

URBAN METABOLISM

MUIDE 1 - URBAN

**Climate Design &
Sustainability**

**KULeuven - Department Architecture
2019**

Michel Aebischer, Amir Andrés Malakouti, Mélanie Pradier, Miguel Rueda

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Team & Data

1. Team members



Michel Aebischer



Amir Andrés Malakouti



Mélanie Pradier



Miguel Rueda

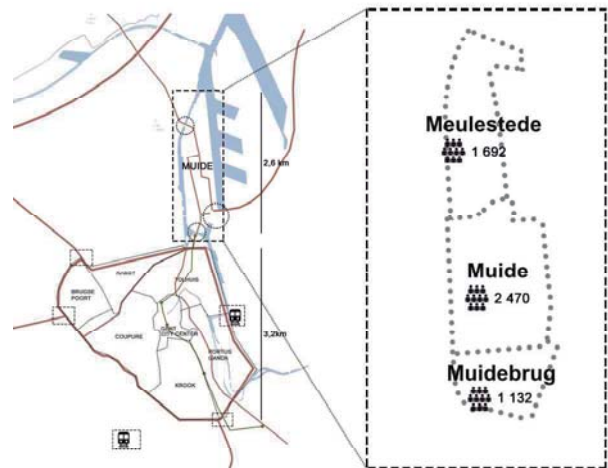
2. General Data

THE NEIGHBOURHOOD

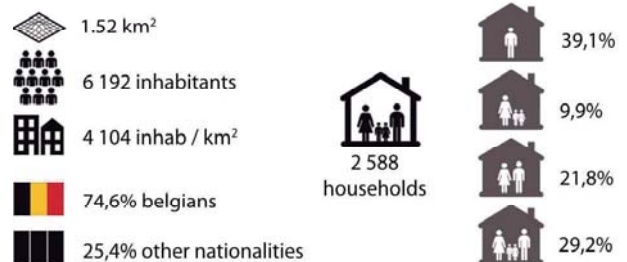
Muide is a working-class area of Gent, located at the north of the city, near the harbour.

Because of the industrial look of this part of Gent, the city tries to make the district more pleasant through a lot of urban projects designed on the basis of dialogues and meetings with the inhabitants. New equipments are planned like parks, playgrounds for children, sport facilities, shared garden etc.

We, as design team, are intended to present a new plan for the development of the area, in order to improve the life quality of their inhabitants, as well as to try to make from Muide a self-sufficient area in the city of Ghent.



THE NEIGHBOURS



GROWING EXPECTANCY

in Ghent from 2019 to 2040

250K ^ 300K

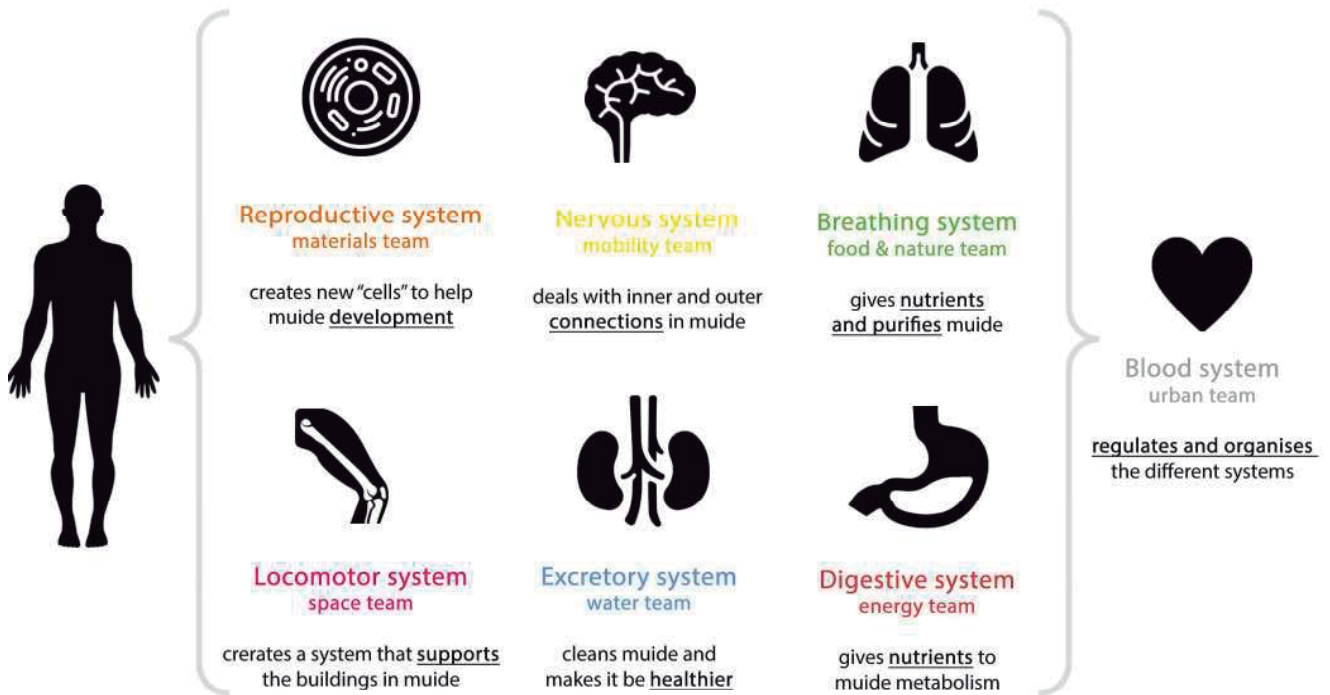
in Muide from 2019 to 2040

2.500 ^ 3.500*

* Taking into consideration that the suburbs are going to grow more than the city centre.

Positive project

muide metabolism



How does Muide Metabolism work?

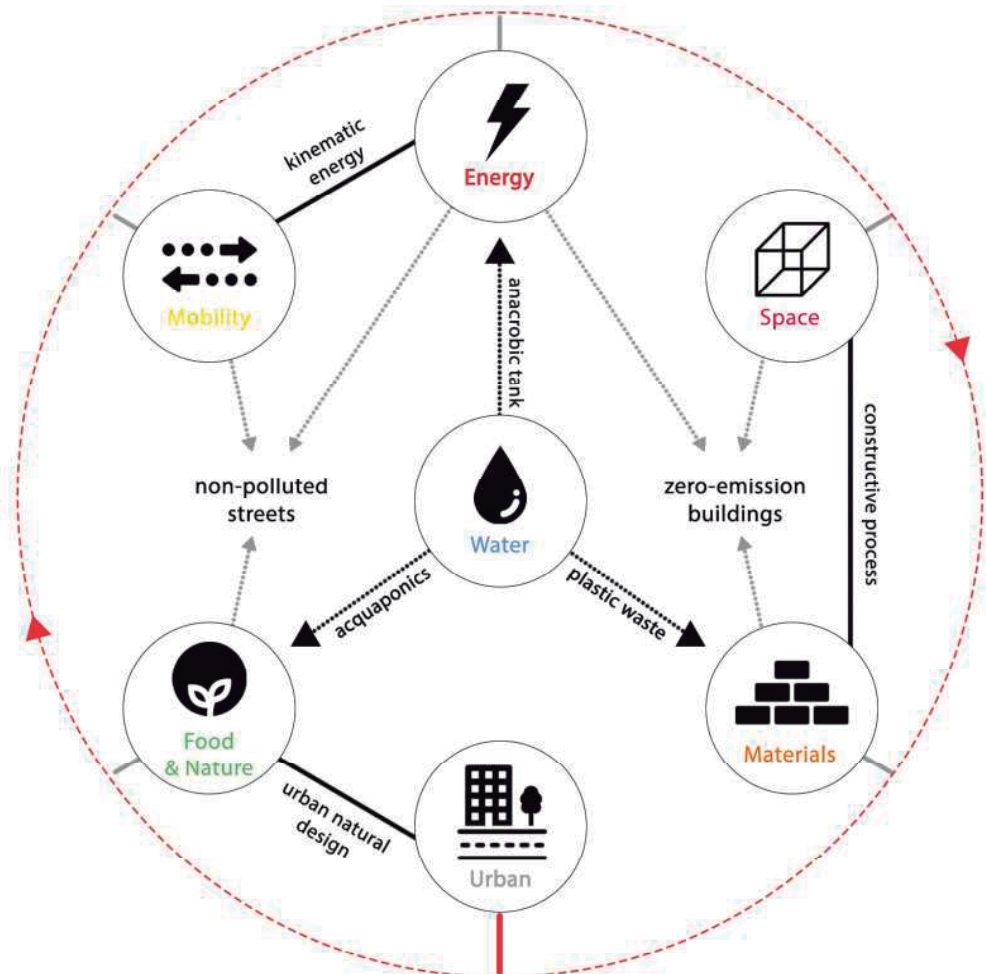
As water plays an essential role in a human beings forming up to 60% of their body, so does in Muide.

This element is the main component of our proposal, and it gives resources to the rest of the groups to make the metabolism work.

Water is used to feed all the different species that food & nature produce. Moreover, a canal makes a direct connection between these two main groups of our proposal.

Besides, residual water is stored in tanks to help to produce energy. Supported by the kinematic energy that mobility group has, our organism is able to obtain the sufficient energy to develop its basic functions.

Finally, the plastic removed from the water in the canal is used to produce new materials, our cells, which combined with the rules that space group suggest, are going to be the basis to build our buildings.



Building programmes

Water Team

1. living machine
2. plastic hub
3. health centre
4. residential
5. cafe

Food & Nature Team

1. vegetable and cereal production (acquaponic system)
2. bio-market
3. responsible restaurant
4. research center
5. educational workshops
6. housing
7. community garden.

Energy Team

1. housing
2. energy storage and production
3. energy store
4. energy repair center
5. fablab

Materials Team

1. apartment units
2. material workshop
3. barley workshop

Space Team

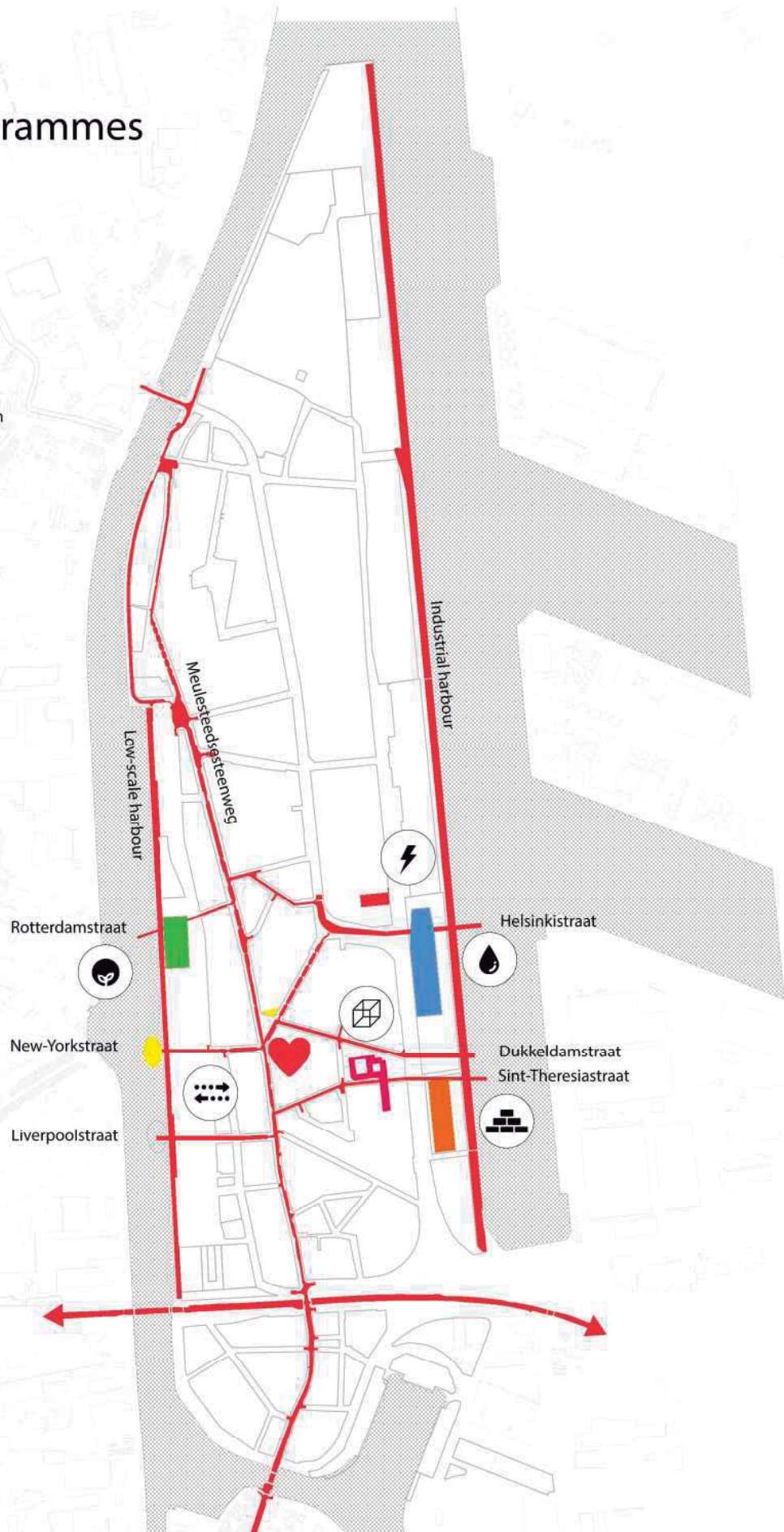
1. residential
2. school
3. village restaurant
4. library
5. PC classes
6. conference rooms
7. events' space
8. winter garden
9. sport facilities
10. laundry

Mobility Team

1. residential
2. public pool
3. boat station
4. store with local products
6. meeting point
7. post office

Urban Team

1. active corridors
2. dynamic corridors
3. public spaces
4. public squares



Rules

Water Team

- 1** NO MORE THAN 2/3 OF THE SURFACE SHOULD BE SEALED OR COVERED BY BUILDINGS.
this will decrease wasteful ground water runoff and aid evapotranspiration and precipitation processes.
- 2** BIO SWALES SHALL BE INTRODUCED THROUGHOUT THE SITE AS NATURAL WATER STORAGE DEVICES
which also passively cool the surrounding buildings and reduce the heat island effect.
- 3** HARBOR WATER SHALL BE FILTERED TO TAKE MICRO PLASTICS OUT OF THE WATER
to improve conditions for the local wildlife and ecosystem.
- 4** ALL ROOFS SHOULD HAVE A COMPREHENSIVE COLLECTION SYSTEM
which stores water on site and can also be sent to other larger water storage facilities for redistribution.
- 5** WASTE WATER, BLACK, GREY AND YELLOW, SHALL BE REUSED ON SITE.
Either incorporated back into the domestic setting or sent to other facilities for energy and material production.
- 6** EACH CITIZEN MUST REDUCE WATER CONSUMPTION FROM 115L DOWN TO 80L PER PERSON PER DAY.
by substituting water consuming devices such as toilets, showers, taps and cleaning machines for more eco-friendly options.
- 7** FILTERED RAINWATER SHALL BE USED AS MUCH AS POSSIBLE FOR DRINKING, WASHING AND KITCHEN
to alleviate and dependence on 'grid' water.

Energy Team

- 1** USE AS MUCH NATURAL DAYLIGHT AS POSSIBLE, TO REDUCE ARTIFICIAL LIGHTING.
good orientation of each room is a must.
- 2** KEEP THE WASTE OF ENERGY AS LOW AS POSSIBLE.
if we use our energy on the scale of a building circularly, we can reuse a lot of it. eg. heat recovering
- 3** KEEP YOUR BUILDING IN SUMMER AS COOL AS POSSIBLE
by placing flexible sunblocking systems in a smart way.
- 4** COOL YOUR BUILDIGN WITH NATURA VENTILATION SYSTEMS
such as night cooling or crossed ventilation
- 5** KITCHEN WASTE AND BLACK WATER IS COMING TOGETHER IN A ANACROBIC DIGESTER TANK.
with the waste we can create a bio-fuel, by which we can cook and heat the place.

Food & Nature Team

- 1** INCREASING OF THE AMOUNT OF TREES IN 3 TIMES
for a better cooling in the village, lowering the UHI.
- 2** FAÇADE 25 % GREEN
new buildings' façade should be covered with green at least 25% of their surface. we recommend S or W façades.
- 3** ROOF 50% GREEN
new buildings' roof must consider at least 50% of greenery in their surface.
- 4** IRRIGATION SYSTEM IN SLOPED ROOFS
recommendable in roofs sloped over 5 degrees. essential on roof pitches over 20 degrees.

Space Team

NEW BUILDINGS

- 1** THE GRID 6.30X6.30
for structural and modular reasons
- 2** EVERY NEW BUILDING SHOULD PROVIDE A CERTAIN AMOUNT OF DWELLINGS.
as part of a co-housing system where a maximum of space is communal.
- 3** GROUND FLOOR CONSIDERED AS A PUBLIC AREA.
- 4** SPACE FOR EVERYONE
every public building should be accessible by disabled people.
- 5** ZERO SPACE WASTE
Prevent using long corridors without extra spatial qualities and incorporate vertical circulation to minimize the use of space for circulation.
- 6** SELF-SUFFICIENT BUILDING
minimal environmental impact.
- 7** BUFFER-ZONES
There should be a low tech solution (buffer zones, winter-garden) on southern facade that will prevent heat losses in Winter and provide sun shading in summer.
- 8** MEETING ZONES
as an urban living room, hosting activities that help to develop relationships in the community.
- 9** ADAPTABILITY
light, removable and reusable wall elements. staircases and elevators in optimal dimensions to allow the change of functions in the future.

Materials Team

- 1** BRICKS FROM REUSED CONSTRUCTION WASTE
as vertical structure
- 2** RECLAIMED WOOD BEAMS
as horizontal structure
- 3** COMPRESSED BARLEY STRAW
from brewery residues. insulation factor 0.052 W/K.m2.
- 4** COMPRESSED STRAW AND EARTH
as interior partial walls.
- 5** CROWN CAPS AND CORK.
as finishing

EXISTING BUILDINGS

- 10** NO HOUSES WILL BE DEMOLISHED.
existing structures will be kept intact.
- 11** ALL HOUSES MUST BE FITTED WITH A NEW APPROPRIATE THERMAL LAYER
using insulating materials produced by the material-group.
- 12** NO NEW TILTED ROOFS WILL BE BUILT.
roof structure must be designed in such a way that vertical expansion is allowed.
- 13** ONE PERSON-HOUSEHOLDS WILL BE ENCOURAGED TO ADAPT TO A CO-HOUSING SITUATION
or find a residency of appropriate size.
- 14** PRIVATE GARDENS WILL BE UNITED AS COMMUNAL VEGETABLE GARDEN

PROTECTED BUILDINGS

- 15** A COMPLETE DEMOLITION IS FORBIDDEN.
Re-use and restore as many elements as possible.
- 16** HIDDEN EXTENSION
as long as it happens at the back side and it's not visible from the street.
- 17** RESPECT THE EXISTING MATERIALS AND EXISTING SITUATION.

Mobility Team

- 1** BICYCLE PARKING SPACE
30 bicycles is provided per residential block.
- 2** EVACUATION PASSAGES
streets must have a free passage of 3 m for evacuation. In case of Meulesteedssteenweg, 10 m.
- 3** LESS MOBILE INHABITANTS SHOULD LIVE CLOSE TO THE PUBLIC TRANSPORT
- 4** 55% OF THE BIKE STORE IN A BUILDING
should be for the inhabitants / employees of the building

How is the space of Muide distributed?

Each one of the groups were assigned a specific area to develop their building proposal. The criteria used to choose that space consist in reusing the existing industrial structures filling them with a different program, as well as completing the void spaces that our vilage had.

Food & Nature

The team spread all its productive activity through the village, in the semi private space in the entrance of the houses, where some species are cultivated, as well as in the inner courtyards of the blocks, completing all their production with the public monitored orchards. Besides, the amount of trees planted tripples the amount existing.

Mobility

Their connection with the city is canalized in the modular spine, via tram. Moreover, several parking lots for bikes are implemented next to the buildings to promote the mobility in bike, as the private cars are banned in the area.ii

Space

Their building spreads its grid throughout all the public spaces that have been created, as well as all the new buildings built.

Material

The materials produced by the different sources that this team has, such as barley or plastic, are going to be implemented in the construction of the new buildings as well as in the restoration of some of the existing ones.

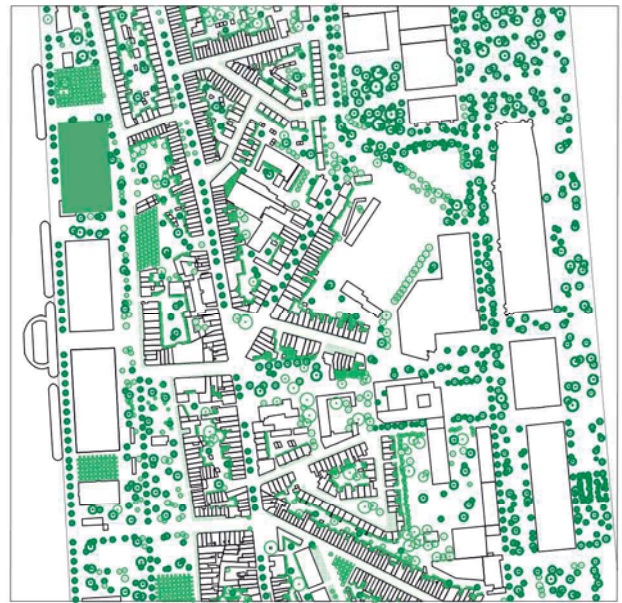
Energy

Energy is stored in containers linked to each of the blocks, where every building has its specific amount of energy available to spend during the day.

Water

They remove the plastic from the water, which after is being filtered in the lake and finally given to the food and nature group. Furthermore, rainwater and sewage tanks collect water from every block.

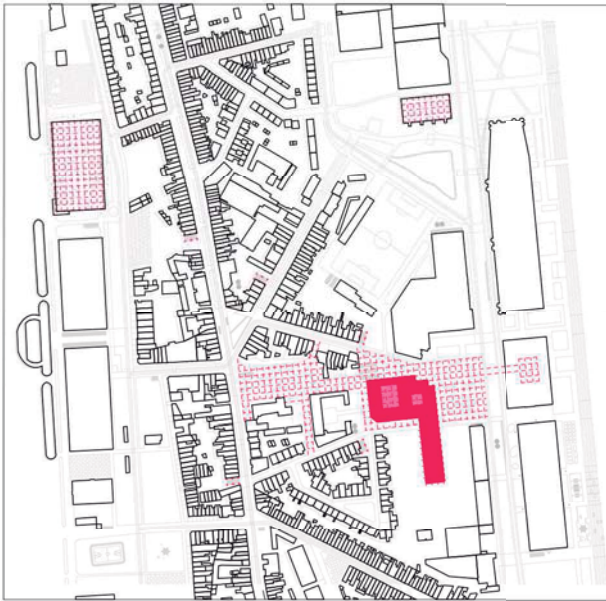
Food & Nature Team



Mobility Team

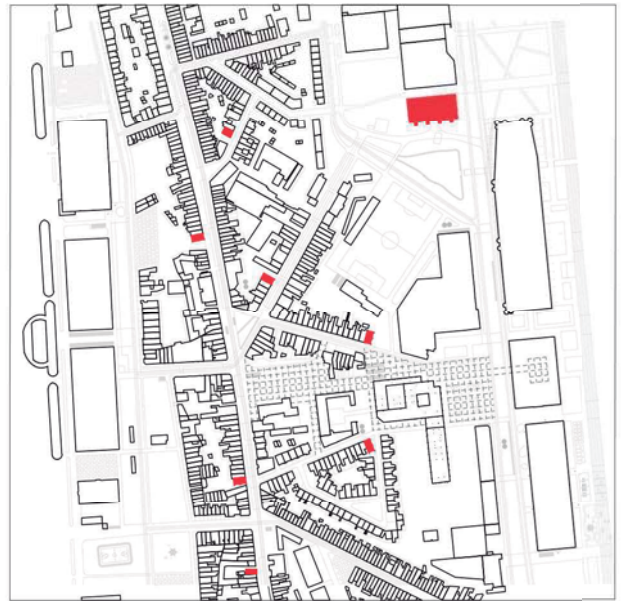


Space Team



■ Building □ Grid

Energy Team



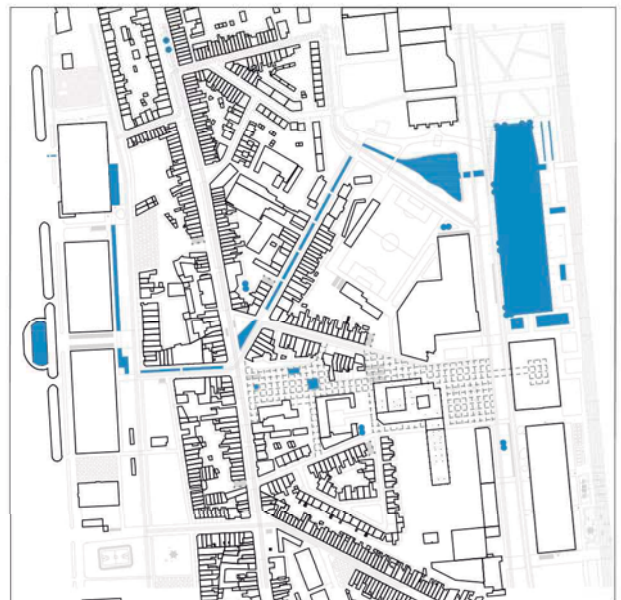
■ Building ■ Tanks

Material Team

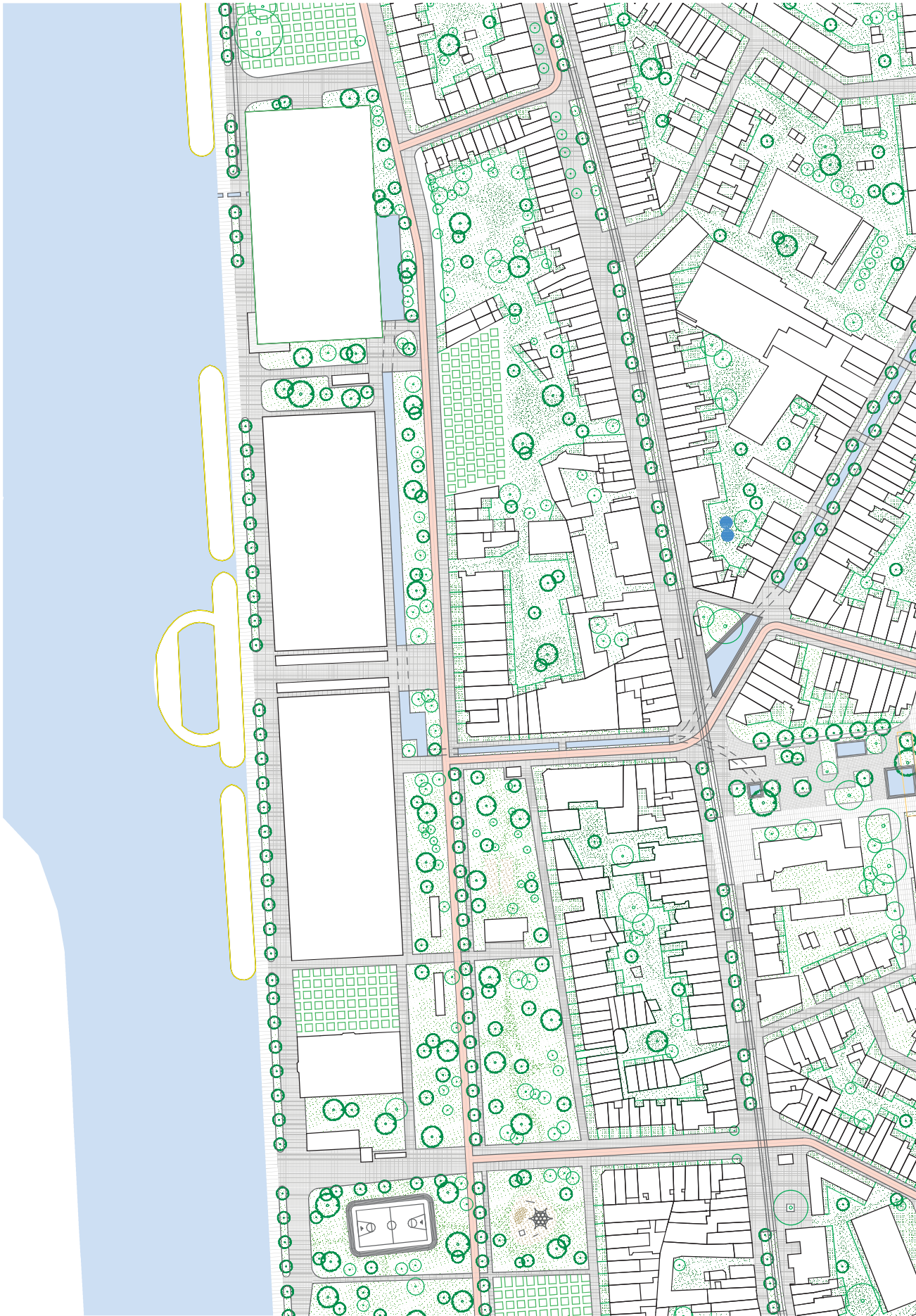


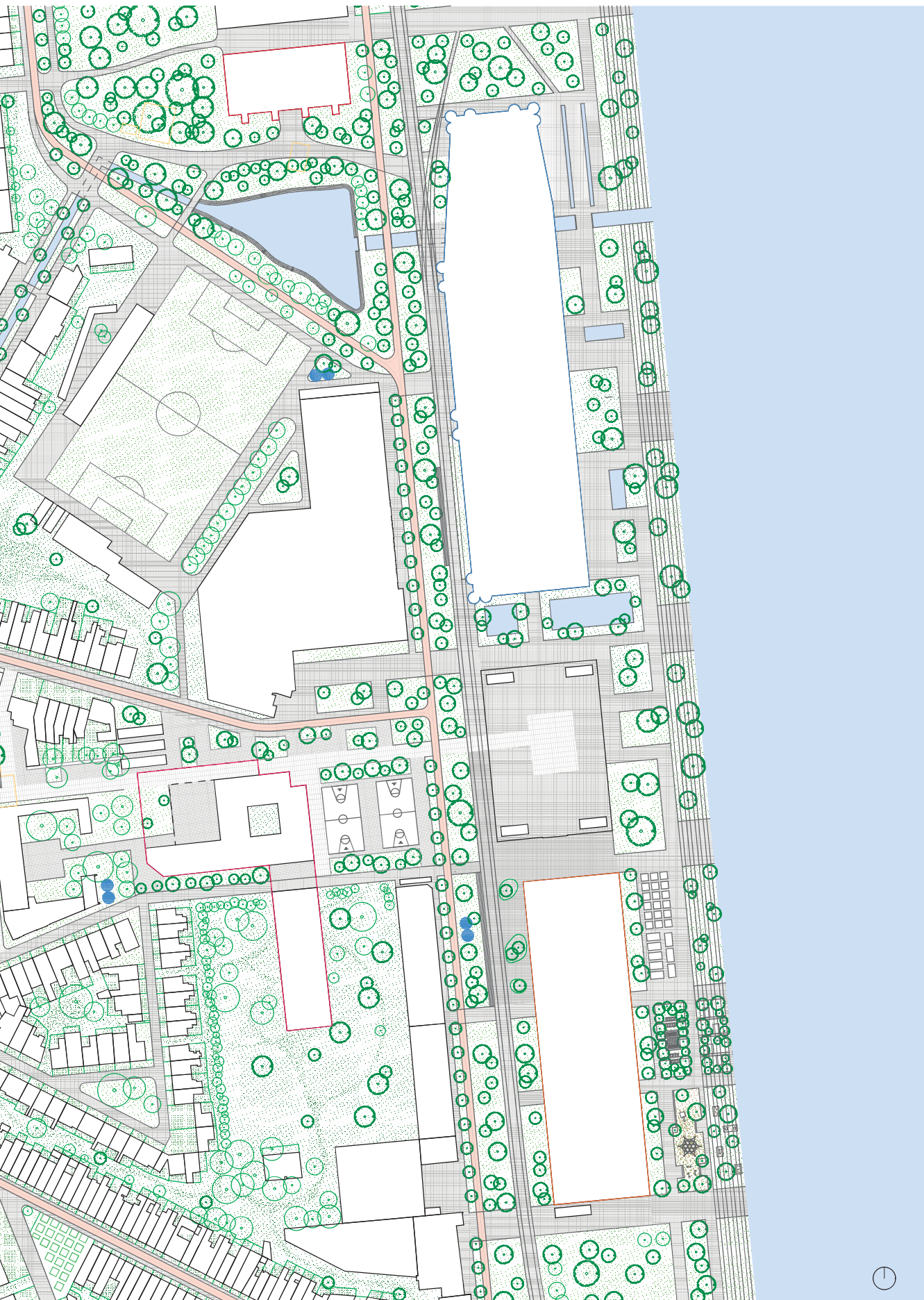
■ Building ■ Buildings where materials are implemented

Water Team



■ Building — Waterline





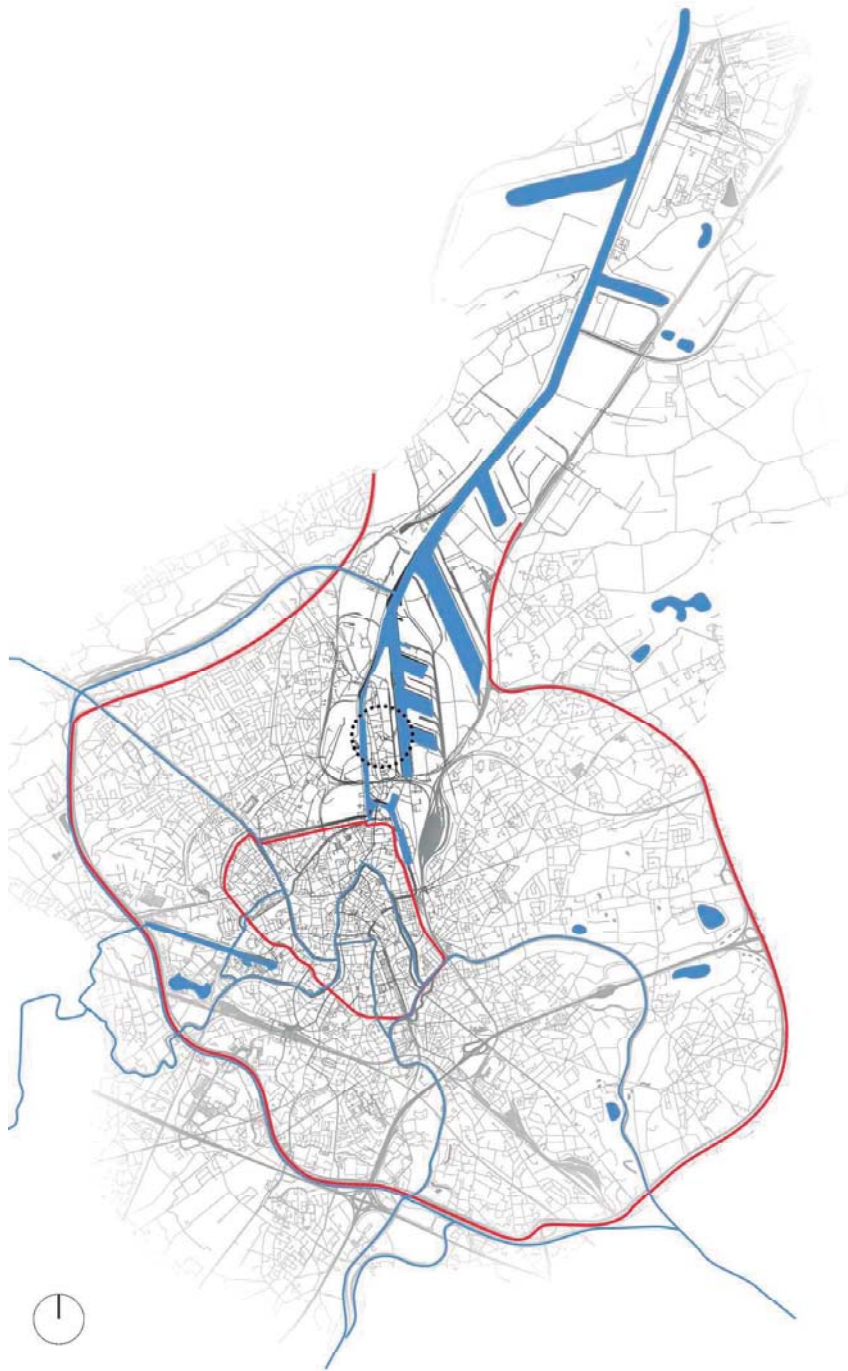
The City & The Island



Ghent - City center



Muide - Village Identity



 Ghent Belts

 Canal

In 1770, Muide was built along a main axis which gathered all buildings and housings, surrounded by fields and some mills. This main axis was developed along the canal and was deported later inside the land (New Orleansstraat).

After 1900, a second axis (Port Arthurlaan) was created on the other side of the island with the development of industrial activities of the harbour. Since 1770, Muide was a real entrance, a front door on the north of the city.



1841

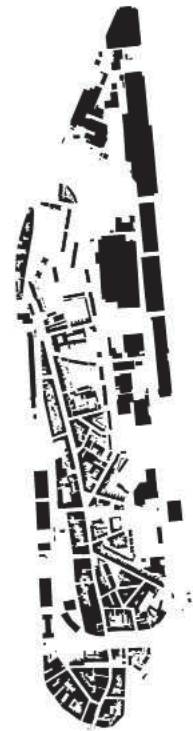


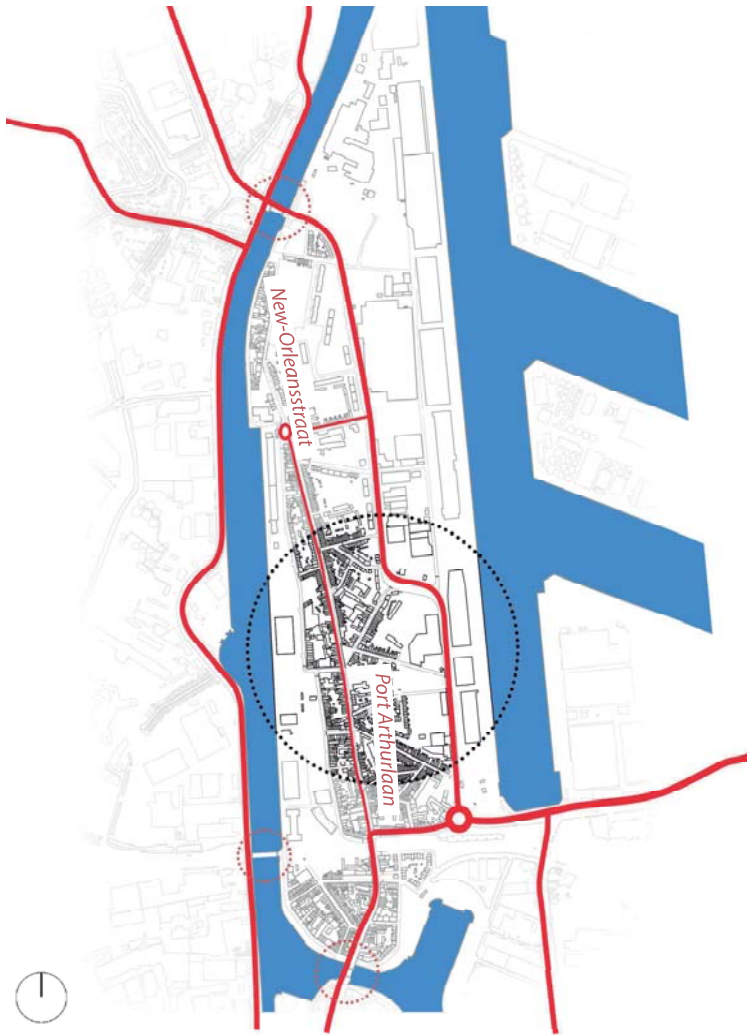
2019



1771 - 1778

1950 - 1970





Peninsula



Canal



Post-industrial waterfront

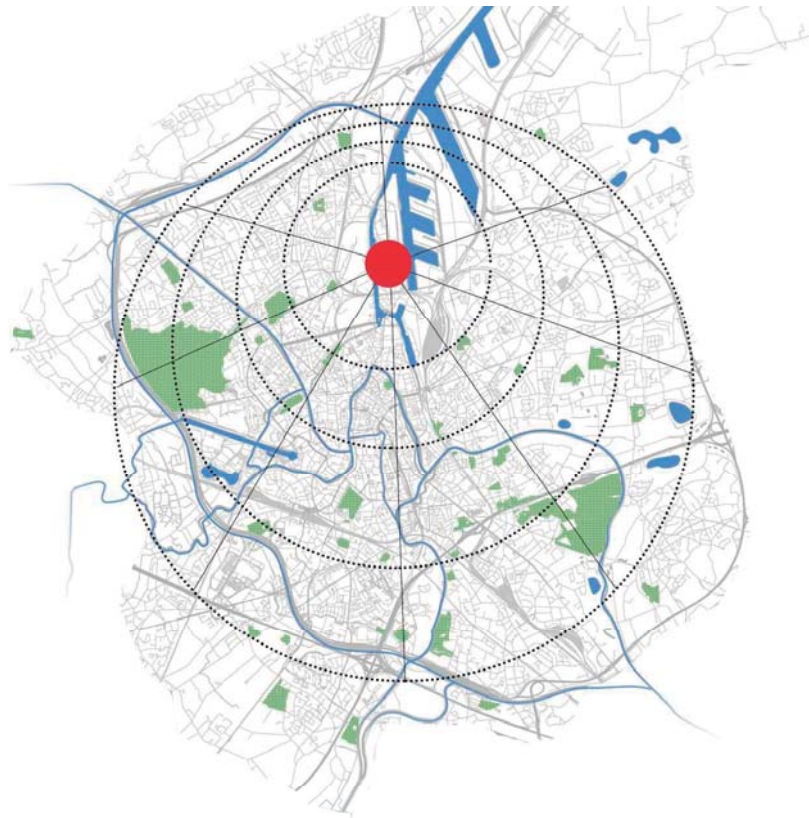


Residential district

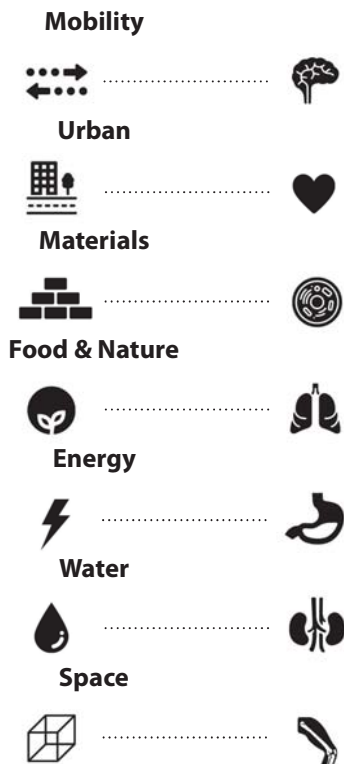


Industrial
Residential





Urban Metabolism



Artery
Recreational Corri-
Spinal Cord
Green Corridor
Harbour artery
Main Artery
Vein Typology



- 1 **Reactivating The Waterline**
- 2 **Public & Social Condensers**
- 3 **Smart Mobility**
- 4 **Self-Productive Island**
- 5 **Recovering the Identity**
- 6 **Urban Metabolism**
- 7 **Urban Ecosystem**

The Village



Private / Public spaces

2019



Buildings
 Public space
 27% public space 73% private space

Today, the district is very privatized in one hand by the inhabitants and on the other, by the harbour.

2040



Shared / community
 Private space
 64% public space 36% private space

Reuse the parking space of the streets for little gardens and organise shared Inner courtyard for neighbour community.

Trees

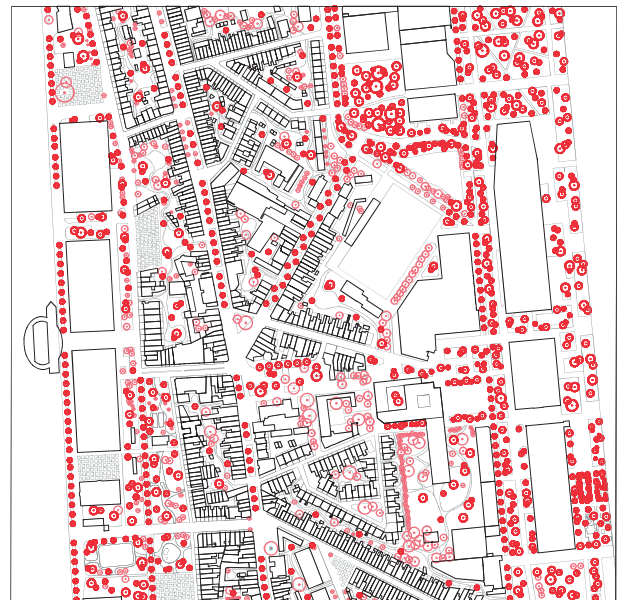
2019



Roads
 Buildings
 426 trees 5.50 CO2 Ton / Inhabitant

Today the area has very few trees because most of the spaces are used as storage for the port

2040



Existing trees
 New trees
 1292 trees 3.1 CO2 Ton / Inhabitant

Multiplication of the number of trees by three for a better urban comfort as well as quality public spaces.

Mobility

2019



Today all streets have priority for cars, pedestrians have only very few spaces.

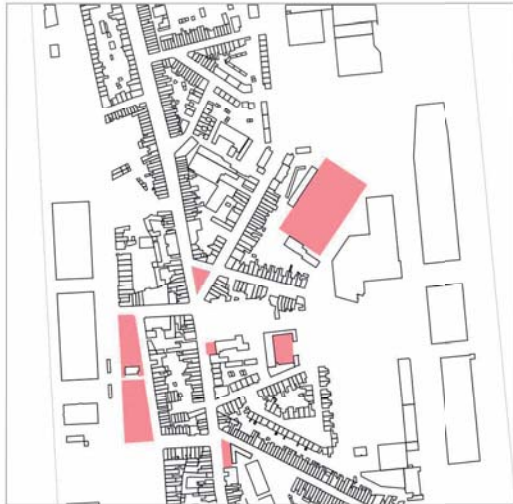
2040



Reuse the parking space of the streets for little gardens and organise shared Inner courtyard for neighbour community.

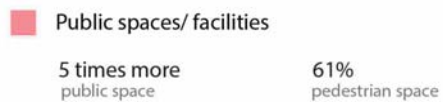
Public Spaces

2019



Today, very few public spaces are reachable for the inhabitants as well as spaces over the water are exploited only by the harbour

2040



Bring water in the center for making it visible and use it as public space as well as use the water front as recreational public spaces.

Void spaces

2019



□ Roads □ Buildings

12
urban plots

Today, we can find a large amount of empty space due to the old harbour.

2040



□ New buildings ■ Void spaces
100% urban plots used 36% with public buildings

Reuse them in new public spaces or mixed uses buildings

Public buildings

2019

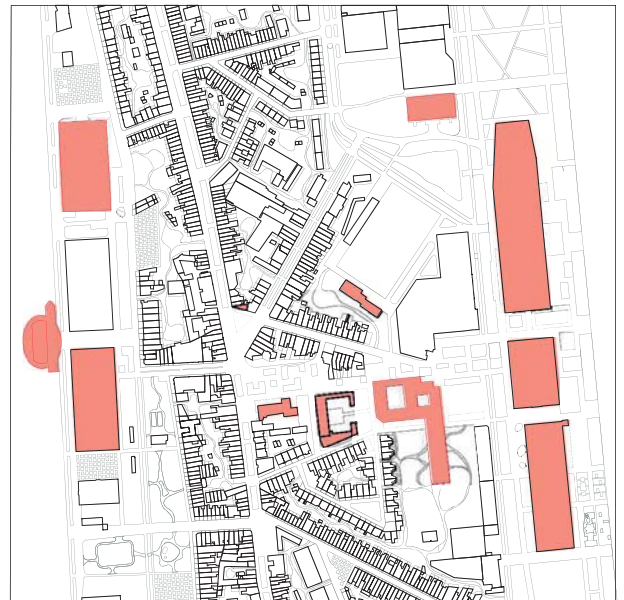


□ Roads □ Buildings

31222 m2
public buildings

Today only three public buildings serve the neighborhood

2040



■ Existing public ■ New public

3 times more
public space

Reuse of three old buildings as well as the construction of three new mixed-use buildings for better public facilities and infrastructure.

Public Spaces

Nervous system city connections



brain plaza
(services and connections)



spinal cords
(direct city connections)

Blood system island connections



heart plaza
(central square)



arterys
(N-S connections)



veins
(E-W connections)

Breathing system island recreations



lung park
(green space)



green corridor

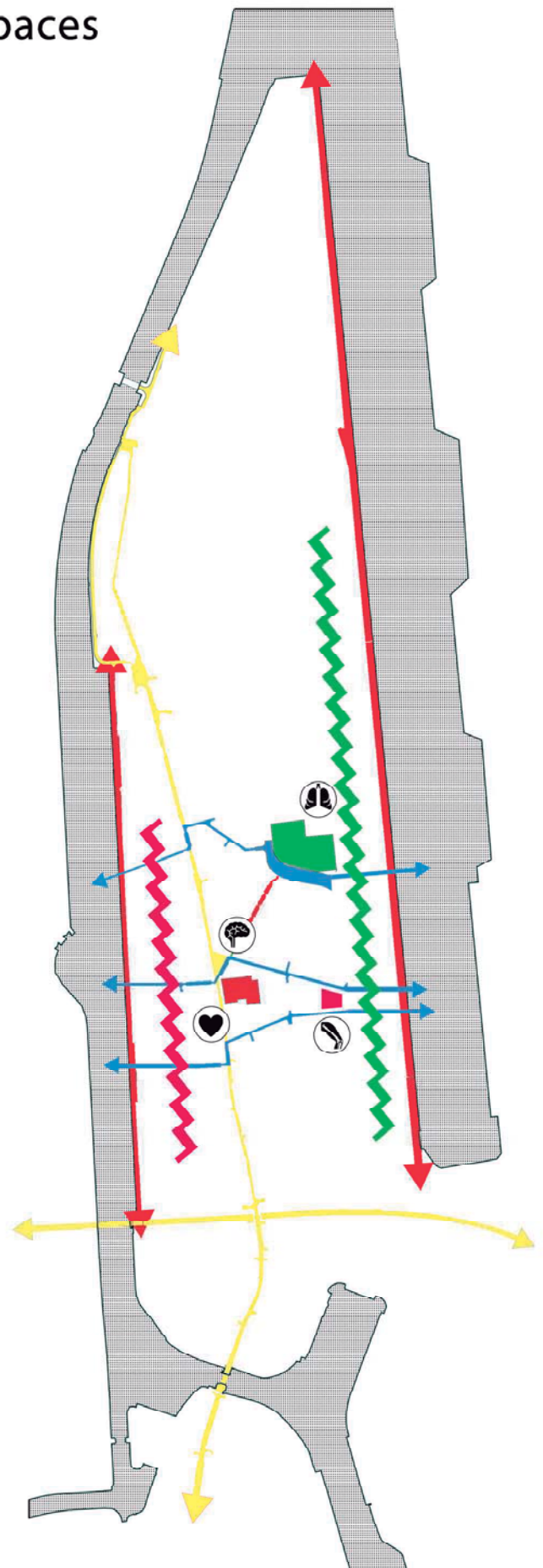
Locomotor system island sport facilities



core square
(sports centre)



recreational corridor



The Streets

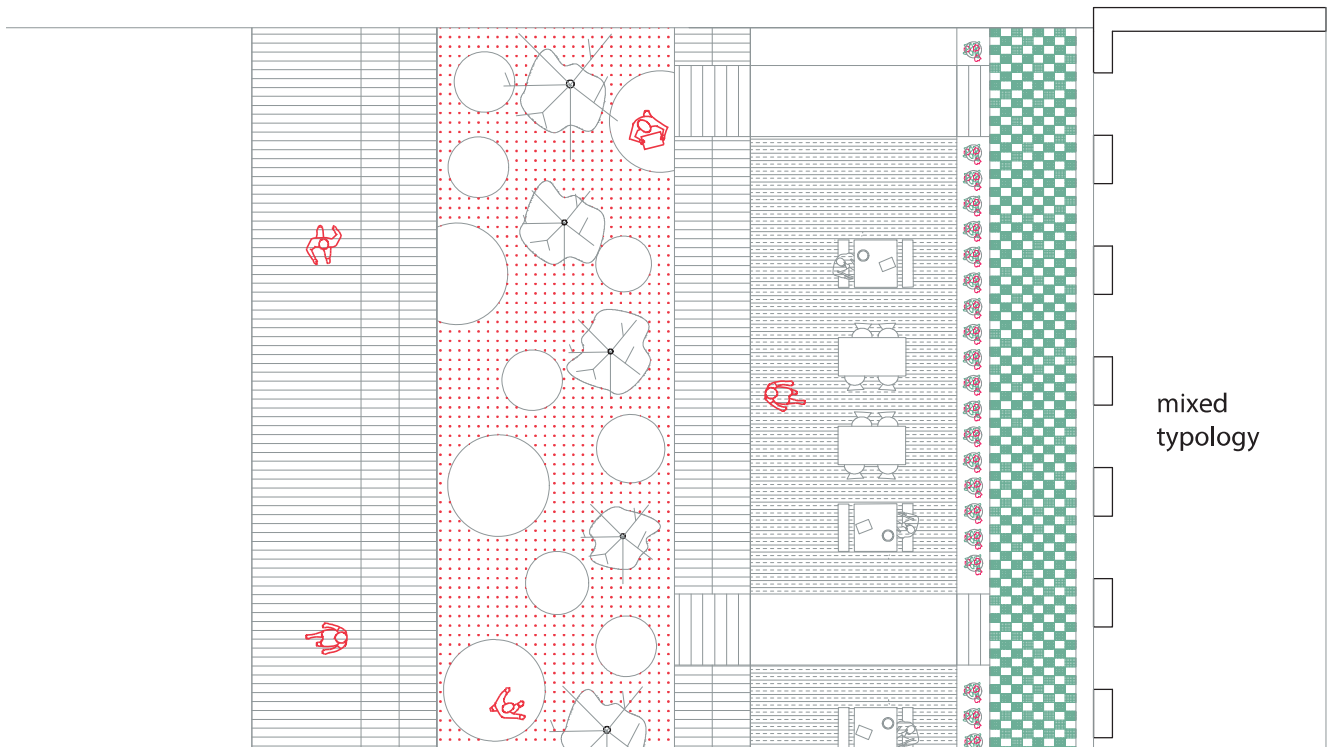
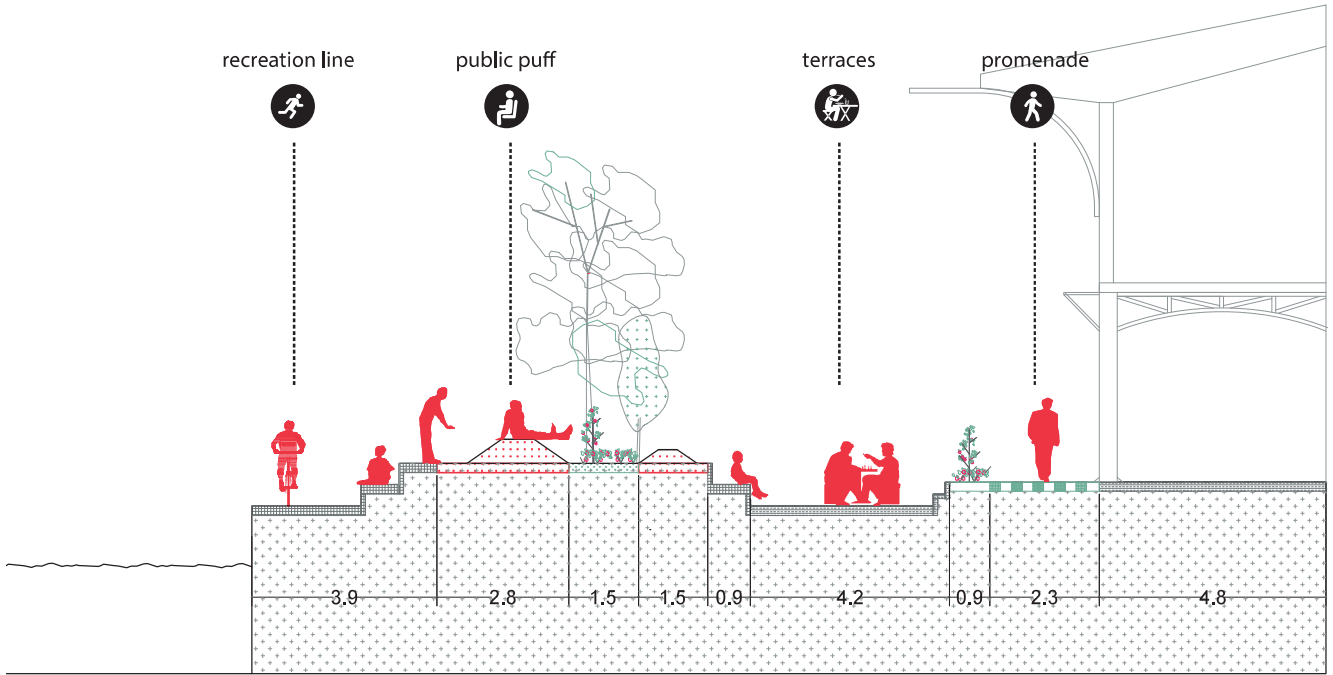
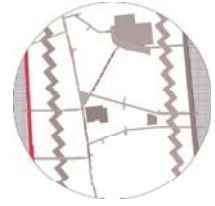


1

Artery

RE.ACTIVATING THE WATERLINE






- wood
- soft concrete pavement
- elastomer / absorbant
- porous floor with bricks
- grass and green layer

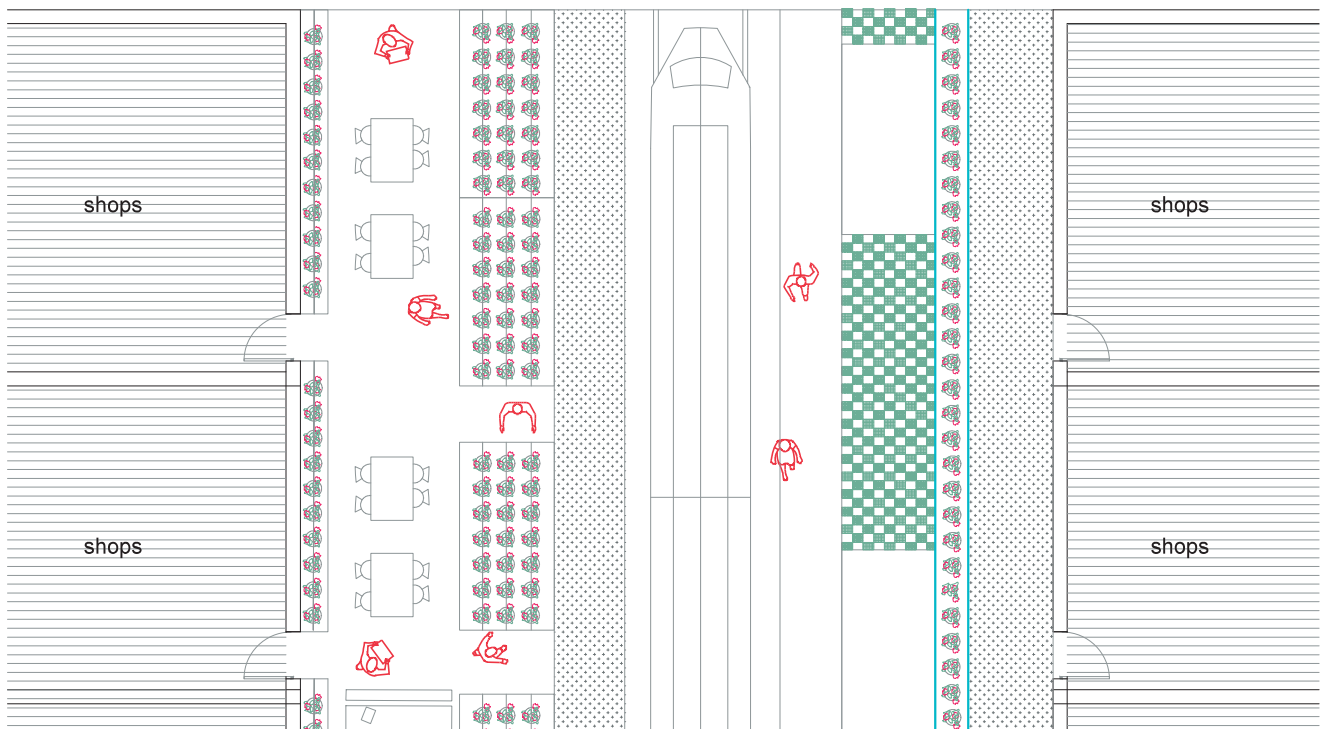
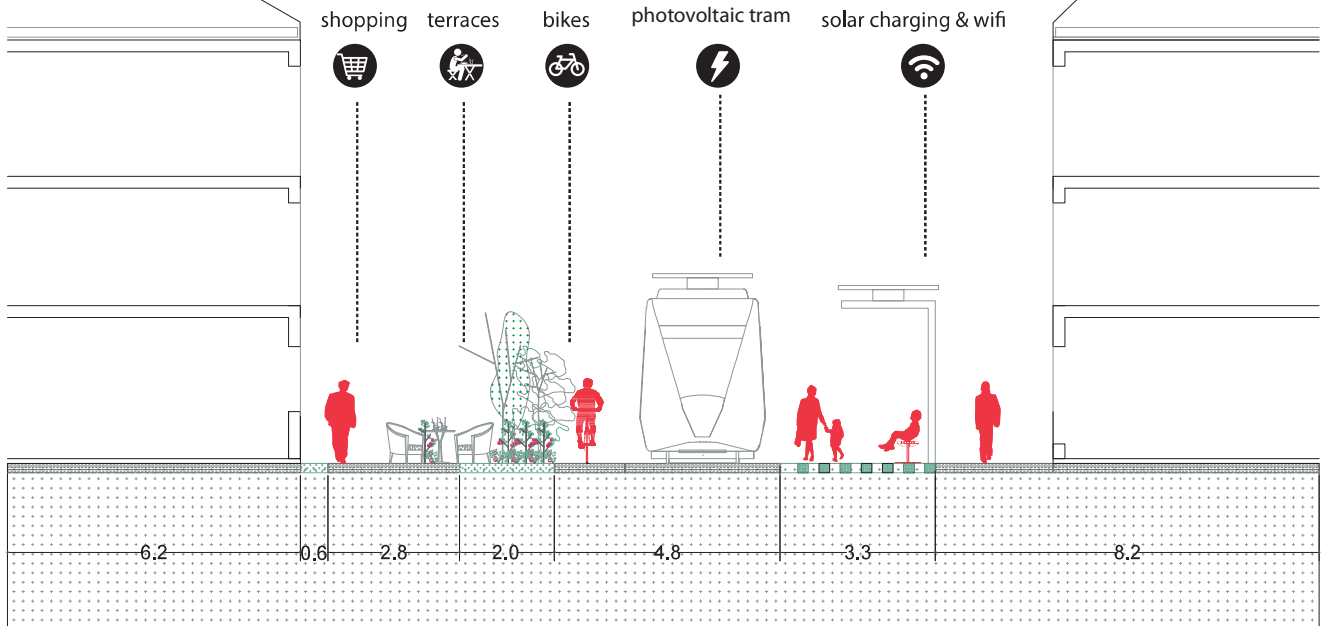
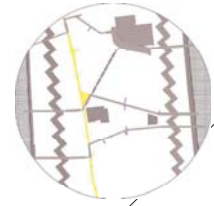




2 Spinal cord

SMART MOBILITY

-  wood
-  soft concrete pavement
-  elastomer / absorbant
-  porous floor with bricks
-  grass and green layer



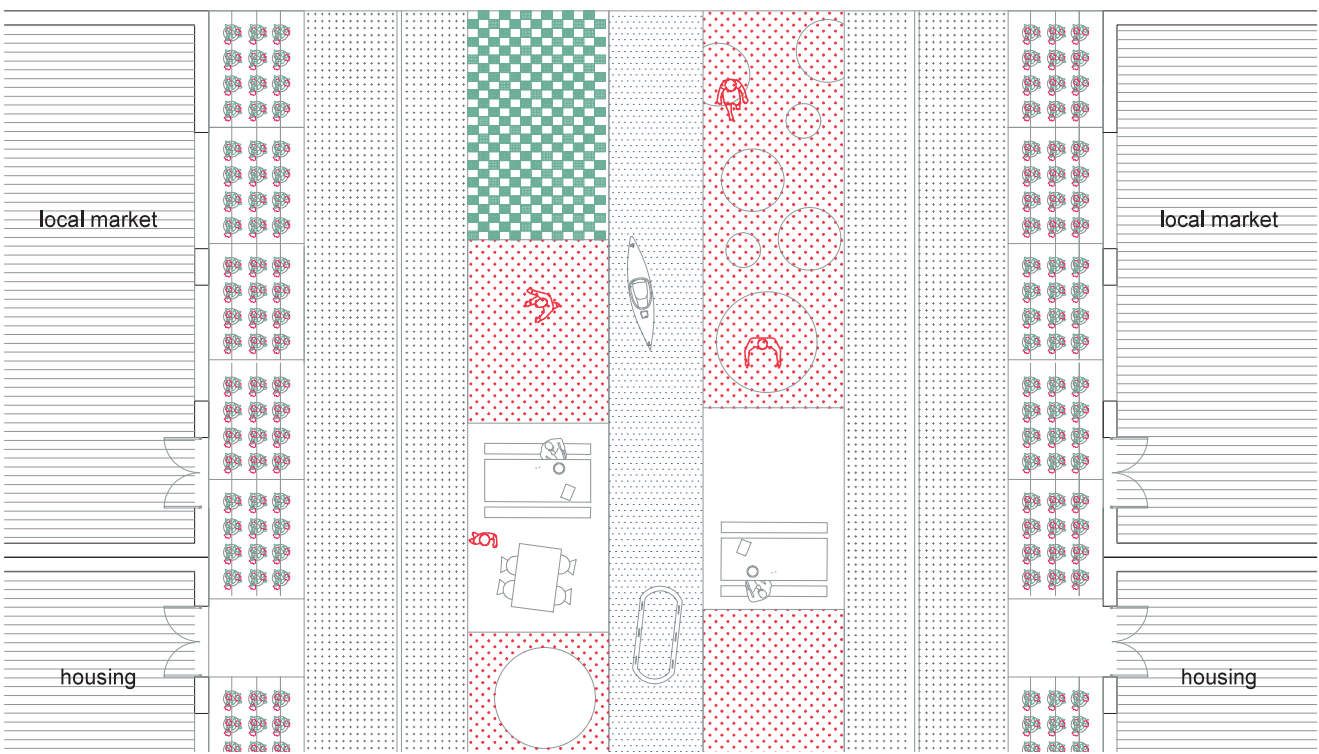
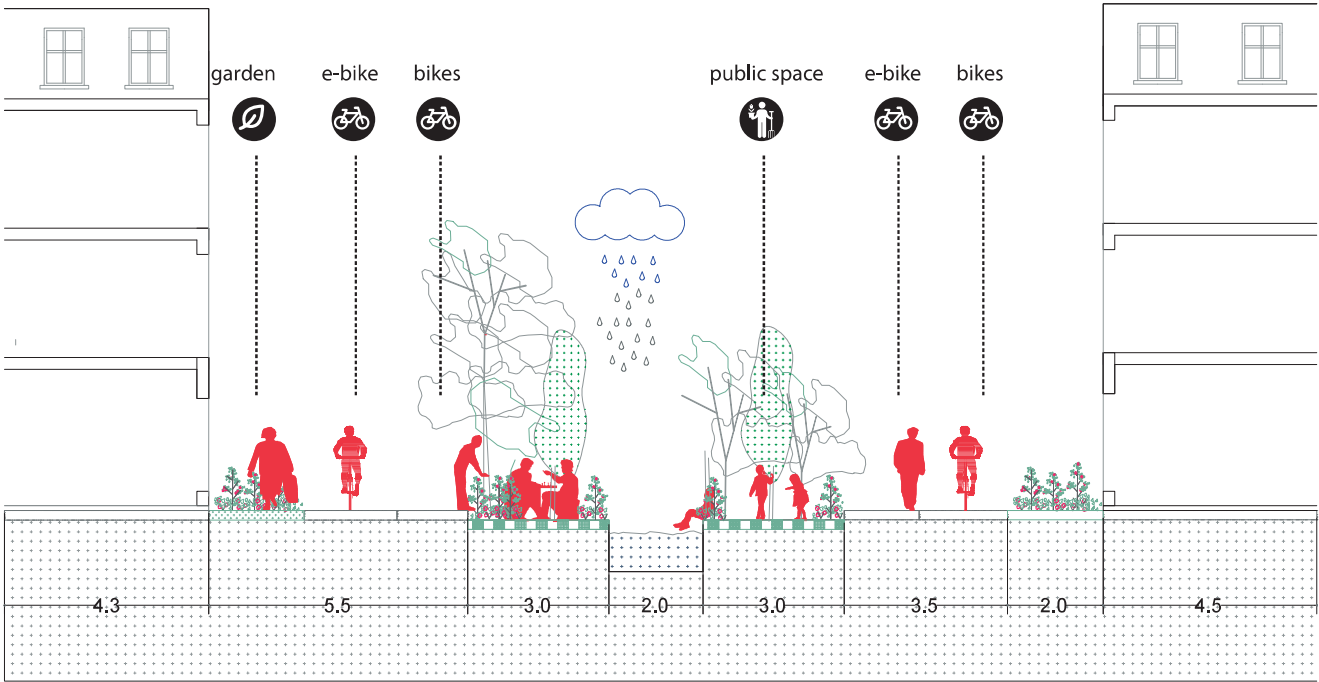
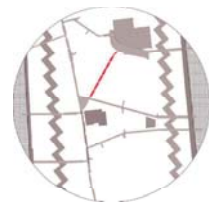


3

Main Artery

URBAN METABOLISM

- wood
- soft concrete pavement
- elastomer / absorbant
- porous floor with bricks
- grass and green layer



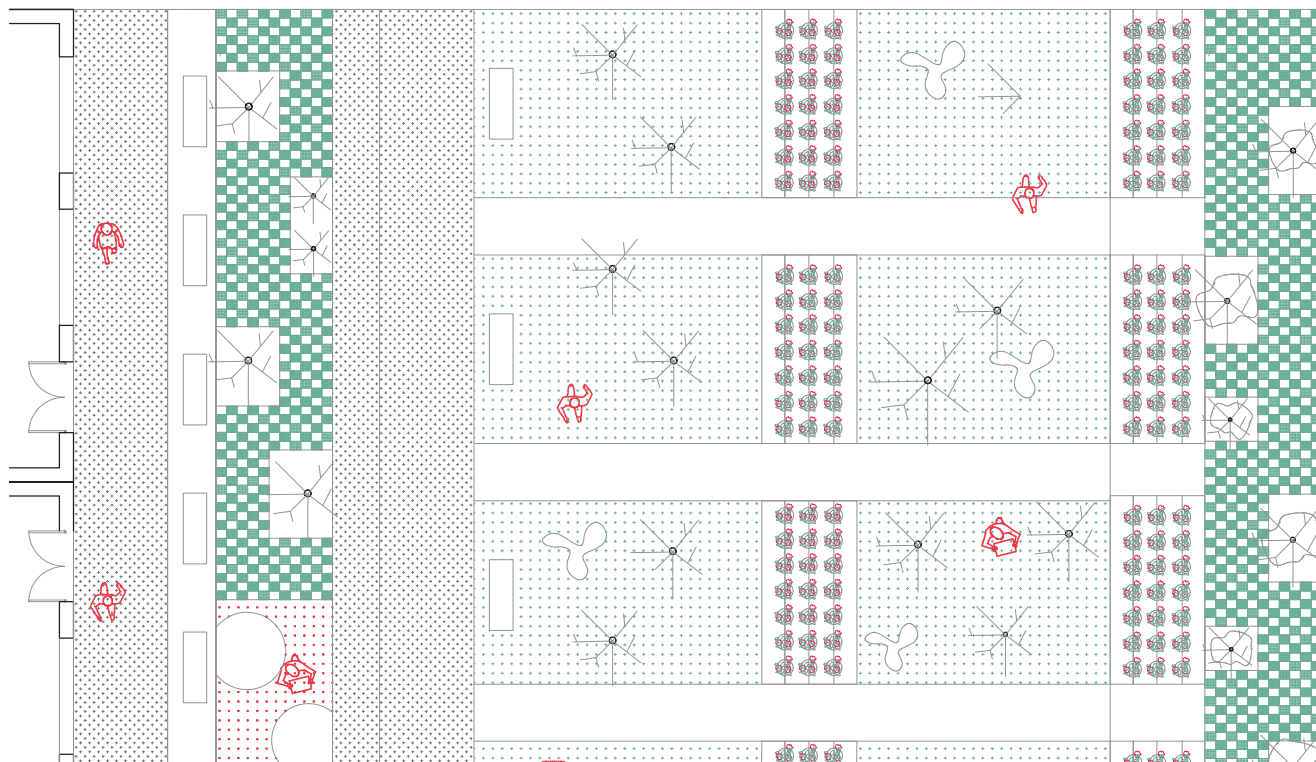
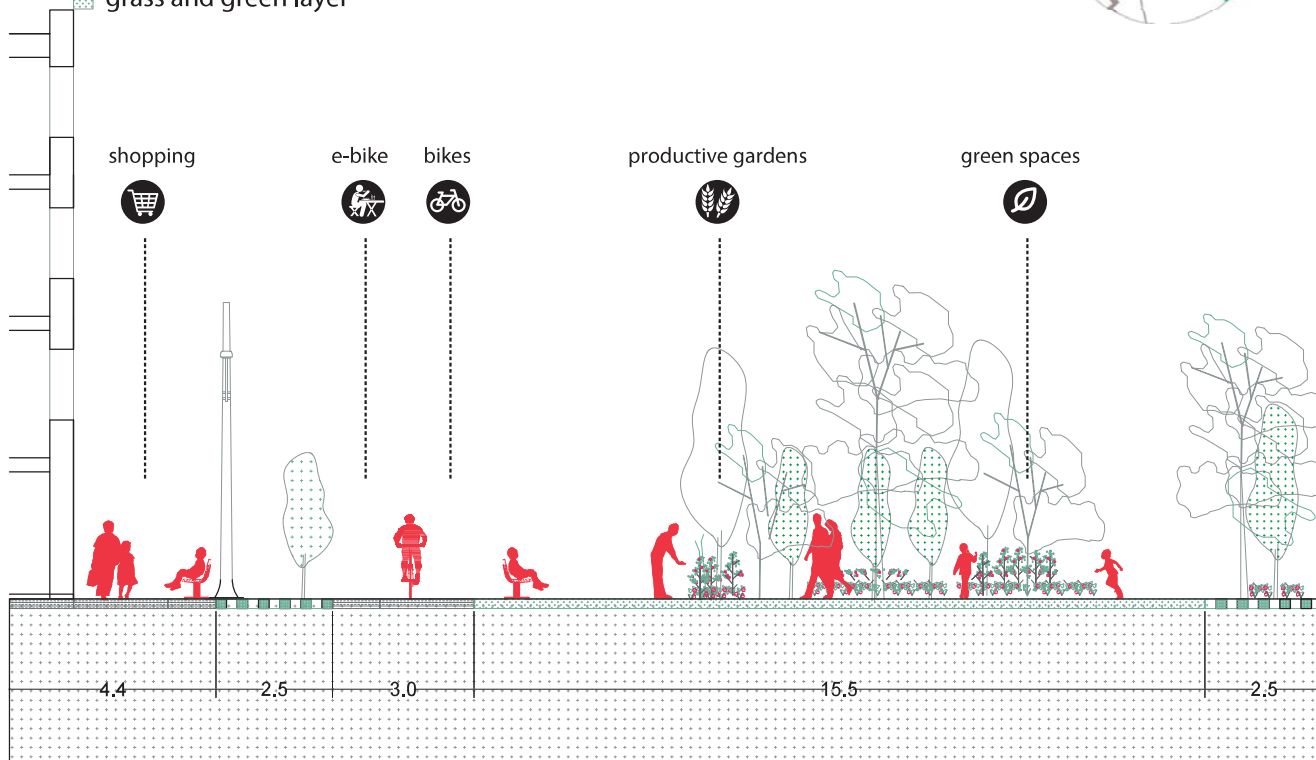
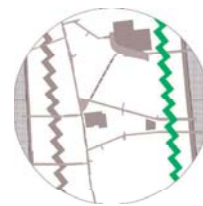


4

Green corridor

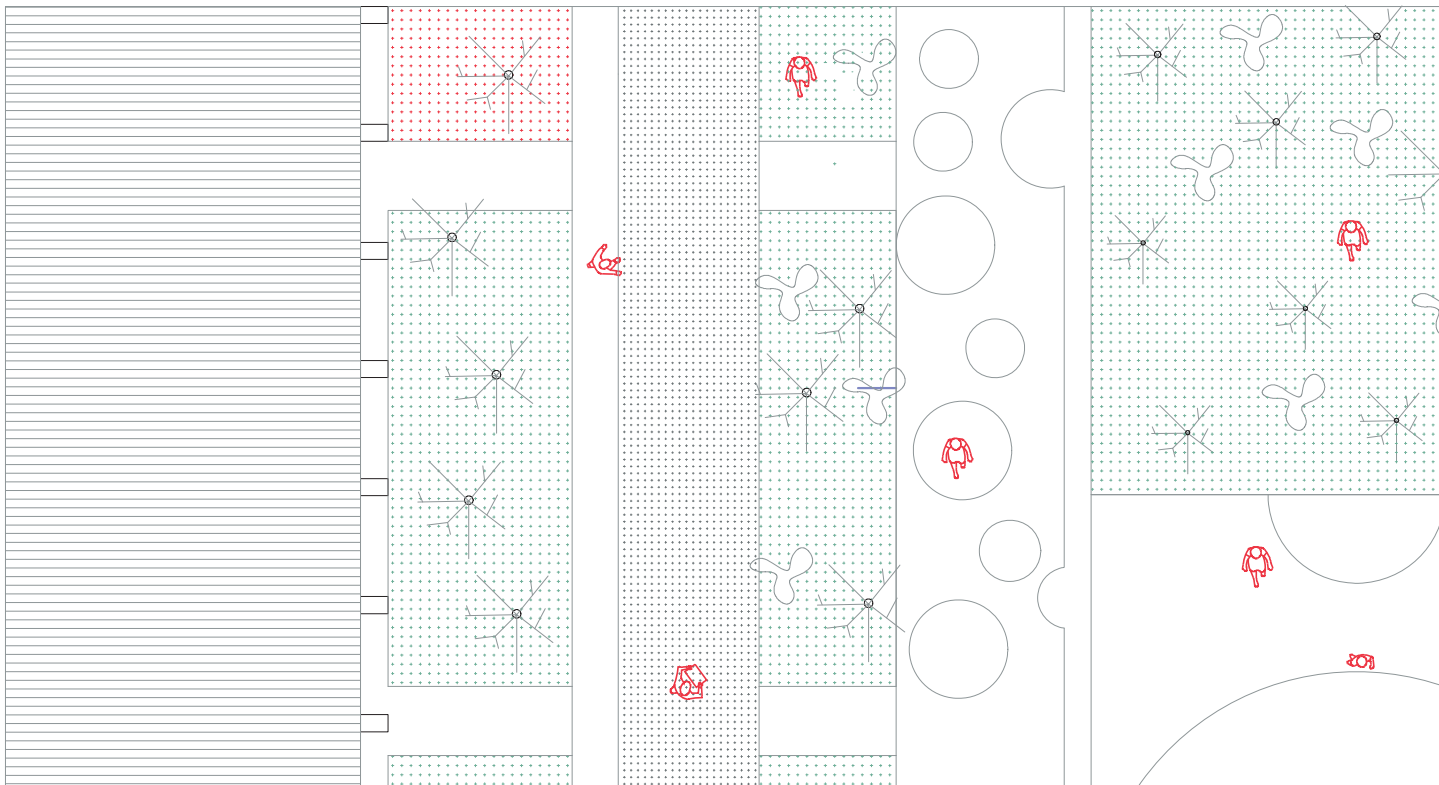
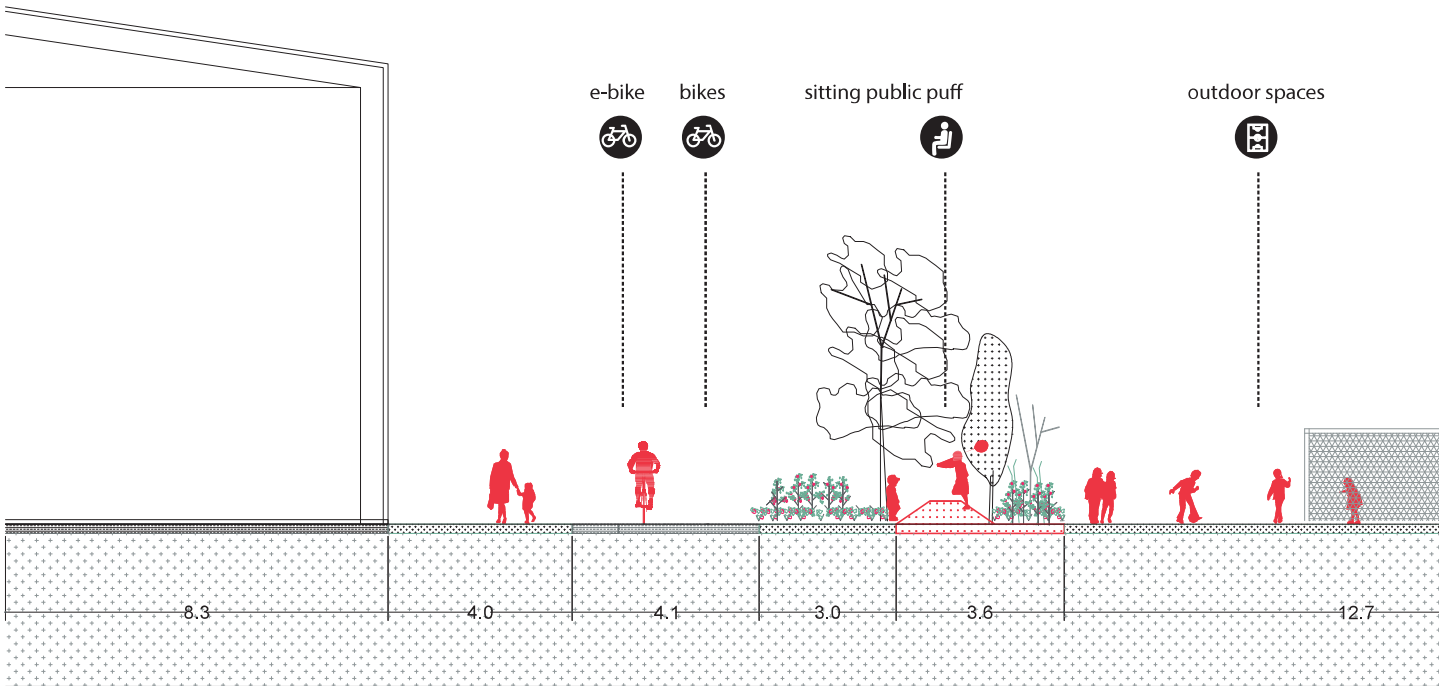
SELF-PRODUCTIVE ISLAND

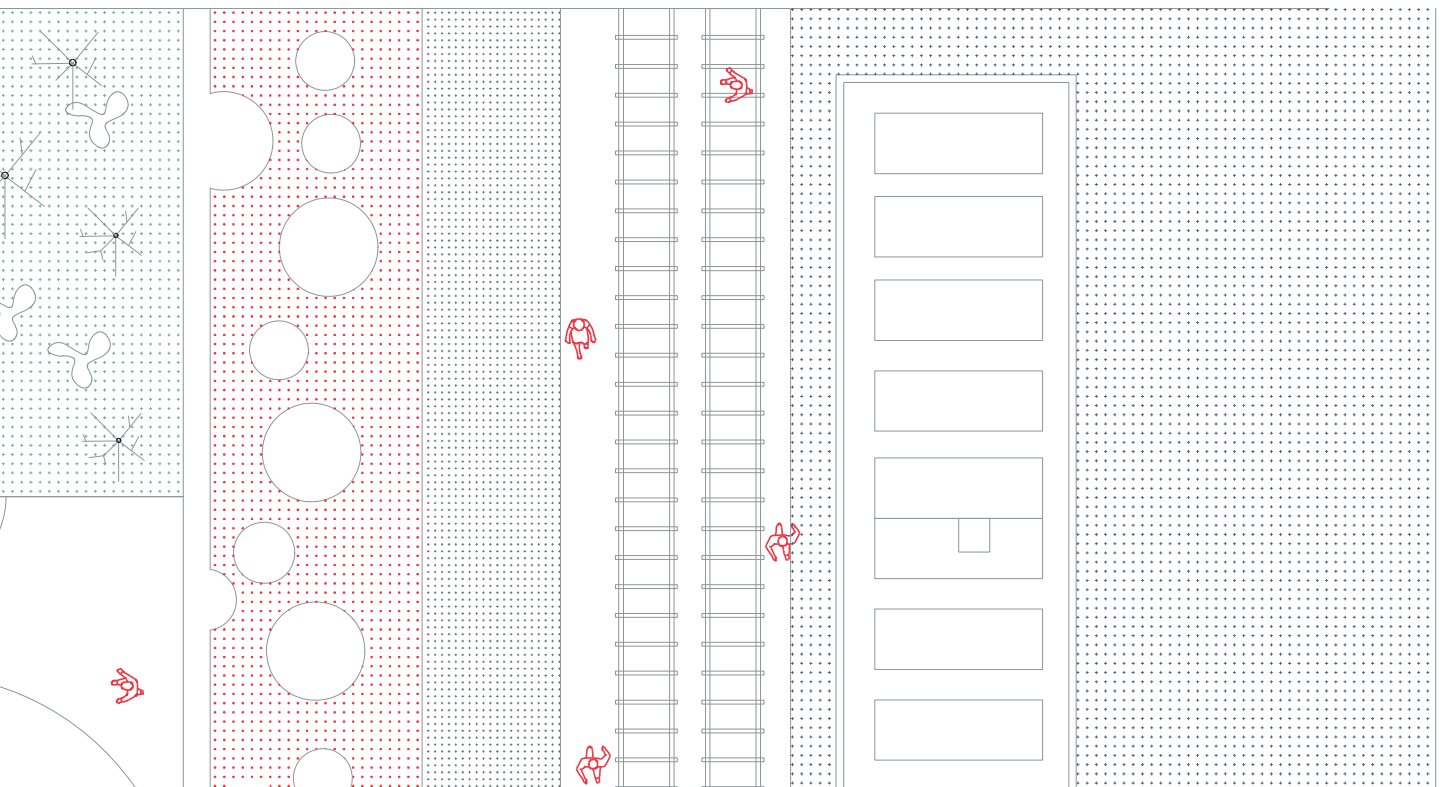
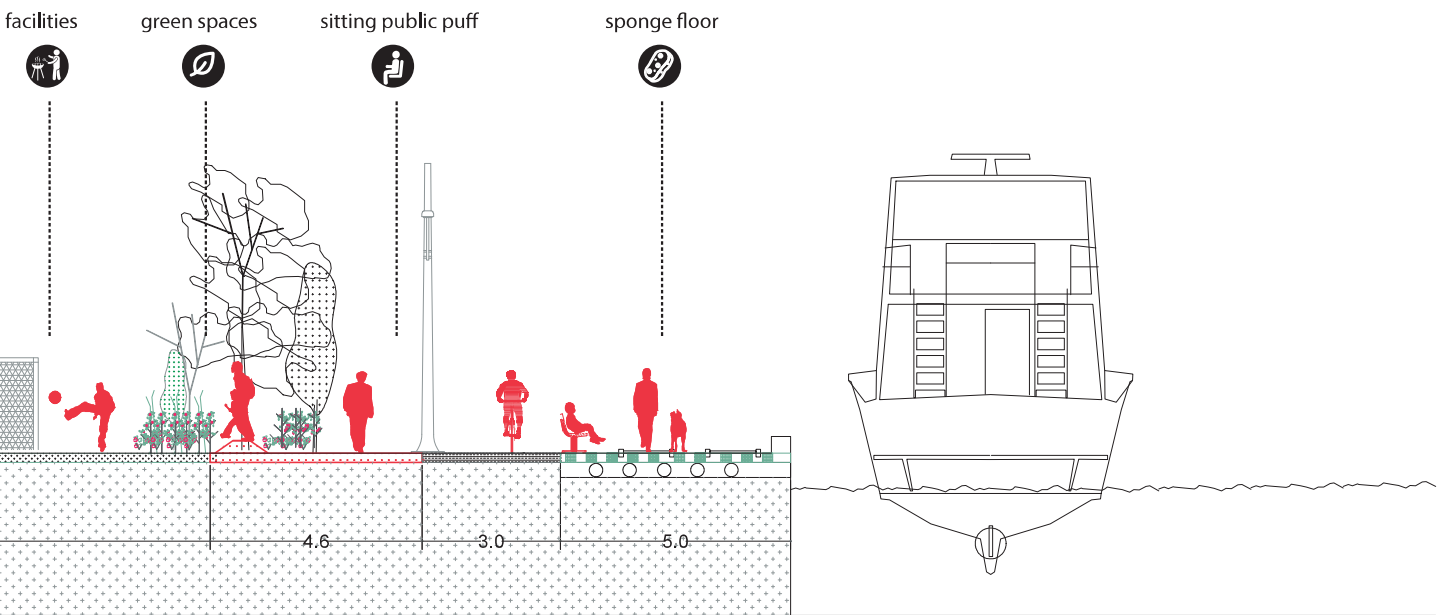
- wood
- soft concrete pavement
- elastomer / absorbant
- porous floor with bricks
- grass and green layer










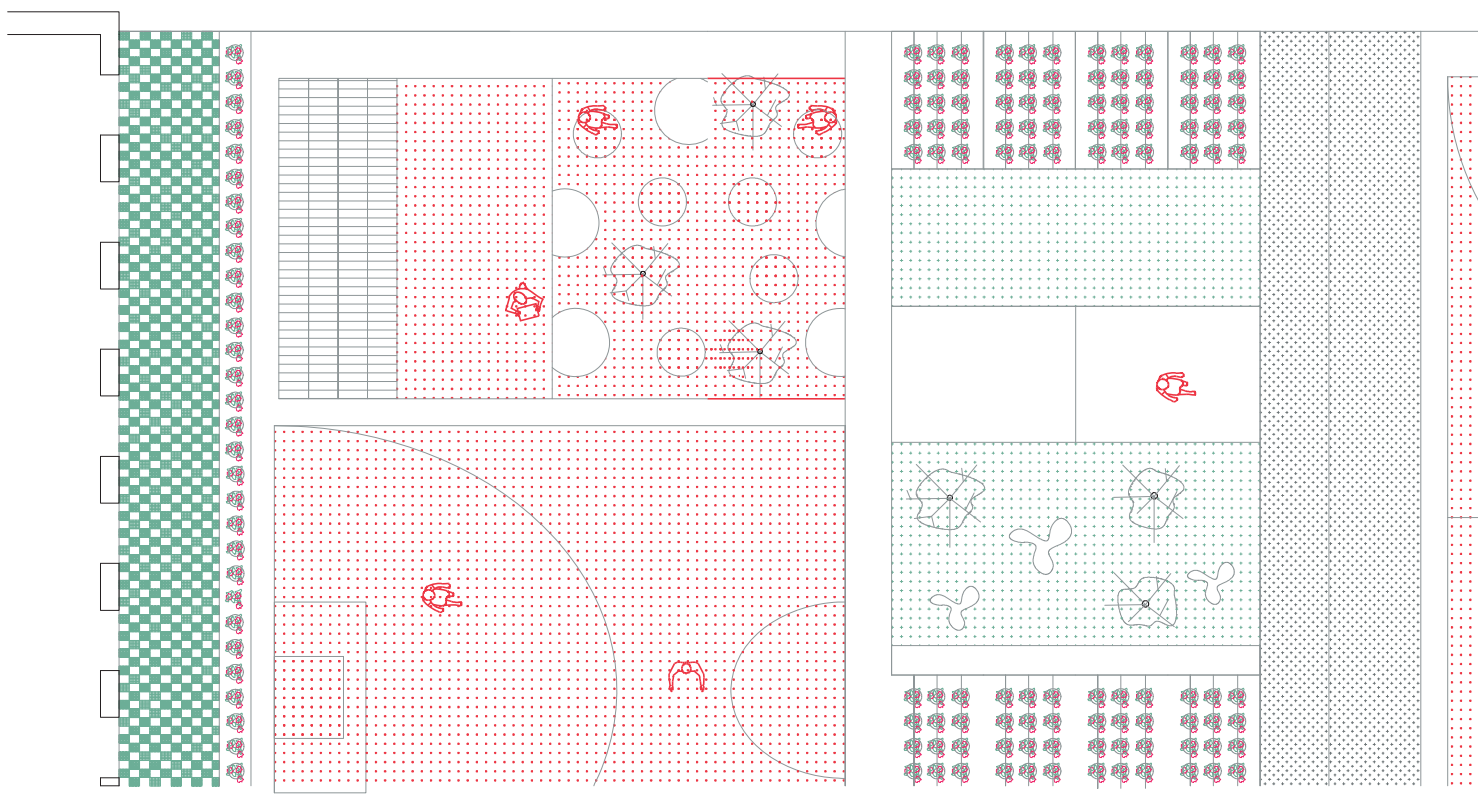
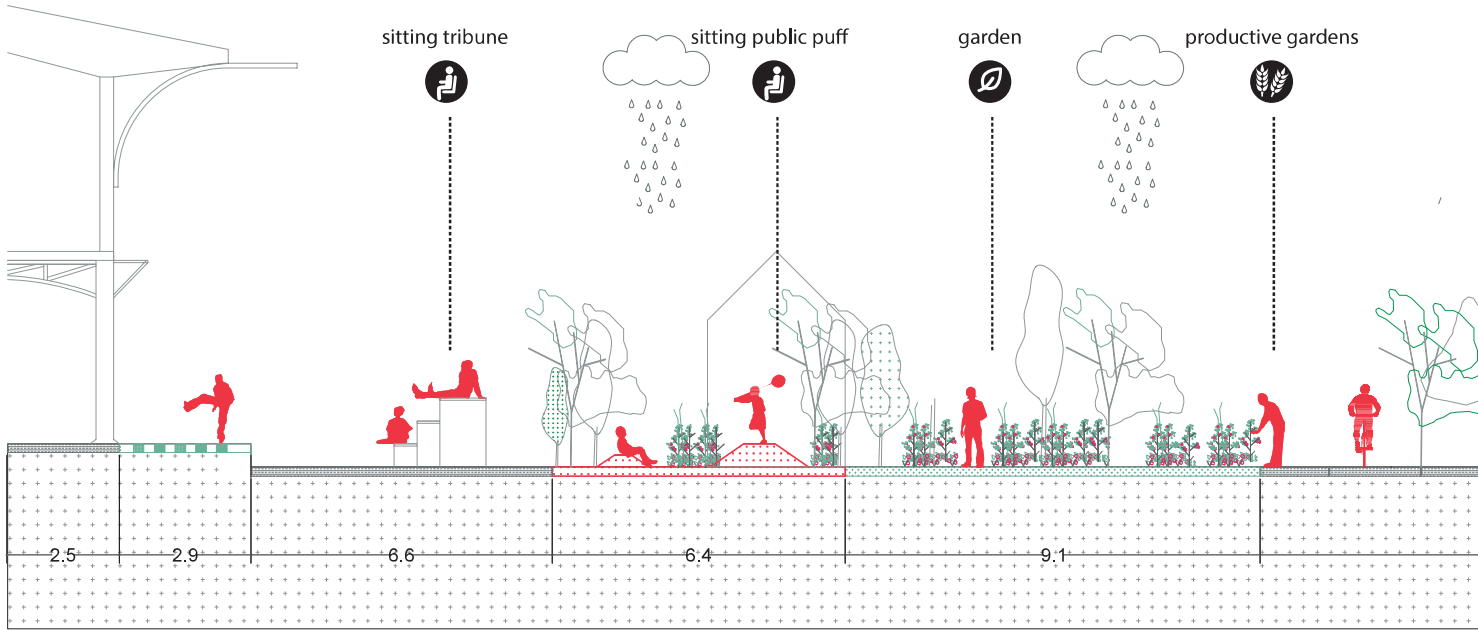
- wood
- soft concrete pavement
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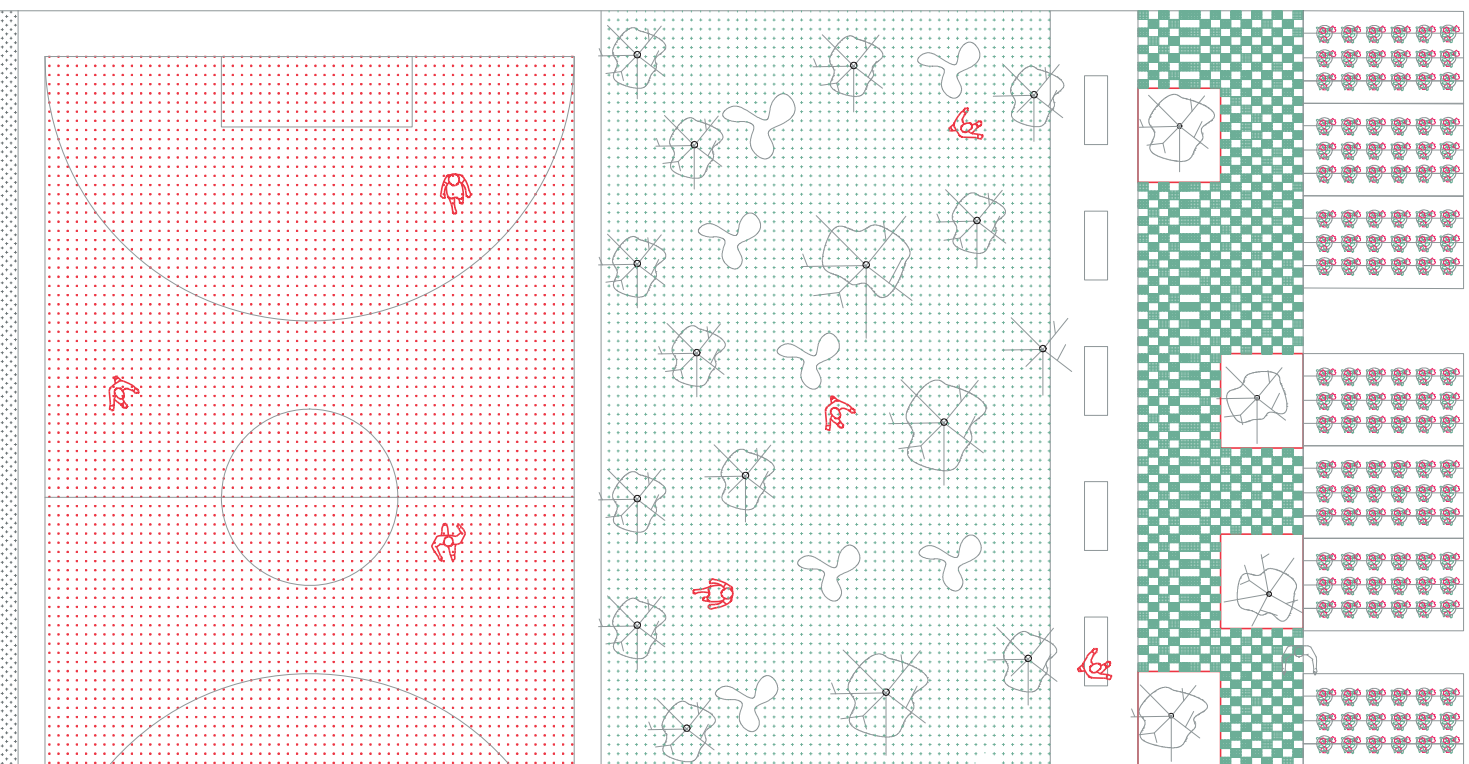
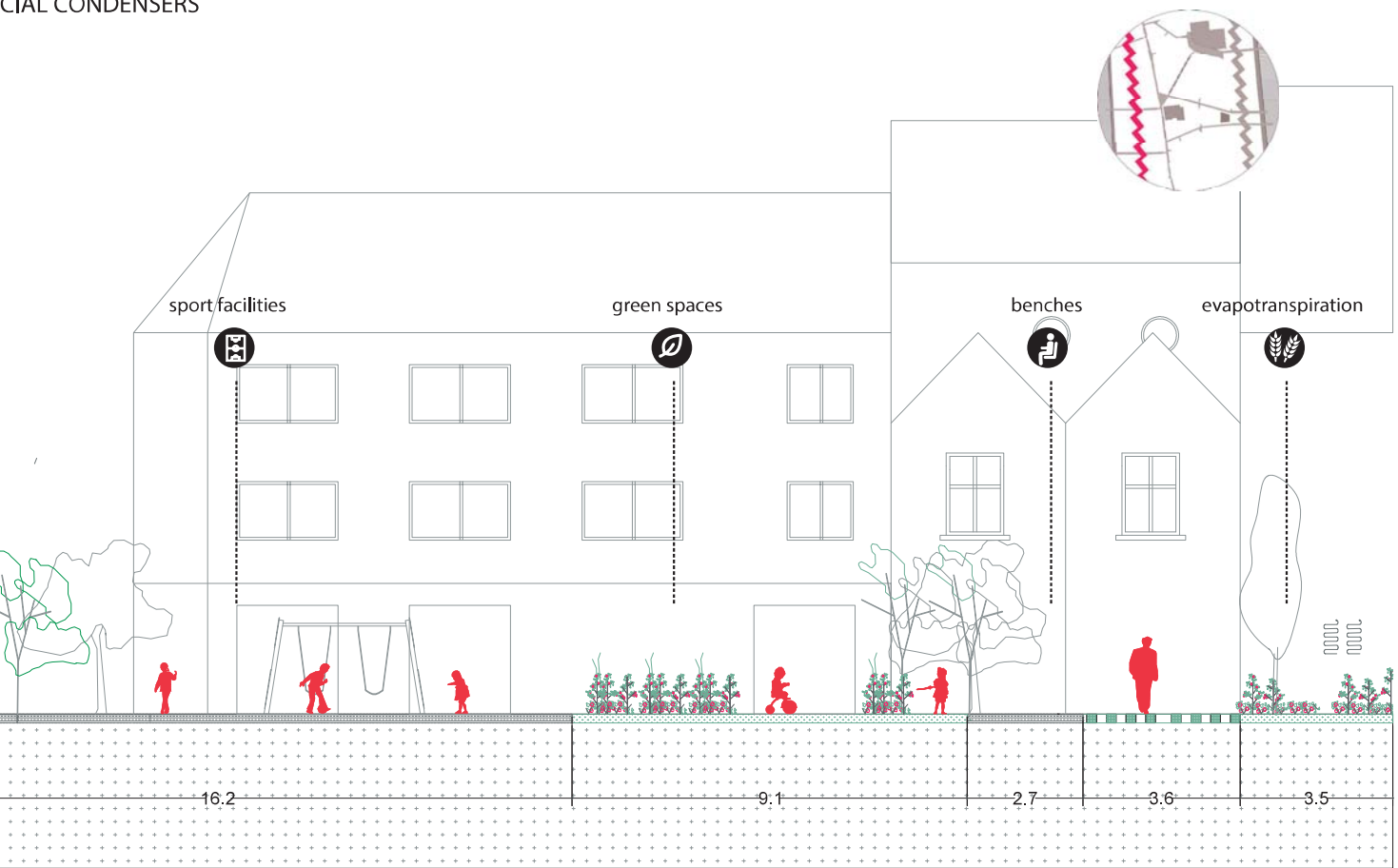


-  wood
-  soft concrete pavement
-  elastomer / absorbant
-  porous floor with bricks
-  grass and green layer



onal corridor






CIAL CONDENSERS

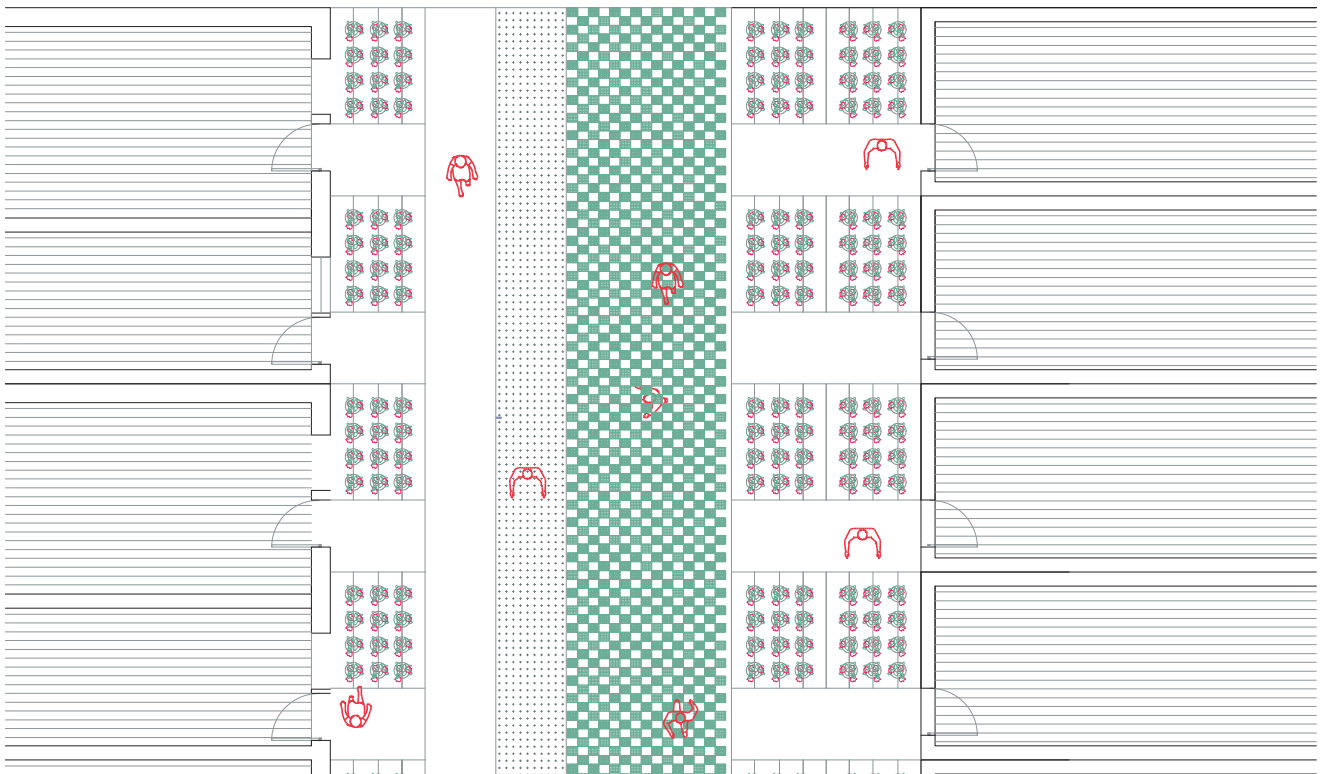
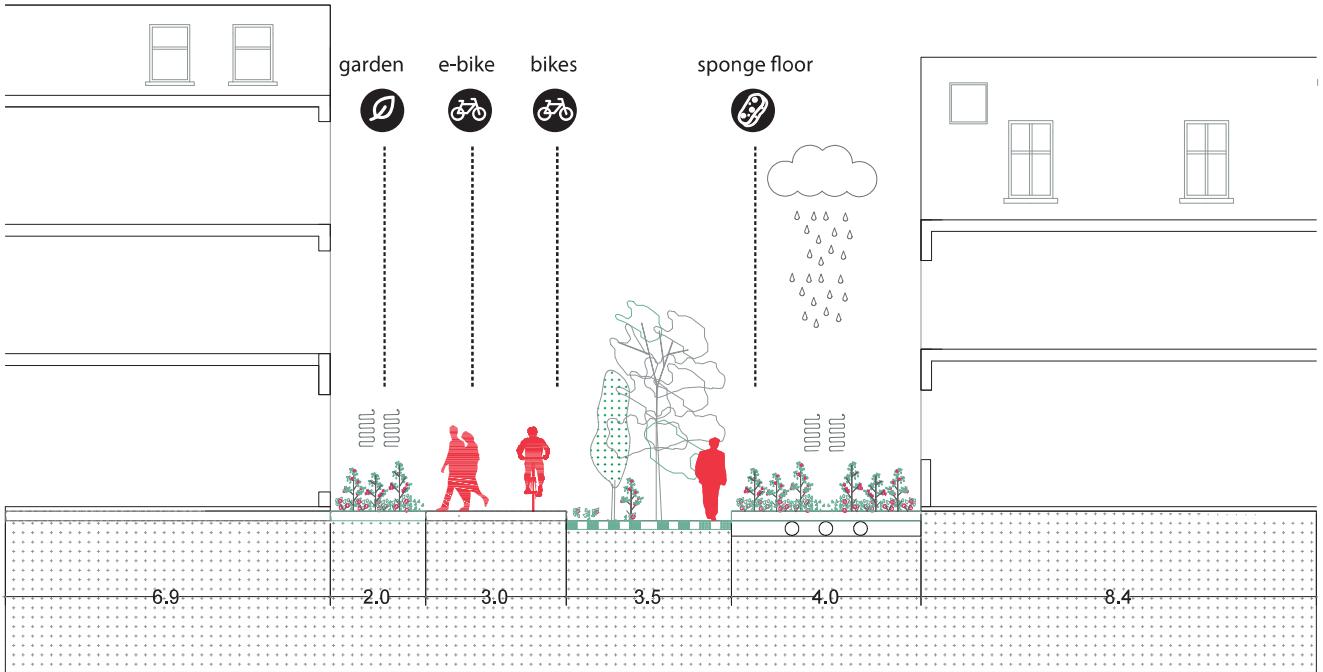
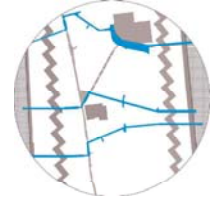




7 Vein typology

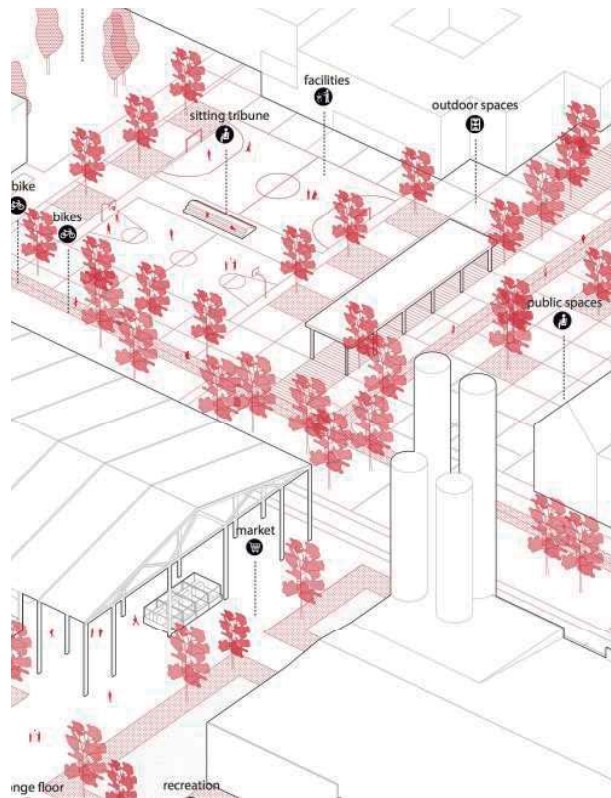
URBAN ECOSYSTEM

-  wood
-  soft concrete pavement
-  elastomer / absorbant
-  porous floor with bricks
-  grass and green layer





The Plazas



1

Brain plaza

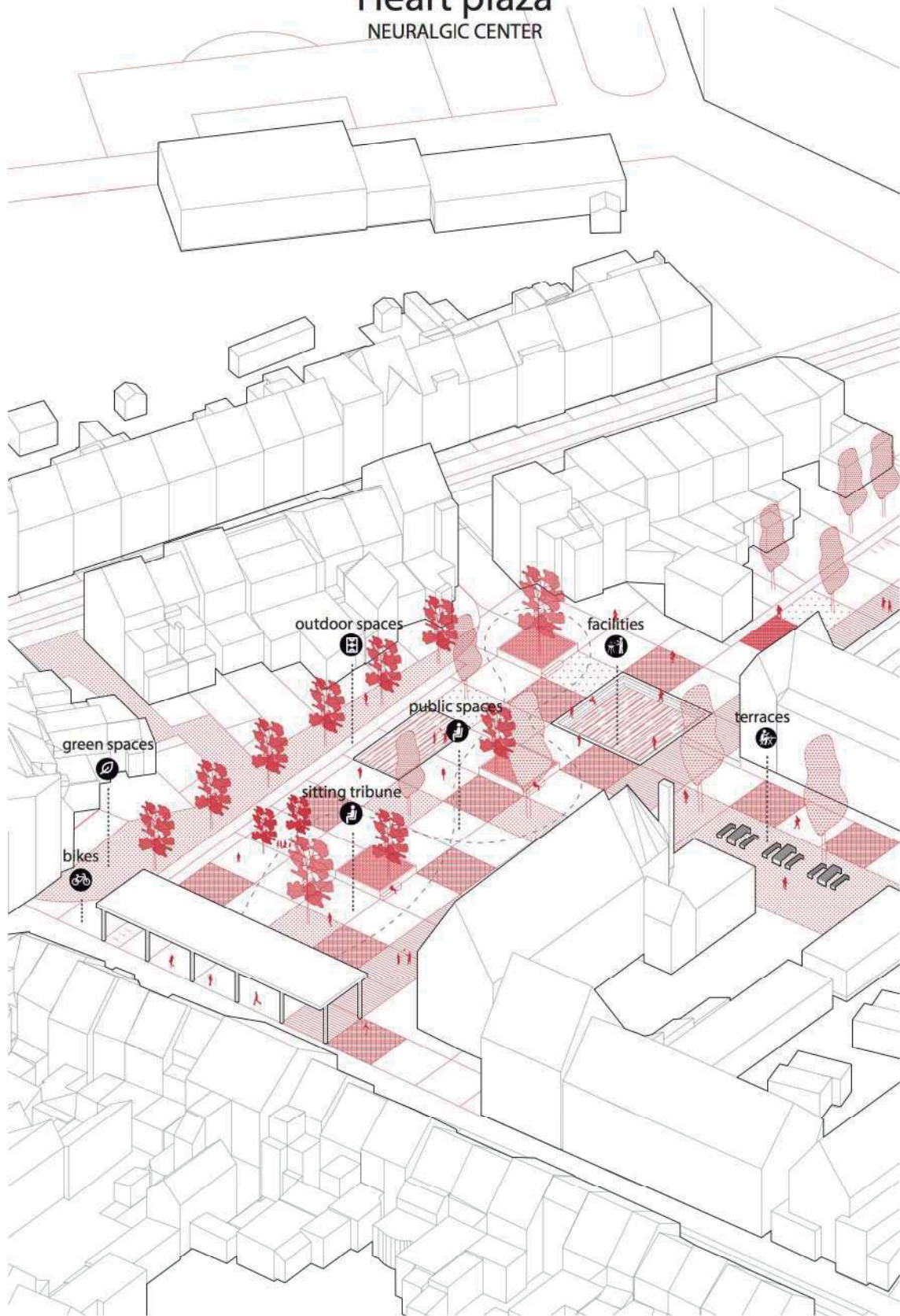
SERVICES AND CONNECTIONS



2

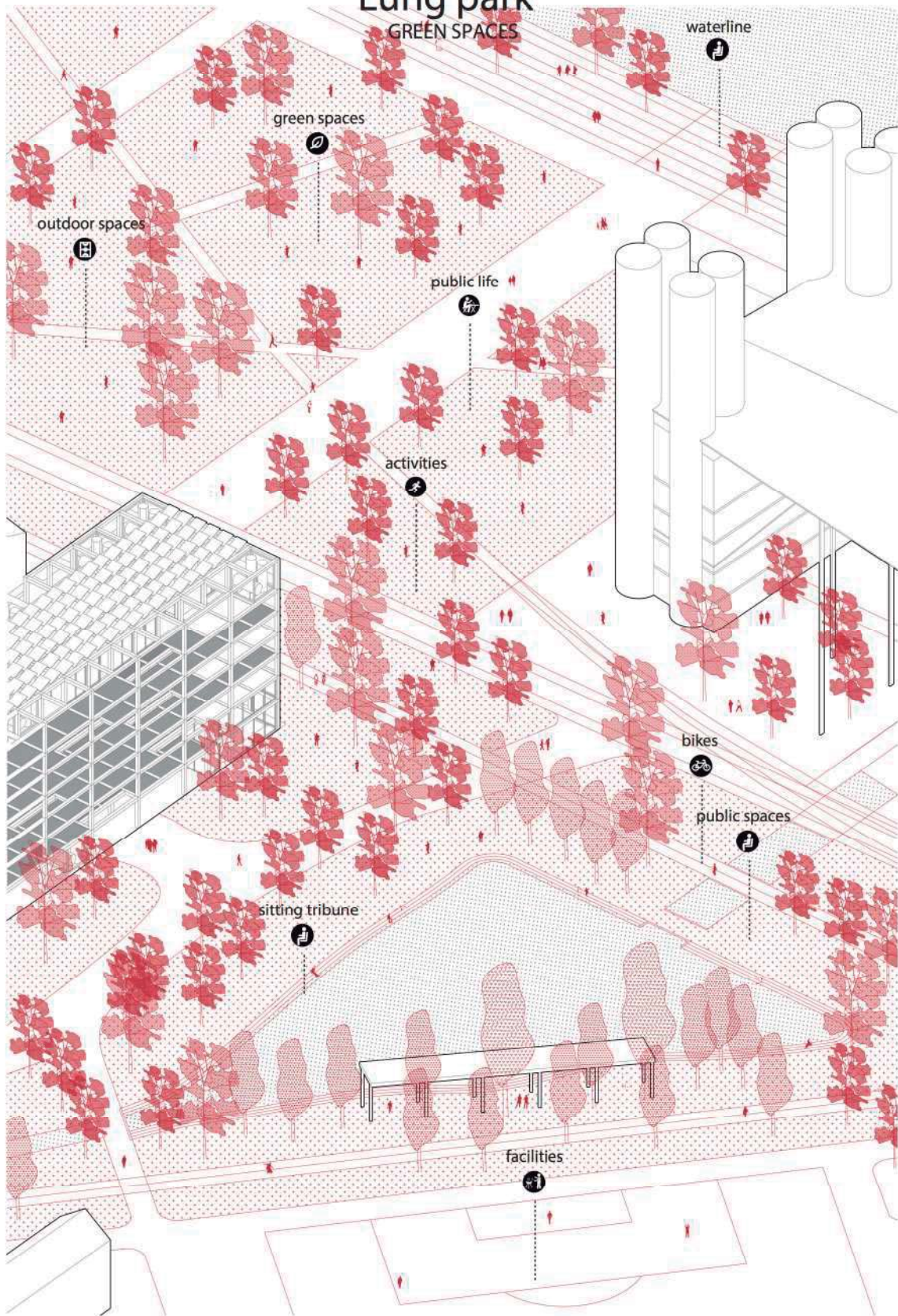
Heart plaza

NEURALGIC CENTER



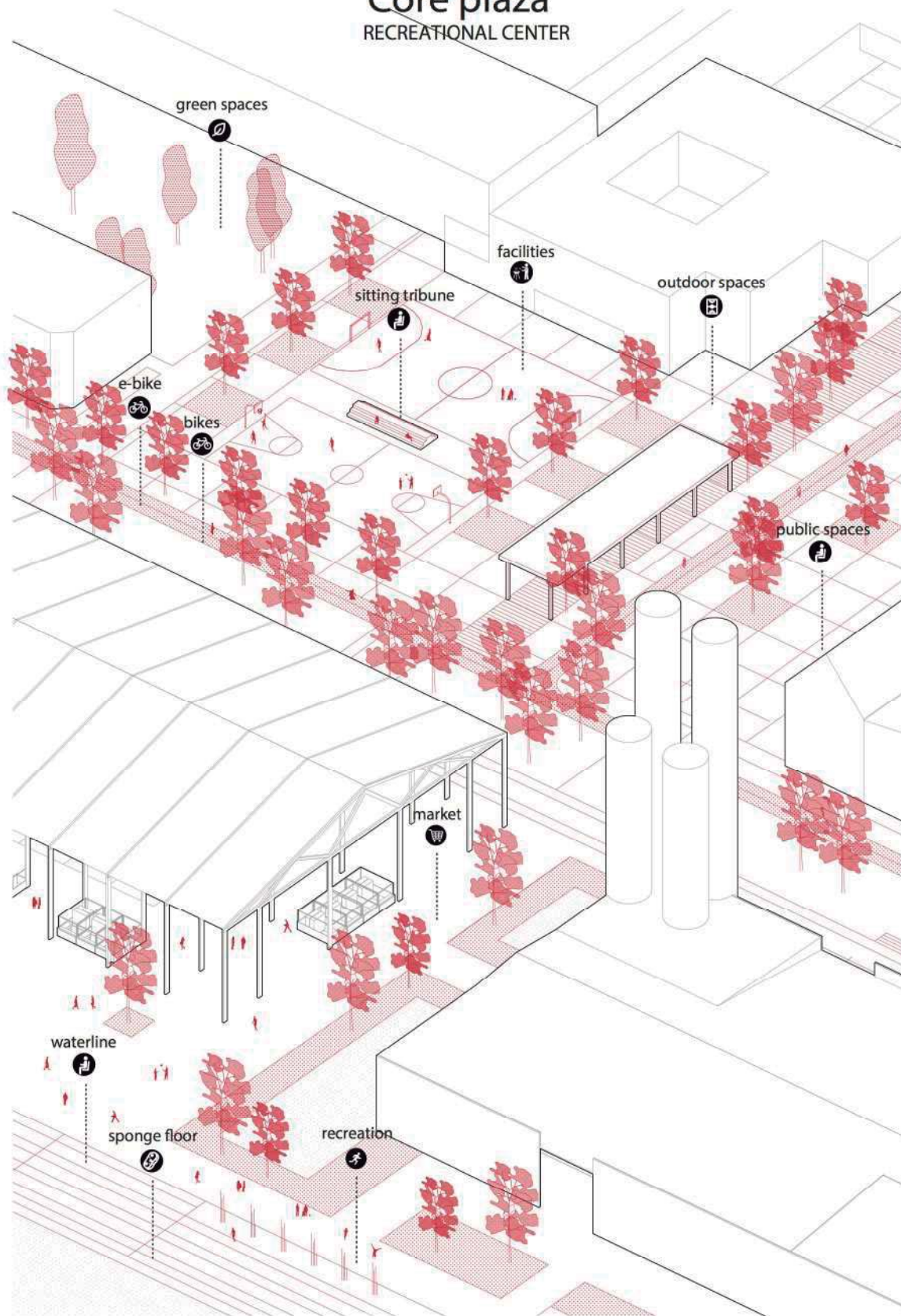
3

Lung park GREEN SPACES

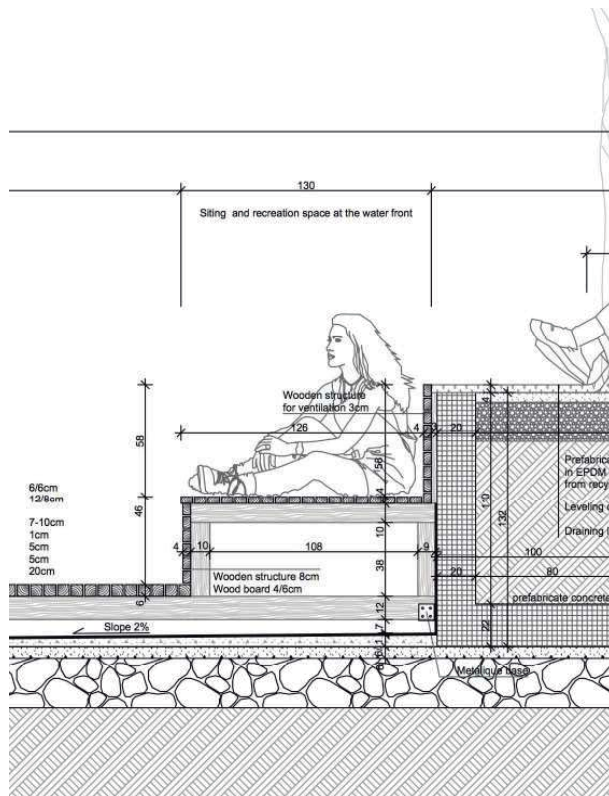


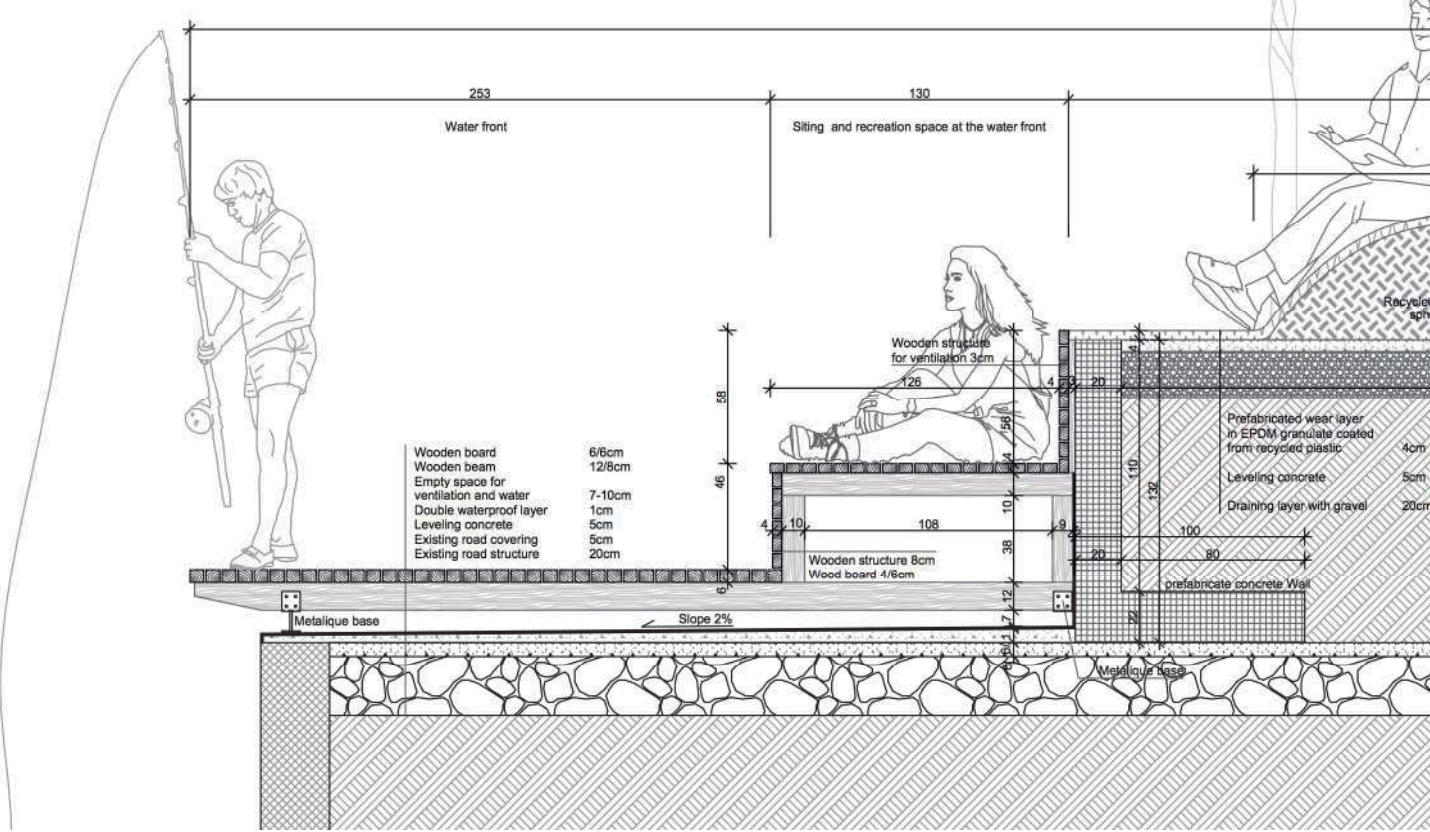
4

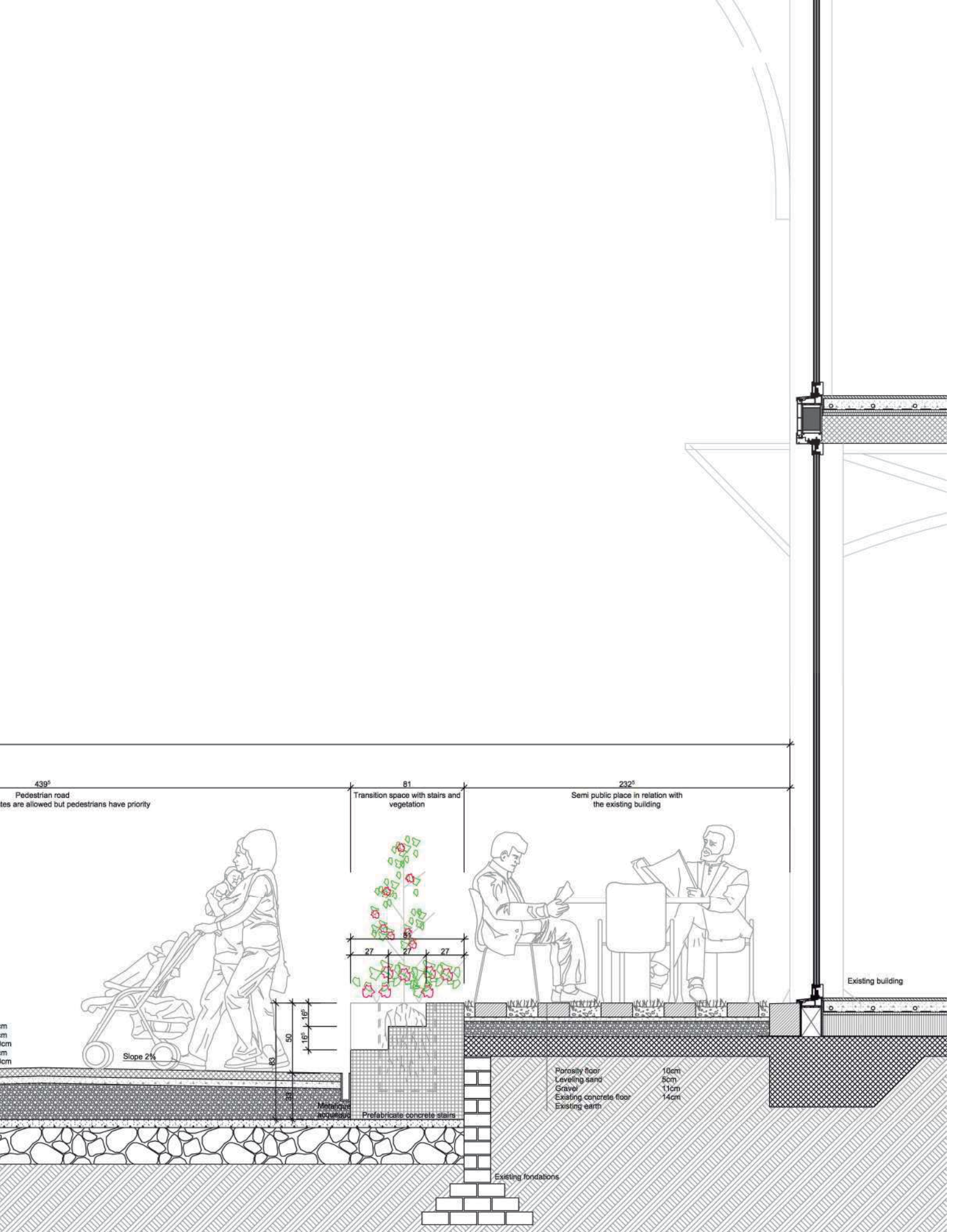
Core plaza RECREATIONAL CENTER



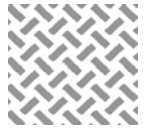
The Detail



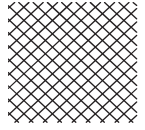




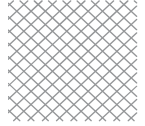
Recycled plastic sphere



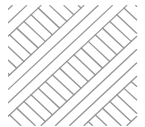
Existing concrete



New concrete



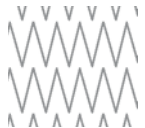
Earth



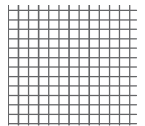
Existing road structure



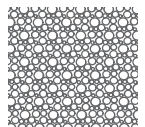
Prefabricated wear layer in EPDM granulate coated from recycled plastic



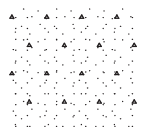
Prefabricate Concrete



Gravel



Existing floor



Level concrete



Vegetal earth



Detail of every type of floor
Scale 1:33

URBAN METABOLISM

MUIDE 1 - URBAN

Muide is a peninsula located at the north of Ghent defined by a residential district with different post-industrial waterfronts. Today, it is a place that tends to turn into a sustainable village, a pilot district which can serve as an example for the rest of the city.

The proposal presented, suggests an analogy between the peninsula and the terminology of “urban metabolism”. Treating the urban fabric as a metabolic system with different organs and circulations.

Indeed, both of them need a nervous system composed by services and connections, a blood system organized with veins and arteries (the avenues and streets), a breathing system made by green spaces, and finally; a locomotor system that defines the structural network of Muide. For this, each team has been given the role of an organ, to reflect on the different scales of the urban project and the further development of the site. By giving the others a set of rules; together they will establish the perfect cohesion between all the proposals. Defining a clear identity for the future village.

The urban team has the role of defining the blood system, but also organizing the whole infrastructure of this “metabolism”. Focusing on the new visions for the streets and the public places, that combined with nature, water, materials, energy, and slow mobility will define the main parameters to develop a future urban metabolism.

