

A Project Document of the Connected Work Zone Working Group

Connected Work Zone Implementation Guide and Standard v01.00

Task 3.4 Validation Report

January 22, 2026

Revision History

Filename	Date	Author	Notes
CWZ Validation Report v01.00.docx	12/20/2025	M. Insignares	Initial draft.
CWZ Validation Report v01.00.docx	1/6/2026	M. Insignares V. Gonzales	Incorporated results from verification and validation testing. Sent report for review by survey and testing participants.
CWZ Validation Report v01.00.docx	1/22/2026	M. Insignare	No additional inputs from survey and testing participants. Quality-checked and finalized report and submitted to ITE.

Contents

1.	Introduction	1
1.1	Purpose	1
1.2	Description of the CWZ Standard and Implementation Guide	1
1.2.1	Background	1
1.2.2	Verification and Validation Testing.....	1
1.3	Validation Report Organization	1
1.4	Referenced Documents.....	2
2.	Validation Site Selection and Surveys	2
2.1	Introduction to the Validation Site Selection and Surveys Task	2
2.2	Letter of Solicitation.....	2
2.3	Summary of Self-Assessment Form (“Survey”) Responses.....	3
2.3.1	Description of Self-Assessment Form Respondents	3
2.3.2	Respondents Identification of CWZ Devices Used and Additional Device Types Needed.....	4
2.3.3	Respondents Discussion of Implementation Approaches	5
2.3.4	Respondents Identification of CWZ Standard and Implementation Guide Gaps and Potential Solutions.....	6
2.3.4.1	Ability to describe the work zone itself	6
2.3.4.2	Ability to describe non-CWZ assets in the work zone.....	6
2.3.4.3	Lane-specific details	6
2.3.4.4	Additional Communications Protocol Features	6
2.3.5	Respondents Discussion of Additional Guidance Needs.....	7
3.	Validation Test Documentation, Open-Source Test Tools, and Testing	7
3.1	Test Plan.....	7
3.1.1	Test Approach	8
3.1.2	Item Pass/Fail Criteria	8
3.2	Test Tools and Test Procedures	8
3.2.1	Test Tools and Pre-Test Activities	8
3.2.2	CWZ Data Feed Test Procedure	9
3.3	Summary Test Results.....	11
3.3.1	Ver-Mac Device Feed Test Results.....	11
3.3.2	Colorado DOT Work Zone Feed Test Results	14
4.	Summary Findings.....	17
4.1	Summary Findings from Surveys.....	17
4.1.1	Summary of Respondents Identification of CWZ Devices Used and Additional Device Types Needed.....	17

4.1.2 Summary of Respondents Discussion of Implementation Approaches.....	17
4.1.3 Summary of Respondents Identification of CWZ Standard and Implementation Guide Gaps and Potential Solutions	18
4.2 Summary Findings from Testing	18
Annex A. Complete Set of Self-Assessment Form (“Survey”) Responses	19
A.1 Colorado DOT.....	19
A.2 QLynx Technologies	24
A.3 Blynxcsy	29
A.4 Caltrans	33
A.5 Ver-Mac	39
A.6 Florida DOT	43

List of Figures

Figure 1. Configuration of Test Laptop and System Under Test	8
--	---

List of Tables

Table 1. Referenced Documents	2
Table 2. Survey Responses Regarding Field Devices Used for Work Zone Data	4
Table 3. Survey Responses Regarding Other Field Devices Used for Work Zone Data.....	4
Table 4. Survey Responses Regarding Process for Creating WZDx/CWZ Feeds	5
Table 5. Survey Responses Regarding Additional Guidance Needs	7
Table 6. CWZ Data Feed Test Software and Electronic Files.....	9
Table 7. CWZ Data Feed Test Procedure Template	9
Table 8. Ver-Mac Device Feed Test Procedure and Test Log.....	11
Table 9. Colorado DOT Work Zone Feed Test Procedure and Test Log.....	14

1. Introduction

1.1 Purpose

This document is the Validation Report for the Connected Work Zones (CWZ) project, and submitted as a required interim deliverable for TOPR Task 3.4 Validation Report.

1.2 Description of the CWZ Standard and Implementation Guide

1.2.1 Background

The primary objective of the CWZ Standard and Implementation Guide project is to publish a non-proprietary, industry-based consensus standard that defines the key data elements, capabilities, and interfaces for a Connected Work Zone (CWZ) Standard. A connected work zone is defined as a set of technologies that generates or collects work zone information (whether automatically or manually), and the infrastructure that broadcasts/distributes this information to the public and to vehicles. The CWZ Standard addresses ambiguities and gaps identified by early deployers, and consolidates multiple independent implementation and standards efforts, to lead to the interoperability of future CWZ deployments across the United States. The CWZ Implementation Guide and Standard v01.00 was published in December 2024.

1.2.2 Verification and Validation Testing

Following the publication of the standard in late 2024, ITE, the CWZ Working Group, and consultants tracked multiple deployment efforts, and conducted a survey of CWZ stakeholders (including those that were implementing CWZ v01.00). An analysis/assessment of the survey responses, reflecting on the standard and guidance, was conducted to identify potential gaps and new needs. A draft summary report was completed during December 2025.

In addition, and in preparation for validation testing of actual deployment efforts, ITE and consultant team developed test documentation and validated various open-source test tools. Test documentation and test tool verification was completed during October and November of 2025.

During January 2026 ITE, consultant team, and validation test participants, Colorado DOT and Ver-Mac, conducted validation testing of their CWZ Feeds. Colorado DOT provided access to their CWZ v01.00 Work Zone Feed, and Ver-Mac provided access to their Device Feed for testing.

1.3 Validation Report Organization

This Validation Report is organized into sections, described below.

- Section 1 Introduction. This section provides an overview of the Connected Work Zones project, and describes the goals and objectives for the Validation Phase.
- Section 2 Validation Site Selection and Surveys. This section summarizes the materials and processes used to solicit organizations who wanted to volunteer to participate in testing, and provides a summary of the self-assessment form (“survey”) responses provided.
- Section 3 Validation Test Documentation, Open-Source Test Tools, and Testing. This section provides an overview of the test process, test procedures, and open-source test tools used to conduct validation testing of the 2 CWZ Data Feeds provided for testing.

- Section 4 Summary Findings. This section provides a summary of the validation phase that may be applicable when considering further development of the standard as described by the users and deployers of the standard.
- Annex A Complete Set of Self-Assessment (“Survey”) Responses.

1.4 Referenced Documents

This Validation Report references the following documents:

Table 1. Referenced Documents

Document Name	Date Published
Connected Work Zone Implementation Guide and Standard v01.00	December 2024
Connected Work Zone Implementation Guides and Standard Test Documentation and Open-Source Test Tools	October 2025
IEEE Std 829-2008, IEEE Standard for Software and System Test Documentation	2008

2. Validation Site Selection and Surveys

2.1 Introduction to the Validation Site Selection and Surveys Task

The purpose of the Validation Site Selection and Surveys task was to accomplish the following:

- Develop a letter of solicitation to engage potential test participants
- Develop and distribute a self-assessment form (“survey”)
- Identify potential validation sites
- Provide a summary/roll-up of self-assessment information

2.2 Letter of Solicitation

During late September 2025 an email was sent out to all members of ITE’s CWZ Standard Working Group Teams list. The email text is reproduced below.

Connected Work Zones: Request for Survey Participation

This is a request for participation from public agencies (Agency) with deployed or in-progress Connected Work Zone (CWZ) data feeds to help shape the next phase of the CWZ Standard effort. The goal is to capture real-world experiences, identify implementation challenges, and highlight opportunities for improving guidance and adoption through the completion of the CWZ Survey Form.

Since the CWZ data structure follows the well-established WZDx schema, we do not expect major structural issues. Instead, the survey seeks to understand:

- How agencies are producing, validating, and publishing CWZ data.
- Gaps or pain points in meeting the CWZ Standard requirements.
- Technical or institutional barriers to deployment.
- Lessons learned from design, implementation, operations, and maintenance.

Background

The United States Department of Transportation (USDOT) ITS Joint Program Office (JPO) is sponsoring the development and publication of *Connected Work Zone Implementation Guide and Standard v01.00* (CWZ Standard) that defines the data elements, capabilities, and interfaces a connected work zone must support to ensure interoperability for state/local infrastructure owner/operators and vehicle operators. A Connected Work Zone is defined as a set of technologies that generates or collects work zone information (whether automatically or manually) as well as the infrastructure that broadcasts/distributes this information to the public and to vehicles.

The CWZ Standard has employed a systems engineering process, referencing design elements from existing standards, and solidifying design content that crosses multiple standards development organizations (SDOs). The result is a harmonization of standards activities. Project progress and updates can be found here: <https://www.ite.org/technical-resources/standards/cwz/>.

The CWZ Standard was published in February 2025. The verification and validation phase is scheduled to start, at which time a subset of agencies may be invited to participate as case sites. Completion of the CWZ Survey Form now will help inform the V&V phase by identifying potential participants and key focus areas.

Survey Submission

Agencies are invited to submit a completed CWZ Survey Form (attached below) to the CWZ Working Group at standards@ite.org, with the subject line/**Attention to: Connected Work Zone Survey** by Sunday, November 16. The survey is designed to help the CWZ WG understand the current work zone data practices, status, implementation processes, challenges, gaps, guidance and support needs, and interest in possible future V&V participation.

A one-hour web conference will be scheduled on Friday, November 19 to review the survey request and to answer any questions. The link to the web conference will be posted at: <https://www.ite.org/technical-resources/standards/cwz/>.

All questions, including questions about completing the CWZ Survey Form, should be sent to standards@ite.org.

Thank you for helping advance the CWZ Standard.

2.3 Summary of Self-Assessment Form (“Survey”) Responses

2.3.1 Description of Self-Assessment Form Respondents

During September 2025, ITE distributed the self-assessment forms to members of the Teams CWZ Working Group. Six sets of responses to the self-assessment form (“surveys”) were received, as follows:

- Colorado DOT
- QLynx Systems
- Bentley Systems
- Caltrans
- Ver-Mac

- Florida DOT

Of the 6 responding organizations, Colorado DOT and Ver-Mac, volunteered to use their CWZ v01.00 Data Feeds for further testing.

It is noteworthy that 3 of the forms came from private sector organizations, and 3 from the public sector.

The following sections are highlights from the survey information, selected by the author, regarding gaps and potential solutions, and new needs. Note that the gaps identified below are in addition to the field device gaps identified previously. The complete set of survey responses are reproduced in Annex A.

2.3.2 Respondents Identification of CWZ Devices Used and Additional Device Types Needed

Survey participants were asked to comment about connected field devices used for work zone data:

Table 2. Survey Responses Regarding Field Devices Used for Work Zone Data

Organization	Arrow Board	Camera	Dynamic Message Sign	Flashing Beacon	Hybrid Sign	Location Marker	Roadside Unit (RSU)	Traffic Sensor	Traffic Signal
CDOT	•		○	○	○	○		○	
QLynx		•	•	•				•	
Blynscy									
Caltrans	•	•	•	•	•	•	•	•	•
Ver-Mac	•		•	•	•	•		•	•
FDOT		•	•	•	•	•		•	
Total	3	3	4.5	4.5	3.5	3.5	1	4.5	2

• Yes

○ Supported but not used

Survey participants were also asked to comment about other field devices used for work zone data:

Table 3. Survey Responses Regarding Other Field Devices Used for Work Zone Data

Organization	Comment regarding other field devices used for work zones. Other (please specify)
CDOT	Geotab vehicle location/status sensors mounted on construction vehicles including autonomous truck-mounted crash attenuator vehicles.
QLynx	1. We provide Bluetooth devices in a fair number of work zones. The original intention was for CWZ to contain Bluetooth devices. However, these were first categorized as sensors, and near the time CWZ was approved, the group realized that Bluetooth devices really need their own device type since they have data elements not part of normal sensors. I still think these are needed as they are a common work zone data device. 2. Classification Data for Radar Sensors - I believe the current feeds support things like speed, volume, and occupancy from radars. But I don't believe it includes classification data (i.e.

Organization	Comment regarding other field devices used for work zones. Other (please specify)
	size of vehicles, small, medium, and large) and that is a common data type provided by side fire radars. I think DOTs may want access to this, where applicable.
Blynscy	Not applicable for our data collection & analysis process.
Caltrans	Please refer to Caltrans standard plans and construction plans for details.
Ver-Mac	Automated Flagger Assistance devices (AFAD), GPS beacon, and worker's module
FDOT	a. Motorist Awareness System (MAS). System used to inform motorists of speed and provide feedback on worker presence, posted speed and motorist speed. • Portable Changeable Message Sign (PCMS) to alert of speed reduction and worker presence. • Portable Regulatory Sign (PRS) with fixed posted speed reduction and amber flashing lights "when flashing" to direct motorists to slow to speed shown. • Radar Speed Display Unit (RDU) with the fixed posted speed reduction plus a radar speed variable display to show motorists how fast they are traveling. b. WZDx System – essentially a location marker as above to provide start and end location of work zone and additional details. c. Queue Warning System (QWS) – Series of PCMSs and speed detection devices to detect speeds and queue build ups and warn motorists of downstream queues in advance of slowdowns or stopped traffic in work zones. d. Dynamic Lane Merge (DLM) - Series of PCMSs and speed detection devices in the area of lane drop to support the activation of messages for motorists to merge early or late depending on traffic flow and current roadway capacity. e. Dynamic Speed Harmonization (DSH) - Series of PCMSs, speed detection devices and speed feedback signs to communicate speed reductions to motorists as they approach congestion and cause them to reduce speed to facilitate smoother traffic flows through the work zone.

2.3.3 Respondents Discussion of Implementation Approaches

Survey participants were asked to describe their process for creating and maintaining a WZDx/CWZ feed.

Table 4. Survey Responses Regarding Process for Creating WZDx/CWZ Feeds

Organization	Implementation Process Response
CDOT	Work zone information comes from planned events recorded by TMC personnel. Additional information from speed reduction forms, mobile vehicles such as autonomous truck-mounted attenuators, and connected field devices such as iCone connected arrow boards.
QLynx	We are used to providing data feeds to customers, so in this case, we are just working to get data into the proper format and to ensure we have all the needed data for CWZ.

Organization	Implementation Process Response
Blynscy	Crowdsourced imagery from work zones is collected on-demand (per customer requested location, time and duration) and data is analyzed to provided WZDX feed and lane closure information.
Caltrans	WZDX/CWZ feeds may begin with inputting work zone information into the Lane Closure System (LCS) . Once closures are approved in LCS, the data is automatically processed to generate the WZDX/CWZ feed in the required format. We perform regular validation checks to ensure data accuracy and completeness. The feed is updated continuously to reflect changes, and monitored for errors or delays to ensure near real-time availability for public-facing applications like QuickMap and connected vehicle systems.
Ver-Mac	All of our device are pushing their data real time. We have a tool to setup feed based on project or geography, type of devices, extends of the data and update periods desired by the requester
FDOT	We are in the process of gathering this information from various sources including 1.) the overall project schedule, 2.) the specific work zone schedule, 3.) the “active” condition of the work zone based on construction or lane closure information, 4.) the posted or changed speed condition, 5.) the presence of workers in the work zone.

2.3.4 Respondents Identification of CWZ Standard and Implementation Guide Gaps and Potential Solutions

2.3.4.1 Ability to describe the work zone itself

QLynx: More consideration about the **work zone ID to define the entire work zone** and how a person can provide **information about the work zone itself**.

2.3.4.2 Ability to describe non-CWZ assets in the work zone

Ver-Mac: What is missing is representing in the device feeds **the location of conventional asset that impact the workzone**. EX: conventional speed limit sign, end of work zone, shift lanes, etc. fundamentally they are not different from a digital speed limit and end of Work zone GPS beacon, etc.

2.3.4.3 Lane-specific details

Caltrans: Some concerns with the CWZ standard include **implementation complexity**, due to additional fields and structure compared to WZDX, which may require more development and integration effort. There are also potential **data consistency and completeness issues**, especially when capturing specialized work zone types or lane-specific impacts. Additionally, keeping up with **version updates**, ensuring **staff and contractor training**, and integrating CWZ feeds with existing systems like LCS and QuickMap are ongoing considerations.

2.3.4.4 Additional Communications Protocol Features

CDOT:

1. The established REST pull request framework works well for general use cases but can be inefficient for iterative updates and more precise requests. The addition of standardized query parameters would be a valuable addition, to standardize ways to filter the feed. We would suggest query parameters for:

- **modified_since/changed_after:** a timestamp (ISO8601 or utc milliseconds) which filters for only events which have changed since the timestamp specified. This would significantly reduce message sizes for multiple successive requests

- geospatial filter: could be a polygon or a point and radius, or even a linestring and width. This would allow filtering for events in the vicinity of a user.

2. Additionally, for center-to-center communication, the current best approach is for the consumer to make continual timed request to the provider, then evaluate whether any changes are present in the feed. This adds a lot of processing load to both systems, and if the consumer wishes to reduce their change latency, they must query more often, further increasing the load on both sides. Adding an alternate streaming communication protocol (such as Websockets, gRPC, MQTT, Server-Sent Events, ...), would alleviate these issues, and allow notification of changes to be pushed from the provider to the consumer. The addition of a modified_since/changed_after query parameter would improve the current system but not alleviate all the concerns. This issue is even more relevant for field device feeds, which is becoming widely supported by connected field device manufacturers.

3. Is there planned support for road closure events (unrelated to work zones)? At CDOT, those are closely linked, and we would like to have a better way of sharing these road closures.

2.3.5 Respondents Discussion of Additional Guidance Needs

Survey participants were asked to comment about need for guidance.

Table 5. Survey Responses Regarding Additional Guidance Needs

Organization	Converting WZDx to CWZ	Required vs Optional Fields	Data Quality Validation	Publishing Feeds	Vendor Contractor Work Flows	Security	Other
CDOT			•			•	
QLynx	•	•	•	•	•		
Blynscsy							
Caltrans							
Ver-Mac							
FDOT	•	•	○		○	○	
Total	2	2	2.5	1	1.5	1.5	0

• Yes

○ Maybe/Possibly

3. Validation Test Documentation, Open-Source Test Tools, and Testing

3.1 Test Plan

This Test Plan has been developed in accordance with existing testing standards that define the content and processes for test documentation. The *IEEE Std 829-2008, IEEE Standard for Software and System Test Documentation*, provides a comprehensive overview of the processes and documentation for testing. IEEE Std 829-2008 specifies the form and content of test documentation, though it does not specify a required set.

The goal of Task 3.1 and Task 3.3 of the project was to develop documentation to test the level of conformance of CWZ Data Feeds against the CWZ Standard v01.00 JSON Schema to enable interoperable exchanges of work zone information between centers.

3.1.1 Test Approach

This test plan proposes the use of black box approach to testing. IEEE 829 defines black box as follows:

"Black box: The test inputs can be generated and the outputs captured and completely evaluated from the outside of a test item; i.e., test cases are developed from the test item specification, only without looking at the code or design." [IEEE 829-2008, Pg. 46]

The purpose of this test plan is to document the testing required to verify system interface conformance with the CWZ Standard v01.00. In general, the approach to testing involves the laboratory setup of a Test Laptop acting as a CWZ Data Feed Consumer and a SUT acting as a CWZ Data Feed provider. Figure 1 illustrates the configuration of a Test Laptop and a SUT.

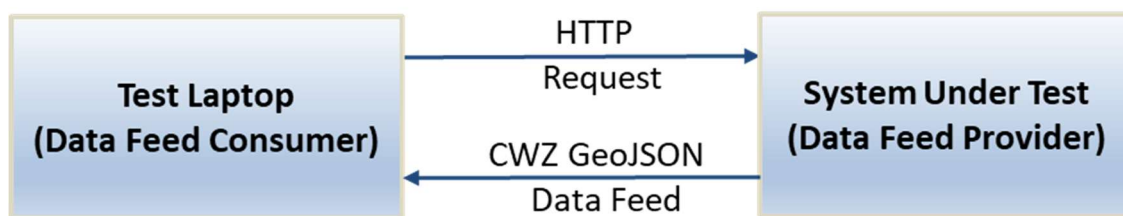


Figure 1. Configuration of Test Laptop and System Under Test

3.1.2 Item Pass/Fail Criteria

It is important to note that all messaging is synchronous between the Test Laptop and the SUT. By synchronous we mean that the Test Laptop polls the SUT. The message exchanges are described as follows: an HTTP Request initiated by the Test Laptop, acting as a Data Feed Consumer, followed by the response of a CWZ GeoJSON Data Feed by the SUT, acting as a Data Feed Provider.

Pass/Fail Criteria for Data Requirements:

- 100% correct transmission and receipt of a CWZ GeoJSON Data Feed between the data consumer and data provider systems, as specified in the CWZ Standard.
- Testing verifies that the data content of the CWZ GeoJSON Data Feed are correct, as specified in the CWZ Standard.
- Testing verifies that the data content contains all mandatory elements, as specified in the CWZ Standard.
- Testing verifies that the structure of the data is correct, as specified in the CWZ Standard.

3.2 Test Tools and Test Procedures

3.2.1 Test Tools and Pre-Test Activities

Prior to execution of a test procedure, the test engineer must install and configure test software and access the CWZ Standard JSON Schema that will be used to verify conformance of a data feed with the standard. The JSON schema (electronic file) can be accessed here: <https://github.com/ite-org/cwz>.

A brief list of possible test software is included in the table below. To the extent possible, the test software are all open source tools. In addition, where applicable, more than one alternative is provided.

Table 6. CWZ Data Feed Test Software and Electronic Files

Function	Software Tool and URL
Fetch Data using HTTP	- Python script (see Test Documentation Appendix D. Python Script – Fetch Data Over HTTP) - cURL (https://curl.se/) - web browser
Visualize Feed Data on a Map (optional)	- Python script (see Test Documentation Appendix E. Python Script – Visualize CWZ Feed on a Map) - QGIS (https://qgis.org/)
Validate CWZ Feed against JSON Schema	Python script (see Test Documentation Appendix F. Python Script – Validate CWZ Feed Against CWZ JSON Schema)

3.2.2 CWZ Data Feed Test Procedure

The Test Procedure Steps from the Task 3.1 Test Documentation may be used as a template to log information captured during testing (i.e., Test Log). If a test fails, the test engineer must fill out a Test Incident Report (See Test Documentation Appendix C. Test Incident Report Template).

The CWZ Data Feed Test Procedure is shown in the table below.

Table 7. CWZ Data Feed Test Procedure Template

Test Procedure	
ID: TP-CWZ-DataFeed	Title: CWZ Data Feed Test Procedure
Test Case References	TC-CWZ-WorkZoneFeed TC-CWZ-DeviceFeed
Requirements Verification Method	Test
Procedure Description	Prior to testing, a URL defining the CWZ Data Feed endpoint must be provided. Message exchanges between the Test Laptop and the SUT are synchronous. The message exchanges are described as follows: an HTTP Request is initiated by the Test Laptop, acting as a Data Feed Consumer, followed by the response of a CWZ GeoJSON Data Feed by the SUT, acting as a Data Feed Provider. If a test procedure step fails, then a Test Incident Report must be completed.
Procedure Steps:	
Step 1: Log Start Time and Date of Test	Date: Start Time:

Test Procedure	
Step 2: Log names of participants, organization, and role	Name: Organization: Email: Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Local Agency Data Provider / Invited Guest <i>{Add additional participants}</i>
Step 3: Log URL identifying CWZ Data Feed endpoint.	URL:
Step 4: Document whether WorkZoneFeed or DeviceFeed	Feed Type: WorkZoneFeed / Device Feed
Step 5a: Fetch CWZ Data Feed	Fetch the CWZ Data Feed and save to test directory. File will be provided with Test Results.
Step 5b: Log Outcome	Pass / Fail Time:
Step 6a: Verify JSON file is visualizable (optional)	Verify that the CWZ Data Feed is visualizable on a map. Take a snapshot and save in test directory. Snapshot will be provided with Test Results.
Step 6b: Log Outcome (optional)	Pass / Fail Time:
Step 7a: Verify Mandatory Requirements	Use preconfigured JSON schema validation software to verify conformance of CWZ Data Feed (GeoJSON file) against the CWZ Standard v01.00 JSON Schema.
Step 7b: Log Outcome	Pass / Fail Time:
Step 8: Log End Time and Date of Test	Date: End Time:
Generate Test Summary Report	Upon completion of this test procedure, generate a Test Summary Report documenting the results, observations, and any incidents encountered.
Relationship to Other Procedures:	Completion of Pre-Test activities.
Procedure Special Requirements:	None

3.3 Summary Test Results

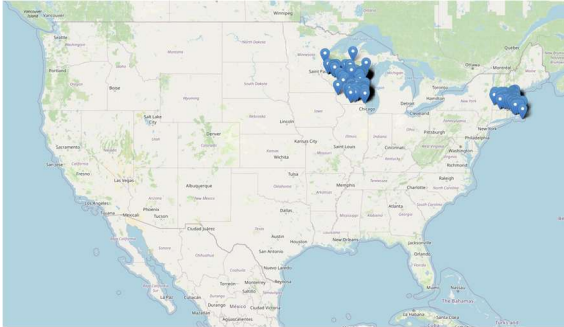
Test procedure logs and test summary for the Ver-Mac Device Feed and Colorado DOT Work Zone Feed are shown in the sections below.

3.3.1 Ver-Mac Device Feed Test Results

Table 8. Ver-Mac Device Feed Test Procedure and Test Log

Test Procedure	
ID: TP-CWZ-DataFeed	Title: CWZ Data Feed Test Procedure
Test Case References	TC-CWZ-WorkZoneFeed TC-CWZ-DeviceFeed
Requirements Verification Method	Test
Procedure Description	Prior to testing, a URL defining the CWZ Data Feed endpoint must be provided. Message exchanges between the Test Laptop and the SUT are synchronous. The message exchanges are described as follows: an HTTP Request is initiated by the Test Laptop, acting as a Data Feed Consumer, followed by the response of a CWZ GeoJSON Data Feed by the SUT, acting as a Data Feed Provider. If a test procedure step fails, then a Test Incident Report must be completed.
Procedure Steps:	
Step 1: Log Start Time and Date of Test	Date: 1/6/2026 Start Time: 1:18PM ET
Step 2: Log names of participants, organization, and role	Name: Siva Narla Organization: Institute of Transportation Engineers Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Local Agency Data Provider / Invited Guest Name: Matt Jasnosz Organization: Institute of Transportation Engineers Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Local Agency Data Provider / Invited Guest Name: Patrick Morrison Organization: Institute of Transportation Engineers Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Local Agency Data Provider / Invited Guest Name: Ross Sheckler (CWZ Standard Working Group Co-Chair) Organization: iCone Products Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Local Agency Data Provider / Invited Guest

	Name: Raj Ponnaluri (CWZ Standard Working Group Co-Chair) Organization: Florida DOT Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Local Agency Data Provider / Invited Guest Name: Serge Beaudry Organization: Ver-Mac Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Data Provider / Invited Guest Name: Pier Costanguay Organization: Ver-Mac Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Data Provider / Invited Guest Name: Manny Insignares Organization: ConSysTec (ITE Subject Matter Expert) Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Local Agency Data Provider / Invited Guest Name: Viban Gonzales Organization: ConSysTec (ITE Subject Matter Expert) Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Local Agency Data Provider / Invited Guest Name: Jacob Frye Organization: Neaera Consulting (Colorado DOT Contractor) Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Local Agency Data Provider / Invited Guest Name: Drew Johnston Organization: Neaera Consulting (Colorado DOT Contractor) Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Local Agency Data Provider / Invited Guest Name: Patrick Chan Organization: ConSysTec Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Local Agency Data Provider / Invited Guest
Step 3: Log URL identifying CWZ Data Feed endpoint.	URL: Test feed is not available to the public.
Step 4: Document whether WorkZoneFeed or DeviceFeed	Feed Type: WorkZoneFeed / Device Feed
Step 5a: Fetch CWZ Data Feed	Fetch the CWZ Data Feed and save to test directory. File will be provided with Test Results.

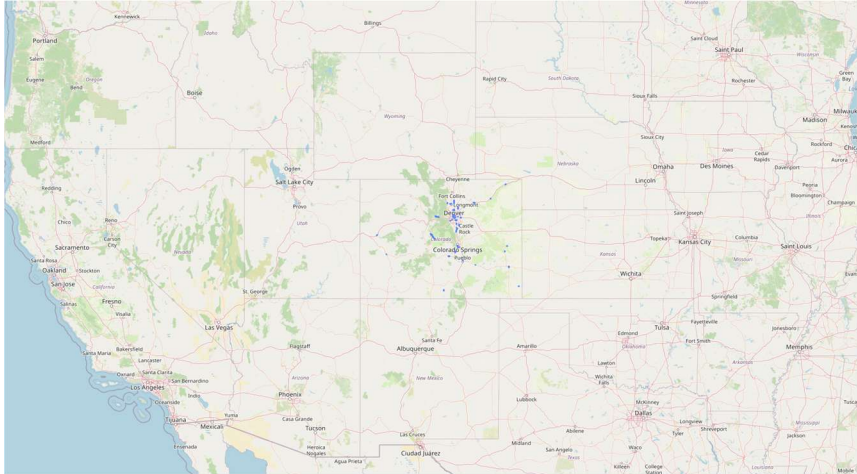
Step 5b: Log Outcome	Pass / Fail Time: 1:20PM
Step 6a: Verify JSON file is visualizable (optional)	Verify that the CWZ Data Feed is visualizable on a map. Take a snapshot and save in test directory. Snapshot will be provided with Test Results. 
Step 6b: Log Outcome (optional)	Pass / Fail Time: 1:23PM
Step 7a: Verify Mandatory Requirements	Use preconfigured JSON schema validation software to verify conformance of CWZ Data Feed (GeoJSON file) against the CWZ Standard v01.00 JSON Schema.
Step 7b: Log Outcome	Pass /Fail Time: 1:25PM
Step 8: Log End Time and Date of Test	Date: 1/6/26 End Time: 1:25PM
Generate Test Summary Report	Upon completion of this test procedure, generate a Test Summary Report documenting the results, observations, and any incidents encountered. Result: Pass Observations: Pass Incidents: None
Relationship to Other Procedures:	Completion of Pre-Test activities.
Procedure Special Requirements:	None

3.3.2 Colorado DOT Work Zone Feed Test Results

Table 9. Colorado DOT Work Zone Feed Test Procedure and Test Log

Test Procedure	
ID: TP-CWZ-DataFeed	Title: CWZ Data Feed Test Procedure
Test Case References	TC-CWZ-WorkZoneFeed TC-CWZ-DeviceFeed
Requirements Verification Method	Test
Procedure Description	Prior to testing, a URL defining the CWZ Data Feed endpoint must be provided. Message exchanges between the Test Laptop and the SUT are synchronous. The message exchanges are described as follows: an HTTP Request is initiated by the Test Laptop, acting as a Data Feed Consumer, followed by the response of a CWZ GeoJSON Data Feed by the SUT, acting as a Data Feed Provider. If a test procedure step fails, then a Test Incident Report must be completed.
Procedure Steps:	
Step 1: Log Start Time and Date of Test	Date: 1/6/2026 Start Time: 1:29PM
Step 2: Log names of participants, organization, and role	Name: Siva Narla Organization: Institute of Transportation Engineers Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Local Agency Data Provider / Invited Guest Name: Matt Jasnosz Organization: Institute of Transportation Engineers Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Local Agency Data Provider / Invited Guest Name: Patrick Morrison Organization: Institute of Transportation Engineers Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Local Agency Data Provider / Invited Guest Name: Ross Sheckler (CWZ Standard Working Group Co-Chair) Organization: iCone Products Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Local Agency Data Provider / Invited Guest Name: Raj Ponnaluri (CWZ Standard Working Group Co-Chair) Organization: Florida DOT Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Local Agency Data Provider / Invited Guest

	Name: Heather Pickering-Hilgers Organization: Colorado DOT Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Local Agency Data Provider / Invited Guest Name: Jacob Frye Organization: Neaera Consulting (Colorado DOT Contractor) Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Local Agency Data Provider / Invited Guest Name: Drew Johnston Organization: Neaera Consulting (Colorado DOT Contractor) Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Local Agency Data Provider / Invited Guest Name: Manny Insignares Organization: ConSysTec (ITE Subject Matter Expert) Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Local Agency Data Provider / Invited Guest Name: Viban Gonzales Organization: ConSysTec (ITE Subject Matter Expert) Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Local Agency Data Provider / Invited Guest Name: Serge Beaudry Organization: Ver-Mac Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Data Provider / Invited Guest Name: Pier Costanguay Organization: Ver-Mac Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Data Provider / Invited Guest Name: Patrick Chan Organization: ConSysTec Role: Funding Agency / Contracting Agency / Test Engineer / Observer / Local Agency Data Provider / Invited Guest
Step 3: Log URL identifying CWZ Data Feed endpoint.	URL: https://data.cotrip.org/api/v1/cwz?apiKey=[...]
Step 4: Document whether WorkZoneFeed or DeviceFeed	Feed Type: WorkZoneFeed / Device Feed
Step 5a: Fetch CWZ Data Feed	Fetch the CWZ Data Feed and save to test directory. File will be provided with Test Results.
Step 5b: Log Outcome	Pass / Fail

	Time: 1:31PM
Step 6a: Verify JSON file is visualizable (optional)	Verify that the CWZ Data Feed is visualizable on a map. Take a snapshot and save in test directory. Snapshot will be provided with Test Results. 
Step 6b: Log Outcome (optional)	Pass / Fail Time: 1:34PM
Step 7a: Verify Mandatory Requirements	Use preconfigured JSON schema validation software to verify conformance of CWZ Data Feed (GeoJSON file) against the CWZ Standard v01.00 JSON Schema.
Step 7b: Log Outcome	Pass/Fail Time: 1:36PM
Step 8: Log End Time and Date of Test	Date: 1/06/2026 End Time: 1:36PM
Generate Test Summary Report	Upon completion of this test procedure, generate a Test Summary Report documenting the results, observations, and any incidents encountered. Results: Passed all Mandatory Requirements. An optional requirement failed. Observations: There may be a need to review optional elements and formats during next update of the standard. Incidents: None
Relationship to Other Procedures:	Completion of Pre-Test activities.
Procedure Special Requirements:	None

4. Summary Findings

4.1 Summary Findings from Surveys

4.1.1 Summary of Respondents Identification of CWZ Devices Used and Additional Device Types Needed

Survey participants were asked to comment about connected field devices used for work zone data:

- Dynamic Message Sign. Portable signs. (4.5 out of 6)
- Flashing Beacon (4.5 out of 6)
- Traffic Sensor (4.5 out of 6)
- Hybrid Sign (3.5 out of 6)
- Location Marker (3.5 out of 6)
- Arrow Board (3 out of 6)
- Camera (3 out of 6)
- Traffic Signal (2 out of 6)
- Roadside Unit (RSU) (1 out of 6)

Survey participants were also asked to comment about other field devices used for work zone data:

- Geotab for Construction Vehicles, including attenuator trucks.
- Bluetooth devices
- Classification data from radar sensors
- Automated Flagger Assistance Devices
- GPS Beacon
- Worker identification devices
- Motorist assistance systems: Portable Changeable Message Sign, Portable Regulatory Sign (speed reduction), Radar Speed Display Units, Queue Warning Signs, Dynamic Lane Merge Signs.

4.1.2 Summary of Respondents Discussion of Implementation Approaches

Survey participants were asked to describe their process for creating and maintaining a WZDx/CWZ feed.

Public sector agencies reported gathering data as follows:

- CDOT: Work zone information comes from planned events recorded by TMC personnel.
- Caltrans: WZDx/CWZ feeds may begin with inputting work zone information into the Lane Closure System (LCS).
- FDOT: Ffrom various sources including 1.) the overall project schedule, 2.) the specific work zone schedule, 3.) the “active” condition of the work zone based on construction or lane closure information, 4.) the posted or changed speed condition, 5.) the presence of workers in the work zone.

Private sector organizations reported the following:

- Qlynx: We are just working to get data into the proper format and to ensure we have all the needed data for CWZ.

- Blynscy: Crowdsourced imagery from work zones is collected on-demand (per customer requested location, time and duration) and data is analyzed to provided WZDX feed and lane closure information.
- Ver-Mac: All of our device are pushing their data real time.

4.1.3 Summary of Respondents Identification of CWZ Standard and Implementation Guide Gaps and Potential Solutions

The following summarizes respondents' identification of CWZ Standard gaps:

- **Ability to describe the work zone itself.** More consideration about the work zone ID to define the entire work zone and how a person can provide information about the work zone itself.
- **Ability to describe non-CWZ assets in the work zone.** What is missing is representing in the device feeds the location of conventional asset that impact the work zone. E.g., conventional speed limit sign, end of work zone, shift lanes, etc.
- **Additional Communications Protocol Features**
 1. Would be a valuable addition, to standardize ways to filter the feed. We would suggest query parameters for:
 - modified_since/changed_after: a timestamp (ISO8601 or utc milliseconds) which filters for only events which have changed since the timestamp specified. This would significantly reduce message sizes for multiple successive requests
 - geospatial filter: could be a polygon or a point and radius, or even a linestring and width. This would allow filtering for events in the vicinity of a user.
 2. Adding an alternate streaming communication protocol (such as Websockets, gRPC, MQTT, Server-Sent Events, ...), would allow notification of changes to be pushed from the provider to the consumer.
 3. Support for road closure events (unrelated to work zones).

4.2 Summary Findings from Testing

From the CDOT test there is a recommendation to revisit the optional elements that have strict formatting requirements, and consider whether those optional elements be allowed to include a null value.

An example, as captured from the CDOT testing was an optional element that contained a formatting requirement as an email address. The CDOT feed contained a blank (or null value), which is not a valid email address.

Annex A. Complete Set of Self-Assessment Form (“Survey”) Responses

A.1 Colorado DOT

CWZ V&V Agency Survey –

The CWZ Standard v1.0 is now entering the Verification and Validation (V&V) phase. This survey will help identify real-world implementation status, challenges, and needs, so we can target testing, documentation, and guidance. Please answer on behalf of your agency’s work zone data efforts. This should take ~15–20 minutes.

1. Agency Profile & Role- [Government State Department of Transportation](#)

1. Agency name, region/state/province – [Colorado Department of Transportation, US, Colorado](#)

2. Point of Contact (name, title, email, phone). – [Benjamin Acimovic, Traffic Operations and Technology Manager, Benjamin.acimovic@state.co.us, 720-951-6151](#)

3. Your role in work zone data collection/management: - [I lead the development of the smart and connected work zone specifications that required work zone data collection and management.](#) -

[o Policy/planning - X](#)

[o Technical/data management](#)

[o Field operations - X](#)

[o Other \(specify\) -X connected and smart work zone specs and standards](#)

4. Who is currently in charge of work zone data feeds in your agency? — [Office of Innovative Mobility.](#)

5. Who championed the adoption of WZDx (if applicable)?- [Ashley Nylen and the Office of Innovative Mobility](#)

2. Current Work Zone Data Practices – [traditional with some connected and smart work zone deployments on larger projects.](#)

6. How many work zones are typically in place at any given time (regardless of worker presence)? [150](#)

7. How would you describe the distribution of your work zone sizes? (e.g., mostly small, mostly large, a mix) [a mix.](#)

8. What types of work zones do you typically manage? (e.g., mobile operations, long-term closures) – [all sorts – mobile, temp, long term, short term](#)

9. How long are work zones typically in place? —[depends on the project and work. We have events going for a few hours, up to a few months](#)

10. How long are workers typically present within those work zones? —[depends on the project and work. We don’t have any methods of detecting active workers in real time.](#)

11. When are work zones typically active (nighttime, weekends, etc.)? —[depends on the project and work](#)

12. Where are your work zones located? (urban, rural, statewide, etc.) Are there any differences you can see with how (or what type of) field devices are deployed depending on area type? —[depends on the](#)

project and work. We have a good mix of events, with a large bulk of events on I-70 and I-25, with the remaining being distributed across smaller roads across more rural parts of the state.

13. Field devices used for work zone data:

[o Arrow board](#)

[o Camera](#)

[o Dynamic message sign \(DMS\) \(supported but not used\)](#)

[o Flashing beacon \(supported but not used\)](#)

[o Hybrid sign \(supported but not used\)](#)

[o Location marker \(supported but not used\)](#)

[o RSU](#)

[o Traffic sensor \(supported but not used\)](#)

[o Traffic signal](#)

[o Other \(specify\) – Geotab vehicle location/status sensors mounted on construction vehicles including autonomous truck-mounted crash attenuator vehicles.](#)

14. What's the current response time for updating work zone data feeds based on changes to the work zone? Is that different from your ideal response time? – [twice a year based on changes on the CWZ and WZDx standard.](#)

15. CV/V2X technology experience:

[o Pilots](#)

[o Implementations](#)

[o Other \(specify\)](#)

Briefly describe the experience here:

16. Platforms/software used to create work zone data feeds:

[o In-house tools](#)

[o Vendor system](#)

[o Other \(specify\)](#)

3. WZDx/CWZ Adoption & Status

17. Which specification(s) do you currently use?

[o WZDx v3.x](#)

[o WZDx v4.x - 4.2](#)

[o CWZ v1.0 – 1.0 is implemented, but has not been fully validated](#)

[o Other \(specify\)](#)

18. When did you adopt WZDx? [2019](#)

19. Why did you adopt WZDx? (problems you wanted solved) – national standard and getting work zone data into our cotrip and other feeds. We also wanted to share our work zone data with the traveling public through third party services like Waze, and implementing these kinds of standards enables us to do that.

20. Do you plan to transition to CWZ v1.0?

[o Yes — in progress](#)

[o Yes — planned](#)

[o No](#)

[o Unsure](#)

21. Estimated CWZ adoption timeline: [2027](#)

22. Have you started testing or implementing CWZ v1.0? – [Yes, the first round of implementation is complete](#)

23. Who do you look to for deciding when to adopt new technology or standards? (peers, FHWA, vendors, etc.) - [use cases, other peers, FHWA](#)

4. Implementation Process

24. Describe your process for creating and maintaining a WZDx/CWZ feed. – [The bulk of CDOT’s work zone information comes from planned events recorded by TMC personnel. Additional information from speed reduction forms, mobile vehicles such as autonomous truck-mounted attenuators, and connected field devices such as iCone connected arrow boards are fused with those planned events to improve information content \(speed reduction forms\), location accuracy \(arrow boards for static events and vehicle locations for mobile events\), and event time ranges \(arrow board status keeps events open longer\).](#)

25. How do you ensure feed data is fresh, updated, and accurate? – [This is mainly completed through strong communication between construction contractors and TMC operators, and high standards placed on contractors. Connected field devices and mobile vehicles assist in this operation but are only present for a limited number of work zones. On the backend, an update to a planned operation \(submitted by a TMC operator upon receiving information from a contractor\) is pushed out through CDOT’s advanced data streaming platform and is directly ingested by the WZDx/CWZ feed management system. Updates to vehicle locations and connected device are collected directly by the WZDx/CWZ feed management system.](#)

26. How does a contractor or maintenance team contribute data to your feed? – [Contractors communicate the status of ongoing work with TMC operators.](#)

27. Any back-office/IT concerns with WZDx or CWZ? – [nope](#)

28. How did you secure your WZDx/CWZ feeds to ensure that only authorized users can access or modify the data? – [Access to the published WZDx/CWZ data feeds are secured through CDOT’s traveler information data feed subscription. Access to the source data is secured through CDOT’s internal TMC access controls.](#)

5. Challenges & Gaps

29. What issues have you faced in deploying your feed? – [None on the CWZ feed itself, that was very simple – mostly a copy of the WZDx feed. However on the internal feed generation, CDOT does not have](#)

a good method for linking additional data sources (mobile vehicles and connected field devices) to specific work zones. All of the associations are done through inferences based on location, time, and other device properties. This added a lot of complexity and uncertainty to the integration of live/connected information with other data sources.

30. Have you noticed any difference in implementability between WZDx and CWZ? – The only noticeable difference is that for the CWZ feed, the geometry type of MultiPoint was removed. CDOT has been using that geometry type for events where only the start and end point are known, as drawing a LineString between these two points may be a poor representation of the spatial extent of the event. This situation is rare, but does occur occasionally.

31. Are there any gaps (e.g., geographic, domain, data elements, or implementation) you can see? - There is no place for an expected activity schedule in the current WZDx message. I believe the current approach is to submit multiple separate events using the first-occurrence and next-occurrence related road event types?

32. Any application areas or use cases you want prioritized?

33. What concerns do you have with the CWZ standard? - No concerns

6. Additional Guidance & Support Needs

34. Where would you like more guidance? (check all that apply)

☐ Converting from WZDx to CWZ

☐ Understanding required/optional fields

☐ [Data quality validation](#)

☐ Publishing compliant feeds

☐ Vendor/contractor workflows

☐ [Security](#)

☐ Other (specify)

35. What features or enhancements would you like to see added to the CWZ standard?

1. The established REST pull request framework works well for general use cases but can be inefficient for iterative updates and more precise requests. The addition of standardized query parameters would be a valuable addition, to standardize ways to filter the feed. We would suggest query parameters for:

- `modified_since/changed_after`: a timestamp (ISO8601 or utc milliseconds) which filters for only events which have changed since the timestamp specified. This would significantly reduce message sizes for multiple successive requests
- `geospatial filter`: could be a polygon or a point and radius, or even a linestring and width. This would allow filtering for events in the vicinity of a user.

2. Additionally, for center-to-center communication, the current best approach is for the consumer to make continual timed request to the provider, then evaluate whether any changes are present in the feed. This adds a lot of processing load to both systems, and if the consumer wishes to reduce their change latency, they must query more often, further increasing the load on both sides. Adding an alternate streaming communication protocol (such as Websockets, gRPC, MQTT, Server-Sent Events, ...), would

alleviate these issues, and allow notification of changes to be pushed from the provider to the consumer. The addition of a modified_since/changed_after query parameter would improve the current system but not alleviate all the concerns. This issue is even more relevant for field device feeds, which is becoming widely supported by connected field device manufacturers.

3. Is there planned support for road closure events (unrelated to work zones)? At CDOT, those are closely linked, and we would like to have a better way of sharing these road closures.

36. Do you see a need for deployment support? What type of support? – not at this time

37. Would a test spec/use case test documentation be valuable to you? – more use case examples/documentation are always welcome!

7. Projects, Funding, and Analysis

38. What projects are you working on that touch WZDx or CWZ?

39. Have you done any analysis on the standard/spec? – Only as it pertains to CDOT’s implementation

40. Where do you send your feeds? (511, third parties, WZDx Feed Registry, etc.) – CDOT’s WZDx feed is shared with the WZDx feed registry, the SDX, and is consumed by Waze.

41. What grants or funding do you use for work zone activities?

8. V&V Participation

42. Self-assessment: Compared to other agencies, your CWZ/WZDx implementation is:

- o Advanced / Early adopter -X

- o Following the lead of early adopters

- o Just getting started / Not currently pursuing, maybe “wait and see”

43. Are you willing/able/ready to be a validation site (regardless of current agency progress in CWZ implementation)?

44. Are you willing to share a CWZ feed for V&V testing? – Absolutely! CDOT’s CWZ feed is ready and available on the USDOT WZDx feed registry.

45. Any related CWZ work we should know about so we don’t duplicate effort? - None

A.2 QLynx Technologies

CWZ V&V Agency Survey –

The CWZ Standard v1.0 is now entering the Verification and Validation (V&V) phase. This survey will help identify real-world implementation status, challenges, and needs, so we can target testing, documentation, and guidance. Please answer on behalf of your agency's work zone data efforts. This should take ~15–20 minutes.

1. Agency Profile & Role

1. Agency name, region/state/province

QLynx Technologies, based in Colorado, but we provide smart work zones across the United States. This is a private company, but we expect to be providing CWZ feeds for our customers, various state DOTs.

2. Point of Contact (name, title, email, phone)

Devorah Henderson, Co-Founder and Head of Engineering, devorah@qlynxtech.com,
404-989-8956

3. Your role in work zone data collection/management:

o Policy/planning

o Technical/data management

o Field operations

o Other (specify)

4. Who is currently in charge of work zone data feeds in your agency?

Our programming department

5. Who championed the adoption of WZDx (if applicable)?

Myself, Devorah Henderson

2. Current Work Zone Data Practices

6. How many work zones are typically in place at any given time (regardless of worker presence)?

40

7. How would you describe the distribution of your work zone sizes? (e.g., mostly small, mostly large, a mix)

Mostly large

8. What types of work zones do you typically manage? (e.g., mobile operations, long-term closures)

We typically provide smart work zone systems for larger highway construction projects.

9. How long are work zones typically in place?

1 month – 7 years

10. How long are workers typically present within those work zones?

We do not currently track this data, but may do so for in the future. There are definitely workers present in these work zones, as they are one of the categories that smart work zone systems help protect.

11. When are work zones typically active (nighttime, weekends, etc.)?

Most of these work zones are constantly active, although weekends or night-times are often used for more significant phases of closure. Occasional projects function only on nights or weekends, but this is the minority.

12. Where are your work zones located? (urban, rural, statewide, etc.) Are there any differences you can see with how (or what type of) field devices are deployed depending on area type?

Primarily urban. Yes, significantly more field devices are deployed in dense urban areas, since the high volume of traffic can create more risk for backups and accidents etc. Urban areas are also more likely to implement multiple safety strategies (queue systems, sensors, PCMS units, flashing beacons, travel times systems etc).

13. Field devices used for work zone data:

- o Arrow board
- o Camera
- o Dynamic message sign (DMS)
- o Flashing beacon
- o Hybrid sign
- o Location marker
- o RSU
- o Traffic sensor
- o Traffic signal
- o Other (specify)

14. What's the current response time for updating work zone data feeds based on changes to the work zone? Is that different from your ideal response time?

From our side, most changes are registered digitally and we can update them to the feed in minute by minute data. However, if any manual changes are needed, this would depend on the response time from those in the field, which could be variable.

15. CV/V2X technology experience:

- o Pilots
- o Implementations
- o Other (specify)

Briefly describe the experience here:

16. Platforms/software used to create work zone data feeds:

- o In-house tools

☐ Vendor system

☐ Other (specify)

3. WZDx/CWZ Adoption & Status

17. Which specification(s) do you currently use?

☐ WZDx v3.x

☐ WZDx v4.x

☐ CWZ v1.0

☐ Other (specify)

18. When did you adopt WZDx?

We have been tracking its development through the last few years and starting to adopt it recently.

19. Why did you adopt WZDx? (problems you wanted solved)

Our anticipation is that this will be the standard for sharing work zone data with DOTs and other interested parties (such as traffic apps like Waze, Apple Maps, Google Maps, etc). And it already shows up in some specs. So we want to be prepared to provide this to our customers. Currently, we provide data feeds to many of our customers that provide a similar purpose, but these are specifically customized to the requirements of each local DOT and their specifications, and it makes sense to have a universal standard instead of each area requiring their own feeds and none of them being compatible.

20. Do you plan to transition to CWZ v1.0?

☐ Yes — in progress

☐ Yes — planned

☐ No

☐ Unsure

21. Estimated CWZ adoption timeline: Variable

22. Have you started testing or implementing CWZ v1.0? We are not yet providing it to customers but are working so it will be ready to release when needed.

23. Who do you look to for deciding when to adopt new technology or standards? (peers, FHWA, vendors, etc.) Peers, FHWA.

4. Implementation Process

24. Describe your process for creating and maintaining a WZDx/CWZ feed.

We are used to providing data feeds to customers, so in this case, we are just working to get data into the proper format and to ensure we have all the needed data for CWZ.

25. How do you ensure feed data is fresh, updated, and accurate?

Our system is able to track equipment digitally and so can update a significant amount of data to the feed one a minute by minute basis. But we do have questions about timely collection of any data that would be manually entered and how to get it from field personnel or DOTs in a timely manner.

26. How does a contractor or maintenance team contribute data to your feed?

We have not yet worked on this aspect data collection, but are considering how to make this easy for customers.

27. Any back-office/IT concerns with WZDx or CWZ?

28. How did you secure your WZDx/CWZ feeds to ensure that only authorized users can access or modify the data?

In our case, because we are a technology company, we are used to password protecting data and ensuring our procedures have security compliance.

5. Challenges & Gaps

29. What issues have you faced in deploying your feed?

30. Have you noticed any difference in implementability between WZDx and CWZ?

No

31. Are there any gaps (e.g., geographic, domain, data elements, or implementation) you can see?

Data elements:

1. We provide Bluetooth devices in a fair number of work zones. The original intention was for CWZ to contain Bluetooth devices. However, these were first categorized as sensors, and near the time CWZ was approved, the group realized that Bluetooth devices really need their own device type since they have data elements not part of normal sensors. I still think these are needed as they are a common work zone data device.
2. Classification Data for Radar Sensors - I believe the current feeds support things like speed, volume, and occupancy from radars. But I don't believe it includes classification data (i.e. size of vehicles, small, medium, and large) and that is a common data type provided by side fire radars. I think DOTs may want access to this, where applicable.

32. Any application areas or use cases you want prioritized?

33. What concerns do you have with the CWZ standard?

I think the feed could use more ability to define and provide data about the work zone itself.

6. Additional Guidance & Support Needs

34. Where would you like more guidance? (check all that apply)

- ☐ Converting from WZDx to CWZ
- ☐ Understanding required/optional fields
- ☐ Data quality validation
- ☐ Publishing compliant feeds
- ☐ Vendor/contractor workflows
- ☐ Security
- ☐ Other (specify)

35. What features or enhancements would you like to see added to the CWZ standard?

More consideration about the work zone ID to define the entire work zone and how a person can provide information about the work zone itself.

36. Do you see a need for deployment support? What type of support?

37. Would a test spec/use case test documentation be valuable to you?

7. Projects, Funding, and Analysis

38. What projects are you working on that touch WZDx or CWZ?

39. Have you done any analysis on the standard/spec?

Yes, we analyzed it significantly during its development

40. Where do you send your feeds? (511, third parties, WZDx Feed Registry, etc.)

We anticipate that our feeds will mostly go to DOTS, but can provide them to any parties they specify.

41. What grants or funding do you use for work zone activities?

NA

8. V&V Participation

42. Self-assessment: Compared to other agencies, your CWZ/WZDx implementation is:

- o Advanced / Early adopter

- o Following the lead of early adopters

- o Just getting started / Not currently pursuing, maybe “wait and see”

43. Are you willing/able/ready to be a validation site (regardless of current agency progress in CWZ implementation)? Because we are a private vendor, this is probably not appropriate for us to say yes to, as it would be a question for the DOTs we support, since if their data.

44. Are you willing to share a CWZ feed for V&V testing?

This would depend on the DOTs we support.

45. Any related CWZ work we should know about so we don't duplicate effort?

A.3 Blyncsy

CWZ V&V Agency Survey –

The CWZ Standard v1.0 is now entering the Verification and Validation (V&V) phase. This survey will help identify real-world implementation status, challenges, and needs, so we can target testing, documentation, and guidance. Please answer on behalf of your agency's work zone data efforts. This should take ~15–20 minutes.

1. Agency Profile & Role: [Road asset and condition monitoring with crowdsourced data & AI](#)

1. Agency name, region/state/province: [Blyncsy \(Bentley Systems\)](#)

2. Point of Contact (name, title, email, phone): [Mark Pittman, Sr. Director, Transportation AI](#)

3. Your role in work zone data collection/management:

o Policy/planning

o Technical/data management

o Field operations

o Other (specify): [Data collection & analysis](#)

4. Who is currently in charge of work zone data feeds in your agency?

[No applicable for our data collection & analysis process.](#)

5. Who championed the adoption of WZDx (if applicable)?

[No applicable for our data collection & analysis process.](#)

2. Current Work Zone Data Practices:

[On demand data collection in work zones and analysis of lane closure and providing WZZDx feed](#)

6. How many work zones are typically in place at any given time (regardless of worker presence)?

[It depends on the are we are monitoring. Typically clients request monitoring \(eg ground truth imagery, lane closures\) on known work zoen location. It can range on 10-20 miles of a highway or statewide.](#)

7. How would you describe the distribution of your work zone sizes? (e.g., mostly small, mostly large, a mix):

[No applicable for our data collection & analysis process.](#)

8. What types of work zones do you typically manage? (e.g., mobile operations, long-term closures):

[No applicable for our data collection & analysis process.](#)

9. How long are work zones typically in place?

[No applicable for our data collection & analysis process.](#)

10. How long are workers typically present within those work zones?

[No applicable for our data collection & analysis process.](#)

11. When are work zones typically active (nighttime, weekends, etc.)?

No applicable for our data collection & analysis process.

12. Where are your work zones located? (urban, rural, statewide, etc.) Are there any differences you can see with how (or what type of) field devices are deployed depending on area type?

No applicable for our data collection & analysis process.

13. Field devices used for work zone data: No applicable for our data collection & analysis process.

- ☐ Arrow board
- ☐ Camera
- ☐ Dynamic message sign (DMS)
- ☐ Flashing beacon
- ☐ Hybrid sign
- ☐ Location marker
- ☐ RSU
- ☐ Traffic sensor
- ☐ Traffic signal
- ☐ Other (specify)

14. What's the current response time for updating work zone data feeds based on changes to the work zone? Is that different from your ideal response time? Near-real time with crowdsourced dash cam imagery

15. CV/V2X technology experience: No applicable for our data collection & analysis process.

- ☐ Pilots
- ☐ Implementations
- ☐ Other (specify)

Briefly describe the experience here:

16. Platforms/software used to create work zone data feeds: In house tools

- ☐ In-house tools
- ☐ Vendor system
- ☐ Other (specify)

3. WZDx/CWZ Adoption & Status

17. Which specification(s) do you currently use? WZDx v4.x

- ☐ WZDx v3.x
- ☐ WZDx v4.x
- ☐ CWZ v1.0
- ☐ Other (specify)

18. When did you adopt WZDx? [No applicable for our data collection & analysis process.](#)

19. Why did you adopt WZDx? (problems you wanted solved) [No applicable for our data collection & analysis process.](#)

20. Do you plan to transition to CWZ v1.0? [Unsure](#)

☐ Yes — in progress

☐ Yes — planned

☐ No

☐ Unsure

21. Estimated CWZ adoption timeline: [No applicable for our data collection & analysis process.](#)

—

22. Have you started testing or implementing CWZ v1.0? [No.](#)

23. Who do you look to for deciding when to adopt new technology or standards? (peers, FHWA, vendors, etc.)

[Industry standards and publications](#)

4. Implementation Process

24. Describe your process for creating and maintaining a WZDx/CWZ feed.

[Crowdsourced imagery from work zones is collected on-demand \(per customer requested location, time and duration\) and data is analyzed to provided WZDX feed and lane closure information.](#)

25. How do you ensure feed data is fresh, updated, and accurate?

[Dash cam imagery provides near-real time imagery of the selected work zone](#)

26. How does a contractor or maintenance team contribute data to your feed? [No contribution from other parties currently](#)

27. Any back-office/IT concerns with WZDx or CWZ? [None](#)

28. How did you secure your WZDx/CWZ feeds to ensure that only authorized users can access or modify the data?

[Only authenticated users create the feed](#)

5. Challenges & Gaps

29. What issues have you faced in deploying your feed? [Unknown](#)

30. Have you noticed any difference in implementability between WZDx and CWZ? [Unknown](#)

31. Are there any gaps (e.g., geographic, domain, data elements, or implementation) you can see? [Unknown](#)

32. Any application areas or use cases you want prioritized? [Unknown](#)

33. What concerns do you have with the CWZ standard? [Unknown](#)

6. Additional Guidance & Support Needs

34. Where would you like more guidance? (check all that apply)

- ☐ Converting from WZDx to CWZ [Yes](#)
- ☐ Understanding required/optional fields [Yes](#)
- ☐ Data quality validation [Yes](#)
- ☐ Publishing compliant feeds [Yes](#)
- ☐ Vendor/contractor workflows [Yes](#)
- ☐ Security
- ☐ Other (specify)

35. What features or enhancements would you like to see added to the CWZ standard? [Unknown](#)

36. Do you see a need for deployment support? What type of support? [NA](#)

37. Would a test spec/use case test documentation be valuable to you? [Yes](#)

7. Projects, Funding, and Analysis

38. What projects are you working on that touch WZDx or CWZ?

[Pilot projects with New Mexico DOT & North Carolina DOT is collecting imagery from work zone locations](#)

39. Have you done any analysis on the standard/spec?

[No](#)

40. Where do you send your feeds? (511, third parties, WZDx Feed Registry, etc.)

[WZDX Feed Registry](#)

41. What grants or funding do you use for work zone activities? [None currently](#)

8. V&V Participation

42. Self-assessment: Compared to other agencies, your CWZ/WZDx implementation is: [NA](#)

- ☐ Advanced / Early adopter
- ☐ Following the lead of early adopters
- ☐ Just getting started / Not currently pursuing, maybe “wait and see”

43. Are you willing/able/ready to be a validation site (regardless of current agency progress in CWZ implementation)? [NA](#)

44. Are you willing to share a CWZ feed for V&V testing? [NA](#)

45. Any related CWZ work we should know about so we don’t duplicate effort? [NA](#)

A.4 Caltrans

1. Agency Profile & Role

1. Agency name, region/state/province

California Department of Transportation

2. Point of Contact (name, title, email, phone)

3. Your role in work zone data collection/management:

Transportation Engineer

o Policy/planning

o Technical/data management

o Field operations

o Other (specify)

4. Who is currently in charge of work zone data feeds in your agency?

Office of Connected Ecosystem, CAV Program

5. Who championed the adoption of WZDx (if applicable)? Office of Connected Ecosystem

2. Current Work Zone Data Practices Using LCS (Lane Closure System) developed by Caltrans

6. How many work zones are typically in place at any given time (regardless of worker presence)? Around 72000 lane closures per month are requested **before pre-screening**, and **50,000 per month** is the number of requests **entered** into the **Caltrans Lane Closure System (LCS)** after pre-screening.

7. How would you describe the distribution of your work zone sizes? (e.g., mostly small, mostly large, a mix)

It would be better to define the small, large or mix. The distribution of our work zone sizes is mixed, with a combination of small, medium, and large projects depending on the location, type of work, and project duration. Refer to AB752 2023-2024 for more information.

8. What types of work zones do you typically manage? (e.g., mobile operations, long-term closures)

Work zone operation team usually manages the short-term planed lane closures.

9. How long are work zones typically in place?

Please clarify this question. Do you mean how long is the lane closure or how long it takes to put a lane closure in place.

10. How long are workers typically present within those work zones?

It depends on the length of the closures.

11. When are work zones typically active (nighttime, weekends, etc.)?

It depends on lane requirement chart.

12. Where are your work zones located? (urban, rural, statewide, etc.) Are there any differences you can see with how (or what type of) field devices are deployed depending on area type?

[It depends on lane requirement chart.](#)

13. Field devices used for work zone data:

- ☐ Arrow board
- ☐ Camera
- ☐ Dynamic message sign (DMS)
- ☐ Flashing beacon
- ☐ Hybrid sign
- ☐ Location marker
- ☐ RSU
- ☐ Traffic sensor
- ☐ Traffic signal
- ☐ Other (specify)

[The field devices used for work zone data include arrow boards, cameras, portable changeable message signs \(PCMS\), flashing beacons, hybrid signs, location markers, roadside units \(RSUs\), traffic sensors, and traffic signals. Please refer to Caltrans standard plans and construction plans for details.](#)

14. What's the current response time for updating work zone data feeds based on changes to the work zone? Is that different from your ideal response time?

[The current response time for updating work zone data feeds is approximately **every 1 to 2 minutes** after a change is made to the work zone information. This aligns closely with our ideal response time, as near real-time updates help ensure accurate and timely traveler information.](#)

15. CV/V2X technology experience:

- ☐ Pilots
- ☐ Implementations
- ☐ Other (specify)

Briefly describe the experience here:

[For pilot and testing bed information refer to champion group.](#)

16. Platforms/software used to create work zone data feeds:

- ☐ In-house tools
- ☐ Vendor system
- ☐ Other (specify)

[In-house tools – primarily the Lane Closure System \(LCS\), which generates work zone data feeds. QuickMap is used to visualize these feeds for public access but does not create the feeds itself.](#)

3. WZDx/CWZ Adoption & Status

17. Which specification(s) do you currently use?

- ☐ WZDx v3.x
- ☐ WZDx v4.x
- ☐ CWZ v1.0
- ☐ Other (specify)

We currently use the WZDx specification (latest known public release is v4.2). We are aware of the CWZ v1.0 specification could be a potential as a reference for future work.

18. When did you adopt WZDx?

The WZDx specification (v1.1) was published in September 2018. We collaborated with Bay area MPO on pilot projects. It's on research phase.

19. Why did you adopt WZDx? (problems you wanted solved)

We adopted WZDx for pilot purpose to standardize work zone data and improve the accuracy, timeliness, and interoperability of information shared with travelers and connected vehicle systems. The primary problems we wanted to address included inconsistent work zone reporting, delayed updates to traveler information systems, and the need to support emerging technologies such as CV/ V2X for enhanced work zone safety and traffic management.

20. Do you plan to transition to CWZ v1.0?

- ☐ Yes — in progress
- ☐ Yes — planned
- ☐ No
- ☐ Unsure

No

21. Estimated CWZ adoption timeline: ____

22. Have you started testing or implementing CWZ v1.0?

23. Who do you look to for deciding when to adopt new technology or standards? (peers, FHWA, vendors, etc.)

4. Implementation Process

24. Describe your process for creating and maintaining a WZDx/CWZ feed.

Based on our research and pilot projects our process for creating and maintaining a WZDx/CWZ feed may begin with inputting work zone information into the **Lane Closure System (LCS)**. Once closures are approved in LCS, the data is automatically processed by in-house tools to generate the WZDx/CWZ feed in the required format. We perform **regular validation checks** to ensure data accuracy and completeness, including verifying location, start/end times, and lane impacts. The feed is **updated continuously** to reflect any changes, and is monitored for errors or delays to ensure near real-time availability for public-facing applications like **QuickMap** and connected vehicle systems.

25. How do you ensure feed data is fresh, updated, and accurate?

We ensure feed data is fresh, updated, and accurate by relying on **real-time updates from the Lane Closure System (LCS)**. All changes to work zones, including new closures, extensions, or removals, are entered and approved in LCS, which triggers updates to the WZDx/CWZ feed. In addition, we perform **automated and manual validation checks** to verify location accuracy, lane impact information, and start/end times. The feed is continuously monitored to detect any errors or delays, ensuring near real-time accuracy for public-facing applications and connected vehicle systems.

26. How does a contractor or maintenance team contribute data to your feed?

Contractors and maintenance teams contribute data to the feed by **submitting work zone information through the Lane Closure System (LCS)**. They enter details such as location, lane impacts, start and end times, and any changes or updates. Once the submissions are approved in LCS, the data is automatically incorporated into the WZDx/CWZ feed for near real-time availability.

27. Any back-office/IT concerns with WZDx or CWZ?

Some back-office and IT concerns with WZDx/CWZ include ensuring **data accuracy and consistency**, maintaining **real-time feed updates**, handling **system integration** with LCS and other traffic management platforms, and addressing **cybersecurity and access control** for sensitive work zone information. Additionally, resources are needed to **monitor feed health**, troubleshoot errors, and implement **version updates** as WZDx/CWZ specifications evolve.

28. How did you secure your WZDx/CWZ feeds to ensure that only authorized users can access or modify the data?

We secure WZDx/CWZ feeds by controlling access through the **Lane Closure System (LCS)**, which requires **authenticated user accounts** for data entry and modification. Only authorized personnel, such as district staff, contractors, and maintenance teams with proper credentials, can submit or edit work zone information. Additionally, **network security protocols** and system monitoring help protect the feed from unauthorized access or tampering.

5. Challenges & Gaps

29. What issues have you faced in deploying your feed?

Some issues we've faced in deploying our WZDx/CWZ feed include **ensuring timely updates from all work zones**, **maintaining data accuracy and consistency**, and **integrating the feed with multiple systems** like QuickMap and connected vehicle platforms. Additional challenges include **training staff and contractors** to correctly enter data in LCS, **handling feed errors or formatting issues**, and keeping up with **updates to WZDx/CWZ specifications**.

30. Have you noticed any difference in implementability between WZDx and CWZ?

Yes, there are differences in implementability between WZDx and CWZ. **WZDx** is widely supported and focuses on **standardized work zone data for connected vehicle and traveler information systems**, making it relatively straightforward to implement with existing LCS feeds. **CWZ**, on the other hand, is newer and more specialized, with additional fields and structure for connected work zones, which can require **more development and integration effort**. Overall, WZDx is easier to implement in the current workflow, while CWZ may offer more detailed capabilities but with slightly higher implementation complexity.

31. Are there any gaps (e.g., geographic, domain, data elements, or implementation) you can see?

Gaps exist in geographic coverage, some specialized data elements, and implementation consistency, including staff training and system integration.

32. Any application areas or use cases you want prioritized?

Priority application areas include **real-time traveler information**, **connected vehicle safety warnings**, **work zone performance monitoring**, and **traffic management optimization**. We would also like to prioritize **integration with advanced traffic management systems (ATMS)**, **data analytics for work zone planning**, and **support for CV/ V2X applications** to improve safety and efficiency.

33. What concerns do you have with the CWZ standard?

Some concerns with the CWZ standard include **implementation complexity**, due to additional fields and structure compared to WZDx, which may require more development and integration effort. There are also potential **data consistency and completeness issues**, especially when capturing specialized work zone types or lane-specific impacts. Additionally, keeping up with **version updates**, ensuring **staff and contractor training**, and integrating CWZ feeds with existing systems like LCS and QuickMap are ongoing considerations.

6. Additional Guidance & Support Needs

34. Where would you like more guidance? (check all that apply)

- ☐ Converting from WZDx to CWZ
- ☐ Understanding required/optional fields
- ☐ Data quality validation
- ☐ Publishing compliant feeds
- ☐ Vendor/contractor workflows
- ☐ Security
- ☐ Other (specify)

35. What features or enhancements would you like to see added to the CWZ standard?

We would like to see the following features or enhancements added to the CWZ standard:

- **Lane-specific impacts and work activity details** to better represent complex work zones.
- **Real-time work progress updates** to improve the accuracy of traveler information and connected vehicle warnings.
- **Enhanced integration guidance** with existing systems like LCS, QuickMap, and ATMS.
- **Clearer definitions for required vs. optional fields** to reduce data inconsistencies.
- **Support for contractor/vendor workflows** to streamline data submission and validation.
- **Security and access control recommendations** to protect sensitive work zone data.

36. Do you see a need for deployment support? What type of support?

Deployment support is needed in technical guidance, staff/contractor training, best practices for feed management, and troubleshooting assistance.

37. Would a test spec/use case test documentation be valuable to you?

Yes, test specifications and use case documentation would help ensure consistent implementation, data accuracy, and proper training.

7. Projects, Funding, and Analysis

- 38. What projects are you working on that touch WZDx or CWZ?
- 39. Have you done any analysis on the standard/spec?
- 40. Where do you send your feeds? (511, third parties, WZDx Feed Registry, etc.)
- 41. What grants or funding do you use for work zone activities?

8. V&V Participation

- 42. Self-assessment: Compared to other agencies, your CWZ/WZDx implementation is:
 - o Advanced / Early adopter
 - o Following the lead of early adopters
 - o Just getting started / Not currently pursuing, maybe “wait and see”
- 43. Are you willing/able/ready to be a validation site (regardless of current agency progress in CWZ implementation)?
- 44. Are you willing to share a CWZ feed for V&V testing?
- 45. Any related CWZ work we should know about so we don’t duplicate effort?

A.5 Ver-Mac

CWZ V&V Agency Survey –

The CWZ Standard v1.0 is now entering the Verification and Validation (V&V) phase. This survey will help identify real-world implementation status, challenges, and needs, so we can target testing, documentation, and guidance. Please answer on behalf of your agency's work zone data efforts. This should take ~15–20 minutes.

1. Agency Profile & Role Device MFG

1. Agency name, region/state/province Ver-Mac, Quebec Canada and Conroe, TX

2. Point of Contact (name, title, email, phone) Serge Beaudry, VP R&D and Products,,
serge.beaudry@ver-mac.com 418-933-6850

3. Your role in work zone data collection/management:

☐ Policy/planning

☒ Technical/data management

☐ Field operations

☐ Other (specify)

4. Who is currently in charge of work zone data feeds in your agency? R&D and Support Department

5. Who championed the adoption of WZDx (if applicable)? Myself- Serge Beaudry

2. Current Work Zone Data Practices

6. How many work zones are typically in place at any given time (regardless of worker presence)? n/a

7. How would you describe the distribution of your work zone sizes? (e.g., mostly small, mostly large, a mix) n/a

8. What types of work zones do you typically manage? (e.g., mobile operations, long-term closures) n/a

9. How long are work zones typically in place? n/a

10. How long are workers typically present within those work zones? n/a

11. When are work zones typically active (nighttime, weekends, etc.)? n/a

12. Where are your work zones located? (urban, rural, statewide, etc.) Are there any differences you can see with how (or what type of) field devices are deployed depending on area type? n/a

13. Field devices used for work zone data:

☒ Arrow board

☐ Camera

☐ Dynamic message sign (DMS)

☐ Flashing beacon

☐ Hybrid sign

☐ Location marker including GPS beacon and worker's module

☐ RSU

☐ Traffic sensor

☐ Traffic signal

☐ Other (specify) AFAD

14. What's the current response time for updating work zone data feeds based on changes to the work zone? Is that different from your ideal response time? Within 1 minute

15. CV/V2X technology experience: We are pushing to Waze (who send to google sometime) and onboard some vehicle with HAAS Alert

☐ Pilots

☐ Implementations

☐ Other (specify)

Briefly describe the experience here:

16. Platforms/software used to create work zone data feeds:

☐ In-house tools

☐ Vendor system - our system

☐ Other (specify)

3. WZDx/CWZ Adoption & Status

17. Which specification(s) do you currently use?

☐ WZDx v3.x

☐ WZDx v4.x

☐ CWZ v1.0

☐ Other (specify)

18. When did you adopt WZDx? 4 years ago

19. Why did you adopt WZDx? (problems you wanted solved) to report location of work zone devices and their data

20. Do you plan to transition to CWZ v1.0?

☐ Yes — in progress already done

☐ Yes — planned

☐ No

☐ Unsure

21. Estimated CWZ adoption timeline: _done_

22. Have you started testing or implementing CWZ v1.0? yes

23. Who do you look to for deciding when to adopt new technology or standards? (peers, FHWA, vendors, etc.) Early adopters and standards

4. Implementation Process

24. Describe your process for creating and maintaining a WZDx/CWZ feed. All of our device are pushing their data real time. We have a tool to setup feed based on project or geography, type of devices, extends of the data and update periods desired by the requester

25. How do you ensure feed data is fresh, updated, and accurate? Our device are always connected and pushing changes on demand + periodic health check. Data includes timestamps for each devices

26. How does a contractor or maintenance team contribute data to your feed? Using our devices. No extra steps

27. Any back-office/IT concerns with WZDx or CWZ? No

28. How did you secure your WZDx/CWZ feeds to ensure that only authorized users can access or modify the data? Credentials are required to access the feed.

5. Challenges & Gaps

29. What issues have you faced in deploying your feed? None

30. Have you noticed any difference in implementability between WZDx and CWZ? Minor

31. Are there any gaps (e.g., geographic, domain, data elements, or implementation) you can see? What is missing is representing in the device feeds the location of conventional asset that impact the workzone. EX: conventional speed limit sign, end of work zone, shift lanes, etc... fundamentally they are not different from a digital speed limit and end of Work zone GPS beacon, etc..

32. Any application areas or use cases you want prioritized? The one above. This would provide a way better definition of what is going on on the road.

33. What concerns do you have with the CWZ standard? Slow adoption by the agency to use the device feed as a way to confirm the jobs on going.

6. Additional Guidance & Support Needs

34. Where would you like more guidance? (check all that apply) none

- o Converting from WZDx to CWZ
- o Understanding required/optional fields
- o Data quality validation
- o Publishing compliant feeds
- o Vendor/contractor workflows
- o Security
- o Other (specify)

35. What features or enhancements would you like to see added to the CWZ standard? See 31

36. Do you see a need for deployment support? What type of support? no

37. Would a test spec/use case test documentation be valuable to you? Not for us, but would be valuable for new people

7. Projects, Funding, and Analysis

38. What projects are you working on that touch WZDx or CWZ? Sending all lanes closures nationwide to Haas Alert. Using device data including workers to trigger “active” workzone in a 3rd party ATMS software.

39. Have you done any analysis on the standard/spec?

40. Where do you send your feeds? (511, third parties, WZDx Feed Registry, etc.) third parties

41. What grants or funding do you use for work zone activities? Internal money.

8. V&V Participation

42. Self-assessment: Compared to other agencies, your CWZ/WZDx implementation is:

[o Advanced / Early adopter](#)

[o Following the lead of early adopters](#)

[o Just getting started / Not currently pursuing, maybe “wait and see”](#)

43. Are you willing/able/ready to be a validation site (regardless of current agency progress in CWZ implementation)? Yes

44. Are you willing to share a CWZ feed for V&V testing? Yes

45. Any related CWZ work we should know about so we don’t duplicate effort?

A.6 Florida DOT

CWZ V&V Agency Survey –

The CWZ Standard v1.0 is now entering the Verification and Validation (V&V) phase. This survey will help identify real-world implementation status, challenges, and needs, so we can target testing, documentation, and guidance. Please answer on behalf of your agency's work zone data efforts. This should take ~15–20 minutes.

1. Agency Profile & Role

1. Agency name, region/state/province [Florida Department of Transportation](#)
2. Point of Contact (name, title, email, phone) [JoAnna Hand, FDOT State TSM&O Software Manager; Traffic Engineering and Operations Office; joanna.hand@dot.state.fl.us; \(850\) 510-5444](#)
3. Your role in work zone data collection/management:
 - o Policy/planning – [Involved in developing and implementing WZDx through collaboration with other FDOT stakeholders.](#)
 - o Technical/data management – [responsible for Data Exchange Platform for Operational Technology \(DEPOT\) - formerly V2X DEP which is the central repository for V2X \(SAE J2735 vehicle-to-everything\) data and has expanded to integrate other important traffic data sources, including traffic counters, microwave detection systems, and probe vehicle data including WZDx feeds. There are other sources of WZDx feeds within the Department.](#)
 - o Field operations – [Typically little involvement. These primarily are under Construction who we regularly collaborate with. However, currently Regional Traffic Management Center \(RTMC\) operators have processes for inputting work zone events into the FDOT ATMS, SunGuide. As the SunGuide software manager, JoAnna regularly communicates and coordinates with the RTMC operators on processes and systems.](#)
 - o Other (specify)
 1. [FDOT's FL 511 system ingests WZDx and is considered a FL navigation provider with data coming from SunGuide.](#)
 2. [Data Integration and Video Aggregation System \(DIVAS\), the FDOT system that provides information directly to WAZE also receives data from SunGuide.](#)
 3. [DEPOT also receives data from SunGuide.](#)
 4. [Lane Closure Notification System \(LCNS\) receives data from contractors who submit their plans for approval for closing lanes during construction and also activate when a lane closure is initiated in the field and when remove it when completed.](#)

[It should be noted that data and information flows of Work Zone information, including WZDx, are still evolving within the Department.](#)

4. Who is currently in charge of work zone data feeds in your agency?
 - a. [FL 511 – James Landini, Central Office Traffic Engineering and Operations](#)
 - b. [DIVAS – James Landini, Central Office Traffic Engineering and Operations](#)
 - c. [DEPOT - JoAnna Hand, Central Office Traffic Engineering and Operations](#)

d. LCNS – Ryan Buck, Central Office Construction

5. Who championed the adoption of WZDx (if applicable)? Previously it was Raj Ponnaluri with these efforts beginning in 2021. Since then, various FDOT groups, including JoAnna in TEO have expanded the adoption and use of these.

2. Current Work Zone Data Practices

6. How many work zones are typically in place at any given time (regardless of worker presence)? FDOT has hundreds of active projects that may have construction in them at any one time ranging from small traffic signal, ITS or sidewalk work all the way to complex multi-year, multi-phase design build projects. Utilizing some of FDOTs Active Construction Contract data updated on Dec 1, 2025, there are approximately 530 projects in active construction across the state that may have work zones in place.

7. How would you describe the distribution of your work zone sizes? (e.g., mostly small, mostly large, a mix) FDOT Construction work zones consist of a mix from heavy freeway to arterial. Other work zones on FDOT facilities include those by FDOT Maintenance forces and contractors, utility companies and those operating in FDOT right of way. These last three are typically smaller than FDOT heavy freeway construction. In general, over the past few years, it seems that FDOT has more large projects.

8. What types of work zones do you typically manage? (e.g., mobile operations, long-term closures) In the current data we are aware of, Construction is the most dominant. Typically, any long-term work on FDOT roadways have additional capacity provided with additional lanes or with well-developed detour routes. FDOT Construction typically involve overnight or short-duration closures as well as long-term closures. Mobile operations can be part of regular Maintenance practices and potentially some Construction projects. These overnight moving activities could be paving projects with various construction functions occurring with lane closures behind tubular markers. The lanes may be closed, but the work area is concentrated and moving throughout the night.

9. How long are work zones typically in place? Typically, lane closures just exist long enough to complete the work during lower volume time periods. This is usually overnight or in some cases off-peak hours. This could be from 8 hours down to just a few hours depending on the capacity analysis. These would normally be utility work, ITS maintenance, minor traffic operations improvements. However, the larger project may be in place for months to years with traffic diversions or additional lanes added with long-term barriers protecting the construction work area.

10. How long are workers typically present within those work zones? See response #9 above for overnight closures, diversions, additional lanes added with barrier separation.

11. When are work zones typically active (nighttime, weekends, etc.)? For this response we are defining active as those locations where lane closures or capacity reductions occur. Most of our work zone lane closures occur during lower volume time periods where traffic impacts are less severe if lanes are closed. This is typically overnight or sometimes off-peak mid-day. These times for closures and capacity reductions are calculated in advance by the department, and these times are specified to the contractor in specifications.

12. Where are your work zones located? (urban, rural, statewide, etc.) Are there any differences you can see with how (or what type of) field devices are deployed depending on area type? In general, everywhere. From two-lane, two-way roadways in rural areas, to multilane roadways with complex staging in some of the country's largest and heavily congested areas.

13. Field devices used for work zone data:

- o Arrow board – At this time, these are not providing WZDx device feeds from FDOT. These may possibly be providing information from the contractor/vendor to navigation providers.
- o Camera – Yes – these are present in many major construction projects. At this time, these are not providing WZDx device feeds from FDOT. These may possibly be providing information from the contractor/vendor to navigation providers.
- o Dynamic message sign (DMS) – Assuming you mean Portable Changeable Message Signs (PCMS) which can be moved as a trailer. FDOT has these in many construction projects. DMS in FL commonly refers to the large, overhead gantry fixed changeable message signs. At times these DMS's are used to alert motorists by posting work zone conditions – especially to alert motorists in advance of lane and shoulder closures. At this time, both PCMS and DMS are not providing WZDx device feeds from FDOT. These may possibly be providing information from the contractor/vendor to navigation providers.
- o Flashing beacon – Occasionally in special condition projects where beacon with fixed signing are used to call attention to a condition like “Caution – Trucks entering or leaving traffic stream when flashing”. At this time, they are not providing WZDx device feeds from FDOT. These may possibly be providing information from the contractor/vendor to navigation providers.
- o Hybrid sign – FDOT does utilize variable speed signs to alert motorists to a different posted speed and/or utilizes speed feedback signs to inform motorists if they are above the posted speed. These can also be part of PCMS systems. At this time, they are not providing WZDx device feeds from FDOT. These may possibly be providing information from the contractor/vendor to navigation providers.
- o Location marker – Currently FDOT has special Smart Work Zone standard plans which incorporate WZDx devices, aka location markers in the CWZ, at the start and end of projects. These standard plans can be utilized by designers by permission (see WZDx System in “Other, item b below”. These may possibly be providing information from the contractor/vendor to navigation providers.
- o RSU – not typically used in work zone plans at this time.
- o Traffic sensor – Side-fire radar is used in many current and special SWZ standards to gather speed and volume information for work zone applications. It should be noted that RTMC operators utilize the extensive *existing* traffic sensor network across the state freeway system to be alerted to slowdowns, capacity reduction and queueing which may reflect planned or unplanned lane closures on the roadway system. Also know that these devices can help track historic speeds and volumes which could be used to support alternate lane-closure times different from the original construction contract. At this time, they are not providing WZDx device feeds from FDOT. These may possibly be providing information from the contractor/vendor to navigation providers.
- o Traffic signal – At this time, they are not providing WZDx device feeds from FDOT. These may possibly be providing information from the contractor/vendor to navigation providers.
- o Other (specify)
 - a. Motorist Awareness System (MAS). System used to inform motorists of speed and provide feedback on worker presence, posted speed and motorist speed.
 - i. Portable Changeable Message Sign (PCMS) to alert of speed reduction and worker presence.
 - ii. Portable Regulatory Sign (PRS) with fixed posted speed reduction and amber flashing lights “when flashing” to direct motorists to slow to speed shown.

- iii. Radar Speed Display Unit (RDU) with the fixed posted speed reduction plus a radar speed variable display to show motorists how fast they are traveling.
 - b. WZDx System – essentially a location marker as above to provide start and end location of work zone and additional details.
 - c. Queue Warning System (QWS) – Series of PCMSs and speed detection devices to detect speeds and queue build ups and warn motorists of downstream queues in advance of slowdowns or stopped traffic in work zones.
 - d. Dynamic Lane Merge (DLM) - Series of PCMSs and speed detection devices in the area of lane drop to support the activation of messages for motorists to merge early or late depending on traffic flow and current roadway capacity.
 - e. Dynamic Speed Harmonization (DSH) - Series of PCMSs, speed detection devices and speed feedback signs to communicate speed reductions to motorists as they approach congestion and cause them to reduce speed to facilitate smoother traffic flows through the work zone.
14. What's the current response time for updating work zone data feeds based on changes to the work zone? Is that different from your ideal response time? Data feed responses vary depending on the application. Some applications require human verification before automated messages can be posted, while others are transmitted and posted immediately with automated processes. Data feeds to WZDx may also be immediately posted depending on the source and system.
15. CV/V2X technology experience:
- o Pilots – FDOT is not aware of these or have any CV/V2X pilots in WZ's. However, we have several CV/V2X-related pilot projects.
 - o Implementations – same as previous
 - o Other (specify) - NA
- Briefly describe the experience here:
16. Platforms/software used to create work zone data feeds:
- o In-house tools – DEPOT is a state-owned software that provides an API feed. Support is provided by Southwest Research Institute (SwRI).
 - o Vendor system - LCNS above is provided by One.Network.
 - o Other (specify)

3. WZDx/CWZ Adoption & Status

17. Which specification(s) do you currently use?
- o WZDx v3.x - No.
 - o WZDx v4.x – yes – WZDx 4.2, for DEPOT
 - o CWZ v1.0 – No.
 - o Other (specify) - NA
18. When did you adopt WZDx? - FDOT adopted the use of WZDx in 2022. Since then, we have been working to implement feeds in other platforms and expansions.

19. Why did you adopt WZDx? (problems you wanted solved) – To distribute work zone information more broadly to motorists – over more areas of the state and further in advance of the actual work zone signing. Wanted to take advantage of connected vehicles or similar application capabilities for the safety of workers and motorists,

20. Do you plan to transition to CWZ v1.0?

o Yes — in progress

o Yes — planned – X as soon as finalized.

o No

o Unsure

21. Estimated CWZ adoption timeline: TBD

22. Have you started testing or implementing CWZ v1.0? – no, waiting for the guidance and protocols for this to have more time for testing and evaluation by others.

23. Who do you look to for deciding when to adopt new technology or standards? (peers, FHWA, vendors, etc.) – Looking for further confirmation of the published standards and how these are being applied by other agencies. FHWA or other standards agencies could help to educate and promote these to the agencies. We work out the details of new technology or standards so we can make sure it can be accomplished within all areas affected in FDOT and with our Florida stakeholders. The new technology or standards must be actionable and scalable for the Department and must meet our needs. Other considerations are will others within the state use these and will these technologies and standard change over time.

4. Implementation Process

24. Describe your process for creating and maintaining a WZDx/CWZ feed. We are in the process of gathering this information from various sources including 1.) the overall project schedule, 2.) the specific work zone schedule, 3.) the “active” condition of the work zone based on construction or lane closure information, 4.) the posted or changed speed condition, 5.) the presence of workers in the work zone. We need to make sure we are able to collect good data, create and maintain a feed, make sure we have and are following good standards so when we communicate it out to the motoring public it is safe and reliable information.

25. How do you ensure feed data is fresh, updated, and accurate? Department is still in development of these practices and approaches. Our API is public, and we work to follow the available standards and make sure it is delivered in real time. We use checks to make sure it is not stale, we confirm visually first with RTMC operators with our extensive camera network.

26. How does a contractor or maintenance team contribute data to your feed? Still in development. Most effort at this time is focused on construction project activities. Note that some construction and maintenance contractors in the state have devices that are capable of communicating directly with navigation providers to inform motorists of work zones. We have std op procedures in place & they comm with RTMC operators.

27. Any back-office/IT concerns with WZDx or CWZ? - Currently we are working through both the tool development/refinement along with the processes various branches of FDOT must share in to assign proper responsibilities. Naturally, we have data quality concerns that must be addressed when we are pulling data from sources outside of Department. In particular, we need to consider data on our roadways

that go directly from vendors to the navigation providers where we are outside of the loop. We need to understand what a good, comprehensive feed is and how it can be maintained. We need to understand how to refine how we comprehensively collect and share data. Also need to understand the need for and how to implement compatibility among various vendors which may be through national standardization.

28. How did you secure your WZDx/CWZ feeds to ensure that only authorized users can access or modify the data? FDOT's trained TMC operators utilize our secure ATMS, SunGuide, to input data into the feeds through secure data tunnels.

5. Challenges & Gaps

29. What issues have you faced in deploying your feed? See some of responses above. Our feeds for freeways are well established and understood. As we expand into arterial deployments, we lack the same depth of infrastructure which makes a similar level of deployment and monitoring more difficult.

30. Have you noticed any difference in implementability between WZDx and CWZ? NA

31. Are there any gaps (e.g., geographic, domain, data elements, or implementation) you can see? Currently there are some geographic, data elements for internal department reference. Need to consistently refer to same project including the project limits along the roadway and the time/duration that the project is planned to be under construction. From there we will be able to drill down to work zone level events and activities.

32. Any application areas or use cases you want prioritized? Construction has indicated lane closure, speed reduction and worker presence. We also need to have a consistent and comprehensive feed of data/information.

33. What concerns do you have with the CWZ standard? – How to implement/communicate to all agency stakeholders so we can reach consistent understanding and develop accepted, repeatable processes as we work to inform motorist. From our understanding there are still things being worked out with the CWZ standard and we need to understand the ramifications of the fluid nature of possible changes or things still to be more fully defined.

6. Additional Guidance & Support Needs

34. Where would you like more guidance? (check all that apply)

o Converting from WZDx to CWZ – Yes.

o Understanding required/optional fields – Would like to understand these so we can implement the ones that are essential to FDOT goals for construction – lane closure, speed reduction, worker presence, active work zone.

o Data quality validation – Possibly.

o Publishing compliant feeds – NA.

o Vendor/contractor workflows - Possibly

o Security – Possibly.

o Other (specify)

35. What features or enhancements would you like to see added to the CWZ standard? Unsure. at this time.

36. Do you see a need for deployment support? What type of support? – Possibly to get an understanding of what is being done nationally for comparison. Pilot projects and lessons learned by others could be helpful in this. These could include a better understanding of how field devices can be incorporated into the FDOT feeds.

37. Would a test spec/use case test documentation be valuable to you? Unsure.

7. Projects, Funding, and Analysis

38. What projects are you working on that touch WZDx or CWZ? FDOT's source that feeds WZDx is DEPOT.

39. Have you done any analysis on the standard/spec? Yes – we have reviewed it and adopted for WZDx 4.2.

40. Where do you send your feeds? (511, third parties, WZDx Feed Registry, etc. - FDOT sends our feeds from DEPOT to WZDx Feed Registry and is a public API available to any navigation providers. The Lane Closure Notification System (LCNS) provides a feed to third party navigation providers.

41. What grants or funding do you use for work zone activities? FDOT has not received any Federal grants.

8. V&V Participation

42. Self-assessment: Compared to other agencies, your CWZ/WZDx implementation is:

o Advanced / Early adopter

o Following the lead of early adopters Yes.

o Just getting started / Not currently pursuing, maybe “wait and see”

43. Are you willing/able/ready to be a validation site (regardless of current agency progress in CWZ implementation)? No/Unsure.

44. Are you willing to share a CWZ feed for V&V testing? Not at this time.

45. Any related CWZ work we should know about so we don't duplicate effort? NA