

A NEW LIFE CIRCLE

Women clinic design in Östra sjukhuset

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Examiner: Peter Fröst
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Master Program of Architecture and Urban Design
2018

Chalmers School of Architecture
Department of Architecture and Civil Engineering
Gothenburg, Sweden





CHALMERS
UNIVERSITY OF TECHNOLOGY

Master Thesis

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STUDENT BACKGROUND

Bachelor study: Bsc of Architecture
Harbin Institute of Technology, China

Master study: Architecture and Urban Design
Sustainable development and the design professions
Residential healthcare, housing for seniors
Nordic architecture
Spatial Morphology studio
Architectural Competitions
Healthcare Architecture

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ABSTRACT



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Today current women hospital at Östra Sjukhuset is isolated and could not meet the challenge of growing fertility. There is an ongoing project at Östra Sjukhuset in Gothenburg to improve and expand the facilities for the maternity care and neonatal departments. Together with the existing Central Women's Clinic, this will become Scandinavia's biggest health facility for women.

Women suffer from maternity both in physical and mental pressure. The new women hospital has purpose to help women reduce stress and care them for a longer process. How to design attract space for patients as well as stakeholders? How to provide comprehensive service with architectural language and program? How to design a modern hospital with long term sustainability? The design will refer research of women maternity problem both on mental and physical aspects and make solutions with architectural method. The project aims to design an exclusive caring facility for women with enriched problems and help women stay in social lives when pregnancy. Healthcare, entertainment, research and education will be integrated effectively to promote and support optimal and modern care.

Key words : Women's healthcare, maternity, neonatal, physical, social lives.

GOAL & RESEARCH QUESTIONS

The goal of the thesis is to design a proposal for women clinic. The design is achieved by understanding the background, researching the questions, workshops for proposal.

The main research question is

How to reduce stress for pregnancy patients by using architecture language?

The following questions are relevant

What is the stress that women will suffer and what will this cause?

What kinds of solutions can reduce the stress of patients?

How will the solutions related to architecture language?

The thesis will follow these questions and explore the solutions as well as designing a proposal.

BACKGROUND



Figure Ch.1-1

During 2015, Västra götlandsregionen has come up with a proposal for how the health care in the future will be directed at Östra sjukhuset. The proposal is based on that all care concerning women's health in Gothenburg will be placed at Östra sjukhus (excluding gynecological tumor surgery). The existing women's clinic at Östra was built 1986 and is no longer sufficient for today's needs nor the future in terms of adequate space, ceiling height and technical systems.

Gothenburg had 10,050 childbirths in 2015. When all deliveries and care concerning child birth are planned to occur at Östra sjukhusets kvinnoklinik, the hospital must adapt the facilities to be able to handle the increased quantity of births. The prognosis in the future is approximately 12 500-13 000 childbirths per year in Gothenburg.

Sahlgrenska University Hospital (SU) is Sweden's largest hospital and one of the larger in northern Europe. The SU has about 1,950 care places distributed in 120 departments and the business has a turnover of around 9.5 billion kronor per year. The hospital was formed on January 1, 1997 when the emergency hospitals Sahlgrenska Hospital, Östra Hospital and Mölndal Hospital were merged.

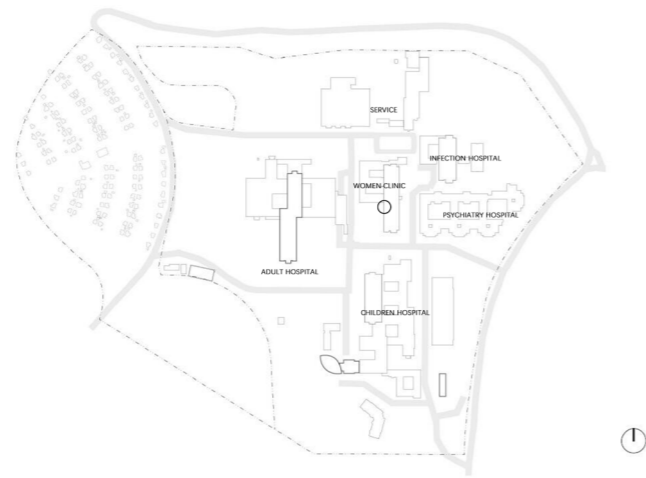
During the 1960s, the Östra Hospital began to be built. For a decade of 1968-78, the women's clinic, the infection clinic, the children's clinic and the central clinic were completed. The Eastern Hospital was opened on January 4, 1978, and the occupation began on January 16th.



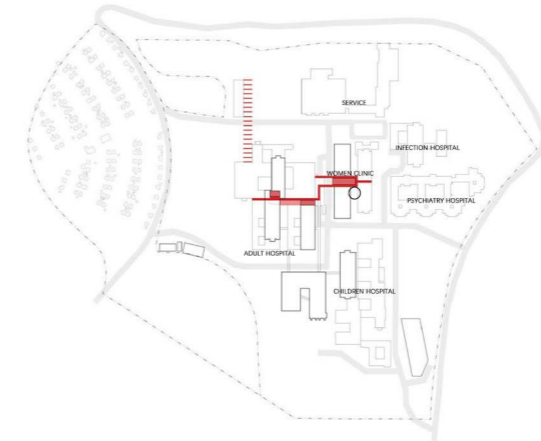
Figure Ch.1-2

CHAPTER 1 BACKGROUND

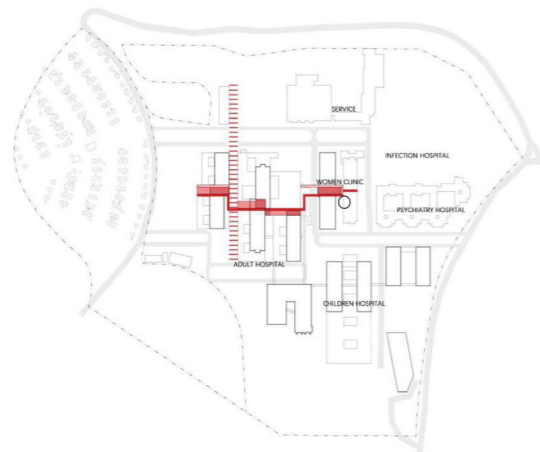
FUTURE PLAN



CURRENT PLAN



NEW CHILDREN HOSPITAL+EXPANSION OF ADULT HOSPITAL
+WOMEN CLINIC HIGHRISE BUILDING



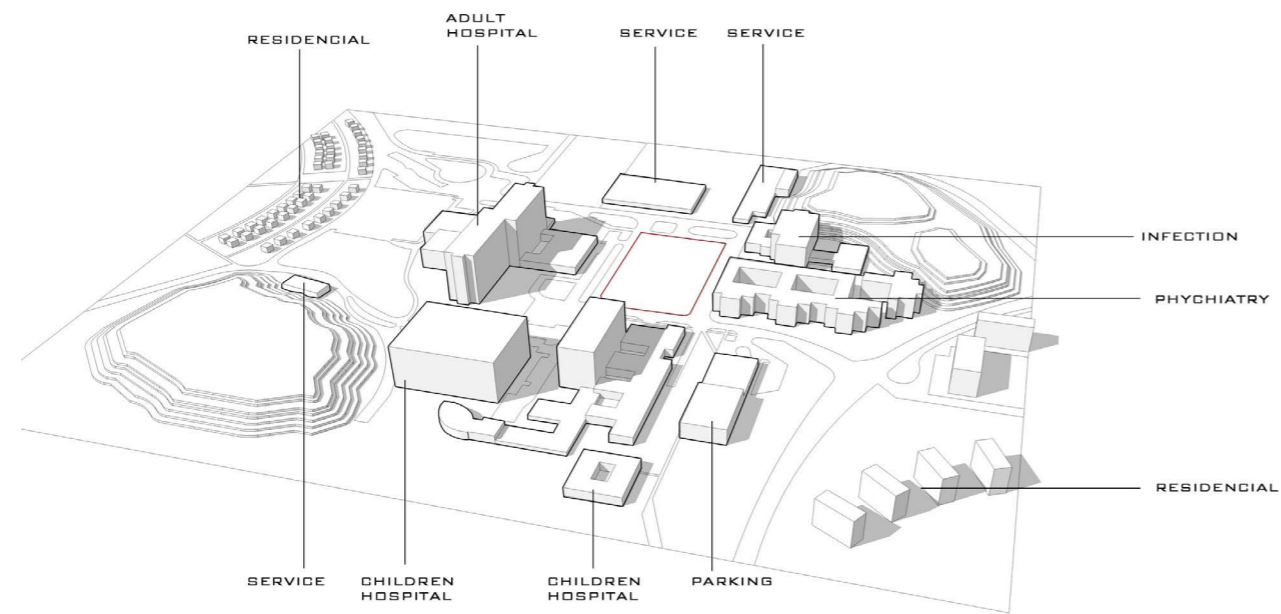
NEW CHILDREN HOSPITAL+EXPANSION OF ADULT HOSPITAL
+WOMEN CLINIC HIGHRISE BUILDING



NEW CHILDREN HOSPITAL+EXPANSION OF ADULT HOSPITAL
+WOMEN CLINIC LOWRISE BUILDING

CHAPTER 1 BACKGROUND

SITE AND ANALYSIS



The location of women clinic is in the central of other buildings, containing adult hospital, phychiatry hospital, infection hospital, children hospital, logistics department and park house. The women hospital will act as a central core, connecting others with sky bridges and basement goods passage.

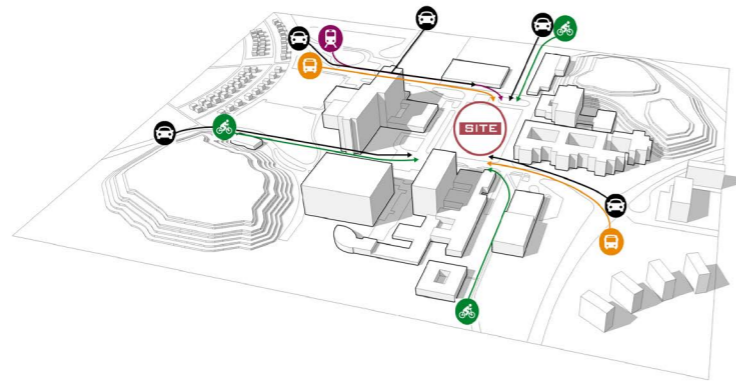


1. Adult hospital 2. Logistics department 3. Logistics department 4. Infection department 5. New children hospital (under construction) 6. psychiatry

CHAPTER 1 BACKGROUND

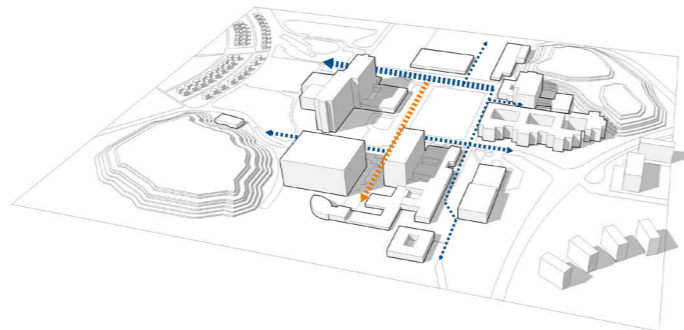
SITE AND ANALYSIS

Flow



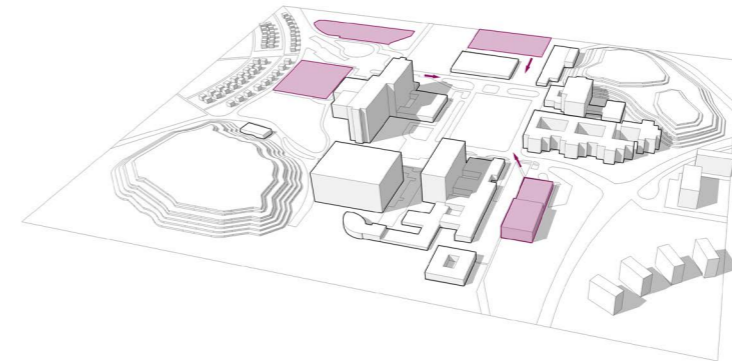
There are different ways coming to the site. It is far from the centre and the main public transportation are trams and buses, the stations of which are on the north-west. Cars, bicycles are accessible for most parts.

Street



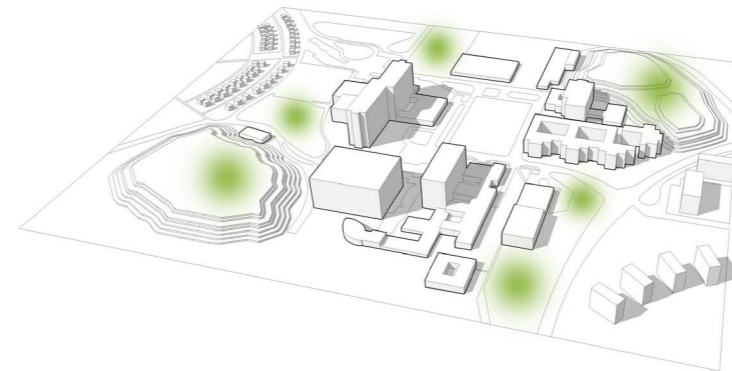
The streets around site have different width, busyness degree and hierarchy. The site has good accessibility. In the future plan, the street to the west will switch its property into a wider and more friendly boulevard, which will be more active in scale.

Parking



There are three large parking lots and a parking house around the site, and People by car will mainly come in three directions. Also, parking spaces are set along the street for temporary use.

Nature resource



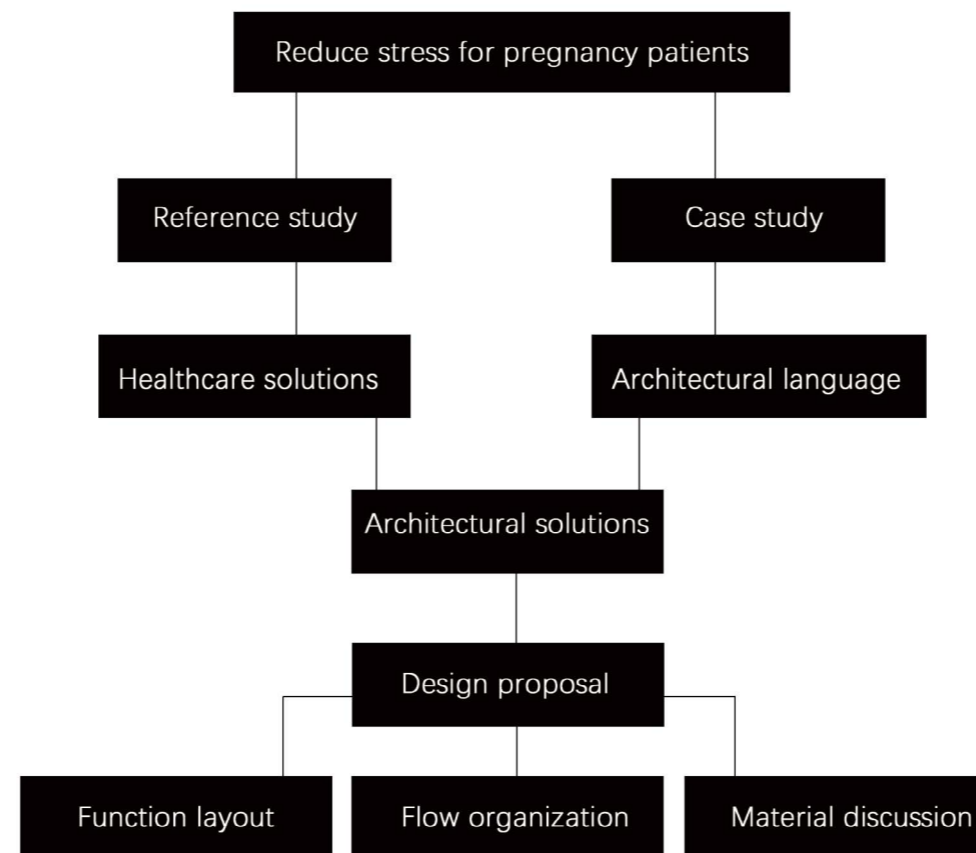
There are plenty of greenery resources in Östra sjukhuset. Natural forest resources and lawn have great health promotion opportunity. This will not only release mental stress, but also create great activity space for patients.

CHAPTER 2 PROBLEM AND SOLUTION

DESIGN METHOD

The method is started with two lines in parallel. One is to explore the problems and solutions in healthcare aspects and the other is the solution in architecture aspects. Those two lines are not isolated, and they affect each other much. Architecture languages are affected by healthcare method, for example, layout, materials, flows are different according to the method that designers will use. The selection of architecture language will make different influences on healthcare problems.

The proposal starts from the stress that a patient will meet during the whole process of pregnancy. Then different problems and solutions are listed, focusing on reducing the stress. Meanwhile, case study will provide reflections of how architecture solve the problems. Combine them and come up with my own solutions.



CHAPTER 2 PROBLEM AND SOLUTION

CASE STUDY

Nya barnsjukhuset, östra sjukhuset.

Architect: White Arkitekter
Size: 33000 m² BTA
Location: Gothenburg, Sweden
Project period 2010-2016



Figure Ch.2-1

The Östrasjukhuset today constitutes a cohesive 60s and 70s building of the type of house in a park with high slats for care departments and lower treatment areas. The increased demand for proximity between activities causes a tightening of the entire hospital area into a more urban environment with elements of streets, squares and avenues. The new children's hospital is a first part of this transformation into a more urban-like hospital area.



Figure Ch.2-2



Figure Ch.2-3



Figure Ch.2-4

Reflection

The new children hospital is located in Östra sjukhuset, which provides a new vision of swedish modern hospital. It has similar scale and context as the women clinic. The hospital has unique program for children, characteristic of colorful interior design, wooden material, nature in atrium and child dimension furniture design...

CHAPTER 2 PROBLEM AND SOLUTION

CASE STUDY

New hospital tower university medical centre

Architect: Perkins+will
Size: 77000 m² BTA
Location: Chicago, United states
Project period 2012

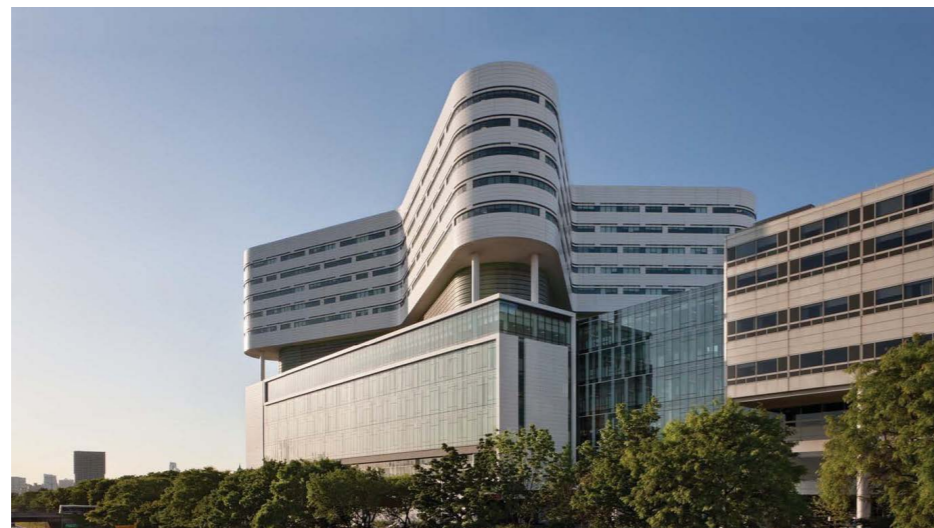


Figure Ch.2-5

This hospital is part of a campus-wide transformation project, which also includes an orthopedic building, parking structure and new loading and delivery systems. The 800,000-square-foot hospital consists of 386 patient beds along with diagnostic and treatment facilities, such as surgery, radiology and emergency departments. The hospital is sited adjacent to the Eisenhower Expressway (a major arterial feeding the central area of Chicago) on the north, Ashland Avenue on the east and Harrison Street, the major internal street for the Rush Campus, on the south.

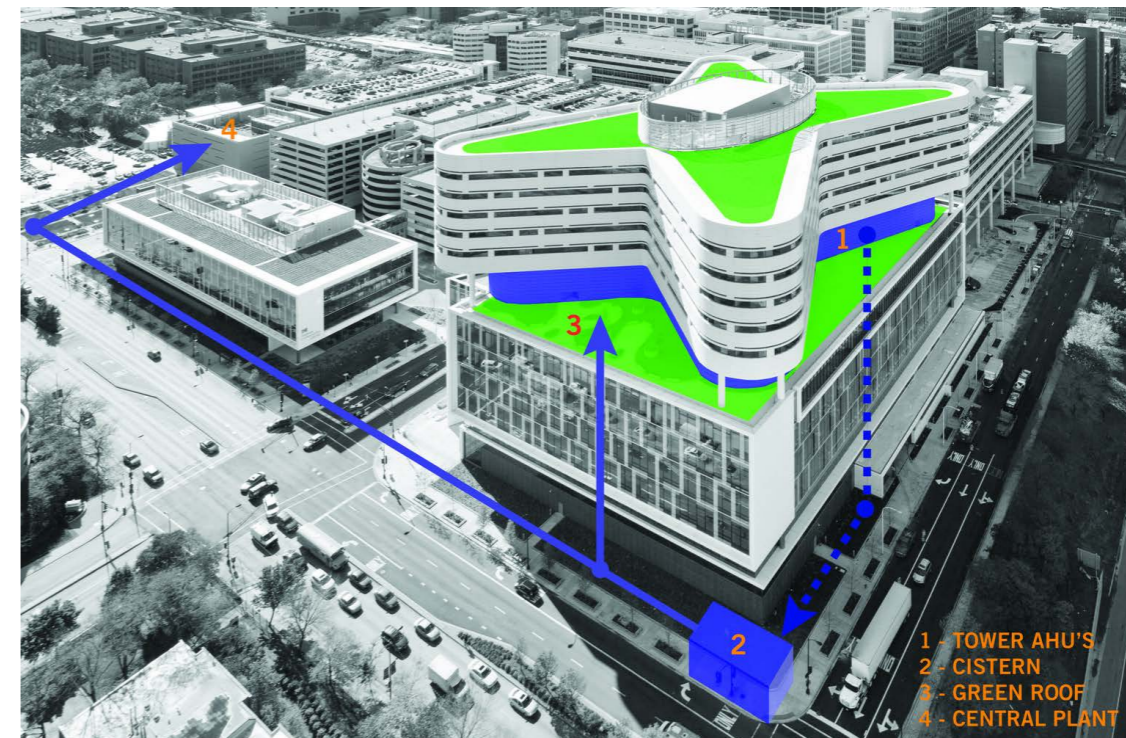


Figure Ch.2-6

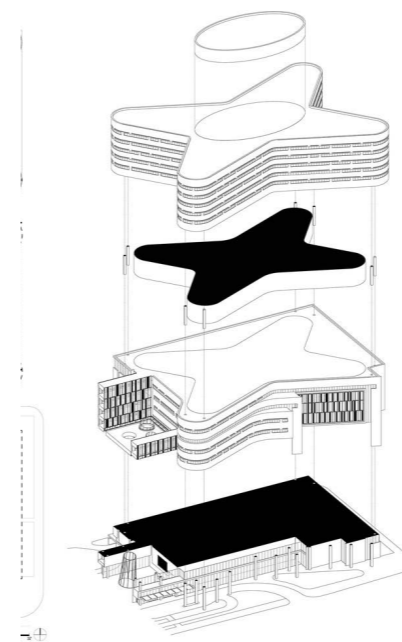


Figure Ch.2-7

Reflection

The project divided the function with different volumes and maximized the daylight and view for single patient rooms. The roof and platform provided safe and quiet outdoor environment for patients to satisfy the need for activities. Natural elements are also important to create healing environment. This project gave a vision of how large scale building dealing with the challenge of healthcare.

STRESS IN PREGNANCY

Women suffer from mental and physical pressure, anxiety or worries, which is harmful for both women and babies. There are several reasons more or less.

- 1.Hormones are changing, which can cause mood to change. Mood swings can make it harder to handle stress.
- 2.Dealing with the discomforts of pregnancy, like nausea, constipation, being tired or having a backache
- 3.First time of pregnancy makes women feel stressed, for they do not know the process and what they will face in nearly future,especially for accidentally pregnancy.
- 4.Women attach great importance to their body shape and appearance. Pregnancy changes the face and figure, so pregnancy often makes certain instrument-conscious women suffer from psychological attacks.
- 5.Women may also worry about whether the fetus is normal, economic burden, career difficulties, social life deprivation, such tension....

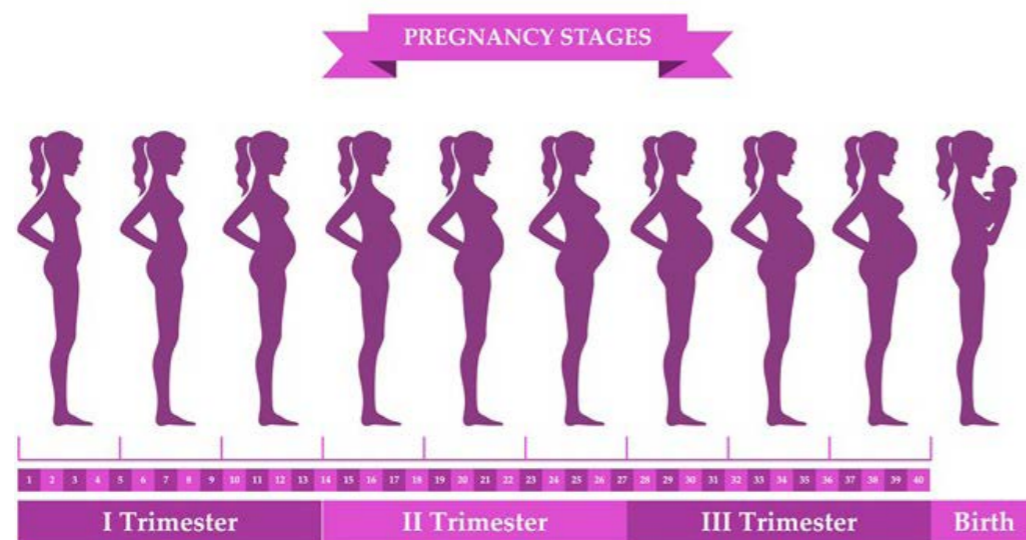


Figure Ch.2-8



Figure Ch.2-9

Post-traumatic stress disorder (PTSD) is when you have problems after seeing or experiencing a terrible event, such as rape, abuse, a natural disaster, a terrorist attack or the death of a loved one. People with PTSD may have:

- Serious anxiety
- Flashbacks of the event
- Nightmares
- Physical responses (like a racing heartbeat or sweating) when reminded of the event

As many as 8 in 100 women (8 percent) may have PTSD during pregnancy. Women who have PTSD may be more likely than women without it to have a premature or low-birthweight baby. They also are more likely than other women to have risky health behaviors, such as smoking cigarettes, drinking alcohol or taking street drugs. Doing these things can increase the chances of having pregnancy problems.

Resource: <https://www.marchofdimes.org/pregnancy/stress-and-pregnancy.aspx>

CHAPTER 2 PROBLEM AND SOLUTION

COMMUNITY HEALTH

The community health acts as an important role in future healthcare. One of the main strategies is to release professional medical space to the public. Therefore, more resources in the women's clinic will be opened to the public.

Lectures, seminars, videos, libraries, tours are opened to the public. Tours led by staff will visit different rooms and introduce different periods and tips when pregnant to those who are preparing to be pregnant, which will reduce the stress of pregnancy for confused couples...

ACCESSIBILITY IN THE BUILDING

The flow of the women's clinic is complex and can be separated into several types: patients, staff, logistics, public, relatives, students, and researchers.

To avoid flow across and to protect patients' privacy and keep quiet, staircases and elevators must be accessible with cards, which can be applied in reception. Different types of people have different accessibility in the building.

HEALING ENVIRONMENT

Healing environment is important for healthcare, therefore creating a modern hospital with a healing environment can reduce stress and affect logical thought processes. A healing environment in a women's hospital including:

- Reduce environmental stressors such as poor air quality, noise, glare, lack of privacy and safety.
- Connect patients with nature, greenery, water elements...
- Single patient room and comfortable waiting area.
- Provide entertainment: interactive, artwork, music...
- Engenders feelings of peace, hope, reflection and spiritual connection and provides opportunities for relaxation, education, humour and whimsy.

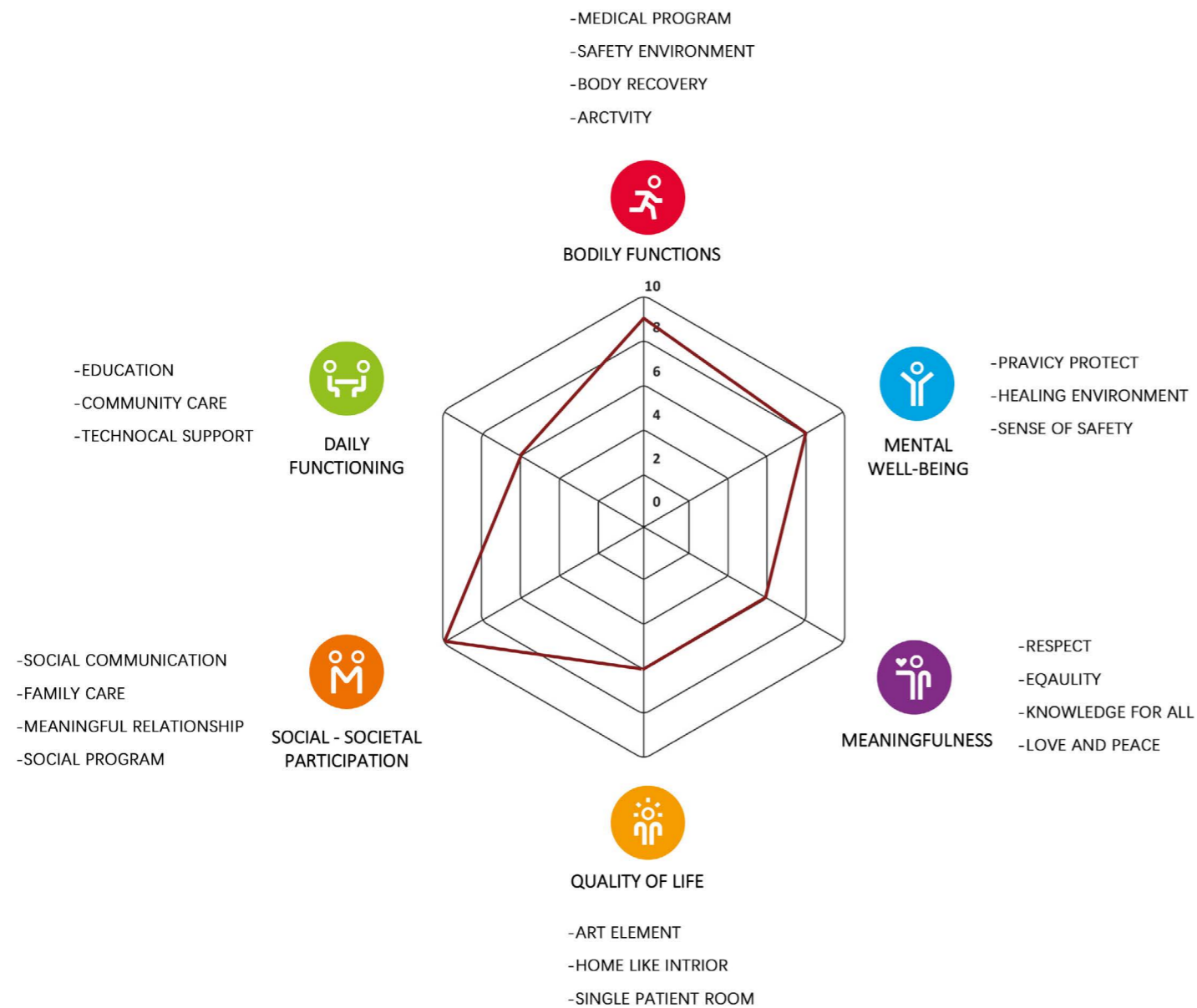
Resource: <http://www.montefiore.org/healingarts-healing-environment>



Inspiration images

CHAPTER 2 PROBLEM AND SOLUTION

POSITIVE HEALTH



PILLARS FOR POSITIVE HEALTH

CARE PROCESS

The care process combines community care and profession care into the longer process of care.

In prenatal process, patients have different choices of attending seminar between patients and professionals or having lecture hold by professions. They have accessibility to hospital's library, so that they can solve some daily questions when it is not emergency. In addition, online consult service can help at home.

When the patients are pregnancy and need regular examination, profession care will help patients until the patients recovery and can be back to social lives. Meanwhile ,the healing environment create high quality and attractive for patients.

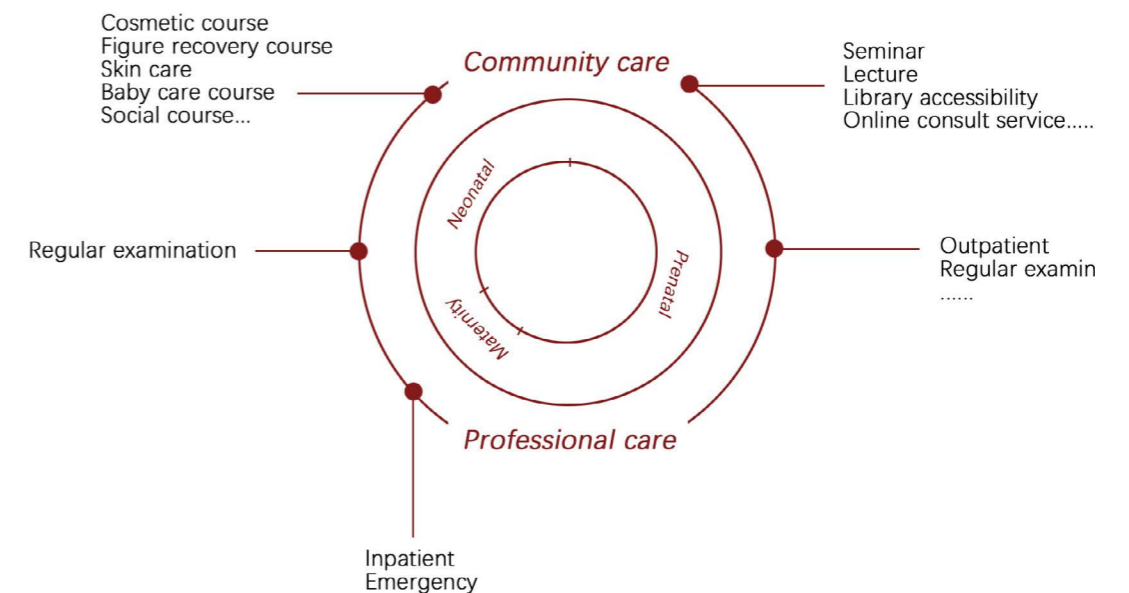


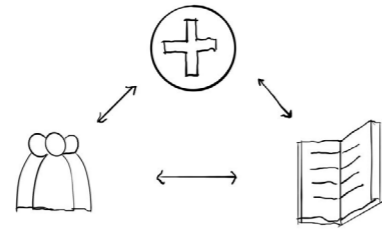
Figure Ch.2-10

CHAPTER 3 CONCEPT AND PROGRAM

VISION

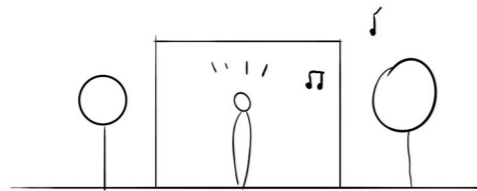
Integration of healthcare, science and education

Healthcare, research and education are integrated with the purpose to effectively support the development of new knowledge.



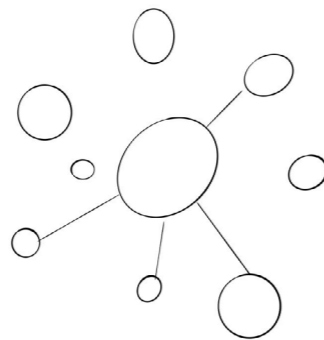
Attractive and healing environment

The project should create attractive and healing environments that are designed for the users with high architectural qualities both within and in direct connection with the healthcare buildings.



Exclusive and enriched program

The project will provide exclusive and enriched program to serve both patients and public



CONCEPT

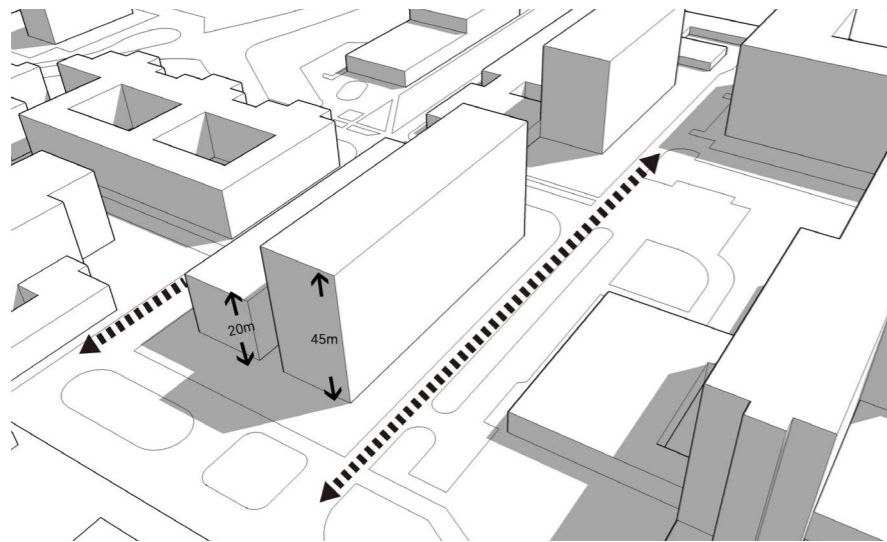
The concept is to build a new life circle for pregnant with enriched activities and knowledge, helping them reduce stress of pregnancy and be back to social lives.



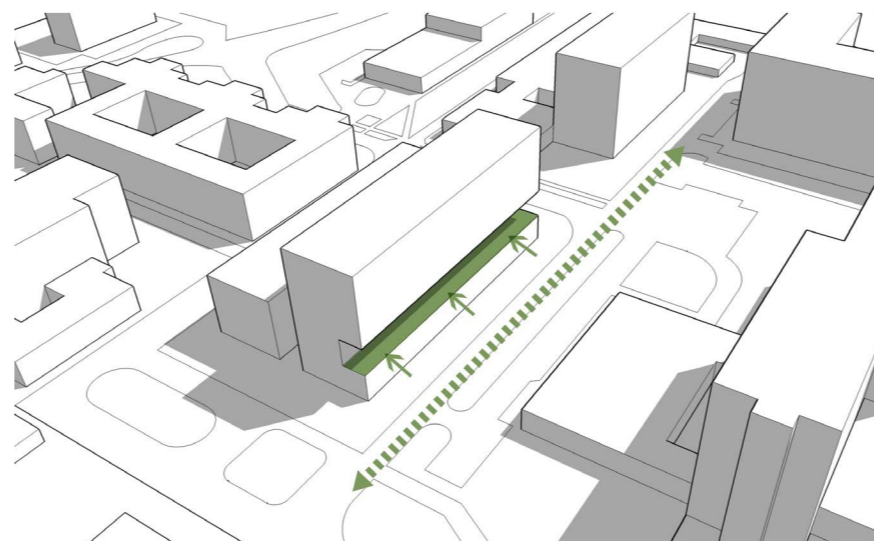
Figure Ch.3-1

CHAPTER 3 CONCEPT AND PROGRAM

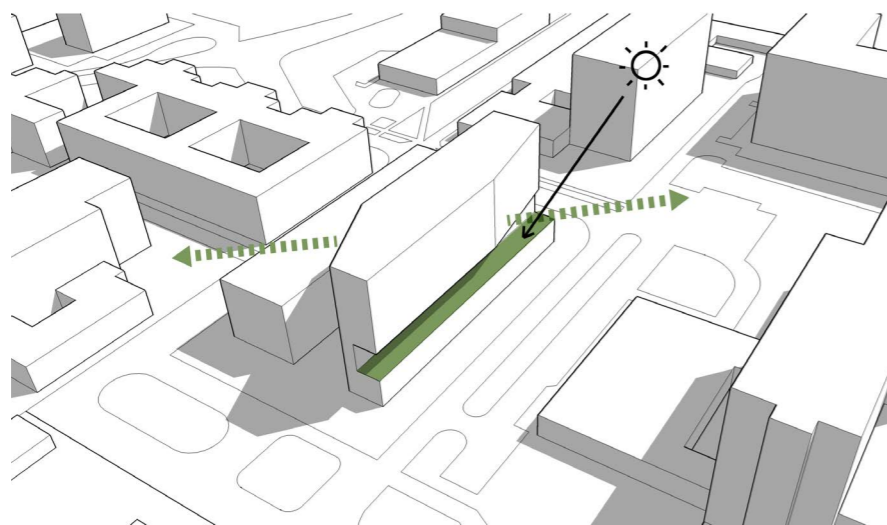
VOLUME ANALYSIS



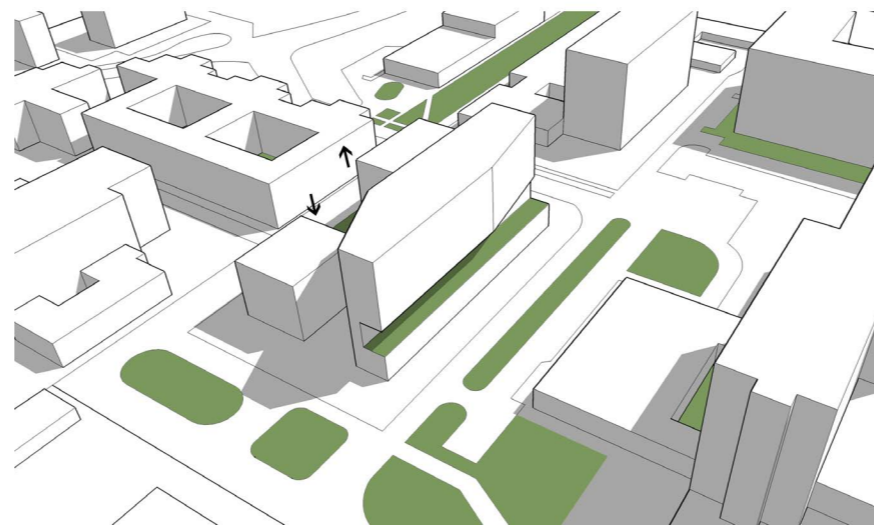
1. Build hiserise and low rise buildings as planned



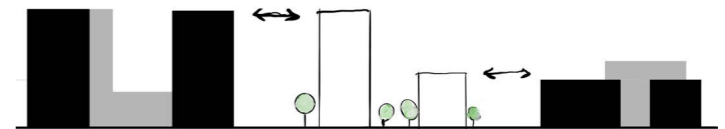
2. Create garden on the second floor



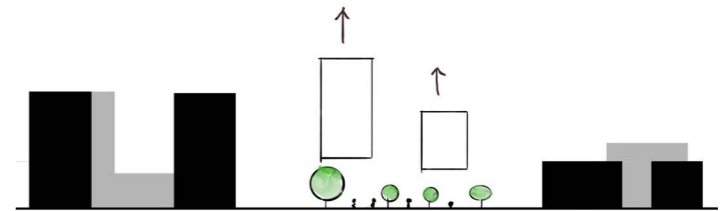
3. Cut corner towards natural view



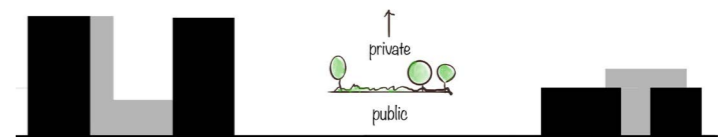
4. Fix volume with function.



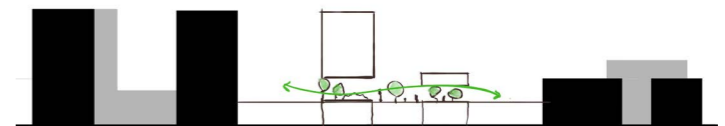
The site locates in the centre of the buildings. The main disadvantage is that it lacks a opportunity to form a large, complex playground with greenery.



So searching for a opportunity to form a larger playground is a starting point, where communication will happen. But this will cause the problem the cross between public and patients.



Uplift it up and definite the public and private area. Create different entrance for different kinds of people involved to seperate flow.



In the future, there will be sky-bridges connecting adult hospital and psychiatry. The green line will extend.

CHAPTER 3 CONCEPT AND PROGRAM

PROGRAM FROM LILJEWALL ARKITEKTER

Liljewall Arkitekter has come up with a plan for program and function layout. The project is separated into high rise building and low rise building, The program is suggested as:

Ward	Low rise building	High rise building
Dilivery room	5-6	20
Isolated dilivery room	2	0
Flexible room	2-4	19
Family BB ward	0	60
Emergency for mom and baby	18	0
Family room Neo department	0	25
Intermediate ward	0	25
NEOIVA	0	16
Outpatient	30	0
Emergency	10	0

Administration	PLAN 8
Care department	PLAN 7
Intermediate room	PLAN 6
Care department	PLAN 5
Technology ,administration	PLAN 4
Technology ,administration	PLAN 3
NEOIVA, treatment room	PLAN 2
Maternity ward, Emergency cut hallway	PLAN 1
Reception,maternity ward, sampling, entrance.	PLAN 0
Lab,storage,dressing	PLAN 99
Culvert, technology	PLAN 98

CHAPTER 3 CONCEPT AND PROGRAM

PROGRAM OF PROPOSAL

My proposal, which is based on the concept of building a new life circle, is slightly different from Liljewall Arkitekter's. It is divided into healthcare, activity, administration, education and technical space. The healthcare system is mainly based on Liljewall Arkitekter's plan, in addition, activity part such as swimming pool, yoga club is an important attachment for healthcare.

HEALTHCARE

Room	Sqm
Patient room	1700
Dilivery room	1320
Flexible room	1000
Family room	1200
NEOIVA	1000
Emergency	200
CT	150
Ultrasound	240
Emergency for child and mom	300
Outpatient	1080
Pharmacy	80

ADMINISTRATION

Room	Sqm
Open office	800
Group room	1200
Reception	120
Mobile team	40
Cleanning centre	200
Dressing room	480

ACTIVITY

Room	Sqm
Swimming pool	400
Sauna	45
Spa centre	90
Fitness	300
Yoga club	90
Cafe	150
Restaurant	120
Retail	120
Bar	60
Children centre	105

EDUCATION

Room	Sqm
Open library	200
Professional library	250
Study room	105
Lecture hall	320
Laboratory	300

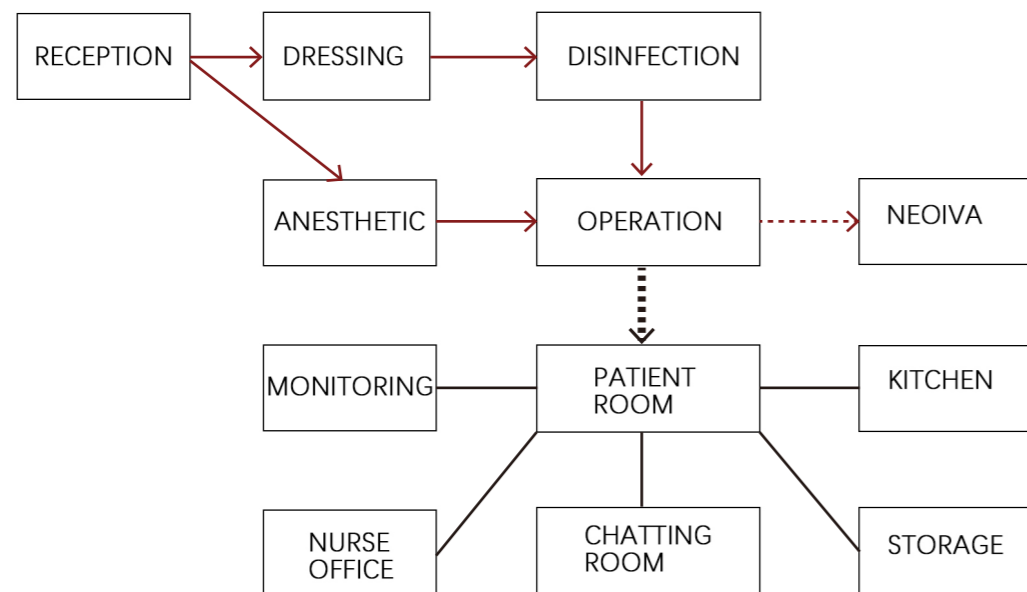
TECHNICAL SPACE

STORAGE
WASTE ROOM
MEDICAL WASTE
ELECTRICITY ROOM
VENTILATION
MACHINE ROOM
WATER
CONTRAL ROOM
DATA ROOM
INFRARED ROOM
LAUNDRY

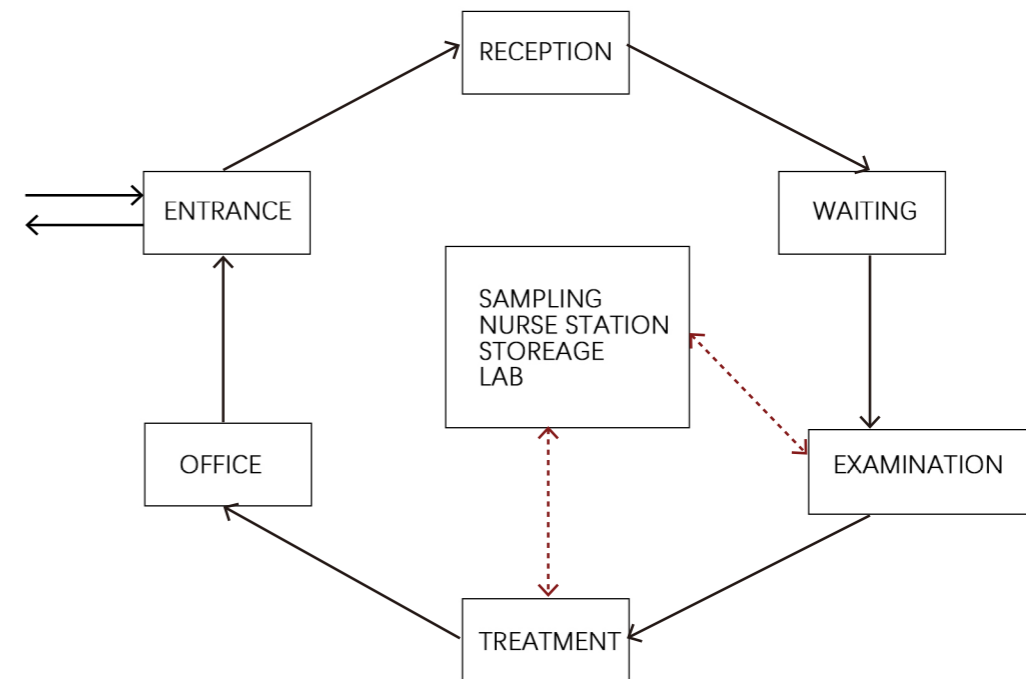
TOTAL : 31000 sqm

UNIT DESIGN

Inpatient unit

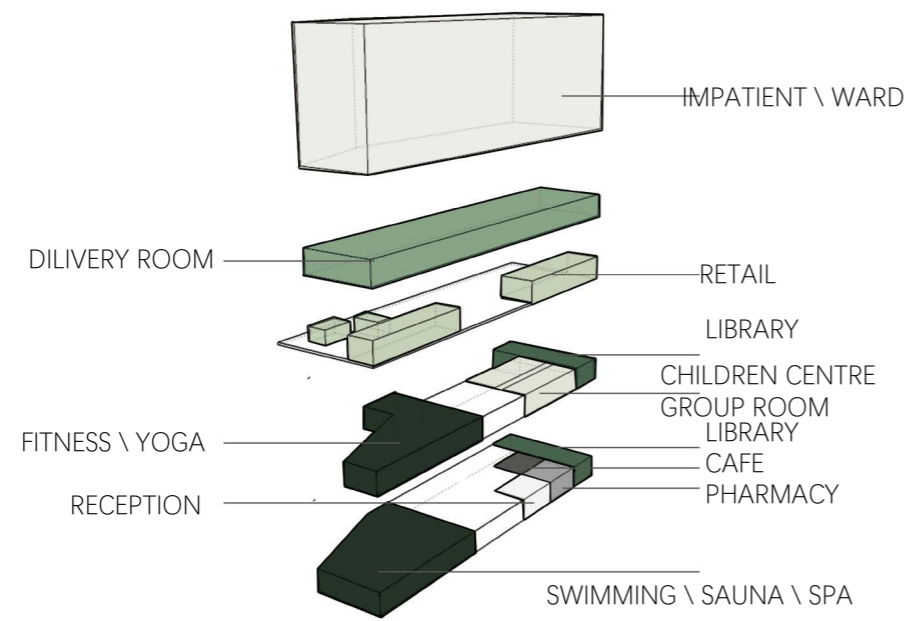


Outpatient unit

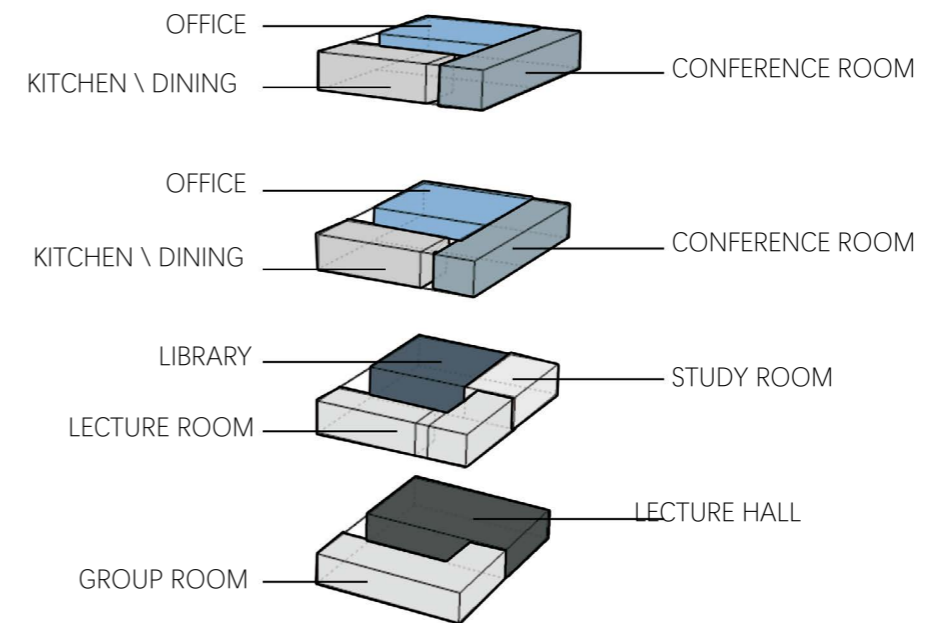


CHAPTER 3 CONCEPT AND PROGRAM

FUNCTION LAYOUT



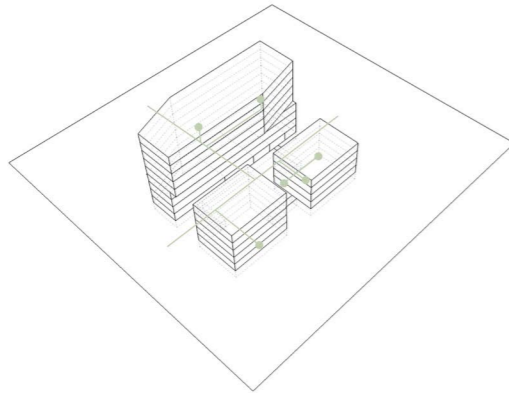
FUNCTION LAYOUT OF A BUILDING



FUNCTION LAYOUT OF B BUILDING

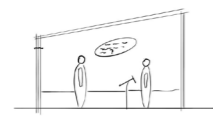
CHAPTER 3 CONCEPT AND PROGRAM

PATIENT FLOW



The program and flow is different for different types of patients or staff. Below are examples.

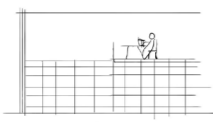
Patient A-who are preparing for pregnancy or who have difficulty being pregnant. They could choose to take part in knowledge seminar hold by doctors or listen to lectures or read in library. For further, they can register in reception and then meet doctors...



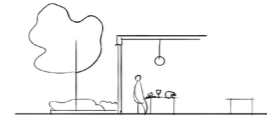
consult service



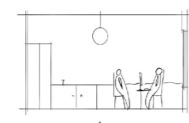
seminar



library



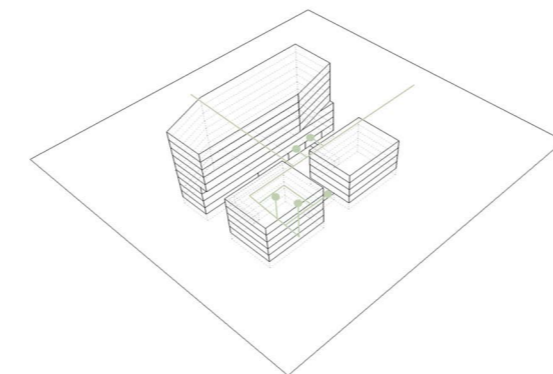
dining



doctor

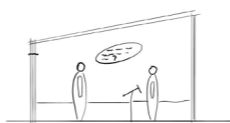


examination



Patient B- Outpatients who are pregnant and need examination monthly, but do not need to stay over night. After booking time with doctor, they could come and enjoy themselves in healing environment...

First staff in consult service will tell them to go to reception and wait in gardens. Then doctor will take them into examination and treatment. Finally if need, they could go to pharmacy.



consult service



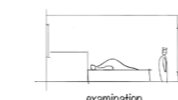
reception



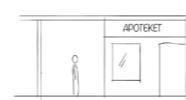
waiting garden



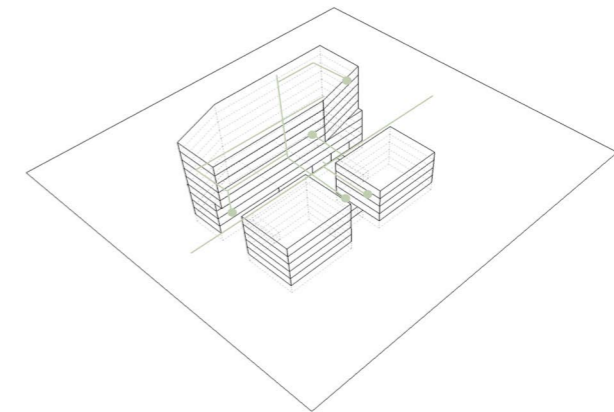
doctor



examination



pharmacy



Patient C-Inpatient\public There are enriched programs for inpatients and public, which helps to reduce pressure and bulid a new life circle for them. Meanwhile, communication will happen between different period, stage's pregnancy and others.

There are also services helping sepcial pregnants...



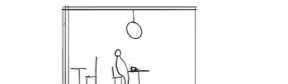
retail



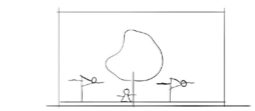
swimming pool



dining



coffee



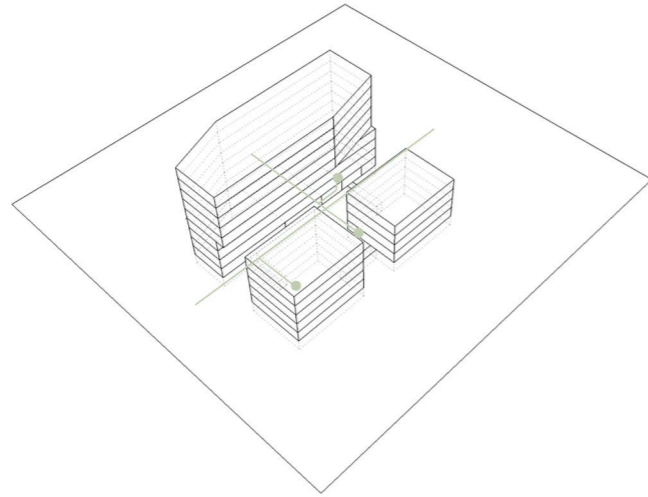
yoga club



waiting garden

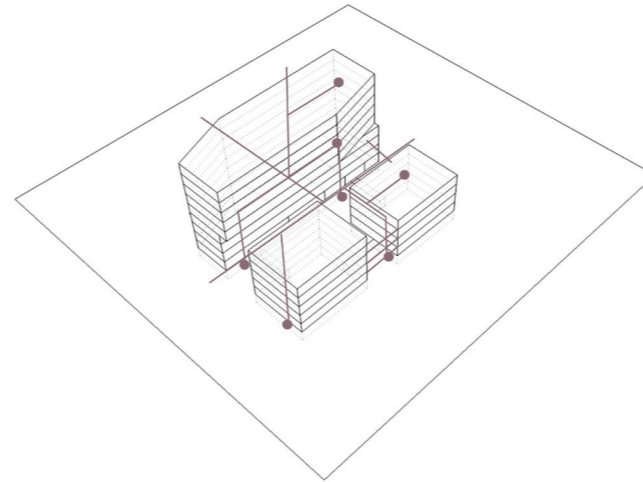
CHAPTER 3 CONCEPT AND PROGRAM

PATIENT \STAFF\PUBLIC\STUDENT FLOWS

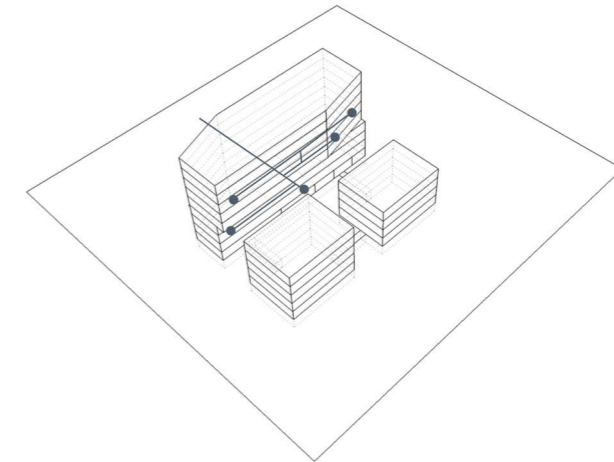


Patient C-Inpatient\public There are enriched programs for inpatients and public, which helps to reduce pressure and bulid a new life circle for them. Meanwhile, communication will happen between different period, stage's pregnancy and others.

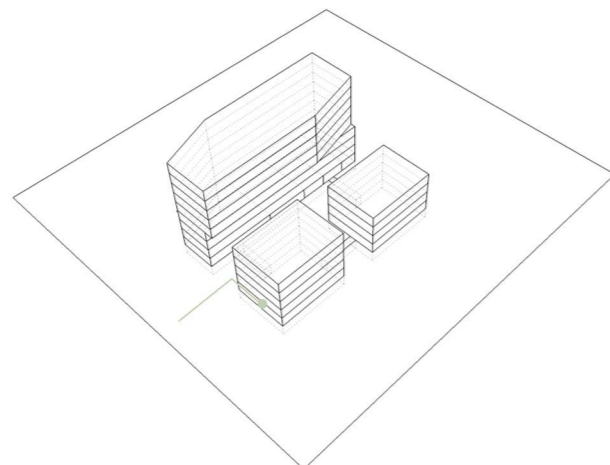
There are also services helping sepcial pregnants...



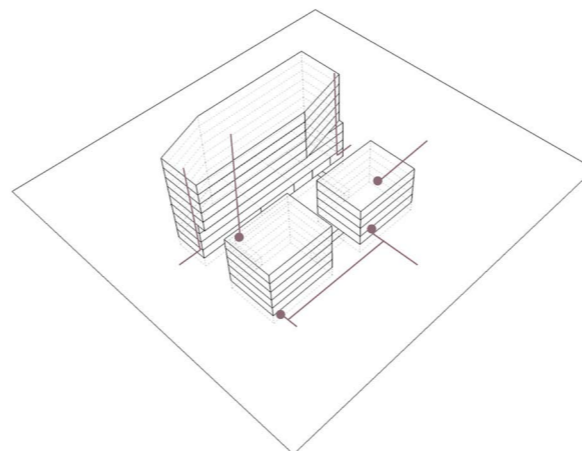
Staff Doctor\ Nurse The staff come from different entrances.The first step is to go dressing room, then back to their office. The staff has the entire accessibility to the building.After work, they can chose to stay and use swimming pool or fitness or retail.



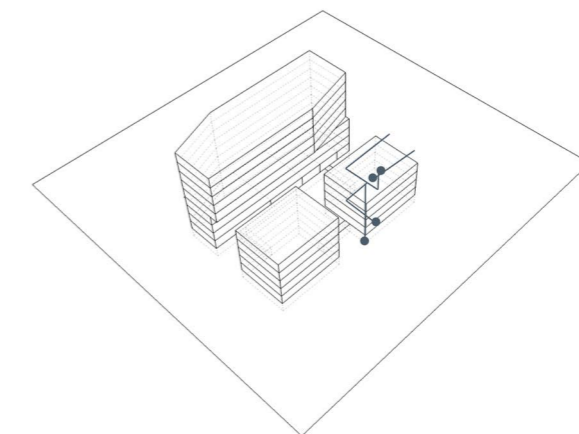
Public : There is an entrance for public and stairs so that publics can reach the second floor garden with disturbing patients. What's more, the elevator must be used with card, which contains accessibility in the building.



Patient E-Emergency, who need emergency and will enter emergency entrance.



Staff Logistic The staff has special entrance and elevator to transport medicine or waste to avoid acrossing flow with patients.



Student \ Researchers The Building B is special for students and researchers They are accessible to lab, lecture rooms, groups rooms. which can be booked through web.

CHAPTER 4 DESIGN PROPOSAL

PERSPECTIVE FROM DIAGNOSVÄGEN



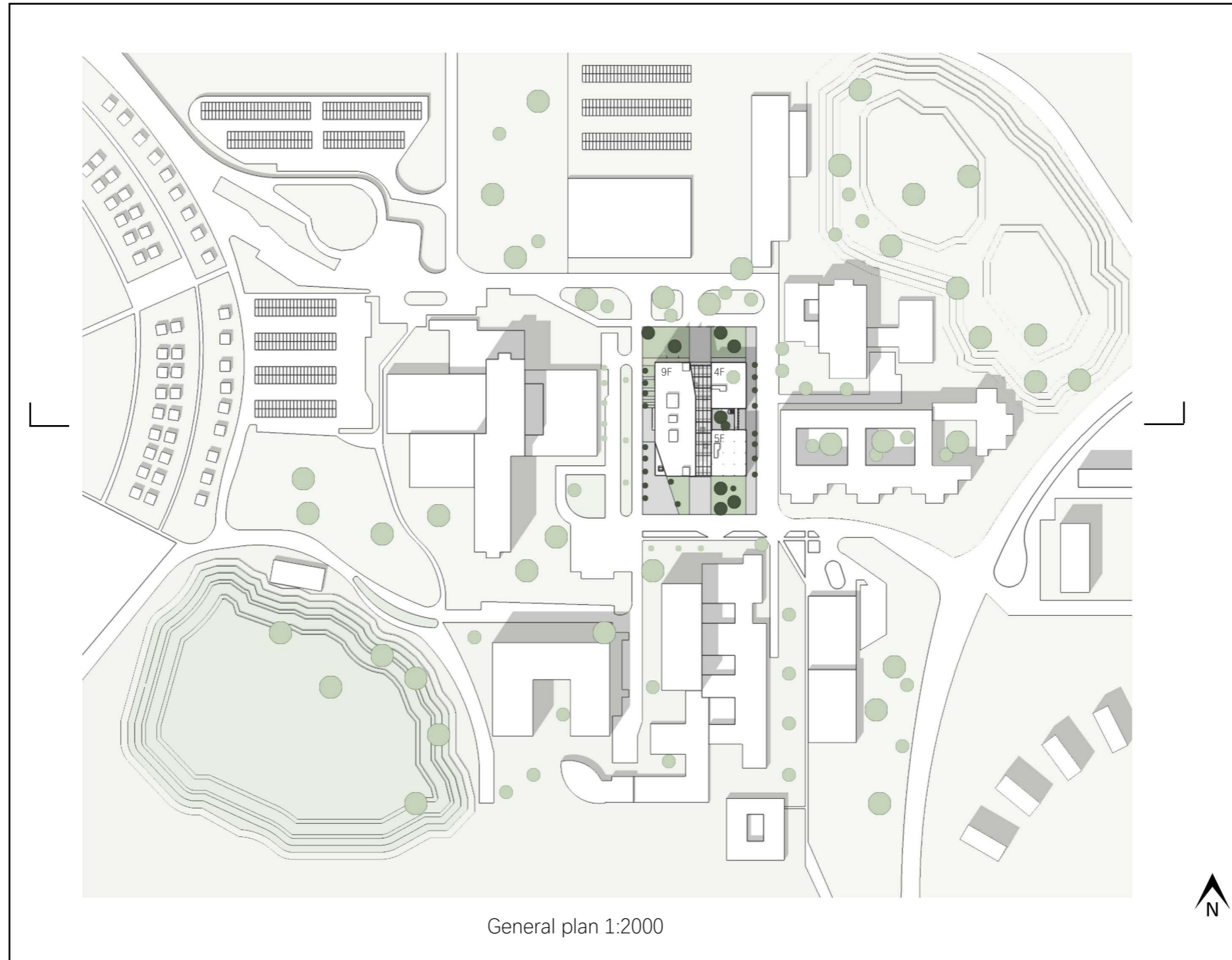
ATRIUM



WARD GARDEN

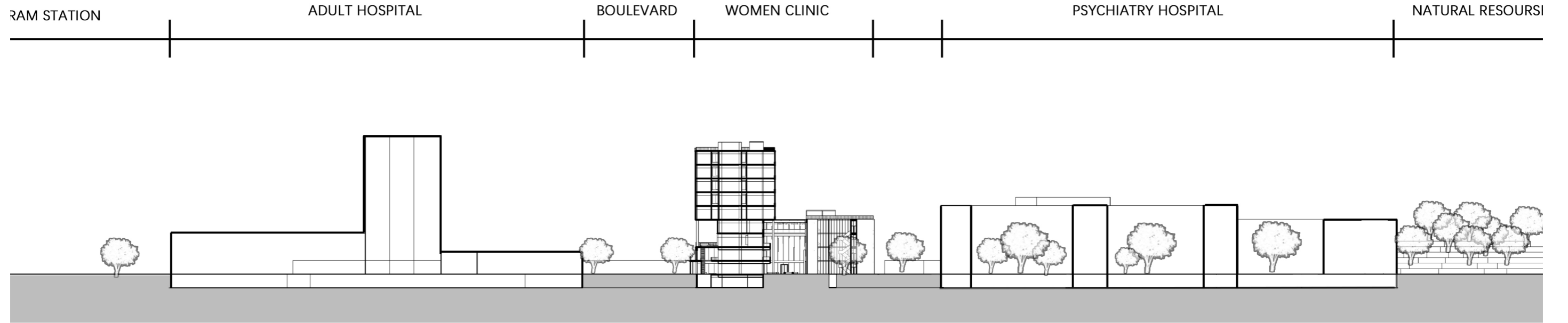


GENERAL PLAN

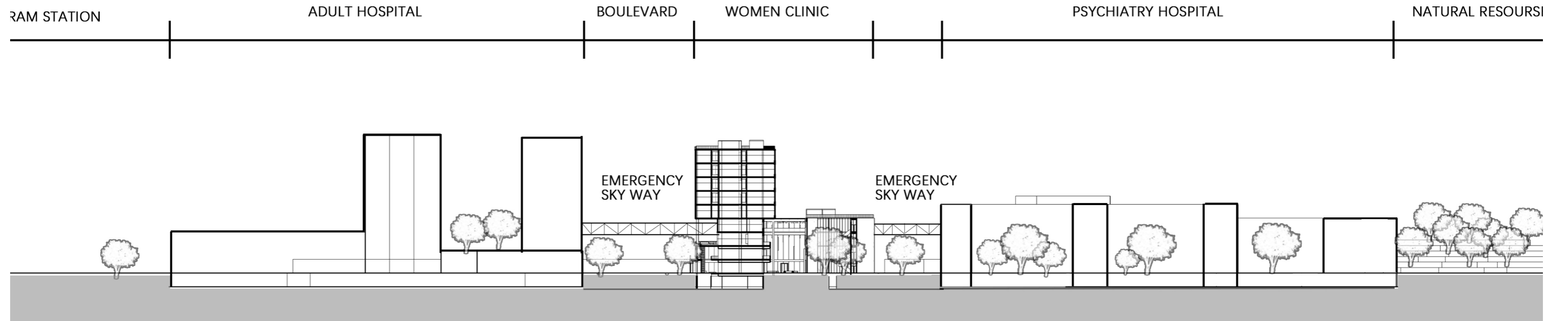


CHAPTER 4 DESIGN PROPOSAL

SECTION 1

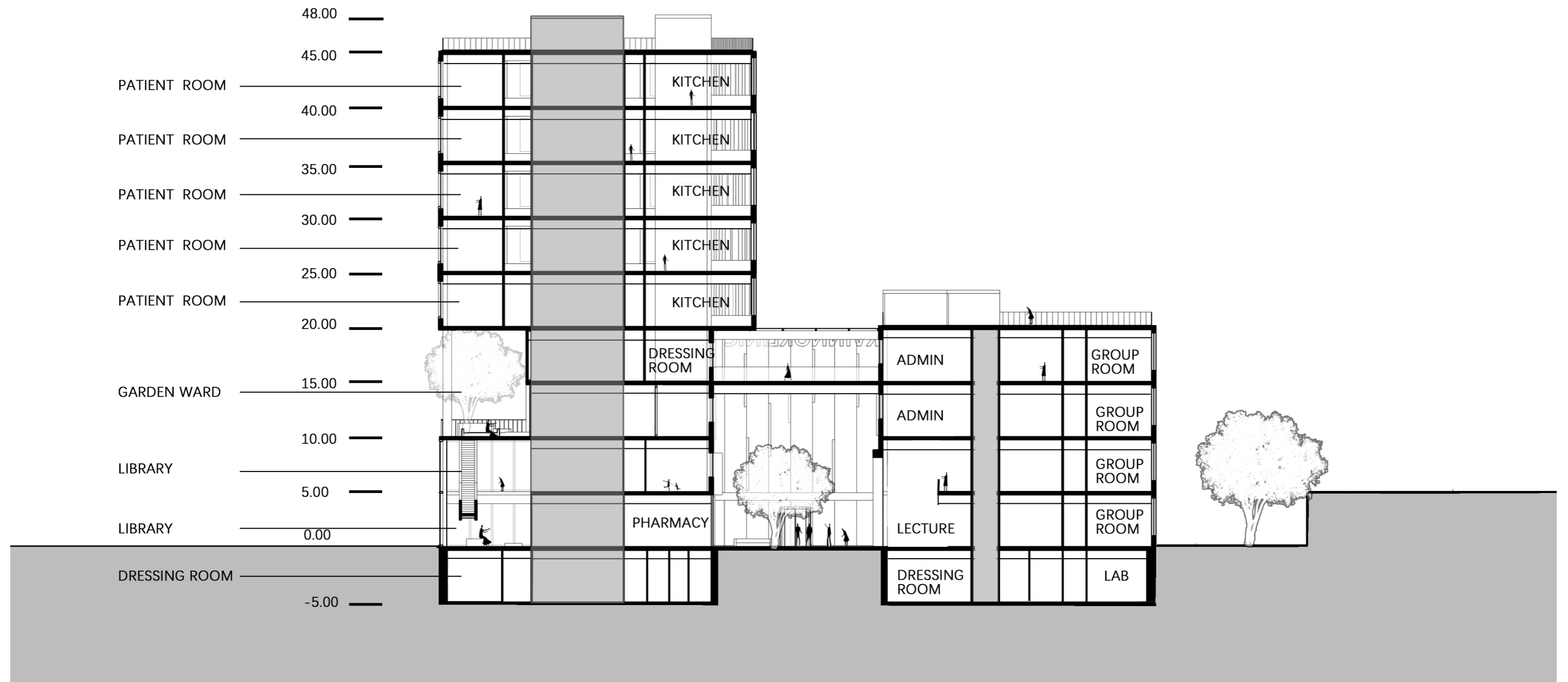


PROPOSAL CURRENT SECTION 1:1500



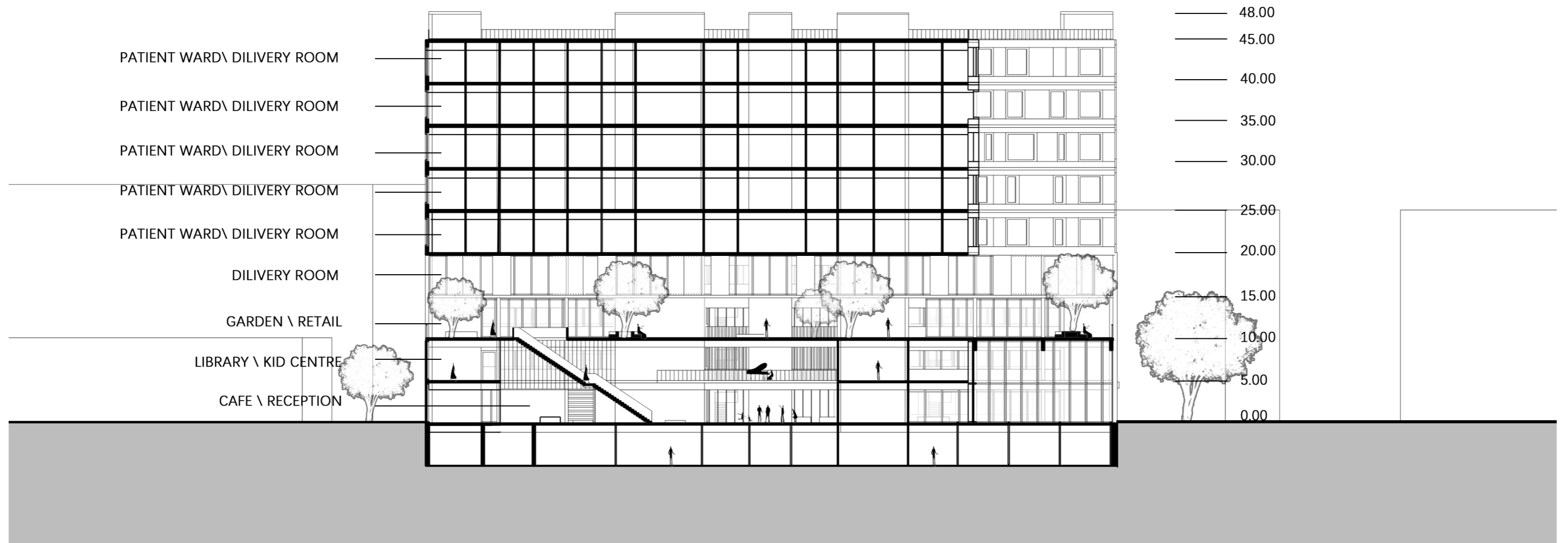
PROPOSAL FUTURE SECTION 1:1500

SECTION 2



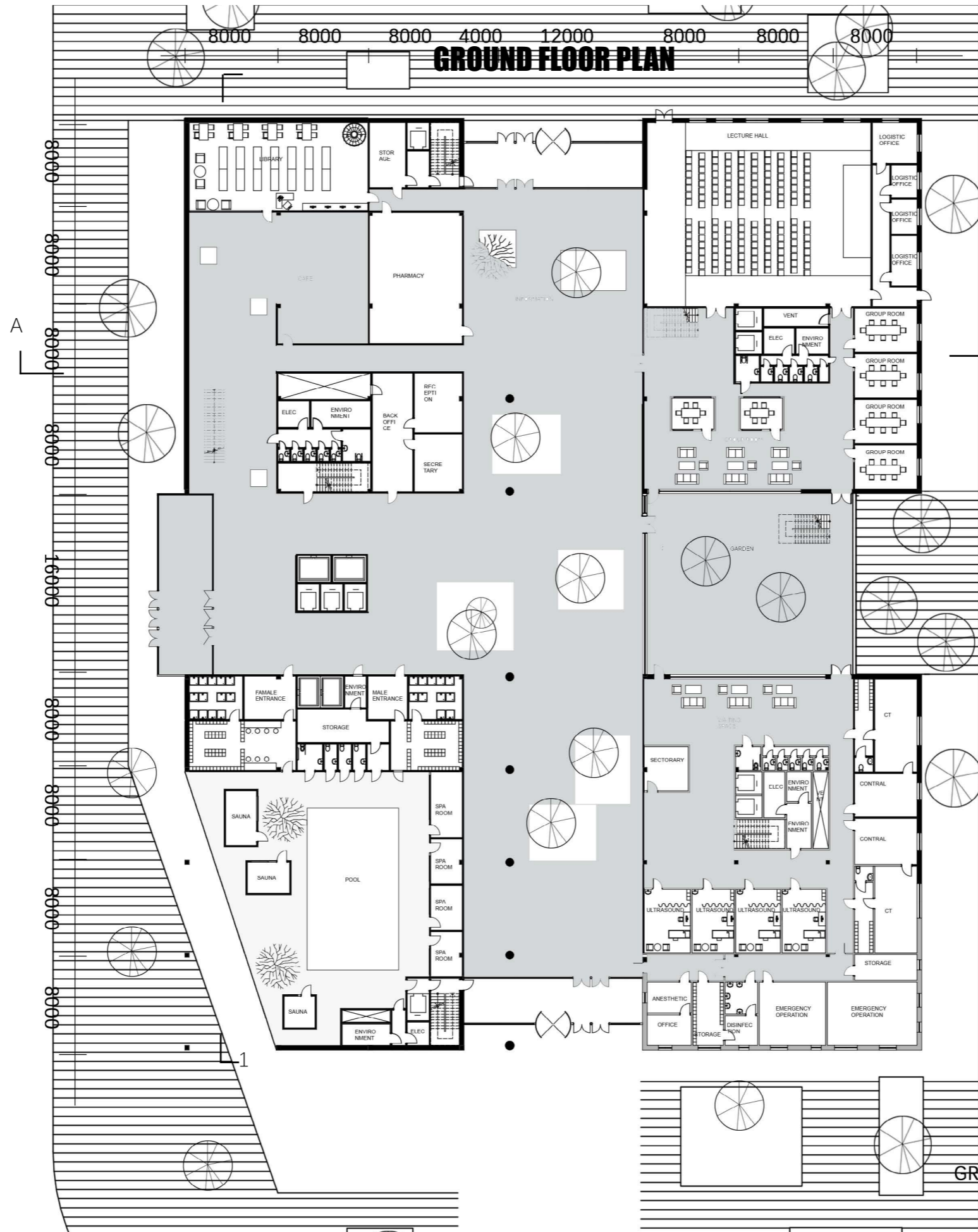
A-A SECTION 1:500

SECTION 3



1-1 SECTION 1:500

CHAPTER 4 DESIGN PROPOSAL



GROUND FLOOR PLAN 1:400



FIRST FLOOR PLAN



CHAPTER 4 DESIGN PROPOSAL

OTHER FLOOR PLAN



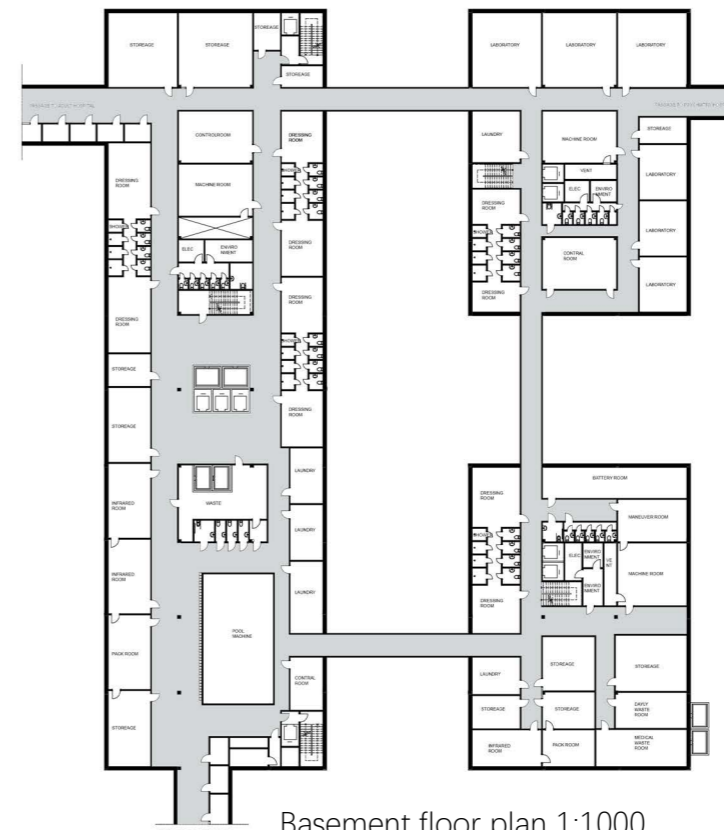
Second floor plan 1:1000



Third floor plan 1:1000



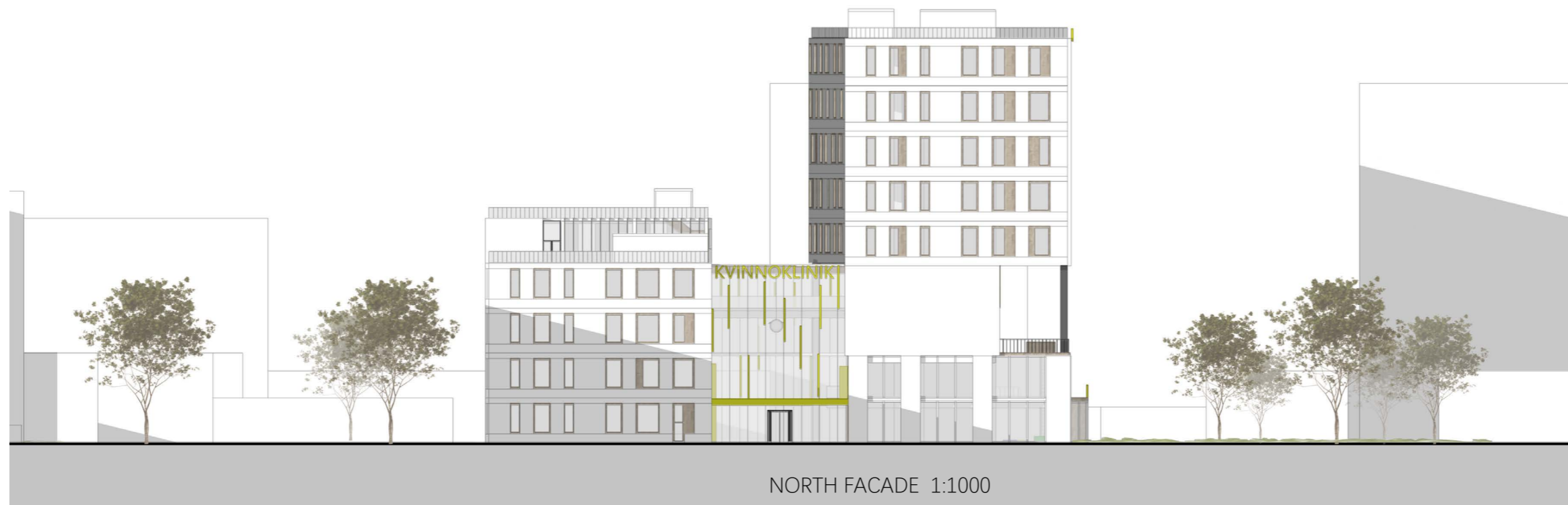
Fourth floor plan 1:1000



Basement floor plan 1:1000

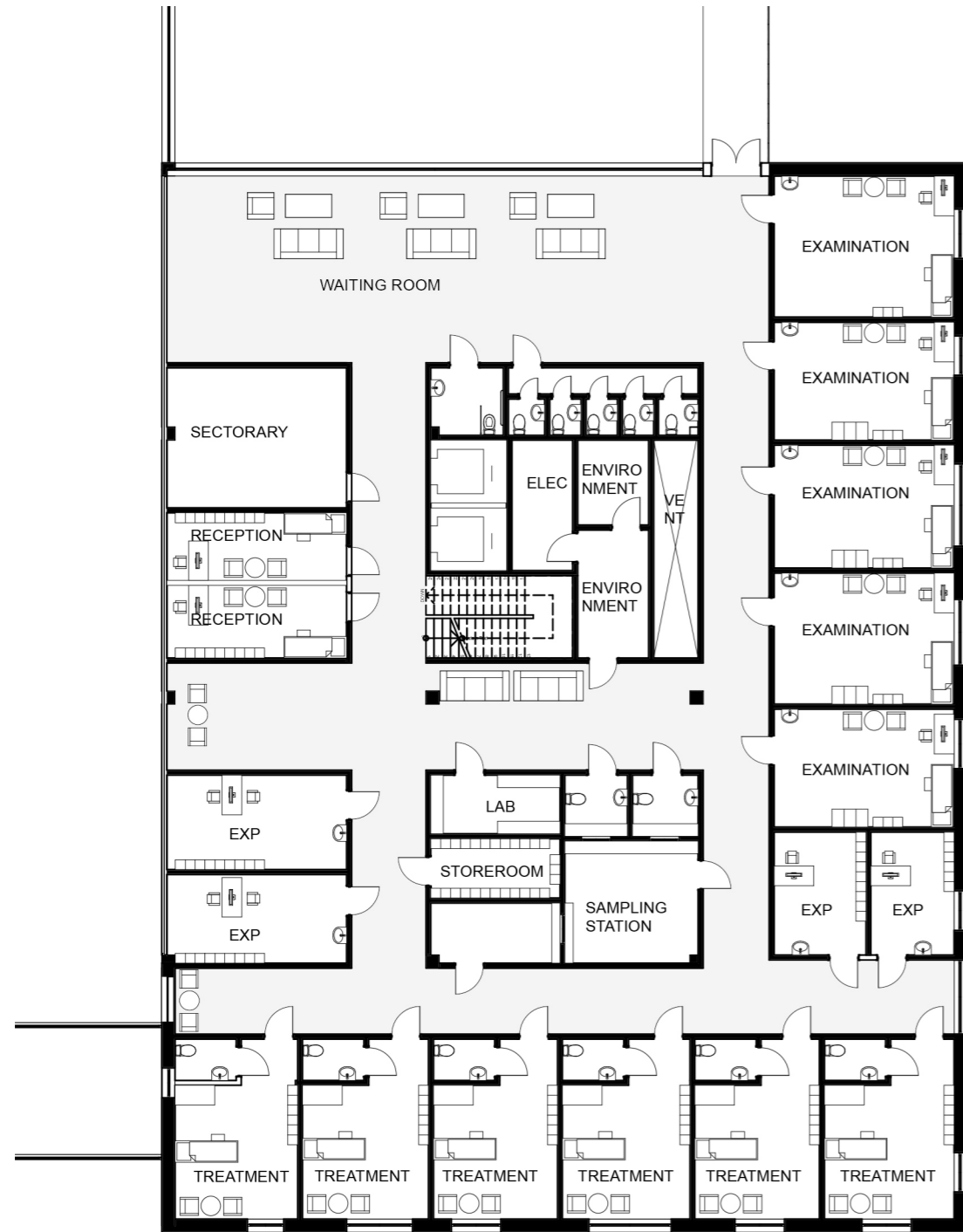


FACADE



CHAPTER 4 DESIGN PROPOSAL

PLAN ZOOM IN 2

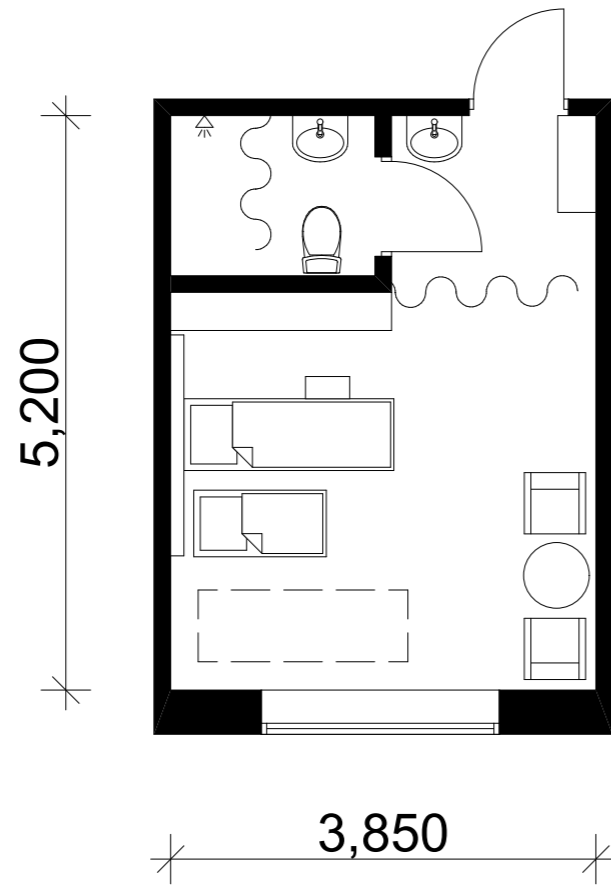


Outpatient plan zoom in 1:200

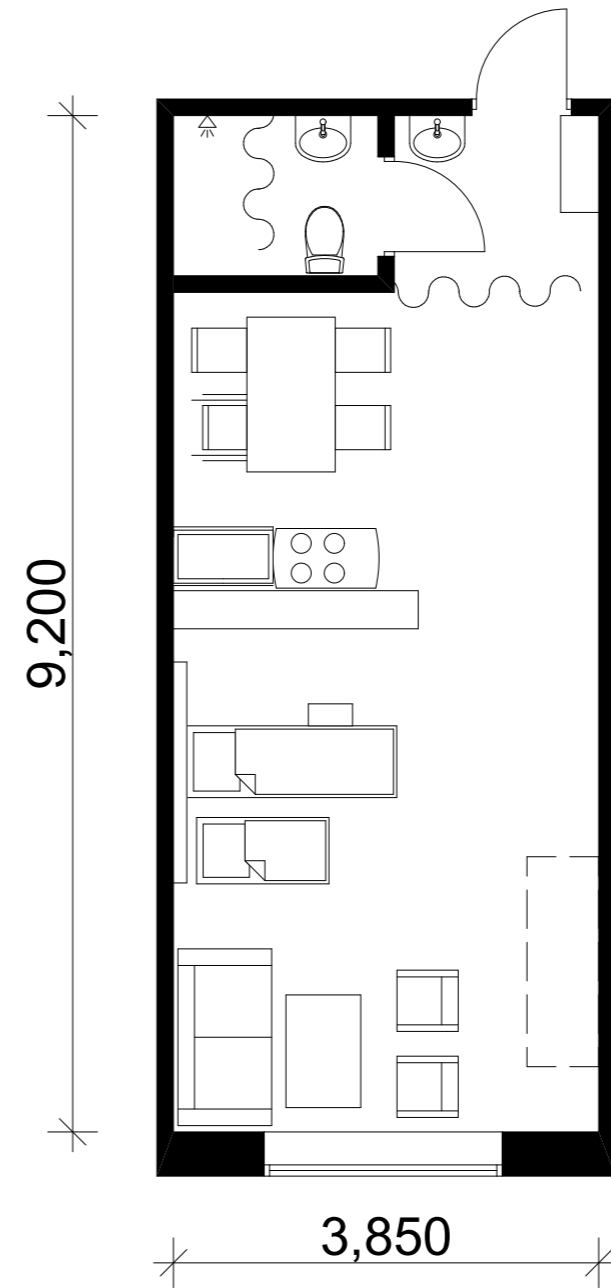


Inpatient plan zoom in 1:200

PATIENT ROOM



Patient Room A 20 sqm 1:50



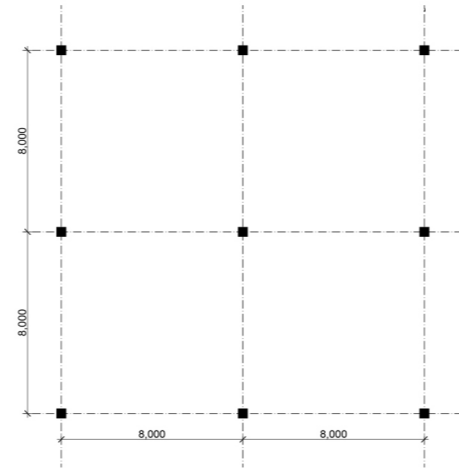
Family Patient Room B 35 sqm 1:50

CHAPTER 4 DESIGN PROPOSAL

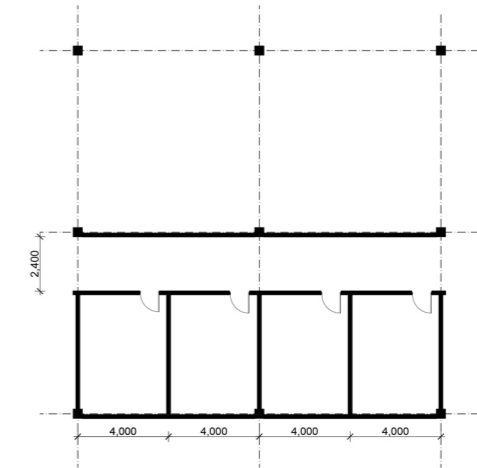
FLEXIBILITY

Healthcare facilities play an important role in society. Medical research makes achievements every day, but at the same time healthcare costs are rising and are becoming a problem for the financing systems (Olsson, 2011). Therefore, it is necessary to reach a high amount of efficiency both in the system (shift from treating to preventing) and in the work flows. For designers, a main challenge is how healthcare buildings can support this and adapt to changes in its internal and external environment in the future (Carthey, 2011).

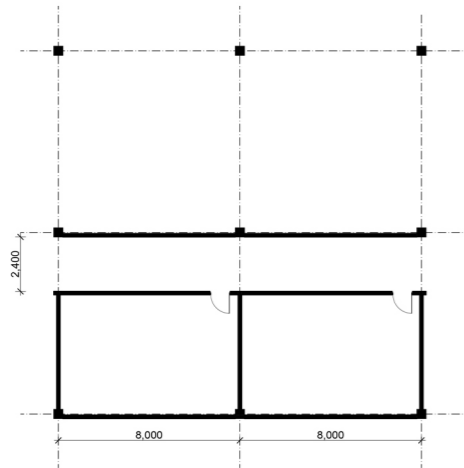
Ahmad (2014) states that space flexibility and standardisation are important when it comes to future-proofing. Due to the rapid changes in healthcare facilities, space flexibility can improve facility adaptability. Space standardisation can improve the quality of healthcare facilities and is more effective when applied to healthcare rooms.



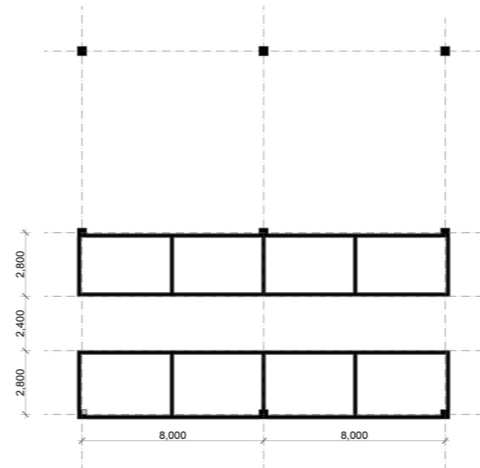
Separation of construction and wall, furniture. Grid system : 8m x 8m



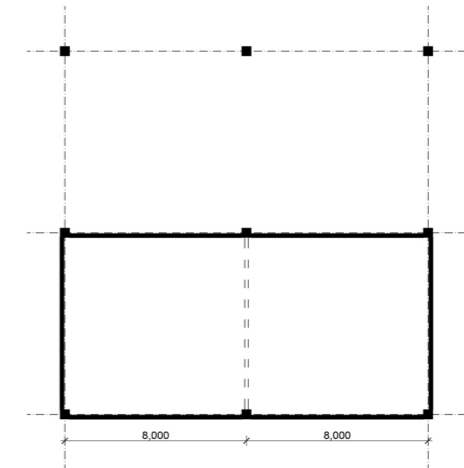
Type 1 : One corridor+two rooms 20 m²
Example : Patient rooms, Examination rooms, Treatment rooms, Group rooms...



Type 2 : One corridor+one rooms 40 m²
Example : CT, Group rooms, Technical rooms....



Type 3 : One corridor+four rooms 10 m²
Example : Study rooms, Group rooms, Offices, Storage....



Type 4 : One room 64m²
Example : Operation, Lecture room...

REFLECTION

1.Regarding the researching questions, I use two main solutions.Healing environment and community health, detailed strategies are classified into six types refering to positive health pillar.

2.To develop after the thesis, I will explore innovation in care process,new models for outpatient and inpatient department, for instance,by having survey and dialog, to see if the result will work.

3.Some improvements can be summarized. 1. Do not go linar from research to design. 2. Design early so that I can choose more options, which may come out diffenent proposals. 3. Read more references and care more healthcare detail solutions.

CHAPTER 5 REFERENCE AND IMAGES

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Figure 1, source:<http://www.boltonft.nhs.uk/services/maternity/information/complementary-therapies/yoga/>

Figure 2, source:<https://www.pinterest.se/pin/97038566951736423/>

Figure Ch.1-1, source:<http://www.inhousetech.se/ny-forsorjning-och-logistik-ostra-sjukhuset/>

Figure Ch.1-2, source:<https://www.google.com/maps/@57.7214354,12.0539404,3a,60y,267.39h,89.77t/data=!3m6!1e1!3m4!1s-Lr7bqAmK1JyiMRgHEF-vw!2e0!7i13312!8i6656>

Figure Ch.1-3, source:<https://www.flaticon.com/>

Figure Ch.2-1, 2-2, 2-3, 2-4 source:<https://whitearkitekter.com/se/projekt/drottning-silvias-barnsjukhus/>

Figure Ch.2-5, 2-6, 2-7 source:<https://www.archdaily.com/443648/new-hospital-tower-rush-university-medical-center-perkins-will>

Figure Ch.2-8, source:<http://ultimatemum.com/blog/top-3-changes-your-body-goes-through-during-pregnancy-/>

Figure Ch.2-9, source:<https://drugabuse.com/library/cocaine-pregnancy/>

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