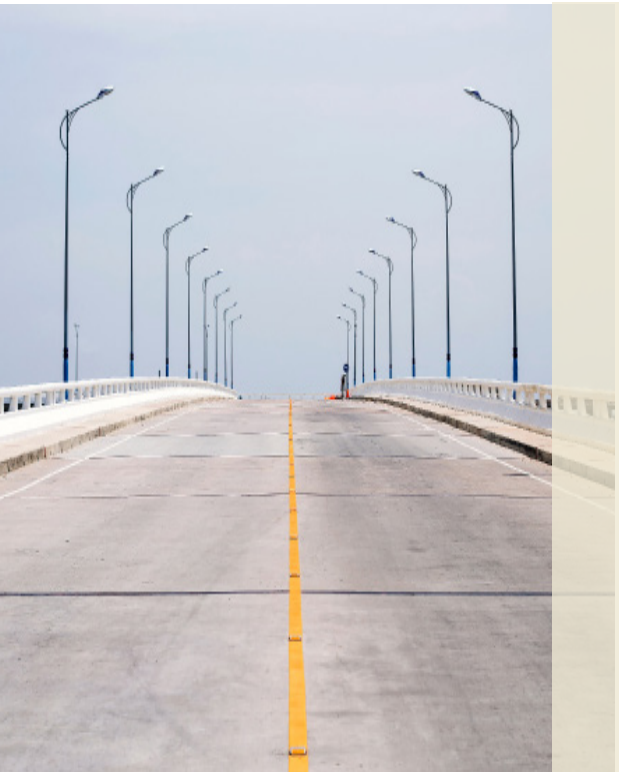
TECHNOLOGY TODAY

VOL 38 ISSUE 3 — *A publication of the Louisiana Transportation Research Center*



RESEARCH

LTRC Explores Innovative Test Method to Enhance Concrete Performance

Concrete is a crucial component in Louisiana's transportation infrastructure, utilized in the construction and maintenance of many of the state's roads, bridges, and other structures. One of concrete's primary vulnerabilities is the alkali-silica reaction (ASR), which can cause "alligator cracking" (also known as "map cracking" or "pattern cracking") over time, leading to costly repairs and potential safety concerns. For this reason, DOTD engineers are highly motivated to identify and implement the most efficient and effective test methods to evaluate ASR potential in its materials.

continued on pg.2

TRAINING

New Seminar Series Equips Co-Op Students for Career Success

DOTD's Co-Op Program provides undergraduate engineering students across Louisiana with the opportunity to gain valuable hands-on experience throughout the department before graduation. As she evaluated program participants' long-term needs, LTRC Education Outreach Program Manager Stacey Wilton recognized an untapped opportunity—preparing students not only technically, but also practically, for the launch of their new careers. The desire to make this next level of investment motivated Wilton to collaborate with several LTRC team members in designing and delivering a series of Student Success Seminars.

continued on pg.4

IN THIS ISSUE

UPCOMING EVENTS

Organizational Culture
March 6, TTEC 175

Louisiana Transportation Conference 2025
March 16-19, Raising Cane's River Center

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

Concrete Testing (ctd. from pg. 1)

In response to this ongoing need, LTRC Concrete Research Manager Zhen Liu, Ph.D., P.E., recently completed a multi-year project assessing the suitability and potential adoption of an innovative test method called the Miniature Concrete Prism Test (MCPT). First published by the American Association of State Highway and Transportation Officials (AASHTO) in 2018, MCPT is advantageous for both its reliability and timeliness. Prior to the development of MCPT, the two tests most commonly used by industry researchers were the accelerated mortar bar test (AMBT), which is prone to produce false-positive or false-negative readings, and the concrete prism test (CPT), which yields much more reliable results but takes 1-2 years to produce. MCPT, by contrast, has been shown to yield accurate results in only 56 days, which significantly accelerates the evaluation process, leading to a more efficient completion of projects.

Dr. Liu, in partnership with fellow researchers Jose Milla, Ph.D., P.E., and William Saunders, E.I., designed and executed an extensive battery of laboratory tests over a one-year period, comparing and contrasting the results of the MCPT with those of the AMBT and CPT with the goal of evaluating its reliability in assessing ASR potential. A diverse array of 24 aggregates known to be potentially reactive were chosen, along with two control samples, ultimately producing a total of 96 unique mixtures for the research team's evaluation. These samples were measured at 7, 28, and 56 days, as well as at 3, 6, 9, and 12 months, to assess their susceptibility to ASR. All tests were completed in accordance with the standards outlined by AASHTO and the American Society for Testing and Materials (ASTM).

The results from these tests yielded promising results overall. Drs. Liu and Milla, along with Saunders, found the MCPT and CPT methods produced an impressive 95.8% agreement rate for aggregate evaluation.

Zhen Liu, Ph.D., P.E., LTRC's Concrete Research Manager

Additionally, the team evaluated 33 of the mixtures for ASR mitigation strategies, revealing a 79% agreement rate between the MCPT and CPT methods. Based on these results, the researchers recommended that DOTD adopt the MCPT method to evaluate ASR reactivity for all coarse aggregates used in the state's transportation system, as well as for fine aggregates that do not exceed a 0.30% expansion rate from the AMBT method.

Dr. Liu highlighted the significance and potential impact of these findings: "The Miniature Concrete Prism Test (MCPT) provides Louisiana's engineers with a useful new tool to produce reliable results for the routine assessment of an aggregate's alkali-silica reactivity over a much shorter period of time. By utilizing this test, suppliers no longer have to wait 12 months or more to receive the results they need."

Read Final Report & Tech Summary 700 online: *www.ltrc.lsu.edu/publications.html*

ASCE Honors LTRC's Mohammad with Lifetime Achievement Award

LTRC is delighted to announce that Professor Louay N. Mohammad, Ph.D., Fellow ASCE, has been awarded the prestigious Lifetime Achievement Award by the American Society of Civil Engineers (ASCE), Louisiana Section—Baton Rouge Chapter. This honor is a recognition of Professor Mohammad's exceptional contributions to the field of civil engineering, significant service to ASCE, and unwavering commitment to professional integrity and technical excellence.

Over the course of a distinguished 37-year career, Professor Mohammad has made several groundbreaking advancements in construction materials characterization, pavement engineering, asphalt science, and sustainable and resilient infrastructure. He has led numerous landmark projects, including efforts to improve the engineering state-of-practice in flexible pavement; showcase how to recycle waste tires for use on Louisiana roads without sacrificing performance quality; and establish multidisciplinary focus research on sustainability, the effects of climate change, and sea level rise on the state road infrastructure. Each of these projects will have a lasting impact on communities across Louisiana and the transportation industry at large.

In addition to his professional achievements, Professor Mohammad has been a dedicated member of ASCE for over 40 years. He has held various leadership positions within the organization, including: Founding Member and Chair of ASCE Construction Institute, Bituminous Materials Committee; Executive Committee Founding Member and Chair of ASCE Transportation and Development Institute, Louisiana Chapter; Bituminous and Flexible Pavement Section Editor of *ASCE Journal of Materials in Civil Engineering*; Trustee of ASCE Foundation Council of Trustees, Region 5; Chair of Materials Engineering Group, ASCE Louisiana Section—Baton Rouge Chapter; and Director at Large, ASCE Louisiana Section—Baton Rouge Chapter.

He has also actively participated in several initiatives aimed at advancing the civil engineering profession and mentoring young engineers.

"Receiving this award is a profound honor," said Professor Mohammad. "I am grateful to ASCE and to all the colleagues, mentors, Louisiana DOTD engineers, undergraduate and graduate students, post-docs, and visiting scholars with whom I have had the privilege to work throughout my career. Being surrounded by these outstanding individuals is what keeps me going! This recognition inspires me to continue advocating for excellence in teaching, research, and service in the civil engineering community."

continued on pg. 5

Student Success (ctd. from pg. 1)

These seminars, delivered throughout the Fall 2024 semester via interactive video conference, included:

- "Evaluating Public vs. Private Sector Opportunities," led by Garrett Wheat, Ph.D., LTRC's Statewide Strategic Program Manager
- "Creating a Compelling Resume," led by Emily Wolfe, M.A., LTRC's Public Information Director
- "Thriving in a Multi-Generational Workforce," led by Marcus Sylvas, Ph.D., LTRC's Leadership Development Program Manager

Wilton emphasizes the need to maximize the Co-Op Program's impact on students' futures at DOTD and beyond: "We place a high value on professional development for full-time employees at LTRC, and we want to extend that same benefit to our undergraduates by investing in their practical career needs as well. We believe this will yield positive results not only for individual students, but for Louisiana's transportation workforce as a whole."

One of the seminar presenters, Emily Wolfe, highlights the critical importance of taking a holistic approach to students' development: "As we welcome a new generation into the transportation workforce, it is critical to ensure that they are prepared with the skills to help them succeed. While their academic coursework is certainly preparing them to contribute meaningfully, the diverse topics and skills presented in this series can enrich their experience as new employees."

Several student participants shared about the importance and impact of these development opportunities:

- *"I found these seminars valuable because they provided a great opportunity for me to improve myself. Professional development is important because it helps to open opportunities for my future career."*—Tellis Hankton, University of New Orleans
- *"Before attending, I wasn't familiar with a lot of what we discussed in these sessions, and I thought that the presenters provided us with valuable information to help find a good job out of college. Development opportunities like these give me the chance to learn outside of a typical work or classroom environment."*—Haley Stevens, LSU
- *"This content really opened my eyes to different ideas and possibilities that can come from working for the state!"*—Thomas Moreau, University of Louisiana-Lafayette

The entire LTRC team remains committed to engaging and equipping Louisiana's university students creatively and strategically as they prepare for all of their future endeavors.

For more information on education opportunities available through LTRC, please contact Stacey Wilton at (225) 767-9141 or stacey.wilton@la.gov.

RESEARCH

LTRC Research Highlights Positive Outcomes from New Asphalt Specifications

Louisiana's DOTD works to design and build durable, long-lasting roads that make the most efficient use of the state's funds while serving its drivers well. LTRC's materials research facilities are a vital partner in that pursuit, and the initial returns on a recent innovation in asphalt design demonstrate this value. The research project, led by LTRC's Corey Mayeux, P.E., and Moses Akentuna, Ph.D., P.E., entitled "Evaluation of Performance and Life Cycle Cost of Asphalt [8/18 Specifications]," aimed to evaluate and compare the performance of pavements constructed before and after the implementation of the 2016 DOTD specification, which introduced the balanced mix design framework to the state's construction processes.

Akentuna, LTRC's Asphalt Research Manager, emphasizes the value of this research: "This study was conducted to ascertain the effectiveness of the changes and improvements made in the Louisiana standard specifications in an effort to enhance roadway performance and value. Additionally, the study included a comprehensive analysis of life cycle costs to assist DOTD in determining whether the modified specifications have increased the overall value of the state's roadways."

To these ends, researchers assessed the available density, volumetric, and performance data on 14 pavement sections across the state, performing a life-cycle analysis to determine if the specification changes increased the service life of the pavements in question compared with those constructed under the pre-2016 specifications. Utilizing a combination of data gleaned from DOTD laboratory engineers and the state's online mix design and records system, LaPave, they discovered the new balanced mix design performed very well by all measures.

Highlights included overall enhanced performance in field rutting and cracking, improved service life values ranging from 0.1 to 3 years, and an average life-cycle improvement of 9.2%, all of which can substantially influence the maintenance and operation of the state's asphalt pavements, ultimately creating significant savings for taxpayers. While the pavements constructed under the new specifications must be monitored to ensure ongoing quality and performance, these encouraging early outcomes are a substantial validation of the research and innovation happening at LTRC on a day-to-day basis.

Read Final Report & Tech Summary 670 online: *www.ltrc.lsu.edu/publications.html*

Dr. Mohammad Lifetime Achievement (ctd. from pg. 3)

Colleagues and peers praise Professor Mohammad not only for his technical prowess, but also for his character. "Professor Mohammad embodies the true spirit of our profession," said Robert Jewell, President of ASCE Louisiana Section—Baton Rouge Chapter. "(His) commitment to ethical practice and willingness to go above and beyond set a standard for all of us."

This Lifetime Achievement Award underscores Professor Mohammad's lifelong dedication to civil engineering practice and his significant role as a cornerstone of knowledge for our communities. His diligent efforts will continue to shape the future of higher education and industry. Please join all of us at LTRC in congratulating Professor Mohammad on this remarkable achievement!

Professor Mohammad has made several groundbreaking advancements in asphalt science over his 37-year career.

TECH TRANSFER

“The Driving Force” Podcast Debuts in 2025

As a new year begins, the LTRC team is pioneering a new approach to highlight the groundbreaking work being performed throughout the center. “The Driving Force” podcast, which debuted in January, aims to leverage this rapidly growing medium to emphasize the people and projects that are driving change in Louisiana transportation and beyond.

Hosted and produced by Manager of Technical Publications, Todd Blount, and Statewide Strategic Program Manager, Garrett Wheat, each episode provides a snapshot of the diverse ways in which LTRC is serving various members of the transportation community across the state and nation through research, technology transfer and training, community outreach, and more.

“The Driving Force” is available on all major podcasting platforms. More information is available by following the QR code to the right or by contacting Drs. Blount and Wheat at ltrcpodcast@lsu.edu.

PUBLICATIONS

Recently Published

Project Capsule 25-1C

Evaluation of the T-FAST (TFHRC ASR Test) Test Method for Aggregate Acceptance
Zhen Liu, Ph.D., P.E.

Final Report & Technical Summary 702 (Project 17-4B)

Development of a 4.75-mm Asphalt Mixture Design
Saman Salari, P.E.; Samuel B. Cooper III, Ph.D., P.E.

Final Report & Technical Summary 703 (Project 22-2ST)

Skew Detection System Replacement on Vertical Lift Bridges (Phase 2)
Gareth Rees, P.E.

VIEW ONLINE

To download a complete list of LTRC publications, visit the website at www.ltrc.lsu.edu.

Updates and Accomplishments

Louisiana DOTD was recently awarded a **$32 million grant** from the Federal Highway Administration as part of its Low-Carbon Transportation Materials program. Funds will be distributed over a seven-year period and utilized in the construction of innovative and environmentally sustainable transportation infrastructure projects in Louisiana. The grant proposal was developed and submitted by the **LTRC Materials Research Team.**

Murad Abu-Farsakh, Ph.D., P.E., and **Isam A. Khasib** were honored with the 2024 Geology and Geotechnical Section Best Paper Award by the Transportation Research Board. Dr. Abu-Farsakh was recognized at TRB's 2025 Conference for his paper, "Assessment of Axial Resistance of Piles Considering Consolidation Setup and Aging Setup Using Direct Pile Cone Penetration Test Methods."

The work of the **LTRC Geotechnical Research Team**, led by **Gavin Gautreau, P.E.,** in conjunction with DOTD Geotechnical Administrator, **Jesse Rauser, P.E.,** was featured in two articles in the November/December 2024 edition of the Deep Foundations magazine *(pictured at right)*. These articles highlighted LTRC researchers' Geotechnical Database efforts. The articles were entitled: "Enhancing Deep Foundation Practices in DOT Projects" and "Contract Documents of The Future."


FEATURE ARTICLE

SPECIAL ISSUE

FUTURE FORWARD

Enhancing Deep Foundation Practices in DOT Projects

The field of deep foundation engineering is undergoing significant changes. Long reliant on established methods and expert judgment, the industry is now integrating data-driven techniques that are transforming how infrastructure is designed and built. This shift is not about abandoning proven practices, but about enhancing them with advanced analytics and data tools to improve accuracy, efficiency and adaptability in construction projects.

Picture a worksite where decisions are made not just from experience, but also informed by data from previous projects and real-time analysis. This isn't a vision of the distant future but the reality of today's deep foundation projects. Data-driven techniques are being combined with engineering expertise, creating smarter and more reliable solutions that can handle the increasing demands for sustainable, resilient infrastructure.

This shift is not about abandoning proven practices, but about enhancing them with advanced analytics and data tools to improve accuracy, efficiency and adaptability in construction projects.

While traditional methods based on empirical data and experienced judgment have served the industry well, they are sometimes limited in addressing modern challenges, such as evolving environmental regulations and the growing need for sustainable, resilient resource management. This is where a data-driven approach comes in, not as a replacement but as an additional tool to refine and strengthen foundational engineering processes. These new techniques allow professionals to analyze larger volumes of data to optimize designs, enhance decision-making and achieve better project outcomes.

AUTHORS

Additionally, **Jesse Rauser, P.E.,** and Ohio DOT Geotechnical Administrator, Chris Merklin, P.E., were featured in the December 2024/January 2025 ASCE GeoStrata article related to LTRC Geotechnical Database research. Their article is entitled: "From Boxes to Bytes, Evolution of Geotechnical Data Management at State Departments of Transportation."

LSU CEE Professor **Louay N. Mohammad, Ph.D.,** has been appointed Co-Editor-in-Chief of the American Society of Civil Engineers (ASCE) *Journal of Materials in Engineering (JMCE)*. The *JMCE* is the premier U.S. publication dedicated to advancing research and disseminating knowledge about civil engineering materials. Professor Mohammad will oversee Section B—Bituminous/Flexible Pavements, Section C—Geo-materials (bases/subbases), and Section D—Masonry/Metals/Timber. In this leadership role, Professor Mohammad will guide the publication of cutting-edge research that supports innovation and excellence in the field of civil engineering materials.

Marcus Sylvas, Ph.D., and **Garrett Wheat, Ph.D.,** were recently sworn in as 2025 board members for the Baton Rouge Chapter of the Association for Talent Development. Marcus will serve as President, and Garrett will serve as VP of Technology.

Garrett Wheat, Ph.D., was selected to serve as a part of NCHRP Panel 23-49—"Anticipatory Knowledge Delivery for State DOTs," and NCHRP Panel 23-45—"A Knowledge Management Manual for Transportation Agencies."

Rudynah "Dynah" Capone, LTAP Director, was the keynote speaker for the Louisiana Engineering Society's Baton Rouge Chapter luncheon. She shared how LTAP provides workforce development opportunities to local public works and engineering officials across Louisiana. She also shared how LTAP is working with parishes and municipalities around the state to improve road safety through the Local Road Safety Program.

LOUISIANA TRANSPORTATION RESEARCH CENTER

4101 Gourrier Avenue
Baton Rouge, LA 70808-4443
DOTD Section 33

ADDRESS SERVICE REQUESTED

Pre-Sort Standard
U.S. Postage
PAID
Permit No. 55
Baton Rouge, LA

www.ltrc.lsu.edu

Technology Today Publication Statement

Technology Today is a quarterly publication of the Louisiana Transportation Research Center.

For additional information on material included in this newsletter, contact the Public Information Director at 225-767-9183.

FOLLOW US

Keep up with our latest updates and information at www.twitter.com/LTRC_Updates, and search for us on Facebook, YouTube, and LinkedIn.

LTRC Administration and Publications Staff

This public document is published at a total cost of $2,029.45. Seven hundred and sixty copies of the public document were published in this first printing at a cost of $2,029.45. The total cost of all printings of this document, including reprints, is $2,029.45. This document was published by Mele Printing, 11930 South Harrell's Ferry 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.