GREEN ZONE

A HEALING PLACE FOR VETERANS

programme and process

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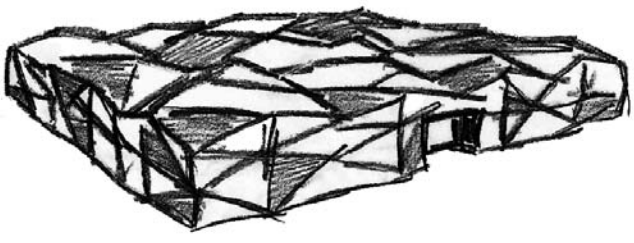
Master Thesis 2012 - ma4-arch25 - Aalborg University



PROLOGUE
SUMMARY

Green zone is about making benefit of the healing potential in architecture. Architecture is not seen as something that can be entirely healing, but the conditions for physical comfort has a positive effect to the human body and mind. The project takes its basis in a current debate; the recreational conditions for Danish veterans.

The result is a rehabilitation centre for the veterans, who have become physical injured or mentally traumatised during war. The design is expressive and developed through an iterative process of architectural, environmental and healing investigations, with a positive effect to the energy performance of the building.

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PROLOGUE
PREFACE

Green Zone - A healing place for veterans is a project developed during a master thesis at Architecture & Design, Aalborg University. The project started on the 1st of February 2012 and was handed in on the 23rd of May 2012.

During the project help and guidance has been given by a couple of people for whom we would like to give our thanks.

A special thanks to Peter Kragelund, press and information officer at the Royal Danish Life Guards, for taking his time to a guided tour through the facilities on the military base in Høvelte and on the specific site for the project.

Additional thanks to Inga Marie and Bjarne Andersen from the KFUM centre at the Royal Danish Life Guards base in Høvelte for meeting with us and telling about their current initiatives.

PROJECT **MOTIVATION**

It is difficult to talk about architecture without mentioning people and context; people are the creators and users and the context is what stage-manages the architecture. Architecture has evolved through time; from being a shelter against nature to become a piece of art that speaks to our secondary needs. Architecture is almost anywhere, it is the physical settings that frames the human body and mind, and it is defined by the way people experience and interact with it.

Healing architecture is a design concept, which deals with the relationship between humans and architecture. The vision is to let the physical settings play an active role in the healing process, and let the design interact with the user.

This project is an interpretation of the design concept, with focus on a current topic; the healing conditions for Danish veterans. The essence is to develop the physical settings, with the purpose to create an inspiring and stimulating atmosphere which has a positive effect to the veterans' health, both physically and mentally.

Shortly, this project is about making benefit of the healing potential in architecture.

INITIAL PROBLEM
DENMARK AT WAR

Denmark is playing an active role in the prevention of international conflicts and wars, and also in the promotion of democracy, freedom and basic human rights. During the last 20 years the deployment of Danish soldiers has increased, mainly because of the conflicts in the Balkans, Iraq and Afghanistan. In the end of 2010 the number of deployments has reached more than 50.000, divided between approximately 26.000 veterans (*DOC; Veteran politics*).

Concurrently with the increased deployment, the missions have become harsher; resulting in several injured and killed soldiers. In the period from 1992 until September 2010, 202 have become physical injured and 62 soldiers have lost their life, dominated by the still on-going operations in Afghanistan (*DOC; Veteran politics*).

There is no official number of veterans with psychological trauma. The mental problems can be difficult to discover, as the symptoms in many cases emerges after a while, sometimes after months and sometimes after several years. With the physical and psychological consequences in mind, it is obvious that the war is not only taking place during the deployment; the life afterwards is in many cases also a war per se.

In the last couple of years, the Danish participation in international missions has been given a lot of attention by the media, especially when it comes to the support of veterans. During 2010 the Danish newspaper Jyllands Posten brought the subject *Back from war* into focus, which gave them the most distinguished journalistic prize in Denmark, Cavlingprisen. With more than 100 articles the paper revealed the bad conditions for Danish veterans and raised the question, is Denmark prepared to meet the veterans, when they return from war?

With the current debate in mind, this master thesis focuses on the creation of better conditions for the veterans, and results in the design of a new rehabilitation centre.









BACK FROM WAR
PHYSICAL DISABLED

With the subject *Back from war*, Jyllands Posten succeeded to put face on the primary victims of war, both physical disabled and mental traumatised veterans. Articles showed the faces of 32 veterans and told their stories from the war and the aftermath (*WEB; Jyllands Posten*). Examples of the articles is presented in the following descriptions, and used as inspiration to define the user group for the project.

1. Kennet Kappendrup is 30 years old and has been deployed to Kosovo and Iraq. As a driver in an armoured vehicle he was involved in an accident during a patrol in Iraq. He was badly injured with several broken ribs, a broken foot, torn ligaments and nerves and injuries in the kidneys, the right hip and knee.

Today he has problems with his memory and needs to rest a couple of hours during the day. He is numb and suffers from pain in the right hip and knee, and the rehabilitation was his own responsibility. He is now declared 30% disabled in his hip, knee, foot and his head.

2. Michael Nyrup Thornqvist is also 30 years old and has been deployed to Afghanistan, two times. A week before going home from his second and last deployment, his combat vehicle was hit by a landmine. He broke his back, his left foot and tore a ligament in the foot. The driver was killed.

Today he has problems with his back, his left foot and the feeling in his legs. He also suffers from mental disorder and takes antidepressant medicine. Without luck he has fought for a qualified rehabilitation. A year after getting injured he started as a trainee in an IT department in the Danish Defence, but is today off working sick.


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BACK FROM WAR
MENTAL TRAUMATISED

1. Per Neis is 34 years old and was deployed to Bosnia back in 1995. On his third day on the mission, he saw a person being killed by a sniper, and he still remembers how the blood flowed from the head. During a patrol a young boy shot at him, he returned the fire, but doesn't know what happened to the boy. When Per and his colleagues drove to the local waste disposal site with garbage, they had to kick desperate and hungry children and adults away to get through.

After the deployment he often had nightmares and woke up crying. Once, when his girlfriend tried to wake him, he attacked her. Since the return he has tried to commit suicide and in 2009 he collapsed because of a brain haemorrhage.
Today he suffers from mood swings and is diagnosed with Post traumatic stress disorder. To get through the day, he is taking sedative pills, tranquilliser and sleeping pills. He lives in a relationship with four children, but is in the moment off work sick.

2. Hans Holm is 35 years old and has been deployed to Kosovo and Iraq. After the deployment he was stressed and ended up in an abuse. He also thought about taking his own life. In the summer, 2010, he ran away with his dog and lived in the forest for a period, in a way to get back on track.

Today he is diagnosed with Post traumatic stress disorder and depression. He receives psychological help from the Danish Defence and gets medicine against mental disorder.


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BACK FROM WAR
IS DENMARK DOING ENOUGH?

When a decision is made about deploying Danish soldiers to international missions, it is necessary to provide support as well. Many soldiers will be able to continue a normal life after returning, but as the examples in the previous pages show it is not everyone who can continue their life as before. Some of them need professional help after being physical disabled and other need a psychological treatment to get back on track.

The great attention from the media during the last couple of years seems to have a positive effect to the support of Danish veterans. In October 2010 the government implemented a new veteran politics, with the purpose to show appreciation and to support the veterans and their relatives. A contact centre was also established in a way to ease up the process for Danish soldiers and veterans to get help.

Though the effort is increasing, the big question still is: are we doing enough?

It is evident to continue the improvement of rehabilitation and constantly evaluate the existing initiatives and facilities. In that perspective it is interesting to look on the physical settings and the environment that surrounds the patients, staff and relatives, as it is of high importance for our well-being. Architecture affects the human body and mind, and has a great potential to become an active part of the healing process. Therefore the design concept Healing architecture will be included in the design process of the project.

HEALING ARCHITECTURE
THEORIES AND METHODS

In the forthcoming decade Denmark is undergoing a great change in the health care sector, with several new hospitals to be build. The need for a scientific based knowledge about creating optimized facilities for patients and staff is therefore higher than ever. A research project, with the purpose of clarifying the relationship between physical space and treatment results, is documented in the report *Helende arkitektur* (*DOC; Helende arkitektur*). The work is based on already existing documentation, and a systematization of this knowledge sets up a model for hospital design. The research focus on hospitals, but the method is also relevant to other building types in the healthcare sector. The research project and the report *A Review of the Research Literature on Evidence-based Healthcare Design* (*DOC; Evidence-based design*) form the basis of the following chapter. Both of the publications are included on the CD-ROM in the back of the report.

Healing architecture
As a design concept Healing architecture deals with the vision that the physical boundaries has a direct impact on the human being, both physically and mentally. Architecture is not seen as something that can be entirely healing, but elements such as quality of daylight, atmosphere, colours, sound and the possibility of being private and safe can improve the healing process. The concept is not only based on the architectures effect on patients, but also how it affects the staff and relatives.

The research project has resulted in a model, which can be used as a tool for hospital design, with the 3 primary levels: physical settings, factors and consequences. The architectural factors divided into 3 groups; body, relations and safety are the central parameters in the model, and adjustment of these has a direct impact on decisions about the physical settings and the physically, psychologically and economically consequences. The choices of which factors that are going to be adjusted depend on the vision of treatment and the wish of consequences to affect.

Evidence-based design
Another design method used in the health care sector is evidence-based design, which is based on scientific documented knowledge and empirical data with the purpose to improve the quality of design and architecture. The method differs from the design concept Healing architecture by also including the measureable effects on the building, such as economics, resource investments, user satisfaction and productivity.

A Review of the Research Literature on Evidence-based Healthcare Design by professor Roger S. Ulrich is a survey and evaluation of scientific research on evidence-based healthcare design. The focus is on the implications for creating better and safer hospitals, both for the patients and staff, and like the research project, Healing architecture, it ends up with a design model for hospitals.

Evidence-based design is a method which can be used as documentation for qualitative decisions during the process and according to the final design.


#.5.

HEALING ARCHITECTURE
DESIGN FACTORS

The design factors of Healing architecture is as mentioned divided into 3 groups; body, relations and safety. Body, is the group of factors that has a direct impact on the human body and its senses, and to a great extent connected to physical comfort. The Relations group is in general based on mental conditions, with possibilities for bonding and access to outdoor areas. Safety, is the third group of factors and most relevant to hospitals, because of the high risk of infection and disease transmissions. Physical settings and consequences for each architectural factor is presented in the following description.

Light
Light is of great importance for the patients well-being and the staffs working conditions, especially when it comes to daylight. The balance between activity and relaxation during the day has a direct impact on the healing process, and is of great significance to the circadian rhythm. Good light conditions during the daytime motivates to a higher activity level, which has a positive effect on the quality of sleep during the night. Sleep is essential in a healing process.
The consequences of the light conditions are both physiological and psychological. Daylight and the sun affect pain and stress related symptoms in a positive way, and a therapeutic treatment with light is in some cases used in the healing of patients with depression.
As light has a positive effect on the healing process, it is necessary to focus on orientation and location in the design. The physical settings are evident for a great result.

Art
In the perspective of Healing architecture, art is solitary visual, tactile or auditory elements and colours. Art can be a mental distractor and have a calming effect, which can be very useful according to pain management. Besides using the colour settings as a stimulating element in architecture, colours can also be part of a wayfinding-system.
When using art as an active element in the healing process, it can be an advantage to integrate it in the early stage of the design process, when making decisions of the interior organisation and the choice of materials.

Sound
In a healing atmosphere sound can both be positive and negative. When used as an auditory element it can function as a distractor in pain management, but if sound is characterised as noise it can be stressful and disturbing to a good night's sleep. For some patients it can even result in fear. Noise can be described as sound from technical equipment, conversations between staff, patients and relatives or activities.
A good acoustic environment enhances the feeling of privacy and confidence, and is important for the communication between patients, staff and relatives.
The acoustic conditions are directly connected to the physical settings, such as plan arrangement, interior organisation, materials and equipment.

Air
Air quality is important for a comfortable atmosphere, but the research according to the healing aspect is limited. Temperature and odour are though elements that have to be taken into consideration when talking about air quality. The physical settings are therefore important when it comes to interior organisation, materials and equipment.

Movement
It can be difficult to navigate around in a hospital, which often is a big and complex building. For the

users of the building it can be stressful and it can result in economic consequences, with less efficiency and wasted time for the staff. Plan management and the interior organisation are therefore evident in the design of the building, and as mentioned it can even be an advantage to use art as part of a wayfinding-system.

Personal space
Privacy is what defines personal space. It has a psychological impact on the patient, staff and relatives in the way of feeling comfortable and satisfied. As communication is an important factor of the treatment, it is necessary to pay attention to the physical settings in the way of creating a confident atmosphere.

Social space
Social intercourse and communication is very important during the healing process, both between the patient and the relatives but also between the patients. The possibility of being together and speak with other patients in the same situation has a positive effect against stress and fear. Therefore it is important to focus on the plan management and interior organisation during the design process, to create the best conditions for bonding with other people.

Outdoor space
The possibility of having contact to the natural surroundings has a positive effect to the psychological and physiological well-being. During pain management the landscape can function as a visual distractor, and direct access to outdoor spaces is often a motivator for being active.
A stay in the green areas with all the sounds, colours and smells stimulates the senses and has a calming effect, with positive changes to the mood and atmosphere. The connection to outdoor spaces is not only an active to the patients, it also affect the staff and relatives by reducing stress and making better conditions for social relations.
Location, plan management and interior organisation are central aspects of the physical settings.

Sanitation
The third group of architectural factors is about safety and includes sanitation. This factor is most important to hospital designs, because of the high risk of infection and disease transmissions, and adds a great focus to cleanliness.
Plan management, interior organisation and choice of materials are of high importance to keep a high level of sanitation.

Accidents and mistakes
The last factor is also related to the safety group and is important to patients and staff. It is evident to reduce the mistakes in the health care sector and to prevent accidents, both when it comes to the patients and the staff. Interior organisation and equipment are aspects of the physical settings that need to be taking into consideration during the design process.


#.6.

CASE STUDY
HEJMDAL CANCER PATIENTS HOUSE

On the basis of Healing architecture it is decided to study two projects, which works with different elements of the design concept. The first project is Hejmdal in Aarhus, a house for cancer patients, designed by the American architect Frank Gehry. The house works both as a consultation for the patients and their relatives and as a social meeting place.

The house is characterised by a build-on architecture, with a restoration of the exterior walls and a brand new interior and roof construction. The relation between the rough existing walls and the refined interior, with a warm character, is well balanced and creates a homely and informal atmosphere.

A unique element of the design is the use of light, where a big translucent roof construction brings in a bright and diffuse light to the upper level of the building. At the lower level rectangular windows are used to bring in daylight and to create visual connections to the outside area. The two ways of working with daylight adds diversity to the different spaces.

Another thing that can be related to the factors of Healing architecture is the artistic way the bearing construction is implemented in the design. The big columns break through the open environment and work as spatial dividers. This solution provides the house with both social spaces and more intimate spaces, with possibilities for deeper conversations, serving everyone's need.

CASE STUDY
CENTRE FOR CANCER AND HEALTH

The second case is the Centre for Cancer and Health in Copenhagen, designed by NORD Architects. Like Hejmdal, this building is made for cancer patients and their relatives, offering them consultations and rehabilitation. The design is developed through the principles of Healing architecture.

When arriving to the centre it appears closed and monolithic with the aluminium covered facades towards the busy city, but when entering the building it seems open and welcoming. The footprint of the building is rectangular with a centralised courtyard and the common areas visually connected to it. This introverted expression towards the courtyard and the common area gives the centre an informal atmosphere and a sense of a safe environment.

The roof construction is expressive with sharp edges, but is complimented well by the light and clean interior design. It functions as an artistic element and defines the spatial perception.

An important factor of the design is the implementation of daylight conditions. The folded roof structure, the window layout and the aluminium cladded exterior contributes to a varied experience of daylight, both through the day and during the entire year.


#.7.

INTERPRETATION
DESIGN FACTORS

In the design of the rehabilitation centre a great inspiration comes from the design concept Healing architecture. The design concept is primarily related to hospital design, but an interpretation of the healing factors will be a motivator for the design process. Like Healing architecture the interpretation is divided into 3 groups; body, relations and safety.

Body
It is the intention that the architecture shall be expressive, without being chaotic. It shall be stimulating to all of the senses and secure a good indoor environment, which is evident for any healing process. The technical solutions which secure a healthy climate shall be integrated in the design, and form the building in an artistic way. In that case the expressive form of the Centre for Cancer and Health in Copenhagen will become a great inspiration to the design process.

Light, air and sound are significant for physical comfort. Good light conditions motivate to a higher activity level, and a higher activity level has a positive effect to sleep, which is evident for the healing process. To improve the circadian rhythm daylight is preferred before artificial light in the project. Like the two cases, it is the intention to bring in a bright daylight, which shall provide diversity to the different areas of the building.

Sound can have a positive effect to the healing process, but if it is characterised as noise it can be very stressful and have a bad influence to the veterans and the staff. Acoustical comfort is therefore of high importance and the acoustical solution shall be exposed and an integrated part of the design.
When it comes to accessibility, everyone shall have the same possibilities to navigate around in the building, no matter mobility. The layout shall be open and clear, and not provoke any stress-related symptoms.

Relations
A crucial part of the healing process is the entire atmosphere. It has to be comfortable and safe, but the way it is experienced is different from person to person. Some people will have an extra need for personal spaces, where other prefers the socialising elements. Like Hejmdal in Aarhus, a differentiation in social and private spaces is therefore a must in the project.

The time during duty is primarily based on fellowship and strong social relations, where everyone supports each other. This quality is considered as very important and can be a great active for the healing process. The design shall therefore take its basis in this quality and appeal to bond with other people.

Another important factor of healing architecture is the accessibility to outdoor spaces and green areas. The Centre for Cancer and Health in Copenhagen is a great example on how this can be solved and included in the design. With the green area as the central element of the building it becomes accessible from anywhere, both visually and physically. It appeals to stays in the fresh air, with all the sounds, colours and smells, and has a clear psychological and calming effect. The Centre for Cancer and Health will be a great inspiration for the implementation of green spaces.

Safety:
The factors concerning safety are highly relevant to hospital design, but it is also useful for this project. To prevent mistakes and minimize the risk of accidents, it is necessary to focus on the entire organisation of the building. Zoning will increase the efficiency and improve the working conditions for the staff, resulting in a better healing atmosphere.

When it comes to the layout of the building, it shall be designed with a common sense, making it as accessible as possible without any unnecessary obstacles.

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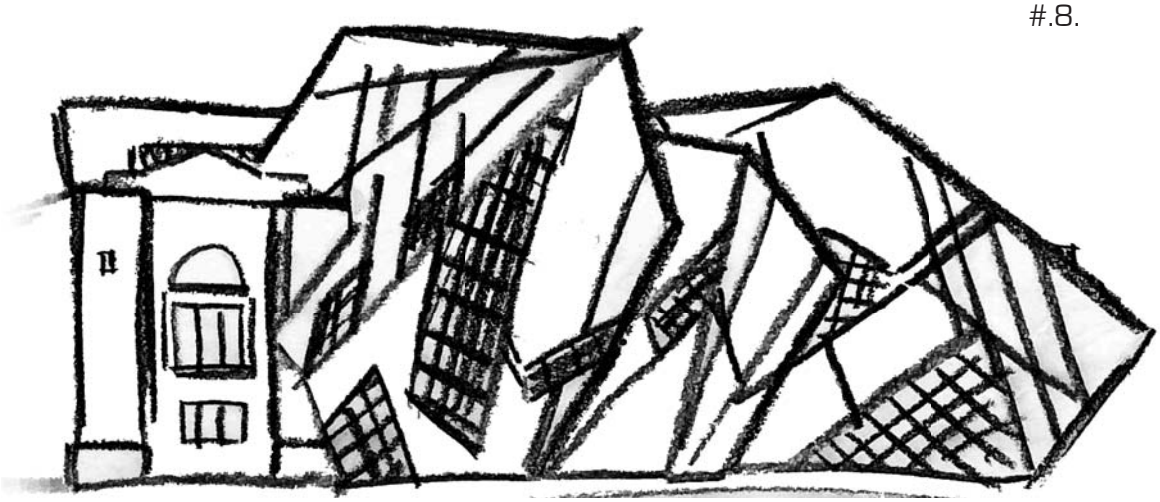

ROYAL ONTARIO MUSEUM BY DANIEL LIEBESKIND

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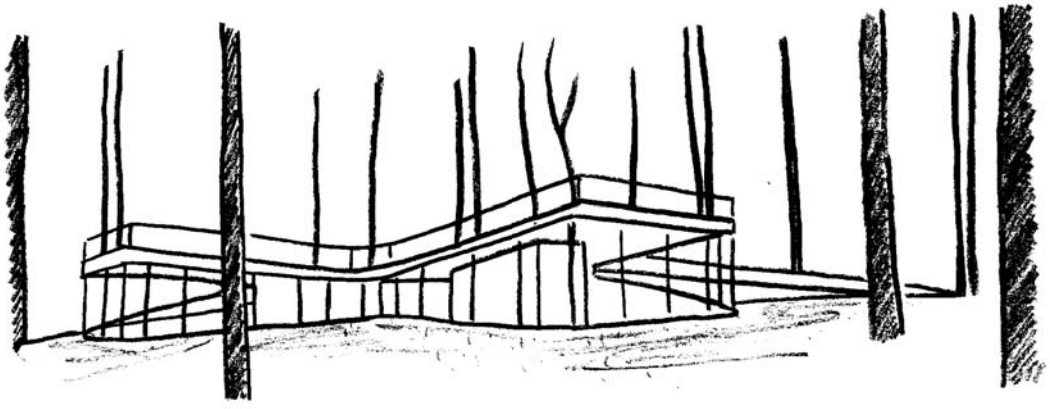

HARRESKOV VISITORS CENTRE BY EFFEKT

ORGANISATION
HEALTHCARE STRUCTURES

When starting to design a basic point of origin is needed. This can be derived from an analysis of existing classical typologies which are used in healthcare architecture. This chapter is based on a research project documented in the report *Trivsel og Boligform - Plejeboligens typologi og arkitektoniske elementer* (*DOC; Trivsel og Boligform*).

The analysis is broken down into four typologies which are wing, comb, courtyard and cluster structures. There are several iterations of the different typologies, but it is only the general organisation that will form the basis of the analysis.

Wing structure
These structures are often placed in an urban context and have derived their shape from these settings. The structure has dwellings to one or both sides, preferably the side orientated to the street. The hallways and common areas are situated towards the garden, and the structure can be built in several stories. A weakness of the structure is the large amount of long straight corridors.

Comb structure
This structure is built as a larger complex which is divided into smaller segments to create more intimate spaces. A positive aspect of being a part of a larger complex is the possibility to have more and large social activities. The large complex results in a huge amount of very long corridors. In each of the dwelling segments there can be between 6-12 dwellings connected by a main building with kitchen, dining and common area. Between the segments there are green areas.

Courtyard structure
The structure is build up around a central courtyard, with the purpose to improve the environmental conditions. This typology is single story and is often placed in an open landscape with only a few surrounding buildings. Dwellings are distributed to the exterior and the common areas and hallway towards the centralised courtyard.

Cluster structure
The fourth typology is characterised as a large structure consisting of several dwelling segments around a main building. Each unit is facilitated with its own common area with kitchen, dining and social area.
Dissolving the large scale into smaller segments creates more intimate spaces, giving the inhabitants a sense of affiliation for their specific unit.

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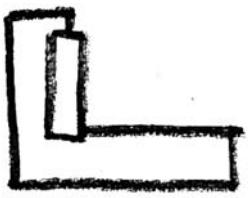
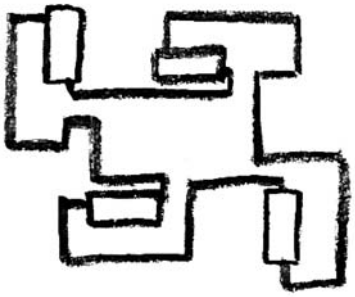


WING STRUCTURE

COURTYARD STRUCTURE

COMB STRUCTURE



CLUSTER STRUCTURE

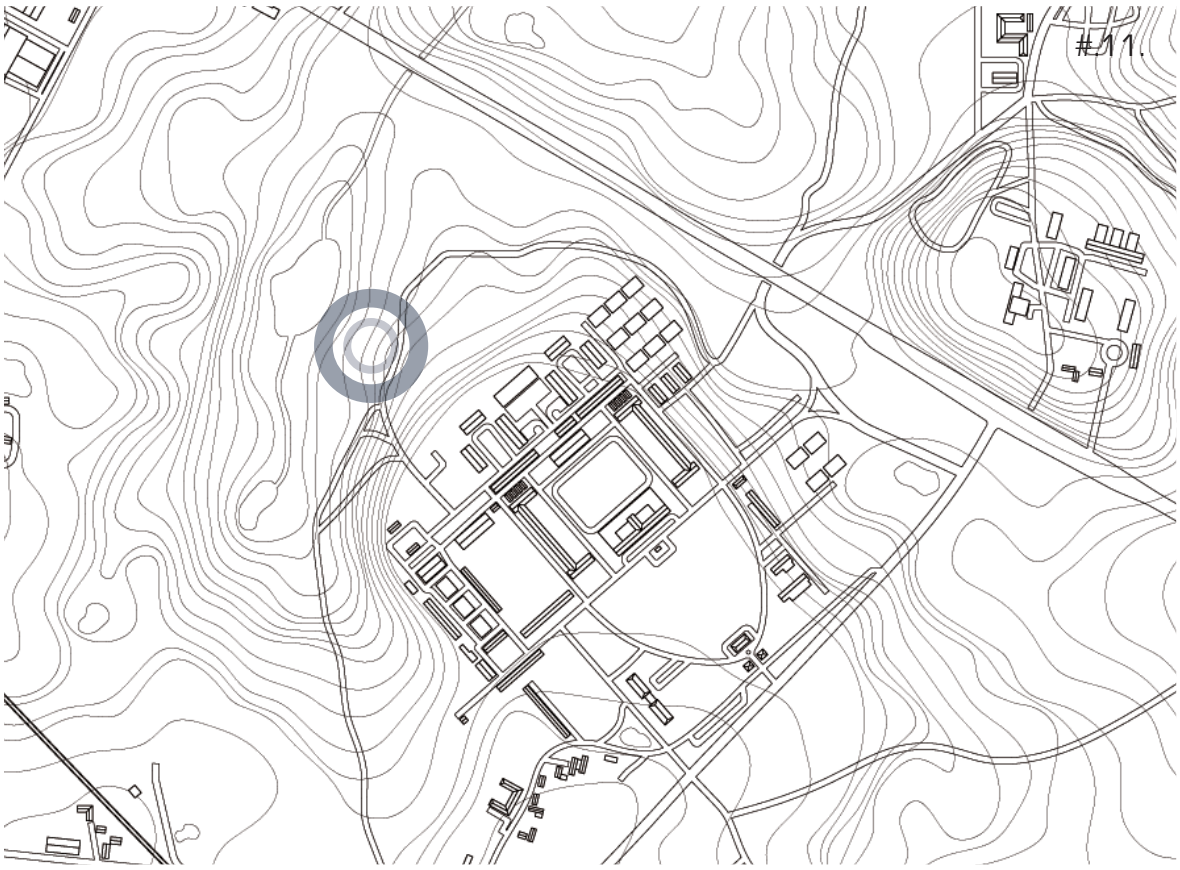
SITE ANALYSIS
CHOSE OF LOCATION

The site for this project is located in Høvelte, next to the Royal Danish Life Guards, in a short distance to Copenhagen. There are several reasons for choosing this site, which will be specified in the following description.

A reason for the choice of location is the Royal Danish Life Guards' active participation in international conflicts, and the short distance to Copenhagen. When physical injured soldiers return to Denmark they are usually recovering at Copenhagen University Hospital, where most of the specialists work. It is therefore seen as an advantage to place the centre near the capital city, so the veterans have the possibility to be affiliated to the Danish Defence, while still having consultations in Copenhagen.

Another reason for the choice of location is related to the social aspect, and the fact that the feeling of belonging somewhere is evident for the healing process. With a direct connection to the Royal Danish Life Guards, the veterans have the chance to maintain and make new relations to new or former colleagues. Some of the veterans will even be able to still have a function in the Danish Defence during and after the rehabilitation.

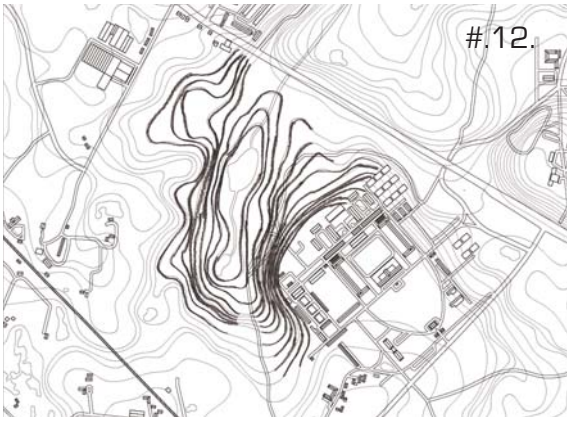
As mentioned in the factors of healing architecture, access to green areas is crucial to the healing process. The location in Høvelte is characterised as a wide open landscape, with beautiful green areas and plenty of natural surroundings. This scenario is suitable for a rehabilitation centre with great conditions for healing.



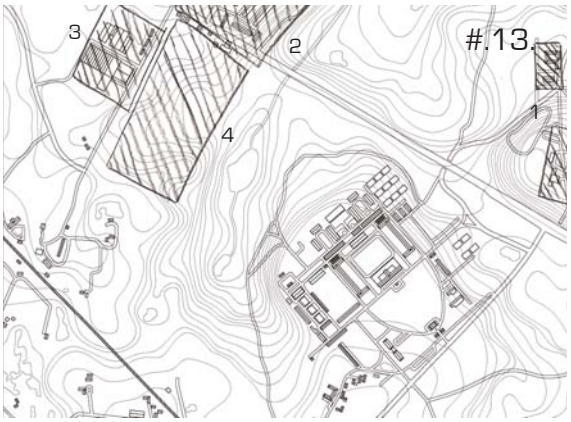
SITE ANALYSIS
MAPPING THE SITE

In the following chapter the site will be analysed with a model based upon Kevin Lynch´s mapping method (DOC; The image of the city). There will be some alterations to better fit the characteristics and qualities of the site. The analysis is based purely upon a plan overview of the area.

Topography
The topography is a sloping landscape which creates a valley in which the site is situated. In the valley there is a small lake surrounded by dense woodland, creating lee against the wind from west. Towards south the landscape is more open with scattered groups of trees and wild vegetation. To the east, where the barracks are situated, the landscape is sloping uphill.

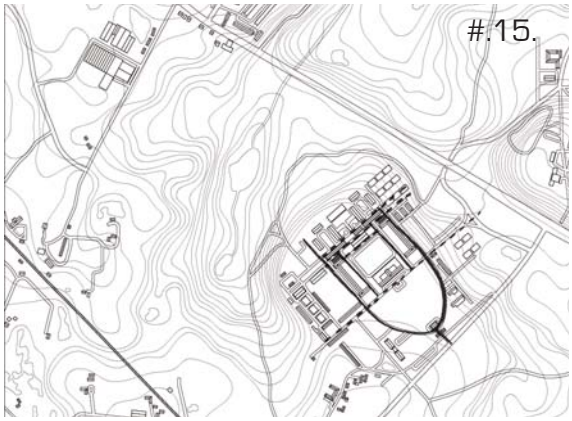


Surroundings
The Royal Danish Life Guards consist of a huge military area with several barracks (1) located all around. A residential area (2) is located to the north of the site, with single family houses. Next to the residential area a large transport centre (3) is located. And between the specific site for the rehabilitation centre and the transport centre there is a cultivated field. (4)

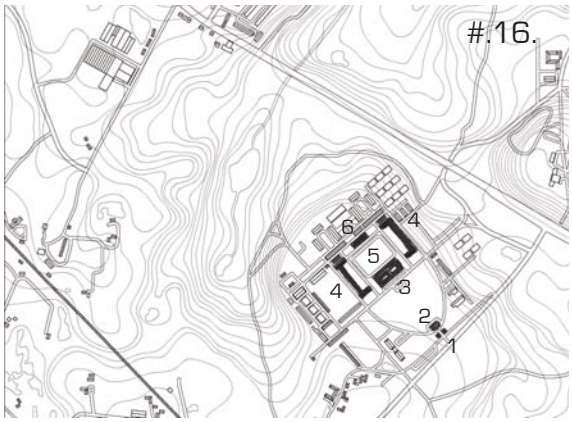


Spaces in nature
The barracks area (1) is because of the natural surroundings closed off and seems like an isolated village with its own pulsating life. The spaces in the surrounding nature are defined by the trees, paths, hills and lakes. The forest (2) to the north is closed off and dense. The open field (3) is divided into minor areas by the paths. The lake area (4) is surrounded and isolated by the trees, giving it a peaceful character.

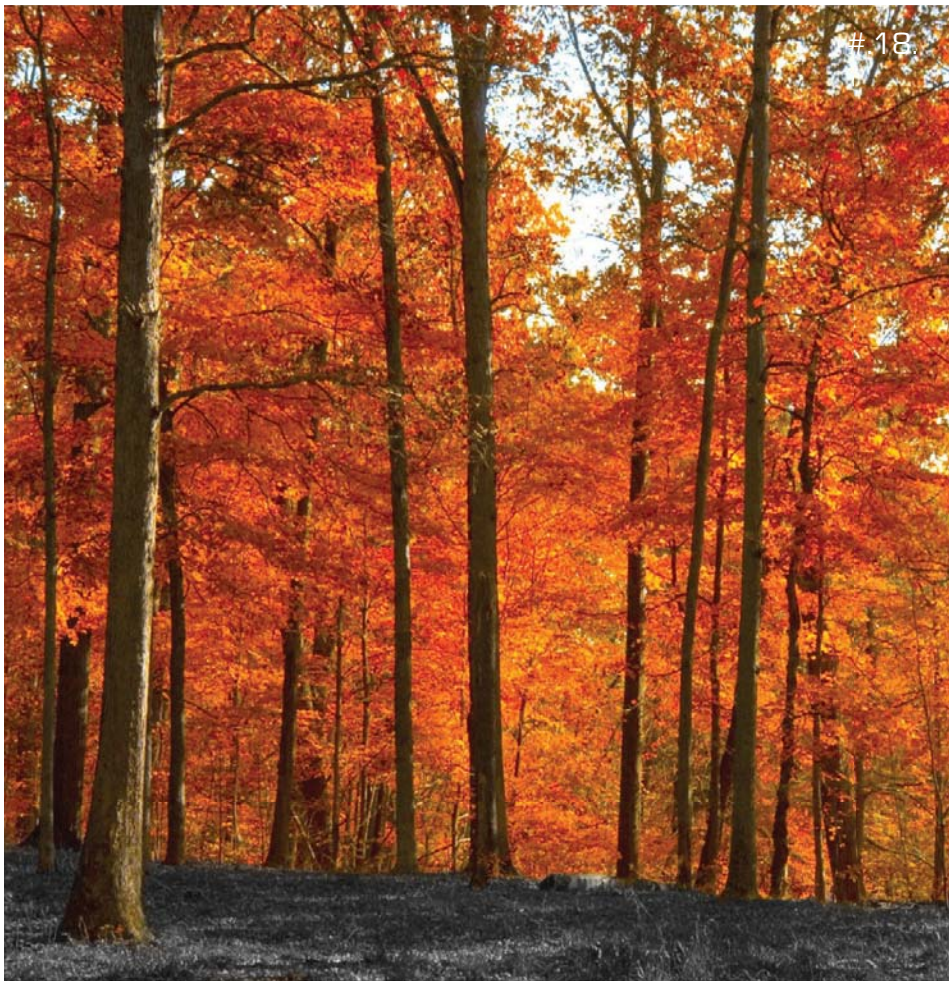
Organisation
The roads and the placement of buildings on the site underlines that the site is based upon a symmetric grid. This way of organising the military facilities reflects the way the military is run through order and discipline. By keeping everything in a symmetric organisation, the site becomes easier to navigate around in and the different functions become easier to find.



Functions
The arrival gate and the guard house (1) is the main access point to the site. The administration building (2) is the formal face of the Royal Danish Life Guards. The infirmary (3), physiotherapist (4), social ward (5) and priest offices (6) are located in a central area for easy access. Housing for recruits (7) are on each side of the wards, facing towards the exercise yard (8), where a gym (9) is located.



Paths
The paths around the site are part of a military training terrain and consist of dirt roads. The paths are distributed around the huge military base and goes through all types of terrain. The paths can be seen as man-made interactions with nature, making the wilderness habitable for humans and giving them the change and ability to move around in nature and enjoy its wonders.



SITE ANALYSIS
SENSORY PERCEPTION

Sensory perception is about the phenomenon's that acquire on the site and how they influence the visitor. The methodology of the chapter is based on the writings of Christian Norberg-Schulz and especially his book *Mellem jord og himmel* (*DOC; Mellem jord og himmel*).

Every location is unique; it consists of a mass variety of perceptions from view to the taste of the air. All these perceptions added up create the sense of the place or the genius of the place. The following description of the site is based on a sensory point of view.

When arriving to the site the first thing that grabs a hold on you is the view, the view over the woods and out towards the fields and the town in the background. When continuing down the hillside, through the open landscape, and down to the forest, the sunlight starts to be blocked by the big tree crowns. The branches and leafs crushes under your feet as you walk. Taking a moment to feel the softness of the soil and hearing the wind, making a whistling sound when stroking the long wild grass between the trees. From a distance the wind carries the sound of a gurgling brooklet.

Getting deeper into the forest, the roughness of the bark of the trees and the glimpses of light through the treetops becomes more intense. The sunrays through the branches colours the surroundings and makes all the details of the forest bed become visible. A brooklet occurs and leads you to the bank of a small lake. The smell of freshness from the water combined with the bitter sweetness of the fields on the other side guides you along a path. The path curves along the lake and leads you further on until you are fully captivated by the beauty and wonder of the site and the landscape.

Another aspect of the sensory perception is the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essence of time and how the variation of the site through time creates a landscape in motion. The changes in nature are all affected by the sun and its position in the sky. These changes can be put into two categories, the daily rhythm and the annual rhythm, which are codependent. For a better understanding the two categories are though separated in the analysis. The effects of the daily rhythm are of small variation and occur often, so they can pass unnoticed. These changes have a great effect to our perception of the landscape.

Going from day to night, watching the darkness creep across the land and the shadows becoming longer adds silence to the place. The limited sight signalises that it could be dangerous to go out. But when the sun rises and light comes over the horizon, the world breathes new life into nature and makes creatures start to emerge from their refuge, waiting for a new daily rhythm to begin.

The annual rhythm is seen in the change of the seasons, having a huge effect on nature over a long period of time; changing the mood by affecting the temperature, the colour of light, the colours of nature and its forms. From the dark simplicity of the leafless trees, the snow covered ground glistening and the petrified lake frozen in time during winter; to the wildness of spring, where all the nature is erupting in combinations of colours.

Ever changing characters of nature created by its fluency and shifts creates our link and the feeling of belonging to these sites.

SITE ANALYSIS
SUMMARY

Through the analysis and the sensory perception of the site it is clear that there are some main characteristics which are interesting to enhance in the design of the new rehabilitation centre. This chapter works as a summary to the entire site analysis.

According to some of the veterans' lack of mobility, and their periodic need for consultations at the Copenhagen University Hospital, makes it clear that there is need for a direct access way to the centre. This can be accomplished by continuing the axial flow from the barracks.
Using the schematic organisational structure of the barracks area can be beneficial to create a link between the two areas. This can also be an active in the case of shared functions between the barracks and the rehabilitation centre. Furthermore it improves the conditions for the veterans to mingle with the recruits and former colleagues, and also be part of the pulsating life in the barracks area.

One of the major characteristics of the site is of course the nature and its healing abilities. It is crucial to make benefit of this scenario and to create a strong interaction between the building and the natural surroundings. It is the intention to let the beautiful and dynamic landscape be as unspoiled as possible, which thereby can be used as an active to compromise the architecture. The experience of arriving to the building shall be unique and something to remember.

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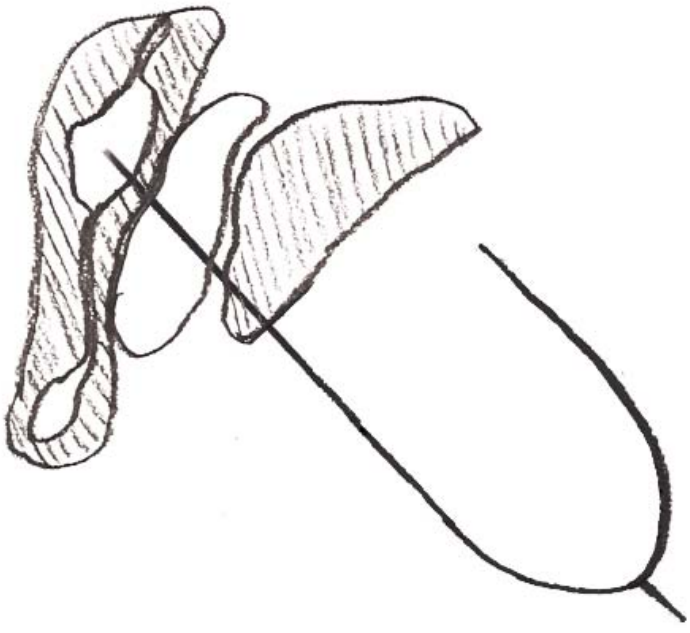

COMBINATION OF ORGINASATIONS AND SPACES IN NATURE

TECHNICAL APPROACH

SITE CONDITIONS

The global environmental challenge and the constantly growing expectations to quality of architecture, makes it relevant to reconsider the way of designing. Nature holds an unbelievable amount of energy, free energy, and it is evident to let a building make benefit of the potential in the surroundings. The building shall not only be an artefact in a scenario, it has to be intelligent and interact with its context.

The site, northwest of the Royal Danish Life Guards, is characterised by being a wide open and green landscape, which has a lot of potential according to passive solutions. To the west the area is sloping downhill and towards south and east it opens up with a terrain of wild grass and a few scattered groups of trees. This scenario creates good conditions for letting daylight into the building, both during the day and in the evening hours. It is also a great opportunity to make benefit of the passive solar heating, though it is evident to prevent overheating. The trees to the west can function as a dynamic shading element; during summer when passive solar heating is unnecessary, the leaves on the trees provide shade to the building. In the wintertime, when the leaves are gone, the sun has easier access to pass through the tree crowns.
When focusing on the atmospheric conditions, the site in Høvelte is almost optimal. With a few hundred meters to the nearest trafficked road, and no industry around, pollution is not a theme. The clean air makes it obvious to implement natural ventilation in the design of the building.

The goal for the project is to meet the demands for a low energy building in 2015, according to the Danish building regulations. To reach the goal, the design has to be optimised through an iterative process, taking the site conditions into consideration, without compromising the essential aspect of this project, the creation of a healing environment.

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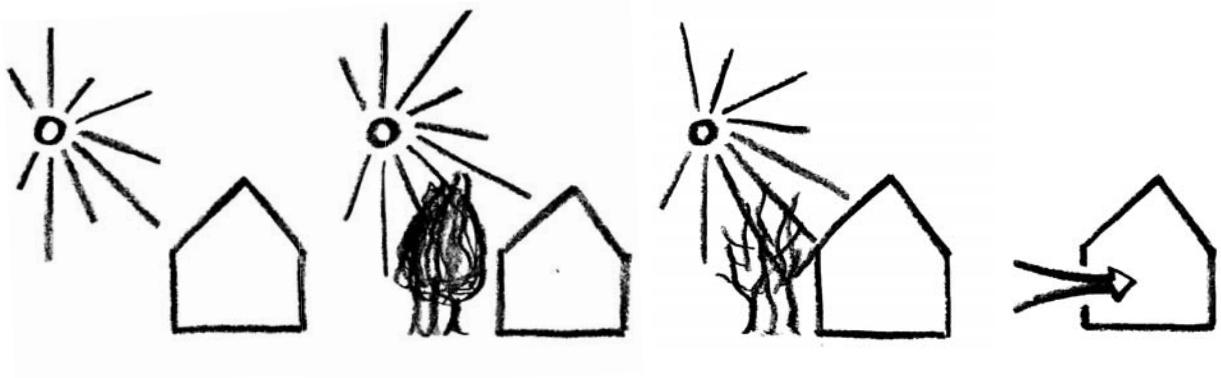

TECHNICAL APPROACH
DESIGN STRATEGY

In the creation of a healing environment the focus lays on the implementation of daylight and the optimisation of atmospheric, thermal and acoustical comfort. The optimisation of the indoor climate and energy performance is based on a strategy from the publication A*rkitektur og energi: mod en 2020-lavenergistrategi* (*DOC; Arkitektur og energi)*, by architect Rob Marsh. The strategy is divided into 4 steps; Dialogue, spatiality, materials and technology.

Dialogue
The primary aspect of a low energy strategy is that architecture is made for people, not for the sake of implementing new technologies. There is no reason to talk about technological solutions if there is no understanding for the usage of the building. The first step is therefore to clarify the users need and the functionality of the building.

Spatiality
The second step is to make use of the spatial and passive qualities of the building to minimise the energy consumption and optimise the indoor climate. Geometry, orientation and interior organisation are all decisive factors when it comes to the daylight conditions and thermal comfort. An evenly distribution of windows and slim building types will improve the utilisation of daylight, passive solar heating and natural ventilation.

Materials
The third step is the choice of materials, which have a direct impact to daylight conditions and the thermal and acoustical comfort. Materials are crucial to the reflection of daylight and the absorption of noise, meanwhile having an accumulating effect. The need for thermal mass shall though be reduced, as the users' possibility of controlling the thermal comfort is getting limited.
The building envelope, detailing and joints are also included in the third step and are highly important for the energy performance.

Technology
The primary focus of this low energy strategy are passive solutions; a graduation of active technical solutions can afterwards be implemented in the design, both to secure the indoor climate and to reduce the energy consumption of the building.

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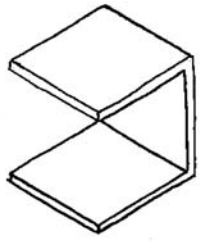
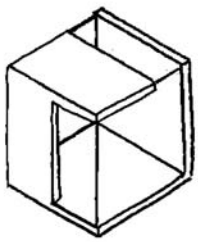
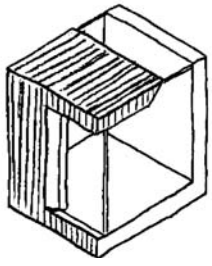


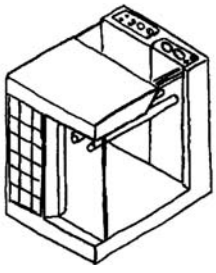
DIALOGUE



SPATIALITY



MATERIALS



TECHNOLOGY

ATMOSPHERE
ROOM DESCRIPTIONS

Entrance and arrival area
The main entrance need to be clearly visible when arriving. When walking towards the entrance it is also the wish that there shall be a sense of the life going on in the building, but without getting the feeling of being watched.
When entering the building there needs to be a clear sense of direction and clarity in the flow to the different functions of the building. The atmosphere of the arrival area shall be light and with a home-like feeling, though with a hint of professionalism. This can be achieved by using natural materials like wood to lighten up the clinical look of the building.

Social spaces
The common areas shall be the central heart of the building, housing the social life and helping it to spread throughout the building. The feeling of the social area need to vary between the different functions, but a common factor is that these are the main spaces which shall generate the homely feel of the building with its warmth and life.
A part of the social space is the kitchen and dining area, which shall be accessible for all the residents. The atmosphere shall be informal, and appeal to meet with new people.
The lounge area is more relaxed and redrawn, consisting of several smaller intimate spaces.
There shall also be a more active area, where the residents can mingle, play games and create bonds, relations and trust. These relations can both be used as a social activator and as a healing factor.

Green spaces
The green spaces of the building consist of one or several gardens which can either be indoors or outdoors, or be a mixture of both. The gardens shall offer the possibilities for varied activities which shall stimulate and inspire the veterans and help them along in their healing process, both physically and mentally.
The garden can both be used with a meditative purpose and in an active way to the physical treatment, with sloping paths.
Another aspect of the garden is to let daylight into the building to secure a good indoor climate.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Living area
The living area has to be the break from the social activities and the treatment process. It has to be a place where the inhabitants can retreat and relax and be in private. The living area shall have a sense of home with all its practicalities, but also have a sense of that it is a temporary stay on the rehabilitation centre.

Treatment facilities
The treatment facilities are divided into two fields, physical training and physiological therapy. The physical training facilities consists of two types of spaces, one for rehabilitating exercises and one for physical workout. The treatment space shall be flexible, have good lighting conditions and have a visual connection to the nature. The atmosphere shall be optimistic and motivating.

Therapy facilities
The therapy facilities consists of consultation spaces and a networking lab where they can be schooled and get ready for a life after their treatment at the centre.
The consultation spaces are intimate with possibilities for deeper conversations.
To lighten the feeling of the room a view to the surrounding nature can be added.

Staff facilities
The staff needs to be visible in the daily life of the building, so the inhabitants can get help whenever there is need for it. In the implementation of a healing atmosphere the working conditions also have to be optimal. It is therefore necessary to implement areas, where the access is only for the staff. The staff facilities shall be friendly and optimistic.

FUNCTIONALITY
ROOM PROGRAMME

TOTAL AREA 1080 m²

Tech room	40 m²
Cleaning storage	15 m²
Total	55 m²

Main hall	120 m²
Kitchens	60 m²
Dining area	50 m²
Lounge	150 m²
Common toilets	30 m²
Total	410 m²

Consulation rooms	40 m²
Networking lab	55 m²
Total	95 m²

Gym area	80 m²
Physical theraphy	15 m²
Storage	10 m²
Total	105 m²

Staff workspaces	40 m²
Staff dinning area	30 m²
Storage	20 m²
Total	90 m²

12 single apartments	300 m²
Washing facilities	15 m²
Storage space	10 m²
Total	325 m²

DESIGN MANUAL
FUNDAMENTAL CRITERIA

Based on the research phase, the design criteria are divided into five groups; Body , Relations, Accessibility, Expression and Technical approach. Some of the criteria can be included in several groups, but will only be mentioned once.

Body
- The design shall be appealing to all senses
- Perception of spaces shall be inspiring and optimistic
- Incorporation of sensory gardens as an active element of the healing process

Relations
- The design shall provide possibilities for privacy and give a feeling of being home
- The centre shall give space for making social relations
- Social spaces shall be part of a natural flow
- Creation of connections to nature, both physically and visually
- A clear zoning of the different functions shall be incorporated in the design

Safety
- The veteran centre shall be accessible for everyone, no matter of mobility
- The centre shall provide an easy navigation

Architectural expression
- The interior shall express openness and an informal atmosphere
- The expression shall be characterized by protective, authenticity and simplicity
- The centre shall have a holistic expression

Environmental aim
- The building shall make benefit of passive elements to improve the energy consumption and to secure a good indoor environment
- Site conditions shall be used active to minimise the energy consumption
- The design shall fulfil the demands for a low energy building in 2015, according to the Danish building regulations

PROJECT **VISION**

The goal for this master thesis is to design a recreational centre for Danish veterans, with optimized conditions for healing of the human body and mind. The physical settings shall develop through elements of the design concept *Healing architecture* and have a clear interaction with the surrounding landscape.

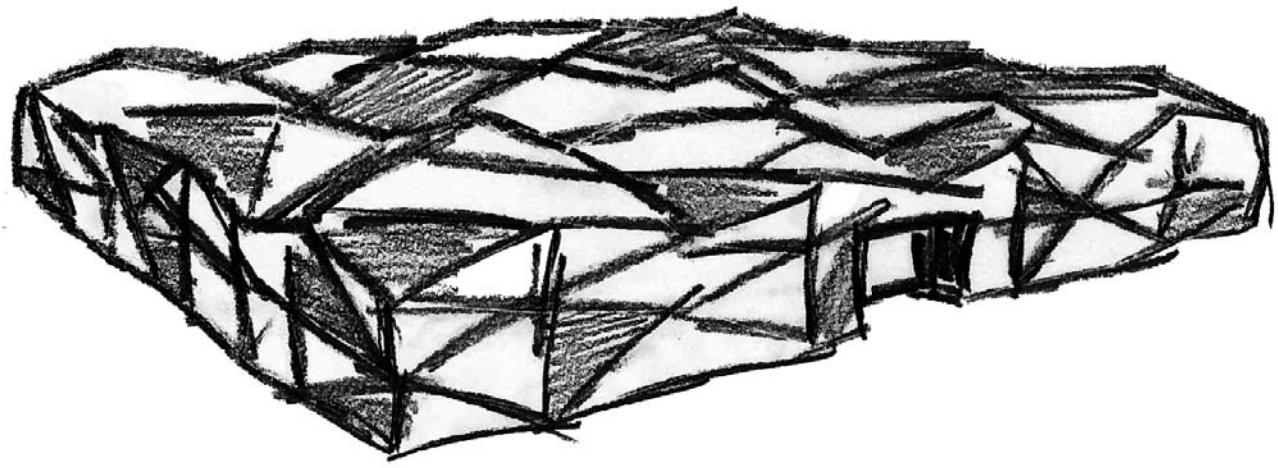
The environmental approach goes hand in hand with healing principles, and shall through a parallel processing end up in an integrated solution for the veteran centre.

Scope
Healing architecture is an entire study per se, and will only be used as inspiration and a guiding tool in the design process. The project will not deal with treatment methods in depth; the focus will be on the physical settings and conditions for treatment.

The district plan is limited to only include the existing arrival area of the Royal Danish Life Guards, and will therefore not have a direct impact on the final result. Development of the project will though be made with respect to the characteristics of the area.

DESIGN PROCESS

DESCRIBTION OF THE PROCESS FROM IDEA TO DESIGN



DESIGN PROCESS
PROCESS OVERVIEW

To get a better overview of the design process, a simplified diagram displaying the process´s major elements is shown on the opposite page.
The design process is based on an integrated design process, where its best to get as many aspects of the design into the process as early as possible and integrate them fully into the design to create a holistic solution. The integrated design process is not a linear process, when there are changes in the fundamentals' of the design some steps can be-taken back in the process and change parts of the design or the values on which they were based.
This way of designing a building helps the process to cope with the obstacles put in front of it and adapt to the situation.
The design process takes its offset in the programme and from the analysis which takes place there.
This way the design has its roots and values planted deep in the arguments and problematics of the project.
As meanchend earlier the design process overview diagram shown on the opposite page, has been simplified to some extent because the process of designing a building over several months can get very complex and entangled and to make it easier for people outside the process to better understand it and the thoughts behind it.
So some aspects of the process have been left out, because they had little or no influence on the design of the final product.
Because the process is rather complex some of the elements may overlap because they were done simultaneously.
Also an aspect which can have a big influence on the design process and which often is hidden when looking back on the process is the influence of external sources like supervisor meeting and consultations, pinups with your fellow student and the midterm review.
In each phase of the design process there are several subcategories, where some of them are technical aspects and calculations which affect and influence the design and will be shown afterwards.

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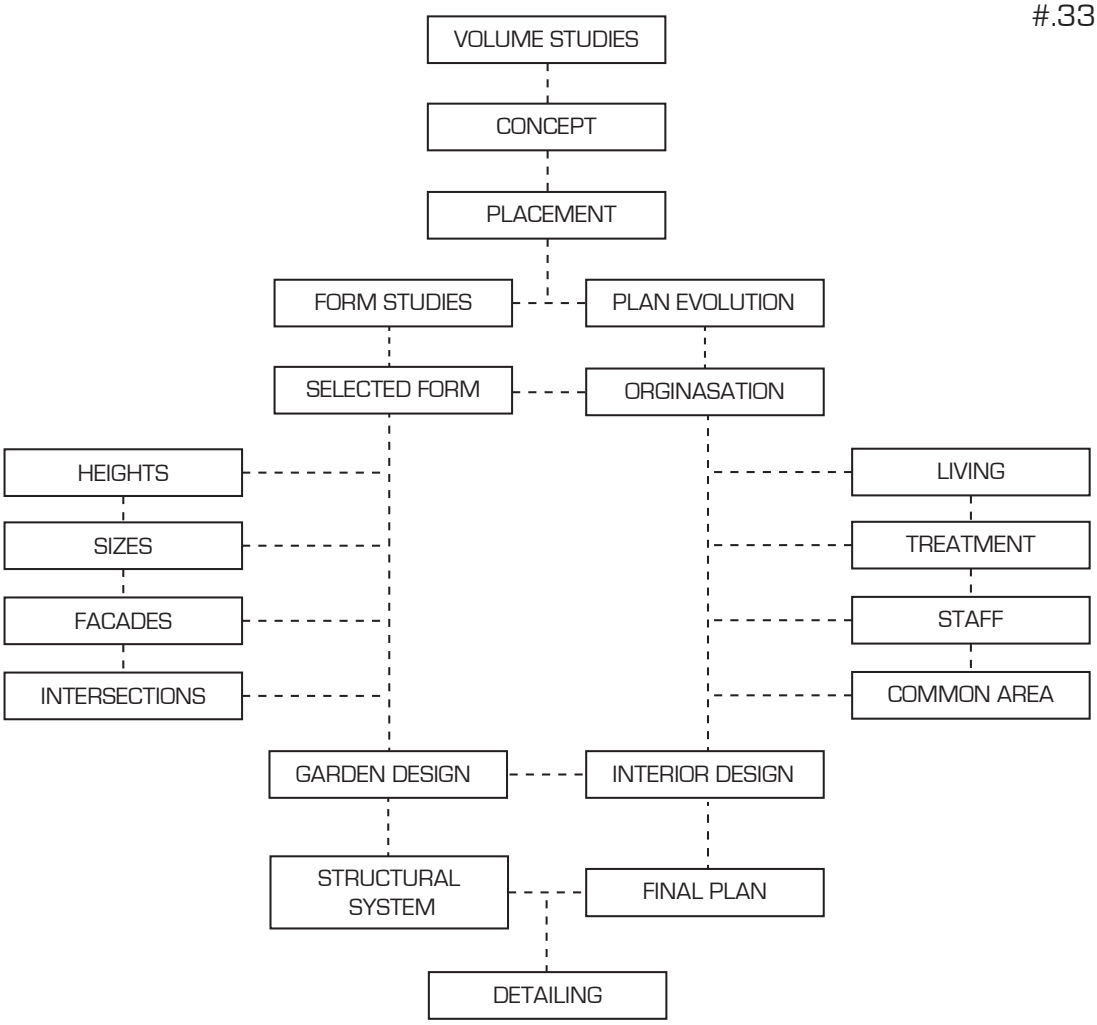
VOLUME STUDIES
CONCEPT
PLACEMENT
FORM STUDIES
PLAN EVOLUTION
SELECTED FORM
ORGINASATION
HEIGHTS
SIZES
FACADES
INTERSECTIONS
LIVING
TREATMENT
STAFF
COMMON AREA
GARDEN DESIGN
INTERIOR DESIGN
STRUCTURAL SYSTEM
FINAL PLAN
DETAILING


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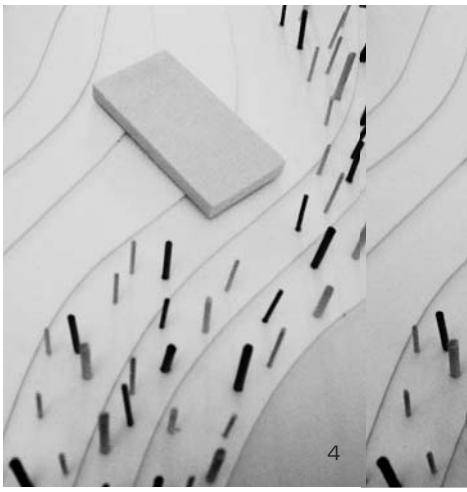
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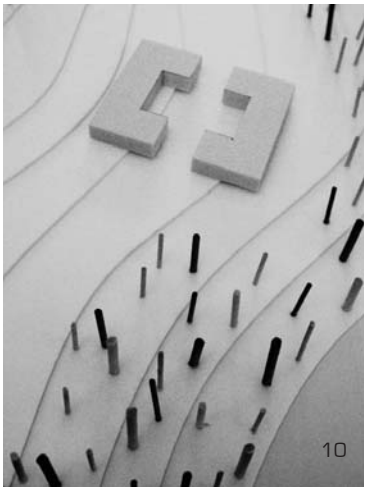
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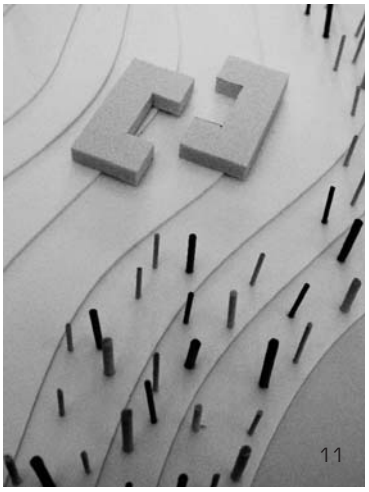
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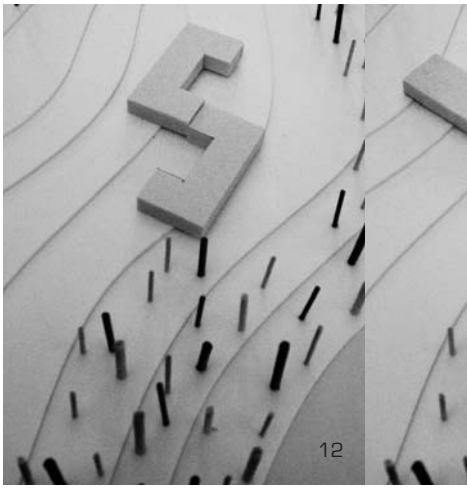
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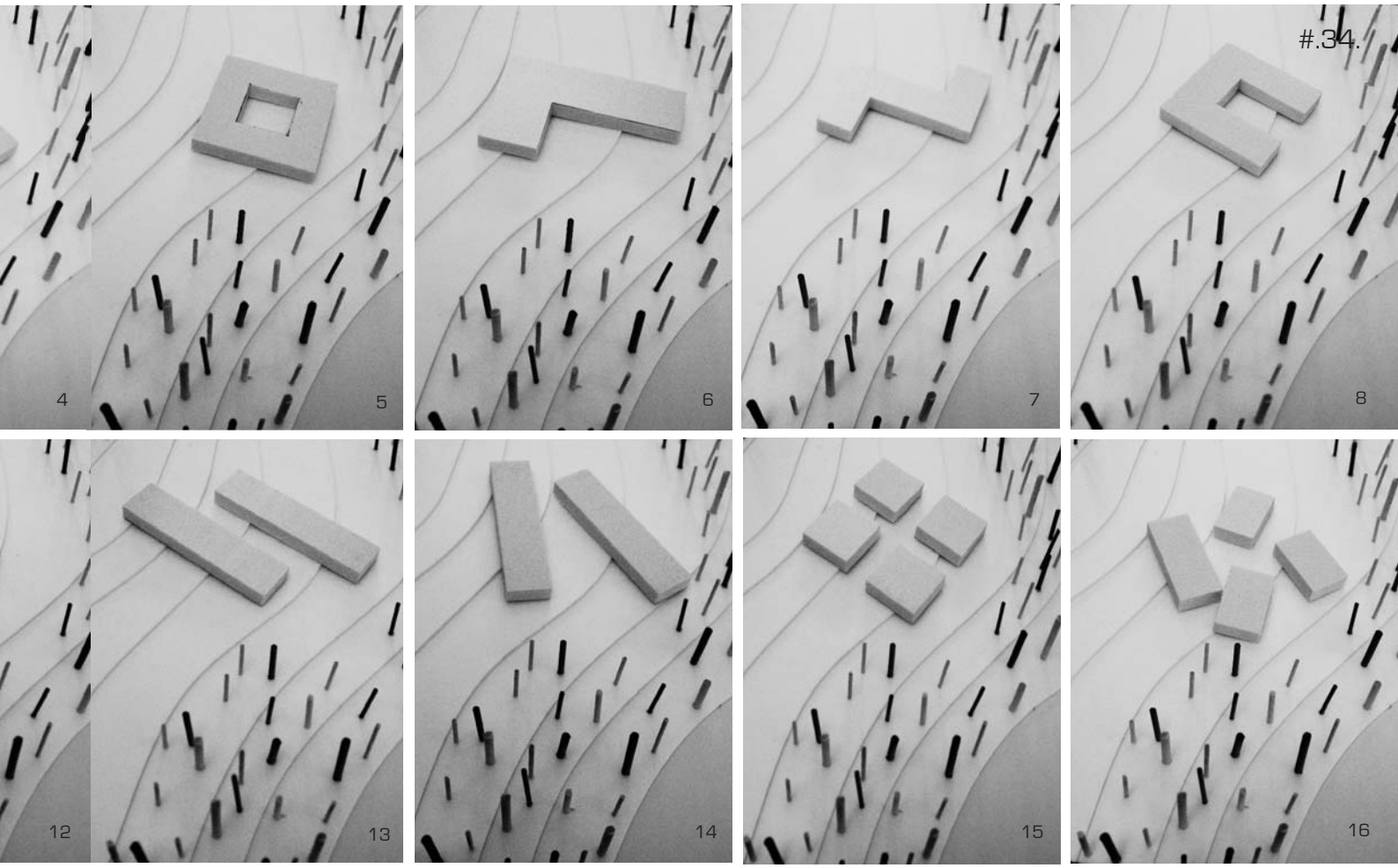

DESIGN PROCESS

VOLUME STUDIES

To explore the possibilities of a building place on this particular site we experimented with different basic forms placed in a small context model. These basic studies have great importance for the direction of the design. The different forms are considerate and compared to their connection and interaction with the context and the values from the programme.

Starting with the simplest volumes and variation the combinations untill they become more complex, but still keep their simple expression.
The different factors on which they were considerate were direction, their variation in expression, the space they create in nature, the spaces they captivate, their connection to nature and if they are protective or open.
The three main types will be explained, but the process was applied to all the examples.
The square (1) and the later iteration where it has a opening place in the centre (5) and where they are divided into two building. The qualities which they posses are a clear focus on the invert and a distance to the outside secluding itself from it context. A simple and monotone expression from the outside, but a different expression on the inside. In the latter it creates a sense of direction leading out into the landscape. though the building.
The rectangle (4) has a clear sense of direction, but lacks any other connection to nature.
The four small squares (15) and later iterations (16) have the qualities that they are diverse in expression and can both be introverted and extroverted. By shifting and stretching the volumes there can be formed spaces in nature around the building which didn't exist before and also spaces between the building which become part of the building itself.

We didn't chose one specific type, but choose to take some of the qualities from each of the examples and try to combine them to something new in the further design.

DESIGN PROCESS

CONCEPT

During the investigation of how the volumes fitted into and interacted with landscape and it was here the concept emerged. The concept is the main idea for the development of the design process and all decisions made in the process should have its root in the concept.

It was to be an object in the landscape only by creating something which contradicts the forms of the landscape can the effects of the landscape best be enhanced and described. The object was to be the opposite of nature manmade and geometrical. Nature is all around us and it is always extroverted, whereas an object is to be compact and introverted and have it focus on the healing which is happening inside.

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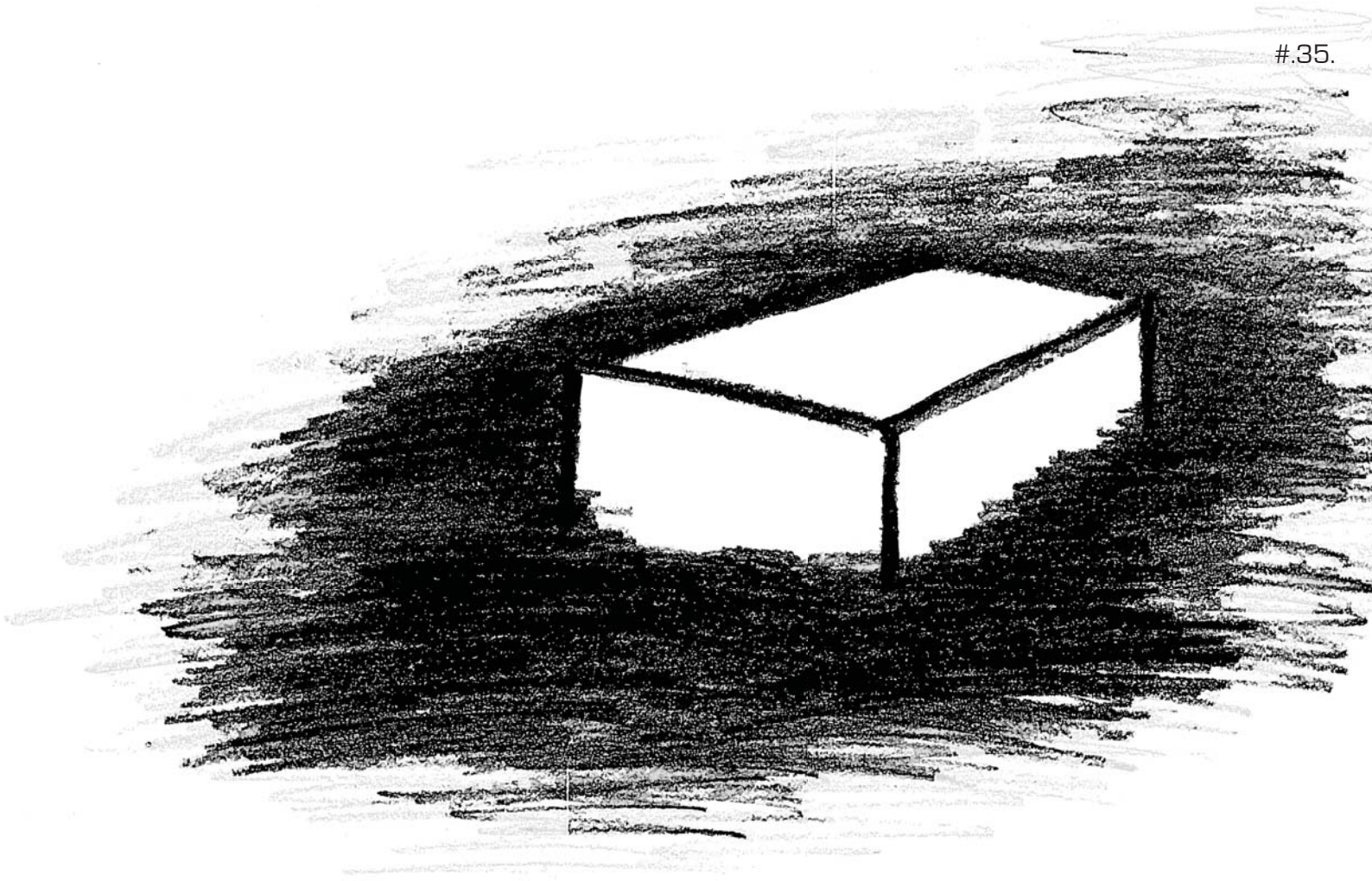

PLACEMENT
CONNECTION TO THE CONTEXT

To create an object in the landscape there needs to be a clear line of how it interact with its immediate surrounding. By during a short sketching analysis on how different way for touching the landscape we got a better understanding of this concept.

The first aspect of this investigation was to see the volume in a section and place it in the landscape. Here three possible scenarios have been presented and all have different ways of interacting with it surrounding.
The first one barely touches the landscape and slight hovers over it and distances itself for the landscape.
The second dig itself into the landscape and creates a clear contrast to the landscape by it contact with it.
The third creates a stamp on which the building is placed. Here the distances itself from the landscape a little but the stamp create a gap between the building and the landscape which highlights them both.

The second part is a continuation of the principles of the first but is concerning how the building is placed in the landscape and done in a planar view. this concerns how the building is placed in combination and connection to the surrounding forest.
The first one is places outside the forest where it seems exposed and unprotected.
The second is placed deep into the forest and seems isolated and distant from the surrounding outside the forest.
The third one is place between the open area and the forest making it protected by the forest from one side and the hillside by the other.

The conclusion for creating a place where the veterans can feel safe and secure is to have the building intersect with the landscape and placed on the edge of the forest and by having the stamp around the building creating a straight piece of land before the curvature of the landscape creates a place where the disabled can move freely and enjoy the nearby nature.

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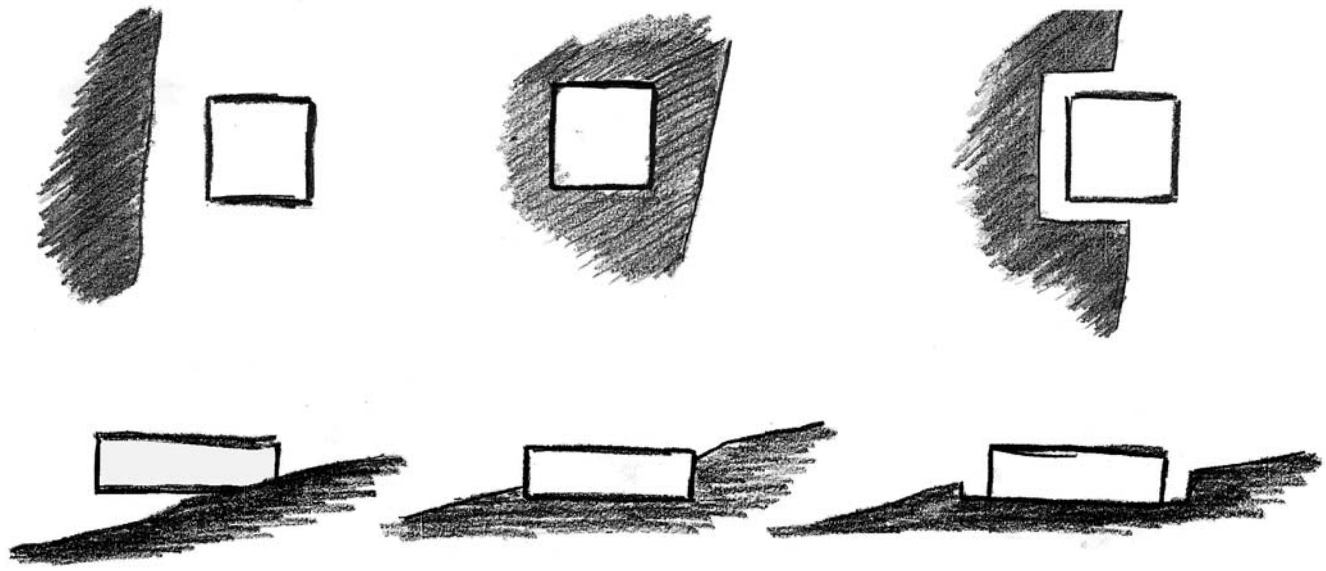

EXPOSED ISOLATED PROTECTED

PLACEMENT
CONNECTION TO THE BARRACKS

The connection to the barracks take it offset from the consideration in the analysis of the location where the most preferable way of connecting the building with the existing area is by extending the lower of the two access roads down to the site. In this chapter will be taking under consideration how this road interacts with the building and its placement.

In the first of two experiments the roads intersection with the building is where the building is orientated directly north to south and the road comes in at a steep angle. Here the goal was to create a clear path from the barracks are down to the scenic lake area below the building.

In the second experiment the building was aligned with the angle of the road so that the focus remained on the building and not on the lake and the continuation of the path down to the lake was just a bonus.

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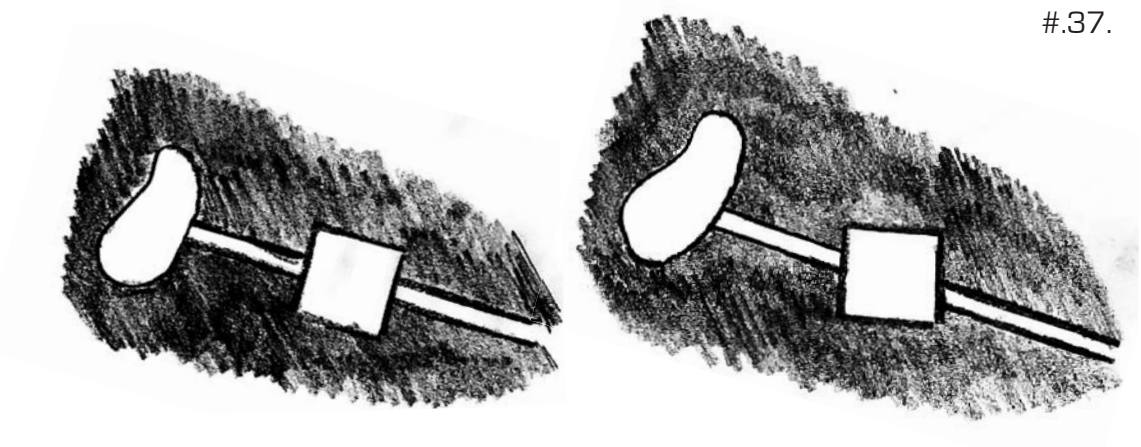

PLAN DETAILING

PLAN EVOLUTION

Working with the values derived from the volume studies and those of the programme to design a plan layout. The plan layout has gone though many different changes from the effects of change in demand and values for its design.

The initial plan layout (1) is based on a rectangle where light wells cut into the building to create something resembling the structure of the four smaller squares from the volume studies. The qualities of this layout is the clear division into segment to house each function and also letting light deeper in to the building. The reason why this proposal was discarded was it failure to be conserved as a whole building and acted more like four individual building connected by corridors.

The second plan solution was again based on the rectangular footprint, here has added a interior space which could acted as gardens. The three garden were to have different characters. One which was a herb garden, one was an activity and training garden and the last was a water garden. This was discarded because of its inability to focus itself inward.

Three proposal show is where the path leading from the barracks area down to the lake cut through the building and creates a garden between the two buildings. The reason why this proposal was discarded was because of its division of the building into two and disturbing the flow and connection between the two. Also it directed all the attention onto the lake inside of the building.

The last and final proposal was the square with a central garden. The reason for choosing this particular solution was its clear introverted character and direction, simple layout and it placement in nature.

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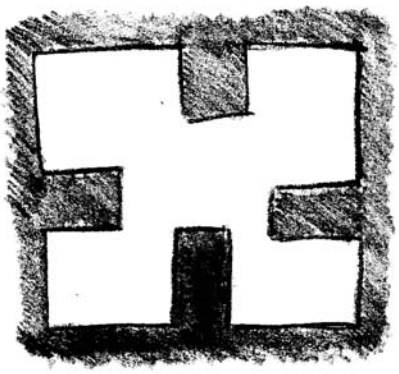

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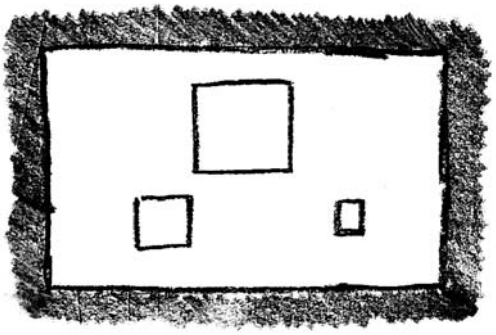

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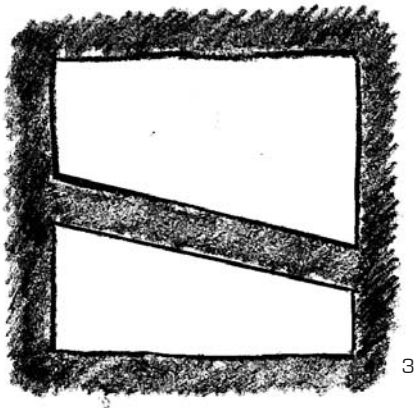

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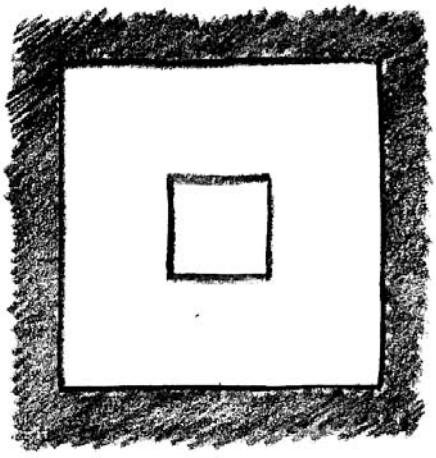

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PLAN DETAILING
PLAN ORGINASATION

After arriving at a plan layout begins the distributing of functions. There have been consideration in the earlier plan and these consideration were taking into account when placing or move functions. The starting point for the placement of all the function except the social areas were placed in the periphery of the building.

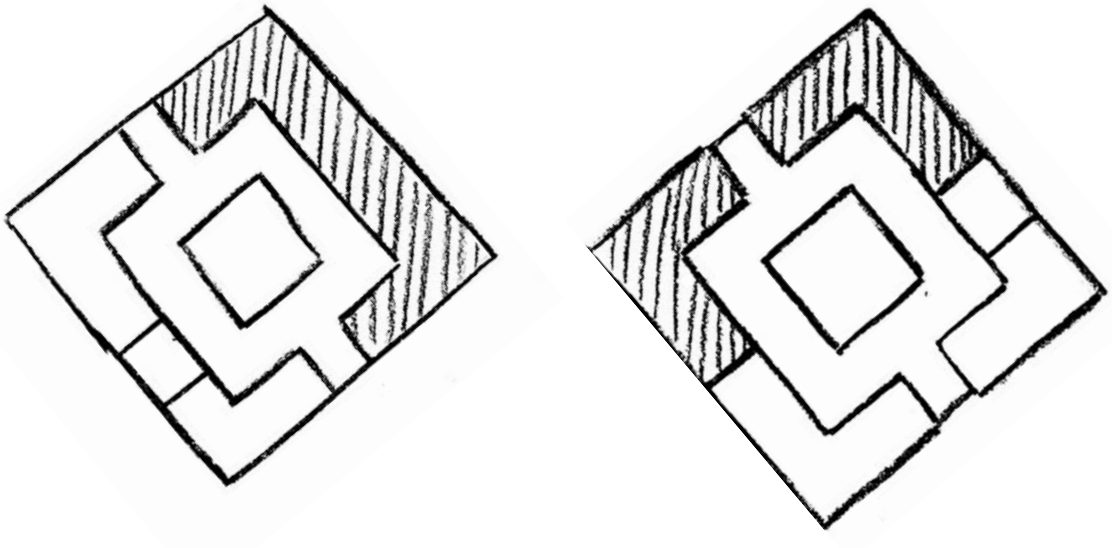
Social
The social area is located around the central interior garden and acts as the primary distribution of flow throughout the building. The social area is divided into smaller spaces depending on the functions placed in the periphery of the building.

Living courters
The living courters were first located to the north east to get the morning sun and thereby help adjust the circadian rhythm, having a view to nature which can help to ease the perception of pain and because of their need for a lower room temperature to have comfortable sleeping conditions.
They were later rotated because the main entrance needed to be in the treatment area and not between living courters and the treatment area, so that visitors could get a good reception and not arrive in the middle of it all.
The result of this was also getting a better view of nature by going from looking at a tree line to looking though the trees to throughways the lake. Diving the long segment of apartment into two smaller more manageable units was also a beneficial result.

Staff
The staff area was always placed to the south because of their need for light during the daytime and being near to the entrance and arrival area.
The light wasn't to create overheating and glare, so that the hillside was highest in the south so that it could add natural shading was a improving factor.

Treatment
The treatment area was also place to the south so that it was easy accessible for the large number of external users. Here getting a good view of nature and sufficient amount of light was also essential.

#.39.



PLAN DETAILING
LIVING QUARTERS

The design process for the living quarters is illustrated here with a series of illustrations. The starting point takes it offset in an standard layout for an healtcare apartment with one room and a toilet.

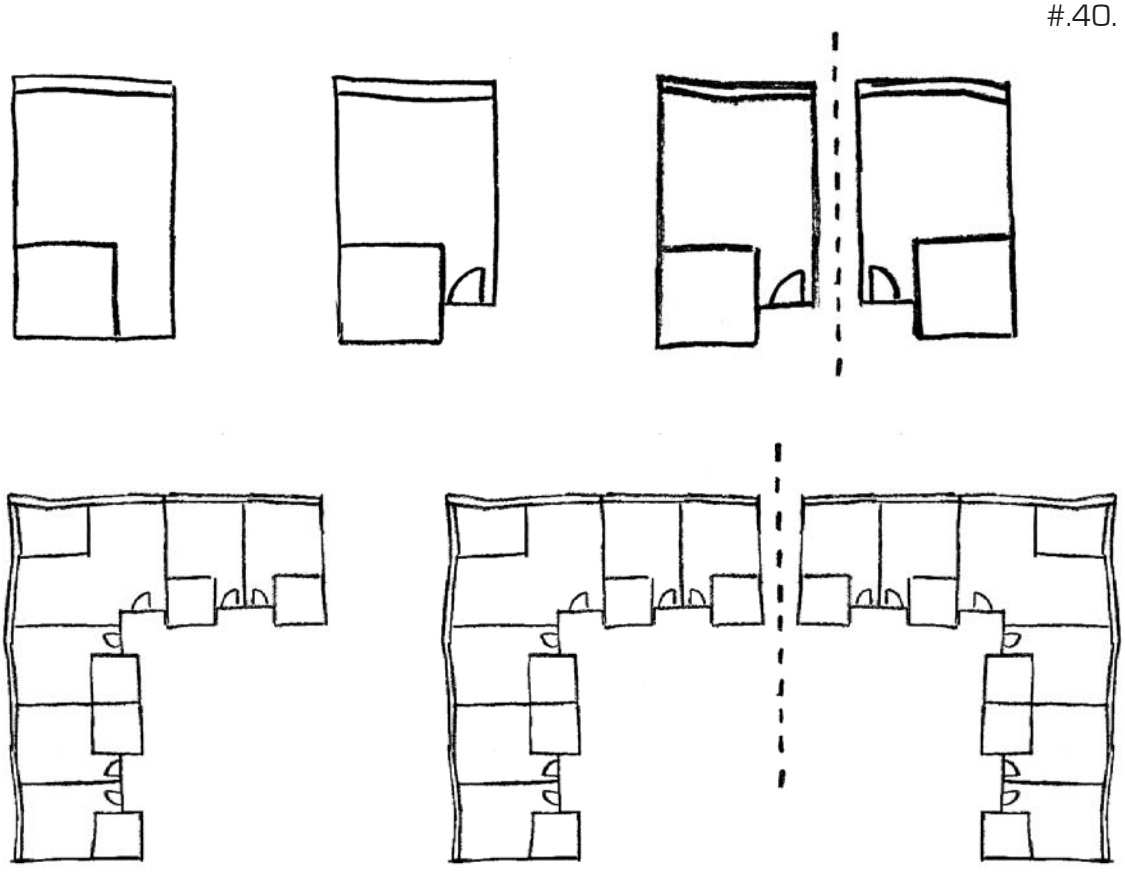
From the offset of the basic layout there is a long hallway when entering the apartment. To minimize this area and still keep the values of having a dedicated entry space, the section with the main door was pulled back. By during this it creates a space in front of the door, which by the line from the bathroom unite was still owned by the apartment. This space can be used as a transition are from the public outside to the private inside and this area could also help personalise the entry to the apartment and be used as a wayfinding element.

The next step was the combination of two apartment and by mirroring the apartments over an axis. The personal space is extended and unify the two apartments entry areas to create a larger recess.

Now having two apartments combined the procedure is duplicated to create a wing with apartments. When combining the apartment to create a wing their arose a problem when concerning the apartment in the corner and here it was decided that the corner apartment should differ from the rest of the apartment and become a one and a half room apartments based on the same principles as the original with the addition of a small living area.

The final step was to create an additional wing so that the total of apartment reached 12. The wing was mirrored in the same way as the apartment. There was kept a gap between the two to create an exit and connection to nature.

#.40.



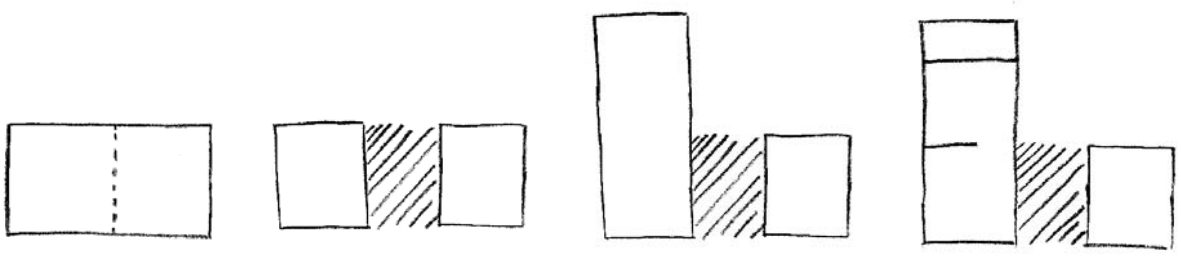
PLAN DETAILING
TREATMENT

The principle for the design process for the treatment area is that it starts out as a single volume and that volume is divided into two categories. The first category consists of the rehabilitation training facilities, the fitness facilities and the physiotherapy which is called the active and the other which is consisting of the counselling facilities is called the passive.

By separating the categories the space in between can hold the locker room and the entrance to training facilities.

The next step is to make it possible to let more light into the training facilities and give them a view to nature and adding space for all the different functions so the space is pulled upwards.
The final step is to separate the training facilities into smaller room with the fitness facilities in the bottom and further up is the rehabilitation training facilities just divided by a wall going half into the room. In the end is place the physiotherapy in a small closed room.

#.41.



PLAN DETAILING
STAFF

The principle for the design process for the staff facilities is to starts out with a single volume where the volume is divided into two categories. The first category consists of the reception area and staff workstations and the second consisting of the staff dining and meeting area, staff locker room, printer room and staff toilets.

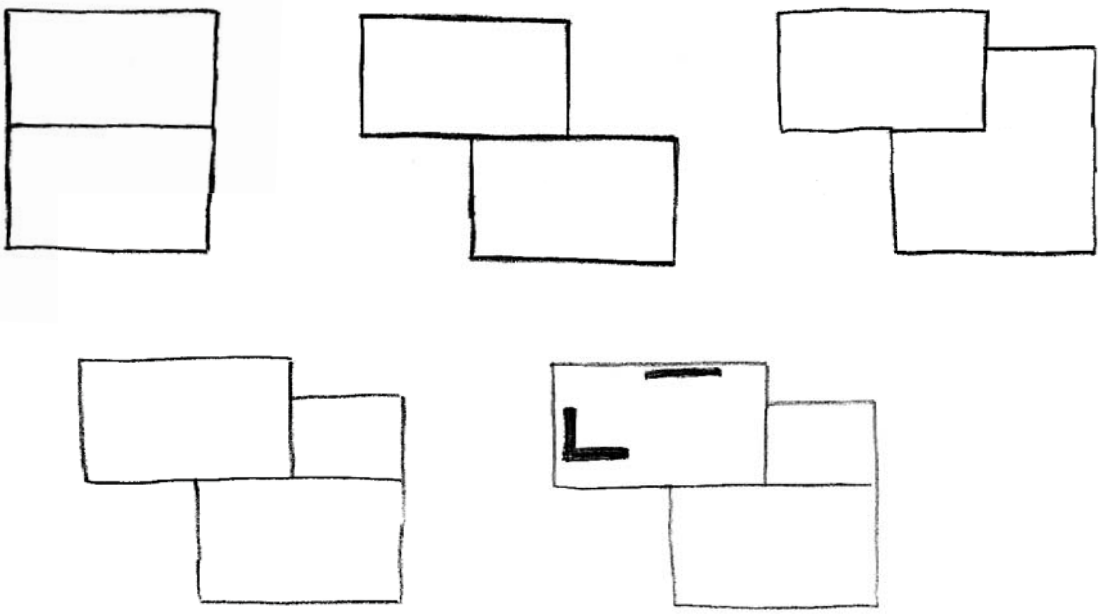
The first step is where the reception area and workstations get pulled towards the entrance and the social area to be easy accessible and have a overview of the rest of the building and of nature.

The next is where the dining, meeting and service facilities are pulled around the functions which face out towards the social area..

The volume is then divided into two segments where one holds the service facilities and the other is the dining and meeting area which has a facade with a view to nature.

The last step goes back to the division of the reception and workstation area. By placing a reception desk as a focus grabbing element to catch the attention of the visitor and define the flow towards the interior garden and around the staff area. The other element is a room divider made of a half high wall which separates the staff from the rest of the common area.

#.42.



PLAN DETAILING
COMMON AREA

The design process for the common area has it offset from the functions surrounding the common which is locates around the central interior garden. The common area is divided into three parts the kitchen and dining area, the activity area and networking lab and last is the lounge area.

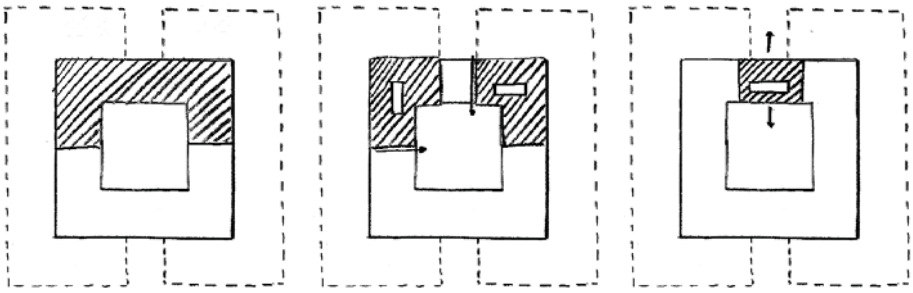
The kitchen and dining area
The kitchen and dining area is located near the living quarters and the first step is to divide the area into two one for each wing. These zones are each fitted with a kitchen unite and this gives the users extra manoeuvre space around the units and making it more accessible for people with a handicap. Along with each of the kitchen units is a path leading out towards to interior garden where they can pick herbs and plant vegetables and be charged with taking care of them and use them in their cooking.
Between the two kitchen areas is located the common dining area where they can share their dinner. The dining area has a view to either side, one to the garden and one out to nature.

The activity area and the networking lab
The activity are is placed between the living quarters and the treatment facilities to create a transition area between the two. The area is to be used for different purposes where the one that we have chose is a pool table and sitting arrangement.

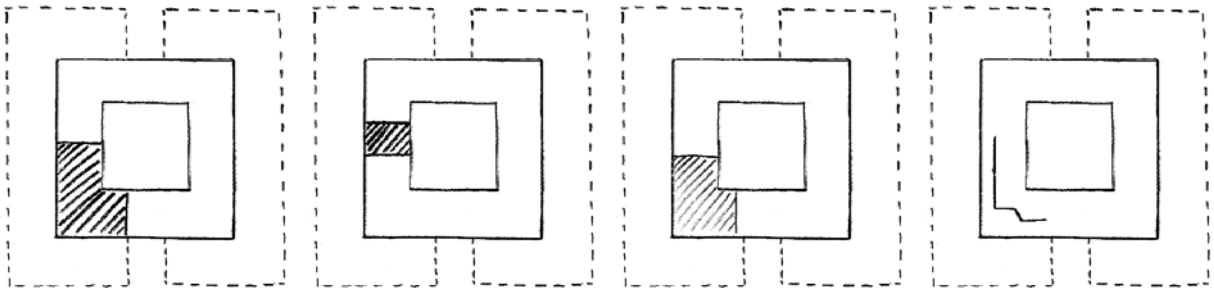
The networking lab is actually part of the treatment area and is to be in close connection to the counselling facilities and staff area. There is a need to have access from the arrival area because it also going to be used by visitors. The area is divided by a half height wall into two areas, one which is dedicated to flow and creates a waiting area which is connected to the treatment facilities. The other protects the networking lab and activity area and defines their connection to the interior garden.

The lounge area
The lounge area is located between the living quarters and the staff area. The lounge area is divided into two areas a TV lounge and an lounge sitting area.
The TV lounge is orientated towards the living quarters and the lounge sitting area is orientated towards the arrival area, but is also open towards the living quarters. The area is defined by a half height wall protecting the lounge sitting area and opening the TV lounge and clearly define the direction of the flow.

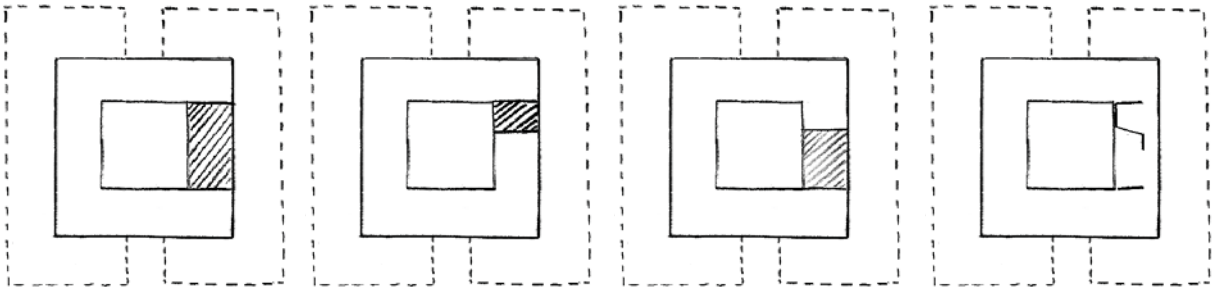
#.43.



Kitchen and dining area



Activity area and network lab



Lounge area

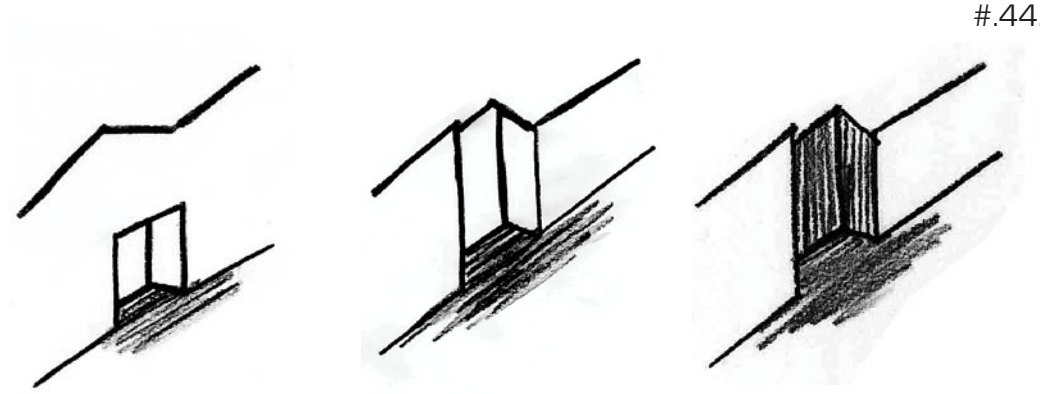
PLAN DETAILING
INTERIOR DESIGN

For the inteiror design two elements were crucial for the expression of the building. The first is the recess created for the apartments entry area and the second is the furniture wall which divides the different functions of the common area.

The recess
The recess which are allround the periphy of the common area. The idea with the recess was to create an personal space for which the residants can identify themselfs and help the to navigate the building.
The first step was just a simple cut into the wall, but this didnt excentuate the opening enough. So extending the cut up to the roof made a clear improvement. By adding wood cladding to give it a higher detail level and thereby deminishing the scale in the recess making it more intimate. The cladding also contained some acoustic qualites which could be needed in the large open common area.

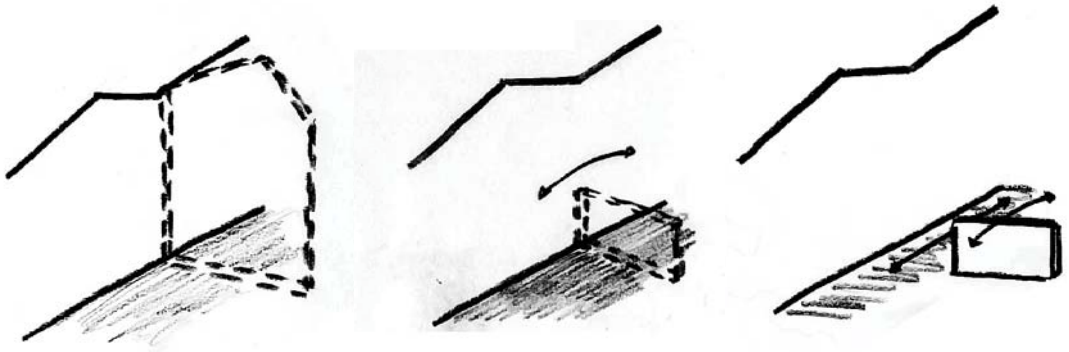
The furniture wall
The furniture wall was designed to help divide the large common area into smaller more managable zones. The walls were first place along other wall but were move away so that flow and access could go around them but still keep the privacy of the areas.

#.44.



Recess

#.45.



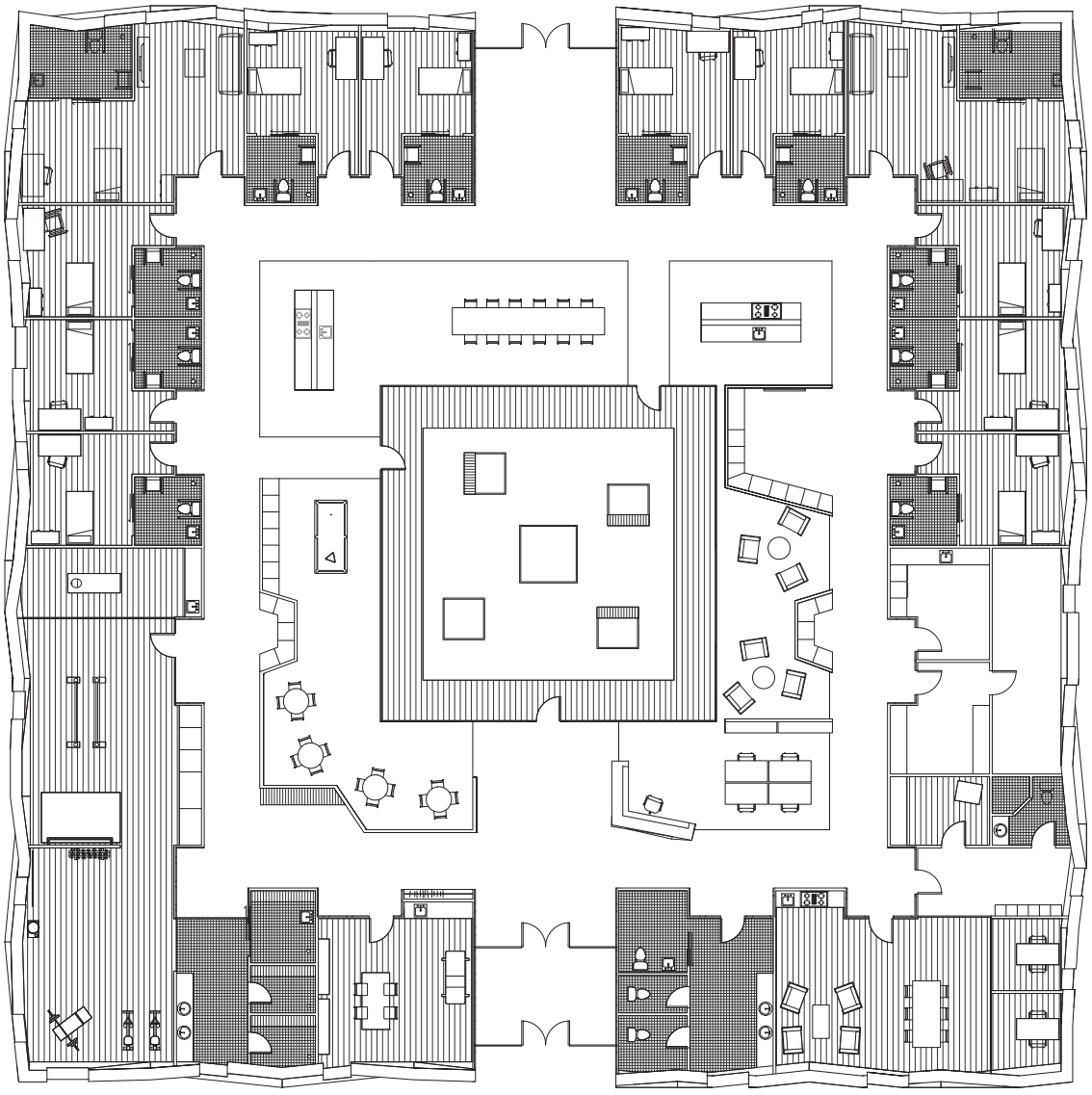
Furniture wall

PLAN DETAILING
FINAL PLAN

Here all the previous elemenents described in the plan detailing segment is combined to create the composior of the final plan. Here is clearified the connections between the singles elements and the hole to create a healing place for veterans to live and be treated.

With the square footprint with an interior central garden as a staring point and built up around a symetric disposition to create a simple and easy to read building.
Here can be seen that all the close functions are place in the periphy of the building creating a wall to the exterior and all the open social and life of the building in orientated inwards toward the interior garden.
The open space around the interior garden which creates the common area and the garden spread the green atmosphere all thoughout the building.
The flow of the building takes place in the common area defined by furniture walls and the wall of the closed functions. The here in the circular flow are access point to all the functions of the building and are easialy accesable because they dont pass though other functions.
The arrival point of the building is by the path leading down from the barracks area on the hillside above the building and this paths cuts in to the building and is stoped by ther interior garden. The entrance is placed between the two function which are going to have visitors which only have a little or no relationship with the inhabitance of the centre.
An additional entry and exit point is at the oppersite end of the building going down to the scenic lake area and the surrounding nature.
The recess princeple from the layout of the apartments is repeated to create the entrances for the other functions in the periphy.

#.46.



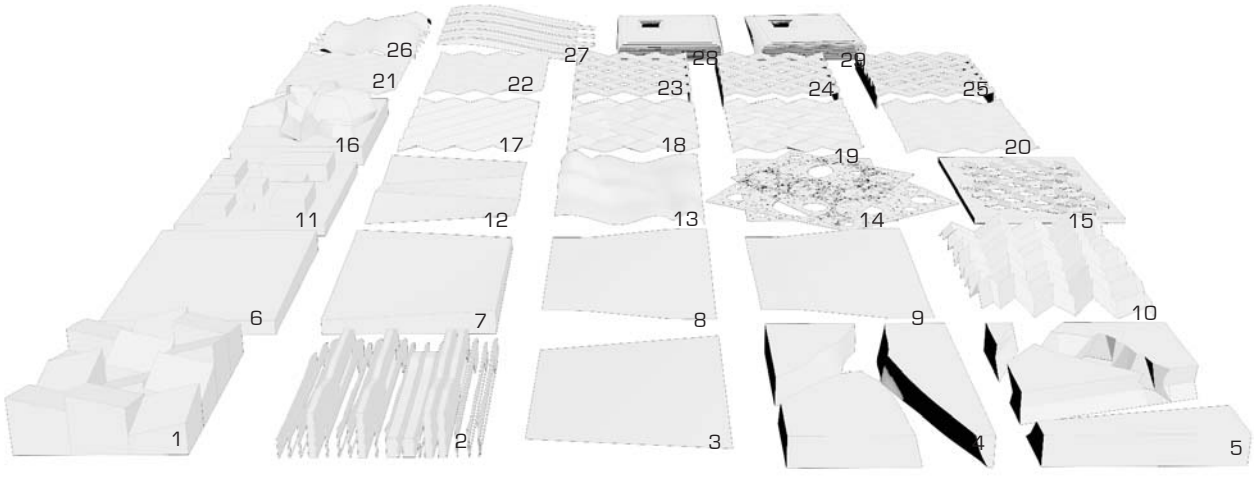
FORM STUDIES
ROOF STRUCTURE ITERATIONS

Along side the investigation of the different plan solutions was an investigation into how the tredimentional form of the building should be shaped.
The expression we seeked was an contridiction or some way of enhancing the effect of the landscape by placing our building. A varity of different solutions where tested and four were picked 1, 19, 25 and 29 for further testing.

The four different sytems selected for further testing where tested in possibilities in form of variation and architectural possiabilities.

The end result was number 25 which had the quality of being a contradiction to the landscape with it geometric surfaces faced in different angles. But the rhythm of the the roof view from afare resemples a simplified landscape or the treetops of a forest. So it creates a dialog between the building and the curvature of the landscape

#.47.



FORM STUDIES
SELECTED FORM ITERATIONS

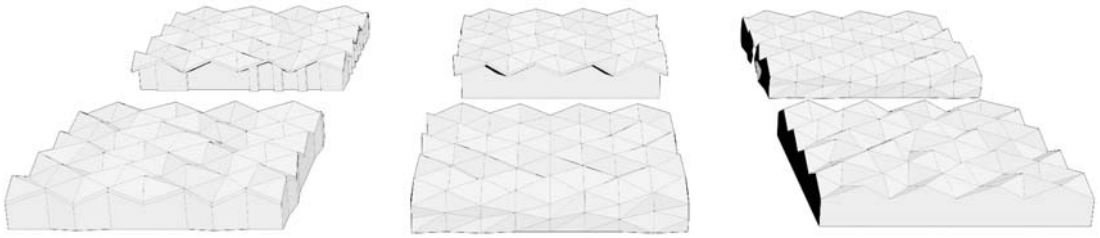
After having selected the chosen form the different parametres and qualities of the form need to be explored. We have chosen three variables from which we have preformed experiments. Experiments on how the facade expression should be, the variation of the height of the triangles and last the amount and size of the triangles. Each of these experiment is divided into several stages.

Facade experiments
The facade experiment is made up of 6 different expressions.
The first is where the edge of the roof is extruded directly down to create the facade by doing it this way it creates a angled facade.
The second is where the roof system is projected on to a planar surface, giving the face the charector of the roof but keeping it on a straight surface.
The next experiment is with a totally straight facades.
One with a pullback facade creating a canapy. The next is similar but with several elements which are pulled back out to the facade to create recesses.
The last experiment is where the roof system is continuation down on the facade to create a unified appeperance.

Height experiments
Five different experiments with changing the height of the triangles going from a maximum height of 8 meters to 4 meters and the lower point being between 3.5 and 7.5 meters.
The effect of these changes on the expression of the structure made it change dramaticly going from a dynamic form with great extremes to a form which had the look of sloped roof.
The selected heigh of the roof ended up being a minimum of 4 and a masimum of 5.5 meters.
The reasons of this chose was among other the perception of the interior space which meant not having to much of a room height but having enough to get a feeling of the structure.

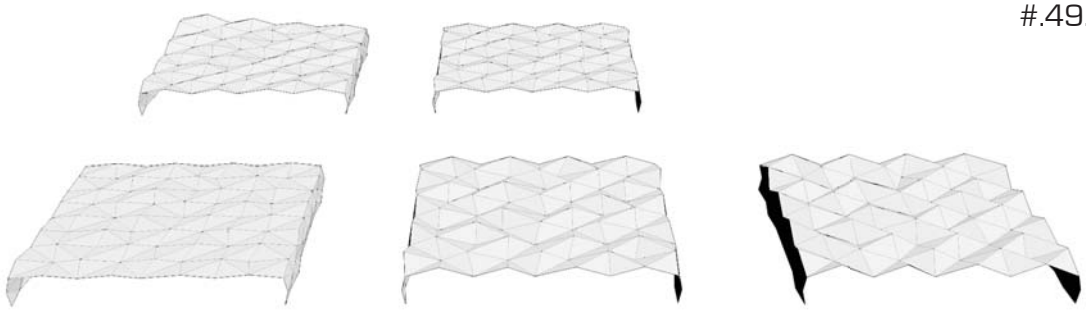
Triangle size experiments
Working with the size of the triangles it also regulated the amount of triangles needed to reach the distance of the building.
Here it was about finding the balance between the amount of triangles needed to understand the system and get a good internal experiance and making it to complex and thereby more difficult to construct.
The chose fell on the the one in the middle in the front because of its ratio between amount of triangles and their size. The size was large enought to get the dramatic expression of the roof and not get the the subdivicion of the roof into too many smaller triangles.

#.48.



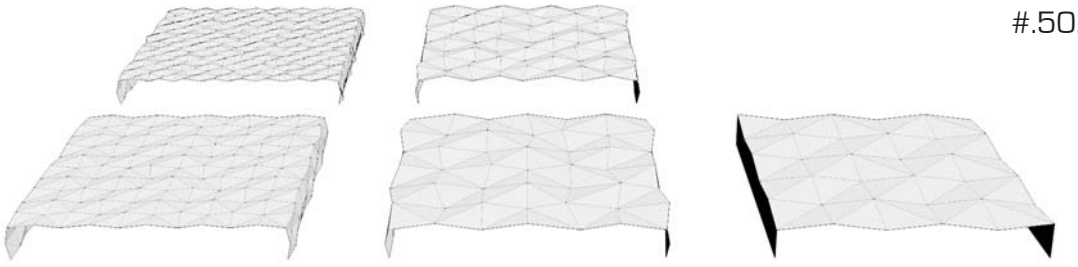
Facade experiments

#.49.



Height experiments

#.50.



Triangle size experiements

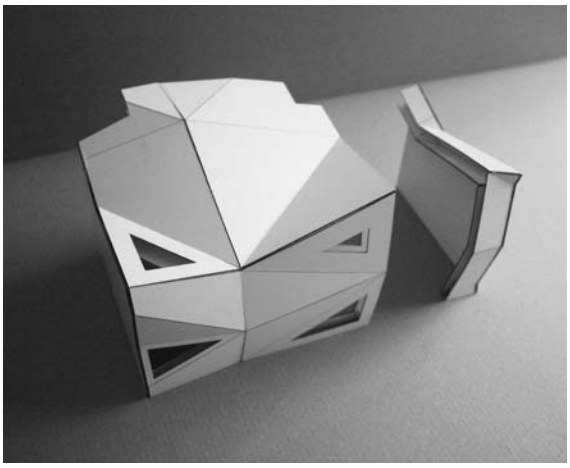
FORM STUDIES
SELECTED FORM ITERATIONS

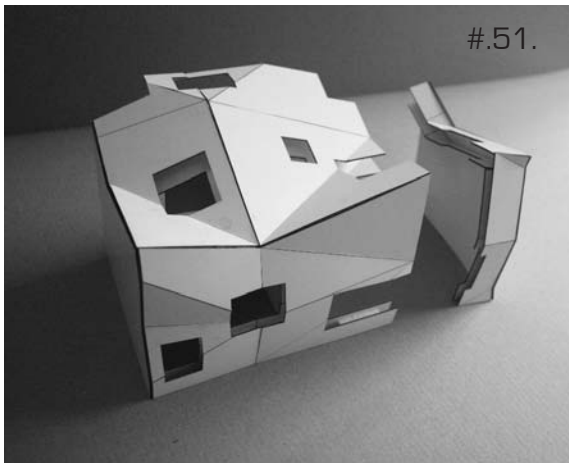
To finde the expession need for the facade a variation of experiment were performed to find suitable solutions. Here is shown the experiments with the system for the placement of the windows in the facade and the way the glass expression of these windows should be experienced.

Window experiments
Different suggestion for the way the window layout for the building should be were test. Here two suggestion are show, one where the window layout fits with the roof and facade system. A posiablitity for varying the size of the windows were added while it still would be compliant to the system.
Another suggestion was to have a windows layout which contridicted with the system of the roof and facade. Here it is show by rectangular windows which cut throw the structure. The rectangles are in three different size and are placed where the light is needed.
The decission for which layout to chose fell on the one with rectangelur window which constriduct the existing system. The reason for this chose was both practical and aesthic. The practical was that the windows can be placed where the light is need and not where the system forces it to be placed. The aesthic reason was that by adding an element which contridicts the orginal system the system becomes more clear.

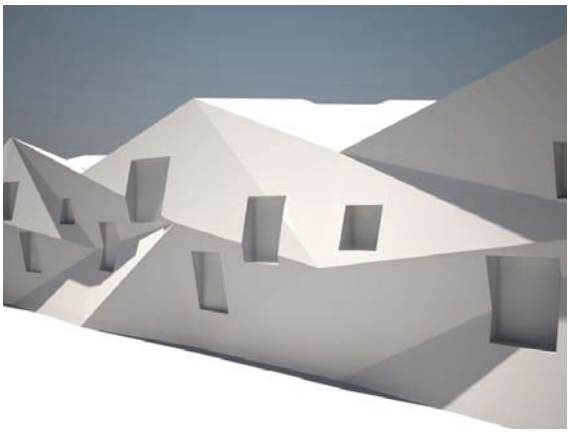
Glass experiments
These experiments are to find the way that the glass is placed in the rectangular cutouts. Two solutions were chosen where the first is where the window glass follows the facade system and the second is where the glass is kept straight and is pulled back from the facade.
The chose feel on the solution where the windows where pulled back and again the reasons were both practical and aesthic.

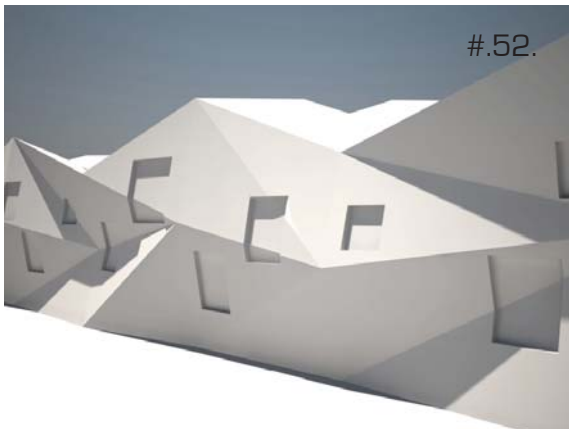
The aesthic reason was to help underline the decission from the previous experiements where the descission was made to make the window system contridict the rest of the structure and if the glass follow the sytem it wouldnt help make it more visable.
The practical reason was that it was easier to get a nice view out of the windows that didt have a frame running thought the middle of it and it is also cheaper to produce.





Facade experiements





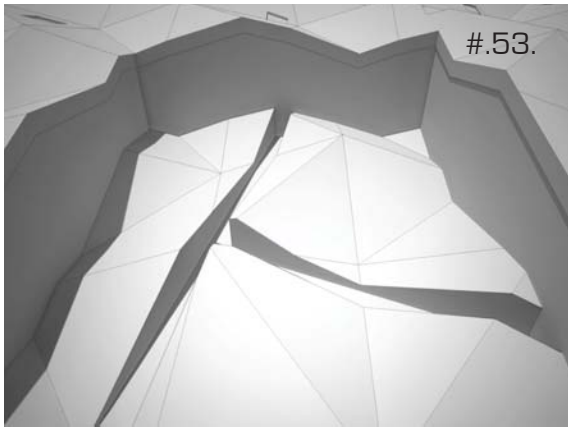
Glass experiements

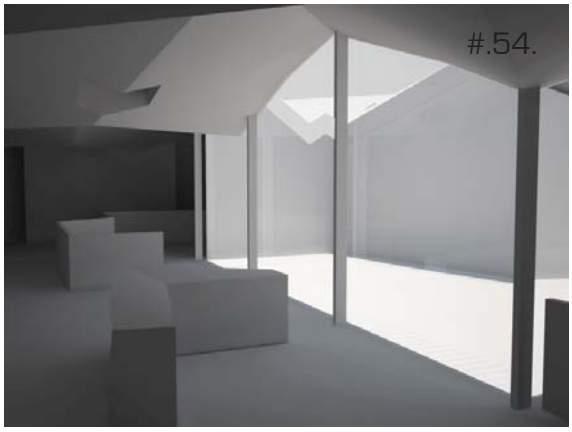
FORM STUDIES
GARDEN DESIGN

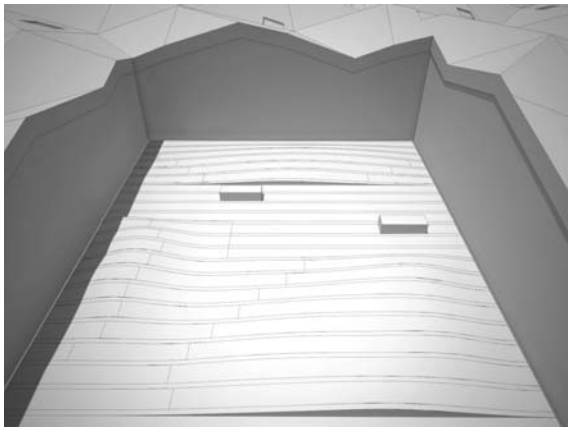
The gardens placement in the heart of the building and the ability to see it thoughout the common area adds an extra layer to the perception of the building. This chapter shows some of the different designs for the garden both in its general layout, facades and supporting structure.

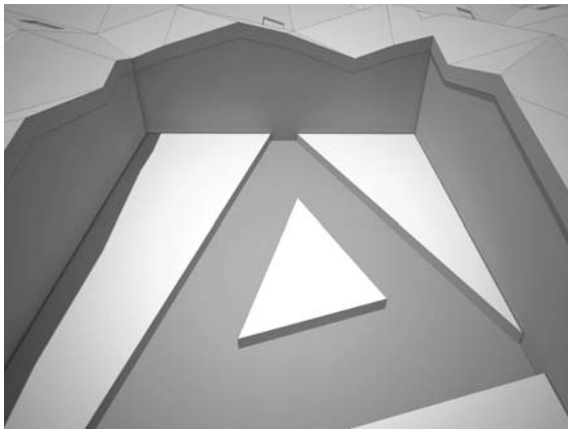
Garden layout
Different strategies where used to design the garden thoughout the process and changes in value depending on the demands for its usage.
The functions of the garden was first being part of the training facilites where the inhabitances and visitors could use different slopes to train using a wheelchair and duing walking exchises.
Then the strategy change to be more of a sensual garden where the the inhabitance can go and relax and enjoy the qualities of nature. It could also included a water fountain and herb garden for growing vegetables for use in the kitchen.
The effect on the expession of the garden by this shifts in values went from a rather expressive and dynamic form to a simplistic and straight design which left room to wander and imagine.

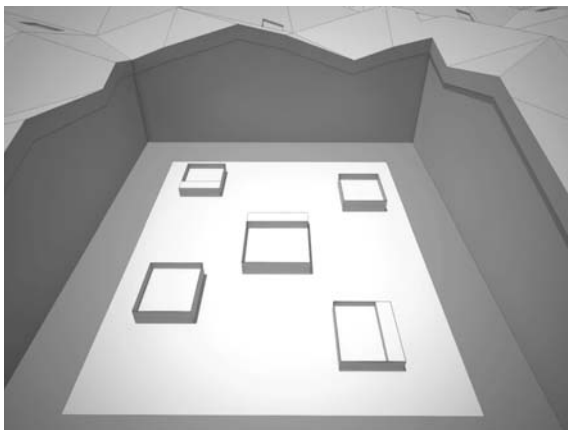
Column experiments
Because of the span from the wall surrounding the common area to the inteiror garden there was a need to have supporting columns around the interior garden. Here is a series of experiments with different expression of columns.
The first experiement was with round columns which didnt fit with the expression of the building with their organic shapes.
The second was with I profile columns which made the building seem more industrial and heavy, not underlining the homely feel.
The third was solid rectanglar columns which seemed massiv and out of place.
The last was cross profile columns which seem slim and had a sorten level of detail and were non directional.











Garden layout

Column experiements

BUILDING STABILITY
STRUCTURAL SYSTEM

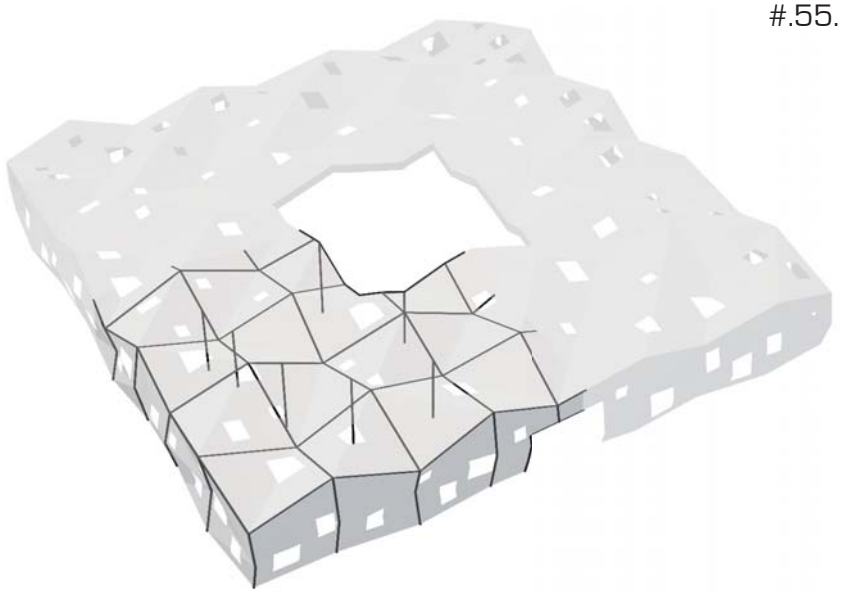
The basis for the structural system has always be taking into the considerations during the design proces and here in this chapter the principles and methods of these considerations will be explained. The idea behind the chapter is to take a rather complex structure and show how it is based on simple principles and there by possable.

Primary load bearing structure
The primary loadbearing structure consists of beams running in both directions with vertical columns fixed to the structure to give it support and thereby formning a frame structure which is stable in one direction and is therefore a good starting point for beginning to stabilice the structure.
By having these connected frames running in both directions of the building interlocking and stabilacing and thereby forming a grid structure which is stable in both directions.

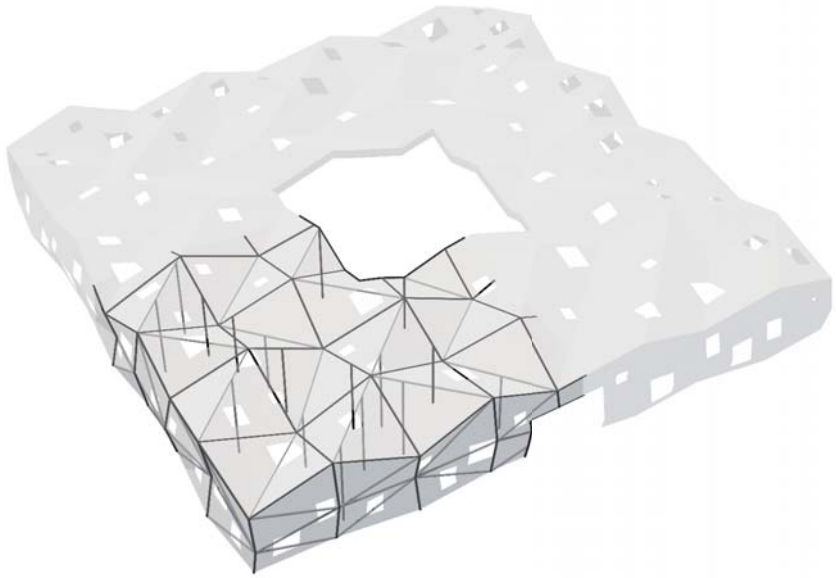
Load distribuating structure
The secondary loadbearing structure function more as a load distributing structure which transmits the stresses and load onto the primary structure. But the structure still has some load bearing capabilities and helps to stabilice the structure even further Additional montage structure is added to hold the insulation, facade elements and additional elements into place.

Weakness´s in the structure
One of the major weakness´s of the structure is the placement of the windows where the structure is running underneth and here the structure needs to be reinforced with an additional structure.
Another thing is where the span of the structure is at it higgest. The maximum span of the structure is 8 meters which is in the treatment area from the corner of the building to the wall of the locker room and out to the common area. Here the structure may also need to be reinforced to cope with the strains from the span.
The last thing is the accumolation of water in the lower points of the structure and there we thought of use the straight segments of the secondary structure and adding an small angle to create a direction for the water to flow. Along these segment can be added drains where the water can exit down thought the structure. These drains can be places near or at the same places as the supporting columns. Where the drains are going though the structure it need to be made waterproof.

#.55.



Primary load bearing structure



Load distributing structure

BUILDING SAFETY
FIRE REGULATIONS

When thinking about the building safety fire is one of the major hazzards some the precousions for such a emergency circomstance need to be thought and design into the fabric of the building to get the optimal solution.

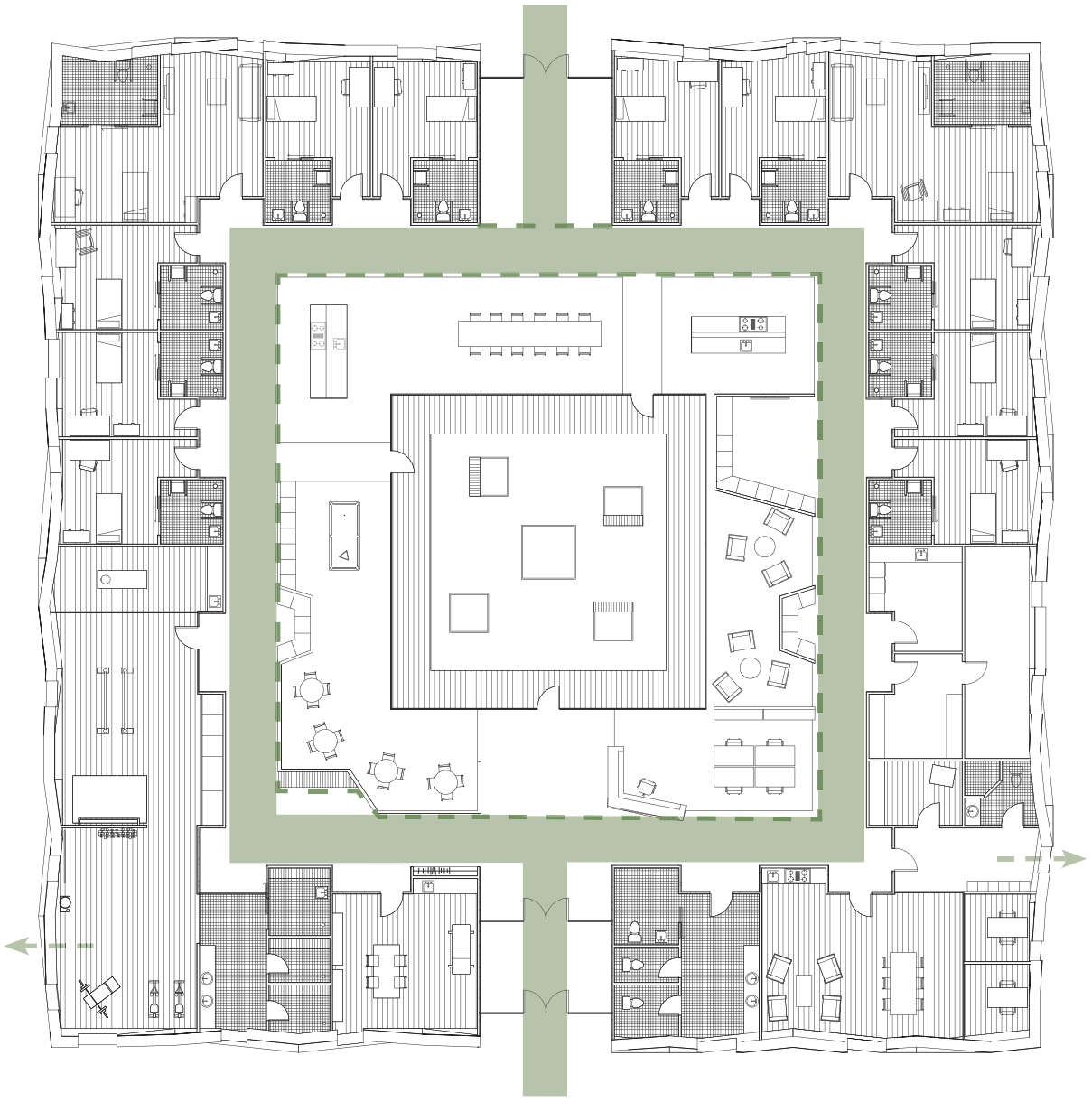
Escape routes
Primary escape routes are running throw the common area and out to the nearest exits. But if the fire is located in the common area itself automaticly fire resistant shutter seal the ecsape route off from harm.

Fire segments
All the functions are place in periphery of the building is regarded as fire resistant segments, because they outfitted with walls with two layers of fire resistant plasterboard and fire safety doors to make the rooms resistant to fire in the time that it take to evacuate the building.
In addition to the fire segment the load bearing construction has been treated with fire resistant chemicals.
The distance between the fire segments and the exterior of the building don't exchide 25 meters walking distance and to make this possiable an fire resistant shutter system with a door is added in the living part of the building to keep the distance under the 25 meters walking distance.
In each of the fire segment is also a window which placement in a height of maximum 600 mm so that they can be used as emergency exits.

Additional fire precoursions
As an additional precoursion fire ventilation can be added which starts during a situation where fire is in the common area and helps to empty it of smoke.
Also additional escape doors with direct access to the exterior are located in the places where there can be a higher consentration of people being the treatment facilites and the staff area.

Evacuation
The area around the building is kept clear so that is can be accessed by emergence personal and fire trucks.
The evacuation area is located in the open field between the barracks area and the building.

#.56.



TECHNICAL PROCESS
INDOOR CLIMATE

When looking at the indoor climate, several factors have to be taken into consideration to ensure a well-functioning environment. As mentioned in the programme, the factors of optimisation are the daylight conditions and the thermal, atmospheric and acoustical comfort. The optimisation is part of an iterative process, where several investigations are running simultaneously, both in an aesthetic and technical point of view. In this description the basis of the environmental investigations will be presented first, followed by a description of the four most critical rooms, and finally the energy performance of the entire building. The final results are included in the separate presentation report.

Geometry
During the design process several iterations of the building geometry have been tested, with the focus on architectural expression, functionality, energy performance and climatic conditions. Because of accessibility and interior organisation the result is a compact building in only one level.

Daylight
To deal with the compact building design, a centralised courtyard has been implemented. This solution makes it easier to let in a satisfying daylight level, as the building geometry becomes slimmer. The windows and glass facades are all by the German manufacturer Enersign, which is known for high energy efficiency. The products have a low u-value, 0,65 W/m^{2}K, which minimise the thermal loss radically, meanwhile being effective according to passive solar gain with a g-value on 0,52.

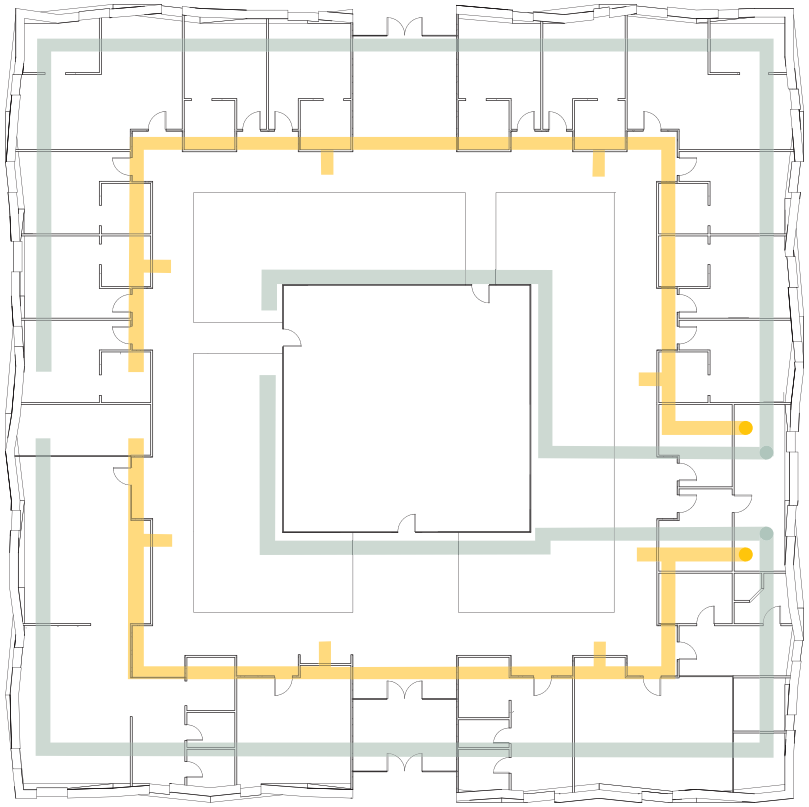
Thermal comfort
The windows and glass facades from Enersign are a great active in the optimisation of thermal comfort, and the implementation of passive solutions in the design. Though the products are effective according to passive solar gain, it is important to prevent the risk of overheating. The total glass area is therefore limited to 30 % of the entire surface area of the building, with an even distribution on all facades and roof. In the periods where the passive solar gain is not enough a heating system of radiators will secure a satisfying temperature.

Atmospheric comfort
The rehabilitation centre is divided into different zones because of a varied functionality, with different time of usage and people load. In the optimisation of atmospheric comfort a mechanical ventilation system is implemented in the design, which can provide the required ventilation rate for the different zones. There are several requirements to ventilation. According to the Danish Building Regulation 2010 the air supply for residential buildings must be at least 0,3 l/s per m^2, and for non-residential buildings it must be at least 3 l/s per child, 5 l/s per adult and 0,35 l/s per m^2. Furthermore there are requirements for the perceived air quality and CO2-level according to the Danish standard, CR1752. The required ventilation rates for the different zones are presented in the diagram on the opposite page, and the detailed calculation methods are attached on the CD-ROM.

Natural ventilation will be used during summer time to provide atmospheric and thermal comfort, but also in the way of reducing the energy consumption.

Acoustical comfort
Throughout the entire design process it has been the intention to ingrate the acoustical solutions in the form of the building. The triangulated shape of the roof and the height of the room help to reduce the reverberation time, and thereby to improve the acoustical conditions.

#.57.



Ventilation layout

#.58.

ZONES	LIVING	TREATMENT	STAFF	COMMON	SECONDARY
BR10					
TIME OF USAGE	0.28	0.51	0.59	0.52	0.60
VACANT HOURS	-	0.32	0.37	0.35	0.50
CR1752					
TIME OF USAGE	0.96	1.94	1.16	1.03	1.23
VACANT HOURS	-	0.72	0.80	0.77	1.07
CO_2					
TIME OF USAGE	0.23	0.81	0.44	0.35	0.33
VACANT HOURS	-	0.00	0.07	0.08	0.16

Required ventilation rate [h^{-1}]

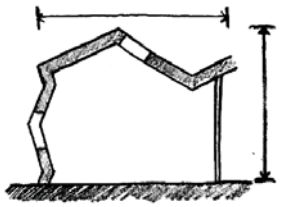
TECHNICAL PROCESS
APARTMENT CONDITIONS

The first critical room is an apartment, which represent the living area. The room is oriented towards south-west and the people load is set to 1 person, with an activity level characterised as relaxed. For optimisation and documentation of the indoor climate there is made use of BSim.

Daylight

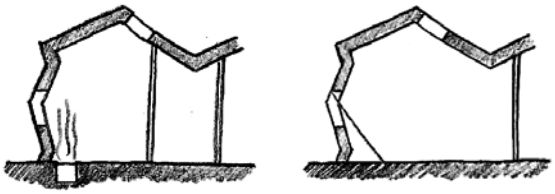
The ratio between depth and height of the room, together with a skylight and two windows in the facade serve to let daylight deep into the apartment. The interior is defined by light materials, which has a reflecting effect. The proportions, materials and window layout are all decisive parameters in the implementation of a satisfying daylight level. Documentation of the daylight factor is included on the CD-ROM in the back of the report.

#.59.



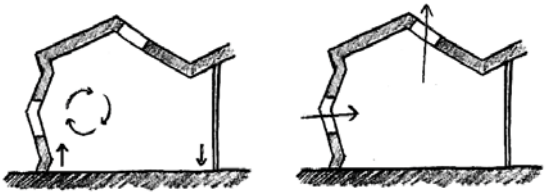
Thermal comfort

Utilisation of free energy is of high importance in the design; the window layout is therefore optimised to make use of the passive solar gain, and in the prevention of overheating venting is possible through the windows, which can be opened. In the heating season thermal comfort is secured by convectors integrated in the floor.



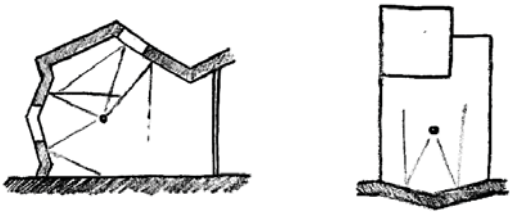
Atmospheric comfort

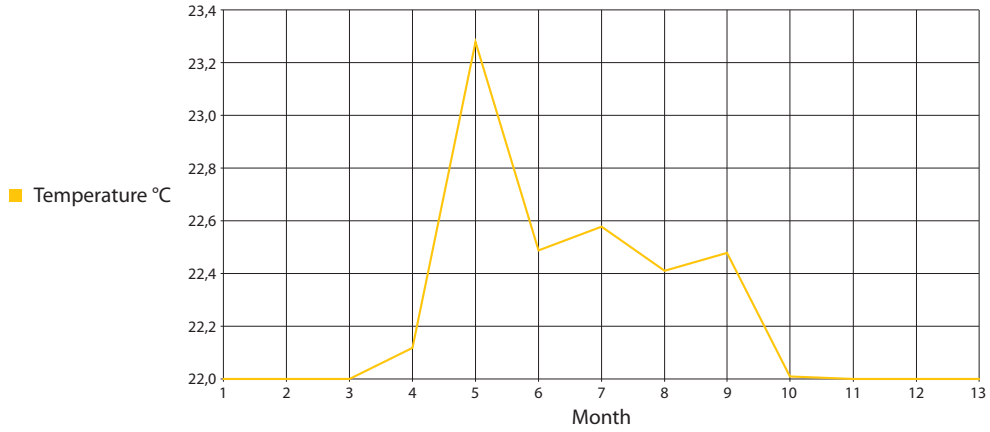
The roof has to be free from technical installations; mechanical ventilation is therefore integrated in the floor. Injection is placed next to the outer wall, and in the prevention of moisture the exhaustion is placed in the bathroom floor. Natural ventilation is also part of the atmospheric conditions, with a positive effect to thermal comfort as well. Inlet is made through one of the windows in the facade, and by the means of thermal buoyancy outlet is through the skylight.

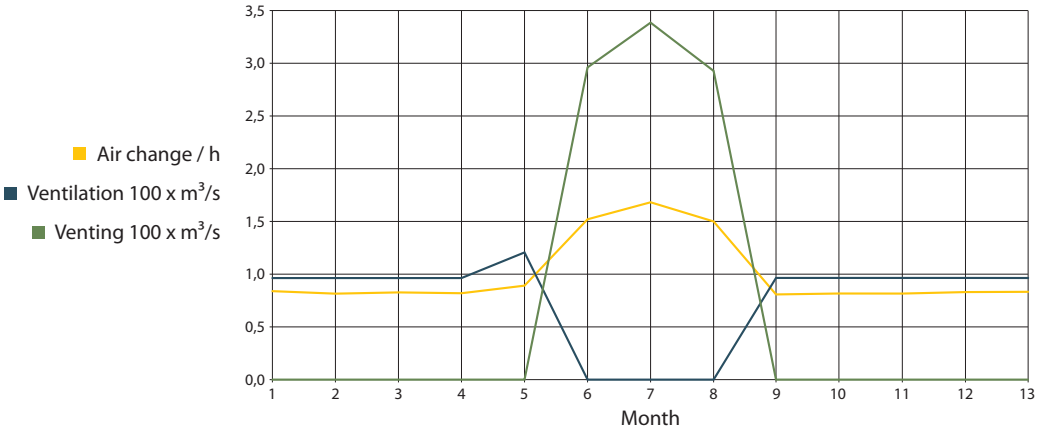


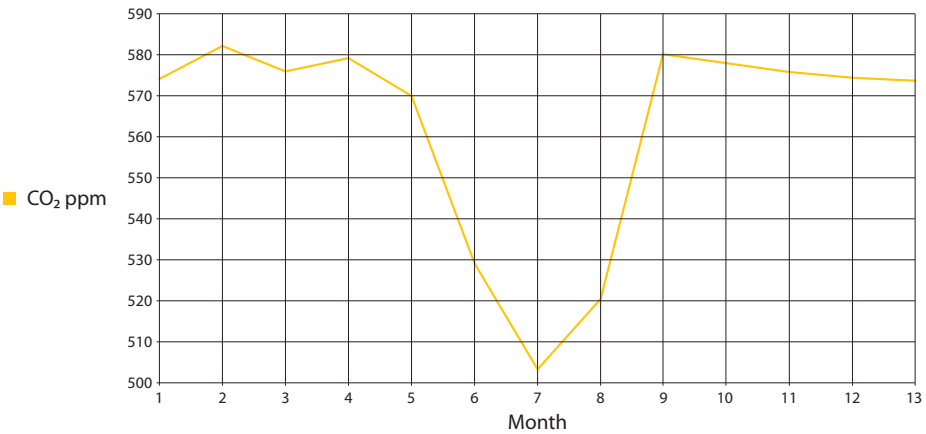
Acoustical comfort

Both the roof construction and the outer wall are built up by a triangular system, which improves the acoustical conditions. The partition walls to the neighbours are though a negative factor according to reverberation time, as the surfaces are parallel.




Temperature °C
23,4
23,2
23,0
22,8
22,6
22,4
22,2
22,0
1 2 3 4 5 6 7 8 9 10 11 12 13
Month


Air change / h
Ventilation 100 x m³/s
Venting 100 x m³/s
3,5
3,0
2,5
2,0
1,5
1,0
0,5
0,0
1 2 3 4 5 6 7 8 9 10 11 12 13
Month

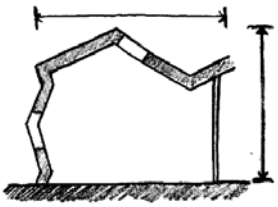

CO₂ ppm
590
580
570
560
550
540
530
520
510
500
1 2 3 4 5 6 7 8 9 10 11 12 13
Month

TECHNICAL PROCESS
TREATMENT CONDITIONS

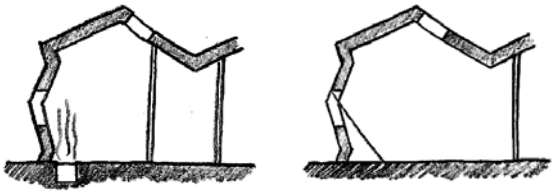
The most critical zone in the rehabilitation area is the room for physical treatment, with a high activity level. As the apartment, this room is also orientated towards south-west. The people load is set to 8 during daytime, and during the evening hours and night the room is considered being out of use.

Daylight
The height and depth of the room is similar to the apartment, which creates good conditions for letting daylight deep into the room. The windows are distributed evenly on the facade and the roof. Sections of the partition wall between treatment area and the common facilities are made of glass, which let extra light in, though it cannot be included in the calculations. Documentation of the daylight factor is included on the CD-ROM in the back of the report.

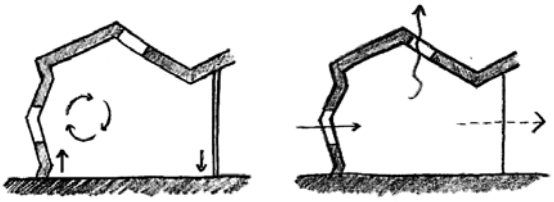
#.61.



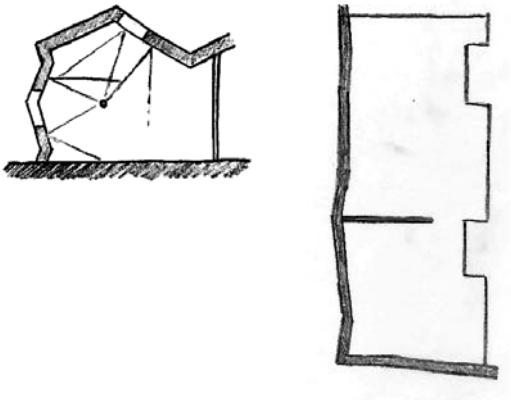
Thermal comfort
Because of the high activity level and the internal heat load from the users, during the time of usage, heating is only necessary to a limited level. Passive solar gain, venting and the method for heating is similar to the apartment.

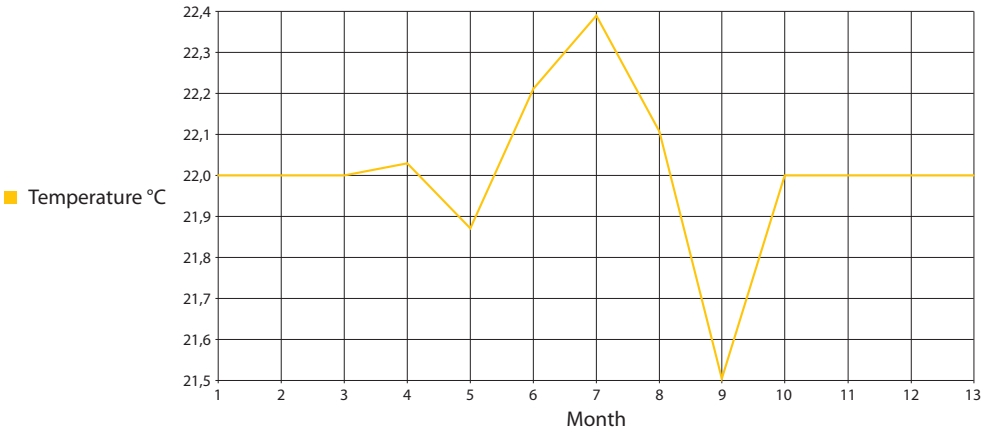


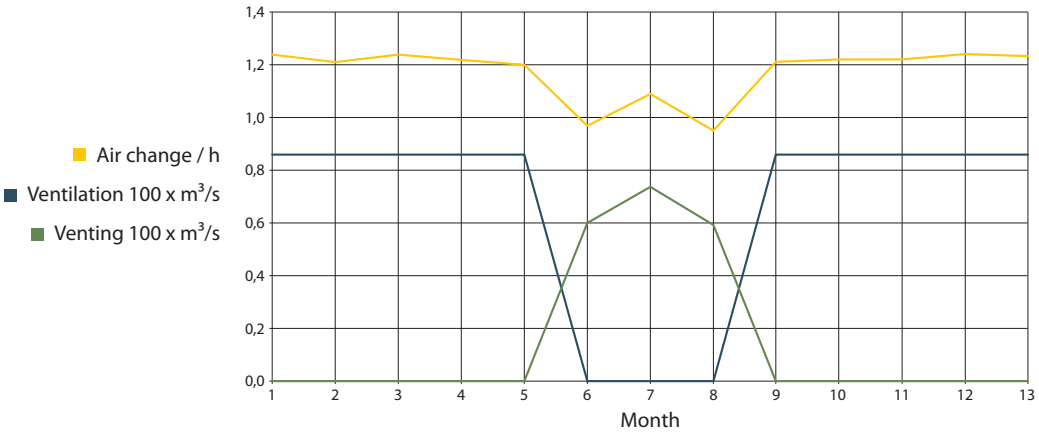
Atmospheric comfort
Due to the activity level and the time of usage, the mechanical ventilation is based on a VAV-system, which is able to vary the air supply according to the different requirements for the ventilation rate. The principle for mechanical ventilation is based on mixture, similar to the principle for the apartment. Natural ventilation is in this room a combination of cross ventilation and thermal buoyancy.

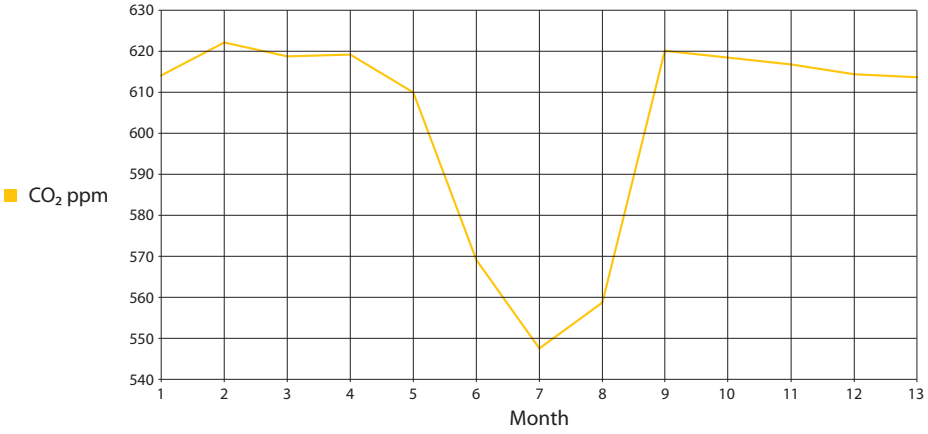


Acoustical comfort
The functionality of the room is divided into two zones, an active area for training and an area for physical rehabilitation. To improve the acoustical conditions in the treatment area, the two zones are divided by a partition wall. The roof and the outer wall have a positive effect to the reverberation time.




Temperature °C
22,4
22,3
22,2
22,1
22,0
21,9
21,8
21,7
21,6
21,5
1 2 3 4 5 6 7 8 9 10 11 12 13
Month


Air change / h
Ventilation 100 x m³/s
Venting 100 x m³/s
1,4
1,2
1,0
0,8
0,6
0,4
0,2
0,0
1 2 3 4 5 6 7 8 9 10 11 12 13
Month

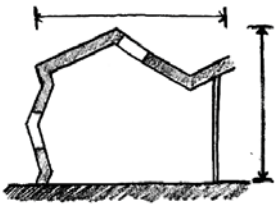

CO₂ ppm
630
620
610
600
590
580
570
560
550
540
1 2 3 4 5 6 7 8 9 10 11 12 13
Month

TECHNICAL PROCESS
STAFF CONDITIONS

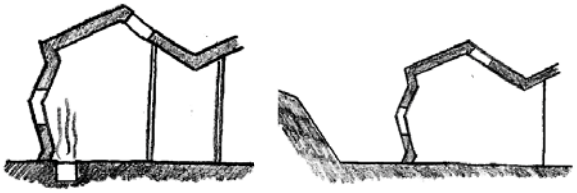
The lunch room with meeting facilities is considered as the most critical zone for the staff, except from the open office which is included in the description of the common area. The orientation is towards south-east and the people load is 6 persons with an activity level characterised as relaxed.

Daylight
The room is both used as a private area for the staff with lunch facilities and as a room with meeting facilities. The service hours are during daytime, which makes the orientation optimal according to the inlet of daylight. The depth and height of the room is similar to the previous descriptions, and serves to let the daylight deep into the building. Documentation of the daylight factor is included on the CD-ROM in the back of the report.

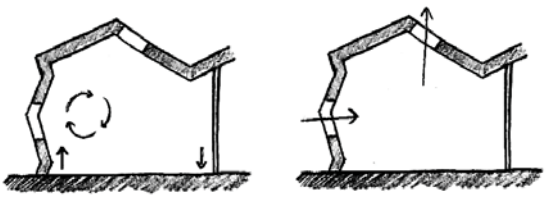
#.63.



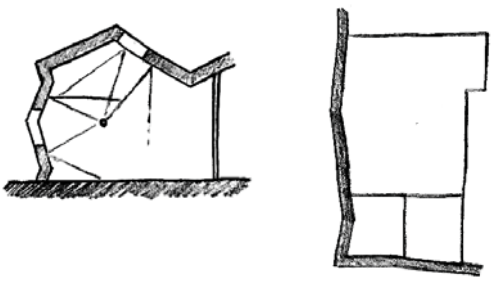
Thermal comfort
In the implementation of a good working environment for the staff, it is evident to balance the thermal conditions. The prevention of overheating is secured by the orientation and the distribution of windows. In the case of high temperatures, venting is possible through windows in the facade and the roof. In the heating season the thermal conditions is secured by convectors in the floor.

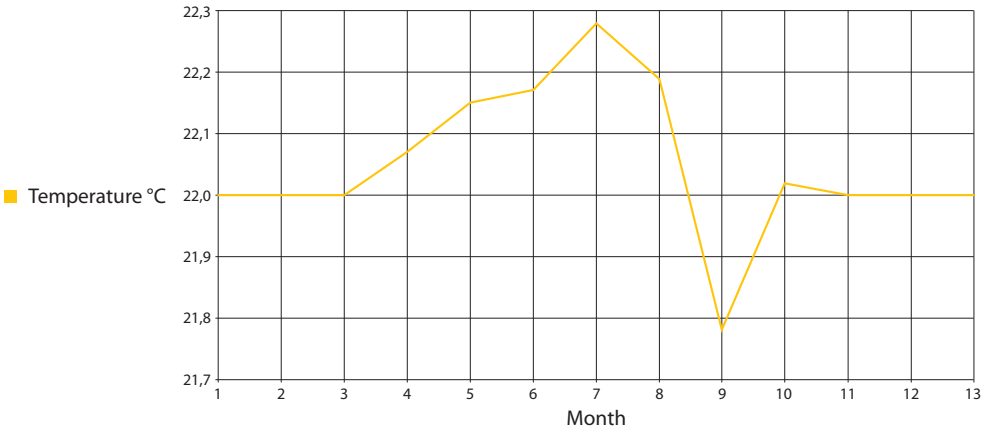


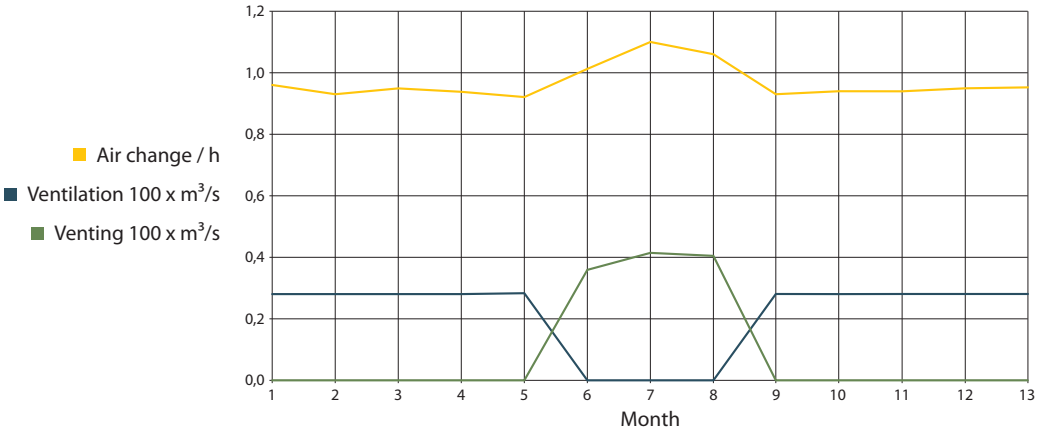
Atmospheric comfort
The time of usage is varying and the mechanical ventilation is therefore adjusted to the requirements for the ventilation rate. Mechanical ventilation is integrated in the floor, with the principle of mixture. Natural ventilation is based on thermal buoyancy with inlet through open windows and outlet through skylights.

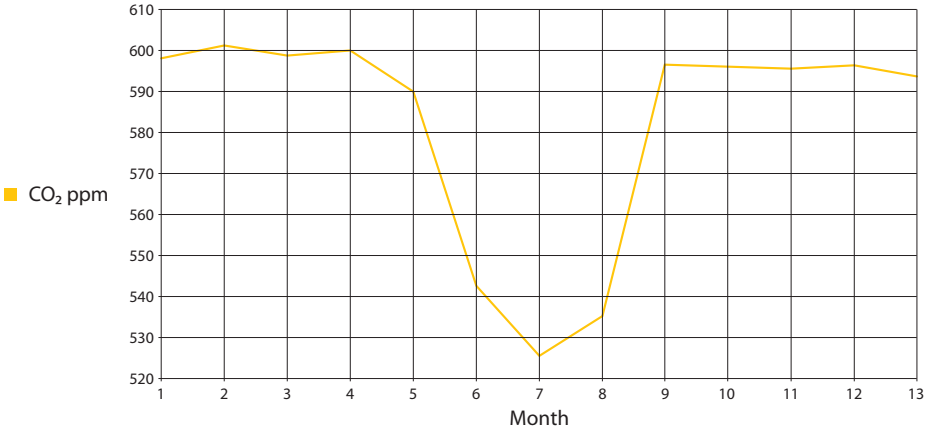


Acoustical comfort
Because of the varied functionality of the room with different acoustical needs, the meeting facilities are secluded by glass partition walls. The triangular system of the roof and outer wall is exposed in both zones, which improves the acoustical conditions.




Temperature °C
22,3
22,2
22,1
22,0
21,9
21,8
21,7
1 2 3 4 5 6 7 8 9 10 11 12 13
Month


Air change / h
Ventilation 100 x m³/s
Venting 100 x m³/s
1,2
1,0
0,8
0,6
0,4
0,2
0,0
1 2 3 4 5 6 7 8 9 10 11 12 13
Month

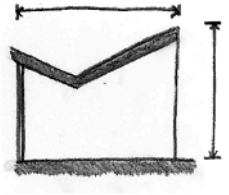

CO₂ ppm
610
600
590
580
570
560
550
540
530
520
1 2 3 4 5 6 7 8 9 10 11 12 13
Month

TECHNICAL PROCESS
COMMON AREA CONDITIONS

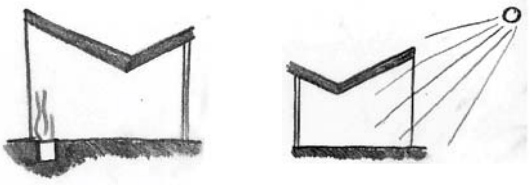
The last critical room to be described is the common area, centralised in the entire building, with a great variation of usage and functionality. The people load is set to a maximum of 26 people, and the activity level is characterised by being relaxed with a slightly variation.

Daylight
Big curtain walls, facing towards the centralised garden, and evenly distributed skylights serve to bring in a rich daylight. The common area is also free of major bearing constructions, which results in an almost unobstructed inlet of daylight. The ratio between height and depth of the room is almost similar to the rooms in the previous descriptions. Documentation of the daylight factor is included on the CD-ROM in the back of the report.

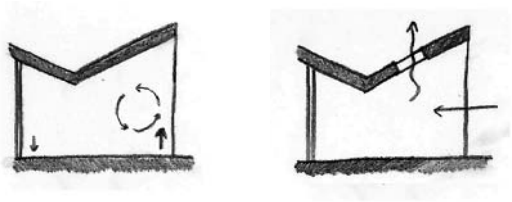
#.65.



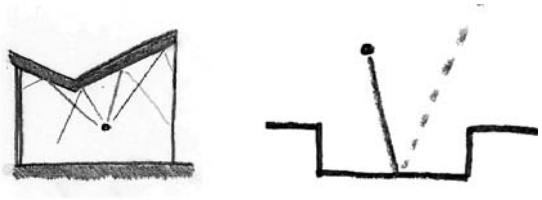
Thermal comfort
The big curtain walls are a great active to passive solar gain, but there is also a risk of overheating. It is therefore necessary to make use of natural ventilation in an extended period; the impact on the energy performance is though positive, as it results in a reduction of mechanical ventilation. Heating is integrated in the floor along with the curtain walls.

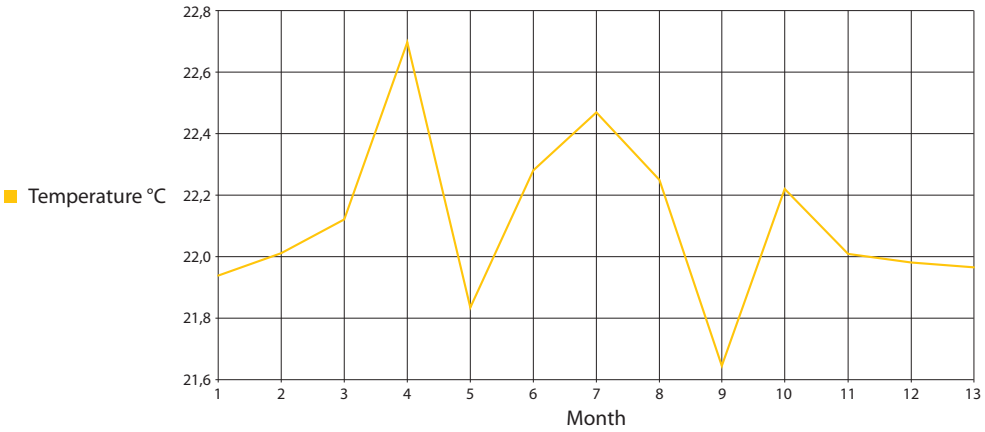


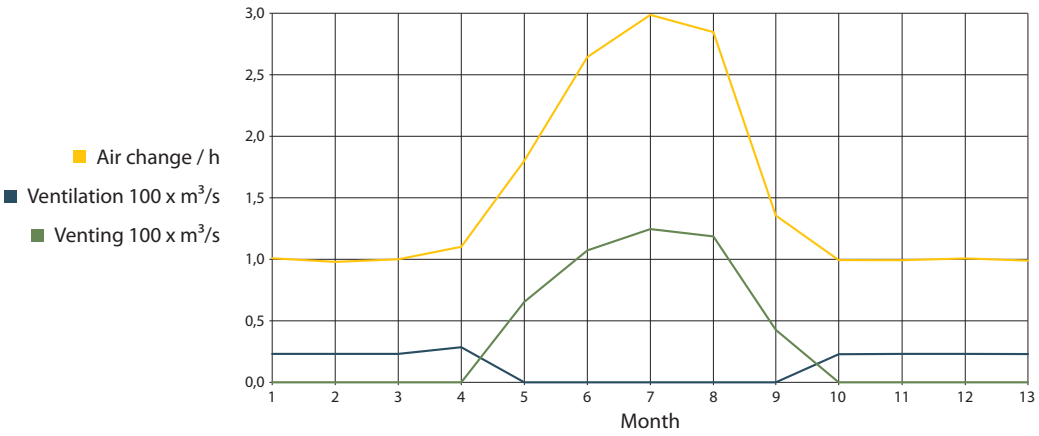
Atmospheric comfort
Because of the varied functionality of the room, mechanical ventilation is based on a VAV-system with inlet and outlet integrated in the floor. As natural ventilation is of high importance for the thermal comfort, it is also a great part of the optimisation of atmospheric conditions. Natural ventilation is based on thermal buoyancy with inlet through open window sections in the curtain wall and outlet through skylights.

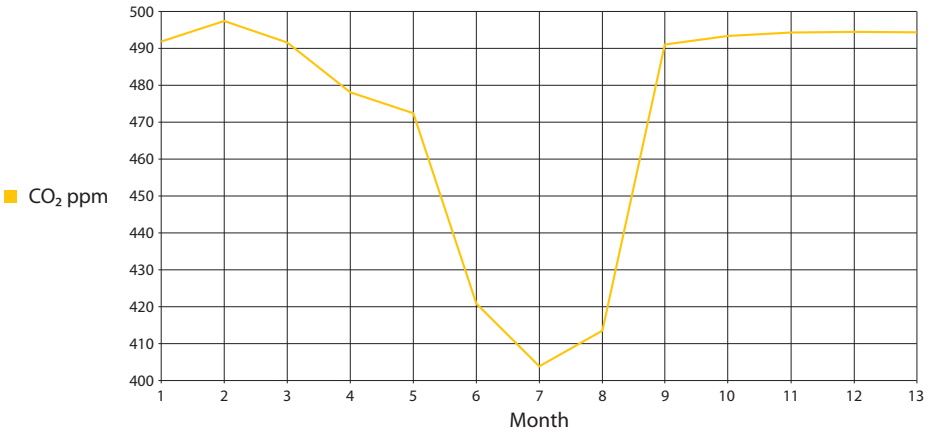


Acoustical comfort
According to the open interior organisation, there is a high need for acoustical solutions to secure a comfortable atmosphere. Besides the triangulated roof construction the secluded entrances to apartments and treatment facilities helps to improve the acoustical conditions. The secluded entrances, cladded with wood, have also a positive effect to sound absorption.




Temperature °C
22,8
22,6
22,4
22,2
22,0
21,8
21,6
1 2 3 4 5 6 7 8 9 10 11 12 13
Month


Air change / h
Ventilation 100 x m³/s
Venting 100 x m³/s
3,0
2,5
2,0
1,5
1,0
0,5
0,0
1 2 3 4 5 6 7 8 9 10 11 12 13
Month


CO₂ ppm
500
490
480
470
460
450
440
430
420
410
400
1 2 3 4 5 6 7 8 9 10 11 12 13
Month

TECHNICAL PROCESS
ENERGY PERFORMANCE

As mentioned in the design criteria, the goal for this project is to fulfill the demands for a low energy building in 2015, according to the Building Regulations 2010. The energy performance of the building is optimised through an iterative process, simultaneously with investigations of the healing environment. The basis of calculation is presented in the following description.

Basis
The rehabilitation centre is characterised as a non-residential building, with a full load on 168 hours per week. The supply of heating and domestic hot water is based on district heating, and there is no stochastic energy sources implemented in the building design.

Building envelope
The roof construction and facades consist of a light-weight grid structure with low u-values; 0,18 W/m^2K for the outer wall and 0,08 W/m^2K for the roof construction. The u-value for the terrain deck is similar to the roof construction, 0,08 W/m^2K. Towards the centralised garden the facades consist of curtain walls by the German manufacturer Enersign, which is known for their energy efficient products. The heat transfer of the products is 0,65 W/m^2K. Skylights and windows are also Enersign products, which have the same values as the curtain walls.

Ventilation
In the optimisation of ventilation, the building is divided into different zones; Living, treatment, staff, common area and secondary rooms. The living area is considered as being in use always and is therefore provided with a constant air supply. The rest of the zones have a varied time of usage, and is therefore facilitated with a VAV-system. To reduce the energy consumption, natural ventilation is implemented during summertime.

Internal heat load
The criteria for internal heat load are different for residential and non-residential building; the building is therefore divided into two zones. Living area relates to the residential criteria, and the rest of the building relates to the non-residential criteria.

Electricity consumption
In the calculation of the energy performance the only parameter for electricity consumption is lighting. Lighting is not included in calculations of residential buildings, which results in a zone division similar to the internal heat load.

Low energy building 2015
The energy frame for low energy buildings in 2015 is 41 kWh/m^2 per year plus 1000 kWh per year divided with the heated floor area. In this project the energy frame to reach is 41,8 kWh/m^2 per year.

With the above mentioned conditions for calculation, the energy performance reach a level of 55,7 kWh/m^2 per year, which is not enough to fulfil the demands for low energy buildings. Because of an extra ordinary service life it is allowed to use a supplement for special conditions in the calculations. The supplement correspond to the difference between a building with a service life on 45 hours per week and the current building with a service life on 168 hours per week. In this case the supplement is 14,1 kWh/m^2 per year; when added to the demands from the Building Regulations 2010, the actual energy frame to reach is 55,9 kWh/m^2 per year. The goal is therefore fulfilled with the calculated result on 55,7 kWh/m^2 per year.

#.67.

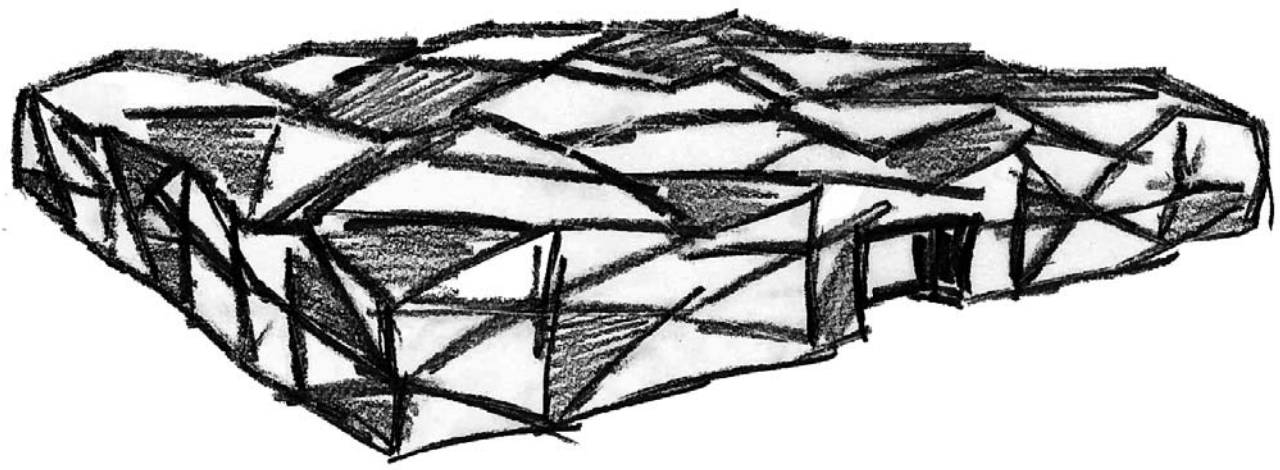
DEMANDS	
LOW ENERGY BUILDING 2015	41.8 KWH/M^2
SUPPLEMENT FOR SPECIAL CONDITIONS	14.1 KWH/M^2
TOTAL ENERGY FRAME	55.9 KWH/M^2

CALCULATED	
ENERGY FRAME	55.7 KWH/M^2

BE10 data

REFLECTION

CONCLUSION AND DISCUSSION



REFLECTION
CONCLUSION

Healing architecture is based on documented research, which makes the concept reliable to use in the design of new buildings. It is though difficult to conclude if a building has a positive effect to the healing process, before it is actually realised. The effect of the building has to be analysed and compared with empirical data from earlier healing processes to draw the conclusion.

The healing atmosphere in this project is optimised through an interpretation of the healing factors, with a great focus to physical comfort. Light, air, temperature and sound are all significant parameters according to the indoor climate, and the intention has from the very beginning been to let the architecture develop through these parameters. The visual impact is quite clear with the triangulated system, which both serves the acoustical comfort and the daylight conditions, but also has a positive effect to the thermal and atmospheric comfort.

The artistic expression of the building contributes to a stimulating atmosphere, where the light interior, the centralised garden and the simple layout prevent it from being chaotic. The introverted expression towards the garden is both made with the physical and mental conditions in mind, as access to outdoor areas motivates to being active, meanwhile having a calming effect. To meet everyone's need there is both created possibilities for being private and to socialise.

According to the environmental aim, the focus on creating physical comfort, with passive solutions to a great extent, has been a great active in the optimisation of the energy performance; the fulfilment of the energy frame indicates that the iterative process, with architectural, environmental and healing considerations has been successful.

REFLECTION
PERSPECTIVE

This project has been focusing on a subject that is rather new to the architectural world; the design concept Healing architecture. With the huge investment in the healthcare sector in the forthcoming years, it is highly relevant to bring the concept into discussion. Though this project has not taken the economics into consideration, it is obvious that the concept will have a beneficial effect in an economical point of view, as the time of hospitalisation, among other parameters, can be reduced radically. One thing is the economics; another thing is the quality of architecture. A few cases have implemented the concept in their design during the last couple of years; one of them is the Centre for Cancer and Health in Copenhagen, by NORD Architects. The centre was finished in September 2011, and it has already received positive feedback according to the atmosphere of the building, both from the users and the staff but also from the media. Though it is only one positive example, the concept might have a bright future.

When it comes to the Danish veterans, current initiatives indicate that there is an actual need for improved conditions for rehabilitation. The Danish government has implemented a new politics to give support and to show appreciation to the veterans. Private organisations, such as KFUM, have also begun to improve the conditions. During the next year, recreational facilities are going to be established in direct connection with three military bases in Denmark, including the Royal Danish Life Guards in Høvelte. The new facilities consist of apartments that can be used temporary by the Danish veterans. Though the new facilities are not related to Healing architecture, it is still a positive effort.

With the global environmental challenge in mind, it is also relevant to bring healing architecture into discussion, as the optimisation of healing atmospheres is highly related to energy performance of buildings. Several of the healing factors, can with advantage be implemented in the design through passive solutions, which has a positive effect to the energy consumption.

According to the above mentioned, it is considered that there is basis for a rehabilitation for Danish veterans, based on the design concept Healing architecture.

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