DRAFT

Connected Work Zones Implementation Guidance and Standard

SDD Comment Resolution Report v02

March 20, 2024

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
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Version	Date	Comments
v01	09/27/2023	Initial Draft. M. Insignares
V02	03/20/2024	Incorporated comments received from Noblis.

Contents

1 Purpose

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

The SDD Walkthrough CRR is submitted as a required interim deliverable for TOPR Task 2.3.2 Deliver SDD Walkthrough Comment Resolution Report (See excerpt below from the TOPR).

TECHNICAL EXHIBIT 2

DELIVERABLES SCHEDULE

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.

Deliverable	Task	Print Ready	Frequency	# of Copies	Medium/ Format	Submit To
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 Design Details document
c) Consider alternatives
d) Ensure conformance to standards and specifications
e) Ensure completeness
f) Gain a consensus on the design details and the other material within the SDD document

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

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

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

2 SDD Comments Received Prior to Walkthrough

This section addresses comments received prior to the SDD Walkthrough.

Table 1. Comments and Resolution Received Prior to the SDD 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	Craig Franklin, Booz Allen	T	CWZ Draft v00.08	1.3			Definition of CWZ Data Provider	We need a definition of CWZ Data Provider. It is important so that we understand the difference between a CWZ Deployer and CWZ Data Provider	Section 2.4.1 includes a definition for Data Provider. The term 'CWZ Deployer' is used sparingly throughout the user needs when neither a data provider or data consumer can be identified as an actor. This happens, for example, with the architectural needs. We will add some brief text to explain how we use the term CWZ Deployer and why.

O/C	Commenter/ Org	E/S	DocID & Ver#	Section	Para/ Table/ Fig	Existing Text	Proposed Text	Reason/Explanation	CWZ WG Response
C	Craig Franklin, Booz Allen	T	CWZ Draft v00.08	2				I would like to see a description of how the CWZ operates, what functions the CWZ performs, and a description of the roles and responsibilities of different actors or participants in a CWZ. I would like to see use cases and examples that relate to how State and Local DOTs perform work zone activities using CWZs. I am interested on where do I put CWZ equipment in my work zone, how I power the equipment, can I move the equipment as my work zone evolves. I am trying to represent the user/worker in the work zone and the traveling public going through the work zone and understand how they affect or influence the conops.	The focus of the CWZ Standard and Implementation Guidance is on system interfaces and data exchanges. How the systems themselves work and their requirements is out-of-scope and may vary widely across agencies. Where to place equipment is out-of-scope.

O/C	Commenter/ Org	E/S	DocID & Ver#	Section	Para/ Table/ Fig	Existing Text	Proposed Text	Reason/Explanation	CWZ WG Response
C	Craig Franklin, Booz Allen	T	CWZ Draft v00.08	2.4.3-2.5				I suggest describing use cases here as section 2.5. The discussion on needs assumes that the audience has an understanding of how CWZs operate. I am not convinced that the reader has that understanding before reading this section, and would like to see use cases here so that I can relate to the needs identified below. There appear to be many assumptions in the needs section about how CWZ operate and I think the reader may read this and think “that is not how we do CWZ” and dismiss or reject the requirements in this document. I want to understand the conops associated with CWZ better before delving into needs of the system and then requirements. I believe that our audience is civil engineers, DOT staff members at a Federal, State, and Local level, systems engineers, and software engineers. Not all these audience members have the same understanding or concept of operations for CWZ at this point in this document.	How CWZs operate may vary widely across deployers, and the operational needs of deployers is out-of-scope. The purpose of this standard and implementation guidance is to ensure that information exchanges between centers is highly consistent and interoperable, even across operational differences among deployers.

O/C	Commenter/ Org	E/S	DocID & Ver#	Section	Para/ Table/ Fig	Existing Text	Proposed Text	Reason/Explanation	CWZ WG Response
C	Craig Franklin, Booz Allen	E	CWZ Draft v00.08	2.5.2.4.2		CWZ deployers manage work zone activities that stretch across long distances. For example, as large as 60 miles.	CWZ deployers manage work zone activities that stretch across long distances, for example, as large as 60 miles.		Agree.
C	Craig Franklin, Booz Allen	E	CWZ Draft v00.08	2.5.2.4.5		Many work zones are dynamic, without a fixed location, and move continuously across time. Examples include work zones for mowing, striping operations, and repaving.	Many work zones are dynamic, without a fixed location, and move continuously across time - examples include work zones for mowing, striping operations, and repaving.		Agree.

O/C	Commenter/ Org	E/S	DocID & Ver#	Section	Para/ Table/ Fig	Existing Text	Proposed Text	Reason/Explanation	CWZ WG Response
C	Craig Franklin, Booz Allen	T	CWZ Draft v00.08	2.5.2.5.1.1				This is not stated as a requirement but a need. This is the conops section so I understand that this is supposed to be descriptive not yet stated as a requirement. I suggest that left most lane in the direction of travel is lane 1. We need to support both left to right and right to left lane numbering until a standard or consensus is developed on the method of lane numbering. Later, the text needs to be stated as a requirement such as The CWZ shall support lane numbering from either right to left or left to right in the direction of travel and indicate which lane numbering convention is being used by the CWZ. Is it the deployer or the data provider that identifies the lane numbering convention? The next section indicates that the data providers identify the numbering convention and I think it should the deployers (IOOs).	The CWZ standard will define the lane numbering convention used for exchanges between two computing systems. How an agency or state DOT defines a lane is up to them. Describing how to translate the lane numbering given in this standard, and what an agency specifies is out-of-scope. We're fortunate that both SAE 2945/4 and WZDx (key for connected work zones) were consistent in this regard. Consistency between these standards will be addressed in the CWZ Annex C during the next update.

O/C	Commenter/ Org	E/S	DocID & Ver#	Section	Para/ Table/ Fig	Existing Text	Proposed Text	Reason/Explanation	CWZ WG Response
C	Craig Franklin, Booz Allen	T	CWZ Draft v00.08	2.5.2.5.2.3				I suggest that the lane 1 is the left most lane in the direction of travel unlerss a state DOT says otherwise. https://ntimc.transportation.org/Documents/12.13.10_laneDesignation-2pg-printer.pdf is an example of where a transportation group has standardized on left to right lane numbering.	The standard will define the lane numbering convention used for specifying information exchanges between two computing systems. The lane numbering in this standard is based on a consensus process. The need to harmonize CWZ and ngTMDD lane information will be added as Annex D Recommendations to SDOs during the next update.
C	Craig Franklin, Booz Allen	E	CWZ Draft v00.08	3.7.17		**traffic-sensor.** A device deployed on a roadway which captures traffic metrics such as speed, volume, or occupancy. See TrafficSensor	**traffic-sensor.** A device deployed on a roadway which captures traffic metrics such as speed, volume, and/or occupancy. See TrafficSensor		Agreed.

O/C	Commenter/ Org	E/S	DocID & Ver#	Section	Para/ Table/ Fig	Existing Text	Proposed Text	Reason/Explanation	CWZ WG Response
C	Craig Franklin, Booz Allen	T	CWZ Draft v00.08	B.3.1		Currently, there is no common view on what specific data need to be provided as work zone information. It currently depends a on the producer of the information and what is available		I disagree. The WZDx followed a consensus building process to identify what data stakeholders want from a connected workzone. Use the WZDx to identify what users want.	We extensively used WZDx to develop the requirements and design contained in this standard.
C	Craig Franklin, Booz Allen	E	CWZ Draft v00.08	E.1.4		.Title	Title	First line of first table	Was unable to find the .Title, but if we find it during the update, we will correct this.

3 SDD Revisions from Walkthrough

This section identifies SDD revisions identified by the CWZ Working Group and participant during the SDD walkthrough.

3.1 Definition of WorkZoneFeed and DeviceFeed Provided by WG Member

During the SDD walkthrough Serge Beaudry provided text, taken from the WZDx Github site, that he thought would be useful to include in Section 2 or Section 3 as definitions for the two feeds, ahead of use of the term. We will add these definitions, as follows.

- **WorkZoneFeed**. Provides high-level information about events occurring on roadways (called "road events") related to work zones that impact the characteristics of the roadway and involve a change from the default state (such as a lane closure). The WorkZoneFeed is the original work zone data exchange feed and was previously named "WZDxFeed".
- **DeviceFeed**. Provides information (location, status, dynamic data) about field devices deployed on the roadway in work zones.

3.2 Section 5 System Interface Design Details: Data Concepts

The following Section 5 items were updated.

- 5.3.2.1.5 update_frequency. Changed value from ‘1’ to ‘-1’.
- 5.4.2.1.6 unit. Change name from ‘unit’ to ‘reference_post_unit’.
- 5.4.2.2.6 unit. Change name from ‘unit’ to ‘reference_post_unit’.
- 5.5.2.4.5 video_update_frequency. New data concept added to reflect how often video is updated. It is a required field.
- 5.5.2.20 MarkedLocationType. Added enumeration with value of ‘pavement-marking-vehicle to the list.

3.3 Annex C Guidance for Deployments Involving Connected Vehicle Environment Work Zone-related Standards [Informative]

Discussion with walkthrough participants revealed content improvements to the information provided. In addition, discussions led to the need to expand the table, and to show more specifically where the WorkZoneFeed and DeviceFeed fit.

Volunteers were solicited to help refine and further develop the contents of Annex C.
A meeting is scheduled to discuss and review revised materials on October 13, 2023 at 2PM.