511 Data Exchange including an Open511 Protocol

Traffic Event and WZDx

October 9, 2023

Version 1.5

METROPOLITAN TRANSPORTATION COMMISSION

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Document History

Description	Version	Date
Working Draft - addressed reorganization comments	0.9	08/28/13
First published version with transit, traffic, tolling, and parking APIs	1.0	09/13/13
Update Traffic APIs' structure information, parameters and filters, and their examples to sync with specification provided on Open511.org.	1.0	5/2/2014
Add GTFS-realtime Trip Updates and Vehicle Positions, and their examples.	1.0	5/7/2014
Minor updates and corrections	1.0	5/28/2014
Add sample request endpoint and parameters and filters tables for Section 3.14 and 3.15. Update references for resource endpoints with their exact URL.	1.0	6/12/2014
Minor updates to Section 3.14 and 3.15	1.0	7/17/2014
Split API specification document into sub docs for each API domain	1.0	8/26/2014
Minor updates to remove Transit references	1.0	9/24/2014
Removed APIs that are not planned to be developed	1.0	08/01/2017
Updated to add road closure polyline	1.1	08/19/2018
Updated to include splitting longer geometries into multiple 100 point Linestring.	1.2	11/01/2018
Updated to include extension to road and event element.	1.3	09/17/2019
Updated 'severity' definitions	1.4	10/3/2019
Added Work Zone Data Exchange (WZDx) API	1.5	10/9/2023

1   Overview

This document focuses on data exchange APIs for the traffic event data. For a complete overview of 511 Data Exchange, please refer to *Open 511 Data Exchange Specifications – Overview* document. The overview document covers:

- General information about 511 Data Exchange

- Different protocols and data feeds available through Open 511 APIs

- Standard Discovery API specifications.

- Encodings and Protocols along with reference to standard documentation.

- Technical Guidelines

It is highly recommened that all users of Open 511 Data Exchange review the information in the Overview document.

2   Traffic API

The core traffic data resources consist of traffic and work zone events. Open511provides message structure and API endpoint for accessing these resources. Open511 will also provide metadata/lookup information that can be used by consumers to filter and limit information during requests.

2.1   API: Event

The event resource provides information about various types of events within a jurisdiction. These can be active incident, scheduled construction/roadway work or public events which may or may not have an impact on traffic conditions. Consumers can request list of all the active events or they can use additional filters such as city, roads to restrict the results as per their needs and use case.

The event structure is the main element of the events collection. Although an event should be considered as independent, it is possible that one major event (mainly construction) could be split across several events. Below is a message structure of Event.

Field	Type	Mandatory/Optional	Description
Self	Link	*Mandatory*	Self link to the current resource.
Jurisdiction	Link	*Mandatory*	Link to the jurisdiction publishing the event.
id	String	*Mandatory*	A globally unique ID for the event, following the format jurisdiction-id/event-id. For example, 511.org/8c3f2.

The first segment of the event ID is the jurisdiction ID. The second segment is a string ID that must be unique within its jurisdiction. It can contain the characters |

			a-zA-Z0-9_.-. The two segments are separated with a /. The event's self link is of course itself a globally unique ID, and it is a suggested practice to use the event ID in the event URL, but a separate ID field is included for user-friendliness.
Status	Enum	*Mandatory*	Status of the event. The status allows a client to determine if the current event should be considered as currently effective. Value list: - ACTIVE: The event should be considered as effective - ARCHIVED: The event should not be considered as effective
Headline	Free Text	*Mandatory*	Title of the event. Should be shorter than 500 characters.
event_type	Enum	*Mandatory*	Basic type of event. Value list - CONSTRUCTION: planned road work - SPECIAL_EVENT: special events (fair, sport event, etc.) - INCIDENT: accidents and other unexpected events - WEATHER_CONDITION: Weather condition affecting the road - ROAD_CONDITION: Status of the road that might affect travelers.
Severity	Enum	*Mandatory*	Severity of the event. Value list: MINOR: the event has very limited impact on traffic. MODERATE: the event will have a visible impact on traffic but travel delays and traffic queuing should be minimimal and local. MAJOR: the event will have an elevated impact on traffic and create noticeable traffic delays and traffic queuing, but on a local level. SEVERE: the event will have a significant impact on traffic and create severe traffic delays and traffic queuing on a large scale. UNKNOWN: the impact is unknown, for example in the case of an accident that has been recorded without a precise description.

Geography	Geospatial	*Mandatory*	Geographical information about the event. Can be Point, MultiPoint, LineString, MultiLineString, or Polygon.
closure_geometry	Geospatial	*Optional*	Multistring geometry for closure associated with an event. The individual LineStringMember represents affected segment of a road. For events that expand over non-contiguous road segments, for example a closure affecting both sides of the freeway, each side will be represented by separate LineStringMember. For continuous event, entire geometry may be split into multiple LineStringMembers due to limitation on number of points that can be included in one line string. When this happens, end point of one line string will be the start point of the next line string.
Created	DateTime (UTC)	*Mandatory*	When the event was initially created.
Updated	DateTime (UTC)	*Mandatory*	When the content of the event last changed. Will be the same as created if no updates have occurred.
Schedule	*schedule* elements	*Mandatory*	Indicates the dates and times when the event is active.
Timezone	timezone	*Optional*	Timezone to be used for this event, e.g. America/Montreal. If not provided, the event is assumed to be in the default timezone of its jurisdiction.
Description	Free text	*Optional*	*But strongly recommended.* Description of the event. Plain text description of the event, the reason for the event and any other relevant information for travelers.
event_subtypes	Collection of event_subtype elements	*Optional*	List of values to provide more detail about the type of event.
— **event_subtype**	Enum	*Optional*	unknown Construction Emergency construction Scheduled roadwork Overnight roadwork Street sweeping Utility work Repaving Bridge work

				Drawbridge testing
				Guard rail repairs
				Tree trimming
				Mowing
				Watermain break repairs
				Long-term construction
				Weekend long construction
				Traffic signal repairs
				Overhead sign repair
				CCTV repairs
				Gas main repairs
				Tunnel washing
				CMS repairs
				Bridge painting
				Line striping
				Barrier repairs
				Deck work
				Bridge cable repairs
				FasTrak toll lane repairs
				Toll lane repairs
				Toll plaza repairs
				Crack sealing
				Expansion joint repairs
				Attenuator repairs
				Tunnel repairs
				Rock blasting
				Installation of fiber optics
				Renovation
				Structure repair
				Road widening
				Intersection improvements
				Drainage improvements
				Installation of sign structure
				Noise wall construction
				Installation of traffic monitoring systems
				Safety improvements
				Steel repairs
				Installation of conduits
				Installation of traffic management systems
				Culvert repairs
				Viaduct repairs
				Test message
				Seismic retrofit
				Landscaping
				Grinding
				Electrical work
				Slide clean-up
				Slide repair
				Light pole repair
				Median Work
				Trench work
				Highway construction
				Paving
				Sound wall construction
				Roadwork
				Emergency lane closure

				Emergency road closure
				Pothole Repair
				unknown
				Severe traffic incident
				Oil spill
				Spill
				Hazmat spill
				Transit related incident
				Severe traffic alert
				Earthquake
				Landslide
				Flood
				Tornado
				Emergency road closure
				Unplanned demonstration
				Rollover-overturn-jackknife
				Non-vehicle fire-explosion
				Grass fire
				Fire
				Noncollision injury
				Chemical spill
				Diverted traffic TO westbound lanes
				Diverted traffic TO eastbound lanes
				Diverted traffic TO northbound lanes
				Diverted traffic TO southbound lanes
				Diverted traffic FROM westbound lanes
				Diverted traffic FROM eastbound lanes
				Diverted traffic FROM northbound lanes
				Diverted traffic FROM southbound lanes
				Collision with impact attenuator
				Collision with bridge structure
				Collision with guardrail
				Collision with concrete traffic barrier
				Collision with post
				Collision with pole or support
				Collision with culvert or ditch
				Collision with curb
				CHP at the scene
				Collision with fence
				Collision with wall
				Collision with fire hydrant
				Collision with shrubbery or bush
				Collision with tree
				CHP enroute
				Collision with pavement surface irregularity
				Sigalert
				Accident
				Overturned truck
				Overturned tractor trailer
				Overturned vehicle
				Accident investigation
				Jack-knifed tractor trailer
				Split tractor trailer
				Separated tractor trailer
				Single vehicle accident

				Overheight tractor trailer
				Truck fire
				Bus fire
				Tractor trailer fire
				Vehicle fire
				Brush fire
				Building fire
				Fire department activity
				Police department activity
				EMS activity
				Disabled truck
				Disabled tractor trailer
				Disabled vehicle
				Disabled bus
				Emergency construction
				Roadwork
				Roving repairs
				Flooding
				Icing
				Fog
				Snow
				Wet pavement
				High winds
				Weather related
				Downed tree
				Downed wires
				Downed pole
				Nearby building collapse
				Debris
				Cargo spill
				Fuel spill
				Water main break
				Abandoned vehicle
				Heavy traffic
				Delays
				Power failure - toll plaza
				Signal problem
				Stuck drawbridge
				Stuck gates
				Drawbridge open
				Transformer fire
				Gas main break
				Injured animal
				Demonstration
				Rubber necking
				Sun glare
				Special event
				Construction
				Unknown other
				Unknown other with information
				Accident with injuries
				Accident with property damage only
				Accident road closed
				Spinout
				Shifted plates
				Road collapse

			Marine-Boat traffic
			Residual delays
			Motorcycle accident
			Missing manhole cover
			Raised manhole
			Collapsed manhole
			Collapsed sewer grate
			Missing sewer grate
			Obstruction
			Test message
			Multi-vehicle accident
			Two vehicle accident
			Structure Fire
			Structure Collapse
			Stuck Crossing Gates
			Pothole
			unknown
			Baseball game
			Football game
			Basketball game
			Hockey game
			Soccer game
			Tennis tournament
			Golf tournament
			Circus
			Parade
			Fireworks
			Concert
			Street fair
			Fair
			Festival
			Awards ceremony
			March
			Race
			Racing
			Fleet week
			Special Event
			Boxing
			Movie-TV filming
			New years eve
			Skating
			Track and Field
			Marathon
			VIP Visit
			Test Message
			Convention
			Conference
Certainty	Enum	*Optional*	Degree of certainty of the event. Should only be used for unplanned events (e.g. incidents, weather conditions and pavement conditions events). Value list to be confirmed. Could be observed/likely/possible/unknown. Value list

			- OBSERVED - LIKELY - POSSIBLE - UNKNOWN
grouped_events	Collection of links	*Optional*	This structure is used to group events together. In specific situations (for example complex construction projects), several events might be related together. This field should be used to point a related event.
— related	Link	*Optional*	Link pointing to another event resource related to the current event.
Detour	Free Text	*Optional*	Description of a detour route to avoid this event.
Roads	Collection of road elements	*Optional*	List of roads affected by the current event. One event can impact several roads.
Areas	Collections of area elements	Optional	Areas affected by the event.
attachments	Collection of attachment links	Optional	Collection of attachments providing additional information about the event (PDFs, images, etc.)
— related	Link	Optional	Link to an attachment. While only the URL is mandatory, more information may be provided via type, length, title, and hreflang, with semantics as in Atom.
source_type	Enum	Optional	Caltrans CHP TIC (511's Traveler Information Center – used for special events)
source_id	Free Text	Option	Indentifier received from external system.

Road   structure

The road data format is used to provide information about the road(s) affected by an event. The structure of road_affected is:

Field	Type	Mandatory/ Optional	Description
Name	Free Text	*Mandatory*	Name of the road affected by the event. Ideally, road names should be formatted in accordance with national or regional standards, and the same road should be named consistently in different events.

self / url	Link	*Optional*	Link to the Road resource for this road.
from	Free text	*Optional*	*Mandatory if 'to' is provided.* Approximate start point of the event on the road. It can be an intersection with another street or it can be a mileage indication. This value should not be used to determine the exact start point since it can be an approximation. The geometry field should be considered as the reference for exact location. If no *to* field is provided, this field means "nearby".
to	Free text	*Optional*	Approximate end point of the event on the road. It can be an intersection with another street or it can be a distance indication.
state	Enum	*Optional*	Whether the road segment is closed or not. Value list: - CLOSED (road closed in the given direction. Used when lane_type = "All lanes"; and lane_status = "blocked|closed") - SOME_LANES_CLOSED (but the road remains open. Default value) - SINGLE_LANE_ALTERNATING (a single lane alternates between both directions of traffic. Used when roadway_advisory = "One way traffic control in effect) - ALL_LANES_OPEN Used when lane_type = "All lanes"; and lane_status = "open")
direction	Enum	*Conditional*	*Mandatory if state is provided.* Direction of the road that is affected by the event. Value list: -Eastbound -Eastbound and Westbound -Nortbound -Northbound and Southbound -Southbound -Westbound
impacted_lane_type	Enum	*Optional*	The type of lane(s) impacted by the event. At least 1 lane All lanes

			All lanes subject to All lanes temporarily Alternate lanes Center lane Center lanes Left lane Left lane and shoulder Left lanes Left shoulder Left and center lanes Lane Lanes Right lane Right lane and shoulder Right lanes Right shoulder Right and center lanes Right and left lanes Sporadic lane Temporary lane Various lanes Bus lane Right lane and exit ramp Left lane and exit ramp Right lane and entrance ramp Left lane and entrance ramp FasTrak lanes FasTrak toll lanes Toll lanes Toll lane Carpool HOV 2nd lane from the left 3rd lane from the left 4th lane from the left Auxiliary Lane Center Divider Left Bore Off Ramp On Ramp Right Bore
road_advisory	Enum	*optional*	A roadway advisory for the traveler. Can be combined with impacted_lane_type and lane_status to add further context. Example: *Right lanes closed until 4 PM.* until further notice until midnight until 12-30 AM until 1 AM until 1-30 AM until 2 AM until 2-30 AM until 3 AM until 3-30 AM

			until 4 AM
			until 4-30 AM
			until 5 AM
			until 5-30 AM
			until 6 AM
			until 6-30 AM
			until 7 AM
			until 7-30 AM
			until 8 AM
			until 8-30 AM
			until 9 AM
			until 9-30 AM
			until 10 AM
			until 10-30 AM
			until 11 AM
			until 11-30 AM
			until 12-30 PM
			until 1 PM
			until 1-30 PM
			until 2 PM
			until 2-30 PM
			until 3 PM
			until 3-30 PM
			until 4 PM
			until 4-30 PM
			until 5 PM
			until 5-30 PM
			until 6 PM
			until 6-30 PM
			until 7 PM
			until 7-30 PM
			until 8 PM
			until 8-30 PM
			until 9 PM
			until 9-30 PM
			until 10 PM
			until 10-30 PM
			until 11 PM
			until 11-30 PM
			Both levels
			2 mile back-up
			2 and a half mile back-up
			1 mile back-up
			1 and a half mile back-up
			3 mile back-up
			3 and a half mile back-up
			4 mile back-up
			5 mile back-up
			6 mile back-up
			7 mile back-up
			8 mile back-up
			9 mile back-up
			10 mile back-up
			1 hour delay
			10 minute delay
			15 minute delay

			2 way traffic 20 minute delay 25 minute delay 30 minute delay 35 minute delay 40 minute delay 45 minute delay 50 minute delay 55 minute delay thru AM rush hour thru PM rush hour thru PM thru AM until noon Traffic is being diverted Expect delays Emergency vehicles enroute Emergency vehicles at the scene Emergency crews enroute Emergency crews at the scene Traffic advisory in effect Metering lights are on Metering lights are off Avoid the area One way traffic control in effect Consider using alternate routes
lane_status	Enum	*Optional*	affected blocked closed open remain closed remains closed
article	Enum	*Optional*	Provides locational context for the event. For examples, can be combined with from, to, and direction to pinpoint the approximate location of the event. Example: *I-680 Northbound <u>at</u> El Cerro Blvd.* unknown approaching area of at between east of from near north of ramp from ramp to south of to west of before by

			past through under over into-out of ramps from ramps to entering at exiting at into out of bypassing after on
areas	Collection of area elements	*Optional*	The areas resource is a list of area items. Area is a geographical area: a city, district, neighbourhood, etc.
lanes_open	Integer	*Optional*	Allowed only if **state** is SOME_LANES_CLOSED and direction is not BOTH. Number of lanes in the given direction remaining open during this event.
lanes_closed	Integer	*Optional*	Allowed only if **state** is SOME_LANES_CLOSED and direction is not BOTH. Number of lanes in the given direction closed during this event.
impacted_systems	Collection of *impacted_system* elements	*Optional*	Allows provision of information about other systems that can be affected.
— impacted_system	Enum	*Optional*	Value list of systems: ROAD SIDEWALK BIKELANE PARKING
restrictions	Collection of *restriction* elements	*Optional*	Some events may come with some restrictions affecting vehicles using the road (speed, weight).

Area structure

Field	Type	Mandatory/ Optional	Description
Name	Free text	*Mandatory*	The name of the area.
id	Opent511 ID	*Mandatory*	Unique identifier for the area from the GeoNames database, in the form of e.g. geonames.org/5323810.
self	Link	*Optional*	URL to a human-readable Web page with information about the area. Example http://geonames.org/{id}/

Restriction structure

Field	Type	Mandatory/ Optional	Description
restriction_type	Enum	*Mandatory*	Type of restriction that affects vehicles. Value list: SPEED: Limitation of the speed of vehicles. Unit is in kilometers/hour. WIDTH: Width limitation, mainly for trucks. Unit is meters. HEIGHT: Height limitation, mainly for trucks. Unit is meters WEIGHT: Weight limitation for vehicles. Unit is metric tons. AXLE_WEIGHT: Weight limitation per axle for truck. Unit is metric tons.
Value	Float	*Mandatory*	Value of the limitation. For example, a speed limitation of 60km/h will have a value of 60 with a **restriction_type** set to SPEED

Schedule structure

The schedule defines timelines of an event.

Field	Type	Mandatory/ Optional	Description
recurring_schedules	Collection of *recurring_schedule* elements	Conditional	*One (and only one) of* recurring_schedules *or* int ervals *is required* The recurring_schedule structure expresses repeating schedules, like "Every day starting December 4th", or "Mondays 9 to 11 from September 1 to October 30." An event can include multiple recurring_schedule el ements inside this recurring_schedules tag; exception elements can override them.
— **start_date**	Date	*Mandatory*	***Mandatory in each* recurring_schedule** Start date of this schedule.
— **end_date**	Date	Optional	End date of the event. If a start date but no end date is provided, the schedule continues indefinitely.
— **daily_start_time**	Time	Optional	Daily start time of the event, as HH:mm , e.g. 13:00 . Applies to each day in this recurring_schedule .
— **daily_end_time**	Time	Conditional	***Mandatory if* daily_start_time *is provided, not allowed otherwise***

			Daily end time of the event, as HH:mm , e.g. 17:30 . Applies to each day in this recurring_schedule .
— **days**	collection of *day* elements	*Optional*	Contains a day tag for every day of the week during which this recurring_schedule is active. Days are indicated with an integer, with (following the ISO standard) Monday being 1 and Sunday 7. So, for an event active on Monday and Wednesday, <days><day>1</day><day>3</day></days>. If omitted, the schedule is active every day between its start and end dates.
exceptions	Collection of exception elements	*Optional*	*if present, there must be a recurring_schedules element (and no intervals)* Exceptions override recurring schedules.
— **exception**	Custom time format	*Mandatory*	An exception provides the definitive schedule for a specific date. It overrides any recurring_schedule information for that date. An exception of the form YYYY-MM-DD indicates that this event is **not** in effect for the given date. An exception of the form YYYY-MM-DD HH:mm-HH:mm indicates that, on that date, the event is in effect only

			between the provided start and end time. If there are multiple disjoint periods on that day, more than one start-end period can be included: YYYY-MM-DD HH:mm-HH:mm HH:mm-HH:mm .
intervals	Collection of interval elements	Conditional	*One (and only one) of* recurring_schedules *or* intervals *is required* Represent an event's schedule as a list of explicit periods. An event must use either recurring_schedules or intervals , not both. If this contains more than one interval , their time periods may not overlap. This also implies that no more than one can omit an end time.
— interval	Custom time format, largely a subset of ISO8601 intervals	*Mandatory*	Defines a specific period of time during which the schedule is in effect; two datetimes (without timezone offset) joined with a / . For example, a period from 9 p.m. September 1 to 8 a.m. September 2 would be 2014-09-01T21:00/2014-09-02T08:00 . The second datetime, after the slash, may be omitted. So, to indicate a period from 9 p.m. September 1 until further

			notice, use: 2014-09-01T21:00/

Sample request endpoint for events

Request Type	**GET**
Request Endpoint Example	For e.g. http://api.511.org/Traffic/Events

Parameters and Filters supported with the request

Parameter	Mandatory/ Optional	Description
format	*Optional*	The response format (json/xml) desired. If none specified, then default response would be JSON. e.g. ?format=json (returns json respone for v1, if v1 is the latest version or specified via version parameter) ?format=xml (returns XML response for v1)
version	*Optional*	The version of Open511 desired. e.g ?version=v1 (returns response for v1 in conjunction with format requested.
api_key	Mandatory	Unique key assigned to a user after they signup for Open511.
status	*Optional*	By default the API should only send active events. Supported values: ACTIVE Default value, returns only active events. ARCHIVED Returns only archived events ALL Returns both active and archived events.
in_effect_on	*Optional*	Show only events that are, according to their schedules, in effect at a specific time, or during a specific time period. Can be either a single time, or a start and end time joined by a comma. The times must be complete ISO 8601 datetimes, with or without a timezone. So to find, for example, all events in effect at some point on June 20th, you would ask for events between 00:00 and 23:59: in_effect_on=2013-06-20T00:00,2013-06-20T23:59

		Or, to find events in effect within the next two hours, you'd get the current UTC timestamp — let's say it's 2013-06-20T17:40Z — and then request ?in_effect_on=2013-06-20T17:40Z,2013-06-20T19:40Z. You can also use the special value ?in_effect_on=now to show events currently taking place. If no timezone is provided, as in the first example, the server searches according to the local time as entered in the event. For example, if highways are closed for an hour at midnight on January 1st in both London and LA, ?in_effect_on=2014-01-01T00:00 would return both events (even though there's no single moment in time when the roads are closed in both cities), whereas the timezone-aware ?in_effect_on=2014-01-01T00:00Z would return only the London event. If this argument is not provided, the API should not perform any filtering based on the event schedules.
severity	*Optional*	Filter by the value of the severity field. OR queries are possible via a comma-separated list: ?severity=MINOR,MODERATE.
Bbox	Optional	Filter events by geographical bounding box. Four comma-separated coordinates, xmin, ymin, xmax, ymax.
geography	Optional	Filtering near a point or linestring. The geography value should be provided as a WKT string in WGS84 latitude/longitude. Example: ...geography=POINT (-73.64 45.52). The geography must be used in conjuction with the tolerance filter.
tolerance	Conditional	Provide a tolerance of radius in meters around if a POINT or LINESTRING is used as filtering parameter. For example ...geography=POINT+(-73.64+45.52)&tolerance=50 would retrieve all the events within a circle of 50m radius around the selected point.
jurisdiction	Optional	The ID or URL of a jurisdiction, in order to show only events from a given jurisdiction. Use a comma-separated list to make OR queries. Example: jurisdiction=511.org.
event_type	Optional	Filter events using the event_type value list. Use a comma-separated list to make OR queries.
event_subtype	Optional	Filter events using the event_subtype value list. Use a comma-separated list to make OR queries.
created	Optional	Filter events based on the creation date and time.

		This parameter can (and generally will) be preceded with one of the following operators: < <= > >=. These allow searches for events created before or after a supplied time, e.g. created=>2013-05-10T12:00Z.
updated	Optional	Filter events based on the last update timestamp. Accepts the same < <= > >= operators as created. Note: by default, the servers should only return ACTIVE events. When using the updated filter, in order to get events going from ACTIVE to ARCHIVED, the client must ask for all events: ...?status=ALL
road_name	Optional	Shows only events containing a road element with the provided name. Case-sensitive exact match. Use a comma-separated list to make OR queries.
Road	Optional	Shows only events containing a road element linking to a road element with the provided id. Use a comma-separated list to make OR queries.
Area	Optional	Shows only events containing an area element with the provided id. Use a comma-separated list to make OR queries.
Limit	Optional	The maximum number of events to return in a single paginated response. The default value for this (i.e. how many items to include on a page if no limit parameter is provided) is up to individual implementors. Likewise, implementors may want to enforce a maximum value for this parameter in order to conserve server resources, so that a ?limit=10000 query would still return only e.g. 500 events per page. However, if such a maximum is implemented, it must not be lower than 500.

The traffic event structure response for XML is shown in Appendix A Section A.I.1 and for JSON is shown in Appendix B Section B.I.1.

Possible Errors

Listed below are HTTP status code and message returned for certain common errors:

- 500 - Internal Server Error (System has issues processing your request)
- 401 – Unauthorized (Invalid API key)

- 404 – Not found (If an individual event resource cannot be located).

2.2 Work Zone Data Exchange (WZDx) API

The Work Zone Data Exchange (WZDx) API resource utilizes the WZDx Specification developed by US Department of Transportation (USDOT) to provide real-time work zone data. This resource consists of two major contents in WZDx, the WorkZoneRoadEvents and DetourRoadEvents. Detailed information about the WZDx data specification contents can be found on the URL: https://github.com/usdot-jpo-ode/wzdx.

WZDx API response is only available in the GeoJSON format as per the specification. A sample output of WZDx API response is provided in Appendix B.

Sample request endpoint for events

Request Type	GET
Request Endpoint Example	For e.g. http://api.511.org/traffic/wzdx&api_key=ENTER-API-KEY-HERE

Parameters and Filters supported with the request

Parameter	Mandatory/ Optional	Description
api_key	Mandatory	Unique key assigned to a user after they signup for Open511.
IncludeAllDefinedEnums	*Optional*	By default, the API converts non-standard directional value 'Both' to WZDx specification allowed value 'undefined'. When this filter is set to 'True' the directional values will be unmasked and be provided with value 'Both' as directions.

Possible Errors

Listed below are HTTP status code and message returned for certain common errors:

- 500 - Internal Server Error (System has issues processing your request)
- 401 – Unauthorized (Invalid API key)
- 404 – Not found (If an individual event resource cannot be located).

3 Appendix A: API Response Messages- XML

3.1 Traffic Event XML

A.1.1 Example Traffic Event Structure Response (XML)

```
<open511
     xmlns:gml="http://www.opengis.net/gml"
     xml:lang="en"
     xml:base="http://api.511.org"
```

```xml
      version="v1"
   >
<events>
  <event>
  <status>ACTIVE</status>
  <link rel="self" href="/traffic/events/511.org/149"/>
  <link rel="jurisdiction" href="http://api.511.org/jurisdictions/511.org/"/>
  <id>511.org/149</id>
  <headline> CHP : Accident on CA-160 Northbound between Main St (Antioch) and Antioch
Bridge - Toll Plaza (Oakley). All lanes closed. Expect delays.
 </headline>
  <event_type>INCIDENT</event_type>
     <event_subtypes>
        <event_subtype>Accident</event_subtype>
     </event_subtypes>
<severity>UNKNOWN</severity>
  <created>2014-05-01T19:28:31Z</created>
  <updated>2014-05-01T19:28:31Z</updated>
  <geography>
    <gml:Point srsName="EPSG:4326">
      <gml:coordinates>-121.75382399999999,38.004908</gml:coordinates>
    </gml:Point>
  </geography>
  <roads>
    <road>
      <name>CA-160</name>
      <from>Main St</from>
      <to>Antioch Bridge - Toll Plaza</to>
      <direction>NorthBound</direction>
      <state>Closed</state>
<lane_type xmlns:gml="http://www.opengis.net/gml" xmlns="http://511.org/open511-
extensions">
All lanes
</lane_type>
<road_advisory xmlns:gml="http://www.opengis.net/gml" xmlns="http://511.org/open511-
extensions">
Expect delays</road_advisory>
<lane_status xmlns:gml="http://www.opengis.net/gml" xmlns="http://511.org/open511-
extensions">
closed</lane_status>
<article xmlns:gml="http://www.opengis.net/gml" xmlns="http://511.org/open511-
extensions">
between
</article>
    </road>
  </roads>
    <areas>
       <area>
         <name>Antioch</name>
         <id>geonames.org/5324200</id>
         <link rel="self" href="http://geonames.org/5324200/" />
       </area>
       <area>
         <name>Oakley</name>
         <id>geonames.org/5378566</id>
         <link rel="self" href="http://geonames.org/5378566/" />
       </area>
    </areas>
  <schedules>
```

```xml
      <schedule>
        <start_date>2014-05-01</start_date>
      </schedule>
    </schedules>
</event>
<event>
  <status>ACTIVE</status>
  <link rel="self" href="/traffic/events/511.org/209"/>
  <link rel="jurisdiction" href="http://api.511.org/jurisdictions/511.org/"/>
  <id>511.org/209</id>
  <headline>CHP : Obstruction on US-101 N NorthBound before Coyote Creek Golf Dr (San
Jose) left lane blocked Expect delays</headline>
  <event_type>INCIDENT</event_type>
  <severity>UNKNOWN</severity>
  <created>2014-05-02T01:13:55Z</created>
  <updated>2014-05-02T02:43:16Z</updated>
  <geography>
    <gml:Point srsName="EPSG:4326">
      <gml:coordinates>-121.69346399999999,37.19068</gml:coordinates>
    </gml:Point>
  </geography>
  <roads>
    <road>
      <name>US-101 N</name>
      <from>Coyote Creek Golf Dr</from>
      <to/>
      <direction>NorthBound</direction>
      <state>Open</state>
    </road>
  </roads>
  <schedules>
    <schedule>
      <start_date>2014-05-01</start_date>
    </schedule>
  </schedules>
<closure_geometry xmlns:gml="http://www.opengis.net/gml" xmlns="http://511.org/open511-
extensions">
<gml:MultiLineString srsName="urn:ogc:def:crs:EPSG::4326">
<gml:LineStringMember>
<gml:LineString>
<gml:posList>
-121.905403778982,37.4664031808211,-121.905516999724,37.4665420000284,-
121.905530999967,37.4665599997276,-121.905550000234,37.4665840000328,-
121.905665999687,37.4667269999391,-121.906012000191,37.4671670002383,-
121.906404999653,37.4676470002688,-121.906715000173,37.4680369998512,-
121.907135000298,37.4685380001628,-121.907393999865,37.4688380001212,-
121.907569999593,37.4690580000859,-
121.907808999967,37.4693440001416,121.938268000236,37.512444999755,-
121.938432000268,37.512730000037,-121.938663000246,37.5131339997496,-
121.93890799957,37.5135559999043,-121.939175000432,37.514022000349,-
121.939356000182,37.5143290001285,-121.939525000237,37.5146310001649,-
121.939581665124,37.5147344758603
</gml:posList>
</gml:LineString>
</gml:LineStringMember>
<gml:LineStringMember>
<gml:LineString>
<gml:posList>
```

```
-121.941468948045,37.5310149698319,-121.941338999731,37.531097000203,-
121.941265999936,37.5311409999076,-121.941188999943,37.5311869999595,-
121.941030999759,37.5312800001638,-121.940669000259,37.5314930001716,-
121.940090999951,37.5318160000229,-121.939761000238,37.5319949996535,-
</gml:posList>
</gml:LineString>
</gml:LineStringMember>
<gml:LineStringMember>
<gml:LineString>
<gml:posList>
-121.885072507042,37.574436747037,-121.885018000099,37.5744620003296,-
121.884722999648,37.5745870001079,-121.884567999837,37.5746469998415,-
121.884411000377,37.5747040000065,-121.884217000208,37.5747680001896,-
121.88396199994,37.5748509998558,-121.883647000295,37.5749509997424,-
121.883442000256,37.5750149997133,-121.882085999623,37.5754569997014,-
121.881545999848,37.5756320001267,-121.88146600038,37.5756530000647,-
121.880771999721,37.5758790003444,-121.880544000115,37.5759670002614,-
121.88040299965,37.5760220002457,-121.880283999824,37.576072999716,-
121.880199000334,37.5761110002897,-121.880077000135,37.5761699999243,-
121.879953000286,37.5762310001006,-121.879832999737,37.5762890000585,-
121.879713999912,37.5763520000107,-121.879580000017,37.5764280001421
</gml:posList>
</gml:LineString>
</gml:LineStringMember>
</gml:MultiLineString>
</closure_geometry>
<source_name xmlns:gml="http://www.opengis.net/gml" xmlns="http://511.org/open511-
extensions">
CHP
</source_name>
<source_id xmlns:gml="http://www.opengis.net/gml" xmlns="http://511.org/open511-
extensions">
1234
</source_id>
</event>
</events>
   <pagination>
     <offset>0</offset>
     <link rel="next" href="/traffic/events/?api_key={api_key}&limit=2&amp;offset=2"/>
   </pagination>
   <link rel="self" href="/traffic/events/?api_key={api_key}&limit=2&amp;offset=0"/>
   <link rel="up" href="/"/>
 </open511>
```

4 Appendix B: API Response Messages- JSON

4.1 Traffic Event JSON

B.1.1 Example Traffic Event Structure Response (JSON)

```
{
  "events": [{
    "url": "/traffic/events/511.org/149",
    "jurisdiction_url": "http://api.511.org/jurisdictions/511.org/",
    "id": "511.org/149",
    "status": "ACTIVE",
    "headline": "CHP : Accident on CA-160 Northbound between Main St (Antioch) and
Antioch Bridge - Toll Plaza (Oakley). All lanes closed. Expect delays",
    "event_type": "INCIDENT",
    "event_subtypes": [
                "Accident"
           ],
    "severity": "UNKNOWN",
    "created": "2014-05-01T19:28:31Z",
    "updated": "2014-05-01T19:28:31Z",
    "geography": {
     "type": "Point",
     "coordinates": [
       -121.753824,
       38.004908
     ]
    },
    "roads": [{
     "name": "CA-160",
     "from": "Main St",
     "to": "Antioch Bridge - Toll Plaza",
     "direction": "NorthBound",
     "state": "Open",
"+lane_type": "All Lanes",
"+article": "between",
"+road_advisory": "Expect delays",
"+lane_status" : "closed"
    }],
      "areas": [
              {
                "url": "http://geonames.org/5324200/",
                "name": "Antioch",
                "id": "geonames.org/5324200"
              },
              {
                "url": "http://geonames.org/5378566/",
                "name": "Oakley",
                "id": "geonames.org/5378566"
              }
         ]
    "schedules": [{
     "start_date": "2014-05-01"
    }],
"+source_id": "1234",
"+source_name": "CHP",
    "+closure_geography": {
     "type": "MultiLineString",
     "coordinates": [
```

```
      [
        [
          -121.965344339091,
          38.0227069562185
        ],
        [
          -121.965265000299,
          38.0226909996807
        ],
        [
          -121.964901000251,
          38.0226219996731
        ],
        [
          -121.963347999975,
          38.0223280002051
        ],
        [
          -121.963122999844,
          38.0222860001848
        ],
        [
          -121.962568,
          38.0221690001024
        ],
        [
          -121.962037000446,
          38.0220539997063
        ],
        [
          -121.961545000351,
          38.0219580000743
        ],
        [
          -121.960780000445,
          38.0218160002701
        ],
        [
          -121.960453000207,
          38.0217570002606
        ],
        [
          -121.960274000107,
          38.0217250000316
        ]
      ]
    ]
  }
},
{
  "url": "/traffic/events/511.org/209",
  "jurisdiction_url": "http://api.511.org/jurisdictions/511.org/",
  "id": "511.org/209",
  "status": "ACTIVE",
  "headline": "CHP : Obstruction on US-101 N NorthBound before Coyote Creek Golf Dr
(San Jose) left lane blocked Expect delays",
  "event_type": "INCIDENT",
  "severity": "UNKNOWN",
  "created": "2014-05-02T01:13:55Z",
```

```
      "updated": "2014-05-02T02:43:16Z",
      "geography": {
       "type": "Point",
       "coordinates": [
         -121.693464,
         37.19068
       ]
      },
      "roads": [{
       "name": "US-101 N",
       "from": "Coyote Creek Golf Dr",
       "to": "",
       "direction": "NorthBound",
       "state": "Open"
      }],
      "schedules": [{
       "start_date": "2014-05-01"
      }]
     }
   ],
   "pagination": {
    "next_url": "/traffic/events/?api_key={api_key}&limit=2&offset=2",
    "offset": 0
   },
   "meta": {
    "url": "traffic/events/?api_key={api_key}&limit=2&offset=0",
    "up_url": "/",
    "version": "v1"
   }
 }
```

4.2   Work Zone Data Exchange (WZDx) JSON

B.2.1 Example Work Zone Data Exchange Structure Response (JSON)

```
{
  "road_event_feed_info": {
    "publisher": "MTC",
    "version": "4.0",
    "license": "https://creativecommons.org/publicdomain/zero/1.0/",
    "update_frequency": 300,
    "contact_name": "511 SF Bay",
    "contact_email": "trafficdata@511.org",
    "update_date": "2023-10-13T18:55:42Z",
    "data_sources": [
      {
        "update_date": "2023-10-12T20:00:35Z",
        "data_source_id": "SF-2",
        "jurisdiction_id": "3",
        "organization_name": "SFMTA",
        "update_frequency": 1440,
        "contact_name": "SpecialEvents",
        "contact_email": "SpecialEvents@sfmta.com"
      },
      {
        "update_date": "2022-12-30T18:53:50Z",
        "data_source_id": "CSC-255998",
        "jurisdiction_id": "8",
        "organization_name": "County of Santa Clara - Roads and Airports Department",
```

```
      "update_frequency": 0,
      "contact_name": "Thien Pham",
      "contact_email": "thien.pham@rda.sccgov.org"
    },
    {
      "update_date": "2023-01-05T20:41:39Z",
      "data_source_id": "SL-889351",
      "jurisdiction_id": "7",
      "organization_name": "City of San Leandro",
      "update_frequency": 0,
      "contact_name": "Sheila Marquises",
      "contact_email": "smarquises@sanleandro.org"
    },
    {
      "update_date": "2023-10-12T07:10:19Z",
      "data_source_id": "SJ-1",
      "jurisdiction_id": "2",
      "organization_name": "City of San Jose Department of Public Works",
      "update_frequency": 1440,
      "contact_name": "Cone Zone Application",
      "contact_email": "joel.clark@sanjoseca.gov"
    },
    {
      "update_date": "2023-10-06T07:10:27Z",
      "data_source_id": "SJ-2",
      "jurisdiction_id": "2",
      "organization_name": "City of San Jose Department of Transportation",
      "update_frequency": 1440,
      "contact_name": "Current Pavement Projects",
      "contact_email": "jay.vanbiljouw@sanjoseca.gov"
    },
    {
      "update_date": "2023-10-13T18:45:00Z",
      "data_source_id": "TM-1",
      "jurisdiction_id": "1",
      "organization_name": "TRAMS",
      "update_frequency": 300,
      "contact_name": "511 SF Bay",
      "contact_email": "trafficdata@511.org"
    }
  ]
},
"type": "FeatureCollection",
"features": [
  {
    "type": "Feature",
    "id": "SF-744117-9738000-3279938",
    "geometry": {
      "type": "LineString",
      "coordinates": [
        [
          -122.43270618000003,
          37.78329259200001
        ],
        [
          -122.43435039600001,
          37.783083017000024
        ]
      ]
```

```
        },
        "properties": {
          "core_details": {
            "event_type": "detour",
            "data_source_id": "SF-2",
            "road_names": [
              "OFARRELL ST"
            ],
            "direction": "undefined",
            "creation_date": "2023-10-12T20:19:36Z",
            "update_date": "2023-10-13T18:45:22Z"
          },
          "start_date": "2023-10-15T11:00:00Z",
          "end_date": "2023-10-15T18:00:00Z",
          "event_status": "pending",
          "start_date_accuracy": "estimated",
          "end_date_accuracy": "estimated",
          "beginning_cross_street": "FILLMORE ST",
          "ending_cross_street": "STEINER ST"
        }
      },
      {
        "type": "Feature",
        "id": "SJ-4167_WB",
        "geometry": {
          "type": "LineString",
          "coordinates": [
            [
              -121.8398006,
              37.3497991
            ],
            [
              -121.8411417,
              37.348861
            ],
            [
              -121.8411525,
              37.3486136
            ],
            [
              -121.8451007,
              37.3457137
            ]
          ]
        },
        "properties": {
          "core_details": {
            "event_type": "work-zone",
            "data_source_id": "SJ-1",
            "road_names": [
              "LAVONNE AVE"
            ],
            "direction": "westbound",
            "creation_date": "2023-05-11T07:11:01Z",
            "update_date": "2023-10-13T18:45:01Z",
            "description": "Utility potholing"
          },
          "start_date": "2023-05-10T15:15:00Z",
          "end_date": "2023-12-31T00:15:00Z",
```

```
          "event_status": "active",
          "start_date_accuracy": "estimated",
          "end_date_accuracy": "estimated",
          "beginning_accuracy": "estimated",
          "ending_accuracy": "estimated",
          "location_method": "channel-device-method",
          "vehicle_impact": "unknown",
          "beginning_cross_street": "MCCREERYAVE",
          "ending_cross_street": "SINCLAIR AVE"
        }
      },
      {
        "type": "Feature",
        "id": "CSC-1688067095810",
        "geometry": {
          "type": "LineString",
          "coordinates": [
            [
              -122.016954,
              37.167567999999996
            ],
            [
              -122.016893,
              37.167657
            ],
            [
              -122.016758,
              37.167845
            ],
            [
              -122.016618,
              37.168115
            ],
            [
              -122.01655699999999,
              37.168264
            ]
          ]
        },
        "properties": {
          "core_details": {
            "event_type": "work-zone",
            "data_source_id": "CSC-255998",
            "road_names": [
              "Bear Creek Road"
            ],
            "direction": "undefined",
            "creation_date": "2023-06-29T19:31:35Z",
            "update_date": "2023-06-29T19:31:35Z",
            "description": "One lane closed on Bear Creek Road 700' north of Highway 35"
          },
          "start_date": "2023-02-01T20:30:57Z",
          "end_date": "2023-11-30T20:31:02Z",
          "event_status": "active",
          "start_date_accuracy": "estimated",
          "end_date_accuracy": "estimated",
          "beginning_accuracy": "verified",
          "ending_accuracy": "verified",
          "location_method": "other",
```

```
          "vehicle_impact": "alternating-one-way",
          "beginning_cross_street": "Highway 35",
          "ending_cross_street": "George Road",
          "worker_presence": {
            "are_workers_present": false
          }
        }
      }
    },
    {
      "type": "Feature",
      "id": "TM-231009GG01893-1104046",
      "geometry": {
        "type": "MultiPoint",
        "coordinates": [
          [
            -122.4409,
            37.9349
          ],
          [
            -122.4409,
            37.9349
          ]
        ]
      },
      "properties": {
        "core_details": {
          "event_type": "work-zone",
          "data_source_id": "TM-1",
          "road_names": [
            "I-580 W"
          ],
          "direction": "westbound",
          "creation_date": "2023-10-13T04:30:06Z",
          "update_date": "2023-10-13T04:30:06Z",
          "description": "CHP : Severe traffic alert on I-580 Westbound at Richmond San
Rafael Bridge (Richmond). Lanes open. Expect delays."
        },
        "start_date": "2023-10-10T10:21:33Z",
        "end_date": "2023-10-11T06:59:59Z",
        "event_status": "completed",
        "start_date_accuracy": "verified",
        "end_date_accuracy": "estimated",
        "beginning_accuracy": "verified",
        "ending_accuracy": "estimated",
        "location_method": "unknown",
        "vehicle_impact": "unknown",
        "beginning_cross_street": "Richmond San Rafael Bridge",
        "worker_presence": {
          "are_workers_present": false
        }
      }
    },
    {
      "type": "Feature",
      "id": "SF-773945-4312000-3287485",
      "geometry": {
        "type": "LineString",
        "coordinates": [
          [
```

```
            -122.40140379600001,
            37.79442684600002
          ],
          [
            -122.40226452799999,
            37.794315756
          ]
        ]
      },
      "properties": {
        "core_details": {
          "event_type": "detour",
          "data_source_id": "SF-2",
          "road_names": [
            "COMMERCIAL ST"
          ],
          "direction": "undefined",
          "creation_date": "2023-10-12T20:20:19Z",
          "update_date": "2023-10-13T18:45:24Z"
        },
        "start_date": "2023-11-23T07:00:00Z",
        "end_date": "2023-11-23T23:00:00Z",
        "event_status": "pending",
        "start_date_accuracy": "estimated",
        "end_date_accuracy": "estimated",
        "beginning_cross_street": "SANSOME ST",
        "ending_cross_street": "LEIDESDORFF ST"
      }
    },
    {
      "type": "Feature",
      "id": "SJ-4738_SB",
      "geometry": {
        "type": "LineString",
        "coordinates": [
          [
            -121.8406038,
            37.3554893
          ],
          [
            -121.8426906,
            37.357681
          ]
        ]
      },
      "properties": {
        "core_details": {
          "event_type": "work-zone",
          "data_source_id": "SJ-1",
          "road_names": [
            "S JACKSON AVE"
          ],
          "direction": "southbound",
          "creation_date": "2023-07-14T07:11:01Z",
          "update_date": "2023-10-13T18:45:01Z",
          "description": "Utility repair"
        },
        "start_date": "2023-07-18T15:30:00Z",
        "end_date": "2023-12-30T23:30:00Z",
```

```
            "event_status": "active",
            "start_date_accuracy": "estimated",
            "end_date_accuracy": "estimated",
            "beginning_accuracy": "estimated",
            "ending_accuracy": "estimated",
            "location_method": "channel-device-method",
            "vehicle_impact": "unknown",
            "beginning_cross_street": "E SAN ANTONIO AVE",
            "ending_cross_street": "WOODSET LN"
        }
      }
   ]
}
```