



# 2012-13

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# ANNUAL REPORT



[www.ltrc.lsu.edu](http://www.ltrc.lsu.edu)



LTRC

Louisiana Transportation  
Research Center



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



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

### **For additional information**

LTRC  
4101 Gourrier Avenue  
Baton Rouge, Louisiana 70808  
[www.ltrc.lsu.edu](http://www.ltrc.lsu.edu)

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, 2012–June 30, 2013. The center is sponsored jointly by the Louisiana Department of Transportation and Development and Louisiana State University.

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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 and 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™).

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 entity 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.



# facilities

*(left to right) Louisiana Transportation Research Center; Transportation Training and Education Center; Accelerated Loading Facility*

**To: Sherri H. LeBas, P.E. | Secretary | DOTD**  
**F. King Alexander, Ph.D. | Interim Chancellor | LSU**  
**Richard Savoie, P.E. | Chief Engineer | DOTD**  
**Richard Koubek, Ph.D. | Dean, College of Engineering | LSU**

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 also included.

LTRC continues its strong focus of solving transportation problems. The implementation of two research products is highlighted in this report. In response to a legislative request, LTRC investigated the effects of overloaded sugarcane trucks on Louisiana’s roads and bridges. In addition, the study looked at a new configuration for haul trucks that could allow up to 100,000-lb. loads. As a result of the study, the legislature implemented the findings through the enactment of revisions to the Revised Statutes. This study was also recognized by the AASHTO Research Advisory Committee as it was selected as one of the 2013 Sweet Sixteen High Value Research projects presented at the AASHTO National Conference to Secretary LeBas.

The second project implemented the Gel Permeation Chromatograph (GPC) as an analytical tool to determine the quantity and types of polymer modifiers being used in asphalt cements supplied to the state. Test methods were developed and refined such that the GPC can be used for fingerprinting refinery submitted asphalts for approval and for forensic analysis of pavement failures. The method has been drafted as an AASHTO standard test procedure.

A number of technical assistance projects were undertaken this year, not the least of which was the response to the Assumption Parish sink hole. The pavement research unit immediately evaluated any impact to LA 70 with our Falling Weight Deflectometer and the High Speed Profiler. Subsequently, LTRC issued a task order to the LSU’s Center for Geoinformatics to establish continuously referencing monitors on LA 70 and the three bridge structures in the vicinity.

The Louisiana Transportation Conference was, of course, the highlight of this year’s technology transfer activities. This biennial event continues to grow. Almost 1800 transportation professionals from 32 states and two foreign countries participated in the conference whose theme was “Partnerships for Progress in Transportation.” The conference was the culmination of activities of seven committees involving LTRC, DOTD, and industry personnel. The conference, which provided a forum for education, sharing new ideas and methods, and discussing changes in the industry, included 72 technical sessions, six workshops, and a two-day vendor exhibition. Transportation professionals were provided opportunities to earn up to 19 professional credit hours, including the required hour in professional ethics.

Speaking of partnerships, there is an article on industry support for LTRC projects that highlights both donations and in-kind services provided through the LTRC Foundation to support on-going research projects at the Pavement Research Facility in Port Allen. In tough budget times, this industry support maximizes LTRC’s ability to improve the state’s transportation systems.

Respectfully submitted,



Harold “Skip” Paul, P.E., Director

**director’s message**

## Completed Research

| LTRC Project No. / Agency     | Principal Investigator      | Project Title  |
|-------------------------------|-----------------------------|--|
| 08-3SS/ULL                    | Dr. Xiaoduan Sun            | Developing Louisiana Crash Reduction Factors   |
| 09-2SS/LTRC                   | Dr. Chester Wilmot          | Enhancing Calibrated Peer Review for Improved Engineering Communication Education  |
| 10-2GT/<br>Dataforensics, LLC | Dr. Scott Deaton            | Geotechnical Information Database – Phase 2  |
| 12-1TIRE/UNO                  | Dr. Malay Ghose Hajra       | Comparative Evaluation of Pile Set Up and Axial Capacity of Driven Piles Installed Using Impact Hammer versus Vibratory Pile Driving Equipment |
| 12-2TIRE/LTU                  | Dr. Nazimuddin M. Wasiuddin | A Novel Dewetting and Spreading Based Moisture Susceptibility Test Method for Hot and Warm Mix Asphalt   |
| 12-3TIRE/LSU                  | Dr. Sherif Ishak            | Modeling the Effect of Gusty Hurricane Wind Force on Vehicles Using LSU Driving Simulator  |
| 12-4TIRE/ULL                  | Dr. Chris Carroll           | Preliminary Analysis of Polymer Concrete Used for Bridge Deck Joint Repairs  |
| 13-9SS/LTRC                   | Dr. Chester Wilmot          | Investigation into the Impact of Privatizing Civil Engineering Operations in Louisiana DOTD  |

## Completed Research (Publication Pending)

| LTRC Project No. / Agency                | Principal Investigator | Project Title  |
|--|------------------------|--|
| 09-1ST/LTU                               | Dr. Aziz Saber         | Load Distribution and Fatigue Cost Estimates of Heavy Truck Loads on Louisiana State Bridges                   |
| 10-1SS/LTRC                              | Dr. Glynn Cavin        | Evaluation of Knowledge Transfer in an Immersive Virtual Learning Environment for the Transportation Community |
| 10-3SS/Cambridge Systematics             | Dr. Susan Herbel       | Automated Enforcement and Highway Safety   |
| 10-5SS/LSU                               | Dr. Helmut Schneider   | Developing Inexpensive Crash Countermeasures for Louisiana Local Roads   |
| 10-6B/LSU                                | Dr. William H. Daly    | Implementation of GPC Characterization of Asphalt Binders at Louisiana Materials Laboratory                    |
| 11-2SS/LSU                               | Dr. Sherif Ishak       | Measuring Effectiveness of Ramp Metering Strategies on I-12  |
| 12-3C/LSU                                | Dr. Marwa Hassan       | Investigation of Best Practices for Maintenance of Concrete Bridge Railings                                    |
| 12-3PF/Georgia Tech Research Corporation | Dr. Baabak Ashuri      | Best Practices for Determining Value of Research Results   |
| 12-5PF/Thompson Engineering              | Mr. Richard Sheffield  | STC Synthesis of Research Results for Water Quality Management at Construction Sites                           |
| 13-2P/ULL                                | Dr. Xiaoduan Sun       | A Comprehensive Study on Pavement Edge Line Implementation   |

# completed research

*ULL: University of Louisiana at Lafayette*

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| LTRC Project No. | Agency                                 | Principal Investigator                | Project Title  | Start Date | End Date |
|------------------|--|---------------------------------------|--|------------|----------|
| 05-1GT           | LTRC                                   | Dr. Murad Abu-Farsakh                 | Field Demonstration of New Bridge Approach Slab Designs and Performance  | 8/1/08     | 9/30/14  |
| 06-3GT           | LTRC                                   | Mr. Gavin Gautreau                    | Field Evaluation of Roller Integrated Intelligent Compaction Monitoring  | 11/1/11    | 10/31/14 |
| 07-1B            | LTRC                                   | Dr. Louay Mohammad                    | Evaluation of Warm Mix Asphalt Technology in Flexible Pavements  | 3/15/09    | 12/31/13 |
| 07-1ST           | LTRC                                   | Dr. Murad Abu-Farsakh                 | Structure Health Monitoring of the I-10 Twin Span Bridge Over Lake Pontchartrain   | 11/1/07    | 6/30/14  |
| 07-4ST           | LSU                                    | Dr. George Z. Voyiadjis               | Integral Abutment Bridge for Louisiana's Soft and Stiff Soils  | 10/1/07    | 9/30/13  |
| 08-2ST           | LSU                                    | Dr. Steve C.S. Cai                    | Monitoring Bridge Scour Using Fiber Optic Sensors  | 1/1/09     | 12/30/13 |
| 08-3GT           | LTRC                                   | Dr. Murad Abu-Farsakh                 | Support Study to Structure Health Monitoring of the I-10 Twin Span Bridge Over Lake Pontchartrain                              | 11/1/07    | 12/31/14 |
| 09-1PF           | LTRC                                   | Mr. Mark Morvant                      | Southeast Transportation Consortium  | 9/1/09     | 8/30/15  |
| 10-1B            | LTRC                                   | Dr. Louay Mohammad                    | Field versus Laboratory Volumetrics and Mechanical Properties  | 8/1/09     | 12/31/13 |
| 10-3GT           | LTRC                                   | Mr. Khalil Hanifa                     | Design Values of Resilient Modulus of Stabilized and Non-stabilized Base   | 9/1/10     | 12/31/13 |
| 10-3P            | LTRC                                   | Dr. Leticia Santos da Rocha Courville | LED Traffic Signal Lifetime Management System  | 11/1/10    | 6/30/15  |
| 10-4B            | LTRC                                   | Dr. Louay Mohammad                    | Development of Performance Based Specifications for Louisiana Asphalt Mixtures   | 4/1/11     | 3/31/14  |
| 10-4P            | ULL                                    | Dr. Mohammad Jamal Khattak            | Development of Cost-Effective Pavement Treatment Selection and Treatment Performance Models                                    | 9/1/10     | 12/31/13 |
| 10-4ST           | Ocean Engineering Associates, Inc.     | Mr. D. Max Shepard                    | Development of Wave and Surge Atlas for the Design and Protection of Coastal Bridges in South                                  | 5/2/11     | 3/31/14  |
| 10-5ST           | Wiss, Janney, Elstner Associates, Inc. | Mr. Jonathan McGormley                | Developing Prestressed Girder Transportation Guidelines  | 5/2/11     | 6/30/14  |
| 10-6SS           | LSU                                    | Dr. Sherif Ishak                      | Establishing an Intelligent Transportation Systems (ITS) Lab at LTRC (Phase II)  | 8/20/10    | 11/19/13 |
| 11-1B            | LTRC                                   | Mr. Md. Sharear Kabir                 | Validity of Multiple Stress Creep Recovery Test for DOTD Asphalt Binder Specification  | 9/1/10     | 1/31/14  |
| 11-1GT           | LTRC                                   | Dr. Murad Abu-Farsakh                 | In Situ Evaluation of Design Parameters and Procedures for Cementitiously Treated Weak Subgrades using Cyclic Plate Load Tests | 3/18/13    | 9/17/15  |
| 11-2B            | LTU                                    | Dr. Nazimuddin M Wasiuddin            | Evaluation of Dynamic Shear Rheometer Tests for Emulsions.   | 9/15/10    | 11/14/13 |

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active research

| LTRC Project No. | Agency                           | Principal Investigator | Project Title   | Start Date | End Date |
|------------------|----------------------------------|------------------------|---|------------|----------|
| 11-2GT           | LTRC                             | Dr. Murad Abu-Farsakh  | Field Instrumentation and Testing to Study Set-Up Phenomenon of Piles Driven into Louisiana Clayey Soils          | 12/1/10    | 11/30/14 |
| 11-3B            | LTRC                             | Mr. Samuel B. Cooper   | Testing and Analysis of LWT and SCB Properties of Asphaltic Concrete Mixtures                                     | 4/1/11     | 12/31/13 |
| 11-3GT           | LTRC                             | Dr. Murad Abu-Farsakh  | Accelerated Load Testing of Geosynthetic Base Reinforced Pavement Test Sections                                   | 12/1/10    | 12/31/13 |
| 11-3P            | LTRC                             | Mr. Mark Martinez      | The Rideability of a Deflected Bridge Approach Slab (LTRC Project 02-2GT Continuation: Phase II)                  | 4/1/11     | 3/31/14  |
| 11-3SS           | C-K Associates                   | Mr. Tre Wharton        | LOOP Environmental Monitoring: 2011-2013 Beach Elevation, Beach Vegetation, Land Loss and Habitat Changes Surveys | 4/12/11    | 4/11/14  |
| 11-4B            | LTRC                             | Dr. Louay Mo-hammad    | Modulus Based Construction Specification of Earthwork and Unbound Aggregate                                       | 10/7/10    | 10/31/13 |
| 12-11P           | LTRC                             | Mr. Mark Martinez      | Field Validation of Equivalent Modulus for Stabilized Subgrade Layer  | 5/1/12     | 4/30/14  |
| 12-1P            | LTRC                             | Mr. Kevin Gaspard      | Assessment of Pavement Distresses caused by Trees on Rural Highway  | 2/1/12     | 6/30/16  |
| 12-1PF           | Oklahoma State University        | Dr. Kelvin Wang        | Traffic and Data Preparation for AASHTO MEPDG Analysis and Design   | 9/1/11     | 8/31/14  |
| 12-1ST           | LSU                              | Dr. Ayman Okeil        | Data Collection and Evaluation of Continuity Detail for John James Audubon Bridge #2                              | 1/3/12     | 1/2/14   |
| 12-2P            | LTRC                             | Mr. Kevin Gaspard      | Assessment of Environmental, Seasonal and Regional Variations in Pavement Base and Subgrade Properties            | 9/1/11     | 6/30/15  |
| 12-2PF           | Florida International University | Dr. Hesham Ali         | Asphalt Surface Treatments for Pavement Preservation  | 6/15/12    | 9/14/13  |
| 12-2SS           | LSU                              | Mr. Hak-Shul Shin      | History of the Implementation of AASHTO and Louisiana DOTD Road Design Standards                                  | 8/1/12     | 1/31/14  |
| 12-2ST           | LTRC                             | Dr. Vijaya Gopu        | Field Performance of Timber Highway Bridges: A National Study   | 1/3/12     | 6/30/14  |
| 12-3B            | LSU                              | Mr. William H. Daly    | Chemical Characterization of Asphalts Related to their Performance  | 12/1/12    | 11/1/14  |
| 12-3P            | LTRC                             | Dr. Zhong Wu           | Minimizing Shrinkage Cracking in Cement-Stabilized Bases Through Micro-Cracking                                   | 11/1/12    | 4/30/16  |
| 12-3SA           | LSU                              | Dr. Brian Wolshon      | DOTD Support for UTC Project: Calibration of the Louisiana Highway Safety Manual                                  | 7/1/12     | 12/31/13 |
| 12-3ST           | UNO                              | Dr. Vijaya Gopu        | Morganza Floodway Bridge Bent Repair using Carbon Fiber Reinforced Polymers (CFRP)                                | 6/1/12     | 6/30/14  |
| 12-4B            | LTRC                             | Dr. Louay Mo-hammad    | Performance of WMA Technologies: Stage II – Long-term Field Performance   | 4/29/11    | 7/28/16  |

# active research

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| LTRC Project No. | Agency                         | Principal Investigator  | Project Title  | Start Date | End Date |
|------------------|--------------------------------|-------------------------|--|------------|----------|
| 12-4C            | LTRC                           | Dr. Tyson Rupnow        | Evaluation of Portland Cement Concrete with Internal Curing Capabilities   | 5/1/12     | 6/30/14  |
| 12-4P            | LTRC                           | Dr. Zhong Wu            | Development of DARWin-ME Design Guideline for Louisiana Pavement Design  | 2/1/12     | 3/31/14  |
| 12-4PF           | Kentucky Transportation Center | Mr. Ronnie Clark Graves | Regional Implementation of Warm Mix Asphalt  | 10/1/12    | 9/30/13  |
| 12-4SA           | LSU                            | Dr. Helmut Schneider    | DOTD Support for UTC Project: Development of a Tool for Documenting, Tracking, Recording, and Analyzing Improvements to Intersection Sites and Roadway | 7/1/12     | 6/30/14  |
| 12-4SS           | UNO                            | Dr. John Renne          | DOTD Support for UTC Project: Development of Minimum State Requirements for Local Growth Policies  | 7/1/12     | 6/30/14  |
| 12-5C            | LTRC                           | Dr. Tyson Rupnow        | Comparison of Conventional and Self-Consolidating Concrete for Drilled Shaft Construction  | 5/1/12     | 10/30/13 |
| 12-5P            | LTRC                           | Dr. Zhong Wu            | Evaluation of DOTD Aggregate Friction Rating Table by Field Measurements   | 2/1/12     | 2/1/15   |
| 12-7P            | LTRC                           | Dr. Zhong Wu            | Roller Compacted Concrete Over Soil Cement Under Accelerated Loading   | 5/1/12     | 4/30/14  |
| 13-10SS          | LSU                            | Dr. James Richardson    | Economic Evaluation of Applicants to the Port Construction and Development Priority Program  | 1/2/13     | 7/1/14   |
| 13-1C            | LTRC                           | Mr. Patrick Ice-nogle   | Evaluation of MIT-SCAN-T2 for Thickness Quality Control for PCC and HMA Pavements  | 1/1/13     | 12/31/13 |
| 13-1SA           | LSU                            | Dr. Sherif Ishak        | DOTD Support for UTC Project: Distracted Driving and Associated Crash Risks  | 7/1/12     | 12/31/13 |
| 13-2C            | LTRC                           | Dr. Tyson Rupnow        | Laboratory Evaluation of 100% Fly Ash Cementitious Systems   | 6/25/13    | 6/24/15  |
| 13-2GT           | LTRC                           | Mr. Gavin Gautreau      | Implementation of Slag Stabilized Blended Calcium Sulfate (BCS) in a Pavement Structure.   | 7/1/12     | 9/30/13  |
| 13-2SA           | ULL                            | Dr. Xiaoduan Sun        | DOTD Support for UTC Project: Developing a Highway Safety Fundamentals Course  | 7/1/12     | 12/31/13 |
| 13-3SS           | LSU                            | Dr. Peter Kelle         | DOTD Support for UTC Project: Development of Performance Measurement for Freight Management  | 7/1/12     | 12/31/13 |
| 13-4SS           | LTU                            | Dr. Aziz Saber          | Highway for Life Demonstration Project: La 511 (70th Street)   | 1/15/13    | 6/14/15  |
| 13-4ST           | LTRC                           | Mr. Ching Tsai          | I-10 Girder Repair Using Post-Tensioned Steel Rods and Carbon Fiber Composite Cables (CFCC)  | 3/18/13    | 3/17/14  |
| 13-5SS           | LTRC                           | Dr. Chester Wilmot      | DOTD Support for UTC Project: Improving Freight Crash Incident Management  | 7/1/12     | 12/31/13 |
| 13-6SS           | LSU                            | Dr. Jared Llorens       | DOTD Support for UTC Project: Economic Impact Analysis of Short Line Railroads in the State of Louisiana   | 7/1/12     | 12/31/13 |
| 13-7GT           | LTRC                           | Dr. Murad Abu-Farsakh   | Support Study to ITRS proposal on "An Integrated Computational and Experimental Study of Pile Setup in Soft Clays"                                     | 2/18/13    | 2/17/16  |
| 13-7SS           | UNO                            | Mr. James Amdal         | DOTD Support for UTC Project: Use of Containers to Carry Bulk and Breakbulk Commodities and its Impact on Gulf Region Ports and International Trade    | 7/1/12     | 12/31/13 |
| 13-8GT           | LSU                            | Dr. Joshua Kent         | Bayou Corne Sinkhole: Control Measurements of State Highway 70 in Assumption Parish, Louisiana   | 9/19/12    | 9/30/13  |

| LTRC Project No. | Agency | Principal Investigator | Project Title   | Start Date | End Date |
|------------------|--------|------------------------|---|------------|----------|
| 13-8SS           | UNO    | Dr. Asaf Ashar         | DOTD Support for the UTC Project: The Impact of Modifying Jones Act on the US and Louisiana         | 7/1/12     | 12/31/13 |
| 13-9GT           | LSU    | Dr. Joshua Kent        | CORS 911: Continuously Operating Reference Stations for the Bayou Corne Sinkhole                    | 3/18/13    | 3/17/14  |
| 14-1C            | LTRC   | Dr. Tyson Rupnow       | Evaluation of Dowel Bar Alignment and Effect on Long Term Performance of Jointed Concrete Pavements | 6/5/13     | 6/4/14   |

### Louisiana Legislature Acts on Recent Overloaded Sugar Cane Truck Research

At the request of the Louisiana Legislature, LTRC conducted research to determine the effects that heavy, overloaded sugarcane trucks pose on Louisiana’s highways and bridges. As a result of the three-part study, the legislature enacted revisions to the *Revised Statute 387.7. Special permits; vehicles hauling sugarcane*. Researchers recommended that the legislature keep the truck weight allowance at the current level, which is 80,000 lb. Furthermore, the newly enacted statute acted on research recommendations by maintaining that truck drivers who wish to haul sugarcane in the weight class of 100,000 lb. must add a third axle to their vehicle, to better distribute the weight of the load and decrease the strain on the state’s pavements.

Under these circumstances, researchers believe the permit fee can be reduced to zero (instead of the current \$100 fee), and a tax incentive of \$683 can be given to each truck for the conversion.

The results of this project indicated that the pavement damage from each sugarcane truck (without the added axle) with a weight of 100,000 lb. is at about \$2,072/year, and the bridge fatigue cost is about \$3,500/year. Therefore, the current sugarcane trucks permit fee of \$100 per year is not adequate and should be increased to recover these costs. It was also found that the legislature should not consider raising the weight level allowance of sugarcane trucks to 120,000 lb. in the future for any reason because the pavement costs increase by double and the bridge repair costs rise. Moreover, the magnitude of the damage caused by the 120,000-lb. truck makes the risk of bridge damage and even bridge failure too significant to ignore.

This study was recently recognized by the AASHTO Research Advisory Committee (RAC) and was awarded a spot on its 2013 Sweet Sixteen High Value Research Projects list. Each year, RAC collects High Value Research highlights from member states across the nation. These highlights showcase projects that are providing transportation excellence through research.



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## Implementation of GPC Characterization of Asphalt Binders at Louisiana Materials Laboratory

Since 1994, DOTD has specified the use of polymer-modified asphalt cements (PMAC) to improve asphalt pavement performance. However, several critical questions associated with QC analysis of PMAC remain unsolved. This research project implemented a procedure for using gel permeation chromatography (GPC) as an analytical tool to define the percentage amounts of polymer modifiers, which are soluble in eluting GPC solvents, in polymer-modified asphalt cements. It also addressed quantification of both GPC solvent soluble and insoluble crumb rubber present in crumb-rubber modified binders. Attention was also paid to using GPC for assessment of the extent of oxidative rolling thin-film oven (RTFO) and pressure aging vessel (PAV) aging of a series of asphalt binders as well as forensic analysis of pavement failures.



The project's two phases included (I) purchasing, installing, and calibrating a GPC instrument at the DOTD Materials Laboratory and writing detailed procedures for conducting binder analysis to determine the percent polymer content in polymer-modified binders and (II) developing an efficient extraction process capable of recovering binder from asphalt cement cores. Phase I included the GPC analysis of different polymers and binders, and a quantitative estimation of polymers, asphaltenes, and maltenes present in the analyzed binders. At DOTD, a large number of binders from various asphalt sources and polymer additives have been analyzed. Over 180 samples of PG 64-, PG 67-, PG 70-22m and PG 76-22m grades were subjected to GPC analysis and the polymer percentage was calculated and compiled. Phase II extended the development of a procedure to define the percent amounts GPC solvent insoluble crumb rubber present in CRM binders. It included a comparison between the extraction of soluble CRM species with a blend of toluene-ethanol (85:15 volumetric ratio) and bromopropane at room or moderate temperatures.

Since similar results have been obtained, and bromopropane is more expensive than toluene and ethanol, the toluene/ethanol mixture appears to be a better option, especially for large scale extractions. An AASHTO standard test method for the quantification of polymer content in polymer-modified asphalt cements by GPC has been proposed. The findings of this research will be documented in the final report (publication pending). Specific accomplishments include:

- Development of an effective asphalt binder extraction methodology without affecting the binder properties.
- Development of a simple GPC procedure for determining the composition of asphalt binders based upon the molecular size of the components.
- Installation of a robust GPC system in the DOTD Materials Laboratory.
- Establishment of a routine binder characterization method using GPC.
- Illustration of the forensic application of GPC to resolving mix problems encountered in the field.
- Proposal of AASHTO standard test method for the quantification of polymer content in PMAC by High Performance Size Exclusion Chromatography (HPSEC).

In addition, chemists from LSU's Chemistry Department provided a week-long training session for the Louisiana Materials Laboratory technicians. This study has also spawned additional research currently underway between LSU and LTRC in an effort to better characterize asphalt binder materials used in Louisiana.

# research highlights

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.

## 2012-13 Technical Assistance Highlights

### *Louisiana Geological Survey*

LTRC Researchers provided Technical Assistance to assist LSU's Louisiana Geological Survey (LGS) in collecting soil data across the state to update maps and develop a GIS data base identifying the Holocene/Pleistocene surface for the Coastal Protection and Restoration Authority (CPRA) at the Department of Natural Resources (DNR). The work is ongoing. When complete, this information will also benefit DOTD's geotechnical section providing a contour map showing this stiff soil layer.

### *LA 70 in Assumption Parish Near the Sink Hole*

On LA 70 near Bayou Corne in Assumption Parish, a portion of the salt dome has collapsed creating a sink hole that is approximately 1,200 ft. from LA 70. In an effort to determine if the sink hole is impacting LA 70, LTRC's pavement unit has conducted testing with the Falling Weight Deflectometer (FWD) and High Speed Profiler on several occasions since August 2012. Subgrade strength and Structural Number readings obtained from the FWD on those occasions have been similar indicating that the roadway strength has not deteriorated due to the sink hole so far. Additionally, roadway roughness (IRI), profile measurements, and cross slope measurements obtained from the High Speed Profiler have also been similar on multiple occasions. Monitoring will continue on at least a yearly basis.

### *I-20 project between Mound and Delta*

The LTRC Asphalt Research Group performed forensic evaluation on the I-20 project between Mound and Delta. Within six months of construction, areas with excessive premature rutting were noticed on a 4.95-mile long asphaltic concrete overlay project on I-20 corridor in Madison Parish, Louisiana.

Lab tests were conducted on a number of roadway cores to quantify the moisture susceptibility of the mixture. Also, investigations into design features revealed lift thicknesses were placed thinner than adequate for the type of mixtures used. Field investigations, subsurface drainage inspection, and laboratory evaluation of

mixtures demonstrated the occurrence of moisture damage in the leveling and binder course lifts.

LTRC recommended modifying the existing drainage system to help eliminate the moisture from the existing pavement structure. LTRC also recommended milling the existing surface course of each outside travel lane and replacing with a new HMA mixture, and adding an OGFC mixture over the full width of pavement to enhance the pavement structure and provide a safer traveling surface.

### *I-20 Alkali-Carbonate Reactions (ACR)*

LTRC investigated the ACR affected pavement section of I-20 between Ruston and Monroe, LA. Pavement conditions were assessed with the FWD and High Speed Profiler. Cores were taken to determine the extent of pavement deterioration and assess the potential for future expansion. Results from the profiler indicated that the roughness has increased from May 2007 to October 2012 and that the pavement is currently in moderate condition with average IRI values of approximately 87 in both travel lanes.

The FWD tests indicated that JCP is showing signs of distress with the East Bound side being more distressed than the West Bound side. Based on testing in May 2007 and October 2012, the pavement condition has not changed "structurally" with the average S<sub>N</sub>eff value being 5.4 and 5.6 in the East and West Bound lanes, which is equivalent to 12 and 13 in. of new asphaltic concrete, respectively. Though not elaborated upon in this document, the average subgrade resilient modulus is approximately 10 ksi, indicating that it would be a good candidate for rubblization.

The condition of the cores ranged from fully intact with little cracking to pieces of concrete retrieved that resembled aggregate. The cracking pattern on the cores is indicative of ACR where a majority of the cracks originate at large aggregates.

The laboratory testing results show that the concrete still exhibits ACR tendencies as exhibited in the control (water) samples. The volumetric expansion was generally less than 1 percent with the

## Private Industry Provides Support for LTRC Research Projects

LTRC’s current active research projects include four that have received either financial support or construction services donated from private industry. These donations of money or in-kind services are provided to the LTRC Foundation, Inc., as part of a cooperative endeavor agreement with DOTD. The non-profit LTRC Foundation raises funds for the promotion, improvement & development of LTRC facilities, thereby encouraging cooperative research, education, training, and technology transfer among DOTD, Louisiana universities, and private industry.



*LTRC’s Accelerated Loading Facility*

TenCate and Tensar donated \$100,000 each to support the test sections built for project 11-3GT, *Accelerated Load Testing of Geosynthetic Base Reinforced Pavement Test Sections*. These pavement test sections have been constructed at the accelerated loading facility (ALF) site. The end goal of this project is to demonstrate the benefits of the geosynthetic subgrade/base stabilization/reinforcement in pavement structures built on weak subgrades in terms of increasing the service life of the pavement structure and/or reducing the base thickness.

In cooperation with the Concrete and Aggregates Association of Louisiana (CAAL), Gilchrist Construction has provided construction services for test sections on three different projects (06-3GT, 11-4B, 12-3P). These projects deal with evaluation of Roller Integrated Compaction Monitoring, performing micro-cracking on typical Louisiana cement stabilized materials, and modulus-based construction specification for earthwork and unbound aggregate.

In addition to these ongoing projects, James Construction Group is planning to provide construction services to testing of unbonded concrete overlay sections for a proposed project that will begin next fiscal year.

This industry support for LTRC projects forms an important partnership. Their donations and services allow research funding to be maximized, ultimately improving the state’s transportation systems.

### *Technical Assistance Highlights, cont.*

majority of the samples having expansion values between 0.4 and 0.6 percent expansion. The results indicate that the expansions are relatively small and can be mitigated by rubblization of the affected pavement.

Acceptable alternate designs include full removal of the pavement structure and replacing it with either hot mix asphalt or portland cement concrete and rubblization of the existing structure and overlaying it with either portland cement concrete or hot mix asphalt. Note that the rubblization option is much more cost effective than the full depth reconstruction option.

### ***I-49 Clay Balls***

LTRC investigated the cored concrete from I-49 north of Shreveport, LA. The cores showed no visible signs of distress when received. The cores were sliced to determine the extent of clay balls within the core and concrete structure. The results showed that all cores contained clay ball inclusions, but the vast majority, about 59 percent, are under ¼ in. in diameter with several approaching ½ in. in diameter.

### ***Surface Resistivity – Latex Modified Concrete***

LTRC investigated the differences in surface resistivity values for latex modified concrete. The testing specifically looked at various curing regimes consisting of curing and drying periods to simulate field cured resistivity and strength values in a laboratory setting.

**research highlights**

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.

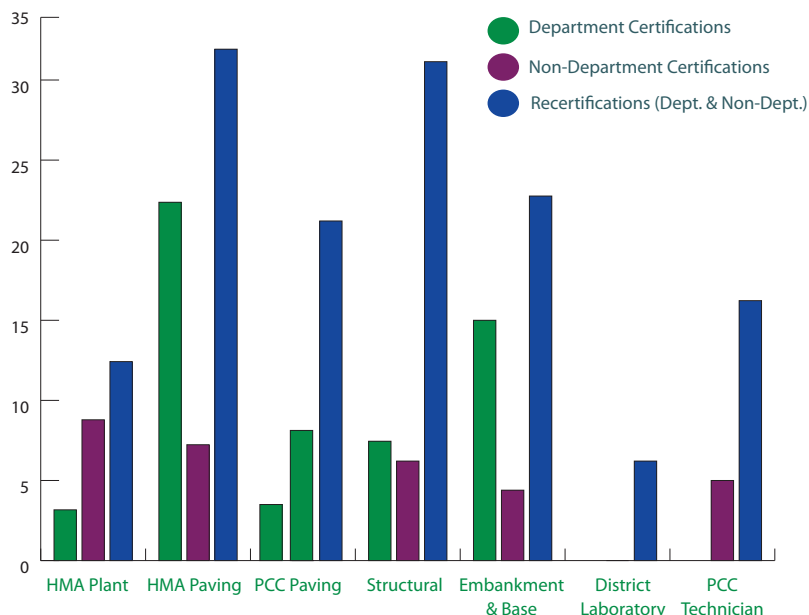
LTRC manages DOTD’s Structured Training Programs; develops maintenance and construction training materials and programs; coordinates seminars, workshops, and conferences for continuing education and professional development; and contracts with the private and public sectors for unique training needs.

### 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, 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 state-wide level in each area of construction.

- Collected \$47,391.00 in Construction Certification Program enrollment fees
- Awarded 92 new construction certifications – processed 141 re-certifications



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.

# education & training

## Course Development

There were 22 courses/projects developed or revised during this time period.

### Construction Training Course/Projects Completed

- *Introduction to Pile Driving Inspection Manual*
- *Introduction to Base Course Inspection Web-Based Course*
- *Introduction to Structural Concrete Inspection Web-Based Course*
- Training video for TR 415-Field Density
- *Site Manager Materials Manager Training Modules:*
  - Introduction to Materials Management*
  - Pipeline Process*
  - Search, Filter, Find, and Sort*
- *Site Manager for Local Construction Projects Training Modules:*
  - Introduction for Local Construction Projects*
  - Daily Work Reports*
  - Estimates*
  - Change Orders*

### Maintenance Courses/Projects Completed

- Motor Grader SOCL Revision
- Crawler Tractor (Bulldozer) SOCL
- Training Upgrade Proposal for Herbicide Applicator
- SOP Directives for HQ Personnel Maintenance Training Classes

### Other Projects Completed

- *Metrics for Engineering Technicians*
- *Grammar and Writing Skills – Parts 1-3*
- *LEO/LSO User Manual*
- *LaGov Training Coordinator Instruction Manual*
- *Email Etiquette – Instructor Led Version*
- *Project Management*
- User Manual for Test.com Proctors and Developers

There are 23 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
- Numerous lab procedure instructional training videos
- *Introduction to Standard Specifications for Roads and Bridges –2013 Edition*
- Updating Specialty Area and Recertification Tests
- Revision of *Application of Quality Assurance for Asphaltic Concrete Mixtures*
- Revision of *Application of Quality Assurance for Portland Cement Concrete and Structures*
- Revision of *Application of Quality Assurance for Embankment and Base Course*
- Continued refinement of the HMA training program and HMA Plant Accreditation Program
- Management of the Inspector/Technician Certification Program for DOTD and the Louisiana Transportation Industry
- *Math for Construction Personnel Volumes 1 and 2 - Revision*

### Maintenance On-Going Projects

- Revision of *Maintenance Planning Manual* and development of instructor-led course for Maintenance Planning
- Revisions/updates for current equipment Safe Operating Checklists
- Training Upgrade Proposal for District Sign Specialists
- Development of in-house training to replace TPC manuals
- Revisions/Updates to IRF courses
- *Maintenance of Signs and Sign Supports manual*
- *Practical Electricity Series*

### Other Projects On-Going

- *Basic Business Math*
- *Facilitation Skills*
- *How to Prepare an Annual Budget*

## Workforce Development Program

This program functions to:

- Serve as liaison to LTRC Transportation Curriculum Council (TCC) as outlined in PPM 47
- Collaborate specifically with District Administrators and Section Heads to support staff development, training and planning.

The LTRC Transportation Curriculum Council (TCC) held its first meeting on September 1, 2010, and continues to meet quarterly. It has an active council consisting of 12 members from Louisiana State University, transportation partners and DOTD management. There are six subcommittees from: Engineering, Operations, Multimodal Planning, Management and Finance, Core Skills, and Leadership and Outreach. The purpose of the committee and related subcommittees is to advise and assist LTRC in the identification, prioritization, development, evaluation, and implementation of transportation related technology transfer, training, work development, and educational services for DOTD and its public and private transportation industry partners. The Workforce Development program has the responsibility of helping to schedule and facilitate subcommittee meetings, distribute the meeting minutes to the appropriate people, and provide any support services needed by the subcommittee. It also has the responsibility of scheduling and planning each TCC Committee meeting.

Over the last year, the TCC, with the assistance of the LTRC training team, reviewed and approved revisions to all Headquarters section's Structured Training Programs, as well as several district training programs. New training and process and procedures are approved by the TCC before implementation.

### Presentations/Classes

- 2 *Basic Flagging*
- *Handling Hazardous Materials*
- 2 *Traffic Control Through Maintenance Work Areas* classes
- 4 *Superpave Mix Design and Analysis* classes – 56 students
- *Highway Plan Reading Volume I* class
- *Highway Plan Reading Volume II* class
- 2 ETRN to LEO/LSO training class for HQ training coordinators

## Headquarters Training Program

This program assists section heads and designated section training coordinators in providing their employees the training prescribed by the training programs governing their employees' positions. This program provided the following for the Headquarters sections:

**Orientation** – Monthly presentation at new employee orientation. This year provided 163 new employees information about respective training programs and how to fulfill individual training requirements.

**Exception reports** – If an employee's training is incomplete at the time of a proposed personnel action, such as a merit increase or promotion, an exception may be allowed if it is the result of circumstances over which the employee has no control, such as scheduling or unavailability. Training records of 28 employees were reviewed and exceptions granted this year.

**Testing** – Testing sessions are held 3 times a month for self-study courses. Employees were given 144 tests for different courses this year.

**Training** – This year classes were conducted to train 120 employees in topics to include: *Basic Flagging*, *Lockout/Tag Out*, *Traffic Control through Maintenance Work Areas*, and *Highway Plan Reading Volumes I and II*.





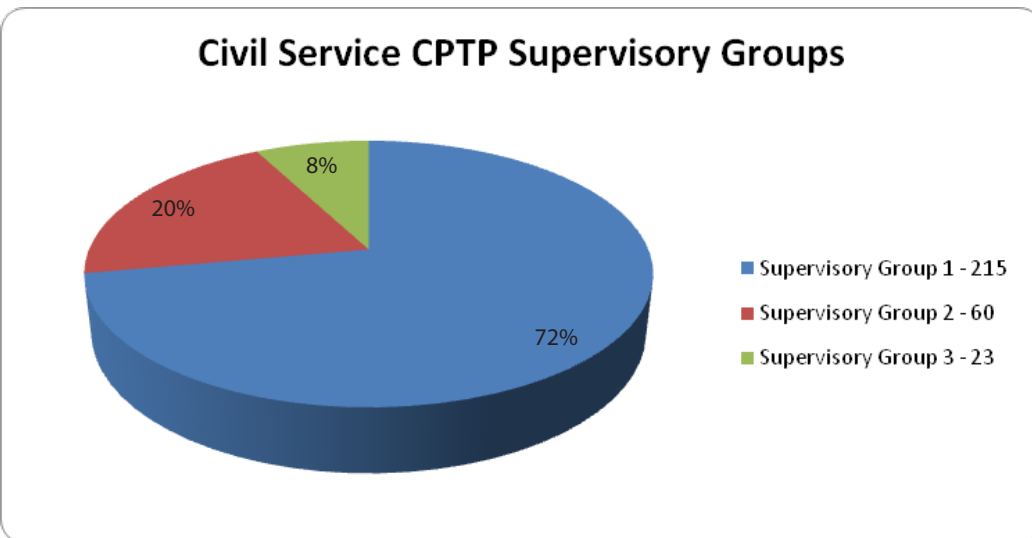
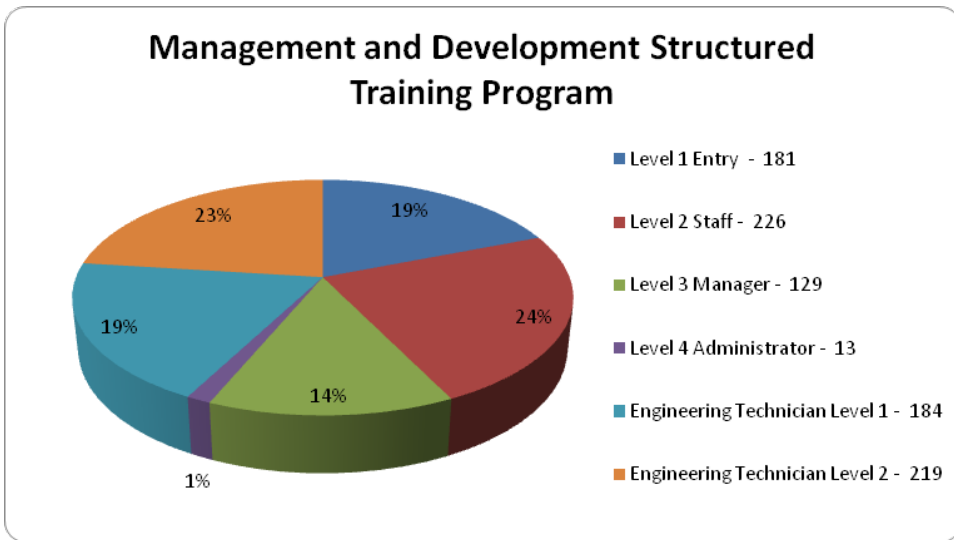
## Management Development Training Program

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, a supervisory training program for DOTD engineering technicians; and the Civil Service Supervisory training program for supervisors not covered by other DOTD training programs.

During fiscal year 2012-2013, courses for these training programs were delivered through several sources: the Civil Service Comprehensive Public Training Program (CPTP), the DOTD Human Resources Section, and in-house training courses developed by LTRC.

There were 952 employees actively participating in the Management Development Training Program in FY 2012-2013.

There were 298 employees actively participating in the CPTP Civil Service Supervisory Group Training Program in FY 2012-2013.



The Transportation Training and Education Center (TTEC) 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. Through this facility, LTRC is expanding the scope and availability of training, thereby serving a larger population.

TTEC’s strategy is to assist and enable workforce development using principles of strategic human capital improvement. The goals of this strategy are to: create and provide sound training, transition current classes/training into the distance learning environment where appropriate, and incorporate instructional design concepts, utilizing the talents of formally trained designers to update and modernize courses.

### Current & Ongoing Projects

- Cataloging of materials in the library
- Leadership Development Institute creation
  - ~Continued research & development of the Leadership Development Institute Classes
  - ~Completed Class 1: Foundations of Leadership Development—1 day (6-7 hour class)
  - ~Completed Class 2: Emotional Intelligence—1/2 day (4 hour class)
  - ~Development of Class 3: Transformational Leadership—1 day (6-7 hour class) *Pilot Date: August 2013*
  - ~Development of Class 4: Organizational Culture—1 day (6-7 hour class) *Pilot Date: September 2013*
- Transformational Leadership class
- Organizational Culture course
- External course contract management (e.g., Pavia Systems, Inc.; NE Roundabouts; Deighton Associates)
- TRAC and RIDES Program Implementation and Evaluation Program creation and deployment
- UNO Computer classes contract
- LSU CADD classes contract
- Audiovisual support and maintenance for TTEC facility
- Management of the Individual Registration Fund
- Scheduling National Highway Institute (NHI) Training
- Conference planning/management of NHTD 2013 held September 29 - October 3, 2013 in Boston, MA
- Conference planning/management of the Southeastern Association of State Highway Transportation Officials (SASHTO) 2014 Conference to be held in August 2014 in New Orleans, LA

- Conference planning/management of the 2014 IHEEP Conference scheduled for September/October 2014 in New Orleans, LA

### Completed Projects

- Leadership Development Institute—Course One & Two
- Emotional Intelligence course
- TRAC and RIDES training workshop
- TRAC and RIDES packages distributed to 11 area schools
- 90 UNO Computer classes with an attendance of 912 students
- 11 MicroStation classes with an attendance of 102 students
- 29 Nuclear Gauge & Radiation Safety classes with an attendance of 521 Students
- NHI Course Offerings - 10 course offerings; total of 262 participants
- Individual Registrations - 336 individuals processed
- Workshops and Conferences - 10 Workshops/Conferences/ Seminars; total of 2,580 participants



*In December 2012, TTEC hosted a workshop for an AASHTO education outreach program called RIDES (Roadways Into Developing Elementary Students) and TRAC (Transportation and Civil Engineering). Teachers from several area schools participated.*

The Louisiana Local Technical Assistance Program (LTAP) is one of 58 centers operating nationally to serve the local and tribal transportation agencies. Throughout 2012, Louisiana LTAP is celebrating 25 years of serving 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.

### Current & Ongoing Projects

LTAP partnered with DOTD and the FHWA Division offer to develop and offer a series of classes for local agencies that utilize federal transportation funds for local projects. The first class, the Core Training for LPAs was developed and presented statewide in 2012. The Construction, Engineering and Inspection class was developed and presented in 2013. Current efforts include development of two more classes covering the planning, application and stage processes and the design and project development phase. These classes are planned for roll out in 2014.

LTAP also completed a leadership development program for the Deep South ITE Section.

LTAP is also working with the Louisiana Parish Engineers and Supervisors Association on the planning activities for the upcoming national meeting of the National Association of County Engineers (NACE) which will be held in Baton Rouge in April of 2014.

### Completed Projects

- Bridge Inspection Course, Course Development and Course Offering Spring 2013
- Bridge Maintenance Course, Course Development and Course Offering Spring 2013
- Basic Sign Installation Course, Course Development and Course Offering Spring 2013
- Leadership Series for Deep South Institute of Traffic Engineers, Course Development and Offerings February and July 2013
- Local Road Safety Program Projects
- Numerous road safety presentations including the DOTD Transportation Conference, regional safety coalition meetings, and participation on the Towards Zero Death panel at the ITE national technical meeting



*(left) LTAP Director Marie Walsh kicks off LPA Core Training class in New Orleans*

*(right) Students participate in Basic Leveling & Grade-Setting*

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.

## 2013 Louisiana Transportation Conference a Success

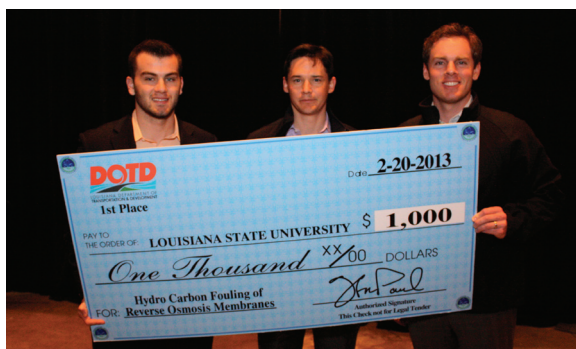
Over 1,780 people representing 32 states and two countries attended the 2013 Louisiana Transportation Conference, which was themed “Partnerships for Progress in Transportation” and held Feb. 17-20 at the Baton Rouge River Center. The biennial conference provides a forum for education, sharing new ideas and methods, and discussing changes in the industry and included 72 sessions, six workshops, and a two-day vendor exhibition.

Sherri H. LeBas, DOTD Secretary, delivered the welcoming remarks at the opening session. “In order to maintain progress and ensure that the infrastructure needs of Louisiana are met, I believe that we as professionals in transportation must work to strive for creative and innovative solutions to fund, design and construct projects,” said LeBas. “Innovation through partnership is essential in order to tackle these challenges.”



*Attendees check in to the 2013 LTC at the Baton Rouge River Center*

The conference’s highly attended general session included key speeches by Sec. LeBas; American Association of State Highway and Transportation Officials Executive Director Bud Wright; Federal Highway Administration Administrator Victor Mendez; and LSU Baseball Coach Paul Manieri.



*2013 LTC Senior Design Project Presentation Awards:  
1st Place: LSU—Hydrocarbon Fouling of Reverse Osmosis Membranes*

After three days of concurrent technical sessions and exhibits, an awards luncheon concluded the conference on Wednesday, Feb. 20. The luncheon recognized special achievements in engineering and construction projects performed by transportation partners of the LTC. This competition recognized the “best of the best” projects, demonstrating dedication to providing the highest quality in transportation infrastructure to customers, the citizens of Louisiana and the users of the state’s highways, transit systems, airports, ports and other public works.

## LTRC Hosts Roller Integrated Compaction Monitoring Showcase

Over 85 attendees convened for LTRC's latest showcase, which focused on roller integrated compaction monitoring. Transportation officials from eight states met at the Ramada Conference Center in New Iberia, LA, June 4, 2013, to attend the one-day seminar, which provided technical presentations, other states' examples, and information on the software, among other items. The rollers used in the ongoing LTRC research were available for a demo at the demonstration project's location as part of the showcase as well.

"The event was held to showcase the technology being used on the project in New Iberia, while the rollers were onsite," said Senior Geotechnical Research Engineer Gavin Gautreau, P.E. "It was in partnership with the FHWA (Every Day Counts initiative), and SHRP2 [Performance Specifications for Rapid Renewal (R07)] to speed construction times and reduce congestion and delays to the public. Onboard computers in the rollers give real-time feedback to the roller operators to help them obtain consistent layers and target stiffnesses—faster."

The current LTRC research project is entitled "Field Evaluation of Roller Integrated Compaction Monitoring." The researchers intend to demonstrate how intelligent compaction technology can accelerate construction, reduce re-work, and improve uniformity of pavement layers. They will evaluate the reliability and potential use of data for acceptance and measurements of in-situ stiffness of the constructed earth materials, linking to properties that relate more directly to design (e.g., modulus) and in-service performance. LTRC will document the impact of implementing these technologies and specification approaches. The demo project, located in New Iberia, LA, will be used as long-term monitoring sections. And finally, researchers worked in conjunction with Strategic Highway Research Program (SHRP) 2 R-07 partners to study the benefits of performance specifications for rapid renewal using the technology and mechanistic-based in-situ point measurements on a new pavement section including subgrade, stabilized subgrade, base course, and hot-mix asphalt (HMA) layers.

The research project will evaluate the technology and its potential implementation logistics in hopes of creating quality, consistent layers for current and future DOTD roads. The technology is still new and not mainstream yet, though researchers see many advantages, including consistency of coverage, digital documentation of efforts, visual representation of roller movements, possible



alternatives to nuclear gauges, and stiffness measurements with location position.

LTRC would also like to thank the following showcase sponsors: FHWA, LAPA, Gilchrist Construction, and SHRP2. To learn more about intelligent compaction, please contact Gavin Gautreau at [gavin.gautreau@la.gov](mailto:gavin.gautreau@la.gov) or (225) 767-9110.

## Support for Higher Education

LTRC coordinates the statewide DOTD Engineer Resource Development Program (ERDP), which provides structured rotational training for entry-level engineers. LTRC also manages the Cooperative Education Program for engineering students, a cooperative endeavor between DOTD and universities within Louisiana to employ full-time university students to perform engineering work and receive practical experience in the field of civil and transportation engineering. During 2012-2013, 7 people participated in the ERDP and 20 participated in the Cooperative Education Program. In addition, 97 graduate students were supported through LTRC research projects during 2012-2013.

LTRC also facilitates the DOTD Support Program for Civil Engineering Studies, a cooperative endeavor between DOTD and Louisiana state universities with civil engineering programs. It provides practical experience to civil engineering students who select transportation-related topics among their engineering design courses. DOTD supports this program financially, and universities grant academic credit to its participants. The senior design capstone projects are transportation-related and are included in courses for which senior-level students receive a grade. At the end of the senior design project, participants provide copies of the final report to LTRC and give a 15-20 minute presentation. Four universities participated in this program during 2012-2013: Louisiana Tech, McNeese, Louisiana State University, and University of Louisiana at Lafayette.

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 2012-2013, LTRC published 15 technical summaries and final reports, 8 project capsules, 1 technical assistance report, and 4 Technology Today newsletters. For a complete listing of publications and presentations by all LTRC personnel, please visit our Web site at [www.ltrc.lsu.edu/pdf/12\\_13publications.pdf](http://www.ltrc.lsu.edu/pdf/12_13publications.pdf).

### Final Reports and Technical Summaries

|         |     |   |
|---------|-----|---|
| 13-9SS  | 504 | Investigation into the Impact of Privatizing Civil Engineering Operations in Louisiana DOTD   |
| 10-2GT  | 498 | Geotechnical Information Database – Phase 2   |
| 11-6GT  | 497 | Quantifying the Key Factors that Create Road Flooding   |
| 10-1C   | 496 | Evaluation of Surface Resistivity Measurements as an Alternative to the Rapid Chloride Permeability Test for Quality Assurance and Acceptance           |
| 11-4GT  | 495 | Calibration of Resistance Factors for Drilled Shafts for the New FHWA Design Method   |
| 06-2SS  | 494 | Development of a Time-Dependent Hurricane Evacuation Model for the New Orleans Area   |
| 09-2P   | 492 | Implementation of Rolling Wheel Deflectometer (RWD) in PMS and Pavement Preservation  |
| 08-3ST  | 491 | Evaluation of Design Methods to Determine Scour Depths for Bridge Structures  |
| 00-2P   | 490 | Implementation of Warranties in State Contracts for Highway Construction  |
| 09-2B   | 485 | Development of Surface Friction Guidelines for LADOTD   |
| 07-2SS  | 484 | Design of Lane Merges at Rural Freeway Construction Work Zones  |
| 09-1B   | 465 | Characterization of HMA Mixtures Containing Recycled Asphalt Pavement Modified with Crumb Rubber Asphalt  |
| 01-3ENV | 448 | Transport, Speciation, Toxicity, and Treatability of Highway Stormwater Discharged to Receiving Waters in Louisiana                                     |
| 05-3ST  | 442 | Development of Advanced Grid Stiffened (AGS) Fiber Reinforced Polymer (FRP) Tube-Encased Concrete Columns   |
| 05-1SS  | 435 | Evaluation of the Traffic Safety Benefits of a Lower Speed Limit and Restriction of Trucks to Use of Right Lane Only on I-10 Over the Atchafalaya Basin |

### Technical Assistance Report

|           |  |
|-----------|--|
| 12-01TA-C | Evaluation of Girder Cores from the US 90 Bayou Ramos Bridge |
|-----------|--|

# tech transfer

## Project Capsules

|        |  |
|--------|--|
| 12-4C  | Evaluation of Portland Cement Concrete with Internal Curing Capabilities   |
| 12-5C  | Comparison of Conventional and Self-Consolidating Concrete for Drilled Shaft Construction  |
| 12-7P  | Roller Compacted Concrete Over Soil Cement Under Accelerated Loading   |
| 12-5PF | STC Synthesis of Research Results for Water Quality Management at Construction Sites   |
| 12-11P | Field Validation of Equivalent Modulus for Stabilized Subgrade Layer   |
| 12-3PF | Best Practices for Determining Value of Research Results   |
| 12-3ST | Morganza Floodway Bridge Bent Repair using Carbon Fiber Reinforced Polymers (CFRP)   |
| 12-2PF | Asphalt Surface Treatments for Pavement Preservation   |
| 12-3C  | Investigation of Best Practices for Maintenance of Concrete Bridge Railings  |
| 12-4SA | DOTD Support for UTC Project: Development of a Tool for Documenting, Tracking, Recording, and Analyzing Improvements to Intersection Sites and Roadway |
| 13-2P  | A Comprehensive Study on Pavement Edge Line Implementation   |
| 13-2SA | DOTD Support for UTC Project: Developing a Highway Safety Fundamentals Course  |
| 12-4SS | DOTD Support for UTC Project: Development of a Minimum State Requirements for Local Growth Policies  |
| 13-3SS | DOTD Support for UTC Project: Development of Performance Measurement for Freight Management  |
| 13-5SS | DOTD Support for UTC Project: Improving Freight Crash Incident Management  |
| 13-6SS | DOTD Support for UTC Project: Economic Impact Analysis of Short Line Railroads in the State of Louisiana   |
| 13-7SS | Use of Containers to Carry Bulk and Breakbulk Commodities and its Impact on Gulf Region Ports and International Trade                                  |
| 13-8SS | DOTD Support for the UTC Project: The Impact of Modifying Jones Act on the US and Louisiana  |
| 13-1SA | DOTD Support for UTC Project: Distracted Driving and Associated Crash Risks  |
| 13-2GT | Implementation of Slag Stabilized Blended Calcium Sulfate (BCS) in a Pavement Structure  |
| 12-3SA | Calibration of the Louisiana Highway Safety Manual   |
| 12-2SS | History of the Implementation of AASHTO and Louisiana DOTD Road Design Standards   |
| 13-8GT | Bayou Corne Sinkhole: Control Measurements of State Highway 70 in Assumption Parish Louisiana  |
| 13-3ST | Effects of Hydrokinetic Turbines on Mississippi River Infrastructure   |
| 12-4PF | Synthesis of Research Results: Regional Implementation of Warm Mix Asphalt   |
| 12-3P  | Minimizing Shrinkage Cracking in Cement-Stabilized Bases Through the Use of Microcracking  |
| 13-1C  | Evaluation of MIT-SCAN-T@ for Thickness Quality Control for PCC and HMA Pavements  |



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## Transportation Research Board (TRB) Committees/Panels

- Committee on Technology Transfer (ABG30)
- Committee on Physicochemical Phenomena in Soils (AFP40)
- Committee on Soils and Rock Instrumentation (AFS20)
- Subcommittee on Methods of Analyzing Steel Bridges [a2c02(1)]
- Committee on Non-destructive Evaluation of Structures Subcommittee [AFF40(1)]
- Committee on Concrete Bridges (AFF30)
- Committee on Culverts & Hydraulic Structures (AFF70)
- Committee on Exploration and Classification of Earth Materials (AFP20)
- Committee on Geosynthetics (AFS70)
- Subcommittee on Mechanistic Characterization of Pavement Layers [AFD80(1)]
- Committee on Transportation Earthworks (AFS10)
- Committee on Pavement Management Systems (AFP10)
- Committee on Strength and Deformation Characteristics of Pavement Sections (AFP80)
- Committee on Bituminous Materials Section (AFK00)
- Committee on Characteristics of Bituminous Paving Mixtures to Meet Structural Requirements (AFK50)
- Committee on Pavement Maintenance Committee (AHD20)
- Committee on Soil and Rock Properties (AFP30)
- Committee on Durability of Concrete (AFN30)
- Committee on Basic Research and Emerging Technologies Related to Concrete (AFN10)
- Committee on Engineering Behavior of Unsaturated Soils (AFP60)
- Committee on Properties of Concrete (AFN20)
- Committee on Concrete Materials and Placement Techniques (AFN40)
- Committee on Pavement Management Systems (AFD10)
- Committee on Characteristics of Asphalt-Aggregate Combinations to Meet Surface Requirements (AFK40)
- Committee on General Issues in Asphalt Technology (AFK10)
- Technical Advisory Council (A0000)
- Special Task Force on Climate Change and Energy (A0020T)
- Research and Technology Coordinating Committee
- NCHRP 01-52, Calibrated Mechanistic-Based Methods for Top Down Cracking of Hot Mix Asphalt Layers

- NCHRP 20-85(5), Climate Change and the Highway System Impacts and Adaptation Approaches
- NCHRP 20-89, Intellectual Property Stewardship Guide for Transportation Departments
- NCHRP 20-07/Task 340 – National Training: Challenges and Opportunities
- State Representative Advisory Committee

## Training Memberships

- Southeast Task Force on Technician Training and Qualification
- Construction Certification Committee
- DOTD Testing Procedures Committee
- ETRN to LSO Planning Committee
- Civil Service Mandatory Training Coordinators representative for DOTD
- National Transportation Training Directors
- American Society for Training and Development
- LATOD - Louisiana Trainers Group
- TRAC & RIDES National Board Member
- American Educational Research Association
- United States Distance Learning Association
- National Council on Measurement in Education
- National Defense Industrial Association
- Infocomm (AV trade organization)
- Society of Government Meeting Professionals



**Congratulations to the following LTRC employees who received service awards for service to the Department earned as of December 31, 2012:**



**35 YEARS—Harold “Skip” Paul and David Jumper**  
**30 YEARS—Mitchell Terrell**  
**25 YEARS—Kevin Gaspard**  
**20 YEARS—Allison Landry**  
**15 YEARS—Douglas Hinton**  
**10 YEARS—Kristina Blanchard, Kirk Zeringue,  
Gavin Gautreau, and Jenny Speights**  
**5 YEARS—Patrick Frazier, Khalil Hanifa,  
Keith Beard, and Richard Black**

## **American Society of Civil Engineers (ASCE)**

- Soil Properties and Modeling Committee, Geo-Institute, ASCE
- Engineering Geology and Site Characterization Committee, Geo-Institute, ASCE
- Experimental Analysis & Instrumentation
- Structural Wind Effects
- Committee Member of the ASCE Engineering Mechanics Division, Technical Committee on Elasticity
- Committee Member of the ASCE Engineering Mechanics Division, Technical Committee on Properties of Materials
- Reviewers for *ASCE Journal of Hydraulic Engineering*
- American Society of Civil Engineers, Structural Engineering Institute New Orleans Chapter.
- Committee Member, ASCE Bituminous Materials Committee (BMC)
- *Journal of Materials in Civil Engineering*, Associate Editor
- Louisiana Chapter of T&DI

## **Library Memberships**

- NTKN (National Transportation Knowledge Network)
- ETKN (Eastern Transportation Knowledge Network)
- AASHTO-RAC TKN Task Force
- TRB-LIST Committee member
- (SLA) Special Libraries Association, Transportation Division

## **Miscellaneous**

- American Society of Mechanical Engineers (ASME)
- American Society for Testing & Materials
- American Society of Civil Engineers (ASCE)
- American Concrete Institute
- Society of Plastics Engineers (SPE)
- American Chemical Society (ACS)
- Society for the Advancement of Materials and Process Engineering (SAMPE)
- International Community for Composite Engineering (ICCE)
- International Institute for FRP in Construction (IIFC)
- United States Universities Council on Geotechnical Engineering Research (USUCGER)
- American Association for Wind Engineering
- American Academy of Mechanics (AAM)
- American Institute of Aeronautics and Astronautics (AIAA)
- American Society for Engineering Education (ASEE)
- Louisiana Engineering Society
- AWWA: American Water Work Association
- WERF: Water Environment Research Foundation
- LSU Communication across the Curriculum – Engineering Advisory Council
- Association of Asphalt Paving Technologist (AAPT)
- Asphalt Pavement Analyzer Users Group Management Committee
- Southeastern Asphalt User Producer Group
- Research Advisory Group of the National Stone, Sand, and Gravel Association
- AASHTO Research Advisory Committee
- AASHTO Standing Committee on Research
- FHWA Technical Working Group on Sustainable Pavements

## Office of the Director

Harold “Skip” Paul, P.E., Director  
Toni Daigle, Executive Services Assistant  
Theresa Rankin, Administrative Manager  
Tina Blanchard, Accountant

## External Programs

Vijaya (V.J.) Gopu, Ph.D., P.E., Associate Director

## Research and Development

Mark Morvant, P.E., Associate Director, Research  
Bridget LeBlanc, Executive Services Assistant

## Pavement and Geotechnical Research

Zhongjie “Doc” Zhang, Ph.D., P.E.  
Pavement & Geotechnical Research Administrator

## Pavement Research

Kevin Gaspard, P.E., Pavement Research Engineer Manager  
Mark Martinez, P.E., Pavement Research Engineer Manager  
Mitchell Terrell, Pavement Technician 5  
Shawn Elisar, Pavement Technician 4  
Glen Gore, Pavement Research Specialist 2

## Pavement Research Facility - ALF

Zhong Wu, Ph.D., P.E., Assistant Professor - Research  
Accelerated Pavement Research Program Manager  
George Crosby, C.P.C., Pavement Research Facility Manager  
Keith Gillespie, Pavement Research Specialist 3  
Brandon Janet, Pavement Research Specialist 1  
Leticia Courville, Ph.D., E.I., Research Associate 4  
Danny Xiao, Research Associate 4

## Geotechnical Research

Gavin Gautreau, P.E., Senior Geotechnical Research Engineer  
Khalil Hanifa, E.I., Geotechnical Research Engineer  
Douglas Hinton, Geotechnical Technician 2  
Paden Shilling, Geotechnical Technician 2

## Geotechnical Engineering Research Laboratory

Murad Abu-Farsakh, Ph.D., P.E., Associate Professor, Research  
GERL Manager  
Qiming Chen, Ph.D., Research Associate 4  
Pallavi Bhandari, Computer Analyst III  
Xinbao Yu, Ph.D., Research Associate 3  
Benjamin Comeaux, Research Specialist

## Materials Research

William “Bill” King, Jr., P.E., Materials Research Administrator

## Asphalt Research

Samuel B. Cooper III, E.I., Asphalt Research Engineer  
Md. Sharear Kabir, P.E., Asphalt Research Engineer  
William Gueho, Senior Asphalt Technician  
Patrick Frazier, Asphalt Technician 5  
Jeremy Icenogle, Asphalt Technician 4

## Concrete Research

Tyson Rupnow, Ph.D., P.E., Concrete Research Manager  
Patrick Icenogle, P.E., Concrete Research Engineer  
Greg Tullier, Senior Concrete Technician  
Craig Johnson, Concrete Tech 4  
Norris Rosser, Concrete Tech 3

## Engineering Materials Characterization Research Facility (EMCRF)

Louay Mohammad, Ph.D., Professor, EMCRF Manager  
Amar Raghavendra, P.E., Applications Engineering Manager  
Minkyum Kim, Ph.D., Research Associate  
Marcelo Medeiros, Ph. D., Research Associate  
Saman Salari, Research Specialist 2

## Structures Research

Walid Alaywan, Ph.D., P.E., Senior Structures  
Research Engineer

## Planning/Intermodal

Chester Wilmot, Ph.D., Associate Professor

## Special Studies

Kirk M. Zeringue, P.E., Senior Special Studies Research Engineer

## Technology Transfer & Training

Sam Cooper, MSCE, P.E., Associate Director,

Technology Transfer & Training

David Jumper, IT Technical Support

Marty Mumphrey, Audio Visual Consultant

Angela Benn, Administrative Program Specialist

## Publications & Digital Media Development

Jenny Speights, Public Information Director

Nick Champion, Audio and Video Production

Jenny Gilbert, Technical Writer

Emily Wolfe, Multi Media Specialist

## Technology Transfer

Michael Boudreaux, P.E., Technology Transfer Engineer

## Structured Training Programs

Cindy Twiner, DOTD Structured Training Director

Karen Cordell, Construction and Materials Program Manager

Rex Ransome, Headquarters Training Program Manager

Candy Cardwell, Training & Development Program Manager,

Workforce Development Planning

Ted Ball, Training & Development Program Manager

Mike Elliott, Engineering Technician DCL

Keith Beard, Engineering Technician DCL

Kelvin Stone, Training and Development Specialist

Richard W. Black, Training and Development Specialist

John Dean, LSU Teaching Associate

## External Educational Resources

Mary Leah Coco, Ph.D., LTRC Training Events

Program Manager

Gisele Landry, Teaching Associate

Allison Landry, Training and Development Specialist

Melissa Lee, Training and Development Specialist

Sandy Brady, Librarian

Brenda Wolfe, TTEC Administrative Assistant

## Local Technical Assistance Program

Marie Walsh, Ph.D., Director, LTAP

Bob Breaux, LTAP Office Manager

Steve Strength, LTAP Program Manager

Blanche Hill, Teaching Associate

Dean Tekell, P.E., PTOE, Local Road Safety Program Coordinator

Rick Holm, P.E., Local Road Safety Program Contractor

Tom Buckley, P.E., Local Road Safety Program Contractor

## Selected Staff Accomplishments 2012-2013

LTRC Director Harold "Skip" Paul, P.E., was appointed as AASHTO Vice Chair and AASHTO SCOR Vice Chair.

LSU Civil Engineering Professor and EMCRF Manager Louay N. Mohammad, Ph.D., was awarded the 2012 Asphalt Rubber Ambassador Award by the Rubber Pavement Association.

Senior Geotechnical Research Engineer Gavin Gautreau, P.E., was awarded the Andrew M. Lockett Medal for Civic Activities from the Baton Rouge Chapter of the Louisiana Engineering Society (LES).

LTRC Associate Director of External Programs VJ Gopu, Ph.D., P.E., served on the NSF Site Visit Teams to review the NEES Equipment Sites at the University of California – Berkeley and the University of Illinois – Urbana/Champaign, and the NEES Headquarters at Purdue University.

LTAP and staff were awarded the Customer Satisfaction Award from DOTD for their work with Ann Wills, DOTD's local programs manager, in improving the DOTD/LPA partnerships.

Associate Director of Research Mark Morvant, P.E., was appointed as co-chair of the AASHTO Research Advisory Committee (RAC) Task Force: Value of Research.

Training and Development Specialist Melissa Lee was elected to a director position in the Society of Government Meeting Professionals (SGMP) Louisiana chapter.

Marty Mumphrey, audio visual consultant, earned three Digital Media Design and Engineering certifications: DMC-T, DMC-D, and DMC-E.

LTRC Training Events Program Manager Mary Leah Coco, Ph.D., has completed a chapter on virtual learning environments for the book *Cross-Cultural Online Learning in Higher Education and Corporate Training* (IGI Global).

Keith Beard, engineering technician DCL, was invited to participate in a workshop for NCHRP Project 20-7(309), *National Training: Challenges and Opportunities* (June 24-25, 2013, Irvine, California).



# ltrc policy committee

Richard Savoie, P.E., Chairman  
Chief Engineer  
DOTD

Norma Jean Mattei, Ph.D., P.E.  
Chair, Civil and Environmental Engineering  
University of New Orleans

Ernest Walker, Ph.D., P.E.  
Dean, College of Engineering  
Southern University

J.O. Uppot, Ph.D., P.E.  
Coordinator, Department of Civil Engineering  
McNeese State University

Kelly Rusch, Ph.D., P.E.  
Associate Dean of Research and Diversity  
Louisiana State University

Eric Kalivoda, Ph.D., P.E.  
Deputy Secretary  
DOTD

Rhett Desselle, P.E.  
Assistant Secretary, Office of Operations  
DOTD

Ken McManis, Ph.D., P.E.  
Professor and Head of Department of  
Civil Engineering  
University of Louisiana at Lafayette

Aziz Saber, Ph.D., P.E.  
Professor of Civil Engineering & Science  
Louisiana Tech University

Bob Bruce, Ph.D., P.E.  
Catherine and Henry Boh Chair in Civil Engineering  
School of Science and Engineering  
Tulane University

Harold R. Paul, P.E., ex officio  
LTRC Director

Jamie Setze, observer  
Federal Highway Administration