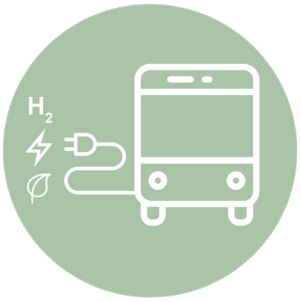
VOLVOLAB 2050

OOSTAKKER VILLAGE - MOBILITY

Climate Design &
Sustainability

KULeuven - Departement Architecture
2020
Alexandre Boyens, Tom Detry, Thibault Feyaerts, Alexis Monti, Valentin Sohet



INDEX

TEAM & CONTENT

1. TEAM & RESPONSIBILITIES

Alexandre Boyens
[Technical Engineer]

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[Storyteller]

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[Industry Councelor]

Alexis Monti
[Sustainable Designer]

Valentin Sohet
[Graphic Designer]

2. FUNCTION

Building location: Pijphoekstraat, Oostakker center

Building function: housing, public bar and services

Floors:

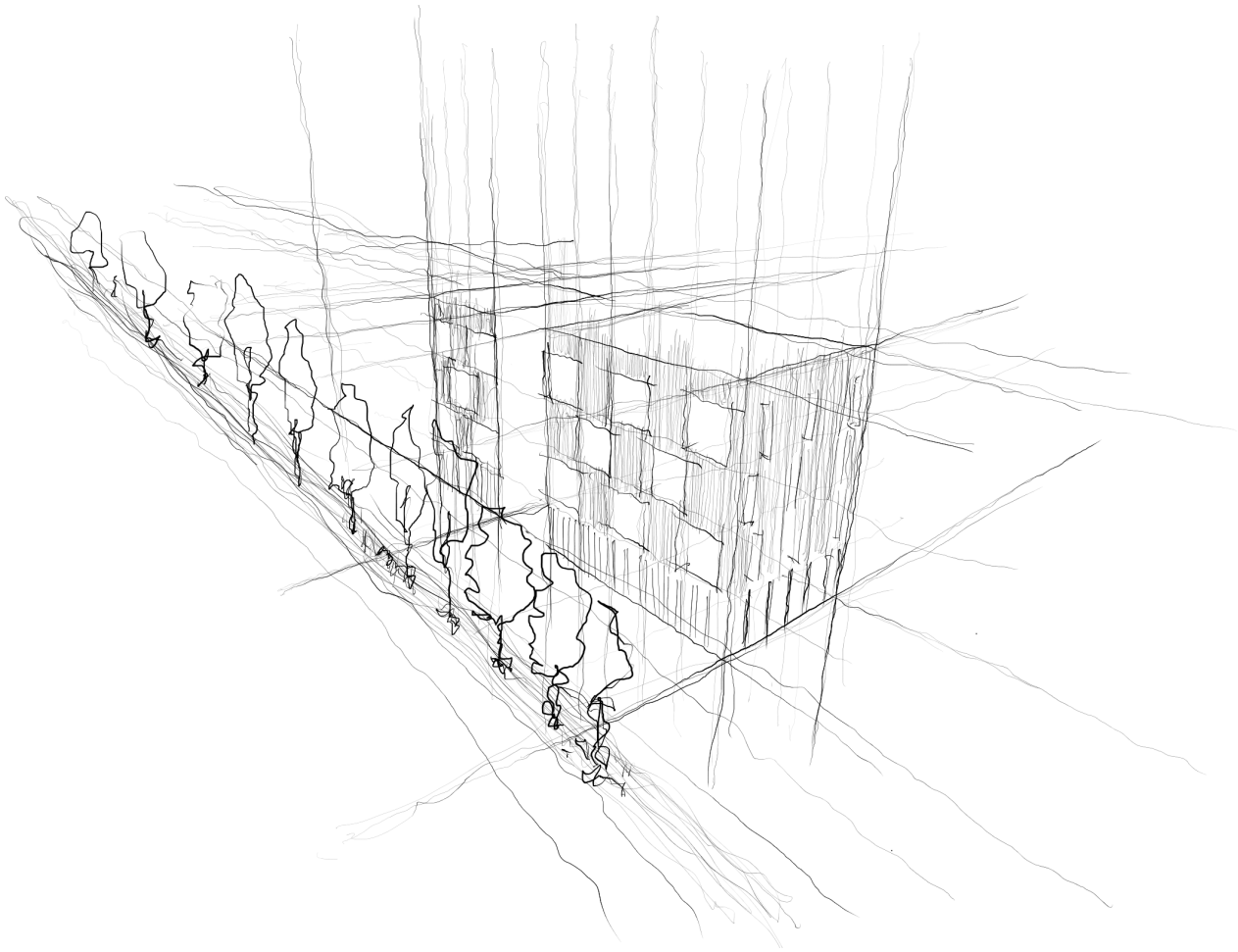
Ground floor: commercial functions
+1: services functions
+2 & +3: housing

3. BASIC DATA

Total site area: 380m^2
Total floor area: 692m^2

Floor area public bar: 108m^2
Floor area bike storage room: 36.5m^2
Floor area staircase: 180m^2
Residential floor area: 4 units, 346m^2
- 2 apartments (3-rooms): 108m^2
- 2 apartments (1-room): 65m^2

Number of people living in the building: 12
Number of people working in the building:
- 5 bar
- 1 professional function (medical function)
- 2 leisure function



General overview

CAR DEPENDENCY

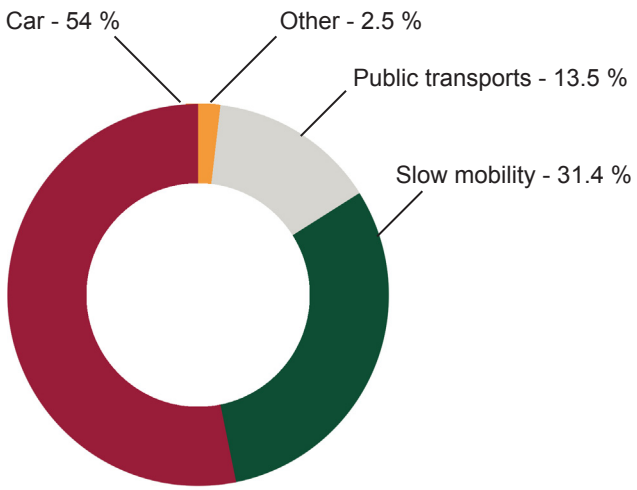
The village of Oostakker is located in the suburban area of the city of Ghent. Despite the isolation feeling you first get when reaching Oostakker, the village is no less definitely dependent on Ghent and its surroundings. Indeed, Oostakker do not offer any economic or social subsistence.

The emptiness of the place is striking in this village dictated by “go-and-back” drives between jobs, schools, services, etc. outside Oostakker and houses that form the urban fabric. While this area could benefit from a stronger and more personal community experience, the overabundance of cars appears as iconic. The only visit of its centre perfectly addresses this huge starting point since the core of the village and its main square appears and are used as a large parking spot.

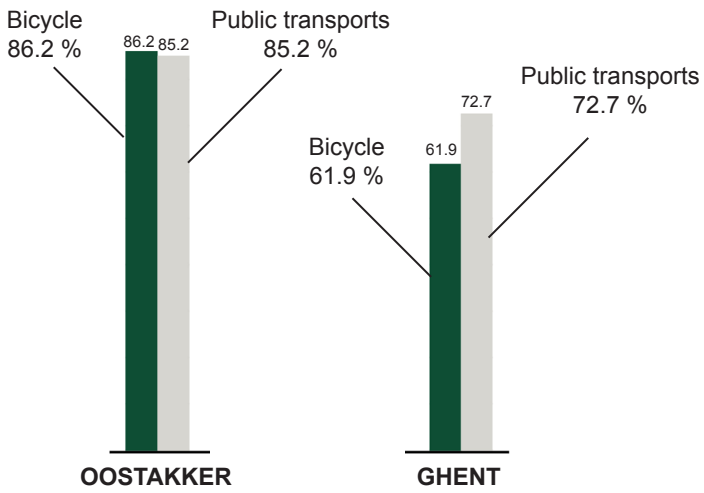
Although the place is now ruled by cars and weak exchanges, its situation is no less extremely interesting and could have a strong growth potential in the years to come. Actually, the village is located in an area surrounded by the harbour of Ghent and many major industries. The reinforcement of the connections between Oostakker and these important economic potentials - that employ most of the inhabitants of the village - could certainly lead to important exchanges in order to revive the place and its local activities.

Therefore, the rethinking of the whole mobility system of Oostakker will enable the development of the village as a more attractive area where public transports and slow/soft mobility could reduce the road congestion during busy hour while improving the ecological aspects and the social interactions.

TRANSPORT TO WORK



INFRASTRUCTURE ACCESSIBILITY



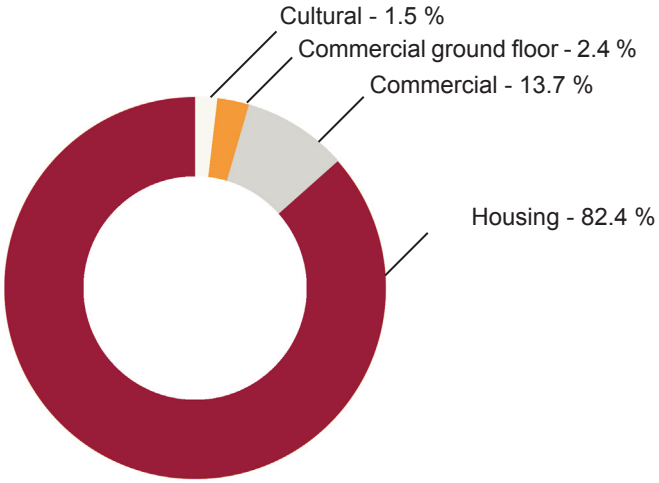
MONOFUNCTIONALITY

In order to make our new network design work, the implementation of a new function mixity is crucial. Indeed, the housing represents the large majority of the programme of Oostakker, resulting in a rather monotonous structure that lack to attract local exchanges and transport. Even in the middle of a weekday afternoon, the centre is quiet and there is only a few people in the streets. This feeling of ghost village is gripping and reveals a typical feature of the place: Oostakker as a dormitory village. Indeed, buildings other than residences are rare and do not participate in the village life at all. The only shops or services are closed for the most part and the huge amount of individual housings are all left abandoned until their owners' return form the surroundings at the end of the day.

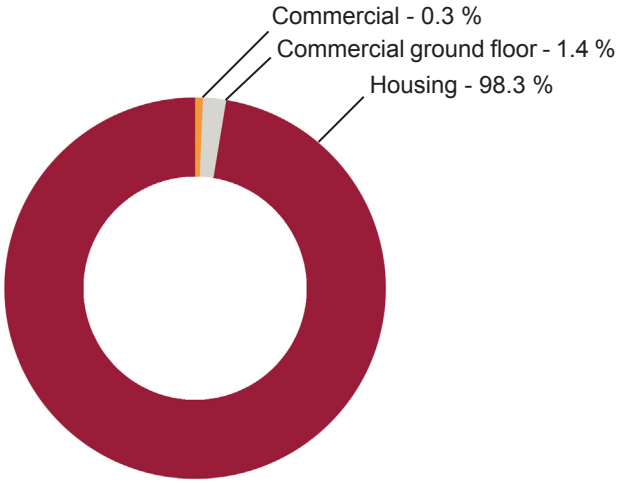
If we want to promote and to make this soft mobility village possible, it is important that Oostakker can be able to propose a local and autonomous concept of life. Therefore, it is vital to find enough residences but also commerces, services, jobs, activities, industries, etc. within the village to make such a concept feasible. The keys to revitalize and to reach the 2050 vision are MIXITY and PROXIMITY.

In order to respect that promise, the village should be composed of a certain amount of each function. In addition, each house should be able to find every function in a radius of 700m (10min walk).

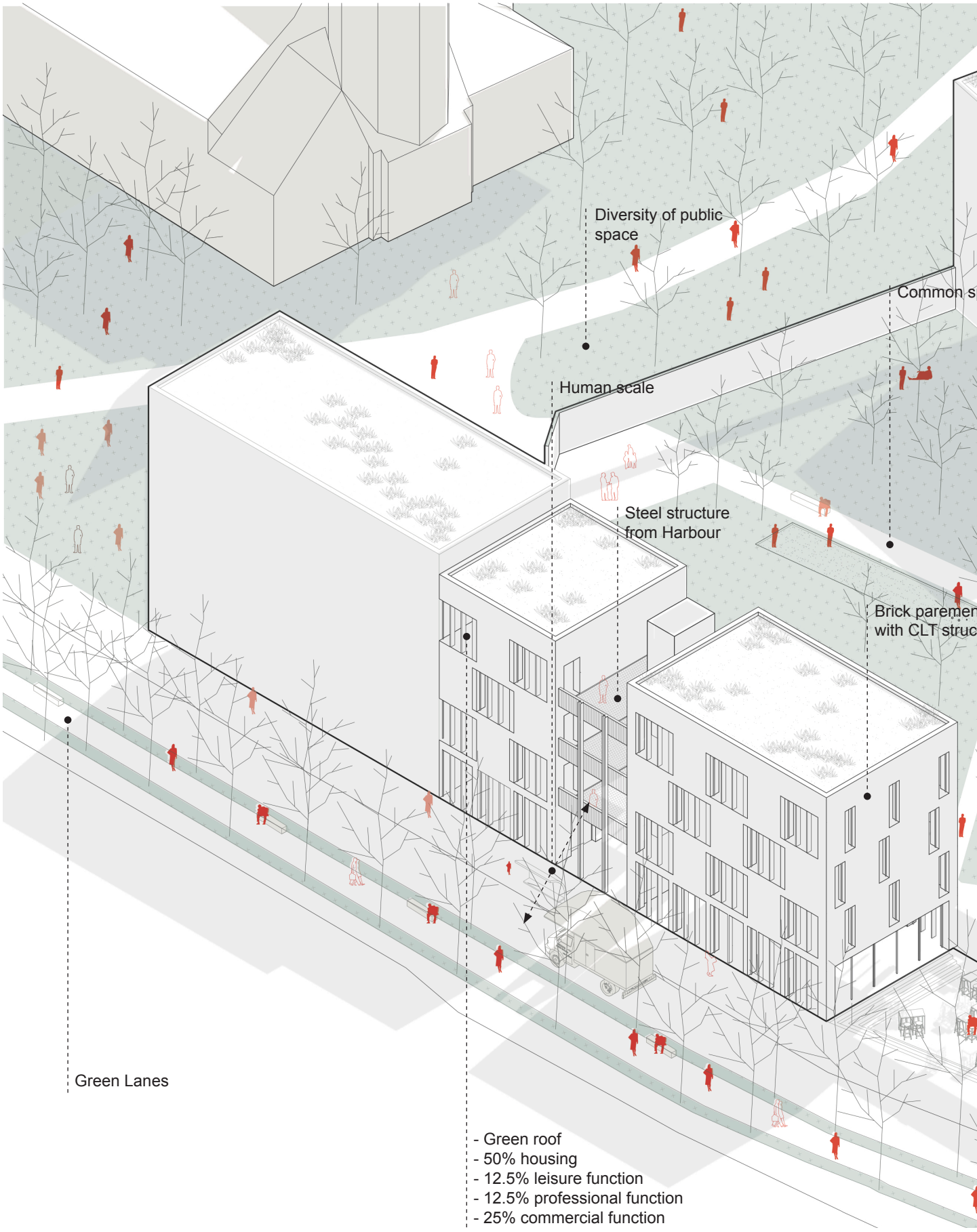
OOSTAKKER CENTRUM

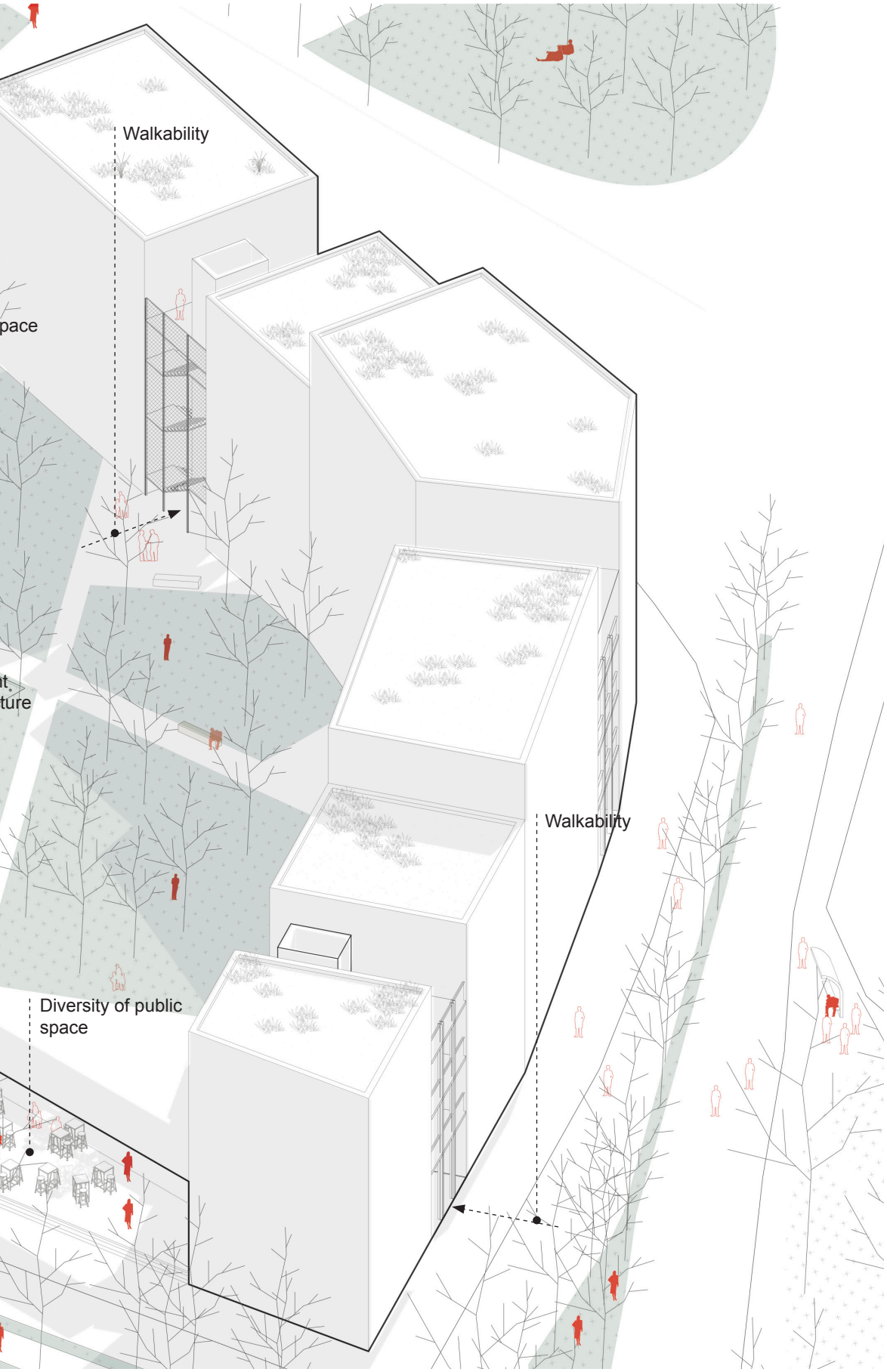


TYPICAL OOSTAKKER NEIGHBOURHOOD



GENERAL OVERVIEW OF VOLVOLAB 2050

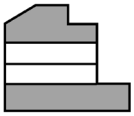




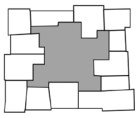

Multifunctional building


Flexibility


Different shape

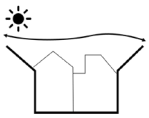

Top & ground potential

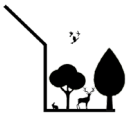

Diversity of public space


Common space

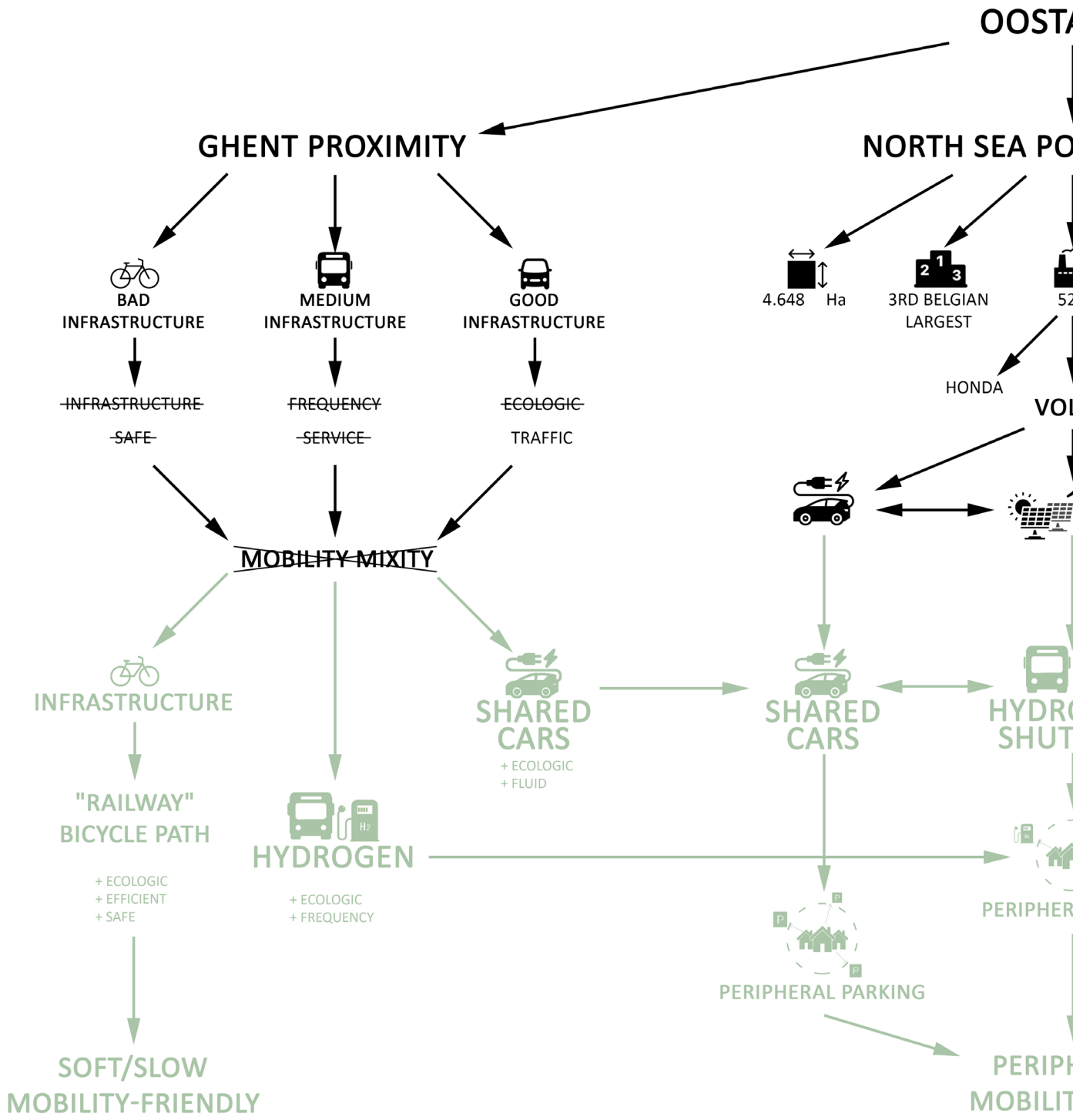

Human scale

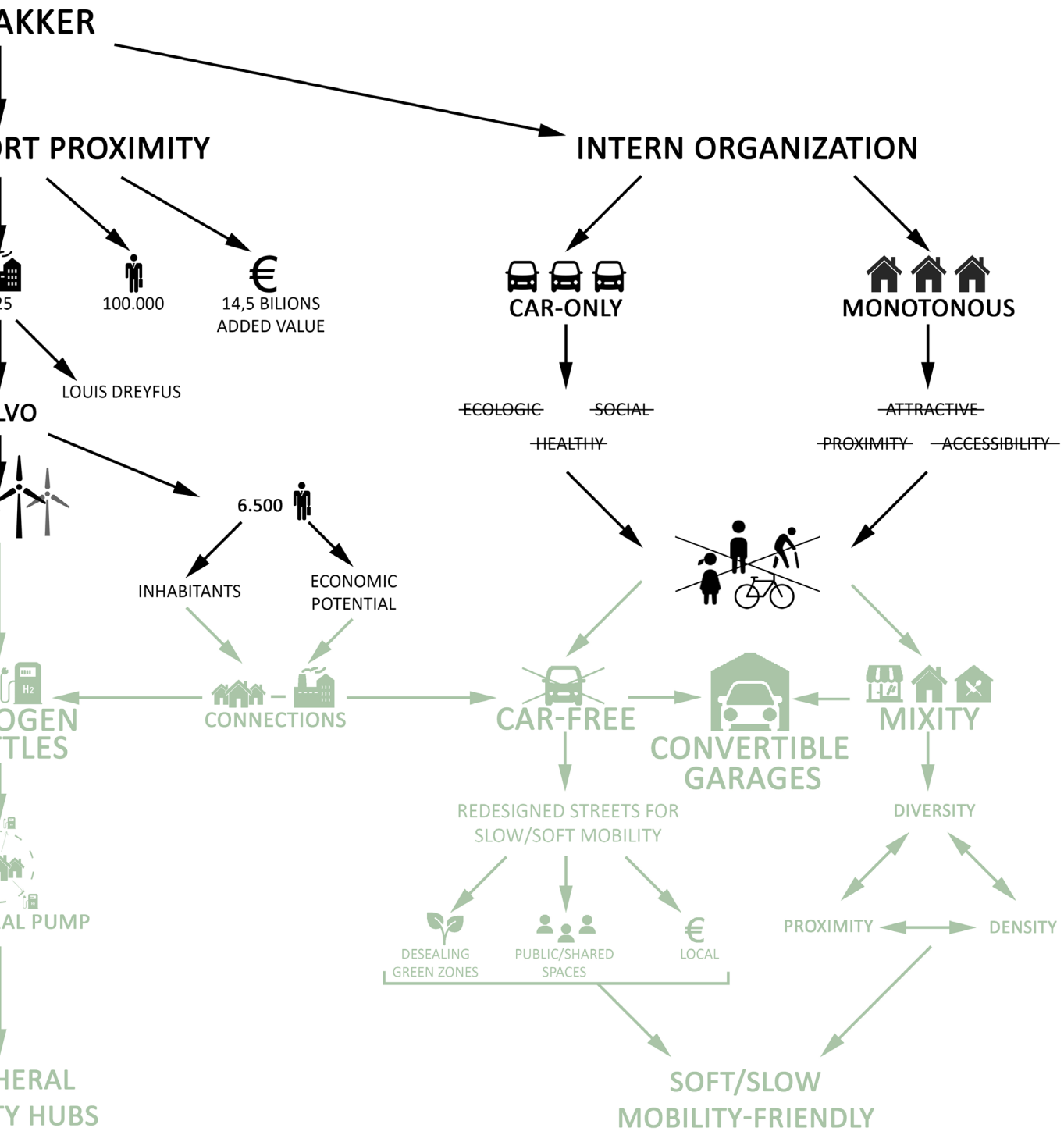

Walkability


Play with weather


Biodiversity

GENERAL ORGANISATION CHART




AKKER
RT PROXIMITY
INTERN ORGANIZATION
100.000
14,5 BILIONS
ADDED VALUE
CAR-ONLY
MONOTONOUS
LOUIS DREYFUS
LVO
ECOLOGIC
SOCIAL
HEALTHY
ATTRACTIVE
PROXIMITY
ACCESSIBILITY
6.500
INHABITANTS
ECONOMIC
POTENTIAL
OGEN
TLES
CONNECTIONS
CAR-FREE
CONVERTIBLE
GARAGES
MIXITY
REDESIGNED STREETS FOR
SLOW/SOFT MOBILITY
DIVERSITY
AL PUMP
DESEALING
GREEN ZONES
PUBLIC/SHARED
SPACES
LOCAL
PROXIMITY
DENSITY
HERAL
Y HUBS
SOFT/SLOW
MOBILITY-FRIENDLY

City scale

2020

In 2020, the analysis is clear at city scale: Cars are still integral part of both the city of Ghent and the village of Oostakker.

Indeed, variety of connections and means of transport between the two points is definitely low and almost limited to highways and motorized vehicles. The only public transports are featured by slow and circuitous drives, and soft mobility infrastructures are missing or totally unattractive.

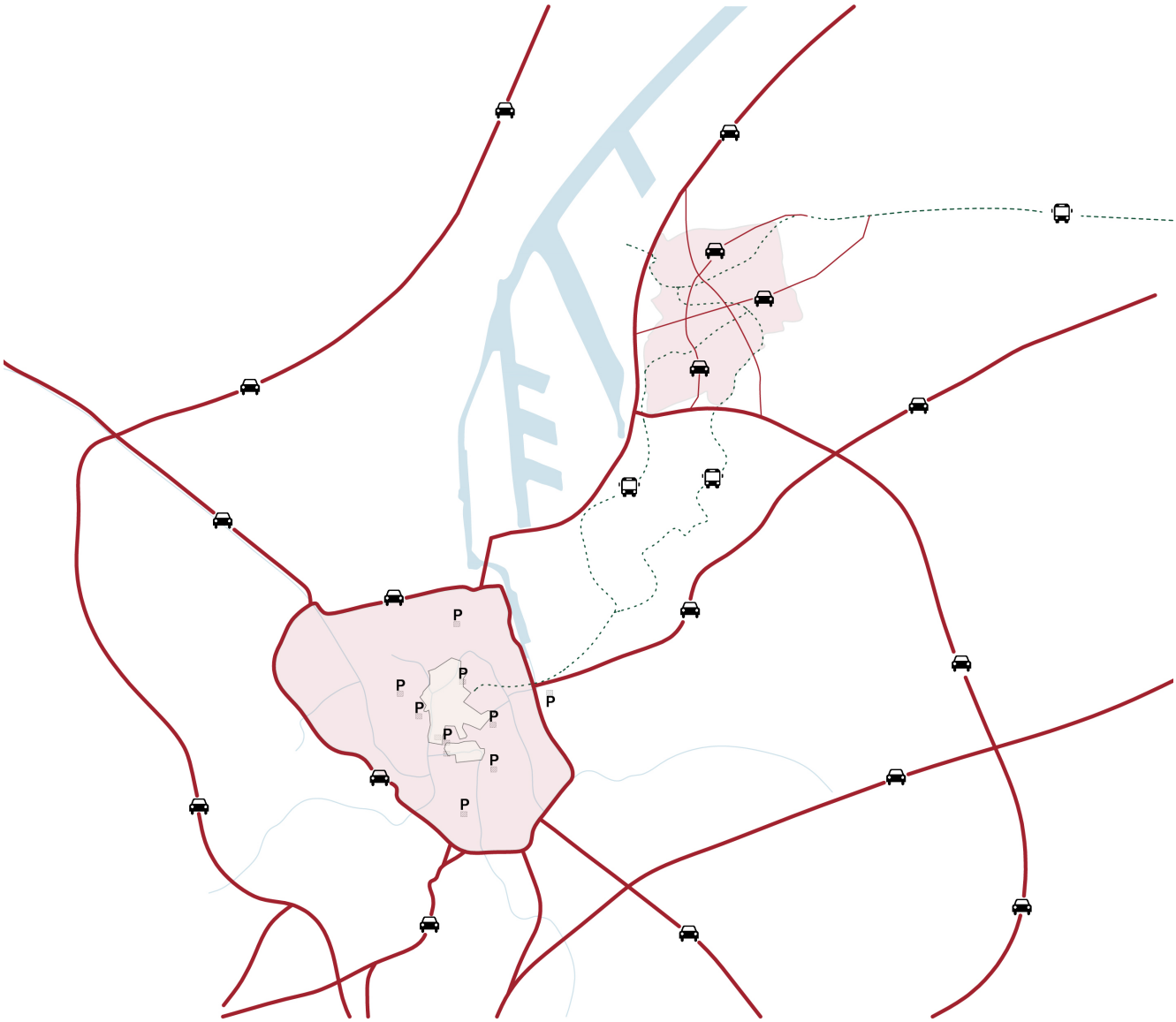
The interview of a local worker in Oostakker opened our eyes to this fact:

“ I live in the surroundings of Ghent and work in a bank in the centre of Oostakker. Although the distance is not huge, I definitely prefer to use my car since I do not feel secure while riding my bike on roads that are in poor condition or simply not appropriate for cyclists.”

Therefore, the overuse of motorized vehicles leads to traffic congestion and terrible waste of time.
Inside Oostakker, the observation remains the same and everything is designed according to cars: streets, buildings, services, etc. The whole village lives at the pace of cars.

Nowadays, Ghent does not differ that much and cars are still very present in the city. However, more and more regulations are being implemented in order to gradually reduce the number of vehicles in the city and more particularly in its core. Car parks are removed from the centre and some pedestrian zones are seeing the light of day.

With that in mind, following and extending this sample vision to the two places in the future could be a great opportunity in order to reinforce and make connections easier.



2050

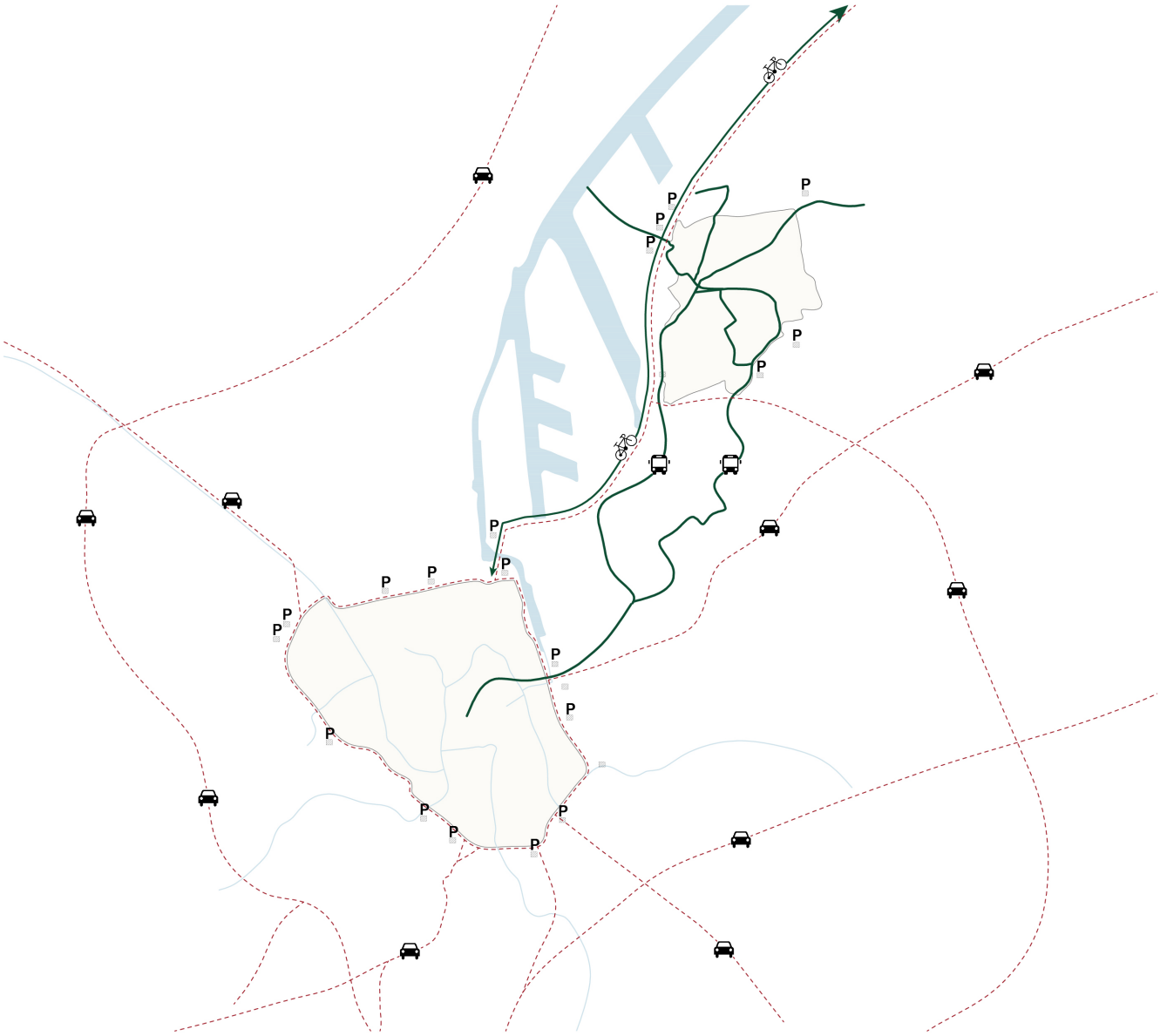
In 2050, the new face of the place is evident: Wiping cars off both the city of Ghent and the village of Oostakker while creating new efficient and sustainable connections between the two.

The purpose is actually to create car-free entities in which the new layout will be structured around pedestrian and soft mobility. Varied means of transport will be implemented in order to ensure efficacity and performance in moving inside but also between the two poles. By extending this car-free vision - that has now slightly started in Ghent - to the outside borders of the areas, the main idea is to keep remaining cars out of these ones and to create new atmospheres/systems inside these.

New vehicles and infrastructures will definitely reinforce the relationship between Ghent and Oostakker by offering multiple and pleasant ways to move. In this system, soft and sustainable mobility will be the key. Therefore, the accent will be put on the use of bikes and varied renewable energy vehicles in order to offer new possibilities and facilitate the link between the two.

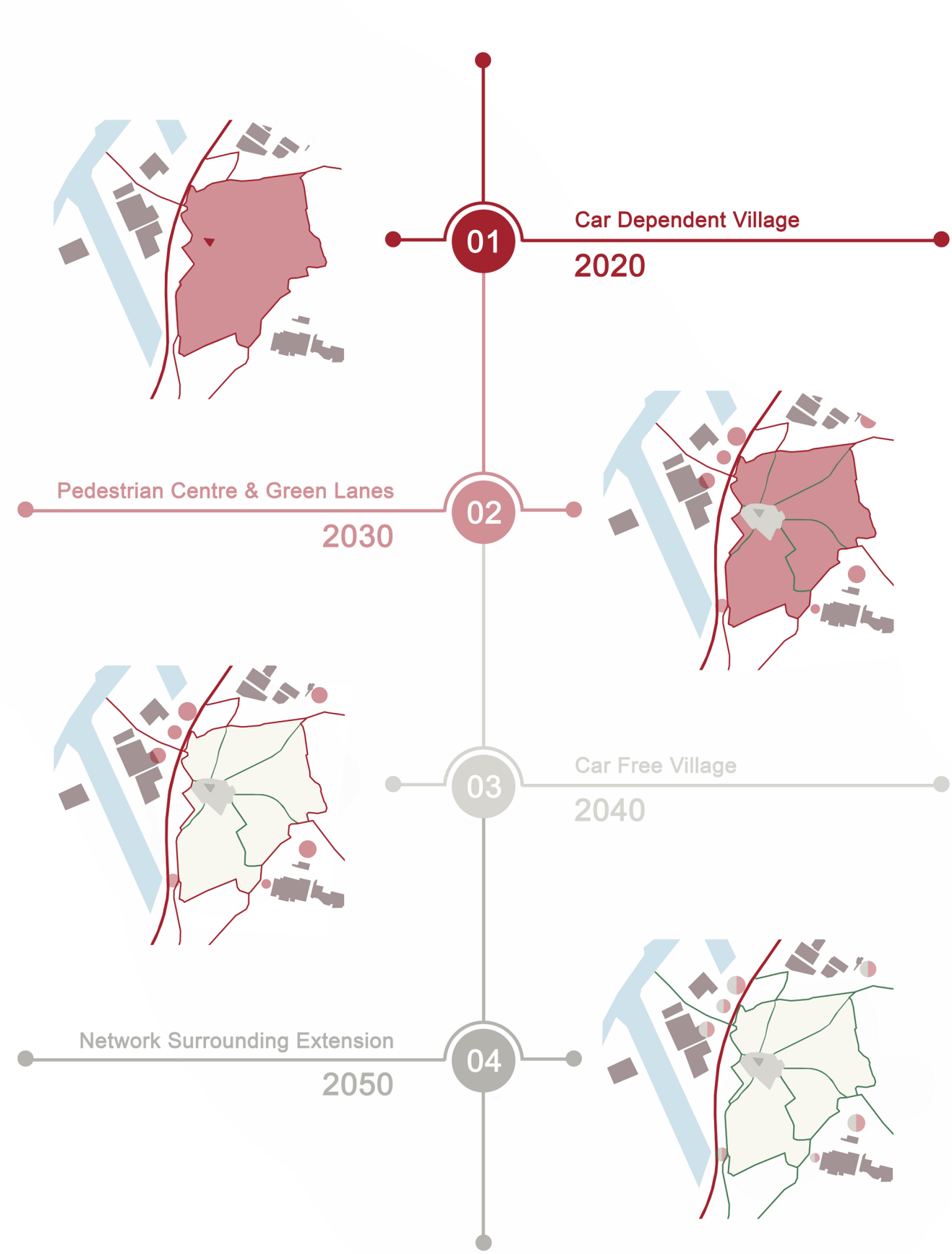
In addition to the connection itself, this future perspective will have a big impact on the inside areas as well. By stopping the access to motorized vehicles, the whole layout will radically transform, and especially its streetscape. In both places, the image of streets will drastically change and lead to new uses and perceptions.

At city scale, this common vision will allow new opportunities for connections while offering transformed environments inside both Ghent and Oostakker. Step by step, cars will become more and more obsolete.



Village scale

TIMELINE



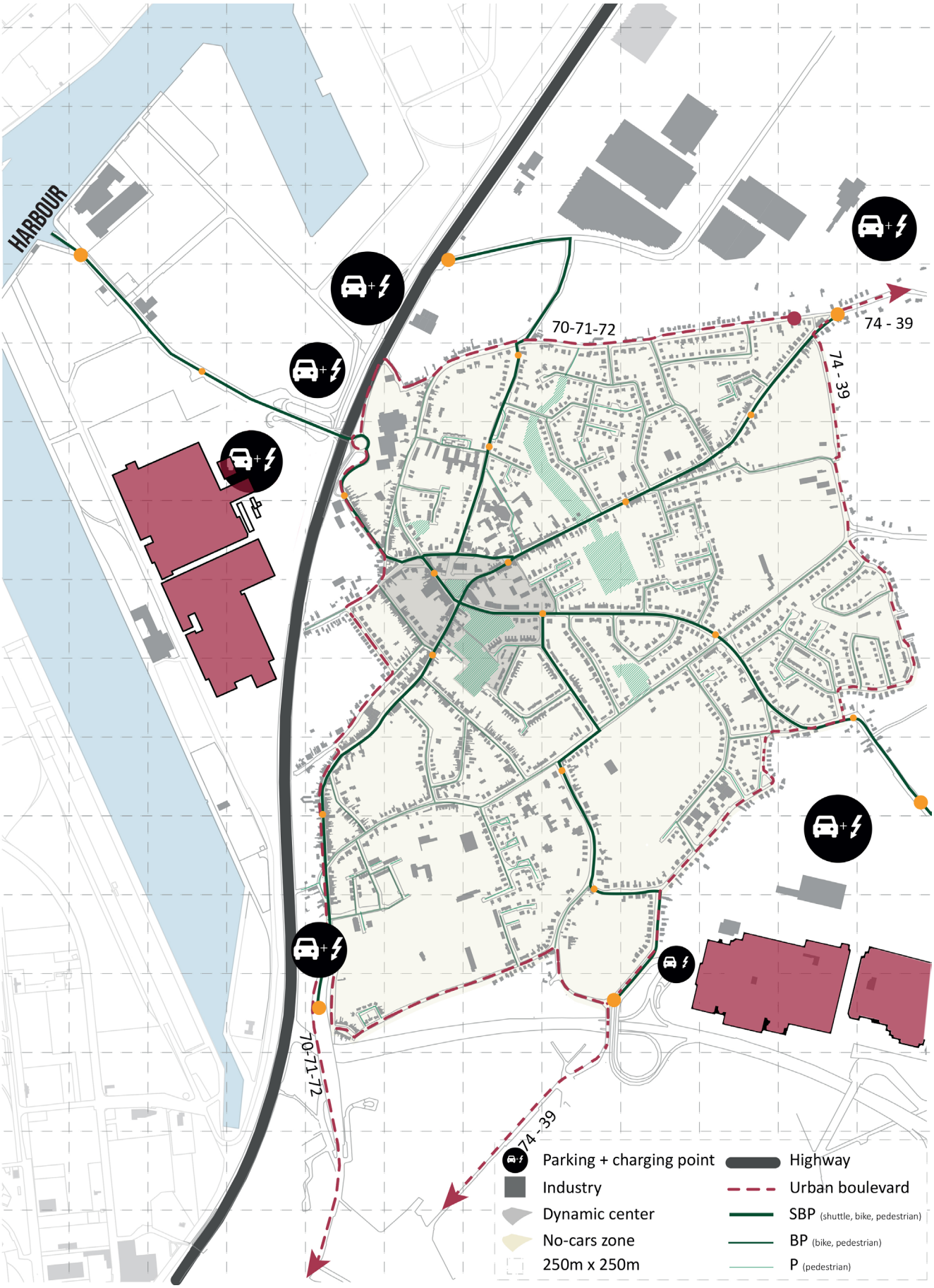
01 At the moment, Oostakker is entirely organized by its roads and cars flow. Indeed, the whole village is invaded by cars. This huge dependence on motorized vehicles has an important impact on the village's typology and structure. It is gripping to observe that the central area of Oostakker is used as a simple parking lot and that residential neighbourhoods do not offer any collective and playful areas apart from a gigantic asphalt surface. All this leads to a lifestyle based on go-and-back drives between house and distant places; and a complete lack of community spirit.
In addition, the village is surrounded by the harbour of Ghent and some major industries. Although these industries have a main role to play in the area, the reality is that the relation between these ones and Oostakker is almost non-existent. The connections are far from being obvious and the structure of the village do not bring any offer to the industries and its workers. Therefore, how could we redesign the village and especially its mobility system in order to promote a new way of life that could create a strong community spirit and reinforce these interactions between the harbour, the industries and Oostakker; targeting 2050 as a totally new vision?

02 The final design for 2050 is clear: Wiping cars off the village! However, this change cannot happen suddenly at the risk of raising inhabitants' opposition. Therefore, some transitional steps have to be reached gradually. The first deadline is planned for 2030 and its goal is to offer a first sample of the future vision of Oostakker. Actually, in 10 years, the purpose would be to wipe cars off the central area of the village.
By removing the cars and all the parking spots from this space and by enlarging it to a wider pedestrian area, this central space could give a first identity to Oostakker. Covering the central area, the park, the church, the main commerces/services and close surroundings; this pedestrian area could lead to a first collective and public space in the village. The rehabilitation/creation of new commerces/services in the center could also help to reinforce this first achievement.
In addition, another step could be reached in order to facilitate the connection between this new attractive center and the industries. By determining several main roads connecting the two and by reshaping them, the relation between Oostakker and these influent poles could be improved. The aim would be to redesign these roads in order to give them a symbolic image of this huge transition.
By welcoming infrastructures for soft mobility, collective transports, collective/public areas and additional commerces/services, these Green Lanes could have a first great impact on the relationship between the industries and the village.
In 2030, the cars will still be part of Oostakker but some spaces would already be spotted near the industries in order to host all these vehicles outside the village in a near future.

03 In 2040, all the measures that have been implemented earlier will still be topical and will even be improved in order to face the different challenges. At that time, the biggest step that is expected to be reached is the suppression of cars and other motorized vehicles inside the village. Indeed, the cars will still be all around Oostakker and on the highways but soft mobility will be everywhere in the village. This measure is going to lead to a huge transformation in the whole village's structure and typology in the centre and large residential neighbourhoods. Roads will be used in another way and will host new functions in favour of community principles such as collective spaces, soft mobility, green areas, food production lots,… This will definitely have a great impact on the inhabitants' way of life and will lead to local and eco-friendly new habits.
The interconnection between Oostakker and the industries will still be possible through these public main roads and sustainable transports.
The last cars and new motorized vehicles (shared, autonomous cars, etc.) will remain outside the village in new infrastructures in direct contact with the industries. These spaces will provide parking spots for these vehicles and, at the same time, other functions profitable for both Oostakker village and the industries.

04 Cars have definitely left Oostakker! The reorganization of the village has led to the advent of a new way of life in which cars and other motorized vehicles have become obsolete inside Oostakker. New spaces and typologies have been created and permit a new structure based on local exchanges and sustainable mobility. The global image of the village has changed and inhabitants have adopted a new rhythm of life. This new mobility is showing the way for a better life and the village acts as the showroom of Volvo's new experiments.
In addition, the relationship between the harbour, the industries and the village has never been that flourishing. Connections are simple and follow the same visions. Indeed, the village is surrounded by a 'soft mobility green ring' in which sustainable transports and collective infrastructures are allowing a perfect link between the harbour, the industries and the center. The highway is the last infrastructure dedicated to cars in the area.
Finally, the surrounding spots do not only host parking areas but, at the same time, these spaces also provide other functions profitable for both Oostakker village and the industries such as services/commerces, food production, manufactures,…; reinforcing the connection between these.

MASTERPLAN 2050



1. STRONG CONNECTIONS TO GHENT / HARBOUR / INDUSTRIES

Oostakker will reinforce its different connections / relations in order to create a strong network.

2. CAR-FREE VILLAGE

Cars will no longer entry Oostakker and will be parked outside the village.

3. OOSTAKKER AS VOLVO LABORATORY

Volvo will become the mobility giant for Oostakker by offering many new vehicles. In exchange the village will act as a laboratory / showroom for the industry.

4. MULTIFUNCTIONAL PARKINGS AROUND THE VILLAGE

Outside parkings close to the industries will become new mobility hubs around the village.

5. HYDROGENE SHUTTLES & SHARED CARS (VOLVO)

Different hydrogene shuttles and shared cars will serve the village and will become the main transports inside and outside Oostakker.

6. NEW PUBLIC TRANSPORTS

Public transports will serve the ring around the village and will connect the outside parkings to Ghent / Harbour / Industries.

7. DIVERSITY THROUGHOUT THE VILLAGE

The mixity of functions is a key point to bring proximity and allow Soft Mobility in the village.

8. IMPORTANCE OF PEDESTRIAN INFRASTRUCTURES

The streets will have another status so that pedestrians will become dominant.

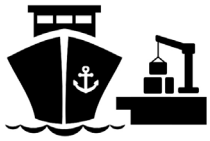
9. IMPORTANCE OF BICYCLE INFRASTRUCTURES

The streets will have another status so that bikers will become dominant.

10. ECOLOGICAL CONTINUITY THROUGHOUT THE VILLAGE

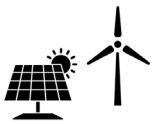
The streets will have another status so that new green areas will be implemented and will emphasize an ecological continuity.

FOCUS ON THE INDUSTRIES, PORT OF GHENT



3RD BIGGEST PORT IN BELGIUM

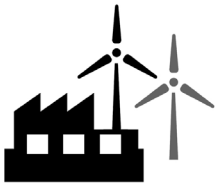
Accessible from Ghent
Terneuzen canal joining the north sea.



PRODUCING RENEWABLE ENERGY

Generates energy equal to the consumptionof 180,000 households.

additional amount of sustainable energy equivalent to the needs of 28,000 households.



BIG COMPANIES SUCH AS

Sidmar, Volvo Cars, Volvo Trucks, Volvo Parts, Honda, and Stora Enso.

525 comapnies
100.000 jobs
1.7 % of the GDP

FIRST FULLY ELECTRIC CAR PRODUCED IN BELGIUM

Volvo is the largest employer in East Flanders (6500 People)

producing 200.000 cars per year

STRATEGY POINT

At the crossroads of the A10 / E40 (Brussels-Ostend) and the A14 / E17 (Antwerp-France)

250 km rail network covering industries.

EMMISSION FREE INDUSTRIAL

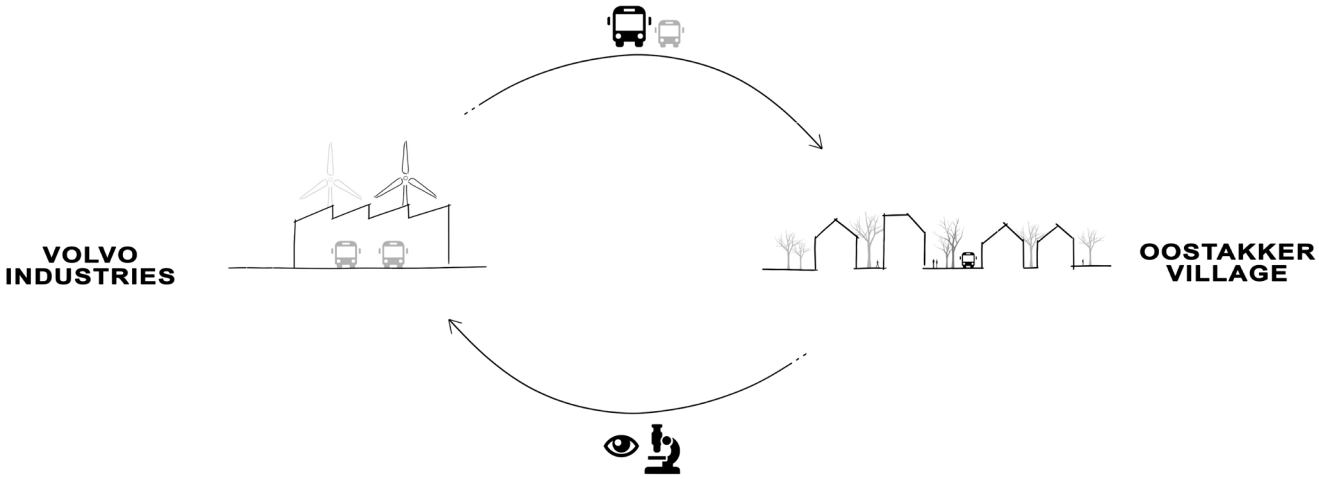
Volvo Group Truck setted the standard for emissions-free industrial manufacturing in 2007.

became the first carbon neutral facility in the automotive sector.

Oostakker as showroom for Volvo's new mobility

Extremely isolated at first glance, Oostakker actually presents very interesting and unexpected opportunities. Indeed, the village is strategically located near the harbour of Ghent and its diverse industries. However, nowadays this potential connection is nonexistent and Oostakker is far from taking any advantage of this distinctive feature. By turning its back to this industrial zone, the village acts as an enclosed area and, therefore, is economically totally dependent on Ghent and its surroundings.
As one of Volvo workers explained:
"There is no relationship between our workplace and Oostakker. I do not know the village, I only come here to get the bus at the end of the day.

More than only working inside the village, the purpose in this mobility project will be to create and allow a strong relationship between Oostakker and the surrounding industries by rearranging the mobility plan first but more deeply by making them work together and setting up a real win-win exchange.
The particularity of the place is the presence of huge port based on green and renewable resources produced on site such as electric or hydrogen vehicles. In the case of Oostakker, the plan is that Volvo Industry will provide new prototypes of hydrogen shuttles (inside the village) and electric shared cars (outside the village) for the villagers. In return, by testing and using these new models, Oostakker village will act as a Laboratory for Volvo and promote a new living environment directly related to this new mobility (VolvoLab).
In addition, these industries will host the remaining shared cars and mobility spots for outside connections.



USING AVAIBLE ENERGIES FOR THE MOBILITY OF TOMORROW

What is avaible on site?

Wind Energy

Production of 280MW per year = 180,000 Households

Solar Energy

Production of 110 MW per year = 28,000 Households

There is a huge leftover!

Problem : this production has become a real commercial market.
None of this energy is redistributed to the village.

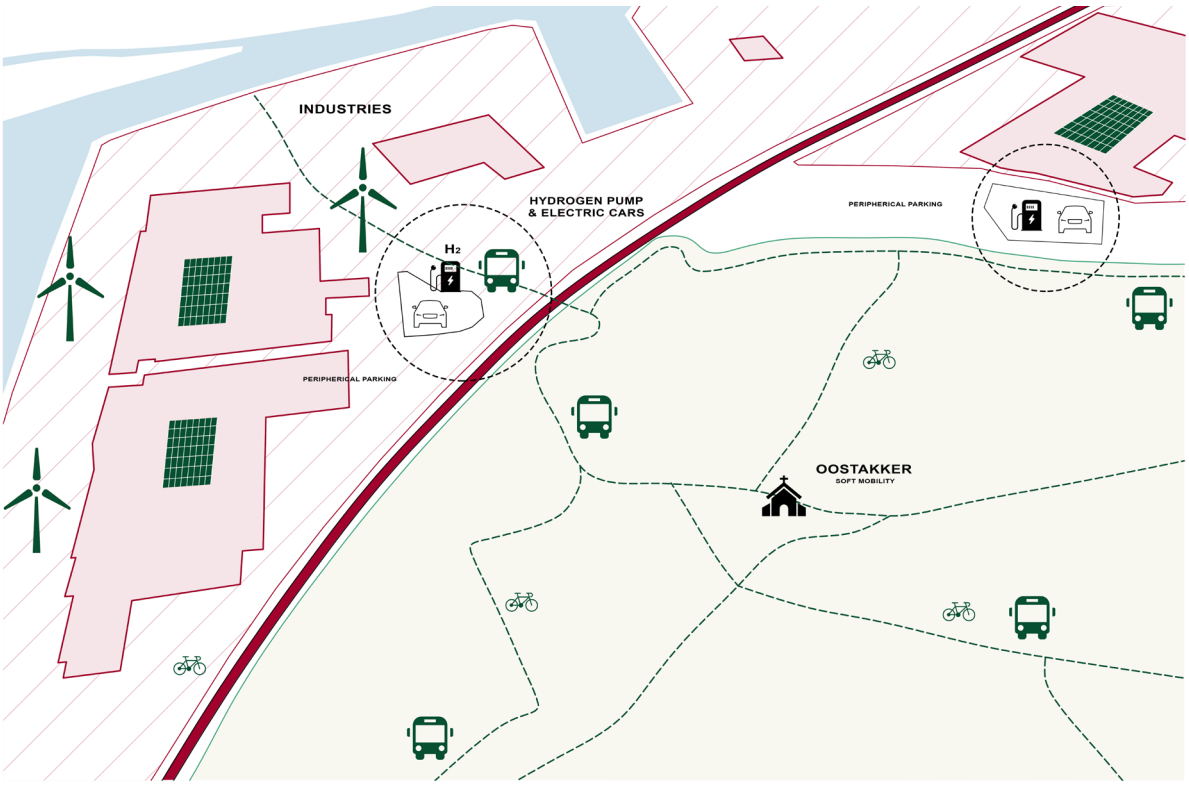
Making a new connection between Industries and the Village.

We would like to connect the village with the industries by installing a means of transport that would run on these green energies.

How are we going to use this energy?

1. By using the energy to charge electric shared cars provided by Volvo to the village.

2. Store some of this energy in a hydrogen pump to introduce a green shuttle system.



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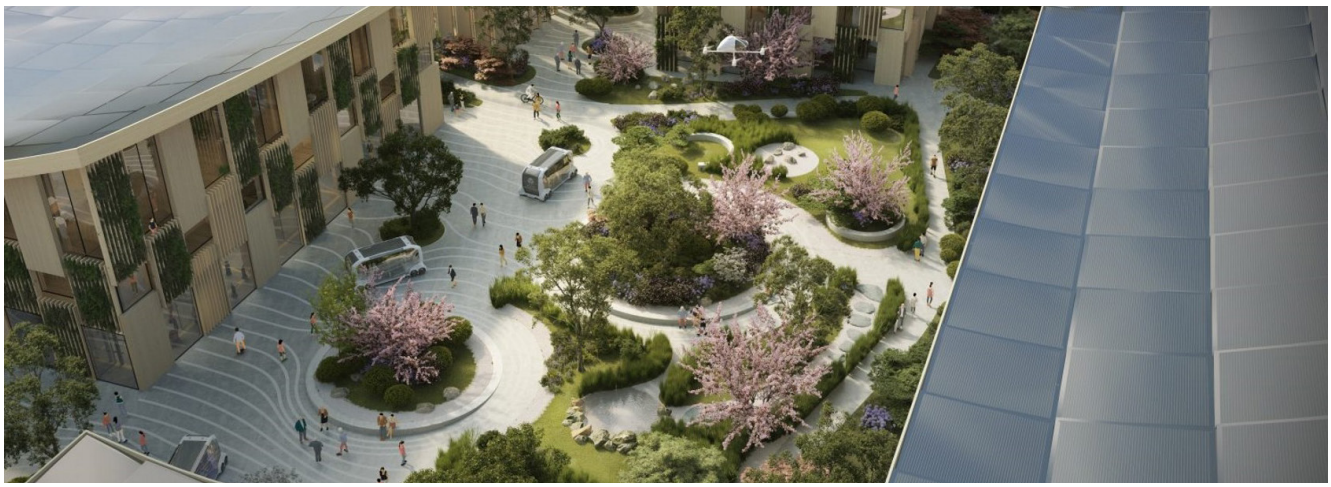


“Toyota woven city”, BIG_Bjark Ingels Group.

“Woven City is a fully connected ecosystem powered by hydrogen fuel cells to be built at the base of Mt. Fuji in Japan.

This “living laboratory” will include full time residents and researchers who will test and develop technologies such as autonomy, robotics, personal mobility and smart homes, in a real-world environment.

We welcome all those inspired to improve the way we live in the future, to take advantage of this unique research ecosystem and join us in our quest to create an ever-better way of life and mobility for all.” (n.d.). Toyota Woven City. https://www.woven-city.global/

VOLVO’S OBJECTIVES FOR THE FUTURE

Cars

2020

“Launch of Volvos with Mild Hybrid drive train - all our new models will be electric, whether in hybrids or all-electric versions.”

2021

“About 20% of all cars we sell this year must be plug-in hybrid - we aim for that.”

2025

“About 50% of all cars we sell must be fully electric, the other half a hybrid.”

2040

“We aim to be climate neutral throughout our value chain, in line with the objectives of the Paris Climate Agreement.”

Heavyweights

In the quest to reduce CO2 emissions from heavyweights, under the pressure of strict European environmental standards, hydrogen represents an alternative to the battery.

First for buses and trucks, says Martin Lundstedt, president of Volvo Group.

First launches are expected around 2025.

A better connection between the village and the industries

LIVING ALONG THE GREEN LANES

VEGETATION PATCH

A number of patches of vegetation are scattered throughout the village, separated by roads.

GREEN LANE

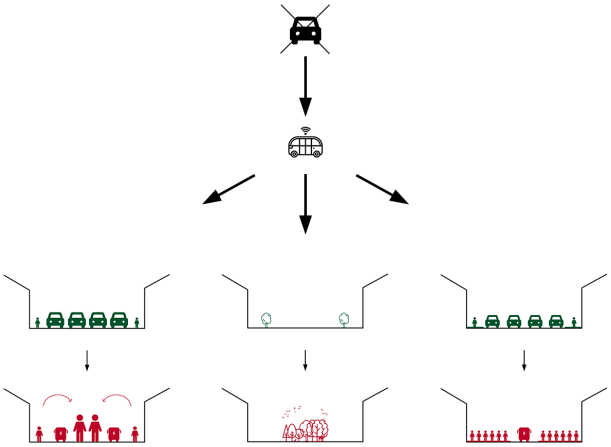
Shuttle bus routes are redesigning the streets. They are completed with vegetation to connect the vegetation patches together.

SHUTTLE PATH

Shuttle buses provided by Volvo industries offer new mobility within the village.
Their route is designed so that the distance between them is a maximum of a 5 MINUTES foothpath.

Still at village scale, it is important to notice that this car-free system will definitely lead to major changes in the actual structure of roads.

By removing the cars, it is the whole typology and vision of the existing streets that will be transformed. Cars out, people in; the streetscape will become the first symbol of this new mobility and its status will radically change. And more than theoretically bringing soft mobility into the streets, these new spaces will have a lot to do in many topics (social, economic, cultural, etc.). Cars and fleeting situations will give way to people and community spirits.



One of our 10 rules at village scale is allowing a certain ecological continuity through the different green spots (parks, meadows, etc.) of Oostakker that are now all isolated in the present layout.
Therefore, our idea is to include this environmental feature into our new mobility system. By mixing mobility and nature, it will be possible to make this new structure play an important role in this ecological aspect.

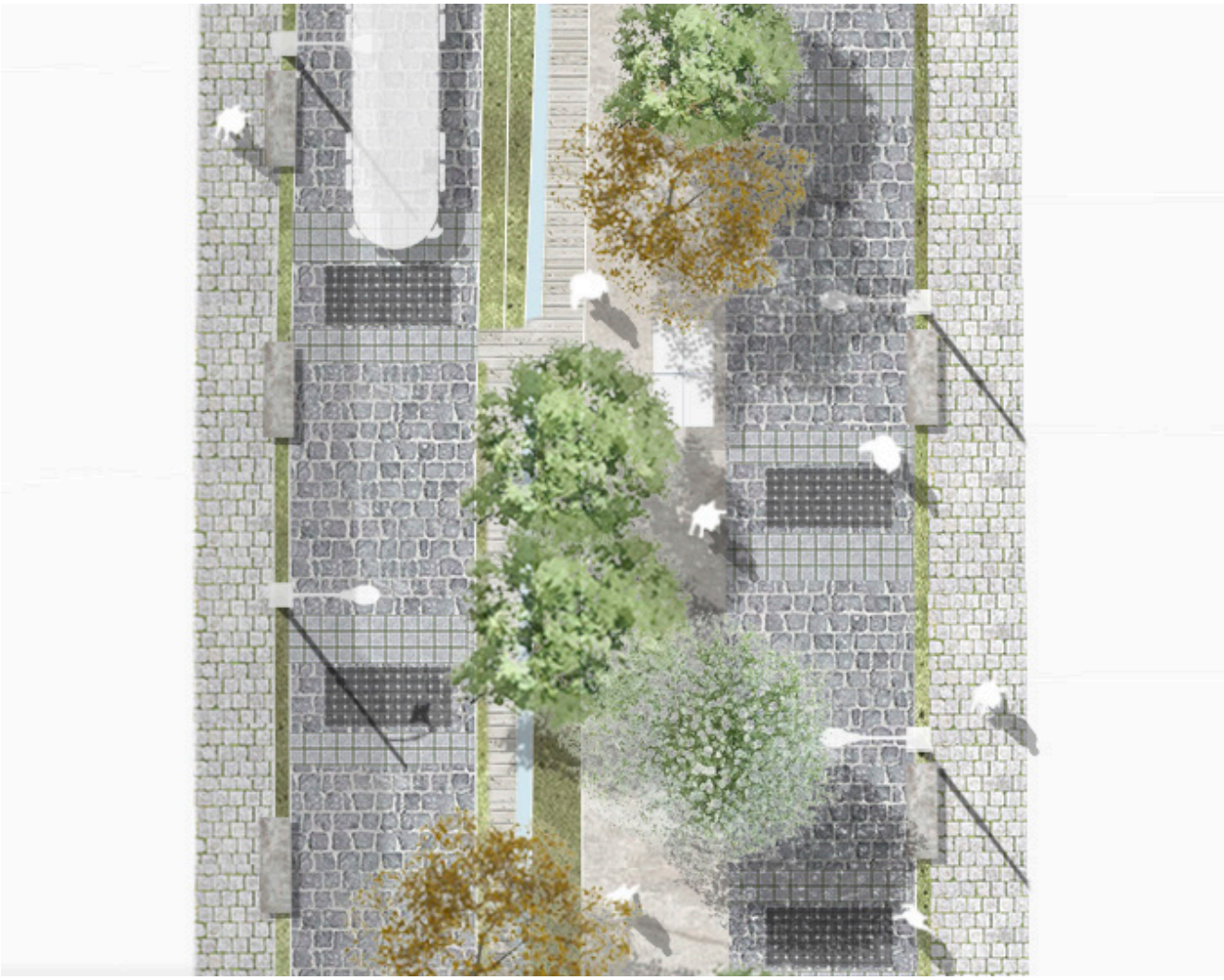
This led us to the design of such new Green Lanes inside the area. These main roads will go through the whole village while efficiently and pleasantly reconnecting the centre of Oostakker and the peripheric industries/harbour. By incorporating new hydrogen shuttle lines, ecological continuity, all kinds of soft mobility and new public spaces; these Green Lanes will become the central part of mobility 2050 in the village of Oostakker.

While changing the living atmosphere and the relationship to the streetscape, these roads and their direct route will, at the same time, become the symbol of this new exchange with the surrounding industries since this continuity will extend beyond these until the harbour of Ghent and will host the hydrogen shuttles' system.

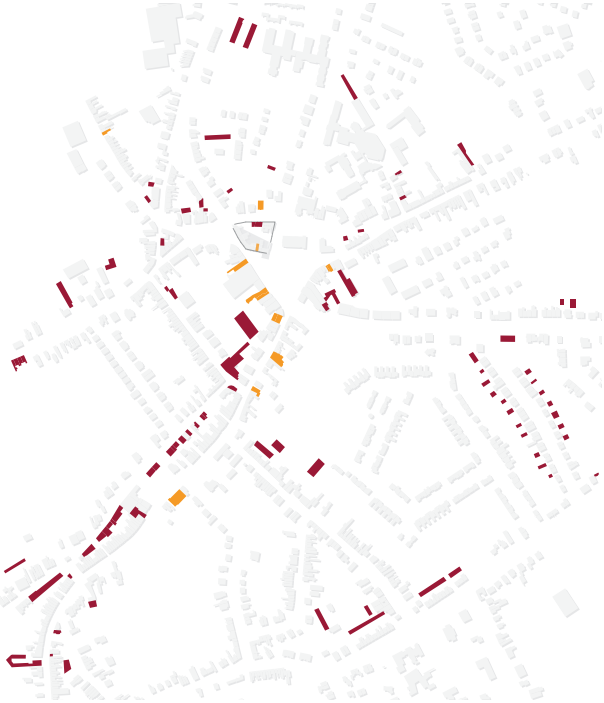
A NEW FACE FOR THE STREETS

The large bitumen roads will disappear and transform into green and playful spaces. The section reserved for vehicles will be definitely reduced and the street will take on the appearance of a large and attractive collective space. By offering resting zones, waiting areas, playgrounds, green corridors, etc.; the street will look like one but varied pedestrian and collective space punctually reduced in size by the regular passage of hydrogen shuttles. In practice, the entire street will be dedicated to people and occasionally shrunk in order to let public transport pass.


150
PAVEMENT 100% PEDESTRIAN
30
BUFFER SPACE
350
MIXED SHUTTLE + BIKES LANE WITH SOLAR PANELS
200
ECOLOGICAL CONTINUITY
200
PROMENADE
100
PUBLIC URBAN DEVELOPMENT
350
SHUTTLE + BIKE / PAVEMENT EXTENSION
30
ECOLOGICAL BUS STOP
150
PAVEMENT 100% PEDESTRIAN



OBSOLETE FUNCTIONS



Type 1 _ Garages

Type 2 _ 2050 Obsolete functions

When taking a walk in the village, it has been clear that the streets will not be the only obsolete infrastructures in our future vision.
Indeed, some buildings are clearly doomed to disappear or completely to adapt since their function is now in close relationship with the car dependency and the current way of working.

Garages

As true emblem of cars, it is complex to imagine garage infrastructures in a car-free village. Therefore, finding new alternatives for these blocks in such system becomes part of the game. Especially in Oostakker where 3m high garages are usual in the urban fabric and more particularly in some streets where they make up a large percentage of the existing building stock. Extending these obsolete structures in order to integrate them in the new vision for 2050 is the challenge.

Obsolete Ground Floors

In 2050, some habits and functions will most likely have changed. It is the case, for instance, of some services such as banks or insurance offices that will exclusively provide online assistances. Located at the ground floor, the extinction of such services could lead to the reorganisation of some ground levels. A solution could be to take advantage of the situation in order to open this part and provide porosity towards the plot's centre throughout the building.

Program mixity

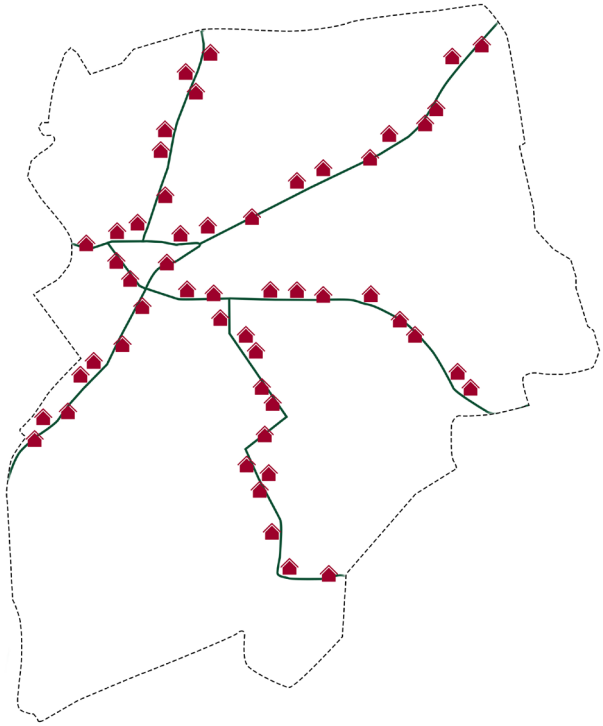
Going on with the building scale now. Since we have worked on this mobility vision for 2050 in the village of Oostakker and its surroundings, it is now essential to keep thinking that way in order to make it workable and realistic.

So far, this new mobility plan remains theoretical and would be almost impossible to implement without any other changes in Oostakker's present structure. Crucially depending on concepts such as proximity and diversity (among others), this mobility is now asking for being materialized through concrete representations of this new organization.

More than designing a mobility vision for 2050, our task will be to design and provide a first sample of the new way of living we want to implement in the village and that will make this mobility functional.

Building / Green Lanes

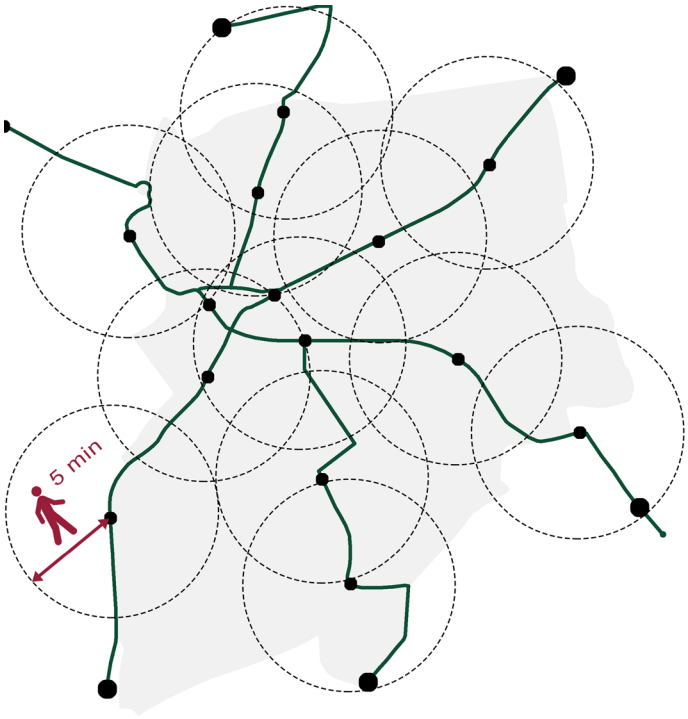
How will people live with this new mobility in 2050? And especially, how will the existing architecture take part and interact within this new system?
Therefore, our intervention will focus on this interaction Building/Green Lanes.



How will people live along the Green Lanes in 2050 ?

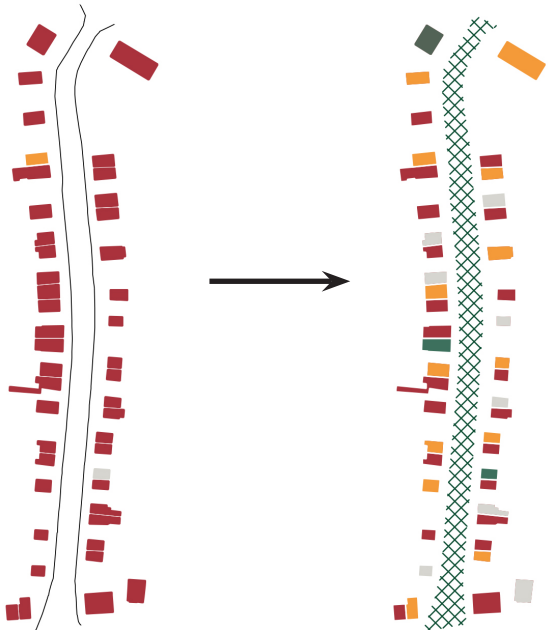
5 minutes accessibility

In order to reinforce the public transport connections for the inhabitants of Oostakker, we worked on a 5 min accessibility principle. This system aims to propose different shuttle stops located at a maximum distance of 350 m from any house. This leads to a strong shuttle network accessible by any inhabitant within a 5 min walk.



Mixity along the Green Lanes

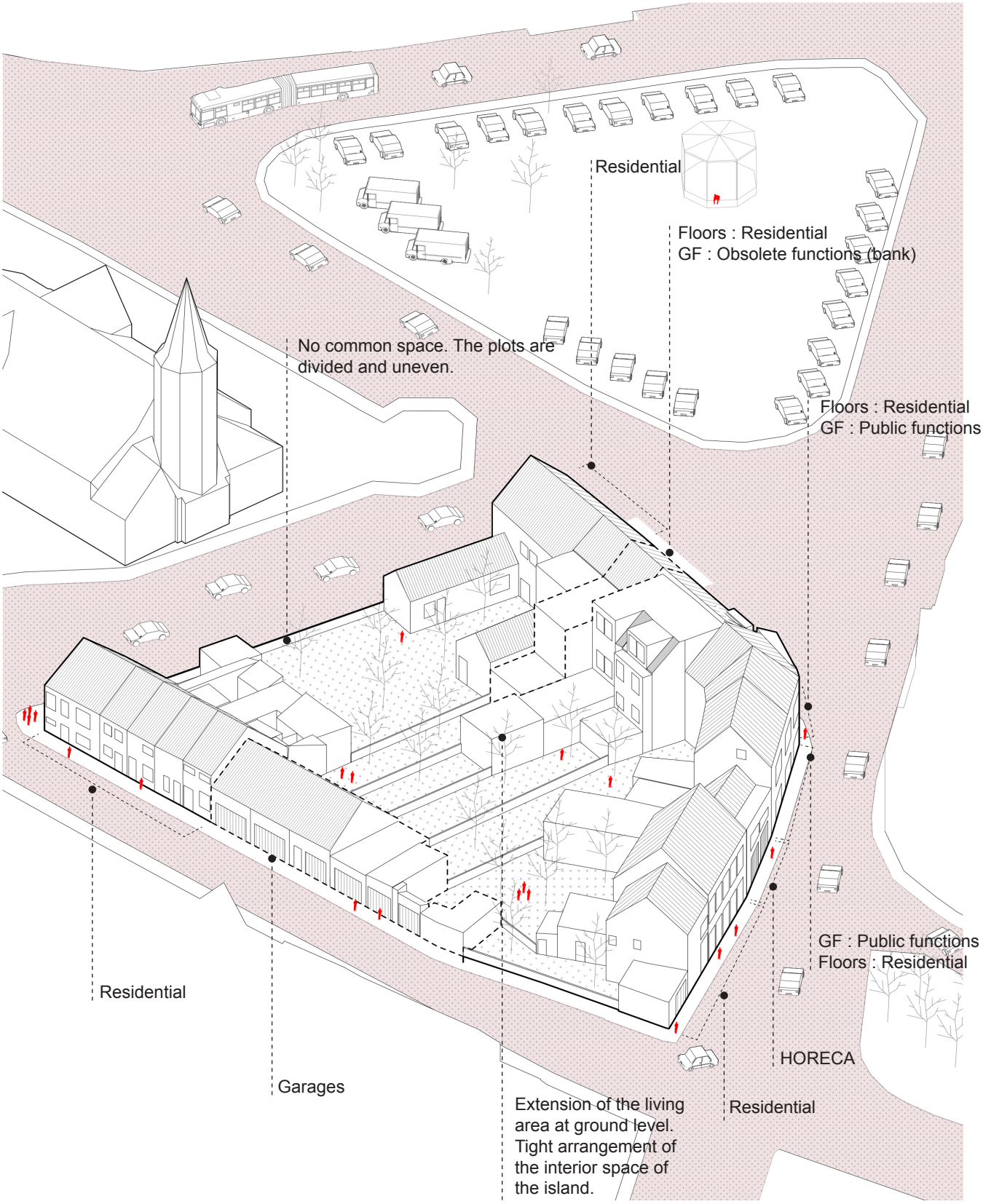
The mixity of functions will be enhanced alongside the strong green lanes served by the strong shuttle network in place.



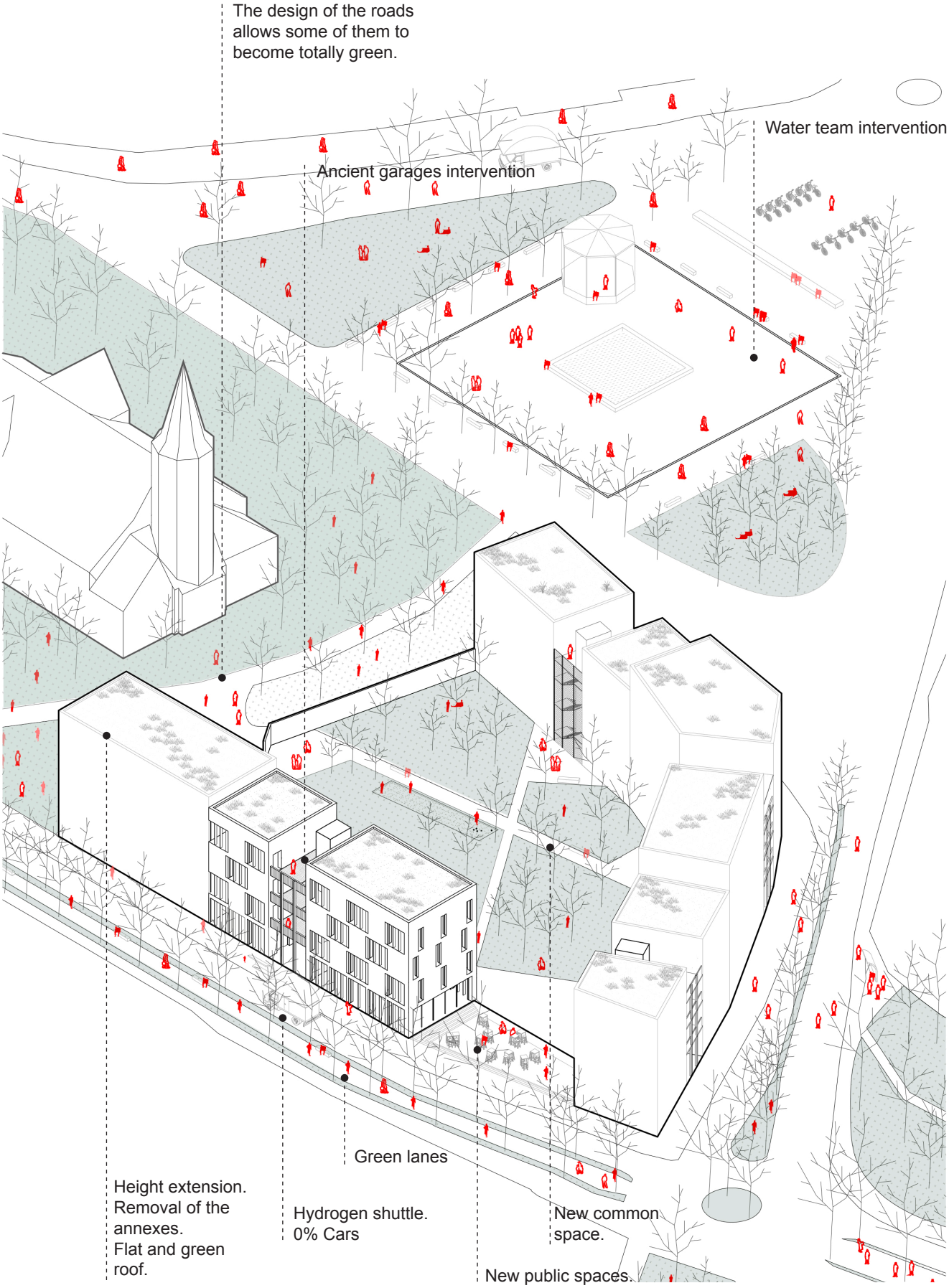
Building scale

2020 EXISTING SITUATION

Although sadly represented by a parking square now, the centre of Oostakker remains the most iconic place in the area so far and hosts some important buildings such as the church, the village hall, etc. Since this location is the heart of the village and will have a lot to say in 2050, it has been essential to select a specific site along the Green Lanes and near the centre at the same time in order to provide a relevant sample. The main goal of this proposal is to implement a first vision of the new system in this symbolic place precisely.

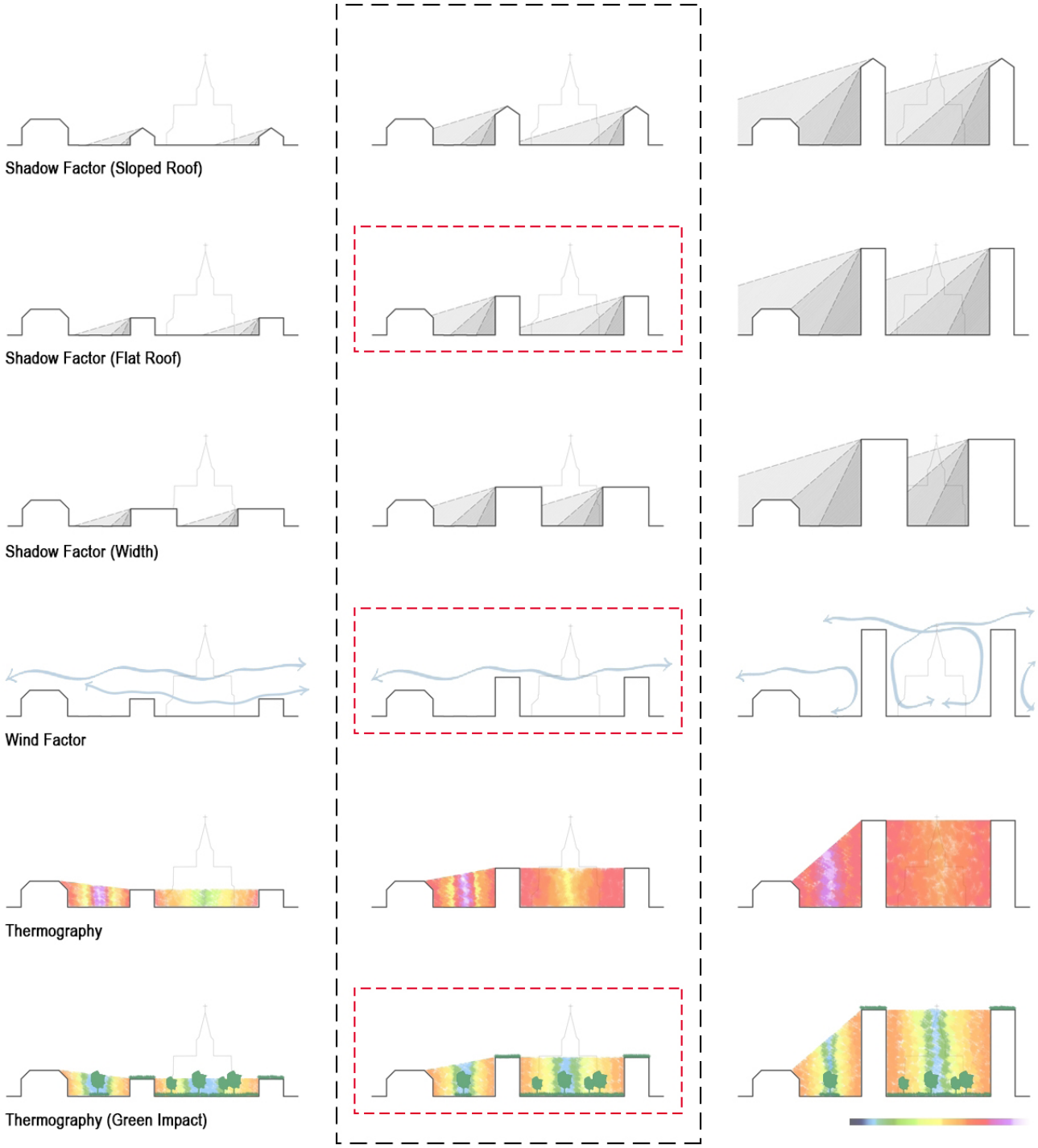


2050 PROJECTED SITUATION



METRICS

Low-rise Building | *Medium-rise Building* | *High-rise Building*



Before diving into the detailed project, it is important to ingeniously approach its environment and to collect some important data's related to its relation with surrounding elements in terms of building impact due to weather and typology factors. And more particularly in an urban fabric in which different tension between blocks can deeply change the perception and atmosphere on site. In this case especially, considering and playing with different factors such as height, width, shape, etc. will allow to provide a suitable architecture that will be in close relationship with its context. By comparing three different sorts of buildings, it will be easier to understand the impact of each of them and then pick the most appropriate one.

Shadow/Sunlight

It is interesting to see through different shadow and sunlight analysis how the plot is working and hence what size we should consider for the intervention. Regarding the impact of roof shape, height and width of the building, it is possible to compare the different light effects and, therefore, opt for the best proportion between shaded and naturally lighted surfaces. In this study, the best compromise seems to be the implementation of a medium-rise building in order to get qualitative shadow and sunlight. At the same time, the width of the building will remain moderate and offer a pleasant inside garden since a kind of sun trap will be created in-between the buildings which will be useful and pleasant for outdoor life when the weather is colder, reducing both heating and cooling costs.

Last but not least, the difference between sloped and flat roof is not huge regarding the light impact. Flat roofs will then be chosen since they offer additional potentials in this context.

Wind

The wind is another element to be aware of. The challenge here is to find the best balance between wind protection and pleasant breeze. By keeping moderate and human scale, the building layout will act as a courtyard and will protect the collective space from the wind since too small buildings do not bring any protection and tall ones cause turbulence and divert the winds down toward the ground. By constructing medium-rise buildings, the goal is to provide a comfortable inside climate slightly refreshed by moderate air flows.

Thermography

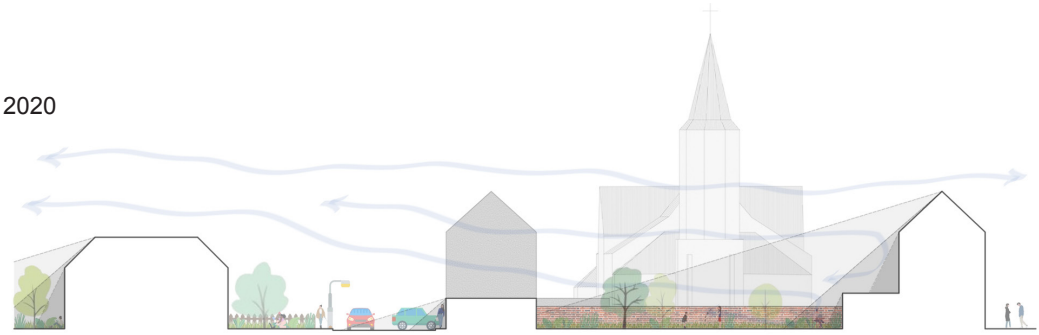
An important issue in most of urban fabric is the heat effect caused by the current buildings/infrastructures and their organisation. Indeed, it is not new that temperature is more conducive to reach high values in built environments due to the abundance of constructions and sealed surfaces.

The thermography analysis allows to quantify this heat on site and reveals the impact regarding building typologies. This factor strongly depends on the typology of buildings (height, width, etc.). Areas enclosed between two high buildings often suffer from high heat levels due to significant heat rejections and considerable lack of air flow to refresh the area. The materiality of surfaces can influence this thermography as well. For instance, bitumen roads and other impermeable surfaces lead to important heat effects. In order to provide resilient alternatives while designing medium and high-rise buildings, the de-sealing and greening of surfaces can be very efficient in this quest for a pleasant environment. Green roofs/facades and permeable ground surfaces can wise solutions.

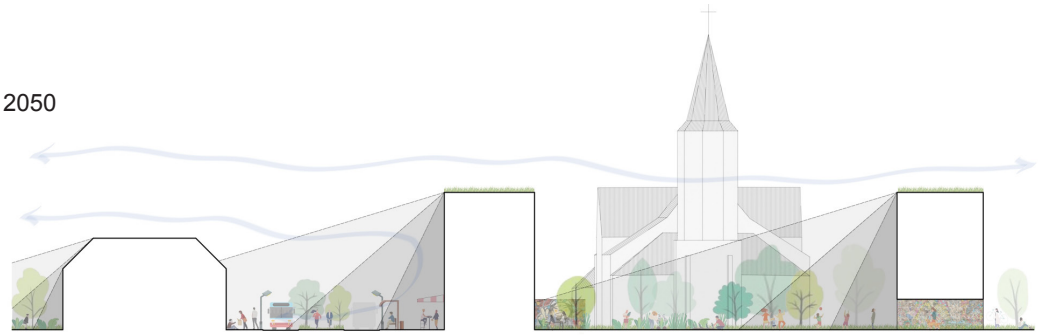
After these several analysis, it is obvious that the medium-rise building scale is the one that will bring the best opportunities in order to provide the most comfortable microclimate while respecting its context.

In conclusion, by providing not too large buildings (8-10m) of about 4/5 levels (12-15m) in place of the existing obsolete garages, the project will particularly fit in its location and promote outdoor life in both the public street and the collective garden.

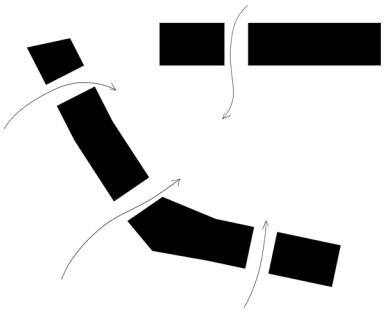
2020

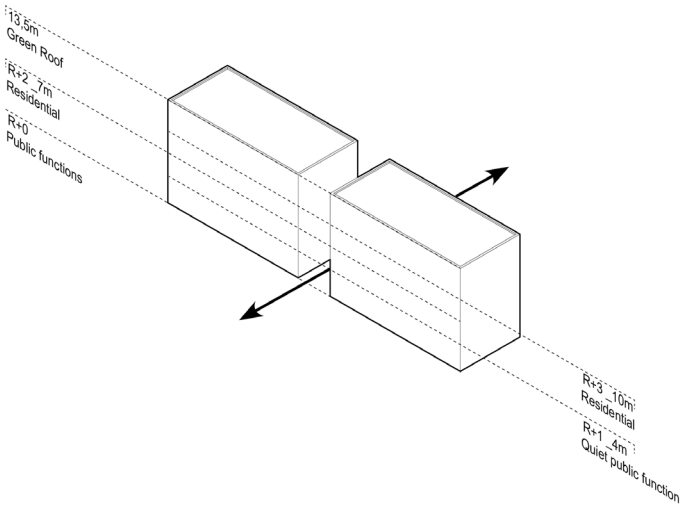


2050

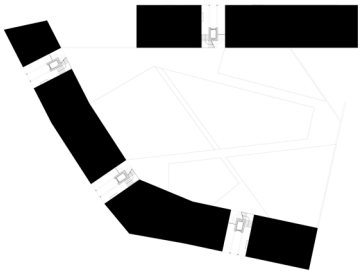


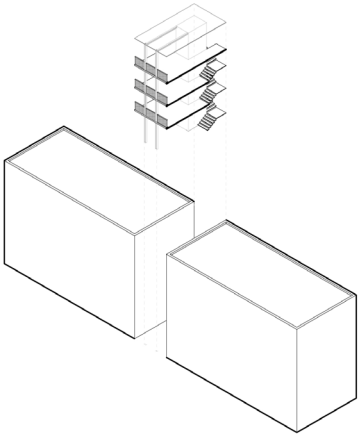
CONNECTION STAIRCASE TO STREET





At the moment, it is clear that the actual buildings turn away from the streets and live isolated on their private parcels. In this new vision for 2050, the connection between the public street and the buildings will be highly improved. Although the central collective space will be dedicated to the residents, a certain visual relationship will be established with the surrounding streets by means of porosity in the building structure. A couple of voids will allow new sensitive connections through views, light, air flow, etc.



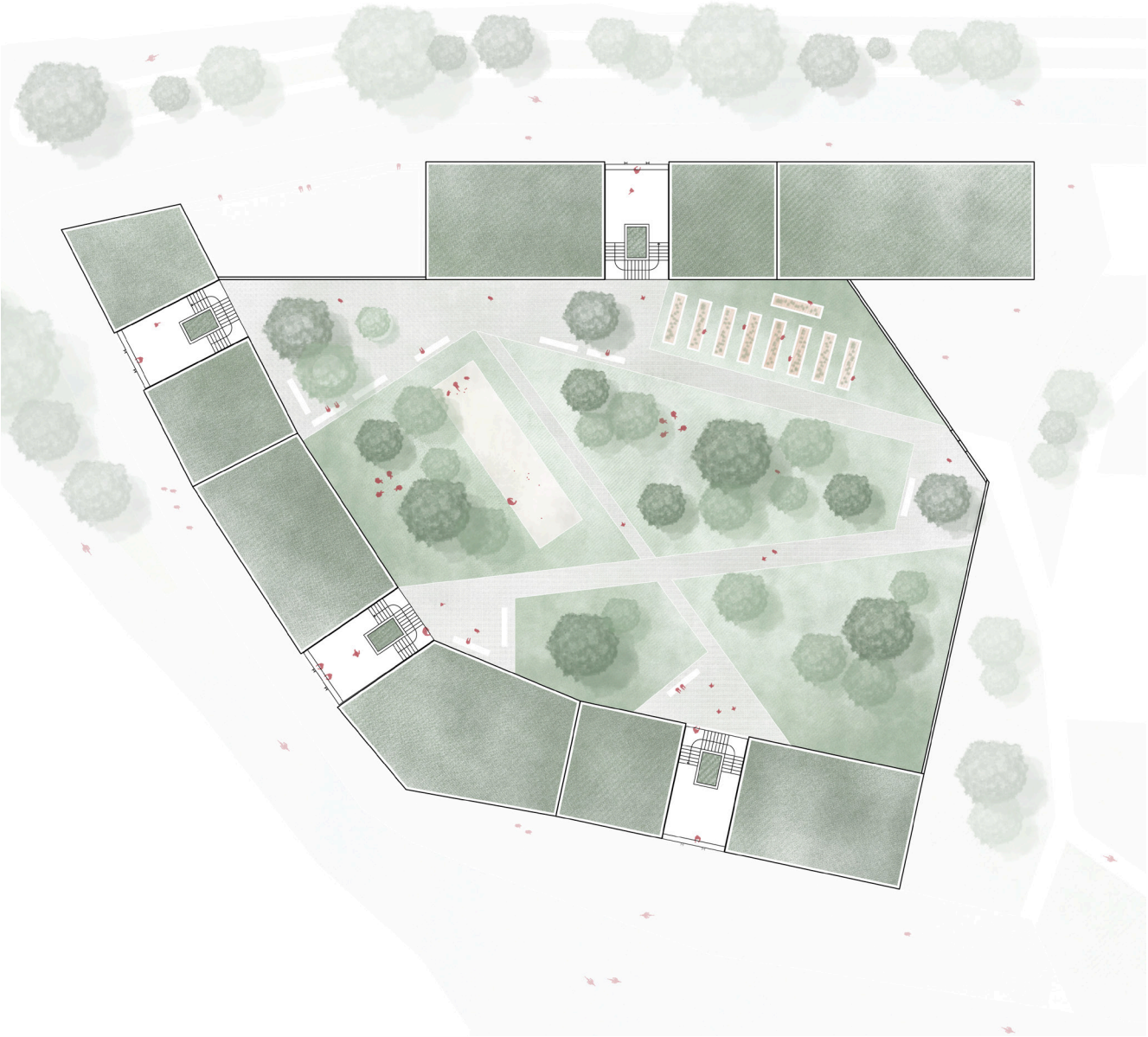


In order to control the passage, mobility blocks will be plugged into these holes and act as physical filters. Nevertheless, these light structures will reach an interesting degree of openness allowing visual and light interactions between the outside and inside of the block and this strong tension between mass and void.
By making the link between the street and the inside garden, and by connecting the different building levels; this element will play a crucial role in connecting Horizontal & Vertical Mobility.

BLOCK PLAN

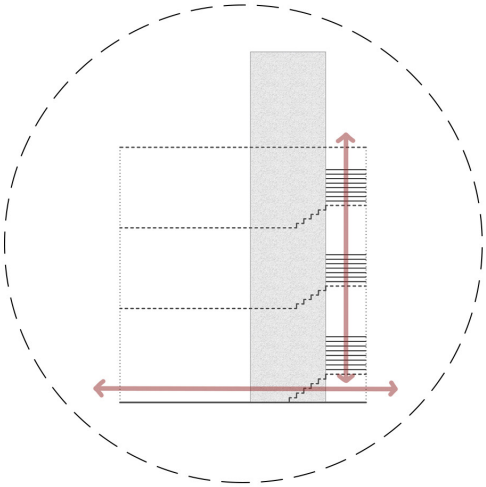
In order to make the intention as realistic as possible, it is crucial to present a clear and systematic scenario for the site.
Nowadays, the plot is nothing more than a set of private buildings, each with its own limited outdoor space, in which a couple of obsolete functions are well present.
The low-quality private outside spaces and the poor mixity in functions have definitely to change in order to integrate the new vision.
With that in mind and with the desire to provide more qualitative and collective spaces for residents while reinforcing connections between the buildings and the new street space, it becomes important to provide one highly interconnected general plan.

Therefore, a new scenario could be proposed in order to integrate the new project. The city of Ghent, the village of Oostakker or any other investors could buy the entire block from current owners and make it work as a common sample of this new mobility. By changing the obsolete layout and bringing higher diversity/mixiBlty in the project, it would make it more in line with the 2050 expectations while creating an important tension between the plot and the street space. By changing the status of the ground, the internal courtyard could become a high valuable semi-private and collective area that would lead to new kinds of outside spaces and atmospheres in the centre.

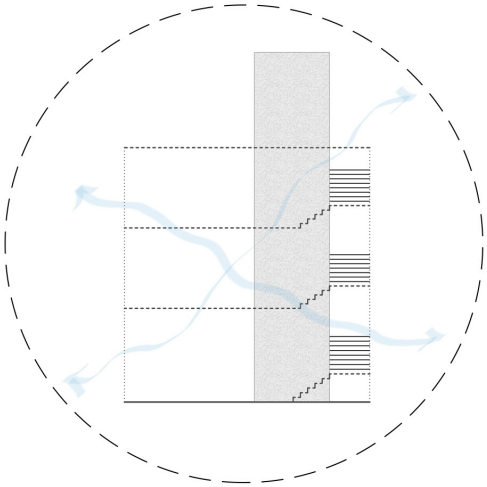


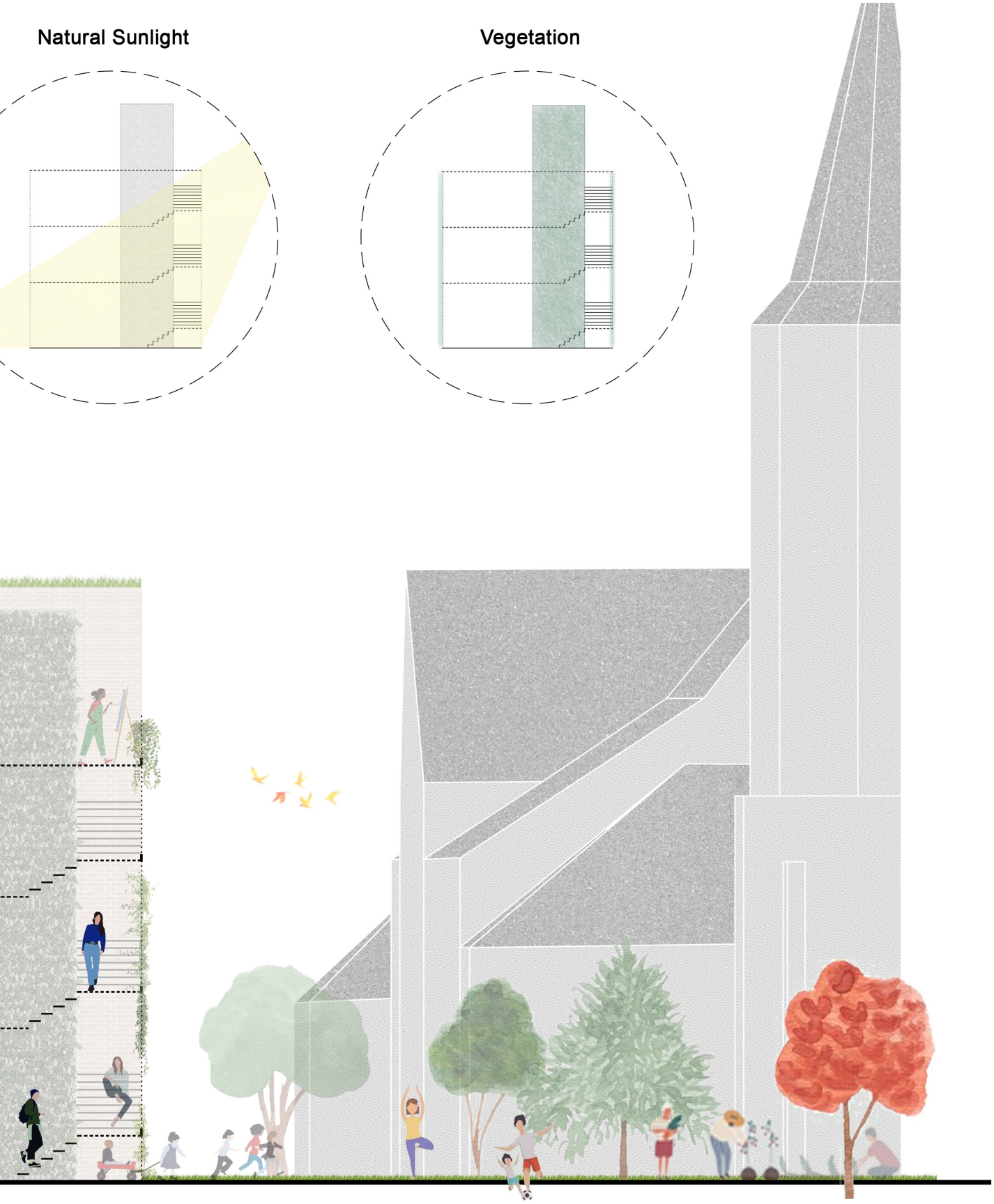
STAIRCASE ATMOSPHERE

Horizontality / Verticality

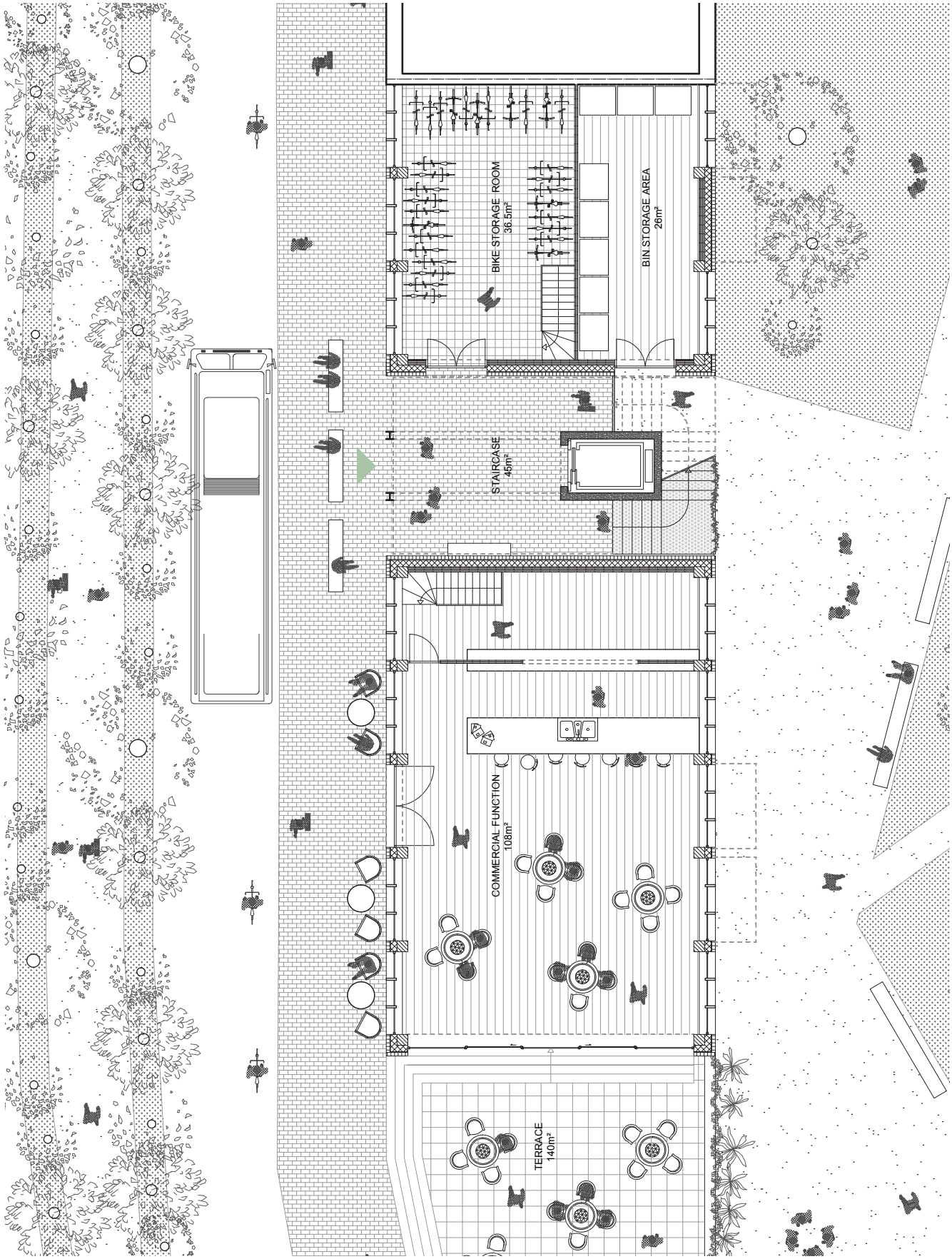


Natural Ventilation

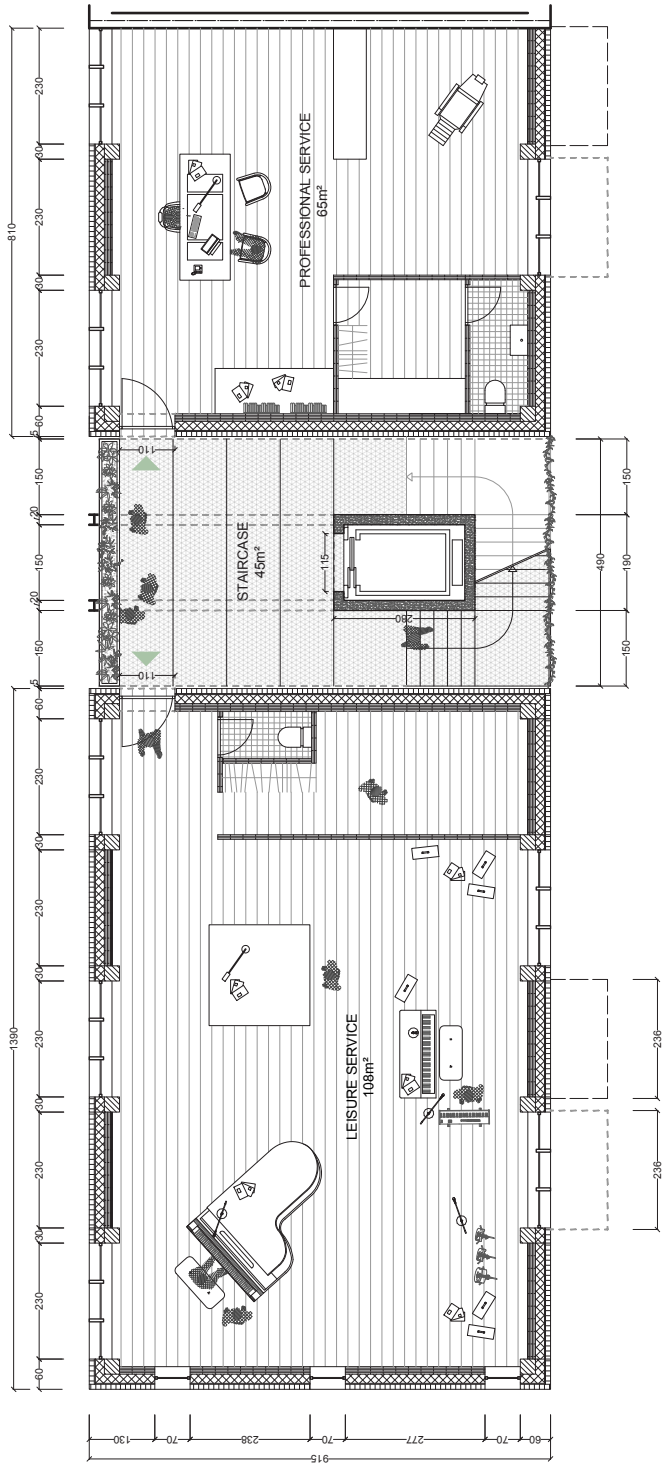



Natural Sunlight
Vegetation

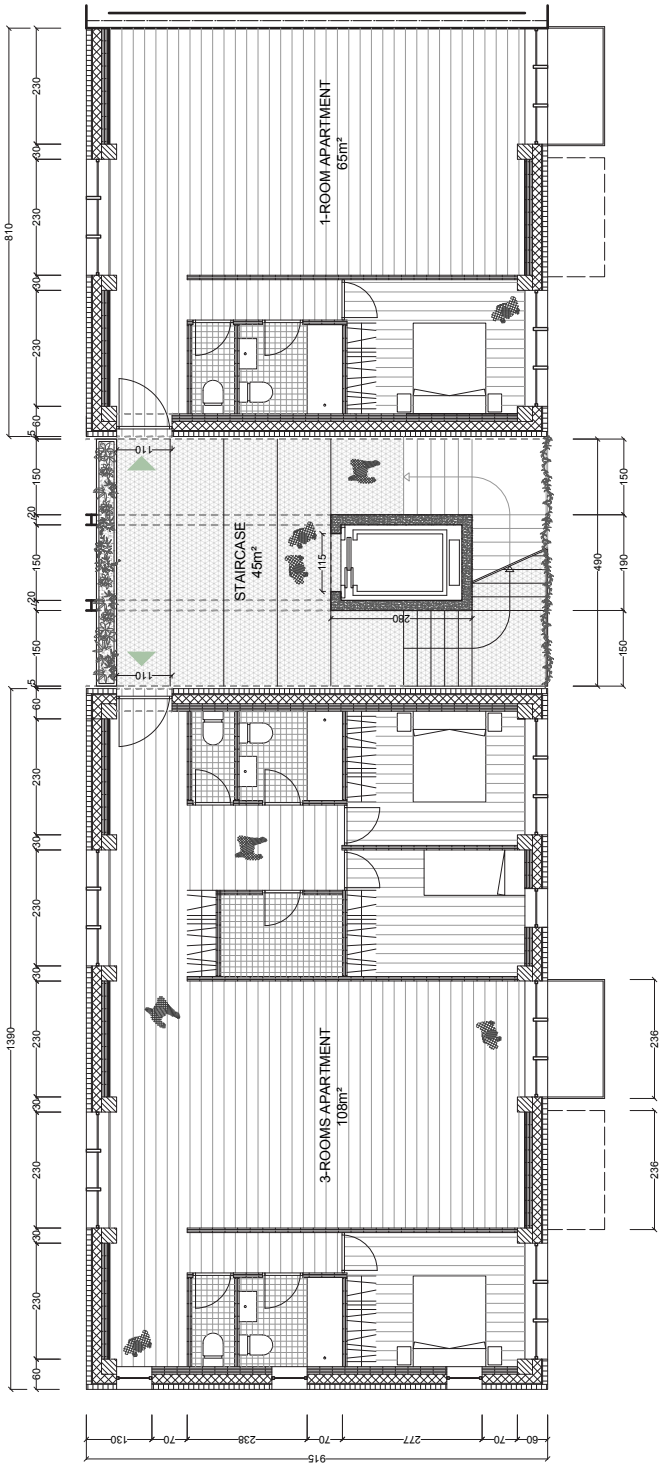
GROUND FLOOR



FLOORS PLAN



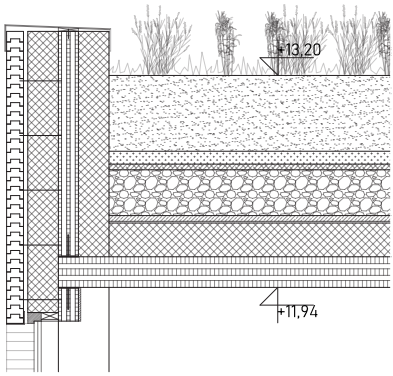
1ST FLOOR



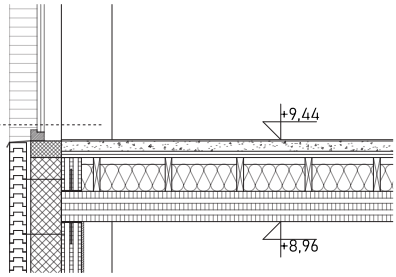
2ND FLOOR

BUILDING STRUCTURE

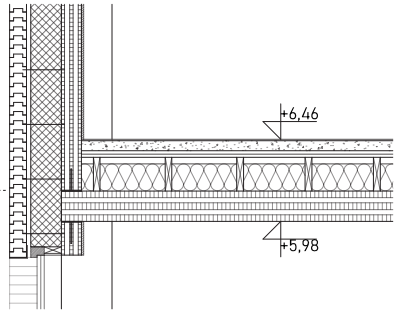
In terms of structure and materiality, the accent will be put on flexibility and resilience in the building construction. By proposing a structure based on flexible layouts, the purpose is to provide a building that could offer many scenarios and possibilities. LVL wood columns will form a free plan in which punctual CLT light partitions will easily create many kinds of rooms. Therefore, this organisation will lead to the improvement of mixity in the village.
By keeping moderate sizes, this project will allow the use of resilient and recycled materials coming directly from the industries and the Material Team intentions. This will again help reinforce the connections with the surroundings while considering ecological ways of construction. The following section informs about the implementation of materials such as CLT, LVL wood and Mycelium in the project.



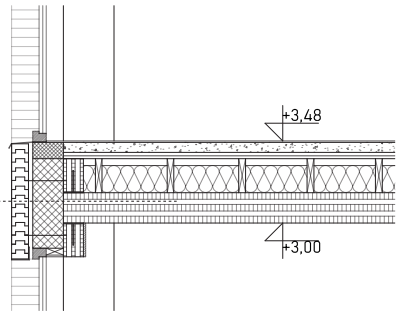
LVL Wood Columns

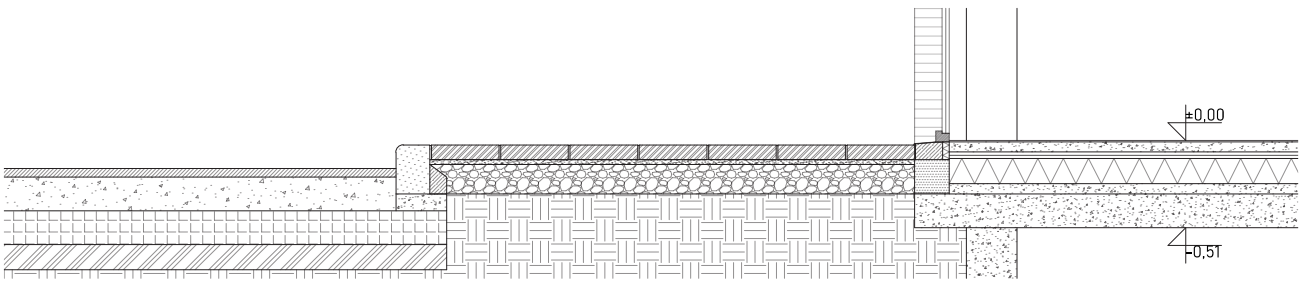


Mycelium Bricks Facade



CLT Floor Panels





BUILDING ATMOSPHERE

Detail scale

CONNECTION STREET/STAIRCASE

STEEL STAIRCASE

The main element of the project - the open staircase - has been thought in the same way as the rest of the building and will be mainly composed of recycled steel from the harbour.

ELECTRO-KINETIC ROAD RAMP

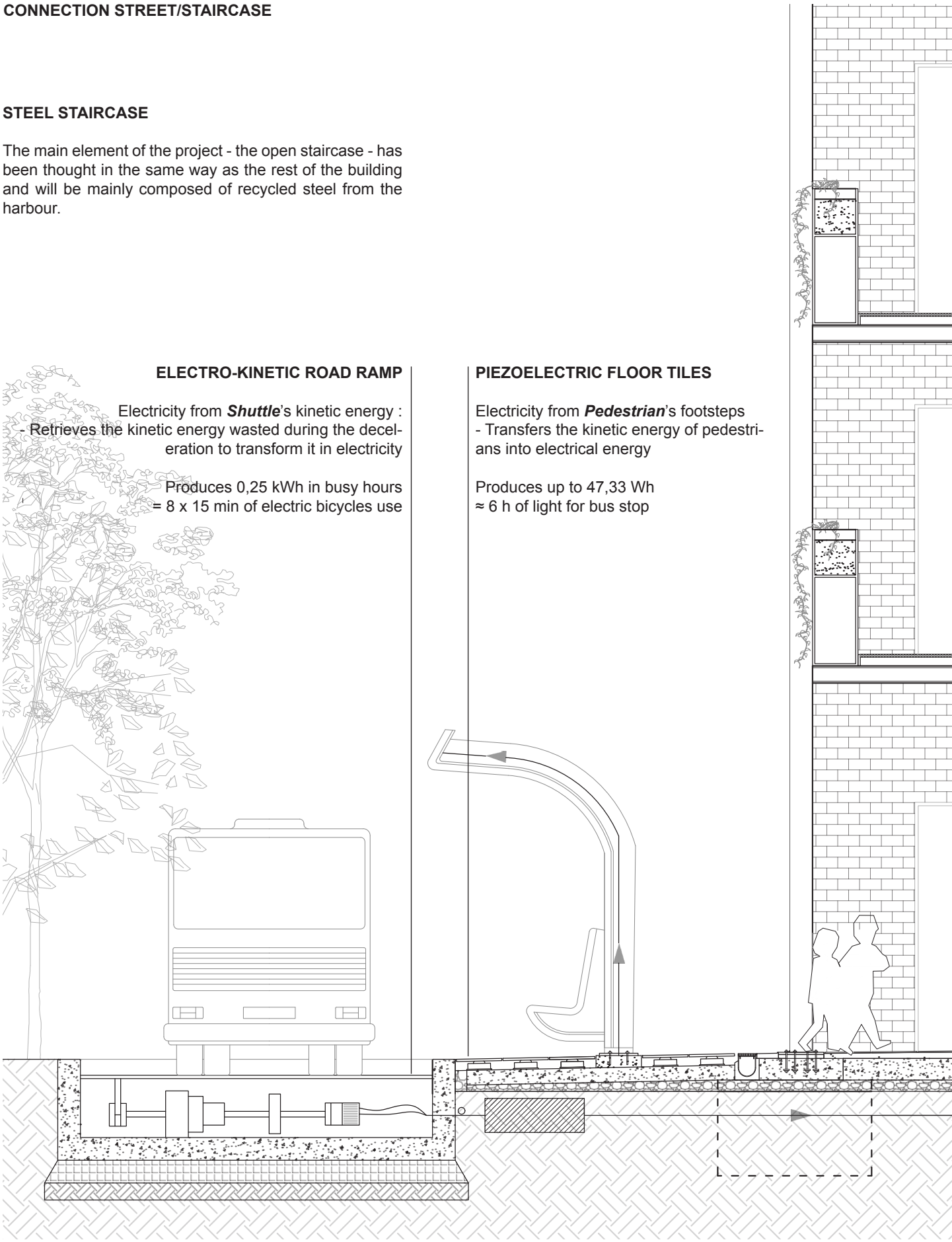
Electricity from ***Shuttle***'s kinetic energy :
- Retrieves the kinetic energy wasted during the deceleration to transform it in electricity

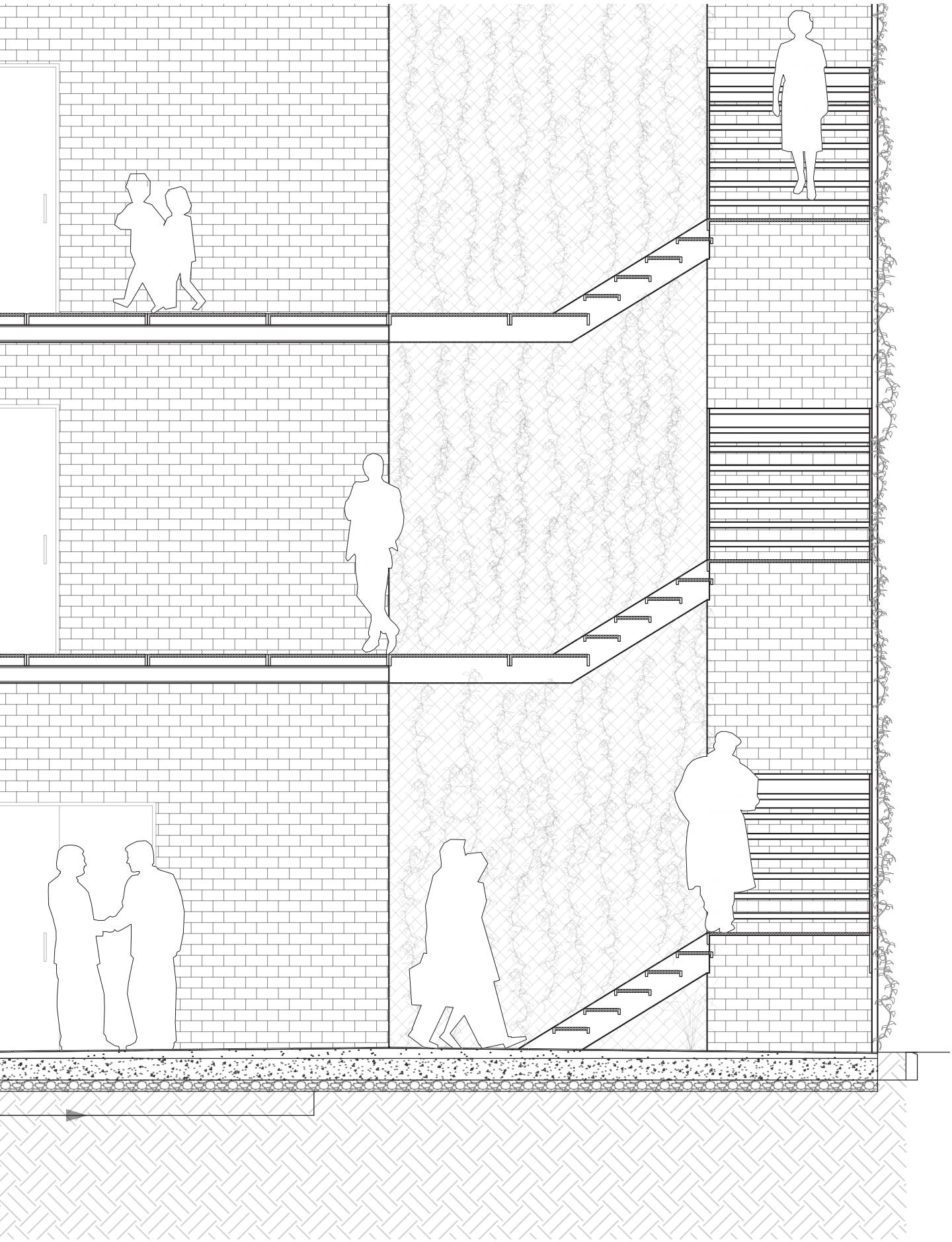
Produces 0,25 kWh in busy hours
= 8 x 15 min of electric bicycles use

PIEZOELECTRIC FLOOR TILES

Electricity from ***Pedestrian***'s footsteps
- Transfers the kinetic energy of pedestrians into electrical energy

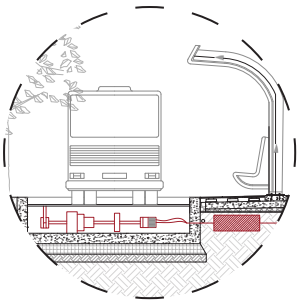
Produces up to 47,33 Wh
≈ 6 h of light for bus stop





ELECTRO-KINETIC ROAD RAMP

Retrieves the kinetic energy wasted during the deceleration of the shuttle to transform it in electricity bicycles.

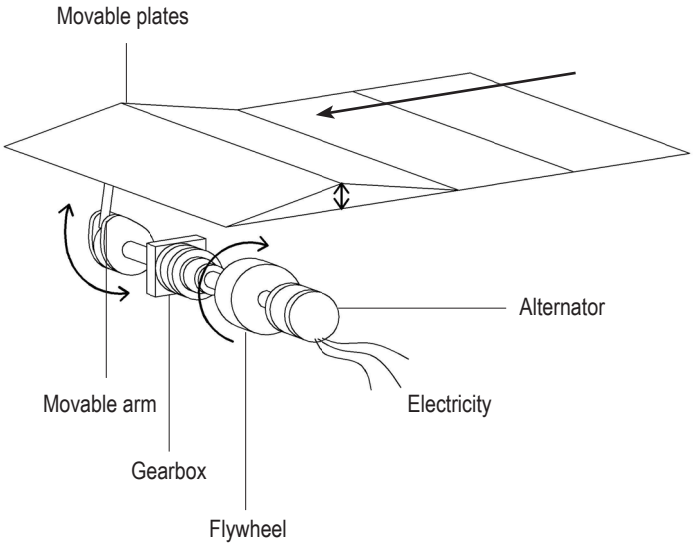


Energy produced

1 Small car : 10 kWs

1 **Shuttle** : 30 kWs
= 0,08331 kWh

1h : 30 Shuttles : 0,24993 kWh
≈ 0,25 kWh



Equivalent in electric bicycle battery life

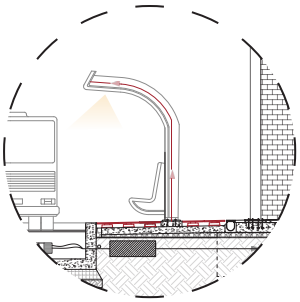
1 **Electric bicycle** : 0,25 kWh

Average battery life : 40 km
= 2h at 20 km/h
= 4x15 min at 20 km/h

0,25 kWh : **4 x 15 min at 20 km/h**

PIEZOELECTRIC FLOOR TILES

Transfers the kinetic energy of steps of the pedestrians into electrical energy for bus stop lights.



Energy produced

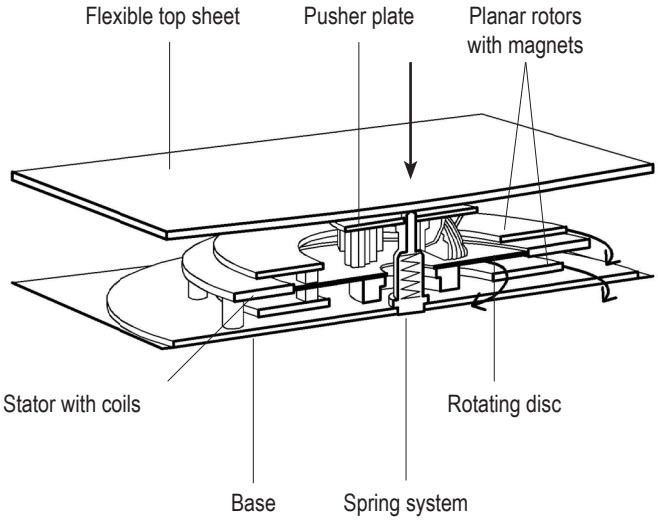
1 **Step** : 5 Ws
= 0,0013888 Wh

1 Step : 0,6 m
=> 20 steps : 12 m

1 crossing = 20 steps = 0,027776 Wh

Potential of 12 793 ppl / 15 bus stop
= 852 ppl / bus stop

=> Potential of 1 704 crossings = **47,33 Wh**



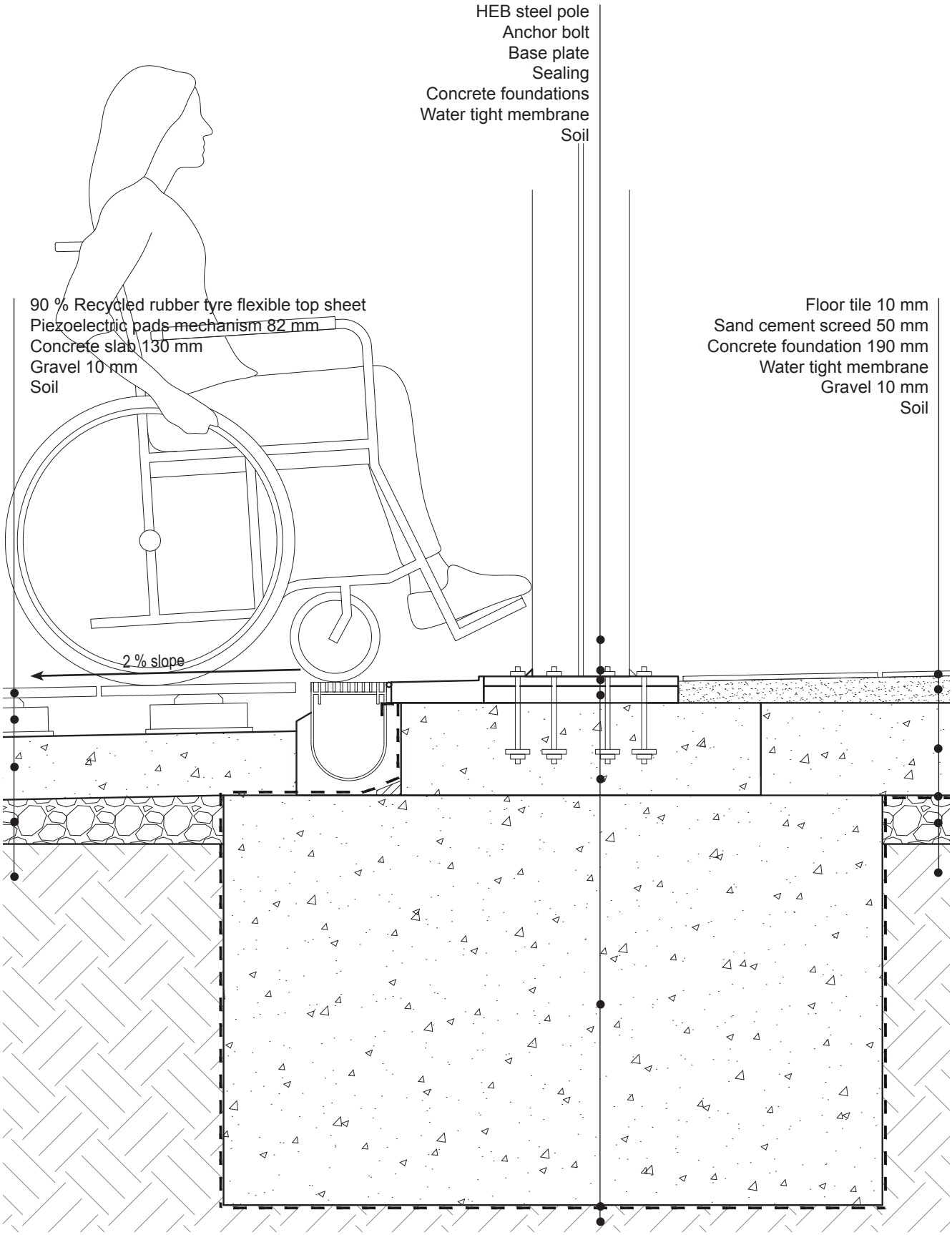
Equivalent in bus stop lighting duration

1 **Bus stop LED light** : 8 W

1 LED for 6 hours : **48 Wh**

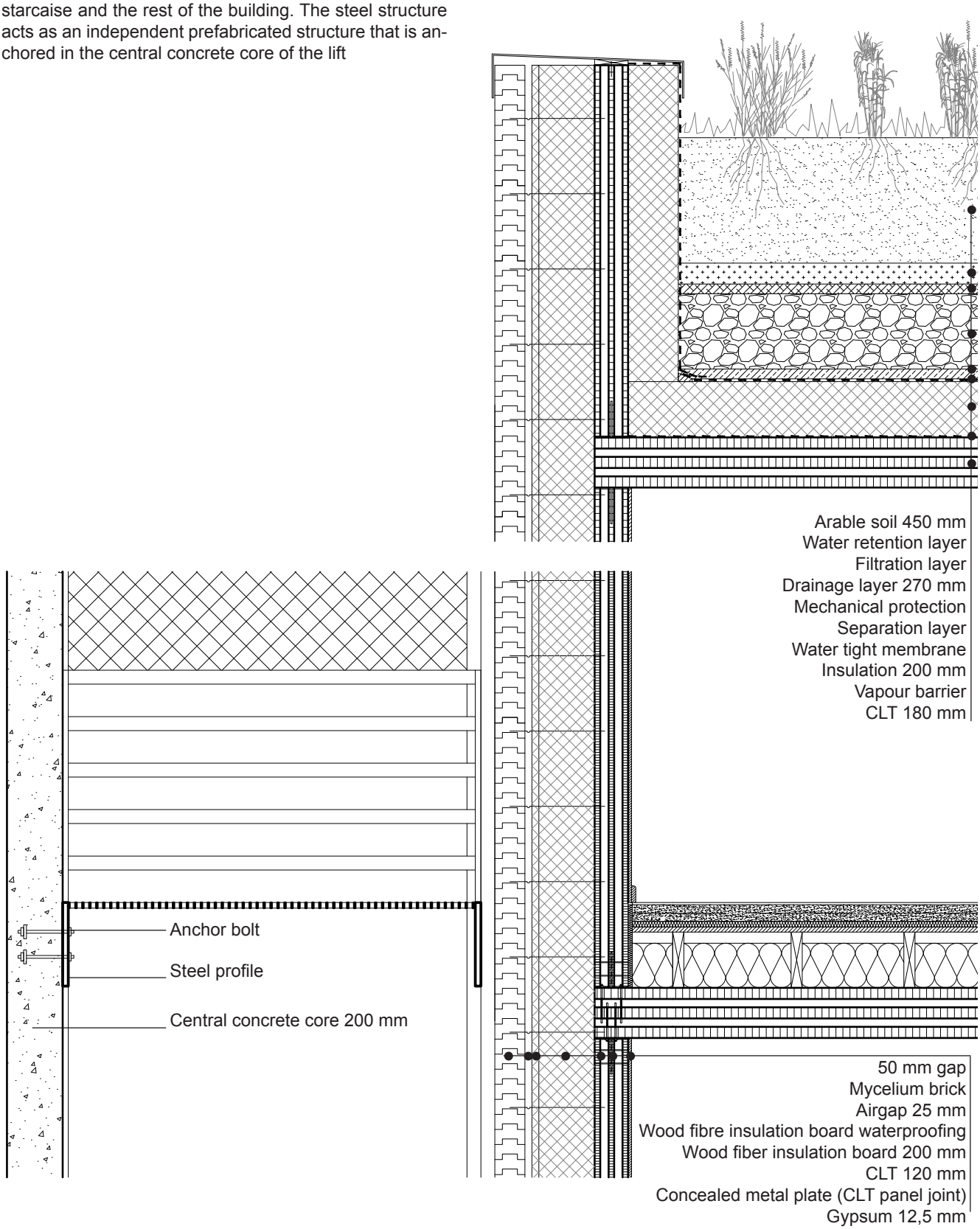
THRESHOLD DETAIL

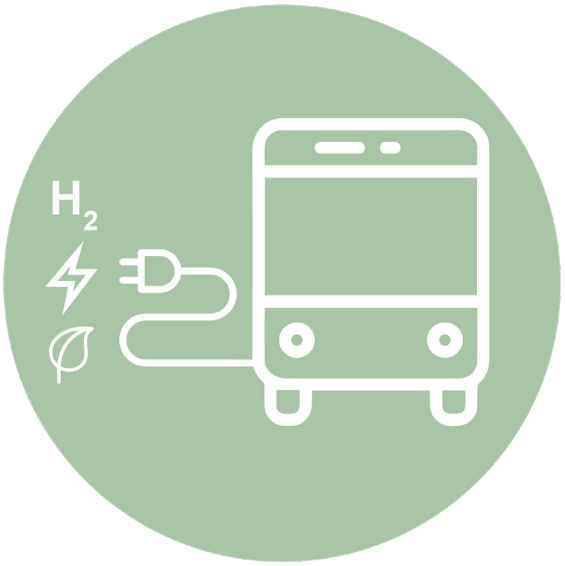
The entrance threshol is adapted to the easy circulation of wheelchairs as it avoid a step chile preventing waterentry.



UNCOUPLED STRUCTURES

This detail expresses the tension between the light steel starcaise and the rest of the building. The steel structure acts as an independent prefabricated structure that is anchored in the central concrete core of the lift





VOLVOLAB 2050

Conclusion

VOLVOLAB 2050

VolvoLab, it is the collaboration between the village of Oostakker and the Volvo company, one of the largest in Flanders, in order to completely change the face of the actual streetscape governed by cars into a car-free village.

These motorized vehicles are thrown out of the village and replaced by a network of hydrogen-powered shuttle buses supplied by Volvo, thus making use of Oostakker as its technology laboratory, while at the same time stimulating a radical change in mobility and the face of the village. This shuttle network criss-crosses the village, minimising walking distances between each line and connecting the village centre to its outskirts through an impressive ecological network.
Along these green lanes, new way of living is taking place. The local environment is changing, proximity is increasing and the use of cars becomes definitely obsolete. Following that, functions basically dedicated to this mean of transport are either doomed to adapt or disappear. Garages are iconic examples of this switch in the future vision.

By connecting the way of living to the new mobility system, an entire village leaves its isolated status and enters into symbiosis with its surroundings. This is exactly what VolvoLab is expecting to reach by setting up a sample project on a defined spot near the centre of the village in which horizontal and vertical mobility will be mixed in order to offer great interactions with the new public street.

VolvoLab is about using the existing towards a new positive and dynamic future.