Research Group	Completion Date	(revised)	
Principal Investigator:	Helmut Schneider			

BUDGET STATUS

Total Budget			**Estimated 2019-2020 Budget**		
Total Cost	(original)	$8,291,932	**Total**		**$750,000**
	(revised)				
Est. Expended to Date		$6,500,000	Salaries		$690,329
FY 2018 - 2019 Budget			Consumable Supplies & Materials		
FY Funds	(original)	$2,835,367	Equipment	(non-expendable)	$28,755
	(revised)		Travel		$20,500
Est. FY Expenditure		$2,835,367	Other		$10,416

PURPOSE AND SCOPE

This project will support the efforts to establish and maintain an effective information system that integrates all data relating to highway safety such as crash data, road inventory, COBRA data, traffic citation conviction data, drivers license history files, etc. The scope of the work includes timely collection of crash data, QA of crash information, maintaining LSU's crash database, facilitating integration of crash data with other safety data, problem identification, dissemination of information to stakeholders and the public, and Technical Assistance.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

All tasks were worked on continuously during the FY and written monthly progress reports were submitted to Louisiana Department of Transportation and Development (LADOTD) and the Louisiana Transportation Research Center (LTRC).
-Task 1:Literature Review;
-Task 2:Data Collection;
-Task 3:Interim report (monthly);
-Task 4:Data Analysis; and
-Task 5:Final Report (Annual).

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Continue work on all tasks.

Equipment Budget Justification is $28,755 of the total cost of $87,113 equipment costs per year (see list below). This equipment will be used 25% of the time on this project.
-Kofax Scanning Software - $1,050
-iBackup Software - $500
-Developer Express Software - $680
-Nagios Software - $2,000
-GoTo Meeting Software - $468
-TeamViewer Software - $1,800
-CETE Software - $2,513
-RedGate Software - $1,400
-Rapid Spell Desktop Software - $199
-HDClone Software - $120
-AT Solutions Electronic LACrash Manual Software - $12,000
-AT Solutions Easy Street Draw Software License - $36,435
-Thawte Software - $350
-Kagi Software - $108
-Tableau Software - $25,000
-Tableau Desktop Software - $1,200
-Aomei Backupper Tech Software - $730
-xSQL Data Compare Software - $400
-DNS Madeeasy Software - $80
-Backup Assist Software - $80

Travel Budget of $20,500
-LACRASH support local travel - $2500
-FARS analyst annual training - $2,000
-ATSIP Conference (6 attendees) - $12,000
-GHSA (2 attendees) - $4,000

Annual Other (Operating Services) Budget of $41,666 (only 3 months, or 25% of each amount for FY 19/20...therefore $10,416). The items below are annual costs:
-Venyu Disaster Recovery Plan - $36,066
-Newspaper Clipping Service - $2,400
-Shipping Costs - $1,200
-Printing for Annual Fact Book - $2,000

Title:	**Economic Evaluation of Applicants to the Port Construction and Development Priority Program**	**Project Status:**	**Ongoing**
Funding Source:	**Port Priority Program**	**Budget Category:**	**Other DOTD Sections**

SIO:	**DOTLT1000148**		Project Start Date:		7/1/2016
Research Project Number:	17-1SS		Completion Date	(original)	12/31/2017
Research Agency:	LSU		Completion Date	(revised)	6/30/2020
Principal Investigator:	James Richardson				

BUDGET STATUS

Total Budget				**Estimated 2019-2020 Budget**		
Total Cost	(original)	$83,732		**Total**		**$41,868**
	(revised)	$167,464				
Est. Expended to Date		$41,868		Salaries		$41,868
FY 2018 - 2019 Budget				Consumable Supplies & Materials		
FY Funds	(original)	$86,732		Equipment	(non-expendable)	
	(revised)	$41,868		Travel		
Est. FY Expenditure		$41,868		Other		

PURPOSE AND SCOPE

The main objective of this project is to perform research and analysis of the Port Priority Program applications to ensure the State is receiving the required minimum rate of return on the State's investment.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

This project was extended through June 2020 to facilitate additional application submittal periods. This FY, 6 applications have been analyzed.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

Review/analyze applications as necessary.

LTRC Annual Research Program
Fiscal Year 2019-2020

Title:	**Louisiana Local Road Safety Program**	**Project Status:**	**Proposed**
Funding Source:	**Safety**	**Budget Category:**	**Other DOTD Sections**

SIO:	**DOTLT1000322**	Project Start Date:		7/1/2019
Research Project Number:	20-LRSP	Completion Date	(original)	6/30/2020
Research Agency:	LTRC	Completion Date	(revised)	
Principal Investigator:	Marie Walsh			

BUDGET STATUS

Total Budget		
Total Cost	(original)	$379,989
	(revised)	
Est. Expended to Date		
FY 2018 - 2019 Budget		
FY Funds	(original)	
	(revised)	
Est. FY Expenditure		

Estimated 2019-2020 Budget		
Total		**$379,989**
Salaries		$317,989
Consumable Supplies & Materials		
Equipment	(non-expendable)	
Travel		
Other		$62,000

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 2018 - 2019 ACCOMPLISHMENTS

-Received, processed and evaluated 10 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 two Local Road Safety Plan Webinars for our Louisiana Regional Safety Coalition Coordinators and the MPO technical support staff. Presented nine workshops on Intersection Basics: Safety, Operations and Accessibility to 164 attendees statewide;
-Reviewed numerous drafts of Local Road Safety Plans, making suggestions and recommendations. Currently there are 11 Parishes with Local Road Safety Plans and 9 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 Program Manager 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 SHSP, LRSP Program, and Local Road Safety Plans and LRSP Project;
-Participated as a core member of the team developing the new Road Safety 101 classes for Louisiana safety practitioners; and
-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.

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES
Other Justification: -Contracts for special services for the Local Road Safety Program. -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 TC3; NHI; FHWA; 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; -Participate in development and presentation of LTAP Roadway Departure Workshops for Local Agency road owners in nine 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.

Title:	**The Future of the Louisiana Marine Transportation System: A System Analysis and Plan to Move Freight by Water**	**Project Status:**	**Proposed**
Funding Source:	**Office of Multimodal Commerce**	**Budget Category:**	**Other DOTD Sections**

SIO:			Project Start Date:		9/1/2019
Research Project Number:			Completion Date	(original)	8/31/2020
Research Agency:			Completion Date	(revised)	
Principal Investigator:					

BUDGET STATUS

Total Budget			**Estimated 2019-2020 Budget**		
Total Cost	(original)	$290,000	**Total**		**$250,000**
	(revised)				
Est. Expended to Date			Salaries		$245,000
FY 2018 - 2019 Budget			Consumable Supplies & Materials		$1,000
FY Funds	(original)		Equipment	(non-expendable)	
	(revised)		Travel		$4,000
Est. FY Expenditure			Other		

PURPOSE AND SCOPE

Louisiana's marine transportation system is important to the State of Louisiana and the nation. Quantifying and characterizing that importance, both historically and in the future, is essential information to decision makers (e.g. DOTD's Office of Multimodal Commerce) when contemplating how to plan for the future of Louisiana's inland waterway system, coastal waterways, and deep draft waterways. The purpose of this research project is to document the importance of waterborne commerce to the State of Louisiana and the nation by (1) identifying the type and value of waterborne commerce, (2) identifying improvements needed to achieve greater utilization of the waterways, and (3) identifying landside bottlenecks where transportation of commerce on a nearby waterway would reduce road congestion. In addition to a final report, it is expected that a major deliverable of this research will be a draft of a waterways transportation plan that could be included in DOTD Statewide Transportation Plan.

FISCAL YEAR 2018 - 2019 ACCOMPLISHMENTS

None

FISCAL YEAR 2019-2020 PROPOSED ACTIVITIES

To be determined based on the RFP developed by the PRC and the subsequent selected proposal.

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
32	A Comparative Analysis of Intermodal Ship-to-Rail Connections and Truck Chassis Access at Louisiana Deep Water Ports

LTRC Annual Research Program

Fiscal Year 2019-2020

Final Ranking	2019 RPIC PROBLEM STATEMENTS
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