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Evaluating driver behavior at rural stop-controlled intersections

Nicole Oneyear, a research engineer at InTrans, recently led an Iowa LTAP webinar that discussed the results of a study that evaluated driver behavior at rural stop-controlled intersections using the Second Strategic Highway Research Program (SHRP2) Naturalistic Driving Study (NDS).

But why this type of intersection? According to Oneyear, stop-controlled intersections make up approximately 30% of all crashes in rural areas. They also make up about 6% of all fatal crashes. One reason for such a high fatality rate is because of higher-than-average speeds (often 1.6x to 2x faster).

“Because of the higher speeds, when there is a crash, the crash is going to be more severe,” said Oneyear.

The goal was to use the SHRP2 NDS data to identify intersection or roadway characteristics that correlated to more risky behaviors to allow agencies to better target resources to address those issues.

The researchers first looked at the literature to identify rural intersection crash *causes* and found a few likely reasons: (1) inappropriate gap selection; (2) failure to stop on minor approach; and (3) various roadway characteristics (e.g., curves, offset intersection, lack of turn lanes, and intersection configuration).

“Drivers often take too small of a gap while leaving the intersection and then run into another vehicle,” said Oneyear. She notes that a study out of Minnesota found that about 56% of all right-angle crashes at rural Minnesota stop-controlled intersections were due to inappropriate gap selection.

The data used in this study—the SHRP2 NDS—were originally completed from 2011 to 2014. Drivers' cars were instrumented with equipment to capture data as they drive. There were approximately 3,100 drivers of all genders and ages. It includes about 4,000 data years, including 5 million trip files and 30 million data miles in six states (Florida, Indiana, New York, North Carolina, Pennsylvania, and Washington).

“We decided to use the NDS data as opposed to other available data—like crash data, which only tells you what happened based on what was included in the crash report or crash narrative. So, you don't get some of that bias from what the officer *may* have captured and what the crash participants *said* happened. We wanted to capture what drivers were actually doing in their vehicles.”

Analyses for this study included driver reaction points, stopping behaviors, and safety critical events (SCEs) for approximately 219 intersections (a total of 7,470 traces).

Driver behavior continued on page 3



A rural stop-controlled intersection, left, and sample safety treatment employed at those locations, right

Acronyms and Abbreviations in *Technology News*

AASHTO	American Association of State Highway and Transportation Officials
APWA	American Public Works Association
FHWA	Federal Highway Administration
ICEA	Iowa County Engineers Association
IHRB	Iowa Highway Research Board
InTrans	Institute for Transportation (at ISU)
Iowa DOT	Iowa Department of Transportation
ISU	Iowa State University
LTAP	Local Technical Assistance Program
MUTCD	Manual on Uniform Traffic Control Devices
NACE	National Association of County Engineers
TRB	Transportation Research Board

About LTAP

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From the Director: Within resilience is...?

At a recent regional meeting of LTAPs, each state was asked to speak about what had occurred at its center since we all had last met three years ago. Not surprisingly, many LTAPs have experienced significant changes in their staffing and/or operations. In addition, this period has had an impact on the well-being of everyone, including those doing this job.

My presentation about Iowa described the winding path, with some switchbacks, of the decision-making and actions we have taken since that fateful Friday afternoon on March 13, 2020 and concluded with adjustments made in response to the unprecedented demand we have seen this spring for our services. In particular, my presentation focused on the flexibility and understanding that was needed by both the Iowa LTAP staff and our customers to address the need.

But it was really two gut observations I mentioned to this group of LTAPs that have attached to and stayed with me. What came forth, without prompting or shame, was that “constant change is exhausting” and “resilience is not unlimited.” I suspect, no matter the audience, that most would agree with these statements. And, most certainly, the last couple of years has tested our resilience and in most cases required us to “refill the tank” time and time again.

So, where does this come from? What is within resilience? Could it be hope? Both conditional hope, one related to circumstances, which is really important, but also unconditional hope, which requires letting go of that. Unconditional

hope is particularly important at times when what is over the horizon is unseen and unknown. A letting-go of logic to embrace the larger hope inherent within all of us. The one that may sometimes be forgotten. As Tom Hanks says near the end of “Cast Away” when he is talking about his relationship with hope on the island, “And one day my logic was proven all wrong, because the tide came in and gave me a sail.” So maybe the question is not “What is within resilience?” but “When and where is resilience?” Now and within? Perhaps. I’ll leave it there, for consideration, at a future discussion of “un-Google-able” discovery.

Iowa LTAP just recently finished up with the 2022 Motor Grader Operator (MoGO) training we do. After decades of taking one approach, we tried something different with the MoGO field days this year and believe it was pretty successful. Please let us know if you hear anything from your staff. We also just completed the Local Agency Bridge Innovation and Demonstration Days event and had good attendance. Coming up are the ICEA Mid-Year Conference, and registration will soon be open for the Streets and Roads Workshop and Conference. Please also keep an eye out for our Build a Better Mousetrap winner announcement and advertisements of our fall safety series. The biweekly newsletter and webinars will also restart in some manner this fall.

Peace,
Keith ■




Driver behavior continued from page 1

For the first analysis, a lineal mixed effect (LME) model was developed to determine most relevant variables related to driver reaction points. Signification results included the following: (1) the reaction point varied by state (23 to 51m) and (2) drivers reacted earlier (38 to 64m) when on pavement signing was present. Also, (3) drivers turning right reacted later than left turning and through vehicles.

For stopping behaviors, the researchers looked at three different stopping types: full, rolling, and no-stop. This analysis included 128 unique drivers on 81 unique approaches at 58 intersections. It was found that vehicles on major approach were 2.22x more likely to perform a full/rolling stop and speeding drivers (5 mph or more) upstream were 2.1x more likely to not stop.

“This isn’t surprising,” said Oneyear. “People who make riskier decisions when it comes to their speed are more likely to make riskier decisions with their stopping behavior.”

For t-intersections (87 unique intersections with 157 unique drivers), the researchers found that if a vehicle was on the major

approach, a full/rolling stop was 55.53x more likely. If lighting was present, a full/rolling stop was 2.32x more likely. Additionally, speeding upstream made a no-stop 2.23x more likely.

And for all-way stops (46 unique intersections with 276 unique drivers), the researchers found that a driver on another approach made a full/rolling stop 7.60x more likely and speeding drivers (10 mph or more) resulted in making a no-stop 1.85x more likely.

“Additionally, we did find that drivers who divert their attention away from the roadway multiple times are more likely to not stop.”

In looking at SCEs, the researchers identified 38 in the NDS data (i.e., crashes, near crashes, and crash-relevant events).

Some major SCE findings included the following: (1) More likely to have a no-stop, (2) 1.52x more likely to be distracted with 5 sec of intersection for major approach vehicles, and (3) 3.56x more likely to be distracted within 5 sec of intersection on minor approach.

Overall, the study did find that some behaviors, characteristics, and countermeasures were found to impact rural intersection safety more than others. For example, on-pavement signing tended to improve reaction time (30–64 m), beacons improved stopping behavior at all-way stops, and lighting increased the probability of coming to a full or rolling stop at t-intersections.

“We found that increasing that awareness of the intersection, especially at night, did make an impact,” said Oneyear.

This project was sponsored by the FHWA. To watch the Iowa LTAP webinar on this topic, visit <https://vimeo.com/698239520/90ca38ec19>. The published report is not yet available; however, a similar report about transverse rumble strips at rural stop-controlled intersections is available on the InTrans website at <https://intrans.iastate.edu/research/completed/iowa-dot-synthesis-of-transverse-rumble-strips-at-rural-stop-controlled-intersections/>.

Article written by Brandy Haenlein, a communication specialist with InTrans. ■

Revamped statewide project management system improves efficiency of county transportation projects

The Iowa Transportation Program Management System (TPMS) has been in use since 2001, allowing cities and counties across the state to manage construction projects using a shared system that all stakeholders can access.

The system contains details on thousands of active and completed projects and is designed to allow users from Iowa’s cities and counties, as well as those from state and federal transportation authorities and private businesses, to work together on shared projects. But after roughly 20 years, as technology has vastly improved and the way people work has evolved, it was clear the system needed an overhaul.

To create a modern program that works for everyone involved, a team from the ICEA

Service Bureau (ICEASB), which maintains the TPMS, crisscrossed the state over several years to consult with thousands of users. With input collected from designers, contractors, builders, project managers, and others, the ICEASB unveiled TPMS 2020 in July 2021.

New and improved features include real-time updates to ensure data is current, greater security against modern threats, additional automation of routine tasks, a more user-friendly interface, and a modular framework to make future updates easier.

The final TPMS 2020 product is housed and maintained by the ICEASB, with access to all authorized users through a secure user interface, and accommodates “real-time” secure application programming interface

(API) data exchange with the DOT’s Program and Project Management System (PPMS) software application.

“By streamlining processes, we minimize the costs, delays, and time required for Iowa’s 99 counties to do business. As a result, we’ll have more money to put into construction rather than administration and development,” ICEASB Executive Director Danny Waid said.

Learn more about this project in the Iowa DOT’s research brief here: <http://publications.iowa.gov/39913/> and the full final report here: <http://publications.iowa.gov/37620/>.

Article from the Iowa DOT, adapted with permission. ■

Iowa LTAP Mission

To foster a safe, efficient, and environmentally sound transportation system by improving skills and knowledge of local transportation providers through training, technical assistance, and technology transfer, thus improving the quality of life for Iowans.

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Iowa LTAP events in full swing this spring

The Iowa LTAP had a busy spring, holding events throughout the state and continuing its biweekly webinar series.

Staff saw a 10 percent increase in attendance at events from 2020 to 2021—presumably due to a lack of in-person training in 2020 as well as ongoing staff turnover—and the increase is expected to be even larger in 2022.

As one example, the Work Zone Safety and Flagger training had more than 1,400 attendees so far this year, when 700 is the typical annual attendance at these events.

Some of the events held this spring include the annual County Engineers Research Focus

Group and the Motor Grader Operator Training. The latter event added a successful “field days” event this year, allowing new operators to get first-hand experience in a motor grader blading a gravel road that was closed to the public.

The number of Iowa LTAP events will decrease this summer as city and county staff field work picks up, but check out the upcoming offerings on page 7 and stay up to date with events this fall by checking out the Current Registrations page at <https://iowaltap.iastate.edu/events/>. ■



Halil Ceylan, director of the Program for Sustainable Pavement Engineering and Research, discusses his recent research projects during the annual County Engineers Research Focus Group



Chris Archer of Pocahontas County, left, and Kary Obman of Sac County, right, lead the Motor Grader Operator Workshop in Ames on June 1, 2022



Wyatt Nelson, left, from Murphy Equipment, demonstrates how to access the motor grader's engine compartment as part of the pre-trip inspection process at the MoGO Field Days on-site training in Ames



Kary Obman, left, of Sac County leads an on-site training on motor grader operation during the MoGO Field Days in Ames

In brief: Lasting LTAP impacts

During 2019 and 2020, one of the targeted safety areas of the Governor’s Traffic Safety Bureau (GTSB) was pedestrians, specifically addressing vehicle-pedestrian crashes. As part of a larger series of statewide projects being conducted at the time, the GTSB sought to also include a pedestrian road safety assessment (RSA). Fast forward to 2021, after COVID-related delays, the RSA was finally conducted on a corridor in the City of Cedar Rapids.

The purpose of the assessment would be to identify pedestrian-related safety issues and potential countermeasures to address them. This initial RSA would serve, in part, as a demonstration of pedestrian safety assessments for other Iowa cities. This assessment was completed by a team from the GTSB, Iowa DOT, FHWA, and Iowa LTAP, which includes David Veneziano—the Safety Circuit Rider.

The assessment corridor is located approximately one-half mile northeast of downtown Cedar Rapids in the vicinity of Coe College. This portion of 1st Avenue Northeast (NE) includes a residential area where residents are crossing the roadway to reach a nearby grocery store and bus stop.

“This stretch was chosen because we see steady foot traffic crossing the five-lane road at locations other than marked crosswalks,” said Sergeant Graham Campshure of the Cedar Rapids Police Department. “There are numerous marked crosswalks with traffic signals pedestrians can use to cross safely but choose not to. I hope the work from this assessment will be used to increase pedestrian safety along this stretch of 1st Ave in Cedar Rapids.”

The RSA began with a review of current field conditions, where the team progressed along the corridor, stopping at each intersection (on a block-by-block basis) to examine individual features (i.e., pedestrian-related infrastructure) and observe pedestrian behaviors. In general, the corridor could be described as flat, with moderate traffic



Pedestrian crossing prohibition between 15th and 16th streets



1st Avenue and College Drive crosswalk east leg (looking south)



Mid-block grass patch worn by frequent pedestrian use between 15th and 16th streets



Uneven sidewalk surface at southwest corner of 1st Avenue and 15th Street intersection

traveling at or near the posted speed limit (35 mph). The corridor is populated by mostly commercial businesses, with some residential apartments.

Afterward, based on site observations, several suggested improvements were identified for later consideration by the city. They are not all inclusive and range between low, moderate, and high cost, and some may be done in the short versus long term. The team made a series of recommendations based on each corridor segment (as well as overall improvements).

For example, on one particular section of 1st Avenue NE, the team observed that the crosswalk markings were dull and could be repainted, or high visibility markings could be considered instead. Additionally, because of a bus stop along the assessment corridor, the team suggested that bus shelters could be expanded, or bus pull-out lanes be considered.

Corridor-wide recommendations included lowering the speed limit through the corridor if pedestrian behavior continued to include predominately midblock crossings. Additionally, the corridor had limited pedestrian warning signage, and adding these, along with things like overhead lighting, could help bring attention to possible foot traffic in the roadway.

The suggestions that came from this RSA will need further evaluation from city staff based on crash data and operational observations. However, the results from this initial pedestrian RSA will help shape how similar efforts are conducted throughout the state.

If your agency is interested in having an RSA conducted for any roadway location, or you have additional questions, please contact David Veneziano at 515-294-5480 or dvenez@iastate.edu. Iowa LTAP RSAs are always conducted for free, thanks to Iowa DOT Traffic and Safety Bureau funding, in an effort to assist our local agencies in maintaining safe and efficient roadways. Don't forget to continue sharing your impact stories with us!

Article written by Brandy Haenlein, a communication specialist with InTrans. ■

CP Tech Center publishes *Guide to Concrete Overlays of Asphalt Parking Lots*

Many important factors considered for concrete overlays of asphalt pavements apply to overlays placed on both roadways and parking lots. However, some characteristics and considerations unique to parking lot overlays affect their design and construction—including fixed elevation points, traffic types and levels, and future changes in usage.

To address these types of overlay applications, the National Concrete Pavement Technology Center (CP Tech Center) recently published the second edition of its *Guide to Concrete Overlays of Asphalt Parking Lots*, a companion document to the fourth edition of the *Guide to Concrete Overlays* released last year.

The guide provides information for decision-makers and practitioners about selecting, designing, and constructing successful concrete overlays on existing asphalt parking lot pavements that serve public, commercial, or multifamily residential buildings.

“Parking lot owners stand to benefit from the proactive, sustainable, long-lasting, and economical strategies for pavement preservation and rehabilitation that concrete overlays represent,” said Gordon Smith, CP Tech Center associate director and lead author of the guide. “With a properly designed and constructed concrete overlay, a distressed or poorly performing asphalt parking lot can be converted into a durable, low-maintenance, and long-life parking structure.”

The updated material in the second edition of the guide reflects advances in technology and research, offers a simplified approach to assessing existing pavements, includes modifications to the material on design and construction based on lessons learned, and presents project profiles demonstrating the principles of the guide.



Active concrete pavement construction site on a parking lot showing several crew members working on various stages of the concrete overlay paving operation (City of Thornton, Colorado)



Placement using a laser-guided screed, with the screed on the left and the texturing and curing equipment on the right (Michael Hoeft, K & M Concrete Construction, Inc.)

Though the guide focuses on parking areas that carry and store light vehicles (primarily automobiles and pickup trucks), it also addresses adjacent access roads and truck lanes that regularly carry heavy trucks for the delivery and pickup of goods and materials, including solid waste containers.

“This document offers expert guidance to supplement practitioners’ own professional experience and judgment,” said Jerod Gross, Snyder & Associates, Inc. project manager and an author of the guide. “With this information, parking lot owners can confidently include concrete overlays in their toolbox of asphalt parking lot maintenance solutions and make informed decisions about overlay design and construction based on existing asphalt conditions.”

The guide update was sponsored by the Ready Mixed Concrete Research & Education Foundation, and the National Ready Mixed Concrete Association (NRMCA) aided the authors in identifying necessary updates based on advancements in technology as well as relevant research.

The updated *Guide to Concrete Overlays of Asphalt Parking Lots* and the fourth edition of the *Guide to Concrete Overlays* are both available, along with other documents related to concrete overlays, at <https://cptechcenter.org/>. ■

Workshop and conference calendar

[Information current as of June 21, 2022] Iowa LTAP's biweekly webinars are on hiatus during the summer (June–August). Iowa LTAP will continue to hold in-person events and trainings and is expected to resume virtual efforts this fall.

For the most up-to-date information about in-person attendance requirements and future virtual events, please check regularly at <https://iowaltap.iastate.edu/events/> and consider subscribing to our mail list at <https://iowaltap.iastate.edu/> for email updates.

2022	Event Name	Location	Contact
July			
14	ICEA Mid-Year Conference	Ames	Keith Knapp
August			
23–26	ICEA Affiliate Meeting at ISAC Annual Conference	Des Moines	Keith Knapp
September			
14–15	Mid-Continent Transportation Research Symposium	Ames	Judy Thomas
20–22	Iowa Streets and Roads Workshop and Conference	Ames	Keith Knapp
28–29	MINK Conference	St. Joseph, MO	David Veneziano

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Event details and online registration

Watch for details and online registration information, by specific dates and events, on the Iowa LTAP Workshops page, iowaltap.iastate.edu/workshops/. ■

Low Volume Roads Conference: Save the date and call for papers



The 13th TRB International Conference on Low Volume Roads is now little more than a year away.

The event will be held July 23–26, 2023 in Cedar Rapids. The conference is convened by the Transportation Research Board and is a global forum to examine new technologies and new techniques in planning, design, construction, operation, maintenance, and administration of low-volume roads.

A call for papers covering any relevant topic related to low volume roads—both research-level and practical papers and extended abstracts/synopses—opened in April. The deadline to submit is September 9, 2022.

Additionally, new details about the field trip to see low-volume road bridge and pavement innovations in Linn and Johnson counties have been announced. The half-day tour is being organized by the ICEA and so far includes stops to see five different innovations.

Along with the tour, the event will feature workshops, plenary sessions, break-out lectern sessions, poster sessions, and exhibits.

The conference has been held every four years since 1975 and was last held in Cedar Rapids in 1979, for the 2nd International Low Volume Roads Conference. The event typically draws between 200 and 300 practitioners and researchers from more than 20 countries.

Additional details about the event, the paper submission process, and a more detailed draft agenda are available here: <https://trb.secure-platform.com/a/page/lowvolumeroads>. Mark your calendars today. ■

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