OpenStreetMap Data in Layered GIS Format

Draft / Version 0.5 - 2010-02-20

Frederik Ramm <frederik.ramm@geofabrik.de>, Jochen Topf <jochen.topf@geofabrik.de>

Table of Contents

Version History

Version	Created At	Changes
0.5	2010-02-20	Add bridge and tunnel attributes to road shapes Add layer, bridge, and tunnel attributes to railway line shape Add operator attribute to powerline shape Add note about splitting road layer for large extracts

1 Preface

The OpenStreetMap (OSM) project (www.openstreetmap.org) has collected an enormous amount of free spatial data and the database is growing every day. Many people want to use this data for their own GIS projects but have been hindered by the use of a non-standard data format in the OSM project. This document describes a mapping from OSM data formats to the usual GIS formats to make the OSM data accessible to more people.

The mapping from OSM data to other formats is not an exact science. OSM rules on how to map certain features are often not well defined and there is no mandatory quality control. This openness allows a lot of flexibility and is part of the reason why OSM has been able to collect so much data in such a short time frame, but it makes using the data more difficult. When using or exporting the data, many decisions have to be made on how to extract the different features into something usable for the task at hand.

The mapping described in this document is in no way the only mapping possible, in fact there is an infinite number of possible mappings. In this document we have specified a general-use mapping of the basic features like roads, waterways, different land use types, and points of interest. Other uses might need specialized mappings, but they are out of the scope of this document.

The format described in this document is used by Geofabrik to create shapefiles and other formats for its clients.

2 Introduction

2.1 Versions

This is no static document. New versions of this document are likely to appear from time to time. If the definition of layers or features is changed significantly, the layers will get new version identifiers.

Layer names will use version numbers with leading 'v' and without the embedded '.': So version 0.1 of this document will use the suffix “v01”, version 2.7 will use “v27” (minor versions above 9 are not allowed).

2.2 Map datum

All coordinates are unprojected WGS84 (EPSG:4326).

2.3 String encoding

All strings are encoded in UTF-8.

2.4 Attribute names

All attribute names are lower case and are less than 11 characters long so that they are not truncated in shapefiles.

2.5 Common attributes

Most tables/shape files will have the following columns/attributes:

Attribute	PostGIS Type	Description
id	INTEGER (4 Bytes)	Id of this feature. Unique in this layer.
osm_id	BIGINT (8 Bytes)	OSM Id taken from the Id of this feature (node_id, way_id, or relation_id) in the OSM database. In case several features in the OSM database are joined into one feature, this is one of the Ids. This Id is not necessarily unique!
lastchange	TIMESTAMP WITHOUT TIME ZONE	Last change of this feature. Comes from the OSM last_changed attribute. Reflects changes in the attributes of a feature, changes in the geometry will not necessarily change this!
code	SMALLINT (2 Bytes)	4 digit code (between 1000 and 9999) defining the class of this feature. The first one or two digits define the layer, the last two or three digits the class inside a layer.
fclass	VARCHAR(40)	Class name of this feature.
name	VARCHAR(100)	Name of this feature, like a street or place name. If the name contains obvious wrong data such as “fixme”, it will be empty.

The code and the combination of layer name and fclass always contains the same information.

2.6 Layers

In OSM there are no layers in the traditional GIS sense. All features are in one big coherent database.

For the purpose of the mapping described in this document, the features stored in the OSM database are extracted into different layers depending on their type.

All layers defined in this document use the “osm_” prefix for their names.

To allow for future changes of this document, the document version number is embedded in the layer names. So the “roads” layer in version 1.0 is called “osm_roads_v10” in file names, WMS layers etc.

3 Feature Catalogue - Overview

The following layers are available:

Geometry	Code	Layer	Description
Point			
	10xx	places	Cities, towns, suburbs, villages,...
	2xxx	-	Points of Interest
	20xx	public	Public facilities such as government offices, post office, police, ...
	21xx	health	Hospitals, pharmacies, ...
	22xx	leisure	Culture, Leisure, ...
	23xx	catering	Restaurants, pubs, cafes, ...
	24xx	accommodations	Hotel, motels, and other places to stay the night
	25xx	shopping	Supermarkets, bakeries, ...
	26xx	tourism	Tourist information, sights, museums, ...
	29xx	miscpoi	Miscellaneous points of interest
	3xxx	pofw	Places of worship such as churches, mosques, ...

Geometry	Code	Layer	Description
	50xx	transportation	Parking lots, petrol (gas) stations, ...
	60xx	railwaystations	Railway stations and halts, tram stops, ...
	64xx	power	Power generators, substations, ...
Line			
	11xx	boundaries	Borders between countries ...
	51xx	roads	Roads, tracks, paths, ...
	61xx	railway	Railway, subways, light rail, trams, ...
	65xx	powerlines	Power lines
	81xx	waterways	Rivers, canals, streams, ...
	83xx	coastline	Coastline
Polygon			
	15xx	buildings	Building outlines
	72xx	landuse	Forests, residential areas, industrial areas,...
	82xx	water	Lakes, ...

4 Point Features

4.1 Places ("places")

Location for cities, towns, etc. Typically somewhere in the centre of the town.

Additional attributes:

Attribute	PostGIS Type	Description	OSM Tags
population	INTEGER	Number of people living in this place	population=*

Note that for many places the population is not available and will be set to 0. For islands the population is always 0.

The following feature classes exist in this layer:

code	fclass	Description	OSM Tags
1000	place		
1001	place city	As defined by national/state/provincial government. Often over 100,000 people	place=city
1002	place town	As defined by national/state/provincial government. Generally smaller than a city, between 10,000 and 100,000 people	place=town
1003	place village	As defined by national/state/provincial government. Generally smaller than a town, below 10,000 people	place=village
1004	place hamlet	As defined by national/state/provincial government. Generally smaller than a village, just a few houses	place=hamlet
1010	place suburb	Named area of town or city	place=suburb
1020	place island	Identifies an island	place=island

4.2 Points of Interest

The following feature classes exist in this layer:

code	layer	fclass	Description	OSM Tags
2000	public			
2001		police		amenity=police
2002		fire_station		amenity=fire_station
2003		recycling		amenity=recycling
2004		post_box		amenity=post_box
2005		post_office		amenity=post_office
2006		telephone		amenity=telephone
2007		library		amenity=library
2008		town_hall		amenity=town_hall
2009		courthouse		amenity=courthouse
2010		prison		amenity=prison
2080			Education	
2081		university		amenity=university
2082		school		amenity=school
2083		kindergarten		amenity=kindergarten
2100	health			
2101		pharmacy		amenity=pharmacy
2110		hospital		amenity=hospital
2200	leisure			
2201		theatre		amenity=theatre
2202		nightclub		amenity=nightclub
2203		cinema		amenity=cinema
2300	catering		Catering services	
2301		restaurant		amenity=restaurant
2302		fast_food		amenity=fast_food
2303		cafe		amenity=cafe
2304		pub		amenity=pub
2400	accommodations			
2401		hotel		amenity=hotel
2402		motel		amenity=motel
2403		bed_and_breakfast		amenity=bed_and_breakfast
2500	shopping			
2501		supermarket		shop=supermarket
2502		bakery		shop=bakery
2503		kiosk		shop=kiosk
2600	money			
2601		bank		amenity=bank
2602		atm		amenity=atm

code	layer	fclass	Description	OSM Tags
2700	tourism			
2701		tourist_info		tourism=information
2702		attraction		tourism=attraction
2703		museum		tourism=museum
2800	transport			
2801		fuel		amenity=fuel
2802		service		highway=services
2803		[removed]		
2804		parking		amenity=parking
2900	miscpoi			
2901		toilet		amenity=toilets

4.3 Places of Worship ("pofw")

The following feature classes exist in this layer:

code	layer	fclass	Description	OSM Tags
3000	**pofw**		**Places of worship**	
3100	pofw	**christian**		**religion=christian**
3101	pofw	christian_anglican		+ denomination=anglican
3102	pofw	christian_catholic		+ denomination=catholic
3103	pofw	christian_evangelical		+ denomination=evangelical
3104	pofw	christian_lutheran		+ denomination=lutheran
3105	pofw	christian_methodist		+ denomination=methodist
3106	pofw	christian_orthodox		+ denomination=orthodox
3107	pofw	christian_protestant		+ denomination=protestant
3200	pofw	**jewish**		**religion=jewish**
3300	pofw	**muslim**		**religion=muslim**

4.4 Railway Stations ("railwaystations")

The following feature classes exist in this layer:

code	layer	fclass	Description	OSM Tags
6000	railwaystations			
6001	railwaystations	station	Larger railway station of mainline rail services	railway=station
6002	railwaystations	halt	Smaller, local railway stations, subway stations	railway=halt
6003	railwaystations	tram_stop	Tram stops	railway=tram_stop

4.5 Power Generation and Distribution ("power")

The following feature classes exist in this layer:

code	layer	fclass	Description	OSM Tags
6400	power			
6401	power	tower	Towers supporting power lines	power=tower

code	layer	fclass	Description	OSM Tags
6410	power	generator	Power generators of all types	power=generator
6421	power	station	Power stations	power=station
6422	power	sub_station	Power substations	power=sub_station

5 Line Features

5.1 Boundaries (“boundaries”)

OSM currently uses up to 11 different levels for administrative boundaries. Only the level 2 is reasonably well defined, it is used for national borders. Other levels depend on the country they are in. Boundaries currently don't have a name attribute.

The following feature classes exist in this layer:

code	layer	fclass	Description	OSM Tags
1100	boundary			boundary=administrative
1101	boundary	admin_level1		+ admin_level=1
1102	boundary	national	National borders	+ admin_level=2
1103	boundary	admin_level3		+ admin_level=3
1104	boundary	admin_level4		+ admin_level=4
1105	boundary	admin_level5		+ admin_level=5
1106	boundary	admin_level6		+ admin_level=6
1107	boundary	admin_level7		+ admin_level=7
1108	boundary	admin_level8		+ admin_level=8
1109	boundary	admin_level9		+ admin_level=9
1110	boundary	admin_level10		+ admin_level=10
1111	boundary	admin_level11		+ admin_level=11

5.2 Roads and Paths (“roads”)

All kinds of roads from motorways to gravel tracks as well as cycleways, footpaths, etc.

Additional attributes:

Attribute	PostGIS Type	Description	OSM Tags
ref	VARCHAR(20)	Reference number of this road ('A 5', 'L 605', ...)	ref=*
oneway	BOOLEAN	Is this a oneway road?	oneway=*
maxspeed	SMALLINT	Max allowed speed in km/h	maxspeed=*
layer	SMALLINT	Relative layering of roads (-5, ..., 0, ..., 5)	layer=*
bridge	BOOLEAN	Is this road on a bridge?	bridge=*
tunnel	BOOLEAN	Is this road in a tunnel?	tunnel=*

Roads of type 5111 (motorway) and 5112 (trunk) are always oneway.

The following feature classes exist in this layer:

code	layer	fclass	Description	OSM Tags
5100	roads			
5110	roads		**Major roads**	
5111	roads	motorway	Motorway/freeway	highway=motorway

code	layer	fclass	Description	OSM Tags
5112	roads	trunk	Important roads, typically divided	highway=trunk
5113	roads	primary	Primary roads, typically national.	highway=primary
5114	roads	secondary	Secondary roads, typically regional.	highway=secondary
5115	roads	tertiary	Tertiary roads, typically local.	highway=tertiary
5120	roads		**Minor Roads**	
5121	roads	unclassified	Smaller local roads	highway=unclassified
5122	roads	residential	Roads in residential areas	highway=residential
5123	roads	living_street	Streets where pedestrians have priority over cars	highway=living_street
5124	roads	pedestrian	Pedestrian only streets	highway=pedestrian
5130	roads		**Highway links (sliproads/ramps) connect from one road to another of the same of lower category**	
5131	roads	motorway_link		highway=motorway_link
5132	roads	trunk_link		highway=trunk_link
5133	roads	primary_link		highway=primary_link
5134	roads	secondary_link		highway=secondary_link
5140	roads		**Very small roads**	
5141	roads	service	Service roads for access to buildings, parking lots, etc.	highway=service
5142	roads	track	For agricultural use, in forests, etc. Often gravel roads.	highway=track
5150	roads		**Paths unsuitable for cars**	
5151	roads	bridleway	Paths for horse riding	highway=bridleway
5152	roads	cycleway	Paths for cycling	highway=cycleway
5153	roads	footway	Footpaths	highway=footway
5154	roads	path	Unspecified paths	highway=path
5155	roads	steps	Flights of steps on footpaths	highway=steps
			Unknown	
5199	roads	unknown	Unknown type of road or path	highway=road

Note: For large excerpts (whole of Europe or larger), we cannot place all road data in one shape file because that would result in a file of more than 2 GB which cannot be processed by most software. In this case we will split the layer in six: "major" (codes 5110-5119), "minor" (codes 5120-5129), "link" (codes 5130-5139), "small" (codes 5140-5149), "paths" (codes 5150-5159) and "other" (all others). World-wide extracts may also require further splitting by region.

5.3 Railways, Subways, Trams ("railways")

Railways do not have a name attribute. Instead, they have the following additional attributes:

Attribute	PostGIS Type	Description	OSM Tags
layer	SMALLINT	Relative layering of railways/roads (-5, ..., 0, ..., 5)	layer=*
bridge	BOOLEAN	Is this railway on a bridge?	bridge=*
tunnel	BOOLEAN	Is this railway in a tunnel?	tunnel=*

The following feature classes exist in this layer:

code	layer	fclass	Description	OSM Tags
6100	railways			
6101	railways	rail		railway=rail
6102	railways	light_rail		railway=light_rail
6103	railways	subway		railway=subway
6104	railways	tram		railway=tram
6105	railways	monorail		railway=monorail

5.4 Waterways ("waterways")

Additional attributes:

Attribute	PostGIS Type	Description	OSM Tags
width	SMALLINT	Width of the waterway in meters	width=*

The following feature classes exist in this layer:

code	layer	fclass	Description	OSM Tags
8100	waterway			
8101	waterway	river	Larger rivers	waterway=river
8102	waterway	stream	Smaller rivers, streams	waterway=stream
8103	waterway	canal	Artificial waterways	waterway=canal
8104	waterway	drain	Small drainage ditches etc.	waterway=drain

Note that in OSM larger rivers are often available as polygon geometries and line geometries.

5.5 Coastline ("coastline")

Only the code 8300 is used. Coastlines don't have a name attribute.

5.6 Power lines ("powerlines")

Only the code 6500 is used. Power lines don't have a name attribute.

Additional attributes:

Attribute	PostGIS Type	Description	OSM Tags
operator	VARCHAR(20)	Operator/owner of infrastructure	operator=*

Note: Some power lines in OpenStreetMap are modeled as relations and are not yet included in this layer. Contact Geofabrik for details.

6 Polygon Features

Polygon features are extracted from simple polygons and from multipolygons in OSM.

6.1 Building outlines ("buildings")

Buildings don't have a name attribute.

The following feature classes exist in this layer:

code	layer	fclass	Description	
1500	buildings		Building outlines	building=*

6.2 Landuse ("landuse")

The following feature classes exist in this layer:

code	layer	fclass	Description	OSM Tags
7200	landuse			
7201	landuse	forest	Forests or woods	landuse=forest, natural=wood
7202	landuse	park	Parks in cities etc.	leisure=park
7203	landuse	residential	Residential areas	landuse=residential
7204	landuse	industrial	Industrial areas	landuse=industrial
7205	landuse	farm	Agricultural land	landuse=farm/farmland/ farmyard
7206	landuse	cemetery	Cemetery/graveyard	landuse=cemetery
7207	landuse	allotments	Areas with small private gardens	landuse=allotments
7208	landuse	meadow	Meadows	landuse=meadow

6.3 Bodies of Water ("water")

The following feature classes exist in this layer:

code	layer	fclass	Description	
8200	water	water	Unspecified bodies of water. Typically lakes, but can also be larger rivers, harbours, etc.	natural=water
8201	water	reservoir	Artificial lakes, typically above a dam.	landuse=reservoir
8202	water	river	Polygons for larger rivers.	waterway=riverbank

Note that in OSM larger rivers are often available as polygon geometries and line geometries.