

Technology Today

Volume 25, Issue 3

Spring 2011

A publication of the Louisiana Transportation Research Center



In this Issue

2011 Louisiana Transportation Conference Draws Large Attendance and Notable Speakers
1

Chip Seal Expert Featured in Louisiana Seminar
4

Permeability Testing Device to Save Department Thousands
5

LTRC and Texas Researchers Team Up in National Research Opportunity
6

LTRC Policy Committee Meets at TTEC
6

Recently Published
7

Staff Updates and Accomplishments
8

Upcoming Events

May 5-6

LPESA Spring Conference
TTEC

May 11

ASCET & DI Louisiana Chapter Seminar
TTEC

To view more events, please visit
<http://www.ltrc.lsu.edu>.

2011 Louisiana Transportation Conference Draws Large Attendance and Notable Speakers

Approximately 1,800 people from 24 states attended the 2011 Louisiana Transportation Engineering Conference, which was held January 9-12, 2011, at the Baton Rouge River Center. The biennial conference, which provides a forum for education, sharing new ideas and methods, and discussing changes in the industry included 64 sessions and four workshops.



The conference's general session included key speeches by Department of Transportation and Development (DOTD) Secretary Sherri LeBas; Division of Administration Commissioner Paul Rainwater; American Association of State Highway and Transportation Officials (AASHTO) Executive Director John Horsley; and Federal Highway Administrator Victor M. Mendez. Additional featured speakers throughout the conference included Eric Kalivoda, DOTD deputy secretary, and DOTD Office of Management and Finance's Michael Bridges, undersecretary, and Kirt Clement, deputy undersecretary.

Featured sessions, which highlighted the conference's theme, *Transportation: A Key to a Sustainable Future*, included

topics ranging from the social and economic sides of sustainability in transportation to new technology and techniques in research.

"The focus for this conference is addressing transportation challenges through innovation," said LeBas. "Now, more than ever, it is important that professionals in the field of transportation continue to seek out innovative and creative solutions within our industry."

Over 200 speakers contributed to the conference as a whole and led discussions during the four-day conference on a variety of topics in addition to sustainability specific topics. A survey taken after the conference showed that many of the sessions were found to be very informative and useful in day to day

operations in the workplace. Many also commented on the great job of all the speakers.

Two sessions in particular gathered the largest crowds. The first was *Session 34: Bridge Construction*, which discussed the John James Audubon Bridge that will be opening this summer. Presenters discussed the innovative precast cofferdam design, installation, and synchronous jacking that took place in the spring of 2009 for the main pier foundations of the bridge and the engineering required for the erection of the bridge that will soon be the longest span cable-stayed bridge in the America, with a main span of 1,583 feet. The second and one of the highest attended sessions featured roundabouts in Louisiana, focusing on the DOTD roundabout contract with NE Roundabouts, which includes assistance in capacity analysis, preliminary design, peer review, design training workshops, roundabout software training, and simulation services. Existing roundabouts in Louisiana were featured as well as state-of-the art roundabout practices.

An awards luncheon closed the four-day conference on Wednesday, Jan. 12, to recognize 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.



View the 2011 LTC photo gallery at http://www.ltrc.lsu.edu/ltrc_11/photos/ to see more images from this year's conference.



TRANSPORTATION EXCELLENCE AWARDS

Roadway/Bridge Construction Less Than \$10 Million:

DOTD District 05 - David Hodnett
D & J Construction – Clayton Hayes

Roadway/Bridge Construction Greater Than \$10 Million:

DOTD District 02 – Fred Wetekamm
Barriere Construction – Matthew Woods

Other Infrastructure Construction Less Than \$10 Million:

Moore Planning Group – Patrick Moore
City of Lake Charles – Mayor Randy Roach

Other Infrastructure Construction Greater Than \$10 Million:

DOTD Aviation Section – Megan McLellan
Lake Charles Regional Airport – Heath Allen

Bridge Design Project Development:

DOTD Bridge Design Section – Ray Mumphy

Road Design Project Development:

DOTD Road Design Section – David Smith

Intermodal/Public Works Project Development:

DOTD Public Works – Zahir “Bo” Bolourchi
Denmon Engineers – Randy Denmon

Context Sensitive Solution/Public Involvement:

DOTD Bridge Design Section – Artur D’Andrea

Use of Innovative Product or Technology:

DOTD Aviation Section – Allen Taylor
False River Regional Airport – Yvonne Chenevert

Special Achievement in Customer Satisfaction:

DOTD Road Design Section – Laura Riggs and Brent Waguespack
DOTD Utilities Section – JoAnn Kurts

LOUISIANA PAVEMENT SMOOTHNESS AWARDS

Smoothest Pavement on the Rural National Highway System:

District 58 – Ricky Moon, District Administrator

Smoothest Pavement on the Urban National Highway System:

District 62 – Jesse McClendon, Assistant District Administrator

LOUISIANA WORK ZONE EXCELLENCE AWARDS

District Work Zone Excellence Award:

District 04 – John Sanders, District Administrator

Work Zone Excellence Signs:

Rick Skoien – Project Engineer
Michael Duplantis – Project Engineer
Chris Lissard – Project Engineer
John (Jody) Fontenot – Project Engineer
Jim Hollier – Project Engineer
Steve Christner – Project Engineer
Michael Murphy – Project Engineer
Jeff Connella – Project Engineer
Gary Panteria – Project Engineer

The luncheon also recognized DOTD/SASHTO

scholarship award winners, which included students from Louisiana State University, the University of New Orleans, Southern University, McNeese State University, Louisiana Tech University, and the University of Louisiana at Lafayette.



Conference sponsors were also recognized for their generous contributions to the conference. Those industry leaders, private sector organizations, and local agencies included:

- **Platinum Sponsor:** the Baton Rouge Area Convention and Visitors Bureau
- **Gold Sponsors:** Fenstermaker & Associates, ABMB Engineers, Inc., Vulcan Materials Company, the Louisiana Asphalt Pavement Association, and the LPA Group Transportation Consultants
- **Silver Sponsors:** Fugro, Pine Bluff Sand & Gravel Company, Louisiana Associated General Contractors, Inc., Neel-Schaffer, Inc., and TRC Engineers, Inc.
- **Bronze Sponsors:** Huval & Associates, Inc., and Wilbur Smith Associates.



Industry partners at GEC, Inc. were also recognized for coordinating the hospitality and vendor exhibits, which was held Monday, Jan. 10, until Tuesday, Jan. 11, in the Baton Rouge River Center Exhibition Hall, where approximately 70 exhibitors participated.

The next LTC is already in the works and is currently scheduled for February 17-20, 2013. If you would like a copy of any of the presentations from this year's conference, you can visit http://www.ltrc.lsu.edu/ltrc_11/survey11_thanks.html.



Chip Seal Expert Featured in Louisiana Seminar

As part of the 2011 LTRC Seminar Series, the Chip Seal Pavement Construction Seminar brought together designers, material suppliers, consultants, parish representatives, DOTD technicians, and engineers to provide end user tools necessary to identify and successfully construct chip seals. Consulting Engineer James Scherocman led the seminar Tuesday, Feb. 1, 2011, and Wednesday, Feb. 2, 2011, in Pineville and Baton Rouge.

Scherocman brought his expertise and wealth of knowledge to the two groups as he discussed factors that affect chip seal construction and performance, determining the condition of existing pavement surfaces, asphalt binder and cover aggregate application, and examples of good and poor chip seal construction. "The instructor who is an expert in this area provided a host of examples and photographs to help identify proper chip seal candidates, proper construction techniques, and techniques for troubleshooting problem areas that may arise," said LTRC Asphalt Research Engineer William "Bill" King, Jr., P.E.

In general, chip seals are applied to existing pavements to extend the life of the pavements and improve traction or "skid resistance"; however, they are not intended as permanent pavement surfaces and are expected to last approximately seven to ten years. Chip seal service life varies depending on the condition of the existing surface, traffic volumes, weather, choice

of materials, and how well it is placed. Since DOTD is more involved in chip seal applications than in the past, it is important for Louisiana transportation professionals to become more accustomed to the proper usage and application of the material.

The main point that Scherocman expressed focused on the basics, explaining what makes a good chip seal and what makes a bad chip seal. Scherocman also emphasized the importance of utilizing the knowledge of workers, types of materials, and proper usage of equipment. He highlighted three main factors that can make the difference in a quality chip seal: uniform application of the asphalt, followed by quick application of the aggregate and uniform application of the aggregate.

The open forum allowed for many attendees to express questions or concerns for certain strategies presented during the seminar and get input from colleagues and other experts in attendance.

Permeability Testing Device to Save Department Thousands

In January 2011, LTRC researchers evaluated a new testing device for quality acceptance of precast and cast-in-place concrete and are in the process of implementing the device into DOTD laboratories across the state. The device, a surface resistivity meter, which tests the permeability of concrete members of bridge structures, replaces an existing method called ASTM C 1202 (Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration). Researchers explain that by using this new testing device, the Department can expect to save about \$98,500 in personnel costs within the first year. It is also estimated that contractors will save about \$1.5 million in quality control costs.

LTRC Concrete Research Engineer Tyson Rupnow, Ph.D., P.E., introduced the device to DOTD officials and is spearheading the project as well as the ongoing implementation. Dr. Rupnow explains that while they confirmed the current and new tests' results correlate well in their permeability results, the main advantages they found with the new device are cost and time. "The existing test method equipment alone cost \$18,000-\$20,000. This new test costs roughly \$3,000 for the piece of equipment," he said. "Also, the old test took two days and 8 man hours to do, while this new test takes less than 5 minutes."

“ By using this new testing device, the Department can expect to save about \$98,500 in personnel costs within the first year. It is also estimated that contractors will save about \$1.5 million in quality control costs. ”

Currently, Louisiana is only the second state in the U.S. to be using the device for acceptance, but many states are in the process of evaluating their current methods against the surface resistivity meter to measure permeability in light of new specifications that will be in effect in 2012. Dr. Rupnow explained, "This testing is important because the new AASHTO LRFD designs for concrete bridges require 75-year or 100-year designs, and the only way you can get that is if you measure permeability." With this new load and resistance factor design (LRFD) requirement, Louisiana will not only continue meeting the standard, but will do so at a higher costs savings to the state than ever before.

Full implementation is scheduled to begin April 2011, where an associated DOTD TR test method will be implemented. Surface resistivity meters will be purchased; one for each district laboratory, central materials laboratory, and LTRC. In addition, a training program will be developed for training district personnel. "The training program will include a short lecture detailing the background and theory of the surface resistivity meter, a tutorial video, performance evaluations, and a proficiency exam," said Dr. Rupnow.

For questions or more information on surface resistivity meter, please contact Dr. Tyson Rupnow at 225-767-9148 or tyson.rupnow@la.gov.

LTRC and Texas Researchers Team Up in National Research Opportunity

6

LTRC researchers have joined a team of Texas researchers to collaborate on a recently awarded research proposal from the National Cooperative Highway Research Program (NCHRP). Researchers will develop a modulus based construction specification of the compaction of earthwork and unbound aggregate, which are used in a pavement structure's base, subbase, and subgrade layers. Engineering Materials Characterization Research Facility (EMCRF) Manager Louay Mohammad, Ph.D., of LTRC is serving as a co-principal investigator for the project, and LTRC Geotechnical Engineering Research Laboratory Manager Murad Abu-Farsakh, Ph.D., P.E., is actively assisting in the project.

"Right now, the specification is based on density and moisture content, and these materials are not a direct predictor of the material's mechanical properties such as modulus and strength. So what this project aims to do is to determine a specification that measures the modulus of earthwork and unbound aggregates, which is important because it is based on stresses and strains," explained Dr. Mohammad. Researchers hope the new modulus-based specification will aid in discovering the correct stiffness needed to increase the performance of pavements by ensuring earthwork and unbound

aggregates materials perform as needed in the pavement structure, despite environmental factors.

The project, which is entitled *Modulus-Based Construction Specification for Compaction of Earthwork and Unbound Aggregate*, will not only include the development of a new specification replacing density and moisture content measures, but researchers will also seek to find a device or devices that best measure stiffness. From there, a test method will be developed and an implementation procedure will be submitted for AASHTO's consideration and disseminated to the rest of the states for adoption consideration, including Louisiana. Dr. Mohammad added, "I hope the project will select a device and develop a procedure that is theoretically sound, yet simple enough to use in the measurement of the modulus value that states will embrace and adopt in order to improve the quality and performance of our pavements for the taxpayer."

The group is currently on Task 1 of an 11-task process under three separate research phases. The study is slated for completion in Spring 2012. Additional information on the project can be found online at <http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=2908>.

LTRC Policy Committee Meets at TTEC

Members of the LTRC Policy Committee met Tuesday, Dec. 14, 2010, at the TTEC facility to discuss the SASHTO scholarship selections, external funding and TIRE programs, the Louisiana Transportation Conference, and research updates.

This year, a record number of SASHTO Scholarship applications were submitted from all over the state. This scholarship, administered by LTRC through LADOTD in conjunction with the Southeastern Association of State Highway and Transportation Officials, was created in 2000 to offer \$1000 awards available annually for undergraduate students at the junior and senior levels with a declared major in civil engineering. With over 40 applicants, committee members spent time observing ratings and discussing the number of scholarships to award with the allocated SASHTO fund.

Following an agreement on scholarship award allocations, External Funding Associate Director Vijaya (VJ.) Gopu gave the group a quick overview of the external funding activities at the center, including those proposals that have been funded or are awaiting funding by various organizations, such as TRB, NSF, etc. Dr. Gopu also discussed a new seminar that was recently held on LSU's campus that taught new faculty members methods to write more competitive NSF proposals—Dr. Gopu hopes to take the seminar around the state to all the universities depending on interest and LTRC Policy Committee support.

Dr. Gopu also discussed the requests he received from several Asian universities that are interested in sending faculty members to Louisiana if LTRC is able to offer them an opportunity to collaborate with other faculty members in the state. "This is a great opportunity because there has been a huge expansion of engineering colleges all over Asia. From Thailand to Malaysia to Singapore, they are searching for opportunities to work with U.S. institutions," he explained.

Technology Transfer and Training Associate Director Sam Cooper then updated the group on the Louisiana Transportation Conference, where the idea arose of awarding LTC Senior Design Project presentations monetary awards for the first time in conference history. Committee members discussed the benefits and potential downfalls of the awards and ultimately agreed that they would move forward with the notion by awarding 1st, 2nd, and 3rd place winners. Committee members hope that this will generate a level of competition and induce better senior design projects in the future among Louisiana universities.

To close the meeting, Mark Morvant, associate director of research, updated the group by giving the status on new projects for the center as well as touching on the Research Problem Identification Committees (RPIC) process that reviews and prioritizes problem statements submitted to LTRC in hopes of being considered for the research program's next two-year cycle. This process gives LTRC's transportation partners and customers a practical way to make a difference and optimize benefits to the industry.

Recently Published

Final Report and Technical Summary 400

Modeling Hurricane Evacuation Traffic: Evaluation of Freeway Contraflow Evacuation Initiation and Termination Point Configurations

Brian Wolshon, Ph.D., P.E., Gregoris Theodoulou, and Yu Yik "Erick" Lim

Final Report and Technical Summary 402

Modeling Hurricane Evacuation Traffic: A Mobile Real-Time Traffic Counter for Monitoring Hurricane Evacuation Traffic Conditions

Sherif Ishak, Ph.D., Ciprian Alecsandru, Yan Zhang, and Dan Seedah

Final Report and Technical Summary 454

Mechanistic Flexible Pavement Overlay Design Program

Zhong Wu, Ph.D., P.E., and Kevin Gaspard, P.E.

Final Report and Technical Summary 460

Development of Index Based Pavement Performance Models for Pavement Management System (PMS) of LADOTD

Mohammad Jamal Khattak, Ph.D., P.E., Gilbert Baladi, Ph.D., P.E., and Xiaoduan Sun, Ph.D., P.E.

Final Report and Technical Summary 461

The Use of DMA to Characterize the Aging of Asphalt Binders

William Daly, Ph.D., Ioan Negulescu, Ph.D., Louay Mohammad, Ph.D., and Ionela Chiparus (Ph.D. candidate)

Final Report and Technical Summary 468

Accelerated Loading Evaluation of Subbase Layers in Pavement Performance

Gavin Gautreau, P.E., Zhongjie "Doc" Zhang, Ph.D., P.E., and Zhong Wu, Ph.D., P.E.

Final Report and Technical Summary 469

Evaluation of Fly Ash Quality Control Tools

Tyson Rupnow, Ph.D., P.E.



Final Report and Technical Summary 470

Calibration of Resistance Factors Needed in the LRFD Design of Drilled Shafts

Murad Abu-Farsakh, Ph.D., P.E., Xinbao Yu, Ph.D., Sungmin Yoon, Ph.D., P.E., and Ching Tsai, Ph.D., P.E.

Technical Summary 438

Flexural Strength and Fatigue of Steel Fiber Reinforced Concrete (SFRC) (2004 Hale Boggs Deck)

John Eggers, P.E., and Tyson Rupnow, Ph.D., P.E.

Project Capsule 09-2B

Development of Surface Friction Guidelines for LADOTD

Zhong Wu, Ph.D., P.E., and William "Bill" King, Jr., P.E.

Project Capsule 10-3P

Light Emitting Diode (LED) Circular Traffic Signal Lifetime Management System

Leticia Courville, Ph.D., E.I.

Project Capsule 10-5SS

Developing Inexpensive Crash Countermeasures for Louisiana Local Roads

Helmut Schneider, Ph.D.

Project Capsule 11-1B

Validity of Multiple Stress Creep Recovery Test for LADOTD Asphalt Binder Specification

Md. Sharear Kabir, E.I., and William "Bill" King, Jr., P.E.

Project Capsule II-2GT

Field Instrumentation and Testing to Study Set-up Phenomenon of Piles Driven into Louisiana Clayey Soils

Murad Abu-Farsakh, Ph.D., P.E., and Xinbao Yu, Ph.D.

Project Capsule II-3GT

Accelerated Load Testing of Geosynthetic Base Reinforced Pavement Test Sections

Murad Abu-Farsakh, Ph.D., P.E.

Project Capsule II-4GT

Calibration of Resistance Factors for Drilled Shafts for the New FHWA Design Method

Murad Abu-Farsakh, Ph.D., P.E.

Staff Updates and Accomplishments

Associate Director of External Programs, **Vijaya (VJ) Gopu**, Ph.D., P.E., served as a member of the Committee of Visitors (COV) for the NSF “Emerging Frontiers in Research and Innovation (EFRI)” Program in Washington, D.C. in January 2011. Dr. Gopu also served on the NSF site visit team that reviewed the NEES Equipment Site at the University of California – San Diego in March 2011.

Senior Structures Research Engineer **Walid Alaywan**, MSCE, P.E., co-authored an article for the *PCI Journal* entitled “Evaluation of Prestress Losses in High-Strength Concrete Bulb-tee Girders for the Rigolets Pass Bridge” and the *ASCE Journal of Bridge Engineering* entitled “Full-scale Test of Continuity Diaphragms in Skewed Concrete Bridge Girders.”

Concrete Research Engineer **Tyson Rupnow**, Ph.D., P.E., co-authored an article for the *Journal of Construction and Building Materials* entitled “A Simple Method for Characterizing and Predicting Temperature Behavior of Ternary Cementitious Systems.”



Follow us at www.twitter.com/LTRC_Updates.
Find us on facebook at <http://www.facebook.com>.

This public document is published at a total cost of \$250.29. One thousand and one hundred copies of the public document were published in this first printing at a cost of \$250.29. The total cost of all printings of this document, including reprints, is \$250.29. This document was published by the Louisiana Office of State Printing, 950 Brickyard Lane, Baton Rouge, to report on the research and training of the Louisiana Transportation Research Center, as required in R.S. 48:105. This material was duplicated in accordance with standards for printing by state agencies, established pursuant to R.S. 43:31. Printing of this material was purchased in accordance with the provisions of Title 43 of the Louisiana Revised Statutes.

Technology Today Publication Statement

Technology Today is a quarterly publication of the Louisiana Transportation Research Center, administered jointly by the Louisiana Department of Transportation and Development and Louisiana State University. For additional information on material included in this newsletter, contact the public information director at 225.767.9183.

Louisiana Transportation Research Center

4101 Gourrier Avenue
Baton Rouge, LA 70808-4443

Harold “Skip” Paul, P.E.
Director

Mark Morvant, P.E.
Associate Director
Research

Sam Cooper, MSCE, P.E.
Associate Director
Technology Transfer and Training

Vijaya (VJ) Gopu, Ph.D., P.E.
Associate Director
External Programs

Glynn Cavin, Ph.D.
Technology Transfer and
Training Administrator

Jenny Speights
Public Information Director

Nick Champion
Photographer

Emily Wolfe
Multi-Media Specialist

Jenny Gilbert
Editor/Technical Writer