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### Iowa Local Technical Assistance Program

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IOWA STATE UNIVERSITY  
Institute for Transportation

## Work Zone Safety Sign Package Program winners

### About

Small city budgets for this type of work can sometimes lead to diminished funding for temporary traffic control devices and the use of signs, barricades, cones, and vests that are deteriorated and may be out of compliance with the 2009 MUTCD. That is why this Iowa DOT-funded program provides an opportunity for operations personnel from smaller cities in Iowa to improve their work zone safety and setups when conducting routine street maintenance. Participants are from cities with a population of less than 10,000 residents.

The program has grown from 10 applications in 2017, the initial year of the project, to 95 applications in 2020–2021.

### Winners

A total of 12 cities from across Iowa were chosen as winners, each receiving a package that included \$2,500–3,000 worth of signs, vests, and materials. The cities include:

- Mingo
- Mitchellville
- Mondamin
- Northwood
- Hopkinton
- Windsor Heights
- Lawton
- West Point
- Toledo
- Gowrie
- Stockport
- Lenox

“We are so excited to give awards to 12 cities this year. With the ever-growing demands on

the roads, streets, and bridges of Iowa, our goal is to make sure cities have everything they need to make their work zones safer,” said Paul Albritton, the Iowa LTAP Technical Training Coordinator and co-organizer of the program.

Each package included the following materials, which were of the correct type and size for lower speed city street work. And all of the devices included high intensity retro-reflective sheeting suitable for nighttime use.

- One Lane Road Ahead signs
- Road Work Ahead signs
- Be Prepared to Stop signs
- Type III barricades
- 28 in. traffic cones
- Class 2 safety vests
- Sign stands
- 42 in. channelizers

Maggie Rains, Mayor of the City of Mondamin, Iowa, stated the city's appreciation in an article published by the *Missouri Valley Times*:

“Mondamin is very grateful to have been selected to receive this grant from the Iowa Local Technical Assistance Program. The road work signs will help protect road workers and motorists when road repairs are underway and warning of special traffic circumstances.”

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



Work zone cones that are aged and in poor condition used by small cities, left, and replacement cones provided as part of the program package, 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

LTAP is a national program of the FHWA. Iowa LTAP, which produces *Technology News*, is financed by the FHWA and the Iowa DOT and administered by the Institute for Transportation at Iowa State University:

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## From the Director: The new lens

Those of you who have regularly read this Director's column know that in recent years I've started adding some personal observations that I hope resonate. These observations, of course, are included in addition to a summary of the technical efforts Iowa LTAP is in the process of planning or offering. Every quarter, you are welcome to step through the observation door I've opened or jump to the technical efforts in the last paragraph.

Is it just me? Are we in a period of time when things are starting to appear "normal," but we don't know how that is defined anymore? Those things we are looking at are familiar, but the set of eyes being used have changed. Not just at the holistic level but a shift right down to the molecular level (in addition to more antibodies). The glimpses gathered and experiences felt during the last year were unlike anything ever before. Is it just me? These glimpses have provided wonderment, changing things permanently in some manner, and leaving us trying to determine how it may or may not impact what is going to happen both personally and professionally. Is it just me? Maybe it is.

This period of time is that of observation and participation but outside the grasp of adjustment. This liminal space of not quite this but not quite that. Familiar actions and spaces that are no longer so familiar. For example, have you had to learn basic social skills again or asked yourself, "Should I shake hands?" These past automatic actions are being relearned within and through a new life lens. All the while thinking that something is just around the corner or over the next hill that will produce clarity and reduce this queasiness, this languishing. That projective thought of undefined essence which will be what is when this—whatever this is—resolves.

Riding this thing out with awareness is one path. Being aware that individual external

and internal resolutions are going to be on different schedules (and always have been) and that each of us will have a differently timed path. Reaching out to those who are in the same situation will assist in traveling it. Meet people where they are. It will be uncomfortable and scary. Trauma impacts everyone differently. Lean on your support structures. In addition, be there for every individual when they land from this time, as they will arrive in a different place from where they started. I currently do not know where I will land. I have seen sparks of wonder, had crazy luck with life and death, and seen incredible caresses of nature during this time. The genie can't go back inside the bottle. I plan to bow to it and honor this truth and have it lead me.

Iowa LTAP is in the process of planning several activities for the summer and fall. We will continue our hourly webinars every other week during the summer. These webinars will focus on a variety of safety subjects (e.g., MUTCD overview, low-cost safety improvements). In addition, we are also helping with the ICEA Mid-Year Conference in July and its Iowa State Association of Counties (ISAC) meeting in August. Planning has also started for potential training and outreach related to the MUTCD, winter maintenance, bridge preservation, road safety, and surveying. Registration for the MINK Conference and the Streets and Roads Workshop and Conference will also soon be released. We look forward to seeing you all very soon. Finally, we are switching our library over to primarily electronic offerings (e.g., CDs, PDFs, live streaming) and introducing a search and retrieve service (for any documents that might be wanted).

With Gratitude,  
Keith ■

## In brief: Lasting LTAP impacts

In-person Motor Grader Operator (MoGO) training returned in 2021 after classes were canceled in 2020 due to the COVID-19 pandemic.

A total of six workshops were successfully held from May through June with two classroom sessions at each location. These sessions, at three hours long, included instruction and presentations, primarily focusing on blading techniques for different tasks, roadway/roadside cross-section elements, safety, and equipment. Each session was capped at 20 participants each (to meet the requirements in place at that time).

LTAP Technical Training Coordinator and MoGO instructor Paul Albritton called 2021 a “transition year.”



Training attendees view a demonstration of the operation of the equipment

“Our instructors are the key to these workshops and their skill, dedication, and professionalism really stood out this year,” said Albritton. “The participants appreciated being able to attend this popular and valuable training even with the restrictions we had in place.”

A total of 191 participants attended the in-person trainings. Additionally, 41% of participants had less than one year on a grader and 33% of participants had one to five years’ total experience.

Iowa LTAP would like to extend a special thank you to the Iowa Streets and Roads Maintenance Supervisors Association, who volunteered to pay the registration fees for city and county operators that wanted to participate.

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

## LTAP completes training needs survey

Thanks to everyone who completed Iowa LTAP’s biannual training needs survey. The results were very informative.

A total of 91 people responded to all or some of the 14 questions posed in the online survey. A little over half (53%) of the respondents were from counties, a quarter (26%) were from cities, and the remainder were from a mix of state government, consultants, and other. The respondents

represented a variety of positions, but more than half were engineers.

Compared to previous years, both supervisors and technicians were more likely to consider attending virtual trainings. However, all respondents remained more likely to attend traditional in-person instructor-led trainings.

Other preferences included scheduling half-day events, non-summer events, and

an electronic newsletter in addition to the traditional format.

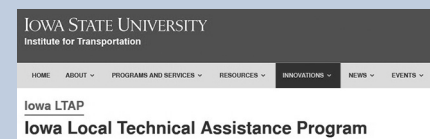
If you missed the opportunity to provide input in the survey, we always welcome feedback. Please contact Keith at [kknapp@iastate.edu](mailto:kknapp@iastate.edu) or 515-294-8817. In addition, we plan to do up to two focus groups to look more closely at specifics related to some of the questions asked in the survey. ■

### LTAP Innovations website tab live

As part of LTAP’s efforts to redesign its website to be more streamlined and user-friendly, we have now added an Innovations tab to share the latest inventions and best practices by local agencies from across the state and across the nation.

The tab includes direct access to the following:

- Iowa Build a Better Mousetrap (BAMB) details and entry form—the 2021 deadline has passed but entries can be submitted year-round for 2022
- Past Iowa BABM winners and their innovations
- Other national innovations—we’re adding links regularly
- FHWA Innovation Exchange Webinar Series



As always, if you have suggestions for items we can add or further improvements to the website, we’d love to hear from you. Contact Shari Butterfield at [sharib@iastate.edu](mailto:sharib@iastate.edu) or 515-294-1292 with any website feedback. ■

## 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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# LCCA tool evaluates costs for Iowa's bridge decks

The ability of agencies to incorporate life-cycle cost analysis (LCCA) into their bridge management programs has become more important as the gap between their maintenance needs and their available resources has grown.

To help agencies address that need, Bridge Engineering Center (BEC) Structure and Infrastructure Engineer and Associate Professor in the ISU Department of Civil, Construction and Environmental Engineering Alice Alipour developed a software tool that allows users to thoroughly and realistically evaluate and compare maintenance costs for bridge decks over a bridge's lifetime. With this information, users can make investment decisions considering all maintenance costs during the period over which alternatives are compared.

“The main objective of this research project was to develop a user-friendly LCCA tool for Iowa's bridges based on survival analysis of bridge condition ratings,” Alipour said. “The tool was designed to cover the most common types of bridges in Iowa while integrating historical data from various sources into the predictive models that account for the cost of maintenance and repair activities during a bridge's service life.”

The developed LCCA tool focuses on bridge decks, with the possibility of potential extensions in subsequent implementation phases. Bridge decks were chosen due to the relatively abundant amount of data available for this component. Bridge data were sourced from experts in the field, Iowa's Structure Inventory and Inspection Management System (SIIMS) database, and the National Bridge Inventory (NBI) database.

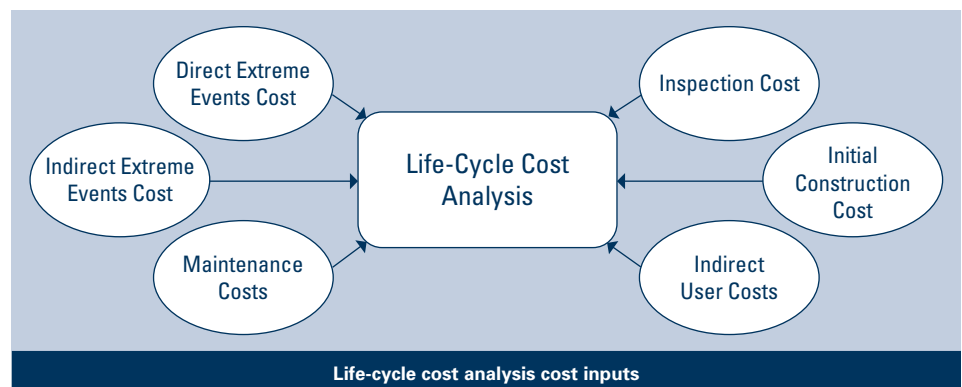
“The tool takes into consideration the deterioration rates specific to Iowa bridge decks at two-year time intervals and aims to predict the agency and user costs associated with preserving, rehabilitating, and repairing the bridge decks,” Alipour said. “This offers a unique advantage over Iowa's current system, which selects projects based on the lowest bid or estimated initial cost.”

The software tool is a MATLAB-based application called LCCAM. The application is built around a deterioration curve for Iowa's bridges that was derived using the project's LCCA methodology and data from 24,000 bridges in Iowa.

Though the tool includes maintenance and repair components in its current form, Alipour expects that future iterations of the software will be modified to include additional components.

A second phase of the project got underway in March. It will develop an updated tool and a user's manual after first taking into consideration various sources of uncertainty, adding an option to consider indirect costs, and seeking input from potential users.

More details on the completed first phase project is available here: <https://intrans.iastate.edu/research/completed/next-generation-life-cycle-cost-analysis-tool-for-bridges-in-iowa/>. More information on the second phase in progress is available here: <https://intrans.iastate.edu/research/in-progress/next-generation-life-cycle-cost-analysis-tool-for-bridges-in-iowa-phase-ii/>. ■





# Data-driven tool can aid in identifying non-motorist crash trends

Crash reports and other raw data—no matter how accurate—aren't always helpful in identifying patterns, which makes it difficult to address problem areas. That's why InTrans' Real-Time Analytics of Transportation Data (REACTOR) Lab has developed several interactive crash tools that literally show those patterns.

“There’s a place for tables and summary statistics and fact sheets, and things like that, but interactive tools really provide more of an understanding to people. They can get a better feel for it,” said Zach Hans, Director of InTrans' Center for Weather Impacts on Mobility and Safety, who was involved in the development of one of the interactive tools that focuses on non-motorist crashes.

Hans said the benefits of the non-motorist crash tool are to help local agencies identify their individual problem areas more accurately and thus to tackle them.

It provides data on crashes across Iowa from 2016 to 2021. All charts are interactive, and making a selection within a chart will filter all other charts for the selected criteria. Users can toggle between a summary and seven other tabs with location or condition-specific data to see how their selections impact other performance measures.

The tool is accessible here: <https://reactor.ctre.iastate.edu/non-motorist-crash-tool/>. Hans also talks about the tool in this two-minute video here: <https://vimeo.com/475907941>.

“People can drill down, because each community may be different, each community may have different issues or different age groups that they want to target, and so this tool provides that ability,” Hans said.

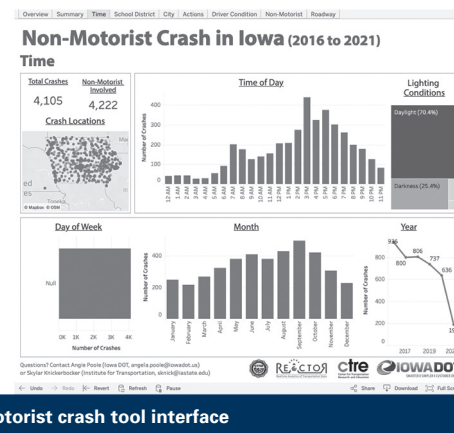
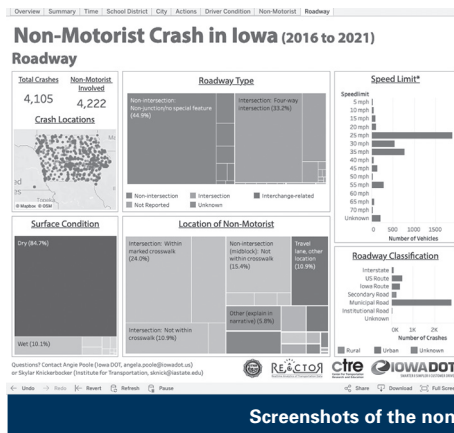
The development of the tool was sponsored by the Governor’s Traffic Safety Bureau (GTSB). The agency was interested in the tool, because it helps the agency to identify communities to contract with to address their local pedestrian safety challenges. The tool shows that pedestrian fatalities are not decreasing, and in many cases are on the rise.

Per the National Highway Traffic Safety Administration (NHTSA), there were 6,283 pedestrians killed in traffic crashes in the US in 2018, which accounted for 17% of all traffic fatalities in that year.

“Non-motorists are vulnerable users of the roadway, and an injury crash could easily be a fatal crash when you’re a bicyclist or pedestrian being struck by a car,” Hans said.

However, the tool doesn’t only identify fatal crashes. It also conveys the frequency of non-fatal pedestrian and bicyclist crashes, which can be surprising to some agencies.

“So, the tool really helps local agencies target what their enforcement or educational efforts should be,” Hans added. ■



Screenshots of the non-motorist crash tool interface

## What’s the big Idea?

Iowa DOT Research site offers insights into in-progress projects



Iowa DOT’s new Research Ideas website—<https://ideas.iowadot.gov/>—offers information on new and in-progress research in an easy-to-navigate format. It serves as a complement to the existing <https://iowadot.gov/research>.

The new site allows keyword searches, as well as the ability to filter information according to an idea. The Iowa DOT is excited to bring you more news and program highlights to help you better understand what it is they do and why they’re so passionate about it.

Here is some of what you’ll find there:

**Driven by you.** We love great ideas, but getting a concept to go from “good” to “great” takes lots of input and development. That’s why the DOT encourages feedback and hopes you’ll weigh in on proposed ideas (under the Ideas tab)—because when more opinions come together, the better the final result will be.

**A transparent process.** Ideas move through one stage at a time. Learn more about how it works (<https://ideas.iowadot.gov/how-it-works/>) from submission to discussion/evaluation to development, you can track the progress of any

idea in the system and identify related projects in development.

**More news and updates.** We think what the DOT does is pretty interesting, and we hope you will too. Their regular news posts (under the News tab) will help keep you informed and give them a chance to showcase the work they think you’ll be most excited about.

Users interested in voting on an idea will have to create an account, but viewing all the above information is open to anyone.

Article from the Iowa DOT, adapted with permission. ■

# An introduction to UAS (in transportation)

An uncrewed (unpersonned or unmanned) aircraft system (or UAS) consists of an uncrewed aircraft, ground control station, and command and control links.

You may know it better as an uncrewed aerial vehicle (UAV) or, more plainly, a drone.

According to the Drone Market Report, the global growth rate of the drone market is growing at an annual rate of 138%, rising from \$22.5B in 2020 to over \$42.8B in 2025. It is expected that nearly 1M drone units will be sold every year around the globe during this time.

As of January 2021, about 1.3M recreational and more than 500,000 commercial drones were registered with the Federal Aviation Administration (FAA) in the US. Approximately 8% of Americans own a drone, and about 15% have flown one. Currently, the estimated annual growth rate of drones in the US is approximately 64%. It is anticipated that by 2026, the US commercial drone market will exceed \$6.30B.

In the US, drones are helpful when fighting wildfires, assisting emergency response and search and rescue operations, protecting endangered species and sensitive ecosystems, assisting in farm activities, and transporting medical supplies to remote locations and underserved communities. In addition, in the transportation field, UAS can also be used to monitor and fix critical infrastructure, such as roads, bridges, and confined areas. It is expected that by 2025, transportation will be the second-largest market for drone use.

UAS operations are particularly effective for operations that are dangerous, as humans are not put at risk. Additionally, they can be outfitted with different sensors: Red-Green-Blue (RGB) optical cameras, thermal, multispectral/hyperspectral, and LiDAR sensors, and can reach hard-to-reach locations, such as the underside of bridges.

Inspection with UAS can often cost less than using traditional manual inspection. For example, the 2019 AASHTO UAS/Drone Survey reported that a bridge deck inspection with UAS (i.e., estimated at about \$1,200) can offer approximately four times lower costs than manual surveys (i.e., about \$4,600).



Drones have a variety of uses in the transportation industry

Many DOTs across the country are utilizing UAS to their advantage. For example, the Michigan DOT uses UAS technologies for structural inspection of bridges and to identify potential deterioration, such as the locations and sizes of subsurface delamination in concrete bridge decks. Additionally, the Utah DOT recently completed the inspection of a construction project 25 days ahead of schedule, with about 26% cost savings by using UAS. The New Jersey DOT reported a cost saving of 15% by using UAS compared to conventional inspection methods for high mast light poles.

Halil Ceylan, Director of the Program for Sustainable Pavement Engineering and Research (PROSPER) and the ISU Site Director for the FAA-sponsored Partnership to Enhance General Aviation Safety, Accessibility and Sustainability (PEGASAS) Center of Excellence (COE) on General Aviation, is currently leading an FAA-sponsored project to develop recommended processes and procedures for using UAS to complement current methods of airport Pavement Management Program (PMP) inspection methods, as well as technical evaluations for various types of current and emerging UAS platforms and UAS-mounted sensor technologies that will lead to FAA-recommended specifications. As an expert on UAS for transportation infrastructure applications, Ceylan had this to say:

“In recent years, the size of UAS platforms continued to decrease while steadily increasing payload capabilities, speed, range, and endurance. We have also seen a trend to modify the UAS design, making them operational in the mixed environment. The degree of autonomy, technical capabilities, and sophistication of communication continued to expand, allowing possible integration of

UAS in transportation infrastructure health monitoring and management. By taking advantage of these tools, the sky is the limit. It truly is a revolutionary innovation.”

As of 2019, 36 out of 50 state DOTs (or 72%) funded centers or programs for drone operations, which includes Iowa.

UAS can be used to monitor multiple structures, including road infrastructure (pavement and gravel roads), bridges, energy infrastructure, and hazardous locations. UAS can also collect various data types such as optical, thermal, multispectral, LiDAR, and traffic monitoring data. While RGB cameras are not functional at night, thermal cameras can offer extended hours of operation. Depending on the camera specification, hyperspectral images can contain 100 to 200 spectral bands in each image pixel. LiDAR uses laser light and can collect 100 to 500 points per meter of resolution.

“Different UAS serve different purposes,” Ceylan added. “For example, a heavy lift hexacopter UAV, while often used for visual monitoring of external defects, can also analyze structural surface conditions and can even check for internal cracks and flaws. On the other hand, a fixed-wing UAV is used for 3D geo-mapping.”

A fixed-wing/quadcopter UAS can produce multiple images with up to 99% geometric accuracy (depending on the type and altitude of the UAS platforms and resolution of the sensors—e.g., RGB optical cameras or an aerial LiDAR—attached to UAVs). A textured 3D model with color is produced. 3D rendering has many potential applications (e.g., virtual reality, 360 panoramic viewing, 4D dynamic modeling, multispectral image processing, and 3D printing and modeling).

# Workshop and conference calendar

[Information current as of June 17, 2021] Iowa LTAP will continue with some virtual efforts, including a summer safety webinar series, but it will also continue phasing in some in-person events and trainings.

For the most up-to-date information about in-person attendance requirements and additional upcoming 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. Thanks for bearing with us as we work through this transition.

Date	Event Name	Location	Contact
<b>July 2021</b>			
8	2021 ICEA Mid-Year Conference	Ames	Keith Knapp
9	Reading the Road	Webinar (12:00 p.m. CT)	Keith Knapp
23	Countermeasures for Road Safety	Webinar (12:00 p.m. CT)	Keith Knapp
27	Bridge Preservation Open House	Jesup	Keith Knapp
<b>August 2021</b>			
13	Maintaining a Safer Roadway	Webinar (12:00 p.m. CT)	Keith Knapp
25–27	ICEA Affiliate Meeting at ISAC Annual Conference	Des Moines	Keith Knapp
27	Take Action Now – Maintaining Safety	Webinar (12:00 p.m. CT)	Keith Knapp
<b>September 2021</b>			
21–23	Iowa Streets and Roads Workshop and Conference	Ames	Shari Butterfield
22–23	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/](https://iowaltap.iastate.edu/workshops/). ■

## UAS continued from page 6

For transportation, this allows for the high-definition visual inspection of pavement and bridge systems and unpaved and county roads, as well as power lines.

“UAS helps with overcoming the challenges you are facing. You can get in there and view the hard-to-reach places and understand the condition of these systems. UAS offers mobility and measurements from multiple perspectives compared to fixed position ground sensors,” Ceylan said.

In all, UAS can contribute to a new era of civil infrastructure health monitoring by helping inspectors become more efficient while reducing the risk of injuries. UAS application spans multiple industries, and—with lower cost, time, and risks involved—there are numerous positive impacts.

## Some general UAS rules

- The “Small UAS” Rule (FAA Part 107 for Small UAS) includes that UAS must be within line of sight with a maximum height of 400 ft above structures and a maximum speed of less than 100 mph
- Small UAS requires FAA authorization to fly any airspace other than Class G
- Small UAS must weigh under 55 lb
- UAS cannot fly directly over airports
- Small UAS pilots operating under Part 107 may fly at night, over people and moving vehicles without a waiver as long as they meet the requirements defined in the rule
- UAS must be registered with the FAA, and the UAS must be labeled with the registration number

## More information on UAS/UAV

- From the Iowa DOT: <https://iowadot.gov/aviation/Unmanned-aircraft-systems>
- From the FAA: <https://www.faa.gov/uas/>
- FAA Part 107: [https://www.faa.gov/uas/media/part\\_107\\_summary.pdf](https://www.faa.gov/uas/media/part_107_summary.pdf)
- FAA Operations Over People: [https://www.faa.gov/uas/commercial\\_operators/operations\\_over\\_people/](https://www.faa.gov/uas/commercial_operators/operations_over_people/)
- FHWA Unmanned Aerial Systems: <https://www.fhwa.dot.gov/uas/>
- AASHTO Evolution of Drones Part Three: <https://www.transportation.org/the-evolution-of-drones-part-3/>

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

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## LTAP Materials

- ✓ Order library materials
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