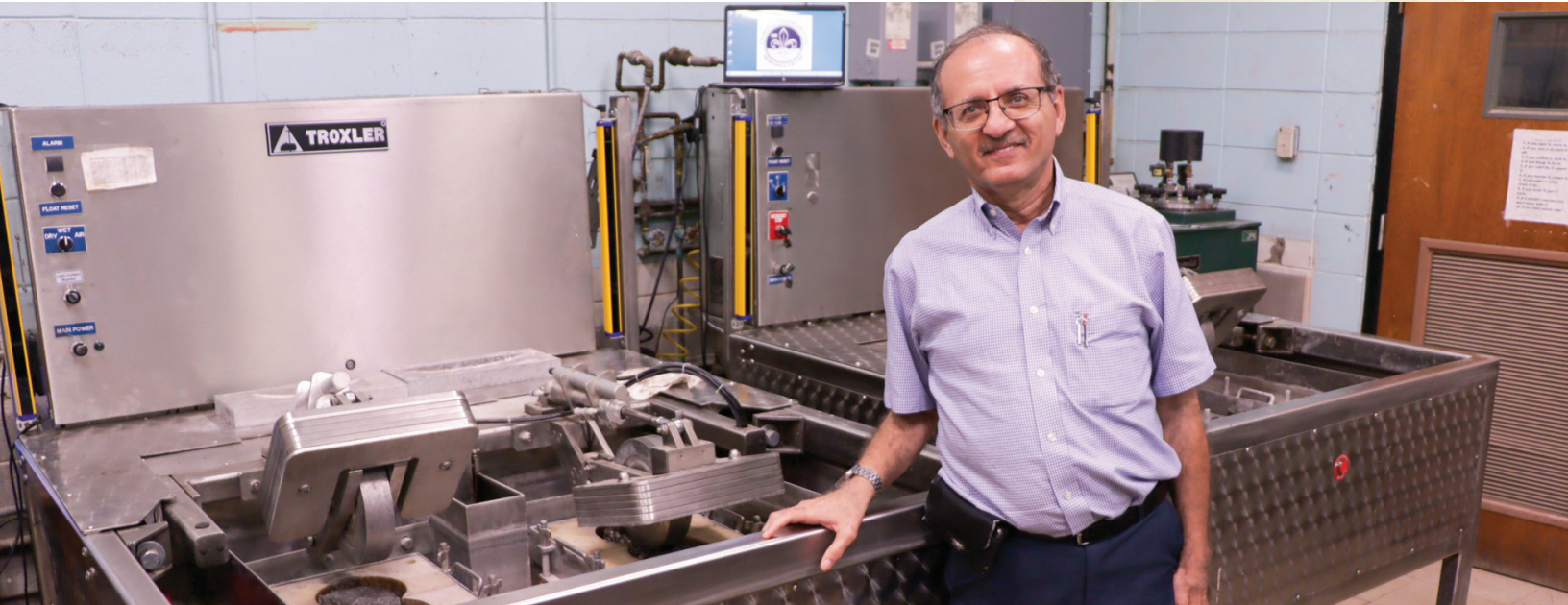




TECHNOLOGY TODAY

VOLUME 35
ISSUE 3

A publication of the Louisiana Transportation Research Center



Editor's note: In a five-part series, LTRC is looking back at previous projects to see how past research is actively benefiting today's roads and bridges.

RESEARCH

LTRC Asphalt Research Continues to Have Industry Effects

LTRC's Louay Mohammad, Ph.D., led a ripple effect in industry changes with his 2014 research into the assessment of the capability of different Hamburg Wheel Tracking (HWT) devices used to carry out the loaded wheel test (LWT) in compliance with AASHTO T 324 Standard Method of Test for Hamburg Wheel-Track Testing of Compacted Hot Mix Asphalt (HMA).

The LWT is a torture test conducted during asphalt mixture design process to determine the viability of the asphalt mixture proposed for a road project against rutting. "While doing initial work in the lab, specimens were not deforming uniformly, which piqued my interest," said Dr. Mohammad, LSU civil engineering professor and EM-CRF director.

During a nationally sponsored research project by the National Cooperative Highway Research Program (NCHRP), Dr. Mohammad and his team conducted a comprehensive experimental program that assessed the capability of five commercially available HWT equipment as well as their ability to accurately measure, control, and

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UPCOMING EVENTS

NHI Course No. 130126—Strut and Tie Modeling (STM) for Concrete Structures
November 17-18

LTAP—Road Scholar #13 Inspection of Local Bridges
December 6-7

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

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maintain the desired test conditions as specified in AASHTO T 324. Parameters investigated during the research include wheel position waveform, loading frequency, and maximum speed; impression measurement system; temperature measurement and control system; free circulating water on mounting system; wheel dimensions; wheel loads; specimen and track length; and data collection and reporting.

Based on results of the experimental program, Dr. Mohammad concluded there were differences between commercially available HWT machines in the U.S. market. Furthermore, available HWT machines did not comply with all the specifications set forth in AASHTO T 324, including requirements for the waveform, temperature range, and reporting parameters to ensure proper testing and accurate results. Research also proposed revisions to AASHTO T 324 and to the configurations of the available HWT machines to address equipment capabilities, components, or design features. The research was published under the National Cooperative Highway Research Program (NCHRP) Project 20-7, "Hamburg Wheel-Track Test Equipment Requirements and Improvements to AASHTO T 324."

According to Dr. Mohammad, AASHTO Committee on Materials and Pavements (COMP) immediately adopted many of the research recommendations in the in the 2016 edition of the AASHTO T 324. "The research had a ripple effect through the industry," Dr. Mohammad said.

By 2020, AASHTO Committee on Materials and Pavements (COMP) has adopted nearly all of the research recommendation to AAHTO T 324 Standard Method of Test for Hamburg Wheel-Track Testing of Compacted Hot Mix Asphalt (HMA). With the adoption of the research recommendations by AASHTO, many state DOTs followed with revisions to their standards to comply with the new AASHTO T 324, including the Louisiana Department of Transportation and Development, which adopted the recommendations in the Standard Specifications. "Many U.S. commercial manufacturers of LWTs retrofitted and/or redesigned older machines to comply with the research findings and specifications of AASTHO T 324," Dr. Mohammad said.

"The successful implementation of findings of this research was the result of continuous communication and facilitation by the research team to stakeholders, including staff of AASHTO COMP, state DOTs, and equipment manufacturers," Dr. Mohammad said.

Since the publication of the research and AASHTO adoption of Dr. Mohammad's recommendations to the Standard, marginal asphalt mixture designs that had previously passed AASHTO T 324 are now ineffective. The future implication of this research is significant as it is part of balanced asphalt mixture design, which will increase reliability of testing and improved performance and sustainability of asphalt mixtures in flexibility pavements.



Loaded-wheel tracking test

The LWT test produces damage by rolling a 158-lb. steel wheel across the surface of compacted asphalt mixtures (cylindrical or rectangular slabs) that are submerged in a temperature-controlled water bath at a temperature specified by the agency. (Louisiana specifies 50°C.) The test duration is 20,000 passes at a rate of 52 passes per a minute. Rut depth measurements are recorded across the surface of asphalt mixture samples until failure. "Typically, rut depth accumulated at 20,000 cycles is a measure of the asphalt mixtures' rut resisting performance after a considerably long-term in service," Dr. Mohammad said.



TRAINING

Meet Asphalt Training Manager Dimetrie Chopin

Asphalt Concrete and Special Topics Training Program Manager Dimetrie Chopin recently joined the training department this past spring. Currently in his position, he provides and oversees training to contractors and DOTD employees in the field of asphalt concrete paving inspection. Before LTRC, Chopin previously worked as a construction inspector with DOTD for St. Martin

Parish Unit 233. Chopin expressed, "When I was an inspector, I enjoyed training new inspectors and seeing them become successful in their job. I am now in a position to help not just employees that were in my previous office but now I can help everyone throughout the state"

Chopin gained valuable experience and knowledge over the years not only in asphalt concrete materials and placement, but also in the entire process of completing a roadway project from start to finish in its entirety. Chopin said, "The firsthand knowledge I gained as a construction inspector, going through the training that I am now responsible for providing, gives me a unique perspective on my current job duties."

Chopin keeps the training courses relevant by maintaining essential relationships with experts in the industry. Training that is provided starts from the testing of materials that make up the composition of the asphalt concrete mix to the roadway paving operation and everything in-between.

Team concrete vs. team asphalt?

When asked which material reigns superior, Chopin asserts that concrete may be a more versatile building material when compared to asphalt, but asphalt has key advantages over concrete when it comes to pavement construction. Chopin explained, "Low-cost, fast construction, and ease of maintenance are what I believe to be asphalt's greatest advantages over concrete in roadway pavement."

RESEARCH

Asphalt Lab Q + A

It's no secret that a major part of accomplishing the research that LTRC delivers first begins in a high-quality lab. Engineering Technician DCL Jeremy Icenogle explained, "Here in the asphalt lab of LTRC, we try to stay up-to-date on all the new techniques and technologies that expand the vastness of making asphalt roads. All of it is for the sake of making roads better, while bringing down the cost to build the roads."



From left to right: Angela LeMay, Jeremy Icenogle, and Hannah Boggs

Icenogle and Engineering Technicians 5 Hannah Boggs and Angela LeMay share 18 years' experience in managing the lab, and they recently sat down to explain some of the ins and outs of the asphalt lab and its capabilities.

What does a day in the asphalt lab typically look like?

A typical day in the asphalt lab involves preparing materials or tools for making samples: aggregate, liquid, or mixture. Aggregate and mixture samples usually need to be prepared the day before in order to be tested

the next day. Liquid asphalt samples are run the day they are prepared. Sometimes we have field work when requested. Since our jurisdiction for field work is the entire state of Louisiana, requests are either from other DOTD offices across Louisiana or at LTRC by professors that work jointly on LTRC projects. Field work is usually coring samples out of the roadway to bring back to the lab for testing. We perform our normal mixture testing on field core samples in a manner of road forensics. The cores can be useful in determining why the asphalt mixture is not performing as expected. Our goal is to improve our roadways using the most durable, cost effective means possible.

What types of equipment are primarily used?

We have a multitude of devices used depending on which types of samples we are testing between aggregate, liquid, or mixture:



Aggregates—Water Baths, Scales, Ovens (These tests are run to understand how the liquid portion will interact with the aggregate as well as structural integrity of the final mixture.)



Liquids—Ductility Machine, Penetration Bath, Rotational Viscometer, Capillary Viscometer, RTFO oven, DSR, PAV, BBR (These tests are run to see how the liquid portion will stand up to the stresses put on the road overtime. Main stresses are traffics and weather.)



Mixtures—Mixing Machine, Gyrotory Compactor, Rice Shaker, CoreLok, Core Dryer, Humboldt Device, Extraction Machine, a few Saw Machines (These tests are performed to see how the fully formed mixture stands up to specification requirements of Louisiana. Usually involved adding loads to the mixture until failure or for a set amount of time.)



Is there a favorite piece of equipment that is more popular?

Running extraction samples is my favorite, as that is probably the most chemical reactionary test we run. I thoroughly enjoy the intricacies of the test method and that you get to essentially dismantle the asphalt mixture from its form into base material. You get to turn the full mixture into aggregates and liquid binder. We can then test the aggregate or liquid to see what is potentially going on with a road out in the field. From there, a diagnosis and potentially solutions can be relayed. Many students have enjoyed the mixing and compaction days since they get to see their results all come together and the different sizes of samples made.



What do you enjoy overall about this aspect of research?

I like to be challenged, and research is a field that challenges your mind and makes you think of new reasons, new concepts, and new opportunities. When experiments do not go as planned or you have unforeseen results, you can make changes and contemplate new and different ways to adjust your research. In addition, I like that research can make a difference in the world. It is so awesome to think that I can be a part of an experiment that can make a difference in someone's life or even change the way we see our asphalt roadway today. Research is a great way to challenge yourself as well as push yourself into discovering something that potentially can help your community.



What do you wish people knew about the asphalt lab and its capabilities?

I think there is a common misconception that asphalt mixture is “one size fits all.” The basic components of asphalt, aggregate, and binder are used in different combinations to create unique mix designs. Mix designs are created for the specific conditions of a road, including average daily traffic. These asphalt mixtures are then tested in the lab to see how they perform. We're also involved in testing new ideas and product, such as “modifying” an existing binder. Binder performance can be enhanced with the addition of certain products. The asphalt lab conducts tests on the modified binder to see how it performs compared to the original binder. One of the more exciting aspects of our lab involves fieldwork. We have equipment that can be used in the field that allows us to monitor the roadway to determine how different applications or mixes are performing.



Local Agencies Receiving Federal, State Funds Must Attend the LPA Core Qualification Training

Classes in Alexandria on November 29 to December 1

By Rudynah Entera Capone, MPA

One of the core courses the Louisiana Local Technical Assistance Program (LTAP) center has to offer is the Local Public Agency (LPA) Training Program. This is a collaborative effort between DOTD, the FHWA Louisiana Division, and LTAP. Any parish, city or municipal government agency is considered an LPA, which is also referred to as “entity” in legal project agreements.

If you are an LPA that receives federal and/or state funding, then you are required to take the LPA Qualification Core Training. The other course on Construction, Engineering and Inspection (CE&I) is offered to enhance the capabilities of “Responsible Charge” personnel from local agencies to develop and manage project or oversee and understand the CE&I process. A “responsible charge” is someone who is a full-time employee of the entity designated to oversee the project.

With LTAP’s assistance, the LPA courses were taught in Baton Rouge this past June and is being offered again on November 29 to December 1 in Alexandria, La. “This outreach is important to DOTD for assisting local governments in obtaining federal dollars for transportation projects,” shared Tanya Moore, the director of Local Public Assistance Programs at DOTD.

“It’s important that LPAs fully understand the project delivery process and requirements that they need to comply with—from the time they apply for funding until they closeout the project for completion,” she added.

“The LPA training series will help local agency project sponsors understand the ins and outs of the various Federal Aid programs, and locals will have an opportunity to meet many of the key program personnel at DOTD who will help them execute a successful project from concept to completion,” LTAP director Steven Strength emphasized.



The LPA classes scheduled on November 29 to December 1 will be held at the AEX Conference Room of the England Airpark. The LPA Qualification Core will be taught in the first two days by FHWA’s Project Delivery Team Leader Mary Stringfellow, Local Public Assistance (LPA) Director Tanya Moore, and LTAP Director Steven Strength. All project sponsors and their consultants working on LPA projects receiving federal or state funding through DOTD are required to attend this training. The topics covered are federal-aid programs available; project planning, funding, and reporting requirements; project development and design process; working with DOTD districts and headquarters; a review of entity-state agreement; and submittal of plans, specifications, and estimates.

The LPA CE&I course will be taught on the third day, which is intended for those LPA construction project personnel or

RESEARCH

Ruijie “Rebecca” Bian Chosen as Research Fellow for Gulf Research Program

LTRC’s Planning and Multimodal Research Manager Ruijie “Rebecca” Bian, Ph.D., was recently chosen as one of five fellows for the Human Health and Community Resilience track of the Early-Career Research Fellowship (ECRF), as part of the Gulf Research Program of the National Academies of Sciences, Engineering, and Medicine.

This two-year program, which began in June, allows Dr. Bian the opportunity to contribute to advancing health equity in the Gulf of Mexico region or Alaska by considering the effects of climate change on social determinants of health. These social determinants include issues such as air and water quality, housing, food security, transportation access, public safety, and employment.

Dr. Bian’s research under the fellowship is titled, “Resilient Solutions for Crash Risk Reduction for All Road Users in Extreme Weather” and will pay special attention to crashes involving non-motorized users and solutions for improving multi-modal transportation access in extreme weather.

“Extreme weather undoubtedly increases crash risk and affects all road users’ safety, which poses negative health impacts on communities,” explained Dr. Bian. “Resilient solutions from transportation planning, design, and operations are needed to fill in the gap and address challenges by case. Some communities are subject to greater health impacts from crash risk in extreme weather than the others because of their geographic locations and existing transportation infrastructure.”

In her position at LTRC, Dr. Bian already focuses on supporting multimodal transportation planning, design, and operation through research with the knowledge of transportation engineering and data science. Well-recognized for her research analyzing and modeling hurricane evacuation behavior and human mobility in extreme weather, Dr. Bian is looking forward to completing the proposed research, mentoring undergraduate students, and preparing graduate course updates during this fellowship.

About ECRF

The Gulf Research Program’s Early-Career Research Fellowship helps early-career researchers during the critical pre-tenure phase of their careers. Fellows receive a \$76,000 financial award along with mentoring to provide them with independence, flexibility, and built-in support as they take risks on untested research ideas, pursue unique collaborations, and build a network of colleagues. “The goal of the ECRF’s Human Health and Community Resilience track is to address the unique health needs of communities in the Gulf region and Alaska. Many of these communities are vulnerable to natural disasters. We have an opportunity to help them build a healthier future, and preserve the areas where they live, work, and play,” said Karena Mary Mothershed, program head and senior program officer for the GRP’s Board on Gulf Education and Engagement.



“Extreme weather undoubtedly increases crash risk and affects all road users’ safety, which poses negative health impacts on communities. Resilient solutions from transportation planning, design, and operations are needed to fill in the gap and address challenges by case.”

LPA training continued

engineers who serve as the LPA project engineer and the “responsible charge.” This class delves into the in-depth phases of construction, engineering, and inspection procedures that include contract administration, Site Manager application, materials and testing quality assurance, contract admin for work zone safety, construction project closeout procedures, and compliance with federal-state requirements.

Register for LPA and other LTAP classes through bit.ly/LTAPtraining

The DOTD’s LPA webpage is intended to assist the LPA by listing available programs, how to obtain a project, and information that will assist in fulfilling the requirements of planning, environmental clearance, design, utility certification, right-of-way acquisition, construction, and maintenance. Visit bit.ly/DOTDLPA for more information.

STAFF NEWS

Staff Updates and Accomplishments

LTAP Innovation and Technology Transfer Manager **Rudynah Entera Capone** has been selected as one of the mentors in NLTAPA’s Peer-to-Peer Mentorship Program. She is mentoring Regina Hackett, communications coordinator of Connecticut LTAP center.

Associate Director for External Programs **Vijaya (VJ) Gopu**, Ph.D., P.E., delivered an invited talk on “Performance of Light Frame Structures in Hurricanes” at the 2022 Arkansas Engineering Forum held in Little Rock, Arkansas, on September 16, 2022. He attended the annual meeting of the National Council of Examiners for Engineering and Surveying held in Carlsbad, CA, from August 23-26.

LTRC would like to welcome **Aaron Brown** as its newest Engineering Technician 4.

PUBLICATIONS

Recently Published

Final Report and Technical Summary 649 (17-1B)

Field Implementation of Handheld FTIR Spectrometer for Polymer Content Determination and for Quality Control of RAP Mixtures

Nazimuddin Wasiuddin, Ph.D., Roksana Hossain, Ph.D., Shams Arafat, and Lamiya Noor

Final Report and Technical Summary 674 (19-2SA)

Reduce Pedestrian Fatal Crashes in Louisiana by Improving Lighting Conditions

Raju Thapa, Ph.D., P.E., (TX), Xiaoduan Sun, Ph.D., Ahmed Hossain, and Syeda Batool Mavra

Final Report and Technical Summary 665 (22-1ST)

Investigating and Developing a MASH Compliant Contraflow Ramp Closure Gate

Maysam Kiani, Ph.D., P.E., PMP, Chiara Silvestri Dobrovolny, Ph.D., and Nathan Schulz



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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.

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