



# RESEARCH INFORMER

— SPRING 2021 —

*A Newsletter by the Arkansas Department of Transportation Research*

## Congratulations ARDOT on Perpetual Pavement Awards for Eight Consecutive Years

BY SANGHYUN CHUN, PH.D., E.I.

**T**he term perpetual pavement refers to the long-lasting structural design, construction, and maintenance of flexible pavements. The perpetual pavement strategy is to design a thick asphalt layer with multiple sub-layers of varying stiffness levels that provide long-term durability (at least 50 years) with no major structural rehabilitation or reconstruction. In this system, the surface layer, which is most severely impacted by traffic and the environment, only needs to be renewed with a new surface layer in response to distresses. The primary benefit of perpetual pavement is to provide long-term structural and functional soundness in conjunction with cost-effectiveness for pavement systems.

The Asphalt Pavement Alliance (APA)

has been granting Perpetual Pavement Awards (PPA) around the United States (US), recognizing the exemplary long-life flexible pavements for their outstanding design, construction, maintenance, and performance. The PPA recognizes state agencies and other owners of perpetual pavement projects at least 35 years old. According to the APA, since 2001, the PPA program has recognized 144 long-life pavements in 36 US states and 1 Canadian province. The age range of winning pavements varies from 35 years to 99 years, and the average age is 45.4 years at the time of the award. The winning agencies are honored by their local state asphalt pavement association in the annual conference. The winning agencies and pavement projects' names are recorded on a permanent display at the National Center for Asphalt Technology (NCAT) Research Center

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## Implementing UAS LiDAR into Bridge Projects

BY ROSS PHILLIPS, E.I.

**U**nmanned aircraft systems (UAS) and light detection and ranging (LiDAR) technologies have emerged in recent years, taking the transportation industry and many others by storm. These technologies have firmly established their essential role within these sectors, and at this point, it's hard to imagine a future without them going forward. The combination of UAS and LiDAR makes it possible to collect vast quantities of data that would be nearly impossible to obtain through traditional methods. Even with the respective drawbacks to these two technologies, they have completely revolutionized the field of surveying and mapping. Because of this, the Arkansas Department of Transportation (ARDOT), as well as many other state DOTs are looking to adopt and implement UAS LiDAR into their standard operations.

One way to test the waters before full-scale implementation is to start on small area projects, where many of the issues can be anticipated, and most, if not all, variables can be identified. TRC2106 Applying UAS LiDAR for Developing Small Project Terrain Models is the research project looking to do just that. The research team will coordinate with the Department to identify four project sites, such as bridge replacements, to obtain ground elevations in vegetated areas. With conventional methods, this can be difficult and especially time-consuming. Data is typically gathered during leaf-off conditions, making it much easier for lasers from the LiDAR unit to penetrate the trees and brush, allowing for clear returns from ground elevations. Once processed, this data provides an exact 3D map of the surveyed environment with a vertical accuracy of 0.3'.

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## Spotlight On T<sup>2</sup>



### TRAINING UPDATE DURING SOCIAL DISTANCING

BY LAURA D. CARTER

**W**hile practicing social distancing, The Arkansas Technology Transfer (T2) Program hosted several training sessions from infrastructure maintenance to road safety through various webinars. Training included Asphalt 101 - Materials and Mixes; Asphalt Maintenance - Potholes and Cracks; Asphalt Maintenance - Treatment Options; and Pavement

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Management - Budgets and Strategies. These webinars covered pavement maintenance techniques, best practices for various pothole-patching methods, and other practices that will benefit the conditions of our roadways. Dr. Stacy Williams, the Director of the Center for Training Transportation Professionals (CTTP) at the University of Arkansas, was the instructor for these sessions.

The Defensive Driving Virtual Training was conducted by Robert Bennett of Thompson Defensive Driving. This training included safe driving practices, roadway signage, intersection safety, pedestrian safety, and motorcycle safety. It also covered the dangers of aggressive and distracted driving and the dangers of driving under the influence of various substances.

Our Work Zone/Flagger Awareness webinar was launched on January 10, 2021, providing training that will help to keep the workers, equipment, and traveling public safe. It also included safety measures for short-term and long-term work zone traffic controls, standard signage, pavement marking applications, and flagging operations. The Manual on Uniform Traffic Control Devices (MUTCD) was used as guidance for this safety training. Ross Maestas, Workforce Development Coordinator at the Arkansas Department of Transportation (ArDOT) was the instructor for this training. Ross also provides this and other training to ArDOT road crews.

Training through this program remains free to class participants. To view the list of upcoming webinars, available training, class calendar, class descriptions, or request a class for your local agency, visit the CTTP website at [www.cttp.org/ardot/t2](http://www.cttp.org/ardot/t2).

For additional information regarding the Arkansas Technology Transfer Program, contact Laura D. Carter, T2 Program Manager at [Laura.Carter@ardot.gov](mailto:Laura.Carter@ardot.gov).

## ...PERPETUAL PAVEMENT AWARDS, PART 2

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at Auburn University.

The Arkansas Department of Transportation (ArDOT) has been named one of the PPA winners for eight consecutive years from 2012 to 2019, and the winners for 2020 will be announced in the first quarter of 2021. ArDOT received the 2019 PPA at the Arkansas Asphalt Pavement Association (AAPA) 2021 Virtual Quality Asphalt Paving Conference held

January 6-7, 2021. Congratulations ArDOT, on eight consecutive years of recognition of well-performing long-life transportation infrastructure success, including excellence in design, construction, maintenance, and public value. ArDOT will continue to work on providing the best State Highway System to fulfill the public's expectations and promote safety.

### Perpetual Pavement Awards for ArDOT (2012-2019)

Awarded	Project	Constructed
2019	US 79 Section 10 in Jefferson County	1962
2018	HWY 92 Section 1 in Conway County	1981
2017	SH 24 Section 6 in Ouachita County	1972
2016	US Route 167 Section 19 in Sharp County	1955
2015	US 62 Section 5 in Carrol County	1971
2014	US 71 in Sevier County	1939
2013	US 425 in Lincoln County	1966
2012	US 82 Section 2 in Lafayette County	1969

## IMPLEMENTING UAS LIDAR INTO BRIDGE PROJECTS

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The sites chosen will include various conditions to best represent what would most commonly be found on many ArDOT construction projects. This variety will demonstrate the technology's usefulness in producing key deliverables for other projects. The data collected will be compared to other techniques, helicopter LiDAR when available, and others like photogrammetry to establish which techniques provide the best cost and accuracy. After the collection and comparison of the data, standard practices and

procedures will be produced, creating a guideline for ArDOT or other contracted data collectors in the future. The research team will use a Phoenix LiDAR system mounted onto a DJI Matrice 600 Pro to collect data. Flight times vary depending on many different factors, but a typical flight will run about 15-20 minutes, and as many as 40 acres can be surveyed in that time. Assuming one has several replacement batteries ready to go, a lot of ground can be covered in a typical workday. With the project underway, test flights have already begun, and the returned data looks promising so far. To reiterate, the best data is captured in the winter months during leaf-off conditions, and with spring fast approaching it may be some time before the research team's UAS takes to the air again. Having said that, this project is definitely one to keep an eye on as it promises to yield valuable data and drive future projects in the coming years.



# The FHWA is Seeking Comments on Proposed Changes to the MUTCD

BY KIM ROMANO, P.E.

For the first time since 2009, the Manual on Uniform Traffic Control Devices (MUTCD) is being revised. Over 100 significant changes are underway, with over 600 total changes. The Federal Highway Administration (FHWA), through the Federal Register, issued the notice of proposed changes on December 14, 2020. The March 15, 2021 deadline for comments was extended to May 14. There is a lot to digest: over 780 pages of marked-up text, figures, revisions, and new material, in addition to the 80 plus summary pages in the Federal Register.

Amendments to the MUTCD are a big deal. They rarely happen, and except to traffic nerds, the FHWA's Notice of Proposed Amendments could have easily gone unnoticed in the backdrop of current events. Given advances in vehicle automation, Toward Zero Deaths safety campaigns, micro-mobility (think new ways to travel that first and last mile), and endless transportation innovations becoming commonplace, updates to the MUTCD have been anxiously anticipated and much needed. The MUTCD website, with what's old, new, and changing, can be found at <https://mutcd.fhwa.dot.gov/index.htm>.

What are some of the proposed changes for the 11th Edition of the MUTCD? Alternative vehicle pavement treatments such as green boxes for bicycles and standardized sharrow markings, and adoption of rules for using flashing yellow arrows, to name a few things. Let's face it, changes are here to stay. The National Committee on Uniform Traffic Control Devices (NUTC), the regulatory committee for the MUTCD, have their job cut out for them. Rules for testing new ideas,

research, or experimentations, are included on the MUTCD website.

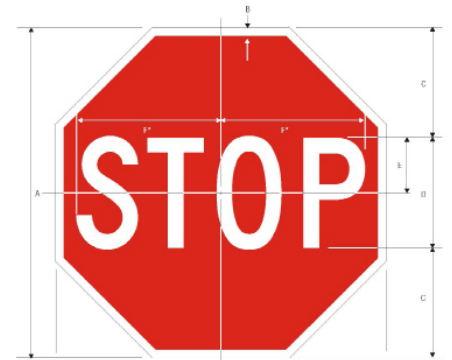
Why is it important to review and comment on the MUTCD? The MUTCD is consulted daily by ARDOT staff: whether designing signing and striping plans, determining traffic signal warrants, considering construction work zones, or choosing bicycle lane markings. Designers, traffic engineers, maintenance staff, researchers, contractors, and the traveling public all rely on uniform and easy-to-understand symbols that quickly convey information. So you see, it is a big deal when the MUTCD changes.

ARDOT has typically commented in concert with the American Association of State Highway and Transportation Officials (AASHTO) and outright adopts the MUTCD as published. Other States may have addendums or even publish their own version, with the MUTCD setting minimum standards. At the end of the comment period, FHWA has about a year to revise and publish the document. After that, States have two years to adopt the MUTCD. A flowchart summarizing the process can be found on the MUTCD website. Implementing the recommended changes to the transportation network is usually linked to asset management and maintenance needs.

For Department employees that may have a comment, please work with your supervisor. The Governmental Relations Office organizes the Department's responses.

People's daily lives are significantly impacted by the MUTCD, one of many guiding documents utilized to design our transportation network. One example is something that we take for granted – Stop signs.

Why do Stop (R1-1) signs look the same no



matter where you are? The answer is the MUTCD. The colors, letter height, font, and dimensions are all meticulously specified. Nothing is left to chance. It's the same with traffic signals: each color, each arrow, and each timing sequence has a well-planned and specific reason and meaning. Should any element become non-uniform, trouble could follow in the form of confusion, near misses, or actual crashes. 🚘

For more information see the following links:

Rules for testing new ideas, research, or experimentations: <https://mutcd.fhwa.dot.gov/condexper.htm>

An Advocate's Guide to Commenting on the Draft MUTCD: <http://www.kostelecplanning.com/an-advocates-guide-to-commenting-on-the-draft-mutcd-part-i/>

MUTCD Amendment Process Flowchart: <https://mutcd.fhwa.dot.gov/amenflowchrt.htm>

Tidbits and trivia on Stop signs: <https://www.allstate.com/blog/history-stop-signs/>

More on signal timing history and trends: <https://www.idrivesafely.com/defensive-driving/trending/history-and-meaning-colored-traffic-lights>

## Workplace Safety Travel Tips

BY LAURA D. CARTER

**Below are safety tips that can help our workers return home safely from each workday assignment.**

- Notify supervisor of travel plans.
- Notify supervisor of changes to travel plans.
- Document travel plans on a shared calendar.
- Log contact person, phone number, date and estimated time of arrival at your destination.
- Text someone when you leave and arrive at your destination. (Same for the return trip.)
- Be alert and avoid compromising situations.
- Be aware of shorter daylight hours and weather changes.
- Notify someone when something looks suspicious.
- Take a quick snapshot of surroundings or locations when needed.
- Make safe rest area stops.
- Immediately inform your supervisor of any emergencies, for example, illness or needed auto services, like a tire repair.
- Add a family/friend locator app to your phone to connect you with a trusted family member or friend.
- Drive safely and if needed, pull off the road at a safe location.

# Best Practices to Avoid a Tractor Mower Roll-Over

BY ROSS MAESTAS

A few years ago, an ARDOT employee mowing the right-of-way of a well-traveled and familiar two-lane highway in a rural part of the state rolled a tractor mower on its side. The slope was not steep, and the height was no more than 4 feet in this particular area. The employee had been with the Department for three years and was the owner-operator of a part-time mowing business, so, needless to say, he had adequate experience. The accident description states, "While mowing, the tractor fell off in a rut and laid over."

The culprit being a rut highlights that even the most seasoned operator on familiar and seemingly even ground can be involved in a tractor mower roll-over accident. Thankfully the operator was not injured, but the damage was costly. That is why it is important to be aware of hazardous conditions and know what to do to avoid an accident.

- **DO NOT** mow slopes greater than 3:1 or an area deemed too uneven. Use another resource for cutting vegetation in the area.
- If possible, walk the area prior to mowing.
- Select a lower gear and travel speed on slopes. The operator needs time to see and react to hazardous situations.
- Watch for signs of erosion, such as holes, ditches, and undermines. These may be covered by grass and debris.
- Drive up and down slopes, not across.
- Do not stop or disengage the clutch when going up or down slopes.
- Use extreme caution around hidden culverts, ditches, and objects such as trees and road signs.
- Cross a ditch at approximately a 45 degree angle with only one tractor wheel in the ditch at a time.
- When it is necessary to operate riding mowers near ponds, creeks, reservoirs, canals, sloughs, lakes, golf course water hazards, and similar bodies of water, evaluate the terrain and any slope conditions. Establish a safety zone to ensure that the mower is operated at a safe distance from such hazards.

Operators should be familiar with the conditions of the terrain on which their mowers are being used. By following the above guidelines, roll-overs, injuries, and equipment damage can be avoided. ❌



# Arkansas Roadways and Human Trafficking

BY LAURA D. CARTER



Model: Monica Debro  
Image: Casey Perry

During this season of COVID, our roadways are used daily to transport goods and services throughout our state. They are also increasingly being used as connectors for human trafficking activities. Sadly, with social distancing, individuals are being separated from co-workers, family, peers, teachers, and various community services. This separation can make individuals vulnerable to mental, moral, spiritual, and physical abuse, resulting in mental and emotional instability which can lead to depression and suicide.

While individuals are spending more time on their computers, they are also spending more time alone, increasing opportunities for predators to connect with them and lure them out of their homes into a life of human trafficking and darkness. As a society, this causes additional concerns because predators are manipulative and gain access to others through social media. They use enticing words to engage the victim and convince them to have a face-to-face meeting.

According to the National Human Trafficking Hotline, human trafficking is increasing yearly. Arkansas had 300 reported cases of human trafficking from 2015 to 2019, mostly women and children. Truck stops along our interstates are among the hotspots for luring and conducting illegal business in this growing industry. We should all maintain awareness and contact law officials when we suspect any unlawful activities. We could be the last chance of hope for a victim. The National Human Trafficking Hotline can be reached at 1-888-373-7888 or by text at 233-733. Additional safety tips are available at <http://humantraffickinghotline.org>, including potential red flags for human trafficking situations and online safety guidance. ❌



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