MCDOT Work Zone Data Exchange (USDOT WZDx) Initial Assessment (MC-85 Project)

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Maricopa County Department of Transportation

USDOT WZDx Workshop
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# Work Zone Technology Comparison

<table>
<thead>
<tr>
<th></th>
<th>Traveler Information</th>
<th>Queue Warning</th>
<th>Lane Merge</th>
<th>Incident Detection</th>
<th>Speed Limit</th>
<th>Automated Enforcement</th>
<th>Entering/Exiting Vehicle Notification</th>
<th>Performance Measurement</th>
<th>In-Vehicle Signage and Alerts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional Work Zone</td>
<td>Static</td>
<td>Fixed Points</td>
<td>Signs</td>
<td>Fixed</td>
<td>Record</td>
<td>Static &amp; Fixed</td>
<td>Static &amp; Fixed</td>
<td>Sensor based</td>
<td>511, WAZE, Google...</td>
</tr>
<tr>
<td>Smart Work Zone</td>
<td>Real-Time</td>
<td>Fixed Points</td>
<td>Signs, Dynamic Fixed Points</td>
<td>Fast Detection</td>
<td>Variable, Fixed Point, CMS</td>
<td>CMS Warnings</td>
<td>Sensor based</td>
<td>511, WAZE, Google...</td>
<td></td>
</tr>
</tbody>
</table>
Every Day Counts Initiative began the conversation in 2015...
**MCDOT SWZ Concept Project**

- **Smart Work Zone** – the use of intelligent transportation systems (ITS) technologies/devices and systems to improve the safety and efficiency of work zones for workers and travelers.
  - Improve collection and dissemination of information about conditions in the work zone.
- **To be deployed as part of the MC-85 construction project**
  - 107th Ave to 75th Ave in two phases
  - Concept will need to be applicable for other types of MCDOT work zones
SWZ Best Practices

• SWZs have been deployed for almost 20 years throughout the country
• Technologies are largely the same in each deployment
• Most ‘best practices’ are for large freeway projects
  – Have more money to design, develop and test a system
  – Can do post-construction evaluations
• There is still a lot of applicability of these best practices to MCDOT
Goals:
1. Improve speed limit compliance through the work zone
2. Increase travel time reliability through the work zone
3. Reduce crashes in the work zone
4. Reduce queues resulting from the work zone
SWZ Device Locations / MUTCD

MCDOT SWZ Device Locations

INFORM
(Work Zone Conditions, Alternate Route Info)

ADVISE
(Work Zone Conditions)

WARN
(Work Zone Conditions, Speed Assignment)

CHECK
(Speed Feedback)

Advance Warning Area
Tells traffic what to expect ahead

Transition Area
Moves traffic out of its normal path

Activity Area
Where work takes place

Termination Area
Lets traffic resume normal operation

MUTCD Temporary Traffic Control Zones
Project Area

- Major Freight Corridor
- Long Project Duration
- Available Alternate Routes
- Challenging Industrial Area
Design

SMARTER WORK ZONE – MC-85 PHASE 1 EXAMPLE
Traffic Control Plans

- January 2019 to June 2020, to widen MC-85 to a total of 5 lanes; storm drains, sidewalk, lighting, irrigation.
- Minimum of 1 lane in each direction open, shifting all traffic to opposite side of road, first south half, then north half.
- 24 x 7 restrictions, workers on-site M-F 8 AM to 5 PM.
Smart Work Zone Components

ITS Components:

- Detection (Speed, Occupancy, Volume)
- ARID readers calculate travel times
- Displayed DMS content varies depending on travel times
- Excessive speed feedback signs
- CCTV Cameras
- RSU
## Sample WZDx Data Frame

### Traffic Control Plan #12 Eastbound

<table>
<thead>
<tr>
<th>Tag</th>
<th>Value</th>
<th>Notes/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>identifier</td>
<td>Maricopa.gov.2019012001</td>
<td></td>
</tr>
<tr>
<td>subidentifier</td>
<td>TT0345;TCP_12;eastbound</td>
<td>Use Project # and TCP #. A single TCP could generate two restrictions, one in each direction.</td>
</tr>
<tr>
<td>StartDateTime</td>
<td>startDateTime-ver: 2019-01-20T06:35:00-07:00</td>
<td>By convention, we will include timezone value (-07:00) since AZ does not recognize DST; could also use UTC (Z). Suggest this be a convention for all.</td>
</tr>
<tr>
<td>EndDateTime</td>
<td>endDateTime-est: 2019-08-20T23:59:59-07:00</td>
<td>How would day-time construction (8 AM to 5 PM, M-F) be represented? Make five entries?</td>
</tr>
<tr>
<td>BeginLocation</td>
<td>roadName: MC-85 (Buckeye Rd) roadDirection: eastbound latitude-est: 33.435795 longitude-est: -112.259716 crossStreet: 91st Ave</td>
<td></td>
</tr>
<tr>
<td>EndLocation</td>
<td>latitude-est: 33.437151 longitude-est: -112.224501 crossStreet: 79th Ave</td>
<td></td>
</tr>
<tr>
<td>wz_status</td>
<td>active</td>
<td>Could this field include a separate Date/Time field if Work Zone will only be set up during off-peak hours during an extend time period?</td>
</tr>
<tr>
<td>totalLanes</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Tag</td>
<td>Value</td>
<td>Notes/Comments</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>openLanes</td>
<td>shift-left (yes)</td>
<td>Trying to describe the case where all lanes are actually blocked and one lane of traffic is shifted over into the opposing traffic lane. Used shift-left since it means “all open lanes shift to the left”. Could also use left-lane? Note, discrepancy in WZDx_final01.xsd, line 185: “shift-left”, vs “left-shift-lanes” in reference document.</td>
</tr>
<tr>
<td></td>
<td>left-lane(also good?)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>alternating-flow-lane (no)</td>
<td></td>
</tr>
<tr>
<td>closedLanes</td>
<td>right-lane</td>
<td>Shared two-way left turn center lane not available or closed; no left turn allowed. Other: How would one represent a center two-way left turn lane on an arterial? See next slide.</td>
</tr>
<tr>
<td>closedShoulders</td>
<td>Both</td>
<td></td>
</tr>
<tr>
<td>workersPresent</td>
<td>True</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Eastbound lanes reduced to one lane and shifted to opposing side of roadway on MC-85 (W. Buckeye Rd) from near 91st Ave to near 75th Ave. for approx. 7 months. Westbound traffic also reduced to 1 lane.</td>
<td>Where would real-time ITS information such as travel times / speeds, and DMS message text be represented? Consider embedding within this field, or provide a URL link in this field to another data page, other?</td>
</tr>
<tr>
<td>issuingOrganization</td>
<td>Maricopa County DOT</td>
<td></td>
</tr>
<tr>
<td>timestampCreation</td>
<td>2019-01-20T06:35:00-07:00</td>
<td></td>
</tr>
<tr>
<td>time_stampUpdate</td>
<td>2019-03-29T14:42:00-07:00</td>
<td></td>
</tr>
</tbody>
</table>
Connected Vehicle WZ Prototype 2.0
Demo

**Info Generators**

- **Construction**
- **TCP Plans**
  - Data entry in RADS
- **Smart Work Zone**
  - Dynamic Message Signs
  - Travel Times
  - Speed Warning
  - Camera Feed (TMC only)

**Info Consumers**

- **Freight Vehicles**
  - WZDx format
  - In-vehicle displays
- **Other Vehicles**
  - USDOT WZDx format