



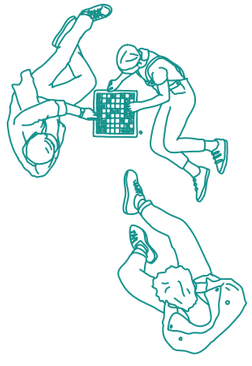



ACTIVATING LIFESTYLES

Architecture activating lifestyles - Design journal







Public building graduation studio - Public condenser, Ydre Nørrebro

Joram Vianen - 5960169

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Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-BK@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

Personal information	
Name	**Joram Vianen**
Student number	5960169

Studio		
Name / Theme	Public Building – Public Condenser	
Main mentor	Antonio Cantero	Project design
Second mentor	Sang Lee	Theory and delineation
Third mentor	Ger Warries	Technical building design
Argumentation of choice of the studio	Public buildings have a large impact on the urban social dynamic. Being relevant to all different demographics, well designed public buildings have the potential to positively impact the urban context in which it stands. The unique way that different aspects of architecture come together in a public building is what interests me the most. Bringing people of different backgrounds, cultures and ages together and creating an meaningful shared communal space where users can interact. Getting a better understanding in creating meaningful interactive public spaces built with not just one specific user in mind is something I aim to master during this course.	

Graduation project	
Title of the graduation project	Activating lifestyles
Goal	
Location:	Copenhagen, Denmark
The posed problem,	In Denmark behavioural risk factors like smoking, alcohol consumption, unhealthy diets, and low physical activity account for more than 40% of deaths in Denmark. In the last 20 years smoking rates and alcohol consumption have decreased whilst obesity among adults and children is increasing. (State of Health in the EU The Country Health Profile Series, 2021), (Action on Urban Diabetes, How Cities Are Building a Healthier Future, 2020). According to the World Health Organization around 60% of men and 50% of women in Denmark are classed as being

	overweight. Especially low-income groups struggle most with these issues (Disadvantaged Areas of Copenhagen, 2010), (*Cities for Beter Health* , 2014). Maintaining an active lifestyle and good physical health is proving to be challenging, this is especially true for low-income groups (Duarte & Vitório, 2013). According to the development plans of the municipality of Copenhagen the health inequality in Nørrebro is higher as compared to other neighbourhoods in Copenhagen (Disadvantaged Areas of Copenhagen, 2010). During our visit to Ydre Norrebro it became clear that the neighbourhood lacks sufficient sports facilities, access to organic farm to table food sources and interactive meeting spaces. Public architecture can play a meaningful role as catalyst for improving physical health and combating imbalance in health equality between high- and low-income groups. Active design, architecture that promotes activity, can be approached from different angles. Only focussing on one health improvement method leaves out a large part of the target group, therefore missing the goal of what this project aims to achieve. In order to improve physical health among all low-income groups a balance must be found. The design should accommodate facilities stimulating healthy everyday habits as well as facilities supporting high intensity sports and activities (Carlén, 2021).
research questions and	Main question: *How can architectural design strategies be deployed as a catalyst for stimulating a healthy lifestyle and improving physical wellbeing among low-income groups in Ydre Nørrebro?* Sub questions: *What facilities regarding improving physical health are missing in Ydre Nørrebro?* *How can public health facilities be made accessible to low-income groups?* *What is needed to stimulate and activate participation of low-income groups within a health and well-being focused environment?* *How can the needs of different users for achieving a healthy lifestyle and improved wellbeing be translated into preventative architectural design measures?*

design assignment in which these result.	The goal of the project is to improve the lifestyle and health of low-income groups through public architecture. The aim is to reach all age groups within low-income demographics. This means that the building should be designed with the unique needs of different age groups and backgrounds in mind. In order to have the largest impact on all low-income age groups a wide variety of functions should be incorporated in the design. Higher interaction and participation can be achieved by allowing users to achieve their personal health goals in their own way (Duarte & Vitório, 2013). This should be done through architecture that is able to respond to the different patterns and habits of users. This responsive multifunctional program should not only make healthy lifestyle alternatives and physical wellbeing facilities accessible but also effective in allowing people to improve their health in their own way. Providing dietary, physical activity and socio-cultural facilities makes sure that personal interpretations on wellbeing are represented within the same building (Duarte & Vitório, 2013). Following this design goal, it should become clear how architectural design strategies can be used as a catalyst for stimulating a healthy and active lifestyle. Hereby the strategies will be based on research on active design, activating participation, strengthening social cohesion, providing a platform for wellbeing, and achieving a healthy lifestyle. The programs and initiatives in place by the municipality of Copenhagen to combat obesity get a physical presence within the urban context. A public condenser focussed on preventing obesity/being overweight, inactive lifestyles and unhealthy dietary patterns are all listed in the plans of the municipality. Preventing these health factors can also decrease other related health risk (Country Nutrition Profiles, 2024). Therefore, lowering the need for curative healthcare facilities by providing preventative measures through the design of a public condenser. The public condenser will improve overall health on an everyday basis without the need for traditional healthcare facilities like hospitals or clinics.

Process

Method description

Research based on literature studies, interviews, case studies and visual analysis will form the structure on which this research is conducted. The qualitative research, research by design, will provide insights into designing a public condenser with the aim of stimulating a healthy lifestyle and improving physical wellbeing.
With the aim of the research being the design of a public condenser it is important to derive answers to the main- and sub questions based on design strategies and architectural concepts found by mapping, diagrammatic research, drawing, scale models and other visual/physical architectural expressions. Research by design will be the most frequently used method to achieve a well-designed public condenser. The design principles and strategies related to the topic of improving health and wellbeing are scientifically substantiated by conducting literature studies.

The research will touch many different topics, not all directly related to architecture. Especially the topics on physical health and diet require methods to be linked/applied into architectural design strategies. Bridging this gap between wellbeing and architecture will be done through comparing problems related to health found in literature with solutions applied in architectural case studies.

Literature and general practical references

Action on urban diabetes, how cities are building a healthier future. (2020).

Burney David, F. T. S.-K. J. B. A. (2010). Promoting physical activity and health in design, active design guidelines.

Carlén, R. (2021). Using Architecture to Using Architecture to Promote Physical Activity Promote Physical Activity.
Cities for better health . (2014). https://www.citiesforbetterhealth.com/network/our-cities/copenhagen.html

Country nutrition profiles . (2024).

disadvantaged areas of Copenhagen. (2010).

Duarte, M. R., & Vitório, P. (2013). Towards an Active Design. An Approach on the Body Interaction with the Built Environment.

Hasan, A., Mette, C. B., Thomsen, R., & Tamke, M. (2023). Connecting the Goals Design for Health Proceedings of the UIA World Congress of Architects Copenhagen 2023.

Helle, J., Mads, M., Trine, S., & Svensson, H. (2022). The urban health culture of the future. Juul Frost Architects.
nycolaas, F., van der Eng, T., & Ruijs, T. (2016). BETA office for architecture and the city Active Design in Buildings.

State of Health in the EU The Country Health Profile series. (2021).

Steward, C. (2024). State of health in Denmark - statistics & facts.
https://www.statista.com/topics/10165/state-of-health-in-denmark/

Reflection

The MSc. 2 track ‘Public Buildings’ sets out to explore possible public interventions within the urban context of deprived areas in Copenhagen. One of the deprived areas is Ydre Norrebro, this neighborhood being my allocated project area during this graduation project. The main focus of the project is to connect people living in Ydre Norrebro whilst simultaneously bringing local issues related to living in these deprived areas to attention and improving them through means of designing a public condenser.

During our site visit to Copenhagen the problem that I wanted to address wasn’t yet clear. The broad scope of the research we did during our visit made it clear that the design of a public condenser had many different possibilities. We got a better understanding of the people living in Ydre Norrebro we interviewed, historic background of the area, and the amount of social and public urban processes already in place. One moment stood out to me during one of the interviews, namely the

health inequality that is present in Copenhagen. It became clear that low-income groups lack access to sufficient sports facilities, access to healthy food sources, and interactive meeting spaces. During our visit numerous inhabitants of Norrebro told about the value of places that combat these health inequality issues. The local Muay Thai gym and non-profit grocery store where mentioned numerous times. Despite the high impact on combatting health inequality, and appreciation from local inhabitants these places are far and few between.

Further research revealed that the health inequality among low-income groups isn't limited to Ydre Norrebro. Other neighborhoods in Copenhagen are struggling with the same issues related to health inequality. Designing a public condenser with the aim of decreasing health inequality can play an important role, not only on neighborhood scale but also within the larger urban context of Copenhagen. The potential for designing a public condenser that can play an impactful role together with the demand for decreasing health inequality where decisive factors in choosing my focus point of the design.

The design touches topics related to healthcare, sports, diet, income, lifestyle, culture, and community. Designing a building that reacts to the needs of its users asks for an integral approach where multifunctionality, hybridity, and resilience allow for the condensing of functions within public architecture. The users of this type of public condenser are diverse. Therefore the aim of this design is to incorporate all different interpretations of what achieving good physical health means to this divers group of users. The complexity of the MSc. 2 graduation project provides a compelling challenge. Here architecture becomes a tool for improving problems not only related to the built environment but also socio-cultural and healthcare topics.

Collaboration of research and design

This graduation project is formed though research by design, quantitative and qualitative data being linked to design choices and vice versa. By creating this link between research and design a comprehensive understanding is formed on the effectiveness of implementation of the design. This method helped me during the design process. The collaboration between making design choices based on data and testing if these design choices achieved the desired results made me keep the aim of the project clear. The revisions that resulted from discussions with tutors and peers showed me new angles in approaching the design. These new angles provided insights into topics I otherwise could have missed, further broadening the scope of the research and understanding of the overall design. Personally I find the work method of testing the design through research by design incredibly useful. Not only by helping me to substantiate the design but also by identifying problems and revise accordingly.

The main example of this can be seen after the P2 presentation. The design at that point was based on numerous findings and data retrieved from research on improving health and wellbeing through architecture. However the design didn't express the goal of what the design was aiming to achieve. The design at that moment was a collection of functions that all individually could improve health inequality. However, the architecture lacked cohesiveness and a direct embodiment of improved health. It became clear that users health should improve simply by interacting with the architecture itself instead of the program dependent interaction. In order to understand how architecture can promote health and wellbeing I started with deconstructing and testing crucial aspects of the design. Through data analysis, calculations, discussions, case studies, sketches, diagrams, and visualizations, it was shown how I was missing the goal. After all aspects of the design where laid out (deconstructed) I could reinterpret the design elements. This was done with case studies like 'playscape' by WAA architects or 'KU.BE house' by MVRDV but also by looking on a local scale what it means for Copenhageners to achieve health. This research showed me that wellbeing and health centric architecture is dictated by integrating play and social interaction. However, this integration is only being effective when done in a vernacular way that fits with the habits and patterns of the local inhabitants.

Creating an elaborate understanding of the role of architecture within the framework of improving health and wellbeing allowed me to effectively make design choices. These design choices resulting in architecture that truly embodies health and wellbeing. Aspects like angled walls and sloped floors in order to stimulate movement, the use of natural materials that reflect the healthy atmosphere, and user specific adaptable spaces where users can practice health in a way that fits their personal habits and patterns. In this way this design became more than just a gym, basketball court, or urban farm. In this design health can be achieved through the embodiment of wellbeing within the architecture.

Throughout this process feedback and insights where provided by Dr. Antonio Cantero, Dr. Sang Lee, and following the second semester, Ir. Ger Warries, with each tutor focusing on their respective focus area. Having the possibility to discuss various challenges in depth with each tutor within their respective focus area allowed me to explore design possibilities in great detail otherwise not possible. This is especially true with my preferred approach of collecting and implementing data, testing design choices, and elaborating revisions.

Value and relevance

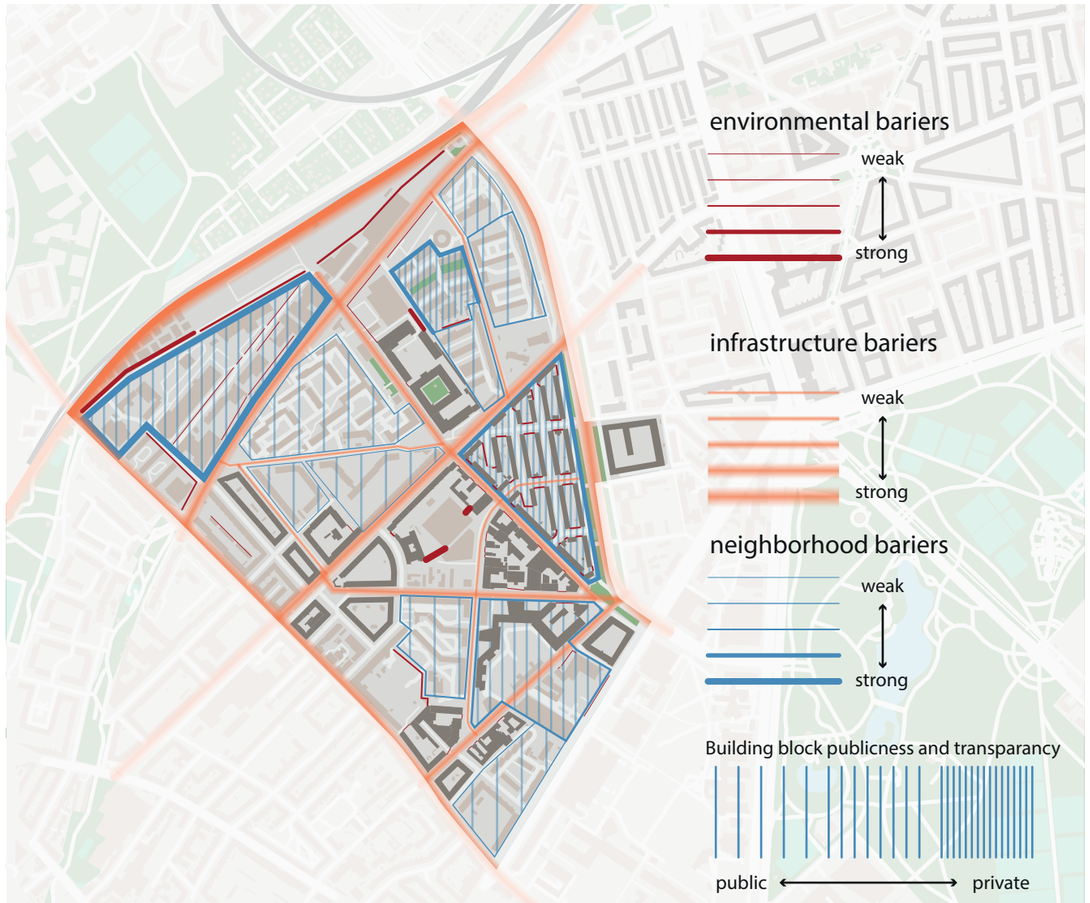
The scope of this graduation project aims for designing a public condenser aimed at improving health and wellbeing among low-income groups in Ydre Norrebro. Low-income groups include people with diverse backgrounds, habits, and patterns. A large diverse demographic requires a comprehensive understanding of the role of architecture in acquiring health.

With low-income households as the target demographic, one of the most important aspects is making the design truly public. Programs like community initiated activities and participation reward systems are in place in order to effectively reach low-income groups. instead of paying for services users are stimulated to contribute within the building. Contributing in ways like providing volunteer work in the communal kitchen, urban farms, organizing sports classes or serving drinks during sport games makes the functions within the building truly accessible. By stimulating participation in this

way a sense of community, involvement, and social cohesion is created. Moreover users get the opportunity to freely acquire health in ways that suit their personal habits and patterns in relation to health, further stimulating user participation.
The research becomes a framework for public healthcare architecture where the focus is put on preventative measures instead of curative measures. Improvements in physical health are achieved through the interaction between users and architecture. In this research it becomes clear how architecture should respond to making improved physical well-being accessible and maintainable for low-income groups. These spaces are often needed in areas where health inequality and low health and lifestyle standards are present. The public condenser in Copenhagen offers an approach which can be copied, reinterpreted, and implemented in similar cases where health inequality plays a big role.

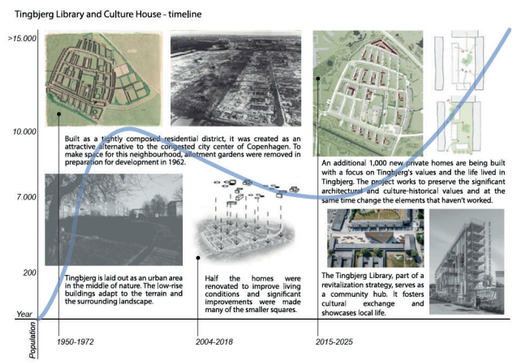
ASSIGNMENTS

Following the readings from the lecture on Commons, the Public Realm, the notion of collective a collective presentation was made. In this presentation the topics discussed in the readings where reflected into a analysis on the site.



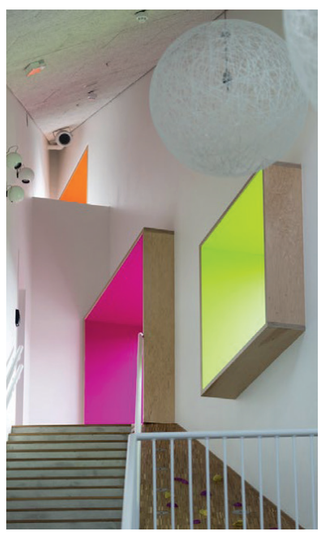
The site visit to Copenhagen was done following a travel itinerary. Within this itinerary case studies, routes through important parts of the city, and analysis on Copenhagen statistics where collectively developed.







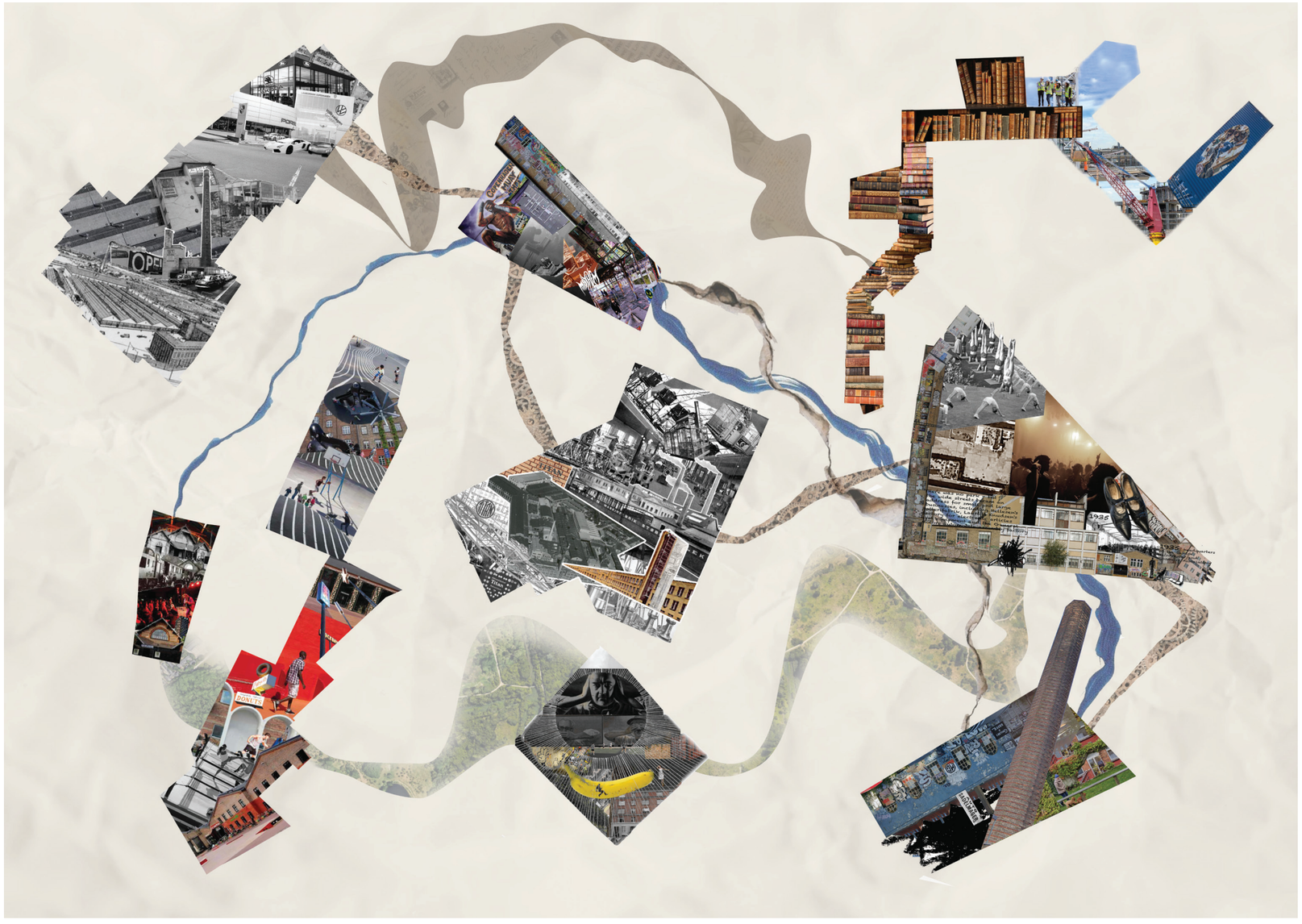




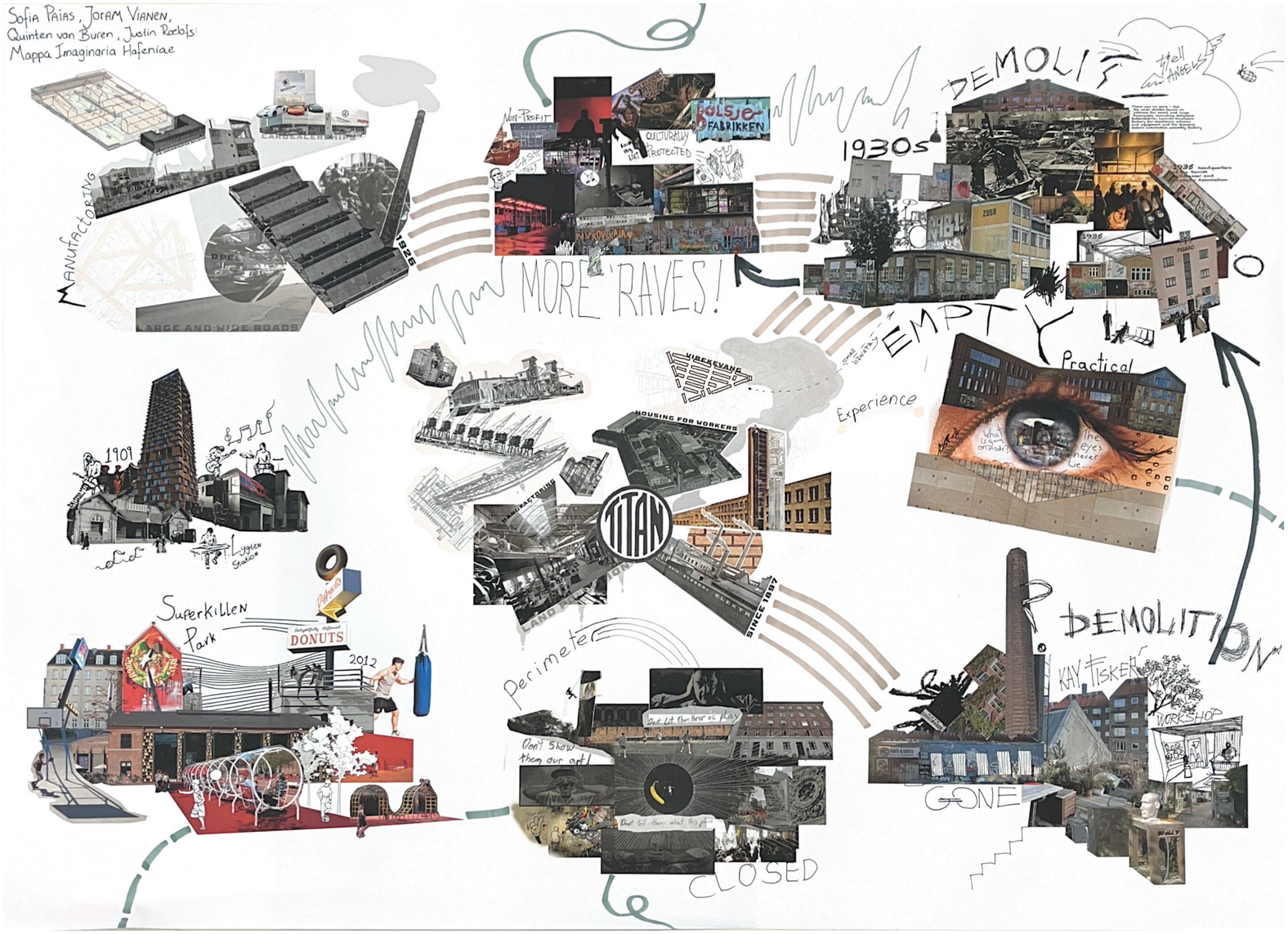
IMAGINARY MAP

The second assignment, Mappa Imaginaria Hafeniae, explored into the interest that followed from our personal interests on Ydre Norrebro. From these interests a conceptual visualization was made in the form of an imaginary map.

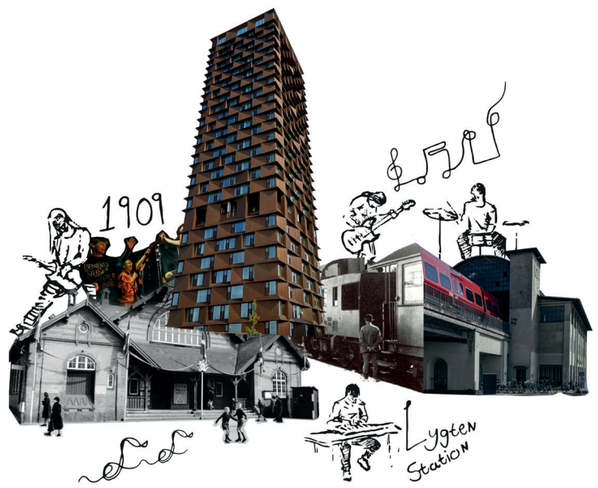
The imaginary map was later revised into a more elaborate form. Exploring the connections between important historical sites in a more elaborate way.






Sofia Paias, Joram Vianen,
Quinten van Buren, Justin Roelofs:
Mappa Imaginaria Hafeniae
Manufactoring
1930s
Non-Profit
Bolsje Fabrikken
Culturally Protected
Demolit
Hell Angels
1930s
MORE RAVES!
EMPTY
Practical
Experience
Vibekevang
Housing for Workers
Manufactoring
TITAN
Since 1897
1909
Lygten Station
Superkillen Park
DONUTS
2012
Perimeter
Don't Show them our art!
CLOSED
DEMOLITION
KAY FISKER
WORKSHOP
GONE

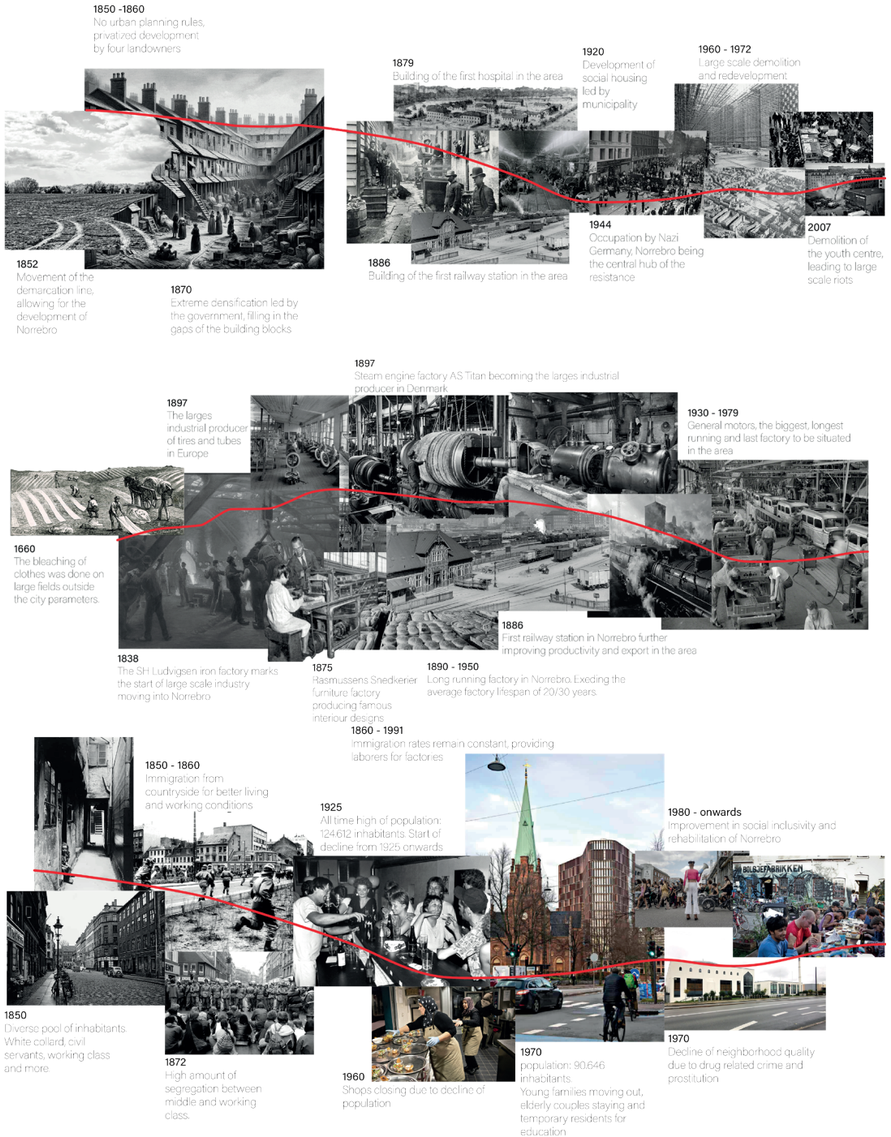

Superkillen Park
DONUTS
2012

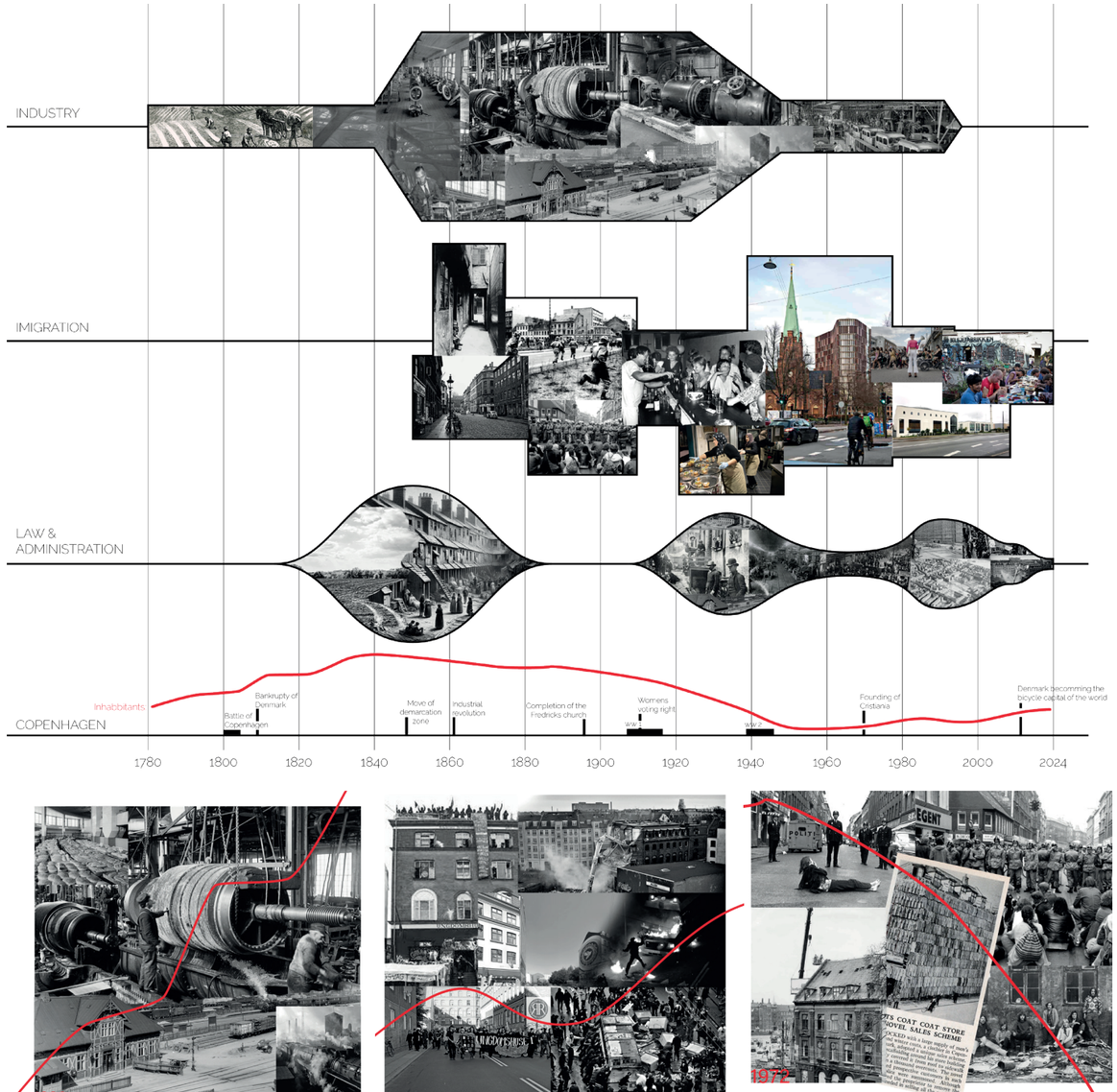

1909
Lygten Station

NEIGHBOURHOOD HISTORY

During the pin-up assignment the focus on the history theme a more in depth research on Ydre Norrebro was conducted. Following this research time lines and important historical events that took place in the neighbourhood where discovered.

The time lines and important historic events where later connected to how these aspects influenced or changed the current built environment of Norrebro.





During the workshop given by Angela Rout we got antiquated with ArcGIS. During this workshop we got a better understanding on how to translate datasets into maps.

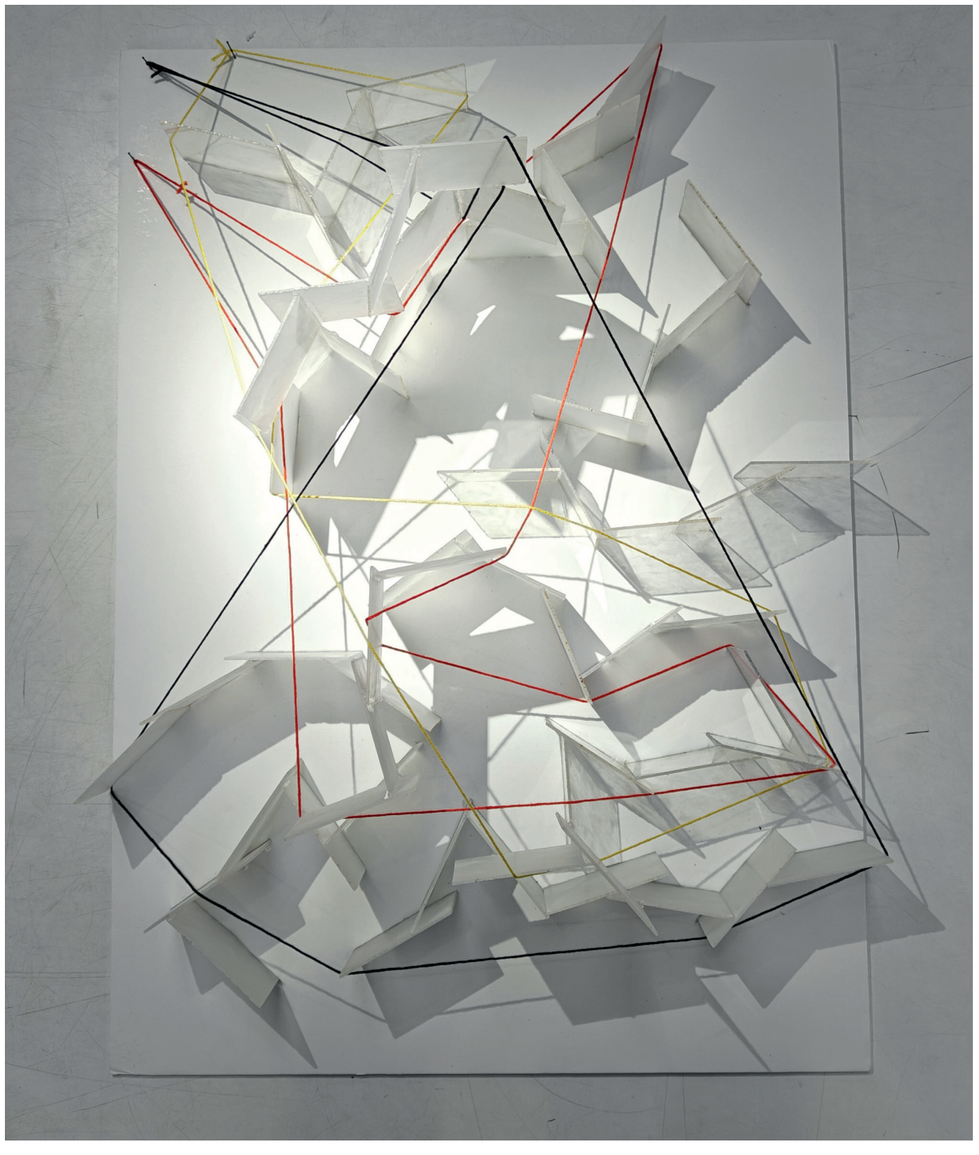
Following the workshop a dataset on Copenhagen's buildings age was translated into a city and neighbourhood scale map. The darker red areas represent older buildings and the lighter blue areas represent the newer buildings.

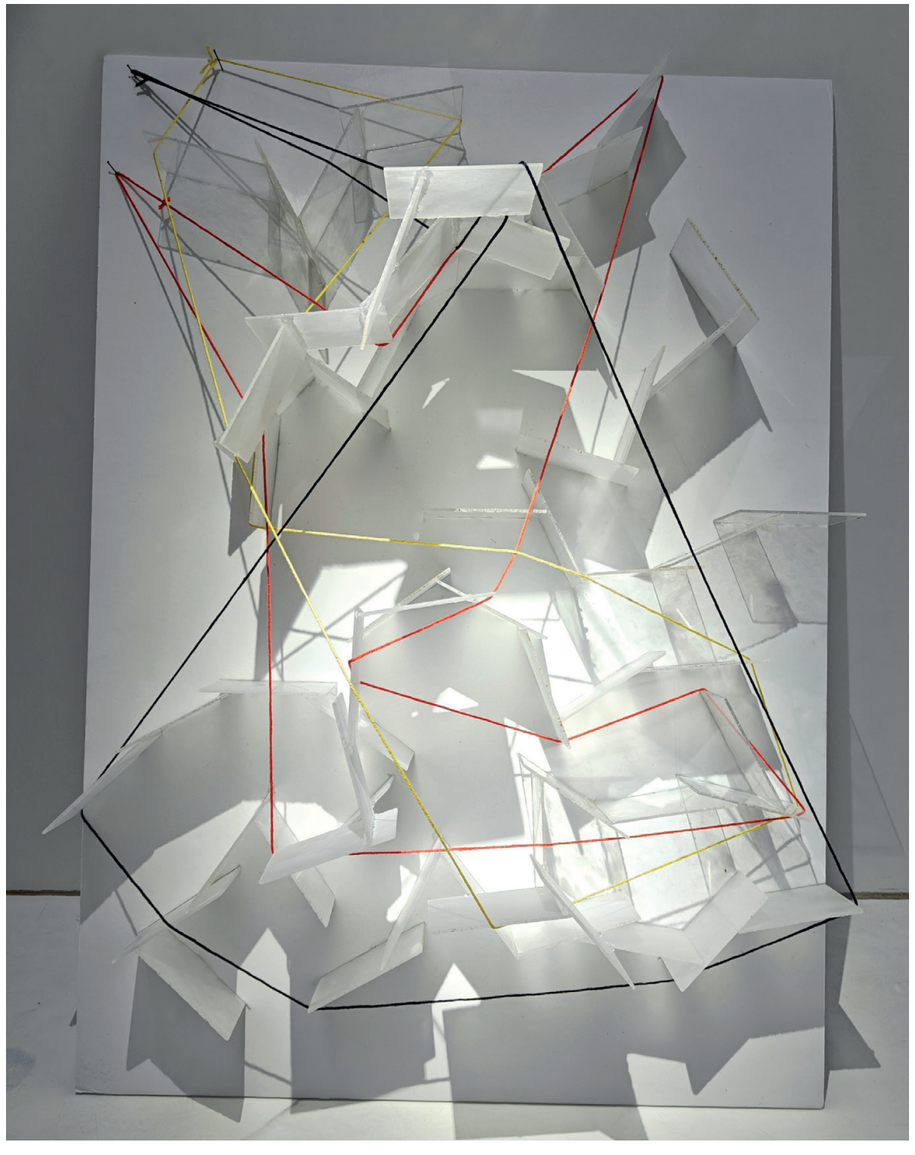


VISUAL ESSAY

The third assignment consisted of composing a 'visual essay'. Imagining 3D diagrams into a practical model. The model represents a composition where light represents space, Through semi-translucent panels placed perpendicular onto a neutral background shadows are created.

The shadows represent private functions within a building program. The light areas represent public spaces. Throughout this program connections and routes of users are shown as pieces of string cutting across the program.

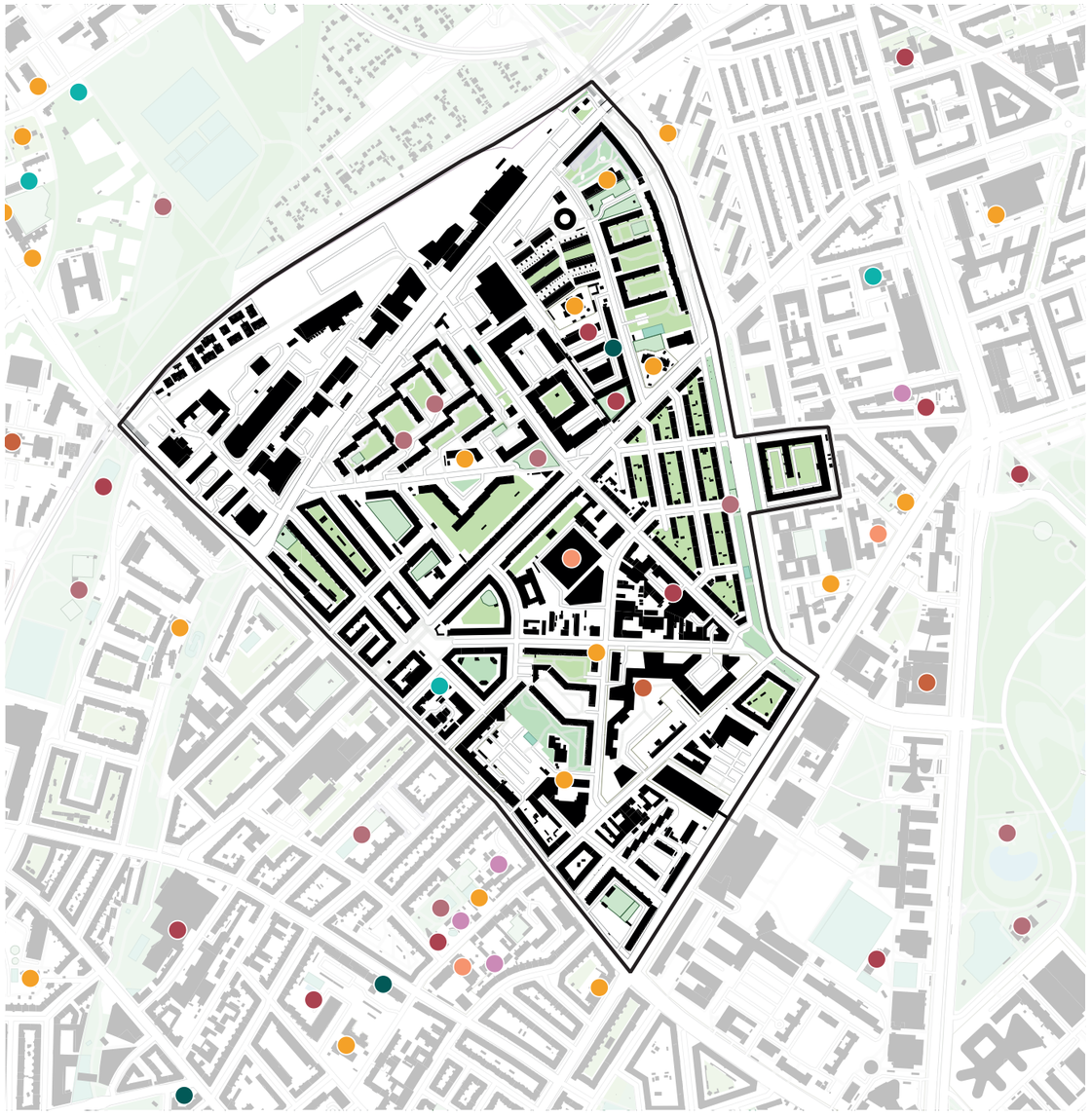


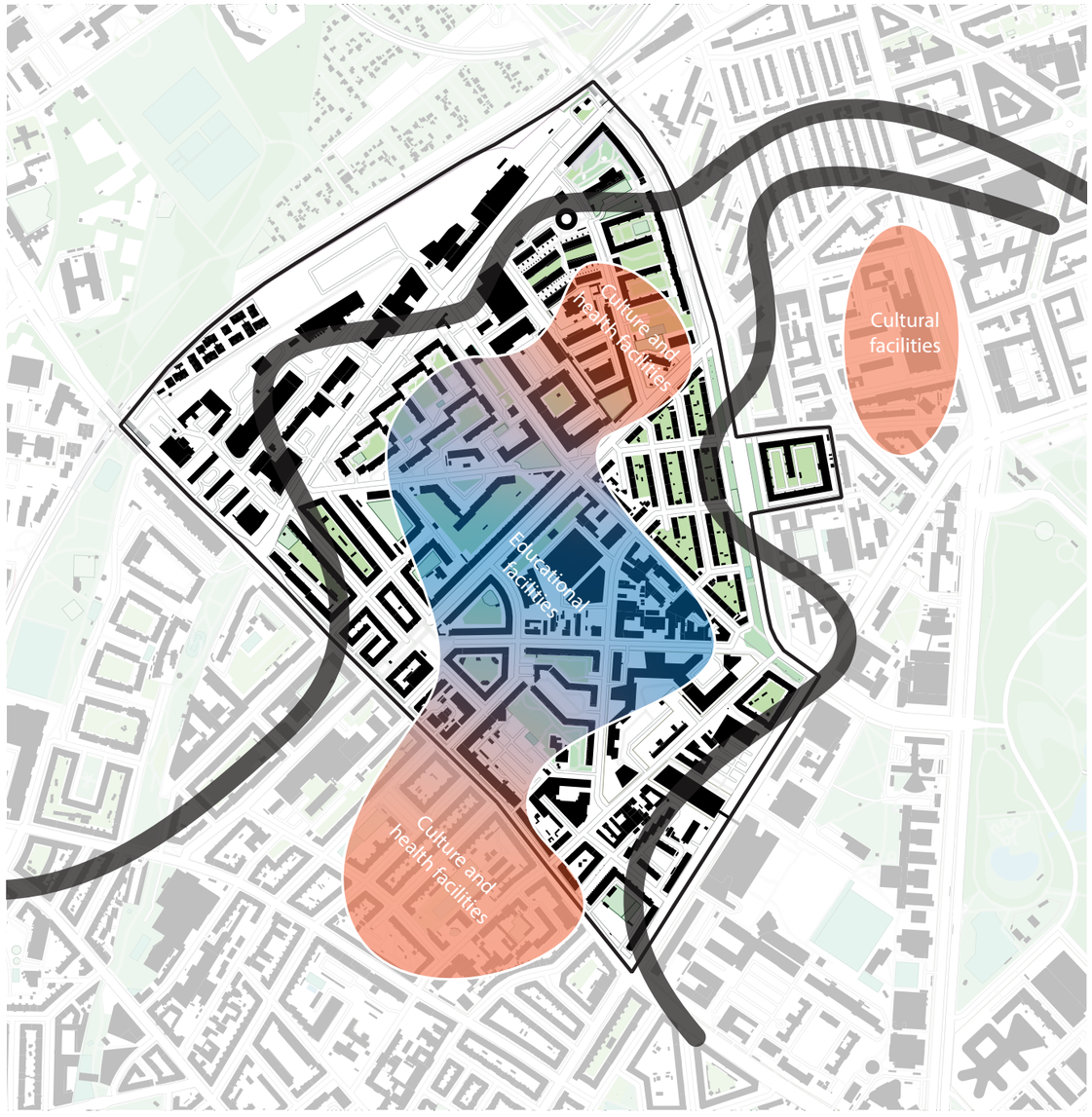


RESEARCH

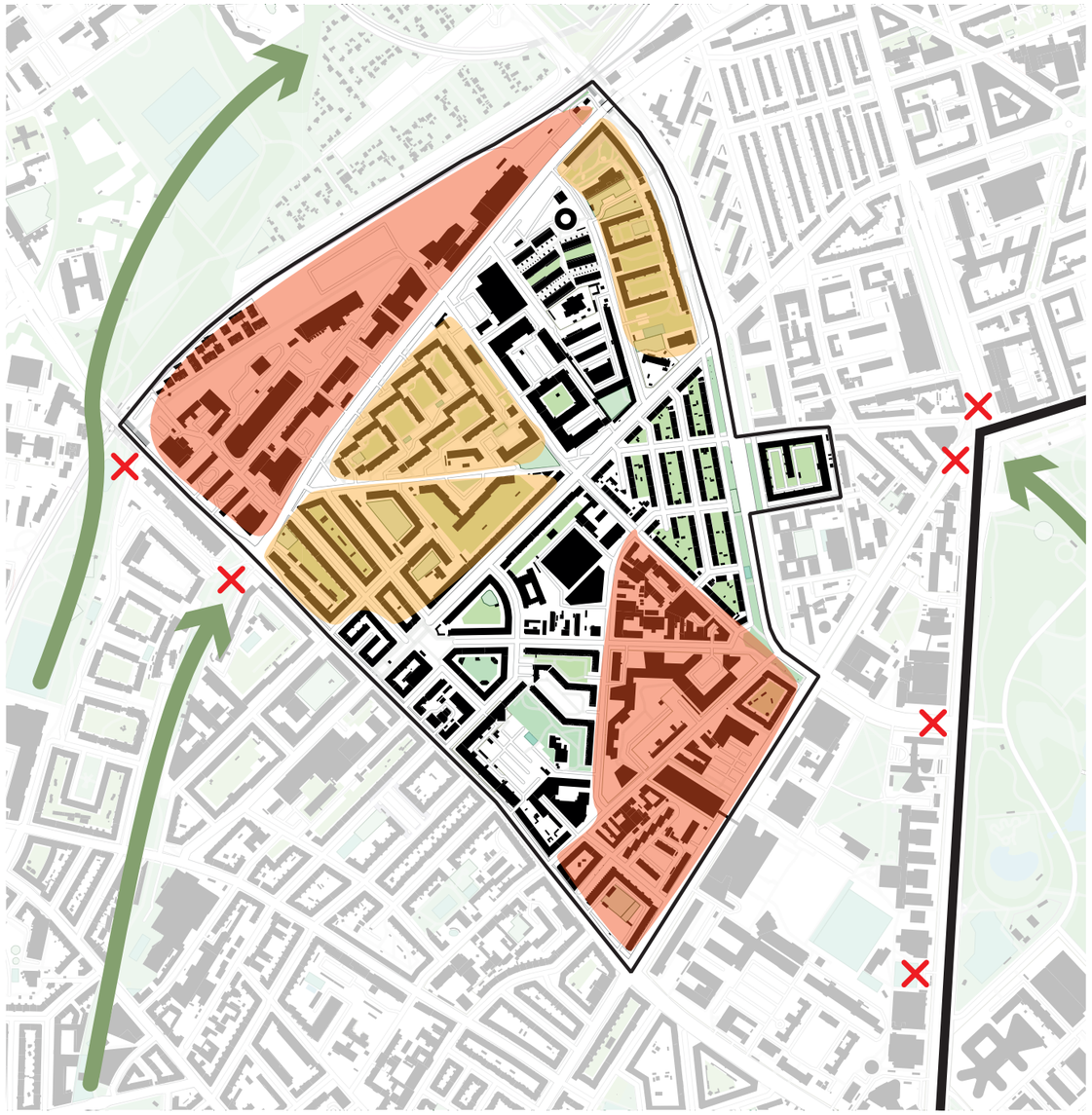
The first analysis on the site where based on the research plan. The aim of the research is to improve physical well-being and active lifestyles among low income households in Ydre Norrebro. The site analysis dives deeper into the facilities that are present in regards to physical activity, education and culture.

Based on this research it becomes clear what facilities are missing or what areas in Ydre Norrebro have shortcomings when it comes to access to healthy lifestyle alternatives. Building further on the facility research an exploration on public space was made.





Here the pubic spaces and degree of accessibility of an area are mapped.
Based on the facility research and the public space mapping three possible locations of the public condenser are taken into consideration





Besides mapping facilities further research was done on the demographics and possible users of the public condenser. The data is based on datasets provided by the municipality. These datasets where later translated into potential users. The data shows the level of education and disposable income in relation to migration background and gender. This data mainly shows which inhabitant groups have least access to healthy lifestyle alternatives because of lower education or income.
This data was later compared to similar findings of other neighbourhoods in Copenhagen. This shows that Ydre Norrebro scores below average when it comes to education and disposable income.



David - age 74

Income level: low / medium income
Citizenship status: Western immigrant - germany
Education level: Low
Family structure: Widower

Healthcare:
Good access to Denmark's healthcare system. Low income could limit access to private health services or additional care that isn't subsidized

Physical activity:
access to public facilities and subsidized elderly activity programs. Possible limited participation to organized activity facilities

Nutrition:
Less budget for buying healthy food and less knowledge of cheap healthy food alternatives

Social:
Loniless could be a problem due to David being a widower. Community and elderly centers are crucial to stimulate social interaction



Sarah and Oscar - Age 38 and 40

Income level: medium income
Citizenship status: western immigrant - Poland and danish origin
Education level: medium
Family structure: couple without children

Healthcare:
access to some basic private healthcare services. mostly reliant on Denmark's healthcare system

Physical activity:
Without children they have more time to spend on physical activities like sports or walking. access to basic and public sport facilities

Nutrition:
Average access to healthy food alternatives and healthy dietary habbits.

Social support:
Might face challenges due to Sarah's immigration background. Good work-life balance and enough free time to partake in social activities



Family Celik - age 55, 56, 20, 25

Income level: low income
Citizenship status: non-western immigrant - Syria
Education level: medium
Family structure: small family

Healthcare:
Relient on Denmark's public healthcare system. language bariers and lack of familiarity with the system can prevent use of the public healthcare system

Physical activity:
Acces to free and public sport facilities. commercial gyms and sport clubs are not always possible

Nutrition:
restricted access to healthy food alternatives often leading to unhealthy dietary habbits

Social support:
Possible isolation due to integration challenges. May benefit from social initiatives focussed on intergration and bridging language barriers



Family Nielsen - age 37, 38, 3, 5, 8, 11

Income level: high income
Citizenship status: Danish origin
Education level: high
Family structure: large family

Healthcare:
Acces to premium private healthcare services and wellness services like therapy and private trainers

Physical activity:
Acces to premium and private sport facilities. Active holidays abroad, exclusive memberships and privat coaching possible

Nutrition:
Acces to premium and healthy food scourses. possibility to frequently eat out

Social support:
Access to good schools and other social facilities that provide a good mental and physical lifestyle



Maria - age 29

Income level: low income
Citizenship status: Non-western immigrant - Lebanon
Education level: high
Family structure: Single

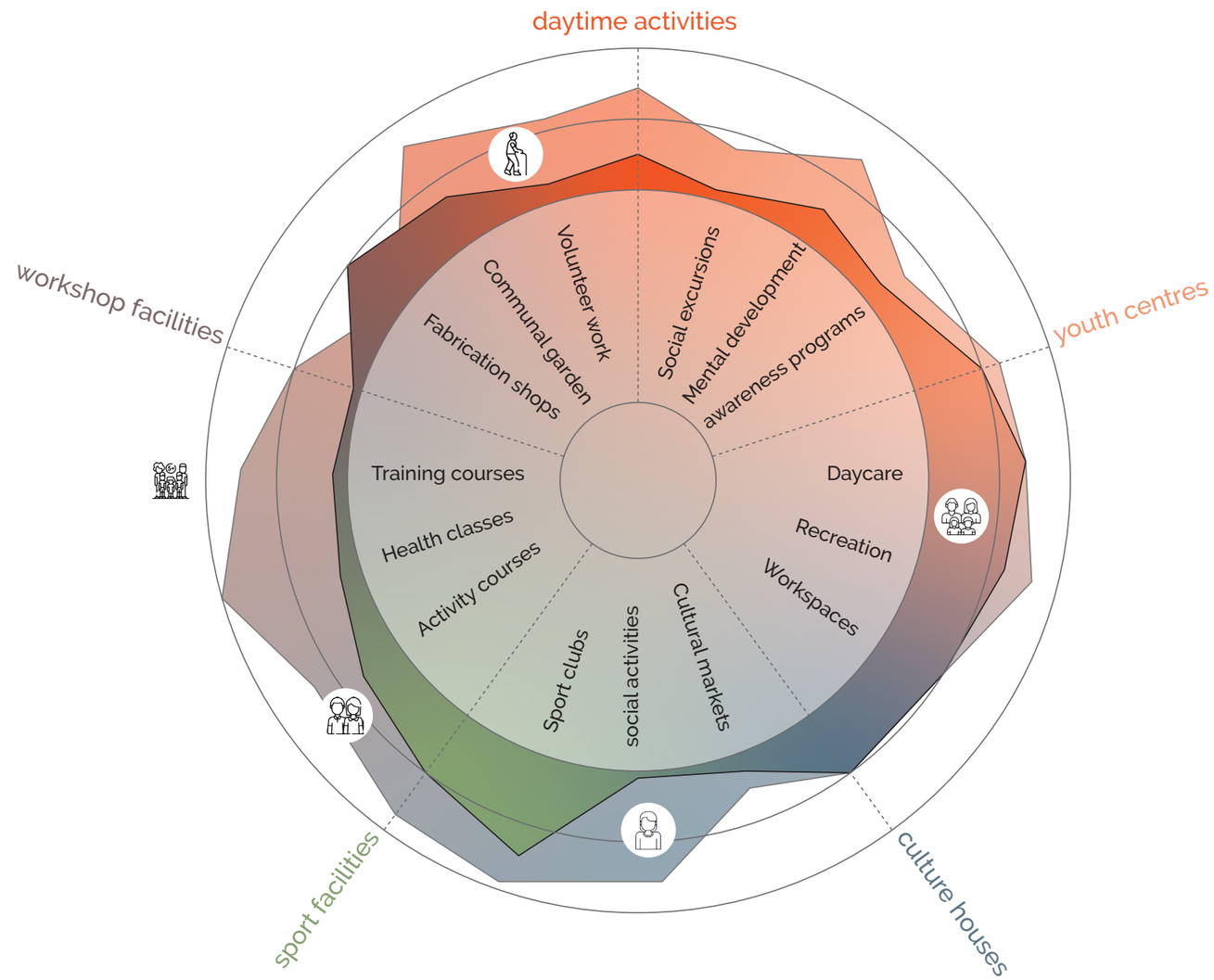
Healthcare:
Acces toDenmark's public healthcare system. Might not use healthcare facilities often due to Maria's age

Physical activity:
limited acces to sport facilities. mostly reliant on low-cost public facilities

Nutrition:
restricted acces to healthy food. high education can mean an understandign in cheap healthy food alternatives despite her low income

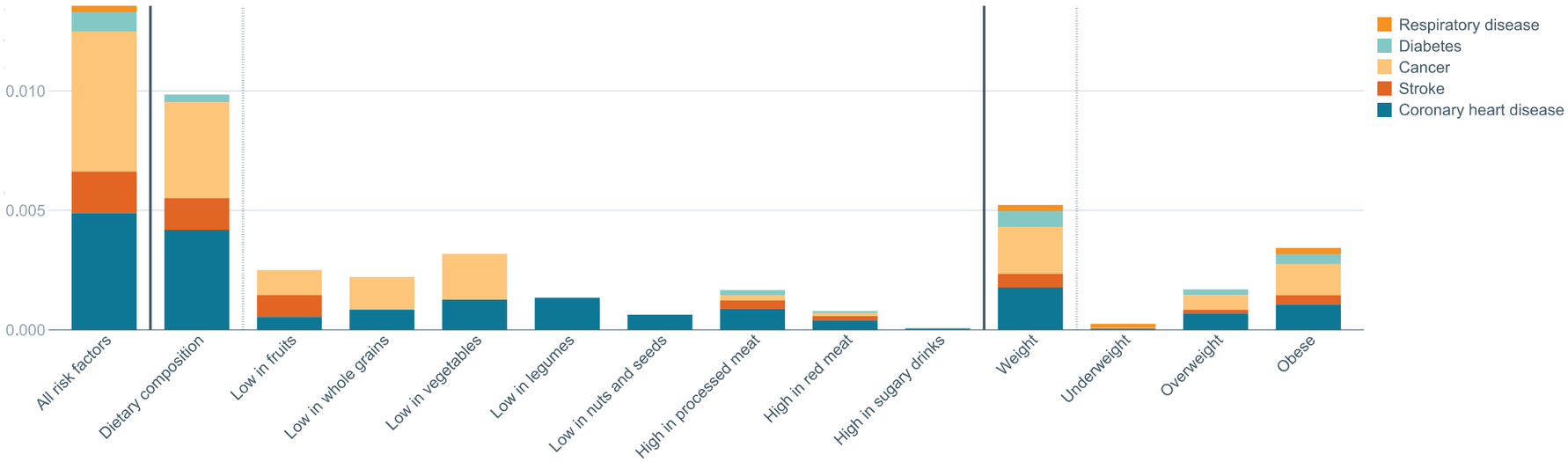
Social support:
Possible risk of loneliness when unemployed. Being a student means free opportunities to social student facilities provided by the university

Based on the potential users derived from the data analysis a butterfly diagram was made. The butterfly diagram serves as exploration on the building program. The public condenser caters to people from different age groups and backgrounds. In the butterfly diagram is shown which demographic fits in which building program typology.

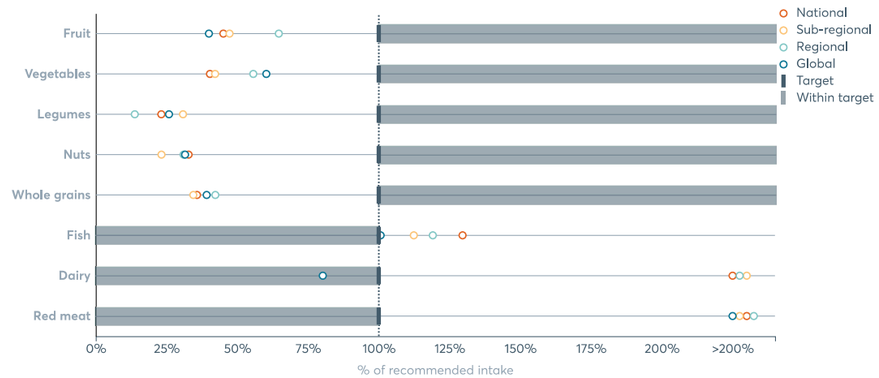


The data provided by the municipality lacked information on physical well-being and active lifestyles of inhabitants. Therefore a more in depth dataset was compiled with information on nutrition and physical activity.
From this research it became clear that the average person in Copenhagen is overweight and doesn't reach the recommended nutritional intake.

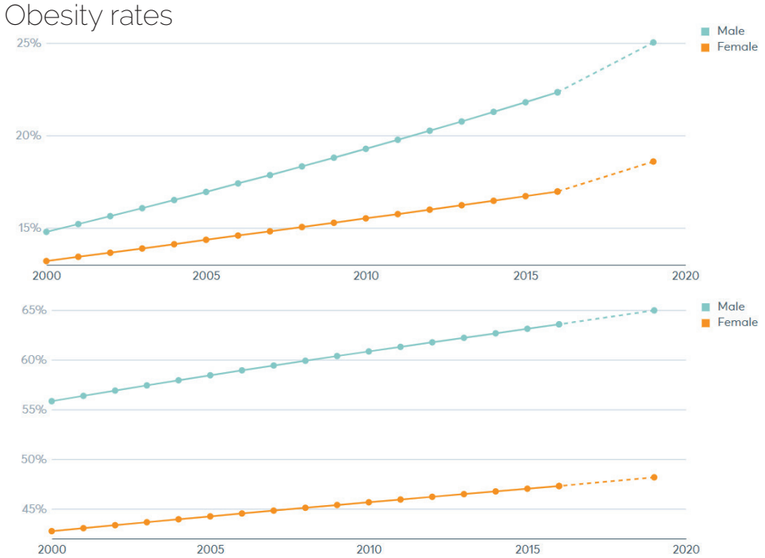
With this data and the aim of the research in mind a shift was made to a public condenser that strongly focusses on activity and dietary functions instead of also cultural and societal facilities. Strengthening the concept and design relation to the research subject.



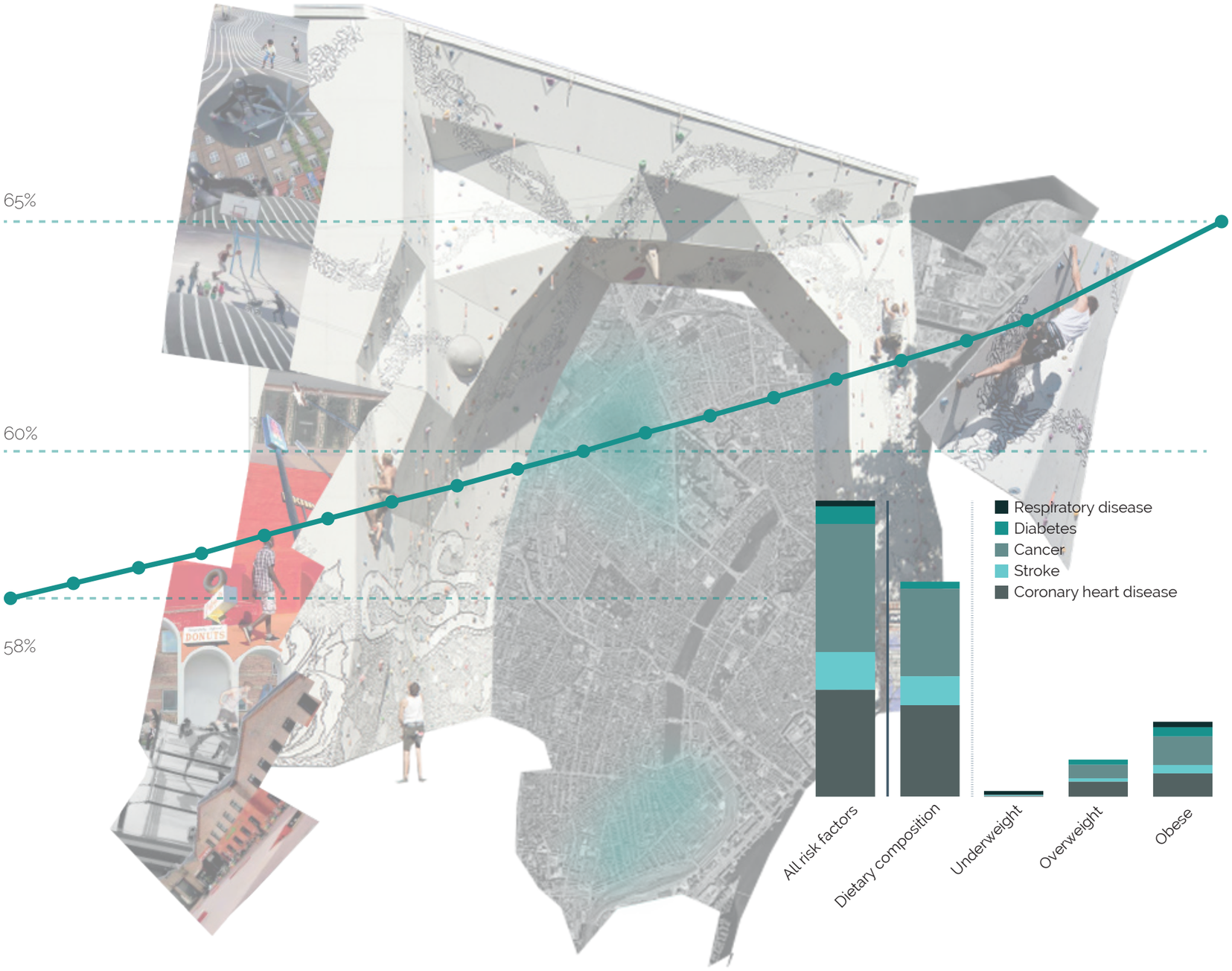
Dietary intakes



Obesity rates



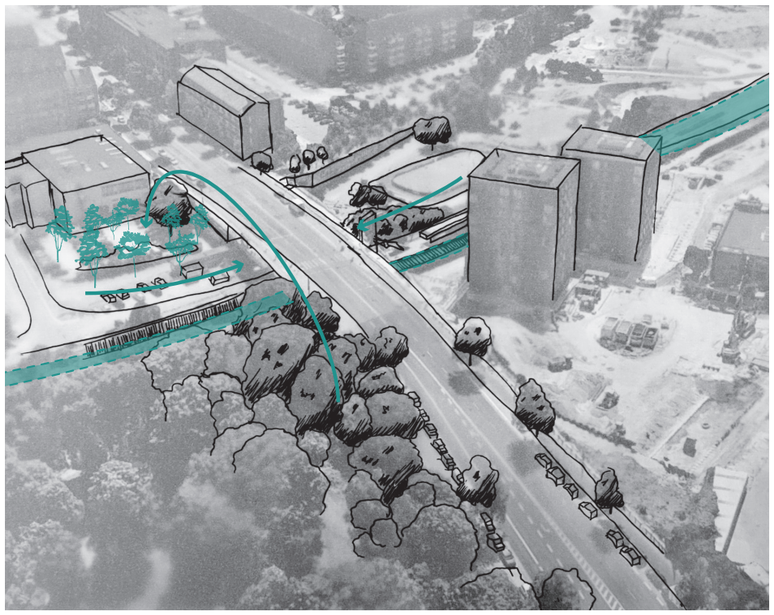
scourse - National nutrition report, 2023

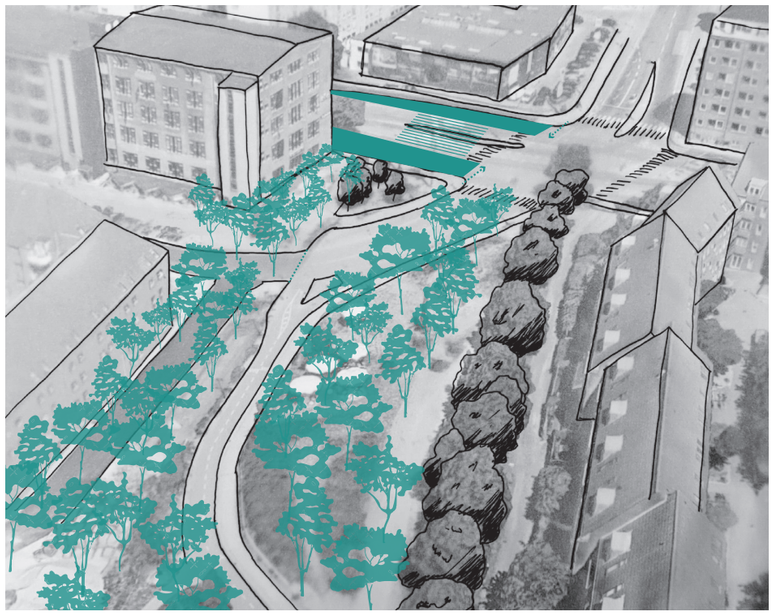

65%
60%
58%
DONUTS
Respiratory disease
Diabetes
Cancer
Stroke
Coronary heart disease
All risk factors
Dietary composition
Underweight
Overweight
Obese

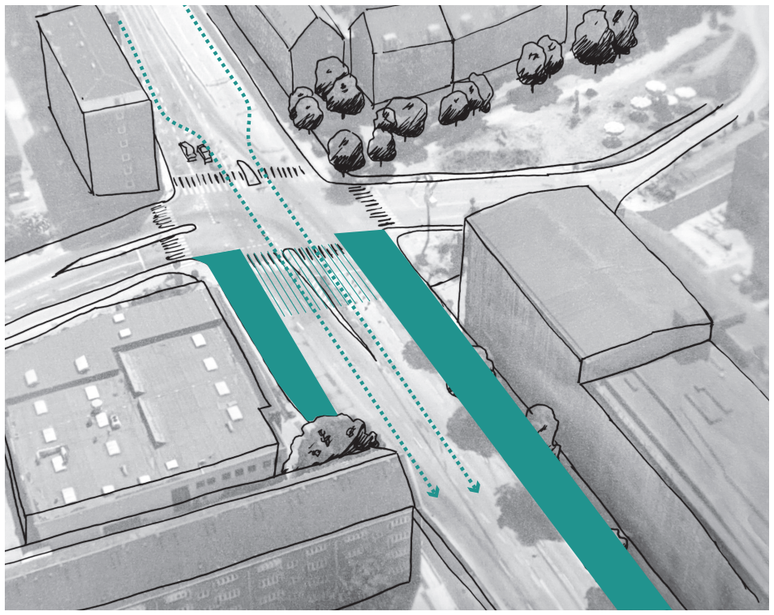
NEIGHBOURHOOD POTENTIAL

The further analysis made on the neighbourhood started of from a zoomed out view. Hereby starting at environmental issues like air and noise pollution. Highlighting these unhealthy hotspots it became clear that some interventions have to be made in order to improve the contextual quality of living in a healthy environment.

These interventions include making more space for bike and pedestrian traffic as well as integrating more green space into the area. One location where these interventions could be best implemented is highlighted in blue. Marking the location where the public condenser is to be built.



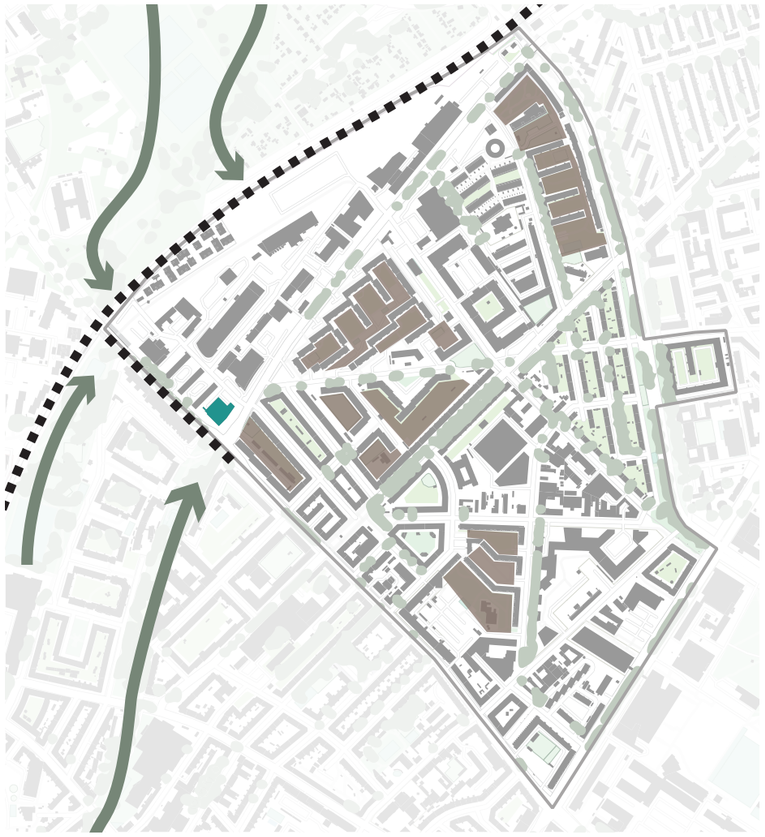






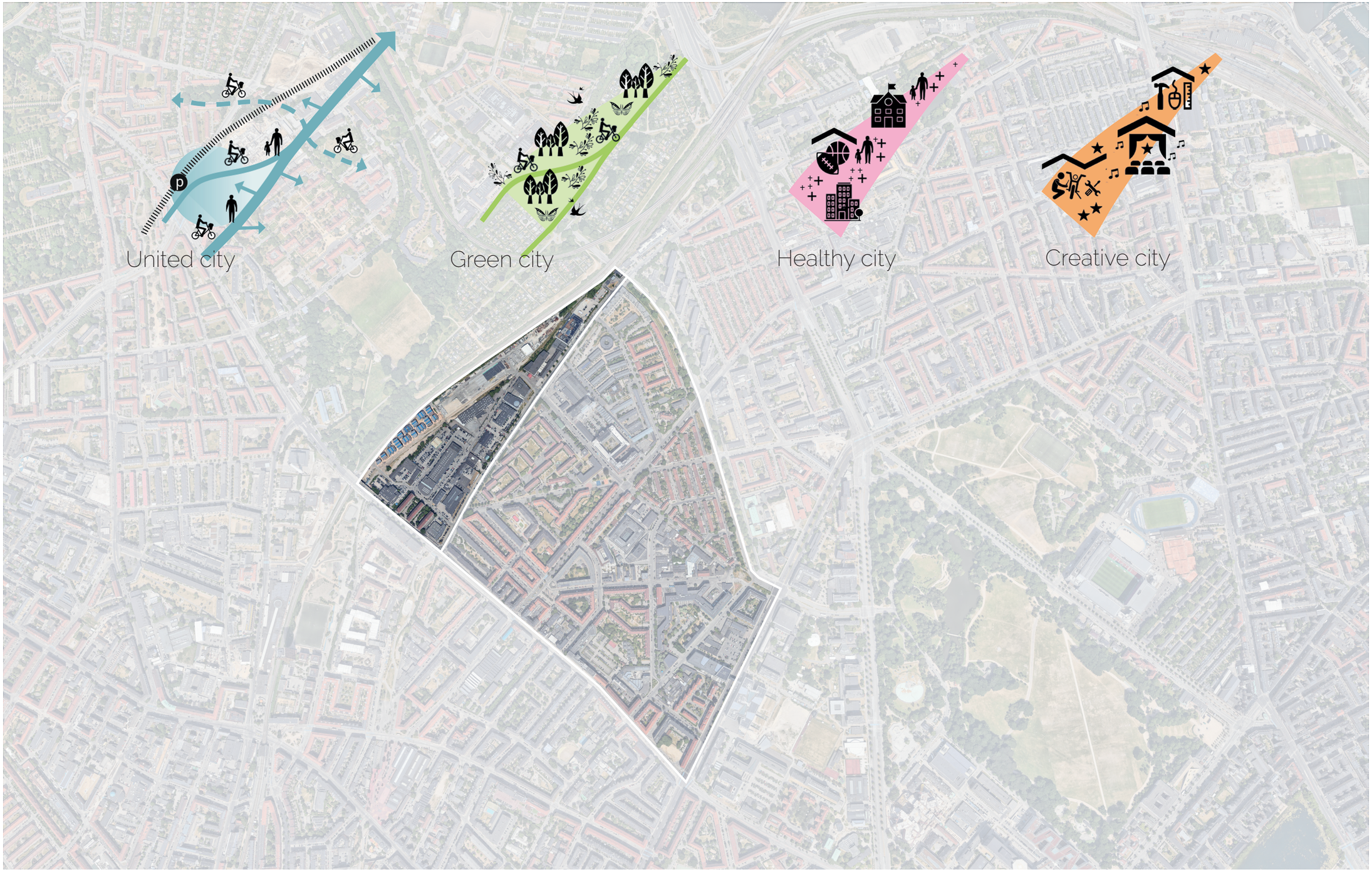
With the site location specified a more in depth exploration on the integration of green public space into the neighbourhood could be investigated. The Supperkillen park and Nimmersparken border the site location and could easily be extended far into the neighbourhood.

Besides these large parks an effort to integrate the already existing public spaces situated in between the housing blocks can be extended further north into the now still barren industrial / commercial part of Haraldsgade.








United city
Green city
Healthy city
Creative city

MAPPING

In one of the first site analysis facilities regarding physical activity, education and culture was made. However with the focus of the design on physical activity and diet the previous analysis lacked information on these topics.

A more in depth analysis was made on mapping the sport facilities in the area. Hereby the specific function, accessibility (public and private function) and distance where mapped. This analysis provided an extensive understanding in access to physical activity facilities in the area and the lack of these facilities to low-income households.





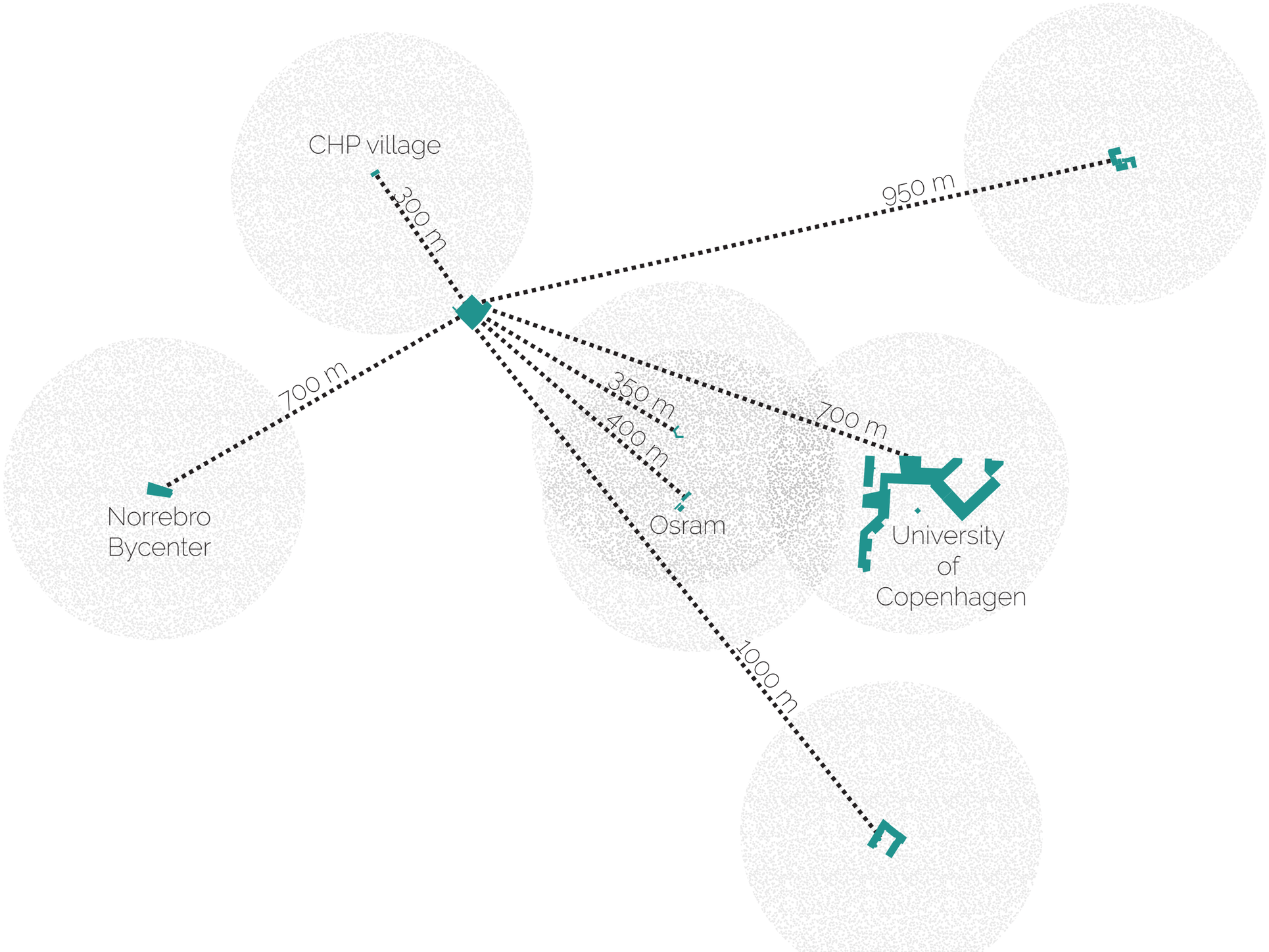

Bolsjefabrikken
800 m
Mimersparken
600 m
700 m
400 m
Osram
huset
1930 m
FC Copenhagen
1670 m
University
of
Copenhagen
Supperkillen
park

The same type of analysis was conducted with the focus on food facilities. Here the same parameters where kept except for accessibility (public and private function). This parameter was changed for healthy and unhealthy nutrition provision.

Also here it became clear that cheap healthy lifestyle facilities where far and wide apart. This showcasing that a public condenser focussing on this area could provide a crucial role in uplifting the neighbourhoods overall health and well-being.

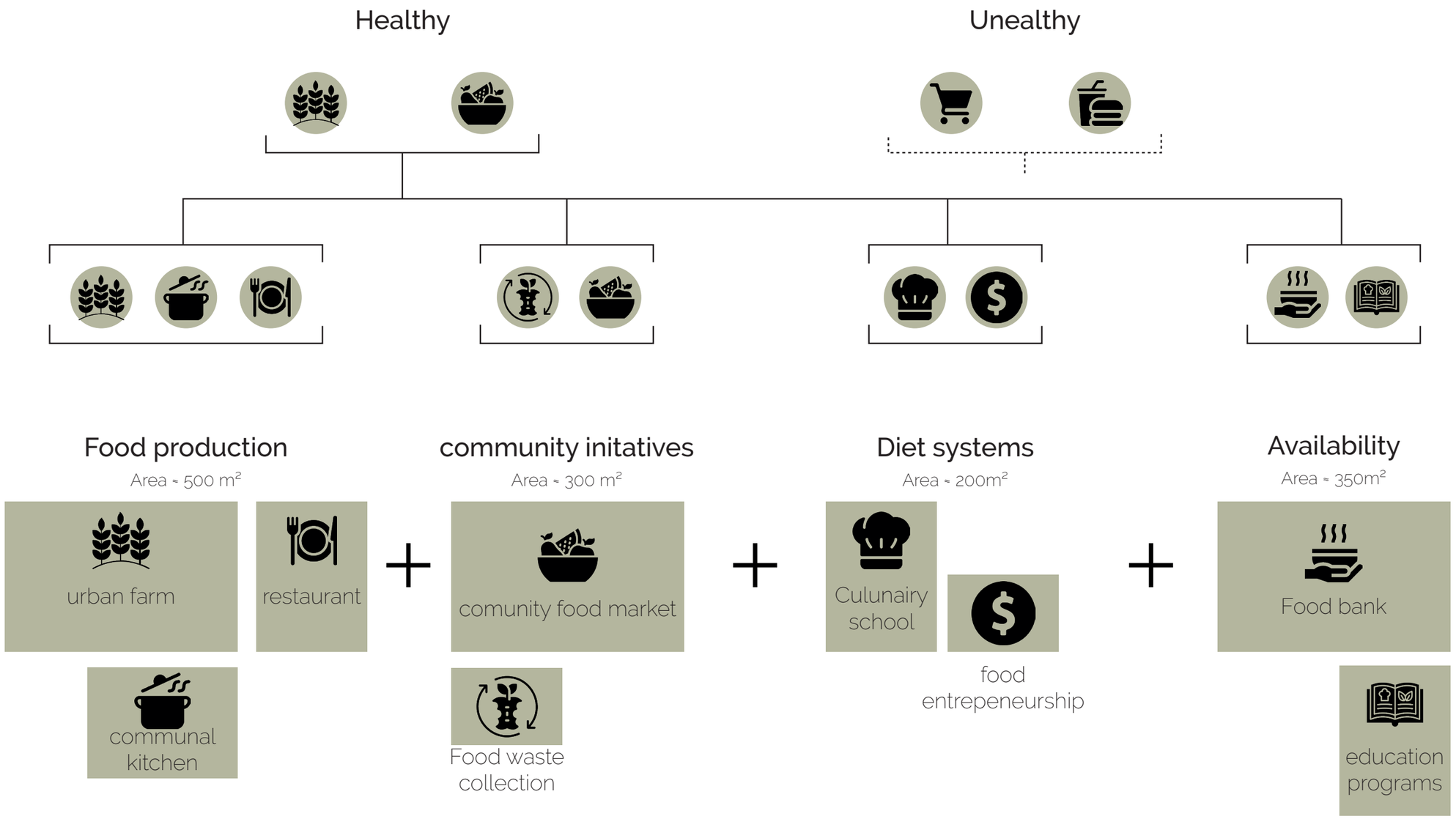


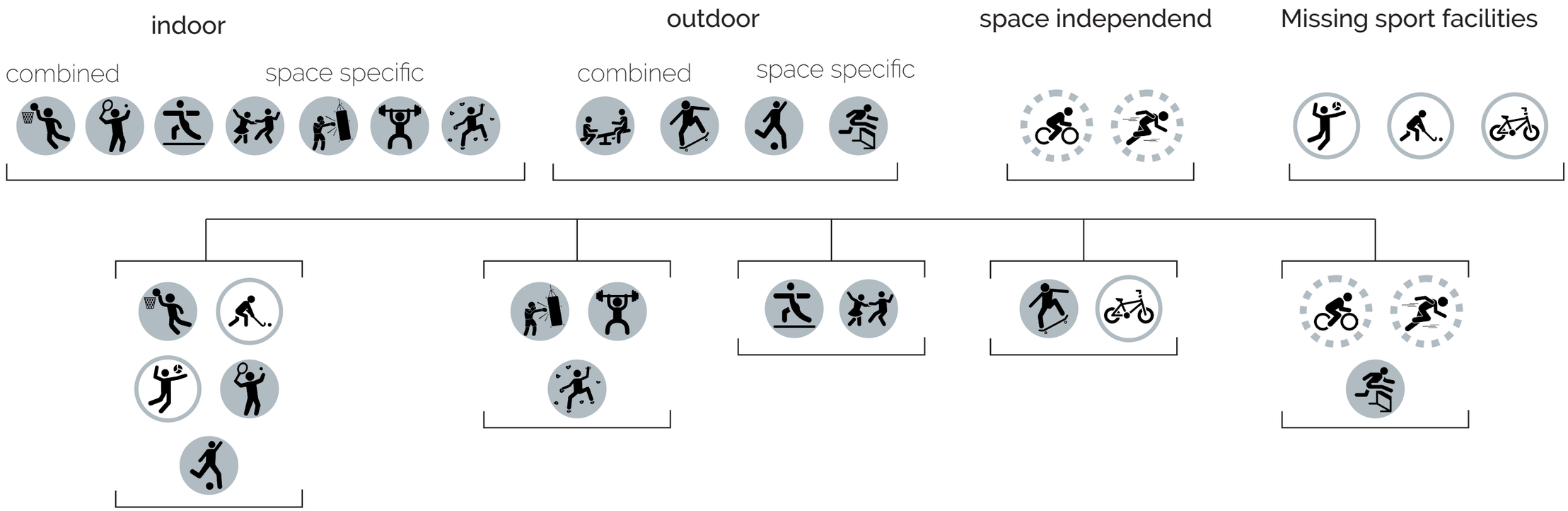


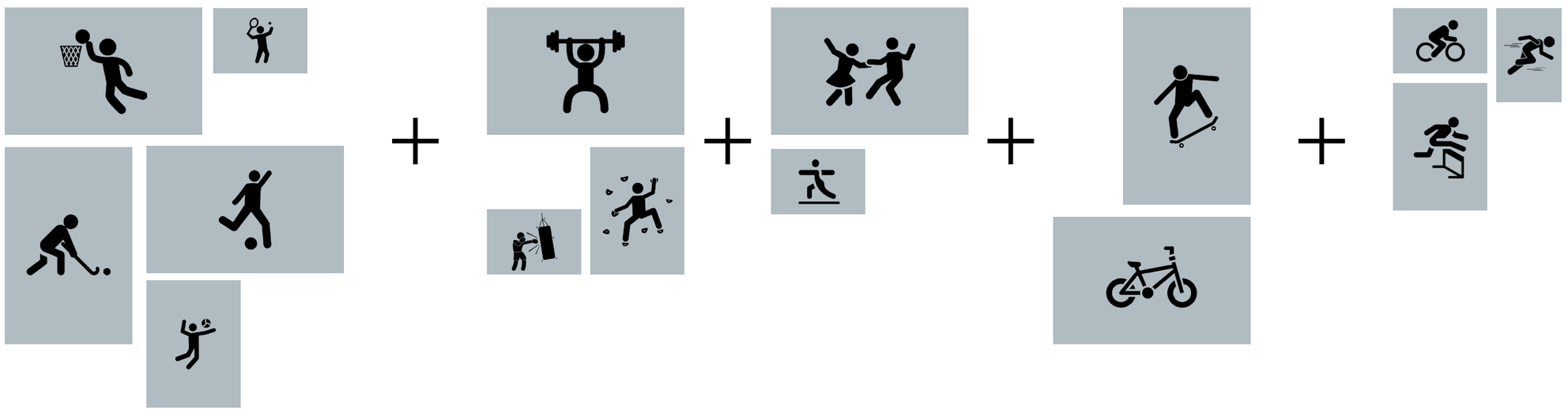

CHP village
300 m
950 m
700 m
350 m
400 m
700 m
1000 m
Norrebro
Bycenter
Osram
University
of
Copenhagen

The building program is based on the site analysis. The program will consist of two parts, one focussed on physical activity the other part focussing on dietary functions. The program is based on combining functions that are present in the area into multifunctional spaces where multiple sports or food facilities that have roughly the same spatial requirements are housed in the same space. Hereby extra focus is put on providing extra dietary functions because these are not yet commonly found in the area.

Because of this combination of functions hybridity and multiplicity in design is acquired.



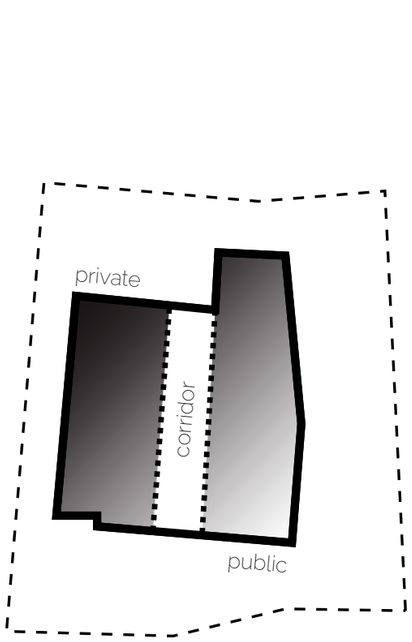

indoor
combined
space specific
outdoor
combined
space specific
space independend
Missing sport facilities

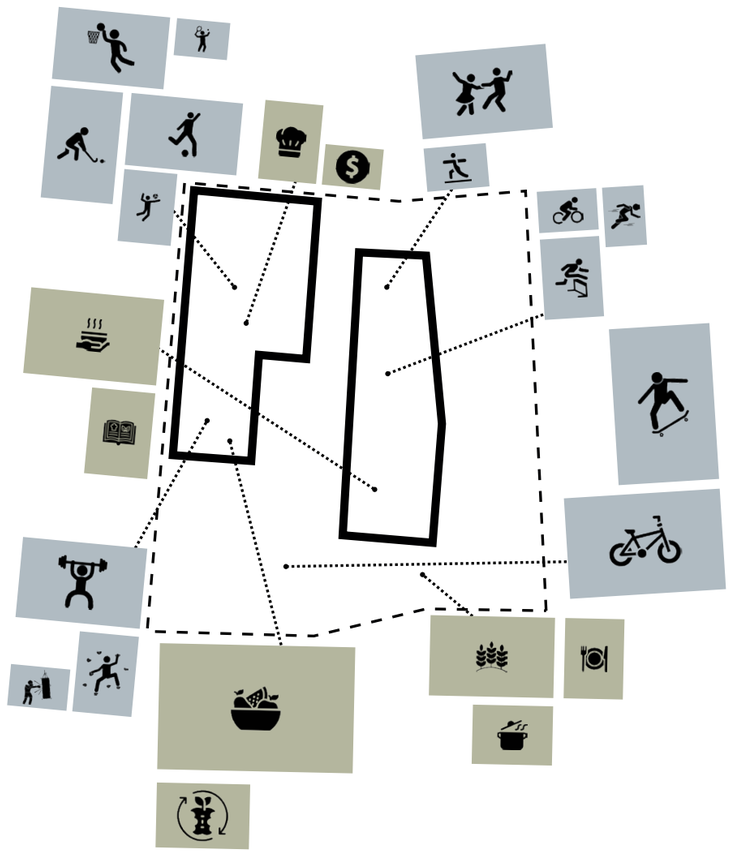

olympic hal
Area ≈ 600 m²
Strength court
Area ≈ 450 m²
Creative hal
Area ≈ 200 m²
Extreme court
Area ≈ 750 m²
athletic oval
Area ≈ 600 m²

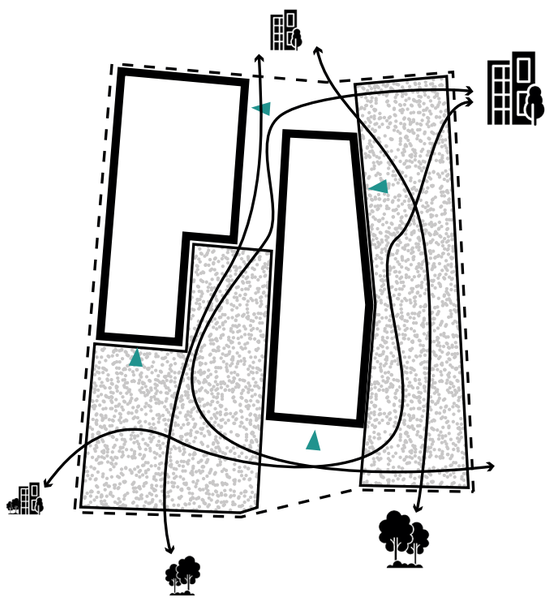
DESIGN POSITION

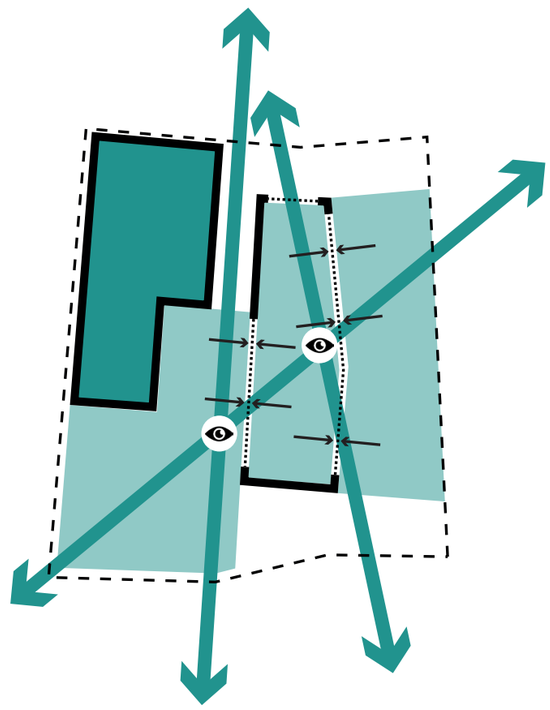
The site where the public condenser is to be built is currently occupied by a Renault car dealership. However this car dealership, together with all other dealerships are ordered by the municipality to move out of the area and the buildings to be demolished. In order to combat unnecessary pollution the existing structure of the Renault dealership can be reused.

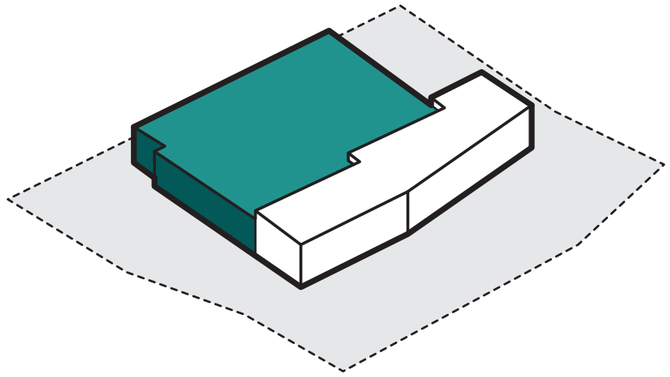
The existing steel frame structure and over dimensioned spaces lend them self well for housing sport facilities. With architectural interventions shown on this page the existing structure can be transformed into a health and well-being focussed public condenser.



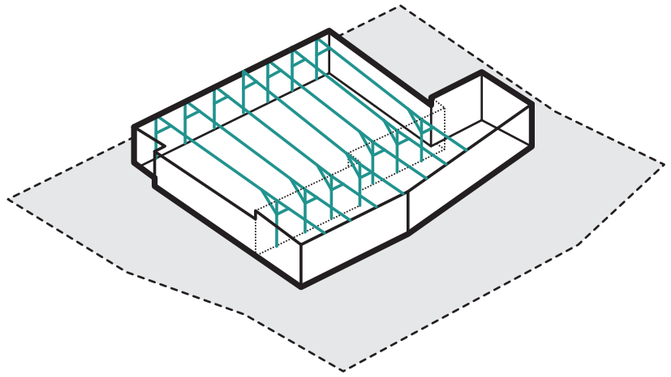




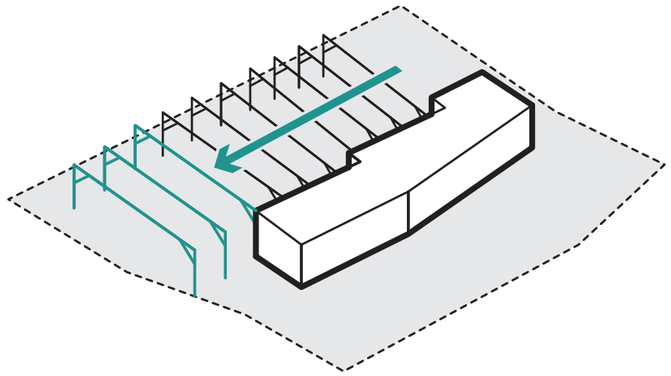




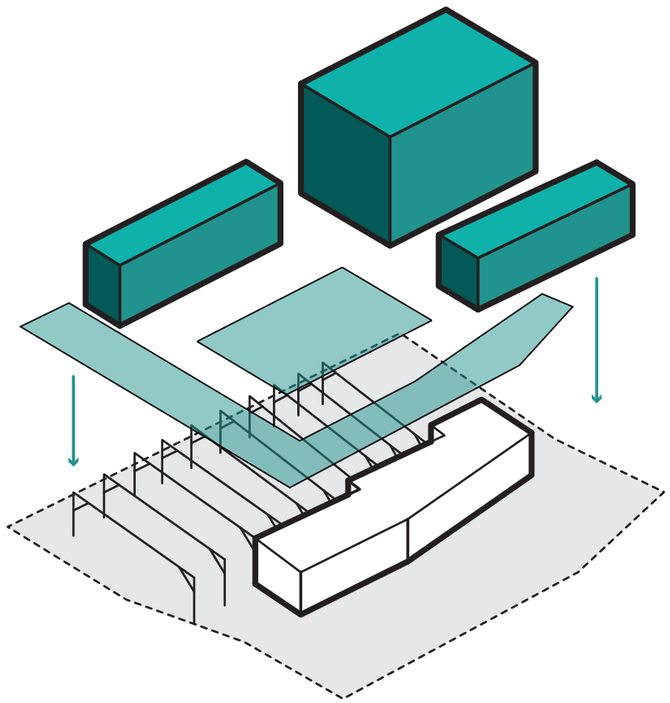
Change in building function



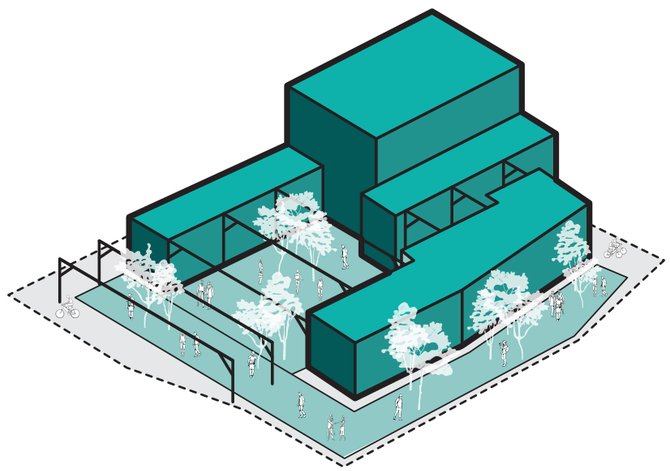
Preservation of existing structure



Extension on existing structure



Placement of volumes housing multifuntional health facilities



Health and community centred design

P2| OUTLINE

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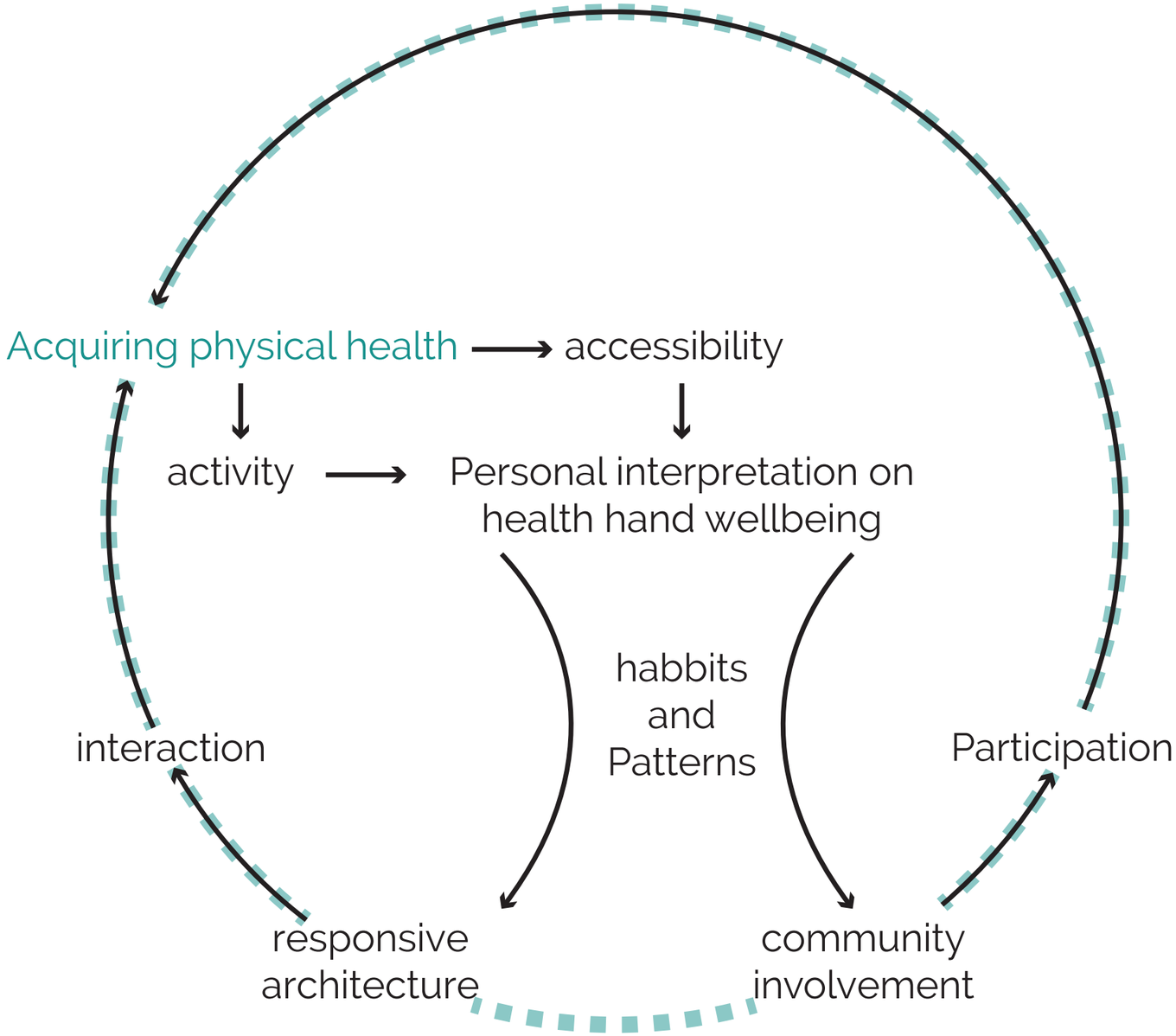
FRAMEWORK


Acquiring physical health
accessibility
activity
Personal interpretation on health hand wellbeing
habbits and Patterns
interaction
Participation
responsive architecture
community involvement







DEMOGRAPHICS



Sarah and Oscar - Age 38 and 40

Disposable income:
medium income
Family structure:
couple without children

Healthcare:
Access to some **basic private healthcare services**. Mostly reliant on Denmark's healthcare system

Physical activity:
Without children they have **more time to spend on physical activities** like sports or walking. Access to basic and public sport facilities

Nutrition:
Average access to healthy food alternatives and healthy dietary habits.



Family Celik - age 55, 56, 20, 25

Disposable income:
low income
Family structure:
small family

Healthcare:
Reliant on Denmark's public healthcare system. Language barriers and lack of familiarity with the system can prevent use of the public healthcare system

Physical activity:
Access to free and public sport facilities. Commercial gyms and sport clubs are not always possible

Nutrition:
Restricted access to healthy food alternatives often leading to unhealthy dietary habits



Maria - age 29

Disposable income:
low income
Family structure:
Single

Healthcare:
Access to Denmark's public healthcare system. Might not use healthcare facilities often due to Maria's age

Physical activity:
Limited access to sport facilities. Mostly reliant on low-cost public facilities

Nutrition:
Restricted access to healthy food. High education can mean an understanding in cheap healthy food alternatives despite her low income



Family Nielsen - age 37, 38, 3, 5 8, 11

Disposable income:
high income
Family structure:
large family

Healthcare:
Access to premium private healthcare and wellness services like therapy and private trainers

Physical activity:
Access to premium and private sport facilities. Active holidays abroad, exclusive memberships and private coaching possible

Nutrition:
Access to premium and healthy food scources. Possibility to frequently eat out



David - age 74

Disposable income:
low / medium income
Family structure:
Widower

Healthcare:
Good access to Denmark's healthcare system. Low income could limit access to private health services or additional care that isn't subsidized

Physical activity:
Access to public facilities and subsidized elderly activity programs. Possible limited participation to organized activity facilities

Nutrition:
Less budget for buying healthy food and less knowledge of cheap healthy food alternatives

DESIGN PRINCIPLES

With the design focussed on activity and well-being an understanding on how humans move, biomechanics, is crucial. The fundamentals of human movement can be distinguished into 7 fundamental elements. Understanding these fundamental elements opens possibilities for translating biomechanics into architecture that stimulates this movement.

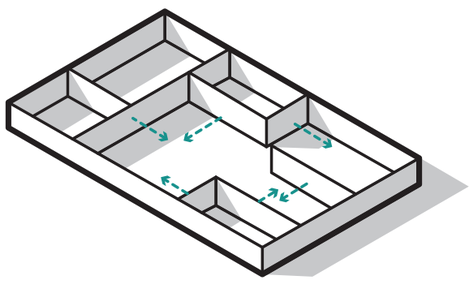


Rotate Squat Hinge Lunge Push Pull Brace

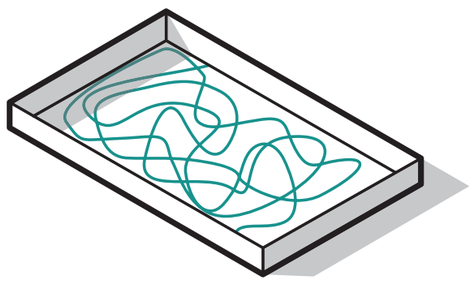
Movement stimulating architecture, active design, becomes the foundation of designing a building that promotes activity and well-being.

The other aspect of stimulating activity through fundamental human aspects is neuroarchitecture. Based on the 5 human senses spaces can promote activity and well-being. Be it by showcasing activity through vision, stimulating healthy food habits through smell of fresh products or interacting with building elements through touch.

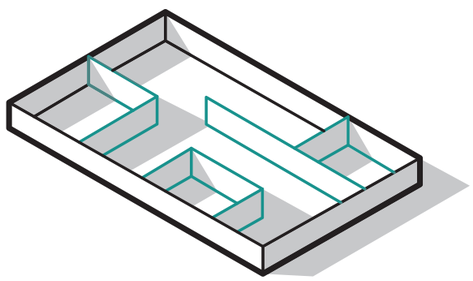
Adaptable space



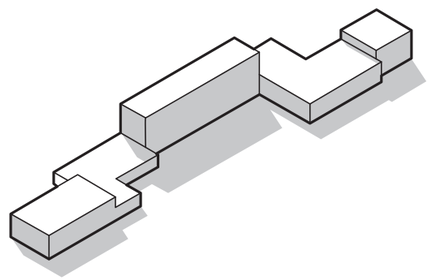
Freedom of movement



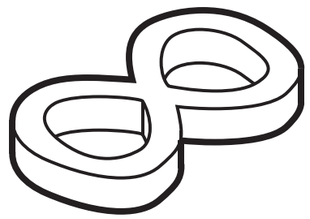
Transparent borders

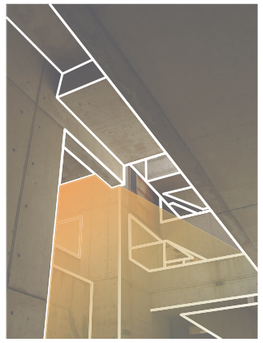


Building as a walkway



Continuous circulation





Vision



Hearing



Smelling



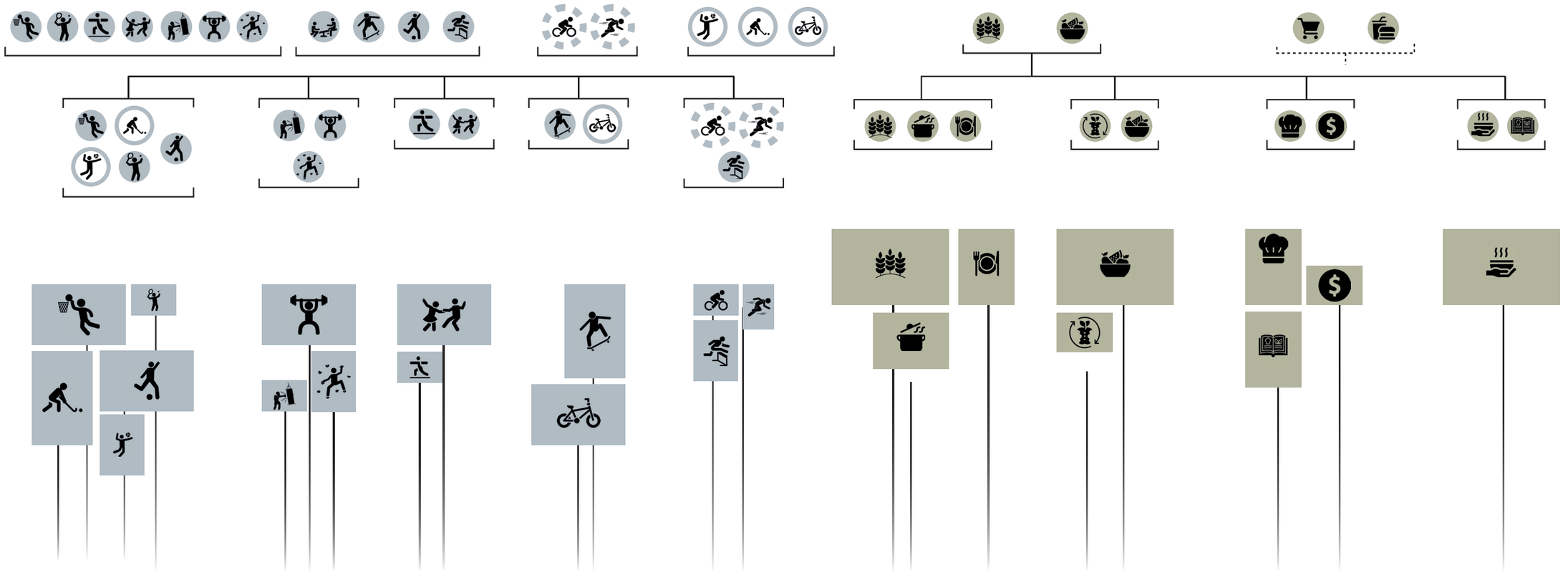
Touching



Tasting

SPATIAL NECESSITIES OF MOVEMENT

Based on the research done on facility mapping in the P1 period an index of spaces is formulated. Following form this index a list of types of movement and spatial necessities of movement are made.
By organizing and grouping spaces with matching types and spatial necessities of space form the base of the building program



Types of movement

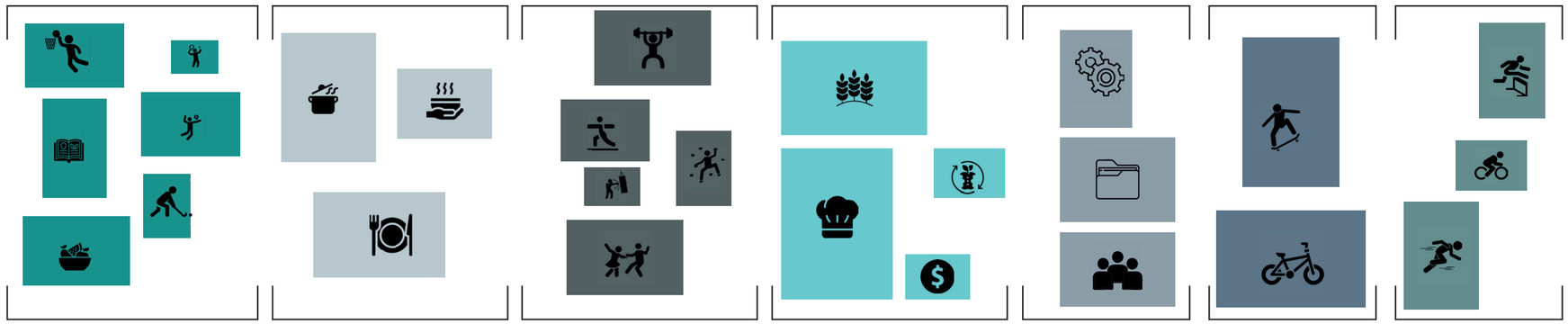
WalkingR
Squatting
Bending
Climbing
Dancing
unning
Pushing
Kicking
Rotating
Falling
Standing
Pulling
Swinging
Hanging
Resting
Stretching
Bending

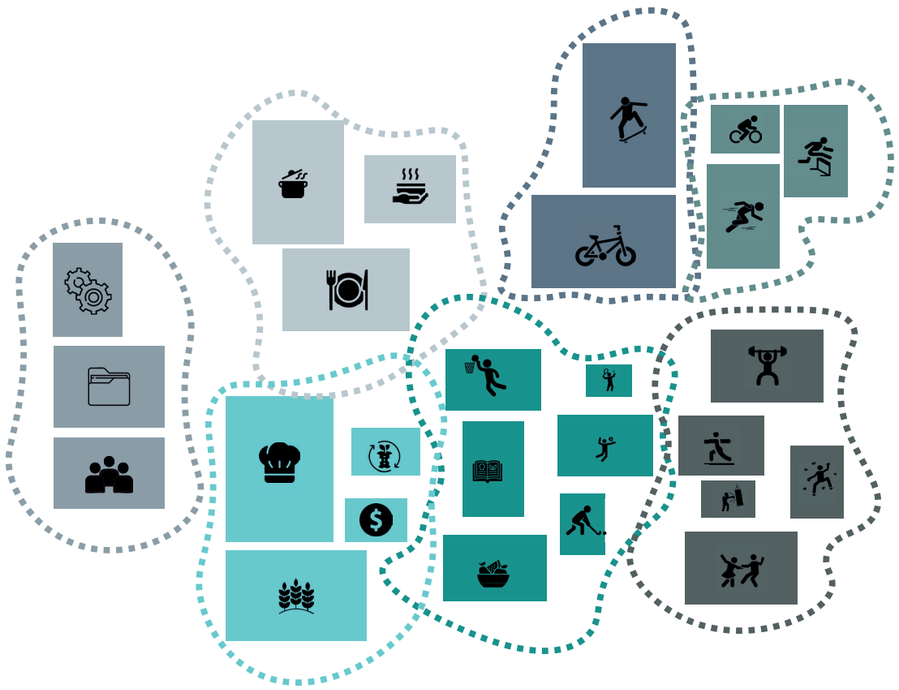
Spatial necessities of movement

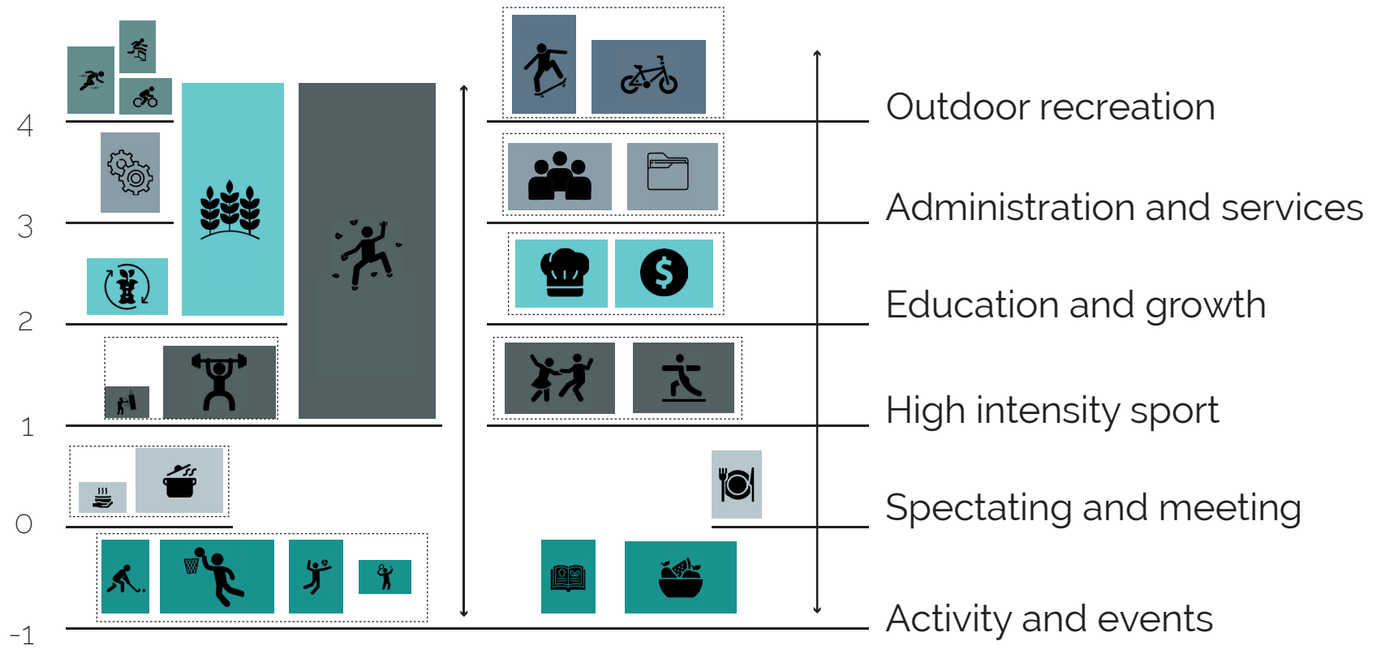
Speed
Space
interaction
Felxibility
Air
Water
Privacy
Light
Rigidity
Obstacles
Comfort

PROGRAM DEVELOPMENT

The grouped spaces derived from the spatial index are organized in a planological way. Analysing the way different spaces are related to each other and where in the building they are positioned.



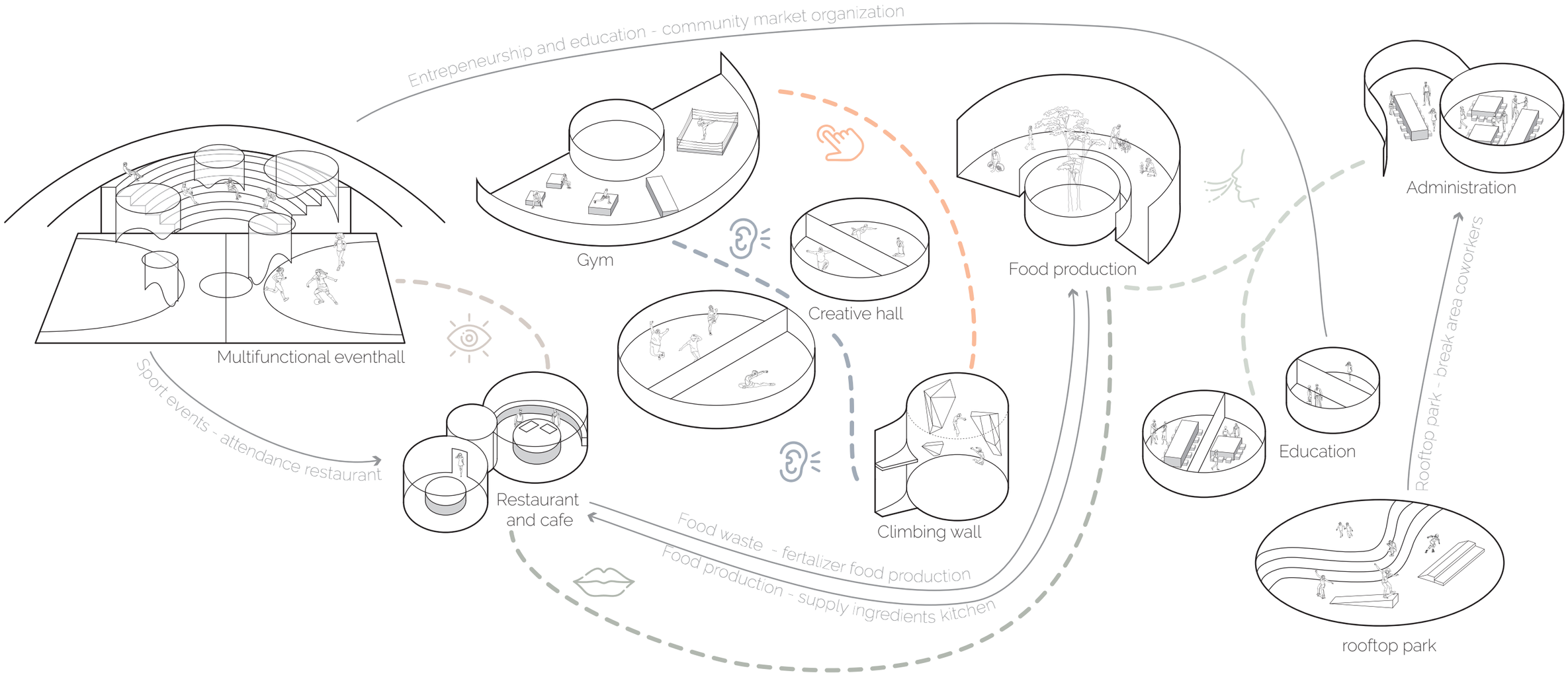




SPATIAL RELATIONS

In order for the design to stimulate activity the building program needs to be related back to the active design and neuroarchitecture design principles. The functions of each individual space strengthens the interaction and participation of the other functions. With spaces like 'food production' and 'restaurant' or the 'event hall' and 'education' having facilities that respond to each other users are stimulated to use the building in a more interactive and diverse way.

This same principle of relating individual spaces is done through neuroarchitecture. Seeing people participate in activities, hearing events take place and smelling the healthy food from cooking workshops all benefit the way people actively participate in the building further.

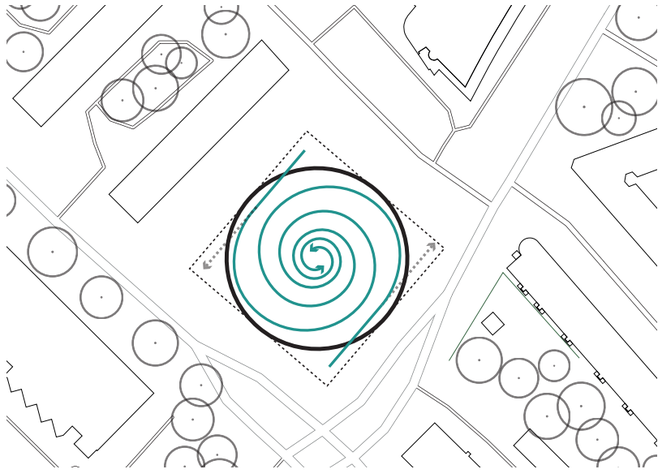


BUILDING FORM

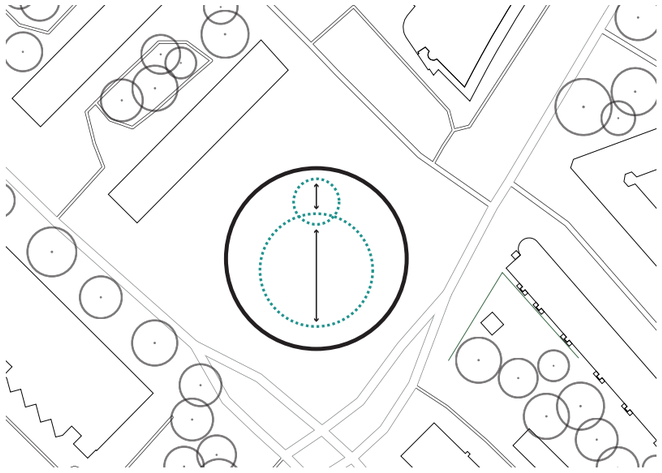
Activity promoting architecture is reflected in the building form. By using basic organic shapes like cylinders and spirals a flow is created where circulation becomes an uninterrupted design element.

This circular form is continued in the interior division of space. Because of the circular composition of functions an interesting negative space arises which acts as an undefined social space where users can interact and participate in activities in a more informal way.

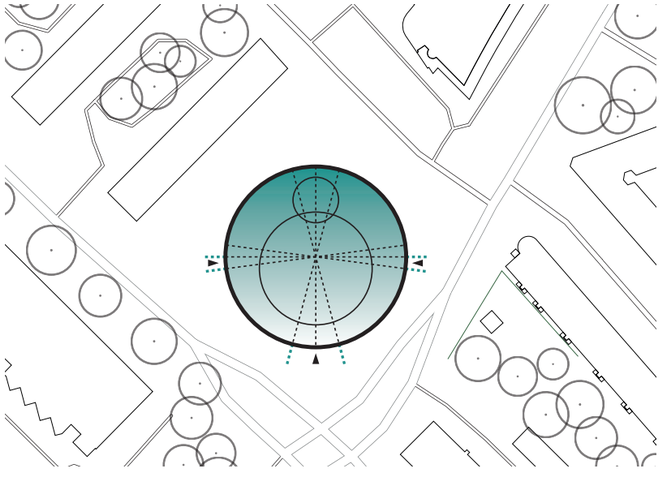
Define building footprint



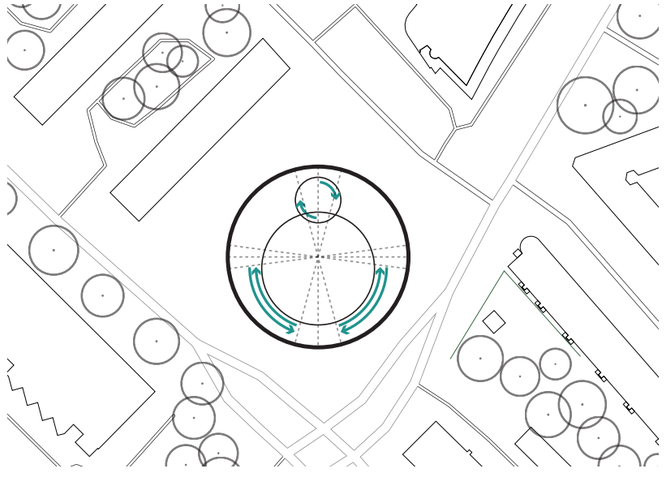
Repeat circular footprint



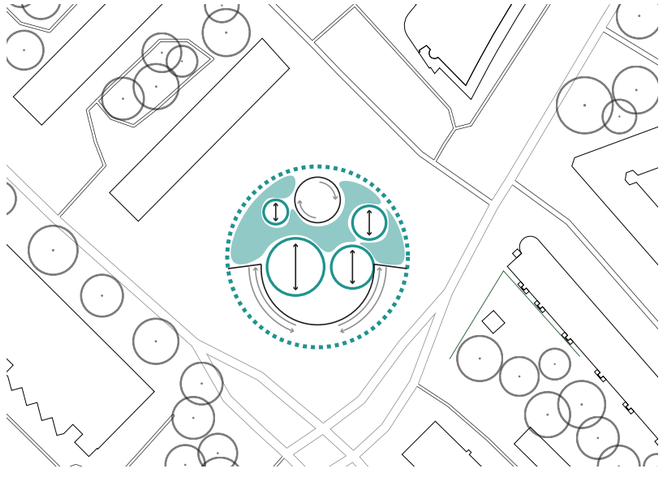
Extending grids along axis



Emphasise and position of circulation



Fluid and dynamic interior space



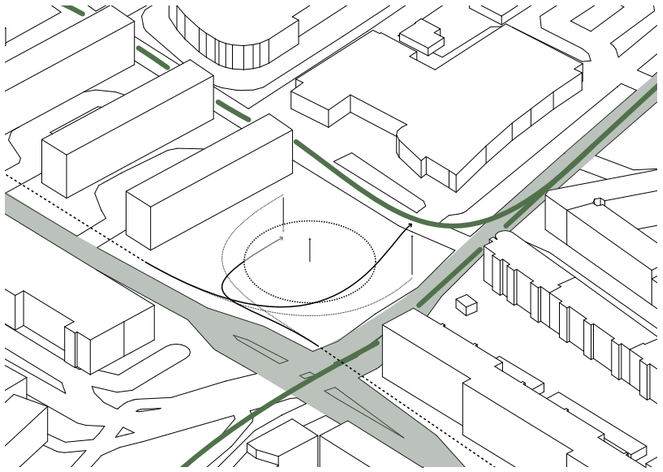
CONTEXT DEVELOPMENT

The circular form of the design poses challenges when positioning it in its context. The all-sided nature of the form asks for extra attention when orientating the building in a inviting and open way.

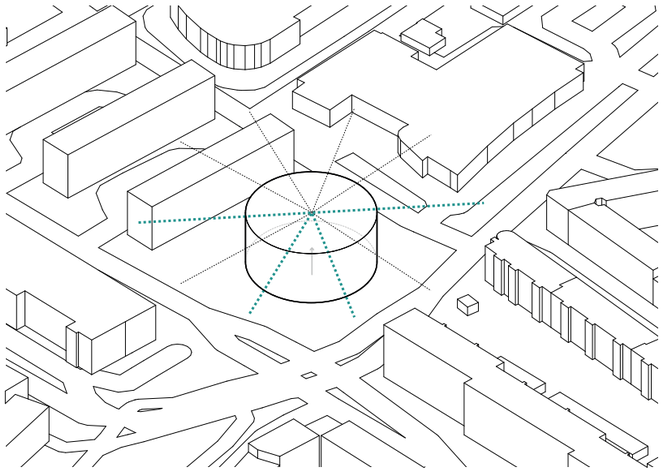
By positioning the spiral circulation towards the main intersection and extending two grid lines from the centre of the building the circular form stretches out towards key entrance points of the site.

The entrance points are each located on a different level making the experience of entering the building unique depending on where the user enters. The landscape follows this elevation change by spiralling from the basement level (right entrance) towards the ground floor level (left entrance).

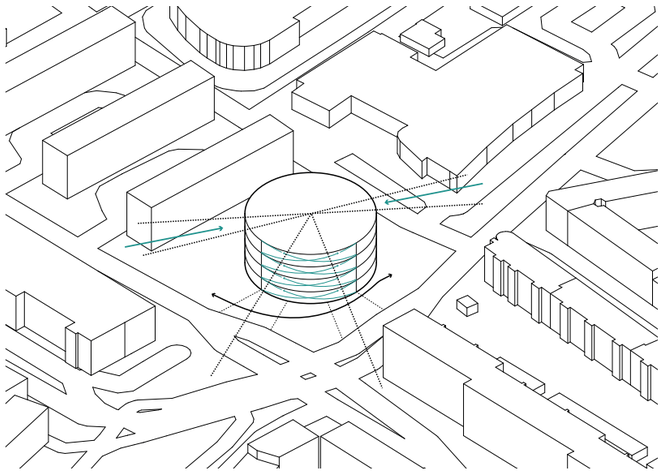
Green corridor - site as cornerstone



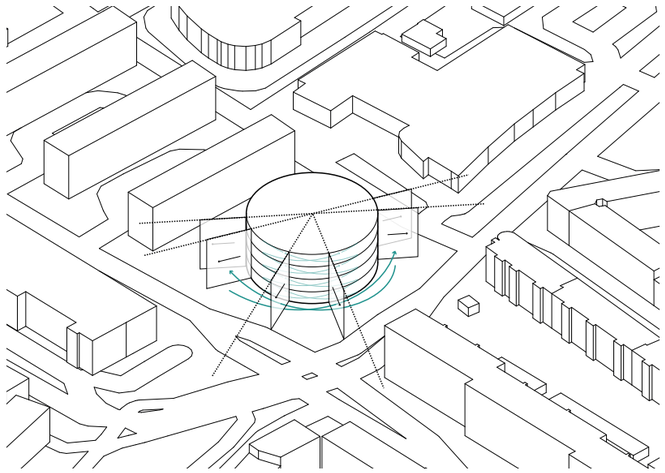
Universal form oriented towards context



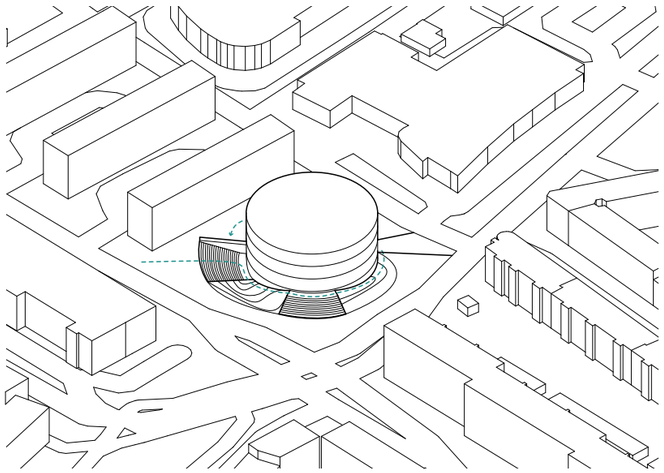
Building entrance positioned at intersections



Interior ramps reflected to the exterior



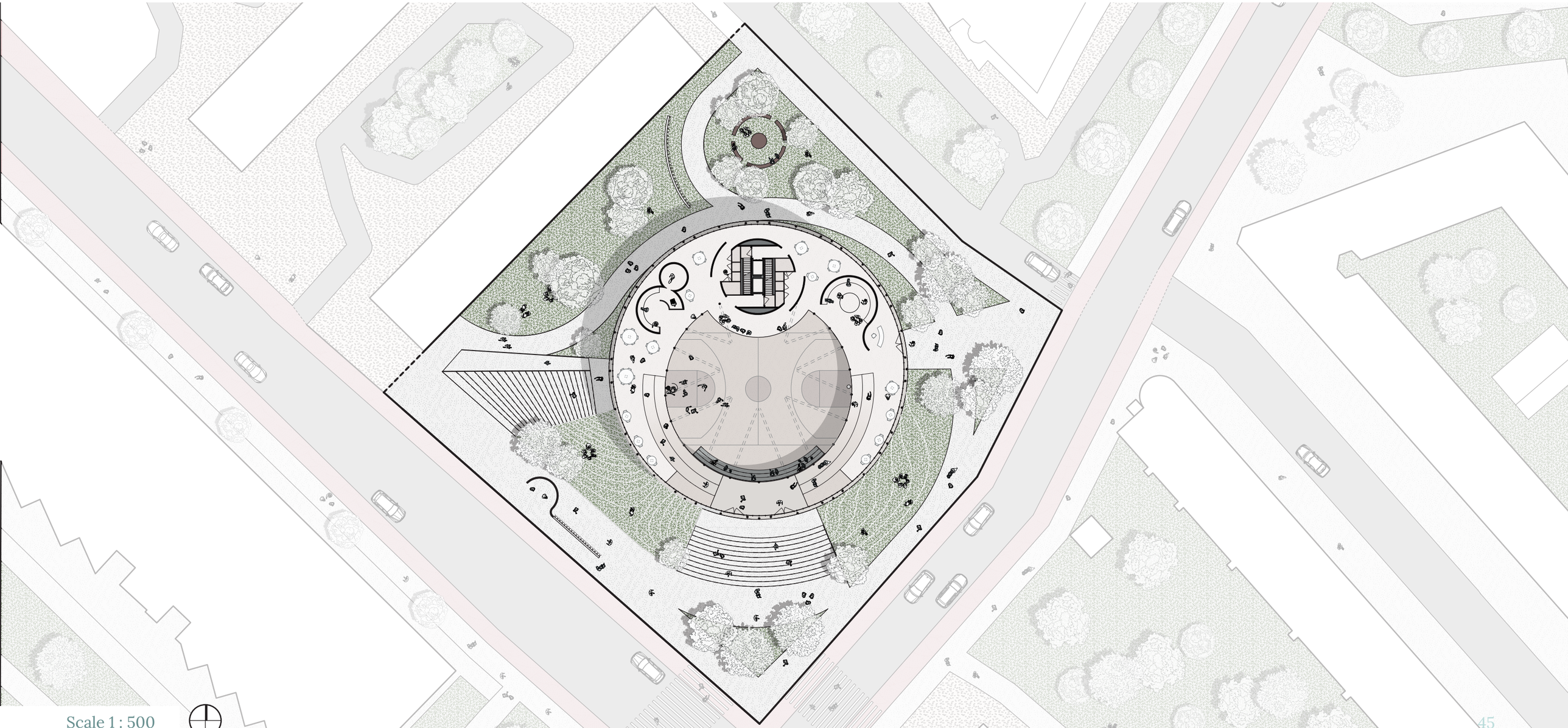
Mass sunken into spiralling landscape



SITE PLAN

A more detailed representation of the site integration is given in the site plan.

The entrances located on the main intersections connect the building to important contextual elements. The west entrance connecting to Nimmerspark, the south entrance connecting to Superkillen park and the east entrance connecting to the residential blocks.

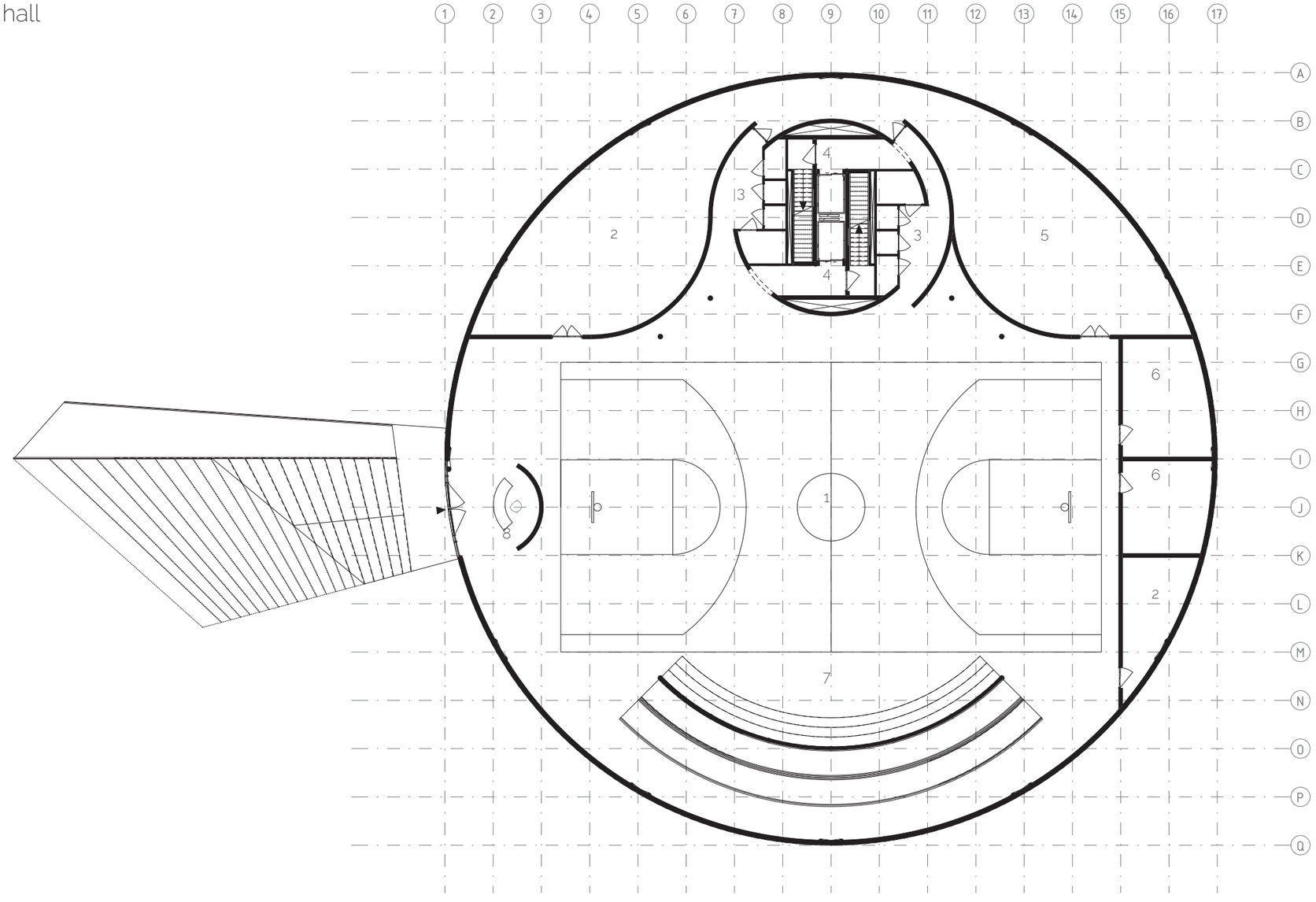


Scale 1 : 500

FLOOR PLAN| -1

The basement level being dedicated to large scale events by providing a large open multifunctional floorspace. On this floor the west entrance is located.

1. Multifunctional event hall
2. Storage
3. Toilets
4. Staircase
5. Mechanical space
6. Dressing room
7. Auditorium
8. Information desk

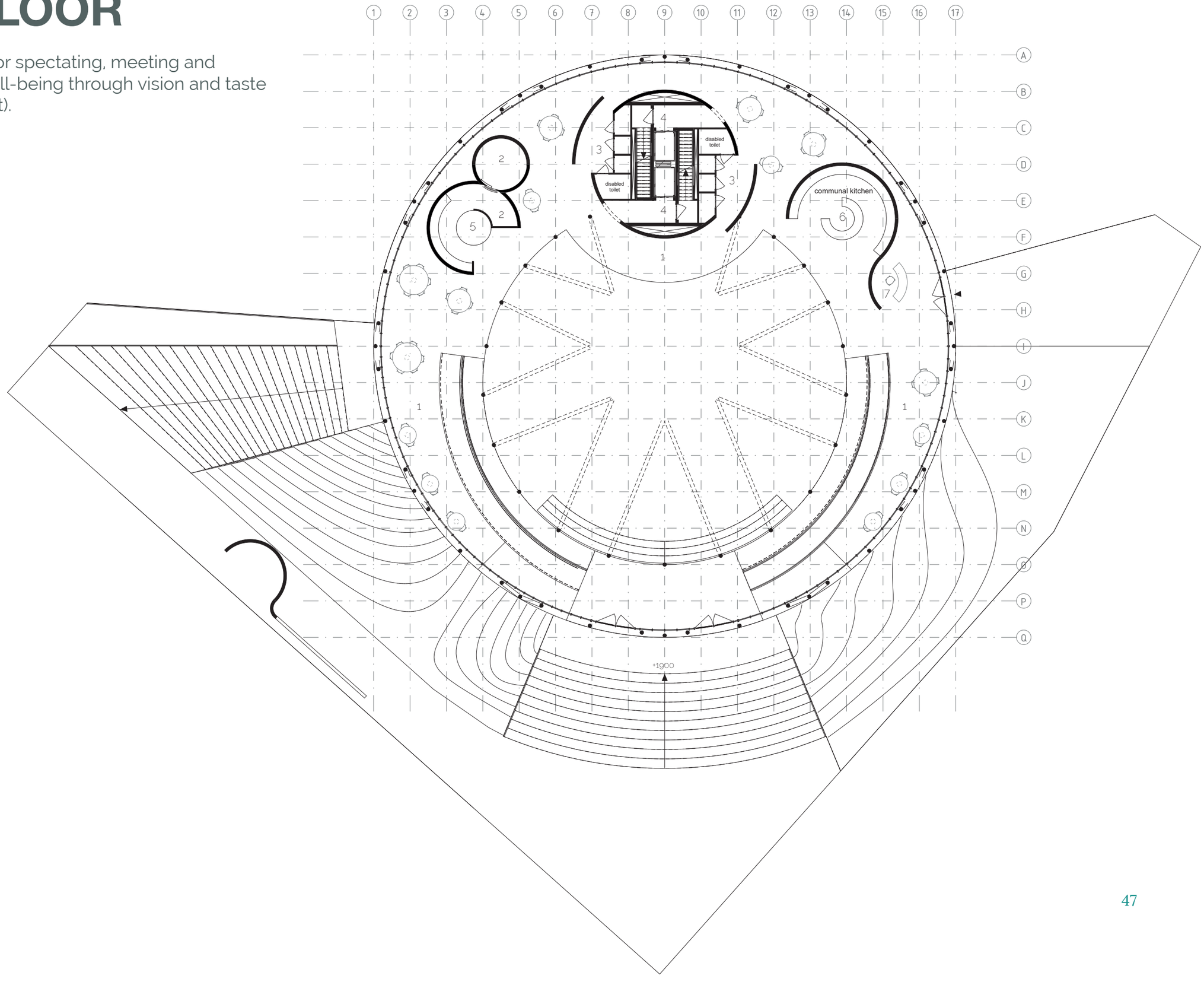


Scale 1 : 250

GROUND FLOOR

The ground floor is designed for spectating, meeting and interacting with activity and well-being through vision and taste (spectating area and restaurant).

1. Spectators area
2. Storrage
3. Toilets
4. Staircase
5. Restaurant/cafe kitchen
6. Communal kitchen
7. Information desk

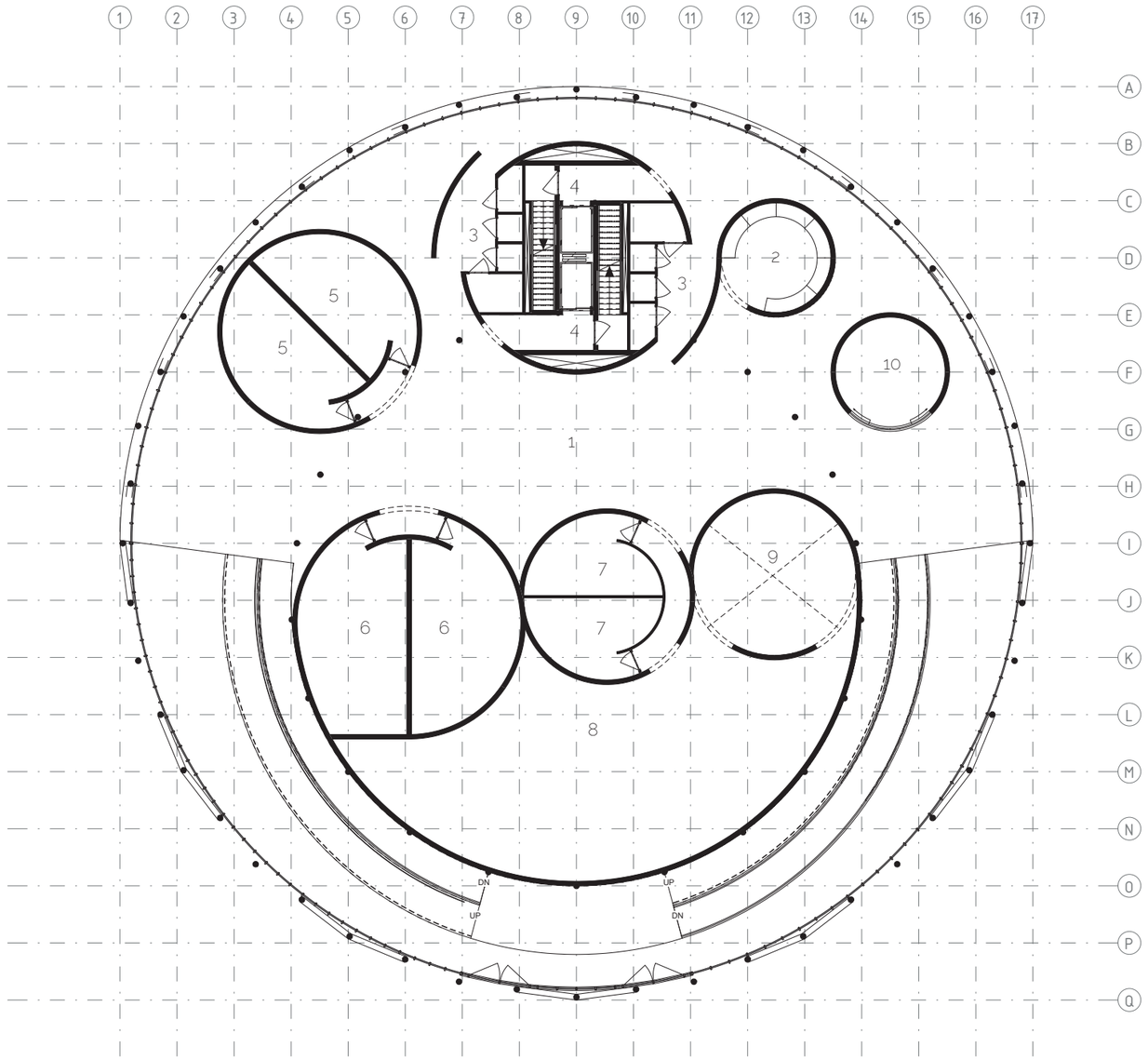


Scale 1 : 250

FLOOR PLAN| 1

The first floor is dedicated to high intensity activities and focussed on physical activity through movement and sports.

1. Communal space
2. Storage
3. Toilets
4. Staircase
5. Dance hall
6. Dressing room
7. Workout area
8. Climbing hall
9. Meditation space

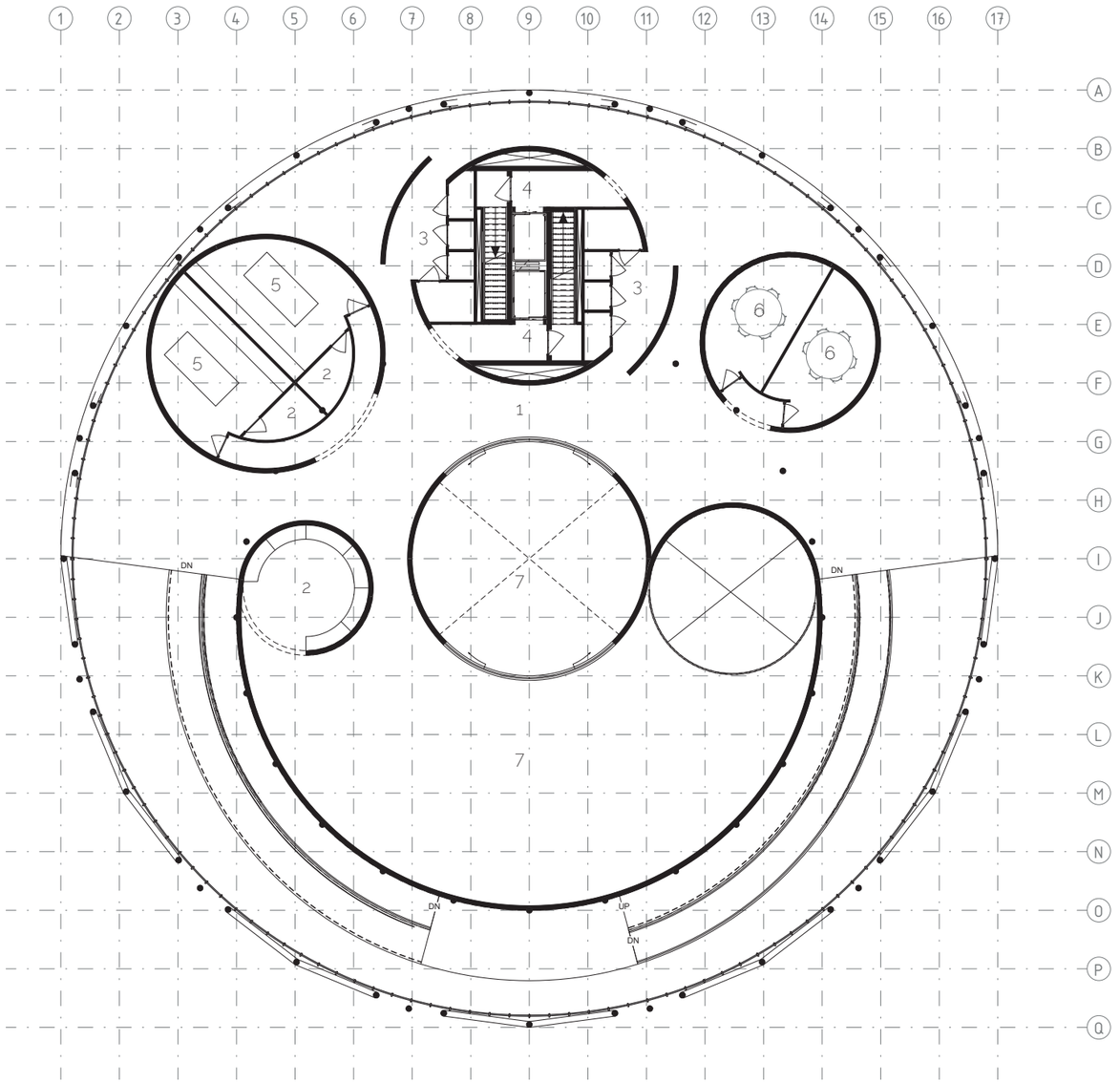


Scale 1 : 250

FLOOR PLAN| 2

The second floor is focussed on growth and development. Both literally (food production) and figuratively (education and workshop programs).

1. Communal space
2. Storage
3. Toilets
4. Staircase
5. Dance hall
6. Dressing room
7. Workout area
8. Climbing hall
9. Meditation space

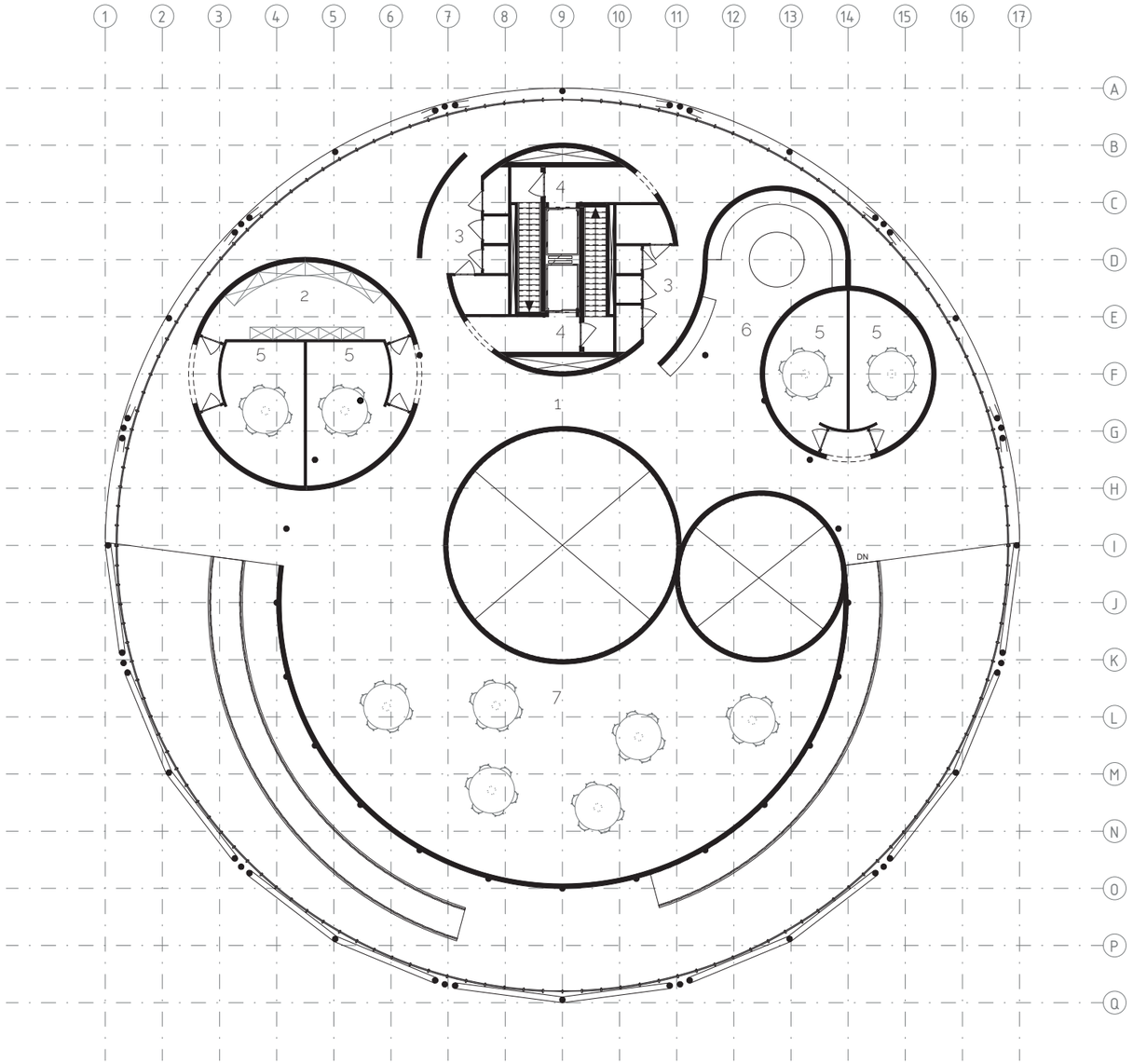


Scale 1 : 250

FLOOR PLAN| 3

The third floor provides office space and services providing extra space for users to interact with the building (entrepreneurship and public services).

1. Communal space
2. Storage
3. Toilets
4. Staircase
5. Workshop space
6. Classroom
7. Food production

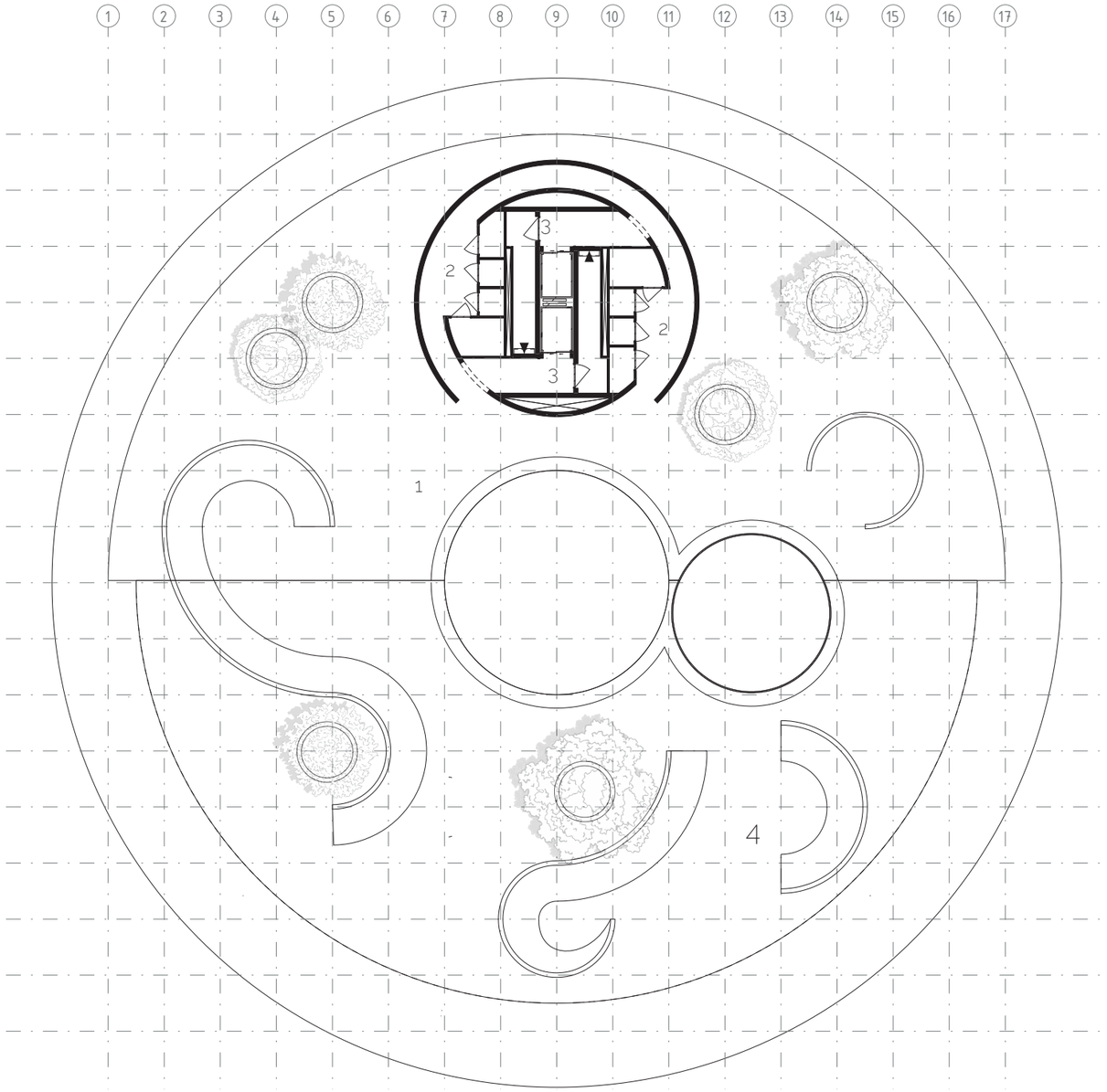


Scale 1 : 250

FLOOR PLAN| 4

The rooftop park provides outdoor recreation space where users can wind down during lunch brakes and interact with other users in an informal outdoor setting.

1. Outdoor recreation space
2. Toilets
3. Staircase
4. Skate park

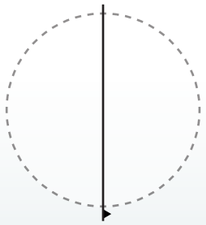


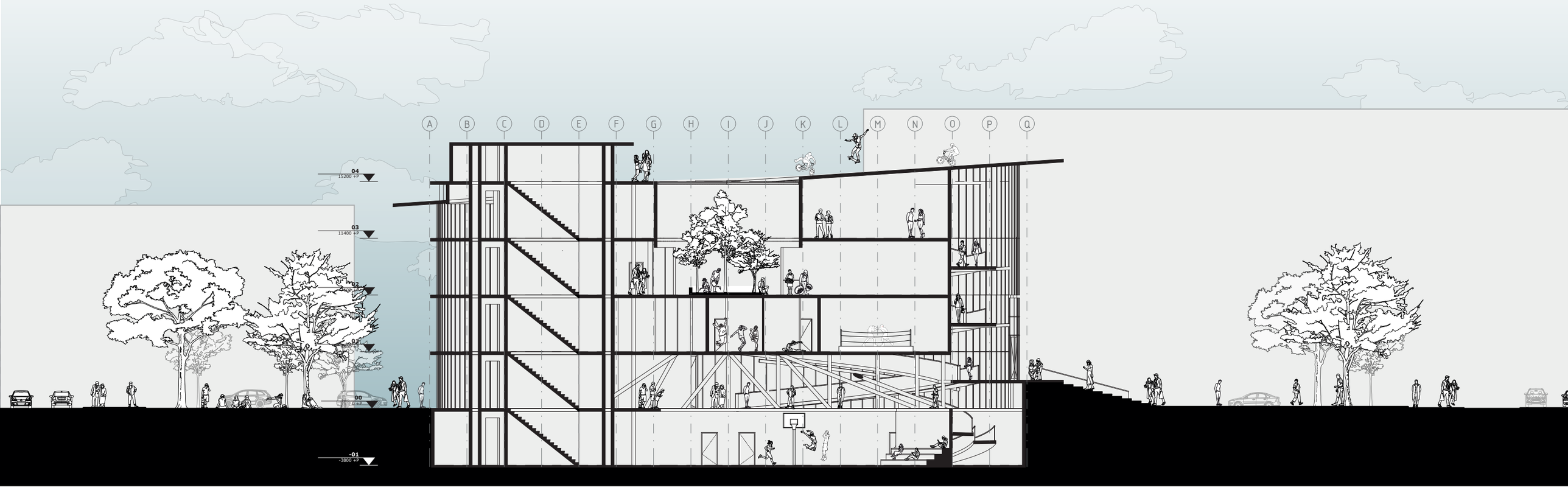
Scale 1 : 250

SECTION| A

The incorporation of the design into its context and the spatial organization of the functions becomes clear when looking at the sections.

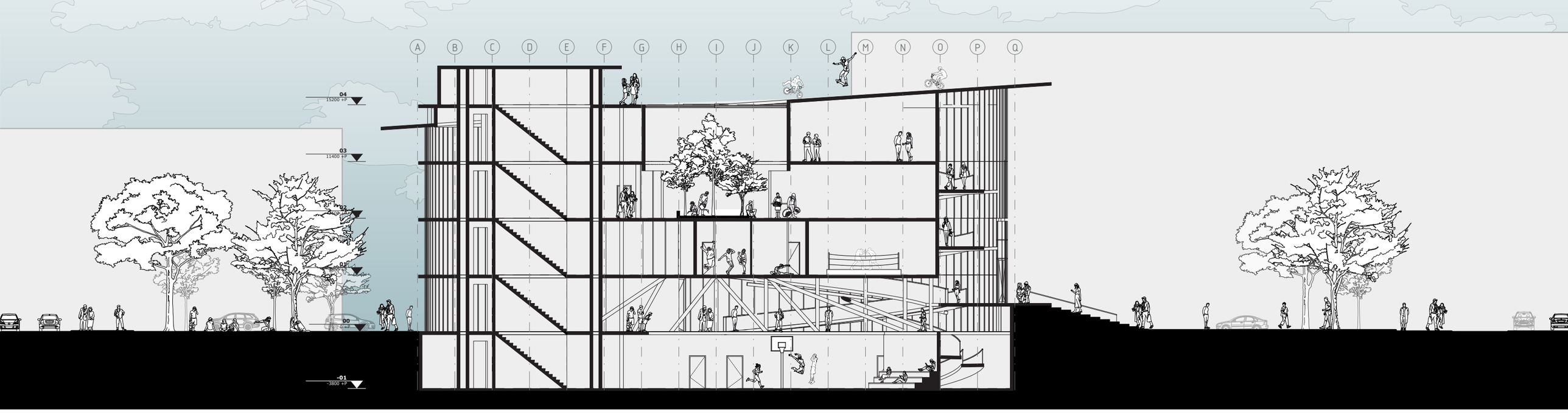
Within the building there are two functions that extend all the way to the roof. Fitted with a skylight roof more daylight enters the building whilst simultaneously these voids can function as a solar chimney, contributing to the sustainability of the building by providing a circular method of ventilation.





Scale 1 : 250

SECTION| B



Scale 1 : 250

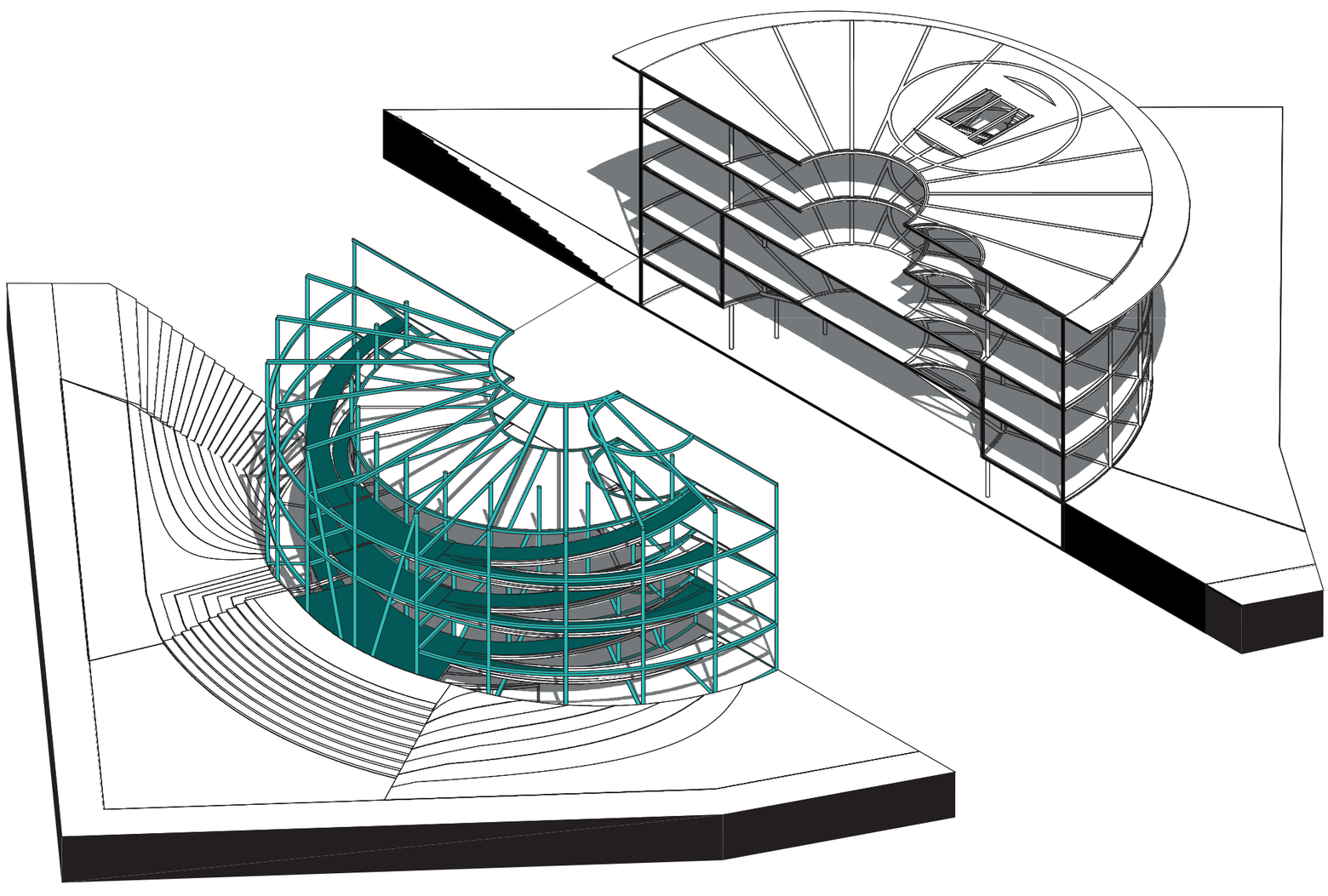
STRUCTURE AND CIRCULATION

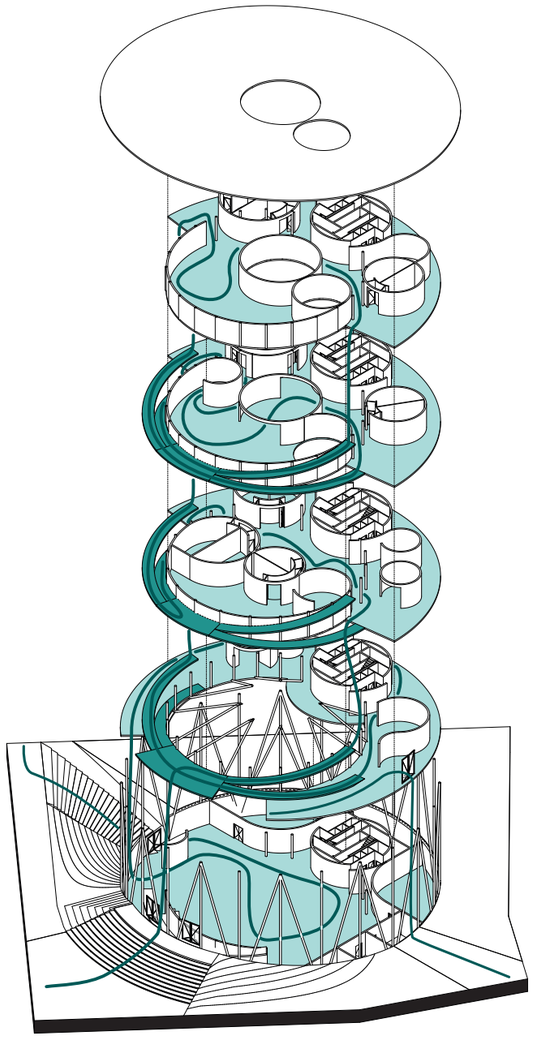
The structure of the building consists of a interior and exterior circular beam construction. These inner and outer beams connecting to each other, providing floor span directions.

Both the inner and outer circular beam structures have their own set of columns. These columns being slanted in the outer ring providing strength against horizontal forces.

How people move through the building is a key aspect of the design. Therefore the circulation principle of the design is highlighted.

The spiral ramps stretch from the sides toward a platform in the centre that acts as a break. This break simultaneously becomes an interesting point where different routes can cross each other. Making these platforms an extra meeting space integrated within the circulation itself.





FACADE SPECULATION

The structure of the building will be visible in the exterior of the facade. Showcasing how the building works from a structural standpoint.

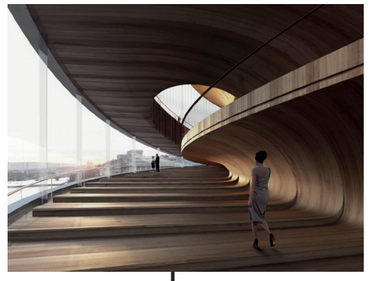
This same transparency is implemented for showcasing the activity and well-being taking place in the building. Through large glass areas in the facade the functions and spiral circulation on the interior becomes visible from the outside.

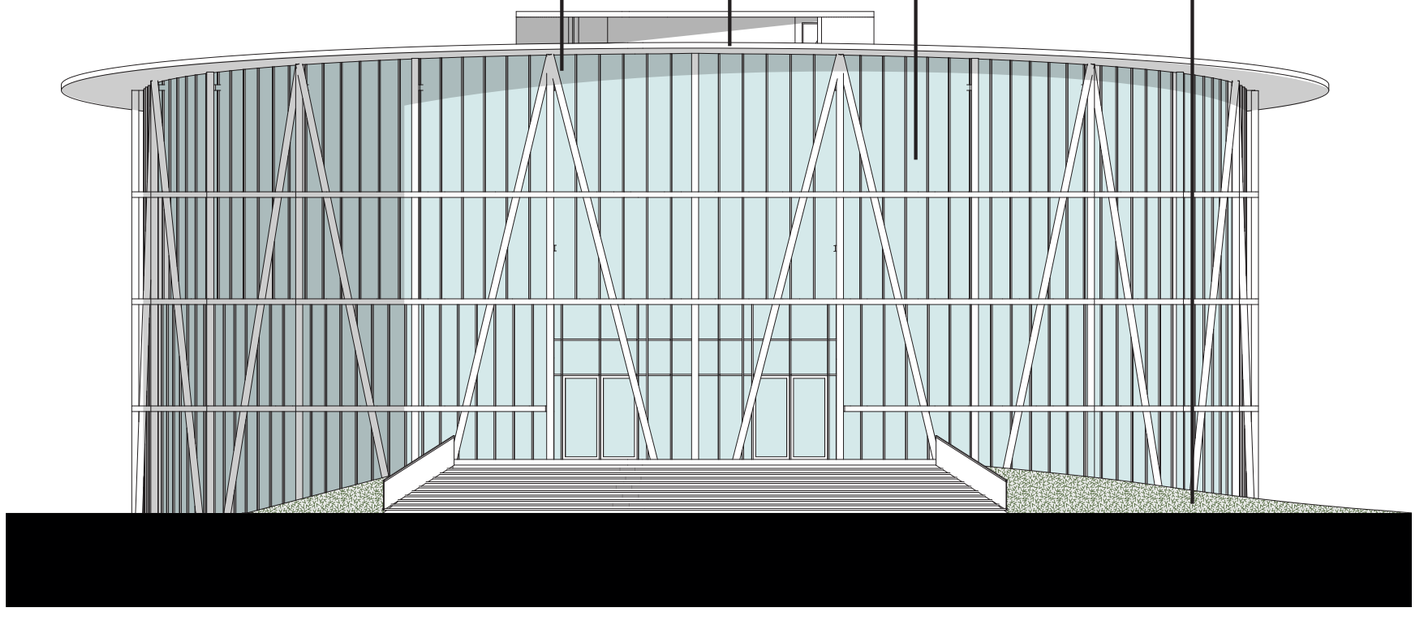














P3| OUTLINE

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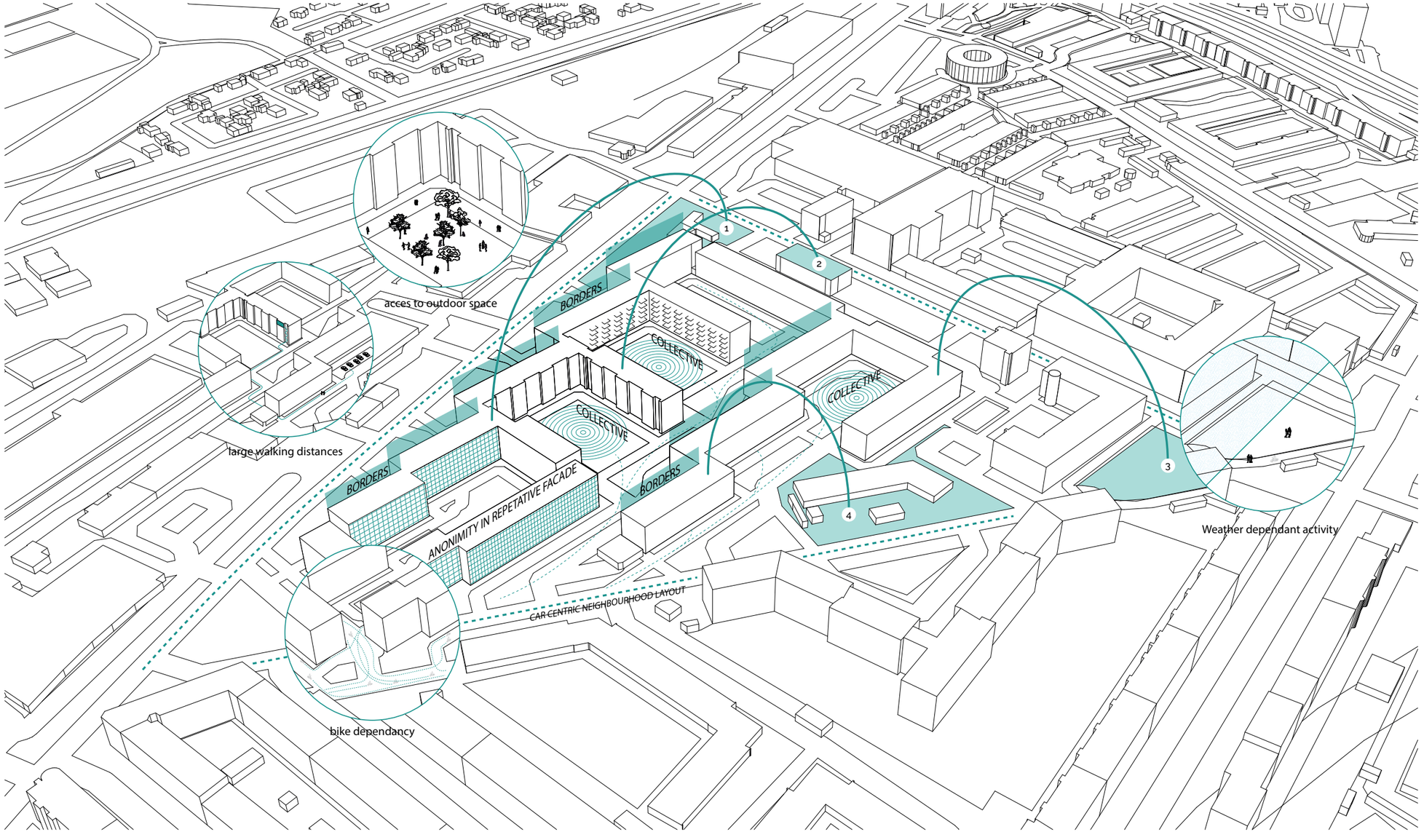
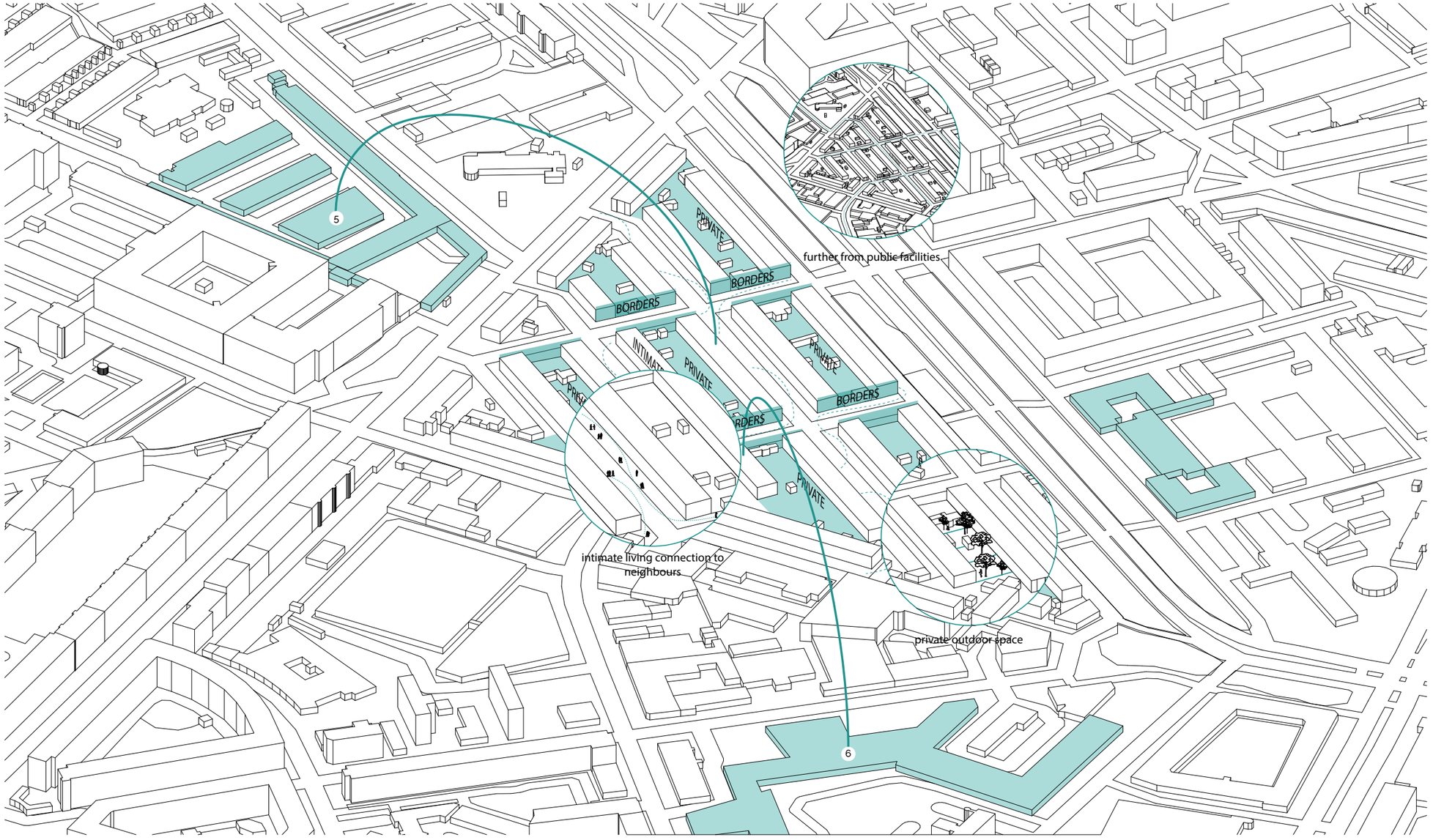
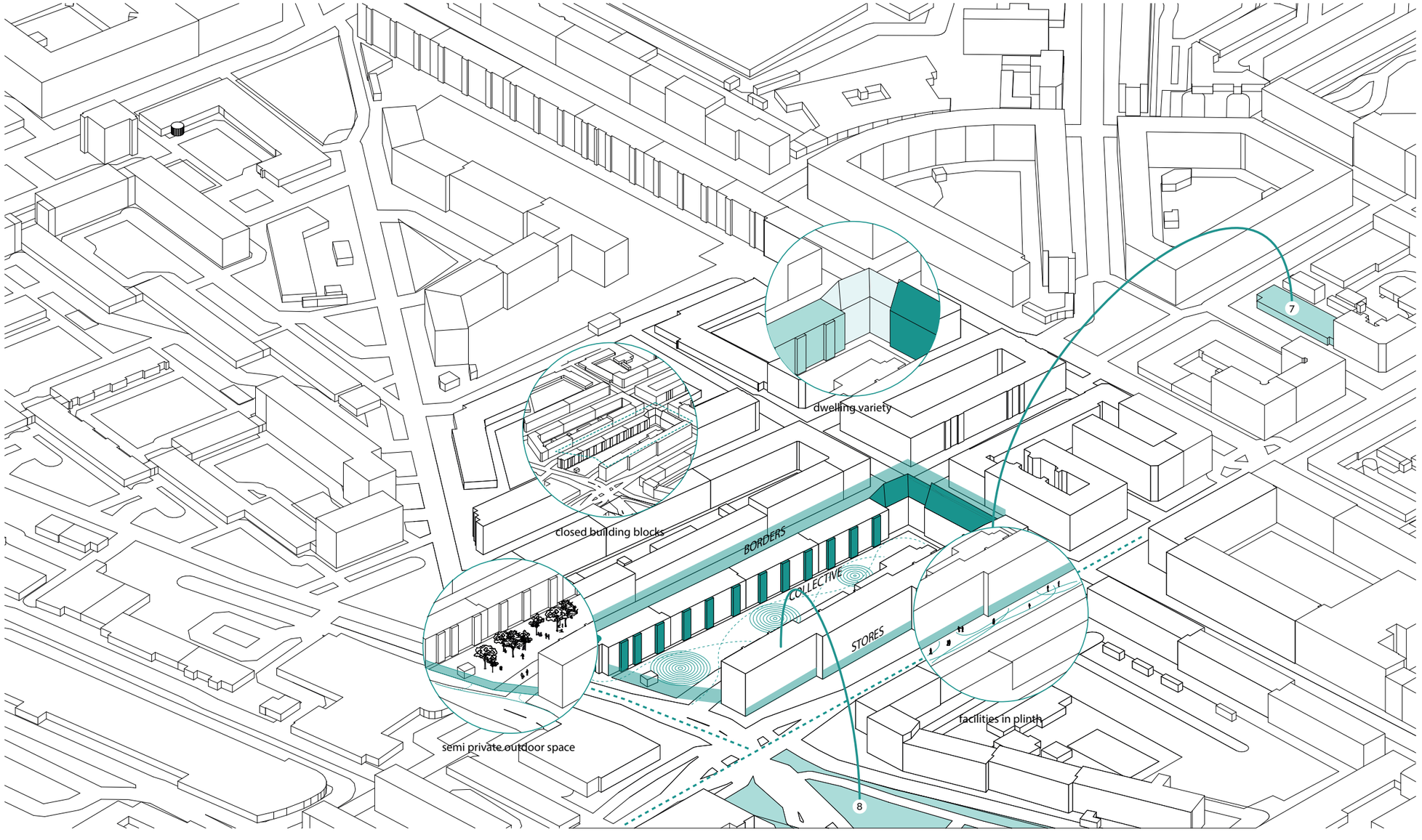
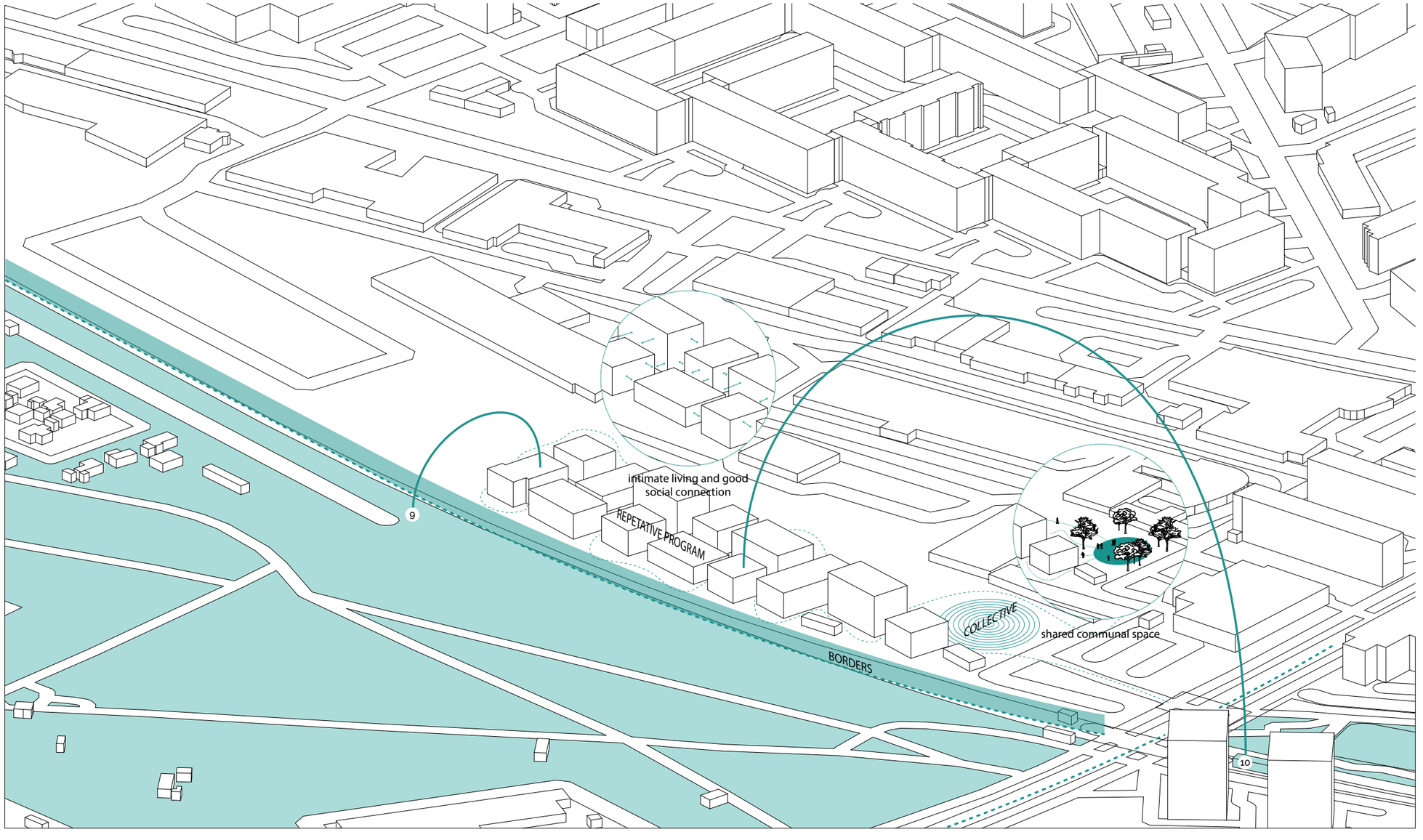
ETHNOGRAPHY ANALYSIS

An ethnography analysis is done in order to better understand how inhabitants of Ydre Norrebro stay active and healthy. This research consists of two scales on which is looked at this vernacular way of staying active. The larger neighbourhood scale focusses on larger urban environmental factors that influence health and well-being.



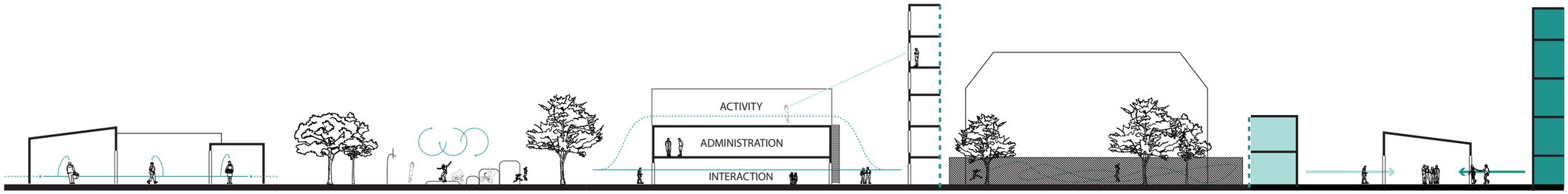

5
further from public facilities.
BORDERS
PRIVATE
INTIMATE
intimate living connection to neighbours
6
private outdoor space


7
dwelling variety
closed building blocks
BORDERS
COLLECTIVE
STORES
facilities in plinth
semi private outdoor space
8


intimate living and good
social connection
REPETATIVE PROGRAM
9
COLLECTIVE
shared communal space
BORDERS
10

By zooming in on the ethnographical health aspect on building scale it becomes clear that the meaning of staying healthy and active can be summarized into key aspects. These aspects correlate with local habits and patterns that are already in place and practices by inhabitants.

In order for the design to effectively connect to the local inhabitants it is important to take local habits and patterns on health and well-being into consideration. By incorporating functions and elements fitting with the buildings contexts and users the design becomes a familiar place. Further stimulating user to practice healthy activities.



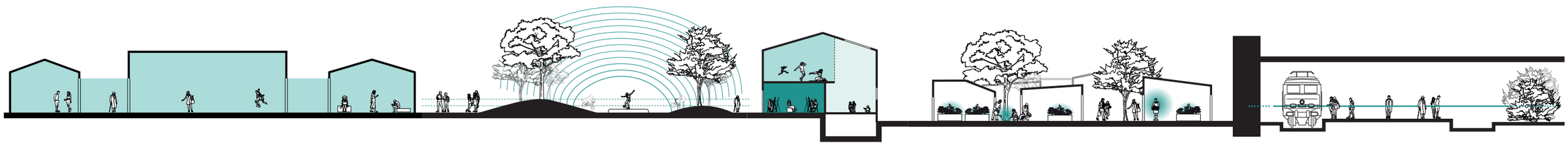
1. CONSCIENCE LIVING
Community to community initiatives

2. PRACTICING SKILLS
Mixing users and functions

3. MEET AND PLAY
Centralized social spaces

4. DISCOVER AND LEARN
Safe space for learning and playing

5. EXPERIMENTING AND DEVELOPING
Common connector between different users



6. CREATIVE EXPRESSION
Collective ownership

7. DIVERSITY IN SPATIAL MOVEMENT
Contextual elements define spaces

8. RECREATION
Multiplicity in program

9. CARRING
Activity based on own initiatives

10. CONNECTIVITY
Levels of movement between borders

REFERENCE PROJECTS



walk on balcony

zalewski architecture
https://www.zalewskiag.com/en/projects/project/walkon_balcony



Towada Community Plaza

Kengo Kuma architects
https://www.archdaily.com/625914/towada-community-plaza-kengo-kuma-and-associates



Stavros Niarchos foundation cultural centre

Renzo Piano building workshop
https://www.archdaily.com/790678/stavros-niarchos-foundation-cultural-centre-renzo-piano-building-workshop?ad_source=search&ad_medium=projects_tab



Co-working utopic, Conde de Casal

Izaskun Chinchilla
https://www.archdaily.com/794909/co-working-utopic-us-conde-de-casal-izaskun-chinchilla-architects



Curiousity constructs

Archidiaries
https://www.archidiaries.com/projects/curiosity-constructs-a-journey-through-childhood-experiences-memories/



Guggenheim museum

Frank Lloyd Wright
https://www.archdaily.com/788914/gallery-frank-lloyd-wrights-solomon-r-guggenheim-museum-by-laurian-ghinitoiu



E-GOI & CLAVEL'S KITCHEN

Paulo Merlini arquitetos
https://www.archdaily.com/961624/e-goi-and-clavels-kitchen-offices-paulo-merlini-arquitetos?ad_medium=gallery



Le Cube: Mirrored Skate Ramp

Mana and Scott oster
https://www.dezeen.com/2019/09/29/le-cube-installation-skateboarding-shop-interiors/



The Playscape

WAA architects
https://www.archdaily.com/962522/childrens-community-centre-nil-the-playscape-waa



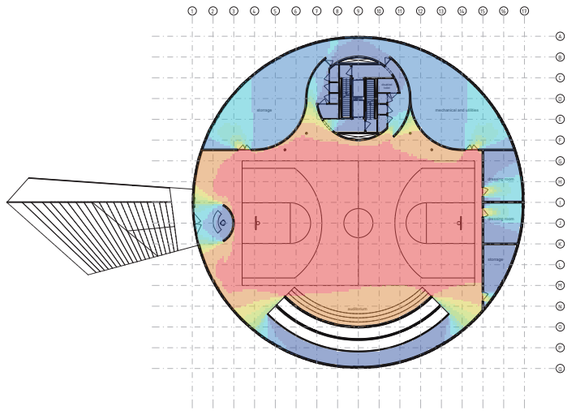
Playground landscapes

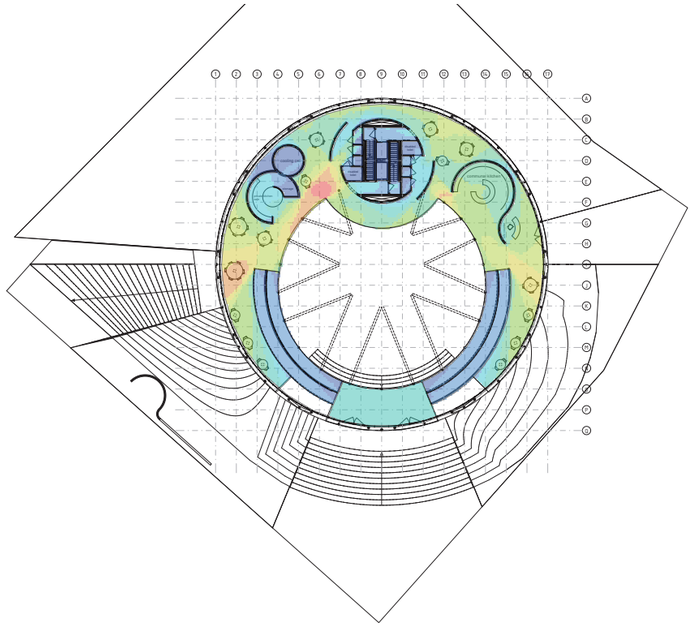
HDH architects
https://www.archdaily.com/964577/playground-landscapes-at-santa-maria-mazzarello-square-hdh-arquitectos

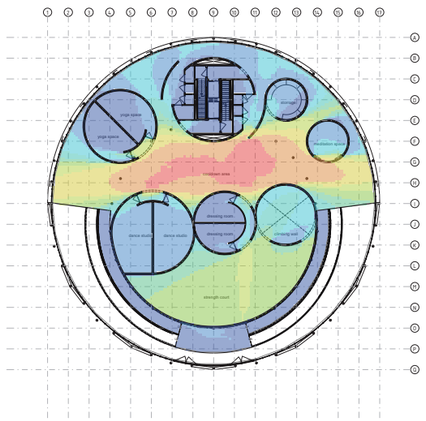
MOVEMENT INTENSITY ANALYSIS

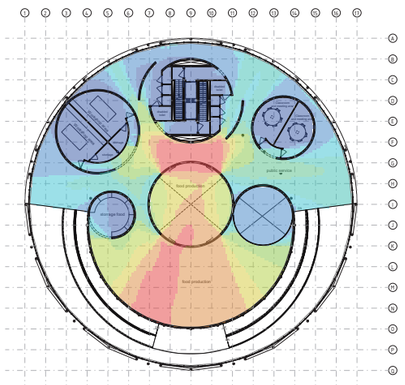
The way users move through the building is an important aspect of the design. By using elements like sloped ramps and curved interior spaces the user is stimulated to more intensely move throughout the building. In order to test if these design choices have the desired effect a space syntax analysis is preformed.

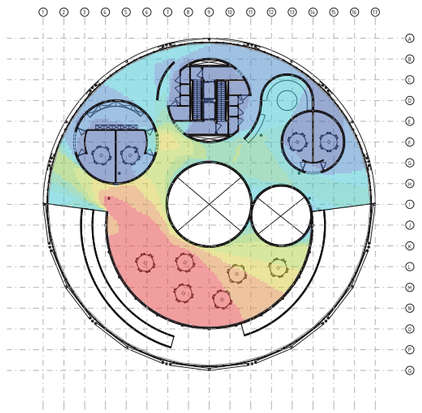
The analysis shows that because of the curved interior spaces a lot of floor area remains unused. Hindering movement instead of stimulating it. Following this research it can be stated that the floor plans should follow a more logical and open layout.







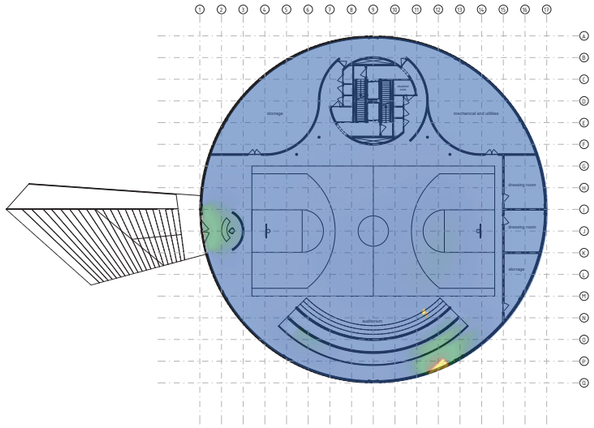


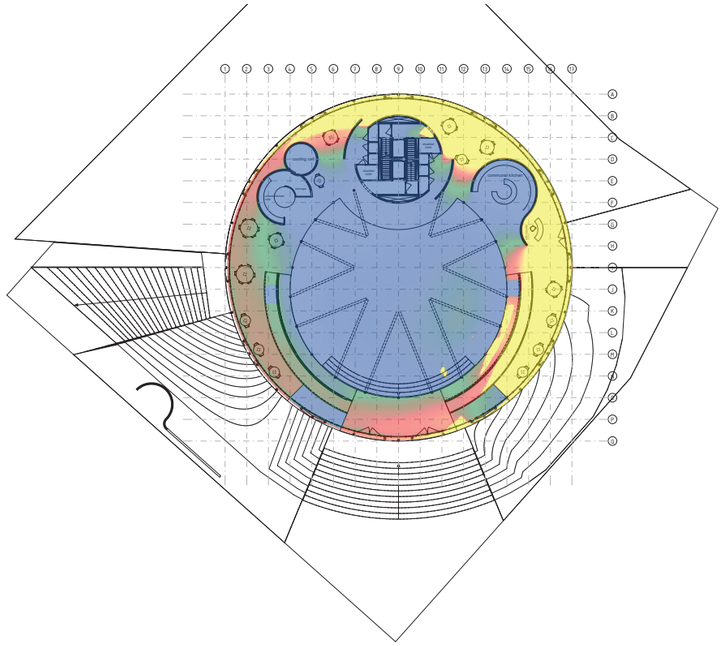


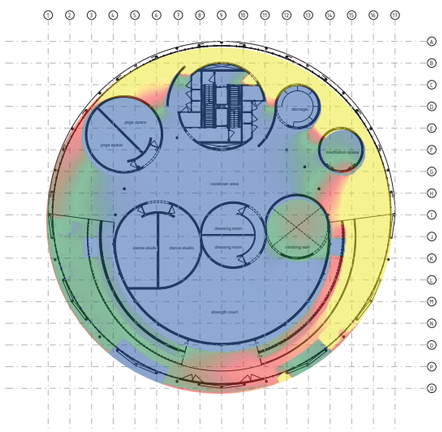
DAYLIGHT ENTRY

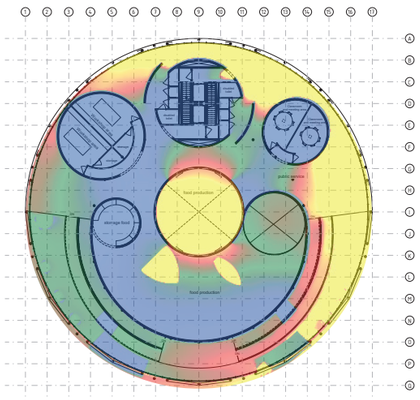
The way users practise health is largely affected by the interior comfort and climate of the building. Light open spaces are inviting and stimulate users to participate and interact with the architecture

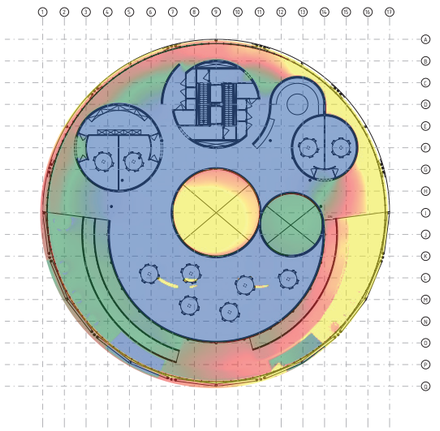
A study on the daylight entry reveals that the amount of daylight entering the centre of the building is minimal. This research revealing the same conclusion as the movement intensity analysis. The floor plans lack openness











HEAT STRESS

Whilst the previous analysis mainly looked at the building layout the research on heat stress dives deeper into the spatial comfort of the functions inside. The calculations done reveal how sensitive certain spaces are to changes in temperature. This sensitivity is expressed in amount of users needed to heat up the space by one degree.

This is done in two situations, one where users are practicing a low level of activity like walking. The second situation where users are practicing a high level of activity like running. This research expresses the importance of creating a comfortable interior atmosphere for activity to take place

ACTIVITY AREA

Level of activity = low
m3 of the space = 6879.895m3 * 1.293 Kg/m3 = 8895.704 Kg of air

kJ needed to heat the space with 1 degree Celsius:
1.005 * 8895.704 = 8940.183kJ
8940.183 / 3.6 = 2482.384 Watts

2482.384 / 100 = 25 people / hour
Transpiration = 0.5 * 25 = 12.5

Level of activity = high
m3 of the space = 6879.895m3 * 1.293 Kg/m3 = 8895.704 Kg of air

kJ needed to heat the space with 1 degree Celsius:
1.005 * 8895.704 = 8940.183kJ
8940.183 / 3.6 = 2482.384 Watts

2482.384 / 300 = 8 people / hour
transpiration = 2 * 8 = 16 litre

Conclusion: the space is sensitive to interior climate change caused by human physical activity taking place.

GYM AND CLIMBING HALL

Level of activity = low
m3 of the space = 686.590m3 * 1.293 Kg/m3 = 887.761 Kg of air

kJ needed to heat the space with 1 degree Celsius:
1.005 * 887.761 = 892.200 kJ
892.200 / 3.6 = 247.833 Watts

247.833 / 100 = 2.5 people / hour
Transpiration = 0.5 * 2.5 = 1.25 litre

Level of activity = high
m3 of the space = 686.590m3 * 1.293 Kg/m3 = 887.761 Kg of air

kJ needed to heat the space with 1 degree Celsius:
1.005 * 887.761 = 892.200 kJ
892.200 / 3.6 = 247.833 Watts

247.833 / 100 = 0.8 person / hour
Transpiration = 2 * 0.8 = 1.6 litre

Conclusion: the space is sensitive to interior climate change caused by human physical activity taking place.

DANCE STUDIO

Level of activity = low
m3 of the space = 125.514m3 * 1.293 Kg/m3 = 162.290 Kg of air

kJ needed to heat the space with 1 degree Celsius:
1.005 * 162.290 = 163.101 kJ
163.101 / 3.6 = 45.306 Watts

45.306 / 100 = 0.5 people / hour
Transpiration = 0.5 * 0.5 = 0.25 litre

Level of activity = high
m3 of the space = 125.514m3 * 1.293 Kg/m3 = 162.290 Kg of air

kJ needed to heat the space with 1 degree Celsius:
1.005 * 162.290 = 163.101 kJ
163.101 / 3.6 = 45.306 Watts

45.306 / 300 = 0.15 people / hour
Transpiration = 2 * 0.15 = 0.3 litre

Conclusion: the space is sensitive to interior climate change caused by human physical activity taking place.

COMMUNAL SPACE

Level of activity = low
m3 of the space = 1630.722m3 * 1.293 Kg/m3 = 2108.524 Kg of air

kJ needed to heat the space with 1 degree Celsius:
1.005 * 2108.524 = 2119.066 kJ
2119.066 / 3.6 = 588.629 Watts

588.629 / 100 = 6 people / hour
Transpiration = 0.5 * 6 = 3 litre

Level of activity = low
m3 of the space = 1630.722m3 * 1.293 Kg/m3 = 2108.524 Kg of air

kJ needed to heat the space with 1 degree Celsius:
1.005 * 2108.524 = 2119.066 kJ
2119.066 / 3.6 = 588.629 Watts

588.629 / 300 = 2 people / hour
Transpiration = 2 * 2 = 4 litre

Conclusion: the space is sensitive to interior climate change caused by human physical activity taking place.

FOOD PRODUCTION

Level of activity = low
m3 of the space = 1261.885m3 * 1.293 Kg/m3 = 1631.617 Kg of air

kJ needed to heat the space with 1 degree Celsius:
1.005 * 1631.617 = 1639.775 kJ
1639.775 / 3.6 = 455.493 Watts

455.493 / 100 = 4.5 people / hour
Transpiration = 0.5 * 4.5 = 2.25 litre

Level of activity = high
m3 of the space = 1261.885m3 * 1.293 Kg/m3 = 1631.617 Kg of air

kJ needed to heat the space with 1 degree Celsius:
1.005 * 1631.617 = 1639.775 kJ
1639.775 / 3.6 = 455.493 Watts

455.493 / 300 = 1.5 people / hour
Transpiration = 2 * 1.5 = 3 litre

Conclusion: the space is sensitive to interior climate change caused by human physical activity taking place.

WORKSHOP ROOM

Level of activity = low
m3 of the space = 94.787m3 * 1.293 Kg/m3 = 122.560 Kg of air

kJ needed to heat the space with 1 degree Celsius:
1.005 * 122.560 = 123.172 kJ
123.172 / 3.6 = 34.215 Watts

34.215 / 100 = 0.3 people / hour
Transpiration = 0.5 * 0.3 = 0.015 litre

Level of activity = high
m3 of the space = 94.787m3 * 1.293 Kg/m3 = 122.560 Kg of air

kJ needed to heat the space with 1 degree Celsius:
1.005 * 122.560 = 123.172 kJ
123.172 / 3.6 = 34.215 Watts

34.215 / 300 = 0.1 people / hour
Transpiration = 2 * 0.1 = 0.2 litre

Conclusion: the space is sensitive to interior climate change caused by human physical activity taking place.

COMMUNAL SPACE

Level of activity = low
m3 of the space = 1305.399m3 * 1.293 Kg/m3 = 1687.881 Kg of air

kJ needed to heat the space with 1 degree Celsius:
1.005 * 1687.881 = 1696.320 kJ
1696.320 / 3.6 = 471.200 Watts

471.200 / 100 = 5 people / hour
Transpiration = 0.5 * 5= 2.5 litre

Level of activity = high
m3 of the space = 1305.399m3 * 1.293 Kg/m3 = 1687.881 Kg of air

kJ needed to heat the space with 1 degree Celsius:
1.005 * 1687.881 = 1696.320 kJ
1696.320 / 3.6 = 471.200 Watts

471.200 / 300 = 1,5 people / hour
Transpiration = 2 * 1.5 = 3 litre

Conclusion: the space is sensitive to interior climate change caused by human physical activity taking place.

OPEN OFFICE

Level of activity = low
m3 of the space = 2060,068m3 * 1.293 Kg/m3 = 2663,668 Kg of air

kJ needed to heat the space with 1 degree Celsius:
1.005 * 2663,668 = 2676,986 kJ
2676,986 / 3.6 = 743,607 Watts

743,607 / 100 = 7,5 people / hour
Transpiration = 0.5 * 7.5 = 3.75 litre

Level of activity = high
m3 of the space = 2060,068m3 * 1.293 Kg/m3 = 2663,668 Kg of air

kJ needed to heat the space with 1 degree Celsius:
1.005 * 2663,668 = 2676,986 kJ
2676,986 / 3.6 = 743,607 Watts

743,607 / 300 = 2,5 people / hour
Transpiration = 2 * 2.5 = 5 litre

Conclusion: the space is sensitive to interior climate change caused by human physical activity taking place.

ENERGY EXPENDITURE

Understanding how a building reacts to movement is one important step in designing architecture that promotes health and well-being. However by understanding how users react to architecture that promotes health and well-being a deeper understanding is created.

By calculating the energy expenditure of users it becomes clear how intense certain activities are, how long users are in the building practicing sports and how elements like sloped landscapes or ramps affect the user.

Basketball game
Duration - 40 min.
Calories burned: 416 Kcal

Volleyball game
Duration - 90 min.
Calories burned: 810 Kcal

Tennis game
Duration - 90 min.
Calories burned: 854 Kcal

Hockey game
Duration - 60 min.
Calories burned: 608 Kcal

Football game
Duration - 90 min.
Calories burned: 1170 Kcal

Fitness
Duration - 60 min.
Calories burned: 390 Kcal

Dancing
Duration - 60 min.
Calories burned: 639 Kcal

Martial arts
Duration 60 min.
Calories burned: 819 Kcal

Yoga
Duration - 60 min.
Calories burned: 229Kcal

Skateboarding
Duration - 60 min.
Calories burned: 410 Kcal

BMX riding
Duration - 60 min.
Calories burned: 696 Kcal

Climbing / Bouldering
Duration - 60 min.
Calories burned: 585Kcal

Cooking
Duration - 60 min.
Calories burned: 164 Kcal

Gardening
Duration 60 min.
Calories burned: 311 Kcal

Walking (flat ground)
Duration - 60 min.
Calories burned: 390 Kcal

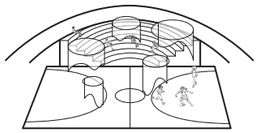
Climbing Ramps (10% incline)
Duration - 60 min.
Calories burned: 780 Kcal

Climbing stair
Duration - 60 min.
Calories burned: 360 Kcal

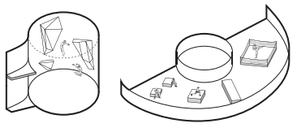
Spectating
Duration - 60 min.
Calories burned: 106 Kcal

PROGRAM ELABORATION

The design of P2 got changed according to the new research done during the P3 period. The old building program got deconstructed and revised in order to better represent well-being architecture. Changes like multiplicity in program, dynamic movement, open floor plans, and incorporating elements fitting with the local habits and patterns on health and well-being.

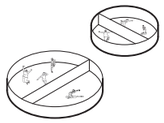


10. bispebjerg station - connectivity



2. Community centre - play

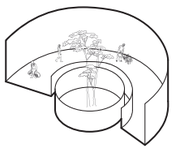
3. Sportspark - practicing skills



5. Bolsjefabrikken - creative expression

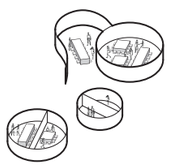


2. Community centre - meet



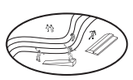
1. Recycle centre - conscience living

9. Urban farms - caring



6. University campus - experimenting

4. Elementary school - Discover and learn



7. Osram Huset - recreation

Movement connected trough open structures





Open space allows for creative flow





Local community building through urban farming initiatives



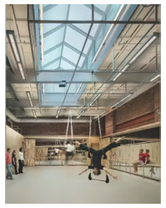


Balance between privacy in practicing and spectating creative acts

Tactile elements representing nature and conscience living



Building elements as activity stimulus





Multiplicity in activity layouts



Building elements with double functions





Meet and play





Weather dependant ways of recreation



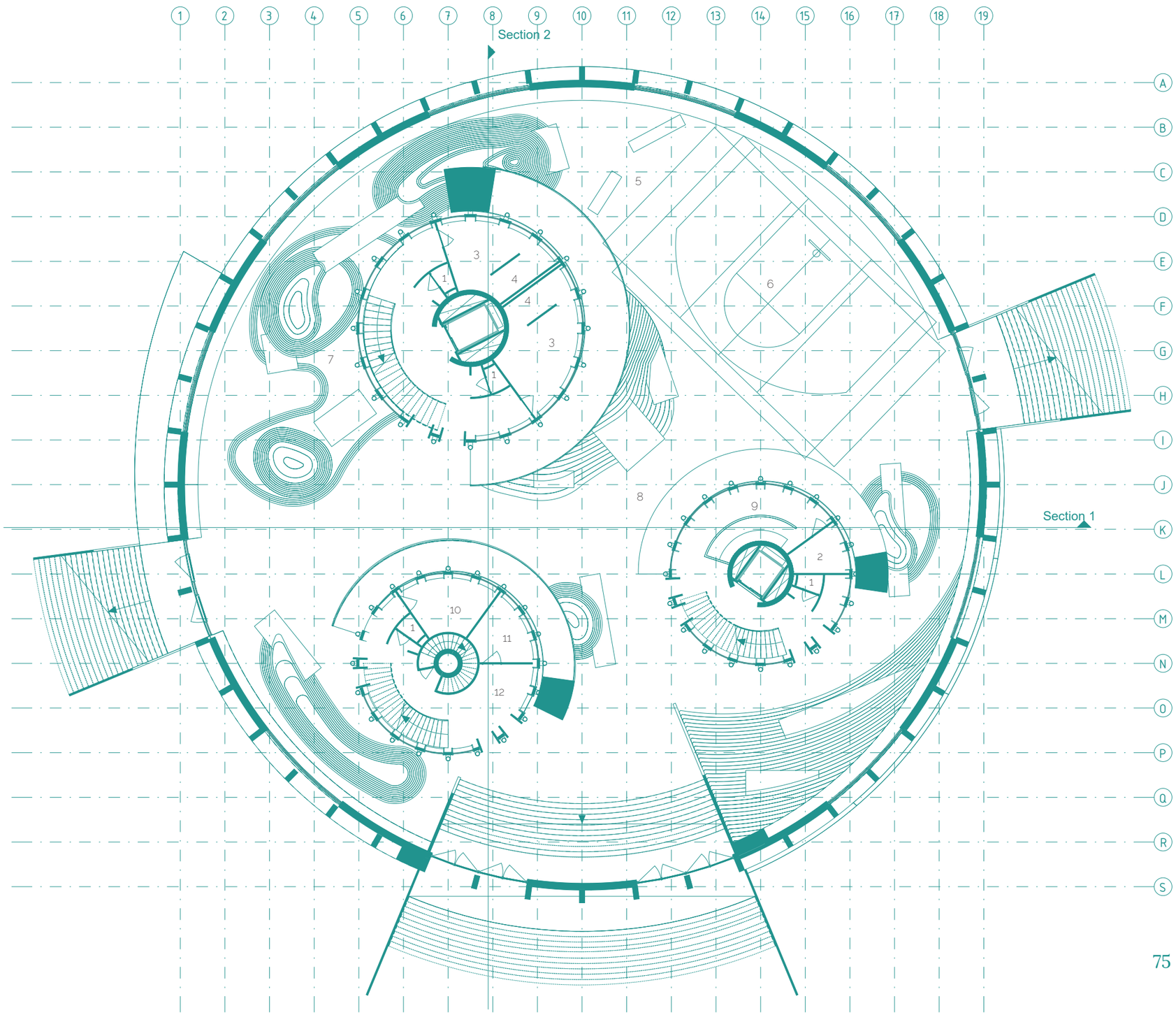
SITE PLAN



Scale 1 : 500

FLOOR PLAN| -1

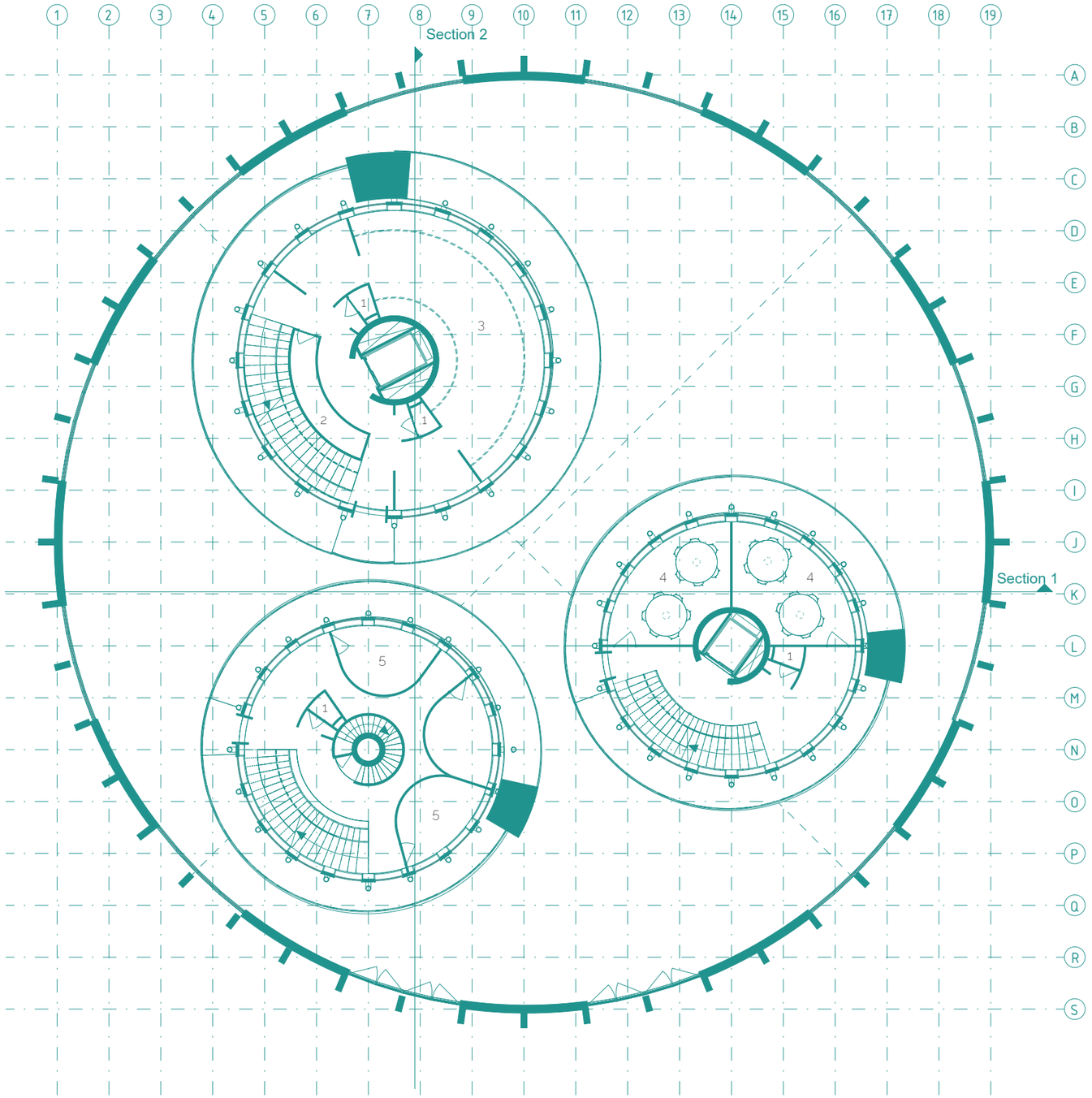
1. Toilets
2. Storage
3. Dressing room
4. Showers
5. Gathering space athletes
6. Sports field
7. Playground
8. Public square
9. Back office
10. Coat room
11. Information counter



Scale 1 : 250

FLOOR PLAN| 1

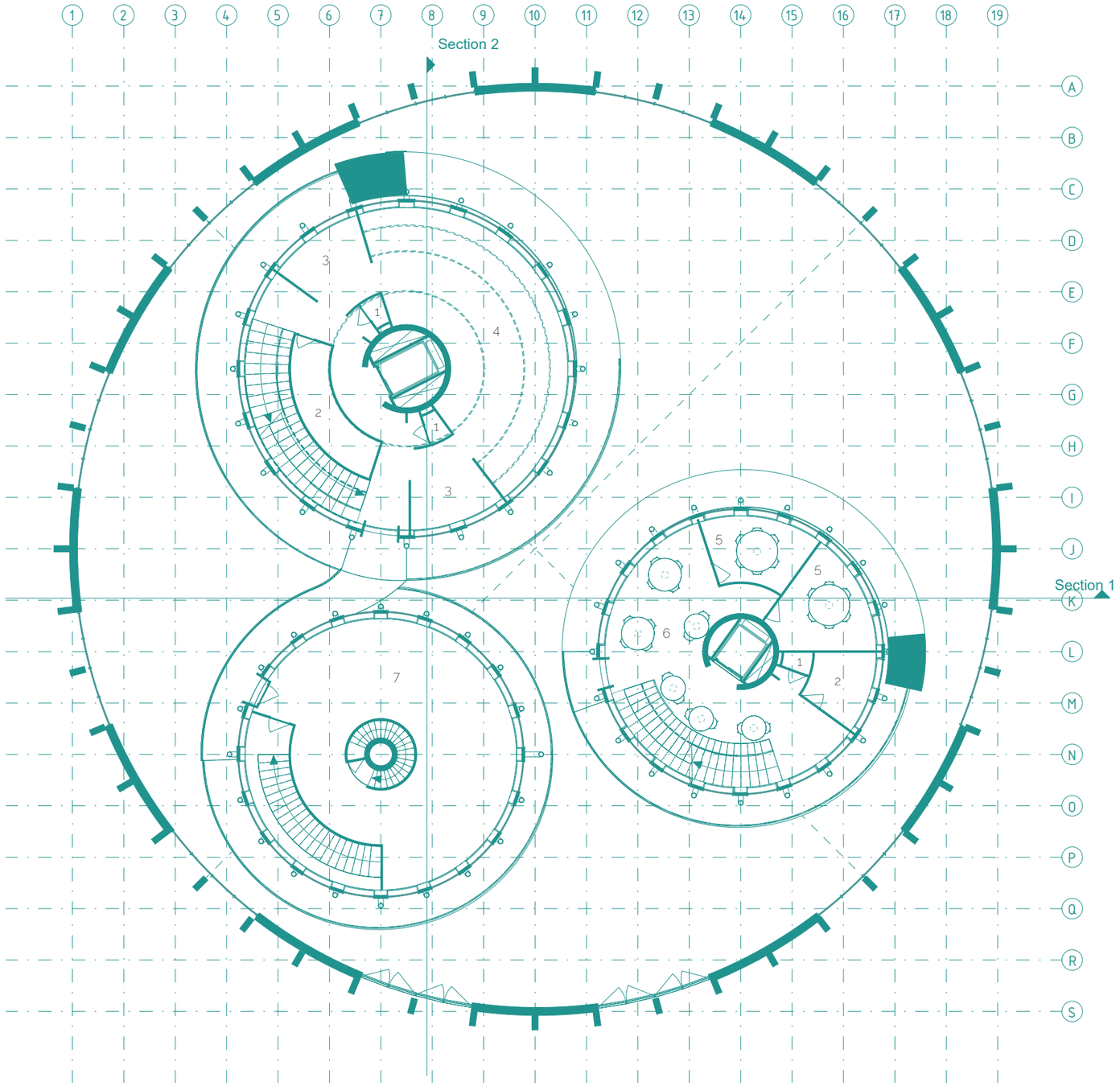
1. Toilets
2. Storage
3. Play and explore
4. Classroom
5. Meditation module



Scale 1 : 250

FLOOR PLAN| 2

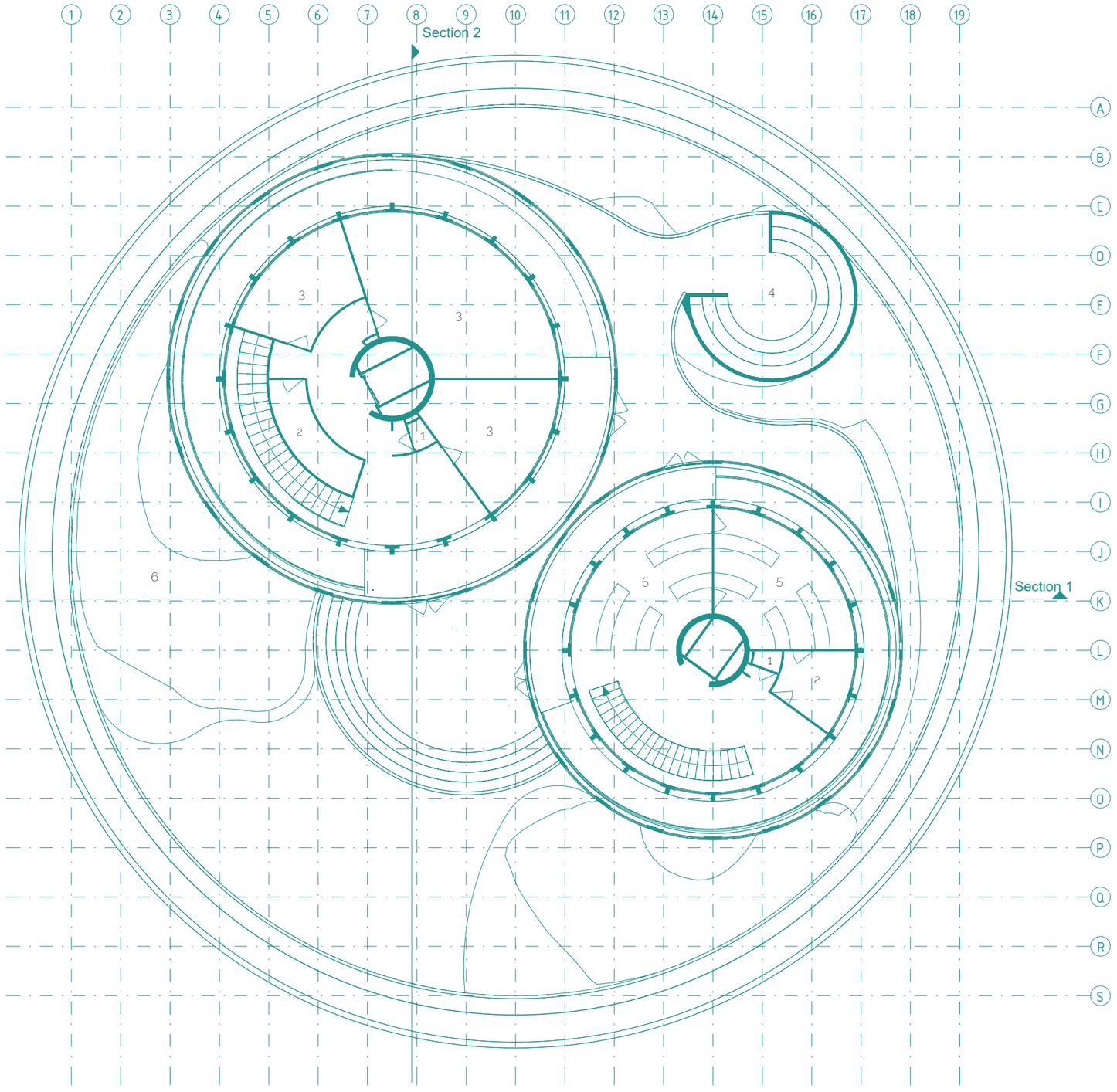
1. Toilets
2. Storage
3. Stretch area
4. Workout space
5. Meeting room
6. Public workspace
7. Mechanical space



Scale 1 : 250

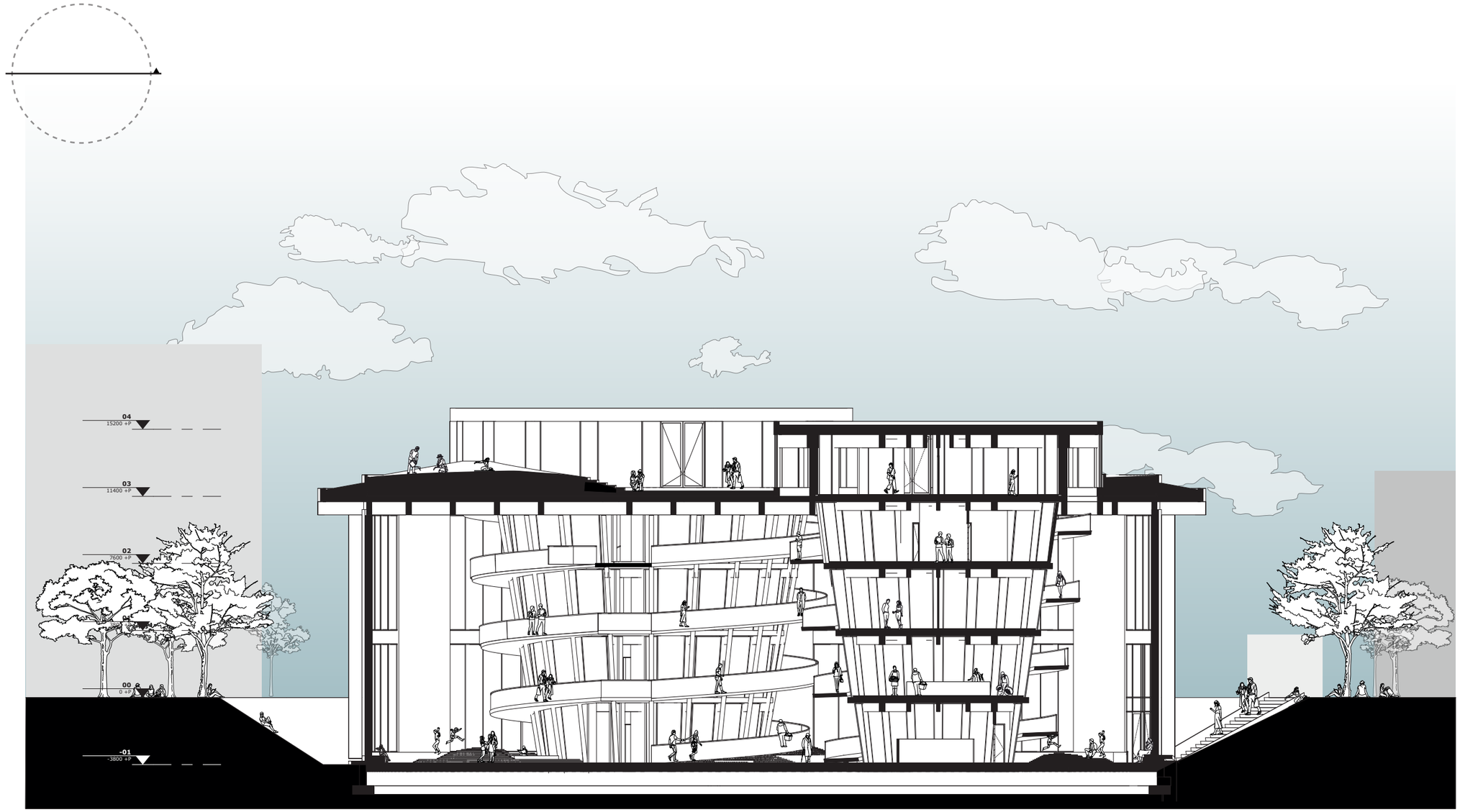
FLOOR PLAN| 3

1. Toilets
2. Storage
3. Dance space
4. Outdoor theatre
5. Greenhouse
6. Rooftop park
7. Rooftop garden



Scale 1 : 250

SECTION| 1



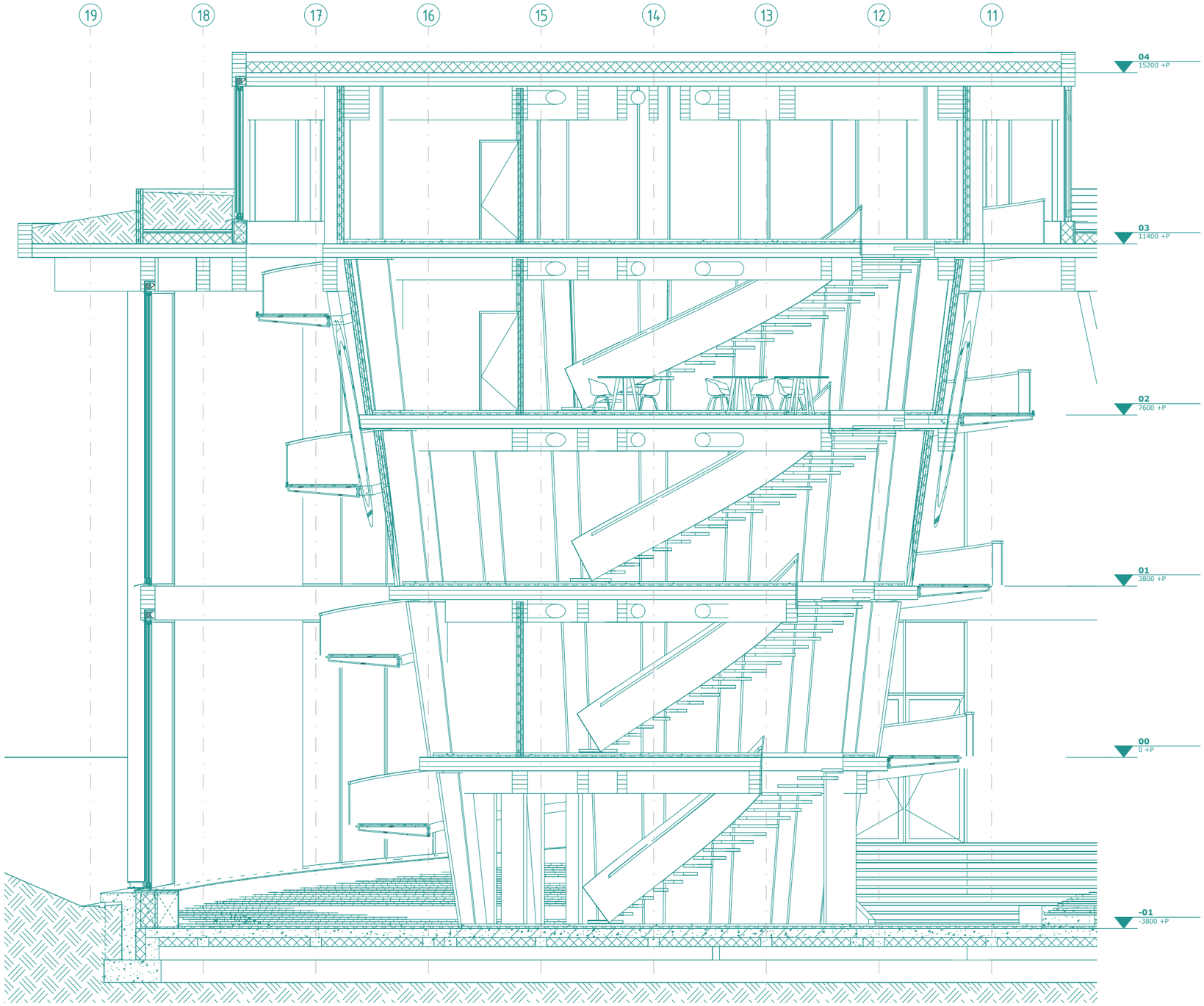
Scale 1 : 250

SECTION| 2



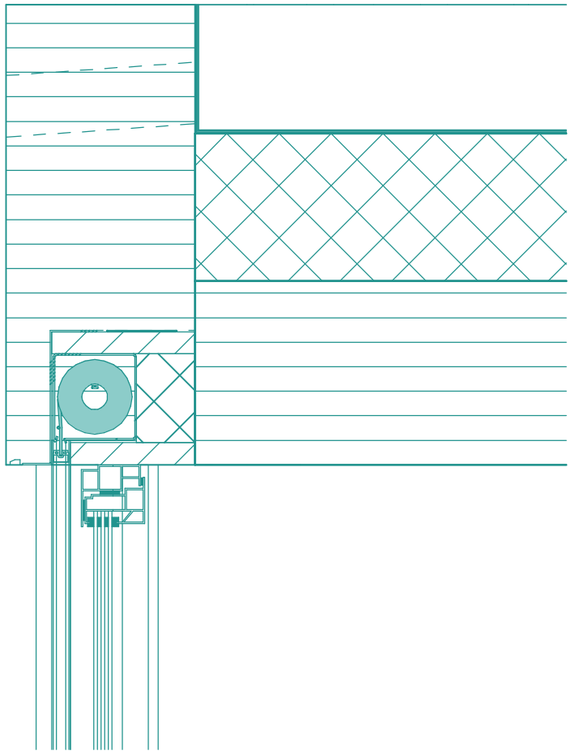
Scale 1 : 250

FRAGMENT



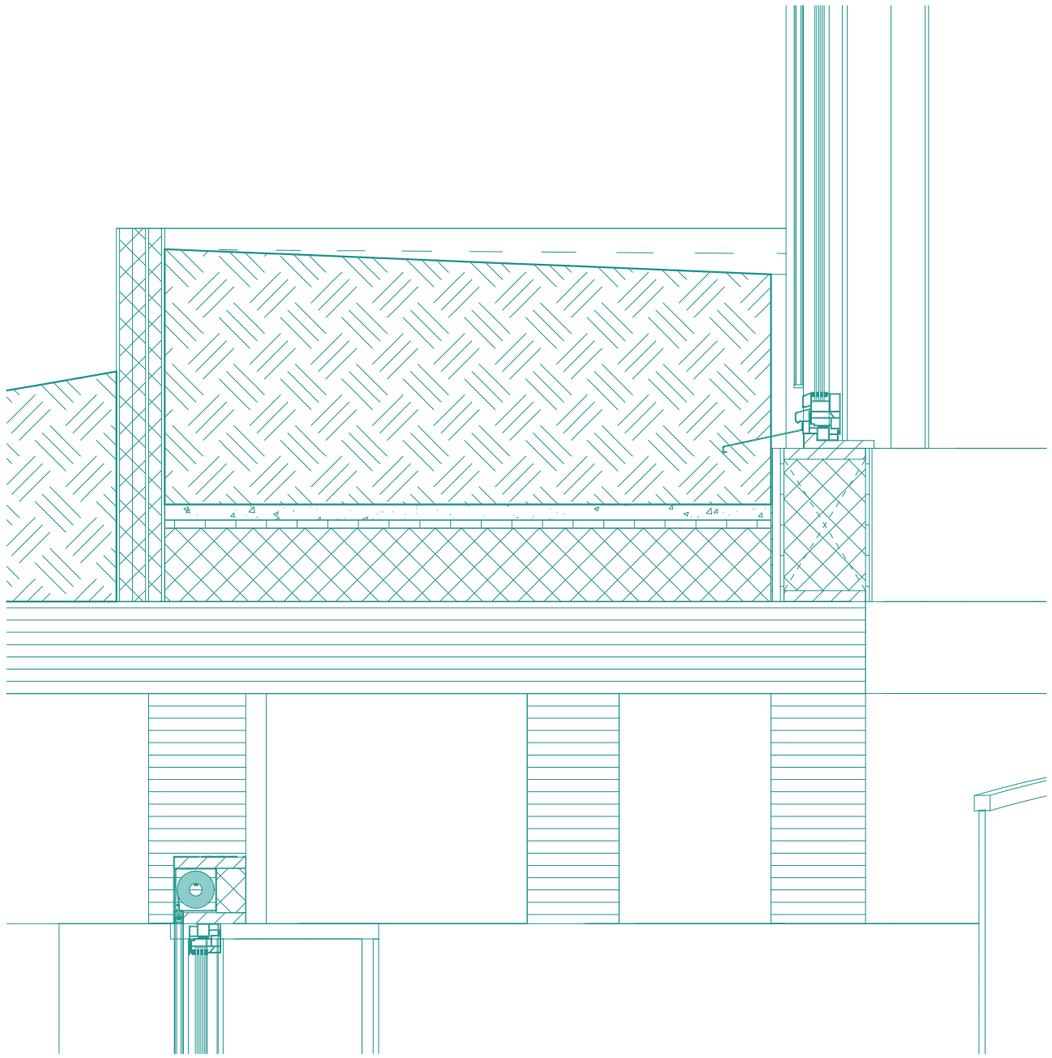
Scale 1 : 100

DETAIL| 1



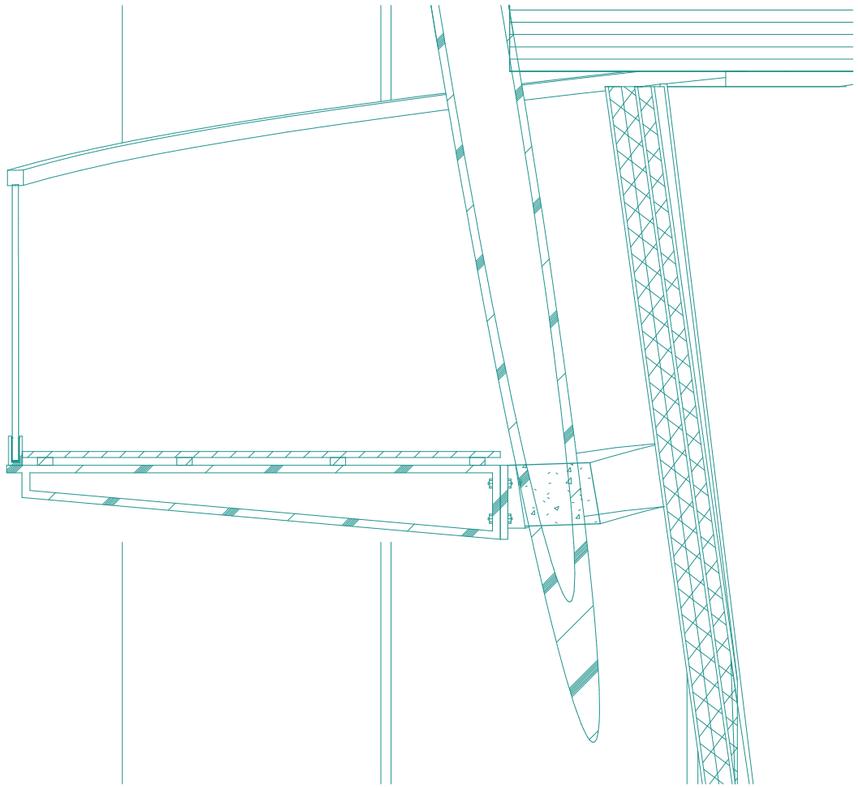
Scale 1 : 5

DETAIL| 2



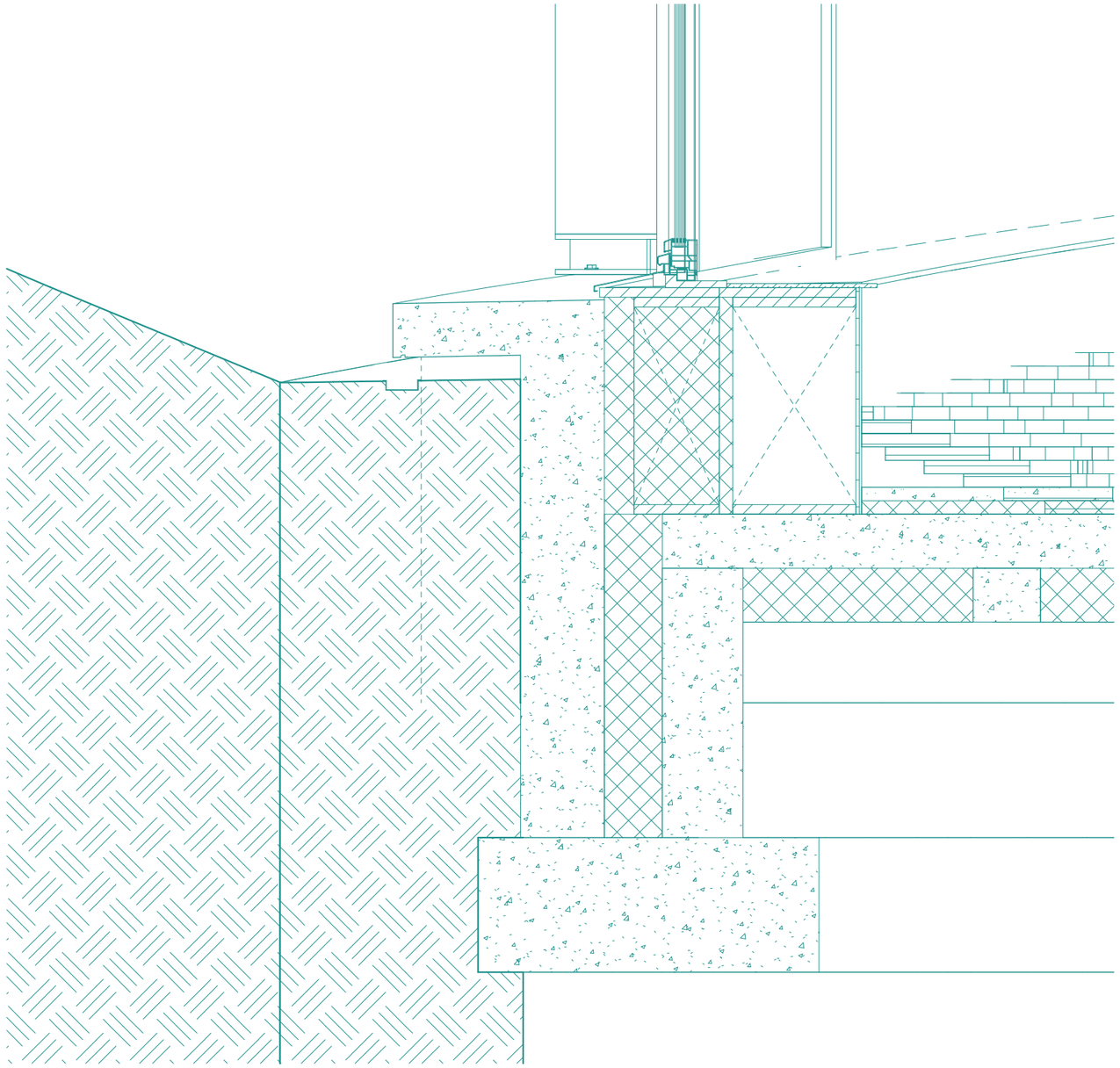
Scale 1 : 10

DETAIL| 3



Scale 1 : 10

DETAIL| 4

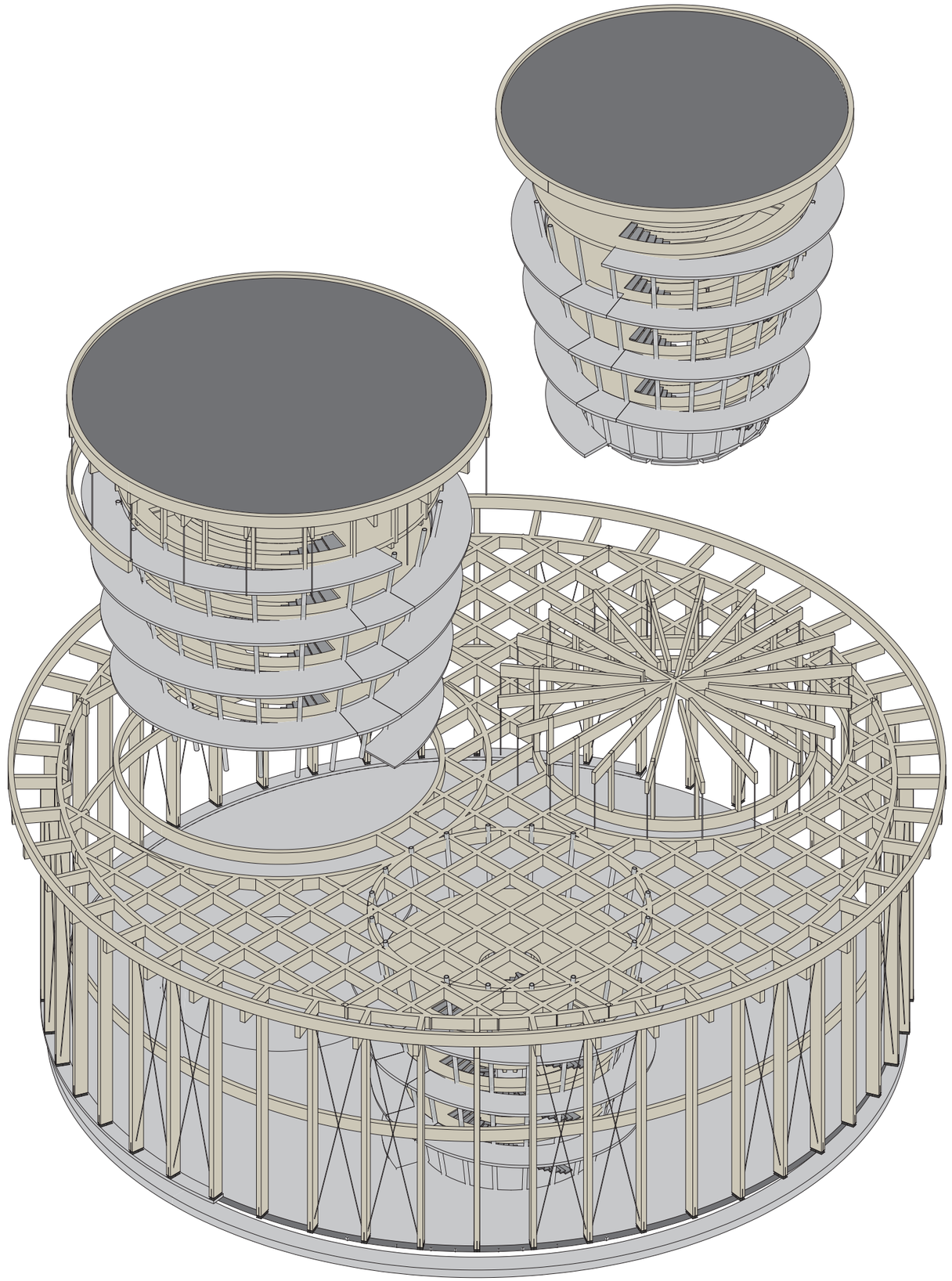


Scale 1 : 10

STRUCTURE

The structure of the building consists of two main elements. The exterior shell and the three interior towers. With each tower having its own programmatic theme, physical, mental, and social, they act as self supporting structures. Connecting to the roof structure which is lay out in a grid pattern.

The pattern and radial structure is based on each individual tower acting as a centre point. From this centre point columns are placed which are aligned with the grid structure in the roof. These columns act as structural support for the towers but also as attachment points for the spiral ramps that flow around each tower.



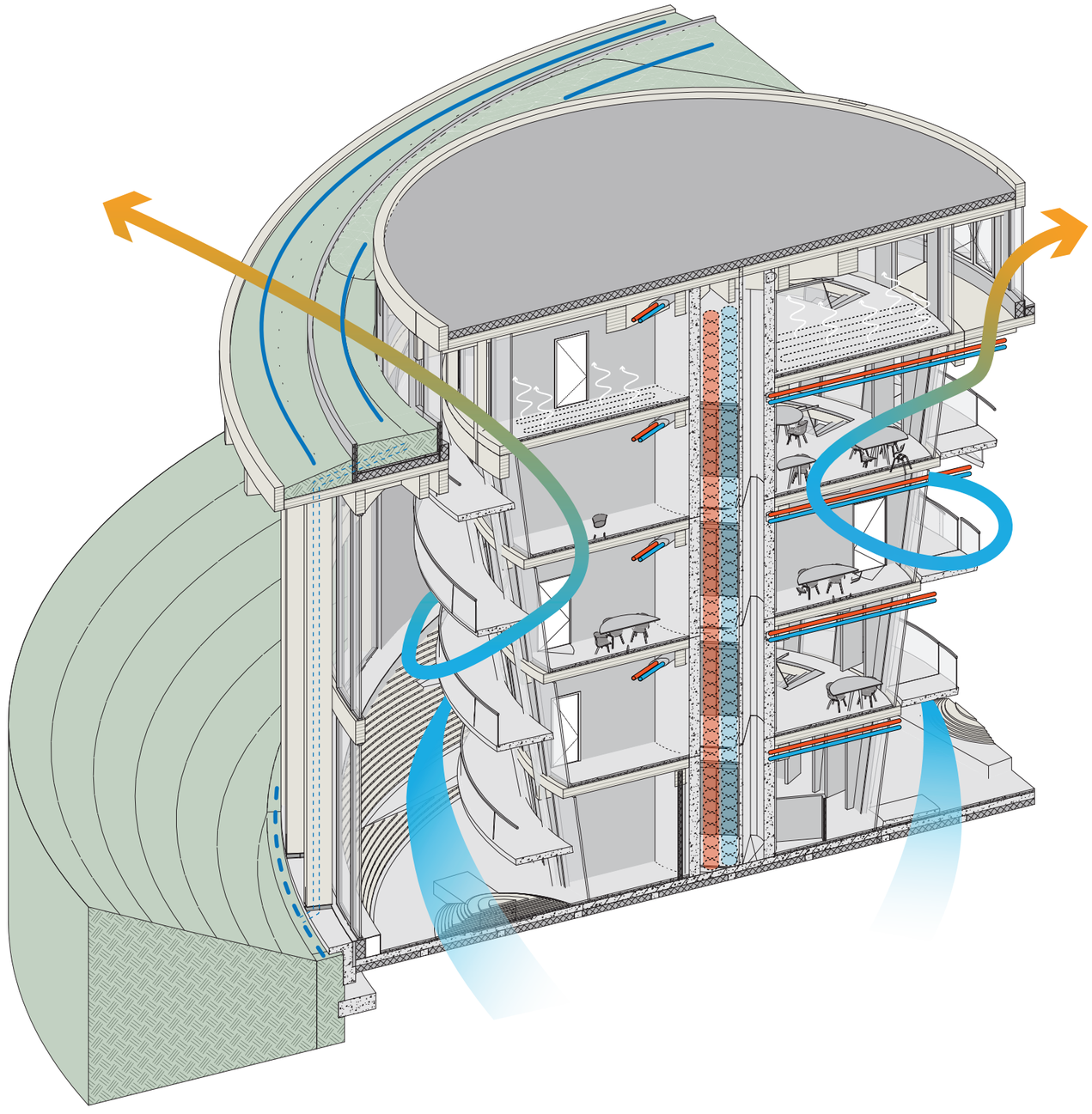
CLIMATE SYSTEMS

1. Natural air circulation through solar chimney effect. Cool air is provided through mechanical ventilation to the lower levels, hot air naturally rises up and escapes the building through the conical interior towers

2. The green roof, stimulating biodiversity, provides a place for people to meet and practice local activities like urban farming. Besides these functions the permeable surface doubles as a water buffer.

3. Centralized shafts extend outwards from each tower into the adjacent interior spaces and out towards the large atrium

4. Heating and cooling is done via a floor system. This system can be connected to circular heating and cooling systems like thermal heat and cold storage











P4| OUTLINE

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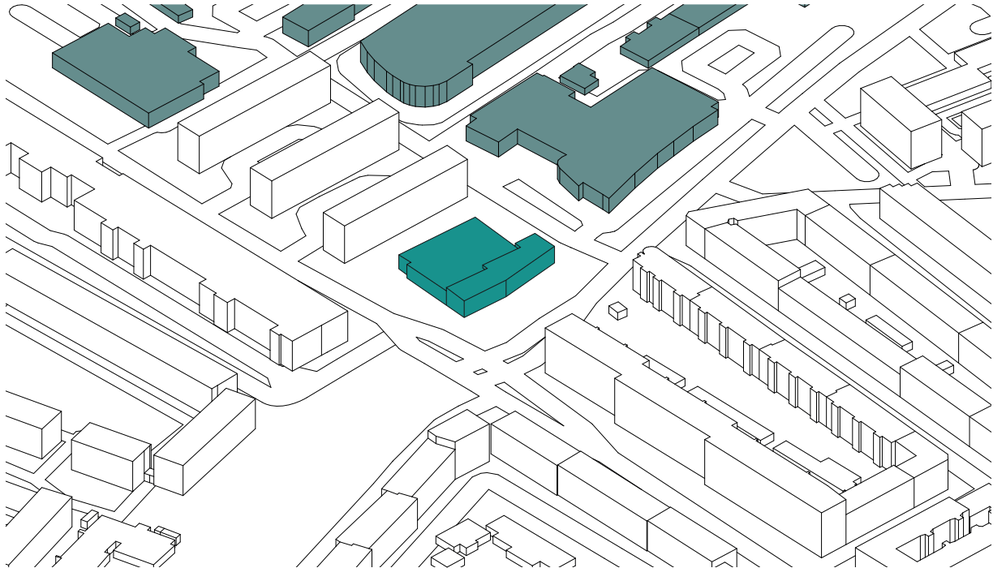
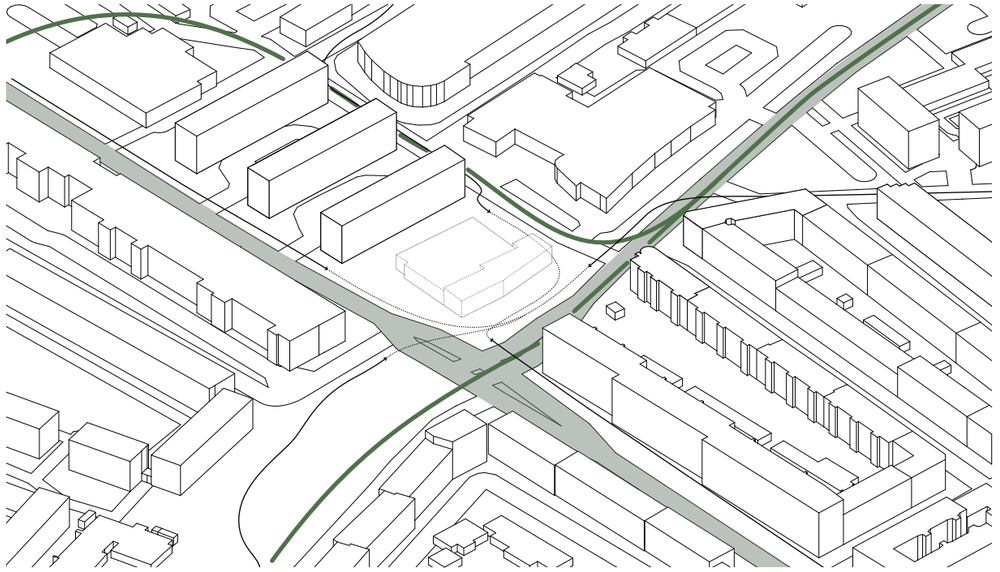
SITE DEVELOPMENT

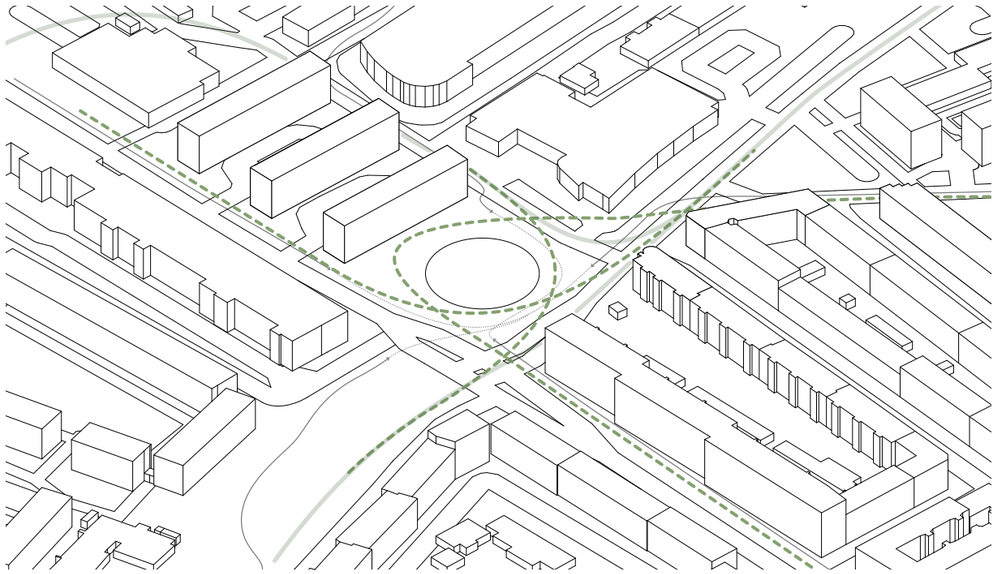
Demolition of existing buildings



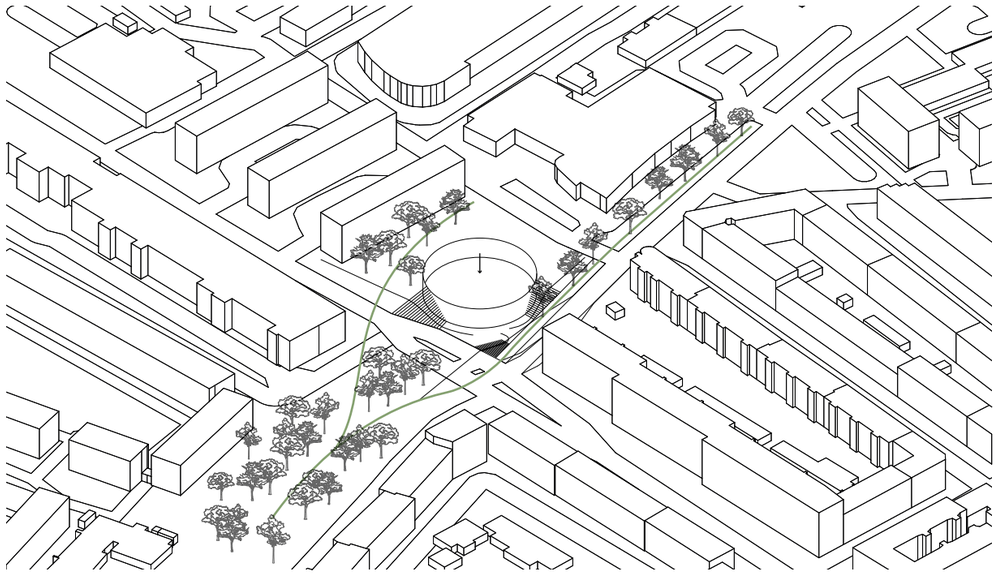
Site development potential



Building as a integral cornerstone

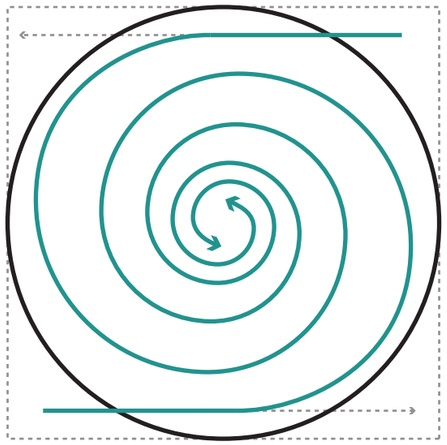


Landscape integration

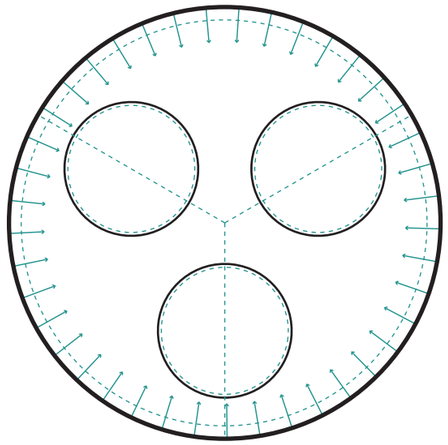


FORM DEVELOPMENT

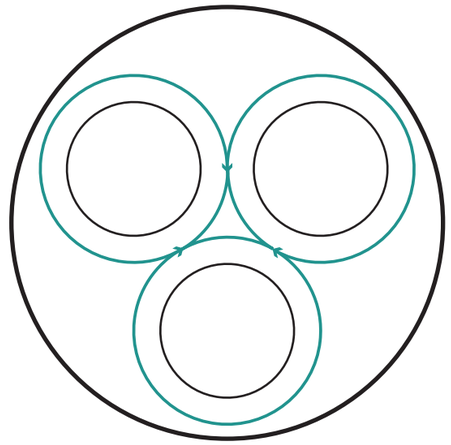
Creating movement



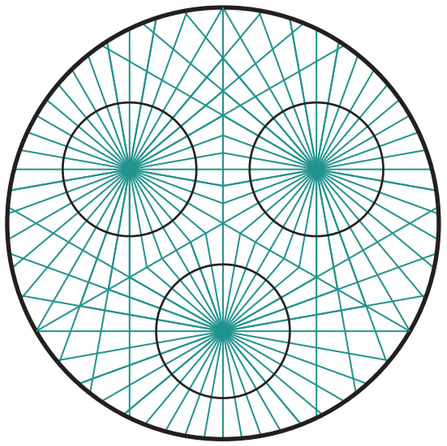
Repeating footprint



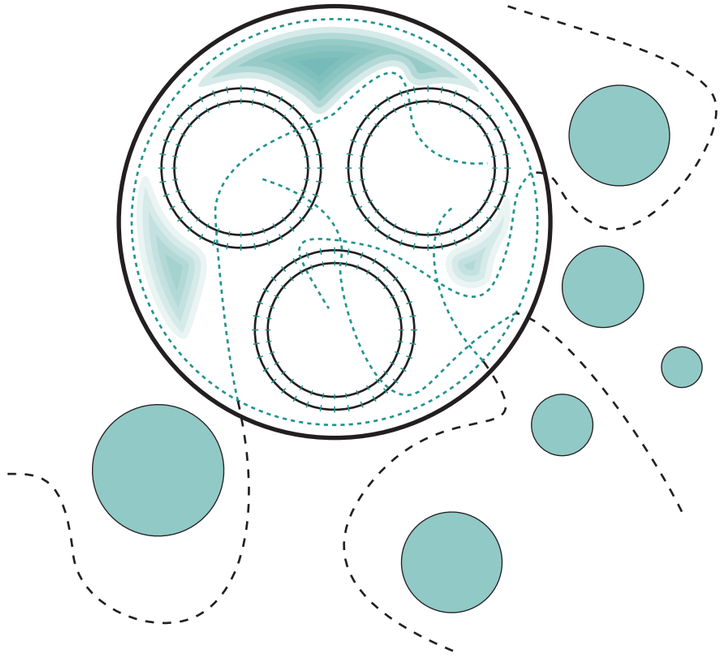
Continuous circulation

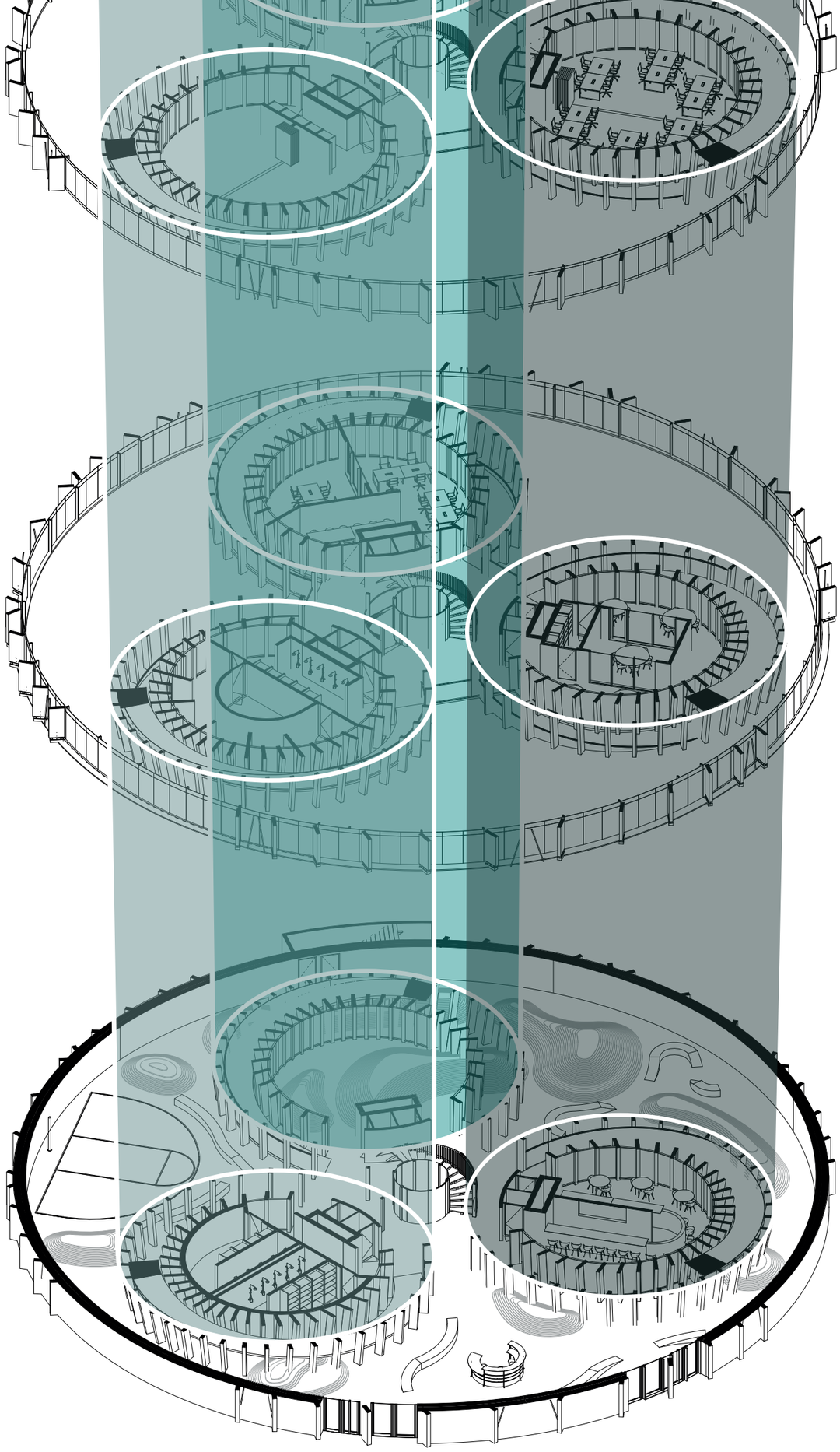


Radial grid layout



Connecting to the exterior

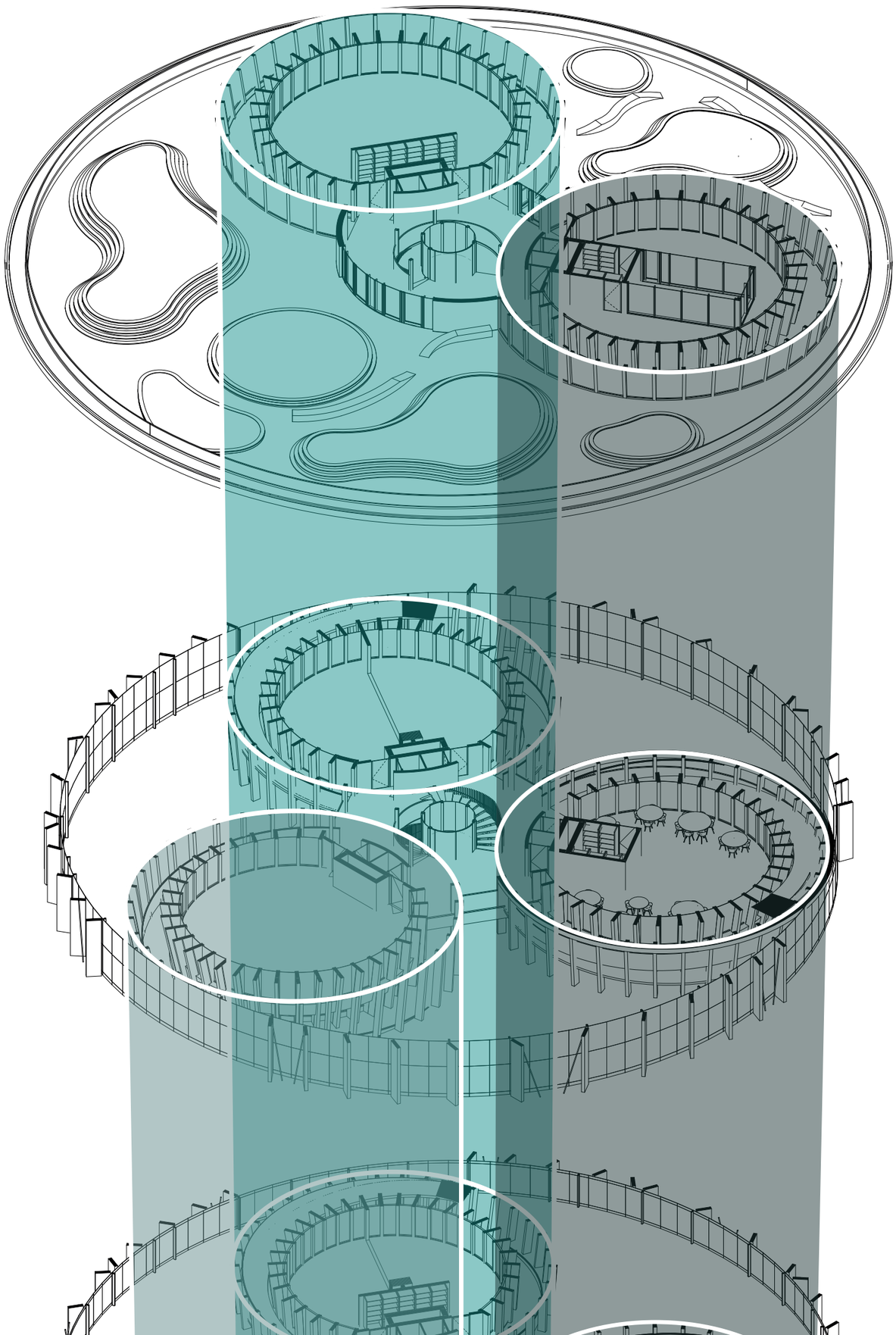




00
1. Administration
2. Public workspace
3. Wellness and sauna

-01
1. Playscape
2. Cafe
3. Sports field
4. Coat room
5. Dressing rooms
6. Information counter

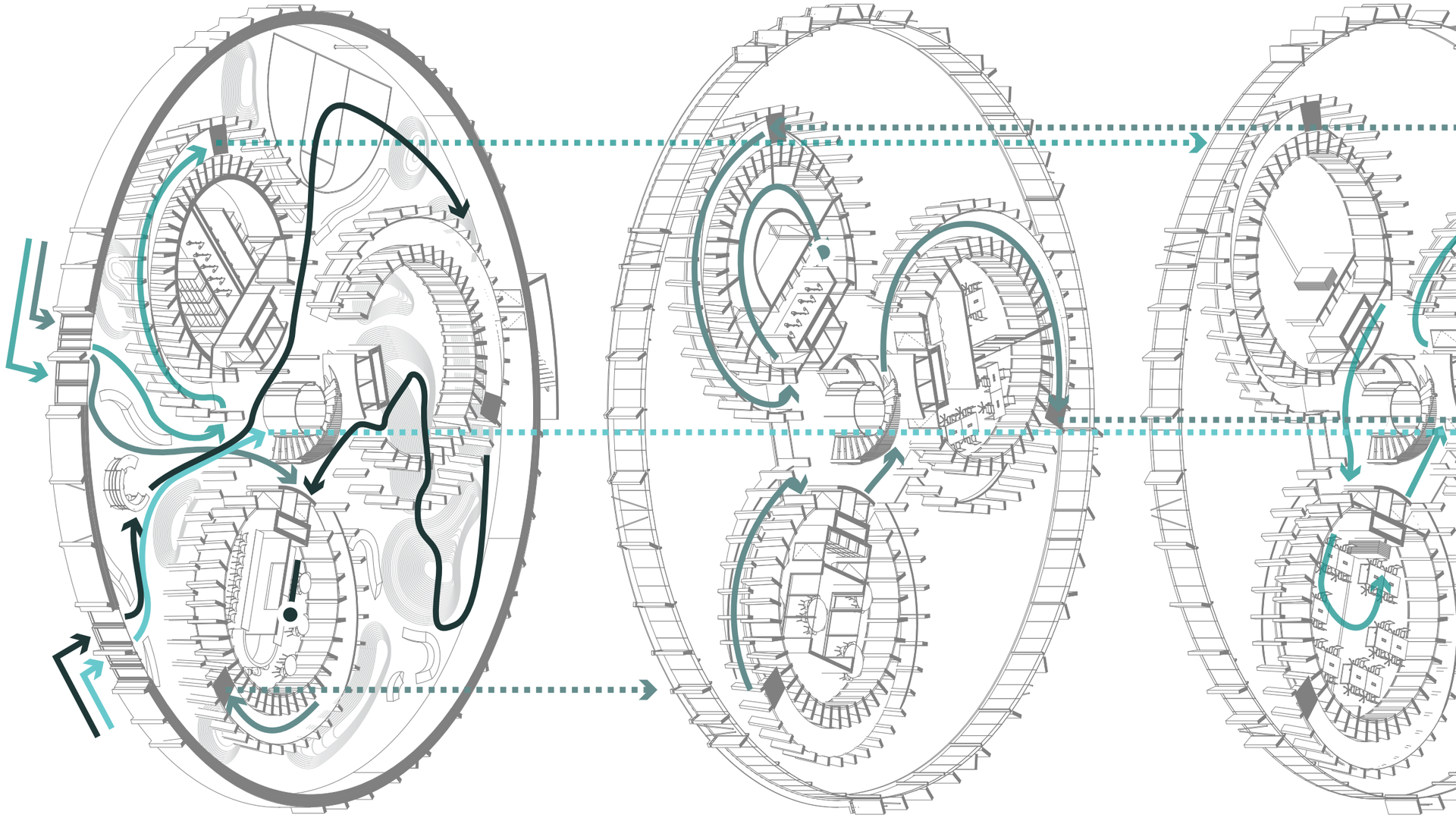
BUILDING PROGRAM

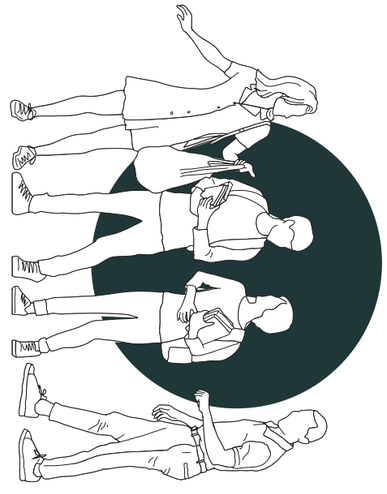


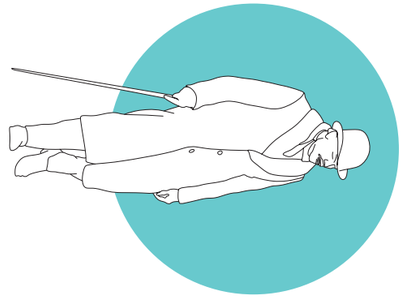
03
1. Public gym
2. Greenhouse
3. Rooftop garden
4. Rooftop park

02
1. Dance studio
2. Communal kitchen
3. Mechanical space

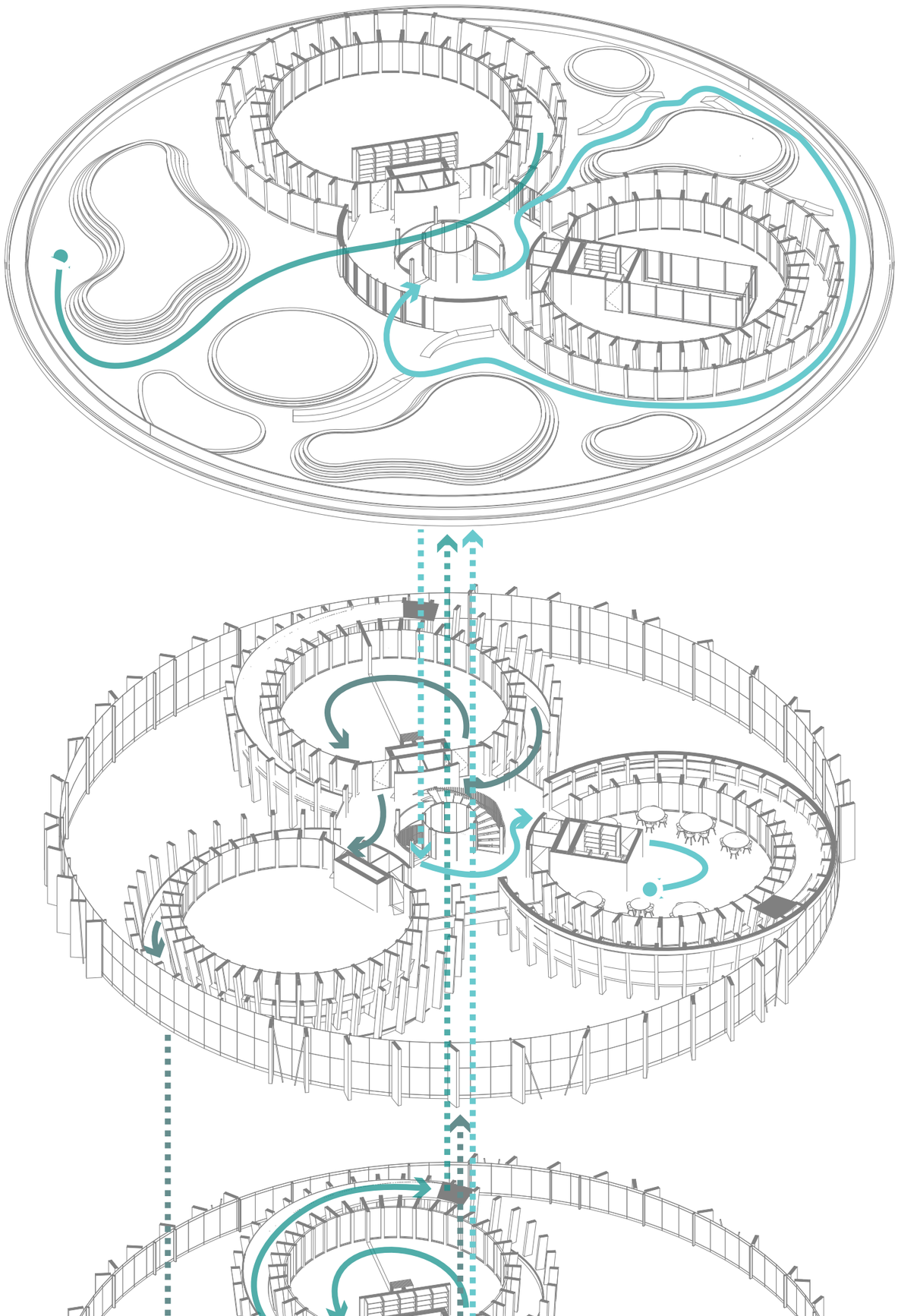
01
1. Fitness workshop area
2. Classroom
3. Meditation area







CIRCULATION







FLOOR PLAN| -1

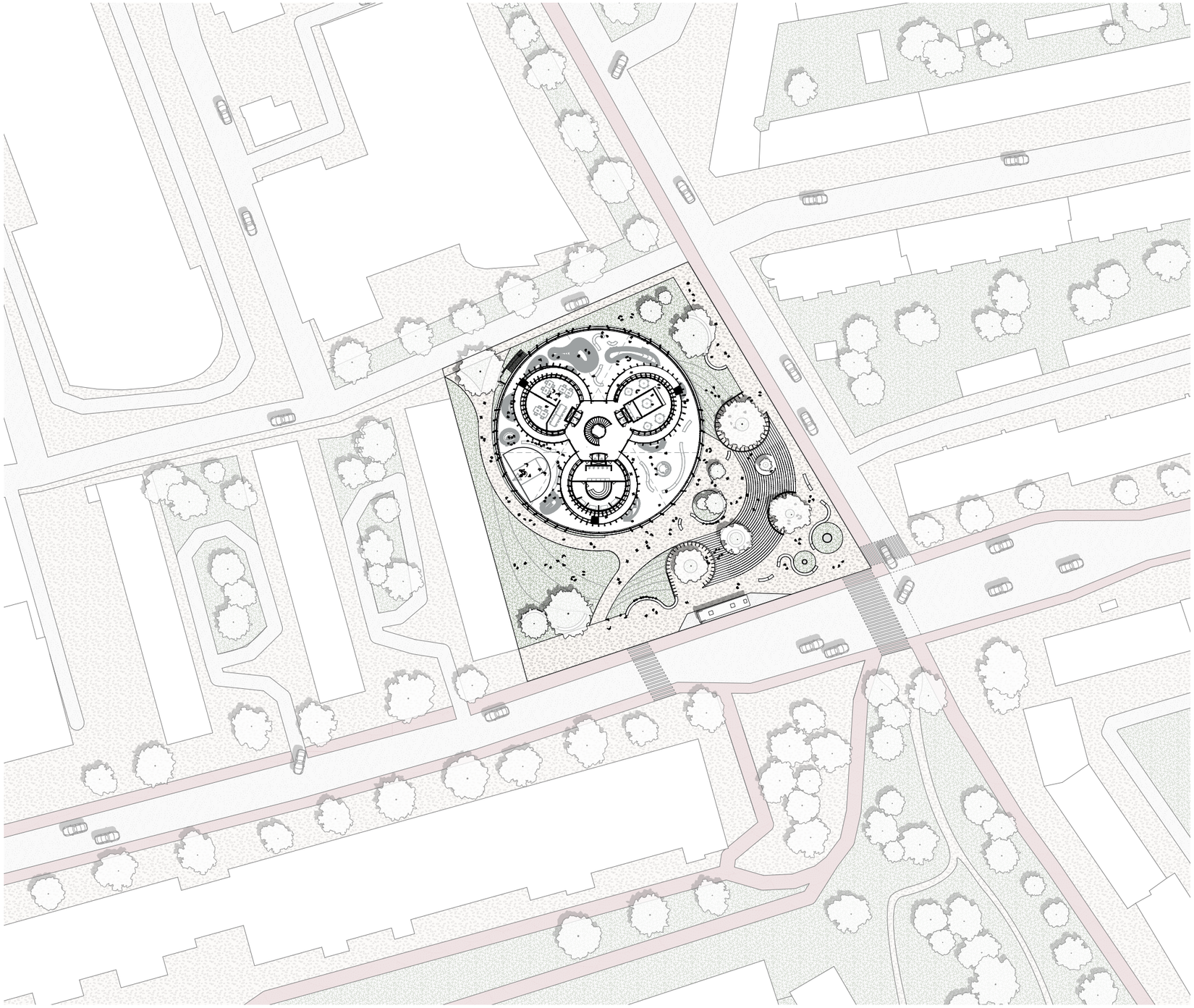
1. Toilets
2. Storage
3. Play-scape
4. Cafe
5. Sports field
6. Coat room
7. Dressing rooms
8. Information counter



Scale 1 : 200

SITE PLAN

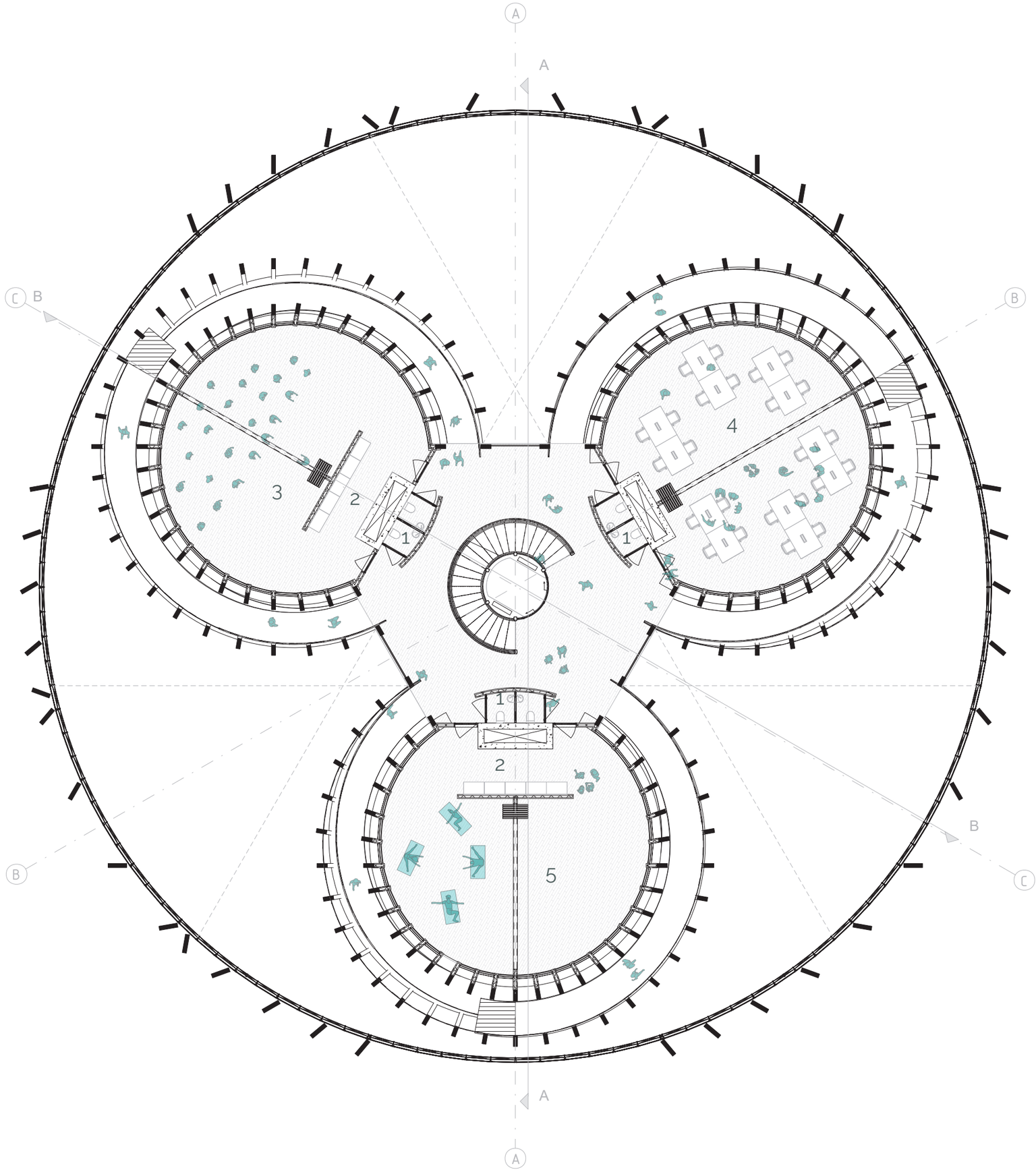
1. Toilets
2. Storage
3. Administration
4. Public workspace
5. Wellness and sauna



Scale 1 : 1000

FLOOR PLAN| 1

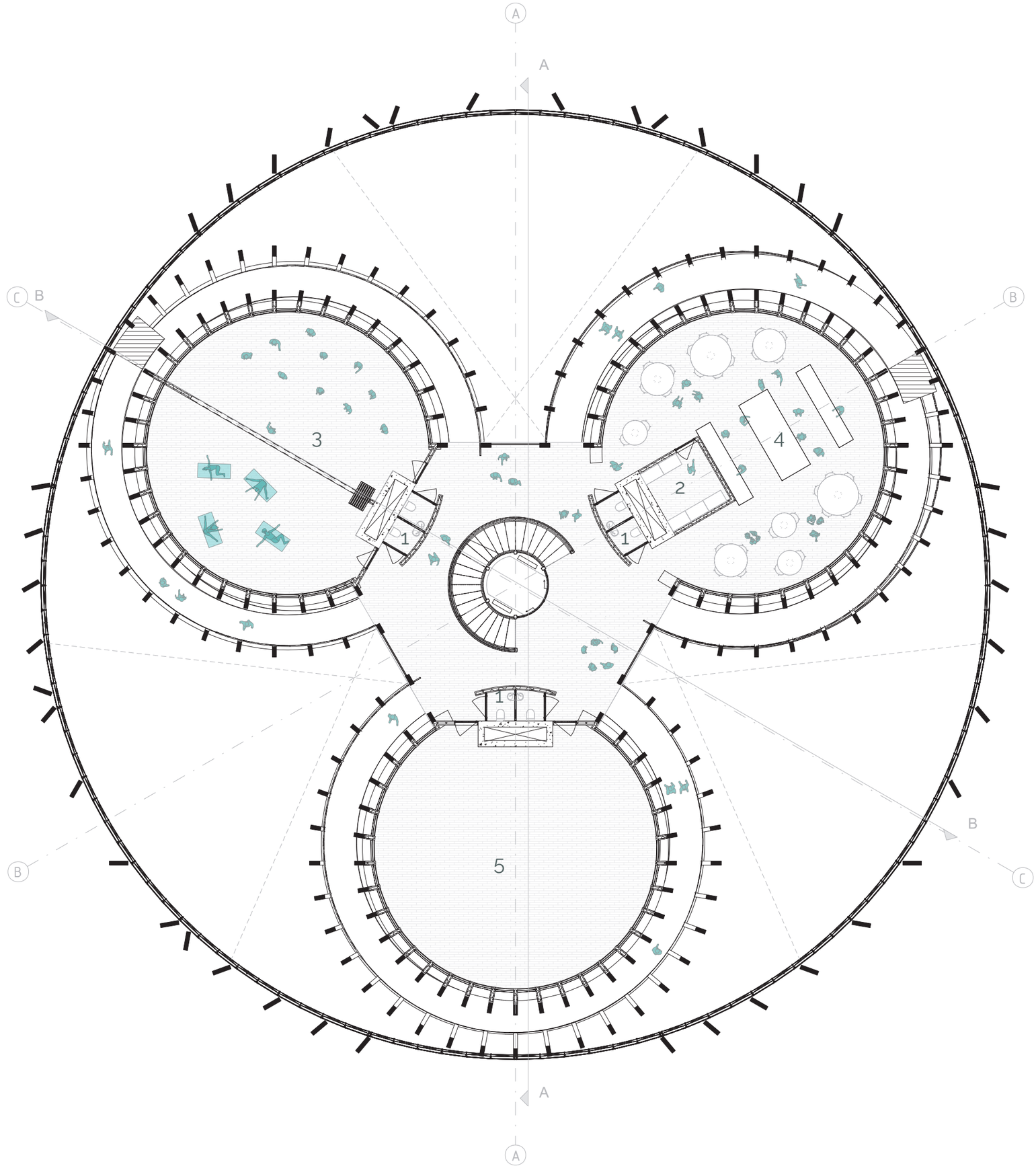
1. Toilets
2. Storage
3. Fitness workshop area
4. Classroom
5. Meditation area



Scale 1 : 200

FLOOR PLAN| 2

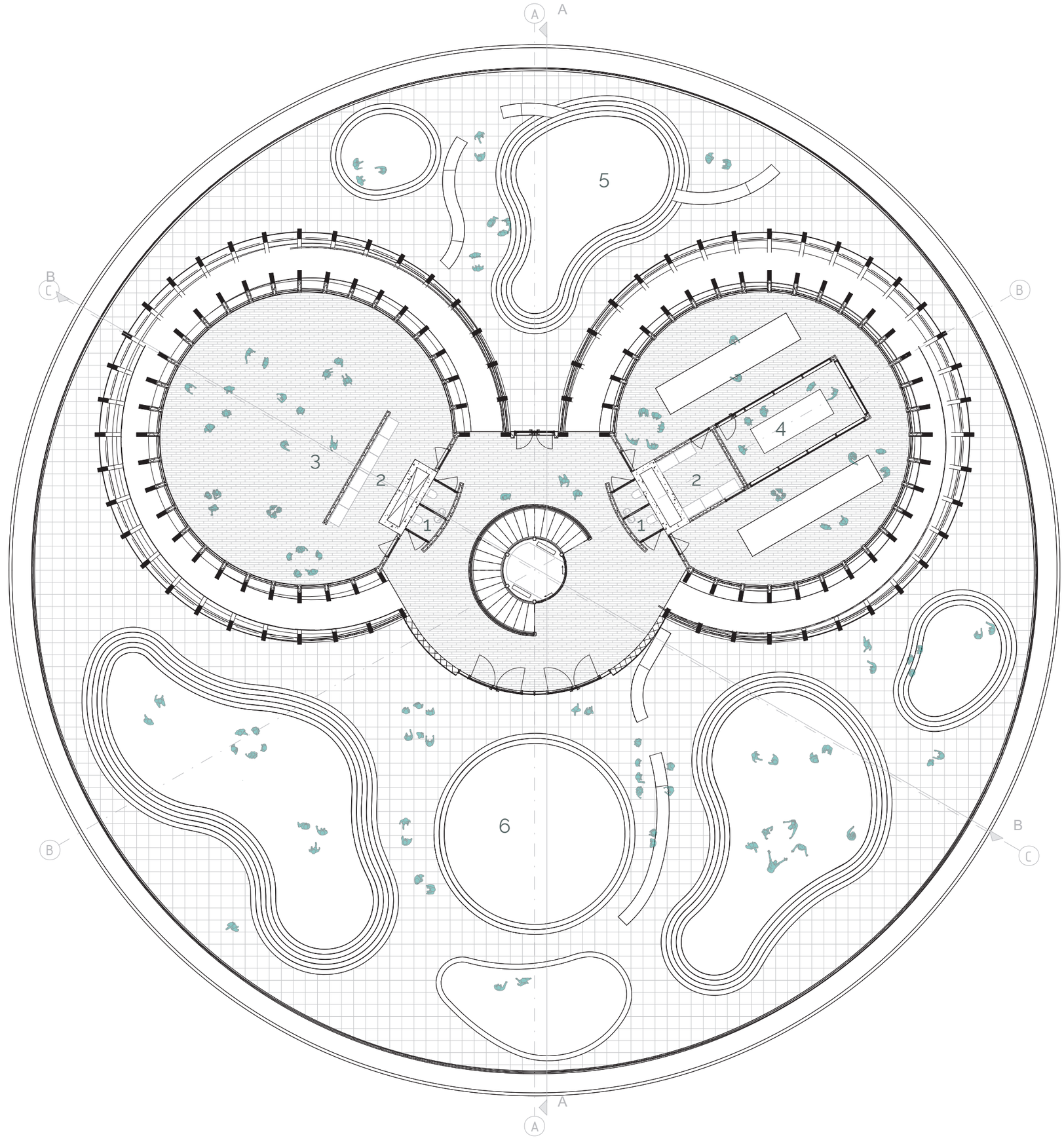
1. Toilets
2. Storage
3. Dance studio
4. Communal kitchen
5. Mechanical space



Scale 1 : 200

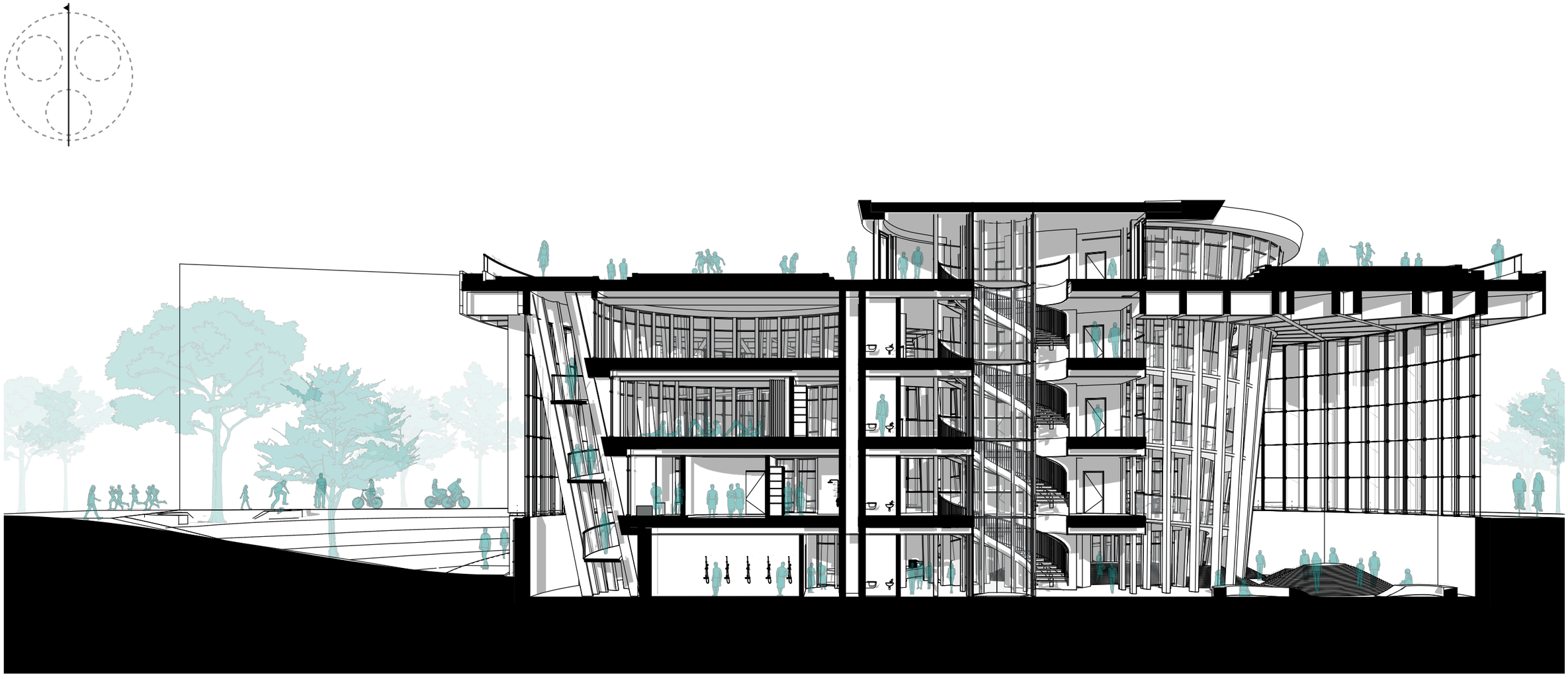
FLOOR PLAN| 3

1. Toilets
2. Storage
3. Public gym
4. Greenhouse
5. Rooftop garden
6. Rooftop park



Scale 1 : 200

SECTION| A



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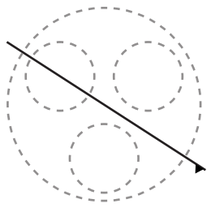
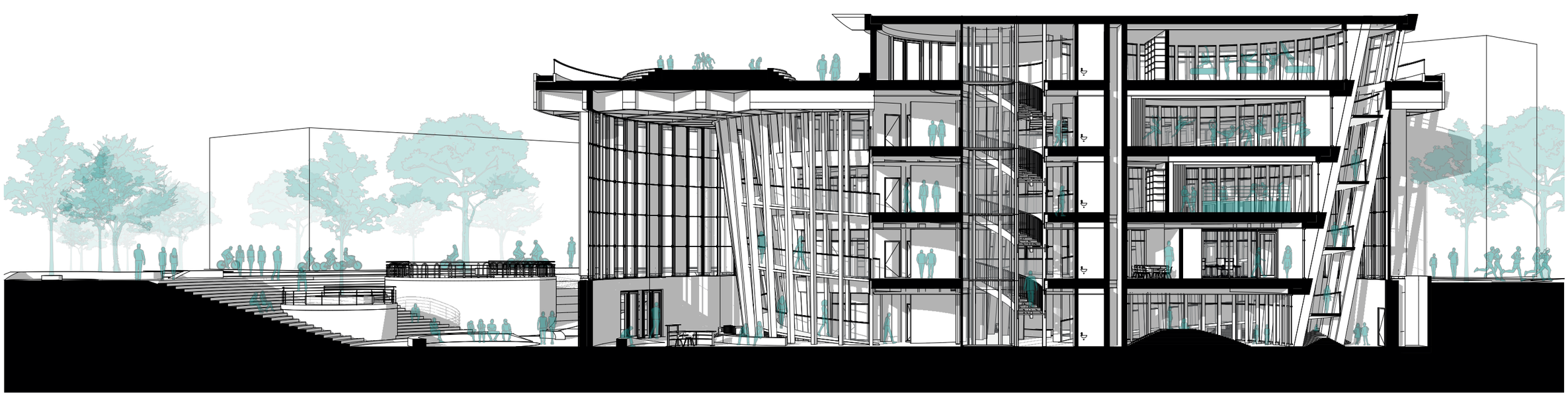
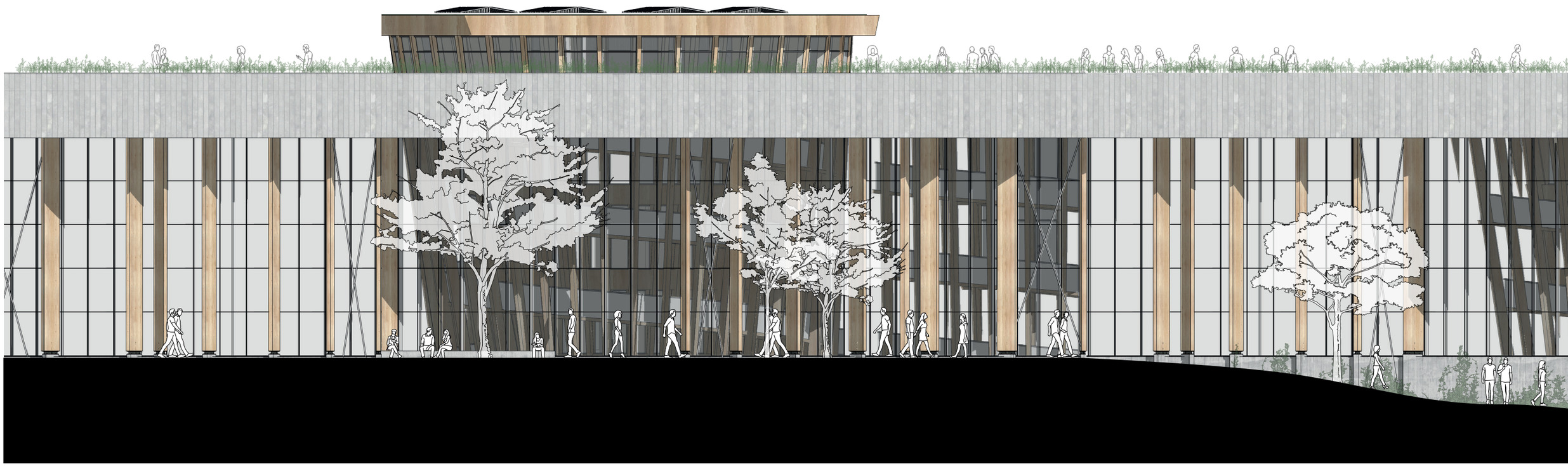
SECTION| B



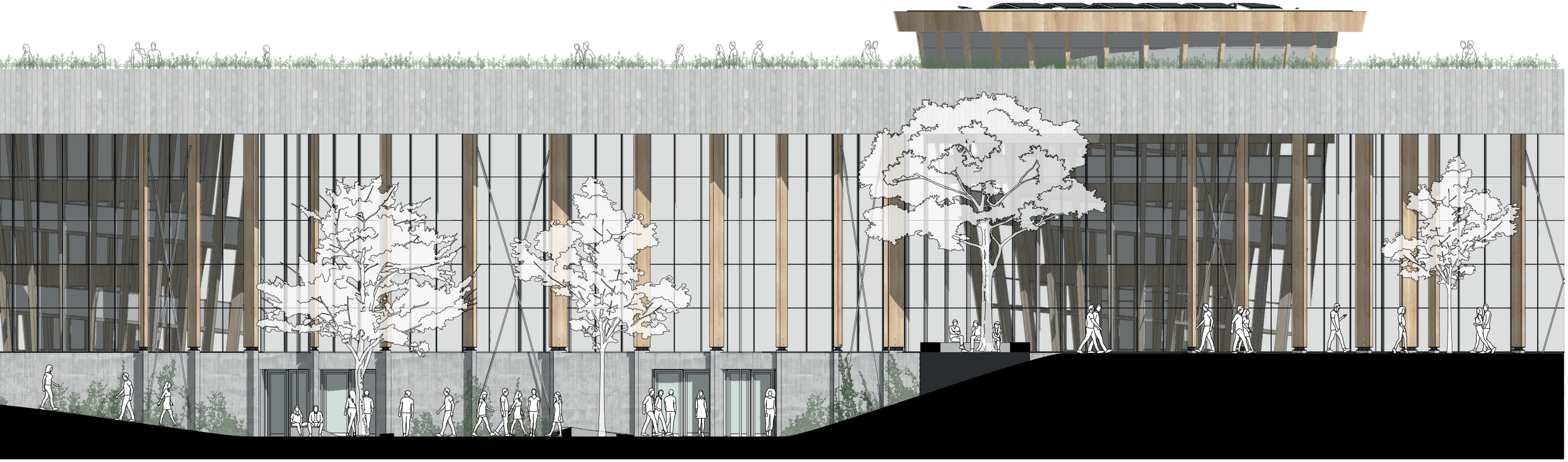


Scale 1 : 250

EXPLODED ELEVATION

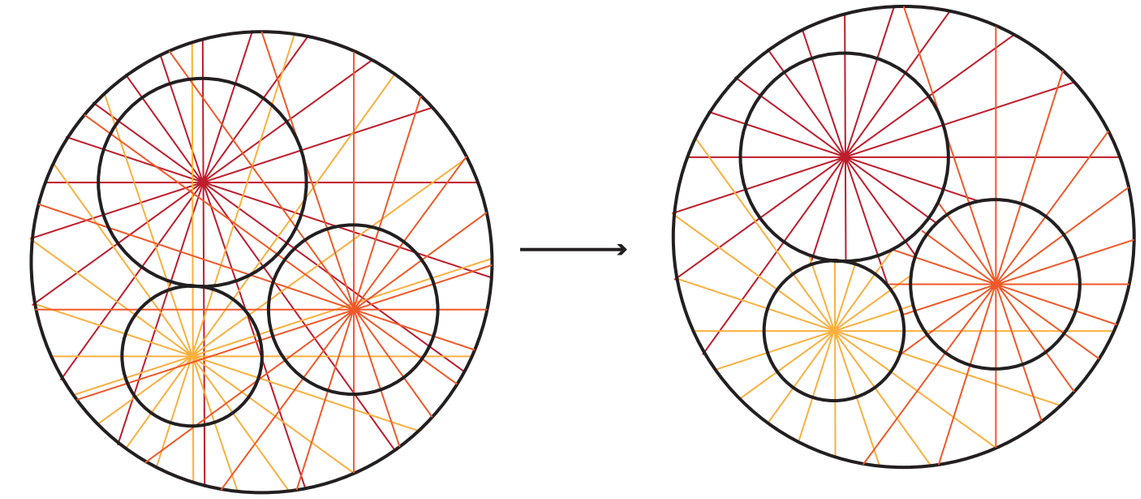


Scale 1 : 175

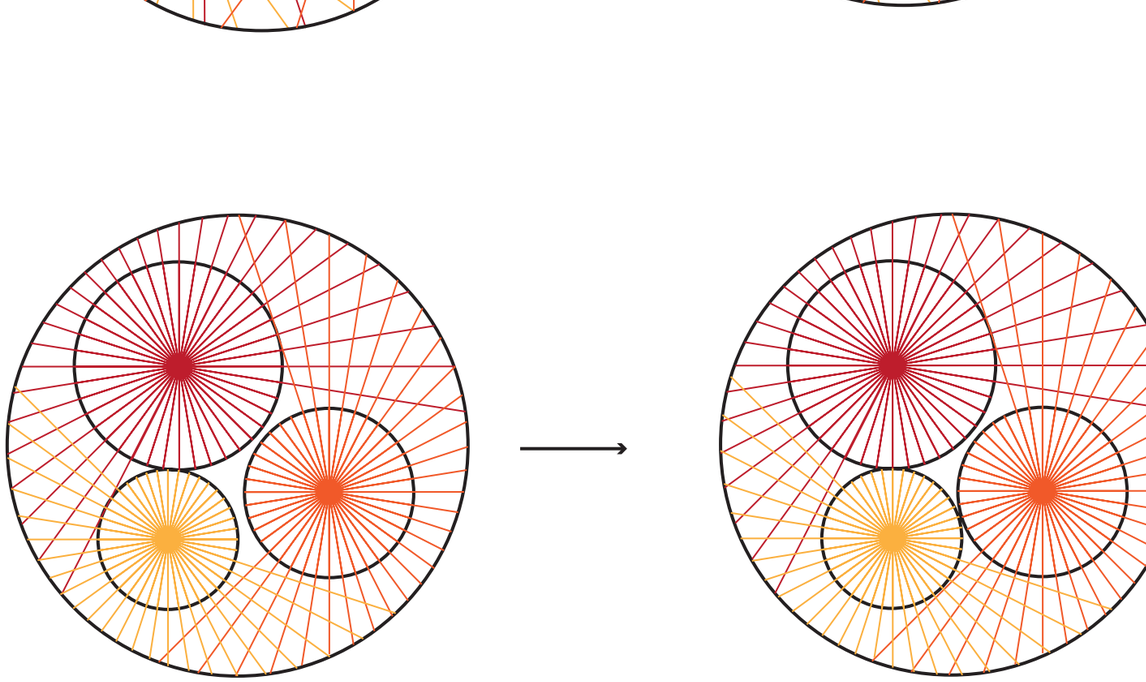


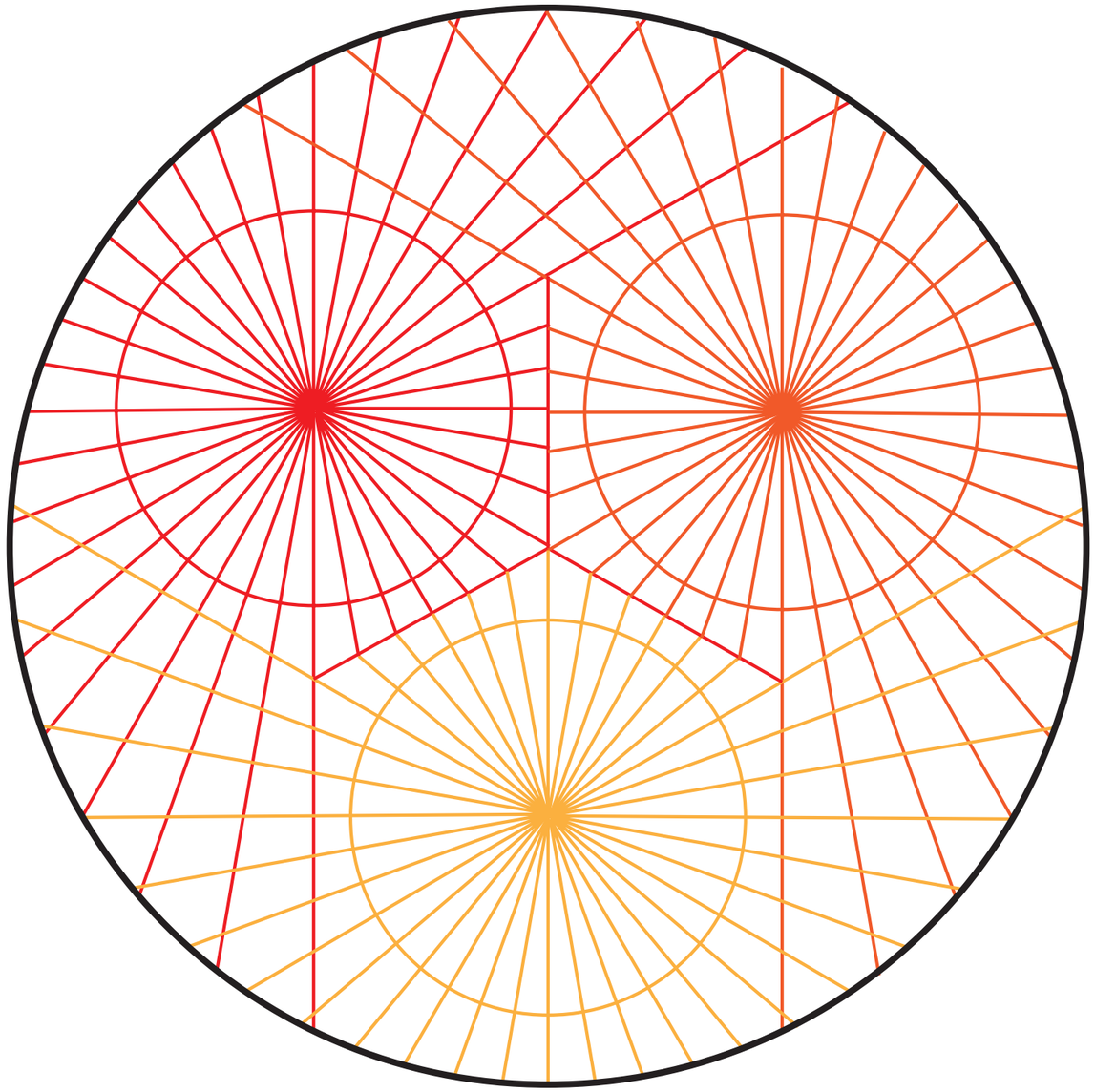
STRUCTURE

The main structural design principles consisting of an exterior and interior component have been kept the same. However the integration between the two components has been improved. By organizing the three interior towers in a tripartite division the interior gets a symmetrical division. From this organization a radial grid pattern is extended.

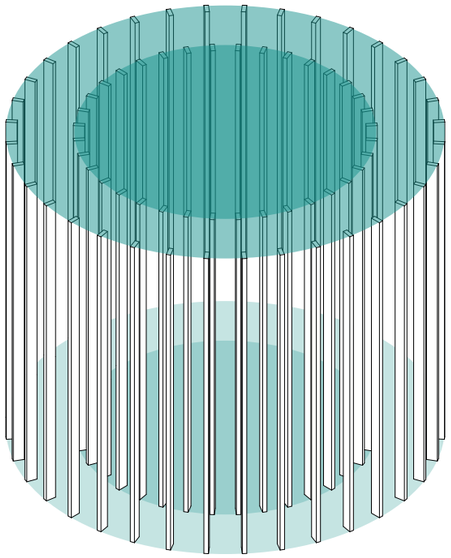


With 10˚ intervals grid lines extend from the centre point of each tower. Both columns and beams follow this grid, making for logical but captivating intersections present in the roof, exterior shell, and towers.

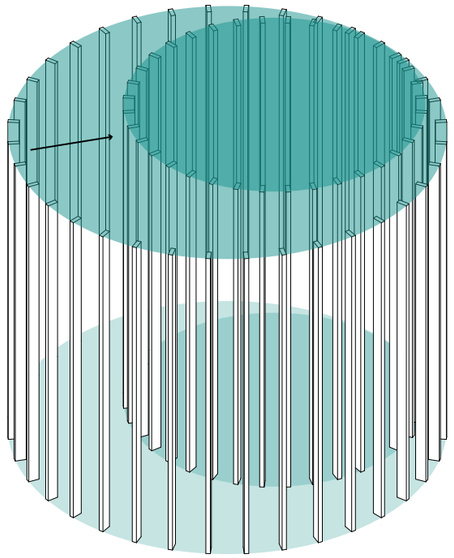




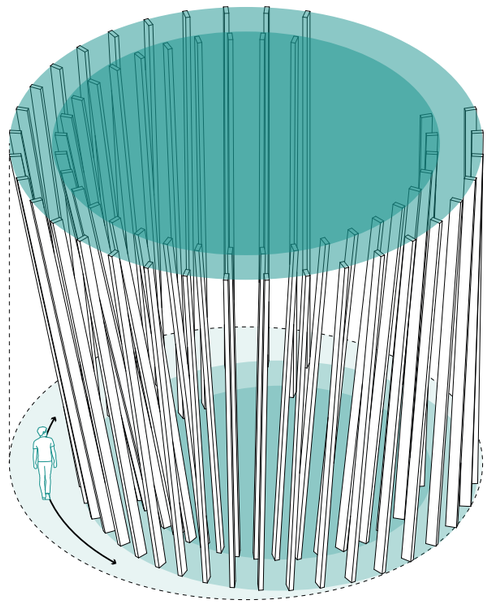
Circular tower footprint



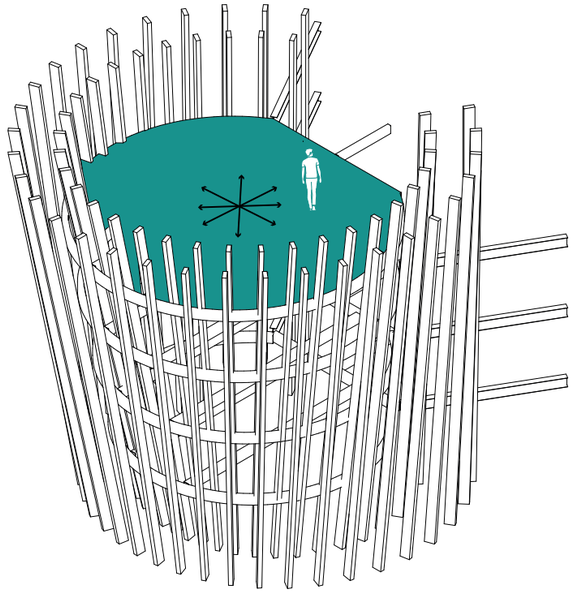
Shifting structure



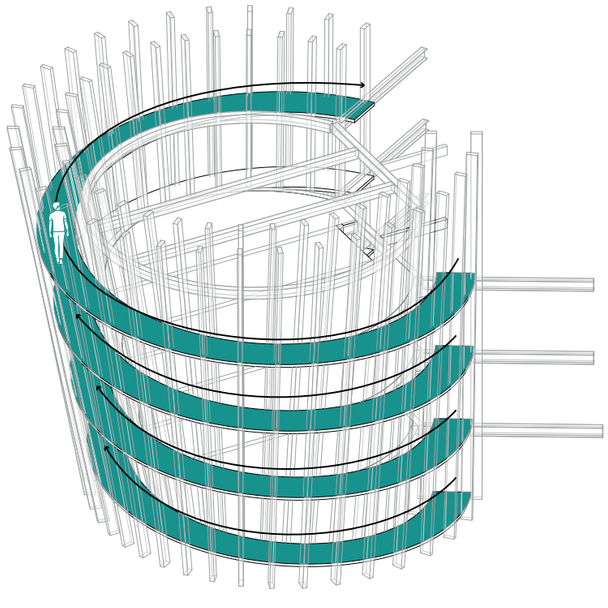
Creating movement



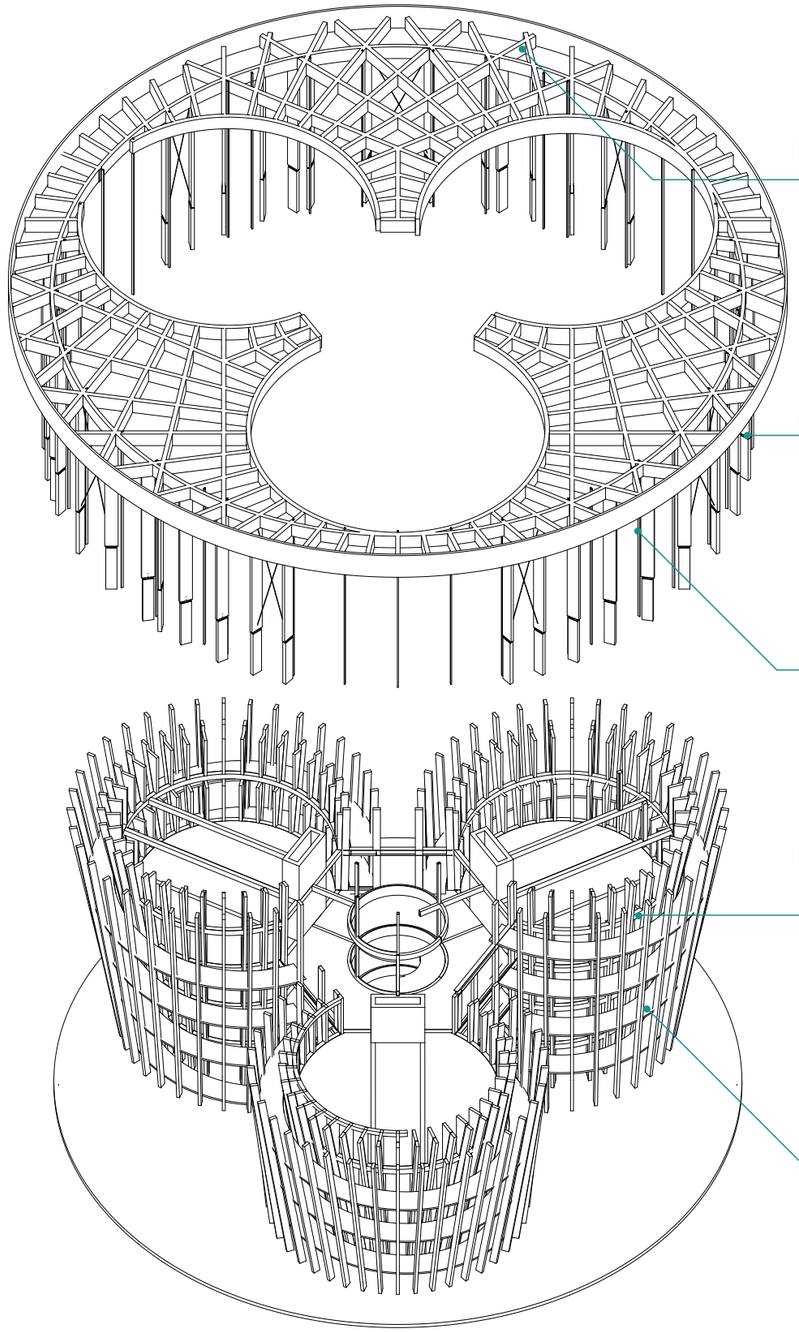
Uninterrupted open floor plans



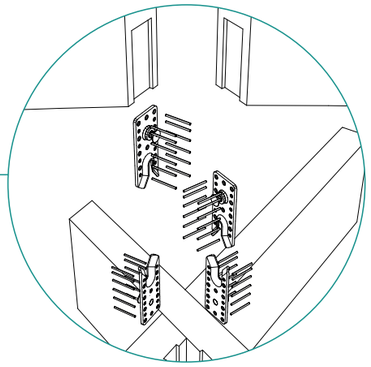
Continuous circulation



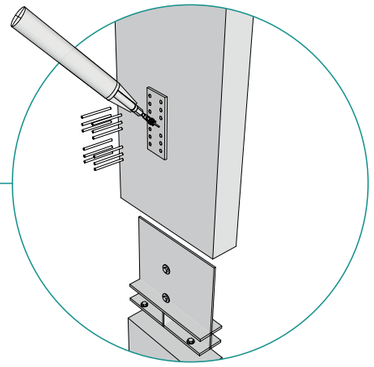
CONNECTIONS



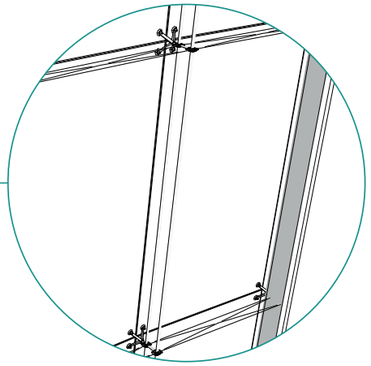
Roof beam connections



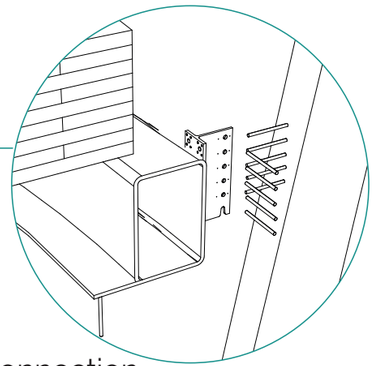
Column
connection



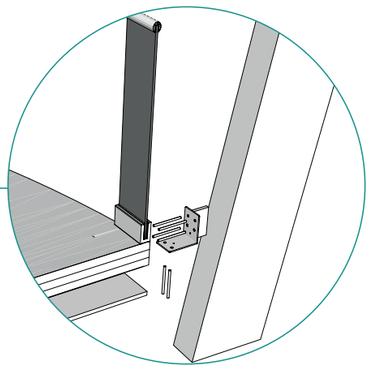
Spider glazing curatin wall facade



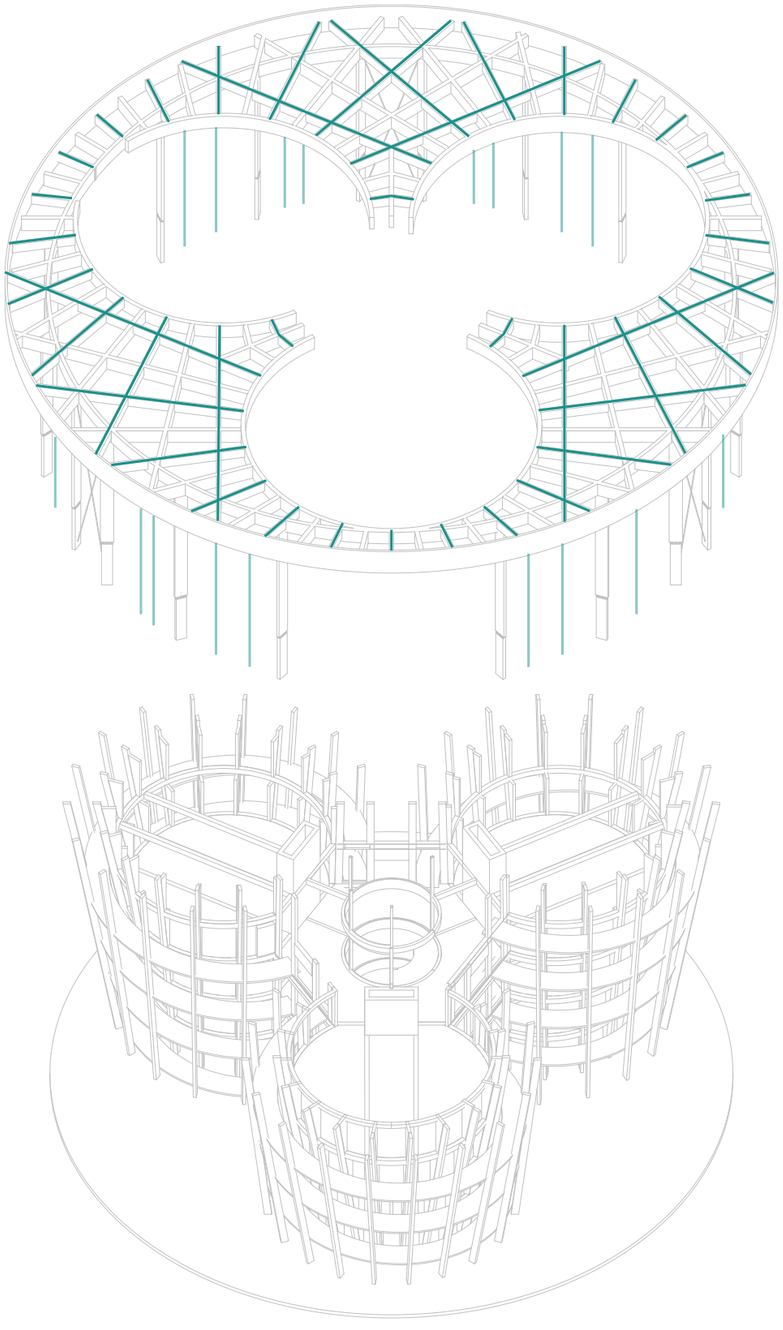
Floor
placement

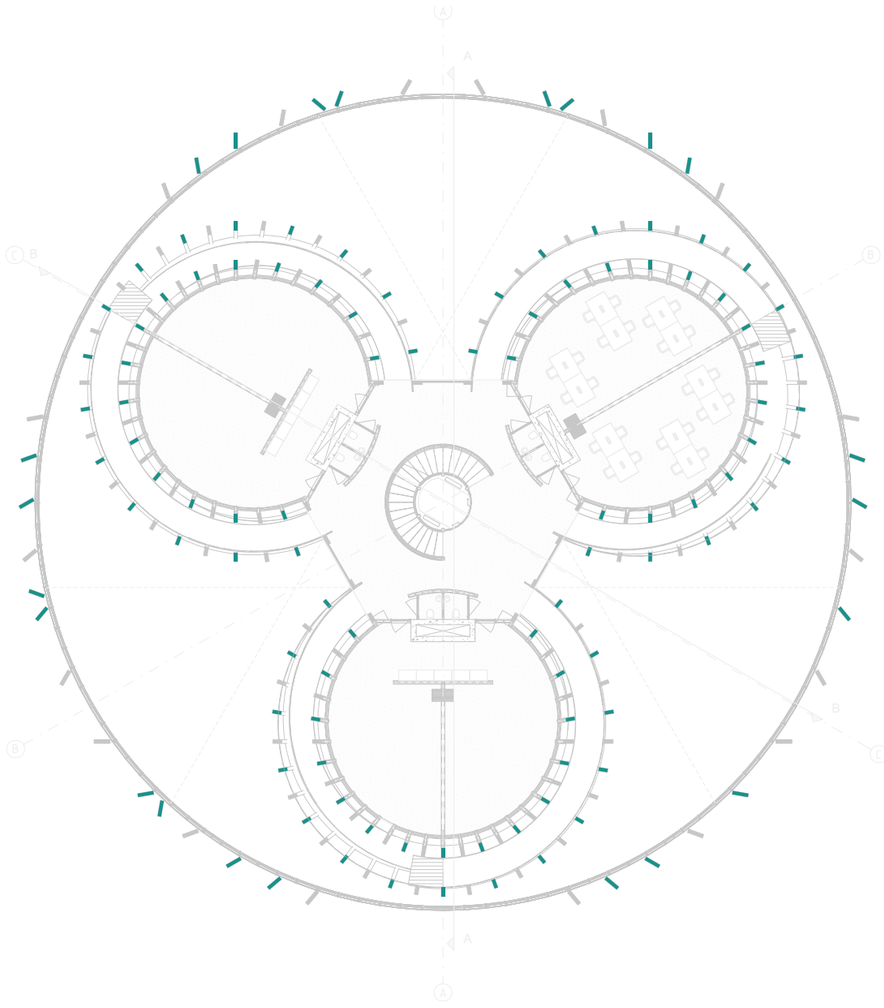


Spiral ramp connection



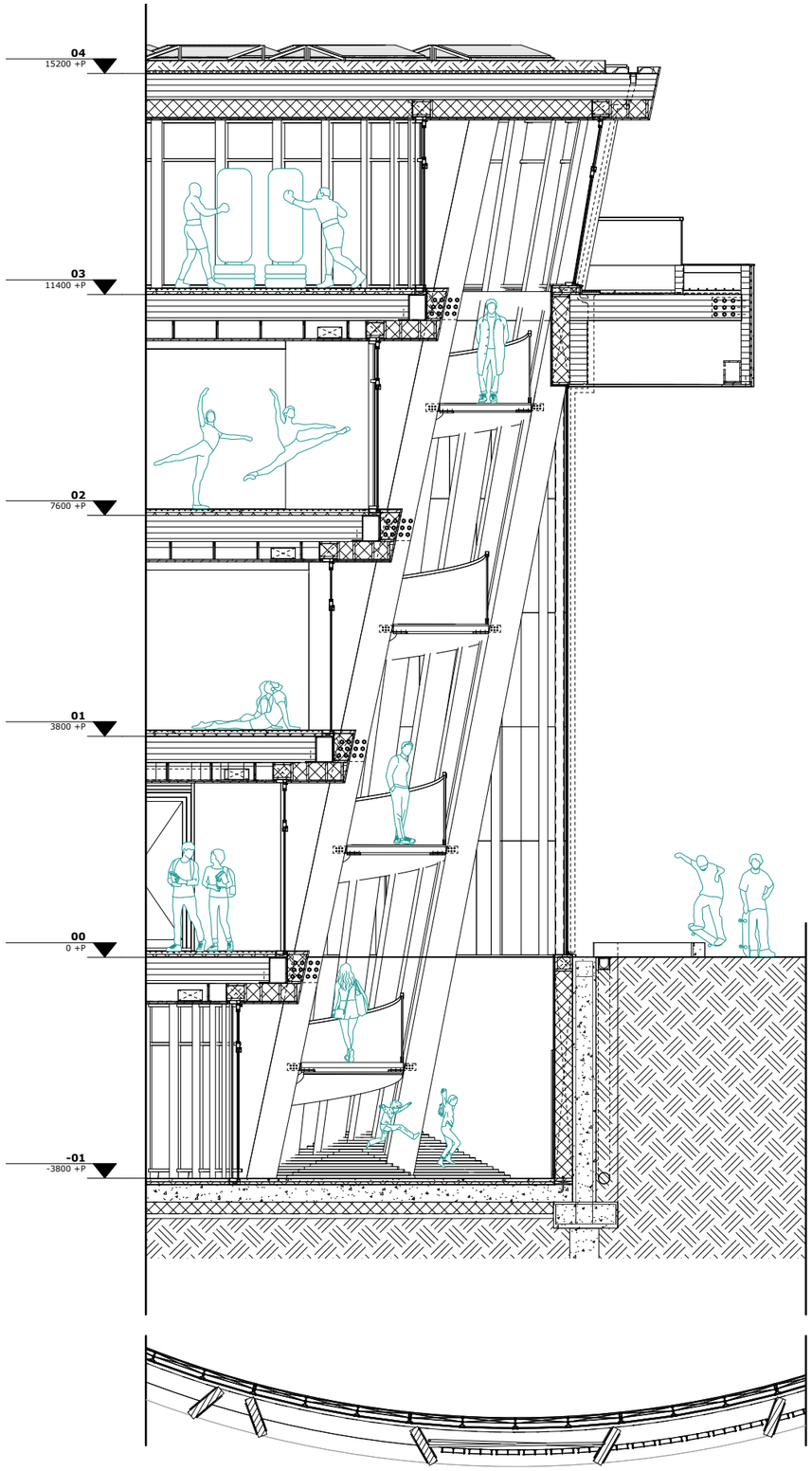
FUTURE DEVELOPMENT

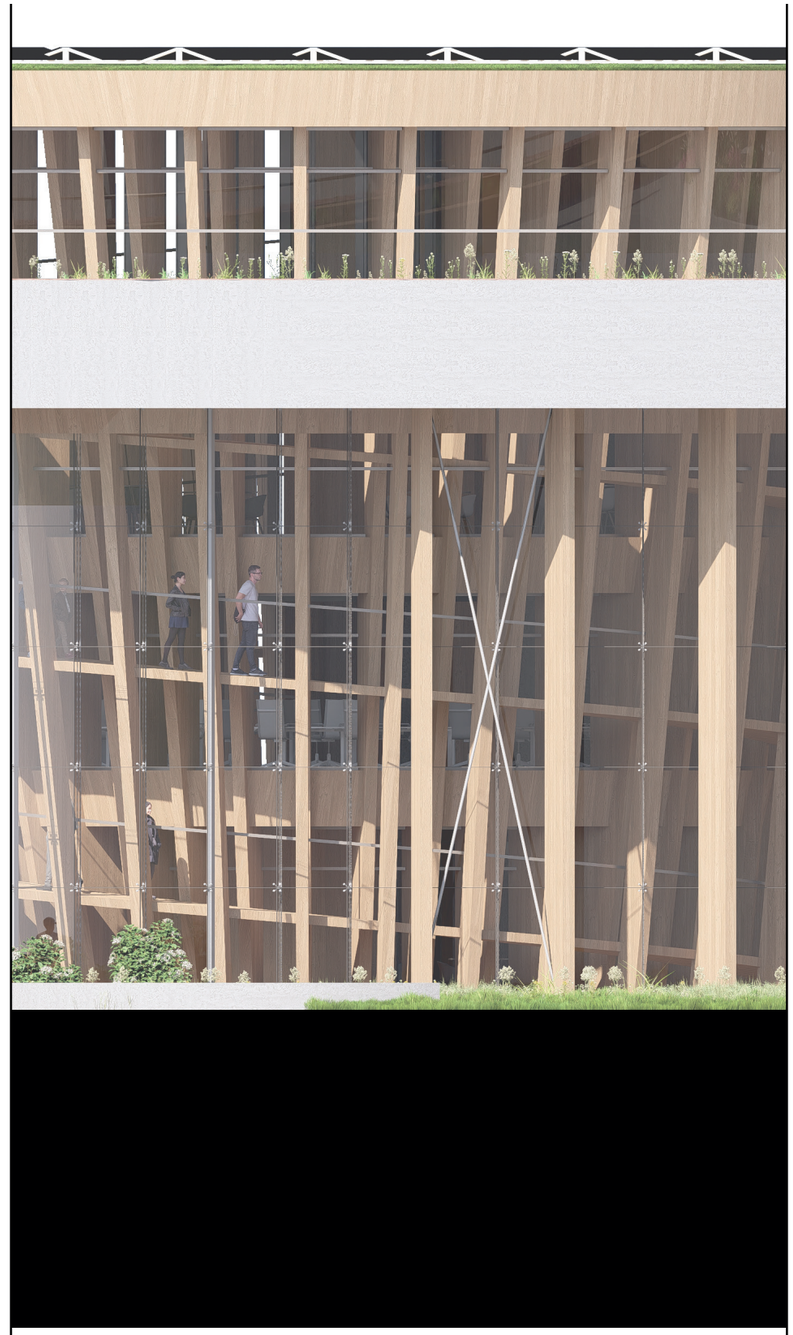




Current construction	Structural elements	226
	Material use in m^3	759,102 m^3
	Material costs	€ 379.551,-
Future development	Structural elements	115
	Material use in m^3	526,331 m^3
	Material costs	€ 263.165,-

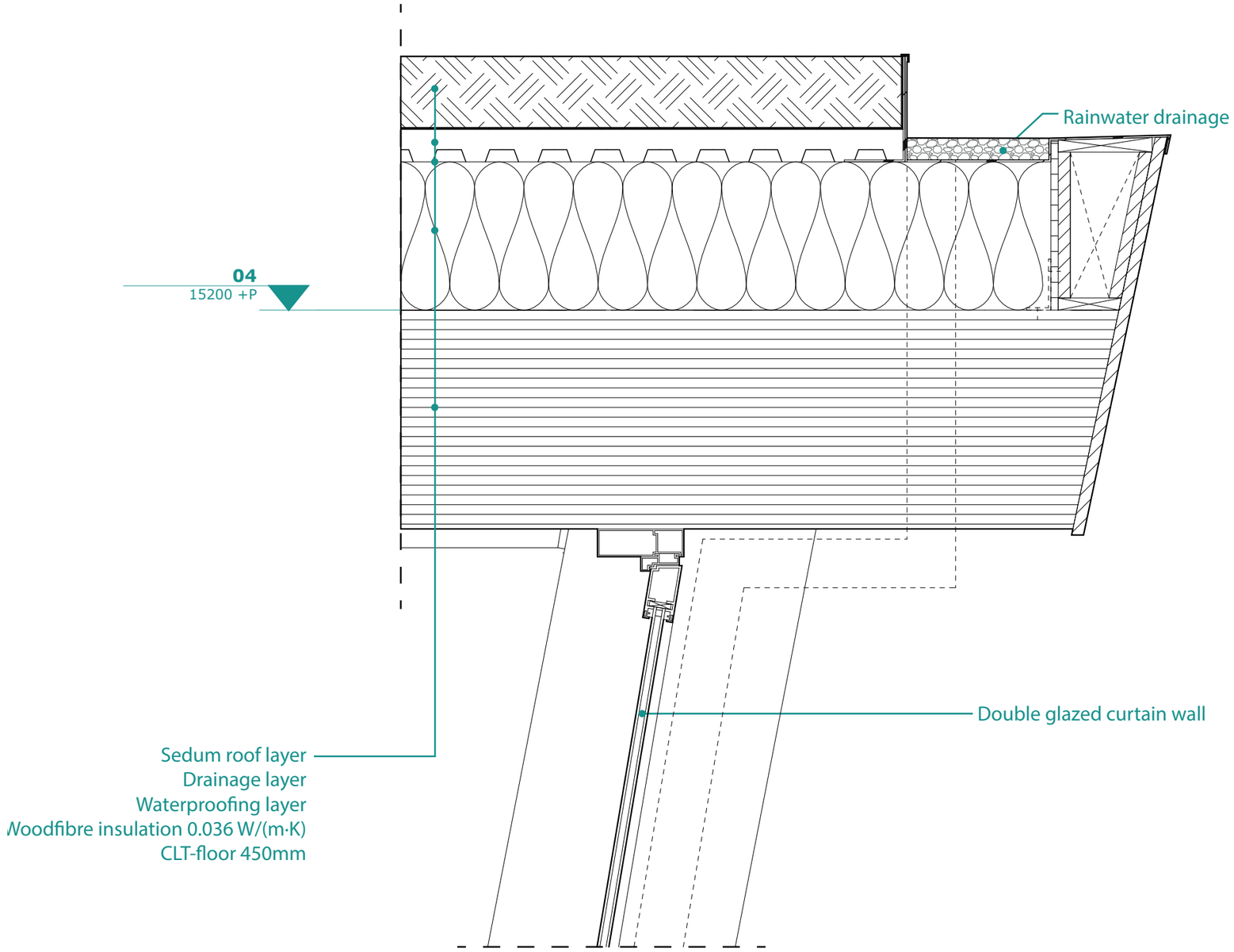
FRAGMENT





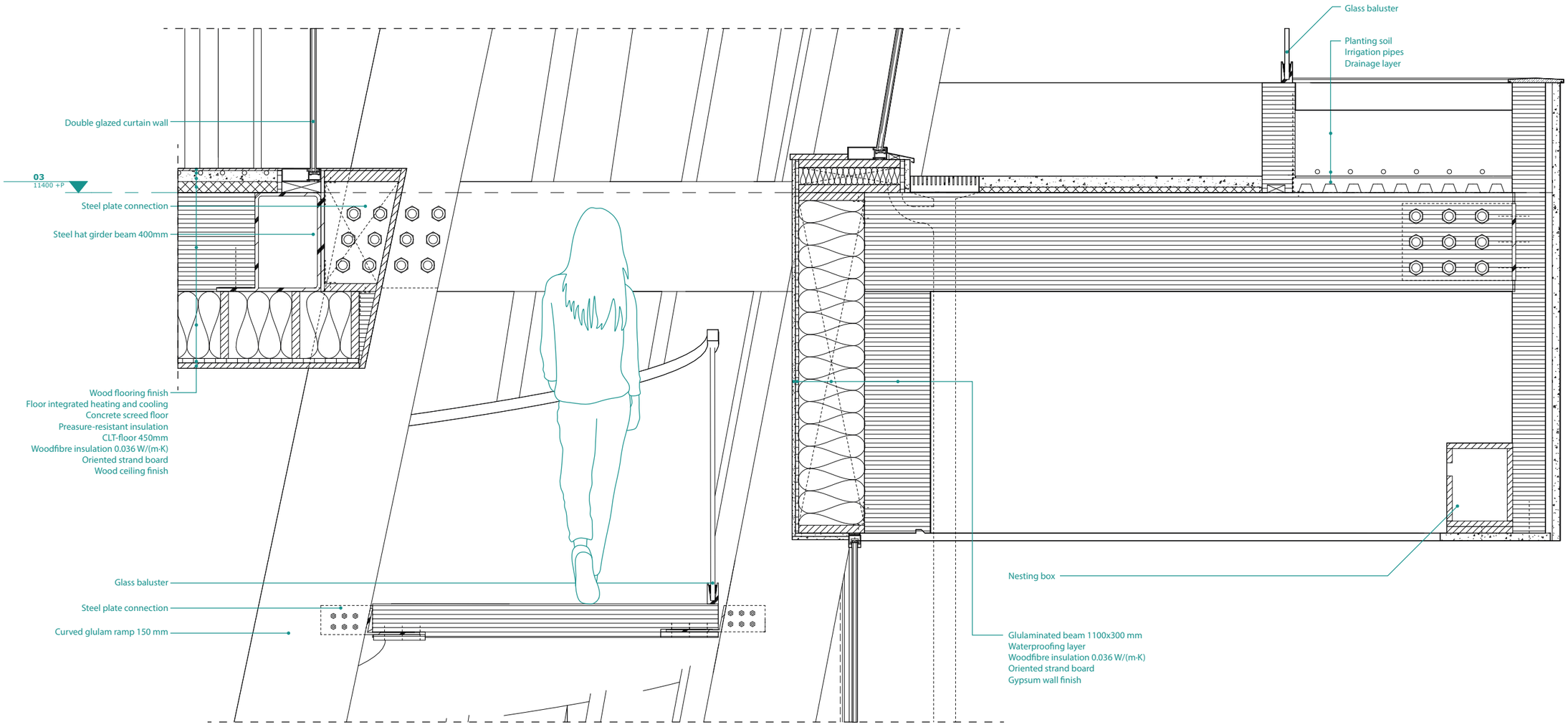
Scale 1 : 100

DETAIL| 1



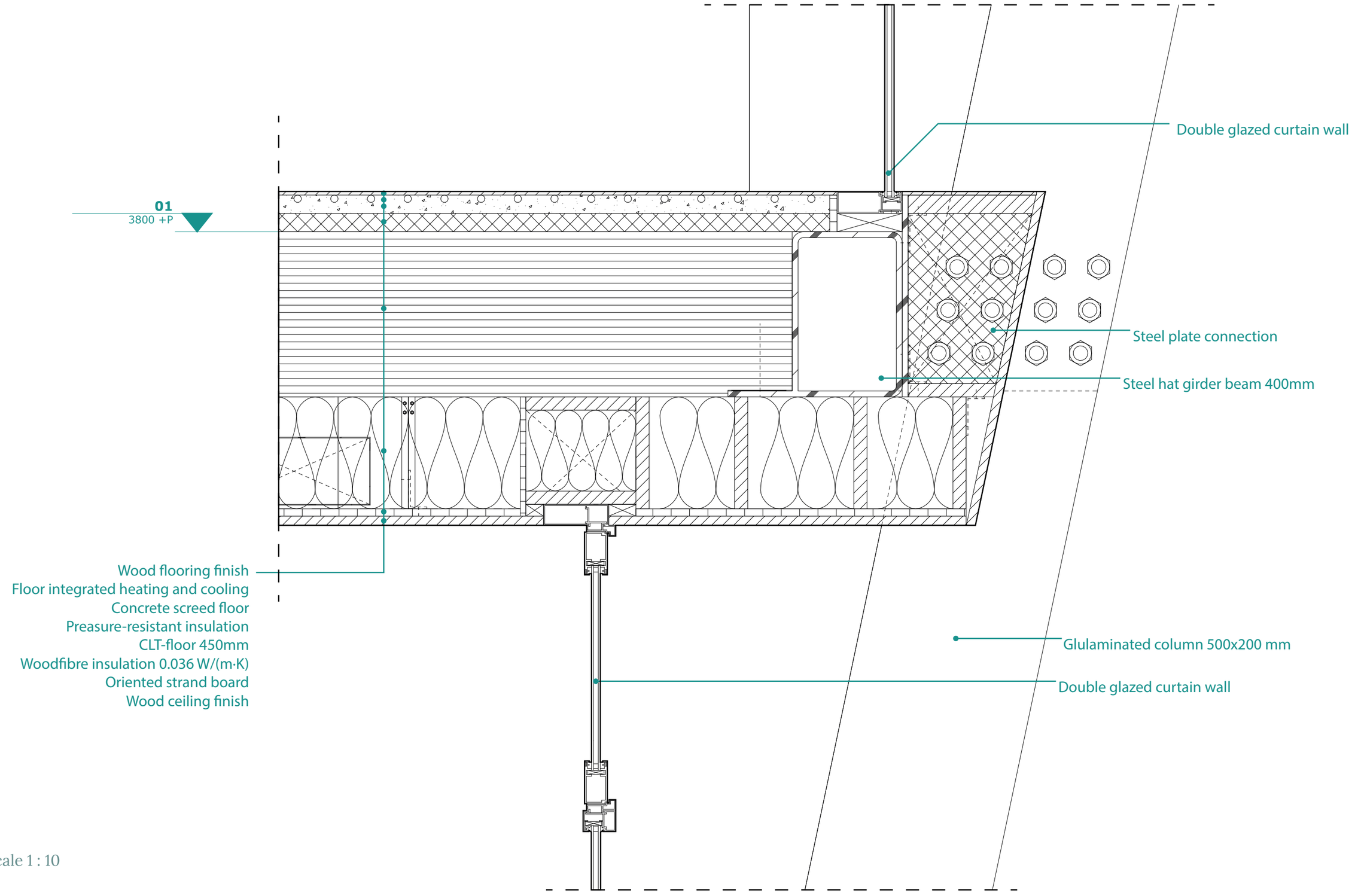
Scale 1 : 10

DETAIL| 2



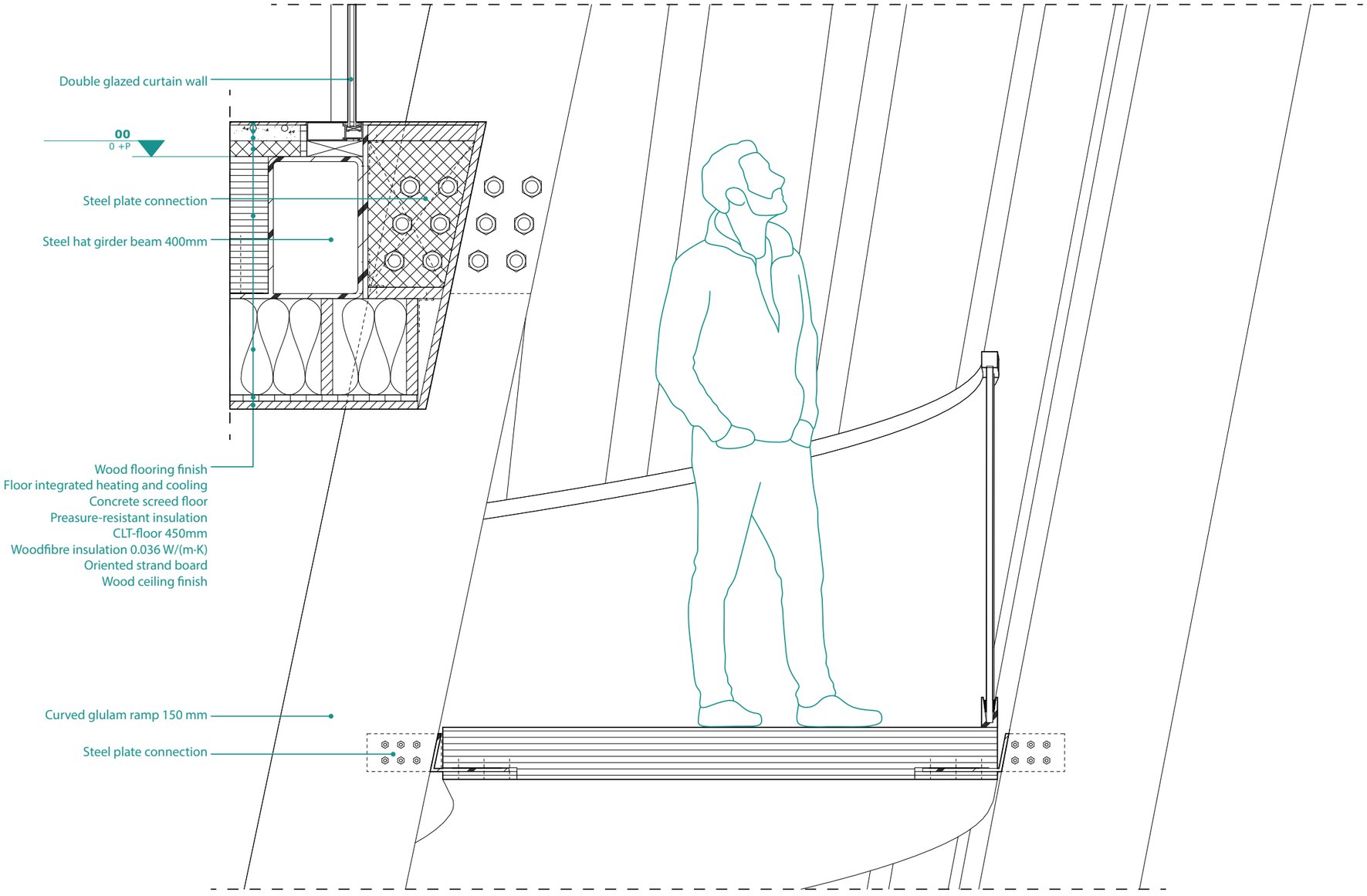
Scale 1 : 20

DETAIL| 3



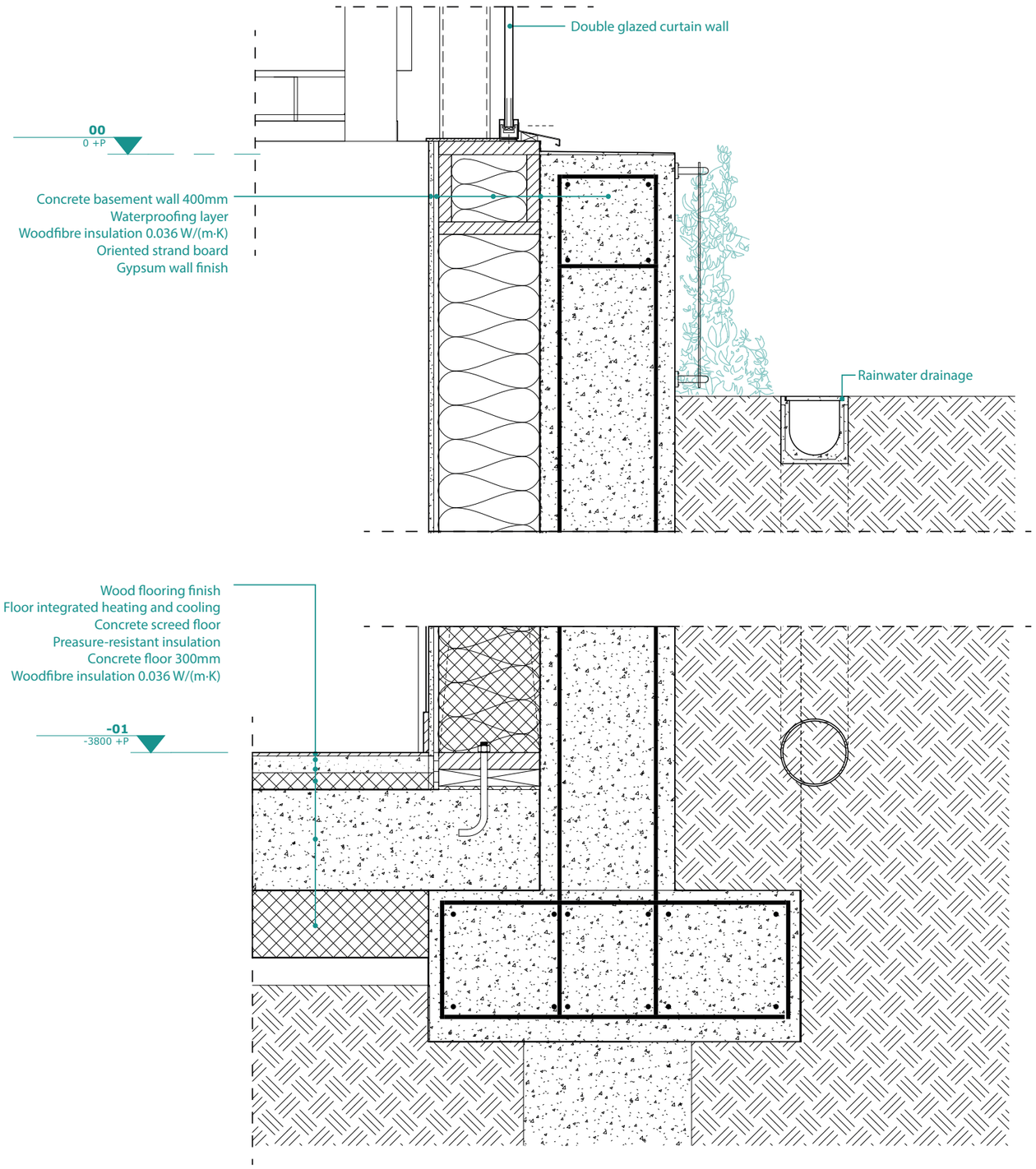
Scale 1 : 10

DETAIL| 4



Scale 1 : 15

DETAIL| 5



Scale 1 : 15

COMFORT

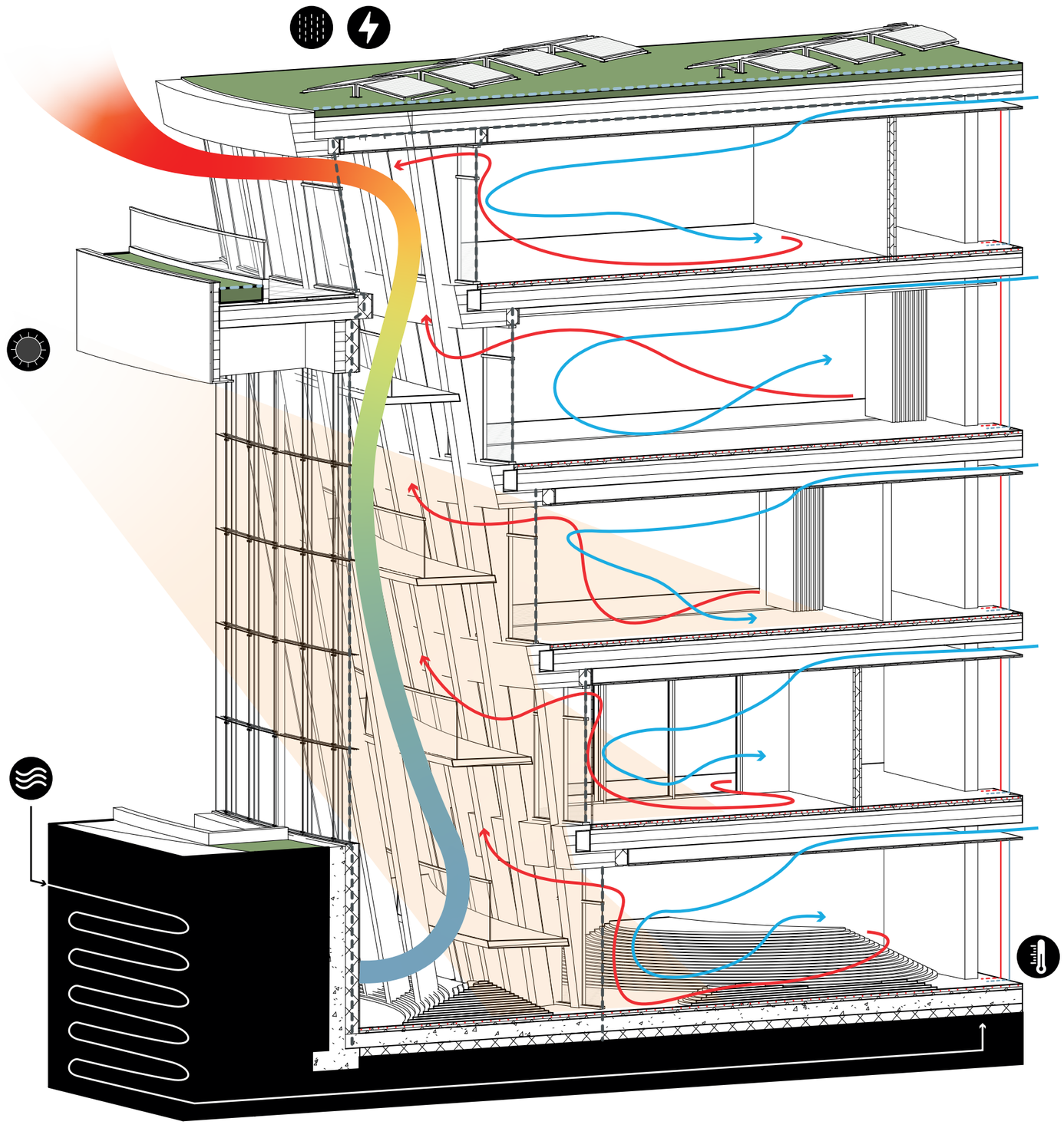
The green roof and terrace contribute to the local biodiversity by providing food and shelter for local insect and bird species. Beside improving biodiversity the green areas on these roof levels double as water buffer.

In total 112 PV-panels will be placed on the roof level, providing the building with a green source of energy. With an average output of 340 KwH per year a total of 38.080 KwH per year can be sustainably generated. Despite this not being enough to power the whole building it will

By having an exterior and interior shell heat stress can be kept to a minimum whilst still having maximum daylight entry. With the exterior shell acting as a double skin the interior towers, and functions in these towers can be kept at a comfortable temperature.

With the large atrium heating up quicker as compared to the towers a solar chimney effect gets created. With hot air being able to rise and exit the building via the towers the whole building can be naturally ventilated.
With hot air escaping out the building via the upper levels of the tower new fresh air gets in the building via natural ground ventilation. Via two inlet pipes in the perimeter of the building outside air gets to a comfortable temperature via thermal heat transfer and enters the building as fresh air supply.

Heating and cooling is done via a floor system. This system can be connected to circular heating and cooling systems like thermal heat and cold storage



CLIMATE

Through integration of local food producing plant species and placement of nest boxes in the facade the overall biodiversity gets improved. This positive climate impact getting further reflected in the material use. The carbon footprint of the building can be kept at a negative Kg CO_2 / M^3 level by mainly using biobased materials and keeping use of concrete and steel to a minimum.



Blackthorn
Height: 4 - 8 m
Bloom: Spring



Structural steel
Footprint:
5403 Kg CO_2 / M^3



Common Hazel
Height: 3 - 15 m
Bloom: Spring



Concrete
Footprint:
215 Kg CO_2 / M^3



Common Hawthorn
Height: 5 - 14 m
Bloom: summer



Reconstituted stone
Footprint:
13 Kg CO_2 / M^3



Chestnut
Height: 6 - 20 m
Bloom: Spring



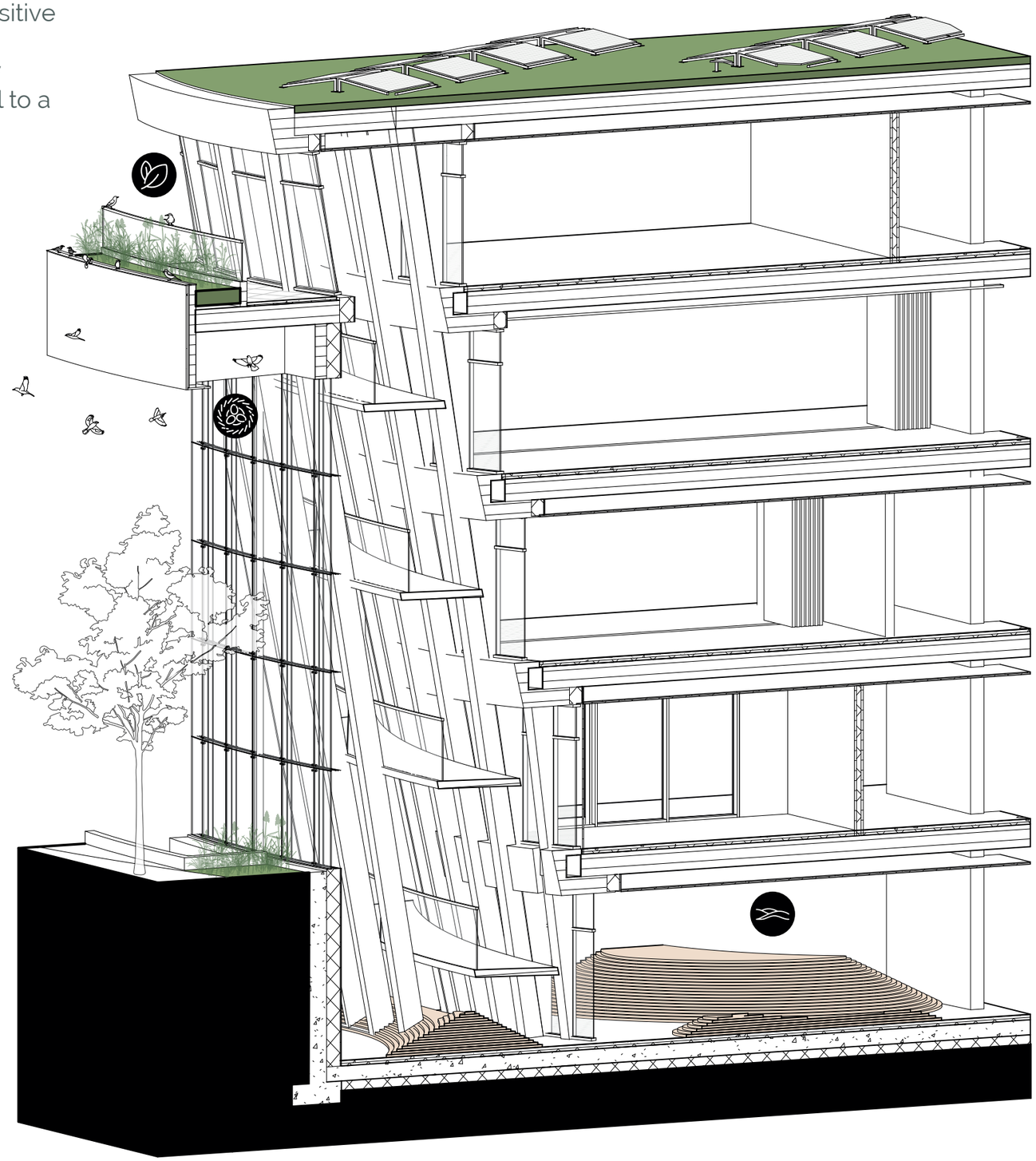
Woodfibre insulation
Footprint:
-61 Kg CO_2 / M^3



European Plum
Height: 6 - 15 m
Bloom: Spring



CLT
Footprint:
-664 Kg CO_2 / M^3

















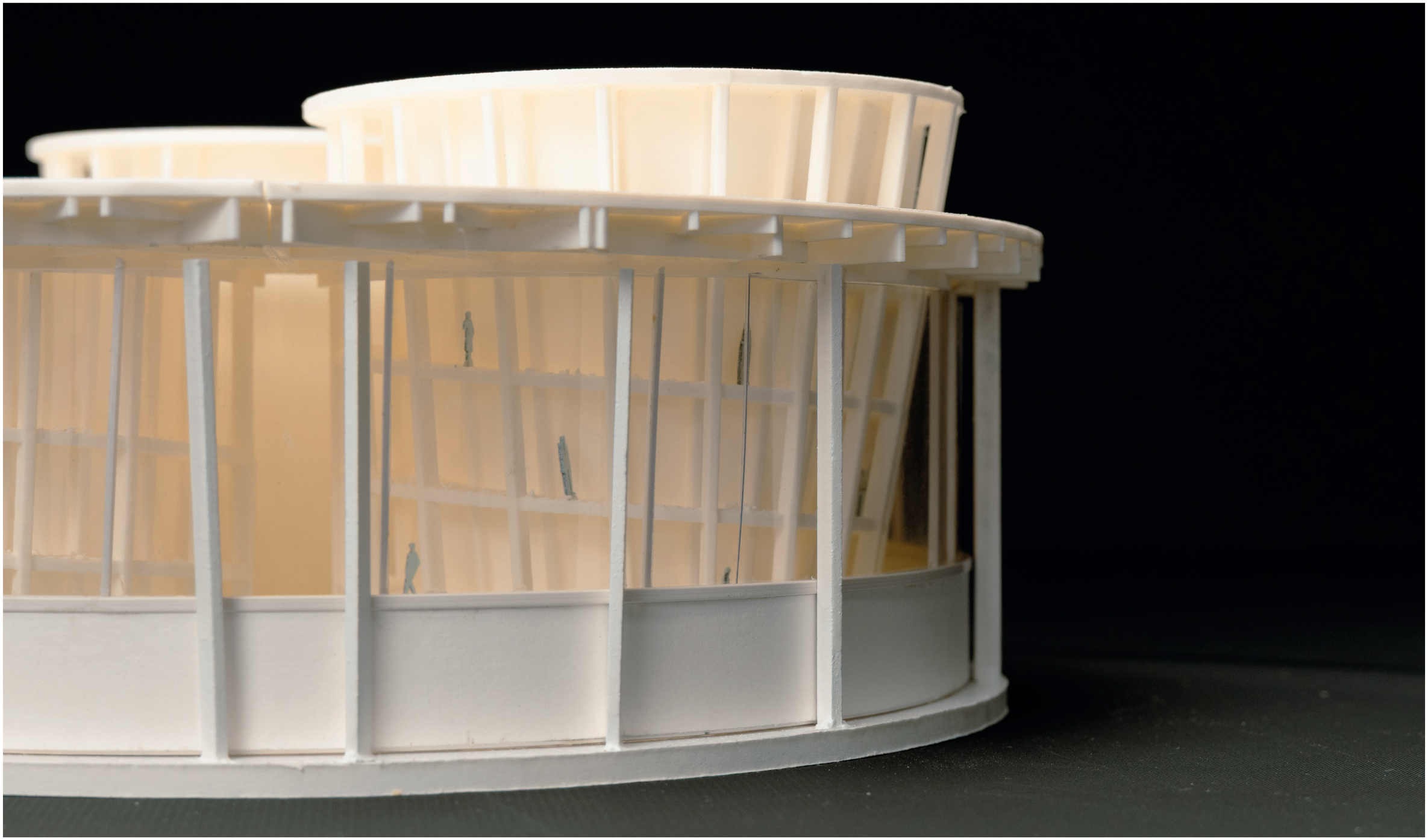


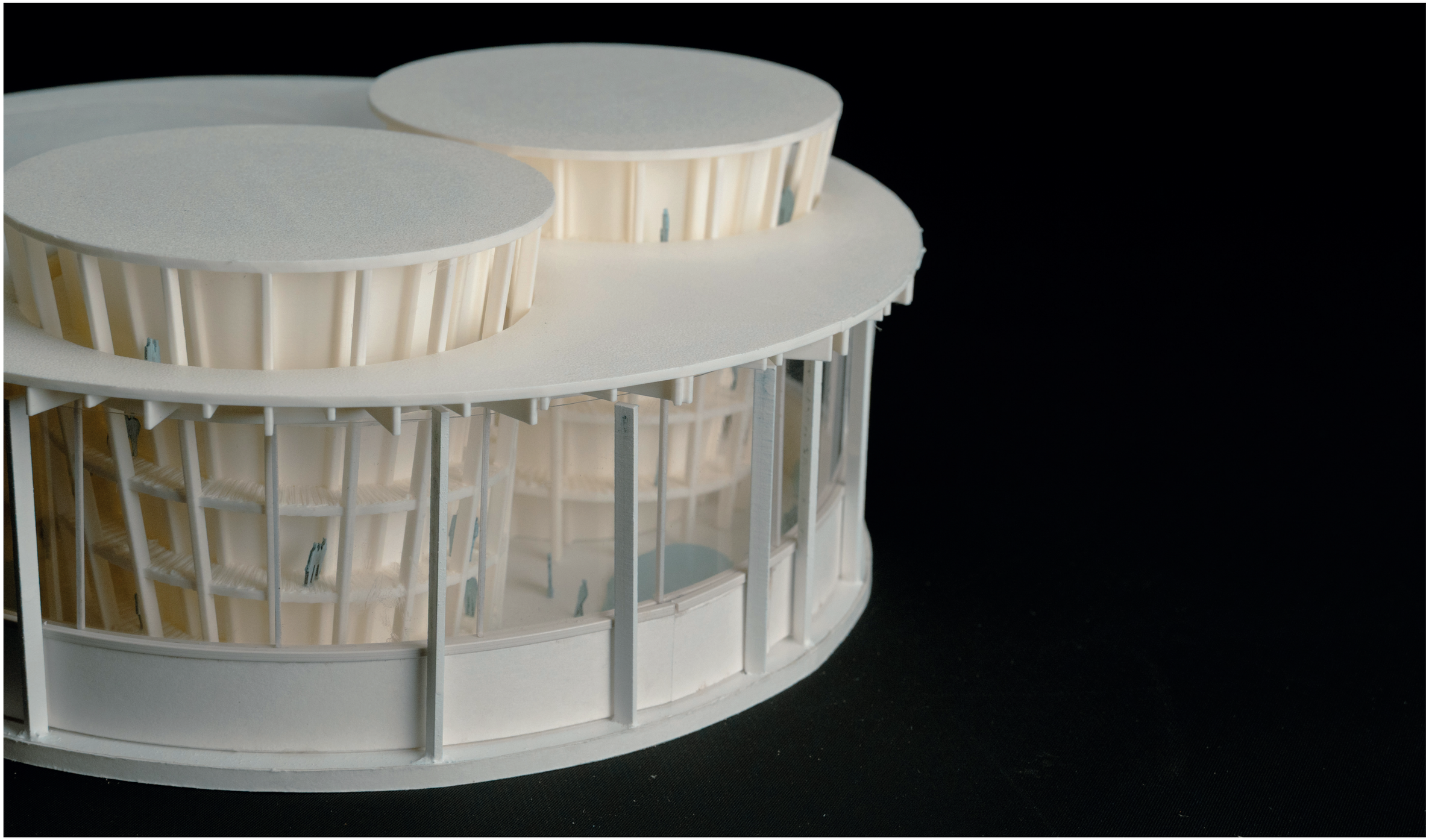


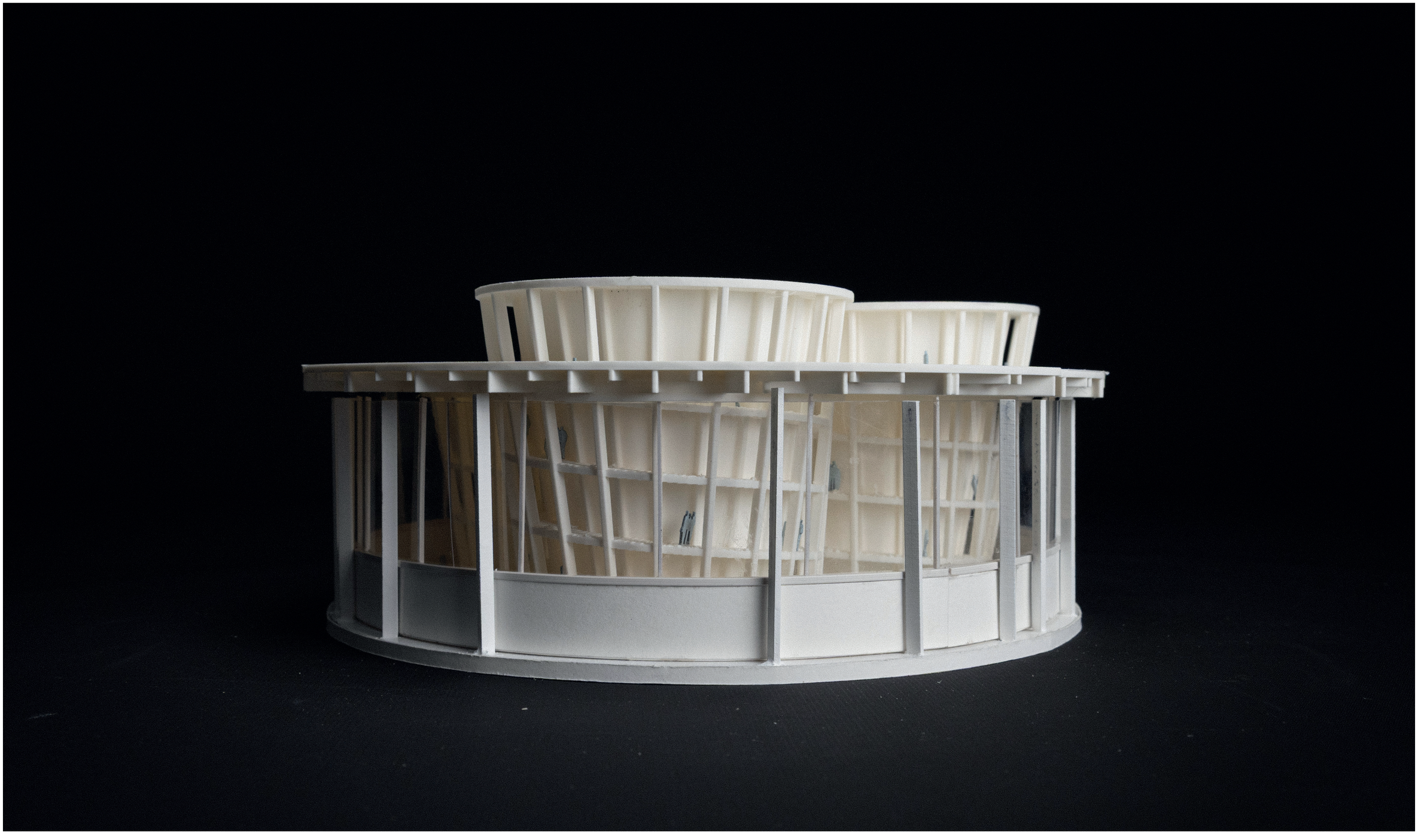


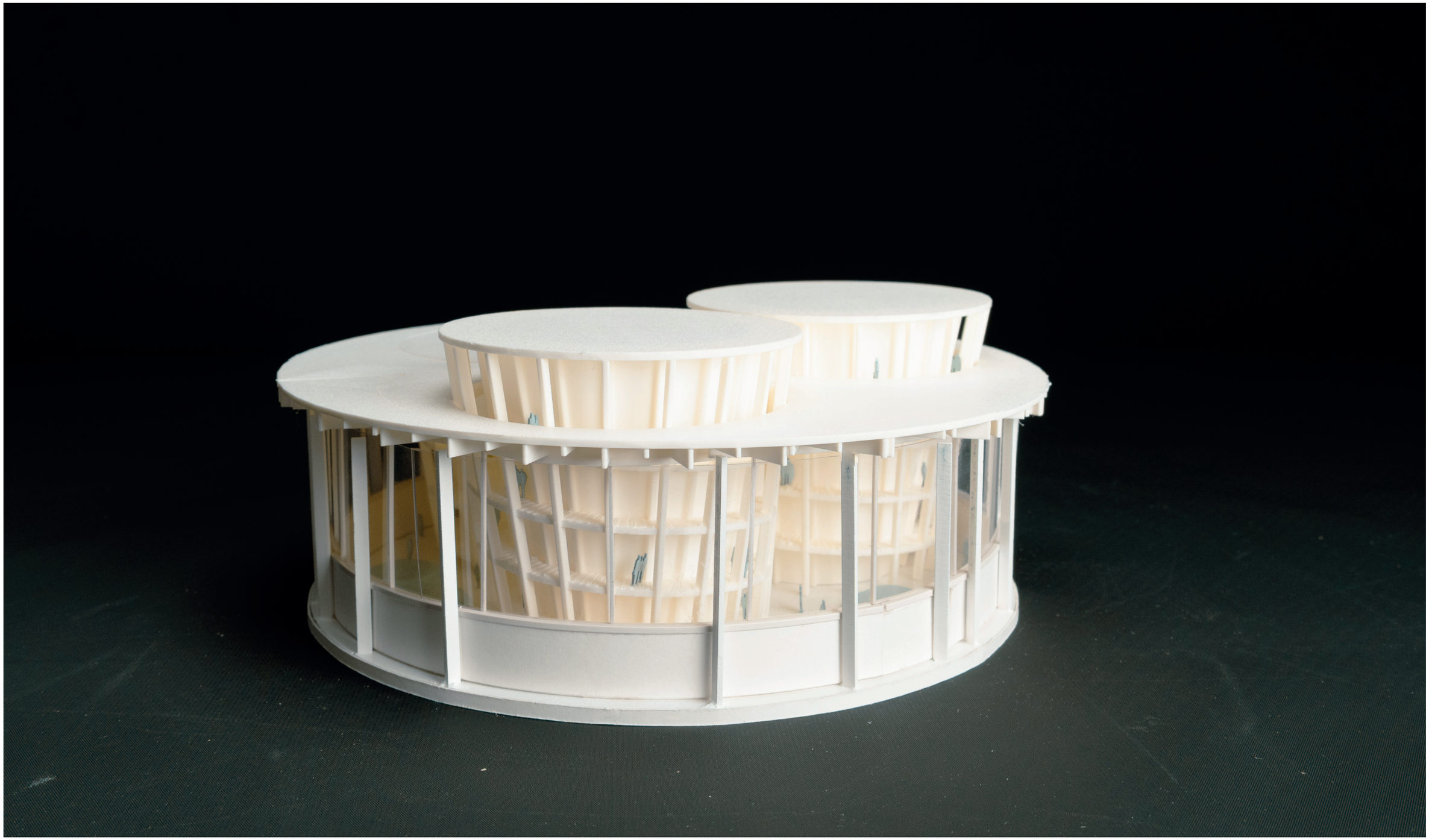


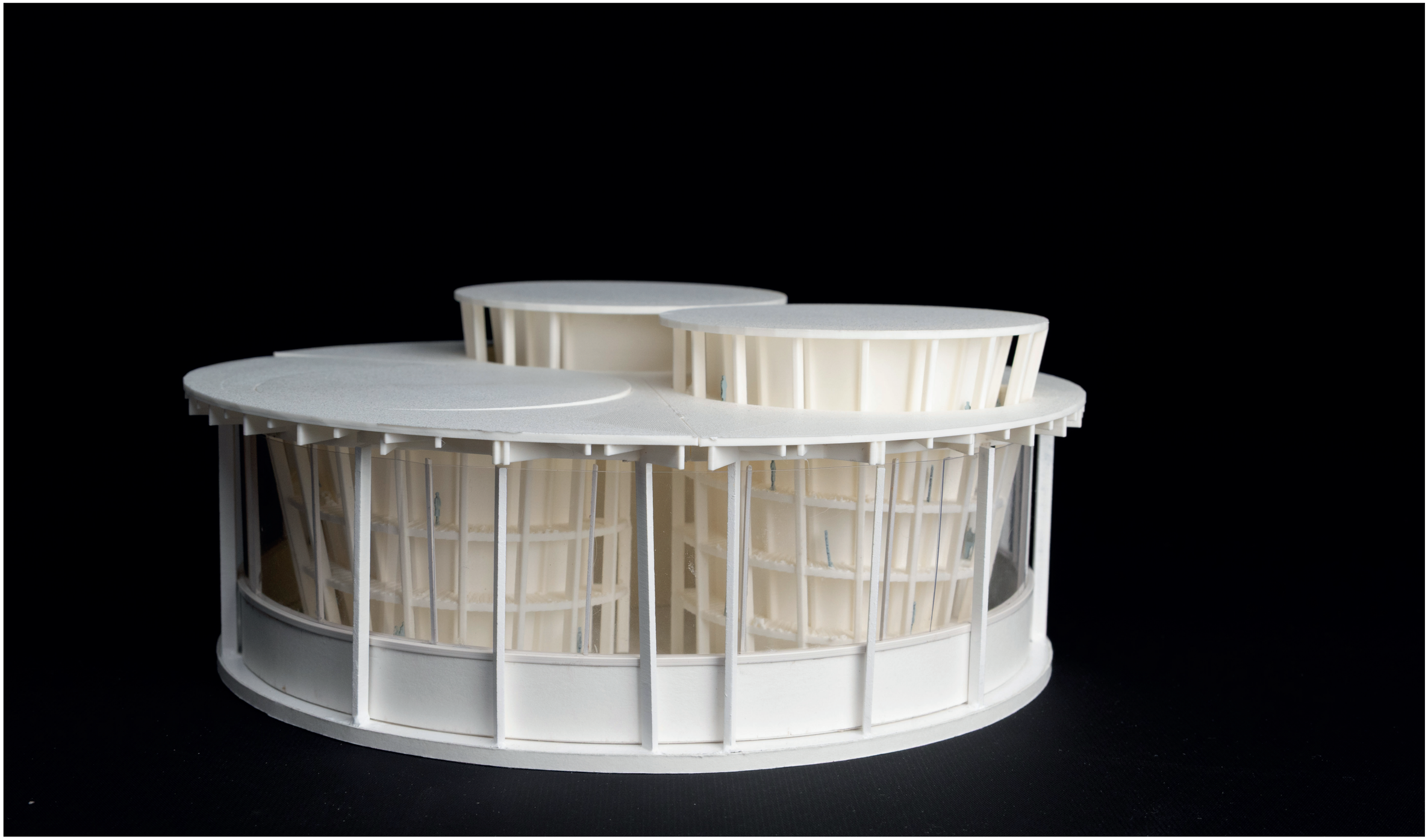




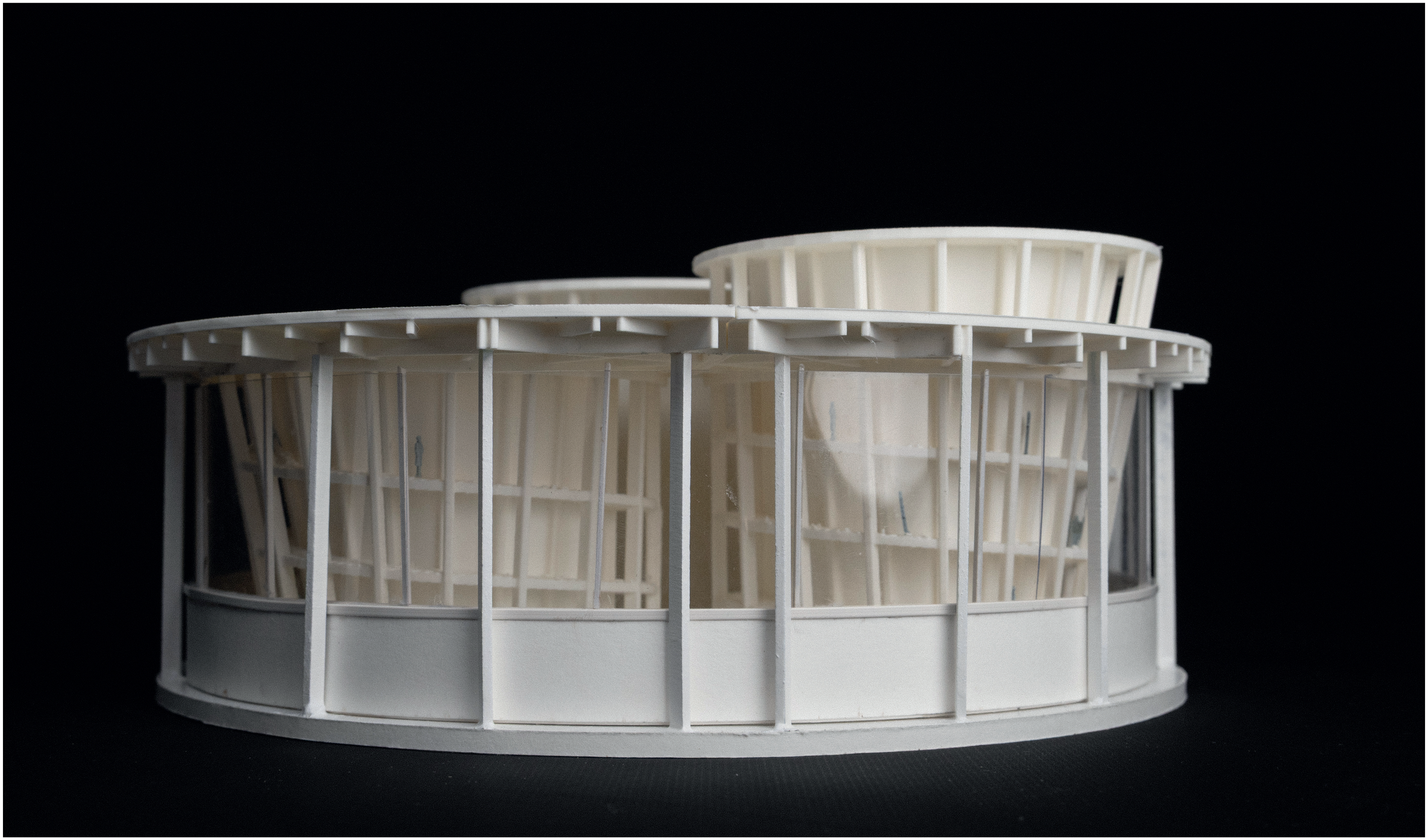


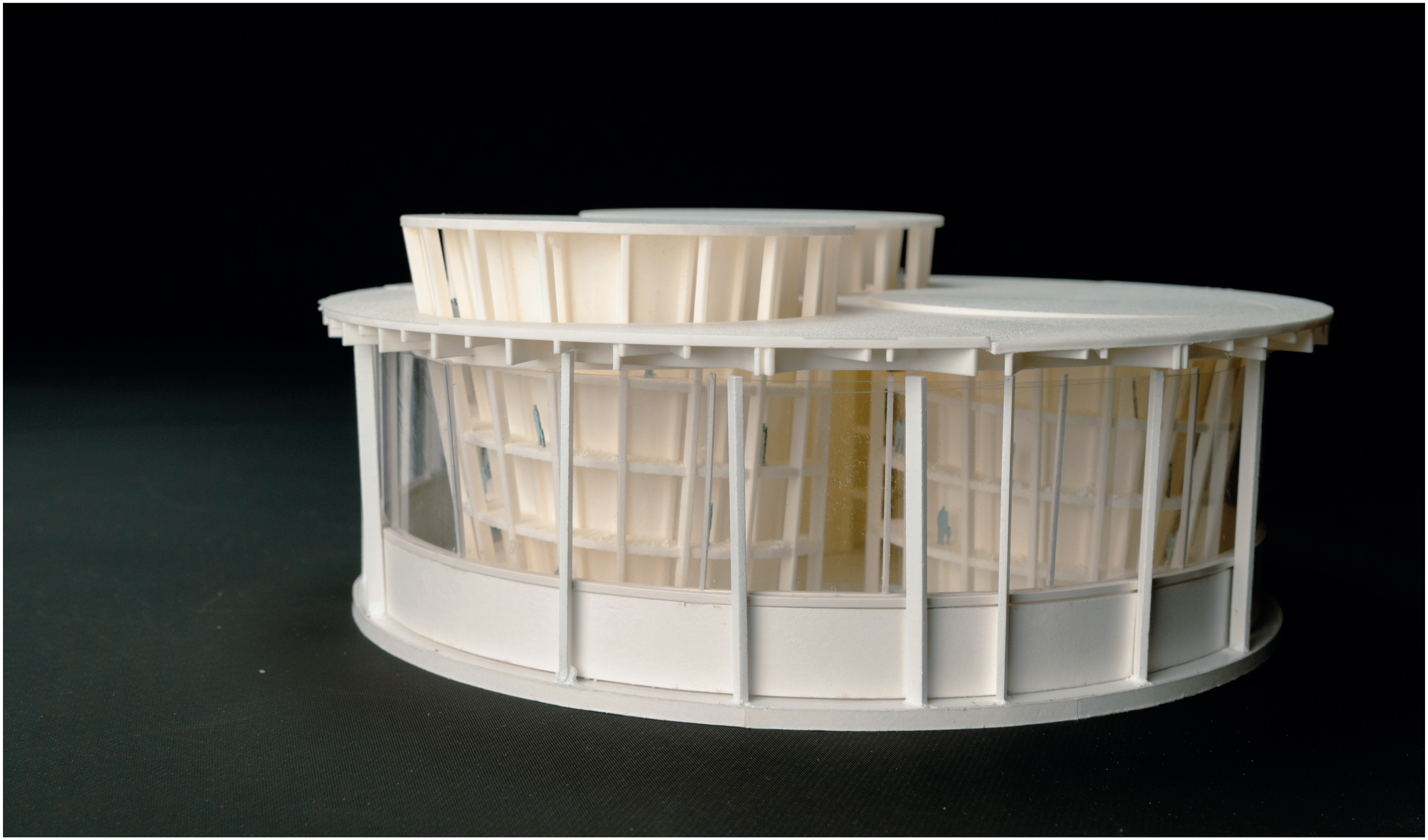


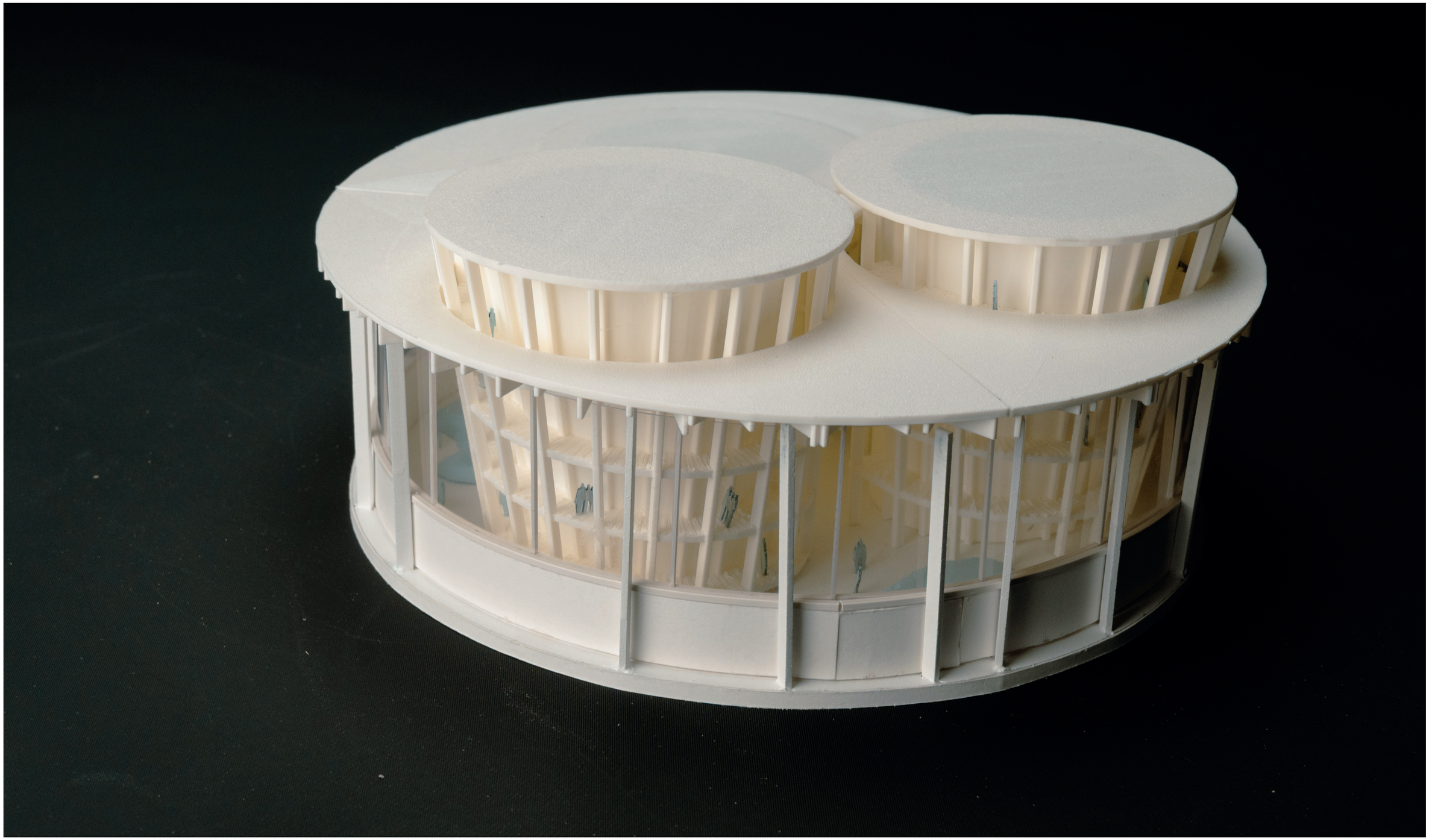


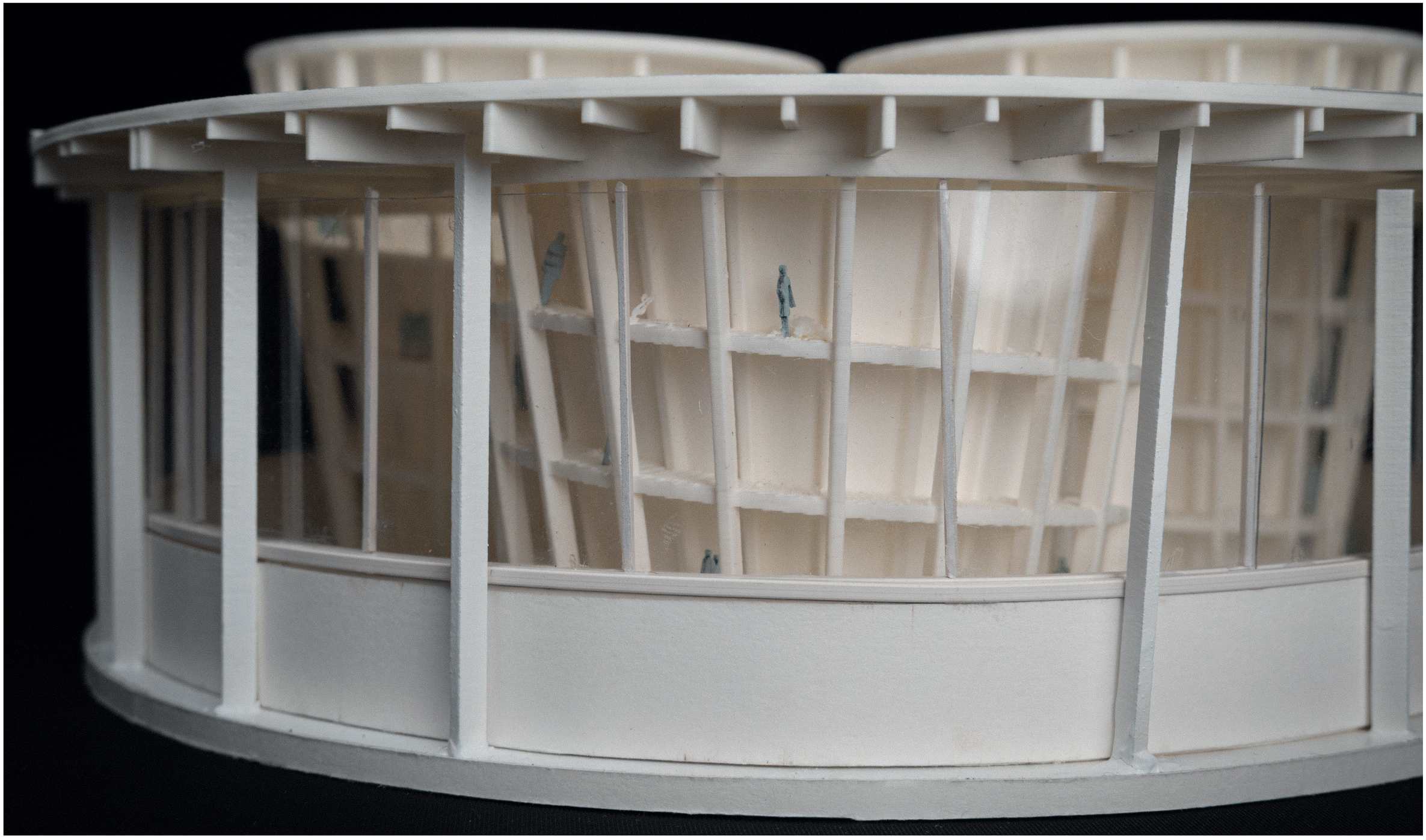


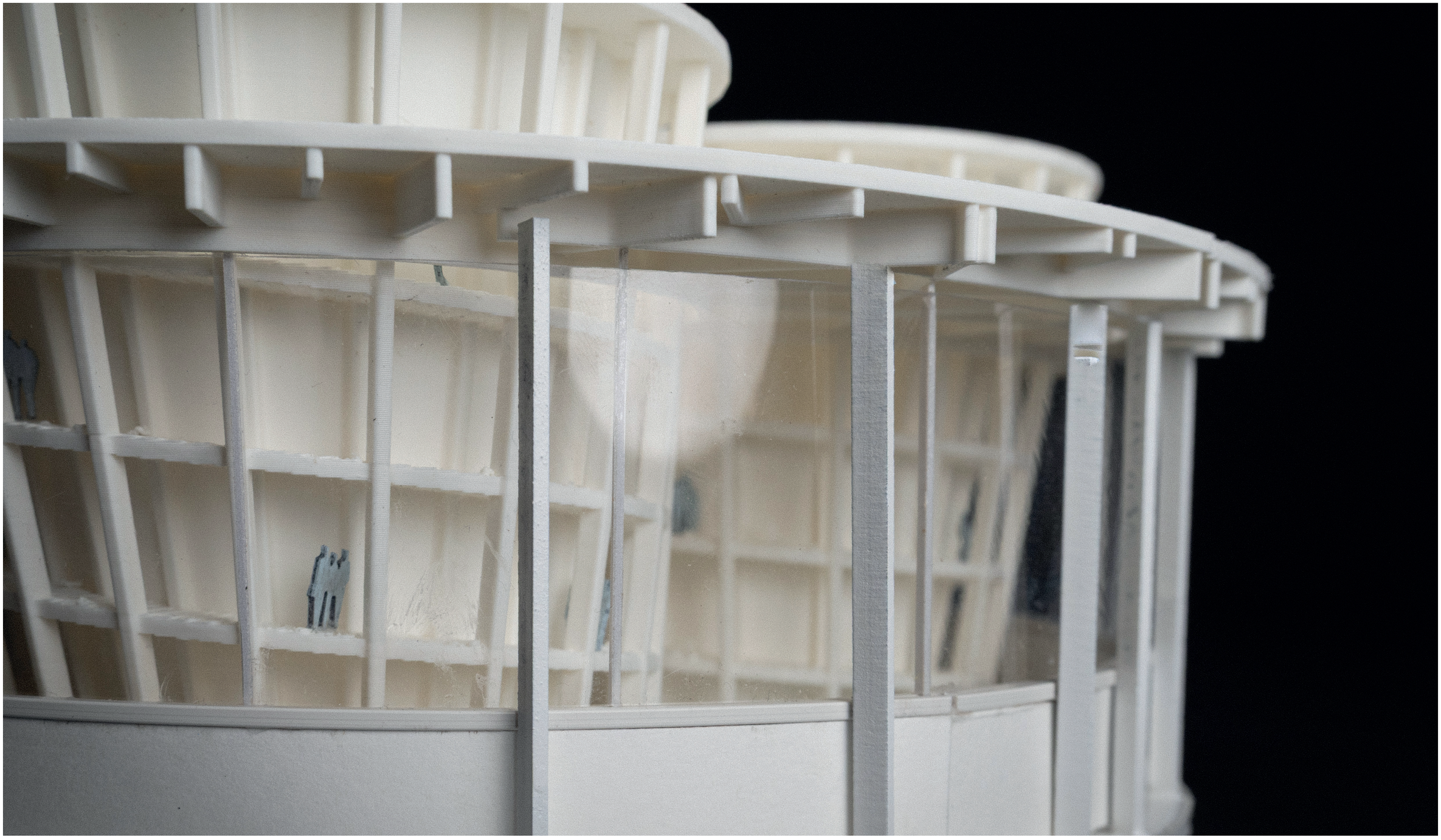


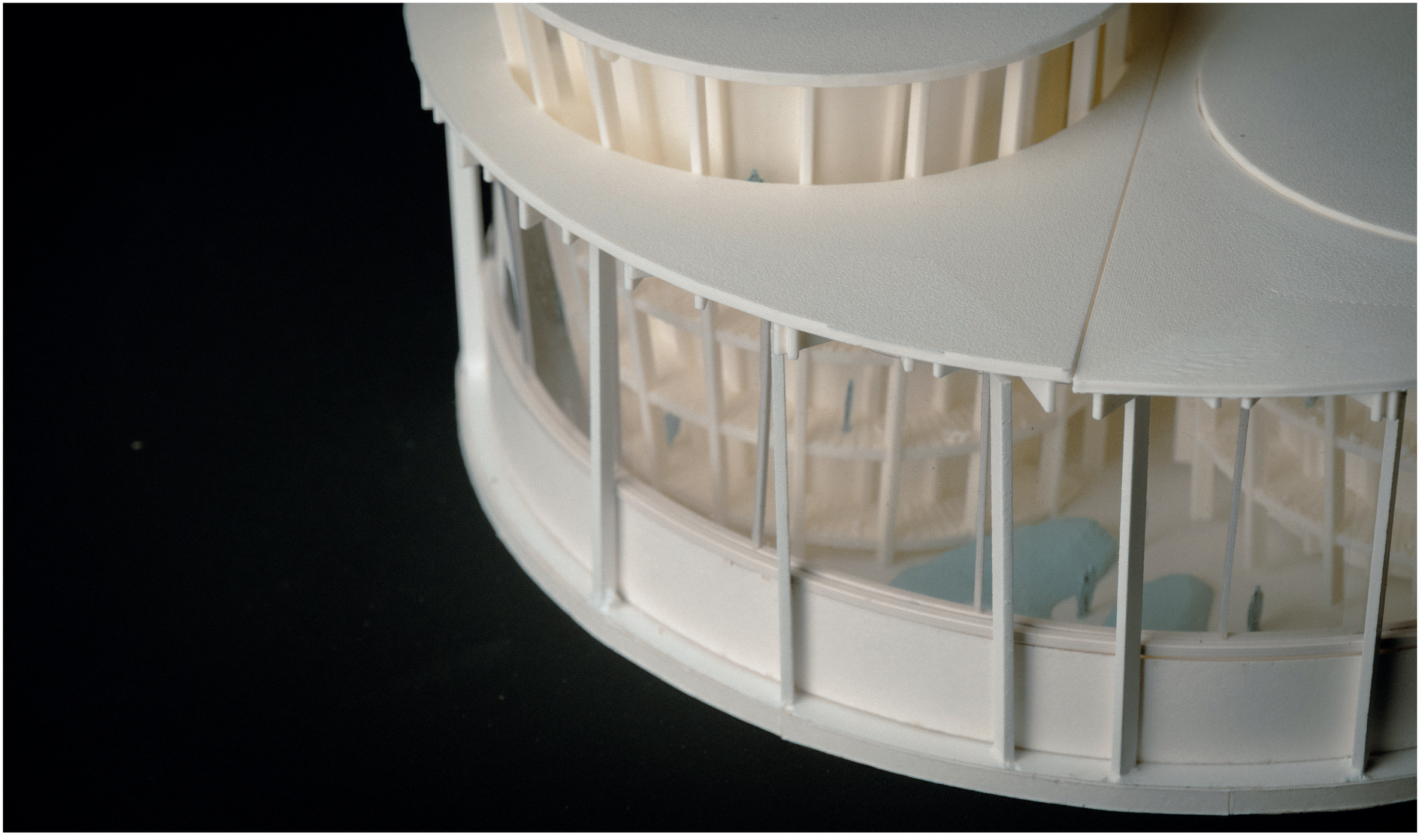






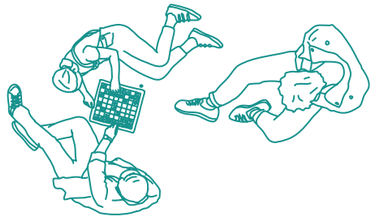






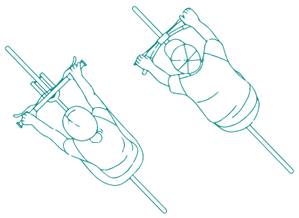




















Progress report - Joram Vianen | 5960169
12-02-2025