Work Zone Manager and WZDx Feed at MassDOT

Connected Work Zones Peer Exchange

College Station, Texas
November 16, 2022
Agenda

- MassDOT Smart Work Zone Manager Application
- Move towards Work Zone Data Exchange (WZDx)
- Developing a WZDx v4.0 Specification Feed
- Integration with “Planned Events” Data
- Putting the Logic to the Test
- Upgrade to WZDx 4.1 Specification
- Integration with Mass511
- Effort to Improve Data Quality
Smart Work Zones at MassDOT

- Several years back we initiated a project to standardize how we integrate with and capture “Smart Work Zone” deployments
- The goal of this effort was to provide an easy-to-use, real-time overview of SWZ conditions across the state
- Ultimately, we want to add all static work zone deployments through use of our “planned events” feed & push to consumers
Migration to Work Zone Data Initiative

- MassDOT’s SWZM Application was well almost fully developed when WZDi was released
- Project put on hold – need to update to meet Work Zone Data Dictionary terminology
- Development team asked to participate in the WZDx effort
- Modification to ConOps was required to adapt to FHWA approach
**MassDOT’s Focus on Work Zone ITS Devices**

**Work Zone Activity Data**
Dynamic Capture of “Smart Data” from the field devices*

- Traffic Sensors
- Dynamic Message Signs
- PTZ Cameras

*Initial focus of project
MassDOT SWZ Specification

The RTTM software shall provide a U.S. Department of Transportation Work Zone Data Exchange (WZDx) DeviceFeed data feed. The feed shall be accessible by the MassDOT Work Zone Manager (WZM) via HTTP across the internet. The WZDx DeviceFeed shall be compatible with the latest version of WZDx at the time of project notice to proceed. See the documentation for Creating a WZDx Feed for more information.
Evolution of MassDOT WZDx Compliant Feed

v4.0 Specification

- Traffic Sensor
- Portable Message Sign
- PTZ Camera
- Connected Arrow Board
- Variable Speed Limit
- Flashing Beacon Sign

*Integrate Static Work Zone Data with Dynamic Work Zone ITS Devices = ROBUST REAL-TIME FEED*
Work Zone Manager Overview Screen
**Work Zone “Road Event” Page**

<table>
<thead>
<tr>
<th>Core Details</th>
<th>Impact</th>
<th>Dynamic Data</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start Date: 2020-08-18, 20:32</td>
<td>Left Lane: Open</td>
<td>Level of Service: ___</td>
<td>No Work Hours Provided</td>
</tr>
<tr>
<td>End Date: 2020-12-25, 20:32</td>
<td>Middle Lane: Open</td>
<td>Travel Time: 5 min</td>
<td></td>
</tr>
<tr>
<td>Work Type: Surface Work</td>
<td>Right Lane: Open</td>
<td>Speed: 40 mph</td>
<td></td>
</tr>
<tr>
<td>Length: 3.09 mi (calculated)</td>
<td>Right Lane: Open</td>
<td>Volume: 6338 vph</td>
<td></td>
</tr>
<tr>
<td>Creation Date: 2020-08-21, 10:14</td>
<td></td>
<td>Occupancy: 51 %</td>
<td></td>
</tr>
<tr>
<td>Update Date: 2022-05-10, 16:32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Schedule</td>
<td>Free Flow: 5 min</td>
<td></td>
</tr>
<tr>
<td>Road: I-90, Westbound</td>
<td>Additional Information</td>
<td>Reduced Speed Limit (mph): 55 mph</td>
<td></td>
</tr>
<tr>
<td>Coordinates: 42.3465900, -71.0613300</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milepost: 134.18, 135.1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Integration with MassDOT’s Planned Event System

- MassDOT uses the Everbridge platform to track all the “planned events” which include temporary traffic control for road work zones
- This past summer our consultant, IBI Group, focused on bringing in these “planned events” into WZM so that we could capture the data elements needed to populate the WZDx feed
- The upgrade was completed on August 16th – however for this first data capture from Everbridge – there is no ability to edit/update the attributes in WZM
- Identified the need to improve the data integrity from what we are getting from the Everbridge XML feed
MassDOT’s Work Zone Manager

- Compliant WZDx 4.0 Feed for Planned Events and Smart Work Zone (Device) Data
- Working on update to system to produce a WZDx v4.1 Feed
- Adding functionality to be able to incorporate “unassociated” field devices captured in Device Feed to the Road Events feed
- Incorporating “edit functionality” to planned events to improve location accuracy
Testing the WZM Logic
Pilot Test of Smart Work Zone Field Devices

- MassDOT is initiating a series of pilot tests to evaluate the ability to capture field devices deployed in an active work zone into the WZM Tool.
- Goal is to associate the WZ ITS Devices to an existing “planned road event” to create that synergy between the WZDx v4.0 Feed and the Device Feed.
- Testing out the capture of the field devices and associated functionality that is pushed to mapping service providers.
- Evaluate timeliness of connectivity and accuracy of location markers.
- Pilot Test Location – Brockton, MA: Route 24 Southbound for short bridge inspection TTC setup (August 17, 2022).
Location Marker – Start of Work Zone
Location Marker – Smart Arrow Board
Location Marker – End of Work Zone
Overview of Work Zone Layout
Back End WZM App - Device Details

Meets the WZDx Device Feed Specification –

- Unique ID
- Road Event (not defined as the pilot was not linked to a planned event)

Meets the WZDx Device Feed Specification –

- Device Type
- Device State (function)
- Roadway Location
Moving WZM to WZDx v4.1
Advancing Functionality of MassDOT’s WZM

October 25th Update:

- Output a WZDx v4.1 Work Zone Feed
- Process text schedule from MassDOT Roadway Events and display on Web UI
- Ignore events from MassDOT Events Feed that do not have a road name
- Use WZDx v4.1 enumerated types
- Add documents table to project details page
- Allow editing the visibility of an existing document

*Note* that the feed generation software does not yet use the event schedule from the Everbridge events to create specific road events for each occurrence of work, which is the recommended technique. The development to use the schedule when building the feed is still ongoing and will be deployed for the next release.
WZM System Architecture

- The architecture for our Work Zone Manager focuses on “data capture” to stress the need for accuracy over entry of the *bare minimum* data.
- The system is set up to accept data from both the MassDOT Everbridge Event Reporting System or via real-time devices in the field.
- The Work Zone Manager (WZM) tool will work seamlessly to not only capture and process the data from all the “active” work zones, but to push this information out to WZDx and other 3rd Party Consumers.
MassDOT Customer Facing Information

- The end goal for MassDOT is to provide our customers with timely, accurate and detailed information about what is happening out on the State Highway network.
- Focus on pushing “planned” and “active” events for work zone temporary traffic control to Mass511 and to the National WZDxFeed including the DeviceFeed.
- Work with Castle Rock to ensure that we use the WZDx Feed to supply Mass511 moving forward for consistency.
# Mass511 – Planned Event List (Details)

<table>
<thead>
<tr>
<th>Type</th>
<th>Roadway</th>
<th>Description</th>
<th>Restrictions</th>
<th>Begin date</th>
<th>Last updated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roadwork</td>
<td>RT-1A</td>
<td>STARTS WEDNESDAY. RT-1A in both directions: Roadwork, Between I-95 and RT-128 (Actonboro). Roadwork, From 7:00AM EST to 3:00PM EST on Thursday and Friday. Starting Wednesday at 7:00AM EST until Wednesday, at about 3:00PM EST.</td>
<td></td>
<td>November 10, 2022</td>
<td>November 10, 2022</td>
</tr>
<tr>
<td></td>
<td></td>
<td>View on Map</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>US 1</td>
<td>US 1 northbound: Roadway reduced to one lane. Between RT-27 and Exit 25: I-95 (Norwood). The roadway is reduced to one lane because of roadwork. From 7:00PM EST to 3:00AM EST on weekdays and Sunday, Until Friday, at about 12:00AM EST.</td>
<td></td>
<td>November 13, 2022</td>
<td>November 10, 2022</td>
</tr>
<tr>
<td></td>
<td></td>
<td>View on Map</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>US 1</td>
<td>US 1 in both directions: Roadway reduced to three lanes. Between I-95 and RI 114 (Peabody). The roadway is reduced to three lanes because of roadwork. From 10:00PM EST to 5:00AM EST on weekdays and Sunday. Until Friday, at about 5:00AM EST.</td>
<td></td>
<td>November 13, 2022</td>
<td>November 10, 2022</td>
</tr>
<tr>
<td></td>
<td></td>
<td>View on Map</td>
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<td></td>
</tr>
</tbody>
</table>
Mass511 – Planned Event List (Map View)
Work Zone Event Capture

- **Traditional** – District staff enter planned events into Everbridge Event Reporting System
- **Technology** – Work Zone ITS vendors document work zone elements through field devices
- **Manual** – Filed Staff or Office Engineers create a “planned” work zone event through manual entry into WZM
Updated Data Entry for WZM

- MassDOT District staff are used to entering project data and work zone lane/shoulder impact schedules into Everbridge
- Goal is to introduce the new WZM Application and encourage transfer to this “new” mechanism to track planned work
- GUI must be “user friendly” to get buy-in
Work Zone Manager Recap

PC / Laptop Application

- MassDOT’s Work Zone Manager was developed and continues to be supported by the IBI Group.

- Features a fully functioning desktop application that is web-based and password protected.

- Mobile App works on Smart Phone and Tablet and provides the same functionality, but limited display width on mapping graphics.
Thank You

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