

National STIC Network Showcase 2023



Category:

Safety



U.S. Department of Transportation
Federal Highway Administration



National STIC Network Showcase

The EDC-7 virtual summit, held in February 2023, included a platform for the State Transportation Innovation Councils (STICs) to showcase homegrown innovations that their members developed and implemented in their state. The purpose of this National STIC Network Showcase was to celebrate and share innovations with a wider audience to expand their potential use and impact. These innovations are saving lives, building sustainable infrastructure, growing an inclusive workforce, saving time, and making our transportation system more efficient. Over 100 innovations were shared by STIC members and are grouped into the following categories.

- Asset Management & Finance
- Maintenance & Emergency Response
- Operations
- Design & Construction
- Technology & Materials
- Planning & Environment
- Safety
- Pavement & Structures
- Civil Rights, Workforce, and Equity

This event also featured short presentations from State and local agencies on some of these homegrown innovations, which are also [available on-demand](#).

Disclaimer

These presentations were created by non-FHWA organizations. The views expressed do not necessarily reflect the official policy of FHWA or the U.S. Department of Transportation (USDOT). The U.S. Government does not endorse products or manufacturers. Trademarks or manufacturers' names appear in this National STIC Network Showcase only because they are considered essential to the objective of the National STIC Network Showcase. They are included for informational purposes only and are not intended to reflect a preference, approval, or endorsement of any one product or entity.

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- MO: Tractor Halo
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- NC: LIVE 511 Call Center Created Between North Carolina DOT and Correctional Institute For Women
- NC: Commercial Trucking Alert System
- NC: NCDOT Traffic Incident Management (TIM) Training Track
- NH: Metal Arrow Stencil Tool
- NH: Pipe Measuring Tool
- NH: Sidewalk Salt Hopper Filler
- NJ: Bicycle-Friendly Resurfacing in Mercer County
- NJ: Commercial Service Vehicle Alerts
- NJ: Weather Savvy Roads Pilot Program
- NM: Innovations in Crash Investigation Technology
- OH: Drone Bridge Inspection
- OH: LED Highway Lighting Conversion
- OH: Traffic Signal Test Cabinet

PA: Fabricated Snow Plow

PA: Live Accident Notification Form

PA: Spreader Chute for Winter Operations

PR: Puerto Rico Road Safety Observatory

SC: Develop a DOT Specific UAS Simulator and Flight Proficiency Exam

SC: Strategic Deployment of Drone Technology and Software to Support SCDOT Operations

TX: TranStarRoadway Flood Warning System Expansion

TX: Freight Optimization in Dallas-Fort Worth (DFW)

TX: Using Crowdsourced Data to Improve Emergency Response to Roadway Incidents in Dallas-Fort Worth (DFW)

UT: Aerial Images Used to Conduct Pavement Inspections

UT: Dash Cam Imaging Improves Outdoor Advertising Enforcement

VA: Wildlife Carcass Removal App

WA: Innovative Design Technology for Ultra Long Span Precast, Prestressed Concrete Bridge Girders

WA: The Low Voltage Auto Start System: We'll leave the light on for you

WA: Movable Sign Fabrication Table

Arizona DOT Crash Barrel Funnel



OVERVIEW OF INNOVATION

The creation of the Crash Barrel Funnel was a result of two incidences where a limited crew (3 people) needed to fill 24 crash barrels immediately. Various methods were employed which led to the creation of the funnel.

First Method – A one-ton pickup truck was pulled up to the crash barrels and sand was shoveled from the truck bed into the barrels. This method worked but was still very labor intensive.

Second Method – A skid steer was used to fill the barrels. While this saved the effort of shoveling, it created a mess in the area which resulted in a bigger cleanup job.

Third Method – A Crash Barrel Funnel was created. The funnel minimized the mess of using the skid steer to fill the barrels. Use of the funnel allowed the crew to fill 24 barrels in approximately 48 minutes.

Since the creation of the Crash Barrel Funnel, the team no longer sees filling crash barrels as a burden. Inspired to look for other ways to create efficiencies, the team also introduced a HydroVac machine which helps reuse sand from broken crash barrels and make site cleanup more efficient.



Source: Shawn Garcia

BENEFITS

Reduces work-related injuries

Fills barrels faster and with less mess

FIND OUT MORE . . .

Arizona DOT Video

[Crash Barrel Funnel](#)

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Safety, Maintenance

Arizona DOT Guardrail Crab



OVERVIEW OF INNOVATION

The old way of repairing guardrail:

- All lifting and leveling of rails is done by hand
- A 25-ft W-Beam weighs approximately 185 lbs
 - When nesting on spillways, rails are doubled increasing weight to 370 lbs
- A minimum of 4 crew members are needed to hold rails 20-30 inches off the ground for 2-7 minutes.

The new way of repairing guardrail:

- The guardrail crab is a metal plate with a 1-ton floor jack bolted to the top and 4 fully-pivoting wheels with brakes bolted to the bottom
- Two 18-in guardrail bolts, each bent into a J shape, are welded to a plate attached to the top of the jack
- A second metal plate with U-clips is welded to the bolts to keep the guardrail from slipping off the crab
- Two crabs used in tandem can easily lift and support 25-ft lengths of W-Beam while they are being bolted to the guardrail posts.



Source: ADOT

BENEFITS

Reduced labor costs

- Fewer employees needed for each repair job
- Repairs are done faster, saving man hours

Increased safety for employees

Easy to make and handle

Inexpensive

- About \$300 per unit to produce

FIND OUT MORE . . .

Arizona DOT Video

<https://vimeo.com/768775532/bf9a9fbd4d>

Arizona DOT

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Safety, Maintenance

Extending Centerline Marking Life



OVERVIEW OF INNOVATION

Schweitzer Mountain Road in the Independent Highway District (IHD), Idaho gets anywhere from 100 to 300 inches of snow annually. Maintenance crews plow the road multiple times per day, which results in the scraping away of pavement markings. The reduction in visibility presented a safety hazard for drivers and for snowplow teams trying to get up and down the well-traveled route to the local ski area.

The Independent Highway District developed the Recessed Lane Indicator. The process involves making indentations or divots along the roadway's centerline using metal plates and then covering them with thermoplastic markings that can remain visible for up to 10 years.

Initial cost to implement innovation was \$940 for materials and labor.



Source: Independent Highway District, Idaho

BENEFITS

- Increased safety for drivers
- Less spending for road maintenance

FIND OUT MORE . . .

https://www.fhwa.dot.gov/clas/pdfs/2021_mousetrap_entries_booklet.pdf

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Keywords: Centerline Markings; Road Maintenance; Pavement; Divots; Snow; Safety

District 11 San Diego: South County Trade Corridors State Route 11 Enrico Fermi Diverging Diamond Interchange



OVERVIEW OF INNOVATION

Starting with policy and planning, multimodal considerations, safety, operational characteristics, geometric design, and completed construction and maintenance, The State Route 11 Enrico Fermi Diverging Diamond Interchange features an unconventional and innovative Diverging Diamond Interchange design.

As part of a larger purpose and transportation system in this corridor, this Enrico Fermi Diverging Diamond Interchange (DDI) will satisfy the increasing demand for California-Mexico trade at existing border crossings.

The efficient delivery of goods and services is critical to the customer's satisfaction – the success of individual businesses and the urban and global economies. Yet to reach the destination, goods distributors face significant challenges across urban and metropolitan environments, regional highway networks, and bottlenecked ports.

This Diverging Diamond Interchange design facilitates the most efficient traffic patterns from Mexico into the United States. Access to border wait times at the different Ports of Entry will reduce congestion and positively impacts the air quality of moving travelers and goods throughout the country.



Caltrans D11

BENEFITS

- Traffic patterns promoted by the DDI will facilitate continuous movement from Mexico into the California State Transportation System, helping to reduce the air quality impact created by the movement of goods and the traveling public.
- The novel DDI design also promotes intersection safety for pedestrians and bikers while meeting the conflicting demands for increasing capacity, decreasing congestion, and minimizing the cost of multiple infrastructures.

FIND OUT MORE . . .

2021 District 11 Innovation Fair

<https://youtu.be/OigDMS6pKqo>

**Keep San Diego Moving
– State Route 11 Corridor**

<https://www.keepsandiegomoving.com/SR-11-Corridor/SR11-intro.aspx>

Caltrans Innovation EXPO 2022

<https://caltrans-innovation-expo.constantcontactsites.com/enrico-fermi-diverging-diamond-interchange-with-border-wait-time-technologies>

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Equity, Operations, Planning, Environment,
Structures, Design, Freight/Goods Movement

DISTRICT 11

Wrong Way Driver Offramp Enhancement Package



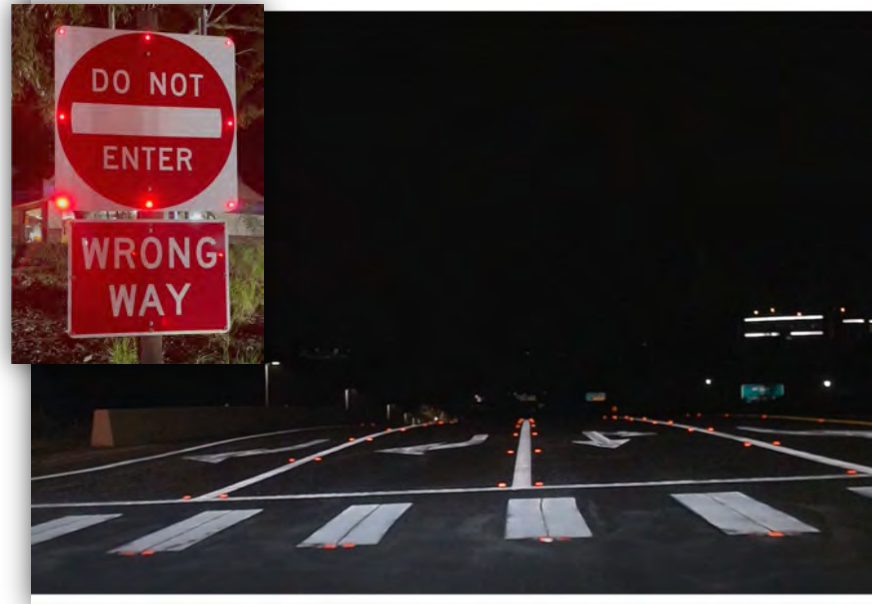
OVERVIEW OF INNOVATION

District 11 took the lead for the wrong-way prevention pilot project initiated after a series of Wrong Way (WW) collisions in 2015 in the San Diego and Sacramento regions that had resulted in several fatalities.

This pilot focused on three areas of enhancement measures:

- Replace traditional one-way markers on exit ramps with red-clear retroreflective markers on lane & channelizing lines. Install red-yellow retroreflective markers along the left edge line and one-way red retroreflective markers along the sides of Type V (through) arrows. In addition, add dashed yellow extension lines to guide motorists to the entrance ramp when it is adjacent to an exit ramp.
- Place additional retroreflective markers on edge lines. With the left edge line, we decreased the spacing of the red-yellow retroreflective markers in the first 480' from the exit terminus. With the right edge line, we reduced the spacing of the one-way red retroreflective markers for 360' starting 120' from the exit terminus.
- Install Blinking LED bordered Wrong Way signs with a wrong way detection system or 24/7 operation.

The pilot project was successful and is currently part of the Caltrans standard wrong-way package at freeway exit ramps.



District 11

BENEFITS

- Red retroreflective pavement markers (backside) resulted in a 44% to 64% reduction in reported wrong way events.
- Blinking LED wrong way signs resulted in a 60% reduction in reported wrong way events

FIND OUT MORE . . .

Wrong Way Pilot Projects

[Wrong Way Pilot Projects | Caltrans](#)

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Safety, Operations, Design,
Construction, Maintenance,
Planning, Equity

Implementation of All-Way Stop Control (AWSC) at Intersections that Do Not Meet MUTCD Warrants



OVERVIEW OF INNOVATION

DeIDOT studied the potential safety benefits of installing AWSC at low-volume intersections that do not meet quantitative MUTCD AWSC warrants.

One of DeIDOT's emphasis areas in the 2021-2025 Delaware Strategic Highway Safety Plan (SHSP): Towards Zero Deaths is Intersections. DeIDOT frequently evaluates the potential to convert intersections from Two-Way Stop Control (TWSC) to AWSC based on guidance contained in the Manual of Uniform Traffic Control Devices (MUTCD).

Starting in 2016, DeIDOT began further emphasizing the importance of crash data and engineering judgement, while also considering the reduced thresholds outlined in FHWA's 2017 Interim Approval for Optional Use of an Alternative Warrant 7 – Crash Experience (IA-19) as guidance, when evaluating AWSC as a potential intersection safety improvement. Traffic control devices needed for AWSC (signs, markings, solar powered beacons) are low cost, minimally invasive, and can be installed quickly. Construction can typically be completed in a single day.

Based on historical crash history and engineering judgement, DeIDOT implemented AWSC at 20 low-volume intersections that otherwise may not have been considered appropriate for AWSC based on quantitative MUTCD warrants. The sample included roadways with varying speed limits, functional classifications, and average daily traffic. DeIDOT performed before/after crash analyses at each location and estimated CMFs using empirical bayes methodology. The data showed a statistically significant reduction in crashes at all 20 intersections that were recently converted to AWSC, regardless of whether the quantitative MUTCD AWSC warrants were met.



Source: Rummel, Klepper, and Kahl, LLP

BENEFITS

Outstanding crash reduction results were observed after implementation of AWSC at these locations:

- Total crashes were reduced by 71%
- Angle crashes were reduced by 82%
- Fatal and injury crashes were reduced by 75% and 90%, respectively

Empirical Bayes analyses indicates an expected reduction in total crashes between 50% and 77% with AWSC installation.

FIND OUT MORE . . .

- [DeIDOT Crash Trends at New All-Way Stop Control \(AWSC\) Locations](#)
- [Delaware Strategic Highway Safety Plan](#)
- [FHWA Interim Approval - Alternative Warrant 7 - Crash Experience](#)

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Keywords: Safety, Intersections, Stop Control, Multi-way Stop Control, All-Way Stop Control, AWSC, Signs, Policy, Empirical Bayes

Low-Clearance Bridge and Tunnel Clankers



OVERVIEW OF INNOVATION

In response to over 70 overheight vehicles striking the CSXT bridge along Casho Mill Road over the past decade, DeIDOT implemented an overhead deterrent to alert drivers that the bridge is too low to safely pass under. A series of “clankers” were installed in conjunction with dynamic warning systems that include signage and flashing lights. The clankers, which have a devoted local following, are comprised of heavy-duty plastic suspended from steel mast arms that span the roadway. If struck, a vehicle is too tall to pass under the bridge prompting the driver to turn around.

Jokingly referred to as “Crasho Mill” and “Smasho Mill” by locals when conventional devices failed to prevent railroad bridge strikes, the new clankers provide a safe deterrent for overheight vehicles. **Materials used reduce the likelihood of flying projectiles injuring nearby pedestrians, bicyclists, properties, and infrastructure.**



BENEFITS

Source: DeIDOT

The clankers were a short-term compromise with CSXT that allowed Casho Mill Road to remain open for residents, commuters, and emergency personnel. When a bridge/tunnel strike occurred in the past, police and public works personnel had to initiate the vehicle extraction process and then a 3 to 4-hour, high-priority structural evaluation needed to be performed via CSXT and DeIDOT. There was also a traffic impact to a commuter route serving nearly 15,000 vehicles per day, plus the insurance costs and property damage to affected overheight vehicles/loads and the consequential personal injuries (about one-third of the reported strikes).

FIND OUT MORE . . .

[MUTCD Part 1 Clankers Memo](#)

Video evidence of the clankers effectiveness: [This boat owner's "catch of the day" was realizing they would not fit under the Casho Mill Road bridge](#)

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Safety, Asset Management, Emergency Response / Relief

Intersection Lighting Retrofits: Improving Existing Street Lighting for Crosswalk Safety



OVERVIEW OF INNOVATION

Florida DOT has a unique, systemic program to upgrade existing intersection lighting to increase safety at crosswalks, known as “Intersection Lighting Retrofits.” Sufficient intersection lighting is proven to reduce nighttime pedestrian crashes by over 40%.¹

After a multi-year program, FDOT has now installed “Intersection Lighting Retrofits” at over 1,800 intersections. This is the result of a strategic initiative to improve the lighting of pedestrian crosswalks at over 2,500 signalized intersections by 2024.

In general, these retrofit operations include switching old lamps to new LED technology in order to meet the FDOT’s own vertical illumination criteria. Additionally, new light poles or fixture mounting arms may be added among existing structures to improve the directionality of light projected on pedestrians.

Prior to launching this retrofit program, FDOT developed the policy and lighting criteria to define an “Intersection Lighting Retrofit” operation and achieve positive contrast of pedestrians in crosswalks as recommended by AASHTO and the Illuminating Engineering Society (IES). Positive contrast is generally found by placing streetlights between crosswalks and approaching vehicles, thereby illuminating the front of pedestrians from the driver’s perspective. This helps approaching drivers to better see pedestrians and avoid crosswalk collisions.

1. “Handbook of Road Safety Measures.” Elvik & Vaa, Oxford, United Kingdom, Elsevier



Source: FDOT Research BDV25-977-60

BENEFITS

Intersection Lighting Retrofits allow for:

- Lower cost lighting improvements at signalized intersections as existing structures do not require removal or rebuilding
- Greater numbers of signalized intersections with vertical illumination design and positive contrast for pedestrian lighting
- Improved nighttime driver visibility and pedestrian safety at signalized intersection crosswalks

FIND OUT MORE . . .

FHWA Video:

<https://www.youtube.com/watch?v=E0A6Ha5eQmo>

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Keywords: Light, Streetlight, Intersection, Crosswalk, Safety, Environment, Design

LED Luminary Glare Shield Improves Visibility for Motorists



OVERVIEW OF INNOVATION

William “Bill” McGhee, the FDOT District 5 Field Maintenance Manager, was presented with the Secretary’s Innovation & Efficiency Award for his display of innovation and commitment to safety. When a concern was identified regarding 149 LED luminaries creating glares for motorists on the U.S. 17-92 bridge over the St. John’s River in Debarry, Florida, McGhee went to work and developed a solution. He designed 12 light shields out of sheet metal for the luminaries that light up the multi-use path along the bridge, improving visibility for motorists without sacrificing visibility for pedestrians or bicyclists. McGhee even dipped the shields in liquid rubber to remove any sharp edges to prevent possible injury.

Creating and installing these shields in-house are also a cost savings for FDOT. If the remaining 137 luminaries were contracted, the cost to the agency would be near \$50,000.

BENEFITS

Safely light the multi-use path along the bridge, removing glare for motorists.

Near \$50,000 savings to the Department by performing in-house.

FIND OUT MORE . . .

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Luminaries, lighting, maintenance,
environment, design, safety

ZICLA Zipper System on Oakridge Boulevard (SR 430)



OVERVIEW OF INNOVATION

This project implemented safety improvements on Oakridge Boulevard (State Road (S.R.) 430) from the east side of the Halifax River to S.R. A1A. The roadway was repurposed by reducing the number of travel lanes from three to two and creating a 7-foot-wide, green, buffered bicycle lane.

As part of this project, the Department introduced the innovative ZICLA Zipper bicycle buffering system, which is the first of its kind to be used in an FDOT construction project. The ZICLA Zipper system is a series of reflective, raised separators designed to protect cyclists and prevent motorists from entering the bike lane. The ZICLA Zipper is widely used in Spain and provides real and perceived safety benefits to cyclists. They are highly visible because 50% of the surface is retroreflective.

Other improvements include a dedicated left-turn lane from Oakridge Boulevard onto Halifax Avenue, repaving Oakridge Boulevard to extend the life of the existing roadway, and landscaping enhancements. Additional pedestrian and bicycle improvements are also included in the project such as upgrading existing sidewalks and adding a bicycle lane transition at Grandview Avenue. A bicycle lane transition provides a place where bicyclists can safely and easily access the sidewalk from the bicycle lane.



Source: FDOT

BENEFITS

- Improved safety for bicyclists
- Improved non-motorized travel options
- Enhanced corridor aesthetics

FIND OUT MORE . . .

Project website -

<https://www.cflroads.com/project/441139-1>

ZICLA website -

<https://www.zicla.com/en/zipper/>

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Keywords

ZICLA Zipper bicycle buffering system, lane repurposing , safety, environment, design

Barricade Trailer



OVERVIEW OF INNOVATION

A smarter trailer design makes placing, removing, and transporting traffic safety equipment and accessories safer and more efficient.

When barricades, cones, sandbags, and other traffic safety equipment are needed, quick and efficient placement is critical. Not only do these devices protect drivers by alerting them to potential hazards in the roadway, but extended exposure to traffic can put workers and all road users at greater risk.

Cherokee County's previous transport system carried barricades upside-down, requiring two workers to physically flip the devices to place them on the roadway. Space for other necessities, such as barricade legs, fence posts, and signs, was also limited and increased the amount of time and trips required to complete the work.

To make the process faster and more efficient, agency staff designed and built a trailer with a better configuration. The trailer transports barricades upright, making it less strenuous for workers to load and unload. It can also accommodate more of the other essentials that are often needed at a site, including fencing, posts, cones, and approximately 80 filled sandbags.



Source: Cherokee County Secondary Roads

BENEFITS

This trailer design is more efficient, decreasing the amount of time required to place or removed traffic safety equipment. This reduces workers' exposure to traffic and ensures the traveling public are alerted to roadway hazards more quickly.

The new design also accommodates more equipment, reducing the amount of time required to set up or remove a closure.

FIND OUT MORE . . .

Innovation Video

<https://youtu.be/COUva7i10QE>

Cherokee County Secondary Roads Website

https://www.cherokeecounty.iowa.gov/departments/offices_a_-_e/engineer/index.php

Iowa Local Technical Assistance Program

<https://iowaltap.iastate.edu/>

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Safety, Construction, Maintenance, Emergency Response, Emergency Relief

Shop Clean-Up Squeegee



OVERVIEW OF INNOVATION

A skid-steer attachment constructed with repurposed materials helps maintenance shop workers wash floors in less time.

Keeping a transportation agency's plows, trucks, and other vehicles in good working condition can be messy as these equipment often leave behind mud, deicing chemicals, and debris on a maintenance shop's floor. Routinely cleaning the shop is important for keeping surfaces clear and workers safe, but washing the entire floor with traditional tools can take hours and considerably strain a small agency's staff resources.

To get the job done in less time, workers in Iowa's Madison County Secondary Roads maintenance shop created a custom attachment for a standard skid-steer. Made with materials found in the shop, including steel components and machinery belting, the attachment serves as a large squeegee that can be quickly installed to clean the entire shop in just 15 minutes.

The attachment, including labor and materials, cost less than \$500 to make.



Source: Madison County Secondary Roads

BENEFITS

This skid-steer attachment works like a giant squeegee to clear dirt and potentially hazardous materials from a concrete floor.

Cleaning the maintenance shop's floor had been a two-hour manual cleaning task but can now be done in 15 minutes. This innovation allows for more efficient allocation of staff resources and a safer and healthier work environment.

FIND OUT MORE . . .

Madison County Secondary Roads Website
<https://madisoncounty.iowa.gov/offices/engineer-secondary-roads/>

Iowa Local Technical Assistance Program
<https://iowaltap.iastate.edu/>

Madison County Secondary Roads

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Safety, Maintenance

Salt/Sand Spreader Lifting Jig



OVERVIEW OF INNOVATION

A custom-made lifting device reduces the risk of injury for maintenance shop workers.

Before a salt or sand spreader—also known as a sander—can be serviced or repaired, it must first be removed from its place in the bed of the dump truck. Traditionally this has been a physically demanding task, requiring a maintenance staff member to climb over the side of the truck and into the sander to attach a chain to each of the four corners before the sander can be hydraulically pulled out.

Using materials found in the weld shop, mechanics in Linn County, Iowa designed and constructed a steel lifting jig that can be attached to the spreader from the outside of the truck. This lifter increases safety by eliminating the need for a worker to climb into the sander and risk potential injury.

The lifting jig is also cost-effective – it was made for less than \$300 but is expected to perform well for years thanks to its steel components.



Source: Linn County Secondary Roads

BENEFITS

By eliminating the need for an employee to climb inside the sander to prepare it for lifting, this innovation significantly increases worker safety and efficiency.

FIND OUT MORE . . .

Innovation Video

<https://drive.google.com/file/d/1J1BAbrltEt0DR2gazg1LsPz9TQL0c3sU/view?usp=sharing>

Linn County Secondary Roads Website

https://www.cherokeecounty.iowa.gov/departments/offices_a-e/engineer/index.php

Iowa Local Technical Assistance Program

<https://iowaltap.iastate.edu/>

Linn County Secondary Roads

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Safety, Maintenance

Tailgate Mounted Spreader Box



OVERVIEW OF INNOVATION

A custom-built chute mounted to the rear of a box spreader makes applying replacement gravel to rutted highway shoulders easier, safer, and more cost-effective.

Replacing aggregates and smoothing highway shoulders is routine work for Iowa's highway maintenance crews. The job has typically required multiple vehicles in tandem: one dedicated to depositing the rock, another close behind to spread and grade the material in place and a third to sweep the pavement. The process can be slow-moving and labor-intensive.

A box spreader modified with a tailgate chute places a consistent quantity of aggregate in a targeted location along a road's shoulder without the need for a separate motor grader and broom. As a result, ruts can be filled in a single pass to save time and money and increase safety for workers and travelers alike.

Each tailgate spreader box costs \$310 in materials and can be installed in 30 minutes.



Source: Washington County Secondary Roads Department

BENEFITS

This innovation makes it possible for one person to perform a task that had previously required multiple people and a variety of equipment to accomplish.

The spreaders directly apply a consistent amount of gravel to the shoulder, ensuring ruts can be addressed in a single pass.

Filling ruts quickly saves time and labor costs and improves safety by reducing workers' exposure to traffic.

FIND OUT MORE . . .

Washington County Road Maintenance
<https://washingtoncounty.iowa.gov/184/Road-Maintenance>

Washington County Secondary Roads Department

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Maintenance, Safety, Asset Management



Construction Partnering and Work Zone Safety

OVERVIEW OF INNOVATION

When a state's Department of Transportation adopts a new practice for construction partnering or work zone safety, it is often not shared with other state DOTs. So, to ensure that the newly adopted practices and their benefits are shared, The Idaho Transportation Department Led a 5-State peer exchange in 2021.

At the peer exchange, state DOT employees from Idaho, Arizona, Nevada, Utah, and Washington State, along with employees from the Federal Highway Administration, were able to share new practices regarding construction partnering and work zone safety.



Source: The Idaho Transportation Department

BENEFITS

Though interstate collaboration, this innovation increased work zone safety and construction partnering efficiency.

FIND OUT MORE . . .

[Peer Exchange Event Program](#)

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Safety, Partnering, Construction



Heated Hot Mix Splitting Table

OVERVIEW OF INNOVATION

When testing a cylindrical cut of hot mix, two samples must be split from opposite sides of the mix. On a stationary table, this process can be cumbersome because the hot mix must be manually rotated, or the technician must maneuver to reach the other side of the cut. Aside from making the process more difficult, using a stationary table also increases the likelihood that the cut is segregated during the splitting process.

To address these issues, ITD employees created a hot mix splitting table that rotates to allow for greater accuracy and ease of use. This not only saves a considerable amount of time, but it increases the likelihood that the splitting process is homogeneous.



Source: The Idaho Transportation Department

BENEFITS

The Heated Hot Mix Splitting Table reduces the time and effort it takes to split hot mix samples.

FIND OUT MORE . . .

N/A

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Testing, Hot Mix, Efficiency, Pavement, Quality,
Time-Savings



Mobile Eyewash Station Attachable to Striping Trucks

OVERVIEW OF INNOVATION

After witnessing a pavement-marking contractor get splashed in the face with striping paint, three ITD employees decided to take it upon themselves to engineer a mobile eye washing station that is mountable to existing striping trucks.

Prior to this innovation, contractors would splash water in their face to wash off paint. Aside from sanitation concerns, water was not always available to contractors to use.

This innovation addressed both of those issues by being mountable to existing striping trucks. Furthermore, to reduce the eye washing station's install time, the station utilizes the water supply and pump already onboard the striping trucks.



Source: The Idaho Transportation Department

BENEFITS

The primary benefit of this innovation is increased access to critical safety equipment used to wash potentially harmful substances out of worker's eyes.

FIND OUT MORE . . .

N/A

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Safety, Eyewash, Striping, Trucks



Temporary Traffic Signal with Bicyclist Button

OVERVIEW OF INNOVATION

Temporary traffic signals are often used in work zones where only direction of traffic can move at a time. However, though these signals work well for vehicles, they often neglect other road users such as bicyclists and pedestrians.

To address this issue in a work zone along a popular biking route, ITD employees decided to use a temporary traffic signal with a button that allows bicyclists and pedestrians to safely move through the work zone.

This innovation not only increased safety for all road users, but it addressed equity issues by allowing those not in vehicles to navigate through the work zone.



Source: The Idaho Transportation Department

BENEFITS

By employing a temporary traffic signal with a bicyclist button, ITD was able to increase safety for all road users and address equity issues by allowing those not in vehicles to navigate through the work zone.

FIND OUT MORE . . .

[Justification for the Innovation](#)

[Render of the Signal in Use](#)

[Diagram of the Signal](#)

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Safety, Equity, Mobility, Bicyclist, Signal

Idaho Career Opportunities – Next in Construction (ICONIC) Workforce Development Program



OVERVIEW OF INNOVATION

As one of the fastest growing states in the nation, Idaho has been facing a severe shortage of skilled workers in the highway construction industry. To help fill this need, ITD partnered with local schools and community organizations to launch a training program called “Idaho Career Opportunities – Next in Construction (ICONIC).”

ICONIC delivered a five-week training program that taught and certified students in multiple specialties pertaining to highway construction. Some of these specialties included forklift operation, flagging, and Hazardous Waste Operations Emergency Response. 15 Students graduated from the ICONIC program.

The ICONIC program also increased the presence of under-represented groups in the field of highway construction. Of the student body, 40% were female and 60% were from minority groups.

This ICONIC program was nominated for and won a STIC Award in 2022.



Source: The Idaho Transportation Department

BENEFITS

The ICONIC Workforce Development Program helped address the severe shortage of skilled workers and increase the presence of under-represented groups in the highway construction industry.

FIND OUT MORE . . .

[STIC Excellence Award Application](#)

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Safety, Workforce, Employees, Development,
Equity, Representation

Oversize/Overweight Audible Route Guidance



OVERVIEW OF INNOVATION

Permitted turn-by-turn route details for oversize/overweight loads traveling on Illinois roads and structures were only available to drivers in printed form, requiring them to look at a set of paper directions to navigate their route. This routinely resulted in distracted driving, bridge strikes and other damage to infrastructure, causing undue public safety risks and costly damages across the state.

To improve safety, reduce distracted driving, enhance driver experience and protect Illinois assets from damage, a groundbreaking mobile app was developed in partnership with ProMiles to provide audible turn-by-turn route guidance for oversize/overweight loads. Drivers may now scan a code on their permit to launch the app for route-specific audible turn-by-turn driving instructions, safety announcements, restriction warnings and off-route alerts. This solution enables safe routing for all Illinois drivers of oversize/overweight loads, facilitating the movement of goods critical to our economy and the nation's supply chain.



Illinois Department of Transportation

BENEFITS

The new app provides distraction-free directions to keep motorists on the correct path. Drivers can easily launch the app, available in iOS and Android app stores, by scanning the QR code on their permit.

FIND OUT MORE . . .

Illinois Department of Transportation

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Keywords – oversize load, overweight load, navigation, route guidance

Snowplow Latch Extension

OVERVIEW OF INNOVATION

When a salt load freezes, it can be difficult to open tailgates secured by chains to remove the salt. This is a dangerous inconvenience that causes unwanted downtime and potential injury to staff. A frozen salt load puts tremendous pressure on the tailgate, and getting it open often requires more than one maintainer using hammers and prybars to release the chains. What's more, this happens most when the weather is at its worst and trucks should be out on the road clearing snow.

New tailgate latch extensions alleviate the potential downtime and injury risk posed by frozen salt loads. The extensions allow the tailgate to be locked in the partially open position using the truck's normal tailgate latches with chains set loosely as backup only. The extensions make it much easier to unload frozen salt, because there is no longer pressure on the tailgate chains. Now, instead of having to beat chains loose because they are under immense pressure from the frozen salt load, the operator can simply trip the tailgate latch and release the frozen load from the bed of the truck.



Illinois Department of Transportation

BENEFITS

Tailgate latch extensions enable a single person to release frozen loads safely, quickly and easily. Carthage Team Section created plans to enable others to replicate the latch extensions for use throughout the state. The extensions can be made easily and at minimal cost.

FIND OUT MORE . . .

Illinois Department of Transportation

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Keywords – snowplow, tailgate release, salt spreading

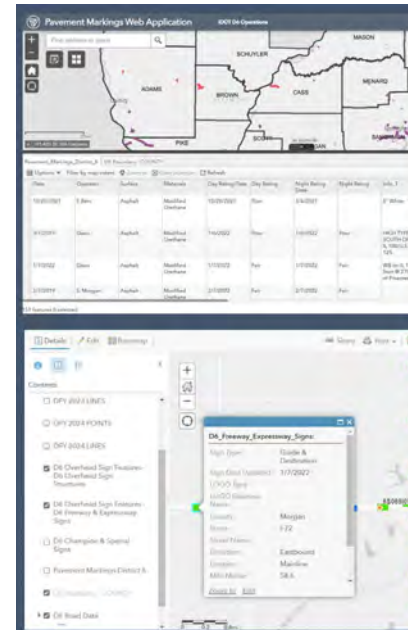
Tracking and Programming Maps



OVERVIEW OF INNOVATION

Decisions regarding when or where high-type pavement marking required restriping relied on past plan sets and technician memory, while hard-copy binders were used to track interstate, overhead, championship and special town name signs. Neither of these systems was reliable or efficient, and pavement markings became unnecessarily deficient throughout the district as a result.

A new system was developed using GIS technology to create a complete inventory of all high-type pavement markings maintained throughout the district, along with an up-to-date evaluation of each. The inventory can be easily filtered to provide a list of all road sections in need of restriping throughout the district. The system also provides a mapped inventory of all interstate and specialty signs, allowing for mobile access while decreasing time and manpower used to approve installation and repairs.



Illinois Department of Transportation

BENEFITS

The new system uses GIS to show striping sections throughout the district. Colors are used to indicate striping conditions. Sign information is filterable by type of sign, and colors and shapes indicate specifics of sign build and purpose. System information is clear, concise and readily accessible.

FIND OUT MORE . . .

Illinois Department of Transportation

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Keywords – pavement marking, asset inventory, asset mapping

Angled Plow Blade Holder



OVERVIEW OF INNOVATION

One day during a storm Levi Violette found himself alone in need of changing a plow blade so developed this nifty holder.

This 30" long, angled U-shaped steel holder mounted on a used plow pin fits into the hole in a 3-ton floor jack if the cover is removable. The back angle is designed to align a Polar Flex plow blade to match the dustpan angle. This holder enables the installer to wheel the blade to the dustpan, adjust the height as necessary, align the holes and have the jack hold the weight while bolts or pins are inserted.



Photo by MaineDOT

BENEFITS

Saves both lifting and finger pinching injuries.
Enables one person to install a plow blade alone if necessary.

FIND OUT MORE . . .

Engineered plan to replicate on MaineDOT Sharepoint site. Contact MaineDOTInnovates@maine.gov for access credentials to view or have file e-mailed.

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Maintenance, Safety

Asphalt Smoothing Rake



OVERVIEW OF INNOVATION

The Athens crew fashioned this asphalt smoothing rake out of used plow blades bolted together. It connects to the sides of an excavator bucket and does a great job smoothing asphalt over jobs like culvert replacements with 16-20' openings. Two people can lift the rake onto a truck for transport to the job site.

The crew notes that the brackets should be installed at the width to match the excavator bucket to which it will be attached. Also, chains could be added to the bracket sides for stability if the rake were to be used for back-dragging material.



Photo by MaineDOT

BENEFITS

This tool utilizes repurposed plow blades to make fast and painless work of smoothing asphalt compared with raking by hand.

FIND OUT MORE . . .

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Athens Crew Supervisor

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Maintenance, Construction, Safety

Cutting Edge Blade Holder



OVERVIEW OF INNOVATION

This simple but elegant 14" long holder mounted on a used plow pin fits into the hole of floor jacks with removable plates.

The holder securely supports up to a 4-foot plow blade or cutting edge enabling the installer to wheel the edge or blade to the bucket or dustpan, adjust the height as necessary, and have the jack hold the weight while bolts or pins are inserted.



Photo by MaineDOT

BENEFITS

Saves both lifting and finger pinching injuries.

FIND OUT MORE . . .

Engineered plan to replicate on MaineDOT Sharepoint site. Contact MaineDOTInnovates@maine.gov for access credentials to view or have file emailed.

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Maintenance, Safety

Harris Inspection Tool (aka HIT Rod)



OVERVIEW OF INNOVATION

MaineDOT Bridge Inspection team leaders and twin brothers Scott and Steve Harris have invented a variation of a selfie stick to enable a phone camera to visually inspect bridge elements that otherwise would require expensive equipment and often traffic control.

The telescoping HIT Rod consists of a 20' telescoping pole with an attached adjustable phone cradle on top. The iPhone's camera is remotely controlled by an Apple watch. MaineDOT Inspection Teams use iPhones and Apple watches, but other phone brands and compatible pairings may work.

The iPhone's camera is activated from the Apple watch via Bluetooth and the preview is actively cloned to the watch display. The iPhone is then moved into position via the HIT rod and the iPhone's picture is snapped remotely from a button on the watch. The Apple watch can also remotely adjust the iPhone Zoom, Flash, Timer, and other functions.

All MaineDOT Team Leaders are issued iPhones by MaineDOT. The additional cost of the HIT Rod for each inspection team is approximately \$800 – the cost of the Apple watch, telescoping pole and phone holder.

The HIT Rod is only used in areas where visual inspections are deemed appropriate by MaineDOT. The use of the HIT Rod often identifies areas requiring advanced inspection techniques.



Photo by MaineDOT

BENEFITS

Up to \$5000/inspection is saved by using the HIT Rod rather than paying for heavy equipment and/or traffic control. Few innovations have this strong a return on investment.

FIND OUT MORE . . .

Demonstration video is posted on MaineDOT Sharepoint site. Contact MaineDOTInnovates@maine.gov for access credentials to view.

Steve Harris

Bridge Inspection Team Leader

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Maintenance, Technology, Safety, Structures

Push Arm Stand



OVERVIEW OF INNOVATION

This stand made of used plow blades holds push arms off the floor when detached from trucks, both during the winter and for summer storage. The crew in Eddington made these years ago.

They have recently been discovered by MaineDOT Innovates and a new design with wheels to make them easier to move is under development at the MaineDOT Fab Shop.

Engineered plans for either design are available for replication.



Photo by MaineDOT

BENEFITS

The stand reduces the repeated lifting of arms when mounting and dismounting, keeps the arms off the floor to reduce tripping hazard, and protects the connecting pins.

FIND OUT MORE . . .

Engineered plans to replicate available. Contact MaineDOTInnovates@maine.gov to have file e-mailed.

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Maintenance, Safety

Synthesis of National Best Practices on Pedestrian and Bicycle Design, Guidance, and Technology Innovations



OVERVIEW OF INNOVATION

Ensuring nonmotorized road users are considered and safeguarded at every opportunity through best practices in infrastructure design and transportation management.

In 2021, bicyclists and pedestrians made up about 19 percent of all traffic fatalities in Michigan. Making roadways safer for all users will help the Michigan Department of Transportation (MDOT) achieve our goal of Toward Zero Deaths (TZD).

To improve pedestrian and bicyclist design practices statewide, MDOT gathered input from experts and advocacy groups and a thorough evaluation of the cutting-edge strategies and design innovations that have been implemented nationwide.

These efforts produced best practice guidance to help MDOT consider pedestrians and bicyclists across all aspects of transportation design. Ultimately, this information was used to identify elements within department guidance documents related to transportation planning or design where consideration for nonmotorized road users could be integrated or enhanced.

Additional materials were developed or revised to provide further guidance toward the use of pedestrian and bicycle strategies in Michigan. This included an update to *MDOT's Best Design Practices for Walking and Bicycling in Michigan* as well as the development of a new document entitled *Tools for the Planning and Design of Pedestrian Crossing Enhancements*.



Source: Michigan DOT

BENEFITS

With a new guidance document, MDOT is better prepared to protect pedestrians and bicyclists across the state with safer roads, sidewalks and paths.

FIND OUT MORE . . .

Research Spotlight Brief:

<https://www.Michigan.gov/MDOT/-/Media/Project/Websites/MDOT/Programs/Research-Administration/Research-Spotlights/SPR-1708-Spotlight.pdf>

Final Report:

<https://www.Michigan.gov/MDOT/-/Media/Project/Websites/MDOT/Programs/Research-Administration/Final-Reports/SPR-1708-Report.pdf>

Tools for the Planning and Design of Pedestrian Crossing Enhancements:

<https://mdotjboss.state.mi.us/TSSD/getTSDDocument.htm?docGuid=07f97844-60a2-49a8-87a0-5d02582e43bb&fileName=Tools%20for%20the%20Planning%20and%20Design%20of%20Pedestrian%20Crossing%20Enhancements%202022.pdf>

Michigan Department of Transportation

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Design, Safety, Pedestrians, Bicyclists

Barrier Saddle



OVERVIEW OF INNOVATION

Years ago, the median of I-70 was closed in. Grated inlets in the median had Type C Concrete Median Barrier slip formed over them. A cut-out in the concrete was made to allow water to drain into the inlets, but it was impossible for maintenance to remove the grate to clean out the inlet with a suck/vac truck. Over time, the inlets became plugged with debris and resulted in standing water on the inside shoulder and fast lane. The Barrier Gap Protection Assembly (BGPA aka Barrier Saddle) allows a four foot section of concrete median barrier to be removed to allow access to routinely, effectively and safely clean out the inlets. The gap in the concrete barrier is permanently protected by the Barrier Gap Protection Assembly which can be unbolted, section by section, to gain full access to remove the grate and clean the inlet. The total cost of materials was \$10,465 with zero recurring reoccurring costs.



Source: Missouri Department of Transportation

BENEFITS

Plugged inlets cause standing water in the shoulder and fast lane. By having access to clean out the inlets, allows the maintenance crews to clean the inlets quickly and safely. In one shift, the barrier saddle can be disassembled, the grate removed, the inlet cleaned, and everything reassembled.

FIND OUT MORE . . .

Missouri Department of Transportation
Innovations Showcase

[BarrierSaddle_SL.pdf \(modot.org\)](#)

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Safety, Median, Maintenance, Pavement

Signals and Lighting Training Facilities



OVERVIEW OF INNOVATION

MoDOT Signals and Lighting Training Facility is a safety improvement innovation to train lighting and signal workers in a safe environment. A complete sign and lighting intersection was created on a MoDOT parking lot. The training facility is beneficial to help build confidence in workers when placed in actual conditions by training them to complete tasks in a calm, quick and efficient manner.



Source: Missouri Department of Transportation

BENEFITS

This innovation saves time and increases safety by creating the ability to train staff in safe conditions before working in live intersections. Money is saved using MoDOT's own products during training that have been recycled.

FIND OUT MORE . . .

Missouri Department of Transportation
Innovations Showcase

[SigningSignalsTrainingLotProductivityHandout_KC.pdf \(modot.org\)](#)

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Workforce Development, Traffic, Lighting,
Safety training

Tractor Halo



OVERVIEW OF INNOVATION

The halo for a cab tractor is a barrier that surrounds the top of the cab and was built to protect the glass, fiberglass body and lines of the tractor from being damaged by overhanging limbs. The halo also protects the operator from flying debris caused by branches breaking through the cab glass. The halo sweeps low lying limbs up and over the cab protecting the lights and glass. The halo can be custom sized depending on the tractor model and implemented on any tractor that has a secure attachment point to the existing rollover protection system.

Existing metal at the district maintenance shed was used to fabricate the halo so the cost was minimal.



Source: Missouri Department of Transportation

BENEFITS

The Tractor Halo has saved MoDOT money due to fewer costs related to replacement of expensive glass, lights and cab parts. The halo provides safety to the operator during mowing operations, which reduces injuries and related costs.

FIND OUT MORE . . .

Missouri Department of Transportation
Innovations Showcase

[50: Tractor Halo | Missouri Department of Transportation \(modot.org\)](#)

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Safety, Savings, Maintenance, Operations,
Mowing

Wing Camera



OVERVIEW OF INNOVATION

When a wing plow is attached to a snowplow in the up position, it is impossible to see out the passenger window while plowing or when pulling out of an intersection. This requires lowering and raising the wing every time or continuously driving with it down. Both of which could inadvertently damage a car, sign, mailbox, or anything along the roadway. With a backup camera mounted to the top of the passenger side mirror, you can see over the front mounted wing plow, making it easier to see cars or other obstructions while plowing.



Source: Missouri Department of Transportation

BENEFITS

Drivers can now use the camera to see over the wing in places they could not see before. This keeps the public and MoDOT drivers safer and reduces claims for damages.

FIND OUT MORE . . .

Missouri Department of Transportation
Innovations Showcase

[WingCamera_NW.pdf \(modot.org\)](#)

[Wing Camera NW Hamilton MT - YouTube](#)

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Operations, Maintenance

LIVE 511 CALL CENTER CREATED BETWEEN NORTH CAROLINA DOT AND CORRECTIONAL INSTITUTE FOR WOMEN



OVERVIEW OF INNOVATION

NCDOT has provided traveler information via a 511 phone system since 2004. The initial 511 implementation included an interactive voice recognition (IVR) menu-driven solution allowing users to use prompts to access road conditions in a specific region. The 511 system supported significant peak call volumes during major events, such as hurricanes and snow. But as smartphones gained popularity and websites and applications were introduced to more efficiently deliver traveler information, NCDOT evaluated the IVR solution based on cost-benefit analysis and user navigation and modified their approach to providing the service.

Since the late 1990s, NCDOT has worked with the Department of Commerce Travel and Tourism Division and the Department of Public Safety Corrections Division to occasionally have inmates answer DOT related phone calls. Originally created to answer travel and tourism related phone calls, the call center is located at the North Carolina Correctional Institute for Women (NCCIW). The call center has evolved to take NCDOT customer service calls on weekends during emergencies, as well as routine calls for the NCDOT Rail Division.

In 2016, NCDOT tested having the NCCIW call center answer 511 calls. The operators used the NCDOT DriveNC.gov website to answer traveler info questions. NCDOT surveyed 511 callers who repeatedly expressed how happy they were to speak with a live person rather than an IVR. NCDOT and NCCIW saw the benefit of converting the 511 system permanently to the NCCIW call center and turned off the IVR at the end of 2017, allowing the NCCIW operators to handle all 511 calls. The center handles about 35,000 511 calls each year.

In 2019, due to budget cuts at NCDOT, NCDOT Customer Service was also moved to the NCCIW Call Center and handles about 80 NCDOT Customer Service calls per day.



Source: NCDOT

BENEFITS

The benefits of using a Live 511 Call Center include cost savings, improved customer service, and providing skills to inmates who will reenter the workforce.

FIND OUT MORE . . .

NOCoe Case Study:

<https://itsheartland.org/wp-content/uploads/2019/08/NCDOT-Case-Study-511-Call-Center.pdf>

511 Information Line Website:

<https://drivenc.gov/>

NCDOT Transportation Mobility and Safety Division

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511 Call Center, Correctional Institute for Women

Commercial Trucking Alert System



OVERVIEW OF INNOVATION

NCDOT is partnering with Drivewyze, a company that provides innovative connected-truck technology, including in-cab communications, and INRIX, a probe speed data provider, to provide real-time in-truck messaging of urgent road conditions. The alerts help commercial drivers react more quickly before encountering stopped traffic or major slowdowns.

NCDOT identified certain major rural interstate routes, where Dynamic Message Signs (DMS) may be lacking. NCDOT maintains more than 300 DMS that provide important traffic updates across 2,500 miles of controlled access freeways. The safety alerts under the pilot, however, can reach commercial drivers even where there is not a digital sign.

Drivewyze monitors INRIX for sudden slowdown and congestion events and distributes the alerts to subscribed drivers for free. The alerts will have messages such as "Sudden Slowdown Ahead" and "Congestion Ahead" about 2 or 3 miles before commercial truck drivers encounter the slowed traffic or incident. These alerts will complement other safety notifications such as low-clearance bridges, rollover risk, steep grades, restricted roads, and approaching work zones.



Source: Drivewyze

BENEFITS

Providing Commercial Vehicles with advanced notification of slowdowns and congestion allows them more time to slow down and potentially reduce secondary crashes.

FIND OUT MORE . . .

Drivewyze Website:

<https://drivewyze.com/drivewyze-infrastructure-services/smart-roadways/>

INRIX Website:

<https://inrix.com/press-releases/ncdot-drivewyze/>

NCDOT Transportation Mobility and Safety Division

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Commercial Trucking, Drivewyze

NCDOT Traffic Incident Management (TIM) Training Track



OVERVIEW OF INNOVATION

NCDOT has envisioned a lifelike classroom where IMAP responders can train and refine their skills in a more realistic environment without being exposed to the hazards of live traffic. The initiation of the track design focused on the intended purpose of training IMAP responders to safely and efficiently manage and clear incidents.

The NCDOT partnered with the North Carolina State Highway Patrol (NCSHP) to construct a training track on land located within the larger loop of the NCSHP's high-speed training track. The new TIM Training Track includes a half-mile of TIM-focused training facilities and ties into the existing two miles of track. The TIM Training Track was designed to incorporate a broad range of physical characteristics that allow agencies to practice various incident work zone applications and vehicle maneuvers.

The track allows IMAP responders and other agencies to train on newer technologies, such as drones for crash investigations and on new technologies for IMAP vehicles.

With the construction of the TIM Training Track, IMAP training is evolving from individualized, agency-led training to an all-responder training environment, focused on fostering consistent TIM culture across multiple agencies.



Source: NCSHP, Apex PD, and IMAP Multi Vehicle Crash Simulation

BENEFITS

The typical classroom-style learning paired with hands-on practical training on the TIM Training Track will prove helpful in efficient on-scene management, quicker incident clearance, and injury reductions to first responders while on the scene of an incident.

An additional benefit of training on a closed course is having the ability to record activities and review the response. These recordings are used to play back and highlight specific actions that were conducted properly as well as identify activities that require further training or the development of additional training modules.

FIND OUT MORE . . .

NCDOT TIM Training Track Website:
<https://www.ncdot.gov/news/press-releases/Pages/2022/2022-06-23-incident-management-track-ncdot.aspx>

NCDOT Transportation Mobility and Safety Division

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Incident management, First responder, Roadside safety

Metal Arrow Stencil Tool



OVERVIEW OF INNOVATION

Metal arrow stencil tool increases efficiency during line striping and reduces time spent in the roadway.

To facilitate effective snow removal around stormwater drains and maintain adequate drainage in roadways, the Concord General Services team paints arrows in the street pointing towards the drains. Josh Brown from the city of Concord, NH General Services team created a metal arrow stencil that is attached to a metal pole. This allows the technician to remain standing upright, hold the metal stencil in place, and paint without having to bend down, reposition the stencil, and without replacing the nylon cord. Previously, the team had been using a standard flat stencil and the process often included burning off the remaining old paint with a heat gun, which would sometimes burn through the nylon cord attached to the stencil.

Josh used an old one-way street arrow sign with the paint ground off and cut out the arrow to create a durable, metal arrow stencil. He then bent the end of the street sign up at a 90-degree angle, in order to bolt a metal pole handle to the edge. This metal pole allows the operator to stay standing while holding the stencil from an upright position and lift and move the stencil easily. Josh used just a couple hours of labor time to create the new stencil, and since an old sign was used for the metal, there was no direct cost.



Source: City of Concord, NH General Services

BENEFITS

The benefits of using the metal arrow stencil tool include reducing the ergonomic stress of repeatedly bending over and picking up the stencil, reducing the amount of time that a team member is in the roadway, and eliminating the time and cost in replacing the nylon cording on the previously used stencil due to heat damage.

FIND OUT MORE . . .

Concord, NH General Services Website
<https://www.concordnh.gov/491/General-Services-Public-Works>

UNH Technology Transfer Center
<https://t2.unh.edu/>

Concord, NH General Services

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Safety, Maintenance, Stormwater Management

Pipe Measuring Tool

OVERVIEW OF INNOVATION

Pipe measuring tool saves time when measuring pipe sizes for design builds or other applications and reduces the risks associated with entering confined spaces.

The Pipe Measuring Tool is constructed out of wood and can be inserted through a grate to measure pipe sizes, minimizing the risks involved with having someone physically enter a confined space. Using the measurement tool, the process of measuring pipe sizes for design builds or other applications is now a one-person task, and no longer requires entering the catch basin.

Craig Borgeson from the City of Laconia, NH DPW developed and constructed a simple tool out of wood that can be inserted through the grate to complete the measurement. It is constructed of one piece of wood strapping (1"x2") with a flat wedge attached at the end with hash marks showing predefined measurements (6", 8" 10" 12" and 15"). Limited time and resources were involved in constructing this tool as Craig used existing wood that he had on hand and limited labor time for the construction process.



Source: Craig Borgeson, City of Laconia, NH DPW

BENEFITS

The benefits of the pipe measuring tool include reducing the risks associated with entering confined spaces, reduced time spent on the roadway, less impact on roadway users, and reduced time spent by employees completing the task.

FIND OUT MORE . . .

Laconia DPW Website
<https://www.laconianh.gov/668/Public-Works>

UNH Technology Transfer Center
<https://t2.unh.edu/>

City of Laconia, NH DPW

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Safety, Maintenance, Construction

Sidewalk Salt Hopper Filler



OVERVIEW OF INNOVATION

Sidewalk salt hopper filler reduces the risks associated with climbing a ladder and saves time when refilling the bobcat spreader hopper.

A bobcat with a salt/sand spreader is used to maintain the city's sidewalks during winter storms. Three team members from the City of Claremont, NH Public Works Department created a sidewalk salt hopper filler which is a mechanical conveyor/funnel that channels material from the pickup truck into the bobcat spreader hopper. Previously, a pick-up truck had to drive out to the bobcat's location, maneuver the truck to park close to the bobcat, and then the driver of either vehicle had to get out and climb a ladder up into the back of the pickup truck to shovel salt from the pickup truck into the bobcat spreader hopper.

Three team members (Ted Wadleigh, Bruce Therrien, and Warren Mordenti) used scrap materials from the DPW yard consisting of an old damaged v-box salt spreader and other scrap metal. They installed a new chain to the v-box, replumbed the hydraulics, and fabricated a chute for the back from scrap metal as well as fabricated new locks for the dump body. The controls to funnel salt/sand from the pickup truck are operated from within the pickup truck, and the operators can communicate via radio or cell phone to indicate on/off and other instructions for filling the hopper. By using the new sidewalk salt hopper filler, the operator can now top off the sidewalk hopper in about 30 seconds without the driver of either vehicle having to get out of their vehicles, without using a ladder, and without shoveling.



Source: City of Claremont, NH Public Works

BENEFITS

The benefits of the sidewalk salt hopper filler includes the ability to top off the sidewalk hopper in 30 seconds on average, eliminates the risk of employee injuries from climbing a ladder and shoveling, and increases the service level to the citizens of Claremont by treating the sidewalks faster during winter storms.

FIND OUT MORE . . .

City of Claremont, NH Public Works
<https://www.claremontnh.com/dpw>

UNH Technology Transfer Center
<https://t2.unh.edu/>

City of Claremont, NH Public Works

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Maintenance, Safety

Bicycle-Friendly Resurfacing in Mercer County



OVERVIEW OF INNOVATION

Mercer County's Bicycle Friendly Resurfacing Program integrates bicycle facilities into resurfacing projects and ensures that bicycle facilities are considered during routine road maintenance, reconstruction, construction, and land development reviews to create a network in alignment with the County's Complete Streets Policy.

The Mercer County Bicycle Master Plan describes factors for analysis of County Roads such as cartway width, environmental constraints, crashes records involving bicycles, network connectivity, Level of Traffic Stress (LTS), Annual Average Daily Traffic, truck volumes, existing bus routes, existing and proposed speed limits, bicycle travel demand modeling and 8-80 Design.

Some routes require simple striping and others will require more intensive work such as road widening or intersection redesign that may involve drainage or right-of-way issues for example. The County prioritizes roadways that are in need of repaving, and only need additions of epoxy paint or thermoplastic and signage to define the bicycle facility, and continues to plan for more complicated segments.

BENEFITS

Bicycle infrastructure is integrated into the repaving program to conduct all work at one time which increases efficiency and cost savings.

The addition of bicycle infrastructure increases safety for all road users.

The integration of bicycle facilities into resurfacing projects advances a multimodal network in alignment with the County's Complete Streets Policy.

FIND OUT MORE . . .

2020 Mercer County Bicycle Plan Element
<http://www.mercercounty.org/departments/planning/2019-bicycle-master-plan>

NJ STIC Innovation Spotlight: Bicycle-Friendly Resurfacing Program
<https://www.njdottechtransfer.net/bike-friendly-resurfacing>

FHWA's Incorporating On-Road Bicycle Networks into Resurfacing Projects
https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/resurfacing/

Mercer County Planning Department

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Safety, Planning, Pavement, Maintenance

Commercial Service Vehicle Alerts



OVERVIEW OF INNOVATION

NJDOT wants to get more information into the hands of drivers about changing roadway conditions – the earlier the better – to inform their decision making in an effort to reduce crashes. Commercial vehicle alerts inform truck drivers of hazards on the road, such as sudden slowdowns, disabled vehicles, debris, and adverse weather conditions, before the truck is affected by the incident. The driver can seek an alternate route or pull over until the slowdown is cleared.

NJDOT partnered with INRIX which collects and delivers real-time data that detects and describes sudden slowdowns, closures, and queues by location for specific events, and Drivewyze which provides communication with some 2.8 million trucks via its Drivewyze application which is embedded in the electronic logging device (ELD) of the truck. Drivewyze takes data from INRIX and communicates it to commercial truck drivers.

With this system, NJDOT can identify hazards and prevent crashes by issuing alerts of adverse road conditions before problems arise.



Source: Sblover99, Wikimedia

BENEFITS

Commercial vehicle drivers can avoid slowdowns, choose alternate routes, or pull over which can increase efficiency.

Awareness of adverse road conditions can help prevent crashes to improve overall safety for roadway users. In one example, a "major winter storm alert" was distributed to several states in the Northeast and reached some 4,811 trucks at a critical time over a 30-hour period.

FIND OUT MORE . . .

National Operations for Excellence Webinar
<https://www.njdottechtransfer.net/NOE-CVA-webinar>

NJ STIC Crowdsourcing for Advancing Operations
<https://www.njdottechtransfer.net/NJSTIC-COA>

New Jersey Department of Transportation

Sal Cowan, Senior Director for Transportation Mobility

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Safety, Technology, Freight/Goods Movement

Weather Savvy Roads Pilot Program

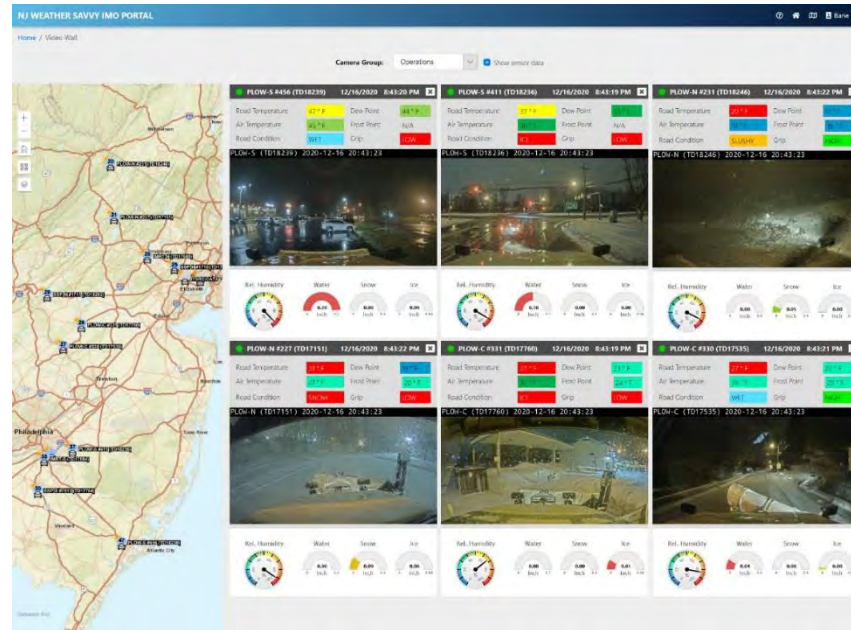


OVERVIEW OF INNOVATION

The deployment of real-time vehicle-based Intelligent Transportation System (ITS) road weather sensors and video cameras, improves NJDOT's ability to detect and forecast adverse road weather and pavement conditions, and determine the most effective roadway and traffic management response. These technologies have enabled the communication of critical road-weather data between vehicles, infrastructure, and Department personnel across the State to assess the impacts of weather on roads, vehicles, and travelers, and has also been used to inform the decision making process by the Department leadership.

NJDOT equipped 24 fleet vehicles with windshield cameras, mobile Road Weather Information Systems (RWIS) sensors, portable PC computers, and cellular routers. The equipment in each vehicle was integrated to provide a continuous feed of road weather data and video of the roadway conditions to the remote data center using cellular communications. The data feed from all vehicles was integrated in a unified data management platform, which also provided a web-based graphical user interface for data and video feed visualization, among other features.

The mobile RWIS provides information on ambient temperature, road temperature, road condition and grip, as well as a windshield view of road conditions. Management can see what the drivers are seeing. The information helps to assess a storm's duration and intensity while it is ongoing and helps management determine appropriate responses.



Source: New Jersey Department of Transportation

BENEFITS

Safety is improved through provision of a continuous feed of road weather data and video of roadway condition which can inform real-time management decisions, post-event analysis, and pavement treatment strategies.

Improves information sharing and communications among agencies including emergency services.

Real-time data is harnessed to inform weather responsive deployment of personnel and vehicle fleet which offers efficiencies for weather responsive management and operations.

FIND OUT MORE . . .

NJDOT Weather Savvy Roads Pilot: Update and Lessons Learned Summary
<https://www.njdottechtransfer.net/weather-savvy-update>

NJDOT Weather Savvy Roads Pilot Program: Final Report
<https://www.njdottechtransfer.net/weather-savvy-final-report>

New Jersey Department of Transportation
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Safety, Operations, Technology

Innovations in Crash Investigation Technology.



OVERVIEW OF INNOVATION

The New Mexico State Police Crash Reconstruction Unit uses drone technology to safely and quickly manage and clear crash sites.

In 2017, New Mexico State Police started the Police Crash Reconstruction Unit. This unit not only investigates and reconstructs crashes, but they also improve traffic safety by clearing crash sites quickly and efficiently with the use of drones.

Prior to using drones, clearing a crash site could take 2-4 hours, now it takes 10-45 minutes. Utilizing drone technology reduces: the opportunity for additional crashes, additional pedestrian injuries, the amount of time the motoring public is stopped, and grants faster access to emergency response / relief so injured parties may receive aid faster. Police officer resources at the site are also maximized because now it only requires 1 police officer to investigate the crash site. Ultimately, drone technology at crash sites, reduces the amount of time all involved in the crash have to be exposed to a dangerous situation.

Due to the high resolution and quality of the cameras and software installed on these Crash Site Investigation Drones, it results in higher quality mapping, documentation and better visual aids at trials for: the Defense, Prosecution, Judges, Witnesses and Jurors.



Aerial Diagram of a multi-vehicle and multi-fatality crash.

Source: New Mexico State Police Drone

BENEFITS

Drone technology reduces the amount of time it takes to clear a crash site from hours to minutes, which increases the safety of the motoring public, grants faster access to emergency response/relief, maximizes police officer resources, and provides better documentation.

FIND OUT MORE . . .

<https://uavcoach.com/drones-accident-reconstruction>

<https://nationalpolice.org/drones-transform>

NMDOT Research Bureau

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Safety, Technology, Emergency Response / Relief

Drone Bridge Inspection



OVERVIEW OF INNOVATION

The Ohio Department of Transportation's (ODOT) expansion of Unmanned Aircraft System (UAS) bridge inspections allowed the department to reduce costs and time associated with essential structure examinations.

ODOT used State Transportation Innovative Council (STIC) funding to purchase equipment and software for new and existing pilots.

A total of eight Skydio 2 UAS and one Skydio X2E were purchased using STIC and ODOT funding. Initially UAS's were mainly used as a supplement for snooper truck inspections. However, the department is moving toward drone use for other services as well.

This migration to using UAS for bridge inspection has significant cost savings. A UAS inspection can be carried out by one or two bridge specialists, without any need for traffic management personnel or equipment. The use of drones for bridge inspections has saved the department over \$1.6 million.

The use of a drone to conduct bridge inspections eliminates the need for lane closures that can cause traffic delays and safety hazards that existed previously with snooper or bucket truck use.

Expanded drone bridge inspections were particularly beneficial during the height of COVID-19 because a minimal number of inspectors could complete this important task while social distancing.



Drone Bridge Inspection of the Jeremiah Morrow Bridge, Warren County, Ohio - Ohio Department of Transportation

BENEFITS

UAS inspection requires fewer people, less time, and reduces costs as compared to using a snooper truck.

Less travel disruption to motorists.

Improved safety conditions.

FIND OUT MORE . . .

[DriveOhio | Ohio.gov](https://driveohio.com)

[About UAS | Ohio Unmanned Aircraft Systems Center](#)

ODOT Office of Unmanned Aircraft Systems

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Safety, Operations, Structures, Technology,
Asset Management

LED Highway Lighting Conversion



OVERVIEW OF INNOVATION

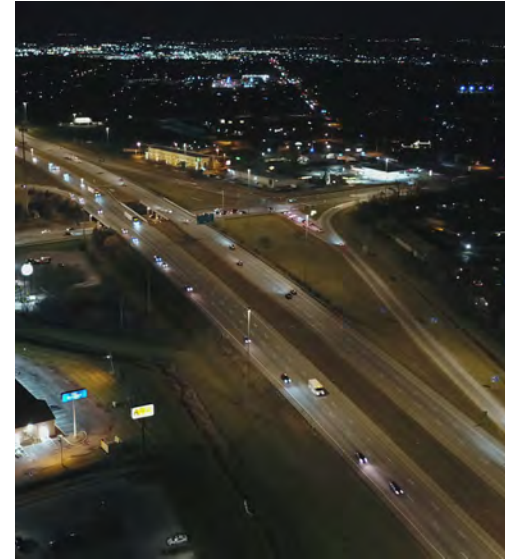
Replacing all high-pressure sodium lightbulbs with brighter, more efficient LED lights improves highway visibility and safety while reducing long-term maintenance costs.

The implementation of an Ohio Department of Transportation (ODOT) employee LED highway lighting conversion recommendation to the department's \$100 million cost savings initiative will result in a long-term savings of nearly \$27 million.

The project replaces all ODOT's existing high-pressure sodium luminaires on high and low mast light supports with more efficient LED luminaires that provide superior roadway illumination.

There are over 45,000 total luminaires lighting ODOT's system with more than 24,000 (over 53%) of being high-mast luminaires. The 19,000 high-pressure sodium lights will be replaced by 11,000 LED lights.

The conversion will save money, improve safety, and lower environmental impacts. This project is well underway and is expected to be completed by the summer of 2023.



Lucas County, Ohio I-75 and U.S. 20 interchange before (left) and after (right) LED highway lighting conversion. - Ohio Department of Transportation

BENEFITS

LED highway lighting improves nighttime visibility, increases safety, and reduces long-term maintenance costs.

Ohio's overall savings is projected to be nearly \$27 million.

FIND OUT MORE . . .

The following videos do not represent ODOT projects, rather they present the benefits of switching to LED lights from the HPS lamps:

[Wellesley Municipal Light Plant Switches to LED Street Lights – YouTube](#)

[Urban Green - Streetlight Replacement Project - December, 2018 - YouTube](#)

ODOT Office of Roadway Engineering

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Safety, Operations, Maintenance, Materials

Traffic Signal Test Cabinet



OVERVIEW OF INNOVATION

The fabrication of a test traffic signal by the Lucas County Engineers Office (LCEO) has allowed for troubleshooting in a controlled environment while eliminating the risks of working among live traffic.

Employees brainstormed various ideas including a “Virtual Cabinet” that eventually was ruled out because that approach wouldn’t allow physical elements of a traffic signal to be analyzed.

The LCEO repurposed an existing traffic signal cabinet and mocked it up as an actual physical signal in the traffic operations shop.

The LCEO currently uses a full NEMA TS1 signal cabinet located at its facility. This allows staff to troubleshoot, diagnosis, and test questionable equipment that has been removed from the field.

There are plans to build a second test signal NEMA TS2 in the future.

Staff knowledge and expertise will increase by having both types of signals that are in use in the field.

Traffic signal complaints or failures are addressed in a timely manner, due to accurate troubleshooting the test cabinet allows staff to perform.

Minimal costs because labor was performed in house using an existing traffic signal cabinet and components.



Equipped traffic signal ready to analyze defective equipment - Lucas County Engineer's Office

BENEFITS

Eliminates risk of working among live traffic.

Increases knowledge and troubleshooting capabilities.

Timely response to problems and outages.

Minimal costs.

FIND OUT MORE . . .

[Lucas County Engineer's Office | Lucas County, OH - Official Website](#)

Lucas County Engineers Office

Michael Melnyk
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Safety, Operations, Technology

Fabricated Snow Plow

OVERVIEW OF INNOVATION

The fabricated snow plow allows crews to quickly return roads to an acceptable level of service without sacrificing operator safety.

When it comes to plowing snow, a few variables rise to the top of the list. First, keeping operators and roadway users safe during plowing, and second, efficiently plowing and moving through route cycles as quickly as weather and road conditions allow.

Clinton County in PennDOT's Engineering District 2 was able to develop an innovation that meets both variables. Through videos and travels where operators saw similar plows in use, county staff determined that the lead point of the plow must hang out further over the cutting edge than traditional plows. To replicate this, Clinton County refabricated an existing plow by cutting the back supports and adding more curvature to the barrel. The retrofit makes the plow height shorter, like a lower case "c" when viewing from the side as opposed to an upper case "C."

This innovation prevented snow from rising over the top of the plow barrel and building up on the truck's windshield. Making this change has greatly improved visibility and elevated the safety factor. It also allows the operator to travel at normal speeds, dependent on weather, which keeps plowing cycle times on track and assures consistent service. The result provides better service during plow events without sacrificing safety.



Retrofitted plows have a smaller curve height. Source: PennDOT

BENEFITS

The benefits of using the fabricated snow plow include increased visibility for operators allowing them to quickly return roads to an acceptable level of service. This not only increases safety for the operators but for the general public as well.

FIND OUT MORE . . .

Pennsylvania DOT

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Winter, Maintenance, Safety

Live Accident Notification Form



OVERVIEW OF INNOVATION

The live Accident Notification Form uses Microsoft Forms with an email notification to improve the line of communication.

When the unfortunate event occurs of an employee being injured on the job or being involved in an accident, a line of communication is needed to notify the appropriate staff. In the past, per PennDOT policy, a hard copy Accident Notification Form (ANF) would need to be completed and sent to key personnel, which could take up to two to three days for notifications to be completed. That's where the use of Microsoft Forms with an email notification came in to improve the line of communication of the ANF.

The ANF Microsoft Form was created for time-sensitive information to be emailed to the appropriate people regarding any accident and/or injury within the district. It was created with the goal of having the foreman, supervisor, or manager complete the form once they arrive on the site of an accident. The reporting tool gives a snapshot of the severity of the accident and provides time-sensitive information. Once submitted, a high priority email is sent to key personnel within the district and PennDOT's Safety Division.

The "live" link to the form was placed on all iOS user devices within the district and displays on the home screen in the same way as an app. A user accesses the form by tapping on the icon, which then accesses Microsoft Forms through the user's web browser.

The screenshot shows a mobile form interface with the following sections:

- 10. Type of Accident:** Radio buttons for "Work Related Injury" (selected), "Fleet/Equipment Accident", and "Med Express".
- 11. Nature of Injury:** A text input field with the placeholder "Enter your answer".
- 12. Body Part Affected:** A text input field with the placeholder "Enter your answer".
- 13. Medical Treatment Received:** Radio buttons for "None", "First Aid", and "Med Express".
- 14. Method of Transportation:** Radio buttons for "Hospital/ER" (selected), "Foreman/Co-Worker Driven", "Ambulance", and "Medical Helicopter".
- A green "Submit" button.
- Footer text: "Never give out your password. Report abuse", "Powered by Microsoft Forms | The owner of this form has not provided a privacy statement as to how they will use your response data. Do not provide personal or sensitive information. | Terms of Use".

Live link to form was placed on all iOS devices. Source: PennDOT

BENEFITS

The benefits of using the live Accident Notification Form include expediting the notifications to key personnel in two to three minutes compared to two to three days and eliminating the use of hard copies.

FIND OUT MORE . . .

Pennsylvania DOT

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Safety, Operations

Spreader Chute for Winter Operations

OVERVIEW OF INNOVATION

The spreader chute directly deposits materials to the shoulders making repairs more efficient, easier, and safer.

In the past, when placing materials to repair roadway shoulders during the winter months, an additional piece of equipment or effort was needed due to the truck's salt spreader being in the way. If this work was being done during mild winter days, it meant removing the winter material spreaders from the dump truck and then reattaching it in preparation for winter weather.

To eliminate or decrease some of that work, Warren County in PennDOT's Engineering District 1 fashioned a prototype chute from a PVC pipe. The goal was to find a way to cover and bypass the spreader while also efficiently place the material along the shoulder. Once the prototype was approved, the county upgraded to a metal chute. The total material costs were approximately \$300 compared to purchasing one for approximately \$750.

The aluminum device attaches to the spreader and can be used to fill low shoulders along the roadway without having to remove the spreader. The chute directs material to the shoulders to fill low spots while keeping the equipment and truck on the main road. Along with making shoulder repairs easier and more efficient, using the chute also created safer work conditions for the operators and laborers.



Aluminum device attaches to the spreader. Source: PennDOT

BENEFITS

The benefits of using the spreader chute include directly depositing materials to the shoulders while keeping the truck and equipment on the roadway. Not only is this more efficient, but it is safer for the crew.

FIND OUT MORE . . .

Pennsylvania DOT

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Maintenance, Construction

Puerto Rico Road Safety Observatory



OVERVIEW OF INNOVATION

Puerto Rico Road Safety Observatory Overview:

The Puerto Rico's Road Safety Observatory (Observatory) is a set of tools for easy access, visualization, and analysis of crash and traffic records data which has been developed by a team of data scientists house under the Puerto Rico Traffic Safety Commission with funding and support from the National Highway Traffic Safety Administration (NHTSA) and the Puerto Rico Traffic Safety Commission (PRTSC).

The Observatory database is made up primarily of the universe of crash reports generated by the Puerto Rico Police Bureau on a daily basis. Other traffic records databases linked to the Observatory include a state and local highway base map and roadways, milepost data, highway performance monitoring system data, and toxicology report data.

The Observatory tools include: (1) an interactive dashboard for viewing crash statistics, (2) a crash geolocation tool, (3) an individual complaint search tool, (4) a data entry tool for reports submitted on paper by those Municipal Police that do not have the software to run the digital crash report, and (5) a newly developed high-crash location analysis tool that uses an average crash weighting methodology to identify hot-spots.

The Observatory is currently used by various government agencies, consultants to the Puerto Rico Highway & Transportation Authority, contractors, and proponents of the Puerto Rico Traffic Safety Commission (PRTSC), the Strategic Highway Safety Plan of Puerto Rico (SHSP), the Bureau of Transportation and Other Public Services (NTSP) for the crash analysis of areas with high crash locations and identification of areas of emphasis. Annually, the data from the Observatory is also used to create and support project proposals with federal and state funds, develop crash prevention campaigns, analyze areas of high concentration of crashes, and scientific research for the development of cutting-edge technology, among others.

To provide the full cycle of road safety analyses, the Observatory will be the repository for all the databases related to road safety. Providing a place where every road safety stakeholder can access and perform the Safety Management Process from network screening to prioritize projects and the safety effectiveness evaluation.

BENEFITS

The Puerto Rico Department of Transportation and road safety related agencies will be able to employ interactive tools developed by the Puerto Rico Road Safety Observatory to strategically prioritize planning efforts, enforcement resources and budget allocation based on data.

With the implementation of the Puerto Rico Road Safety Observatory tools, the road safety stakeholders will benefit from the development of strategies that will impact the fatality rate and the frequency of crashes.

FIND OUT MORE . . .

Puerto Rico Road Safety Observatory
for registered users:

<https://beta.observatoriovial.net/>

For new access contact:

Damaris Rivera

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Puerto Rico Road Safety Observatory
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Safety, Technology, Planning

Develop a DOT Specific UAS Simulator and Flight Proficiency Exam



OVERVIEW OF INNOVATION

Most state DOT Unmanned Aircraft Systems (UAS) commercial operations are governed by CFR 14 Part 107. This regulation requires pilots pass a knowledge test but does not require a demonstration of minimum flight proficiency to operate in the national airspace. This project addresses this limitation by developing a computer-based flight proficiency simulator based on the National Institute of Standards and Technology (NIST) Basic Maneuvering Test (BMT). The simulator realistically recreates environmental conditions, UAS physics, stick control and field conditions of the BMT. A “drone rodeo” was hosted to evaluate if the simulator BMT performance data is simulator to traditional in-person methods. Twenty-four Part 107 pilots completed the BMT in-person and with the simulator. At 95% confidences, the pilots scores at times were statistically the same. The significant percentage of the SCDOT pilots completed the BMT under proctored conditions. Based on their performance and similar nationally recognized organization’s certifications, the research team recommends that the SCDOT require a minimum score of 80% on the BMT with a maximum duration of 5 minutes per maneuver before flight privileges are granted. In addition to the NIST scenarios develop, a bridge inspection scenario was developed to support this common use for UAS.



Source: Clemson University

BENEFITS

Drone flight proficiency is a skill that requires continual practice. The simulator developed in this project provides a convenient way to practice, teach and assess UAS flight skills. This software is available at no cost to all state DOTs.

To date, 24 state DOTs have requested licenses and made this simulator an important part of their drone program.

FIND OUT MORE . . .

Little Arm Studio:

<https://www.zephyr-sim.com/>

Clemson University – Department of Construction, Development, and Planning:

<http://www.clemson.edu/degrees/construction-science-and-management>

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UAS, UAV, Drone, Simulator

Strategic Deployment of Drone Technology and Software to Support SCDOT Operations



OVERVIEW OF INNOVATION

A recent FHWA publication found that all 50 state DOT's are using Unmanned Aircraft Systems (UAS), commonly referred to as "drones," in some capacity. As the cost of UAS equipment can be relatively low, the greatest challenge limiting the benefit that this technology can provide is the lack of education and training. By partnering with Clemson University, this project aggressively addressed this challenge and made meaningful drone deployment a viable option for employees across the SCDOT. The project leveraged Clemson University's nationally recognized School of Construction Management to develop a drone training program tailored to the SCDOT's needs. The course was structured so Clemson students and SCDOT employees could work shoulder-to-shoulder as they learned leading edge drone workflows. The program participants came from a wide range of SCDOT offices including (among others) Construction, Communications, IT Services, Preconstruction Engineering, Planning, Traffic Engineering, Survey and Maintenance. Through its professional studies program, Clemson University has made this course available fully online to any state DOT.



Source: Clemson University

BENEFITS

This project created an in-person and online drone course for SCDOT employees. During the class, students earn their FAA Part 107 drone license, flight skills (in-person and with a simulator), and how to create 3D maps/models with drone data. It is an excellent way for employees to gain the skills and knowledge to operate a UAS to benefit their department.

The course is available online for all state DOT employees.

FIND OUT MORE . . .

Overview video of the course:
<https://www.youtube.com/watch?v=YlkoQl64D3w>

Clemson University – Department of Construction, Development, and Planning:
<http://www.clemson.edu/degrees/construction-science-and-management>

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UAS, UAV, Drone, Class, Course, Professional Development

TranStar Roadway Flood Warning System Expansion



OVERVIEW OF INNOVATION

Problem

Southeast Texas Districts face numerous challenges when extreme weather events, such as Hurricane Harvey in 2017, generate high water conditions affecting the ability of travelers to safely navigate the roadways. It is essential that travelers, emergency response personnel and other roadway users receive real-time information that enables better decision-making.

Solution

Expansion of Houston's TranStar Roadway Flood Warning System into the other TxDOT Districts. The tool, developed in 2018 after Hurricane Harvey, synthesizes rainfall and stream elevation data with traffic information in real time to identify where roadway flooding is highly likely to occur and displays that data on TranStar's traffic map and mobile application.

This effort is a collaboration between TranStar, the Harris County Flood Control District, TxDOT and Texas Transportation Institute (TTI). TTI has incorporated existing rainfall sensors into the system, some owned and maintained by Jefferson County Drainage District 6.

BENEFITS

Improving the level of safety and availability of technology provides highway users the benefits of real-time information for more accurate route decision making. The system warns travelers to avoid potentially flooded areas and helps displaced individuals return to their communities following major storms.

FIND OUT MORE . . .

Web link:

<http://www.houstontranstar.org/>

Video:

<https://youtu.be/MKwzhMDU5ME>

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TxDOT RTI Division
shelley.pridgen@txdot.gov

Keywords: Safety, Technology, Emergency
Response / Relief

Freight Optimization in Dallas-Fort Worth (DFW)



**North Central Texas
Council of Governments**

OVERVIEW OF INNOVATION

At the intersection of multiple interstate highways and Class 1 railroads, plus DFW Airport, DFW is a key part of the nation's freight system. This North Central Texas Council of Governments (NCTCOG) project is intended to **optimize the flow of freight vehicles through up to 500 signalized intersections in the region** to improve traffic flow between regional freight hubs and expressways.

The project is the first to combine Green Light Optimized Signal Advisory (GLOSA) and signal priority solutions. The project will use existing in-vehicle technology and established NTCIP protocols. No new roadside or onboard vehicle equipment will be required. When fully built out, the system will operate in up to ten jurisdictions and serve up to 5,000 vehicles simultaneously.

Through use of smartphone apps, the system is accessible even by truckers that lack AVL equipment in their cabs. NCTCOG's contract with the integrator includes a performance incentive payable when the system delivers travel times savings for freight vehicles at least equal to the amount of NCTCOG's investment, aligning public and private sector incentives. Local authorities can retain full control over their traffic signals; the project is a collaborative effort informed by a detailed performance dashboard that will guide system optimization adjustments over the course of the project.

BENEFITS

Lessening the number of freight vehicle stops and starts at signalized intersections will improve traffic flow for all vehicles and deliver safety benefits such as reduced rear end collisions. Based on past research, emissions reductions in the range of 5%-10% are anticipated from less truck idling and fewer deceleration/acceleration cycles. Travel time savings for freight vehicles will help lower the cost of the freight being delivered, a tangible economic benefit. There may be travel time savings for non-freight vehicles as well.

FIND OUT MORE . . .

Weblink:

NCTCOG - Freight Vehicle
Intersection Optimization Services
<https://freightpriority.com/>

Texas STIC Website: <http://txstic.org/>

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Keywords: Freight/Goods Movement, Safety,
and Operations

Using Crowdsourced Data to Improve Emergency Response to Roadway Incidents in Dallas-Fort Worth (DFW)

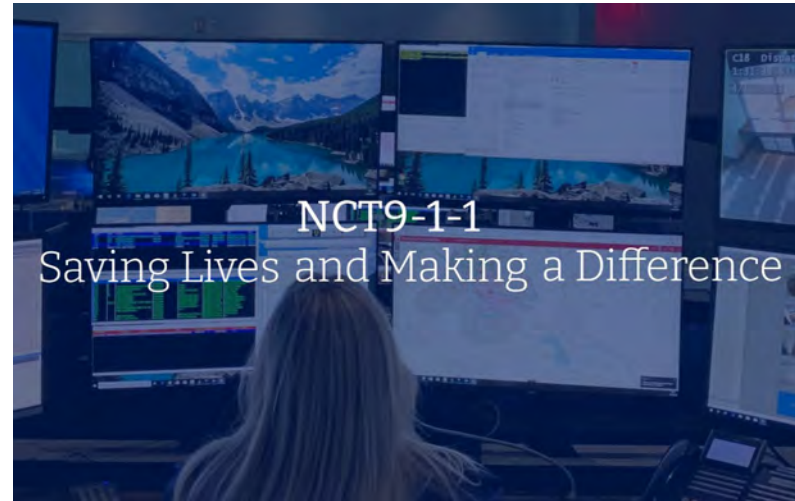


OVERVIEW OF INNOVATION

The NCT9-1-1 section of the North Central Council of Governments (NCTCOG) operates 42 Public Safety Answering Points (PSAPs) in DFW. **NCTCOG's Transportation Department (NCTCOGTrans) introduced NCT9-1-1 to the Waze roadway incident data stream.** NCT9-1-1 then incorporated this data stream into 911 operations at its 42 PSAPs. PSAP operators reported that this crowdsourced roadway incident data is very helpful in alerting them to roadway hazards and in helping them find the exact location of crashes reported via 911 calls.

NCTCOGTrans, in cooperation with TxDOT, funded a project through which the 911 centers in the DFW region not served by NCT9-1-1 were introduced to the tools necessary so they could also incorporate the Waze incident data stream into their operations. As part of this project, the Texas Transportation Institute at Texas A&M University and the Center for Transportation Research at UT-Austin compared crowdsourced roadway incident reports with 911 calls in an expressway corridor between Dallas and Fort Worth. This study found that crashes were reported first via crowdsourced data 20% of the time and that crowdsourcing was a much richer data set for notice of roadway hazards.

Incorporating crowdsourced roadway incident reports is just one element of a combined NCT9-1-1 and NCTCOGTrans strategy to improve emergency response to roadway operations. The other elements include: (i) give 911 centers access to TxDOT roadway cameras, (ii) establishing a system alerting 911 centers of traffic speeds on roadway segments that differ substantially from historical norms, suggesting the possible presence of a roadway incident requiring emergency response, and (iii) mining crowdsourced, CRIS, and other data to identify patterns of hazard reports and traffic speed deviations indicating a high risk that a crash has or will occur.



Source: NCT9-1-1 Website

BENEFITS

One of the five pillars of USDOT 2022 Roadway Safety Strategy is to improve emergency response to roadway incidents, resulting in better medical outcomes for crash victims. By giving 911 centers more timely notice of roadway incidents, 911 centers can dispatch appropriate forces sooner. Over time, this will result in lives saved and a reduction in the severity of crash-related injuries. In addition, more timely response to roadway incidents means less time to restore the roadway to normal operations and fewer secondary crashes.

FIND OUT MORE . . .

Project Web Link:

NCT9-1-1 Program North Central
Texas 9-1-1 Program
<https://www.nct911.org/>

Video: <https://youtu.be/To-IEoRbdiQ>

Texas STIC Website: <http://txstic.org/>

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Keywords: Safety, Technology, Emergency
Response

Aerial Images Used to Conduct Pavement Inspections

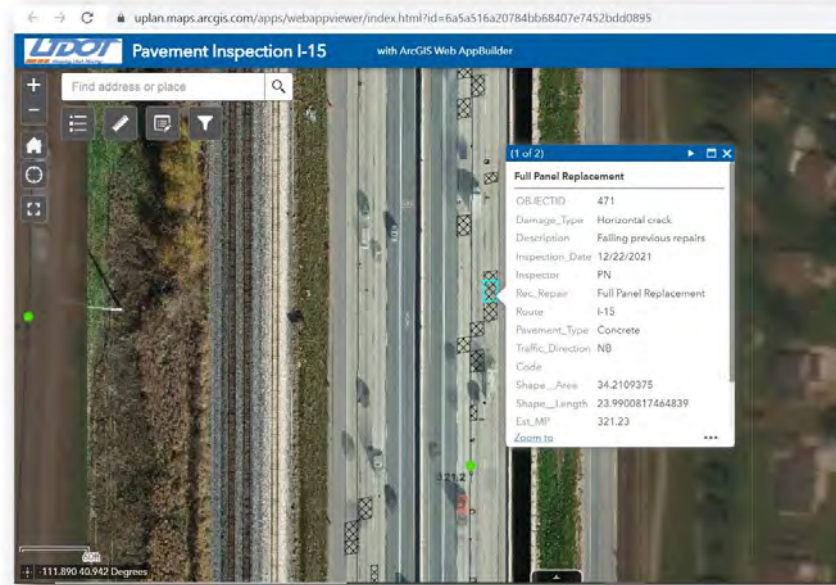


OVERVIEW OF INNOVATION

The aerial images are used to create a dynamic GIS map with embedded feature layers to mark the necessary repairs.

This new method of conducting pavement inspections results in improved efficiency, safety, and accuracy of inspections. The UAS pilot can collect images of the area in need of repair from a safe distance, and the inspection completed on a computer in the office. The location of the repairs and damage area measurements are marked with greater accuracy, leading to better project cost estimates. This in turn decreases the number of change orders made during construction.

The Central Design and GIS teams are taking the next steps to improve this new process by developing a machine learning program that will analyze photos taken by a UAS and automatically identify cracks and potholes to create a database for further processing.



Source: UDOT UPLAN

BENEFITS

Using aerial imagery is helping crews conduct inspections that are done more efficiently and with greater accuracy and safety.

FIND OUT MORE . . .

[Technical summary document](#)

Information from 2023 Innovation and Efficiency Report

[Aerial Images Used for Pavement Inspections](#)

For more information:

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Safety, Maintenance, Pavement, Asset Management

Dash Cam Imaging Improves Outdoor Advertising Enforcement



OVERVIEW OF INNOVATION

Outdoor Advertising Enforcement uses GPS-equipped dash cams to improve safety and efficiency of inspections.

UDOT enforces state and federal standards for the sizing, lighting, spacing, and zoning of advertising signs along state roads. The Outdoor Advertising Control (OAC) team gathers photographic evidence of potential advertising violations. They previously did this by pulling to the side of the road, sometimes in heavy traffic with a narrow shoulder, to take photos.

In order to better communicate violations to sign and property owners, the OAC team purchased a GPS-equipped dash cam to record video as they drive through enforcement areas. Still images are later extracted from the video and oriented on Google Maps. The camera captures an image with location data simultaneously without additional work by the agent.



Source: UDOT Right of Way, Outdoor Advertising

BENEFITS

The use of dash cameras is resulting in a more efficient enforcement process and it is safer for the inspection agents.

FIND OUT MORE . . .

Information from 2023 Innovation and Efficiency Report

[Dash Cam Imaging Improves Outdoor Advertising Enforcement](#)

For more information:

Utah Department of Transportation

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Safety, Maintenance, Right of Way

Wildlife Carcass Removal App



OVERVIEW OF INNOVATION

An app for use by maintenance contractors provides a streamlined and accurate means of tracking wildlife carcass removals and identifying crash hotspots.

Virginia is considered a high-risk state with regard to deer-vehicle collisions, but the magnitude of this problem is not reflected by the police report data used by transportation staff for safety evaluations. This project provides the Virginia DOT (VDOT) with a standardized method of collecting wildlife carcass removal data and tools that allow for simple visualization and identification of wildlife crash problem areas.

Using input gathered from a variety of VDOT staff, researchers developed and tested a web-based app for use by interstate maintenance contractors to record animal carcass removals at their removal site. Data display and evaluation tools were customized to allow maintenance staff to create work tracking reports. The data allows researchers, traffic engineers, and project managers to identify wildlife crash risk areas for the consideration of countermeasures.

BENEFITS

Previous research found that deer carcass removals are up to 9 times higher than the number of deer crashes in police reports. Use of the app not only results in an accurate dataset on wildlife crash locations, but provides transportation staff a more streamlined and efficient contract management process.

FIND OUT MORE . . .

VDOT Wildlife Carcass Tracking Map

<https://arcg.is/1WL00L>

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Web-based app, deer-vehicle collisions, wildlife carcass removal data, wildlife crashes

Innovative Design Technology for Ultra Long Span Precast, Prestressed Concrete Bridge Girders



OVERVIEW OF INNOVATION

Advanced design methodology coupled with state-of-the-art software enable design of ultra long and efficient concrete bridge girders, reducing project cost and improving on-site safety.

Extending the span length of precast concrete bridge girders beyond 200 feet in length presents unique challenges for design, fabrication, handling, and erection. An advanced design methodology cooperatively developed by the Washington State DOT and local precast concrete producers results in designs that support optimized fabrication and safe handling of precast concrete girders at the manufacturing facility, during transportation, and on-site.

State-of-the-art open-source software, named BridgeLink:PGSuper, has been collaboratively developed by the Washington State and Texas Departments of Transportation implementing this design technology. This software is used by DOT, local agency, and consulting engineers around the country and by international engineering organizations.

The technology for designing ultra long span girders has been successfully deployed in Washington State. The recently completed Wapato Way bridge over Interstate 5 in Fife, WA features 220 ft long girders weighing in excess of 220,000 lbs. each, spanning 10 traffic lanes, 4 shoulders, and the median in a single span. The median pier was eliminated reducing project cost and improving on-site safety by eliminating the dangerous work area between north and southbound highspeed traffic. The recently completed Interstate 5 bridge over the Puyallup River features a span of record setting 223 ft long girders.



Source: WSDOT

BENEFITS

The benefits of the BridgeLink:PGSuper software and its advanced design technology include:

- reduced design time
- technical solution for designing ultra long span precast, prestressed girder
- designs that support optimization of fabrication processes
- improved safety during manufacturing, transportation, and on-site construction activities

FIND OUT MORE . . .

WSDOT Bridge Software Tools
<https://wsdot.wa.gov/engineering-standards/design-topics/bridge-software-tools-downloads>

WSDOT Bridge Design Manual
<https://www.wsdot.wa.gov/publications/manuals/fulltext/M23-50/BDM.pdf>

Brice, R. 2009, *Design optimization for fabrication of pretensioned concrete bridge girders: An example problem*. PCI Journal, Fall 2009, V. 54, No. 4. pp 73-111

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Precast, Prestressed, Concrete, Girders, Bridges, Fabrication, Optimization, Safety, Design, Construction, Technology

The Low Voltage Auto Start System: We'll leave the light on for you.



OVERVIEW OF INNOVATION

Often, WSDOT vehicles equipped with beacon lights or message signs need to be left in a work zone or near a hazard for prolonged periods of time. This system ensures that when it's time to head for the barn, the vehicle starts right up.

The Low Voltage Auto Start system took the top prize of the WSDOT Innovations Challenge in 2022.

This system integrates into the vehicle using factory electrical connectors and allows the operator to leave a vehicle unattended with warning and information delivering devices communicating to the traveling public.

When activated, the system battery voltage is monitored. When the system voltage drops to 11.5 volts, the vehicle will start up and run for a predetermined time period to properly charge the batteries. When that time period ends, the system shuts the vehicle off. The system will continue to operate in this manor until deactivated and includes safety features for technicians including preventing activation if the hood is open or the doors are unlocked. To prevent theft, when the system is activated and the brake pedal is pressed, the engine shuts off.



Employee Solutions
Making a Difference



Source: WSDOT Fleet Operations

BENEFITS

- A reduction in idle time by 70%.
- Reduced fuel consumption.
- Reduced Carbon Footprint.
- Reduced Maintenance on Heavy Truck Emission Components.

FIND OUT MORE . . .

[Low Voltage Auto Start video](#)

The WSDOT Innovation Challenge is open to all full-time maintenance and operations employees. All Innovations must be in use and showing desired results.

Categories include - Tools & Equipment, Technology Best Practices, and Techniques Best Practices.

<https://www.wsdot.wa.gov/>

WSDOT Innovation Challenge Resources

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Innovations challenge, Auto Start, No Idle, Sustainability, Safety, Operations, Environment, Maintenance.

Movable Sign Fabrication Table

Innovative Design for Easy Adjustment and Efficiency in Building Signs



OVERVIEW OF INNOVATION

The two-person Sign Installation Team at the Washington State Department of Transportation in South Central Region is responsible for building and installing signs along highways in the region. Each sign is delivered in panels to be built before installation. Due to the large size of the signs, the team noticed the stationary table they were using was starting to affect them physically. They needed a table that could adjust to the height of the sign during fabrication. After researching a variety of designs and models, the team designed a hybrid model to fit their needs – a table with easy adjustment to efficiently build signs with less physical demand.



Source: WSDOT



Source: WSDOT

BENEFITS

Benefits of using the movable sign fabrication table are:

- **less physical strain on workers**
- **improved sign fabrication efficiency.**

Using the movable sign fabrication table decreases the likelihood of injury and burn out of the team.

FIND OUT MORE

Sign Shop Website:

<https://wsdot.wa.gov/business-wsdot/highway-signs/sign-shop>

Sign Installation Team:

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Sign fabrication table, easy adjustment, efficiency to building signs, design lessens physical demand, operations, safety, design, ergonomic