

DRAFT

Connected Work Zones Implementation Guidance and Standard SRS Comment Resolution Report

August 24, 2023

In support of: Task Order No. 693JJ322F00209N

For approval by: Deborah Curtis, Highway Research Engineer
Federal Highway Administration

For use by: Siva Narla, Senior Director, Transportation Technology
Institute of Transportation Engineers

Connected Work Zone Working Group Co-Chairs

Members of the Connected Work Zone Working Group (CWZ WG)

Consultant Team for the CWZ Standard Project

Prepared by: Manny Insignares
Consensus Systems Technologies Corp. (ConSysTec)

Version	Date	Comments
v01	08/24/2023	Initial Draft. M. Insignares

Contents

1	Purpose.....	4
2	SRS Comments Received Prior to Walkthrough	5
3	SRS Revisions from Walkthrough	9
3.1	Poll for Updates and Change-driven Updates	9
3.2	Architectural Needs.....	9
3.3	Compatibility with the WZDx Specification.....	9
3.4	WorkZoneFeed and DeviceFeed Requirements Updates	10

1 Purpose

This document is the SRS Walkthrough Comment Resolution Report (CRR) for the Connected Work Zones project.

The SRS Walkthrough CRR is submitted as a required interim deliverable for TOPR Task 2.2.2 Deliver SRS Walkthrough Comment Resolution Report (See excerpt below from the TOPR).

TECHNICAL EXHIBIT 2						
DELIVERABLES SCHEDULE						
<p>This technical exhibit lists any reports or documentation that are required as a deliverable to include the frequency, # of copies, medium/format and who/where it is to be submitted. A deliverable is anything that can be physically delivered but may include non-physical things such as meeting minutes. The Contractor shall build in ten business day response times from the Government for all deliverables.</p>						
<u>Deliverable</u>	<u>Task</u>	<u>Print Ready</u>	<u>Frequency</u>	<u># of Copies</u>	<u>Medium/Format</u>	<u>Submit To</u>
Deliver Progress Reports	1.1	No	In accordance with the IDIQ contract	One	Email/MS Word	CO COR TOCOR
Deliver Project Management Plan (PMP)	1.2	No	30 days after task order start date	One	Email/MS Word	TOCOR
Deliver System Engineering Management Plan (SEMP)	1.3	No	30 days after task order start date	One	Email/MS Word	TOCOR
Deliver Connected Work Zone Working Group Roster	2.1.1	No	Per Schedule in PMP	One	Email/MS Word	TOCOR
Deliver Draft Connected Work Zone ConOps	2.1.2	No	Per Schedule in PMP	One	Email/MS Word	TOCOR
Deliver ConOps Walkthrough Plan	2.1.3	No	Per Schedule in PMP	One	Email/MS Word	TOCOR
Deliver ConOps Walkthrough Comment Resolution Report	2.1.3	No	Per Schedule in PMP	One	Email/MS Word	TOCOR
Deliver Draft Connected Work Zone SRS	2.2.1	No	Per schedule in PMP	One	Email/MS Word	TOCOR
Deliver SRS Walkthrough Plan	2.2.2	No	Per schedule in PMP	One	Email/MS Word	TOCOR
Deliver SRS Walkthrough Comment Resolution Report	2.2.2	No	Per schedule in PMP	One	Email/MS Word	TOCOR
Deliver Draft Connected Work Zone SDD	2.3.1	No	Per schedule in PMP	One	Email/MS Word	TOCOR
Deliver SDD Walkthrough Plan	2.3.2	No	Per schedule in PMP	One	Email/MS Word	TOCOR
Deliver SDD Walkthrough Comment Resolution Report	2.3.2	No	Per schedule in PMP	One	Email/MS Word	TOCOR
Deliver Recommended Connected Work Zone Standard	2.4.1	No	Per schedule in PMP	One	Email/MS Word	TOCOR

The purpose of the walkthrough is to allow the CWZ Working Group, additional stakeholders, and interested parties to:

- a) Identify anomalies
- b) Improve the Requirements document
- c) Consider alternatives
- d) Ensure conformance to standards and specifications
- e) Ensure completeness
- f) Gain a consensus on the requirements and the other material within Requirements document

A formal walkthrough is a proven method to validate a product, in this case, the requirements for a proposed standard.

Section 2 of this report addresses comments received prior to the SRS walkthrough.

Section 3 addresses modifications made to the SRS after the walkthrough based on participant discussions occurring during the SRS walkthrough.

2 SRS Comments Received Prior to Walkthrough

No comments were received prior to the SRS walkthrough specific to the requirements, but there were several outstanding comments at the time of the SRS walkthrough that remained after the ConOps walkthrough, many of which were resolved during the SRS walkthrough. At this time there are no outstanding comments.

Table 1. Comments and Resolution Received Prior to the SRS Walkthrough

COLOR KEY	
	Not Discussed
	Discussed but still Open
	Closed
	Parking Lot
	no change, for INFO only

O/C	Commenter/Org	E/S	DocID & Ver#	Section	Para/ Table/ Fig	Existing Text	Proposed Text	Reason/Explanation	CWZ WG Response
C	USDOT	E	CWZ Draft v00.01_230222	2.5.2.2.3				Commented Text: 'CWZ data providers need to provide zone status, speed limit zones, speed limits, lane shifts, lane tapers, and direction of lane shift, number of lanes to taper, and lane closures when providing work zone information to data consumers. ' Do CWZ data providers *always* need to provide this information for *every* work zone? How will this ConOps reflect the limitations of data availability and prioritization of what data is most important?	During the requirements phase, the CWZ WG identified and reviewed all mandatory vs. optional elements.

O/C	Commenter/ Org	E/S	DocID & Ver#	Section	Para/ Table/ Fig	Existing Text	Proposed Text	Reason/Explanation	CWZ WG Response
C	USDOT	E	CWZ Draft v00.01_230222	2.5.2.5.1.1				Commented Text: 'Right-to-Left'. Add that data exchange needs to agree on what lanes are counted – WZDx counts lanes only in one direction of traffic, but some count across the whole driveable surface.	After the SRS WT, the method of count of lanes and numbering remains the same as in WZDx v4.2. Annex C provides an analysis of consistency between CWZ/WZDx and J2945/4. In a nutshell, both CWZ/WZDx and J2945/4 use the exact same method and terminology. During this analysis at least one data element used in both the CWZ/WZDX and J2945/4 are inconsistent – the TypeOfWork. Annex C and Annex D SDO Recommendations provide advice on how to potentially address and resolve this inconsistency.

O/C	Commenter/ Org	E/S	DocID & Ver#	Section	Para/ Table/ Fig	Existing Text	Proposed Text	Reason/Explanation	CWZ WG Response
C	Serge Beaudry, Ver- Mac	E	CWZ Draft v00.01_230222	A.5.2				Serge Beaudry – One guidance need that is not existing in this document is related to Worker privacy. These standards can open the doors to lot of new applications by having worker’s personal devices. Where, when and who is on site could be interesting for many stakeholder (invoicing, health and safety, time tracking). On the flip side this open the privacy door. Do we want this standard to cover that part?	During the ConOps Walkthrough there was discussion of these items, and the Sections from Annex B Implementation Guidance was moved to the parking lot, Annex C. This item should have been identified as ‘Closed’ when reported in the ConOps Walkthrough Comment Resolution Report.

3 SRS Revisions from Walkthrough

This section identifies SRS revisions identified by the CWZ Working Group, and is based on discussions during the SRS walkthrough. The rationale for why these changes were made is provided.

3.1 Poll for Updates and Change-driven Updates

The following sections were moved to the parking lot (Annex E).

- 2.4.3.1 Polling for Updates – An Alternative to Polling
- 2.4.3.2 Change-driven Updates Described as an Interaction Between Humans
- 2.5.1.2.2 GeoJSON Data Exchange – Poll for Data Updates
- 2.5.1.2.3 GeoJSON Data Exchange – Change-driven Updates
- 2.6.6 Generic Work Zone Information Data Exchange (Change-driven Updates)
- 3.3.1.2 Send WorkZoneFeed Upon Request for Updates
- 3.3.1.3 Send WorkZoneFeed Information Updates Upon Change of Information
- 3.3.2.2 Send DeviceFeed Upon Request for Updates
- 3.3.2.3 Send DeviceFeed Information Updates Upon Change of Information

Rationale: CWZ WG Discussion.

- The Polling for Update and Change-driven update data exchange mechanisms have advantages and disadvantages for deployers. These disadvantages do not exist with the current Polling mechanism of WZDx. Developing a satisfactory design to overcome the disadvantages is a complex issue with many design considerations. It was the opinion of many in the WG to postpone a design for a future update of the CWZ Standard. Therefore, the materials leading to the design, including this tutorial, associated needs, operational scenario, and requirements have been relocated to this Annex for future consideration.

3.2 Architectural Needs

The following sections were moved to the parking lot (Annex E).

- 2.5.1.5 Architectural Need – Time Source

Rationale:

- No requirements nor design were identified for this need by the CWZ WG.

3.3 Compatibility with the WZDx Specification

After discussion with the CWZ WG during the SRS Walkthrough the following approach and text was developed to address the need to maintain a high degree of consistency with WZDx v4.2, while addressing the reality that the requirements and design will break backward compatibility.

“The CWZ WG believes that the approach described here supports the objective to preserve the investment of deployers in prior versions of WZDx, while lessening the burden of legacy deployments to upgrade to this standard. The general approach below states that where applicable, a WZDx specification design element shall be reused, instead of developing a new data requirement and design element.

The requirements identify specific rules for exceptions, and then states a requirement to the effect that WZDx elements shall be re-used except where allowed as an exception. The list of exceptions and

number of elements modified in this standard is relatively small. Exceptions follow that may break backward compatibility for some deployments:

- a) Elements described as DEPRECATED have been removed in this standard.
- b) Some elements described as OPTIONAL have been made MANDATORY in this standard.
- c) Some elements were renamed to generalize the choice of units, for example the choice of miles or kilometers for reference posts. Elements described as having metric units were left as-is.
- d) Some elements within enumerations were renamed for clarity in this standard.

3.4 WorkZoneFeed and DeviceFeed Requirements Updates

Requirements with Deprecations - Removed and Updates

1. Made 3.4.1 a) feed_info required because road_event_feed_info was deprecated.
2. Made 3.5.2 e) update_frequency and f) update_date required because of group discussion.
3. Removed deprecated elements 3.5.2 g) lrs_type, h) lrs_url, i) location_verify_method.
4. Fixed verified typo throughout.
5. Made 3.6.2 f) is_start_position_verified, g) is_end_position_verified, j) is_start_date_verified, k) is_end_date_verified required because v)-y) were deprecated.
6. Removed deprecated requirement 3.6.2 u).
7. Made 3.6.3 h) is_start_date_verified and i) is_end_date_verified required because k)-l) were deprecated.
8. Removed deprecated requirement 3.6.3 j).
9. Removed deprecated requirement 3.6.4 j) relationship.
10. Removed deprecated requirement 3.6.6 Contents of Relationship.
11. Removed deprecated requirement 3.6.9 d) lane_number.
12. Removed deprecated requirement 3.6.14 Enumeration of SpatialVerification.
13. Removed deprecated requirement 3.6.15 Enumeration of TimeVerification and 3.6.16 Enumeration of EventStatus.
14. Changed WorkTypeName "maintenance" to "non-encroachment".
15. Removed deprecated requirement 3.6.18 Enumeration of LaneType center-left-turn-lane.
16. Removed deprecated requirement 3.7.4 c) is_moving.
17. Removed deprecated requirement 3.7.19 MarkedLocationType road-event-start and road-event-end.
18. Removed deprecated requirement 3.7.19 MarkedLocationType temporary-traffic-signal.

Other changes:

1. Change text from "mobile-equipment-in-work-zone-not-working" to "mobile-equipment-in-work-zone-not-moving"
2. Removed 'restriction' as an EventType
3. Updated 'milepost' to reference_post throughout. Added 'units' requirement.
4. Updated the 'units' requirement to include 'miles'.
5. Added 'video_url' requirement for Contents of Camera.
6. Added 'roadside-unit' to FieldDeviceType requirement.
7. Added requirement for message being broadcast by an RSU (e.g., RSM, TIM, SPaT, MAP)
8. Added vehicle types and 'other' to MarkedLocationType requirement.

These requirement updates will flow into the design, specifically the schema in Section 5 that will be reviewed during the SDD walkthrough.