



TWIN HOSPITALS

Hospital project in Lund

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ARK 263 Future visions for healthcare, housing and work 3: Healthcare Architecture

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About the task

The task of this year's iteration of studio ARK263: Healthcare Architecture at Chalmers was the design of a proposal for the extension of the University Hospital of Lund. With an extensive program of around 110,000 sqm, the new building is planned to house diverse healthcare functions ranging from lower-tech primary care to state-of-the-art surgery and diagnostics.

Lund holds a historical position both nationally and internationally in terms of tradition of knowledge and healthcare. The Region of Skåne, in its projection into the future, wishes for Lund to maintain a strong and progressive position, not only in healthcare but in the development of other forms of knowledge as well. Recently, two high-tech facilities were completed just north of the site of our project, the MAX IV and the European Spallation Source. The future addition to the hospital will relate to these internationally attractive institutions in terms of its level of ambition and investment.

One principal challenge for us as students has been the understanding of the interrelations of the program and the requirements of staff and patient flows between different functions. For the visitor, the main issue might instead prove to be orientation and way-finding, adding another aspect to the design work.

The pairing of such an immense program with the proposed site of around 35,000 sqm, produces a problem of scale. The managing of human scale in the new building was a prevalent topic of discussion within the studio, and among the ten proposals produced across all students, several different interpretations and solutions can be found.

The scope of the project has been large for one semester of work. The structure of the studio has enabled us to deal with the project at varying scales; from the urban scale during the master planning phase to the scale of the individual room during the later parts of the semester. Naturally, not all parts of the proposal enjoy the same level of definition, but an initial understanding of the complexity of hospital architecture has started to form.

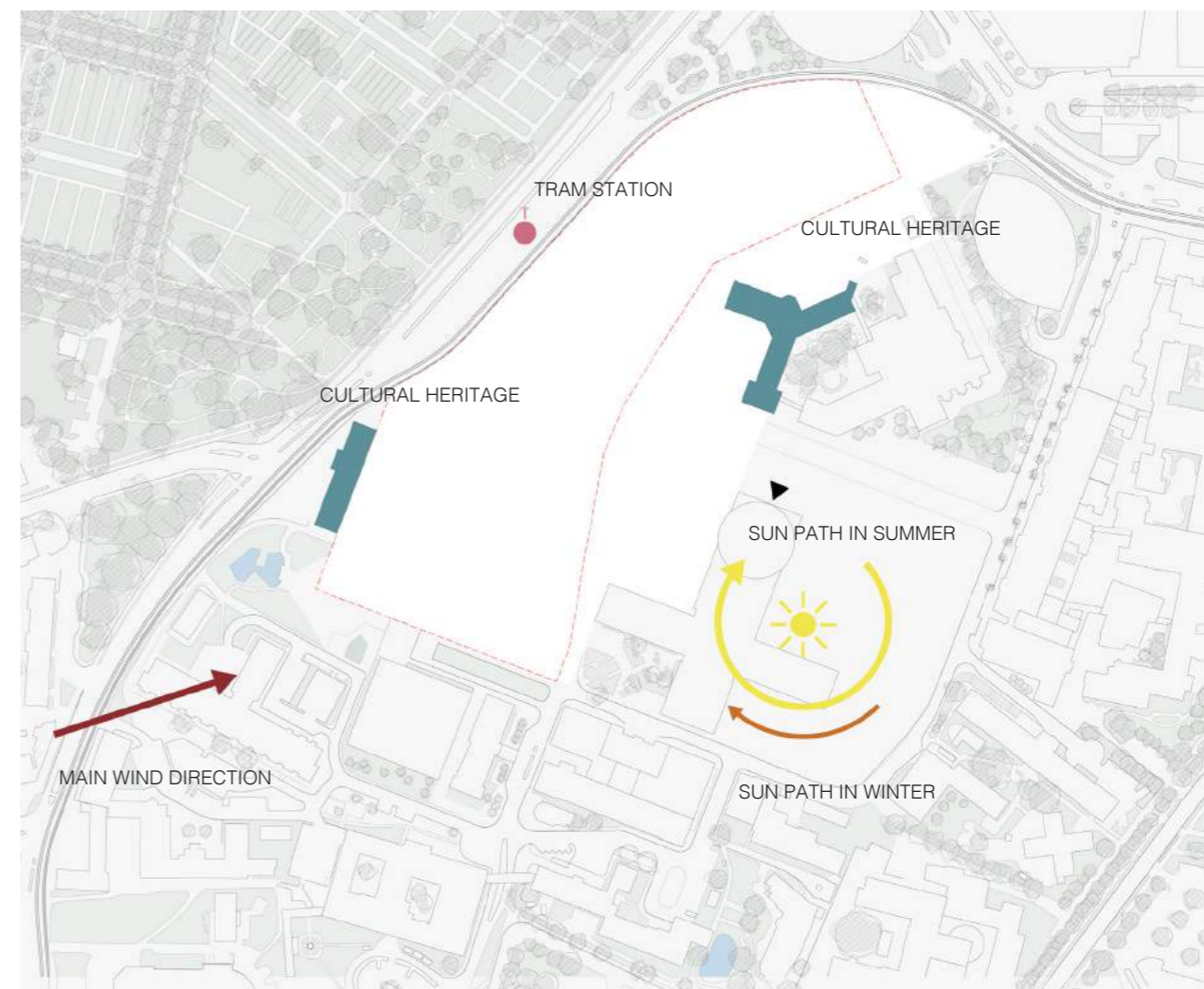
What follows in this booklet is the graphical presentation of our work. It begins with the identification of certain preconditions and/or problems found on site and in relation to the project brief. Subsequently, we formulated a set of design strategies to deal with some of these challenges by means of design. The strategies are related to the themes of Brief & Logistics, Site & Context, Sustainability & Future Proofing as well as Health Promotive Architecture. The project is then presented on the scale of the master plan and gradually defined in further detail as you proceed through the document.

About the site

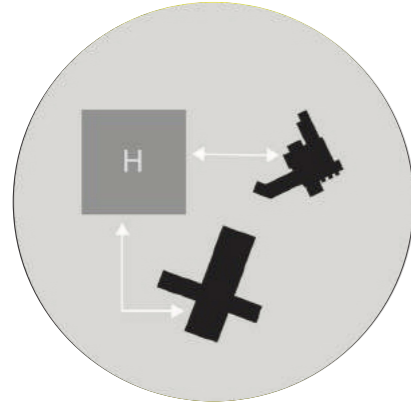
The given site is roughly aligned with the north-east and south-west axes. The Southern part benefits from a good connection to the city and has a bigger footprint for the construction. Moreover, there is a new tram line going by the west edge of the site and the station is located at the middle part of the site. In this case, we have to consider that all people coming from the tram enter the middle part of the site and its where we may consider as the main entrance.

Another factor is about the amount of sunlight shining to the site; Sweden has some limitations in this sense. The sun path in summer is high and is quite satisfying but during the winter the sun has a much lower path which causes long shadows and difficult conditions for daylight access.

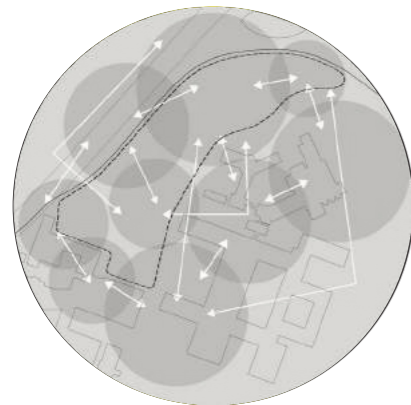
Another special characteristic of our site is the adjacent environment. There are two important sight-lines through the area. One allows you to see over the tram line toward the greenery of the cemetery, the other is towards the Old Seminar building, a structure with high historical value.



The new building will have functions related to functions in existing surrounding buildings.



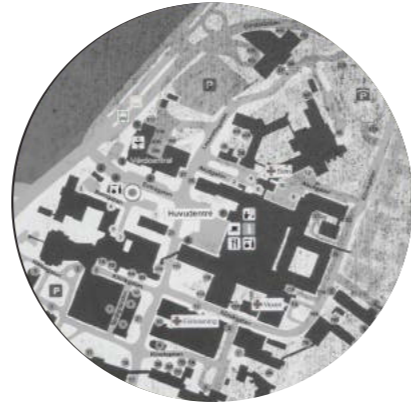
The different functions within the program are related and need to connect to each other in different ways.



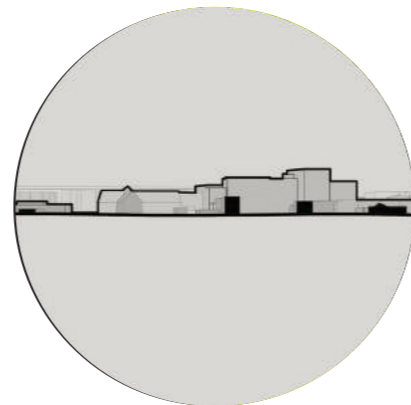
Today, the hospital area is dedicated to healthcare almost exclusively. The municipal government of Lund aims to make the area more attractive to the general public.



Because of the size and many functions of the hospital as a whole, way-finding can be quite difficult for the visitor.



The program is very large in relation to the size of the site. The skyline of the city around the area is various.



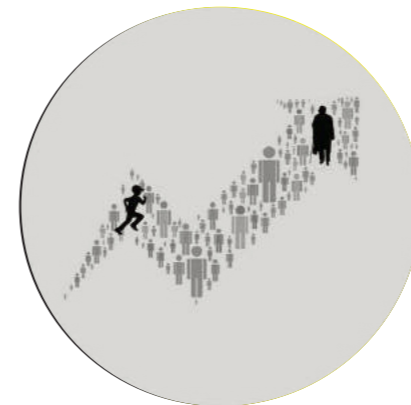
The hospital area is a historically important site, with specific buildings classified as culturally significant.



The hospital is already planned for further expansion in the future.



Parts of the interior of the new building will most probably have to be rearranged at some point to facilitate changes in organization and function.



Increased biodiversity has a positive effect on human health and resilience to disease. These factors will become increasingly important in the post-antibiotic era.



Large-scale buildings are common in hospitals and tend to be perceived negatively from the outside.



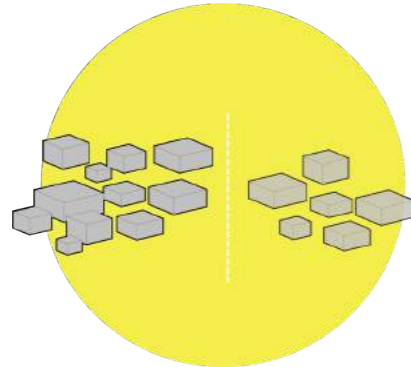
Hospital visits can be stressful or have other negative impacts on the emotions.



An active lifestyle is important for good health. Today, the hospital area prioritizes the car to a large degree.



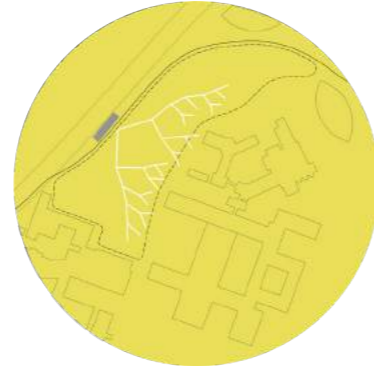
BRIEF & LOGISTICS



Separation of brief

The brief will be separated in two dominant parts: one part specialized in women and newborns, another more general but very broad part for the majority of the brief.

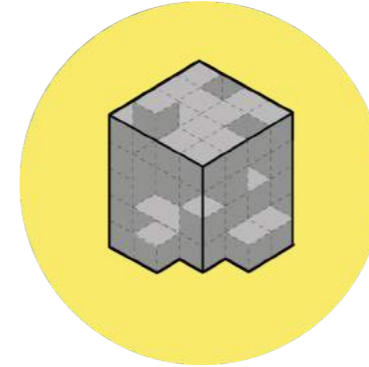
SITE AND CONTEXT



Simplified orientation

Visitors will be able to visually orient themselves through a gradual passage from the exterior of the building to the inside.

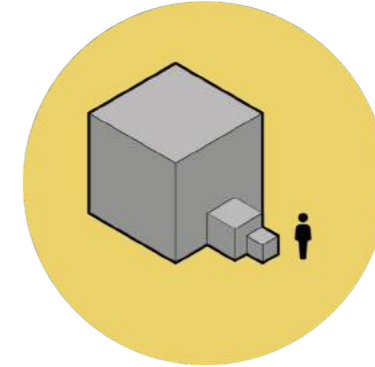
SUSTAINABILITY & FUTURE PROFING



Structural grid

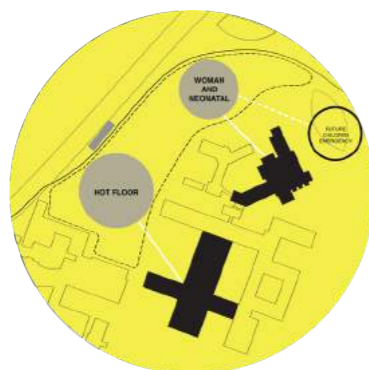
A structural grid is established and repeated on all floors. The grid should facilitate different types of layouts, both in the original design of the building and in future adaptations.

HEALTHPROMOTIVE ARCHITECTURE



Human scale design

The building volumes are treated to produce a human scale in the area.



Connections to existing buildings

The hot floor will be close to Blocket. The women and neonatal facilities will be close to the children's hospital.



Concentration of building height

Concentrating much of the floor area in one point will liberate the rest of the building in terms of height so that it can be more freely managed in relation to its surroundings.



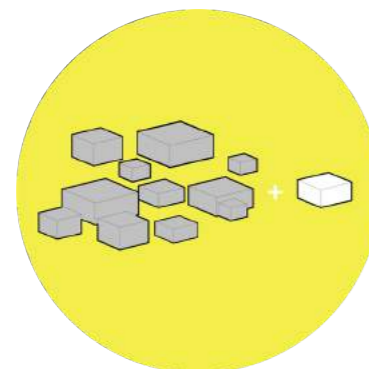
Connectivity of natural habitat

Green spaces are planned in a continuous fashion around the site, also forming a connection to the greenery of the cemetery.



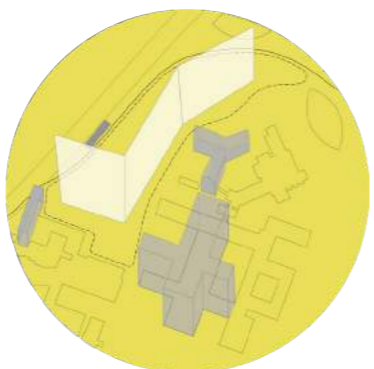
Prioritize walking and cycling

Routes are proposed to free the immediate area of all car traffic.



Addition of a public function

To help integrate the hospital in the city, an additional public function separated from strictly medical activities will be added to the brief.



Considering the cultural heritage

The new building will relate to existing heritage buildings in order to contribute to the visual coherency of the area.

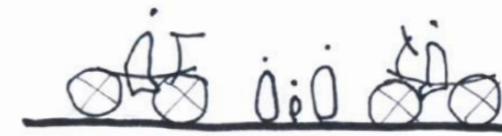


As a health promotive and sustainable element we have greenery in our concept. There is also a possibility for view towards nature and connecting our green area to cemetery to promote biodiversity in the project.



The site is so close to a tram station and it can be used to activate this area and invite public to visit a more healthcare specialized area.

For reaching that goal we consider the surface between the site and the street towards the tram station as a public zone and we want to add public function and invite city to the site.



The other side of the site close to Blocket and children hospital is a calmer area and for promoting health and creating a more sustainable city, we created bike lines and delightful paths for walking.

This car free zone around the site is giving a new atmosphere and sustainable life style in the city.



In the hospitals, way-finding is so important for both patient and staff in a daily base. As a strategy we separate the buildings with their specialization and it helps the way-finding. As a interior solution we have special areas for staff connected to their dressing room and courtyards in different scale with their own facade to help people find the way.



The concept we had for energy saving is having compact shapes and decrease the shape factor of the design. The facade is also double for saving more energy and future expansion.

Our approach towards separating the building makes the maintenance easier.

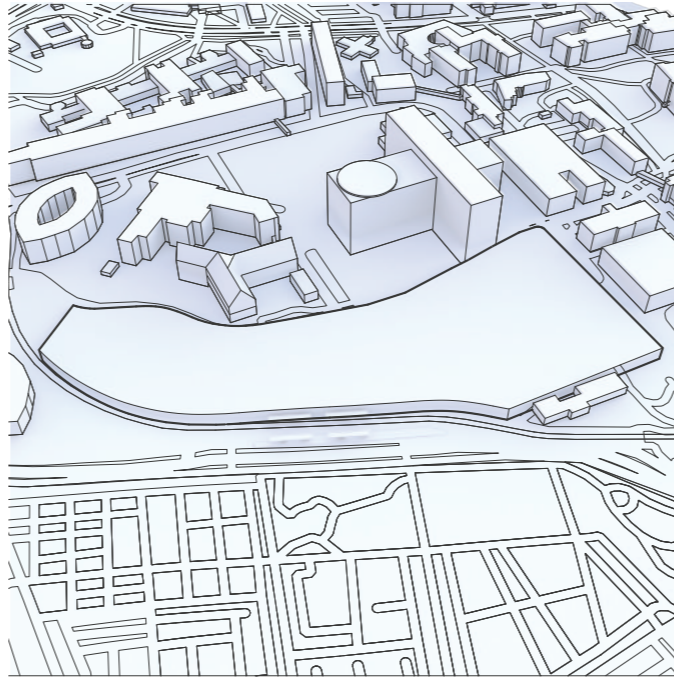


Working with the scale and facade is a priority in large project. We decided to put the higher part close to Blocket and meet the street with a more human scale and activated.

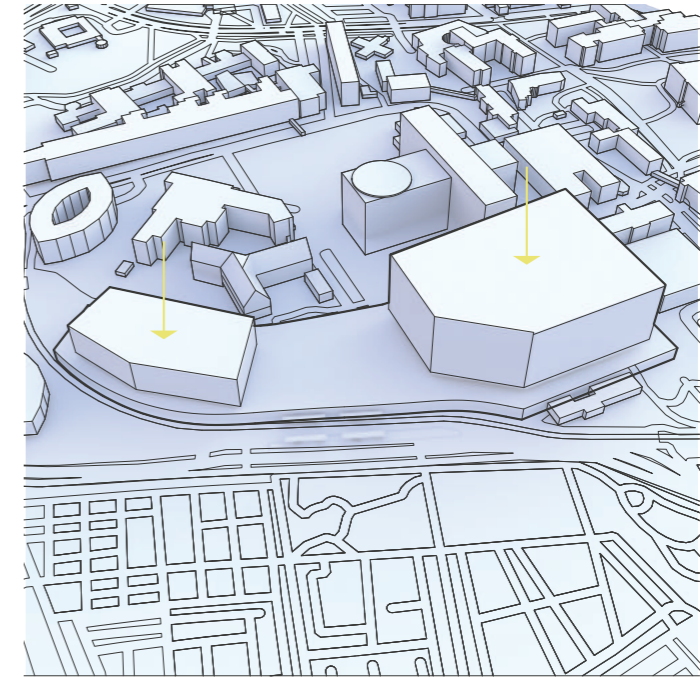
The facade should be in a way to harmonize with the existing building in the site.

One important starting point for the proposal was the division of the program into two dominating parts: one part specialized on care for women, mothers and newborns, the other with a more general scope of healthcare activities ranging from dialysis to advanced radiation treatment, as well as different forms of surgery and inpatient wards, just to name a few. This division is thought to strengthen orientation from outside and to decrease the perceived scale of the building as a whole.

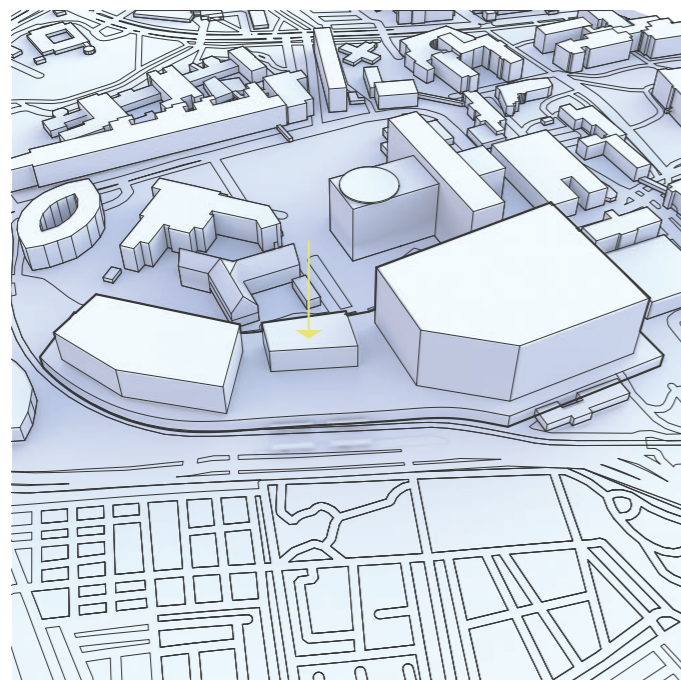
The building has been sculpted from the exterior to a large extent, both in an effort to carefully fit the building on the site, but also as an experiment to produce a building of a seemingly different typology. When the internal logic and structure of the hospital is used to inform the overall volume of the building, familiar forms tend to appear. The buildings of this proposal negate the dominating linearity of the hospital corridor and the clumsiness of the straight angle. Unsurprisingly, this approach did prove a challenge when it came to the design of the floor plans and managing the overlay of different functions within the same, rather unruly structural grid.



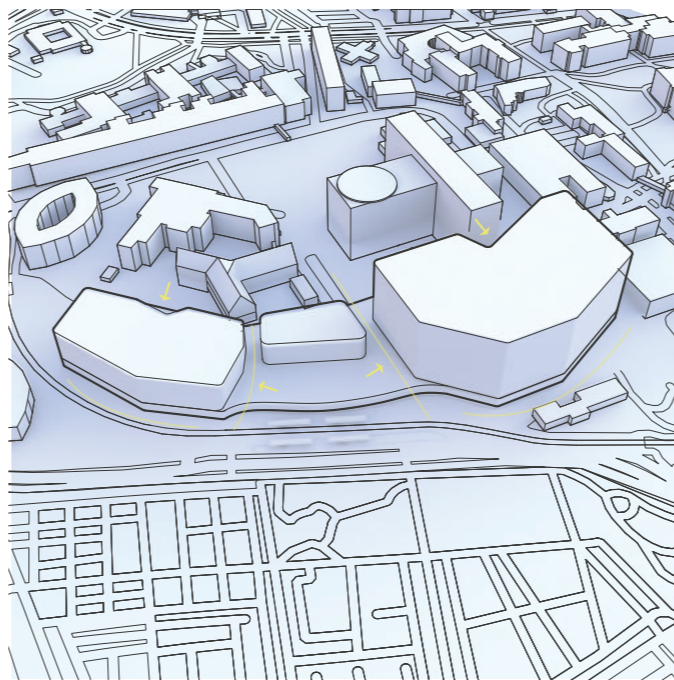
The site is located close to Blocket and the northern cemetery of Lund. It is located along the newly opened tram of the city and has its own station. It is narrow and irregular in shape, however the big scale of the project make the mass study enjoyable.



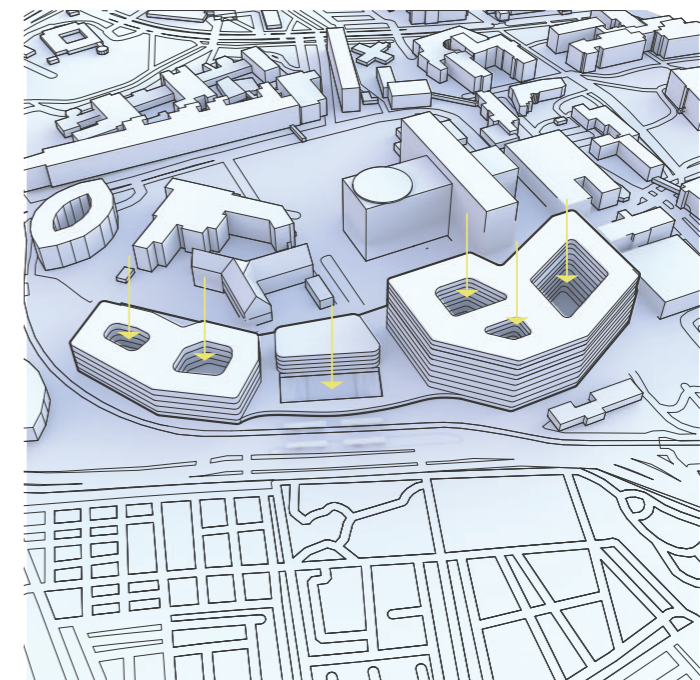
According to our strategies, we consider these two building on the site for woman and the hot floor separately. The height difference between the two sides of the site is used to make a more public area towards the street and a calm environment inside the hospital area.



As the link of knowledge is connected to the tram station and we want to invite people to visit our project, the third building appears in the middle with the public functions such as library and hotel.



Considering the main paths around the site and the entrances for each building, we shaped the buildings from outside and the brief is subsequently fitted to the inside.



The large volumes are penetrated by courtyards in an effort to provide daylight and green areas, both promotive of health and a general sense of well-being. The in-between exterior courtyard is conceived as a pause in the public flow and provide opportunity for orientation and way-finding.

SITE PLANS 1:1000



TRAM
STATION

WOMAN AND
NEONATAL

⊕ +20,000

⊕ +140,000

PUBLIC
BUIDLING

⊕ +0,000

GENERAL
HOSPITAL

⊕ +45,500

HELIPAD



OUTER FLOW 1:1000

AMBULANCE

TWIN HOSPITALS | 8



PEDIATRIC EMERGENCY



WOMAN AND NEONATAL ENTRANCE



WOMAN AND NEONATAL MAIN ENTRANCE



STAFF ENTRANCE



STAFF ENTRANCE



ADULT EMERGENCY



HOSPITAL MAIN ENTRANCE



PUBLIC BUILDING ENTRANCE



HOSPITAL ENTRANCE



AMBULANCE



The program

The brief is extensive and the areas are very large for the allocated site. Thus, extensive use of vertical connections are unavoidable. Internal flows strongly dictates the layout of the brief in the buildings.

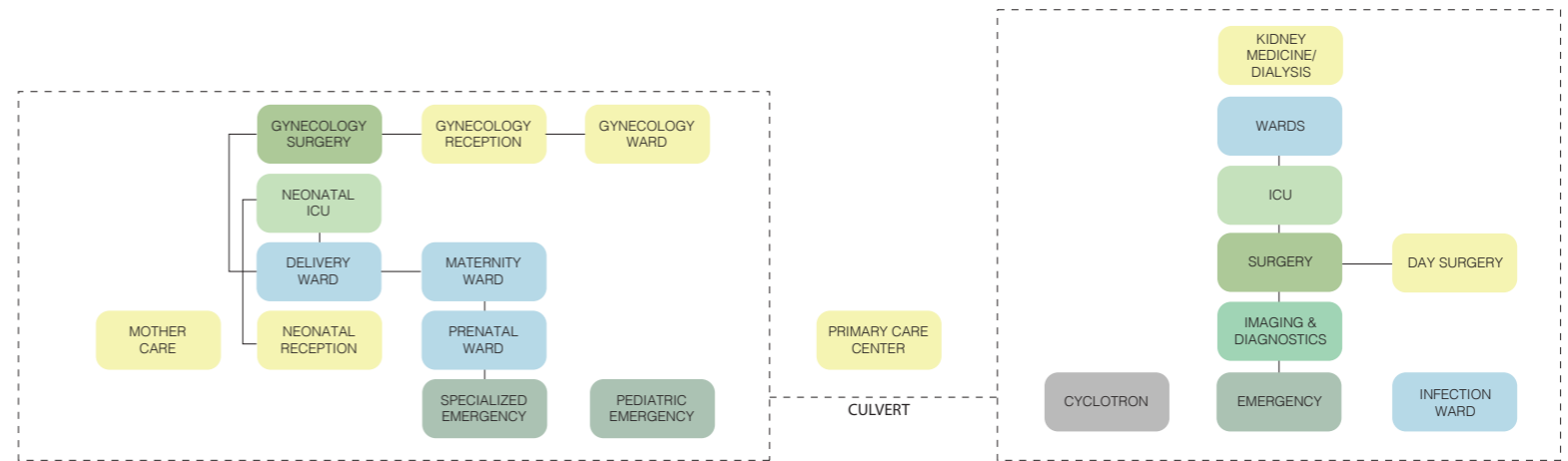
The emergency for both children and adults are in the ground floor, at the level of the tram station. The emergency, ICU and surgery have a close vertical connection to ensure quick and easy access between them.

Day surgery shares a floor with the specialized surgery for shorter flows and access for staff. It has its own entrance and reception as its an outpatient function.

The wards are at the top for purposes of daylight. Some of the wards have their own small balcony with greenery. The infection ward is in the ground floor with its own entrance and connection to emergency.

There are also other outpatient functions in the general hospital such as the kidney medicine and dialysis and the cyclotron. The cyclotron needs the equivalence of four floors of height and has an access from the entrance going four levels down.

In the woman and neonatal building the process of giving birth was in focus when distributing the brief. It starts from the emergency in the ground floor, followed by outpatient functions and the prenatal ward in the level of the main entrance. Going up, we find the delivery ward, maternity ward and neonatal ICU, in that order, for efficient circulation between functions. The gynecology department and its specialized surgery are placed in the fourth floor.

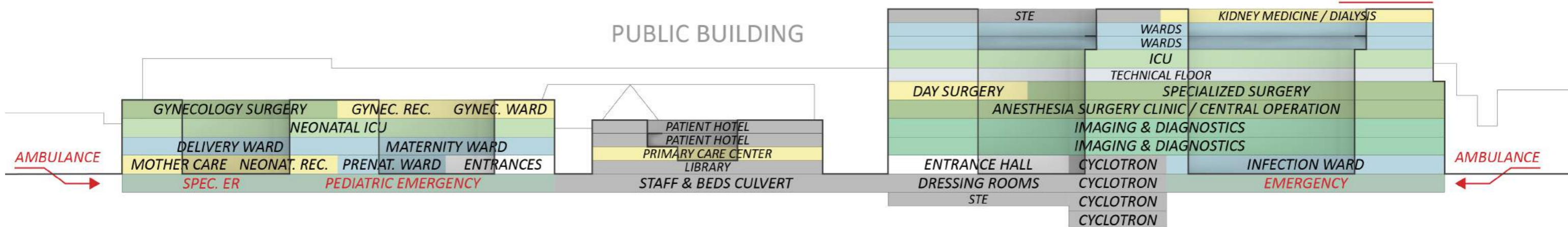


GENERAL HOSPITAL

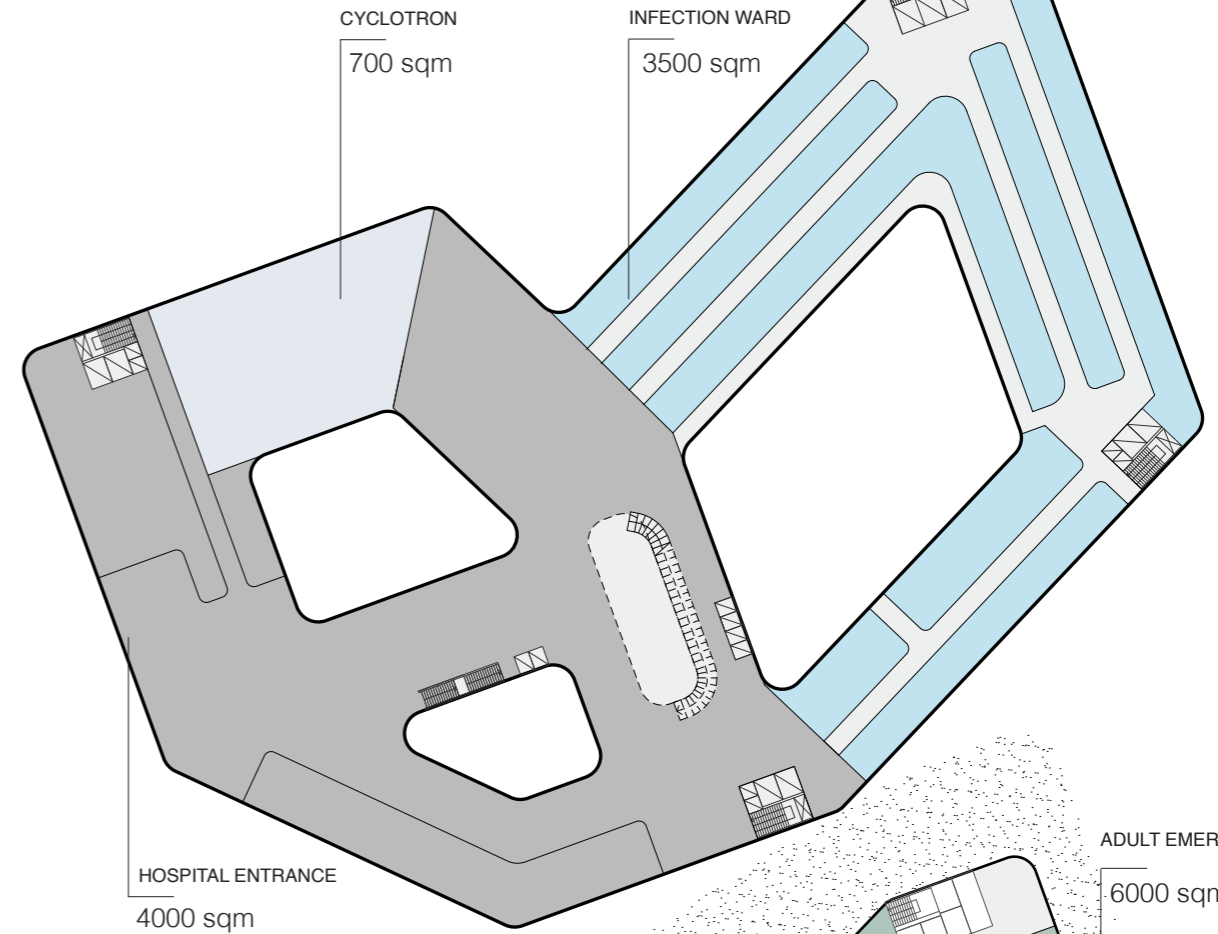
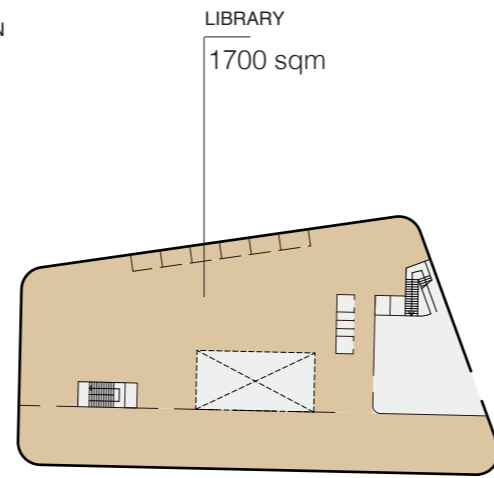
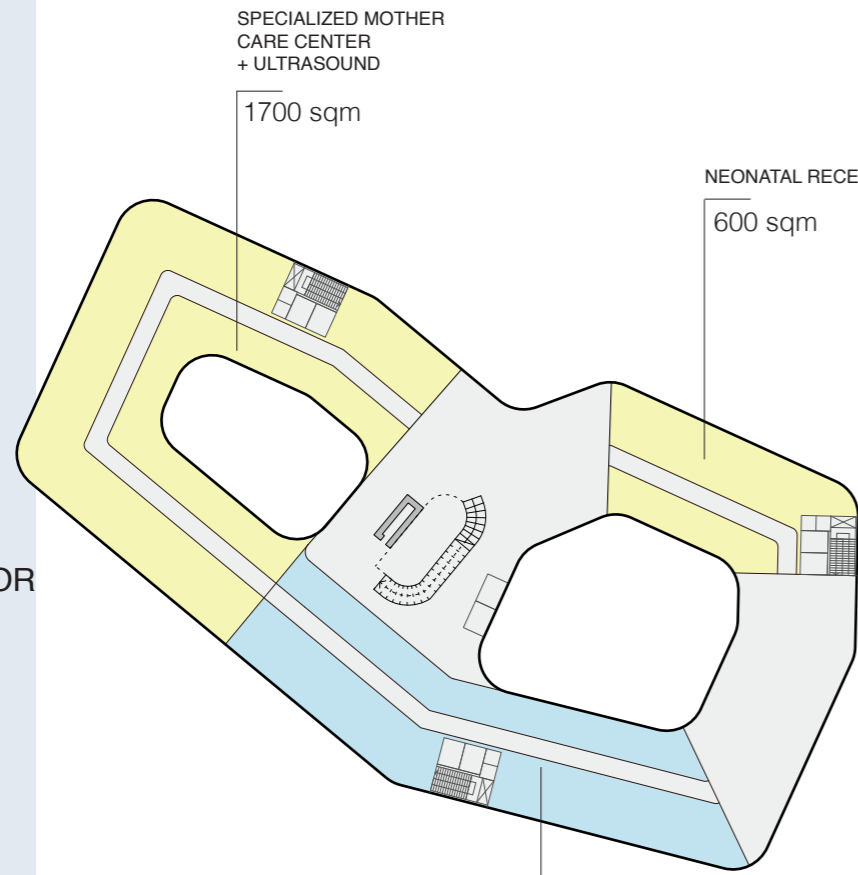
WOMAN & NEONATAL HOSPITAL

PUBLIC BUILDING

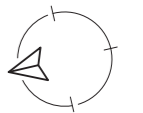
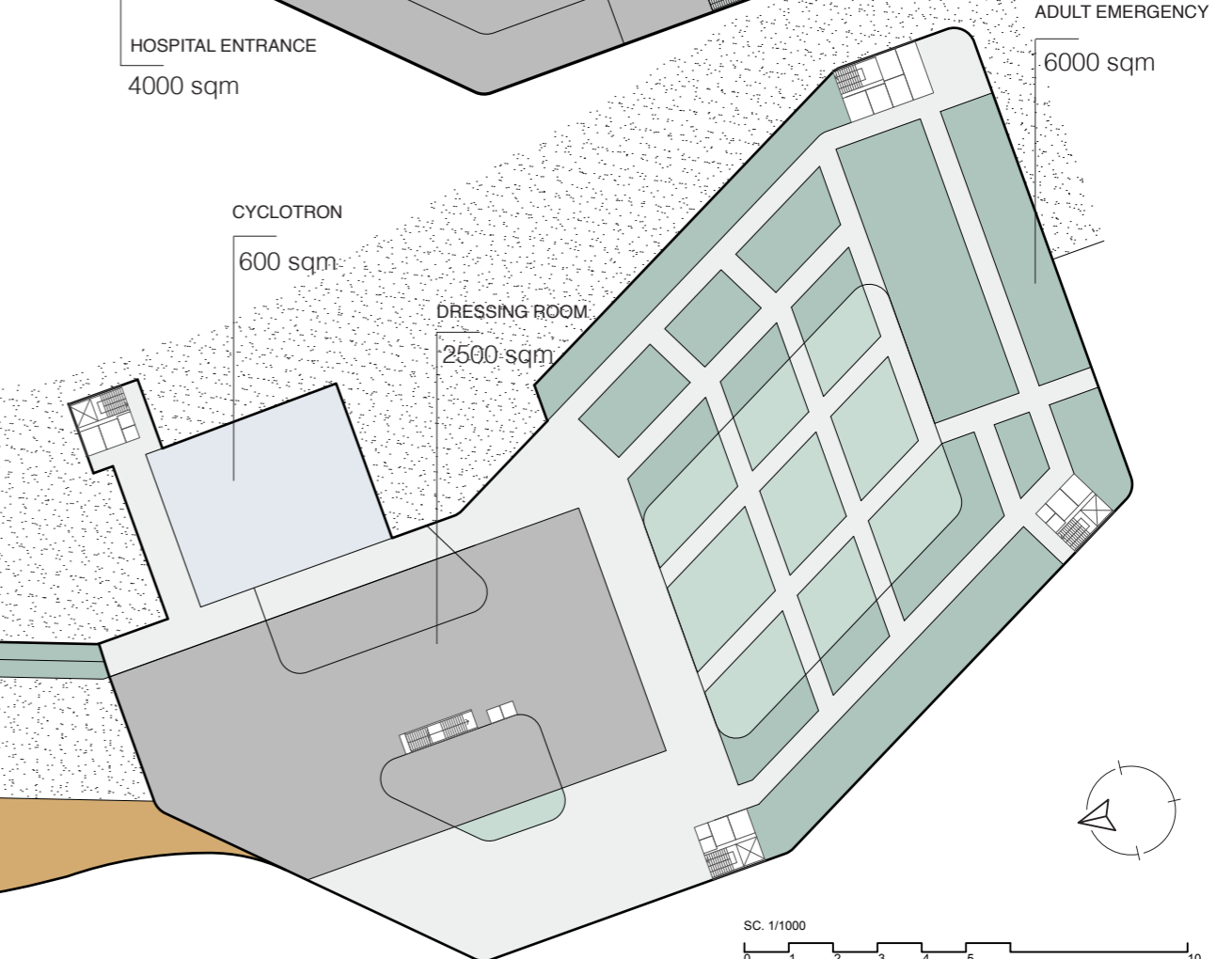
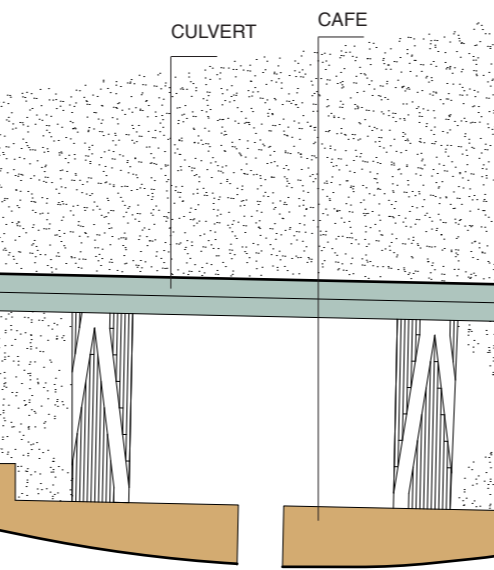
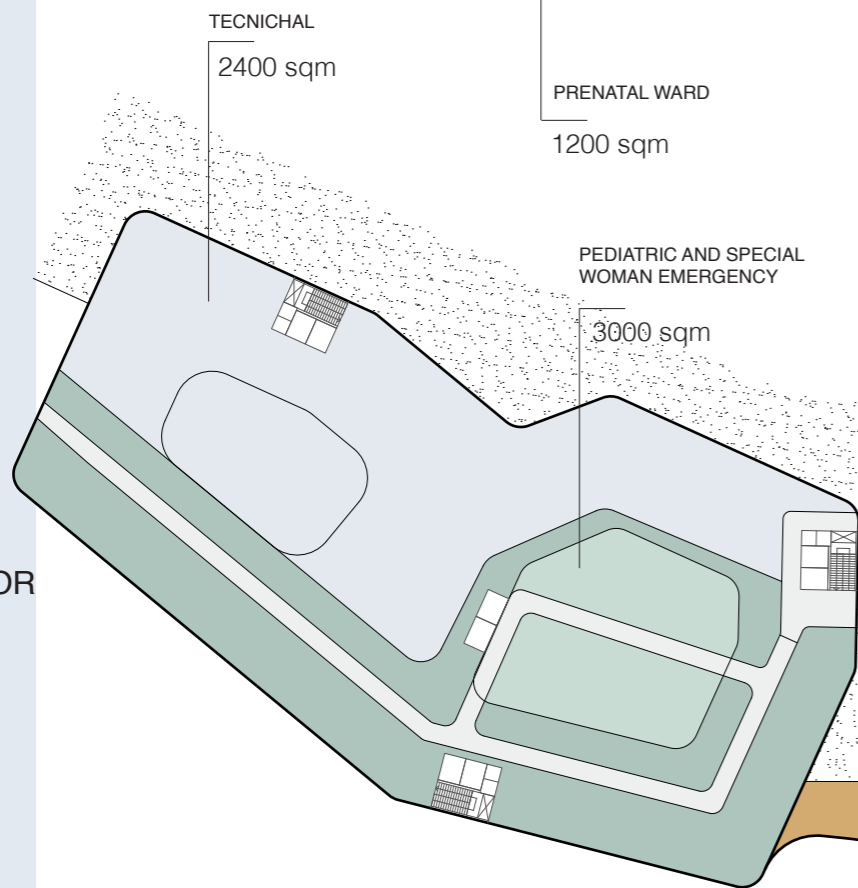
HELICOPTER PAD



1st FLOOR



0 FLOOR

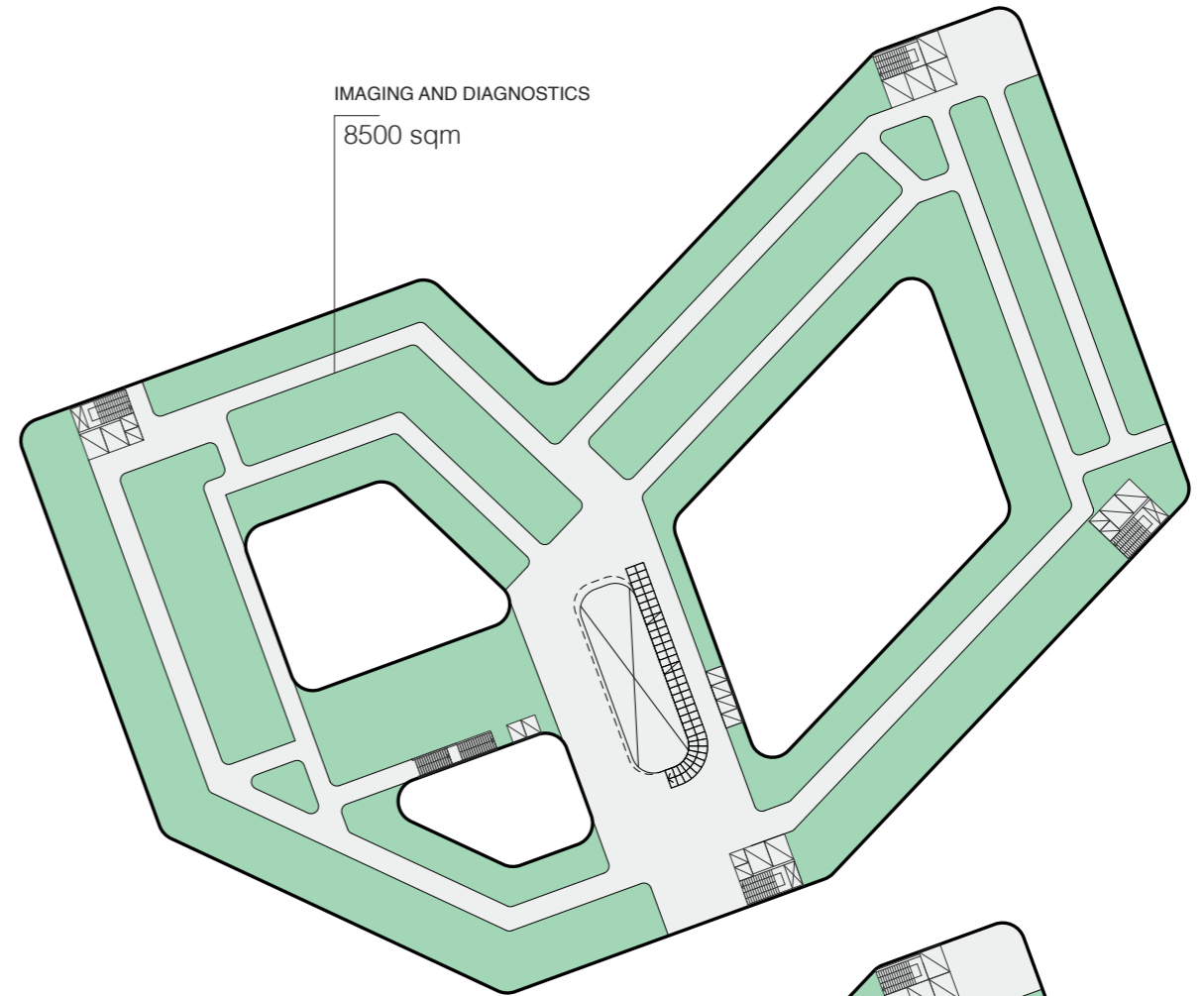
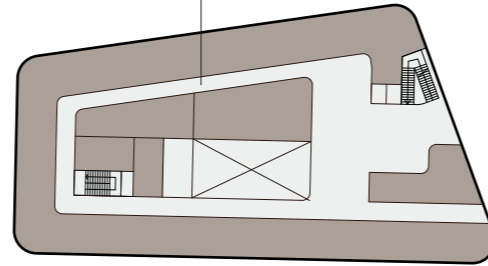
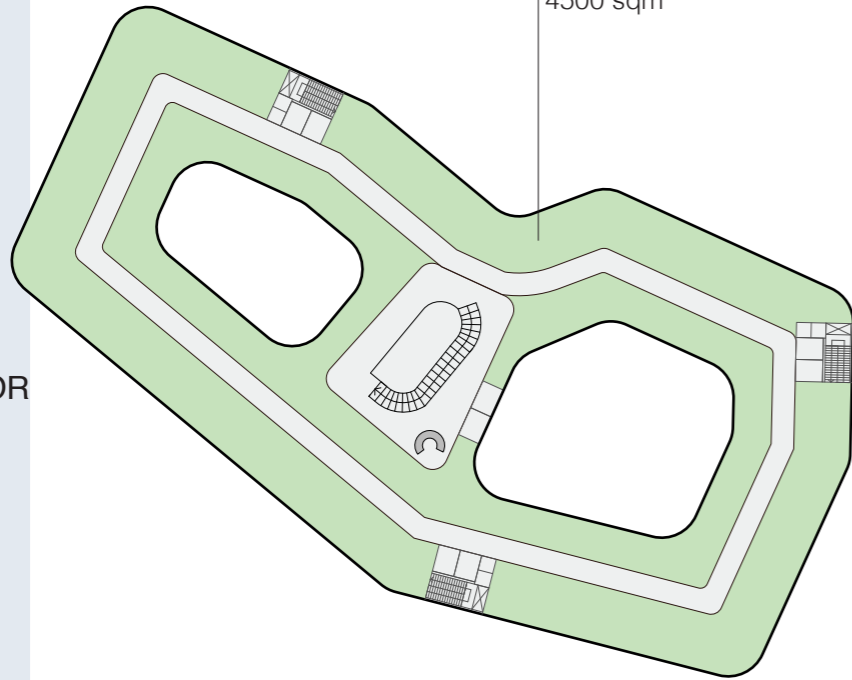


3rd
FLOOR

NEONATAL ICU
4500 sqm

PATIENT HOTEL
1500 sqm

IMAGING AND DIAGNOSTICS
8500 sqm



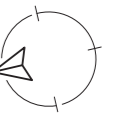
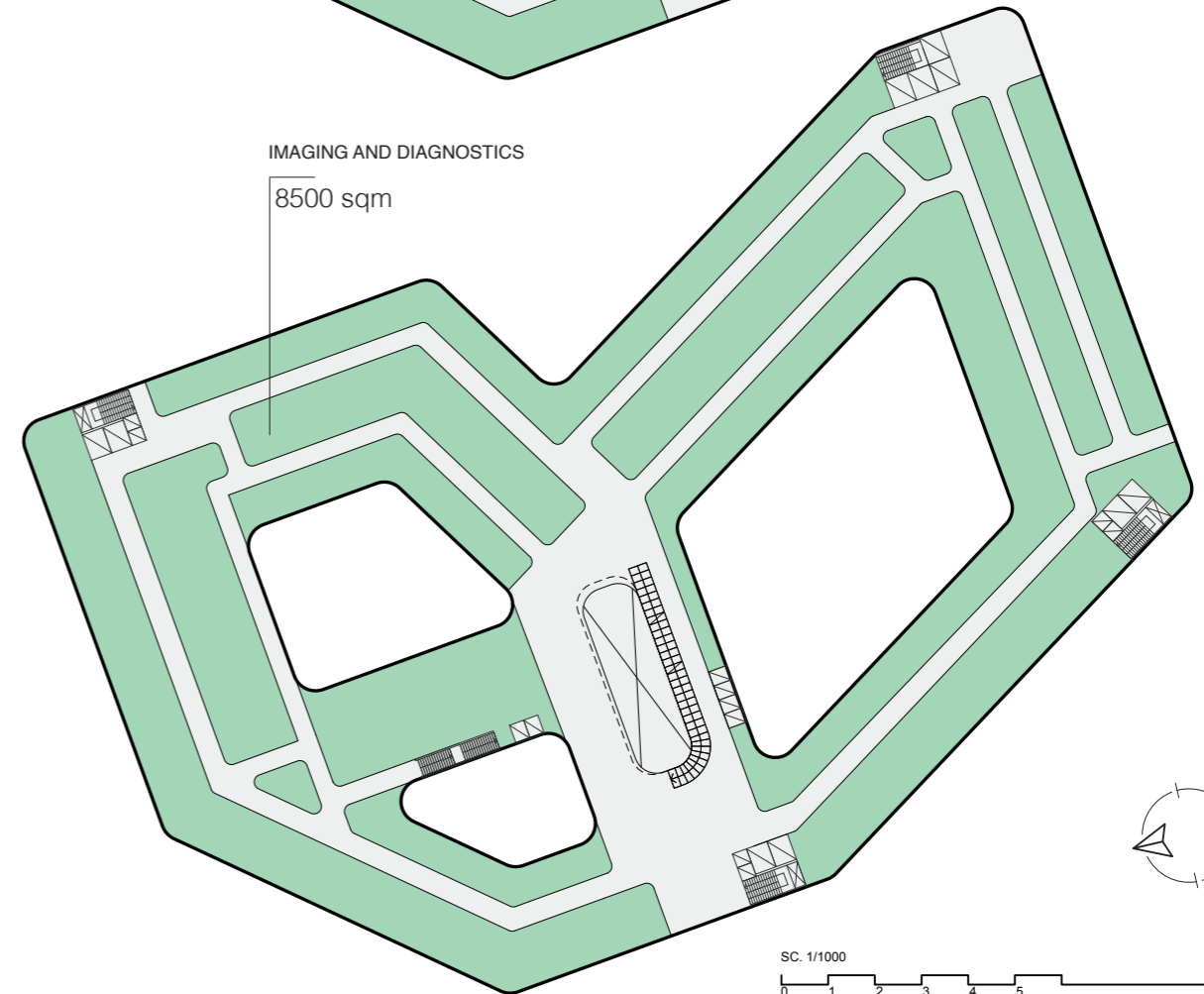
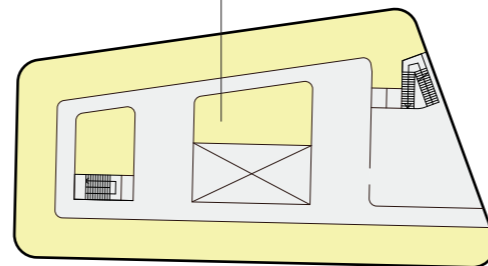
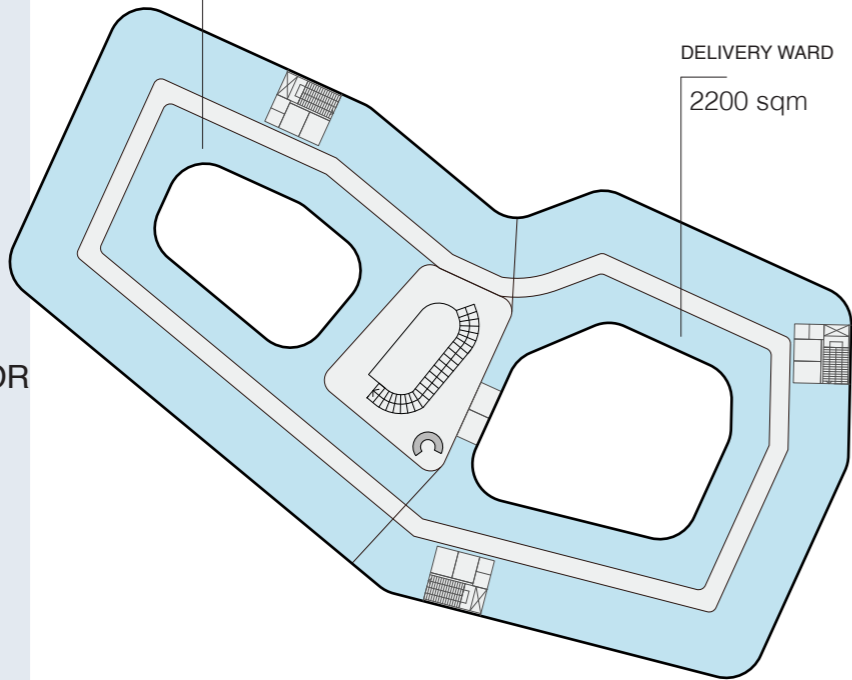
2nd
FLOOR

MATERNITY WARD
2400 sqm

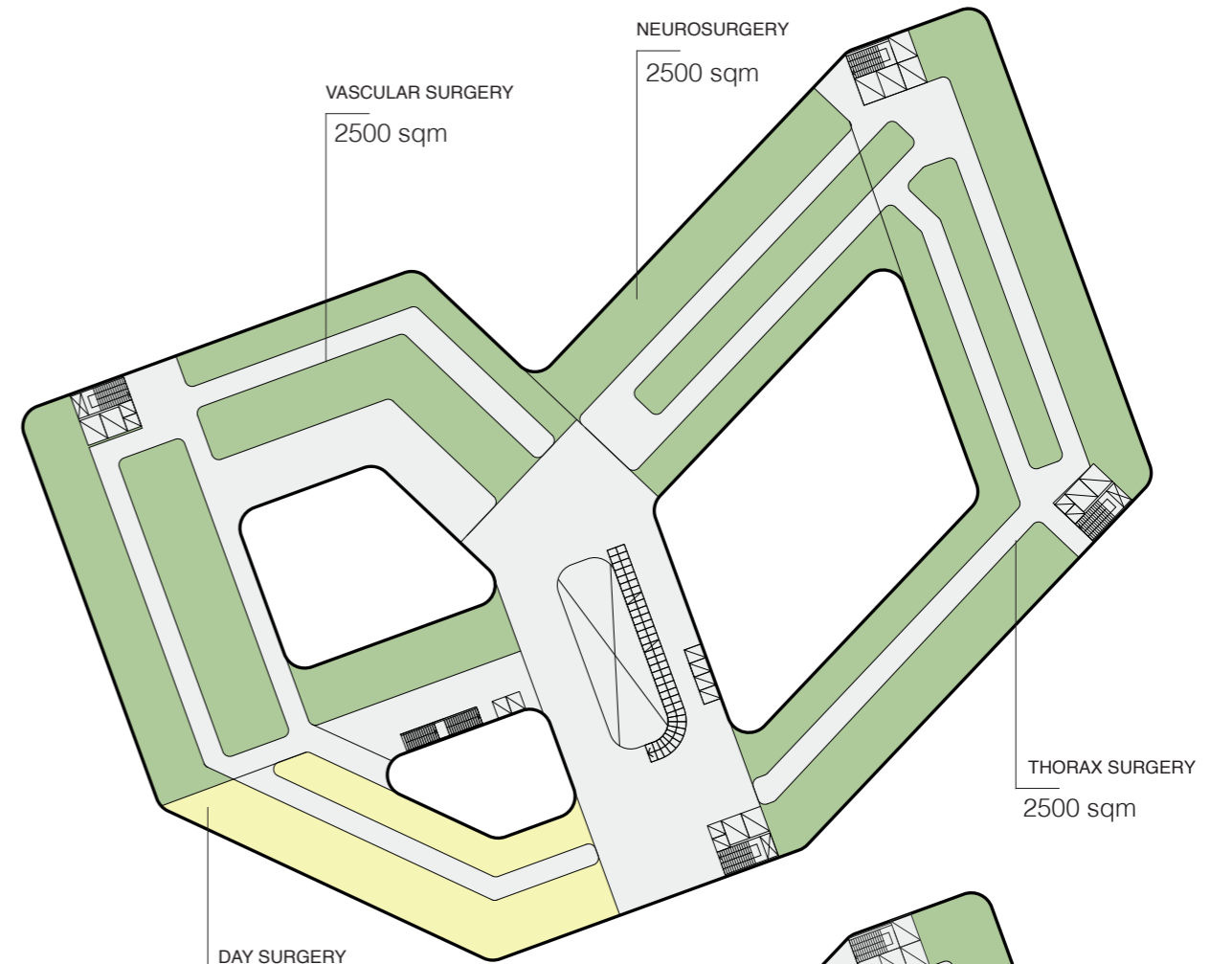
DELIVERY WARD
2200 sqm

PRIMARY CARE
1500 sqm

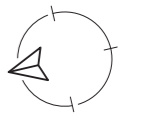
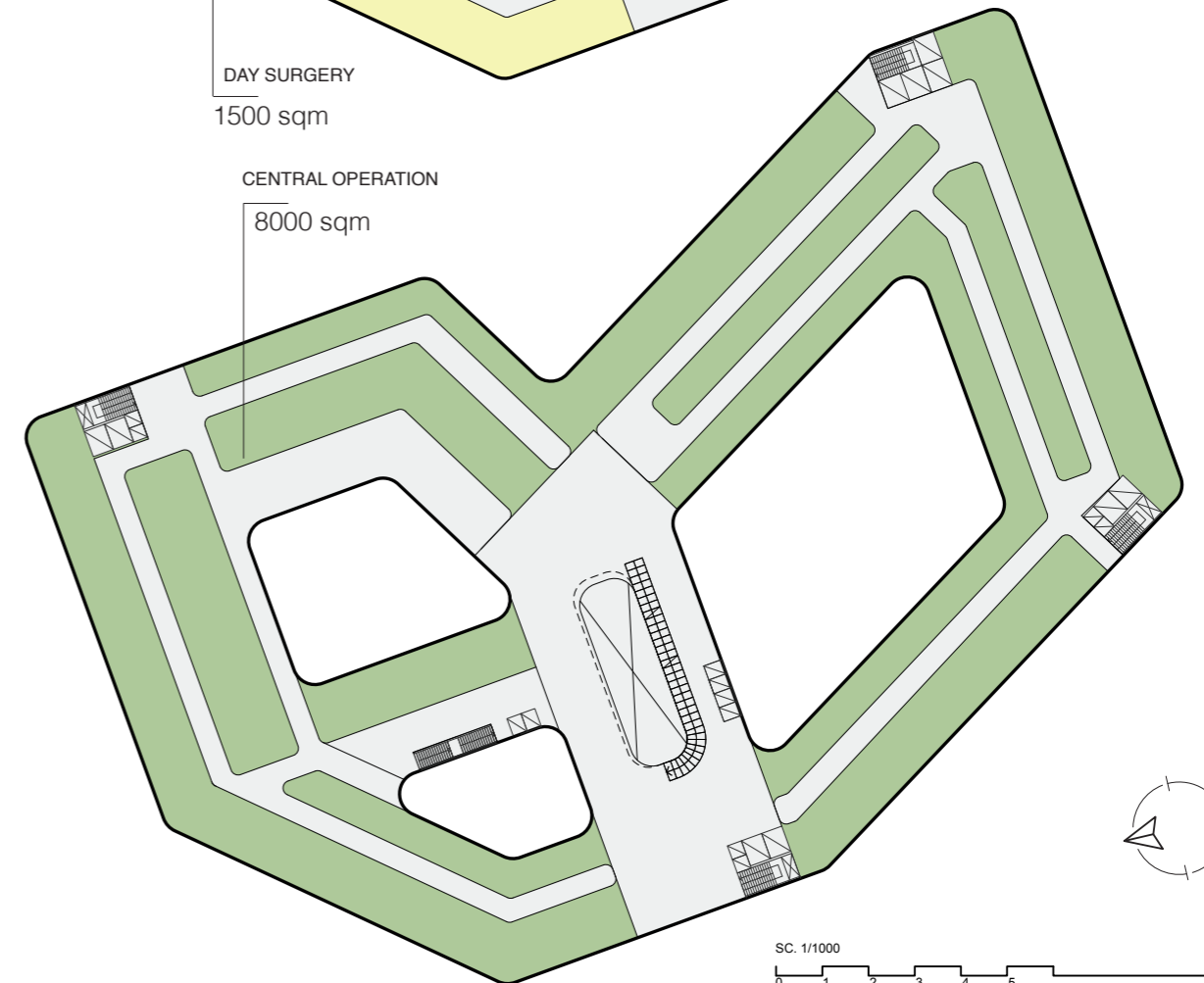
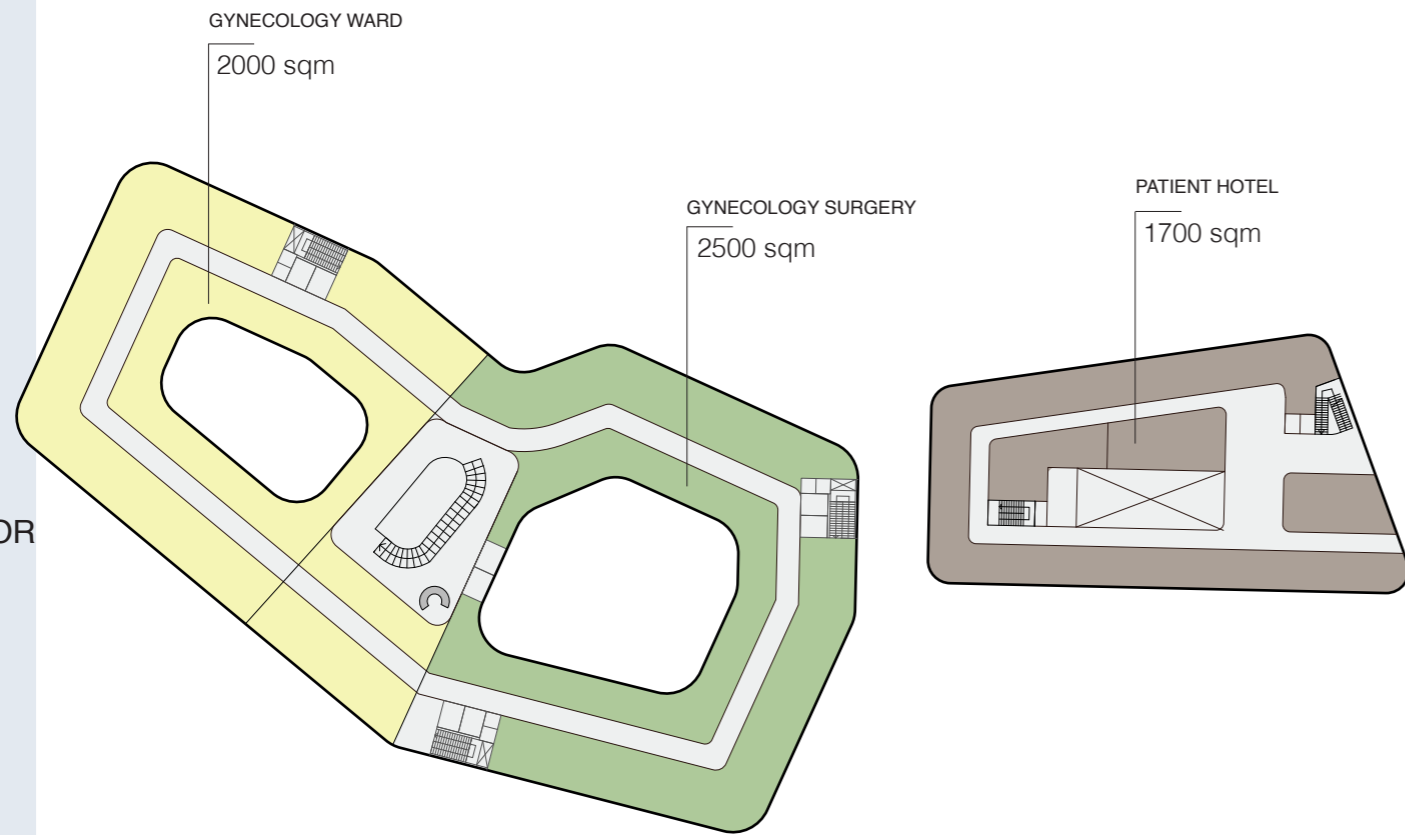
IMAGING AND DIAGNOSTICS
8500 sqm



5th
FLOOR

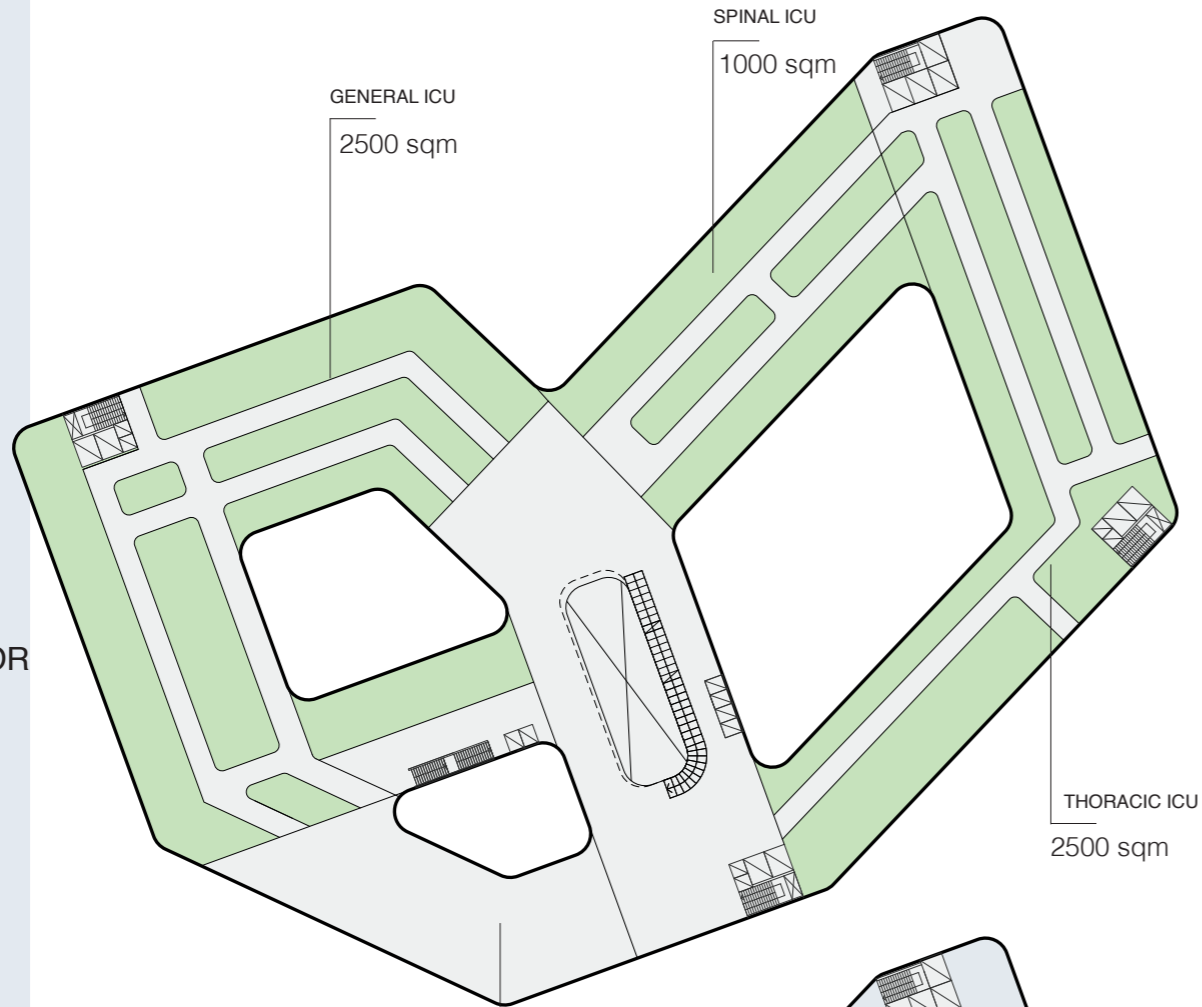


4th
FLOOR

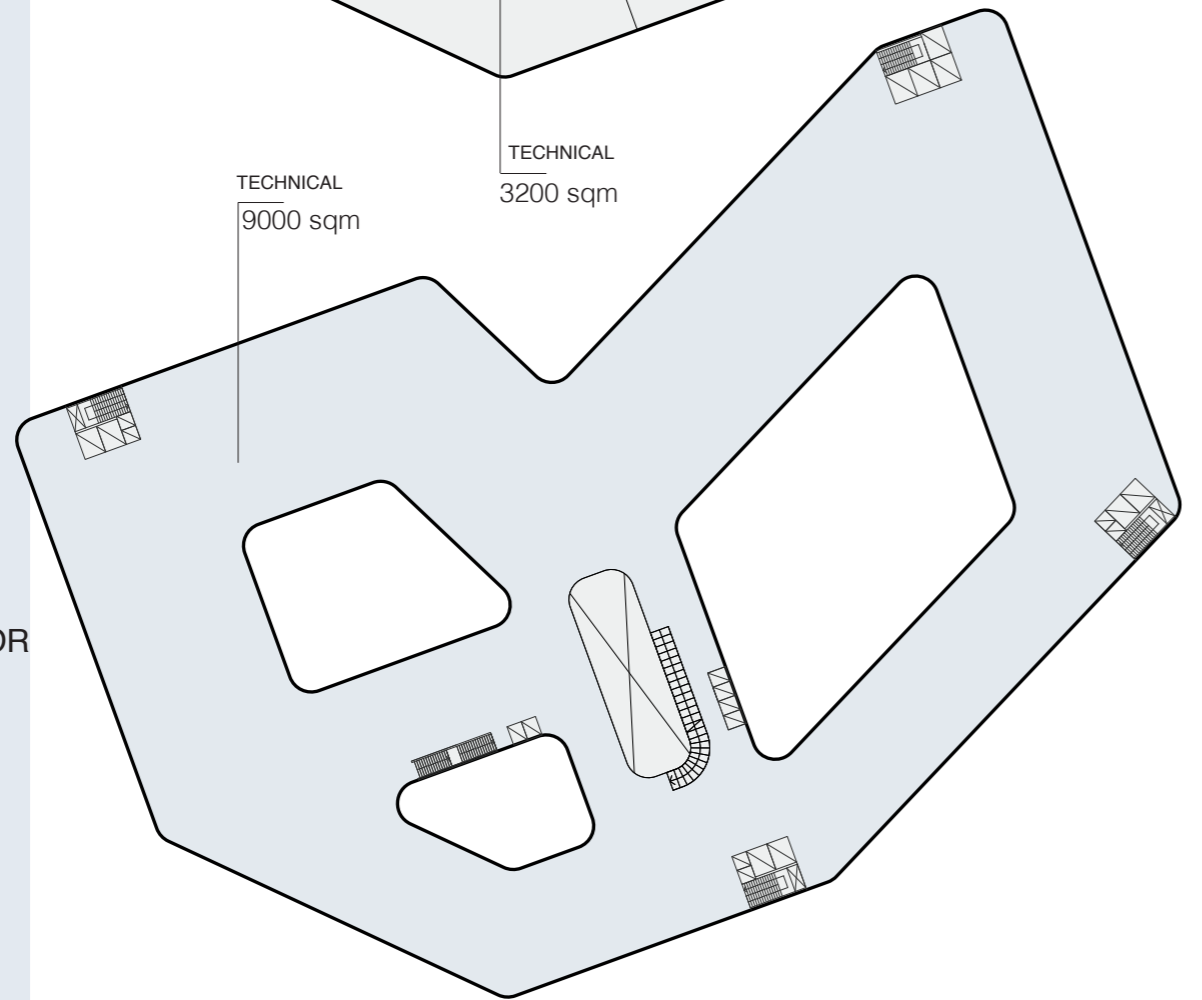


FLOOR PLANS 1:1000

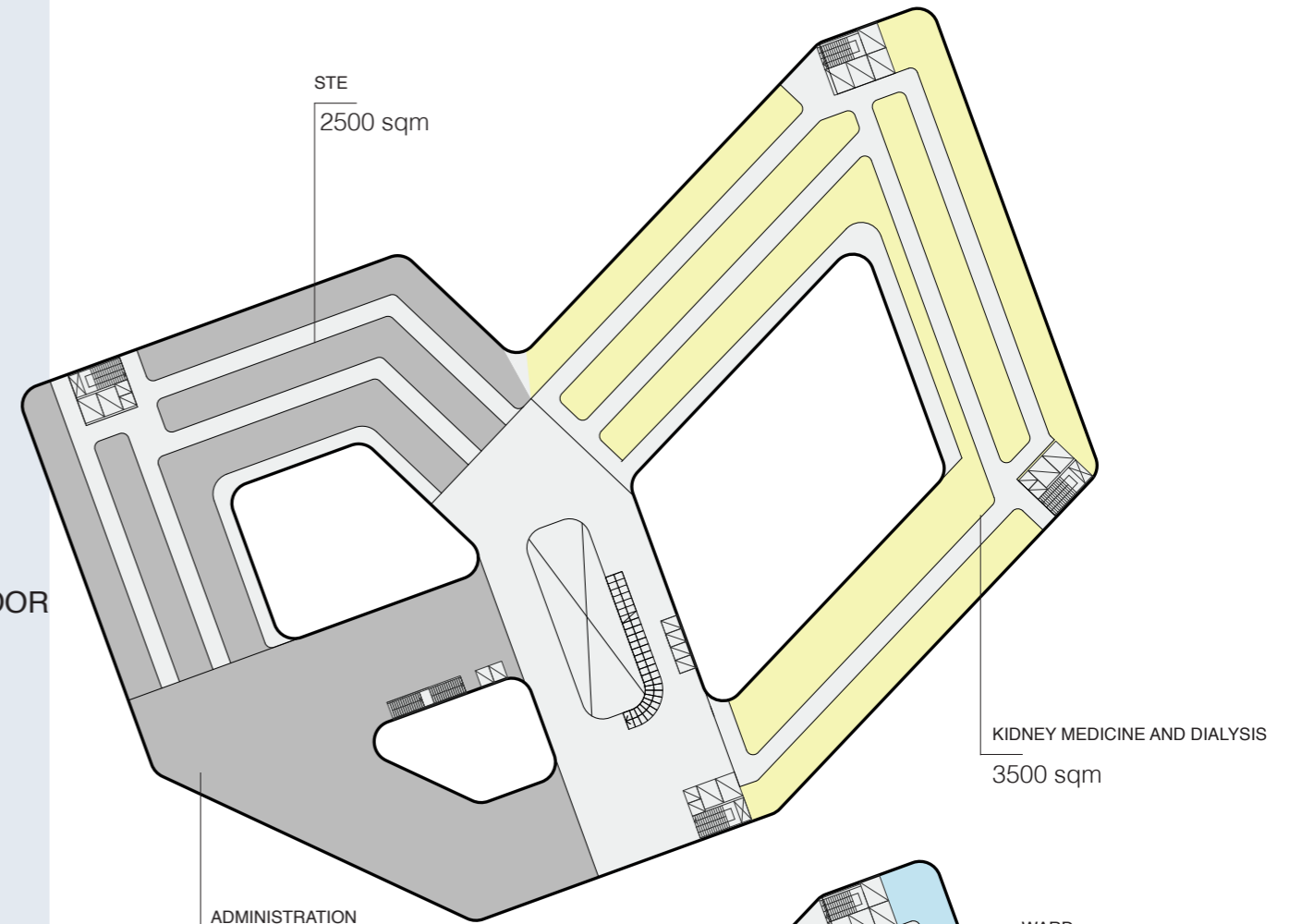
7th FLOOR



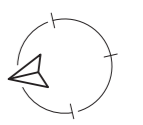
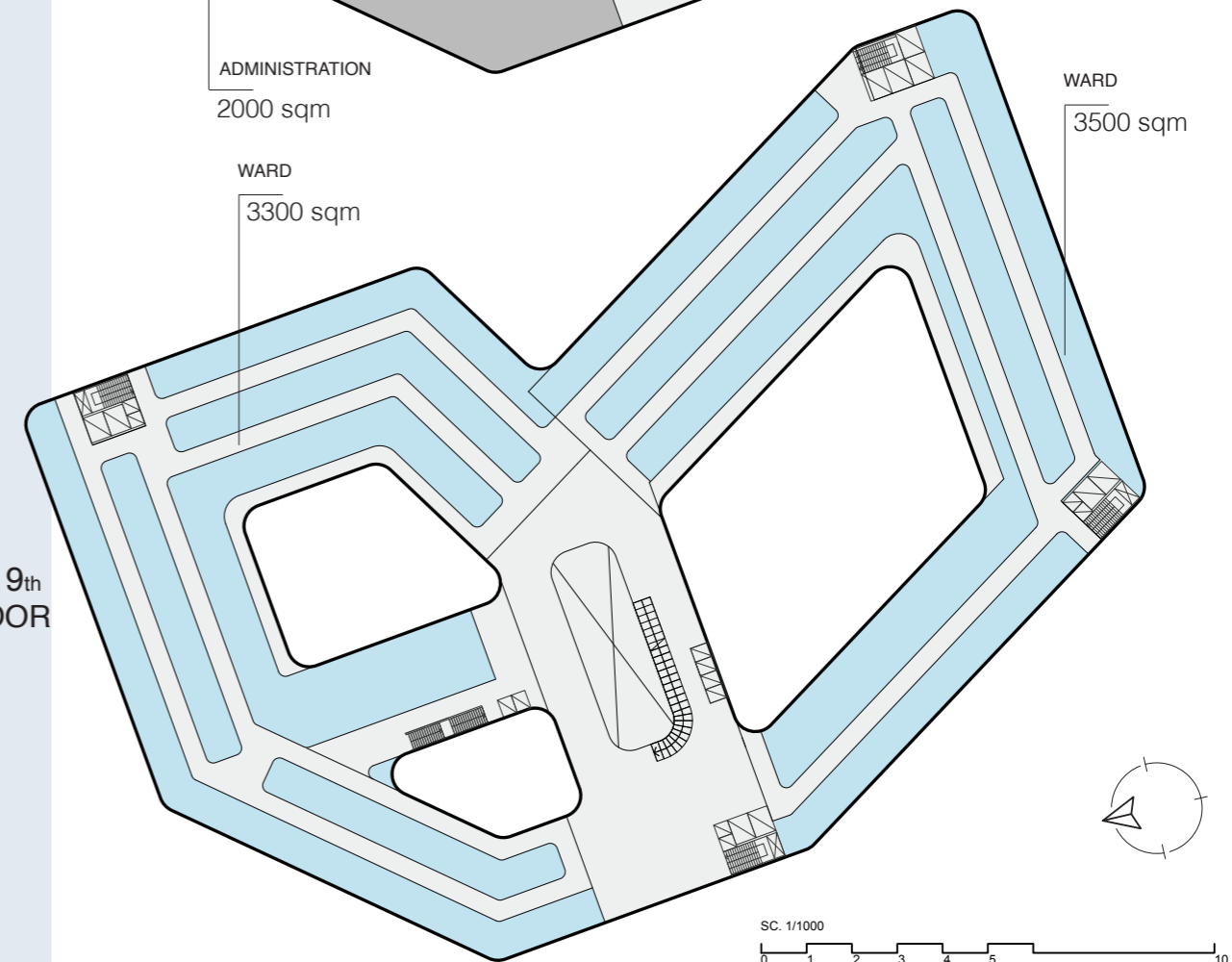
6th FLOOR



10th FLOOR



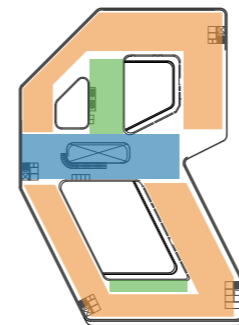
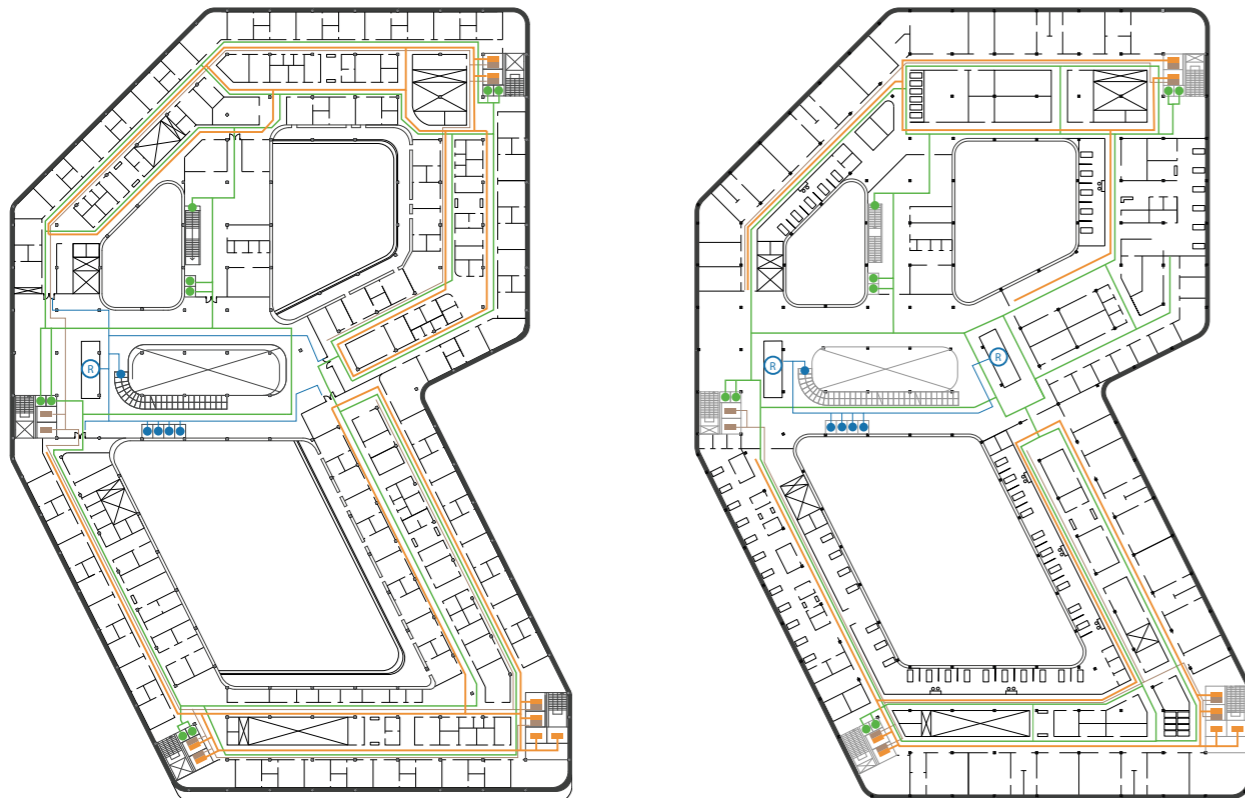
8th & 9th FLOOR



FLOW

The floor layout of the general building has been configured in a way that improves the efficiency of different flows. On each floor, there is a central zone defined as public area meaning that anyone (except staff who have separate vertical circulation) coming to the floor, first end up here. This feature helped us to respect patient privacy and reduce the chance of disorientation by visitors. Immediately after arriving at the floor, the reception area is quite visible where everyone will be led to the related entrance. In total there are four entrances, two for the north cluster and two for the south.

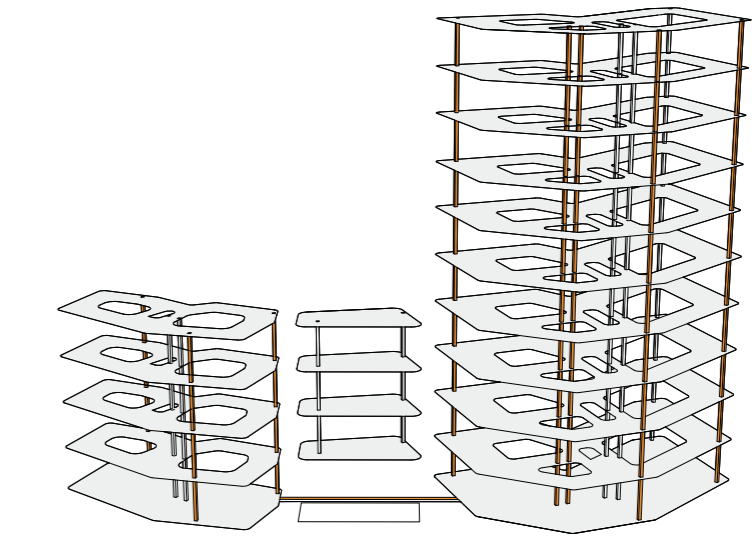
Regarding the staff flow, we allocated a very central staff zone, which can easily reach the whole floor. The main aim was to first provide a pre-space for staff coming directly up from the dressing room in the basement in order to arrive in their own zone and then spread out through the floor. We imagine this place as an area where nurses, doctors, and any other practitioners have a chance to meet up and rest during the workday.



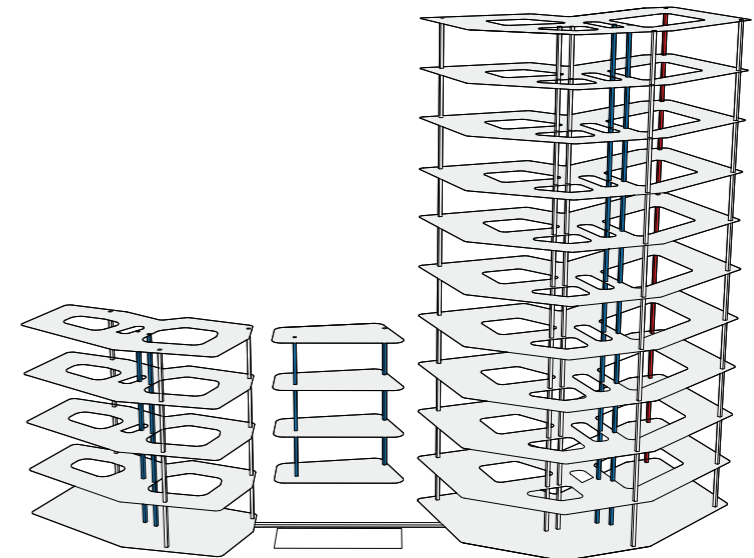
- EMERGENCY
- IN BED
- STAFF
- VISITORS

- VISITORS
- STAFF
- PATIENT IN BED
- GOODS

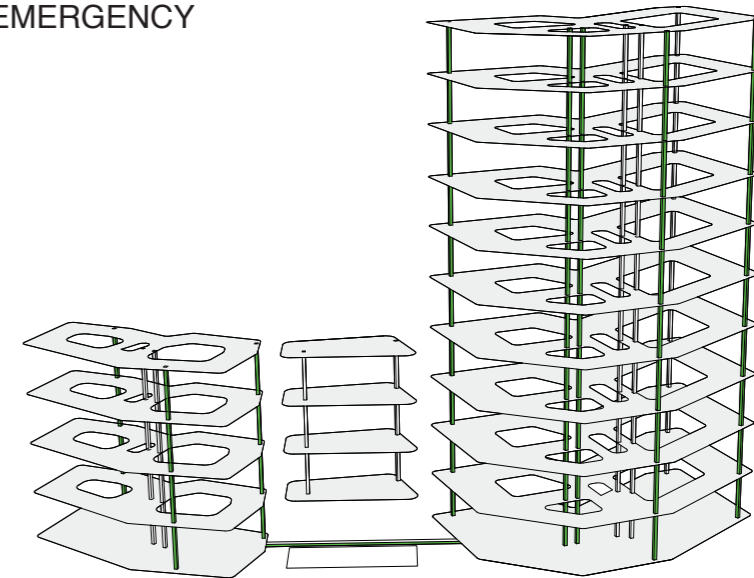
PATIENT IN BED



VISITORS AND EMERGENCY



STAFF

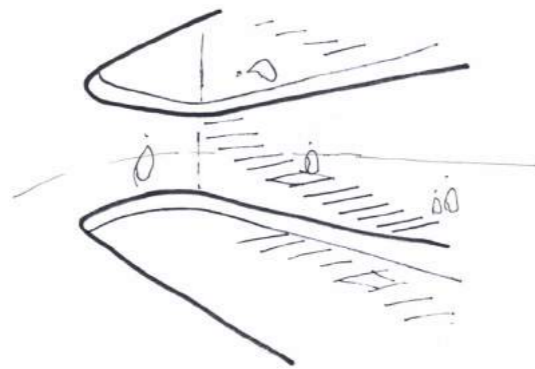




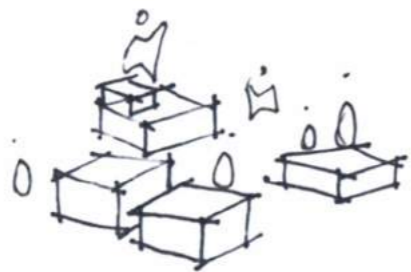
Entrance hot floor

The main entrance for the hospital designed to be as inviting as possible by providing some public spaces on the facade to give the feeling of inclusiveness to the people walking by, no matter if they are sick or not. We defined two main waiting areas, one for the main entrance adjacent to the reception and one close to the southern entrance yet close to the reception. In this design we didn't forget about the families coming with their children and have to wait for their medical processes for a long time, so to make the environment more pleasant for the kids we allocated a play area right beside the waiting area where kids can play while the families observe them.

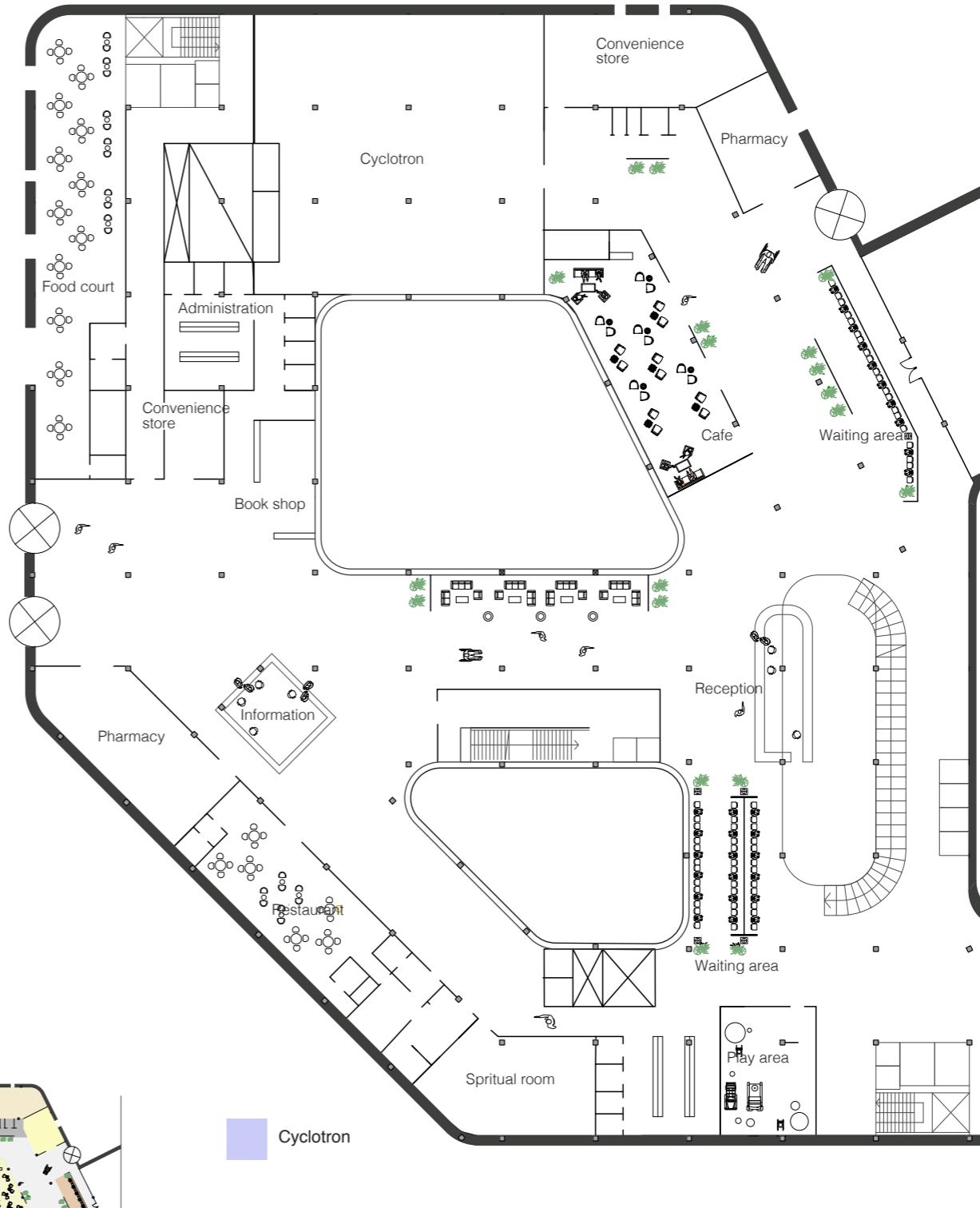
Another factor in hospitals is the high-stress level. We proposed a place for the ones who want to have some quality time to be relaxed and inspired. The Spiritual Room would benefit in this case.



The middle void for daylight and wayfinding

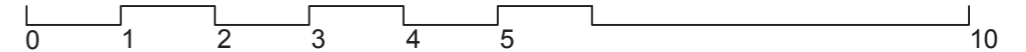


Play area for kids in the entrance level



- Cyclotron
- Pharmacy
- Café and restaurant
- Waiting area

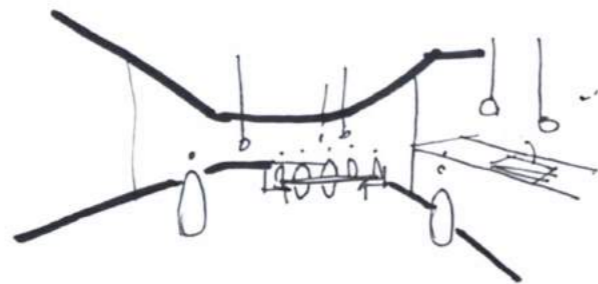
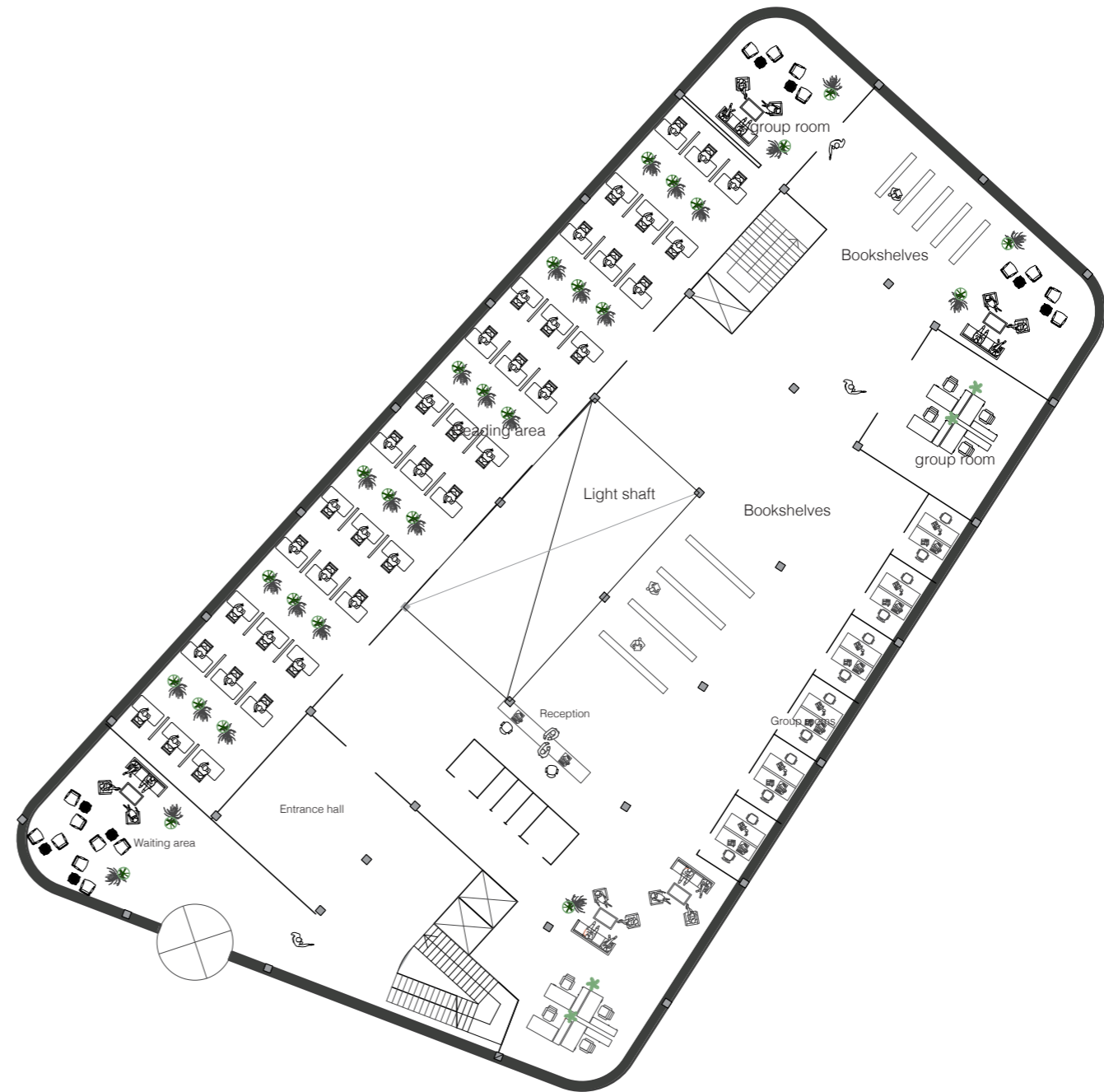
SC. 1/500



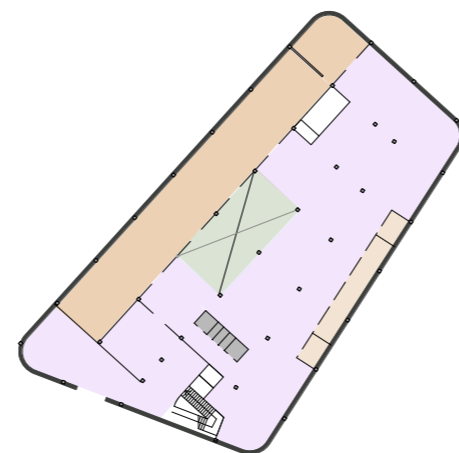
Library

The rather compact shape of the public building causes some inner dark zones where functionally will be low. The solution for us was to convert the core of the structure to a semi-open zone includes a void ending up to a skylight. In this way, we provided enough daylight for the library, primary care, and patient hotel. The main benefit would go for primary care facility which need to provide privacy for the patients. In this case, it is a good open space yet closed area to give the feeling of protection while enriching the environmental quality of space.

The library layout is designed so that the reading zone are located on the facade facing the west entrance courtyard. This should provide plenty of daylight and to present the building and the hospital area to visitors from another point of view, emphasizing its publicness and the creation of knowledge.

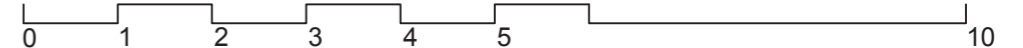


Group rooms for studying together



- Reading area
- Light shaft
- Book shelves
- Group room

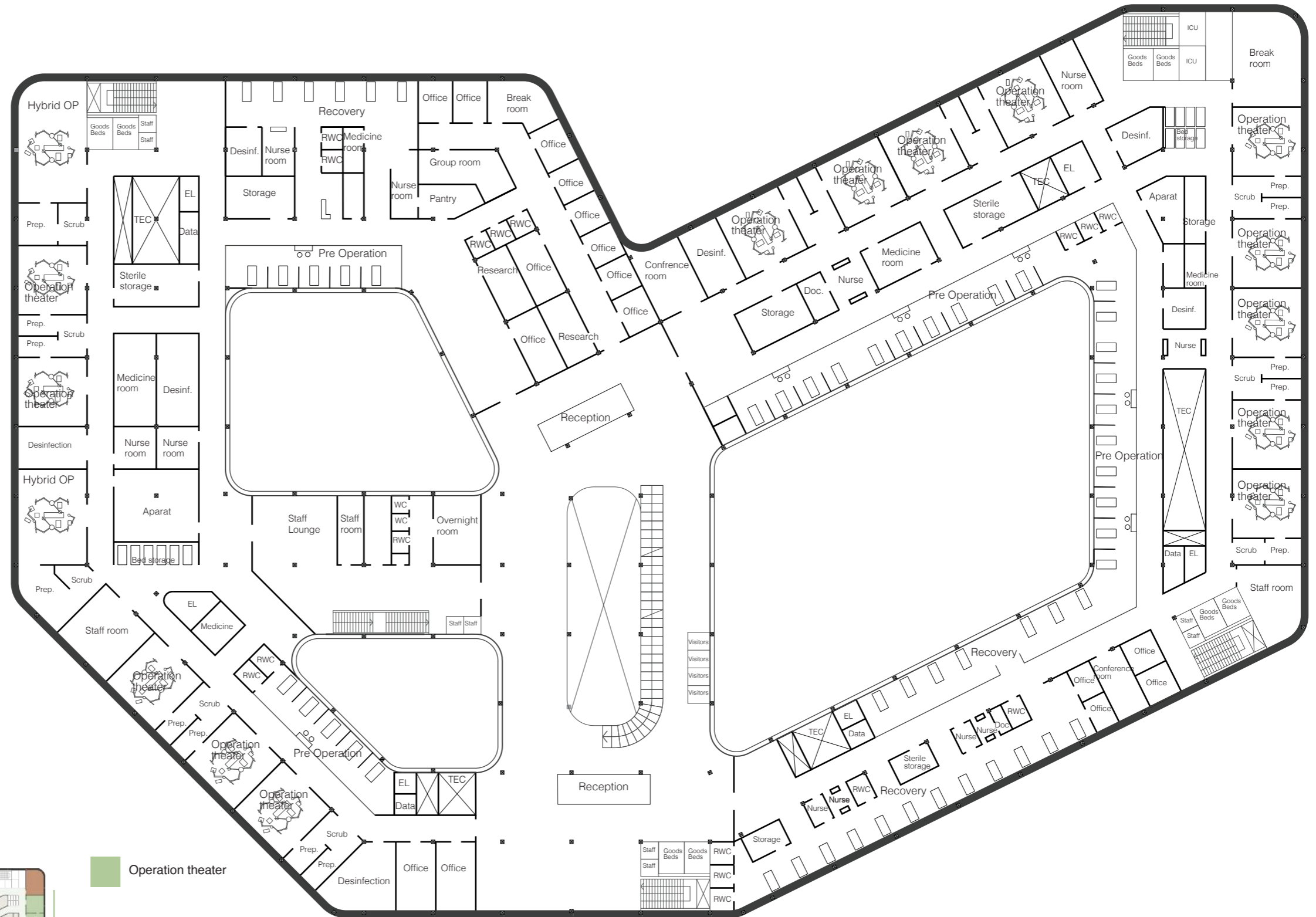
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Surgery

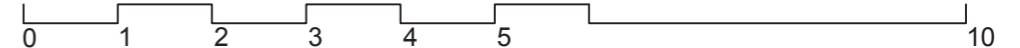
The main factor in designing a plan which would function well for a surgical procedure is to consider the steps that a patient will go through. In this case, we tried to locate each space based on medical logic. In this floor first patient in bed arrives by elevators from different part of the hospital and go directly to the pre-operation zone. Then in shortest distance will be transferred to the operation theaters. When the surgery is done, the patient has to rest in the Recovery Zone and be stabilize and released.

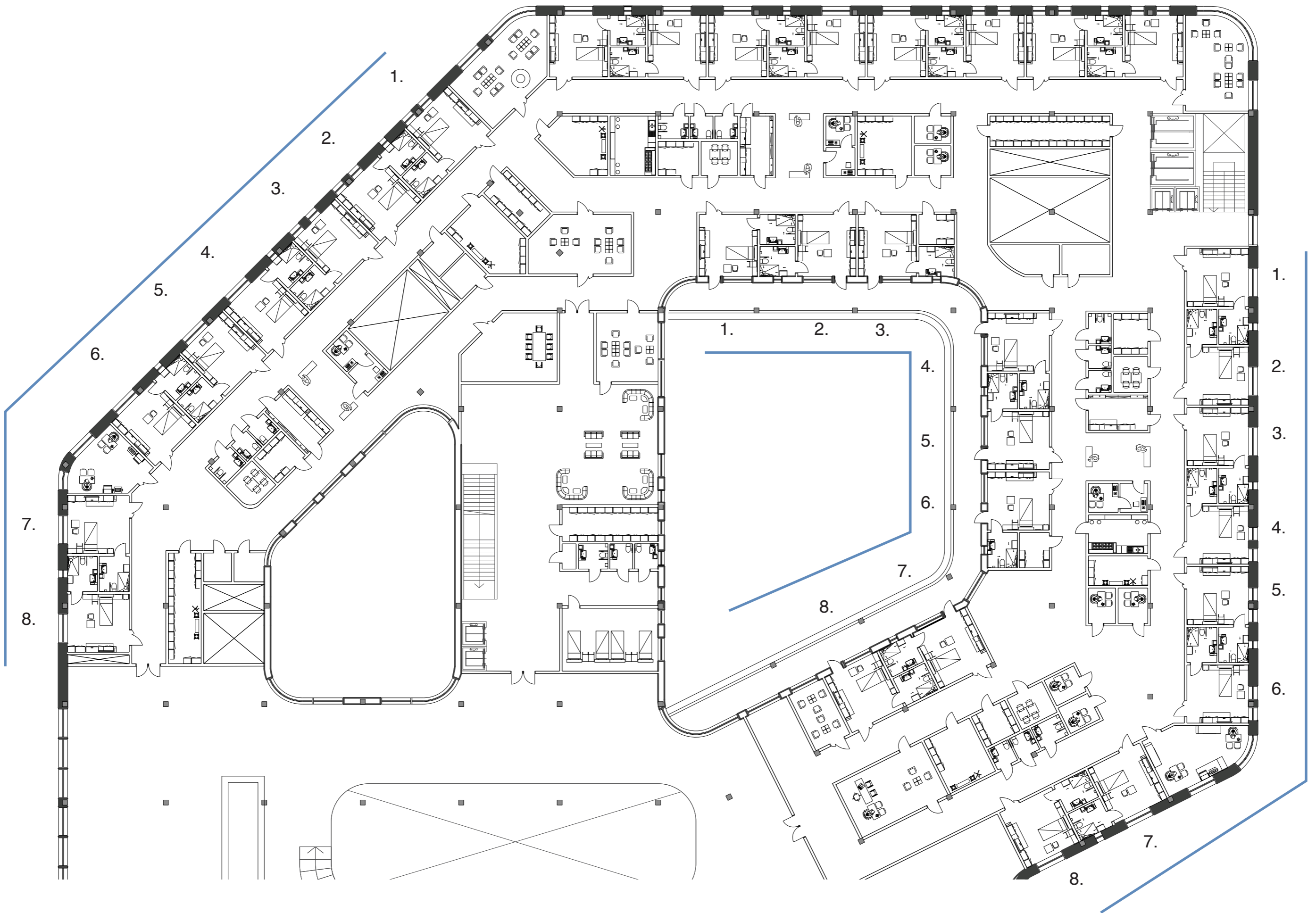
So, in each cluster, there is a one-way and direct flow leading the patient from the first step to the last. This flow not only benefits the staff work flow but also will decrease the chance of any unpredicted conflict during the rush moments since each procedure occurs in the special zone and doesn't have that much of overlapped functionality that consequently provides quite a safe environment for patients.

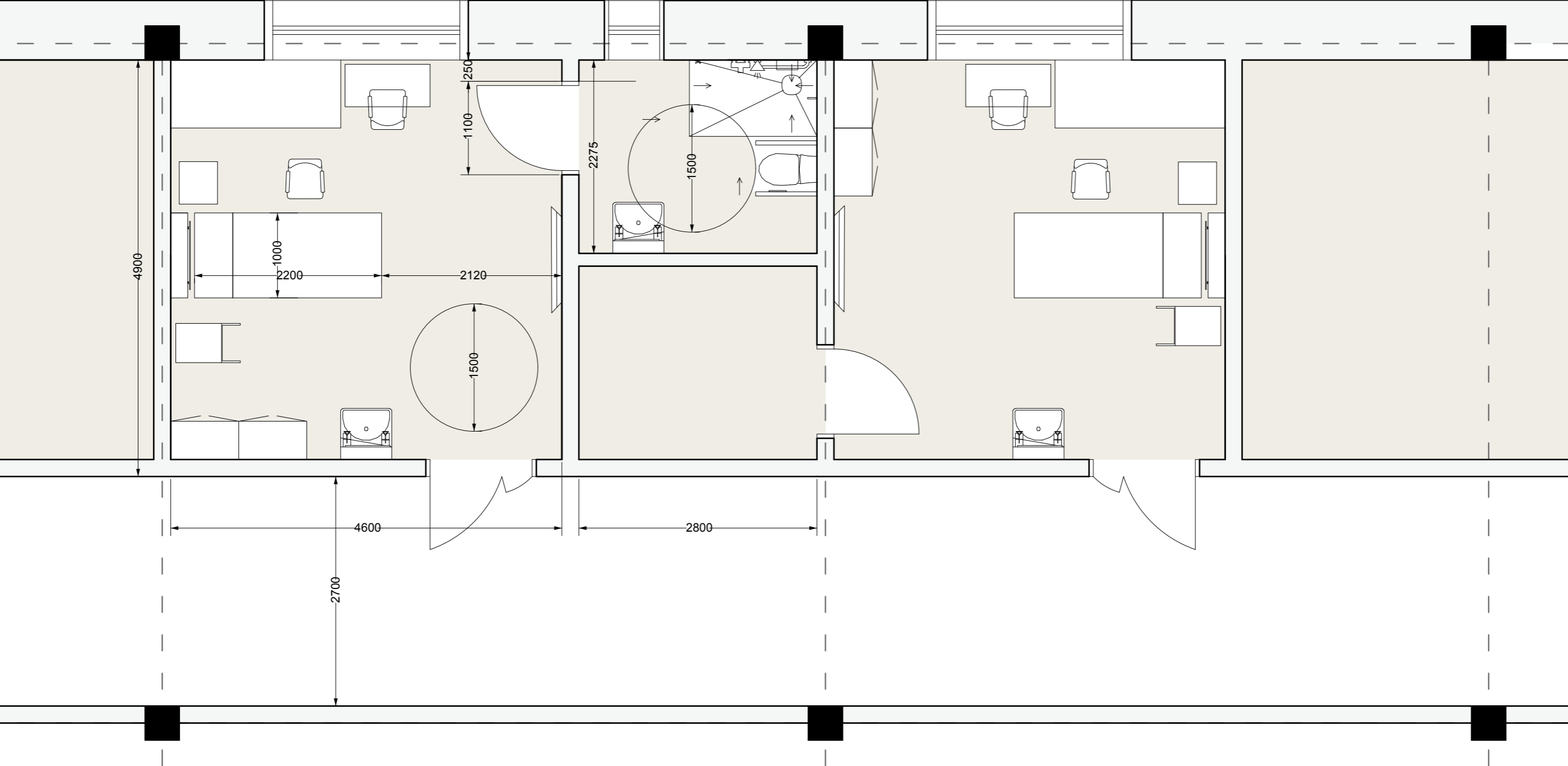


- Operation theater
- Supporting function
- Staff
- Day surgery

SC. 1/500







GRID

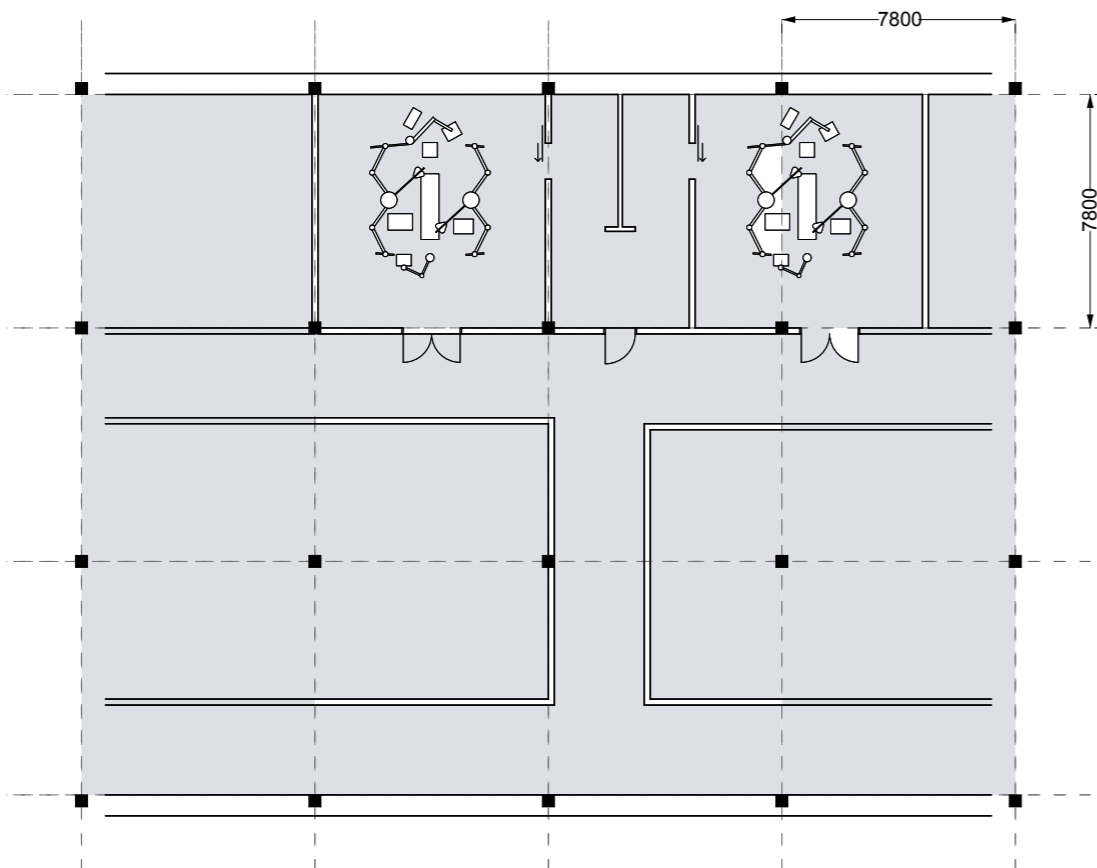
The most challenging stage of designing a complex structure like hospitals is always the construction matter. For sure in our project, we didn't go through all the construction phases but the main and crucial part which effect our design is the Grid System.

As a design strategy for flexibility and the future proofing and sustainability, we had grid structure in our mind for this project. The grid layout is easier in built process and is beneficial for the expenses and construction time. A coherent and repeated structural grid also facilitates future adaptations to a higher degree.

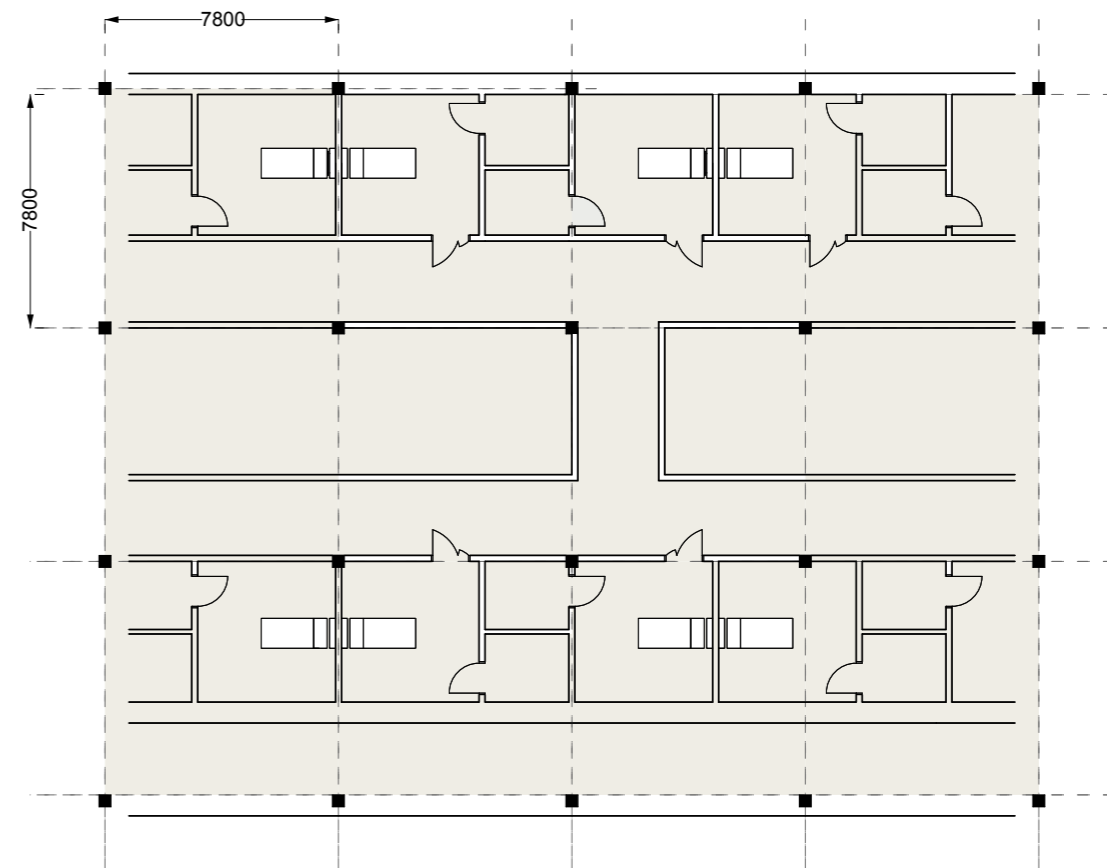
In the general hospital building, we have operation units and wards within the same structural layout. Considering the differences between the workflow, corridor span and room dimensions of these two units, the challenge is to define a layout that works for both. We proposed a 7.8 m x 7.8 m grid system. Below is an illustration of how these different units work within the structural system.

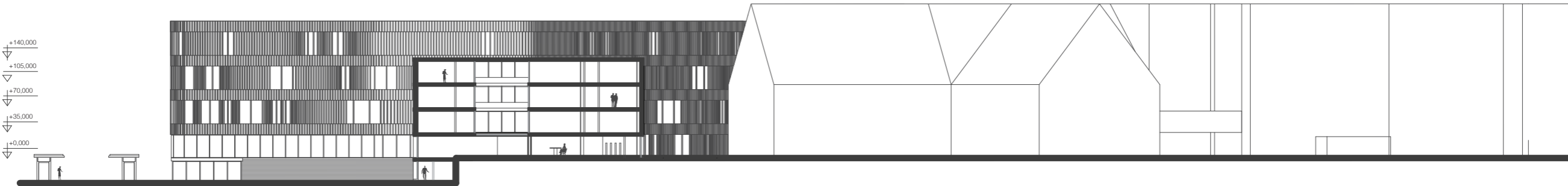


OPERATION FLOOR PRINCIPLE

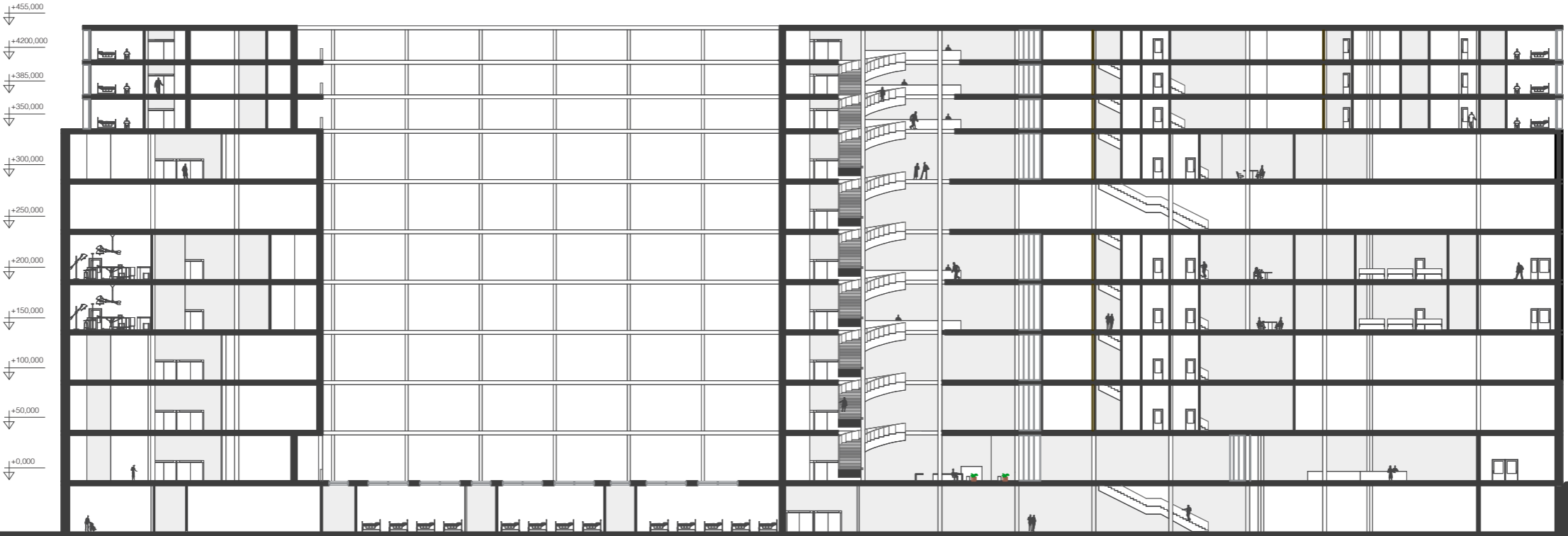
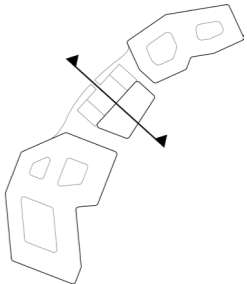


WARD FLOOR PRINCIPLE

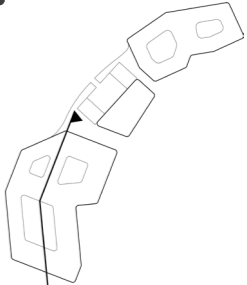




Section of the public building



Section of hot floor



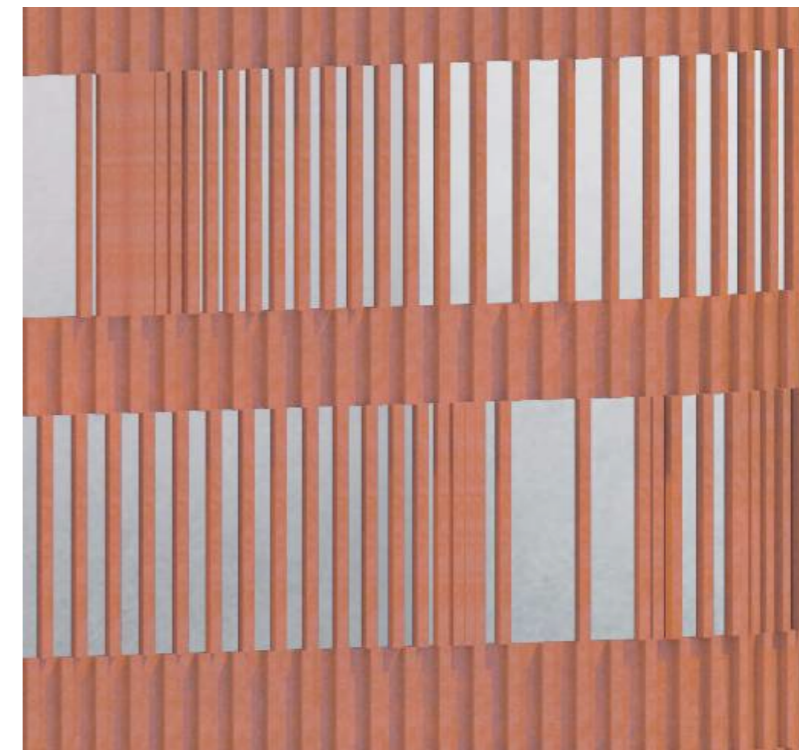
Facade

In this project we considered our building as a part of the Lund city. The facade is the very first screen facing the public we decided to choose a very compatible skin presenting a warm yet individual look. The main material is CORTEN STEEL covering the whole building coherently. Our interest was first the color which give the same reddish shade of the surrounded facades while maintaining a contemporary aesthetic.

One of our strategies from the beginning was to think about our structure as a human scale one. Regarding our large building with vast area, we ended up with a tall structure, conflicting with our strategy. The proposed solution is a pattern that will break down the long facade in a way to meet the street closer. The horizontal and vertical elements helped us produce this feeling while providing patient privacy throughout the building.

With the help of parametric design, the facade is quite interesting for people passing by, as well as creating nice shadows inside the building.

Our design proposed the double skin facade for easier expansion in future, benefiting the post occupancy maintenance and also saving energy by functioning as insulation for the building.



ZOOM-IN OF FACADE



Elevation from west 1:1000

REFERENCE PROJECTS

SAHLGRENSKA SCIENCE PARK
Hening Larssen and link Architecture
The concept with seperation and the playful facade helped our design.



FORUM UZH
Herzog & de Meuron
The inner yard and the public facade towards the street is inspired by this project



SAHLGRENSKA SCIENCE PARK
SWECO
The concept with seperation and the playful facade helped our design.



URBAN FOREST
Herzog & de Meuron
The inner yard and greenery, with the different facade from outer one.





THANK YOU