





**Sherri H. LeBas, P.E.**  
**Secretary**



**F. King Alexander, Ph.D.**  
**Chancellor**

The Louisiana Transportation Research Center (LTRC) is a research, technology transfer, and training center administered jointly by the Louisiana Department of Transportation and Development (DOTD) and Louisiana State University (LSU). LTRC provides a setting in which the thresholds of technology can be explored and applied in practical ways. By merging the resources of DOTD and LSU, a versatile core of facilities and expertise addresses the rapidly evolving challenges in the transportation field.

In addition to its affiliation with LSU, LTRC participates fully with other universities in Louisiana that house engineering programs (Louisiana Tech University, McNeese State University, Southern University, Tulane University, University of Louisiana at Lafayette, and University of New Orleans). By combining their resources with those of DOTD, the center eliminates duplication of effort and provides a richer base of support. The center also provides an avenue for multi-disciplinary support from universities to meet the practical and academic needs of the transportation industry in such areas as engineering, law, business and management, basic sciences, planning, and environmental studies.

Since its creation by the Louisiana legislature in 1986, LTRC has gained national recognition through its efforts to improve transportation systems in Louisiana. The center conducts short-term and long-term research and provides technical assistance, training, continuing education, technology transfer, and problem-solving services to DOTD and the transportation community at large. The center is largely supported through funding authorized by DOTD and the Federal Highway Administration (FHWA).

LTRC merges the resources of the state and local government, universities, and private industry to identify, develop, and implement new technology to improve the state's transportation system. By harnessing these valuable resources, LTRC is empowered to find innovative solutions to Louisiana's transportation problems.

To enhance the center as the focus for transportation-related research, technology transfer, and education in Louisiana, the LTRC Foundation, a non-profit organization, has been established. The foundation provides an excellent partnership opportunity for DOTD, state universities, and the private sector.

In these and other ways, LTRC is paving the way for more efficient and beneficial research and training, thanks to a combination of modern techniques, locally available resources, and a wide pool of support.



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This publication is a report of the transportation research, technology transfer, education, and training activities of the Louisiana Transportation Research Center for July 1, 2014–June 30, 2015. The center is sponsored jointly by the Louisiana Department of Transportation and Development and Louisiana State University.





Located on the LSU campus in Baton Rouge, LTRC provides researchers and students access to excellent laboratories and state-of-the-art research equipment. The full resources of LSU as a Carnegie Designated Doctoral/Research Extensive Institution are also available. The unique position of LTRC provides access to virtually all of LSU and DOTD’s resources to pursue its mission.



LTRC houses more than 90 employees and up to 30 students in two adjacent facilities. The LTRC building is a 25,300-square foot facility that includes five research laboratories, a conference room, and offices. The laboratories are used to conduct advanced research into asphalt, concrete, soils, and pavements. The 14,000-square foot Transportation Training and Education Center (TTEC) houses a lecture hall, a computer-based training classroom, and two general classrooms that are all equipped with advanced education and training equipment and distance learning/video-conferencing capabilities. A comprehensive transportation library and offices are also included.



LTRC has identified research areas of strategic importance and has developed expanded capabilities for concentration in several areas: the Engineering Materials Characterization Research Facility (EMCRF), a laboratory facility specializing in fundamental materials characterization; the Geotechnical Engineering Research Laboratory (GERL), a laboratory focusing on transportation earth-works, structural foundations, and geosynthetics; Pavement on the Move (POM), a multi-use mobile laboratory for collecting data from field construction projects as well as research and training; and the Intelligent Transportation Systems (ITS) lab, the newest lab designed to evaluate traffic data collected from Louisiana’s traffic management centers. Although remote from the center, the Louisiana Pavement Research Facility is an important facility that streamlines pavement loading research by compressing years of road wear into months of testing. The six-acre facility is located on the west side of the Mississippi River and incorporates an Accelerated Loading Facility (ALF™) for testing flexible pavements and our ATLAS for testing rigid pavements.

(top to bottom)  
Louisiana Transportation  
Research Center;  
Transportation Training  
and Education Center;  
Accelerated Loading Facility

The addition of TTEC greatly enhances LTRC’s mission by facilitating the delivery of training, professional development opportunities, and technology transfer to engineers, technicians, undergraduate and graduate students, and professionals from both the public and private domains.

LTRC is a budget division of the Louisiana Department of Transportation and Development. Funding is a combination of State, State Planning and Research (Part II, Federal), Innovative Bridge Research and Deployment (Federal), Surface Transportation Program (STP-Federal), and external contracts and grants, such as the National Cooperative Highway Research Program, Federal Agency Grants, and the National Science Foundation.

# DIRECTOR'S MESSAGE

Inside this report you will find featured articles on the research program, education and training, and technology transfer activities. Completed and active research projects, training accomplishments, technology transfer activities, support of higher education and publications and presentations are included.

LTRC continues its strong focus of solving transportation problems. We are currently sponsoring 53 active formal research studies. Part of this is related to our partnership in the National Center for Intermodal Transportation for Economic Development Competitiveness (NCITEC), a Tier 1 University transportation Center housed at Mississippi State University. You will note that five of the UTC projects in the freight and safety areas are coming to fruition and have been published. Similarly, our partnership in the Southeast Transportation Consortium, a pooled fund collaborative effort with the twelve SASHTO states, has produced five synthesis studies in areas of common interest.

This year, Louisiana hosted the annual meeting of the Southeastern Association of State Highway and Transportation Officials in New Orleans, SASHTO 2014. This is a premier technology transfer activity for the twelve southeastern states and Puerto Rico. The annual meeting, presided over this year by Louisiana DOTD Secretary Sherri LeBas, was themed "Transportation Innovation: Building the Future." This year's opening session featured Mike Hancock, Secretary of the Kentucky Transportation Cabinet and President of AASHTO; David Vitter, US Senator Louisiana, who serves on the Committee on Environment & Public Works; and Greg Nadeau, Acting Administrator of FHWA. The general session's keynote speaker was Dr. Mae Jemison, the first woman of color in the world to go into space, serving six years as a NASA astronaut. In addition to executive level meetings, 25 technical sessions were conducted over the three day conference. Over 1,300 people participated. A number of LTRC personnel were involved in the planning and execution of this event.

One of the two LTRC research projects featured in this report was among those highlighted in an AASHTO High Value Research special publication in 2015 and received an award at the annual AASHTO Research Advisory Committee meeting. *Improving Freight Crash Incident Management* determined the most effective way to mitigate the effect of freight crash incidents on Louisiana freeways.

Finally, a new addition to the LTRC family was introduced this year, the Louisiana Center for Transportation Safety (LCTS). LCTS provides a foundation and mechanism to facilitate the development of sustainable systems to improve highway safety and achieve the goal of zero deaths on Louisiana's roads. LCTS will expand LTRC's highway safety initiatives through applied and theoretical safety-related research projects; workforce development and training of current transportation professionals; academic program enhancements for college-attending students in transportation and safety-related disciplines; technical assistance about practical application of effective infrastructure and non-infrastructure safety countermeasures; collaboration with state and local highway safety professionals to address prioritized safety areas through coalitions; outreach to local government municipalities to promote funding programs that utilizes federal-aid funds for safety improvements on locally owned and maintained roads; and knowledge transfer support through technology to build a comprehensive program serving more stakeholders and customers.

Respectfully submitted,



Harold "Skip" Paul, P.E., Director

# COMPLETED RESEARCH

LTRC #	Project Title	Principal Investigator	Agency
12-2PF Final Report 515	Asphalt Surface Treatments for Pavement Preservation	Hesham Ali	FIU
11-2B Final Report 519	Evaluation of Dynamic Shear Rheometer Tests for Emulsions	Nazimuddin M. Wasiuddin	LTU
10-3GT Final Report 521	Design Values of Resilient Modulus of Stabilized and Non-stabilized Base	Khalil Hanifa	LTRC
13-2SA Final Report 524	DOTD Support for UTC Project: Developing a Highway Safety Fundamentals Course	Xiaoduan Sun	ULL
10-4ST Final Report 528	Development of Wave and Surge Atlas for the Design and Protection of Coastal Bridges in South Louisiana	D. Max Sheppard	Ocean Engineering Associates, Inc.
10-4P Final Report 518	Development of Cost-Effective Pavement Treatment Selection and Treatment Performance Models	Mohammad Jamal Khattak	ULL
13-5SS Final Report 542	DOTD Support for UTC Project: Improving Freight Crash Incident Management	Chester Wilmot	LTRC
08-2ST Final Report 535	Monitoring Bridge Scour Using Fiber Optic Sensors	Steve C.S. Cai	LSU
12-5C Final Report 533	Comparison of Conventional and Self-Consolidating Concrete for Drilled Shaft Construction	Tyson Rupnow	LTRC
14-4TIRE	User Sentiment Analysis with Louisiana Social Media Data for Better and Effective Crash Countermeasures	Xiaoduan Sun	ULL
07-1ST Final Report 529	Structural Health Monitoring of the I-10 Twin Span Bridge Over Lake Pontchartrain	Murad Abu-Farsakh	LTRC
12-4SA Final Report 540	DOTD Support for UTC Project: Development of a Tool for Documenting, Tracking, Recording, and Analyzing Improvements to Intersection Sites and Roadway	Helmut Schneider	LSU
12-1PF Final Report 538	Traffic and Data Preparation for AASHTO MEPDG Analysis and Design	Kelvin Wang	OSU
14-2PF Final Report 543	Real time Driver Information for Congestion Management	Sherif Ishak	LSU
14-3PF Final Report 544	Transportation Funding Sources and Alternatives in the Southeastern States Now and in the Future	James Brian Gibson	KTC
14-4PF Final Report 541	Mitigation Strategies for Reflective Cracking in Pavements	Mostafa Elseifi	LSU

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## Completed Research, continued

LTRC #	Project Title	Principal Investigator	Agency
07-4ST	Integral Abutment Bridge for Louisiana's Soft and Stiff Soils	George Z. Voyiadjis	LSU
07-1B	Evaluation of Warm Mix Asphalt Technology in Flexible Pavements	Louay Mohammad	LTRC
11-1B	Validity of Multiple Stress Creep Recovery Test for DOTD Asphalt Binder Specification	Md. Sharear Kabir	LTRC
11-4B	Modulus Based Construction Specification of Earthwork and Unbound Aggregate	Louay Mohammad	LTRC
11-3B	Testing and Analysis of LWT and SCB Properties of Asphaltic Concrete Mixtures	Samuel B. Cooper, III	LTRC
12-3SA	DOTD Support for UTC Project: Calibration of the Louisiana Highway Safety Manual	Brian Wolshon	LSU
12-2ST	Field Performance of Timber Highway Bridges: A National Study	Vijaya Gopu	LTRC
15-4SS	Assessment of Sedimentation Affecting Riverine Ports in Louisiana	James Amdal	UNO
14-2TIRE	Hurricane Hazard Mitigation in Traffic Light Support Structures	Aly Moussaad Aly	LSU
14-3TIRE	A Novel Magnetostriction Based Sensing Technology for Rapid Condition Assessment of Bridge Decks	Arun Jagnathan	LTU
06-3GT	Field Evaluation of Roller Integrated Intelligent Compaction Monitoring	Gavin Gautreau	LTRC
13-6GT	Development of LADOTD Standards for GPS Elevation Accuracy	Joshua Kent	LSU
14-1GT	Calibration of Region-Specific Gates Equation for LRFD	Ed Tavera	GeoStellar Engineering, LLC
14-2GT	Testing Protocol for Predicting Pile Behavior within Pre-Bored Soil	Malay Ghose Hajra	UNO
12-4P	Development of DARWin-ME Design Guideline for Louisiana Pavement Design	Zhong Wu	LTRC
12-5P	Evaluation of DOTD Aggregate Friction Rating Table by Field Measurements	Zhong Wu	LTRC
10-4B	Development of Performance Based Specifications for Louisiana Asphalt Mixtures	Louay Mohammad	LTRC
12-3B	Chemical Characterization of Asphalts Related to Their Performance	William H. Daly	LSU
12-3ST	Morganza Floodway Bridge Bent Repair using Carbon Fiber Reinforced Polymers (CFRP)	Vijaya Gopu	UNO
14-3SA	Developing a Method for Estimating Traffic Volumes on Local Roads in Louisiana	Xiaoduan Sun	ULL
12-4SS	DOTD Support for UTC Project: Development of Minimum State Requirements for Local Growth Policies	John Renne	UNO
13-2SS	DOTD Support for UTC Project: Travel Time Estimation Using Bluetooth	Chester Wilmot	LTRC
14-4SS	Feasibility of using Local Public Transit Resources for Evacuations and Other Unscheduled Needs	Chester Wilmot	LTRC
13-2C	Laboratory Evaluation of 100% Fly Ash Cementitious Systems	Tyson Rupnow	LTRC
14-3C	Laboratory Fatigue Evaluation of Continuously Fiber Reinforced Concrete Pavement	Tyson Rupnow	LTRC
14-1PF	Best Practices for Achieving and Measuring Pavement Smoothness	David Merritt	The Transtec Group

# ACTIVE RESEARCH

LTRC #	Project Title	Principal Investigator	Agency
08-3GT	Support Study to Structural Health Monitoring of the I-10 Twin Span Bridge Over Lake Pontchartrain	Murad Abu-Farsakh	LTRC
11-1GT	In Situ Evaluation of Design Parameters and Procedures for Cementitiously Treated Weak Subgrades using Cyclic Plate Load Tests	Murad Abu-Farsakh	LTRC
11-2GT	Field Instrumentation and Testing to Study Set-Up Phenomenon of Piles Driven into Louisiana Clayey Soils	Murad Abu-Farsakh	LTRC
11-3GT	Accelerated Load Testing of Geosynthetic Base Reinforced Pavement Test Sections	Murad Abu-Farsakh	LTRC
13-5GT	Monitoring of In-Service Geosynthetic Reinforced Soil (GRS) Bridge Abutments in Louisiana	Murad Abu-Farsakh	LTRC
13-7GT	Support Study to ITRS proposal on "An Integrated Computational and Experimental Study of Pile Setup in Soft Clays"	Murad Abu-Farsakh	LTRC
13-9GT	CORS 911: Continuously Operating Reference Stations for the Bayou Corne Sinkhole	Joshua Kent	LSU
12-11P	Field Validation of Equivalent Modulus for Stabilized Subgrade Layer	Mark Martinez	LTRC
10-3P	LED Traffic Signal Lifetime Management System	Leticia Courville	LTRC
12-1P	Assessment of Pavement Distresses caused by Trees on Rural Highway	Kevin Gaspard	LTRC
12-2P	Assessment of Environmental, Seasonal and Regional Variations in Pavement Base and Subgrade Properties	Kevin Gaspard	LTRC
12-3P	Minimizing Shrinkage Cracking in Cement-Stabilized Bases Through Micro-Cracking	Zhong Wu	LTRC
12-7P	Roller Compacted Concrete Over Soil Cement Under Accelerated Loading	Zhong Wu	LTRC
14-2P	Assessment of Structural Capacity Indicators from Rolling Wheel Deflectometer Data Collection in Louisiana	Mostafa Elseifi	LSU
10-1B	Field versus Laboratory Volumetrics and Mechanical Properties	Louay Mohammad	LTRC
12-1B	Evaluation Of Asphalt Mixtures Containing Recycled Asphalt Shingles	Louay Mohammad	LTRC
12-4B	Performance of WMA Technologies: Stage II – Long-term Field Performance	Louay Mohammad	LTRC
14-1B	Effects of Temperature Segregation on the Quality of Asphalt Mixtures	Louay Mohammad	LTRC
14-2B	Field Implementation of the Louisiana Interface Shear Strength Test	Louay Mohammad	LTRC
10-5ST	Developing Prestressed Girder Transportation Guidelines	Jonathan McGormley	Wiss, Janney, Elstner Associates, Inc.





LTRC #	Project Title	Principal Investigator	Agency
13-2ST	Live Load Monitoring of the I-10 Twin Span Bridge	Steve C.S. Cai	LSU
13-4ST	I-10 Girder Repair Using Post-Tensioned Steel Rods and Carbon Fiber Composite Cables (CFCC)	Ching Tsai	LTRC
14-1ST	Evaluating Louisiana New Continuity Detail for Girder Bridges	Ayman Okeil	LSU
13-10SS	Economic Evaluation of Applicants to the Port Construction and Development Priority Program	James Richardson	LSU
14-1SA	DOTD Support For UTC Project: Drugged Driving in Louisiana	Helmut Schneider	LSU
14-2SA	Factors Influencing Seatbelt Utilization in Louisiana and Strategies to Improve Usage Rate	Helmut Schneider	LSU
10-6SS	Establishing an Intelligent Transportation Systems (ITS) Lab at LTRC (Phase II)	Sherif Ishak	LSU
12-1SS	DOTD Support for UTC Project: Traffic Counting using Existing Video Detection Cameras	Sherif Ishak	LSU
12-2SS	History of the Implementation of AASHTO and Louisiana DOTD Road Design Standards	Sherif Ishak	LSU
13-4SS	Highway for Life Demonstration Project: La 511 (70th Street)	Nazimuddin Wasiuddin	LTU
14-1SS	DOTD Support For UTC Project: Development of an Optimal Ramp Metering Control Strategy for I-12	Sherif Ishak	LSU
14-2SS	DOTD Support For UTC Project: A Simulation Model for Intermodal Freight Transportation in the State of Louisiana	Peter Kelle	LSU
12-4C	Evaluation of Portland Cement Concrete with Internal Curing Capabilities	Tyson Rupnow	LTRC
13-1C	Evaluation of MIT-SCAN-T2 for Thickness Quality Control for PCC and HMA Pavements	Tyson Rupnow	LTRC
14-1C	Evaluation of Dowel Bar Alignment and Effect on Long Term Performance of Jointed Concrete Pavements	Tyson Rupnow	LTRC
14-4C	Evaluation of Bonded Concrete Overlays over Asphalt under Accelerated Loading	Tyson Rupnow	LTRC
14-5C	DOTD Support for UTC Project: Development of Rapid PCC Pavement Repair Materials and Construction Techniques	Hak-Shul Shin	Southern University
15-3GT	Calibration of LRFD Geotechnical Axial (Tension and Compression) Resistance Factors for California	Murad Abu-Farsakh	LTRC
15-2GT	Lime Utilization in the Laboratory, Field, and Design of Pavement Layers	Mostafa Elseifi	LSU

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# ACTIVE RESEARCH

LTRC #	Project Title	Principal Investigator	Agency
15-2B	Support Study for Evaluation of Crumb Rubber Modification of Louisiana Mixtures	William H. Daly	LSU
15-1B	Evaluation of Crumb Rubber Modification of Louisiana Mixtures	Samuel B. Cooper, III	LTRC
14-3B	Hamburg Wheel-Track Test Equipment Requirements and Improvements to AASHTO T 324	Louay Mohammad	LTRC
15-3ST	Rehabilitation of Deteriorated Timber Piles using Fiber Reinforced Polymer (FRP) Composites	Hota-WVU GangaRao	
15-1ST	Development of Wave and Surge Atlas for the Design and Protection of Coastal Bridges in South Louisiana Phase II	D. Max Sheppard	INTERA Incorporated of Texas
15-3SS	Investigation into Legislative Action Needed to Accommodate the Future Safe Operation of Autonomous Vehicles in the State of Louisiana	Chester Wilmot	LTRC
14-2C	Implementation of Concrete Maturity	Tyson Rupnow	LTRC
16-3TIRE	Development of High Strength Super Light Weight Concrete for Transportation Infrastructures	Shaurav Alam	LTU
16-2TIRE	Easy Add-on Fuel Saver for Non-Hybrid Vehicles	Chandra Theegala	LSU
16-1TIRE	Development of a Composite Bridge System for Short and Medium-span Bridges	Fatmir Menkulasi	LTU
14-5PF	Design and Analysis Procedures for Asphalt Mixtures Containing High-RAP Contents and/or RAS	Louay Mohammad	LTRC
15-3SA	Investigating Safety Impacts of Centerline Rumble Strip, Lane Conversion, Roundabout and J-turn Features on Louisiana Highways	Xiaoduan Sun	ULL
15-2SA	Development of a Simulation Test Bed for Connected Vehicles using the LSU Driving Simulator	Sherif Ishak	LSU
15-1SA	Exploring Naturalistic Driving Data for Distracted Driving Measures	Sherif Ishak	LSU

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# RESEARCH HIGHLIGHTS

## Louisiana Center for Transportation Safety: A Critical Need to Reach Destination Zero Deaths

Destination Zero Deaths is the vision of Louisiana’s Strategic Highway Safety Plan (SHSP) which implements strategies to accelerate the decrease in motor vehicle crashes that cause deaths and serious injuries. This vision and plan are congruent with the National Strategy on Highway Safety – Towards Zero Deaths that is being implemented through a collaborative effort of national highway safety leaders and injury prevention organizations.

In an effort to achieve the state’s vision, Louisiana’s lead agencies in traffic safety and injury prevention have joined together to create the Louisiana Center for Transportation Safety (LCTS). The LCTS will enhance collaboration between traditional and new partners, promote road safety research and education, and provide technical assistance and technology transfer to the transportation community and related stakeholders.

Housed at the Louisiana Transportation Research Center (LTRC), the LCTS will build on the foundation created by LTRC to facilitate the development of sustainable systems to improve roadway safety and achieve the goal of zero deaths in Louisiana.

The LCTS goals include:

- To provide traffic safety research program development and implementation
- To develop a competent and well-trained highway safety workforce
- To identify opportunities for traffic safety related university programs and curriculum
- To improve technology transfer and training opportunities for highway safety

- To administer the Local Road Safety Program (LRSP) in coordination with DOTD Highway Safety Section
- To increase collaboration and to coordinate behavioral projects funded through the DOTD Strategic Highway Safety Plan and the Louisiana Highway Safety Commission Highway Safety Plan.

In January 2015, the LCTS officially joined the Louisiana traffic safety community as a member of the Louisiana Strategic Highway Safety Plan (SHSP) Implementation Team. The Safety Center Director, Dortha Cummins, was then appointed as co-chair of the SHSP Statewide Occupant Protection Emphasis Area Team. The Local Road Safety Program (LRSP) was transferred to the LCTS and continued to support local public agencies by providing local road data analysis, problem identification, project development, and delivery. The program also provided technical assistance to the Infrastructure and Operations Teams for the eight Regional Safety Coalitions.

The LCTS began developing a safety training program and hosted various webinars in coordination with DOTD and other safety stakeholders.



LCTS Staff (l to r):

Elisabeta Mitran, Ph.D., Research & Technical Assistance Manager

Kristy M. Miller, MPA, Workforce Development & Training Manager

Rudynah E. Capone, Local Road Safety Program Manager

Dortha Cummins, Director, LCTS

# RESEARCH HIGHLIGHTS & TECHNICAL ASSISTANCE

## Improving Freight Crash Incident Management



18-wheeler Crash on I-12  
<http://theadvocate.com/home/2017790-125/accident-closes-i-12-for-hours.html>

The objective of this study was to determine the most effective way to mitigate the effect of freight crash incidents on Louisiana freeways. Candidate incident management strategies were reviewed from practice in other states and from those published in the literature. Current legislation in the state was also reviewed. A procedure to estimate the cost of delay caused by an incident was developed and used to provide a rough estimate of the cost efficiency of an Instant Tow Dispatch Program and an Expedited Towing Program.

The Instant Tow Dispatch Program provides funding for the police agency to reimburse a tow company that has incurred a “dry run.” A dry run may occur because a driver involved in the incident has requested a specific tow company or the vehicle(s) involved in the incident was able to be driven away under its own power. Providing this reimbursement encourages police agencies to “instantly” dispatch a tow company to an incident as soon as there is an indication that a tow may be needed to clear the roadway.

Instant dispatch allows the tow company to be in route and access the scene before the queue from the accident reaches its maximum.

The Expedited Towing Program provides monetary incentives (in addition to normal towing and recovery charges) to tow companies that can recover heavy duty vehicles or cargo that are blocking travel lanes within a prescribed time frame. Both programs were estimated to be highly cost efficient with the estimated cost of delay far exceeding the estimated cost of the programs. Implementation of an Instant Tow Dispatch program and an Authority Removal Law was recommended.

*The two LTRC projects featured in this spread were among those highlighted in AASHTO High Value Research special publications in 2014 and 2015.*

## TECHNICAL ASSISTANCE

LTRC’s technical assistance program provides laboratory testing, field testing, and forensic investigation in direct response to Departmental inquiries for expert analysis on DOTD projects. LTRC also provides assistance to state universities for laboratory or field testing on research projects not funded by LTRC.

## Evaluation of Rutting Distresses on I-20

Noticeable rutting issues have been a problem for many years on a corridor of I-20, in both eastbound and westbound lanes, located near Minden, LA and near the Webster-Bienville parish line. At the request of the DOTD designers and District 04 engineers, the LTRC asphalt research group performed a small-scale forensic evaluation in December 2014. The request was made because a reconstruction project is planned and scheduled in an attempt to remediate the rutting issues observed.

## Bridge Repair Solution Reduces Traditional Costs

LTRC provided research implementation support for demonstrating the use of high-strength composites for structural repair when the pile cap of an end bent of the Morganza Spillway Bridge suffered extensive damage at the girder bearing locations. The project demonstrated a useful implementation of existing technology for cost-effective rehabilitation of bridge structures. The overall cost of the repair (\$15,000) using carbon fiber and inorganic polymer coating was one-third the cost of providing an external reinforcement retrofit, one-sixth the cost of replacing the pile cap, and one-tenth the cost of utilizing VARTM (Vacuum Assisted Resin Transfer Molding) cap repair. The damage was due to the pounding of the girders at the bearing locations by the adjacent concrete deck located on the approach side of the bent. The pounding caused heavy spalling of the concrete on the west face of the pile cap at the girder bearing locations and the spalling extended all the way to bearing plates.

The repair of the damaged pile cap was carried out as a demonstrated effort in conjunction with a major repair that was being

undertaken on the bridge. Structural grade high-adhesive epoxy concrete was utilized to patch the damaged areas of the pile cap. The repaired areas of the pile cap – namely, the bearing plate locations – were strengthened to prevent delamination of the repair material by confining it with high modulus carbon composite wrapping. An inorganic polymer coating that provides UV protection and prevents mold and mildew growth was utilized. The carbon fiber composite has complete chemical adhesion with the pile cap and its high modulus fibers will not allow the repair material to separate from parent concrete material.

The project clearly demonstrates the significant cost-savings that can be realized from effective implementation of existing composites technology for repairing and rehabilitating damaged components of the nation's highway infrastructure.



Pile cap repaired with high-strength composites.

### *Rutting Distresses (continued)*

An evaluation of the site and asphalt cores retrieved showed considerable deterioration of the binder course due to its moisture susceptibility and due to inadequate moisture drainage. The support structure of the road was damaged and settling occurred in the surface layers causing severe rut issues. Based on these findings, a full-depth rehabilitation of the asphalt pavement was recommended. Additional breaking of the original pavement should be performed in various areas of the old test sections. In addition, it was recommended that the current underdrain system be removed and replaced.

# WORKFORCE DEVELOPMENT

Because training is a necessary component of career advancement, DOTD supports and promotes an environment of continual learning. This atmosphere allows employees to maximize their potential and provide qualified personnel crucial to the effective management of the transportation system. Through specialized and intensive job-specific training and education programs, LTRC reaches out to the individual working in the transportation industry.

LTRC manages DOTD's Structured Training Program, Management Development Program, and Leadership Development program; develops maintenance and construction training materials and programs; coordinates seminars, workshops, and conferences for continuing education and professional development; and contracts with the private and public sectors for unique training needs.

Central to all of our training programs is the Transportation Training and Education Center (TTEC), which is dedicated to the delivery of transportation training, professional development opportunities, continuing education, and technology transfer to engineers, technicians, and other professionals from Louisiana's public and private sectors. As an extension of the Louisiana Transportation Research Center (LTRC), this facility is expanding the scope and availability of training, thereby serving a larger population. Each year, TTEC hosts programmatic initiatives for approximately 10,000 individuals (state, local, federal, and industry). TTEC is a progressive partnering effort between the public and private sectors of the transportation industry.

## DOTD Structured Training Unit

The DOTD Structured Training Program is a department-sanctioned, progressive training curriculum that requires specific work-related training be completed at each level of an employee's career path. DOTD supports and promotes an environment of continual learning and feels that training is a necessary component and an integral part of career advancement. Structured training can involve professional development, technical skills training, continuing education, and hands-on and on-the-job training. The program manages the work force development for personnel in construction, maintenance, and supervisory/leadership positions. The program also provides liaison assistance to headquarters personnel and district training personnel for policy interpretation and compliance decisions.

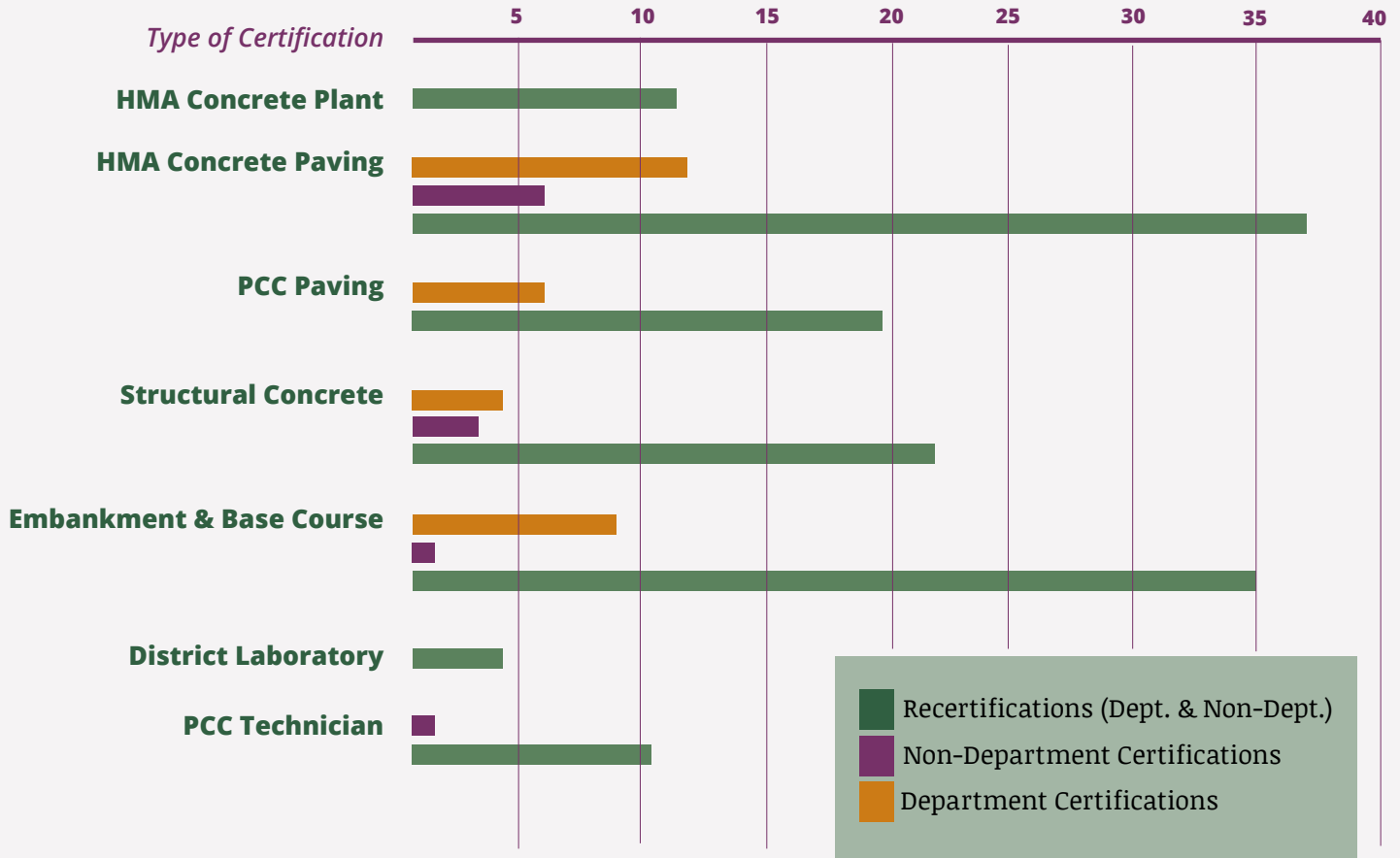
The Construction and Materials Training Program manages the Inspector/Technician Certification Program for DOTD and the Louisiana transportation industry. This program develops construction and materials

training materials and coordinates the training, testing, authorization, certification, and re-certification of inspectors and technicians on a statewide level in each area of construction. During fiscal year 2014-15, the unit awarded 42 new construction certifications and processed 143 re-certifications (see graphic on page 15)

The Maintenance Training Program focuses on the development of new job-specific courses related to job functions, work processes and safe operation of equipment used by maintenance field personnel. These courses promote an awareness of safe practices and attitudes needed for maximum job performance. A new committee was formed to create an Equipment Operation Certification Program to standardize and improve equipment training for maintenance functions.

Over the last year, with the assistance of the Transportation Curriculum Council, the LTRC training team finalized revisions to all of the Structured Training Programs taking the total from 150 programs to 96.

## Certification Actions for Fiscal Year 2014-15 Department & Non-department



## Presentations & Classes

- *Basic Flagging Procedures* class
- *Traffic Control Through Maintenance Work Areas* class
- *Lockout/Tagout* classes
- *Hand and Power Tool Safety* class
- *Poisonous Plants* class
- *Hazardous Communications* class
- *Duties of Personnel Assigned to Moveable Bridges*
- *Superpave Mix Design and Analysis* class
- *Highway Plan Reading Volume I* class
- *Highway Plan Reading Volume II* class
- *Project Management* classes
- *Email Etiquette* class
- *Facilitation Skills* classes
- *Process Mapping*
- *LTAP Site Manager* classes
- *Project Manager Manual* presentations



## Course Development

**There were 11 courses/projects developed or revised during this time period.**

### Construction Training Course/Projects Completed

- *Semi-Circular Bend Training Video*
- *Construction Inspection Training System (CITS)*
- *Revision of Application of Quality Assurance for Portland Cement Concrete and Structures*
- *Revision of Application of Quality Assurance for Asphaltic Concrete Mixtures*
- *Revision of Application of Quality Assurance for Embankment and Base Course*
- *Mathematics for Construction Personnel Volume 2 Manual*

### Maintenance Courses/Projects Completed

- *Revision of STP for District Sign Specialists*

### Other Projects Completed

- *Email Etiquette Web-Based*
- *EEO Biennial Meeting – Revision*
- *DOTD Project Manager's On-line Manual*
- *Revision and consolidation of all Structured Training Programs*

**There are 27 projects current/on-going.**

### Construction Current/On-Going Projects

- *Revision of Structural Concrete Inspection Volumes I and II manuals*
- *PCC Paving Inspection Manual* and supporting materials
- *PCC Plant Inspection Manual* and supporting materials
- *PCC Mix Design Manual* and supporting materials
- *Profiler Authorization Program*

- Numerous lab procedure instructional training videos
- *Introduction to Standard Specifications for Roads and Bridges–2015 edition*
- Updating Specialty Area and Recertification tests
- Aggregate Tester Program (Spec Delays)
- Incorporation of a Construction Inspection Online Testing System
- *Revision of Pre-Stressed Concrete Inspection* course
- *Creation of Structural Steel Welding Inspection* course
- Management of the Inspector/Technician Certification Program for DOTD and the Louisiana Transportation Industry
- Revision of Location and Design Math courses

### Maintenance On-Going Projects

- Equipment Operator Certification Program
- Basic Flagging Update
- Traffic Control Through Maintenance Work Areas Update
- *Small Signs and Sign Maintenance Field Guide*
- *Dangerous Insects/Poisonous Plants* Course
- *Maintenance Planning Manual Study Guide*
- IRF Videos and Supplements Update
- Practical Electricity Series 1-4

### Other Projects On-Going

- *Basic Business Math*
- *How to Prepare an Annual Budget*
- *How DOTD Works*
- *Project Management Handbook*





## Management Development Training Program

This program oversees several mandatory supervisory, management development, and career development training programs: the Management Development Training program, a structured training program for DOTD employees in a professional job series; the Engineering Technician Supervisory Training program; and the Civil Service Supervisory training program for supervisors.

Civil Service and CPTP (Comprehensive Public Training Program) did a complete revision of the Civil Service Supervisory Program that was implemented in January 2015. This included revising courses as well as adding a core level to the program, which serves as a foundation for the next three levels. They also added a continuing education requirement for supervisors that are finished with their programs. All DOTD employees who were affected were subscribed to the appropriate program level by July 1, 2015.

During fiscal year 2014-2015, courses for these training programs were delivered through several sources: the Civil Service CPTP, the DOTD Human Resources Section, and in-house training courses developed by LTRC.

There were 775 employees in the Management Development Program, 250 of them completed their course programs in FY 2014-15 and 235 are not yet complete.

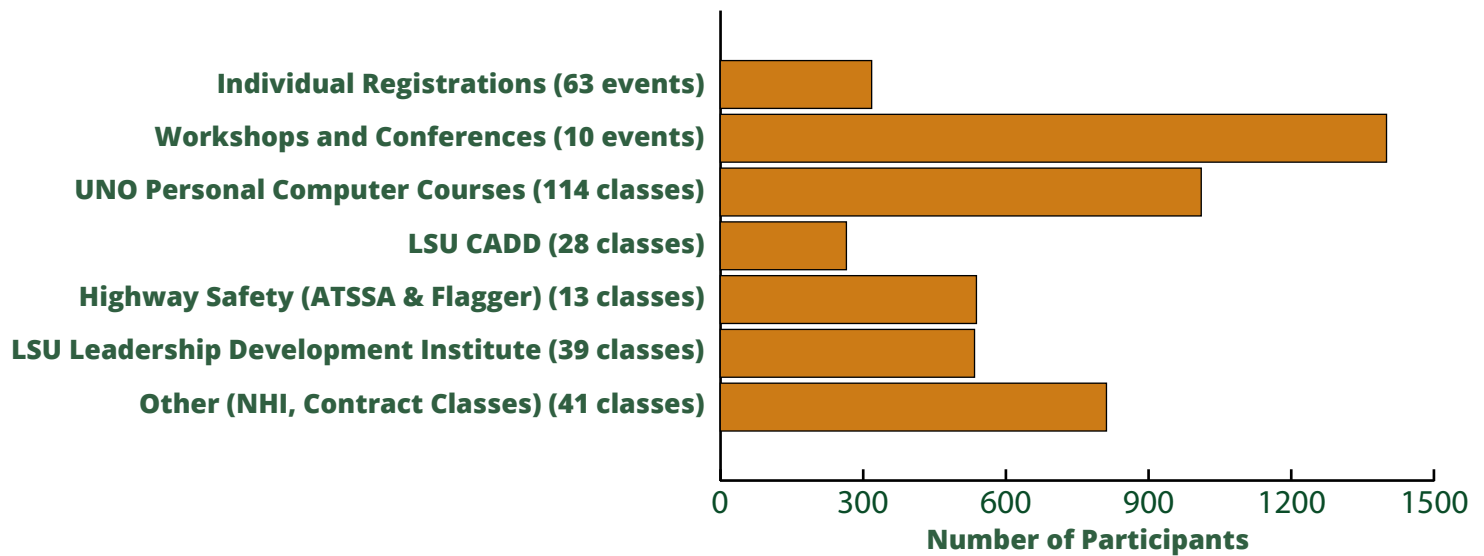
There were 349 employees in the CPTP Civil Service Supervisory Group Training Program, 235 of them completed their course programs in FY 2014-2015 and 114 not yet complete.

## Support for Higher Education

LTRC facilitates the DOTD Support Program for Civil Engineering Studies, a cooperative endeavor between DOTD and state universities with civil engineering programs. It provides practical experience to students who select transportation-related topics among their engineering design courses. DOTD supports this program financially, and universities grant academic credit to its participants. At the end of the senior design project, participants provide copies of the final report to LTRC and give a 15-20 minute presentation. Louisiana Tech University and the University of Louisiana at Lafayette participated in this program during 2014-2015. In addition, 35 graduate students were supported through LTRC research projects during 2014-2015.



## Overview of Participation in Transportation Training & Education Center (TTEC) Activities



*LTRC is committed to being a leader in workforce development. As LTRC's research section continues to focus on the future of transportation technology, the technology transfer and training section maintains its roots in the present—in making practical application of research's technological innovations and transferring them to the transportation community through aggressive implementation, training, and educational activities.*

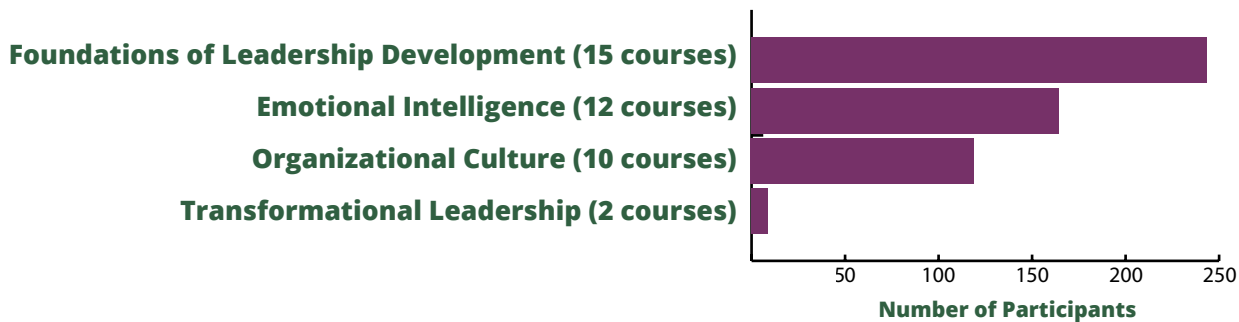




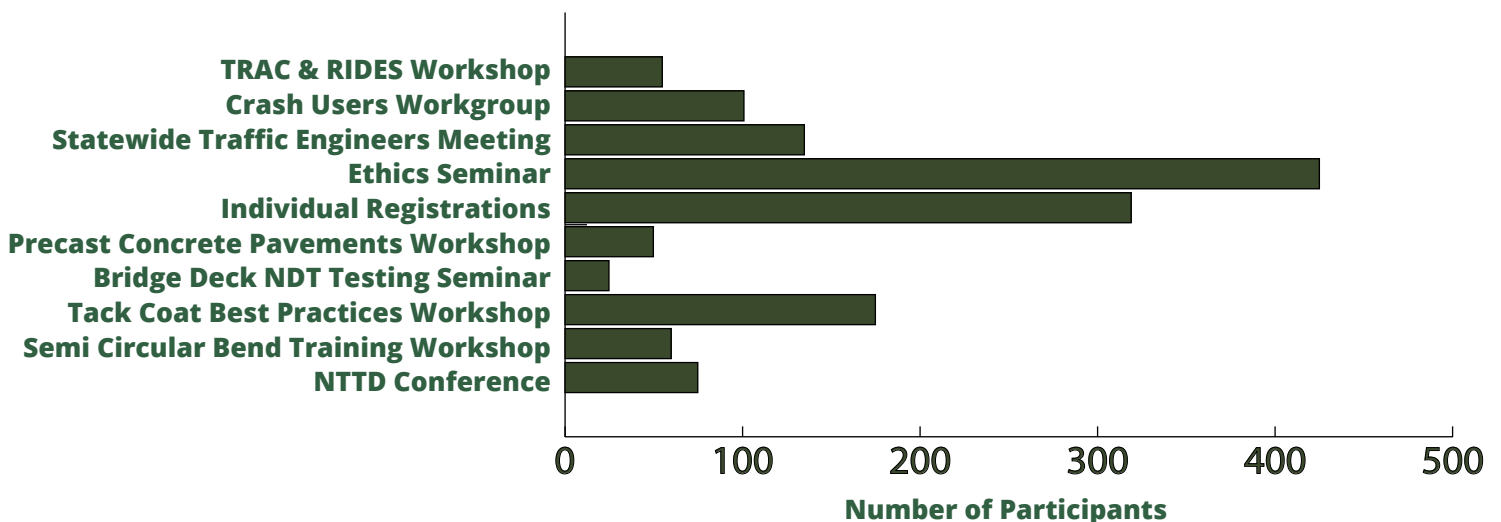
## Leadership Development Program

The Leadership Development Program (LDP) provides participants a process of continuous learning and the ability to apply the leadership methods discussed. In addition, the Leadership Development Program aims for everyone within the Department of Transportation and Development to adopt new behaviors and beliefs toward effective leadership and extend them to the highest levels of achievement.

The goal of this program is to introduce and promote competencies that will empower participants to recognize and improve their leadership skills. Emphasis will be on leadership competencies such as Excellence in Behavior, Communication, Relationships, Innovation, and Operational Agility. These competencies are essential to getting extraordinary things done in organizations. Leadership concepts and approaches will be introduced throughout the courses.



## Workshop and Seminar Attendance



# LTAP

The Louisiana Local Technical Assistance Program (LTAP) is one of 58 centers operating nationally to serve the local and tribal transportation agencies. Louisiana LTAP serves DOTD and Louisiana's local agencies by providing technical training, safety training, technical assistance, and technology transfer. To achieve our objectives, LTAP works in direct partnership and cooperation with our national, state, and local partners to identify needs, develop materials, and implement programs.

New classes and activities as were added as part of the Local Public Agency (LPA) Core Training Program and the DOTD Off-System Bridge Compliance Program. LTAP also delivered new and improved versions of traditional LTAP classes. LTAP continued in its role as a member of the State Innovation Council (STIC) and participated in Everyday Counts (EDC) with FHWA and DOTD.

The LPA training program includes a series of classes designed to assist local agencies that utilize federal transportation funds for local road projects. The topics begin with the project concept and application stage and track the life of a project through the final project inspection and closeout. The classes are coordinated by LTAP and include instructors from FHWA, DOTD and LTAP. Classes were offered around the state throughout the year as well as during "LPA Palooza" type events where all four classes were presented in three day workshops conducted in North Louisiana and in Baton Rouge. Future classes will be scheduled on an as needed basis.

The inspection, maintenance, and compliance of locally owned off-system bridges with state and federal requirements continues as a significant challenge in Louisiana. LTAP collaborated with the Louisiana Parish Engineers and Supervisors Association and the DOTD Bridge Inspection and Maintenance and Bridge Design sections to prioritize statewide needs and organize the parishes to participate in implementing the new initiatives. A pilot project was designed and conducted to identify methods and opportunities to improve planned compliance related activities. A completely updated class, *Inspection of Local Bridges*, was developed

and piloted in close partnership with DOTD to ensure that all new requirements were included. Upcoming classes being jointly developed include bridge rating of local bridges and maintenance and repair techniques.

LTAP's course line-up included a new class, *Creating a Safety Work Environment*, designed to help supervisors grow as leaders and managers of safety in the workplace. Other safety related topics and courses included *Tractor Mower Safety*, *Heavy Equipment Operator Safety*, work zone safety, safety during road safety audits, and on-site safety workshops as requested. To help local agencies prepare for emergency situations such as hurricanes an updated class *Safety for Public Works Responders* was offered statewide. This was followed by the wildly popular chainsaw safety class that focused on tree cutting and removal as part of recovery efforts after storms. Most of these classes are offered statewide at up to nine locations and LTAP also conducts workshops as requested at individual locations.

LTAP coordinated with the new Louisiana Center for Transportation Safety on issues related to local road safety and continued strong support of efforts related to Destination Zero Deaths in the state and Towards Zero Deaths at the national level. Staff members participated on a number of NCHRP panels related to safety, safety culture and traffic engineering as well as serving as a member of the Domestic Scan Team Towards Zero Death Programs. The LTAP staff also responded to FHWA requests to participate in a variety of safety related activities such as on-site pilot projects utilizing new guidebooks and other Technical Oversight Working Groups.

# TECH TRANSFER

As LTRC's formal research program continues to investigate solutions to Louisiana's transportation problems, the technology transfer program serves the wider transportation community by implementing these research findings and technological innovations. Whether through technical assistance on DOTD projects, publications, videos, seminars, or workshops, technology transfer's ultimate goal is to disseminate practical knowledge to municipalities, parishes, and the transportation industry at large.

## LADOTD Hosts SASHTO 2014



The Louisiana Department of Transportation and Development welcomed over 1,270 southeast transportation officials and professionals to the Sheraton in New Orleans August 23-27, 2014, during the Annual Southeastern Association of State Highway and Transportation Officials (SASHTO) Conference. The conference provided an opportunity for officials from all over the region to learn new methods and strategies in the transportation field as well as network with fellow professionals.

The annual meeting, presided over this year by Louisiana DOTD Secretary Sherri LeBas, was themed "Transportation Innovation: Building the Future." This year's opening session featured Mike Hancock, Secretary of the Kentucky Transportation Cabinet and President of AASHTO; David Vitter, US Senator Louisiana, who serves on the Committee on Environment & Public Works; and Greg Nadeau, Acting Administrator of FHWA. The general session's keynote speaker was Dr. Mae Jemison, the first woman of color in the world to go into space, serving six years as a NASA astronaut.

In addition to attending an opening and general session, attendees were given many options of technical

sessions presented throughout the three-day conference. The sessions focused on an array of topics relevant to the transportation communities of the southeastern states such as: updates on the Strategic Highway Safety Plan (SHRP) 2, bridge rehabilitation projects, lessons learned from state emergencies, weather and climate change, data system implementations, FHWA's Every Day Counts (EDC) initiatives, major bridge projects, advancements in tolling operations, MAP-21, autonomous vehicles, and many more.

With 25 concurrent technical sessions offered, conference attendees were offered a range of topics covering many different facets in today's transportation field, such as incorporating media or paperless options, examples of implementation success stories, and strategies to tackle today's challenges.



# TECH TRANSFER

## Publications

Technology transfer's ultimate goal is to disseminate practical knowledge to municipalities, parishes, and the transportation industry at large. LTRC's Publications and Digital Media Development Program meets DOTD's informational and training needs through newsletters, brochures, annual reports, capsules, web development, and video production/photography. During 2014-2015, LTRC published 21 final reports, 17 technical summaries, 13 project capsules, 2 technical assistance reports, and 4 Technology Today newsletters.

## Final Reports and Technical Summaries

<b>LTRC No. (Final Report No.)</b>	<b>Title</b>
04-6B (499)	Characterization of Louisiana Asphalt Mixtures Using Simple Performance Tests and MEPDG
13-2GT (516)	Implementation of Slag Stabilized Blended Calcium Sulfate (BCS) in a Pavement Structure
12-2PF (515)	Asphalt Surface Treatment Practice In Southeastern United States
13-3SS (522)	Development of Performance Measurement for Freight Transportation
13-6SS (527)	Economic Impact Analysis of Short Line Railroads
11-3P (531)	The Rideability Of A Deflected Bridge Approach Slab
12-4PF (534)	Regional Implementation of Warm Mix Asphalt
12-1ST (526)	Data Collection and Evaluation of Continuity Detail for John James Audubon Bridge No. 61390613004101
11-2B (519)	Evaluation of Dynamic Shear Rheometer Tests for Emulsions
07-1ST/ 08-3GT (529)	Structural Health Monitoring of I-10 Twin Span Bridge
12-3C (532)	Investigation of Best Practices for Maintenance of Concrete Bridge Railings
12-1PF (538)	Traffic and Data Preparation for AASHTO DARWin-ME Analysis and Design
10-4ST (528)	Development of Wave and Surge Atlas for the Design and Protection of Coastal Bridges in South Louisiana
14-3PF (544)*	STC Synthesis of Transportation Funding Sources and Alternatives in the Southeastern States Now and in the Future
14-1PF (550)	Best Practices for Achieving and Measuring Pavement Smoothness, A Synthesis of State-of-Practice
12-5C (533)	Comparison of Conventional and Self-Consolidating Concrete for Drilled Shaft Construction
08-2ST (535)	Monitoring Bridge Scour Using Fiber Optic Sensors
12-4SA (540)*	Development of a Tool for Documenting, Tracking, Recording, and Analyzing Improvements to Intersection Sites and Roadway Departures in Curve Locations
14-4PF (541)	Mitigation Strategies of Reflection Cracking of Pavement
13-5SS (542)*	Improving Freight Crash Incident Management
13-2SA (524)*	Development of a Highway Safety Fundamental Course

\*Indicates no accompanying Technical Summary

## Technical Assistance Reports

LTRC No.	Title
13-02TA-P	Assessment of Mitigating Transverse Joint Faulting with Polyurethane Foam on LA 1 By Pass, State Project Number 034-30-0023
14-02TA-B	Evaluation of Rutting Distresses on I-20 Near Minden, LA

## Project Capsules

LTRC No.	Title
14-5C	DOTD Support for UTC Project: Development of Rapid PCC Pavement Repair Materials and Construction Techniques
14-1ST	Evaluating Louisiana New Deck Continuity Detail for Precast Prestressed Concrete Girder Bridges
14-2SA	Factors Influencing Seatbelt Utilization in Louisiana and Strategies to Improve Usage Rate
12-1B	Evaluation of Asphalt Mixtures Containing Recycled Asphalt Shingles
12-3B	Chemical Characterization of Asphalts Related to their Performance
14-2C	Implementation of Maturity for Concrete Strength Measurement and Pay
14-5SS	LTRC Project Management and Tracking System Enhancement
14-3B	NCHRP Project 20-07 / Task 361: Hamburg Wheel-Track Test Equipment Requirements and Improvements to AASHTO T 324
14-1B	Effects of Temperature Segregation on the Volumetric and Mechanistic Properties of Asphalt Mixtures
15-3SS	Ensuring Safety in Autonomous Vehicle Legislation in Louisiana
15-4SS	Assessment of Sedimentation Affecting Riverine Ports in Louisiana
15-2GT	Lime Utilization in the Laboratory, Field, and Design of Pavement Layers
15-1ST	Development of Wave and Surge Atlas for the Design and Protection of Coastal Bridges in South Louisiana - Phase II



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# PROFESSIONAL MEMBERSHIPS

## Transportation Research Board Committees/Panels

- Committee A0000 – Technical Activities Council
- Committee AFP40 – Full-Scale Accelerated Pavement Testing
- Committee AFP10 – Pavement Management Systems
- AFP80-Strength and Deformation Characteristics of Pavement
- Committee AFN30 – Durability of Concrete (Chair)
- Committee AFN10 – Basic Research and Emerging Technologies Related to Concrete
- Committee AFN20 – Properties of Concrete (Communication Coordinator)
- Committee AFN40 – Concrete Materials and Placement Techniques
- Committee AFD10 – Pavement Management Systems
- Committee AFK 00 – Asphalt Materials
- Committee AFK10 – General Issues on Asphalt Technology (Chair)
- Committee AFK20 - Standing Committee on Characteristics of Asphalt Materials
- Committee AFK30 - Standing Committee on Characteristics of Nonasphalt Components of Asphalt Paving Mixtures
- Committee AFK 40 - Characteristics of Bituminous-Aggregate Combinations to Meet Surface Requirements
- Committee AFK 50 - Characteristics of Bituminous Paving Mixtures to Meet Structural Requirements
- Committee AHD 20 - Pavement Maintenance Committee
- Committee AFP30 - Soil and Rock Properties
- Committee ANB80T - Task Force on Emergency Evacuations
- Committee ABG20 - Education and Training
- Committee ABG30 - Technology Transfer Committee
- Committee AFD80 - Strength and Deformation Properties of Pavement Sections
- Committee AFP60 –Engineering Behavior of Un-saturated Soils
- Committee AFP20 – Committee on Exploration and Classification of Earth Materials
- Committee AFS80 – Committee on Cementitious Stabilization.
- Committee AFS10 –Transportation Earthworks
- Committee AFS30 – Foundations of Bridges and Other Structures (Committee Coordinator)
- Committee AFS70 – Committee on Geosynthetics
- Committee AFF40 – Field Testing and Nondestructive Evaluation (NDE) of Transportation Structures
- Committee A0020T – Special Task Force on Climate Change and Energy
- Committee ABG05T – Task Force on Mastering the Management of Transportation Research and Training Programs
- Research and Technology Coordinating Committee
- NCHRP 20-89 – Intellectual Property Stewardship Guide for Transportation Departments (Chair)
- NCHRP 46-03 – Performance Based Specifications (PBS) for Asphalt Mixtures
- NCHRP 20-07/Task 340 – National Training: Challenges and Opportunities
- NCHRP Project 01-52 – “Calibrated Mechanistic-Based Models for Top-Down Cracking of Hot-Mix Asphalt Layers”
- NCHRP Project 01-53 – “Proposed Enhancements to Pavement ME Design: Improved Consideration of the Influence of Subgrade and Unbound Layers on Pavement Performance” (Panel Chair)
- NCHRP 18-17 – Entrained Air void System for Durable Highway Concrete
- Data Analysis Working Group Steering Committee
- State Representative Advisory Panel





## Training Memberships

- Southeast Task Force on Technician Training and Qualification
- American Society for Training and Development
- National Transportation Training Directors
- TRAC & RIDES National Board Member
- American Educational Research Association
- United States Distance Learning Association
- American Society of Training and Development
- National Council on Measurement in Education
- Louisiana Chapter of ASCE

## ASTM International Memberships

- ASTM Subcommittee D04.20 on Empirical Tests of Bituminous Mixtures
- ASTM Subcommittee D04.22 on Effect of Water & Other Elements on Bituminous Coated Aggregates
- ASTM Subcommittee D04.24 on Bituminous Surface Treatments
- ASTM Subcommittee D04.25 on Analysis of Bituminous Mixtures, Chair
- ASTM Subcommittee D04.26 on Fundamental / Mechanistic Tests
- ASTM Subcommittee D04.44 on Rheological Tests
- ASTM Subcommittee D04.45 on Specifications for Modified Asphalt
- ASTM Subcommittee D04.46 on Durability & Distillation Tests

## Other Memberships

- Infocomm International
- Society of Government Meeting Professional (SGMP)
- Louisiana Engineering Society
- National Society of Professional Engineers
- American Society of Civil Engineers
- ASCE Geo-Institute
- ASCE Bituminous Materials Committee (BMC)
- Chi Epsilon – Civil Engineering Honor Society
- LSU Communication across the Curriculum, Engineering Advisory Council
- Engineering Geology and Site Characterization Committee, Geo-Institute
- Engineering Geosynthetics Committee, Geo-Institute
- Engineering Deep Foundation Committee, Geo-Institute
- US Universities Council on Geotechnical Engineering Research (USUCGER)
- Gulf Region Intelligent Transportation Society (GRITS)
- American Institute of Chemical Engineers
- American Concrete Institute
- American Society of Engineering Education (ASEE)
- Association of Asphalt Paving Technologists (AAPT)
- Traffic Safety Culture Transportation Pooled Fund Executive Board
- International Association for Bridge and Structural Engineering Transportation Research Board
- American Association for Wind Engineering
- American Society of Aeronautics and Astronautics American Academy of Mechanics
- FHWA Technical Working Group on Sustainable Pavements
- AASHTO Standing Committee on Research (Vice-Chair)
- AASHTO Research Advisory Committee (Chair)
- International Steering Committee for Travel Survey Conferences
- Louisiana Strategic Highway Safety Plan Implementation Team
- ETKN (Eastern Transportation Knowledge Network)

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LTRC Director

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Federal Highway Administration

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