S T R A N D B A K K E H U S E T

Master thesis 2019

MSc04 Architecture, group 2

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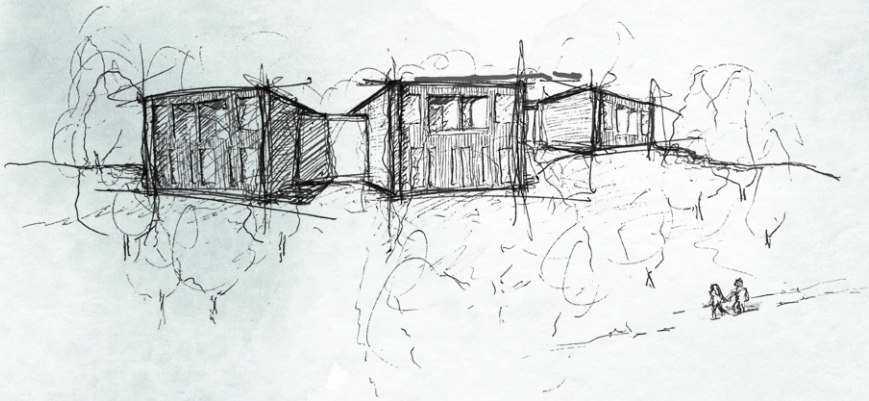

C O V E R

Aalborg University
Department of Architecture and Design

Theme: Children's hospice
Project title: Strandbakkehuset

Project period: 01.02.2019 - 23.05.2019
Group: 2
Semester: MSc04 Architecture 2019

Main Supervisor: Lars Brorson Fich
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Number of pages: 136
Attachments: drawing folder

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INTRODUCTION

Hospice for children was introduced in Denmark in 2015, with the opening of Lukas Huset in Copenhagen (Region Midtjylland, 2018). In 2018 it was decided that this should also be the case in Jutland, and a hospice for children should be placed in Rønde on Djursland in connection with the excising Hospice Djursland. The name of the hospice will be **Strandbakkehuset** (Region Midtjylland, 2018)

The goal of this project is to design a hospice for children and youth. We aim to create space that is designed with focus on easing the illness for the patient, optimising the quality of life for all family members and accommodating needs for both the ill, relatives and staff.

The design of the hospice takes offset in the theory of healing- and palliative architecture with a sustainable design approach based on DGNB system. This in combination with factual knowledge derived from relevant cases and soft values coming from the experiences of a family with an ill child. Along with these design parameters and a integrated process of technicality, the building will fulfil the energy demands of the building regulation's 2020 and set the frame of a well-functioning, home-like and family-minded children's hospice.

LOCATION

DJURSLAND, DENMARK

Ill. 001

METHODOLOGY

The methodology of this thesis project is based on the Integrated Design Process defined by Mary-Ann Knudstrup (2005). The aim of this method is to integrate design specialisms that are usually handled separately, in an integrated process, where all parts becomes tools for designing. If using the integrated design process correctly, one will get an understanding of the outcome of earlier proposals and then allowing the next step to be based on new knowledge.

In this thesis project, the Integrated Design Process is used to determine functionality and technicality, with offset in one of the main design parameters; sustainability. This in combination with aesthetic decisions.

The Integrated Design Process contains five phases with different ways of clarifying challenges. This is systematised in a series of loops, which is shown in the illustration.

1. In the first phase, the challenge of the project is defined and become the 'problem' that will set the base of the design process.

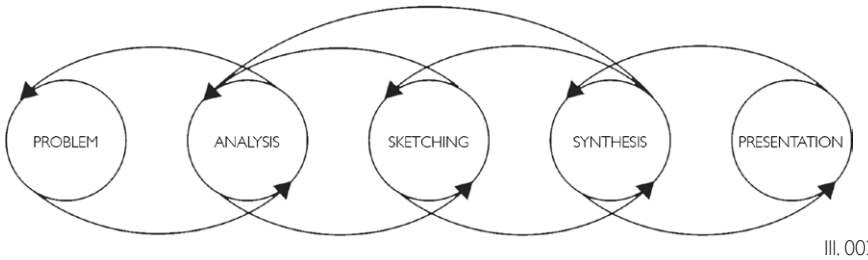
2. The second phase is the Analysis Phase, dealing with relevant aspects of the problem. The project site is analysed through cartographic, hermeneutic and phenomenological investigations. Functional demands and theories are analysed to get a better understanding of the problem. The architectural aim and vision is derived from the collected knowledge of the analysis-phase.

3. The third phase is the Sketching Phase, which is the phase where many different ideas is being tested. The new knowledge and studies are put through this test by sketching and modelling etc.

4. The Synthesis Phase is the phase where a chosen design that meets the requirements of the design parameters, starts taking its final form. This is the phase where details are optimised and more qualities can appear and be developed.

5. The final phase is the Presentation Phase. This is where phase four is expressed through visualizations, illustrations and description. This phase is very important for the project to be communicated properly. (Knudstrup, 2005)

Especially for this project, where technical elements can make the hospice less home-like, it is important to integrate the technical aspect at an early state in the design process, in order to create the best solutions.



Ill. 002

THE HOSPICE

A hospice is a place of relief, and not a place of healing and recovery, in contrary to a hospital. It is a place where the patient can be relieved of pain and stress of medical treatment, which is the core of palliative care.

It was the English nurse, doctor and social worker Dame Cicely Saunders, who founded the modern hospice philosophy in 1967 in England. The hospice philosophy is today worldwide and came to Denmark in the early 1990s. The first hospice in Denmark was Skt. Lukas Hospice, which opened in 1992. (Hospice Forum Danmark, 2019)

For many years, a hospice was perceived as a place to die, but today a hospice is an accepted offer for people with life-threatening diseases and their relatives. Patients say that it is a nice place to go, because it makes it possible to find peace and to be allowed to be ill. (Steenfeldt, 2013)

At an adult hospice, the death rate is high. Between 80-90% of patients die at a hospice in Denmark. (Pedersen, 2018) When death is the case, a hospice is a place that does not see death as a taboo. It is a part of our existence and should therefore be treated in a natural and dignified manner. A hospice is a place to help the dying patient find a state of calm, clarification and dignity, while the staff have the opportunity to help and enlighten relatives so they are not uncertain. The foundation of the hospice philosophy includes:

• Creating a place that provides the best possible conditions for quality of life and self-worth and a dignified death.

• To provide palliative care such as nursing, pain relief and soul care for incurably ill people with a progressive, lethal disease, in which curative treatment is abandoned.
• That care can help to make peoples last time a positive part of the life cycle, so that the patient and relatives experience a holistic effort, characterised by openness, unconditional acceptance and affirmation of the value of the sick, as a human being.
• To provide support, guidance and soul care to relatives of the dying, before and after the loss.
• That the whole effort is organised so that individual needs and wishes are taken into account, and all tasks are solved in close cooperation with the sick and their relatives. (Hospice Forum Danmark, 2019)

Patients in a hospice have their own room to give them peace and quiet, which creates a difference to hospitals, where you often share a room with others.

In both the patients and relatives stories, it turns out that the meeting with a hospice does not only deal with the meeting with a staff and reception of care, it is also a meeting with a house. Great emphasis is placed on the room's aesthetic appearance with an architecture that invites sensory experiences.

Room of home
A hospice is designed in many ways to create a sense of home. This is very important for both patients and relatives. Gunhild (relative) describes her experience as follows:

"Here I really felt that I stepped into my mothers home. After all, there are furniture like in my mothers living room, which Mother also said "God, its just my colors and its elegant, simple and delicious". I find it easy to feel like home, also because it is really something that Mom could buy by herself. Another thing that means a lot is that, here mother was allowed to smoke in her room. It was one of the biggest things for her. I am allowed to drink red wine in the room as well. (Steenfeldt, 2013, p. 138 (Original language see appendix 01)

The patients have the opportunity to decorate the room in the way they want, with their own belongings. Some patients just bring some personal items, like a lamp, a painting or a chair. For others, it might take a larger refurbishment so that the husband and wife can stay in the room in the same way as they did at home.

Room of heart
When speaking of the "room of heart" in a hospice, it is considered as the living room. In a broader perspective this room is something that exists as a space between people and a space that binds people together. A hospice makes a lot of effort in making the living room as welcoming and inviting as possible, which means real flowers, bright colors, and soft furnishings that invites for longer stays.

The room of heart is expressed in the understanding that despite the serious circumstances that bring people to a hospice, there is room for a warm interaction with each other. A nurse has stated that even though a hospice is a house of death and sorrow, it is also a house of joy, where there is room for cheerfulness and jokes. (Steenfeldt, 2013, p. 143)

Room of relief
A large proportion of the patients living at a hospice have a cancerous disease. This means that they have all been through one or several periods of treatment. However, it is not the suffering patients report most about when asking them how they have experienced going to a hospice - just the opposite. Something happens to the patients the moment they enter a hospice. Patients describe it as if there becomes a calmness over him/her and they are now allowed to be sick. Whether it is the buildings aesthetics that has a calming effect, the silence that helps to relief, the staffs way of being a part of this peaceful space is a unreplied question, but it is for sure that the patients experience relief just by coming inside the hospice. (Steenfeldt, 2013, p. 144)

The peaceful and tranquil atmosphere is important for the patients to experience relief. When the patients arrive at the hospice, the staff takes complete care of the patients medicine, informs the patients and relatives closely if changes in the disease occur, they account for all the practicalities in relation to diet, catering, cleaning, laundry washing etc. For some patients, the physical disorders do not disappear but as long as the patient can feel a change it is worth it. The staff also informs the patient about safety and security. Patients with lung diseases are often afraid that they will eventually die a choking death, making them unsafe. The security by living at a hospice is about the patient getting a promise that this will not happen. The relief is that this promise takes the anxiety from the patient. Some patients have been through turbulent experiences like hospital stays. They find it a relief that everything is transferred to professional staff at the hospice.

Ill. 003

A CHILDREN'S HOSPICE

The following section is an interview with Joan Thyde, the chairman of the Hospice Forum Denmark's Children's Hospital Committee (Sankt Lukas Stiftelsen, 2019).

When children and adolescents get a life-threatening illness, the whole family is affected. In a children´s hospice, a palliative treatment is offered to those with a life-threatening illness as well as the possibility to have a place for familylife, and sorroundings that acommodate the needs for the whole familily. It is not a hospital, but more a "home-away-from-home".

Admission is offered throughout the course of the disease, depending on the needs of the individual family. Care and palliative care are carried out in an interdisciplinary collaboration of a chief physician, nurses, physiotherapist, psychologist, social worker and a priest. In addition, there is also a hospital crew and volunteers.

It affects life at all levels both emotionally and socially when you have an ill child. It creates anxiety amongst parents, siblings and other relatives. Staying in a hospice gives the sick child, and the family a free space in a difficult time. Therefore, a children's hospice must take care of the entire family and create a sense of security with space for play, socialising, relaxing and reading stories. The opportunity for a family to sleep in the same room can make a big difference for the family, because some might have not had this opportunity in hospital stays.

All families are different and it is also very varying what the individual family needs in order to feel comfortable. Usually it is the practical tasks that can be difficult for the families. For example, cleaning, shopping, cooking and laundry, which are tasks the hospice offers to help with. Besides this, the hospice provides doctors, nurses and other health professionals who take care of the sick child.

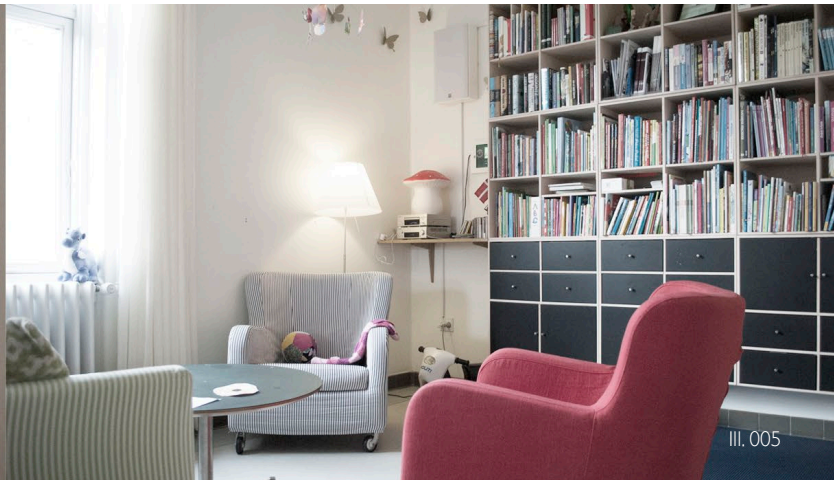
The stay must allow parents to sometimes focus on the healthy child, knowing that the sick one is in the good and safe hands of professionals. This activity with the healthy sibling, could be just a peaceful walk in the woods.

A hospice for children is often related to cancer, but the hospice cares for all children with life-threatening diseases. There are also children who suffer from muscular diseases, gene diseases, metabolic diseases, heart disease, lung diseases and then there are a lot of diagnoses they do not even know about.

The National Board of Health has estimated that about 300 Danish children die every year. It is also estimated that there are about 700 children a year who gets a life-threatening disease.

The time-period of the stays varies depending on the needs. Sometimes a family only stays for a short period of time and other times it is a long-term period. When looking at the death-rate for a children's hospice, it is rather different than a regular hospice, because at a children's hospice, it is expected that between 80-90% of the children will return to their home. (Hospice Forum Danmark, 2019)

Ill. 004



Ill. 005

DIFFERENCES BETWEEN HOSPICE AND CHILDREN'S HOSPICE

Besides the death-rate, which makes a clear contrary between children's and adult's hospices, there is also a distinct difference in hospice offers for adults and children. (Hospice Forum Danmark, 2019)

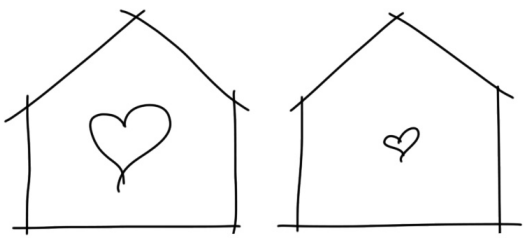
In Denmark, we only have room for four ill children and their families. These offers are located at Sankt Lukashuset in Hellerup, whereas there are 25 hospices for adults placed around in Denmark. (Hospice Forum Danmark, n.d.)

These four hospice-places for children are far from enough, knowing that about 700 children are diagnosed with a life-threatening disease every year. When a child is diagnosed with such a condition, the course of the disease may have different developments, as can be seen in the diagram below (Sankt Lukas Stiftelsen, 2019).

Ensuring equal rights for children and adolescents when it comes to access to hospice is one of Hospice Forum Denmark's key issues. There is a difference in the needs of children and adults when it comes to hospice. Therefore, it is important to ensure the right offers are available so both children and adults can get the help they need. (Hospice Forum Danmark, 2019) (Sundheds- og ældreministeriet, 2017)

Palliative care for children is also very different from adult palliative care:

- The individual conditions are often rare diagnoses specific to childhood, although the child may survive into early adulthood (age 19 or older).
- The time scale of children's illnesses is generally different from adults; palliative care may last only a few days or few months, or over many years.
- Many of the diseases are genetic in the family. There may be more than one affected child in the family.
- All family members to an ill child may be vulnerable as they face changes in life that the child's diagnosis imposes on them. Parents and siblings are also a part of the disease and very vulnerable.
- A characteristic of childhood is continuing physical, emotional and cognitive development. Children's palliative care providers need to be aware of and responsive to each child's changing levels of communication and ability to understand their illness, treatments and prognosis. Children with life-limiting or life-threatening conditions face many periods of transition throughout their life.
- Something that adds to the complexity of child care, is that education and play is essential to a child. This introduces an additional dimension of education in the needs of children (Chambers, et al. 2009)



Ill. 006

GRIEF

In order to create optimal settings for people who are experiencing grief, it is important to understand the term in order to get a closer understanding of the needs of the people feeling grief.

Grief is a normal reaction to losing. When someone we love dies or when we lose something significant, a grief process starts in response to the loss. Our body and psyche begins to understand and adapt to the fact that we have lost something. (Guldin, 2019)

The reaction of grief is complex with a wide range of emotions, thoughts and social- and physiological symptoms. The grief will to some extent feel different depending on what is lost and at what point in life, one is experiencing the loss, but the basic reactions are quite similar across the different types of loss and the circumstances.

Typical signs of grief
The expression of grief must be seen in the context of whom you have lost and the challenges that the loss causes. It also has the influence on our grief process, the life situation you are in and the personal resources available. For some, grief becomes very intense and may mean that you experience not being able to function mentally, cognitively and socially immediately after the loss, for others the duration and intensity of grief are more limited.

Treatment
The following is an excerpt from an interview by Larsen in Gentofte local newspaper (2016) where a father reports about the loss of their little son. Their 10 months old son, had a rare gene disease called *Neonatal Marfan Syndrome*. They lived at Lukashuset for five and a half month, describing their stay as a fantastic place, where they were able to be a family.

"We could enjoy ourselves and have something that resembles a normal day."
Quote by Anders Schultz Andersen

After a long period outside the hospice with a minimum of sleep, Anders descriebes "Now, suddenly someone was taking the responsibility away from me. I could sleep. For the first time in a long time I got more than two hours of sleep a day. I no longer had to be on guard every second minute like in the hospital. "

The couple's older son Asker and Anders still visits Lukashuset several times a month. Then they play a couple of hours in the living room or in the sensory garden. Asker has got a book with lots of pictures from their time in Lukashuset, and every time he sees a picture of the 13 nurses, he says "it's my friends, father." It is also important for Anders to come back. "For us he is still out here. I can feel him here more than I can at home."

These quotes are all from the article, and the original danish quotes can be found in appendix 1.

The help
Both at Lukashuset in Copenhagen and at Hospice Djursland they make a great effort for the family when someone passes away. Both places offers different types of help in form of a psychologist as well as conversations with the staff. At Lukashuset, however, they do something extraordinary when losing a child or siblings. They make a book where the ill child tells his/hers life story in text and pictures, so that he/she does not feel afraid that the family and siblings will forget him/her. This can also help the siblings remember this important part of his/hers life and to be able to tell about the experience of losing a sibling.


Ill. 007


Ill. 008

SHADOW CHILDREN

When a brother or sister is ill, siblings of the sick can often feel neglected and forgotten, because both parents, staff and other relatives often focus on the sick child. (Spinetta et al., 1999) (Andersen, 2017) (Lövgren et al., 2009) They often stand in the shadow of the sick child with the feeling that their needs are not met. (Andersen 2017)

These siblings reports getting less attention and the answer they are often asked by friends and acquaintances is how their ill sibling is doing. They also say that they need social support and studies show that if they do not get it, they have a higher risk of getting anxiety. The shadow-children are also more likely to develop sleep issues and lower maturity level. (Lövgren et al., 2009)

Generally, siblings to sick children say they want to be seen and heard. They also state that it is the little things that matters, such as playing a game, going for a walk og receiving a hug. In addition, it is important for them that a balance between hope and realism is maintained as they describe uncertainty as being one of the most difficult emotions. They also want to gain knowledge about the sick child, and some want to take part in the care if possible.

This information is, however, based on siblings for cancer children. (Spinetta et al., 1999) Siblings of children with rare diseases, often feel more alone as it is harder to find and meet children in the same situation. (Andersen, 2017)

Sibling experience psychosocial distress, both during and after the child's illness, and they have a higher risk of getting PTSD (Posttraumatic Stress Disorder) and other reactions. A big focus-area is the need of caregivers to notice and support siblings. (Lövgren et al., 2009)

Lukashuset in Hellerup, try to make an effort for siblings by making sure that employees and volunteers are especially aware of them. The volunteers do activities with siblings, such as baking, creative projects and playing games. As mentioned earlier, they also help making a book about the sick child and the important time of the family's life. This is sometimes made specifically for siblings and is describing their feelings and thoughts. They also pay close attention to telling the siblings that their feelings are all right, and in no way wrong. This is what Nanette Quistorff, Head Nurse at Lukashuset, states in the interview on the 13th of February 2019.

Ill. 009

HOSPICE DJURSLAND

Hospice Djursland is a place for people with life-threatening diseases in their last chapter of life. It is for people with a need of care and palliative treatment. The Hospice is a self-owned institution with an agreement with Region Midtjylland. The hospice has its own board of directions that, along with the management, secures a healthy organisation.

At Hospice Djursland they work in an interdisciplinary and holistic way to relieve the symptoms of the ill and the challenges they may face. Because of the very different situations the patients are in, there are no certain circadian rhythm at the hospice and only a few routines – it all comes down to the wishes and needs of the patients. (Hospice Djursland, n. d.)

The following part is based upon an interview with Dorit Simonsen, who is the hospice-leader at Hospice Djursland. The Hospice is of great advantages of the surrounding settings of the hospice, such as the nearby water, the forest and the small city of Rønde, which creates some opportunities for the patients in order to enjoy nature. They would like to take even more advantage of the nearby forest, in terms of different activities.

There are currently 60 volunteers and 47 employees working at the hospice. This makes the volunteers an important part of the hospice. They take care of all the important tasks, that gives the nurses and other staff members the base to focus on their jobs and by that, the volunteers become a big part of the successful and healthy organisation. The volunteers take care of tasks like watering plants, providing fresh flowers, responsibility of the Wednesday-bare, mowing the lawn or just talking with the patients and keeping them company for a while.

The hospice offers special activities such as a sensory room and spa room, which can be seen on the plan-drawings of Hospice Djursland in appendix 3. When exploring the house of the hospice, small indoor gardens (in terms of non-heated rooms with characteristics like a garden and terrace). These indoor gardens, brings light into the centre of the building and allows very ill people with poor immune system to enjoy nature without exposing them to a too harsh climate.

The size of the rooms are described as very suitable – not too big and neither too small. This is important in order for the patient not to feel to small and alone in a big room, but on the other hand, the rooms contain space enough for the entire family to be together. All the rooms are facing south with a large window, which creates some difficulties in terms of indoor climate. The patients open up the doors and windows in order to balance the temperature in the room, which causes the mechanical ventilation to disable. A well-functioning mechanical ventilation system is very important because the institution contains a lot of medical machinery that contributes to heating up the building and the activity peaks from lunch-time to after dinner-time, because of treatment, family visit, working staff and volunteers preparing dinner.

A very interesting topic that was brought up in the interview, was initiated by the fact that Dorit Simonsen, along with the staff, has a very natural approach to death. Death is usually a tabular topic, but it is very important to the people behind the hospice, that death is not hidden and neither is the deceased. The dead corps exits the building from the same way he or she came in. Every second day a patient dies and a light is lit in the hallway as a memorial symbol. For us, even saying the word "death" was rather limit-pushing, but as Dorit Simonsen states it with a smile on her lips: "saying it, does not kill you", describes their natural approach very well.

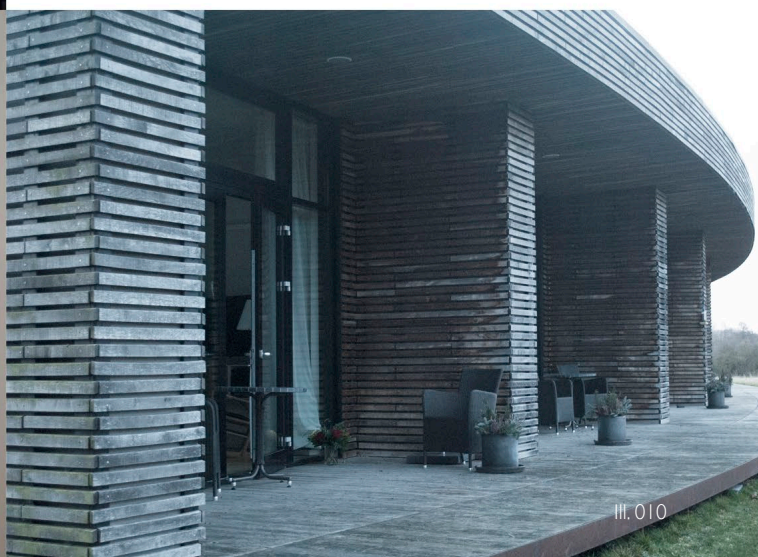
Besides the fact that death is a reality within the hospice, the focus is on the exact opposite: "Life". Within this lies: family, every day life, sociality, existential basic conditions and life towards and after death. A ruling tristrophon for the hospice is:

"Life, play and relief".
(Dorit Simonsen, 2019)

Dorit Simonsens has many visions for the children's hospice. The plan is for the children's hospice to be connected with the existing hospice, to have a connection with the woods interfering with the determined building field. She also dreams of a rooftop that can be used as terrace and for activities and a large floor plan for various activities for kids. The building must express "childhood" internal and external, without being too childish for adolescent.

"Liv, leg og lindring"

(Dorit Simonsen, 2019)
Translation in appendix 01



L U K A S H U S E T

Lukashuset is a part of the deaconess house, the Saint Lukas Foundation. The foundation has been a pioneer within health care for almost 100 years. (Sankt Lukas Stiftelsen, n.d. a) Lukashuset is the first children's hospice in Denmark and it opened in 2015 with room for four ill children and their families. (Sankt Lukas Stiftelsen, n.d. b)

Lukashuset offers palliative care for children and youth with life threatening diseases and their families. The people behind Lukashuset consist of a doctors, nurses, psychologist, social workers, priests, volunteers, a clown and even musicians. (Sankt Lukas Stiftelsen, n.d. c)

Lukashuset offers space for the family as well as the patient and there is a high focus on the quality of life for all family members.(Sankt Lukas Stiftelsen, n.d. c)

At Lukashuset there are at the moment 12 full-time employees, 10 hourly based nurses and 22 volunteers. The volunteers must go through a process of employment to get accepted as a volunteer. (Quistorff, 2019)

The following is based on a visit to Lukashuset and an interview with Nanette Quistorff, who is the head nurse of the department.

Lukashuset is situated in an old hospital building, which becomes clear when entering and having to walk down a very long hallway in order to get to the right department in the building. Even though the facilities were renovated with the purpose of creating the frame for a children's hospice, the overall plan in combination with materials such as linoleum floor, makes the feeling of "old hospital" shine through. The plan of the hospice is not necessarily bad for the purpose, but considering the hospital atmosphere being the feeling that most families in the hospice, are trying to avoid, it does not become the optimal settings for the hospice.

According to Nanette, the situation for a family staying at the hospice, is not all black and white. There are something in between the fact having an ill child and parents that have lost their track in life because of the circumstances;

The ill child often carry the existential crisis of the entire family, of which the child cannot explain. The hospice must provide help by assuring the child that they will take care of mom, dad and brother/sister. It is important to understand that the children of the family are living in the "edge" of the family which is a heavy burden. The ill child is living in one edge of the family and the healthy sibling in the opposite edge with the parents in between having to tie the edges. Sometimes they do not succeed in maintaining the stable core of the family and therefore need help as well.

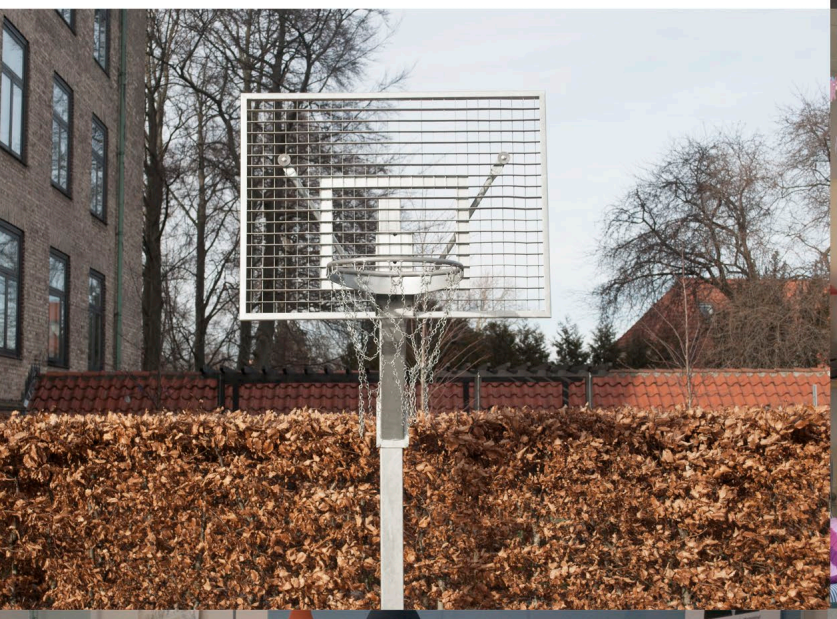
It is not only during the stay the family can get help. The hospice provides help with practical matters during and after the stay, also if the stay ends with the passing of a child. If this is the case, the hospice arrange farewell memorial ceremonies, make sure to arrange lunch/dinner for the family, helps them decide what should happen now, concerning funeral - when and how? The hospice makes a great effort in not hiding death. They actually involve all the other children, to help them understand and because they probably at the moment has come to know the deceased.

Nanette explains how the families get to know each other through their stays and create a very strong bond because they have something in common and are able to understand one another better. Something Nanette has noticed is that mothers often comfort mothers and they become a community - supporting all the way to the funeral and after.

We asked Nanette what we should have in mind when designing the hospice based on her experiences with Lukashuset. To this she explained that a practical issue at the moment, is that they do not have enough room for storage and they lack a kitchenette in the apartments, which they would very much like to have, but they do have patient units that contains two rooms, one for the ill child, and one for parents and/or siblings, which is something that is very important. The plan solution, reflecting the old hospital, creates many dead zones which they have tried to make more welcoming, but this does not work without prober light and cosy niches.

" Vores fornemmeste opgave er at minimere lidelsen og optimere livskvaliteten. "

(Nanette Quistorff, 2019)
Translation in appendix 01



TRYGFONDENS FAMILIEHUS

Trygfondens familiehus is a place where the family can live when a child is long-term hospitalised or has complicated courses. It is a place where the family can get a break from the hospital settings and have more homely surroundings, with more playful rooms.

In the family house they take care of the relatives, while a child is admitted to Aarhus University Hospital. In contrast to a children's hospice, there is no nurse or other nursing staff employed here. The permanent employees is a manager, a secretary and an administrative employee, the rest is run by 60 volunteers. (ed. Nørr & Højrup, 2017)

Trygfondens familiehus was built in two stages, the first was completed in 2012, and was designed by C. F. Møller. The second half was completed in 2016, designed by Østergaard Arkitekter Aps. (ed. Nørr & Højrup, 2017) (C. F. Møller, n.d.) After the extension, the floor plan is now shaped like an "S", and in the middle of these closed outdoor areas are a playground and outdoor areas for everyone in safe surroundings. The "S" shape has long corridors, but these are in visual connection to the outdoor areas with large glass sections, and siblings uses these to cycle in. (Guided tour, 2019)

There is a total of 22 rooms, some are family rooms with two rooms, and others with one room. It is not only parents and siblings who can live there, also grandparents and other relatives has the opportunity to stay. (ed. Nørr & Højrup, 2017) In addition to the "apartments" there are various living rooms, some with toys, game consoles, music rooms, etc. There is also a focus on the shared kitchens, where each family has their own refrigerator and colonialism, but where they otherwise share the kitchen. This is a place where the families can meet and exchange experiences with other families in similar situations. (Trygfondens familiehus, n.d.)

Pia Bang Westmark speaks in an interview on 22 February 2019 about staying at Trygfondens familiehus, and about having an ill child.

Pia and Michael's story
Big brother, Tobias, is 4 years old at the time when Pia gets pregnant with Mikkel. Meanwhile, Pia has been pregnant, where they had to interrupt the pregnancy at week 24, because of a heart failure. Pia becomes pregnant again and they are offered an extra scanning in week 16 and the message was hard; The foster has malformations of the urinal tract, which can lead to serious kidney damage, but the extent is unknown. (ed. Nørr & Højrup, 2017) (Westmark, 2019)

Mikkel is born in 2012 six weeks premature. He seems to be healthy, but after a few hours they have to rush-operate him and implant a catheter. Mikkel was fighting for his life, and there was nothing the doctors could do. Pia is uncomfortable with the hospital, with the feeling of being trapped, and the constant fear of losing a child again. She had a hard time attaching to Mikkel and even touching him since she was convinced that he would die. (ed. Nørr & Højrup, 2017)

"Why should i touch him? He was to die anyway" Quote Pia Bang Westmark (ed. Nørr & Højrup, 2017 p 38, original quote in appendix 01).

While Pia is at the hospital with Mikkel, Michael has gone home to Frederikshavn for a while, along with Tobias. Pia cannot cope with the situation and being at the hospital anymore - she is about to run away from it all when a nurse stops her and tells her about the new family house that has just opened. (ed. Nørr & Højrup, 2017) (Westmark, 2019)

When Pia is in the family house shortly after, she can finally breathe. Now they can all be together again, also with big brother Tobias. She quickly writes to Michael:

"I found a place we can be together, al of us. . ." Quote by Pia Bang Westmark (ed. Nørr & Højrup, 2017 p 41, original quote in appendix 01).

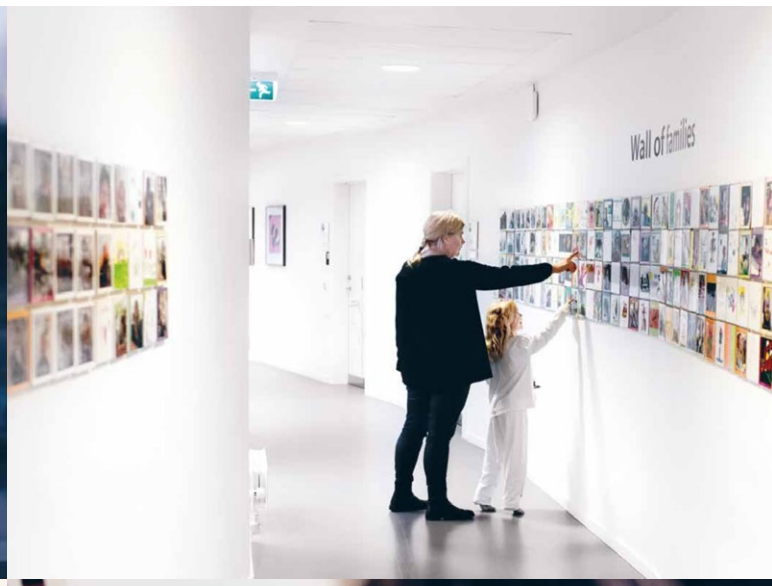
The family moves into the Trygfondens familiehus, as one of the first families. It doesn't make the situation perfect, but it makes things a little easier. (ed. Nørr & Højrup, 2017) (Westmark, 2019)

In Trygfondens familiehus there are other families they can talk to, and other children Tobias can play with. At the same time it is a place where they can get help if both Pia and Michael are in the hospital with Mikkel, volunteers will take care of Tobias. (Westmark, 2019)

Mikkel is still very ill and in need of a new kidney, which is possible when he weighs 10 kg. Until then, he will be in dialysis every day for 10-12 hours. In the first half year after Mikkel has been born, they practically live in the house. When they sometimes come home, they long for the house. (ed. Nørr & Højrup, 2017) In 2016, Mikkel is at the target weight, and can get his father's kidney. Even though it is Mikkel who has been ill, the whole family has been affected by it. And today, Tobias tells things about his experience of Mikkel's disease and the time at the family house, even though they thought they coped with the situation without injury, but everyone is affected by it, even the young siblings. (ed. Nørr & Højrup, 2017) (Westmark, 2019)

"Familiehuset became our rescue at a very critical time in our lives. We would not have been able to exist as a family in the hospital, where there was only one bed, one chair and no room for us to be together. "

Quote Pia Bang Westmark (ed. Nørr & Højrup, 2017 p 41, original quote in appendix 01)



NEURO AESTHETICS

In order to define something as "healing architecture" and "palliative architecture" one is saying that a building in some way can affect us mentally and have an effect on our behaviour. This means that environmental changes, affect our brain. Therefore, architectural design creating a certain setting, can affect our brain as well. According to Vittorio Gallese, our brain contains "mirror neurons" which causes us to react to the environment. (Gallese et al. 2015)

Important parts of the influential environment are such as nature and daylight which are important factors in architectural design. Natural environments are thought to be rich in characteristics that reduce mental fatigue and provide restoration (Kaplan, 1995). Daylight helps regulate the circadian system, which has an impact on sleep routines, hormone regulation and mental alertness (Figueiro, 2013). Studies has shown that exercising can influence the balance of brain and body. Architectural design can entreat to movement and thereby affect one mentally (Ratey, et al, 2008).

Much of the data within the research of Neuro Aesthetics is not directly connected to architecture. A test of human perception and response to different spaces, shows behavioural response of this and in one case, this behaviour was tested in relation to spaces formed by curves and rectangular lines (Vartanian et al., 2013), room height and perceived open and closed space. The results of the test showed that different spatial characteristics has an effect on people's behaviour. It is preferable to by far most people to have a higher room-height than a usual 2.44 meters. Open spaced were to be prefer compared to closed (Vartanian et al., 2013) and curvilinear spaces activate centres of the brain related to wellbeing and comfort(Vartanian et al., 2013).

This theory of neuro aesthetics contains principles useful for designing a children's hospice and can be applied in order to create the ideal architecture serving the exact purpose of the hospice. Design guidelines withdrawn from this theory, held with the precaution that this is not a test made upon children, are such as implementing nature in a design, sufficient daylight and design that entreats movement. Besides this, open and tall spaces were favourites along with curvilinear shapes.

Ill. 013

USER GROUPS

The patient
The age-span represented in a children's hospice is age 0 -18 and with life-limiting, life-threatening or incurable illness, where they need a specialised palliative effort. (Sankt Lukas Stiftelsen, n.d.)

A reference to a children's hospice can be done by professionals or by parents and relatives. The staff at the hospice will then contact the family. Admission is offered on the basis of an assessment of the child's physical, mental, social, spiritual and existential symptoms, as well as the individual family's need of support and help.

The relatives
Relatives who experience loss in the family need extraordinary help and support to get through the situation. Relatives must have the possibility of being with the ill child. Besides having the opportunity to live in the same room as the ill or a guest room, they must also have access to the common areas.

For a children's hospice, it is important to take care of the whole family and not just the ill children. There are often healthy brothers and sisters of a ill child who should not feel that their lives are at a standstill or that their needs are unimportant. Therefore, it is important in a hospice design to consider places and objects that cater to the healthy children and invite them to stay and play.

Staff
The staff of a hospice is roughly divided into four categories:

- Nursing staff
- Palliative team
- Volunteers
- Management

The palliative team includes a therapist, a physiotherapist and a paediatrician. There is also a psychologist attached to a hospice who is present approx. 30 hours a week. Their primary role is to treat the sick, their relatives, but also the employees if the need arises. This palliative team might work at the hospice full time or is only called in on special occasions. The volunteers have a varying work-schedule and the amount of work-hours varies as well. The volunteers help and support patients during their stay and solve tasks that employees do not have the means and time for. These tasks could be decorating in connection with occasions or holidays, preparing events such as bingo, baking with the children and siblings, preparation of the weekly bar or serving dinner etc.

A hospice design should facilitate a good working environment with meeting rooms, changing rooms, quiet and private zones and social areas that are not disturbing the domestic hospice atmosphere. (Sankt Lukas Stiftelsen, n.d.)

Ill. 014

DESIGNING FOR CHILDREN

The design of a hospice is a complex task, and the complexity is not minimised due to designing it for children. It is therefore important to investigate the needs and perceptions of the age group having to interact with the surroundings. One of the most important atmospheric feelings for children are security and the feeling of the situation being in control. Therefore, it is important to design small hiding places that a child can hide in, small niches to play in, perhaps placing a window so low that a child can crawl up in the windowsill. It is also important to tease children's natural interest in exploring, making trouble and playing games.

It is important to remember that these children are having a hard time, therefore disorder must be minimised and joy optimised. When children and young people enjoy themselves and are immersed in play, they can have a tendency to forget about the level of noise they make. When designing a large playing room, it must be placed at a distance from the rooms, so that children in need of peace and quiet are not disturbed. The living room should both have elements for the healthy sibling and the ill child and it must be both cosy and invite to play, without the family feeling like they are eating in the middle of a playground.

The Choice of colour and tactile has different effects based on experience and is an important factor for children (Dudek, 2000).

Children are often dressed in colourful clothes and have toys with bright colour palettes that adds colour to the environment as well. Colours are important as because it can be clearly separated by children and can act as a common reference and determine the mood of a given room. (Dudek, 2005)

A children's hospice accommodates young teenagers, which have different needs than those of younger children. A teenager strives for a more quiet space, where one can play video games or watch TV, and prefer more subtle colour palettes and less variation in colour. This means that there must be a balance in the needs accommodating the wide age-span represented in a children's hospice.

When designing a hospice for children it is important to include universal designing as well. Universal design tries to meet every need for any age, size, functional capacity and nationality. Anyone living in a hospice has a disability. Some may have problems with vision, mobility, hearing, speech, touch, understanding, strength or sense of direction.

The key elements in universal design are to cater for all abilities and all age groups, creating spaces including, participating, and accessible to everyone, creating an environment where everyone can maintain their independence and the agency.

When designing a building for everyone, one of the key elements is level-free access, which can facilitate wheelchair users and patients who are forced to be bedridden. Also when someone dies you need to have a place where the coffin is able to come into the car at the parking lot. In addition, there must be large bathrooms so that people in wheelchairs are able to use these.
(Authority and Design, 2016)

Ill. 015

Ill. 016

PALLIATIVE ARCHITECTURE

Palliative architecture is architecture that can help relieve. This is done in conjunction with palliative efforts to help promote quality of life for those with life-threatening diseases. (REPHA, n.d. a)

In Denmark, the palliative effort is described based on the WHO's description of palliative care, which states that the purpose is to:

- Encourage the quality of life for children / young people and their families
- Strengthen the family to cope with everyday life
- Relieve physical, mental, social and spiritual-existential symptoms
- Support and initiate medical treatment
- Individual courses based on needs assessments

Added by Lukashuset:
- Offer a homely framework for the sick child and its family (Raunkiær, 2016)

Dorit Simonsen, head of Hospice Djursland, stated at an interview on the 13th of February 2019, that one of the most important focuses at a hospice are life, play and relief. This is also emphasised by interview with Nanette Quistorff, Head Nurse at Lukashuset at an interview the 13 February 2019, that their most distinguished assignment is to minimise suffering and optimise quality of life, which the architecture will set the frame of.

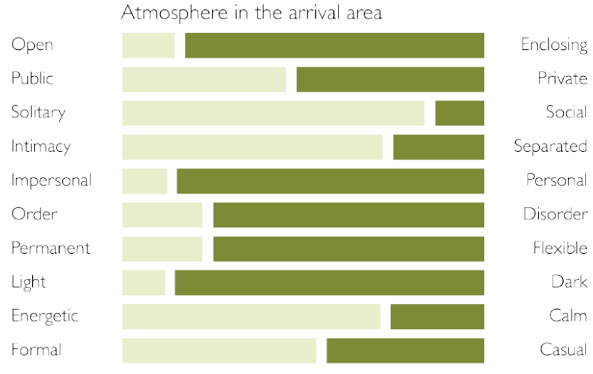
The palliative architecture is based on five elements; functionality, light / sound / air / temperature, nature, privacy and relation, atmosphere (see ill. 017). (REPHA, n.d. b)

The physical framework in a hospice is of great importance, however, this cannot be recognised immediately on the design and layout of a hospice. What will be noticed is the feeling of security, peace, dignity and continuity for the patients and relatives. The architecture can help to support this. (Realdania, 2009) At a hospice, it is important to avoid hospital-like atmosphere, but instead try to create a feeling of home. Studies have been made on which atmospheres the users want to be in the different rooms / areas. (Realdania, 2009) (See illustrations 018 - 021).

It should be possible to bring your own things to the "apartments", as this helps to make patients feel at home. In addition, the choice of materials should reflect the desired mood, where in a hospice it is recommended to choose carpets or wooden floors instead of linoleum or similar. (REPHA, 2017 e)

Since many patients are bedridden, it is important to take this into account in relation to the design and decoration of ceilings, this can be done in the form of skylights, stucco tiles, lamps, wood panels or the like. (Realdania, 2009)

Functionality, light / sound / air / temperature, nature, privacy and relation will be described under the next section "Healing Architecture".



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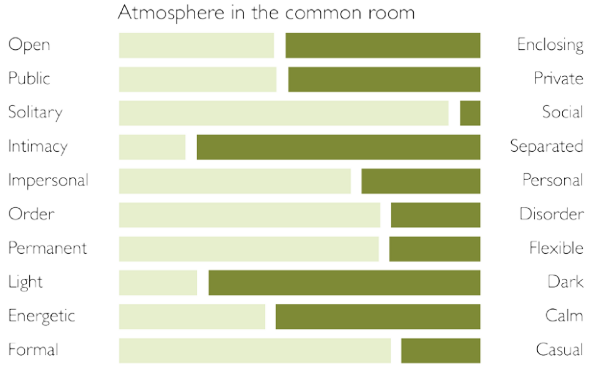

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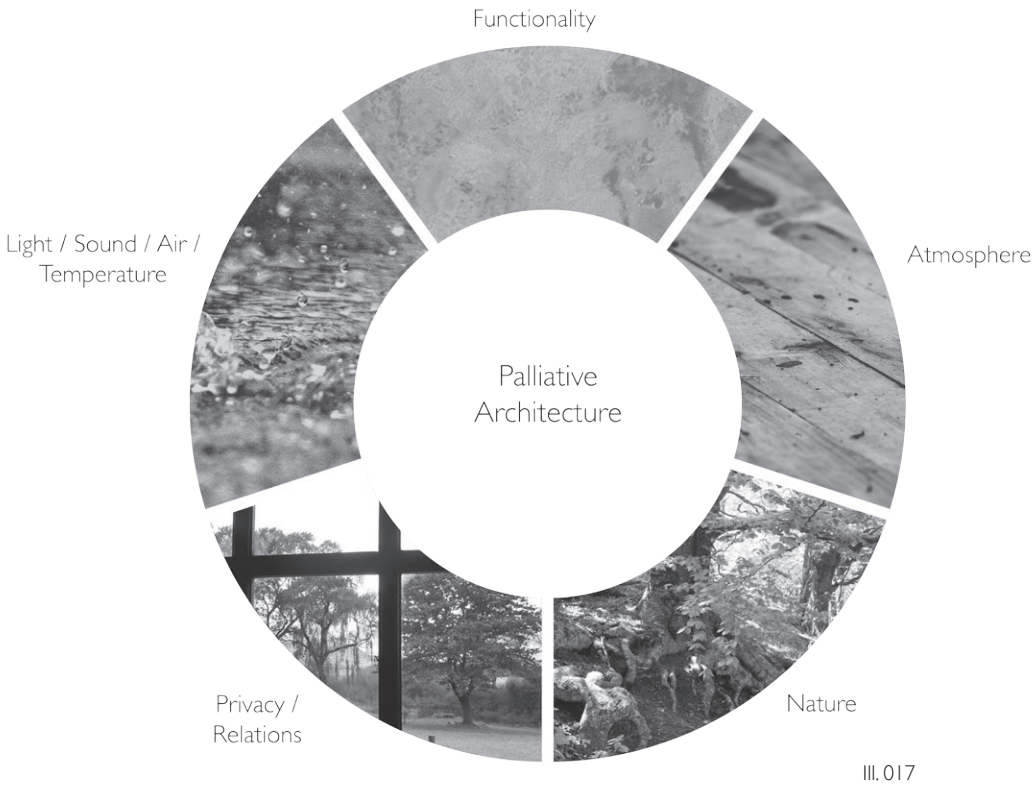

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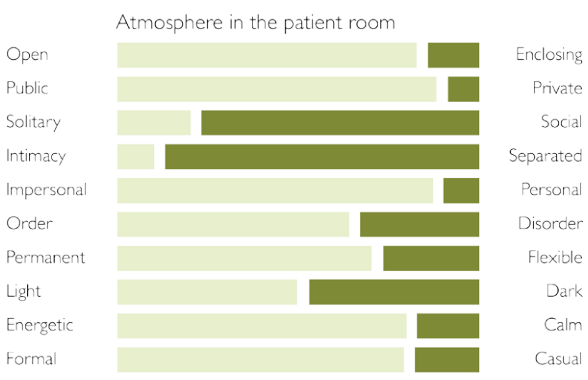

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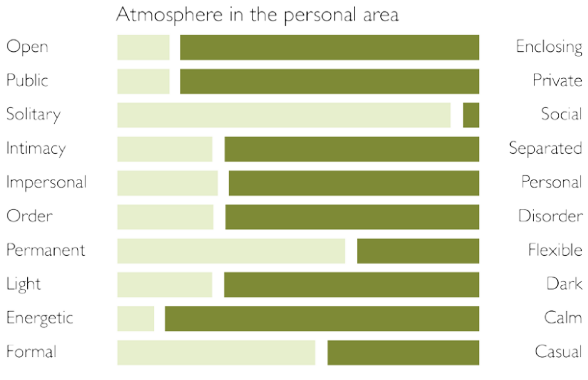


Ill. 021

HEALING ARCHITECTURE

Healing architecture is an evidence-based design concept based on the fact that architecture affects humans well-being, both physically and mentally, and that architecture thereby can help to promote a healing process. (Frandsen et al. 2009, p 4)
Since a hospice intends to relieve both physically and mentally, it makes sense to use the architecture to promote this. There are many aspects that can be worked on, including daylight, the atmosphere of the room, colours, sounds and the separation between private and public spaces. This section should not be seen as how we literally can heal the patient, but how architecture can minimise suffering and optimise quality of life.

This section is based on knowledge from "Helende arkitektur", where it is categorised in three different groups; body, relation and security. Under each topic, it will be mentioned how architecture can influence the topic. (Frandsen et al. 2009) Ill. 024 shows how the physical environment influence the different parameters, and which consequence this have.

"Body" is related to the human body based on some of the senses. "Light" and "Art" are based on the visual sense, "Sound" on the hearing sense, "Air" on the sense of smell and "Moveability" on the kinaesthetic sense.

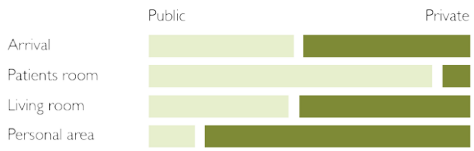
Light is important for the well-being of everyone at a hospice, both patients, relatives and employees. It is not only natural light that is important but also artificial, as some will be up at night. (Frandsen et al. 2009) Light helps to maintain the circadian rhythm, and especially for those who may have sleep-issues. Studies show that sufficient daylight helps depression, pain and stress, but that it also makes hospitalisation shorter. (Frandsen et al. 2009) In addition, patients also want to be able to look at nature such as forest and water. Furthermore it should be prioritised with light from the south and east in the bed rooms. (REPHA, 2017 b)

Based on Realdanias "Program for Det Gode Hospice i Danmark", it is also seen that patients generally want bright spaces, with the possibility of adjusting the amount of light themselves. (Se ill. 023. Light can also help to create different atmospheres, such as candles when the last goodbye is said. (REPHA, 2017 b) Patients want windows with views where it is possible for them to orient themselves. The staff also wants to be able to look, but there can be rooms, where it is preferred that there is no direct sunlight. (Frandsen et al. 2009) Windows should be placed to optimise the light in the rooms, where light from the south and east should be prioritised in the bed rooms. (REPHA, 2017 b)

In terms of light in general, however, it is important to think about the indoor climate because large window sections must not result in overheating.

Art refers to visual, tactile or auditory artworks and colours. Art can be used in hospice for pain distraction, but also to stimulate senses and divert thoughts.
In relation to pain, art and view of nature raises the pain threshold. (Frandsen et al. 2009) Colours can be used to soothe, but also to create moods. (Frandsen, AK et al. 2009)

Sound can both be soothing and healing if used as a distractor. But sound can also be perceived negatively, such as sleep disturbing and stressful, especially noise from engineering, staff and other patients. (Frandsen et al. 2009) Noise has a great influence on sleep, therefore acoustic regulating measures can be taken that reduces the reverberation time. (Frandsen et al. 2009) Positive sounds can also be incorporated, such as the whispering of the trees, the chirping of birds and water. (REPHA, 2017 b) Sound also has a great influence on how patients and their families experience confidentiality, privacy and communication. Where some rooms should be quieter than others. If acoustic privacy is lacking, it may result in patients not passing on relevant infor-



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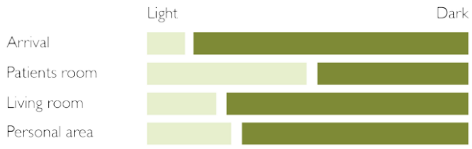
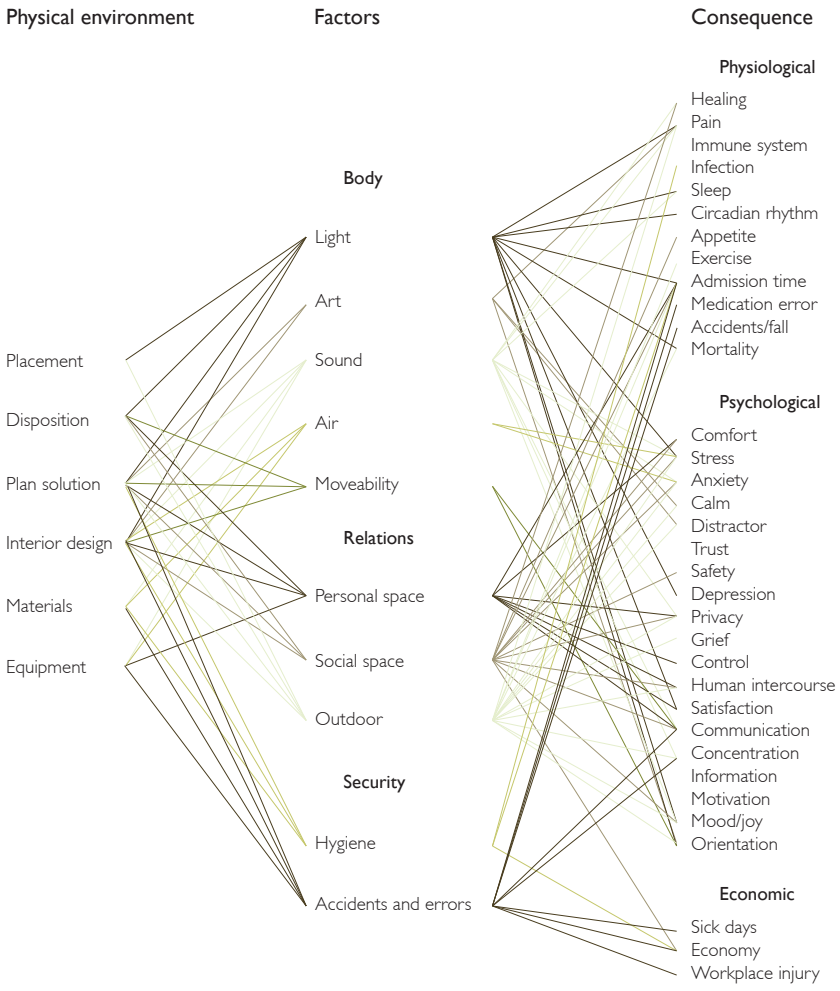


Ill. 023

mation and thus not receiving optimal treatment. (Frandsen et al. 2009)

Air means how is it felt on the body, for example with temperatures and scents. Too high or low temperatures can give rise to discomfort. Therefore, it is important to look at things like overheating (and how this can be avoided) and how the room is heated - here the patient should preferably be able to adjust himself. (Frandsen et al. 2009)
To avoid annoying odours, it is important to optimize ventilation and use easy-to-clean surfaces. (Frandsen et al. 2009) There may also be scents that stimulate and soothe and fragrances, such as flowers, can also bring positive memories. (REPHA, 2017 b)

Moveability
It is important that it is easy to carry out daily routines efficiently. It saves both time and money. This can be done by making a simple floor plan. In addition, it appears that buildings based on parallelism and a clear orientation direction are easier to orient in than buildings with 45 ° turns. (Frandsen et al. 2009) Instead of a square structure for ground planes, a circular, H-shaped or L-shaped with 90 degree angles is preferred. (REPHA, 2017 a)



Ill. 024

The rooms must be flexible, and must also be able to accommodate, for example, a birthday. Accessibility is an important element where there must be room for bedridden people to get around the building, but also that a coffin can easily be carried out in the event of death. (REPHA, 2017 a)

Relation
This section contains the relationship between space and human interaction and relationship.

Personal room
The personal rooms concerns the privacy of the patient, relatives and staff, and the possibility of openness and confidentiality for all parties. It is important to design the physical framework, to different needs for privacy and confidentiality. (Frandsen et al. 2009) In more private rooms, relatives take a greater part in the care, and there should be room for them to stay overnight. There should also be room for relatives to wash and cook, as well as a room where relatives have the opportunity to withdraw. In a hospice private spaces are particularly important for the "difficult" conversations and for being able to mourn. (REPHA, 2017 d)
In relation to a children's hospital, it is particularly important to think about the "apartments" and how the family can be together, but also how the patient can be alone if needed. Based on Realdanias "Program for Det Gode hospice i Danmark", the ill. 022, shows the wanted level of privacy in different room or areas.

Social room
The social space concerns both the relationship between patient and relatives, patient to patient, patient and staff and the importance of the interior design according to this Between the patient and relatives there must be a framework for ordinary conversation, private and confidential conversation, active and passive contact, family life and private life, as well as physical and psychological support and care. (Frandsen et al. 2009) Most importantly, the architecture promotes social interaction, resulting in increased well-being. The social space can be in waiting areas, treatment rooms and living areas. (Frandsen et al. 2009) In relation to the hospice, it must be conceived, that the relatives and possibly co-workers also meet. In addition, cooking and eating together can promote socialisation, and increase the patient's energy intake and optimise the healing process. (Frandsen et al. 2009) In the hospice context, it will therefore be optimal to have rooms where families can eat and cook together, but room for all patients and families to be together.

Interaction with staff involves space for treatment, care, knowledge sharing, social and confidential conversation. It is also important that the staff is accessible and close. (Frandsen et al. 2009) In relation to the architecture, it is important where these meeting places and common areas are located. For example, a common room should not be located in a very busy area. For common rooms, a circular floor plan is preferred rather than a rectangular one. This also applies to the furniture. (Frandsen et al. 2009) It is also important that these rooms have a homely touch, which is also an element described in Realdanias "Program for Det Gode Hospice i Danmark" (2009). Long corridors should be avoided, but where this is not possible, they should break down small niches and zones of varying degrees of privacy. At the same time, there is also a need for flexible social spaces where, for example, parties and other events can be held. (REPHA, 2017 d)
The situation patients and relatives in that hospice is in, helps them to help each other and share experiences. (Realdania 2009) It is these meetings that the common areas of a hospice must be able to form a framework for, both inside and outside.

Outdoor
Views and gardens are important to all users, both patient, relatives and staff, helping to reduce stress and promote social relationships, and play a role in privacy. Outdoor areas like a garden can help the mood, and many feel more relaxed and calm. (Frandsen et al. 2009) The outdoor areas must be easily accessible for everyone to use. In addition, outdoor areas should be divided into different zones, with the possibility of being either private or social. Elements such as places to sit and opportunity and shelter are things that make the outdoor areas more frequent to be used. Trees, plants, flowers and water (and the sound from it) are among the most important elements that attract people in the outdoor areas. For children, water artwork, play, a mill, shadow wall and animal motifs are important elements that attract. (Frandsen et al. 2009) Outdoor areas should be located close to inside areas so they can be accessed more easily, and so that nature can be enjoyed from the inside. (REPHA, 2017 c)

Security
Security is divided into hygiene and damage and faults, respectively, and the things that can help to minimize these.

Hygiene
Hygiene is an important matter. Cleaning must be as easy as possible so infection is not transmitted so easily. Here, the choice of material also has great influence, since bacteria have varying survival times on different materials, and furthermore, some materials are more difficult to disinfect than others. (Frandsen et al. 2009)

Accidents and errors
This section deals with treatment errors that can cause physical and mental damage. This can be for both patients and staff. Things that influences this is good acoustics that can help speech intelligibility and thereby avoid misunderstandings. Daylight and artificial light makes it easier to see, and thus easier to carry out tasks. Care areas must be designed, with good manoeuvring area for lift. Accessibility is important. (Frandsen et al. 2009)

Ill. 025

HOSPICE COMPONENTS

This text is based on Realdanias "Program for Det Gode Hospice i Danmark" (2009), which takes its offset in Hospice Djursland.

Generally, the building should be constructed in a human scale, where the building must relate to the surroundings. In addition, it must be experienced as inviting and open, both in daylight and during the evening hours. (Realdania, 2009)

This section goes in depth with which rooms a hospice / children's hospital need and what is desired by the different rooms, both according to functions, connections and atmosphere.

The arrival to the children's hospice must have parking close, but still hidden, so this is not the first thing that catches the eye. The entrance should be clearly marked so that no one is in doubt of where to go. This also applies within so that patients, relatives and volunteers can find their way around. Advantageously, arrival can be a central core from which the other functions are placed around, to avoid long corridors. The hospice must signal life, activity, openness and homeliness. It is important that the surroundings of the building is a green area that can be used by everyone. (Realdania, 2009)

Personal welcome should be placed near the main entrance and as a part of the personal area. (Realdania 2009) The administration will be shared with the existing "Hospice Djursland". (Simonsen, 2018) Staff-area should be close to administration, the bed section and the examination facilities, because the staff works across the departments. The staff-area should be divided into two; an extrovert part with room for visitation, consultation and therapy and a closed part for meetings, phone calls and alone work. Advantageously desks can be shared since much of the work is done away from the desk. This area requires a closed meeting room for confidential conversations, tranquillity and concentration. In addition, flexible rooms can be used by different professional groups. In the staff area, wood or linoleum floors, a modern and functional furniture style and energetic and dynamic colours are desired. (Realdania, 2009) Some of these functions can be shared with the existing "Hospice Djursland", since much of the staff will work both places.

Kitchen and service functions are placed in the existing Hospice Djursland, therefore, they will only need a smaller kitchen in the children's hospice, where the families can prepare food together. (Realdania, 2009) (Simonsen, 2018)

Bed sections should be close to the staff-area to avoid long walking distances for staff. Since patients in the hospice need a lot of peace, this department should be perceived as an independent unit. Here you want to keep the colours in a warm palette and light tones. Earth tones, orange, golden, beige and reddish colours create a warm and safe atmosphere for the patient.

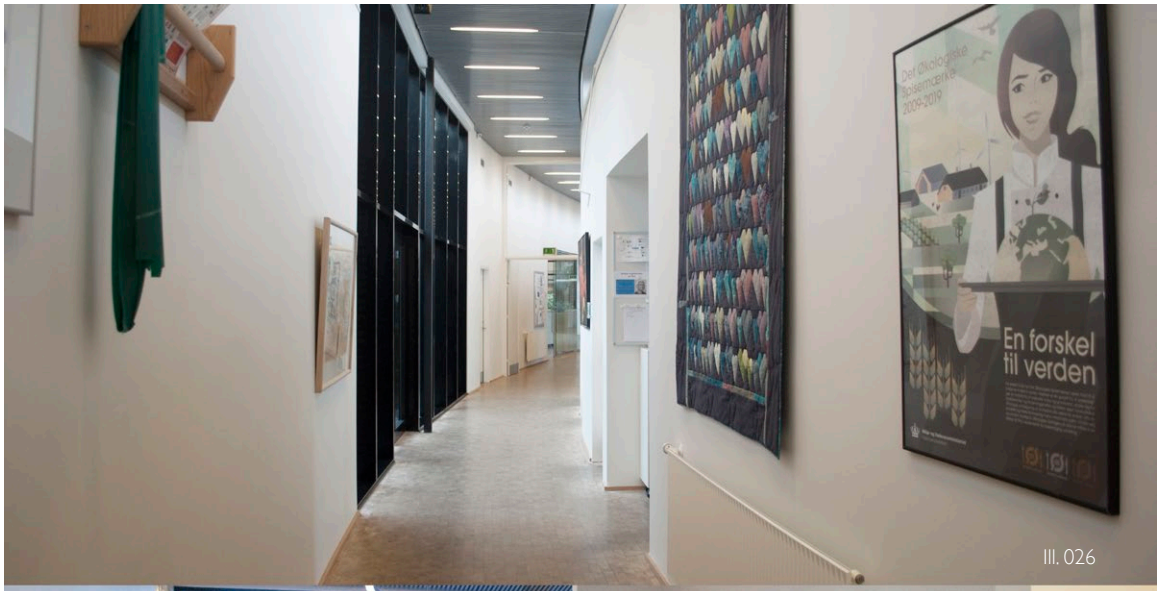
In the patient room, wooden floors and modern but functional furniture with a homely feeling are desired, where obscurity to the bathroom from the living room should be avoided. There should be large window sections, with a door that can be opened out to a green area. The room must not seem too big for the patient, as patients in hospice are often more sensitive to sensory impressions. Patient rooms should be flexible, as there is a great difference between how many relatives are visiting. Since the patients often prefer to lay in bed, one must be able to look out the window from the bed, and one should effortlessly get outside. (Realdania, 2009)

According to the wishes of the team that is preparing material for Børnehospice Djursland (Simonsen, 2018) each apartment must contain two rooms; a living room, and a room where parents can retire. In addition, there must be a private bathroom.

Common room are divided into different zones and niches. One of the zones is kitchen- / dining

area where kitchen assistants, pedagogue and possibly a volunteer can make and arrange food with the help of parents, siblings and possibly patients. There should be a possibility of eating together or eating in one of the niches. The common room can have room for play, art, singing, reading aloud etc.

The art must be easily readable and positive. The colours of these rooms are to be cheerful, warm and in overall light tones, with large window sections, which also include a door that can be opened onto a terrace or a green area. (Realdania, 2009)



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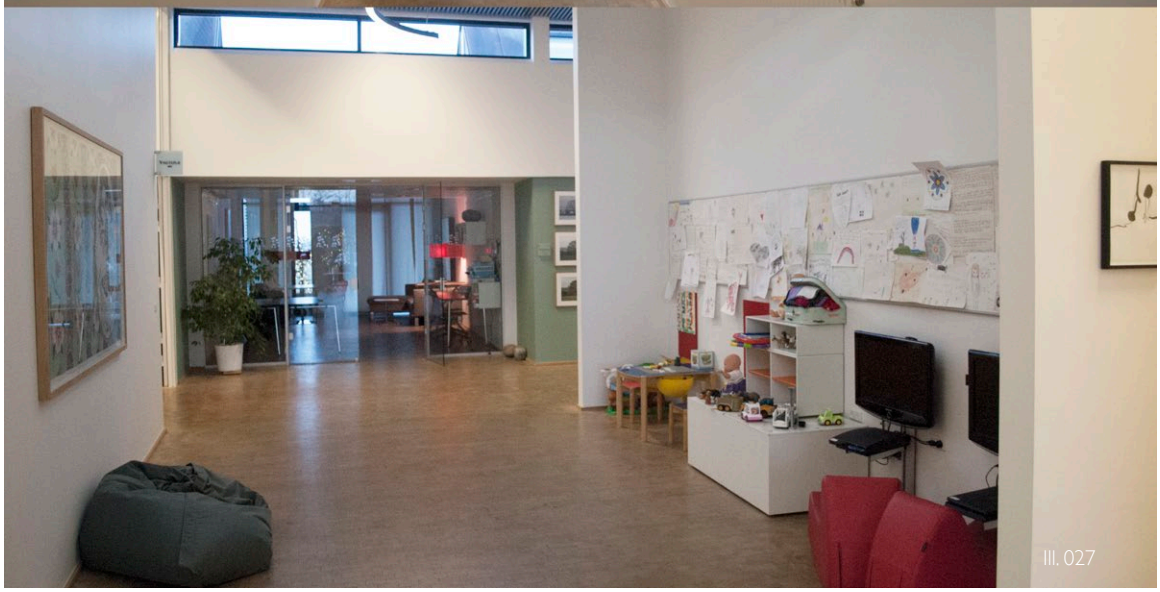


Ill. 027

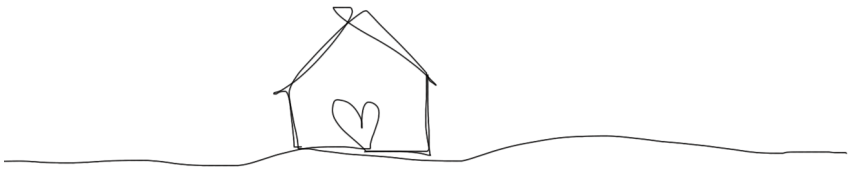
A HOME AWAY FROM HOME

As mentioned in the previous paragraphs, an important element of a hospice is having the atmosphere of a home, where "home" often is described as embedded in positive feeling and affective bonds. (Coolen and Meesters, 2011)

A home is often considered from the family or households' perspective, and is a place for many activities as eating, sleeping, relaxing, and entertaining family and friends, but most important, it is a place for family life, a place where you can feel safe and have privacy. (Coolen and Meesters, 2011) Therefore it is important that the units and hospice in general comply spaces for these situations. Furthermore, living areas with a homely atmosphere in an institution can be crucial for the patient's involvement in the surroundings. (Frandsen et al., 2009)

An atmosphere of home
Since "home" is often a feeling, we must try to make a frame, which is flexible enough to make everyone feel at home. To achieve this sense of home, hospices also allow to bring personal effects. Materials as wooden floors and carpets can be used to get a homely atmosphere, whereas etc. linoleum will often give an institutional touch. (Realdania, 2009) In addition, the relationship between private and social spaces, colors, scents, décor, light and views can contribute to a homely atmosphere. (REPHA, 2017)

"The experience of home is essentially an experience of intimate warmth"
Quote by Juhani Pallasmaa, p 63 (2012)



Ill. 028

NORDIC ARCHITECTURE

Nordic architecture becomes an important element, considering the site, because the site is surrounded by nature such as forest, water and green areas. Hospice Djursland, which the children hospice will be an extension of, also exudes "Nordic", with focus on natural materials and a respect for the surroundings.

"Nordic architecture" was recognized at the beginning of the 20th century as being architecture, with its own characteristics. (Lund, 2008) The Nordic architecture is based on social and cultural traditions, with focus on climatic circumstances, surroundings, functionalism and the use of Nordic materials. These elements are about sensing the architecture, both what can be seen, and what can only be experienced. (Kjeldsen, 2012) Christian Norberg-Schulz (1996) states that light is what defines the Nordic world, and it can create different atmospheres, depending on how the weather is, how it is used, and from what direction it comes. Light can be used in many manners, both as diffuse and direct, but one must be aware that the light changes radically through the seasons and time of the day. Therefore, it is important to integrate light, both diffuse and direct in different ways, whenever it is possible. Light is an important element in healing architecture, and the use of daylight must correspond with the needs of it in a hospice.

In Nordic architecture the surroundings are very important. It is about designing a building with respect for nature and the surroundings, that also fits into the traditions. This is very relevant when designing a hospice in the settings in Rønde, Djursland, that are characterised by beautiful nature. In Nordic architecture there is a tradition for using natural materials, this also correspond to what the users of a hospice wants, which is warm materials with history and soul.

Ill. 029

SUSTAINABILITY

Sustainability became a known concept in 1987 through the Brundtland report. The report lay out the complications the world was facing according to environmental issues, and was the first to put focus on the topic in a global scale. (The Brundtland report, 1987)

A holistic sustainable approach
It is a fact that our world is build up by mutual depending elements, and a truly sustainable approach is a holistic notion that is identified by three equally important aspects of the development of sustainability; Environmental, economic and social. (DAC, 2014) These aspects must be seen at as a whole otherwise the approach is not truly sustainable, which is also the way the approach is today. This holistic approach was introduced in 1992 from the Rio Declaration (Drexhage and Murphy, 2010).

Sustainable Architecture
Sustainability is a very important part of the building sector and it has been since the climate changes became a political topic (Drexhage and Murphy, 2010). An important part of the sustainable strategy is to increase focus on energy consumption and on the emission of greenhouse gasses as well, and this has been the case in the recent decades. The political goal in Denmark regarding this strategy is to become completely CO2 neutral by the year 2050 and become extremely energy efficient (Kleis, 2014).

By designing the children's hospice with a sustainable approach, the negative impact of a building will be minimised. Besides this, there is no correspondence in creating a building that eases life on the inside, but decreases life on the outside.

III. 030

D G N B

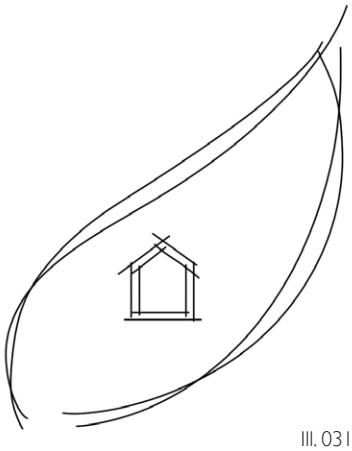
In addition to the importance of creating a sustainable building for the children's hospice, the DGNB certification system for ranking buildings is a good way of securing this.

In 2012 the system was adapted for Danish standards. A building can be ranked with bronze, silver and gold based on an overall sustainability assessment of the building. (DK-GBC, 2014).

The DGNB ranking system is divided into five categories and Each category weighs 22,5 % except the process-category that has a weighted score of 10% (DK-GBC, 2014). Another category considering the quality of the building site, is seperate to the system, but important in the ranking.

Environmental quality
This category secures that a buildings impact on global local environment is minimised as much as possible. This also includes the running of the building and production of materials. This is calculated through a life-cycle-assessment (LCA). (DK-GBC, 2014). The LCA analysis, together with atmosphere, will form the basis for the material selection in the children's hospice. Environmental quality is also how the building can be separated and the materials reused or recycled. This also applies to the excess soil on the site - where the optimum scenario is that the soil can be used on the site. Furthermore, trees should be preserved, since they have positive effects on the local micro climate, the area's biodiversity and for human well-being. (DK-GBC, 2016).

Economic quality
The economic quality contains a life-cycle-cost-analysis (LCC) of the building and an determination of a buildings potential for economic development through flexibility and other uses. The LCC is calculated like the LCA for a period of 50 years. The assessment includes cost for construction of the building and running. It also includes the maintenance of the building. This category also looks at the life span of materials used in the building (DK-GBC, 2014).



Ill. 031

This project does not calculate the economy, but there will still be focus on how easy it is to clean the children's hospital, with e.g. wall-hung toilets, whether you can reach windows from the ground, floor heating instead of radiators etc. In addition, another focus point will be to optimize the layout, which can result in fewer m^2 to be built, and make these m^2 as flexible as possible to comply with new use or functions. Therefore, the room height should above 2.5 m to to enable changes in installations but the highest score is obtained at a free room height of 3 m or above in bedrooms. Examination and treatment rooms require 4.2 m or above to achieve max score. (DK-GBC, 2016).

Another factor is passive energy strategies that can reduce the need for technology by minimizing energy consumption and optimizing indoor climate. (DK-GBC, 2016).

Social quality
Social quality deals with parameters as health, comfort, user satisfaction, functionality and aesthetics. A good indoor environment is important and can prevent absence due to illness. This is achieved through thermal, atmospheric and visual comfort, as well as the quality of outdoor spaces and the safety and security of the building. Another parameter that is included in the social quality is accessibility (DK-GBC, 2014).

Thermal and atmospheric comfort should be documented in relation to DS / EN 15251 Category I, which is described in more detail under the section "Room program". A compliance with the requirements gives the highest point score in DGNB. This is a knock-out criterion, which means that if this is not complied with, the building cannot be certified as DGNB. Shading, venting and temperature must be adjustable by the user to achieve the best comfort. (DK-GBC, 2016).

According to visual comfort, the highest score is given with a daylight factor on 3% or above, on at least half of the usable area. In addition, it is important that there is good visibility while avoiding glare, both when the solar shading is used. Furthermore, there should be access to direct sunlight, this is investigated by documenting sunlight hours on the facade of the rooms, where maximum point is given when having over 2 hours in all patient rooms at equilibrium. (DK-GBC, 2016).

As mentioned previously outdoor spaces has a great influence on humans well-being. There must be a variety of outdoor spaces in close connection with the building, preferably visible from the inside. These outdoor spaces must allow both patient, staff and relatives to find them attractive for many purposes. Therefore, it is also important that these areas are accessible to everyone. All outdoor surfaces should be used, also the roof for etc green roof with living space, roof terrace, roof gardens, solar cells / solar panels, and ventilation- or cooling systems. Interior spaces like atrium and light farms also contribute to a higher score. (DK-GBC, 2016).

Safety and security are important at a hospice, where it is important that it is easy to orientate and that there is good lighting in the evening. (DK-GBC, 2016).

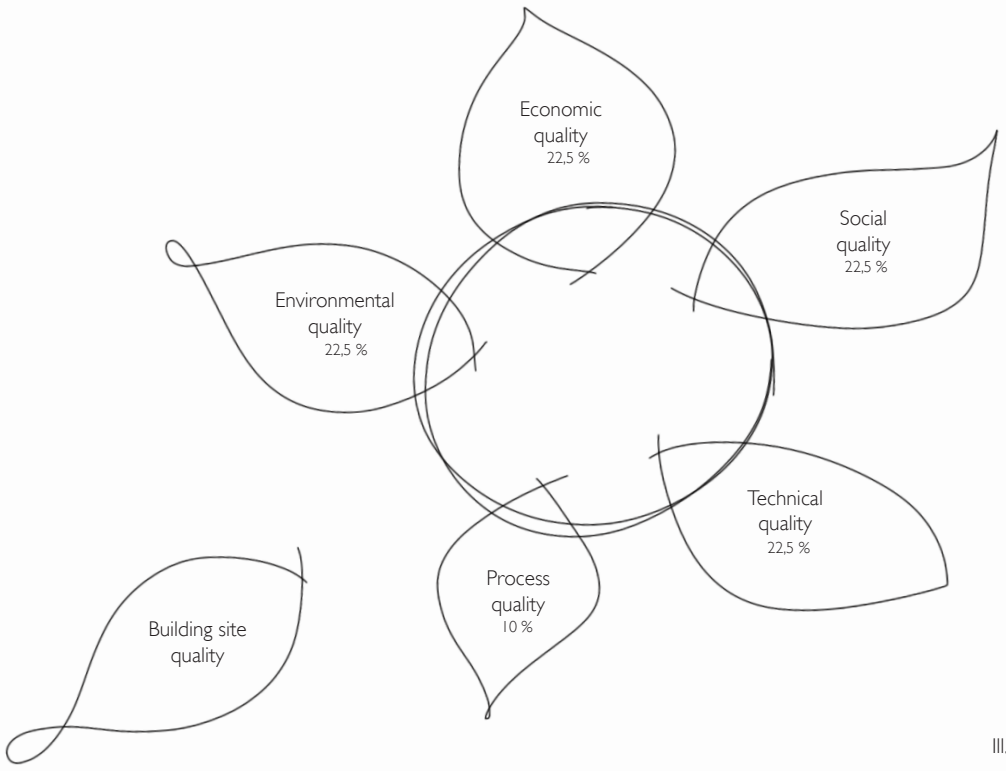
Accessibility is a knock-out-criteria, which means that if the building does not comply with this, it can not be certified as DGNB. It is based on equality that everyone should be able to access all places. The children's hospital must be under category A, which is the highest level. There must be a free door opening of 1.5 m, where patients must get around and common access routes must have a free width of 2.5 m. Furthermore there must be ceiling lifts in bedrooms, and if there are elevators, at least one must have a door opening of 1.5 m, and an area of about 5.35 m^2. All bathrooms in connection with living rooms must be equipped handicap friendly, in addition there must be HC toilets available in common areas. (DK-GBC, 2016). This is even more important at a hospice, since many can't walk around.

The architectural quality concerns the building's design, materiality, usability, cultural value and its interaction with the context. It optimizes a long life, good maintenance, a high degree of flexibility and good integration in the building's and the city's context. (DK-GBC, 2016)

Space disposition is important in terms of flexibility and functionality, and emphasis is also placed on interior design and sensory impressions, but patient privacy should be taken into account. (DK-GBC, 2016).

Technical quality
This parameter deals with the technical solutions in the building. It includes the construction and how easy the maintenance of the building is and how easy it is to disassemble and remove after it has been used. The technical solutions are important to the environmental, economic and social quality (DK-GBC, 2014).

All building regulations requirements for buildings must be followed, but in relation to DGNB, top points are given for e.g. reducing the length of the escape routes by 40%, increasing the width of the escape routes by 20%, according to the otherwise 30 m for hospitals. (Bygningsreglementet 2018) Furthermore the fire resistance of load-bearing elements and fire section separation should be +90 min. (DK-GBC, 2016)



Ill. 032

The acoustics have an influence on the user's well-being and comfort, here the reverberation time for study rooms, offices, meeting rooms, living rooms, waiting rooms and walking areas must be 0.6 sec.. For bed rooms below or equal to 0.8 sec. will be sufficient. In addition, it must be ensured that there is sufficient air sound insulation and step sound insulation between rooms and that sounds from technical installations do not bother. (DK-GBC, 2016)

Passive strategies for energy optimization are also contemplated, where highest points are given where; U-values for roof and ceiling constructions are 0.1 W/m^{2}K, outer walls and basement walls against ground are 0.15 W/m^{2}K, terrain decks, basement floors against the ground and floor separations across the open are 0.1 W/m^{2}K, and windows, doors, gates and skylights are 1 W/m^{2}K. (DK-GBC, 2016)

In terms of maintenance and cleaning, it is generally a matter of everything having to be easy to access, including technical installations and construction elements. The location of radiators and columns, as well as the design of stairwells, toilets and baths, is important. It's also about minimizing the area of vertical surfaces, as these require more frequent cleaning. (DK-GBC, 2016)

The construction sector is one of the areas with the largest material consumption in Denmark, and the construction sector is responsible for about 35% of the waste material in Denmark. Therefore, according to DGNB, the materials used and how they are used must be seen, so that from the start of the design process you can look at how the building can be de-constructed and recycled or reused. (DK-GBC, 2016)

Process
This parameter relates to the process of designing a building. This can be a guideline for securing that the requirements for sustainability is reached. This involves preparations, planning and use of pre-qualification (DK-GBC, 2014). Many of these things will be described by design parameters, which have been prepared based on the program. Here different demands for the building or room should be mapped. A point below is also planning for future changes, in this case it may be planning for an extension of children's hospice. In general, it is also about working with the integrated design process and having all the points in mind in the different design phases. (DK-GBC, 2016).

Quality of the building site
This parameter deals with public transportation, close environment and other challenges in relation to the climate (DK-GBC, 2014).

In this project, the focus will be on accessibility, thermal comfort, and daylight. Chosen subtopics under these focus areas will achieve top scores within DGNB. Other DGNB aspects will be accepted not to get top score.

Ill. 033

Iconic tree of Hospice Djursland, in its stages of life.

LOCAL- AND MUNICIPALITY PLAN

According to local plan 43, which applies to the displayed area on ill. 035 (lokalplanen). This indicates that new buildings must not be built with more than 2 floors, and the total height of the building must not exceed 8.5 m. (Rønde Kommune, 1996)

Parking areas must be located along the northern boundary of the local plan (see ill 034). There may be new paths connecting the area and the buildings, but no more than 2 paths crossing the forest. In addition, the existing open areas along Strandvejen must be preserved. (Rønde Kommune, 1996)

The local plan indicates which areas are allowed for building (see ill. 037) The entire local plan-area are allowed a building percentage of maximum 10%. (Rønde Kommune, 1996)

According to the Municipality plan, it states that new buildings should have tile roof, with an slope of minimum 20 degrees. City council can approve other roofing materials if this means that the building seems lower with a smaller building height. (Rønde Kommune, 1996)

On the map of ill. 036 a burial mound is marked. At such an ancient monument, it has been decided that construction must not be built over 6 m within 100 m. However, you can build up to 1½ floors or 7 m if the building is built with tile roof. (Rønde Kommune, 1996)

This legalisation is an important driver when designing a building, and should, at an early state, be investigated and taken into consideration.

Ill. 034
Parking area

Ill. 035 - Local plan area

Ill. 036 - Protected area

Ill. 037 - Building field

AREA

Ill. 038

Access and parking

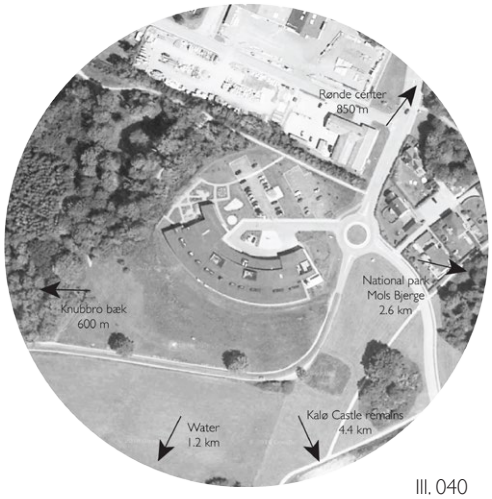
As the diagram shows, the roads in the area are primarily to residential areas and a single road to industrial area with a few builders' merchant. This means that there is limited traffic in the area. The road (Strandvejen) running in front of Hospice Djursland goes all the way down to the beach.

The parking facilities at the site is sufficient, which means that in the new building there is no need for additional parking spaces. (Simonsen, 2019)

Ill. 039

Nature

Djursland is characterised by large open green areas, water, beach and forest. To the west of the hospice is a small forest and in the middle is a small lake. Otherwise the rest of the site is a large open green field.

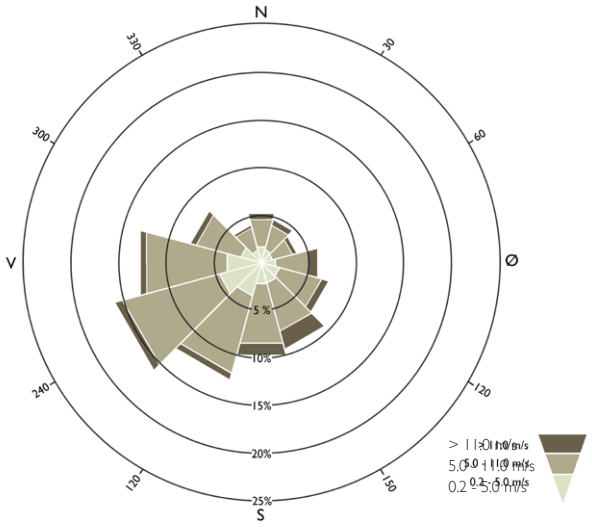


Ill. 040

Distances

The site is ideally located for various attractions. Rønde center is in a walking-distance from the site, which makes it possible to walk up there with a wheelchair. The beach is only 1.2 km away, which means that there is view to the water from the site. Nearby (2.6 km) is the National Park of Mols Bjerge, which is also a short drive by car. This park contains beautiful nature.

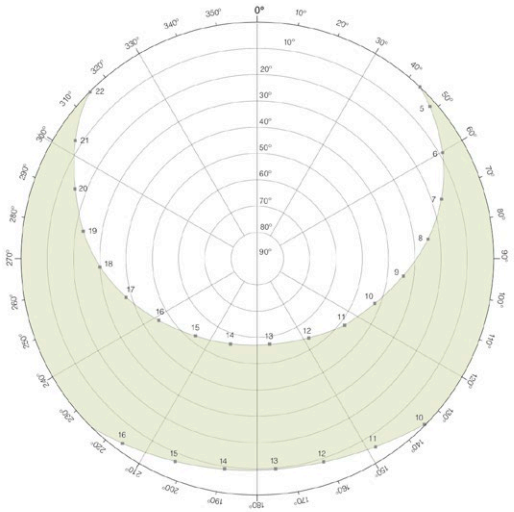
SITE ANALYSIS



Ill. 041

Wind

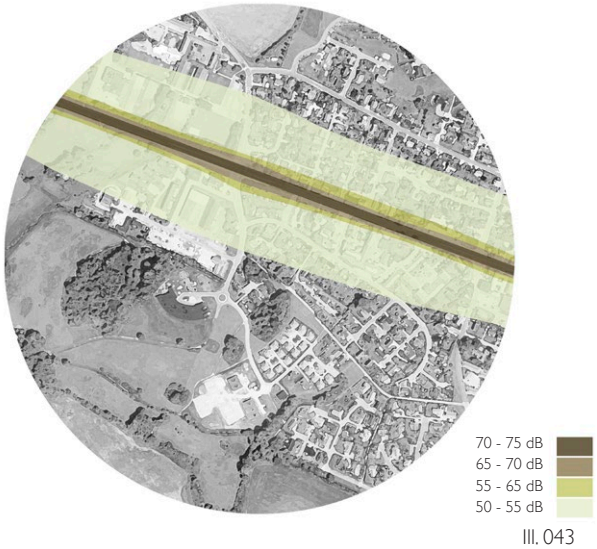
The primary wind direction is west and south-west. There is a smaller forest west to the site with large threes, so that the building is sheltered from the most powerful wind direction.



Ill. 042

Sun

Because of the openness of the area around the existing hospice, there are only shadow-zones created from the hospice building. In the west-end of the site provides shelter from the sun and a possible placement of the hospice could therefore by advantage be placed here.

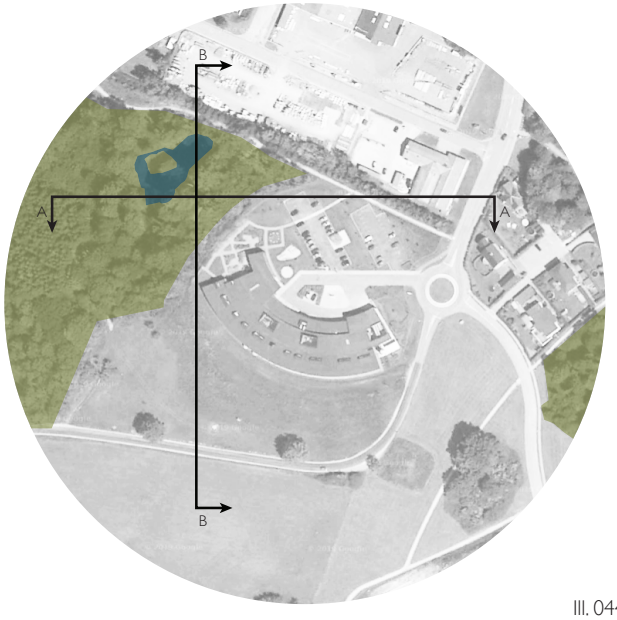


Ill. 043

Noise

Røndes main road is about 200 m. from the site, which means that no noise above 50 dB can be heard from the site,.

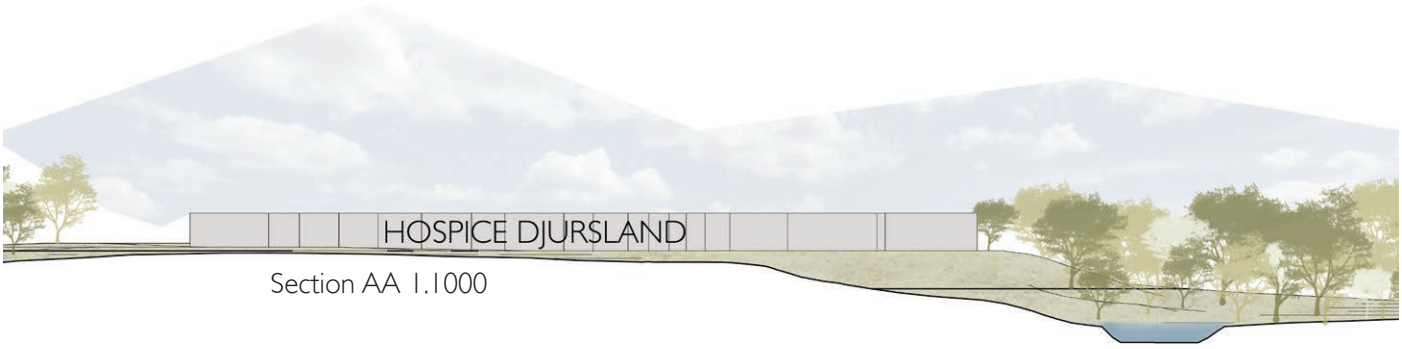
SECTIONS



Ill. 044

In order to make an optimal flow through Strandbakkehuset, the connection with the existing hospice and the nature surrounding, the ideal placement for Strandbakkehuset is in the north-east area of the site, within the local plan area. Therefore sections has been made of this area, because observations of the site, showed a large difference in the height on the site.

From the level with Hospice Djursland and down to the lake, there is a height difference of 10 m. This can be a challenge for the design but can also be taken advantage of in the design.



Section AA 1.1000

Ill. 045

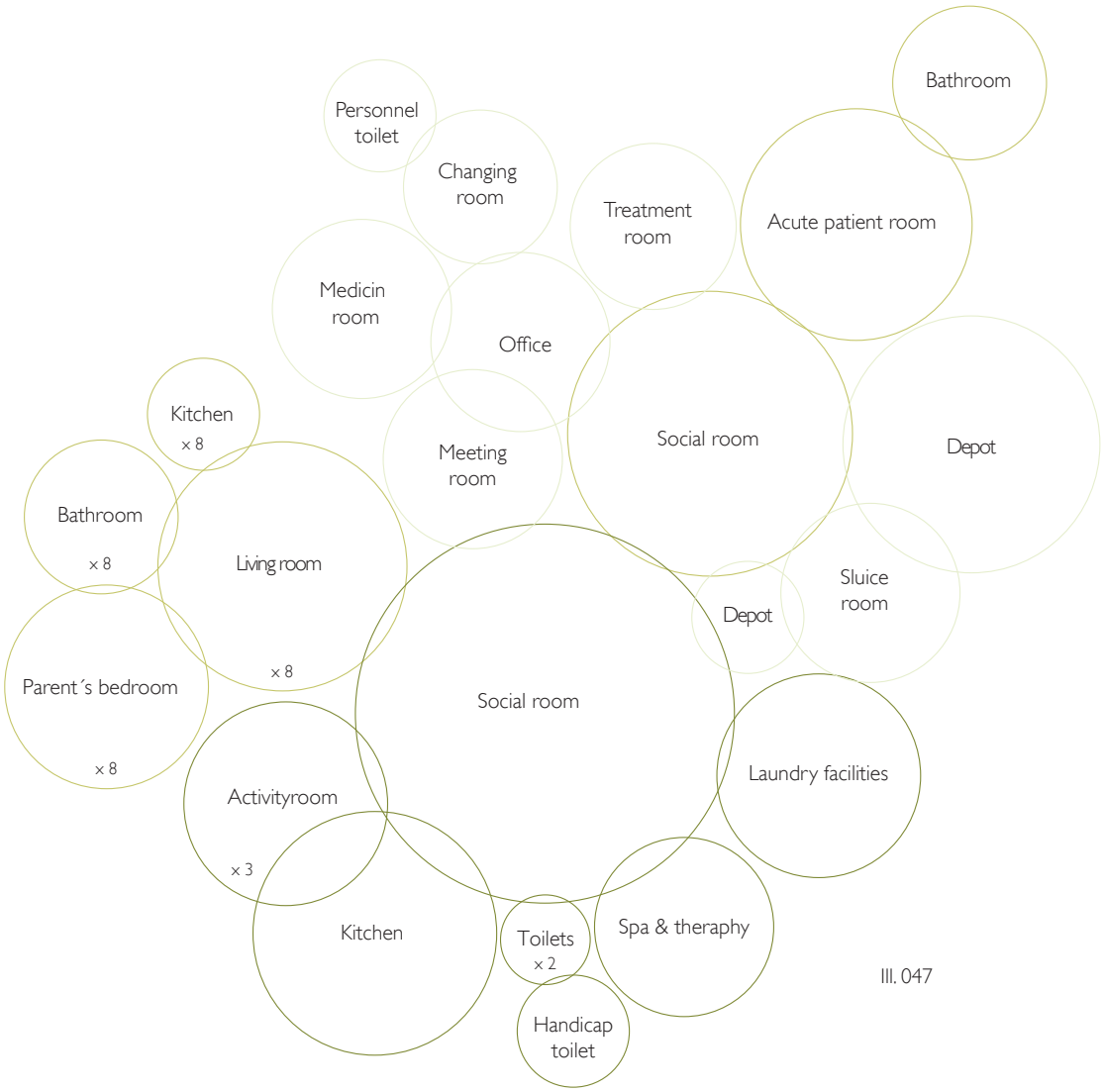
Section BB 1.1000

Ill. 046

DIAGRAM OF FUNCTIONS

The different functions represented in this diagram are placed in relation to one another. The colours of the circles indicates whether it is related to the category of the patient, the staff or social areas, which the room program on the next page explains.

Private
Social
Staff



III. 047

ROOM PROGRAM

Room	Area m2	Amount	Comments		Total m2
Patient / Family unit			Cozy and homely		
Living room	35	8	Room for family and friends, direct access out		280
Parent's bedroom	20	8	Should not be bothered by sound from living room		160
Bathroom	10	9	Accessibility		90
Small kitchen	5	8	With refrigerator ("real" food should be prepared in the common kitchen)		40
Acute patient room	35	1			35
				Total	605
Personnel facilities					
Personnel toilet	5	1			5
Changing room	10	1			10
Medicine room	15	1			15
Washing room	15	1			15
Sluice room	15	1			15
Storage	50	1	There should be room for all bed sizes for all room - including beds for family etc.		50
Storage	20	2			40
Office	15	2			30
Meeting room	15	1			15
				Total	195
Commen rooms					
Toilet	2	2			4
Handicap toilet	6	1			6
Kitchen	30	1			30
Therapy	15	1	A room for massage and therapy		15
Spa	25	1	In connection with toilet and bath		25
Activity room	30	4	Multimedia room (dark), activity room, (open) creative room (teaching, painting etc.) and fitness		120
Pool	50	1	Used for pain treatment for the ill child and as a place for siblings to play together (both ill and healthy)		50
Laundry facilities for parents	20	1			20
Social room	60	1	Can be split into different niches etc.		60
Social room	40	1	Can be split into different niches etc.		40
				Total	370
				Total building	1170

This is without corridors and hallway, that would take much space, due to accessibility.

According to DS EN 15251, the hospice should correspond to category 1, which means that:
- The PPM level should be below 350 + outdoor level
- Temperatures should be minimum 21 °C during winter and max 25.5 °C during summer, with maximum 50 hours above 25.5°C

According to DGNB for hospitals (highest score):
- Daylight factor ≥ 3 %
- Room height above 3 m

And according to SBi 258:
- Reverberationtime in units, examination rooms and treatment rooms should be below or equal to 0,6 s

PROGRAM CONCLUSIONS

The conclusion is derived on the base of analysis described throughout the program.

The first part of the program contains an investigation of what characterises a hospice and a children's hospice. This was done in order to lay down the similarities and clarify what separates these as well. Many characteristics of an adult hospice applies in an children's hospice as well, but children has different needs than adults, different diagnoses, different time scales of the illness, the extent of pain the illness is causing, communication with the ill child and also the needs of education and play makes a big difference.

The next part of the program deals with grief and shadow children. The importance about knowledge within the process of grief, sets down some essentials within the room program, because the hospice offer help dealing with grief through conversations with specialists, and there must be room for this, a suiting atmosphere as well and easy connection to this. The shadow children are an important part of the project, because they have many needs when it comes to making them feel at home as well, creating space for activities and maintaining an atmosphere where they can be the healthy beings they are, without being compromised by the ill sibling neither the tired and sad parents.

From the three references is important knowledge, facts and soft values derived, helping to form the project. The visit and interview at Hospice Djursland is our main reference, where all the elements of the hospice becomes important in the design of the children's hospice, because they will have a connection. The Lukas House gives us a guideline for what is working very well for them, and what is not, which are experiences that we must use in order to develop the best solution for the project. The last reference represents the soft values in our project, in order to understand the point of view from a family who has actually experienced what is being described through relevant literature in this program. This point of view allows us to see a perspective that gives us a realistic picture of how they experience the elements of a hospice.

The theory of neuro-aesthetics, palliative- and healing architecture deals with principles that are useful when designing a children's hospice and can be applied in order to create the ideal architecture serving the exact purpose of the hospice. Some of the design guidelines derived from this theory, held with the precaution that this is not a test made upon children, are such as implementing nature in a design, sufficient daylight and design that entreats movement. Besides this, open and tall spaces are preferable along with curvilinear shaping.

To narrow down the design criteria for the use of children, an investigation of design for children has been made, and from this analysis it is clarified that the wide age span demands very different settings and an important task becomes to accommodate the needs of this wide age span. From this occurs the need for a universal design that can switch and be adapted to the users. The user groups are described in the users-analysis, consisting of the patient, relatives and staff.

The analysis of hospice components sets guidelines of the different functions of a hospice, their connections and atmospheres as well, for instance which materials and desired feelings are used in connections to certain rooms.

A very important yet complex analysis is "a home away from home". It becomes complex because the feeling of home is intangible. Our fine task is to create a common denominator for the homely feeling in the design and the final edges of this feeling is created by the fact that patients can bring their personal items.

The next analysis, Nordic architecture, is very relevant when designing a hospice in the settings in Rønde, Djursland, that are characterised by beautiful nature. In Nordic architecture there is a tradition for using natural materials, this also correspond to what the users of a hospice wants, which is warm materials with history and soul. This project must keep respect for nature and the surroundings.

With the planar complexity of a hospice containing many functions and the importance of a aesthetically appealing building, this interplay of the three tectonic elements in the triangle is very relevant when designing a children's hospice. Along with the integrated design process, the three elements must be tied together in cohesion.

An analysis upon sustainability is an important part of the design approach in this project. An important part of the sustainable strategy is to increase focus on energy consumption, which in this project will be met by the use of integrated passive design solutions and a part wise DGNB-certifications used as a guideline and tool, focusing on daylight, materials, room height and optimal acoustics.

This legislation of the local- and municipality-plan is an important driver when designing a building, and will, at an early state, be investigated and taken into consideration. It provides criteria such as a given building field and a maximum building height.

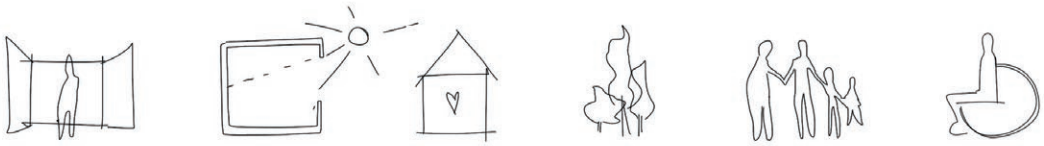
The surrounding area was investigated, and from this analysis it becomes clear that there is a limited amount of traffic in general and the excising parking is at the moment sufficient for both the hospice and the children's hospice. The area is characterised by large green areas, forest, water and a beach. To the west of the hospice is a small forest and in the middle is a small lake, this setting will be used in the design process both according to orientation, wind and sunlight. Besides this small forest in the west-end of the site, there is only the excising hospice shielding from the sun as well.

The sections gives a understanding of the very distinct difference in height, sloping down from the excising hospice to the small forest. As this is an obvious building field for the project, it must be related to.

Finally, many of these analysis provides knowledge to visualise through a function diagram, the functions and relations in between, made on behalf of the specific room program. These diagrams will be a ruling factor that must be fulfilled in order to fulfil the spacious needs of the users.

These different analysis has lead to design criteria for the project with a hierarchy. The hierarchy and degree of how much the design criteria will be used in the project is shown by the order in the design criteria. The first criteria in each section divided in aspects of aesthetic, functional and technical is the one that will be of most importance in our project.

DESIGN PARAMETERS



Ill. 048

Aesthetics
- Inviting architecture in a human scale
- Comfortable daylight
- An atmosphere of "home"
- Use of nature and art
- Room for family life

Functional
- Accessibility - inside and outside
- Flexible common rooms and patient units
- Simple plan solution - easy navigation
- Dissolve long corridors
- Facilities for siblings
- Optimised staff work flow

Technical
- Energy demands of the building regulation's 2020
- Integrated passive solutions
- Indoor climate class I
- Daylight

Ill. 049

PRESENTATION

Ill. 050 Masterplan 1:1000

PLAN

Ill. 051 Level 1 1:200

III. 052 Level 0 1:200

Living room in family-unit

The living room in the unit has an atmosphere of home, with warm colours and art on the walls. This is the family's private and intimate space, where they can be calm and casual with a view into the forest.

Ill. 053

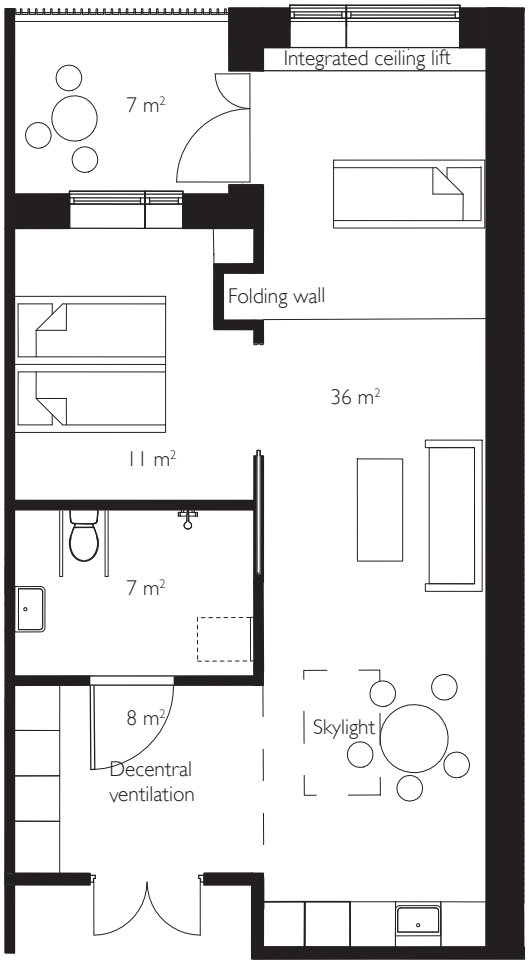
U N I T S

The units must create the framework for family life in a safe environment with room for both children and adults. Therefore, it is important that the living room can be used even if a child is sleeping, which is the basis of making a flexible folding wall.

In addition, the ceiling lift is integrated into a piece of furniture that allows both sitting and storage of personal belongings. The integrated furniture frames nature as a picture motive. A ceiling lift comply with highest score in accessibility according to DGNB SOC 2.1.6. (DK-GBC, 2016)

The feeling of comfort in a building is closely linked to user satisfaction. Therefore the units are designed on the basis of having a good indoor comfort, both visual, atmospheric, thermal, and acoustic.

The visual comfort concerns both the view and the daylight factor. The daylight inside the building has a particularly important role, since natural light has a positive impact on people's mental and physical health, as well as people's sense of comfort. Studies of the daylight factor can be seen in appendix 06.



Ill. 054. Unit plan 1:100 (different orientations - see plan of the whole building)

SECTIONS

Strandbakkehuset is built into the terrain, which means that the social areas in level 0 all have direct access to the outdoor area.

The double-height room connects the social room in level 0 with the lounge area in level 1, where there is a simple transport flow, with elevator, stair and a slide, which helps to create life and dynamism. Under the stairs, there will be a play area, with pillows, which are a more private space for the children where they can hide.

The courtyard in section CC is creating a green enlightened spot at the centre of the building. Which also correspond to DGNB SOC 1.6.1.4. with outdoor areas integrated in the building. (DK-GBC, 2016 p 281)

Ill. 055 Section plan

Ill. 056 Section AA 1:500

Ill. 057 Section BB 1:500

Ill. 058 Section CC 1:500

PRIVATE / PUBLIC

This diagram shows the different zones in the building, divided into private and public where the double hatched is the area in between public and private. Here, some areas can cover several different things, such as niches in the corridor of level 1. This area is in the semi-public space, but still have a sense of privacy. At the same time, small spaces will also be more semi-public, and the degree thereof can be determined, for example, whether the door is open or closed.

These different zones provide the framework for meetings between people in the building, both children meeting children, children meeting adults, adult meeting adult, adult meeting staff and staff meeting staff.

These meetings are particularly important at a children's hospital where you need space for private conversations. At the same time, this is also a home where everyone must be able to meet and play or talk, but there is still room for them to be alone in the social areas.

Ill. 059

Social area

The social area has an atmosphere of life and play, with the flexible dinner area in the middle. This area is in connection with the other social rooms; activity room, creative room, multimedia room, kitchen, fitness and pool. This provides facilities for all ages, also in relation to whether you want to be social or more private.

The view into the playground and forest gives an casual and light atmosphere.

View down the corridor

The courtyard is creating a green enlightened spot at the centre of the building. The shape and materials on the units meet the internal building, and leads the mind towards the residential neighbourhood.

Ill. 061

FACADE ART

The eastern facade and part wise the southern facade is decorated with art from a local artist.

The local artist, named Ulla Philbert, creates art that is specific but in the same time abstract that contains positive motives.

Ulla uses figures that emerge with different expressions. These artworks reflect both comic, grotesque, poetic, mournful and happy in the human spectra of emotions. (Kunstgruppen Djurs, n.d.)

In addition to this, Ulla Philbert works with fantasy figures, masks and birds, which together form a very special adventure universe. (Kunstgruppen Djurs, n.d.)

Ill. 062 - Krukkeri

Ill. 063 - Kendisser

Ill. 064 - Kendisser

Ill. 065 - Crazy city

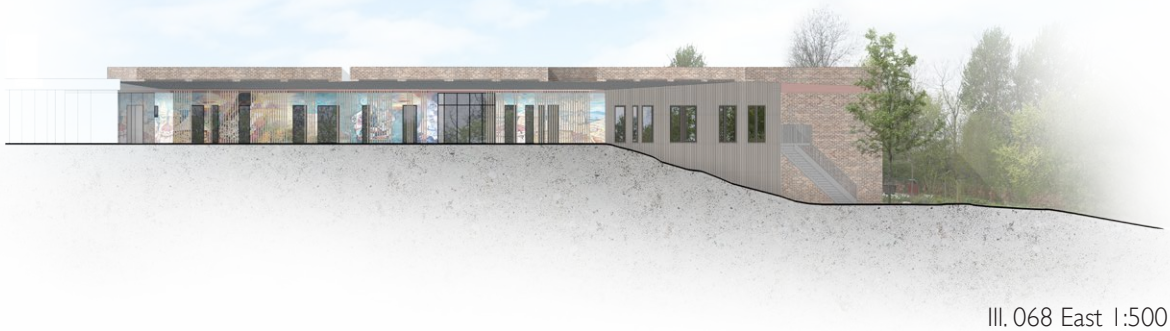
Ill. 066 - Pigen og fuglene

E L E V A T I O N S

Strandbakkehuset is a building with a focus on the human scale. From the arrival you are met by a building on one floor, filled with art and life. At the same time there is a clear entrance in glass that breaks from the façade with art and wooden slats,.

To the west, the building is partly in two floors - but only where the terrain makes it optimal. Thereby there is also easy access to the outdoor, where the children can easily and level-free get out into the playground, or the family can go for a walk in the forest.

Ill. 067 North 1:500



Ill. 068 East 1:500

The location more or less in the forest can also act as a distractor, especially for the adults who can sit down quietly and think of something other than their sick child.

To the west, the sun shading breaks with the vertical lines of the wooden slats, taking the horizontal lines from the slats and bricks and continuing. At the same time, the solar shading more visible and dynamically, where it will also vary where it is located, in relation to where the individual wants it to be.

Ill. 069 South 1:500

Ill. 070 West 1:500

MATERIALS

The materials are chosen according to different parameters such as sustainability, acoustics, construction, aesthetics and the feeling of home.

Interior
The interior materials are recycled brick, gypsum, Ecophon ceiling, ash floor, grey tiles and glulam wood.

The flooring is ash in all rooms except wet room and entrance areas. Ash is one of the hardest flooring materials, and the floors must be able to wear and tear. (Danish Plank Company n.d.) The flooring will have the same direction as the visible glulam beams in the ceiling, which makes the structure of the building easy to read. The ash floor will be in a light colour as the glulam wood beams.

DGNB TEC 1.2.1, states some criteria for the reverberation time. Our study has been based on one of the most important rooms, the living room in the units, where DGNB states a reverberation time of max. 0.6 sec., with furniture, but without people. (DK-GBC, 2016) This has been one of the criteria for choosing materials. In appendix 08, there can be seen a calculation of the reverberation time, which as shows the best results for Ecophon ceiling (see ill 075), gypsum walls with mineral wool behind, and wooden floor. This has been a part of construction choice, since the reverberation time, is better with a lightweight construction than a heavy. Therefore there are battens with mineral wool behind the gypsum.

The brick that will be used are recycled bricks, in a reddish colour. (see ill 073) This should be machined cleansed bricks which gives the masonry a rustic appearance. The cleaning and decomposition of the bricks will give them rounded edges. (Gamle mursten n.d.) These recycled bricks will be used exterior on the box around the units, which will also be seen interior in the hallway. This can also create the feeling of walking around in a residential neighbourhood, with reddish bricks, where you can feel the texture when walking in the corridors.

Exterior
The exterior materials are bricks, oak slats, plaster, copper roof, copper gutter and roofing felt.

Hospice Djursland extrudes Nordic architecture with a focus on nature and natural materials from the immediate environment. In general Strandbakkehuset has a large focus on nature, and being a honest building, with an easy readable structure. The curved area of the building, continues the materials from Hospice Djursland, with oak slats and copper.

The oak slats will be used in the pergola against east, where there will be a plastered brick facade covered with art behind it. The pergola will have a visible copper roof, with copper gutters as well, to continue the materials from Hospice Djursland. The rest of the building will have roofing felt.

The oak slats will continue against north and south where there will be a shift in materials, because the unit begins with recycled bricks. The west facade in the units will also have oak slats, as a continuation of the tree lines from the forest. Oak will also be used in the terrace, where the centreline, that splits the two terrace from the different units, will be a brick wall, to create privacy.

Ill. 071 Tiles for bathrooms

Ill. 072 Hospice Djursland facade with oak and cobber

Ill. 073 Recycled bricks

Ill. 074 Copper gutter

Ill. 075 Ecophone acoustic ceiling

Ill. 076 Copper roof

Ill. 077 Oak flooring

Ill. 078 Oak used on the terraces

THERMAL COMFORT SOCIAL ROOM

Ill. 079

Social room	
>25,5	qsunrad
max 50	
47	3556

BSim results, based on a curtain wall with a g-value (solar transmission) on 0.28, and a LT-value (light transmission) on 0,54)

General
In order to achieve the highest score in DGNB, it requires that the rooms meet level 1 in relation to DS EN 15251, which indicates that the temperature should be minimum 21 °C during winter and max 25.5 °C during summer, with maximum 50 hours above 25.5°C. This also gives the highest score for operative temperature according to SOC 1.2 in DGNB. (DK-GBC, 2016 p 236-239)

To document this, BSim calculation has been made on the critical room, in this case the unit, that is faced most against west. Here both the living room and the parents bedroom in the units are tested, and the social room, with large glass facade.

DGNB has given some guiding air change levels, which this in done on the basis of, and afterwards optimised. (DK-GBC, 2016 p 252)

The indoor climate is very important considering housing ill people.

The building is located with the view direct into the forest against west, where the trees will provide shading during summer, where all leafs are on, but during winter there will be no leafs, and therefore it will allow more sun to enter the building.

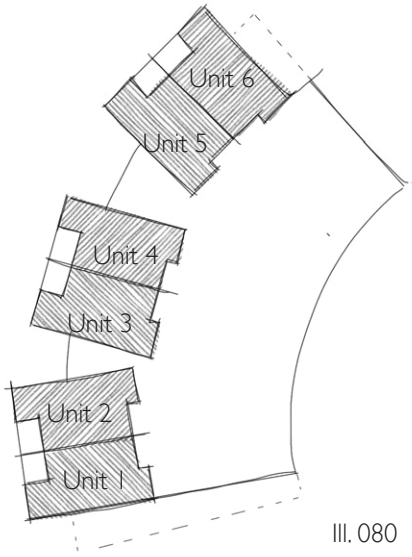
The ventilation is a VAV system, which is a variable air volume ventilation system. This in combination with a thermal sensor, which will mainly control the inlet during daytime, and a CO2 sensor, which will be mainly controlling during night. This can optimise the air change level, since it does not ventilate more than needed, but furthermore also accommodate the high level of the indoor climate.

Social room
The social room has a max people load of 30 people, varying through the day.

In BSim, it has been the thermal comfort that has been dimensioning for the ventilation. Which gives a CO2 level, varying from 350 to 439 during summer, and from 350 to 591 during winter.

In general the thing that have had most influence on the social room, was the choice of window / curtain wall that was used, especially the g-value, whereas solar shading had no influence, due to the already large shading elements, and shading from the trees. Which can be seen in the design process.

THERMAL COMFORT UNITS



Ill. 080

	Living room		Parents bedroom	
	>25,5	qsunrad	>25,5	qsunrad
	max 50		max 50	
Unit 1+2	48	1598	49	715
Unit 3+4	49	1566	47	571
Unit 5+6	47	1479	41	515

BSim results, based on 20 % flexible shading on windows against west in the living room in unit 1+2+5+6, and 25 % in unit 3+4. Details of the shading can been an appendix 16. There are roof over the unit terraces, railing and interior shading.

Units

The temperature is set to 21 degrees, done by floor heating, which is normal living room temperature. The unit is calculated as two different thermal zones; the living room and the parents bedroom.

In the living room the max people load is during the weekend with 6 people in the afternoon - this to test worst case scenario, because the west sun will go directly into the room during afternoon. In the weekdays there will be a max of three persons in the room.

The bedroom has a people load of 3 persons at night during weekends (parents and a sibling). During weekdays, it will be 2 people. It is taken into account that the MET for sleeping people is lower.

All windows has a g-value (solar transmission) on 0.54, and a LT-value (light transmission) on 0.72)

The air change rate is based on guiding values from DGNB for hospitals. (DK-GBC, 2016 p 252). They recommend an air change of 6.0 h^{-1} for bedrooms. The system has a 0.85 heat recovery with no heating or cooling system. Natural ventilation has not been included in BSim at first, since some patients may have diseases that make them unable to withstand the slightest draught.

In BSim, it has been the thermal comfort that has been dimensioning for the ventilation. Which gives a very low CO2 level, varying from 350 to 438 in the living room, and from 350 to 402 in the parents bedroom during a day with max load. DGNB states that the max PPM level should be 750 (based on a outdoor CO2-concentration on 400 PPM, where we used 350 PPM as outdoor CO2-concentration and thereby a max PPM level on 700). (DK-GBC, 2016 p 255)

If natural ventilation is used in conjunction with mechanical, this will result in less mechanical ventilation, both in the living room and in the parents bedroom, which will save energy. In combination with natural ventilation the air change rate for the living room will have an average on 4,2 h^{-1}, where it will be 5,8 h^{-1} without natural ventilation.

Natural ventilation in conjunction with mechanical will by far occur most, where there will be only few cases where it will not be possible to ventilate naturally. Therefore, all rooms are designed so that it is possible to ventilate naturally.

VENTILATION

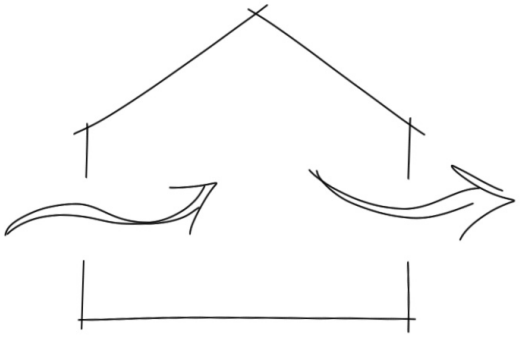
Ventilation is essential to create the best atmospheric and thermal indoor climate. A ventilation system helps provide fresh air all year. This is especially important in a hospice building where certain smells can be associated with smells in a hospital (Realdania, 2009)

The building is ventilated through a mechanical ventilation system, but with the possibility of natural ventilation as well. Natural ventilation is a passive strategy used during the hot months to ventilate the excessive heat but it can also prevent a feeling of being trapped, because of the lack of openings in the windows. To ensure comfort of all individuals in the building and no risk of airborne infections through the channels, each unit is provided with its own VAV-system, placed above the entrance in the suspended ceiling.

The family units have openings for natural ventilation in two alternating faces, which makes cross-ventilation, the most efficient type of natural ventilation, possible. The social-areas in between the units is through-going double-height-room from level 0 to level 1 and can be naturally ventilated by the thermal buoyancy, because of the difference in the air density, caused by temperature differences.

The system controlling the rest of the ventilation in the building is also a VAV-system. The central ventilation system is placed in level 0, and distributed through a horizontal shaft and afterwards going up through vertical shafts, so that it can be distributed without interfering with the structural system. The central aggregate in level 0 is near outdoor air intake and return, which is placed under a fire escape, with a proper distance to any outdoor activated area and will not be of inconvenience.

In appendix 16, the horisontal ventilation distribution in the roof is illustrated.



Ill. 081

Entrance & lounge

From the entrance there is a view through the building and towards the forest, which helps to create a calm atmosphere. It is an open area which make it easy to create an overview of. Lots of light flows in from several directions, where the materials at the same time helps to create a feeling of home. The visible beams in the ceiling also leads the eyes to the beautiful nature.

ENERGYFRAME

The energy frame shows that Strandbakkehuset will be able to meet the requirements for the low energy frame, without the use of photovoltaic (PV), and when using PV the frame becomes even lower.

It should be pointed out that the results are after impairment according to SBi 213 p. 17 (2018), to usable hours on 45 hours a week. In Appendix 09, the energy frame can be seen without impairment.

In the building there are used passive strategies to save energy and optimise indoor climate. In DGNB ECO 2.2.3 (DK-GBC, 2016) point are given for passive design-concept that optimises indoor climate, insuring low energy use for heating, cooling and/or lighting etc.

The building are optimised according to heat loss, mainly by optimising the U-values. The U-values from the different elements is taken into consideration, as the higher U-value on the exterior wall above the windows in the units living room, due to the shading element. There are calculations of the U-values in appendix 10 , where the table, shows the U-values.

All windows has a g-value (solar transmission) on 0.54, and a LT-value (light transmission) on 0,72) except north, where it has a g-value on 0,5, to allow more of the solar heat to get in, and he curtain wall has a g-value on 0.28, and a LT-value (light transmission) on 0,54.

The different rooms are also placed according to optimal orientation, where offices, meeting room and examination rooms are oriented to the north. To avoid overheating, there are flexible shading element in the units against west, which are dimensioned according to BSim. The building itself as well as the trees, provides enough shading in the social rooms against west. There are not made any studies of the rooms against east, since these are secondary functions as laundry room. But there are still shading elements, which are done based on the knowledge that the sun has the same intensity and height as against west.

In Be18, the ventilation are made as a combination of natural and mechanical (where natural will be used during summer). This since even though there can be cases where the ill child health cannot tolerate it, this will be very rare.

The light is energy saving LED, based on the demanded lux level stated by Energistyrelsen (2015) in DS 12464.

The electricity that should be covered is electricity for building operations, where here the starting point is the energy frame without impairment. This gives a solar cell area on 403 m2, which corresponds to that the roof of all three units is covered by solar cells. The calculation for the PVs needed can be seen in appendix 11.

It is polycrystalline solar cells, placed horisontally on the roof. The solar cells used have an efficiency of 16.5%, and are 1650 mm height and 992 mm long. (JinKO Solar, n.d.,) DGNB SOC 1.6 1.1 is about activating roof surfaces where top score is given to activate 100% of the roof surfaces, with elements like green roofs and PV. (DK-GBC, 2016) Altogether, Strandbakkehuset has a roof surface of 1242 m2, which makes 32.5% activated by PV.

	Strandbakkehuset U-value	DGNB top score (TEC 1.3.) U-value
Roof	0.07-0.08 W/m2K	0.1 W/m2K
Terrain deck	0.07 W/m2K	0.1 W/m2K
Exterior walls	0.10-0.13 W/m2K	0.15 W/m2K
Basement walls	0.10 W/m2K	0.15 W/m2K

Low energy frame
Key numbers kWh/m2 pr year

	Total energy frame
	33.0
Total energy requirement (without PV)	32.7
Total energy requirement (with PV)	7.7

Contribution to energy requirement	- PV	+ PV
Heat	22.4	22.4
El. for operation of building	7.2	-5.9
Excessive in rooms	0.0	0.0
Selected electricity requirements		
Lighting	2.4	2.4
Heating of rooms	0.7	0.7
Heating of DHW	0.2	0.2
Heat pump	0.0	0.0
Ventilators	3.5	3.5
Pumps	0.6	0.6
Cooling	0.0	0.0
Total el. consumption	23.0	23.0

Net requirement	- PV	+ PV
Room heating	16.2	16.2
Domestic hot water	6.5	6.5
Cooling	0.0	0.0
Heat loss from installations		
Room heating	0.3	0.3
Domestic hot water	1.3	1.3
Output from special sources		
Solar heat	0.0	0.0
Heat pumps	0.0	0.0
Solar cells	0.0	27.1
Wind mills	0.0	0.0

The screenshots of the Be18 results can be seen in appendix 09

STRUCTURAL SYSTEM

Roof on units:
Light roof constr.: 0.60 kN/m2
Solar panels: 0.11 kN/m2
Snow load: 0.72 kN/m2

Roof rafter in unit:
c/c 600 mm.
Dimension cross sec:
65 x 300 mm.

Ill. 083

Glulam rafter:
Max. span: 16200 mm.
Max. corbel span: 6800 mm.
c/c 1800 mm.
Dimension cross sec:
140 x 733 mm.

floor slab rafter:
Max span: 7100 mm.
c/c: 300 mm.
Dimension cross sec:
65 x 366 mm.

Roof:
Light roof construction: 0.60 kN/m2
Snow load: 0.72 kN/m2

Intermediate ceiling/floor:
light constr.: 0.60 kN/m2
Light int. walls: 0.50 kN/m2
Payload cat. A1: 1.50 kN/m2

The structural system consists of the materials glulam and brick walls.

The highlighted cases are the ones with the most critical span/deformation and thereby determining the dimension of the rafter.

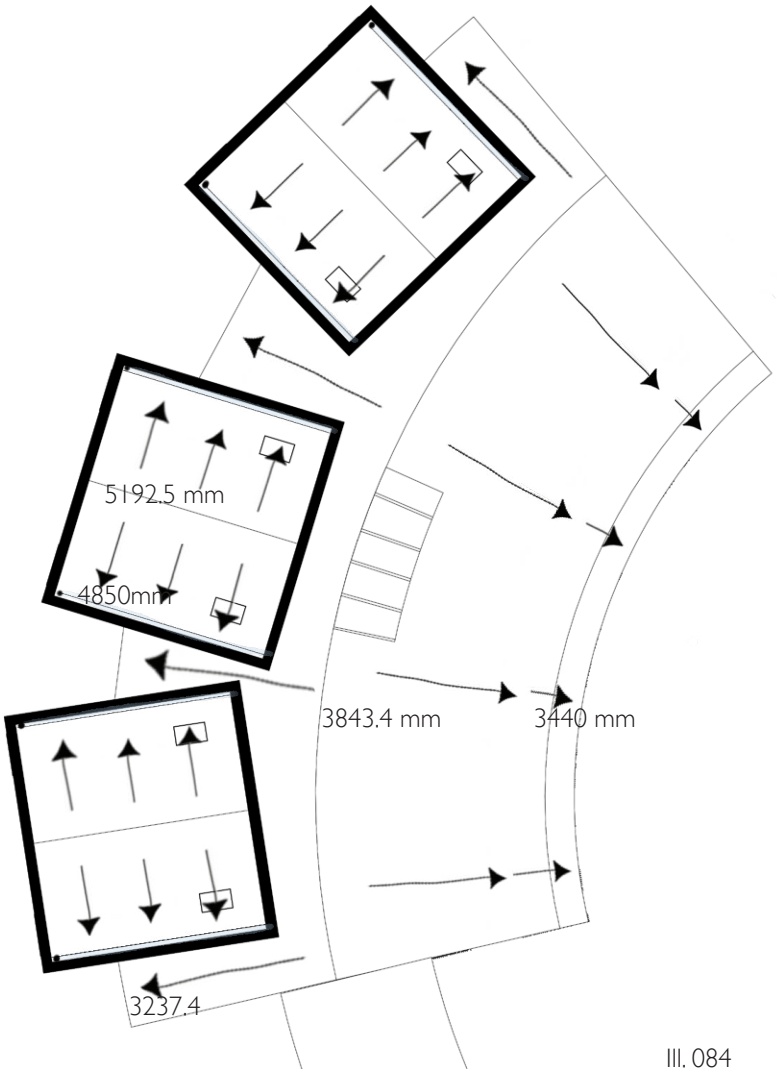
The red dashed line indicates a girder, placed to fulfill a bearing line in the building.

The rafters in the roof of the units and the ones in the floor slab are hidden in the construction and the distance c/c is determined to be the most optimal, giving the smallest dimensions possible.

The rafters carrying the roof are exposed except for rooms that does not have an open connection to the open areas.

Calculations: appendix 12

R O O F



Ill. 084

To ensure that the water can get off the roof, the roof is made as a pitched roof, with a slope on 1:20. Over the units, this slope will be hidden by a battlement, where the difference between the highest and lowest point is 342.5 mm. Here, the water will run down to the bottom of the battlement where there will be drains down to the gutter.

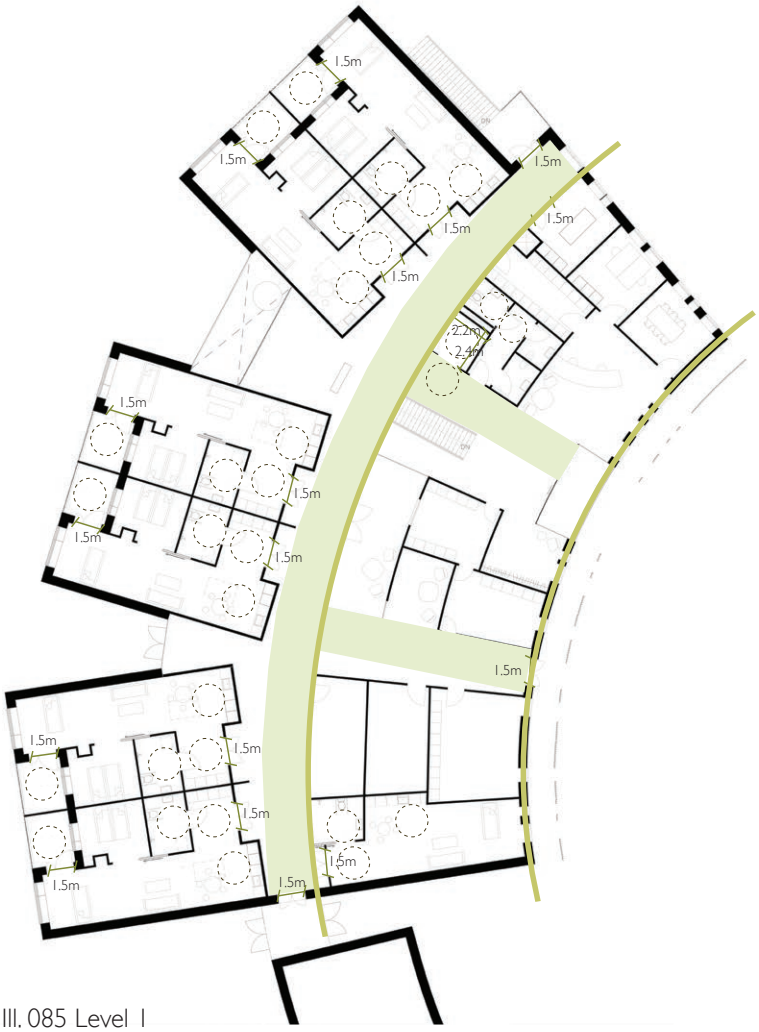
On the other part of the building, the pitched roof will be visible, ending with a gutter of copper. There is a height difference of 403.4 mm here, where the vertex is positioned to allow a skylight window down to the court yard. The cavity in the barrier is used to guide the ventilation tubes.

ACCESSIBILITY

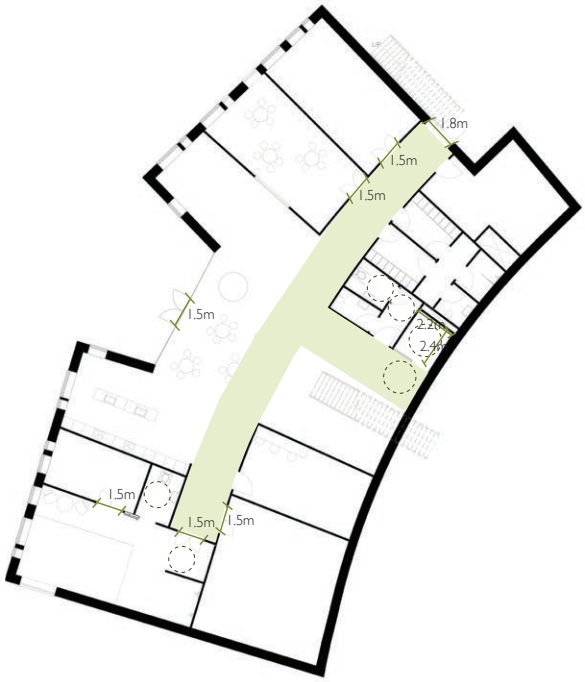
The accessibility in the DGNB certification system is a knock-out criteria. When talking about accessibility it means both the area inside the building and the outdoor areas in connection with the building. Accessibility for all is an essential part of a future-proof and sustainable development within construction.

According to DGNB point are given for:
• Door openings on 1.5 m (free width)
• Corridors in the building that follow the building's exterior architecture
• Simple corridors with few niches
• Common corridors with a free width of min. 2.50 m
• Doors should not open out into common corridors
• Wall-mounted fixed fixtures, fire cabinets etc. should be placed outside the 2.5 m in the corridors
• Short-term storage of equipment and aids must take place outside the free width of the corridors
• At least one service elevator up to each building sectio with an area on approx. 5.35 m2, (eg 220x240 cm), and a door opening on150 cm
• No spindle or spiral stairs in common corridors
• Resting place / pitches. Variety for everyone also for children and the overweight people.
• Passages and doorways in escape routes min. 150 cm

These above are only a selection of all accessibility points in DGNB ((DK-GBC, 2016 p 304)



Ill. 085 Level 1



Ill. 086 Level 0

Corridor width 2.5 m
Corridor follows exterior
Maneuvering area

F I R E

According to DGNB TEC 1.2, passages and door openings in escape routes must be at least 150 cm wide in buildings with hospitalised patients. (DK-GBC, 2016 p 306)

Furthermore, there is a rule for establishing at least two escape routes independent of each other with a maximum length of 18 meters relative to DGNB. (DK-GBC, 2016 p 369)

The requirements for targets on a rescue opening according to the building regulation 2020 are:
• Height plus width must be at least 1.5 meters and the height and width at least 0.5 m.
• If the lower edge of the window is more than 2 meters above the ground (1st floor), the height of the window must be at least 0.6 meters.
• Height from floor to bottom of rescue opening must be max. 1.2 meters.

Ill. 087 Level 1

Ill. 088 Level 0

Escape path min. width 2,5 m (DGNB)

Escape straight to the outside

Escape route

Fire Cell Separation - (R)EI 90

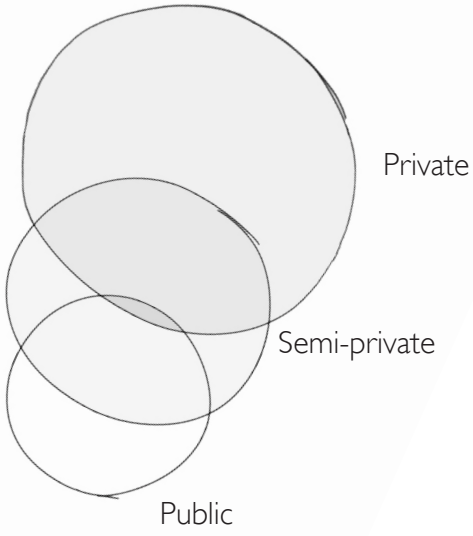
Rescue opening

DESIGN PROCESS

At the very beginning of the integrated design process of this project, a study was made concerning building size and building field. The limiting building field is clearly very ruling to the building shape. In illustration 089 the dark hatched area shows the approximate building ground-floor if the building design is in only one floor. Illustration 090 shows an approximate determination of the size of the ground-floor if divided into two floors. Besides the limit of the building field, the slope down to the forest also limits the building site that is possible to build on while remaining respect to nature around. Along with this study, different plan-solutions was tested to determine the possibility of having the entire plan within the boundaries of the local plan. The view to the forest is very important when determine the location of the family units, and therefore these must be placed in relation to this, which is difficult when having only one floor. Because of this investigation it is decided to build in two floors. When doing this, it is possible to make a smaller footprint of the building and there by leaning more to the local plan of the area, even though the local plan is only being used as a guideline in this project.

Ill. 089

Ill. 090



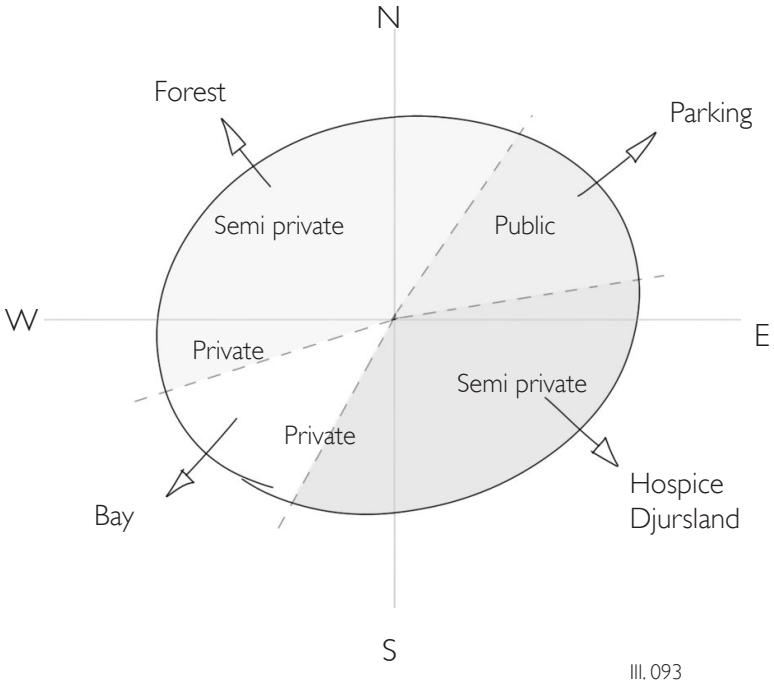
Ill. 091

The private, semi-private and public zones represent the use of the different functions. When zones are overlapping a middle-zone is created. The links and overlaps in between the zones represents both visual, psychical and in general barriers in between the zones. The zones interfering with the private zone, representing the family-units, is not necessarily a visual link, but instead a dissolved barrier simply because the staff can always enter since no doors are locked, which minimises the amount of privacy. Having the zones interfere with each other, with edges, overlaps and middle-zones, creates diversity in the different atmospheres within one zone.

Ill. 092

There are four main settings surrounding the site. These are the view to the ocean, the forest, parking and the existing Hospice Djursland.

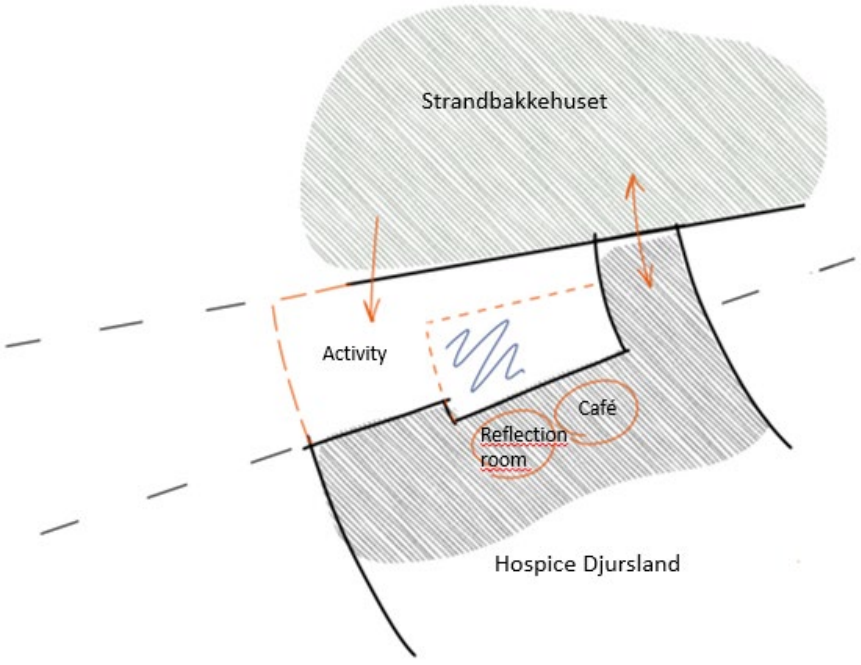
The diagram shows the preferable orientation for the functions, divided into private-, semi-private- and public zones, both according to view and daylight. As the diagram shows, the private zone, including family-units, are oriented south/west towards ocean and forest. The semi-private, such as social areas, is oriented to the north/west with a primarily view to the forest. The semi-private zone is also oriented to the south/east towards Hospice Djursland. The public zone, such as entrance and information counter is oriented towards the parking, against north.



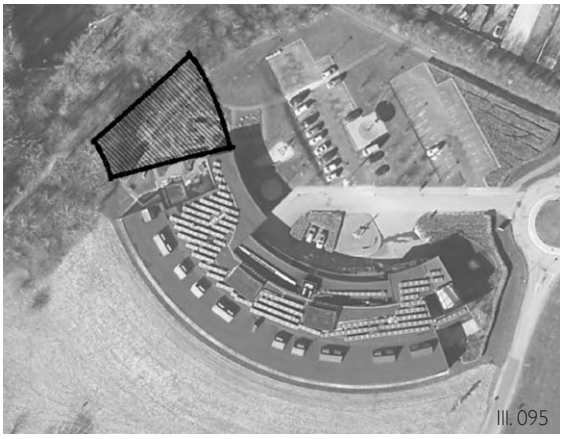
Ill. 093

Some initials thoughts about the meeting between the existing Hospice Djursland and Strandbakkehuset was made in the early stage of the design-process. A very ruling factor is the fact that there must be a distance in between the two buildings, which visually will separate them. On the other hand, the connection in between, making it possible to have shared functions, must be closed of, so that the staff does not have to step outside to go from one building to another. There are two important functions in Hospice Djursland orientated towards the connection, which is a reflection room and a café.

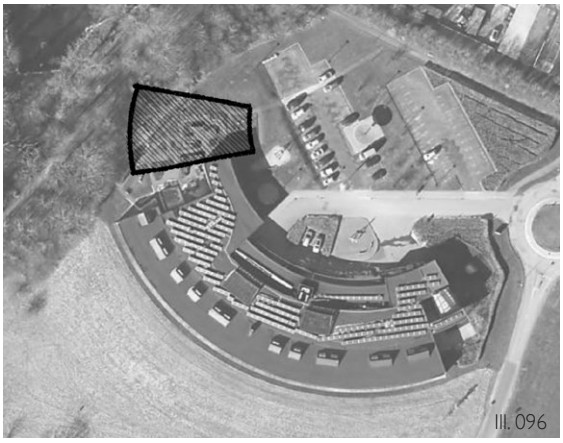
The location of the reflection room, limits the outdoor possibilities, because the outdoor facilities must not be disturbing. At the moment, there is water outside a window placed by the ground, and if remaining this water, there will be taken a distance to the reflection room, because no one can step outside the window. In connection to the cafeteria, a small court-yard is a very obvious choice to place outside, and this could be used by both Hospice Djursland and Strandbakkehuset. In between the buildings, low activity that is not too disturbing could be placed. This will make it possible for the patients at Hospice Djursland to watch the kids play.



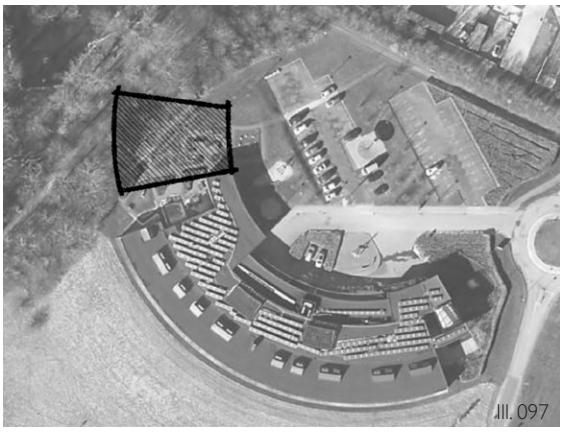
Ill. 094


Ill. 095

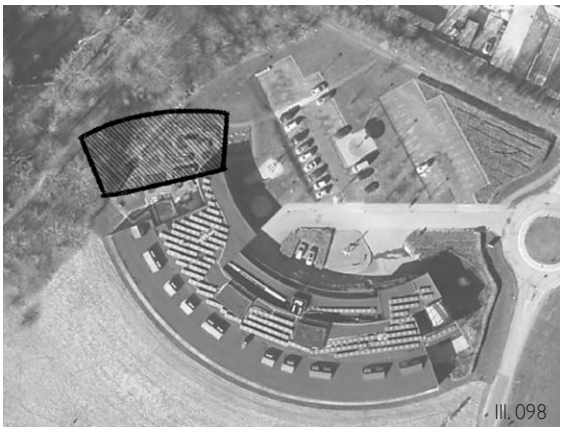
This shape creates a long facade towards the forest, creating possibilities for similar orientation of all units towards the forest. The shape also creates a long facade towards parking. It is formed by a reversed extension of the excising hospice,


Ill. 096

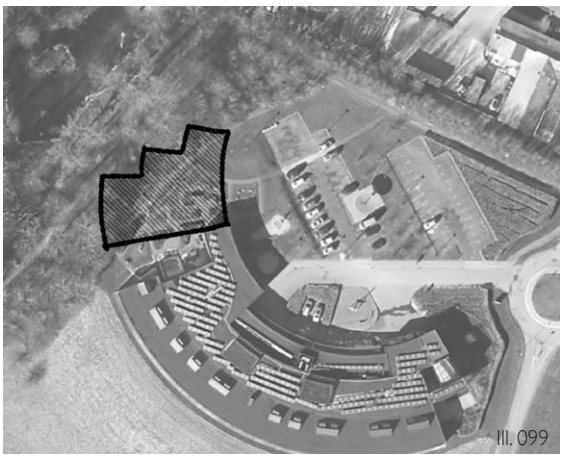
The form takes offset in the excising hospice, but is shifted forward, to separate the buildings. The shape minimizes the facade towards parking and opens up towards the forest.


Ill. 097

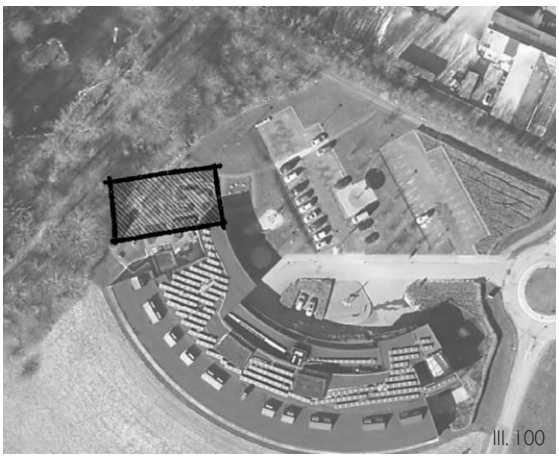
The form takes offset in the excising hospice, with no shift. The shape minimizes the facade towards parking and opens up towards the forest. It takes up a lot of the forest which contradicts with the intentions and the essentials of the local plan.


Ill. 098

This idea of this shape is mainly to orient as much facade as possible into the forest. The shape does not correspond to the excising hospice and the other facades than the one oriented towards the forest, becomes neglected.


Ill. 099

This shape touches the forest in a more graduated way and creates more facades towards the forest. Becomes an extension of the existing hospice, but dissolving in the end.


Ill. 100

This shape was made to test a regular rectangular shape. It does not correspond to the landscape nor the existing hospice. Planar solutions would be eased in a rectangular shape.

PLAN LAYOUT

When designing the plan-layout of the building, there are important factors:

- A conceptual idea upon building form
- The functionality in the placement of rooms
- The connection to the excising Hospice Djursland
- Orientation of the building and importance of the placement of family-units
- The building field/Respect to nature (the forest)

Plan-solutions within the building field and solutions that exceeds are tested in the process. It is decided that what will be prioritized is that the means of the local plan is kept - respecting nature.

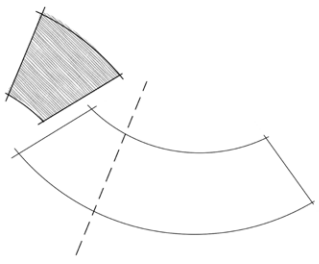
During the process, different elements in the plan-proposals are being evaluated and optimized.

Accessibility, fire-strategy and daylight becomes ruling in the process of planar design.

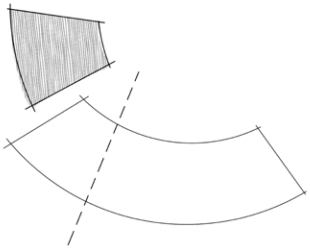
There are challenging elements when designing the plan-solution. One is creating distributing spaces, that does not only become long corridors, without any sense of homely feeling. Another is to place the family-units as equal as possible considering social areas and other attractive and preferable spaces in the building. The last big challenge is designing family units, with an overall-shape, that does not take up much of the facade, because the space on the site is limiting and it is preferable to orient all family-units towards the forest.

An important tool in the plan-solution is to consider the division of zones going from private zones to public zones and the edges and overlaps in between, meaning that the diversity in atmospheres must be evaluated along the process.

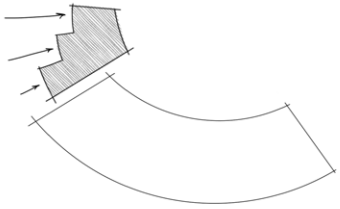
Three overall shapes were chosen to be investigated further and initial plan-solutions was made with off-set in the concepts showed below.



Ill. 101



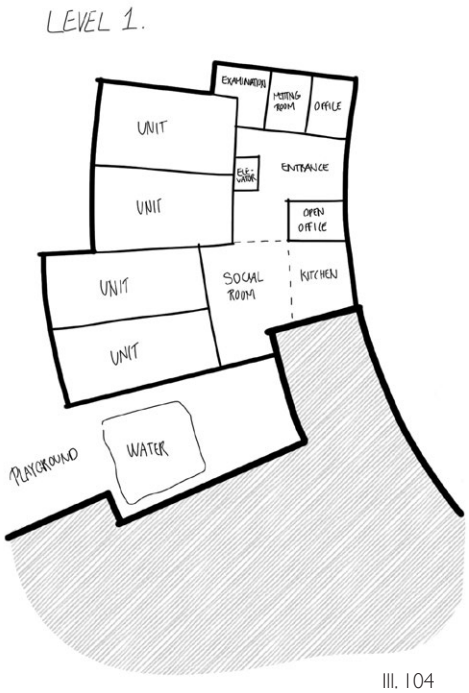
Ill. 102



Ill. 103

One of the first plan-solutions was formed by separating the units in two floors. The shape of level 0, is following the height on the site and the shape of level 1 is a continuation of one of the previous shapes that has been tested in a model. An important part was to keep the family-units towards the forest, and equally divide social space to the two floors to accommodate units placed on both floors. Level 0 is using the building field entirely to the edge.

A disadvantage of this solution is that it is by far a simple plan-solution because of all the different units, needing individual plan. Besides this, there will not be sufficient daylight in the social rooms placed in Level 0. The overall shape, having a graduating "stair-shape" on level 1, and a shape determined by the building field on level 0, creates a very ambiguous expression in shape and concept.



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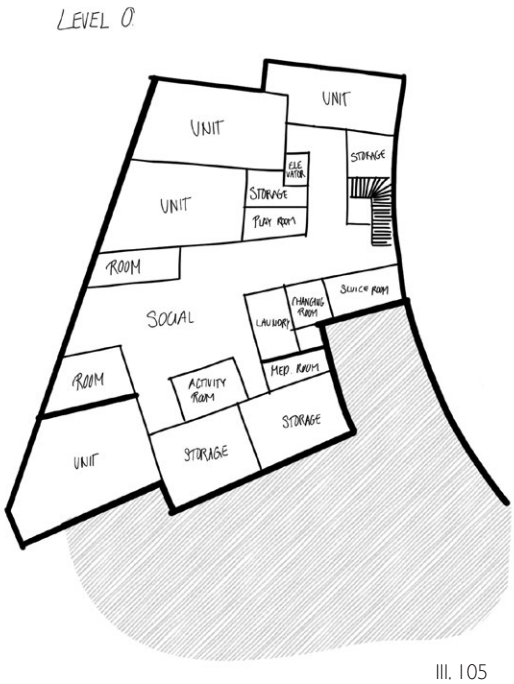
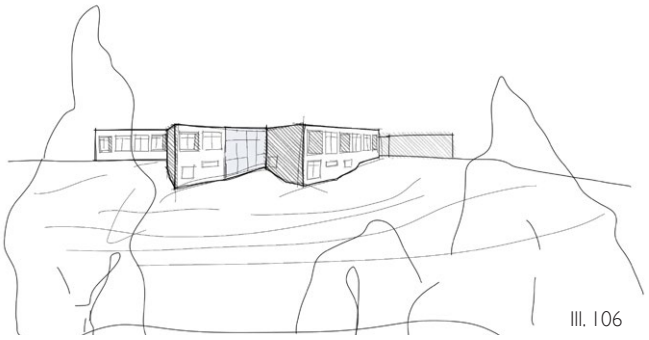


Ill. 105

This plan solution takes off-set in the graduating shape on both levels. The distribution of the units creates a hierarchy, because some units are better placed than others. The plan solution also creates a lot of corridor space, which both becomes middle-zones giving more privacy to the units, but also a lot of dead and insufficient space. By placing the social room on level 0, many problems can be solved. One is the fact that the social room must be central and could advantageously have an open connection to the ground floor and outdoor-area. The shape is shifted forward, which separates the building from the excising hospice. The graduating shape towards the forest creates many facades, that lengthens the distance to the units and makes a potential individual balconies more private. It also casts shadows, that has an negative impact on the daylight in the units.



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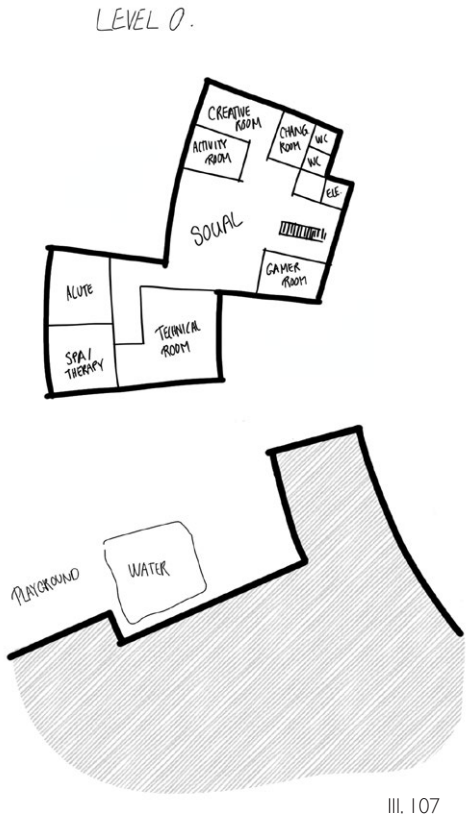

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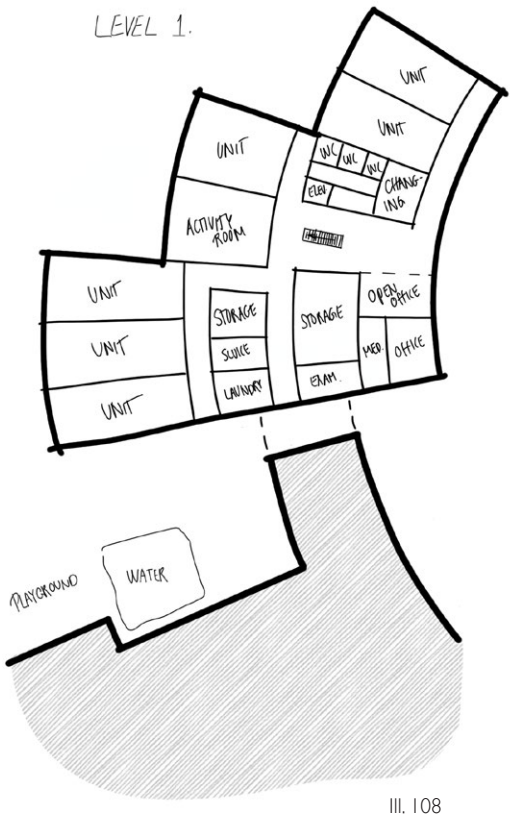
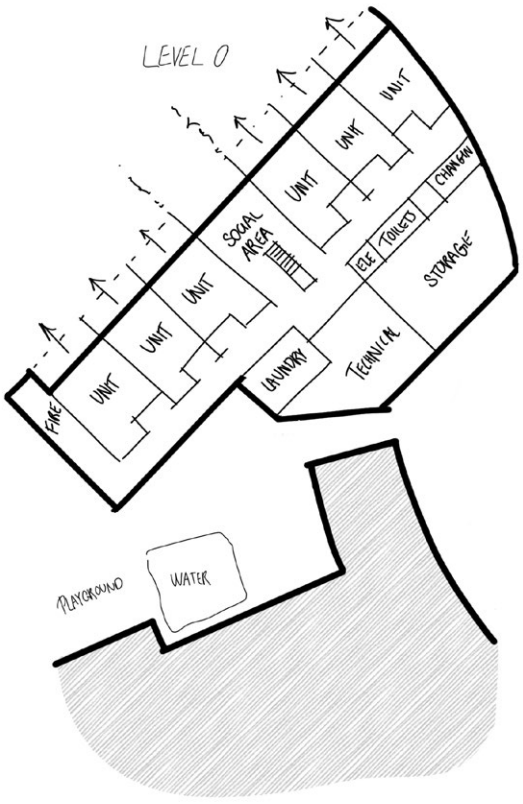


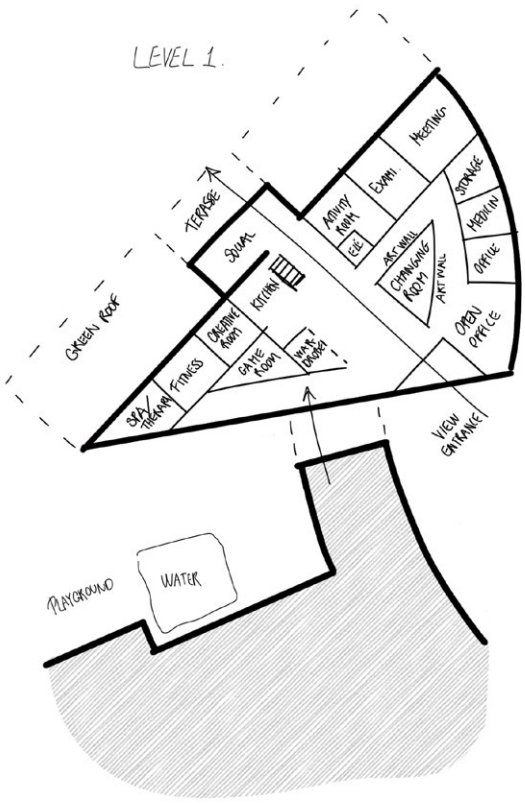
Ill. 108

In this plan solution all units are placed at level 0, with direct access to the outdoor ground floor, which creates some great possibilities for the families. But it also shortens the distance to the public path in the forest, which minimizes their privacy and the outdoor space from the units might not be usable because of the slope. Even though the units are at their ground floor, one must still take the elevator one floor down, which makes it like a basement, which is not the desired feeling.

The size difference from level 0 to level 1, creates a large roof-surface in the same level as level 0, which could be used for terrace and green roof. A disadvantage of this is that the outdoor space from the social-area is not connected to the ground floor. The circular facade, appears as the facade on the excising Hopsice Djusland but just opposite, which creates a connection to the excising form, but also a differentiation. The shape of the building, does not complement a simple plan solution and creates rooms that are less flexible.

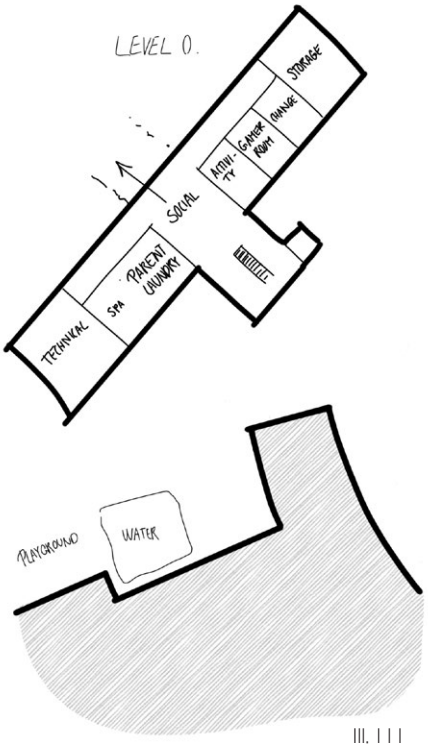


Ill. 109

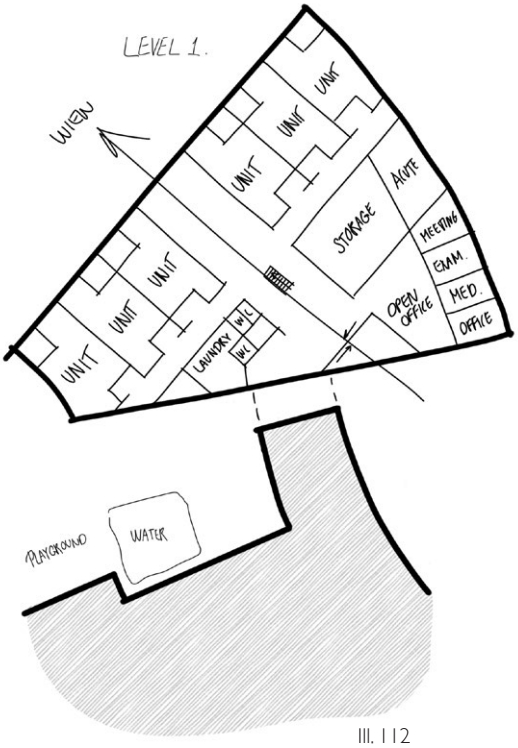


Ill. 110

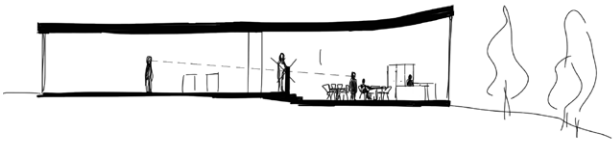
In this plan-solution all the units are placed on level 1. There is a visual contact from the social-area to the open office, which creates a feeling of safety for the families. The straight lined surface of which the units are placed, creates long straight corridors. The social area in connection with the entrance is a strong characteristic of the plan solution, making the plan easy to read and navigate in and reveling the view and the nature when entering the building. This creates a challenge in keeping the social area a semi-private zone, to which different solutions has been developed.



Ill. 111



Ill. 112

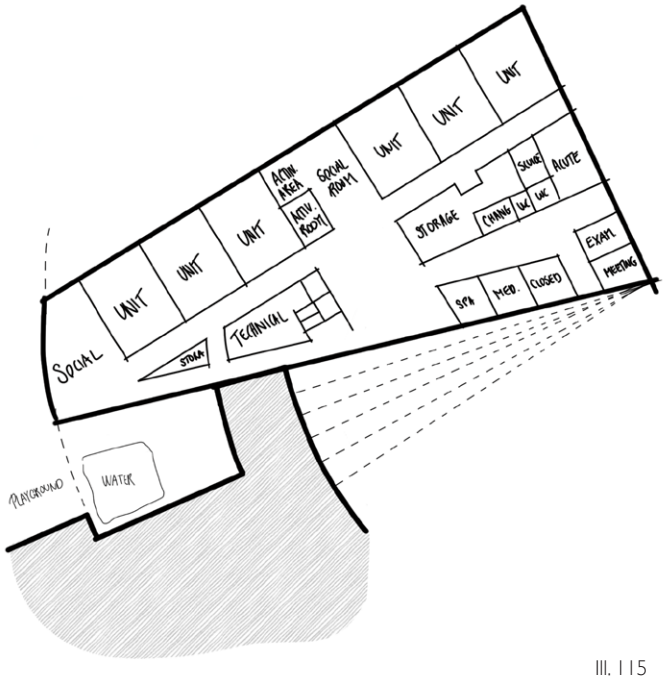


Ill. 113

Ill. 114

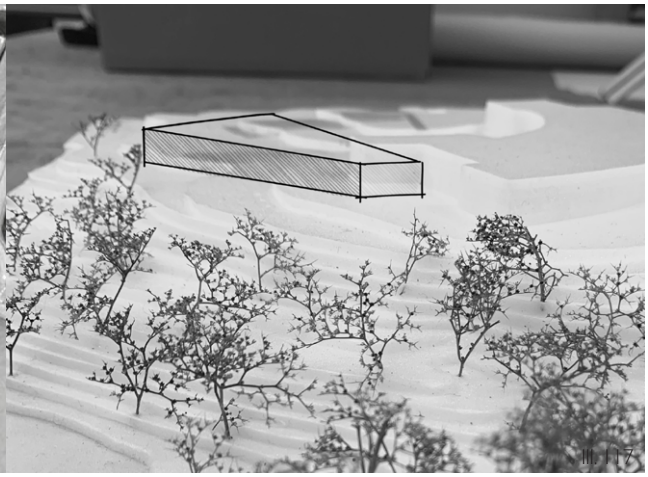
This shape takes off-set in the lines of the existing hospice but more hidden in the design, because when meeting the building in a human scale, one is meet by a shape that is very different from the general language of shape from the existing hospice.

This plan solution in one plan, was made in order to take a step back and create a plan where functions are not divided into two floors, making some functions very accessible and others less. This creates a very large ground-floor taking up a lot of the are and the parking, forcing the building to lie very close to the excising hospice. By having two separate social-areas, it is possible for the families to split in groups, so that all six families do not necessarily have to be together all at once, but can be split into groups. It is also possible to have different zones of social-rooms, with different variations of privacy/public atmospheres. Another issue with this plan and the fact that the building is in only one level, is that it stretches far over the slope towards the forest, creating dead space underneath. The stretched shape makes it hard to avoid long corridors.



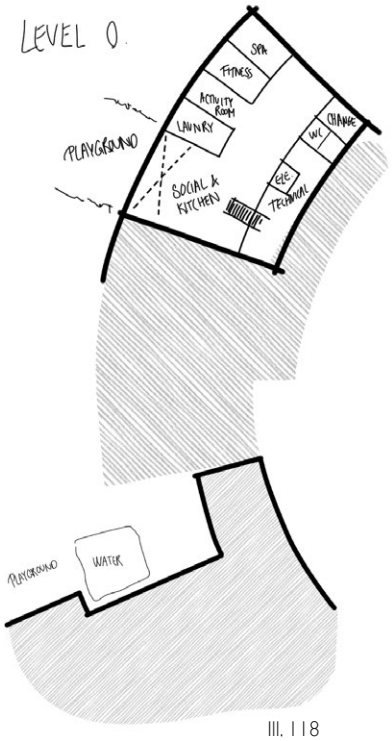
Ill. 115

Ill. 116

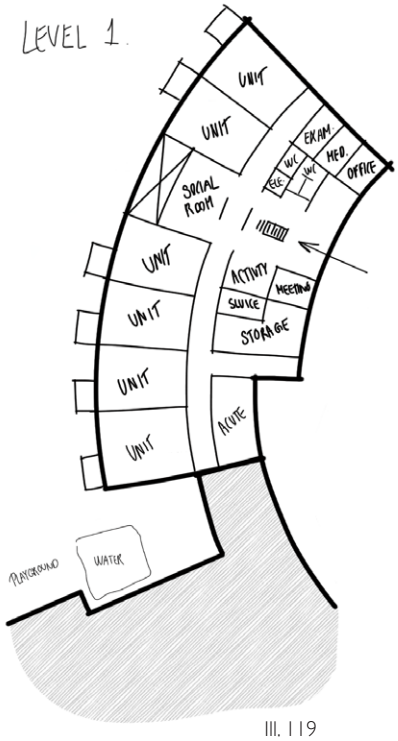


Ill. 117

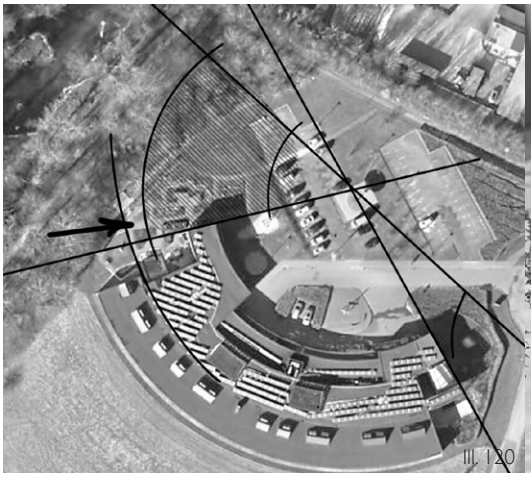
This solution has the same principles as the previous proposals, but the shape is continued by the excising hospice. Once again, the shape is distributed into two levels in order to minimize the ground floor taking up space at the site and with least interference with the forest. Terraces has been put outside of the building form, with the purpose of having them step into the forest. The issue with the long corridors, is still a matter in this solution. The social area is placed centrally and with a double-height-room with a view to the forest. The stair is placed centrally, to make it more inviting, and to minimize the feeling of a "basement". The shape is drawn back in the connection with the excising hospice with the purpose of creating more privacy to the acute family unit. This shape appears as a continuation of the excising hospice and makes it appear less as a unique and separate building. To solve this problem and make the building appear more separate, the entire building has afterwards been shifted forward, which then causes a modulation of the plan-solution.

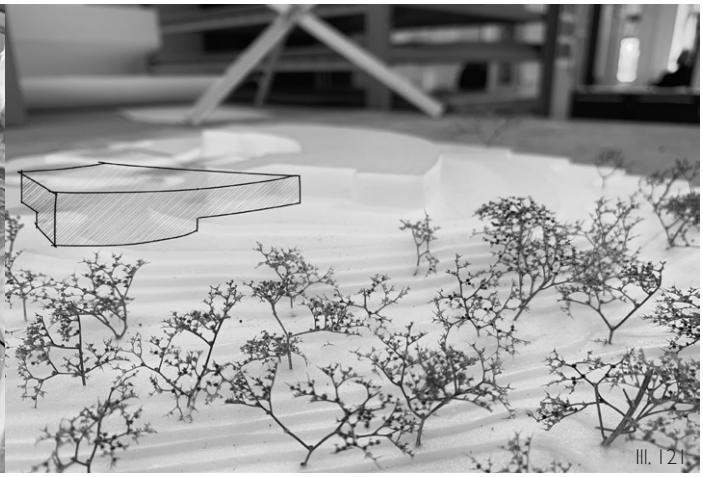


Ill. 118

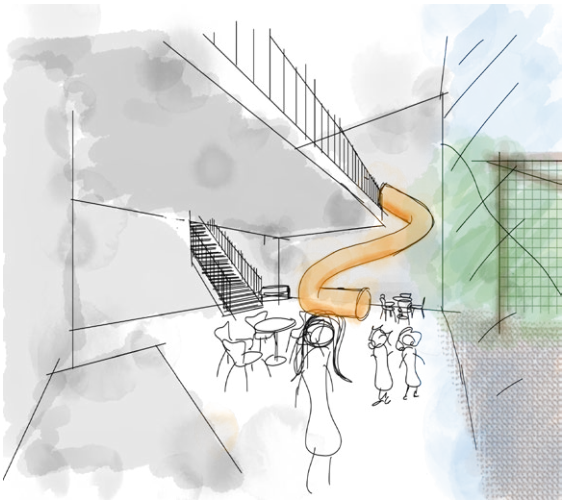


Ill. 119

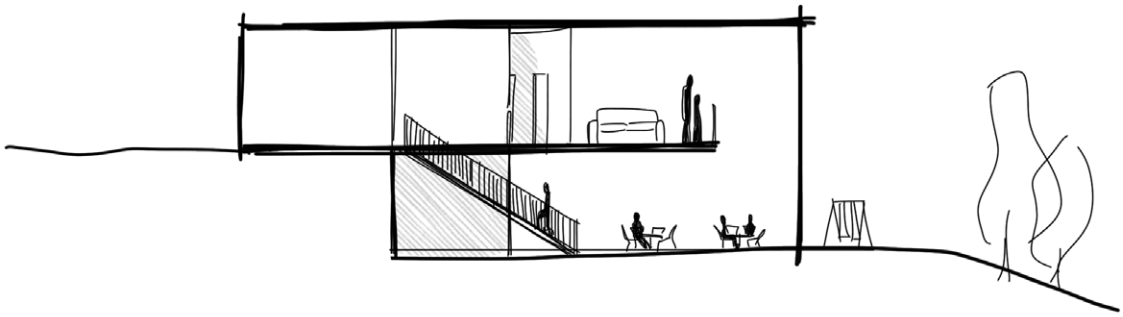

Ill. 120


Ill. 121

Parallel to the plan-process some interior design solutions has been progressed and these are the ones that will be developed further on to the final design. The double-height-social room in combination with a slide, making the social room on level 0 more inviting and a slide will create activity on both levels. It will also be possible to have visual contact diagonally through the floor, which makes it possible for the families to locate relatives or friends, if they are looking for them and level 0 will not get the atmosphere of a basement when going down the stairs.



Ill. 122

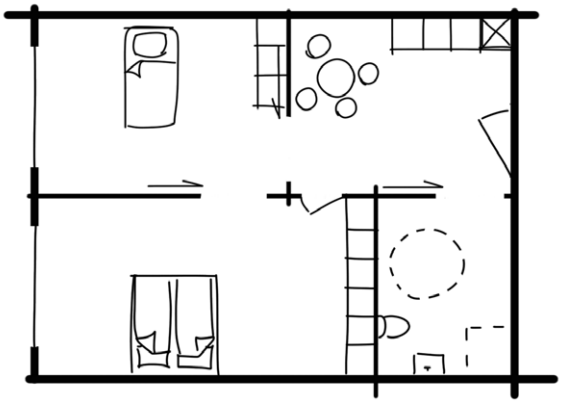


Ill. 123

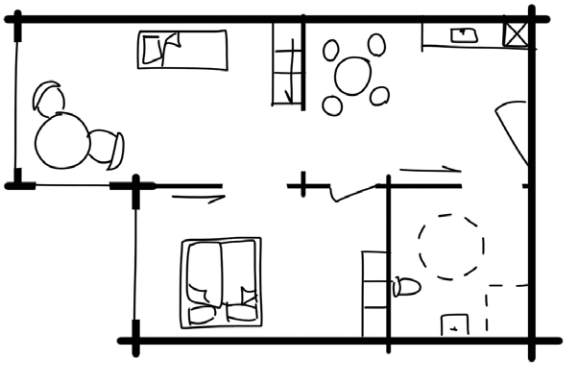
Ill. 124

To use up the space to its fullest and prevent dead-space, a pillow room / cage has been processed to use the space under the stair. Children loves a cage where they can withdraw to maybe be alone and discuss secrets with you sibling or maybe for a high activity pillow game in safe surroundings. At the same time, parents will be able to locale the children, because it will be in connection with the social room and kitchen. This is an design element that will be carried through to the final design.

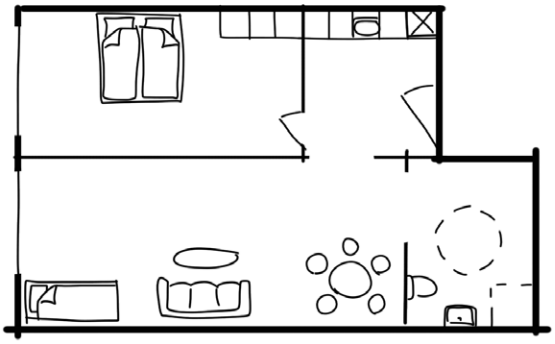
UNITS



Ill. 125



Ill. 126



Ill. 127

Different unit-solutions has been processed. In most of the plan solutions the facade towards the forest is limited especially to meet the criteria to have all units in one floor. This means that the overall shape of the units becomes rather longitudinal with the short facade inwards the building and towards the forest.

Furthermore the plan solution has to comply with the DGNB demands for accessibility, as 1.5 m door openings, a free turning area on 1.75 m both in bathroom and kitchen, free corridor width on 1.8 m, distance to bed on 0.9 m that is based on SBi 249. (DK-GBC, 2016) (SBi 249 2015)

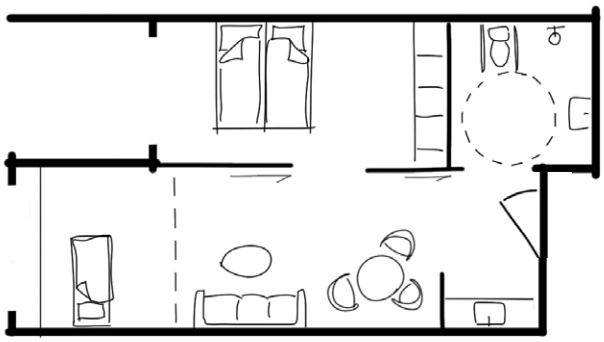
Ill. 125 shows a unit-plan with the kitchen separate from the two bedrooms. There are two entrances into the parents bedroom, in order for them to be able to go to the kitchen and bathroom without interrupting a sleeping child. A consequence of this is that more wall is taken up by doors, which makes the plan less flexible. Besides this, there is a daylight-issue in the kitchen and the parents bedroom is too large.

Ill. 126 shows a plan where the parents bedroom is pushed in to make it smaller and at the same time create a terrace.

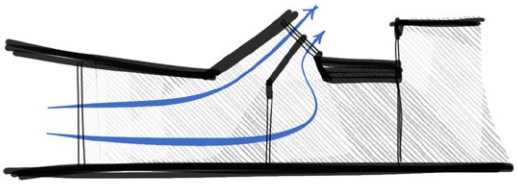
The last unit plan ill. 127 is turned upside down and the entrance is pushed in to create a private space before entering.

Elements in these plan solutions such as pushing in the entrance and a terrace are working very well and will be carried on the design process of the unit-plans. It must be solved how the low daylight factor can be improved in the back of the units to achieve the highest score in DGNB according to daylight. (DK-GBC, 2016) Studies of this can be seen in appendix 06 and 07.

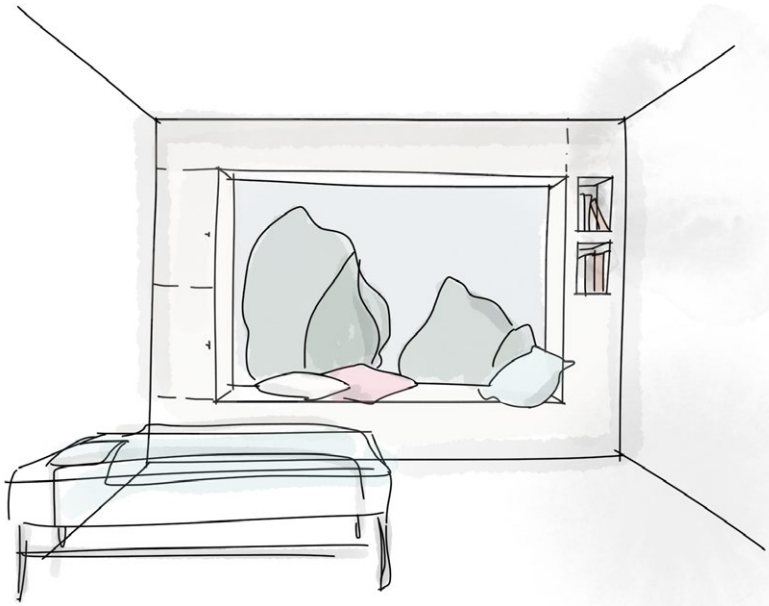
The daylight issue becomes an issue because of the fact that the both bedrooms should be able to be closed of and a solution to this is to make a flexible wall, that can be put out when it is time to sleep and taken away during the day to get a larger living room with appropriate daylight all the way down to the kitchen. This flexible wall does create an issue because it interferes with the lift in the room. To solve this issue an Integralift (Botved n.d.) has been chosen, which also comply with the highest level of accessibility in DGNB SOC 2.1.6. (DK-GBC, 2016) This lift becomes a part of a furniture. In order to create a sense of home in the room where the child will be sleeping and not having to feel too exposed because of the large window in the facade, a solution of an integrated furniture with a lift, place for sitting and shelf has been made. This gives a child-room feeling.



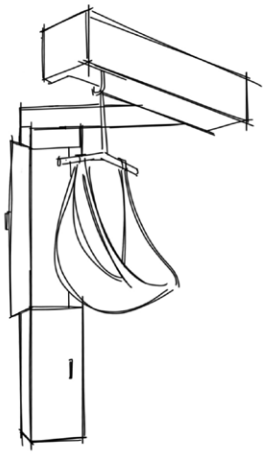
Ill. 128



Ill. 129

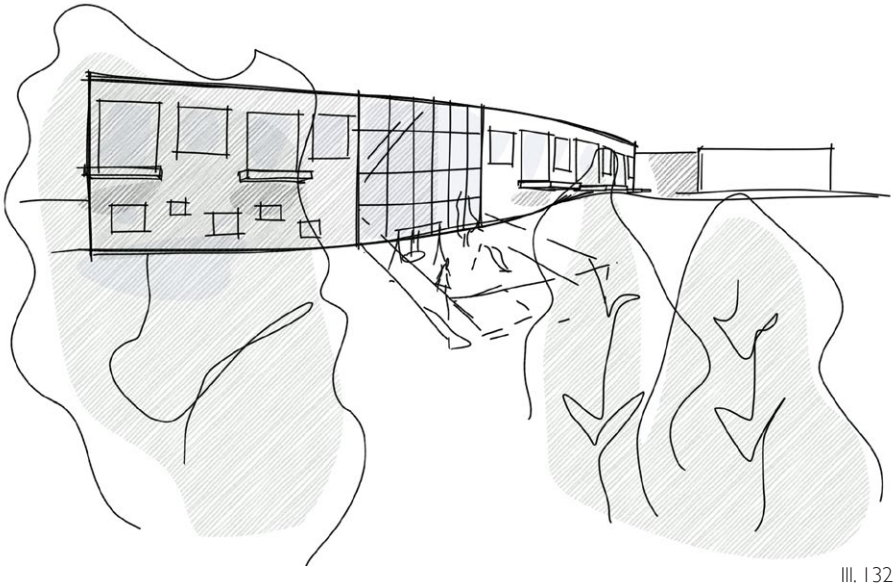


Ill. 130



Ill. 131

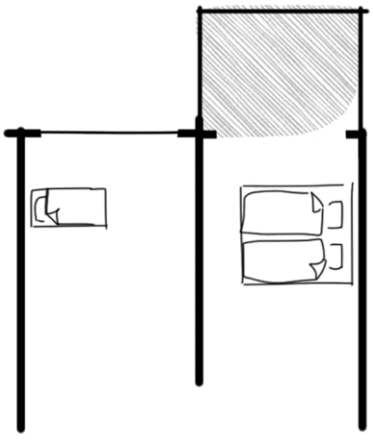
TERRACE



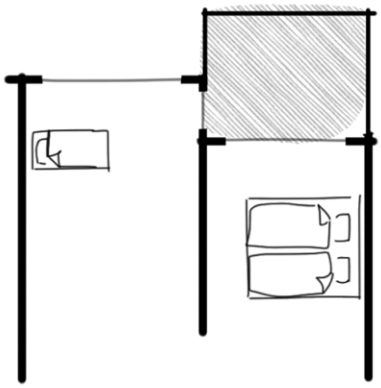
Ill. 132

The terrace is a very important element in the facade expression and the design of it is very important when considering the use as well. It is also an important element according to DGNB SOC 1.6.1.3. where point are given for integrated outdoor areas in the facade. (DK-GBC, 2016)

An extrovert terrace like in illustration 133 makes the user very exposed visually but also in terms of weather. The facade becomes more dynamic and less monotone. By pushing in the terrace like in ill. 135, another facade is created, giving the unit more window area, which is very positive in these units that has only one facade where it is possible to place windows in. It also creates a shield to the wind and rain and it becomes a more natural part of the design to make it a covered terrace with a roof over. The facade does become more monotone when pushing in the terrace, which contradicts the wish of a building that is more or less graduating towards the forest.



Ill. 133



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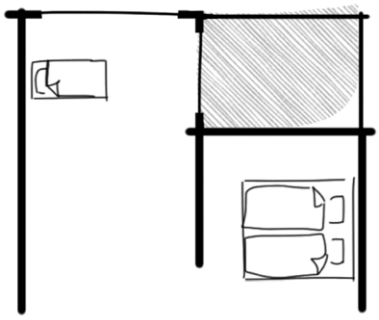
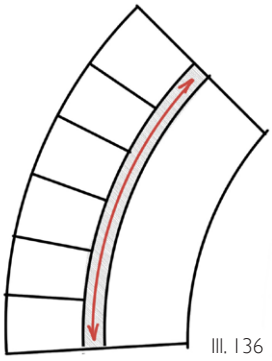
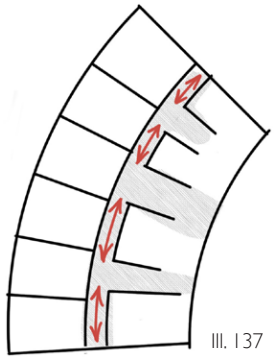


Ill. 135

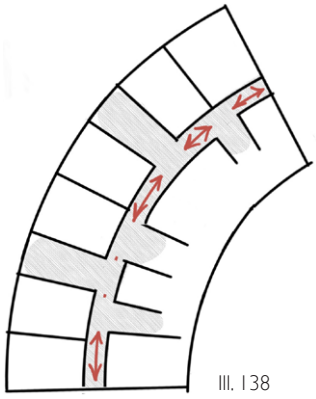
CORRIDORS



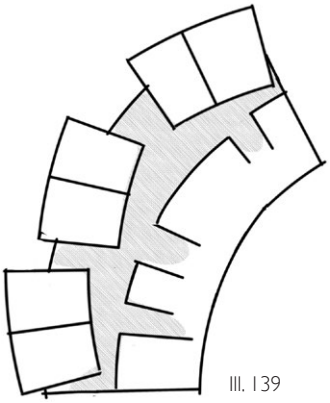
Ill. 136



Ill. 137



Ill. 138



Ill. 139

Corridors are hard to avoid in a plan solution, especially when having six units on a row and oriented the same way.

In the development shown in the illustrations on the left it is visual how the corridors are being processed. By creating openings in the hallway such as other corridors or other open zones with room for stay, the corridors will be dissolved and light may enter as well.

When the units are laying side on side on one corridor they appear alike and it is therefore not easy to recognize the unit one is staying in - they become monotone and lose a bit of the homely-feeling.

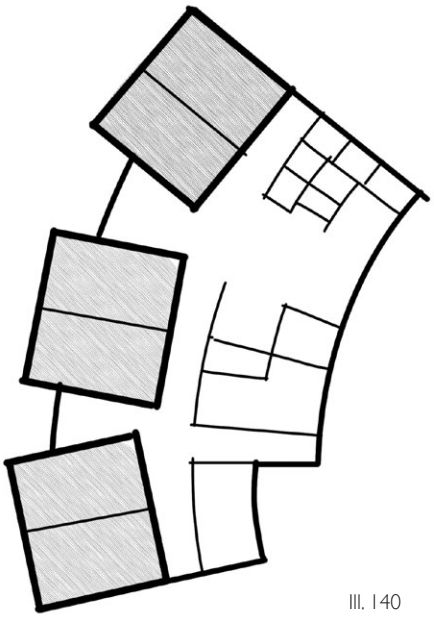
It is also important that daylight can enter, especially in a corridor that otherwise can seem rather sinister and in general a unpleasant place to stay. That can easily become many square meters that is only being used for one purpose - room-distribution - which is by far the full potential of the space.

By separating the units into groups of two, it is discovered that this is good solution to the daylight issues. This also helps the building comply with DGNB according to fire TEC 1.1.2.1 which states that escape routes should be 40 % shorter, then the recommended 25 m, and the width 20 % wider than the recommended 1.3 m. (DK-GBC, 2016 p 369)

By afterwards tilting them, the corridor is dissolved and a hierarchy in space is formed and thereby it will be perceived more as zones than one long corridor. This lengthens the entire building a little, but not the length of any corridor. By adding space to the building, it is important that the extra space does not become insufficient.

OVERALL SHAPE

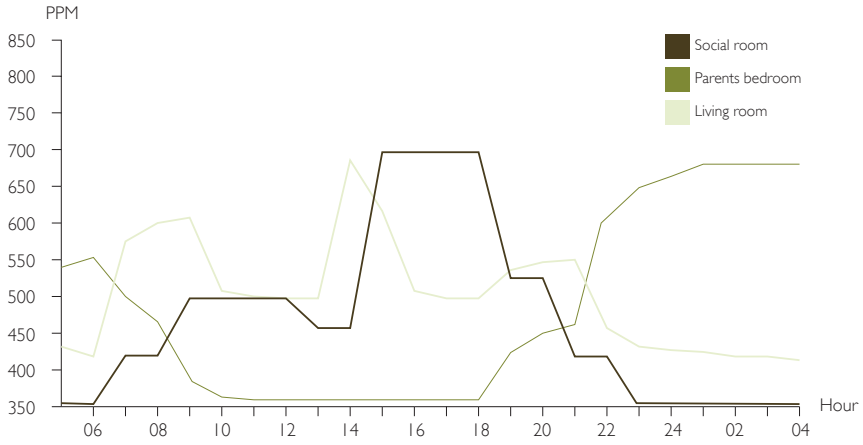
The overall shape is taking form and the units has been processed into squares, so the language of form becomes very different from the entrance-facade to the facade towards the forest. The shifted units forms social-areas in between and opens up towards the forest and thereby improving the view. This solution creates openness and overview, according to SOC 1.7.1.5.. (DK-GBC, 2016 p 294) The units are stepping out into the forest by touching it with the "finger-tips" of the building. The units are visually being cut from the rest of the building when considering the form, this gives an opportunity of designing the units like an individual home in terms of placement, materials and form.



Ill. 140

Ill. 141

B S I M



Ill. 142

Since we have some concerns about some of the rooms and their orientation according to overheating, they were tested in BSim, in order to optimise them.

The ventilation is based on thermal or atmospheric comfort. To achieve the highest score in DGNB according to atmospheric comfort, the hospice should correspond to category 1, which means that the PPM level should be below 350 + outdoor level.

This graph shows the CO2 level based on the lowest possible air change level that makes it possible to upholds the demands in the living room and in the parents bedroom.

According to the CO2 level, the air change rate could be as low as 1,8 h^{-1} for the living room and 1,0 h^{-1} for the bedroom, if the CO2 level was the dimensioning giving factor for ventilation.

The diagram shows the CO2 during a Saturday, where the people load is highest. With air change rate as mentioned above. The calculation which are the base for the diagram, can be found in appendix 13-15.

The social room has a max of 30 people, and an air change rate between 1 and 5,9h^{-1}

The rooms we test for heat balance / overheating are in the units living room and parents' bedroom, as well as social area with kitchen.

Ill. 143

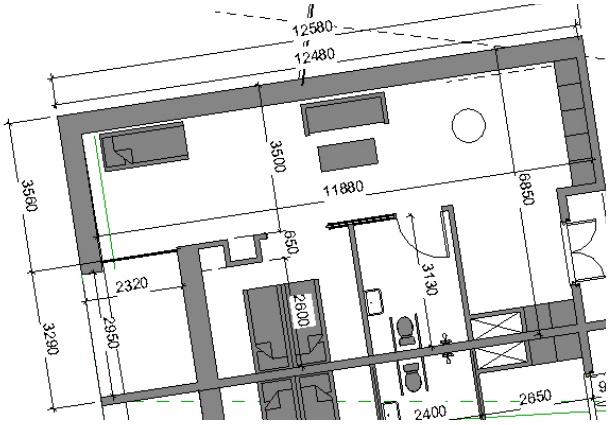
B S I M U N I T

The unit BSim is shown on the plan drawing, with a room height of 4.25 m.

The building is optimised by means of shielding, and the amount of it, to achieve good thermal comfort.

There must not be more than 50 hours above 25.5 according to level 1 in DS EN 15251. Which also gives the highest score for operative temperature according to SOC 1.2 in DGNB.

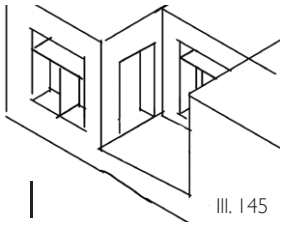
The results in the schedule below, also shows that it would be best with flexible shading, which also corresponds to achieving a higher score according to DGNB, which will be shown after BSim.



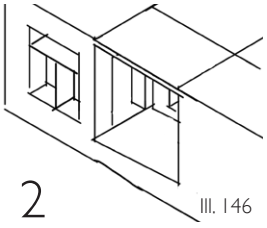
Ill. 144

	Livingroom		Parents bedroom		Notes
	>25,5	qsunrad*	>25,5	qsunrad*	
	max 50		max 50		
Test 1	178	2149	101	968	Starting point
Test 2	151	1960	86	899	Roof over terrace
Test 3	88	1778	86	899	10% shading on living room west windows + roof over terrace
Test 4	82	1791	84	890	20% fixed shading on living room west windows + roof over terrace
Test 5	78	1769	50	721	20% fixed shading on living room west windows + roof over terrace+railing
Test 6	55	1732	50	721	20% flexible shading on living room west windows + roof over terrace+railing

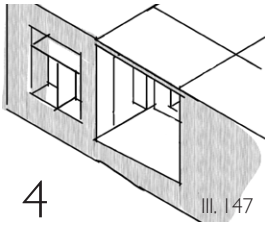
*This number may in real life be different, since you cannot put trees into BSim, therefore it is made as a building, but i real life, the trees will be without leafs during winter, and therefore there would get more heat in.


1 Ill. 145

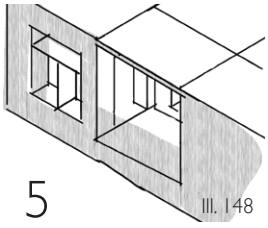
A facade with vertical windows, where there is no roof over the terrace, and no shielding.


2 Ill. 146

With covered terrace

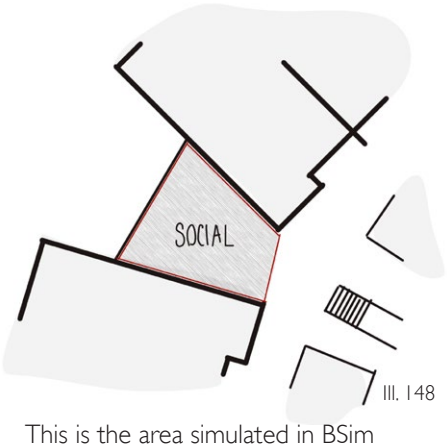

4 Ill. 147

Covered terrace and 20% shielding against windows in living room to the west.


5 Ill. 148

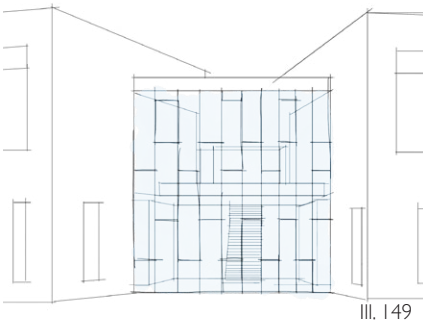
Covered terrace with railing and 20% shielding .

BSIM SOCIAL AREA

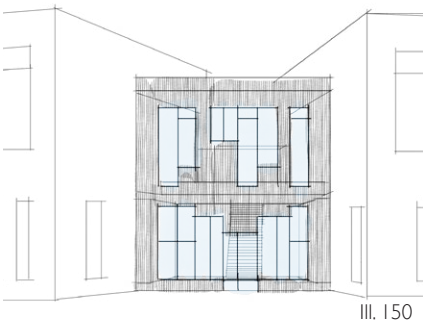


Ill. 148

This is the area simulated in BSim


Ill. 149

From outside with a large curtain wall


Ill. 150

From outside where the wall has approx 50 % windows

The studies of thermal comfort in the social room, is based on this area, with a large glass facade against west. In terms of BSim, it is made into two rooms, with the shaped and dimensions as on the section of the plan drawing. To make the room double high, there is made a opening, where there will be no floor slab.

It makes sense to test this area, since this is places where many people are together, the hallway behind, is only a transit place.

There have been many iteration and tests in BSim to optimise the social room, and the ones in the table below, are only some of them. The first studies of BSim, showed that even without the solar heat load, the social room there would be hours above 25.5, due to the internal heat load.

The social room is tested with a max load of 30 people during afternoon and dinnertime, and no people there at night.

The solar shading had no effect, as shown in the table below, which makes good sense, since there are already large shade elements to the south and north, while there is a forest close by that will shade in the summer, but let the sun's heat enter during winter, as no one leaves have.

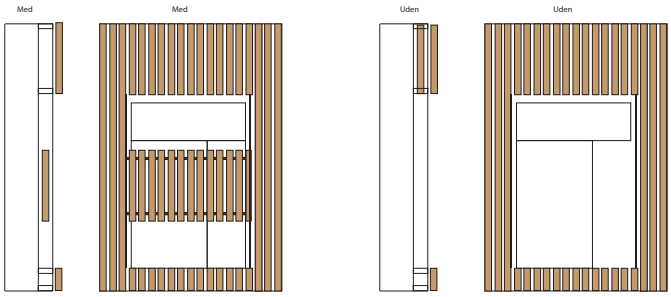
Since the solar shading had no effect, instead, different types of glass were used, with lower g-value, but thereby also lower lt-values.

Furthermore, it has been tested whether it will be better with several windows, which, however, were quickly deselected, due to aesthetic values, while at the same time the feeling of being a part of nature with view etc. is desired.

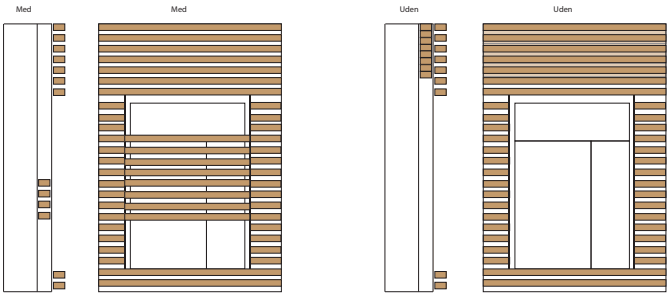
	Social room		Notes
	>25,5	qsunrad*	
	max 50		
Test 1	92	6617	No shading, g = 0,54, lt =0,72, a large curtain wall facade against west
Test 2	12	0	No windows
Test 3	114	3689	50 % windows, g = 0,54, lt =0,7
Test 4	47	3556	g=0,28 lt = 0,54 (Pilkington SuncoolTM 60/30, 6C(60)-16Ar-4S(3)-16Ar-6,8L) This window type will be used for the rest of the tests.
Test 5	47	3556	10 % fixed shading

* Since you cannot put trees into BSim, it is made as a building, but i real life, the trees will be without leafs during winter, and therefore there would get more heat in.

SOLAR SHADING



Ill. 151



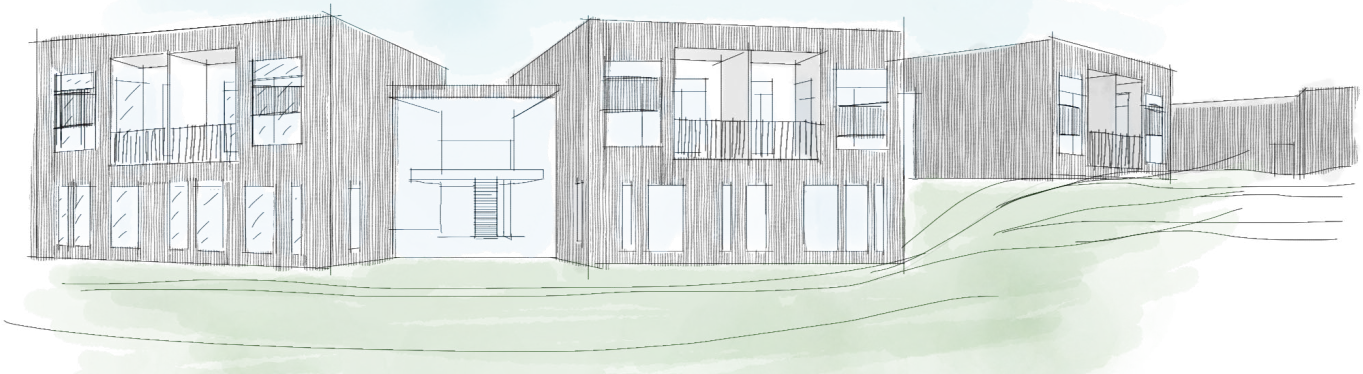
Ill. 152

Natural light has a positive effect on humans well-being and sense of comfort, which DGNB SOC 1.4: Visual comfort deals with. DGNB SOC 1.4.3 state that there must be a view, be still avoid glare (SOC 1.4.4). (DK-GBC, 2016 p 263)

To get the highest score, the solar shading has to be dynamic, which makes it able to shade when needed, but not take the view when not activated. When activated there should still be a view to the outdoor. The solar shading are made on the basis of BSim, and with the needed shading percent therefrom.

The lamellas is dynamic in the way that when it is not needed, it can be hidden behind the cladding.

There is made studies of both vertical and horizontal lamellas, where it is chosen to have vertical lamellas with horizontal shading to create a connection between the horizontal lines created by the bars in the windows and the lines from the bricks.

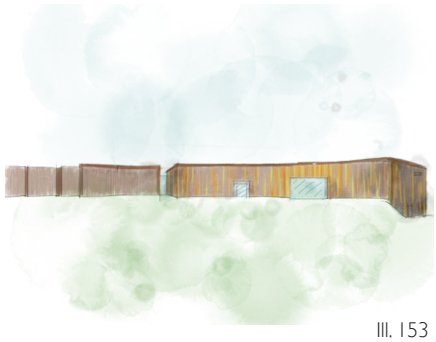


Ill. 152

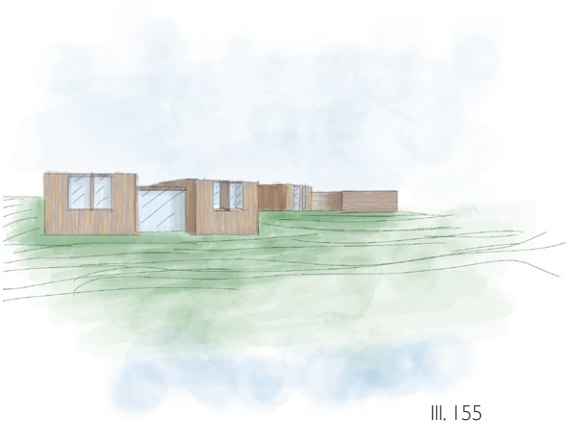
FACADES

It is important that the choice of materials indicates that it is a place for children, underlining the feeling of home and is warm and inviting. This could be done by using the same wooden material as the excising Hospice Djursland, but adding colors. The wooden facade towards the forest complements the forest, and a vertical cladding becomes a part of the vertical trees.

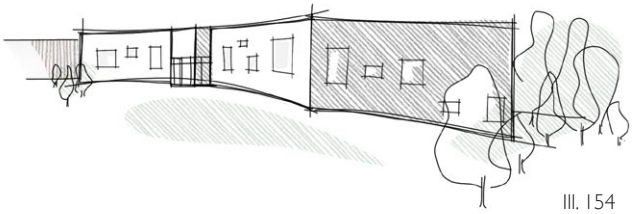
By adding colors the building will become a bit more childish and excising, and it will be easy to locate which house is the house for children and which is the adult hospice.



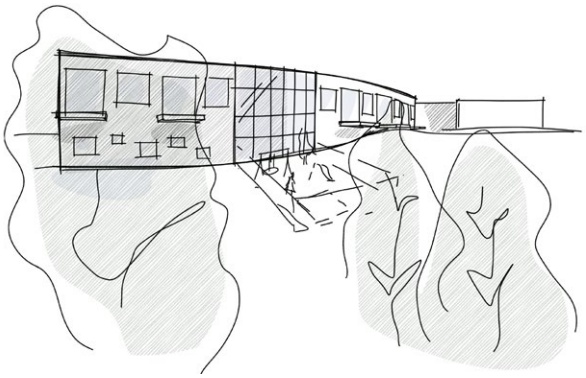
Ill. 153



Ill. 155

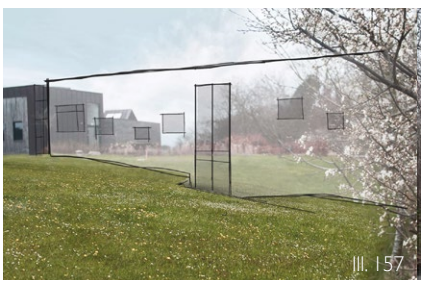


Ill. 154



Ill. 156

To enhance a playful facade, the windows has been processed. One proposal is with windows that vary a lot in size creating a lot of dynamic in the facade. The windows in different heights creates many different possibilities for internal use, some for sitting, some as a shelf and some to let light in at the top the facade. A disadvantage from the result of this is that a very textured cladding mixed with playful windows, can become complex to look at and not create a sense of calm, which is also the strive. To create a more calm facade, the windows were tested with a simple white plastered wall instead.



Ill. 157

Ill. 158

Ill. 159

In this proposal showed in illustration 160. the windows has the same heights, which makes them appear vertical like the trees in the forest and gives a more systematic and calm look to the facade and allows artistic walls. The art must be suitable for all ages, not too childish and neither too abstract.

In the proposal the materials vary a lot and the wooden cladding is pulled of the facade forming an outdoor corridor instead. This creates an outdoor area with possibility of social interaction according to SOC 1.6.1.5. (DK-GBC, 2016 p 285)

The three unit-blocks has been made in a different material, to stand out from the rest of the building and appear as the core of the building.

Ill. 160

The window design is processed with different systems in mullions. In this process both aesthetic appearance, practical use and natural ventilation is taken into consideration. Where placement of the windows are tested according to daylight, which can be seen in appendix 06-07.

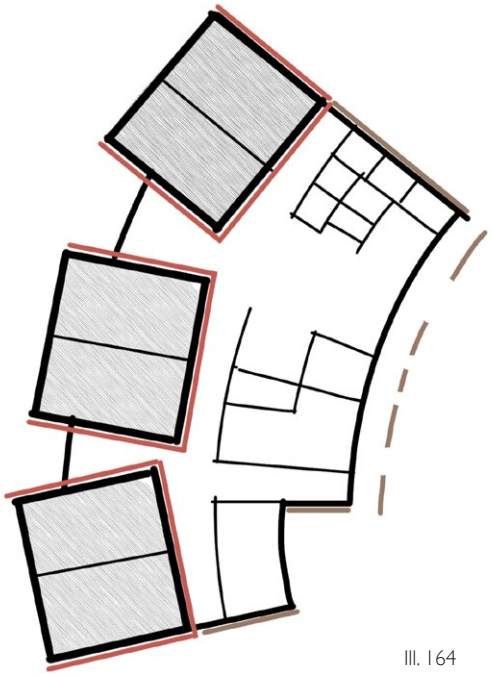
Ill. 161

Ill. 162

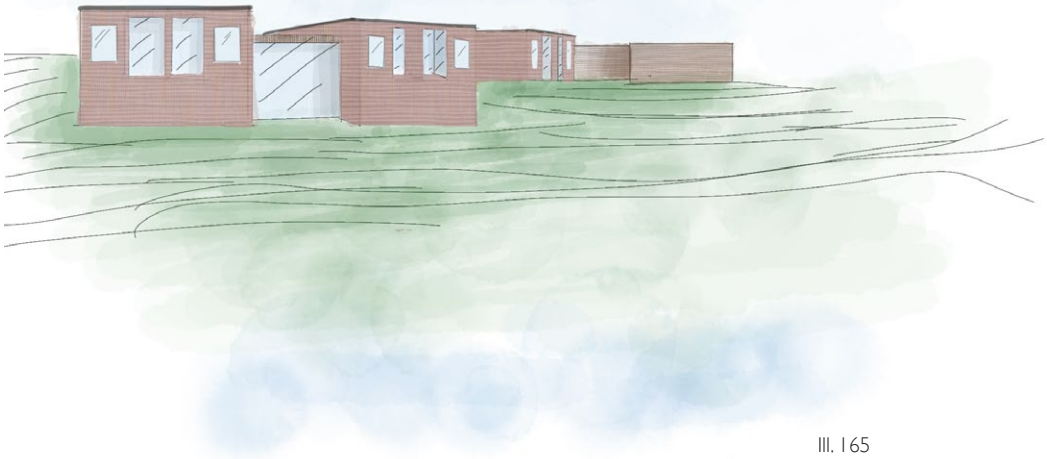
Ill. 163

The choice of materials is in process and brick is being tested. A proposal is to make the unit-blocks with bricks, giving a sense of the regular Danish single family house. The bricks will be experienced from the inside and out, so that the family enters their unit from inside the building, it will appear as an exterior wall and their own little house. This creates a contrast and boundary between where the family lives and the rest of the institution which can help create a sense of home for the families.

Having brick on the facade towards the forest is being evaluated, because some concerns are again not having a natural material meeting the forest, which contradicts the local plan as well. The amount of different materials must also be considered according to the practical making of the building and according to the structural systems. The brick walls will provide bearing elements to the building, and a light and open construction in the big social room, will bring a warm feeling to this area of the building.



Ill. 164



Ill. 165

EPILOG

CONCLUSION

The result of this thesis is a building that provides settings for the users offering both privacy in a homely environment and for socialising. All this in a safe environment and in a human scale.

Strandbakkehuset has, in a conspiracy of different design parameters, become a place where the quality of life is enhanced, based on knowledge from healing and palliative architecture. This is a building designed with the purpose of easing the illness, not only for the patient but also the family. The family can be together in facilities offered to all family members and taking the wide age span of the ill child or adolescent into consideration.

The children´s hospice has a huge focus on terrain, view, nature and art, and this has been important parameters through the design process. This has been the basis of Strandbakkehuset which is build into the terrain and nature and has been oriented with the view into the forest, creating good daylight conditions, where shading helps provide thermal comfort in terms of DGNB criteria.

Strandbakkehuset has great similarities between the inside and the outside with a curved façade outside and a curved wall along to corridor on the inside. The curved corridor makes it easy to navigate inside the building. These corridors on the inside are dissolved and by this, niches for random meetings with different degrees of privacy is created.

The building is designed with a great focus on accessibility and thereby eases the every-day-life for the ill. The patient units are designed in a flexible matter in terms of rooms that can be used for different family-situations and are easy to access for the staff.

REFLECTION

In the design process of Strandbakkehuset many different challenges occurred along the way, resulting in choosing a direction of certain parameter of the design. Some of these challenges will be reflected upon in the following section.

One of the important discussions in the early design process concerned the building felt and the limitations of it. As described in the design process, it was possible to fit the building in the building felt, but this would result in a building shape that is being dominated completely of the building felt.

Another very well-discussed topic of this project has been the degree of inspiration coming from the shape of the existing hospice. The balance between creating something new that separates itself from Hospice Djursland and creating something that shares some nuances of an architectural language with Hospice Djursland became a very hard task in the project. This issue walks hand in hand with another challenge concerning the many guidelines leading to the "perfect" hospice design and it has been a complex task finding a balance in using this knowledge and making qualified decisions that deviate to this "hospice recipe".

When working side-handed with the building form and the complexity of the plan, the design evolved to a building having very defined shapes on level 1, to which the plan is very honest, but when dissolving this on level 0. the plans become very different from one another and the structural system along with its recognisability becomes a very interesting parameter, even though it is not a focus-area in the project.

A ruling factor in the design process has definitely been living up to the chosen DGNB topics, that demands extra corridors in terms of fire escapes, automatic sun-shading and to live up to the criterias of the thermal comfort but at the same time remaining the view. These criterias challenges the design at an early state and use these as a part of the integrated design process.

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APPENDIX

APPENDIX 01
QUOTES IN ORIGINAL LANGUAGES

''Her har jeg virkelig følt, at jeg trådte ind i mors hjem. Det er jo mors stue, som mor også sagde "Gud, det er jo lige mine farver". Det er enkelt, elegant og lækkert. Jeg synes, det er nemt at føle sig hjemme her, også fordi det virkelig er noget, som mor kunne finde på at købe selv. Også fordi mor må ryge. Det var noget af det største. Og jeg må drikke rødvin på værelset"
(Steenfeldt, 2013, p. 13)

"Tiden lige efter dødsfaldet var ubeskriveligt svær. Et kæmpe tab, stort tomrum, ingen energi, jeg græd ustandseligt og følte, at det bare ikke kunne være sandt. Jeg har haft svært ved at forstå, at jeg skulle igennem dette, og at det virkelig skete for mig. Det tog lang tid, før jeg begyndte at få det bedre igen."
(Guldin, 2019)

".....Vi kunne hygge os sammen her og have noget, der minder om en normal dag."
Quote by Anders Schultz Andersen (Larsen, 2016)

"Nu var der pludselig nogen, der tog noget ansvar fra mig. Jeg kunne sove, sådan rigtigt. For første gang i lang tid fik jeg mere end to timers søvn i døgnet. Jeg var ikke længere nødt til at springe op hvert andet minut som på hospitalet"
Quote by Anders Schultz Andersen (Larsen, 2016)

"det er mine venner, far."
Quote by Asker (Larsen, 2016)

"For os er han herude stadigvæk. Jeg kan mærke ham her mere, end jeg kan derhjemme."
Quote by Anders Schultz Andersen (Larsen, 2016)

"Life, play and relief".
(Dorit Simonsen, 2019)

"Liv, leg og lindring".
(Dorit Simonsen, 2019)

"Our finest job is to minimise suffering and optimise the quality of life."
(Nanette Quistorff, 2019)

"Hvorfor skulle jeg røre ved ham? Han skulle jo alligevel dø"
(ed. Nørr & Højrup, 2017 p 38).

"Jeg har fundet et sted, vi kan være alle sammen . ."
(ed. Nørr & Højrup, 2017 p 41).

"Familiehuset blev vores redning på et meget kritisk tidspunkt i vores liv. Vi ville ikke have kunnet eksistere som familie på sygehuset, hvor der kun var én seng, én stol og ingen plads til, at vi kunne være sammen."
(ed. Nørr & Højrup, 2017 p 41)

APPENDIX 02
INTERVIEW WITH DORIT SIMONSEN

Int: "Hvad fejler børn oftest som bliver indlagt på hospice?"

Dorit: "De fejler alle mulige forskellige ting – det er ikke sikkert at de dør ved deres første eller anden indlæggelse på hospice, men de er alvorligt syge."

Int: "Tænker I at der skal være særlige faciliteter til søskende ? Og kan hospice dagcenter bruges til det? Og er det noget som skal integreres i børnehospice?"

Dorit: "Vi har jo ikke et dagscenter. Og et dagscenter er fordi det måske ikke er alle patienter som har behov for at blive indlagt, men kan få hjælp i et dagscenter, hvor de kan komme ind og være det meste af dagen. Hvor de kan få hjælp og evt. snakke med en diætist, fysioterapeut, eller komme ind og få en behandling, en samtale med psykologen, hvor sygeplejersken kan følge dem. Hvor de ikke nødvendigvis har brug for en seng. Da en seng på et hospice koster 5.800 kr. i døgnet, som samfundet betaler.
Tit har vi nogen inde, hvor vi tænker at dem kunne vi godt have behandlet på et dagscenter hvis vi havde haft et. Så kan de komme et par dage så de kan følge patienter. Det er måske angsten ved sygdommen patienten har brug for at snakke om, hvordan går det, hvordan skal jeg gøre det, hvad nu – jeg kan ikke ret godt spise, og sådan noget. Og sådan noget kan man godt håndtere på et dagscenter.
Men det er ikke så enkelt med et dagscenter, da der koster at bygge sådan et – og det betyder også at der skal ansættes nye folk som nogen også skal betale for."

Int: "Men hvad med særlige aktiviteter til søskende?"

Dorit: "Vi ved at de er ved at lave et projekt i Lukashuset med noget omkring søskende. Og vi ved jo at søskende fylder meget på hospice, så vi vil jo rigtig gerne have et sted hvor der både er plads til de syge børn og søskende, og så integrere med de børn som vi har her på voksen hospice. For her i sidste uge havde vi en 4 årig og 9 årig, som gik her hvor deres far skulle dø, og her er jo ikke særlig meget, selvom vi prøver at gøre lidt for børnene, så er det jo ikke det der fylder mest herover. Så ville det jo være let, hvis der var noget i børnehospice bygningen hvor de kunne få over. Hvilket er et godt argument for at det nye børnehospice skal være en tilbygning i stedet for en separat bygning, så den bliver lidt mere tilgængelig.
Mit ønske vil jo være at det nye hospice bliver omkring 400 m2 i grundplan, eller i alt 870 m2.
Men ovenpå, da vi gerne må bygge i 8,5 meters højde, kunne man forestille sit et hus/rum på et par hundrede m2, til aktivitet, leg, musik, forskellige kreative ting. Kæmpe stort fælles rum.
I dag er der kun meget begrænset leg til børnene. Derudover er der nogle forskellige rum her – bibliotek, cafe, fugle osv. Så der er små rum her også.
Det store aktivitetsrum skal børnene have lov til at larme, for når det er et børnehospice skal der selvfølgelig være plads til børn og søskende. Men der skal også være noget ro. Der er jo fire forskellige familier i forskellige situationer. Så der skal være plads til at trække sig tilbage men samtidig også være plads til børn med der har meget energi.
Vi har også en rigtig fin stor skov hernede bagved. Der er noget oppe i Sverige i Skåne, jeg tror det hedder Wanås Park – en kunst park. Der sker nogle forskellige aktiviteter i parken som man møder når man kommer frem. At kunne bruge skoven hernede til noget aktiviteter både fysiske og oplevelser, sanselige aktivitet. Det skal være sådan at man kan komme rundt i kørestol."

Int: "Vi synes der mangler information om hvor meget brug der er for børnehospice i Danmark."

Dorit: "Der er ingen tvivl om at det er godt at der er blevet bevilliget 4 pladser her til Jylland, så der kan komme en dialog i gang om dette emne. Børn skal jo så vidt muligt være hjemme i deres hjem med deres forældre. Men børnene ryger også ind og ud af børneafdelingen og dem har vi en dialog med nu omkring børnehospice, de er jo vant til at have de her børn og kan se at de måske ikke skal komme ind til dem mere. De blev klar over at et hospice for børn er noget helt andet end en børneafdeling. Der er en helt anden ro og et helt andet hus end et sygehus.
Der er rigtig meget omkring opfattelsen af et hospice fra befolkningen. Der er jo nogen som siger nej tak – da de ikke tør at sige ja tak. For så siger man også ja til døden."

Int: "Det kan jo også være en udfordring at ligge et hospice og børnehospice så tæt på hinanden?"

Dorit: "Ja men det kan ikke hjælpe noget, da vi bliver nødt til at holde hinanden fast i, både som befolkning, som arkitekter, som professionelle, at vi ikke kan sælge det som noget det ikke er.
Et hospice er hyggeligt men det er også alvorligt. Nu har vi jo valgt at kalde dette for Strandbakkehuset, da det ligger på strandbakken. Allerede der er hospice ordet udeladt. Det kommer ikke til at hedde Strandbakke huset ved Hospice Djursland. Det bliver et navn som er selvstændigt."

Int: "Nu har vi undersøgt at stranden ligger tæt på og I har skoven lige hernede. Har børnene og forældrene nogen gange lyst og behov for at komme op i byen og ud? Og må de?"

Dorit: "Ja - enten kører de i kørestol op til hovedgaden eller sætter sig i bilen og kører et sted hen. Det er meget forskelligt. I byen er der en cafe og lidt tøjbutikker. Rent trafikmæssigt er det meget let at komme hertil. Der er busser fra Århus, Randers, Grenå osv. Det ligger meget centralt.
Djursland er meget naturrigt som tilbyder til ophold i naturen."

Int: "Har patienterne givet udtryk for om de mangler et køkken på værelserne eller hvordan forholder de sig til det?"

Dorit: "Her har de ikke et køkken, men en the-køkken. Der er køleskab, køkkenbord, vask.
Ingen kogeplade. Fælles køkkenalrum, hvor patienterne kan tage deres pårørende med ud og lave mad. Det køkken er faktisk lavet med et hæve-sænke bord – men det bliver aldrig brugt.
Vi har et stort industrikøkken hvor der bliver lavet frisk mad hver dag af personalet, da der er store krav fra sundhedsvæsenet.
Det jeg forestiller mig at vi gør i det nye børnehospice, er at der bliver et stort fælleskøkken, uden industrikøkken, hvor man nemt kan lave noget selv. Der skal stadig være køleskab på stuerne, men man skal ud i fællesrummet og bruge faciliteterne derude. Det er jo alligevel ikke så mange der bor der. Ved ikke om de kan få noget halvfabrikat her ovrefra skal vi lige finde ud. Men der skal være et stort fælleskøkken til dem, også så de frivillige kan være med til at lave nogle aktiviteter. Så man kan spise sammen eller spise for sig selv."

Int: "Hvad tænker du i forhold til antal pladser og parkeringspladser?"

Dorit: "Som udgangspunkt er der kun på nuværende tidspunkt tiltænkt 4 pladser, men på sigt ville det være oplagt at kunne udvide i den eksisterende bygning. For 870 m2 til 4 familier er jo meget, især hvis jeg gerne vil have det store aktivitetsrum ovenpå på 200 m2 – så er det 1000 m2. Det er måske lige meget. Den nederste etage ville være smart hvis man kunne åbne 2-4 plader på sigt.
Dette er hvad regeringen og ministrene samt regionerne vil på nuværende tidspunkt.
Vi vil jo gerne have et sanserum, et sparum, tænk hvordan man kunne bygge videre på det vi har i dag.
Med hensyn til parkering, så er der masser af plads, så det er tiltrækkeligt"

Int: "Skal vi tiltænke det som en tilbygning til det I har i dag ?"

Dorit: "Narh – synes i skal tænke det som en helt selvstændig bygning, hvor man bare har forbindelse herover.
Der skal stadig være kontorer, samtalerum, vaskerum, depot osv. som vi har her. Da vi deler produktionskøkken, skal det jo ikke være sådan at de skal ud med maden, så derfor skal der være en forbindelse mellem de to bygninger.
Caféen vi har her, må også godt blive brugt at børnehospicet, da vi bruger den til større møder, fester. Festerne er fx musikarrangementer, fødselsdage, årsfester for frivillige."

Int: "Der er jo et fast formsprog i den her bygning – hvordan skal vi forholde os til det?"

Dorit: "Det skal ikke bare være det samme der kører videre – jeg holder på at den nye bygning skal kunne noget helt andet. Den arkitektoniske udfordring her er at der skal være en sammenhæng men også en forskel. Jeg har ikke bare brug for mere plads og derfor bygger en tilbygning. Den nye bygning skal indeholde noget helt nyt og helt andet – meningen er noget andet.
Det skal ikke stikke fuldstændigt af men samtidig være sig selv.
Bygningen i dag er jo holdt meget tro til naturen – naturlige materialer som patinerer og falder i med den omkringliggende natur."

Int: "Kommer der til at være mere udeareal? Nu nævnte du selv skoven – er der andre ideer og ønsker?"

Dorit: "Ja altså skoven kommer vi i hvert fald til at udnytte meget mere. Det er utrolig smukt område. Ellers skal der helst ikke røres ved naturen rundt, da jeg synes det skal være uforstyrret når man kigger ud af sit vindue.
Vi har jo en legeplads ude foran som bare er som den er. Men en legeplads nede i skoven ville jo være meget bedre, end at have en gynge herude foran.
Kan være vi skal bruge arealet herude til noget mere sansehave, da vi får den brugt rigtig meget. Den er både smuk og rigtig fin om sommeren – alle farver, alle dufte. Den er rigtig fin, selvom den ikke ser ud af meget på denne årstid.
Vi SKAL beholde den eller i hvert fald noget af den – og ellers flytte den om foran hvor legepladsen er."

Int: "Er der et tidspunkt på dagen hvor der er aktivitets peak?"

Dorit: "Ja fra frokost af og frem der sker der en masse når der både bliver lavet mad i køkkenet, patienterne er oppe, pårørende kommer måske på besøg.
Og så er der onsdagsbar, hvor vores frivillige holder bar i vores bibliotek hvor man kan få lidt kaffe, glas rødvin, gin og tonic. Og så kan man bare slappe af og snakke med andre."

Int: "Hvordan er jeres politik i forhold til rygning på værelserne og sådan generelt?"

Dorit: "Det må man ikke her. Mange patienter har kvalme og er utilpas – så ikke engang vores ansatte på ryge da det kan gå ud over patienter.
Og det er slet ikke noget problem – det respekter folk. Patienterne må ryge ude på deres terrasser. Og de ansatte skal køre dem derud."

Int: "Vi har en forestilling af at der er mange maskiner på et hospice. Har i oplevet overophedning?"

Dorit: "Ikke specielt fra maskinerne men fra naturen! Vi har jo de store vinduespartier mod syd. Vi havde en vanvittig varm sommer i sommers hvor alle gerne vil åbne deres vinduer hvilket betyder at ventilationssystemet slukker – så virker det jo ikke. Så vi brugte gammeldags vifter.
Vi har jo et stort udhæng, så det kan ikke rigtig være anderledes."

Int: "Det grønne rum i har her bag kontoret bliver det brugt meget?"

Dorit: "Ja der er nogle patienter som bruger det om eftermiddagen hvor de bare sidde i ro og fred og slapper af. Drikker måske en kop kaffe. Og selvom folk måske mener at man ikke kan sidde ugeneret derinde, så har vi prøvet at skærme af med beplantning. Det var meningen da det blev bygget at det skulle være et helt åbent rum med loft ud til det fri, men det måtte vi ikke pga. Energitab. Men i dag er det et uopvarmet rum. Det er lidt som en japanskhave.
Og uanset hvor dårlig en patient er så skal de have lov til at komme ud. Her den anden dag blev en patient kørt ud på sin terrasse i sengen med dyner og tæpper, så patienten kunne ligge og nyde den tidlige forårssol." Sammen med de "grønne haver" er vores store akvarie også ekstremt populært plandt patienterne og specielt hvis der bor nogle børn her.

Int: "Størrelsen på værelserne – er de passende?"

Dorit: "Ja de passer rigtig fint. Så patienterne hverken føler sig klemt eller meget alene i et stort rum. Det er okay at være alene derinde, man samtidig kan de også rumme familier i værelset.
Man vil gerne have det lidt småt og intimt når man er syg."

Int: "Har du nogle ting som vi skal være særligt opmærksomme på når vi skal designe et børnehospice?"

Dorit: "Noget af det som jeg synes er en meget spændende opgave er at når man snakker børnehospice, så tænker man at man vælter rundt i bamser og babylegetøj. Men det er jo et børne og unge hospice. Så hvordan vil man indrette værelser så der både er plads til en masse bamser men samtidig til en teenager som gerne vil sidde med sin computer og sine kammerater. Derudover skal I VIRKELIG huske depot, depot, depot. Det ene øjeblik skal der være en lille vugge, babyseng og det andet øjeblik skal der være en voksenseng til en teenager, og alle de senge og udstyr skal jo opbevares et sted når det ikke bliver brugt. Så selvom man føler det er spild areal betyder det utrolig meget for at et hospice fungere optimalt."

Int: "Hvad har du af tanker i forhold til det aktivitetsrum øverst?"

Dorit: "Ideen var at børnene skulle have lov til at udfolde sig og ikke tænke over deres støjniveau. Herude på Djursland er der mange kunstnere som måske kunne komme og lave noget med både børn og voksne.
I det hele taget et stort rekreativt rum hvor der både kan være små nicher og samtidig rumme større arrangementer."

Int: "Ved du lidt om hvordan det er opdelt i forhold til ansatte og frivillige?"

Dorit: "Her på Hospice Djursland har vi 47 medarbejdere og 60 frivillige. De er fx værter ved frokosten, friske blomster, haven, onsdagsbaren, godtevognen, de slår græs, passer skoven. De er også vågekoner, hvis nogen er alene. Alt det sygeplejerskerne ikke har tid til. De bager også julekager i deres fælleskøkken så der kommer duft rundt i hele huset. Det er dem der gør noget alment ekstra, gør det hjemligt. De klarer en masse opgaver som der ikke lige ligger indenfor sygeplejefaget."

Int: "Hvad gør I når folk dør? Skal de opbevares et sted?"

Dorit: "Man dør ikke af at tale om døden – her på stedet er det et emne man ikke kan undgå at tale om.
Når en patient dør bliver vedkommende liggende på stuen. Sygeplejerne gør personen i stand og får nogen gange hjælp af de pårørende. Nogen gange vil nogen af de pårørende gerne sove på stuen sammen med den afdøde en sidste nat.
Som regel ligger den døde på stuen et døgn før bedemanden kommer med kisten, som kommer ind af hovedindgangen. Hvilket er samme sted som den kommer ud.
Den gang arkitekterne tegnede denne bygning var det tiltænkt at de døde skulle ud den samme vej som affaldet med de store porte nede bagerst i bygningen.
De vidste ikke hvor de døde skulle ud ellers. Der sagde jeg at de skulle ud af hovedindgangen som alle andre. Det er et led i at bearbejde det at alle skal dø.
Et af de hensyn vi tager er at når en ny patient ankommer så sørger vi for at der ikke lige er en kiste der skal ud på samme tid, da det kan være en lidt hård konfrontation.
Det vi har tænkt skulle være vores vision for børnehospice Strandbakkehuset er at vi vil have fokus på LIV, LEG, LINDRING!
Livet handler om hverdagslivet, familielivet, det sociale liv, livet op til døden, livet mens det leves, livet efter døden.
Man har som børnehospice også et ansvar for den efterladte familie."

Int: "Har i oplevet at familier er kommet tilbage ti jer efter de har mistet en pårørende?"

Dorit: "Her på Hospice Djursland dør der ca. 220 mennesker om året. Vi inviterer pårørende 2 gange om året til en mindehøjtidelighed. Indenfor de første 14 dage efter man har mistet en herude modtager man et brev med en lille hilsen fra den gruppe herude som har passet den afdøde. Indenfor de første 2 måneder er der en opringning med hvordan det går, noget de skal have hjælp til eller andet. Højtiderne er i maj og november. Der er gratis psykologhjælp i den forstand at man får tilbudt 1-2 samtaler ude hos dem."

Int: "Er der en religiøs tilgang her på stedet?"

Dorit: "Nej ikke som sådan. Vi prøver at møde mennesker der hvor de er i livet. Det der er at vi har tilknyttet en præst til steder 20 timer om ugen. Og hun kan jo lige så godt tage kontakt til en imam, eller det jødiske trossamfund. Hun er også sjælesørger hvis man har behov for det. Vi holder også gudtjenester, da den største del af den danske befolkning er medlem den protestantiske del.
Det er i modsætning til det de gør i Lukashuset, som udspringer af det kristne trodssamfund. Det gør flere af de nye hospicer i Danmark ikke."

Int: "Vi har læst lidt at folk med anden etnisk begrund ikke søger hjælp på et hospice, da de gerne vil holde det for dem selv?"

Dorit: "Der vil i opleve at det er helt andeledes med børn og på Lukashuset. Der blev de overrasket over hvor mange anden etnisk bagrund der kom ind til dem. Det handler om at nogen af de familier måske er mere udsatte og når de så får et sygt barn, som kræver en masse ting, så betyder det mere end for danskere.
Så derfor er der rigtig mange med anden etnisk bagrund ved børn. En anden ting som børnelægerne herude på sygehuset fortalte – da de også oplever det på hospitalet er at der bliver født flere børn med større problemer, kromosomfejl osv. fra anden etnisk baggrund. De ser anderledes på det med at skille sig af med et foster hvis det fejler noget end os danskere. De får børnene på trods af at de måske får et barn der måske ikke overlever."

Int: "Den præst der kommer her, har hun et kontor?"

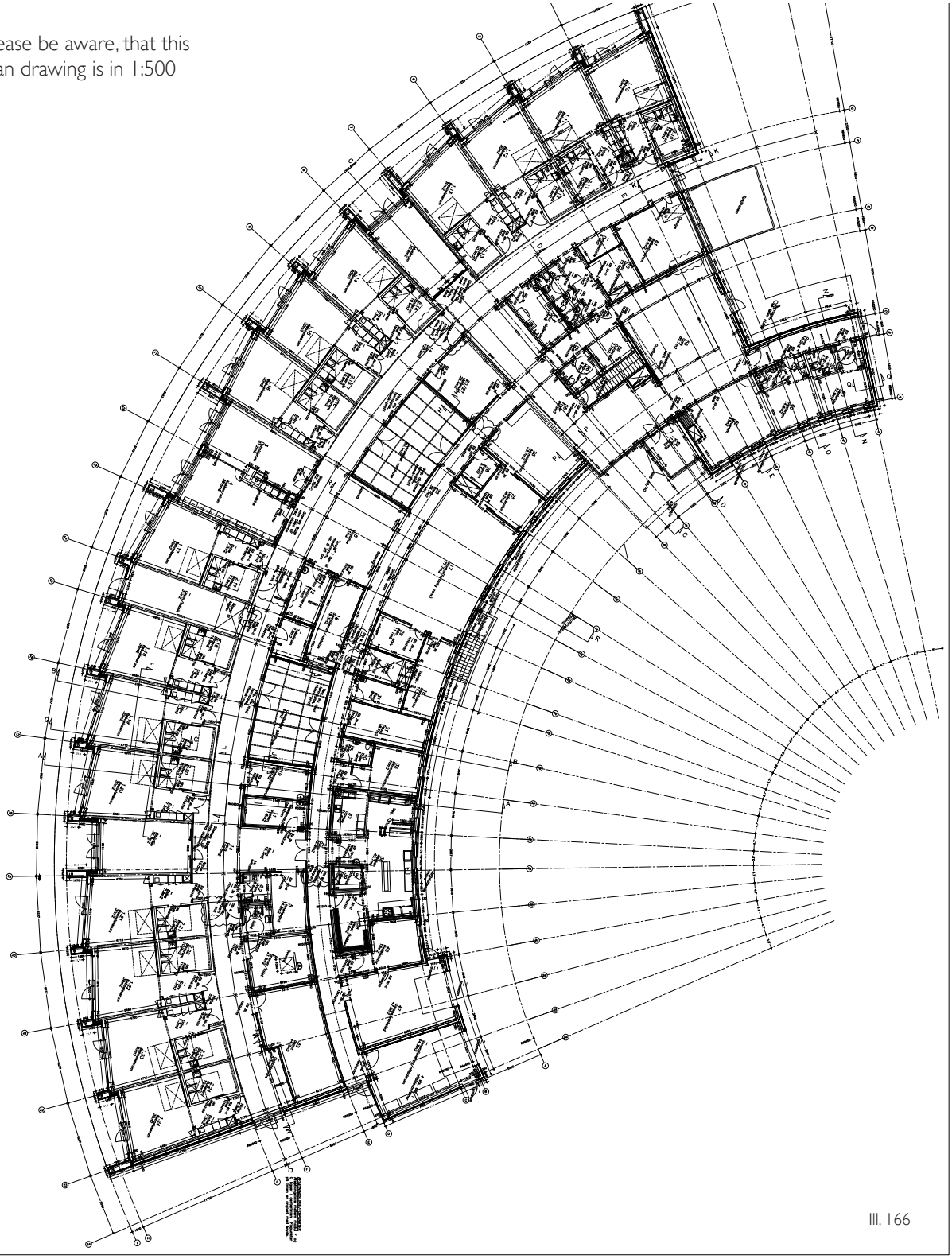
Dorit: "Nej – der er ingen her der har et kontor. Der er administration som er meget åben. Lægen har et lukket kontor, da hun sidder og dikterer meget og skal have ro. Lægen er ikke ansat her. Hun er fra det palliative team på Randers Sygehus. Præsten er heller ikke ansat her. Eller er alle de andre ansat – fysioterapeuten, psykologen, musikterapeuten, frivilligkoordinatoren osv. Psykologen er ansat ca. 26 timer, fysioterapeuten er ansat 32 timer om ugen, fordi det passede ind i hendes."

Int: "Psykologen har hun ikke et rum hvor hun kan snakke alene med patienter eller pårørende?"

Dorit: "Patienterne ligger jo alene, så der kan hun sidde inde hvis det er omkring patienterne. Hvis det er med de pårørende har hun et samtalerum, hvor de kan sidde uforstyrret og snakke."

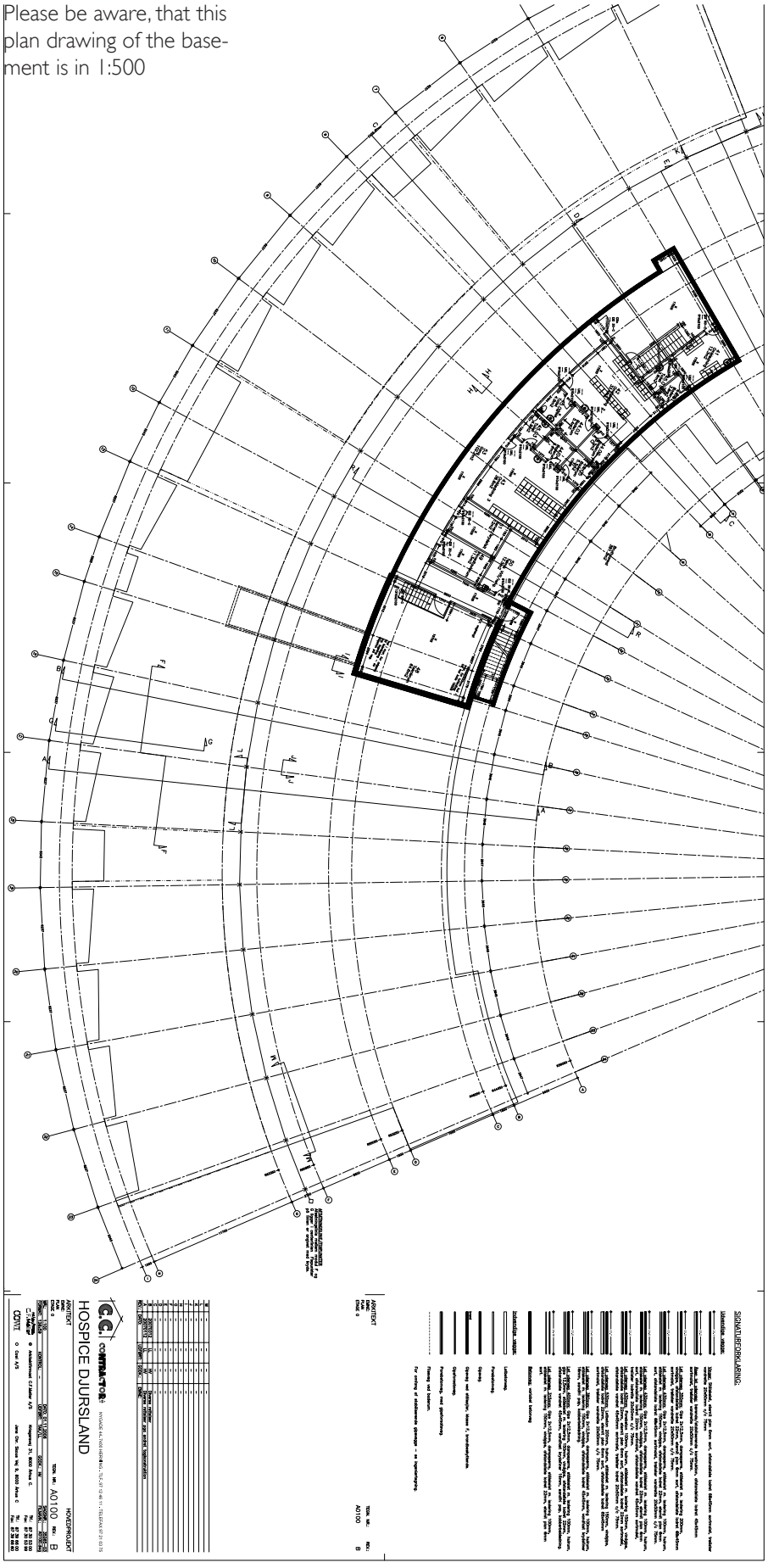
APPENDIX 03
PLANS OF EXISTING HOSPICE DJURSLAND

Please be aware, that this plan drawing is in 1:500



Ill. 166

Please be aware, that this plan drawing of the basement is in 1:500



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APPENDIX 04
REPORT ON INTERVIEW WITH NANETTE QUISTORFF

Nanette is the head-nurse at Lukas Huset. She has always worked with the palliative part of the job, personal loss and has also experienced it in her own life. Her former job-position ere at the children's department dealing with cancer at Bispebjerget. And later on, at the intensive palliative department, dealing with young cancer-patients who are in a really bad shape. She started working at the Lukas House and the planning of it in 2013.

The hospice is for children with life-threatening, life-limiting and incurable diseases without a diagnosis. Many in need of relief, die later on.

At the moment they are.
12 full time employees
10 hourly-based nurses
22 volunteers

Yearly memorial day, where the families can come and remember their child.

Two types of palliation:
- Basal palliation
- Specialised palliation

Basal palliation: The palliative care performed by own doctor, nausea-treatment, treatment of epilepsy etc.

Specialised palliation: Palliative care with a focus on a core-job, pure palliative care because they can't operate or provide kemo-treatment.

Total pain: The type of pain affecting the families in hospice. It is called total because it does not only involve the ill, but the entire family.

The hospice helps siblings and takes care of them, because they must get help as well. They make a great deal in developing ways to speak with the children and understand them, they use children-psychologists, nurses with a special in children and they do activities with the healthy children and even takes them on excursions/trips.

Nanette: "Our finest job is to minimise suffering and optimise the quality of life."
Original quote: "Vores fornemmeste opgave er at minimere lidelsen og optimere livskvaliteten."

It is often difficult for them to see if a child is in pain, and how much pain. A baby cannot explain.

The ill child often carries a lot of guilt, and actually carries the entire families existential crisis. Therefore the staff at the hospice makes It clear to the child that they will take care of mom, dad and brother/sister. The ill children, as well as the healthy, are living in the edge-zone of the family, which can be hard.

It is important for the staff at the hospice to be aware of that they cannot create miracles, they can only deal with the actual situation, which can be hard.

For adults, the risk of dying of cancer is higher than with children. So it is important to maintain a sense of hope, but still realism.

The psychologist at the Lukas House states that he has never met so exhausted people as the parents of these children. It effects them both financially and even their own self-understanding.

They receive many presents and donations, which is good, because they need them.

It is always hard for the hospice to say when a room will be available, which have resulted that some people haven't been offered a room. They wish in the future to have an acute room.

Some of the children are isolated because of multiresistent bacteria's, and needs to be protected. They are mostly at the same time,

bed-written. In very rare cases we have children who can not withstand the minor traits etc, it is important to take into consideration.

The ages of the patients are mostly infants, or very young. They do not have many teenagers.

They have hired a nursery teacher from the 1. Of march 2019. There will not be teaching, which can cause problem according to siblings. The ill child will probably have to redo the class instead of continuing their school. The hospice do have collaboration with Hellerup skole, which is an offer for siblings, but it is very rarely used. The school-situation of siblings depends on age and home-location. If they are in high school, they are probably only here for the weekend and stay in the room with the ill sibling during the weekends.

The volunteers working at the hospice goes through a process of employment, to ensure they are right for the job.

A critical matter for the hospice is the area for storage, which is far by sufficient at the moment.

It is possible to have the diseased for three days. They have a cool-room in the basement, but sometimes they stay laying in bed, depends on the wishes of the family.

The hospice provides help with practical matters such as goodbye-memorial, arrangement of lunch.

The hospice does not hide to the other patients and families, that a child has died. The other children are actually involved, so death is treated as a natural thing. The other children often know the diseased as well.

The parents have a way of forming a community. Mothers comfort mothers.
They have a after-process with conversations both with parents and siblings, offer psychology-help. Often they families do not know that they need the help, so the staff often pushes.

The place is an old hospital, that has been renovated, but remained the outer shell. They had to work on creating an atmosphere by niches and activities on the long corridors. One of the most popular things is the aquarium, and all the kid love to look at the fish. They approve to the demands of hygiene and accessibility. They have succeeded in having very contagious diagnoses, without anyone else being infected. Ventilation is working very well.

The hospice is no luxury, but has proved to work.

Having 2 units for each family is important. Something they would like to have in the future is a kitchenette in and own bathroom. The advantage of this is they are forced out to socialise, which many have reacted positively to.

They have tried to create little niches on then hallway, but some haven't been successful and become "dead-areas" without comfortable daylight. They have an aquarium, which the kids love.

The whole place must be able to be ventilated without natural ventilation because they can be in a situation where the patients have a low immunedefense, and cannot be exposed to open windows. It is still important that they are able to open the windows.

Eventhough the Lukas House has a Christian perspective, many Muslims stay there as well. The purpose is basically about loving your next, respect and caring.

They have open church every Wednesday at the hospice. The volunteers cook dinner every Tuesday.

They have a hospital clown attached to the hospice, a violinist and more.

Depending on their condition, they mostly eat in their rooms.

They offer a professional photographer to take pictures of the entire family.

The ill child or the sibling often makes a script or story of the stay and the situation they are going through in life. Or the parents make a document for the sibling. The hospice helps with this.

APPENDIX 05
INTERVIEW WITH PIA BANG WESTMARK

Pia: "Selvom Mikkel er dialysepatient og burde få sine behandlinger på sygehuset er det altid rare at være i hjemmet. Derfor var det fantastisk da det blev muligt at han kunne få behandling hjemme.
Da sygehusene er meget tarvelige – gammelt skidt. Så det betød rigtig meget for os at vi både måtte bo på Trygfondens Familiehus i Skejby når Mikkel skulle have behandlinger på sygehuset og samtidig måtte bo lidt hjemme når muligheden var der for det.
Vi flyttede jo ind i Familiehuset 14 efter det stod færdigt hvor alt var nyt, og det betyder bare meget at man kommer væk fra dårligt indeklima, slidte møbler med ridser osv. Det er nogen gange nogle mærkelige ting man hæfter sig ved i krisesituationer.
Jeg ved slet ikke hvor vi havde været i dag, hvis vi ikke var kommet over i Familiehuset."

Int: "Var der sygeplejesker på Trygfondens familiehus?"

Pia: "Nej. Det er jo det som adskiller sig fra børnehospice. For i familiehuset må det syge barn jo ikke komme med hvis det er meget sygt da der intet fagpersonale er. Og det var en kæmpe stressfaktor, for selvom der måske kun er 3-400 meter til sygehuset, så skulle vi hele tiden koordinere hvem der blev tilbage med vores ældste søn Tobias, mens den anden gik over til Mikkel. Nogen gange skulle vi også være der på bestemte tidspunkter fordi lægen sagde han ville komme forbi, men de kommer jo sjældent på aftalte tidspunkter, så tit gik man forgæves. Det ville være noget helt andet og give mere ro hvis vi alle 4 kunne være sammen hele tiden. For så skulle man ikke tænke på det ene når man har det andet sted og omvendt.
Nogen gange krævede det begge forældre på sygehuset, så Tobias blev passet af de frivillige i Familiehuset.
De frivillige er primært studerende og pensionister, da det er dem der har tid.
Der er også en ugentlig fælles maddag i Familiehuset hvilket var en kæmpe lettelse for os, da vi så ikke skulle tænke på mad den dag. For alle de andre dage skal man jo selv sørge for at handle ind og lave mad."

Int: "Vi skriver lidt om skyggebørn i projektet."

Pia: "Åh jeg hader det ord – men de børn står i skyggen af deres syge søskende. Og hvordan de børn har det som bliver overset kommer faktisk først til udtryk mange år efter.
Tobias var 4 år da Mikkel blev født og er i dag 10 år. Det er først nu er han først begyndt at snakke om det og sætte ord på det han kan huske og der får man det helt dårligt. Og den måde han kan sætte ord på det nu er stadig ikke på samme måde som han nok vil gøre det når han bliver voksen. De ord han bruger og den måde han fortæller på kan man mærke at han har følt sig svigtet. Han kan både huske noget godt og dårligt fra den tid. Han husker bestemt også noget godt. Vi gik i lang tid og tænke "pyha" vi er kommet godt ud på den anden side, og det er heller ikke fordi Tobias har nogle problemer i dag."

Int: "Kunne du havde forestillet dig at du og din familie havde boet på et børnehospice hvor der var fagpersonale til at tage sig af Mikkel, lavet aftensmad hver aften og et værelse hvor I alle 4 kunne have boet sammen?"

Pia: "Ja det ville have været fantastisk! Det er dog vigtigt at man kan sove adskilt fordi et sygt barn ville kunne vække hele familien hundrede gange på en nat. Så hvis man kunne lave to rum så forældre ville kunne sove ordentligt og vide at sygeplejerskerne nok skal sørge for at det syge barn får den medicin barnet skal have osv.
Det kan man jo ikke engang på sygehusene i dag. Der er det udelukkende det faglige de hjælper med, de kommer ind og siger når barnet skal have medicin, men resten står du jo selv med.
Så omgivelserne har også stor betydning for om man overhovedet har lyst til at sove ordentligt."

Int: Har I haft nogle specielle trælse historier som du vil fortælle om?

Pia: "Vi har haft mange trælse episoder, men vi har specielt en vi husker tilbage på hvor Mikkel slet ikke kunne komme sig efter en af de utallige operationer han har fået. Han kommer sig meget langsomt når han har været i narkose, hvilket giver god mening når man har nogle nyrer som ikke fungere ordentligt. Og så var de kommet til at give ham et stof, da han lå på opvågning som man bestemt ikke må få når man ikke rigtig har nogle nyrer. Så han var rigtig dårlig. Til sidst kom der en læge og sagde at I bliver nødt til at tage ham ud herfra og over i Familiehuset så vi kan se hvordan han har det. Mikkel har vel været omkring 2-3 år på det her tidspunkt, men han kunne alligevel mærke at de var et sted som ikke var rart. Og der gik ikke mere end en halv dag før han havde det markant bedre. Så det hjalp at komme væk fra de dårlige rammer der var på det sygehus vi var på."

Int: "Hvordan går det med Mikkel og hans indtag med mad? Vi ved at han ikke rigtig har prøvet rigtig mad endnu og lever af at få sonde."

Pia: "Det vil han på ingen måder, det er så træls. Vi har været indlagt hvor lægerne ville have at han skulle lære at spise rigtig mad. Vi prøvede i 3 måneder, men han ville på ingen måder spise mad selvom han blev tyndere og tyndere, og mere og mere uoplagt. Han ville kun spise chokolade og karameller. Så efter de 3 måneder opgav jeg simpelthen, så nu kører vi sondemad igen. Men mon ikke han på et tidspunkt selv tager initiativ. Han kan jo starte i skole til sommer og der håber jeg lidt at han kommer til at indse at det skal til.
Vi er jo lidt anderledes fra andre forældre, da vi ikke holde så skarpt øje med hvad Mikkel skal kunne i en speciel alder. Vi er jo bare glade for at vi har ham – dermed ikke sagt at vi skal fastholde ham i sygdommen og lade ham spise sondemad. De 3 måneder hvor vi skulle lære ham at spise almindelig mad var bare så hårde, for der ville han ikke lege på legepladsen, talepædagogen kunne slet ikke arbejde med ham fordi han lå slapt hen over bordet og sov. Så der valgte vi altså at sige stop og lade ham tage det i sit eget tempo. Selvfølgelig skal Mikkel lære at spise rugbrød med leverpostej."

Int: "Er der noget du synes at Familiehuset har manglet?"

Pia: "Altså når børnenes bedsteforældre har været på besøg og overnattet har det jo foregået i musiklokalet, da der ikke har været kapacitet til dem. Og man har altså brug for lidt aflastningen en gang imellem når man har et sygt barn og der hidkalder man jo oftest sine forældre eller hvad man ellers har i sit netværk."

Int: "Hvordan er det i Familiehuset med faciliteterne, er de meget tilbagetrukket eller meget åbne?"

Pia: "De har et stort fælles køkken med tilhørerende legeområde, hvor man går hen hvis man vil være social. Derudover er det også der man står hvis man skal lave mad. Og det kan godt virke ret intimt at stå og lave sin egen aftenmad til sin egen lille familie med fremmede omkring sig.
Men samtidig meget godt da man lidt bliver tvunget til at snakke med andre som også står i en træls situation og helt sikkert gennemgår de samme følelser som en selv. Det har også medvirket til at vi ikke har gjort brug af psykologhjælp, selvom vi har været berettiget. Det at snakke med andre familier.
Også det at legehjørnerne er i samme lokale gør at når børnene så ville ud fra værelset og lege så bliver man nødt til at gå med selvom man måske mest har haft lyst til at sidde alene. Og når man så kommer derover og begynder at snakke med andre, så er man jo glad for at man gik med, så på den måde trækker børnene også forældrene ud af værelserne.
Det er vigtigt at man kan trække sig og være på værelserne, men det er også afgørende at man kommer til det fællesområde.
Så hvis det er bevist at de har samlet køkken med legeområder, så er det genialt. Så man både kommer ud af sin boble når man skal lave mad og når man skal lege.
Desuden er det udendørst legeområde helt genialt, da det er helt aflukket, så man har jo i sjælden når man ens barn leger derude. Specielt fordi familiehuset ligger midt i trafik osv."

Int: "Hvad med the-køkken på værelserne?"

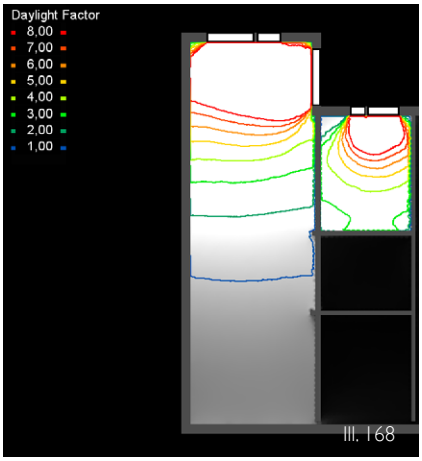
Pia: "Åh ja – det har vi også savnet. En gang i mellem har man brug for at de bare var vores lille familie. Og så kan det være træls at man skal gå 300 meter efter en kop kaffe og gå 300 meter tilbage.
Så et the-køkken ville bestemt have været rart. Men samtidig har vi også haft brug for at komme ud i det sociale selvom jeg ikke har vidst det, da vi er meget private mennesker. Så hvis man skal have et lille køkken skal det næsten være uden kogeplader, så man bliver tvunget ud en gang i mellem.
Så det er en hårfin grænse for hvordan man deler det op. For skal man gå ud i det sociale område direkte fra sin dør eller skal man gå lidt for at komme derhen. I Familiehuset er der meget lange gange og selvom de ikke er triste, så er der stadig langt."

Int: "Er der ekstrafaciliteter som du havde ønsket at der havde været i Familiehuset?"

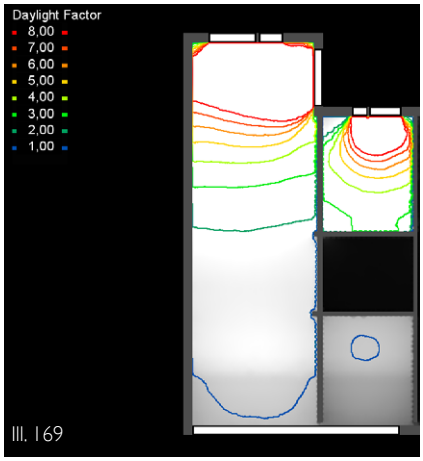
Pia: "Selvom man slet ikke havde tænkt det så blev der på et tidspunkt doneret 2 ladcykler, hvilket bare gav så god mening. For så kunne man tage børnene med på tur. Fx til McDonalds i drive-in. Der er jo ingen grænser for hvad folk vil donere til sådan et formål som Familiehuset.
Jeg synes bestemt ikke der mangler noget i dag, men i starten var der selvfølgelig ikke så meget, men det er der hurtigt blevet lavet om på.
Det eneste jeg kan komme i tanke om – men ved ikke om I kan bruge det til noget - er at jeg synes der manglede noget hjælp fra fagligt personale. Ved godt der er rigtig mange frivillige, men kunne godt have brugt noget fagligt personale, der kunne hjælpe med Mikkel når han var der eller Tobias når han havde brug for hjælp.
De frivillige er meget flydende i Familiehuset. Kunne godt have brugt at der var nogle arrangementer på nogle tidspunkter i løbet af dagen hvor man kunne aflevere sit raske barn så man vidste at det havde det godt, mens man måske selv kunne koble lidt af uden at det var bedsteforældrene som var der.
Også hvis Mikkel skulle have medicin sent om aftenen og om natten, så blev man nødt til at tage over på sygehuset og sove det, da vi ikke selv måtte give ham det medicin. Selvom vi har set dem give det hundrede gange, så skulle det være fagpersonale som skulle give ham det. Og der havde det været rart med en sygeplejeske på stedet. Når man skulle have en nat på børneafdelingen blev det jo heller ikke til meget søvn, da der er så meget gråd og grædende børn på den afdeling."

APPENDIX 06
DAYLIGHT IN LIVINGROOM

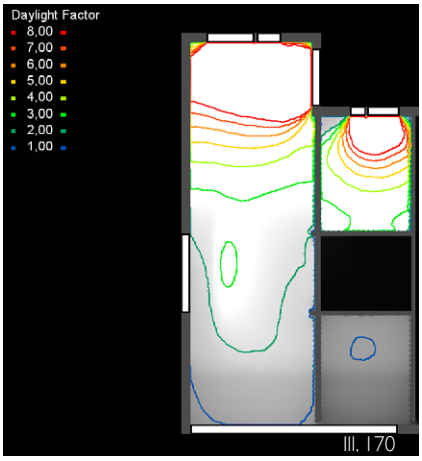
In order to achieve the highest score according to DGNB SOC 1.4.1, the requirement is that there must be a daylight factor of at least 3% in 50% of the utility area. (DK-DGNB, 2016 p 262) This has been investigated in the program Velux daylight visualizer.



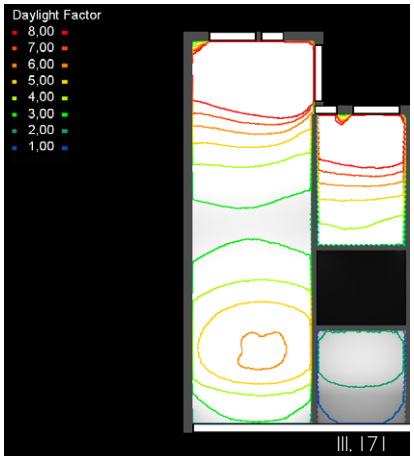
The living room was a challenge because of the room's dimensions.
Area of the windows in living room: 11.76 m^2
Area of living room: 44 m^2
Percent: 11.76/44*100 = 26.7 %
Result: only 33% of the utility area has a daylightfactor on 3%.



Adding a horizontal window against east
Area of the windows in living room: 13.86 m^2
Area of living room: 44 m^2
Percent: 13.86/44*100 =31.50 %
Result: Didn't help much on the daylight factor



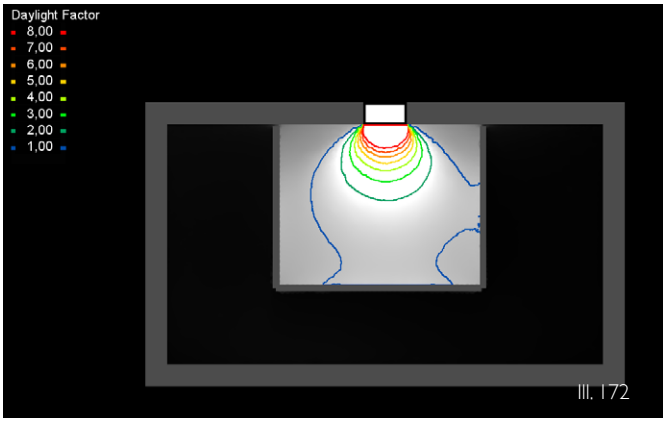
Added a horizontal window against south
Area of the windows in Lightroom: 15.55 m^2
Area of living room: 44 m^2
Percent: 15.55/44*100 =35.4 %
Result: Getting closer to the 50 % of the utility area with a daylight factor on 3 %



Added a window in the roof and deleted the window against south.
Area of the windows in living room: 17.18 m^2
Area of living room: 44 m^2
Percent: 17.18/44*100 =39.05 %
Result: The DGNB SOC. 1.4.1 requirement has been met.

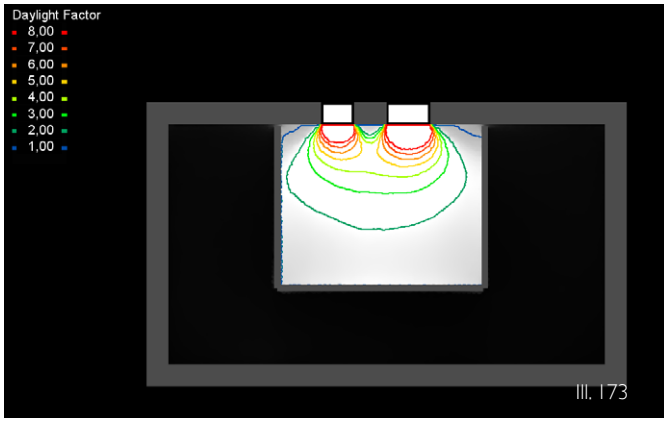
APPENDIX 07
DAYLIGHT IN OFFICE

In order to achieve the highest score for DGNB SOC 1.4.2, the requirement is that there must be a daylight factor of at least 3%, for at least 80% of all workplaces. (DK-DGNB, page 262)



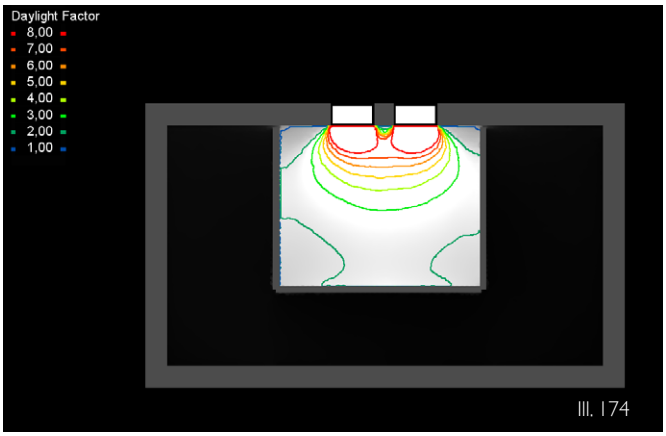
Ill. 172

Area of the windows in office: 2.5 m^2
Area of meeting room: 15 m^2
Percent: 2.5/15*100 = 16.7 %
Result: There isn't a daylight factor of at least 3%, for at least 80% of all workplaces.



Ill. 173

Another window was added
Area of the windows in office: 3.75 m^2
Area of meeting room: 15 m^2
Percent: 3.75/15*100 = 25 %
Result: Nearly 50 % of all workplaces has a daylight factor at 3%.



Ill. 174

Another bigger window was added
Area of the windows in office: 5 m^2
Area of living room: 15 m^2
Percent: 5/15*100 = 33.3%
Result: The DGNB SOC. 1.4.2 requirement has been met.

APPENDIX 08
REVERBERATION TIME

Room Livingroom

Demand DGNB T= ≤ 0.6 s (Living room)

Volume		Areas	
V: m3	183	Floor	43,0
		Wall	133,1
		Ceiling	41,2
		Windows	11,0
		Skylight	1,8
		Doors	9,5

Based on the Sabine formula

$$T_{60} = 0.161 \frac{V}{A_t}$$

T60 = Reverberation time
V = volume
A = Total absorptionarea

Surfaces

	Type	Area	125 hz	250 hz	500 hz	1000 hz	2000 hz	4000 hz
Floor	Wooden floor	43,0	0,18	0,12	0,10	0,09	0,08	0,07
Wall	Brick (natural)	133,1	0,03	0,03	0,03	0,04	0,05	0,07
	Plasterboard on batten with glasswool		0,30	0,20	0,15	0,05	0,05	0,05
Ceiling	Markant regula (u. perfo.)		0,40	0,20	0,10	0,05	0,05	0,05
	Markant quadro (perfo.)		0,45	0,60	0,70	0,65	0,60	0,45
	Ecophon gedina A	41,2	0,45	0,90	1,00	0,85	0,95	0,95
	Troldtekt akustik i nedhængt loft		0,75	1,00	0,95	0,90	0,80	0,90
Windows	Glass	12,8	0,10	0,07	0,05	0,05	0,02	0,02
Doors	Plate door	9,5	0,10	0,07	0,05	0,04	0,04	0,04
Furniture	Wooden seating, moderate upholstered (	2,0	0,40	0,50	0,58	0,61	0,58	0,50
	Couch	2,0	0,70	0,76	0,81	0,84	0,84	0,81
			34,70	50,31	53,39	48,13	52,71	54,72

Total absorptionarea

Test 1	Brick wall + gypsum ceiling		32,64	2,47	16,31	15,17	15,63	17,64
Test 2	Gypsum wall + ceiling		68,58	44,10	32,28	16,51	15,63	14,98
Test 3	Gypsum wall + markant quadro		70,64	60,58	57,00	41,23	38,29	31,46
Test 4	Gypsum wall + troldtekt		83,00	77,06	67,30	51,33	46,53	50,00
Test 5	Gypsum wall + ecophon		70,64	72,94	69,36	49,47	52,71	52,06
Test 6	Brick wall + ecophon ceiling		34,70	50,31	53,39	48,13	52,71	54,72

Reverberationtime

		125 hz	250 hz	500 hz	1000 hz	2000 hz	4000 hz
Brick wall + gypsum ceiling		0,90	11,84	1,79	1,93	1,87	1,66
Gypsum wall + ceiling		0,43	0,66	0,91	1,77	1,87	1,95
Gypsum wall + markant quadro		0,41	0,48	0,51	0,71	0,76	0,93
Gypsum wall + troldtekt		0,35	0,38	0,43	0,57	0,63	0,58
Gypsum wall + ecophon		0,41	0,40	0,42	0,59	0,55	0,56
Brick wall + ecophon ceiling		0,84	0,58	0,55	0,61	0,55	0,53

APPENDIX 09
BE18

Nøgletal, kWh/m² år

Renoveringsklasse 2

Uden tillæg	Tillæg for særlige betingelser	Samlet energiramme
96,8	0,0	96,8
Samlet energibehov		62,3

Renoveringsklasse 1

Uden tillæg	Tillæg for særlige betingelser	Samlet energiramme
72,7	0,0	72,7
Samlet energibehov		62,3

Energiramme BR 2018

Uden tillæg	Tillæg for særlige betingelser	Samlet energiramme
41,8	0,0	41,8
Samlet energibehov		62,3

Energiramme lavenergi

Uden tillæg	Tillæg for særlige betingelser	Samlet energiramme
33,0	0,0	33,0
Samlet energibehov		62,3

Bidrag til energibehovet

Varme	11,9
El til bygningsdrift	27,5
Overtemp. i rum	0,0

Netto behov

Rumopvarmning	7,9
Varmt brugsvand	6,5
Køling	0,0

Udvalgte elbehov

Belysning	8,7
Opvarmning af rum	2,7
Opvarmning af vbv	0,2
Varmepumpe	0,0
Ventilatorer	15,5
Pumper	0,6
Køling	0,0
Totalt elforbrug	86,2

Varmetab fra installationer

Rumopvarmning	0,2
Varmt brugsvand	1,3

Ydelse fra særlige kilder

Solvarme	0,0
Varmepumpe	0,0
Solceller	0,0
Vindmøller	0,0

Result without impairment to 45 hours a week

Ill. 175

Nøgletal, kWh/m² år

Renoveringsklasse 2

Uden tillæg	Tillæg for særlige betingelser	Samlet energiramme
96,8	0,0	96,8
Samlet energibehov		32,7

Renoveringsklasse 1

Uden tillæg	Tillæg for særlige betingelser	Samlet energiramme
72,7	0,0	72,7
Samlet energibehov		32,7

Energiramme BR 2018

Uden tillæg	Tillæg for særlige betingelser	Samlet energiramme
41,8	0,0	41,8
Samlet energibehov		32,7

Energiramme lavenergi

Uden tillæg	Tillæg for særlige betingelser	Samlet energiramme
33,0	0,0	33,0
Samlet energibehov		32,7

Bidrag til energibehovet

Varme	22,4
El til bygningsdrift	7,2
Overtemp. i rum	0,0

Netto behov

Rumopvarmning	16,2
Varmt brugsvand	6,5
Køling	0,0

Udvalgte elbehov

Belysning	2,4
Opvarmning af rum	0,7
Opvarmning af vbv	0,2
Varmepumpe	0,0
Ventilatorer	3,5
Pumper	0,6
Køling	0,0
Totalt elforbrug	23,0

Varmetab fra installationer

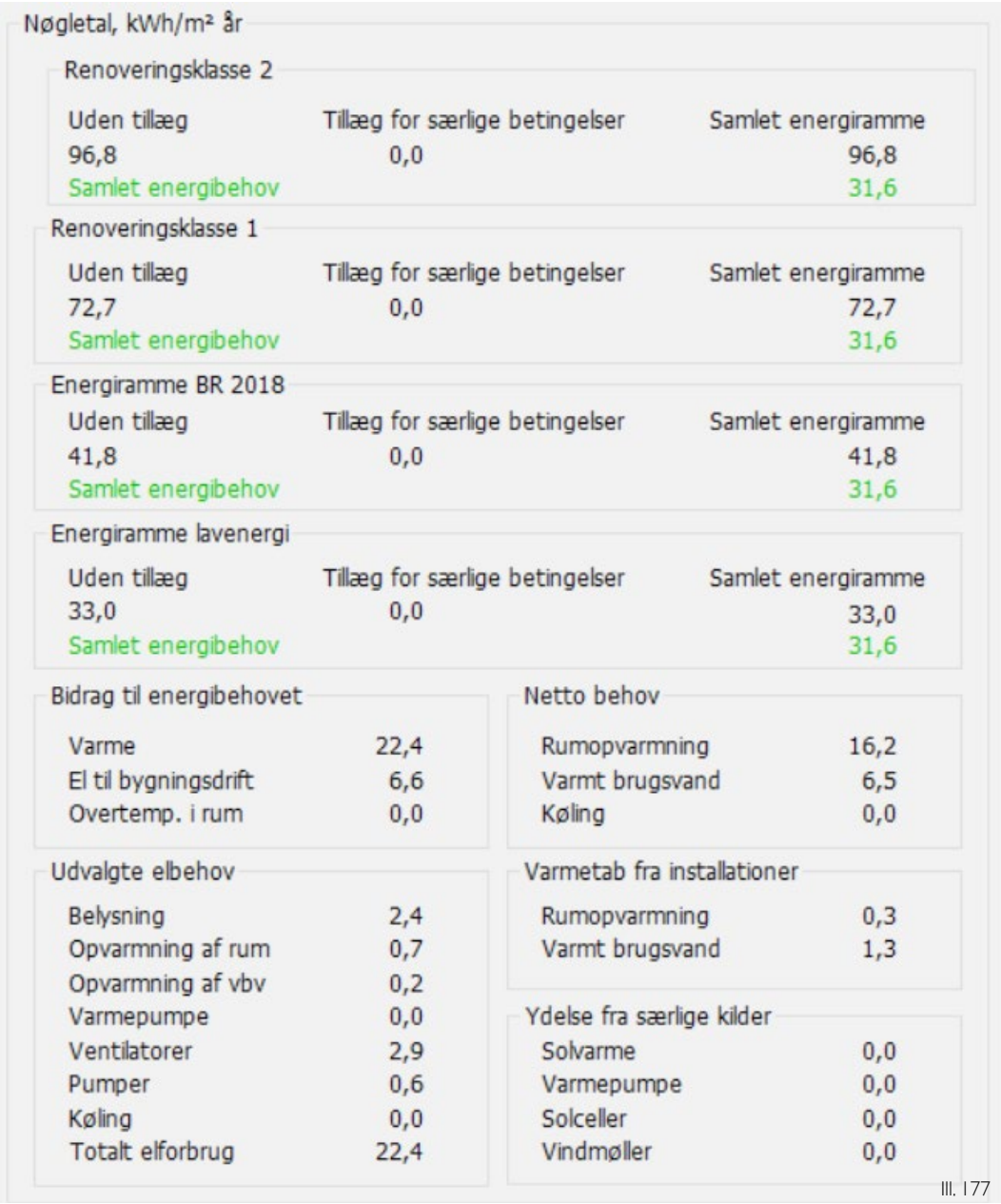
Rumopvarmning	0,3
Varmt brugsvand	1,3

Ydelse fra særlige kilder

Solvarme	0,0
Varmepumpe	0,0
Solceller	0,0
Vindmøller	0,0

Result without PV

Ill. 176



Ill. 177

Result with PV

APPENDIX 10
U-VALUES

Foundation	Thickness (e)	Thermal conductivity (λ)	Thermal Resistance (R) = e/λ
Unit	m	W/mK	K m²/W
Inner resistivity			0.10
Wood floor	0.01	0.130	0.08
Concrete	0.12	2.100	0.05
Polystyren	0.4	0.033	12.12
Sand	0.15	2.000	0.08
Exterior resistivity			1.5
Total	0.53		13.93
U-value (W/m²K)			0.07

Roof	Thickness (e)	Thermal conductivity (λ)	Thermal Resistance (R) = e/λ
Unit	m	W/mK	K m²/W
Inner resistivity			0.10
Ecophon ceiling	0.025	0.25	0.10
Wood beams with insulation	0.3	0.0453	6.62*
Battens with insulation	0.045	0.0432	1.04**
Insulation	0.145	0.037	3.92
Plywood	0.021		
Roofing felt	0.08		
Exterior resistivity			0.04
Total	0.593		11.88
U-value (W/m²K)			0.08

*Lamda for the inhomogene layer (wooden beams (140mm cc 1800mm) :

Lamda for insulation	0.037	W/mK
Width of insulation	0.54	m
Lamda for wood	0.12	W/mk
Width of wood	0.06	m
Inhomogen lamda (λ')	0.045	W/mK

**Lamda for the inhomogene layer (wooden battens (45m cc 600mm) :

Lamda for insulation	0.037	W/mK
Width of insulation	0.555	m
Lamda for wood	0.12	W/mk
Width of wood	0.045	m
Inhomogen lamda (λ')	0.043	W/mK

Exterior wall: Brick	Thickness (e)	Thermal conductivity (λ)	Thermal Resistance (R)= e/λ
Unit	m	W/mK	e/λ
Inner resistivity			0.13
Plaster	0.005	0.27	0.02
Brick	0.108	0.5	0.22
Insulation	0.33	0.037	8.92
Brick	0.108	0.5	0.22
Plaster	0.005	0.27	0.02
Exterior resistivity			0.04
Sum	0.556		9.56
U-value (W/m²K)			0.10

Exterior wall: ½ Brick	Thickness (e)	Thermal conductivity (λ)	Thermal Resistance (R)= e/λ
Unit	m	W/mK	e/λ
Inner resistivity			0.13
Gypsum, 2 layers	0.025	0.25	0.1
Stud with insulation cc 600	0.095	0.046	2.06
Stud with insulation cc 600	0.295	0.04623	6.38
Fibercement windbarrier	0.012	0.049	0.24
Airgap	0.05	0.075	0
Brick	0.108	0.5	0.22
Exterior resistivity			0.04
Total	0.585		9.17
U-value (W/m²K)			0.11

Basement exterior wall	Thickness (e)	Thermal conductivity (λ)	Thermal Resistance (R)= e/λ
Unit	m	W/mK	K m²/W
Inner resistivity			0.13
Concrete	0.2	2.1	0.10
Insulation	0.3	0.037	8.25
Exterior resistivity			1.25
Total	0.5		9.58
U-value (W/m²K)			0.10

Exterior wall: Wooden slats	Thickness (e)	Thermal conductivity (λ)	Thermal Resistance (R)= e/λ
Unit	m	W/mK	e/λ
Inner resistivity			0.13
Gypsum, 2 layers	0.025	0.25	0.1
Battens with insulation cc 600	0.045	0.046*	0.97
Stud with insulation cc 600	0.295	0.046*	6.38
Fibercement windbarrier	0.012	0.049	0.24
Vertikal battens	0.045		
Horisontal battens	0.025		
Vertical sheating	0.025		
Exterior resistivity			0.04
Total	0.535		7.87
U-value (W/m²K)			0.13

Exterior wall: Wooden slats bedroom	Thickness (e)	Thermal conductivity (λ)	Thermal Resistance (R)= e/λ
Unit	m	W/mK	e/λ
Inner resistivity			0.13
Gypsum, 2 layers	0.025	0.25	0.1
Battens with insulation cc 600	0.045	0.046*	0.97
Stud with insulation cc 600	0.295	0.046*	6.38
Fibercement windbarrier	0.012	0.049	0.24
Vertikal battens	0.025		
Horisontal battens	0.025		
Vertical sheating	0.025		
Exterior resistivity			0.04
Total	0.452		7.87
U-value (W/m²K)			0.11

*Lamda for the inhomogene layer (wooden beams (45mm cc 600mm) :

Lamda for insulation	0.037	W/mK
Width of insulation	0.555	m
Lamda for wood	0.16	W/mk
Width of wood	0.045	m
Inhomogen lamda (λ')	0.0462	W/mK

APPENDIX II
PV CALCULATION

The energi solar cells should cover:	27,5	kWh/m2	
Area of whole building	1450	m2	
Annual yield (kWh in all)	39875	kWh	

We know how many kWh/year we want, and therefore we need to find the area of solar cells needed.

E: Solar radiation intensity:	999	kWh/m2	(Horisontal)
D: Evaluation of system factor:	0,6		(Light shadow)
C = Annual yield/(D*E) =	66,5		
B: Module efficiency:	16,5	%	JKM270P-60 255-270 Watt
A = C*100/B (since C = A*B/100) =	**403**	**m2**	

We therefore need **403** m2 of photo voltic to cover the energy need.

Area of the roof on 1 unit	168,5	m2
Area 3 units roof	505,5	m2
Area of 1 solar cell	1,7	m2
Elements needed	240,8	

APPENDIX 12
STATIC CALCULATION

Program: Parallel beam over a section with one-sided cantilever

Base: DS/EN 1990 FU: 2013 & DS/EN 1991-1-3 FU: 2014
DS/EN 1995 FU: 2013 & DS/EN 1995-1-2+AC:2007 + DK NA 2007

Classes:		Fire-affected surfaces:	
Use class: (1 / 2 / 3)	1	Width: (0 / 1 / 2)	2
Impact class: (CC1 / CC2 / CC3)	CC2	Height: (0 / 1 / 2)	2
Glulam class: (GL 30c / GL 28cs)	GL30c	Fire duration:	30 min

System and dimensions:			Characteristic loads:	
Span subjects:	ℓ	16.200 m	Slope of roof	0.0 degress
Length of cantilever:	ℓ_{uk}	6.800 m	Self load roof	0.60 kN/m^2
Remuneration Length:	ℓ_v	100 mm	Self load beam	0.51 kN/m^2
Load width:	e	1.800 m	Terrain value snow	1.00 kN/m^2
Lateral stiffened per.:	ℓ_s	1.000 m	Formfactor snow u2	0.80
Width of the beam:	**b**	**140 mm**	Snowload s	0.80 kN/m^2
Height of the beam:	**h**	**733 mm**		

Deflection kriterie:

Self load:	$w_{G,fin,\ell} < \ell$ / **400**	$w_{G,fin,UK} < \ell_{UK}$ / **200**	$w_{c,\ell}$ = **0** mm
Snowload:	$w_{inst,\ell} < \ell$ / **400**	$w_{inst,UK} < \ell_{UK}$ / **200**	$w_{c,UK}$ = **0** mm

STR 6.10b: 1,0x1,0xG + 1,0x1,5xS (K-load)

			Reactions:	
Remuneration:	V_d =	35.76 kN	R_A =	26.81 kN
Subject:	$M_{fag,d}$ =	95.78 kNm	R_B =	61.28 kN
Cantilever:	$M_{B,d}$ =	-86.77 kNm		

Confirmation:

k_{cr} =	1.0	Displacement	τ_d	=	0.52 MPa	<	2.42 MPa
$k_{c,90}$ =	1.75	Side tree	$\sigma_{c,90,d}$	=	2.74 MPa	<	3.03 MPa
k_h =	1.000	Inflection	$\sigma_{m,d}$	=	7.64 MPa	<	20.77 MPa
k_{crit} =	1.00	Mowing	$\sigma_{m,d}$	=	7.64 MPa	<	20.77 MPa

Deflections:

Self load subject	16 mm	25 mm	<	41 mm
Self load cantilever	-4 mm	-7 mm	>	-34 mm
Snowload subject	18 mm		<	41 mm
Snowload cantilever	-15 mm		>	-34 mm

Fire (6.11b): G + 0,2xS

V_d =	17.92 kN		$M_{fag,d}$	=	44.82 kNm	$M_{B,d}$ =	-43.49 kNm
k_{cr} =	1.0	Displacement	τ_d	=	0.42 MPa	<	4.03 MPa
k_{crit} =	0.52	Mowing	$\sigma_{m,d}$	=	6.78MPa	<	17.94 MPa

APPENDIX 13
CO2 LEVEL LIVINGROOM

To get an idea of how much we need to ventilate in the room, there is made an calculation of the CO2 level, with people and polution from materials etc.. Max CO2 level for the livingroom is 700 ppm.

This is done based on the following formular:

$$c = \frac{q}{nV}(1 - e^{-n\tau}) + (c_0 - c_i)e^{-n\tau} + c_i$$

q: CO2 polution from materials	0,2	l/s pr m2
q: CO2 polution / person	19	l/s
n: airchange	1,8	h^-1
V: Volume	182,75	m3
c_0: CO2 level in the room	0,00035	
c_i: CO2 level outside	0,00035	
Floor area	43	m2

Start	End	Time	Persons	q: CO2 polution	CO2 level	CO2 level
		(hours)		(m3/h) (19 l/s*prs)/1000		ppm
					0,00035	350,0
6	7	1	1	0,0276	0,000420	420,0
7	8	1	4	0,0846	0,000576	576,2
8	9	1	4	0,0846	0,000602	602,1
9	10	1	4	0,0846	0,000606	606,3
10	11	1	2	0,0466	0,000511	510,6
11	12	1	2	0,0466	0,000495	494,8
12	13	1	2	0,0466	0,000492	492,2
13	14	1	2	0,0466	0,000492	491,7
14	15	1	6	0,1226	0,000685	684,5
15	16	1	4	0,0846	0,000620	620,0
16	17	1	2	0,0466	0,000513	512,9
17	18	1	2	0,0466	0,000495	495,2
18	19	1	2	0,0466	0,000492	492,2
19	20	1	3	0,0656	0,000540	540,0
20	21	1	3	0,0656	0,000548	547,9
21	22	1	3	0,0656	0,000549	549,2
22	23	1	3	0,0656	0,000549	549,4
23	24	1	1	0,0276	0,000453	453,0
24	1	1	1	0,0276	0,000437	437,1
1	2	1	1	0,0276	0,000434	434,4
2	3	1	1	0,0276	0,000434	434,0
3	4	1	1	0,0276	0,000434	433,9
4	5	1	1	0,0276	0,000434	433,9
5	6	1	1	0,0276	0,000434	433,9

APPENDIX 14
CO2 LEVEL PARENTS BEDROOM

To get an idea of how much we need to ventilate in the room, there is made an calculation of the CO2 level, with people and polution from materials etc.. Max CO2 level for the bedroom is 700 ppm.

This is done based on the following formular:

$$c = \frac{q}{nV}(1 - e^{-n\tau}) + (c_0 - c_i)e^{-n\tau} + c_i$$

q: CO2 polution from materials	0,2	l/s pr m2
q: CO2 polution / person	19	l/s
n: airchange	1,0	h^-1
V: Volume	182,75	m3
c_0: CO2 level in the room	0,00035	
c_i: CO2 level outside	0,00035	
Floor area	11	m2

Start	End	Time	Persons	q: CO2 polut	CO2 level	CO2 level
		(hours)		(m3/h)		ppm
				(19 l/s*prs)/1000		
					0,00035	350,0
6	7	1	3	0,0592	0,000555	554,8
7	8	1	1	0,0212	0,000499	498,7
8	9	1	0	0,0022	0,000412	412,3
9	10	1	0	0,0022	0,000381	380,5
10	11	1	0	0,0022	0,000369	368,8
11	12	1	0	0,0022	0,000365	364,5
12	13	1	0	0,0022	0,000363	363,0
13	14	1	0	0,0022	0,000362	362,4
14	15	1	0	0,0022	0,000362	362,2
15	16	1	0	0,0022	0,000362	362,1
16	17	1	0	0,0022	0,000362	362,1
17	18	1	0	0,0022	0,000362	362,0
18	19	1	0	0,0022	0,000362	362,0
19	20	1	1	0,0212	0,000428	427,8
20	21	1	1	0,0212	0,000452	451,9
21	22	1	1	0,0212	0,000461	460,8
22	23	1	3	0,0592	0,000596	595,5
23	24	1	3	0,0592	0,000645	645,1
24	1	1	3	0,0592	0,000663	663,3
1	2	1	3	0,0592	0,000670	670,0
2	3	1	3	0,0592	0,000673	672,5
3	4	1	3	0,0592	0,000673	673,4
4	5	1	3	0,0592	0,000674	673,7
5	6	1	1	0,0212	0,000542	542,4

APPENDIX 15
CO2 LEVEL SOCIAL ROOM

To get an idea of how much we need to ventilate in the room, there is made an calculation of the CO2 level, with people and polution from materials etc.. Max CO2 level for the socialroom is 700 ppm.

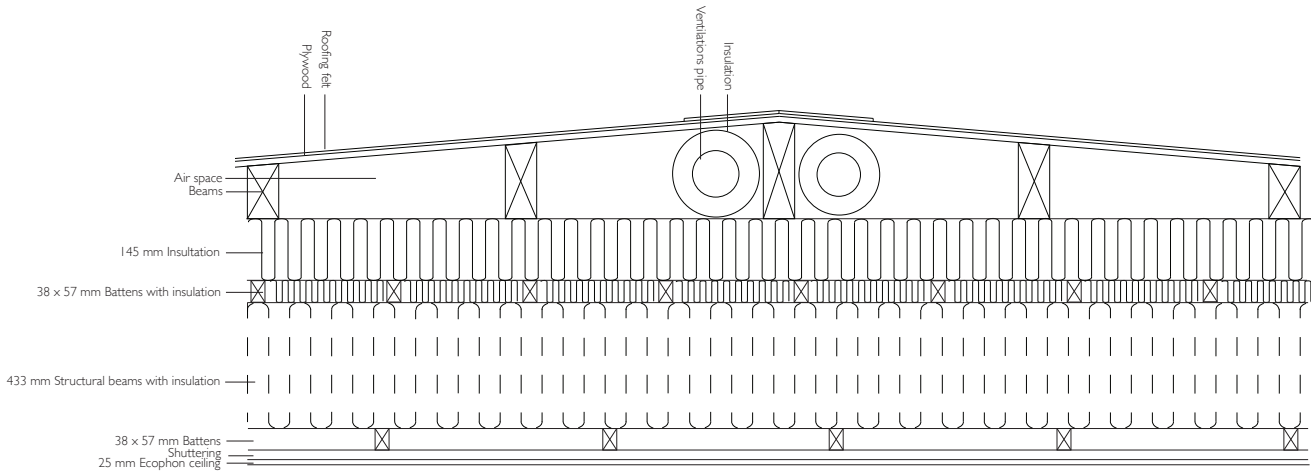
This is done based on the following formular:

$$c = \frac{q}{nV}(1 - e^{-n\tau}) + (c_0 - c_i)e^{-n\tau} + c_i$$

q: CO2 polution from materials	0,2	l/s pr m2		
q: CO2 polution / person	19	l/s		
n: airchange	5,6	h^-1	Idea for CAV with 3 levels	
V: Volume	297	m3	3 steps:	
c_0: CO2 level in the room	0,00035		High	5,6 h^-1
c_i: CO2 level outside	0,00035		Med	2,9 h^-1
Floor area	39,6	m2	Low	1 h^-1

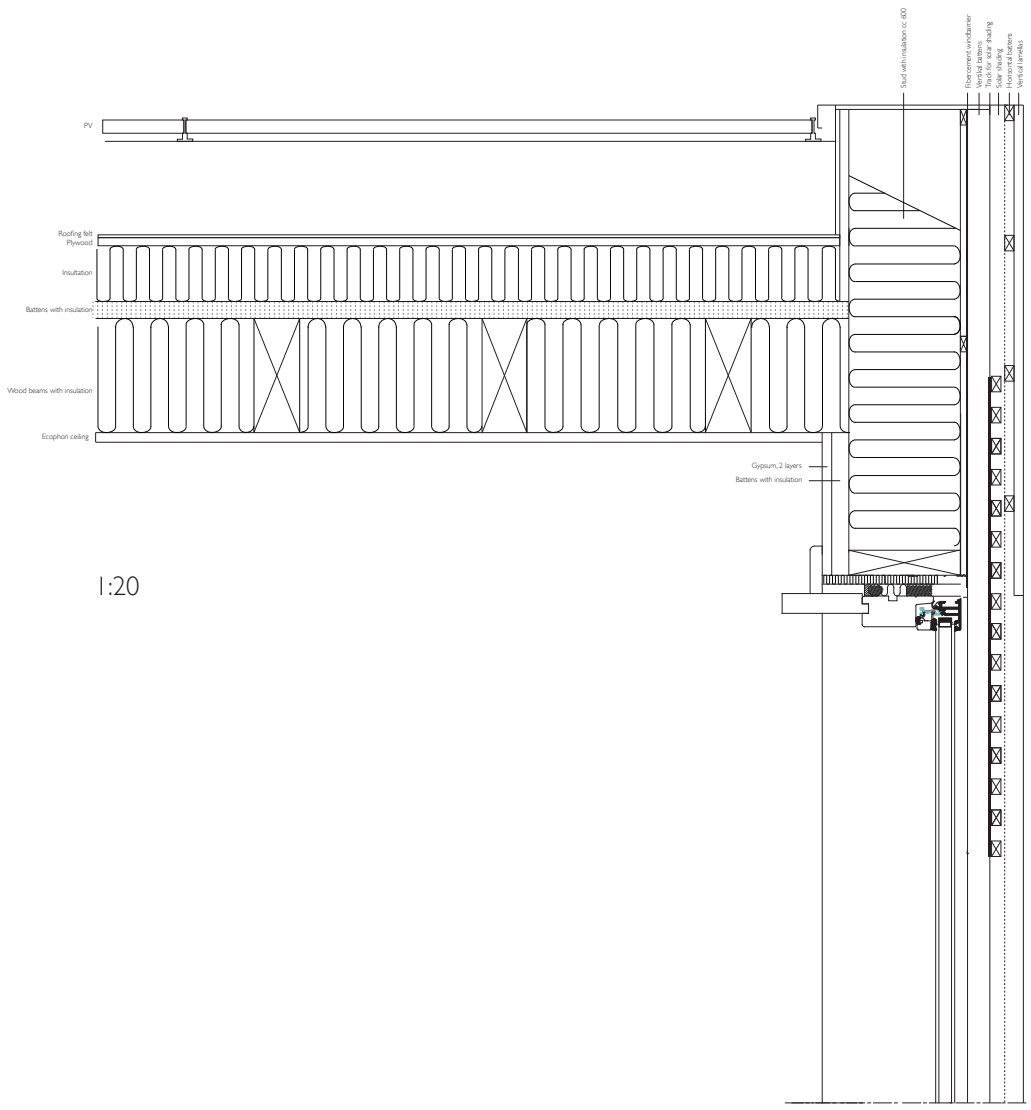
Start	End	Time	Persons	q: CO2 polut	CO2 level	CO2 level
		(hours)		(m3/h)		ppm
				(19 l/s*prs)/1000		
					0,00035	350,0
6	7	1	0	0,00792	0,000355	354,7
7	8	1	6	0,12192	0,000423	423,1
8	9	1	6	0,12192	0,000423	423,3
9	10	1	12	0,23592	0,000492	491,6
10	11	1	12	0,23592	0,000492	491,8
11	12	1	12	0,23592	0,000492	491,8
12	13	1	12	0,23592	0,000492	491,8
13	14	1	9	0,17892	0,000458	457,7
14	15	1	9	0,17892	0,000458	457,6
15	16	1	30	0,57792	0,000697	696,6
16	17	1	30	0,57792	0,000697	697,5
17	18	1	30	0,57792	0,000697	697,5
18	19	1	30	0,57792	0,000697	697,5
19	20	1	15	0,29292	0,000527	526,8
20	21	1	15	0,29292	0,000526	526,1
21	22	1	6	0,12192	0,000424	423,7
22	23	1	6	0,12192	0,000423	423,3
23	24	1	0	0,00792	0,000355	355,0
24	1	1	0	0,00792	0,000355	354,8
1	2	1	0	0,00792	0,000355	354,8
2	3	1	0	0,00792	0,000355	354,8
3	4	1	0	0,00792	0,000355	354,8
4	5	1	0	0,00792	0,000355	354,8
5	6	1	0	0,00792	0,000355	354,8

APPENDIX 16
DETAILS



Visual structural beam

1:20


PV
Roofing felt
Plywood
Insultation
Battens with insulation
Wood beams with insulation
Ecophon ceiling
Gypsum, 2 layers
Battens with insulation
Stud with insulation cc. 600
Fibre cement weatherbarrier
Wooden battens
Track for solar shading
Solar shading
Mineral insulation
Vertical lamellas

1:20