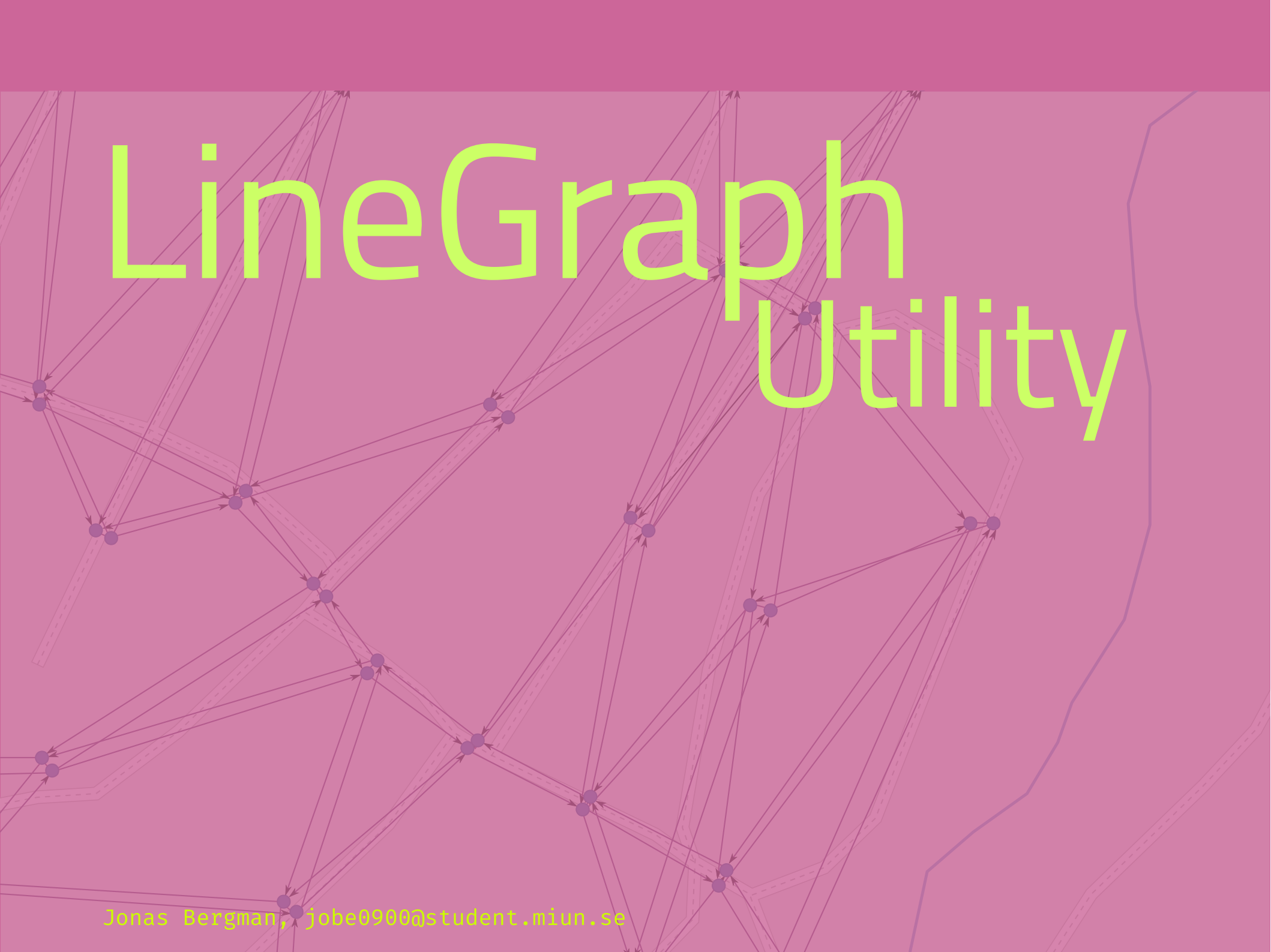
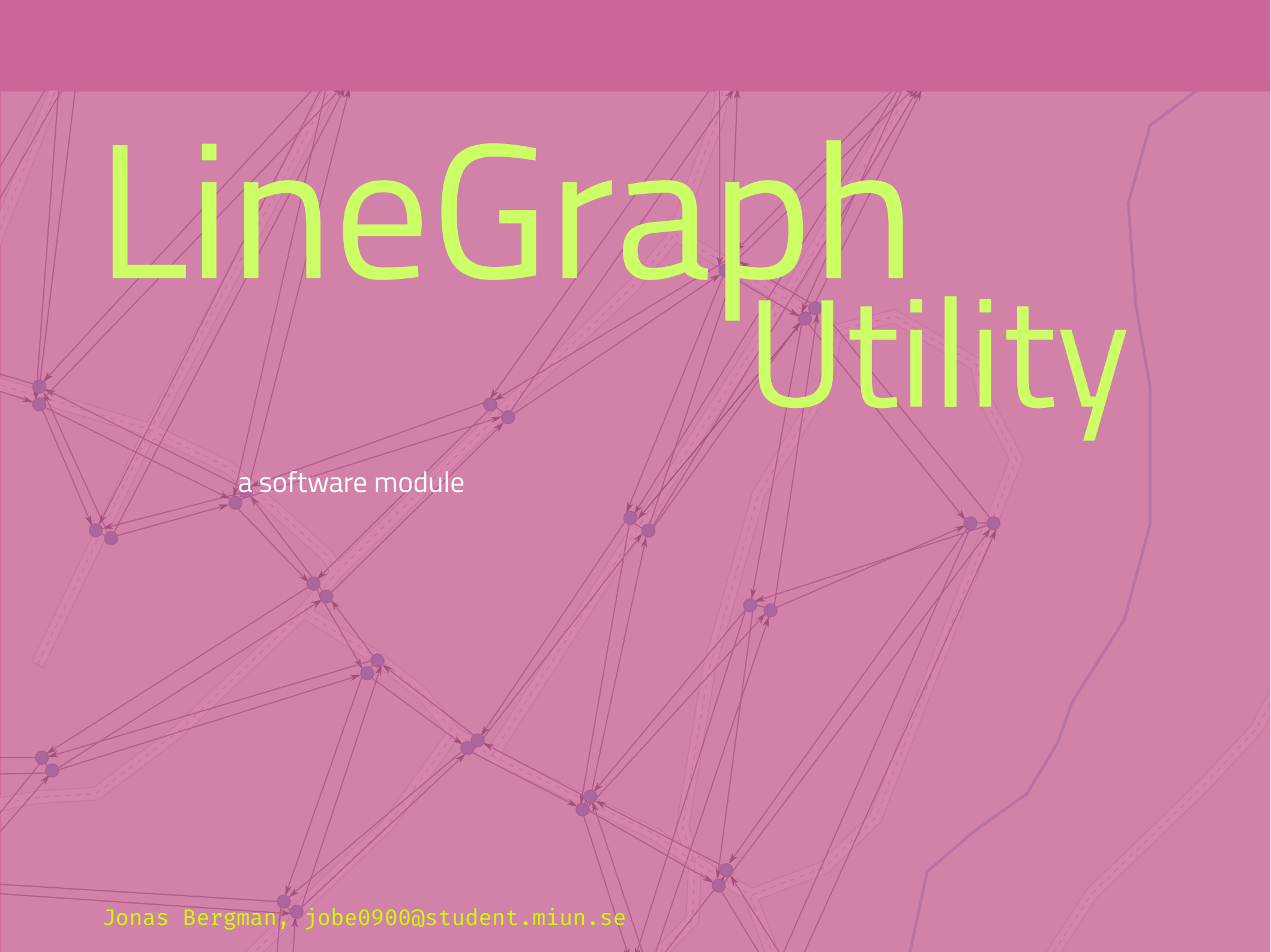


LineGraph Utility

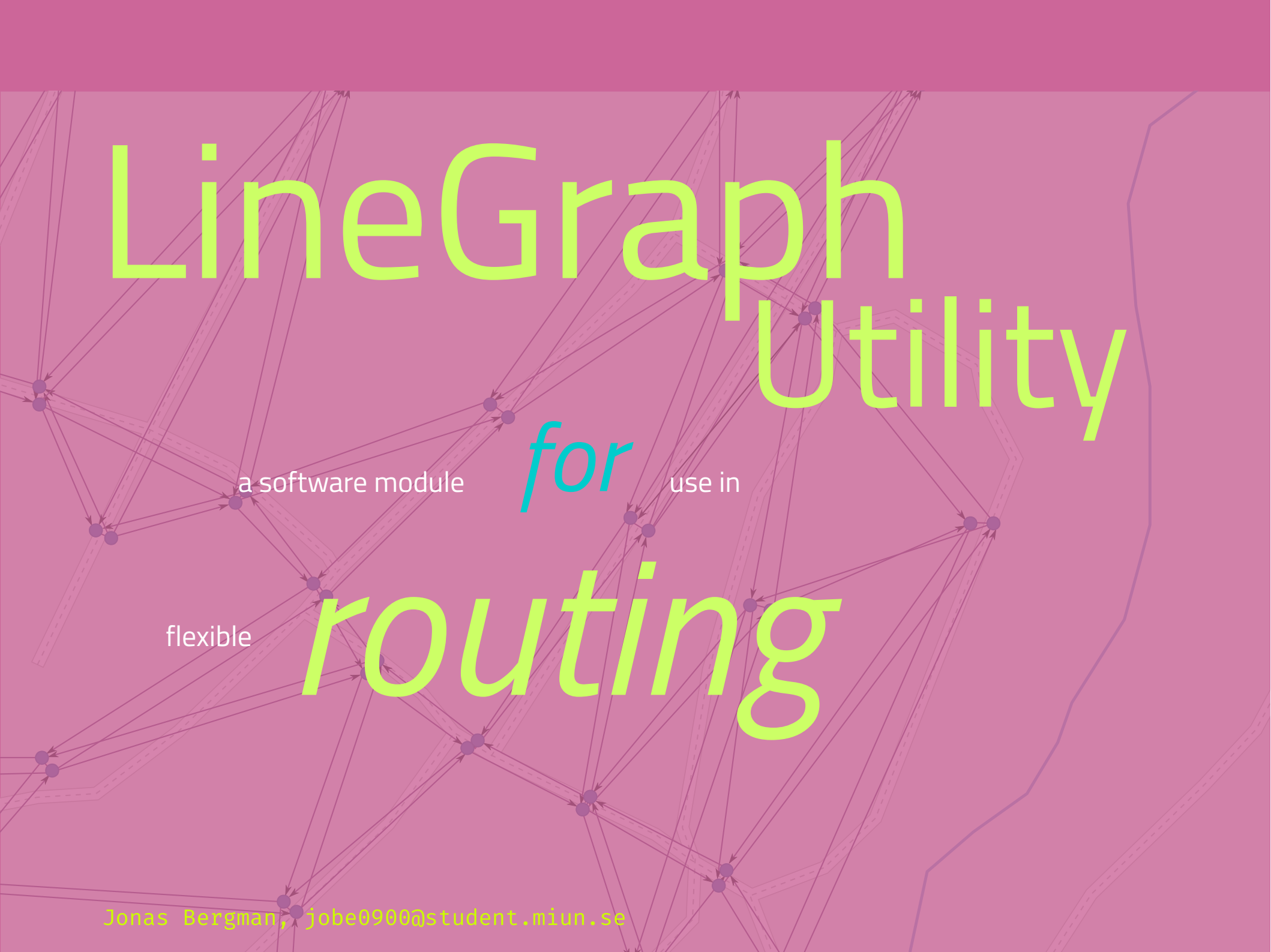
Jonas Bergman, jobe0900@student.miun.se



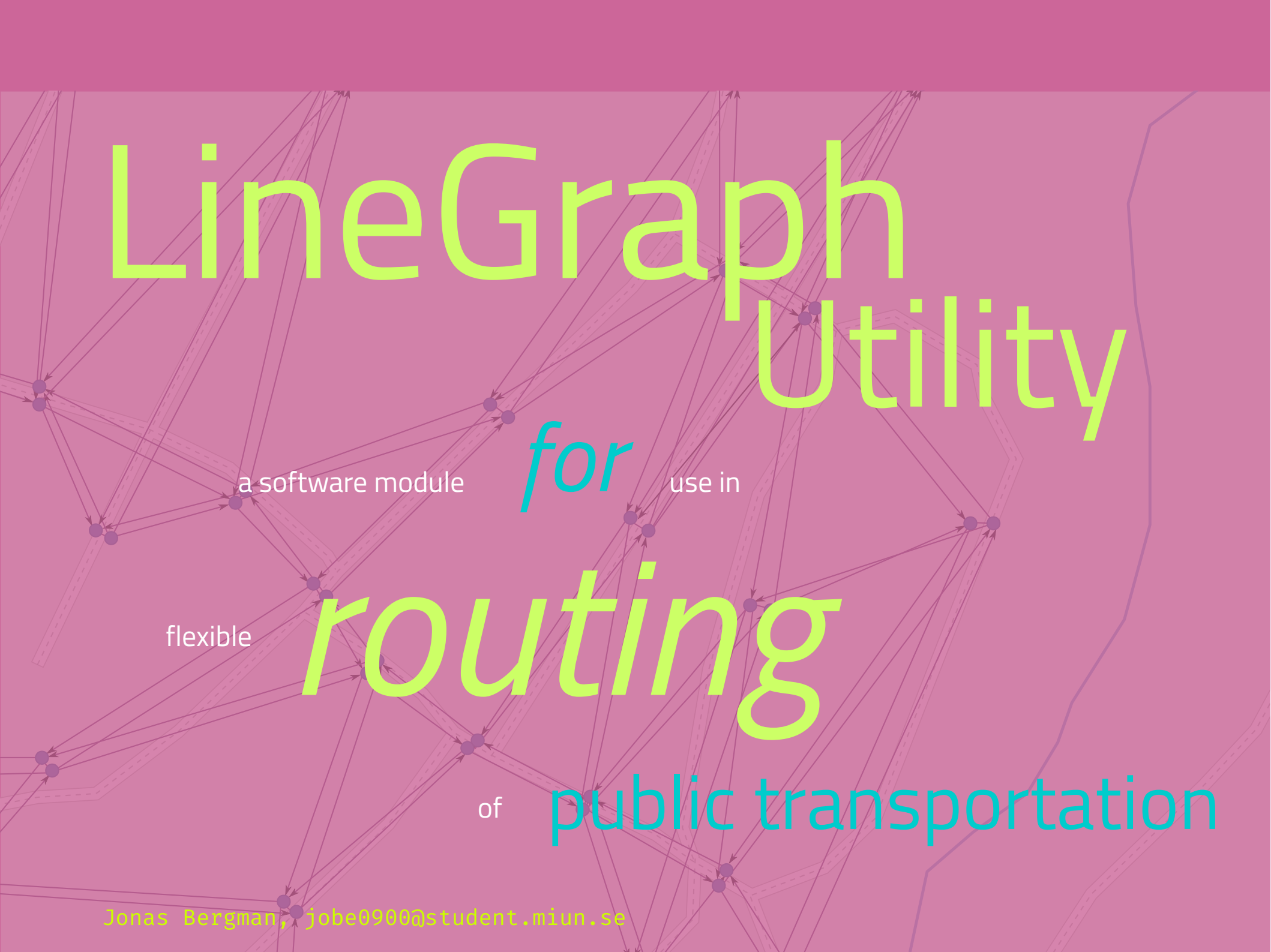
LineGraph Utility

a software module

Jonas Bergman, jobe0900@student.miun.se

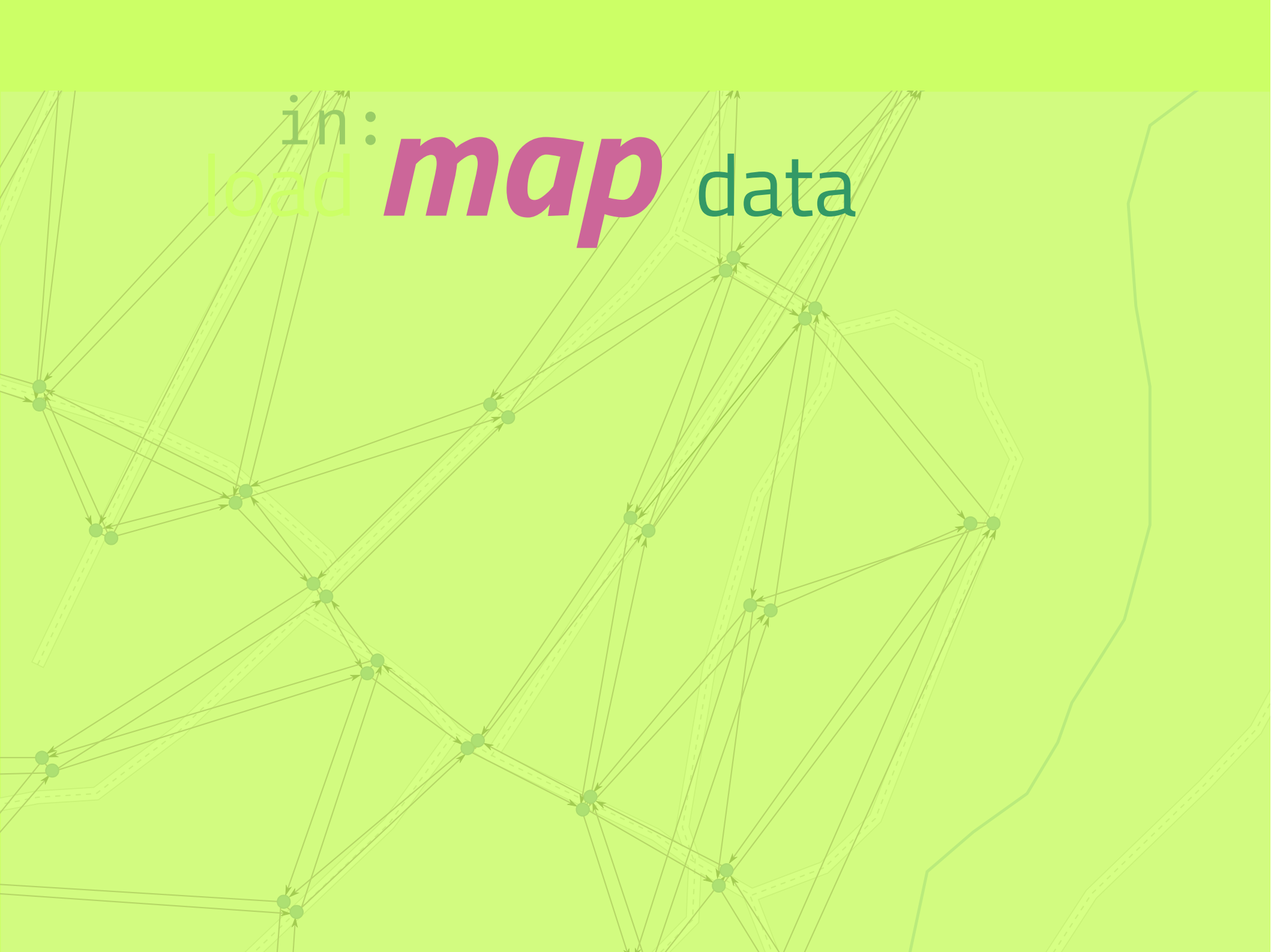


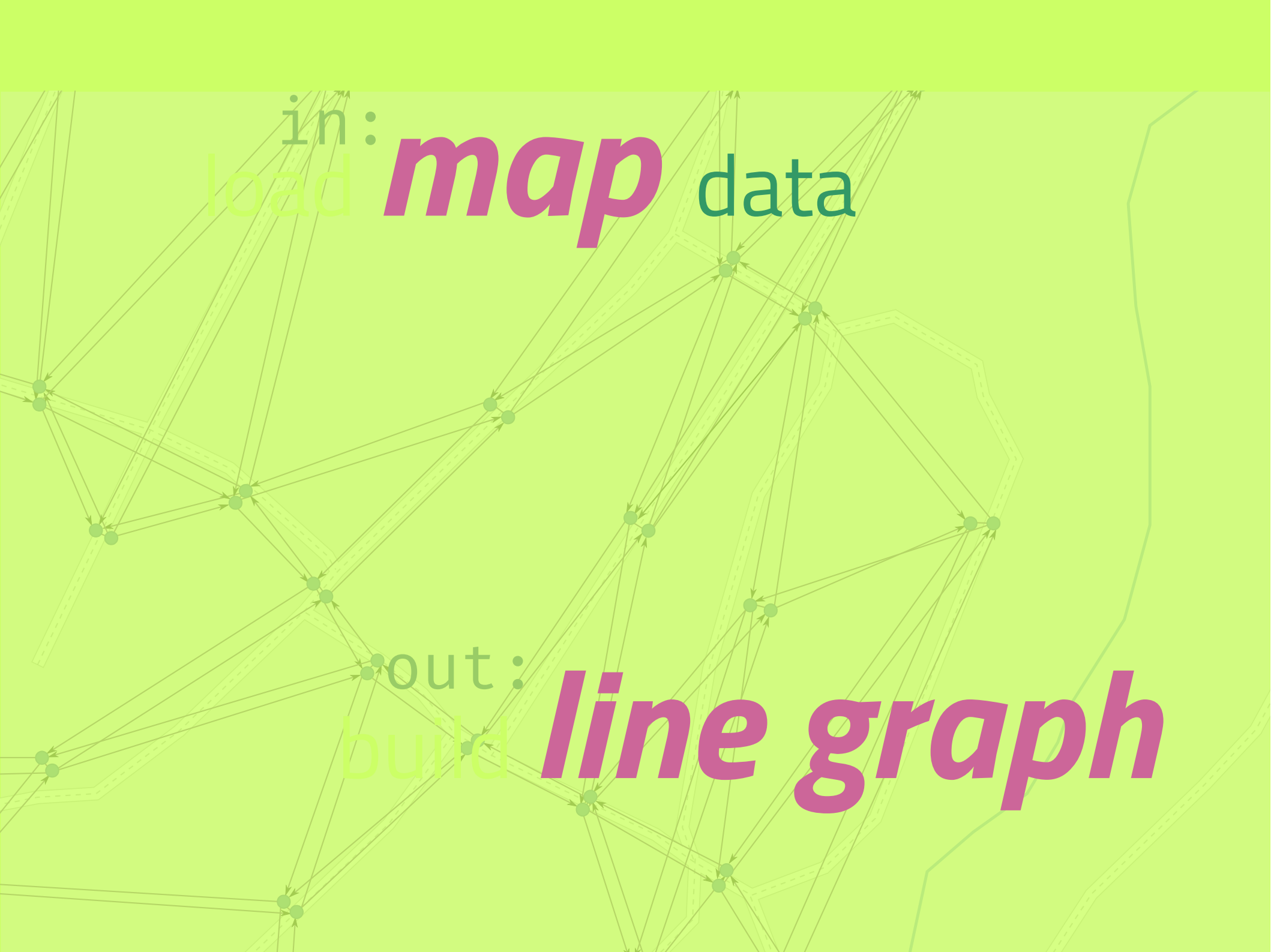
Jonas Bergman, jobe0900@student.miun.se



Jonas Bergman, jobe0900@student.miun.se

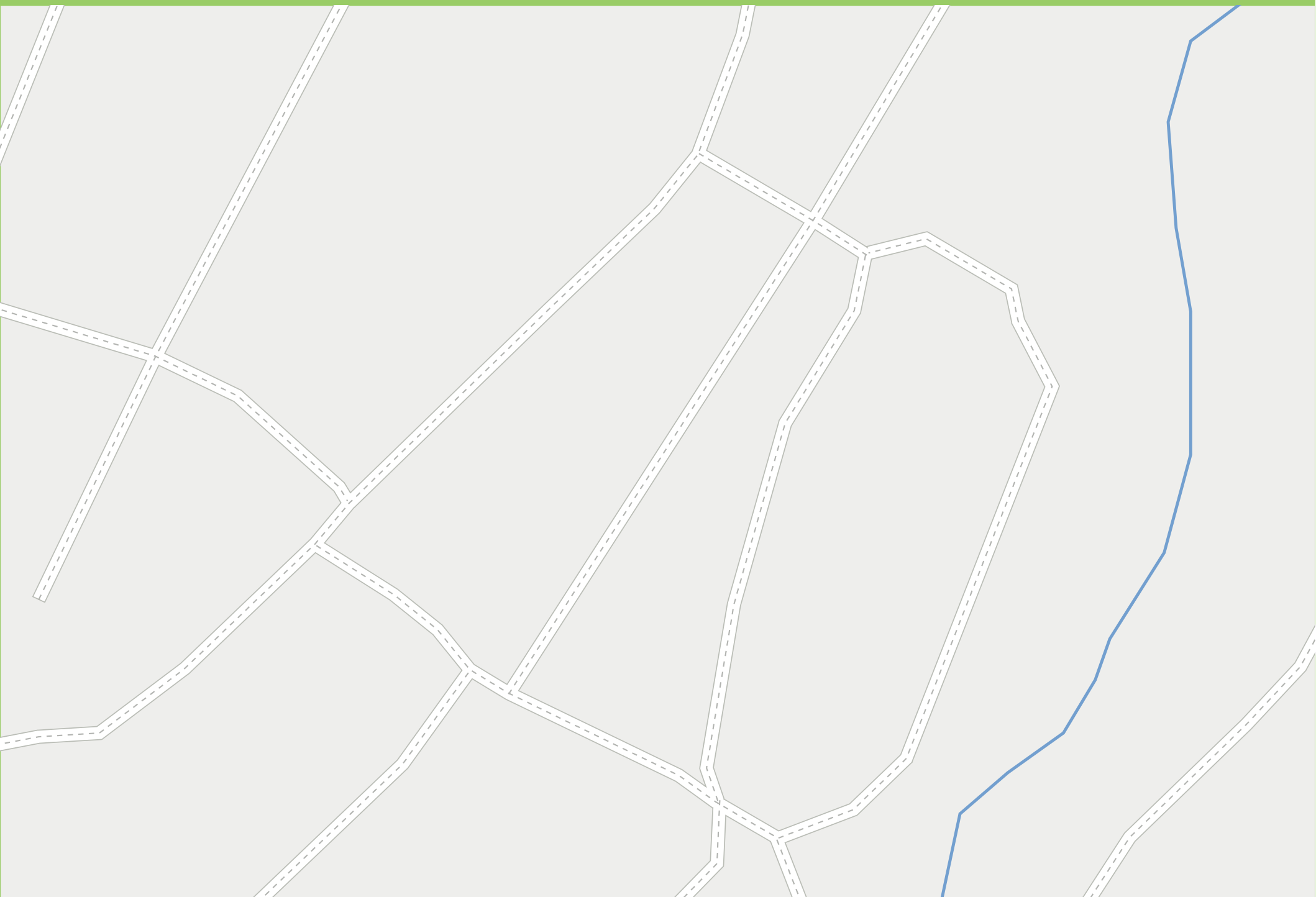
requirements


in:
load
map
data


in:
load
map data
out:
build
line graph

1 load *map* data

1. map



1. map

source: **OpenStreetMap**

www.openstreetmap.org

1. map

source: **OpenStreetMap**

www.openstreetmap.org

store: **PostGIS**

www.postgis.net

1. map

source: **OpenStreetMap**

www.openstreetmap.org

store: **PostGIS**

PostgreSQL + spatial data extension

www.postgis.net

1. map

source:

OpenStreetMap

www.openstreetmap.org

load:

```
$ osm2pgsql
```

store:

PostGIS

PostgreSQL + spatial data extension

www.postgis.net

1. map

source:

OpenStreetMap

www.openstreetmap.org

load:

```
$ osm2pgsql -U user -d map_db -s -k mapdata.osm
```

store:

PostGIS

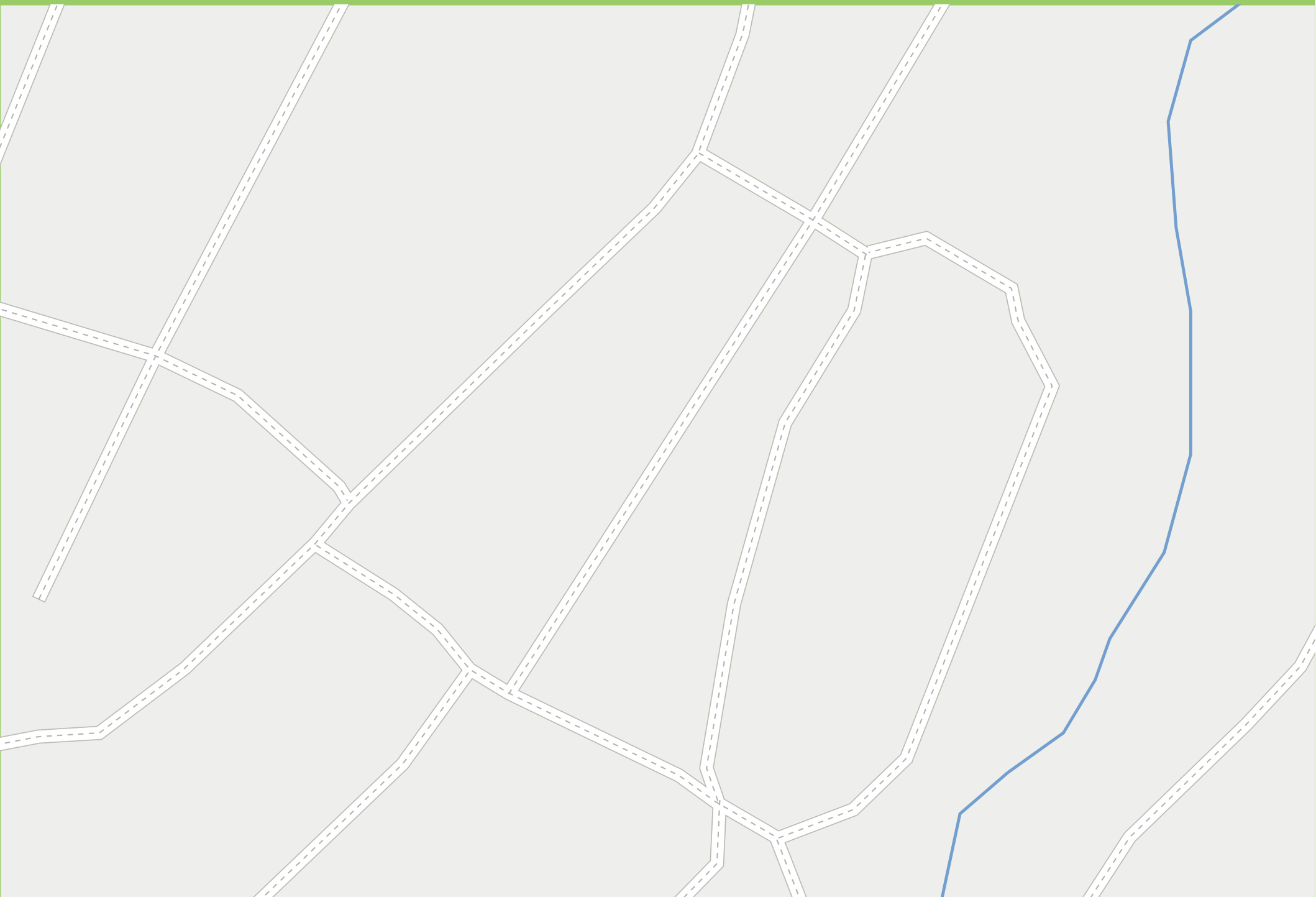
PostgreSQL + spatial data extension

www.postgis.net

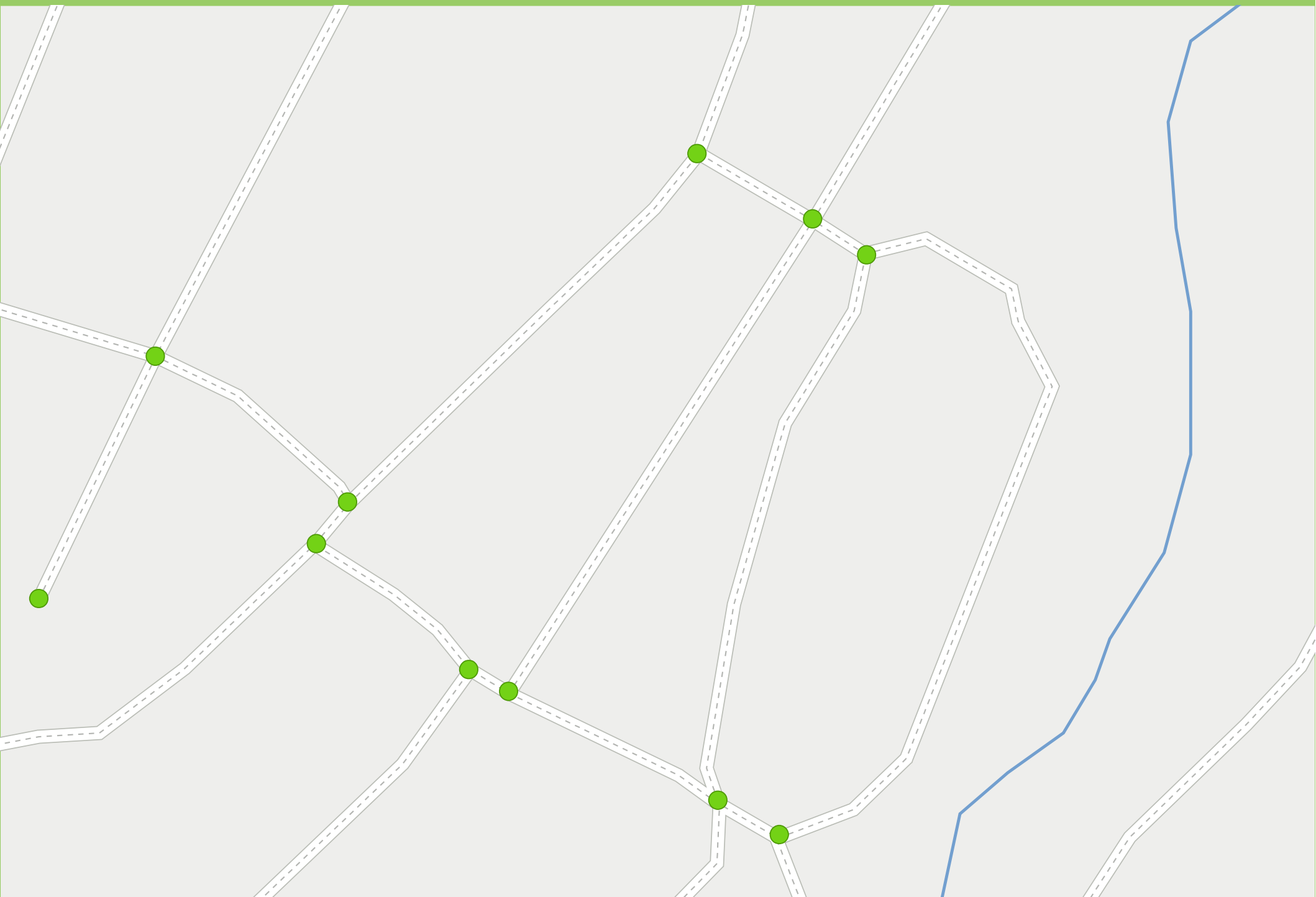
1 load ***map*** data

2 build *topology*

2. topology



2. topology



2. topology

2. topology

2. topology

2. topology

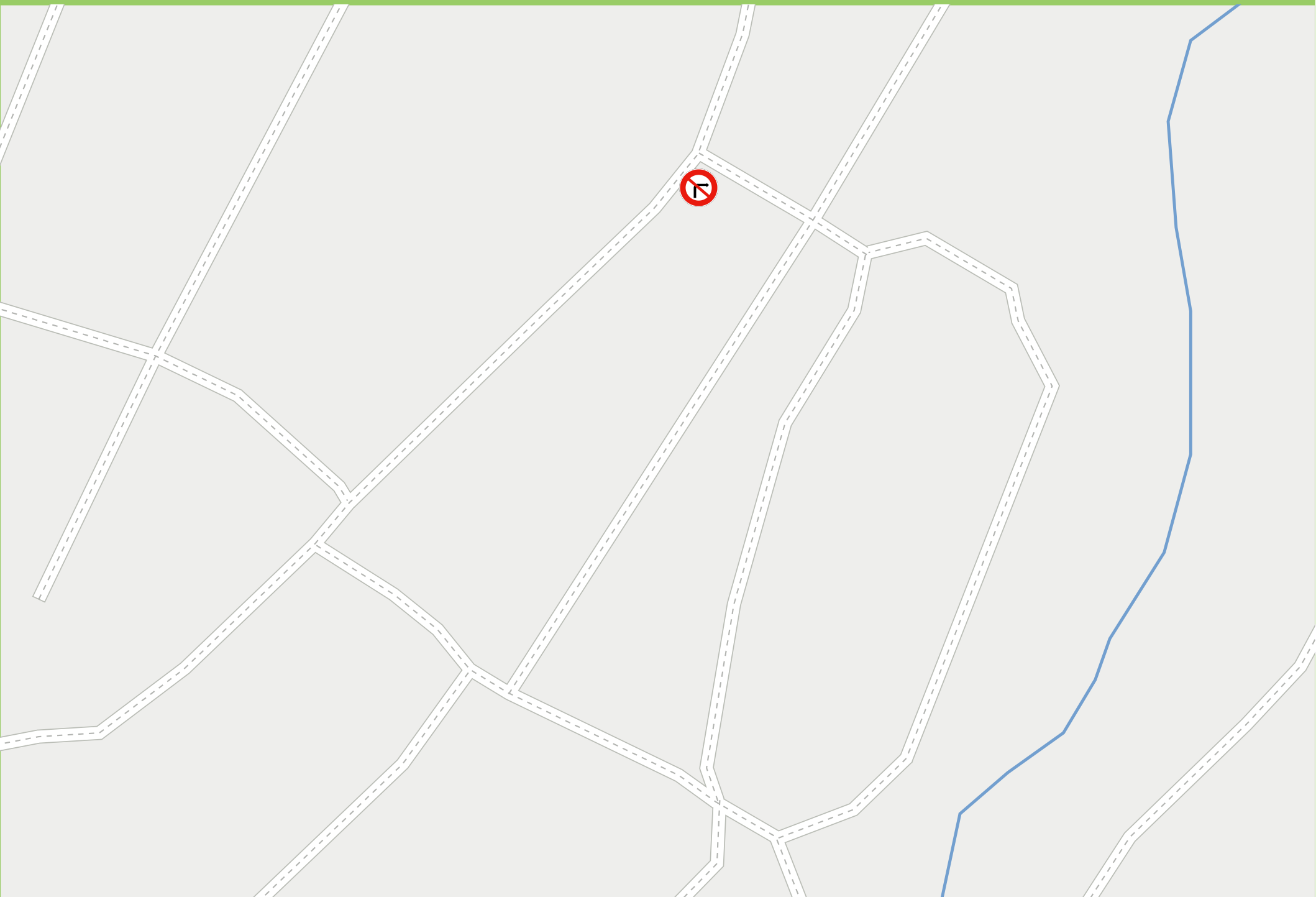
2. topology

1 load ***map*** data

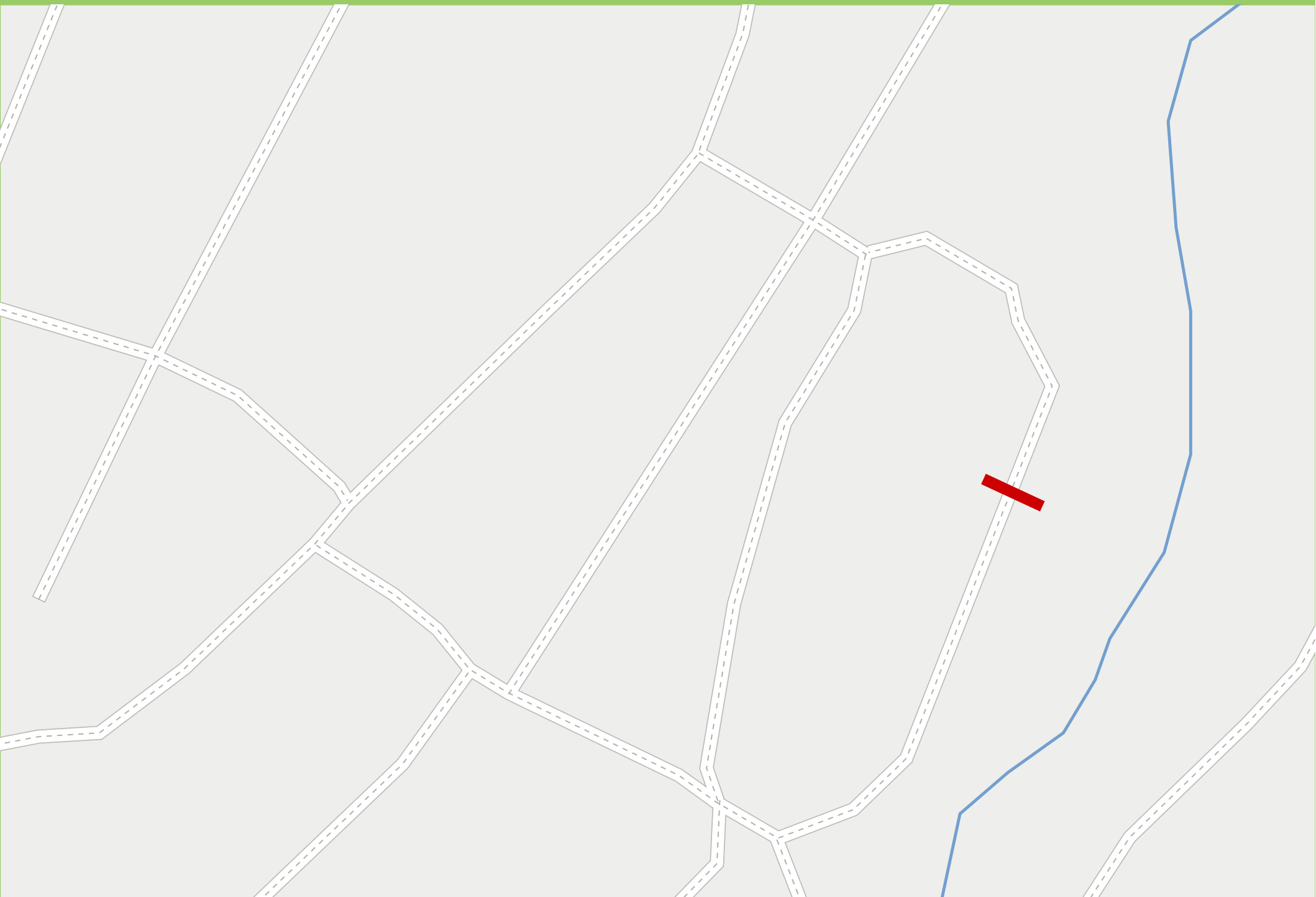
2 build *topology*

3 apply *restrictions*

3. restrictions



3. restrictions



3. restrictions

3. restrictions (directed graph)

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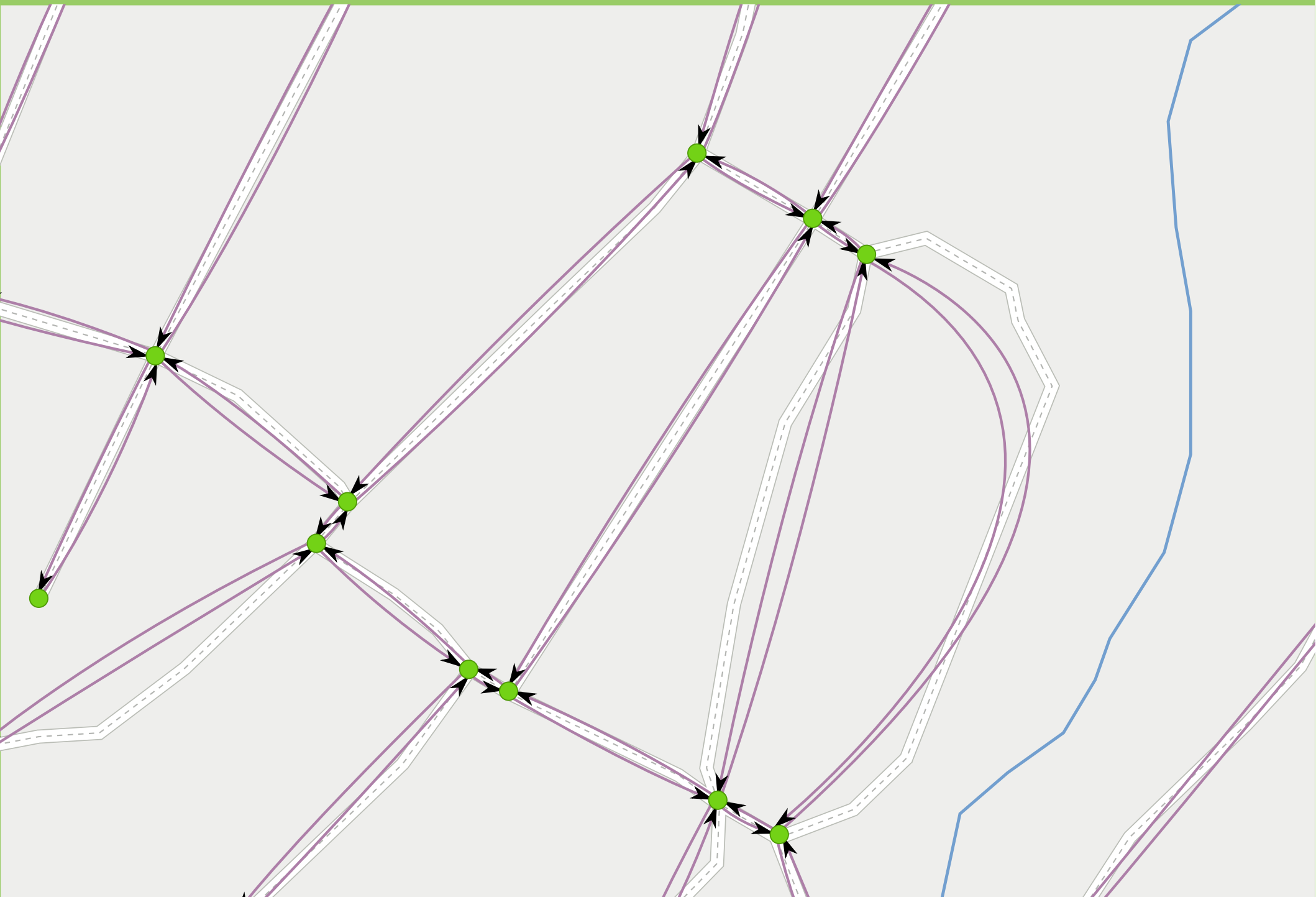
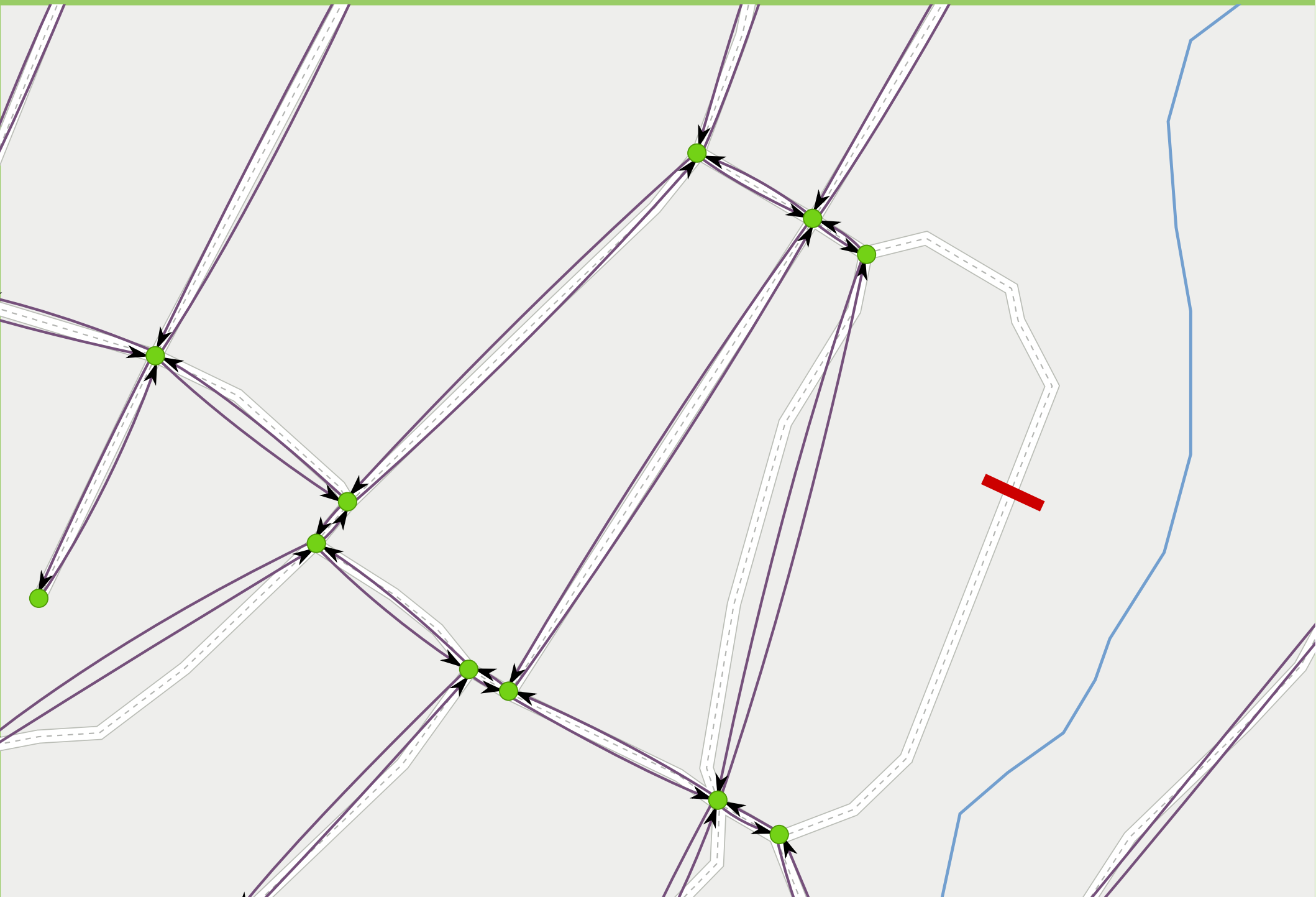
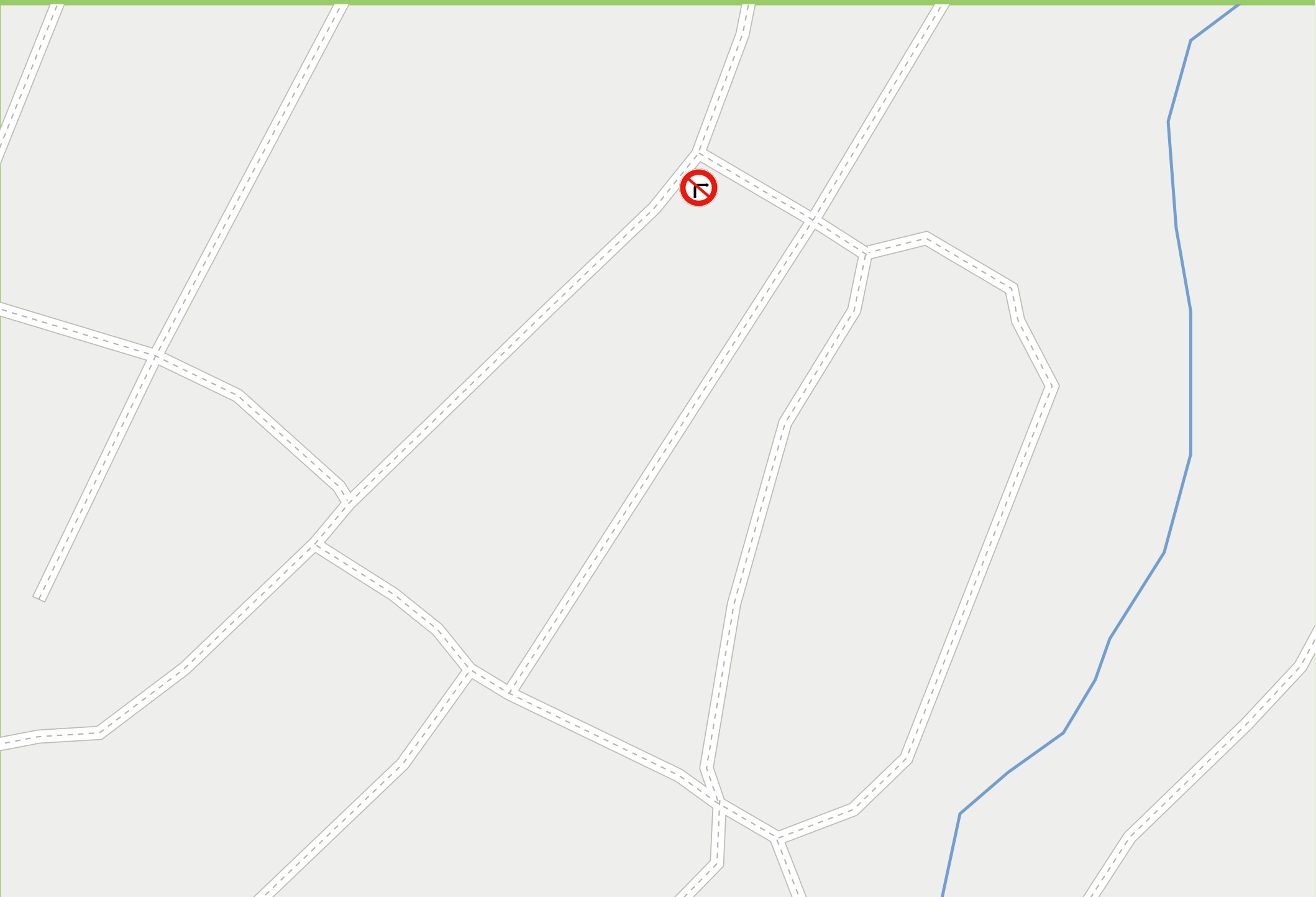


3. restrictions

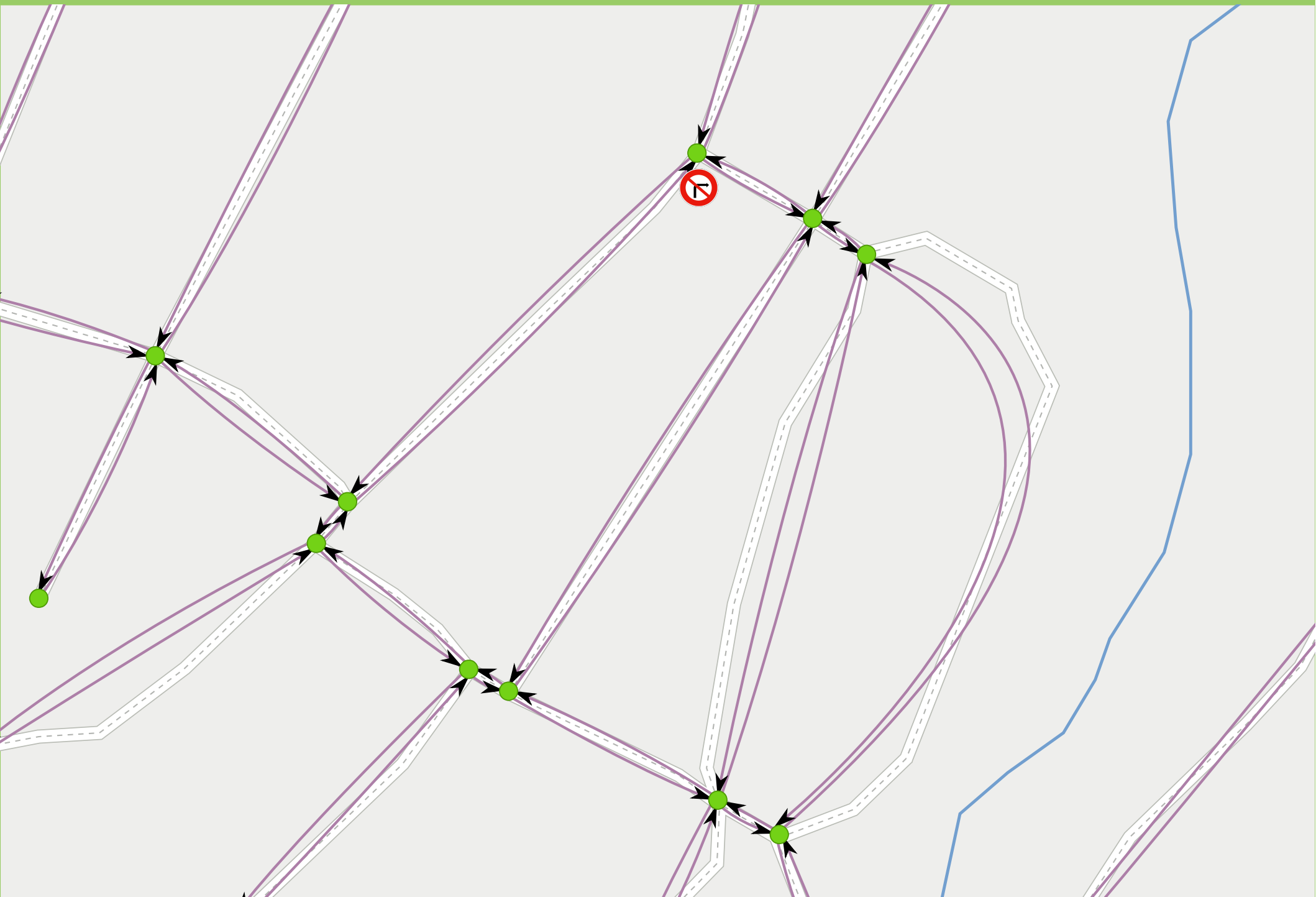
3. restrictions



3. restrictions



3. restrictions



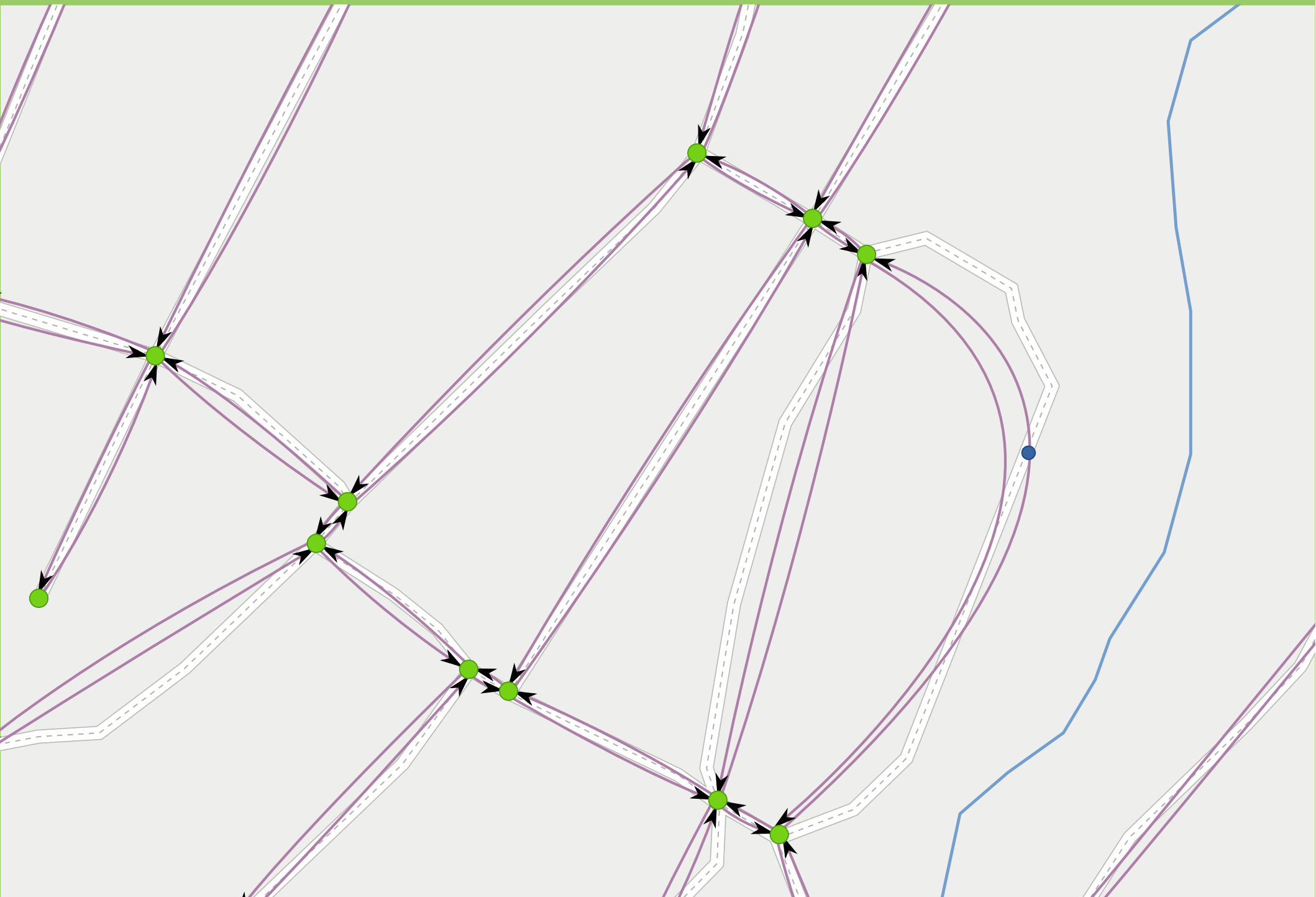
1 load ***map*** data

2 build *topology*

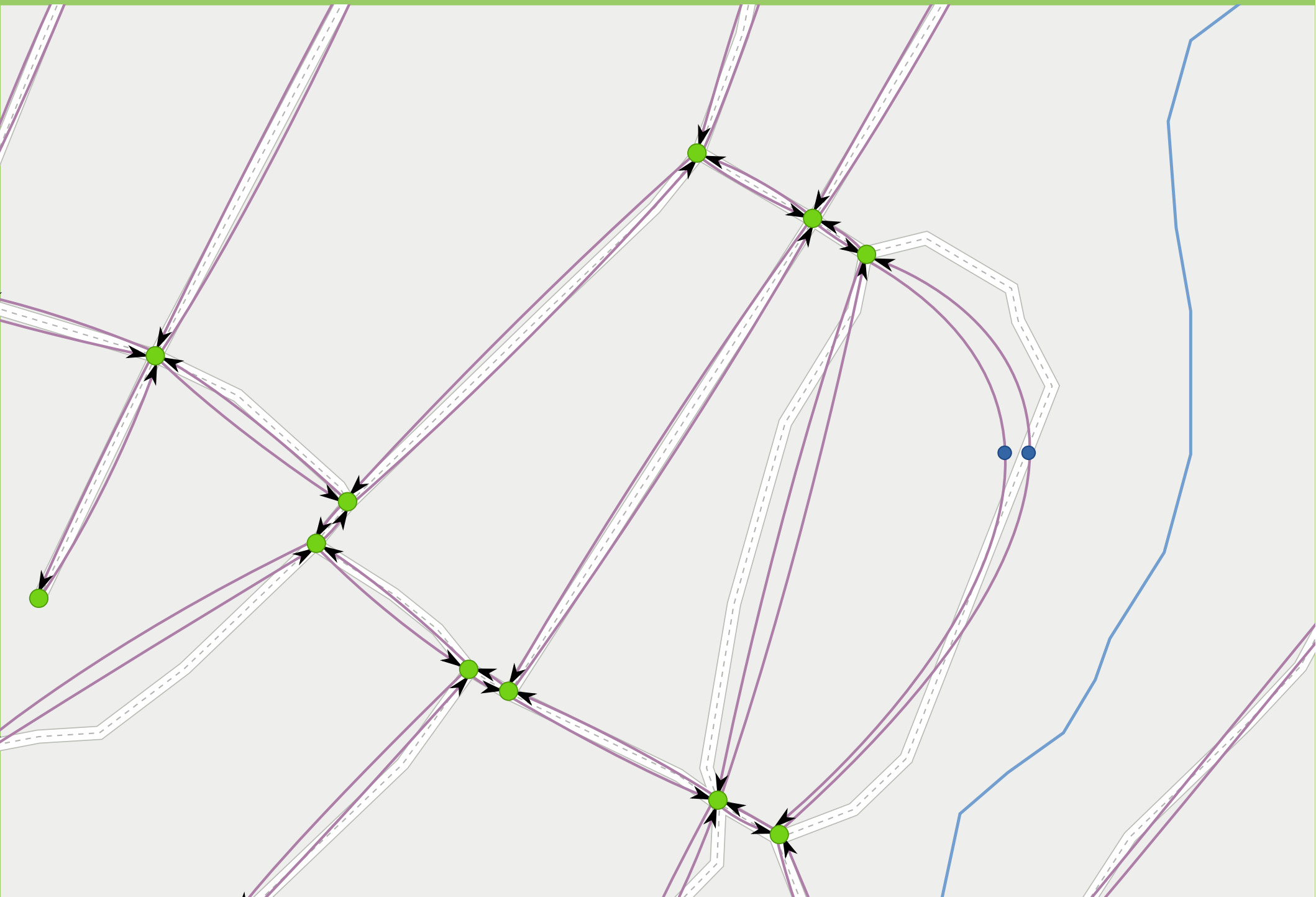
3 apply *restrictions*

4 build ***line graph***

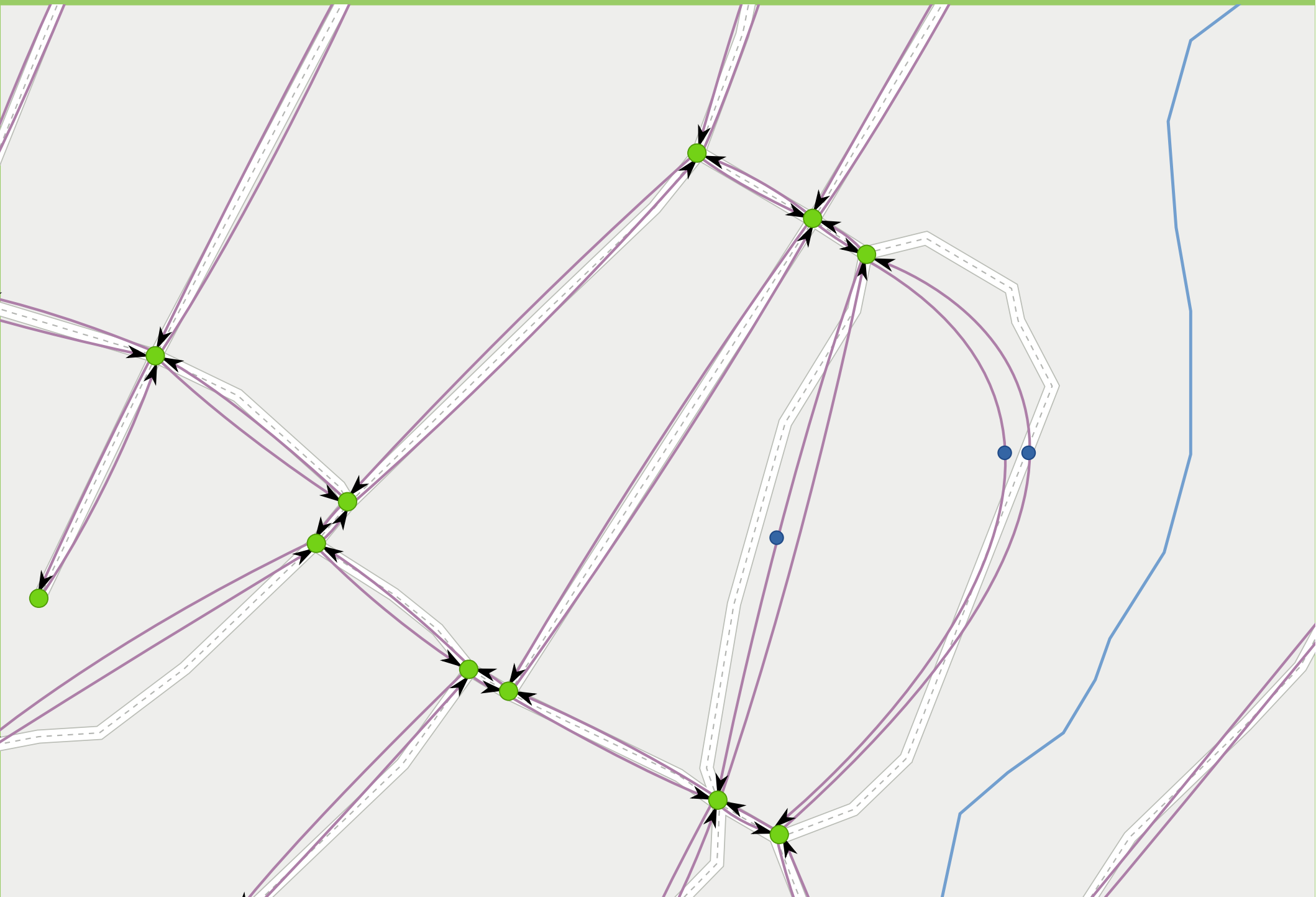
4. line graph



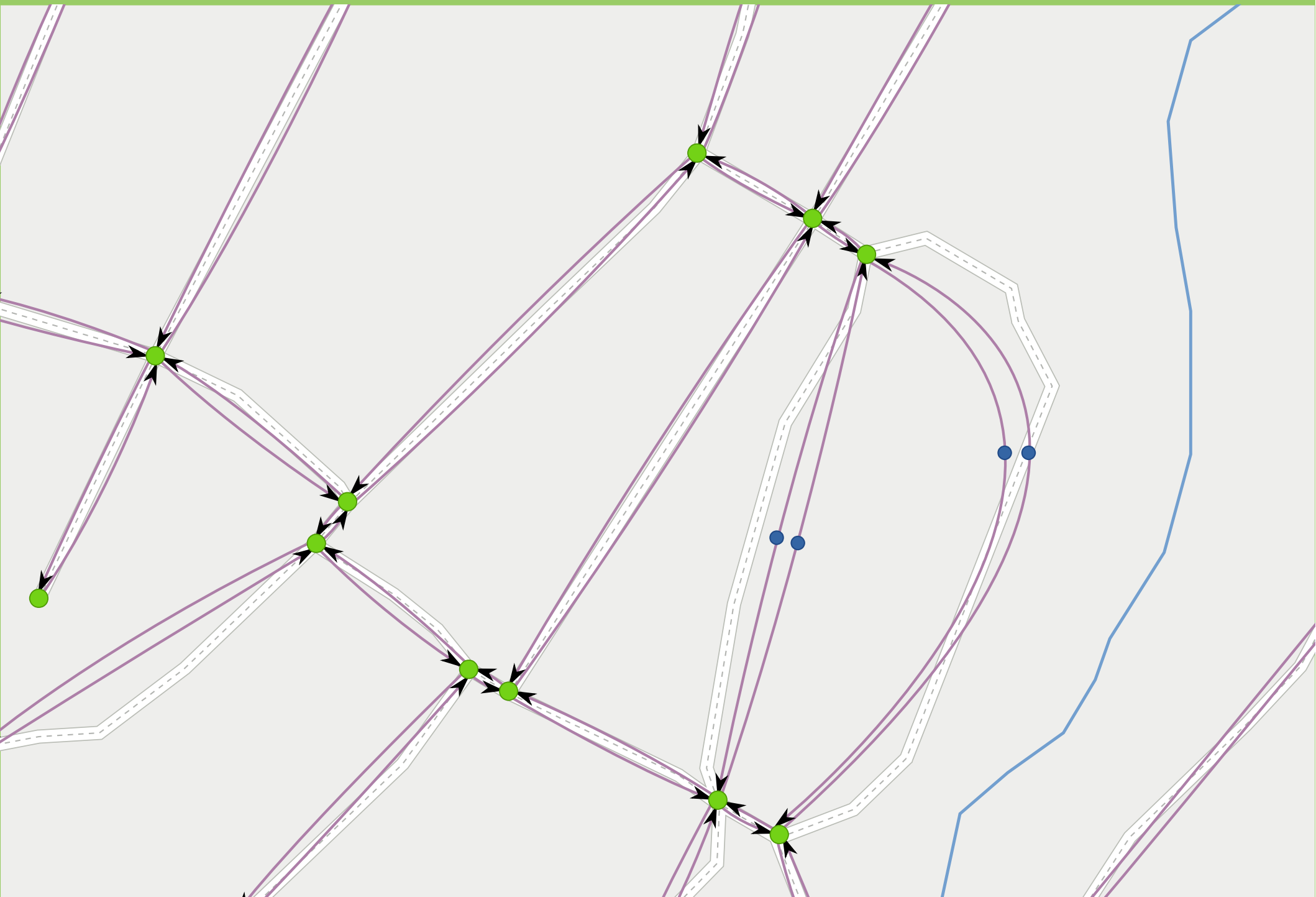
4. line graph



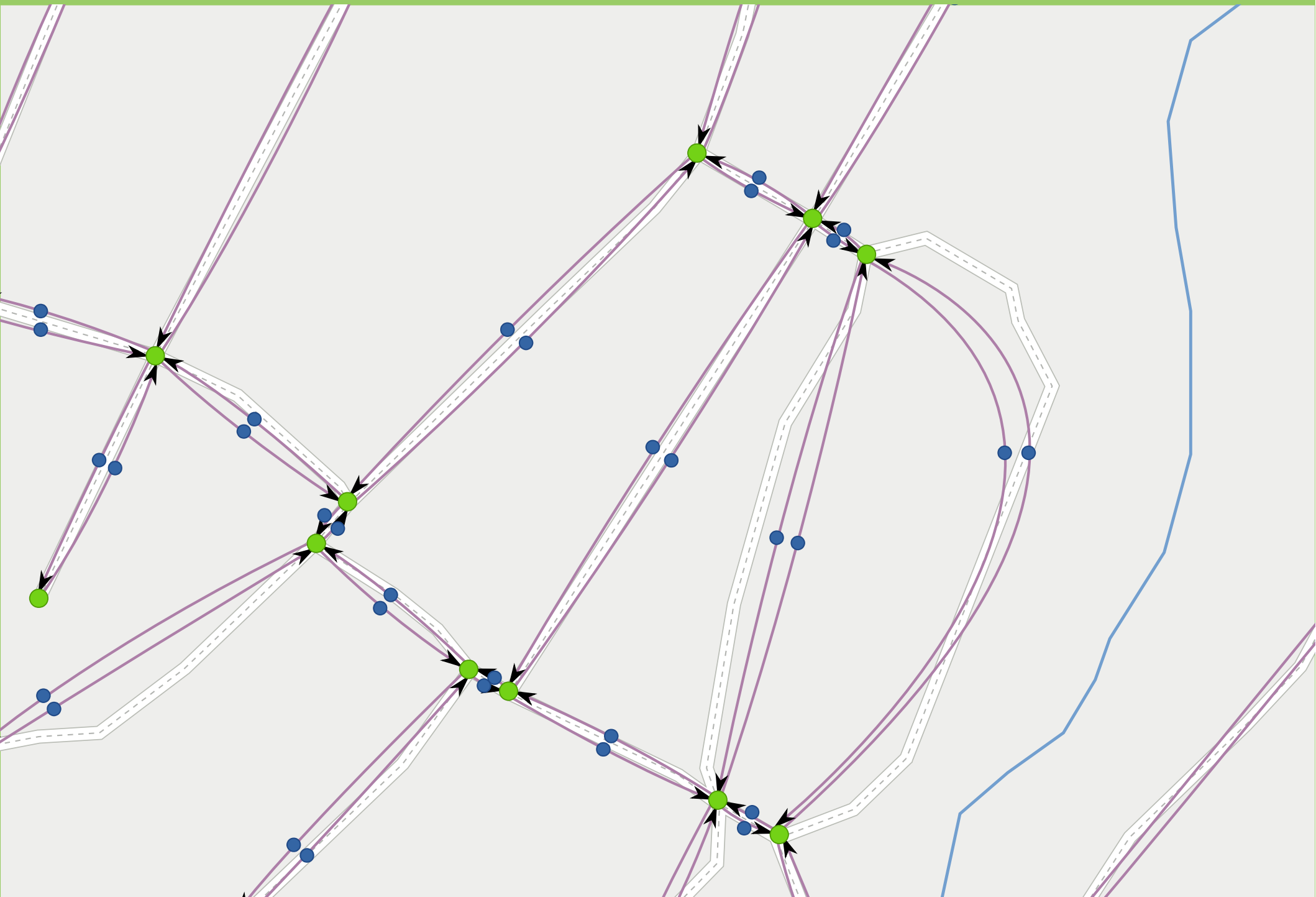
4. line graph



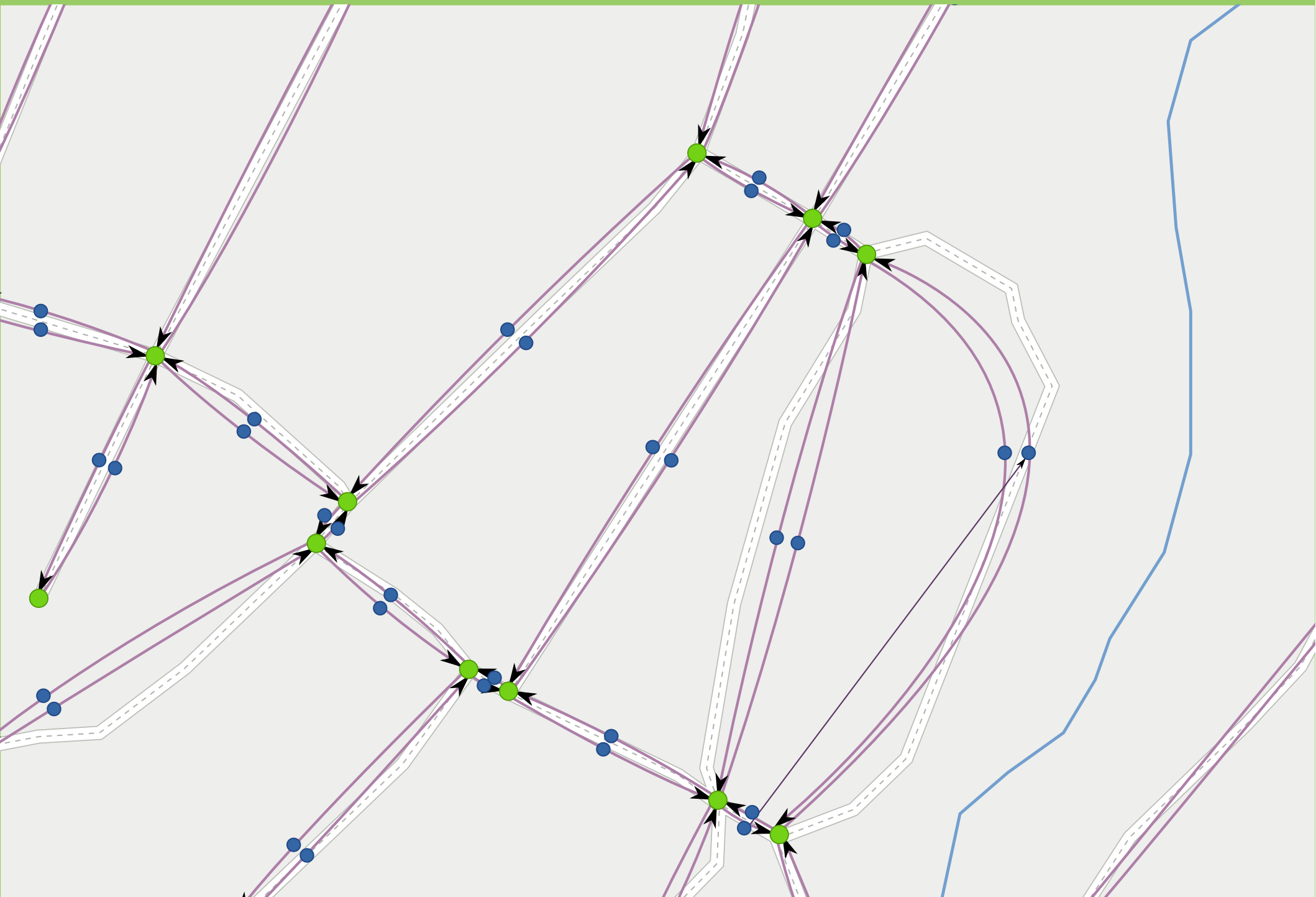
4. line graph



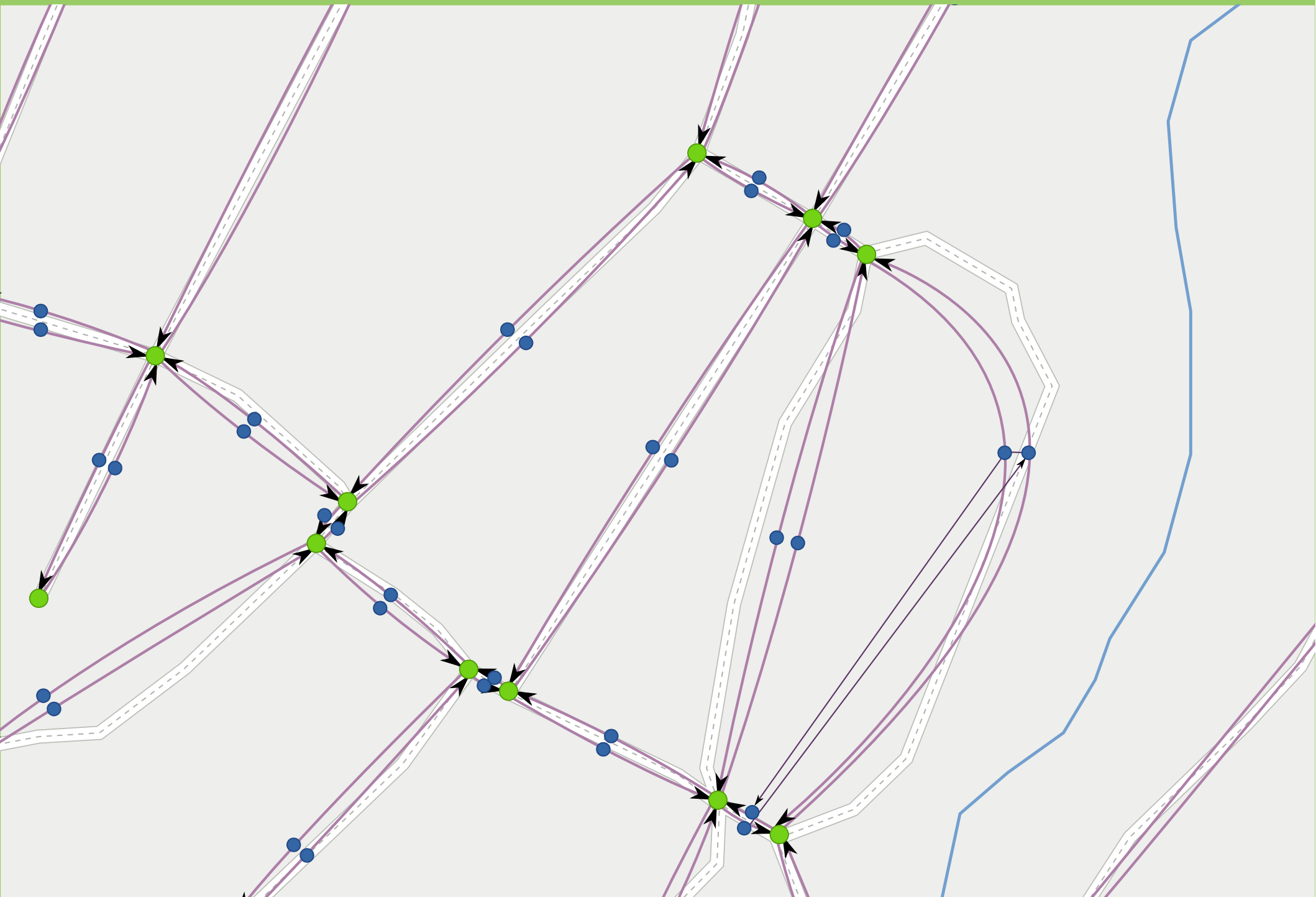
4. line graph



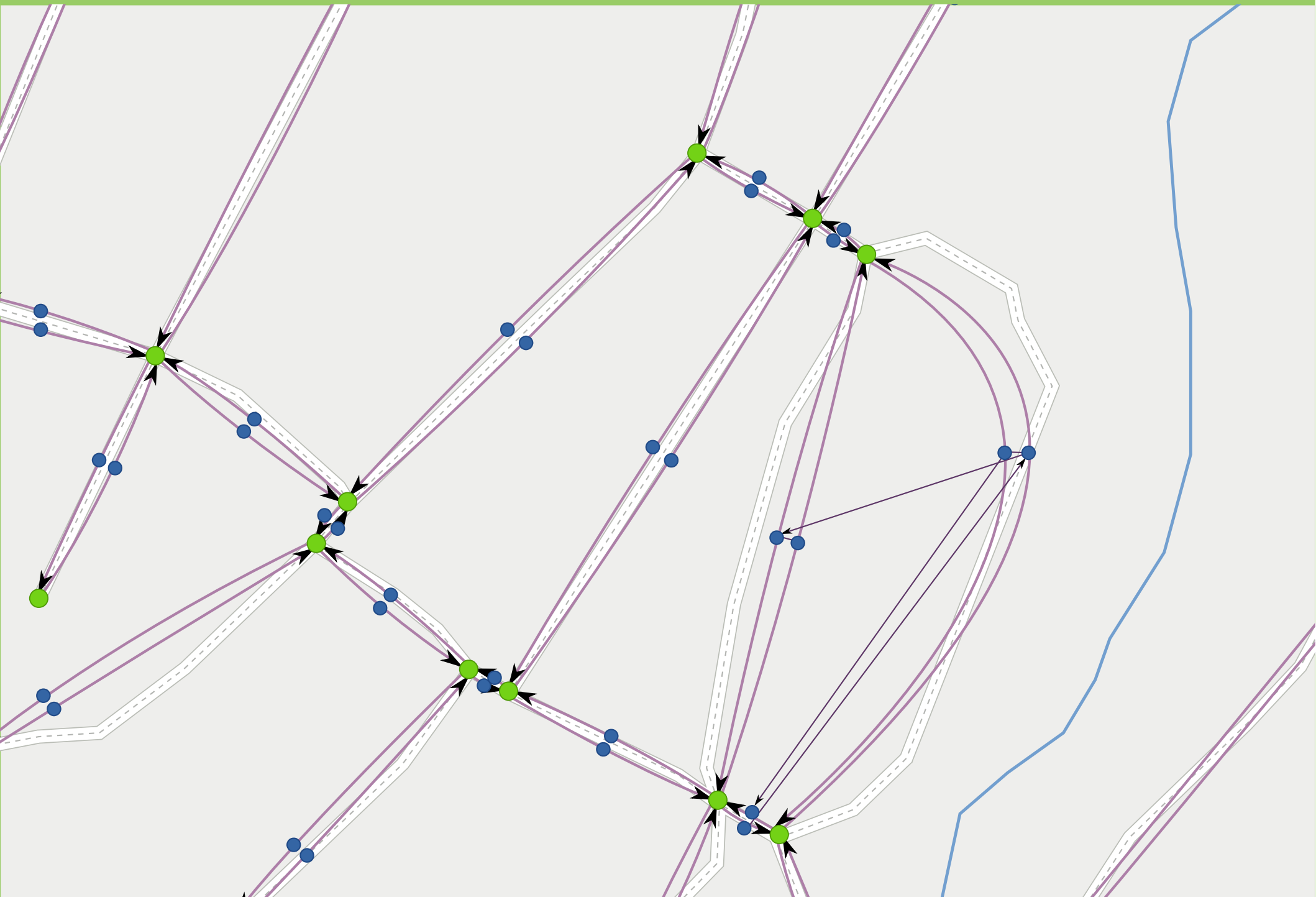
4. line graph



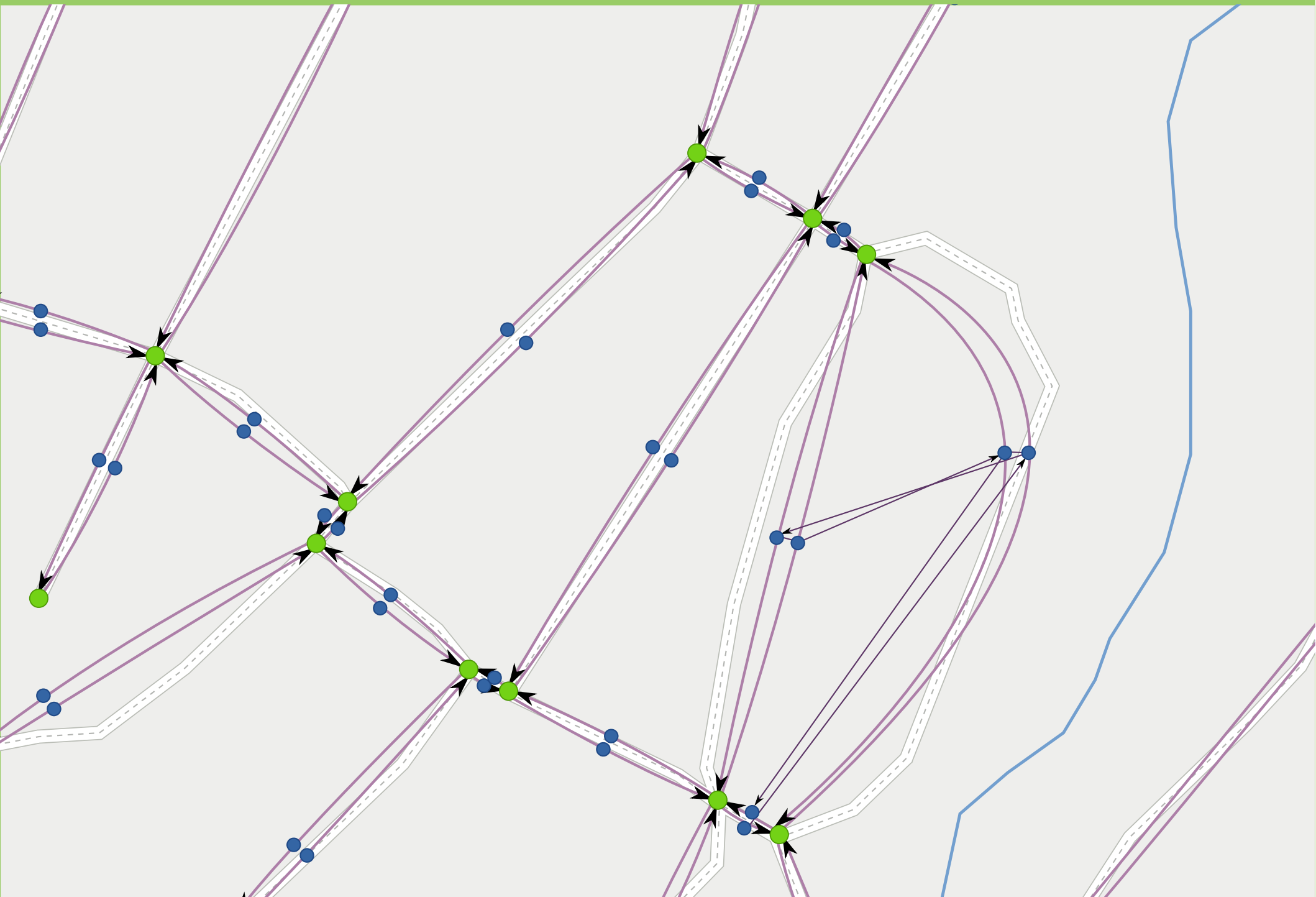
4. line graph



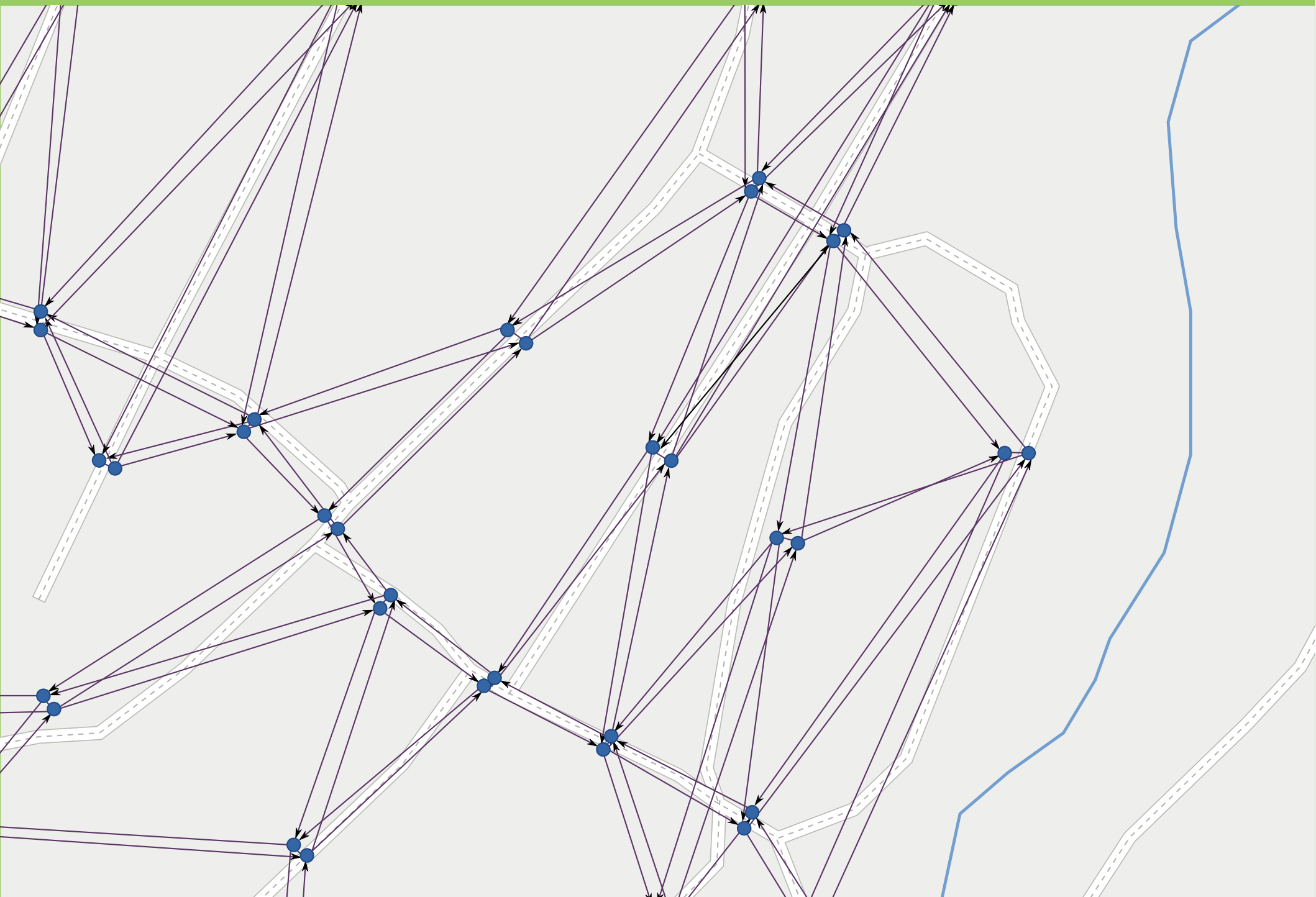
4. line graph



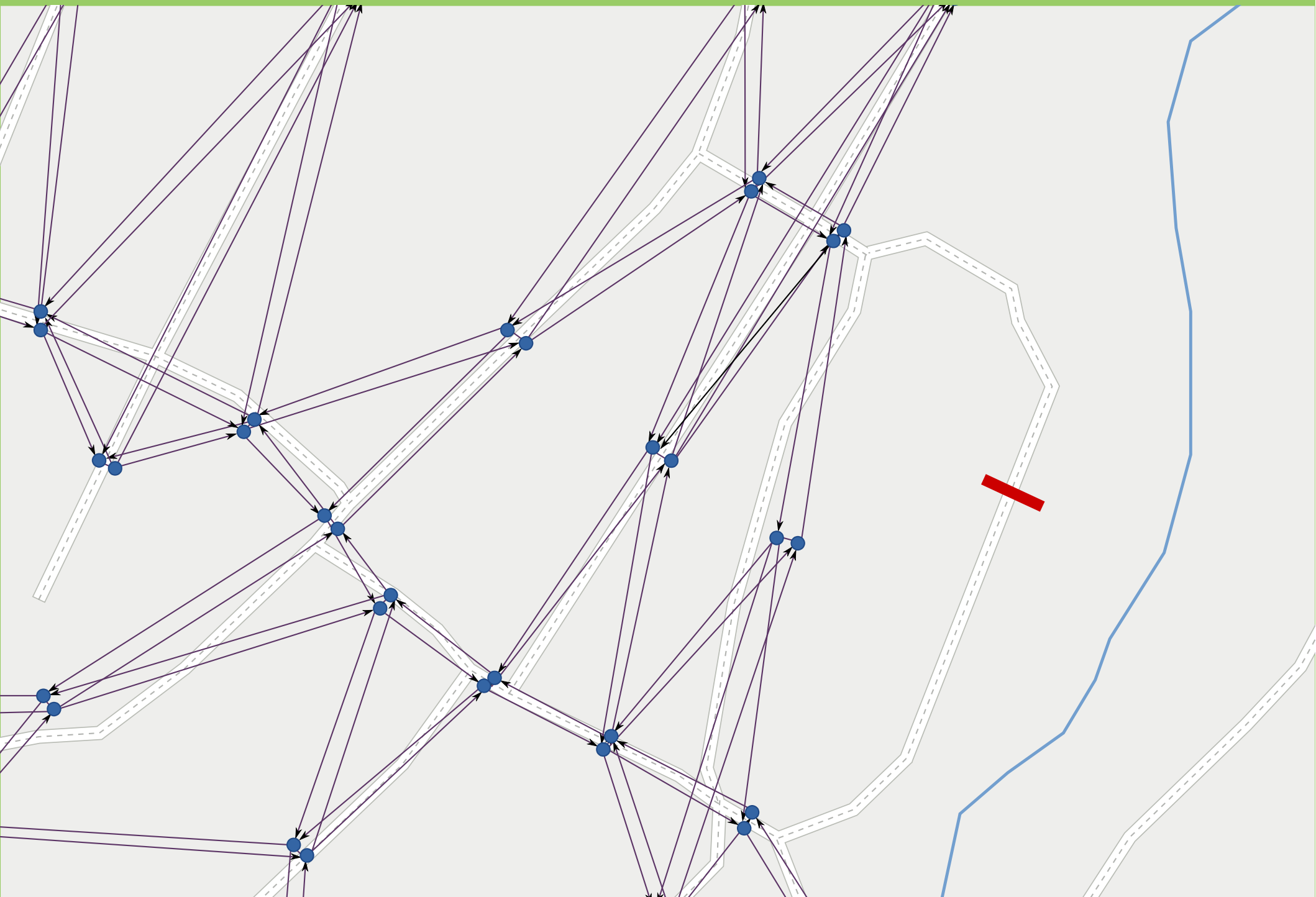
4. line graph



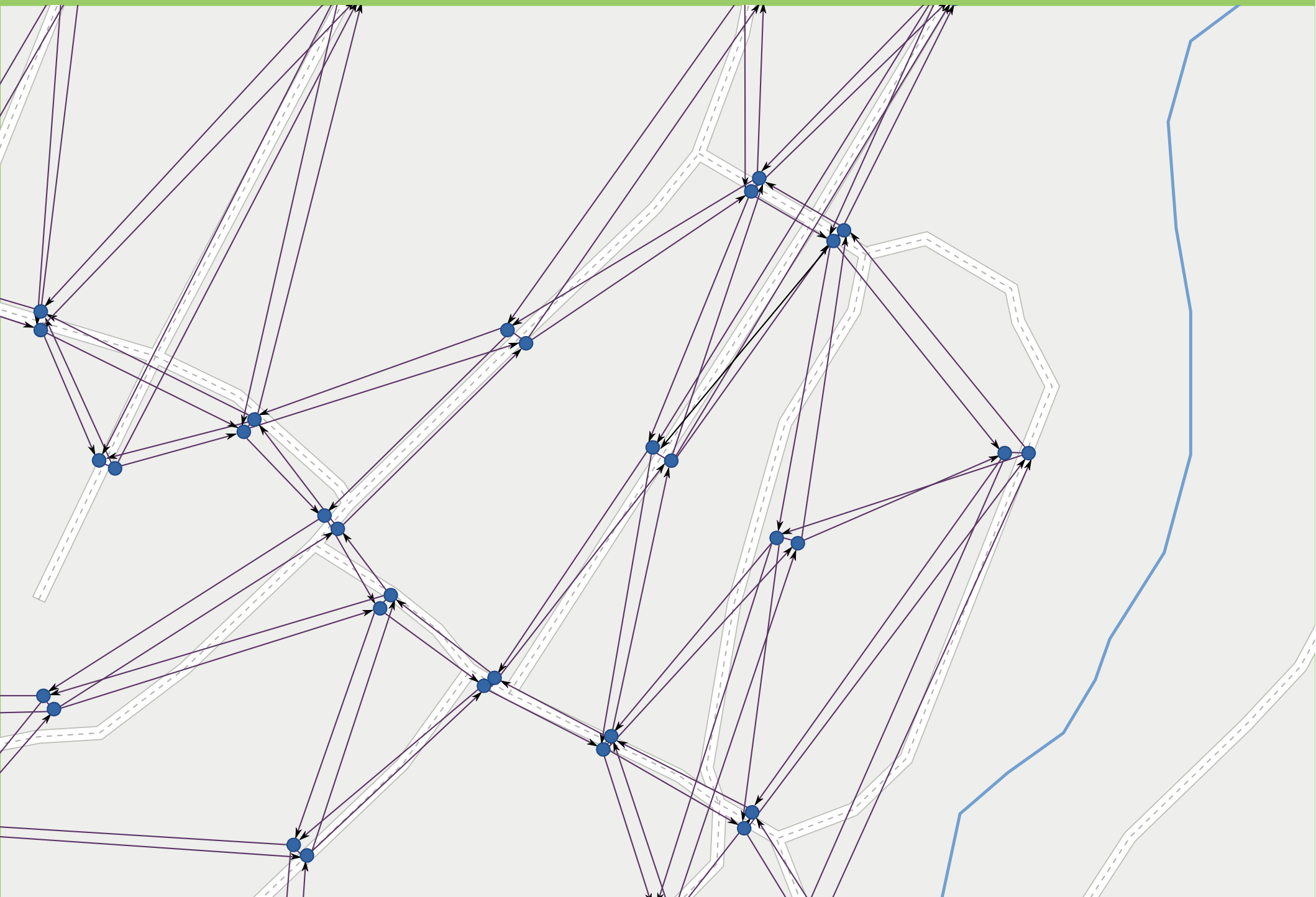
4. line graph



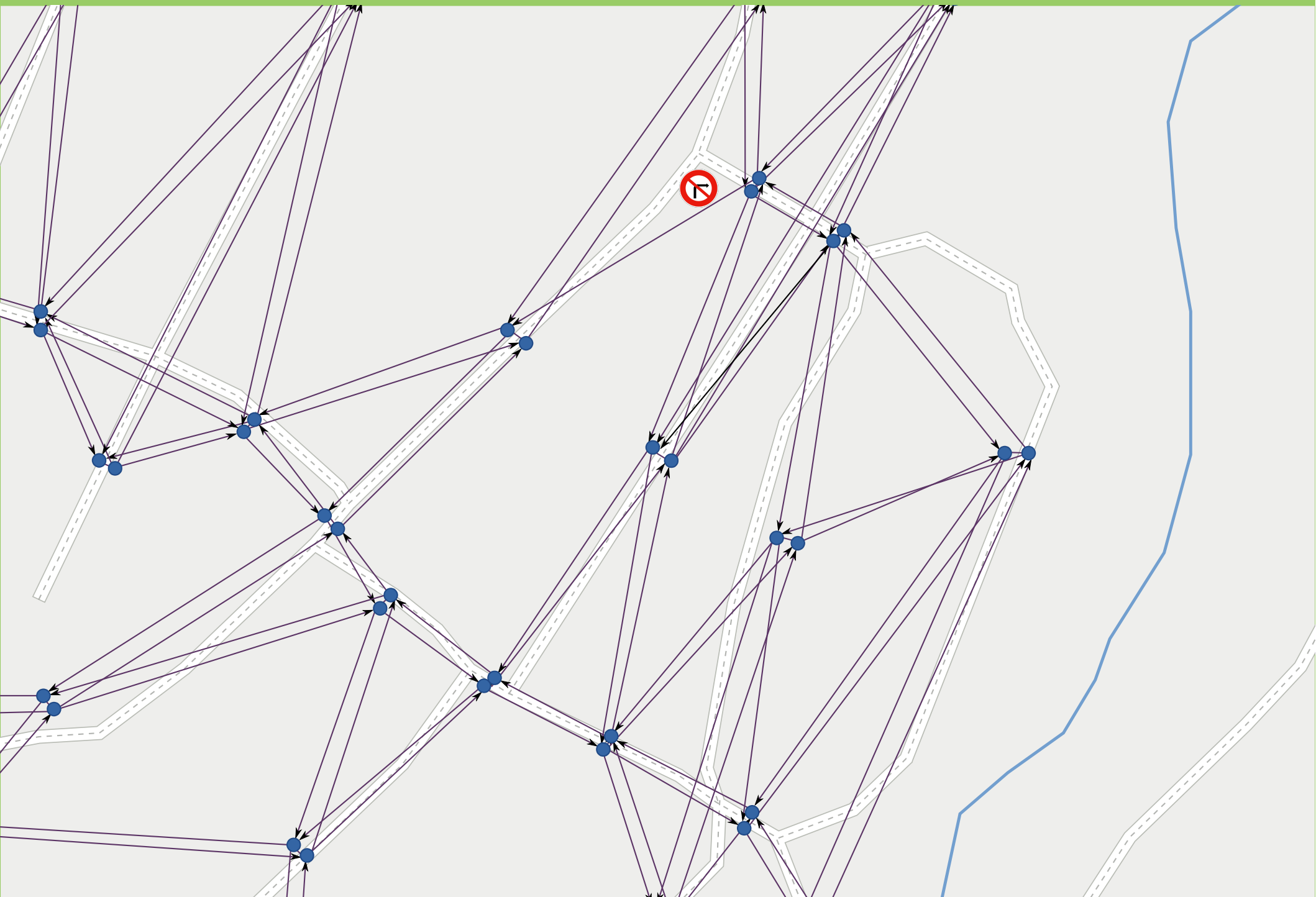
4. line graph

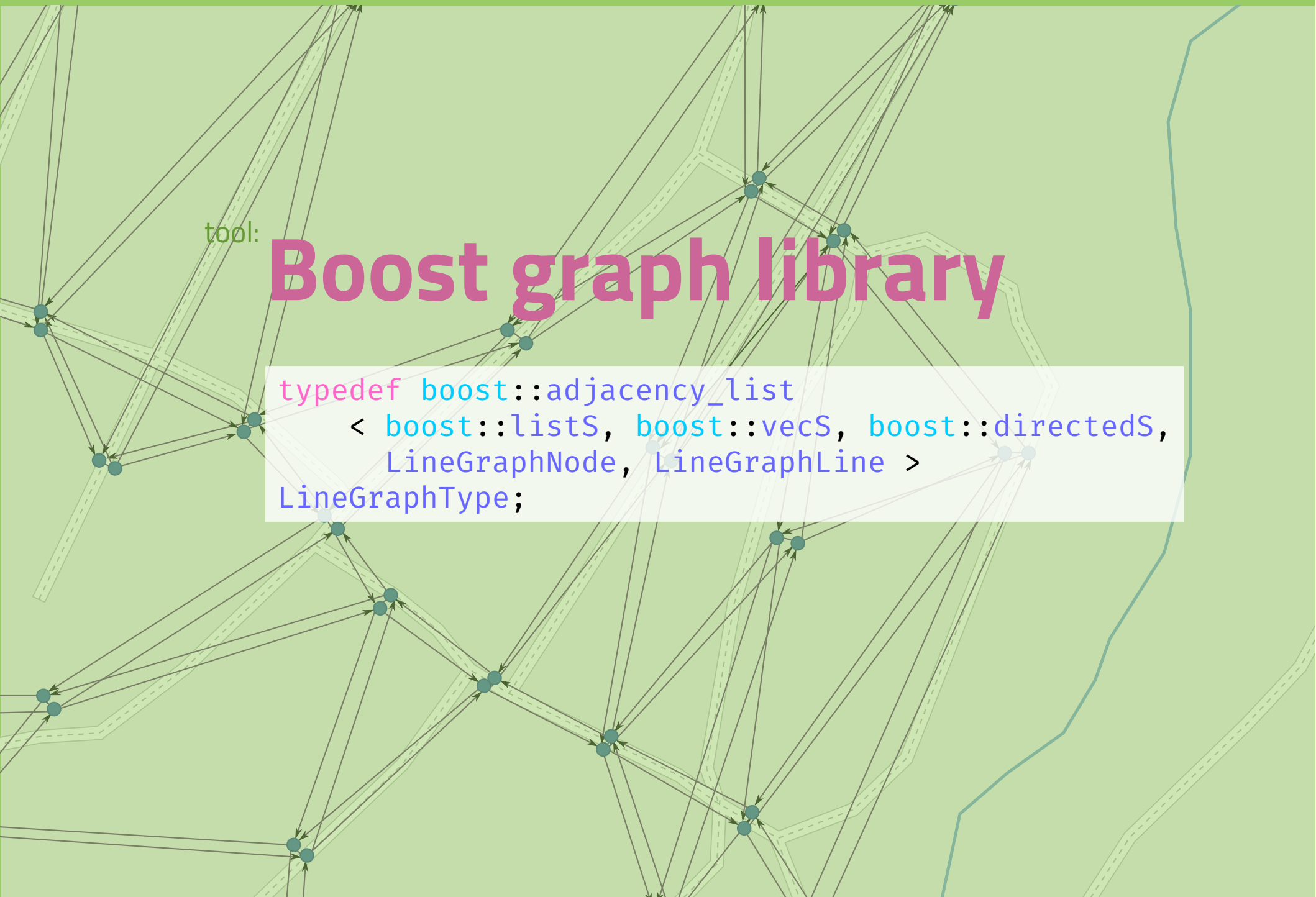


4. line graph



4. line graph





tool:

Boost graph library

```
typedef boost::adjacency_list
    < boost::listS, boost::vecS, boost::directedS,
      LineGraphNode, LineGraphLine >
LineGraphType;
```

remarks

preliminary

preliminary

load ***map*** data

preliminary

load ***map*** data

build *topology*

preliminary

load ***map*** data

build *topology*

on demand


preliminary
load map data
build topology
on demand
apply restrictions


preliminary
load map data
build topology
on demand
apply restrictions
build line graph

configurable

configurable

json file

for *settings*

configurable

json file

for *settings*

database

configurable

json file for *settings*

database, vehicle properties

configurable

json file for *settings*

database, vehicle properties,

road speeds

configurable

json file for *settings*

database, vehicle properties,

road speeds, surfaces

configurable

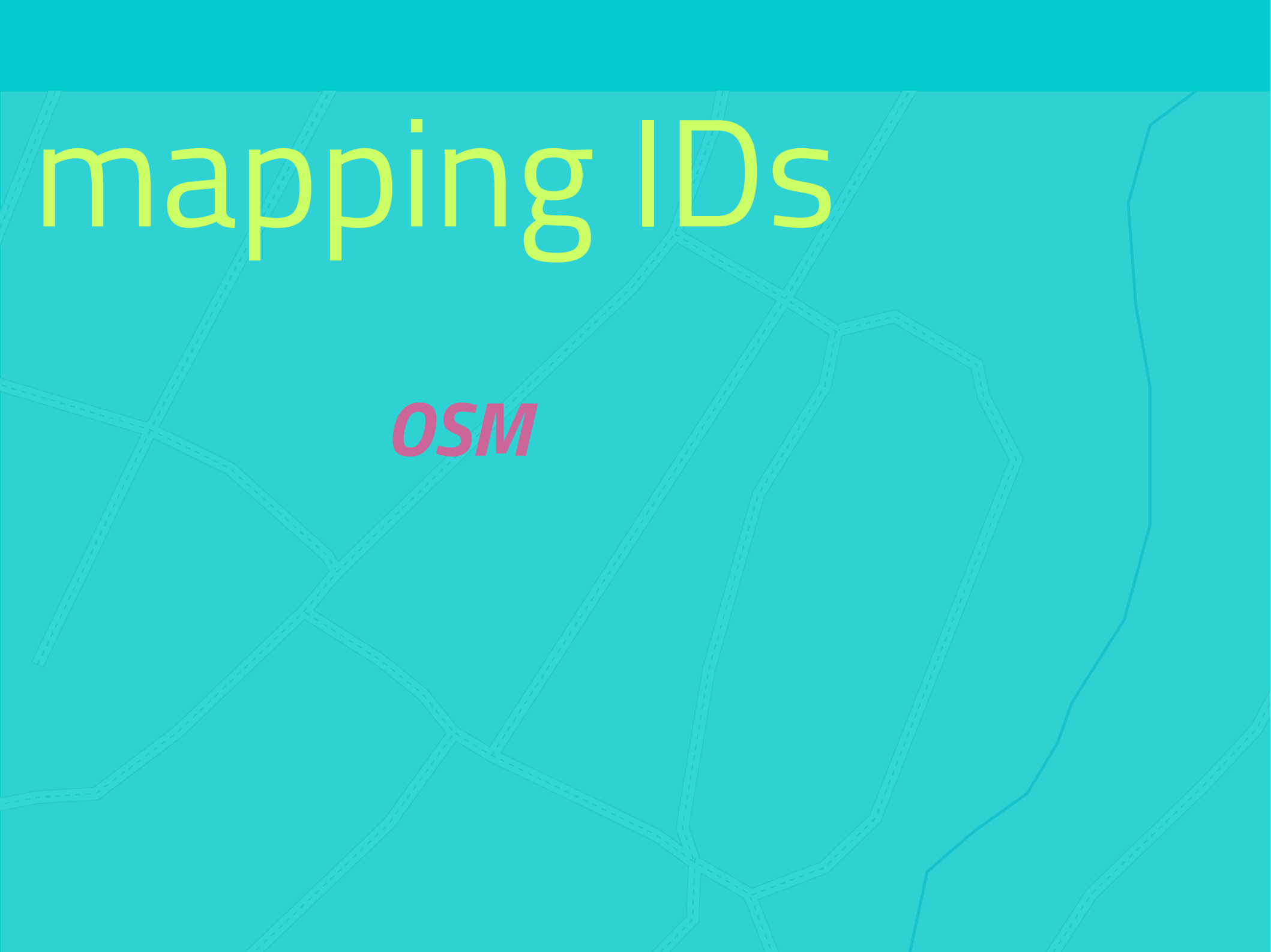
json file for *settings*

database, vehicle properties,

road speeds, surfaces,

restrictions and costs, ...

mapping IDs

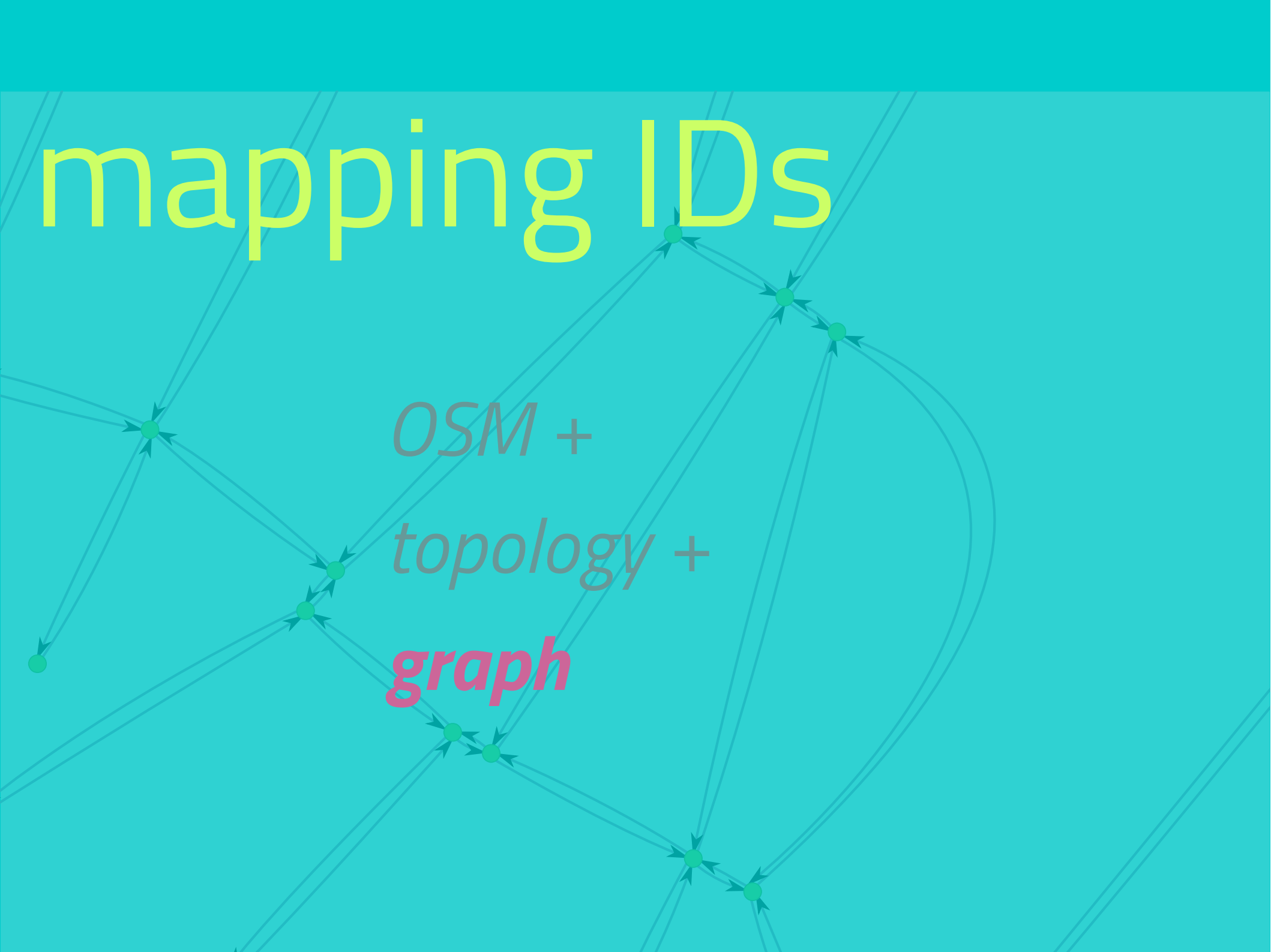


mapping IDs

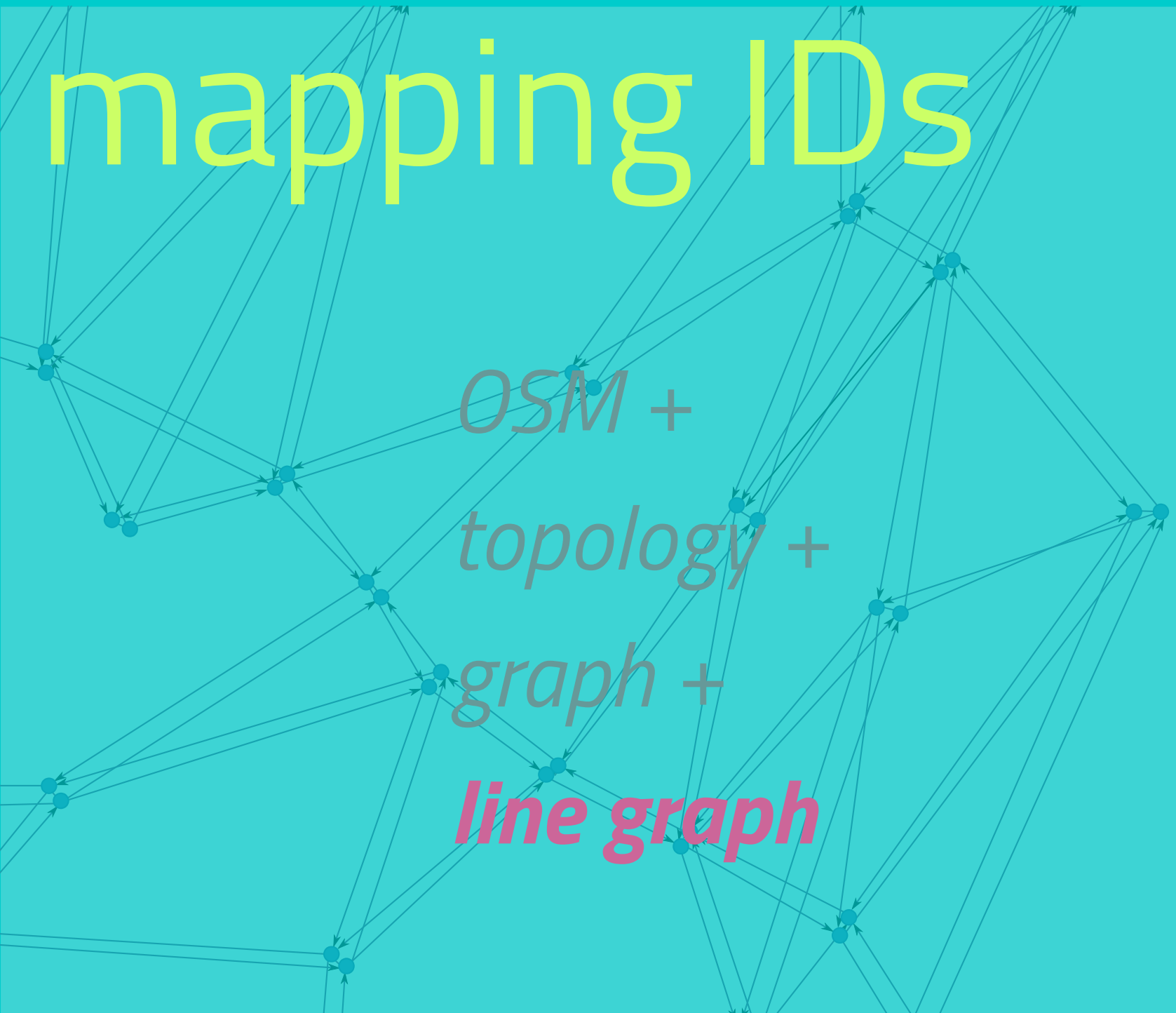
OSM +

topology

mapping IDs



mapping IDs



OSM +

topology +

graph +

line graph

restrictions

Values:

yes

restrictions

Values:

yes,

no

restrictions

Values:

yes, no,

permissive

restrictions

Values:

yes, no, permissive,

designated

restrictions

Values:

yes, no, permissive, designated,

private

restrictions

Values:

yes, no, permissive, designated, private,

discouraged

restrictions

Values:

yes, no, permissive, designated, private, discouraged,

delivery

restrictions

Values:

yes, no, permissive, designated, private, discouraged, delivery,

customers ...

restrictions

`values:`

yes, no, permissive, designated, private, discouraged, delivery, customers ...

`routing:`

one-way (explicit / implicit), lanes ...

restrictions

`values:`

yes, no, permissive, designated, private, discouraged, delivery, customers ...

`routing:`

one-way (explicit / implicit), lanes ...

`transportation mode:`

all

restrictions

`values:`

yes, no, permissive, designated, private, discouraged, delivery, customers ...

`routing:`

one-way (explicit / implicit), lanes ...

`transportation mode:`

all,

foot

restrictions

`values:`

yes, no, permissive, designated, private, discouraged, delivery, customers ...

`routing:`

one-way (explicit / implicit), lanes ...

`transportation mode:`

all, foot,

vehicle

restrictions

`values:`

yes, no, permissive, designated, private, discouraged, delivery, customers ...

`routing:`

one-way (explicit / implicit), lanes ...

`transportation mode:`

all, foot, vehicle,

bicycle

restrictions

`values:`

yes, no, permissive, designated, private, discouraged, delivery, customers ...

`routing:`

one-way (explicit / implicit), lanes ...

`transportation mode:`

all, foot, vehicle, bicycle,

motor_vehicle

restrictions

`values:`

yes, no, permissive, designated, private, discouraged, delivery, customers ...

`routing:`

one-way (explicit / implicit), lanes ...

`transportation mode:`

all, foot, vehicle, bicycle, motor_vehicle,

motorcycle

restrictions

`values:`

yes, no, permissive, designated, private, discouraged, delivery, customers ...

`routing:`

one-way (explicit / implicit), lanes ...

`transportation mode:`

all, foot, vehicle, bicycle, motor_vehicle, motorcycle,

motorcar

restrictions

`values:`

yes, no, permissive, designated, private, discouraged, delivery, customers ...

`routing:`

one-way (explicit / implicit), lanes ...

`transportation mode:`

all, foot, vehicle, bicycle, motor_vehicle, motorcycle, motorcar,

goods

restrictions

`values:`

yes, no, permissive, designated, private, discouraged, delivery, customers ...

`routing:`

one-way (explicit / implicit), lanes ...

`transportation mode:`

all, foot, vehicle, bicycle, motor_vehicle, motorcycle, motorcar, goods,

hgv

restrictions

values:

yes, no, permissive, designated, private, discouraged, delivery, customers ...

routing:

one-way (explicit / implicit), lanes ...

transportation mode:

all, foot, vehicle, bicycle, motor_vehicle, motorcycle, motorcar, goods, hgv ...

by use:

psv

restrictions

`values:`

yes, no, permissive, designated, private, discouraged, delivery, customers ...

`routing:`

one-way (explicit / implicit), lanes ...

`transportation mode:`

all, foot, vehicle, bicycle, motor_vehicle, motorcycle, motorcar, goods, hgv ...

`by use:`

psv,

car_sharing

restrictions

values:

yes, no, permissive, designated, private, discouraged, delivery, customers ...

routing:

one-way (explicit / implicit), lanes ...

transportation mode:

all, foot, vehicle, bicycle, motor_vehicle, motorcycle, motorcar, goods, hgv ...

by use:

psv, car_sharing,

emergency

restrictions

values:

yes, no, permissive, designated, private, discouraged, delivery, customers ...

routing:

one-way (explicit / implicit), lanes ...

transportation mode:

all, foot, vehicle, bicycle, motor_vehicle, motorcycle, motorcar, goods, hgv ...

by use:

psv, car_sharing, emergency,

hazmat

restrictions

values:

yes, no, permissive, designated, private, discouraged, delivery, customers ...

routing:

one-way (explicit / implicit), lanes ...

transportation mode:

all, foot, vehicle, bicycle, motor_vehicle, motorcycle, motorcar, goods, hgv ...

by use:

psv, car_sharing, emergency, hazmat,

disabled

restrictions

values:

yes, no, permissive, designated, private, discouraged, delivery, customers ...

routing:

one-way (explicit / implicit), lanes ...

transportation mode:

all, foot, vehicle, bicycle, motor_vehicle, motorcycle, motorcar, goods, hgv ...

by use:

psv, car_sharing, emergency, hazmat, disabled ...

restrictions

`values:`

yes, no, permissive, designated, private, discouraged, delivery, customers ...

`routing:`

one-way (explicit / implicit), lanes ...

`transportation mode:`

all, foot, vehicle, bicycle, motor_vehicle, motorcycle, motorcar, goods, hgv ...

`by use:`

psv, car_sharing, emergency, hazmat, disabled ...

`dimensions:`

max height, weight, width ...

conditional restrictions

conditional restrictions

Photo (cropped): Achadwick. ©CC-SA 2.0
http://wiki.openstreetmap.org/wiki/File:UK_motor_restriction_sign_with_exceptions.jpg

```
motor_vehicle=no
motor_vehicle:conditional=yes @ (18:30-07:30)
psv=yes
```

conditional restrictions

```
maxspeed=none
maxspeed:conditional=
  120 @ (06:00-20:00);
  100 @ (22:00-06:00)
```

turning restrictions

Relation:

turning
restrictions

Relation:

from

turning restrictions

Relation:

from → ***via***

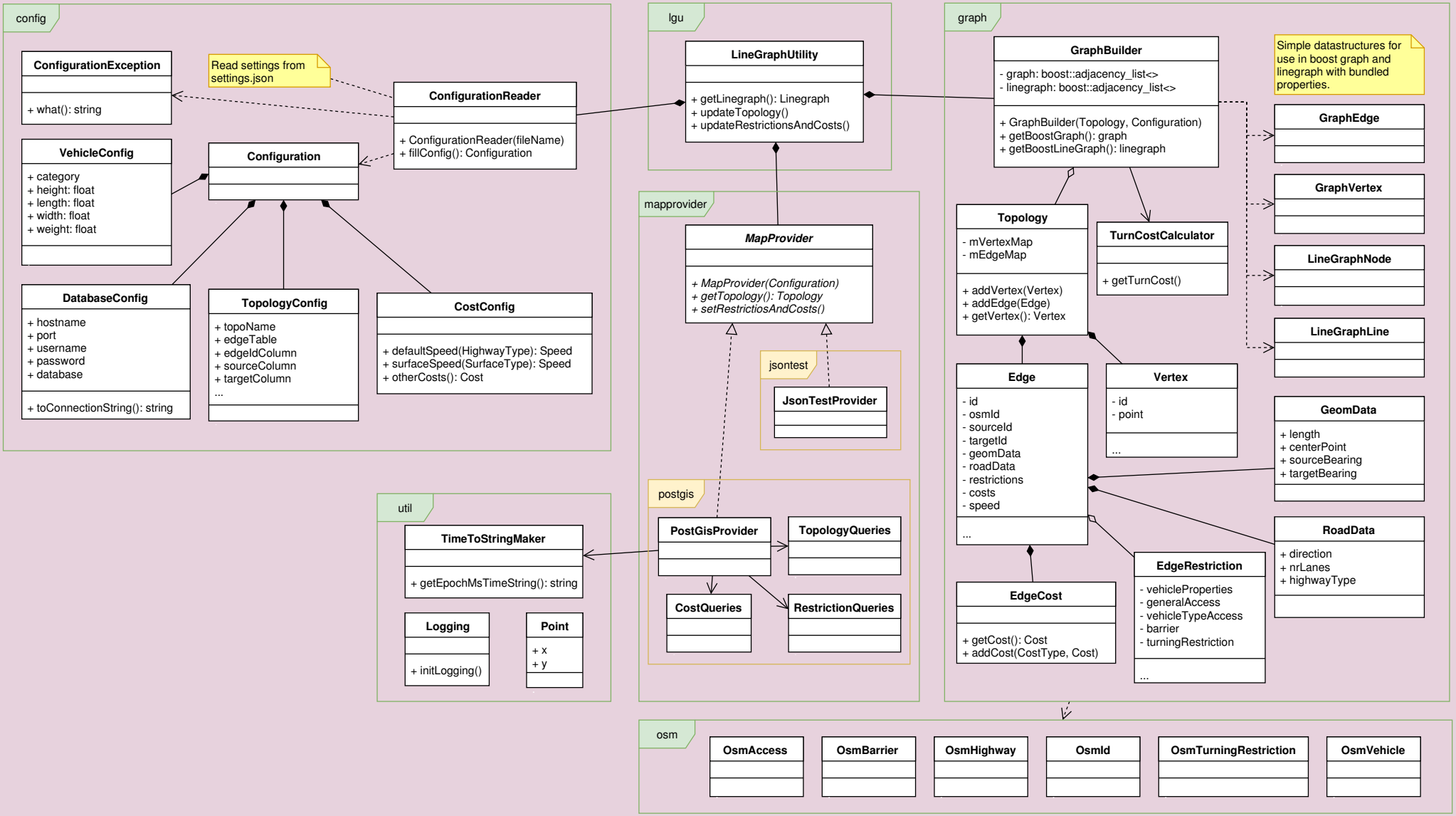
turning restrictions

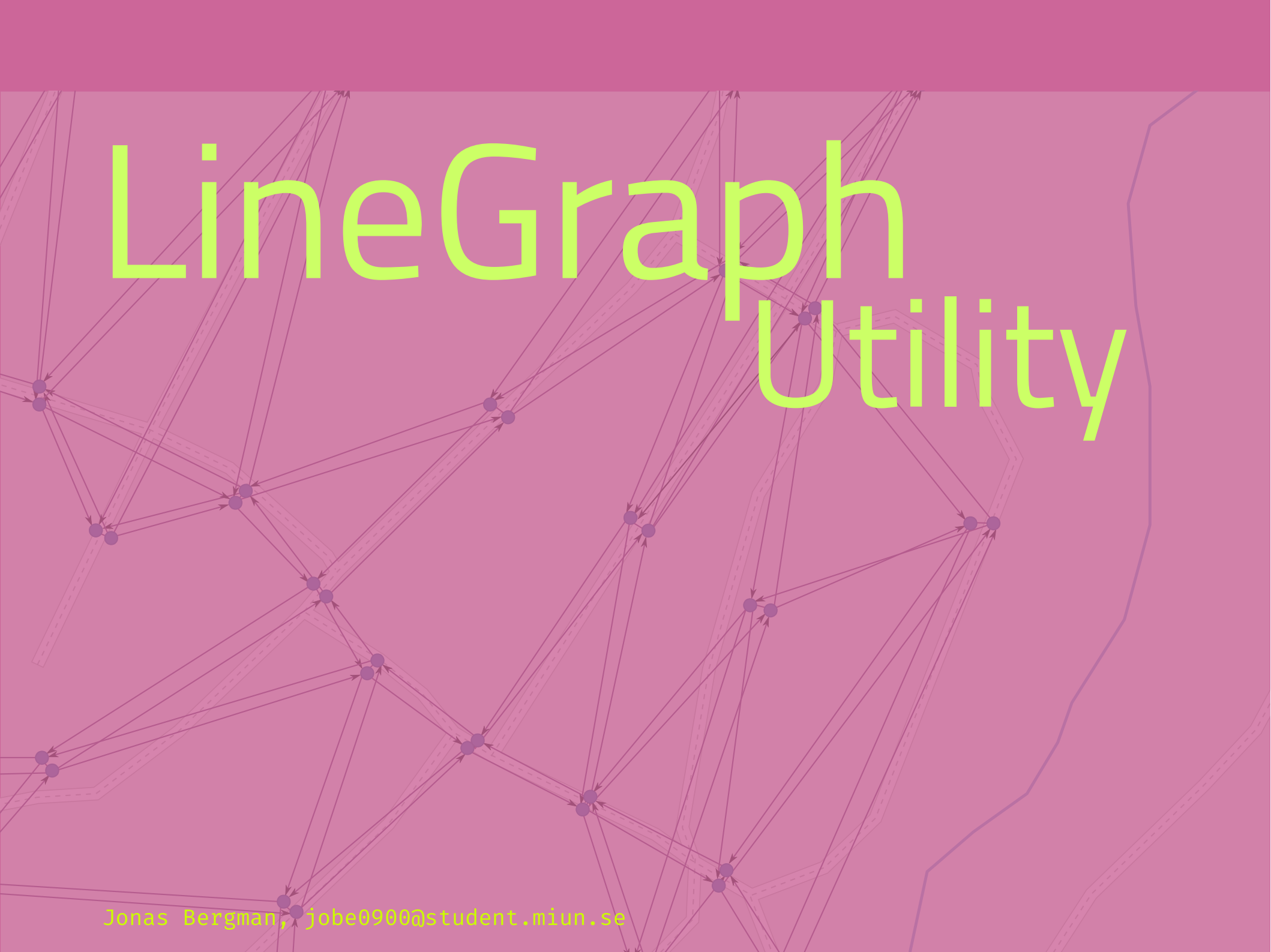
Relation:

from → via → ***to***

solution

class diagram





LineGraph Utility

Jonas Bergman, jobe0900@student.miun.se