



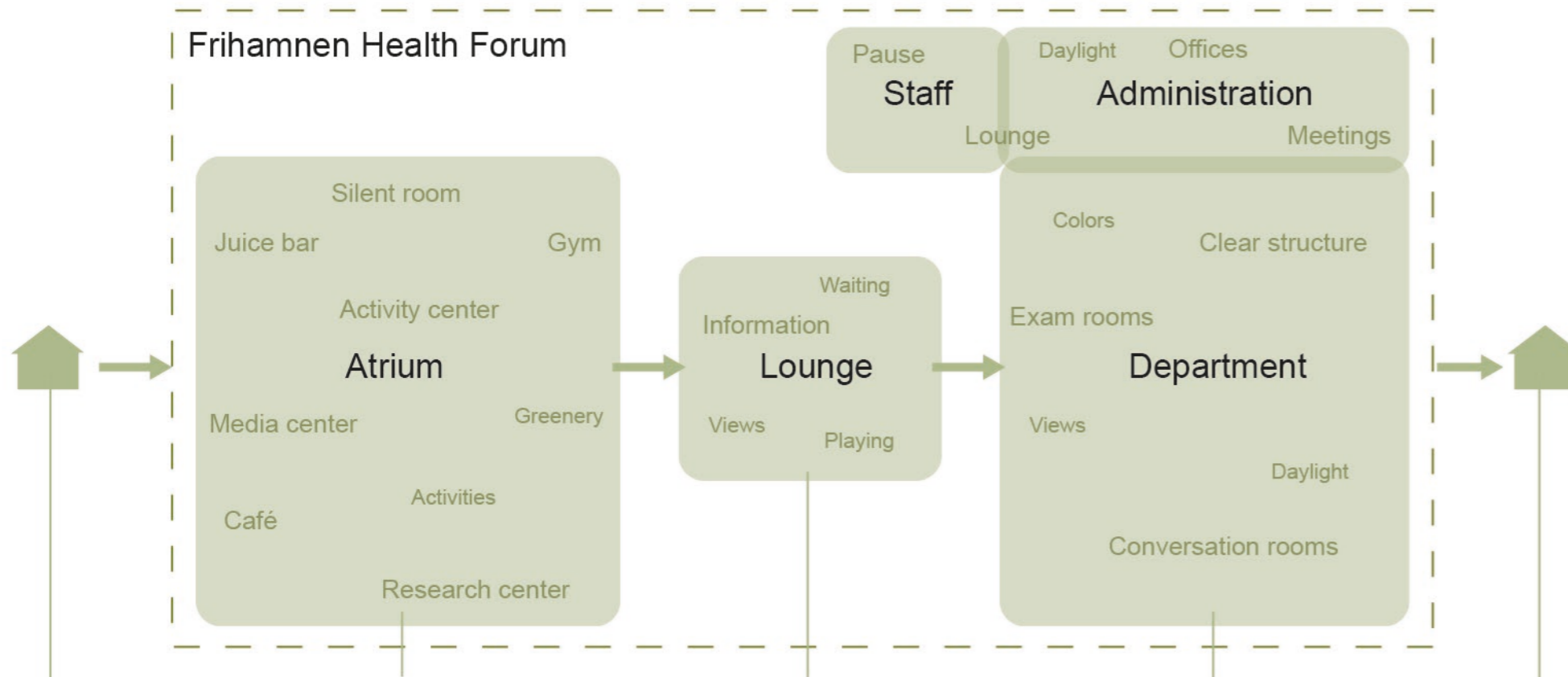
# FRIHAMNEN HEALTH FORUM - A PLACE WHERE PEOPLE CAN MEET EACH OTHER, LEARN AND HAVE FUN

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HEALTHCARE STUDIO 2016 ARK262 CHALMERS UNIVERSITY OF TECHNOLOGY



# THE PATIENTS WAY THROUGH THE HOSPITAL



## BEFORE VISIT

Book your time  
Check your journal  
Use a smart device to monitor your health status  
Consult doctor via video

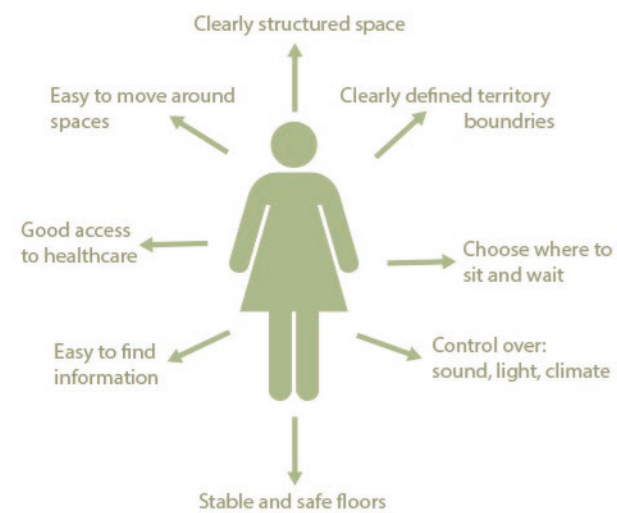
Self check-in for visit  
Self check-up of health  
Waiting in different settings  
Play in the activity center  
Sit in the café  
Find information in the media center

Choose between different environments to wait  
Toys for children  
View over Frihamnen

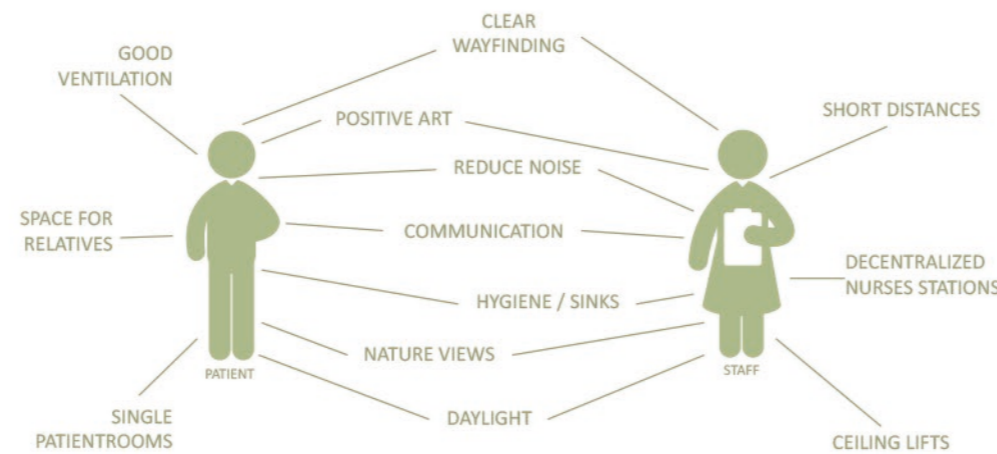
Exam rooms with space for relatives  
Rooms designated for conversation  
Corridors with daylight  
A clear structure with straight corridors

## AFTER VISIT

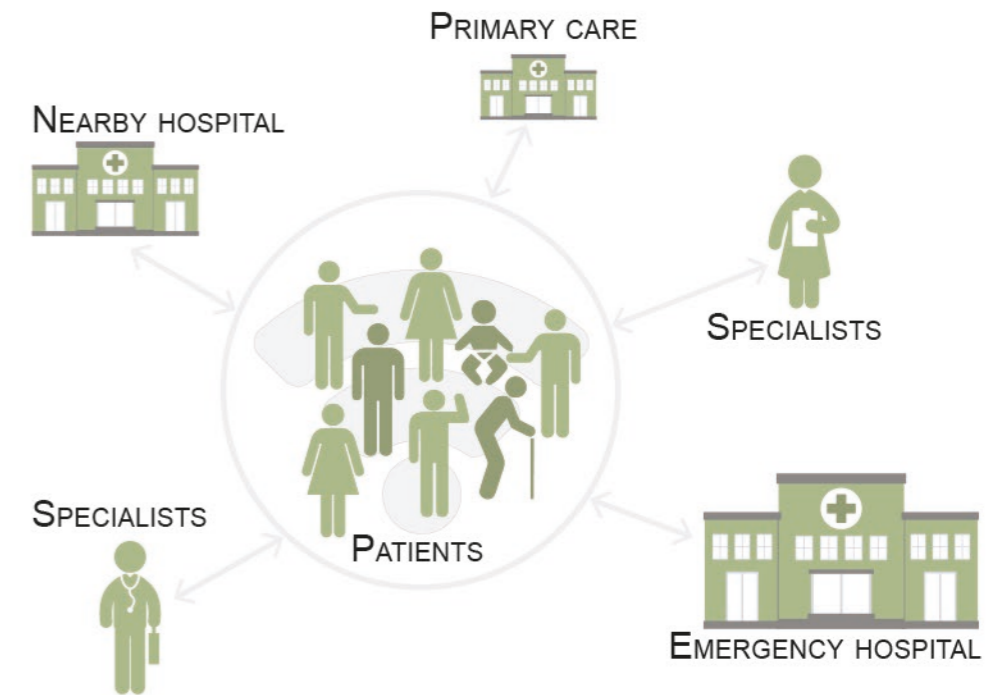
Follow-up control via video  
Evaluate your visit



## EMPOWER THE PATIENT



## A BUILDING FOR BOTH PATIENTS AND STAFF



## HEALTHCARE AS A NETWORK

# HEALTHCARE IN GOTHENBURG 2023

In the year 2023 healthcare is closer to the patient and the patient's needs are in focus.

The care takes place in many different settings. The first step when contacting healthcare takes place at home, via phone or video and the next step is the primary care center. The nearby hospital is a specialised hospital with outpatient care that takes pressure of the big emergency hospitals. A nearby hospital is a way to make healthcare more accessible for the patient.

The vision for Frihamnen Health Forum is that it will not only be a hospital but a forum where people can gather around health and work with health promotion rather than illness prevention.



## HEALTH PROMOTING ACTIVITIES THROUGHOUT THE BUILDING



Gardening



Nutrition education and information



Climbing competitions



Group fitness events for teenagers



Gym



Bicycle workshop

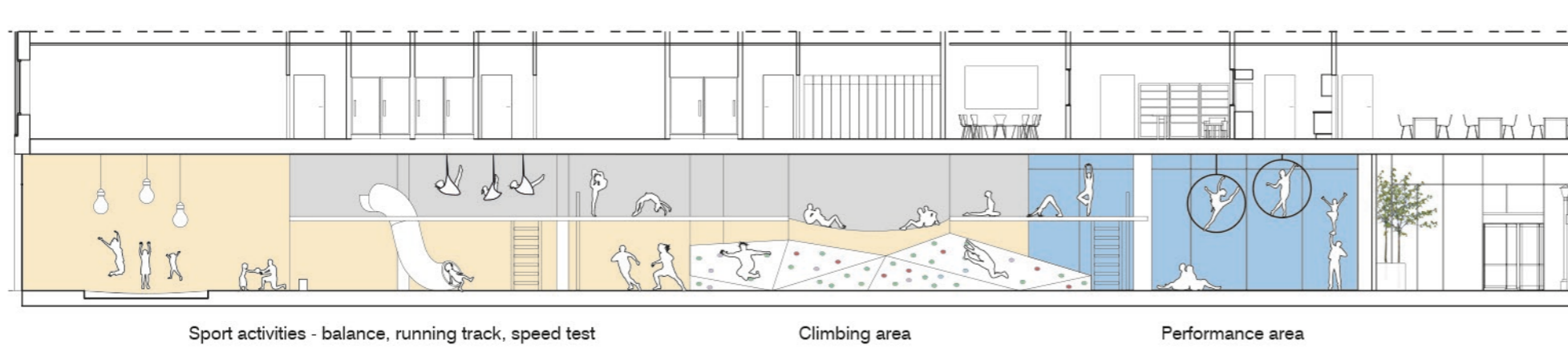


Group fitness events



Indoor cycling events

## PUBLIC ACTIVITY CENTER



Sport activities - balance, running track, speed test

Climbing area

Performance area

Scale 1:20 0 10 20 30 40 50 60 70 80 90 100 (cm)

## HEALTH PROMOTION

Frihamnen health forum is not only about curing illness, but more about promoting health and contribute to preventing illness in different ways.

On the ground floor there are spaces for different health promoting activities, and the atrium can be used for events for health promotion like group fitness events.

The activity center has equipment for many kinds of physical activity. There is a climbing wall, a trampoline, slides, equipments for acrobatics, a performance space and a running track.

Within the café, courses in healthy cooking where people can meet and learn to make healthy food, can take place.

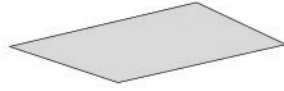
The bike workshop is a place where people can fix their bikes. A place like this can be hard to find if you live in a small apartment, so this is a quality for the inhabitants around Frihamnen.

On the 8th floor there is a greenhouse with urban farming and tables for people to gather and exchange knowledge about gardening. The plants from the farming can be used in the cooking classes in the café. On the tram side of the greenhouse there is a calmer garden area where one can sit and enjoy the greenery.

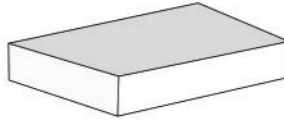


## THE VOLUME

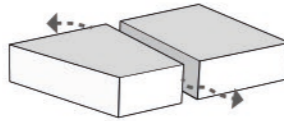
THE PLOT



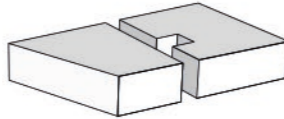
FILL THE PLOT



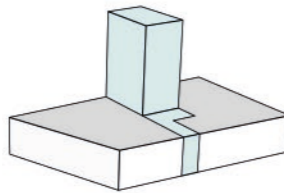
CREATE PATH THROUGH THE PLOT



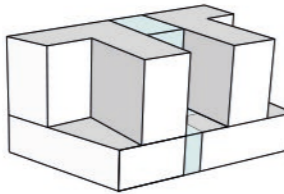
CREATE CENTRAL SQUARE



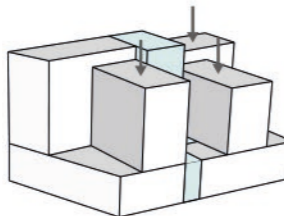
VERTICAL CENTRAL CORE



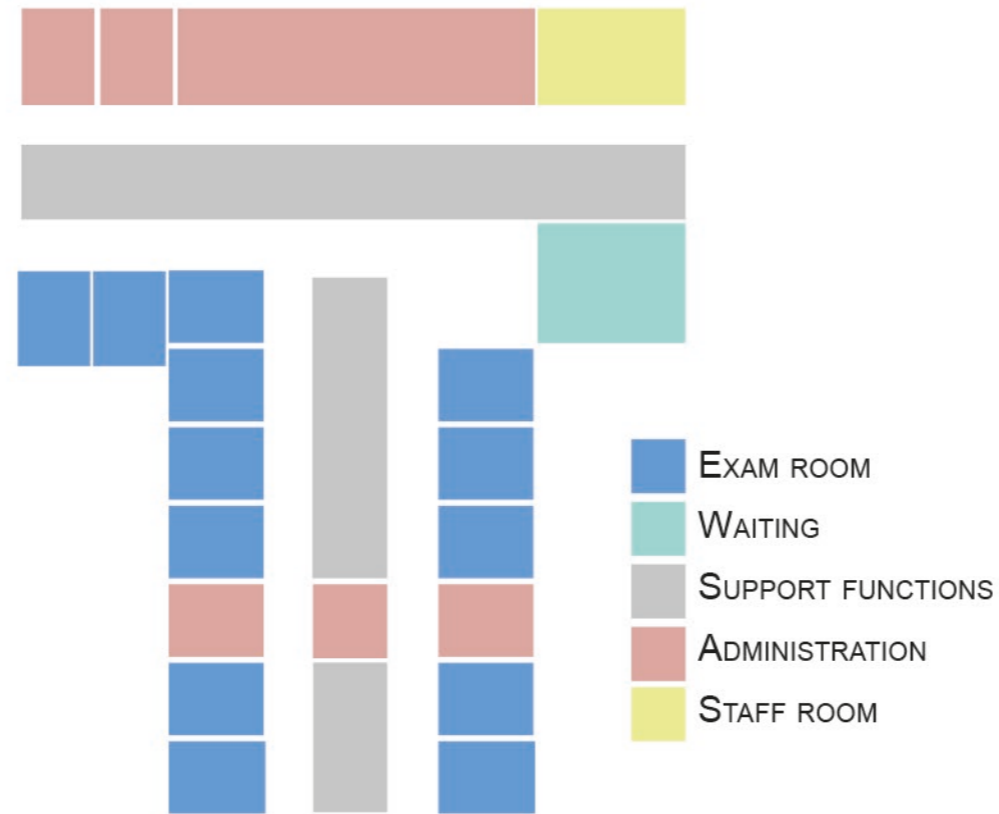
TWO WINGS FOR DEPARTMENTS



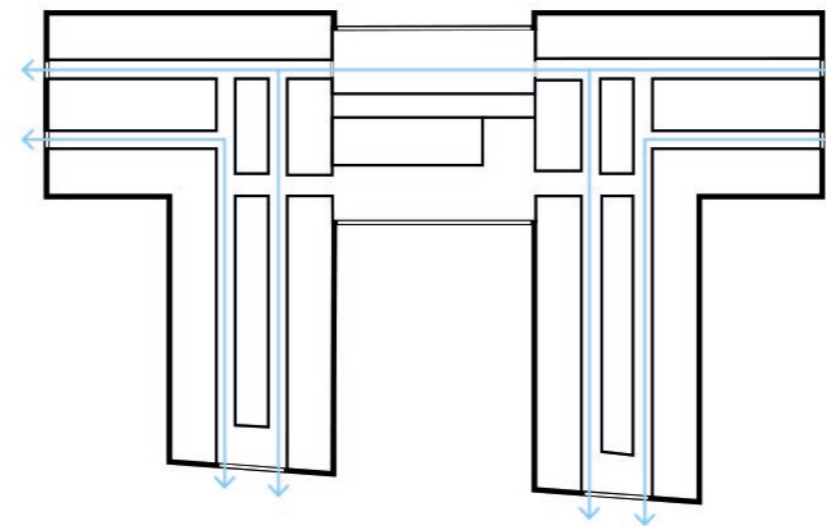
ADJUST HEIGHTS



## CONCEPT DEPARTMENT LAYOUT



STRUCTURED DEPARTMENTS THAT PROVIDE FLEXIBILITY



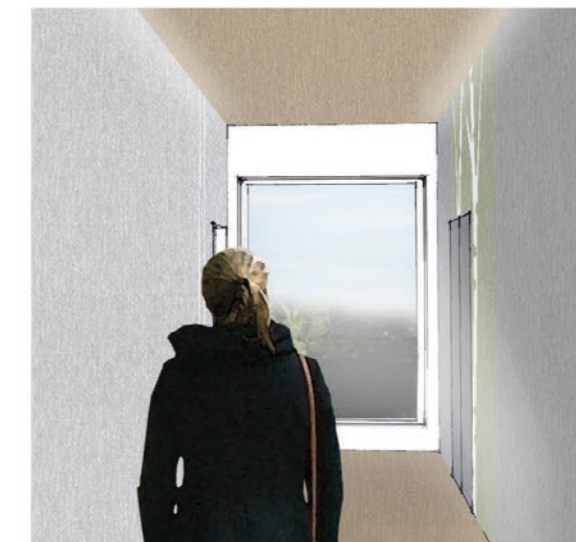
A WINDOW AT THE END OF EVERY CORRIDOR

## BUILDING CONCEPT

The volume follows the demands of a hospital building. It has a heavy base which fills the plot creating the setting for high tech departments with demands on big rooms. In order to create an inviting building an interior street and an atrium were designed, allowing the public to easily access the site. The heights are adjusted when taking in consideration the character of the surrounding area.

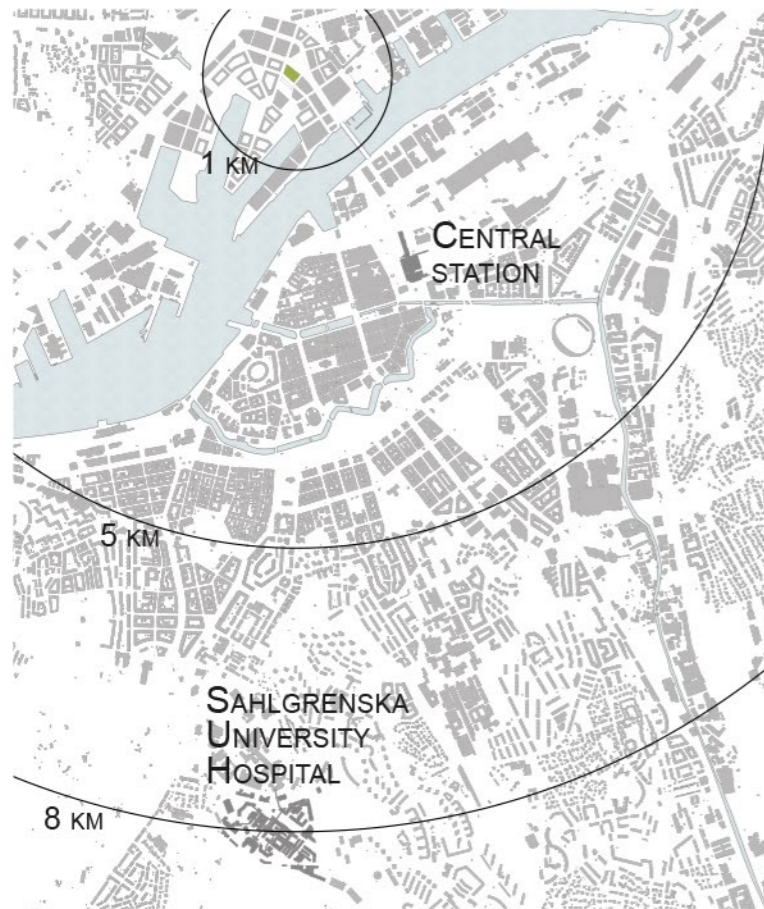
The other departments are developed in narrow wings that provide good daylight and beautiful views. The departments are structures as to provide flexibility and the possibility to change size in time. They have mixed flows of patients and staff, with double corridors that accommodate support rooms in the dark core. In order to allow for future changes in department layout the administration is mainly concentrated on one part of the department.

Wayfinding was an important aspect of the design, it was achieved by having waiting rooms located on the same place throughout the building, working with straight lines and placing windows at the end of every corridor



View in corridor





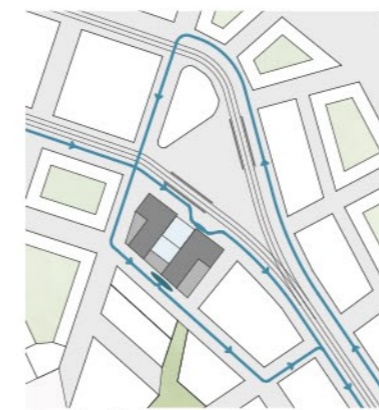
Scale 1:10000 0 50 100 150 200 250 300 350 400 450 500 (m)



Ambulance traffic flow



Goods traffic flow



Car traffic flow

## THE CONTEXT

As Gothenburg grows the area of Frihamnen will become an important part of the city which will strengthen the regional core, evolving from an industrial area to an urban centre where many people will live and work.

A dense area, with 20 000 accommodations will need a nearby hospital which will function in connection with other medical providers in the city.

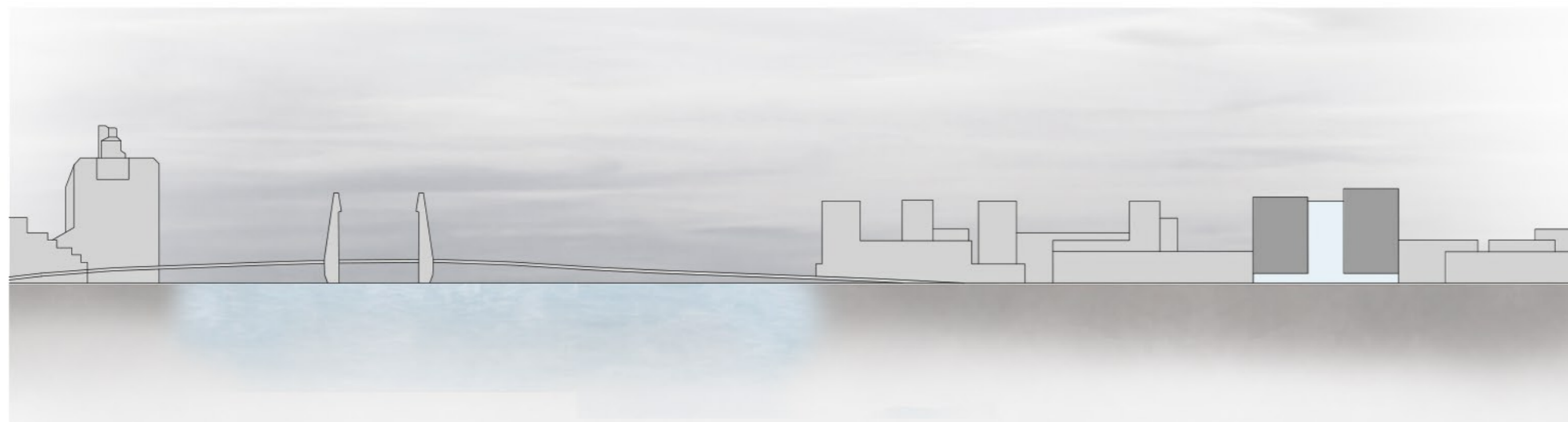
The site of the hospital is well connected to the city and will most likely function well as a nearby hospital.

In order to design the new Frihamnen nearby hospital the proposal for the new area was analysed, as well as the possible traffic flows for different needs of the hospital.

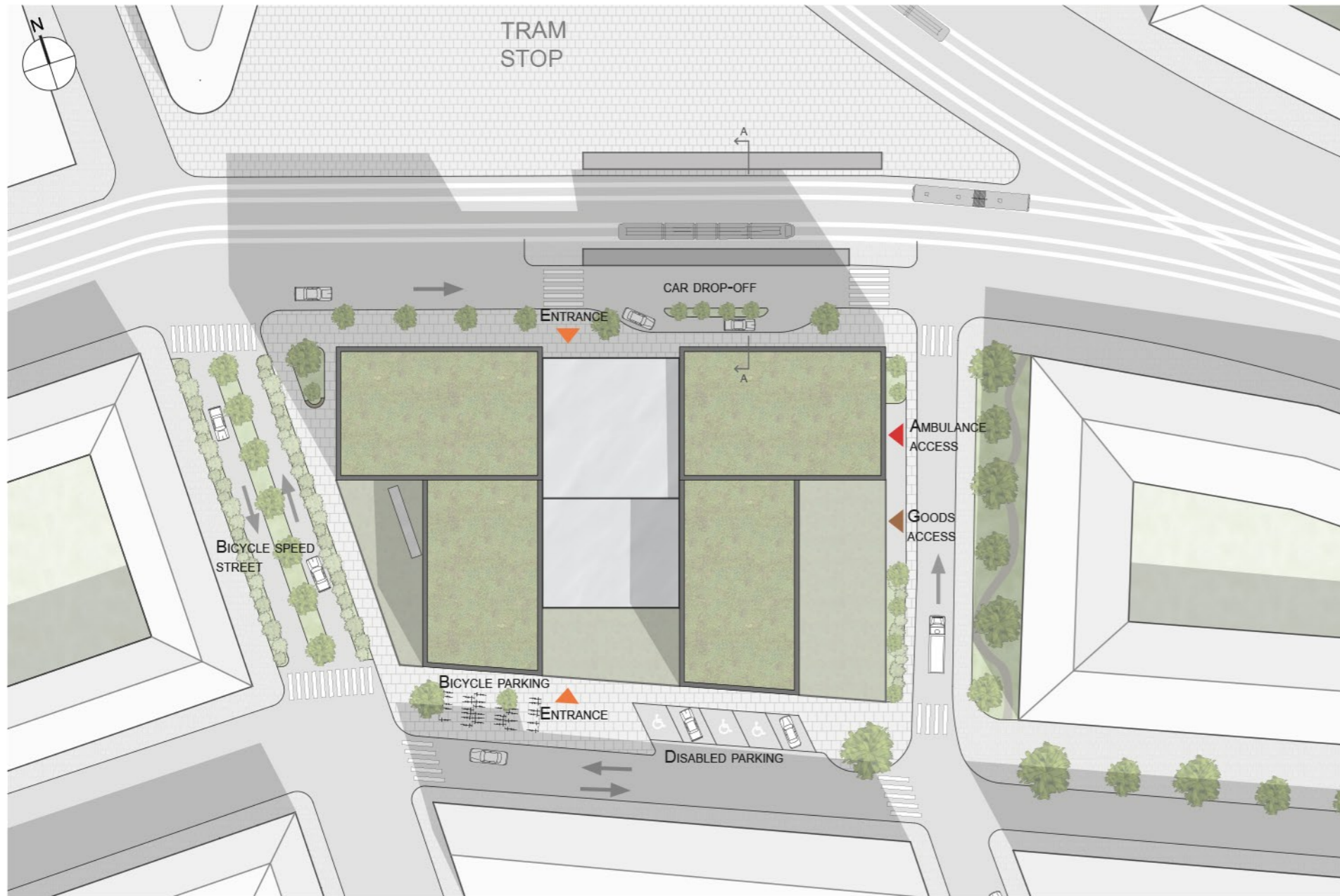
The building will have different heights which fits with both sun orientation and the vision of the city planning department for all the buildings in the area. One other suggestion of the building planning department was increasing the accessibility of people through building blocks in order to provide a city friendly environment. This is achieved by an interior public street.

The vision for Frihamnen is that of an active area with many activities which will keep people engaged and healthy. By activating the interior street with health promoting activities the hospital will be part of this vision.

Taking in consideration the city context and the views of the city planning the proposed building fits with the neighbouring buildings, creating a landmark without overpowering the surroundings.







## SITE PLAN

The site and the surroundings of the nearby hospital is designed to provide a good accessibility for visitors, staff, inhabitants, cars, ambulance and goods. All the accesses were established after the analyses of the site.

People can access the building through two equally important entrances which connect two of the streets surrounding the building.

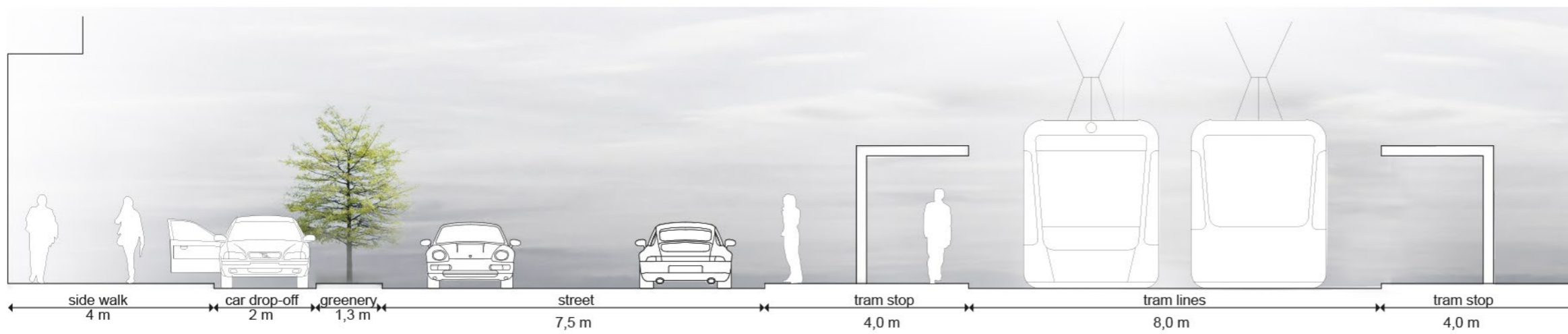
Greenery is an important feature of the site, with different types of vegetation on all sides of the building. On the eastern part the neighbouring building was quite close to the site therefore a decision was made to withdraw the boundary of that future building and create a green area as a buffer which will help with both noise control from the goods department and privacy.

Traffic and access of cars was very much considered in order to provide the best solutions.

The street on the eastern part of the site is quite narrow so we decided to make it a one way street for better goods distribution.

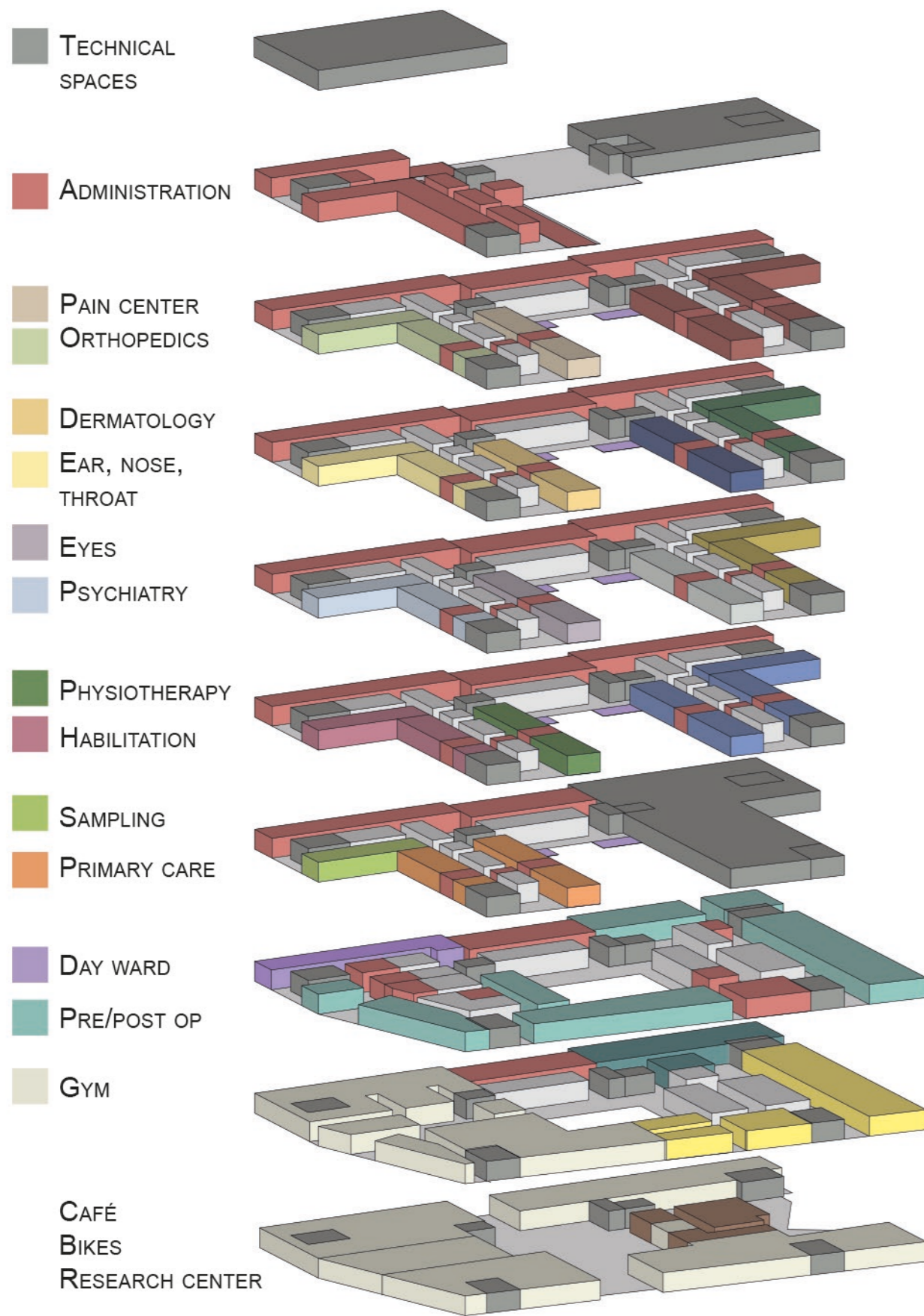
On the western side the street is designed as a bicycle speed street with plenty of greenery.

On the side with the tram stop a car drop-off area was designed and on the opposite side a parking for people with disabilities and a bicycle parking.



Scale 1:100 0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5 (m)





## STACKING

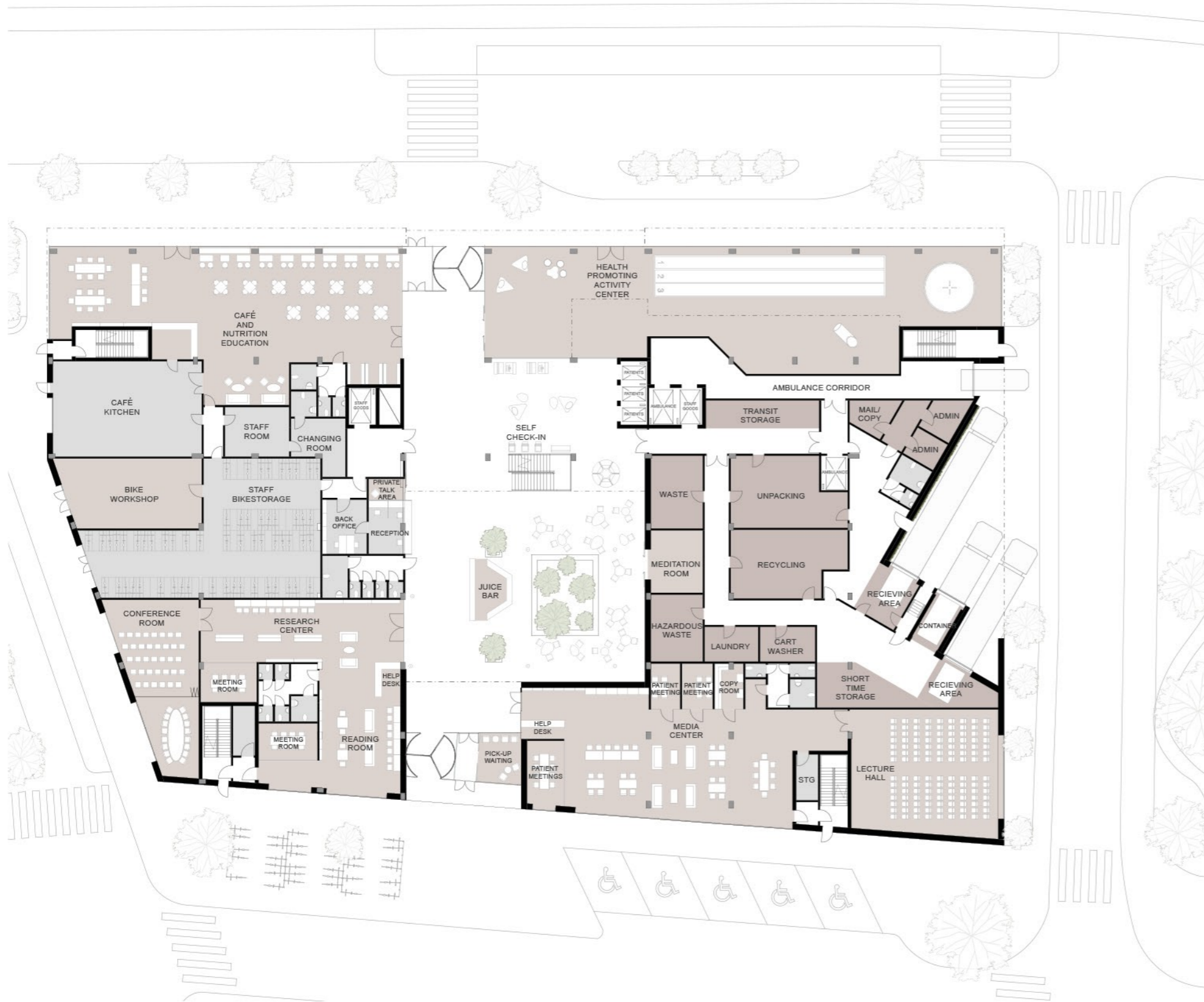
The groundfloor is very open with many public functions. On the two first floors are departments with heavy equipment and larger rooms such as Imaging and Operation. On top of the heavy base the building has slim wings with departments. Each floor has administration and staff areas towards the tram stop and exam rooms towards the harbour. Departments with similar rooms are placed together, for example Endoscopy and Gynecology that needs a toilet connected to the exam rooms. Dialysis is placed on the 7th floor to give the patients, that have to stay there for a longer time, a nice view. The hospital's main administration is on the 8th floor with a nice view over Frihamnen and the river. Technical spaces are situated right on top of the operation department and on the top of each wing.

## VERTICAL COMMUNICATION

There are separate elevator packs for patients and staff. The three patient elevators open to the central core and there is one staff/goods/beds elevator in each wing. In the south wing there is an elevator designated for emergency runs.







## GROUND FLOOR

On the ground floor an internal street opens up the building to the city and creates two entrances.

In the center the street opens up in an atrium with different forms of seating, a garden and a juice bar. Everything is open to the public and this brings quality both to people visiting Frihamnen as a neighbourhood and the hospital.

### CAFÉ

The café is placed along the facade towards the tram stop. There are regular seating and a section for cooking classes in healthy cooking.

### ACTIVITY CENTER

The activity center have different kinds of physical activities such as a climbing slope, a running track and a trampoline.

### BIKE WORKSHOP

Along the bike speed street there is a workshop where the citizens in Frihamnen can fix their bikes.

### RESEARCH CENTER

The research center is a place both for researchers and for the public. There is a small library, a reading room, meeting rooms and a conference room. The idea is that interested public can meet with researchers and exchange thoughts.

### MEDIA CENTER

In the media center you can sit down by a computer while waiting for your doctors appointment, get help from staff with finding information about health or illness and meet with patient groups with similar symptoms. There is also a lecture hall for public lectures about health.

### GOODS DEPARTMENT

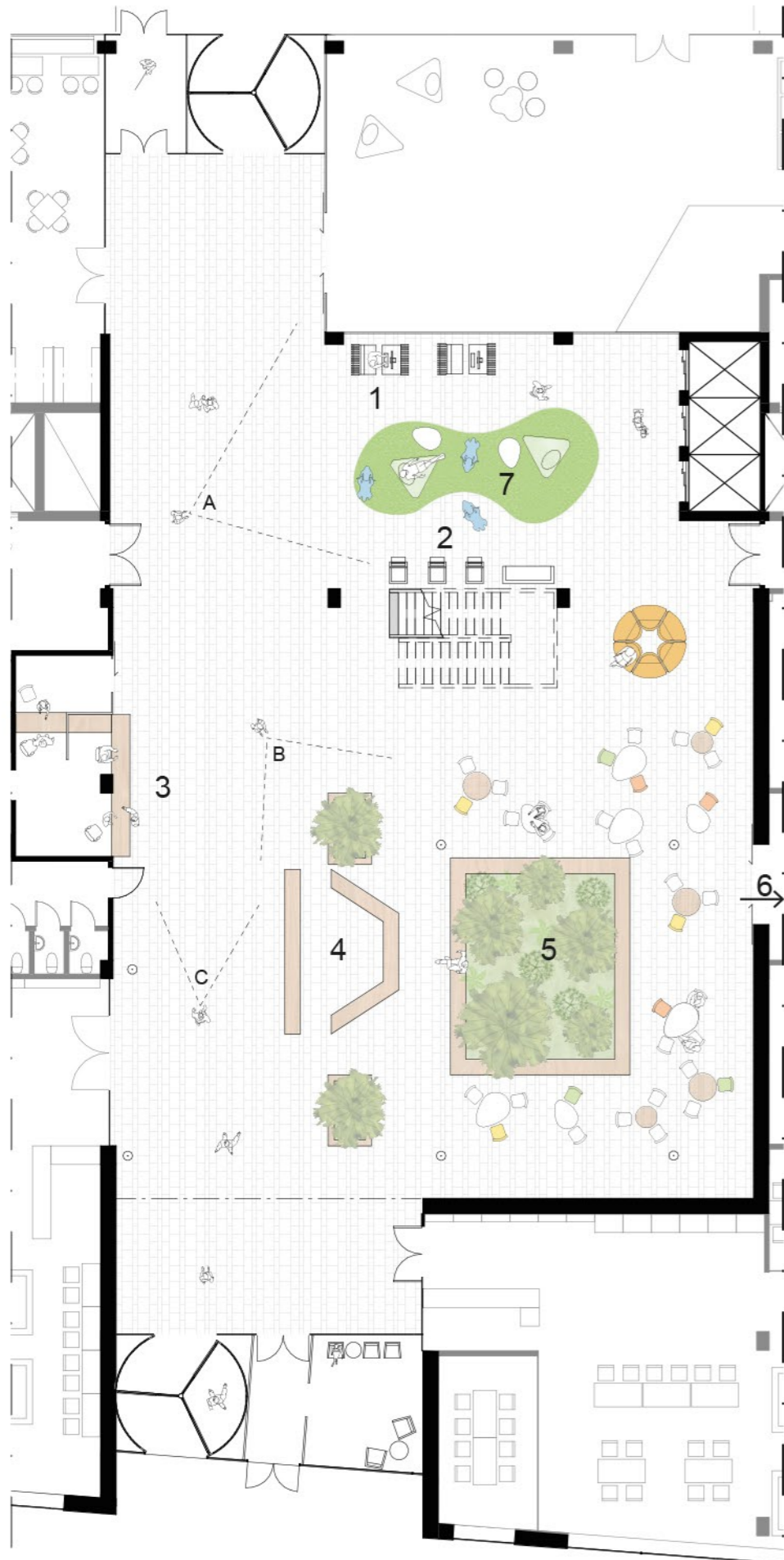
The goods department is divided into two parts, incoming and outgoing goods. There are two loading decks, one container space, unpacking areas, waste rooms and administration for the goods department.

### AMBULANCE ACCESS

The ambulance can back into the building to pick up patients that come via the emergency elevator.







A - View of self check-up and lounge area



B - View of the garden and juice bar



C - View of the main reception and interior street

## THE ATRIUM

The atrium is a space both for the visitors to the hospital but also for people passing by. Patients can sit and wait in an environment with activities going on that can distract them from being nervous or stressed about the cause for visiting the hospital. They can sit in a green setting, have a juice from the juice bar or relax in the silent room and children can play in the lounge area by the elevators.

The reception is placed by the atrium with good view over everything that happens in the street. It has an open desk as well as a private talk room for confidential conversations.

### 1 - SELF CHECK-UP

Patients can check blood pressure, heart-rate and other simple procedures on their own

### 2 - SELF CHECK-IN

Check-in for patients visiting the hospital

### 3 - RECEPTION

The reception has an open desk as well as a private talk room

### 4 - JUICE BAR

Get a healthy drink in the atrium while waiting

### 5 - GARDEN

A green environment for waiting or hanging out

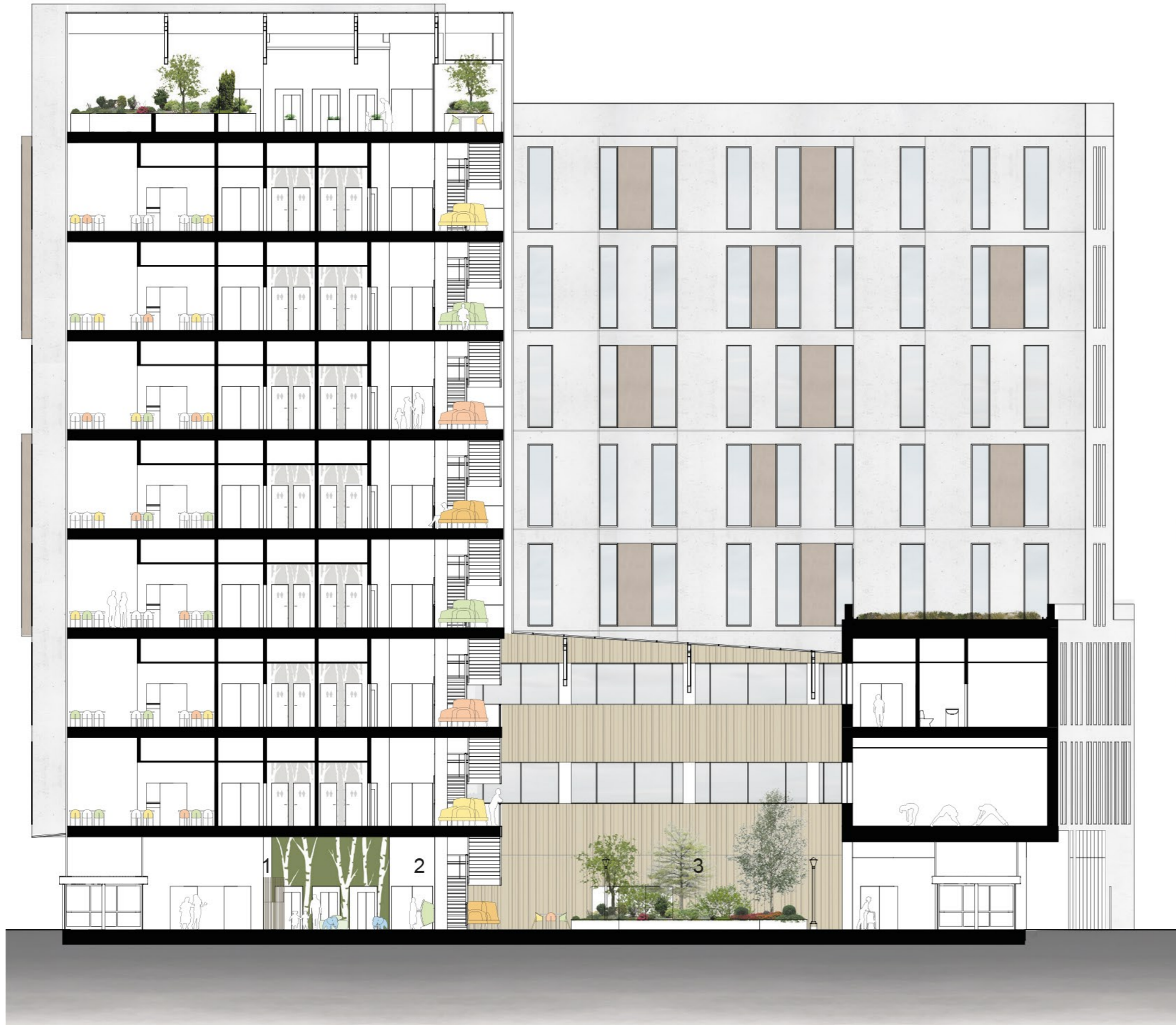
### 6 - SILENT ROOM

A silent room for contemplation and meditation

### 7 - LOUNGE AREA

Waiting with toys and soft furniture





## THE ATRIUM

The walls in the atrium are covered with wood planks with different widths. Behind the planks are acoustic boards to handle the sound level in the big room.

The elevators are marked with a simplified image of birch trees which is a part of the colour scheme for the hospital.

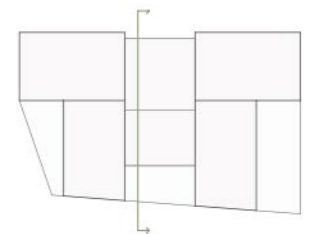
- 1 - SELF CHECK-UP
- 2 - SELF CHECK-IN
- 3 - GARDEN



Render of a wood panel



Reference image Source: [www.rema-wood.com](http://www.rema-wood.com)







Scale 1:400 0 2 4 6 8 10 12 14 16 18 20 (m)



Scale 1:200 0 1 2 3 4 5 6 7 8 9 10 (m)

- 1 - RECEPTION
- 2 - PRIVATE TALK AREA
- 3 - WAITING AREA
- 4 - WAITING AREA FOR CHILDREN
- 5 - ENTRANCES TO DEPARTMENTS

## FLOOR 1

The first floor contains a public gym, imaging and changing rooms for staff.

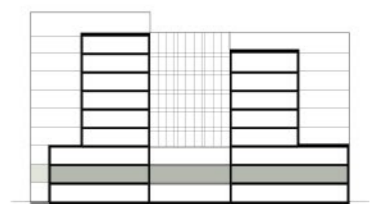
If the hospital needs to grow in the future, the gym can be demolished and that space can be remodelled to become part of the hospital.

In the central core above the entrance is a staff area with some meeting rooms and a lunch room with a view over the square by the tram stop. In the side of the core facing the atrium there is a small reception and waiting areas for patients and visitors to the gym.

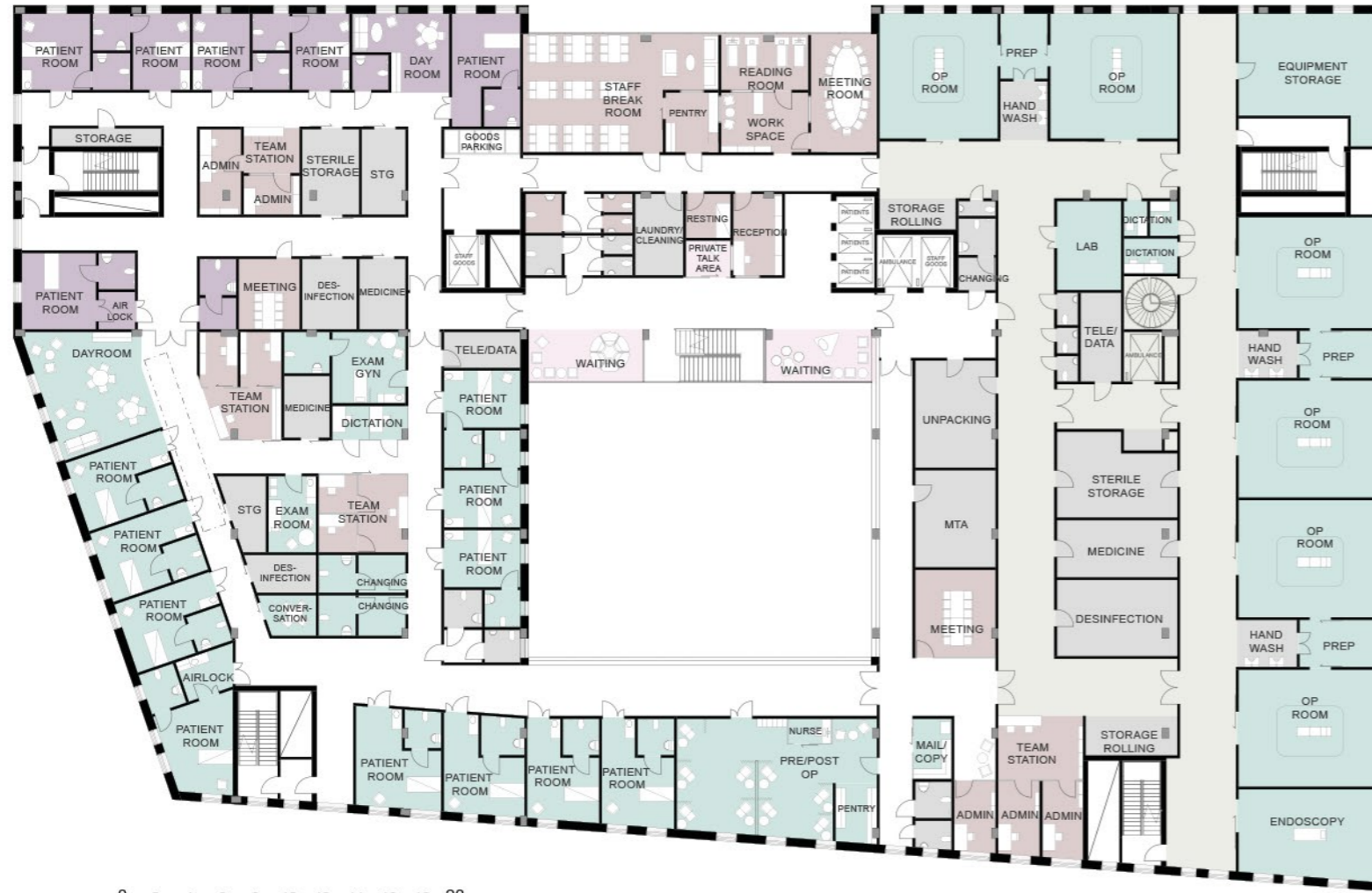


A - View of the waiting area

Waiting for a doctor's appointment is very different for different people. Some are nervous, some do it every week and some are stressed for missing work. Those people need different things; if you are nervous it can be nice to have a view or something to do to occupy your mind. Someone who's there every week might have his or hers favourite spot and just wants to get it over with. A person missing work wants a place to set up a laptop and access the internet. Children want to play and some people might want to wait in peace without playing children around them. This makes it important to give the opportunity to wait in different settings so that the patient can choose an environment he or she likes.







CLEAN ZONE

Scale 1:400 0 2 4 6 8 10 12 14 16 18 20 (m)

## FLOOR 2

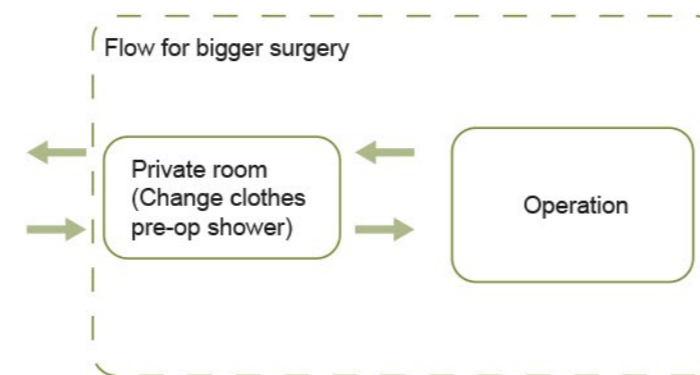
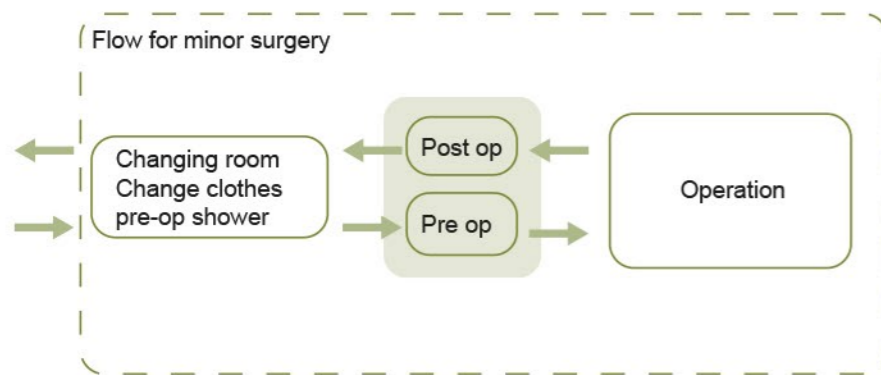
The second floor contains day ward and operation. Patients that undergo surgery can get assigned an own room if it's needed for recovery. For minor surgery there is a lounge-like area with comfortable chairs and a pentry for pre- and post-op.

The staff for operation have their own changing rooms on floor 1 with a stair connecting it directly to the operation department. There is an elevator connecting the operation floor with the imaging floor, the goods department and the ambulance corridor.

The operation theatres are placed along the facade to get daylight. They are paired up so that two operation theatres share an area for hand wash and preparations. This space in between the theatres can also be used to expand the theatres if it in the future is necessary with bigger operation theatres. In the clean zone is a team station with two administration places.

In the day ward and pre/post op combined there are 17 single patient rooms, each with separate bathrooms. They also have day rooms with comfortable seating, a pentry and space to hang out.

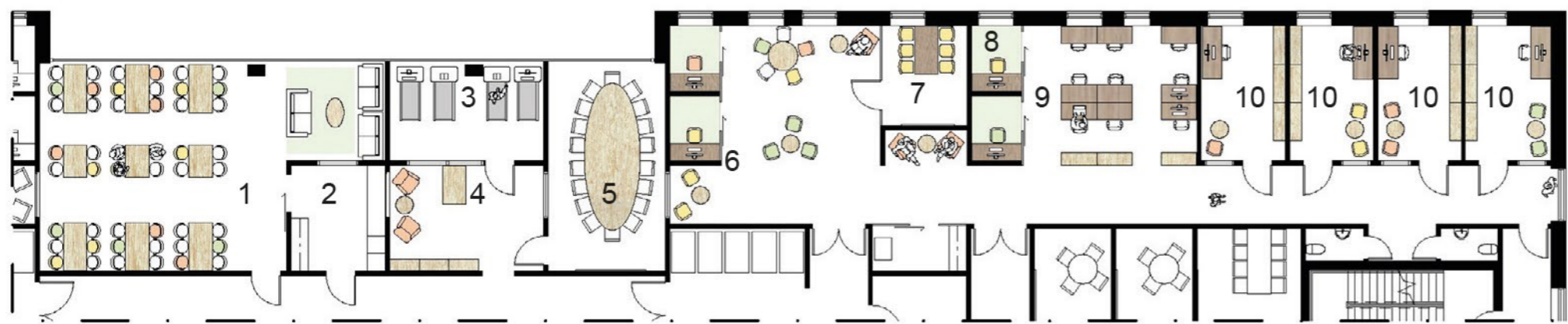
The day ward and pre/post op departments are organised with teams with a group of patient rooms and a team station with some administration places.







Scale 1:400 0 2 4 6 8 10 12 14 16 18 20 (m)



Scale 1:200 0 1 2 3 4 5 6 7 8 9 10 (m)

## FLOOR 5

On the fifth floor are the departments Psychiatry, Eyes, Urology and Internal medicine. Psychiatry has mainly smaller rooms for conversation while Eyes and Internal medicine needs bigger rooms. Urology has accessible toilets connected to their exam rooms.

### ADMINISTRATION

In the north east side of the core there is shared spaces for all of the staff on that floor. The main feature is the staff room but there is also a workspace where staff from the two wings can meet, a bigger meeting room as well as a reading room with treadmill desks where you can work on your computer or read all while talking a walk and enjoying the view.

The staff areas from the central core continues into both of the wings where the staff from the departments have their administration space. There are also some smaller administration units down in the wings to shorten the walking distances for staff.



Informal meeting room



Private call rooms



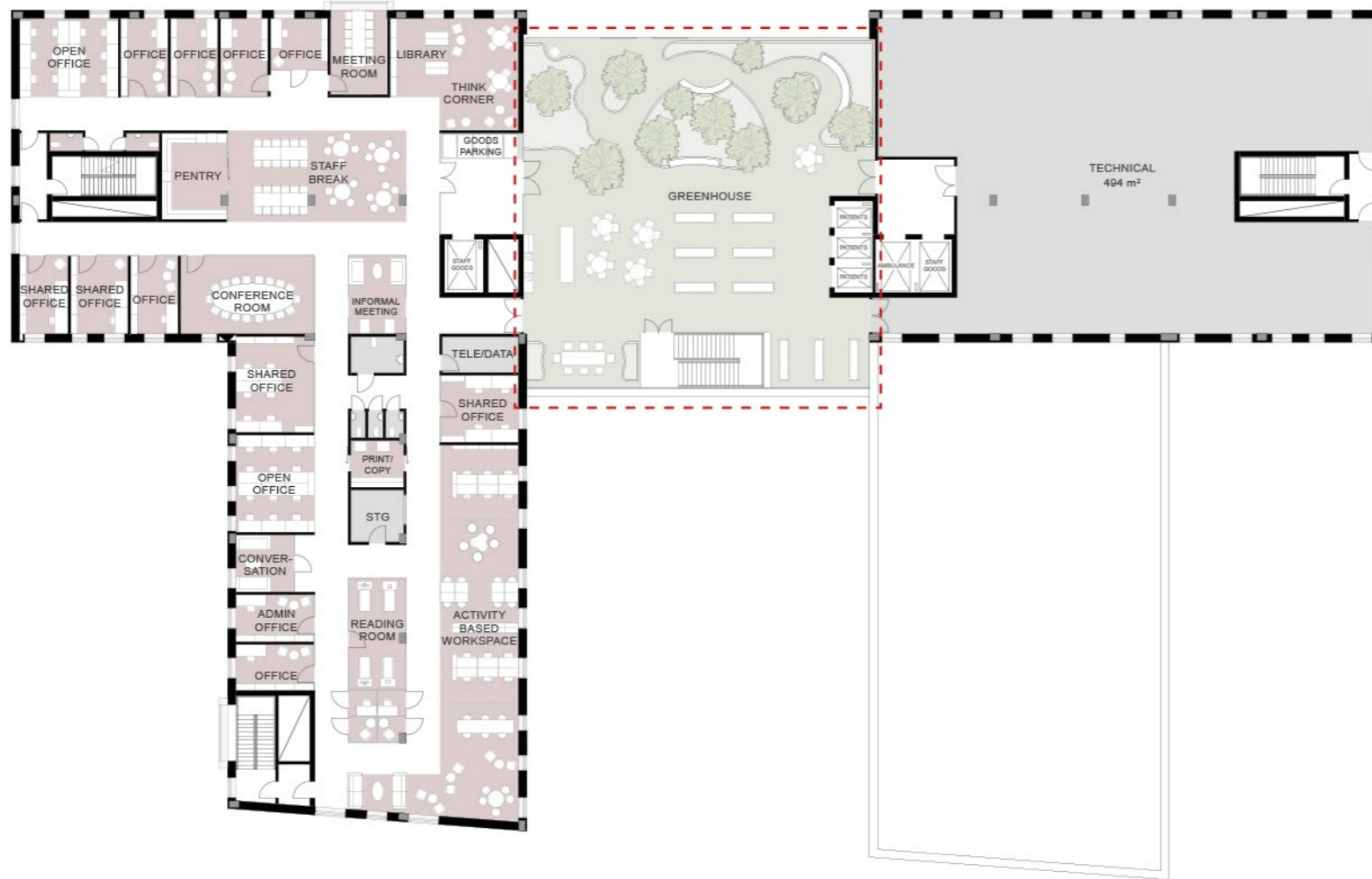
Treadmill desk

- 1 - LUNCH ROOM
- 2 - PENTRY ROOM
- 3 - READING ROOM WITH TREADMILL DESKS
- 4 - READING ROOM
- 5 - MEETING ROOM
- 6 - INFORMAL MEETING ROOM WITH PRIVATE ROOMS
- 7 - SMALL MEETING ROOM
- 8 - PRIVATE CALL ROOMS
- 9 - SHARED OFFICE
- 10 - PRIVATE OFFICE

Office space - source: [www.archdaily.com](http://www.archdaily.com)  
Treadmill desk- source: [www.lifespanfitness.com](http://www.lifespanfitness.com)

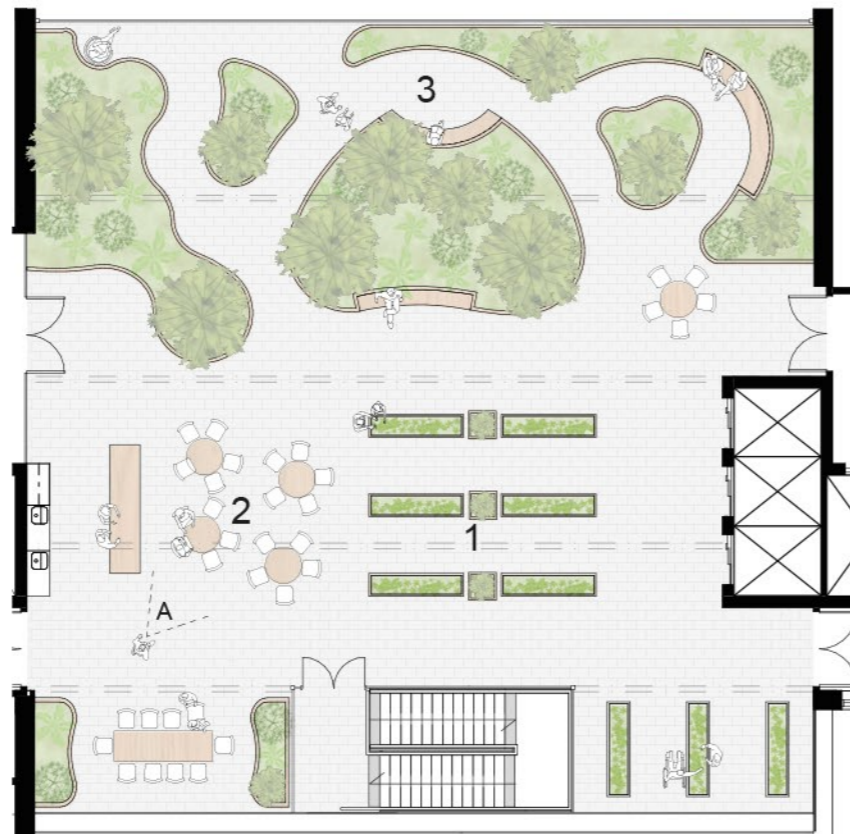






Scale 1:400 0 2 4 6 8 10 12 14 16 18 20 (m)

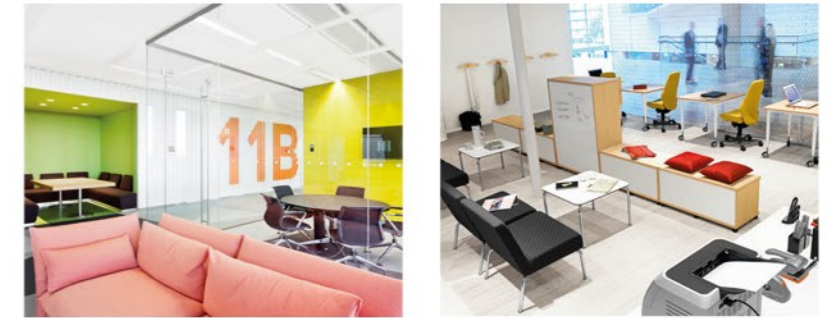
- 1 - URBAN FARMING
- 2 - EATING AREA
- 3 - GARDEN



Scale 1:200 0 1 2 3 4 5 6 7 8 9 10 (m)

## ADMINISTRATION

The hospital's main administration area is situated on the eighth floor in close connection to the greenhouse. There are some cell offices but also a big, open space with different configuration of furniture for different ways of working; you can sit in a comfy chair near a window, put up your laptop on a desk, read a chart while walking on a treadmill or have an informal meeting and enjoy the view.



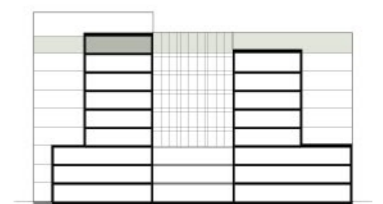
Reference images - source <http://www.archdaily.com>

## GREENHOUSE

The greenhouse has different areas with different functions. There are crop boxes for urban farming, tables for eating, a simple kitchen and a garden where you can sit alone or with friends and enjoy the greenery.



A - View of the greenhouse







FLOOR 3



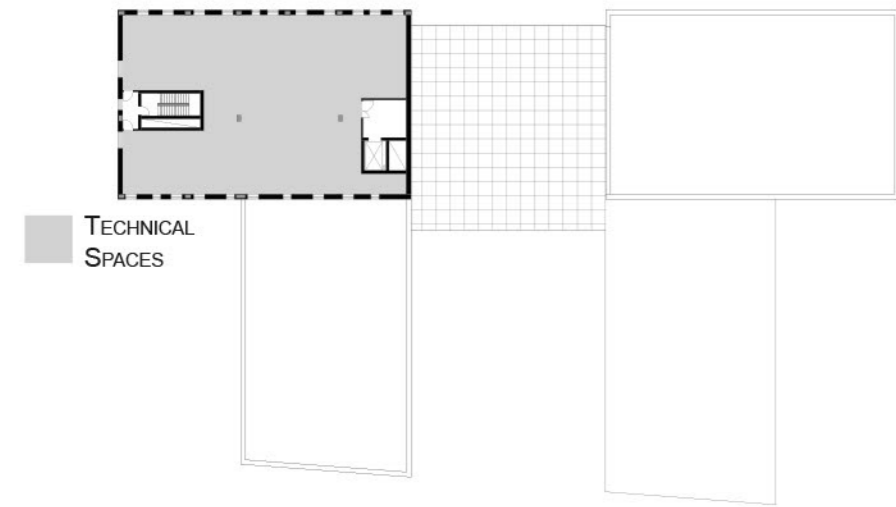
FLOOR 4



FLOOR 6



FLOOR 7



FLOOR 9

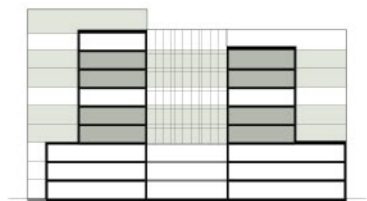
BUILDING GROSS AREA: 27600 SQM  
 HOSPITAL AREA: 20100 SQM  
 PUBLIC FUNCTIONS: 4200 SQM  
 NUMBER OF EXAM ROOMS: 149

## DEPARTMENT FLOORS

The department floors all contain two wings with a central core in between them. This is where all the vertical communication takes place. In the central core the flow of patients is separated from the flows from staff, goods and ambulance. The patients enter the core either via the patient lifts or the staircase located in the south west part and all the patient areas are on that side. A corridor that is only accessible for hospital staff connects the two wings and keeps all the daily hospital functions hidden from patients. Having a central core located on the same position in all the floors helps with orientation for the patients that can always easily find these areas.

All of the patient rooms are located in the wings and each wing can either have one or two departments in it. Departments with a need for similar functions of rooms are located together so that they can share some rooms and grow into each other. This allows for a great flexibility over time creating the possibility for departments to change sizes depending on the current demands of healthcare. All patient rooms have a nature view, to the harbour and the greenery in the biodiverse roofs.

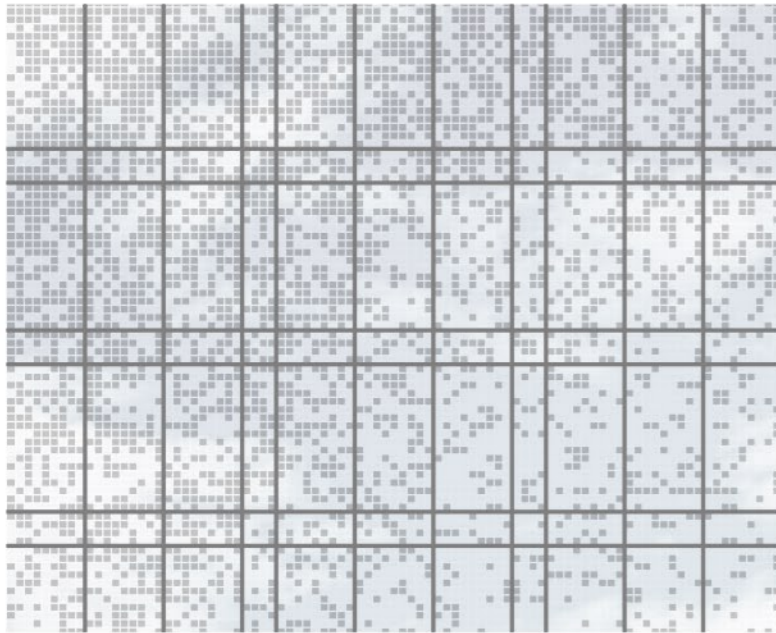
Located in the space between the corridors are the support rooms that don't need natural light. All corridors have a window at the end, helping with orientation and creating a pleasant environment for patients and staff. The length of the corridors is shorted by glazed administration offices and when possible by niches for waiting.



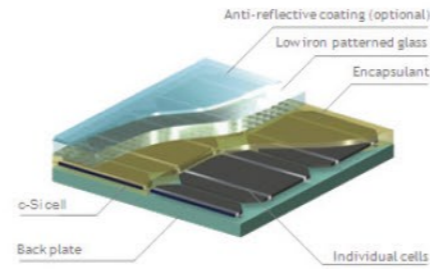
# FLOORS 3, 4, 6, 7, 9

Scale 1:800 0 5 10 15 20 25 30 35 40 45 50 (m)





Zoom in of the facade pattern



Individual solar cells



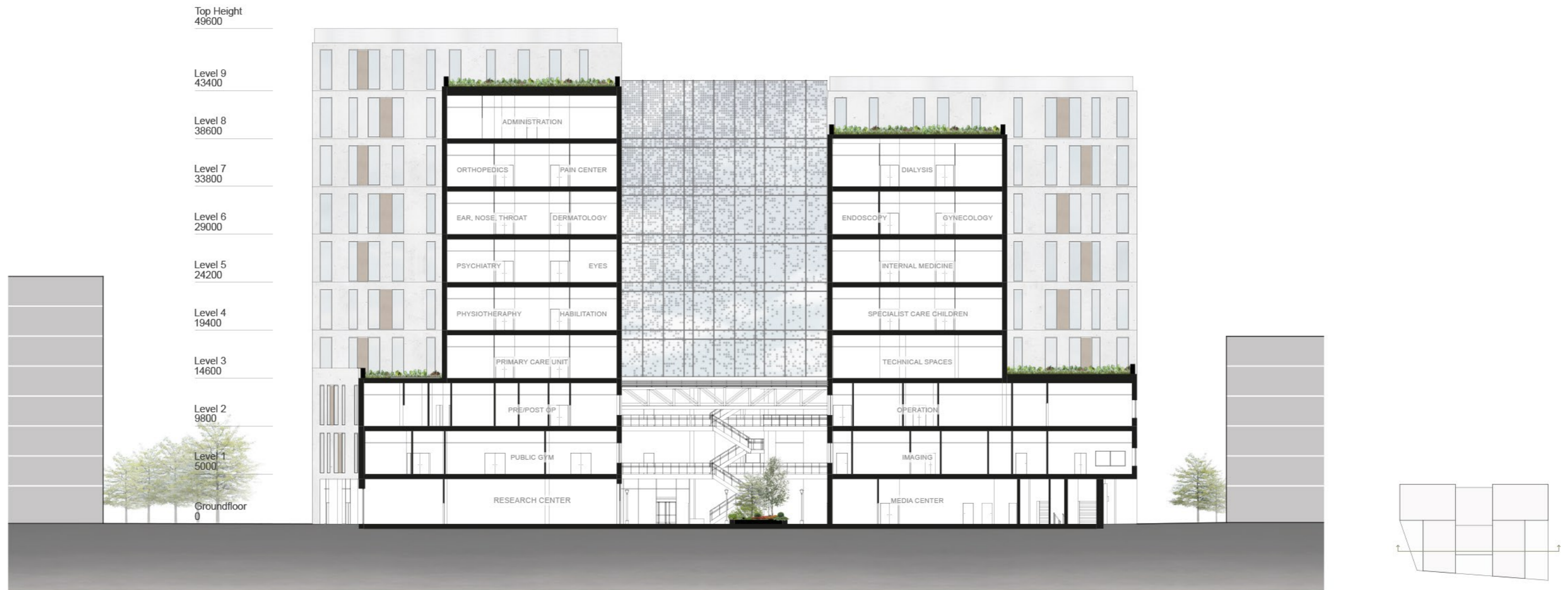
Reference image

## GLAZING

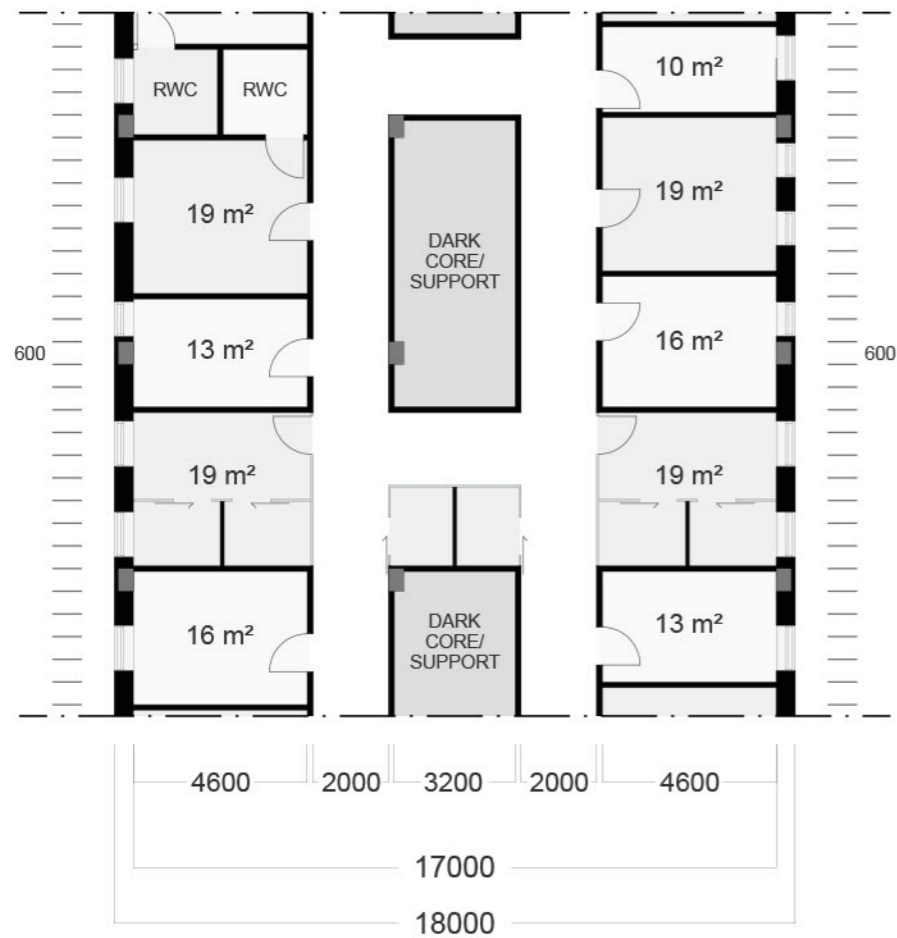
The central core of the building is completely glazed providing views towards the city. The side which opens to the harbour is especially important as it provides nice views for the people waiting for appointments but also receives much sun light. This solar exposure can be used in order to generate energy through solar cells. The solar cells are integrated on the glazing and also provide shading. Because the cells function individually they can be arranged in different patterns creating an interesting image for the facade.

The pattern can be generated parametrically using the shading conditions of the building. Using this method the cells are used in the most effective way.

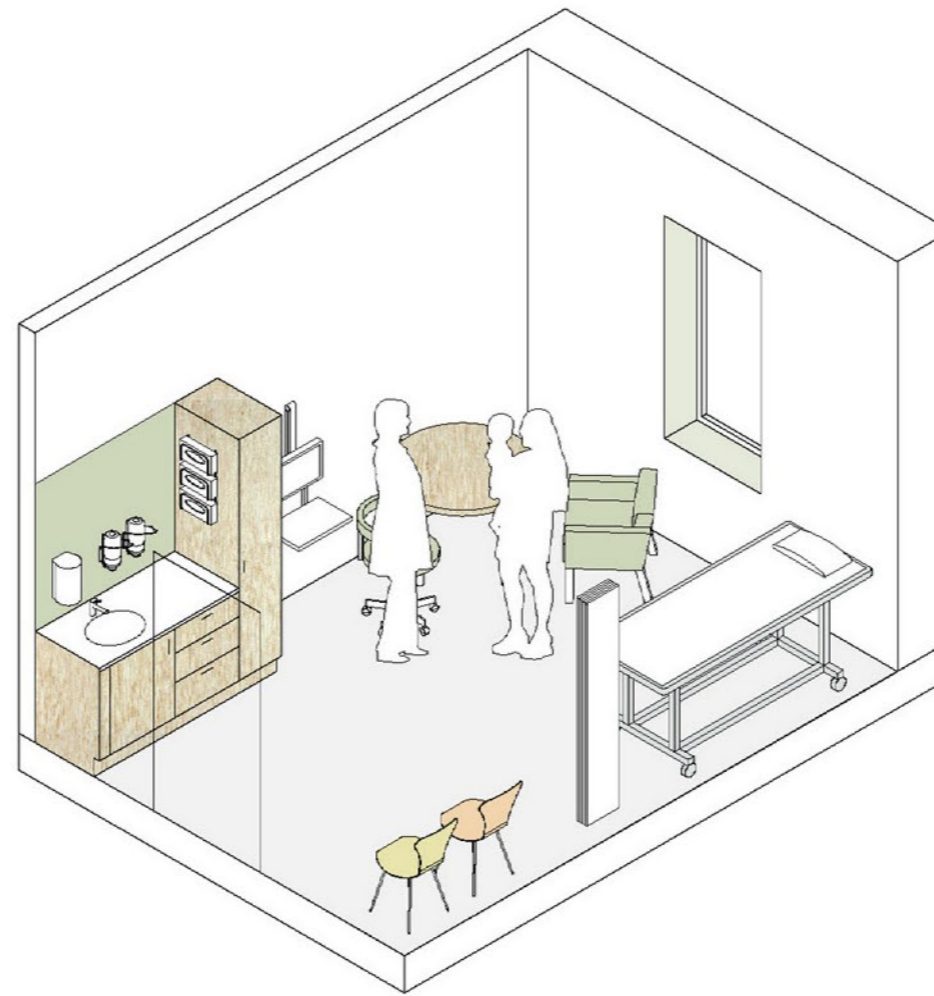
The sun conditions of the building generated a gradient pattern with more cells on the upper left corner of the glazing.







Scale 1:200 (m)

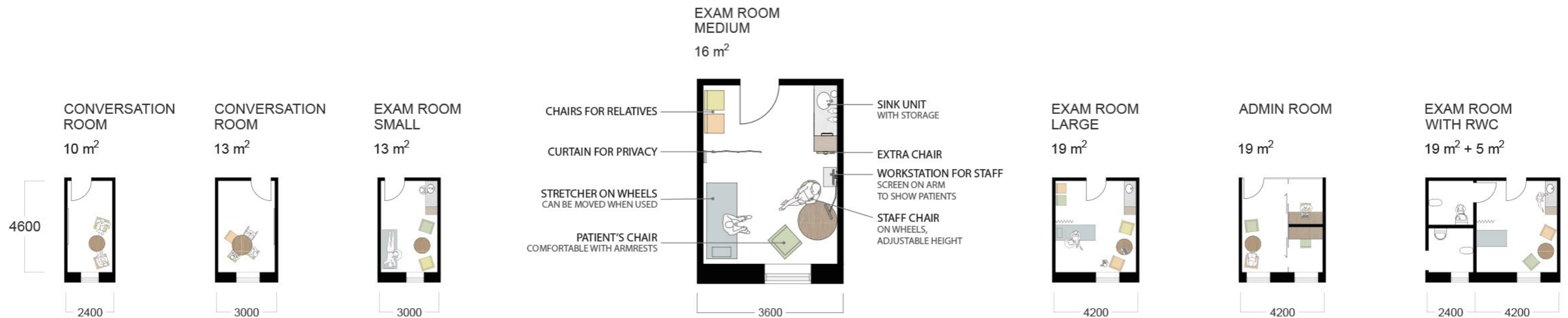


## FLEXIBILITY

The system for the floor plans are built on a two corridor system with rooms along the facades that are 4,6 meters deep and 2 meter corridors. The perpendicular walls are then placed on a grid of 600 mm which gives rooms of varying size that can be used for different functions. The dark core is used for support functions such as toilets and storage.

## EXAM ROOM

The exam room is designed with a sink unit for the staff by the door. The sink is integrated in a storing unit with a wooden pattern to make it less clinical. Near the window there is a conversation area with a work station for the staff where the computer screen is mounted on a moving arm to make it easier to show the patient what's on the screen. There are also extra chairs provided in the room for when patients arrive with a friend or relative. The stretcher has wheels on it so that it can be rotated out into the room when needed for extra accessibility. A screen can be pulled out from the wall for privacy by the stretcher.







HIGHLIGHT - EXAM ROOMS



DETAILS



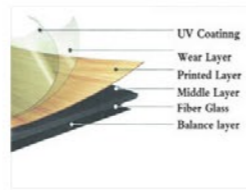
SUBTLE HIGHLIGHT - PATIENT TOILETETS



HIGHLIGHT - PRIVATE TALK AREA



SUBTLE HIGHLIGHT - ADMIN AREA



FLOORS - LUXURY VINYL TILE (LVT)

## COLOURS

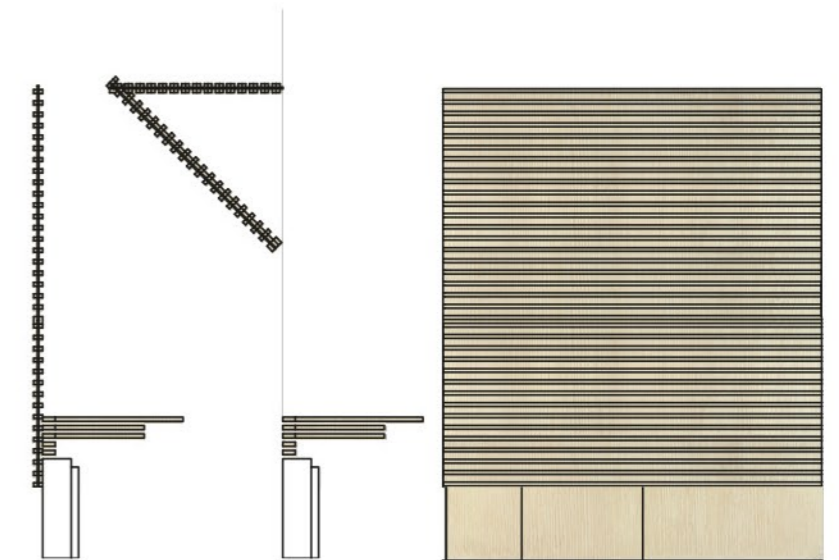
The concept of the colour scheme for the hospital has as the starting point the silhouette of a birch forest.

This silhouette can be found throughout the entire building with different colours that highlight different rooms.

Exam rooms have a stronger colour, private talk rooms have a distinctive colour that can be easily identified all over the building. Administrative rooms have no colour as to not attract attention and support rooms have no image associated to them.

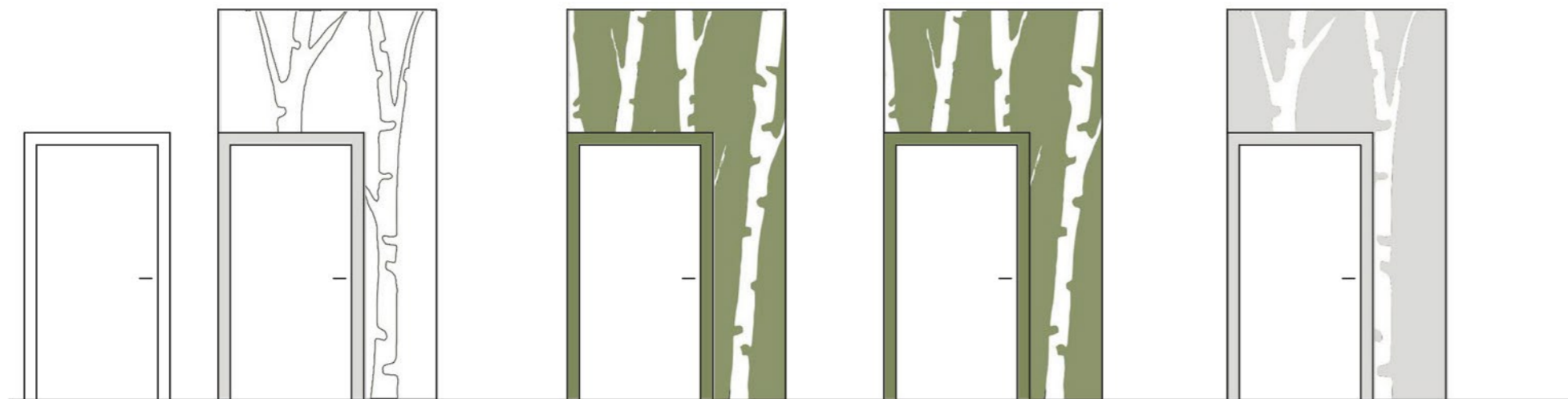
The design of the reception was very important, it uses as material wood and it can close down without disturbing the interior setting.

The flooring material allows for a variety of expressions such as wood or different patterns and colors.



RECEPTION CONCEPT

RECEPTION - CLOSED



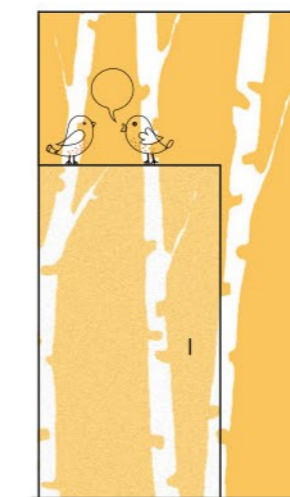
STORAGE

ADMIN ROOM

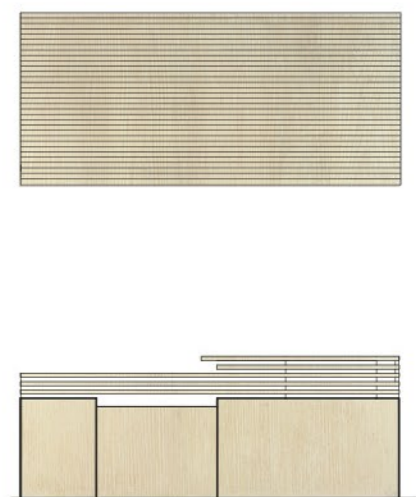
EXAM ROOM

EXAM ROOM

TOILETS



PRIVATE TALK ROOM



RECEPTION - OPENED





## FACADES

For the façades pre-cast concrete is used for the large surfaces and wood for details.

The design of the building makes the roof become the 'fifth' facade, the terraced roofs can be seen from all the rooms of the building and therefore should provide nature views, especially considering that the site is very urban with little greenery. The biodiverse green roof creates a pleasant view and by integrating solar panels the roof becomes also a sustainability feature.

## FACADE



Precast concrete



Wood

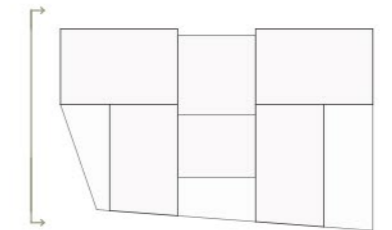
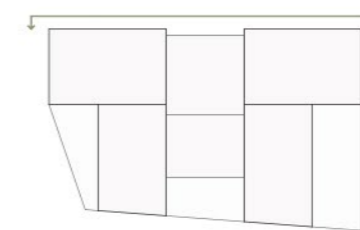
## ROOF



Biodiverse



Biosolar



# FACADES

FROM TRAM STOP - FROM BICYCLE SPEED STREET

Scale 1:400 0 2 4 6 8 10 12 14 16 18 20 (m)

Oana Dumitrache, Anita Mustonen, Malin Nilsson  
HealthcareStudio 2016 ARK262





View from the tram stop



Aerial view from the southern part



## SUSTAINABILITY PRINCIPLES



NARROW FLOORS AND GENERAL SHAPE



RAIN WATER MANAGEMENT



ACCESS TO GREENERY



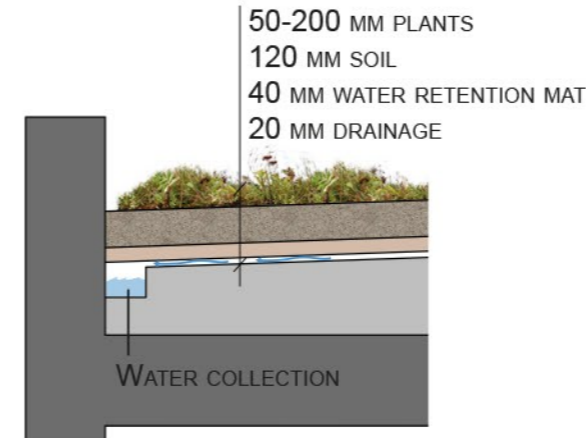
SOCIAL SUSTAINABILITY



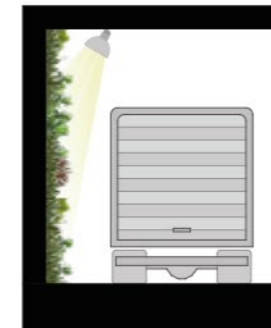
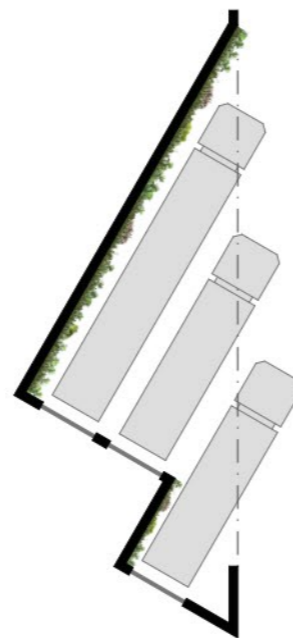
SOLAR POWER



GREEN ROOFS



Solar cells on glass  
Source: resources.made-in-china.com



## GREEN ROOFS

All the terraced roofs of the building are green roofs with a great biodiversity and water collection systems. The benefits of using this are: reducing water runoff, filtering and cleaning storm water, resting place for birds and insects, help keep the temperature of the roof even, improve air quality, providing a nature view for all the rooms of the building, reducing the noise.

In addition to greenery, on the roofs there are solar panels, creating a biosolar roof. This is a multi-beneficial solution for generating solar energy.

## DOUBLE SKIN FACADE WITH SOLAR CELLS

On the large glazed areas of the building a double skin facade is used. This facade has different roles: It provides air circulation between the two glass sides maintaining the air cooler in summer time and warmer in winter. It reduces glare. By adding solar cells on the outside solar power is harnessed and energy is produced for the hospital.

## GREEN WALLS IN GOODS RECEIVING

On the exterior part of the walls surrounding the goods receiving area there are green walls which help reducing the noise, provide biodiversity and clean the air in this area. By adding this feature a nicer, pleasant work environment is also provided. Since the green walls are placed in a dark area they get energy from a daylight lamp.