

# National STIC Network Showcase 2023



Category:

## Technology & Materials



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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OH: LED Highway Lighting Conversion

OH: Traffic Signal Test Cabinet

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PR: Hybrid EDC Training: Success Stories of Next Generation TIM & MicrosurfacingUsing Drones in Puerto Rico

PR: PMIS and its benefits for e-construction

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

VA: Wildlife Carcass Removal App

VA: Informative Monitoring Platform: Reporting the Occupancy ofVehicles (IMPROVE)

WA: Design Technology for Ultra High Performance Concrete (UHPC) Precast, Prestressed Bridge Girders

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

# District 11 Transportation Management Center: Hydrogen Fuel Cell Alternative Emergency Power Pilot for Traffic Signals during PSPS events



## OVERVIEW OF INNOVATION

### LEAD CLIMATE ACTION WHILE PROVIDING A RELIABLE TRANSPORTATION NETWORK

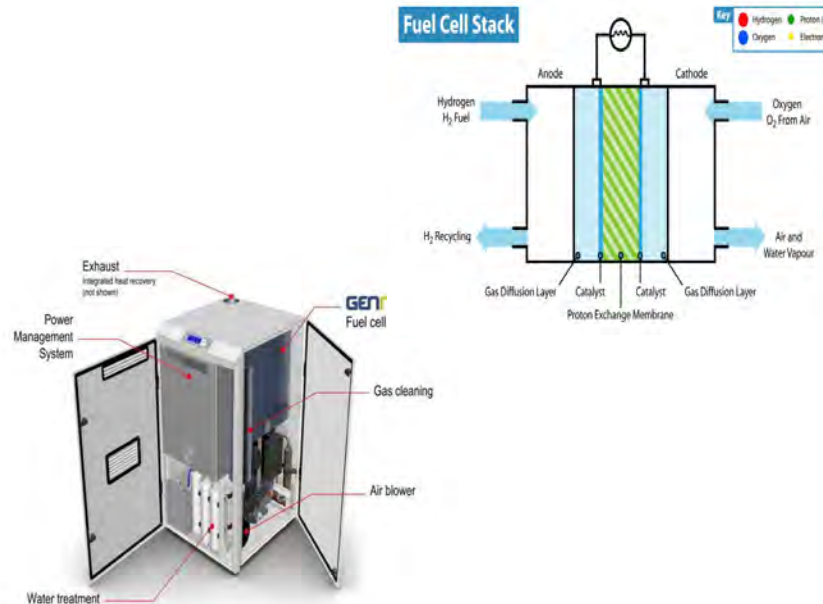
In response to severe weather, a Public Safety Power Shutoff (PSPS) are a preventative measure where regional power utilities may temporarily turn off power to specific areas to reduce the risk of fires caused by electric infrastructure. PSPS events could last from a few hours to several days.

Traditionally, Batteries and generators have been the popular choices for backup power for public services infrastructure such as traffic signals. However, batteries typically cannot provide long performance and require frequent replacement, while generators are noisy, bulky, maintenance intensive, and a product of dirty energy.

Hydrogen fuel cell technology requires less field maintenance than batteries and generators, lessening Caltrans personnel's field maintenance burdens during planned/ unplanned PSPS events.

Hydrogen fuel cell technology works like a battery, the major difference being the chemical material and electrolytic medium. The runtime of hydrogen fuel cell technology is dependent on the amount of hydrogen bottles stored at the field site, which will typically run up to 90 hours. It can have unlimited runtime with hydrogen refueling, provided that the inlet air filter is cleaned or replaced once a year or every 500 hours of operation.

Hydrogen fuel cell technology is the cleanest option compared to its counterparts: batteries and generators. It burns cleanly because it produces water vapor as its emission. It does not produce any carbon-based fuels or contributes to greenhouse gas emissions. It is a clean alternative that is also efficient.



<https://www.altery.com/>

## BENEFITS

- A major advantage of the hydrogen fuel cell is the zero-carbon emission.
- Hydrogen is 125 times more energy-dense compared to Lithium and there are no heavy metal hazardous waste to dispose at the end of life.

## FIND OUT MORE . . .

### 2021 District 11 Innovation Fair

<https://www.youtube.com/watch?v=OigDMS6pKqo>

### Altery.com

[https://www.altery.com/wp-content/uploads/2020/08/2020\\_Altery\\_Reformer\\_Data\\_sheet\\_2.pdf](https://www.altery.com/wp-content/uploads/2020/08/2020_Altery_Reformer_Data_sheet_2.pdf)

### DRISI- Public Safety Power Shutdown

[Public Safety Power Shutdown – Hydrogen Fuel Cell Mitigation Pilot \(ca.gov\)](#)

### District 11 Transportation Management Center

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Sustainability, Operations, Environment,  
Technology, Emergency Response / Relief

# eSTORM – an Innovative Emergency Management Device Operational Status Platform



## OVERVIEW OF INNOVATION

**The eSTORM web- and phone-based application collects, in one place, the necessary field data, device operational status, generator deployment, cabinet flooding, and downed structures events for ITS and traffic signals devices following a hurricane or thunderstorm. The application works offline, collecting information and pictures even if there is no cellular coverage. This data is uploaded automatically once internet service is available. Collected information is displayed in a dashboard for a quick real-time snapshot of the work that is done by the field staff. This allows for resource planning and allocation to expedite the recovery efforts.**

The application, built on ArcGIS, was conceptualized in FDOT District 3 during Hurricane Sally in 2020 and converted into a statewide application in the 2021. Recently, the application was used during Hurricane Ian in September 2022.

The application has been pioneered in the State of Florida and has usability across the nation for any emergency management scenarios when the knowledge of device operational status is critical to safe and efficient traffic movement. The application is portable and scalable and can connect with arterial and freeway management software for a direct connection to extract operational status remotely.

## BENEFITS

eSTORM allows FDOT to allocate its resources efficiently and expedite recovery efforts to make Florida roadways safe and traversable again.

## FIND OUT MORE . . .

### **Website link:**

eSTORM Article:

<https://bit.ly/56934FL578>

TIM Website:

[www.fdot.gov/emergencymanagement](http://www.fdot.gov/emergencymanagement)

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Hurricane, estorm, situational awareness, emergency management, GIS, planning, freight/goods movement, technology, asset management, emergency response/relief, operations

# FDOT's eTRAC – an Innovative Technology Solution for Traffic Incident Management and Stakeholder Coordination



## OVERVIEW OF INNOVATION

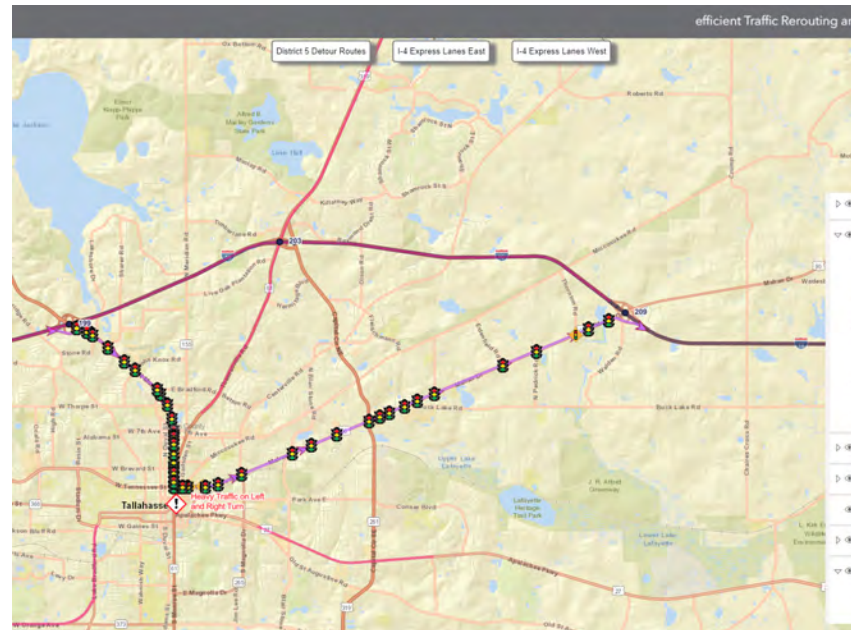
The eTRAC (efficient Traffic Rerouting and Agency Coordination) is a web-based application that allows Law Enforcement Agencies to auto-identify detour/diversion routes with all necessary information on their phones/laptops including – active construction, traffic signals with agency contact information, turn lane restrictions, railroad crossings, bridges, crossovers, rest areas, and live traffic data. This helps the agency save time and make an informed decision efficiently. For long-term detours, the solution also provides PDFs of temporary traffic control plans and resources needed.

Traffic incidents are a major cause of traffic congestion on the freeway system and every second counts to prevent secondary crashes and conform to the FDOT's Open Roads Policy. The policy requires the incident to clear within 90 minutes.

This solution was started by FDOT District 3 and is now being adopted statewide to carry out integrated corridor management services and post information on FL511 and third-party applications such as Google and Waze.

The picture of the web-based application shows a selected detour route between two sets of exits. If there is more than one route available, longer detour routes can be selected. Therefore, depending on the congestion, traffic could be diverted to the alternate route. The application has several different layers and points of interest along the detour routes to aid in decision-making.

The application is easily portable and scalable for any state in the country.



Source: FDOT eTRAC

## BENEFITS

The benefits of using eTRAC includes congestion reduction, incident clearance, time savings in opening the detour route(s), efficient agency coordination, and informed decision-making. The application provides a platform for integrated corridor management and improved agency coordination.

## FIND OUT MORE . . .

### Website link:

eTRAC website:

<https://etrac.fdot.gov/>

Florida TIM Website:

[www.FloridaTIM.com](http://www.FloridaTIM.com)

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Traffic incident management, TIM, etrac, integrated corridor management, ICM, technology, operations, freight/goods movement, emergency response/relief

# Internally Cured Concrete in Florida's Concrete Bridge Decks and Rigid Pavements

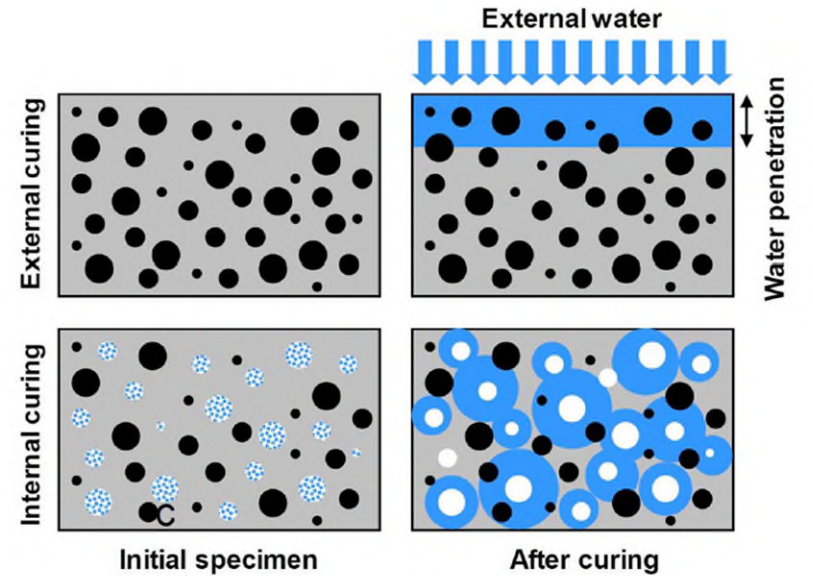


## OVERVIEW OF INNOVATION

Typically, high-strength concrete used in bridge decks and rigid pavements has very high early-age shrinkage, which often leads to cracking. Cracks can greatly decrease the structural service life, causing decks or pavements to prematurely fail.

The innovative approach of internal curing concrete was investigated by the Florida Department of Transportation (FDOT) in partnership with the University of Florida. The resulting research concluded that resistance to shrinkage cracking was substantially higher for Internally Cured Concrete (ICC) than for standard high-strength concrete. Additionally, permeability of the ICC was reduced/improved compared to standard high-strength concrete.

As a result of its research, FDOT developed and implemented standard specifications for ICC and currently allows its use in bridge decks and rigid pavements.



● Normal aggregate    ❄ Water-filled intrusion    ● Cured zone

*National Institute of Standards and Technology, U.S. Department of Commerce*

## BENEFITS

**Durability (Reduced Cracking and Permeability)**, Reduced cracking due to reduced early-age shrinkage, Improved hydration – no self-desiccation, denser interfacial transition zone, Reduced permeability – less ingress of chlorides, etc., Reduced slab curling and warping

**Structural Endurance (Reduced Cracking & Fatigue)**, Small reduction in weight, Lower elastic modulus, Lower coefficient of thermal expansion, Small increase in strength

## FIND OUT MORE . . .

Mitigation of Cracking in Florida Structural Concrete  
[Summary](#) | [Final Report](#)

Internally Cured Concrete for Pavement and Bridge Deck Applications  
[Summary](#) | [Final Report](#)

FDOT State Materials Office

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Keywords:

internally cured concrete, lightweight aggregate, bridge deck, pavement slab, coefficient of thermal expansion, modulus of elasticity, shrinkage cracking, restrained shrinkage, sustainability, pavement, structures, materials

# Cold-Mix Placer



## OVERVIEW OF INNOVATION

### Filling pavement cracks and potholes is faster, easier, and more precise with a portable hopper.

Traditional methods for filling pavement potholes and other deteriorated areas of pavement have required maintenance crews to shovel the cold-mix asphalt into place by hand or rely on dump trucks that often deposit too much material or miss the target.

To ensure the right amount of cold-mix asphalt is placed exactly where it's needed on the road, workers developed a portable device that can quickly be installed onto the bed of a standard maintenance vehicle. Designed to accommodate the width of a loader bucket and hold 2,000 pounds of material, the unit also includes a hydraulic power unit and an auger that simultaneously grinds larger aggregates for a more uniform fill and places the material with precision.

The unit was produced in 25 hours using locally purchased materials and components for approximately \$7,250.



Source: Jones County Secondary Roads

## BENEFITS

This innovation places cold mix where it's needed, allowing maintenance workers to fill potholes more quickly and efficiently with less material waste.

The automated process is faster, less physically demanding and more cost-effective because less material is wasted at each site.

## FIND OUT MORE . . .

Innovation Video

<https://www.dropbox.com/sh/l7kowljf353sg4f/AABRCltADaFw7NfDnKdyk5Lka?dl=0>

Jones County Secondary Roads Website

[https://www.jonescountyiowa.gov/secondary\\_roads/](https://www.jonescountyiowa.gov/secondary_roads/)

Iowa Local Technical Assistance Program

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

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Maintenance, Materials



# Public Involvement Management Application



## OVERVIEW OF INNOVATION

### A powerful virtual tool facilitates management and coordination of public engagement and agency communications for thousands of active and completed transportation projects.

Across the state, Iowa DOT manages approximately 4,000 active transportation projects at any given time. However, the agency only has two staff members devoted to coordinating public and stakeholder involvement throughout the development and construction process.

To provide its Public Involvement staff with the right tools for this important work, Iowa DOT developed the Public Involvement Management Application, or PIMA, in 2015 to manage registrations for public meetings. Since that time the app has expanded to also manage stakeholder contact information, track project feedback and agency responses, collect and report project-specific data and analytics, and more.

Iowa DOT is part of multi-state PIMA consortium that also includes Maine, Wisconsin, Massachusetts, and Texas. Representatives from these states meet monthly to discuss the app's usage and potential improvements. The consortium's no-cost sharing agreement gives member states full access to all updates and improvements while allowing each state to implement the features that support their particular needs and stakeholders.

## SHARE YOUR FEEDBACK ON PROJECTS & STUDIES

We are committed to improving our transportation system through your participation and feedback. Public hearings, meetings, and notices allow you to take part in the planning process and help you better understand the highway projects and studies that affect your community. We provide auto-translation tools on this website if you have limited English skills. Iowa DOT does not guarantee the accuracy of auto-translation tools. For more information, see the disclaimer below. If you need more help, please email the project contact listed on each project web page.

### SEARCH PROJECTS & STUDIES

Search the site for project information, handouts and materials. Includes both current and historical project info.

### MAP SEARCH

Find any active project or study on our interactive map. Share your thoughts and view feedback.



Source: Iowa DOT

## BENEFITS

PIMA gives a two-person staff the power to successfully manage details and communications regarding thousands of transportation projects across Iowa. By sharing the costs and benefits of developing and maintaining the application, the multi-state PIMA consortium maximizes the app's potential. Recent and in-progress improvements include a dashboard that shows the equity of transportation projects as well as an extension that allows access via cell phone.

## FIND OUT MORE . . .

Iowa DOT's Public Involvement Website  
<https://www.news.iowadot.gov/pim/>

YouTube Video  
<https://www.youtube.com/watch?v=9oeQ1td5ORs>

FHWA's *Innovator* Newsletter Article  
[https://www.fhwa.dot.gov/innovation/innovator/issue80/page\\_05.html](https://www.fhwa.dot.gov/innovation/innovator/issue80/page_05.html)

Iowa DOT Office of Public Involvement

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Planning, Technology, Equity, Design,  
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



# 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

## OVERVIEW OF INNOVATION

With the newly passed Climate and Equitable Jobs Act, Illinois will need to be reliant on 100% renewable energy by 2050. The fifth-largest energy-consuming state, Illinois currently gets just 10% of its electricity from renewable sources.

Through the Technical and Financial Feasibility Study for Installation of Solar Panels at IDOT-owned Facilities, potential locations for solar array installation were evaluated for various factors, including solar radiation, slope percentages, distance from transmission line, elevation, accessibility to road networks, and population center density to create a list of sites ripe for solar production. As one of the largest landowners in Illinois, IDOT has the potential to lead the state in its transition to a renewable energy future by leveraging these sites for placement of solar arrays.



*Illinois Department of Transportation*

## BENEFITS

Identified sites have the potential to create more energy than IDOT consumes. Using these sites for solar power could make Illinois one of the largest renewable energy producers in the state.

## FIND OUT MORE . . .

Illinois Department of Transportation

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Keywords – solar panels, renewable energy, climate, environment

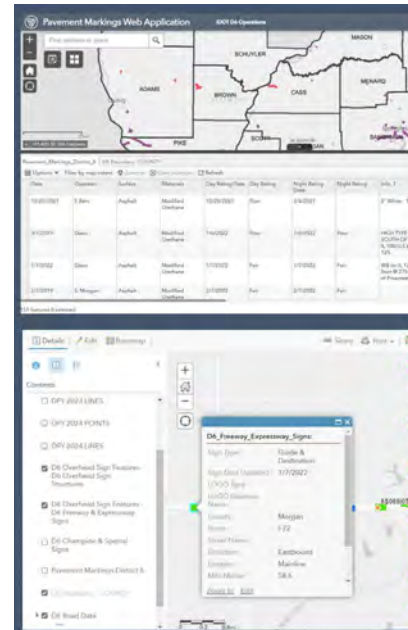
# Tracking and Programming Maps



## 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

# 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](mailto:MaineDOTInnovates@maine.gov) for access credentials to view.

### Steve Harris

Bridge Inspection Team Leader

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Maintenance, Technology, Safety, Structures

# Buy America: Utilizing the NTPEP Compliance Certification Process



## OVERVIEW OF INNOVATION

MoDOT has implemented a programmatic system where if a supplier is National Transportation Evaluation Program (NTPEP) compliant they no longer must submit material of origin forms with their steel or iron products. This process utilizes the existing AASHTO NTPEP Compliance program which already verifies Buy America Compliance for Steel and Iron items.

The current FHWA Buy America policy requires a material of origin form for every steel and iron component of a project. Additionally, it requires a material of origin form for each step in the process including smelting, shipping, coating and bending. The submittal process for the suppliers and contractors is very onerous. Also, each state has varying requirements and forms which makes compliance very challenging for suppliers. The DOT struggles to receive all the numerous required material of origin forms. The entire process is extremely time consuming and costly to administer.

If the steel and iron products for a project cannot be documented as domestic, the entire federal funding for a project is jeopardized. Most suppliers of steel and iron products such as rebar and traffic safety components (guard rail and end treatments) are NTPEP compliant. Verification of Buy America is part of the evaluation process to be a NTPEP compliant supplier.



*Source: Missouri Department of Transportation*

## BENEFITS

If the supplier is NTPEP compliant, this process negates the need to submit and file, the thousands of materials of origin form we were previously processing. It saves hundreds of hours annually in processing documents. The process is much simpler to maintain which reduces errors. By simplifying the process, it greatly reduces the chance of missing documentation which can lead to all federal funding being lost on a project.

## FIND OUT MORE . . .

Missouri Department of Transportation  
Innovations Showcase

[Buy America NTPEP | Missouri Department of Transportation \(modot.org\)](#)

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Materials, Construction

# Electronic Stormwater Inspection Process: Automated Reporting and Notification Process



## OVERVIEW OF INNOVATION

In 2009, the Mississippi Department of Transportation (MDOT) Environmental Division was tasked with managing a new Stormwater Inspection Program which was developed to assist in compliance with the current Mississippi Department of Environmental Quality (MDEQ) Construction Permit. The vast amount hard-copy data that was compiled by weekly and monthly inspections was cumbersome and difficult to analyze and needed to be streamlined to maximize program management.

In response, the MDOT Information Systems Division developed two field inspection applications that could be accessed by smartphone, tablet or iPad.

The first application – the Erosion Control App – is used by contractors during permit-required weekly inspections to identify any observed deficiencies that may affect compliance with the construction permit and store this information in an electronically-accessed database.

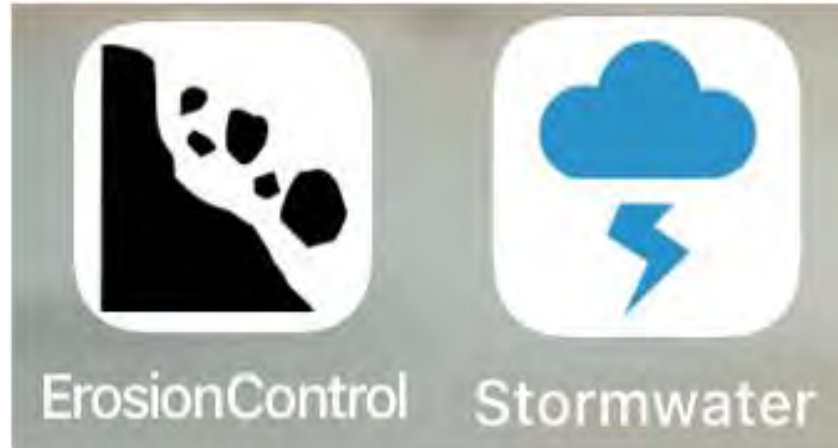
The Erosion Control App requires that all previously observed deficiencies stored in the database be addressed by the contractor before current inspection reports can be uploaded.

Once uploaded, two summary reports are then generated: 1) The MDEQ Site Inspection and Certification Form as required by the MDEQ permit and, 2) the MDOT Erosion and Sediment Control Field Inspection Report as required by MDOT contract.

The next application – the Stormwater App – is used by MDOT personnel and MDOT-contracted consultants during monthly quality assurance inspections to also identify observed deficiencies. This app then generates the MDOT Construction Stormwater Inspection Report which compiles five inspection “grades” into an overall Project Preparedness Rating.

Both apps consist of the following features:

- Data collection during site inspections (with or without cellular connection).
- GPS-integrated locations of field observations.
- Upload/storage of observation photos.
- Inspection data is stored in MDOT database.
- QA/QC review of inspection data prior to report generation (MDOT app)
- Reports are automatically generated, distributed and stored.



Source: MDOT

## BENEFITS

Report generation and distribution time has been reduced from 7-10 days to 2-3 days.

Electronic storage and retrieval of reports.

Data collected used for analysis and dashboards

## FIND OUT MORE . . .

MDOT homepage

<https://mdot.ms.gov/portal/stormwater>

MDEQ homepage

<https://www.mdeq.ms.gov/>

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Technology, Web App, Inspection, Electronic Reporting, Stormwater management



# Electronic Stormwater Report access: On-site QR Codes



## OVERVIEW OF INNOVATION

Mississippi Department of Environmental Quality (MDEQ) is required to go paperless by 2025.

Mississippi Department of Transportation (MDOT) provided a solution to MDEQ for the erosion control reporting process. The QR Code allows for simple, quick access to all documentation required to be onsite by MDEQ's permit.

With the implementation MDOT's erosion control and stormwater app, requiring electronic access to these reports on the job site was the next logical step.

The QR codes go out in the project documentation packet given to the contractors when they are awarded a project. These QR codes are printed on Weather and UV resistant Stickers. The Stickers are placed on the project site bulletin boards and mailboxes.

## Stormwater Documents



Source: MDOT, <https://mdot.ms.gov/applications/qr/102046301000>

## BENEFITS

- Quick access to electronic stormwater documentation required to be onsite
- Documentation previously easily damaged by weather or stolen from the job site, is now on a weather resistant sticker

## FIND OUT MORE . . .

MDOT homepage

<https://mdot.ms.gov/portal/stormwater>

MDEQ homepage

<https://www.mdeq.ms.gov/>

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### Wes Stafford

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- QR code, Stormwater management, Erosion control, Technology

# BridgeWatch: Public Safety Through Real-time Structure Monitoring



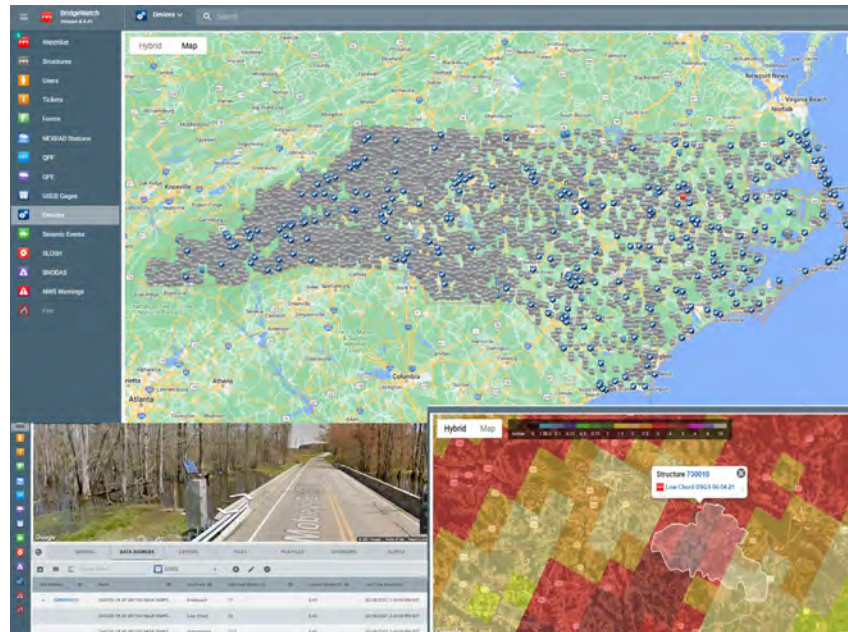
## OVERVIEW OF INNOVATION

**BridgeWatch empowers bridge management to predict, identify, prepare for, and record potentially destructive environmental events by proactively monitoring, in real-time, bridge infrastructure.**

BridgeWatch collects and processes real-time data at regular intervals from meteorologic, hydrologic, and oceanographic sources, gauges, and other sensing devices. Data comparisons are then performed with internal NCDOT bridge parameters such as flood impact (floodwaters reaching structure levels) or roadway overtopping. NCDOT officials and Emergency managers can customize alerts, when appropriate, via any electronic medium (cell phones, email, application dashboard, etc.) when bridges are experiencing a dangerous or critical condition.

Officials are notified as sensors in the field detect water levels or high rainfall intensity levels that could indicate that the roadway is overtopped either at the bridge or bridge approaches based on elevation or design data. This valuable information can be used for road closure, emergency response, and post-event inspection prioritization.

In addition, BridgeWatch can also be utilized as a hands-on training and scenario tool for emergency evacuation or security drills with event simulation capabilities.



Source: BridgeWatch

## BENEFITS

The benefits of using BridgeWatch include improved monitoring and awareness of structures impacted during major storm events.

In the past 3 years, the North Carolina DOT has piloted BridgeWatch and integrated it into its storm response. Structures management uses BridgeWatch alerted structures to aid in identification of critical structures to inspect post-storm.

## FIND OUT MORE . . .

NCDOT BridgeWatch Website (Login Required) [BridgeWatch v8.4.41 from USEngineeringSolutions](#)

Hydraulics Storm Tools Website [NCDOT - Hydraulics & EM Flood Warning Tools - Home \(sharepoint.com\)](#)

US Engineering Solutions Website (BridgeWatch) <https://usengineeringsolutions.com/bridge-watch/>

NCDOT Hydraulics Unit

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Structure Management, Flood Warning, Emergency Response, Situational Awareness, Roadway Flooding, Hydraulics, Operations,

# T-SURGE



## OVERVIEW OF INNOVATION

**Expanding on the FIMAN-T (Flood Inundation Mapping and Alert Network for Transportation) system, T-Surge helps NCDOT identify potentially-impacted roadways and assets during a storm surge event.**

Rather than relying on gauge-based data like the rest of the FIMAN-T network, this dashboard uses data from RENCI (Renaissance Computing Institute at The University of North Carolina), which models storm surge for the entire North Carolina coastline based on National Hurricane Center official advisories.

T-Surge automatically downloads maximum water elevation and wave height rasters as soon as they are available. This data runs through a model that maps predicted flood inundation extents and depths, and uses lidar-derived roadway elevations to estimate flooding along roadways. The roadway inundation is then viewable on the interactive dashboard application that allows users to view mapping, filter roads by type and depth of flooding, and view summaries of predicted impacts.

T-Surge provides visualization and metrics for roadway inundation from forecasted hurricane and tropical storm surges. The dashboard application maps predicted flood and roadway impacts for the entire North Carolina coastline. This information allows emergency managers and first responders to reach critical destinations, like hospitals, while avoiding potential roadway flooding.

## BENEFITS

- Easily identify areas and roadways forecasted to be impacted by flooding during a storm event
- Provides summary reports and navigable tables for predicted roadway inundation to aid in quick decision-making
- Expands coverage to include all coastal areas

## FIND OUT MORE . . .

[T-Surge Dashboard](#) (beta version – open to NCDOT staff)

NCDOT Hydraulics Unit

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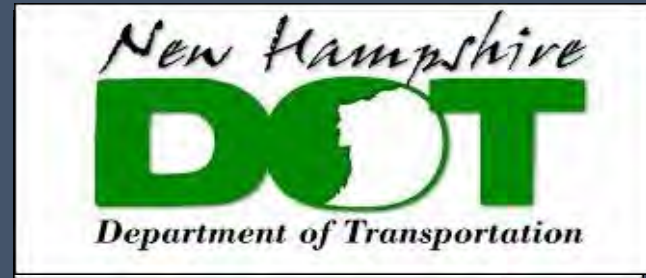
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Emergency Response/ Relief, Technology,  
Roadway Flooding, Inundation Mapping,  
Hurricane Preparedness

# An engineered log jam provides erosion defense along the Magalloway River in Errol, New Hampshire.



## OVERVIEW OF INNOVATION

**A first for New Hampshire, the innovative engineered log jam solution was selected as the streambank stabilization method.**

A section of NH 16 in Errol, NH, experienced extreme bank erosion that resulted in failure of the road structure. The installation of engineered log jams (ELJs) is a river restoration practice, implemented to modify flow structure and increase hydraulic complexity for the benefit of streambank protection and fish habitat (*L'Hommedieu, 2014*). Streambank protection options were evaluated and, because the roadway was realigned about 90 feet from the river, an ELJ could be considered and was ultimately selected. Construction was performed in winter 2020/2021 with topsoil and plantings completed in spring 2021.

The layered installation incorporated log members, with and without root balls, stone ballast, and a surface landscaping, restoring the streambank with natural materials. As part of the permitting process, NHDOT Research engaged the University of New Hampshire to perform the required pre- and post-construction monitoring and documentation.



Source: NHDOT



Source: SLR

## BENEFITS

The ELJ provided the benefit of a natural instream structure and resulted in cost savings over a conventional bank stabilization system. Some trees harvested from the site during roadway realignment were incorporated into the ELJ. The results of the monitoring performed by UNH will document information on the hydrologic and environmental aspects of the ELJ.

## FIND OUT MORE . . .

**NHDOT Research Link:**

<https://www.nh.gov/dot/org/projectdevelopment/materials/research/projects/26962w.htm>

**Contract Administrator:**

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**Project Champion:**

***Tobey Reynolds, NHDOT***

**Principle Investigator:**

***Tom Ballestero, UNH***

**Designer:**

***SLR International Corp.***

**Contractor: *J.P. Sicard, Inc.***

engineered log jam,  
streambank protection,  
erosion, stormwater  
management, environment,  
construction, materials

# 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

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Safety, Technology, Freight/Goods Movement

# Ultra High Performance Concrete for Bridge Repair



## OVERVIEW OF INNOVATION

**An NJDOT pilot project demonstrated that UHPC overlay will provide durable bridge decks that will extend the service life of the structures. Additionally, the project showed that UHPC overlay construction methods can minimize traffic interruptions and shorten the total construction time.**

NJDOT installed three UHPC bridge deck overlays as pilot projects. One of these projects, completed on a bridge spanning the Newark Turnpike, included both a UHPC bridge deck overlay and field-cast UHPC joint headers.

This curved 3-span bridge, originally built in 1979, feeds nearly 30,000 vehicles per day from the New Jersey Turnpike onto I-280. The heavy traffic and the impact of de-icing salts resulted in corrosion of the reinforcing steel in the existing bridge deck, as well as the deterioration of all abutment and pier expansion joints.

Prior to installation of the UHPC overlay and field cast UHPC headers, the existing asphalt overlay and deteriorated expansion joints were removed. A new UHPC header expansion joint solution was installed, and after installation the finished UHPC overlay was covered with asphalt.

The resulting 340-foot UHPC overlay is currently the longest continuous overlay installation in North America.



*Source: New Jersey Department of Transportation*

## BENEFITS

UHPC bridge overlays offer superior bond strength, compressive strength, lower permeability, more resistance to freeze thaw-damage, good abrasion resistance, and rapid cure times, among other benefits.

Increases safety and efficiency due to fewer days required for construction, and less impact on the traveling public due to traffic interruptions.

## FIND OUT MORE . . .

NJ STIC, UHPC for Bridge Preservation and Repair in NJ

<https://www.njdottechtransfer.net/UHPC-bridge>

Design, Construction, and Evaluation of UHPC Bridge Deck Overlays for NJDOT - Presentation

<https://www.njdottechtransfer.net/UHPC-presentation>

New Jersey Department of Transportation

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Structures, Construction, Pavement, Materials

# Weather Savvy Roads Pilot Program

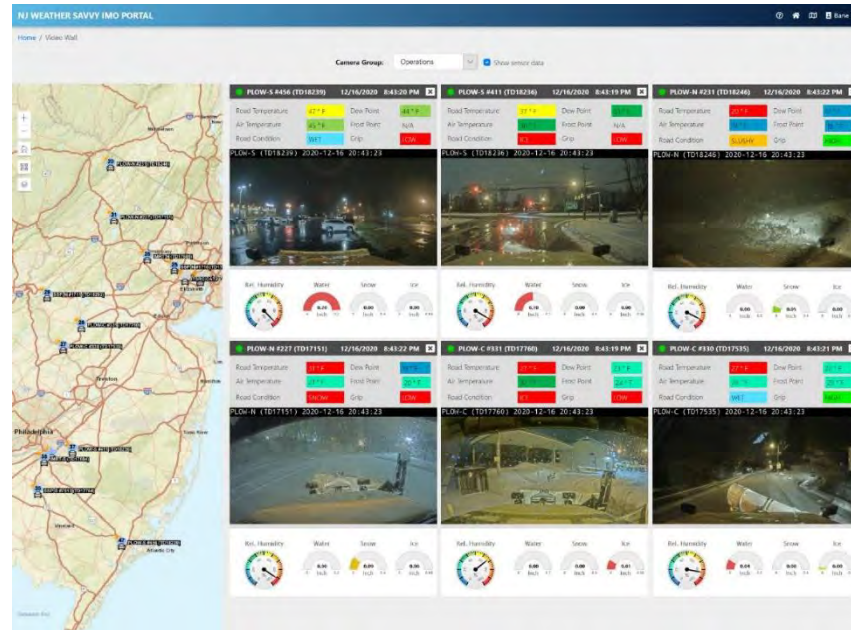


## OVERVIEW OF INNOVATION

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



# Bridge Upcycling



## OVERVIEW OF INNOVATION

**“Upcycling is the act of taking something no longer in use and giving it a second life and new function.” - Habitat for Humanity.**

The innovative Ohio County Engineer’s Bridge Upcycling program is the state LTAP Center’s top Local Public Agency success story.

The Ohio Department of Transportation partnered with the County Engineers Association of Ohio to upcycle steel beams leftover from bridge projects that were demolished or rehabilitated.

Reusing this existing product helps stretch financial resources and reduces potentially unsafe bridge rating conditions.

Two Ohio counties, Defiance and Muskingum, have successfully used upcycled steel beams on several projects.

"It's a benefit to our county, a benefit to our community, and we're not scrapping valuable products," said Muskingum County Engineer Mark Eicher.

Defiance County Engineer Warren Schlatter praised the program's cost savings benefits and is confident that the bridge is just as safe and just as strong as if they had used new steel.

"So, in the end the capacity of the bridge is not of concern. These are rock solid bridges," he said.



*Upcycled bridge beams ready for a local construction project. - The Toledo Blade newspaper*

## BENEFITS

Upcycling reuses steel bridge beams that previously had been discarded.

Saves costs by reducing the need to fabricate new material.

Enables additional bridge reconstruction and enhances motorist safety.

## FIND OUT MORE . . .

<https://youtu.be/r5AyX5uDH8U>

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Sustainability, Planning, Structures,  
Construction, Materials, Asset  
Management

# 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 snoopers 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://www.driveohio.gov)

[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

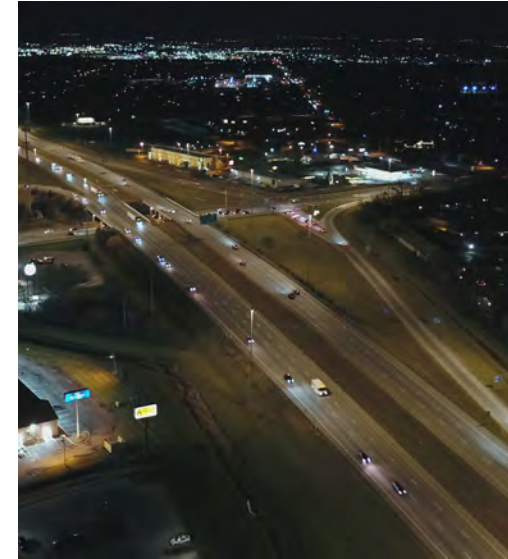
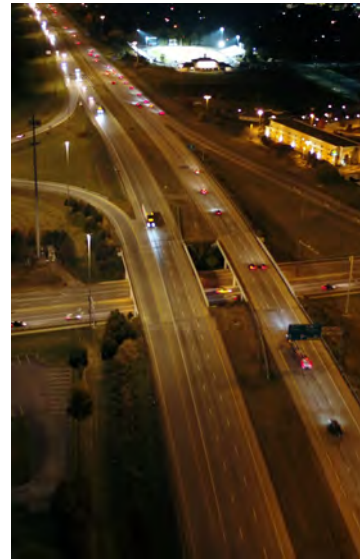
**Replacing all high-pressure sodium lightbulbs with brighter, more efficient LED lights improves highway visibility and safety while reducing long-term maintenance costs.**

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

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Safety, Operations, Technology

# GTFS-ride: Easing the use of transit ridership data with a common data standard



## OVERVIEW OF INNOVATION

- Transit ridership data is needed to set policy, develop plans, and prioritize investments but is not easily available and/or not in a useful standard format. Transit agencies vary widely in their ability to provide sufficient quantities of high-quality ridership data, and the data that does exist is often of little use due to a high level of aggregation, broad scope, sparsity, errors, and lack of standardization.
- These inconsistencies in the availability, format, and quality of ridership data make it very difficult (if not impossible) for entities with an interest in multi-agency transit networks to make effective and informed decisions. Regional governments, researchers, policymakers and transit agencies themselves don't have an easy way to collect, store, share, report, and analyze their ridership data.
- GTFS-ride provides a comprehensive (yet flexible) public transit ridership data standard. It was designed to improve the processes of ridership data collection, management, reporting, and analysis. Web-based software tools have been developed to support the core functionality of GTFS-ride.

## BENEFITS

- Link ridership data to GTFS data accurately
- Identify the most productive route(s)
- Find the busiest/idle stops in the system
- Integrate with common transit analysis software
- Simplify reporting to the National Transit Database

## FIND OUT MORE . . .

GTFS-ride: <http://gtfsride.org/>

GTFS-ride Github:  
<https://github.com/ODOT-PTS/GTFS-ride>

Zephyr Foundation  
<https://zephyrtransport.org/projects/5-transit-ridership-standard/>

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Keywords: transit, bus, data, ridership, GTFS, GTFS-ride, analysis, data standard, route, stop, integration

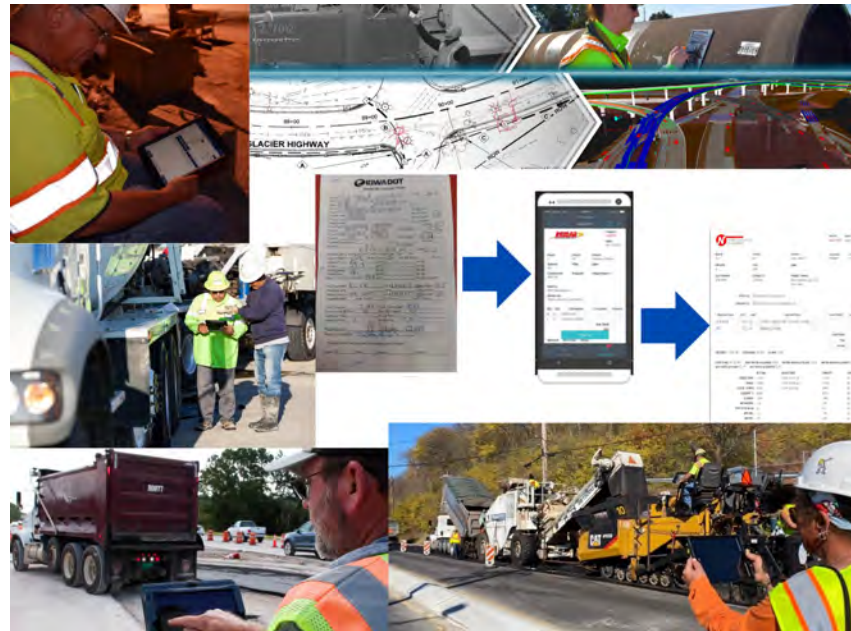
# Hybrid EDC Training: Success Stories of e-Ticketing in Puerto Rico



## OVERVIEW OF INNOVATION

The Puerto Rico LTAP has adapted its training program to address a combination of strategic virtual webinars and in-person seminars to be able to open the educational spread.

- Peer exchange with representatives from the public & private sector, Associated General Contractors (AGC), federal government, resource center & DOT representatives from Delaware & Pennsylvania.
- DOT Construction & Material Office staff exchange ideas with the Aggregates, Asphalt, and Concrete representatives to go paperless promoting e-ticketing for the processes using iPads, mobile phones, etc.
- In-person activity at the College of Engineers and Surveyors of Puerto Rico with the support of the transportation community.
- At the same time, remote participation from Municipalities and other interested professionals.
- e-Ticketing Demonstration from Vendors (Headlight, Fleetwatcher, HaulHub and Equipment Watch).



Source: PRHTA, FHWA, PennDOT & PRLTAP

## BENEFITS

Participation from other locations of the Island. Increase of over 50% in participation.

Also allowed other key speakers in US to present virtually.

Significant travel time savings to local transportation officials that are located far from the College of Engineers and Surveyors of Puerto Rico.

Provide opportunity to the future workforce to be up-to-date on new initiatives and innovations in the field.

## FIND OUT MORE . . .

PRLTAP Website

<https://www.prltap.org>

PRLTAP Webinars Recordings

<https://www.gotostage.com/channel/prltap>

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Technology Transfer, Continuing Education, e-Ticketing, EDC

# Hybrid EDC Training: Success Stories of Next Generation TIM & Microsurfacing Using Drones in Puerto Rico



## OVERVIEW OF INNOVATION

The Puerto Rico LTAP has adapted its training program to address a combination of strategic virtual webinars, field demonstration of EDC proven initiatives combined with UAS (unmanned aerial systems), and in-person seminars to be able to open the educational spread to all of our stakeholders. Vital elements for the success of the hybrid EDC trainings in Puerto Rico includes:

- Webinar to present the practical uses of UAS in the transportation area.
- Field Demonstration with different types of drones used for Traffic Incident Management.
- Hands-on practice on flying a UAS.
- Assistance in taking *The Recreational UAS Safety Test* (TRUST) Certificate.
- Includes a bilingual translation of pertinent technical information when a SME (subject matter expert) from State and Federal agencies from Puerto Rico and the US are in the same technical session.
- Use of mentimeter with strategic poll questions to know the diversity of our participants and promote active participation in the hybrid training.



Sources/Credits: Puerto Rico LTAP-T<sup>2</sup>, FHWA, PRHTA & NICR

## BENEFITS

A 100% increase in participation in virtual events.

Improve adult learning with one-to-one technical assistance in using apps; train-the-trainer with field demos and technical assistance in the process for UAS recreational license exam.

Raise safety awareness in work zones for all users.

The learning process of EDC initiatives and emerging technologies is fun and exciting for participants of all ages, and is cost effective.

## FIND OUT MORE . . .

PRLTAP Website

<https://www.prltap.org>

PRLTAP Webinars Recordings

<https://www.gotostage.com/channel/prltap>

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Technology Transfer, Continuing Education, TIM, EDC, Traffic Incident Management

# PMIS and its benefits for e-construction



## OVERVIEW OF INNOVATION

The Project Management Information System (PMIS) is a comprehensive solution to streamline the full project life cycle management including Planning, Design, Environmental, Land Acquisition, Bids, Construction and Closing with the objective to expedite the project delivery, improve accountability, security and audit capability and being the single source of truth for all projects.

PMIS is a cloud web-based solution and includes a mobile app for allowing the access to the system from anywhere including field activities. This PMIS has been designed with more than 100 business processes that allow compliance with the procedures and requirements of Puerto Rico Highways and Transportation Authority (PRHTA) and FHWA for the management of construction projects and professional services associated with the different phases of the project.

All business processes defined in PMIS are supported by the centralized document repository that facilitates agency-level collaboration, thus keeping all project information in one place. PMIS workflows allows the user to approve and electronically sign off.

PMIS is integrated with the PRHTA's financial systems (Oracle EBS) to streamline the finance process. PMIS will carry out the allocation of funds and budget for a project, and the creation and approval of contracts, change orders and payment certifications for each project. PMIS is a Web Based solution and includes a mobile app for allowing the access to the system from anywhere including field activities.

PMIS has an electronic bidding module that includes a Web Portal for bids activities, from publication to award, which is supported by business processes designed for the creation of estimates and specifications packages, approvals, questions and answers and for the automatic generation of the resulting contracts.

PMIS is a solution built on the Oracle Primavera Unifier solution, which has extensive integration capabilities with other systems like Laboratory Material Testing System, FMIS, e-ticketing, among others. In addition, it has the ability to generate reports, supported by Oracle BI Publisher.

## BENEFITS

- Standardize processes through all organization and eliminate silos
- Streamline the project delivery processes by electronics signoff and approvals; and provides the contract documents in a paperless environment.
- Single source of truth for all projects
- Better projects funds visibility and tracking
- Integration between accounting, project controls and more
- Better security, audit, and backup

## FIND OUT MORE . . .

**End-user e-Learning site:**

<https://pmis-elearning.info/>

**Oracle Unifier, PMIS platform:**

<https://www.oracle.com/industries/construction-engineering/primavera-unifier-project-controls-facilities-asset-management/project-controls-datasheet/>

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PMIS, Single Source, Project Development, Business Processes, Technology



# 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:

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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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Keywords: Safety, Technology, Emergency  
Response / Relief

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

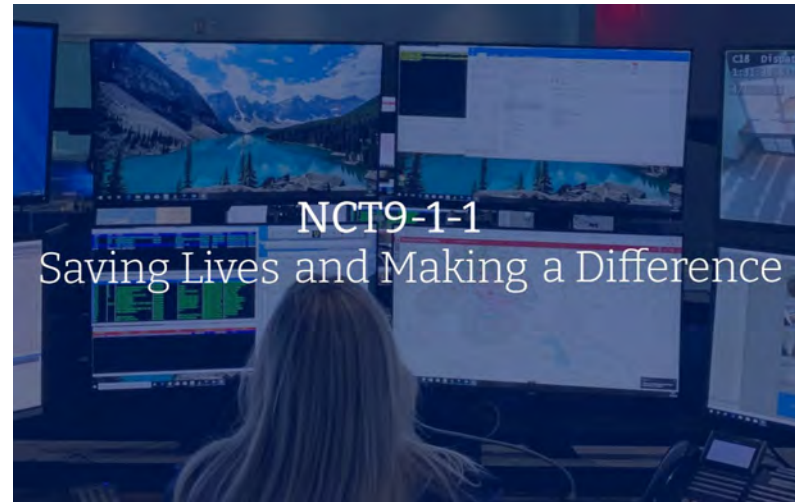


## OVERVIEW OF INNOVATION

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

# 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

# Informative Monitoring Platform: Reporting the Occupancy of Vehicles (IMPROVE)



## OVERVIEW OF INNOVATION

**The Informative Monitoring Platform offers an innovative methodology for extracting multi-year vehicle occupancy rates, providing long-term data for improved project management, transportation systems design, and sustainable development.**

Publicly available web-based occupancy maps are created for cities, block groups, and roadways based on crash data. This methodology, which integrates a small number of field observations with the large number vehicle crashes, partially controls for crash bias and provides otherwise costly-to-obtain vehicle occupancies. These online maps can be updated annually.

Automated workflow tools have been developed in the form of Python modules and GIS models which helps to efficiently process occupancy data. Considering the high cost of vehicle occupancy field data collection, IMPROVE provides a cost-effective means to estimate occupancies for regions, counties, cities, smaller block groups, and roadways (see figure).

IMPROVE supports decision-making opportunities for planners and engineers in terms of project management and capital outlay. Because higher vehicle occupancies are associated with reduced emissions, IMPROVE strengthens the connection between investment decisions and environmental impacts.

## BENEFITS

1. **Project Prioritization:** person throughput—the product of vehicle throughput and vehicle occupancy—account for 45% of a project's evaluation in the urban Virginia project prioritization process. (An occupancy change of 0.10 affects around \$34 million in a case study.)
2. **Planning Tasks:** Long-term occupancy trends support transit design, travel demand models, and alternatives analysis.
3. Occupancy data support **"flexing" federal funds** for goals of single occupant vehicle reduction and improved air quality.

## FIND OUT MORE . . .

IMPROVE - Corridor Level Occupancy Map:

<https://arcg.is/159nan>

IMPROVE - Block Group Level Occupancy Map:

<https://arcg.is/1uzqzmz0>

IMPROVE – VDOT District Level Occupancy Map:

<https://arcg.is/0m454u0>

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Keywords:

Vehicle Occupancy, Single Occupant Vehicles, High Occupancy Vehicles, Data Collection

# Design Technology for Ultra High Performance Concrete (UHPC) Precast, Prestressed Bridge Girders



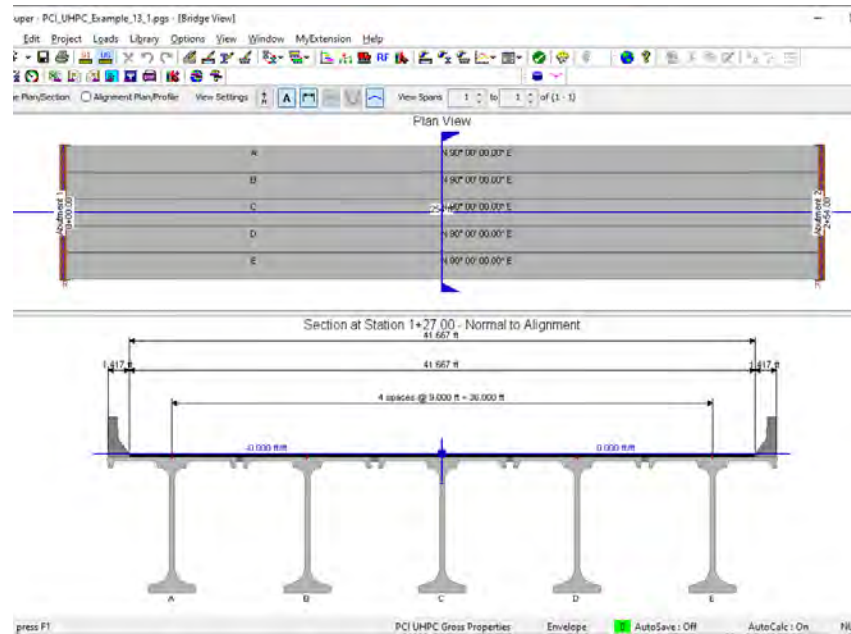
## OVERVIEW OF INNOVATION

**UHPC is an innovative concrete material gaining traction in the US infrastructure sector. The BridgeLink:PGSuper bridge design software has been updated to support design for precast, prestressed UHPC bridge girders.**

UHPC is a fiber-reinforced composite cementitious material with unique properties that differ greatly from conventional concrete. UHPC provides superior durability and high tensile and compressive strengths compared to other classes of concrete. The Precast/Prestressed Concrete Institute (PCI) and the Federal Highway Administration (FHWA) have developed structural design guidance for precast, prestressed concrete bridge girders manufactured with UHPC. This guidance is being coalesced into AASHTO guide specifications.

Washington State and Texas Departments of Transportation collaboratively developed open-source bridge design software named BridgeLink:PGSuper. This software is used by DOT, local agency, and consulting engineers around the country and by international engineering organizations. The software has been recently updated to support design of precast, prestressed UHPC girders with both the PCI and FHWA structural design guidance.

Many US bridge engineers are unfamiliar with the use of UHPC in precast structural elements. The BridgeLink:PGSuper design technology reduces barriers for adopting UHPC solutions and provides engineers with an important tool that supports the implementation of UHPC in US infrastructure projects.



Source: WSDOT

## BENEFITS

The benefits of the BridgeLink:PGSuper software and its UHPC design capabilities includes:

- supporting national implementation of UHPC bridge girders
- open-source software available to everyone for production design and research implementations
- educating design engineers on UHPC design requirements

## FIND OUT MORE . . .

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

Tadros, M., *Implementation of Ultra-High Performance Concrete in Long-Span Precast Pretensioned Elements for Concrete Buildings and Bridges, Phase II Report*, Sept. 15, 2021, Precast/Prestressed Concrete Institute

## WSDOT Bridge and Structures Office

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Precast, Prestressed, Concrete, Girders, UHPC, Software, Structures, Design, Technology, Pavement



# 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