



Work Zone Data Exchange (WZDx) v3.1 - Specification Reference Document

*This PDF is current as of 4/30/2021, for the latest version, see the [WZDx Specification repository](#)

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1. Introduction

1.1 Project Description

What is the WZDx Specification? The Work Zone Data Exchange (WZDx) Specification enables infrastructure owners and operators (IOOs) to make harmonized work zone data available for third-party use. The intent is to make travel on public roads safer and more efficient through ubiquitous access to data on work zone activity. Specifically, the project aims to get data on work zones to vehicles to help automated driving systems (ADS) and human drivers navigate more safely.

Why is WZDx being developed? Improving access to work zone data is one of the top needs identified through the US Department of Transportation (USDOT) [Data for Automated Vehicle Integration \(DAVI\)](#) effort.

Up-to-date information about dynamic conditions occurring on roads – such as construction events – can help ADS and humans navigate safely and efficiently. Many IOOs maintain data on work zone activity. However, a lack of common data standards and convening mechanisms makes it difficult and costly for third parties – including original equipment manufacturers (OEMs) and navigation applications – to access and use these data across various jurisdictions.

Inspired by [GTFS](#), USDOT launched WZDx to jumpstart the voluntary adoption of a basic work zone data specification through collaboration with data producers and data users. Longer-term, the goal is to enable collaborative maintenance and expansion of the specification to meet the emerging needs of ADS.

Who is involved in developing WZDx? The [Federal Highway Administration \(FHWA\)](#) and [Intelligent Transportation Systems Joint Program Office \(ITS JPO\)](#) co-led the early stages of the WZDx project and remain actively involved along with the [Bureau of Transportation Statistics \(BTS\)](#), [Federal Motor Carrier Safety Administration \(FMCSA\)](#), and others in the USDOT.

Several data producers and data users voluntarily developed v1.1 of the specification in collaboration with USDOT, and have set up data feeds based on the specification. These WZDx-compliant feeds and their links can be found in the [Work Zone Data Exchange Feed Registry](#). Data producers with feeds in the registry currently include: Texas Department of Transportation (TxDOT), Massachusetts Department of Transportation (MassDOT), Maricopa County Department of Transportation (MCDOT), and Iowa Department of Transportation (IDOT).

The [Work Zone Data Working Group \(WZDWG\)](#), established under the Federal Geographic Data Committee (FGDC) Transportation Subcommittee (TSC) maintains the WZDx Specification with the goal of publishing incremental updates to refine the features, attributes, and vocabulary needed to model work zone activity data.

How can I get help with implementation? The WZDx Specification's [GitHub Repository](#) is continually updated with resources to help with implementation. If you don't find the answer you're looking for, please make a GitHub [issue](#) or [discussion](#) entry if you need help implementing the WZDx Specification or have questions.

The Federal Highway Administration is leading efforts, via the [Work Zone Data Initiative \(WZDI\)](#), to develop a standard approach for collecting, organizing, and sharing data on the “when”, “where,” and “how” of work zone deployment. As part of this effort, key documents have been developed and made publicly available:

- WZDI Framework provides a conceptual architecture for work zone data systems for collecting, storing, disseminating, managing, maintaining and archiving work zone activity data.
- WZDI Data Dictionary provides digital descriptions of work zone activities that enable and support transportation agencies and third-party providers to describe and communicate work zone-related information to agency, private sector, and public users timely and seamlessly across multiple jurisdictions and regions.

1.2 Document Organization

The remainder of this document is organized into the following sections:

- **WZDx Specification Content** – details the data content of the WZDx specification, including data tables, field names and types, and enumerations.
- **Create Feed** – contains information regarding the creation of a WZDx feed, including feed format, example feeds, JSON schemas, and validation tools.

1. WZDx Specification Content

The WZDx specification describes the content and structure of a WZDx GeoJSON document. It defines distinct entities called objects which contain the data content (called fields or properties) of each entity. The structure of and relationship between objects describes how the GeoJSON output of a WZDx feed looks. Objects are found in the objects directory.

The value of some properties of an object are restricted to a defined set of values. These enumerations are found in the enumerated-types directory.

2.1 Objects Overview

The WZDx specification describes the structure and content of a GeoJSON document, which can be called an instance of a "WZDx Feed". Each WZDx GeoJSON document has one root object, a [WZDxFeed](#) object, with many properties and nested objects. An object represents a distinct entity, such as a road event, a lane, or information about a feed. All pieces of data that describe that entity are included as properties of the object.

2.1.1 Object Details

Each object is described by a table of properties, which are each defined by the following characteristics:

- **Name** - The property name.

- **Type** - The type of data being stored. This can be one of the JSON primitive types (only String, Number, Array are used), Integer, as defined in the [JSON schema validation specification](#), a [WZDx Enumerated Type](#), a WZDx Object, or a [GeoJSON Object](#).
- **Description** - A description of the value of the property.
- **Conformance** - An indication of the requirement for including the property in a WZDx GeoJSON document. There are three categories of conformance:
 - *Required* - The property must be included
 - *Optional* - The property may be omitted
 - *Conditional* - The property's inclusion depends on the inclusion or value of a separate property
- **Notes** - Additional comments, guidance, notes for future consideration, or examples.

2.1.2 List of Objects

This section provides a tabular list of all objects used in the WZDx specification.

Table 1-1: List of Objects

Object	Description
Lane	An individual lane within a road event.
LaneRestriction	A lane-level restriction, including type and value.
Relationship	Identification of both sequential and hierarchical relationships between road events and other entities.
RoadEvent	Information that describes where, when, and what activity is taking place along a road segment.
RoadEventDataSource	Information about a specific data source used to build a work zone data feed.
RoadEventFeature	The GeoJSON Feature container object for a WZDx RoadEvent.
RoadEventFeedInfo	WZDx feed header information such as metadata, contact information, and data sources.
TypeOfWork	A description of the type of work being done in a road event and an indication of if that work will result in an architectural change to the roadway.
WZDxFeed	The root (highest-level) object of a WZDx feed GeoJSON document.

2.1.3 Enumerated Types

Many object properties are restricted to a finite set of values, defined by an enumerated type. This section provides a tabular list of all enumerated types used in the WZDx specification.

Table 1-2: Enumerated Types

Enumerated Type	Description
Direction	The direction for a road event based on standard naming for US roads.
EventType	The type of a WZDx road event.

Enumerated Type	Description
EventStatus	The status of a road event.
LaneRestrictionUnit	Units of measure used for a lane restriction value.
LaneStatus	The status of a lane for the traveling public.
LaneType	An indication of the type of lane or shoulder.
LocationMethod	The typical method used to locate the beginning and end of a work zone impact area.
RoadRestriction	The type of vehicle restriction on a roadway.
SpatialVerification	An indication of how a geographical coordinate was defined.
TimeVerification	A measure of how accurate a date-time is.
VehicleImpact	The impact to vehicular lanes along a single road in a single direction.
WorkTypeName	A high-level text description of the type of work being done in a road event.

For ease of reference, the table below describes all properties in the WZDx specification whose value is restricted by an enumerated type, as well as the object that contains that property.

Table 1-3: Data Fields Using Enumerated Types

Property	Object	Enumerated Type	Notes
beginning_accuracy	RoadEvent	SpatialVerification	Enumeration updated in WZDx v3.0
direction	RoadEvent	Direction	Enumeration adapted from TMDD link-alignment
end_date_accuracy	RoadEvent	TimeVerification	Enumeration updated in WZDx v3.0
ending_accuracy	RoadEvent	SpatialVerification	Enumeration updated in WZDx v3.0
event_type	RoadEvent	EventType	Enumeration create in WZDx v3.0
event_status	RoadEvent	EventStatus	Enumeration created in WZDx v1.0
location_method	RoadEventDataSource	LocationMethod	Enumeration created in WZDx v3.0 but referenced since v1.1
restrictions	RoadEvent	RoadRestriction	Enumeration created in WZDx v1.0
restriction_type	LaneRestriction	RoadRestriction	Individual lane restrictions
restriction_units	LaneRestriction	LaneRestrictionUnit	This is an initial list, created in WZDx v2.0, and is not intended to be complete. More values will be added as needed.
start_date_accuracy	RoadEvent	TimeVerification	Enumeration updated in WZDx v3.0
status	Lane	LaneStatus	Enumeration created in WZDx v2.0

Property	Object	Enumerated Type	Notes
type	Lane	LaneType	Enumeration adapted from TMDD LaneRoadway; updated in WZDx v3.0
type_name	TypeOfWork	WorkTypeName	Enumeration created in WZDx v2.0
vehicle_impact	RoadEvent	VehicleImpact	Enumeration created in WZDx v2.0
Property	Object	Enumerated Type	Notes

2.1.5 Object Diagram

The [object diagram](#) below indicates the relationship between the data objects. Required data elements are in **bold**. Conditional data elements are ***bold and italicized***. Deprecated data elements have gray background.

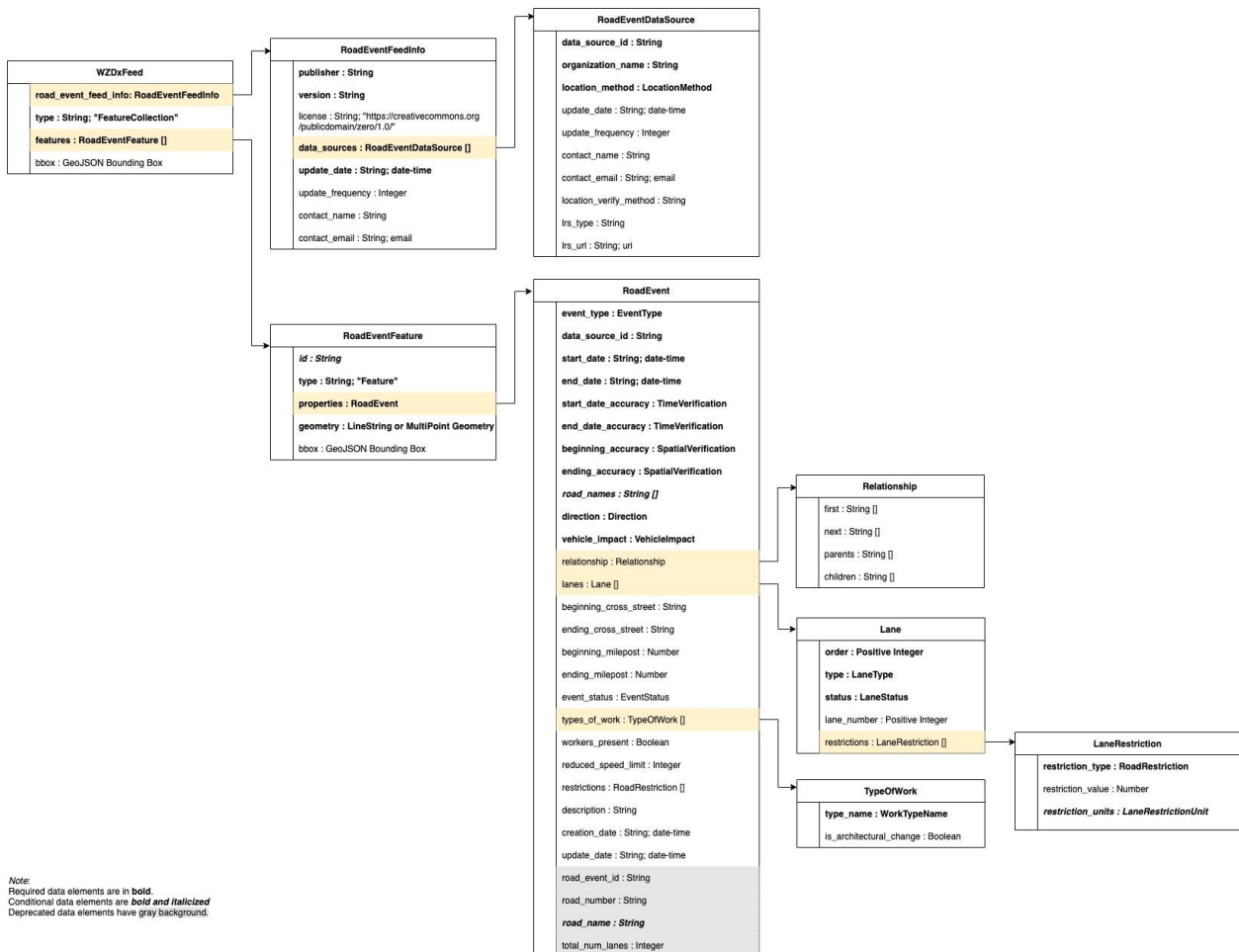


Figure 1: Object Diagram

2.2 Lane Object

The Lane object describes an individual lane on the roadway within a road event.

Table 1-4: Lane

Name	Type	Description	Conformance	Notes
order	Positive Integer	The position of a lane in sequence on the roadway. This value is used as an index to indicate the order of all WZDx lanes provided for a road event.	Required	A value of 1 must represent the left-most lane and an increase in 1 must represent moving a single lane over from the left.
type	LaneType	An indication of the type of lane or shoulder.	Required	
status	LaneStatus	Status of the lane for the traveling public.	Required	
lane_number	Positive Integer	The number assigned to the lane to help identify its position. Flexible, but usually used for regular, drivable lanes.	Optional	Assigned by counting from the left edge of the improved surface. Useful for text to voice translation.
restrictions	Array; [LaneRestriction]	A list of specific restrictions that apply to the lane.	Optional	

2.3 Lane Restriction Object

The LaneRestriction object describes a restriction on a specific lane within a road event.

Table 1-5: Lane Restrictions

Name	Type	Description	Conformance
restriction_type	RoadRestriction	The type of restriction being enforced.	Required
restriction_value	Number	The measure of the restriction type.	Optional
restriction_units	LaneRestrictionUnit	Units of measure for the restriction value.	Conditional: required if restriction_value is not null

2.4 Relationship Object

The Relationship object is used to identify both sequential and hierarchical relationships between a road events and other entities. For example, a relationship can be used to link multiple road events to a common "parent", such as a project or phase, or identify a sequence of road events that make up a

larger work zone. The value of all elements in the Relationship's first or next properties must match the value of the id property of a [RoadEventFeature](#) that is included in the same WZDx GeoJSON document.

Table 1-6: Relationships

Name	Type	Description	Conformance
first	Array; [String]	Indicates the first (can be multiple) road event in a sequence of road events. All values in this array should be a road event ID—they should match the id property on a RoadEventFeature within the same WZDx GeoJSON document.	Optional
next	Array; [String]	Indicates the next (can be multiple) road event in a sequence of road events. All values in this array should be a road event ID—they should match the id property on a RoadEventFeature within the same WZDx GeoJSON document.	Optional
parents	Array; [String]	Indicates entities that the road event with this relationship is a part of, such as a work zone project or phase. Values can, but do not have to, correspond to a WZDx entity.	Optional
children	Array; [String]	Indicates entities that are part of the road event with this relationship, such as a detour or piece of equipment. Values can, but do not have to, correspond to a WZDx entity.	Optional

2.5 Road Event Object

The RoadEvent object contains information that describes where, when, and what activity is taking place along a road segment. This specification currently accommodates work-zone and detour type road events, specified by the road event's event_type property (see [EventType](#)).

Table 1-7: Road Events

Name	Type	Description	Conformance	Notes
event_type	EventType	The type/classification of road event.	Required	
data_source_id	String	Identifies the data source from which the road event originates.	Required	The value must match to the data_source_id property of a RoadEventDataSource included within the same WZDx GeoJSON document.
start_date	String; date-time	The UTC time and date when the event begins.	Required	All Date Time formats shall follow RFC 3339 Section 5.6 . Example: 2016-11-03T19:37:00Z.
end_date	String; date-time	The UTC time and date when the event ends.	Required	All Date Time formats shall follow RFC 3339 Section 5.6 . Example: 2016-11-03T19:37:00Z.
start_date_accuracy	TimeVerification	A measure of how accurate the start Date Time is.	Required	
end_date_accuracy	TimeVerification	A measure of how accurate the end Date Time is.	Required	
beginning_accuracy	SpatialVerification	Indicates how the beginning coordinate was defined.	Required	
ending_accuracy	SpatialVerification	Indicates how the ending coordinate was defined.	Required	

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Name	Type	Description	Conformance	Notes
road_names	Array; [String]	A list of publicly known names of the road on which the event occurs. This may include the road number designated by a jurisdiction such as a county, state or interstate (e.g. I-5, VT 133).	Conditional: required if road_name is not provided.	This property captures the functionality of the deprecated road_number and road_name properties and conformance will be required in a future release.
direction	Direction	The digitization direction of the road that is impacted by the event. This value is based on the standard naming for US roadways and indicates the direction of the traffic flow regardless of the real heading angle.	Required	Example northbound (for I-5 North)
vehicle_impact	VehicleImpact	The impact to vehicular lanes along a single road in a single direction.	Required	
relationship	Relationship	Identifies both sequential and hierarchical relationships between the road events and other entities. For example, a relationship can be used to link multiple road events to a common 'parent', such as a project or phase, or identify a sequence of road events	Optional	
lanes	Array; [Lane]	A list of individual lanes within a road event (roadway segment)	Optional	
beginning_cross_street	String	Name or number of the nearest cross street along the roadway where the event begins.	Optional	

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Name	Type	Description	Conformance	Notes
ending_cross_street	String	Name or number of the nearest cross street along the roadway where the event ends.	Optional	
beginning_milepost	Number	The linear distance measured against a milepost marker along a roadway where the event begins.	Optional	A milepost or mile marker is a surveyed distance posted along a roadway measuring the length (in miles or tenth of a mile) from the south west to the north east. These markers are typically notated on State and local government digital road networks. See also the <code>lrs_type</code> property on the <code>RoadEventDataSource</code> object.
ending_milepost	Number	The linear distance measured against a milepost marker along a roadway where the event ends.	Optional	A milepost or mile marker is a surveyed distance posted along a roadway measuring the length (in miles or tenth of a mile) from the south west to the north east. These markers are typically notated on State and local government digital road networks. See also the <code>lrs_type</code> property on the <code>RoadEventDataSource</code> object.
event_status	EventStatus	The status of the event.	Optional	
types_of_work	Array; [TypeOfWork]	A list of the types of work being done in a road event and an indication of if each type results in an architectural change to the roadway.	Optional	
workers_present	Boolean	A flag indicating that there are workers present in the event space.	Optional	
reduced_speed_limit	Integer	The reduced speed limit posted within the event space.	Optional	

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Name	Type	Description	Conformance	Notes
restrictions	Array; [RoadRestriction]	Zero or more road restrictions applying to the work zone road segment associated with the work zone.	Optional	These are included as flags rather than detailed restrictions. Detailed restrictions are coded to specific lanes.
description	String	Short free text description of work zone.	Optional	This will be populated with formal phrases in a later WZDx version
creation_date	String; date-time	The UTC time and date when the activity or event was created.	Optional	All Date Time formats shall follow RFC 3339 Section 5.6 . Example: 2016-11-03T19:37:00Z.
update_date	String; date-time	The UTC time and date when the activity or event was updated.	Optional	All Date Time formats shall follow RFC 3339 Section 5.6 . Example: 2016-11-03T19:37:00Z.
road_event_id (DEPRECATED)	String	This property is deprecated; use the id property on the parent RoadEventFeature object instead — A unique identifier issued by the data feed provider to identify the road event activity.	Optional	This property will be removed in a future version of WZDx.
road_number (DEPRECATED)	String	This property is deprecated and will be removed in a future version; include road numbers within the road_names array instead — The road number designated by a jurisdiction such as a county, state, or interstate.	Optional	Examples I-5, VT 133.
road_name (DEPRECATED)	String	This property is deprecated and will be removed in a future version; include road names within the road_names array instead — Publicly known name of the road on which the event occurs.	Conditional: required if road_names property is not provided.	

Name	Type	Description	Conformance	Notes
total_num_lanes (DEPRECATED)	Integer	This property is deprecated and will be removed in a future version — The total number of lanes associated with the road segment designated by the event geometry.	Optional	A segment is a part of a roadway in a single direction designated the event geometry
road_number (DEPRECATED)	String	This property is deprecated and will be removed in a future version; include road numbers within the road_names array instead — The road number designated by a jurisdiction such as a county, state, or interstate.	Optional	Examples I-5, VT 133.

2.6 Road Event Data Source Object

The RoadEventDataSource object describes information about a specific data source used to build a work zone data feed. A WZDx feed must contain at least one RoadEventDataSource, included as an entry in the data_sources array of the RoadEventFeedInfo object. The value of a RoadEventDataSource's data_source_id property should match the value of the data_source_id property of at least one [RoadEvent](#) that is included within the same WZDx GeoJSON document.

Table 1-8: Road Events Data Sources

Name	Type	Description	Conformance	Notes
data_source_id	String	Unique identifier for the data source organization providing work zone data.	Required	Linked to a RoadEvent by the RoadEvent's data_source_id property.
organization_name	String	The name of the organization for the authoritative source of the work zone data.	Required	Example: [Name] DOT
location_method	LocationMethod	The typical method used to locate the beginning and end of a work zone impact area.	Required	

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Name	Type	Description	Conformance	Notes
update_date	String; date-time	The UTC date and time when the data source was last updated.	Optional	All date-time formats shall follow RFC 3339 Section 5.6 . Example: 2016-11-03T19:37:00Z
update_frequency	Integer	The frequency in seconds at which the data source is updated.	Optional	
contact_name	String	The name of the individual or group responsible for the work zone data source.	Optional	Example: Jo Help
contact_email	String; email	The email address of the individual or group responsible for the data source.	Optional	
location_verify_method	String	The method used to verify the accuracy of the location information.	Optional	Example: Survey accurate GPS equipment accurate to 0.1 cm
lrs_type	String	Describes the type of linear referencing system (LRS) used for the milepost measurements.	Optional	Example: Use of milemarkers posted by the roadways. These are registered to a dynamic segmentation of statewide LRS basemap.
lrs_url	String; uri	A URL where additional information on the LRS information and transformation information is stored.	Optional	Example https://aaa.bbb.com/lrs

2.7 Road Event Feature Object (GeoJSON Feature)

The RoadEventFeature object is the container object for a WZDx [RoadEvent](#). The RoadEventFeature object is an instance of a [GeoJSON Feature](#).

Table 1-9: Road Event Feature

Name	Type	Description	Conformance	Notes
id	String	A unique identifier issued by the data feed provider to identify the WZDx road event.	Conditional; Required if road event's ID is not provided via the road_event_id property on the road event (detailed in the properties property).	In prior versions of WZDx, the road event ID was given by a road_event_id property on the RoadEvent object. Now, road_event_id is deprecated and this id should be used instead. This property will be required in a future version of WZDx. This is a GeoJSON property.
type	String; "Feature"	The GeoJSON object type. This MUST be the string Feature.	Required	This is a GeoJSON property.
properties	RoadEvent	The specific details of road event.	Required	This is a GeoJSON property.
geometry	GeoJSON Geometry object with type of LineString or MultiPoint	The geometry of the road event. The Geometry object's type property MUST be LineString or MultiPoint. LineString allows specifying the entire road event path and should be preferred. MultiPoint should be used when only the start and end coordinates are known.	Required	This is a GeoJSON property.
bbox	GeoJSON Bounding Box	Information on the coordinate range for this RoadEventFeature. Must be an array of length 2*n where n is the number of dimensions represented in the geometry property, with all axes of the most southwesterly point followed by all axes of the more northeasterly point. The axes order of a bbox follows the axes order of the geometry.	Optional	This is a GeoJSON property.

2.8 Road Event Feed Info Object

The RoadEventFeedInfo object describes WZDx feed header information such as metadata, contact information, and data sources. There is one RoadEventFeedInfo per WZDx GeoJSON document.

Table 1-10: Road Event Feed Information

Name	Type	Description	Conformance	Notes
publisher	String	The organization responsible for publishing the feed.	Required	Example: [Name] DOT
version	String	The WZDx specification version used to create the data feed in major.minor format. Note this mandates that all data in a WZDx feed complies to a single version of WZDx.	Required	Examples: 1.1, 2.0
license	String; uri; "https://creativecommons.org/publicdomain/zero/1.0/"	The URL of the license that applies to the data in the WZDx feed. This must be the string "https://creativecommons.org/publicdomain/zero/1.0/".	Optional	Data in all public WZDx feeds must be licensed under the Creative Commons - Public Domain License (CC0) which permits consumers to freely publish the enclosed information. This property is currently optional but will be required in a future release.
data_sources	Array; [RoadEventDataSource]	A list of specific data sources for the road event data in the feed.	Required	Length of array must be at least one.
update_date	String; date-time	The UTC date and time when the data feed was last updated.	Required	All Date Time formats shall follow RFC 3339 Section 5.6. Example: 2016-11-03T19:37:00Z
update_frequency	Integer	The frequency in seconds at which the data feed is updated.	Optional	Example: 60
contact_name	String	The name of the individual or group responsible for the data feed.	Optional	Example: Jo Help

Name	Type	Description	Conformance	Notes
contact_email	String; email	The email address of the individual or group responsible for the data feed.	Optional	Example: abc@testcity1.gov

2.9 Type of Work Object

The TypeOfWork object indicates the type of work being done in a road event, if applicable (e.g. typical work zones), as well as optionally noting if the type of work will result in an architectural change to the roadway.

Table 1-11: Type of Work

Name	Type	Description	Conformance
type_name	WorkTypeName	A high-level text description of the type of work being done.	Required
is_architectural_change	Boolean	A flag indicating whether the type of work will result in an architectural change to the roadway.	Optional

2.10 WZDx Feed Object (GeoJSON Feature Collection)

The WZDxFeed object is the root (highest level) object of a WZDx feed. There is one WZDx feed object per WZDx GeoJSON document. The WZDxFeed is an instance of a [GeoJSON FeatureCollection](#) object.

Table 1-12: WZDx Feed Object

Name	Type	Description	Conformance
road_event_feed_info	RoadEventFeedInfo	Information about the WZDx feed.	Required
type	String; "FeatureCollection"	The GeoJSON object type. For WZDx, this must be the string FeatureCollection.	Required
features	Array; [RoadEventFeature]	An array of GeoJSON Feature objects which represent WZDx road events.	Required
bbox	GeoJSON Bounding Box	Information on the coordinate range for all RoadEventFeatures in the WZDx feed. Must be an array of length 2*n where n is the number of dimensions represented in the contained geometries, with all axes of the most southwesterly point followed by all axes of the more northeasterly point. The axes order of a bbox follows the axes order of geometries.	Optional

2.11 Direction

The direction of a roadway. The values are based on the standard naming for US roadways and indicates the direction the traffic flow regardless of the real heading angle of the roadway. The Direction enumerated type values were based on the TMDD Link-alignment Enumeration, which contains the following values:

- northbound (1)
- eastbound (2)
- southbound (3)
- westbound (4)
- inner-loop (5)
- outer-loop (6)

Table 1-13: Direction Enumeration

Value	Description
northbound	Road flow is in the northbound direction
eastbound	Road flow is in the eastbound direction
southbound	Road flow is in the southbound direction
westbound	Road flow is in the westbound direction

The enumeration is used by the following fields:

Property	Object
direction	RoadEvent

2.12 Event Status

The status of a road event.

Table 1-14: Event Status Enumeration

Value	Description
planned	Planned status is associated with overall project or phase timing and locations. Typically, this information is estimated during planning or early design phases. The WZDx will not generally include planned activities.
pending	<p>Pending is used to alert stakeholders that work is scheduled for the near future (e.g., 2-3 weeks). The certainty of starting at this time is greater than 90% (barring weather and other unforeseen circumstances).</p> <ul style="list-style-type: none"> • Time horizon: approximate begin / end dates • Location: coverage area and main road name; path (polyline or geoface) around zone area
active	Used to alert stakeholder that work zone is in place and active.

Value	Description
cancelled	Reported cancellation of a proposed or active work zone; the coverage applies to the work zone activity record. <ul style="list-style-type: none"> When date/time is estimated, the cancellation may be one or more days associated within the reported scheduled Date Times.
completed	Work zone is closed and completed; all work zone impacts are mitigated. This status may be used when a work zone activity is completed earlier than expected.

The enumeration is used by the following fields:

Property	Object
event_status	RoadEvent

2.13 Event Type

The type of a WZDx road event.

Table 1-15: Event Type Enumeration

Value	Description
work-zone	<p>An area of a trafficway with highway construction, maintenance, or utility-work activities. A work zone is typically marked by signs, channeling devices, barriers, pavement markings, and/or work vehicles. It extends from the first warning sign or flashing lights on a vehicle to the "End of Road Work" sign or the last traffic control device. A work zone may be for short or long durations and may include stationary or moving activities.</p> <p>Inclusions:</p> <ol style="list-style-type: none"> Long-term stationary highway construction such as building a new bridge, adding travel lanes to the roadway, and extending an existing trafficway. Mobile highway maintenance such as striping the roadway, median, and roadside grass mowing/landscaping, and pothole repair. Short-term stationary utility work such as repairing electric, gas, or water lines within the trafficway. <p>Exclusions:</p> <ol style="list-style-type: none"> Private construction, maintenance, or utility work outside the trafficway. <p>*The AASHTO term equivalent to roadway is traveled way. *The AASHTO term equivalent to trafficway is highway, street, or road.</p> <p>Source: https://www.fhwa.dot.gov/publications/publicroads/99mayjun/workzone.cfm</p>
detour	<p>A temporary rerouting of road users onto an existing trafficway to avoid a work zone or other impedance.</p> <p>Source: https://mutcd.fhwa.dot.gov/htm/2009/part6/part6c.htm</p>

The enumeration is used by the following fields:

Property	Object
event_type	RoadEvent

2.14 Lane Restriction Unit

Units of measure used for a lane restriction value.

Table 1-16: Lane Restriction Unit Enumeration

Value	Description
feet	Imperial system 'feet'
inches	Imperial system 'inches'
centimeters	Metric system 'centimeters'
pounds	Imperial system 'pounds'
tons	Imperial system 'tons'
kilograms	Metric system 'kilograms'

The enumeration is used by the following fields:

Property	Object
restriction_units	LaneRestriction

2.15 Lane Status

The status of the lane for the traveling public.

Table 1-17: Lane Status Enumeration

Value	Description
open	The lane is open for travel
closed	The lane is closed to travel
shift-left	The lane shifts left from its current bearing and continues
shift-right	The lane shifts right from its current bearing and continues
merge-left	The lane gradually tapers while merging into the lane directly to the left
merge-right	The lane gradually tapers while merging into the lane directly to the right
alternating-flow	Traffic may travel in either direction, depending on certain conditions. Example conditions include time of day (e.g. reversible lanes), automated controls, or on-site personnel.
alternating-one-way (DEPRECATED)	This value is deprecated and will be removed in a future version; use alternating-flow instead — The lane alternates the direction of travel via either automated controls or onsite personnel

The enumeration is used by the following fields:

Property	Object
status	Lane

2.16 Lane Type

A description of the type of a lane on the roadway. The LaneType enumerated type was originally based on the TMDD LaneRoadway Enumeration, which is imported into TMDD from SAE 2540 (ITIS Standard).

In later release, other standards were examined for inspiration. These include SAE J2735 and the ISO 20524-1 Geographic Data Files (GDF) standard.

Table 1-18: Lane Type Enumeration

Value	Description
lane	Generic lane type, intended to be used for normal, driveable lanes
right-turning-lane	A lane where right turns are permissible
left-turning-lane	A lane where left turns are permissible
right-exit-lane	A lane with an egress on the right
left-exit-lane	A lane with an egress on the left
left-exit-ramp	An exit ramp with an egress on the left in the direction of flow at an interchange
right-exit-ramp	An exit ramp with an egress on the right in the direction of flow at an interchange
right-entrance-ramp	A lane or ramp with an ingress on the right
left-entrance-ramp	A lane or ramp with an ingress on the left
sidewalk	A sidewalk or pedestrian way
bike-lane	A lane on the roadway for cyclists only
shoulder	A generic shoulder
center-left-turn-lane	A lane in the center of a bidirectional roadway in which traffic from both directions uses to make a left turn
left-lane (DEPRECATED)	This value is deprecated and will be removed in a future version; use lane instead - The leftmost lane
right-lane (DEPRECATED)	This value is deprecated and will be removed in a future version; use lane instead - The rightmost lane
middle-lane (DEPRECATED)	This value is deprecated and will be removed in a future version; use lane instead - A lane that is not the rightmost or leftmost lane
center-lane (DEPRECATED)	This value is deprecated and will be removed in a future version; use lane instead - The center-most lane when the total number of lanes is odd
right-shoulder (DEPRECATED)	This value is deprecated and will be removed in a future version; use shoulder instead — The outer shoulder or the rightmost shoulder
left-shoulder (DEPRECATED)	This value is deprecated and will be removed in a future version; use shoulder instead — The inner shoulder or the leftmost shoulder
right-second-exit-ramp (DEPRECATED)	This value is deprecated and will be removed in a future version; use right-exit-lane instead — The second exit ramp with an egress on the right in the direction of flow at an interchange
left-second-exit-ramp (DEPRECATED)	This value is deprecated and will be removed in a future version; use left-exit-lane instead — The second exit ramp with an egress on the left in the direction of flow at an interchange

Value	Description
right-second-entrance-ramp (DEPRECATED)	This value is deprecated and will be removed in a future version; use right-entrance-lane instead — The second entrance ramp with an ingress on the right in the direction of flow at an interchange
left-second-entrance-ramp (DEPRECATED)	This value is deprecated and will be removed in a future version; use left-entrance-lane instead — The second entrance ramp with an ingress on the left in the direction of flow at an interchange
right-merging-lane (DEPRECATED)	This value is deprecated and will be removed in a future version; specify merging lanes via the lane's status property — The right lane where the lane ends with a gradual merge with the second most lane
left-merging-lane (DEPRECATED)	This value is deprecated and will be removed in a future version; specify merging lanes via the lane's status property — The left lane where the lanes ends by a gradual merge with the second most left lane
hov-lane (DEPRECATED)	This value is deprecated and will be removed in a future version; specify hovs via the lane's restrictions property — A high-occupancy vehicle lane
alternating-flow-lane (DEPRECATED)	This value is deprecated and will be removed in a future version; specify alternating flow via the lane's status property (value of alternating-flow) — A lane where signal or flagger controls lane flow
reversible-lane (DEPRECATED)	This value is deprecated and will be removed in a future version; specify reversible status via the lane's status property (value of alternating-flow) — A lane in which traffic may travel in either direction, depending on certain conditions such as time of day

The enumeration is used by the following fields:

Property	Object
type	Lane

2.17 Location Method

The typical method used to locate the begin and end of a work zone impact area.

Table 1-19: Work Type Name Enumeration

Value	Description
channel-device-method	Location of first and last channeling device (e.g., cone or barrier) that is part of a “travel impact effect” (taper) or designation of a work zone transition area. This is the preferred location method.
sign-method	Location of first and last work zone-related signs
junction-method	Location of a junction (e.g., a cross street or exit/entrance ramp) before and after a work zone
other	Location method does not match any of the other options
unknown	Location method is not known

The enumeration is used by the following fields:

Property	Object
location_method	RoadEventDataSource

2.18 Road Restriction

The type of vehicle restriction on a roadway.

Table 1-20: Road Restriction Enumeration

Value	Description
local-access-only	Travel allowed only for vehicles accessing addresses in the work zone area; this includes emergency services, deliveries, and direct property access
no-trucks	Trucks are prohibited from traveling in work zone area
travel-peak-hours-only	Travel restricted to travel peak hours only
hov-3	Travel restricted to high occupancy vehicles of three or more
hov-2	Travel restricted to high occupancy vehicles of two or more
no-parking	No parking in work zone area
reduced-width	Lane width reduced in work zone area
reduced-height	Height restrictions reduced in work zone area
reduced-length	Vehicle length restrictions reduced in work zone area
reduced-weight	Vehicle weight restrictions reduced in work zone area
axle-load-limit	Vehicle axle-load-limit restrictions reduced in work zone area
gross-weight-limit	Vehicle gross-weight-limit restrictions reduced in work zone area
towing-prohibited	Towing prohibited in work zone area
permitted-oversize-loads-prohibited	“Permitted oversize loads” prohibited in work zone area; this applies to annual oversize load permits.

The enumeration is used by the following fields:

Property	Object
restrictions	RoadEvent
restriction_type	LaneRestriction

2.19 Spatial Verification

An indication of how a geographical coordinate was defined.

Table 1-21: Spatial Verification Enumeration

Value	Description
estimated	Estimated location associated with work zone activities and lane closures.
An estimated measurement may be based on an approximation of a location	

The enumeration is used by the following fields:

Property	Object
beginning_accuracy	RoadEvent
ending_accuracy	RoadEvent

2.20 Time Verification

A measure of how accurate a date-time is.

Table 1-22: Time Verification Enumeration

Value	Description
estimated	Specific times/dates when work will or is occurring; includes advanced notice of
activities or unverified work zone activities. This date/time may be reported in	

The enumeration is used by the following fields:

Property	Object
start_date_accuracy	RoadEvent
end_date_accuracy	RoadEvent

2.21 Vehicle Impact

The impact to vehicular lanes along a single road in a single direction.

Table 1-23: Vehicle Impact Enumeration

Value	Description
all-lanes-closed	All lanes are closed
some-lanes-closed	Some lanes are closed
all-lanes-open	All lanes are open
alternating-one-way	The roadway is alternating one way
unknown	The vehicle impact is unknown

The enumeration is used by the following fields:

Property	Object
vehicle_impact	RoadEvent

2.22 Work Type Name

A high-level text description of the type of work being done in a road event.

Table 1-24: Work Type Name Enumeration

Value	Description
maintenance	Work with no impact on the roadway. This includes events such as trash pickup, mowing, landscaping.
minor-road-defect-repair	Pothole repair, road crack repair and sealing, and other small road defect repairs.
roadside-work	Work that is isolated to the side of the road and not in the main travel way, such as repair, replacement, or addition of streetlights, VMS, signs (guide, warning, regulatory, and information signs) in the ground.
overhead-work	Work that occurs above the road, such as repair/replacement of overpasses, overhead VMS, wires, overhead signs, signals, etc. This type of work requires a bucket truck or similar setup rather than being isolated to the side of the road.
below-road-work	Work occurring below the road such as boring or bridge repair.
barrier-work	Repair, replacement, addition, or change of barriers, guardrails, retaining walls, K-barriers, or similar.
surface-work	New resurfacing, such as adding new lanes, moving lanes, or adding or changing connectivity (turn lanes), as well as creation or repair of non-drivable surfaces such as the shoulder or median.
painting	Repainting, re-striping, adding new lanes, moving lanes, adding stop bars/lines, etc. Note: is_architectural_change field should be false when new paint is expected to be within 1 meter of the old paint.
roadway-relocation	Physically relocating the road, such as adding a bridge or removing a sharp curve.
roadway-creation	Adding a new road.

The enumeration is used by the following fields:

Property	Object
type_name	TypeOfWork

2. Creating a Feed

This directory contains information regarding creation of a WZDx feed, such as the feed format, example feed outputs, JSON schemas, and validation tools.

3.1 Feed Format and File Type

The WZDx v3.1 data feed is formatted according to the [GeoJSON](#) specification. GeoJSON is the file format of choice because:

- It is a lightweight data exchange format.
- It is easy for humans to read and write.
- It is easy for machines to parse and generate.
- The format is designed to exchange spatial data, which is a primary goal of the Work Zone Data Working Group.
- It is an open specification and does not carry licensing burdens.
- GeoJSON formatted-data is published as text files, so there is a low technological burden of entry.
- GeoJSON validation, mapping, and visualization tools already exist and will ease adoption by producers and consumers.

A WZDx feed contains a single-entry describing aspects of the feed itself (such as version) as well as one or more entries which describe a work zone's (generically: road event) characteristics along a single road segment in a single direction.

Objects

WZDx Feed Information

- The [Road Event Feed Information](#) object describes the data feed.
- The [Road Event Data Sources](#) object describes the data sources used to build the work zone data feed.

WZDx Work Zone (Road Event) Information

- The [Road Events](#) object describes a work zone event.
- The [Types of Work](#) object describes the work taking place along the road. If applicable, it indicates if the work changes the roadway's architecture.
- The [Lanes](#) object identifies and describes individual lanes within an event.
- The [Lane Restrictions](#) object describes restrictions for identified lanes.
- The [Relationships](#) object identifies sequential and hierarchical relationships between road events and other entities.

3. Business Rules

The following business rules help assure a standardized and interpretable use of the WZDx specification. The specification describes the required structure and data fields to describe a work zone, whereas business rules are additional requirements for using the WZDx specification in a standard manner. Note that business rules are distinct from best practices in that the latter are suggestions and business rules are requirements.

1. Each direction of travel must be represented by a separate road event. For example, if there is a work zone on a roadway with two lanes, each in an opposite travel direction (↑↓), each direction must be a separate road event.
2. Construction which requires alternating traffic flows within a lane must be represented with at least one road event in each direction. Similarly, roadways that during normal operation have an alternating flow of traffic direction based on time of day must be represented by at least one road event in each direction.
3. The preferred GeoJSON Geometry for a RoadEventFeature is LineString, which allows indicating the full path of the road event. In cases where only the beginning and ending coordinates are available, the MultiPoint can be used.
4. A cascading multi-lane closure should consider the speed of vehicles traveling through the work zone. If the distance between lane closures is short enough that time in a to-be-closed lane is not significant, which is common, the to-be-closed lane should be represented as closed to avoid traffic delays and potential crashes.
5. A detour must be represented with a RoadEvent of type (i.e. with event_type of) detour and its containing RoadEventFeature should have a geometry of type LineString to represent the full detour route. The detour road event should be connected to the work zone road event using the relationship property on the detour road event.
6. If the lanes property on the RoadEvent object is provided, it must include one entry for every lane in the road event. Providing lane information for only some of the lanes in a road event is not allowed.