WZDx & ITS JPO Data Exchange Development

FHWA Connected Work Zones Peer Exchange
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Mark Mockett
Engineer
Volpe Center
U.S. Department of Transportation

Murat Omay
Program Manager, Data Access and Exchanges
ITS Joint Program Office
U.S. Department of Transportation
Timeline

- Work Zone Data Exchange (WZDx) development begins 2018
- WZDx Demonstration grants awarded 2021
- WZDx development transitioned to Connected Work Zone Standard under ITE and AASHTO 2022
- Managing Disruptions data specification development begins 2022
- Development of additional data feeds continues 2022-2026
Scope of Data Exchanges

WZDx includes:
• Work zones
• Devices in work zones

Managing Disruptions will include:
• Incidents
• Weather
• Emergency Response
• Special Events
• Evacuation Routes
• More
WZDx Coverage

WZDx Activity
As of November 2022

Feed Registry can be accessed at: https://www.transportation.gov/standards/vehicle-to-vehicle-technology-collaboration/dataset/wzd-vehicle-to-deck-data

USDOT ITS-JPO

WZDx Statistics

13
Active Feeds

375
Current Working Group Membership

185
Unique Organizations

https://www.transportation.gov/av/data/wzdx
Update if Michigan and MTC aren't available on feed registry

Mockett, Mark (Volpe), 2022-11-08T14:50:37.236
Recent Specification Updates

- Version 4.0 (November 2021)
  - Introduced option to represent connected devices in work zones (e.g., “i-Cones”, smart arrow boards) in new Device Feed
  - Introduced option to represent restrictions on roadways, such as low clearance bridges, in new Road Restriction Feed
  - Restructured “RoadEvent” model to be more extensible to other types of events
  - Added more specificity to worker presence

- Version 4.1 (September 2022)
  - Introduced option to represent crashes, special events, disasters, and winds in new Road Incident Feed.
  - Added additional devices to the Device Feed
  - Enabled better representation of mobile work zones
## Four types of feeds for work zones and more

<table>
<thead>
<tr>
<th>GitHub site</th>
<th>WZDx</th>
<th>WZDx</th>
<th>TDx</th>
<th>TDx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed</td>
<td>Device Feed</td>
<td>Work Zone Feed</td>
<td>Road Restriction Feed</td>
<td>Road Incident Feed</td>
</tr>
<tr>
<td>Features</td>
<td>Devices</td>
<td>Road Events</td>
<td>Road Events</td>
<td>Road Events</td>
</tr>
<tr>
<td>Feature types</td>
<td>Arrow boards, cameras, dynamic message signs, flashing beacons, hybrid signs, location markers, traffic sensors, traffic signals</td>
<td>Work zones and detours</td>
<td>Restrictions, such as bridge heights</td>
<td>Incidents and detours</td>
</tr>
<tr>
<td>Producer</td>
<td>Work zone equipment manufacturers or vendors.</td>
<td>Transportation Authorities like Tribal, Local, County, State, or Federal Agencies.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumer</td>
<td>Transportation agencies. Mapping &amp; Navigation companies and CAVs may also be interested.</td>
<td>Traveling public via third parties such as mapping and navigation applications and CAVs.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

https://www.transportation.gov/av/data/wzdx
WZDx Work Zone Feed as of version 4.1

- **WorkZoneFeed**
- **FeedInfo**
- **FeedDataSource**
- **RoadEventFeature**
  - **DetourRoadEvent**
  - **WorkZoneRoadEvent**
  - **RoadEventCoreDetails**
    - **Lane**
    - **Restriction**
    - **TypeOfWork**
    - **WorkerPresence**
  - **RelatedRoadEvent**
  - **Relationship**

- **New in v4.1**
- **Shared structure**
- **Shared Road Event object**
- **Road Event object only used in this feed**
- **Deprecated Road Event object**
**WZDx Device Feed** as of version 4.1

*Introduced in WZDx v4.0*

- DeviceFeed
- FeedInfo
- FeedDataSource
- FieldDeviceFeature
  - ArrowBoard
  - Camera
  - DynamicMessageSign
  - FlashingBeacon
  - HybridSign
  - LocationMarker
  - TrafficSensor
  - TrafficSignal
  - TrafficSensorLaneData
  - MarkedLocation

- New in v4.1
- Shared structure
- Field Device object
TDx Road Restriction Feed as of version 4.1

First extension of the WZDx model beyond work zones

Introduced in WZDx v4.0

- **RoadRestrictionFeed**
- **FeedInfo**
- **FeedDataSource**
- **RoadEventFeature**
- **RestrictionRoadEvent**
- **RoadEventCoreDetails**
- **Lane**
- **Restriction**
- **RelatedRoadEvent**
- **Relationship**

- New in v4.1
- Shared structure
- Shared Road Event object
- Deprecated Road Event object

https://www.transportation.gov/av/data/wzdx
TDx Road Incident Feed as of version 4.1

Second extension of the WZDx model beyond work zones

Introduced in WZDx v4.1

RoadIncidentFeed

FeedInfo

FeedDataSource

RoadEventFeature

DetourRoadEvent

RoadEventCoreDetails

IncidentRoadEvent

TypeOfIncident

Relationship

Lane

Restriction

New in v4.1

Shared structure

Shared Road Event object

Road Event object only used in this feed

Deprecated Road Event object

https://www.transportation.gov/av/data/wzdx
Connected Devices in WZDx

• **WZDx Device Feed** helps DOTs integrate real-time data from the field with other data
• DOTs can then publish verified work zone data in a **WZDx Work Zone Feed**
• Data consumers may make use of either/both feeds
WZDx in Use – System Architecture

• Wisconsin DOT uses their lane closure system and advanced traffic management system to produce a WZDx feed.
WZDx in Use – Worker Presence

- Minnesota DOT will use a worker check-in app from ATMS vendor Castle Rock to activate work zones
WZDx in Use – End to End

- Michigan DOT demo with General Motors and Ver-Mac used worker presence vest and variable speed limit signs
Future – Standardization

• Work on WZDx specification under current processes is ending

• Connected Work Zone standardization process will kick-off this fall/winter to standardize WZDx Work Zone Feed and Device Feeds following a systems engineering process
  • Co-led by SAE and ITE partnership that has facilitated the Connected Intersections process

• Specifications are not expected to change significantly

• Open to participation from all stakeholders
  • Email standards@ite.org to get involved!
Future – Extending the WZDx Model

- US DOT has begun work on a new set of data exchanges around “Managing Disruptions to Roadway Operations”
- This multi-year project will refine the process established through the development of WZDx and use it to create data exchanges for additional roadway disruptions including:
  - Incidents,
  - Weather,
  - Emergency Response,
  - Special Events,
  - Evacuation Routes, and more.
- The focus of the data exchange and development of the specification will be driven by stakeholder needs - We want to hear from you!
Call to Action

• Join the Connected Work Zones Standardization process by emailing standards@ite.org or Mark Mockett (mark.mockett@dot.gov)

• Participate in Managing Disruptions work by emailing AVDX@dot.gov

• Set up a WZDx feed for your agency (work zones, incidents, restrictions, or all of the above!)

• Attend an upcoming meeting:
  • Final Work Zone Data Working Group meeting to discuss WZDx v4.2: Monday, November 21st, 2:00-3:30pm EST
WZDx Resources for Adoption & Use

- **WZDx Example feeds** based on common road construction closure scenarios
- **WZDx data feed visualizations** and archives
- **JSON Schema** for validating WZDx conformity
- **.NET frameworks** for building WZDx feeds
- **Guidance documents** for data producers and consumers created by the WZDx community

• All WZDx resources and the WZDx specification are open and free for all to use at [https://github.com/usdot-jpo-ode/wzdx](https://github.com/usdot-jpo-ode/wzdx)
For questions, more information, or to join the mailing list email AVDX@dot.gov.