transportation
# TRACKS

North Carolina Local Technical Assistance Program (LTAP) Newsletter **Fall 2020**

## Simple Changes to Roadway Signs can Reduce Wind-Induced Vibrations

*by Center for Transportation Studies, University of Minnesota*


Trailer trucks with rear extensions to reduce wind drag have become increasingly common on the highway. With the success of these truck-trailer tails, engineers wondered if the concept could help solve the problem of wind-induced vibrations of road signs as well.

Typically, roadside structures must feature breakaway mechanisms to reduce potential injuries to drivers and passengers, which means the support structures can't be stiffened. "This makes heavier signs very susceptible to wind-induced vibrations that potentially cause the support structure, and any attached electric signs, to fail prematurely," says Lauren Linderman, an assistant professor in the Department of Civil, Environmental, and Geo- Engineering (CEGE). In addition, the vibrations may make the signage less visible to drivers.

In a recent project, Linderman led a research team that studied the potential impacts of vibrations on large roadway sign panels, using a MnDOT rural intersection conflict warning sign (RICWS) for analysis. The goal was to understand wind-induced behavior and propose potential sign modifications. MnDOT and the Minnesota Local Road Research Board funded the project.

The researchers focused on two potential modifications. The first modification was the simple removal of the secondary panels behind the flashing yellow lights at the top of the original sign.

"The second idea was motivated by the ability of truck-trailer rear extensions to reduce drag, and involved adding short aerodynamic extensions to the main RICWS panel," says Dominik Schillinger, a CEGE adjunct associate professor on the research team (now a professor at Leibniz University).

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transportation**TRACKS**
Technology Transfer Newsletter

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To test the effectiveness of these modifications, the researchers used a computational fluid dynamics (CFD) approach that has been used successfully to calculate pressure on complex sign configurations due to wind loading or passing vehicles. In the first step of the project, researchers set up their CFD model of the rural intersection conflict warning sign, built a smaller, scaled model of the sign, and tested it in the wind tunnel at the U of M's Saint Anthony Falls Laboratory (SAFL).

In the next step, researchers used the validated CFD model at the field scale to determine the pressure data for the original sign configuration and added it to their mathematical model. Finally, they conducted an analysis to assess the ability of the new sign configurations to improve the sign's aerodynamic properties.

Based on their analysis, researchers concluded that the modifications to the sign structure were effective. The modifications led to significant reductions of wind drag, turbulent kinetic energy in the wake of the sign, and vibrations of the structure.

"We've taken an important first step toward establishing the use of aerodynamic devices for road sign structures," Linderman says.

"With the research findings and results, MnDOT has made the changes to the geometry of RICWS to reduce the wind-induced dragging force and improve the structure in dynamic resisting properties," says Jihshya J. Lin, MnDOT bridge evaluation and fabrication methods engineer. "This benefits MnDOT in RICWS service life and in safety to the public."

The results of this study open up a number of avenues for future work, including optimizing the shape of the rear extensions for different classes of road sign structures and exploring the aerodynamic and vibration response under different wind conditions and directions.

Others on the research team included co-investigators Catherine French (professor) of CEGE and Michele Guala (assistant professor) with the SAFL Hydraulic Lab.

*Reprinted from CTS Catalyst, July 2020"*

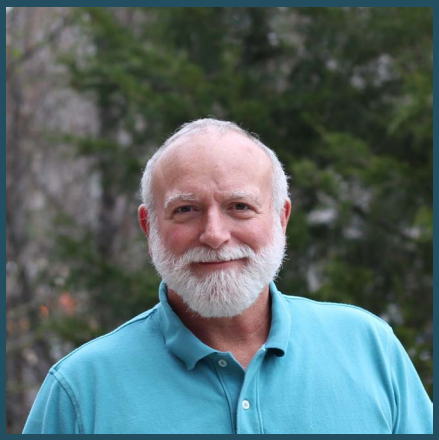
## What's "Wrong" with this Picture?


Do you recognize the man in the orange hat and safety vest on the image to the left?
If you have taken a work zone safety class with ITRE or NC LTAP anytime in the last 26 years, you know who I mean.

You will remember the enthusiasm, energy and expertise that Tim Baughman has brought to work zone safety training.

How many hours has Tim Baughman stood before a classroom and outside in the heat or cold to make sure we take flagging and work zone safety seriously?
What's wrong with this picture is that Tim has retired and we will miss him.

Congratulations to Tim!
We thank you for helping to keep our families, friends and neighbors safer on the highways of North Carolina.



**Congratulations to Tim Baughman!**

# Get Ready for Every Day Counts Round Six

Federal Highway Administrator Nicole R. Nason will launch the next round of Every Day Counts innovations at a webinar on September 23, 2020. Seven innovations will be promoted in the sixth round of Every Day Counts (EDC-6), the State-based program to rapidly deploy processes and technologies to boost the safety and efficiency of the transportation system and keep America moving.

The EDC-6 innovations feature strategies to increase engagement with the people who build and use the transportation infrastructure, products to save money on preserving and repairing bridges and roads, and processes to save time on project delivery and incident management.

FHWA's call for ideas for EDC-6 yielded more than 100 suggestions from local, State, and Federal agencies; academia; and industry. After consulting with the American Association of State Highway and Transportation Officials and other stakeholders, FHWA selected seven proven, market-ready innovations to promote in 2021 and 2022.

This fall, FHWA's Center for Accelerating Innovation (CAI) will hold a virtual summit on the EDC-6 innovations for all transportation stakeholders. Starting in January, EDC-6 deployment teams will provide technical assistance and training to help transportation agencies implement the innovations State Transportation Innovation Councils choose to adopt in their States.

## Crowdsourcing for Advancing Operations

State and local transportation agencies need real-time, high-quality, and wide-ranging information to optimize roadway operations for reduced congestion and increased safety. Agencies are increasing the quality and quantity of operations data with crowdsourcing, which enables staff to make better decisions that lead to safer and more reliable travel and apply proactive strategies cost effectively. With crowdsourced data from multiple streams, agencies can capture in real time what happens between sensors, in rural areas, along arterials, and beyond jurisdictional boundaries. Learn More >

## e-Ticketing and Digital As-Builts

Highway construction projects generate massive amounts of valuable data that historically were communicated via paper, but agencies are improving on paper process by integrating them into electronic and digital workflows. Electronic ticketing improves the tracking, exchange, and archiving of materials tickets. Digital information, such as three-dimensional design models and other metadata, enhances the future usability of as-built plans for operations, maintenance, and asset management. Both can increase project safety, quality, and cost savings through efficient data gathering and sharing. Learn More >

## Next-Generation Traffic Incident Management: Integrating Technology, Data and Training

More than 6 million traffic crashes are reported each year, creating congestion and putting motorists and responders at risk of secondary crashes. Next-generation traffic incident management (NextGen TIM) builds on FHWA's national TIM responder training program to shorten the duration and impact of incidents and improve the safety of motorists, crash victims, and responders. NextGen TIM offers tools, data, and training mechanisms that can benefit both new and existing TIM programs, including local agency and off-interstate applications.
Learn More >

## Strategic Workforce Development

The demand for highway construction, maintenance, and operations workers is growing while the transportation industry is experiencing a revolution of emerging technologies that require new skills. The Highway Construction Workforce Partnership developed strategies and resources to demonstrate the value of a career in transportation and fill the jobs that support the Nation's highway system. Resources include the "Identify, Train, Place" workforce development playbook and Roads to Your Future outreach campaign to attract and retain workers in highway construction jobs. Learn More >

## Targeted Overlay Pavement Solutions

Pavement overlays represent a significant portion of highway infrastructure dollars. Many pavements in the highway system have reached or are nearing the end of their design life while carrying traffic that exceeds their initial design criteria. Targeted overlay pavement solutions (TOPS) are now available for asphalt and concrete pavements that enable agencies to maximize their investment and help ensure safer, longer-lasting roadways. TOPS will improve performance, lessen traffic impacts, and reduce the cost of pavement ownership. Learn More >

*Continues on page 4*

## Transitioning to Online Classes

Your feedback on evaluations is always important to us, but especially when we're trying something new! We're receiving lots of positive responses about the online classes; here are some responses that highlight just a few of them:

On ADA in Temporary Traffic Control, taught by Dr. Ron Eck

"Thought the moderator did an excellent job moving the class along, and used the tools of the virtual training effectively. I love the mid-class surveys to keep us awake, and Q/A interaction."

On Flagger Training, taught by Scott Tison

"Honestly enjoyed this format greatly. I know it may not be the best for everyone but this format with these administrators was extremely beneficial for me. It was especially nice feeling more comfortable asking questions or making comments. I wasn't concerned about being singled out or interrupting the class."

On Fundamentals of Government, taught by Ellis Hankins

"Very informative course regarding Federal and State government operations and relationships."

On Management and Supervisory Skills for Experienced Supervisors, taught by Carolyn Miller

"Using the breakout rooms for the Ugli Orange exercise was a great adaptation for adjusting this to virtual formal."

### Ultra-High Performance Concrete for Bridge Preservation and Repair

Ultra-high performance concrete (UHPC)—a fiber-reinforced, cementitious composite material with mechanical and durability properties that far exceed those of conventional concrete—has become popular for field-cast prefabricated bridge elements. Bridge preservation and repair is a new application of UHPC that offers superior strength, enhanced performance, and improved life-cycle cost over traditional methods. Learn More >

### Virtual Public Involvement

Public engagement during transportation project planning and development helps agencies identify issues and concerns early in the process, which can ultimately accelerate project delivery. Virtual public involvement supports agency efforts to engage the public more effectively by supplementing face-to-face information sharing with technology. Techniques such as telephone town halls, online meetings, and social media increase the number and variety of ways to inform the public, receive feedback, and collect and consider stakeholder input. Learn More >

# Modernizing North Carolina's Infrastructure Through Sustainable and Diversified Revenue Streams 2020 Report

*Prepared by: Steven Bert, M.A., AICP Weston Head, M.S. Nicolas Norboge, Ph.D. Stephen Odom, B.S. Lindsey Dorn, Daniel Findley, Ph.D., P.E.*

In 2015, Diversifying Revenues to Improve Commerce and Economic Prosperity, identified 16 possible options for generating revenue for transportation in North Carolina. At the time of the report release, the long-term viability of the motor fuels tax as a primary funding mechanism for transportation was questioned across the United States and within North Carolina. Vehicle fuel economy improvements, coinciding with substantive real purchasing power losses of the federal motor fuels tax (the federal tax rate has not been adjusted for inflation since 1993), were creating uncertainty about how the motor fuels tax could sustainably finance our transportation system needs. North Carolina's current transportation funding structure has not materially changed since our first report. The Department of Transportation faces historical revenue shortfalls, and important parts of our infrastructure require maintenance to maintain or improve their conditions. Despite some adjustments to our motor fuel tax formula in 2017, the existing revenues are not adequate to maintain, let alone improve, our deteriorating system. North Carolina currently invests approximately $5 billion annually in its transportation system. This investment enables the state to achieve an overall infrastructure rating of mediocre (ASCE, 2017). In this condition, our state is facing serious challenges affecting driver safety and economic productivity.

*Continues on page 6*

## Get The Picture!

*by Scott Tison*

*ITRE Training Specialist*

Here's the situation. Utility work is being done on a Two Lane, Two Way Road. Needing to shut down part of One Lane, the operation becomes a One Lane, Two Way Road. Traffic will need to be alternated by a Flagger on each end. In addition, there are side roads in the vicinity. So, what's wrong with this picture?

If you've been through our Flagger Training, I am hoping that you remember to stand on the shoulder of the road. Your safety, the safety of the crew and that of the motoring public are more important than the job being performed. Additionally, a Stop/Slow paddle shall be octagonal in shape. Look closely and you'll see this flagger chose to use a rounded paddle.

You will also remember that it is crucial to establish an escape route for possible dangerous situations. The Manual on Uniform Traffic Control Devices (MUTCD) states in Section 6E-08 Flagger Stations, Note 3, "The Flagger should identify an escape route that can be used to avoid being struck by an errant vehicle." In this scenario, the Flagger is standing in the middle of the roadway. If an errant vehicle fails to stop or makes a turn from a side road, how does the flagger escape?

If you haven't been through our training, we would like to see you. Again, it is more than legal liability. It is about giving our workers tools for doing their tasks as safely as possible. It is also about keeping your family and my family safe as they traverse our work zones.

If you have any questions about worker's safety or work zone traffic control, give me a call at (919) 515-6949, or you can email me at sitison@ncsu.edu.

## NCTROADS

Subscribe to the NC LTAP listserv. It is free and easy.

Send a message to kbdaviso@ncsu.edu and ask to be added to NCTROADS.

This is an informal network for the exchange of news about current research, discussion of problems and solutions, request for advice and assistance, and announcements of upcoming conferences, events and training opportunities for transportation personnel.

Once you are subscribed, you can send a message all the listserv members at

NCTROADS@lists.ncsu.edu

## Rural Road Safety Webinars

FoRRwD (Focus on Reducing Rural Roadway Departures) has lots of great resources, both recorded webinars and short videos on proven safety countermeasures. Don't forget to check out their new website when you have the time.

https://safety.fhwa.dot.gov/FoRRRwD/resources.cfm

Currently, North Carolina ranks nineteenth in the nation for percentage of interstate bridges that are structurally deficient or in poor condition (TRIP, 2020); it ranks twenty-seventh in commute time (U.S. News, 2018); and the state ranks third in the nation for the net increase in vehicle miles traveled (VMT) on interstate highways from 2000 to 2018 (TRIP, 2020). With that backdrop, the NC Chamber Foundation commissioned this second report to assess:

1. the most viable funding mechanisms and implementation strategies
2. economic impact of infrastructure investment, and
3. the impacts of COVID-19 on driver behavior, transportation revenue, business supply chains, and other considerations.

Our economic analysis demonstrated that highway construction projects lead to immediate positive economic impacts in as few as two years after project completion. One key finding illustrated that the number of businesses within one mile of NC highway projects increased by 73 percent, a rate that is 48 percent higher than the growth of business establishments within one mile of unimproved NC highways. Other studies have shown that the time to make capital investments, such as infrastructure, often has the most value in times of recession (CRS, 2018) with increased spending and job creation.

Summary of Findings

State and local communities quickly realize significant economic benefits after infrastructure investment. From 2001 to 2016, locations within proximity to NC highways experienced a 35 percent increase in employment, 16 percent more than other NC highways that were not improved.

- North Carolina's existing motor fuels tax does not yield sufficient revenue in the current environment of changing driving behaviors and the increased use of fuel efficient vehicles.
- Current and projected future trends in transportation use and innovation require strategic and structural changes to our state's funding mechanisms.
- Revenue diversification is critical to fund necessary transportation operation, maintenance, and modernization projects. Recommendations include:

1. Implement a road user charge program
2. Phase out the motor fuels tax
3. Adjust the highway use tax to a competitive rate
4. Dedicate a fraction of the statewide sales tax to transportation investment

Tor read the full report visit https://ncchamber.com/nc-chamber-foundation-itre-report-modernizing-ncs-infrastructure-through-diversified-sustainable-revenue-streams/

# NC LTAP News & Updates

To update your mail information, add a colleague to the database, or obtain information about Roads Scholar Program fax this sheet to 919-515-3983 or complete online at go.ncsu.edu/ncltapcontactform.

*For more special offers and news,*

*Like us on Facebook and*

*Follow us on Twitter*

**Your Name** _____

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**Check Appropriate Items**

- ☐ Add/Update email information to NCLTAP listserv NCTROADS
- ☐ Send information about Roads Scholar program
- ☐ Send schedule of training opportunities

# NCTROADS Listserv

Subscribe to the NC LTAP listserv. It is free and easy. Send a message to linda_collier@ncsu.edu and ask to be added to NCTROADS.

This is an informal network for the exchange of news about current research, discussion of problems and solutions, request for advice and assistance, and announcements of upcoming conferences, events and training opportunities for transportation personnel. Once you are subscribed, you can send a message all the listserv members at NCTROADS@lists.ncsu.edu

# NC Local Technical Assistance Program 2020 Schedule

**Questions or Email Registration:** kbdaviso@ncsu.edu **For Online Registration:** itre.ncsu.edu/training/ltap-training/

| Date | Class Title | RS/ ARS/ MRS | Cost | Location | To Sign Up |
|---|---|---|---|---|---|
| October 14-16, 2020 | Traffic Calming | ARS | $150 | Online | Click Here |
| October 21, 2020 | Municipal Success in a Coronavirus Environment | | No Cost | Onine | Click Here |
| October 21-23, 2020 | Effective Leadership Skills | MRS | $150 | Online | Click Here |
| October 28-30, 2020 | Traffic Sign Retroreflectivity/Pavement Markings | ARS | $150 | Online | Click Here |
| November 9-10, 2020 | ADA Self Evaluation/Elements of PROWAG | ARS | $150 | Online | Click Here |
| November 12, 2020 | ADA in Temporary Traffic Control | ARS | $100 | Online | Click Here |
| November 16, 2020 | Plan Reading for Transportation Personnel | RS | $100 | Online | Click Here |
| November 17-18, 2020 | Basic Drainage/Roadway Drainage Maintenance | RS | $150 | Online | Click Here |
| November 19, 2020 | Flagger Training | RS | $100 | Online | Click Here |
| December 1-2, 2020 | Asphalt Pavement Maintenance | RS | $150 | Online | Click Here |
| December 7-11, 2020 | Work Zone Traffic Control Supervisor | ARS | $450 | Online | Click Here |
| December 14-15, 2020 | Basic Work Zone Installer | AS | $150 | Online | Click Here |
| December 16-17, 2020 | Intermediate Work Zone Safety | ARS | $150 | Online | Click Here |
| December 16-17, 2020 | Wrok Zone Traffic Control Supervisor RECERTIFICATION | ARS | $175 | Online | Click Here |
| December 18, 2020 | Flagger Training | RS | $100 | Online | Coming Soon |

## LTAP Links on the Web

### Transportation Information at your fingertips!

| | |
|---|---|
| NC LTAP | https://itre.ncsu.edu/focus/ltap/ |
| National LTAP/TTAP | http://www.nltapa.org/ |
| NC Department of Transportation (NCDOT) | https://www.ncdot.gov/ |
| Rural Road Safety Center | https://ruralsafetycenter.org/ |
| Federal Highway Administration (FHWA) | https://www.fhwa.dot.gov/ |
| US Department of Transportation (USDOT) | https://www.transportation.gov/ |
| UNC School of Government | https://www.sog.unc.edu/ |
| Institute of Transportation Engineers | http://www.ite.org/ |
| NC Section of ITE (NCSITE) | http://ncsite.org/ |
| APWA - NC Chapter | http://northcarolina.apwa.net/ |
| NLTAPA Tailgate Talks | https://nltapa.org/information-exchange/nltapa-tailgate-talks/ |

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