Technology



Underway

LTRC 2004

A publication of the Louisiana Transportation Research Center

TTEC Construction

Today

For more information about TTEC and the LTRC Foundation, call (225) 767-9131.

In August, construction crews broke ground on the Transportation Training and Education Center (TTEC), a progressive partnering effort between the public and private sectors of the transportation industry.

Don L. Arnold, AIA, of Baton Rouge, designed the TTEC facility. Burns Construction of Baton Rouge, Inc., was awarded the contract with a bid of \$2.425 million; they



LTRC, LADOTD, and LSU administrators dicuss plans for TTEC. (I to r) Skip Paul, Joe Baker, Johnny B. Bradberry, Bill Temple, William Jenkins, and Kirt Clement.



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Trench Backfill Research Leads to Specification Changes

When settlement occurs around conduit structures like pipes and culverts, dips form in the surrounding pavement surfaces, causing the public's ride quality and comfort to suffer. LADOTD's current standard specifications for furnishing, installing, and maintaining these conduit structures cannot guarantee that the cross drain installations will preserve pavement quality. As a result, LTRC's 2002 Research Project Identification Committee recommended research on the issue. In general, trench backfill must provide sufficient support for pipe stability as well as adequate support for pavement structures located around highway cross drain pipes. The research team's goal was to specify



Trench Backfill Research (cont. from page 1)

conditions for using different backfill materials and/or techniques to install highway conduit structures that would prevent backfill settlement and enhance pipe stability.

In the first phase of the project, researchers completed **Dynamic Cone Penetration** (DCP) tests at nearly 20 trench backfill locations with and without settlement problems. DCP testing provides continuous measurements of the in-situ strength of subgrade soils without excavating the existing pavement. Results showed that pavement dips at cross drain pipe locations can be prevented if the trench backfill is as strong or stronger than the adjacent subgrade soils. In many cases, the sand backfill was weaker than the native subgrade soils. Since sand is one of the major backfill materials used in Louisiana, the current construction practices needed to be investigated.

During the project's second phase, sand, select soils with a Plastic Index (PI) less

than 10, Recycled Asphalt Pavement (RAP), and crushed limestone were tested as potential backfills in four construction projects from District 61. Field testing proved that all these materials can perform well if they are properly compacted within specified moisture limits. However, optimum conditions for compaction are difficult to achieve for sand and select soils because of the trench's confined space and limited equipment options. Aggregate backfill materials like stone and RAP are much easier to control and compact.

Based on these research results obtained to date, the Project Review Committee (PRC) has recommended that stone aggregate be required for backfill materials for all cross drain pipes and side drain pipes under paved areas of travel lanes, shoulders, and turnouts. Although recycled Portland cement concrete was not studied in this project, it is suggested as an option for stone aggregate. Because using RAP as a backfill material is still considered experimental, the PRC has suggested that one project in each district include a RAP option for pipe backfill. The districts will monitor the construction and performance of these installations and advise the PRC on decisions for or against further implementation.

District construction engineers have reviewed and commented on the proposed specifications. Before full implementation, the Contracts and Specifications Section will review and revise them as appropriate, and the Hydraulic Section will revise the standard plans.

P.I.: Zhongjie "Doc" Zhang, Ph.D., P.E. Co-P.I.s: Murad Abu-Farsakh, Ph.D., P.E., and Lam Wang, Ph.D., P.E.





Staff Accomplishments

LTAP Director **Marie Walsh**, **Ph.D.**, has been named as a Regional Representative to the National LTAP Association (NLTAPA). She is also a member of the LTAP/American Public Works Association (APWA) Products Development Committee.

Two research staff members have been appointed to National Cooperative Highway Research Program (NCHRP) Panels. **Skip Paul, P.E.**, (Associate Director, Research) is serving on the NCHRP 9-40 Panel on "Optimization of Tack Coat for HMA Placement." **Louay Mohammad, Ph.D.**, (Associate Professor, EMCRF Manager) is serving on the NCHRP 9-39 Panel on "Development of Procedures for Determining the Mixing and Compaction Temperatures of Superpave Asphalt Binder in Hot Mix Asphalt."

Louay Mohammad, Ph.D., presented a keynote speech on the "History of the Development of Superpave Mixture Design" at the 1st International Conference on Pavement Engineering: Rehabilitation & Maintenance in Hefei, China (June 26 - July 2, 2004).

LTRC hosted a visiting professor this summer. **Dr. Ata Doven**, Assistant Professor of Civil Engineering at Eastern Mediterranean University (EMU) in Gazimagusa,Cyprus, visited LTRC to learn about its research operations and laboratory capabilities in anticipation of possible joint research. Louisiana State University and EMU have a partnership to exchange students and faculty to work on joint projects.



Theme: Advanced Technologies for Homeland Security

(Previously scheduled for Friday, September 17, 2004) Has been rescheduled for Thursday, December 9, 2004

- Registration Opens 8:00 a.m.
- Program 8:30 a.m.- 5:00 p.m.
- New Orleans Hilton Riverside

The latest forum and registration information is available at www.eng.tulane.edu/tef For more information, contact: Jenny Kottler, CMP

Coordinator, Tulane Engineering Forum 504-891-1044

jkottler@bellsouth.net

Qualifies for 7 Professional Development Hours

Behind the Scenes at LTRC: Geotechnical Research Staff

In the next issue, the staff of the Geosynthetic Engineering Research Laboratory (GERL) will be presented. identify, develop, and implement new technology to improve Louisiana's transportation system, LTRC has assembled a team of talented professionals. In upcoming issues of *Technology Today*, we will introduce you to the people behind the various areas of research, tech transfer, and training.

In pursuit of its mission to

LTRC's Geotechnical Research Engineers and lab technicians investigate the properties and strengths of different materials used to construct the slopes, roads, and structures of our highway infrastructures. In addition to formal research, the geotechnical group provides technical assistance and problem-solving services to all LADOTD districts.

Senior Research Engineer Zhongjie "Doc" Zhang, Ph.D., P.E., manages all of LTRC's contract research in the geotechnical area and performs in-house research. Doc's 15-plus years of experience in geotechnical research, design, and consulting includes universities, research institutes, industry, and government agencies in both the United States and China.

Before joining LTRC's staff in 2001, Doc worked for LADOTD in Urban Traffic and Planning, Pavement Design, and Bridge System Management. His primary research interests are geotechnical design procedures for highway infrastructures (e.g., bridge foundations, embankment slopes, subgrade soils, etc.), evaluation of lab and in-situ engineering properties of soils, pavement design and maintenance, and highway infrastructure system management.

He is currently involved in two LTRC research projects investigating ways to improve pavement ride quality for the public. "Determination of the Interaction between Bridge Concrete Approach Slabs and Embankment Settlement" (LTRC Project No. 03-4GT), which Doc is managing, is part of a Louisiana Quality Initiative (LQI) effort to improve the design of bridge approach slabs and foundations. He is also the principal investigator of "Alternative Methods to Trench Backfill" (LTRC Project No. 03-3GT), which is examining ways to

combat settlement around conduit structures and has led to changes in LADOTD specifications (see article on page 1).

Doc received his B.S., M.S., and Ph.D. degrees from Xian Highway Transportation University, Tongji University, and LSU, respectively. He has authored numerous refereed journal articles and is a frequent presenter at the Transportation Research Board's annual meetings and other conferences.

Geotechnical Research Manager Gavin Gautreau, P.E., works in conjunction with Doc Zhang. Gavin coordinates the soil laboratory employees, laboratory equipment, and the cone penetrometer (CPT) vehicles. He also oversees all of LTRC's technical assistance efforts in the geotechnical area, e.g., new product evaluations, collecting and analyzing field information, and making recommendations to District Maintenance and Construction Engineers to speed or solve maintenance or construction issues.

Gavin spent nine years as a Project Engineer in the pri-

(I to r) Gavin Gautreau, Aaron Austin, Doc Zhang, Melba Bounds, Paul Brady, Bill Tierney



vate sector before beginning work at LTRC in 2002. In addition to his laboratory and technical assistance duties, Gavin performs inhouse research. Currently, he is the principal investigator of "Development of **Geotechnical Information** Database-Computer Program to Expedite Soil Subgrade Survey Data to **Designers**" (LTRC Project No. 03-1GT), which is creating a computer program that will expedite the reporting process for survey data by automatically compiling the data, performing analysis, and replacing hand drawings with computer-generated tables.

Gavin received his B.S. in civil engineering from LSU.

He is a member of the American Society of Civil Engineers and is the President-elect of the Baton Rouge branch of the Louisiana Engineering Society.

The day-to-day operations of the geotechnical research program depend heavily upon the laboratory staff that runs LTRC's fully equipped soil laboratory which is capable of performing routine and advanced soils testing (including triaxial strength testing, direct shear testing, consolidation testing, and tensile/compression testing).

Melba Bounds leads the soils lab as Senior Technician. She has worked for DOTD for 31 years, with the majority of her career spent in Materials Testing.

Lead Technician **Paul Brady** has worked for DOTD for 21 years, including 15 years of service at LTRC.

Bill Tierney operates the CPT vehicles, which are involved in pile capacity predictions, soil classification and characterization, soil insitu properties, and subsurface settlement predictions.

Aaron Austin, an intern with the department, is a recent Civil Engineering graduate and plans to soon start work on a Master's degree in Geotechnical Engineering.

Technology Today Publication Statement

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Joe T. Baker, P.E. - Director, LTRC Skip Paul, P.E. - Assoc. Director, Research Emily Wolfe - Editor Nick Champion - Photographer Kirt Clement, P.E. - Assoc. Director, Technology Transfer Sher Creel - Executive Editor Vicki Dischler - Graphic Designer Jenny Speights - Web Site Developer This public document is published at a total cost of \$1192.00. Seventeen hundred copies of the public document were published in this first printing at a cost of \$920.00. The total cost of all printings of this document including reprints is \$1192.00 This document was published by Louisiana State University, Graphic Services, 3555 River Road, 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.

LTRC Measures Performance with

Customer Satisfaction Survey

To maintain its high standard of service to the transportation community, LTRC must interact with its customers and be conscious of their evolving needs. As a result, the first-ever LTRC customer satisfaction survey was performed in the fall of 2003.

LTRC emailed the survey to its customer base—LADOTD employees, industry personnel, and university contract researchers—to determine their satisfaction levels with the center's different program areas, including research and technical assistance, project management, training, and publications.

Survey respondents rated these areas on a scale of 1 to 5, with 5 being "very satisfied" and 1 being "very dissatisfied." Customers could also submit both positive and negative comments along with their suggestions for improvement.

The following ratings are based on responses from both LADOTD and industry personnel. In their comments, respondents noted that LTRC's research program has become more practical, but more research is needed in specific technology areas. LTRC is currently examining new ways to track the effectiveness of technical assistance solutions, such as cost-benefit analyses.

Research/Technical Assistance				
Helpfulness of LTRC regarding requests for technical assistance	3.9			
Responsiveness of LTRC Research Program in addressing research requests	3.7			
Effectiveness of research solutions provided by LTRC	3.6			
Usefulness of LTRC solutions	3.7			
Usefulness of University solutions	3.6			
Overall satisfaction with research services and products	3.7			

University personnel who have performed contract research provided the following responses about LTRC's research policies and procedures.

Research/Project Management				
Biennial Research Project Identification Committee (RPIC) Process	4.3			
Clarity of the Request for Proposal (RFP)	4.4			
Amount of time given to respond to the RFP	4.3			
Accessibility of the LTRC staff throughout the contract time	4.8			
Timeliness of LTRC in providing material, information, and assistance	4.6			
Quality of technical and editorial review of the final report	4.2			
Overall satisfaction with LTRC project management	4.5			

Respondents from both LADOTD and private industry rated their overall satisfaction with LTRC's training classes and seminars/workshops with a 3.8 and 3.7, respectively. Further data analysis revealed that ratings increased when responses from engineering technicians were removed. Currently, much of the new structured training program for this group is com-

LTRC is encouraged by these results and looks forward to the challenge of improving its products and services to better serve the transportation industry. After further analyzing results and improving the survey instrument, LTRC plans to conduct a follow-up survey next year.



prised of self-study courses. LTRC is working towards implementing more instructor-led and computer-based courses for engineering technicians.

Training Classes and Seminars/Workshops						
Format of LTRC training materials			3.8			
Usefulness of the information presented in LTRC training classes			3.8			
Availability of LTRC training classes			3.3			
Presentation skills of instructors for LTRC training classes			4.1			
Overall satisfaction with the LTRC training classes			3.8			
Format of LTRC seminar/workshop materials			3.8			
Match between current technology and LTRC seminar/workshop content			3.8			
Usefulness of information presented in LTRC seminars/workshops			3.8			
Availability of LTRC seminars/workshops			3.2			
Presentation skills of instructors for LTRC seminars/workshops			3.9			
Overall satisfaction with the LTRC training seminars/workshops		3.7				
Publications						
Usefulness of publications	3.4	Format of publications		3.6		
Relevancy of publications	3.5	Usefulness of the LTRC Web site		3.6		
Overall satisfaction with publications	3.6					
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TTEC (cont. from page 1)

are allowed 365 calendar days to complete construction.

TTEC will greatly enhance LTRC's mission by facilitating the delivery of transportation training, professional development opportunities, and technology transfer to engineers, technicians, and professionals from both the public and private domains.

The 14,000-square-foot facility is being constructed adjacent to the current LTRC office building on LSU's campus. This new building will house a lecture facility for 100, a computerbased training classroom for approximately 30, and two general classrooms for about 40. Each of these will be equipped with advanced education and training equipment and distance learning/video-conferencing capabilities. A comprehensive transportation library and offices are also included in the plans.

LADOTD Secretary Johnny B. Bradberry and LSU System President and Interim Chancellor William Jenkins attended the ground-breaking ceremony on September 14, 2004.

Together, LADOTD and LSU are funding the building's construction. The LTRC Foundation is raising the remaining funds needed for TTEC's technologically advanced equipment and furnishings. After reviewing TTEC's mission and plans for construction, Secretary Bradberry said, "It is important that our partners in private industry now step forward to fulfill this need by supporting the LTRC Foundation."

Since 1994, LADOTD has employed Louisiana university students in the Cooperative Education Program for civil engineering undergraduates. LTRC manages this program that provides full-time students with practical experience in the civil engineering field—experience that can greatly enhance resumés for new college graduates applying for their first jobs.

Besides gaining a field education, students earn a salary and can receive academic credit from their universities. Program participants work 20-hour weeks in different LADOTD sections throughout the state. The 2004 summer participants worked in Bridge Design, Data Collection and Analysis, Traffic Services, Bituminous Materials Research at LTRC, Traffic Engineering, District 61 Laboratory, District 03 and 07 Design, and District 05 Construction.

For every academic term (semester or quarter), each Louisiana university with a civil engineering program can nominate two students at the junior or senior level. If a university forgoes their allotted nominations, those positions can be used by students from other schools. Every participant is assigned to a LADOTD supervisor who will evaluate the student's work performance. Likewise, co-op participants evaluate their program assignment at the end of the work period.

To complete the co-op program, students must give a 15-minute presentation at LTRC about their job duties and the lessons learned over the course of the semester or quarter.

"After spending the summer in Traffic Services, one of the things I learned is that much more work goes into sign production than I thought," said LSU student Misty Daigle, a 2004 participant. Her supervisor, David Backstedt of Traffic Services, highlighted the program's usefulness as a recruiting tool for LADOTD. "The co-op program is a great opportunity to give engineering students exposure to the department. I've seen many of these participants eventually come to work for the department," he said.

The number of co-op applicants usually exceeds the number of available positions, and the program consistently receives good reviews from both supervisors and participants, according to program coordinator Mike Boudreaux. "Past participants have attributed subsequent success in the classroom to real-world situations experienced during co-op employment."

For more information about LADOTD's Cooperative Education Program for civil engineering students, contact LTRC's Mike Boudreaux at (225) 767-9123 or michaelboudreaux@dotd.louisiana.gov.

Students from the following universities are eligible for the co-op program: **Louisiana State** University, Louisiana Tech University, **McNeese State** University, Southern University, Tulane University, University of Louisiana at Lafavette, and **University of New Orleans.**