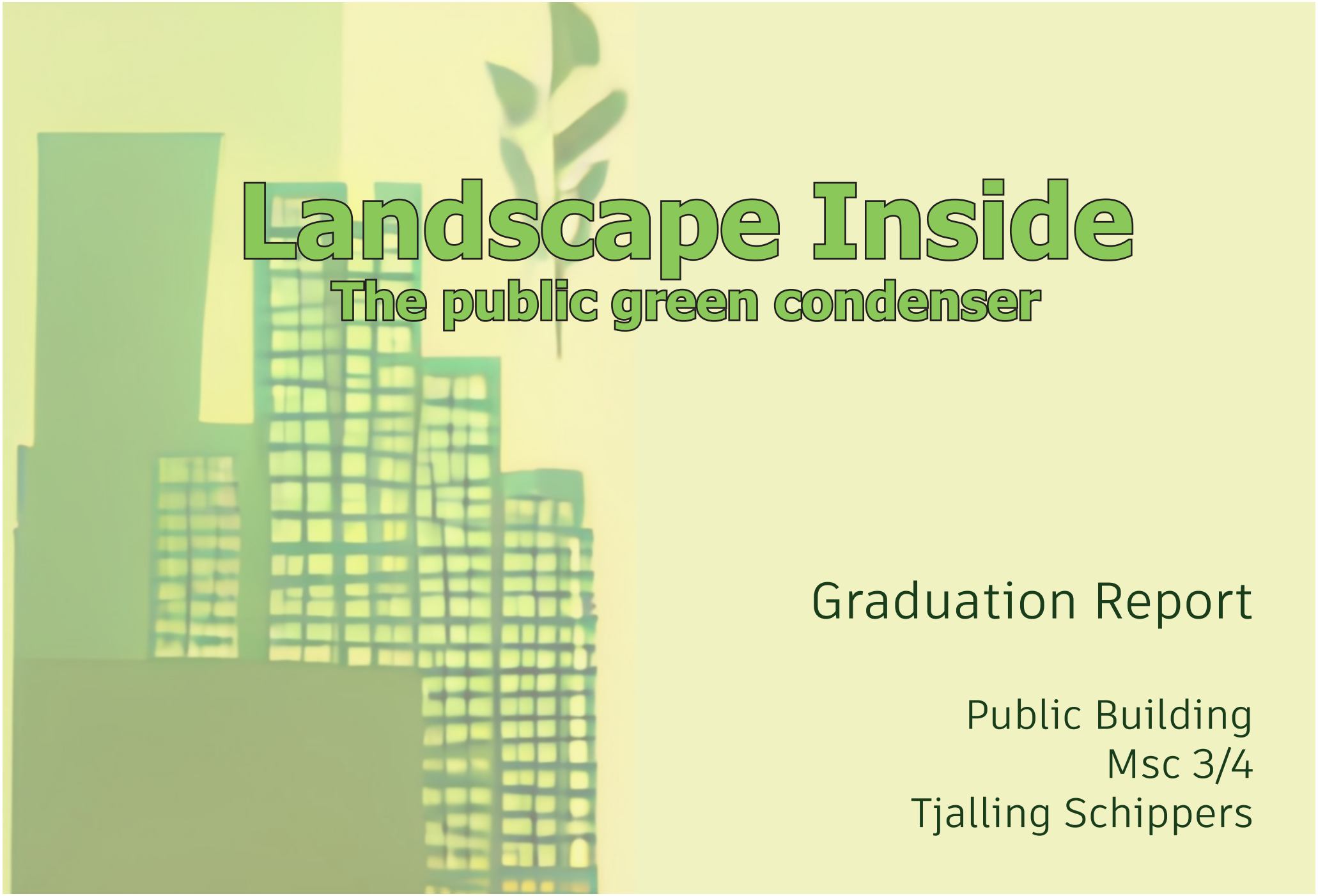


Landscape Inside

The public green condenser

Graduation Report

Public Building
Msc 3/4
Tjalling Schippers

Project abstract

Lead - In Friedrichshain, a new place for the community will be built. This place could make the lives of the people living in this part of the city a lot more enjoyable as it could be an extension of their outdoor-and indoor living space. Other neighborhoods already have communal gardens and commons as a central point for the neighborhood to come together.

In Kreuzberg for example, there is a communal garden called Prinzessinnengarten with a temporary building. Unfortunately this communal garden is closing, eventhough the concept is a success. With a more permanent building as a centre, a communal garden could last longer. The organizations in this concept will get a more solid base, which results in a more permanent organization.

In a new building type for the commons, urban gardening will get a central role.
Problem - Before that type can be defined, research (by design) has to be done to create a prototype for combining urban gardening and architecture.
Research question- The main question in this research is 'Which Design principles can be created for designing a building with integrated urban gardening for the commons in Andreasviertel in Berlin?'

Methods+sub questions - The research question is answered through research by design in the following stages. In the first stage the site analysis of the Friedrichshain district is elaborated further. This is done by drawing a map of the green urban fabric and existing initiatives in the neighborhood. This information can be used to create a specific program that enhances the relation of the people with the existing green infrastructure.

In the second stage the focus is directed towards different architectural solutions to shape integrated green in buildings. This is done through case studies into existing buildings, that already have integrated green spaces. The results of these case studies will be an inventory of products, materials and systems for building green.

The third stage is to define the conditions needed to integrate urban gardening in a building. This is done in a literature study of the conditions that are needed to make plants grow in and on buildings. In combination with the solutions found in the second stage, a new typology is defined for commons with integrated greenspaces.
Goal - This research will be the starting point for creating a new modular building type with integrated urban gardening for the commons in Andreasviertel in Berlin, Germany.

Diagram

There are two routes to take in this research. To specify the questions for the literature research and the research by design, the following diagram gives a broad description of these two routes.

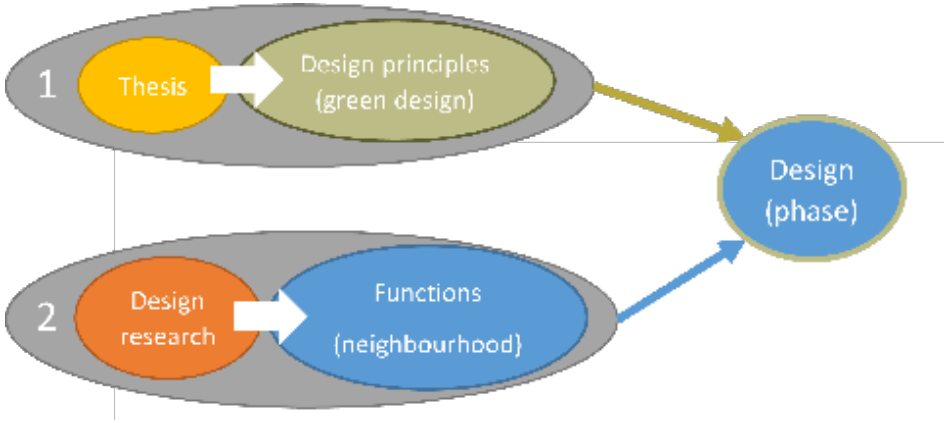


Diagram explanation

1. Subject is general (contributing to the realm) > Design principles for designing the 'Commons' > Specify on the location in the design phase
-Focus: Urban gardening + architecture + urban acupuncture > how to combine?
-Method: a literature study into urban gardening and building green
+ research by design
-Outcome: design principles

>> How can a public building hook into the green urban fabric and existing green initiatives?

2. Site analysis > Which functions are already there in Friedrichshain > Which functions are needed in the public building > How do I include these functions in the design?
-Focus: Finding the ideal combination of functions for the commons in Friedrichshain
-Methods: literature study (demographics, etc.), map study/creating a map
-Outcome: functional program for the building

Theoretical framework

Hull IV, R., Lam, M., & Vigo, G. (1994). Place identity: symbols of self in the urban fabric. Elsevier Science, Landscape and Urban Planning, 28, 109–120.

Levy, A. (1999). Urban morphology and the problem of the modern urban fabric: some questions for research. Urban Morphology, 3(2), 79–85. https://doi.org/10.51347/jum.v3i2.3885

Matthew Carmona (2015) Re-theorising contemporary public space: a new narrative and a new normative, Journal of Urbanism: International Research on Placemaking and Urban Sustainability, 8:4, 373-405, DOI: 10.1080/17549175.2014.909518

Sahito, N., Han, H., Thi Nguyen, T. V., Kim, I., Hwang, J., & Jameel, A. (2020). Examining the Quasi-Public Spaces in Commercial Complexes. Sustainability, 12(5), 1830. MDPI AG. Retrieved from http://dx.doi.org/10.3390/su12051830

UN Habitat. (2018). Module 6: Public Space. In unhabitat.org (SDG Indicator 11.7.1). United Nations Human Settlement Programme (UN-Habitat). https://unhabitat.org/sites/default/files/2020/07/indicator_11.7.1_training_module_public_space.pdf

Graduation plan

Turning Public Green Outside In

Designing an urban green condenser
for Andreasviertel, Friedrichshain, Berlin

Argumentation of choice of the studio

The importance of public buildings lies in the way they shape our society. Without them a whole part of societal interaction cannot take place. By creating meeting places, people can come together, express themselves and find common identities and similarities. Through sharing our interests and working together on things we like, boundaries can be broken down.

To facilitate this environment, public buildings are necessary. It is important for every designer to understand how their design impacts societal life. Architects especially bear this responsibility, since the permanent character of their designs impacts cities and neighbourhoods for a long time. With the right functions and a resilient design, a public building facilitates cross-communal interactions.

The Public Building studio brings the opportunity to specialise in this interaction and work on solutions for topical issues.

Problem

Contemporary cities are often characterized by lack of greenspaces or their inaccessibility. One of the causes to this shortcoming is privatization. Common green areas around dwellings are maintained by housing companies and home owner associations. They put up fences to lower the maintenance costs or sometimes even sell these grounds to private parties so these spaces will get filled in by new buildings. This motion limits accessibility for all citizens.

The problem with greenspace in the neighbourhood of Andreasviertel in Berlin particularly, can be subdivided in three problems. The first is the general problem of privatization. Too much designed public green from the DDR Period has been privatized since the fall of the Berlin wall. This results in little interaction between people and the public green and between people in the public space. This leaves too few opportunities for cross-communal interaction in Andreasviertel.

The second problem is that in Andreasviertel there is only 4,1m2 greenspace per person, where it should be 9m2. New insights posed by the World Health Organisation (WHO) state that more public greenspaces are needed close to living areas. To increase the availability to green, there is not enough public space available to make it 9m2 per person.

The third problem is the climate in Berlin. This causes problems with the availability to public green and the usability of community gardens. In winter the usage of community gardens is very low, which makes it hard to create opportunities for cross communal interaction in those places in that time of year.

Research Questions

The lack of greenspace in the neighbourhood and the privatization of green areas bring up the need for a green intervention in Andreasviertel. Because new standards are out of reach, the new greenspace must be condensed. This brings opportunities for increasing public interaction opportunities all year through. The challenge is to facilitate these green meeting places in the winter season, since the climate does not allow outdoor activities in this time of year.

The main question these problems lead to is:
'Which design principles can be created for designing a public building with an integrated community garden for the commons in Andreasviertel in Berlin?'

To answer this question, it can be subdivided in different subjects and sub-questions. Most of the design principles needed are focused on indoor greenspaces. This leads to the subquestion 'how can architecture embed indoor greenspaces in its interiors?'. This question will be answered through the drawing up of a catalogue of indoor green typologies. By making this catalogue, the subquestion 'what typologies need to be explored to accommodate greenery?' is answered.

With this catalogue different greenspaces can be linked to the building functions. The typologies of the different building functions are necessary to make spatial configurations and floorplans/sections, as well.

When adding different types of greenspace in a building, the question 'how can different types of greenspace coexist in the same building?' arises. To answer this, parameters need to be added to the different combinations of green types and functions. The parameters will have to include technical and spatial solutions for including indoor green. This leads to the subquestion 'what technical and spatial solutions need to be implemented to achieve a green condenser?'. The found parameters will rule out any contradictions in the configuration of (green)spaces.

Design Assignment
The design assignment for the Public Building Graduation studio is to design a Public Condenser. The goal of this specific project is to enhance social and health qualities by adding public indoor greenspace in Andreasviertel. The building will host an indoor community garden and other functions related to gardening. Because public green will be condensed in this specific design, it will be an Urban Green Condenser.

The outside image of the building will reflect the green indoors and represents a circular way of building. This indoor community garden is going to be a prototype for other green condensers in Berlin. To create a resilient design, an interchangeable system will be designed to attach different gardening related functions to the neighbourhood garden. As a result, the building will not only be literally, but also figuratively and technically green.

A catalogue of indoor green typologies will be made to help designing this Urban Green Condenser. For the design, each function will be combined with an indoor green type from the catalogue. The building program will contain functions that are related to urban gardening. For example, there will be a library with information about gardening, communal kitchens that use fresh picked vegetables and herbs, a flexible office space for green start-ups and workshop spaces to learn skills for gardening and arts and crafts. These functions and the combination with a great variety of indoor green, will give the users a green experience that compensates and exceeds the lack of green in the city.

Process - Method description
The general method of this graduation project is 'research by design'. The research steps alternate with the design iterations. These research steps will provide design principles to support this iterative process. To grasp the scale of the problems around greenspace in Berlin, a quantitative research will be done. By the use of geodata and maps, the lack of greenspace in Andreasviertel, Berlin, is determined. This provides an area in square metres that needs to be condensed.

Specifically on the subject of indoor gardening, different indoor greenspaces will be analysed. This results in a catalogue of typologies of indoor urban greenspaces and their relation to other gardening related functions. The design of the building will be a case study/experiment for the combination of a community garden and indoor greenspaces.

Reflection - Relevance
In my past Studios, I gained experiences that lead to choosing Public Building as graduation studio. In Msc1 the assignment for Heritage was to design an addition and renovation of the Rietveld Pavilion, Zonnehof in Amersfoort. The function of this pavilion is a museum, which is also a public building.

In the second semester, the campus utopias elective was also about a public building. The campus of Brasilia, designed by Oscar Niemeyer, was a great example of how modern architecture can be combined with urban green. In the BK Launch studio in the second half of Msc2, the goal was to create a built environment related start-up. This gave the opportunity to focus on circularity and designing in a user-friendly way. This empathise-phase of the design process is something that is important for public buildings as well.

The topic of this graduation project relates to the studio topic in the sense that it is an public condenser, but then green. The graduation project's topic is an indoor neighbourhood garden and the studio topic is a 'public condenser'. The result of this relation is an 'Urban Green Condenser', where the public green is condensed within the building/ project.

The neighbourhood garden aspect applies to the subject of commons. Gardening enhances cross-communal interactions and forms the core of a community centre, where other communal activities can be connected to. Cross-communal interaction is a topic within the literature about public buildings. By combining this topic with that of 'Green Architecture', the studio topic is connected to broader explorations within the master track of Architecture.

Green Building Design is a topic that has kept architects busy for centuries and throughout different cultures. There are many examples available, but few of them are an actual indoor neighbourhood garden. This project experiments with that concept and aims to create new openings in the debate about integrating green within buildings.

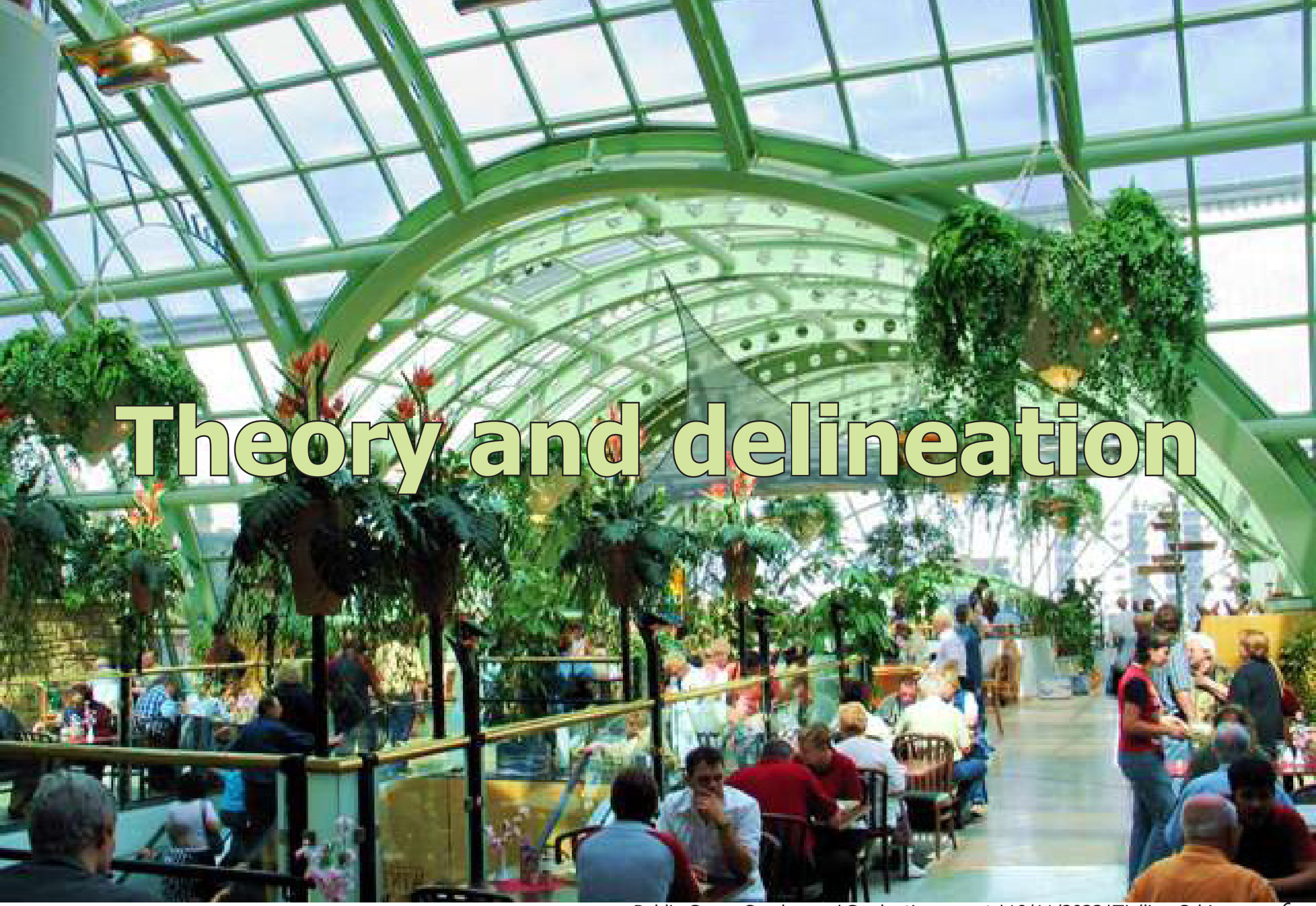
The Urban Green Condenser is a prototype that can be applied all around the world and adjusted to specific climates and communal needs. It serves as a counter-movement against the privatisation and hardening of the urban environment. In a social context, this graduation project gives hope for bringing new life and meaning to neglected public greenspaces and communities in a world of increasing urbanization and privatization. On a professional level this translates into creating new possibilities for designing indoor interactive greenspaces. Other architects and students can take inspiration from the outcomes and use this knowledge in their designs.

Time planning

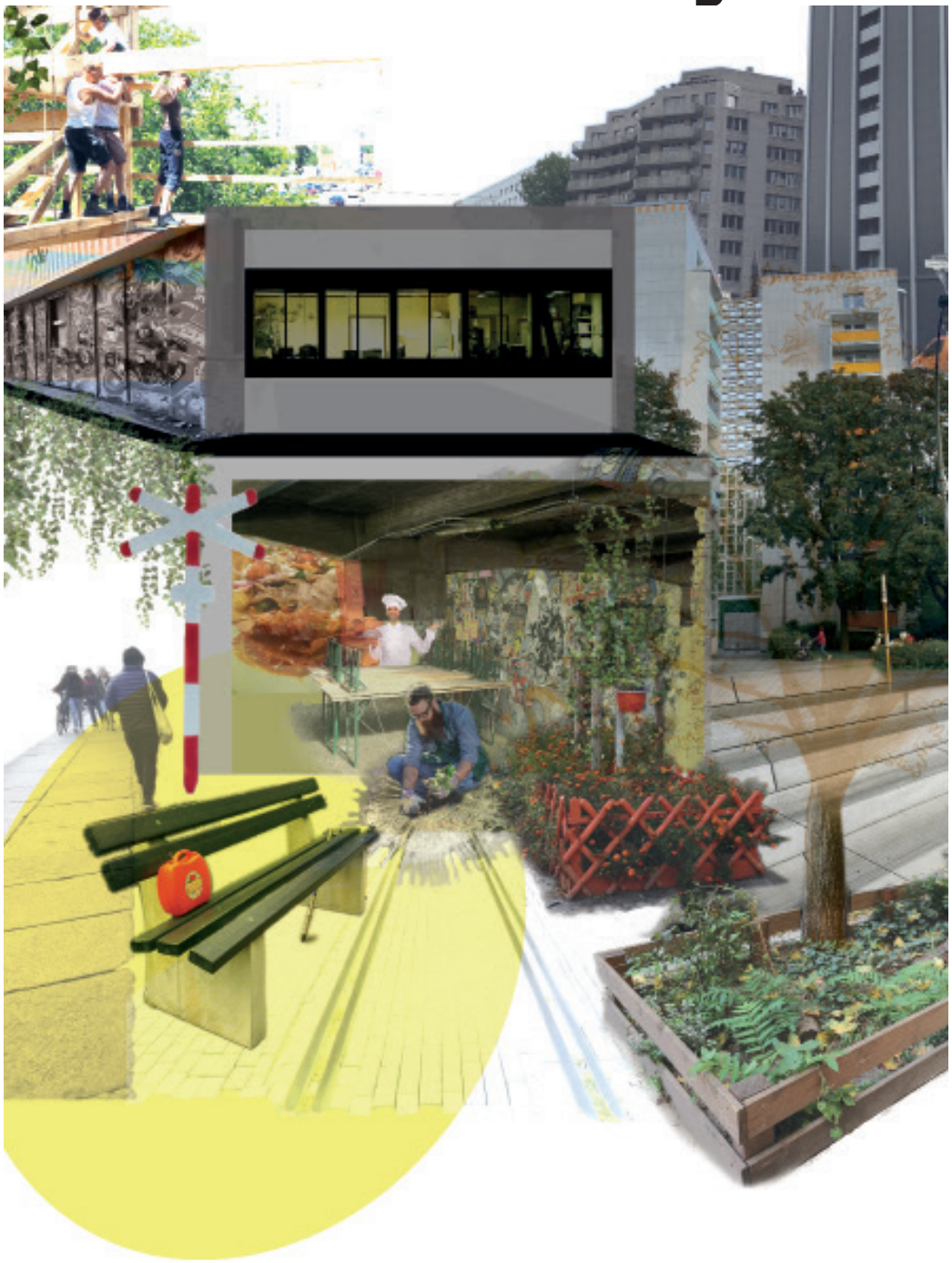
First semester, completed
The first semester was mostly focused on the research and site analysis. Prior design explorations are completed with situation sketches and volume studies. The first research stage is concluded with an indoor green type catalogue. For the design, a floorplan and sections are presented as a preliminary/sketch design.

Semester 2, Period 3, February 13 – April 21
In the third period the research and explorations will be transformed to plans and drawings on concept design level. In this process the feedback and reflections of the P2 presentation will be taken into account. New research will give a more detailed insight in the parameters necessary in the positioning and growing of specific plant species. The scale of drawing will be brought from 1:500 down to 1:50. Materiality and main construction methods will be explored.

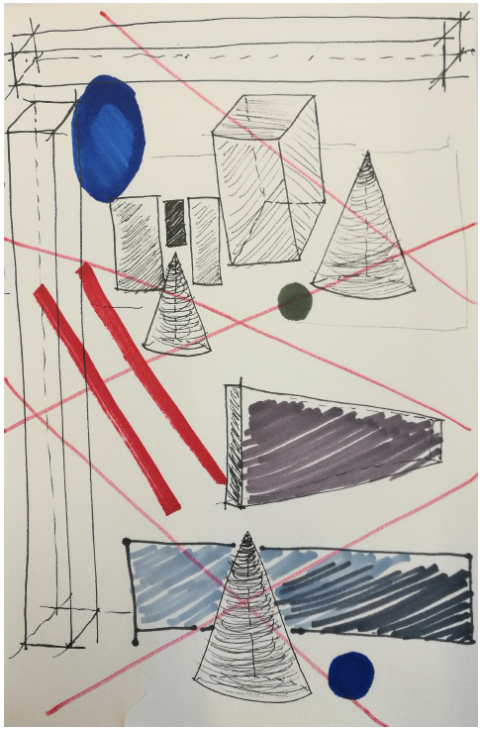
Semester 2, Period 4, April 24 – June 30
In the fourth period, the plans for the building will be revised and specified. Research will provide the necessary details for determining the parameters included in the design. The details of the construction and architectural features will be based on calculations of weight, sunlight exposure and other parameters that are specified during this process. In choice of materials, circularity will always be a main consideration. At the end of P4, the completed final design will be presented. A concluding reflection on the overall process will provide insights for future research on the given subjects.

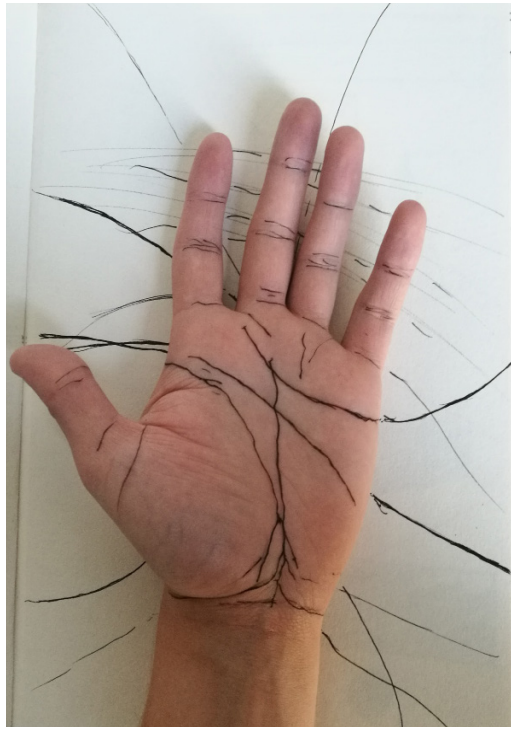
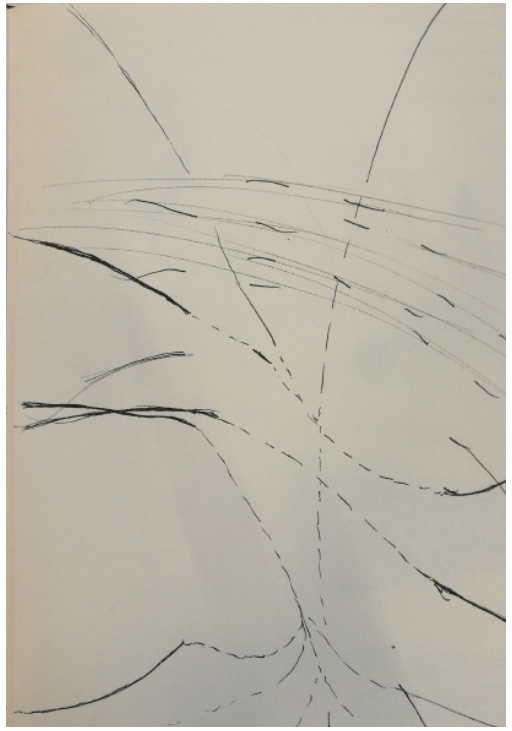

Theory and delineation

Collage/montage - condenser for urban gardening



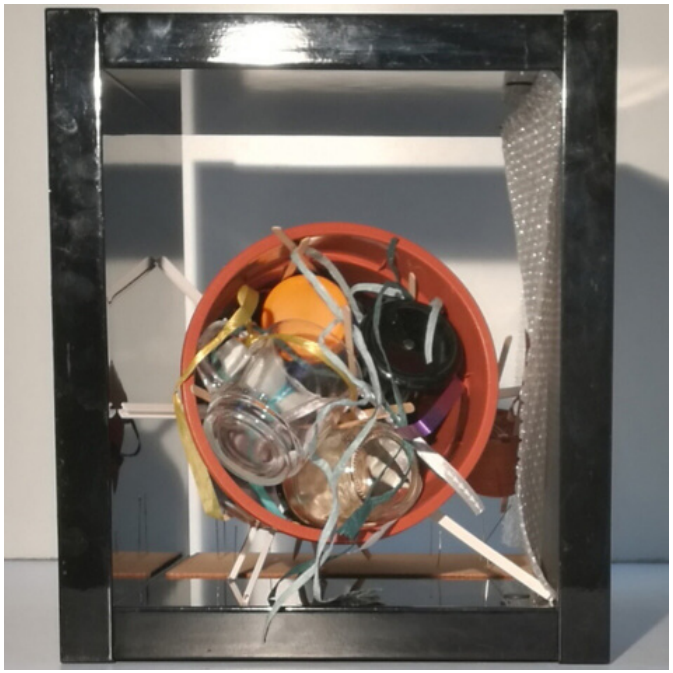
Conceptual diagrams - geometry to lifelines

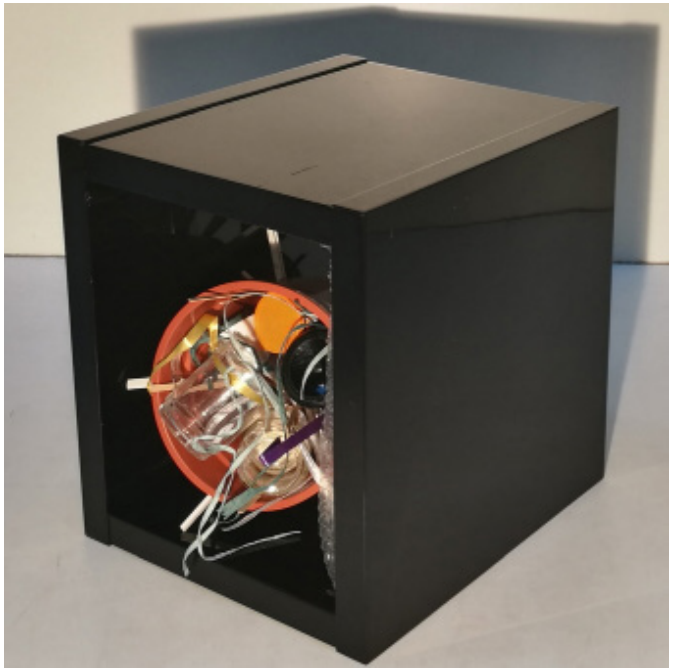


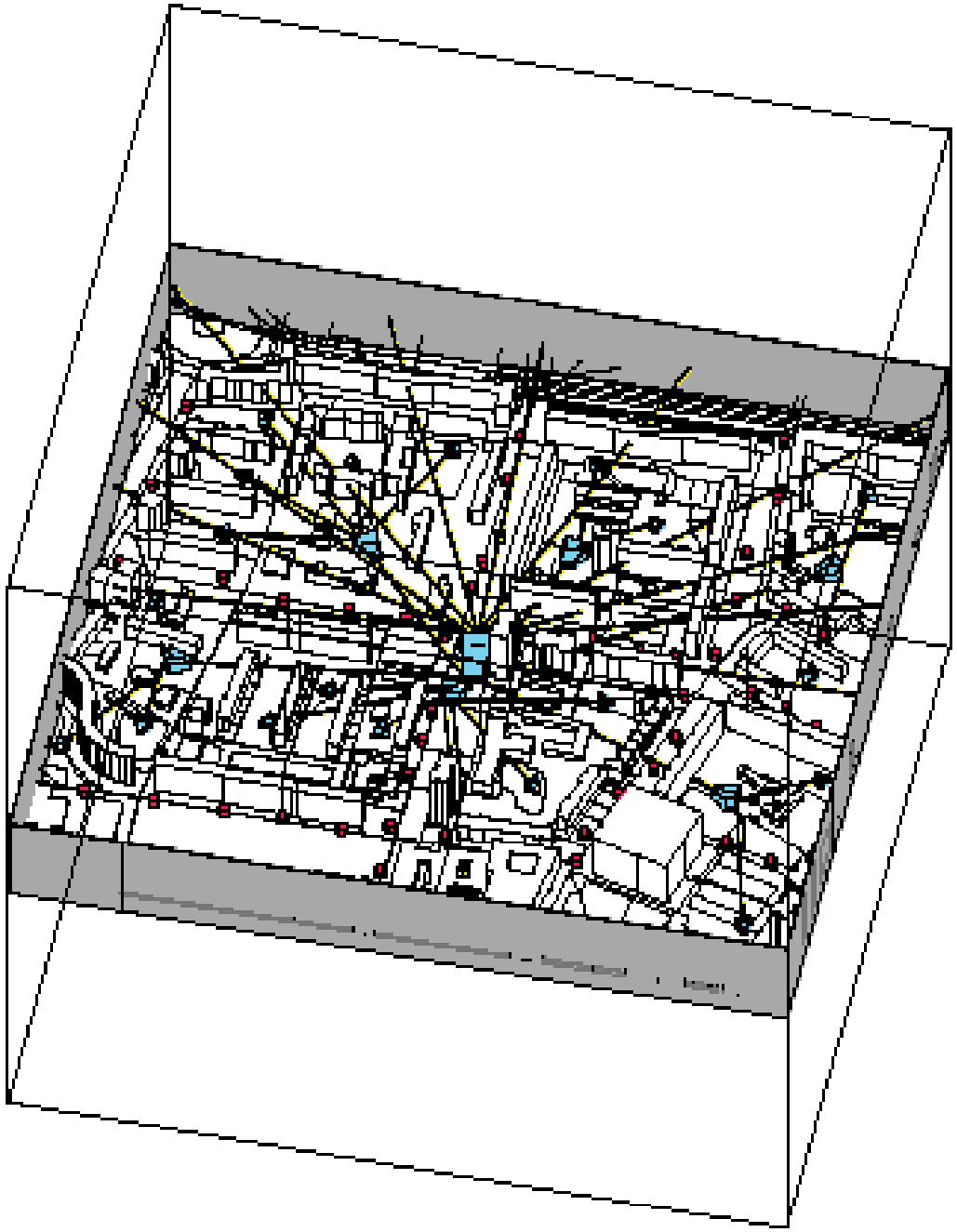
Psychogeographic map - the memory of an experience

Conceptual model - physical expression of ideas

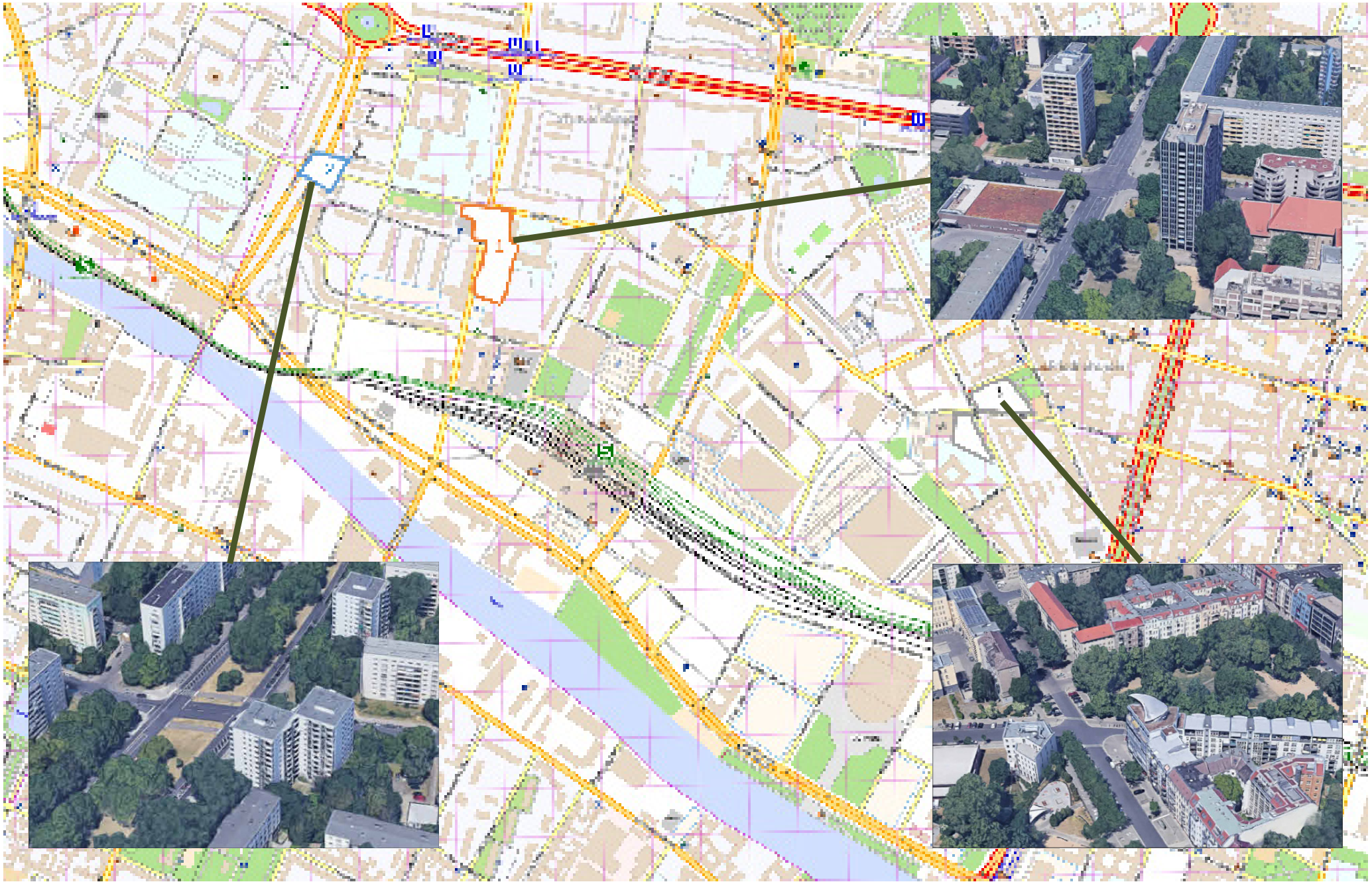





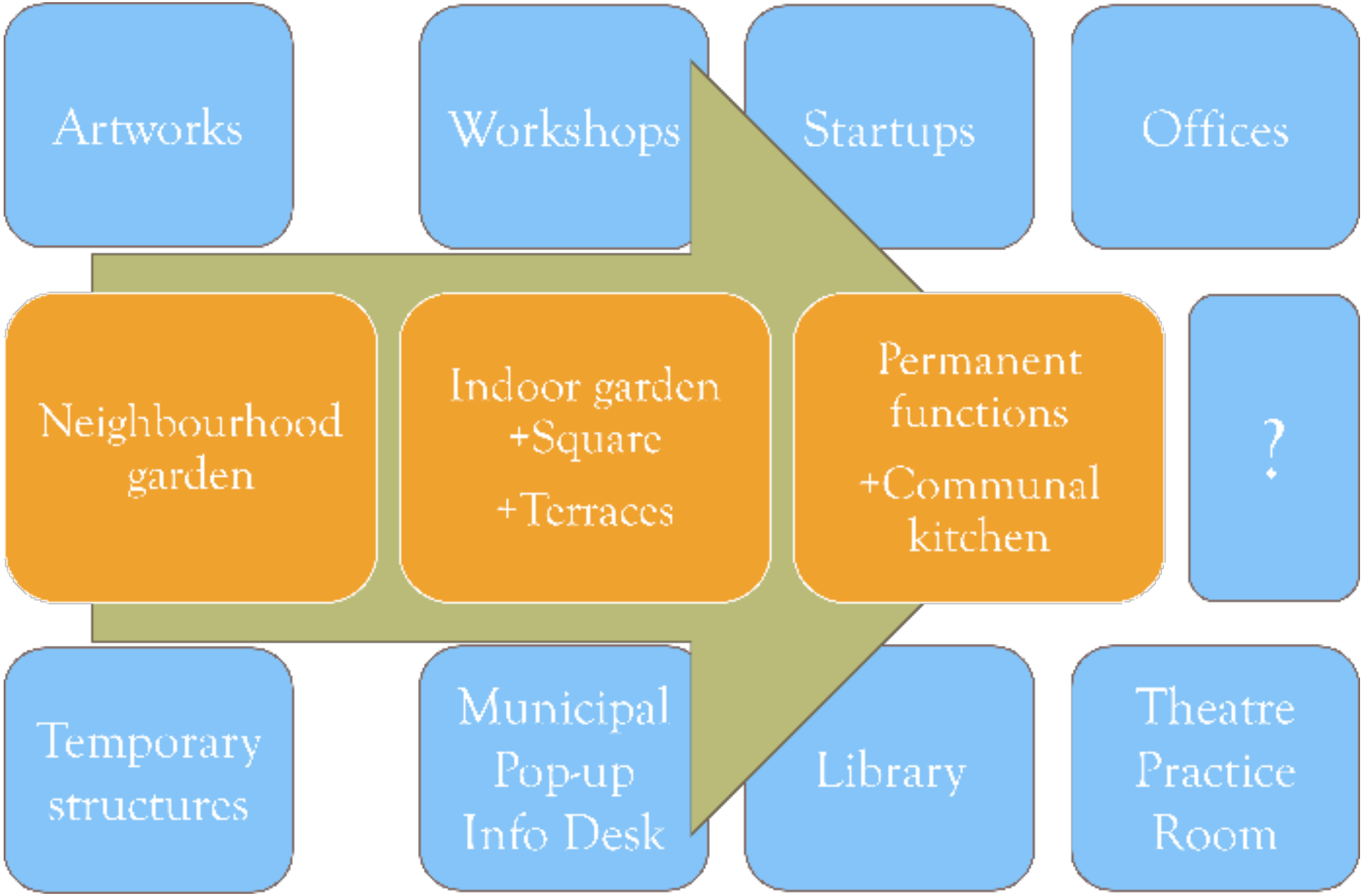
Digital translation of conceptual model



Three considered sites



Original schematic program



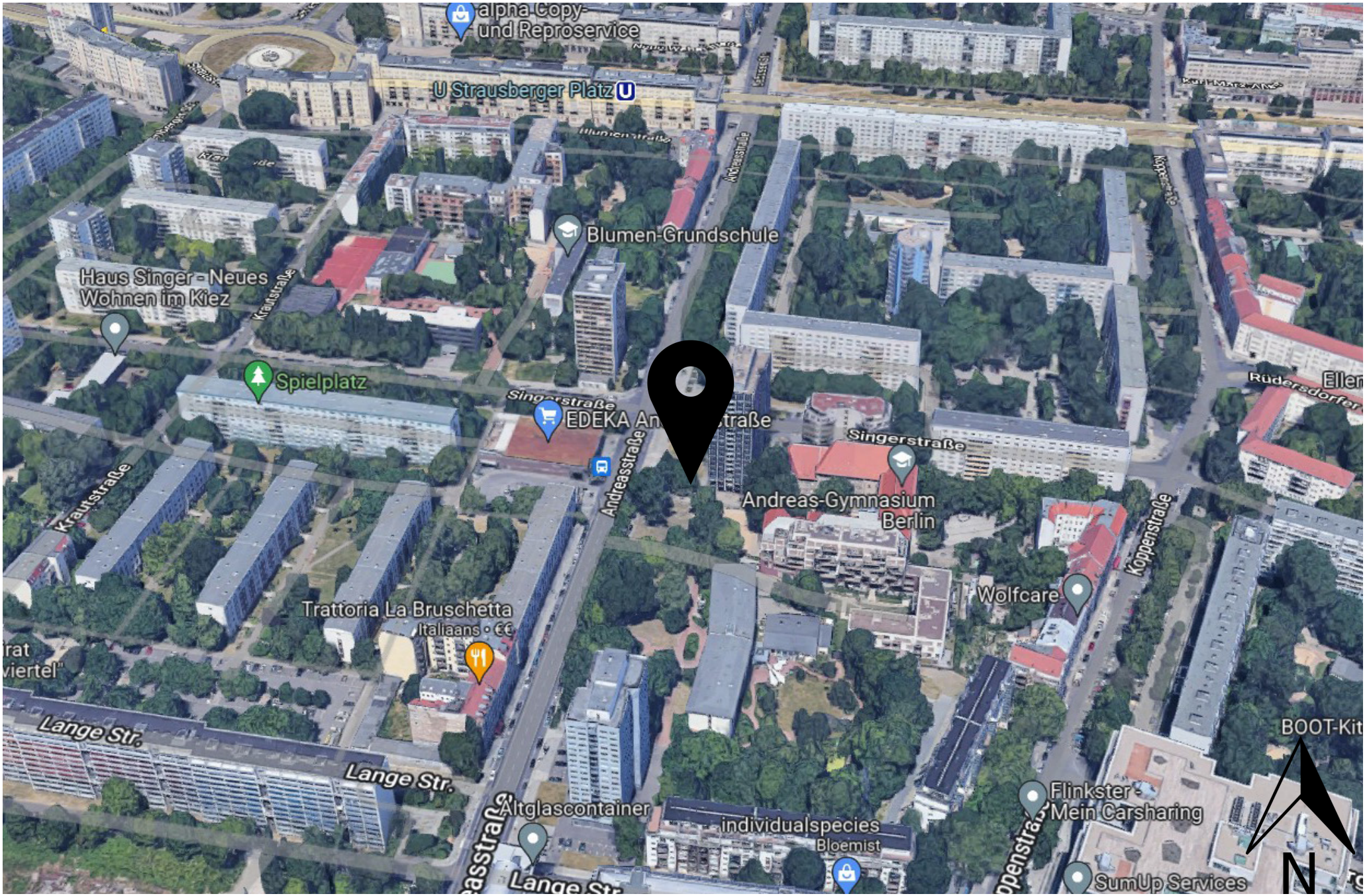
Design Brief

Function	Area (m^2)	Height (m)	Functions/activities	Criteria/Characteristics
Neighbourhood garden (Outdoors)	300	Sky = the limit	-Terrace -Planting borders -Vegetable garden -Shadow/ half covered area -Decorative green -Different gardening styles -Space for artworks	-Functional garden -Decorative garden -Semi-closed from surroundings -Green fencing -South facing -Minimal shadows from buildings -Could be divided into different areas
Entrance hall	250	8	-Entrance -Reception information -Ticket Counter -Café with small kitchen -Shop -Toilets	-Decorative green -Central meeting place -Near main circulation on streets - Enter through neighbourhood garden or pathway next to busy street
Public Service	(150-) 200	3	-Information counter -Waiting area -Private meeting rooms -Back office -Auditorium	-Decorative green -Next to entrance hall -In natural circulation
Wintergarden	200	8	-Neighbourhood garden -Terrace/sitting area -Work tables -Indoor green -Storage -Greenhouses -Vegetable garden -Different gardening styles	-Functional garden -Decorative garden -As much daylight as possible -Greenhouse-structure -Tall windows -Skylights/glass ceiling -South-facing -Could be divided into different areas
Communal kitchens	100	3/7	-Cooking lunch & dinner -5 Kitchens for preparing different meals -5 Dining tables for eating the different meal -Vertical farming -Freezer room -Entrance -Toilets	-Functional garden -Decorative green -Connection to herb garden -Connection to vegetable garden -Connection to vertical farming
Theatre/open stage	250	6	-Stage -Tribune -Changing rooms (29m2)	-Decorative green -Outdoor (& indoor, see public service) -Place for 200 people -Ability to enclose

Administration and services	(200-) 250	3	-Information counter/area -Offices -Storage -Changing rooms -Kitchen and break rooms	-Decorative green (-Functional garden for kitchen)
Workshop spaces	100	4	-Classroom (35m2) -6 Workshops (garage-like)	-Decorative green -Any orientation possible -Inspirational views from windows -Heavy duty finishings -Connection to vertical farming
Shared offices	100	3	-5 enclosed rooms (10m2) -1 shared office area (50m2)	-Decorative green -Combination with library possible -Could be divided over different floors -Communal gardens as break rooms
Library	200	3(/7)	-Meeting room -Bookshelf (4x4m) -Pantry -Silence rooms/boxes -Botanical garden (7m high)	-Decorative green -Pop-up style -North-facing -Not too much daylight
Parking	170	2,25 (>3m)	-Bicycles (40x) -Handicapped parking (5x)	-Decorative green -Common car parking across the street could be expanded for more cars (with addition of green) -Bike parking in stimulating place -Handicapped parking in strategic place (next to roads)
Storage	50	6	-Gardening equipment -Theatre props -Modular grid adjustments -Tools & hardware	-No green inside -In between gardens -Ground floor -Next to theatre/auditorium
Mechanical & Utilities	30 (?)	4	-Rainwater collector -Rainwater storage -Solar panels (integrated in roofs and facades) -Air circulation central functions	-Functional green -Placed in/on most-permanent functions -Green for cooling the building
Circulation (25-30% of total)	660	>2,6	-Paths through gardens -Hallways connecting functions	-Decorative green -Park - style -Semi-covered
TOTAL	2860	20	5 stories of 4m + rooftop garden & installations (2200m2 without Circulation	


Site Location

Andreasviertel, Friedrichshain, Berlin



Privatization problem

Problem statement - a dissection of landuse

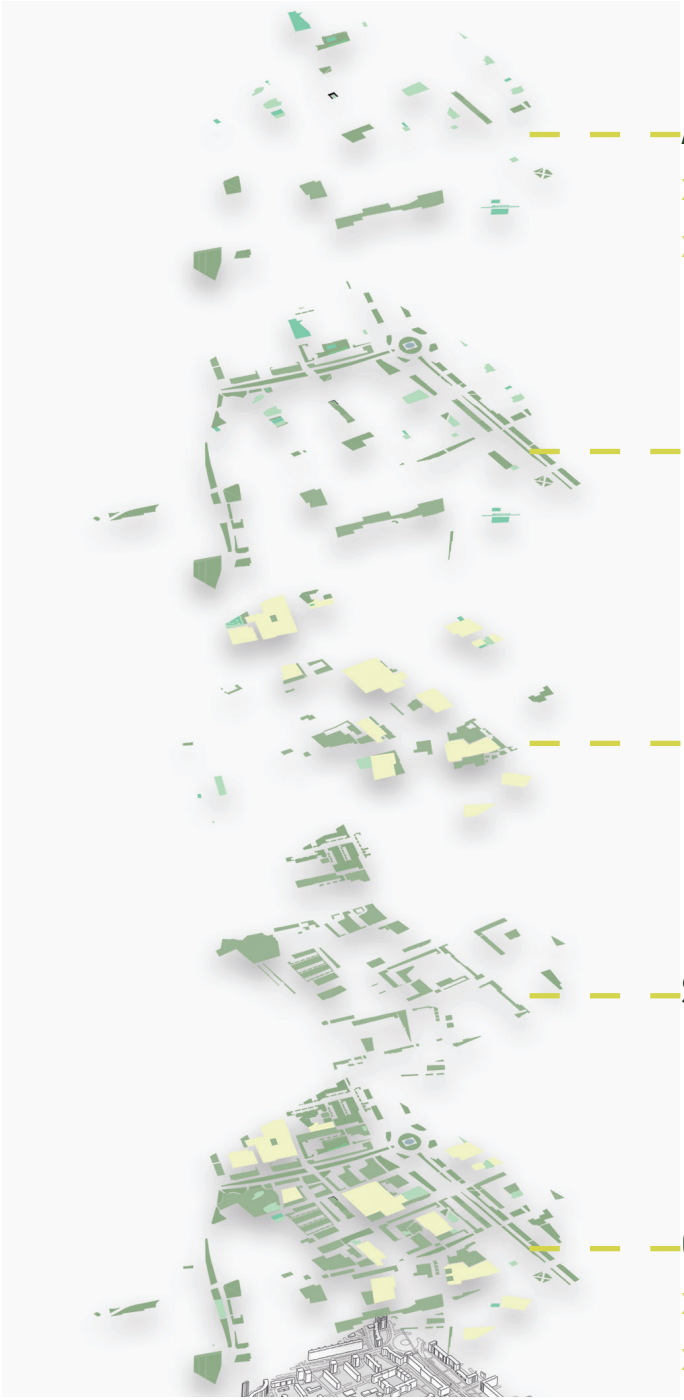
Greenspace total
- x 54964 m²
- x 5,7% of landuse

Buildings
- x Average height 18m
- x Plattenbau most common

Settlement area
- x 60,1% of landuse
- x 0,6 km²

Infrastructure

Andreasviertel
- x Surface 1 km²
- x 978.638 m²



Accessible public green
- x 0,13% of landuse
- x <0,1 m² per inhabitant

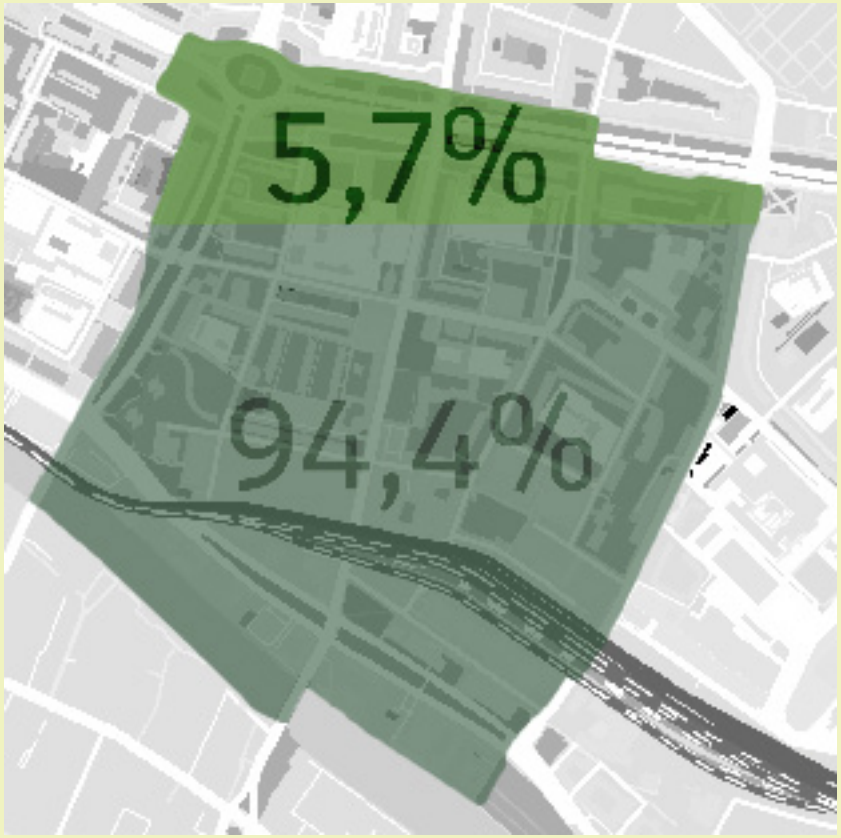
Public green - total

Private green

Semi-private green

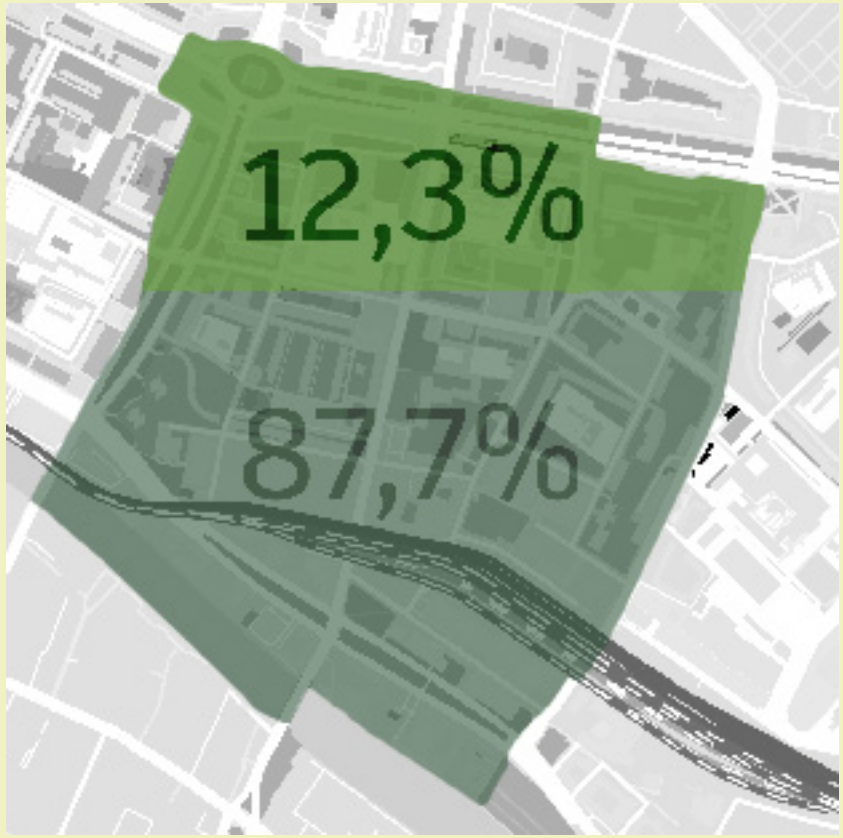
Greenspace total
- x 54964 m²
- x 5,7% of landuse

How much extra green do we need?



Accessibility public green
Andreasviertel now

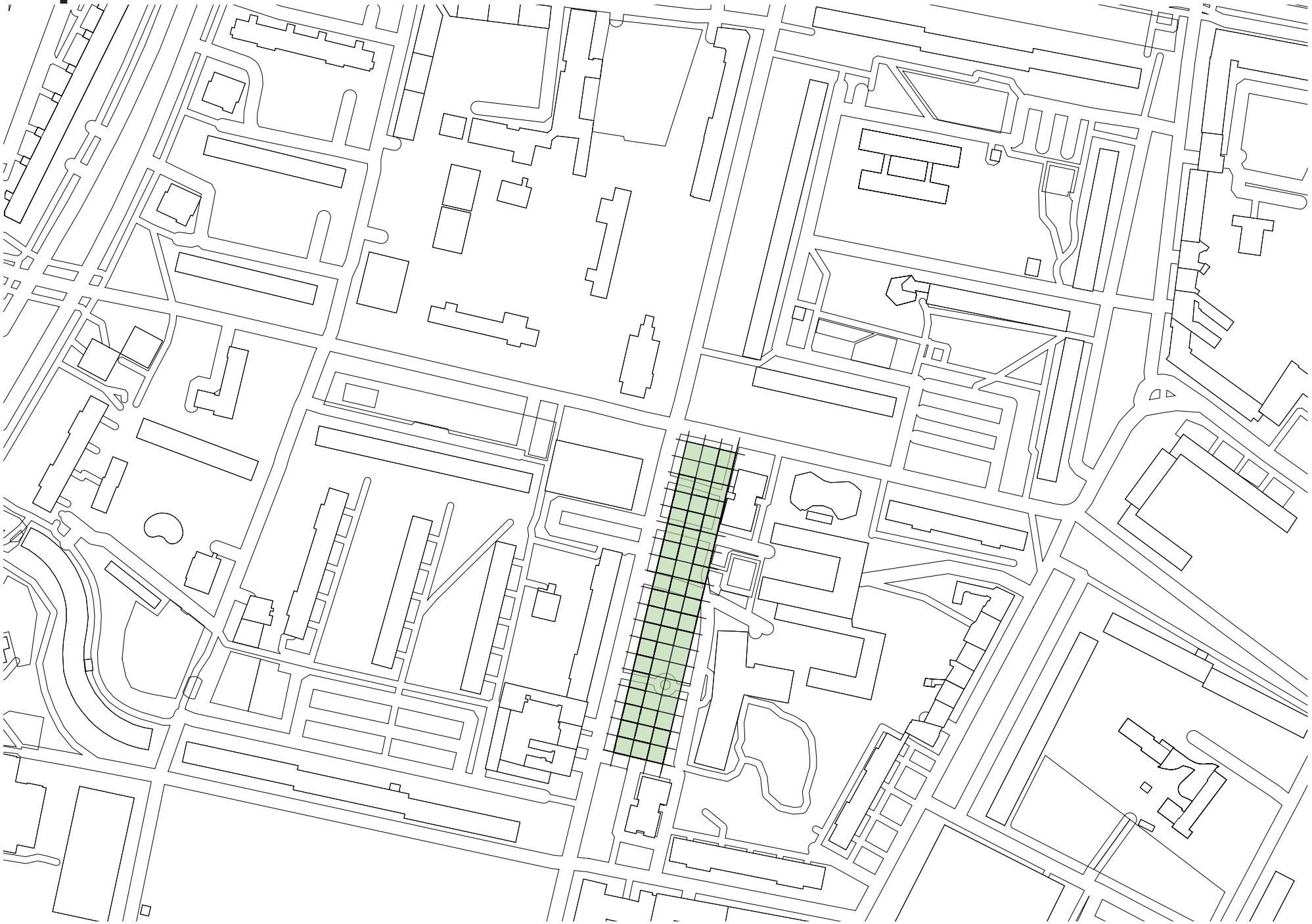
x 13.406 inhabitants (2022)
x 4,1 m² greenspace per inhabitant
x 1.341 m² accessible public green
x 5,7% of landuse is greenspace



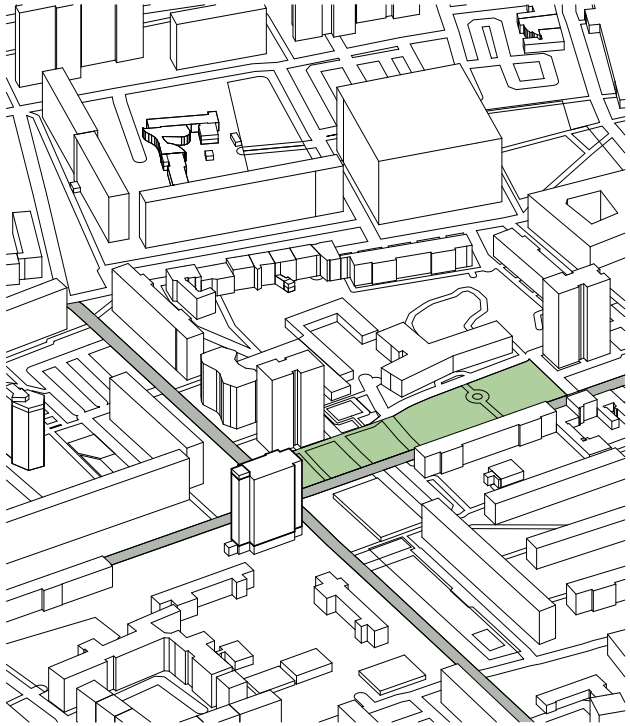
Accessibility public green
WHO Recommendation

x 9 m² greenspace per inhabitant
x 12,3% of landuse is greenspace
x **>65.690 m² greenspace lacking**

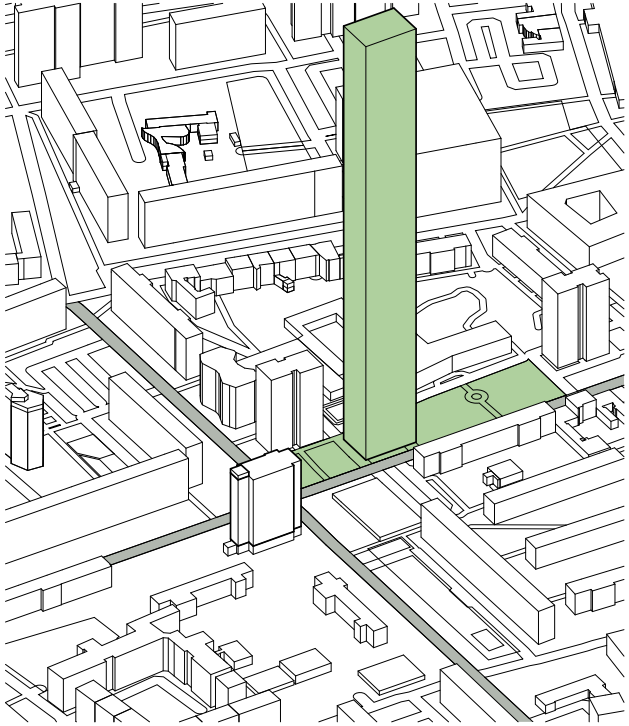
Site plan 1:1000



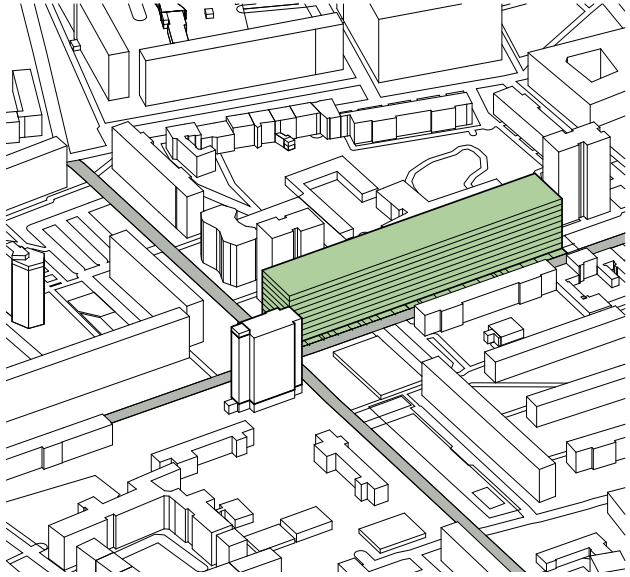
Increasing the area of greenspace



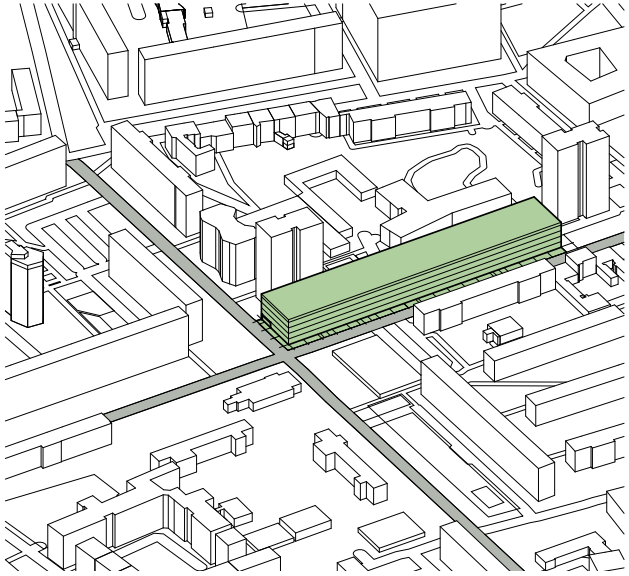
Site area - 9.286 m^2



Vertical stacked - 65.000 m^3



Horizontal stacked - 65.000 m^3



Condensed volume - 37.144 m^3

Neighbourhood gardens > indoor?

Community garden, Shanghai

Green condenser research

What is a green condenser?

XL

Central park - 3,41 km² - 1.620.867 C
Manhattan, New York City, USA

M

Floriade - 0,60 km² - 217.828 C
Almere, Flevoland, Netherlands

S

Hortus Botanicus-0,025 km²-104.574 C
Delft, Zuid Holland, Netherlands

References

Biodomes - Amazon head offices
Manhattan, New York City, USA

Green atrium - Hotel Jakarta
Amsterdam, Noord Holland, Netherlands

Semi-indoor green - Bosco verticale
Milano, Italy

Floating green - Central park
Symphony of the seas

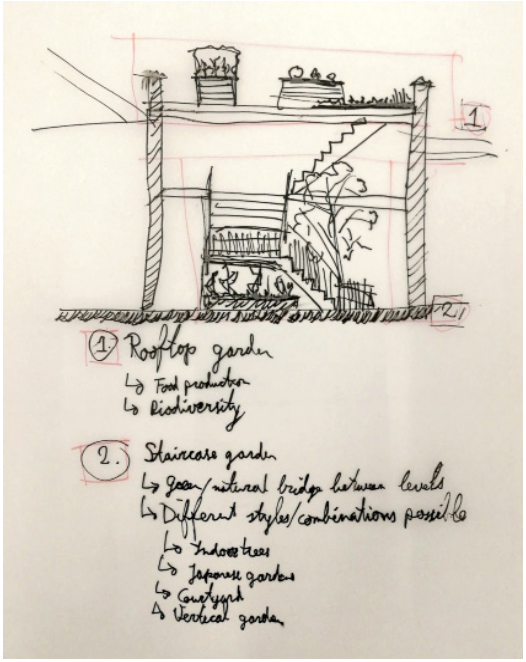
Sketches


Vertical farming
↳ Food production
↳ Minimal requirements
↳ Stacked garden beds

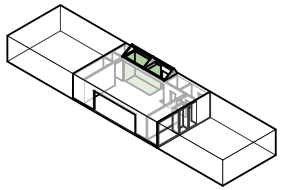

Vertical garden
↳ Modern/Contemporary
↳ Design feature/decorative
↳ Low maintenance if done correctly


Indoor courtyard/trees
↳ Decorative
↳ Fresh air
↳ Gathering/central space

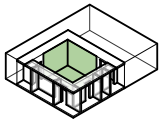

Orangery/Botanical garden
↳ Home/estate scale
↳ English style
↳ Greenhouse


1
2.1
1. Rooftop garden
↳ Food production
↳ Biodiversity
2. Staircase garden
↳ Green/natural bridge between levels
↳ Different styles/combinations possible
↳ Indoor trees
↳ Japanese garden
↳ Courtyard
↳ Vertical garden

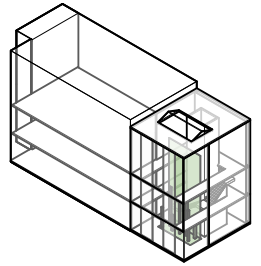
Indoor green type catalogue



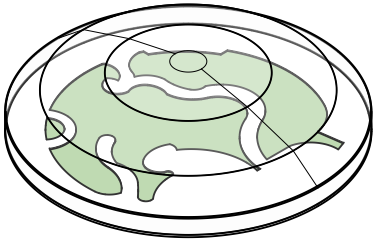
Green wall + skylight 1:200



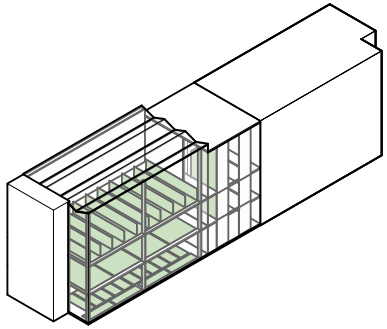
Patio 1:200



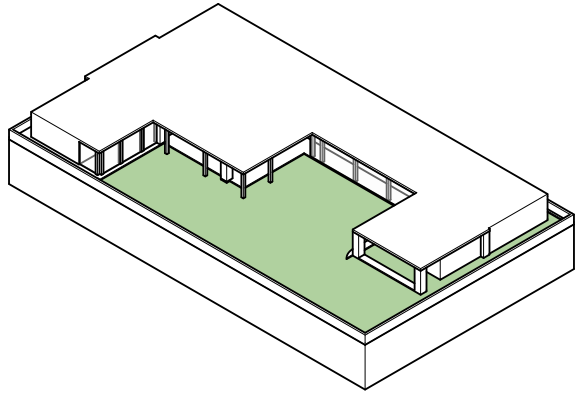
Stairwell garden 1:200



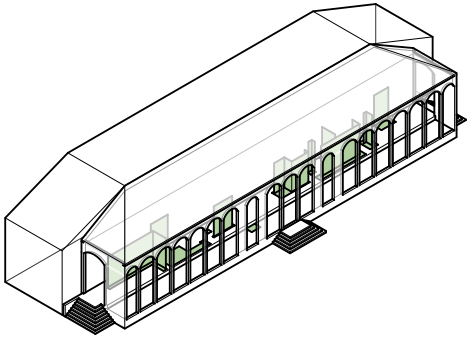
Biosphere/dome 1:200



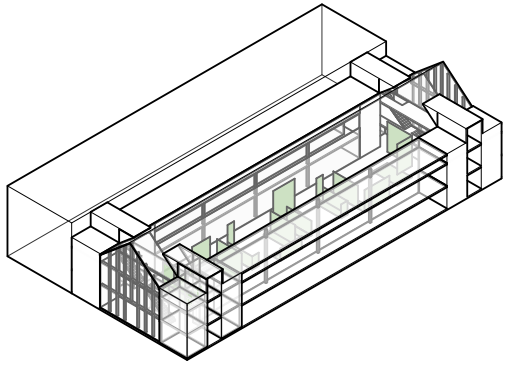
Vertical Farm 1:200



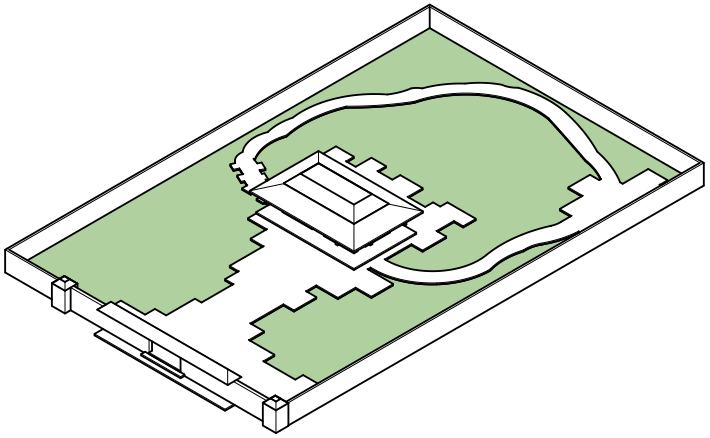
Rooftop garden 1:200



Orangery 1:200



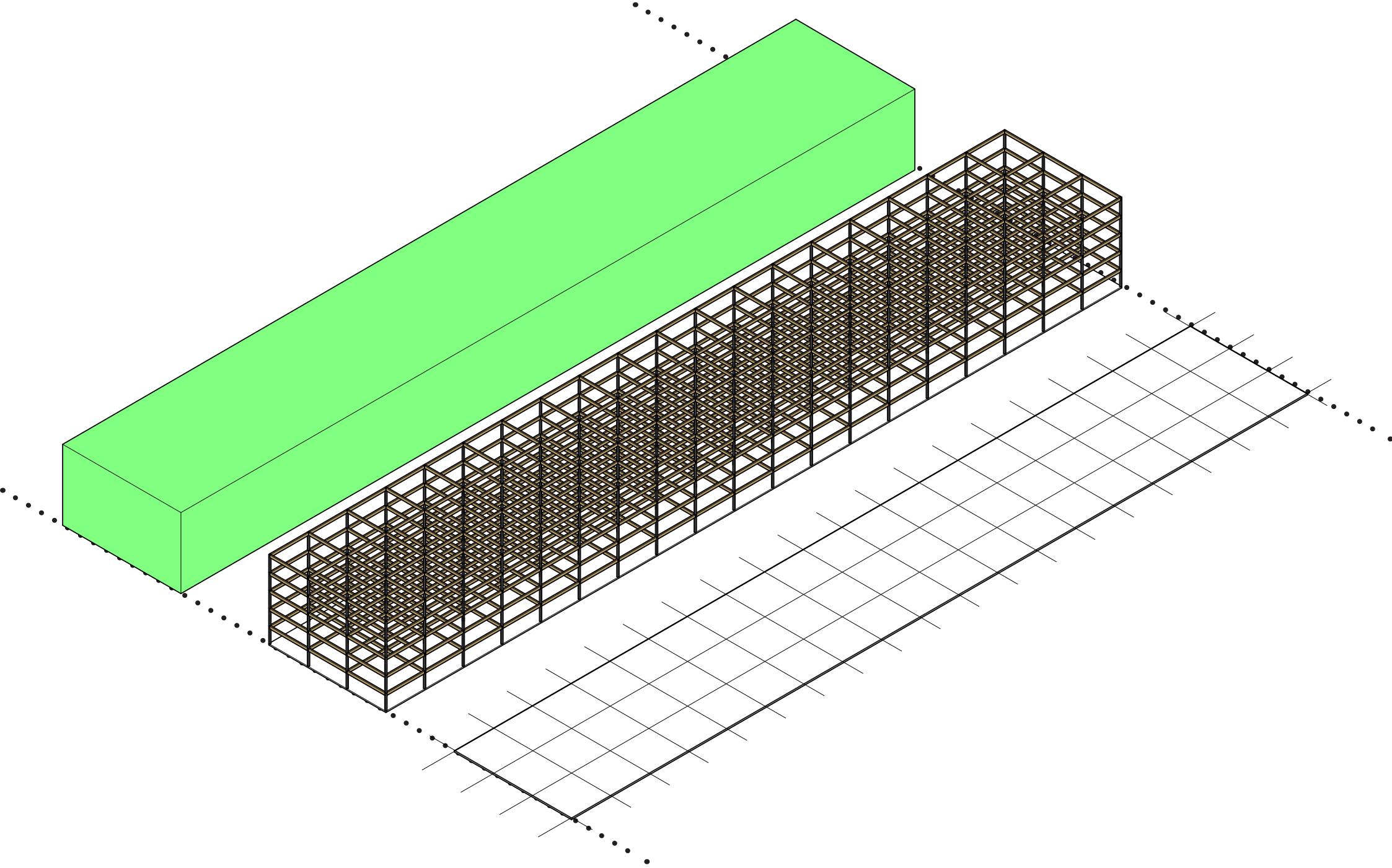
Atrium 1:200



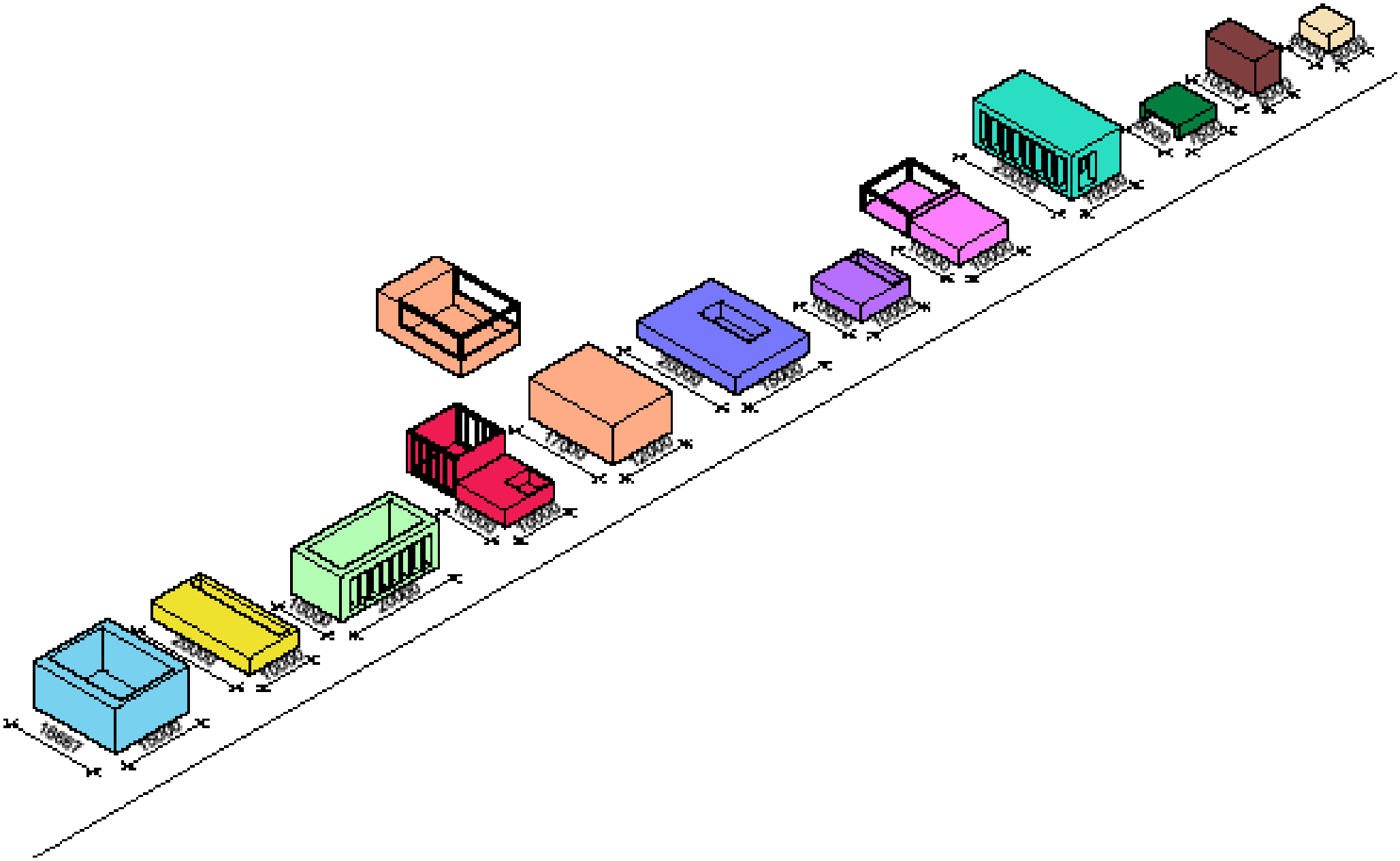
Chinese garden 1:200


Concept Design

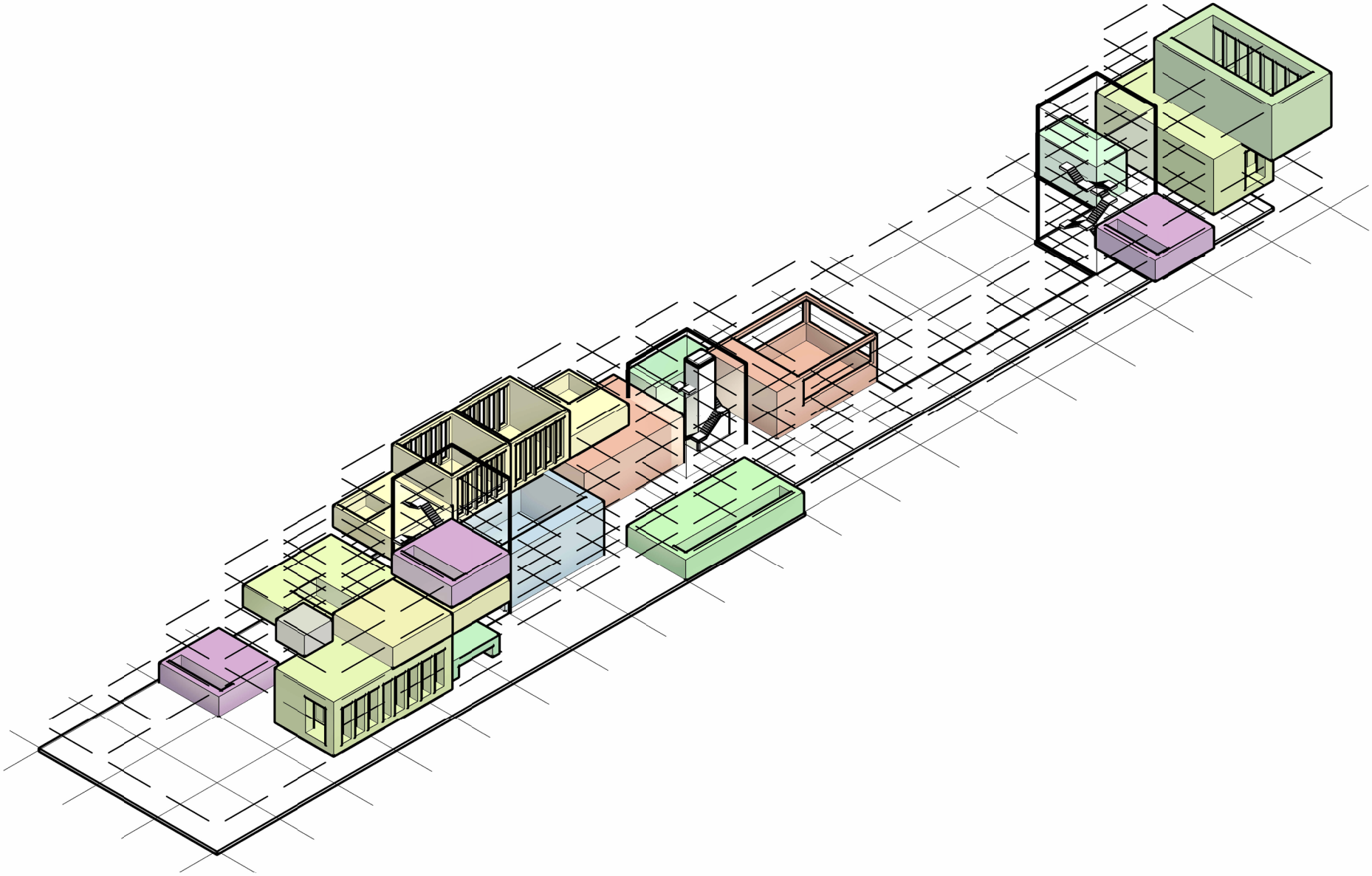
Modular grid solutions



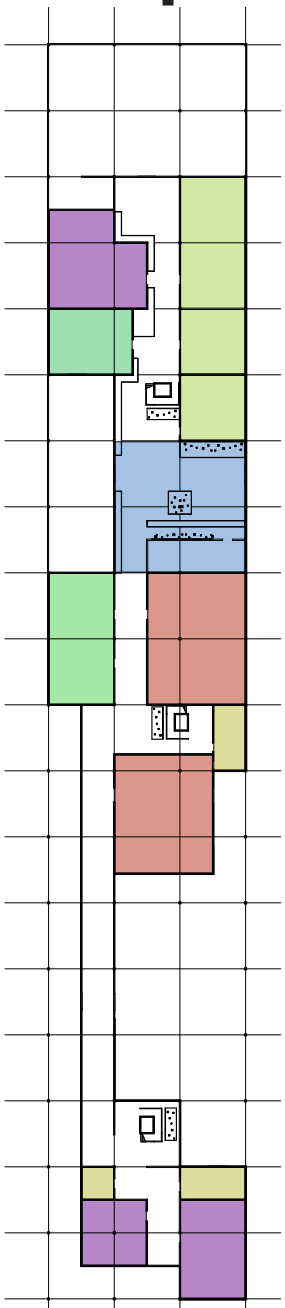
How to combine different functions with indoor green?



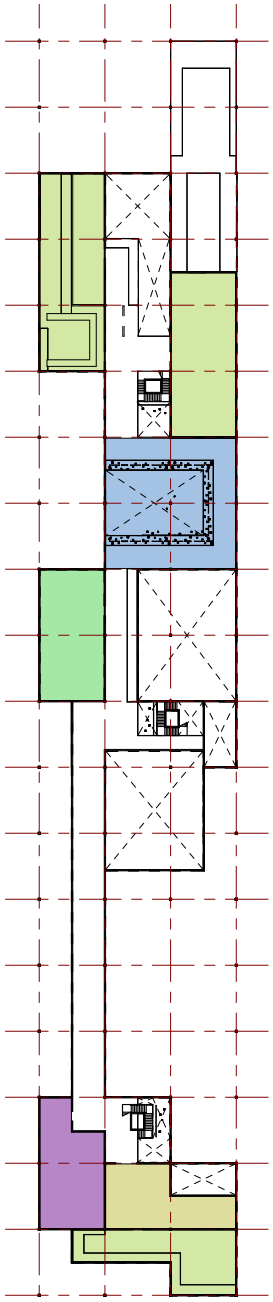
Functional diagram



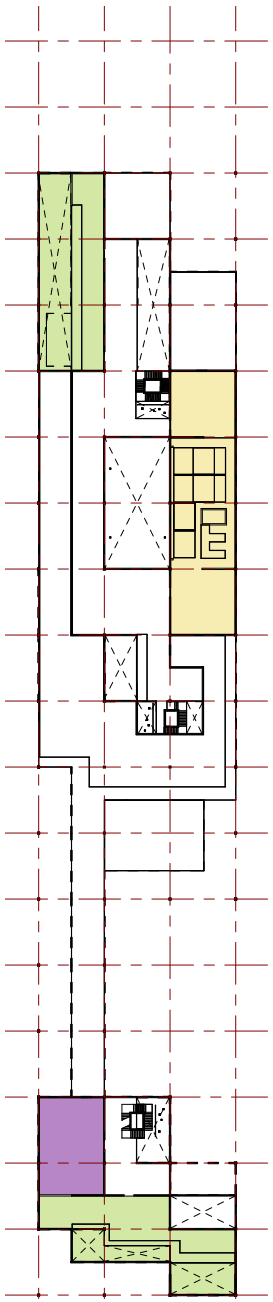
Floorplans



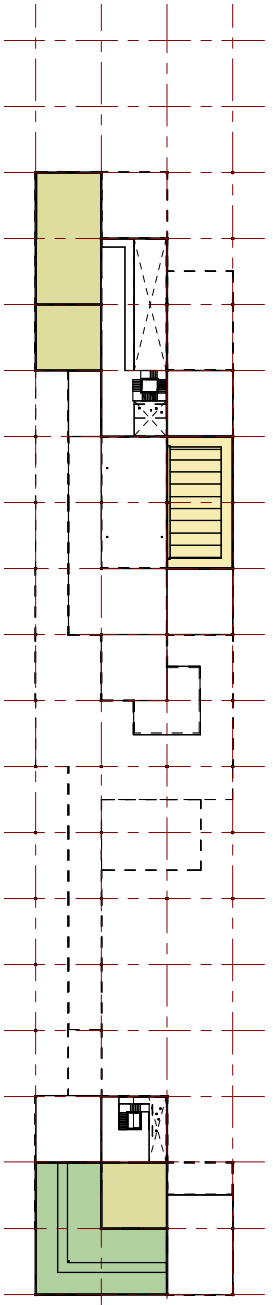
Groundfloor



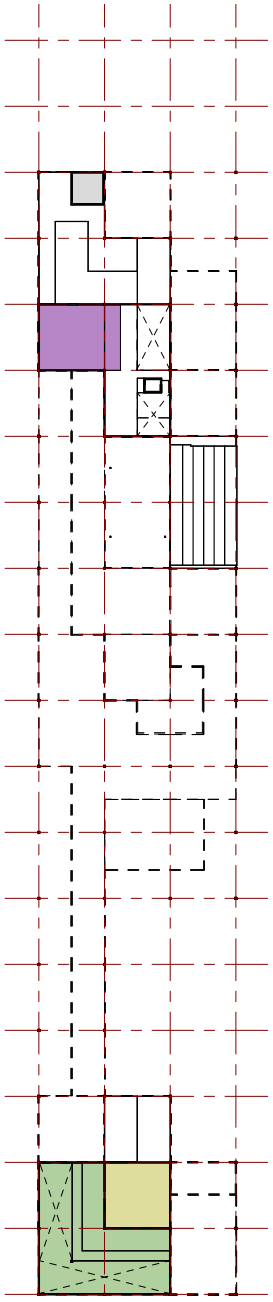
First floor



Second floor

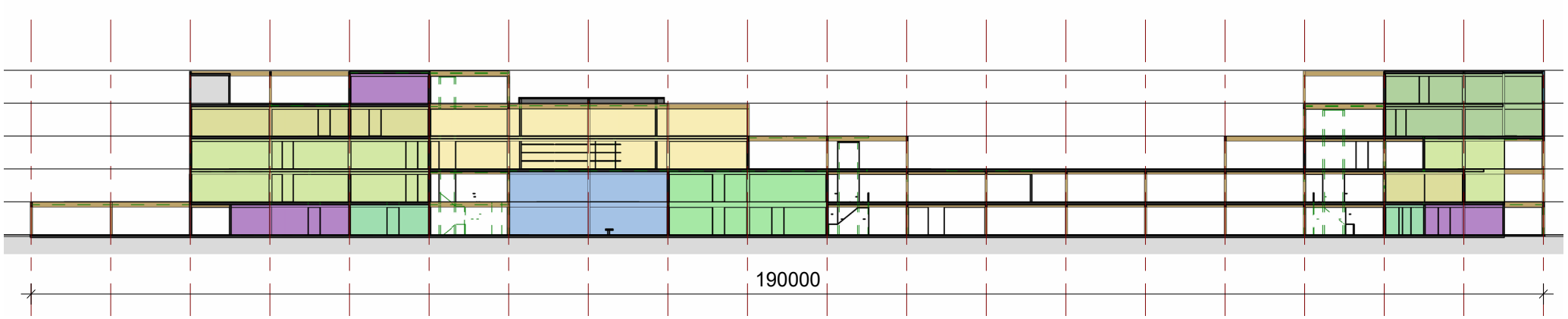


Third floor

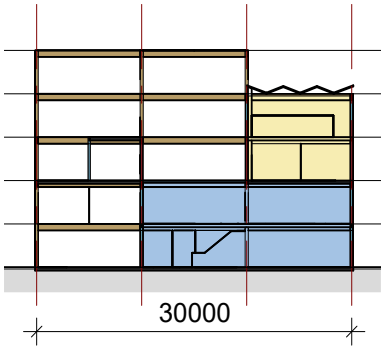


Fourth floor

Sections

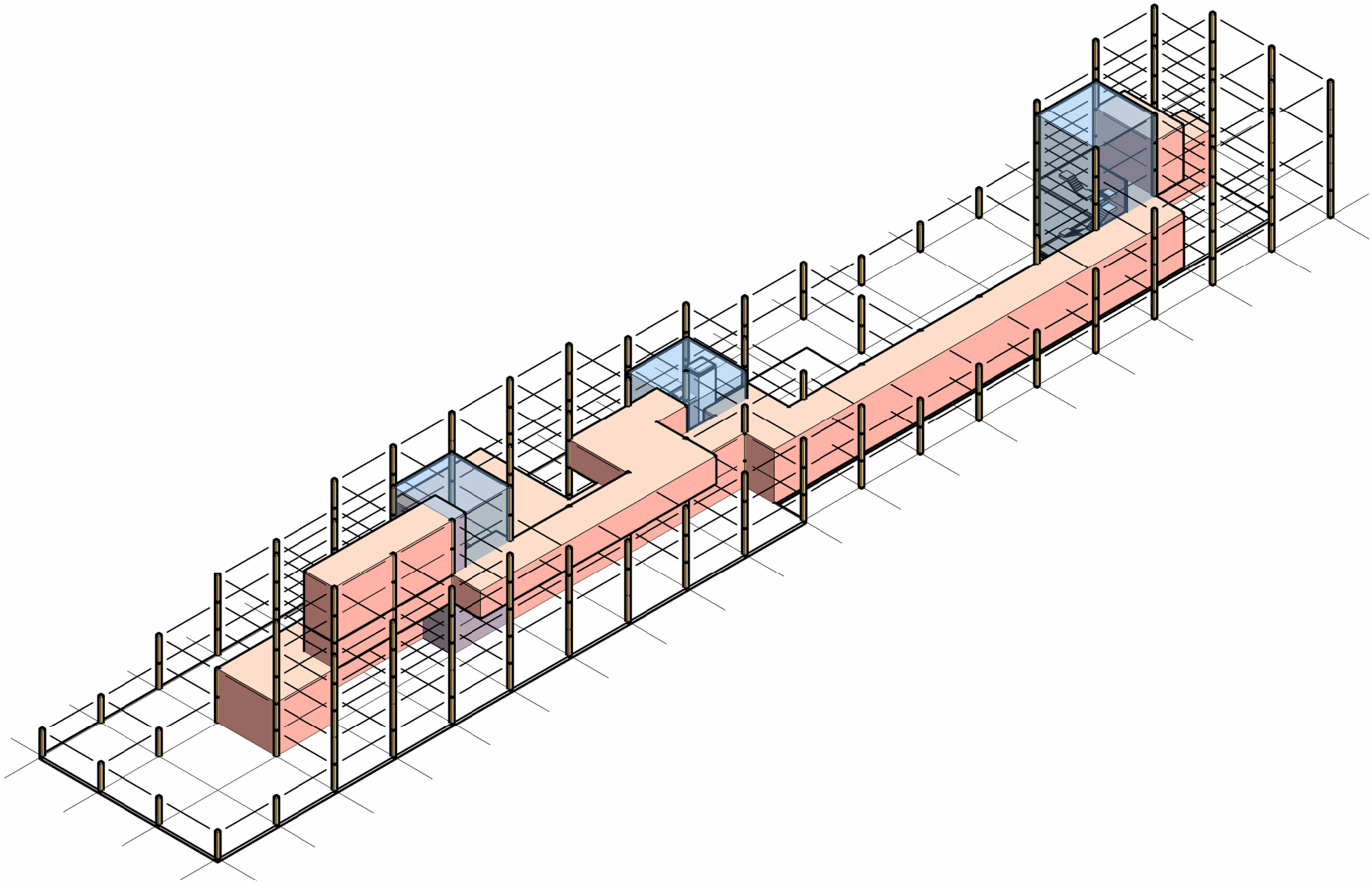


Section AA

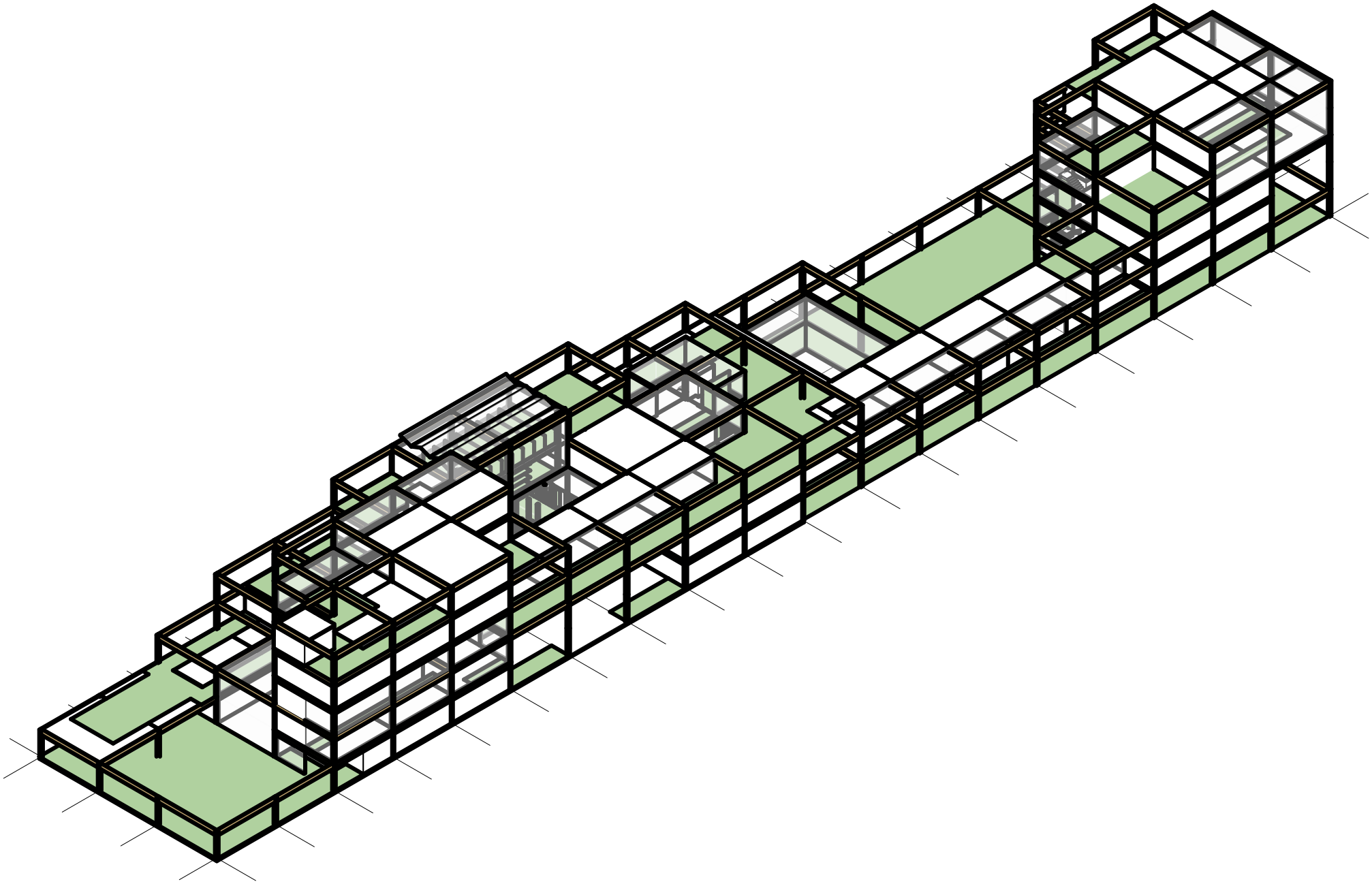


Section BB

Circulation



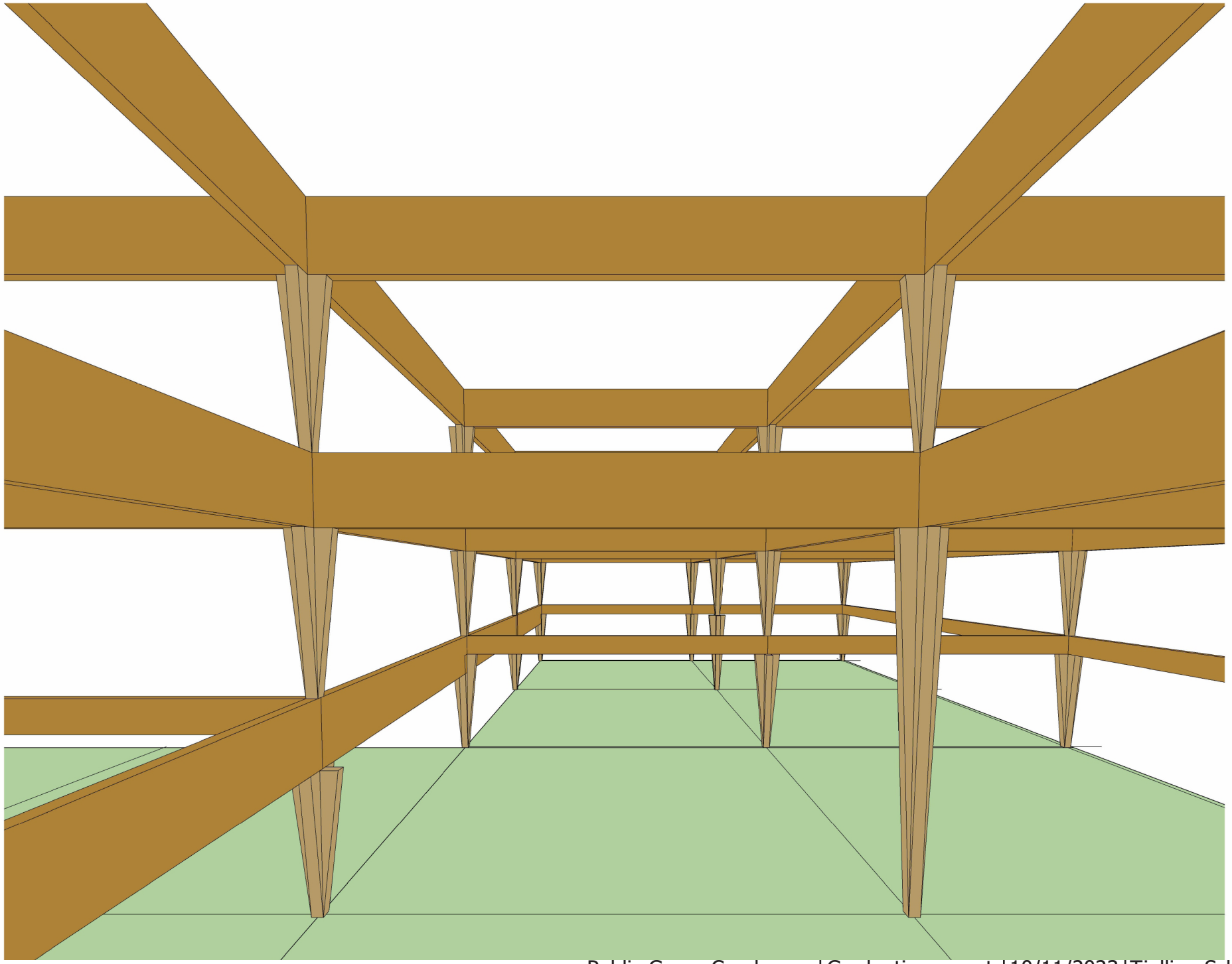
Building overview



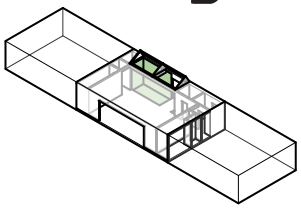

Preliminary design
Landscape Inside
The public green condenser

Vision in AI: Condensed communal green

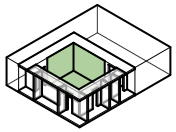
Modular grid structure - technical solutions



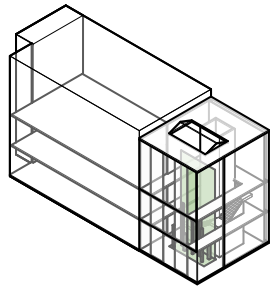
Indoor green type catalogue



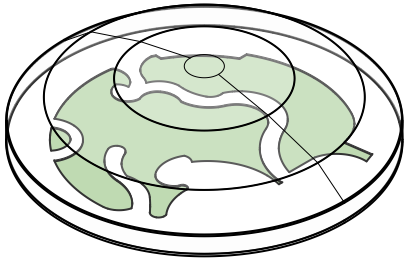
Green wall + skylight 1:200



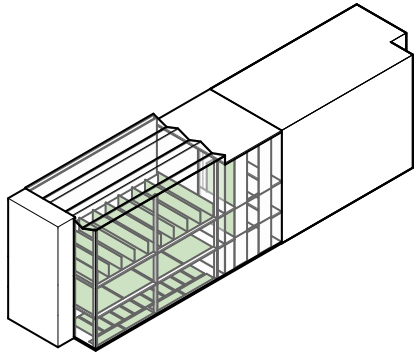
Patio 1:200



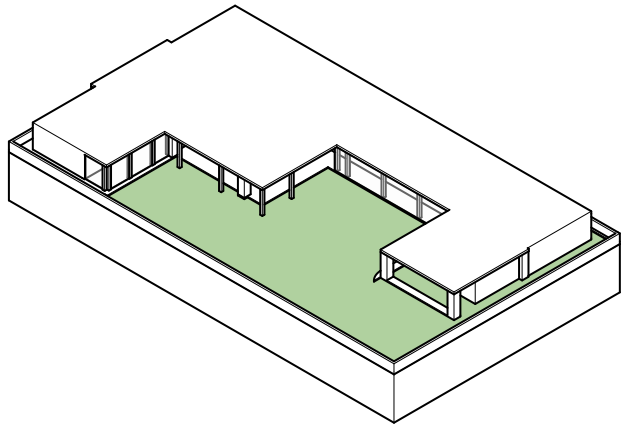
Stairwell garden 1:200



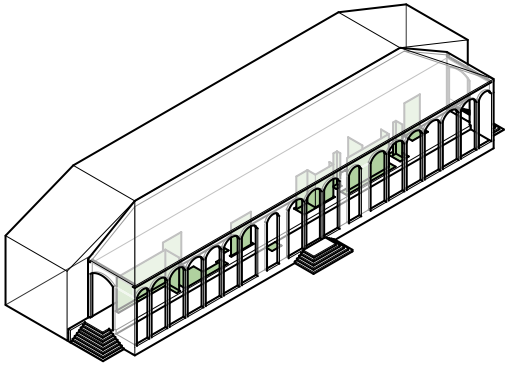
Biosphere/dome 1:200



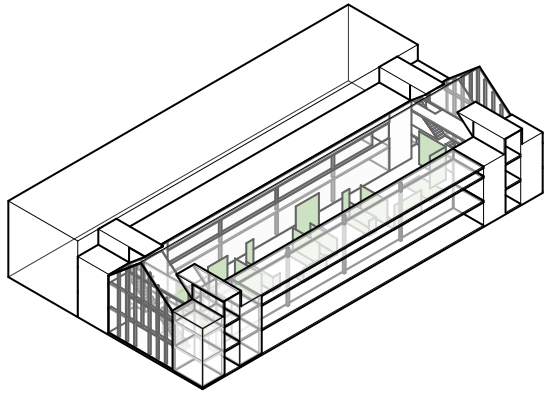
Vertical Farm 1:200



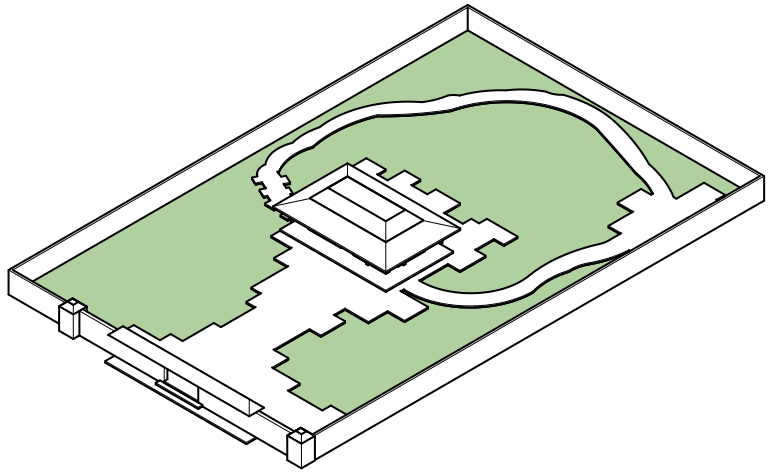
Rooftop garden 1:200



Orangery 1:200

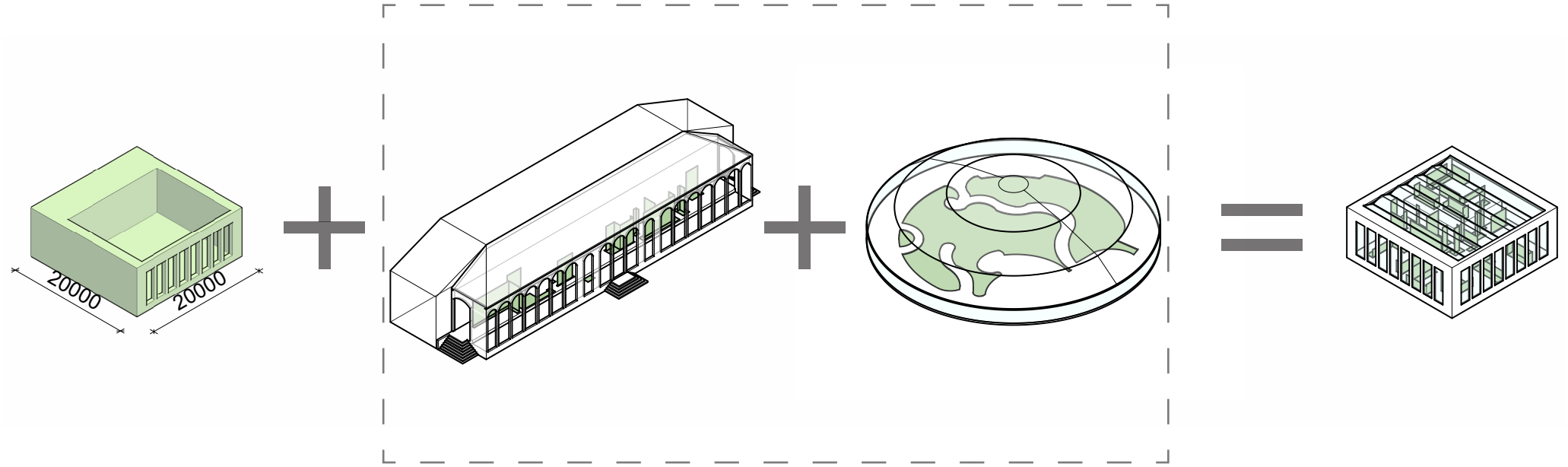


Atrium 1:200



Chinese garden 1:200

Creating green condenser types



Wintergarden

- 400 m²
- 80% open roof
- Skylights
- Facades with tall windows
- South/west oriënted
- Great variation of plants
- Regulated indoor climate

Orangery

- 300 m²
- Closed roof
- Possibility for skylights
- Facades with tall windows
- South/west oriënted
- ‘Library’ of plants
- Climatization specified for special plants

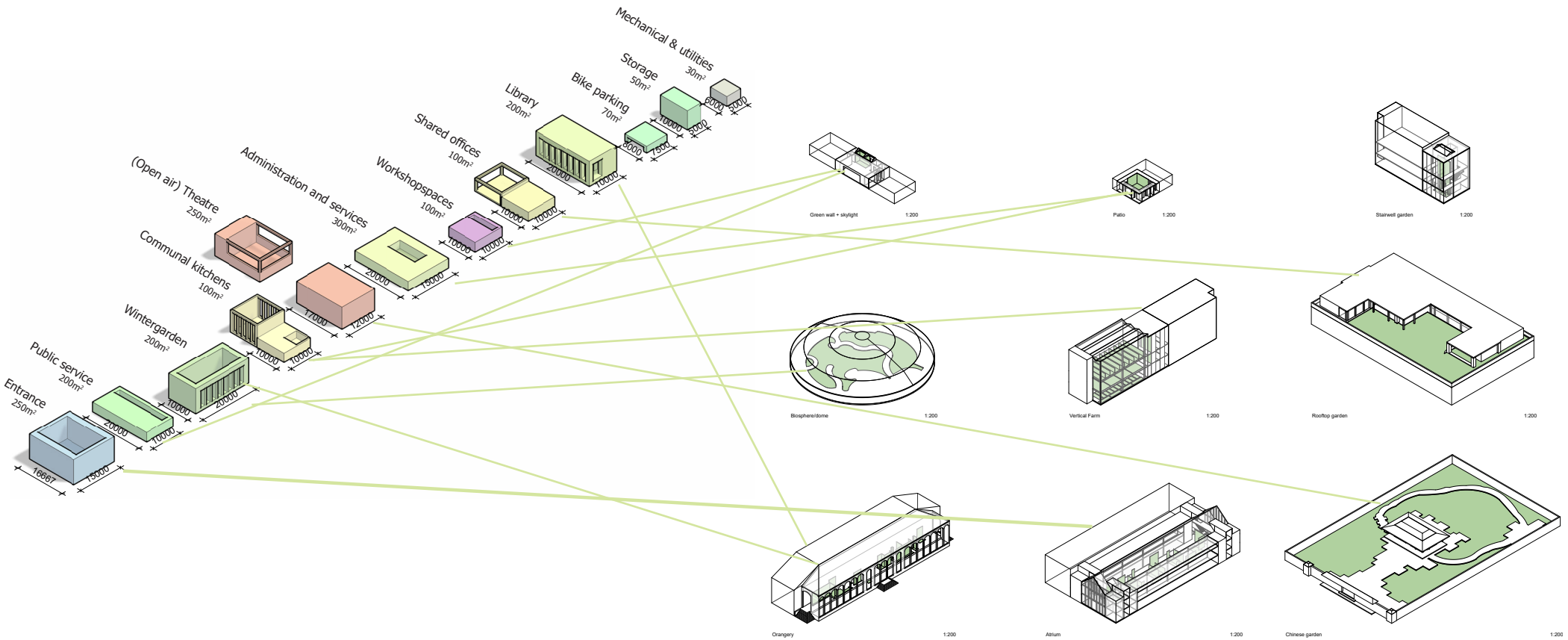
Biodome

- 1200 m²
- 100% open roof
- Glass dome
- 90% glass facades
- 180° sun orientation
- Oriental plant species
- Biosphere-principle

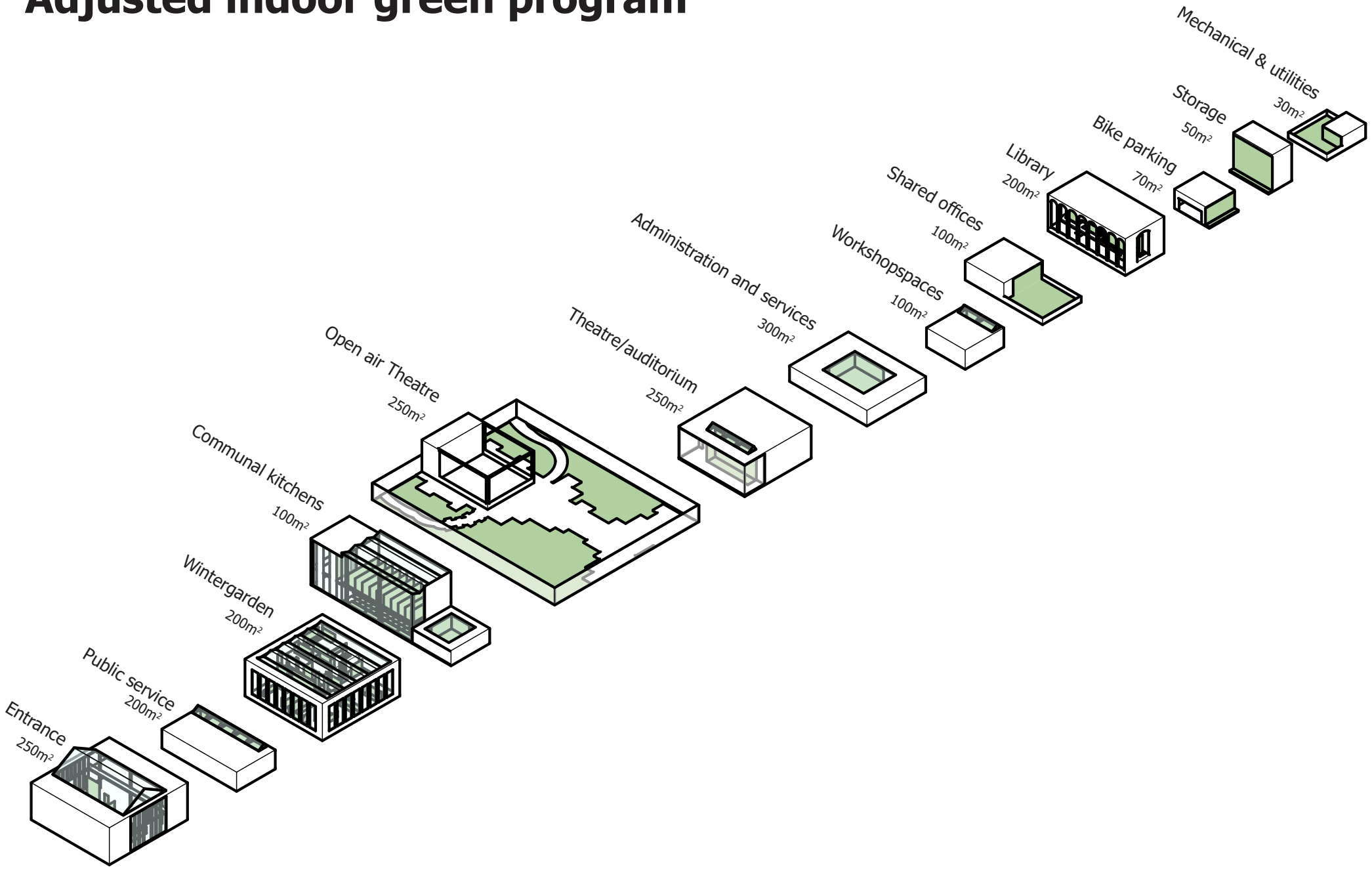
Indoor Communal garden

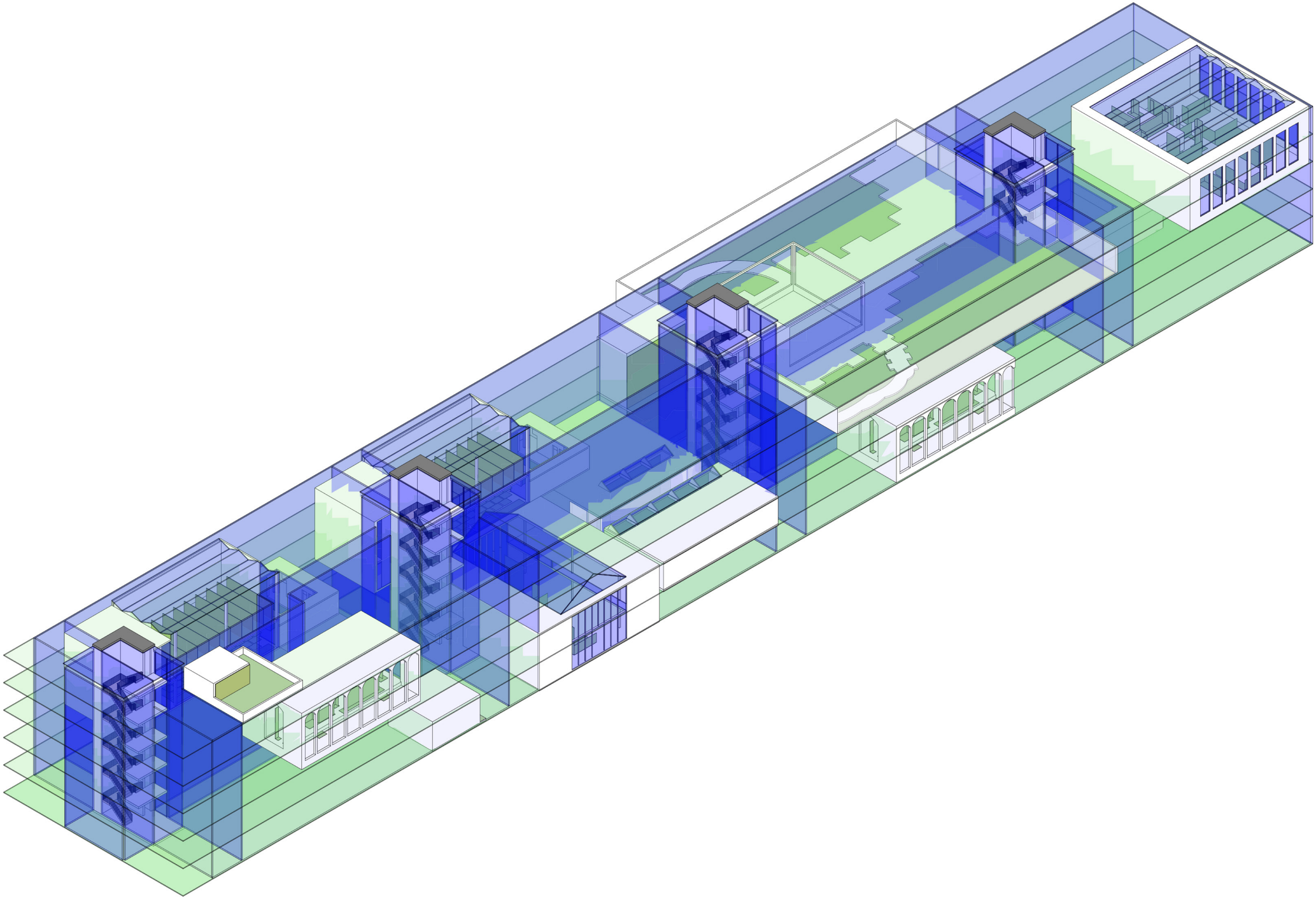
- 400 m²
- 90% open roof
- Skylights/greenhouse
- Facades with tall windows
- Windows on 2 or 3 sides
- Possibility for different garden styles
- Regulated indoor climate

Matching functions and indoor green typologies



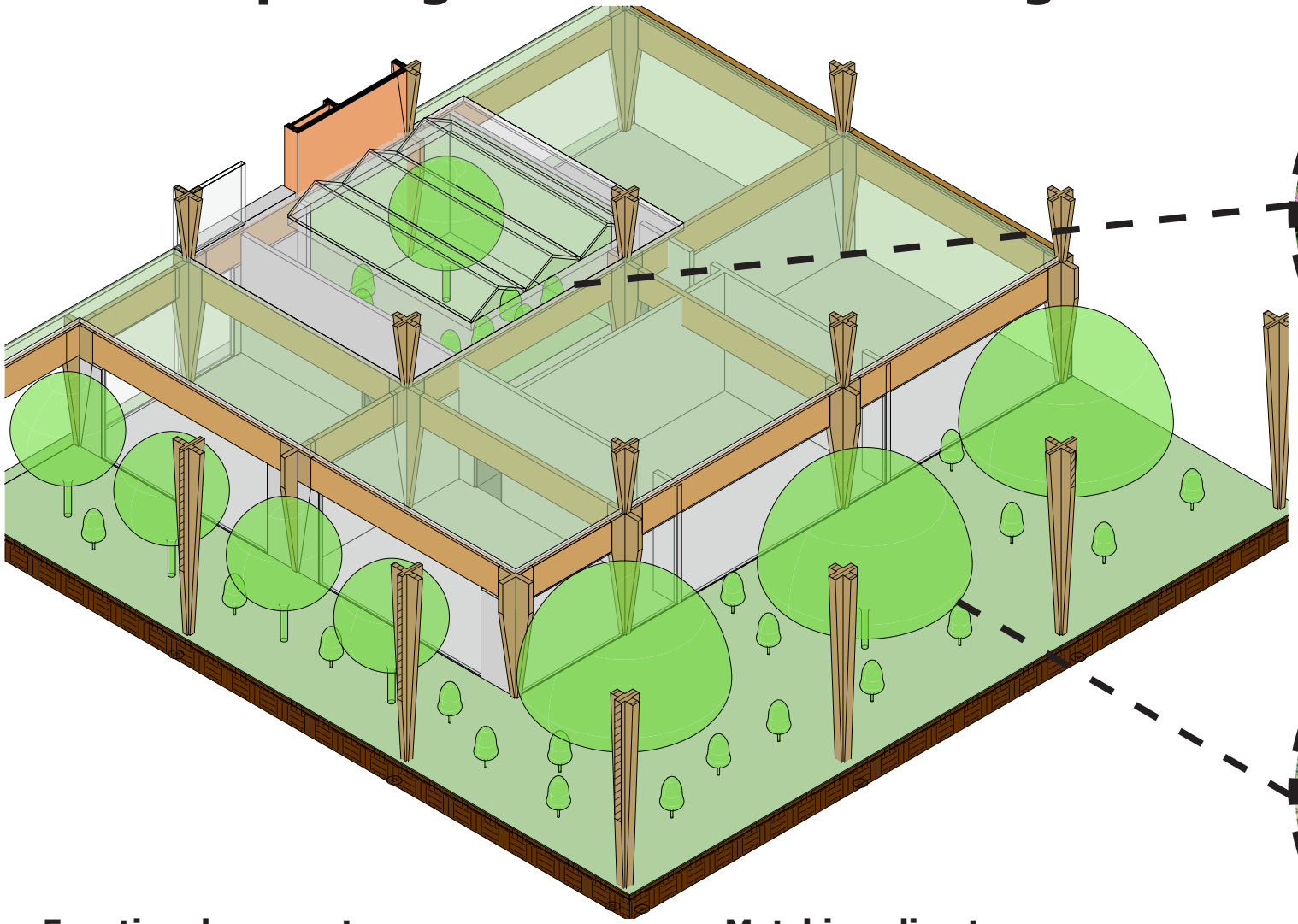
Adjusted indoor green program





Functional arrangement

“Tetris”: placing the functions in the grid



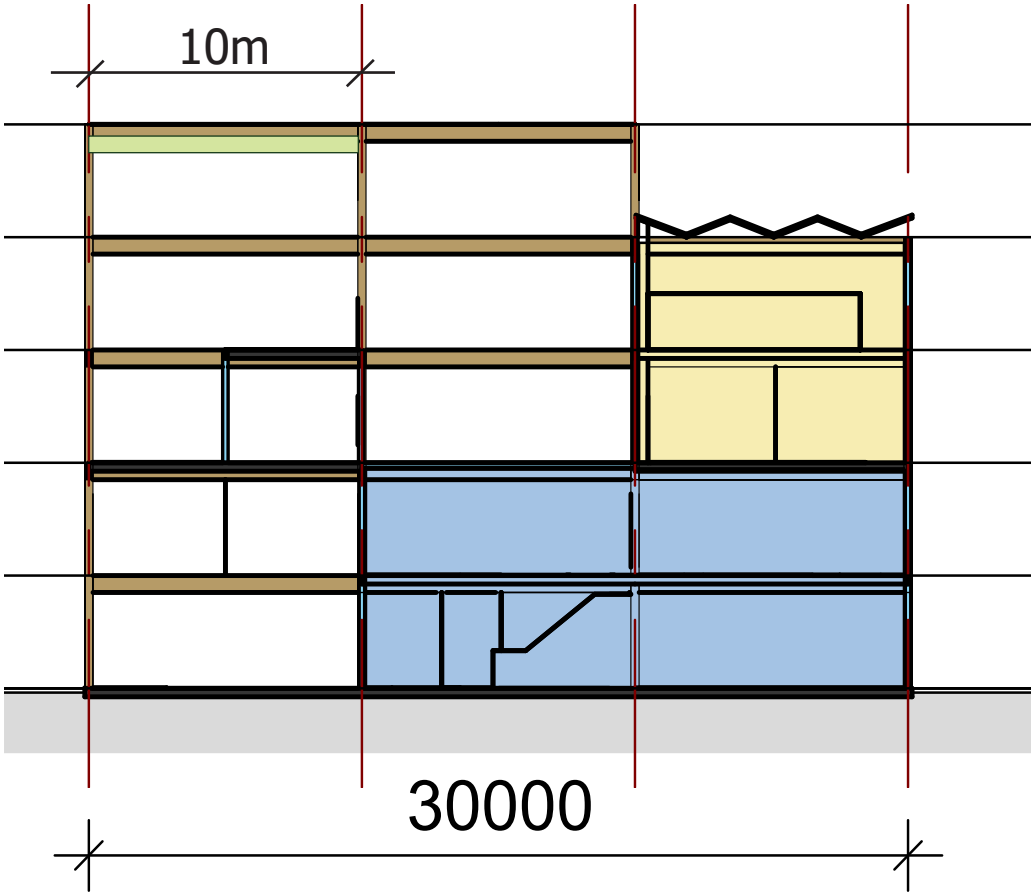
Flowers
Temperature: 18-25°C
Humidity: 55%

Olive trees
Temperature: 7-37°C
Humidity: 45%

Functional parameters
Temperature: 15-27°C
Daylight: All day (in)direct
Height:
General: embedded in gardens and visiual relation to street life

Matching climate: Meditterranian
South facing
Temperature: 10-40°C
Height: 10m

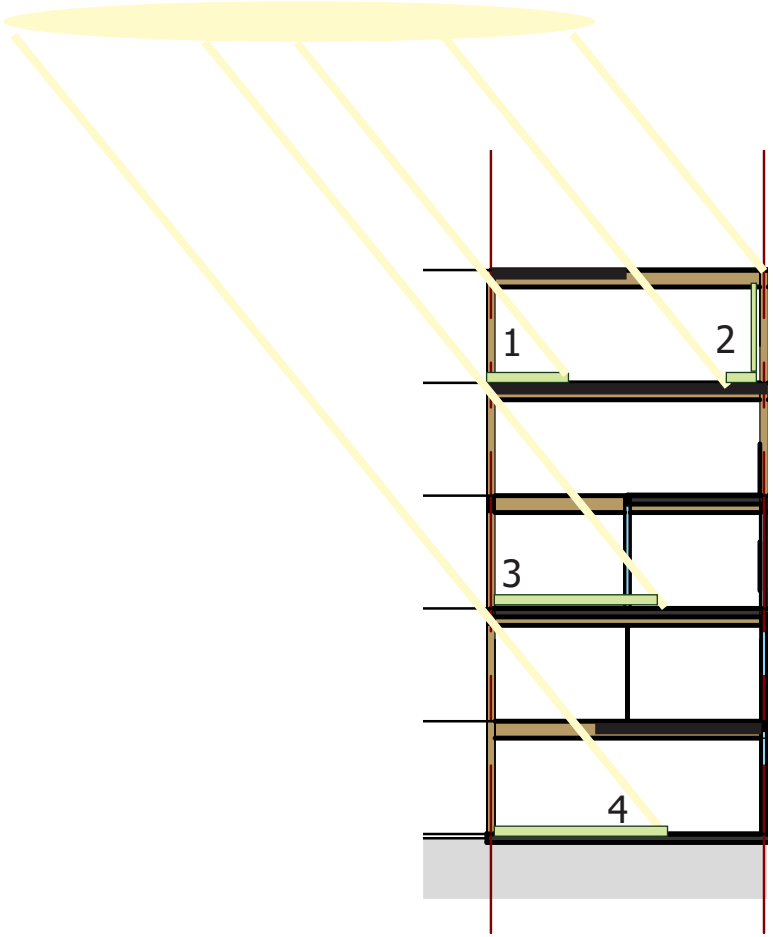
Technical design challenges



Challenge 1: weight

Dry soil = 1600 kg/m³
Wet soil = 2000 kg/m³

Soil volume (roof) = 10m · 10m · 0,4m = 40m³
=> Max soil weight = 2000 · 40 = 80.000 kg

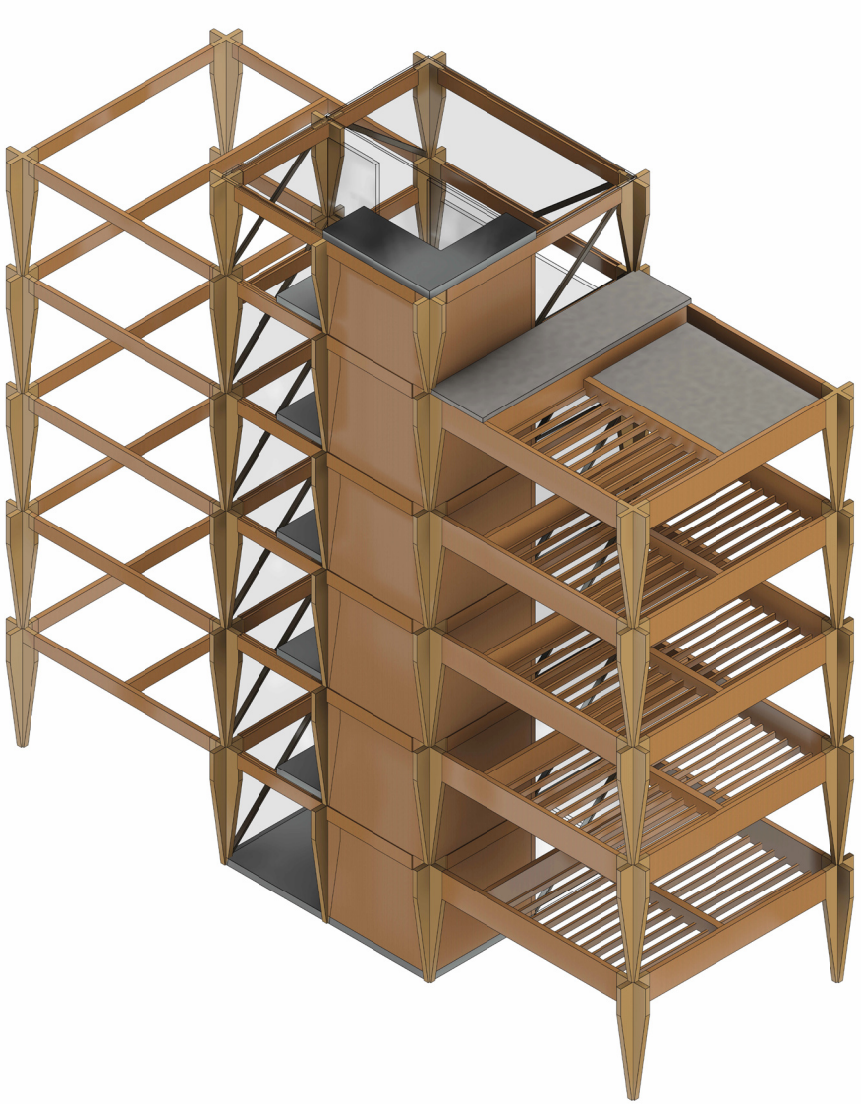


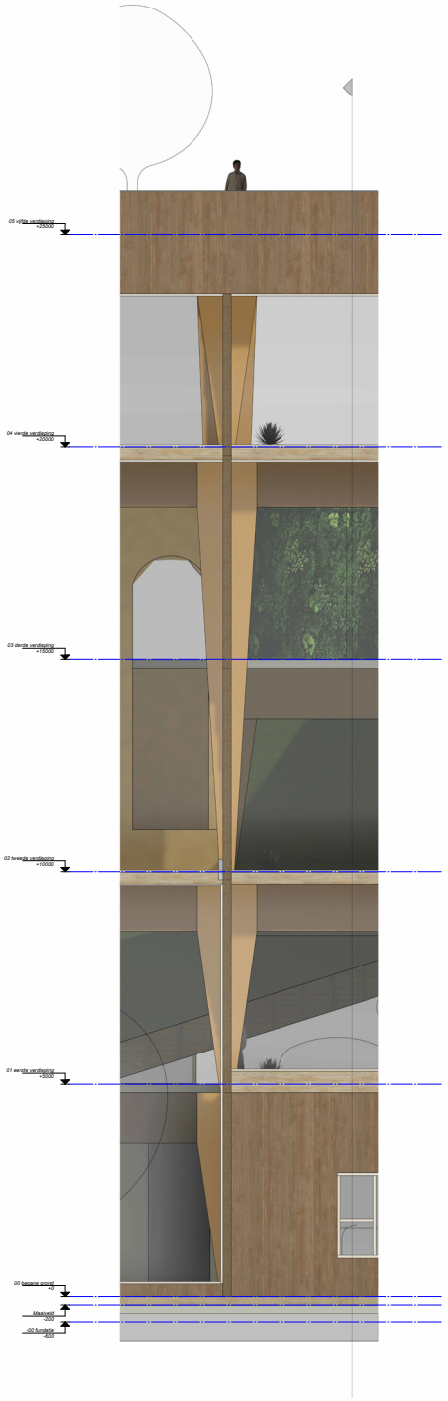
Challenge 2: daylight

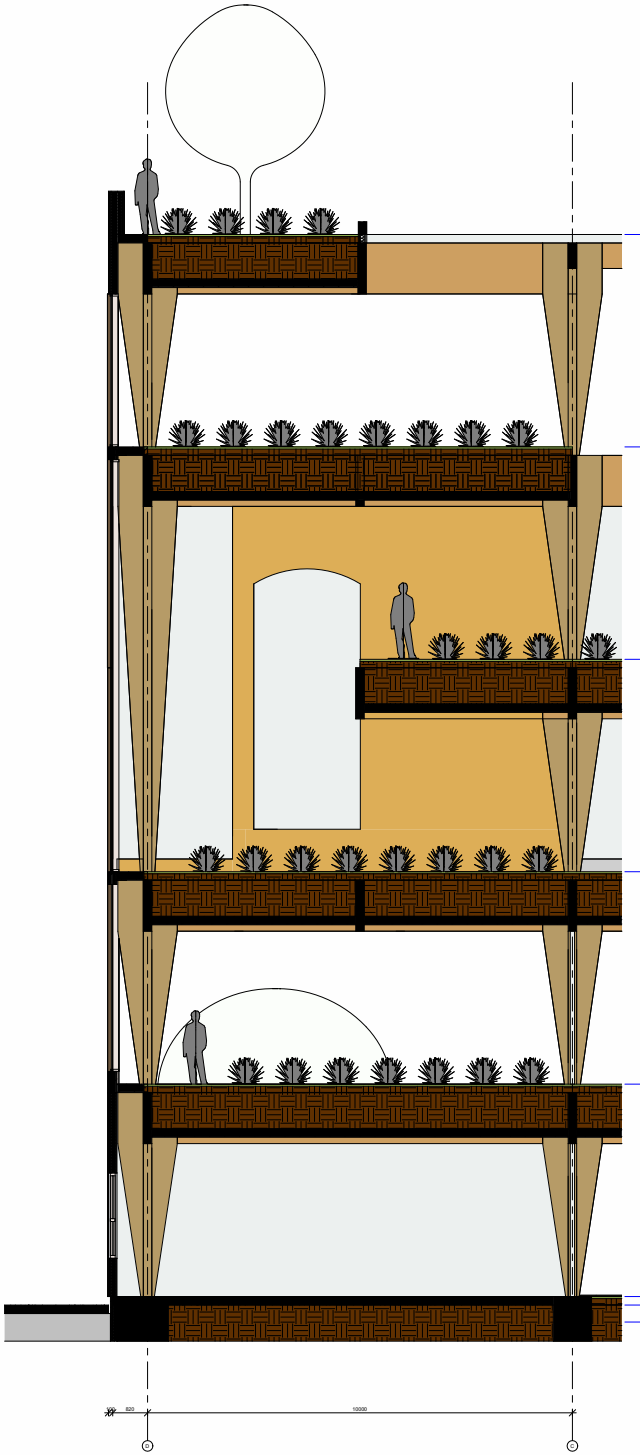
Floor thickness = 10000/25+15+10/2 = 420mm
Floor weight = 2500 kg/m³ · 42 m³ = 105.000kg
Total weight = 185.000 kg

Beam thickness = 1/17 · 10.000 = 588mm
>> Sufficiënt?

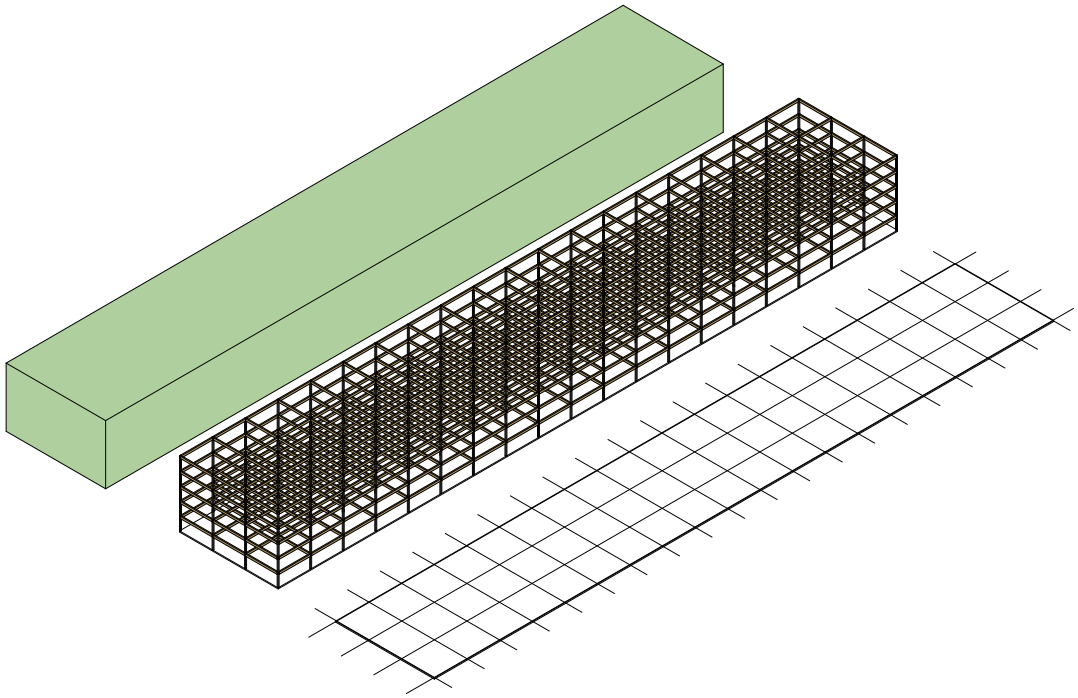
Technical solutions

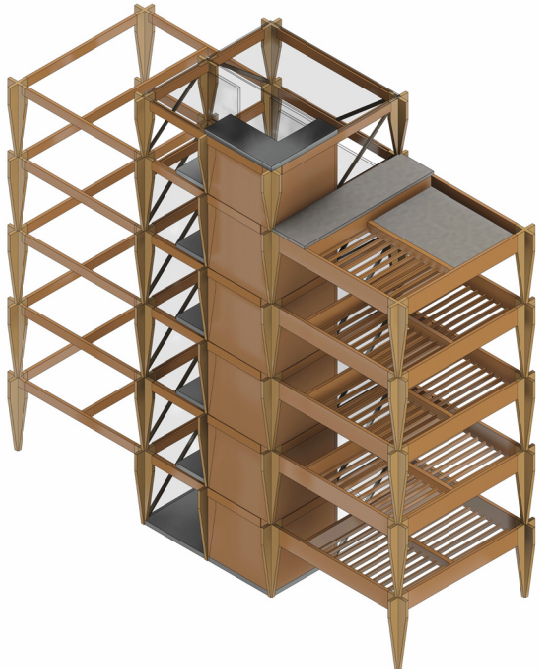


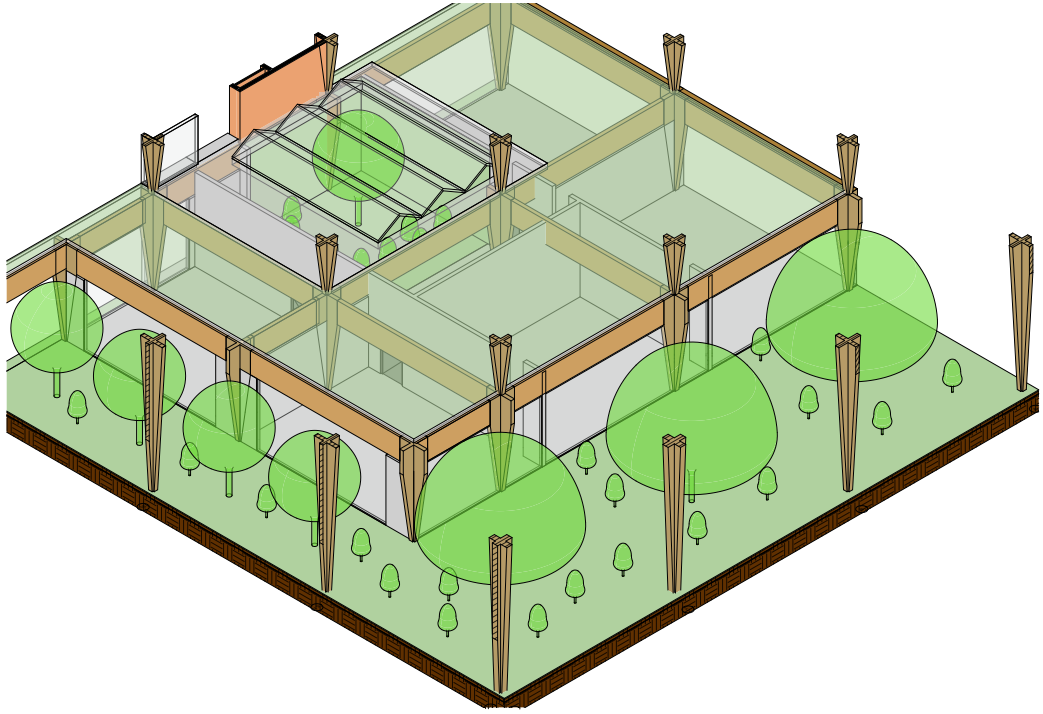


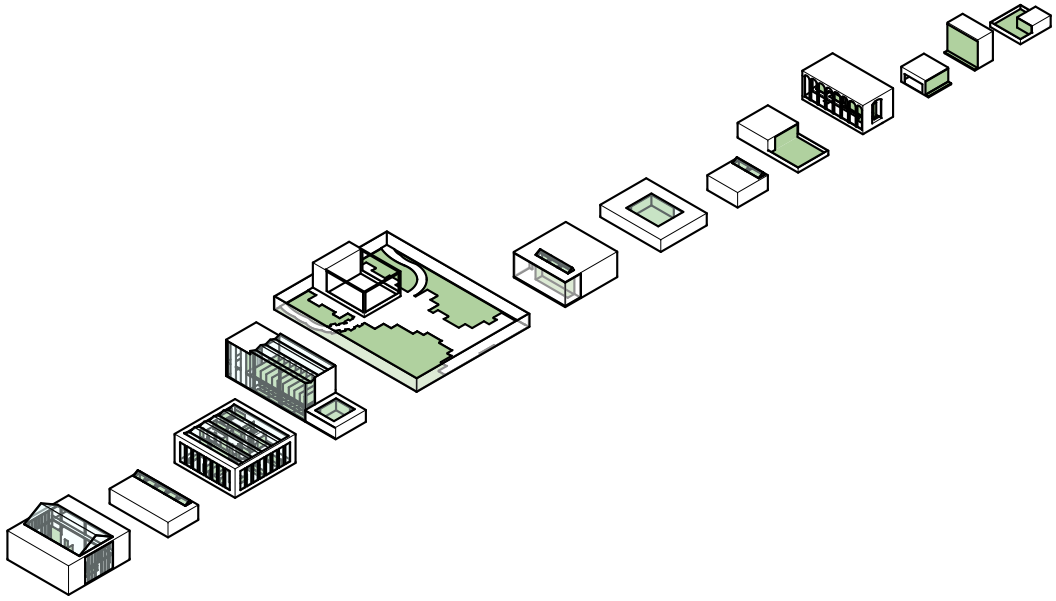


Prototype for future indoor green condensers

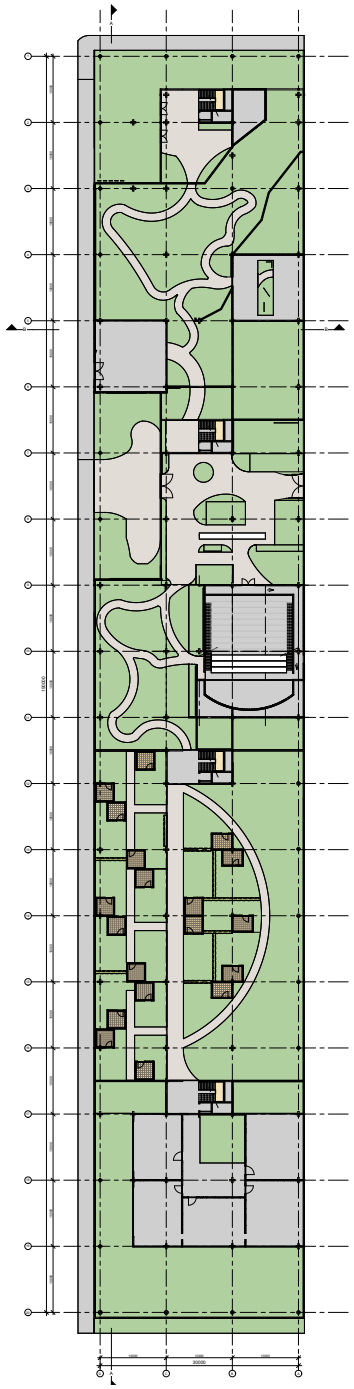


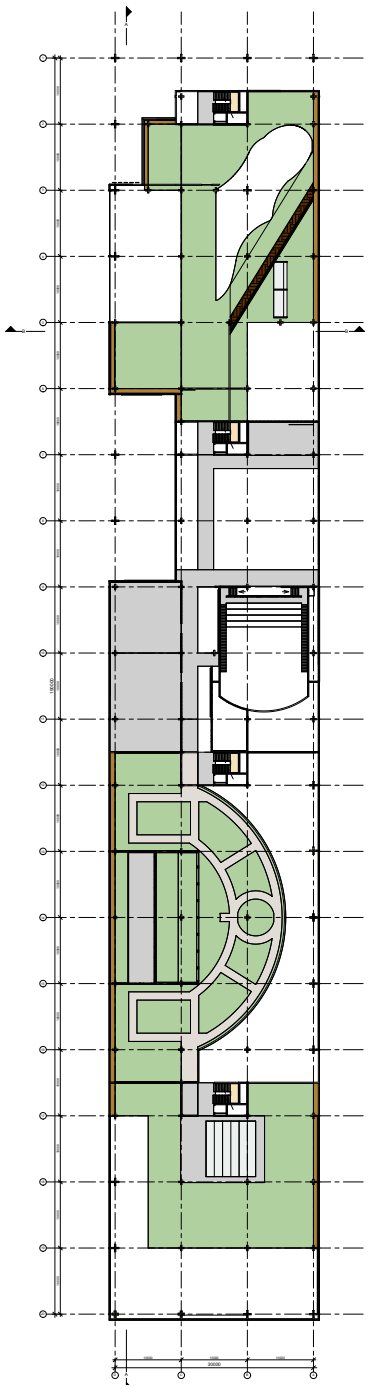


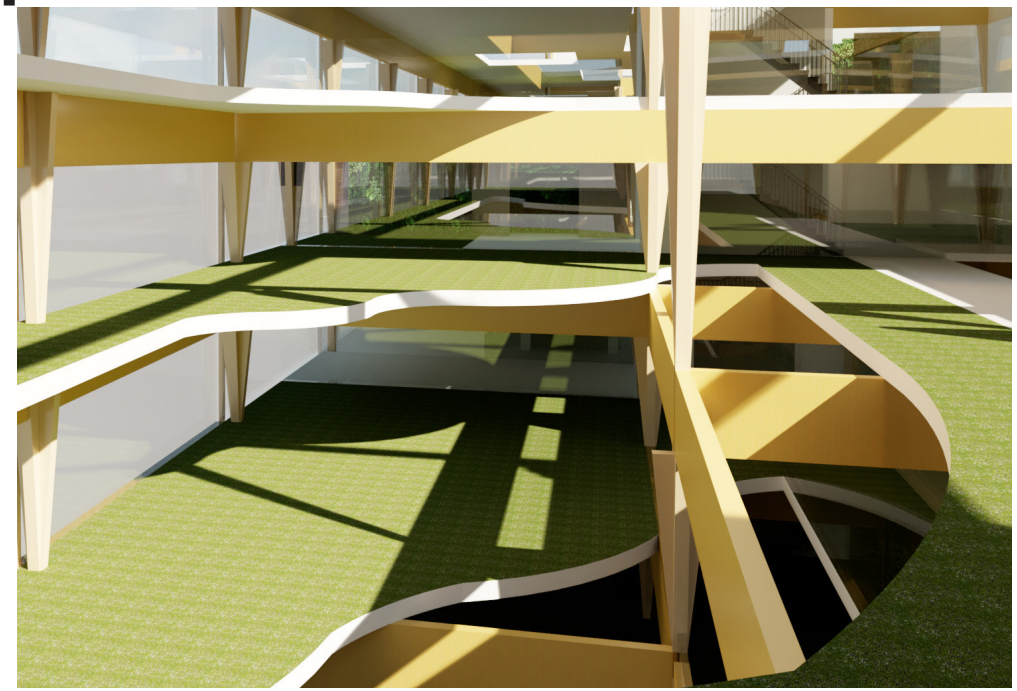


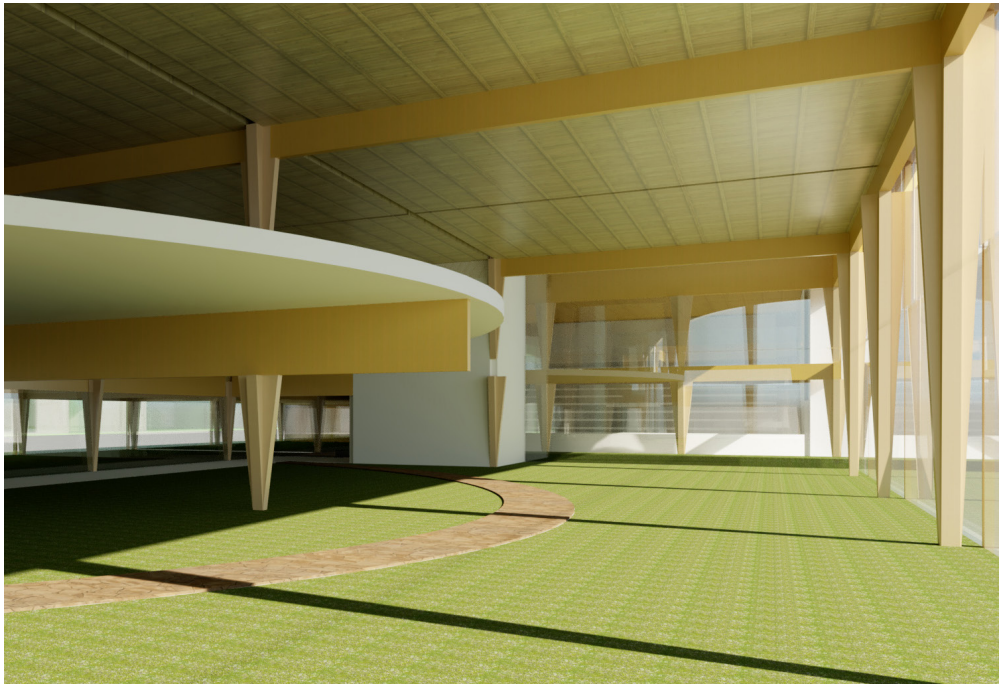


Sequences of different landscapes

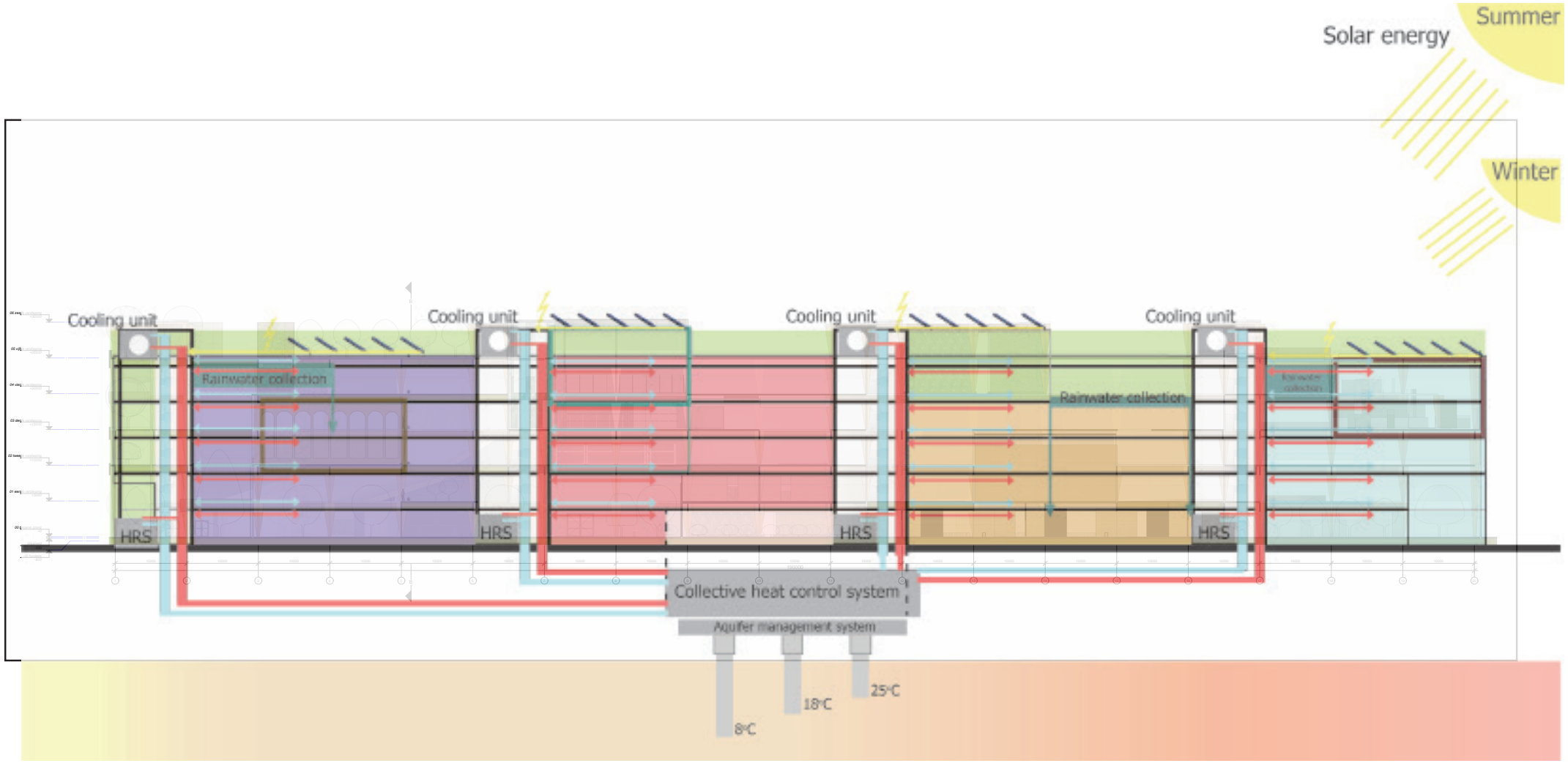




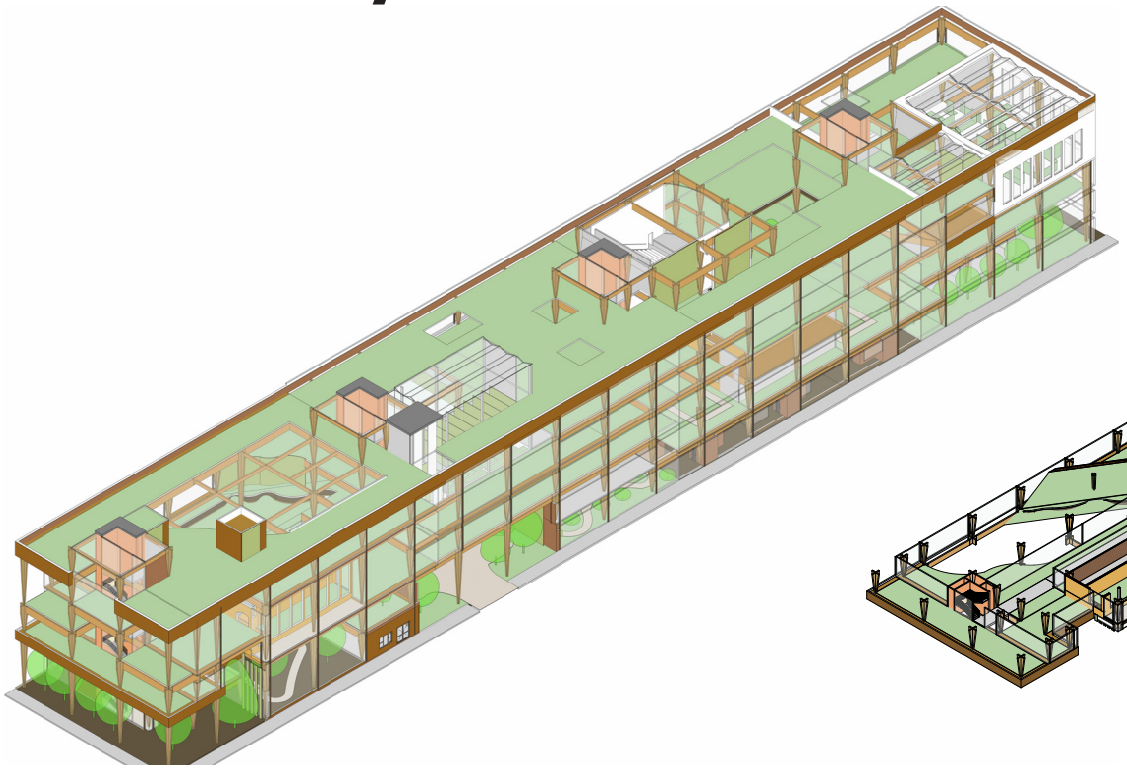


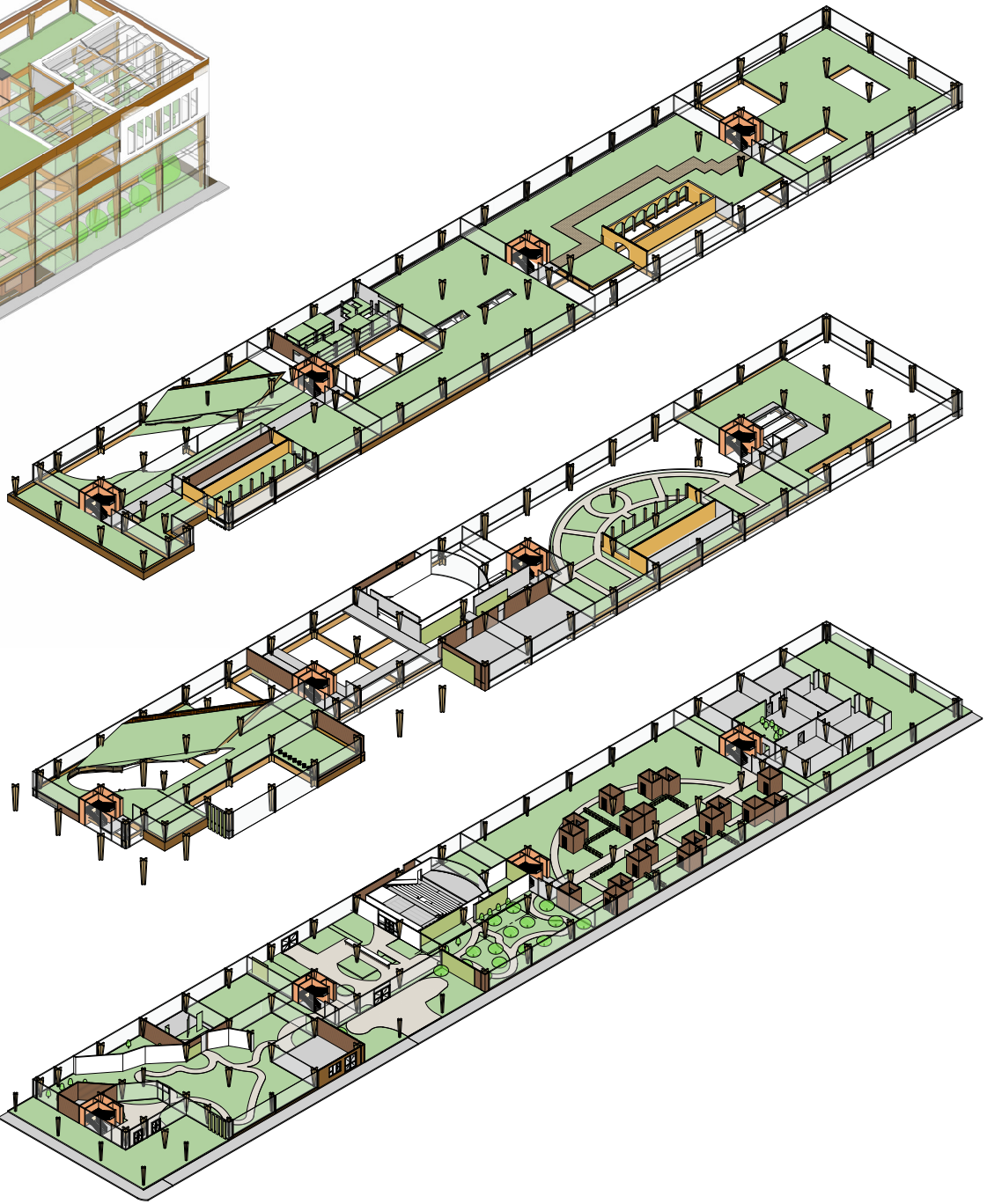


Different climates in balance



Preliminary draft overview



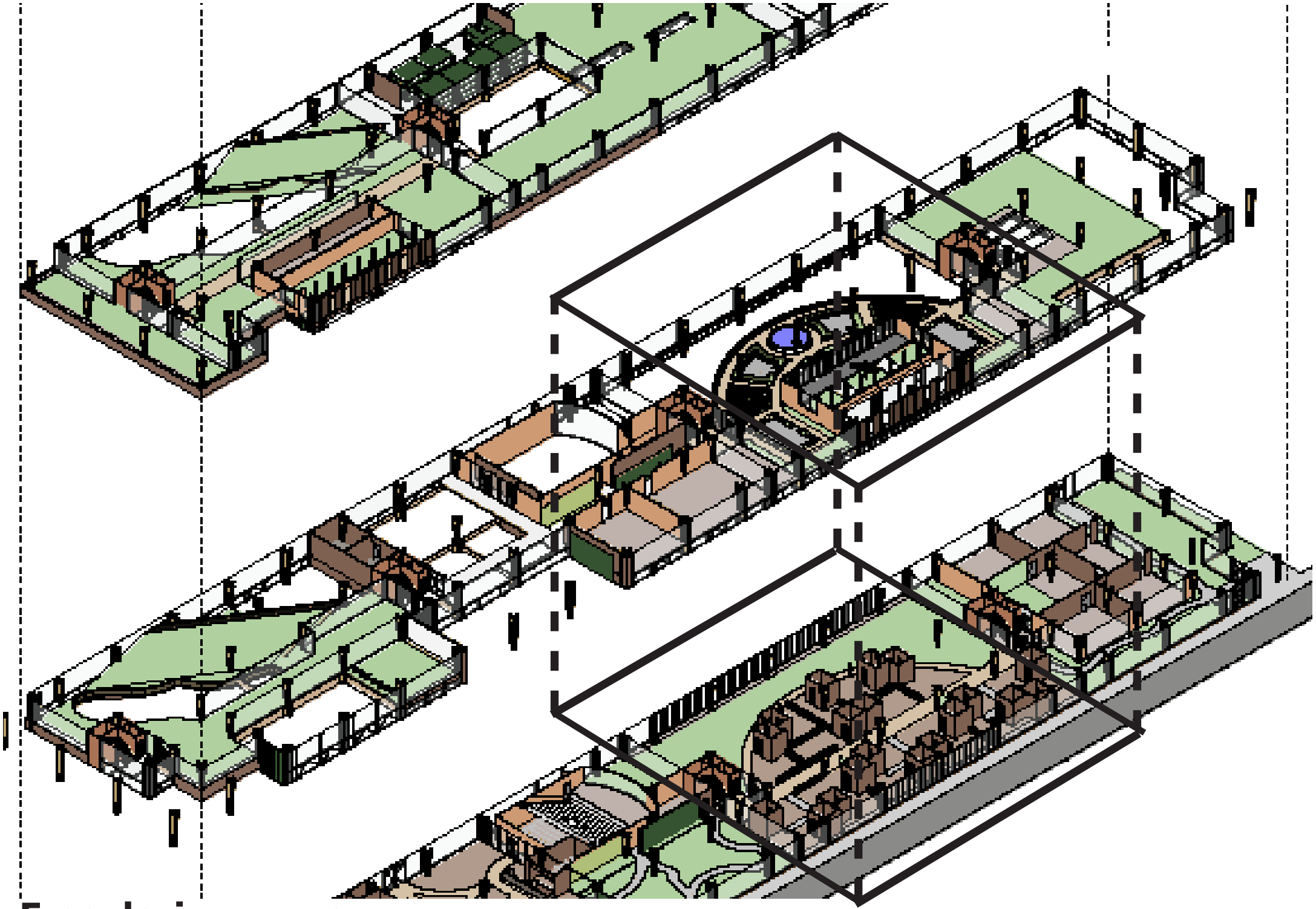


Landscape inside

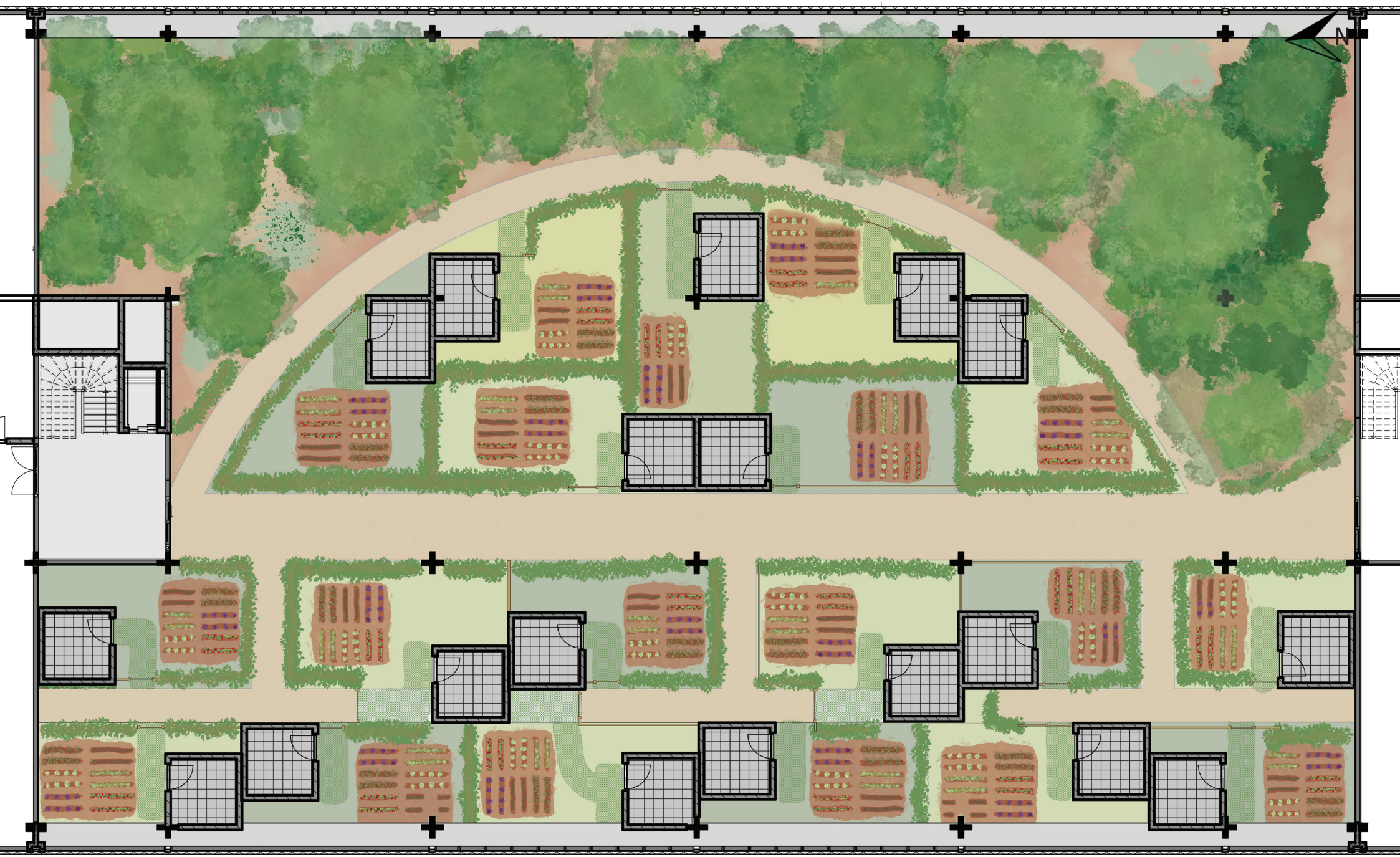
The final design

Site plan

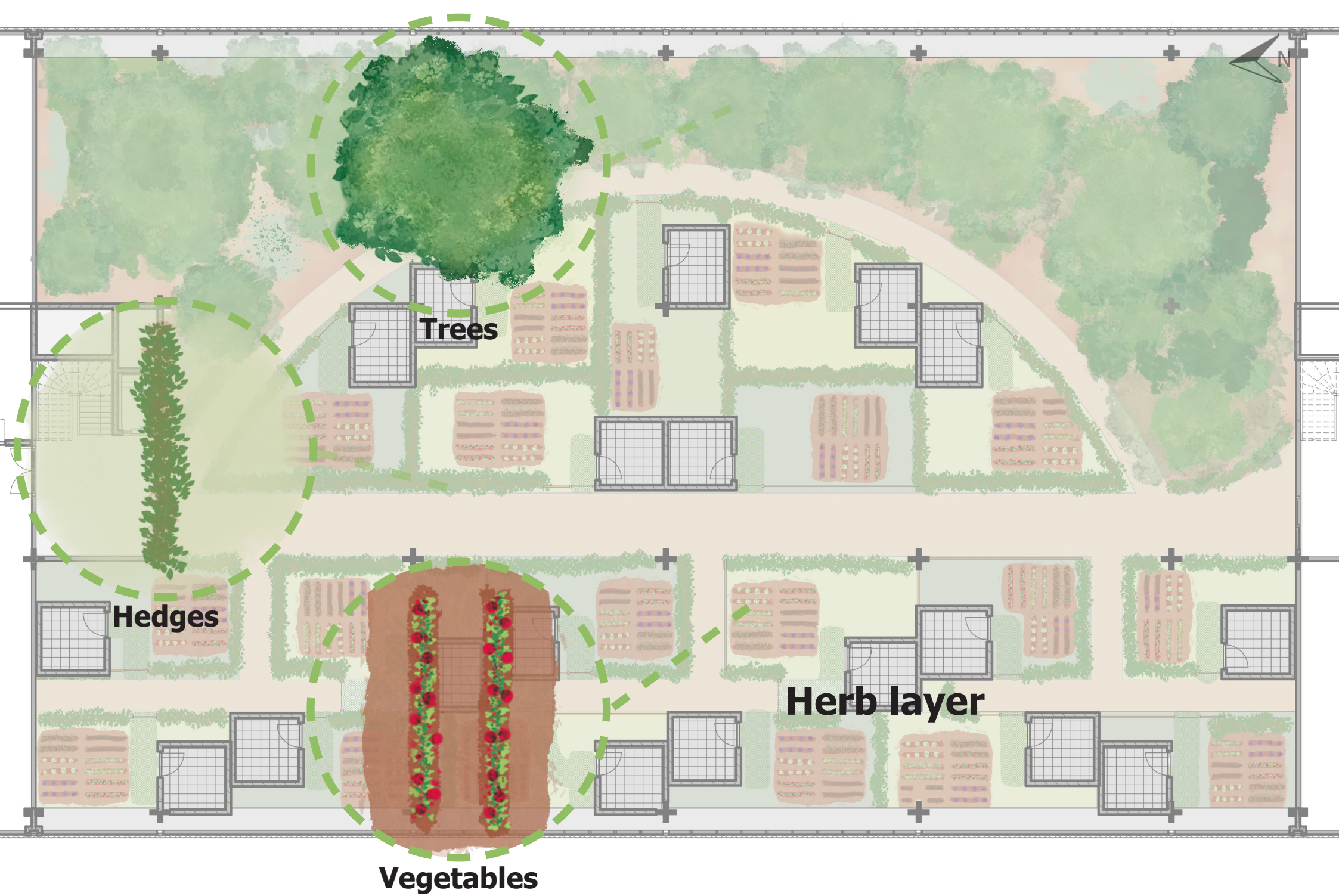
Prototype green condenser



Free design spaces



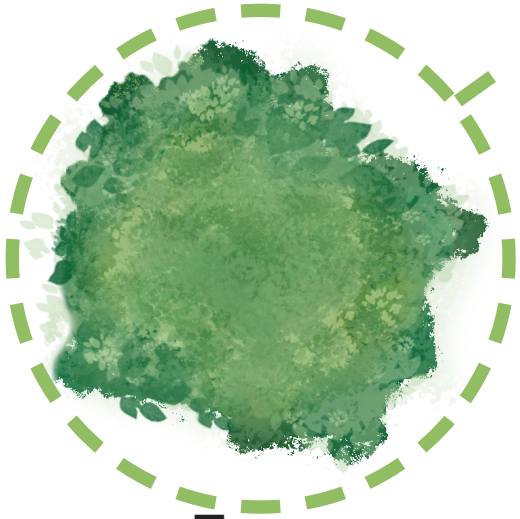
Floorplan alotments + forest



Layers

Plant selection

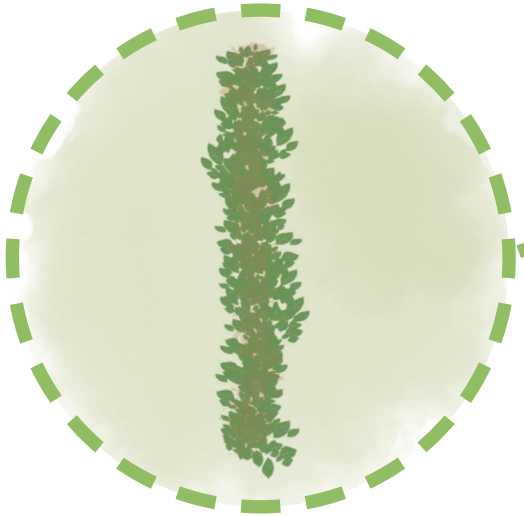
Alotment garden



Trees

Quercus ilex, Holm oak

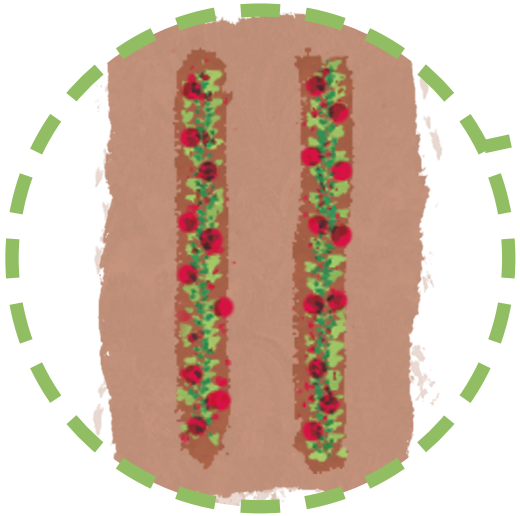
Sunlight:	Full sun/half sun (east)
Temperature:	-10-35°C
Humidity:	~55%
Height:	4,75-15m (width: 8-12m)



Hedges

Fagus Sylvatica, Beech hedge

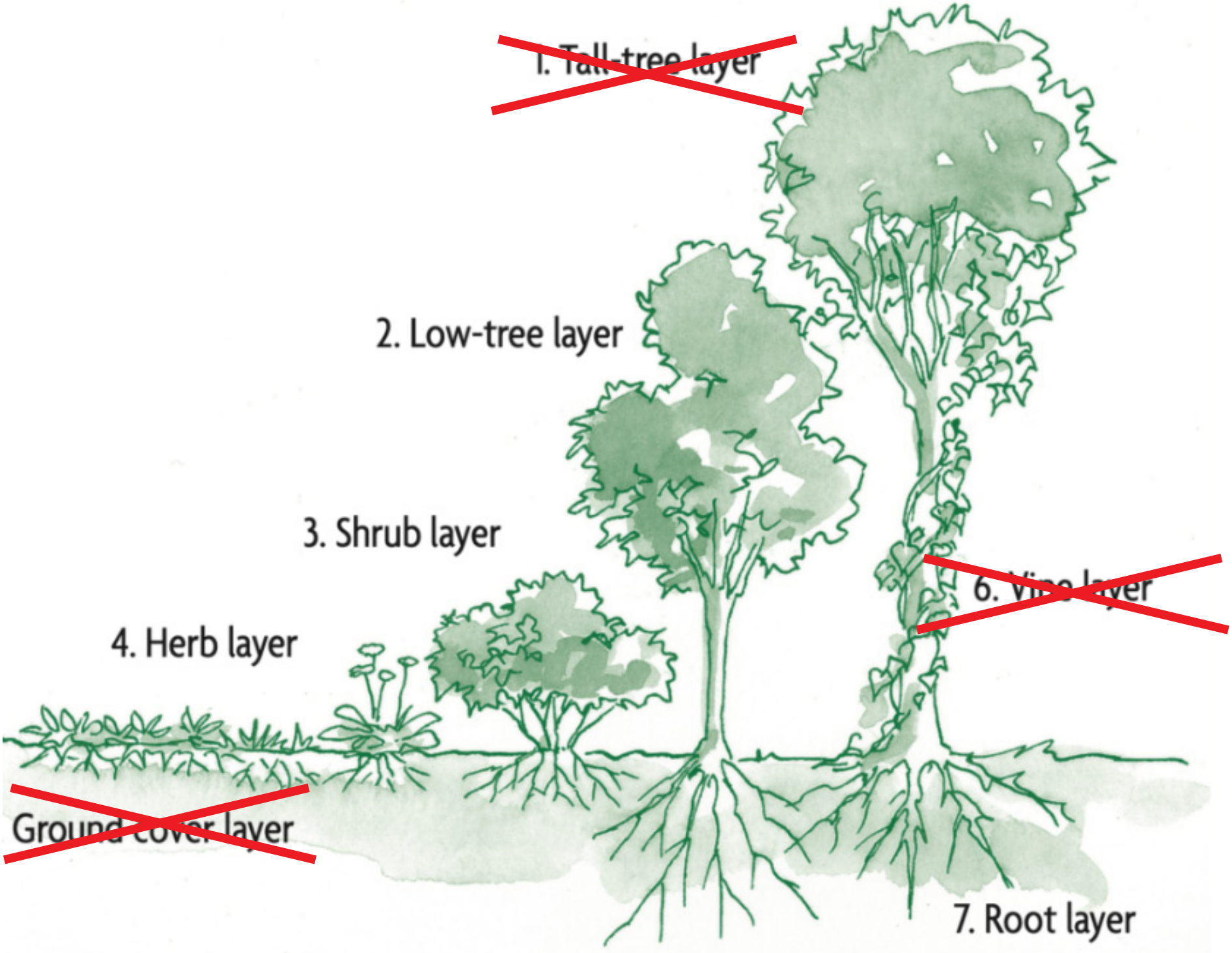
Sunlight:	Sun/half shade
Temperature:	2-24°C (non-critical)
Humidity:	~75%
Height:	0,6-1,5m



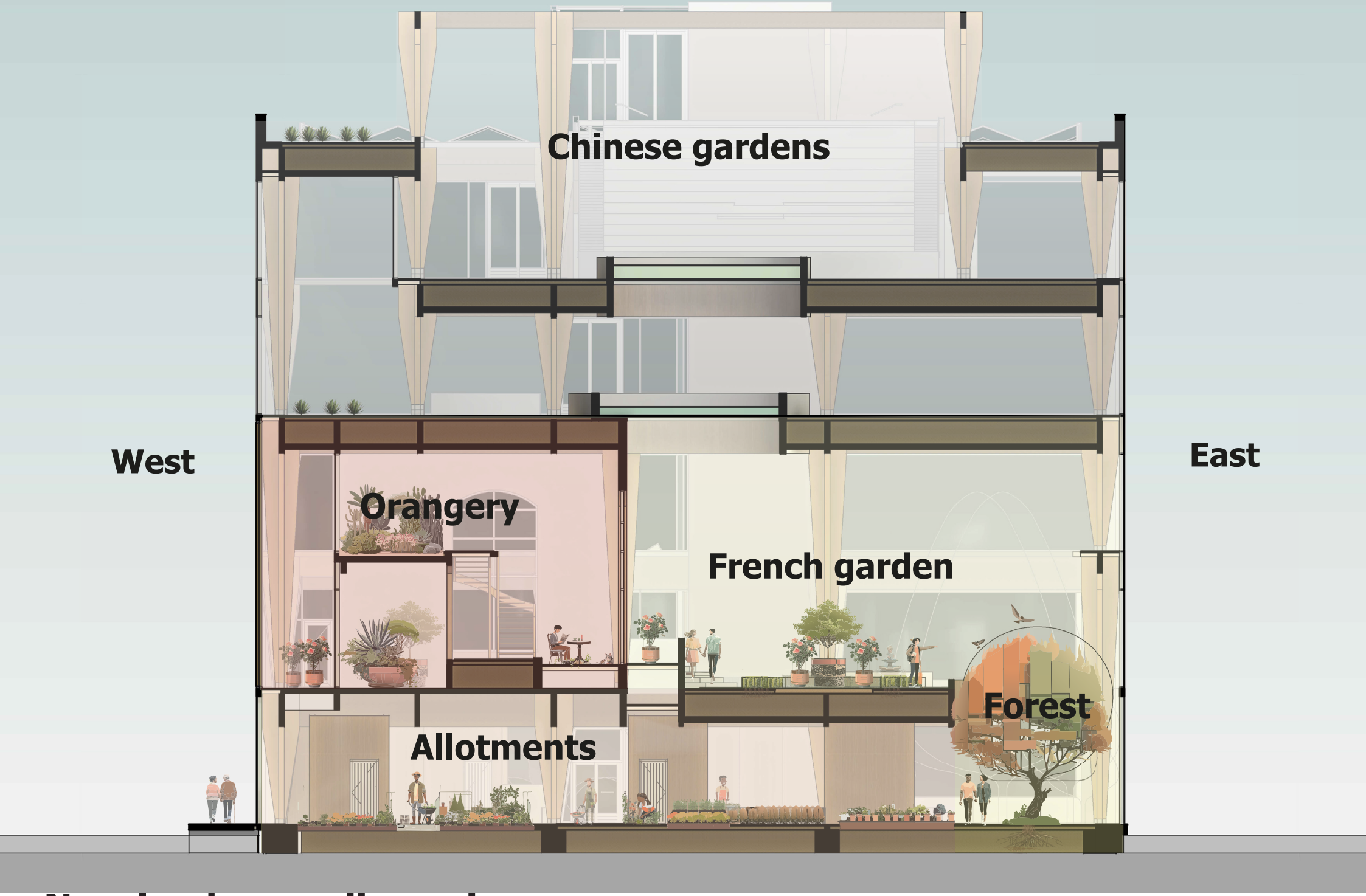
Vegetables

Solanum Lycopersicum, Tomato

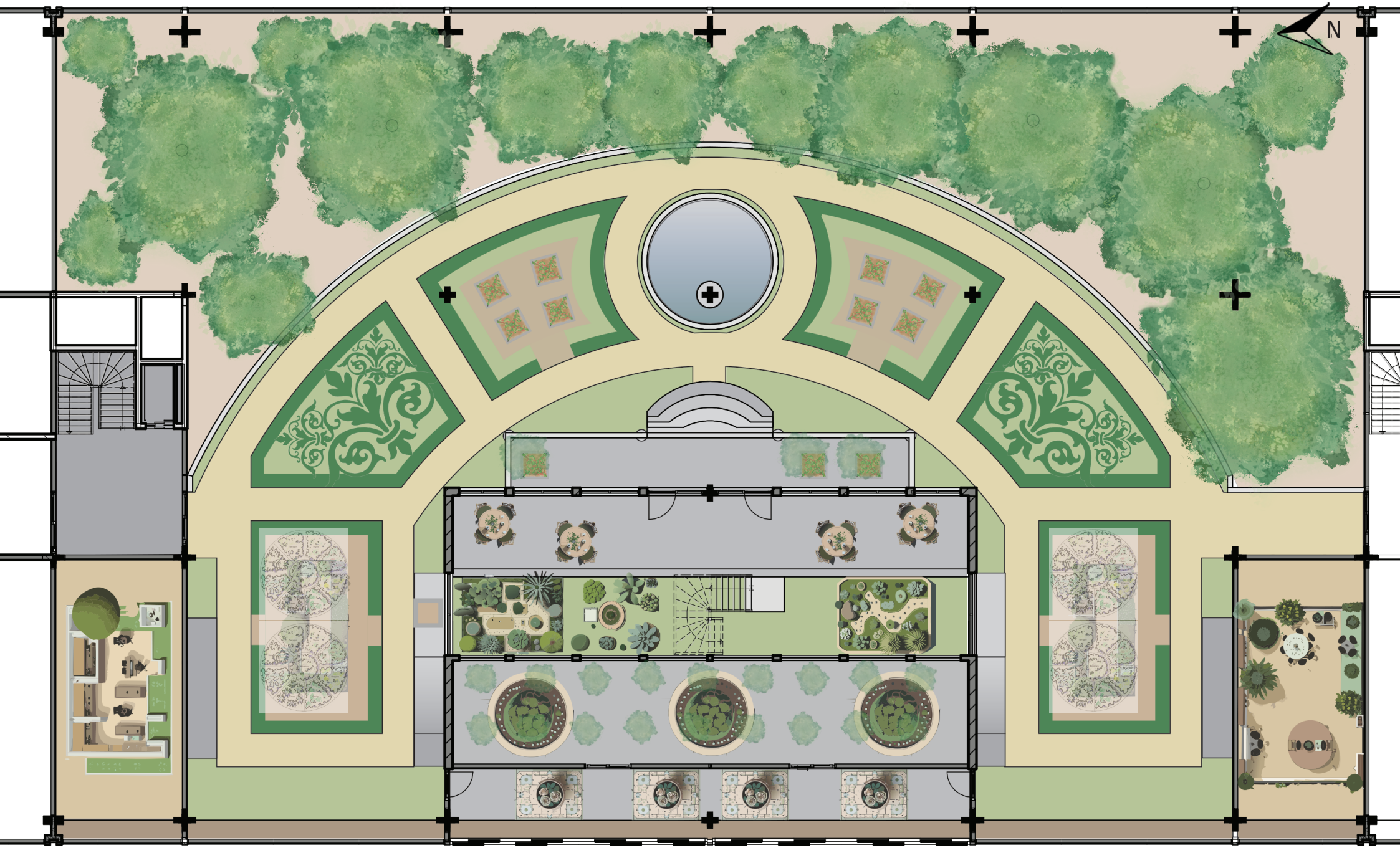
Sunlight:	Full sun
Temperature:	15-32°C (21-27°C (D), 16-18°C (N))
Humidity:	60-85% (80-85%(D), 65-75%(N))
Height:	0,2-2,0m



Landscape design principles



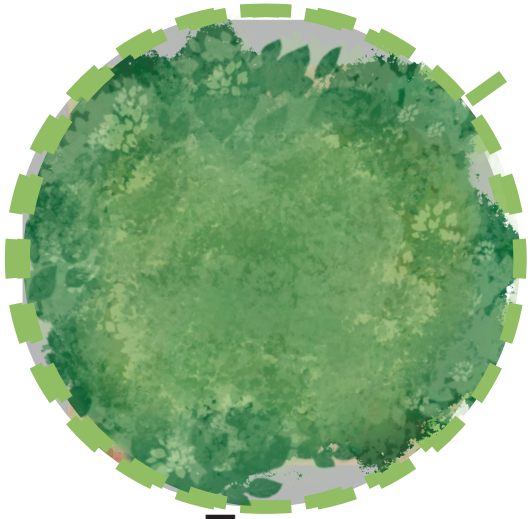
New landscape dimensions



Floorplan French garden

Plant selection

French garden



Trees

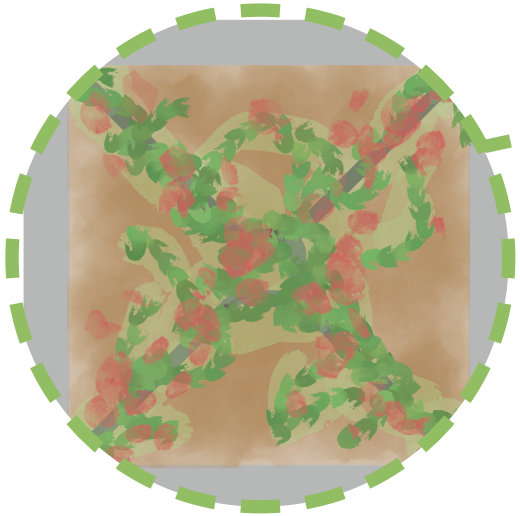
Ficus Carica, Fig tree

Sunlight:	Full sun (sheltered from wind)
Temperature:	15-22°C (min -10°C max 35°C)
Humidity:	~60% (non-critical)
Height:	1,3-3,0m

Hedges

Buxus sempervirens, Buxus hedge

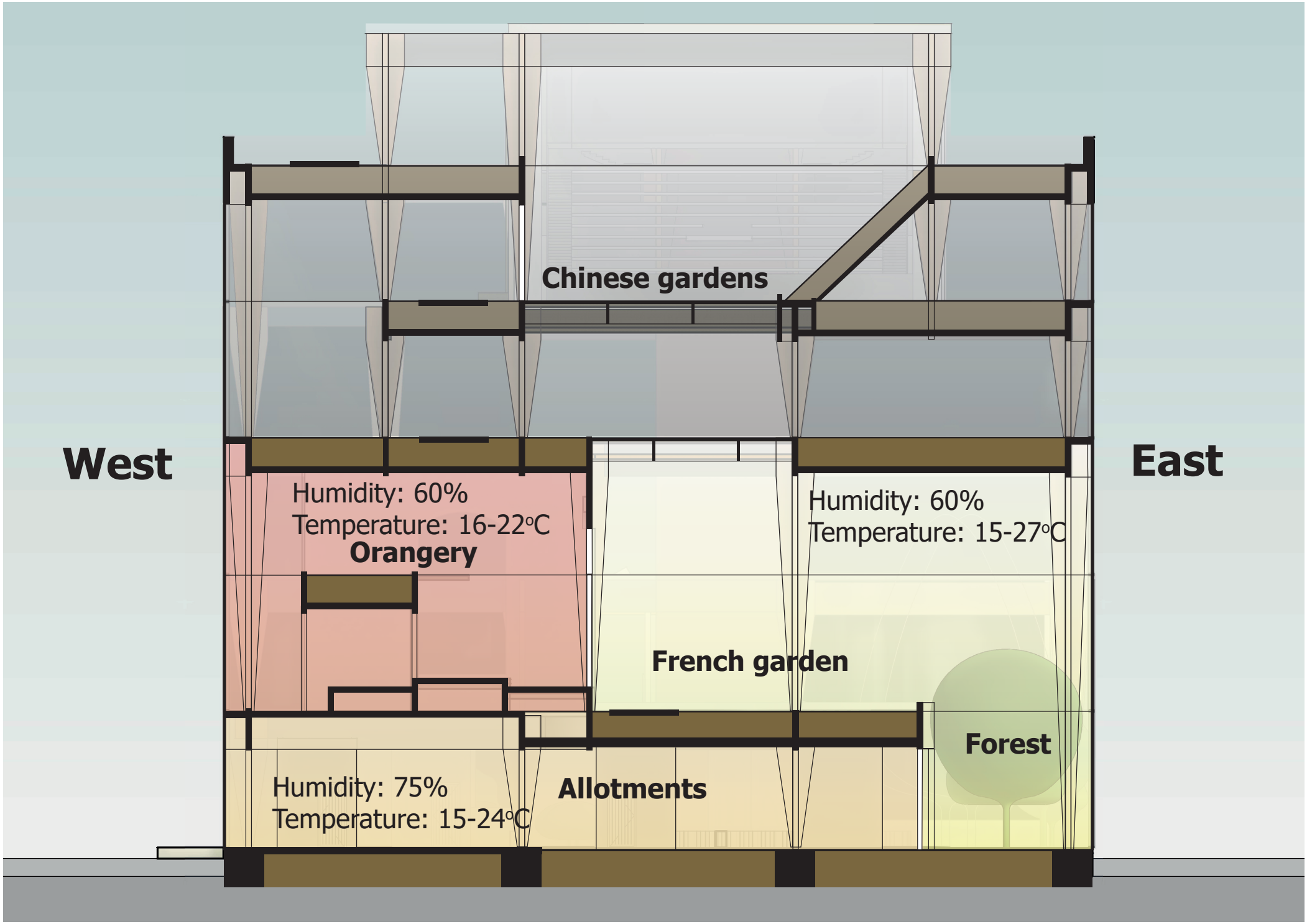
Sunlight:	Shade/half shade/Sun
Temperature:	16-27°C (min. -23°C max 35°C)
Humidity:	50%-60% (non-critical)
Height:	0,2-1,0m (as hedge)



Flowers

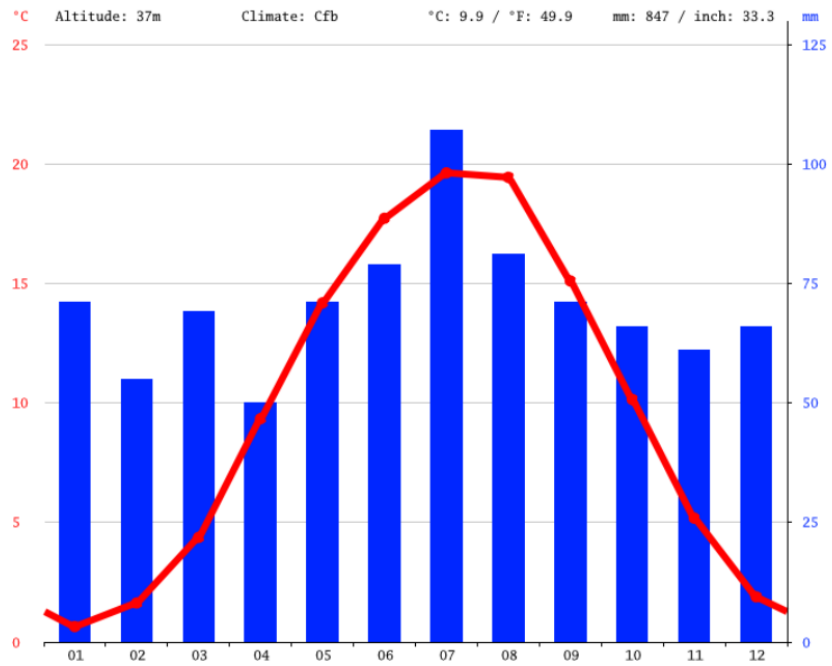
Rosa Amadeus, Climbing Roses

Sunlight:	Full sun (south-east)
Temperature:	-20-35°C
Humidity:	~60% (non-critical)
Height:	0,3-3,0m

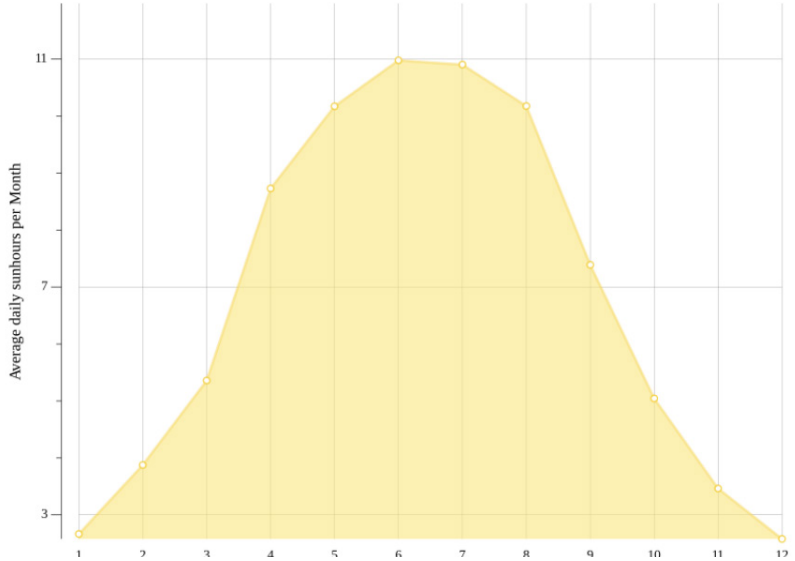


Section D - Subclimates

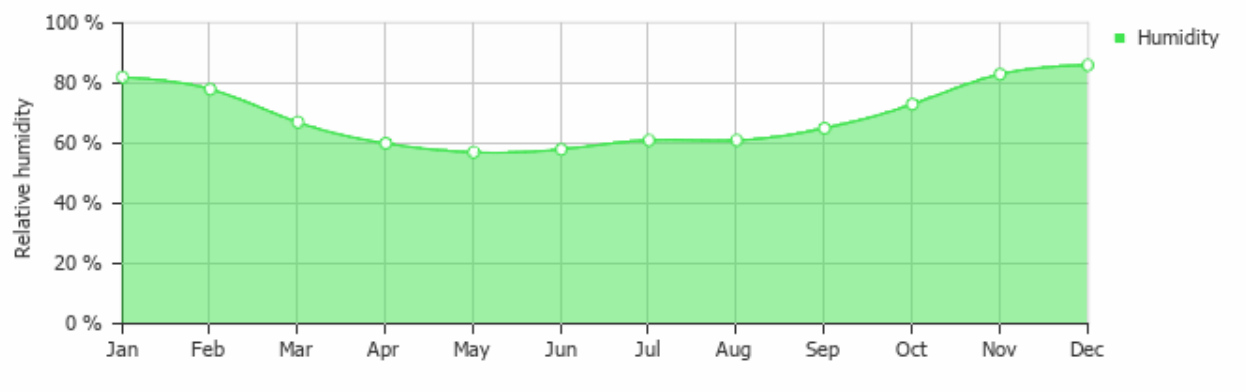
Berlin climate diagrams



Weather graph Berlin



Average daily sunhours Berlin



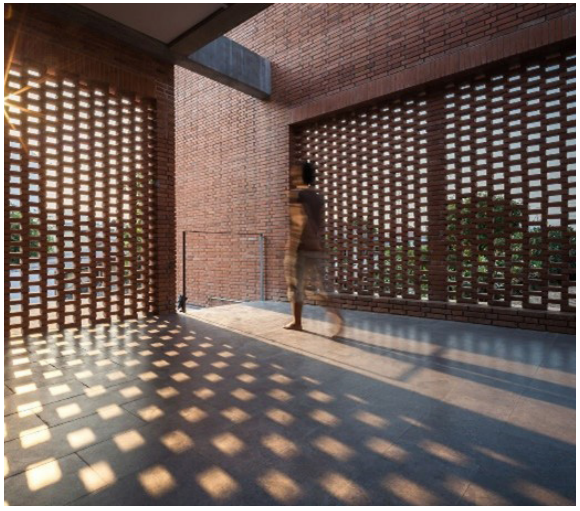
Average relative humidity Berlin

Technical solutions & products: open facade systems

Turning panels

Plant guiding cables

Shutters

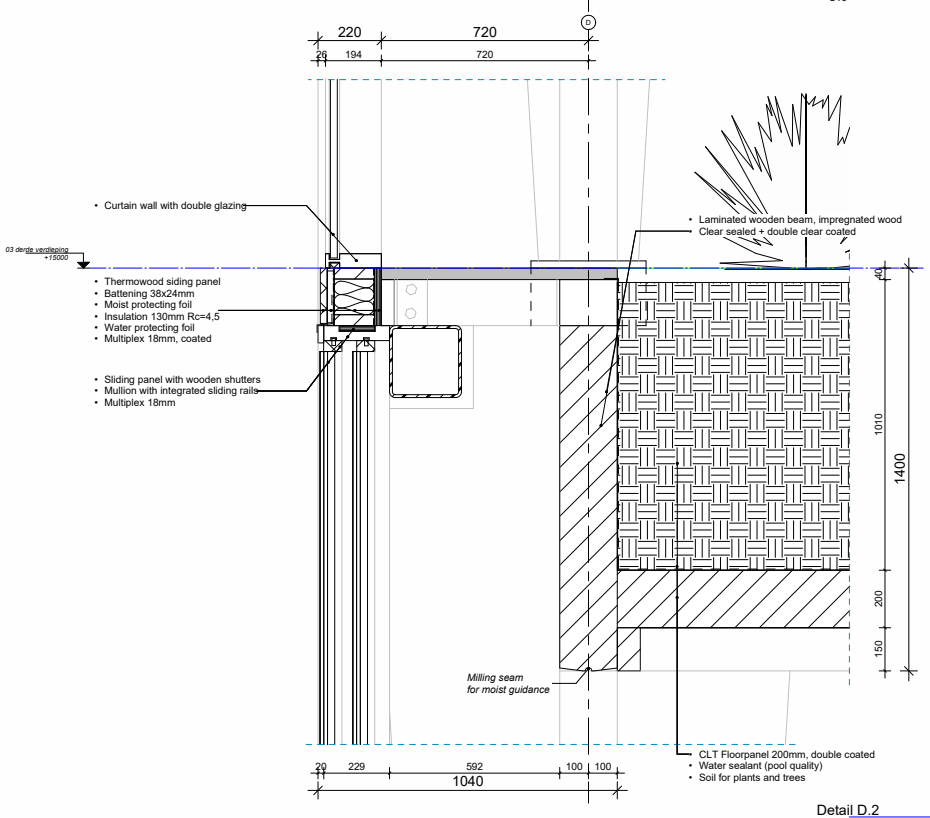


Perforated brickwork

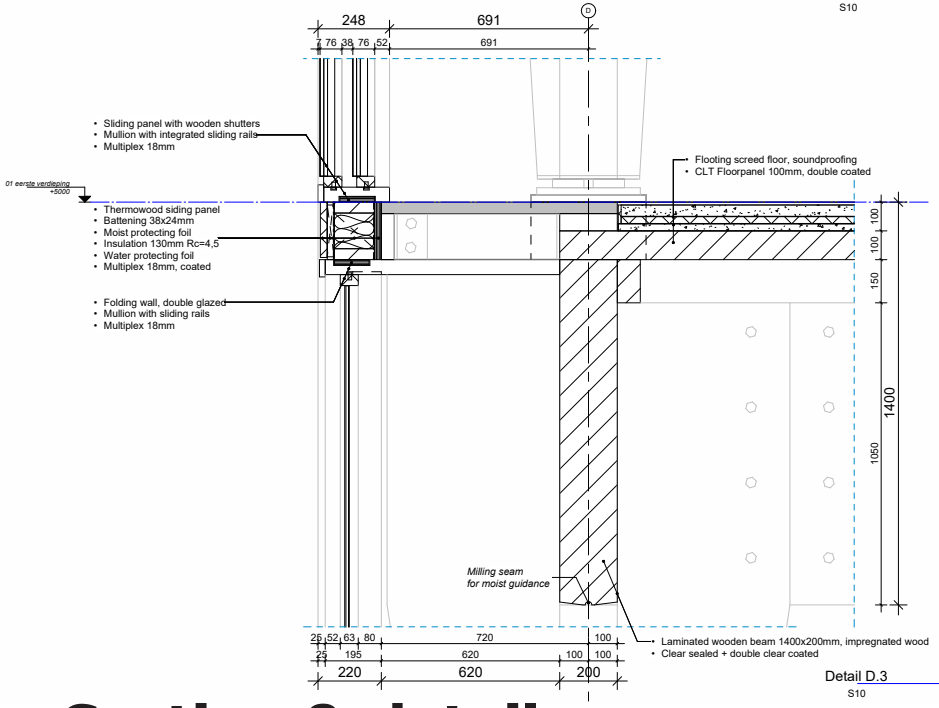
Folding walls

(Glass) sliding panels

Facade & section



Detail D.2
S10



Detail D.3
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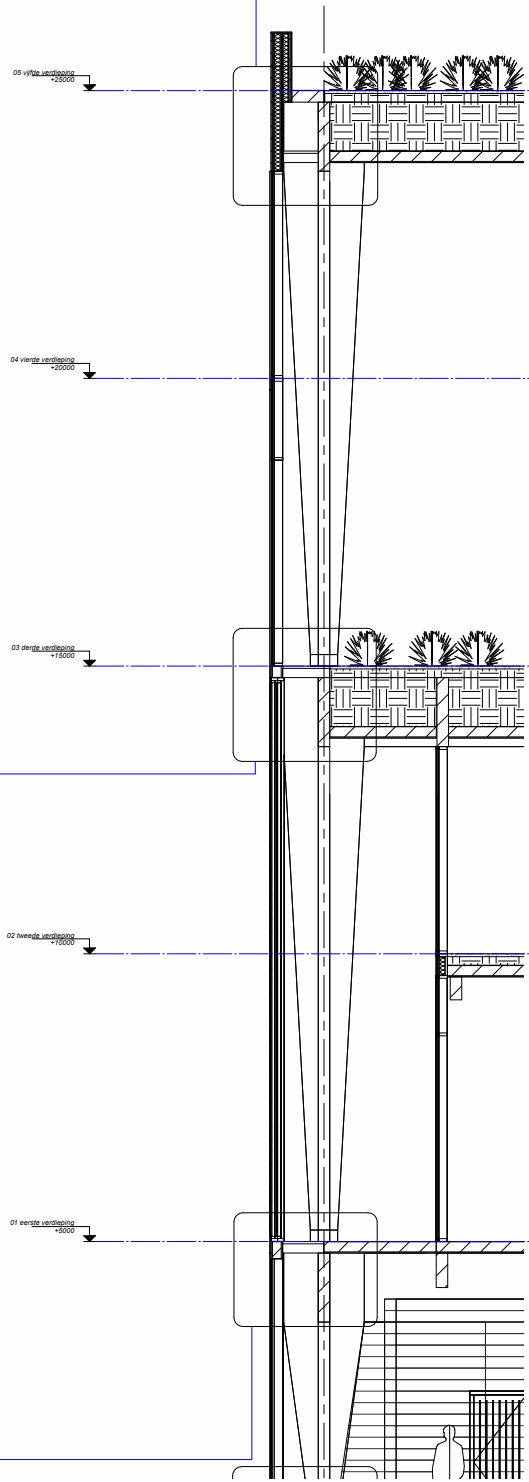
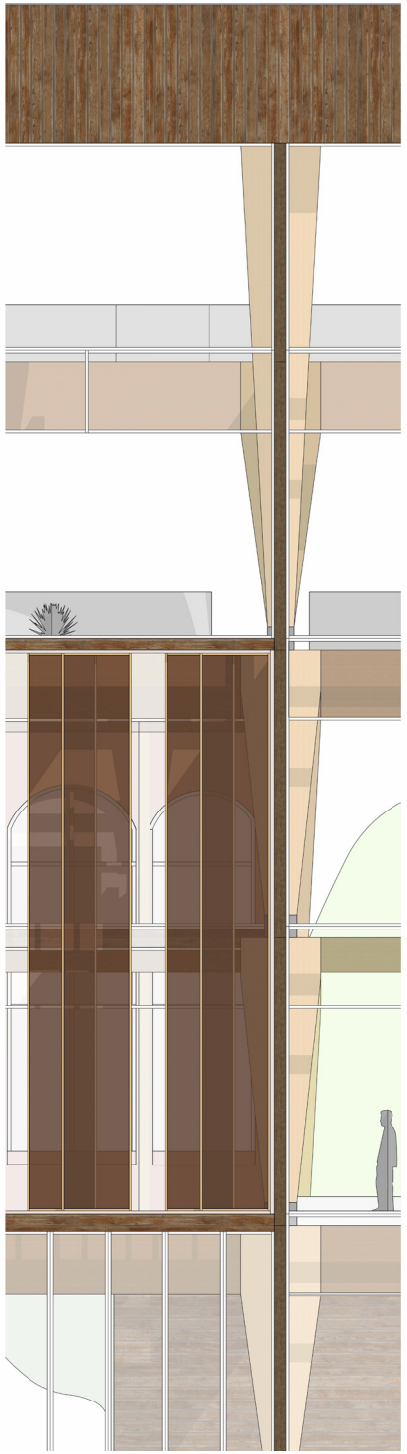
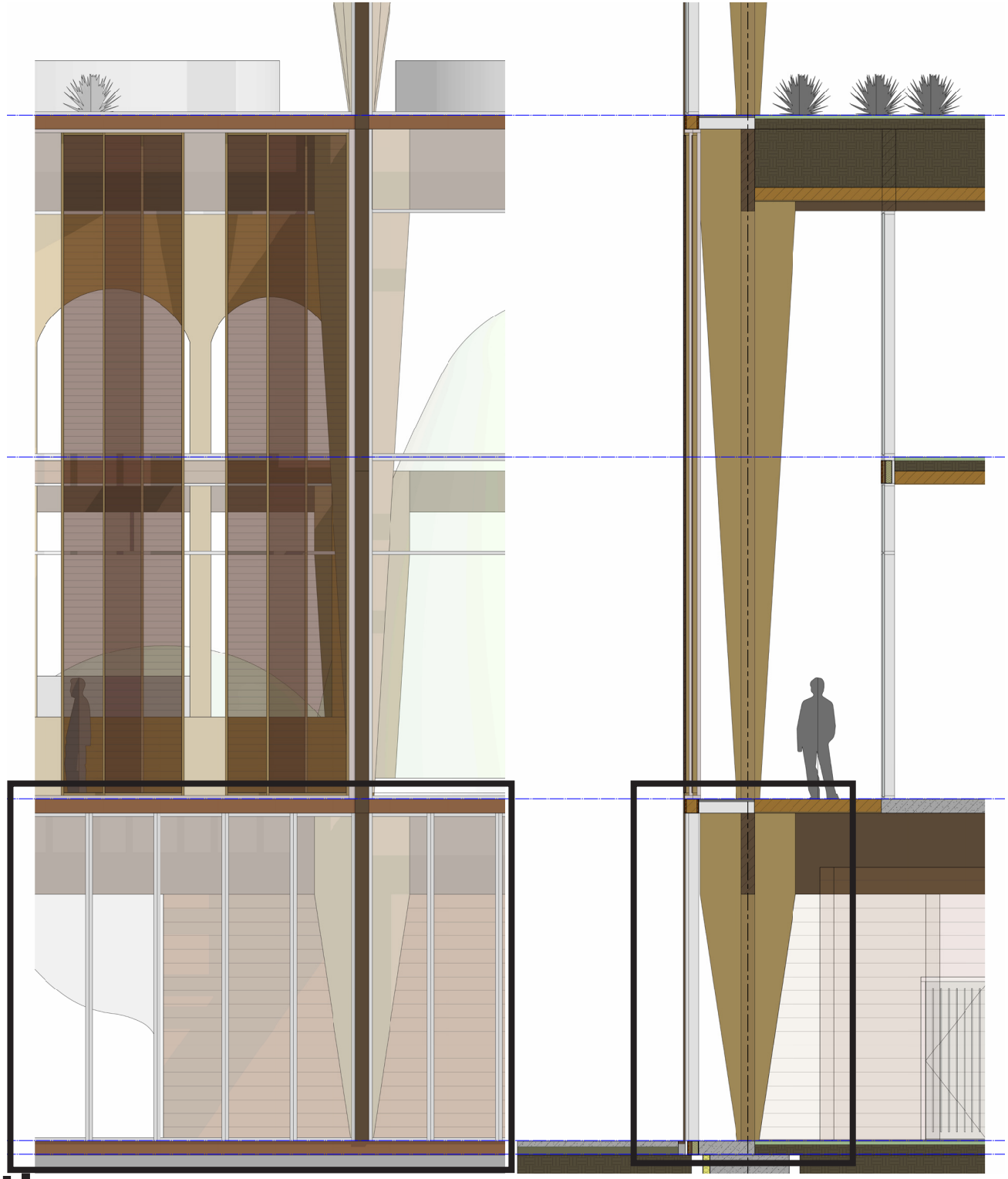
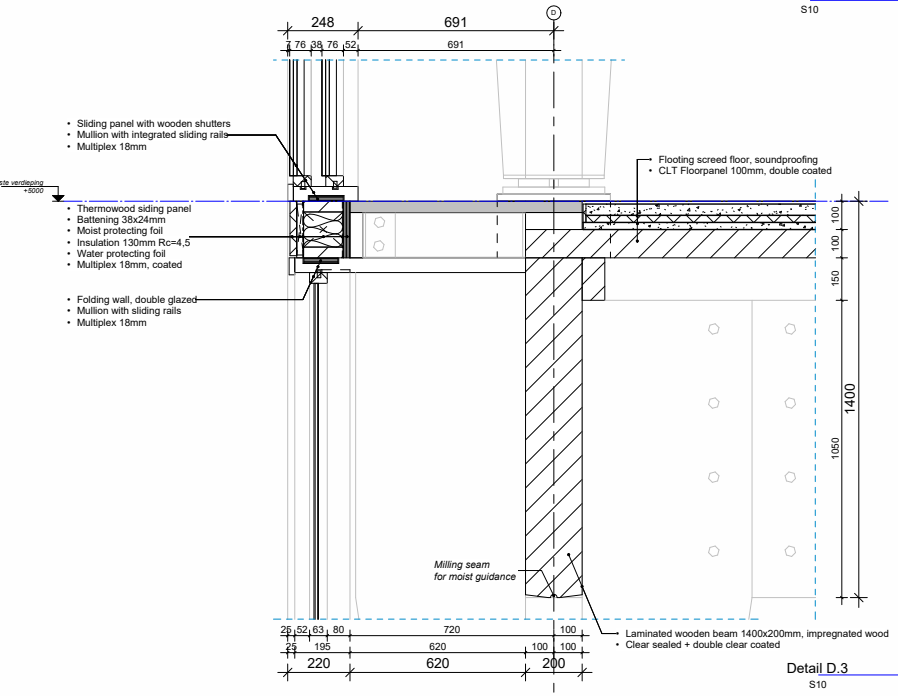




Section & details



Facade & section



Detail D.3
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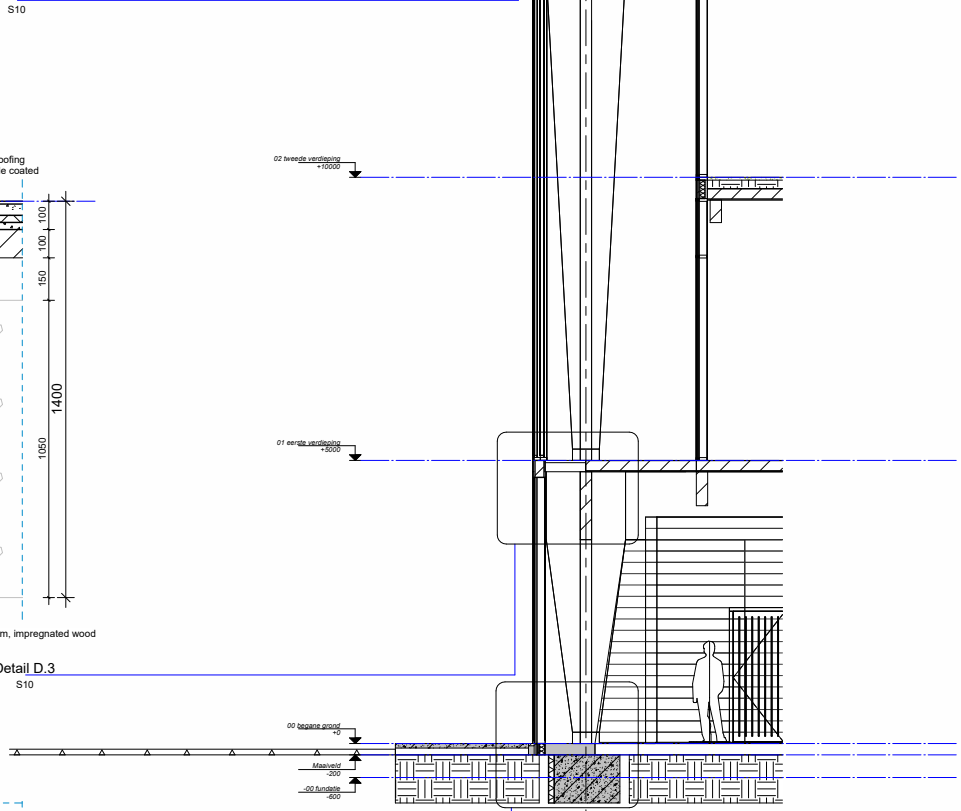
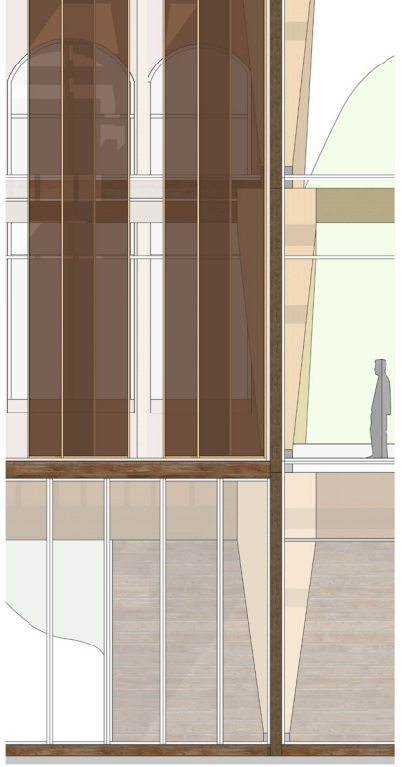
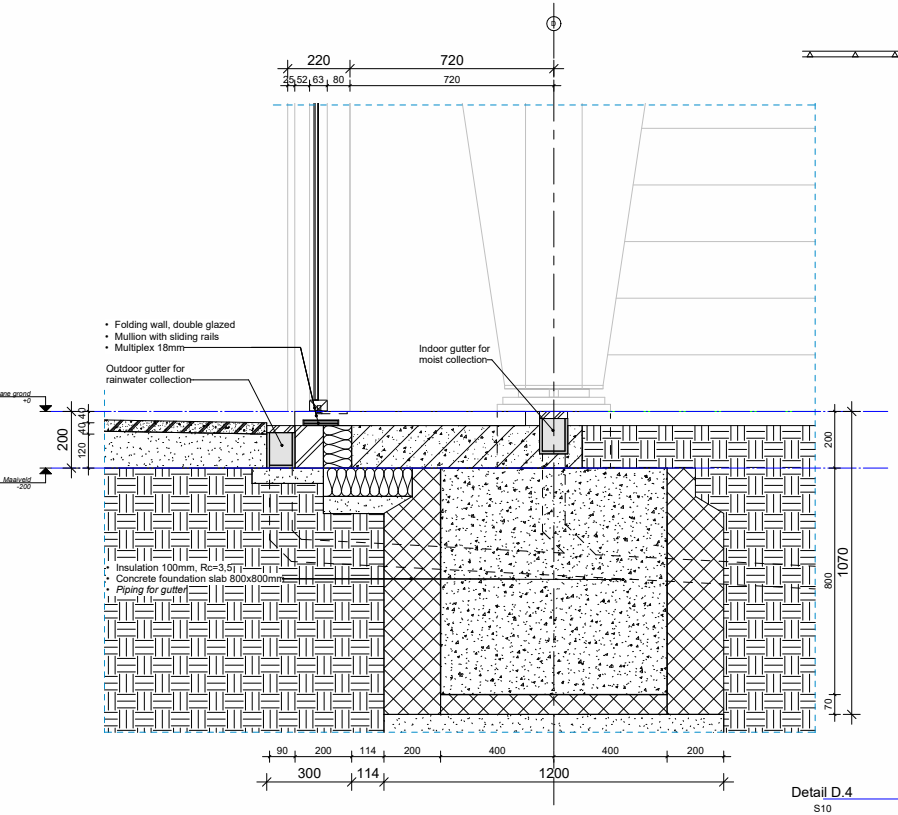
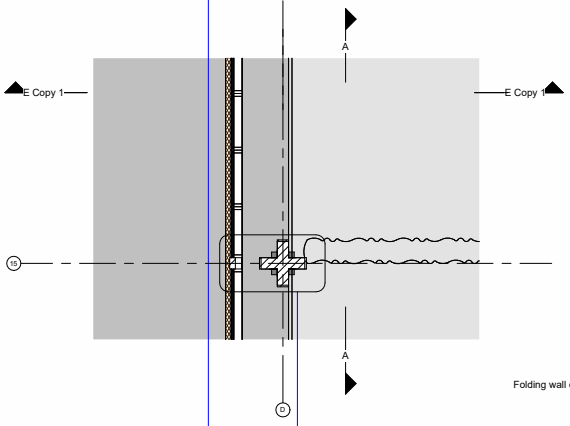
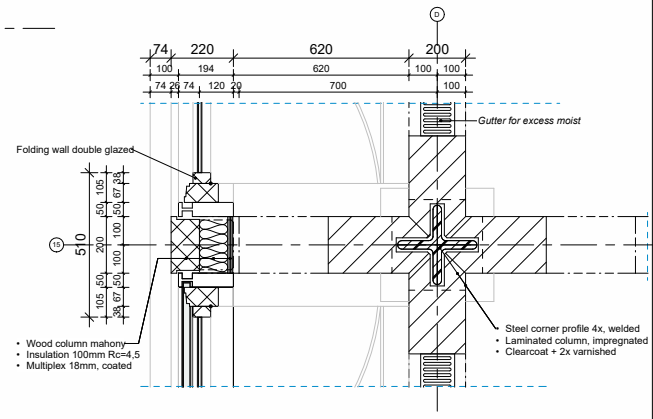






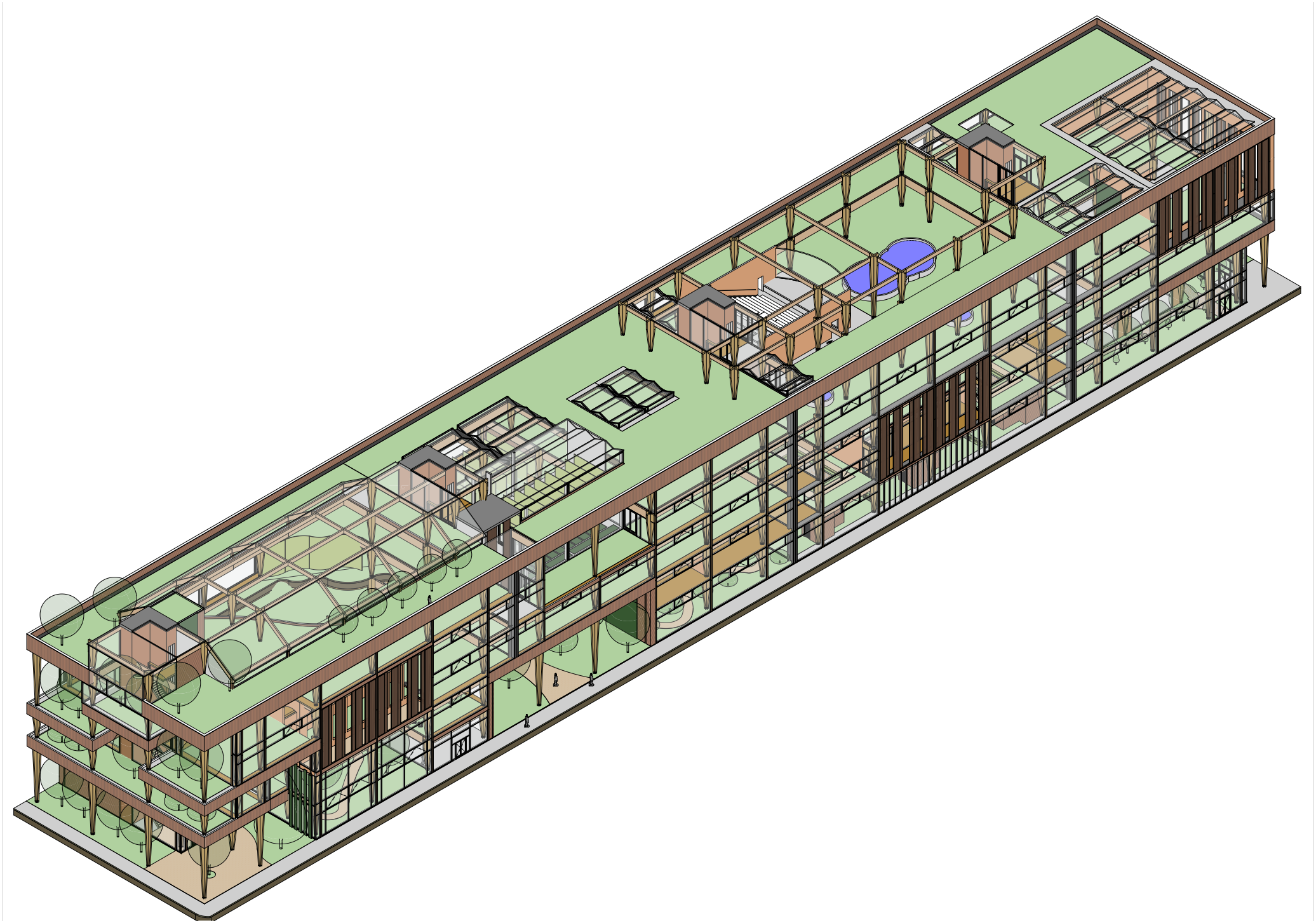
Detail D.4
S10





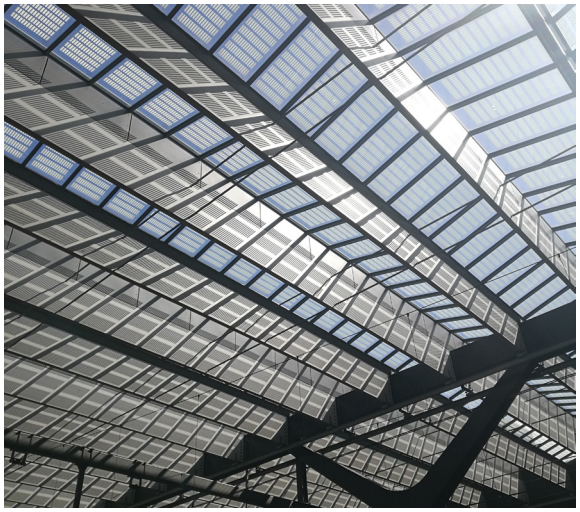
1_10 - Detail D.5
S10

Sections & details

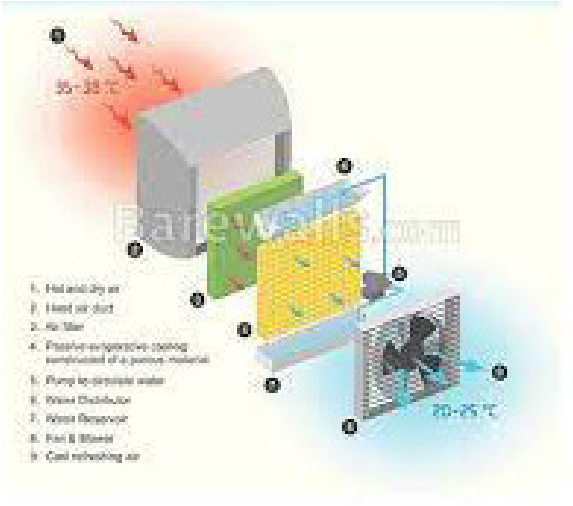


Total overview

Technical solutions & products: climate systems

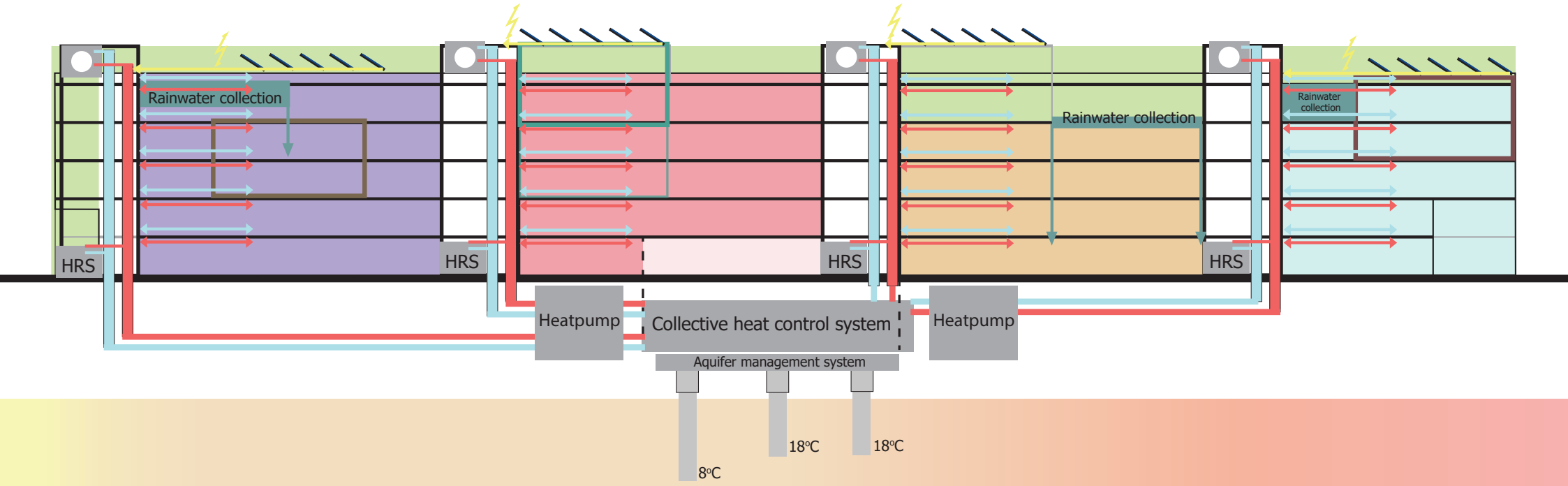


Integrated solar panels

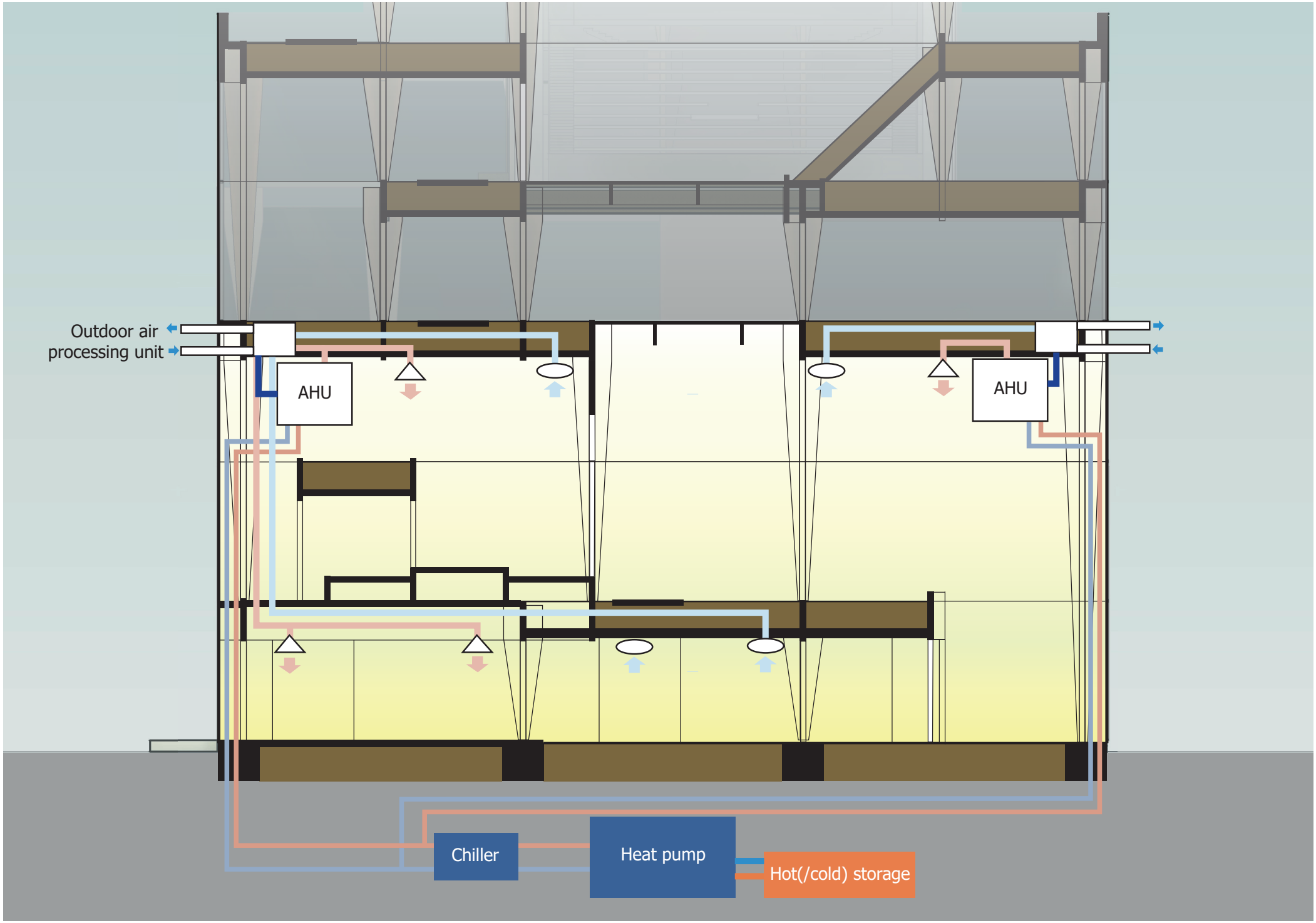


Evaporative cooling

Misting airconditioning

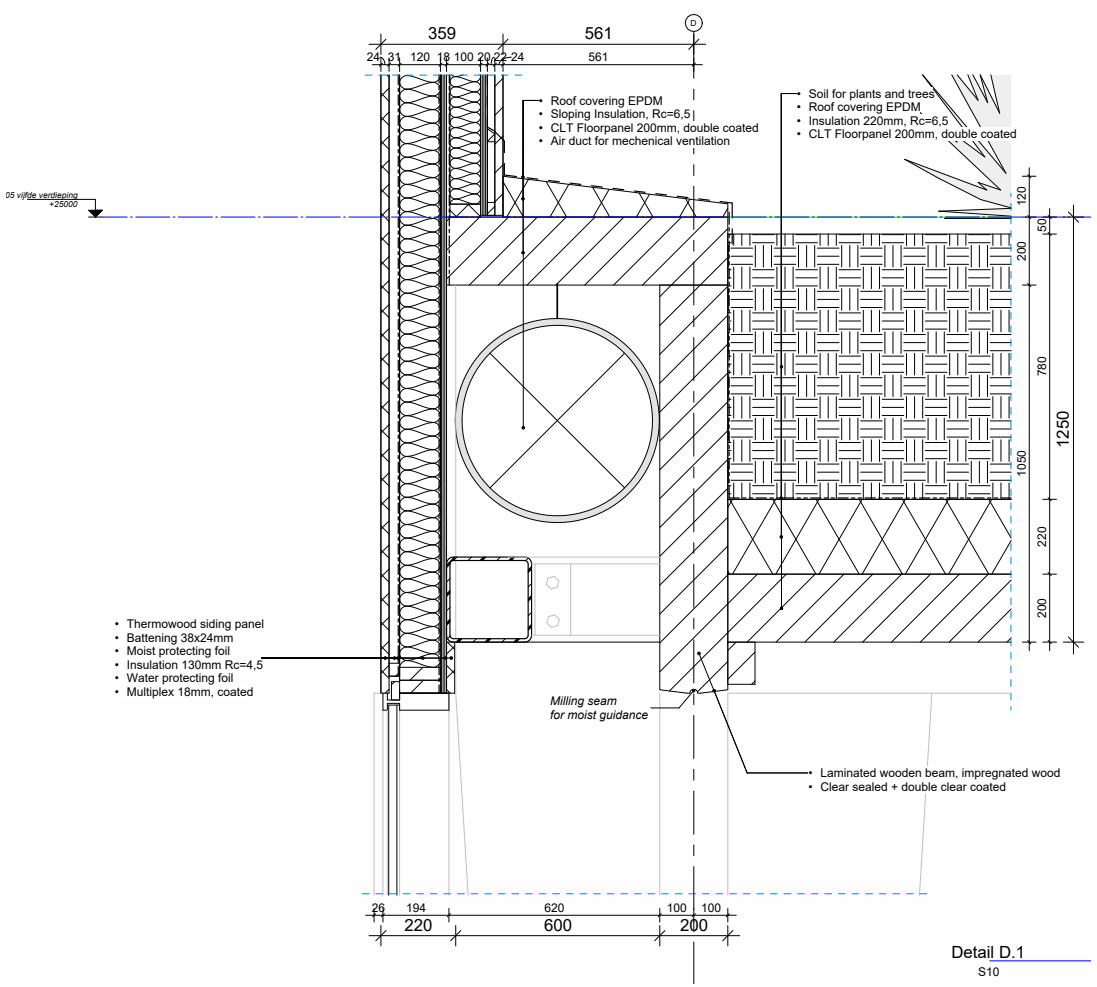


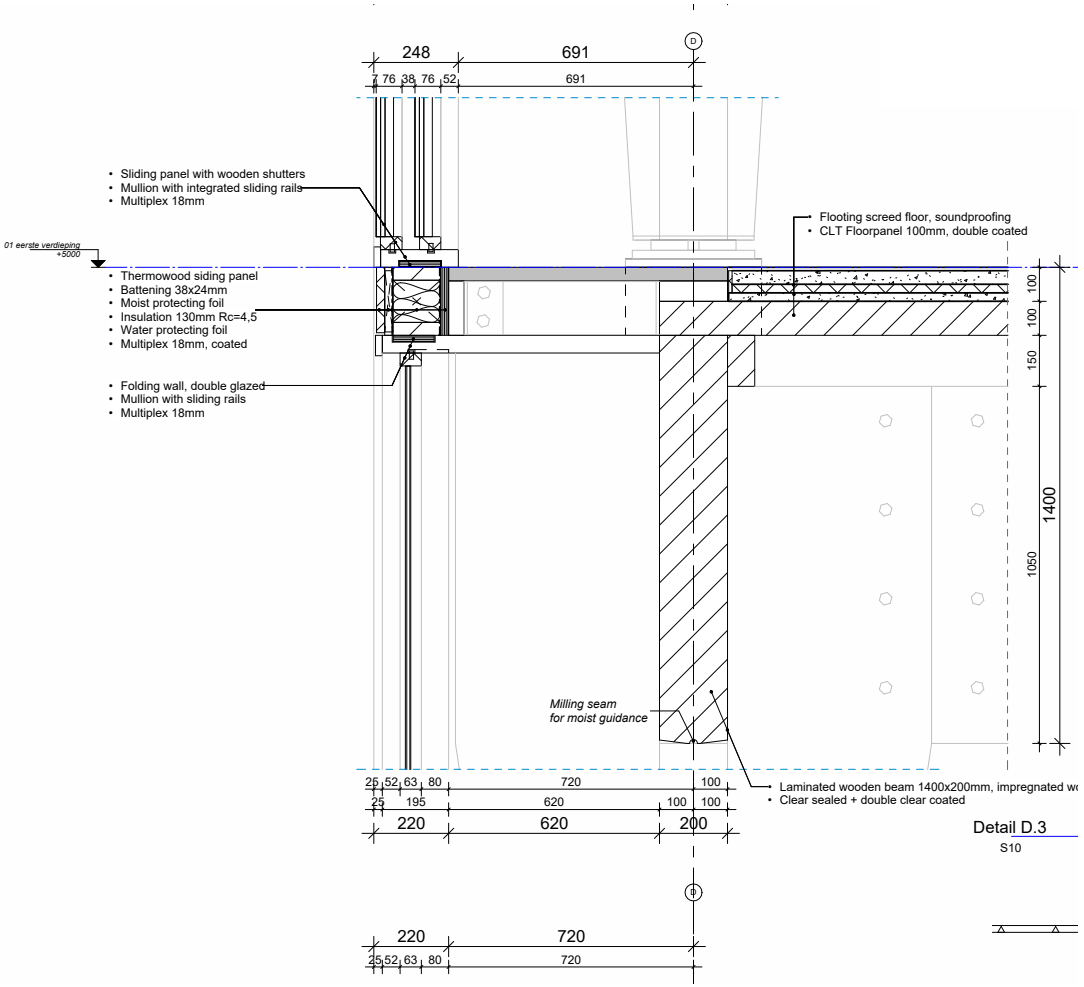
Section A - Climate diagram



Climate systems diagram

Technical Details





Main entrance

Landscape Inside

Reflection (pt. 1)

The objective of the Public Building studio was to design a public condenser for the district of Friedrichshain in Berlin, Germany. This neighbourhood is a gentrifying and densifying part of the city and more and more land use is repurposed for building houses. Without intervention, there would be a lack of places where people can come together. These effects are already noticeable. The problem of densification was translated into the project specific goal of designing a Public Green Condenser.

The investigation of the neighbourhood brought up that there was a lack of public and accessible green in the neighbourhood. This is a problem because people like to engage in the green and an important part of community life is taking place in public greenspaces like parks and communal gardens. The research of an allotment garden in New York showed that, despite arguments about how to maintain the gardens and hedges, this communal garden contributed to intercultural interaction and thereby social cohesion in the neighbourhood. This reasoning could be applied to the Green Condenser in Berlin.

My personal experience is that houseplants and gardening are getting more and more popular. In my own social environment people engage through this hobby and like to trade leeks and share information. Because plants are universally appreciated and give a common base for conversation, urban green can lead to more social cohesion.

By going on an excursion and doing interviews with local people, it came forward that communal gardens in other parts of the city were closing or going to be closed in the near future. This lead to the need for a permanent place to engage in the green. To design a building for this specific purpose, meant that a way to enhance the urban green experience had to be found through research by design. This process involved trying out different scenarios and combining different ways of integrating green into a building. This way the project formed an experiment with indoor green. A new step in green architecture is made, which links this project to the architecture track.

The following paragraphs give a step-by-step insight into the conducted research-by design process. In between those steps there will be an intervention, because of the delays during the process. After the last step there will be a look ahead into the future for the development of the prototype and the impact on indoor green innovation.

Step 1: finding a good, suitable location

The district for the project was already defined, but not the specific location and neighbourhood in Friedrichshain. Different sites were considered, as the project is meant to connect people and there must be enough space for the indoor and outdoor gardens. After the excursion the objective changed and so did the appropriate sites. The goal changed from turning empty land to a communal/ allotment garden into making a prototype for a green condenser.

The site needed to be a place that is generic for post-war neighbourhoods in (cities like) Berlin. Other important criteria were: central location in neighbourhood, site near local facilities, a place you could call a 'Kiez', good accessibility and a natural flow of people going through. Eventually after considering these parameters, a park Andreasstraβe in Andreasviertel became the designated location.

Andreasviertel is a post war East-Berlin neighbourhood that has undergone major renovations over the last decades. As part of the investigation of this neighbourhood, the numbers were cracked and the lacking amount of greenspace was calculated to be about 65.000m^2.

I talked to people in similar streets as this location and they seemed quite concerned about the lack of housing and what rising prices do for the cohesion in the neighbourhood. The cohesion is something a public building and specifically an indoor green condenser could be an answer to.

Step 2: how to include green in a building?

Because of the research by design approach of the public building studio, the research and design phases fluently alternated throughout the project. In the first instance the concept was to make a roof over a neighbourhood garden. By doing so, the public green would become accessible all year round and less space would be needed. Thereby a permanent location for a communal garden resolves moving between temporary locations. It could have a fixed board group for decision making and maintenance of the gardens. The building would also house different gardening related and social functions like an auditorium, theatre and public service offices.

Further research into user participation brought up the point that every function has a different relation with the indoor green. This was investigated further by determining the indoor green typologies. The result was a catalogue of indoor green typologies.

Reflection (pt. 2)

The research influenced the design very directly and became part of the design process. The catalogue was implemented in the building by combining it with the functions of the building program through a list of parameters. By doing so, new typologies were developed for these functions in an iterative process. This approach made it possible to look differently at existing ways of integrating public green in a building. It created a base for further development of the indoor green types.

Step 3: creating as much as possible greenspace per m² land use

To create as much m2 of green, the case study first had to be analysed on an urban level. The question was: how to deal with this long and narrow site? A solution to this problem could be to make stacked greenscapes. This gave a new perspective to the project: landscape architecture within the building. By making a clear overview of the parameters, even landscapes could be typologized.

The discipline of landscape architecture was quite new to me, but it did fit my own interests: I like gardening and using my "green fingers" with my plants at home. I talked to a landscape architecture graduate to help me with ideas and solutions for the landscape design of the building. That really helped and brought me a step forward in my research and design.

Landscape architects do not include a complete and detailed arrangement of single plant species in their designs and maps/floorplans at a 1:200 level. You can never make a landscape design that is tailored to the ideal specifications for every single plant or tree that will be planted in a garden. This means that the criteria for the different landscapes and climatizations in the building could be brought back to those for examples of plants and trees. That way the properties of every garden in the building can be considered for the design.

These landscapes were then used to maximise the greenspace in the building and to complete the indoor green experience. To make that possible, the site got divided in a grid of 10m by 10m (acres). This grid is both suitable for landscape architecture and for example factories with a column-structure (a multiply of the standard 5x5m grid). Every segment of the grid could either be filled in with functional program or as part of the landscape around that function. That way a patchwork of gardens started to take shape.

Step 4: Technical building design and overall architecture

The project has the potential to impact society in a great way because it shows what designers could achieve when they think differently about greenspaces within public buildings. To make sure the urban green condenser would function as a public building, the overall structure and layout have to be predetermined. The vertical cores are very important because of fire regulations/escape routes and functional use of the building. These cores could also be combined with installations and shafts going up and down the building.

The design process involved trying out solutions to the question what a green condenser could be. Because of the maximum flight route of 40m, the building got divided into 5 segments. Every segment could host a different climate with sub-climates. To make the building energy efficient, the gardens and functions are matched with the different possible indoor and outdoor climates of the 5 segments. Each climatization results in a different approach for the building technology and installations. This eventually shaped the different segments on a technical level and architecturally.

The grid structure was then translated in a wooden column and beam construction. The advantage of this system is that the height of the 10m long laminated wooden beams could be used to store the soil for the landscaping. The special shape of the columns reduces the amount of crossbeams. Even though the technical design result of this project may not be achievable to build in this setting (budget wise), further development of the initiative could help increase public greenspace within city neighbourhoods.

Intervention: change of trajectory and specification

Like a plant that grows, the design grew naturally with the conditions and criteria proceeding through time. To complete the building design, some specifications still had to be reconsidered. This involved making a more detailed overview of the façade techniques and installations. Examples of the gardens were then worked out in as a landscape design to make better visualisations of what the building would look like. Overall design and related technical details had to be made more specific in the period after the first P4.

Reflection (pt. 3)

Step 5: zooming in on a segment and deeper research of landscape designs

When the overall design of the building neared completion, it was important to zoom into a segment that characterizes the project on a more detailed scale. Therefor the land climate segment with the allotments, forest, French garden and orangery were zoomed into. All the earlier attempts to zoom in on a bigger scale, were then applied to these specific gardens. That way the vision became more clear and in line with the earlier research and design statements.

To zoom in on the landscape designs, research was done on landscape architecture: how do landscape architects work, what are the stages and what characteristics do the design drawings have? In this research, it became clear that the different layers of a landscape design correspond to previous ideas for determining the characteristics required for climate zones. In this, the 3-layer principle was an important starting point: the herb layer, the shrub layer and the tree layer. At all scales, these three layers appeared differently on the design drawings.

The problem with level of detail at the scale I first worked on became clear by looking at landscape designs at the same or smaller scale. In these, you do not see individual plants either, only areas as spot plan/shading.

Through this research, it became clear as well what caused problems when working out the landscapes on a smaller scale. The scale at which the building had been worked out until then (1:200) contains little detail in landscaping as well. No individual plants are then indicated, only areas as patches/drawings accompanied by a legend with the type of plants/area. The three layers are then shown, but not exactly which specific plants are used in them, only a few times how many trees/shrubs per m^2.

To develop the design in more detail, I took a lot of inspiration from visits to botanical gardens. Even on a visit to Legoland, I saw inspiration in the way they build miniature landscapes with real live plants.

This research could then be projected onto the segment and landscapes I zoomed into for the larger scales (1:100, 1:50 and 1:10). To properly visualise these gardens, the design for the chosen segment was worked out 1:100.

For the French garden with orangery, inspiration was taken from a classical French garden in Paris. With these elaborations, it became clear what plants fit into these landscapes for each of the three layers of the landscape design. The specifications required by these plants were then translated into a facade design 1:50, through a technical and material study. This facade design with details 1:10, focused on the part of the orangery located above the allotments. Since these sub-climates have their own characteristics, it clarifies how the technical design can be focused on the different zones.

Finally, at this scale level and by applying new visualisation techniques, the design really came to life. The climate concept and engineering could be tailored to the landscape design. The earlier study concluded with these research-by-design steps. Focusing on one segment was crucial to that. It sets an example for how the rest of this prototype can be worked out and how architecture and landscape architecture can come together in the indoor green condenser. The building is given the title 'landscape inside' for this reason.

I see now that when I first took on P4, this circle was not yet complete and I still had to do the deeper research on landscape architecture for doing so. This has resulted in a good bridge between the various disciplines and a design I can be proud of.

Looking ahead: further development of the prototype

Now that the design and design research have been completed, the building can be further developed as a prototype and applied in different locations. In doing so, a climate expert can work towards creating multiple variations on the climate system for the sub-climates in the building. By doing so, this concept will be better aligned with the values revealed in the plant research/landscape design. In addition, this will make the prototype more applicable to other locations around the world as well.

In the future, the components of this prototype can be applied to a location where that demands expansion and condensation of greenery and in post-war neighbourhoods specifically. It can be tailored to the climate zones of the locations where the concept is applied. Since I focused on (landscape) architecture, I have come up with a master plan for installations and how this can be reflected in the more detailed worked-out segment. In doing so, I hope to have inspired other designers, researchers and architects to think about new concepts and techniques for integrating greenery in architecture. This project thereby takes a step towards solving a growing problem in increasingly densifying cities.