



2008-2009 Annual Report

Merging Government, Industry & Academia





William D. Ankner, Ph.D.
Secretary



Michael V. Martin, 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 civil 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, continu-

ing 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, 2008–June 30, 2009. The center is sponsored jointly by the Louisiana Department of Transportation and Development and Louisiana State University.

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Director's Message

To:

William D. Ankner, Ph.D.
Secretary, DOTD

Michael V. Martin, Ph.D.
Chancellor, LSU

William Temple, P.E.
Chief Engineer, DOTD

Richard Koubek, Ph.D.
Dean
College of Engineering, LSU

From:

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



This annual report begins with a new look and logo for LTRC, as presented on the cover of this report. The new design was launched by our publications and electronic media unit and made its first appearance on the 2009 Louisiana Transportation Conference program. The designers felt it was important to create a clear and consistent image that could easily be remembered. The fleur-de-lis was chosen to emphasize LTRC's history and important contributions to the state.

The year began with national recognition of the LTRC Workforce Development Program in a highlight article in the July/August edition of the Transportation Research Board's *TR News* periodical. The seven page article titled "The Louisiana Model for Transportation Workforce Development," demonstrated the integration of technical assistance, structured training, continuing education, and technology transfer as an effective way to prepare current and future employees.

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.

The Louisiana Transportation Conference was, of course, the highlight of this year's technology transfer activities. Over 1,500 transportation professionals and 180 vendor representatives participated in the conference whose theme was "Transportation Innovation: Solving Tomorrow's Challenges." The conference was the culmination of activities of seven committees involving over 150 LTRC, DOTD, and industry personnel. Over 70 technical sessions provided transportation professional opportunities for up to 19

professional credit hours, including the required hour in professional ethics.

Other technology transfer events were also conducted, such as two more offerings of our seminar series—*Building Quality Pavements* and *Emulsion Design, Construction, and Performance*.

LTRC played host to the 4th Annual Transportation Library Connectivity Conference in October with transportation library professionals from all over the country at the TTEC facility. Secretary Ankner welcomed the group with a discussion that focused on providing seamless access to all DOT libraries across the nation. Reflecting that desire, LTRC became a member of the Eastern Transportation Knowledge Network (ETKN) comprising 26 NEASHTO and SASHTO states. Sandy Brady, LTRC librarian, has recently been named chair of the ETKN. Through its association with the National Transportation Knowledge Network, Dr. Ankner's vision of a seamless access has become reality.

The TTEC facility, brought to fruition through a DOTD, LSU, and industry partnership, continues to expand its offerings. Over 3,600 students attended almost 300 offerings this year. Combining individual registrations to conferences, workshops, seminars, and certification programs, training was provided to nearly 10,000 students this year.

Respectfully Submitted,

A handwritten signature in black ink that reads "Harold Paul". The signature is written in a cursive, flowing style.

Harold "Skip" Paul, P.E.
Director

Facilities

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 classroom, a conference room, and offices. The laboratories are used to conduct advanced research into asphalt materials, concrete, soils, pavements, and geotextiles. 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, which includes mobile equipment, including the mini-cone intrusion technologies for in-situ characterization of geomedia; and Pavement on the Move (POM), a multi-use mobile laboratory for collecting data from field construction projects as well as research and training.

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.



(top to bottom): LTRC, ALF, TTEC

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) 100 percent federal, Surface Transportation Program (STP-federal), and external contracts and grants, such as the National Cooperative Highway Research Program, the U.S. Army Corps of Engineers, and the National Science Foundation.

Completed Research

02-2GT: The Rideability of a Deflected Bridge Approach Slab

Principal Investigator: Mark Martinez, P.E., LTRC

04-4B: Development of a Design Methodology for Asphalt Treated Base Modules

Principal Investigator: Louay N. Mohammad, Ph.D., LTRC

06-2P: Mechanistic Flexible Pavement Overlay Design Program

Principal Investigator: Zhong Wu, Ph.D., P.E., LTRC

06-2ST Elimination of Deck Joints Using a Corrosion Resistant FRP Approach

Principal Investigator: Guoqiang Li, Ph.D., Southern University

06-3ST Field Evaluation of the Effectiveness of Continuity Diaphragms for Skewed Precast Prestressed Concrete Bridge Girders

Principal Investigator: Aziz Saber, Ph.D., Louisiana Tech University

07-2C: Determination of Coefficient of Thermal Expansion Effects on Louisiana's PCCP for the Mechanistic-Empirical Pavement Design Guide

Principal Investigator: Hak-Chul Shin, Ph.D., P.E., LSU

08-2P: Analysis of Seasonal Strain Measurements in Asphalt Materials Under Accelerated Loading

Principal Investigator: Mostafa A. Elseifi, Ph.D., LSU

05-3ST: Development of Advanced Grid Stiffened (AGS) FRP Tube-Encased Concrete Columns

Principal Investigator: Guoqiang Li, Ph.D., Southern University

07-3GT: Development of Operational Real-Time Kinematic Global Positioning Service for Southeastern Louisiana

Principal Investigator: Roy K. Dokka, Ph.D., LSU

04-2P LADOTD Pavement Management System: Development of Uniform Sections for PMS Inventory and Applications

Principal Investigator: Mohammad Jamal Khattak, Ph.D., Louisiana Tech University

04-2ST: Structural Monitoring of Rigolets Pass Bridge

Principal Investigator: Robert N. Bruce, Ph.D., Tulane University

06-1B: Implementation of Testing Equipment for Asphalt Materials

Principal Investigator: Bill King, P.E., LTRC

07-2P: Characterization and Development of Truck Load Spectra for Current and Future Pavement Design Practices in Louisiana

Principal Investigators: Sherif Ishak, Ph.D., and Hak-Chul Shin, Ph.D., P.E., LSU

08-1TIRE: Developing an In-situ Characterization Technique to Assess the Scour Potential of Cohesive Soils

Principal Investigator: Gouping Zhang, Ph.D., LSU

08-2TIRE: Application of Inorganic Polymer Concrete ('Geopolymer') in Transportation Structures Located in Harsh Environments

Principal Investigator: Erez Allouche, Ph.D., LTRC

08-3TIRE: First Flush Reactor for Stormwater Treatment for Elevated Linear Transportation Projects

Principal Investigator: Zhi-Qiang Q. Deng, Ph.D., LSU

08-4TIRE: Automated Construction of 3-D Road Models From Right-of-Way Video

Principal Investigator: Ryan Benton, Ph.D., ULL

09-1B: Characterization of HMA Mixtures Containing Recycled Asphalt Pavement Modified with Crumb Rubber Asphalt

Principal Investigator: Louay N. Mohammad, Ph.D., LTRC

Featured Research

Dynamic Cone Penetrometer Implementation

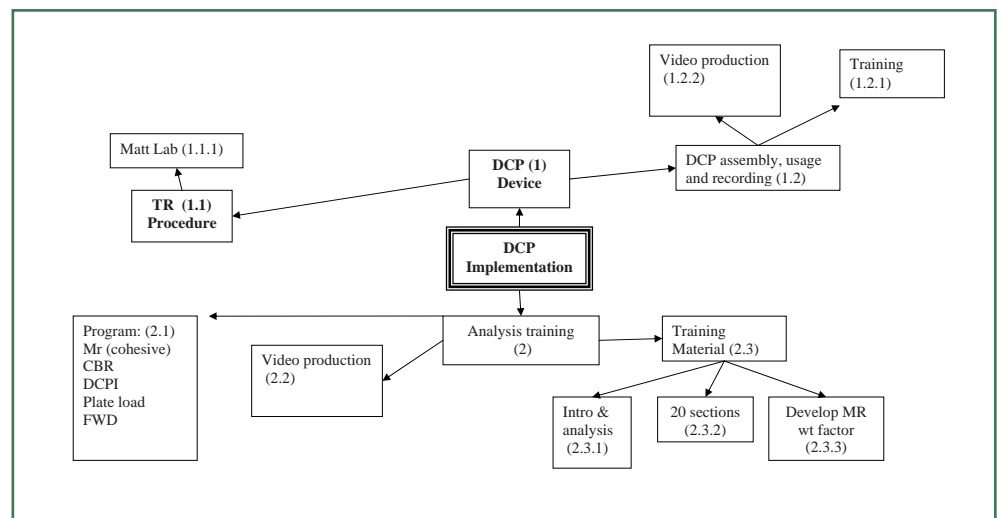
The Dynamic Cone Penetrometer (DCP) has evolved into a tool used internationally by private, governmental, and military agencies. It has been researched extensively and numerous correlations have been established. The correlation list is exhaustive including resilient modulus, CBR, plate load testing, unconfined compressive strength, soil classification, shear strength, and stiffness index.

In recent years, LTRC has conducted several research projects from which either formal reports or papers have been published. Based on the results of the research, an implementation program is underway. DCP data can be used in pavement design, geotechnical design, or construction quality control applications.

The implementation program has two main parts. Part 1 focuses on how to use the DCP and record its data. Explicit details on how to use the DCP and record its data were documented in a TR procedure. An extensive hands-on training session illustrating the assemblage and usage of the DCP is under development as well. It is anticipated that a training video will be manufactured as well.

Part 2 focuses on how to analyze the data and apply it to engineering applications. It includes a training manual with 20 actual field case studies, a video production of the training materials as well as a user friendly computer program to analyze the data.

The implementation team is also working with DOTD executives to integrate DCP usage into the current pavement design process.



Featured Research

Calibration of Resistance Factors for LRFD Design of Driven Piles



This research study evaluated the axial load resistance of piles driven into soft Louisiana soils based on the reliability analysis. Forty-two square precast-prestressed-concrete (PPC) piles that were tested to failure were included in this investigation.

The predictions of pile

resistances were based on static analysis (α -method for clay and Nordlund method for sand) and three direct cone penetration test (CPT) methods (Schmertmann method, De Ruiter and Beringen method, and Bustamante and Gianeselli [LCPC] method). In addition, dynamic measurements with signal matching analysis of pile resistances using the Case Pile Wave Analysis Program (CAPWAP) were evaluated. The Davisson and modified Davisson interpretation method were used to determine the measured ultimate load carrying resistances from pile load tests. The predicted ultimate pile resistances obtained using the different design methods were compared with the measured resistances determined from the pile load tests. Statistical analyses evaluated the capability of the prediction design methods to estimate the measured ultimate pile resistance of driven piles.

The results showed that the static method over-predicts the pile resistance, while the dynamic measurement with signal matching analysis (CAPWAP-EOD and 14 days beginning of restrike [BOR]) under-predict the pile resistance. Among the three direct CPT methods, the

De Ruiter and Beringen method is the most consistent prediction method with the lowest coefficient of variation (COV).

Reliability based analyses, using First Order Second Moment (FOSM) method, First Order Reliability (FOR) method, and Monte Carlo simulation were also conducted to calibrate the resistance factors (ϕ) for the investigated pile design methods. The resistance factors for different design methods were determined and compared with AASHTO recommended values. The calibration showed that the De Ruiter and Beringen method has a higher resistance factor than the other two CPT methods.

Design and Development of Instrumentation Plan for Structural Health Monitoring of I-10 Twin Span Bridge

On August 29, 2005, the existing Interstate I-10 Twin Span Bridge that crosses Lake Pontchartrain between New Orleans and Slidell sustained heavy damage from the storm surge associated with Hurricane Katrina. The construction of a new replacement bridge over Lake Pontchartrain began in August 2006. The new I-10 Twin Span Bridge was designed to be higher, bigger, and stronger than the existing bridge so it can last well into the 22nd century. The bridge will be supported by groups of battered pile foundations.

To address several questions raised during the design phase of the project, LADOTD decided to install a substructure and superstructure health monitoring system on a selected bridge pier (MI9 eastbound) at the main span for short-term and long-term monitoring of the bridge. The substructure monitoring system includes instrumenting eight piles with In-Place Inclinometers (IPI) and strain gauges and instrumenting the pile-cap with accelerometers, tiltmeters, water pressure cells, and corrosion meters. The superstructure monitoring system includes instrumenting the columns, bent cap, three steel girders, three concrete

LTRC Project Management and Tracking System

Pallavi Bhandari, LTRC Computer Analyst II, has reached the coding phase for the LTRC Project Management and Tracking System. In this phase, Bhandari is in the process of writing, testing, debugging, and troubleshooting the source code of the computer program.

When all phases are complete, the web-based application will smooth the process of managing and tracking LTRC research projects. It is also predicted to improve inter-organizational coordination and communication as well as impact both the overall business process and the end users of the application. Bhandari explained, “The goal is to make sure that apart from storing and maintaining the data in electronic format, the application will play a role in streamlining the tracking of various elements involved in the lifecycle of a project beginning from the problem statements through to the final reports and implementation.”



Last October, Bhandari held an interactive demonstration with LTRC and DOTD employees by taking the group step-by-step through every Web page and answering many questions regarding the specifics of the application. “The major functions will include ratings and tracking of approvals of proposals, reports, and the status of ongoing projects,” said Bhandari. However, as Bhandari also demonstrated, the use of all these functions and access to data will vary depending on users’ job titles.

While progress has been steady, Bhandari explained that it was difficult getting to know the processes which currently exist and designing the web application so that it reflects these processes and meets the end users’ needs. However, regardless of the challenges, Bhandari said that the response has been positive from everyone who has seen the system, and she is looking forward to seeing the project through to completion.

girders, and one diaphragm with strain gauges and corrosion meters. A Weigh In Motion (WIM) system will be installed at the concrete bridge deck of the M19 eastbound pier.

A unique lateral load test was designed and conducted to assess the validity of the analysis methods used to design the battered pile foundations using the FB-MultiPier software. Two high strength steel strands were run through the pile caps of M19 eastbound and M19 westbound

piers. These cables were pulled with hydraulic jacks to impose about 1900 kips of lateral force between the two pile caps. The horizontal movements of the pier caps and bents were monitored using an automated survey station with prisms. The strains and deformations within the foundation piles were measured using the strain gauges and IPI inclinometers in the foundation piles.

Active Research

Project No.	Agency	Principal Investigator	Title	Start Date	End Date
04-5B	LTRC	King	Implementation of New OGFC Specifications	1-Jul-2005	1-Dec-2009
04-5GT	LTRC	Abu-Farsakh/ Gautreau	Control of Embankment Settlement: Field Verification of PCPT Prediction Methods	1-Mar-2005	30-Jun-2010
04-6B	LTRC	Mohammad	Characterization of Louisiana Asphalt Mixtures Using Simple Performance Tests and MEPDG	1-Jan-2008	30-Dec-2010
05-1GT	LTRC	Abu-Farsakh	Field Demonstration of New Bridge Approach Slab Designs and Performance	1-Jul-2008	30-Sep-2011
05-5GT	LTRC	Abu-Farsakh	Evaluation of the Base/Subgrade Soil Behavior Under Repeated Loading	1-Aug-2005	31-Jul-2010
07-1B	LTRC	King	Evaluation of Warm Mix Asphalt Technology in Flexible Pavements	15-Mar-2009	15-Mar-2011
07-2GT	LTRC	Abu-Farsakh/ Tsai/Yoon	Calibration of Resistance Factors Needed in the LRFD Design of Driven Piles	1-Sep-2006	30-Dec-2009
08-3GT	LTRC	Abu-Farsakh/ Yoon	Support Study to Structure Health Monitoring of the I-10 Twin Span Bridge Over Lake Pontchartrain	1-Jan-2008	31-Dec-2010
09-1C	LTRC	Rupnow	Evaluation of Fly Ash Quality Control Tools	1-Mar-2009	1-Mar-2010
09-2C	LTRC	Rupnow	Evaluation of Cement and Fly Ash Treated RAP and Marginal Aggregates for Base Construction	1-Mar-2009	1-Mar-2010
09-2ST	LTRC	Alaywan	Performance and Analysis of Concrete Bridge Railing Using Conventional and Composite Reinforcement Materials	1-Apr-2009	30-Sep-2009
09-4C	LTRC	Rupnow	Evaluation of Ternary Cementitious Combinations	1-Mar-2009	1-Mar-2011
09-5C	LTRC	Icenogle/Kabir	Evaluation of Non-Destructive Technologies for Construction Quality Control of HMA and PCC Pavements in Louisiana	1-Jun-2009	1-Jul-2010
04-1GT	LTU	Wang	Estimating Setup of Piles Driven into Louisiana Clayey Soils	15-May-2008	14-Nov-2009
04-3B	LSU	Daly	A Comparative Analysis of Modified Binders: Original and Materials Extracted from Existing Pavements	1-May-2007	17-Jan-2010
06-2SS	LTRC/LSU	Wilmot	Development of a Time-Dependent Hurricane Evacuation Model for the New Orleans Area	1-Jul-2008	30-Jun-2010
07-2SS	LSU	Wolshon	The Design of Lane Merges at Rural Freeway Construction Work Zones	1-Sep-2007	31-Oct-2009
07-4SS	SU	Parsons	LADOTD Customer Service Process and Outcome Evaluation	1-May-2007	30-Jun-2010
07-9P	LSU	Lian	Support Study for Developing Embedded Wireless Strain/Stress/Temperature Sensors Platform for Highway Applications	1-Jun-2007	31-Dec-2009
08-1P	LSU	Elseifi	Cost Effective Prevention of Reflective Cracking of Composite Pavement	1-May-2008	31-May-2010
08-1ST	LSU	Okeil	Evaluation of Continuity Details for Precast Prestressed Girders	10-Dec-2007	30-Nov-2009

Project No.	Agency	Principal Investigator	Title	Start Date	End Date
08-3ST	LSU	Zhang	Evaluation of Design Methods to Determine Scour Depths for Bridge Structures	1-Apr-2009	31-Mar-2011
08-6GT	LTRC	Barbato	Performance Evaluation of Buried Pipe Installation	1-Jan-2008	1-Jan-2010
09-1GT	WPI	Tao	Update LADOTD Pile Driving Vibration Monitoring Policies	1-Jun-2009	1-Dec-2011
09-1ST	LTU	Saber	Load Distribution and Fatigue Cost Estimates of Heavy Truck Loads on Louisiana State Bridges	1-Apr-2009	31-Mar-2011
09-2P	LTRC	Elesifi	Implementation of the Rolling Wheel Deflectometer (RWD) in PMS and Pavement Preservation	1-May-2009	30-Jun-2010
09-5ST	LSU	Li	Support Study for a Shape Memory Polymer Based Self-Healing Sealant for Expansion	1-Mar-2009	31-Aug-2010
05-5ST	LSU	Cai	Development and Performance Evaluation of Fiber Reinforced Polymer Bridge (FRP)	15-Nov-2005	14-Nov-2009
06-2B	LTRC	Mohammad	Optimization of Tack Coat for HMA Placement	1-Jul-2005	30-Sep-2009
07-1ST	LTRC	Abu-Farsakh/ Yoon	Structure Health Monitoring of the I-10 Twin Span Bridge Over Lake Pontchartrain	1-Nov-2007	31-Oct-2010
07-3ST	LSU	Cai	Use of Fiber Reinforced Polymer (FRP) Bars in Highway Concrete Bridges	1-Oct-2007	30-Apr-2011
07-4ST	LSU	Voyiadjis/Cai/ Sharma	Integral Abutment Bridge for Louisiana's Soft Soil	1-Oct-2007	31-Aug-2011
07-8P	LSU	Lian	Developing Embedded Wireless Strain/Stress/ Temperature Sensors Platform for Highway Applications	1-Jun-2007	31-Dec-2009
08-2ST	LSU	Cai	Monitoring Bridge Scour Using Fiber Optic Sensors	1-Jan-2009	30-Jun-2011
08-4GT	LTRC	Abu-Farsakh/ Chen	Support Study to Evaluation of the Base/Subgrade Soil Under Repeated Loading	1-Jan-2008	31-Dec-2009
02-3SS	ULL	Sun	Developing a Comprehensive Highway Accident Data Analysis System with GIS (III)	1-Aug-2004	30-Jul-2009
05-1SS	LSU/ULL	Wolshon/Sun	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	1-Jan-2005	31-Aug-2009
07-7P	ULL	Sun	Safety Improvement from Edge Line of Rural Two-Lane Highways	1-Sep-2007	30-Aug-2010
08-2SS	C-K Assoc., LLC	Strecker	LOOP Environmental Monitoring: 2008-2010 Beach Elevation, Beach Vegetation, and Land Loss and Habitat Change Surveys	1-Jan-2008	31-Dec-2010
03-7ST	LTRC	Alaywan	Long-Term Monitoring of the HPC Charenton Bridge	1-Jun-2004	30-Jun-2010
09-1GERL	LTRC	Abu-Farsakh	LTRC Support for Geosynthetic Research at the Geotechnical Engineering Laboratory	1-Jul-2009	30-Jun-2010
10-1EMCRF	LTRC	Mohammad	Pavement Materials Research Using Special Equipment at the Engineering Materials Characterization Research Facility	1-Jul-2009	30-Jun-2010
09-1PLAN	LSU	Wilmot	LTRC Proposal for the Support of Research and Development in Transportation Planning	1-Jul-2006	30-Jun-2009
10-1AD	LTRC	Gopu	Research Expansion Program	1-Nov-2006	30-Jun-2012
10-1ALF	LTRC	Wu	Management and Operation of the Pavement Research Facility	1-Jul-2009	30-Jun-2010

LTRC: Louisiana Transportation Research Center | LSU: Louisiana State University | LTU: Louisiana Tech University
ULL: University of Louisiana at Lafayette | SU: Southern University

Education and Training

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.

Structured Training Programs

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 the 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 recertification of inspectors and technicians statewide in each area of construction.

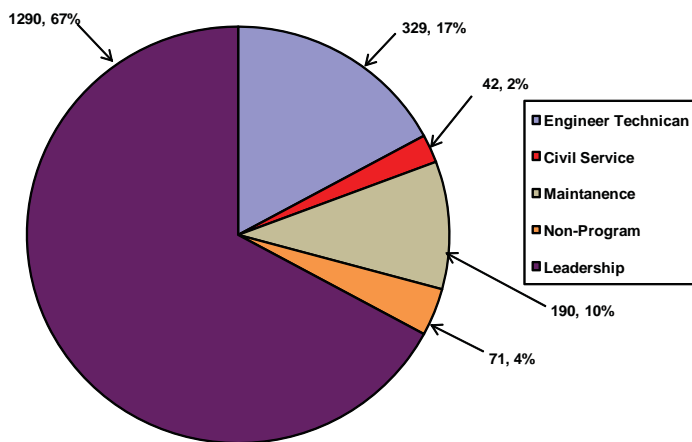
The Maintenance Training Program focuses on the development of new job-specific courses related to job functions, work processes, and safe operation of equipment used by maintenance field personnel. These courses promote an awareness of safe practices and attitudes needed for maximum job performance.



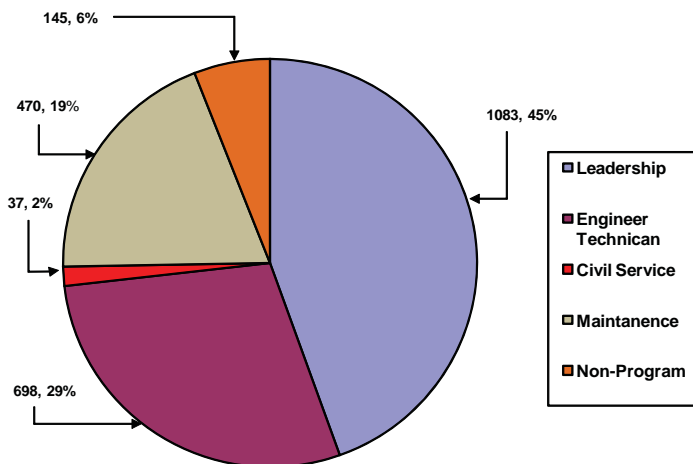
Management Development Training Program

This program oversees several mandatory supervisory, management development, and career development training programs: the Leadership 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; the DOTD Supervisory Maintenance Training program for trades, crafts, and maintenance supervisors; and the Civil Service Supervisory Training program for supervisors not covered by other DOTD training programs.

Instructor Led Courses
1922 Course Completions



Management Development Program
2433 Participants



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 2008-2009, 2 people participated in the ERDP and 49 participated in the Cooperative Education Program. In addition, 56 graduate students were supported through LTRC research projects during 2008-2009.

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 projects are transportation-related and are included in courses for which junior- or 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. LSU and Louisiana Tech participated in the program during 2008-2009.

Education and Training

Construction and Maintenance Course Development

There were 16 courses/projects developed or revised during this fiscal year, 9 in construction and 7 in maintenance.

Construction Training Courses/Projects Completed

- Application of Quality Assurance Specifications for Asphaltic Concrete - Implemented
- Excavation and Embankment Inspection course book revision - Implemented
- Basic Asphaltic Plant Inspection course book revision - Implemented
- Asphaltic Concrete Paving Inspection Volumes I and II course book revisions - Implemented
- Ethics for Construction Personnel - Power Point presentation - Implemented
- Structured Training Program for Asphaltic Concrete Plant Inspectors - Tech 5 and DCL
- Revisions to Superpave Mix Design and Analysis course modules
- Sampling and Testing of Plastic Concrete course book revision
- Revision of policy for Authorized Density Tester

Maintenance Courses/Projects Completed

- Traffic Control Through Maintenance Work Areas and Handbook
- Traffic Signal Installation Plan Reading and Inspection

- SOCL Aspen Aerial Bridge Access Unit Model UB50
- Maintenance Math I (revision implemented)
- SOCL Sweepers (revision)
- Letter Bid Study Guide
- Herbicide Applicator Certification (revision)

There are 16 projects currently on-going, 11 in construction and 5 in maintenance.

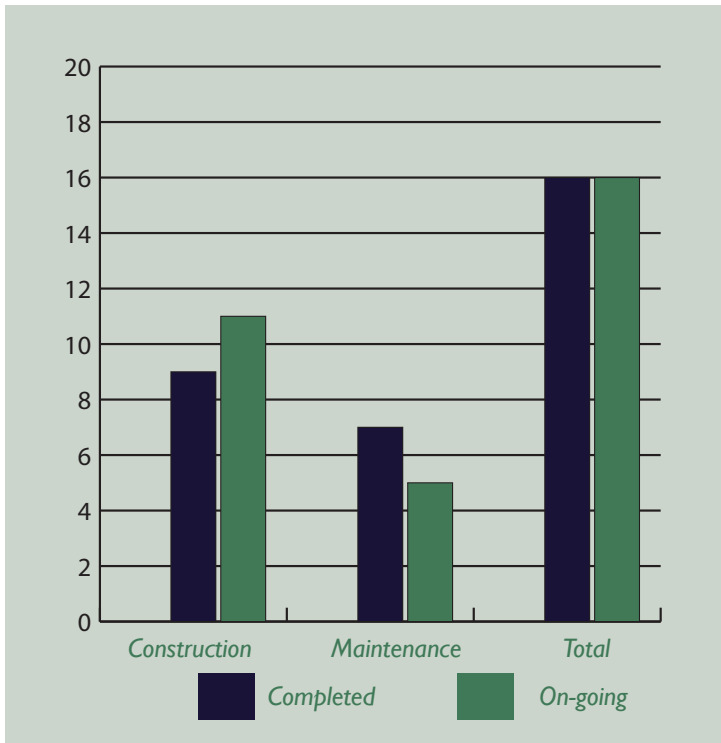
Construction Training Current/On-Going Projects

- Base Course Inspection course book revision
- Introduction to Highway Plan Reading
- Safety in Soils Exploration (revision of existing course)
- Drilling Rig Operations (revision of existing course)
- Surveying with Transits, Theodolites, and Total Stations course manual
- Portland Cement Concrete Paving (revision of existing course)
- Portland Cement Concrete Plant (revision of existing course)
- Structural Concrete Inspection Volumes I and II (revision of existing course)
- Application of Quality Assurance Specifications for Embankment and Base Course (revision)
- Lab Safety Procedures for Section 19

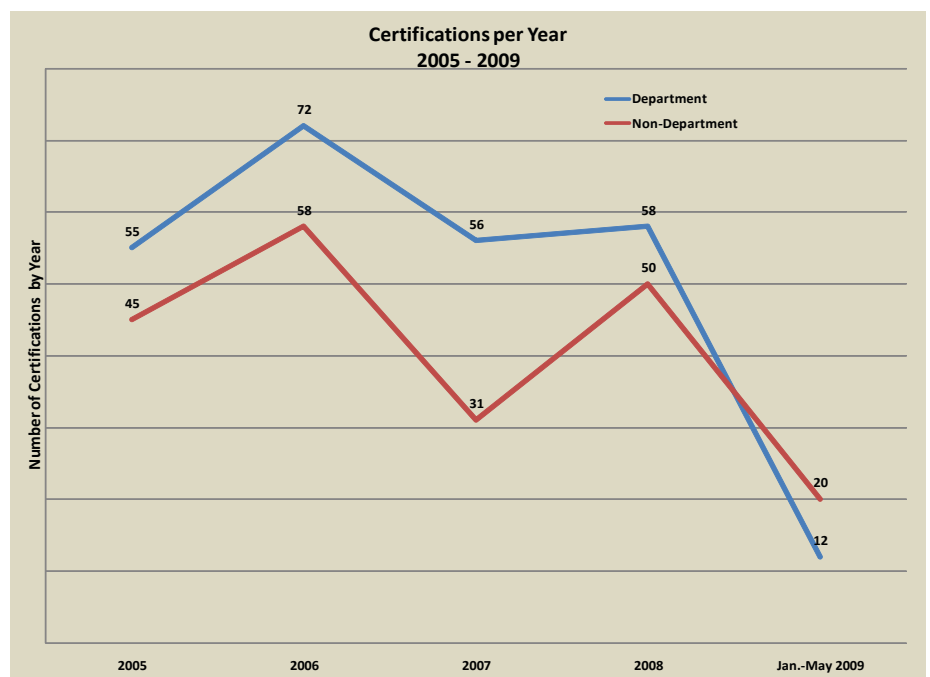
Maintenance Current/On-Going Projects

- Preventive Maintenance Module (revision to on-line version)
- SOCL Herbicide Spray Rig
- SOCL Aspen Aerial Bridge Access Unit Model A40
- SOCL Sewer Jet
- Maintenance Math 2 (revision)





LTRC continues to manage the Inspector/Technician certification program for the Louisiana Department of Transportation and Development and the Louisiana transportation industry. The chart at right shows the total number of new certifications issued since 2005.



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 new 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:

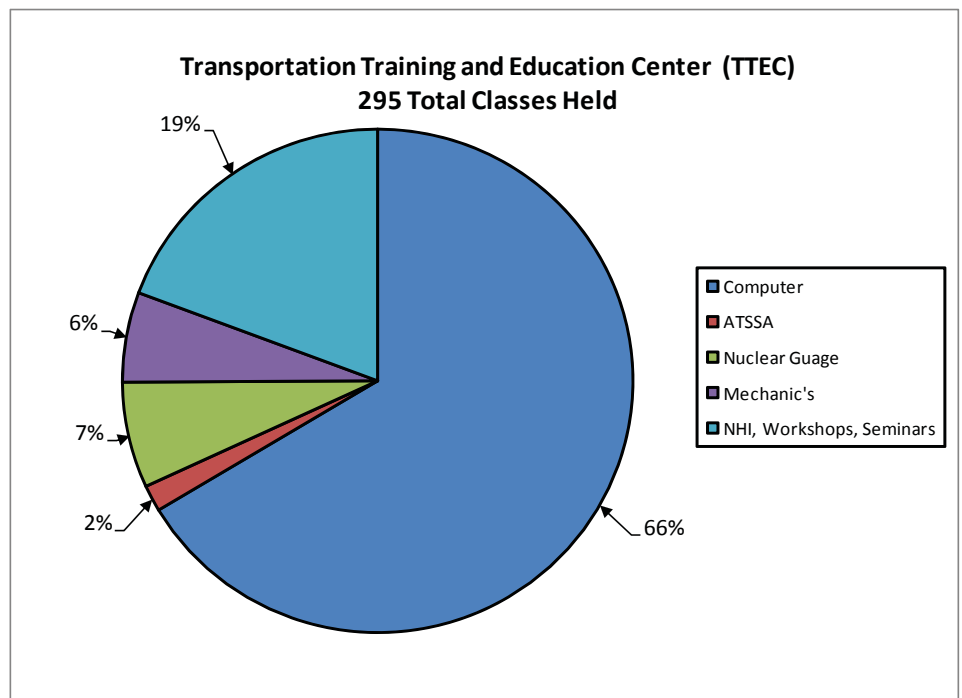
- Create and provide sound training.
- Transition current classes/training into the distance learning environment where appropriate.
- Incorporate instructional design concepts, utilizing the talents of formally trained designers to update and modernize courses.



External Training Activities

LTRC's external training program, which includes event management of workshops and conferences, continues to supply the professional development and technical skills training necessary for strategic human capital improvement, workforce development, and the career growth of all DOTD employees and the greater transportation community of the region. This training program, which is vital for DOTD, local governments, and private industry, is increasing its offerings to the wider transportation community. External training satisfies specific needs by providing job related training topics through partnerships with universities and private training providers. TTEC's training program has been so successful that it was featured in the 2009 National Highway Institute (NHI) catalog.

TTEC was the host for the majority of these events which included NHI, FHWA, Louisiana State University, University of New Orleans, and Northwestern University courses. Over 3,600 students attended almost 300 courses offered by TTEC from July 2008 through June 2009. The breakout of courses is shown below:



Individual Registrations

In addition to managing courses in-house, the center provides the opportunity to attend courses, conferences, seminars, and other educational and training opportunities offered by outside parties. During 2008-2009, LTRC managed registrations for 454 employees to attend 147 conferences, courses, seminars, and other educational and training opportunities. TTEC was also responsible for all the logistical, site management, automation, and audio/visual support for 8 conferences attended by 1,700 participants at various metropolitan areas around the state.

Library and Information Services

The TTEC Library continues to grow and provide assistance to a wide range of customers. Computers are now available to those visiting the facility for e-mail access, DOTD employees for electronic testing, and researchers for database access and general use. A wide range of print materials are available and are being inventoried with a catalog of those items available online from the library Web site. The site also provides access to a number of research databases, such as ASTM Standards and TRISworld, as well as direct contact with the library staff via real-time chat or e-mail. The library staff is available to provide research assistance for questions simple or complex and when necessary locate and obtain materials from other libraries for DOTD researchers.



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, and videos, or seminars and workshops, technology transfer's ultimate goal is to disseminate practical knowledge to municipalities, parishes, and the transportation industry at large.



2009 Louisiana Transportation Conference

Over 1500 transportation professionals from 24 states and Canada attended the three-day 2009 Louisiana Transportation Conference (LTC). This year's theme was *Transportation Innovation: Solving Tomorrow's Challenges*. Representatives from the public, private, and academic sectors of the transportation industry convened at the Baton Rouge River Center on February 8-11, 2009 to network and attend workshop sessions, panel discussions, and receptions.

The LTC is held on a biennial basis to foster a better relationship and understanding among the Louisiana Department of Transportation and Development (DOTD), Federal Highway Administration (FHWA), and the transportation industry (contractors, consultants, universities, suppliers, parish/local agencies, etc.) by providing an interchange between the public and private sectors relative to transportation policy, practice, and problems.

DOTD Secretary William Ankner, Ph.D., welcomed this year's attendees at the keynote luncheon and introduced this year's keynote speaker Joseph M. Giglio, Ph.D. Dr. Giglio teaches corporate strategy at the Graduate School of Business at Northeastern University in Boston and has authored many books relating to the transportation industry, such as "Fast Lane to the Future," "Mobility," and "Driving Questions." Dr. Giglio discussed his most recent book, "Judges of the Secret Court," a fast-paced fiction novel that considers ways to stimulate economic growth by transforming America's transportation system.

Following the luncheon, attendees dispersed into various concurrent sessions throughout the River Center. The Planning Committee organized more than 70 sessions, several personal development courses, and informative panel discussions. Mississippi Department of Transportation (MDOT) State Research Engineer and LTC speaker Randy Battey, P.E., said, "I really enjoyed the conference; the organizing committee should be commended for putting on such an excellent and informative event. It is by far the best state agency led transportation conference that I have attended."

Sessions were broad in topic ranging from design strategies to customer service, and many transportation professionals at the 2009 conference were able to receive credit for up to 19 professional development hours (PDH), including the biennially required hour in Professional Ethics.

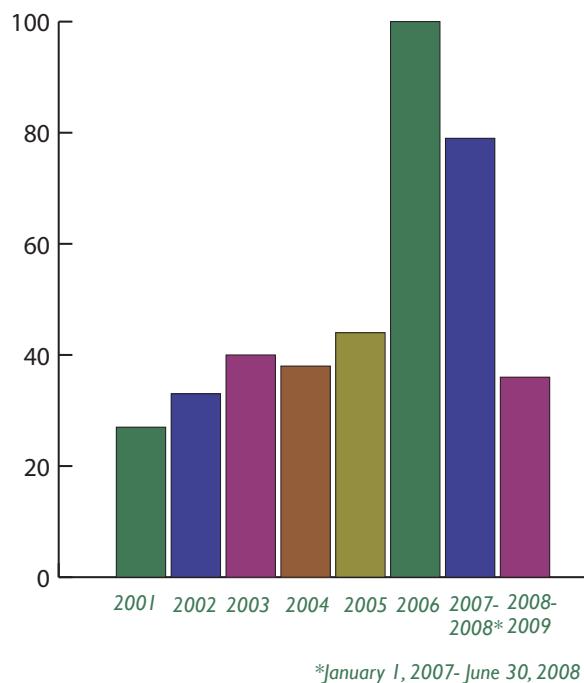
In addition to the numerous sessions, conference attendees were also able to attend the 2009 Vendor Exhibition that was held in the Baton Rouge River Center Exhibition Hall on Monday, February 9. Over 180 vendor representatives were present with over 80 vendor booths displayed.



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Technical Assistance Projects

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. During the 2008-2009 fiscal year, LTRC responded to 36 of 40 technical assistance requests.



Vendor reception attendees were able to visit different booths that were set up from 5-8 pm to network, receive vendor company materials, and have the opportunity to learn more about the different facets of the transportation industry. Hor d'oeuvres and appetizers were also served during the three-hour exhibition allowing conference participants to mingle and socialize with vendors in attendance as well as their colleagues in the industry.

The conference concluded on Wednesday, February 11, with an awards luncheon where over 20 awards were given to outstanding industry professionals. Mark Morvant, DOTD assistant to the secretary for policy, closed the conference by thanking all those in attendance for making this one of the most successful conferences to date and reminded the crowd of the next conference that will be held January 23-26, 2011 at the Baton Rouge River Center.

Dissemination of Information

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 2008-2009, LTRC published 6 technical summaries, 14 project capsules, 4 *Technology Today* newsletters, 12 final reports, and 3 technical assistance reports. For a complete listing of LTRC publications for 2008-2009, please see page 20.

LTRC's Publications and Digital Media Department also launched a new identity for the research center during the past fiscal year. The new brand was designed to increase cohesiveness within LTRC and serve as a visual tool to build its reputation within the public and private sectors of the engineering industry as well as in the community. The new logo first appeared in the 2009 Louisiana Transportation Conference programs. Designers of the new logo felt that it was important to create a clear and consistent image that is easily remembered and best reflects the character of the center for years to come. The fleur-de-lis was chosen to emphasize LTRC's history and important contributions to the state. LTRC's Web site (www.ltrc.lsu.edu) was also redesigned to reflect the logo change.

Tech Transfer

Seminar Series Continues with Two Offerings in 2008



A short panel discussion marked the conclusion of the Building Quality Pavements seminar. The panel provided answers and additional thoughts to the group regarding changes and concerns that arose during the day-long seminar.

LTRC continued its annual series of focused technical conferences with the “Emulsion Design, Construction, and Performance Seminar,” which was held July 1 at the Holiday Inn Select in Baton Rouge. “Building Quality Pavements” was held at the Hilton in Lafayette on November 19. Both seminars attracted public and private sector engineers, construction managers, inspectors, quality assurance managers, and other transportation professionals from all over the state.

LTRC hosts two technical seminars a year in an effort to provide technical leadership through a forum that demonstrates new technologies, implements and publicizes LTRC research, discusses and resolves problems, imports the best practices of others, and partners with the transportation community.

Emulsion Design, Construction, and Performance

Topics covered included an overview of asphalt emulsion technology, emulsion storage and handling, the importance of proper sampling and testing, using emulsions for tack coat application, warm mix asphalt, and successfully marketing pavement preservation techniques.

Delmar Salomon, president of Pavement Preservation Systems explained, “I enjoyed the seminar. I learned what is being done in Louisiana, liking the integrated approach between research and applied area. This was my first participation in the LTRC series of seminars, and I would support the series.”

LTRC conducts post-seminar evaluations to continually improve these focused technical seminars and collect attendee feedback and ideas. According to the emulsion seminar evaluation, respondents rated their satisfaction with the seminar an average of 4.56 on a scale of 1 to 5, with 5 being “very satisfied.” All respondents noted that they would recommend an LTRC technical seminar to others, and most noted that the best part of the seminar was the quality of the speakers and the timeliness of the subject matter.

Building Quality Pavements

The goal of the seminar was to educate the DOTD and its affiliated working groups in the area of quality assurance aiming to raise the awareness of quality in paving operations. LADOTD uses various methods to measure quality and these measures define the product produced by the hard working contractors and DOTD construction inspection teams.

Speakers covered a wide range of topics, such as the advantages and disadvantages of various quality measures, possible future quality control programs, and Louisiana’s history of construction specifications from method-based to various statistically-based specifications. The importance of certification and training for building quality pavements was also discussed along with the impact that SiteManager Materials will have on DOTD contracts and how it will help LADOTD and others manage materials and finalize contracts. In addition, seminar topics discussed Louisiana’s smoothness specifications, the use of International Roughness Index

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LTAP

The Louisiana Local Technical Assistance Program (LTAP) is one of 58 centers in a national network that provides services to the local transportation community in each state, Puerto Rico, and the Native American Tribal areas. Each center operates independently to develop and implement programs that best meet the needs of the local transportation agencies while sharing a common national mission “to foster a safe, efficient, and environmentally sound surface transportation system by improving skills and increasing knowledge of the transportation workforce.” LTAP also shares four national focus areas that include infrastructure maintenance, safety, workforce development, and value delivery.

The LTAP provides an array of services geared specifically to the local agencies and personnel that manage and maintain Louisiana’s local roads and transportation system. Training classes and workshops have been primary services offered since the program began in 1986. Classes are routinely offered at eight locations around the state as part of the ongoing “Roads Scholar” program. Special topic classes are also offered, and on-site on-demand workshops are also available. LTAP also provides technical assistance on request, publishes a quarterly newsletter, and maintains a publication and video library.

(IRI) as a preferred measure of smoothness, and new ideas to replace unreliable, extensive testing.

Chris Abadie, P.E., LTRC materials research administrator, explained, “All presentations confirmed that all of the tests and statistical methods used to quantify our pavement quality are good tools to measure quality.” Abadie also added, “I thought it all blended together very well. It was really good to see the contractors’ response to Material Engineer Administrator Luanna Cambas’s presentation on the proposed specification change that will take the LADOTD inspector out of the asphalt plant and placing the pay factor exclusively at the roadway.”

Professors from McNeese University were also in attendance and were eager to educate their students on some of the topics that were discussed during the seminar. Joseph Richardson, associate professor, is currently teaching a quality class and explained, “It’s good to show students real life applications of what they are learning. It’s a way to show how it applies outside the classroom.”

LTAP Joins New Core Safety Coalition



A core group consisting of representatives from the Louisiana Highway Safety Commission (LHSC), LTAP, DOTD, and the Federal Highway Administration (FHWA) recently formed a coalition that worked to aggressively and collaboratively to implement key strategies of the Louisiana Strategic Highway Safety Plan (SHSP). The coalition’s inaugural effort supported the annual *Click It or Ticket* campaign sponsored by the LHSC. *Click It or Ticket* efforts include high visibility and aggressive enforcement of Louisiana’s primary seat belt law as well as education and outreach. The coalition also worked to organize local collaborations to implement regional strategies in four areas with historically low seatbelt usage.

LTRC Publications

Technical Assistance Reports

08-3TA	Gavin P. Gautreau, Murad Y. Abu-Farsakh, and Zhongjie Zhang	Bottom Ash Test Section Evaluation - Erwinville, LA
08-4TA	Haoqiang Fu and Chester G. Wilmot	Assessing Performance of Alternative Pavement Marking Materials
09-1TA	Mini Radhakrishnan and Chester G. Wilmot	Impact of Left Lane Truck Restriction Strategies on Multilane Highways in Louisiana—A Literature Review

Final Reports and Technical Summaries

406	Louay N. Mohammad, Ananda Herath, Ravindra Gudishala, Munir D. Nazzal, Murad Y. Abu-Farsakh, and Khalid Alshibli	Development of Models to Estimate the Subgrade and Subbase Layers' Resilient Modulus from In situ Devices Test Results for Construction Control
408	Haoqiang Fu and Chester Wilmot	Modeling Hurricane Evacuation Traffic: Development of a Time-Dependent Hurricane Evacuation Demand Model
417	Louay N. Mohammad, Kevin Gaspard, Ananda Herath, and Munir D. Nazzal	Comparative Evaluation of Subgrade Resilient Modulus from Non-destructive, In-situ, and Laboratory Methods
418	Aziz Saber and Freddy Roberts	Monitoring System to Determine the Impact of Sugarcane Truckloads on Non-Interstate Bridges
420	Steve Cai and R. Richard Avent	Assessing the Needs for Intermediate Diaphragms in Prestressed Concrete Bridges (Summary Report)
425	Aziz Saber, Freddy L. Roberts, and Arun K. Guduguntla	Evaluating the Effects of Heavy Sugarcane Truck Operations on Repair Cost of Low Volume Highways
426	George Z. Voyiadjis	Feasibility of Tubular Fender Units for Pier Protection Against Vessel Collision
428	Bill P. Buckles, Sherif Ishak, and Stephanie Smith	Development of a Statewide Transportation Data Warehousing and Mining System under the Louisiana Transportation Information System (LATIS) Program
429	Mingjiang Tao and Murad Y. Abu-Farsakh	Effect of Drainage in Unbound Aggregate Bases on Flexible Pavement Performance
430	Mohammad Jamal Khattak, Gilbert Y. Baladi, Xiaoduan Sun, Jared Veazey, and Corey Landry	Development of Uniform Sections for Pavement Management System Inventory and Application
433	Chester G. Wilmot, Srinivas Varanasi, and Srividya Vadlamani	Analysis of Louisiana Vehicular Input Data for MOBILE 6
436	John Eggers	Air Void Analyzer for Plastic Concrete

Project Capsules

04-IGT	Estimating the Setup of Piles Driven into Louisiana Clayey Soils
05-IGT	Field Demonstration of New Bridge Approach Slab Designs and Performance
07-IP	Finite Element Simulation of Structural Performance on Flexible Pavements with Stabilized Base/Treated Sub-base Materials under Accelerated Loading
07-2C	Determination of Coefficient of Thermal Expansion Effects on Louisiana's PCC Pavement Design
07-4ST	Integral Abutment Bridge For Louisiana's Soft and Stiff Soils
08-IP	Cost Effective Prevention of Reflective Cracking of Composite Pavement
08-5GT	Measurement of Seasonal Changes and Spatial Variations in Pavement Unbound Base and Subgrade Properties
08-7GT	LTRC Project Management and Tracking System
09-1C	Evaluation of Fly Ash Quality Control Tools
09-2C	Evaluation of Cement and Fly Ash Treated RAP and Aggregates for Base Construction
09-4C	Evaluation of Ternary Cementitious Combinations
09-5C	Evaluation of Non-Destructive Technologies for Construction Quality Control of HMA and PCC Pavements in Louisiana
09-1B	Characterization of HMA Mixtures Containing Recycled Asphalt Pavement Modified with Crumb Rubber Asphalt
09-2SS	Enhancing Calibrated Peer Review for Improved Engineering Communication Education



For a complete listing of publications and presentations by all LTRC personnel, please visit our Web site at www.ltrc.lsu.edu/08_09publications.

Professional Organizations

Transportation Research Board (TRB) Committees/Panels

- AFK 00, Bituminous Materials Section, Member
- AFK 10, General Issues in Asphalt Technology
- AFK 20, Characteristics of Bituminous Materials
- AFK 30, Characteristics of Nonbituminous Components of Bituminous Paving Mixtures
- AFK 40, Characteristics of Bituminous-Aggregate Combinations to Meet Surface Requirements, Member, Chair, April 2007 - April 2010
- AFK 50, Characteristics of Bituminous Paving Mixtures to Meet Structural Requirements, Member
- AHD 18, Pavement Preservation
- AHD 20, Pavement Maintenance Committee, Member
- AFD 20, Pavement Monitoring, Evaluation and Data Storage, Member
- AFP 30, Soil and Rock Properties, Friend of the Committee
- Chair of AFN 30, Durability of Concrete
- AFN 10, Basic Research and Emerging Technologies Related to Concrete
- ABG40, Library and Information Science for Transportation (LIST)
- AFP 10, Committee on Pavement Management Systems
- AFS 50, Committee on Modeling Techniques in Geomechanics
- AFP 20, Committee on Exploration and Classification of Earth Materials
- AFS 70, Committee on Geosynthetics.
- AFP 40, Committee on Physicochemical and Biological Processes in Soils
- AFS 10, Committee on Transportation Earthworks
- AFD 60, Committee on Flexible Pavement Design
- AFP 60, Committee on Engineering Behavior of Unsaturated Soil

- Highway Research Program (SHRP 2) Technical Expert Task Group (T-ETG)
- AFN 20, Properties of Concrete
- AHB20, Freeway Operations Committee
- ABJ70, Artificial Intelligence and Advanced Computing Applications
- ANB10 (3), Subcommittee on Emergency Evacuation
- Highway Safety Manual Task Force
- NCHRP Panel 20-68A, U.S. Domestic Scan Program
- NCHRP Panel 20-86(5), Climate Change and the Highway System

American Society for Testing and Materials

- Subcommittee D04.20 on Empirical Tests of Bituminous Mixtures, Member
- Subcommittee D04.22 on Effect of Water & Other Elements on Bituminous Coated Aggregates, Member
- Subcommittee D04.24 on Bituminous Surface Treatments, Member
- Subcommittee D04.25 on Analysis of Bituminous Mixtures, Chair, June 2000-Present
- Subcommittee D04.26 on Fundamental/Mechanistic Tests
- Subcommittee D04.44 on Rheological Tests, Member
- Subcommittee D04.45 on Specifications for Modified Asphalt, Member
- Subcommittee D04.46 on Durability & Distillation Tests, Member

Federal Highway Administration (FHWA)

- Asphalt Binder Expert Task Group
- Emulsion Expert Task Group

Miscellaneous

- American Association of State Highway and Transportation Officials Research Advisory Committee
- American Institute of Steel Construction
- American Society of Civil Engineers
- American Society of Engineering Education (ASEE)
- Asphalt Pavement Analyzer User Group
- Association of Asphalt Paving Technologists (AAPT)
- Committee on International Transportation
- Concrete Pavement Technology Center
- Geo-Institute, Engineering Geology and Site Characterization Committee
- International Society of Asphalt Pavement
- International Society for Concrete Pavements
- Louisiana Engineering Society
- LSU Communication across the Curriculum (CxC)
- LTPP State Highway Agency (SHA) contact person
- National Research Council Committee on the Role of Public Transportation in Emergency Evacuation
- National Society of Professional Engineers
- Research Advisory Group of the National Stone, Sand, and Gravel Association
- Society of Government Meeting Planners (SGMP)
- Southeastern Asphalt User Producer Group
- Special Library Association
- Transportation Knowledge Network Task Force (AASHTO/RAC/TKN/TF)
- US Universities Council on Geotechnical Engineering Research (USUCGER)
- Chi Epsilon, Civil Engineering Department Level Honor Society
- Tau Beta Pi, College of Engineering Level Honor Society
- Phi Kappa Phi, University Level Honor Society
- International Steering Committee for Travel Survey Conferences
- Institute of Transportation Engineers Transportation Security and Evacuation Advisory Committee
- Served on 2 NCHRP panels on Highway Safety

Training Memberships

- American Society for Training and Development
- Civil Service Mandatory Training Coordinator for DOTD
- Construction Certification Committee
- CPTP Statewide Training Coordinators representative for DOTD
- DOTD Loss Prevention Committee
- DOTD Testing Procedures Committee
- LA Comprehensive Public Training Program (CPTP) Curriculum Committee
- Southeast Task Force on Technician Training and Qualification



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