



Connected Work Zone (CWZ) 101 Training

Introduction to Connected Work Zone Standard

Today's CWZ 101 Instructors



Steven T. Parker
University of Wisconsin-Madison



Skylar Knickerbocker
Iowa State University



Disclaimer

This material is based upon work supported by the Federal Highway Administration under grant agreements 693JJ31750009 and 693JJ32450003.

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Module 1

Course Overview

CWZ 101 & 201 Course Overview

CWZ 101: Introduction to Connected Work Zones

The CWZ 101 course will introduce key concepts of the Connected Work Zone data exchange standard:

- What is a Connected Work Zone (CWZ)?
- Why is a CWZ Standard Needed?
- Overview of the 2024 CWZ Data Exchange Standard
 - The Work Zone Feed
 - The Device Feed
- Agency Considerations for CWZ Data Management

This course is intended for participants who are new to CWZ data management or who may need a refresher.

Connected Work Zones Implementation Guide and Standard v01.00

Guidance for Setting Up and Operating a Connected Work Zone

December 2024

Previously Work Zone Data Exchange (WZDx)

Developed by: American Association of State Highway and Transportation Officials (AASHTO), ITE—A Community of Transportation Professionals, and National Electrical Manufacturers Association (NEMA)

AMERICAN ASSOCIATION
OF STATE HIGHWAY AND
TRANSPORTATION OFFICIALS
AASHTO

ite
A Community of Transportation Professionals

NEMA
National Electrical Manufacturers Association

Supported/Sponsored by: The United States Department of Transportation (USDOT)

Source: ITE CWZ Standard v1.00

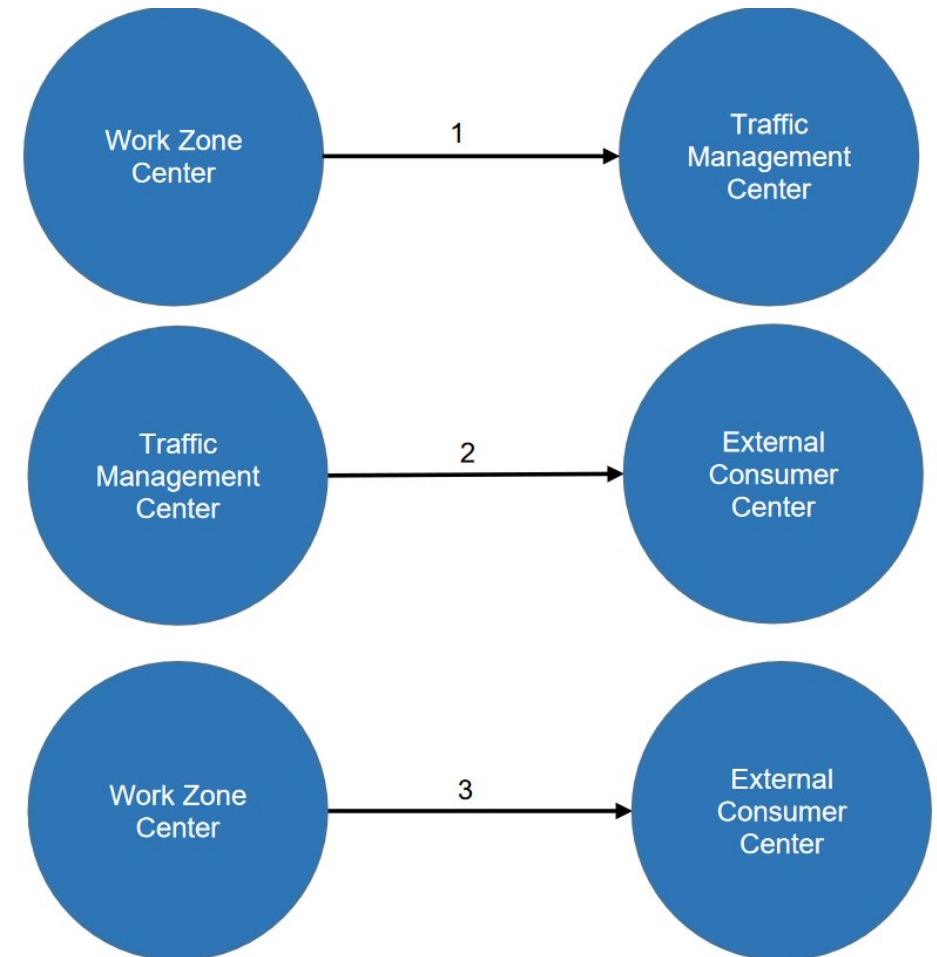
CWZ 101 & 201 Course Overview

CWZ 201: CWZ Implementation and Use Cases

The CWZ 201 course will cover technical concepts and use cases to incorporate CWZ capabilities into an agency's work zone management landscape. Key concepts will include:

- Architecture and Integration Models
- Lessons Learned and Best Practices
- Use Cases for CWZ Implementation

Participants are expected to have familiarity with the CWZ concepts presented in the 101 module.



CWZ Work Zone Data Collection and Distribution
Source: ITE CWZ Standard v1.00

Today's CWZ 101 Course Outline

- **Module 1:** Course Overview & Background
- The CWZ Standard: A Primer
- **Module 2:** The CWZ **Work Zone Feed**
- **Module 3:** The CWZ **Device Feed**
- **Module 4:** Real-World Examples & Making the Case for CWZ



Connected Work Zones

A **connected work zone** is defined as:

- A set of technologies that generates or collects work zone information (whether automatically or manually).
- The infrastructure that broadcasts/distributes this information to the public and to vehicles.



Source: Iowa DOT



CWZ data describes the *what*, *where*, *when*, and *how* of a work zone deployment:

TYPE OF WORK

DURATION

LOCATION

LANE AND
SHOULDER IMPACTS

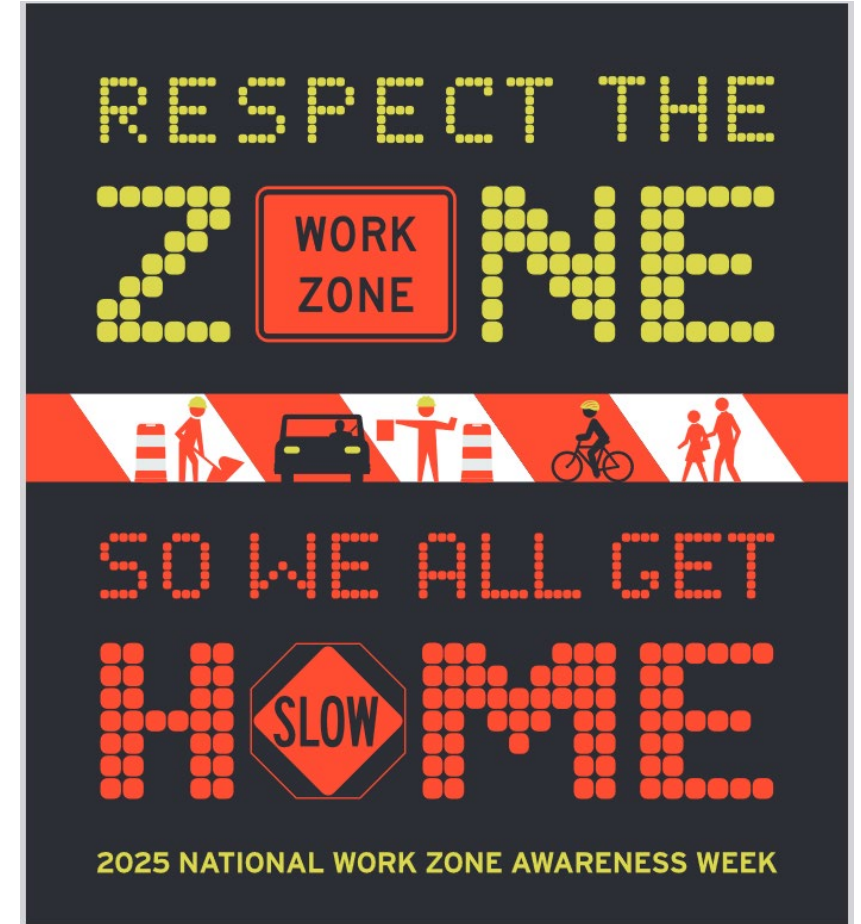
RESTRICTIONS

DETOUR ROUTES

CWZ does *not* address work zone safety or mobility outcomes, such as performance metrics, crash data, or travel times.

Why is CWZ Data Important?

- Motorist Safety and Mobility
- Worker Safety
- Incident Management
- Emergency Vehicle Routing
- Freight Permitting and Routing
- Enabling Automated Vehicles
- Performance Management



Source: <https://ops.fhwa.dot.gov/wz/workersafety/>

The Work Zone Data Exchange (WZDx)

- Benefits/Objectives

- Improve work zone safety and mobility by making harmonized work zone activity data available for third-party use
- Provide data on work zones to vehicles to help automated driving systems (ADS) and human drivers navigate more safely
- Define two data exchanges: WorkZoneFeed and DeviceFeed

- Development History

- Launched by FHWA and ITS JPO in 2018, with thirteen WZDx Demonstration Grants awarded in 2021
- Developed collaboratively through the Work Zone Data Working Group, 2019–2023
- Incorporated into the ITE CWZ Standard in 2024

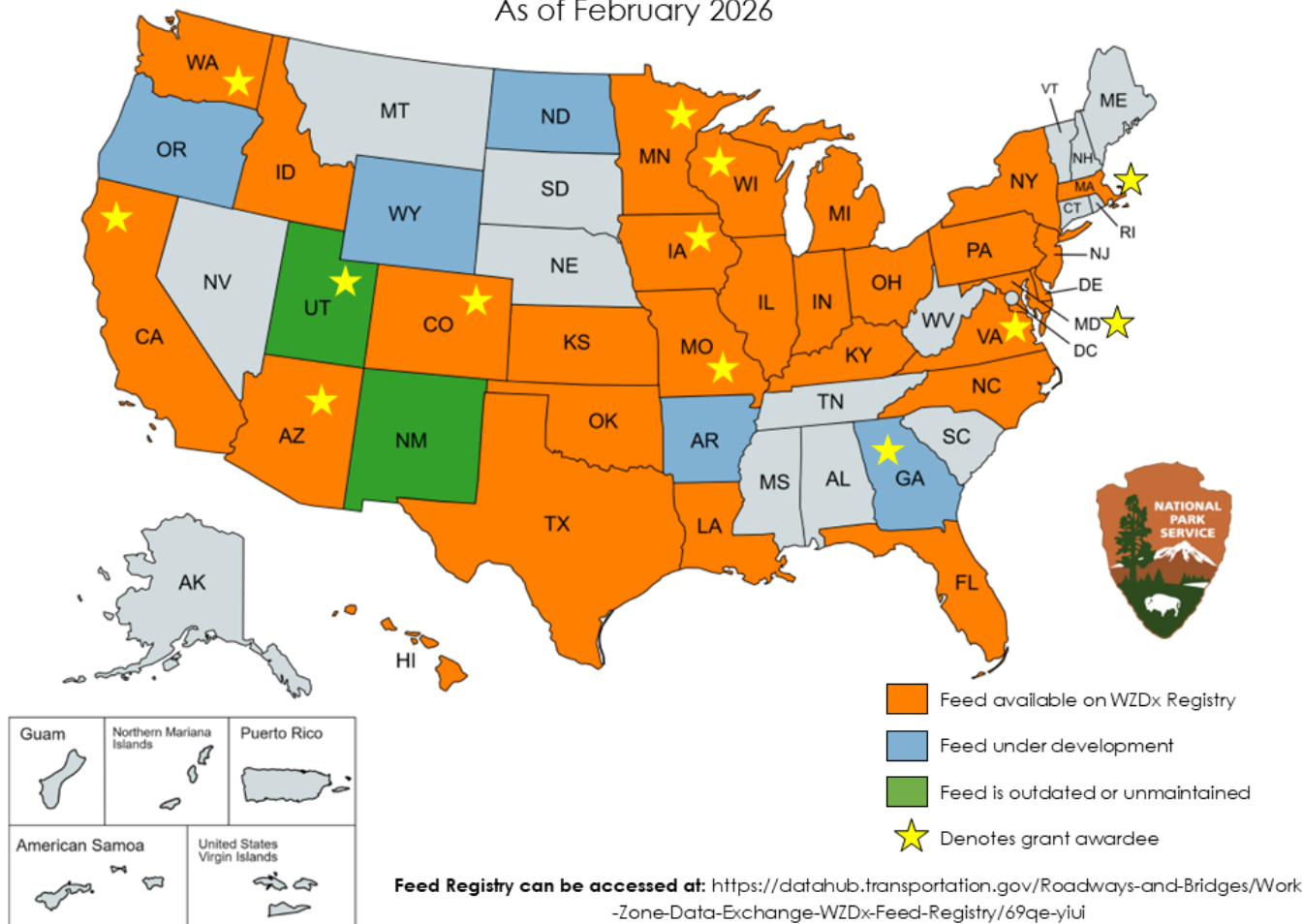


Source: USDOT and FHWA

National WZDx Deployment Status

WZDx Activity

As of February 2026



Source: USDOT Volpe Center

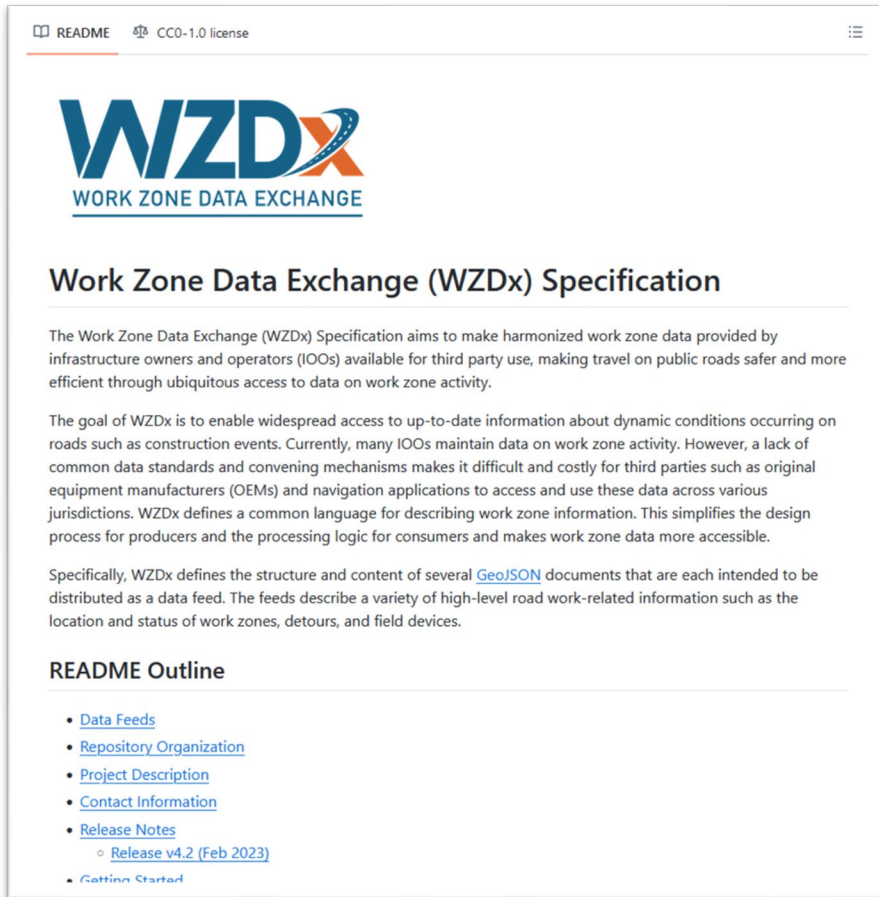
Module 1 – Course Overview

- Q & A
- Polling Questions



CWZ Primer

WZDx and CWZ Online Resources



The screenshot shows the GitHub README for the WZDx project. At the top, it says 'README' and 'CC0-1.0 license'. The WZDx logo is prominently displayed, with the text 'WORK ZONE DATA EXCHANGE' underneath. The main heading is 'Work Zone Data Exchange (WZDx) Specification'. The text describes the goal of WZDx: to make harmonized work zone data provided by infrastructure owners and operators (IOOs) available for third party use, making travel on public roads safer and more efficient through ubiquitous access to data on work zone activity. It also mentions the goal of enabling widespread access to up-to-date information about dynamic conditions occurring on roads such as construction events. A 'README Outline' section lists links to 'Data Feeds', 'Repository Organization', 'Project Description', 'Contact Information', 'Release Notes' (including 'Release v4.2 (Feb 2023)'), and 'Getting Started'.

README CC0-1.0 license

WZDx

WORK ZONE DATA EXCHANGE

Work Zone Data Exchange (WZDx) Specification

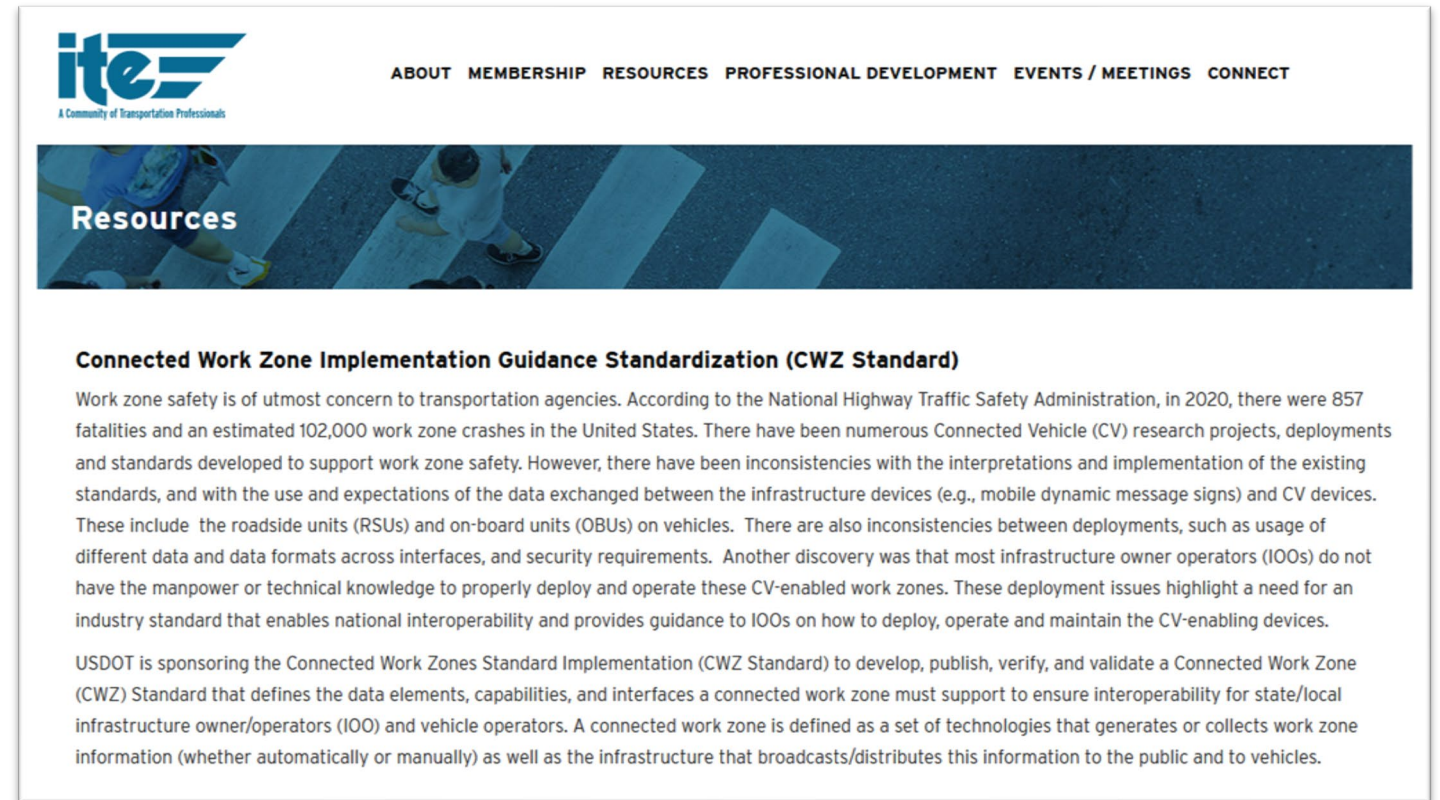
The Work Zone Data Exchange (WZDx) Specification aims to make harmonized work zone data provided by infrastructure owners and operators (IOOs) available for third party use, making travel on public roads safer and more efficient through ubiquitous access to data on work zone activity.

The goal of WZDx is to enable widespread access to up-to-date information about dynamic conditions occurring on roads such as construction events. Currently, many IOOs maintain data on work zone activity. However, a lack of common data standards and convening mechanisms makes it difficult and costly for third parties such as original equipment manufacturers (OEMs) and navigation applications to access and use these data across various jurisdictions. WZDx defines a common language for describing work zone information. This simplifies the design process for producers and the processing logic for consumers and makes work zone data more accessible.

Specifically, WZDx defines the structure and content of several [GeoJSON](#) documents that are each intended to be distributed as a data feed. The feeds describe a variety of high-level road work-related information such as the location and status of work zones, detours, and field devices.

README Outline

- [Data Feeds](#)
- [Repository Organization](#)
- [Project Description](#)
- [Contact Information](#)
- [Release Notes](#)
 - [Release v4.2 \(Feb 2023\)](#)
- [Getting Started](#)



The screenshot shows the ITE website's 'Resources' page. The ITE logo is at the top left, with the tagline 'A Community of Transportation Professionals'. Navigation links include 'ABOUT', 'MEMBERSHIP', 'RESOURCES', 'PROFESSIONAL DEVELOPMENT', 'EVENTS / MEETINGS', and 'CONNECT'. The 'Resources' section is highlighted. The main heading is 'Connected Work Zone Implementation Guidance Standardization (CWZ Standard)'. The text discusses work zone safety, mentioning 857 fatalities and an estimated 102,000 work zone crashes in the United States in 2020. It notes the need for a national interoperability standard and mentions that USDOT is sponsoring the Connected Work Zones Standard Implementation (CWZ Standard) to develop, publish, verify, and validate a Connected Work Zone (CWZ) Standard.

ite

A Community of Transportation Professionals

ABOUT MEMBERSHIP RESOURCES PROFESSIONAL DEVELOPMENT EVENTS / MEETINGS CONNECT

Resources

Connected Work Zone Implementation Guidance Standardization (CWZ Standard)

Work zone safety is of utmost concern to transportation agencies. According to the National Highway Traffic Safety Administration, in 2020, there were 857 fatalities and an estimated 102,000 work zone crashes in the United States. There have been numerous Connected Vehicle (CV) research projects, deployments and standards developed to support work zone safety. However, there have been inconsistencies with the interpretations and implementation of the existing standards, and with the use and expectations of the data exchanged between the infrastructure devices (e.g., mobile dynamic message signs) and CV devices. These include the roadside units (RSUs) and on-board units (OBUs) on vehicles. There are also inconsistencies between deployments, such as usage of different data and data formats across interfaces, and security requirements. Another discovery was that most infrastructure owner operators (IOOs) do not have the manpower or technical knowledge to properly deploy and operate these CV-enabled work zones. These deployment issues highlight a need for an industry standard that enables national interoperability and provides guidance to IOOs on how to deploy, operate and maintain the CV-enabling devices.

USDOT is sponsoring the Connected Work Zones Standard Implementation (CWZ Standard) to develop, publish, verify, and validate a Connected Work Zone (CWZ) Standard that defines the data elements, capabilities, and interfaces a connected work zone must support to ensure interoperability for state/local infrastructure owner/operators (IOO) and vehicle operators. A connected work zone is defined as a set of technologies that generates or collects work zone information (whether automatically or manually) as well as the infrastructure that broadcasts/distributes this information to the public and to vehicles.

<https://github.com/usdot-jpo-ode/wzdx>

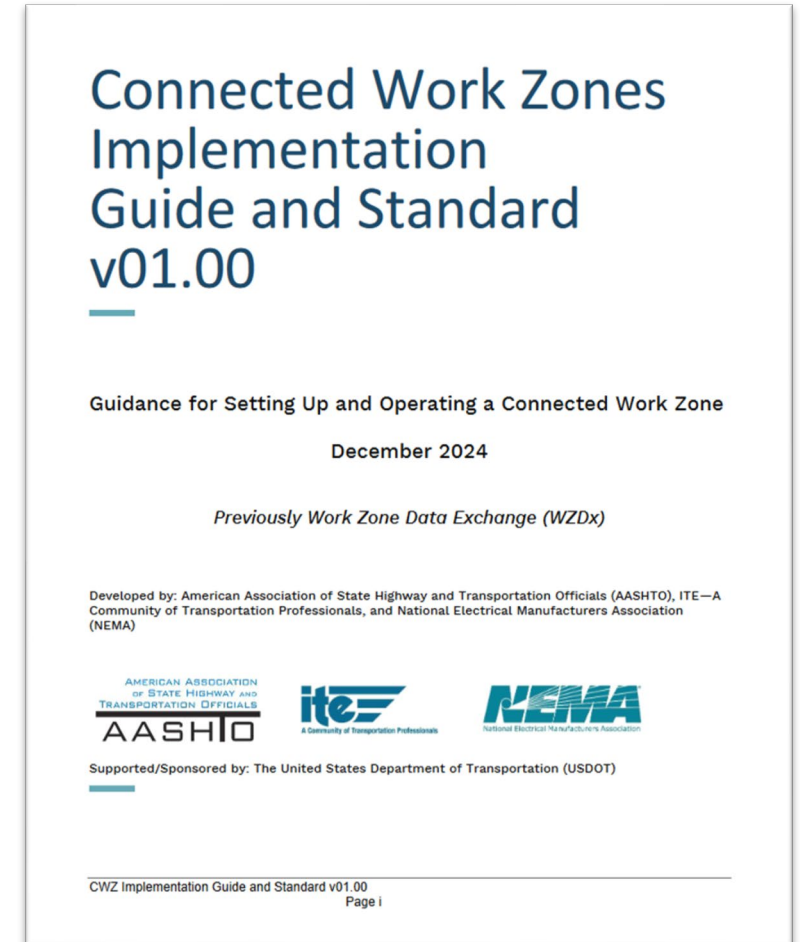
<https://www.ite.org/technical-resources/standards/cwz/>

Tour of the CWZ Standard

The CWZ Standard defines the **data elements**, **capabilities**, and **interfaces** a connected work zone must support to ensure interoperability between components of a connected work zone.

- General Information
- Concept of Operations
- System Requirements
- System Design Details
- Annexes & Guidance Needs
- Changes from WZDx v4.2

<https://www.ite.org/technical-resources/standards/cwz/>



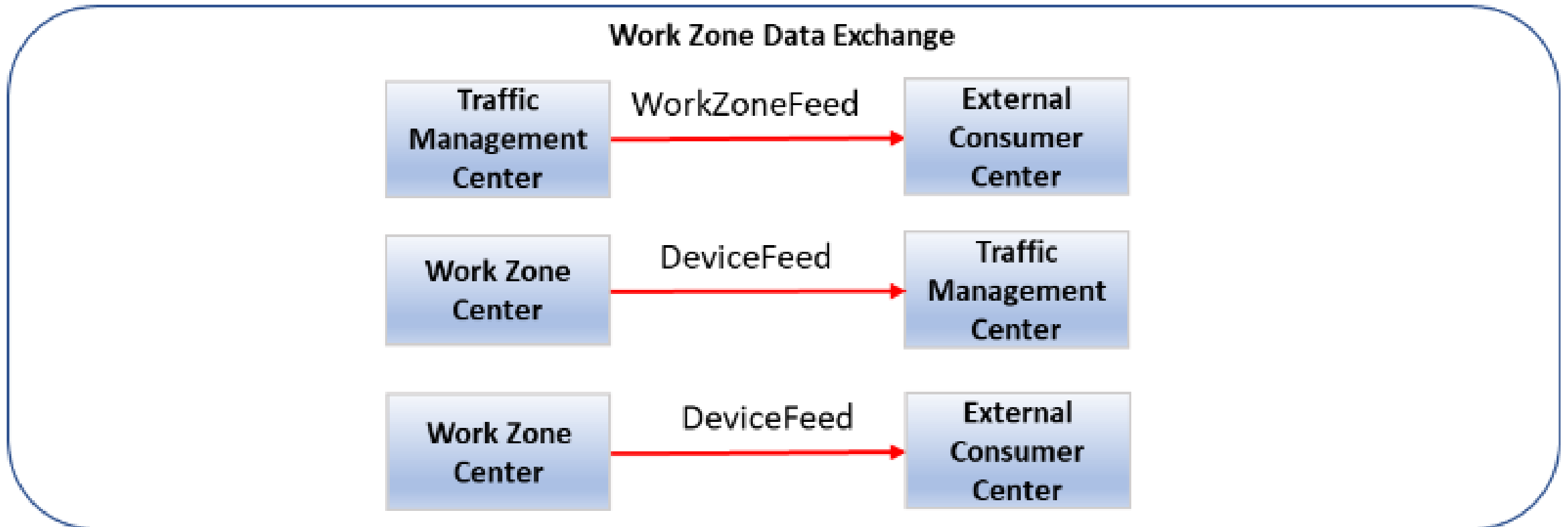
Source: ITE CWZ Standard v1.00



CWZ Standard Data Feeds

- **WorkZoneFeed:** Provides high-level information about events on roadways related to work zones that impact the characteristics of the roadway and involve a change from the default state (e.g., a lane closure)
- **DeviceFeed:** Provides information (location, status, dynamic data) about field devices deployed on the roadway in work zones.

CWZ Standard Data Exchange Architecture



CWZ v1.00 - Physical Architecture: Work Zone Data Collection and Distribution

Source: ITE CWZ Standard v1.00

GeoJSON Data Format

- **JSON** (JavaScript Object Notation)
 - A lightweight, human-readable data interchange format
- **GeoJSON**
 - A geospatial data interchange format based on JSON
- The CWZ 1.0 standard includes a companion **JSON Schema**
 - Describes the JSON format of the CWZ WorkZone and Device feeds
 - Used to validate conformance of work zone data to the CWZ standard
 - GeoJSON is the required data exchange format for CWZ WorkZone and Device feeds



Source: ITE CWZ Standard v1.00

GeoJSON Objects and Terminology

- **Geometry:** A geographical shape or entity in coordinate space.
- **Feature:** Combines a Geometry object with additional non-spatial attributes called Properties.
- **FeatureCollection:** A collection of features.
- **Bounding Box:** Coordinate range of an object represented by the lowest and highest values for each coordinate axis.

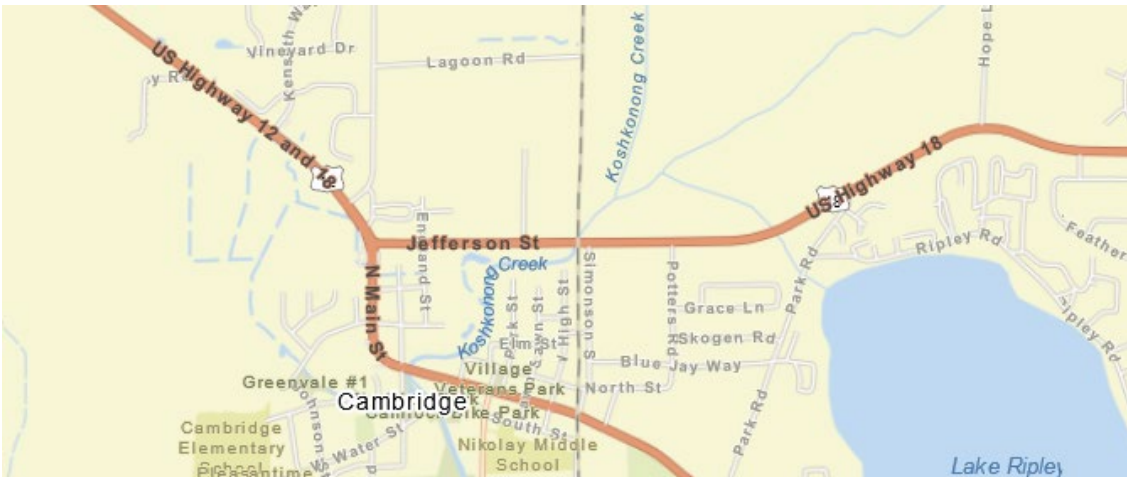


CWZ Geometry Objects

- **Point:** A single location defined by coordinates, e.g., representing a ramp closure or work zone device location.
- **LineString:** A series of points connected by straight lines, e.g., representing the path of a work zone or detour.

```
"geometry": {  
  "type": "Point",  
  "coordinates": [-93.635, 41.998]  
},
```

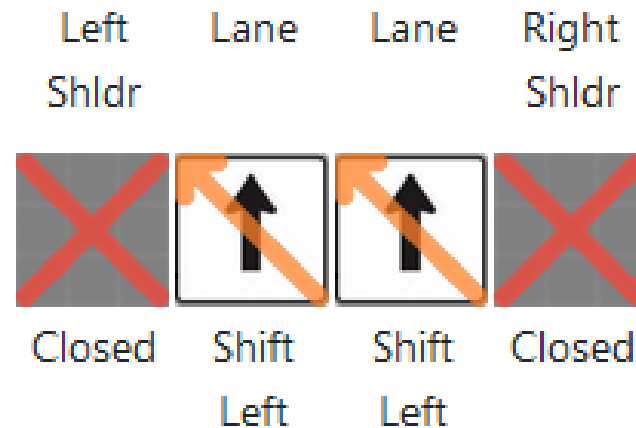
```
"geometry": {  
  "type": "LineString",  
  "coordinates": [  
    [-89.409, 43.0725],  
    [-89.409, 43.0722],  
    [-89.409, 43.0719],  
    [-89.409, 43.0713]  
  ],  
},
```



Source:
©OpenStreetmap®,
modifications by
University of
Wisconsin-Madison

CWZ Feature Objects

- **Geometry:** The geographical shape of the CWZ Work Zone Road Event or Field Device feature
- **Properties:** Non-spatial attributes associated with the CWZ Work Zone Road Event or Field Device feature
- **ID:** Common identifier for the CWZ Work Zone Road Event or Field Device feature

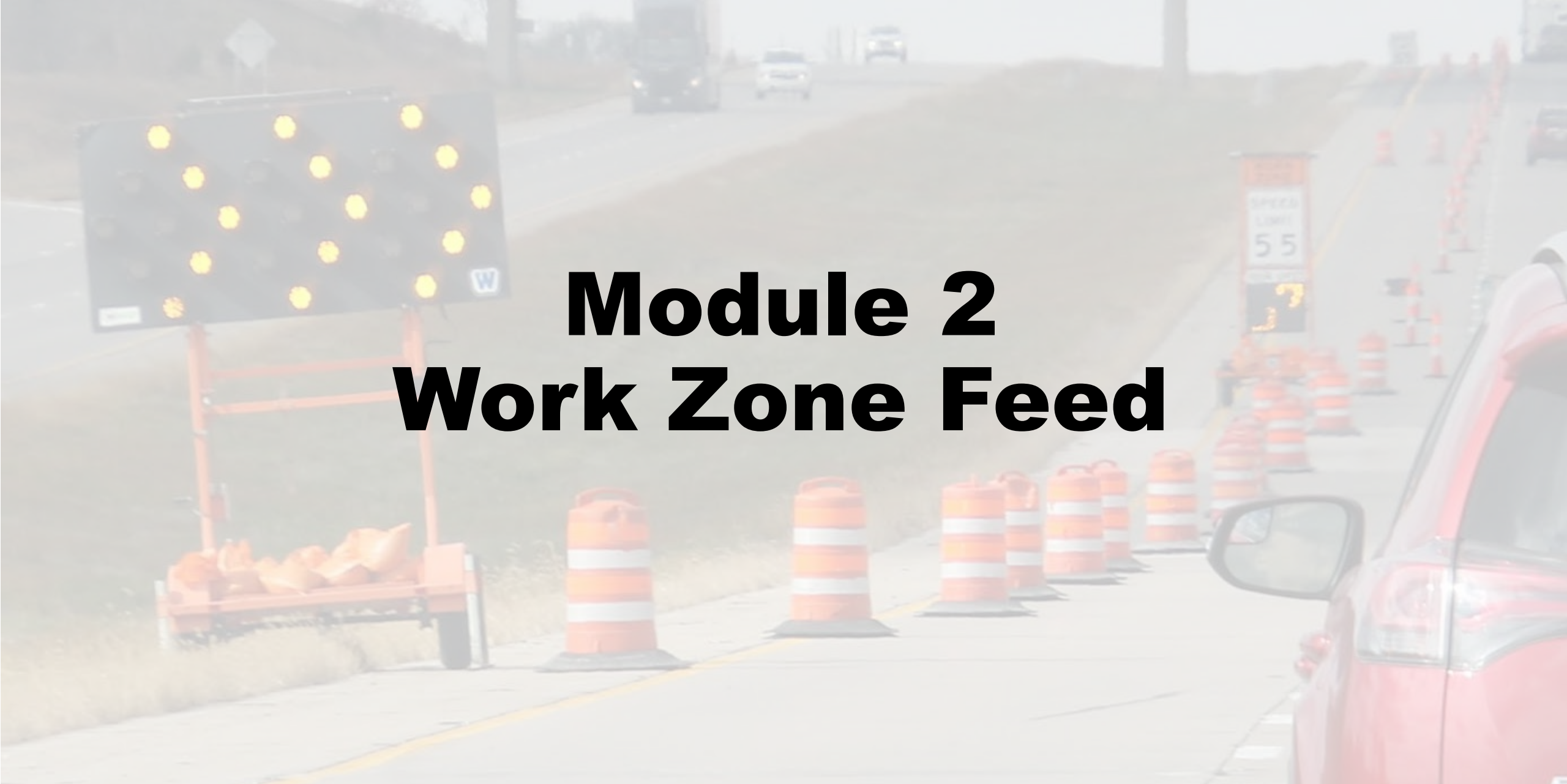


Source: Wisconsin DOT

```
{
  "id": "3ee92027-830b-0558-ba4e-cb9bc49f7b43",
  "type": "Feature",
  "geometry": {
    "type": "LineString",
    "coordinates": [
      [
        -88.1742707923499,
        44.370716082844
      ],
      [
        -88.1768331896396,
        44.3678427778223
      ],
      [
        -88.2341637712669,
        44.3107594803119
      ],
      [
        -88.2347124512398,
        44.3104700012495
      ]
    ]
  },
  "properties": {
    "lanes": [
      {
        "type": "shoulder",
        "order": 1,
        "status": "closed"
      },
      {
        "type": "general",
        "order": 2,
        "status": "shift-left"
      },
      {
        "type": "general",
        "order": 3,
        "status": "shift-left"
      },
      {
        "type": "shoulder",
        "order": 4,
        "status": "closed"
      }
    ],
    "end_date": "2026-11-21T05:59:59+00:00",
    "start_date": "2026-03-16T05:00:00+00:00",
  }
}
```

CWZ Primer

- Q & A
- Polling Questions



Module 2

Work Zone Feed



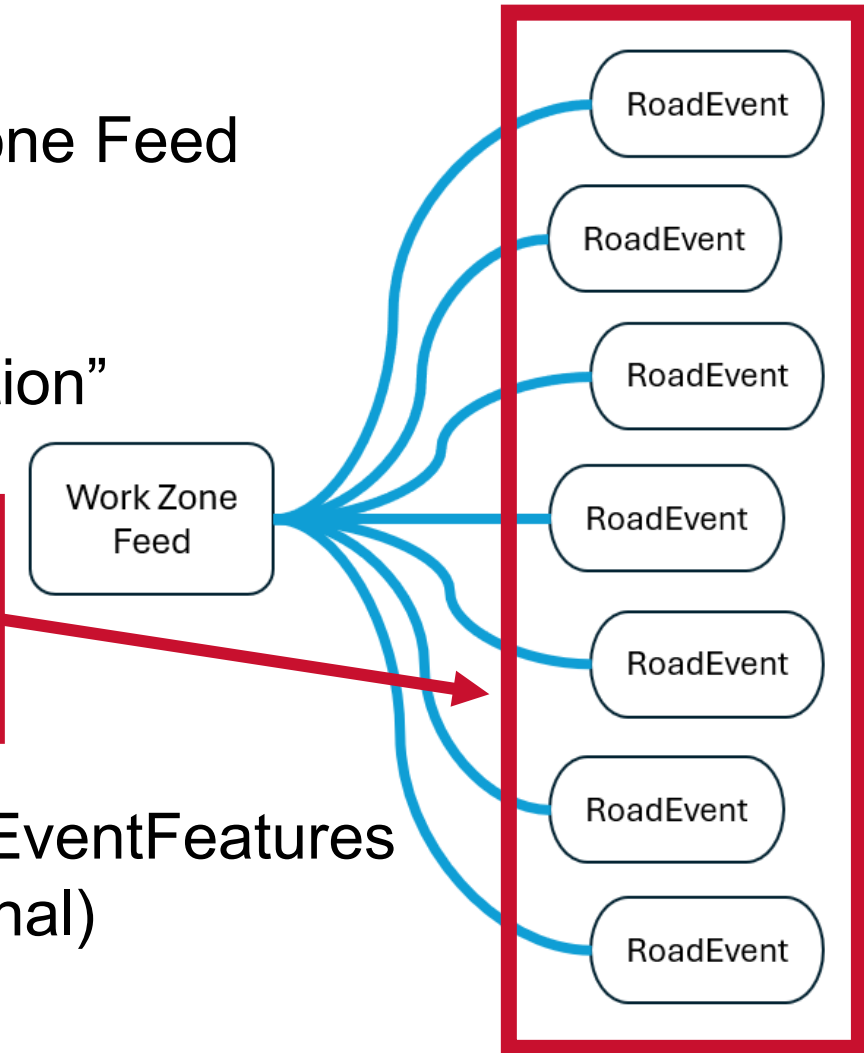
Contents of the Work Zone Feed

feed_info → Information about the Work Zone Feed

type → Value must be “FeatureCollection”

features → Array of RoadEventFeatures

bbox → Coordinate range of all RoadEventFeatures in the Work Zone Feed (optional)





Contents of the RoadEventFeature

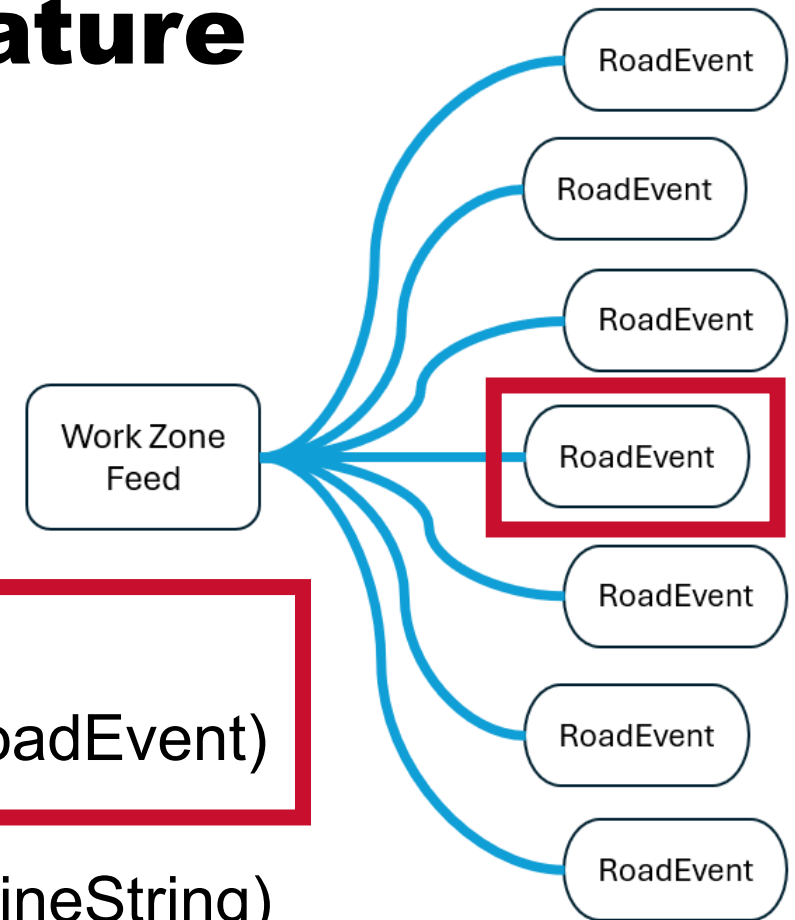
id → Unique identifier which is a UUID

type → Value must be “Feature”

properties → Details of the road event
(WorkZoneRoadEvent or DetourRoadEvent)

geometry → Geometry of road event (Point or LineString)

bbox → Coordinate range for this road event (optional)

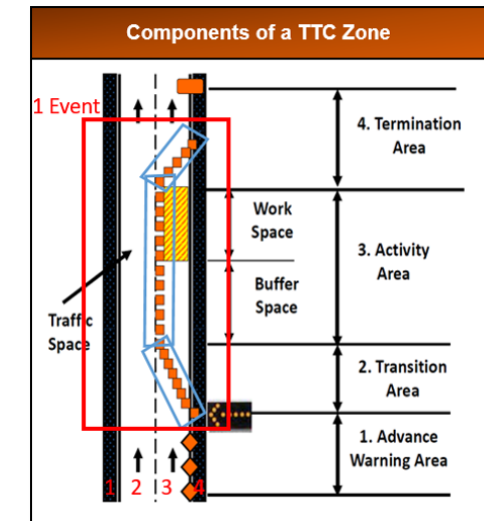


Mandatory WorkZoneRoadEvent Properties

- Data Source Identifier
- Event Type (Work Zone or Detour)
- Road Names
- Direction
- Start Date
- End Date
- Vehicle Impact
- Location Method
- Is Start Position Verified?
- Is End Position Verified?
- Is Start Date Verified?
- Is End Date Verified?

VehicleImpact
all-lane-closed
some-lanes-closed
all-lanes-open
alternating-one-way
some-lanes-closed-merge-left
some-lanes-closed-merge-right
all-lanes-open-shift-left
all-lanes-open-shift-right
some-lanes-closed-split
flagging
temporary-traffic-signal
unknown

LocationMethod
channel-device-method
sign-method
junction-method
other
unknown



Source: ITE CWZ Standard v1.00



Optional WorkZoneRoadEvent Properties

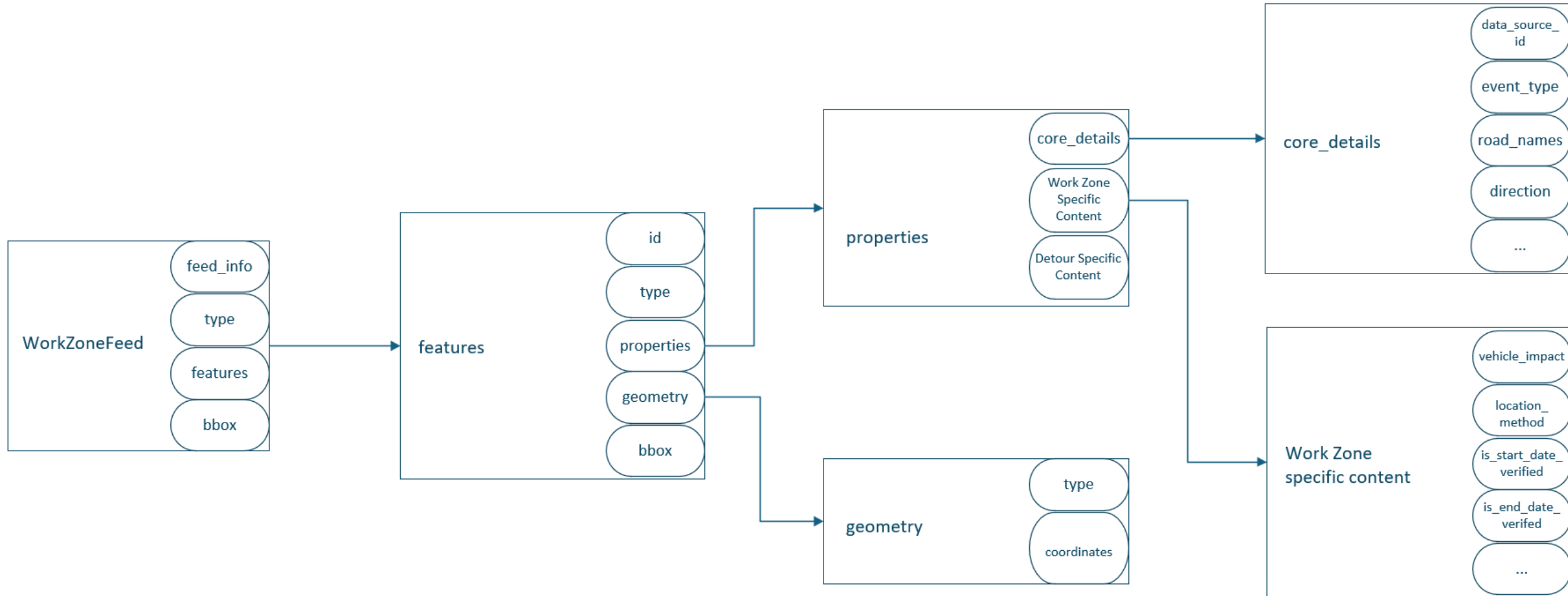
- Cross Street / Reference Post
- Work Zone Type
 - Static, Moving, Planned Moving Area
- Restrictions
 - Width, Height, Weight, Speed, etc.
- Types of Work
 - Overhead, Surface, Barrier, Painting, etc.
- Lane Details
 - Order, Status, Type, Restrictions
- Worker Presence
- Event Description (Free Text)
- Event Name / Project ID
- Related Road Events
- Creation and Update Date

LaneType
general
exit-lane
exit-ramp
entrance-lane
entrance-ramp
sidewalk
bike-lane
shoulder
parking
median
two-way-center-turn-lane

LaneStatus
open
closed
shift-left
shift-right
merge-left
merge-right
alternating-flow

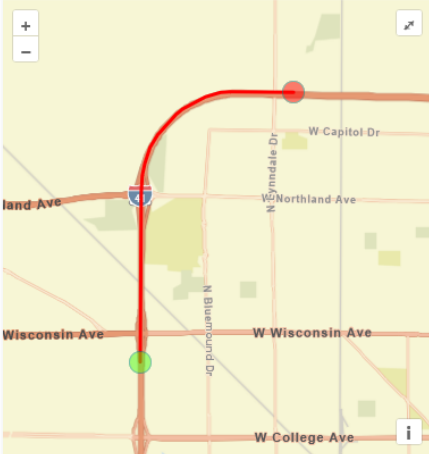


Bringing it all together



Work Zone Data Feed Example

Roadway Status: Lane or Shoulder Closure		Duration: From 05:00 AM on 03/02/2026 to 11:59 PM on 05/29/2026	
Left Lane Lane Right Shldr Shldr Shldr  Closed Shift Shift Closed Right Right Right			
Begin County:	OUTAGAMIE	Highway:	I-41 NB
End County:	OUTAGAMIE		
Begin Location:	OFF RAMP TO WIS 96	End Location:	COUNTY A (B-44-0140 BEGIN)
Distance From:	0.05 Miles	Distance From:	0.15 Miles
Direction From:	Upstream	Direction From:	Downstream
Latitude:	44.270045045	Latitude:	44.299269349
Longitude:	-88.466446927	Longitude:	-88.443242671
Closure Length:	2.87 Miles		



Roadway Width	Vertical Restrictions	Weight Restrictions	Speed Restrictions
Restriction Type: Barrier	Vertical Restrictions? No	Weight Restrictions? No	Speed Reduction? Yes
Available Roadway Width: 26 ft. 0 in.	Minimum Vertical Distance:	Maximum Vehicle Weight:	Reduced Regulatory Speed: 60
Effective Roadway Width: 25 ft. 0 in.	Temporary Signalization: No		

```
{
  "id": "b8228c3b-c8b4-9451-aaf9-abcd12973a21",
  "type": "Feature",
  "geometry": {
    "type": "LineString",
    "coordinates": [
      [
        -88.4664469261598,
        44.2700451390585
      ],
      [
        -88.4664096134444,
        44.2721463156541
      ],
      [
        -88.4663507581428,
        44.2845845809131
      ],
      [
        -88.4662899346517,
        44.2885377655386
      ],
      [
        -88.4649548783709,
        44.2933173131324
      ],
      [
        -88.4609760263365,
        44.296906649181
      ],
      [
        -88.4542601820711,
        44.2992656998319
      ],
      [
        -88.4432223126362,
        44.2992689314165
      ],
      [
        -88.4432223126362,
        44.2992689314165
      ]
    ]
  ]
}
```

Source:
Wisconsin
DOT

Wisconsin Lane Closure System (WisLCS) event 269767-4 and its associated WorkZoneRoadEvent geometry.

Work Zone Data Feed Example (Continued)

```
"properties": {
  "lanes": [
    {
      "type": "shoulder",
      "order": 1,
      "status": "closed"
    },
    {
      "type": "general",
      "order": 2,
      "status": "shift-right"
    },
    {
      "type": "general",
      "order": 3,
      "status": "shift-right"
    },
    {
      "type": "shoulder",
      "order": 4,
      "status": "closed"
    }
  ],
  "end_date": "2026-05-30T04:59:59+00:00",
  "start_date": "2026-03-02T11:00:00+00:00",
```

```
"core_details": {
  "name": "WisLCS-269767-4",
  "direction": "northbound",
  "event_type": "work-zone",
  "road_names": [
    "I-41 NB"
  ],
  "description": "Mainline Lane Shift on I-41 NB from OFF RAMP TO WIS 96 to COUNTY A (BRIDGE CROSSING)",
  "update_date": "2026-02-23T06:16:42.56+00:00",
  "creation_date": "2026-02-23T06:16:42.56+00:00",
  "data_source_id": "ATMS-ExtEvent"
},
"restrictions": [
  {
    "type": "reduced-width",
    "unit": "inches",
    "value": 300
  }
],
"vehicle_impact": "some-lanes-closed",
"location_method": "channel-device-method",
"is_end_date_verified": false,
"is_start_date_verified": false,
"reduced_speed_limit_kph": 96.53999999999999,
"is_end_position_verified": false,
"is_start_position_verified": false
}
```

Work Zone event properties corresponding to WisLCS event 269767-4



Estimated vs. Verified Fields

- Is Start/End Date Verified?
 - Indicates if work has been confirmed to have started/ended, such as from a person or field device
- Is Start/End Position Verified?
 - Indicates if the start/end position (first/last geometric coordinate pair) is based on actual reported data from a GPS-equipped device that measured the location of the start of the work zone



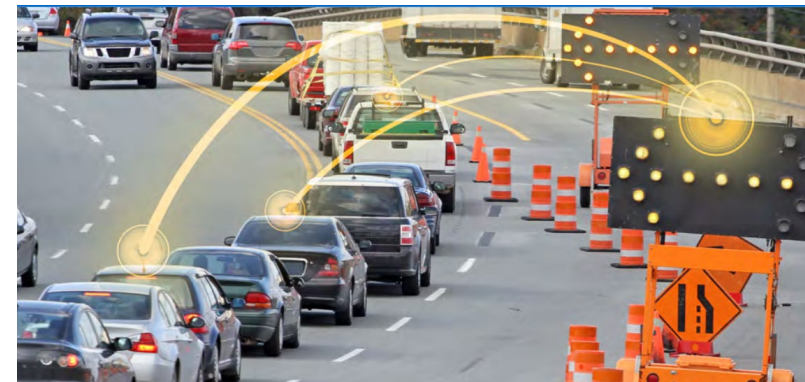
Source: Wisconsin DOT



Source: Wisconsin DOT



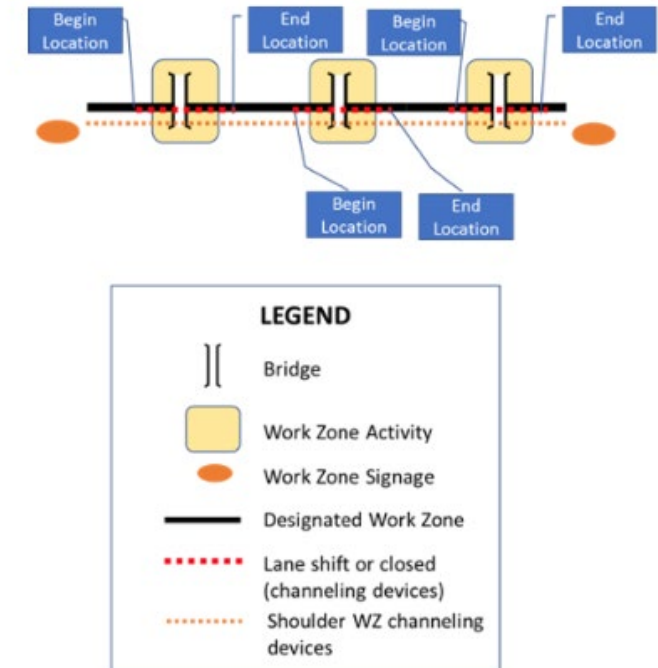
Source: Wisconsin DOT



Source: USDOT Preparing for the Future of Transportation:
Automated Vehicles 3.0

Additional Business Rules

- Event Segments Follow Attribute Changes
 - Per changes in overall location and/or time frame properties
 - Use of `related_road_event` to model related work zone events
 - First- and next-in-sequence – identifies separate segments
 - First- and next-in-occurrence – identifies recurring schedules
- WorkZoneRoadEvent Lanes
 - Lane details are optional, but they must follow standard business rules when they are included
 - Information for all lanes must be provided, regardless of status
 - Lane order must be provided, with 1 as the left-most lane
- UTC Date-Time Format Specification



Source: ITE CWZ Standard v1.00

Module 2 – Work Zone Feed

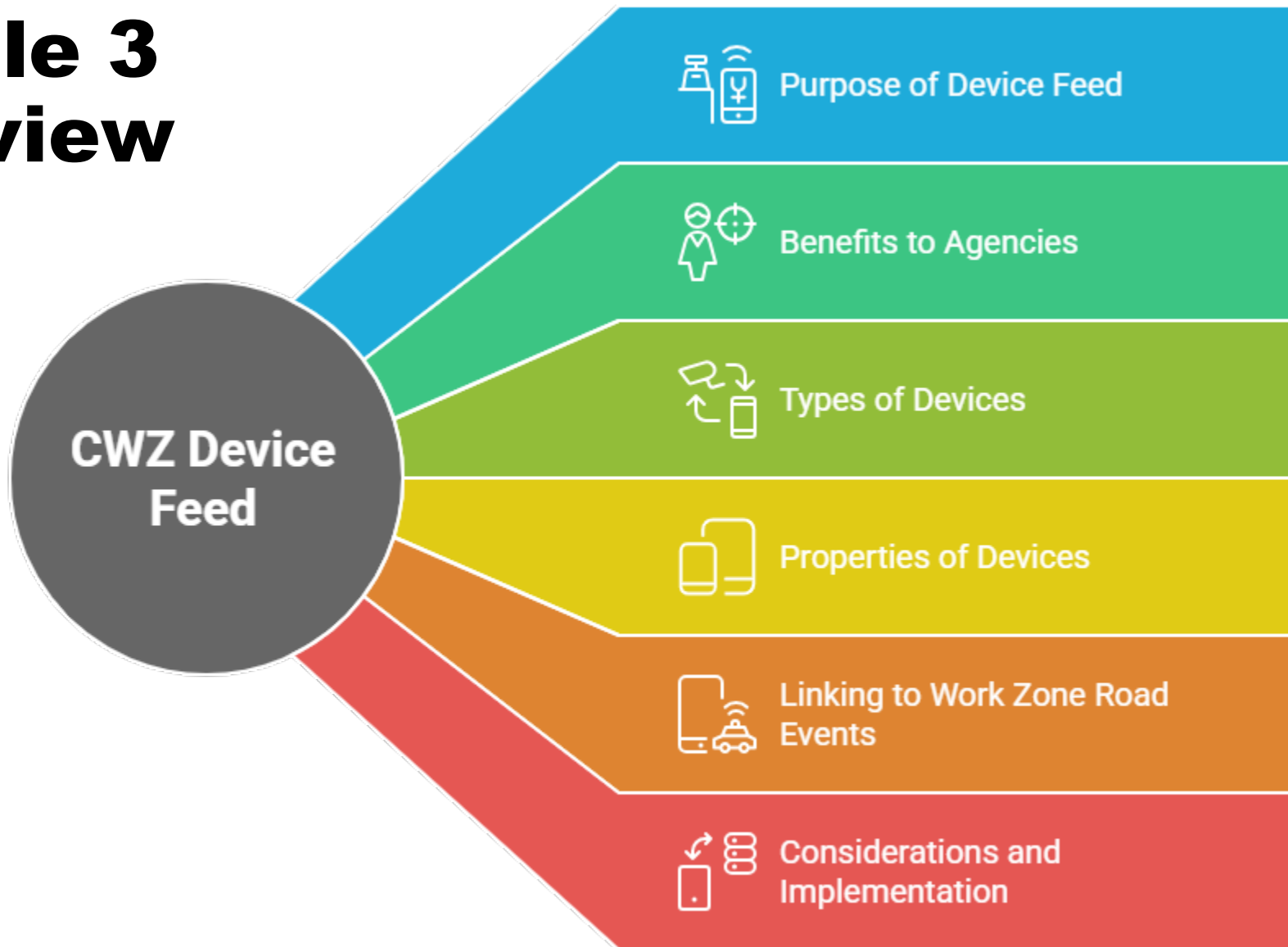
- Q & A
- Polling Questions

A photograph of a highway construction site. In the foreground, a line of orange and white striped traffic barrels is placed along the edge of the road. To the left, a portable lighting sign on a trailer is visible, featuring a grid of yellow lights and a 'W' logo. In the background, a speed limit sign for 55 is visible, and further back, a large truck and a car are driving on the highway. The scene is slightly hazy, suggesting a bright day.

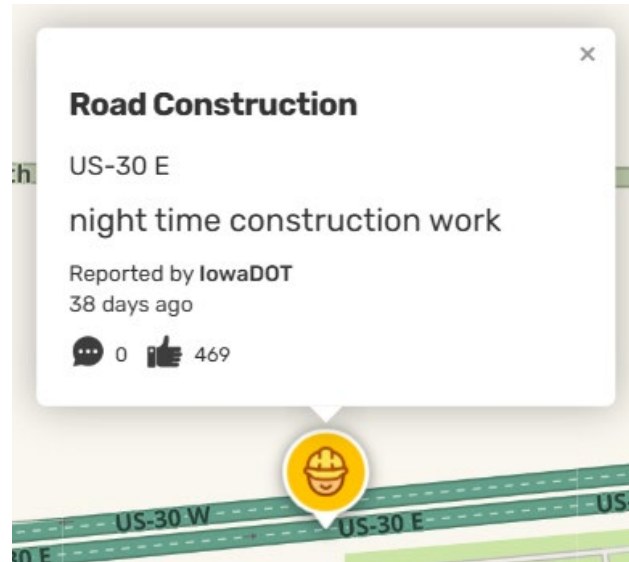
Module 3

Device Feed

Module 3 Overview



Moving towards connectivity...



- Improved data quality (time and location)
- Automating data updates
- Ability to share with public
- Work Zone confirmation

Sources: Iowa State University, Iowa DOT, Waze

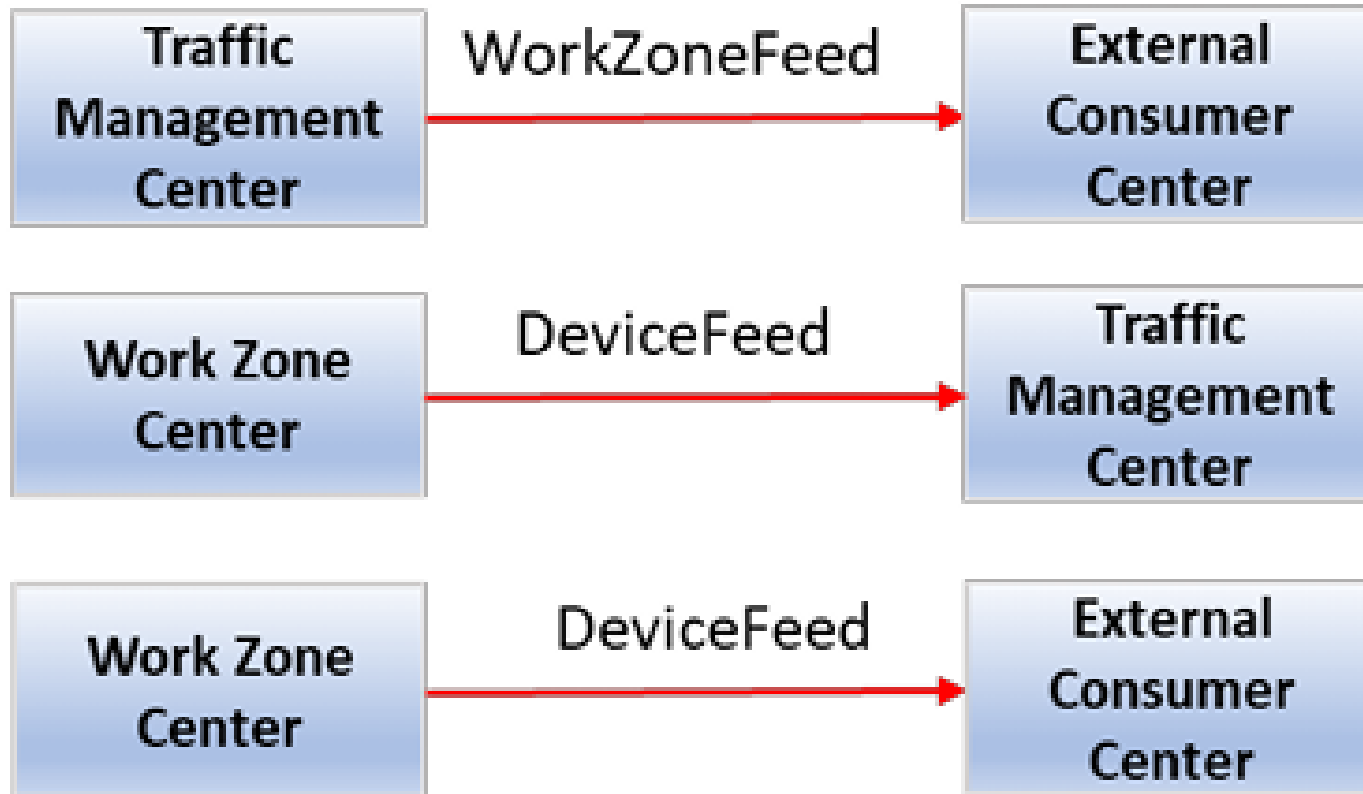


Device Feed Purpose

Provides information (location, status, dynamic data) about field devices deployed on the roadway in work zones

Device Feed Architecture

Work Zone Data Exchange



For IOOs:

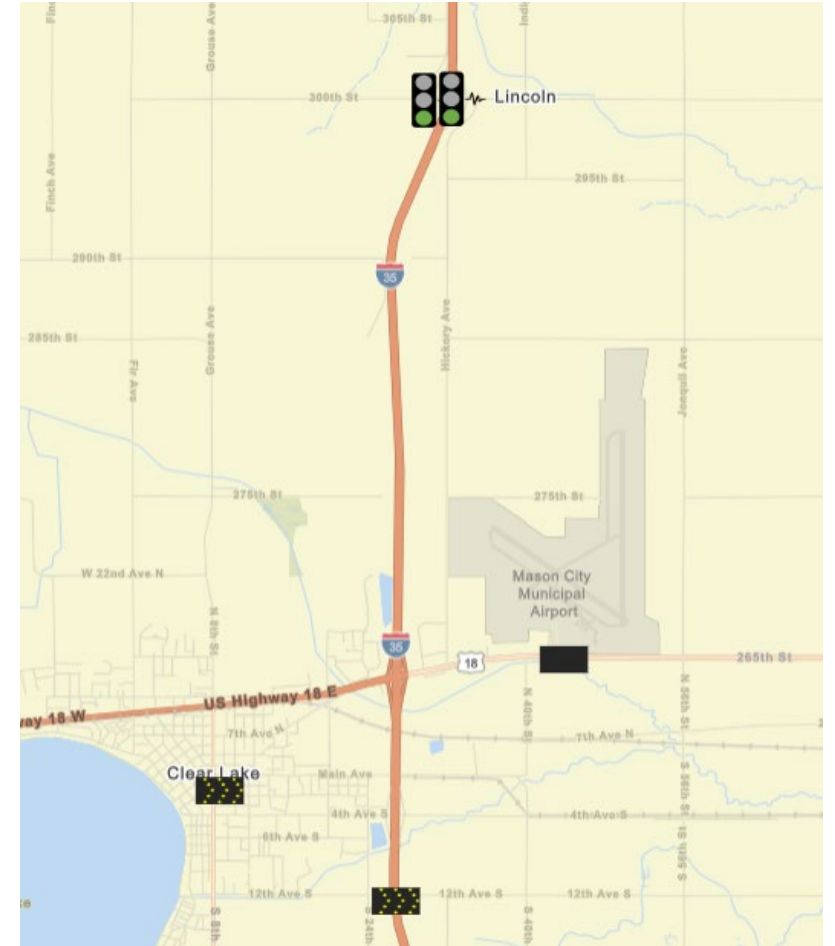
Communication from device manufactures to work zone management or similar systems

Polling used by IOOs to get updates on devices

<https://www.ite.org/technical-resources/standards/cwz/> (Figure 1)

Why do we need a Device Feed?

- Provides standardized way of integrating devices into management systems
- Primarily intended for devices owned by contractors (simplifies integration)
- Improves the accuracy of work zone locations
- Better situational awareness of work zone



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Device Feed Limitations

- View only purposes
- No ability to control devices



Source: Iowa State University



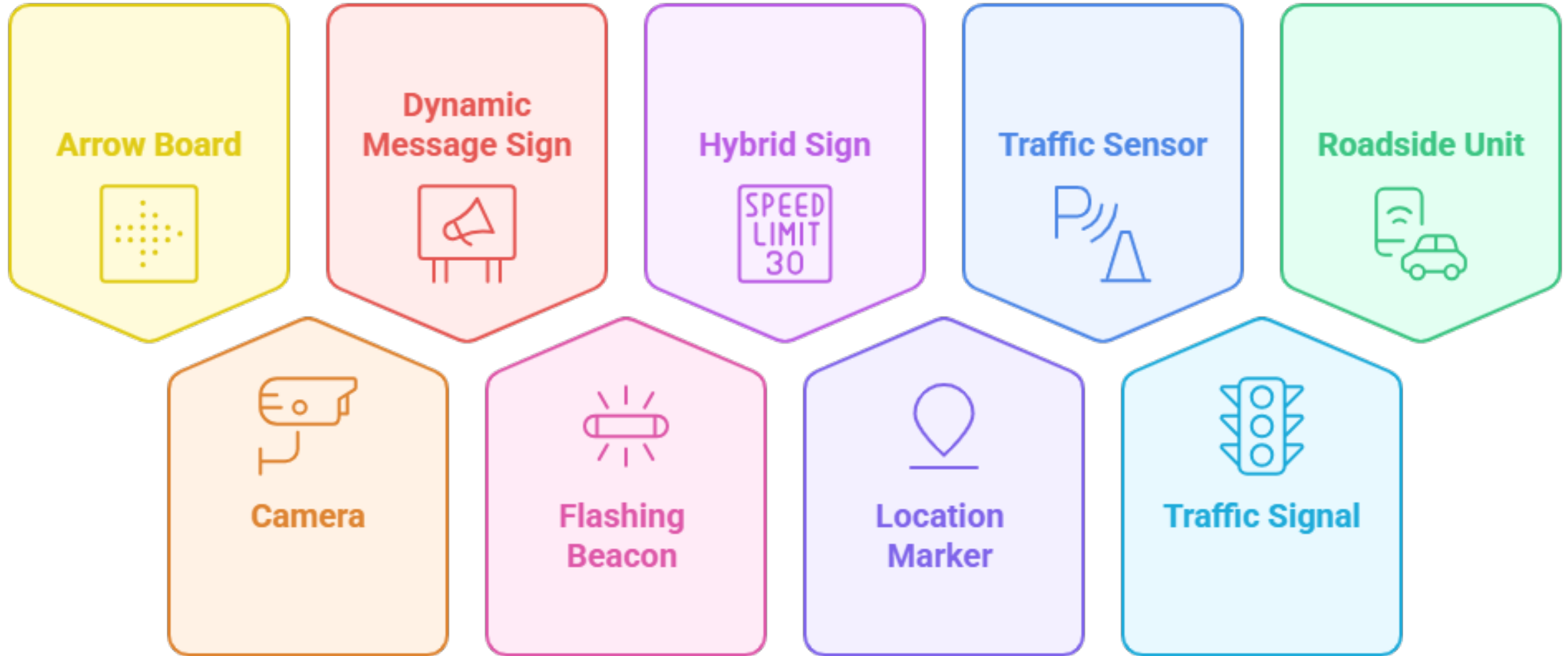
Source: Iowa State University



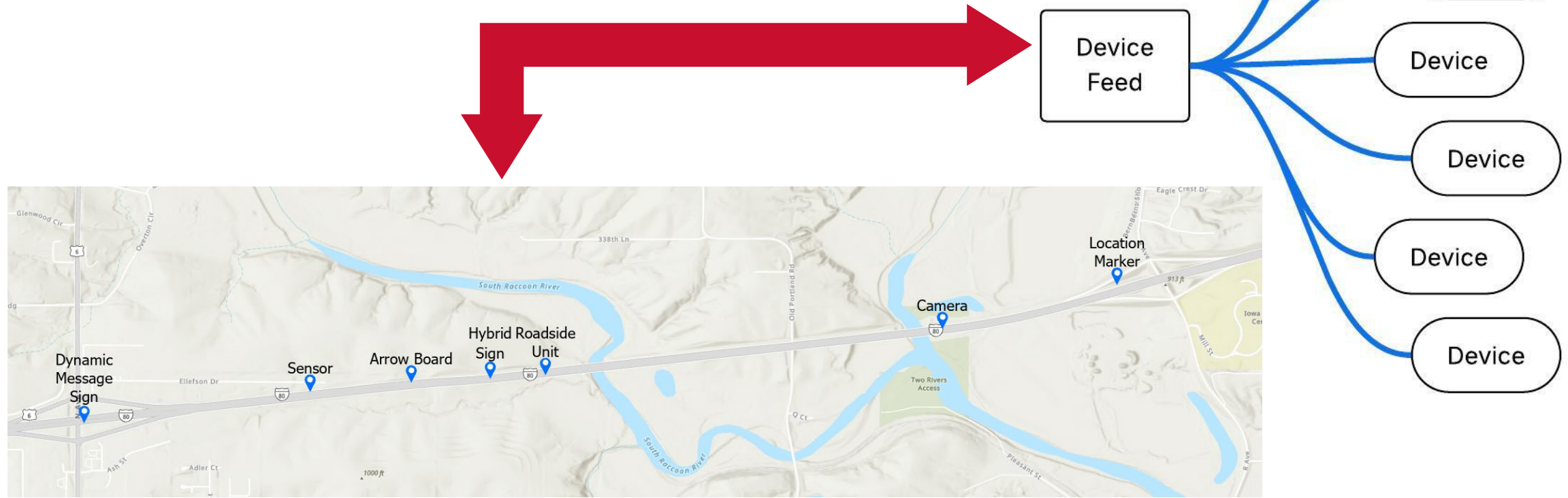
Source: Iowa DOT



Types of Devices



Device Feed Contains Array of Devices



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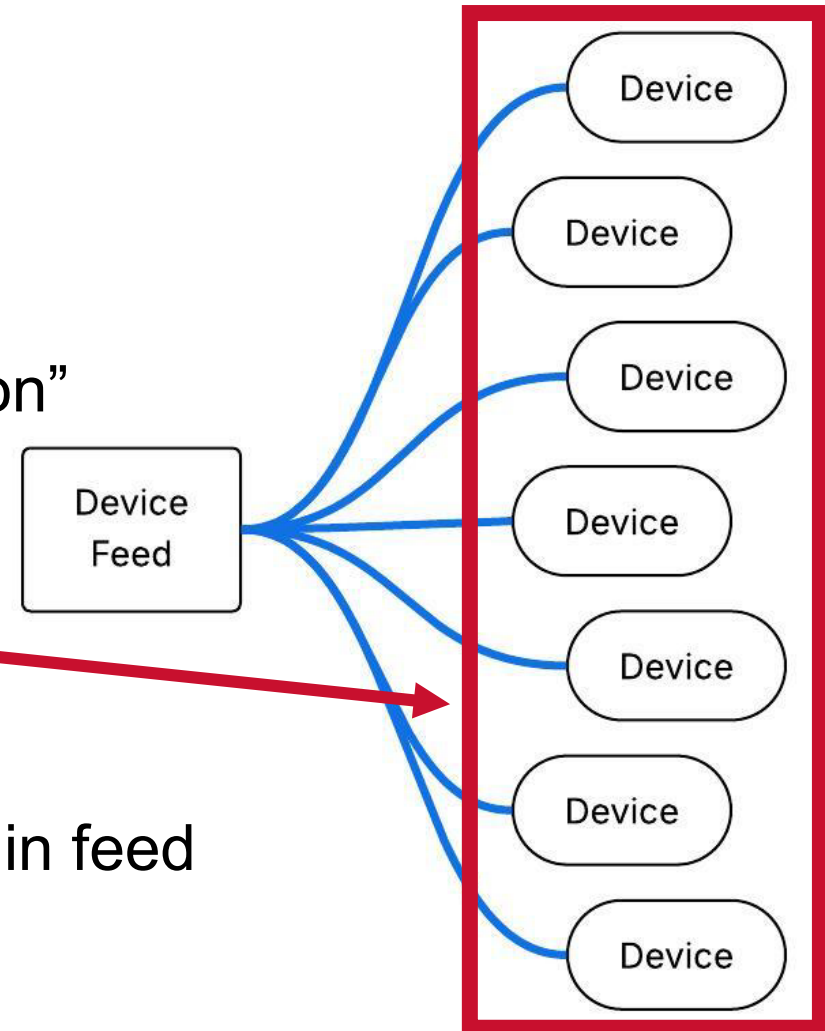
Contents of Device Feed

feed_info → Information about the feed
(similar to work zone feed_info)

type → Value must be "FeatureCollection"

features → Array of field devices

bbox → Coordinate range of all devices in feed



Contents of 'features'

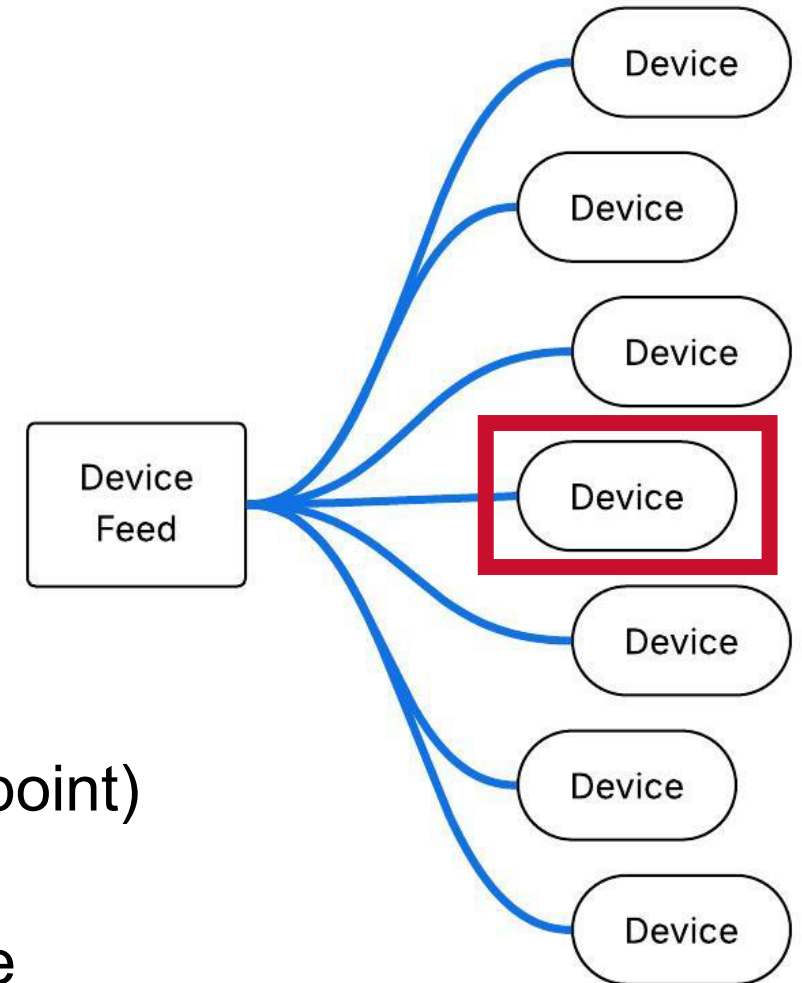
id → Unique identifier which is a UUID

type → Value must be "Feature"

properties → Details of field device

geometry → Geometry of field device (must be point)

bbox → Coordinate range of the field device





Contents of ‘properties’

Contents vary based on type of device

Core Details

Type of Device
Specific Elements



Core Details

device_type

data_source_id

device_status

update_date

has_automatic_location

road_direction

road_names

name

description

status_messages

is_moving

road_event_ids

project_id

reference_post

reference_post_unit

make

model

serial_number

firmware_version

is_in_transport_position



Contents of ‘properties’

Type of Device Specific Elements

Arrow Board
core_details
pattern

Dynamic Message Sign
core_details
message_multi_string

Flashing Beacon
core_details
function
is_flashing
sign_text

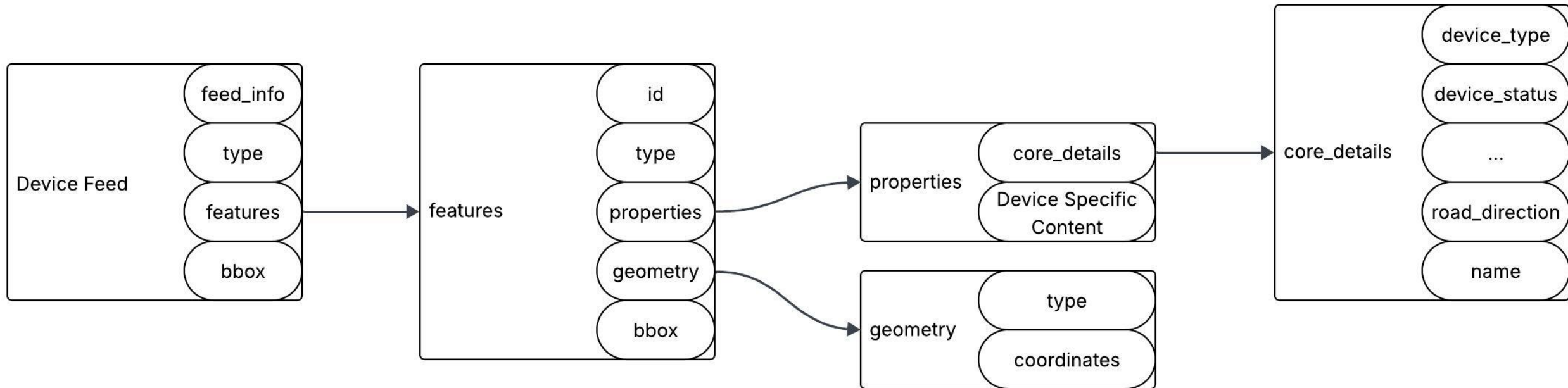
Traffic Sensor
core_details
collection_interval_start_date
collection_interval_end_date
average_speed_kph
volume_vph
occupancy_percent
lane_data

Camera
core_details
image_url
is_image_url_public
image_timestamp
video_url
is_video_url_public
video_update_frequency

Roadside Units
core_details
message_types



Bringing it all together



Arrow Board

```
{
  "feed_info": {
    "update_date": "2021-12-06T15:00:00Z",
    "publisher": "TestVendor",
    "contact_name": "Robert Vendor",
    "contact_email": "robert.vendor@testvendor.com",
    "update_frequency": 60,
    "version": "4.2",
    "license": "https://creativecommons.org/publicdomain/zero/1.0/",
    "data_sources": [
      {
        "data_source_id": "ff55b721-bd18-4c21-8ad7-1b31fdddd876",
        "organization_name": "Test Vendor Inc.",
        "contact_name": "Timmy Testor",
        "contact_email": "timmy.testor@testvendor.com",
        "update_frequency": 60,
        "update_date": "2021-12-06T14:54:12Z"
      }
    ]
  },
  "type": "FeatureCollection",
  "features": [
    {
      "id": "280258a2-d131-4d8d-b5a7-2cef813b25a8",
      "type": "Feature",
      "properties": {
        "core_details": {
          "device_type": "arrow-board",
          "data_source_id": "ff55b721-bd18-4c21-8ad7-1b31fdddd876",
          "road_names": [
            "I-80",
            "I-35"
          ],
          "device_status": "ok",
          "has_automatic_location": true,
          "road_direction": "northbound",
          "name": "Arrow Board 1",
          "is_moving": false,
          "update_date": "2021-12-06T14:54:12Z",
          "is_in_transport_position": false
        },
        "pattern": "right-arrow-flashing"
      },
      "geometry": {
        "type": "Point",
        "coordinates": [
          -93.776684050999961,
          41.617961698000045
        ]
      }
    }
  ]
}
```

Camera

```
{
  "feed_info": {
    "update_date": "2021-12-06T15:00:00Z",
    "publisher": "TestVendor",
    "contact_name": "Robert Vendor",
    "contact_email": "robert.vendor@testvendor.com",
    "update_frequency": 60,
    "version": "4.2",
    "license": "https://creativecommons.org/publicdomain/zero/1.0/",
    "data_sources": [
      {
        "data_source_id": "ff55b721-bd18-4c21-8ad7-1b31fdddd876",
        "organization_name": "Test Vendor Inc.",
        "contact_name": "Timmy Testor",
        "contact_email": "timmy.testor@testvendor.com",
        "update_frequency": 60,
        "update_date": "2021-12-06T14:54:12Z"
      }
    ]
  },
  "type": "FeatureCollection",
  "features": [
    {
      "id": "f18dd2ab-6f1a-4039-8012-54c677be18ab",
      "type": "Feature",
      "properties": {
        "core_details": {
          "device_type": "camera",
          "data_source_id": "ff55b721-bd18-4c21-8ad7-1b31fdddd876",
          "road_names": [
            "US-1",
            "I-295",
            "ME-26"
          ],
          "device_status": "error",
          "has_automatic_location": true,
          "road_direction": "northbound",
          "status_messages": [
            "Failed to capture image."
          ],
          "name": "Tukey's Bridge North CCTV",
          "update_date": "2021-12-06T14:54:12Z",
          "is_moving": false
        },
        "image_url": "https://exampledevice.org/BridgeNorth.jpg",
        "is_image_url_public": true
      },
      "geometry": {
        "type": "Point",
        "coordinates": [
          -70.25631689267998,
          43.676800032123545
        ]
      }
    }
  ]
}
```



Linking Devices to Work Zones

Within core details

road_event_ids

Array which allows for associating to multiple work zones

Associated to road_event in work zone feed



Feed Info

Feed Details

- Feed Version
- Time feed updated
- Frequency of updates
- License
- Data Sources

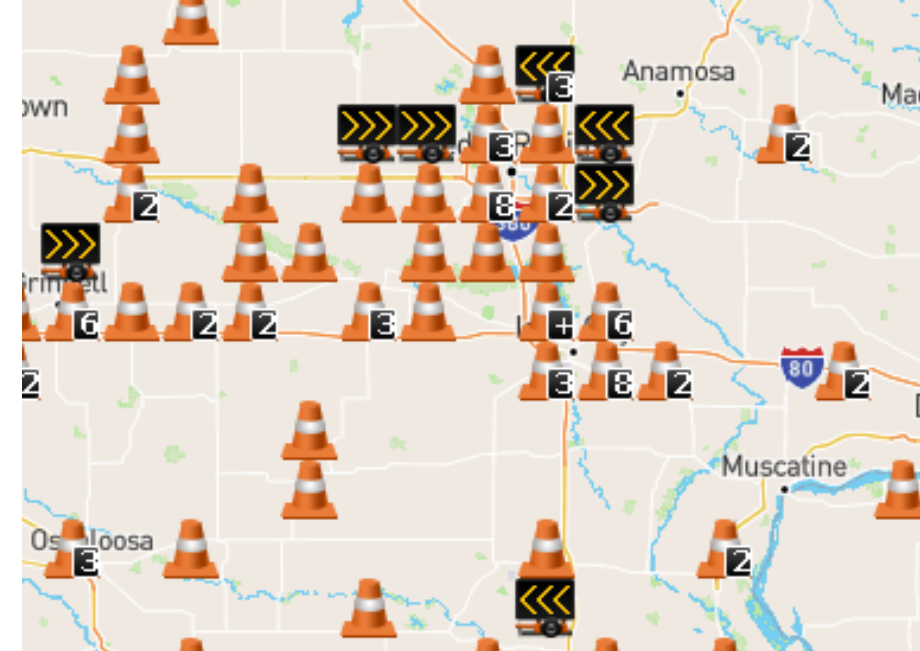
Device Contact Information

- Multiple Data Sources Listed
- Device Owner
- Device Contact Information
- Data Source Update Time
- Data Source Update Frequency

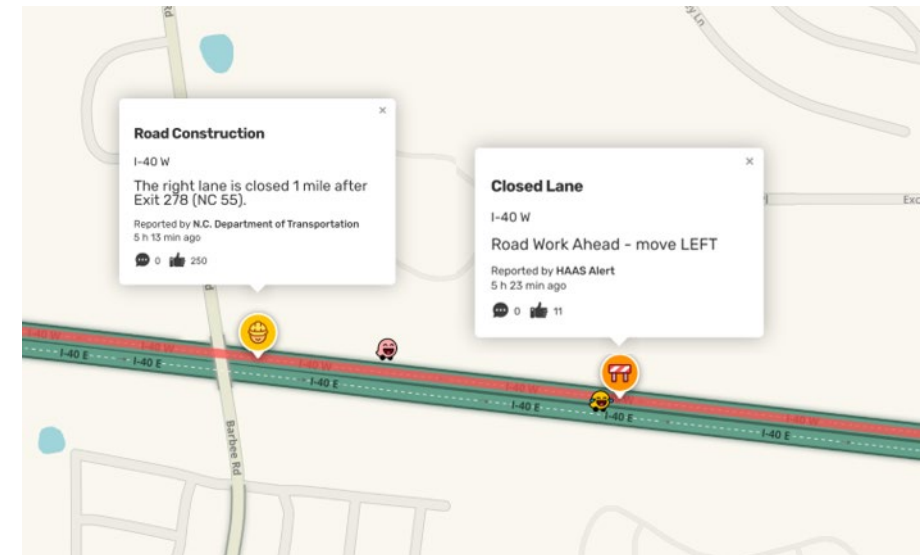
Limited use to date but could expand to contractor or project manager contact information

Considerations

- Device Feed only provides format
 - Need to coordinate with manufacturer on update frequency, device testing, etc.
- Need for methods of associating devices to work zones
 - Automated preferred vs manual
- Work zones can then be updated with location and changed to “verified”
- Coordination needed with manufacturers on sharing with public



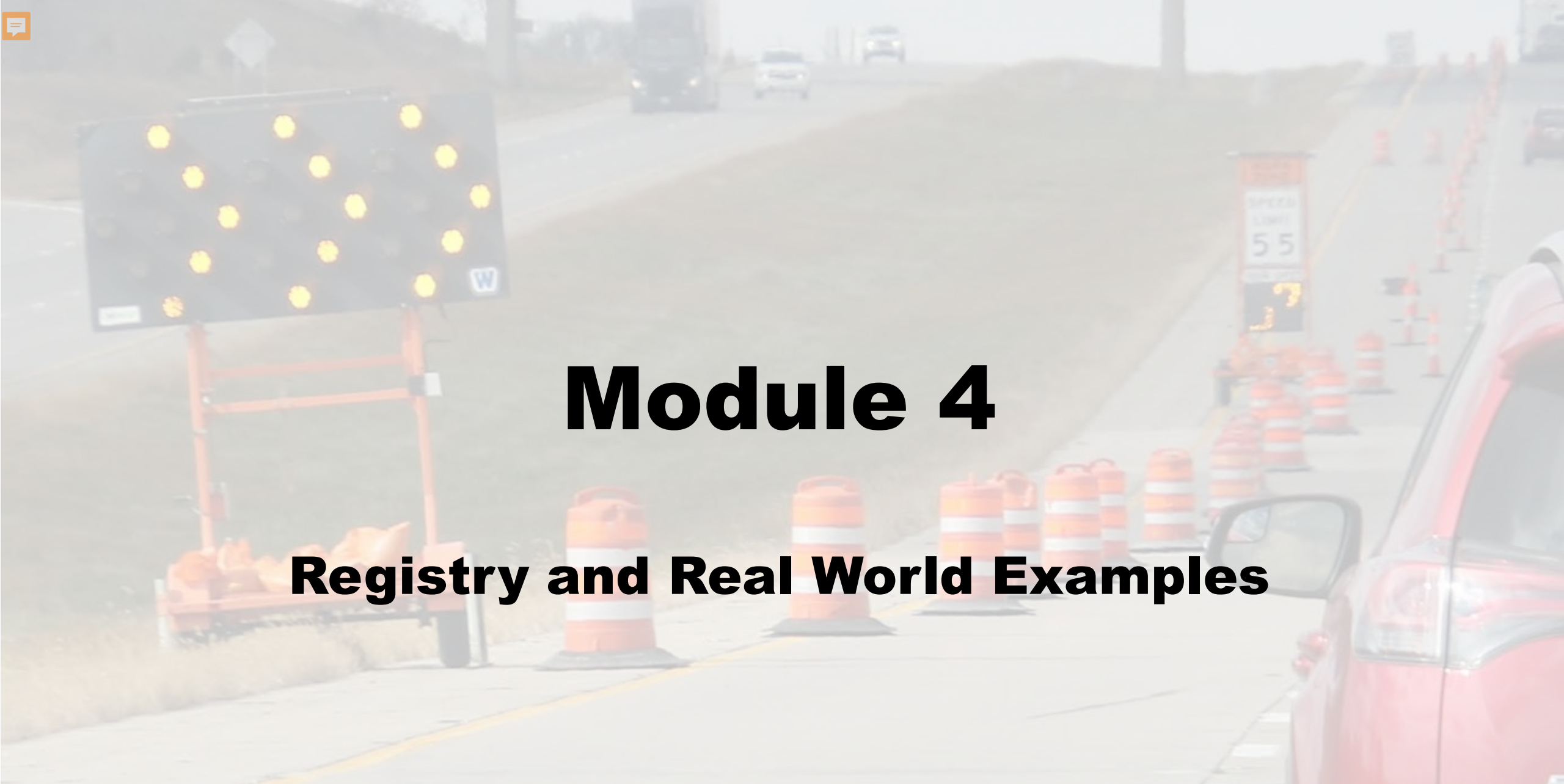
Source: Q-Free



Source: Waze

Module 3 – Device Feed

- Q & A
- Polling Questions



Module 4

Registry and Real World Examples



WZDx Registry

- Register data feeds with US DOT
- Allows for common location to access other agencies feeds and broader distribution

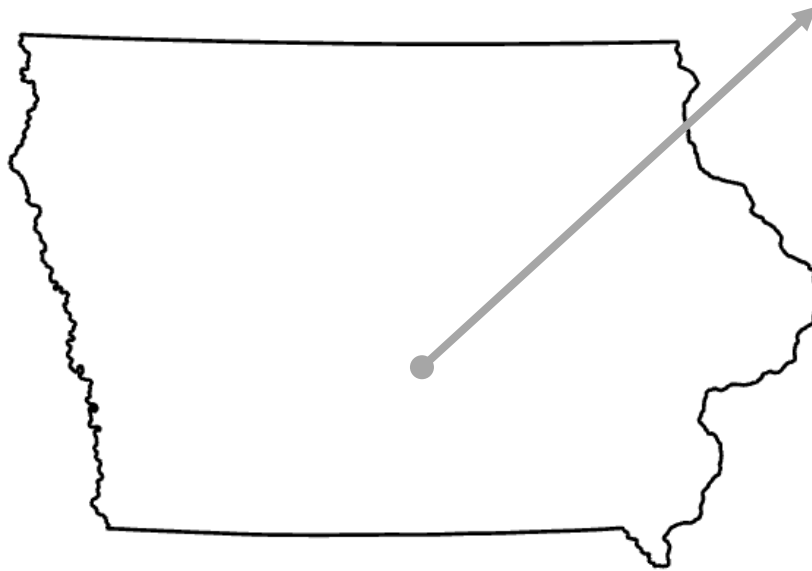
Work Zone Data Exchange (WZDx) Feed Registry							
state	issuingOrganization	feedName	url	format	active 	Dataf...	version 
colorado	Colorado DOT	cdot	https://data.cotrip.org/api/v1/wzdx?apiKey=	geojson	True	5m	4.2
florida	Florida DOT	fldot	https://us-datacloud.one.network/fdot/feed.json?app_ke	geojson	True	4m	4.2
arizona	Maricopa County DOT	mcdot	https://wzdxapi.aztech.org/construction	geojson	True	1m	4.2
texas	Texas DOT	txdot_v4_2	https://api.drivetexas.org/api/conditions.wzdx.geojson?k	geojson	True	5m	4.2
washington	Washington State DOT	wsdot	https://wzdx.wsdot.wa.gov/api/v4/WorkZoneFeed	geojson	True	1m	4.2
texas	City of Austin	austin	https://data.austintexas.gov/download/d9mm-cjw9	geojson	True	60m	4.2



Example Implementations of CWZ/WZDx

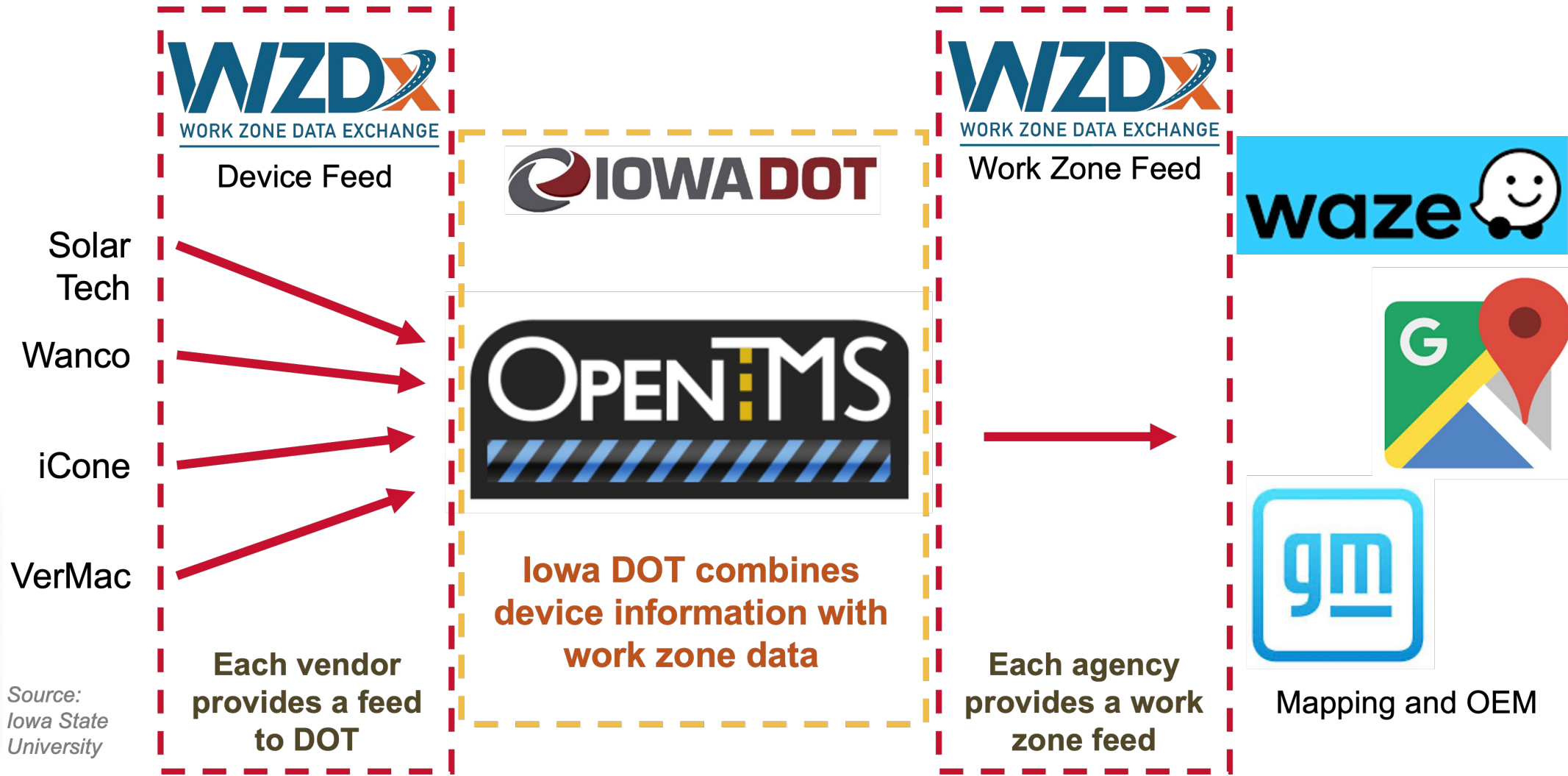


Source: Iowa State University



Source: Iowa State University

Iowa Example





WZDx + Smart Arrow Boards

OPEN:MS

Map Manage Devices More sknick@iastate.edu

Planned Events > Events > D1[C] - Jefferson - US-30 EB/WB @ MM152

Active

Details Timing & Recurrences Detours 511 Resource Plans Activity Logs Attachments

NAME AND TYPE

Name *
D1[C] - Jefferson - US-30 EB/WB @ MM152

Home Group *
STATEWIDE

Type *
Construction Work

Additional Public Details:
☒ Impacts both directions

LOCATION

Region
STATEWIDE

Road Type *
Primary

District *
DISTRICT 1

Road Name *
US-30E

Jurisdiction *
STORY (COUNTY)

Direction *
East

Patrol Route

MM(0 - 332.8) *
151.7

Landmark *
[SF] 30E-151.7, MM: 151.7

MM(0 - 332.8) *
154.5

Landmark *
[SF] 30E-154.5, MM:

Smart Arrow Board

IMPACT

Eastbound

Shoulder
Roth

EAST

☐ Mobile
☐ Police Involvement
☐ Oversize Load Restriction
☐ Ramp Restriction

POINTS OF CONTACT

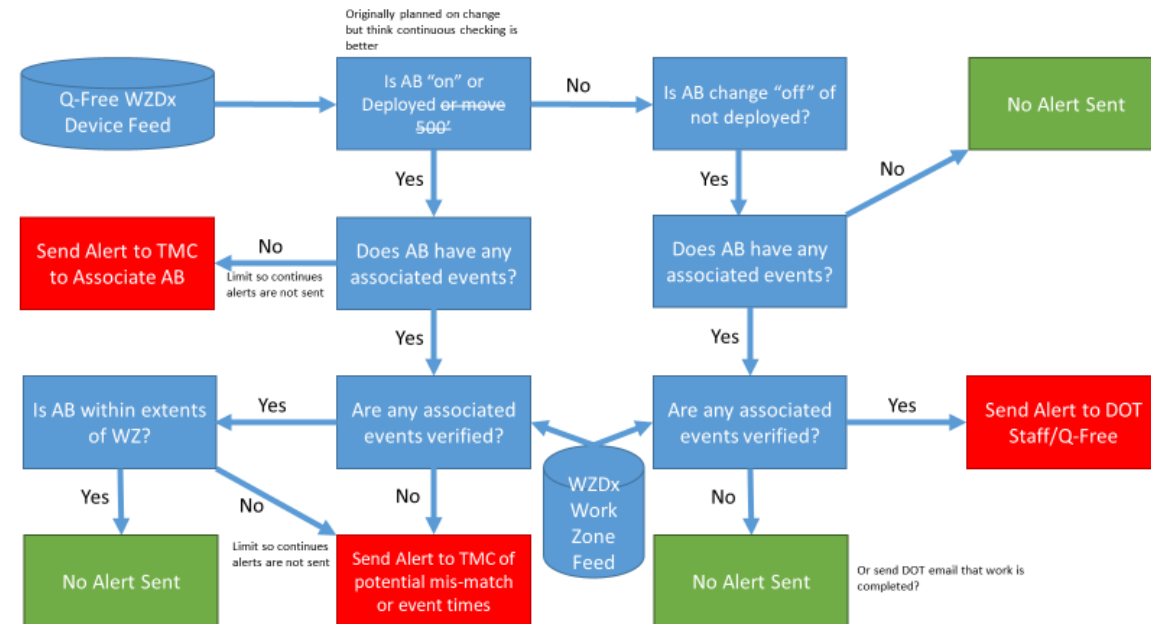
Contact Details

Assign Contacts
Click "+" to add contacts.

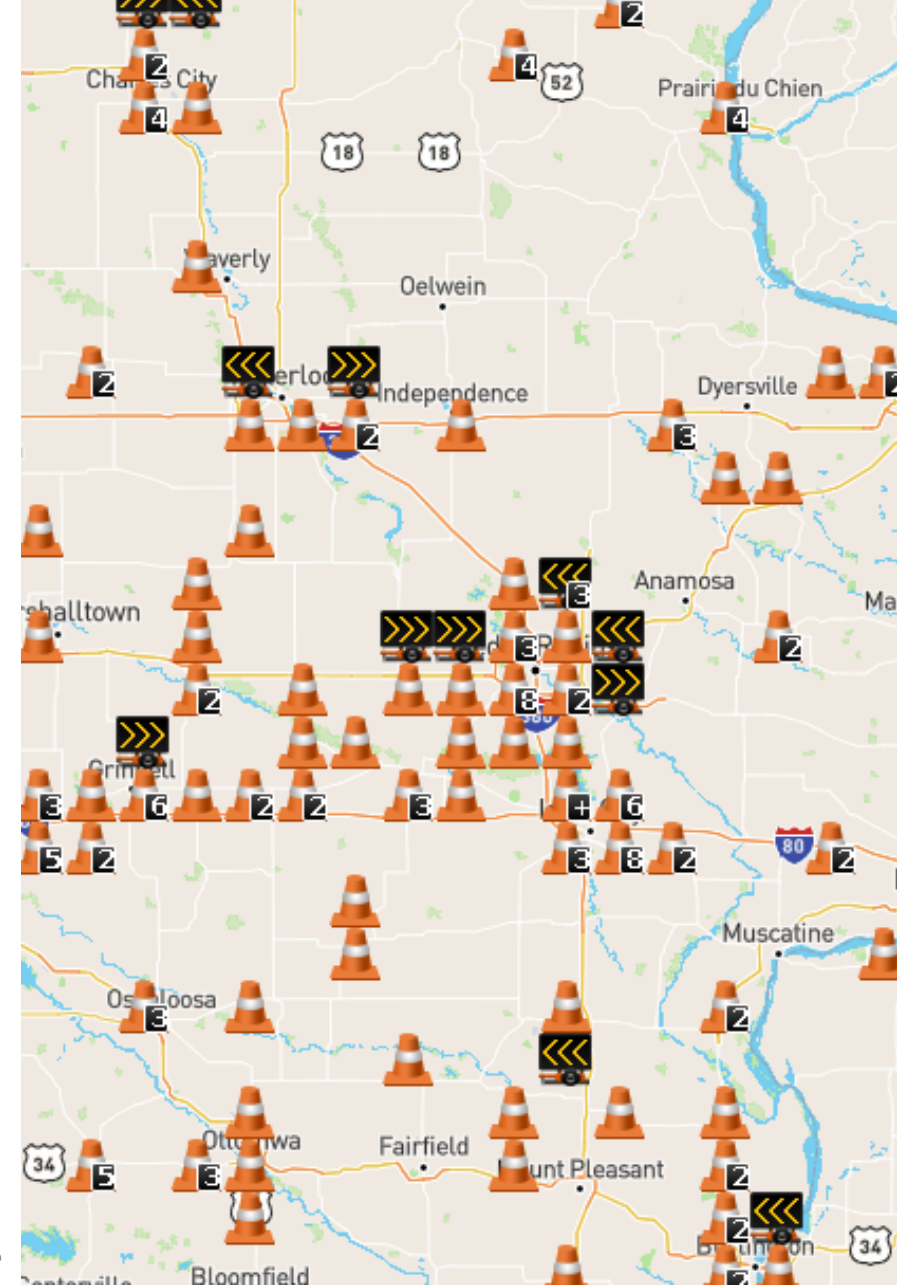
Source: Iowa DOT

Alerting System

- Arrow boards manually assigned
- Need for alerts for assigning



Source: Q-Free

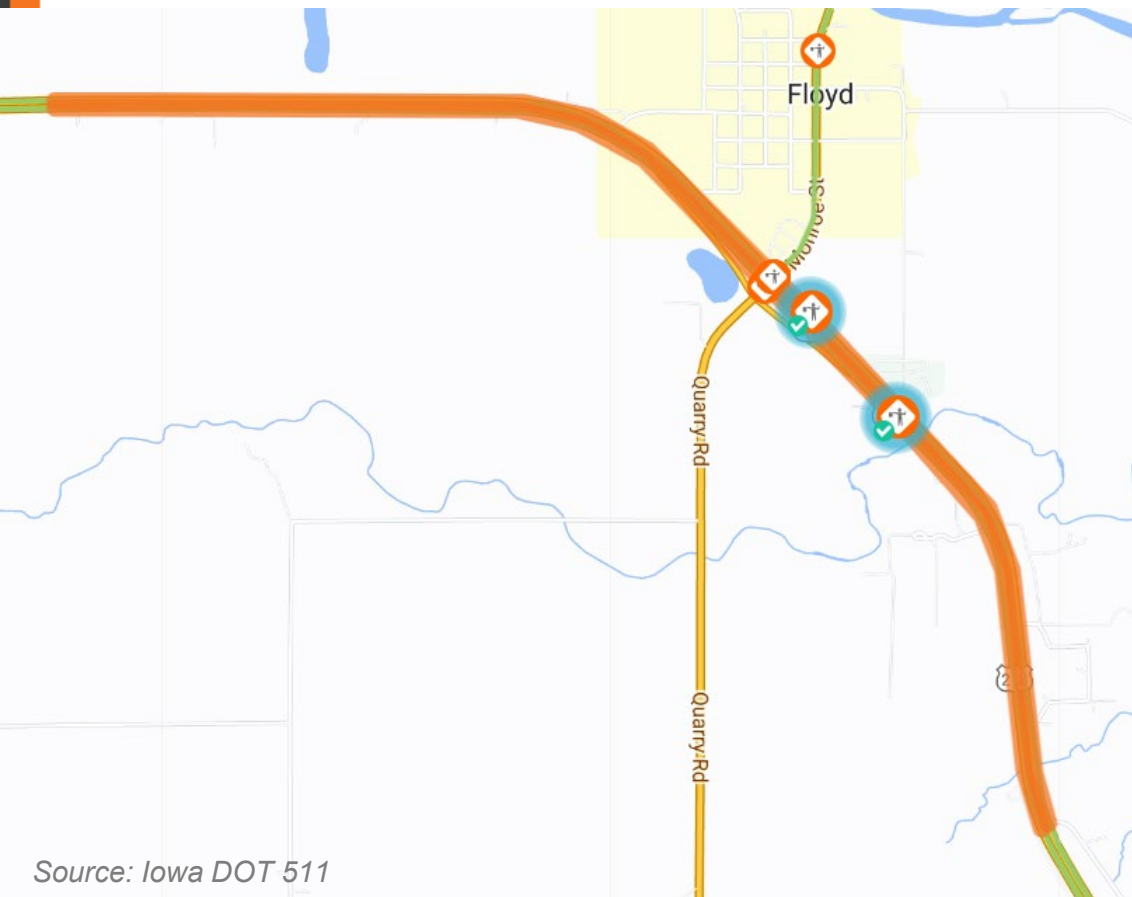




US 18 in both directions: Road construction.

Updated September 13 by [Iowa DOT](#)

Verified by smart device ?



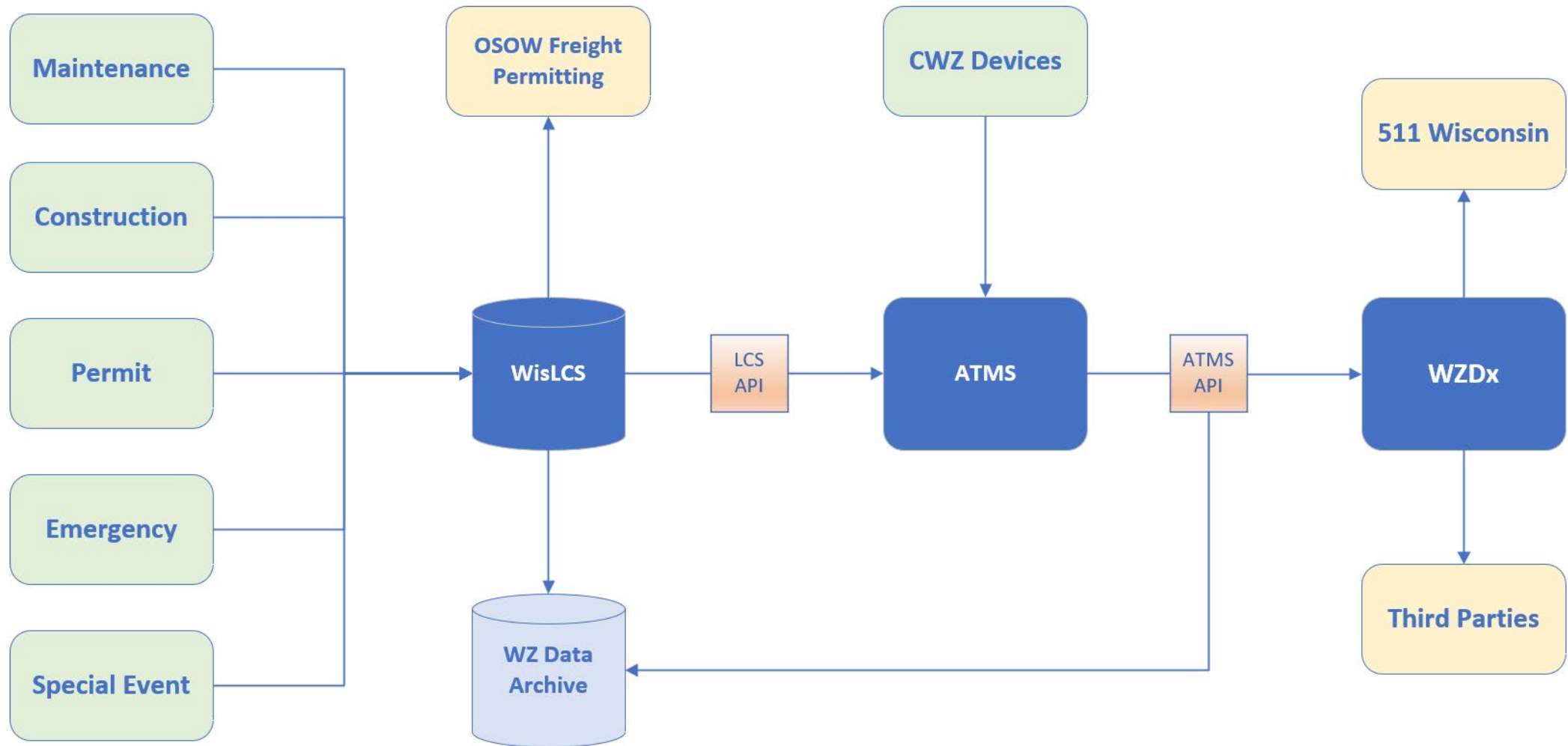
Source: Iowa DOT 511

Verified Work Zones



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modifications by
Iowa State

Wisconsin Example

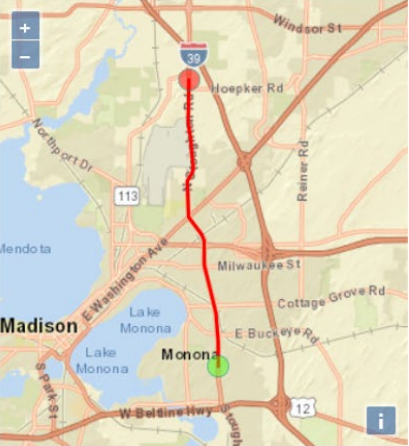


Source: University of Wisconsin-Madison

WisLCS 2.0 Upgrade

[Add/Edit Location](#)

Begin County:	DANE ✓	Hwy:	US 51 NB ✓
End County:	DANE ✓		
Begin Location:	PFLAUM RD ✓	End Location:	HOEPKER RD ✓
Distance From:	0.05 ✓	Distance From:	0.25 ✓
Direction From:	Upstream ✓	Direction From:	Downstream ✓
Latitude:	43.061361025 ✓	Latitude:	43.167900431 ✓
Longitude:	-89.309528910 ✓	Longitude:	-89.324686781 ✓
Closure Length:	7.59 miles		



Left Shldr	Lane	Lane	Right Aux	Right Shldr
				
Closed	Closed	Open	Open	Open

Source: Wisconsin DOT

Pick Closure Dates ?

Duration Type:

Daily ✓

Closure Begin & End Time:

Start:

09:00 AM ✓

End:

02:30 PM ✓

Calendar:

Selected: 10/24/2024 to 11/28/2024 (25 Days)

OCTOBER 2024							NOVEMBER 2024						
SU	MO	TU	WE	TH	FR	SA	SU	MO	TU	WE	TH	FR	SA
												1	2
6	7	8	9	10	11	12	3	4	5	6	7	8	9
13	14	15	16	17	18	19	10	11	12	13	14	15	16
20	21	22	23	24	25	26	17	18	19	20	21	22	23
27	28	29	30	31			24	25	26	27	28	29	30

Bulk Exclude:

- ☒ Sunday
- ☐ Monday
- ☐ Tuesday
- ☐ Wednesday
- ☐ Thursday
- ☐ Friday
- ☒ Saturday

Exclude Dates Begin & End Time

11/27/2024:

12:00 AM

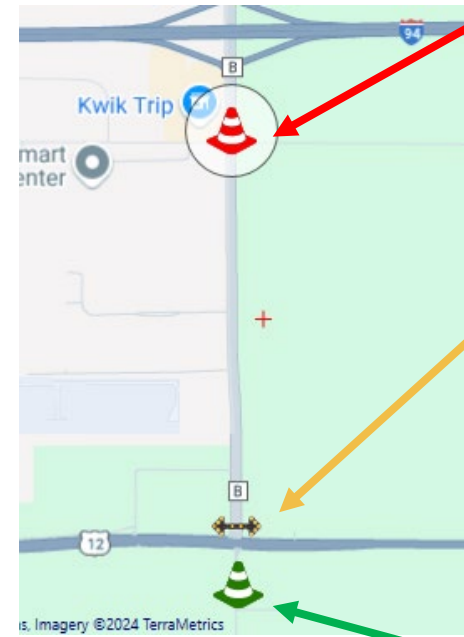
11:59 PM

Enter Comment

Click on individual calendar dates to exclude them

Wisconsin CWZ Devices

- Connected Arrow Board
 - Provide verified Start Time/End Time
 - Lane closure confirmation
- Connected Work Zone Start/End Location Markers
 - Provide verified work zone limits



Source: Wisconsin DOT

Linking CWZ Devices to Closures in Wisconsin ATMS

The screenshot displays two side-by-side windows from the Wisconsin ATMS interface. The left window, titled 'Connected Work Zone Device - Sold 2SGUS2118SS000358', shows device details: Name (Sold 2SGUS2118SS000358), Type (Arrow Board), Update Time (10:09), Description, Status (OK), and Pattern (Left Arrow Flashing). Below this is a map titled 'Location and Linked Work Zone' showing the device's location on W Glenbrook Rd near Northridge Lakes. A table at the bottom lists the linked work zone.

Work Zone	Cause	Start Date	End Date	Association	Actions
WisLCS - 20075	utility-work	10/02/2025 07:00	10/31/2025 17:00	Automatic	Link Close

The right window, titled 'WisLCS Event Details - 20075', shows event details: ID (266923-2), Status (Accepted), and Last Updated (09/29/2025 08:51). It includes tabs for Event Details, Restrictions, Project Details, and Work Zone Devices. The 'Event Details' tab is active, showing Cause (utility-work), Description (Mainline Right Lane Closed on WIS 181 SB from NORTHRIDGE LAKE BLVD to OFF RAMP TO WIS 100), Schedule (Start Time: 10/02/2025 07:00, End Time: 10/31/2025 17:00), and Location (Begin Roadway: WIS 181 SB (9.48), End Roadway: WIS 181 SB (9.77)). A map at the bottom shows the event location on WIS 181 SB near Northridge Lakes.

Source:
Wisconsin DOT

CWZ Device Verified Closures in Wisconsin 511

Roadwork

Roadwork - Mainline Right Lane Closed on WIS 181 SB from NORTHRIDGE LAKE BLVD to OFF RAMP TO WIS 100
Last Updated 9/29/25, 8:55 AM.

County	Milwaukee
Type	Roadwork
Start / Expected End Time	10/3/25, 8:09 AM 10/31/25, 5:00 PM

[f](#) [X](#)

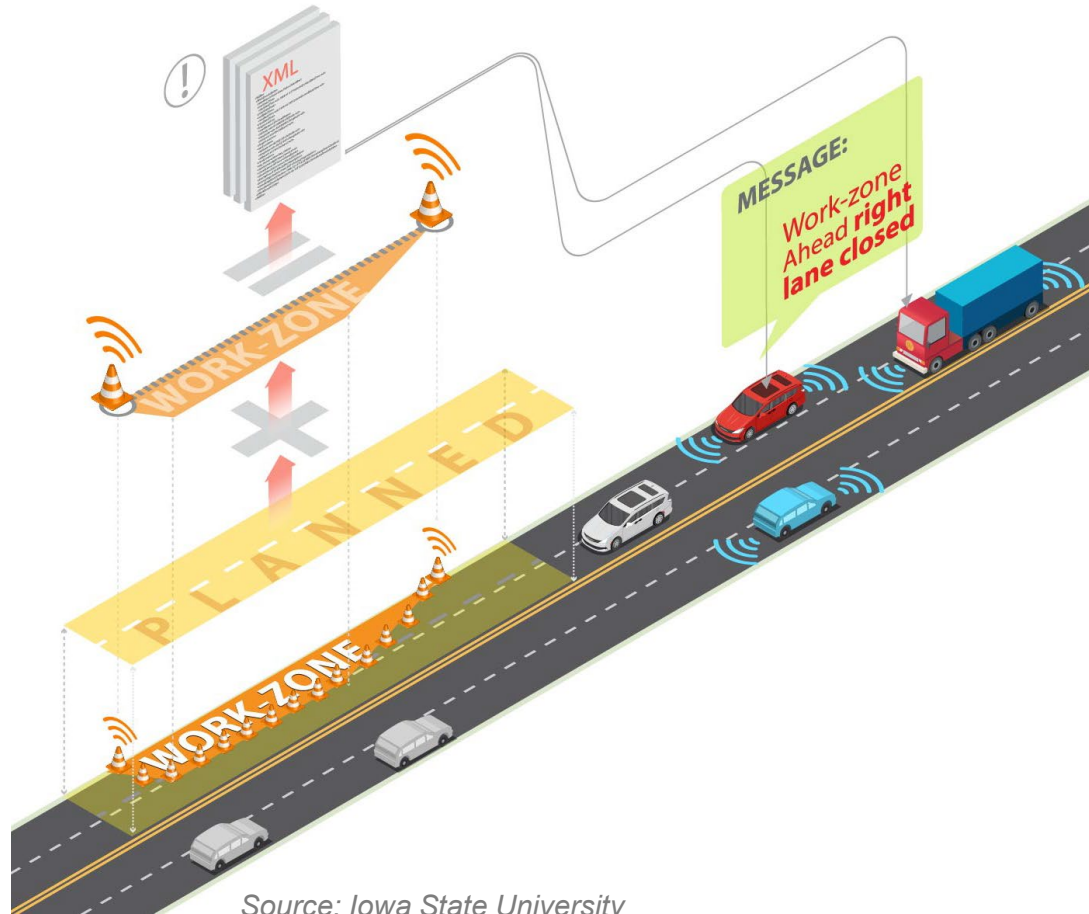
- ☐ Cameras
- ☐ Incidents
- ☒ Roadwork
- ☒ Verified by Connected Device ?
- ☐ Closures
- ☐ Special Events
- ☐ Closures
- ☐ Flex Lanes
- ☐ Message Signs
- ☐ Park & Ride
- ☐ Safety Rest Areas
- ☐ Weather Radar

Source: Wisconsin DOT



Why CWZ?

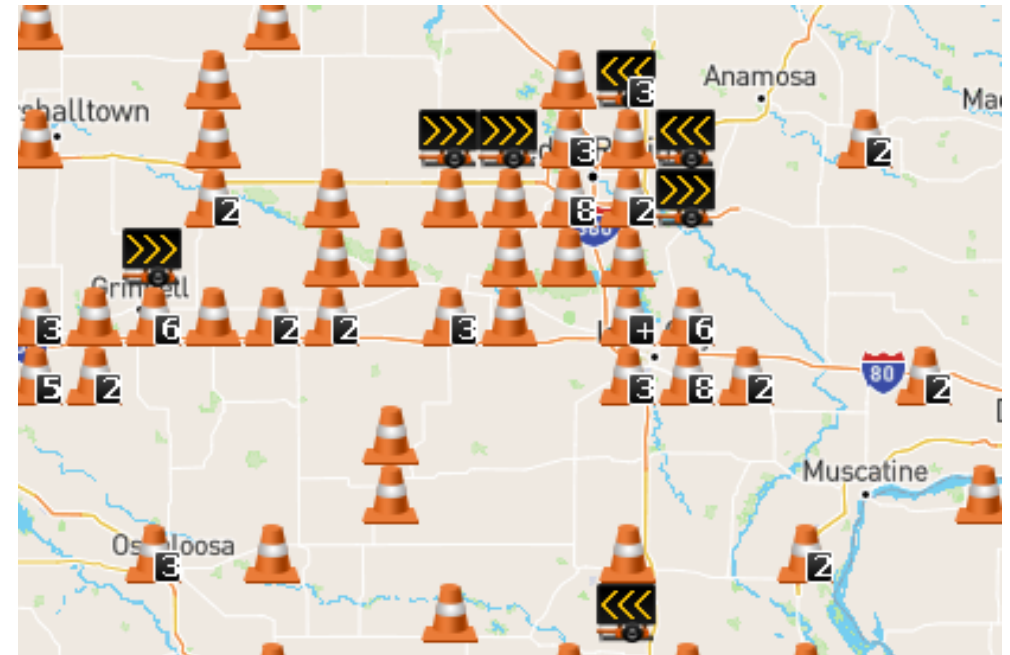
Making the case for CWZ (Work Zone)



- Authoritative and Unifying
- Alerting Motorist of Work Zones
- Convey Confidence in Quality of Data
- Enable Data-Driven Work Zone Management

Making the case for CWZ (Devices)

- Efficient Integration and Sharing of Device Data
- Standard Method of Using Data within Agency
- Larger Scale Deployment of Connected Devices
- Improved Accuracy of Work Zones Data Feeds



Source: Iowa DOT and Q-Free

Module 4 – Making the Case for CWZ

- Q & A
- Polling Questions

Coming Soon: CWZ 201 Training

Training focused on enabling accurate, reliable, and scalable CWZ/WZDx deployments through strong data management, device integration, governance practices, and proven implementation strategies

Training Dates

Wednesday, July 15th, 1:00 – 2:30 PM ET

Wednesday, August 12th, 1:00 – 2:30 PM ET

Wednesday, October 14th, 1:00 – 2:30 PM ET



<https://topslab.wisc.edu/training/>