

# THE STACK

## DESIGNING A



CIRCULAR  
STACKED  
MULTI-PURPOSE  
LARGE-SCALE  
INDUSTRIAL

BUILDING

## IN KORTRIJK

## FOR A CLIENT

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**With the feedback from the field by**

BC architects and studies  
TRANS architectuur | stedenbouw  
practice for architecture urbanism landscape - FALLOW  
Intercommunale LEIEDAL

**KULeuven  
Faculty of Architecture**

Masterstudio, semester 1  
2021-2022  
Campus: Ghent  
Engagement: Craftsmanship



THE  
STACK

Designing a  
circular  
stacked  
Multi-purpose  
large-scale  
industrial  
building  
in Kortrijk  
for a client

# IN THE SPATIAL POLICY PLAN SPACE FLANDERS, THE GOVERNMENT FORMULATES THE AMBITION TO USE THE BUILT-UP SPACE MORE INTELLIGENTLY, WITH A VIEW TO THE EUROPEAN OBJECTIVE<sup>1</sup> OF 0% EXTRA LAND TAKE BY 2050.

## THE STUDIO

The stack is the title of the design course at the Faculty of Architecture Sint-Lucas in Gent in the first semester of the master program.

The preliminary task has been to design a feasible mixed-use building for mainly stacked production and ateliers on a specific site in the city of Kortrijk.

This has been done for a real client which informed the students, asked a lot of questions and evaluated their proposals. This has been a great opportunity for the students to check and evaluate their designs and relate it to market conditions.

The building had to be realized to the maximum extent in a circular and sustainable way and has a clear link with the context, both with the immediate and wider surroundings. The entire life cycle of the building had to be taken into account, from design through realisation, operation, maintenance and end of life.

The possibility could be provided to open up buildings and their environment to third parties as much as possible. The sharing of space results in space savings; in the first place, one can think of functions that support business operations, such as reception meeting rooms, dressing rooms and dining areas for staff.

It is clear that cooperation between companies becomes essential, but can also be facilitated by the design.

Through architectural and spatial quality and a good relationship with the environment, a timeless quality ensures a building that is less subject to fashions and trends.

The studio worked as an office. The students have learned from other work that has been made by their fellow students by sharing information and design insights. This method allows to learn a lot, learn new methods, make progress and make sure that the quality of the work is and keeps very high. The students have been guided and got feedback from the field as there has been interventions by BC architects and studies, practice for architecture urbanism landscape - FALLOW and TRANS architectuur | stedenbouw.

The students worked in pairs of two or three, and were asked to illustrate their approach with sketches, collages, plans, models etc.



Collage

1. European Environment Agency, 'Land take in Europe'  
<https://www.eea.europa.eu/data-and-maps/indicators/land-take-3/assessment>

“IN TODAY’S NEW  
ECONOMY THE  
FACTORY TYPOLOGY  
OFFERS ARCHITECTS  
A CHALLENGING  
DESIGN  
OPPORTUNITY”<sup>1</sup>

1. Nina Rappaport in 'City Made'  
<https://www.verticalurbanfactory.org/>

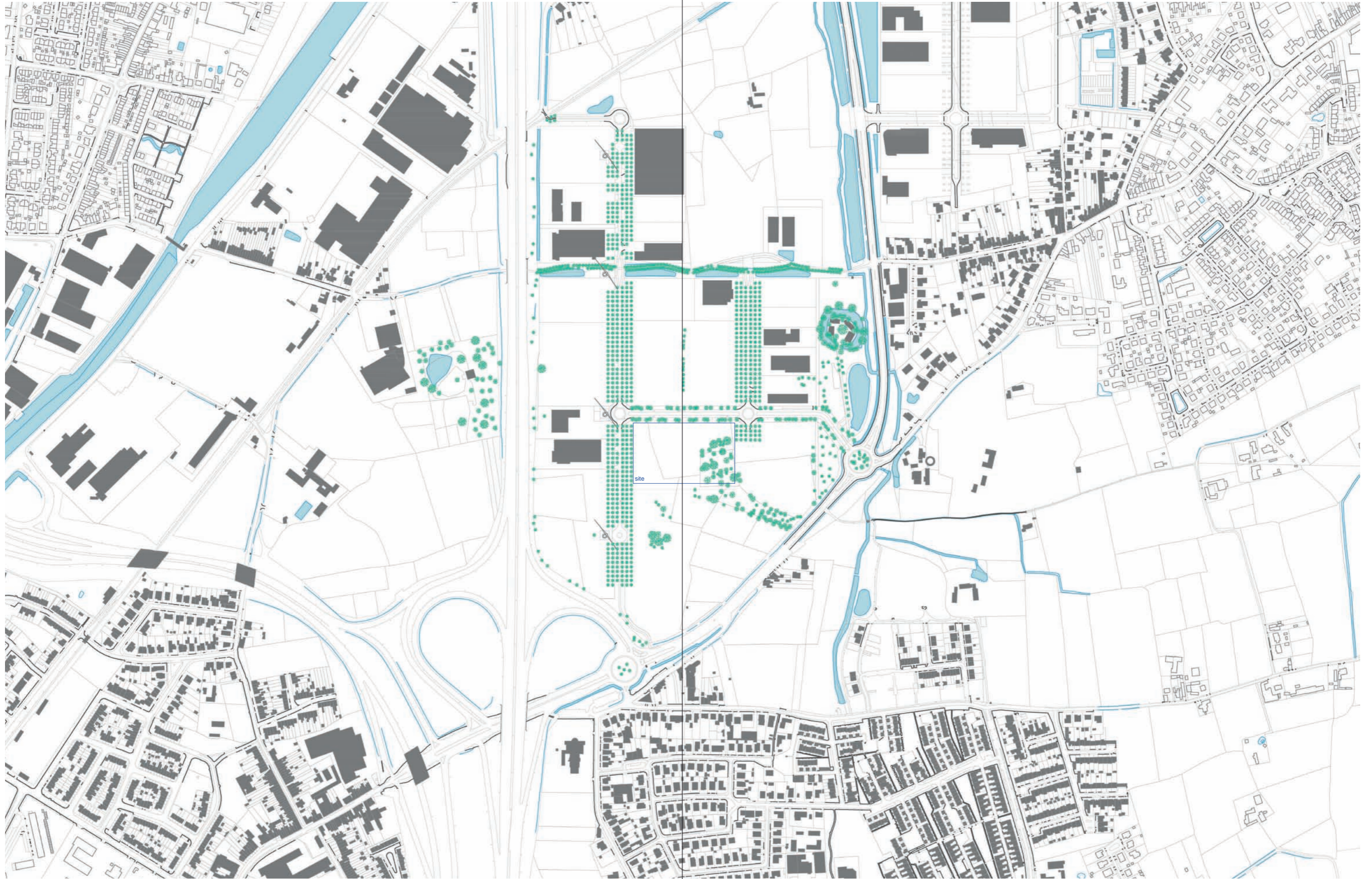
## PROGRAMME

Production space:	27.000 m <sup>2</sup>
Showrooms:	1.490 m <sup>2</sup>
Catering:	2.360 m <sup>2</sup>
Leisure:	4.200 m <sup>2</sup>
Offices:	13.440 m <sup>2</sup>
Sports roof:	3.600 m <sup>2</sup>
Parking:	500 cars
Bicycle parking:	500 bikes

## SITE



fig. 3 Aerial image of the site



site plan with broader surroundings



## PROJECTS

01

AIKEN PARMAR - STIJN OEYEN  
5%

02

BAYAN ZAREA - IULIIA GALKINA -  
NOUR SAADAH  
THE STACKED TOWER

03

BOUFFART - SPINNEWYN - VAN  
CAUWENBERGHE  
CLAIR OBSCUR

04

CLAUDIA PERÉZ HOM - LLUIS PERIS  
MIRALLES - VERONIKA TOMICKOVA  
VLC PROJECT

05

DAVIDE BRUNETTI - LOTTE  
ENGELBORGHES  
INTERPLAY

06

MARIEKE SCHOONJANS - PIETER  
REYNAERT  
THE CROSS

07

SARA CLAES - JULIE DE ROUCK  
K-FORUM

09

SHAURYA DUTTA - WIKTOR SERAFIN  
THE STASH

09

LARS GUSTAV ROGNE & STIJN JALON  
THE GARDEN

10

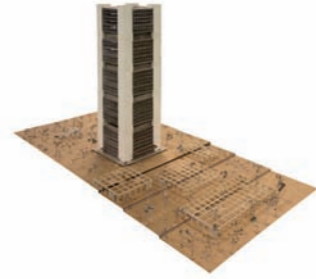
VOET MATHIEU - KEYAERTS  
KENNETH  
THE STACK

11

JASPER - CARO  
THE LIVING FACADE



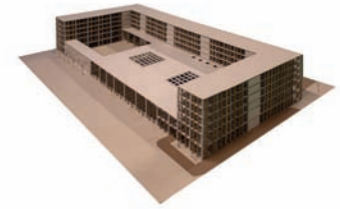
01



02



07



08



03



04



09



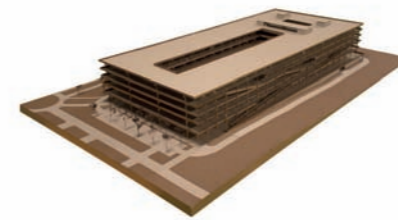
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05



06



11





## 01

AIKEN PARMAR - STIJN OEYEN  
5%

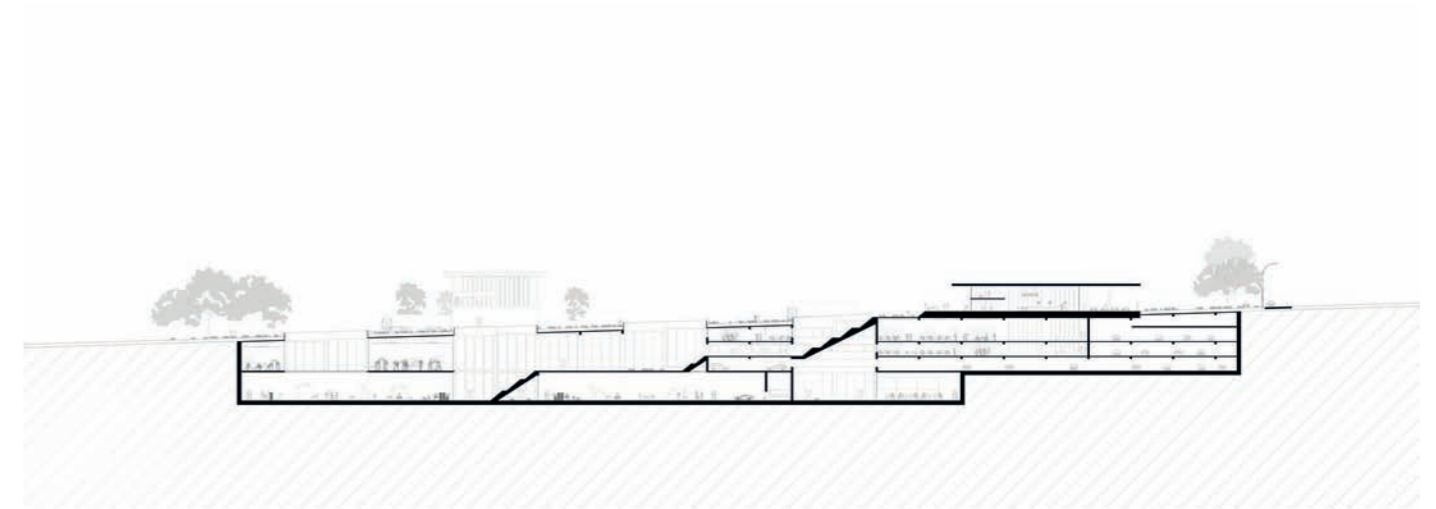
This project explores the possibility to build the program mainly underground taking advantage of the climatic conditions while achieving an open ground floor.

Thanks to the natural slope of the site, we decided to put the public functions as the showroom and cafeteria on top of the hill. The distribution towers, which allow for the vertical circulation of goods and employees, can be found on the lower part of the site located near the street. Here, trucks can easily access the dock levellers without crossing the public and lighter circulation routes. These cores have a direct vertical connection to the production and storage areas below. Smaller vehicles, such as vans, go down one floor which improves the efficiency of the delivery and picking while decreasing the travel distance of the goods.

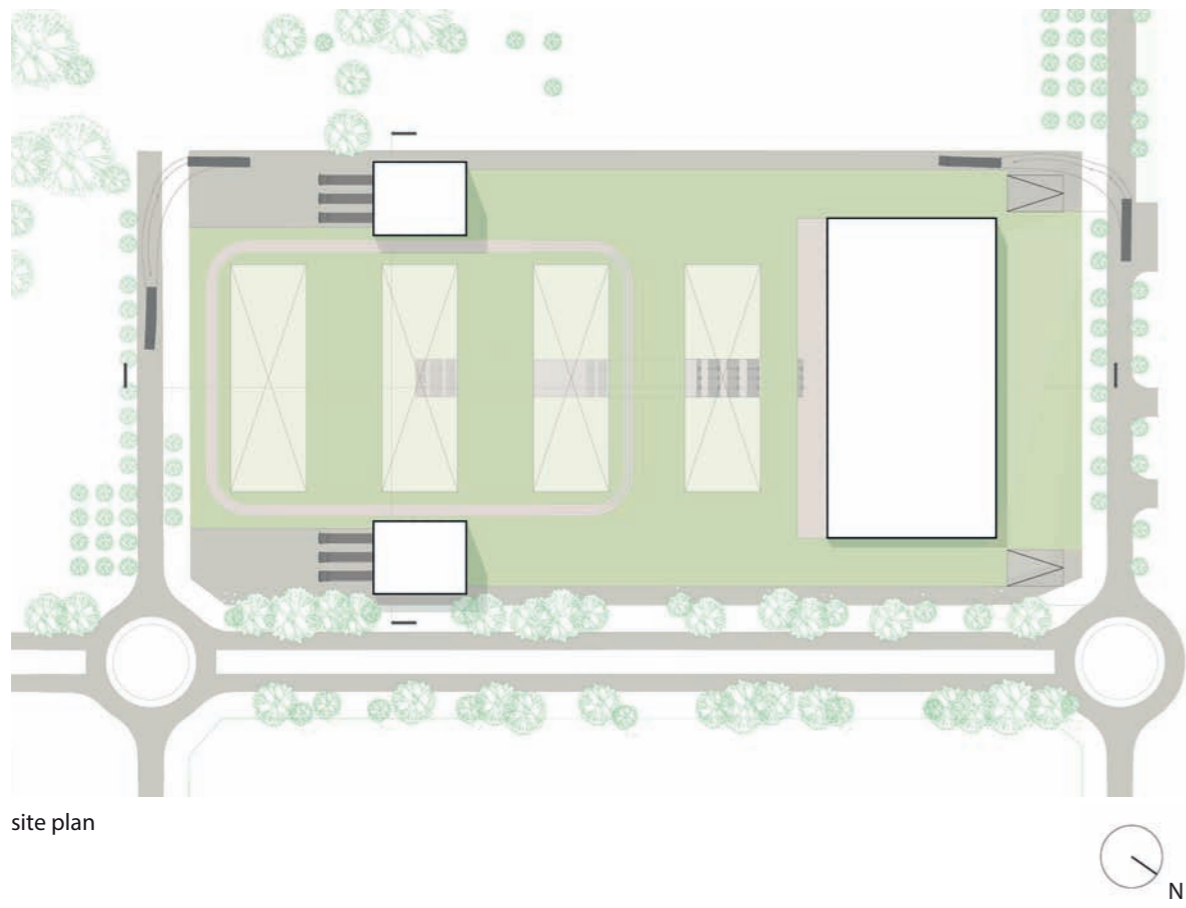
We do find four courtyards to maximise the daylight. A central promenade connects those courtyards and every other function within the building.

The structure consists of a grid of wooden columns and beams that support a precast concrete floor. The production areas are designed to fit a combination of different companies. As such the production floor can be divided into four production spaces.

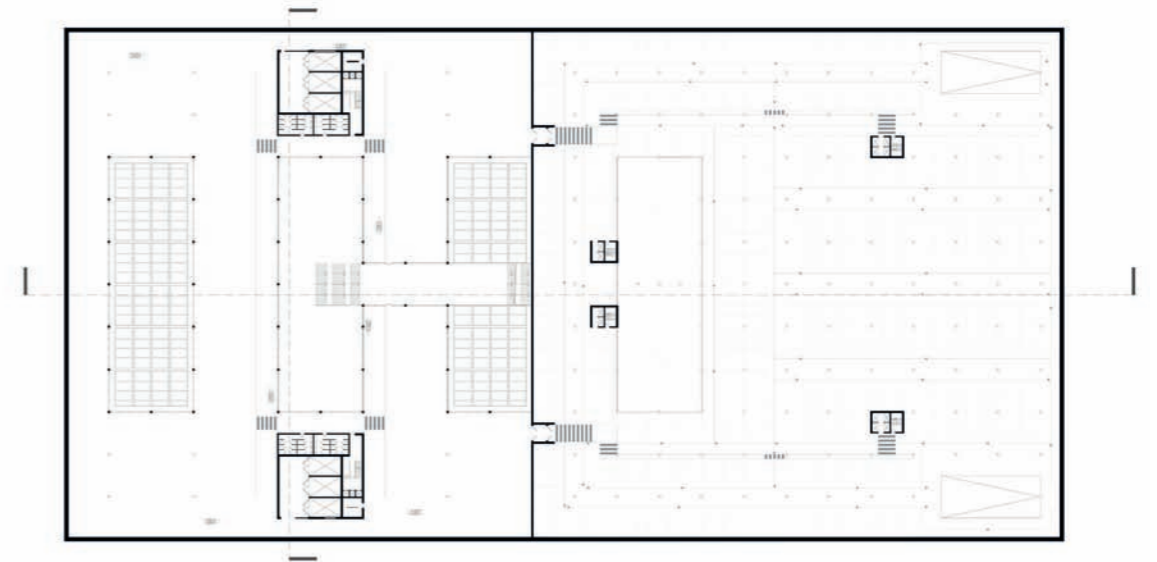
Finally, only 5% of the total amount of the ground floor is built.



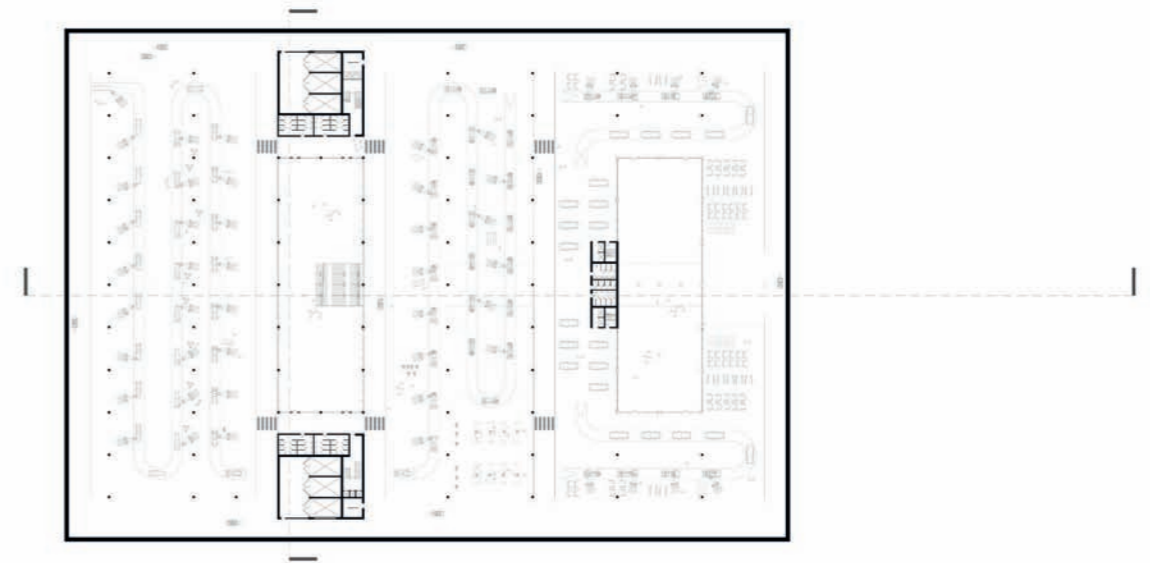
section



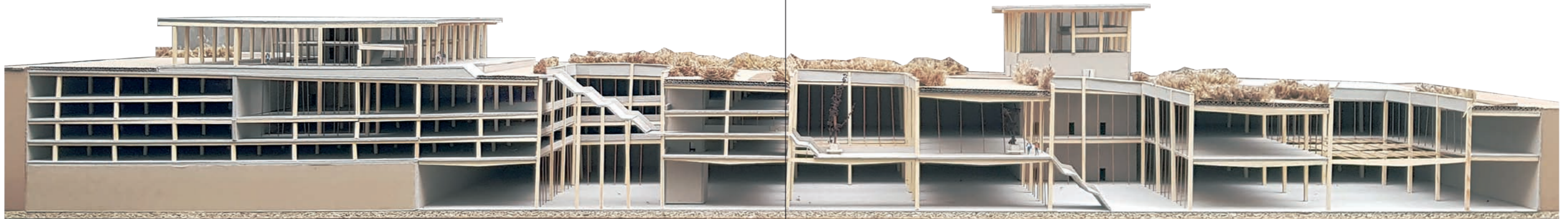
site plan



plan -2



plan -3, production floor



model picture

## 02

### BAYAN ZAREA - IULIIA GALKINA - NOUR SAADAH THE STACKED TOWER

The main concept is to stack all functions vertically to free up the site, to be able to divide the site into two main zones. One, being a place for the circulation of cars and trucks close to the road while on the other side we have an open area for outdoor activities which is only accessible by pedestrians and bicycles.

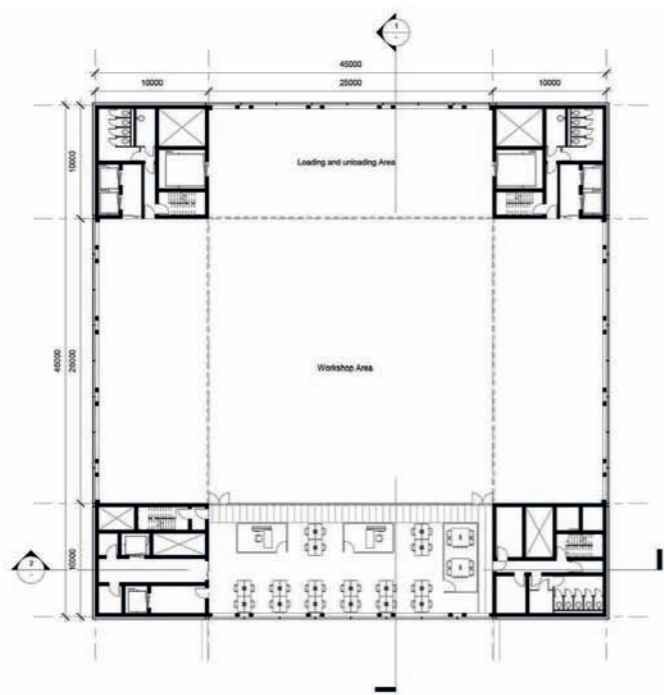
The tower is having four cores which are located at each corner's extremity of the rectangular tower. The four cores ensure the vertical circulation and serve the different floors with the necessary techniques. The tower is mainly divided into five clusters above ground and two underground levels for parking. Four production clusters with on the top a cluster dedicated to public activities such as the showroom etc. A production cluster has three floors of production space with a mezzanine for offices and one technical floor with storage space.

On every two floors, a truss beam connects two cores to transfer the horizontal loads. The cores and the slabs are made of concrete while CLT (Cross laminated timber) is used for the truss beams.

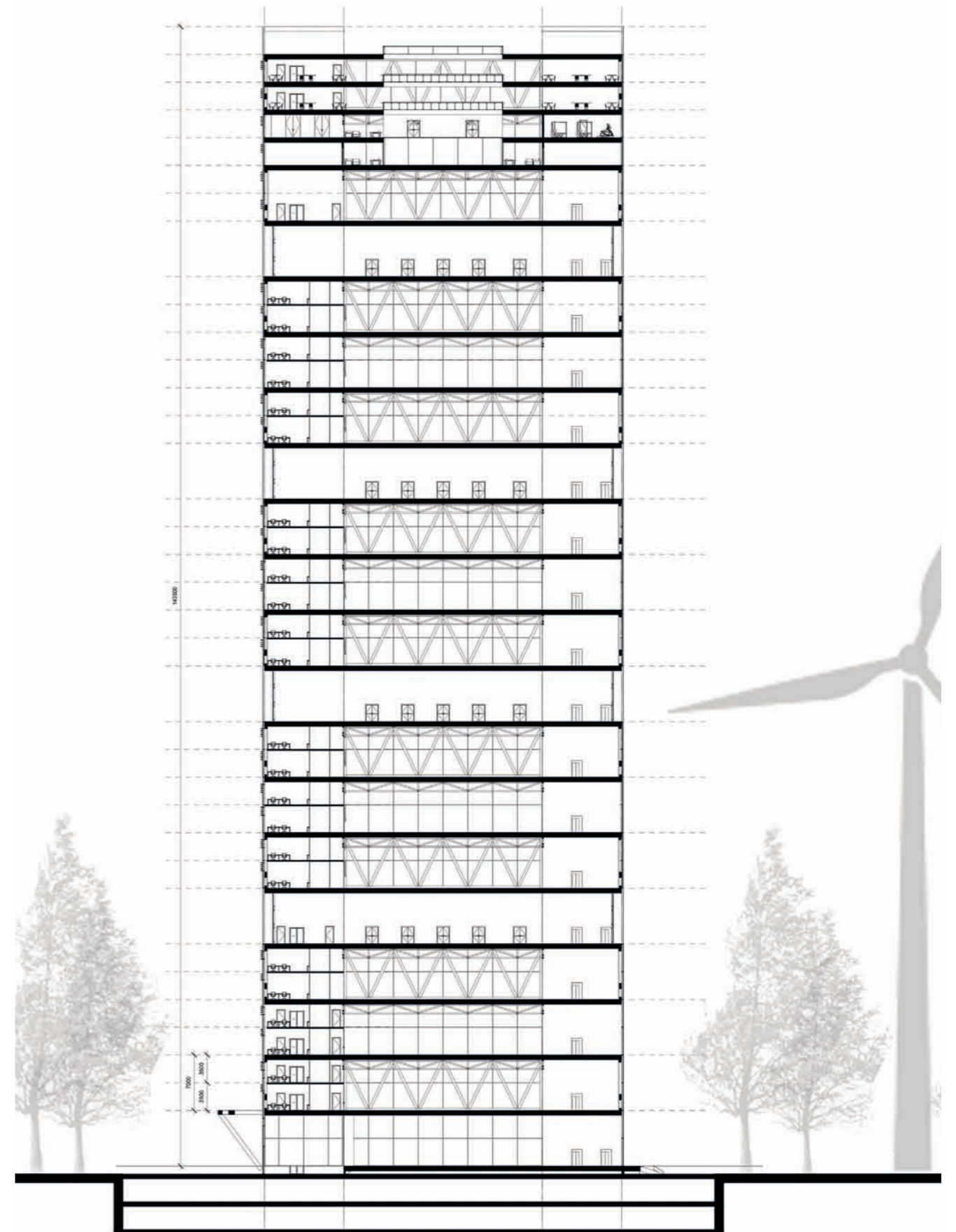
Horizontal louvres are hung on the facade, to avoid direct sunlight while expressing change. Furthermore, a metal mesh is used for the technical floors' facade, as it is a lightweight material and keeps the service rooms ventilated as much as possible.



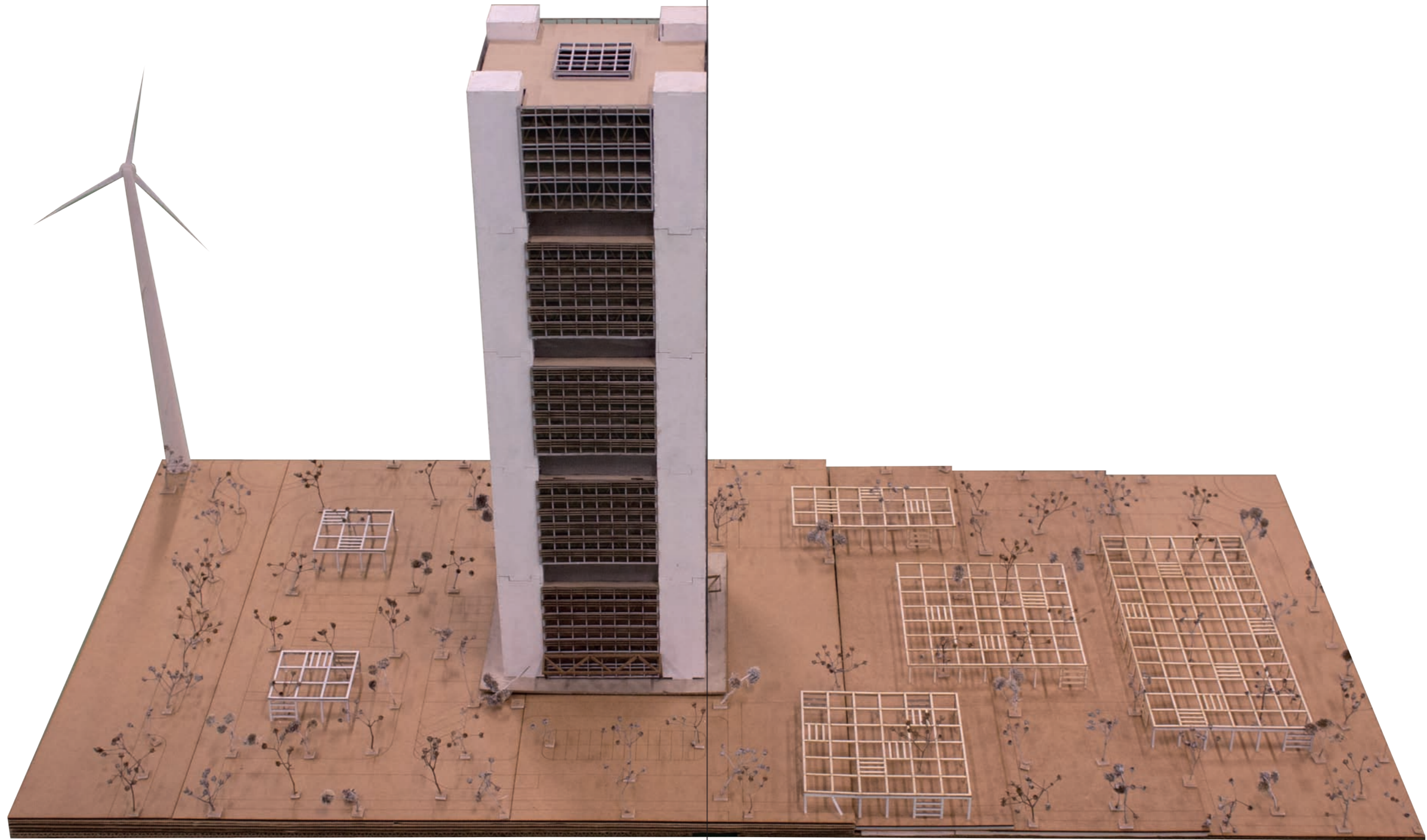
collage



plan +1



section 1



Model picture

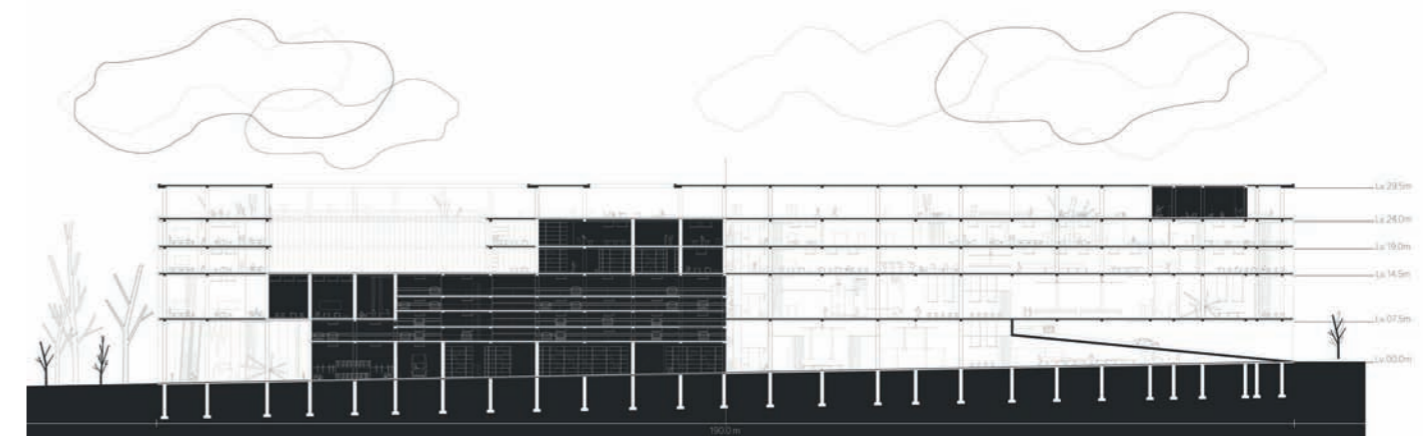
## 03

BOUFFART - SPINNEWYN - VAN CAUWENBERGHE  
CLAIR OBSCUR

An analysis of the functions showed that 42% of the activities would benefit from an access to daylight. With the help of light diagrams, taking orientation into account as well as floor to ceiling distances and obstacles to light, we ensured that our building could supply the needed 42% of well lit spaces.

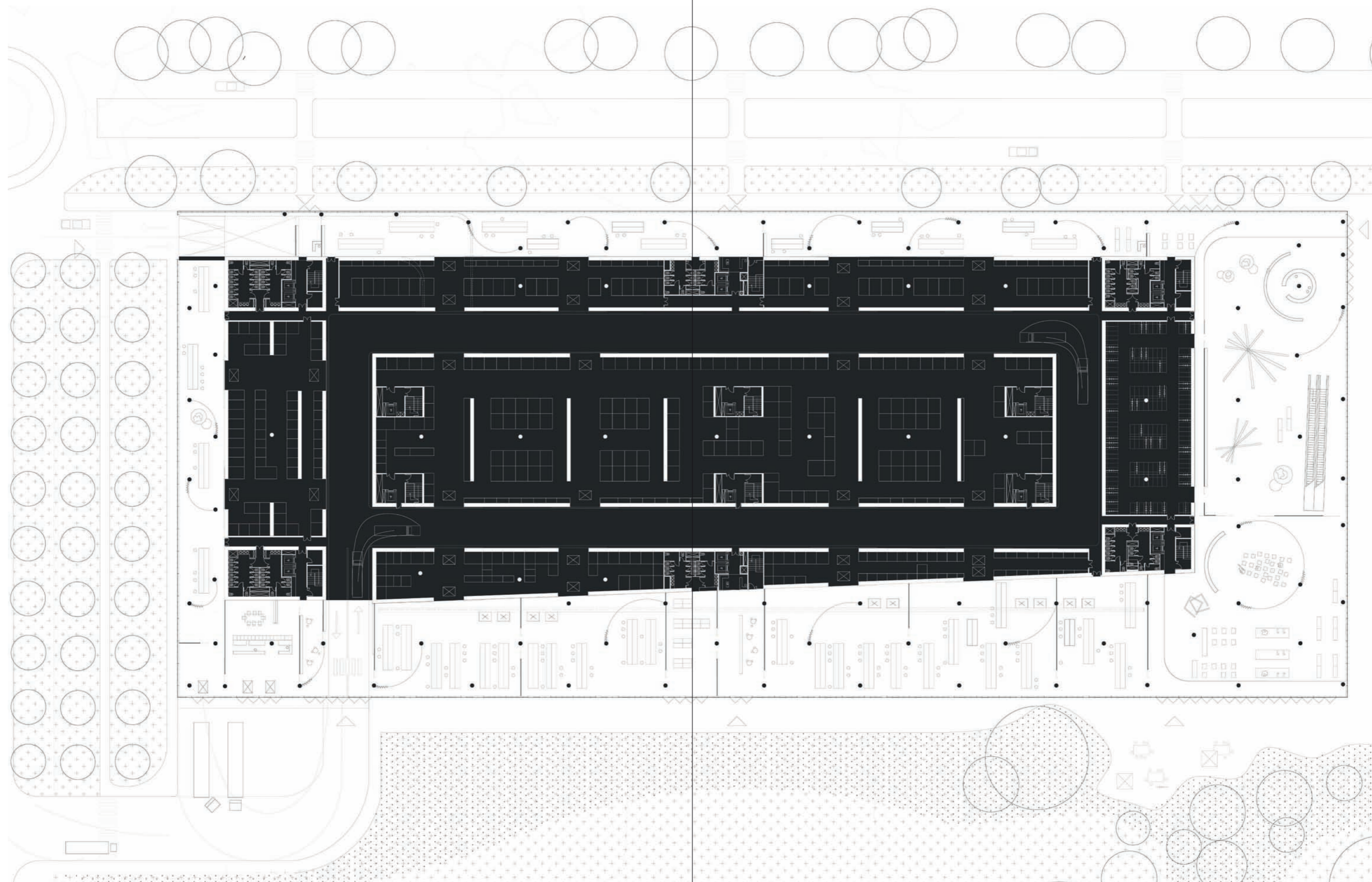
It quickly appeared that the harmonious coexistence of two different atmospheres, a clear building and a dark building should become a visible pattern, influencing the design, the aesthetics of the building, the choice of materials and creating an instantaneous readability of the concept. Inside the building, behind a concrete envelope, one finds those functions that do not need daylight, like storage, parking, technical rooms etc. A thick concrete wall marks the limit between the clear and the dark areas. Both worlds are completely modular.

The top floor is an open space dedicated to sports activities.



section







model picture

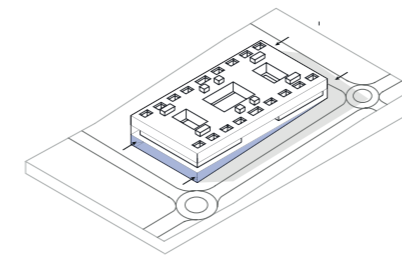
## 04

CLAUDIA PERÉZ HOM - LLUIS PERIS MIRALLES -  
 VERONIKA TOMICKOVA  
 VLC PROJECT

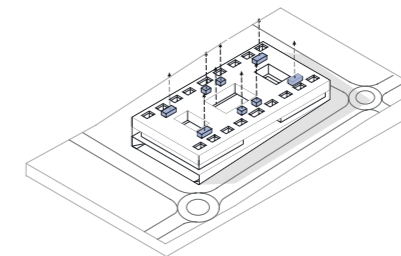
The building follows a rectangular shape that has more than 20 holes that ensure daylight and ventilation while bringing greenery into the working areas. In order to keep the fluency of the site, the ground floor has an open layout that works as a semi-public area which can be used for several public activities such as an event. The entrances are determined by the topography of the place, which allows access on different levels for different vehicles.

The façade uses translucent materials to bring in light to the very heart of the building.

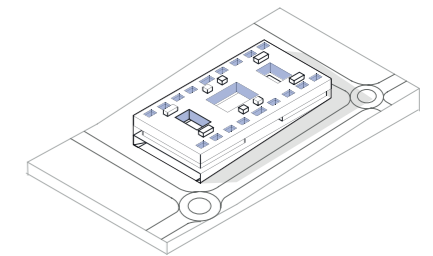
The entire project structure system is based on stacked timber units, reducing the footprint of the building significantly while ensuring enough flexibility.



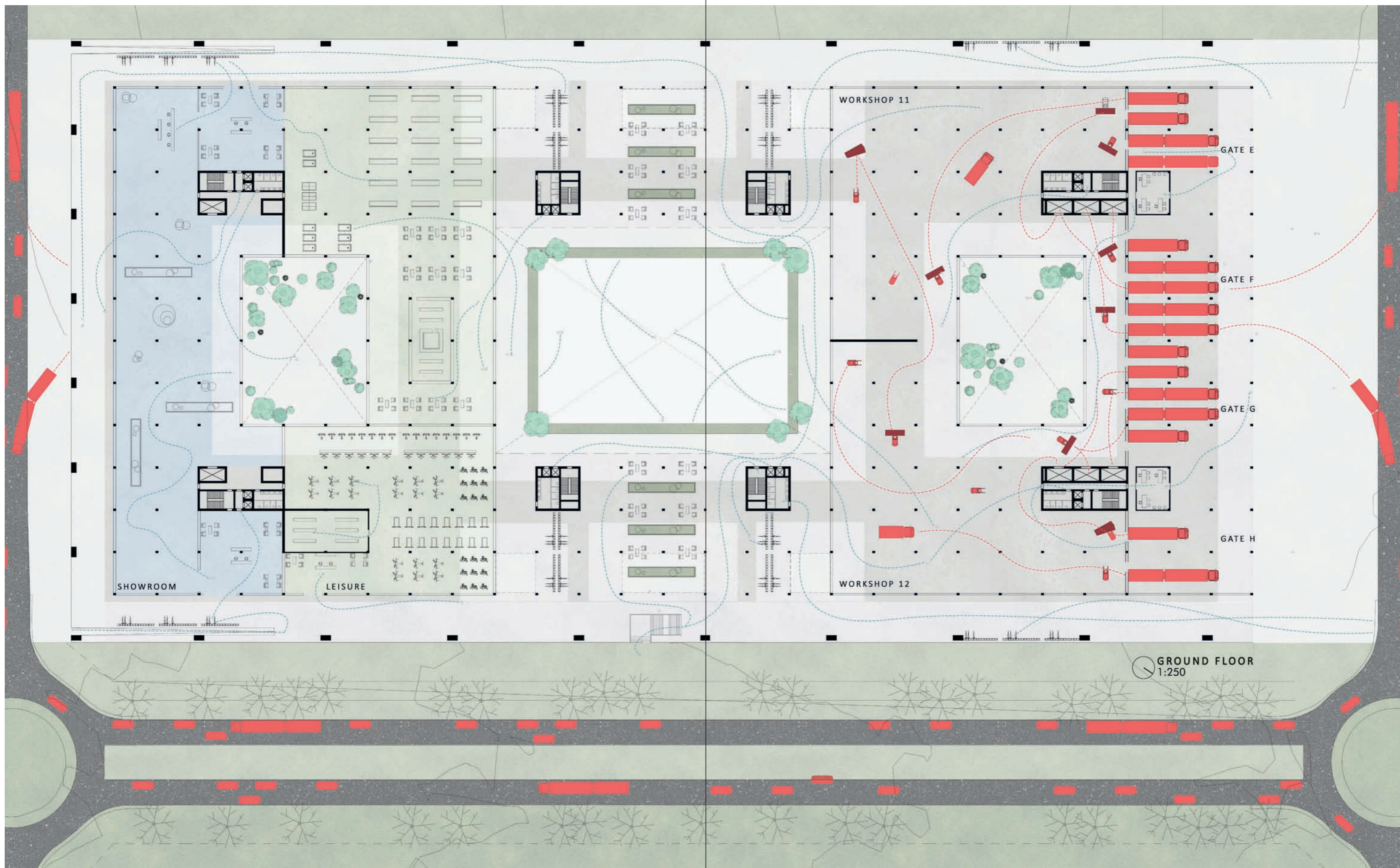
ENTRANCES

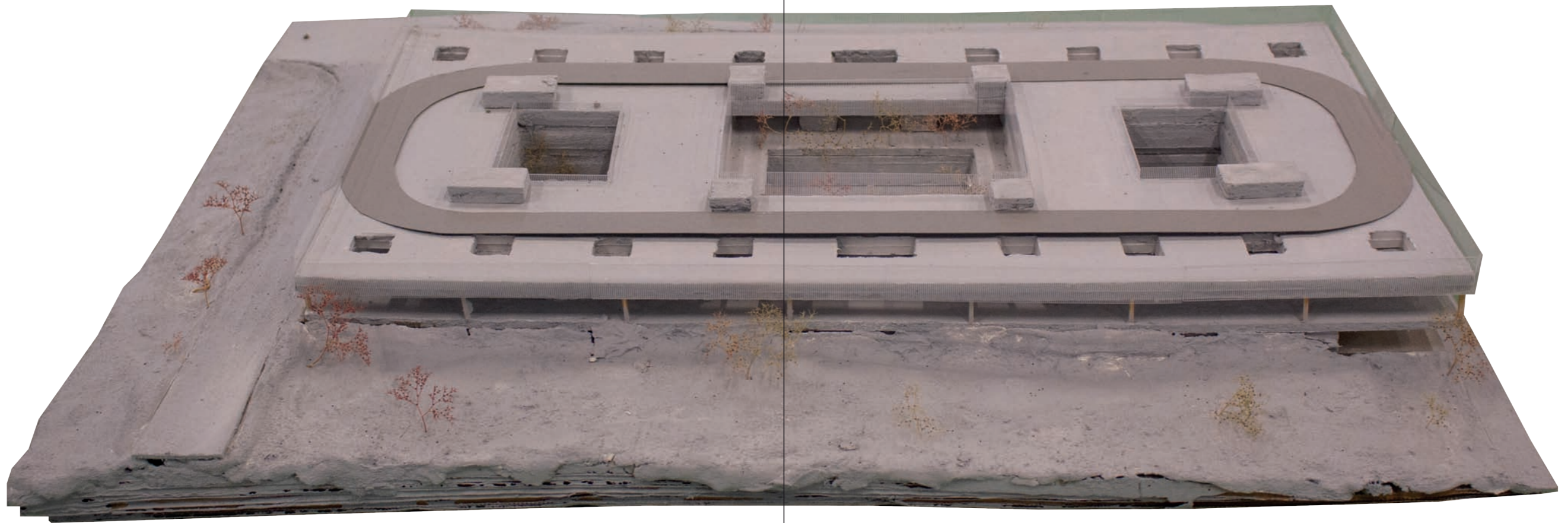


MOBILITY



OPEN SPACES





model picture

## DAVIDE BRUNETTI - LOTTE ENGELBORGH'S INTERPLAY

Interplay is needed within modern working environments as a medium to foster productivity while allowing individuals to achieve personal developments as part of a healthy and balanced daily life.

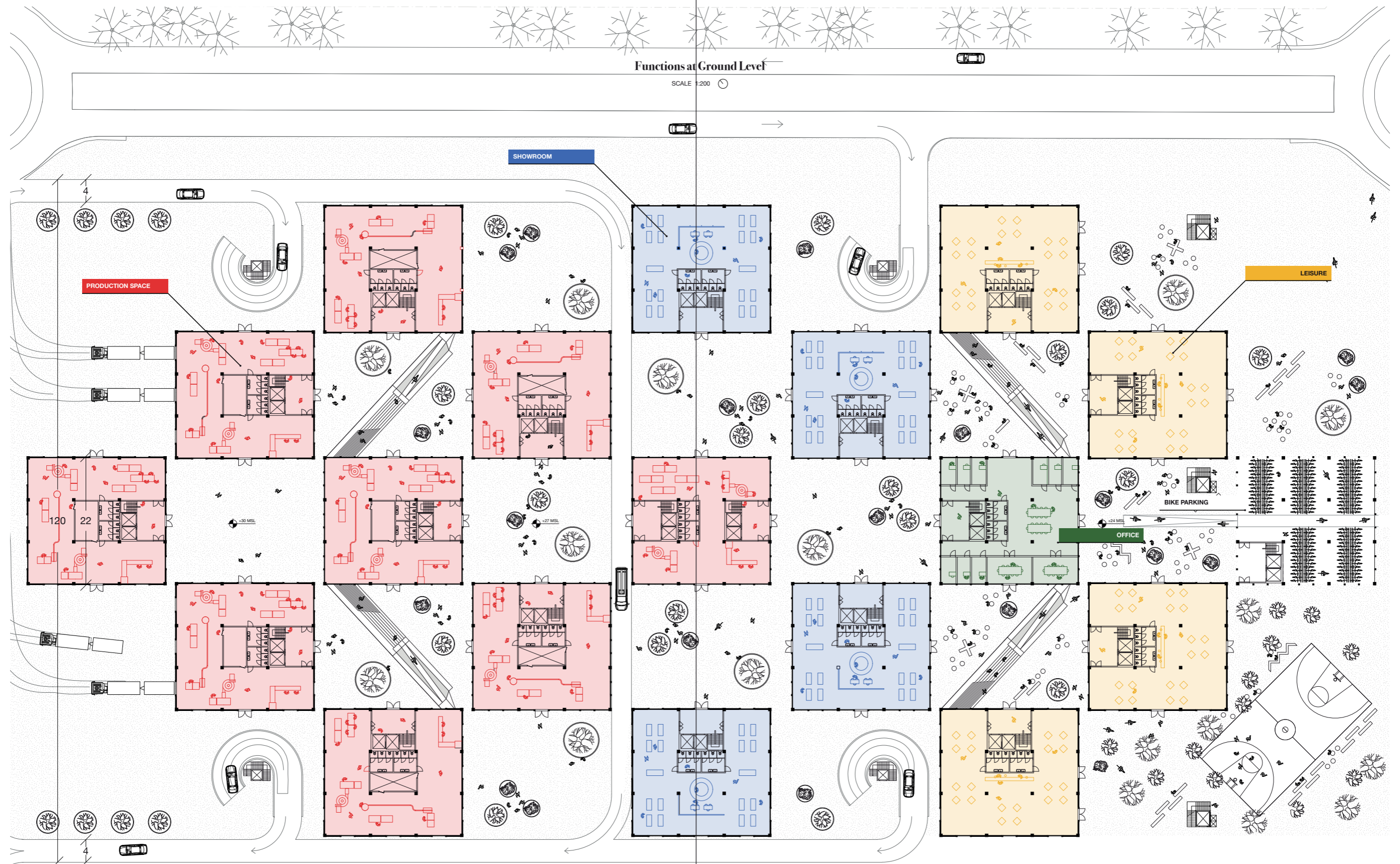
To do so, we need to provide occasions of contact between diverse activities

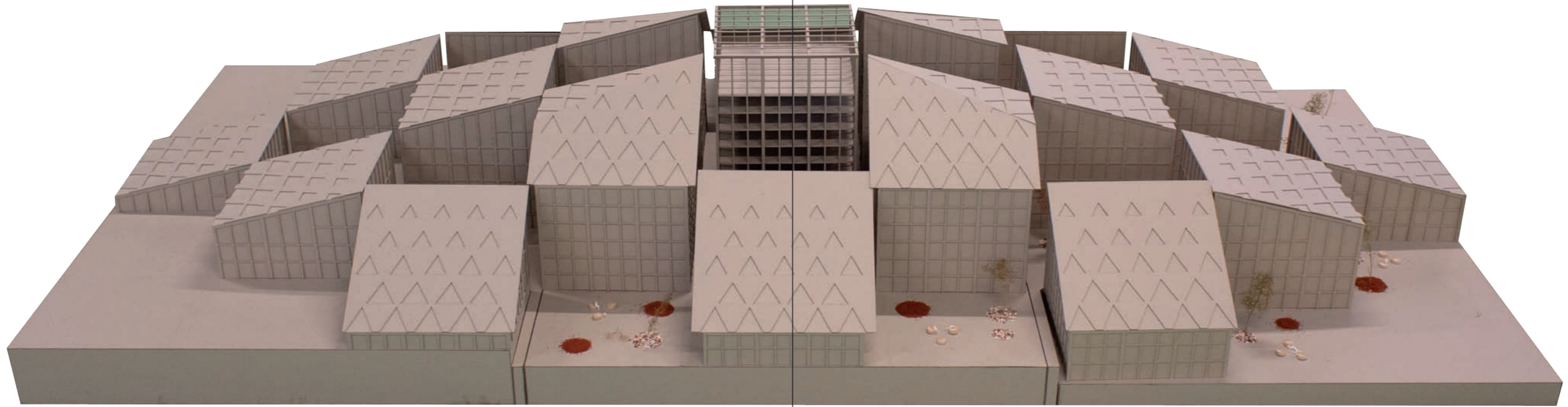
The modular nature of the spaces allows a dynamic distribution of activities based on each function's specific needs and welcomes future changes in the program, keeping developments and modifications easily achievable.

Three mobility zones are implemented to allow different flows of vehicles and people to reach the building safely and without obstructing one another.



section





model picture



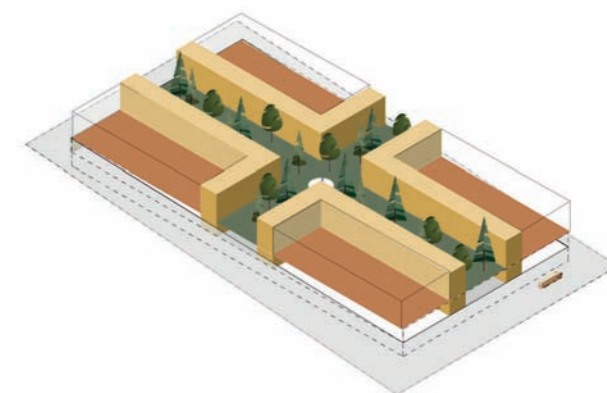
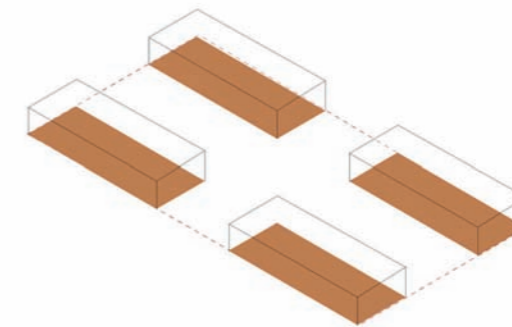
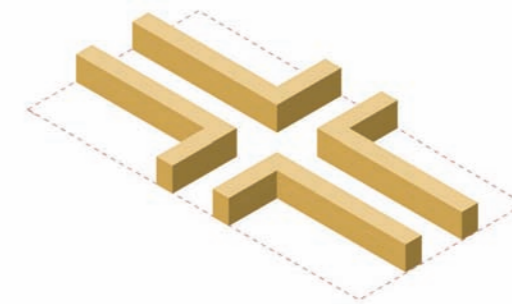
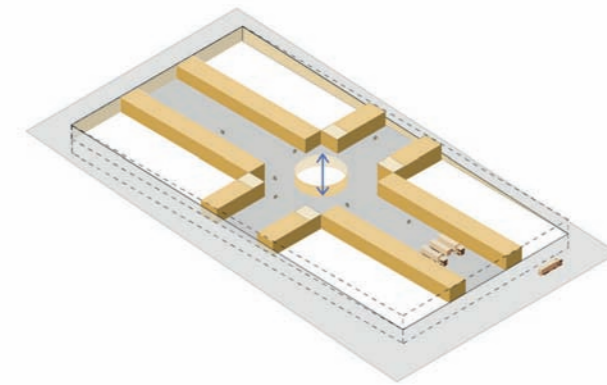
MARIEKE SCHOONJANS - PIETER REYNAERT  
THE CROSS

The cross is the characteristic shape of our design. It's an inner green space, a greenhouse, where all kinds of activities can take place.

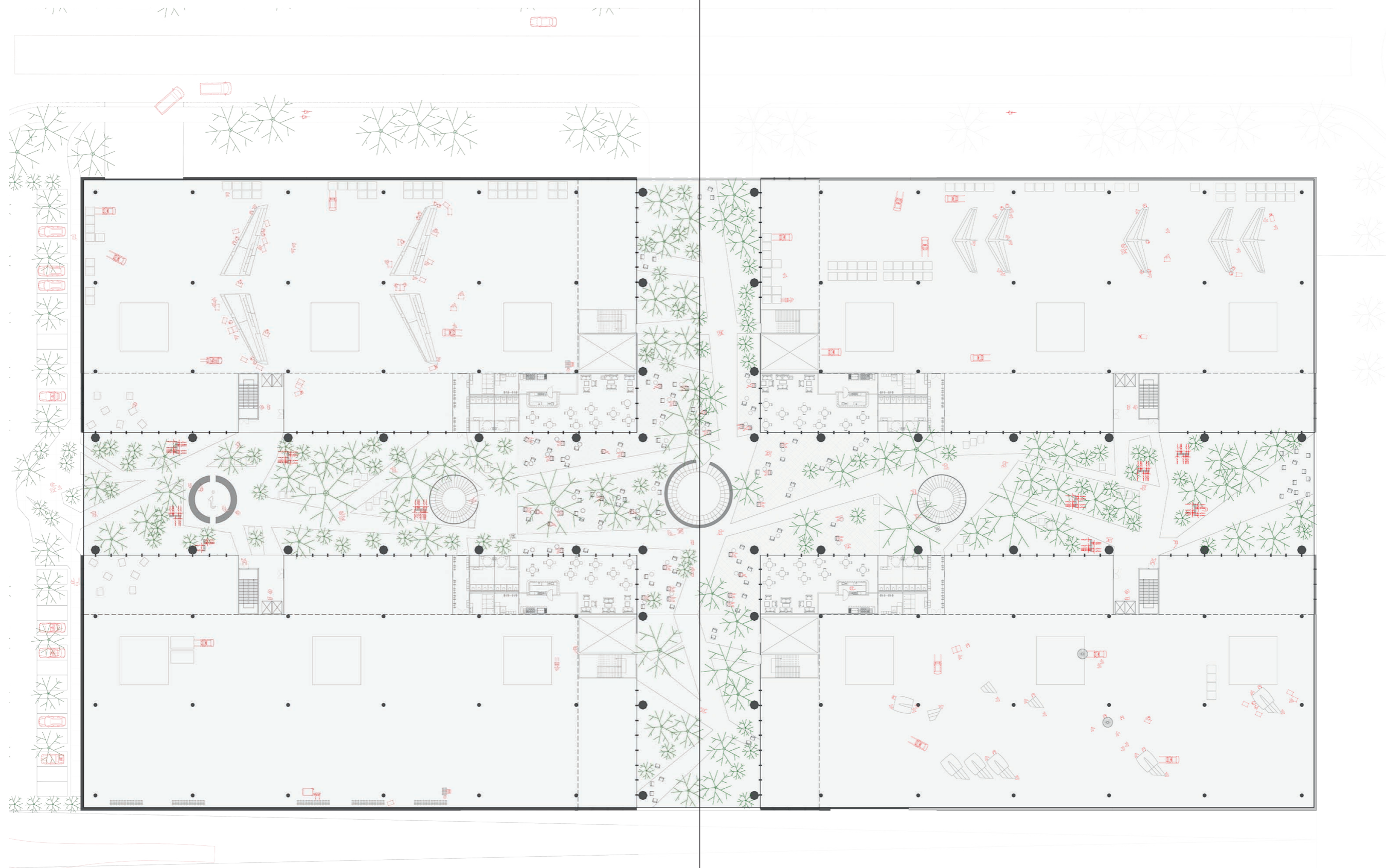
The production spaces are located on the extremities and have voids which allow daylight to enter the underground floor. The hall is constructed in a lightweight steel roof with massive concrete pillars on a grid of 15 meters. The facade is made out of a 14-meter height plinth with large windows above. Offices are built in a wooden structure and surround the productions space while having a look at the green central space.

The configuration allows other programs such as a concert or event to take place in the production hall.

The slope of the terrain is used to separate the different types of circulation such as the delivery with heavy trucks, the cars of the employees, the pedestrian and bike-friendly routes. On the minus one, the goods from the trucks are unloaded centrally and are distributed from there to the elevators. In the middle, we find a roundabout which is used as a double ramp. One is used for deliveries of vans while the other one leads to the parking. The ramp can also be used for the forklifts to transport bulky goods on several levels. This space figures as an open void which can be seen from the inner garden.



scheme





model picture

## 07

SARA CLAES - JULIE DE ROUCK  
K-FORUM

Coming together is the main focus. On the middle of the site, you find a square surrounded by buildings. It generates a space to eat, work out, celebrate, discuss, read... Workers of the production spaces, as well as employees of the offices and visitors of the showroom can meet each other in this central area. After all, whether you arrive at the site by car, bike or on foot, the entrance to every building is on the square.

We decided to house every function into its own building. There is a parking tower with a sports roof on top, a production space, an office building and a restaurant.

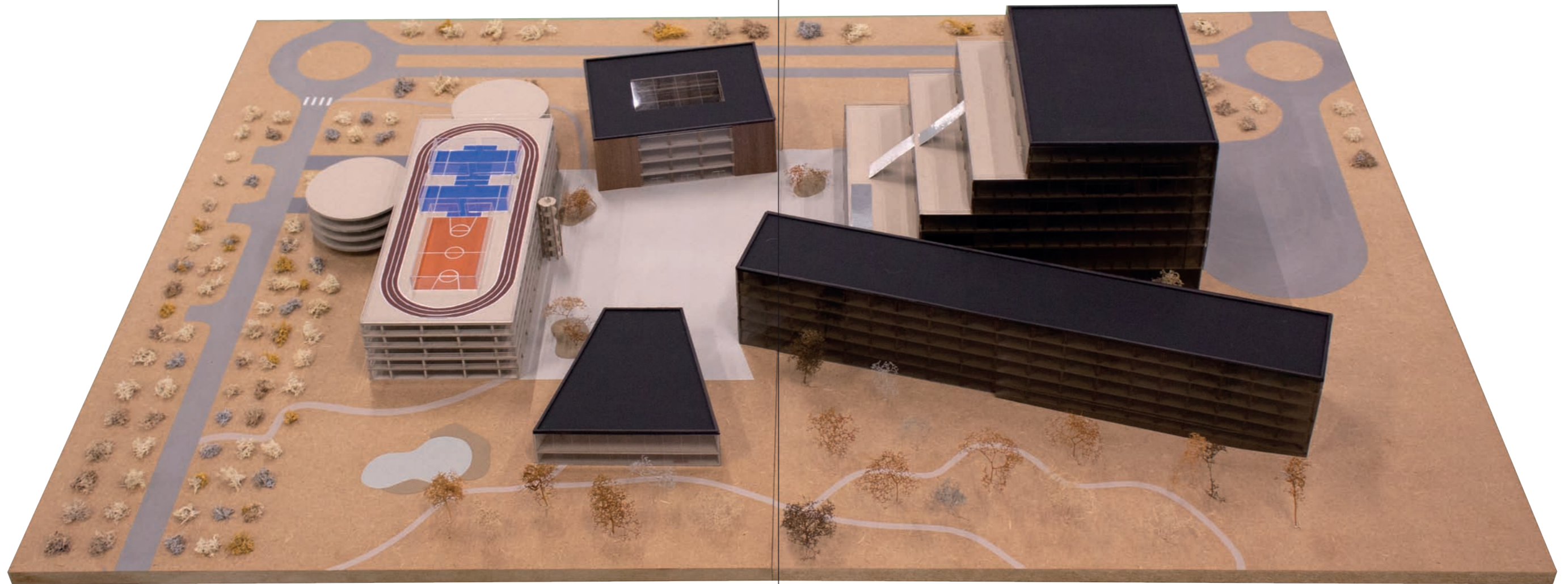
This way we could assure that every building is adapted to the needs and standards of its function and to have its own identity.

The production space is the closest to the street, in order to separate the heavy traffic and light traffic.

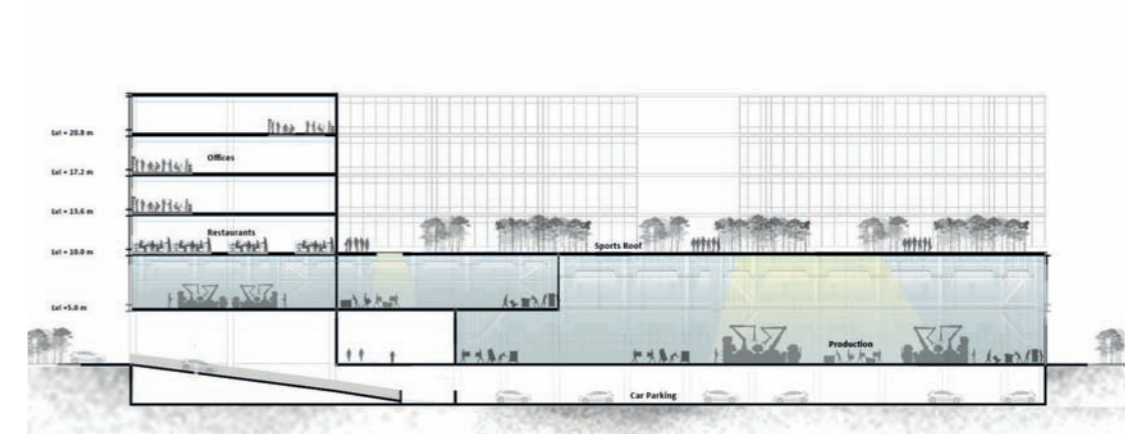


collage





model picture



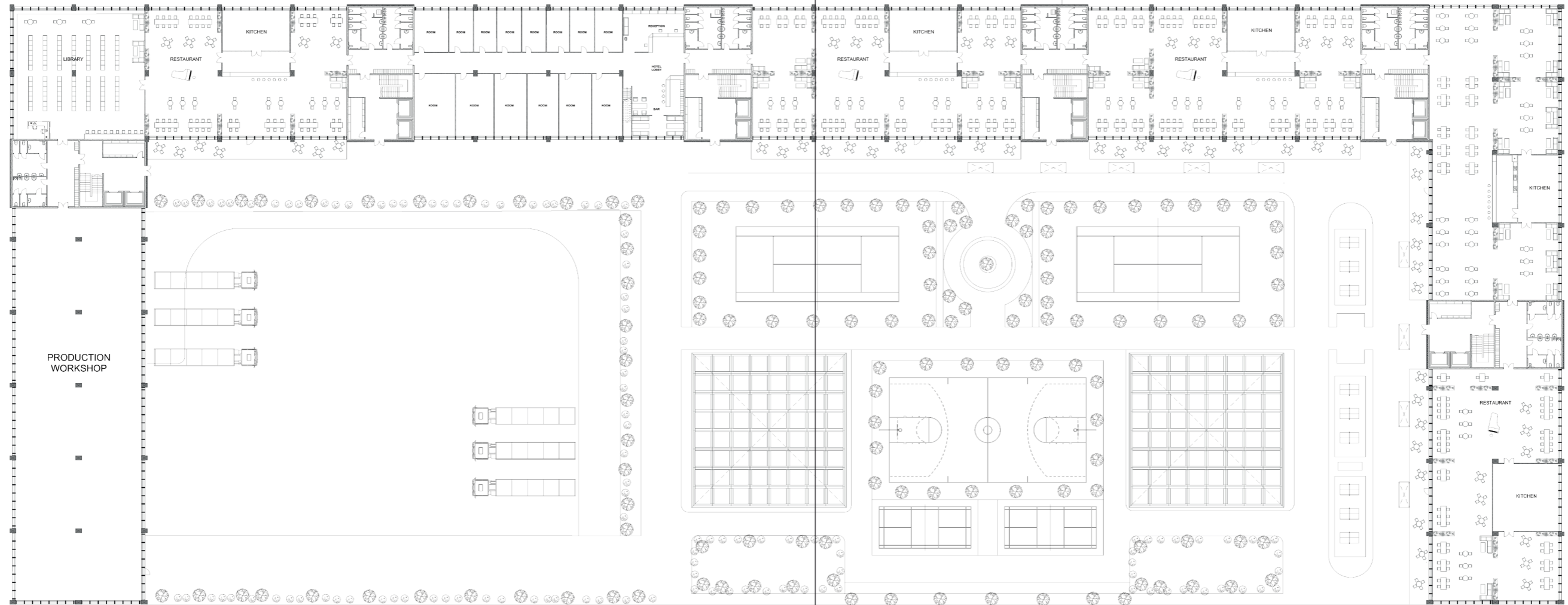
section

## SHAURYA DUTTA - WIKTOR SERAFIN THE STASH

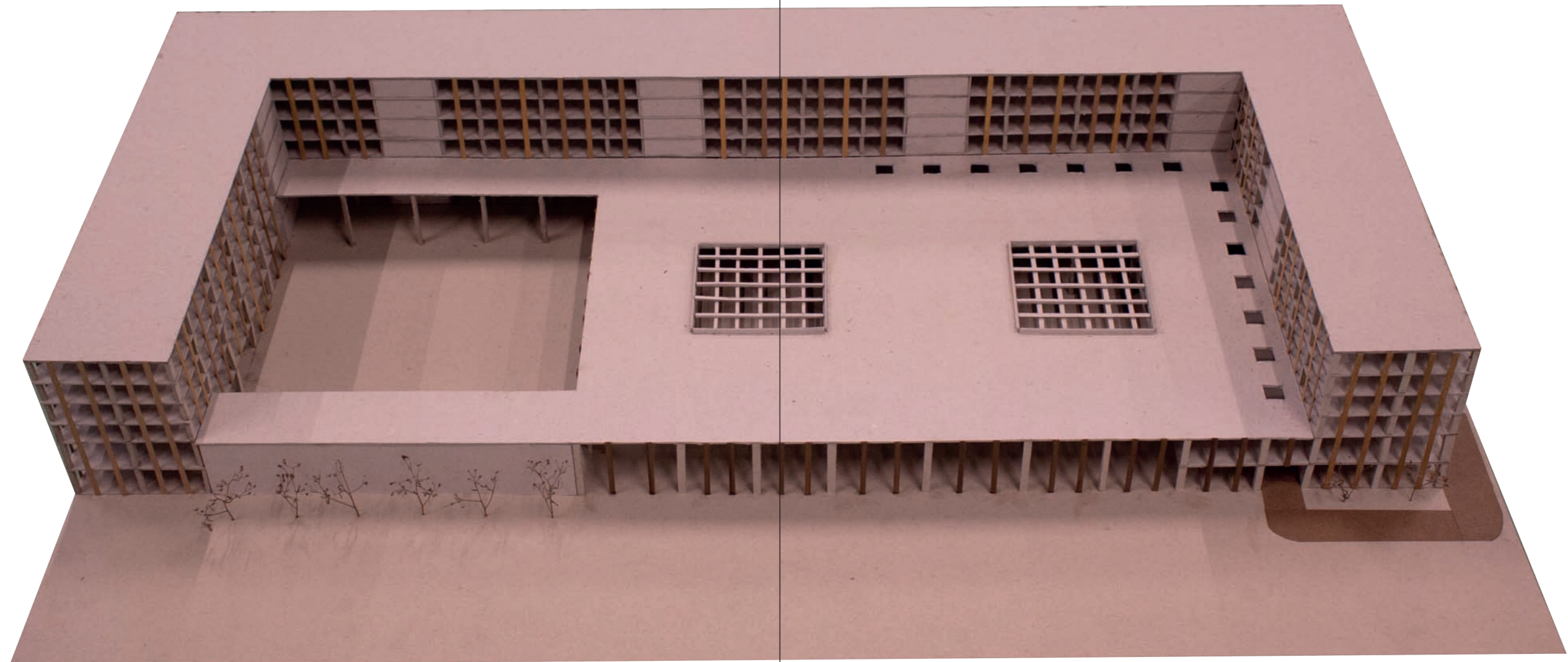
### Stack...

The word as we realise is not just about putting things on top of each other. It is about arranging things neatly, such that it's simple, well balanced and in order. As such, the configuration ensures as much segregation as possible in the different modes of vehicular movement.

The building is defined by the U-shaped tower and a plinth or podium, forming an enclosure that denotes a clear, but porous, boundary between the production and the commercial space. The showroom is placed on the first floor, along with a smaller production hall, so it looks into the main production hall below, allowing for a visual dialogue between the making and the showcasing.







model picture

## 09

LARS GUSTAV ROGNE & STIJN JALON  
THE GARDEN

The design is the result of exploring different ideas regarding circulation, temperature conditions and daylight when designing partly underground.

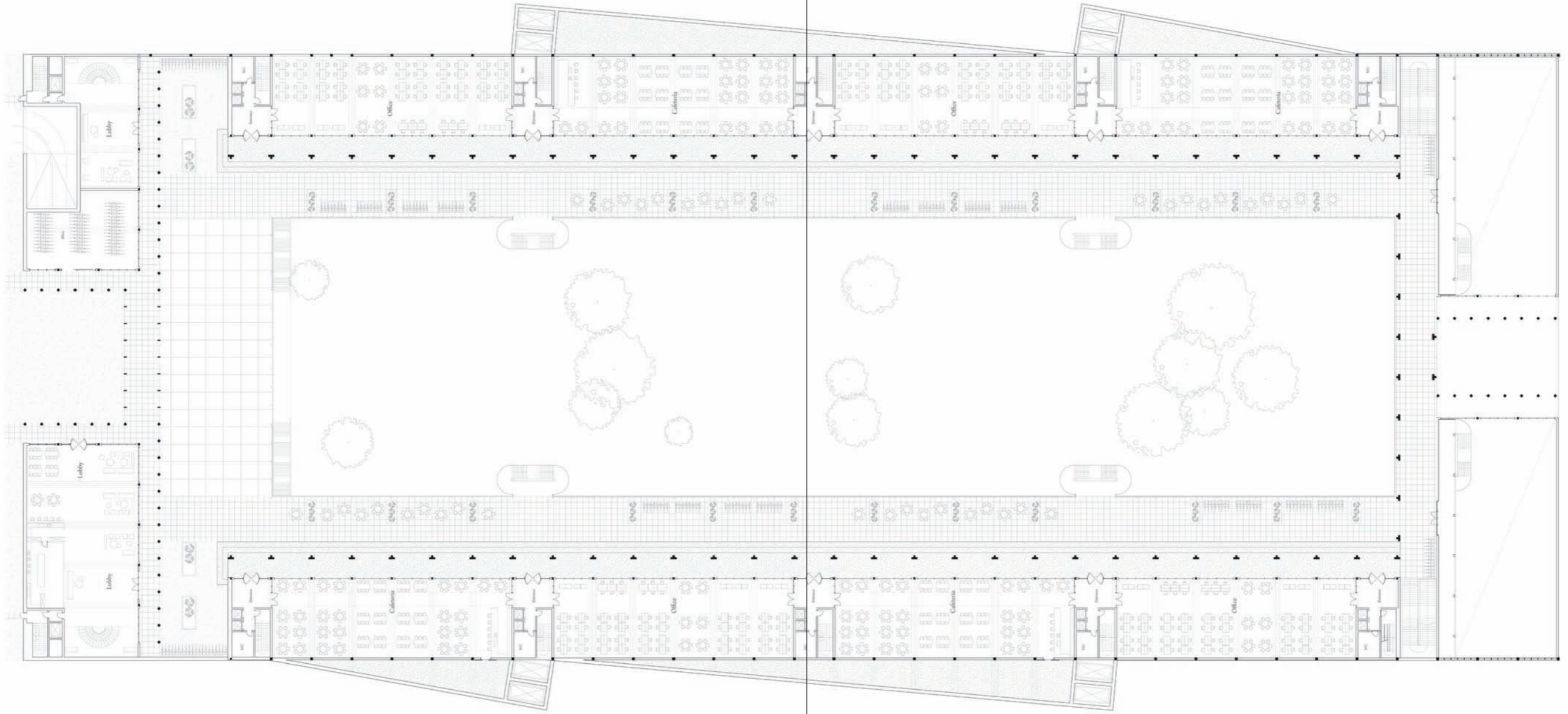
The production units benefit from colder and less volatile temperature changes that can be found underground, while also having fewer daylight requirements. The large courtyard, for example, functions both as a garden for the employees and visitors of the site, as well as a mechanism to bring in daylight. The peculiar shape of our outer facade on the other hand is a consequence of the docking system that is needed to get goods on the different production floors

Aiming for a minimal carbon footprint, timber was our main material when possible. As timber buildings can store carbon rather than emit, we designed with a ratio of 1/2 timber to concrete. One cubic metre of timber approximately stores the amount of carbon emitted by one cubic metre of concrete. With this ratio, we strived to balance out the carbon emission.

The garden filled with sports fields and the eateries on top offer an attractive place for leisure activities for the surrounding neighbourhoods, functioning as an oasis in industrial areas.

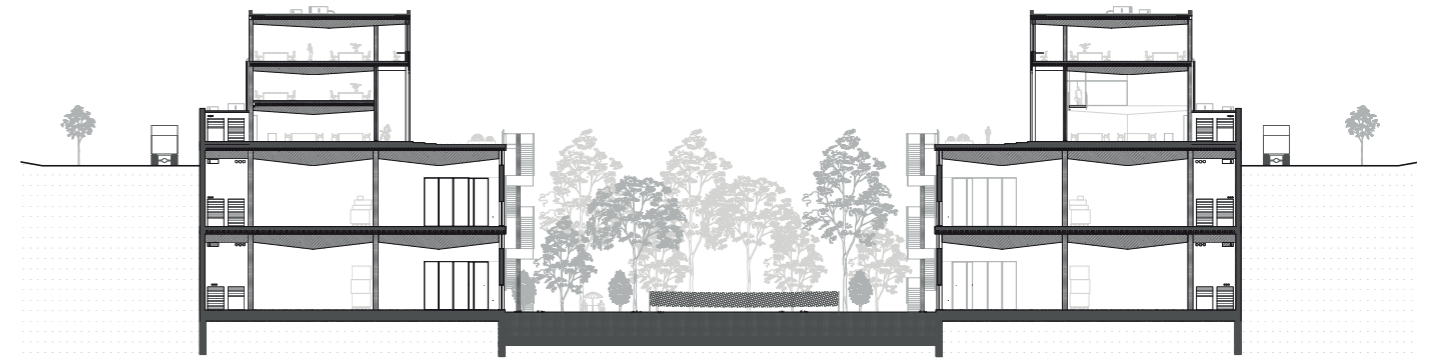


model picture





collage



section



model picture



model picture

## 10

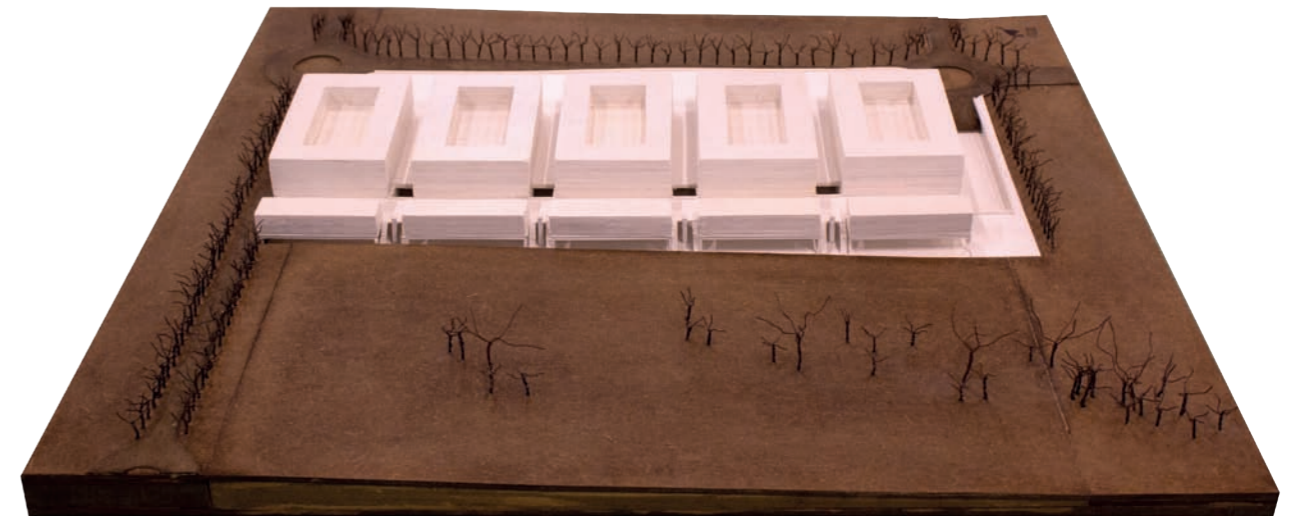
VOET MATHIEU - KEYAERTS KENNETH  
THE STACK

A circular building is multipurpose in the sense that it can also acquire a different interpretation later on and is stacked to prevent wasted use of ground on a large scale. That means that the aspect of timelessness plays a major role. By using primitive, archaic and austere shapes and materials, we can ensure that the building becomes 'timeless'. It won't be just a building for a specific company.

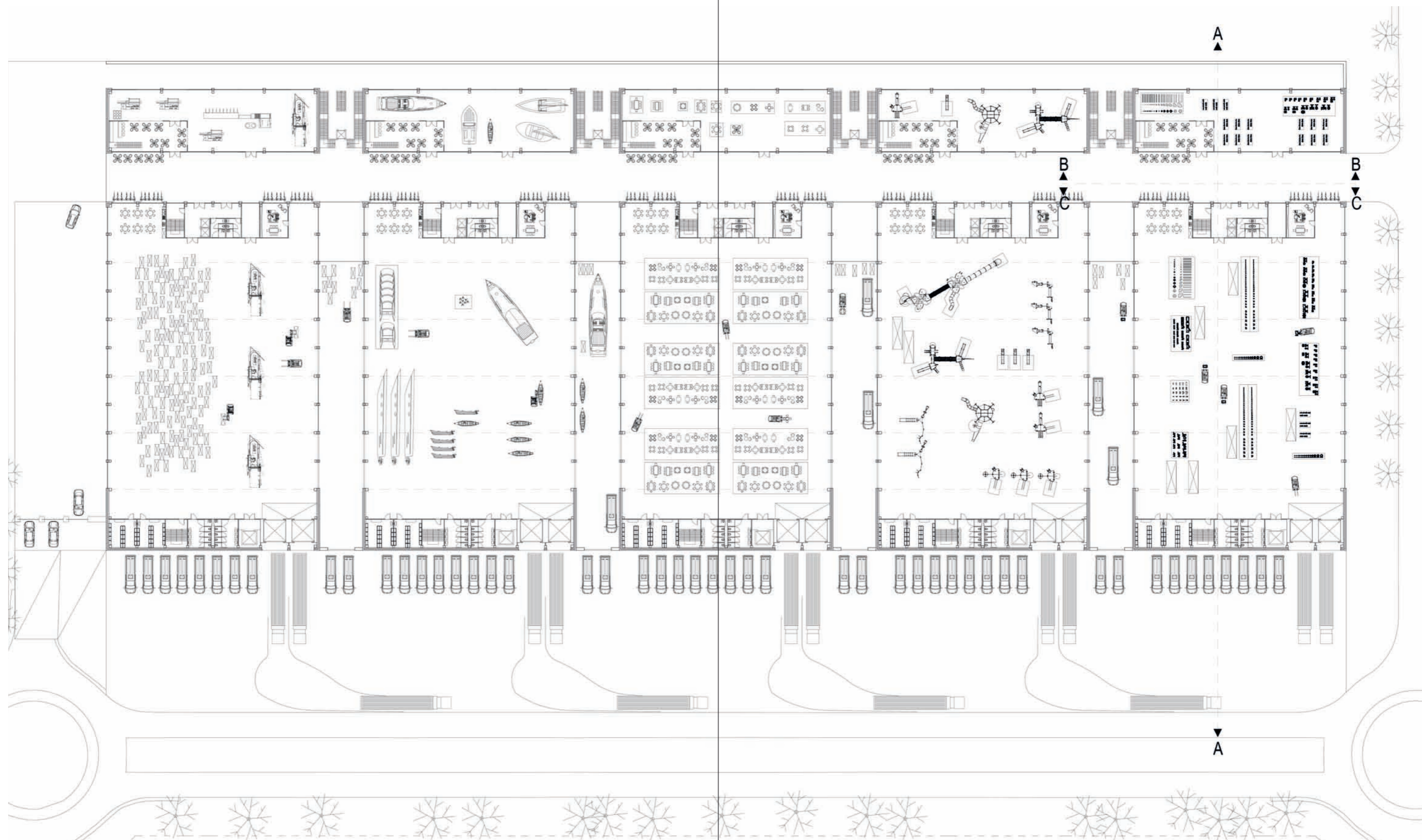
Dividing the site into a 'barcode', a series of compartments that can each be given a different interpretation, together with an open plan, ensures a very flexible and circular approach. Streets in between the buildings are at the same time interaction spaces, not only between outside and inside but also between people.

We divided our circulation routes in 4 categories: the circulation for trucks and vans, pedestrians and cyclists, employees and customers. The four trajectories don't cross each other to insure their safety.

The use of steel for the structure makes it possible to have a very light, strong and flexible base. We do re-use the excavated earth of the site and transform it into rammed earth walls within the public spaces and the facade.

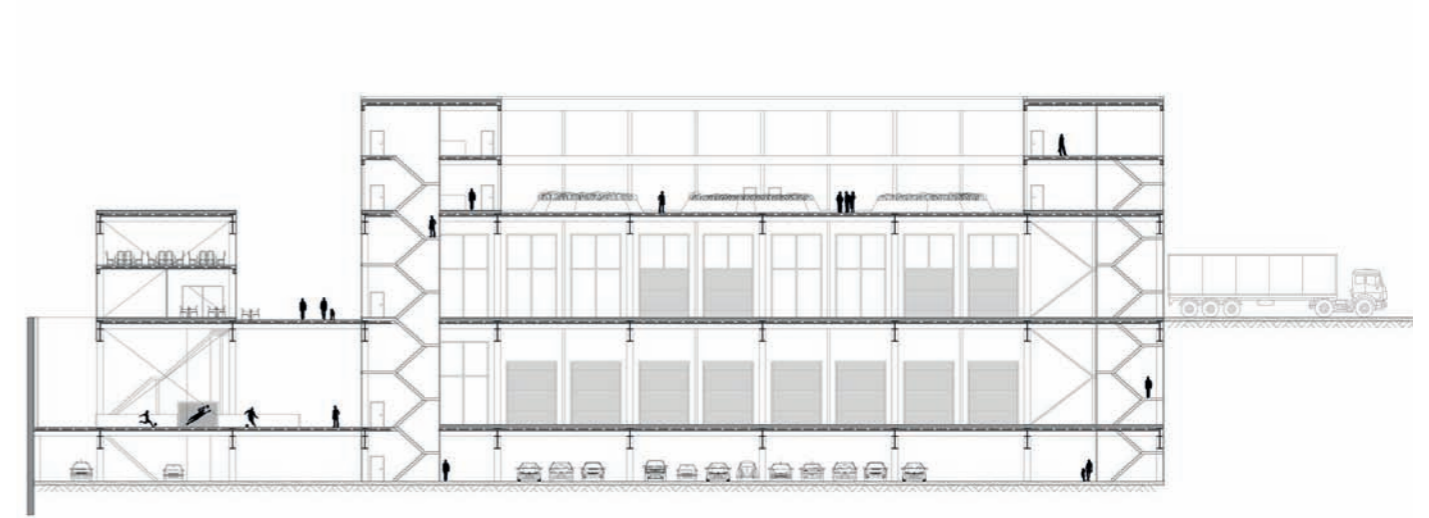


model picture





model picture



section A



## 11

### JASPER - CARO THE LIVING FACADE

We wanted to make lanes surrounding our building for the trucks and vans that need to reach our production units on every floor. In that way, the movement of those vehicles become a visible part of the facades and expression of the building.

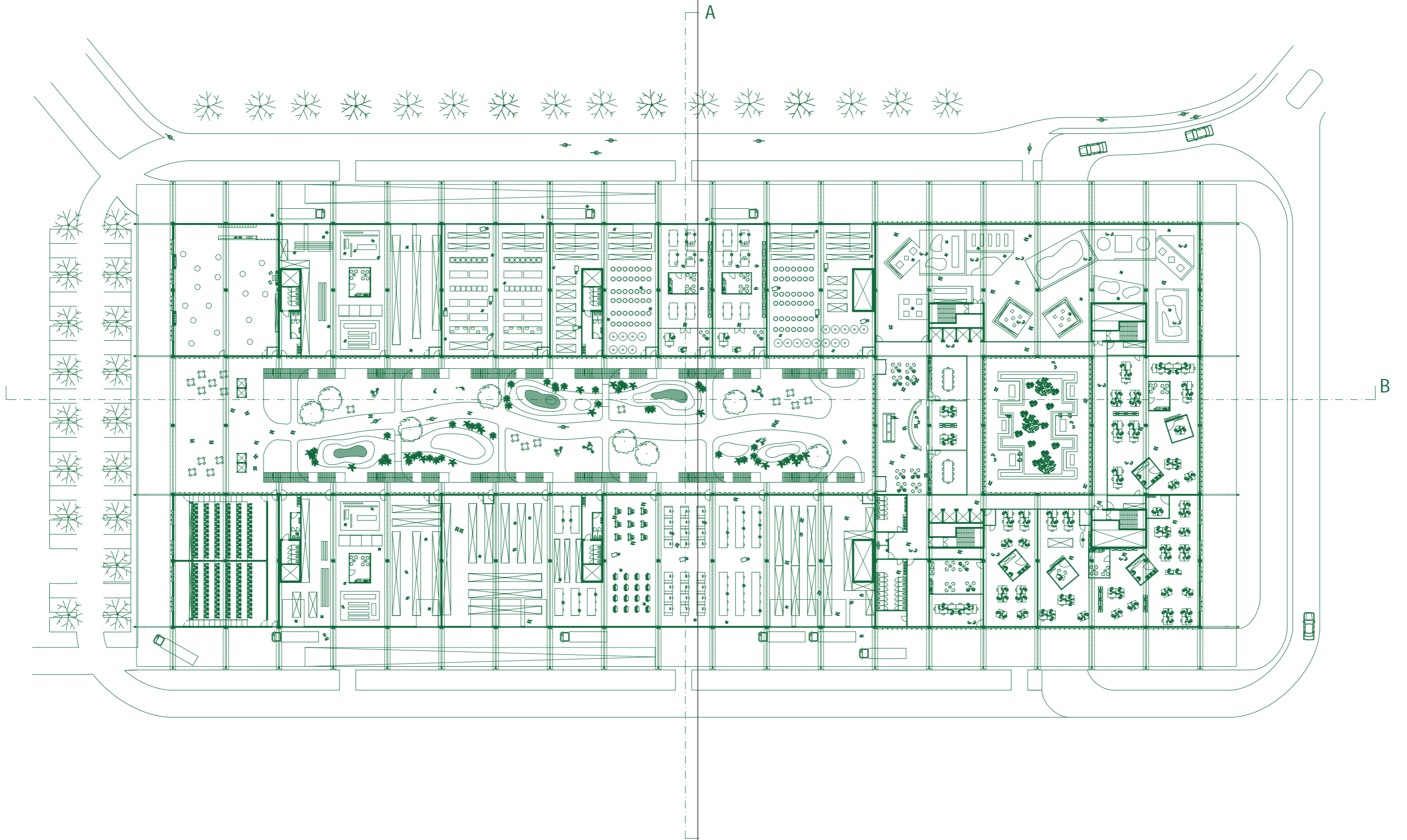
We decided to make two courtyards, one courtyard for the production spaces and a smaller one in the middle of the offices. In that way, light can fall inside our building. In the courtyard, we do also find lanes as those that we see on the outside, but these are instead for the employees and visitors.

Our structure is made of wooden columns of 60x40 cm with on top doubled wooden laminated beams of 80x40 cm. CLT panels ensure the cantilever and have a thin layer of poured concrete for horizontal stability and industrial requirements.

It's possible to hire a part of the grid, which ensures that a variety of companies can settle in our building.



section A





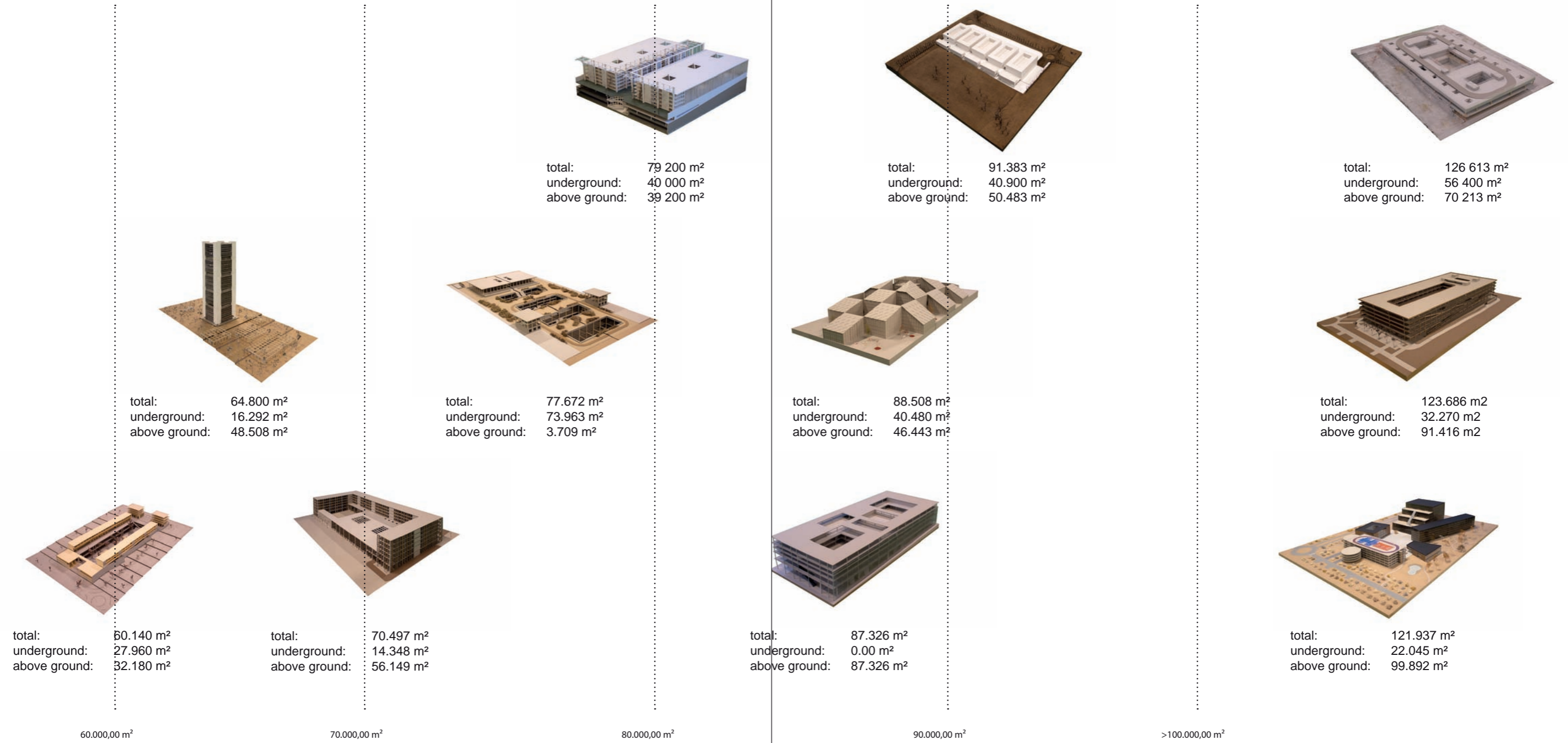
model picture



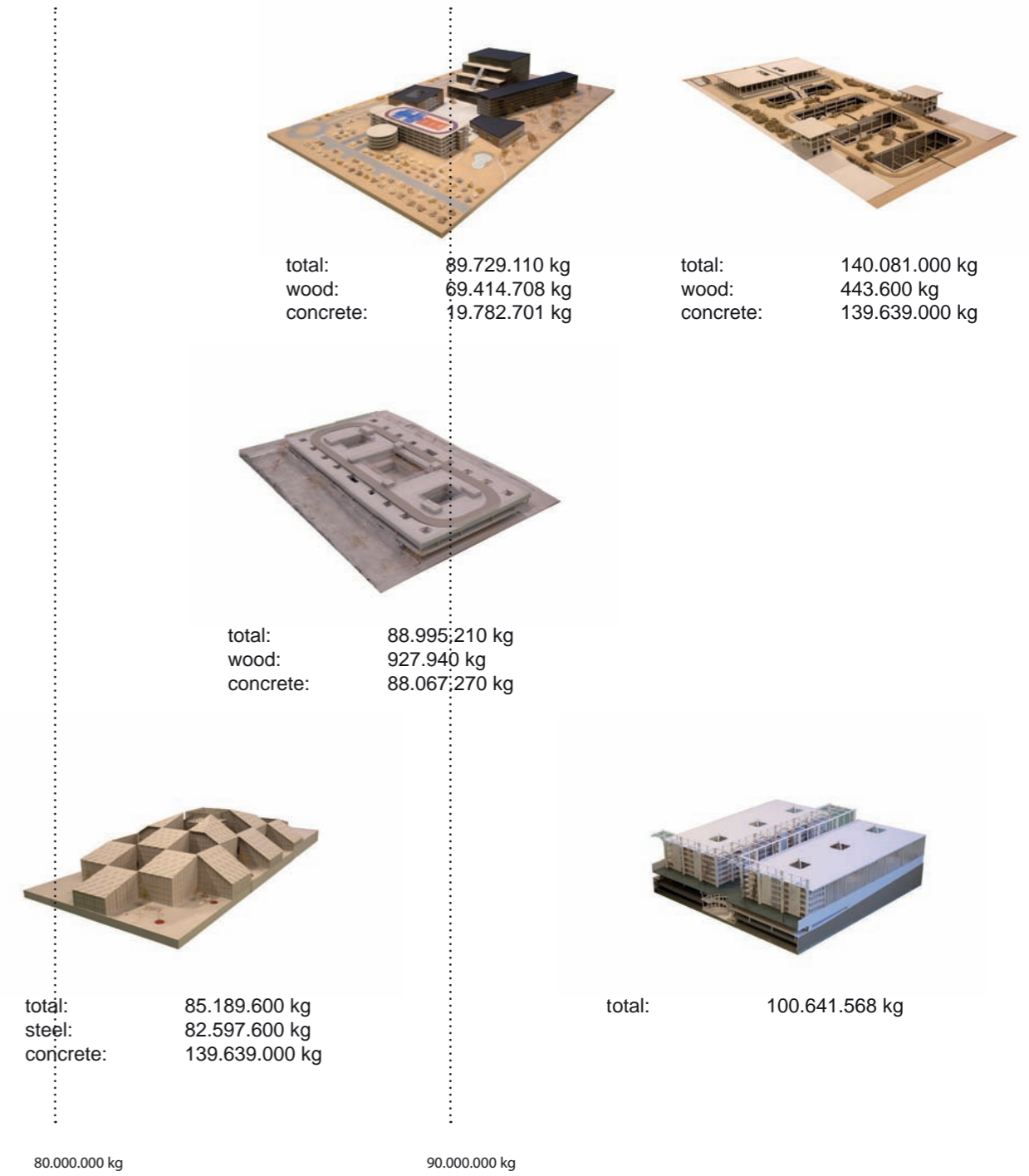
01. HEIGHT BELOW AND ABOVE GROUND



02. SURFACE UNDER AND ABOVE GROUND



03. WEIGHT OF THE STRUCTURE



“THE ULTIMATE  
FAILURE OF THE  
CURRENT APPROACH  
IS A FAILURE  
OF IMAGINATION.”<sup>1</sup>

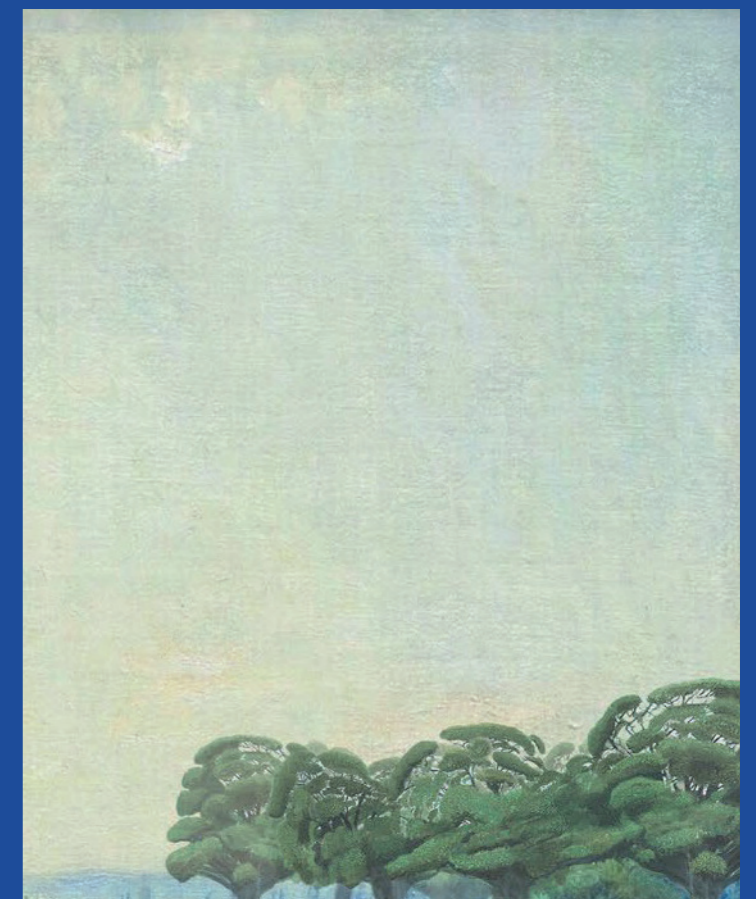


“IN ORDER TO ARRIVE AT TRULY SUSTAINABLE SOLUTIONS, IN ADDITION TO RIGOROUS CALCULATIONS, COMMON SENSE, IMAGINATION AND A GOOD DOSE OF NAIVETÉ ARE ALSO NEEDED.”

### IT'S A DOCUMENT

It's a document, written out of concern that the choices we are currently making collectively in terms of industrial architecture are throwing us back to a one-sided rationalizing approach.

It is consciously or unconsciously sometimes naive or rhetorical. But above all, it is an appeal to continue to think critically about the way we are conceiving our products. The enormous amount of land used for industrial activities should be reconsidered, rethought and could be of an enormous impulse in the pursuit of a sustainable society.



Collage

#### ACKNOWLEDGEMENTS

We, Bram and Jan, would like to express our gratitude to our colleagues from BC architects & studies and Fallow for their expertise and contribution to the studio as part of the external jury.

Thank you Ken de Cooman & Matthias Salaets.

We would also like to express our special thanks to the intercommunale Leiedal, who has been present during both intermediate and final reviews.

Thank you Siel Gybels, Steven Vanasssche & Ewout Vanvooren.

It has been a real pleasure for the students to have you following up their projects.

Last but not least, we wish to thank the students themselves for the great work that has been delivered over such a short time. The complexity of the subject has not been an obstacle to success.

