



# TECHNOLOGY TODAY

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## UPCOMING EVENTS

LTAP Roadway Departure (TTEC 100)  
May 10

DOTD MD Facilitation Skills for Managers (TTEC 175)  
May 24-25

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

## RESEARCH

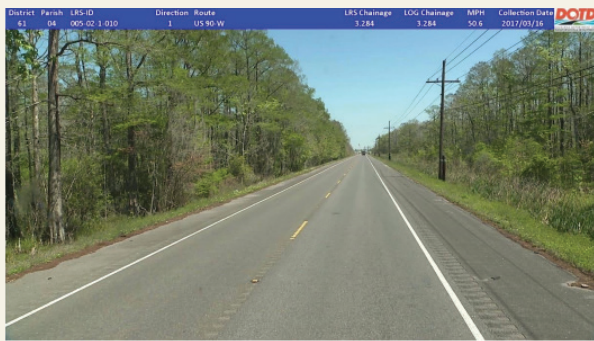
### Rumble Strips on Two-Lane Highways Show Significant Safety Benefit

In Louisiana, roadway departure crashes are a serious concern that often results in deadly consequences—especially on two-lane urban and rural highways. To assist in lowering these crashes, the state has continued to install centerline rumble strips and shoulder rumble strips to alert distracted or inattentive drivers. Now, researchers have studied the specific safety impact these safety countermeasures have had in reducing crashes and found the biggest reductions come from fatal and severe injury crashes.

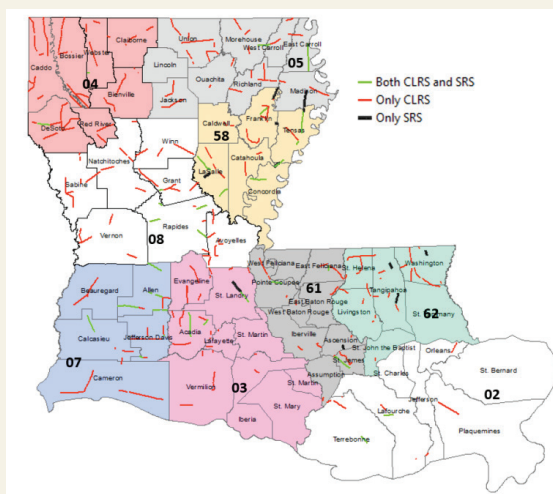
#### Ready to Rumble

In their study, “Impact of Centerline Rumble Strips and Shoulder Rumble Strips on all Roadway Departure Crashes in Louisiana Two-lane Highways,” researchers investigated the effects of rumble strips that were installed between 2010 and 2016 on more than 1,600 miles of Louisiana two-lane highways. Rumble strips are grooves or rows of indents in pavement that are designed to alert inattentive drivers of potential danger. These strips also act as a navigational aid to help drivers maintain their intended travel lane during poor visibility at nighttime or in inclement weather. The project analyzed the crash characteristics of before and after years, used state-of-

*continued on page 2*



An illustration of a local two-lane section with rumble strips



Location of rumble strip segments on rural two-lane highways

the-art roadway safety evaluation methods to estimate the crash modification factors, and estimated the benefit-cost ratio of rumble strips.

Lead researcher Xiaoduan Sun, Ph.D., P.E., explained, “To capture all departure scenarios and take full advantage of crash data, the observed crash analysis included not only conventional total crashes and targeted crashes, but also crashes with combined key crash attributes as well as selected crash report reviews, which helped to clarify the ambiguous or inconsistent information identified during the initial analysis.”

Crash modification factors were estimated through four analysis methods: the before and after empirical Bayes (EB) analysis, comparison group EB analysis, cross-sectional analysis (with-and-without rumble strips), and autoregressive integrated moving average (ARIMA) intervention model of trend analysis. All four methods showed similarly positive results about the effectiveness of rumble strips.

### Centerline Success

Dr. Sun explained, “The biggest reductions come from fatal and severe injury crashes, which are 34% for rural two-lane and 45% for urban two-lane highways. The safety evaluations from multiple evaluation methods consistently demonstrate the success of rumble strips, particularly the centerline rumble strips installations.”

Some of the additional findings include the locations with both centerline and shoulder rumble strips having a crash reduction of 22% for rural two-lane highways and an impressive 75% for urban two-lane highways.

“This study demonstrated rumble strips as a low-cost, effective crash countermeasure on two-lane highways,” said Dr. Sun. “To reach the state’s goal of Destination Zero Deaths, rumble strips should be considered for installation along two-lane highways everywhere, if financially feasible, or if not, by prioritizing the installation projects based on either the crash frequency or crash risk at the network level.”



To learn more about this study, please visit [https://www.ltrc.lsu.edu/pubs\\_final\\_reports.html](https://www.ltrc.lsu.edu/pubs_final_reports.html) and select Final Report 648 or Technical Summary 648.



## RESEARCH

# Steve Strength Honored with NLTAPA Achievement Award

LTAP Director Steven Strength received this year's NLTAPA Achievement Award during the NLTAPA Winter Business Meeting held in Washington D.C. at this year's TRB annual meeting. This award is presented to an individual (or individuals) in recognition of their dedication, leadership, and effectiveness in promoting the goals and purposes of the National Local and Tribal Technical Assistance Program through service to the Association (NLTAPA).

Strength is a distinguished leader in the field of engineering, public works, traffic/work zone safety, and workforce development and training. He is a huge advocate of Louisiana's road safety initiative called the DestinationZeroDeaths where he serves as a statewide co-chair of the Strategic Highway Safety Plan's (SHSP) Infrastructure and Operations Emphasis Area.

As Louisiana LTAP center's director, Strength oversees training, technical assistance, and outreach activities that benefit the local public agencies in Louisiana. Prior to joining LTAP as the program manager in 2013, he spent 31 years with Louisiana Department of Transportation and Development (DOTD) District 02 in New Orleans, including 22 years as district traffic operations engineer. During this time, he managed or participated in a variety of programs and projects involving traffic engineering,



highway safety, roadway maintenance, work zone operations, incident and special events management, and intelligent transportation systems.

Strength currently serves as NLTAPA's liaison to the National Association of County Engineers (NACE) and secretary of the Louisiana Parish Engineers and Supervisors Association (LPESA). He has also participated on many NCHRP research panels, including NCHRP 17-65 "Improved Analysis of Two-Lane Highway Capacity," NCHRP 05-21 "Safety and Performance Criteria for Retroreflective Pavement Markers" (panel chair), and NCHRP 17-76 "Guidance for the Setting of Speed Limits." His participation on these national research panels, as well as many research projects in Louisiana, has helped ensure the technical integrity of the research and its applications, particularly as it can be applied at the local level.

**To read more** about the selection process, please visit <https://nltapa.org/about/awards/>.

## EDUCATION

# DOTD, SASHTO Award Louisiana Engineering Students with Scholarships

The Louisiana Department of Transportation and Development, in conjunction with the Louisiana Transportation Research Center (LTRC) and the Southeastern Association of State Highway Transportation Officials (SASHTO) announced the recipients of 10 scholarships. These \$1,000 scholarships were awarded to 10 students from four Louisiana universities who are juniors and seniors in civil engineering degrees.

"Every year we are able to give out scholarships to 10 deserving students who show interest in the transportation field," said DOTD Secretary Shawn Wilson, Ph.D. "This partnership has allowed us help 283 students with their tuition. It is my hope that these bright individuals will use their knowledge one day bring new, innovative ideas to our state."

Funding for these scholarships is provided by SASHTO, which has given nearly 300 scholarships since 2003, totaling to \$293,000.

## RESEARCH

# LTRC Represented at 101st TRB Meeting

The Transportation Research Board (TRB) 101st Annual Meeting was held January 9-13, 2022, at the Walter E. Washington Convention Center in Washington, DC. Following a virtual 2021 conference, attendees were eager to participate in over 400 workshops, lectern sessions, and poster sessions. A number of sessions and workshops focused on the spotlight theme for the 2022 meeting: *Innovating an Equitable, Resilient, Sustainable, and Safe Transportation System*. The following is a list of presentations made by LTRC staff members and contract researchers:

### **“Development of a Fatigue Design Model for Roller Compacted Concrete Pavement Based on In Situ Saw-Cut Beams and Accelerated Pavement Performance”**

Moinul Mahdi, Golam Sobhani, Zhong Wu, Yilong Liu, and Zhaoxing Xie

### **“In Situ Strain Distribution and Fatigue Damage Assessment of Roller Compacted Concrete Pavement Under Accelerated Pavement Testing”**

Moinul Mahdi, Yilong Liu, Golam Sobhani, Zhong Wu, and Zhaoxing Xie

### **“Performance Evaluation and Prediction of Preservation Asphalt Overlay in Louisiana”**

Zhaoxing Xie, Zhong Wu, Farzana Moon, Moinul Mahdi, and Yilong Liu

### **“Estimating Average Daily Traffic on Low-Volume Roadways”**

Afia Yeboah, Julius Codjoe, and Raju Thapa

### **“Applying Association Rules Mining to Investigate Pedestrian Fatal and Injury Crash Patterns Under Different Lighting Conditions”**

Ahmed Hossain, Xiaoduan Sun, Raju Thapa, and Julius Codjoe

### **“Safety and Operational Effectiveness of Protected Only Versus Protected and Permitted Left Turn Signal Phase”**

Md Asaduzzaman, Raju Thapa, and Julius Codjoe



### **“Evaluation of the Impact of Work Zone Traffic Control Devices on Change in Speed Using the SHRP2 Naturalistic Driving Study”**

Shauna Hallmark, Guillermo Basulto-Elias, Nicole One-year, Amrita Goswamy, Raju Thapa, Susan Chrysler, and Omar Smadi

### **“The Use of Bayesian Analysis for Implementing the Specific Site Variability into the Load and Resistance Factor Design of Piles”**

Md Habibur Rahman, Murad Abu-Farsakh, and Sabarethinam Kameshwar

### **“Performance Evaluation of Recycled Plastic Pin and Geosynthetic Platform Supported Embankment over Soft Soil: A Numerical Study”**

Abdallah Ikbarieh, Murad Abu-Farsakh, and George Voyiadjis

### **“Quantifying the Benefits of Geosynthetics Reinforcement in Flexible Pavement Design using Cyclic Plate Load Testing”**

Murad Abu-Farsakh, Qiming Chen, and Milad Saghebfar

### **“Evaluation of Pile-Cone Penetration Test (CPT) Methods Using Multidimensional Unfolding Technique and Evaluating the Ultimate Pile Capacity from CPT Data Using the Artificial Neural Network”**

Murad Abu-Farsakh

### **“Evaluating the Impacts of the Complete Streets Policy in Louisiana: A Review of Practices and Projects in the Last 10 Years”**

Ruijie Bian and Tara Tolford

### **“Contextual Adjustment of the ITE Trip Generation Rates for Small and Medium Urban Areas in Louisiana”**

Saba Doulabi, Chester Wilmot, Peter Stopher, and Angela Antipova

**“Development of Cost-Effective, High-Modulus Asphalt Concrete Mixtures Using Crumb Rubber and Local Construction Materials in Louisiana”**

Ibrahim Elnaml, Momen Mousa, Marwa M. Hassan, Ipshit Idris, and Louay Mohammad

**“Warm Mix Asphalt Demonstration Projects in Louisiana: Case Study of 5 to 8 Years of Field Performance”**

Moses Akentuna, Louay Mohammad, Kwadwo Boaten, and Samuel Cooper, Jr.

**“Mechanistic Evaluation of Asphalt Mixtures Progressive Moisture Damage”**

Moses Akentuna, Louay Mohammad, Sanchit Sachdeva, Samuel Cooper, III, and Samuel Cooper, Jr.

**“Evaluation of the Interlayer Bond Strength of Micro-Surfacing Mixes”**

Ahmad Al-Hosainat, Munir Nazzal, Sang Soo Kim, Louay Mohammad, Ala Abbas, Eric Biehl, Perry Ricciardi, and Sk Abu Talha

**“Best Practices for Assessing Roadway Damages Caused by Flooding”**

Tyson Rupnow

**“Development of Practical and Cost-Effective Ultra-High Performance Engineered Cementitious Composite Using Natural Sand and No Silica Fume”**

Daniel Game, Gabriel Arce, Marwa Hassan, Hassan Noorvand, Sujata Subedi, and Tyson Rupnow

**“Optimizing the Self-Healing Efficiency of Hydrogel-Encapsulated Bacteria in Concrete”**

Ricardo Hungria, Momen Mousa, Marwa Hassan, Omar Omar, Andrea Gavilanes, Gabriel Arce, Gary King, Jose Milla, and Tyson Rupnow

**“Feasibility and Performance of Low-Volume Roadway Mixture Design in Louisiana”**

Corey Mayeux, Saman Salari, and Samuel Cooper, III

**“Laboratory Evaluation of Warm Mix Asphalt Ipen Graded Friction Courses”**

Hossam Abohomer, Mostafa Elseifi, Corey Mayeux, Samuel Cooper, III

**TRAINING**

## Louisiana to Host 2022 AASHTO Spring Meeting

Serving as this year’s president of American Association of State Highway and Transportation Officials, DOTD Secretary Shawn Wilson, Ph.D., is placing Louisiana in the spotlight as the host of the 2022 AASHTO Spring Meeting. The meeting will bring together senior level leadership within the transportation community on May 9-12, 2022, in New Orleans, LA.

The AASHTO Annual Spring Meeting offers transportation executives the opportunity to network and share the latest in industry policies and innovations. “Attendees can look forward to an agenda that has been strategically planned to include meaningful policy discussions along with multiple knowledge sessions and technical tours that showcase Louisiana’s transportation system,” explained Associate Director, Technology Transfer and Training Mary Leah Coco, Ph.D.

Opportunities to experience Louisiana hospitality and culinary culture will also be available to all attendees during networking breakfasts, lunches, and breaks in addition to a Host Night Reception and a Welcome Reception.

DOTD hopes attendees of the spring meeting leave with a better understand of the strategic vision for transportation along with a new appreciation for New Orleans’ unique cuisine and vibrant history.



## *Scholarships continued*

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Students who receive the scholarships must be in good academic standing at their respective universities, and their grade point averages are taken into consideration when their applications are reviewed. Each prospective scholarship recipient must also submit a one-page description stating how their university courses reflect their interest in transportation. Those students who have participated in DOTD's summer engineering and co-op programs receive extra credit.

The students who received scholarships are the following:

- Louisiana Tech University – James Cowart and Zachary Hill
- Louisiana State University – Andrew Cashman, Marcus Cepeda, Hiruni Fernando, and Ryan Lam
- University of Louisiana at Lafayette – Bailey Bergeron, Miles Loker, and Ty Westerman
- McNeese State University – Madison Fontenot

“The LTRC Foundation SASHTO Scholarship awards are awarded every year to undergraduate students in Civil Engineering from the colleges in the State of Louisiana,” said George Voyiadjis, Chair of the LSU Department of Civil and Environmental Engineering. “They are evaluated by faculty representatives from all institutions in Louisiana that offer B.Sc. degrees in Civil Engineering. We are very proud of the LSU Civil Engineering student recipients as they excelled in both their course work as well as their interest in Transportation Engineering.”

### **STAFF NEWS**

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## Staff Updates and Accomplishments

Section 33 would like to welcome **Dimetrie Chopin** to our team! Dimetrie will serve as the Asphaltic Concrete and Special Topics Training Program Manager-Engineering Technician DCL in the Internal Training group.

LTAP Program Manager **Chris Melson** was selected to serve on the panel for NCHRP Project 20-102(20): “Impacts of Connected and Automated Vehicles on State and Local Transportation Agencies: Workforce Capability Strategies.”

Assistant Professor and Research Planning/Intermodal Research Manager **Ruijie “Rebecca” Bian**, Ph.D., obtained her P.E. license and is now officially a Texas-registered P.E. Rebecca was also selected to be a member serving on the Louisiana Complete Streets Advisory Council.

Associate Director Technology Transfer and Training **Mary Leah Coco**, Ph.D., has been appointed to NCHRP project 20-44 (40) “Implementation Project, Ensuring Essential Capability for the Future Transportation Agency.”

Congratulations to Engineering Technician Training Program Manager **Annisia Osborne** on earning her certification as an SHRM Certified Professional. This certification demonstrates a mastery of HR knowledge and is a pinnacle achievement and global standard in certification for the HR profession.

Audio Visual Manager **Patrick Mehaffey** received a Certified Technology Specialist (CTS) certification from the Audiovisual and Integrated Experience Association (AVIXA). This is the leading professional credential for audio/visual professionals with more than 13,000 CTS holders worldwide.

LTAP Innovation and Technology Transfer Manager **Rudynah Capone** recently completed the eLearning Architect Certificate Program (EAC) offered through DOTD's CPTP. This program guides participants through a series of courses and assignments designed to cultivate the diverse knowledge and skills necessary to develop eLearning courses.

LTRC welcomes **Bret White** to Section 19 as Engineering Technician 1 in the Pavement Research Group.

EMCRF Manager and Professor **Louay Mohammad**, Ph.D., P.E. (WY) organized and chaired a Lectern Session at the 2022 TRB annual meeting titled “Resilience of Asphalt Pavement Structures.”

## PUBLICATIONS

### Recently Published

#### **Technical Assistance Report 21-01TA-P**

*Forensic Evaluation of Pavement Structure: Ponderosa Drive in East Baton Rouge Parish*  
Qiming Chen, Ph.D., P.E.; Nicholas Ferguson, P.E.; Moses Akentuna, Ph.D., P.E.; Saman Salari, P.E.; Gavin Gautreau, P.E.; and Samuel Cooper, III, Ph.D., P.E.

#### **Final Report and Technical Summary 650 (18-4ST)**

*Load Rating of Existing Continuous Stringers on Louisiana's Bridges*  
C. Shawn Sun, Ph.D., P.E. (TX); Daniel Linzell, Ph.D.; and Jay Puckett, Ph.D.

#### **Final Report and Technical Summary 651 (13-3GT)**

*Finite Element Analysis of the Lateral Load Test on Battered Pile Group at I-10 Twin Span Bridge*  
Murad Abu-Farsakh, Ph.D., P.E.; Ahmad Soury, Ph.D., P.E. (TX); and Mohsen Amirmojahedi, Ph.D., E.I.

#### **Final Report and Technical Summary 654 (19-5SA)**

*Young Driver Crashes in Louisiana: Understanding the Contributing Factors to Decrease the Numbers*  
Elisabeta Mitran, Ph.D.; Xiaoduan Sun, Ph.D., P.E.; M. Ashifur Rahman, Ph.D.; and Md. Mahmud Hossain

#### **Final Report and Technical Summary 655 (18-2SA)**

*Louisiana's Alcohol-Impaired Driving Problem: An Analysis of Crash and Cultural Factors*  
Eva Shipp, Ph.D.; Subasish Das, Ph.D.; Scott Smith; Lingtao Wu, Ph.D., P.E. (TX); and Xiaoduan Sun, Ph.D., P.E.

#### **Final Report and Technical Summary 656 (19-2GT)**

*Quality Control/Assurance on Base Course and Embankment with the Dynamic Cone Penetrometer*  
Nicholas Ferguson, E.I., and Gavin Gautreau, P.E.

#### **Final Report and Technical Summary 657 (18-4P)**

*Cost-Effective Detection and Repair of Moisture Damage in Pavements*  
Mostafa A. Elseifi, Ph.D., P.E.; Nirmal Dhakal, Ph.D.; Hossam Abohamer; Ye Ma; and Zia U.A. Zihan

#### **Final Report and Technical Summary 658 (16-1ST)**

*Retrofit of Existing Statewide Louisiana Safety Walk Bridge Barrier Railing Systems*  
William Williams, P.E.; Wanda Menges; Bill Griffith; William Schroeder; Sana Moran; and Darrell Kuhn

#### **Final Report and Technical Summary 661 (21-1SS)**

*The Impact of the Louisiana Grade Crossings: A Synthesis and System Analysis*  
Guang Tian, Ph.D.; Maryam Izadi; and Bethany Stich, Ph.D.



**VIEW ONLINE**

To download a complete list of LTRC publications, visit the website at [www.ltrc.lsu.edu](http://www.ltrc.lsu.edu).





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