FROM BARRELS TO AUTOMATION: KEEPING WORK ZONES SAFE

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Matt Junak, AVP, PE (HNTB)

WORK ZONE DATA **EXCHANGE**



Developed and supported by:

- FHWA
- USDOT
- BTS
- FMCSA



Work Zone Data Exchange (WZDx) Live Information Sharing

How MDOT can leverage connected vehicle technology to improve work zone safety?



CV2X demonstration took place on November 3, 2021.

PROTECTING ROAD WORKERS

- Live information sharing demonstration on
 I-96 "Flex" Route
- May 2022 non automated vehicle demonstration using a Chevrolet Tahoe









Pictured: Ver Mac Connected Vest, We can now indicate a worker's presence in connected vehicles and on navigation systems.

DEMONSTRATING V2X COMMUNICATION

SMART Devices Feed on I-96



SMART Work Zone Devices

Arrow Boards: location & arrow pattern display Camera Trailers: location & URL for latest still image Portable Message Signs: location & current message Flashing Beacons: location, application & message Hybrid Signs: static text with dynamic LED display Location Markers: critical GPS location markers Traffic Sensors: location & traffic data over intervals



SPEED

YOUR SPEE

REAL-TIME WORK ZONE INFORMATION IN GPS



WZDX PILOT WITH GM VIDEO



Safety Alerts for Work Zones

- SAFEZONE
- <u>Static</u> work zones

EXAMPLE Michigan Department of Transportation		PATE POLICE
MH CORBIN	HNTB	
BOSCH	COMUNICATIONS ENGINEERING & SYSTEMS INTEGRATION	VER-MAC°



Mobile Trailers



Smart Work Zone Equipment



Video Detection Scene Recognition



Integrated V2X



Smart Digital Signage



Traffic Management Safety Alerts



Connected Vehicle Message Sets defined by SAE J2735: BSM – Basic Safety Message PSM – Personal Safety Message

TIM – Traveler Information Message



CONECT: ITS – EDGE PROCESSING



Connect:ITS Edge Processor

Partnering Automated Work Zones (PAWZ)

- 2022 HP-ITD grant •
- Mobile work zones ٠







Communication **Systems**



Real-time In-vehicle Alerts





Smart Work Zone Equipment



Smart Worker Vest

CLOUD BASED COMMUNICATIONS





MODOT TEAM CONFERENCE



Pi-Lit Smart Sequential Flares

- Easily deployed automatically sequenced
- Easy to program Provides great advanced traffic guidance Can be used UNDER cones, on floor alone, or
- Mounted on top of a traffic cone



Pi-Li

PI-LINK DIGITAL

- Automatically connects when the Pi-Lit's are deployed
- Sends automatic alert to Waze
- Provides option to customize the incident message



The Pi-Link with serial number M7PN5GXMNV9IZVTTH3T2 has started a new event.

The event's message is "Maintenance Vehicle".

If you would like to change the event's message, please respond with one of the following numbers:

- 1 Right Lane Closed Ahead
- 2 Left Lane Closed Ahead
- 3 Road Closed Ahead
- 4 Construction Ahead
- 5 Stalled Vehicle Ahead
- 6 Maintenance Crew Ahead

If you do not want to change this event's message, ignore the message or respond with "No".

The event's message and type will not be changed.

(Text Message

Waze Public View

Waze Incidents

 Sent as a HAAS Alert, so it is automatically posted, it doesn't need to be verified or "liked" to be shown to the public



Deployment Examples

Cone-Mounted to improve visibility

Placed under the cones and on the back of the tailgate

Directly on the roadway and at the back of the vehicle

100000-000

Nrecker Collab!

We have teamed up with AAAA Wrecker Service and will begin training a couple of their drivers on how to use the Pi-Lit/ Pi-Link combo. Their incident data will be sent back to OkTraffic.Org Will enhance safety and efficiency during incident response



Current goals we are working

towards



IOW THE APP WORKS

Construction ID Homepage

- Type in Construction ID number to pull up Project
- View Location and Project Description & Info
- Toggle from Map View to Pictures
- Search Contracts by Division, Date, and Key words

CODOT Turnpike	CODOT Turnpike	< ODOT
Q 220268 × Itt	Q 220268	Q Search cont
	Seminol. Sportsman Lake Recreation Area	180203 Desc: BRIDGE AND APPROACH Location: US-377/SH-99: OVER LA TEXOMA (WILLIS BRIDGE TEXAS STATE LINE NEAR County: MARSHALL District: District 2
Contract name: 220268 Request completion Add detour esc: GRADE, DRAIN, SURFACE AND BRIDGE ocation: S-270: FROM 1.0 MILE SOUTHEAST OF THE H-270A JUNCTION, EXT END SOUTHEAST	Contract name: 220268 Request completion Add detour Desc: GRADE, DRAIN, SURFACE AND BRIDGE Location: US-270: FROM 1.0 MILE SOUTHEAST OF THE SH-270A JUNCTION, EXT END SOUTHEAST NEAP SEMINOLE	180260 Desc: BRIDGE AND APPROACH Location: COUNTY ROAD (NS-405 MUDDY BOGGY CREEK, 4 AND 5.0 MILES NORTH C NEAR BOSWELL. County: CHOCTAW District: District 2
EAR SEMINOLE. ounty: SEMINOLE tatus: Active ata: 3	County: SEMINOLE Status: Active Data: 3	180349 Desc: BRIDGE AND APPROACH Location: SH-43: OVER MILL CREE MILES WEST OF THE US- JUNCTION NEAR COALG County:

Q

, ON THE

VILLIS.

): OVER 7 MILES

US-70

Status:

Active Data Status: Approved

N/A

Status: Closed Data Status:

> Approved Start Date:

GO →

Status:

Closed Data Status: Approved Start Date: N/A

N/A

Start Date:

How the App Works

RECORDING CONSTRUCTION LOCATION

- Click on Location Icon
- Start the recording Drive the construction route
- Click End when finished with that direction

Add a New Route if you have multiple directions to route







How the App Works

Take Pictures and Videos

- Click Photo Icon
- Take multiple photos and a "Save" button will appear in the top right corner
- Take a video by holding the capture icon.

Add a New Route if you have multiple directions to route



ODOT





Edit Construction Details (WZDX)

Vehicle, Lane and Speed Impacts

- Click Edit Contract
- Add in an Estimated End Date
- Add Vehicle/ Lane Impacts for each route
- Add Original and Reduced Speeds
- Add as many restrictions that applies to that route.
- Width, Heighth, Length Limits, etc.

CODOT Turnpike	Image: Book of the second seco	< Edit Contract
Q 220268 X	Route 1	Route 1
	Completion Date	Completion Date
	Vehicle Impact Vehicle Impact	Vehicle Impact
Contract name: 220268 Request completion Add detour	Original Speed Limit Original Speed Limit	Original Speed Limit Original Speed Limit
Desc: GRADE, DRAIN, SURFACE AND BRIDGE	All Lanes Open	Reduced Speed Limit
Location: US-270: FROM 1.0 MILE SOUTHEAST OF THE SH-270A JUNCTION, EXT END SOUTHEAST	All Lanes Open Shift Left	Reduced Speed Limit
NEAR SEMINOLE. County: SEMINOLE	All Lanes Open Shift Right	Restrictions
	Alternating One Way	
	Flagging	Submit
	Flagging	

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Projects mapped shown on Oktraffic.org



STATEWIDE PROJECTS



Current goals we are working towards

Easy Access to

Resources

Toll Calculat

OkTraffic / Drive Oklahoma **App** - Integration

- Currently testing • integration into our OKTraffic.org map. From Then we will be able to see the incidents as they pop up
- Push notifications will • be sent to the users of our Drive Oklahoma App
- This will help us inform drivers faster and improve safety and efficiency.



Download the App! \rightarrow

I-235

D I-235 & N 36th

1-235 & N 6th

🗇 I-235 & Sheridar

1-35 1-40







ATMA

- An Autonomous truck follows the path of lead maintenance vehicles by using connected and automated vehicle technology.
- The lead vehicle leaves "electronic breadcrumbs" for the Autonomous Vehicle to follow, allowing the vehicle to operate automatically.
- The ATMA has a LiDAR System which is a laser- based technology that helps autonomous vehicles perceive their surroundings.





ATMA

- The Autonomous Vehicle is trailing the maintenance vehicle to carry out various projects.
- These projects include striping, herbicide spraying, road repairs, and other maintenance projects.



ATMA

- The ATMA vehicle is equipped with a sophisticated steering and guidance system that utilizes sensors, GPS, and automation to navigate pre-defined paths or directions.
- The vehicle makes small, continuous adjustments to ensure it stays perfectly aligned with the path it's following.
- The video below demonstrates the ATMA adjusting to ensure it remains aligned with its path.



Iowa DOT Work Zone Transportation Engineers Association of Missouri

C/O Matthew Miller

Director of New and Emerging Transportation Technologies



IQWA DOT

Smart Arrow Boards



Started 2020.

Deployed boards feed Traffic Management Center and Waze.

Arrow Board device feed is dependent on submitted requests to display on 511.

End of work zone is not identified.



Required by Specification 4188.11 <u>https://erl.iowadot.gov/aw-</u> <u>server/rest/product/purl/IOWADOT/s/bcd4</u> <u>7a97-fcbb-4299-9ea4-dec9a476df3c</u>

Connection to traffic event is manual process at Traffic Management Center.

Maintenance has 50+ out of 450 arrow boards across the state with more to be retrofit. Iowa Connected Arrow Board Summary 2023





Here is an example on our GIS dashboard.



Now Waze.

See the iCone message.



511.

If an event is not connected the board is not shown.







US 30 eastbound: Road construction.

Updated Last Tuesday at 9:33 AM CST by lowa DOT

Verified by smart device 🔞

Between County Road S52 (State Center) and IA 330 (4 miles west of the Marshalltown area). Road construction work is in progress. A lane is closed intermittently. Look out for flaggers. Until November 26, 2024 at about 7:00PM CST. Full schedule below:

September 16, 6:00AM - November 26, 7:00PM

Comment: Marshalltown RCE (800-251-2706) - Marshall County





IQWA DOT

Automated Flagger Assistance Devices



Automated Flagger Assistance Devices

Ensure all AFADs meet the current requirements of the MUTCD Section 6E.04 and 6E.06.

Use RED/YELLOW Lens type AFADs as per MUTCD Section 6E.06.

AFADs shall meet crashworthiness requirements of Article 4188.01, B.

When using AFADs for work zones on Primary roadways, remote communication capabilities meeting requirements of Article 4188.11 are required.



IQWA DOT

OnStation

onStation

«nStation

Is an application that uses alignments and stationing layered on a GIS map for inspection locations.

They have partnered with iCone to feed active work zones from users on the application within the geofence of their project.





IQWA DOT

Situation Data Exchange



45

Situation Data Exchange

Pilot project with 17 states to connect to a single dashboard that can push V2X messages to Google, Apple, Tom Tom, Sirius XM, Volkswagen and others direct TIMs messages.

Actively connecting states now and hope to report back at completion expected around June timeframe.



Lane Closure System



Lane Closure System

Beta testing currently, should be in production around September this year.

Connects: Lane Closure Planning Tool, Permitting system, Linear Reference System, Pavement management system, 511 Traffic Management Center, AASHTOware Project, Masterworks, etc. for Maintenance and Construction, internal and external users.

Iowa DOT Lane Closures Login	
Iowa DOT User External User	
CLICK TO LOGIN	
Forgot Password?	

THANK YOU!

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KEEPING WORK ZONE SAFE

Text -

Eric Kopinski MoDOTI-70 Program Director

Work Zone Observations – The Bad



Work Zone Observations - The Worse



Work Zone Observations – The ?



Work Zone Safety?



How Distracted Are Drivers?



Smart Work Zone



Real Time Work Zone



Real Time Map Update



The Future is Bright?

