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Winter 2023

COMPLETE STREETS

Prioritizing Safety for All Road Users



U.S. Department
of Transportation

Federal Highway
Administration

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on Safe, Accessible Truck Parking

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COVERS and ABOVE—The Complete Streets design model looks to improve safety for all roads users. The model advances planning, design, and construction activities that allow safe mobility for pedestrians, bicyclists, motorists, and transit riders across all ages and abilities.

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Are you a longtime transportation professional conducting new research on a particular topic? Or an industry freshman looking to expand your knowledge base?

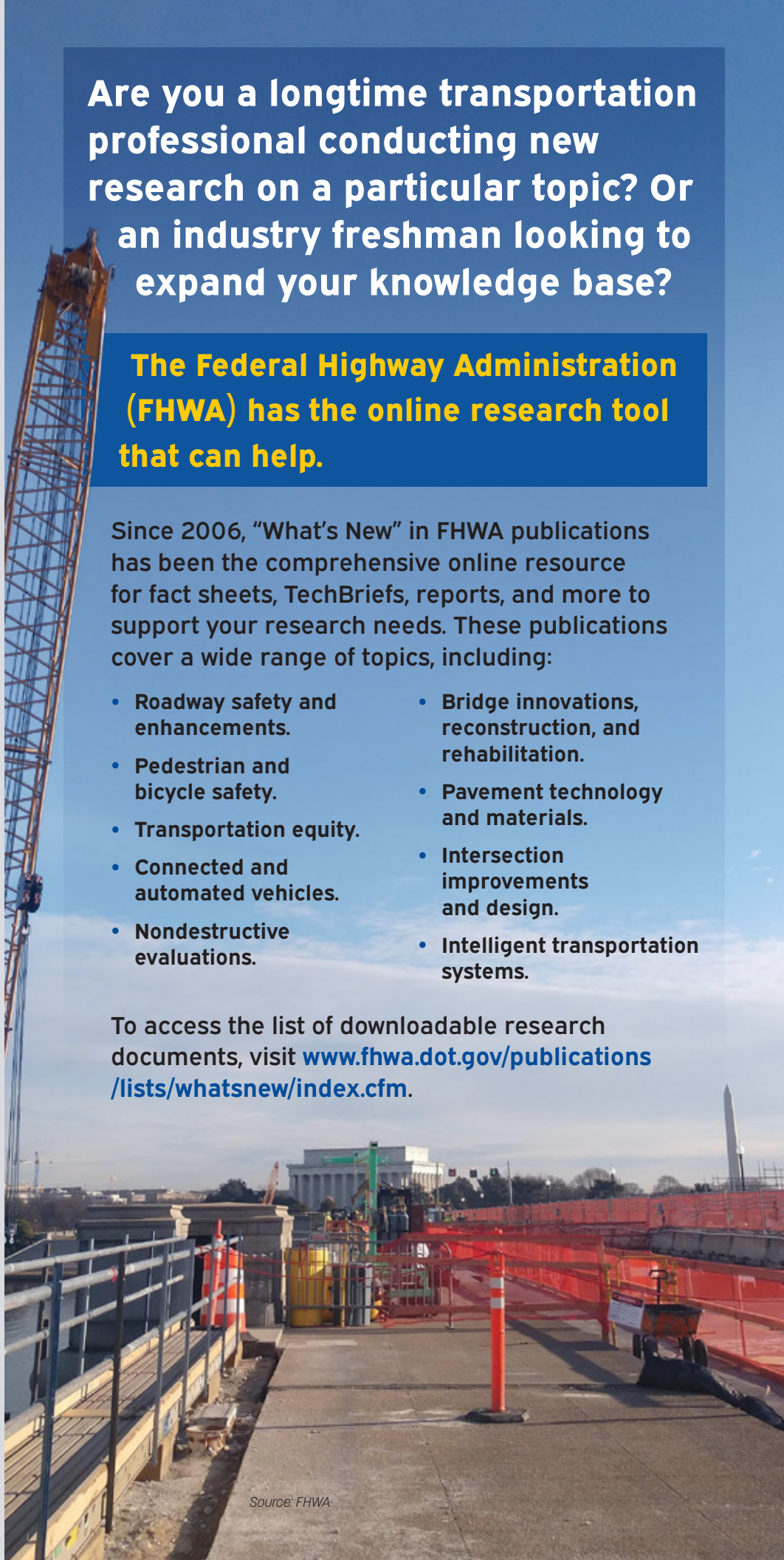
The Federal Highway Administration (FHWA) has the online research tool that can help.

Since 2006, "What's New" in FHWA publications has been the comprehensive online resource for fact sheets, TechBriefs, reports, and more to support your research needs. These publications cover a wide range of topics, including:

- Roadway safety and enhancements.
- Pedestrian and bicycle safety.
- Transportation equity.
- Connected and automated vehicles.
- Nondestructive evaluations.
- Bridge innovations, reconstruction, and rehabilitation.
- Pavement technology and materials.
- Intersection improvements and design.
- Intelligent transportation systems.

To access the list of downloadable research documents, visit www.fhwa.dot.gov/publications/lists/whatsnew/index.cfm.

Source: FHWA.





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Getting to Zero

Last year, in the Guest Editorial of the Winter 2022 issue of *Public Roads*, I shared the tragic news that 2020 had the highest number of people killed on our Nation’s roadways since 2007. As high as that number was, we lost even more family members, best friends, colleagues, and neighbors on our roadways in 2021, with an estimated 42,915 lives lost—representing a more than 10 percent increase from the previous year.

The *only* acceptable number is zero. And getting to zero is a shared responsibility between those who build, design, operate, and utilize the Nation’s roadways.

With the recent escalation in roadway fatalities, the challenge of getting to zero seems daunting. Nonetheless, with the actions that the U.S. Department of Transportation is taking and the historic levels of funding in the Bipartisan Infrastructure Law (BIL), we remain committed to taking actions that will lead to reversing the current trend in roadway fatalities.

In January 2022, recognizing that the status quo is unacceptable and, more importantly, preventable, Secretary of Transportation Pete Buttigieg launched the USDOT National Roadway Safety Strategy (NRSS). Implementation of the NRSS is arranged around the Safe System Approach, which focuses on five key objectives: safer people, safer roads, safer vehicles, safer speeds, and post-crash care. The NRSS also identifies new priority actions, makes changes to our existing practices, and targets solutions with the most substantial impact. Bolstered by the once-in-a-generation level of funding provided in BIL, the objectives and actions in the NRSS provide the steps needed as FHWA does its part in working toward the ambitious goal of zero fatalities.

BIL’s investment in transportation has infused additional Federal funds to increase safety for people to travel on our roads. BIL increases funding for the Highway Safety Improvement Program by nearly 34% over the 2015 Fixing America’s Surface Transportation Act levels, totaling over \$15 billion over the 5-year life of BIL. This gives States and local communities the ability to deploy lifesaving countermeasures more rapidly across more parts of their transportation system. For example, the new Safe Streets and Roads for All program (<https://www.transportation.gov/grants/SS4A>) provides \$1 billion per year, over the next five years, for regional, local, and Tribal investments in meaningful Safe System initiatives. This discretionary grant program will support communities across the United States in preventing transportation-related deaths and serious injuries on roads and streets.

This issue of *Public Roads* elaborates on the Complete Streets model that will help States and localities prioritize safety, comfort, and connectivity for people of all abilities and across all modes of transportation (see “Complete Streets: Prioritizing Safety for All Road Users” on page 17). FHWA submitted a Report to Congress that highlighted the barriers and opportunities to implementing a Complete Streets model. The article summarizes those barriers and opportunities and shares how FHWA is starting to address them.

Further, with the nighttime fatality rate at three times the daytime rate, improving visibility at critical locations is necessary for road safety. My office has made efforts this past year to address this critical problem, including:

- In April 2022, publishing the Pedestrian Lighting Primer to help transportation practitioners address

the vulnerability of pedestrians during dark conditions.

- Updating the *Manual on Uniform Traffic Devices for Streets and Highways*—under the recently published final rule by FHWA to provide a new minimum standard regarding pavement marking retroreflectivity, which is expected to reduce crashes in dark or low-light conditions.

The final rule also requires States and local officials to implement a method within 4 years for maintaining retroreflectivity at or above minimum levels.

Getting to zero requires a lasting commitment from everyone. Our efforts at FHWA must include coordination among the public sector, private sector, and research communities. Only by working together on this public crisis will we reach our ultimate goal.



Source: FHWA.

Cheryl J. Walker

Cheryl J. Walker
Associate Administrator for Safety
Federal Highway Administration

(Re)Introducing Gloria Shepherd, FHWA's New Executive Director

Gloria Shepherd, the Federal Highway Administration's newly minted Executive Director, is as close to a "household name" as you can be inside an agency with an annual budget of over \$67 billion and a nationwide workforce of nearly 2,700 people spanning all 50 States, Puerto Rico, and the District of Columbia. But after 23 years at FHWA, Gloria has built a name for herself as someone who delivers results and trains future leaders while doing so.

Shepherd started with the U.S. Department of Transportation's Federal Highway Administration by managing 14 transportation professionals and a budget of over \$100 million as director in the Office of Human Environment beginning in 1999. In her first role, and all those leading up to this latest, her leadership and support of colleagues and staff have been witnessed firsthand and relied upon across FHWA and the Department.

"It's so important, especially with the implementation of the Bipartisan Infrastructure Law [BIL], to have someone who can help us mentor and groom leaders, and Gloria has been passionate about that," USDOT Deputy Assistant Secretary for Administration Keith Washington says. "Succession planning is becoming more and more pivotal to meeting the mission of this Department. Time and time again, Gloria has been instrumental for us, by participating in Qualification Review Boards for staff who want to be Senior Executive Service [SES]-qualified," he adds.

FHWA Associate Administrator for Administration Arlan Finfrock echoed Washington's comments, noting that "Gloria has devoted tremendous time and energy into this area, especially with her involvement in the Road to the SES training sessions. She is always willing to take time to talk with employees about their career development."



Asked to describe her leadership abilities, Finfrock states, "Gloria has the courage of her convictions, is always willing to champion and advocate for issues she believes are important and has a keen understanding of the workings of the agency and the needs of its partners. Combining this with her tenacity and perseverance, she will be a strong advocate for FHWA programs and the needs of our workforce."

Shepherd is the first woman, first African American, and eleventh individual to hold the position of Executive Director since FHWA's founding in 1971.

In an FHWA press release announcing her selection (<https://highways.dot.gov/newsroom/us-department-transportation-announces-gloria-shepherd-selected-executive-director-federal>), she says, "I am humbled by the opportunity to serve as the next Executive Director of FHWA. It does not fall short on me the enormous responsibility that comes with the position. I am grateful that history has allowed me to fulfill the dreams of my parents and relatives who have gone on and bent their shoulders low, so I could stand on them in this position of public service. I am confident with the help of all the talented people in FHWA, we will not only fulfill our mission but reach new horizons."

Her first order of business as Executive Director will be continuing to implement new programs and changes to existing ones made possible by more than \$350 billion in funding under BIL.

"We live in a once-in-a-generation time for our Nation's roads, bridges, highways, crosswalks and bike lanes," she notes. "It's an honor and a privilege to play a role in their modernization and making travel safer for everyone who relies on them to get where they're going."





Neural networks of tools can be used in artificial intelligence to advance data-driven projects and research. Such tools are applied in data science and will be a commonplace element of FHWA one day.

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by **JAMES POL, CRAIG THOR, and YUSUF MOHAMEDSHAH**

New Laboratory to Explore Data Analytics for Transportation Professionals

FHWA advancing facility and protocols to support research.

Every discipline related to planning, developing operations, and maintaining a roadway network is data dependent. For decades, different disciplines established specialized practices for gathering data that address key questions and considerations. As each discipline has evolved, the amount of data collected has increased. The Federal Highway Administration (FHWA) hosts critical data stores that enable State and local agencies, industry, academia, and the public to analyze and determine solutions for specific problems. Since 2000, for example, the Highway Performance Management System was cited in nearly 2,600 academic articles.

As FHWA's partners and stakeholders have become more data driven, practitioners have grown more sophisticated in their analytical practices. The advent of "big data" in recent years has posed a substantial challenge to data production and management. Transportation professionals in every discipline increasingly rely on data from nontraditional sources (e.g., demographic data from the Census or fatal injury data from the Centers for Disease Control and Prevention) and performance measurement data. A greater number of sensors from infrastructure, third-party providers, and vehicle-based sources are also providing additional data.

The ability to collect different data elements and categories in large volumes has led to less specialized, or single-use data collection. As a result, data collection has become more efficient, as collectively we are moving from a "collect once, use once" paradigm to a more domain-agnostic approach that offers more opportunities to turn data into knowledge. Frequently, data collected for one purpose can be used for many other disciplines. Data science efforts can help practitioners learn how to effectively leverage the large amounts of data that are available from multiple domains to answer specific questions.

What Is PANDA?

A need exists to build up FHWA's data science capabilities to meet the demands of increasingly big data-oriented transportation

practitioners and stakeholders. After talking with various FHWA subject matter experts, the agency's leadership has agreed to create a data science laboratory, PANDA (Path to Advancing Novel Data Analytics), providing access to advanced analytical tools.

PANDA will grow FHWA's data science capabilities and address the phenomenon of "data rich, information poor," in which there is a lot of data produced for a specific purpose and the data are not reused effectively for other purposes. PANDA will offer access to analytic tools and methods that can help researchers turn data into knowledge with real-world impact.

PANDA reflects FHWA's experiences supporting research using machine-learning, machine vision, and big data analysis. This work has demonstrated a need for advanced analytics within the agency. The types of data that are relevant to a specific domain may be different, but the tools and techniques needed to transform that data into information are often cross-disciplinary.

PANDA addresses the following items noted by FHWA subject matter experts who responded to a survey exploring the concept:

- Understanding the data and analytics needs specific to FHWA business units.
- Difficulty gaining access to data/stove-piped data (data that are difficult to access and interpret).
- Difficulty gaining access to tools/software.
- Desire for improved data automation for data-driven decisionmaking.
- Desire for an elevated base level of statistics and data analytics skills within the units and across offices.

PANDA Supports FHWA's Mission

PANDA will enable advanced analytics capabilities, including multidiscipline analytics. These technologies will provide FHWA researchers with new tools to explore transportation-related questions outside the constraints of a particular domain or traditional analytical approach.

Some examples of these tools include:

- Economy and operations optimization: Developing advanced tools that will enable States to monitor real-time traffic and predict patterns across the United States rather than just a street, intersection, area, or region.
- Economy and best use of system: Working with the Internet of Things system (physical objects with sensor capabilities connected with other devices and systems over the Internet or a communications network) to:
 - Predict when businesses and individuals will need products and the ensuing traffic patterns, freight movement, and deliveries of items to homes and businesses.
 - Move from a “just-in-time” approach to a synchronized approach for all transportation movement.
 - Help to establish a system-of-systems approach by identifying the interconnected elements of transportation and the relationships between different systems.
- Operations and safety optimization: Enabling automated vehicles to communicate trillions of data points in realtime and provide intelligent decisionmaking on an individual and collective basis.
- Infrastructure improvements:
 - Enabling integration of disparate and complex datasets characterizing design, materials, construction, weather, traffic (volumes and load) to support improved infrastructure resiliency and sustainability and more effective infrastructure asset management.
 - Integrating sensor data into infrastructure health monitoring that influence the utility and life cycle of the infrastructure elements.
- Environment optimization: Scheduling transportation freight movements to optimize low traffic and reduce gas emissions and impacts on the environment.
- Financial improvements: Analyzing contracting history to determine cost overruns and improving research and construction contracting to save taxpayers money.
- Safety enhancements:
 - Identifying methods for enhancing traffic safety prediction models and new methods for evaluating the effectiveness of countermeasures through the

integration of novel approaches and new data elements that have an impact on safety.

- Aiming to identify and understand the relationships that have an impact on the safety of the transportation system and provide near real-time accident prediction to traffic control centers.

PANDA's Targeted Audience

PANDA has been established as a minimum viable product (a version of a product with just enough features to be used by early users who can provide feedback for future product development) to demonstrate the rudimentary capabilities of the laboratory. PANDA aims to be an FHWA resource that enables researchers and staff across the agency to collaborate on new analytics projects using cutting edge methodologies. Eventually, FHWA plans to expand access to qualified external users for specific research and analytics. PANDA was constructed in a research cloud—a cloud environment—to facilitate FHWA/stakeholder joint analysis and collaboration.

PANDA's Current Status

In its initial operating capability stage, PANDA is working to carry out research activity using artificial intelligence and machine-learning (AI/ML) tools.

FHWA is developing use cases (descriptions of how the system will work for specific applications) for each transportation discipline and implementing high priority use cases as proof of concept in PANDA. As FHWA continues developing the initial operating capability, the effort to define PANDA will focus on the following:

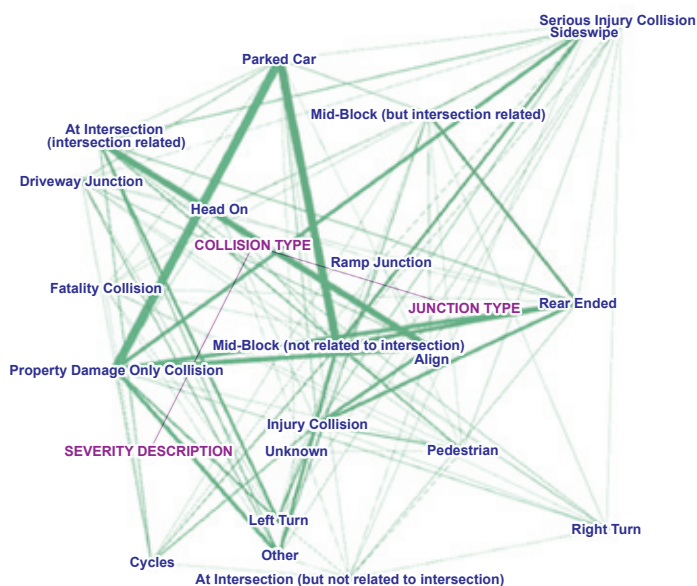
- Establishing access protocols, data governance, and pricing mechanism for long-term sustainability.
- Developing a catalog of research projects, AI/ML tools used, and research results.
- Preparing a physical space for PANDA to be part of Turner-Fairbank Highway Research Center tours in McLean, VA.

PANDA's development is helping FHWA advance its capabilities to provide effective data science-related support to its stakeholders. As FHWA becomes more proficient in working with PANDA's data analytics tools enabled through PANDA, there will be shifts in how the agency conducts its work as significant as migrating away from the use of slide rules (mechanical analog computers) more than a generation ago. Preparing FHWA for the future will require that its capabilities in advanced data analytics grow along with the stakeholders it serves.

JAMES POL, PE., PMP, is the technical director for safety research in the Office of Safety and Operations Research and Development (R&D). His 23 years of experience with FHWA has involved working with operations, safety, and intelligent transportation systems.

CRAIG THOR, Ph.D., is the chief scientist at Turner-Fairbank Highway Research Center. He has worked at FHWA for more than 12 years. Dr. Thor holds a Ph.D. in biomedical engineering from Virginia Tech.

YUSUF MOHAMEDSHAH is a research highway safety specialist in the Office of Safety and Operations R&D. He has more than 30 years of experience with FHWA managing various data laboratories, including the Highway Safety Information System, and PANDA. Mohamedshah holds a master's degree in civil engineering from Virginia Tech, and a bachelor's degree in civil engineering from Mumbai University.



An artificial intelligence model can look at two separate data sets and identify logical associations. Thicker lines indicate the greater likelihood of association between two data elements.

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Get Ready for the Every Day Counts Round Seven Summit!

by **JULIE ZIRLIN**

On February 14–16, 2023, a Federal Highway Administration-hosted virtual summit will bring together State Transportation Innovation Councils to explore the benefits of innovations from the seventh round of Every Day Counts (EDC-7) and identify those that best fit the needs of their respective State’s transportation programs. The summit is free, and registration is currently open at <http://fhwa-everyday-counts-7-virtual-summit.com>.

For over 10 years, FHWA’s Every Day Counts program has rapidly deployed proven technologies and processes. EDC-7, scheduled for 2023 and 2024, will highlight innovations to improve safety for all road users, build sustainable infrastructure for the future, and grow an inclusive workforce.

Every 2 years, FHWA works with key stakeholder groups to identify a new set of innovations that merit accelerated deployment. After consulting with stakeholders and receiving more than 70 suggestions from local, State, and Federal agencies; academia; and industry, FHWA selected 7 innovations to promote. This portfolio of market-ready and proven, yet underutilized, practices and technologies address the unique transportation challenges on American roadways today. “I am really excited about this batch of initiatives,” stated Amy Lucero, associate administrator for FHWA’s Office of Transportation Workforce and Technology Deployment. “They represent a wide range of high priority topics and there is something for all of our stakeholders to pursue.”

Innovations for Building a Sustainable Infrastructure for the Future

Integrating GHG Assessment and Reduction Targets in Transportation Planning

Transportation is the largest emitter of greenhouse gases in the U.S. This initiative provides resources to help agencies quantify greenhouse gases and set goals to decrease motor vehicle, construction, and life-cycle emissions through planning and project development.




Freshly placed internally cured high performance concrete bridge deck on an overpass.

Source: FHWA.

EPDs for Sustainable Project Delivery

Highway pavement construction materials such as concrete and asphalt have environmental impacts during their life cycle. Environmental product declarations, or EPDs, document those impacts. This tool helps States support procurement decisions and quantify embodied carbon reductions using life cycle assessments for sustainable pavements.



Sample Environmental Product Declaration for Pavement Mixtures

TRACI Impact Indicator	Unit	Materials	Transport	Production
Global Warming Potential	Kg CO ₂ -Equiv.	90.5	10.0	175

A representation of an environmental product declaration documenting the environmental information that would be provided for the manufacturing processes associated with pavement mixtures.

Source: FHWA.

Enhancing Performance with Internally Cured Concrete (EPIC²)

Shrinkage cracking in concrete is a limiting factor in achieving long-term concrete performance. Internal curing mitigates shrinkage cracking. It has the potential to triple the service life of concrete bridge decks and extend the performance of pavements and repairs.

Innovations for Improving Safety for All Users

Nighttime Visibility for Safety

The nighttime crash fatality rate is three times the daytime rate. Enhancing visibility along corridors, intersections, and pedestrian crossings can help reduce fatalities. This initiative promotes traffic control devices and properly designed lighting to improve safety for all users.

Next-Generation TIM: Technology for Saving Lives

Over six million crashes a year in the U.S. put responders and other vulnerable road users at risk. Next-Generation Traffic Incident Management programs promote emerging technologies such as emergency vehicle lighting and queue warning solutions. These and other tools can advance safety and operations to mitigate incident impacts.

Poor nighttime visibility conditions on a rural freeway enhanced with partial interchange lighting.

Source: FHWA.



Innovations for Growing an Inclusive Workforce



Strategic Workforce Development helps identify workers for highway construction careers.

© USDOT / Getty Images.

Rethinking DBE in Design-Build

Many design-build contracts do not adequately provide opportunities for disadvantaged businesses. New practices are available to support the effective integration of program requirements to help small, disadvantaged businesses compete for design-build contracts.

Strategic Workforce Development

The demand for highway workers is growing, and emerging technologies require new skills. This innovation helps stakeholders improve their ability to identify, train, and place highway construction workers. The focus will expand to rural and Tribal communities to increase career opportunities.

JULIE ZIRLIN is the Program Manager of Every Day Counts.

For more information, visit: <https://www.fhwa.dot.gov/innovation/everydaycounts/>



RELATIONSHIP BUILDING and How to LEVERAGE EXPERTISE Across AGENCIES

Peer-to-peer learning is difficult when coming from different perspectives, but not insurmountable.

As viewed from aerial photography, Idaho's Manning Crevice Bridge underwent construction in 2017. Built in 1934, the old, narrow bridge (top, center) lay above the Salmon River with 90-degree turns on and off the structure. The new Manning Crevice Bridge (bottom, center) is an award-winning single-span style suspension bridge with a wider deck for entering and exiting the structure.

Source: FHWA.

by KARYN VANDERVOORT and ZEKIAL RIOS

Remember seesaws... that simple playground equipment that was once a tradition in many parks? The thing that you and a friend spent hours going up and down on, and would adjust your positions so much so that one of you would end up closer to the middle?

A seesaw is a type of lever and a lever is regarded as one of the world's greatest inventions. A lever is how many believe that large stones were moved and lifted to build the ancient Egyptian pyramids nearly 5,000 years ago. Just as they were central to early construction, they remain in use today.

It takes two people for a seesaw to function properly. The size, weight, or height of each person does not really matter. This relationship is a lot like a partnership. A partnership is grounded in having at least two people aligned in achieving a common goal. The partners can represent organizations of different sizes, structures, and functions but when there is a mutual

objective to accomplish, they still function together.

For the Federal Highway Administration's Office of Federal Lands Highway (FLH), partnerships are a mainstay function of doing business. FLH's partners come by way of the Federal Land Management Agencies—the National Park Service (NPS), U.S. Forest Service (Forest Service), U.S. Fish and Wildlife Service, Bureau of Indian Affairs (BIA) and Tribal

Governments, U.S. Bureau of Land Management, Department of Defense, U.S. Army Corps of Engineers (USACE), and Bureau of Reclamation. These partners come from all corners of the Nation, whether urban, rural, remote, big, or small. The common bond of these partnerships is the mission to serve American travelers by providing the world's premier and safest transportation network. Like on a seesaw, and as with any relationship, there is a time when either party must pivot to find a balance. This delicate balance can be attained with skills such as emotional intelligence, listening, negotiating, and ingenuity—bound together by a shared commitment to fulfilling a mission.

Partnering on Prioritizing Safety Projects

The North Dakota Department of Transportation (NDDOT) partners with the Turtle Mountain Band of Chippewa Indians, Standing Rock Sioux Tribe, and the Mandan, Hidatsa, Spirit Lake, Arikara, and Sisseton-Wahpeton Oyate Nations to identify future projects that could improve traffic safety on Tribal roads. This identification is a cornerstone of the Highway Safety Improvement Program (HSIP), a core Federal-aid program with the purpose of determining which safety projects can achieve a significant reduction in traffic fatalities and serious injuries on roadways.

While NDDOT safety engineers actively promote a Vision Zero approach to identifying key transportation improvement projects, programs governing Tribal roads may be less equipped to carry out such tasks. Hence, to help fulfill the goal of eliminating motor vehicle crash fatalities and injuries on all State roads, multiple jurisdictions collaborate. "NDDOT's Vision Zero Plan is a strategy to eliminate motor vehicle crash fatalities and serious

injuries on all roads within the State, and we need to partner with city, county, and Tribal agencies to accomplish this goal,” says NDDOT assistant local government engineer Bryon Fuchs.

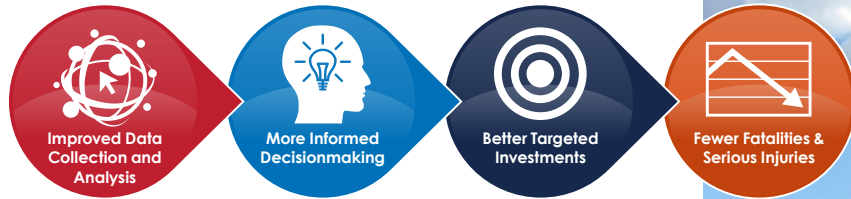
HSIP—a key component of FHWA’s overarching zero deaths vision—requires a data-driven, strategic, and systemic approach to improving public roadway safety. Many Tribes proactively identify safety improvement projects and communicate fatalities, serious crashes, and other safety concerns through their transportation safety plans. These plans often detail data-driven approaches. The safety improvement projects identified on Tribal lands still require a data-driven strategic approach but use Federal HSIP funding for the preliminary engineering phases to ensure projects stay on track.

As part of its partnership to reduce roadway incidents statewide, NDDOT provides services to Tribes that expedite the full delivery of their safety projects—including the traditional planning and programming phases. In 2021, NDDOT was granted authority to expand its service offerings, making it possible for Tribes to seek assistance for project design and in obtaining construction permits, National Environmental Policy Action (NEPA)-related clearances and the completion of other preliminary engineering-related actions.

“We are excited about this new opportunity to expand our partnership and collaboration with local tribes,” says NDDOT traffic operations engineer Justin Schlosser. With this expansion of services, Tribes can now meet expedited timeframes for HSIP projects. In addition, expedited project delivery often yields significant cost savings. For example, by purchasing materials more sooner than later, price escalations can be minimized. Plus, projects are usually devised to fix a problem; the quicker a project can be completed, the faster the solution can be implemented.

Partnering on Alternative Data Collection Tools

Unmanned aerial systems (UAS) have come into the spotlight in the past several years as an excellent tool for many surveying and engineering applications. These applications include aerial photography and videography, land surveys, quantity calculations, geotechnical investigations, bridge inspection



The Federal Highway Administration’s Office of Safety, supports a data-driven analysis approach to decision making for identifying locations and features with the highest potential for safety improvement.

Source: FHWA.

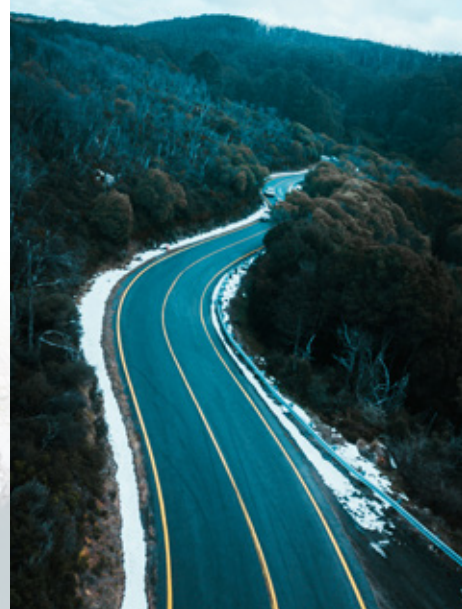
support, and asset management. Aerial photography with UAS fills the gap between someone on the ground taking pictures with a digital camera and a full-blown manned aircraft photographic mission.

Since 2017, FLH has worked with the Forest Service, NPS, USACE, State departments of transportations, and county governments, to leverage their expertise in conducting UAS flights. Among other things, FLH has used UAS to map terrain after landslides, scope projects, and monitor construction projects and roadway conditions.

Using UAS to assess road conditions has many benefits. First, aerial photos are far superior to shots captured from the ground because they collect more data from the wider angle of view. Photos of areas outside the immediate roadway are also easily obtained this way. Though they may not be needed initially, having them as a reference later in a project’s lifecycle can be invaluable. For example, during a pavement preservation project, the scope grew to include guardrail improvement because of details observed from the aerial photos. While the original length of the guardrail may have not been included in photographs taken from the ground, the lengths were captured in the aerial photos, permitting multiple improvements to be completed at the same time, using the same funds and resources.

UAS has become a more commonly used tool to support survey and engineering activities.

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A notable asset condition assessment was conducted as a collaboration between the Western Federal Lands Highway Division (WFLHD) and Crater Lake National Park in southwestern Oregon. In 2019, WFLHD evaluated the historic stone guardwall along the park’s East Rim Drive, much of which is at the top of very steep slopes resembling the rim of an ancient volcano.

The use of UAS saved FLH countless work hours and significant project development investigation funds, and the high-quality photographic products were used to establish a maintenance and repointing contract. NPS was thrilled with the work FLH accomplished.

“[FHWA] made a monumental surveying task look easy,” says Kirsten Hardin, Crater Lake National Park chief of facility management. “The final product was the closest observation we have had of the historic rock walls since they were constructed in the 1940s.” This was one of the last UAS flights piloted by WFLHD. Following 2019, the U.S. Department of Interior banned UAS flights in national parks, except for emergency operations. The ban restricts flights for asset condition assessment, but the agencies continue to collaborate, seek peer advice on equipment purchases, expand piloting expertise, and collaborate on agency policies.

Today, UAS proves to be an important tool to assess assets. FLH has upcoming flights planned to help develop USACE’s Bridge Inspection Support Program. In addition, FLH has flights planned to map and evaluate pavement surfaces in Idaho in advance of pavement preservation projects. USACE and the U.S. Fish and Wildlife Service both have research projects funded through FHWA’s Highway Research and Development Program. Both projects focus



A portion of the historic stone guardwall in Oregon's Crater Lake National Park along a sheer cliff.

© 2010 Germano / NPS.

on asset condition assessment using UAS as a supplemental means for collecting data—one project is for unpaved trails and the other for steel-member bridges.

Partnering on Innovative Contracting

The Lower Brule Highway 10 Reconstruction project in South Dakota illustrates how alliances, ingenuity, and balance solved funding shortages for roadway improvement on an essential road for the Lower Brule Sioux Tribe.

In fiscal year 2017, the Lower Brule Sioux Tribe was awarded \$21 million through the Transportation Investment Generating Economic Recovery (TIGER) program. The TIGER grant program provided discretionary funding for investments in road, rail, transit, and port projects.

The Lower Brule project surrounded the reconstruction of 13.5 miles of BIA Route 10, which serves as a major access road for Lower Brule, SD, and is the only direct route between the Lower Brule Tribal Reservation and Pierre, the nearest city.

Due to several decades of limited funding, Route 10 remained in poor condition. This condition was caused by pavement heaving due to a degraded base from erosion and the continual freeze-thaw weather conditions in South Dakota. The TIGER grant funding and nominal Tribal Transportation Program safety funds were the only two financial resources available to improve the roadway's condition and to ensure that the communities that depended upon Route 10 access to the city of Pierre for food, work, school, and emergency response were able to maintain their standards of living. As such, the total project cost needed to stay within the available

funding amount of \$21 million.

In spearheading this project, the collaboration between BIA and FHWA's Central Federal Lands Highway Division (CFL) experienced a period of adjustment. BIA completed the NEPA documentation, public engagement to seek opinions on the project, and the consulting party activities required by Section 106 of the National Historic Preservation Act. With these public processes completed, CFL could focus on the engineering design of the road.

Based on South Dakota's market conditions and bidding environment, and per BIA's plans and specifications, it was determined that there was likely insufficient funding for the full reconstruction of Route 10. Because assistance was needed to advance the delivery of the project within its budget, CFL conducted field assessments and calculated that the route's western portion showed less pavement fatigue and that subgrade concerns could be rehabilitated with a reduced scope as opposed to full reconstruction. Moreover, FLH's engineers, with their innovative contracting savvy, ensured the project—substantially

completed in October 2022, with the road opened to public traffic—would be adequately constructed and meet national design and safety standards.

Various contracting options were discussed among the collaborators, and a fixed-price Variable Scope contract was determined to be the best option. This contract type maximizes the available funding for construction during the competitive bidding process and required less preliminary engineering. In essence, the team leveraged industry experience to determine how much reconstruction and rehabilitation could be constructed within the available funding.

Just like the seesaw is a metaphor for establishing meaningful balance or a harmonized relationship, so are the project-delivery relationships created by FLH staff. There is a give and take among the partners of any productive relationship, and the examples in this article are no different. Some relationships may not start well but, in the end, once balance is obtained through ingenuity, tenacity, and endurance to strike an equilibrium, a mutual, beneficial playing field can be established for both sets of partners.

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ZEKIAL RIOS is a civil engineer and land surveyor with the Office of Federal Lands Highway, and currently serves as the FHWA unmanned aircraft systems coordinator, and land services manager for the Western Federal Lands Highway Division.

For more information, see <https://www.fhwa.dot.gov/uas/> or contact Zekial Rios at zekial.rios@dot.gov.

The Lower Brule Highway 10 reconstruction project in South Dakota illustrates how relationships, ingenuity, and balance helped complete roadway improvement on an essential road for the Lower Brule Sioux Tribe.

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The Role of Traffic Incident Management in the Safe System Approach

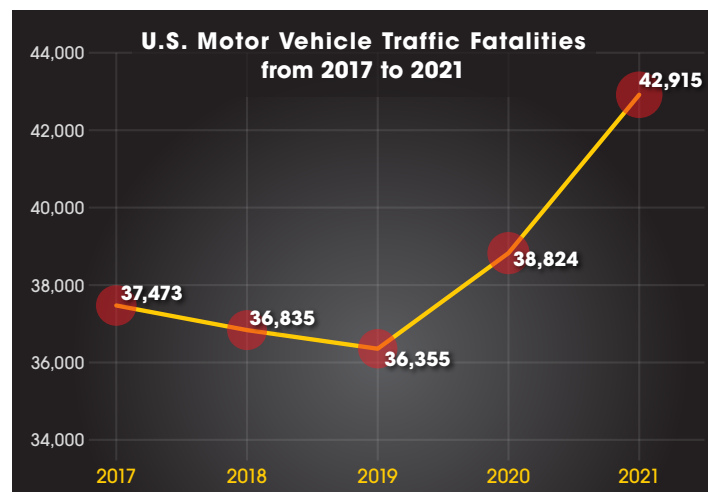
Responders provide key post-crash care to bolster safety amid increasing highway dangers.

by JAMES AUSTRICH, PAUL JODOIN, JOSEPH TEBO, GRADY CARRICK, and VAISHALI SHAH

Hundreds of times each day around the Nation, a law enforcement officer will arrive at a traffic crash scene. The officer will work to secure the scene, aid the victims, collect information, and document the crash facts on traffic crash forms. Police assistance is generally required by State traffic crash reporting laws. Often fire department and/or emergency medical services (EMS) personnel will also be present to assist with the injured, extricate victims from vehicles, and mitigate fires and chemical spills. Transportation agency and towing and recovery company personnel may also be present, lending necessary support to protect and clear the scene. Public safety dispatchers and traffic management center operators work remotely to coordinate resources. Collectively, this group of responders works together to perform traffic incident management (TIM) with a goal to shorten the duration of incidents, restore traffic back to normal, and improve safety for everyone on the scene, as well as approaching motorists.

Although the United States has enjoyed many years of downward-trending traffic crash fatality statistics, those numbers are now ratcheting back upward. While total vehicle miles traveled decreased by 11 percent in the United States from 2019 to 2020, roadway deaths increased by 6.8 percent to 38,824 in 2020. In 2021, an estimated 42,915 people died in traffic crashes,

a 10.5 percent increase over the previous year. Traffic incident responder line-of-duty deaths have seen similar increases from 2019 through 2021, culminating with over 60 responders struck and killed by vehicles while working at roadway incidents in 2021.



Source: FHWA.



The Safe System Approach principles and elements.

Source: FHWA.

After the crash, traffic incident management kicks into gear.
© PhotoSpirit / AdobeStock.com.

“I wish I could say otherwise, but the recent trend of increased line-of-duty deaths continues unabated. An unknown number of responders are also injured in ways that are often life changing and career ending. To fully recognize the service of these responders, we owe it to them to adopt the traffic incident management practices we know will work to make our roads safer,” states Martin Knopp, FHWA associate administrator for operations.

In response to the crisis on America’s roads, the U.S. Department of Transportation released the *National Roadway Safety Strategy* (NRSS), which adopts the Safe System Approach as a model to bolster roadway safety. Unlike traditional safety countermeasures that apply treatments to a problem behavior or location, the Safe System Approach applies multiple layers of protection and uses redundancy to mitigate failures of any part of the system. The principles of the Safe System Approach prioritize the elimination of crashes that result in



FHWA Office of Operations Director Mark Kehrl signing a proclamation supporting Crash Responder Safety Week.

Source: USDOT.

death and injury. People make mistakes and humans are vulnerable, so a system of shared responsibility and proactive tools are needed to address safety issues.

The Safe System Approach focuses on five key elements: safer people, safer roads, safer vehicles, safer speeds, and post-crash care. TIM is specifically called out to be a part of the actions for post-crash care. One of the key departmental actions needed, as noted on the USDOT website (<https://www.transportation.gov/NRSS/PostCrashCare>), is to advance TIM training and technologies targeted at improved responder and motorist safety. The following sections describe TIM and how it is an integral part of the Safe System Approach, particularly post-crash care.

What is TIM?

TIM has likely been around since the early years of the automobile but has certainly been formalized over the past five decades. The concepts of quicker detection, response, and clearance evolved in the 1970s and 1980s. By the 1990s, transportation management centers and intelligent transportation systems gained traction, helping to bolster the overall TIM effort. Laws requiring motorists to move over for responders stopped on the roadway

and to remove drivable cars out of travel lanes after minor crashes worked to codify TIM principles.

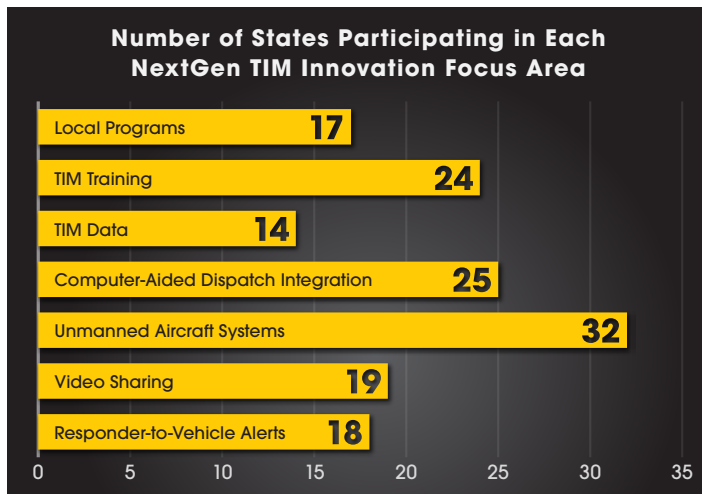
In the past two decades, the Federal Highway Administration has led national TIM efforts that have engaged State and local stakeholders in workshops, training, and self assessment. Because of these efforts, State and local agencies have not only embraced TIM but, in many cases, institutionalized it.

Current training and outreach efforts include enhancements to the National TIM Responder Training Program, support for local TIM teams and committees, and outreach, which is brought to greater focus through the nationwide Crash Responder Safety Week, taking place each year in November.

The outcomes from TIM practices are demonstrated by the operational, environmental, and safety benefits that many EMS and transportation agencies have experienced. From the Maryland Coordinated Highway Action Response Team TIM program’s estimated reductions in secondary crashes, delay, fuel consumption, and emissions, to the Houston (TX) Fire Department’s reductions in scene time and fire apparatus struck at incident scenes, TIM benefits continue to be documented.

Advancing Safety and Resiliency Through Next-Generation TIM

The nexus between TIM and the Safe System Approach lies with the stated action to improve responder and motorist safety through training and technology. Fortunately, the FHWA Every Day Counts Program was on the forefront of leveraging advancements in training, data collection, and technology with the Next-Generation TIM innovation.



Source: FHWA.

Training

FHWA and responder organizations have made a significant and long-term investment in training. TIM training focuses on responder and motorist safety. The training promotes accepted standards of practice necessary to minimize responders being struck by incident, as well as secondary, crashes. International Association of Chiefs of Police President John Letteney notes, “We can’t always see the benefits of TIM training, but we know from the comments and reviews of former students that they think it is important to their job and their safety.”

The National TIM Responder Training Program has trained more than 600,000 responders over the past decade. Optimized through in-person interaction, but also available as a self-paced online course, the program will soon be available as a virtual, instructor-led course. These platforms mean that responders can take the course without significant time away from their primary responsibilities. The national TIM program training products are currently undergoing a second refresh to ensure that the material stays current, relevant, and credible.

Rather than offering this training as an optional course, States with advanced TIM programs have institutionalized TIM training. For example, Texas requires all police and fire personnel to complete TIM training, and Georgia requires this training for all EMS personnel. Training academies in many States have also incorporated the National TIM Responder Training Program within their curriculum, ensuring that responders are TIM trained.

As part of the ongoing maturation of TIM training, the National TIM Responder Training Program will soon offer a stand-alone lesson that targets response in rural and remote environments. This lesson further reinforces the fact that TIM is applicable to anywhere that incidents might happen. Supplemental lessons on technology topics are also available to enhance responder understanding of the most current concepts for response, like those described in the

Technology section to follow. Finally, online and classroom training are often enhanced with practical application of TIM concepts. Many locations are using driver training facilities to provide hands-on training for responder students, furthering their ability to operate safely at incidents.

Data Collection

TIM data will be instrumental in defining safety performance targets and contributing key performance indicators for performance management dashboards. The essence of TIM data is performance measures for secondary crashes, roadway clearance time, incident clearance time, and responder struck by incidents. Agencies like the Arizona Department of Public Safety found that introducing and training officers about TIM performance measures reduced their time at crash scenes.

Free and low-cost crowdsourced data also provide a basis for better incident response and response planning. State and local agencies are using anonymized data from roadway users, connected vehicles, and navigation applications for faster detection of incidents and congestion. Both the Maricopa Association of Governments in Arizona and the Indiana Department of Transportation (DOT) have begun using anonymous speed and acceleration information from cars that are using the roadway in this way.

Technology

TIM technology focuses on systems that improve safety by increasing responder and motorist situational awareness, hardening the target at incident scenes, and by otherwise improving the efficiency of response activities.

The exposure of responders is reduced when overall incident duration is reduced. Unmanned aircraft systems (UAS) have greatly reduced the time necessary for law enforcement to measure, map, and photograph serious incident scenes. Field tests in Washington State showed a reduction in road closure time of 80 percent, and in Tippecanoe, IN, overall scene time was reduced by 60 percent when UAS was used over traditional technology approaches. Meanwhile, agencies like the Pennsylvania Turnpike Commission and North Carolina DOT are testing tethered UAS, deployed from safety service patrol vehicles, to improve situational awareness and roadway surveillance. According to Todd Leiss, TIM program coordinator for the Pennsylvania Turnpike, “A tethered UAS gives us a unique vantage point to provide real-time information to our emergency responders and ultimately motorists.”



An unmanned aerial system.

© 2020 Enforcement Engineering, Inc.



Safety service patrol-mounted camera system.

© 2022 Florida DOT.

Many locations are using technology to notify drivers of upcoming dangerous slowdowns and roadside incident response activity. Alerts are delivered to motorists through their mobile navigation app or in-vehicle system. For example, Kansas City, MO, has deployed systems that alert motorists of responder activity along their route, while North Carolina, New Jersey, and Colorado are able to warn commercial vehicle drivers using systems specific to their

vehicles. Other locations are improving traveler information systems to reflect the presence of incidents and responders better.

While a picture may be worth a thousand words, access to real-time video is significantly enhancing responders' ability to perform TIM activities. Indiana, Florida, and Maryland are States that have made sharing video from incident scenes possible using cameras mounted on safety service patrol vehicles. Timely information helps fellow responders deploy appropriate resources and choose more effective response routes.

Emerging technologies are now just gaining traction in TIM and are poised to make an impact on responder and motorist safety. The Grand Prairie Fire Department in Texas has outfitted truck-mounted attenuators on surplus fire apparatus to serve as barriers at freeway incident scenes. Several locations are affixing special devices to safety service patrol vehicles that allow them to scoop up roadway debris without stopping. A host of new smart temporary traffic control devices are being tested to provide drivers with early warning of potential dangers ahead.

Evolving TIM to Meet New Challenges and Capture New Opportunities

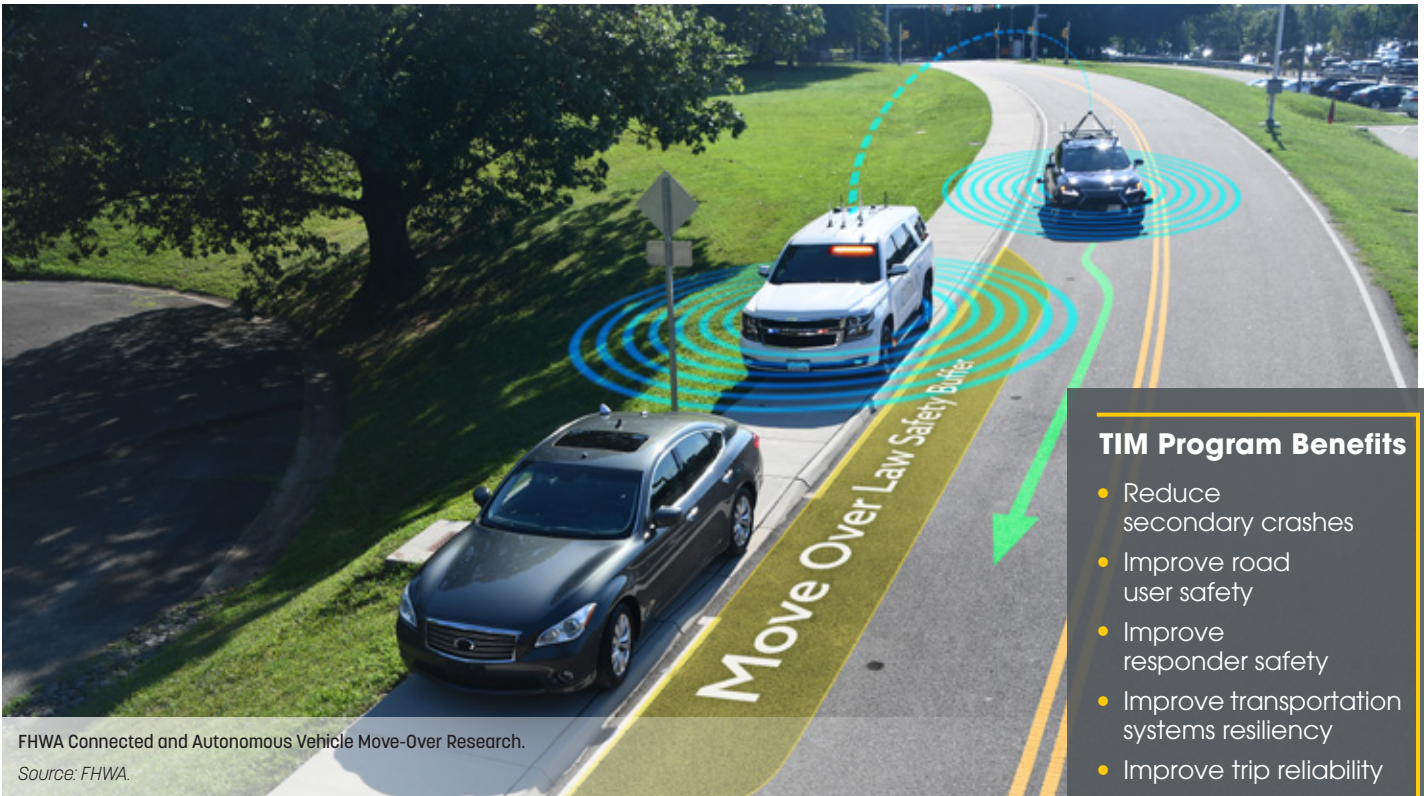
One cornerstone to the practice of TIM is the multidisciplinary TIM team or committee, which had traditionally focused on urban areas. Collegial TIM activities are now being undertaken in suburban and rural communities as well. For example, the Colorado DOT recently established 27 local, geographically focused TIM teams and produced a supporting toolkit that provides templates and tips for starting a TIM team.

Advances in vehicle safety systems, connected vehicles, automated vehicles, and connected infrastructure hold the promise of fewer roadway crashes, injuries, and fatalities. The FHWA CARMASM Program recently conducted a successful test demonstrating the slow-down and move-over functionality for an automated vehicle passing a roadside law enforcement response vehicle. Dale Thompson, FHWA team leader of the transportation enabling technologies team, notes, "FHWA in collaboration with industry is conducting research that demonstrates emerging technologies such



Fire apparatus with truck-mounted attenuator used by Grand Prairie, TX.

© 2020 Grand Prairie Fire Department.



FHWA Connected and Autonomous Vehicle Move-Over Research.
Source: FHWA.

TIM Program Benefits

- Reduce secondary crashes
- Improve road user safety
- Improve responder safety
- Improve transportation systems resiliency
- Improve trip reliability
- Reduce mortality and morbidity rates related to injury crashes
- Reduce greenhouse gas emissions

as connectivity between vehicles and smart infrastructure are foundational to achieve safer roadways for travelers, public safety officers and maintenance crews.”

Separate research seeks to use machine learning to detect Move Over law violations, and still other work is underway testing wearable technologies to alert responders of wayward traffic when they are working on the roadway.

In the coming years, new funding will allow States to rebuild roads, bridges, and railways across the country, creating new opportunities for TIM to improve responder and motorist safety. Traffic management plans are typically part of work zone planning, and a greater focus on TIM in the planning and operation of work zones presents a tremendous opportunity for advancing safety.

Embracing TIM for Safe System Approaches

TIM programs have and will continue to offer proven strategies that embrace a “systematic, planned, and coordinated use of human, institutional, mechanical, and technical resources to reduce the duration and effects of incidents and improve the safety of motorists, crash victims, and emergency responders” (United States Government Accountability Office. 2020. *Emergency Responder Safety: States and DOT Are Implementing Actions to Reduce Roadside Crashes*. Report No. GAO-21-166.

Washington, DC: GAO). Thus, agencies should continue to focus on traditional and Next-Generation TIM policies, tools, technologies, and training as part of their Safe System Approach.

JAMES AUSTRICH is a program manager with FHWA’s Office of Operations, TIM Program Office. His career spans over 30 years of public and private sector work in traffic operations, homeland security, and as a TIM subject matter expert for the DC Metropolitan Police Department. Jim studied Business Administration and is a graduate of the University of Maryland Senior Management Operations Academy.

PAUL JODOIN has been a traffic incident management program manager for FHWA’s Office of Operations since July 2009. Before his current assignment, Paul had a 38-year career with the Massachusetts DOT where he was the intelligent transportation systems programs operations manager for the last 12 years. He was responsible for management of the Traffic Operations Center and various other emergency management programs.

JOSEPH TEBO has been a member of FHWA’s TIM Program team for the past 2 years and brings four decades of on-the-ground TIM expertise. He is a former paramedic and rescue specialist and has served for over 40 years as a volunteer firefighter, including leading crash scene investigations with the National Transportation

Safety Board and time as the deputy emergency management coordinator at the Federal Transit Administration.

GRADY CARRICK is a retired Florida highway patrol commander with a combined 40 years of TIM, traffic safety, and public management experience. He holds graduate degrees in Transportation Engineering and Public Administration.

VAISHALI SHAH is a senior program director with a consulting and development agency, helping Federal and State transportation agencies innovate through technology and process change. She holds a master’s degree in Transportation Engineering from the University of Texas.

The authors thank Katherine Belmore, National TIM responder training program coordinator, for her contribution to this article.

For more information about the Safe System Approach, see the Winter 2022 issue of *Public Roads*: <https://highways.dot.gov/public-roads/winter-2022>.

COMPLETE STREETS: Prioritizing Safety for All Road Users

Agencies should systematically change policies, rules and procedures to fully implement a Complete Streets design model.

by **BARBARA MCCANN, ANTHONY BOUTROS, and ANNA BITON**

A Complete Street is safe—and feels safe—for everyone using the street. According to the National Complete Streets Coalition, 1,533 jurisdictions across the United States—including two-thirds of the States—have adopted Complete Streets policies directing their transportation agencies to routinely plan, design, build, operate, and maintain safe street networks for everyone. Often, the real challenge of implementing Complete Streets policies is in changing project-development processes to consistently prioritize safety outcomes. To address this challenge, many jurisdictions have gone on to create new plans and Complete Streets design models that transform their project-development processes to prioritize safety for all users.

Complete Streets is a transformative strategy in which the transportation network is planned, designed, built, operated, and maintained to enable safe mobility and access for all road users, including, but not limited to, pedestrians, bicyclists, motorists, and transit riders across a broad spectrum of ages and abilities. Moving to a Complete Streets design model may help reverse the trend of increasing fatalities and serious injuries on the Nation's roadways to reach the goal of zero deaths and to create a healthier, greener, and more equitable roadway system. To support this mission, the Federal Highway Administration (FHWA) launched a Complete Streets initiative, which includes

This street supports the safe mobility of pedestrians, drivers, transit users, and bicyclists. Future transformations could include separation to improve comfort for bicyclists.

© Ann McGrane / pedbikeimages.org.



active participation by 10 program offices, several division offices, and the Federal Transit Administration (FTA).

In 2021, Congress directed FHWA to lay the groundwork for the adoption of a Complete Streets design model. As a result, FHWA began an extensive review of Federal rules, policies, and guidance to understand how Complete Streets could improve safety for all road users. The agency also interviewed stakeholders in State, regional, and local government and professional organizations; some of their insights are included in this article. The resulting report to Congress, *Moving to a Complete Streets Design Model: A Report to Congress on Opportunities and Challenges* (<https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-03/Complete%20Streets%20Report%20to%20Congress.pdf>) identifies five areas of opportunity for FHWA and its local, Tribal, and State transportation stakeholders to positively influence the safety of all roadway users:

- A. Improve data collection and analysis** to advance safety for all users.
- B. Support rigorous safety assessment** during project development and design to help prioritize safety outcomes across all project types.
- C. Accelerate adoption of standards and guidance** that promote safety and accessibility for all users and support innovation in design.
- D. Reinforce the primacy of safety for all users** in the interpretation of design standards, guidelines, and project review processes.
- E. Make Complete Streets FHWA's default approach** for funding and designing non-access-controlled roadways.

The ongoing efforts of the FHWA Complete Streets initiative to address each of the areas identified in the report are described in the next sections.

Improve Data Collection and Analysis

Appropriate data on the modes of transportation that use the road network are critical for tracking the impact of projects and for ensuring that performance management efforts can incentivize projects that support safety for all roadway users. However, basic data about the transportation network, including roadway elements, traffic volumes, and even crash data, are often unavailable or incomplete, especially for people traveling outside of motor vehicles. Additionally, FHWA recognizes that traditional data collection and analysis methods may further underrepresent underserved communities that are disproportionately impacted by traffic fatalities and serious injuries.

Transportation agency officials interviewed for the report highlighted that State and local agencies do not have comprehensive or

consistent information about roadway features that are essential to safety and comfort for people walking and bicycling, such as sidewalks, crosswalks, bus stops, pedestrian signals, or bike lanes. States are not currently required to collect pedestrian or bicyclist user counts. Interviewees noted that many State and local agencies and metropolitan planning organizations (MPOs) have not developed sufficient expertise, technology, or resources to collect and meaningfully use nonmotorized data for planning and decisionmaking. This situation is especially true for small, rural, and underserved communities. The problem is compounded by the undercount of pedestrian and bicycle crashes, which are often not reported.

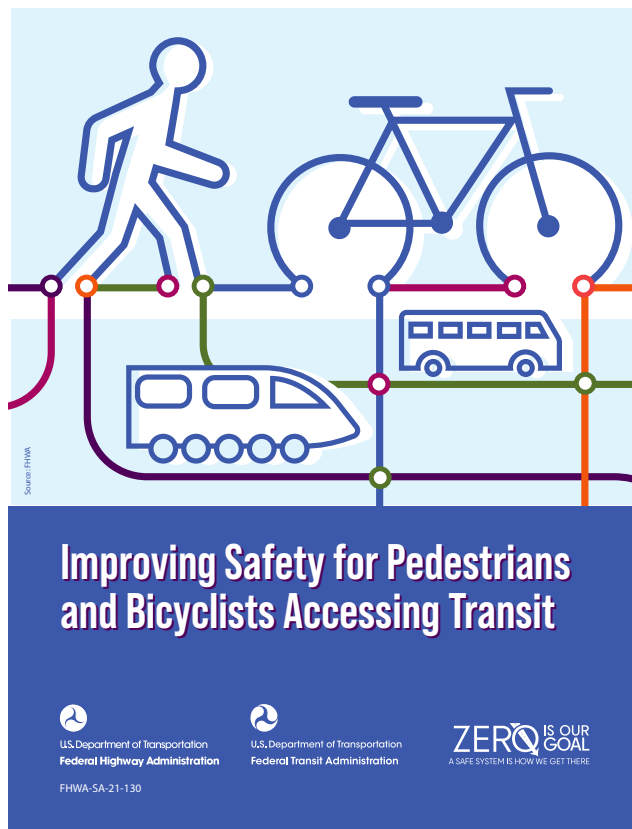
“The lack of holistic data leads to systemic bias in project selection, which can result in ruling out many Complete Streets projects,” says Laura Sandt, senior research associate for the Human Sciences Research Council. “For example, police-reported crash data are often the primary measure of a road’s safety performance or need

for improvement, but they notoriously undercount pedestrian and cyclist crashes and injuries. Despite Complete Streets projects having lots of local support and ability to improve safety and comfort for all road users, the reliance on biased crash data means that these projects receive lower priority.”

The lack of comprehensive and consistent data on infrastructure and travel volume beyond automobiles, or full crash data, presents a challenge to the development of measures that show how projects and investments affect fatalities and serious injuries. It also constrains documentation of potential co-benefits, such as improved health outcomes, increased economic activity, personal cost of transportation savings, or greenhouse gas emission reductions that come from shifting trips away from the use of personal vehicles to sustainable modes of transportation.

FHWA is working to address these issues with initiatives to improve data collection and analysis and to provide new tools to State, local, and Tribal agencies. FHWA worked with the Bureau of Transportation Statistics, the National Highway Traffic Safety Admin-

istration, and other U.S. Department of Transportation offices to develop a Learning Agenda aimed at improving foundational knowledge of pedestrian and bicyclist risk rates and other nonmotorized safety data. The Learning Agenda is helping guide future research efforts across the USDOT. In addition, in a Letter Report to FHWA on Complete Streets, the Research and Technology Coordinating Committee of the Transportation Research Board suggests that FHWA can help define the data collection and research, development, and technology necessary to build the science and knowledge on which the safety benefits and policy tradeoffs of Complete Streets design can be based.



Ensuring safety for all users includes improving access to on-road buses and rail service. FHWA has a new resource to help.

Source: FHWA.

Projects underway include an initiative to encourage submission of walking and bicycling volume data into the FHWA Travel Monitoring Analysis System, as well as leading and supporting research projects to identify and study technology-based solutions to obtain exposure data. Also, a research project is underway to develop analytic tools that quantify the risk reduction provided when multiple countermeasures are used to create a Complete Street. FHWA is also reviewing innovative data sources to understand and address disparities experienced by underserved communities and explore new ways to model and measure the benefits of Complete Streets. FHWA is collaborating with the Centers for Disease Control and Prevention on improving the integration of transportation and health data sources to better inform project prioritization and measure potential health benefits of Complete Streets projects, particularly for underserved communities.

Support Rigorous Safety Assessment

State or local agencies may need guidance on how to prioritize safety in transportation planning and performance management across all types of Federal-aid projects.

FHWA has long encouraged the use of the latest evidence-based tools and approaches to assess the future safety performance of an existing or proposed transportation facility. For example, FHWA recommends the use of the American Association of State Highway and Transportation Officials' *Highway Safety*

Manual (HSM) to inform State departments of transportation (DOTs), Tribal, and local agencies in targeting investments and making project decisions. However, the analytic tools that are available to assess the benefits of Complete Streets may not be useful in local communities that lack the data to conduct rigorous safety assessments. This situation can make it difficult to adequately score safety through the project prioritization process used by States and MPOs, which undertake project scoring under specified criteria, eligibility analysis, and, less frequently, formal benefit-cost analysis. Some State DOTs and MPOs have addressed this situation by developing their own tools, policies, and procedures to assess and analyze the safety performance of their existing facilities and projects, regardless of funding source, and to determine project alternatives and countermeasures that improve safety. FHWA is seeking to learn more and promote noteworthy practices about these methods as we address the roadway safety crisis.

Of particular note in the report to Congress was the relationship of safety and congestion management, which are two primary goal areas that transportation agencies consider when evaluating projects but that may sometimes be perceived as conflicting with each other. While Federal regulations and policies—including highway design manuals, metropolitan planning requirements, and national performance measures—currently include specific requirements to evaluate congestion, there

Resources in the Bipartisan Infrastructure Law

The Bipartisan Infrastructure Law (BIL) provides resources that will help State and local agencies build capacity and fund projects that prioritize safety for all users. The new \$5 billion Safe Streets and Roads for All grant program puts an emphasis on helping regional, Tribal, and local jurisdictions create comprehensive safety action plans and carry out projects identified in them. Highway Safety Improvement Program funding has increased and now requires States to prepare vulnerable road user safety assessments. States that have a high proportion of vulnerable road user fatalities compared to the number of total crash fatalities must direct a portion of their Highway Safety Improvement Program funding to address this issue.

is no prescribed process to conduct a safety analysis of projects that receive the overwhelming majority of Federal transportation dollars. Specific requirements to address safety are tied to a single funding program, the Highway Safety Improvement Program, which constitutes only about 6 percent of all Federal surface-transportation funding.

The Clean Air Act adds another dimension to the need to properly weigh the safety and environmental benefits of Complete Streets in relation to traditional congestion mitigation methods. Congestion management has long been a primary strategy with the goal of reducing pollutants and improving air quality. Current modeling consistent with this strategy primarily captures the negative impacts of vehicular congestion on air quality. As a result, Complete Streets projects that improve safety for all road users by reallocating roadway space to low- or no-emission modes of transportation—such as transit, biking, and walking—may show increasing vehicular congestion and, as a result, negative air quality impacts without accounting for the benefits of the lower emission modes. Recognizing this issue, some States and localities have created more robust regional and microscale modeling tools that have the capacity to capture mode shift and its benefits. However, data may not be consistently available at a local or regional



Safe crossings are an essential part of complete streets.

© Andy Hamilton / pedbikeimages.org.

level, and not all communities have the technical expertise to evaluate and quantify the benefits of shifting to bicycle, pedestrian, or transit trips. FHWA's Congestion Mitigation and Air Quality Emissions Calculator Toolkit (https://www.fhwa.dot.gov/environment/air_quality/cmaq/toolkit/) can support agencies to perform these analyses. Additionally, FHWA is developing resources to help agencies identify tradeoffs and solutions as they prioritize safety in their everyday work, including a primer that will detail operational strategies that can support and complement safety improvements for all users.

Accelerate Adoption of Standards and Guidance

Two documents have long provided standards and governed designs at a national level: FHWA's *Manual on Uniform Traffic Control Devices for Streets and Highways* (MUTCD) and AASHTO's *A Policy on Geometric Design of Highways and Streets* (also called the Green Book). Both documents are undergoing updates.

Many agencies are also using documents published by industry organizations that provide information on roadway design. Notably, the National Association of City Transportation Officials has published design guides specific to the context of city streets. Many State and local agencies have rewritten their own design documents as part of the implementation of their Complete Streets policies, changing designs and decisionmaking tools to prioritize safety for all users.

To ensure that streets serve people of all abilities, the U.S. Access Board proposed guidelines—known as (Proposed) Public Rights-of-Way Accessibility Guidelines (PROWAG)—for pedestrian facilities in the public right-of-way in 2011. Once the Access Board finalizes the PROWAG, the USDOT and the Department of Justice must undertake their own rulemakings to adopt the PROWAG into their Americans with Disabilities Act regulations as enforceable standards.

Reinforce the Primacy of Safety for All Users

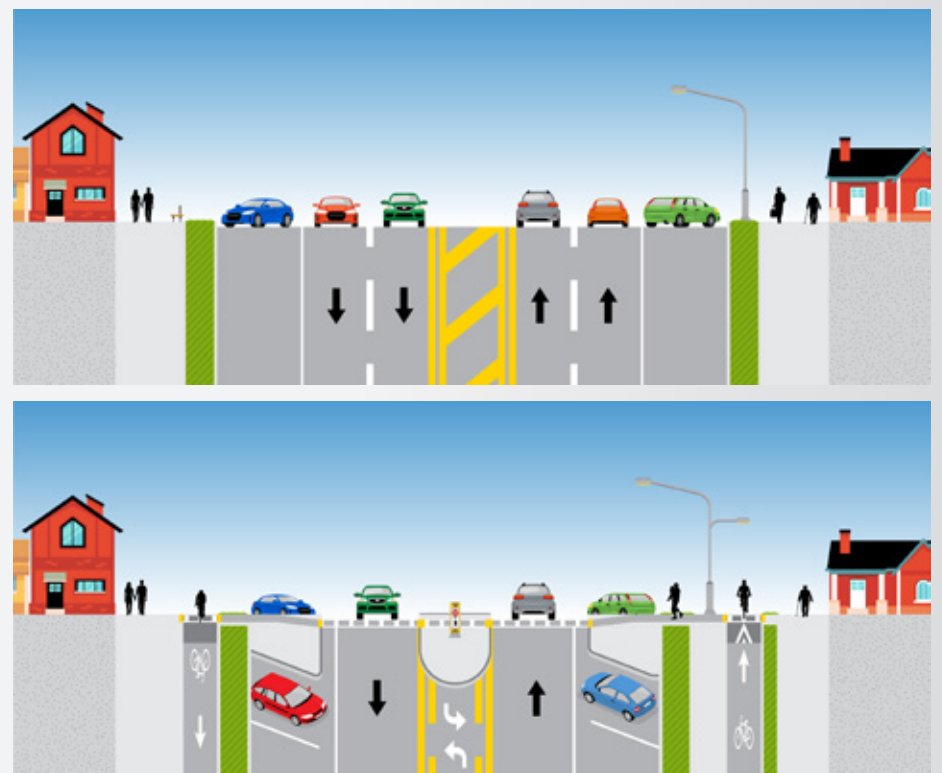
The U.S. transportation system is a complex, decentralized system with Federal, State, Tribal, regional, and local governments responsible for varying aspects that influence safety outcomes. As a result, a full transition to a Complete Streets model requires leadership, identification and elimination of barriers, and development of new

policies, rules, and procedures to prioritize safety at all levels of government.

As previously referenced, FHWA is reviewing Federal rules, policies, and guidance to help make Complete Streets the default approach for funding, planning, designing, constructing, operating, and maintaining non-access-controlled roadways. Similar efforts are critical at the State, Tribal, regional, and local levels to identify and eliminate funding and administrative hurdles that discourage Complete Streets implementation. This step is especially important since projects to add features that improve safety for all road users may also encounter obstacles based on the way that Federal policies, rules, and guidance materials are interpreted and applied at the State and local levels.

Some agencies noted that, despite clear Federal guidance on the importance

In general, the Complete Streets design model includes careful consideration of measures to set and design roadways for appropriate speeds; separate various users in time and space; improve connectivity and access for pedestrians, bicyclists, and transit riders, including for people with disabilities; and implement safety countermeasures. This model is especially important on arterials in urban areas and many small-town main streets, where the competing demands for throughput and local access create a challenging safety environment. Almost 70 percent of mileage on the National Highway System is not access-controlled freeways, and many of these roads serve a wide variety of road users and purposes beyond rapid mobility. These roadways are the focus of the FHWA Complete Streets initiative. The publication, *Complete Streets Transformations*, provides scenarios to stimulate ideas for improving these streets as part of developing a Complete Streets network. For people walking, biking, or rolling, continuous corridors and facilities—like sidewalks and bicycle facilities—are essential to ensuring safety and comfort for their entire trip. So there is an emphasis on developing safe and complete bicycle and pedestrian networks and access to public transportation.



These cross-sections show how a rural 4-lane principal arterial Main Street could be converted to improve safety and access for all road users.

Source: FHWA.

of designing to context (<https://www.fhwa.dot.gov/planning/css/>) and ensuring safety, in some States, project proponents must repeatedly justify the use of designs or treatments that, while allowable, may not yet be common practice in their jurisdiction. One issue behind this reluctance may be concerns about liability, as the engineering practice shifts from ensuring safety by relying on compliance with design standards to an analytical approach based on data and new analysis tools, such as those included in the HSM. BIL clarifies that local jurisdictions may use design guides that are different from State standards on the roads they own that are not part of the National Highway System, without approval from the State.

To begin to address these challenges, FHWA is ramping up training and capacity building, both internally and externally. The FHWA Resource Center has a suite of trainings that support the implementation of a Complete Streets design model. Since January 2022, the Resource Center has fulfilled more than 50 training requests related to Complete Streets, both within FHWA and from State and local stakeholders. Additionally, the Resource Center is providing technical assistance to agencies that are seeking to consistently design for the safety of all users. Some examples include providing assistance to an agency seeking to overcome barriers to a statewide systemic crosswalk improvement program and providing review and advice for a local agency designing its first on-street bike lane.

The report to Congress further elaborates on the challenges at the State and local level that create hurdles for the routine implementation of streets that are safe for all users. For example, local governments may require support from States in overseeing funding for local projects. This requirement is particularly true for smaller projects, such as sidewalks, bicycle facilities, and transit stops. Currently, the administrative burden for smaller projects may be the same or proportionally higher than that for larger capacity expansion roadway projects; this cost may create a disincentive to pursue such projects. This situation is further complicated by the fact that some State DOTs may not be willing to act as fiscal agents for local projects that provide facilities for all users. Agencies interviewed for the

report explained that this reluctance may result because State DOTs only administer projects over a certain size, leaving communities with smaller projects seeking another fiscal agent, such as an MPO or another Federal agency, to administer project funding. Additionally, a State that has not embraced a Complete Streets design model may not work closely with a local government on innovative safety treatments—such as separated bike lanes—on roads it owns or controls. The State may instead take a hands-off approach. On these roads, the local jurisdictions may then face the burden of funding and designing projects, leading public involvement, and even securing funding for on-going maintenance. To

implement projects that create safe, multi-modal facilities and corridors for all users, local governments may face significant hurdles when Complete Streets implementation is not the default approach in State and local funding and administering processes. FHWA is researching the cost associated with Complete Streets implementation to support localities and States in routinely funding and administering projects that prioritize safety for all road users.

To address funding challenges, some State and local governments are pursuing innovative funding and administration practices, like project bundling, to prioritize safety for all road users. Project bundling is a way for multiple local agencies or the



This street includes multiple safety countermeasures to create safe and comfortable corridors and facilities for all road users, including a wide sidewalk with street furniture, separated bike lane, wide crosswalk, and on-street parking.

© Toole Design Group / pedbikeimages.org.



A student marching band crosses a marked crosswalk under a pedestrian hybrid beacon on a multilane suburban arterial.

© Mike Cynecki / pedbikeimages.org.

State and a local agency to come together and implement similar projects on roadways across multiple jurisdictions. For instance, a jurisdiction could make its project—such as a pavement marking or rumble strip installation—part of a larger State effort. In Minnesota, for example, adjacent counties partnered to submit projects across their roadway network. St. Louis County, MN, used project bundling to reduce unit costs, which provided treatment for more miles of roadways at a lesser cost. Usually, the agency with more experience in administering the cash flow and leading engineering efforts takes the lead on implementation, making it easier for localities without the same resources or confidence to implement the project. As another example, San Diego, CA, is completing a project in which they bundled 60 to 70 intersections together to implement an FHWA Proven Safety Countermeasure, leading pedestrian intervals.

Another source of uneven progress is the number and variety of jurisdictions

making decisions about transportation corridors. These entities may have different approaches based on their varying priorities. In many places, different jurisdictions control roadways and transit service, resulting in gaps in the provision of resources and support for the design of on-road transit facilities. For instance, many bus stops lack sidewalk connections, and the need to remove barriers for people with disabilities is complicated by differing jurisdictional responsibilities. To address this challenge, the FHWA Complete Streets initiative includes a Transit Task Force led by FTA staff to support appropriate inclusion of transit service in street design decisions and to prioritize road users' safe walking, bicycling, and rolling to bus stops and metro stations. FHWA and FTA also recently published a guide, *Improving Safety for Pedestrians and Bicyclists Accessing Transit* (https://safety.fhwa.dot.gov/ped_bike/ped_transit/fhwasa21130_PedBike_Access_to_transit.pdf).

Make Complete Streets FHWA's Default Approach

All these efforts converge on making Complete Streets FHWA's default approach to designing non-access-controlled roadways. The aim is to make funding and creating streets that are safe for all users the easiest option for stakeholders.

This transition has been underway in some States. For example, California DOT (Caltrans) recently issued a new Complete Streets Action Plan to guide implementation of its updated Complete Streets policy issued in December 2021.

“Our complete streets work is imperative to ensuring safe, accessible, connected transportation options for all Californians,” said Caltrans Director Tony Tavares. “The Complete Streets Action Plan identifies the steps we will take over the next two years to maximize walking, biking, transit, and passenger rail in communities throughout the state.”

FHWA is developing guidance and technical assistance that better support

communities to implement Complete Streets. Additional policy and procedural changes will support Federal-aid recipients in making Complete Streets their default approach as they design non-access-controlled roadways. FHWA is also working with State DOTs to develop, implement, and synthesize the results of a nationwide assessment of State DOT maturity in implementing safety for all users. The information collected through this assessment will help FHWA better understand where it can develop additional technical assistance and tools to improve Complete Streets implementation at the State level.

Conclusion

The FHWA Complete Streets initiative is already advancing specific efforts in addressing all five areas of opportunity identified in the report to Congress. BIL creates new funding opportunities to support safety projects, requires States to use a portion of their State planning and research funding and MPOs to use a portion of their metropolitan planning funding to develop and adopt Complete Streets policies, and brings safety for all users into clearer focus in the eligible uses for formula funding programs. Guided by these identified opportunities and challenges, and with the funding and other tools provided in BIL, both USDOT and FHWA leadership are committed to implementing Complete Streets—reversing the

trend of increasing fatal and serious injuries and creating a transportation network that is healthier, greener, and more equitable for all users.

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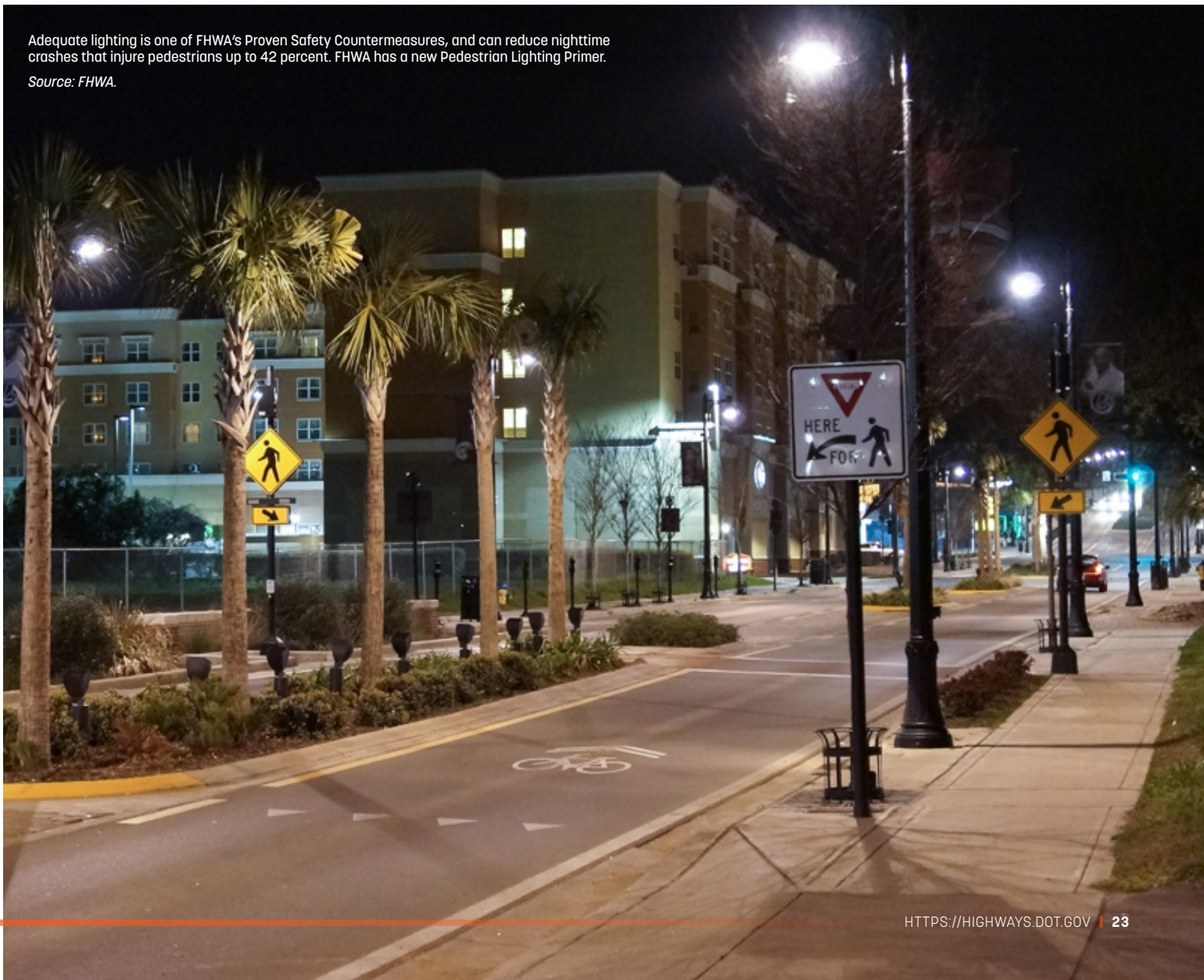
ANTHONY BOUTROS is a transportation specialist in FHWA's Office of Safety, focusing on advancing Complete Streets and equity in safety programs. He holds bachelor's degrees in sociology, public health studies, and international studies from Johns Hopkins University and is a Truman-Albright Fellow.

ANNA BITON is a community planner at the USDOT Volpe Center. Her work primarily focuses on safety, asset management, and performance management. Anna holds a B.S. in environmental engineering from the Massachusetts Institute of Technology and a master's degree in city and regional planning from the University of North Carolina at Chapel Hill.

For more information, see FHWA's Complete Streets website or contact Barbara McCann, Barbara.McCann@dot.gov, or Anthony Boutros, Anthony.Boutros@dot.gov.

Adequate lighting is one of FHWA's Proven Safety Countermeasures, and can reduce nighttime crashes that injure pedestrians up to 42 percent. FHWA has a new Pedestrian Lighting Primer.

Source: FHWA.





Integrating Wildlife Connectivity and Safety Concerns into Transportation Planning Processes

A manual for transportation agencies and their partners to include wildlife concerns in their transportation planning process.

by DANIEL BUFORD, PATRICIA CRAMER, and NOVA SIMPSON

Consideration of wildlife is increasingly becoming part of transportation planning processes as agencies act to reduce the risk of wildlife-vehicle collisions, improve wildlife connectivity, and save lives. From 2017 to 2022, the Nevada Department of Transportation furthered these efforts leading a transportation pooled fund study that included Federal, State, and Provincial agencies across the United States and Canada, and this article focuses on one study completed by the pooled fund study. There are other products from that study and other efforts, including provisions in the 2021 Infrastructure Investment and Jobs Act (also known as the Bipartisan Infrastructure Law or BIL), seeking to reduce wildlife-vehicle collisions and improve habitat connectivity for terrestrial and aquatic species.

This study, “The Strategic Integration of Wildlife Mitigation into Transportation Procedures,” took lessons learned from State departments of transportation (State DOTs) in the United States, provincial ministries of transportation (MoT) in Canada, and

their partners to create a voluntary manual titled *The Strategic Integration of Wildlife Mitigation into Transportation Procedures: A Manual for Agencies and Partners* to help transportation professionals and their partners incorporate wildlife concerns into planning processes. The manual will support participating agencies and their partners in reducing wildlife-vehicle collisions.

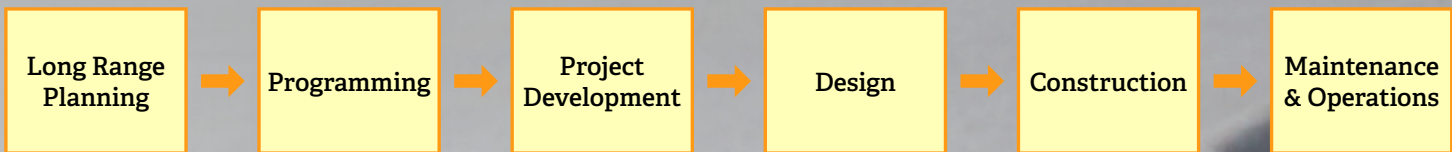
The mitigation the manual refers to helps reduce wildlife-vehicle collisions, and increase connectivity for wildlife beneath, above, and across roadways. This mitigation could take the form of wildlife crossing structures; retrofits of existing bridges and culverts; diversions of airborne birds, mammals, and insects above traffic; pathways along waterways and under bridges to allow for terrestrial passage; animal-detection driver warning systems; and other infrastructure-related additions or changes that reduce transportation impacts to wildlife.

The probability of collisions with wildlife is a factor that agencies consider when planning. The manual focuses on how

transportation agencies and their partners can reduce the challenges and effects of wildlife-vehicle conflict. This conflict is defined in the manual to include:

- “Consequences of both terrestrial and aquatic animals’ inability to safely move across roads to necessary habitat across the landscapes,
- Crashes with wildlife,
- Crashes caused by driver actions to avoid hitting wildlife,
- Road avoidance by animals that need to get across,
- Habitat fragmentation,
- Genetic isolation of wildlife populations due to roads, and
- Wildlife population extinction or extirpation.”

The manual was based on the professional experience and expertise of the research team, and the research project’s technical advisory panel for the Wildlife Vehicle Collision (WVC) Reduction and Habitat Connectivity Transportation Pooled Fund Project TPF 5(358).



The Transportation Planning to Maintenance and Daily Operations Process.

© Patricia Cramer.



Known as the “Matriarch” in Grand Teton National Park, grizzly bear “399” gave birth to a rare set of quadruplets in spring 2020. Although she is older than most grizzlies, 399 has regularly produced triplets and has given birth to a total of 16 cubs in her long lifetime. Roadway safety programs and proper planning enable her, her cubs, and countless other wildlife, to flourish in the region.

© Patrick / AdobeStock.com.

After 5 years of producing research projects on wildlife and transportation, this collaborative research effort ended in 2022. The partner agencies were led by the Nevada DOT and also included the State DOTs in Alaska, Arizona, California, Iowa, Michigan, Minnesota, New Mexico, Oregon, and Washington. Federal Highway Administration, the Ontario MoT, Parks Canada, and Animal Road Crossing (ARC) Solutions were also participants.

The partners guided the development of the manual and additional reports to provide recommendations that worked within the various agency constraints and planning and operating processes. Nevada DOT’s lead on this project stemmed from their commitment to addressing wildlife-oriented transportation solutions, as relayed by the Nevada DOT’s Environmental Services Chief Christopher Young: “For more than a decade, the Nevada Department of Transportation has been a leader in integrating wildlife crossings into its transportation system. The genesis came out of a vehicle, or user safety approach, but is evolving toward an integrated transportation ecology approach. The work provided by this pooled fund study assesses the groundbreaking work of transportation and resource

agencies across North America to provide actionable recommendations for implementing and ensuring the success of wildlife-oriented transportation solutions.”

The results of the study’s 2019 online survey of environmental personnel in State DOTs, Canadian MoTs, and U.S. Metropolitan Planning Organizations (MPOs) and Regional Transportation



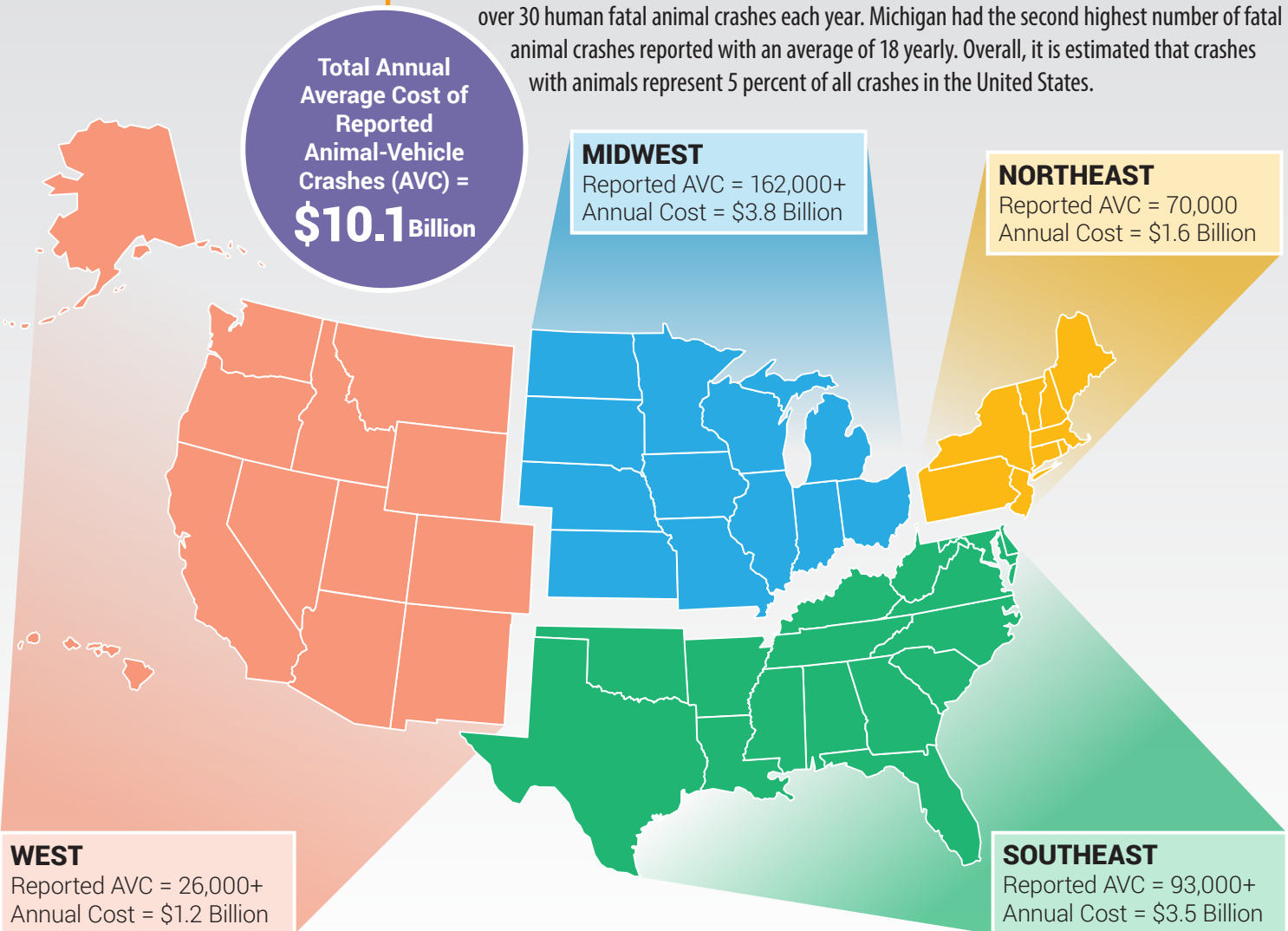
A female black bear teaches her cubs to move beneath Highway 93 in a wildlife crossing structure in Kootenay National Park, British Columbia, Canada. Parks Canada has installed crossing structures for large mammals in several of Canada’s mountain parks, and amphibian or reptile crossings in many parks across the country.

© Parks Canada.

The annual average number of animal-vehicle crashes reported in each U.S. region and their costs based on crash severity and FHWA crash costs.

@ Patricia Cramer.

Reported animal crashes are estimated to cost Americans over \$10 billion and cause 201.8 fatal crashes annually. This figure gives regional representation of those numbers and costs across the United States. Michigan had the greatest number of reported animal-vehicle crashes, with an average of over 54,000 each year. The State with the greatest number of reported human fatal animal crashes was Texas, with over 30 human fatal animal crashes each year. Michigan had the second highest number of fatal animal crashes reported with an average of 18 yearly. Overall, it is estimated that crashes with animals represent 5 percent of all crashes in the United States.



Planning Organizations (RTPOs) strongly influenced the manual. The invited State DOT participants were selected from the American Association of State Highway Officials (AASHTO) list of members from the AASHTO Committee on Environment and Sustainability. The invited MoT participants were selected after reviewing each MoT's online resources concerning their environmental professionals. MPO participants were selected from an FHWA master list of 404 MPOs. A smaller sample of these MPOs were selected that represented each State and came from areas near protected forests, preserves, and State or national parks. In all, the survey was sent to 237 State DOT and MoT professionals and 230 MPO personnel. The objectives of the surveys were to learn about the activities and opinions concerning agency inclusion of wildlife considerations in transportation planning procedures and processes. The completed surveys represented 57 respondents in 31 State DOTs, 6 Canadian MoTs, 39 respondents in 27 MPOs in 21 States, and 8 anonymous responses.

Three major themes evolved from the survey results:

1. The most important information sources for integrating wildlife needs were wildlife-vehicle crash data and hotspot analyses of these data;
2. The most important parts of the planning process were collaboration with wildlife agencies and inclusion of wildlife mitigation plans into long-range plans; and
3. The top four most common needs for improvement cited in the responses pertained to collaboration with wildlife agencies, dedicated funding, legislative support to consider wildlife movement needs, and instilling environmental stewardship and awareness within agencies.

The remainder of the research effort focused on these survey results and presented how agencies and partners could insert wildlife connectivity concerns and the reduction of wildlife-vehicle collisions into all aspects of transportation procedures. The manual presented dozens of case studies, websites, and links to best management practice manuals to illustrate how Federal, State, provincial, county, and city agencies and MPOs can institutionalize wildlife considerations into transportation planning processes and procedures.

State	Annual Average Number of Animal-Vehicle Crashes	Percentage of Total Crashes	Annual Average Number of Animal-Vehicle Fatal Crashes	Societal Cost Using State's Crash Costs	Societal Costs Using FHWA Crash Costs*
Alabama	2,424	1.59	1.40	\$100,946,835	\$89,537,280
Alaska	685	6.51	1.60	\$46,472,960	\$47,750,540
Arizona	2,117	1.74	1.80	\$72,641,014	\$77,466,560
Arkansas	2,495	3.20	3.67	\$64,581,667	\$104,943,533
California	2,131	0.45	4.80	\$251,844,156	\$149,765,700
Colorado	4,326	3.62	4.80	\$87,695,460	\$197,031,540
Connecticut	434	0.16	0.00	\$4,108,000	\$11,598,280
Delaware	1,531	5.87	0.40	\$33,709,140	\$33,709,140
Florida	**	**	**	**	**
Georgia	14,489	3.77	4.80	\$851,731,800	\$428,343,420
Hawaii	36	0.37	0.20	\$4,537,440	\$4,537,440
Idaho	1,542	6.31	1.80	\$47,538,374	\$74,580,420
Illinois	16,245	5.18	5.80	\$330,197,028	\$403,181,180
Indiana	16,362	7.62	6.00	\$359,596,580	\$324,639,740
Iowa	6,915	12.91	2.60	\$83,528,000	\$175,772,240
Kansas	9,846	15.65	4.2	\$166,192,800	\$219,511,100
Kentucky	6,565	4.80	5.2	\$158,227,125	\$193,327,720
Louisiana	2,222	1.34	1.2	\$73,233,190	\$73,979,540
Maine	5,671	16.51	1.40	\$103,153,400	\$127,922,720
Maryland	1,936	1.73	1.00	\$72,912,340	\$72,912,340
Massachusetts	2,969	2.12	0.80	\$90,119,680	\$65,057,420
Michigan	54,328	17.30	18.75	\$720,359,950	\$1,122,628,350
Minnesota	1,944	2.33	6.00	\$26,780,020	\$153,436,320
Mississippi	4,222	5.30	2.80	\$85,626,500	\$110,992,380
Missouri	4,550	3.05	6.60	\$186,598,040	\$221,883,880
Montana	3,450	15.14	4.20	\$100,302,700	\$157,838,360
Nebraska	2,659	7.52	2.00	\$95,103,644	\$94,967,760
Nevada	625	1.30	1.80	\$27,065,597	\$44,770,940
New Hampshire	1,536	4.51	0.60	\$39,879,780	\$34,038,560
New Jersey	10,015	3.65	2.60	\$156,111,786	\$209,053,000
New Mexico	1,615	4.24	1.60	\$27,209,440	\$62,592,060
New York	40,465	8.19	6.20	\$292,698,853	\$757,995,900
North Carolina	21,658	7.15	3.60	\$424,460,520	\$509,066,100
North Dakota	2,749	18.84	1.20	\$56,551,220	\$56,551,220
Ohio	20,990	7.03	6.80	\$296,927,145	\$525,951,680
Oklahoma	1,451	2.08	5.40	\$214,329,840	\$154,712,880
Oregon	1,679	3.07	1.60	\$115,306,260	\$134,632,140
Pennsylvania	4,121	3.24	12.40	\$327,329,692	\$304,875,400
Rhode Island	989	2.02	0.00	\$10,212,014	\$22,345,080
South Carolina	3,151	2.30	6.20	\$124,648,200	\$182,486,240
South Dakota	4,845	25.97	2.00	\$126,407,780	\$99,953,980
Tennessee	8,967	4.37	5.00	\$285,109,100	\$285,109,100
Texas	11,614	0.02	30.80	\$2,043,960,200	\$917,888,680
Utah	3,374	5.68	3.00	\$137,637,220	\$121,227,460
Vermont	324	2.82	0.60	\$9,653,686	\$15,307,540
Virginia	6,405	4.99	2.20	\$133,999,660	\$195,799,100
Washington	1,665	3.17	0.80	\$79,308,460	\$62,114,420
West Virginia	1,795	5.15	3.20	\$62,499,883	\$107,399,960
Wisconsin	20,710	16.48	8.80	\$416,241,806	\$443,596,260
Wyoming	2,958	20.84	1.60	\$157,765,296	\$71,447,360
Total	345,795	5.14	201.82	\$9,783,051,280	\$10,056,229,963

*2018 FHWA estimated societal costs from Harmon et al (<https://safety.fhwa.dot.gov/hsp/docs/fhwa17071.pdf>).

**Numbers and Costs could not be calculated due to reporting complexities in different data worksheets.

The Challenges

Wildlife presents challenges for transportation agencies because of the risks involved with wildlife-vehicle collisions; the conflicts or impacts to survival that roads, railways, and vehicles pose to animals; the protection status of certain species; and the historically limited funding for addressing these challenges.

Transportation agencies' mission statements and long-range plans generally include goals to reduce the number of dangerous crashes. Reducing crashes with wildlife contribute to this safety goal. Five years of crash data with severity codes for each animal crash were obtained from every State DOT, and animal crashes were used rather than wildlife crashes because 12 States do not report if the animal involved in the crash was wild or domestic. The severity codes ranged from property damage only crashes, to three levels of injury crashes, to fatal crashes, and each crash type had an estimated cost to society. The crashes were analyzed and the annual average number of reported animal-vehicle crashes and their cost for every State were calculated. These numbers were combined for the United States to illustrate how the reduction of wildlife-vehicle collisions is a pressing public safety issue.

For the national perspective, the 2018 FHWA publication, *Crash Costs for Highway Safety Analysis*, was used to determine dollar-value estimates for various types of crashes. The publication estimates that a human life lost in a vehicle crash is valued at \$11,295,400 and the value of a property damage only crash as \$11,900, with three levels of injury crashes valued between the two. These values were used to calculate the annual average reported animal crash costs for each State, and for the United States overall.

The conflicts that roads and vehicles pose for wildlife are also a concern to transportation agencies. Wildlife moves across the landscape and waterways to access food and seasonal ranges, reproduce, and escape the effects of climate change. Our transportation routes can place populations of animals at risk by interrupting these movements. The 2008 FHWA report titled *Wildlife-Vehicle Collision Reduction Study: Best Practices Manual: Report to Congress* estimated that 21 Federally listed or endangered wildlife species are threatened by vehicle collisions. In 2018, 11 western States listed their top wildlife migration corridors for mule deer, elk, and pronghorn in accordance with Secretary of the Interior Order 3362, which instructs U.S. Department of Interior agencies and western State wildlife agencies to take steps to protect ungulate migrations. Every State listed vehicle collisions and roads as major threats to these species and their migratory routes, which highlights the need to protect and accommodate wildlife in transportation planning.

According to survey participants, limited funding has been a part of the challenge when it comes to including wildlife concerns and mitigation efforts in transportation projects, and there has also been limited commitment among transportation agencies and MPOs for addressing wildlife challenges. These two issues were listed by the survey participants as the top reasons their agency did not do more to mitigate roads for wildlife movement. Despite these limitations, the research team found there are several ways to address these concerns, from provisions in national transportation legislation that have set aside designated funding for wildlife mitigation efforts to institutionalizing wildlife considerations into transportation planning processes.

Constructing large structures such as this wildlife underpass in Arizona along SR-260 entail inclusion of these structures in early planning, such as in the long-range plans of agencies.

© Terry Brennan.



The Solutions

Solution 1—Get Wildlife Considerations into the Planning Process Early

Key actions for instilling State or provincial transportation agency, MPO or RTPO, and Tribal consideration of wildlife connectivity, and a reduction of wildlife-vehicle collisions, are for wildlife to be considered in each organization's long-range planning and programming processes through institutionalized procedures. These processes can result in creating wildlife crossing structures and other wildlife mitigation projects as standalone projects or as part of other transportation projects.

Long-range planning is generally the first step in the transportation planning process. When the reduction of wildlife-vehicle collisions and consideration of wildlife connectivity are part of the goals and objectives of an agency's long-range plans, wildlife concerns can become part of an agency's processes. Wildlife concerns can be added with simple statements, such as including the reduction of wildlife-vehicle collisions as part of a mission statement's safety goal. An acknowledgement of the risks posed by wildlife crashes is an important first step in reducing them.

For example, Steve Gent, director of traffic safety from Iowa DOT says, "In Iowa, 14 percent of all reported crashes involve animals; therefore, it is critical that we consider these crashes as part of our transportation planning processes." If there is an environmental component, such as a "Do No Harm" statement or protecting the environment, then wildlife connectivity and the creation of wildlife crossings structures can be part of those goals. With these common goals, concerns for wildlife can be better incorporated into each potential project.

Incorporating concerns for wildlife includes considering the National Environmental Policy Act, or NEPA, definition of mitigation in governmentwide NEPA implementing regulations, reflecting the "Do No Harm" conservation hierarchy. Key aspects of the definition can be summarized as avoiding, minimizing, and compensating for impacts to resources. With input from partner agencies, project impacts that would

seriously harm wildlife populations may be mitigated or entirely avoided. With enough data and planning, standalone wildlife mitigation projects can be included in an agency's long-range plans to rectify situations where motorists and wildlife are at risk of collisions and where wildlife need assistance in connectivity across transportation corridors. Finally, all potential projects in the long-range plans that occur in areas with wildlife should consider and mitigate for impacts to wildlife.

Programming is usually the next step in the transportation process. Here, too, wildlife concerns should be identified and incorporated into transportation plans, which in the United States, results in a State Transportation Improvement Program (STIP). STIPs are multiyear planning documents that list potential projects in an agency's long-range plan in detail and, with funding sources identified. Each transportation agency has its programming process for prioritizing what projects are moved to the STIP. The information sources used to prioritize projects in programming include planning studies, MPOs' and RTPOs' transportation plan priorities, stakeholder priorities, and priorities of the transportation agency's divisions at headquarters and the districts. The plans and information, external relationships, and different levels of professionals in a transportation agency offer a rich variety of approaches to include wildlife and wildlife-vehicle collision safety concerns in upcoming STIP projects, or create standalone wildlife transportation mitigation projects. The inputs to the programming step that help identify the importance of wildlife connectivity and the reduction of wildlife-vehicle collisions include:

- Data and hotspot analysis on wildlife-vehicle collisions.
- Agency maps of wildlife habitats and where wildlife need to move across roads.
- Locations of upcoming transportation projects in the long-range plan and the STIP, and where those areas intersect the wildlife-vehicle collision hotspots and wildlife movement maps.
- Expertise of personnel within agencies whose role is specified to put forward projects that help reduce wildlife-vehicle collisions and find ways to provide connectivity for wildlife populations.



Desert bighorn sheep move across the new wildlife overpass on Interstate 11 in southeastern Nevada.

© Nevada DOT.

The Nevada DOT prioritized areas of wildlife-vehicle conflict across the State with a study that identified both the animal crash hotspots and the wildlife habitats that are bisected by roads. The results have been used to recognize areas with wildlife conflicts for ongoing consideration and planning of potential wildlife crossing structures and other mitigation measures to reduce wildlife-vehicle collisions and restore wildlife connectivity.

New Jersey's Division of Fish and Wildlife maintains an interactive website that helps identify key areas where actions are needed for wildlife connectivity through its Connectivity Habitat Across New Jersey program. The interactive map helps to guide mitigation of road barriers to wildlife movement and can be used in early long-range planning.

Solution 2—Partnerships

Transportation agencies' stakeholders can help institutionalize wildlife concerns throughout the transportation planning process. The most successful efforts to date to include wildlife crossing structures in transportation projects, and overall, in a transportation agency's planning, come from working with other Federal and State agencies, nonprofit organizations, Tribes, and members of the public interested in establishing mitigation measures to reduce wildlife-vehicle collisions. These efforts include working with MPOs and RTPOs in the development of their transportation plans, which are included in the STIP;

working with Federal agencies and Tribes to identify the most important areas to apply mitigate measures for wildlife and to secure Federal funding; and working with the State or provincial wildlife agency to identify key areas for wild animal movement while securing funding and public support for wildlife mitigation projects.

MPOs and RTPOs can be important contributors to providing wildlife connectivity mitigation. MPOs cover urbanized areas with a population of more than 50,000 while RTPOs cover geographic areas with a population of less than 50,000. MPOs and RTPOs carry out metropolitan and regional transportation planning processes respectively, which are incorporated in the development of long-range statewide transportation plans and STIPs. However, State DOTs administer only 18.8 percent of the roads across the United States. The remaining roads are under the jurisdiction of MPOs and RTPOs, Federal agencies, counties, and others. Thus, it is important these organizations identify wildlife connectivity and wildlife-vehicle conflict problem areas as important factors in their transportation plans and help find funding sources to support wildlife mitigation actions, creating win-win solutions.

In Tucson, AZ, Pima County residents voted to impose a local tax that would fund wildlife connectivity projects. As of 2022, the tax raised \$45 million for wildlife crossings and land protection projects into 2026. Pima County authorized the Regional Transportation Authority to build several



Mule deer used the SR-77 overpass placed in conjunction with the Regional Transportation Authority and Arizona Department of Transportation.

© Arizona Game and Fish Department.

Colorado Governor Polis' 2019 executive order "Conserving Colorado's Big Game Winter Range and Migration Corridors" is available at: <https://drive.google.com/file/d/1HokP2Vsh749PpJtazPgldLgEjBYjypro/view>.

The text of the Infrastructure Investment and Jobs Act, also known as the Bipartisan Infrastructure Law, is available at: <https://www.congress.gov/117/plaws/publ58/PLAW-117publ58.pdf>.

For more information on 2022 FHWA Environmental Excellence Awards, visit: https://www.fhwa.dot.gov/environment/environmental_excellence_awards/eea_2022/#a13.

See the FHWA Pooled Fund website for Wildlife Vehicle Collision Reduction and Habitat Connectivity at <https://pooledfund.org/Details/Study/610>.

To view the Nevada DOT study, "Prioritization of Wildlife-Vehicle Conflict in Nevada" which identifies both animal crash hotspots and the wildlife habitats that are bisected by roads, visit: <https://www.nevadadot.com/home/showdocument?id=16038>.

To access the New Jersey's Division of Fish and Wildlife interactive map that helps guide the mitigation of road barriers to wildlife movement, visit: <https://www.state.nj.us/dep/fgw/ensp/chanj.htm>.

For more information on the New Mexico Wildlife Corridors Action Plan, visit: <https://wildlifeactionplan.nmdotprojects.org/>.

To access statistics on State DOT administration of roads across the United States, visit: <https://www.fhwa.dot.gov/policyinformation/statistics/2020/hm10.cfm>.

For more information on the Colorado's Wildlife and Transportation Alliance, visit: <https://www.coloradowta.com/home/>.

For more information on British Columbia's Ministry of Transportation and Infrastructure wildlife awareness programs, visit: <https://www.tranbc.ca/tag/bc-wildlife/>.

The TxDOT-made movie on the project, "Incorporation of Wildlife Crossings into TxDOT's Projects and Operations" is available at: <https://www.youtube.com/watch?v=YuCR-zGSbCA>, and the report is available at: <https://library.ctr.utexas.edu/ctr-publications/0-6971-1.pdf>.

The website, www.wildlifeconnectivity.org provides links to several of the second author's studies, slide shows, reports, and media articles that also demonstrate how States, MPOs, and partners have addressed wildlife concerns in transportation.

wildlife crossings with Arizona DOT and more are planned in southern Arizona.

From the development of long-range transportation planning to everyday transportation operations and maintenance, wildlife agencies are important partners for transportation agencies. Federal and State wildlife professionals can identify locations of protected and other important wildlife species. This work in turn helps transportation agencies avoid and minimize transportation impacts to wildlife using crossing structures and other types of mitigation measures that reduce crashes and provide safe connectivity. Some wildlife biologists can also suggest the optimal crossing structures for target species; however, transportation ecologists, who are often outside these agencies, may know best the science and practice of transportation ecology and the proven effective designs for specific species. Wildlife agencies and nonprofit organizations can also provide funding for projects.

The most robust programs in States and provinces with dozens to hundreds of wildlife crossing structures have a memorandum of understanding, or MOU, between the wildlife and transportation agencies, regular meetings, and some regulatory power for the State, provincial, or Federal wildlife agency to approve transportation projects. There are also active research programs in States and provinces that create wildlife crossing structures and other mitigation measures, which evaluate how well the mitigation infrastructure meets performance measures, and assists in developing future effective mitigation.



Colorado
Wildlife
Transportation
Alliance

@ Colorado's Wildlife and Transportation Alliance.

In 2017, Colorado's DOT and Colorado Parks and Wildlife, in coordination with FHWA, sponsored a two-day Wildlife and Transportation Summit that resulted in the formation of the Wildlife and Transportation Alliance. The working relationships among these agencies and many other members of the Alliance have resulted in prioritization of top wildlife connectivity areas across the State. Some wildlife mitigation measures and additions to upcoming projects to help wildlife move under roads have been developed at these locations. Additionally, Governor Polis' 2019 executive order, "Conserving Colorado's Big Game Winter Range and Migration Corridors," reinforced the Alliance's ongoing work.

Legislation promoted by nonprofit conservation organizations at the State and national level have resulted in both providing additional funds for wildlife mitigation efforts, and in persuading transportation agencies to identify and prioritize areas of wildlife connectivity or corridors across transportation infrastructure. The most significant legislation in the U.S. is the BIL, which has 10 funding sources that can be used to create wildlife crossing structures. These funding sources include the Wildlife



Mule deer pass over I-15 in Utah on the United States' first wildlife overpass. The Utah DOT and Division of Wildlife Resources work together to create wildlife overpasses and underpasses throughout the State.

@ Patricia Cramer.



New Mexico's Wildlife Corridors Action Plan.

@ New Mexico DOT.

Crossings Pilot Program (23 U.S.C. 171), which is a 5-year, \$350 million program for reducing the number of wildlife-vehicle collisions and, in carrying out that goal, improving habitat connectivity for terrestrial and aquatic species. This program will fund wildlife-transportation mitigation projects through a competitive process providing grants to eligible entities including Federal land management agencies, States, Tribes, and local land management and transportation agencies.

States are also passing legislation to incentivize collaboration between transportation and wildlife agencies to identify places where wildlife need to move across roads, and to institutionalize efforts to work together on behalf of wildlife. In 2019, the New Mexico governor signed the New Mexico Wildlife Corridors Act. The New Mexico DOT then supported a study where wildlife movement requirements and areas of wildlife-vehicle collision hotspots were combined with other information to create the New Mexico Wildlife Corridors Action Plan. The plan provides a list of the top 11 priority locations for wildlife mitigation measures and recommends locations and types of structures to be placed to provide wildlife connectivity.

Solution 3—Agency Culture Change

Transportation agencies can also make changes from within to help create a culture of awareness for wildlife concerns while institutionalizing actions to ensure wildlife will be included in planning and other parts of their transportation processes.

Transportation agencies can include wildlife consideration in their professional manuals to institutionalize wildlife concerns. Texas DOT (TxDOT)

commissioned a study, “Incorporation of Wildlife Crossings into TxDOT’s Projects and Operations,” to assess how recommendations to consider wildlife can be written into TxDOT professional manuals. This resulted in specific instructions for 18 professional manuals, including manuals for planners, traffic safety engineers, and maintenance professionals.

Transportation agencies can also create a formal education program for all professions to better understand the need for wildlife connectivity and the prevention or reduction of wildlife-vehicle collisions. The Vermont Transportation Agency offers the Vermont Highways and Habitat Program, where agency participants go into the field to see how wildlife move near roads, track and photograph wildlife, handle snakes, other reptiles, and amphibians, and work with wildlife professionals to better understand how the transportation agency’s actions affect wildlife of all kinds. These working field trips help planners, engineers, and maintenance personnel discover how the agency’s roads intersect with wildlife movement paths and what they can do to help the wildlife. This training program won a 2022 FHWA Environmental Excellence Award.

A transportation agency can have an official wildlife program where a point person and team are the go-to professionals to help with all things wildlife. In British Columbia’s Ministry of Transportation and Infrastructure, the wildlife program leader briefs all new hires individually on wildlife concerns in transportation. This individual also creates a robust social media presence to inform employees and the public about wildlife and road compensation projects.

Next Steps and Recommendations

“The Strategic Integration of Wildlife Mitigation into Transportation Procedures” study found that transportation agencies can make great gains by installing wildlife crossing structures in larger transportation projects. However, these efforts are often inadequate because wildlife mitigation practices are not typically institutionalized within their organizations. Some of the opportunities for transportation agencies to include wildlife considerations in everyday actions are based on incremental changes that do not garner headlines and attract social media stories.

The manual *The Strategic Integration of Wildlife Mitigation into Transportation Procedures: A Manual for Agencies and Partners* recommends three major changes for agencies to consider:

1. Wildlife need to be considered in a transportation agency’s standardized procedures.
2. Transportation agencies and MPOs should work with outside agencies and others to plan, fund, and construct wildlife crossing structures.
3. Transportation professionals need to be inspired to consider wildlife in their everyday actions.

These three changes create a culture of care for wildlife that results in actions to mitigate barriers to wildlife movement and makes roads safer for the motoring public.

For more information, see *The Strategic Integration of Wildlife Mitigation into Transportation Procedures: A Manual for Agencies and Partners* (<https://pooledfund.org/Details/Study/610>) for how agencies and partners can standardize wildlife considerations in transportation procedures, from planning and project construction to everyday maintenance and operations and include wildlife in their processes. Scroll to the Documents pull down menu, and look for publications with Cramer as the author. Note: There are other parts of the Transportation Pooled Fund Study research effort that have reports on this site as well.

DANIEL BUFORD is an ecologist with FHWA’s Office of Planning, Environment, and Realty (HEP). He was the FHWA Technical Liaison for the Wildlife Vehicle Collision Reduction and Habitat Connectivity Pooled Fund Study.

PATRICIA CRAMER is an independent wildlife researcher specializing in wildlife crossing structures, and planning for wildlife in transportation. She specializes in western States. Dr. Cramer was the principal investigator for this study.

NOVA SIMPSON is Nevada Department of Transportation’s Northern Nevada biological supervisor and large mammal mitigation specialist. She was the study champion and project manager for the pooled fund study.

For more information on the integration of wildlife connectivity into the transportation planning process, visit <https://www.wildlifecconnectivity.org/national-study-to-integrate-wildlife-into-transportation>, or email Dr. Patricia Cramer (cramerwildlife@gmail.com), Nova Simpson (NSimpson@dot.nv.gov), or Daniel Buford (daniel.buford@dot.gov).



A screen shot of the British Columbia Ministry of Transportation and Infrastructure webpage on wildlife programs.

@ British Columbia Ministry of Transportation and Infrastructure.

THE PARKING IMPERATIVE:

A Safe and Healthy Supply Chain Rests with Truck Parking

While growth in freight demand continues to outpace truck parking supply, new Federal funding and State freight plan requirements may catalyze development to help meet the need.

Trucks parked at night at a truck stop in Ohio.

Source: FHWA.

by CAITLIN HUGHES and JEFF PURDY

The lack of safe truck parking is a consistent concern expressed by commercial motor vehicle operators according to national surveys conducted under Section 1401 of the Moving Ahead for Progress in the 21st Century (MAP-21) Act (Public Law [P.L.] 112-141), commonly referred to as Jason's Law. This issue stems in part from an active economy, which places pressure on the trucking industry to move more goods by both long- and short-haul shipments and to make last-mile deliveries.

Acting Administrator for the Federal Highway Administration Stephanie Pollack has flagged this critical concern facing the trucking industry and the Nation in a September 30, 2022 press release from the U.S. Department of Transportation (<https://www.transportation.gov/briefing-room/biden-harris-administration-brings-together-trucking-community-help-expand-truck>), stating that “truck parking is a safety issue—both for truck drivers and all other road users, which is why FHWA has updated our guidance to ensure there is no question about eligibility for truck parking projects in new formula and discretionary grant programs authorized under the Bipartisan Infrastructure Law [BIL].” She further notes that “this new information will help States, localities and other eligible entities identify eligible formula funding sources



Truck parked at a factory in Phoenix, AZ.

Source: FHWA.

Bipartisan Infrastructure Law - Section 21104: Improving State Freight Plans

SEC. 21104. IMPROVING STATE FREIGHT PLANS.

“(10) <> the most recent commercial motor vehicle parking facilities assessment conducted by the State

“(11) the most recent supply chain cargo flows in the State, expressed by mode of transportation;

Commercial Motor Vehicle Parking Facilities Assessments.--As part of the development or updating, as applicable, of a State freight plan under this section, each State that receives funding under section 167 of title 23, in consultation with relevant State motor carrier safety personnel, shall conduct an assessment of--

“(1) the capability of the State, together with the private sector in the State, to provide adequate parking facilities and rest facilities for commercial motor vehicles engaged in interstate transportation;

“(2) the volume of commercial motor vehicle traffic in the State; and

“(3) whether there exist any areas within the State with a shortage of adequate commercial motor vehicle parking facilities, including an analysis (economic or otherwise, as the State determines to be appropriate) of the underlying causes of such a shortage.

MAP-21

Section 1401 of MAP-21, also known as “Jason’s Law,” was intended to address the commercial motor vehicle parking shortage along the National Highway System to improve safety and directed the U.S. Department of Transportation to conduct a survey and a comparative assessment to:

1. Evaluate the capability of each State to provide adequate parking and rest facilities for commercial motor vehicles engaged in Interstate transportation.
2. Assess the volume of commercial motor vehicle traffic in each State.
3. Develop a system of metrics to measure the adequacy of commercial motor vehicle parking facilities in each State.

Jason’s Law also expanded the eligibilities for Federal funding to include a variety of activities including construction as well as truck parking information systems.

and apply for discretionary grants to fund truck parking projects that not only support the increased demand for truck deliveries and strengthen our supply chains, but also provide safe truck parking, which is critical to protect the truck drivers we rely on, as well as the traveling public.”

Public and private sector partnering is a key strategy in successfully addressing truck parking safety and capacity concerns. Such cooperation will help meet the safety rest needs of drivers and will help provide appropriate staging areas for transloading goods being moved by multimodal operations—operations where trucking meets ports, airports, and intermodal rail facilities. The National Association of Truck Stop Operators prefers this approach, and has been quoted as saying that, “To the extent that Federal dollars are utilized for truck parking, we think that partnering with the private sector in the existing locations is the best way to maximize the use of those dollars” (<https://www.transportdive.com/news/national-coalition-of-truck-parking-pete-buttigieg-federal-grant-money-awards-jasons-law/633141/>).

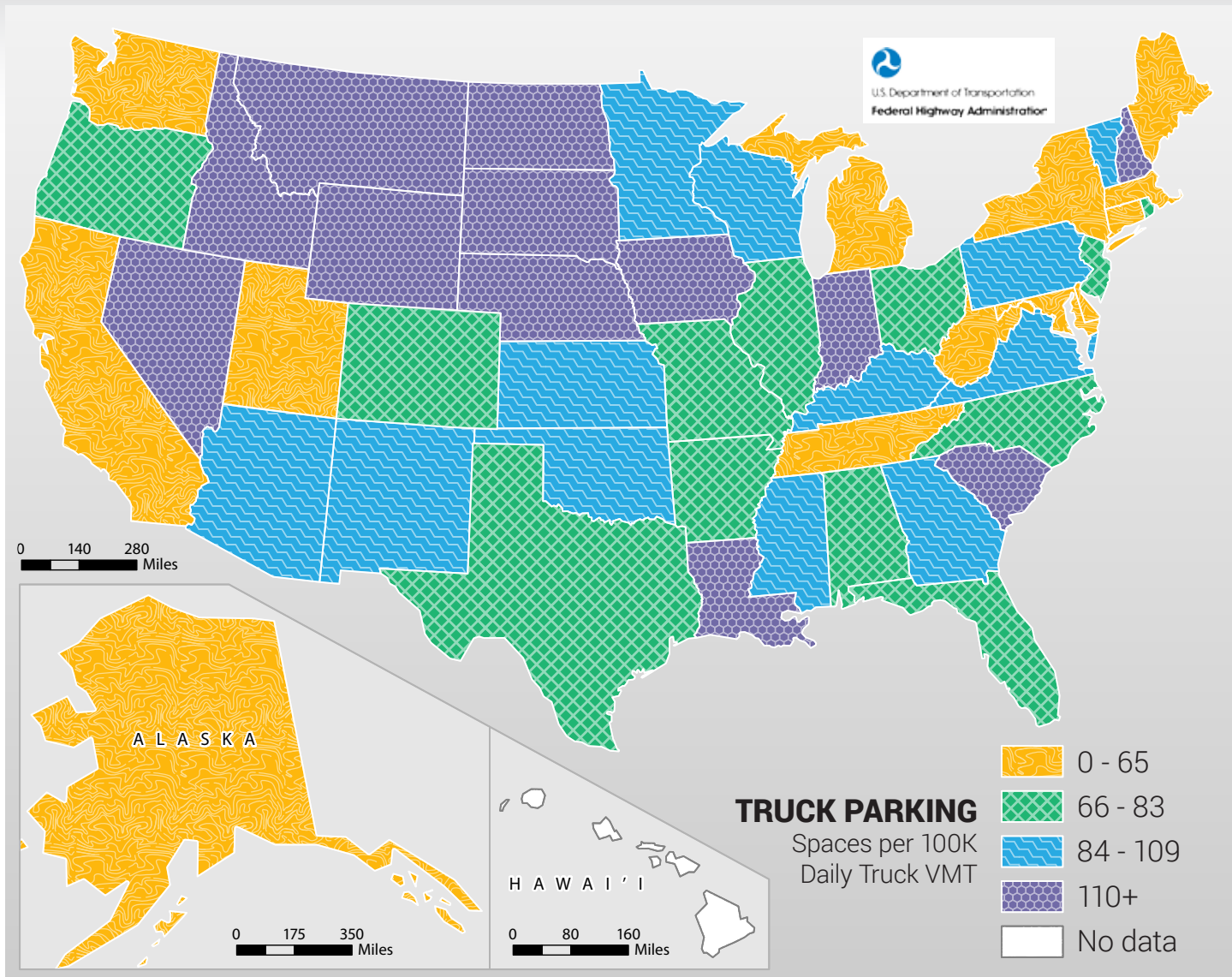
Although the need for truck parking has long been identified, ongoing growth in trucking operations is outpacing the construction of new spaces. Data collected for the Jason’s Law Truck Parking Surveys, published by FHWA in 2015* and 2020** confirmed this trend. Although the majority of truck parking is

built and maintained by the private sector (i.e., truck stops and private lots), public sector providers of transportation infrastructure (i.e., counties, cities, States, some port authorities and toll road operators, etc.) are finding that roadway safety and the need to resolve supply chain issues are two compelling reasons to invest in the development of truck parking spaces. Drivers need adequate rest to continue to safely operate on the Nation’s roadways and continue to play a vital role in the American economy. Without safe parking, drivers are forced to park in unsafe locations, like highway shoulders and freeway exit/entrance ramps, creating a safety hazard for the truck driver as well as other motorists. The inability to find safe parking can result in fatigued drivers and unsafe driving conditions, loss of productivity and income, increased congestion, and higher costs for businesses and consumers.

New and expanded transportation funding programs resulting from the passage of the 2021 BIL offer opportunity and support for entities seeking to invest in truck parking space development, as these programs are broad enough to provide States, local governments, public ports, and other public sector organizations with funding—individually or in partnership with the private sector—to address truck parking shortages. Although BIL did not establish a dedicated truck parking program, and does not require expansion of truck parking, many Federal funding programs are

* The survey published in 2015 was conducted in 2014.

** The survey published in 2020 was conducted between 2018 and 2019.



Total public and private truck parking spaces per 100,000 daily truck vehicle miles traveled, as a measure relative to the demand for truck parking.

Source: FHWA.

eligible for the construction or expansion of truck parking. Funding can also be used for technologies that would support safe truck parking operations, such as reducing emissions through truck stop electrification and providing truck drivers with information on real-time truck parking availability.

In addition to creating funding programs, BIL directs States to assess truck parking needs as part of the revised State Freight Plan requirements. This must be included in the next State Freight Plan update to continue eligibility for use of National Highway Freight Program funding. This new planning requirement should improve State, regional, and local government understanding of truck parking needs and can inform private sector parking developers about the level of truck parking needs and locations. The

U.S. Department of Transportation is actively providing information to States, and other eligible stakeholders, as guidance addressing the planning requirements and eligibility of various formula and grant funding programs.

Increasing Demand, Lagging Supply

FHWA has been surveying truck parking providers (both public and private sector), drivers, and law enforcement since the enactment of Jason’s Law—as part of MAP-21—in 2012. The latest survey results are available online: (https://ops.fhwa.dot.gov/Freight/infrastructure/truck_parking/workinggroups/2020/mtg/mtg12012020_jasons_law.htm).

In comparing data from the 2015 and 2020 surveys, FHWA found that truck vehicle miles traveled (TVMT) increased by 15 percent between 2012 and 2017.

Moreover, data from the 2020 assessment indicate slower growth in truck parking capacity expansion—private truck parking spaces increased 11 percent, whereas public truck parking spaces increased by 6 percent.

Based on information collected from prior Jason’s Law surveys, 36 States reported an increase over 5 years in daily TVMT. Interstates connecting major metropolitan areas of the East Coast, Midwest, and Southeast have particularly high truck volumes; other concentrations of high truck volumes occur along major east-west interstate highways and along the West Coast. TVMT is a good indicator of parking demand since these regions and corridors of high TVMT coincide with the locations where surveyees have consistently indicated truck parking shortages.

From data in the 2020 assessment, approximately 313,000 truck parking

spaces were documented nationally; nearly 40,000 parking spaces were located in public rest areas and toll road service plazas. The majority, however, were located at privately operated truck stops and establishments. Private truck stops are generally much larger than public rest areas, with an average of 50 spaces per private facility and 21 spaces per public facility. Data from this assessment also indicated a 10 percent increase in the number of private truck parking facilities and an 11 percent increase in the number of parking spaces at these facilities across the Nation.

States are opening more public locations to truck parking. A comparison of the responses from States in the 2015 and 2020 surveys indicated a 13 percent increase in the number of public truck parking facilities. These new public facilities and expansion at existing facilities has increased the number of parking spaces by nearly 6 percent. Although there has been expansion in some areas, 57 public facilities closed since the original Jason's Law Truck Parking Survey in 2015; the expense of maintaining these facilities may have played a role in closing them, as that concern is raised by State departments of transportation (DOT) in meetings with FHWA.

In the 2020 survey of truck drivers, FHWA received 11,696 responses from drivers—a 43.5-percent increase over the 2015 survey reporting. Ninety-eight percent of drivers responded that they have problems finding safe parking. Almost 75 percent of drivers reported regularly experiencing a problem finding a safe location to park their truck for rest—one or more times a week—in the year prior to being surveyed.

This shortfall has serious implications as expressed by Robin Hutcheson, administrator of the Federal Motor Carrier Safety Administration (FMCSA), an agency within USDOT. Hutcheson states, “Parking facilities provide commercial motor vehicle operators, including buses and trucks, locations where drivers can rest, recharge, and find needed services. Drivers also need to take breaks in compliance with hours-of-service [HOS] regulations. Without safe truck parking, drivers may end up parking in unsafe locations—or worse, continue to drive beyond HOS limits.”

Via the 2020 survey, commercial vehicle operators were asked to report which States have a shortage of safe truck parking. While shortages were identified across the United States for both for

“One of the leading causes of truck crashes is driver fatigue. It is clear that adequate rest for drivers is foundational for safe operations. We have heard loud and clear from drivers—they need more places to rest and they need to be safe and secure while doing so.”

—FMCSA Administrator Robin Hutcheson

public and private facilities, drivers cited the greatest shortages in large, populous States on both the East and West coasts, as well as Illinois and Tennessee. Drivers reported fewer parking shortages in Hawaii, Alaska, North Dakota, South Dakota, and Montana. Drivers reported the greatest increases in parking shortages in States along the southern part of the Interstate-95 corridor as well as coastal States in the Pacific Northwest, Pennsylvania, and West Virginia.

The Trucker and the Supply Chain

Modern supply chains are highly optimized and depend on freight arriving at its destination on time. The reliability of shipments is an important variable for trucking companies and the location and availability of truck parking affects route planning and efficiency. Safe and adequate truck parking is tied to several factors in addition to parking availability:

1. Federal rest requirements HOS for commercial vehicle operators;
2. Driver safety off the road at truck parking facilities;
3. Truck operations in long-haul supply chains, and
4. Impacts on local communities (<https://ops.fhwa.dot.gov/publications/fhwahop17026/index.htm#s4>).

Public agencies have studied parking at national, regional, and local levels. Now, in an era of supply chain challenges and issues, truck parking considerations are beginning to be addressed in stand-alone truck parking plans and in more comprehensive freight

Parking Inventory Results from the 2020 Jason's Law Truck Parking Survey

- Approximately 313,000 truck parking spaces exist nationally:
 - 40,000 at public rest areas.
 - 273,000 at private truck stops.
- 2014-2019 growth in truck parking spaces:
 - 6 percent increase in public parking spaces.
 - 11 percent increase in private parking spaces.

plans by State DOTs and metropolitan planning organizations (MPO).

“I’ve heard from countless truckers across the country about how the shortage of truck parking costs them time and money—not to mention making our roads less safe and weakening our supply chains,” said U.S. Transportation Secretary Pete Buttigieg. “We’re using funds from President Biden’s [BIL] to help address truck parking shortages, and we’re working with state and industry leaders to develop more parking that will improve safety and quality of life for our Nation’s truck drivers.”

An underinvestment in infrastructure, as well as a healthy economy propelling more trucks on the road, has led to unsafe and unauthorized parking on highway shoulders and at interchange ramps, which is a key area of concern for many States. Congestion, construction, and decreased roadway reliability has a downstream effect on truck parking, causing drivers to fall short of where they planned to rest on long-haul trips.

Public agencies are now studying truck parking in the broader context of economic development opportunities and constraints, and the differences in parking capacity and information needs among various segments of the trucking industry are being examined in more detail. Long-term rest requirements, short-term parking activity, and staging near major freight generators have very different parking characteristics for the trucking industry.

Parking shortages can create strain on local communities from unauthorized parking, excessive truck movements on local roadways (and around schools and residential areas), roadway wear, idling, noise, and emissions. Further, some areas are unable to sufficiently enforce local ordinances while at the same time, there are no good alternatives for drivers in search of parking and truck parking bans compromise the ability of drivers in those areas to find adequate parking. Some of these issues compound existing equity and health and safety issues. In these locations, communication and collaboration is vital to identify solutions to meet the variety of community and trucking needs.

To address very unique issues affecting long-haul, interstate truck drivers during the height of the pandemic, FHWA signaled to States that rest areas should remain open and accessible to

Why is Truck Parking Important?

Just as the trucking industry is critical to our Nation's economic success and way of life, **SAFE, ACCESSIBLE TRUCK PARKING** is critical to truck drivers.



Long haul

Long-haul drivers are on the road days and sometimes weeks at a time traveling across the country.



Staging

Truck drivers picking up and delivering freight at manufacturing plants, warehouses, and distributions centers need a place to park to await their appointment time.



30-minute break

As part of the federally mandated 30-minute break, the driver must be off duty, meaning they are no longer working, and will not have to move the truck for any reason.



Emergency

Drivers may be impacted by an incident that has either closed or severely congested the roadway, and they need a place to park.



Time off

Independent drivers don't have a company facility to provide parking during time off. They are done with their work week and need a place to park their truck while off-duty.

Safe, accessible truck parking is important, and critical, to truck drivers.

Source: FHWA.

truck drivers, and that States would not be penalized for allowing the provision of food trucks to provide meals for drivers at Interstate System rest areas—something that generally falls under the longstanding ban on commercial activities at rest areas within the Interstate right-of-way. While these short-term, emergency actions helped alleviate some of the pressure at that time, the pre-existing lack of truck parking availability continues to grow with the increased demand for supplies.

One finding of the Jason's Law surveys acknowledged that major freight generators, such as industrial parks, distribution centers, intermodal facilities, and ports, are key elements of the Nation's freight transportation system and therefore provide critical context to understanding truck parking demand. The Jason's Law survey looked at truck parking facilities near major freight corridors, origins, and destinations based on the National Highway Freight Network (NHFN) and interstates (<https://ops.fhwa.dot.gov/freight/infrastructure/nfn/index.htm>). Data collection for the 2020 survey documented 614 truck parking spaces per 100 NHFN miles across the country, with about 78 spaces per 100 miles in public facilities and almost 536 in private facilities. Nationally, 79 percent of spaces were within 1 mile of an interstate and 84 percent were within 5 miles of the NHFN.

Areas of major freight origins and destinations that were analyzed in 2020 included:

1. The 20 Freight Analysis Framework zones (https://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm) with the highest long-haul truck tonnage originating or destined for the zone.
2. The 10 ports with the highest loaded container volumes in 2017 as measured by the U.S. Army Corps of Engineers.
3. The top 10 intermodal markets according to data published by the Association of American Railroads.

A total of 32 regions were identified as major freight origins and destinations using this method, with almost 24,000 truck parking spaces located within them.

Despite the critical need, the prioritization of public funding for capital costs and the lack of Federal funding for operating costs are major challenges in implementing solutions for truck parking. To help address truck parking amidst competing transportation priorities, States and MPOs are encouraged to look for solutions that leverage available federal funding for capital projects and to explore private sector partnership options. States have explored financing options with private partners, and a few have recently sought Federal grants for truck parking expansion projects. In September

2022, USDOT awarded two discretionary grants for truck parking capacity projects in BIL (<https://www.transportation.gov/grants/mpdg-announcement>).

FHWA has conducted a review of State and regional truck parking plans. Most State, MPO, or regional plans describe strategies for expansion and redesign of facilities to improve access and circulation, offer additional amenities, and provide a range of parking types (short or long term). Some have identified a need for expanding overnight rest options and for other types of parking, such as for staging activities. This mix of short-term and overnight parking is critical to the efficient operation of economic generators and nodes in the supply chain, such as ports and freight facilities. States such as Kansas and Nebraska have considered asset-based approaches to parking facility development so they can have an understanding of facility conditions and performance to implement improvements.

FMCSA's Hutcheson also notes, "The availability of truck parking is a key concern to truck drivers." She explains the USDOT's focus on the subject, stating that, in "understanding the necessity for safe parking for drivers to improve working conditions and safety, the Department is working to raise awareness regarding eligibility for truck parking projects." For instance, FMCSA has

Studies

- <https://ftp.txdot.gov/pub/txdot/move-texas-freight/studies/truck-parking/final-report.pdf>
- <https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/freight-planning/plan-accordion/catrpkpgstdy-finalreport-a11y.pdf>
- https://uknowledge.uky.edu/cgi/viewcontent.cgi?article=2498&context=krc_researchreports

approved funding for truck parking Intelligent Transportation Systems (ITS) through its Innovative Technology Deployment program. FMCSA also issued the Accelerating SmartPark Deployment Strategic Plan (<https://rosap.nhtl.bts.gov/view/dot/40895>) as part of its Accelerating SmartPark Deployment project. The plan reviewed ITS technologies to help monitor and disseminate real-time information on truck parking availability. The plan also documented ways that these projects disseminate information to the user and any lessons learned during the life cycle of the projects.

State action has shown the promise of connecting truck parking, economic development, and tourism as well as the importance of including truck parking in policy development discussions. For example, South Dakota engaged its economic development, tourism, and transportation entities to develop the *South Dakota Interstate Rest Area Revitalization Plan* to focus on parking and amenity needs for all travelers. Kansas has efforts to develop pro-parking policies and consider truck parking impacts and needs in transportation policy development. Other States like New Mexico consider truck parking an economic development issue and assessed bottlenecks, capacities on freight routes, gateways, and opportunities to improve parking to support freight flows.

The Safety Factor

The Safe System Approach (SSA), a vision to reach zero traffic-related deaths per year, is a goal for USDOT and many public partners. Secretary Buttigieg commented on the topic of truck parking safety during a hearing before the U.S. Senate Committee on Environment and Public Works on March 2, 2022, stating, “This is a very important issue, and if you talk with any truck driver, it is not only an issue of convenience; it is an issue of safety.”

Exhausted truckers operating a vehicle are a risk to not only their health and safety, but also that of other motorists, bicyclists, and pedestrians using the same roadways. Furthermore, studies have shown (see box above) that unauthorized truck parking along the roadway impacts safety by creating a crash hazard to other motorists. Moreover, truck drivers need safe locations to park that include amenities, such as clean rest rooms and safe lighting, and advanced truck stop electrification to power auxiliary needs, such as the heating and cooling of parked cabs. Additionally, drivers responding to the Jason’s Law Truck Parking Surveys identified a need for police officer patrols, cameras, fencing, and other safety and security options at parking facilities.

Metrics of trucking safety and security within the context of truck parking include truck crashes, regulatory rest violations, and crime. Truck parking shortages can increase the chance of a driver becoming a victim of crime; for instance, when drivers park in unprotected areas. It may also be helpful to measure information on parking spaces that accommodate oversize and or overweight trucks to enhance the safety of these drivers and the security of their loads at rest areas and truck stops.

Truck parking improvements can be part of SSA strategies to reduce deaths and injuries. Using truck parking metrics, agencies can expand their SSA toolkit to justify and improve safety, directly and indirectly, by informing the siting, design, and implementation of new truck parking solutions. States are advancing metrics as data on truck parking demand/utilization become more readily available and analytical tools for truck operations become more advanced. These type of metrics include:

- Average time needed to find truck parking locations (protracted searching for parking can increase traffic, increase emissions, and prevent a driver from getting timely rest).
- Driver preference for the transmission method and timing of truck parking information such as secondary parking locations (e.g., public/private designated truck parking locations at retailers and hotels/motels).
- Accessibility of truck parking locations from adjacent roadways.
- Community impacts of truck parking in nearby residential neighborhoods.

Metrics can also be used to support the development of truck parking facilities directly within the sites of freight generators, such as industrial parks, warehouses, or distribution centers. In such cases, these facilities can be incorporated into an existing safety framework, and the support of potential stakeholders in these freight-intensive



Trucks parked at a Pennsylvania Turnpike travel plaza.

Source: FHWA.

communities—such as school boards, law enforcement, and commercial vehicle safety agencies—is vital.

In recent years, States and MPOs are making efforts to focus on the safety aspects of truck parking issues. A key safety concern, as previously mentioned, involves the use of roadway ramps and shoulders for truck parking, which presents a risk to truck drivers and a hazard to other road users. In the 2020 Jason's Law Truck Parking Survey results, 80 percent of States identified unofficial/unauthorized truck parking in their State. Safety considerations also included driver fatigue and HOS, crashes, crime at truck parking facilities, and driver safety. USDOT is also focused on safety; for example, FMCSA is currently conducting a study, "Crime Prevention for Truckers." Moreover, FHWA included in its recently published truck parking development handbook (https://ops.fhwa.dot.gov/freight/infrastructure/truck_parking/docs/Truck_Parking_Development_Handbook.pdf) a discussion of the need to combat human trafficking through better rest area design and awareness, in addition to more standard matters such as noteworthy safety practices for ingress/egress and internal layout of spaces. FHWA has been working in partnership with FMCSA and the U.S. Maritime Administration on initiatives related to truck parking, driver safety, and truck staging needs at ports.

Crash- and fatigue-related data, as well as crime reports by parking location, were included in the 2015 Jason's Law truck parking survey. For operations, some States are improving on these metrics. Washington analyzes how many days per week parking

shortages lead to fatigued driving and issues with maximum HOS. While only a few States are measuring and reporting crime at parking locations, Florida and Georgia both report on acts of theft and other incidences at parking locations.

States and MPOs typically analyze data on truck-involved crashes to identify areas where incidents frequently occurred. States also use multiple approaches to analyze crash data, including crashes that involved fatigued drivers, crashes with trucks parked on roadway shoulders or ramps, and the distance of crashes from truck parking facilities. See examples in the box, at right.

Some States and MPOs are using truck GPS data to identify how long trucks are parked, providing insight into how truck drivers are using truck parking facilities (e.g., for a 10-hour rest break or staging). More usage information could be available in the future with the implementation of truck parking availability systems by State DOTs. The trucking industry could also use data from electronic logging devices (ELD, <https://eld.fmcsa.dot.gov/About>) to provide accurate utilization information. An ELD synchronizes with a vehicle's engine to automatically record a driver's off-duty and on-duty time and securely transfer HOS data to a safety official. This includes GPS location data. Results of anonymized and aggregated ELD data would be useful to States in identifying locations where new truck parking capacity is needed.

States and MPOs are also analyzing crime statistics at truck parking facilities and using surveys of truck drivers to identify the driver's perception of their safety at different types of truck parking

Analysis Examples

- The Virginia DOT measured total truck-related crashes on the on/off ramps of their State's corridors of statewide significance. http://www.virginiadot.org/projects/resources/VirginiaTruckParkingStudy_FinalReport_July2015.pdf
- Kentucky analyzed the number of crashes involving driver fatigue and/or trucks parking on roadway shoulders or ramps. https://uknowledge.uky.edu/cgi/viewcontent.cgi?article=2498&context=ktc_researchreports
- The North Carolina DOT analyzed the proximity of on/off ramps to truck parking facilities. https://connect.ncdot.gov/projects/planning/Statewide-Freight-Plan/Documents/Truck_Parking_Study_Final.pdf
- The Michigan DOT analyzed the impact of the Interstate-94 Truck Parking Information Management System (TPIMS) on crashes involving a fatigued driver, trucks parked in undesignated areas, or crashes where only a truck was involved and ran off the road. (Woodrooffe, J., D. Blower, J. H. Sullivan. 2016. *Evaluation of MDOT Truck Parking Information and Management System*. Ann Arbor, MI: University of Michigan.)
- Other academic research has analyzed the probability of fatigue-related crashes near locations with truck parking. (Bunn, T., S. Slavova, and P. Rock. 2017. "Association between commercial vehicle driver at-fault crashes involving sleepiness/fatigue and proximity to rest areas and truck stops." *Accident; Analysis and Prevention* 126.)

locations. Though limited, some States are considering environmental and livability factors when analyzing truck parking. Examples include time spent idling, emissions during idling, and noise impacts.



Trucks parking at the Interstate-95 rest area near Laurel, MD.

Source: FHWA.

New Partners, New Funding Opportunities

With the passage of the BIL that reauthorized surface transportation programs for the nation, Congress established new funding opportunities and expanded the eligibility of other programs. These changes offer additional chances for public sector entities looking to develop new truck parking. Some programs have more specialized eligibilities, such as a goal to reduce emissions. States, localities, MPOs, Tribal Nations, publicly owned ports, and other eligible entities are encouraged to consider using Federal-aid apportioned funding or apply for grants under the discretionary programs to develop or enhance truck parking facilities.

The Office of the Secretary of Transportation is updating the State Freight Plan guidance to assist States in meeting the new requirements. FHWA, in partnership with FMCSA, updated the guidance on funding eligibilities for truck parking (https://ops.fhwa.dot.gov/freight/infrastructure/truck_parking/title23fundscmv/title23_49_funds_cmv.pdf) and created the truck parking development handbook to support public sector entities—especially local governments—in their efforts to invest in truck parking capacity solutions. FHWA also developed a workshop focused on creating an action plan to address truck parking needs, and has facilitated over 20 such workshops since 2018 at the request of cities, States, and transportation corridor-based organizations, engaging stakeholders from transportation agencies, law enforcement, and the trucking industry in the identification of needs and solutions.

Other initiatives led by USDOT include continued public engagement with a broad

cross-section of industry and government stakeholders, academics and drivers. Established in 2015, the National Coalition on Truck Parking (referred to as the Coalition) was an early action of USDOT based on the severity of the issues raised by results of the 2015 survey. The Coalition includes public and private sector organizations with an interest in advancing safe truck parking measures. Four working groups within the Coalition were established to share noteworthy practices and information in topic areas including parking capacity; technology and data; funding, finance and regulations; and State, regional, and local government coordination.

Of the Coalition and FHWA-led workshops, Tom Kearney, a retired FHWA transportation specialist focused on freight and truck parking issues, says they “established an environment of open discussion and trust between the public and private sectors.”

The FHWA Resource Center has actively been delivering tailored truck parking workshops in specific states and regions that include a broad mix of public and private stakeholders. These events always include peers from across the U.S. who share how they worked through similar truck parking problems and solutions that have been effective. “Hearing success stories from peers really seems to motivate workshop participants,” Kearney notes.

“The key to a successful workshop is having the right people or mix of people participate. You never know where the gold is when you’re planning and operating a truck parking workshop.” Kearney recalled that “amazing contributions” were made by a legislative coordinator who worked with Union Pacific and Burlington Northern

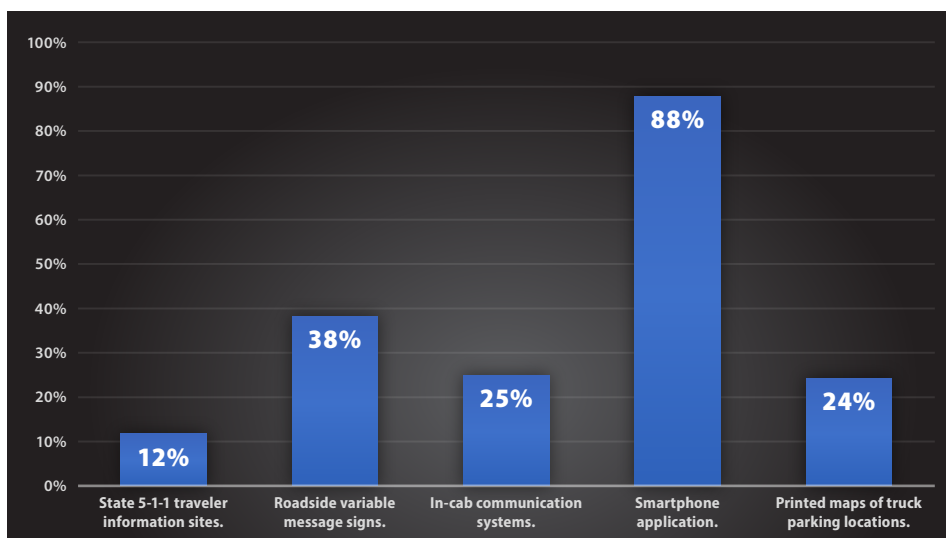
Federal Funding Programs Eligible for Truck Parking Development

For more information on commercial motor vehicle funding eligibility and related State Freight Plan requirements, visit: https://ops.fhwa.dot.gov/freight/infrastructure/truck_parking/title23fundscmv/title23_49_funds_cmv.pdf

Santa Fe Railroads. “The individual had no background in trucking, but was an expert on supply chains. His contributions were solid gold.” But even as the various levels of government and private stakeholders recognize the need for parking expansion, a struggle exists in developing business models that unite the public and private sectors in implementing solutions to the problem. Truck stop owners and operators cite a need to understand how to make parking a viable business, and how to better understand demand. Drivers and managers raise concerns about increased costs and regulatory challenges. The public sector’s concerns are safety, congestion, and economic development. More focus is needed on strategies that will work for the diversity of stakeholders as well as the types of commercial vehicles involved.

Local government involvement and education is also needed. Many respondents to the last Jason’s Law survey discussed the challenge of educating citizens and local governments about how trucking operations work and the value of trucking to their community. Understanding the linkage between land uses that generate truck demand and truck parking activity is critical to improving the planning for truck parking facilities and their utilization. Key institutional challenges include: lack for full alignment between land use and transportation planning products and processes; lack of clarity on appropriate roles (including for public sector agencies); and zoning polices that may not fully address freight needs. Lack of availability, affordability, and suitability of land on which to develop truck parking capacity is another challenge. And there is still ambiguity regarding the appropriate public sector role in solving truck parking needs.

The emergence of smart technologies to inform drivers of parking availability was another focus area resulting from the 2015 survey. Overwhelmingly, survey respondents indicated that they prefer smartphone applications to other methods of information. Federal funding has been provided through grants from USDOT to not only build spaces but also to improve their utility by “matching parking demand with



The majority of drivers surveyed prefer to obtain information about truck parking via their smartphones.

Source: FHWA.

parking supply, by leveraging technology to monitor parking space availability, and communicat[ing] this information to truck drivers,” describes Hutcheson. An 8-State coalition leveraged an FHWA-administered Federal grant from the former Transportation Investment Generating Economic Recovery, or TIGER, program, to build a TPIMS across key highways in the Midwest. To ensure the success of these technologies and improve access to parking information, understanding driver needs and preferences is important.

Stakeholders in the trucking industry and truck safety communities have been calling for a new funding program dedicated to truck parking, as a program has not existed since the sunset of a \$25 million truck parking facilities pilot program under the Safe, Accountable, Flexible, Efficient

Transportation Equity Act: A Legacy for Users (SAFETEA-LU, P.L. 109-59). At a September 30, 2022 meeting of the Coalition, the Owner-Operator Independent Driver Association spoke about the status of a pending legislative proposal to create a new grant program focused on truck parking.

Since the publication of the 2015 Jason’s Law Survey results, truck parking needs awareness, data gathering, analysis, and project development has significantly increased. Public interest in promoting safe truck parking as a key element of a safe transportation system as well as an important part of trucking operations has grown. Two issues related to these efforts have been:

1. Identifying and addressing truck parking capacity needs, and

2. Developing innovative and effective tools to collect and transmit information about parking availability.

As part of the collection of updated information for the 2020 assessment, FHWA reviewed State, MPO, regional, and Federal truck parking studies, plans, programs, and projects. FHWA also looked at major studies as well as State freight plans or long-range transportation plans that include truck parking activity and measurement. Overall, results and findings were that 41 States voluntarily mentioned truck parking in their statewide freight plans (inclusion of this information is now a required element of State freight plans). Another five States incorporated truck parking in their overall planning activities.

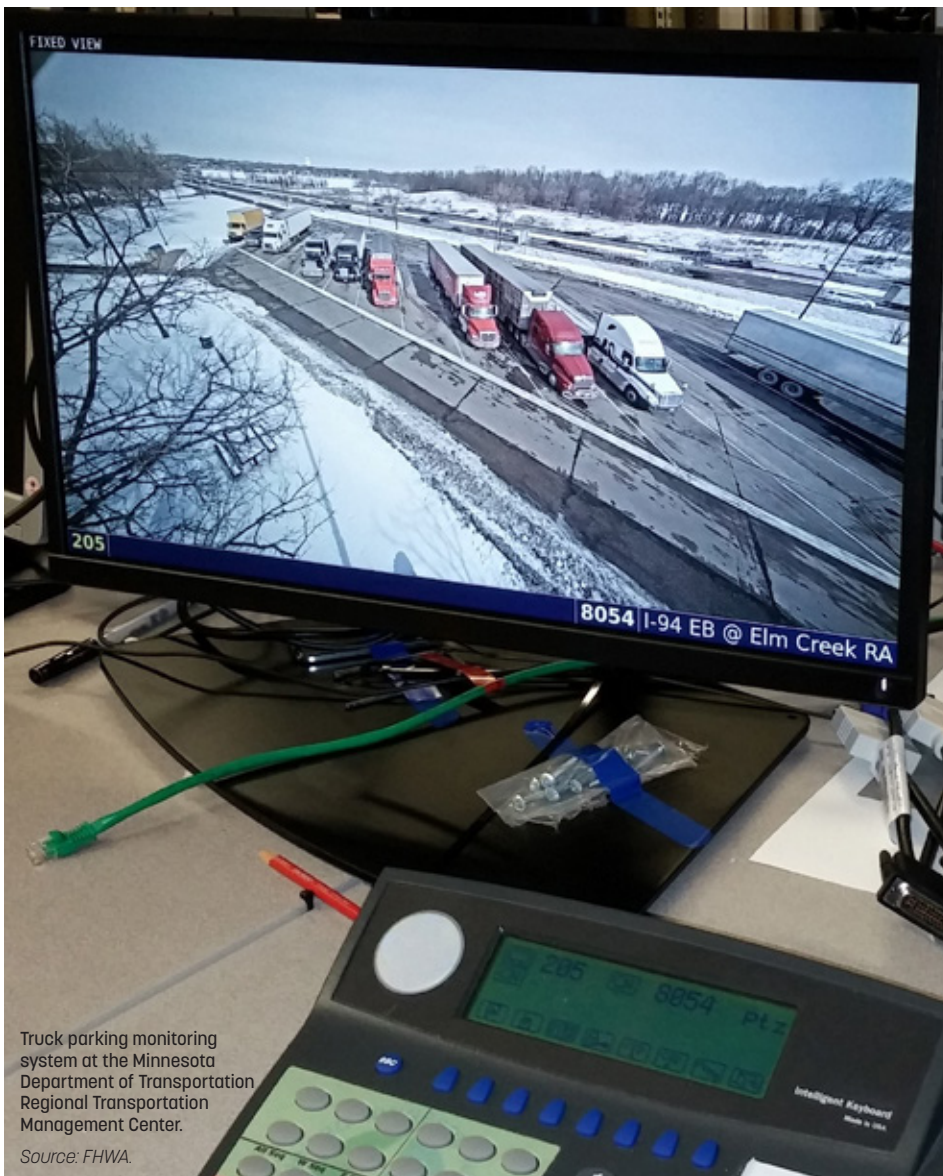
Many States have identified the location of parking capacity deficiencies as a major issue. Common locations with truck parking gaps are specific corridors with high truck traffic, areas with high levels of local truck activity, and areas with major freight generators (such as industrial parks and port terminals).

“It is important to advance truck parking efforts with ways to help local governments understand, plan for, and accommodate truck parking in their planning and development as well as with ways to partner with the private sector to offer public property or funding to spur parking increases or improvements, and to incentivize for parking (e.g., tax credits, incentive funding, alternative funding arrangements),” says Nicole Katsikides, a research scientist at the Texas A&M Transportation Institute.

Information about truck parking, provided via signs, maps, truck parking websites, and ITS technologies, is attracting interest in the public and private sectors, with significant activity related to ITS and data-transfer solutions. For participating States, TPIMS now provides robust technology solutions that collect and disseminate information on the availability of truck parking.

A number of State projects have been funded under Section 1305 of SAFETEA-LU to improve truck parking; however, this program was not continued under MAP-21. Since then, new major areas of research have sprung up to improve the analysis and planning in the field.

Advances in connected and automated vehicle (CAV) technology also offer potential opportunities for truck operations and data exchange. Implications of CAV growth on driver rest needs are yet to be determined. The new funding opportunities



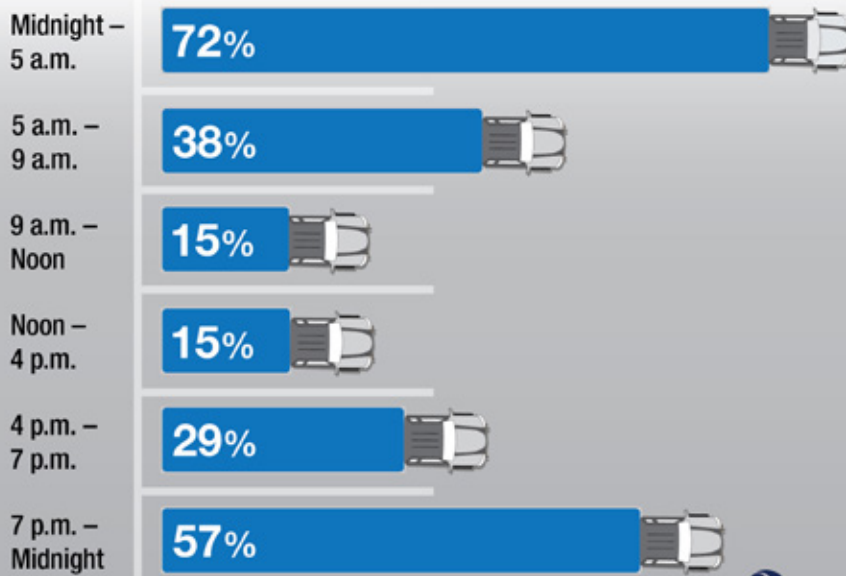
Truck parking monitoring system at the Minnesota Department of Transportation Regional Transportation Management Center.

Source: FHWA.

OVERFLOWING COMMERCIAL TRUCK STOPS

... will soon be a thing of the past, thanks to Bipartisan Infrastructure Law funding and public-private investment in capacity expansion.

Percent of commercial truck stops where parking areas are at or over capacity by time of day.



Sources: Jason's Law Truck Parking Survey, 2019. Survey of commercial truck stop operators (does not include State rest areas) https://ops.fhwa.dot.gov/freight/infrastructure/truck_parking/



Differences in parking capacity at commercial truck stops by time of day.

Source: FHWA.

to expand capacity and technologies to transmit parking availability information are of great interest to many States. Several States are also looking into potential public private partnership options to finance new parking capacity. The September 2022 Coalition meeting included presentations from the Colorado DOT, California State Transportation Agency, and the Eastern Transportation Coalition on recent projects.

States and MPOs have greatly improved their stakeholder engagement processes. The involvement of different levels of government and multiple private industries makes truck parking a complex issue to address. Effective stakeholder engagement, particularly at the local level, is critical to the successful implementation of policies, plans, and projects to address truck parking needs.

Planning for truck parking is becoming more advanced and more detailed, using new data sets and methodologies to predict truck parking need and locations. While the 2015 Jason's Law Truck Parking Survey showed that States and MPOs were mainly using truck parking metrics that relied on easily obtained data sets, many States and MPOs are now using a wider range of

data types, developing more sophisticated metrics to understand truck parking issues and solutions, and investigating options for harder to obtain data, such as improper parking and the proximity of truck parking to major freight generators. To reflect the advancements in the field, the 2020 survey asked additional questions about the metrics that can help improve safety. These details will aid in justifying and measuring the need for public investment and public-private partnerships to develop more truck parking capacity.

As truck parking needs evolve, the Coalition will continue to serve as a forum for discussion and information-sharing. Secretary Buttigieg has spoken publicly on several occasions about the need for safe truck parking and USDOT's support for parking investment. At the September 2022 Coalition meeting, USDOT announced \$37.6 million for two parking projects awarded under the Infrastructure for Rebuilding America program, a new memo on truck parking funding eligibilities, a new truck parking development handbook, and a summary of State Freight Plan requirements. Subsequent meetings may look at

future policy and operational considerations that may occur where truck parking for safety rest would exist together with parking needs for recharging trucks powered by electric and hydrogen fuels.

Evidence of State, local government, and MPO activity to measure truck parking problems and explore solutions was spurred by truck parking advocates, industry and Federal surveys, truck driver and road user safety concerns, and community needs. Federal surface transportation laws and funding, government- and industry-led dialogues and training, and improvements in technology will help change the future of this industry and provide much-needed expansion in truck parking. Many States and MPOs are including truck parking in their ongoing planning and program activities or developing stand-alone truck parking studies.

This heightened focus on truck parking is fostering an environment for new ideas, expanded analysis, and innovative solutions. These solutions can provide better data to States for understanding how truck parking improvements can support highway safety as well as businesses within their State. Technology and capacity solutions can be deployed to provide truck drivers the ability to more reliably find truck parking on their delivery route. Successful implementation of these solutions will be improved through a collaboration of the public and private sectors. All signs point to a coming realization of these efforts, an expanded investment and nationwide improvement in the safety of trucking operations, and a more resilient supply chain.

CAITLIN HUGHES is the director of the FHWA's Office of Freight Management and Operations where she oversees highway freight policy and programs and the administration of infrastructure investment programs. She has a B.A. from the University of Vermont and an M.A. in public administration from George Washington University.

JEFF PURDY is the freight programs team leader and works with an interdisciplinary team to advance freight policy and programs. He has a B.S. and a master's degree in urban planning from Michigan State University.

For more information, see https://ops.fhwa.dot.gov/Freight/infrastructure/truck_parking/index.htm or contact Caitlin.Hughes@dot.gov or Jeffrey.Purdy@dot.gov.



The Wailua River Bridge is located on Kauai, Hawaii's fourth largest island, and is used to access essential services.

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Along the Road is the place to look for information about current and upcoming activities, developments, trends, and items of general interest to the highway community. This information comes from U.S. Department of Transportation sources unless otherwise indicated. Your suggestions and input are welcome. Let's meet along the road.

Public Information and Information Exchange

Upgrades Begin on Hawaii's Wailua River Bridge

The Wailua River Bridge on Hawaii's fourth largest island—Kauai—is one of the most trafficked areas and under renovation.

Built in 1945, the 77-year-old bridge measures 424 feet (129 meters) long and is supported by seven concrete piers. The concrete piers are supported by piles made of wood that were driven into the riverbed when the bridge was originally constructed.

In June 2022, a groundbreaking ceremony was held to initiate the start of the \$55.7 million renovation project. The most highlighted renovation is the planned replacement of the wooden piles with reinforced concrete piles. The concrete piles will better weather the heavy rains and flooding which has plagued the bridge in the past. The project also calls for a new pier between the piles to provide better support for the existing structure.

Construction on the bridge will be handled both carefully and efficiently as the Wailua River Bridge serves as a primary means by which residents and visitors of the island access essential services (e.g., a hospital and airport). The bridge will remain open for much of the renovation. The Hawaii Department of Transportation expects the repairs to continue through the end of 2024.

MARAD Announces Four New Marine Highway Projects

The U.S. Department of Transportation's Maritime Administration recently designated four new marine highway projects as part of the America's Marine Highway Program (AMHP). The program has one major goal: expand the use of America's navigable waters—that is, rivers, bays, channels, coasts, the Great Lakes, open-ocean routes, and the Saint Lawrence Seaway System. A marine highway project is a planned service, or expansion of an existing service, on a designated marine highway route.

The designations announced in June 2022 include the Riverbulk Steel Shuttle (North Carolina), Yakutat, Alaska's Freight Expansion Service, Unalaska Express (Alaska), and the Puerto Rico Maritime Transportation Services Project.

Since its inception in 2010, the AMHP has designated 58 marine highway projects. Designations are beneficial to the public as well as to the environment. For instance, the Riverbulk Steel Shuttle supports an existing barge service, reducing the number of trucks traveling on roadways and shipping costs for cargo owners. Likewise, the Puerto Rico Maritime Transportation Services Project will grant island residents access to essential services located primarily on the main island, such as food, groceries, construction services, and equipment.

For more information on the Maritime Administration, visit <https://www.maritime.dot.gov/grants/marine-highways/marine-highway>.

USDOT, Cherokee Nation Sign First Ever Tribal Transportation Self-Governance Compact

The U.S. Department of Transportation and the Cherokee Nation signed the first ever Tribal Transportation Self-Governance Compact. The compact gives the Tribe the ability to plan and oversee its own road construction planning and transit projects without having to seek Federal permission.

In June 2022, Deputy Secretary of Transportation Polly Trottenberg visited the Cherokee Nation in Oklahoma, meeting with Principal Chief Chuck Hoskin, Jr., to sign the compact—the first compact under USDOT’s Tribal Transportation Self-Governance Program. As part of her visit, Secretary Trottenberg surveyed road safety projects the Cherokee Nation is currently executing, including electric vehicle initiatives. The Cherokee Nation built one of the first solar canopies in Oklahoma.

For more information, visit: <https://www.transportation.gov/briefing-room/usdot-choerokee-nation-sign-first-ever-tribal-transportation-self-governance-compact>.

The Cherokee Nation is the first Tribe in the country to participate in the U.S. Department of Transportation’s Tribal Transportation Self-Governance Program.

Source: FHWA.



Policy, Legislation, and Grants

Idaho Awarded \$30.9 Million for Four Projects Statewide

Announced in August 2022, Idaho recently received nearly \$31 million in funding through the Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Program to modernize its transportation system.

However, modernization isn’t the grant’s only goal: safety, accessibility, affordability, and sustainability are main objectives as well.

The total amount of funding will be dispersed among four projects within the State: \$12.4 million to the Idaho Transportation Department for Wood River Valley Mobility Corridor Improvements; \$8.4 million to Valley Regional Transit for the State Street Premium Corridor; \$5 million

to the Ada County Highway District for the Access to Opportunity Planning Project; and \$5 million to City of Nampa for Reconnecting Accessibility and Improving Safety and Equity.

RAISE is one of several ways communities can secure funding

for projects under the Bipartisan Infrastructure Law’s competitive grant programs. Idaho’s portion of RAISE is part of more than \$2.2 billion awarded nationwide.

For more information on Idaho’s four projects, visit <https://itd.idaho.gov/news/idaho-awarded-30-9m-in-federal-grants-to-modernize-transportation-statewide/> or <https://www.transportation.gov/sites/dot.gov/files/2022-08/RAISE-Idaho-2022.pdf>.



The RAISE program is one of several ways communities, like the ones in Idaho, can secure funding for projects under the Bipartisan Infrastructure Law’s competitive grant programs.

Source: USDOT.

Internet Watch

#EndTheStreakTX

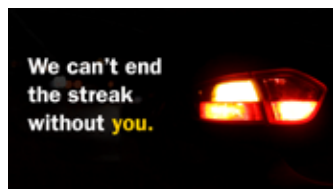
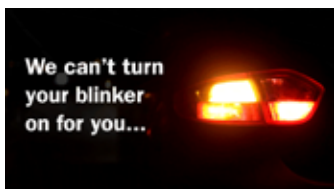
The last deathless day in Texas was November 7, 2000. Since then, over 75,000 people have died on Texas roadways. To discontinue the nearly 22-year streak of daily deaths on Texas roads, #EndTheStreakTX was created—a grassroots and word-of-mouth effort where Texans are being asked to utilize social media to:

- Post pictures of the #EndTheStreakTX sign, using the hashtag #EndTheStreakTX.
- Share personal stories of loved ones who have been lost in a crash, using the hashtag #EndTheStreakTX.

- Follow the Texas Department of Transportation’s (TxDOT) social media pages and share related content.

Texans, and those driving through Texas, are also asked to buckle up, follow speed limits, never drive while under the influence of drugs or alcohol, and never drive distracted (e.g., use a cellphone while driving). TxDOT is also contributing to the effort through the way roads are engineered, the installation of median barriers to prevent head-on collisions, the use of flashing LED signs and radar sensors to prevent wrong-way collisions, and more.

For more information, visit: <http://www.EndTheStreakTX.com>.



The State of Texas averages nearly 11 traffic fatalities every day.

@TxDOT.



by **STEPHEN MARTINEZ**, **JULIA JOHNSTON**, and **SABRINA SYLVESTER**

Federal Highway Administration's National Highway Institute Has a New Look

The Federal Highway Administration's (FHWA's) National Highway Institute (NHI) will be launching a redesigned website and new Learning Management System (LMS) soon. This comprehensive update will provide learners and partners with a more dynamic and engaging environment to access the training resources needed to continue improving the Nation's highway transportation system.

NHI always strives to be on the cutting edge of innovation by using technology that supports a robust and flexible learning environment. NHI has partnered with the well-known Blackboard® LMS platform, now part of Anthology®, to provide stakeholders with a streamlined registration process, easier access to course information, and enhanced content delivery methods to create a modern learning environment.

Blackboard will enable NHI to continue supporting transportation

professionals in meeting their educational goals and excelling in their careers by providing a phenomenal learning experience for training participants, and simplifying processes for hosts, instructors, and developers to manage their courses. In addition, NHI will provide new communication channels between instructors and students to ensure a better learning experience.

All current NHI student data will automatically migrate to the new system, including course completion records, accreditation information, and student profile information. The entire NHI course catalog will also be moved into the new LMS environment in the coming months. Blackboard will completely replace the former NHI learning system.

If you have any questions or need assistance using the new NHI learning system, please contact the customer service center at NHICustomerService@dot.gov.



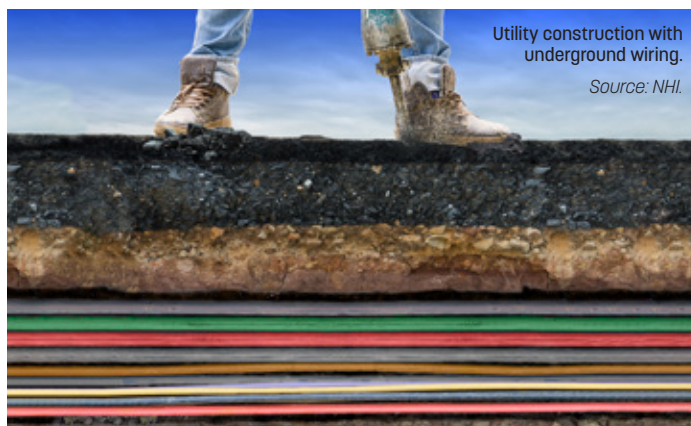
National Highway Institute's website redesign homepage.

Source: NHI.

Learn How to Mitigate Utility Issues with Utility Conflict Management

Issues in utility construction are considered one of the major reasons for project delays. Utility conflict management (UCM) thoroughly identifies and resolves utility conflicts as part of the transportation project delivery process. These conflicts are often the result of inaccurate and incomplete information about existing utilities, unsuccessful coordination between State transportation agencies and utility companies, or the lack of understanding of each other's processes. NHI has created a course that covers the importance of conducting effective UCM and how to integrate it throughout the project development process.

NHI has developed a course to mitigate the issues in utility projects through UCM for transportation personnel who manage preconstruction utility coordination and design for highway projects, including utility managers, highway designers, consultants, utility companies, highway contractors, construction personnel, and surveyors.



Utility construction with underground wiring.

Source: NHI.

Achieving Successful Utility Conflict Management with NHI

Utility Conflict Management (FHWA-NHI-134209) is a self-directed training course (formerly Web-based training) that emphasizes the importance of integrating utility investigations into the identification and resolution of utility conflicts by applying the UCM outputs to facilitate relocations and other process activities throughout the project delivery. Participants will learn how to effectively apply UCM strategies and activities, and compare these implementations throughout the process. These methods will help learners apply the principles to minimize and mitigate UCM issues. Applying these methods will result in improved design plans and fewer unnecessary utility relocations.

How to Attend or Host a Course

NHI invites all transportation professionals interested in a course to visit <https://www.nhi.fhwa.dot.gov/> to learn more information on how to register or host a course. The course catalog lists over 350 courses in 19 program areas.

NHI is an approved Accredited Provider by the International Accreditors for Continuing Education and Training (IACET). As an IACET Accredited Provider, NHI offers continuing education units for its programs that qualify under the American National Standards Institute/IACET Standard.

STEPHEN MARTINEZ is a learning management specialist for NHI.

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