OPEN STREET MAP

A Free Map of the World

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BACKGROUND

- Goal: a crowd sourced, Wiki style map of the world
- no IP encumbrances, share-alike licensing
- Started in England
- Has played out very differently based on location
- Still heavily Euro-centric

LICENSING

- Initially licensed under Creative Commons/Share Alike

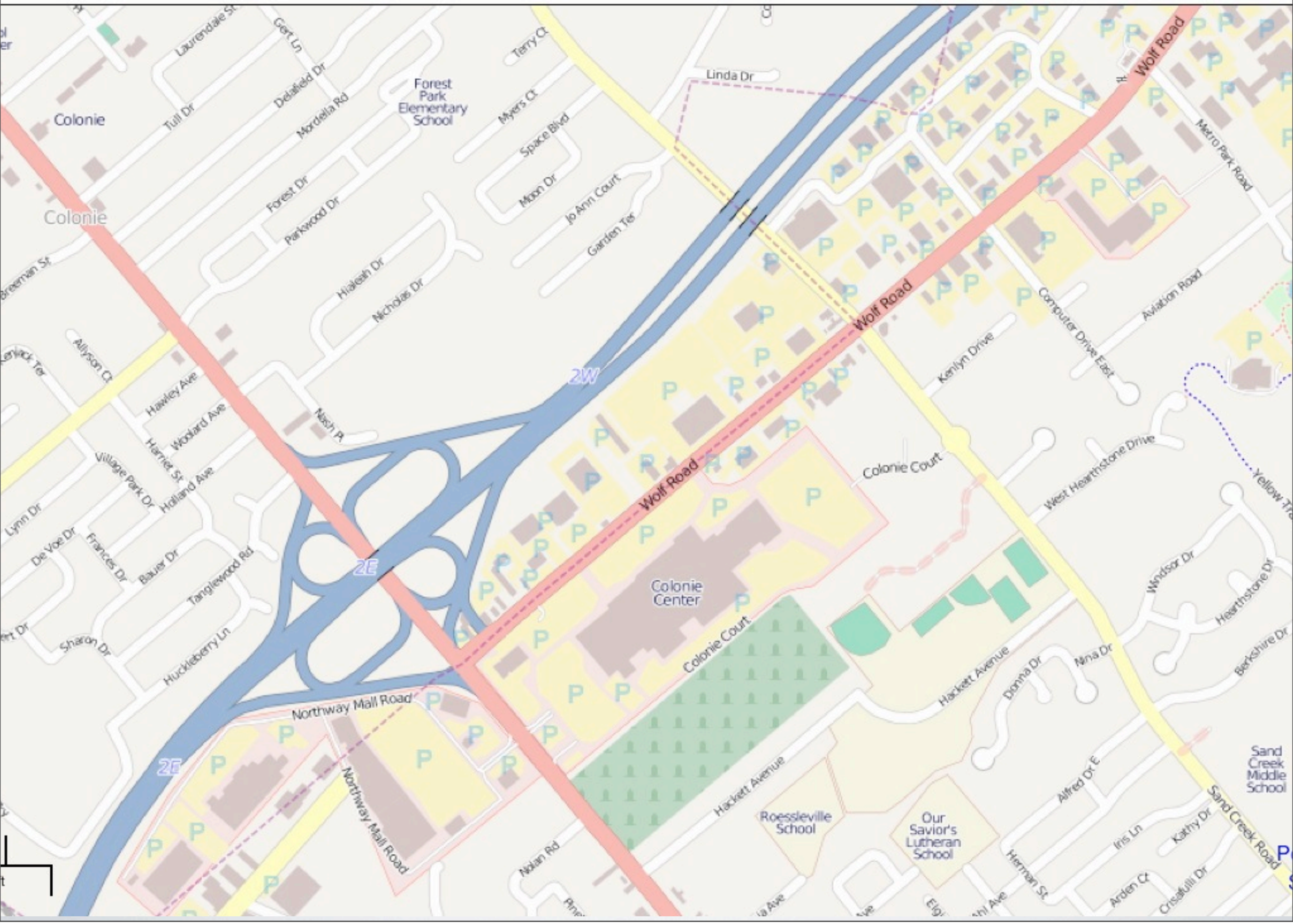
- Now migrating to a more suitable license
  - ODbL (Open Database License)
  - Creative Commons not appropriate for fact collections

- License change is controversial

HOW REAL IS THIS MAP?

- Very real

Edit ▾ | History | Export | GPS Traces | User Diaries | log



Thursday, October 20, 2011

HOW REAL IS THIS MAP?

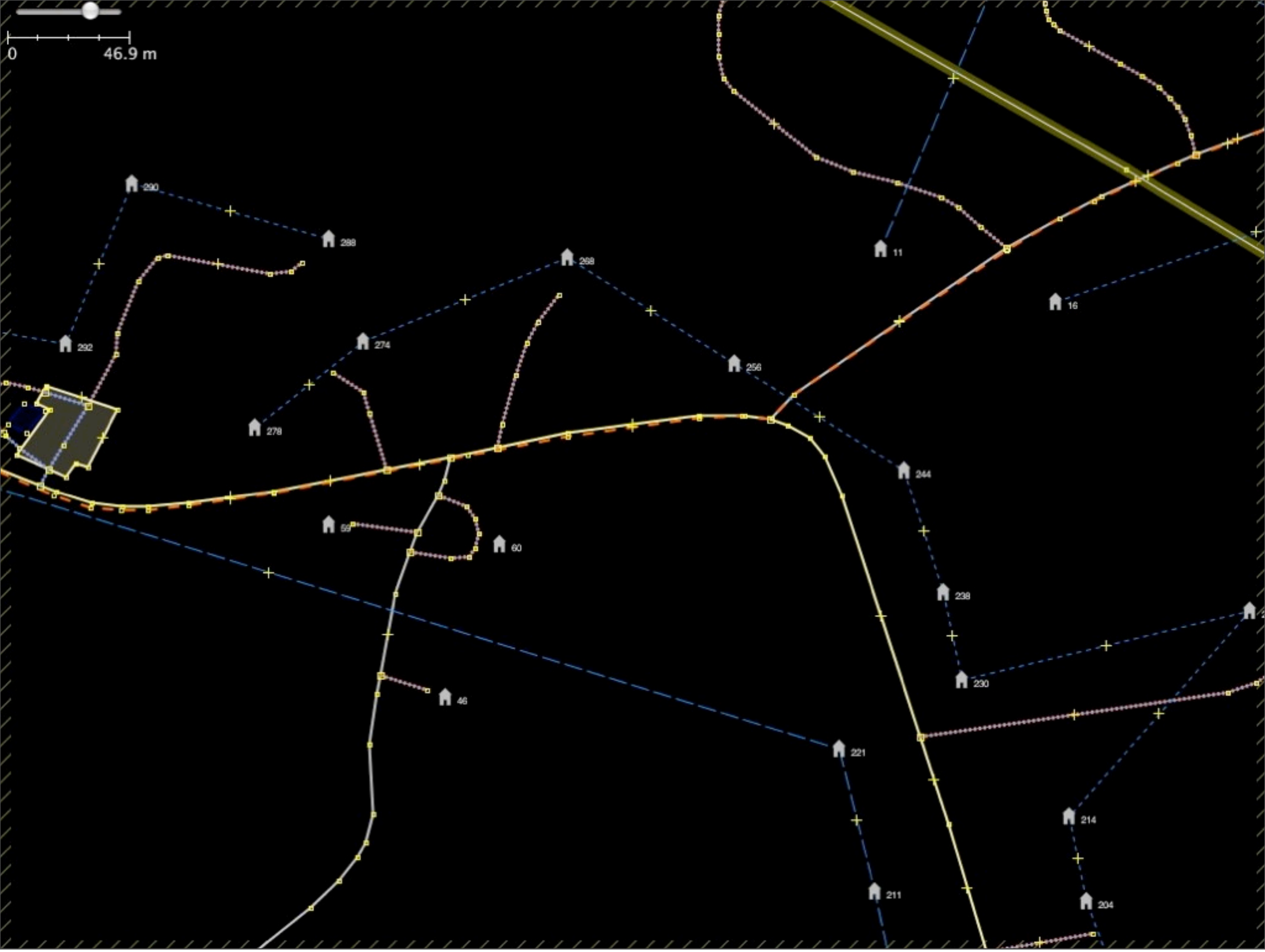
- Almost Looks Finished, Doesn't it?
- But it's not

WHERE DOES THE DATA COME FROM?

- In Europe, mostly from feet on the ground
- In the US, data imported (mostly) from Census Bureau TIGER database, then edited by OSM participants
- Most digital maps of US came from TIGER (both GPS and online)
- Commercial Map Suppliers NavTeq & TeleAtlas

WHERE DOES THE DATA COME FROM?

- Aerial Imagery
- GPS Traces
- Imports (National Hydrologic Database, USGS data, various state and local GIS organizations)



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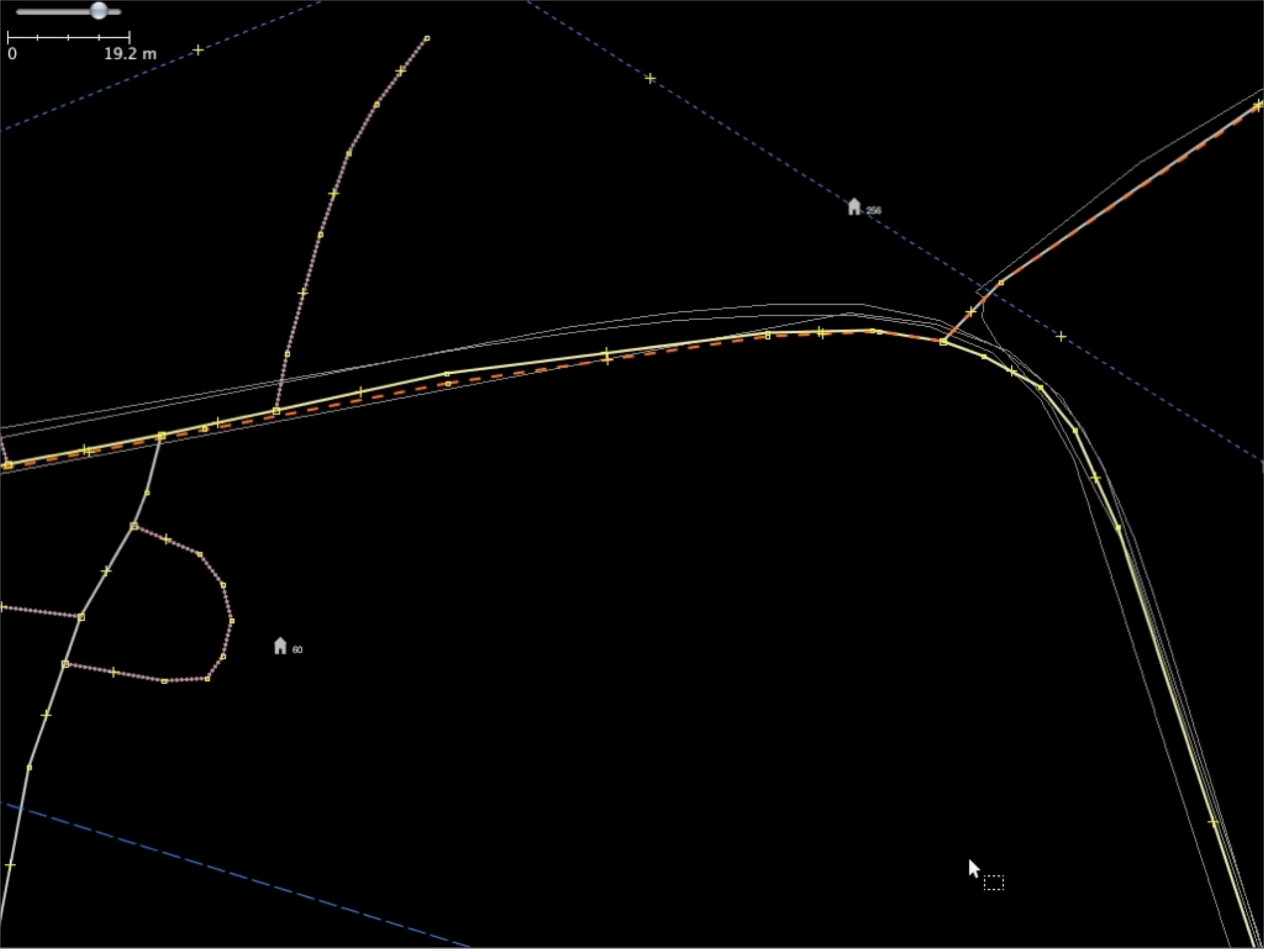

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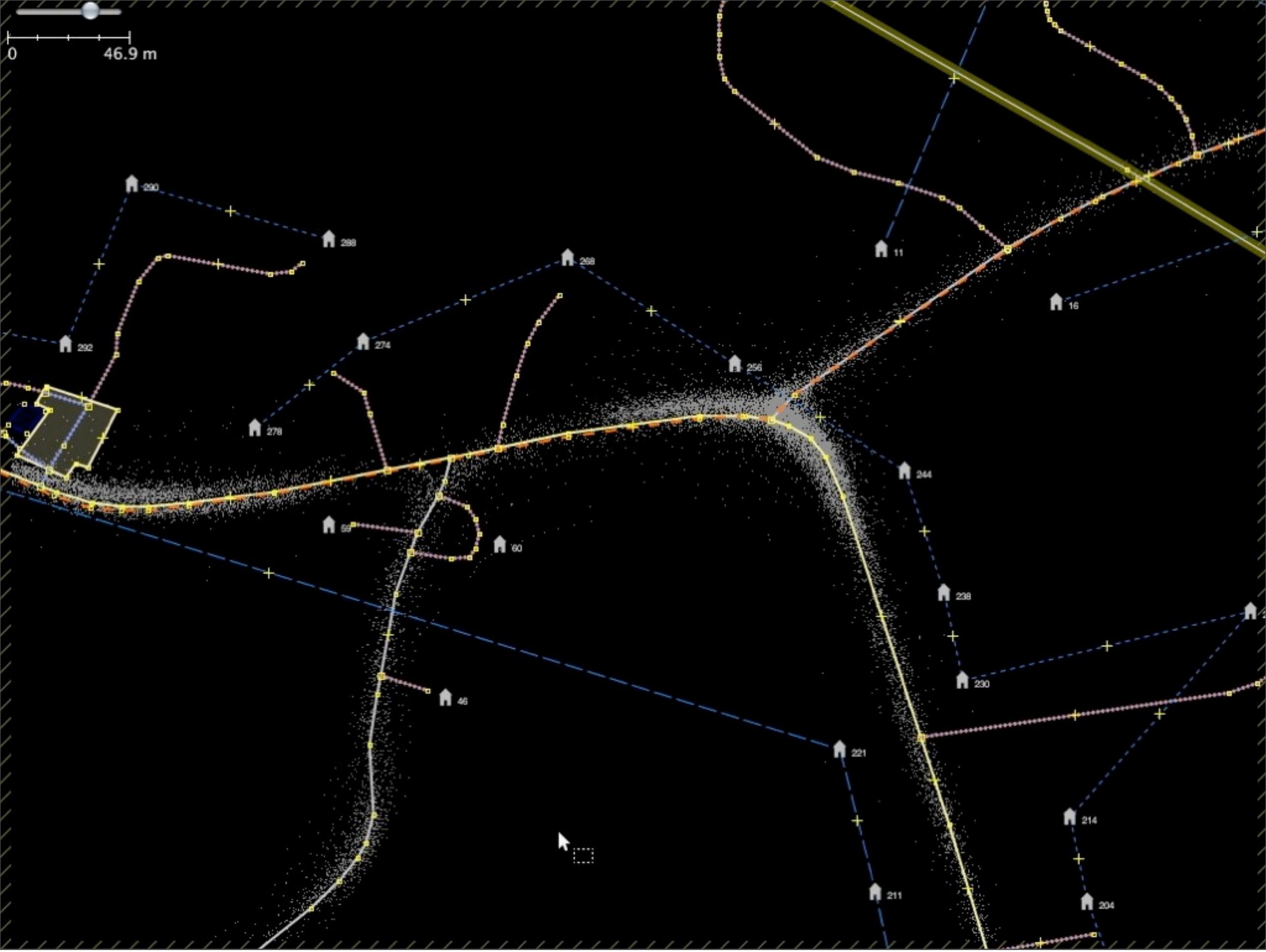

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THE PROBLEM(S) WITH TIGER

- "the map looks done"
- Erratic (needs review)
  - Much of Capital District is not bad, some errors
  - Scoharie County is mediocre
  - some areas really awful (rural WV, MD)

COMMON ERRORS

- wrong name
- bad classification (driveways misclassed as residential streets)
- wrong location (Scoharie annoying, West Virginia really bad)
- non existent roads (never built developments, misinterpretation of aerial images)

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THE OSM DATA MODEL

NODES, WAYS & RELATIONS

- Nodes - latitude & longitude
- Ways - ordered lists of nodes. May be open or closed. used for roads, land use, parking lots, buildings, etc.
- Relations - collections of "related" objects
  - routes (ways comprising a continuous highway)
  - areas (say, a lake perimeter with islands)

THE OSM DATA MODEL

TAGS

- tags can be placed on nodes, ways & relations
- key/value pairs
  - highway=primary
  - name=4th Street
  - ref=US 4
  - maxspeed=30 mph
  - oneway=yes

INFRASTRUCTURE

- PostgreSQL (originally MySQL)
- Ruby (www.openstreetmap.org)
- Java (xapi for raw data queries)

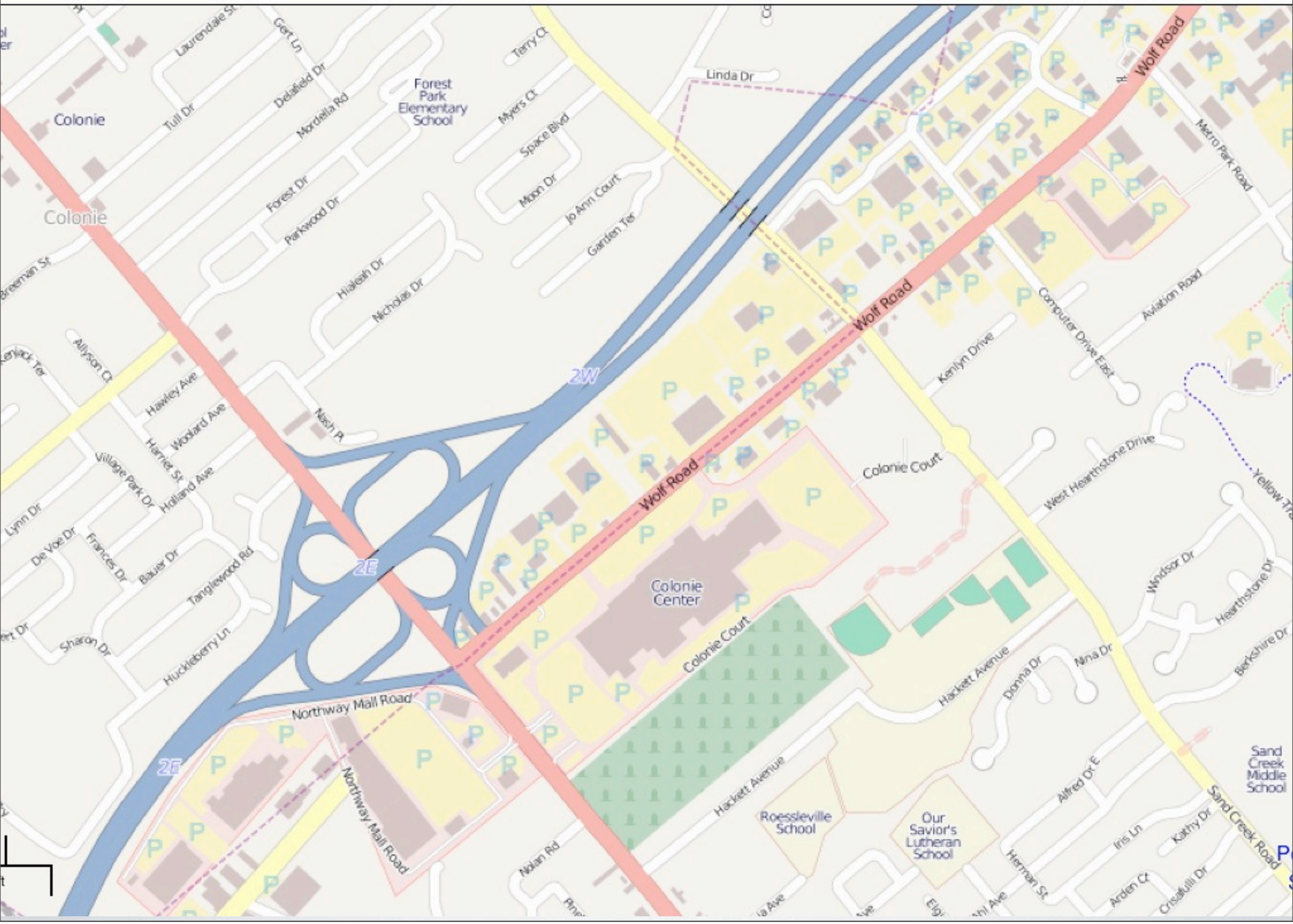
DATA CONSUMERS

- Multiple data consumers
- Rendering engines
- Routing engines
- GPS maps (combo of rendering & routing)

RENDERING ENGINES

- Mapnik
  - Mapquest is moving to Mapnik
- OSMARender
- Cyclemap (bicycling routes)

Edit ▾ | History | Export | GPS Traces | User Diaries | log



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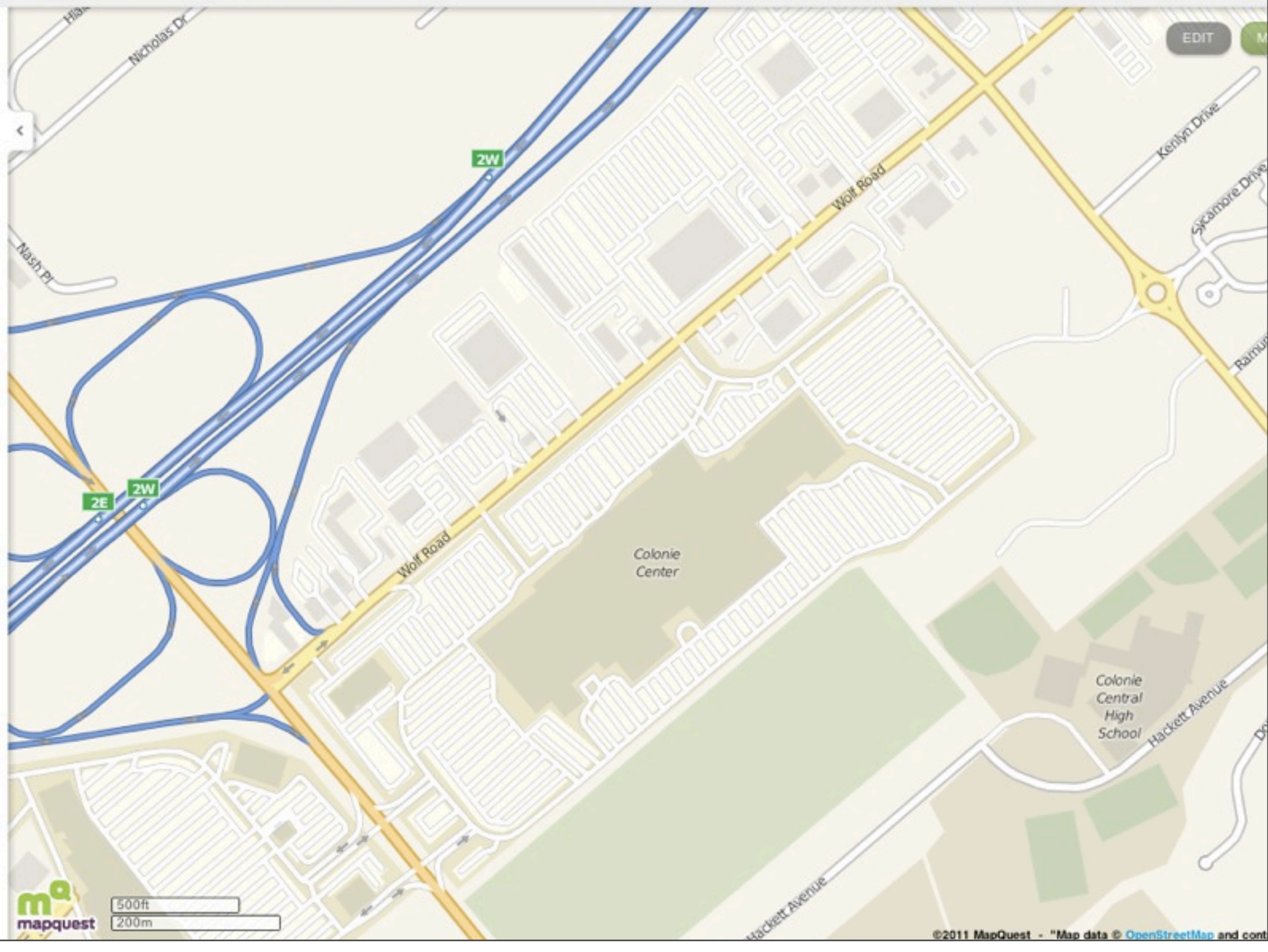

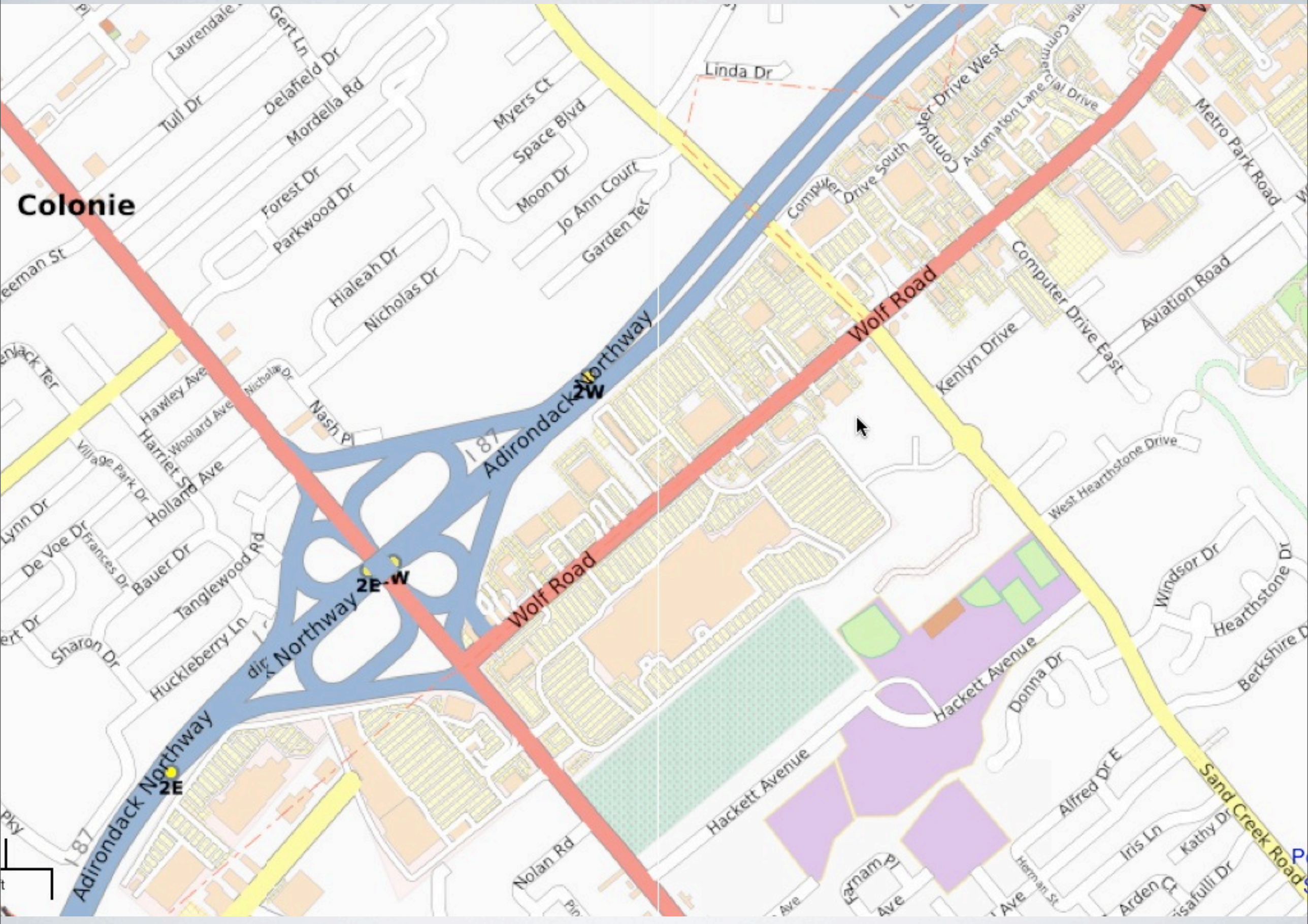

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ROUTING ENGINES

- Infancy
- Fixes needed in US map to make routing practical

GPS MAPS

- GPS maps are hard, formats are generally proprietary
- Garmin has mostly been reverse engineered, but not everything works properly yet

GPS ISSUES - GARMIN

- Good
  - OSM maps can be installed using SD/MicroSD cards
  - stuff mostly works
  - decent tracks in GPX files along with waypoints

GPS ISSUES - GARMIN

- Bad
  - "Wandering off the Reservation"
- Snap to Road
  - tracks are adjusted to nearest road on car GPS
  - if the map has a copyright, tracks may cause IP issues
  - turning off feature on car Garmin units disables routing

GPS ISSUES - TOM TOM

- Linux based, add applications to perform mapping tasks
- TomTom internals themselves are proprietary

EDITING TOOLS

- Potlatch 2 (web based)
- JOSM (standalone Java app, for power users)
- Merkaator (standalone C++ app)
- Mapzen (very simple editor)
- iLOE (apple iDevice editor)
- Mapzen POI Collector (apple iDevice editor)

MAJOR USERS

- MapQuest - planning to migrate from commercial data to OSM data
- Bing - hired Steve Coast, OSM founder. Future plans unclear

GOOGLE MAPMAKER

- The elephant in the room

- Simple editing tools allow volunteers to provide limited updates to Google maps

- no power tools (no JOSM equivalents)

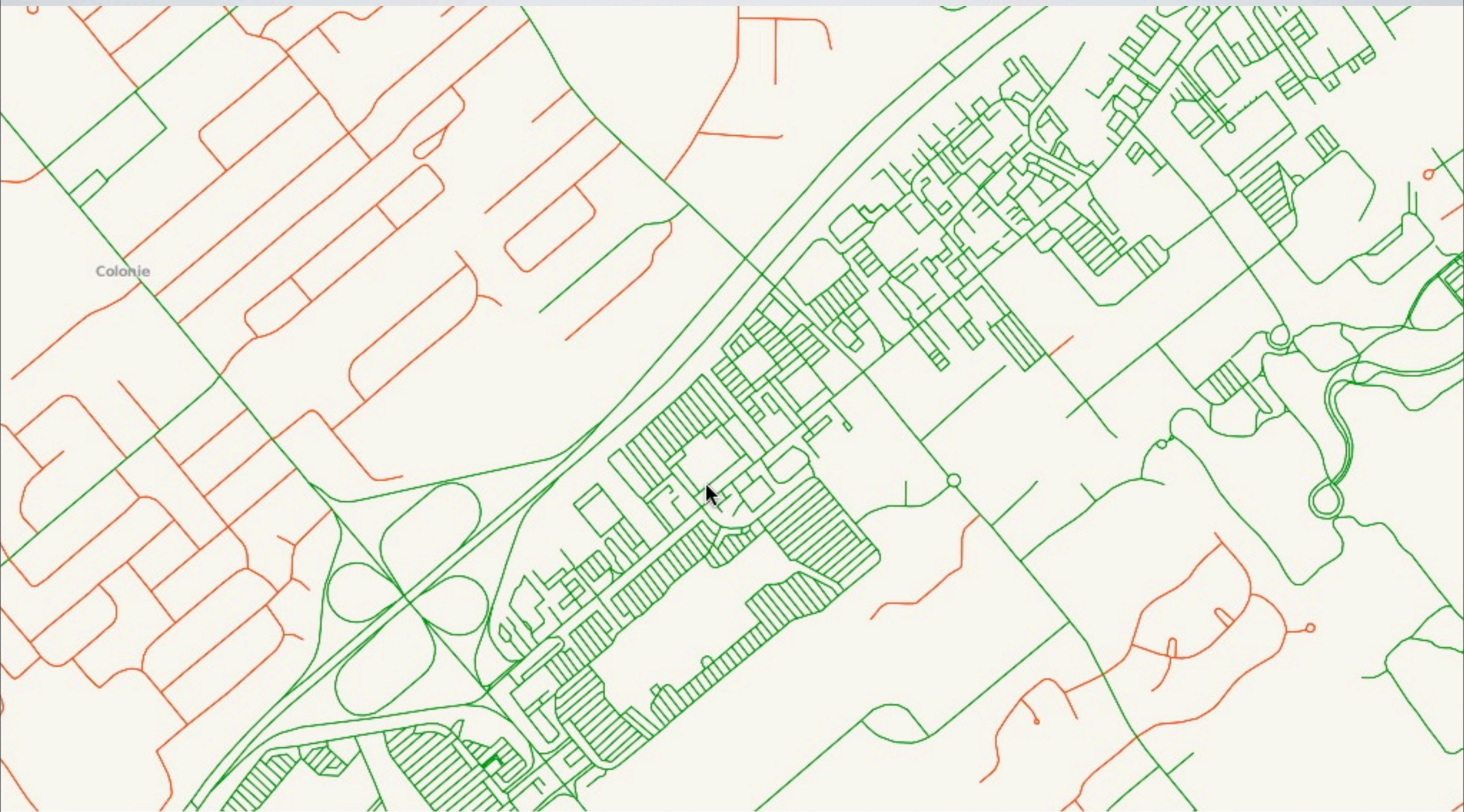
- Google owns the resulting data

ON ROAD MAPPING TOOLS

- GPS
- Voice Recorder
- IPAD (w/ data connection) + OpenMaps app

THINGS TO BE DONE

- TIGER cleanup
- Points of Interest
- connectivity (so routing will work)
- speed & weight restrictions (so routing will work well)
- addressing (so routing will have somewhere to go)


Colonie


Glenville
Rotterdam
Brunswick
Guilderland
Map Data © OpenS

ogle

ito ITO - Map (Speed limits mph

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Link See In Spe

Berg Rd
Faciolla Dr
Henry St
Creighton St
Alfred Rd
Edward St
Elbert St
Parkview Cemetery
Southgate Dr
Frank St
Zion Cemetery
Jerry St
Dartmouth Street
Alvey Street
Myrtle Avenue
School Street
Selden Street
Aldi
Paige Elementary School
Long Ave
Sherwin Ct
Seam Dr
Tower Ave
Ave

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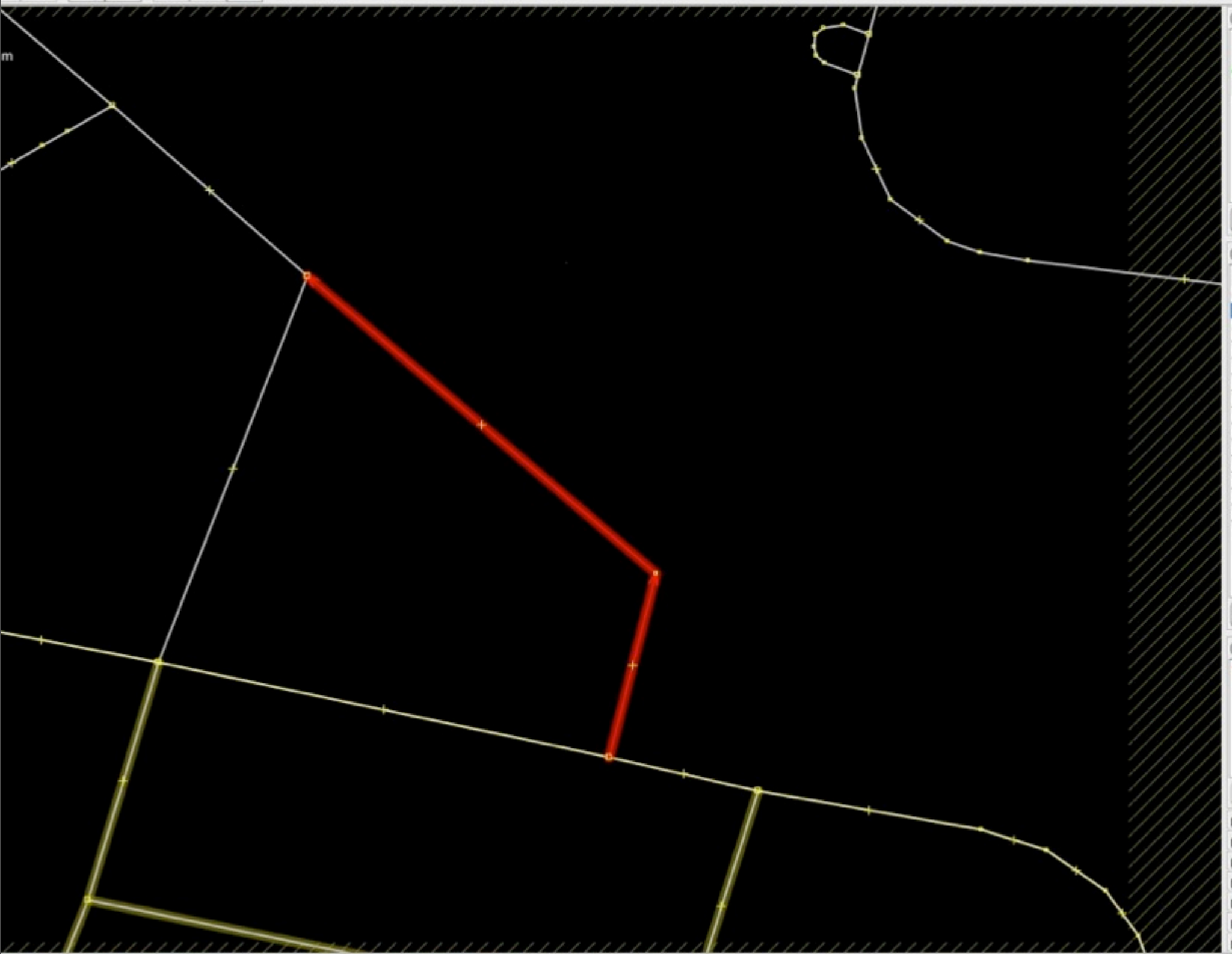
EDITING EXAMPLES

- Using JOSM

Java OpenStreetMap Editor



Layers
- Cycle routes
- Czech hiking trails
- **Data Layer 1**
- Downloaded GPX Data

Properties: 14 / Memberships: 0

Highways/Streets/Residential ...

Key	Value
highway	residential
name	E Palmer Ave
tiger:cfcc	A41
tiger:county	Schenectady, NY
tiger:name_base	Palmer
tiger:name_direction_...	E
tiger:name_type	Ave
tiger:reviewed	no
tiger:separated	no
tiger:source	tiger_import_dch_v0.6...
tiger:tlid	18030502
tiger:upload_uuid	bulk_upload.pl-c5f55...
tiger:zip_left	12303
tiger:zip_right	12303

Add | Edit | Delete

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

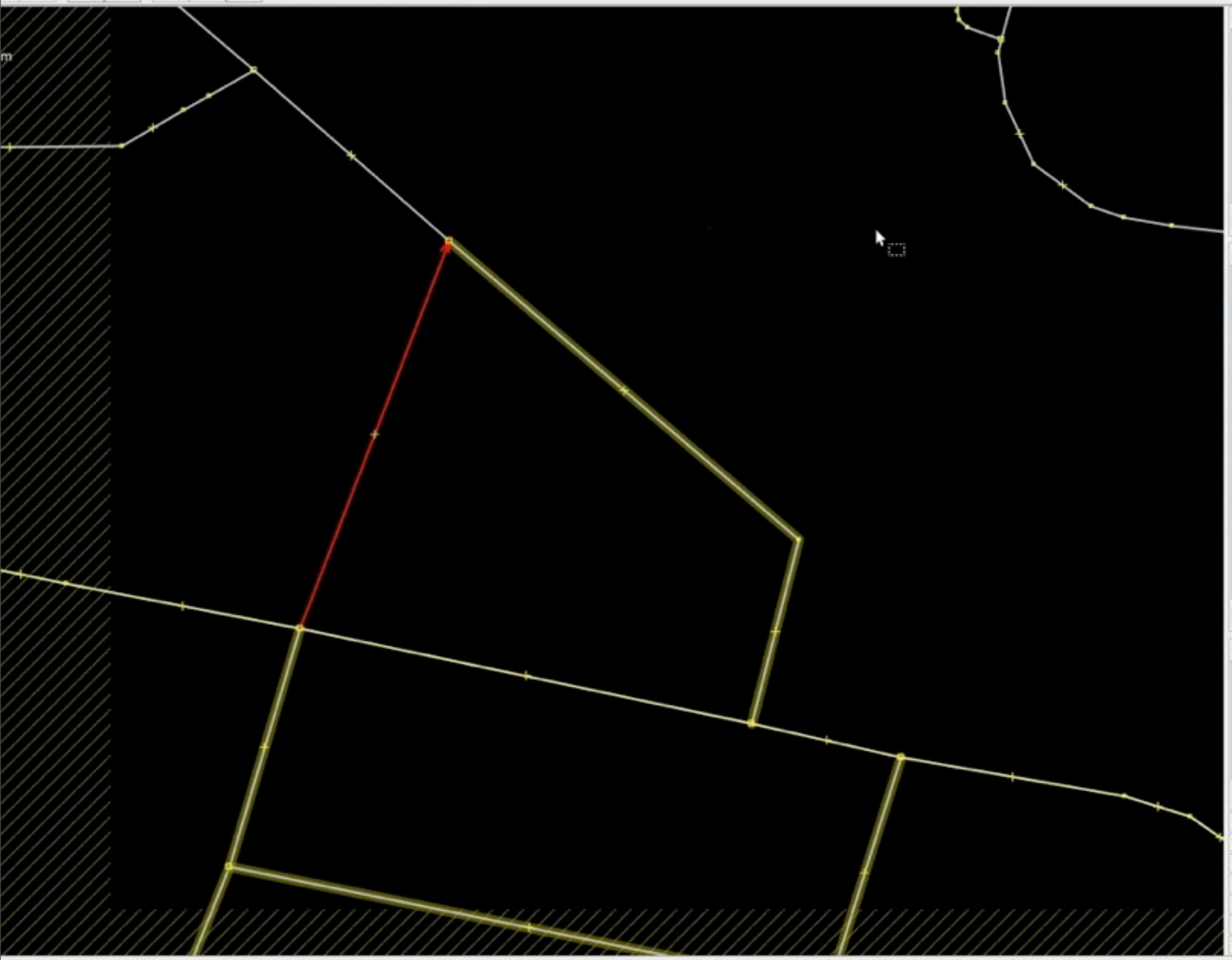
E Palmer Ave (3 nodes)

Select | Search

Relations
Command Stack
1 Author
History
Conflict
Validation Results
Turn Restrictions

195046 | 271.9 m | (no object) | Release the mouse button to stop moving. Ctrl to merge with nearest node.

Java OpenStreetMap Editor



Layers
- Cycle routes
- Czech hiking trails
- **Data Layer 1**
- Downloaded GPX Data

Properties: 14 / Memberships: 0

Highways/Streets/Residential ...

Key	Value
created_by	iLOE 1.9
highway	residential
maxspeed	30 mph
name	Palmer Street
tiger:cfcc	A41
tiger:county	Schenectady, NY
tiger:name_base	Palmer
tiger:name_type	St
tiger:separated	no
tiger:source	tiger_import_dch_v0.6...
tiger:tlid	18030495
tiger:upload_uuid	bulk_upload.pl-c5f55...
tiger:zip_left	12303
tiger:zip_right	12303

Add | Edit | Delete

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

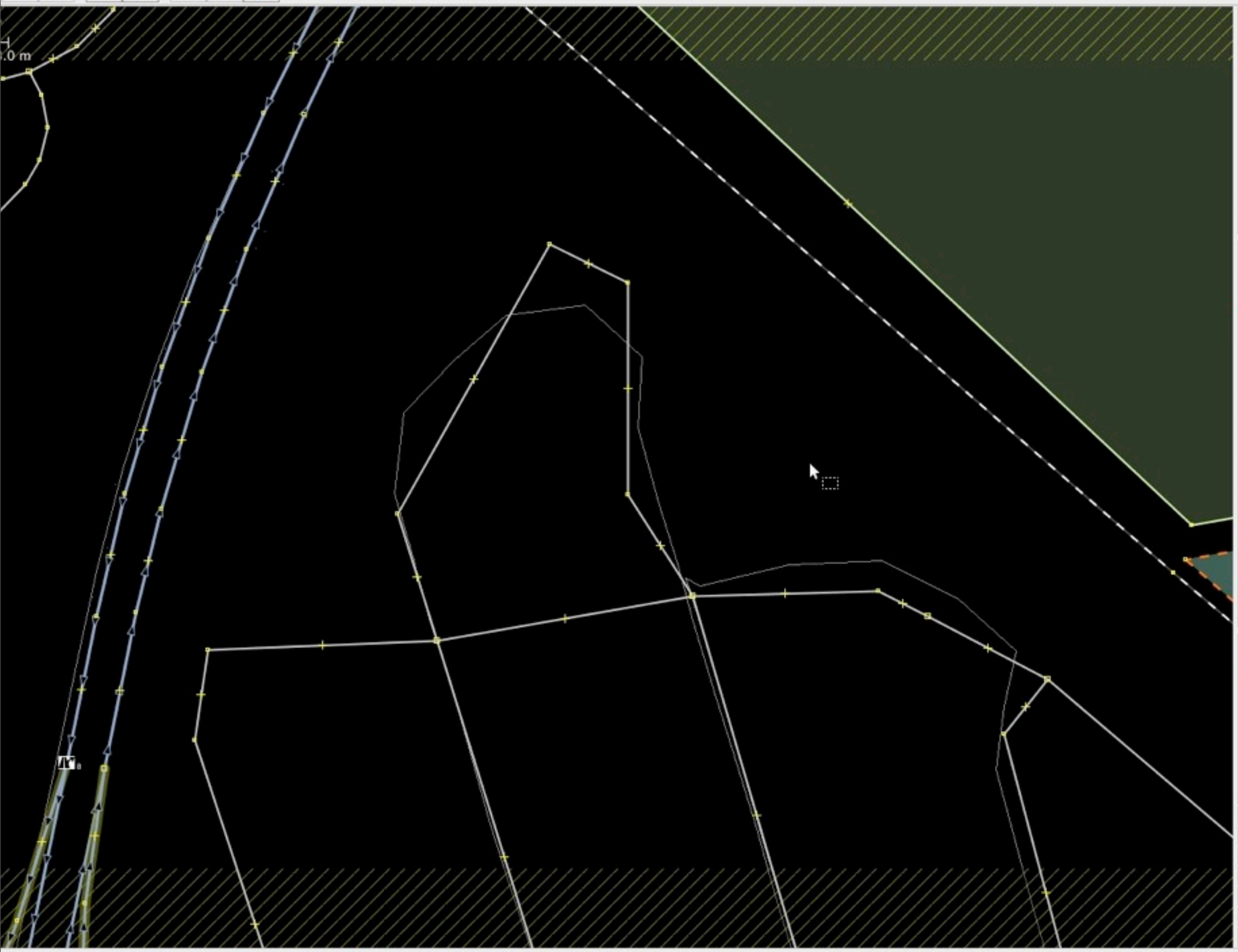
Palmer Street (2 nodes)

Select | Search

Relations
Command Stack
1 Author
History
Conflict
Validation Results
Turn Restrictions

161489 | 188.8 m | (no object) | Release the mouse button to stop moving. Ctrl to merge with nearest node.

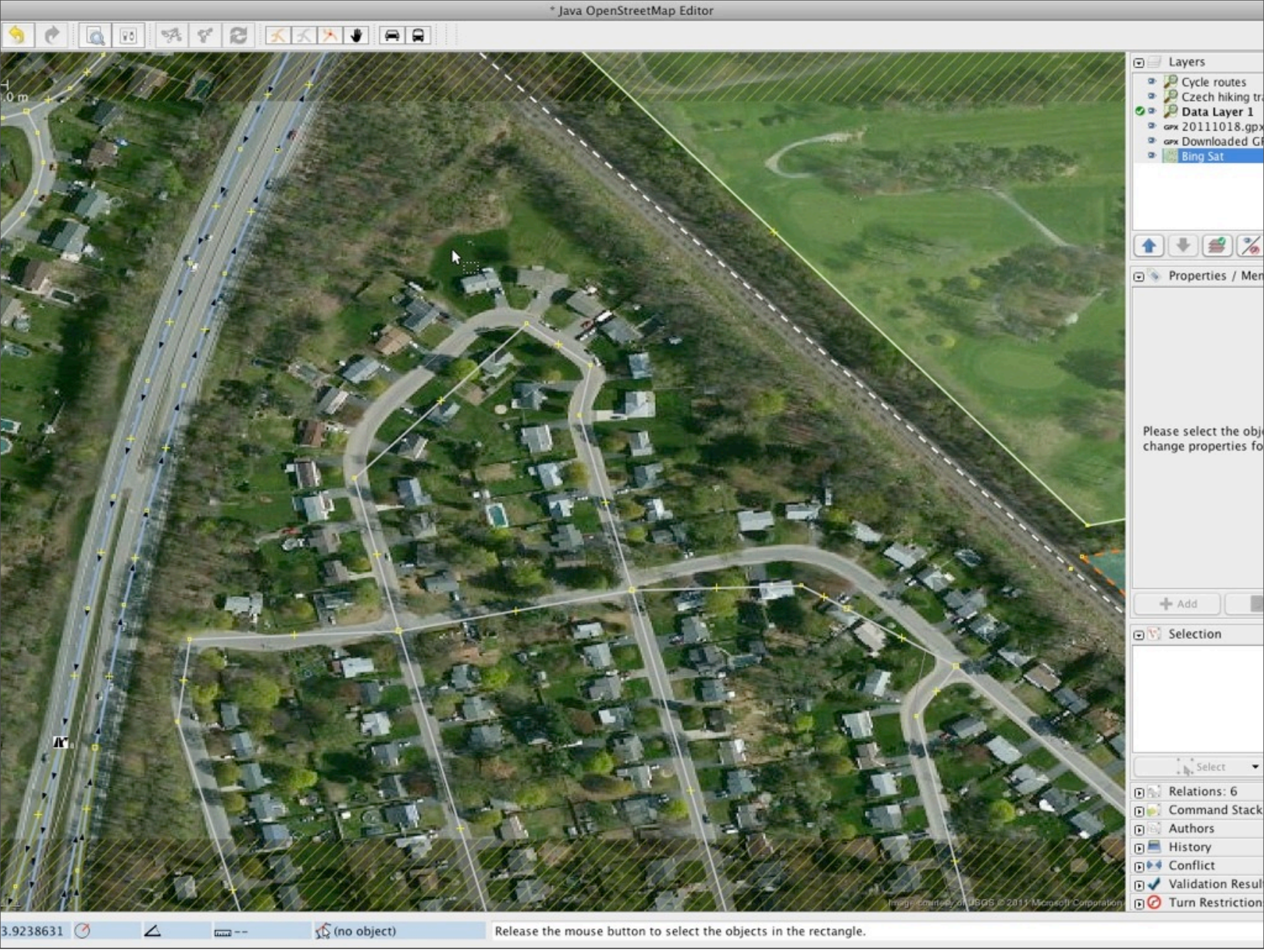
Java OpenStreetMap Editor



3.9222322 | 188.8 m | (no object) | Release the mouse button to select the objects in the rectangle.

Java OpenStreetMap Editor

3.9216587 | 188.8 m | (no object) | Release the mouse button to select the objects in the rectangle.


* Java OpenStreetMap Editor
Layers
Cycle routes
Czech hiking tra
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Select
Relations: 6
Command Stack
Authors
History
Conflict
Validation Resul
Turn Restriction
Image courtesy of USGS © 2011 Microsoft Corporation
3.9238631
(no object)
Release the mouse button to select the objects in the rectangle.

* Java OpenStreetMap Editor

3.9215351 | 280.4 ° | -- | -- | (no object) | Release the mouse button to select the objects in the rectangle.

PROGRAMMING TOOLS

- OpenLayers
- Javascript library to setup maps and overlays
- supports many maps, not just OSM
- www.openlayers.org

OPENLAYERS WITH MARKERS

OPENLAYERS

```
OpenLayers.ProxyHost="/proxy/?url=";

map = new OpenLayers.Map('map');

layer = new OpenLayers.Layer.WMS( "OpenLayers WMS",

"http://vmap0.tiles.osgeo.org/wms/vmap0", {layers: 'basic'} );


map.addLayer(layer);

map.setCenter(new OpenLayers.LonLat(0, 0), 0);
```

OPENLAYERS

```
var markers = new OpenLayers.Layer.Markers( "Markers" );

map.addLayer(markers);



var size = new OpenLayers.Size(21,25);

var offset = new OpenLayers.Pixel(-(size.w/2), -size.h);

var icon = new OpenLayers.Icon('http://www.openlayers.org/
dev/img/marker.png',size,offset);

markers.addMarker(new OpenLayers.Marker(new
OpenLayers.LonLat(0,0),icon));
```

OPENLAYERS

```
marker = new OpenLayers.Marker(new OpenLayers.LonLat
(90,10),icon.clone());

marker.setOpacity(0.2);
```

```
marker.events.register('mousedown', marker, function(evt) { alert
(this.icon.url); OpenLayers.Event.stop(evt); });

markers.addMarker(marker);
```

OPENLAYERS

```
var newl = new OpenLayers.Layer.Text( "text", { location:"./
textfile.txt"} );

map.addLayer(newl);
```

```
point   title  description  icon
10,20   my orange title    my orange description
2,4     my aqua title      my aqua description
42,-71  my purple title    my purple description<br/>is
great.
        http://www.openlayers.org/api/img/zoom-world-mini.png
```

JAVA TOOLS

- the API is xml based
- easily handled with standard Java tools

XML

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<osm generator="RPWGISConverter" version="0.6">
<bounds maxlat="42.822577" maxlon="-73.676762" minlat="42.407127"
minlon="-74.264863"/>
<node id="-12079" lat="42.778877" lon="-73.809365" visible="true"/>
<node id="-12080" lat="42.778877" lon="-73.799465" visible="true"/>
<node id="-12081" lat="42.779477" lon="-73.797965" visible="true"/>
<node id="-12082" lat="42.782577" lon="-73.793565" visible="true"/>
<node id="-12083" lat="42.789677" lon="-73.787065" visible="true"/>
<node id="-12084" lat="42.791777" lon="-73.782464" visible="true"/>
```

XML

```
<way id="-12352" visible="true">
<nd ref="-12079"/>
<nd ref="-12080"/>
<nd ref="-12081"/>
<nd ref="-12082"/>
<nd ref="-12083"/>
<nd ref="-12084"/>

...
</way>
```

XML

```
<relation id="-12353">
<tag k="admin_level" v="6"/>
<tag k="border_type" v="county"/>
<tag k="name" v="Albany"/>
<tag k="boundary" v="administrative"/>
<tag k="type" v="boundary"/>
<tag k="attribution" v="Tiger 2000 County Boundary"/>
<tag k="FIPS" v="36001"/>
<member ref="-12352" role="" type="way"/>
</relation>
```

RESOURCES

Email: richard@osmf.us

wiki.openstreetmap.org
talk-us@openstreetmap.org
newbies@openstreetmap.org

Facebook page: Openstreetmap Capital District NY
Facebook group: Openstreetmap US

Meetup.com: CapitalDistrict-OpenStreetMap