HEALTHCARE CENTER IN FINSPÅNG

-A new highly specialised treatment building in Finspång

LEI QIAN 2014 SPRING MASTER THESIS CHALMERS
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ABSTRACT

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_ ABSTRACT

KEY WORDS:
CITY CONTEXT , TOPOGRAPHY, COMPLEXITY, NATURE, SUSTAINABILITY

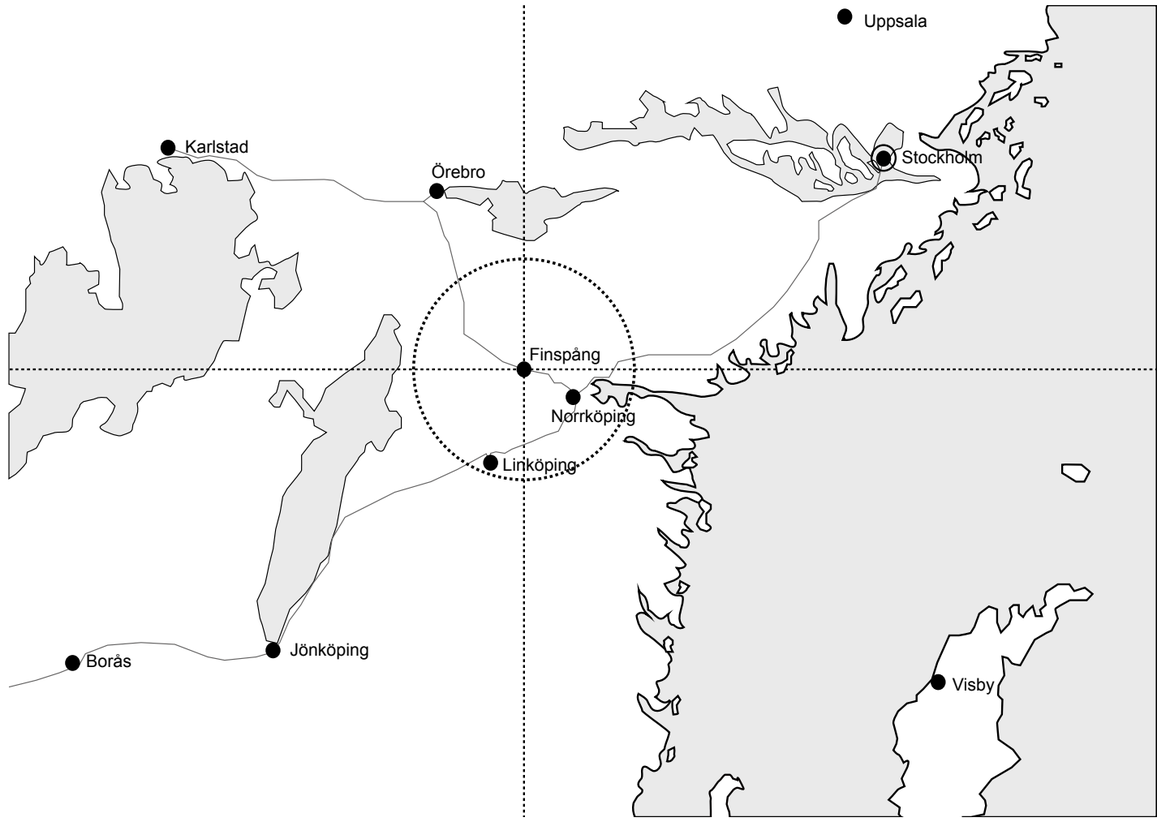
This master thesis project discusses how to deal with the relation between the volume of the building and the small city context.

The proposal focusses on analysing the surrounding topography of the site, making it convenient with regard to the logistic as well.

To highly investigate the theories about the healthcare design in the first step, meanwhile to reconsider its historical and cultural value,aesthetic value,ecological value and economic value for the new healthcare building in a sustainable way.

It aims at looking for a new design approach in order to make the building repect to the nature and finding a promising strategy for the challenge of the complexity.

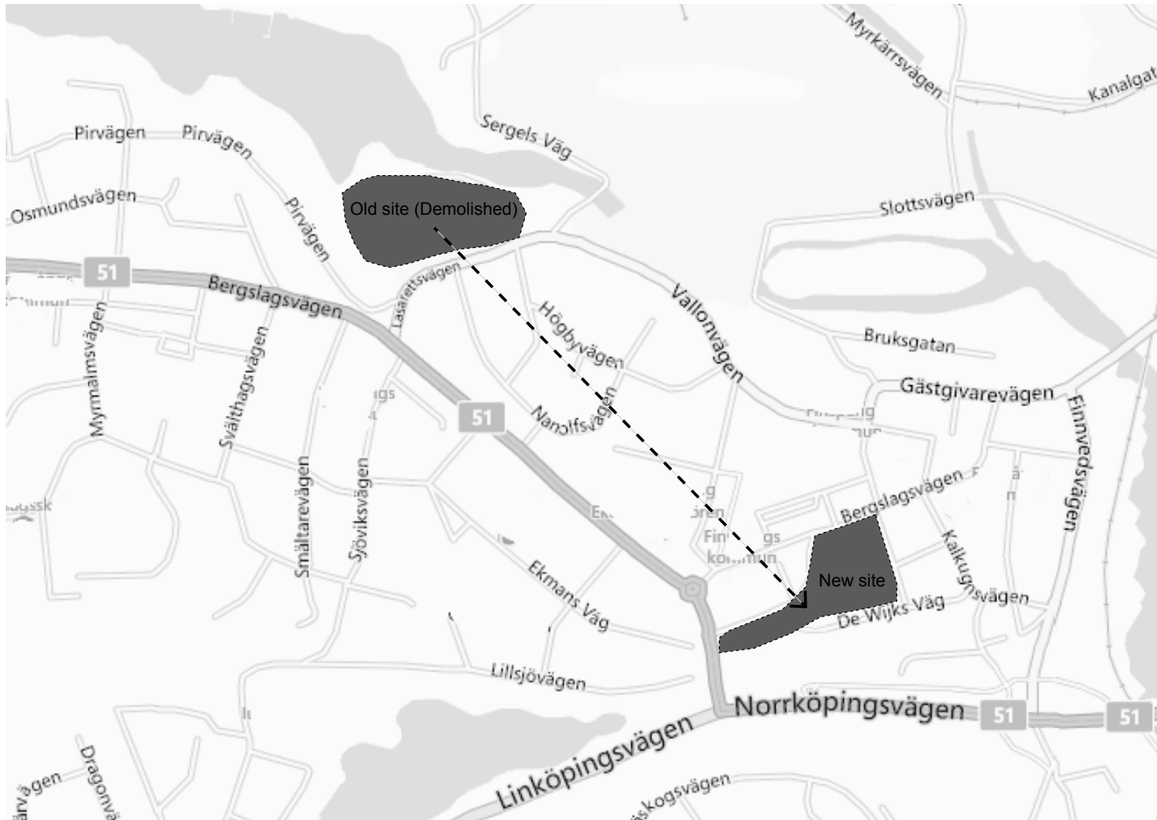
_ LOCATION



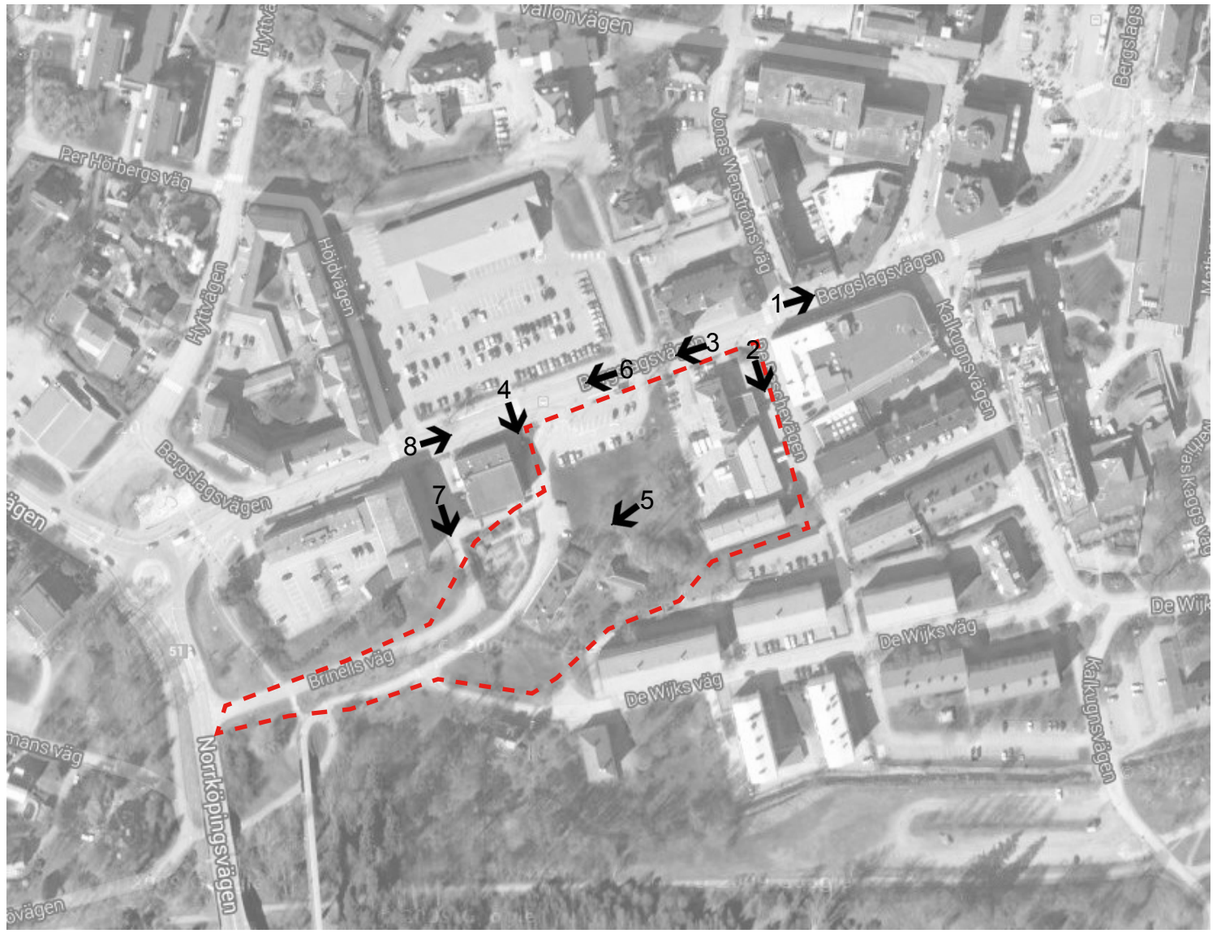
Finspång is an old industrial town and it belongs to Östergötland County, Sweden. Finspång is to the northeast of Linköping. And it is about 50 KM distance from Linköping to Finspång.

Based on the statistics on the website SCB, there are 20903 inhabitants including 5023 residents whose ages are above 65 until 31/12/2013. The average life expectancy in Finspång were 83 years for women and 78.9 years for men from 2005 to 2009. Currently, it seems that the number of older people who are over 65 and who are with multiple illnesses is increasing. The needs from the local people in Finspång for good quality of medical treatments and modern facilities are rising as well.

The existing hospital, which is a community healthcare center, has to be replaced with modern facilities. Many different healthcare specialty groups helped by Östergötland County Council will join in this hospital according to the plans of Finspång's municipality. Under the expectations of the local residents, the new healthcare center in the future should be more accessible to the people. And the total area of the building is expected to be approximately 16 000 square meter.



_ EXISTING SURROUNDING



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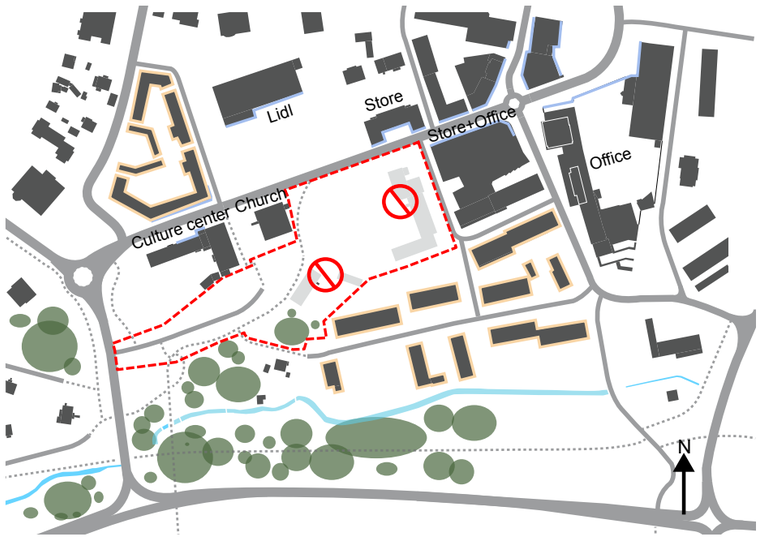
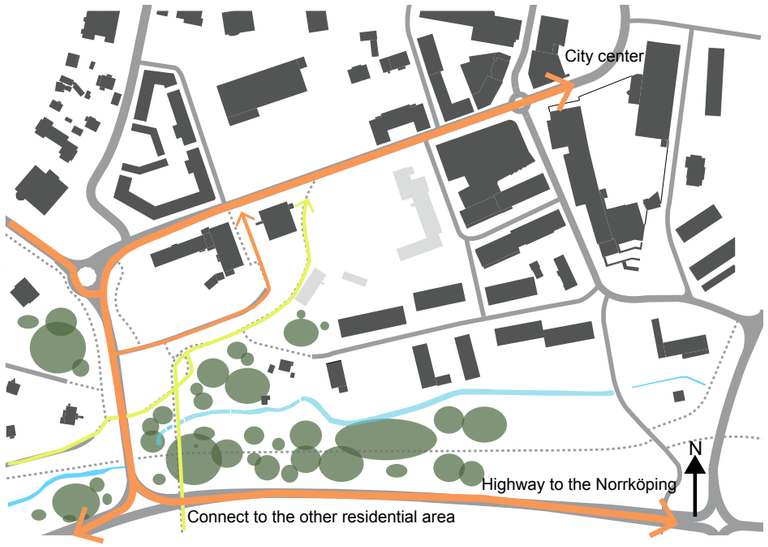
- The buildings around the site with different ages and styles
- The facade of the building is mixed without same pattern
- The typology is complicated

_ EXISTING SURROUNDING ANALYSIS



The site is near the city center. It is more accessible for residents to come. The road Bergslagsvägen which is on the northern part of site is the main road in the city. It is spread with lots of commercial stores and working office along the road. The location of big residential area is to the southwest of the site.



The road Bergslagsvägen is connected to the highway which is going to the Norrköping. And the branch of this road is going though the area between the church and culture center. It is also possible for people from another residential area to come to the site via the green color road.

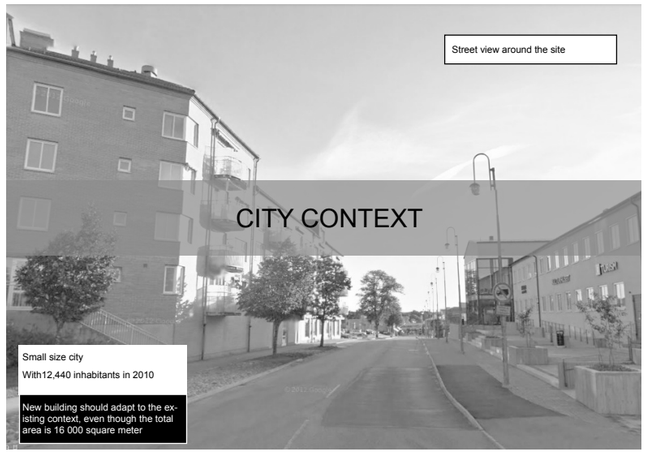
Plenty of forests on the southeastern side provide nice view for the future building. Three building inside the site now will be demolished in the future as the the plan. And three large areas which are showing in the picture with grey color might be utilised to be parking space in future.

Name:	LIDL supermarket	Church	Center store	Culture center	Healthcare center	Store + Office
User:	Residents	Residents	Tourists	Residents	Patients	Office worker
Height:	15 m	15 m	16 m	25 m	30 m maximum	30 m

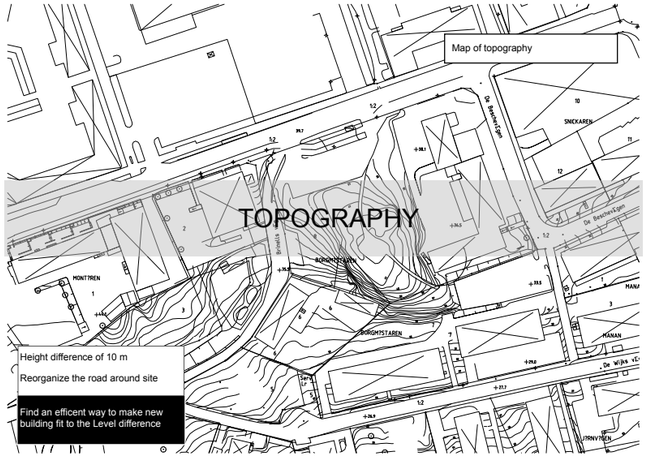
_Scale comparison

The estimated height limatation regarding the regulation around the site is 30 m.

_ DESIGN CHALLENGES

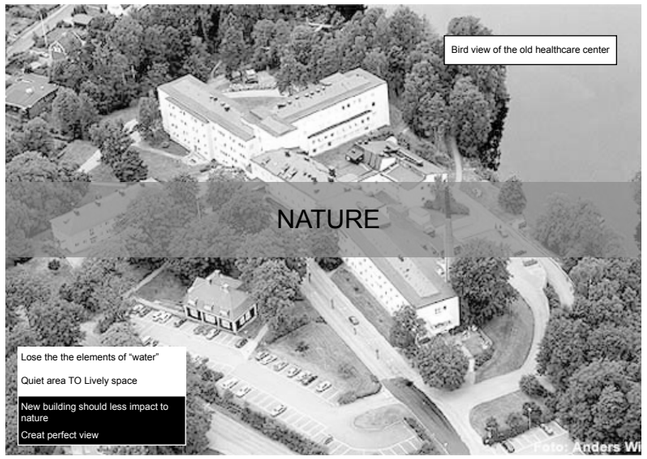


Finspång is a small scale city. The height of buildings around the site is below 25 m. The new building can't be too large scale, and otherwise it will destroy the whole city context. It is vital to lessen the impact of the new building to the surrounding buildings.



The topography near the site is complicated with a lot of cliff and slope, especially on the south side. How to deal with the topography is largely related to the site plan. On the other hand, the small hill in the middle of the site provides people a good chance to get great view.

The new healthcare building is included with several programmes. It seems to be a complex building with 16000 square meter size. It is important to cope with all logistics and relations among different functions.

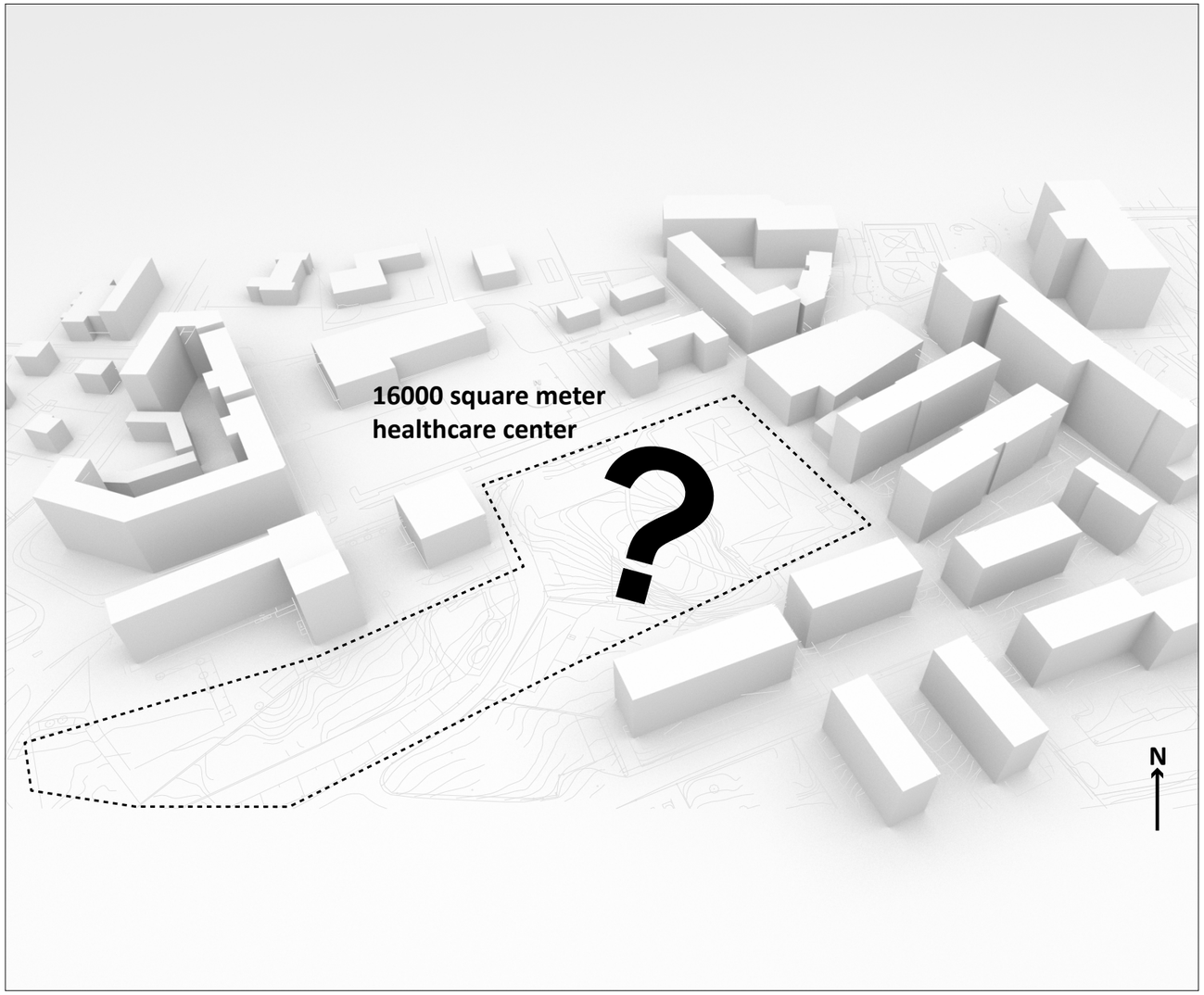


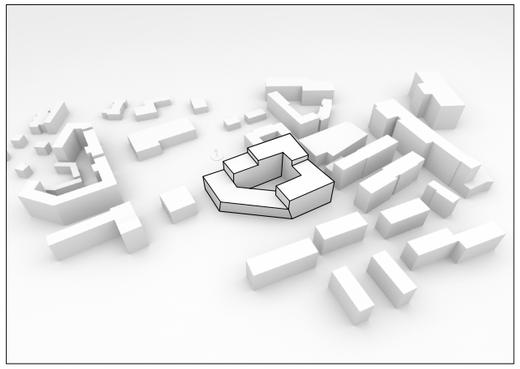
The old site of the healthcare building is easily approaching to the rivier. The new building has to be moved to center area. Fortunately, the site is easily access to the green forest. The way of the design will be related to this merit.

Due to industial city of Finspång, it generated lots of problems regarding the sustainability. The new building should be less impact to the nature, and it is better to find a great approach to fulfill the sustainable goal.

In generally, the function inside hospital building will change constantly with time going. The building designed would be better for future extension. Flexibility is the main character for the healthcare building design.

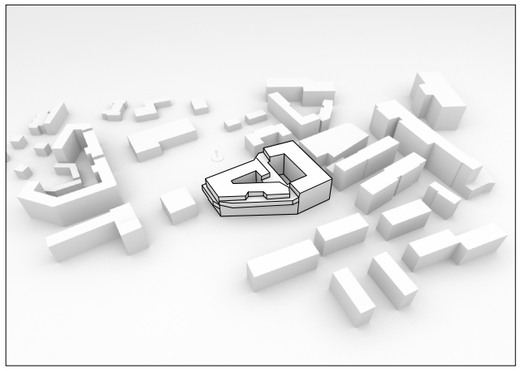
_ WORKSHOP





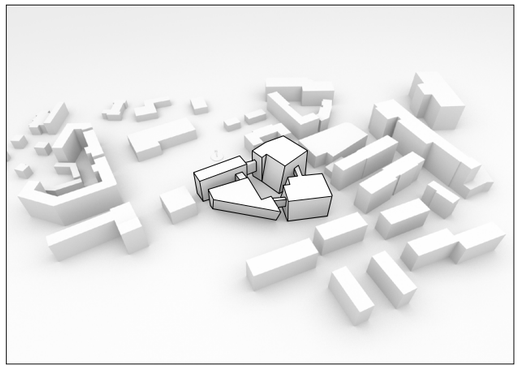
A: Inner courtyard, "step" shaped roof, well connected

W: Large scale, shadow in the courtyard



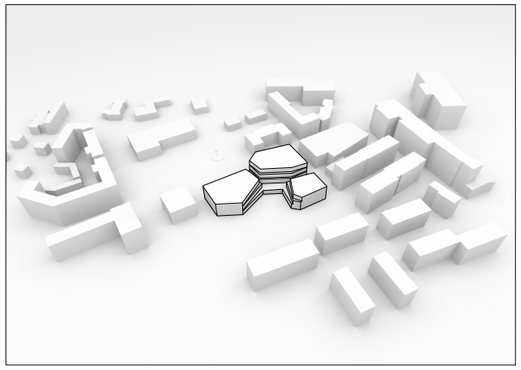
A: Inner courtyard, "step" shaped roof, well connected green roof

W: Large scale, shadow in the courtyard



A: Inner courtyard, seperated buildings, more sunshine

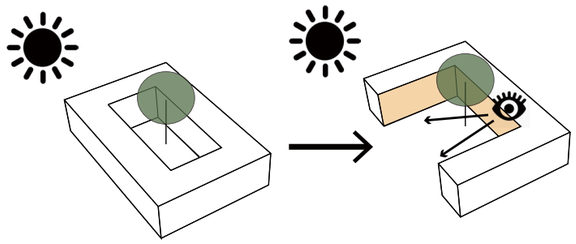
W: Less connection between units



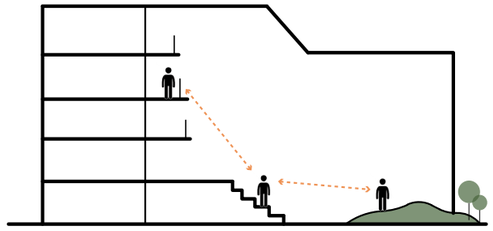
A: seperated buildings, more sunshine

W: Less connection between units, less privacy

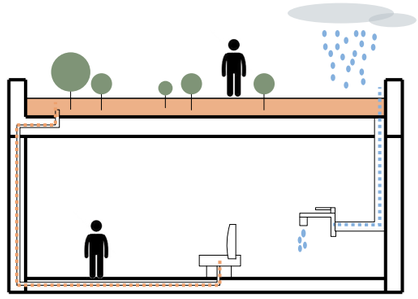
_ CONCEPT



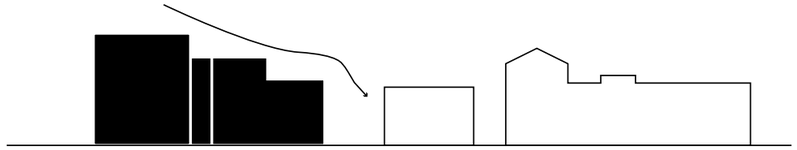
OPEN COURTYARD
It is good way for the building more opportunities to get the sunshine and views.



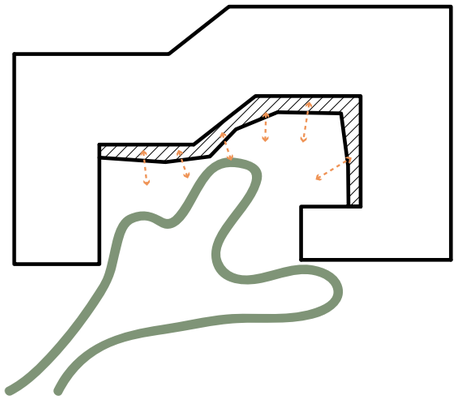
VISABILITY
Semi-public courtyard and "step" shaped ground floor give more opportunities of communication to people from different palces.



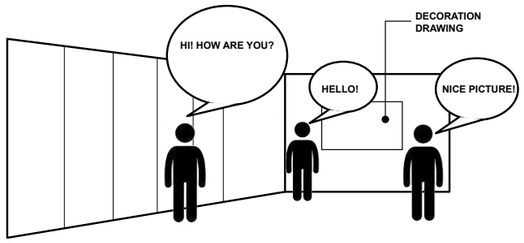
GREEN ROOF
It is important for patients inside enjoying the landscape. The water from the rain can be collected to wash. The grey water could be used to be the chemical fertilizer of the plants on the roof.



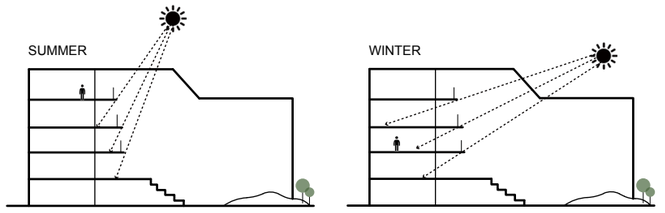
SIMPILIFY THE VOLUME
The big scale building with 25m height will be a great impact to the surrounding buildings. To change the roof into the "step" shape, indeed, reduces that situation. The green area on the roof is also providing the good view for the other building and catering to the current city texture as well.



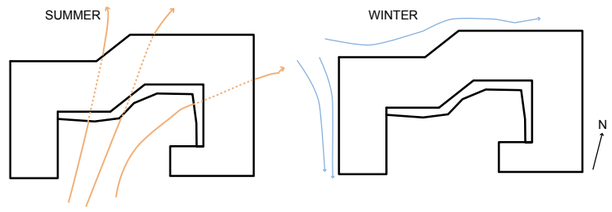
ADD OUTSIDE CORRIDOR
More space for relax, introduce the green view into the south part of the building.



COMMUNICATION SPACE
Large space of the atrium plays a great role in communication among the residents. The decoration drawings are important parts of the hospital environment. According to research, art can be a stress-relief and improves recovery.

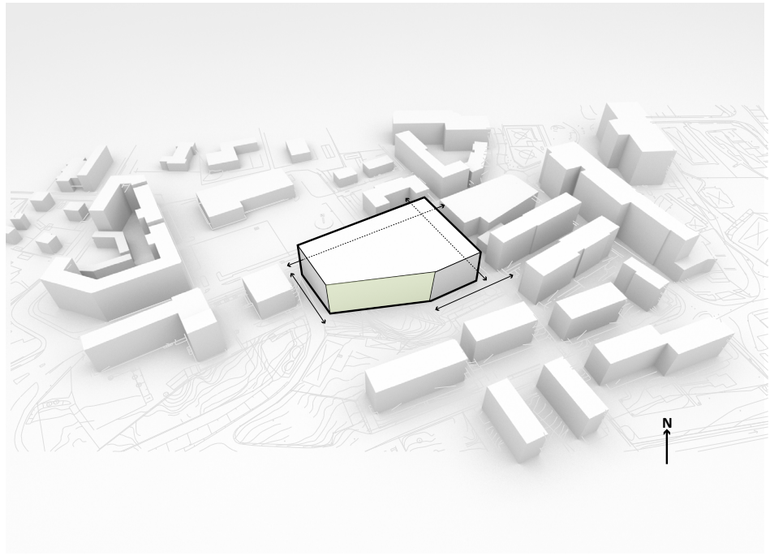


SHELTER
Outside corridors can be used for shelter especially in the summer time. It is a sustainable way for saving energy of cooling. On the other hand, planty of sunshine will go into the inner space of building.



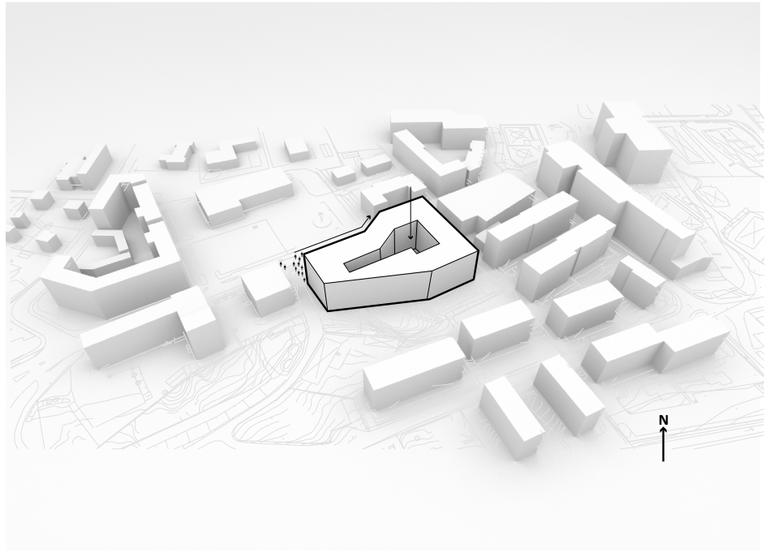
WIND PROTECTION
According to the wind direction in Finspång, in the summer time, the wind can go though the building, which enhances the natural ventilation. The wind in the winter time is stopped by the shape of the building.

_ VOLUME STUDY



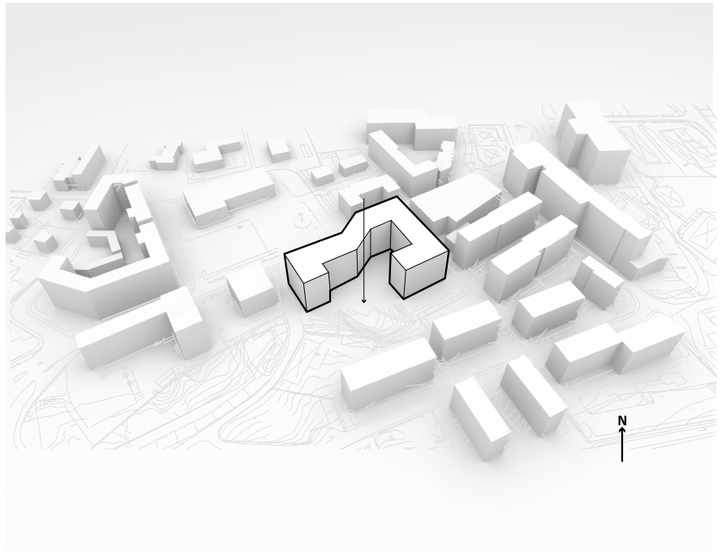
CREATE THE BASIC VOLUME

Draw the lines along the existing road to create a simple volume. The green surface is parallel to green forest.



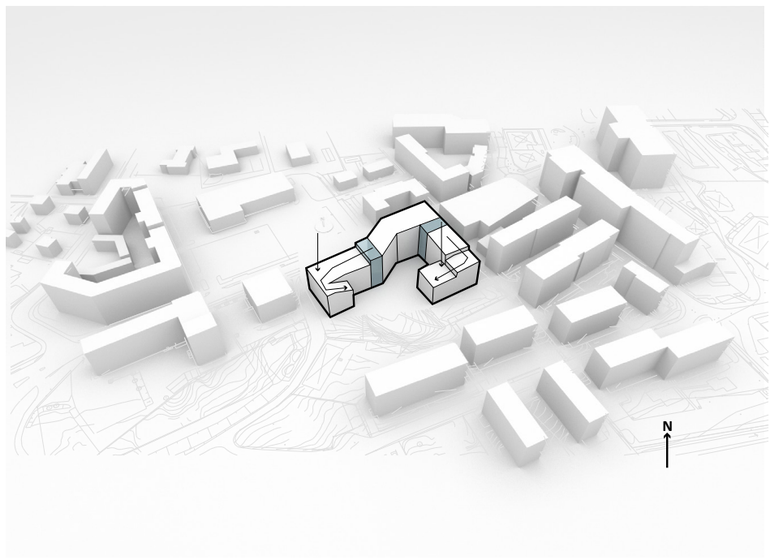
CREATE COURTYARD AND SQUARE

Make the inner courtyard in order to develop communication space. In the front of the main entrance is a large square for people getting together.



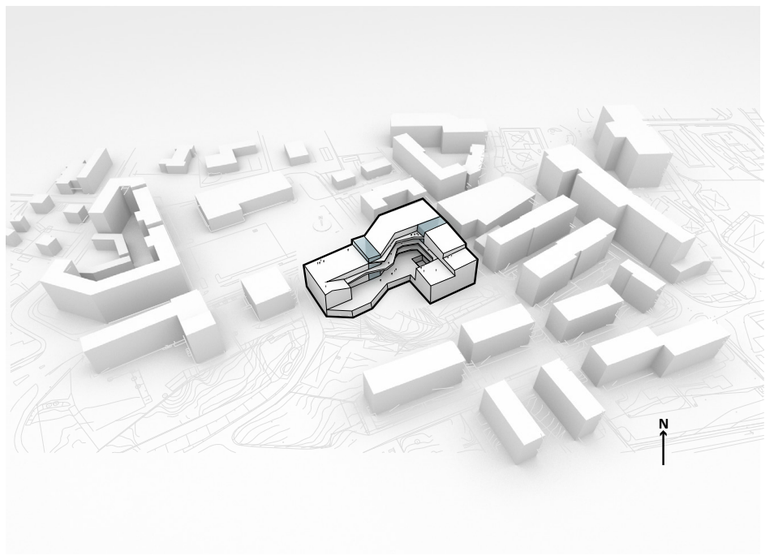
OPEN THE COURTYARD TO THE NATURE

More space in the building can get the sunshine, fresh air and green view.



SIMPILIFY THE VOLUME

After dividing the building into three parts, connect them with glassing vertical units. Change the roof into slope, lessen the impact to the other buildings.



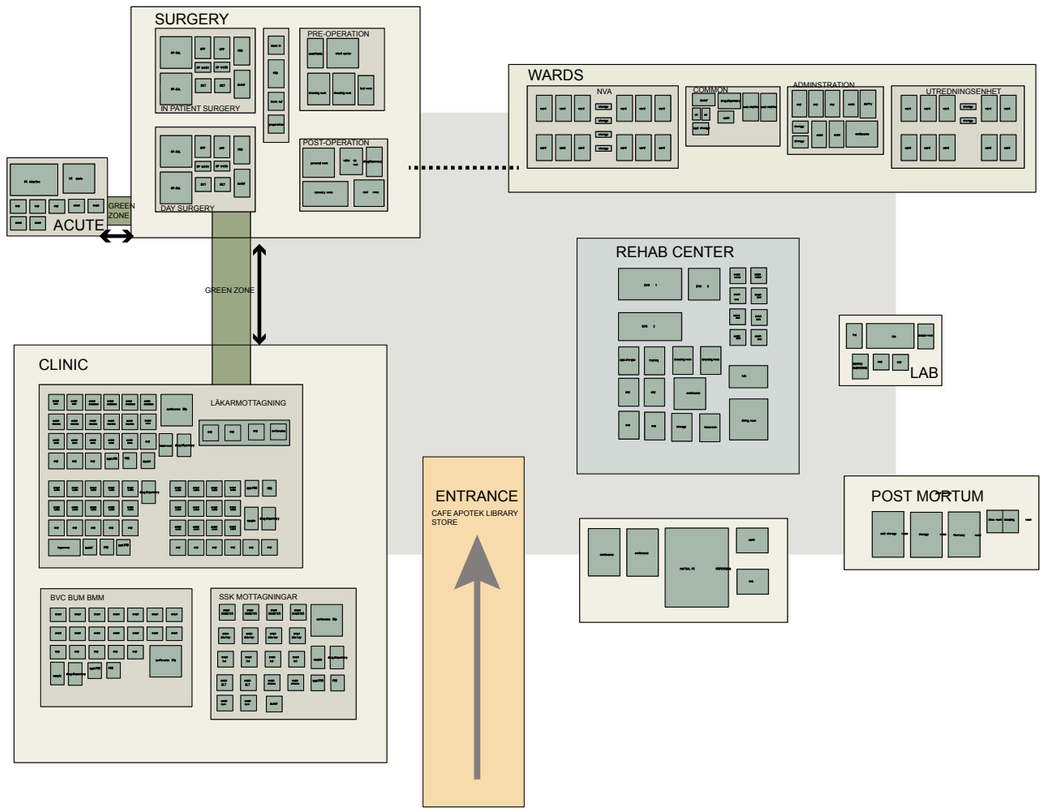
CONNECT IN 1st FLOOR AND MAKE OUTSIDE CORRIDOR

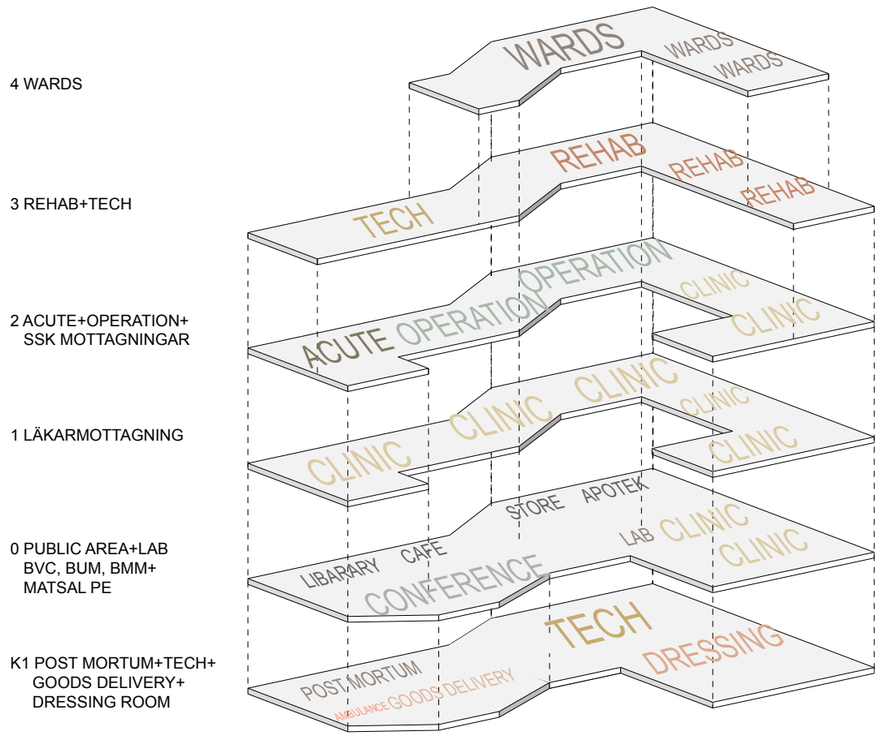
To connect the ground floor is in order to create indoor communication space. Outside corridor is great for people going outside to have fresh air and enjoy the sunshine.

MAKE THE GREEN ROOF

Turning the slope roof into green area is providing the nice view for surrounding building as well.

_ PROGRAM AND LAYOUT





Due to the height difference on the southeastern part of site, the staff entrance is set up in that area. On the floor -1, there are two distinct dressing rooms for the staff. On the eastern wing of the floor -1 is post-mortem and the entrance of the acute area. The embulance is easily parking inside the southwest of the building, which reach to the floor 2 acute center and operation floor as soon as possible. Goods storage and delivery center are arranged in the floor -1 as well, and it seems convenient for logistics of the goods.

On the northern side of the ground floor is commercial extension along the facade including cafe, library and pharmacy. The atrium is in the middle of the ground floor, which provides the residents big communication space. Two big conference rooms and 100 persons dininig are on the west of the atrium. Meanwhile, the atrium would be a buffer area for gathering people. The lab and children and antenatal care clinic(BVC, BUM, BMM)are arranged on the east of ground floor.

The clinic(LÄKARMOTTAGNING) in the floor 1 is separated into three parts, which are connected by the two common inner waiting areas. Vertical connections are set up in the glassing part. Floor 2 is acute center, operation including day surgery and in-patient surgery and clinic (SSK MOTTAGNINGAR). Floor 3 is rehab center with gyms, kitchen and exam room including. The gym is connceted to the outside wooden corridor. Wards (run by NVA and UTREDNINGSENHET) are on the top floor in the healthcare building,which is easily access to green roof.

_ HEALTHCARE CENTER DESIGN THEORY

RELEVANT IDEAS AND CONCLUSIONS ABOUT HEALTHCARE CENTER DESIGN

GREAT HEALING ENVIRONMENT

Good healing envirment depends on satisfactory communication between the patient and the health doctor. Therefore, it is important that the hospital's design makes provision for satisfactory interaction in many parts of the hospital. It is a good start from a patient's perspective. Physical surroundings play a great role inside the hospital design. In other words, nice healing environment successfully create surroundings which have the potential to function satisfactorily for many years to come. And different interior decorations play different roles towards sickness, for example, a tranquil interior contributes to a relaxed body and mind, which is a good basis for sound health.

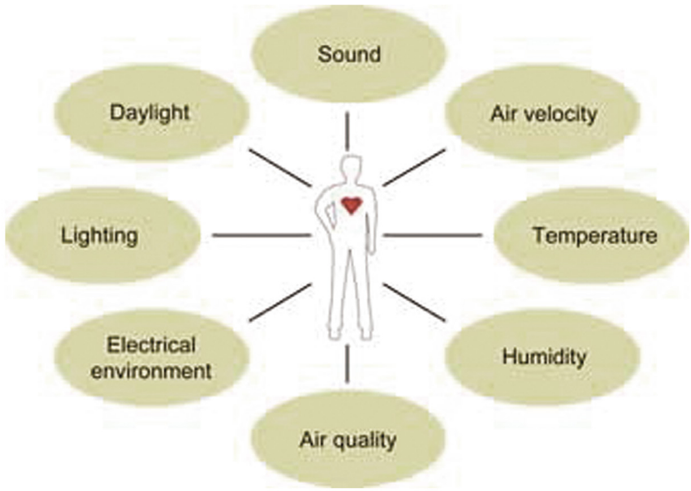
SPACE FOR CONTACT AND COMMUNICATION

A useful starting point for the design of hospital interiors is the awareness of the human being's ability and need to create a range of spatial boundaries around one's own body, person or group. These different boundaries and spatial levels are necessary for the individual to be in contact with theirown self, and therefore to be able to communicate in the most effective possible way with others.

In the healthcare building, many units with regard with large inner communication area will be set up and the private space as well. Interior of waiting space is vital to be decorated into special healing feeling. Near the entrance space, a spacious foyer or atrium with an open reception creates a generous, accessible and friendly atmosphere with associations to a hotel or a similar service institution.Further up in the building, the environment is characterised by separation and quietness. Meanwhile, individual space is mainly a psychological space. Boundaries and control over one's individual space are crucial to the human being's ability to relax and feel safe.

ROOF LANDSCAPE

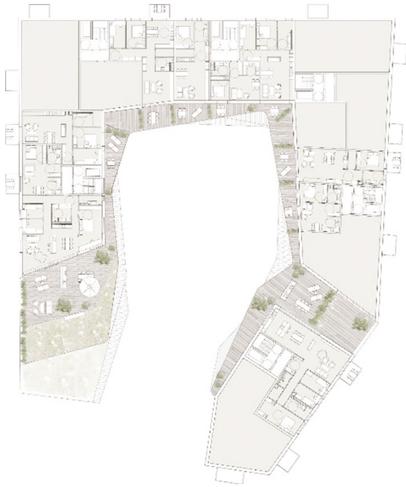
It is suggested that the roof of the hospital gives attractive vegetation. Roof terraces with vegetation give outdoor space and views for the personnel, and also form an attractive eye-catcher from floor levels above.The ambition is that the environment shall contribute to patients and relatives feeling as relaxed as possible during their time in the hospital. The nice green view also provide the staff the opportunities to get fresh and gain more energy to repay attention to their working.



_ CASE STUDY

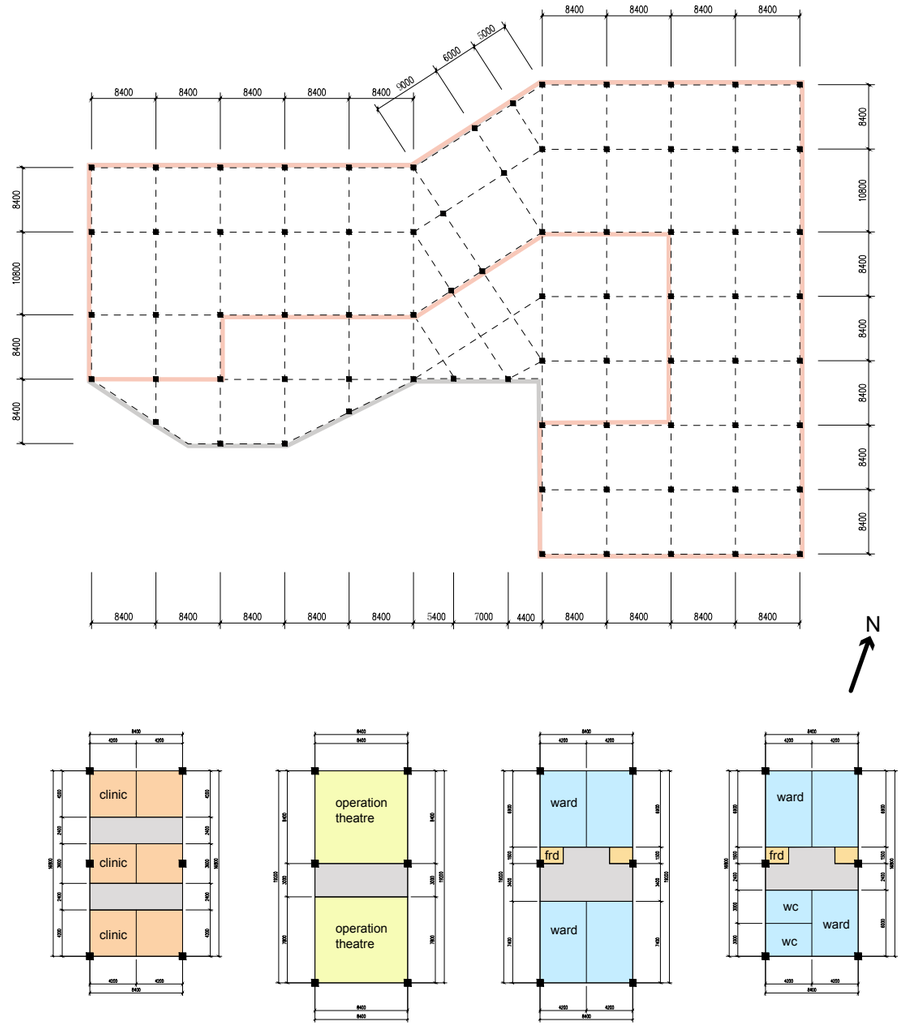
The picture is showing that 35000 square meter social hub in the Oslo harbor. The Bispevika mixed-use development proposal by PUSHAK wants to maximize the views of the harbor and integrates passive design methods to minimize energy use. The buildings wrap around a wooden terraced courtyards, providing play spaces and introducing the island-like nature into the site. Passive solar heating minimizes heat loss. Nearly all units have a private balcony or terrace. Semi-public pavilions further buffer the boundary of public and private while creating pleasant outdoor spaces. Common rooftop terraces provide all residences access to the ultimate views. 1

On the southeastern side of the my site is a greet view as well. The proposal of this architecture company provide a way to enhance the views of green forest. It is a useful way to make this kind of semi-public wooden terraced couryards. That solution provides common spaces and introducing the nature into the healthcare building. Moreover, the healthcare building becomes sculpture itself, which provide a great view to the surrounding building.



1 PUSHAK, Competition Entry for Bispevika Development in Norway (http://www.archdaily.com/186555/competition-entry-for-bispevika-development-in-norway-puskak/)

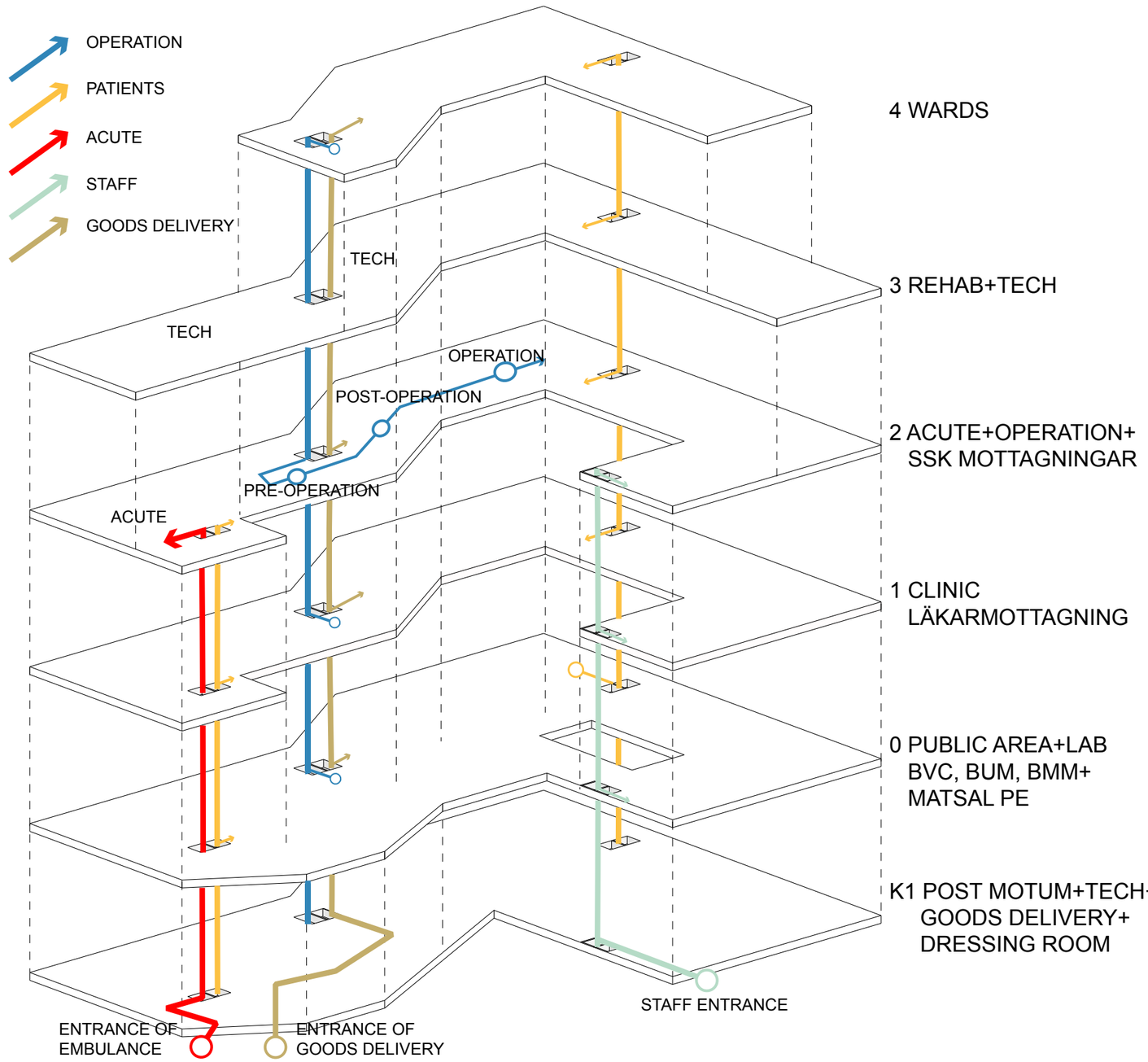
_ GRIDS AND FLOWS



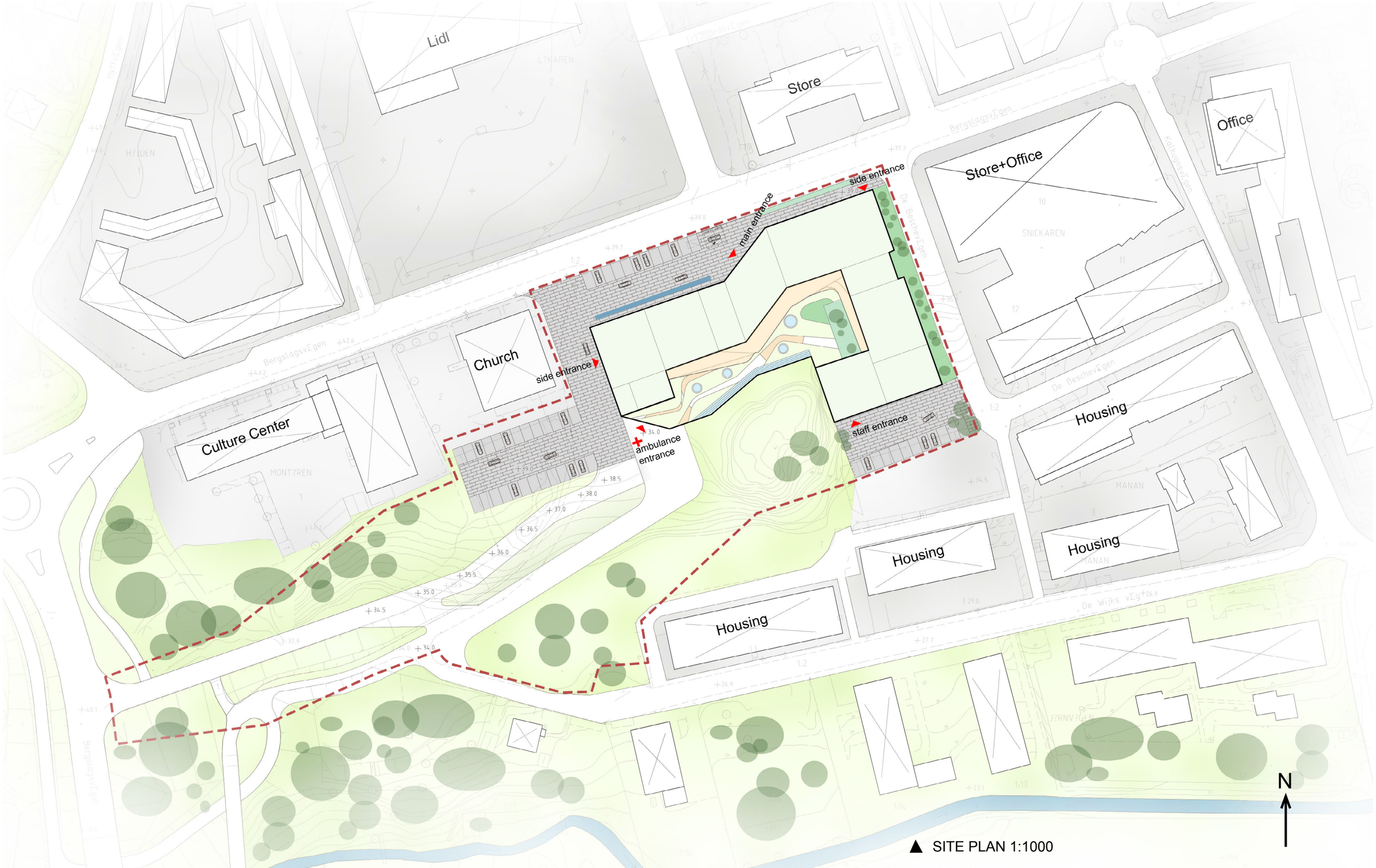
- Grids about 8.4m × 8.4m is flexible to arrange the clinic with double corridor system and is easy for the future reconstraction as well.

- In the operation floor, two operation theatre is using the same corridor with 3m width, which is useful for large operation equipment movements.

- Due to the different sizes of grids, there are two types of wards. It seems more convenient to combine the storage room with the wards.

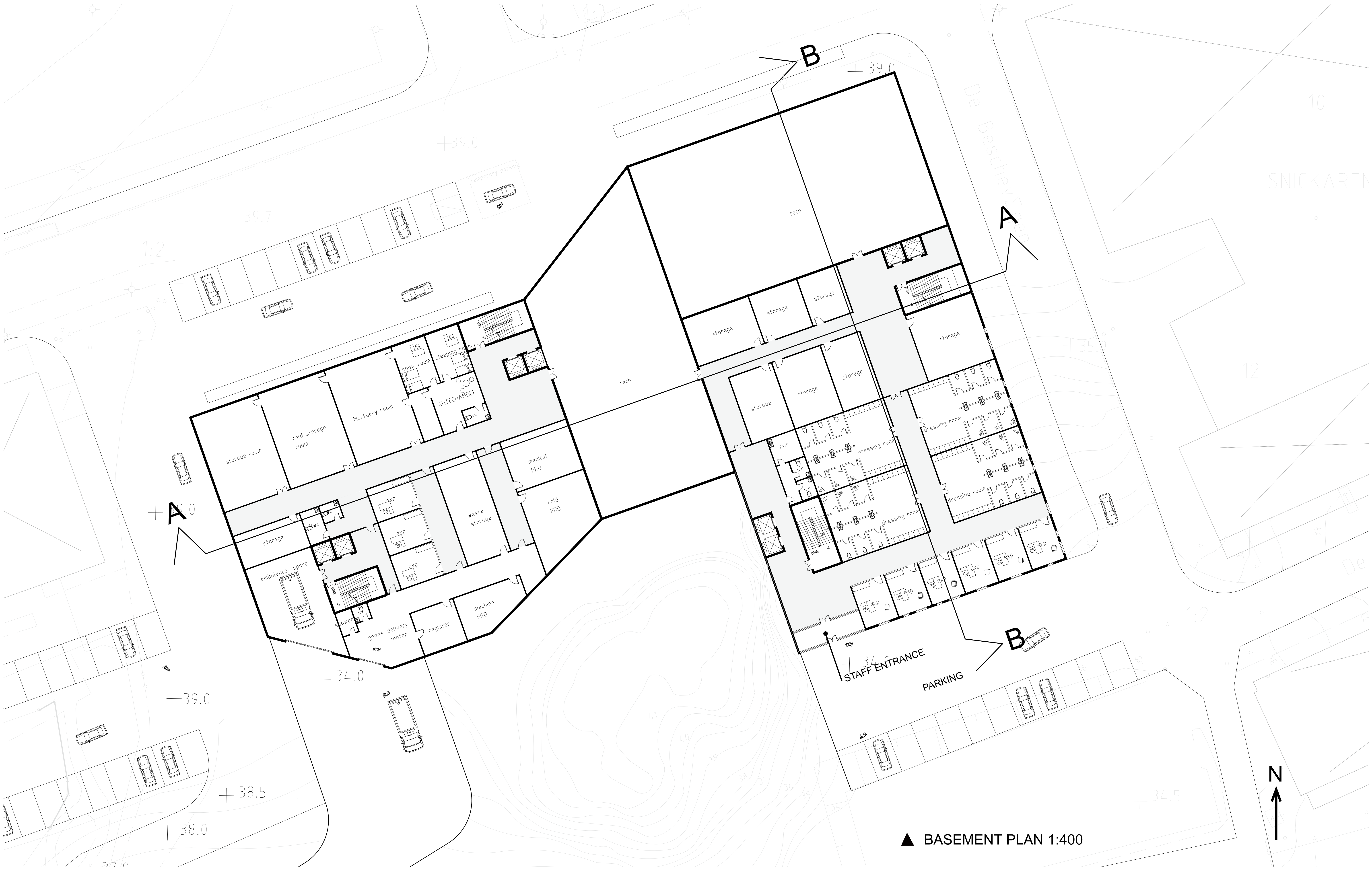


_ SITE PLAN



▲ SITE PLAN 1:1000

_ BASEMENT POST MOTUM+TECH+GOODS DELIVERY+DRESSING ROOM



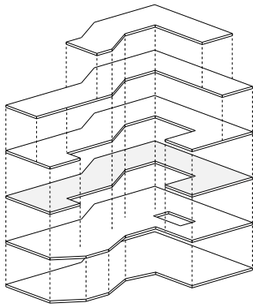
▲ BASEMENT PLAN 1:400

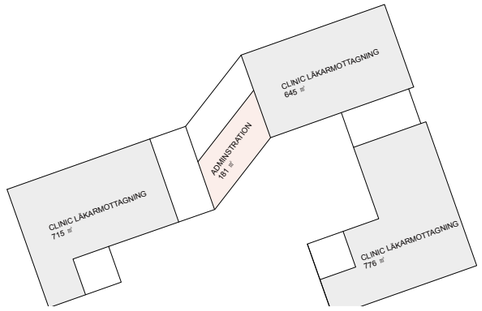
_ GROUND FLOOR PUBLIC AREA+LAB+BVC, BUM, BMM+MATSAL PE

▲ GROUND FLOOR PLAN 1:400


RECEPTION

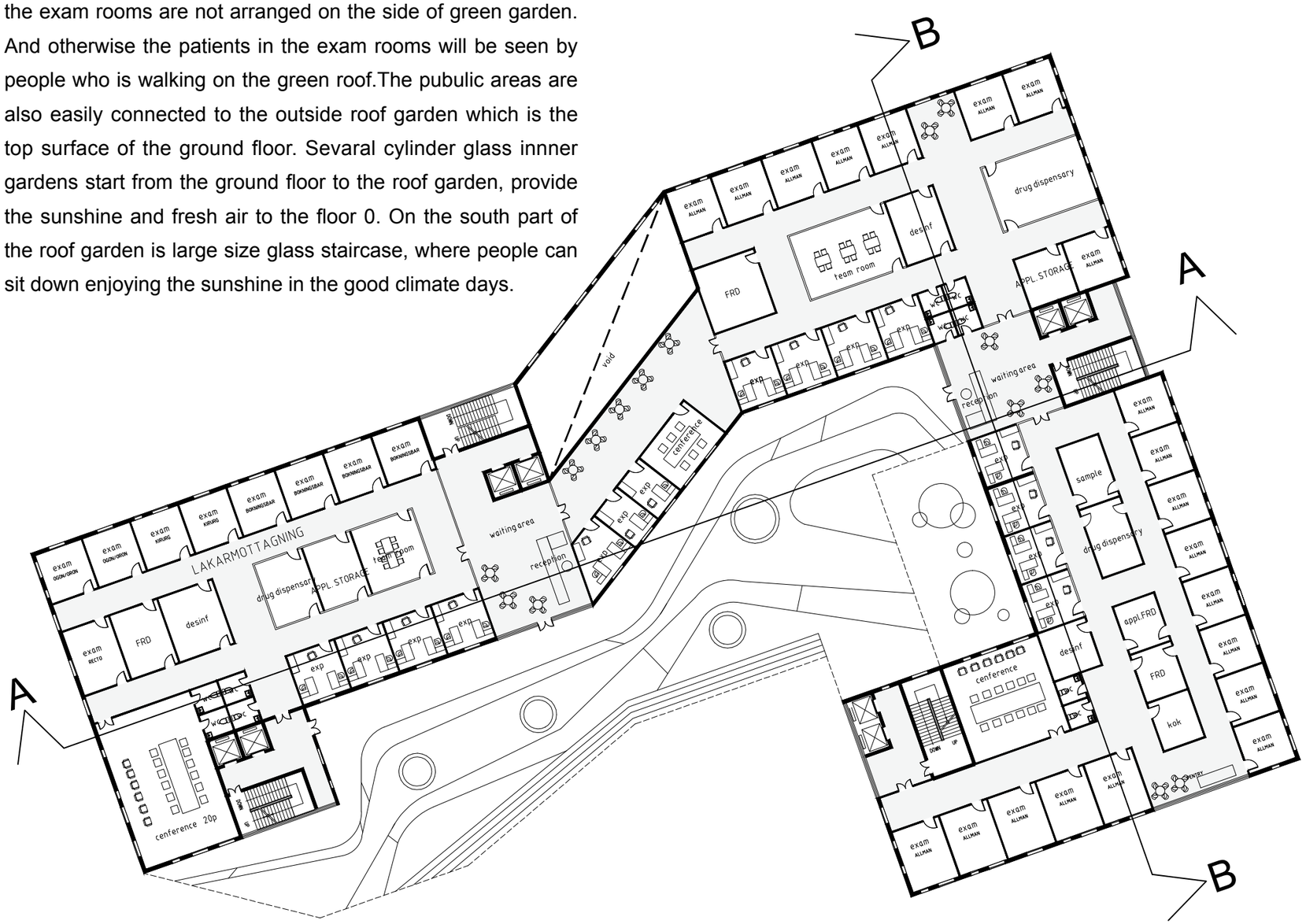
_ FLOOR 1 CLINIC LÄKARMOTTAGNING





The LÄKARMOTTAGNING clinic is the tenant of this floor. This floor is divided into three parts, which are connected by the two public areas. I want to keep the privacy of exam rooms, so all of the exam rooms are not arranged on the side of green garden. And otherwise the patients in the exam rooms will be seen by people who is walking on the green roof.The pubulic areas are also easily connected to the outside roof garden which is the top surface of the ground floor. Sevaral cylinder glass innner gardens start from the ground floor to the roof garden, provide the sunshine and fresh air to the floor 0. On the south part of the roof garden is large size glass staircase, where people can sit down enjoying the sunshine in the good climate days.

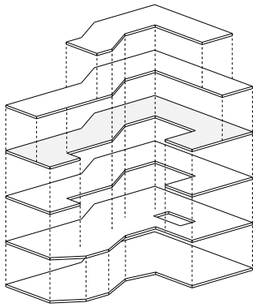
◀ ZOOM IN FLOOR PLAN 1:200



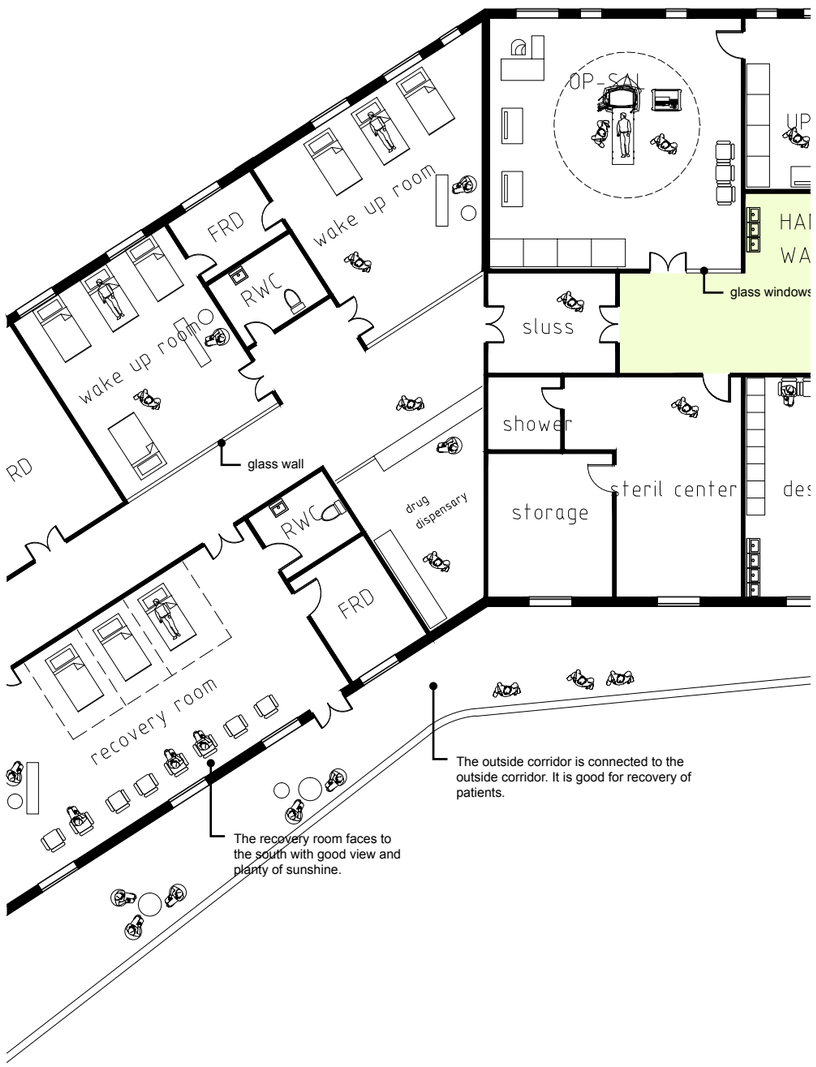
▲ FLOOR 1 PLAN 1:400

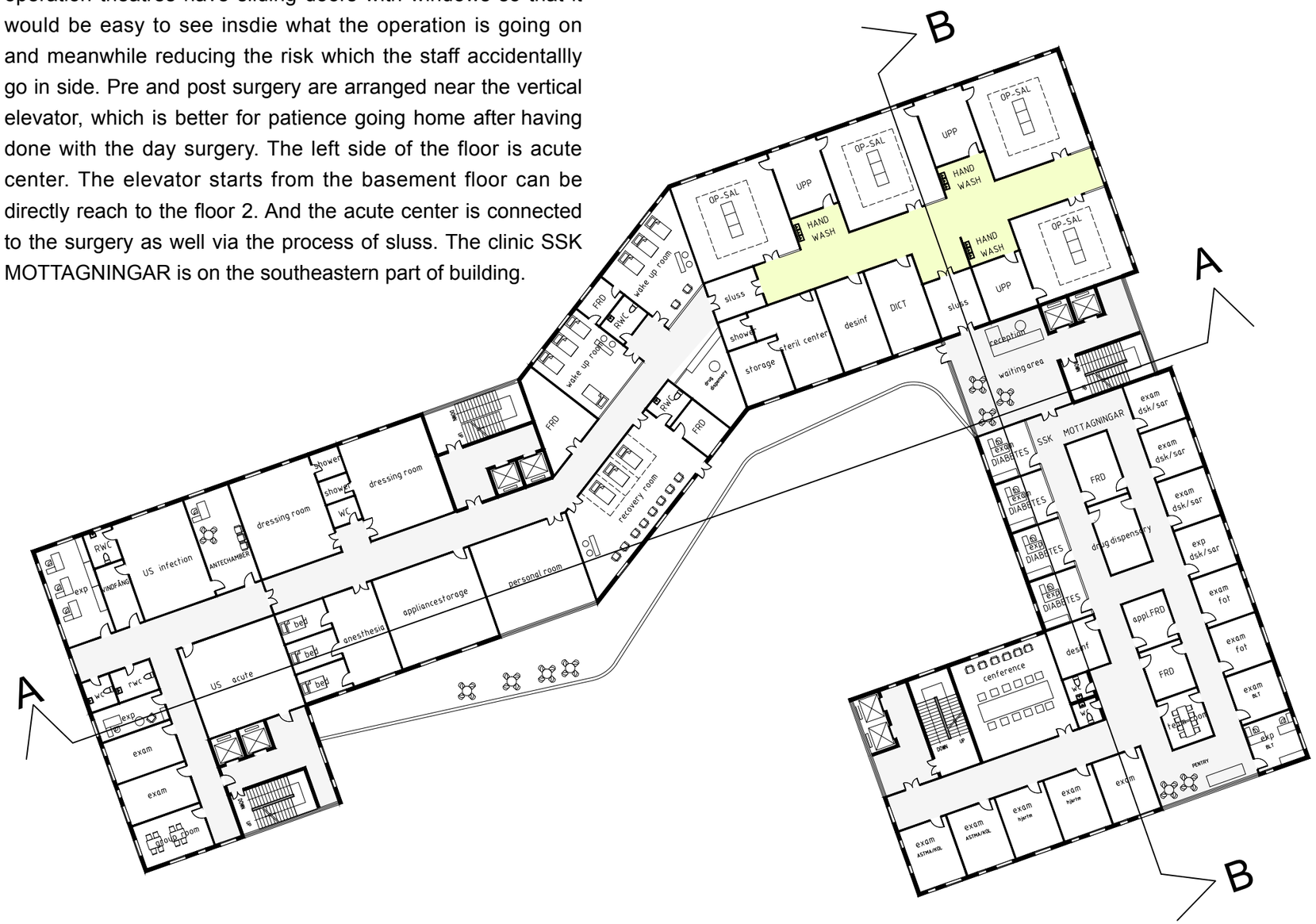
N

_ FLOOR 2 ACUTE+OPERATION+SSK MOTTAGNINGAR



The four operation theatres with the ventilation that brings clean air to the innner space in order to improve the sterile environment. Regarding the suggestions of the doctors, the operation theatres have sliding doors with windows so that it would be easy to see insdie what the operation is going on and meanwhile reducing the risk which the staff accidentallly go in side. Pre and post surgery are arranged near the vertical elevator, which is better for patience going home after having done with the day surgery. The left side of the floor is acute center. The elevator starts from the basement floor can be directly reach to the floor 2. And the acute center is connected to the surgery as well via the process of sluss. The clinic SSK MOTTAGNINGAR is on the southeastern part of building.

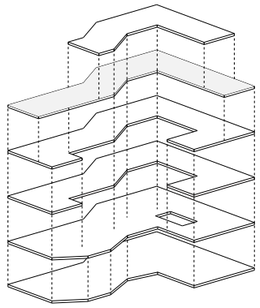


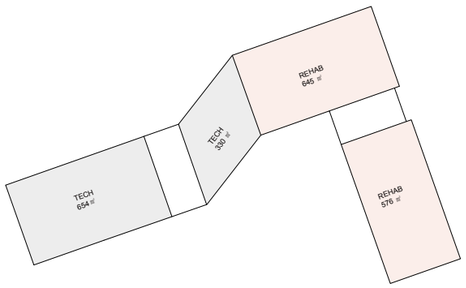


◀ ZOOM IN FLOOR PLAN 1:200

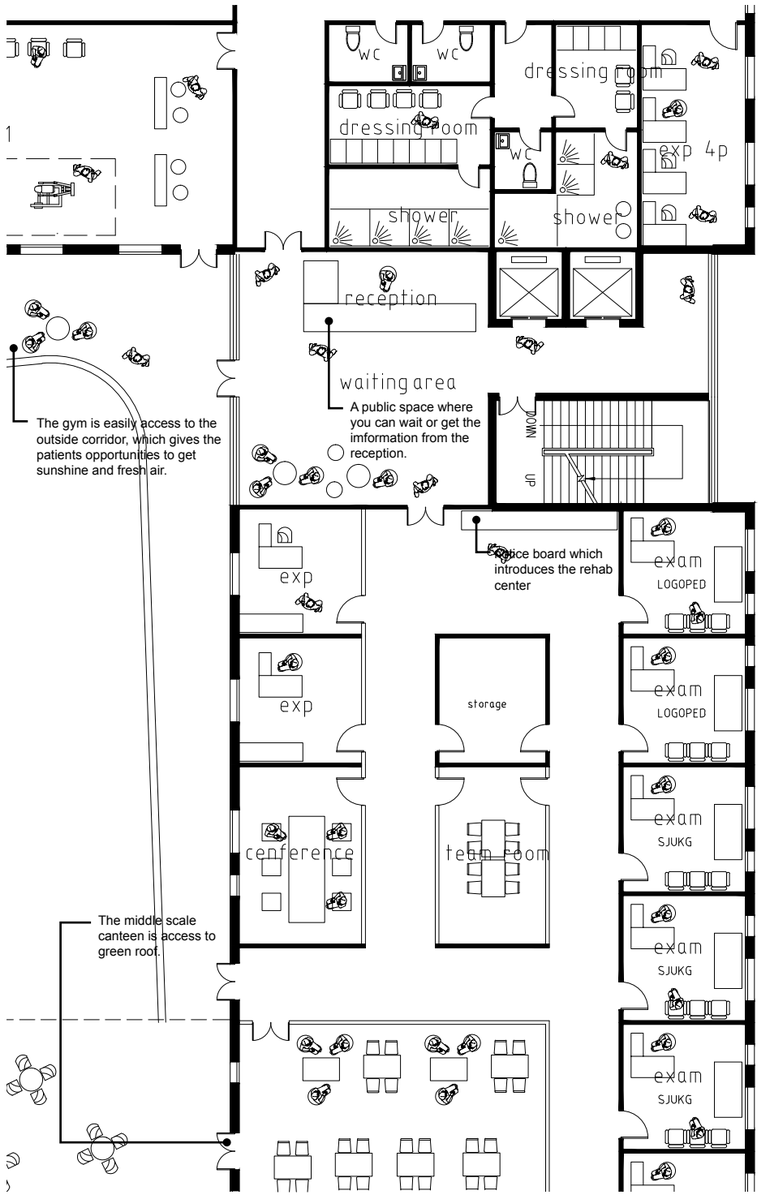
▲ FLOOR 2 PLAN 1:400

_ FLOOR 3 REHAB+TECH





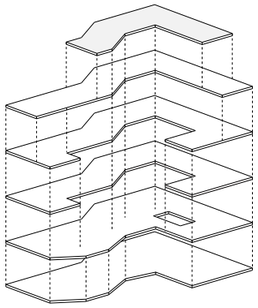
Rehab center is included with exam rooms, training room, gyms, and a middle scale size canteen. The whole rehab center is divided into two parts, which are connected by the public waiting area in the middle. Meanwhile, this area is also easily access to outside corridor. And so do the gym, which can get fresh air inside. All the exp rooms faces to the south getting perfect view. On the other hand, the exam rooms are arranged along the east facade, due to the problem of privacy. On the western side of the building is technical floor.

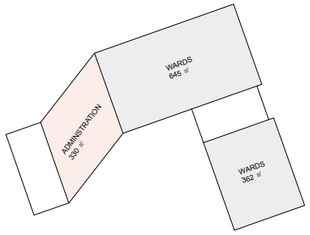


◀ ZOOM IN FLOOR PLAN 1:200

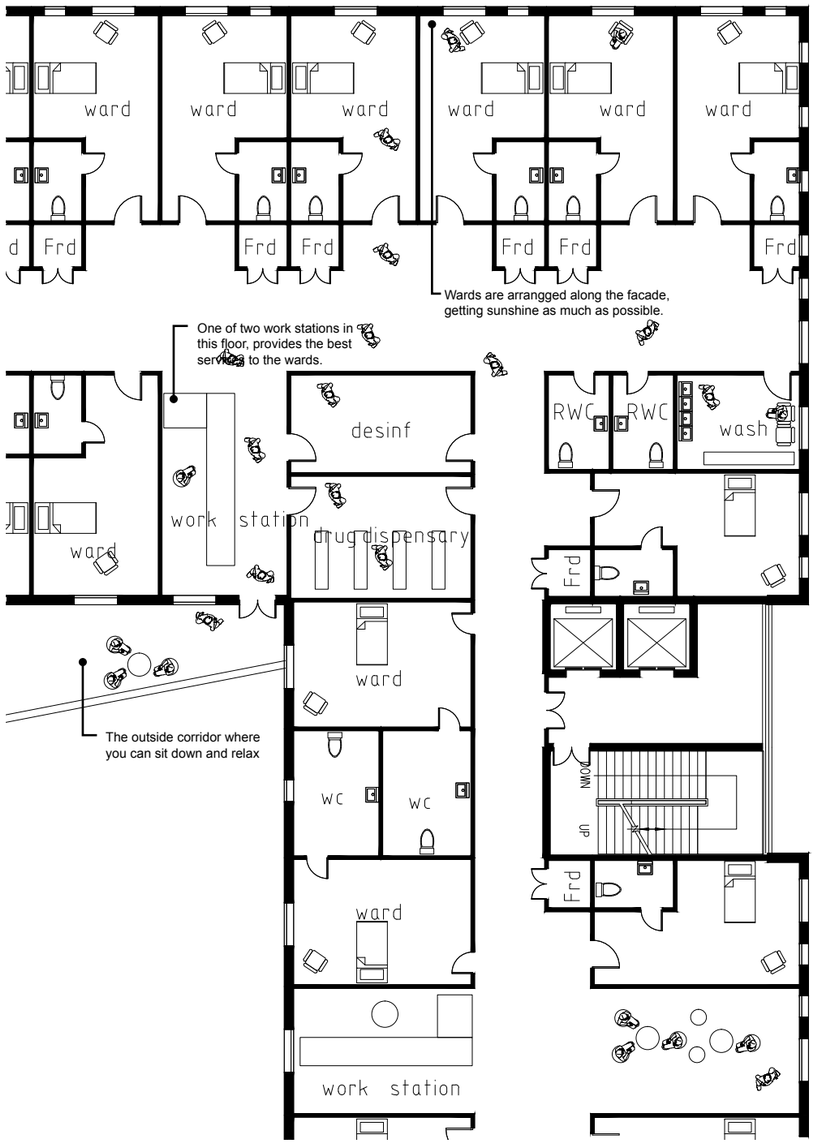
▲ FLOOR 3 PLAN 1:400

_ FLOOR 4 WARDS





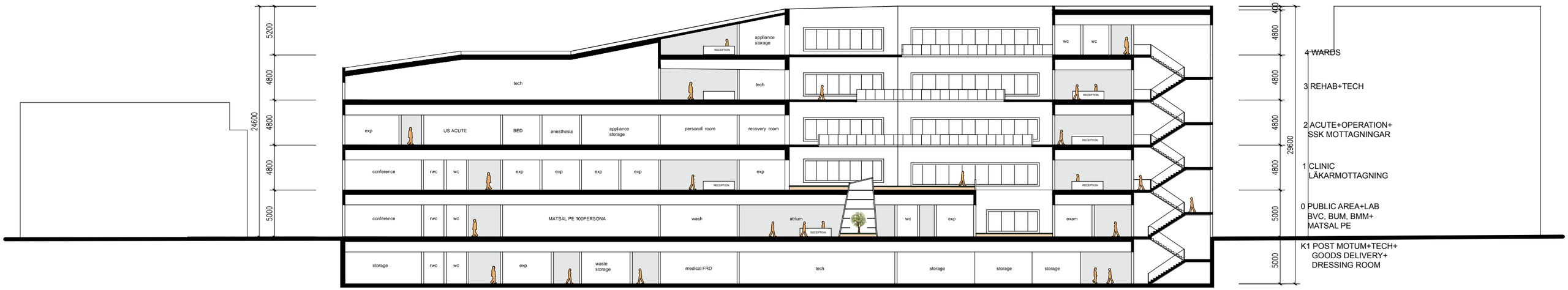
There are two types of wards in order to fit to the size of the buiilding grids.And the wards are run by different tenants, NVA and UTREDNINGSENHET. Two work stations in the middle of two each parts efficiently and effectively provide the service to the wards. On the left side of the wards is adminstration offices with several office rooms. Outside corridor is connected to public space. The patiences are easily to go outside enjoying the sunshine and getting refresh. The green roof on the south side gives the people nice view and entertainment place.



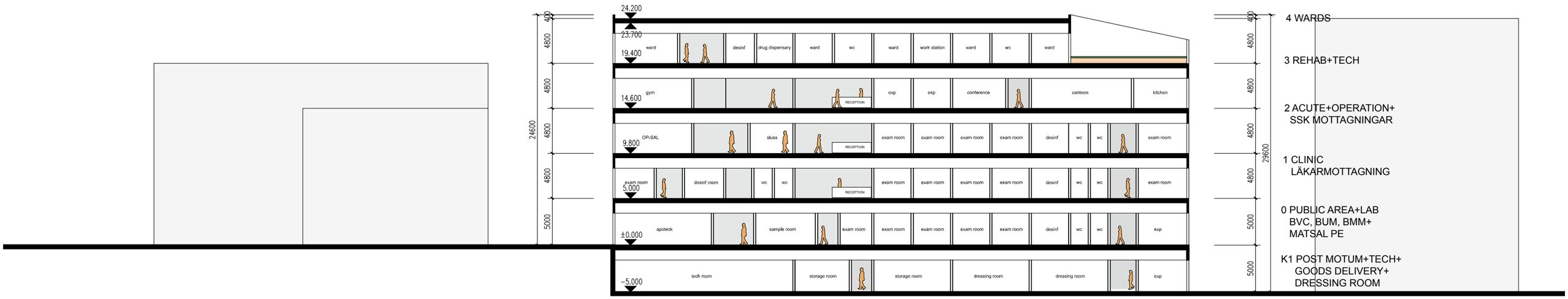
◀ ZOOM IN FLOOR PLAN 1:200

▲ FLOOR 4 PLAN 1:400

_SECTIONS

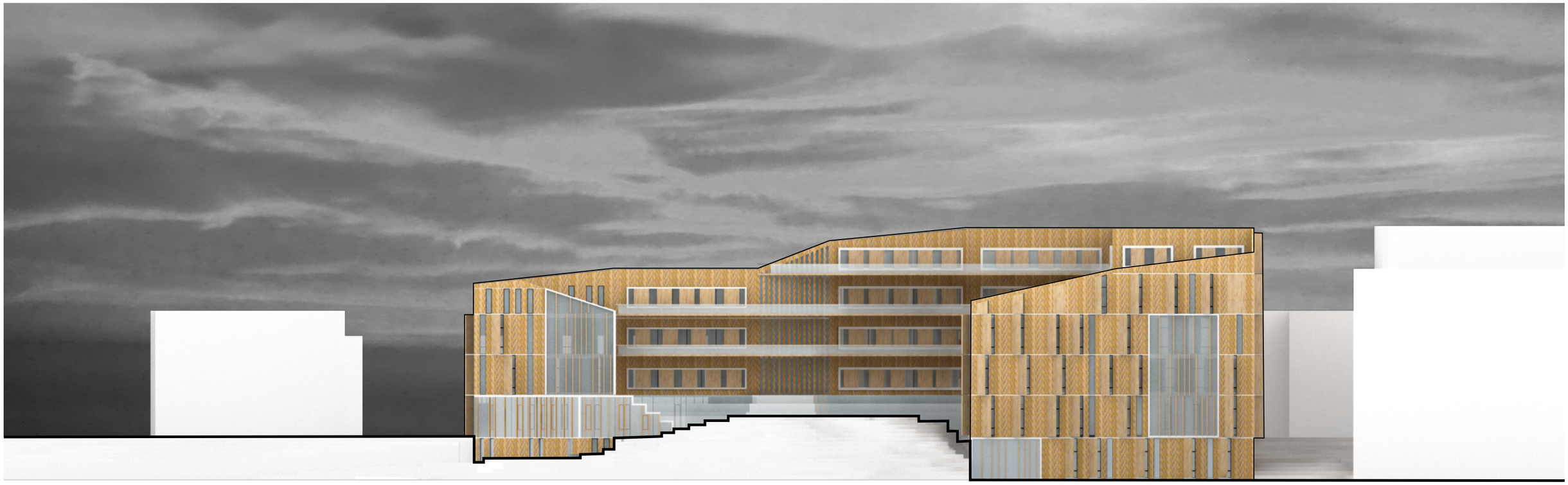


▲ A-A SECTION 1:400



▲ B-B SECTION 1:400

_ FACADE CONCEPT



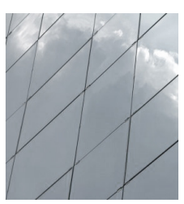
FACADE SOUTH

MATERIALS

Wood
The use of this material give the buildinga an uniform sculptural expression. Wood is popular using among nordic countries, which convey the culture identity to the residential people.

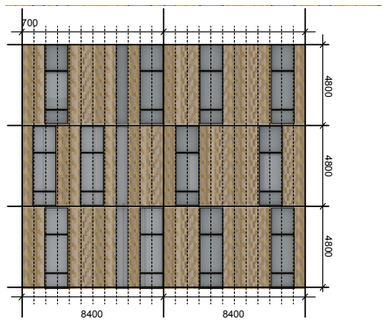
Concrete
The inner walls and slabs are prefab elements. And they are cheap, easy to install. Moreover, they can be sustainable merits for recyling.

Wood 2
Another pattern of wood has been used for the outside material of shifting windows. Those different colors of woods make the facade become changeable and indented facade.It is possible to adapt the structure with open and closed parts depending on the functions behind it.

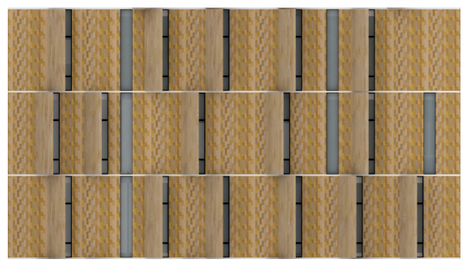


Glass
The frequently-used material is used for windows and middle parts of handrail. The combination between glass and wood provide the building a quiet and harmonious atmosphere.

CONCEPT



The distance between two different pillar is 8.4m, which could be divided into 12 parts. The 700m width windows could be used to the end of the corridors permanently getting some sunlights. And other types of windows create the indented facade and dynamic scenario.

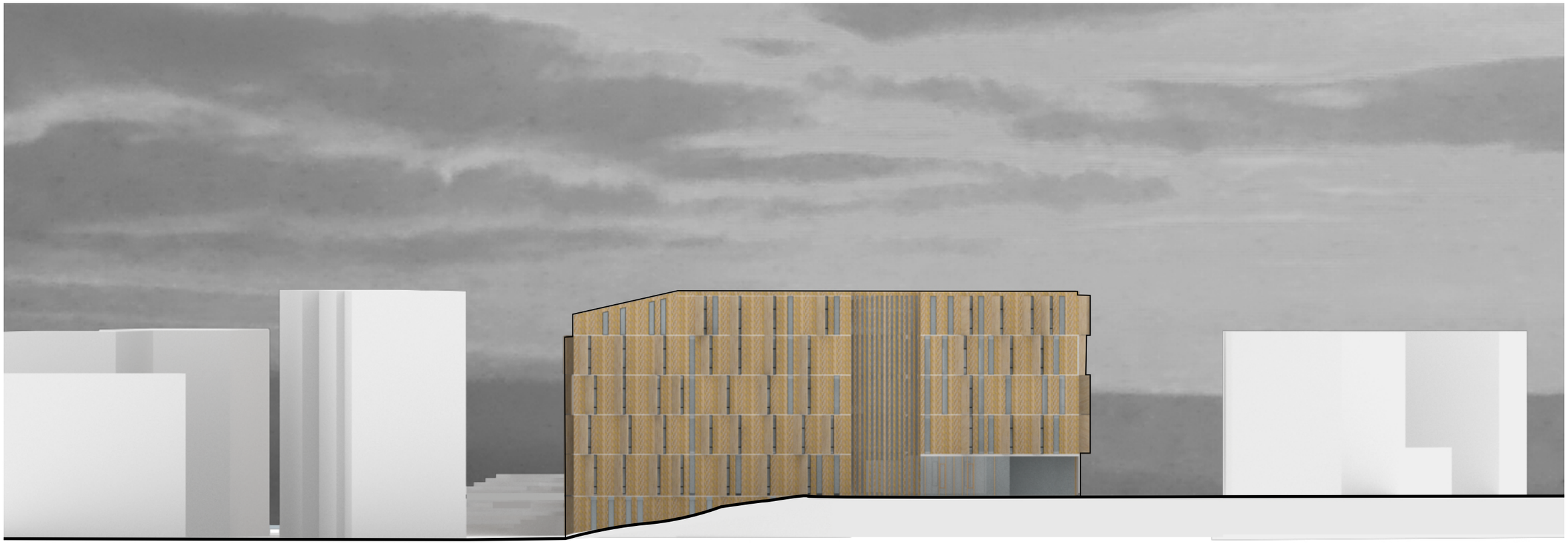


The shifting windows
Another material of wood provides the protection for the windows. In the winter time without sunshine, it is good to close the second layer of wooden plank saving the energy lose of the building. Meanwhile, it generate different pattern of the facade.

_ FACADE

FACADE WEST

_ FACADE



FACADE EAST

_ FACADE

FACADE NORTH

_ SUSTAINABLE STRATEGIES

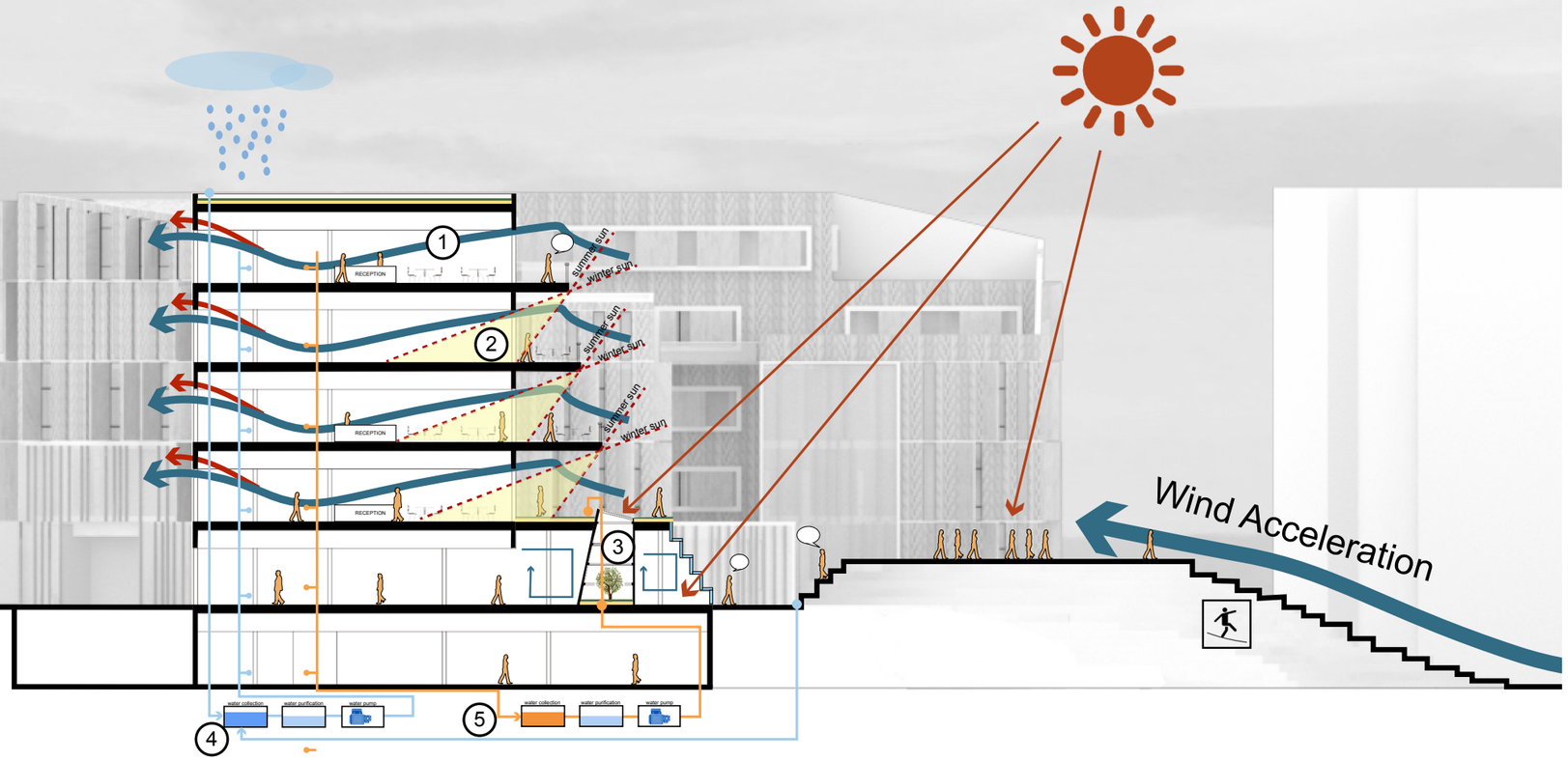
1 The wind in the summer is from the northwestern direction. It is good for cooling about the inside temperature of the building. this nature function from the wind decrease the costing of energy.

2 The outside corridors can be shelter in summer time, which protect the direct sunshine outside. And in the winter time, due to lower the solar height angle, sunshine can go though into rooms.

3 Inner garden in the ground floor adjusts the micro-climate inside, meanwhile it provides the great view as well.

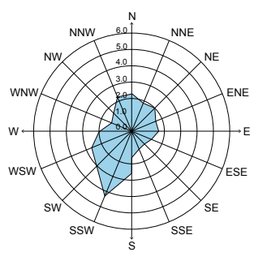
4 Collect the water from rain, and pump the water to every floor for special use after the process of water quality purification.

5 Grey water treatment. The grey water can be collected in the containers, after the water quality purification, this kind of water can be used for fertilizer of green roof.

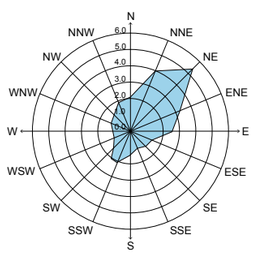


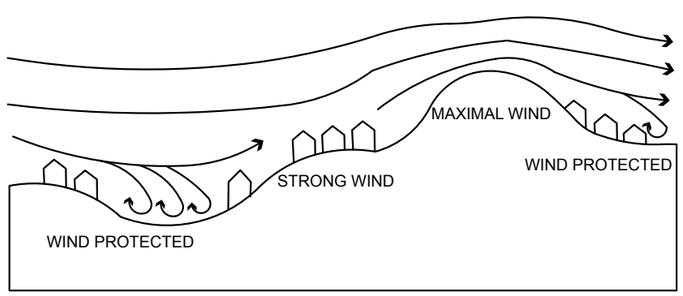
WIND ACCELERATION AND PROTECTION

Average wind direction and wind speed (m/s) in Finspång
Summer



Average wind direction and wind speed (m/s) in Finspång
Winter



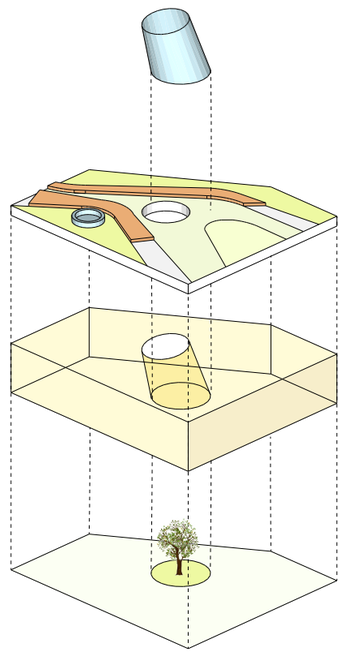


Picture from (H.Koch Nielsen, 2002)

From the wind-rose diagram about the wind average direction and speed in Finspång, the wind from southwest in the summer and the wind from northeast in the winter are frequent. The facade of wood can be block the extreme wind from northeast, like the function of wind protection, which decrease the loss of the energy and saving the costing of the heating.

Due to the theory about the wind and topology, the wind will be accelerated in the top area. The wind in the summer time provide the nature cooling wind to the building. if opening all windows, the building will be cooled down without mechanicial ventilation.

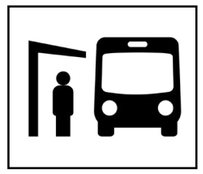
INNER GARDEN



This inner garden is a cylindrical shape, which starts from the ground floor to the roof garden on the floor 1. The surface inner garden is made by glass, and it is better fot sunshine going though especially in the public area of the ground floor. Moreove, the tree inside the cylinder optimizes the micro-climate inside the building, providing nice view and beautiful sculptural element. On the roof graden, the round shape is perfact to mingle with the strip-shaped wooden roads. After the combination among the wooden road, stone road and light well, the landscape on the roof is harmonious.

_ CONCLUSION

Swedish hospitals

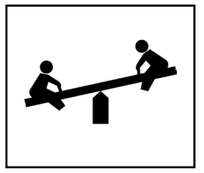


Depanding on the public transportation, the hospitals are more accessible to the local residents.

Large area for communication

High quality of wards

Better atmosphere for treatment (home-like exam rooms)



Space for activities
children
adults
patients

Chinese hospitals in future

Medical treatment needs

Aging population

Area in the center for the hospitals

With the development of public transportation

Central area

1. Less wards
2. Focus on space for exam room
3. Investigate the different spaces enhancing the treatment
4. The hospitals should have enough space for parking

Outskirt area

1. Keep the numbers of wards
2. More close to the nature
3. Investigate the space for the wards
4. Develop into senior housing or “hospital hotel”

_ CLOSURE

During the whole process of the master thesis, I always keep the sustainable strategies initially in my mind. The proposal must adapt to local culture and context. According to the design theory of the healthcare building, I learned many advanced knowledge, which provide better atmosphere for the healthcare building especially regarding the medical treatment.

It exits some weakness about the project remaining. But, in general, the house offers a wide range of different rooms for exam rooms, therapy, operation rooms and interaction with a focus on the patients' comfort and wellbeing. The architectural design in terms of daylight quality, the room's mood, color, sound and the ability to be private and secure to support the healing that takes place both physically and psychologically.

Meanwhile, the architectural idea also aims to enhance the characteristics of the existing landscape especially the existing terrain in the middle and to create synergy between the different functions of the healthcare building. Fundamentally, the architecture is clear and meets the request of a hospital which offers a humane and spatial experience.