Technology NEWS

April–June 2020

Iowa LTAP
Local Technical Assistance Program

Providing transportation technology transfer for Iowa's cities and counties

Inside this issue

Iowa Local Technical Assistance Program

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IOWA STATE UNIVERSITY
Institute for Transportation

With traffic down, Iowa gears up for full construction season

"Business as usual" was the recurring phrase from county engineers throughout the state during an Iowa LTAP advisory board meeting this past spring.

"We're pretty much trying to be business as usual with some differences," said Cathy Nicholas, Black Hawk County Engineer.

Some of the differences county engineers mentioned including offices being closed to the public, smaller work groups, new devices to allow work to be completed alone, maintenance staff taking home garage doors openers to get in and out without interaction, and other staff taking home their equipment to go directly from home to the field.

"We are all staying busy," said Brad Ketels, Linn County Engineer.

"It's same old, same old for counties," added Ryne Thornburg, Van Buren County Engineer.

Additionally, with many people staying home, traffic has been reduced. This allows Iowa DOT construction and maintenance forces, along with industry partners, to alter schedules in work zones to allow more work to happen during the day. Typically, best practice on a heavily traveled roadway in need of repair that requires a lane closure would be to work at night whenever possible to minimize the impact to traffic and reduce the risk to workers. With traffic levels dipping dramatically now, much of that work can be shifted to daytime hours. This increases the workers' ability to see and be seen by traffic. This not only keeps projects moving along, it's good for the workers to be outside as the weather improves and allows them to be home with their families at night.

"We're still gearing up for a complete construction season," said Donna Buchwald, of the Iowa DOT. "We're trying to be business as usual in an unusual situation. It should be noted that social distancing on job sites are still being taken into account by allowing only one employee per vehicle as well as following other state and federal health recommendations."

In regards to traffic, Buchwald added that traffic in Iowa was down about 40 percent in mid-April, which was actually a larger reduction than in some other states that had been locked down.

As of right now, there is still $775 million in construction slated for this season, according to the Iowa DOT website. With the COVID-19 crisis being a fluid, ever-changing event, Buchwald said that it needs to be taken one day at a time so everyone can play their role and respond during this unprecedented time.

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

Work continued on the I-80/I-380 project this spring when traffic was down

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

U.S. Department of Transportation
Federal Highway Administration

IOWA DOT

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:
Gratitude and the "communities of we"

I went back and forth on what to write about for this column. There is the absolutely incredible job all our friends that kept working have done, keeping the roadways open and maintained. Everyone should be proud of what they have done, always have done, and continue to do. Much closer to home, there is the LTAP staff and all the team members at InTrans that help them. Early on during the pandemic they were asked to remain a constant in the lives of those that use our services to make sure they knew we are still here to help in any way we could. Any constant during these time is a comfort. I believe we have accomplished this and hope you do to. It was also necessary to focus on what we can do now (even if the "how" was unknown) rather than what was or may be. I am so proud of everyone at LTAP and InTrans who has made this happen. They stepped up to get it done. Words can't really describe my feelings of gratitude for how they have handled what continues to happen here every day given the continual stream of unknowns. For myself, I hope that I have grown in adaptability, identifying what's truly important, and meeting people where they are at the moment (which is a necessity in today's world). Always treat everyone as an essential being.

I used the term "communities of we" in the column title. This is something I've been thinking a lot about lately and perhaps you have too. I have several communities of "we" in my life, and they have become more obvious to me during this time. These are the communities that I may have taken for granted before the pandemic and now appreciate all the more. Or, they are communities that the pandemic has drawn me to and nurtured. And I hope that I can re-establish a connection with those I now know are missing. For me, these communities are places where you are accepted fully and where you are able to explore where you are at the moment and also where you are going.

I am glad that I am part of these communities and hope that you have discovered yours. There is also, I believe, an increasing awareness by many of a greater societal community of "we" to which many are feeling some responsibility. Thomas Merton said, "I think a man is known better by his questions than by his answers," in his book *Conjectures of a Guilty Bystander*. During this time, it seems right to ask questions related to our communities of "we." For example: Can we identify them in our lives and define what draws us to them?; Can we bring those characteristics into our being, wherever we are, and whatever we are doing, and establish a community of "we" and/or serve the larger community?; and, What would be the result if we did this?

Iowa LTAP continues to do virtual webinars and workshops (and plans continue for some potential on-site events in the fall). We have expanded our methods of advertising, including a bi-weekly resource flyer, and I hope you are taking advantage of these offerings. We are also still (and always have been) available for technical assistance, equipment loans, and on-site safety reviews (but in a different manner). Be sure to check out our website too, because it continues to include a lot of links to online resources, and we record just about every virtual activity we do. Finally, we have just started experimenting with town halls—a kind of virtual roundtable—let's see what happens! We learn something new every day, adjust, and improve.

With gratitude.

Keith ■

In brief: Lasting LTAP impacts

With change often comes obstacles, but also the opportunity for a great response. When news of the COVID-19 pandemic hit, the Iowa LTAP took action.

"In these uncertain times, communication is key. The Iowa LTAP [is] a resource that is ready to help," wrote Keith Knapp, the Iowa LTAP Director, in a weekly circular sent in late March.

Since that time, LTAP professionals have adapted well to the "new normal," especially in how they provide resources, hold workshops, and communicate with Iowa's local agencies. "The move to all online training has been quick, but I think it has been pretty successful," added Knapp. The Iowa LTAP continues to learn how to improve its online services every day.

Since Iowa's local transportation agency staff includes essential workers, they have continued to work throughout this period, and with that comes the need for the same level of support. Although the pandemic and its aftereffects will last into the foreseeable future, LTAP is dedicated to providing as many opportunities as possible now.

"We are still here to serve our primary purpose…," Knapp said. "We need to discard what was and might be and focus on what we can do now."

Professional development opportunities, technical assistance and training, among other long-standing LTAP services, are still available. But, they may be, at least for now, provided in a different format or manner.

According to David Veneziano, the LTAP Safety Circuit Rider, onsite trainings have now become virtual trainings. For example, 4- to 6-hour onsite trainings are now 2-hour virtual segments conducted over two days.

"In addition, a version of our onsite road safety reviews are happening while taking social distancing into account," he said. "And we continue to make equipment from our equipment loan program available for quick pickup, as well as cleaning it when it comes back."

All LTAP staff agreed that some type of "hybrid approach" (a combination of online and onsite) to the program's normal services are a definite possibility going forward.

"Things are still fluid," said Knapp. "Some efforts are going to virtual and may stay virtual, other efforts may be hybrids, and others still will likely go back to being face-to-face at some point. This is a difficult time, but we will continue to serve. I want to look back at this period and know we did everything we could."

Additional free online training and technical information resources are available for use on the LTAP website here: https://iowaltap.iastate.edu/web-based-training-opportunities/. For a list of upcoming webinars, presentations, and events, visit the LTAP Resource page here: https://iowaltap.iastate.edu/ltap-resource-bi-weekly/. And, as always, please do not hesitate to reach out with suggestions for materials or presentations (kknapp@iastate.edu, 515-294-8817).

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

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.

Work zone sign package

Winners

A total of 10 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:

- Adel
- Cascade
- Charter Oak
- Correctionville
- Earlville
- Griswold
- Iowa Falls Water
- Readlyn
- Shelby
- Wilton

"Because of COVID-19, getting these packages to the cities was a unique challenge, because at the time overnight travel was prohibited. But, after everything, the cities have everything they need to keep 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

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

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.

CP Tech Center releases *Guide to Concrete Trails*

Recreational trails have been growing ever more popular over the past three decades, which has created the need for comprehensive guidance at a national level for constructing concrete trails.

The National Concrete Pavement Technology (CP Tech) Center has recently released just such a guide to aid the ready-mixed concrete industry, contractors, design professionals, decision-makers, practitioners, and public agencies. The *Guide to Concrete Trails* is available at https://intrans.iastate.edu/research/completed/guide-to-concrete-trails/.

The guide focuses on the steps for concrete trail development, design parameters and options, important elements of construction from subgrade preparation to delivery, use of various and sometimes innovative construction equipment, and on maintenance and repair. It also offers case studies on concrete trails of all ages from projects located throughout the country.

The guide is useful for construction of all types of paved recreational trails, including those for biking, running, and walking, as well as for other pathways such as cart paths on golf courses. Use of the guide will aid in the design, construction, and maintenance of concrete trails and paths that will help to improve the transportation and recreation opportunities of the general public.

Trail development surged in the 1990s due to federal and state funding for alternative transportation and the development of rail trails. However, the funding is highly competitive, and new construction to expand the trail system is often favored over maintenance of old trails.

A properly designed and constructed concrete trail can be a sustainable amenity for the community over the long term. Communities that have robust trail networks attract residents and tourists as well as further economic development.

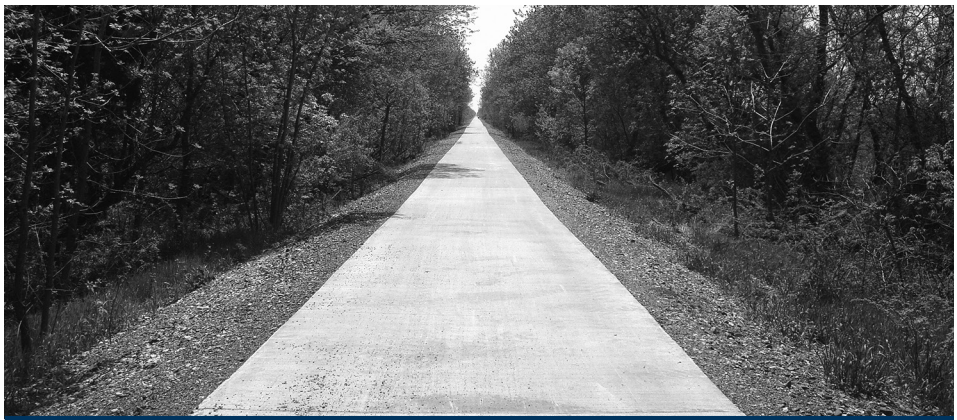
Public agencies in Iowa can truly benefit from this guide, says contributing author Gordon Smith. Smith is also the Associate Director of the CP Tech Center and has nearly 45 years of experience with concrete pavements and concrete products.

"The Concrete Trails Guide provides important tools for owners, engineers, and contractors interested in the proper and efficient design and construction of today's growing network of trails throughout Iowa and the nation. With this knowledge, quality of product will be enhanced, competition increased, and costs optimized," said Smith.

For local agencies, Smith suggests that the section on pavement design, including proper subgrade/subbase preparation (located on page 12), would be an area of special interest because concrete trails are typically built on a compacted subgrade. And, according to the *Guide to Concrete Trails*, the condition of the support system is critical for the performance of the concrete trail.

The Ready Mixed Concrete Research & Education Foundation sponsored the development of the guide.

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



Former railroad converted into trail

Iowa DOT Soils Design advances use of geophysical technologies with the A-GaME innovation

The Soils Design Section of the Iowa Department of Transportation (Iowa DOT) is responsible for providing geotechnical engineering design for roadway and bridge projects throughout the state. For a typical investigation, borings are taken, soil samples are collected, and tests are run. This data is then used to determine the suitability and strength of soils encountered in the borings. However, soil boring data has limitations. A boring only provides subsurface information at the location that it was taken. Away from the boring, soil deposits can change resulting in the possibility of anomalies, such as boulders, sinkholes, mine voids, and peat deposits, to remain undiscovered. These unknowns can increase design and construction risk.

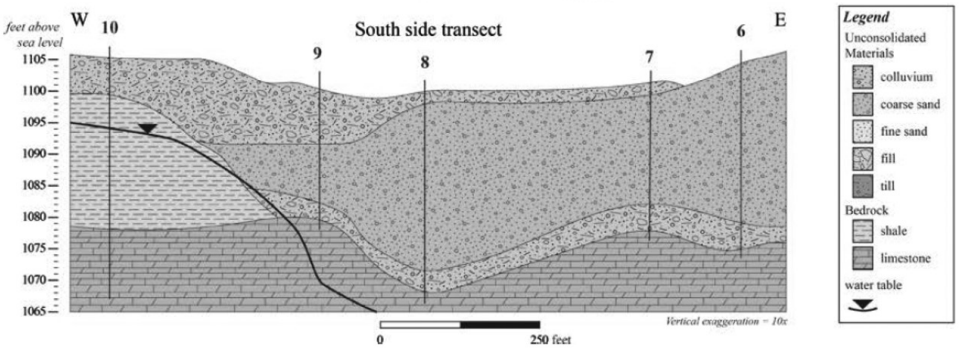
One of the 2019–2020 Every Day Counts (EDC-5) Innovations is the Advanced Geotechnical Methods in Exploration, dubbed the A-GaME. The goal of this innovation is to identify and deploy proven, yet underutilized methods that shorten project delivery, reduce traffic, while saving time, money, and resources. The Soils Design Section has recently committed to participating in the A-GaME, and has begun to apply some of the tools to geophysical investigations, with the goal of moving to a demonstration stage where the technology will be used to better understand how these tools can advance geotechnical design.

There are five major tool categories the A-GaME is promoting: (1) Electrical Methods, (2) Seismic Methods, (3) Cone Penetration Testing, (4) Measurement While Drilling, and (5) Optical and Acoustic Televiewers. These tools help to reduce uncertainty in subsurface conditions, thus improving confidence in subsurface characterization, and providing a more reliable basis for design and construction, while often accelerating project delivery.

Soils Design is testing three technologies. Electrical resistivity (ER) is being used to detect potential sinkholes in Cerro Gordo County (see figure below) and abandoned mines near US 52 in Dubuque County. Another electrical method, ground penetrating radar (GPR), has been used to investigate possible weathering related voids under pavement in Scott County.

A third technology, cone penetrating testing (CPT), is being used to supplement borings and will provide continuous subsurface soil property data in lieu of boring samples.

Soils Design finds ER a promising tool and recently applied and was awarded federal funds to purchase equipment and software. This technology is a powerful supplement to the traditional boring method, and Soils Design has plans to incorporate ER into its investigation processes to gain preliminary data of a project area. Using interpretation of the resistivity data provided from an ER survey, a more targeted approach to locating soil borings can be applied. A reduction in exploration cost and risk is anticipated with the addition of this new tool, plus confidence that roads and bridges are being designed with a better understanding of the subsurface.



When pairing ER data with soil boring results, the cross-section above was created. In such a geologic setting the shale to the west is relatively impenetrable by water and creates a protective barrier from limestone erosion. In contrast, the sand layer to the east allows water to reach the limestone causing dissolution and karstic conditions that can lead to sinkholes. Without ER to guide the boring layout it is possible that the sand layer could have been missed, and a continuous shale layer would have been assumed.

FHWA's Ben Rivers gives a demonstration on Advanced Geotechnical Methods in Exploration in between sessions using a HoloLens visualization tool

Article written and provided by Mark Dell, Steve Megivern, and Michelle Barger, Iowa DOT, Soils Design Section. ■

ISU Transportation Services named a Leading Fleet

ISU's Transportation Services was among the 50 Leading Fleets for 2020.

The awards program is a partnership between *Government Fleet* magazine and the APWA and sponsored by Ford. It recognizes operations that are performing at a high level, efficient, planning for the future, and overcoming challenges.

The City of Cedar Rapids was also named a notable fleet as part of the awards program. ■

Best practice guidelines for real-time smoothness technology now available

Even as practitioners work to design and build pavements that can last 100 years with little maintenance, road users will continue to judge the finished surface by its smoothness and their overall ride quality.

Thus, one of the most impactful technologies for concrete pavement construction quality control is real-time smoothness (RTS) technology. However, as agencies began to implement this new technology to evaluate the concrete surface during construction, it became clear there was a need for guidance on best practices.

The National Concrete Pavement Technology (CP Tech) Center recently completed a Federal Highway Administration (FHWA) field trial project demonstrating RTS technology in an effort to assist with implementation. Through the project, their lessons learned enabled the research team to develop the much-needed specifications and guidelines.

Workers use a slipform paver to finish a fresh concrete pavement

The document, Implementation of Best Practices for Concrete Pavements: Guidelines for Specifying and Achieving Smooth Concrete Pavements, is now available from the CP Tech Center's curated RTS resource page: https://cptechcenter.org/real-time-smoothness/. It provides general best practices along with key recommendations for quality control processes specifically as they relate to pavement smoothness.

Implementation of RTS technologies not only improves the road users' experience but researchers also now recognize that pavement smoothness has an impact on the structural performance of pavements. For instance, roughness can exacerbate dynamic loading from heavy vehicles that significantly increases stresses in a concrete pavement, resulting in distresses and ultimately failure.

With this recognition, agencies have sought a balance between producing pavements that are "smooth enough" and ensuring that the contractor can achieve the smoothness requirements. The CP Tech Center has responded to those needs by identifying a number of best practices to ensure agencies achieve their smoothness requirements. In addition, the Center will continue to provide guidelines for implementing RTS technologies.

The curated RTS page is one of several resource pages the CP Tech Center provides on key topics that include concrete overlays, concrete recycling, geotextiles, pavement preservation, and performance-engineered mixtures. ■

Work Zone Data Exchange project aids in navigation and safety in work zones

Imagine having to switch navigation apps every time you crossed jurisdictions or state borders. Now imagine having to navigate through a work zone in that world.

That nightmare scenario doesn't exist thanks to the proactive work of the U.S. Department of Transportation (DOT) that initially brought together six agencies, including the Iowa DOT, that produce work zone data and six companies that would use that data to produce navigation tools. Now, cities and state transportation agencies from across the country are working together to come up with a common language around work zone information through the Work Zone Data Working Group.

"Providing a standard way to communicate work zone data ensures that third parties are getting the same or similar data regardless of the state or jurisdiction they are driving in," said Skylar Knickerbocker, an InTrans research scientist who has been aiding the Iowa DOT in the Work Zone Data Exchange project and is a co-chair of the Work Zone Data Working Group Specification Sub-Group.

"The specification tries to balance what agencies can provide at this point and what information third parties would like to have," added engineer Sinclair Stolle of the Iowa DOT.

The effort is not only aiming to provide better information to road users navigating through work zones but it ultimately is meant to save lives. There were more than 750 work zone-related fatalities in 2018, according to the Fatality Analysis Reporting System from the National Highway Traffic Safety Administration.

The Working Group completed its first set of guidelines in the fall of 2018, and a second version was approved in January. The Iowa DOT, with the assistance of InTrans, has been involved since the beginning and became the first state agency to begin producing a work zone data feed.

Creating a shared terminology is more difficult than it may initially sound, as each jurisdiction could have a different way of describing where a work zone starts and ends, or conveying which lane is closed on a multi-lane highway.

"You've got 50 states as well as other cities all doing it their own way and all thinking they're doing it the right way," Knickerbocker said. "It's a constant balancing act of providing enough details and not getting so much into it that it makes it impossible to use."

Work Zone Data Exchange continued on page 7

Workshop and conference calendar

[Information current as of June 19, 2020] Due to the ongoing COVID-19 pandemic, many of our usual events have moved to an online format as staff consider how and when to safely return to typical in-person trainings, workshops, and conferences. The fluid nature of our current moment means that the virtual events have not been scheduled as far in advance as is typical for this quarterly format, and the events listed below as scheduled to be in person are subject to change.

Events that staff may consider scheduling in person may also offer a registration of interest to gauge potential participants' willingness to hold events in a variety of formats. Anyone who registers for such events will be notified as the situation changes and will be given guidance as needed.

For the most up-to-date information, please check regularly at https://iowaltap.iastate.edu/events/ and consider subscribing to our mail list from the Iowa LTAP home page at https://iowaltap.iastate.edu/ to get regular email updates.

Date	Event Name	Location	Contact
July 2020			
2	Everything you Wanted to Know about Concrete but were Afraid to Ask	Webinar (12:00 p.m. CT)	Keith Knapp
9	2020 ICEA Mid-Year Conference	Ames	Keith Knapp
10	Building Intelligence for Next Generation Traffic Management	Webinar (12:00 p.m. CT)	Keith Knapp
15	Leadership Skills – Team Development and Organizational Self-Assessment	Webinar (10:00 a.m. CT)	Paul Albritton
16	A Local Agency Perspective on Automated Traffic Signal Performance Measures	Webinar (12:00 p.m. CT)	Keith Knapp
September 2020			
15	Modern Roundabouts: Intersections De-signed for Safety	Ames	Keith Knapp
22–24	2020 Iowa Streets and Roads Workshop and Conference	Ames	Keith Knapp
October 2020			
19	2020 Excavation Safety	Sigourney	Paul Albritton
20	2020 Excavation Safety	Humboldt	Paul Albritton
21	2020 Excavation Safety	Denison	Paul Albritton
22	2020 Excavation Safety	Villisca	Paul Albritton
23	2020 Excavation Safety	Independence	Paul Albritton

Contact information

Keith Knapp, 515-294-8817, kknapp@iastate.edu
Paul Albritton, 515-294-1231, palbritt@iastate.edu ■

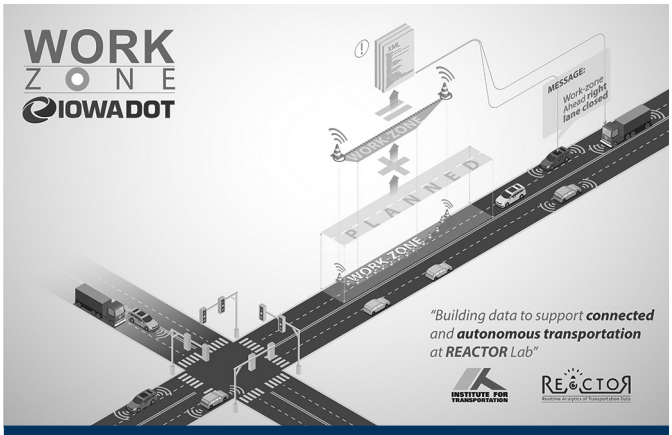
Event details and online registration

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

Work Zone Data Exchange continued from page 6

In addition to improving safety and efficiency in work zones, the project also will help as connected and autonomous vehicles (CAVs) saturate the market. The common language that helps navigation aids now will be critical to ensuring that CAVs can successfully operate through work zones tomorrow.

The Work Zone Data Exchange Specification project grew out of a need for work zone data that was identified through the U.S. DOT Data for Automated Vehicle Integration effort. ■



The Work Zone Data Exchange Specification project will ultimately aid in CAV navigation

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