

Missing Roads and Directionality

Project Scope

Missing Roads and Directionality project requires identifying missing roads, creating missing roads, and understanding directionality of roads to fixing them if necessary.

Key Terms

One way road - a road where vehicles can only drive in one direction

Highway Type - the type of road classification that creates a hierarchy of road types within a road network

Lane Count - the number of lanes used by vehicles on a road

Bi-Directional Road - A road that has two opposing directions of vehicle travel

Dual Carriageway - road that is comprised of two separate one way roads going in different directions with physical barriers between the opposing traffic. Together the one way roads make up a large street of the same name

Cycle Lane - A lane that is designated for cyclist and is marked to indicate it is a lane for only cycling

Link Road - road that connects two roads. Also referred to as a slip road or ramp

Tagging

Road Features		
Key	Value	Description
oneway	yes	One way road
name	*	Road name
tunnel	building_passage	Indicates ways that go through a building and have walls on both sides
covered	yes	Indicates objects which are not covered by an arcade or a colonnade
barrier	kerb	Indicates a kerb (US English: curb), a short barrier for vehicles and wheelchair users, usually found at the edge of a road, path or sidewalk
highway	proposed	Indicates roads that are about to be built, but where any construction work hasn't yet been started

Highway Types

1. Highways have various classifications of highway types and tags associated with each type.
2. The highway=* key is the main key used for identifying the type of road, street or path.
3. The value indicates the importance of the highway within the road network.
4. The highway=* key includes tags that also encompass related features that are associated with using a road. This includes bus stops, service areas, pedestrian crossings and other highway related features.
5. There are seven types of highway types that are used for tagging when mapping for autonomous vehicles; motorway, trunk, primary, secondary, tertiary, residential, service.
6. The highway type classifications exist as a hierarchy from highway=motorway to highway=service.
7. When curating classifications, take into account what the classification of roads are in the area that is being mapped.

Highway Types	
Value	Description
motorway 	A major divided highway, normally with two or more lanes plus an emergency hard shoulder. Equivalent to the freeway. (ex: I-5, I-405, I-90, etc.)
trunk 	Not necessarily a divided highway. The most important roads that aren't motorways. (ex: Aurora/Highway 99)
primary 	Often links larger towns.
secondary 	Often links towns.
tertiary 	Often links smaller towns.
residential 	Providing access through residential neighborhoods. If you are driving on a road and there are homes lining the road, it would be classified as residential.
service 	Providing access to places of interest (POIs), such as businesses, parks, or parking lots.

Service Roads Classification

Road types play a huge role in our routing and the detail classification of the service road type will dramatically decrease mistakes related to routes through unrouteable roads.

Service types			
Key	Value	element	Description
service	emergency_access	way	A restricted access major divided highway, normally with 2 or more running lanes plus emergency hard shoulder. Equivalent to the Freeway, Autobahn, etc.
service	drive-through	way	A drive-through way where customers can visit a business without leaving their cars.
service	driveway	way	Specifies that a road is a driveway, typically leading to a residence or business.
service	alley	way	An alley is a service road usually located between properties for access to utilities.
service	parking_aisle	way	A subordinated way in a parking lot between rows of parking spaces that vehicles use to drive into and out of the spaces.

service=driveway

Specifies that a road is a driveway, typically leading to a residence or business.



highway	▼	service	▼		
service	▼	driveway	▼		

service=alley

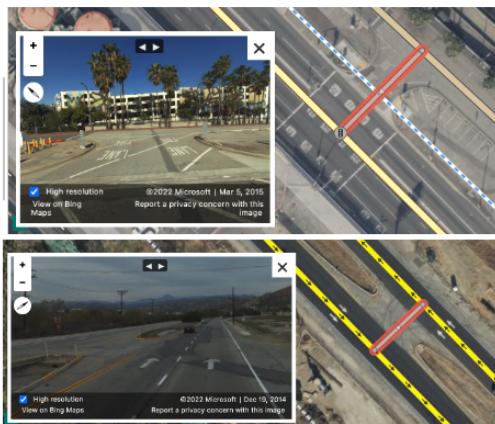
An alley is a service road usually located between properties for access to utilities.



highway	▼	service	▼		
service	▼	alley	▼		

service=emergency_access

A restricted access major divided highway, normally with 2 or more running lanes plus emergency hard shoulder. Equivalent to the Freeway, Autobahn, etc.



highway	▼	service	▼		
service	▼	emergency_access	▼		

service=drive-through

A drive-through way where customers can visit a business without leaving their cars.



highway	▼	service	▼		
oneway	▼	yes	▼		
service	▼	drive-through	▼		

service=parking_aisle

A subordinated way in a parking lot between rows of parking spaces that vehicles use to drive into and out of the spaces.



highway	▼	service	▼		
oneway	▼	yes	▼		
service	▼	parking_aisle	▼		

Missing Roads

Missing roads are considered ways that are not mapped in OSM or mapped incorrectly, but up to date sources provide evidence that a road is present. Adding missing roads will create a more accurate map and improve routing for vehicles.

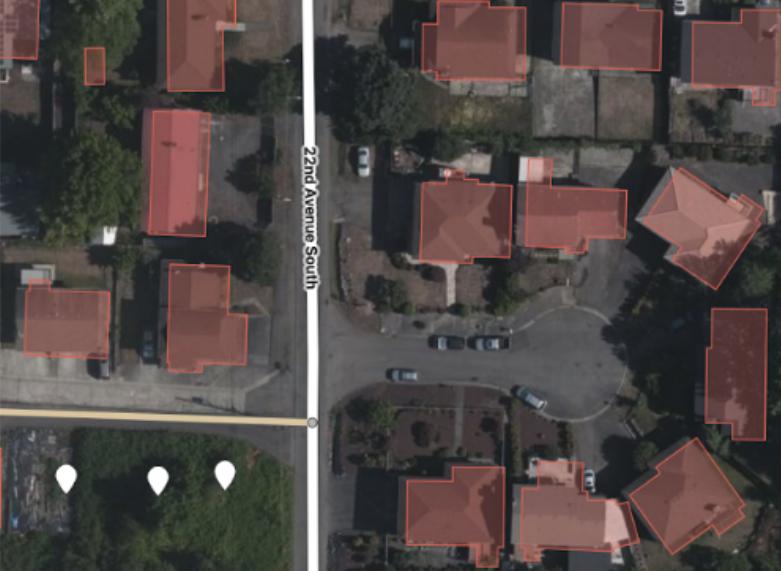
Sources

- Use the most up to date satellite imagery when creating a new way
- The imagery should align to the roads in the area as well as the newly created way

Creating New Ways

1. When creating new roads, they must connect to the larger network of streets. Roads can not be created to be separate from the road network, and must be connected to another way.
 - a. A node will turn from white to grey when it is attached to another feature
2. A new way is drawn down the center of the road width from satellite imagery.
 - a. Always use the most up to date imagery
 - b. Ways represent the physical streets they are rendered over
3. A new way is drawn perpendicular or parallel to existing roads, unless the road is at an angle
4. At an intersection, ways should join at one central node
5. Create ways with a limited amount of nodes
 - a. If a road curves in geometry, use 3 nodes to create a bend in a way.
6. Add the correct road type tag for a new way
 - a. Reference the **Highway Types** to apply the correct road type tag
7. Check all resources to verify if the road is a one way road
 - a. Add the **oneway=yes** tag if the road is a one way road.
8. Check all resources to verify the road name
 - a. Add the road name tag if it exists
9. Do not add new roads that are temporary or within construction sites

10. Do not add new roads for private driveways

Road existing in imagery	Way created from imagery
	

General cases and recommendations

1. `tunnel=building_passage` vs `covered=yes`

- a. `tunnel=building_passage` tag is used to indicate driveways that are completely isolated from the environment (arches, underground road tunnels, etc).
- b. `covered=yes` tag is used to indicate driveways that have a roof, but do not restrict movement on the sides, at least for people (covered petrol stations, etc).

<code>tunnel=building_passage</code>	<code>covered=yes</code>
	
 	 

1. barrier=kerb

- If the **barrier=kerb** tag added to the node between road segment and crossing it should be removed and tag **highway=crossing** should be added.
- This is out of policy tag and can't be added to OSM. Reference [Traffic Control Elements](#) policy.



1. highway=proposed

- The tag has the same removal algorithm as construction tag. Reference [Construction tags test removal algorithm](#) policy.
- If the tag should be removed according to the algorithm, the tag **proposed=*** is removed and the value of this tag should be applied to **highway=*** tag.
- This is out of policy tag and can't be added to OSM.

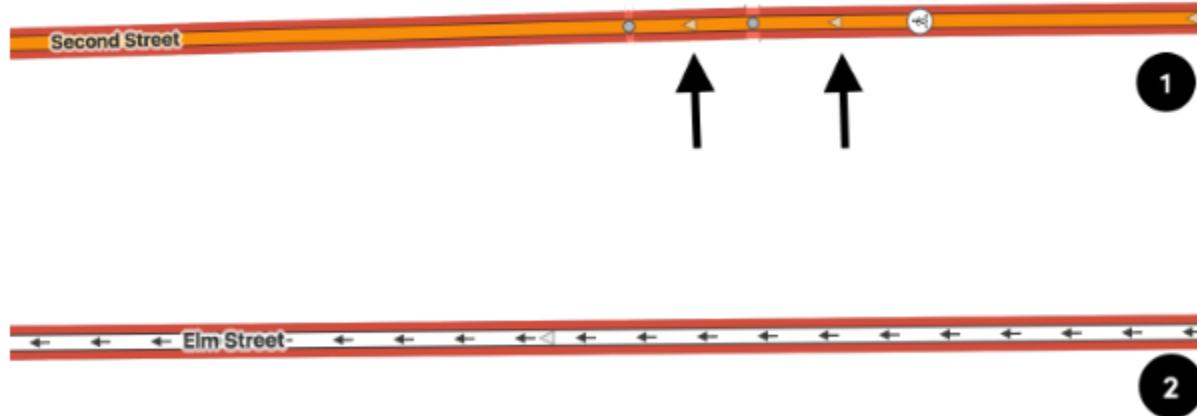
Directionality



Every way drawn in OSM has a direction applied to it from how that way was drawn. The way directionality does not reflect a real world road object, but is instead used a reference for creating specific tags for a way.

1. The way directionality is indicated by an arrows along the way when it is selected in iD Editor.

2. A one way road is a road where vehicles can only drive in one direction. Black arrow along the road indicate if it is a one way road along with the tag associated to the way.



Sources

- Use the most up to date and project approved street side imagery when finding sources to indicate if a road is a one way road.
- Use the most up to date satellite imagery when determining if a road is a one way road
- Use active Lyft GPS tracks as additional evidence to determine the direction of the road (can not be the only evidence)

One Way Roads

1. If a way is associated with a road where vehicles can only drive in one direction, apply the **oneway=yes** tag
 - a. Use the most recent sources to identify if the road is driven in one direction
2. If a way is associated to a road that has a physical barrier between opposing traffic, the road should be modeled as dual carriageway
 - a. A dual carriageway is defined as a road that is comprised of two separate one way roads going in different directions with physical barriers between the opposing traffic. Together the one way roads make up a large street of the same name
3. If a way is a link road, it is usually a one way road, but not always
 - a. A link road is defined as a road that connects between two high-class roads

4. If a way is associated with a road that is driven in both directions, no tag is applied for directionality.

Adding One Way Directionality

1. If a road has sufficient sources to indicate that vehicles can only drive in one direction, add the **oneway=yes** tag to the way associated with that road.
2. Select the the way that needs to be edited
3. At the top of the feature panel the section "One Way" will display for all ways
 - a. The default of a way in OSM is assumed to not be a bidirectional road with two standard lanes, one forward and one backward.
4. Click on "Assumed to be No" to change the "One Way" section to **Yes**
5. The one way direction will be applied to the direction the way was drawn
6. To change the direction of the one way street, click **Change Direction** in the "One Way" panel. The direction of the arrows should reflect the direction that vehicle travel.
7. Remove the **oneway=yes** tag by clicking on the trash can icon in the "One Way" panel or removing the tag in the All tags section

The screenshot shows the OpenStreetMap feature panel for a 'Residential Road' named 'Orange Street'. The 'One Way' section is expanded, showing the current value 'Assumed to be No'. A 'Change Direction' button is visible at the bottom right of the panel.

Name	Value	Action
Name	Orange Street	
One Way	Assumed to be No	