

MEDICAL GARDEN

Healthcare centre in Karlskrona



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ARK 263 Future visions for healthcare, housing and work 3
Healthcare Architecture MPARC 2020-21

TASK

BLEKINGE

Chalmers healthcare studio ark 263 this year focuses on the design of a new Health Center in Karlskrona. The client Region Blekinge set the ambitious goal to:

“Create an attractive, health-promoting and sustainable primary care centre with a human-centric approach.”

Taking their responsibility for public healthcare serious, the Region Blekinge wants to increase patient safety, achieve efficient care processes, create attractive care environment, and establish future proof facilities. This particular project is the development of a primary healthcare center in the dense capital Karlskrona. The brief includes a medical center, a women’s health center, a rehabilitation unit, a dental care center and common functions. The program is around 4,500 sqm.



VISIONS

On a global perspective the UN 2030 sustainability goals number 3; Good health and wellbeing, and number 11; Sustainable cities and communities are especially relevant for this project. The Goals 7, 12 and 13 play a subordinate but nevertheless important role. As Sweden and Region Blekinge committed to these goals the following trends and wishes are to be implemented in this visionary approach to primary healthcare.

E-health and Artificial Intelligence, elasticity between units, a flexible and general structure, separation of flows, space efficiency, shared areas for public use and the possibility for patients, parent’s groups and other to meet and exchange experiences and knowledge units.

Additionally, the recent topic of post-covid-19 design is to be taken in consideration as well.



SITE & CONTEXT

KARLSKRONA

Designated building site is the capital of Region Blekinge. The city Karlskrona is spread over 30 islands in the eastern part of Blekinge archipelago. It was founded in 1680 when the Royal Swedish Navy was moved from Stockholm to this very important strategic position in the Baltic sea. Most of the baroque buildings from this era are still standing, which is why the city centre is architecturally uniform. The capital currently counts 66.000 habitants. The city’s main interest concerning this project is to:

“Create a high- quality contemporary architecture addition, that will add value to the baroque city plan and strengthen the entrance to the city”

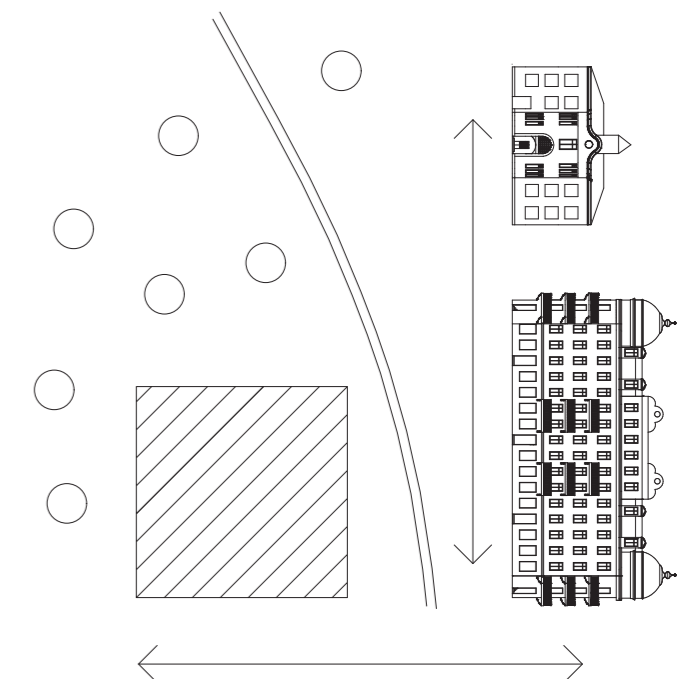
These two different perspectives on the project, of the Region Blekinge and the city Karlskrona, demand for a compromising architectural proposal.



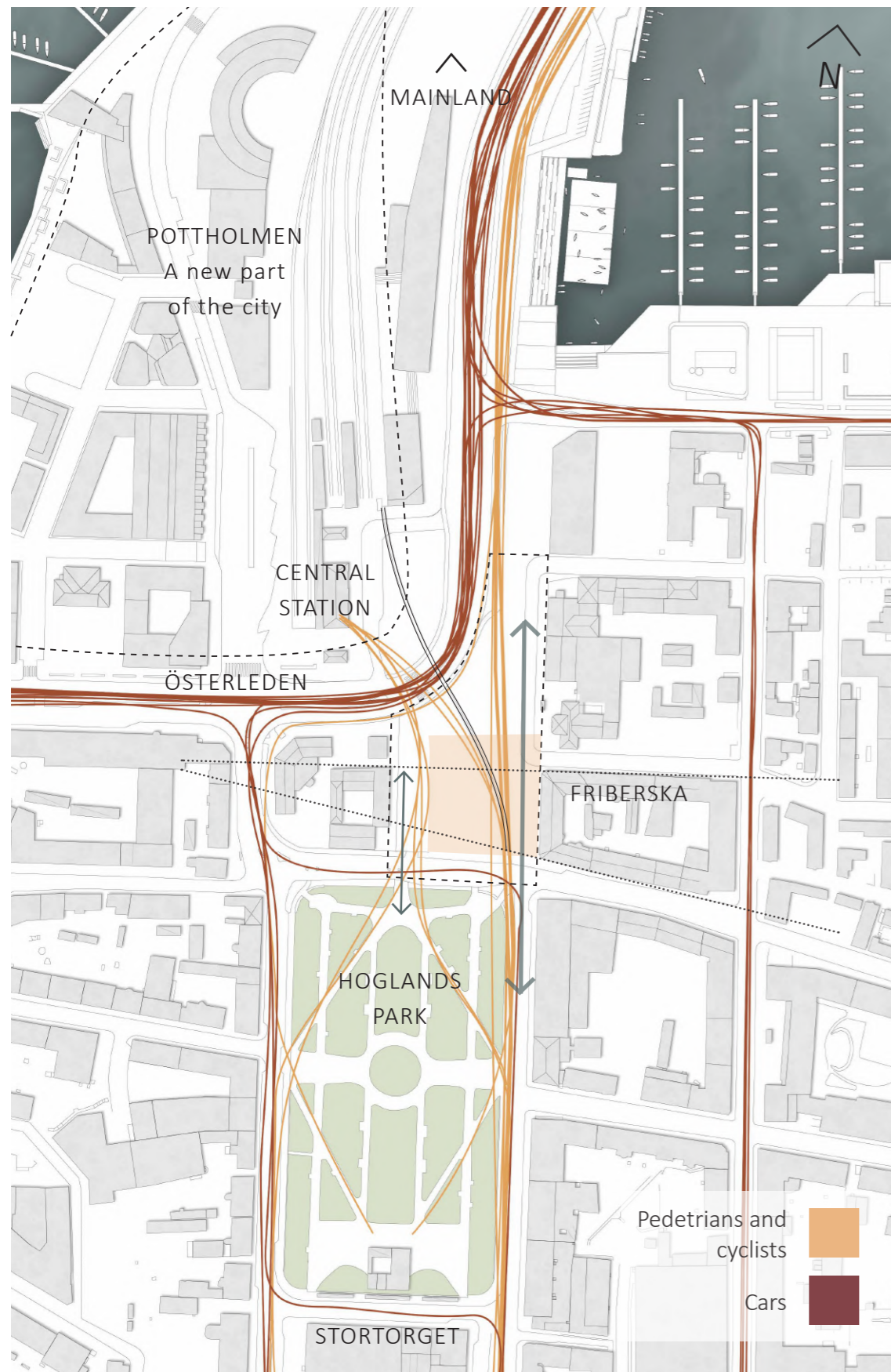
CHALLENGES

The site is by Kungsplan, which is located within the northern part of Karlskronas main island Trossö. Kungsplan is directly south of the central station square, and it is today used as a bus terminal. It is at the northern end of Kungsgatan, the main axis of the city. Being exposed and located in the entrance of the Unesco World Heritage of Karlskronas baroque city, the architectural proposal on site must address the following restrictions and opportunities.


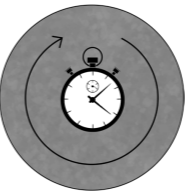





Enhance Karlskrona’s main urban axis, take care of the history of the place (greenery, railway tracks and the open space), let the Fribergsska house dominate in the scale, adapt to the city plan and the neighborhood structure that exists on Trossö and consider that the site has no backsides. Furthermore, the design of the ground floor is of significant importance for creating an interesting urban path, especially considering the historical railway.



SITE ANALYSIS



DESIGN STRATEGIES

BRIEF AND LOGISTICS	HEALTH-PROMOTING ARCHITECTURE	SITE AND CONTEXT	SUSTAINABILITY
 <p>Integrating the city life</p> <ul style="list-style-type: none"> • Wintergarden where people can meet • Add a public function • Yoga on evenings and weekends 	 <p>Green archipelago</p> <ul style="list-style-type: none"> • Connect the green axis outside of the building • Create a rooftop garden • Create a green waitinghall 	 <p>Past, present and progress</p> <ul style="list-style-type: none"> • Follow the Baroque park pattern • Open the building towards Fribergiska and Hoglands Park 	 <p>Carbon balanced building</p> <ul style="list-style-type: none"> • Use as much timber as possible • Create a building without a basement
 <p>Sharing but caring</p> <ul style="list-style-type: none"> • Combine medical + women and dental + rehab • Create one staff area easily accessed for all units 	 <p>Healthy architecture</p> <ul style="list-style-type: none"> • Inviting stairs and slopes • Activating childcare • Public activities • Green rooftop garden 	 <p>Pre waterworld</p> <ul style="list-style-type: none"> • Change flooding challenges to flooding design • Integration of multipurpose areas 	 <p>Upcycle</p> <ul style="list-style-type: none"> • Save and reuse as many trees as possible • Integrate the railway • Reuse the cobblestones

The plot is located on the north side of Trossö in Karlskrona and is the very first thing you see when you arrive from car or from the train station. The station is located around 100 meters from our site, on the other side of Österleden. The central city is located five minutes walking distance towards south from our site. The buildable site is 3430 sqm and the plannable space is around 10 000 sqm.

The Healthcare centre is going to be the new entrance to the city and adjacent of the developing Pottholmen area. The major pedestrian and bicycle flows are crossing the plot. Therefore, we came up with a sentence that has followed us during the whole project. We want to create a healthy place in the city, where you not just pass by, where you want to go and feel inspired for a healthier life. To succeed with our goal, we have 8 strategies that will help us on the way.

The strategies are divided into four main topics that covers ideas from large scale to small details. With our eight strategies we want to create a place for not only patients. By offering spaces and different activities we believe that we can attract children, teenagers, middle age persons and older people to visit this building.

Our building will have a health promoting profile. By adding a lot of greenery into and on our building, we will not only create a nice and beautiful environment, the greenery will also reduce the stress and promote our mental health. By adding inviting stairs and slopes we hope that people will be more active and strengthen their physical health.

BUILDING CONCEPT DESIGN

SITE AND CONTEXT

Our building has its shape from the axis around the site and from the lines of Friberska. The building strengthens the connection between Hoglands park and the railway station (1), as well as the connection from Stortorget to the mainland (2).

To future proof the building from getting flooded, it is elevated 1.5 meter above the ground. By adding welcoming and good designed stairs and ramps, the flooding challenges we had from the beginning is now part of the building concept design.

The concept continues the north site of our building, where we have added one skatepark and one basketball plan. Both areas are sunken as a future flooding basin. The surrounding elevations are a sound barrier from Österleden, the road on the north side.

BRIEF AND LOGISTICS

The building is close to the city centre of Karlskrona and by adding a wintergarden and a rooftop garden, we hope to attract people from the city centre to visit the building. Activities our building has to offer is climbing, yoga and urban gardening. On the west side the building we have one café and in the waitinghall there is a small coffee cart.

To make the building more efficient and to promote conversations between staff at the different units our building has one staff area including dressing rooms, staff rooms, offices, and conference rooms. The staff area, together with the childcare is placed on the first floor. On the second floor the women's and medicals healthcare are placed. On the third floor the dental care and the rehabilitation are placed and on top of the building there is rooftop garden.

HEALTH PROMOTING ARCHITECTURE

Good health is a combination of mental and physical health, and that is what our building has to offer. The green wintergarden, together with the rooftop garden, offers places for relaxation and contemplation. Green areas are not only beautiful to look at, but studies also show that greenery helps to reduce stress and to strengthen the mental health.

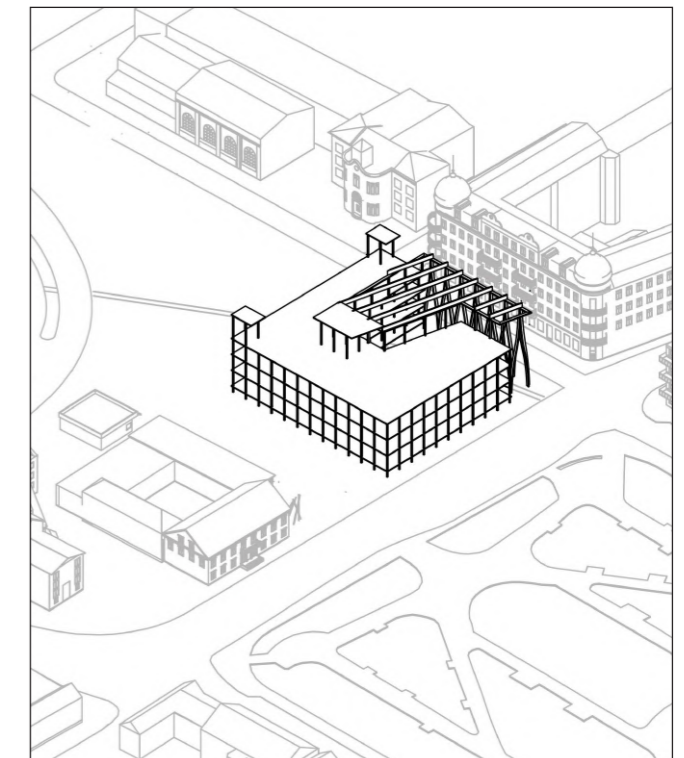
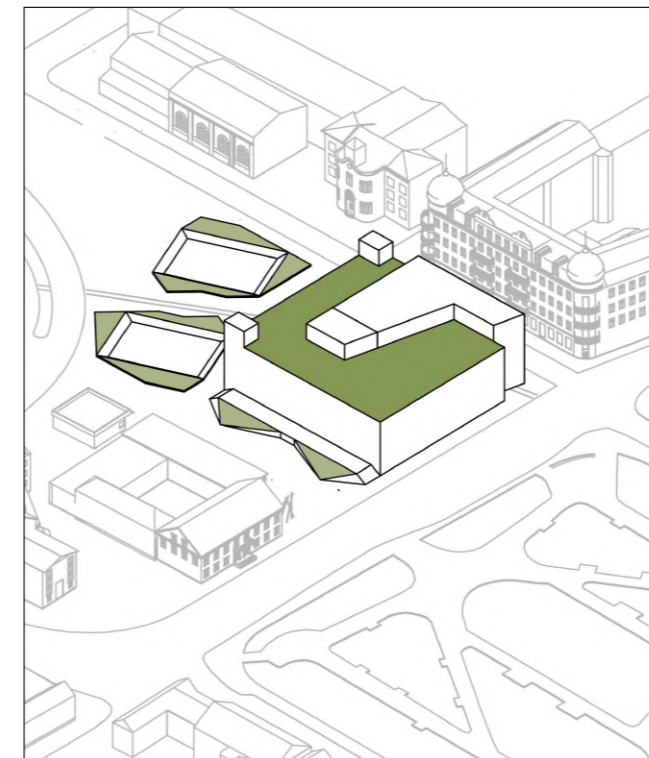
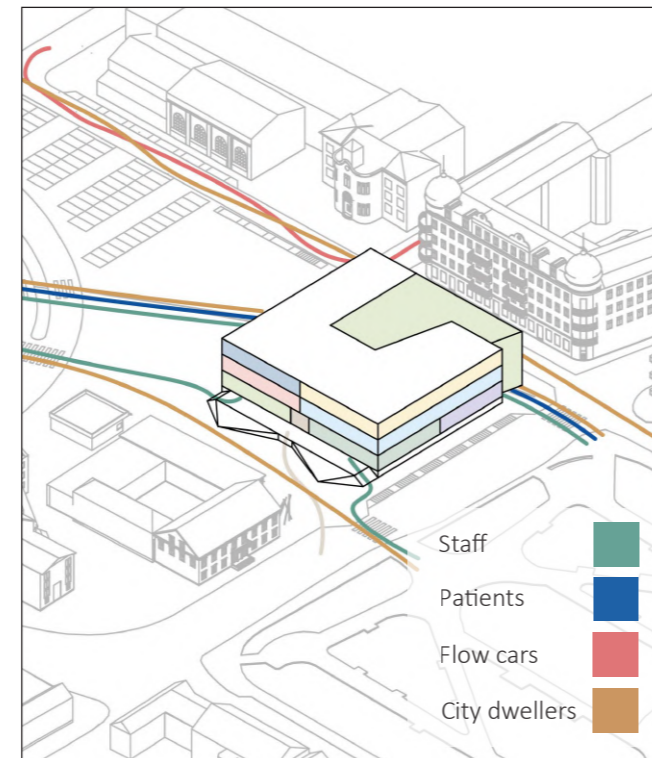
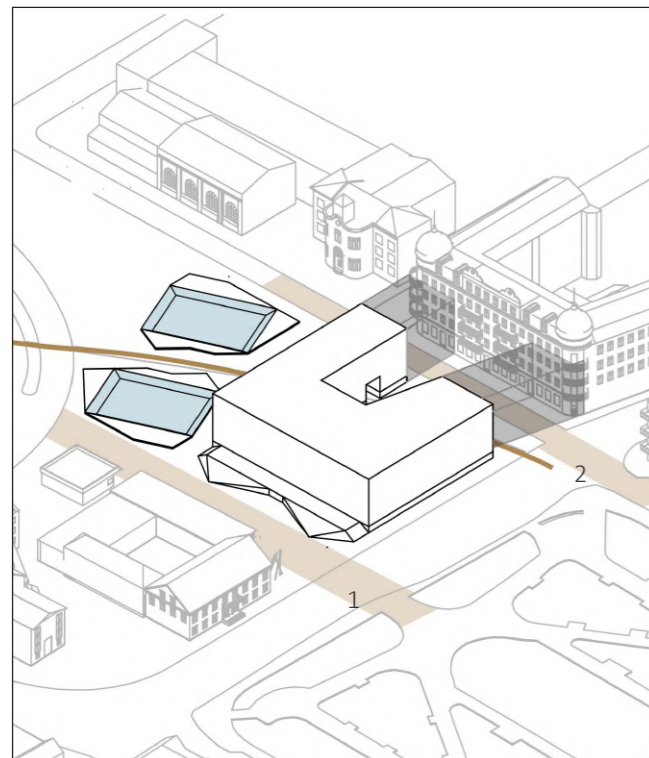
Inside of the wintergarden, a climbing wall is added on one of the facades. On the rooftop garden there is place for yoga lessons and other classes during the summers, there is also a place for urban gardening. On the ground in front of the building, there are a skatepark and a basketball plan.

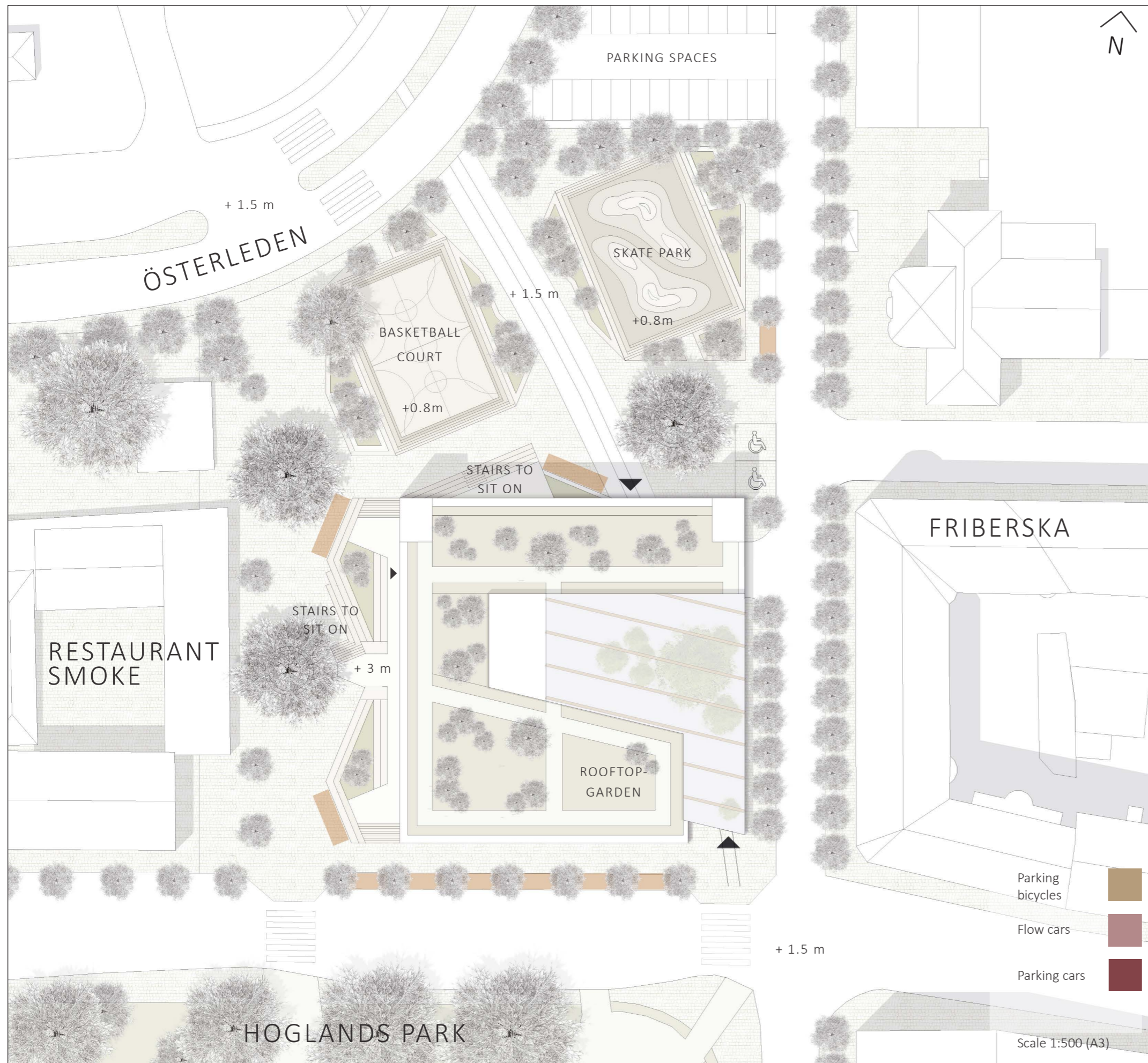
In the centre itself stairs are always the preferred option. Being designed prominent and always offering the shortest way they invite to choose a healthier lifestyle.

SUSTAINABILITY

One of our strategies is to create a carbon balanced building, and to succeed with that goal, our building will be constructed in as much timber as possible. We do not have a basement in our building because we want to use as little concrete as possible. We have placed all the technical areas inside the building and on the roof.

At the site there are beautiful old cobblestones and a railway. The railway will be preserved and work as a promenade through the building and the cobblestones will be reused on the site and in the wintergarden. The trees on the site will also be reused inside, outside or on our building.

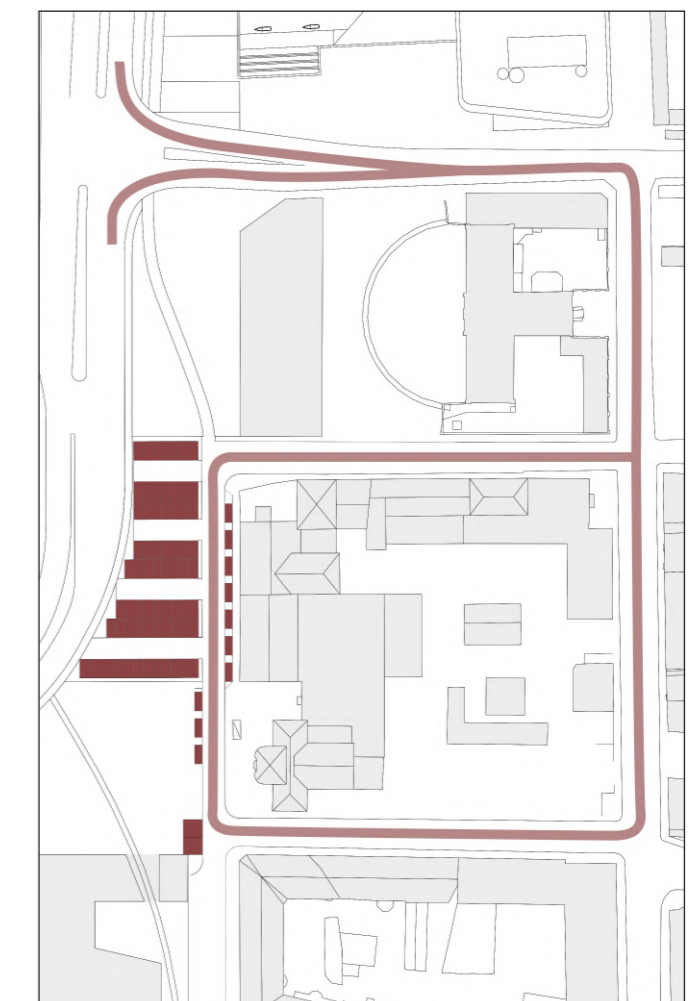




SITE PLAN

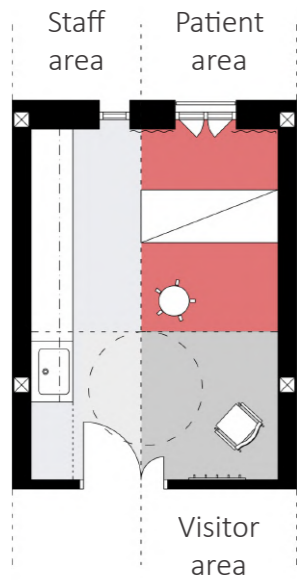
Our building is placed as an extension to Friberska. In the north part of the site the carparking is placed. This because we want to reduce the number of cars that is driving on the road between our building and Hoglands park. Our proposal does not have the smartest or simplest way for the cars to arrive, because we promote the pedestrians and bicycles instead of the vehicles. The parking for bicycles is located in privileged positions, close to the building.

The norther pedestrian area functions as a buffer zone between the building and the car parking. Extended green areas sum up the image and make the plot a true extension of the adjacent Hoglands park.

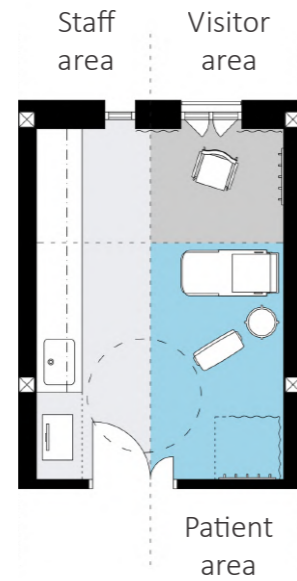


BRIEF

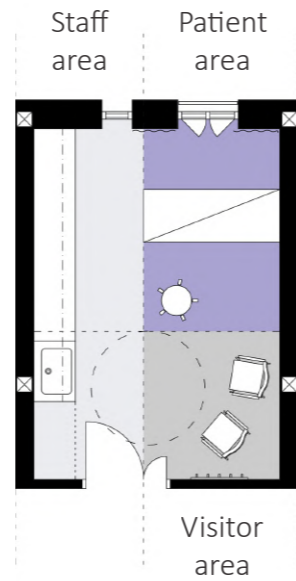
MEDICAL ROOM



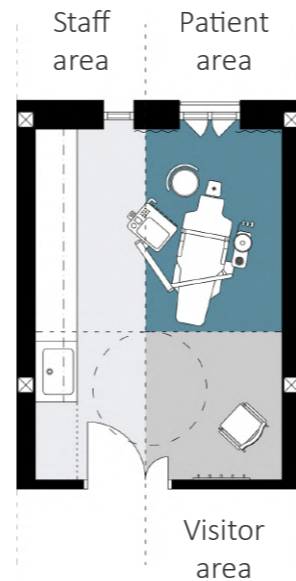
WOMEN'S ROOM



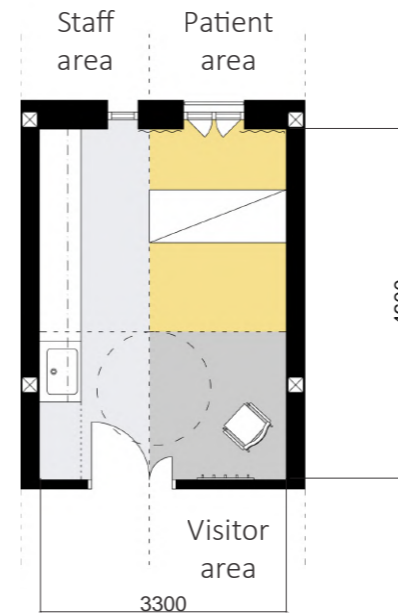
CHILD ROOM



DENTAL ROOM



REHAB ROOM



Old brief
Examination rooms used 20 % of the time

New brief
Examination rooms used 35 % of the time

20

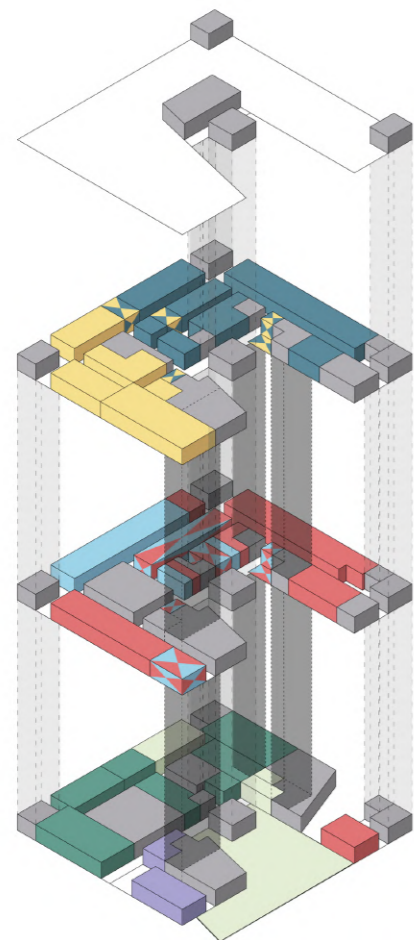
13

Number of medical care rooms

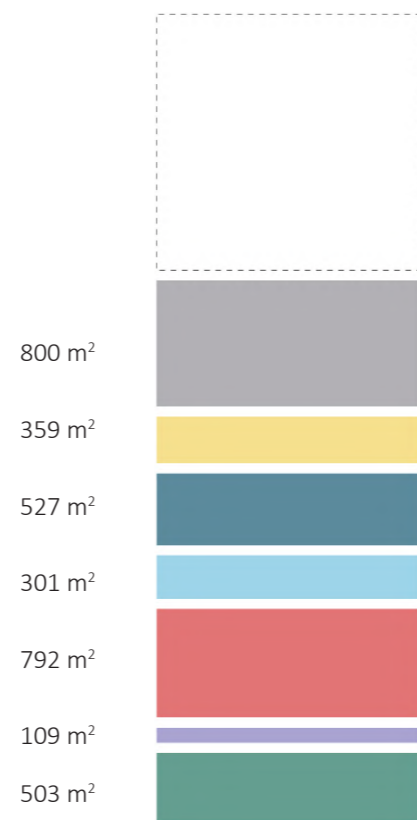
9

6

Number of women's care rooms

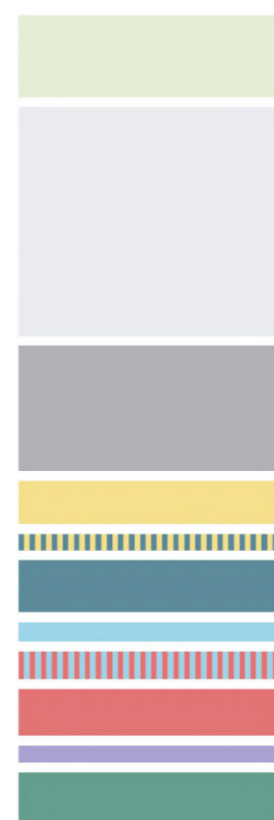


OLD BRIEF



2591 + 800 m²

NEW BRIEF



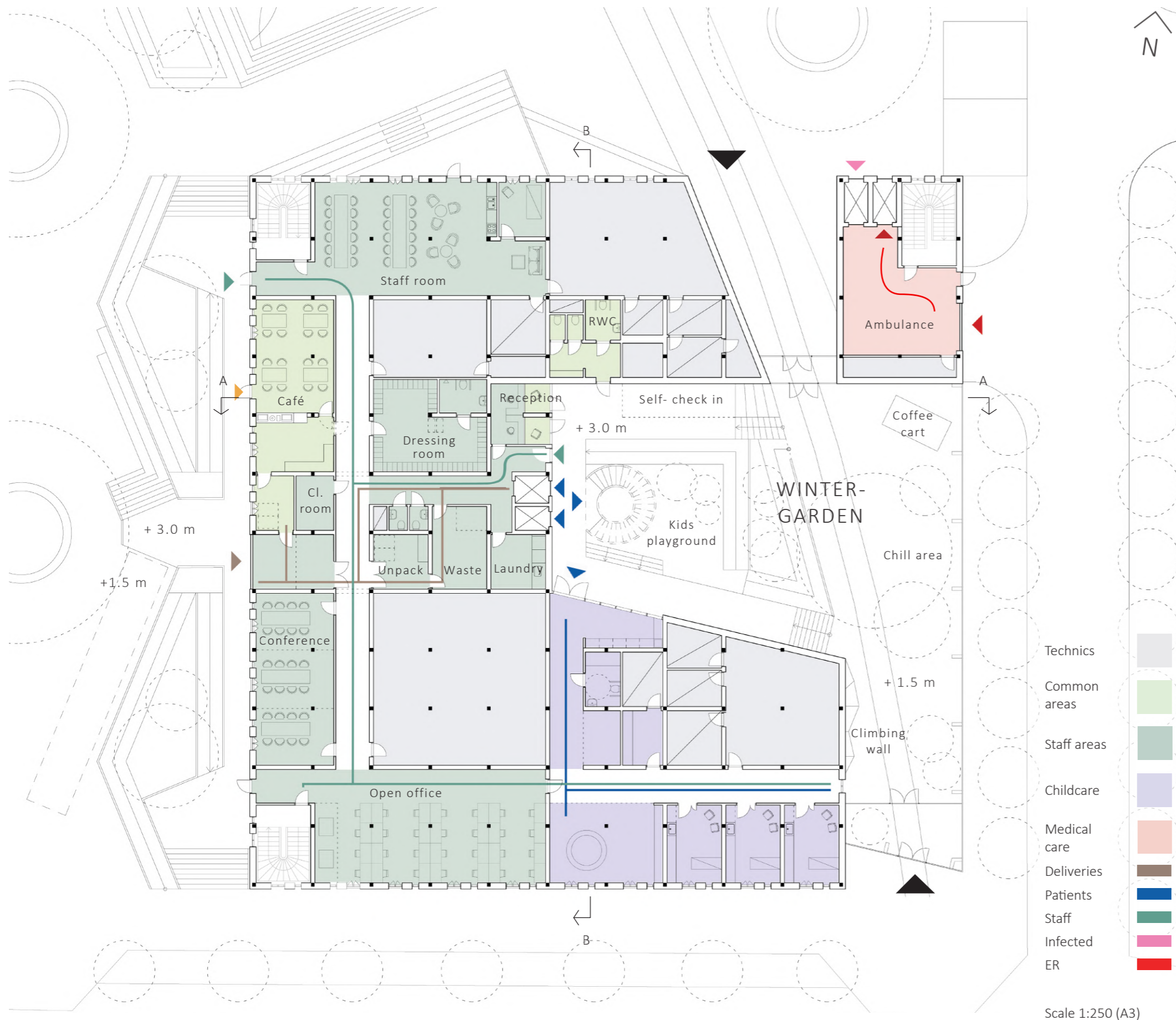
4500 m²

- 518 m² Added functions
- 1452 m² Communication areas and walls
- 800 m² Technical areas
- 271 m² Rehab
- 99 m² Rehab and dental
- 328 m² Dental care
- 123 m² Women's care
- 179 m² Women and medical
- 298 m² Medical care
- 109 m² Childcare
- 323 m² Common areas staff

In the beginning of this course, a survey about architecture and covid-19 was made, and one of many things that nurses and doctors requested, was smart invisible storage. All the examination rooms in this building has a smart invisible storage placed along with one of the walls. This creates a nice and clean design in the room, but the idea is mainly created for the staff, so they can disinfect the rooms more efficient. All the examination rooms in this healthcare center have the measurements, 15.2 sqm, to make it easy to change purpose of the room over time.

“Examination rooms are mostly used by a patient approximately 20 percent of the medical center’s opening hours”. Reference; Marie Larssons lecture 15/10. We assume that this is the case even in this medical center. If we change the number to 35 percent, we need to create 13 medical rooms and 6 women’s rooms.

GROUND FLOOR

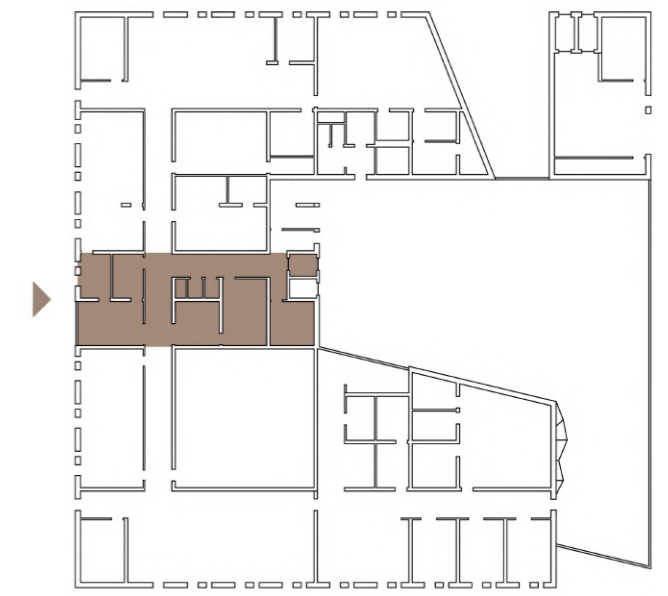


- Technics
- Common areas
- Staff areas
- Childcare
- Medical care
- Deliveries
- Patients
- Staff
- Infected
- ER

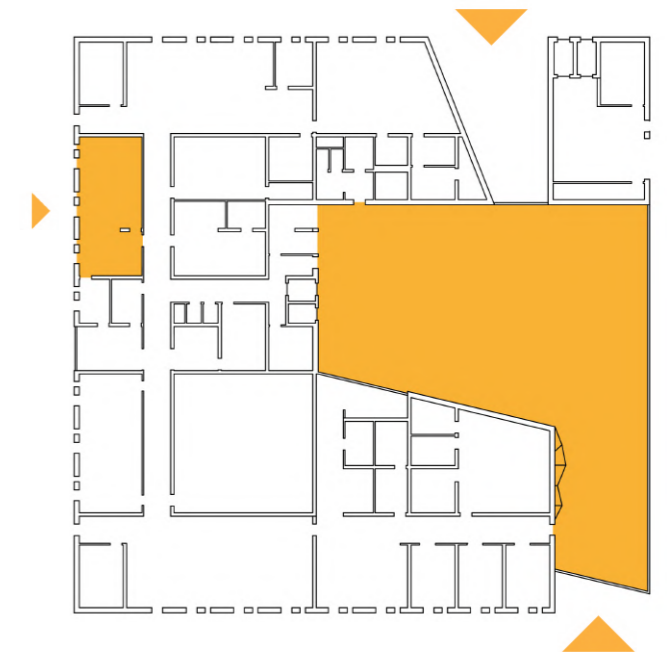
Scale 1:250 (A3)

Our building has no backside and therefore the ambulance pickup zone is integrated inside of the building, both for the patient's privacy but also for the ambulance staff.

The healthcare centre has self-check-in opportunities that most of the patients will use but if a patient is uncomfortable with using technical devices, there is a small reception on the north side of the main staircase.

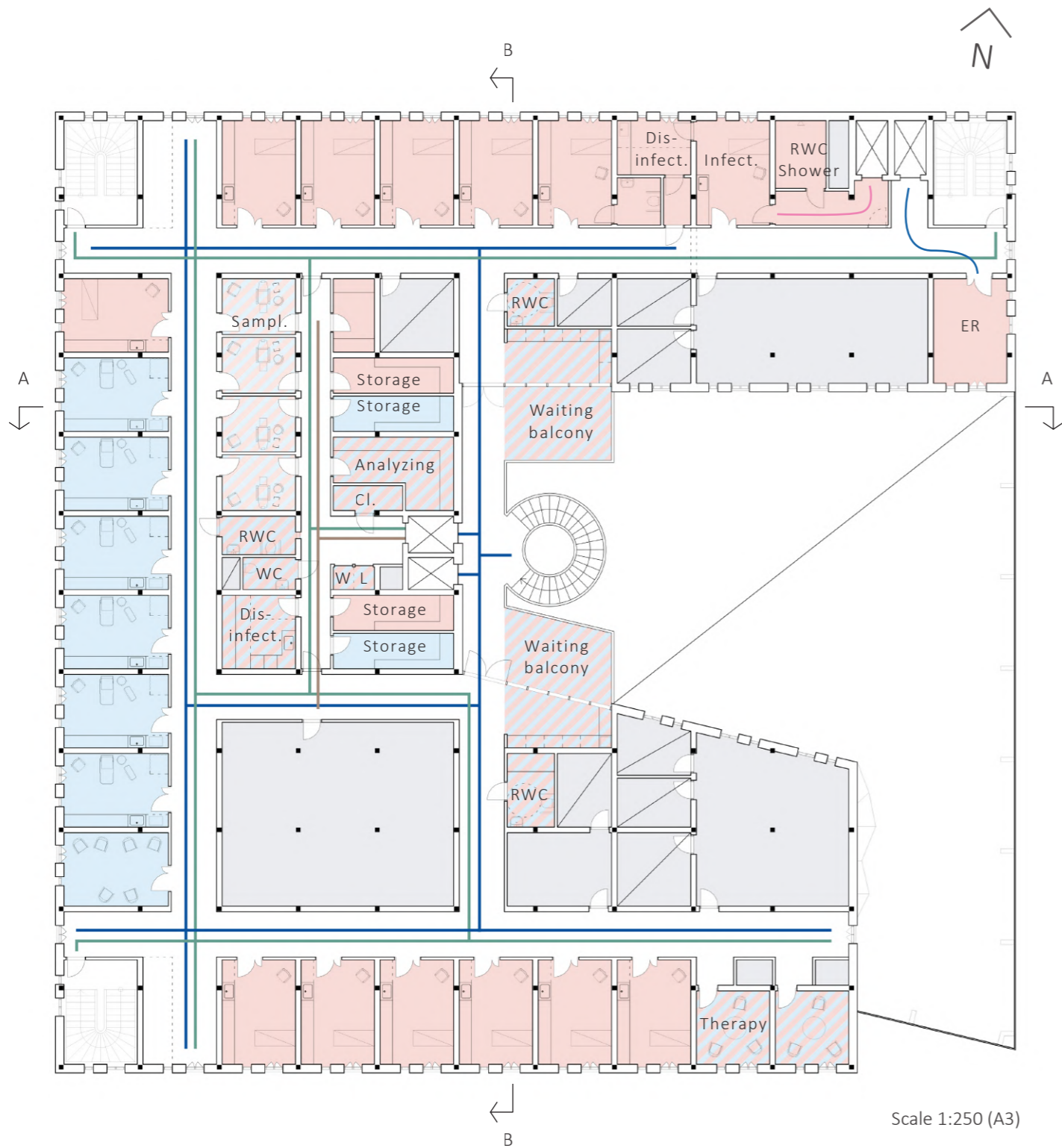


Deliveries

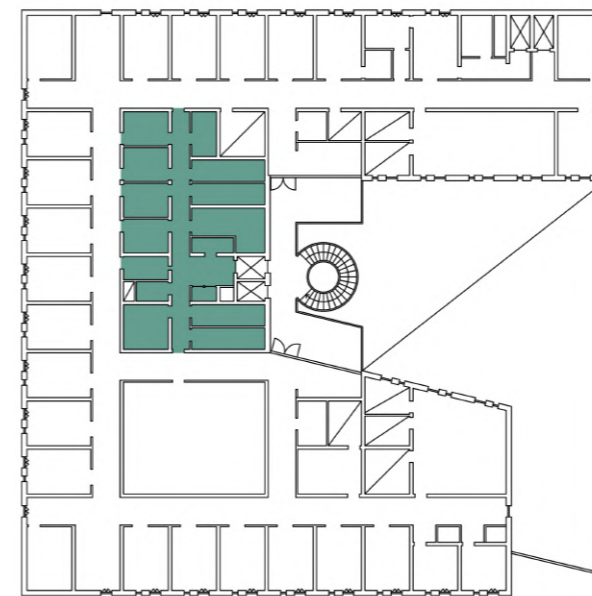


Open on evenings and weekends

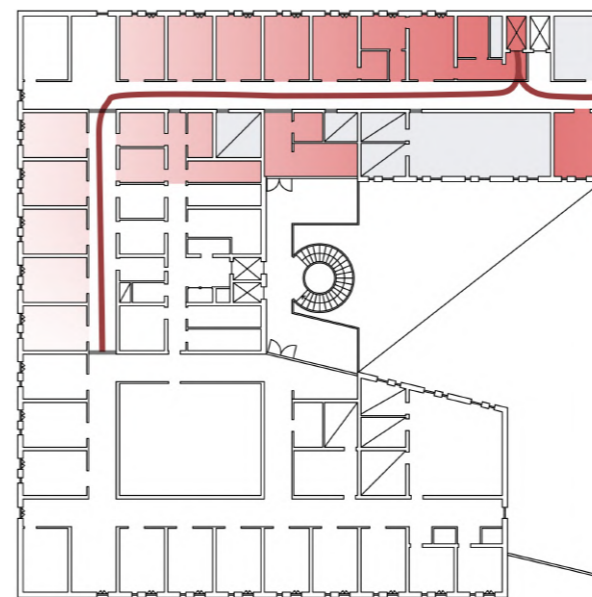
FLOOR 2



Scale 1:250 (A3)



Staff areas



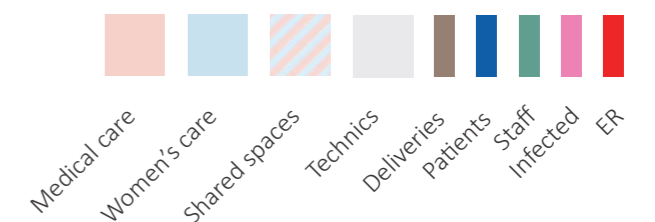
Pandemic perspective

The main access for patients is the central positioned staircase. It connects the waiting area in the wintergarden with the two healthcare floors. Through small waiting areas on indoor balconies the patient rooms can be reached, always positioned on the façade where daylight is guaranteed. The symmetrical floorplans allow easy orientation on the circular patient flows.

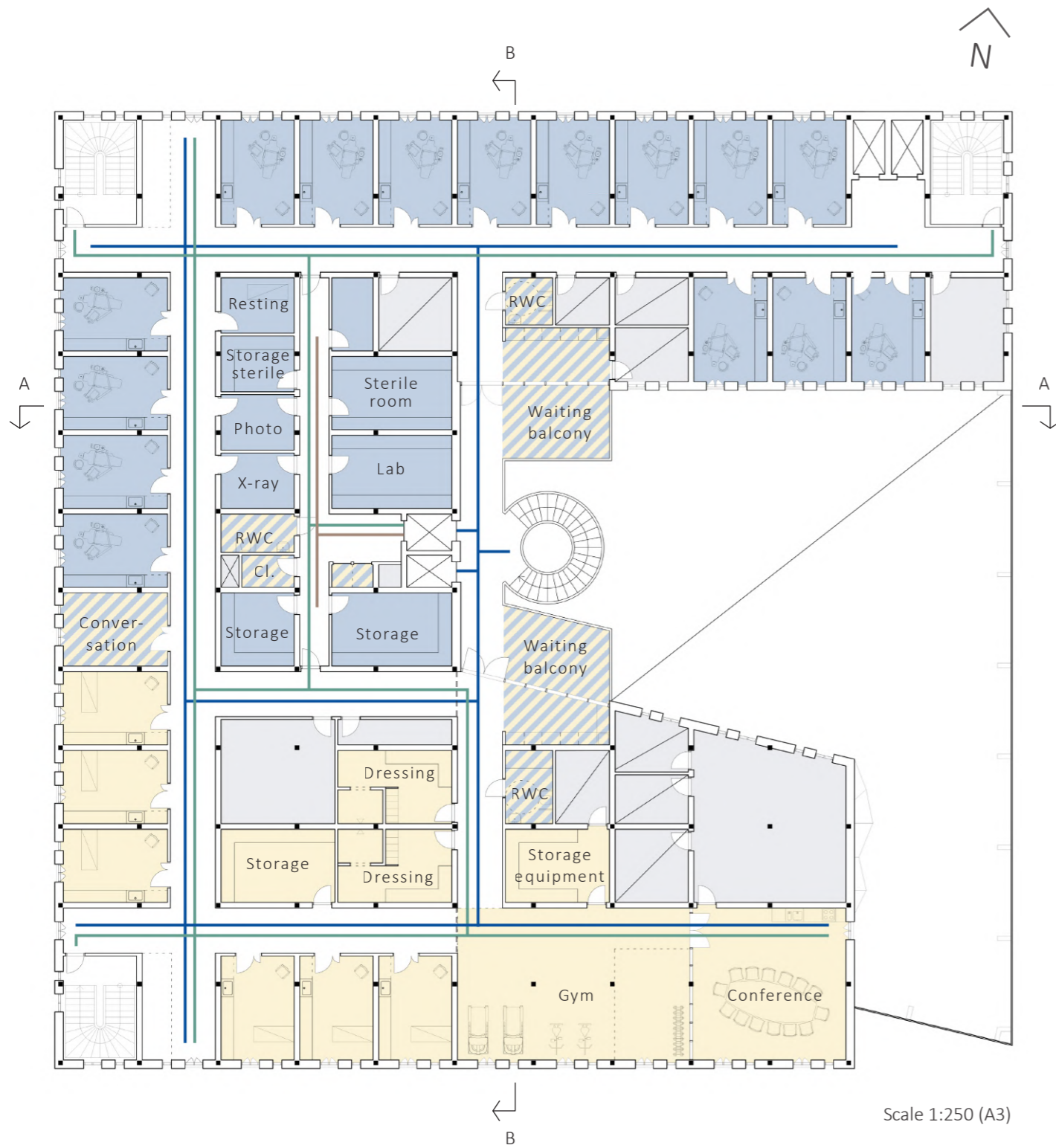
The staff has access through the main core. This area concentrates staff exclusive rooms and goods to allow short ways and therefore high efficiency.

The medical care shares a lot of functions with the women's care. Spaces that are used for both units are following: sampling rooms, analyzing rooms, one of the disinfection rooms, waiting rooms/balconies, toilets, waste and laundry pipes, cleaning room and therapy rooms.

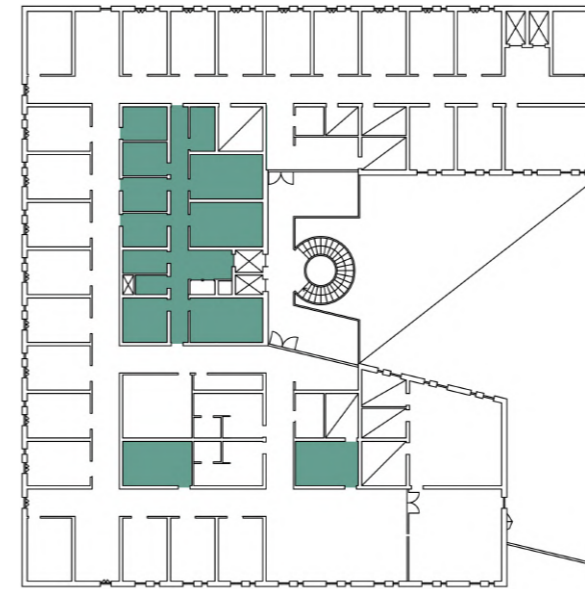
Our building is created in a flexible way for future diseases. If there will be a new pandemic in the future, it is easy to divide our building into two zones. One infected area and one non-infected area. Depending on how many infected rooms the healthcare centre needs in the future, the amount can go from one room to 12 examination rooms and 4 sampling rooms.



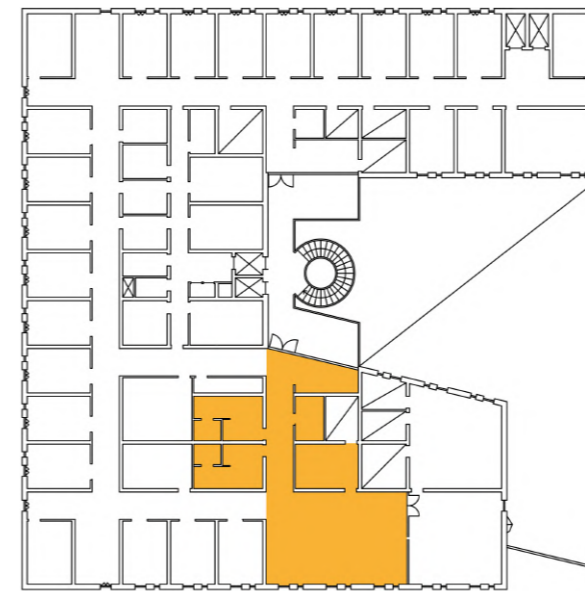
FLOOR 3



Scale 1:250 (A3)



Staff areas



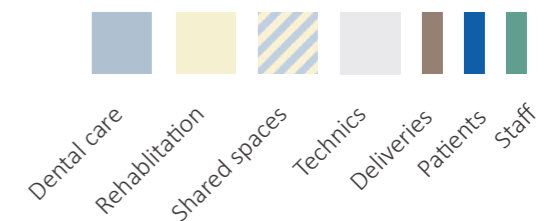
Gym during evenings and weekends

Once again, the main patient access is provided through the staircase. Mirroring the second floor the patient rooms as well as the circular hallways follow the same pattern.

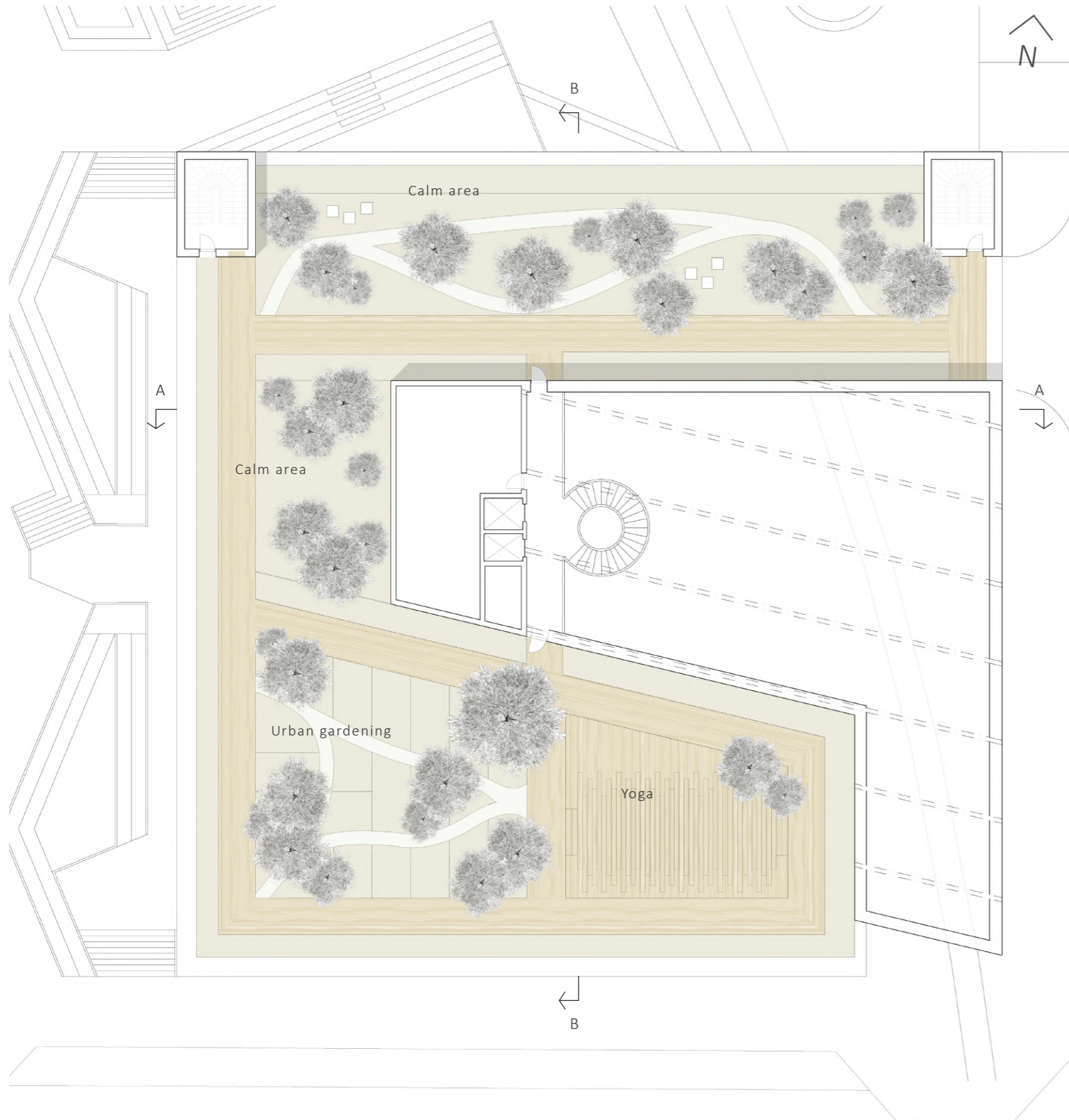
This is also the case for staff flows. Access is through the main core, again containing the staff relevant rooms like storage areas, the sterile room, and analytic rooms. Short ways for staff and goods allow high efficiency. The core is closed for patients to avoid overlapping flows.

On the third floor the dental unit and the rehab unit are located. They do not share as much as the medical unit with the women's unit on the previous floor. Nevertheless, waiting rooms/balconies, toilets, waste and laundry pipes, cleaning room and conversation rooms, are shared.

The rehab unit is consisting of patient rooms, but also a gym and conference room. These are located on the south facade which allows a magnificent view over the adjacent Hoglands park while working out. To maximize utilization the gym area can exclusively be open during weekends and evenings.



ROOFTOP GARDEN



The exclusive top of this centre is once again mainly accessible through the central staircase. The related elevators allow even the weakest visitors recreation. Balancing the overlapping volume of the wintergarden, a technical area including the elevator shafts is positioned on the roof. The single staircases in the north guarantee exit opportunities in emergency situations.

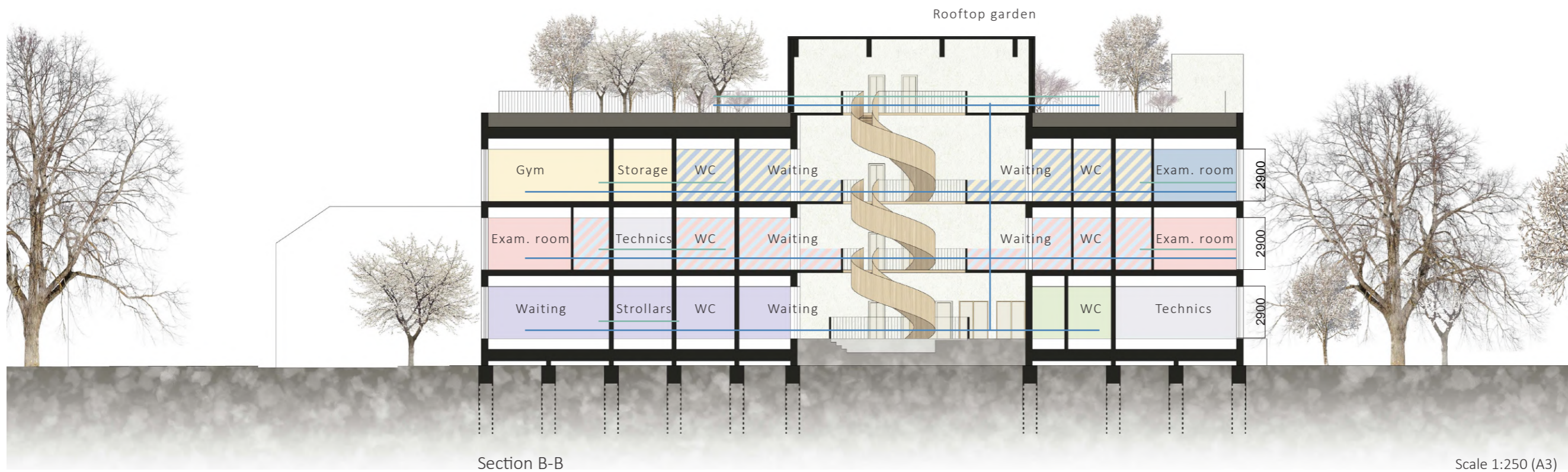
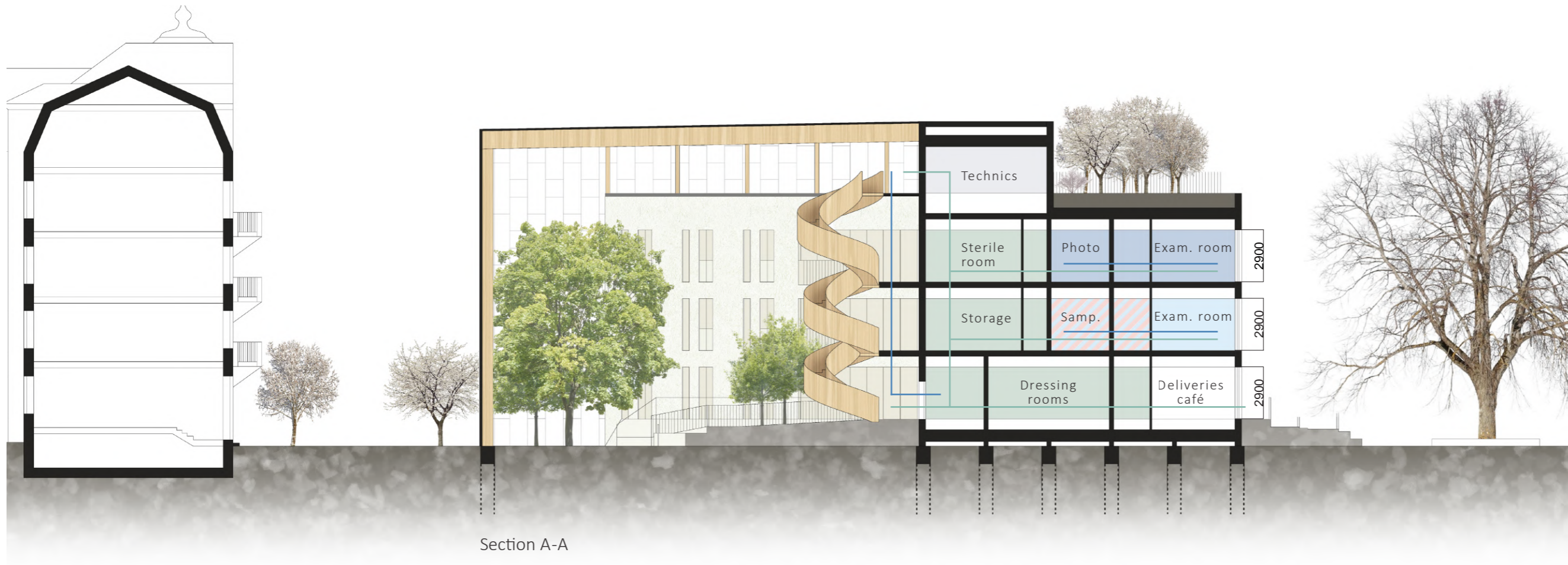
A circular elevated wooden pathway guides the visitors through the extended green areas. The rooftop garden allows magnificent views over the surroundings; the new area in the north, Fribergsgata to the east, Hoglandspark to the south and parts of the Unesco World Heritage baroque city in the east. Trossö being an island one might even catch a glance of the Baltic sea.

Leaving the main path, calm areas invites for recreational walks and allow eye to eye contact with nature. The elevated position allows relaxation and contemplation and is the perfect hideout in a dense capital.

Additionally, the designated areas in the south part of the park creates space for urban gardening and yoga sessions. The activities this healthcare center is promoting attracts different target groups and will hopefully work as a meeting point for people with different backgrounds and ages.

Scale 1:250 (A3)

SECTIONS

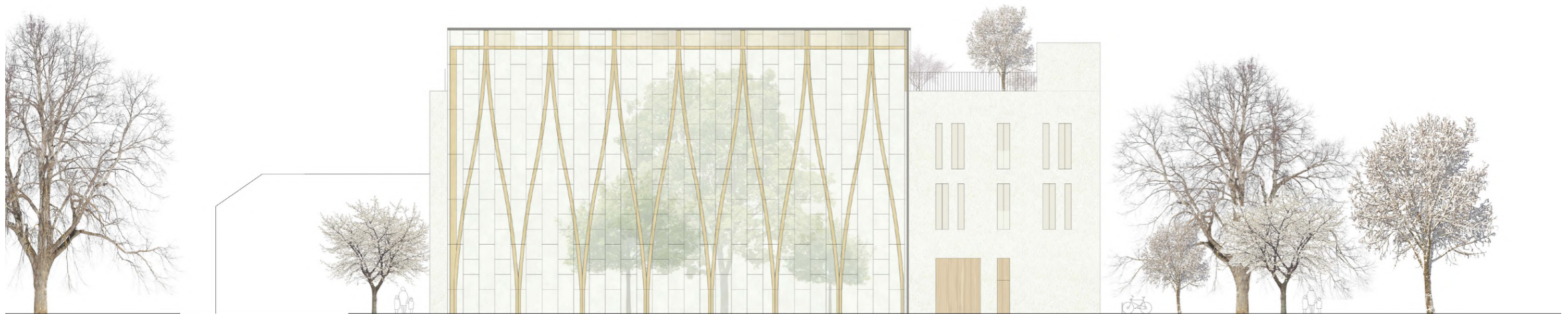


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FACADES



Facade west



Facade east

FACADES

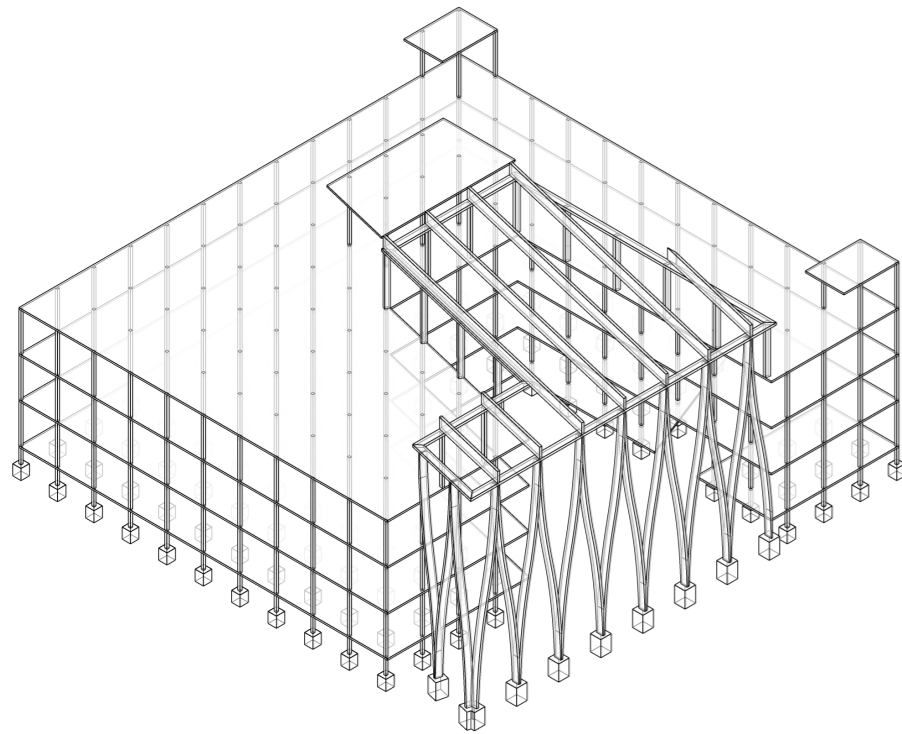


Facade south



Facade North

CONSTRUCTION



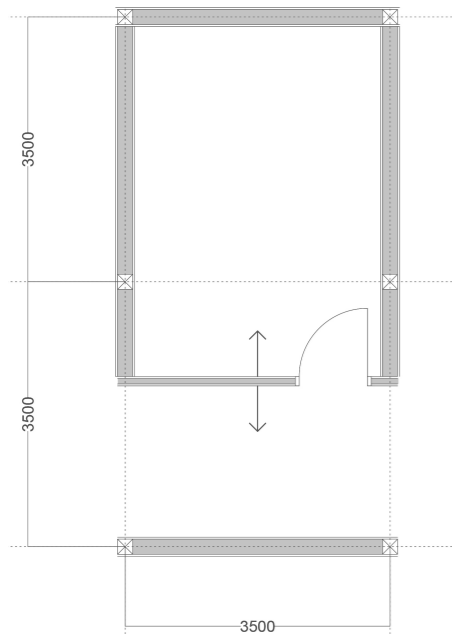
Construction Axonometrie

To reach our ambitious sustainability goals we created one design strategy in the beginning of the course where we should use as much wood as possible and as less concrete as necessary.

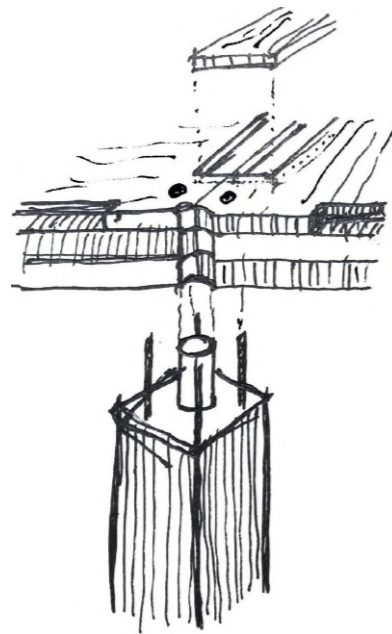
This led to the decision of not having a basement. The main construction is based on single point-foundation which minimizes the amount of concrete. The construction itself consists of cross laminated timber slaps and posts.

The grid axis of just 3500 mm allow the utilization of relatively small posts of 200 mm by 200 mm footprints. This size can be hidden in standard drywall constructions. Resulting in a high flexibility and post-free floorplans. Additionally, the slaps just have a thickness of 140 mm.

The static construction of the wintergarden could be described as freestanding wooden skeleton celebrating timber constructions.

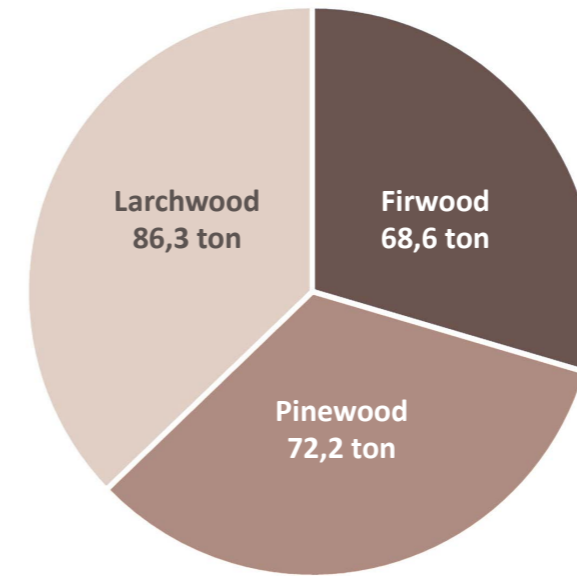


Grid Flexibility



Construction Detail

SUSTAINABILITY



CO₂ eq emissions for different types of wood.

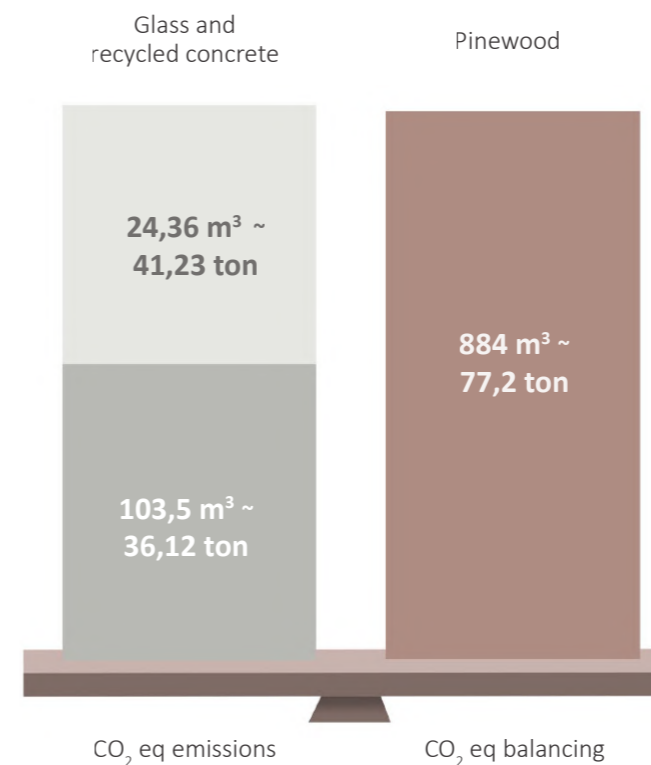
Together with a chemical engineer, we have done some simplified calculations on the approximate CO₂eq from the static construction of our building. The three materials we have taken into consideration are wood, glass and concrete.

Total amount of wood in our building is 884 m³. Before we decided which wood material to use, we got calculations from three different types of wood. Larch was the material that stored the most carbon dioxide of the materials we picked, but we did not choose that material because it would mean more transportations since it probably would be a Siberian larch. The second best material from a stored carbon dioxide perspective was Pinewood and this was the material we chose.

Total amount of concrete in our building is 103,5 m³. The calculations of the carbon dioxide emissions from the concrete showed to be huge even though we do not have much concrete in our building. By using recycled concrete from the old healthcare center, the emissions decreased from 134,5 ton CO₂eq (new concrete) to 36,12 ton CO₂eq (recycled).

Total amount of glass in our building is 24,36 m³. We do have a lot of glass in our building, but we did not want to decrease it because of access to good daylight and architectural values.

The calculations show that our building only emit 150 kg CO₂e from the static construction.



Calculations performed by Love Gidlund, Chemical engineer, MSc Industrial Ecology

DETAIL AND ELEVATION

HEALTHCARE

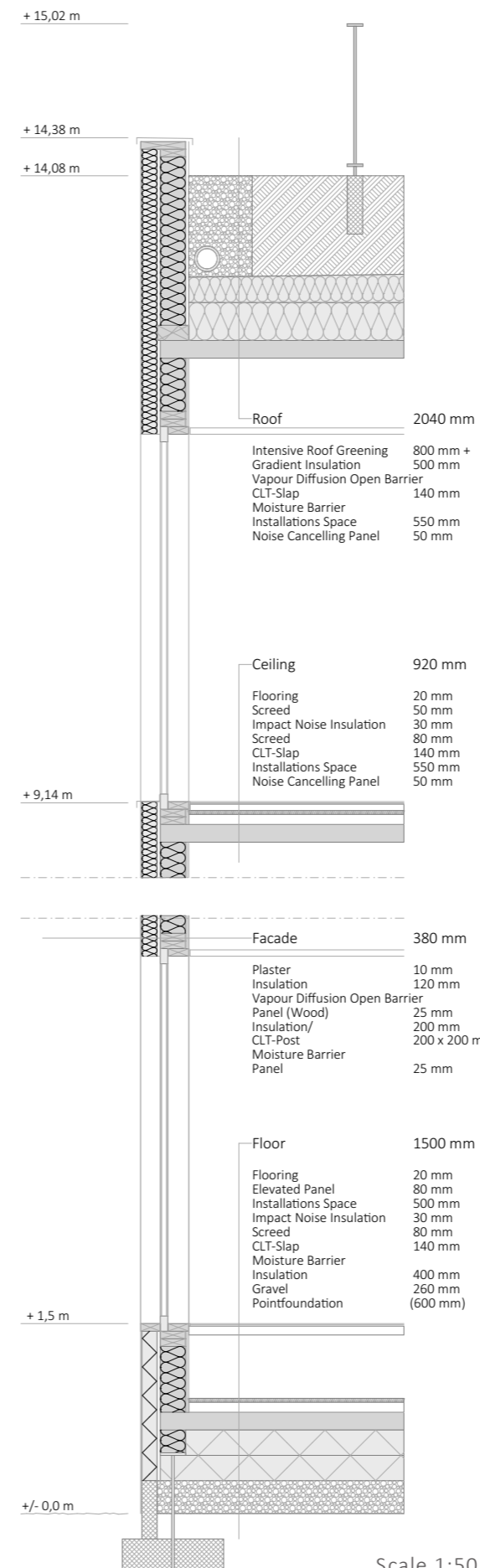
The main facade covering the surfaces of the medical centre itself has a plaster finish in a white, nearly clinical finish. On the same time, the façade it adapts to the dominant finish in the baroque environment and is durable against the harsh Swedish environment.

Visible wooden frames around the windows creates a warm and well-designed building into the very smallest scale. The windows are openable for staff who wants to have a short five-minute break with fresh air before their next meeting, and for patients who might be nervous and need to think about something else.

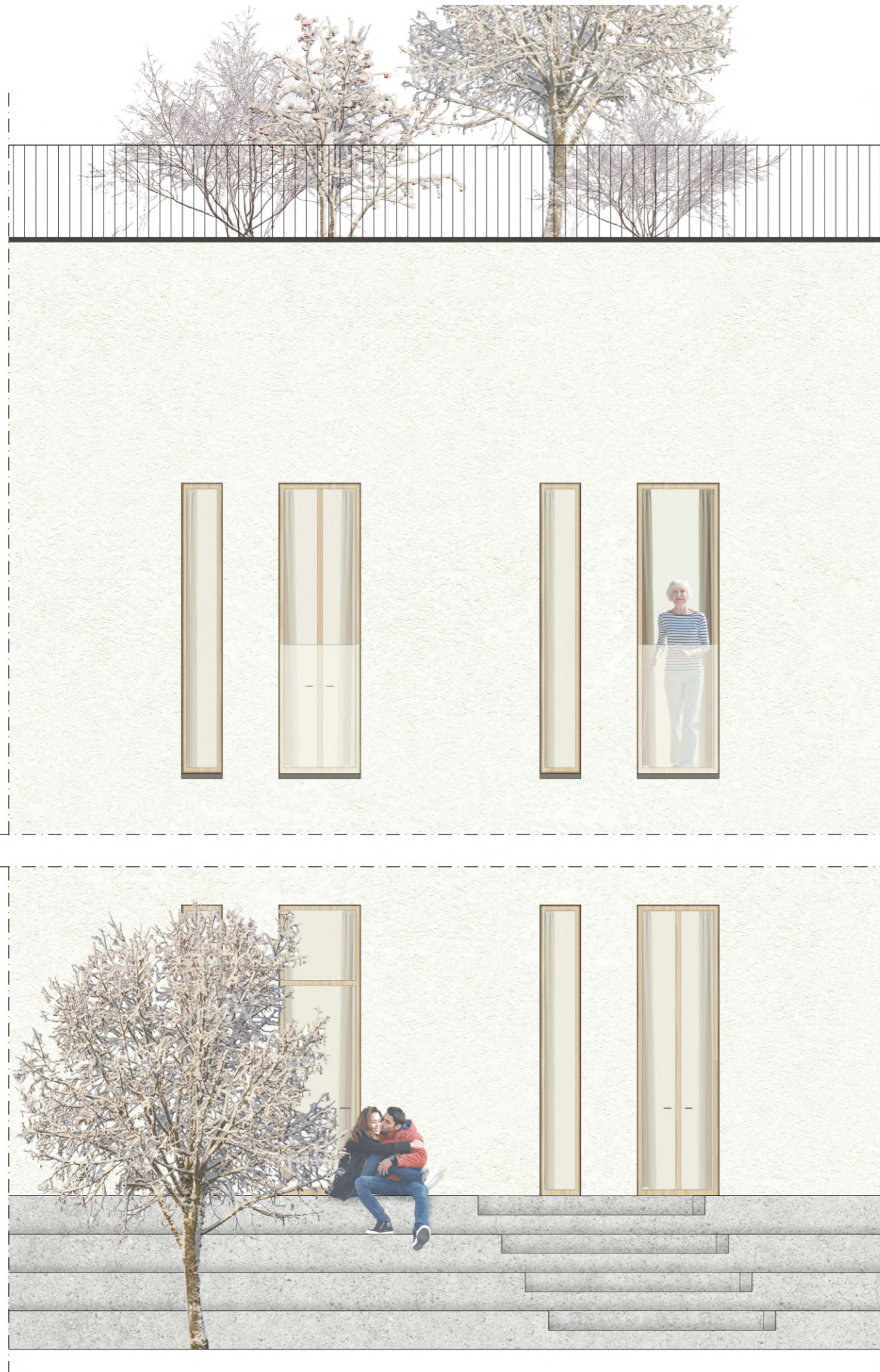
Behind the plaster finish, a double insulation ensures optimal energy efficiency. In the main construction axis are the room height windows allocated. With a height of 2,9 m from floor to ceiling and the large-scale windows a bright and welcoming room climate is assured.

Due to the no basement policy, a major part of the technical building equipment and piping finds space in the double floor on the first level. This plus the necessary insulation above ground fill the 1,5 m of flooding elevation.

With just 140 mm height the CLT-slaps are relatively slim. Once again creating space for technical equipment and ventilation systems double ceilings with noise cancelling panels are installed underneath. The roof structure consists of the necessary gradient insulation and a covering soil layer. Building the perfect ground for the intensive roof top garden.

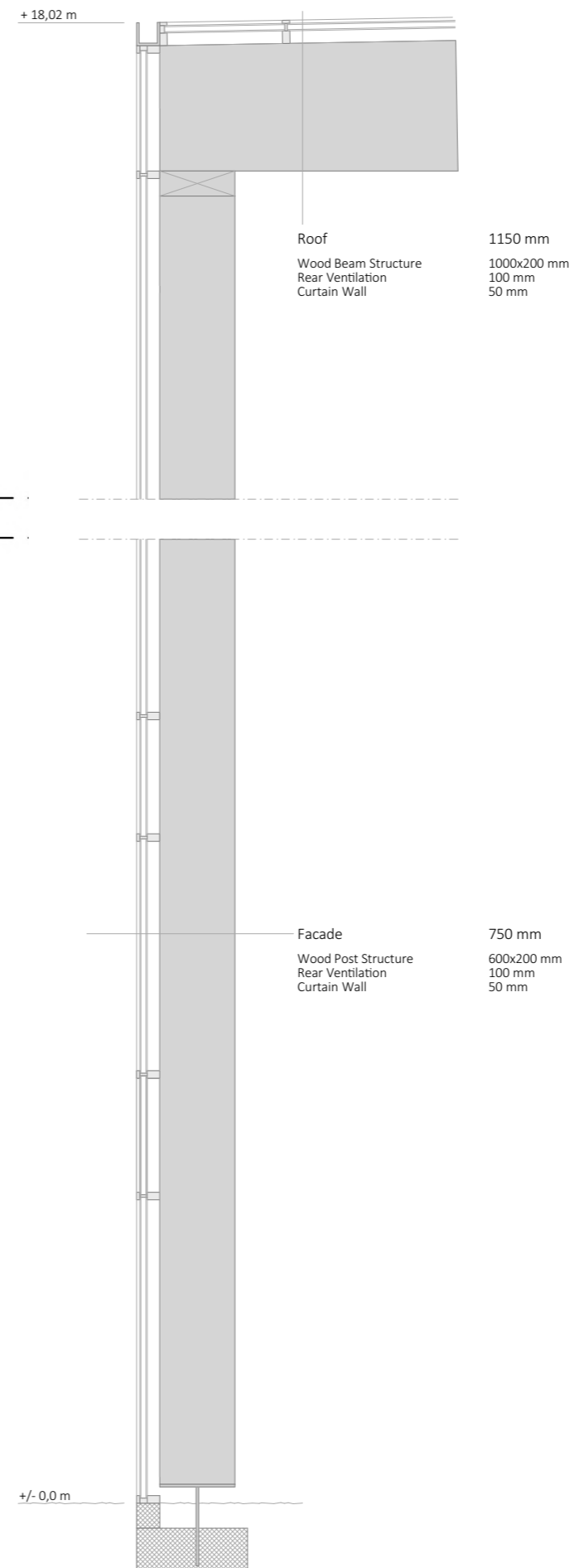


Scale 1:50



DETAILS AND ELEVATION

WAITINGHALL



The static construction of the waiting hall consists of two parts. Facing towards Fribergsgka, 4 floors over spanning arches hold the roof structure. In their curved form they adapt baroque beauty and build a dominant opposite to the clean reserved appearance of the plastered facade. They embrace the pure beauty of timber construction and have a very light and slim appearance.

The arches support the roof structure, covering the waiting hall and creating a wintergarden. The double supported beams connect to the main construction on the other side.

This wooden skeleton is wrapped in a curtain wall. This surrounding structure expands the pattern of the room height windows and reinterprets them for this second volume. Resulting in an interesting correlation of two architecturally unique volumes. On the same time invisible and still protective skin, creates the unprecedented atmosphere in the waiting hall. It allows to create this wintergarden environment without losing the connection to the rich cultural surrounding.

EXTERIOR PERSPECTIVES



Perspective from Norra kungsgatan and Hoglands park



Perspective from the train station

INTERIOR PERSPECTIVE

WINTER GARDEN

