

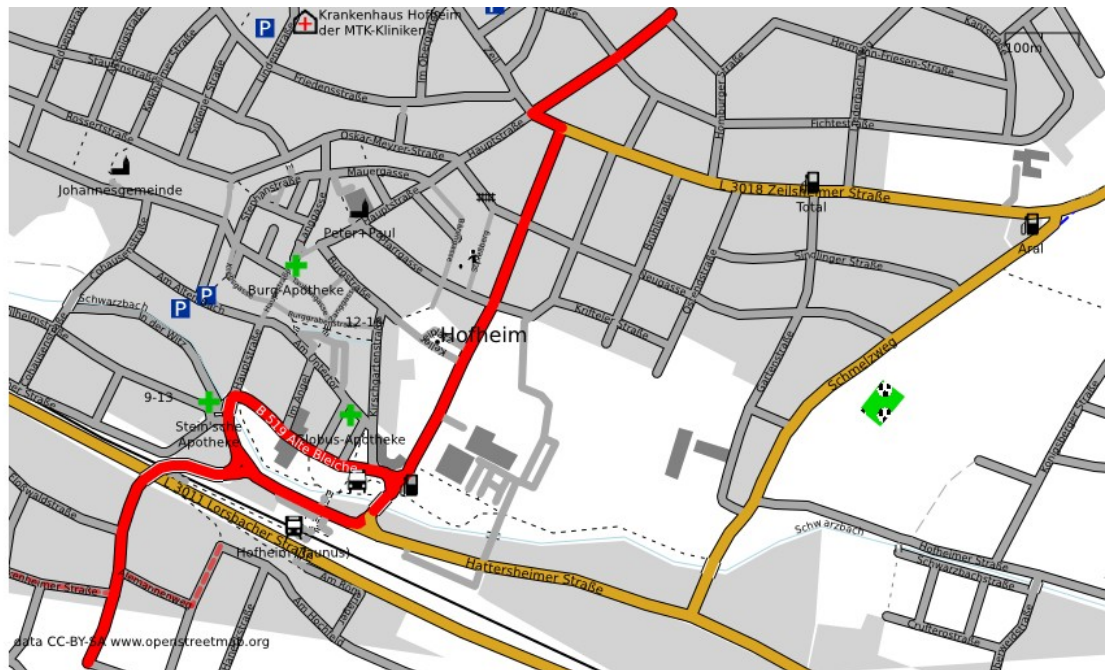
# Mapgen

by Gary68

## User's manual

Version 1.11, October 2010

- residential
- motorway
- primary
- secondary
- tertiary
- track
- footway
- path
- cycleway
- park
- stadium
- cemetery
- military
- forest
- farmland
- residential
- industrial



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# Introduction

Mapgen has its roots in osmdiff.pl and osmrender.pl. They were very basic render programs. Once Haiti was hit by the strong earthquake I wanted to provide large png maps for the local help. This proved to be hard since so many things couldn't be done with my programs. So I decided to improve the features of my renderer and give it a new name. So the basic goals became:

- Fast and easy map generation, different output formats
- Fast extraction of needed data out of \*.osm files (place=\*)
- Easy style file handling
- Street and place directories
- Keep it simple (easy invocation with only 2 mandatory parameters)
- Keep it powerful (by using more parameters)

## Hints

The projection method used is Mercator, ellipsoid is WGS84. Projection used is displayed in footer of map.

Be aware that at the edges of the map items may be missing. This may occur when items are not completely contained in the osm file. You can try to prevent this by using the clip parameter with larger values.

## Installation

- Put the mapgen.pl file in a folder
- Put dir.pl in the same folder
- Put \*.pm files in a subfolder called OSM (can also be put into a directory contained in the @INC pathes)
- Get Math::Poygon from CPAN and create a subfolder Math (can also be put into a directory contained in the @INC pathes)
- (Install osmosis if desired; take care that it can be invoked from command line)
- (Install inkscape if desired; take care that it can be invoked from command line) **This is necessary when usein SVG files as tile patterns or when converting from SVG to PNG or PDF!**
- bzip2 installation: sudo apt-get install libcompress-bzip2-perl
- GD installation: sudo apt-get install libgd-graph3d-perl
- Geo::Proj4: cpan<enter>, dann install Geo::Proj4
- For the directory in PDF format you'll also need the following:
  - latex: sudo apt-get install texlive-latex-base

- dvips: `sudo apt-get install texlive-latex-bin`
- ps2pdf: `sudo apt-get install texlive-latex-bin`

Information about Osmosis can be found here: <http://wiki.openstreetmap.org/wiki/Osmosis>

## Basic parameters

Obviously there are some things that can't be hidden from the user. So the user has to specify at least 2 basic parameters:

```
-in=file.osm  
-style=style.csv (original can be kept and maintained in OO sheet or MS Excel)
```

-in also supports \*.osm.bz2 format.

Default output name is mapgen.svg.

## Output

Basic and only output format from mapgen itself is SVG. That has the advantage that all further formats contain all elements that mapgen can produce. Disadvantage is a post-processing done by inkscape.

```
-out=file.svg (png and pdf names are automatic, DEFAULT=mapgen.svg)
```

There are two options specifying additional output formats:

```
-png (also produce png, inkscape must be installed, very big)  
-pdf (also produce pdf, inkscape must be installed)
```

The names are automatic and derived from the -out name. Inkscape must be installed and your system must be able to run it from command line in the current directory.

The PNG files are rather big. So maybe some post-processing is appropriate.

## Usage examples

Most **simple** form:

```
perl mapgen.pl -in=file.osm -style=mapgenRules.csv
```

Also specify an **output** name, if you wish

```
perl mapgen.pl -in=file.osm -style=mapgenRules.csv -out=map.svg
```

Also specify **size** and that you want a **PDF** additionally:

```
perl mapgen.pl -in=file.osm -style=mapgenRules.csv -size=2048 -pdf
```

Now let's say you have a big osm file but only want a **map of a certain city**:

```
perl mapgen.pl -in=germany.osm -style=mapgenRules.csv -place=Frankfurt
```

This will probably not cover the whole of Frankfurt because the default **radiuses** are too small (2km each direction)

```
perl mapgen.pl -in=germany.osm -style=mapgenRules.csv -place=Frankfurt -lonrad=10  
-latrad=10
```

Now we want our map with **grid lines** and a **street directory**:

```
perl mapgen.pl -in=file.osm -style=mapgenRules.csv -grid=8 -dir
```

And let's turn off the **legend**:

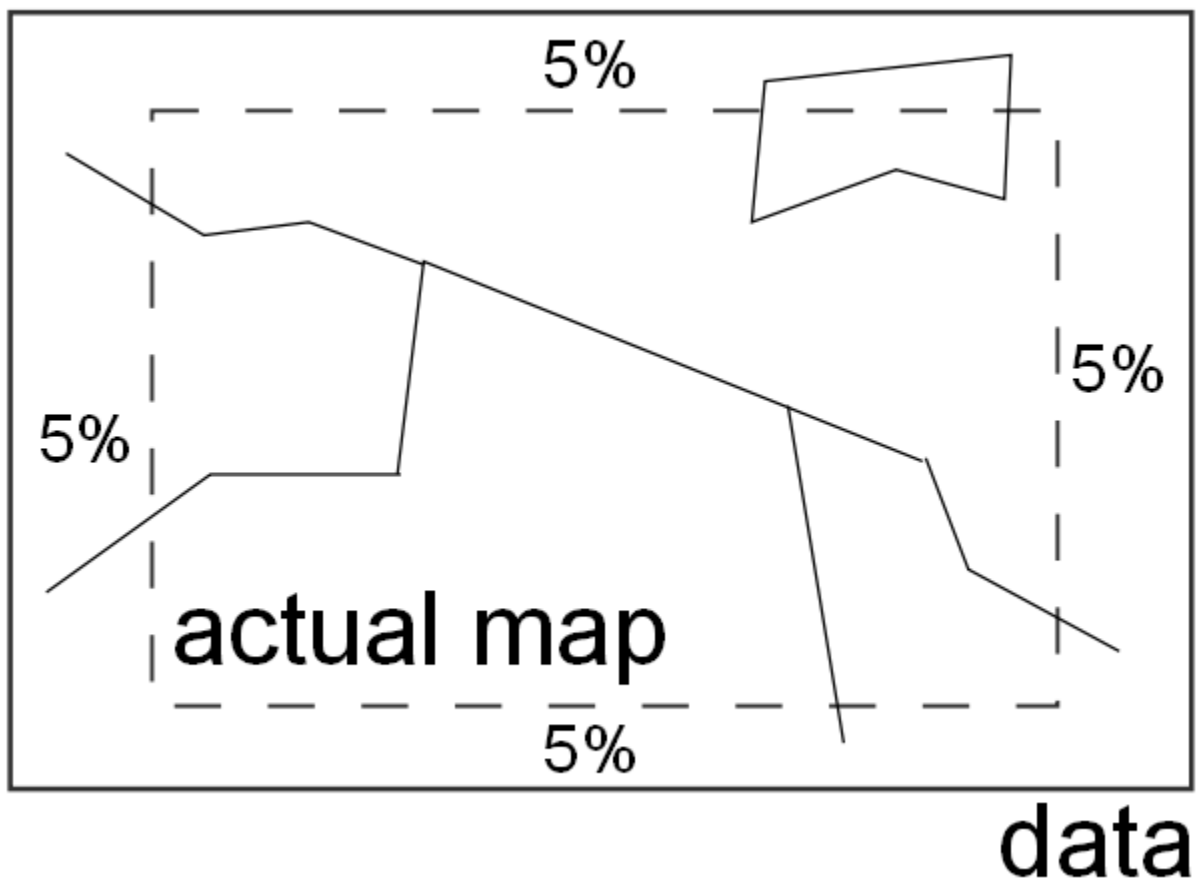
```
perl mapgen.pl -in=file.osm -style=mapgenRules.csv -legend=0
```

## Map size and the like

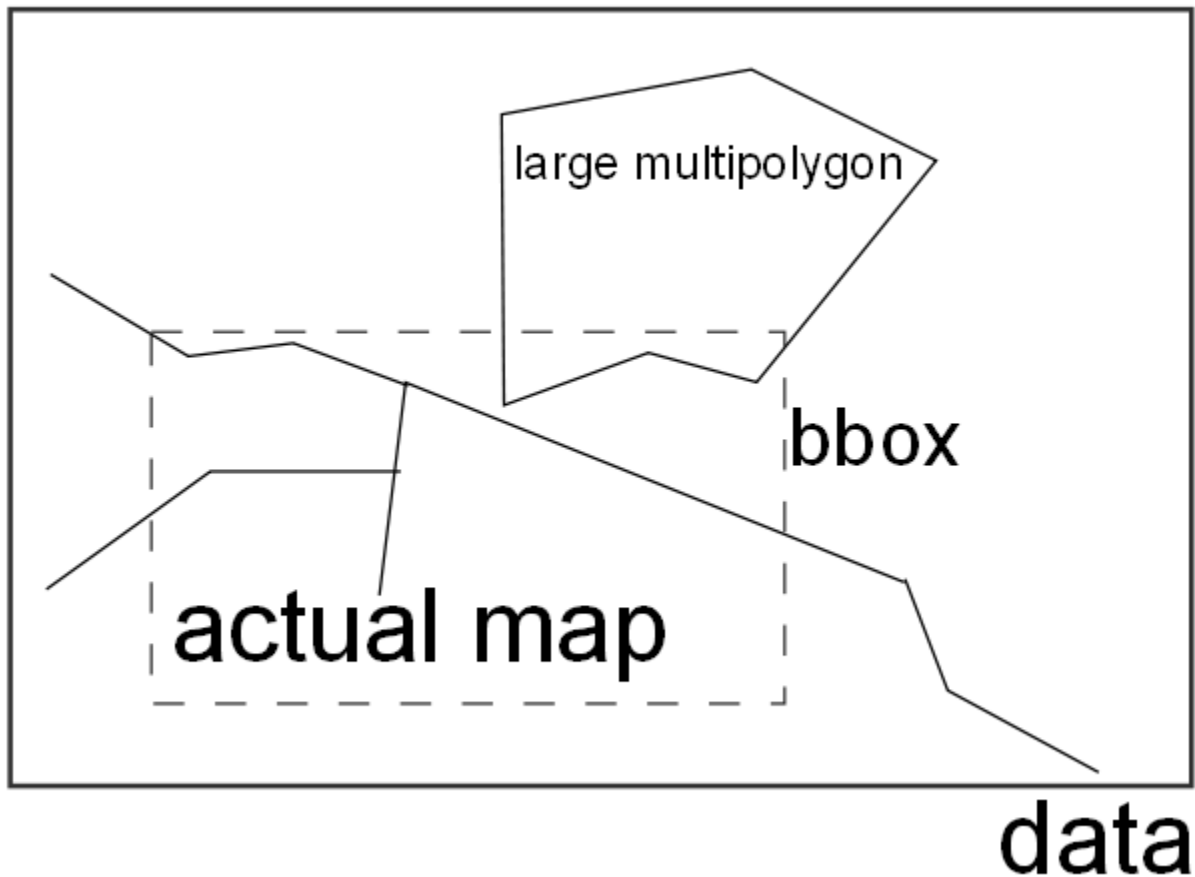
The background color can be set according to the given color set.

The size of the picture is specified by the width in pixels. Height is automatically calculated.

Clipping means that not all of the data given in the osm file will be presented. This is useful to clip incomplete data at the edges of the area in the osm file. Clipping can be done by a percentage or by giving a bounding box, which might be more precise. Giving a bounding box overrides simple clipping.



Symmetric clipping



Clipping to enable big elements not completely in bbox

Padding means to pad the map with an empty border. Useful for islands...

Program will output some useful information about map and paper sizes as well as resolution and scale.

```
-bgcolor=TEXT (color for background)
-size=<integer> (in pixels for x axis, DEFAULT=1024)
-clip=<integer> (percent data to be clipped on each side, 0=no clipping, DEFAULT=0)
-clipbbox=<float>,<float>,<float>,<float> (left, right, bottom, top of bbox for
clipping map out of data - more precise than -clip; overrides -clip!)
-pad=<INTEGER> (percent of white space around data in osm file, DEFAULT=0)
```

## Advanced parameters

By default a legend is drawn in the upper left corner. This can be switched off.

```
-legend=INT (0=no legend; 1=legend in top left corner; 2 = legend in lower right
corner; DEFAULT=1)
```

You can also place the legend in the lower right corner by giving -legend=2

**The legend will only show elements that would be drawn if present in the current map scale!**

A ruler is drawn by default in the upper right corner. This can be switched off as well. Additionally a color can be specified.



```
-ruler=INT (0=no ruler; 1=draw ruler; DEFAULT=1)
-rulercolor=TEXT (DEFAULT=black)
```

Optionally a scale value can be calculated and added to the map. Of course the color for this text can be set.

```
-scale (print scale)
-scalecolor=TEXT (set scale color; DEFAULT = black)
```



A specific scale can be set, i.e. 1:25.000 by adding `-scaleset=25000` to the command line. To be able to work with this information you have to specify the resolution of the output device in dpi. By default this is set to 300dpi.

```
-scaleset=INTEGER (1:x preset for map scale; overrides -size=INTEGER! set correct
printer options!)
-scaledpi=INTEGER (print resolution; DEFAULT = 300 dpi)
```

**Setting the scale overrides the -size parameter!**



The program will in any case print information on how big the map will be and on what paper size it will fit.

## ***basedpi***

basedpi is the dpi on which the sizes in the rules file are given. So if you i.e. want to use a base resolution of 72dpi you could set this by specifying `-basedpi=72`. You should then also specify `-scaledpi=72`.

```
-basedpi=INTEGER (rule size resolution; DEFAULT = 300 dpi)
```

## ***Understanding rules and dpi***

First of all: **The next paragraphs apply to PNG or other pixel related (unscaled) graphic formats like JPG or BMP.** When using PDF or SVG you don't have to care about this too much.

Because there is always a bit confusion about sizes of objects and the according rules I want to give some hints.

The rules provided in SVN are for a resolution of 300dpi. So the resulting files should be suitable for printing. In the file there are ways that have a thickness of let's say 40px. What does that mean? It means that when printing with 300dpi the way will be displayed using 40 pixels, which is roughly 3mm. If you look at this same map on a screen you will have much larger ways because the resolution of the screen is much lower (90-120dpi).

What to do? Very simple. To create a map for the screen using the same style file just specify `-scaledpi=117` (i.e. for my netbook). Everything will be scaled now. Of course you can't send this to the printer now because everything would be too small.

If you use the 300dpi rule file and you want to print with a higher resolution, just specify `-scaleset=600` or `1200`.

What to do if you want to specify your rule file for another resolution than 300? Just as easy but don't forget: You now have to use `-basedpi=75` (or whatever you chose) each time you call mapgen. Let's look at our 40px way from above. Assuming a base dpi of 75 this way would have to have a thickness of only 10px! Assuming a base dpi of 600 would mean to specify a thickness of 80px.

Some Hints:

- my netbook has a resolution of 117 dpi
- my 18" monitor has a resolution of 90 dpi
- for printing choose a scalable format or a dpi of 300 dpi or more. most laser printers today support 600 or even 1200 dpi

## ***Setting a scale for rules alone***

If you specify a certain scale for rulescaleset then for selecting rules not the actual scale of the map is used but the specified one.

This is useful to show more or less details than initially intended by the given ruleset (minScale, maxScale).

A similar function can be found in the Garmin GPS receivers: Map details normal/more/most/less/least.

```
-rulescaleset=INTEGER (determines the scale used to select rules; DEFAULT=0,  
meaning actual map scale is used to select rules)
```

## Style file format

In any case only one rule per object is used. And this is the first matching rule according to the style file. So it's possible i.e. first to look after all tracktype=XY and then having a “default rule” for all highway=track.

**So it is important to have more specific rule higher above in the sheet/file!**

The different sections of the file start with a SECTION line: This line contains the word “SECTION” in the first cell. These lines are mandatory even if no rules for a section are present.

You can add COMMENT lines for remarks if you enter “COMMENT” in the first cell. These lines will be omitted when style file is read.

## File

Note that you can enter multiple key/value pairs for a rule. Valid for nodes and ways. Different entries must be separated by a “|”. If you for example want a rule for all tracks with tracktype=grade1, then the entries would be:

```
column key/tag: highway|tracktype
column value:   track|grade1
```

## Nodes

Column #	Name	Values	Description
1	key	see wiki values can be separated by a “ ”. see above	
2	value	see wiki an asterisk (*) may be used as a wild card values can be separated by a “ ”. see above	
3	color	see separate table	the fill color
4	thickness	INTEGER	
5	label	key, where value will be the label text; entries can be separated by ! or #. !=AND. #=PRIO special keys: _lon and _lat	
6	label color	see list below	
7	label size	INTEGER	size of text
8	label offset	INTEGER	NOT USED RIGHT NOW
9	legend	0 or 1	

10	Icon	File name	
11	Icon size	In pixels	
12	FromScale	INTEGER	
13	ToScale	INTEGER	

A halo can be specified by using the option:

`-halo=<FLOAT>` (white halo width for point feature labels; DEFAULT=0)

However then a bold font is used so you also have to adjust `-ppc` to maybe 7.

The halo is white and opacity is 90%. Use large font sizes.

## Ways

Column #	Name	Values	Description
1	key	see wiki values can be separated by a “ ”	
2	value	see wiki an asterisk (*) may be used as a wild card values can be separated by a “ ”	
3	color	see separate list	the fill color
4	thickness	INTEGER	thickness of line
5	dash style	1-4: for tracks 10-14: relation 1:1 dashes 20-23: for borders 30-35: for steps (drawn with linecap=BUTT)	determines the style of the dashes forming the way
6	Border color	TEXT	Border color for the way. Only valid if border thickness is > 0
7	Border thickness	INTEGER	Border thickness for the way
8	fill	0 or 1	0 = area will not be filled; 1 = area will be filled
9	label	key, where value will be used as label text. entries can be separated by ! or #. !=AND. #=PRIO special keys: _lon and _lat	
10	label color	see below	*

11	label size	INTEGER	font size
12	label font-family	see below	
13	label offset	INTEGER	offset for label text in y-direction (negative = up, positive = down)
14	legend	0 or 1	entry for automatic legend (0=no, 1=yes)
15	base layer	0 or 1	applies for areas (closed ways). areas tagged with 1 are drawn as "background" first. use for landuse, natural etc.
16	Icon	TEXT	Fill icon for area. SVG and PNG supported
17	FromScale	INTEGER	
16	ToScale	INTEGER	

Mapgen will produce a file that lists all labels that were not placed on the map but should have according to the rules given. The file name is derived from the svg name and ends with "\_NotDrawnLabels.txt". The user can then process this information further.

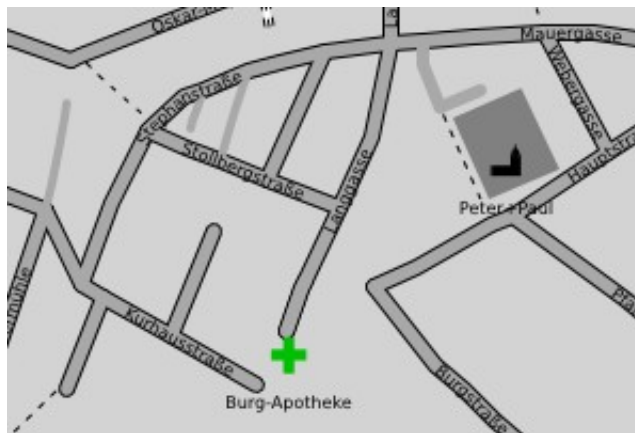
Using \_lon and \_lat you could nicely label a natural=peak, using a second rule for elevation i.e:



Using area icons...



Ways with borders...



## Routes

Column #	Name	Values	Description
1	RouteType	bus, hiking - see wiki	
2	Color(s)	All valid colors	A set of colors can be given by using the ; as a delimiter
3	Thickness	INTEGER	...of the line
4	DashType	See above	...of the line
5	Opacity	0..100	...opacity in percent
6	Label	Valid keys	Key to get the label from
7	StopNodeThickness	INTEGER	
8	FromScale	INTEGER	
9	ToScale	INTEGER	

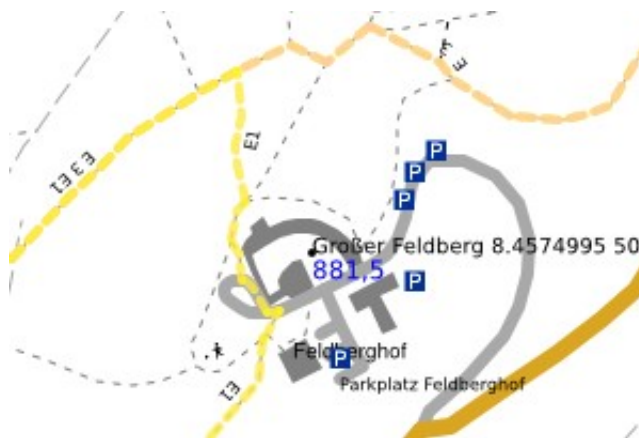
The colors will be assigned to each found route in order of occurrence in style file if no k/v for the colors are present in the osm file.

Additionally the labels can be configured by command line parameters:

```
-routelabelcolor=TEXT (color for labels of routes)
-routelabelsize=INTEGER (DEFAULT=28)
-routelabelfont=TEXT (DEFAULT=sans-serif)
-routelabeloffset=INTEGER (DEFAULT=35)
```



Bus routes in Frankfurt



Hiking routes in the Taunus



Some bus stops in Frankfurt

## Route icons

Additionally icons for routes can be added to the map if icons are provided as follows. Create folder “routeicons” and save icons there. As the file name choose the ref or the name of the route preceeded by the route type and a dash. **If the route has a ref the ref has to be used!**

Example: ./routeicons/hiking-E3.png OR ./routeicons/hiking-E3.svg

The default icon directory can be changed.

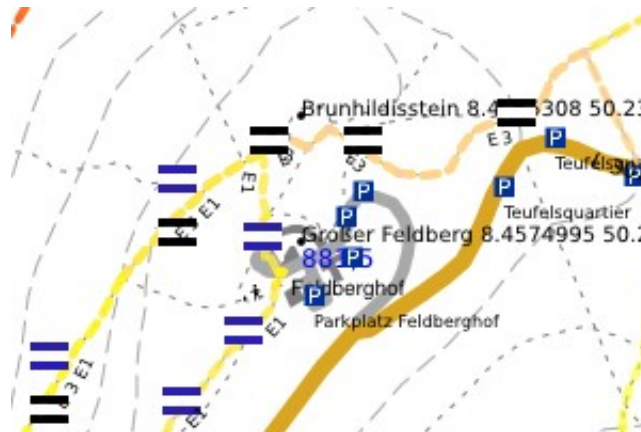
```
-icondir=TEXT (dir for icons for routes; ./icondir/ i.e.; DEFAULT=./routeicons/ )
```

You can also change the default distance of pixels between multiple icons for same way.

```
-routeicondist=INTEGER (dist in y direction for route icons on same route;  
DEFAULT=75)
```

And perhaps sometimes it comes in handy if you can scale the given route icons by a factor.

```
-routeiconscale=FLOAT (factor to scale the height and width of the route icons; >1  
bigger; <1 smaller)
```



## Colors

aliceblue	black	chartreuse	darkblue
antiquewhite	blanchedalmond	chocolate	darkcyan
aqua	blue	coral	darkgoldenrod
aquamarine	blueviolet	cornflowerblue	darkgray
azure	brown	cornsilk	darkgreen
beige	burlywood	crimson	darkgrey
bisque	cadetblue	cyan	darkkhaki



darkmagenta	hotpink	mediumblue	purple
darkolivegreen	indianred	mediumorchid	red
darkorange	indigo	mediumpurple	rosybrown
darkorchid	ivory	mediumseagreen	royalblue
darkred	khaki	mediumslateblue	saddlebrown
darksalmon	lavender	mediumspringgreen	salmon
darkseagreen	lavenderblush	mediumturquoise	sandybrown
darkslateblue	lawngreen	mediumvioletred	seagreen
darkslategray	lemonchiffon	midnightblue	seashell
darkslategrey	lightblue	mintcream	sienna
darkturquoise	lightcoral	mistyrose	silver
darkviolet	lightcyan	moccasin	skyblue
deeppink	lightgoldenrodyellow	navajowhite	slateblue
deepskyblue	lightgray	navy	slategray
dimgray	lightgreen	oldlace	slategrey
dimgrey	lightgrey	olive	snow
dodgerblue	lightpink	olivedrab	springgreen
firebrick	lightsalmon	orange	steelblue
floralwhite	lightseagreen	orangered	tan
forestgreen	lightskyblue	orchid	teal
fuchsia	lightslategray	palegoldenrod	thistle
gainsboro	lightslategrey	palegreen	tomato
ghostwhite	lightsteelblue	paleturquoise	turquoise
gold	lightyellow	palevioletred	violet
goldenrod	lime	papayawhip	wheat
gray	limegreen	peachpuff	white
green	linen	peru	whitesmoke
greenyellow	magenta	pink	yellow
grey	maroon	plum	yellowgreen
honeydew	mediumaquamarine	powderblue	

## ***Fonts***

- serif

- sans-serif
- cursive
- fantasy
- monospace
- Times
- Baskerville
- Verdena
- Symbol

## Oneways

```
-oneways (add oneway arrows)
-onewaycolor=TEXT (color for oneway arrows)
```



## Lower scale maps

For lower scale maps it might be appropriate to disable drawing of bridges and tunnels because they are too short and the map doesn't look pretty then.

Also the layer of ways will then be set to zero.

Then smaller ways are drawn first, then bigger ones (regarding thickness). So important roads appear "in one piece".

```
-nobridge (don't draw bridges and tunnels - for lower scale maps)
```

## Extracts

If you don't want the whole osm data to be printed that is contained in the file – no problem. As long as you have installed osmosis and this can be invoked from the current directory by command line.

Just specify the name of a place or a node id and mapgen will look for such a place. Upon success it will invoke osmosis to extract the needed data. By default a width and height of 4km (2\*2km radius) is set. But of course it can be overridden. If you want to speed up the search process you can provide a placefile in osm format which only contains places. Can be created with osmosis.

```
-place=TEXT (Place to draw automatically; quotation marks can be used if necessary;  
node id can be given alternatively; OSMOSIS REQUIRED!)  
-lonrad=FLOAT (radius for place width in km, DEFAULT=2)  
-latrad=FLOAT (radius for place width in km, DEFAULT=2)  
-placefile=<TEXT> (file in which to look for places; can be produced with osmosis;  
speeds up search process)
```

Program will print used OSMOSIS string to STDOUT for later use...

## Declutter

Usually when drawing maps (especially with lots of details) clutter may occur.

- mapgen will register an used area for each drawn label and won't use this area again.
- mapgen will register an used area for each drawn icon and won't use this area again.
- mapgen registers a polygon for each drawn way label and will prevent collision

Icons will be placed at the given location.

Using option -allowiconmove you can permit the program to slightly move icons if they don't fit the original position. Labels are drawn afterwards and will be placed accordingly. Using this option will significantly increase the number of drawn icons in cluttered areas! (In Frankfurt using a scale of 1:50.000 150 more icons could be drawn.)

`-allowiconmove` (allows icons to be moved if they don't fit the exact position)

Text labels for nodes and areas will be placed on a default position and orientation. If this is not possible other positions and alignments will be tried. So labels might be moved and/or omitted at all.

At the end of map drawing program will show how many labels and icons were omitted or moved.

To prevent a special form of clutter caused by certain parallel ways the following option may be specified:

`-declutter` (declutter text; WARNING: some labels might be omitted; motorway and trunk will only be labeled in one direction)

- Motorways and trunks will be labeled only in one direction

mapgen tries not to put labels on ways that are too short. To do so it calculates the length of the way and the length of the text. This is done by assuming a need of 6 pixels per character for a 10pt font. Other font sizes are calculated automatically. If you find out that 6 ppc doesn't suit your used font, please reconfigure the value using the following option.

`-ppc=<float>` (pixels needed per label char using font size 10, DEFAULT=6)

# Grids, directory and stats

A grid can be laid over the map. Just specify the number of squares you want in longitude direction. The other dimension is automatic. Of course you can specify the grid color. The grid squares are labeled numerically and alphabetically.

```
-grid=<integer> (number parts for grid, 0=no grid, DEFAULT=0)
-gridcolor=TEXT (color for grid lines and labels (DEFAULT=black)
```



## Street directory

mapgen can even create a street directory. It will do so including the grid squares where the street is located if the grid is turned on. Output is an unformatted street list to be further processed. The grid squares are separated by a tab. File name is name\_streets.txt.

```
-dir (create street directory in separate file. if grid is enabled, grid squares
will be added)
```

In the next table you can see a section of the street directory. On the left without grids, on the right with grid squares:

Burgstraße	Burgstraße.....B1
Cohausenstraße	Cohausenstraße.....A1 A2 B1
Crufterostraße	Crufterostraße.....D2
Elisabethenstraße	Elisabethenstraße...B2 C1 C2 D1 E1
Eschborner Weg	Eschborner Weg.....C1
Feldbergstraße	Feldbergstraße.....A1 B1

## ***Poi and place list***

You can print a poi and place list like the street directory. Grid option applies as well.

```
-poi (create list of pois)
```

```
Delkenheim.....C5
Diedenbergen.....F4
Eddersheim.....G5
Edeka Kundenparkplatz.....G7
Falkenberg (Keramag).....E7
Flörsheim.....F6
Geldautomat.....C1
```

## ***Street and POI directory in PDF***

You can create a formatted street and POI directory in PDF format. To be able to do so you need some programs installed (see installation):

latex

dvips

ps2pdf

Also necessary is to also specify the options to create street and POI directories with `-dir` and/or `-poi` and a grid created by `-grid=x`.

```
-dirpdf (creates directory of streets and POIs if according options for generation
are set)
-dircolnum=INTEGER (number of columns for PDF directory of streets and POIs;
DEFAULT=3)
-dirtitle=TEXT (title for PDF directory of streets and POIs; DEFAULT="mapgen map")
```

## ***Statistics***

You can print a tag statistic about the usage of the keys and values. To keep the list short unimportant keys are omitted. This must be adapted in the code if desired.

The idea is to see what keys are used mostly. So you can decide for which features rules are needed.

Mapgen will print an alphabetical list of keys and values as well as a list of the most used k/v combinations. At the end of each line the program prints if it knows a rule for that k/v.

Output is separated for nodes and ways and will be written in a file called `name_tagstat.txt`

```
-tagstat (lists keys and values used in osm file; program filters list to keep them
short!!! see code array noListTags)
```

TOP 20 LIST:

highway	residential	123	RULE
highway	footway	51	RULE
oneway	yes	38	-
highway	service	21	RULE
highway	primary	19	RULE
highway	steps	14	-
foot	yes	12	-
highway	secondary	11	RULE
building	yes	10	RULE
bicycle	yes	10	-
amenity	parking	10	RULE
surface	cobblestone	9	-
service	parking_aisle	8	-
highway	pedestrian	8	-
landuse	residential	6	RULE
highway	track	6	RULE
highway	path	5	RULE
highway	living_street	5	-
amenity	restaurant	5	-
amenity	pharmacy	5	-

Obviously we should maybe implement a rule for oneway=yes. And we can see that by far the most used tag here is highway=residential.

## Coordinates Grid

You can add a grid of coordinates to your map by specifying the `-coords` option. By default the grid distance is 0.01 degrees.

This can be changed by using the `-coordsexp` parameter. The value given here is the power of 10. (-2 means 0.01 degrees, 2 means 10 degrees).

And of course the color can be changed.

```
-coords (turn on coordinates grid)
-coordsexp=INTEGER (degrees to the power of ten for grid distance; DEFAULT=-2
equals 0.01 degrees)
-coordscolor=TEXT (set color of coordinates grid)
```





## External POI files

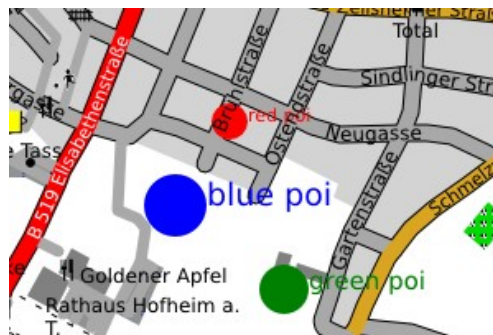
A separate POI file can be specified where additional POIs are defined. These will be placed on the map according to their positions. The following information is needed:

- longitude
- latitude
- size of dot in points of base resolution
- color for node and label
- name of POI
- size of label in points of base resolution

`-poifile=<TEXT>` (name of file with POIs to be displayed in map)

The file must be in text format (CSV) and uses SPACE as a delimiter and " as field delimiters and could look something like this:

```
8 50 40 "blue" "confluence point 1" 40
9 50 40 "blue" "confluence point 2" 40
8.45 50.086 40 "red" "HOME" 40
```



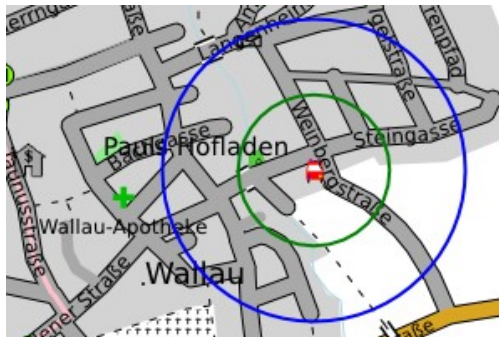
## Circles around POIs

For some applications it is useful to be able to draw a circle around a POI, like a fire department i.e. Just specify the k/v of the POI with the `-circle` parameter. Add distance in meters, the color and the thickness of the circle. It is possible to have multiple POIs. Just separate them with a semicolon. It is also possible to have multiple circles around one POI! Just use two entries.

```
-circle=key,value,distance,color,thickness  
-circle=key,value,distance,color,thickness#key,value,distance,color,thickness;...  
-circle=key,value,distance,color,thickness
```

The value may be an asterisk! Then all values of the key are allowed.

Example: `-circle=amenity,fire_station,3000,black,30`



## Debug

Verbose will turn on lots of information to be printed while program executes. This is mostly done for debug purposes.

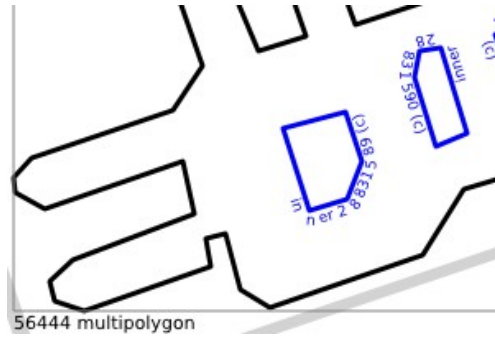
```
-verbose
```

If you want to print a map only containing multipolygons you can specify so. This is also a debug function, although a graphical one.

```
-multionly (draws only areas of multipolygons; for test purposes)
```

## Relation analyzer mode

```
-ra=TEXT (TEXT = types and/or ids, separated by commas; add relation analyzer layer; keep normal elements in map in light colors)
```



Displays elements of relations in map. Background should be kept in light colors. Elements are labeled and whole relation will be placed inside a box.