

An Introduction to OpenStreetMap

Mele Sax-Barnett
October 19, 2013

OpenStreetWhat?

- <http://www.osm.org>
- OpenStreetMap or OSM
- **Not** “Open Street Maps”
- Founded in 2004
- Worldwide and seamless
- “Wikipedia of Maps”
- Editable by anyone with an account



OpenStreetMap
The Free Wiki World Map

So, what is it really?

- It's a very large database of XML data
- Each feature is of a certain basic type, and is defined by tags (key value pairs)
- Basic types:
 - Nodes (points)
 - Ways (lines)
 - Areas (polygons)
 - Relations (groups)
- Example tags:
 - highway = primary, bridge = yes

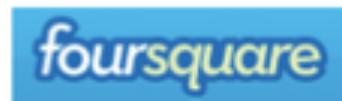


What is it *not*?

- A rendered map that uses particular cartography, whether for web or paper.
- Proprietary—anyone can use it for free as long as they provide proper credit
- Something static—it changes and grows all the time
- Controlled by an authority—it is driven and maintained by a large community of contributors and data consumers

Who uses OpenStreetMap?

- <http://switch2osm.org>



WIKIPEDIA
The Free Encyclopedia



What kind of things can you find in OpenStreetMap?

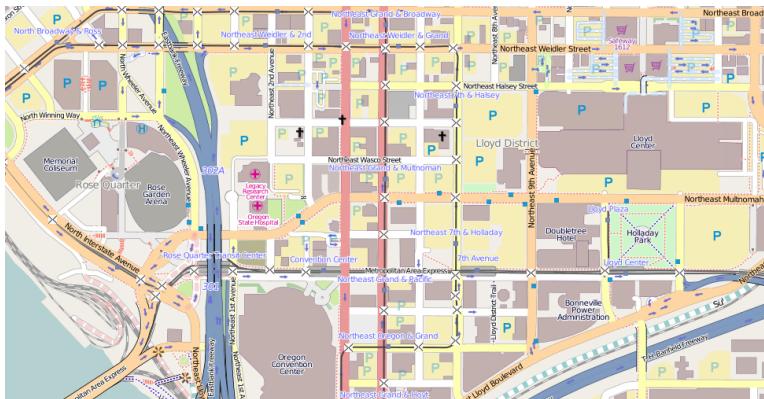
- Roads, highways, bridges, and tunnels
- Bus stops, bus routes, bike routes, and railways
- Businesses: shops, restaurants, bars
- Buildings: schools, churches, houses
- Parks, lakes, mountains, and even trees
- Airports, power networks, and mailboxes
- Administrative boundaries
- Almost anything that stays the same for a while,
see <http://wiki.osm.org> for more

How did all this data get there?

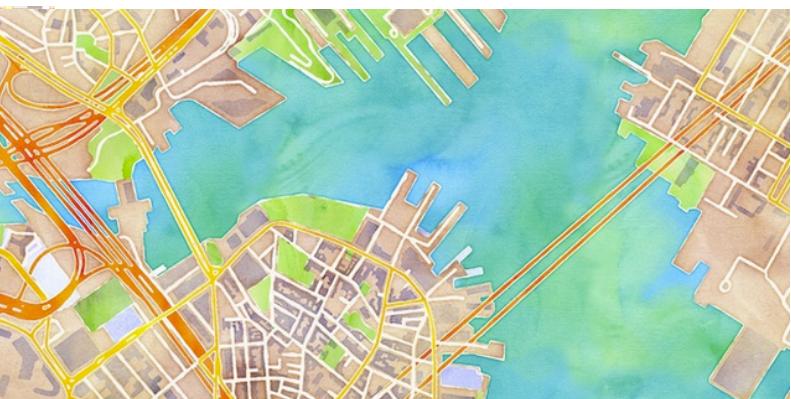
- United States: 2007 TIGER data import
<http://wiki.openstreetmap.org/wiki/TIGER>
- Other imports of open data
- Around the world: lots of people uploading and tidying up GPS tracks
- More recently, tracing aerial imagery (Bing gave special permission for editors to use its aerials)
- Local knowledge
- *A real person put it there, and other people have looked at it and confirmed that it is correct*
- **Challenge: data maintenance**

What does it look like?

OSM.org default



Stamen Design



MapBox



MapQuest

What does it look like?

OpenStreetMap
The Free Wiki Map

View | Edit | History

Data

Manually select a different area | Hide areas

Court Street Northeast

highway: secondary
is_in: Marion, OR
name: Court Street Northeast
oneway: yes
tiger:zip_left: 97301
tiger:zip_right: 97301
Show History

Back to object list

Map Layers

Standard (selected)

Cycle Map

Transport Map

MapQuest Open

Enable overlays for troubleshooting the map

Map Notes

Map Data

20 m
50 ft

© OpenStreetMap contributors

examples: 'Alkmaar', 'Regent Street, Cambridge', 'CB2 SA2', or 'postcodes.org.uk'. See more examples... Where am I?

OpenStreetMap is a free worldwide map, created by people like you.

The data is free to download and use under its open license. Create a user account to improve the map.

Help

Help Centre

Documentation

Community

Community Blogs

Foundation

User Diaries

Data

Copyright & License

Export Data

GPS Traces

State of the Map 2013

6-8 September

Birmingham, UK

Make a Donation

Hosting is supported by the UCL VR Centre, Imperial College London and Bytemark Hosting, and other partners.

What does it look like?

OpenStreetMap View Edit History

Edit feature

Secondary Road

Name: Court Street Northeast

One Way: yes

Structure: Bridge

Access: General Unknown, Foot Unknown, Motor Vehicles Unknown, Bicycles Unknown, Horses Unknown

Speed Limit: 40, 50, 60... mph

Surface: asphalt, paved, unpaved...

Lanes:

View on openstreetmap.org

0 Mele Sax-Barnett

Point Line Area Save

Street Northeast

Court Street Northeast

East Summer Street Northeast

Court Street Northeast

Willson State Park

Oregon State Capitol

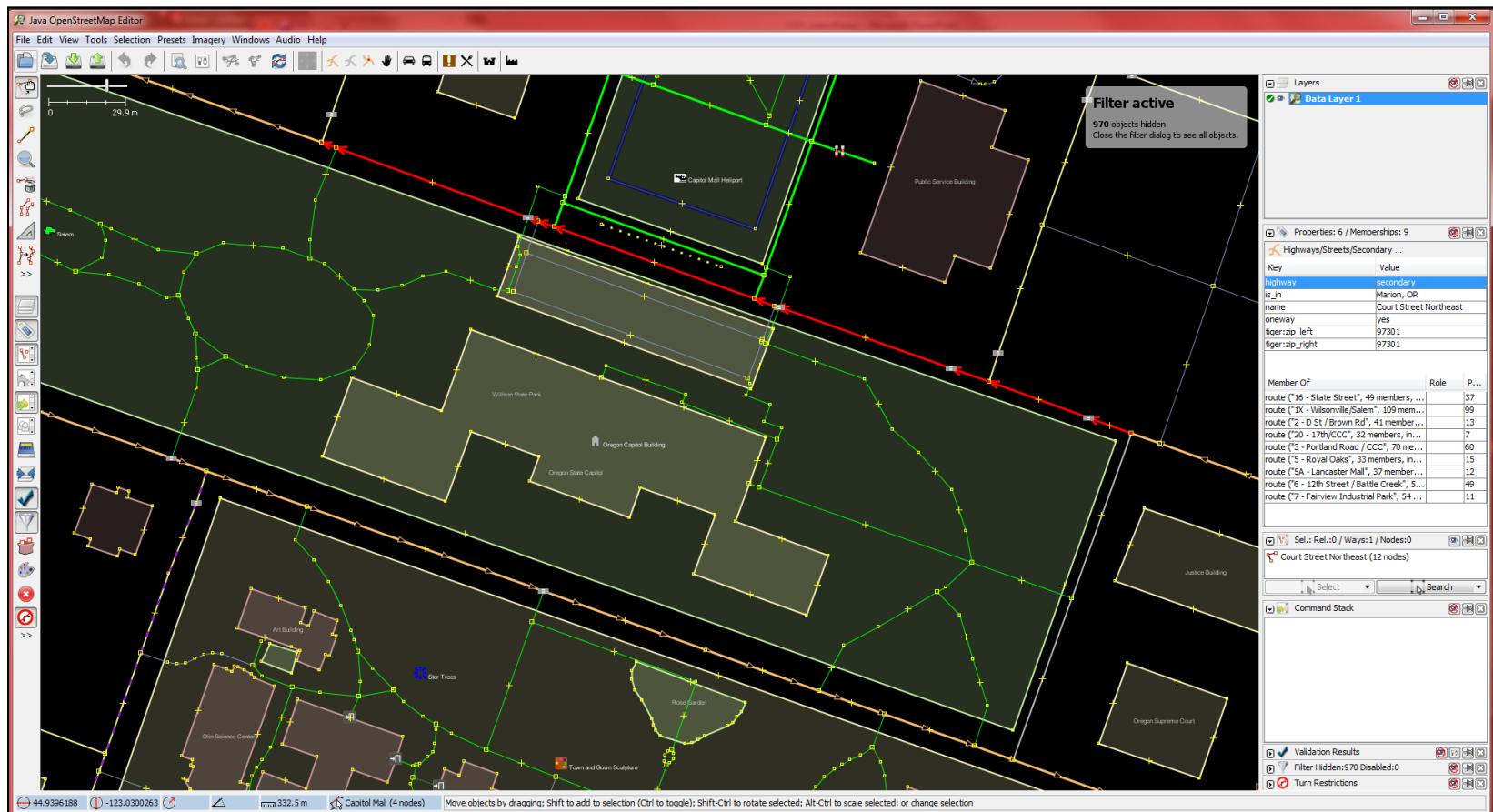
State Street

Art Building

bing ©2014 Microsoft Corporation

Edits by Paul Johnson, Grant Humphries, Mele Sax-Barnett and 6 others | 1.1.6

What does it look like?



OSM data

Properties: 6 / Memberships: 9

Highways/Streets/Secondary ...

Key	Value
highway	secondary
is_in	Marion, OR
name	Court Street Northeast
oneway	yes
tiger:zip_left	97301
tiger:zip_right	97301

Member Of

Route	Role	P...
route ("16 - State Street", 49 members, ...)	37	
route ("1X - Wilsonville/Salem", 109 mem...)	99	
route ("2 - D St / Brown Rd", 41 member...)	13	
route ("20 - 17th/CCC", 32 members, in...)	7	
route ("3 - Portland Road / CCC", 70 me...)	60	
route ("5 - Royal Oaks", 33 members, in...)	15	
route ("5A - Lancaster Mall", 37 member...)	12	
route ("6 - 12th Street / Battle Creek", 5...	49	
route ("7 - Fairview Industrial Park", 54 ...)	11	

Sel.: Rel.:0 / Ways:1 / Nodes:0

Court Street Northeast (12 nodes)

Select Search

JOSM



iD



All tags (6)

highway	secondary
is_in	Marion, OR
name	Court Street Northe...
oneway	yes
tiger:zip_left	97301
tiger:zip_right	97301

All relations (9)

- Bus Route 2 - D St / Brown Rd
- Bus Route 1X - Wilsonville/Salem
- Route 5 - Royal Oaks
- Bus Route 3 - Portland Road / CCC
- Route 5A - Lancaster Mall
- Bus Route 20 - 17th/CCC
- Bus Route 16 - State Street

How do you get the data?

- [http://
wiki.openstreetmap.org/wiki/
Downloading data](http://wiki.openstreetmap.org/wiki/Downloading_data)
- Download via OSM editors
and GIS software OSM plugins
- Large extracts are hosted
around the web, updated at
differing schedules
- You can also now download
directly from <http://osm.org> in
the data view

Data Close

[Manually select a different area](#)

[Hide areas](#)

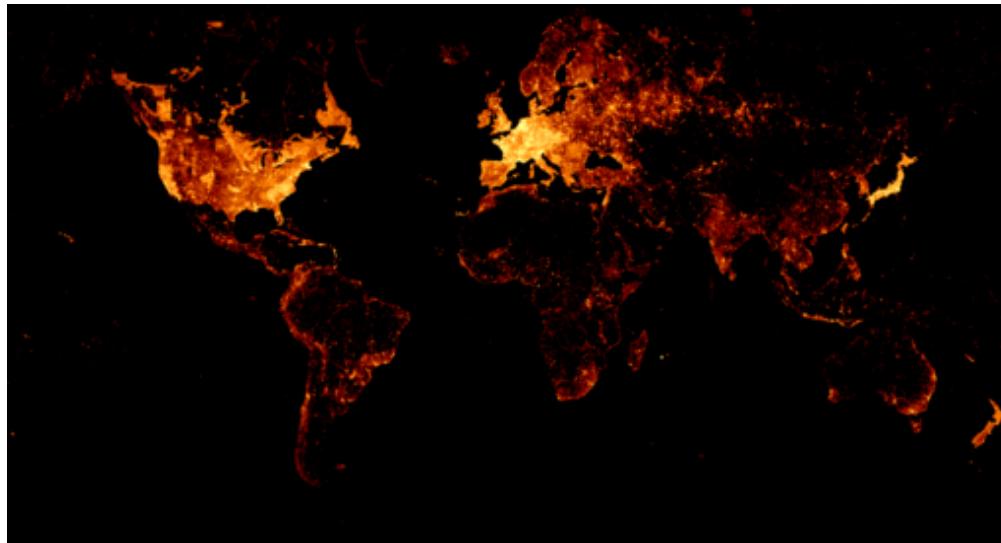
Object list

Node [Oregon Capitol Building](#)
Way [163748503](#)
Way [Oregon State Capitol](#)

[Retrieve this area from the API](#)



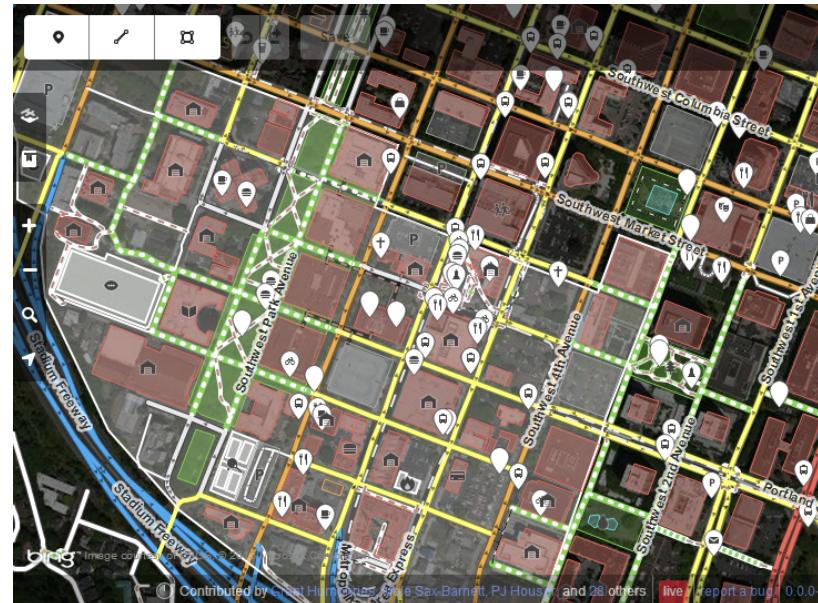
Taking the next step: Editing OpenStreetMap



http://www.openstreetmap.org/user/tyr_asd/diary/19549

How do you edit OSM?

1. Sign up for an account
2. Choose one of several free and open source editors
 - iD and JOSM are popular
 - Examples here will be using iD, a new in-browser editor



Step 1: Sign up for an account

- Go to <http://osm.org>
- Click the “sign up” link in the top right corner

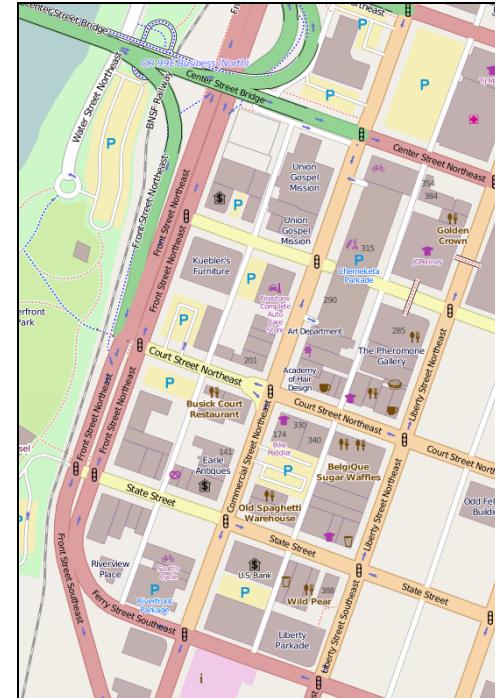


- Set up your account!

The sign up form is titled "Sign Up". It features a background image of a globe with binary code and a map pin. The form includes fields for "Email Address" and "Confirm Email Address", both with placeholder text boxes. A note states "Not displayed publicly (see [privacy policy](#))". To the right, a section titled "Free and editable" explains that OpenStreetMap is created by people and is free for anyone to fix, update, download and use. Another note says "Sign up to get started contributing. We'll send an email to confirm your account." Below the email fields, it says "Display Name" with a placeholder box, noting that it's publicly displayed and can be changed later. Under "Password", there are fields for "Password" and "Confirm Password". A note at the bottom left says "Alternatively, use OpenID to login". A large blue "Sign Up" button is at the bottom.

Step 2: Where and what

- Congratulations! You are now the owner of one of > 1 million OSM editing accounts!
- Go to <http://osm.org>
- Find a neighborhood that you know well
- Think about the places that you know about there - **local knowledge**
- Notice anything missing?



Step 3: Getting started with iD

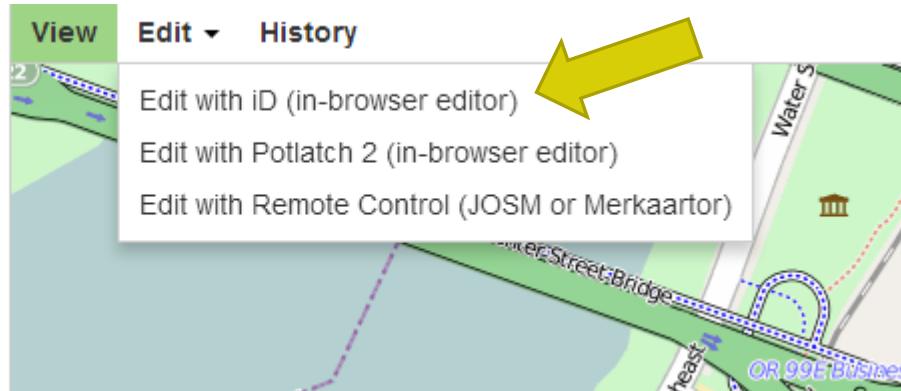
- Start familiarizing yourself with iD:
 - Select Edit -> Edit with iD
 - Go through the walkthrough



[Start the Walkthrough](#)

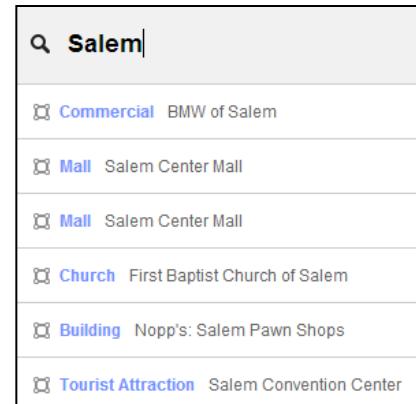


OpenStreetMap
The Free Wiki World Map



Step 3: Getting started with iD

- After the walkthrough:
 - Click things to see how they're classified
 - Don't worry, you can't break anything ***until you click "Save"***
 - Click the magnifying glass to search for a city or place
 - Or, click the arrow to find your current location



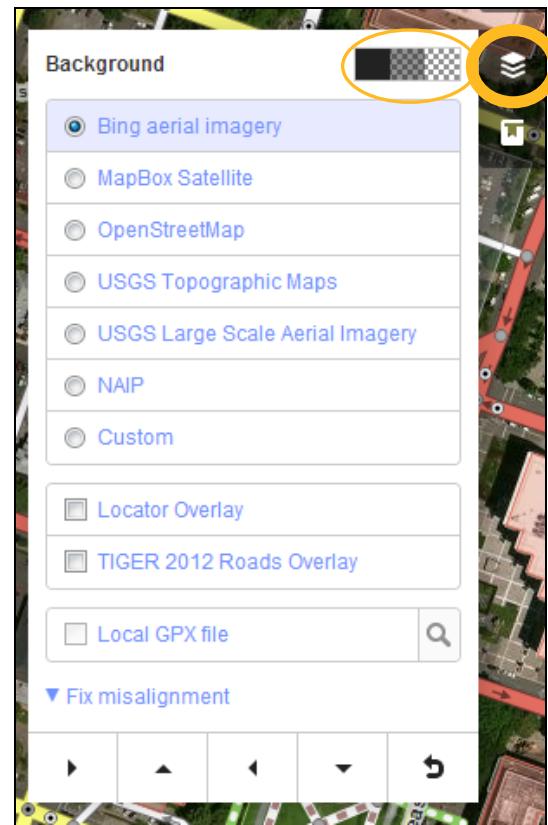
A screenshot of the iD application interface. At the top, there is a search bar with the text "Salem". Below the search bar is a list of search results categorized by type:

- Commercial: BMW of Salem
- Mall: Salem Center Mall
- Mall: Salem Center Mall
- Church: First Baptist Church of Salem
- Building: Nopp's: Salem Pawn Shops
- Tourist Attraction: Salem Convention Center



Step 3: Getting started with iD

- Changing the background imagery
 - Adjust brightness
 - Lots of imagery choices
 - TIGER data overlay
 - Custom/local files and imagery
 - Adjust alignment



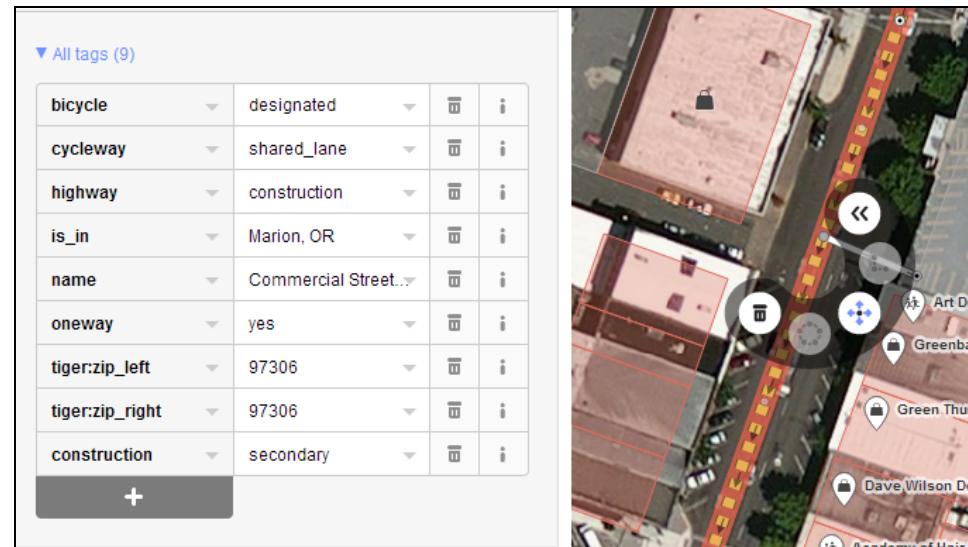
Step 4: Change something

- But first, what's your source?
- **Don't copy from other maps**
- Local knowledge is best, but a dataset with the correct license and permissions can be a source
- You even need permission for aerial imagery (imagery included in OSM editors is OK)
- More info about the OpenStreetMap license (ODBL) can be found at
<http://www.openstreetmap.org/copyright>

Step 4: Change something

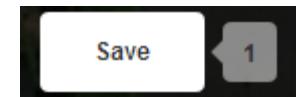
- Let's say a road will be closed for construction for a long period of time
- Select it, click the triangle to show all tags

Change from
highway=secondary
to
highway=construction
and
construction=secondary



Step 5: Save your edits

- Save early, save often
- This creates a “changeset” that is sent to the database
- **Give an informative changeset comment** that includes what you were working on and your sources
- What imagery are you using?



Save Changes X

Commit message

This section of Commercial Street will be closed, undergoing construction until X/Y/2014. Source: ODOT (<http://URL>)

The changes you upload as Mele Sax-Barnett will be visible on all maps that use OpenStreetMap data.

Save

1 Modified

line Commercial Street Northeast

A larger screenshot of a "Save Changes" dialog box. At the top, it says "Save Changes" with a close button. Below that is a "Commit message" field containing a note about closing a street for construction. Underneath is a note about the changes being visible on maps. A "Save" button is at the bottom. Below the dialog, a summary shows "1 Modified" and a list item "line Commercial Street Northeast".

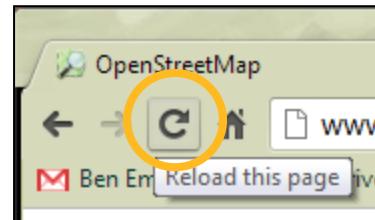
Step 6: View your edits

- Click “View on OSM” (or go to <http://osm.org>)
- Hold down *Ctrl* while clicking *refresh* to clear your browser’s cache of map tiles (shift-refresh with Firefox)
- Should be updated within a few minutes



[View on OSM](#)

Ctrl +



More about editing

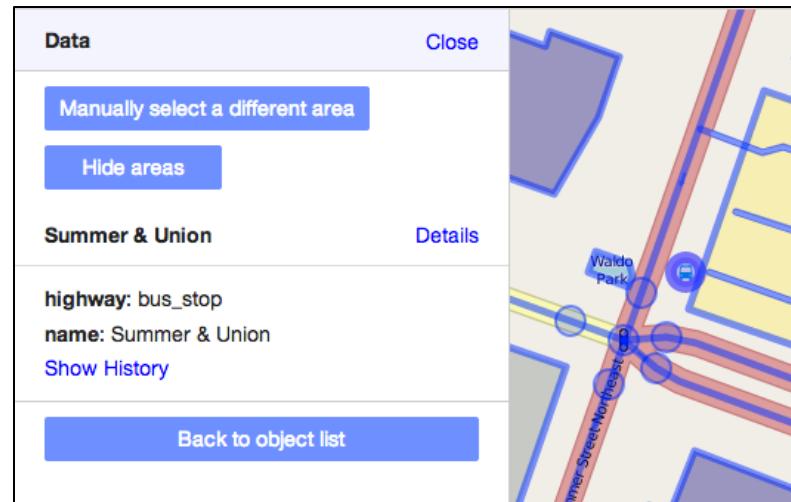
- JOSM (Java OpenStreetMap Editor) is another editor I highly recommend
 - Not too hard to learn, especially if you're familiar with GIS software
 - <http://josm.openstreetmap.de/>
 - <http://learnosm.org>
- Visit <http://wiki.osm.org> for tagging help, or ask on the newbies listserv
<http://lists.openstreetmap.org/listinfo/newbies>

More about the OpenStreetMap data structure: Tags

- Tags are the equivalent of feature attributes
- They consist of two text fields, a key and a value
 - highway = residential
 - leisure = park
 - bicycle = designated
 - cycleway = lane
 - foot = no
 - name = Salem Bus Station

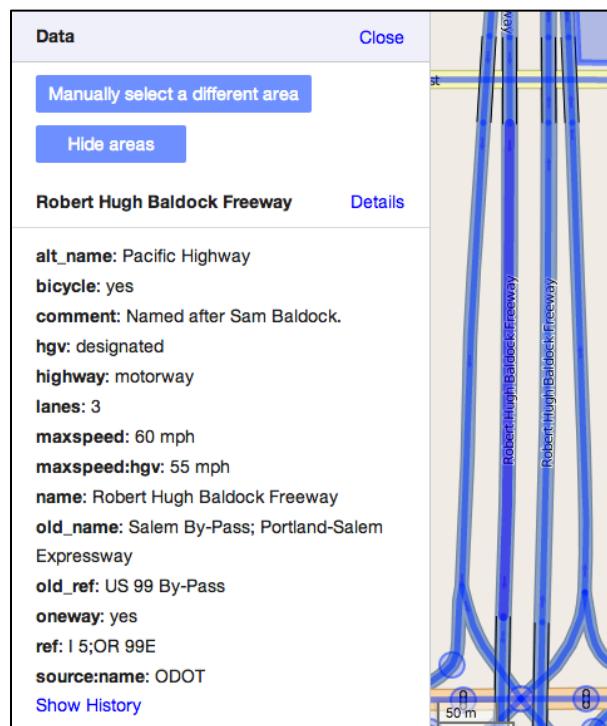
More about the OpenStreetMap data structure: Nodes

- Nodes:
 - A node/point can be used to mark a particular place on the map
 - For example, a bus stop may be marked using a node tagged with `highway = bus_stop`



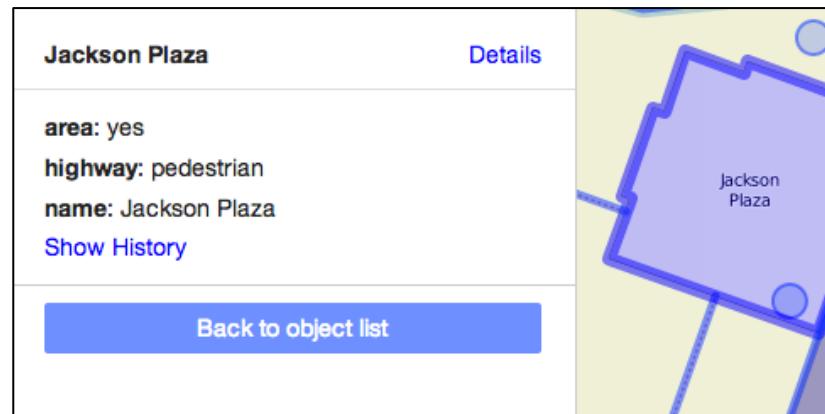
More about the OpenStreetMap data structure: Ways

- Ways:
 - A way is a line feature, made up of two or more connected nodes
 - For example, a freeway would be a way tagged with `highway = motorway`



More about the OpenStreetMap data structure: Areas

- Areas:
 - An area is a closed way
 - For example, a plaza would be an area tagged with `highway = pedestrian` and `area = yes`



Tags that can apply to ways or areas, like `highway = pedestrian`, may also require an `area = yes` tag

More about the OpenStreetMap data structure: Relations

- Relations:
 - Groups of nodes, ways, or areas
 - Types:
 - Route: includes interstate routes, cycling routes, and bus routes
 - Multipolygon: areas with multiple parts or holes
 - Boundary: for administrative boundaries
 - Restriction: to describe turn restrictions

OSM peculiarities to keep in mind

- Most keys and values should not be capitalized (the only exceptions are values for the “name” key)
- Avoid using abbreviations of any kind
- Local knowledge trumps jurisdictional datasets
- If you are editing to match a reference dataset, make sure you are allowed to use it for OpenStreetMap (read the license)

More OSM peculiarities

- Street names should be what you see on the street sign, but expand the abbreviation
- Highways may also have ref codes, which are not the same as the name
 - For example, I5 is known by many names (Robert Hugh Baldock Freeway, etc.) but it is always `ref = I 5`
- On and off ramps and service roads are generally unnamed
- Separated roadways should be mapped as separate ways in OpenStreetMap

Topology/Connectivity

- Does this street actually go through and connect to this other street?
- Adding new streets and paths
- Keeping up to date on prolonged closures due to construction projects
- Directionality (one_way = yes)



Topology/Connectivity

- Bridges and tunnels
 - Only connect them to other features according to reality (ok if they overlap other features)
 - `bridge = yes`
 - `tunnel = yes`
 - Associated layer tags:
 - `layer = 0` is implied, ground level
 - `layer = 1` is the next layer up
 - `layer = -1` is the next layer down
 - Continue incrementing up/down as needed

Highway classification

- **highway** =
 - **motorway**: freeway
 - **trunk**: not an official freeway, but bicycles and pedestrians not usually allowed
 - **primary**: major arterial
 - **secondary**: secondary arterial
 - **tertiary**: yellow centerline
 - **residential**: no centerline
 - **service**: often unnamed driveway or alley
- <http://wiki.openstreetmap.org/wiki/Highway>

Highway classification

- `_links`, for instance, `motorway_link`:
 - Defined by the highest-classification roadway it connects to
 - Unnamed links between named roadways
- Highways are for pedestrians and bicycles too
 - `footway`: primarily for foot traffic
 - `cycleway`: primarily for bicycle traffic
 - `path`: for both foot and bike traffic
 - `pedestrian`: wider way for pedestrian and bicycle traffic, occasional service vehicles
- <http://wiki.openstreetmap.org/wiki/Highway>

Access tags

- `access = no` : nobody can go there (unless you also add exceptions)
- `access = private` : only allowed if you are ending or beginning the trip there
- `bicycle = yes` : for places they're not usually allowed, like motorways and trunks
- `bicycle = designated`
- `foot = no`
- `psv = designated, bus = yes`
- <http://wiki.openstreetmap.org/wiki/Access>

Turn restrictions

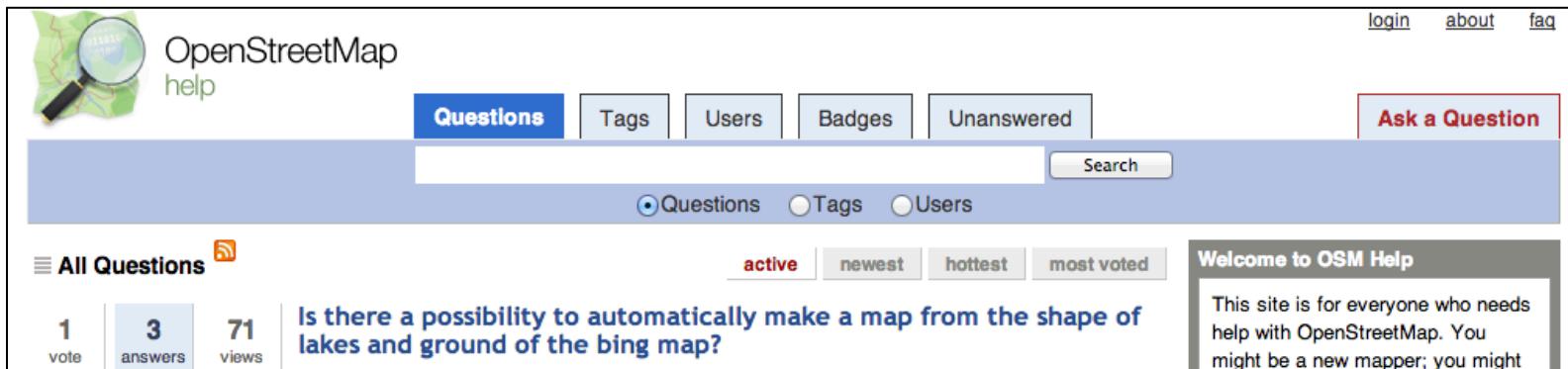
- Relations that say you can or cannot go from one way to another via a particular node
 - A “type”: no_right_turn, no_left_turn, no_u_turn, no_straight_on, only_right_turn, only_left_turn, only_straight_on
 - A “from” way, a “via” node, and a “to” way
 - Can except or apply to only certain kinds of vehicles or bicycles
- http://wiki.openstreetmap.org/wiki/Turn_restrictions

Bicycle facilities

- `cycleway = lane` : bike lane
- `cycleway = opposite_lane` : bike lane going against traffic (for one way streets)
- `cycleway = shared_lane` : sharrows
- `cycleway = share_busway` : shared bike/bus lane
- `cycleway:right = lane`, `cycleway:left = shared_lane` : for when different sides of the street have different facilities
- <http://wiki.openstreetmap.org/wiki/Cycleway>

Resources

- <http://wiki.osm.org>
- <http://help.osm.org>
- Ask on the newbies listserv:
<http://lists.openstreetmap.org/listinfo/newbies>

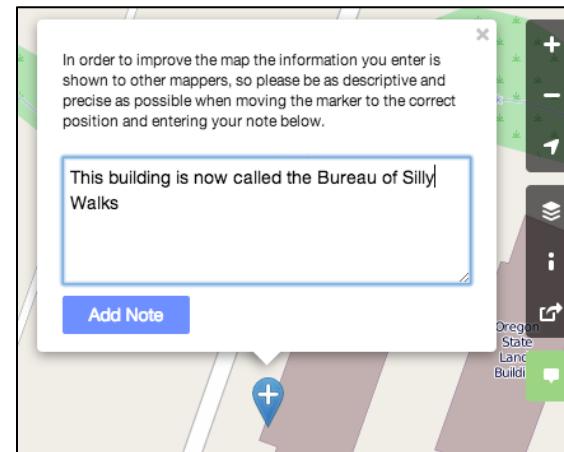
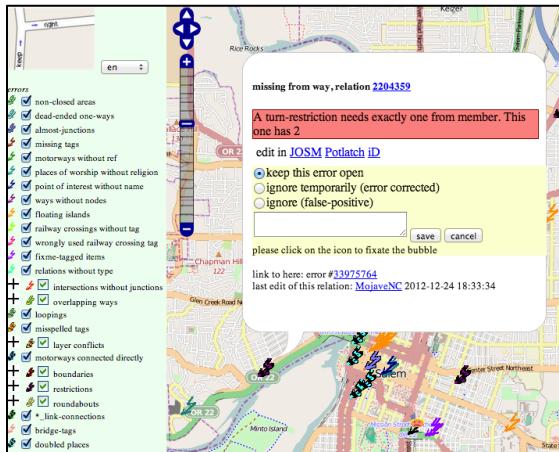


The screenshot shows the OpenStreetMap Help website interface. At the top, there's a navigation bar with links for [login](#), [about](#), and [faq](#). On the left, there's a logo featuring a magnifying glass over a map and the text "OpenStreetMap help". The main menu includes [Questions](#) (which is highlighted in blue), [Tags](#), [Users](#), [Badges](#), and [Unanswered](#). To the right of the menu is a red button labeled "Ask a Question". Below the menu is a search bar with radio buttons for "Questions", "Tags", and "Users", and a "Search" button. Underneath the search bar is a navigation bar with buttons for "active", "newest", "hottest", and "most voted". A sidebar on the right is titled "Welcome to OSM Help" and contains the text: "This site is for everyone who needs help with OpenStreetMap. You might be a new mapper; you might...". At the bottom, there's a summary of the question: "Is there a possibility to automatically make a map from the shape of lakes and ground of the bing map?", along with statistics: 1 vote, 3 answers, and 71 views.

More resources

- QA tools:

- http://wiki.openstreetmap.org/wiki/Quality_assurance
- Keep right: <http://keepright.ipax.at/>
- Notes: <http://wiki.openstreetmap.org/wiki/Notes>



Practice time!

1. Try adding a new walkway or road, and make sure you connect it to the surrounding features correctly
2. Try changing a road classification or adding a bike lane tag
3. See if you can figure out how to split or orthogonalize a feature, or change the direction of a way
 - You can always re-run the iD walkthrough or look at the manual (behind the book icon) if you forget how to do something
 - I'm here if you need any help!