SALT BATH

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Preface

This thesis is the result of a 10th semester architectural project, developed at the department of Architecture & Design at Aalborg University. The report describes the foundation for the project, the process towards the design and the presentation of the bathing resort.

The report consists of four chapters; program, process, presentation and appendix. The structure of the report is reflecting the overall chronological progress in the project. The process has been iterative but here the process is divided in different aspects of the design, in order to make the understanding of the complex process easier. The process has been highly influenced by hand drawings and models this is shown in the process and appendix. The main energy calculations are documented in the appendix, and the key results are shown in the process. The presentation is divided in 2D and 3D drawings hereby the basic understanding is provided first and finally the general experiences of the SALT BATH is illustrated in collages.

The architectural concept for the design focuses on contrasts. The concept is developed by implementing the most important design parameters directly in the sketching phase. The contrasts used in the design are reflections of the specific building site. Hereby the transformation of the existing church will share the histories of the church, the environments and the function of a bathing resort. The design of the building must also focus on achieving a low energy demand, while creating good indoor climate. These two technical aspect are important when designing a building, which is likely to use a lot of energy, and even have problems with the indoor climate.

APPENDIX

PROGRAM

PROLOGUE

The foundation for this thesis is a competition regarding the transformation of Vesterø Havnekirke into a modern bath resort. The frame of this project is formulated with inspiration in the competition material, but with additive focus placed on architectural and energy related visions. Parts of the competition material are not followed in this project; i.e. the economical demand.

The Competition

The competition is set by Læsø Foundation and Læsø Municipality. Realdania is contributing to the financial foundation of the project. The project is made without considerations for the already built Læsø Kur.

Læsø Sydesalt is a strong brand in the Danish gastronomic world. Through the last 4-5 years the popularity of the salt, which is also fabricated as bathing salt and used in lotions has grown steadily. There is a solid foundation for using the salt to different treatments, i.e. psoriasis treatment. This treatment with salt is already practiced and it shows great results, but the location and the rooms, of the place for the treatment, are not satisfying. The idea of creating the SALT BATH is to expand this success into a serious resort, which both offers baths and treatment to the regular visitors but also special treatment for visitors with psoriasis.

In many hundred years Viborg Domkapitel owned the island of Læsø, and they were responsible for a large part of the salt production through the history, in a sense it is appropriate that the salt is used inside the church in a bathing resort, for making a relation to the old days.*

The idea is to reuse the religious building to a new vernacular function, and to do it with respect for its history and the nature;

-Connection between the existing church building and the new building.

-Reuse of the special rooms and qualities in the church

-Adjustment to the local town and landscape with the sea as a near neighbor

For the entire competition material use the CD, or read the extract in appendix A.

*Viborg Domkapitel was one of the most important Domkapitel´s in Jutland. For centuries Viborg Domkapitel owned Læsø and was the in charge of the salt production from 1100-1652.

[Saltproduktion; på Læsø, i Danmark og i Europa]

Initiative Problem Statement

“How can the transformations of the existing Vesterø Havnekirke, result in a bathing resort, preserving the character of the church and the environment?”

METHOLOGY

IDP

The Integrated Design Process [IDP] is a tool that enhances a holistic integration of both technical and aesthetic aspects in the design process. This method intertwines knowledge from both the engineering and the architectural fields, and this promotes integrated architecture.

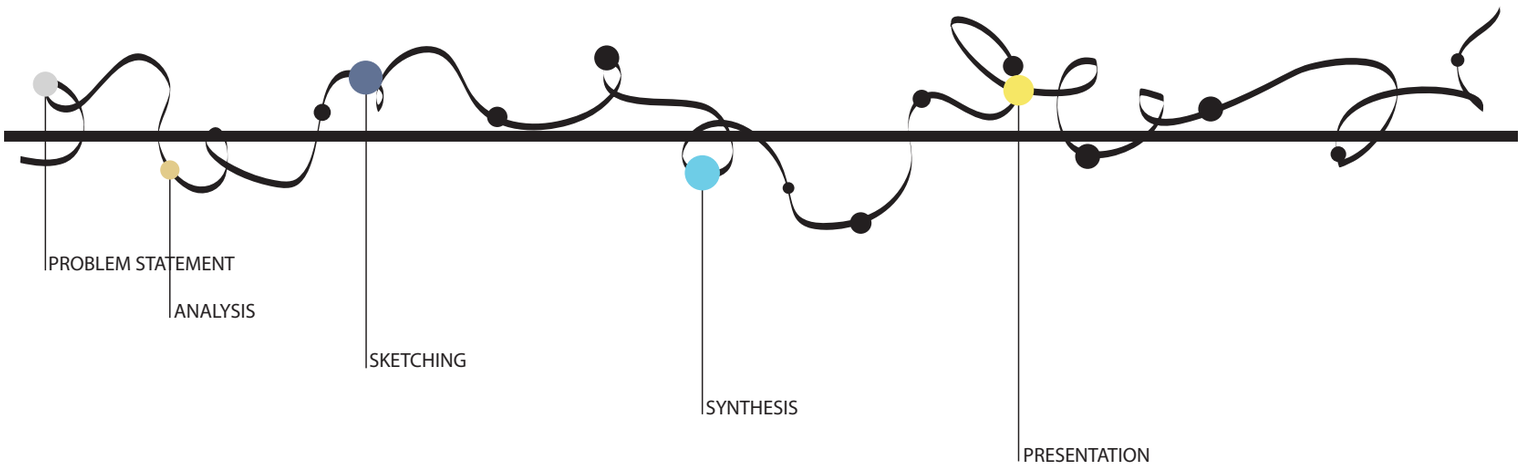
The method is used during the whole project period, from Program to Presentation. The method consists of five phases; Problem formulation, Analysis, Sketching, Synthesis and Presentation. Each phase sets a new focus, so the process will progress as according to plans.

The IDP is used to ensure the progression and keeping the deadlines during the project.

[Integrated design process]

Iterations

In a successful design process the iterative process is dominating; the design keeps evolving and improving throughout the different phases, also during the last phase. Through evaluating the design and testing the architectural and technical properties, continuously it is possible to improve problems in the design during the process.



ill. 1 Integrated Design Proccess

Study trips

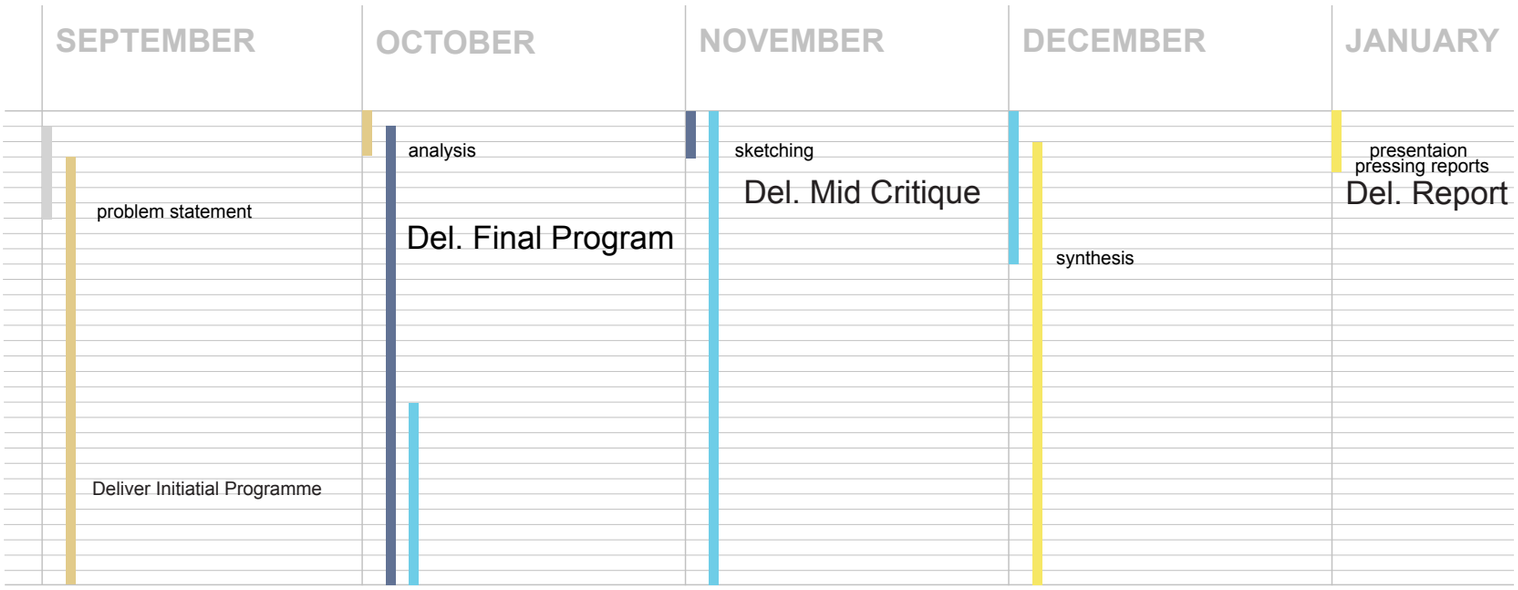
In the start of the project a study trip to Læsø was made. It was highly necessary in order to analyze the site and area, and to experience the entire area. The study trip included a tour in the build Læsø Kur, where small notations of successful details were made.

In general the sense of the island was captured and interpreted as a quite tourist minded island. The registration of the surroundings consisted of walks mainly along the Vesterø Havnegade and the beach, and from the beach to the actual site. At the site Læsø Wellness was build, and this building was of course studied both on the outside and on the inside. This last registration is not included in the program, since this thesis project has different aims than the Læsø Wellness.

When starting the sketching phase, information of different technical issues was emerging. A study trip to Haraldslund Svømmehal was made in order to see the technical aspects of a building with water.

Time schedule

The time schedule is an important tool almost implemented in the IDP. All phases overlap each other in less or larger extends, see ill 2. During the different phases, several tools are used. When communicating the project both text, illustrations, posters and models are used. When designing, both analogue and digital tool are used; drawings, models, and calculations. The concept of using many design tools is a way of testing the design and to explore its potentials.



ill. 2 photos from Study trip

ANALYSIS

Læsø

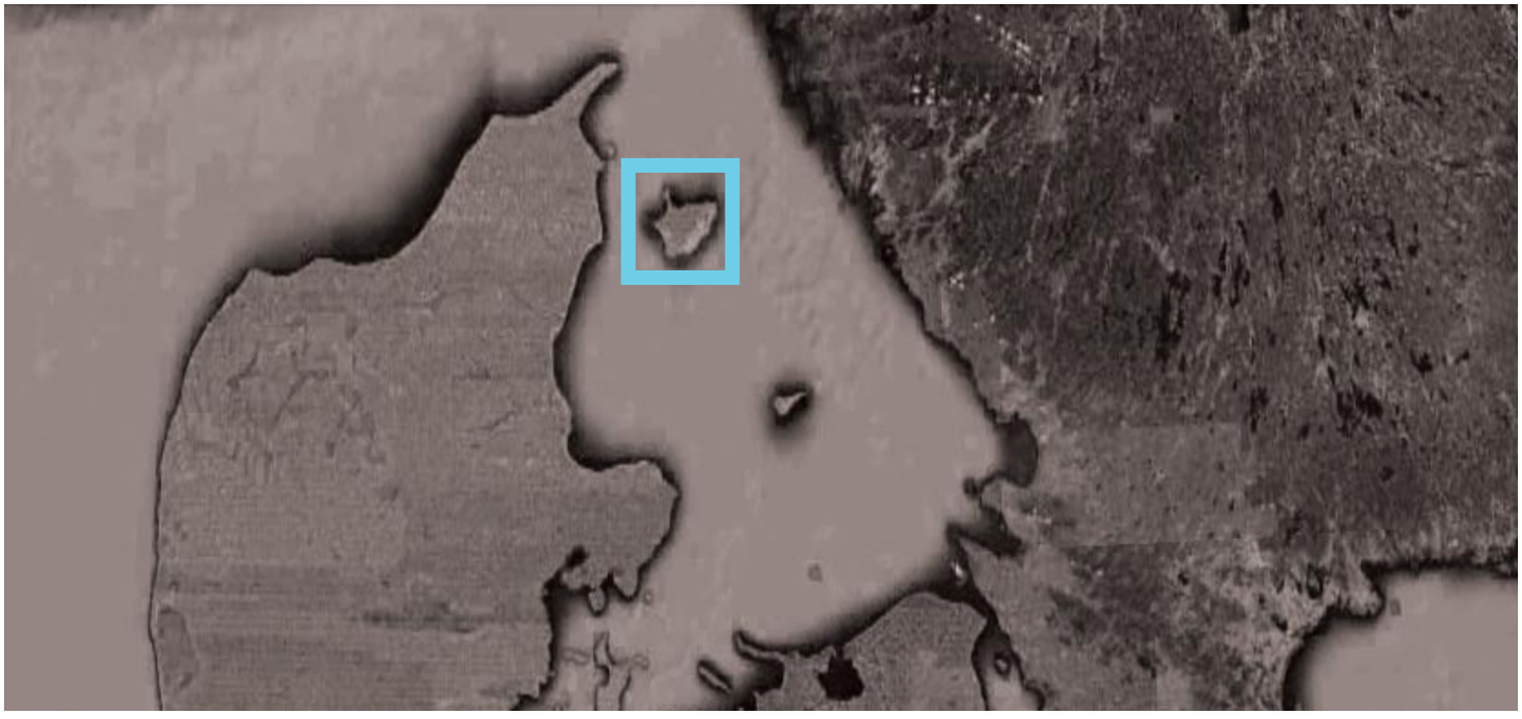
Læsø is located in the Danish sea Kattegat, between Frederikshavn (DK) and Göteborg (S), and is the largest island in that sea. It occupies 118 square kilometres and has 1.996 inhabitants.

The island is mostly known for the salt production and the historical method of production, which take place on a “salting house”; which is a very popular tourist attraction. The island has several treasuries; half timbered farm houses thatched with seaweed; “seaweed-farms” which are a central part of the history of the island. Besides the salting houses and the seaweed farms the island is known for its unique nature with sandy beaches and flat moors. In the sea area of Nordre Rønner there is a fauna of sea alga these have been used in special skin treatments for many years and they show effective results. In the beach areas of the island the land is very sandy, so mainly reed and rose hips grows here. The small square on ill.XX represents the area of Vesterø where the project site is located.

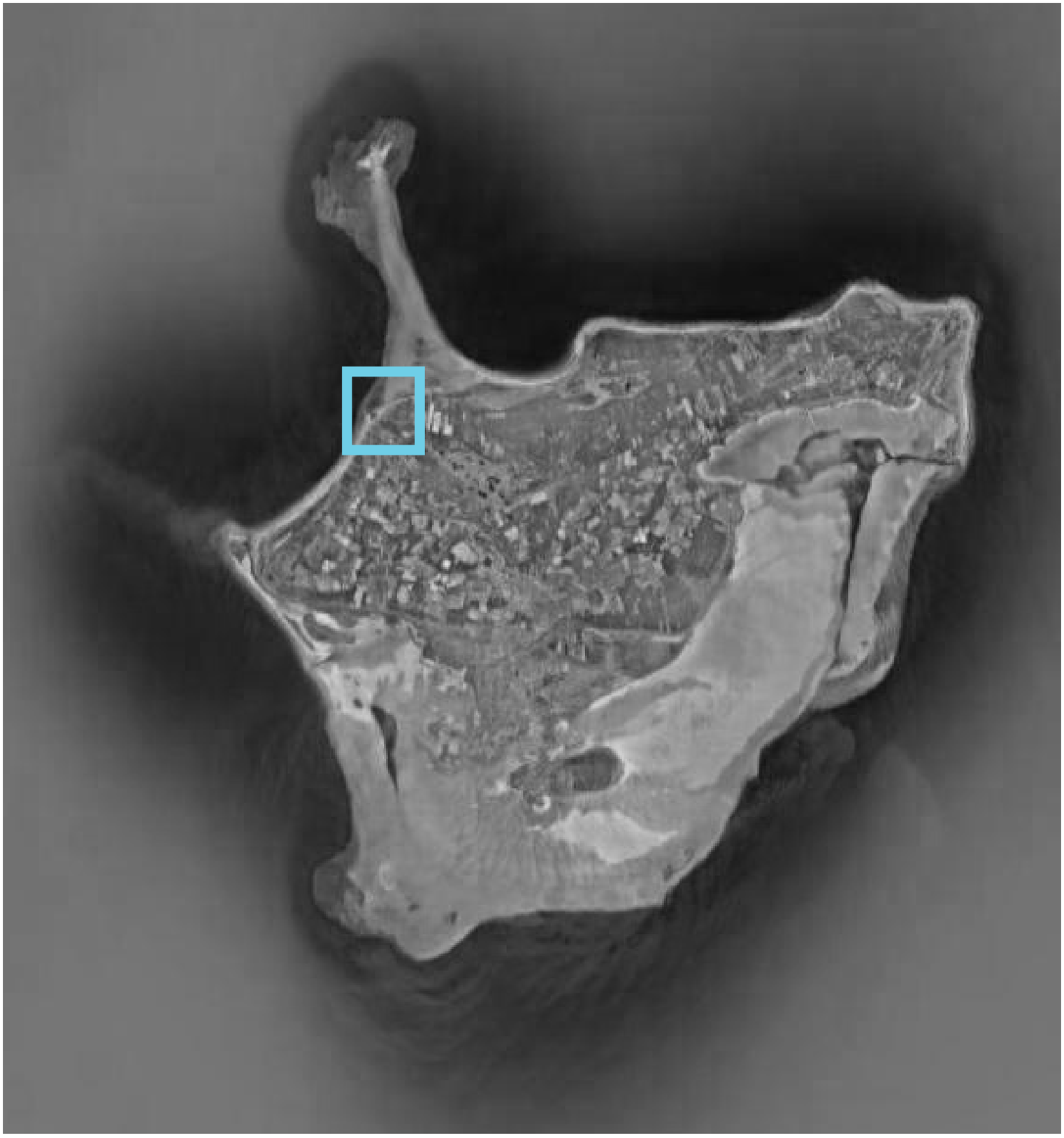
The island is a popular place for tourists, especially Danes, Germans, Norwegians and the Swedes. Comparing the number of people on the island during summer and winter reveals a large difference. The summer season starts in Easter and ends after the fall vacation in October. In the season of winter the number is 1.996, and consists almost only of inhabitants. The guests during the summer are mainly regular tourists but also a number of people with psoriasis come to the island to get a treatment with salt. The facilities of the place for treatments are very poor and there is a need for expanding, both to get better facilities and to attract more people with psoriasis. The fresh air and silent nights, which is only interrupted by the sounds of nature, are some of the experiences Læsø can offer.

[Læsø, rig på oplevelser]

[http://www.laesoe.dk]



ill. 3 Ortophoto of Denmark



ill. 4 Ortophoto of Læsø

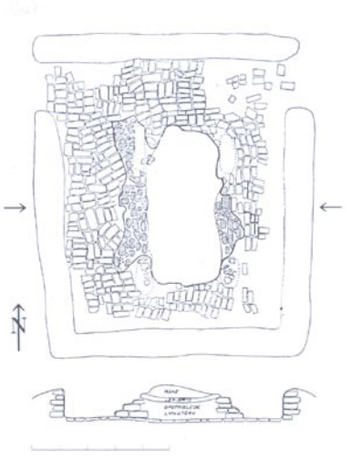
History of Salt Production

The production of salt at Læsø, started around year 1100. The production of salt has always been humble, mainly because the salt produced other places, like West Germany, would sell at a lower price on the markets, i.e. the Hansemarket. In the years of 1700-1800 the interest was to discover where the most salted water was located in the ground of the island. During the middle ages and renaissance the areas for salt production were located in the south of the main island, and the area was called “Boebakker”, see ill XX. The former salt production was situated at many places. In the late period of salt production the most important areas were Langerøn, Færøn, Kringelrøn (Rønnerne, see ill. XX) which were three islands south of the main island. The foundation for the century long production of salt was the good and changing opportunities for digging holes, which would naturally fill up with water with high salt levels; between 9-15 percent. The seawater that surrounds the island has salt levels of 2-3 percent; this meant that the water in these holes on the island were easier to produce salt from. The heavy production of salt consumed large amounts of wood, which was used to burn a fire beneath the big pan for the saltwater. Eventually the island became deforested, sandstorms almost buried villages, and salt extraction was banned. Some of the salt productions on the Rønnerne has been dug out and examined in the period 1957-1990. In these years archaeological diggings were made, to clarify the original making of salt. The dig-out showed how small houses were build around a big “pan” where the water with high levels of salt was put. From the 1980´ies the idea of attracting tourists by showing how to produce salt was developed and was planned to be a large asset for the island. The interests for the salt were now more cultural and historical. After knowing how the workers earlier produced the salt, a new house for salt production was build, in order to attract tourists and to tell the local story of salt production. The salt can be bought in several stores with other high quality products. Today there is made an economical sustainable salt production using the same techniques as for 1000 years ago.

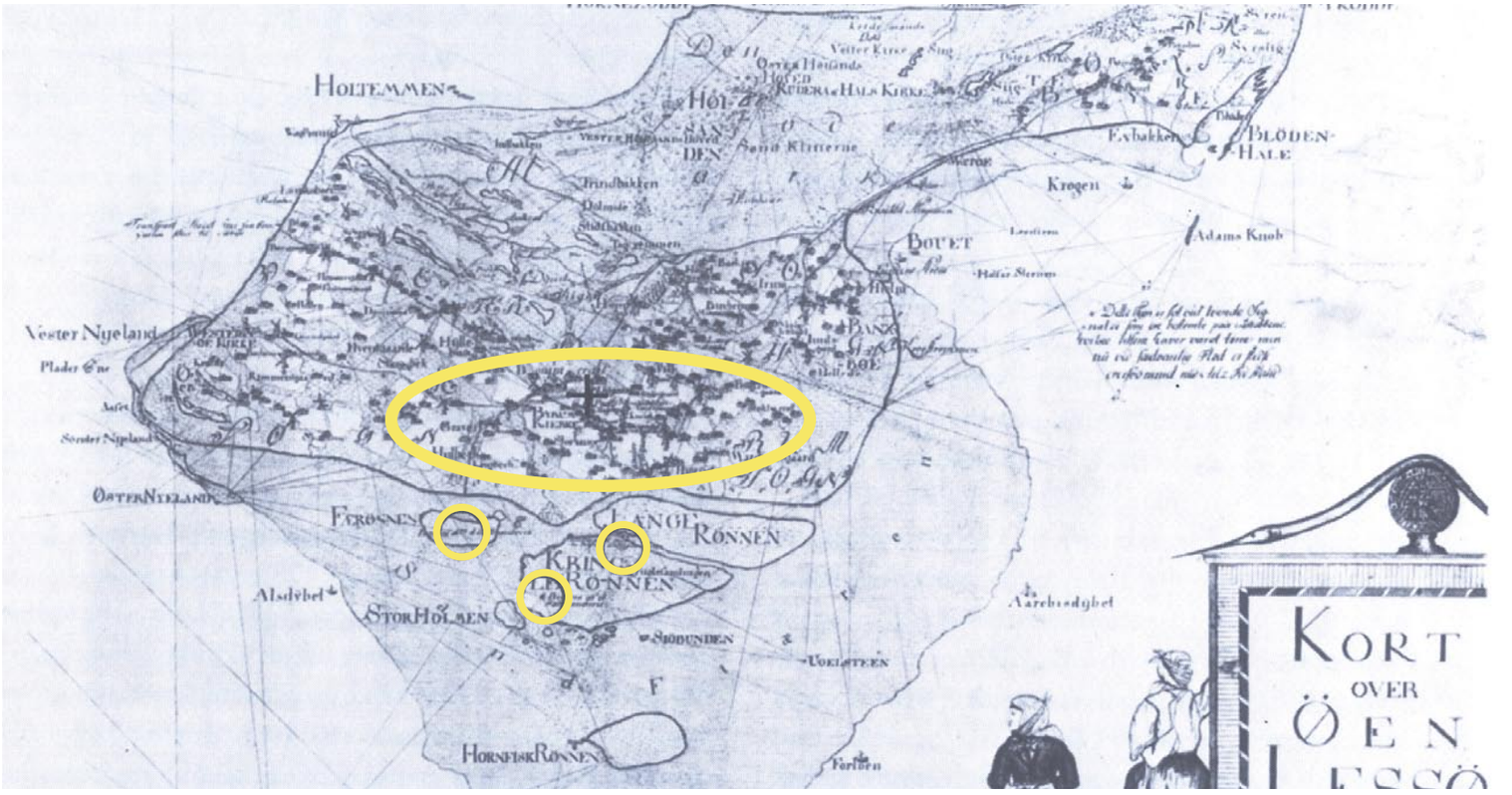
[Saltproduktion; på Læsø, i Danmark og i Europa]

[http://en.wikipedia.org]

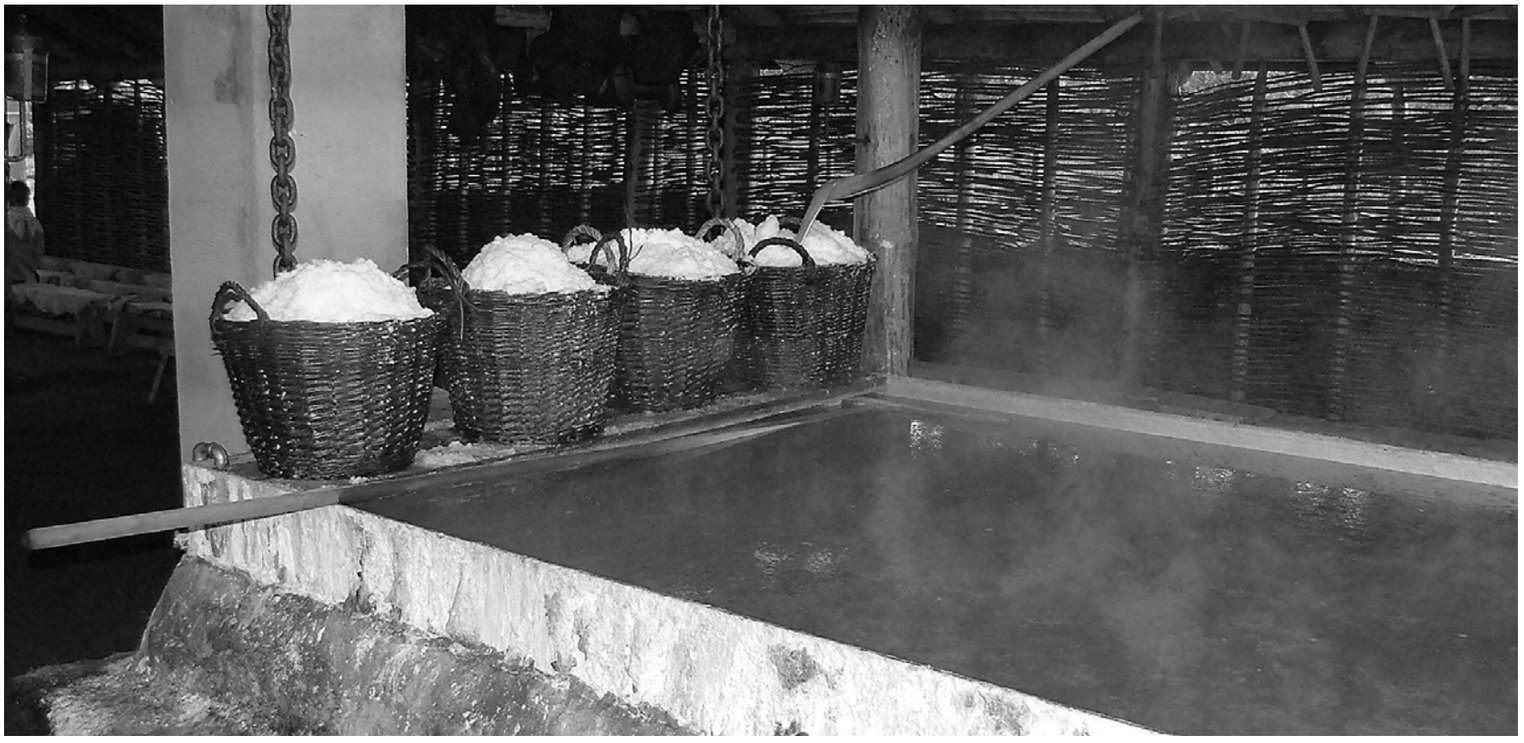
ill. 5 Reconstructed salt production



ill. 6 Plan of original old salt house



ill. 7 Old map of Læsø

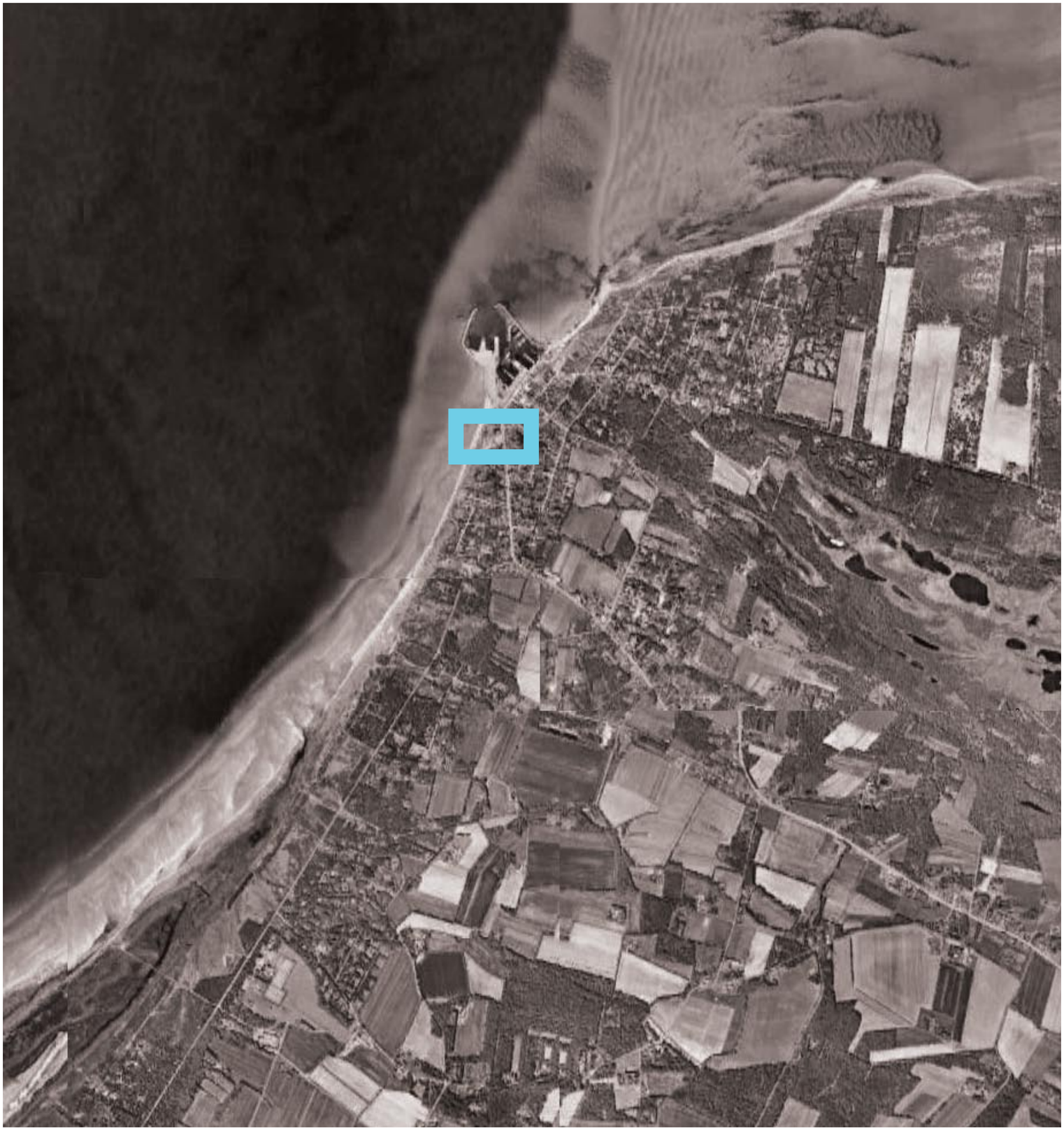


ill. 8 Salt baskets

Vesterø

Vesterø is a small village with a harbor for fishermen. Two ferries shuttles forth and back from Jutland. There are about 775 inhabitants during the winter and about 80.000 tourists throughout the summer, and the village covers an area of app. 1 km². In the harbor there are wooden fishing boats accommodated and they mainly catch lobsters and different kinds of fish, this contributes to the everyday life in the village. About 100 m from the harbor there is a small grossest, a few restaurants and hotels. Vesterø has a 10 kilometers long beach with large areas of bare nature attached. From the village busses to Byrum and Østerby depart and these are free of charge. Whenever the weather is suitable, the harbor becomes a place for meeting, both tourists and locals, enjoying the sun set and the view over the sea. The small square on ill.XX represents the area used for mapping in the analysis.

ill. 9 Area of Vesterø



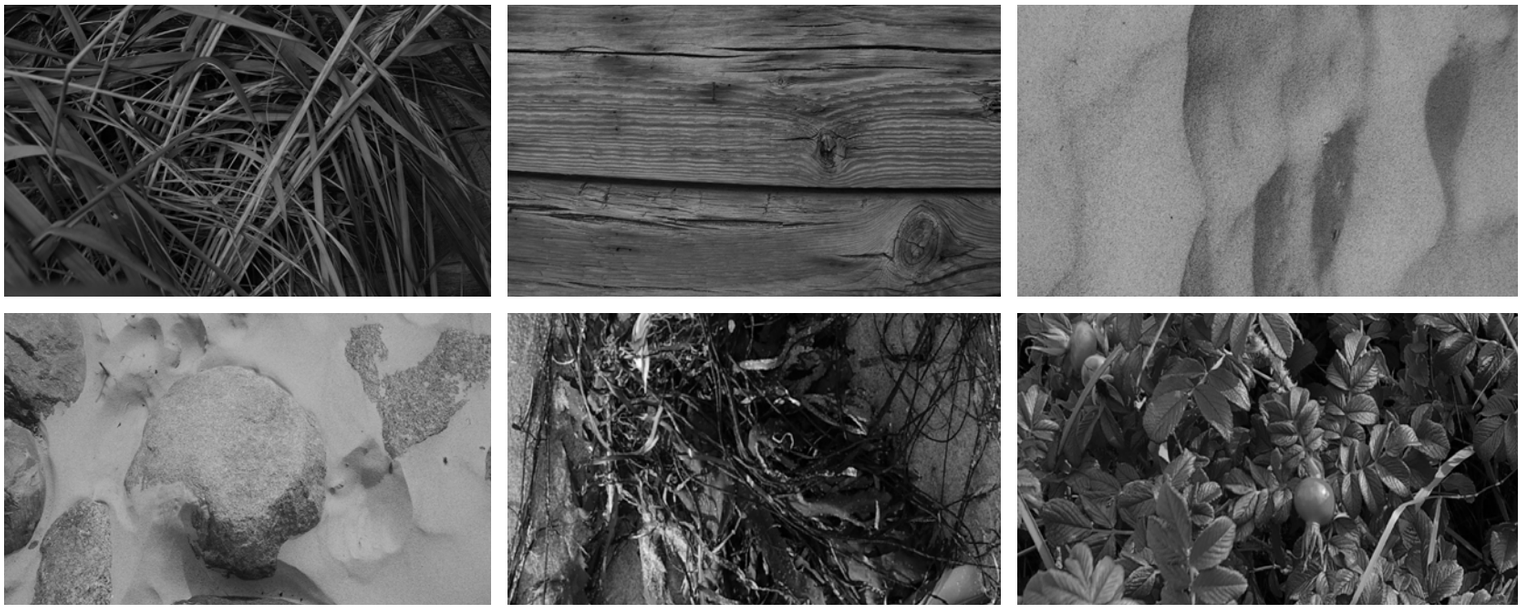
The Site

Materials

The materials used in the buildings are quite modest; bricks and tiles are used in a wide extend. Wooden boards are used as separation between gardens and streets, see ill XX.

The materials around the site cause a feeling of beach in the village, in ill XX stone, sand and wood is shown.

All the colors, textures and type can be used as an inspiration. The linking to the present materials can be an effective way to adapt the new building into an old and more local context.



ill. 10 Materials from the site area

ill. 11 The site

100 meters

Building typology

In general the building typology is characterised by the fact that the small island is quite remote from a larger society, such as the society of Aalborg or Hjørring, and it is also reflected in the typology of the buildings on the island.

Almost all buildings at the site are small single family houses. There is a few old half-timbered houses thatched with straw, one is the “Søfart og Fiskeri” museum which is located on Vesterø Havnegade, 295 m north of the church.There is also a few other buildings with special functions as post office, small shoestore, bakery and the Vesterø Havnekirke, see ill XX. The buildings in the site area is generally like the rest of the island, but obviously the Vesterø Havnekirke stands out as a special building; clear religious typology and the high tower, which is visible from far away. The church has two single family houses on the north and south side, on the eastern side across Vesterø Havnegade is two single family houses. On the west side of the church is a smaller summer house, see ill XX located between the land register of the church and the sea. The typology is quite equal to the buildings in an ordinary suburb.

Because of the traditional and modest building typology, it is necessary to link the new design for the bathing resort to this building typology. To avoid an architectural chock in Vesterø, it is crucial to make the new building link to the existing and traditional buildings in the surroundings.

ill. 12 Two buildings on opposite side of Vesterø Havnegade

ill. 13 Spread of building mass, size and shape

100 meters

ill. 14 Timber framed house with roof of reeds

Vegetation

The vegetation of the island is harsh and can perfectly resist the rough climate. The most obvious part of the landscape at the site is the sea. The beach is only 180 m away in the west direction, and this distance is only disturbed by a summer house in the middle.

When analysing the vegetation on the sand dunes it is clear that only reed and lyme grass can grow here, see ill XX. There is also several large stone in the sandy earth, also wooden sticks from the bushes in the sand dune. On the eastern side of the dunes, the vegetation is calmer; the dominant plant is grass, though quite stiff compared to normal grass, but not so tall and stiff as the reed on the dunes. At the land registers the vegetation is controlled to some extend; some cut their grass, some let it grow according to the nature of the site. Around the church there are some relatively high trees and different bushes which erase the line of the church register toward the dunes, see ill XX. The trees does cast some shadow and block some views from the church, they grown randomly and are not controlled, mainly because the church is not in use.

This vegetation can be useful to the new design of the building. It can be cut in order to frame special views, or it can be used as a shield for the rough western wind or as a natural shadow casting element. The trees and bushes have potential and they must also be redesigned in a way that contributes to the building design.

[http://www.ku.dk]

ill. 15 Vegetation between the site and the beach

ill. 16 The vegetation; trees, beach moor and reeds at the dunes

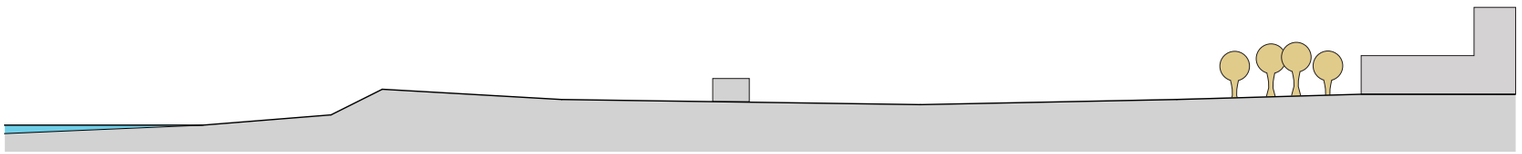
100 meters

Topography

The topography of the island is easy to overview; the land is quite flat; the quote is mainly between 3-7 m. The highest point of the island, which is in the area three kilometres south of Vesterø, is 8 m over sea level. The lowest area of Læsø is Rønnerne; the area south of the island, here the level is 2 m above sea level.

The area around the site is between 4 and 6 m, see ill XX. The sand dune on the limit to the beach is approximately 7 m over sea level. The project site is lower in the western end; 4,6 m and has the height of 6,12 m in the eastern end of the register. The church is built on a quote of about 6 m. The area between the church and the dunes is quite flat and low.

The sand dunes are very significant in the context, because they are the only element that rises 7 m over the flat sea and the flat island. They mark the border between the beach and the land, almost like a wall, see ill XX. The topography is interesting because it gives special opportunities for designing with considerations for the views. It can also be an important aspect with regards to the wind, since the wind at the coast can be a driving force of natural ventilation.



ill. 17 Principal section of site and area to the beach

ill. 18 View of the church from the dune

ill. 19 The views

100 meters

Views

Along Vesterø Havnegade is a long and clear view though a large part of the village, see ill XX. The beach has an even undisturbed view along itself, see ill XX, and on top of the sand dunes there are spectacular views over the sea and the horizon and also over the village of Vesterø, see ill XX.

The site area has an open flat area to the west, which is limited by the dunes provides some shorter view towards the nature. The tower of the church provides a sheltered viewpoint; here the view faces either the eastern part of Vesterø, or the Western part of the beach and sea, see ill XX.

The good long views are a quality that should be respected in the new design. The views are a very important part of the experience of the site. There is a certain magic feeling to looking out toward the stunning sea also the view over the village is impressive.

Districts

There are four districts in the area of the site; village, dunes, beach and some agriculture, see ill XX. The site is placed between the village and the dunes, which also are the two main districts; which dominate the area. The districts have influence on each other, the fact that the sea is close by, is obvious in all the districts; there is sand from the dunes in the village, the salty smell of sea is everywhere and the fresh coastal wind is pulling ones hair. The village provides people close to the building site, this creates exposure and the building has an opportunity to become present in the mind of the passersby.

The fact that the sea is close to the church gives a wonderful opportunity to link the building to the beautiful beach and sea. The sea is the most important part of the landscape at the site. The village on the eastern side is a contrast to the natural beach on the western side of the site; this contrast will be investigated in the design process.

Paths

The main street in Vesterø is Vesterø Havnegade, see ill XX and it provides a direct connection to the other middle of the island and the main village; Byrum. The road continues to the other end of the island; Østerby. During the summer season a lot of tourists move to the island and the motorised traffic on Vesterø Havnegade becomes quite heavy. The other important path around the site is the beach path; this continues around the border of the island. During the summer season there are a lot of people along this path. From the church a small hiking path is moving through the landscape towards the beach. It connects all the way from Vesterø Havnegade across the site to the beach.

Vesterø Havnegade is a very important street because it distributes all traffic from the ferry to the entire island, this means that many people pass by the site, and this creates easy access. Another easy and direct access is achieved between the village and the sea, crossing the building site; which will be kept in the new design.

ill. 20 Path along the beach

ill. 21 The districts, paths and landmarks

100 meters

Landmarks

In the context of the site there are no other landmarks, besides the church itself. Further away there is an –for the island- important landmark; the ferry. The tower of the church is 19 meters high and it stands as a visual landmark which is clearly seen when arriving to the island. When walking along Vesterø Havnegade, the church is visible from time to time, and when approaching the site, it suddenly rises with its tall tower.

The tower may not strike one as an exceptional tall mass, but when placed in a context with low and spread building mass, the height is quite significant.

[The image of the city]

Vesterø Havnekirke

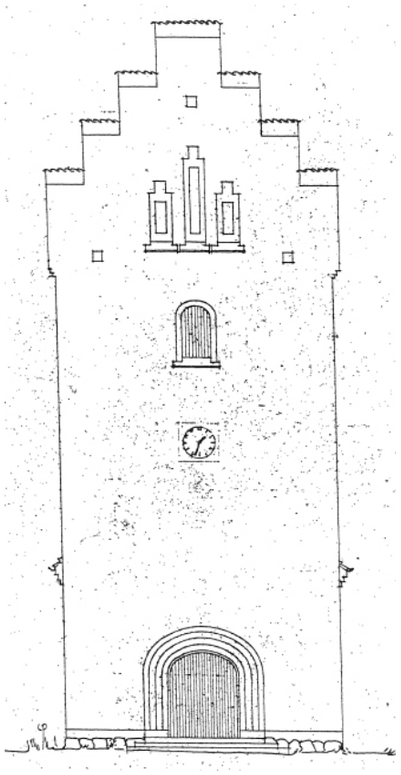
Vesterø Havnekirke stands out as a special building; clear religious typology and the high tower that is visible from far away. The church is placed on a beach land register of 3.920m² and the church is 237m², see ill XX. The church was built in 1954 and is situated approximately 6 m above the sea level. The walls are whitewashed bricks and the roof is covered with red tiles, see ill XX. The church is symmetrical; the church porch is normally on the one side of the church, but in this case it is built as a longitudinal extension of the church and becomes a part of the tower.

When entering the church, one enters the tower, where the church porch is situated in the bottom covering 64 m 2 see ill XX. The tower is 19 m high, and provides a fabulous view over the island. The entrance to the nave, measures 1,8 x 2,1 m and is placed in the middle of the wall. The nave is not divided in niches and inside it covers an area of 140m2, no walls going out surrounding the altar. The wall behind the altar consists of 3 wall pieces that together gives the back wall a concave rounding. They round 2,35 m from the centre of the semi-circle. When received communion the floor rises 2 steps; 30 cm.

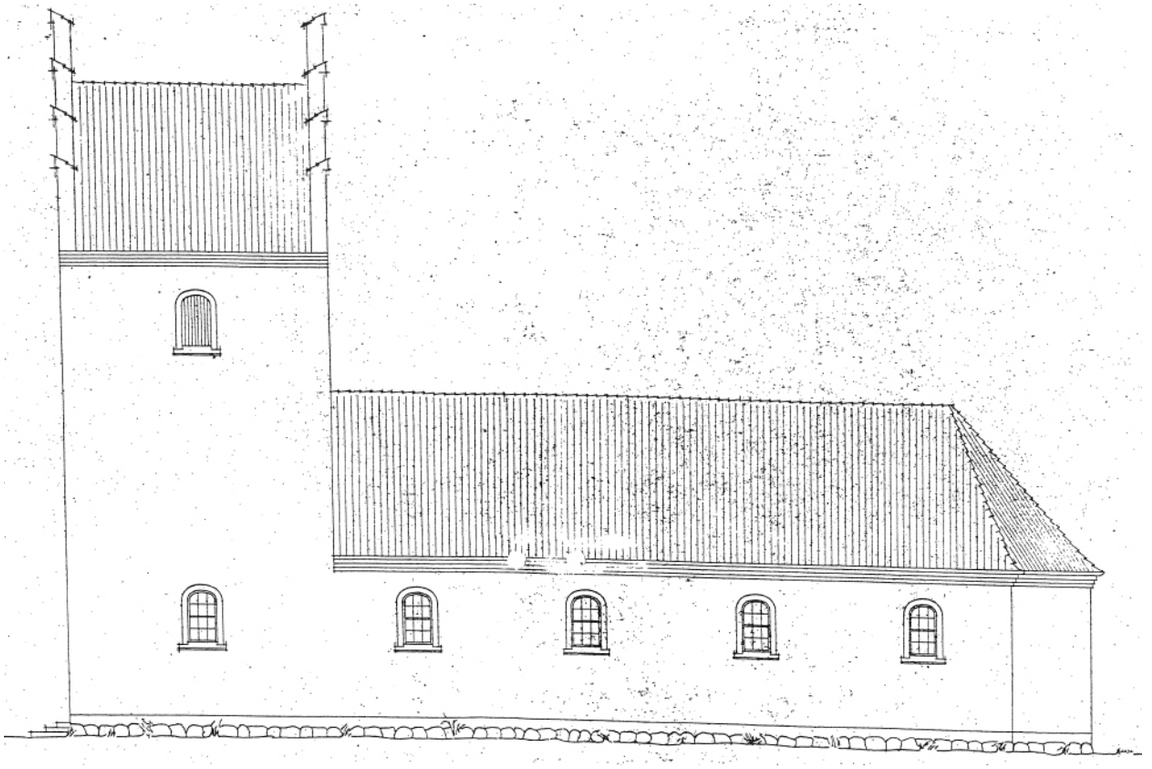
The floor is covered with yellowish bricks; this has a silent link to the sandy flooring outside. The walls are white washed, and there is 4,5 m up to the visible wooden construction of the horizontal ceiling.

In the back of the church there is a repos which have been used for either choir singers or the organist. It is quite small and measures 7 x 2 m and lifted up 2,35 m. The material is painted wood as are also the sitting arrangement, see ill 30.

Under the eastern part of the main space, there is a small basement; with an area of 2,25 x 7 x 2,25 m, see ill 35, in the northern part of the



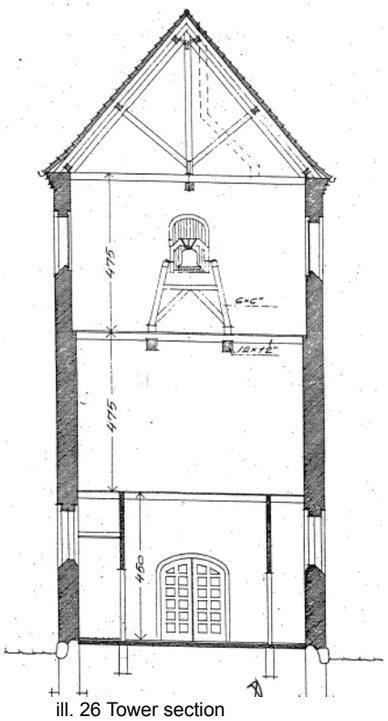
ill. 22 East facade



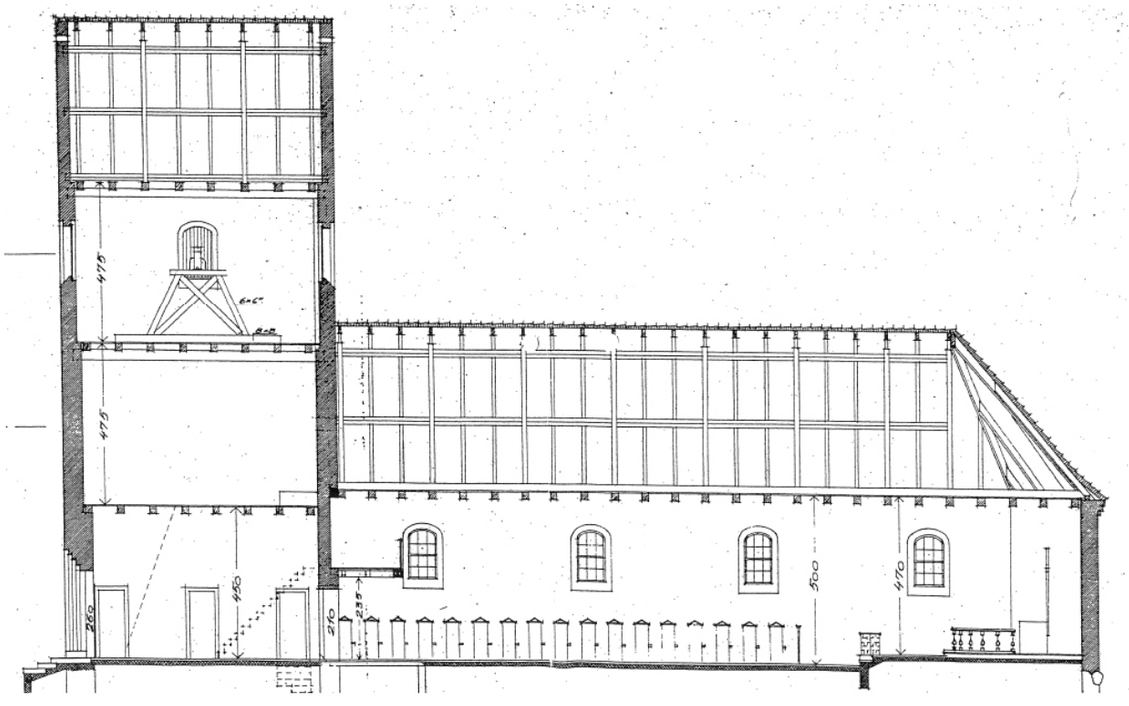
ill. 23 North facade

ill. 24 Front area

ill. 25 Back area



ill. 26 Tower section



ill. 27 Longitudinal section

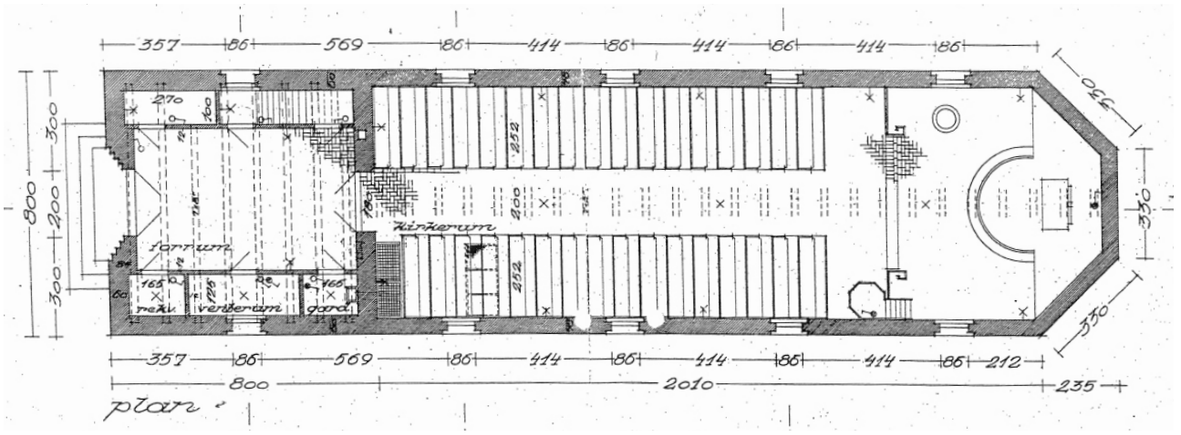
room the width is 3,5 m. This has been used for storage and valuable items belonging to the church.

The church is very visible when arriving to the island; it stands tall and clear and is close to the beach. When walking along the beach the tower is visible all the time. The church is quite modest and has a simple and symmetrical architectural expression. This is seen both on the inside and the outside.

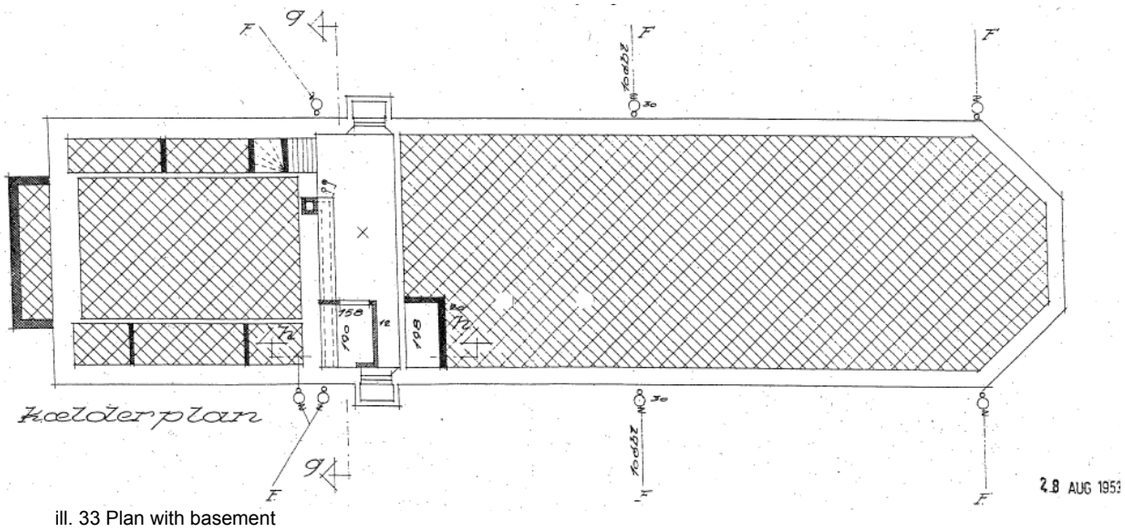
Some of the interior has been removed, so it is the overall framed spaces that can be redesigned. When redesigning the church one must be aware of which architectural elements of the church are reusable and in this sense can be a part of a new space and increase its architectural qualities. The tower is an interesting part of the church, because most people immediately recognize it as a part of a church, it is an icon. In many hundred years Viborg Domkapitel owned the island of Læsø, and they were responsible for a large part of the salt production through the history. In a sense it is appropriate that the salt is used in the church due to make a relation to the old ownership.

[http://www.denstoredanske.dk]

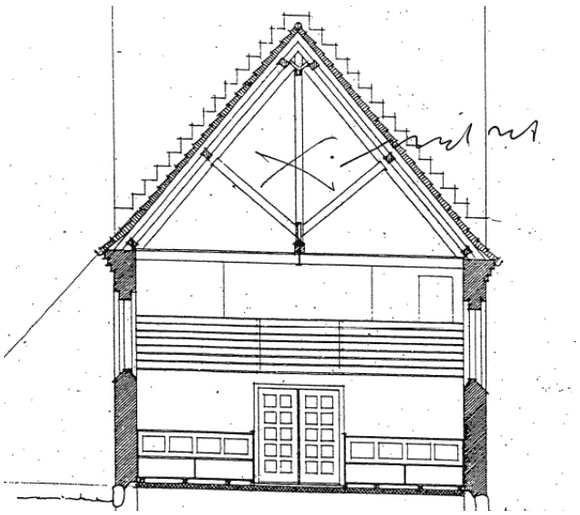
[http://www.toppenafdanmark.dk]



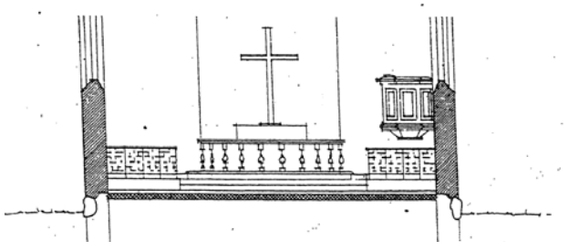
ill. 32 Plan with measurements



ill. 33 Plan with basement



ill. 28 Section towards entrance wall



ill. 29 Section towards altar wall

ill. 30 Photo towards entrance wall

ill. 31 Photo towards altar wall

ill. 36 Church from Vesterø Havnegade behind the neighboring buildings

ill. 37 Church from the harbour behind the sandy dune

THEORY

Climate

There are no structured registrations of the climate precisely on Læsø. At Anholt there are similar wind velocities and the location at sea makes it reasonable to choose the weather data from Anholt, see ill XX. At Anholt the direction of the wind is slightly more south-wards than the dominating western wind at Læsø.

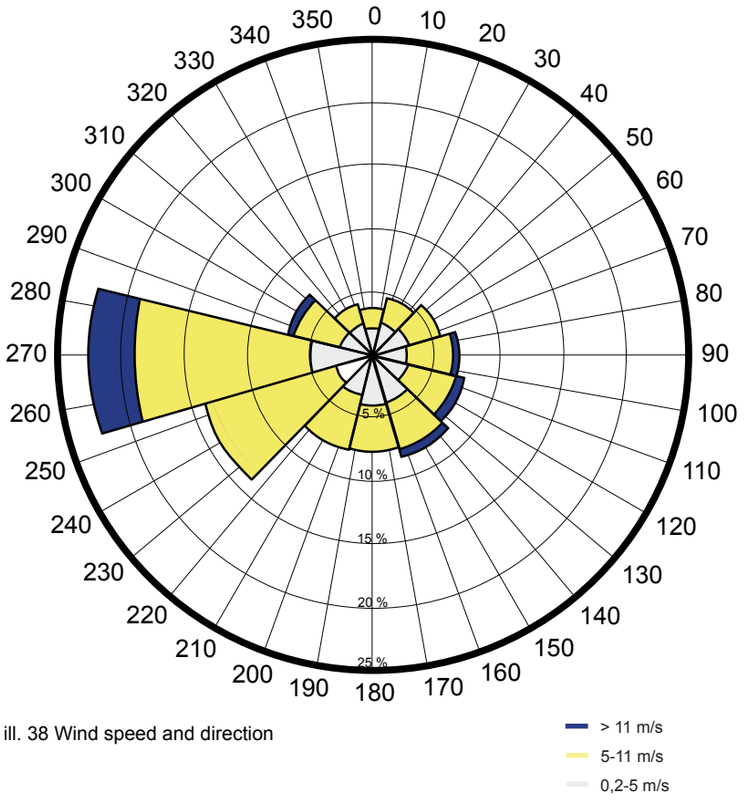
The climatic data is used directly in the calculations made later on in the design process, but especially the conditions of wind and sun are used intuitively in the early design process.

Wind

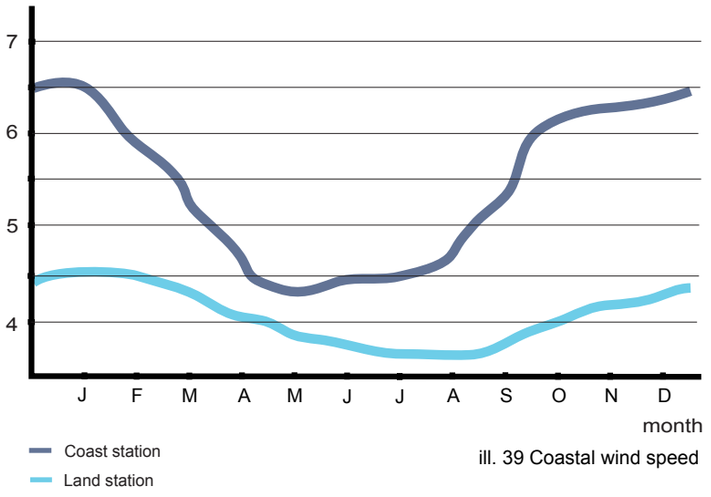
The wind rose shows information about the direction, speed and frequency of wind, and this can be quite specific to a certain area, see ill XX. In coastal areas the wind is often stronger, than inside the country. The difference of wind velocities is largest in winter season.

The information is often gathered from airports and is measured in a height of 10 m; here the situation can be quite different than the wind situation on the site, because there is no turbulence at this height. Primarily the velocity can be lowered, and the operative wind pattern can be modified, by the local topography and surroundings. The values will not be lowered because the wind is quite strong at the site also because there is almost no turbulence, when the wind comes directly from the sea, see ill XX.

[Lecture]



ill. 38 Wind speed and direction



ill. 39 Coastal wind speed

Temperature

The average temperatures given in the diagram was measured specifically at the site in 2006, see ill XX. These temperatures are useable mostly for calculations, but also for an overall understanding of the climate at the site.

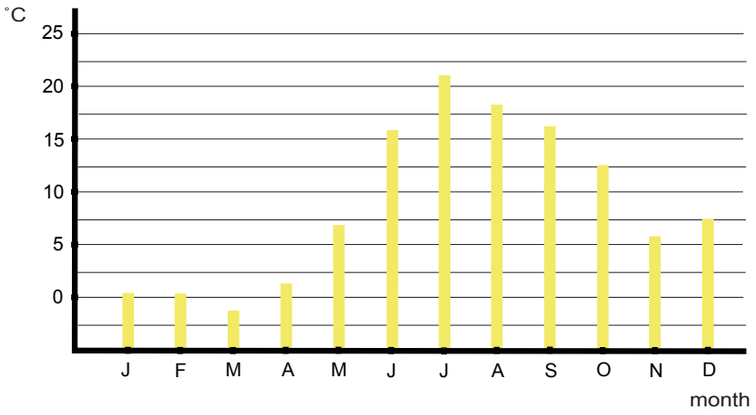
Solar radiation

Because of the rotation of the earth, the path of the sun changes throughout day and year, see ill XX. The highest sun path exists in the summer solstice, the middle path depicts the equinoxes; spring and fall, and the lowest path is a depiction of the winter solstice.

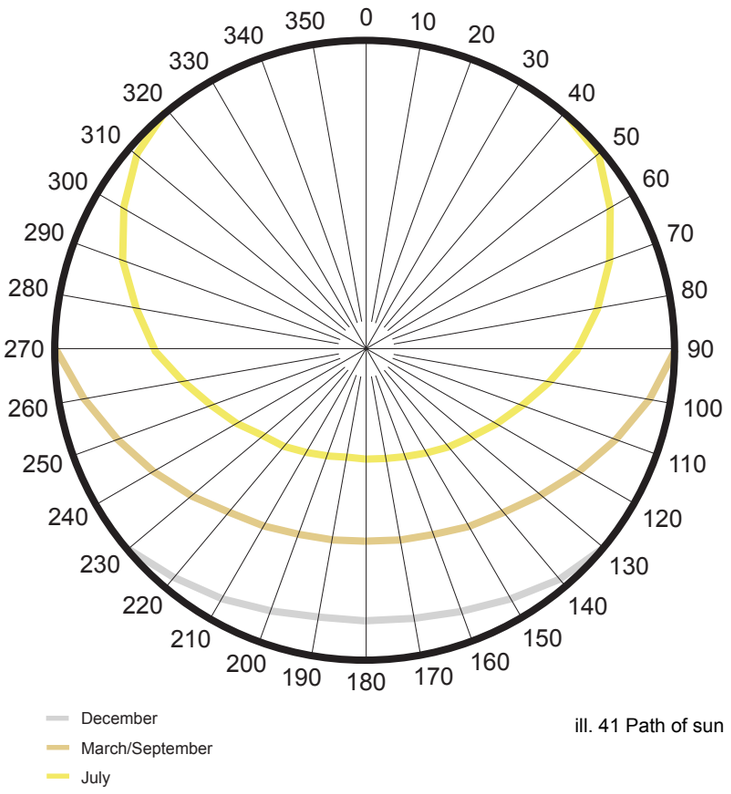
The ill XX shows how the shadows will fall at the site, at noon the 21.th of December, when the sun is at its lowest position. The shadows relative small and the to each other, and the threes can be modified in order to function optimal with the design.

[Lecture]

[http://www.dmi.dk]



ill. 40 Temperatures during year



ill. 41 Path of sun

The transformation of the church includes an optimization of the energy performance because the new building must achieve high energy- and indoor climate standards. In this project one of the technical aims are to create a good and healthy indoor climate that can underline the exact experience desired in the different spaces.

The quality of the indoor environment has a great importance when experiencing the rooms in a building. Some new building have considerable bad indoor climate, which results in dissatisfied [PPD] users and if the problem is to be solved, the economical costs of i.e. a mechanical ventilation system, are significant.

The indoor environment can be categorized in four aspects; thermal comfort, air quality, acoustic comfort and comfort of light, see ill. Xx. In this project mainly two aspects of the indoor environment is to be considered; the thermal comfort and the air quality, the other two aspects are only considered intuitively throughout the design process.

The four aspects can be sensed physically and mentally, and the state of the mind can affect the censoring of a physical aspect as well as the physical state of the body can affect the mental senses. Knowing this calls for a design that satisfy both physical and mental senses.

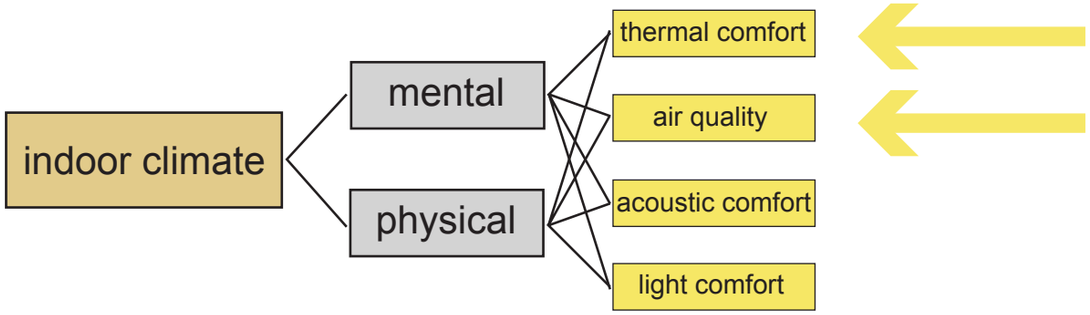
In order to design an effective ventilation strategy, it is necessary to decrease the indoor sources of pollution and to adapt the ventilation rate to the actual demand. This ventilation will result in a good indoor climate with a low health risk and it will only use the necessary amount of energy.

To evaluate the quality of the environment a method of collecting the number of dissatisfied can be used. Most individuals have different requirement for an optimal environment, to cope with this fact, a number of percentage is made of those who find the circumstances unacceptable. The aim is a category B indoor quality, with maximum 10% of dissatisfied, see ill XX.

The aspects of the indoor environment are dealt with separately; but they are still a part of the whole. Quite often there can be serious conflicts between the qualities of the indoor climate and energy use, and then it is necessary to make a compromise.

[CR1752]

[Lecture]



ill. 42 Understanding of indoor climate

categories	PPD	draght	temp. difference	hot/cold floor	radiant asymetry
A	<6%	<15%	<3%	<10%	<5%
B	<10%	<20%	<5%	<10%	<5%
C	<15%	<25%	<10%	<15%	<10%

ill. 43 Categories of indoor quality

Ventilation Strategy

The desired indoor quality should have the level of category B, with only 10% dissatisfied. An indoor quality of category A could also be a goal, but this is more appropriate for a place for long time stay; residence or workspaces. The quality of category B is chosen with respect of the challenge of creating good indoor quality in a building where the temperatures are high and with pollutional sources ceding considerate amounts of salt and chlor to the air.

When designing residential houses, an appropriate ventilation strategy would consist of a mix of natural and mechanical ventilation; hybrid ventilation. When using both strategies, the energy performance is improved without decreasing the quality of the indoor climate. During the winter season the mechanical ventilation is used, in order to avoid cold air from cooling the building. A special heat recovering device can keep the heat from the polluted air, before it is pulled out of the building. During the summer energy is saved by using the natural ventilation, the outdoor pollution is extremely low, and the air will freshen up the indoor climate. The system must be able to be controlled manually also, this is necessary in order to adjust the indoor climate to the precise wishes of the users. This strategy may not be as effective for a building with high temperatures and high humidity; here it might be necessary to use a mechanical ventilation system, in order to keep the different levels as wanted.

The natural ventilation is driven by thermal buoyancy and outdoor wind velocity. Using only thermal buoyancy, the ventilation is driven by the difference in the density of the outdoor and indoor air. The difference in the temperature results in high and low air pressures, where the high pressure is trying to expand itself through different openings in the building.

When the indoor temperatures are higher than the outdoor temperatures, there is created a high pressure in the top of the building, and there will be a low pressure in the bottom of the building, because the warm air rises up. In a certain height the indoor pressure equals the outdoor pressure, end this is referred to as the neutral plane, see ill XX. The high pressures over the neutral plane are pushing out air through the high placed openings, and the low pressures below the neutral plane is pulling air inside through the low placed openings.

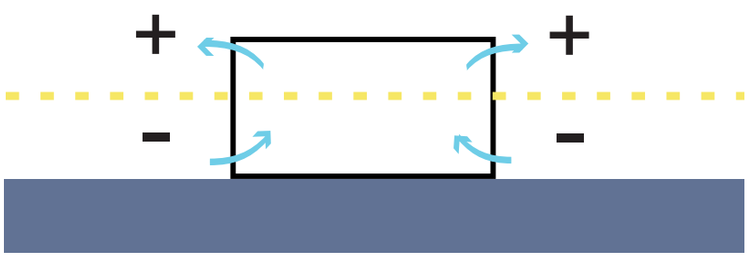
Using the wind as a ventilation driver, the effective forces are those pressure differences that are created by the outdoor wind in areas around buildings, vegetation and topography. There is created pressure differences around the building that pushes outdoor air through the building from the areas where there is a high pressure, see ill.xx. Likewise, air is dragged out of the building from the areas where the outdoor air pressure is low.

The two drivers for natural ventilation can appear alone, but mostly appear together. When the outdoor wind velocity is low, the thermal buoyancy is the dominant ventilator. The wind will ventilate whenever it is strong enough to come through the openings in the building.

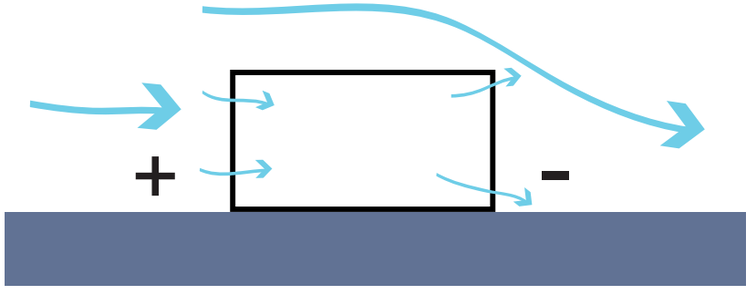
Mechanical ventilation is normally needed during the winter, but in this case with a bathing resort, the demand for ventilation will be so high, that it will be necessary to use the mechanical ventilation all year. The important keywords concerning mechanical ventilation are the maximum pollution rate and hence the air change rate. When designing the overall ventilation, consideration for the mechanical devices is important in order to create an effective system.

[SBi anvisning 202]

[Lecture]



ill. 44 Neutral plane, depend on air pressure



ill. 45 Air pressures caused by wind

Public bath regulations

When designing a public bath resort there are some regulations which are relevant and useful in order to create a successful design. The regulations set standard for a soundly technical and hygienic level of quality. Guidelines for space properties, like square meters, height, depth and temperatures are used when developing the spatial program, together with the competition material.

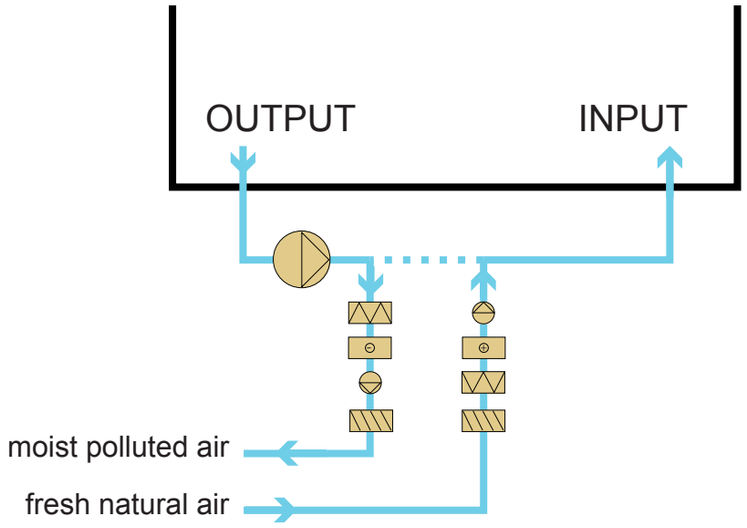
Independent of the type of basin the cleaning system consists largely of the same basic elements and technologies, see ill XX. This system is not to be designed, but only the placement and size of it is considered in the design process.

To avoid moist air from penetrating the construction of the building and the static air pressure in the building must be lower than in the surrounding outdoor. This can be achieved through the design and control of the ventilation system, see ill XX. This concept causes a difference in the amount of incoming and out coming air, which will result in a lower pressure inside the building. Before losing the waste air, the heat is recovered and reused in the building, by a mechanical device implemented in the system. To optimize the system further the incoming air could be preheated a few degrees, in the winter, through air pipes in the ground.

[DS477]

[http://www2.mst.dk]

Energy Performance



ill. 46 Ventilation strategy for buildings containing water

The energy performance of the new building must achieve the standards of the Danish energy class 1.

When considering the energy performance, the essence is to consider the actual building site;

“We must begin by taking note of the countries and climates in which homes are to be built if our designs for them are to be correct. One type of house seems appropriate for Egypt, another for Spain....one still different for Rome... It is obvious that design for homes ought to conform to diversities of climate.”

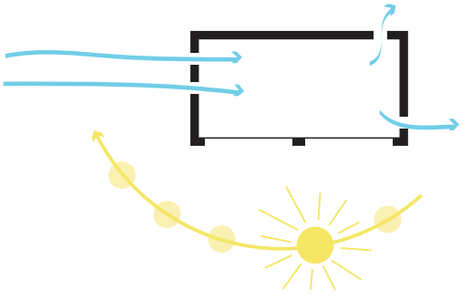
Vitruvius, architect in first century B.C.

The idea of designing building according to the climate is an old idea.

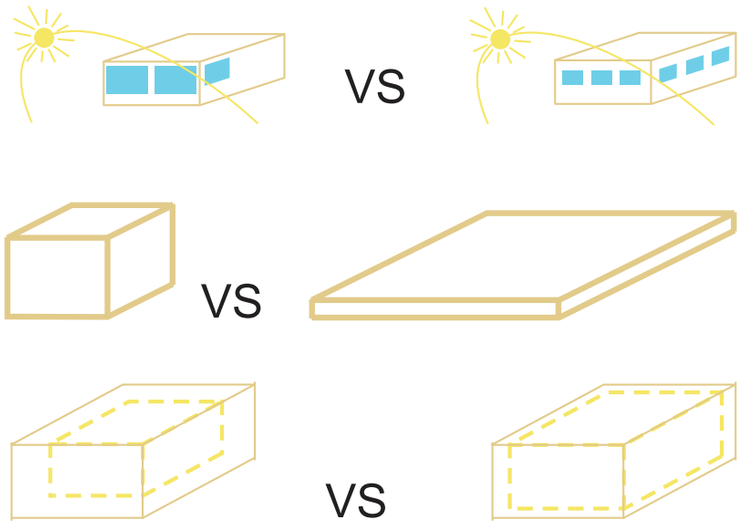
It is necessary for the designer to know the micro climate on the specific site in order to optimize the design. When talking about outdoor climate there can be referred to the microclimate, which typically refers to the climatic conditions near a smaller group of buildings or may be even limited to a single building. When designing the building this climate has great importance, and can be used only with a basic understanding see ill XX, but also used with an intensive and detailed strategy. It is possible, to some extent, to adjust the climate to the technical design needs of the building, by i.e. directing the wind with use of trees or other buildings, see ill XX.

When designing by passive strategies, the solar gain is crucial to get heat into the building during the winter. The intensity of solar energy received in a specific place, depends on latitude and local sky clearness, so the feasibility of solar heating depends on the relationship between solar energy received and the heating load of the building. Still the most important issues when designing an energy efficient building in Denmark, is to minimize the heat loss of the building. When considering this, it is necessary to orientate the building by the sun, consider the volume to surface ratio, and use an appropriate type of insulation, see ill XX.

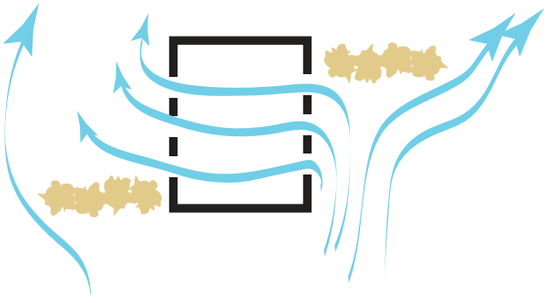
Using passive heating and cooling strategies is more efficient than us-



ill. 47 Basic understanding of micro climate



ill. 49 Orientation, volume and insulation



ill. 48 Moderation of wind

ing active strategies, for several reasons; the costs of active mechanical devices are quite high, lower maintenance cost, higher reliability and better indoor environment.

Depending on the relationship of the three main concepts; direct gain systems, indirect gain systems, remote gain and storage system, in a passive solar heating system, there are several possible types of passive solar systems, see ill XX-XX.

-Direct gain systems

-Indirect gain systems

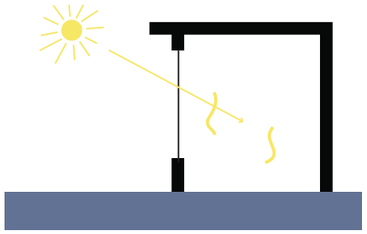
Thermal storage wall

Air flow window

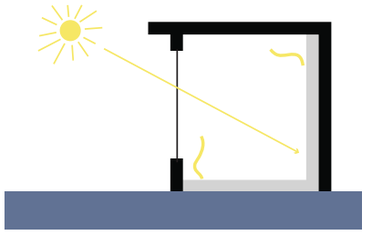
Sunspace

-Remote gain and storage system

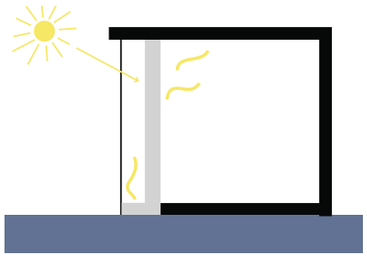
Air collector system



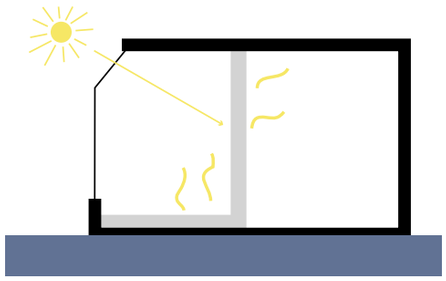
ill. 50 Direct gain



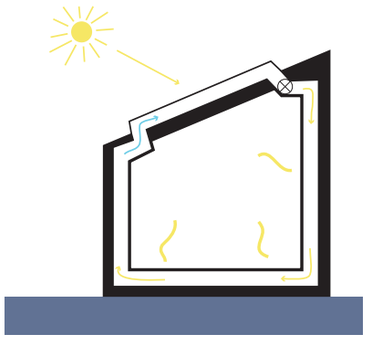
ill. 51 Thermal storage wall



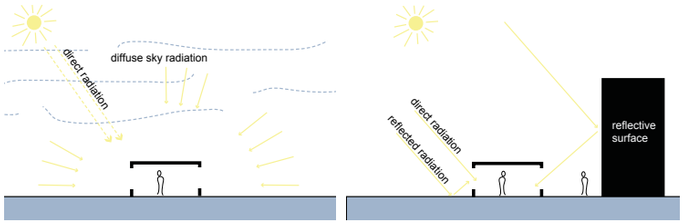
ill. 52 Air flow window



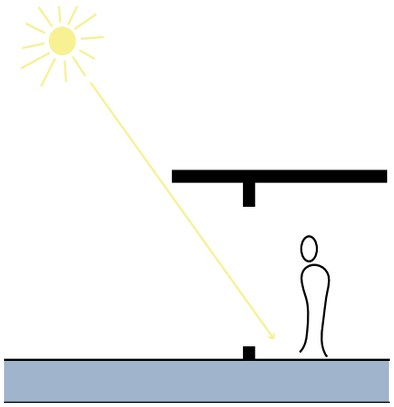
ill. 53 Sunspace



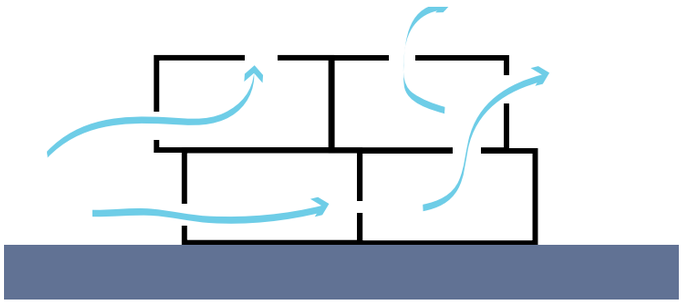
ill. 54 Air collector system



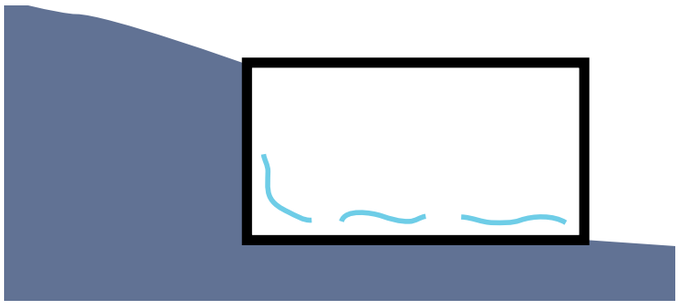
ill. 55 Solar radiation control



ill. 56 Heat avoidance



ill. 57 Natural ventilation



ill. 58 Ground cooling

Heating concepts that “let the sun in” and “keep the heat in” are relatively easy to achieve where cooling concepts requires more sophisticated approaches; control of air temperature and velocity, wall and ceiling surface temperatures (radiation), and air humidity control. Cooling has not been as systematically studied as heating, so there are fewer standard techniques available. The praxis of passive cooling techniques is more dependent on climate than passive heating ones are. The choice of appropriate cooling techniques depends not only on the local climate but also on the building type.

Passive cooling can broadly cover all the measures and processes that contribute to the control and reduction of the cooling needs of buildings, see ill XX-XX. Protection or prevention of heat gains involves the following design techniques, most of them according to the microclimate:

- Solar radiation control

- Building form and layout

- Heat avoidance

- Internal gain control

- Behavioral and occupancy patterns

Natural sources that can be utilized as cooling sinks are; the upper atmosphere, the ambient air and the earth. Natural cooling includes (see ill XX-XX):

- Natural ventilation

- Ground cooling

- Evaporative cooling

- Radiative cooling

By combining different passive and natural cooling techniques, it is possible to prevent overheating problems, decrease cooling loads and hereby improve comfort conditions in buildings.

The calculations of the need of heating and cooling will decide which techniques are to be dominant in the design process.

[Lecture]

[http://en.wikipedia.org]

Tradition of Baths

Architecture and style follows the social trends of the present time, and it is sometimes very clear to see the relation between architecture and trends; as for instance the case of how the kitchen is evolving from being a highly functional space, to being a cultural and social space in the residential buildings. The same thing has also happened with the bathroom. As a part of this change in the awareness of the importance of wellness the public bath is becoming popular again.

The original public baths, as we know of, was invented in the antique Rome. In the middle Ages crusaders spread the concepts of common public baths. This trend grew in most of Europe but was later closed because of religious reasons and many sorts of diseases like syphilis and plague.

The tradition of public baths did not flourish again until the 19th century; in these years new hygienic methods were used and made it safer to bathe in public. The part of private baths were increasing in number compared to the public baths, one of the reason for this was that they were more attractive and also functioned as a sign of wealth.

The recent wellness movement has lead to great popularity in public bathing resorts. Besides wellness, the understanding of experience economy has also increased the popularity of these public baths. Now there is an exciting alternative to the old-fashioned swimming halls, which “only” offers limited experiences. Architects got a new assignment; to create these shining new temples for the body and mind. It has been done with inspiration from different regions in the world, like the Middle East and the Orient. The resorts present a new way of nourishing the body and mind, and hereby they also function as ideals for the design of many private bathrooms. The different designs are very experimental with materials, spaces and lighting. This kind of experimenting demands developments of the materials, both to be able to establish new shapes and to obtain higher standard in the material.

ill. 59 Residens with outdoor bath

The bathing area has once again become an important cultural and social vessel for water.

[Spa]

The tradition of the public bath institution can be divided in two groups; the Roman wet bath and the Finnish dry bath. Nowadays the bathing resorts often use parts of each tradition; this is also seen in northern bath resorts. As an inspiration the Swiss Thermae in Vals is investigated.

[Finland]

Thermae Vals

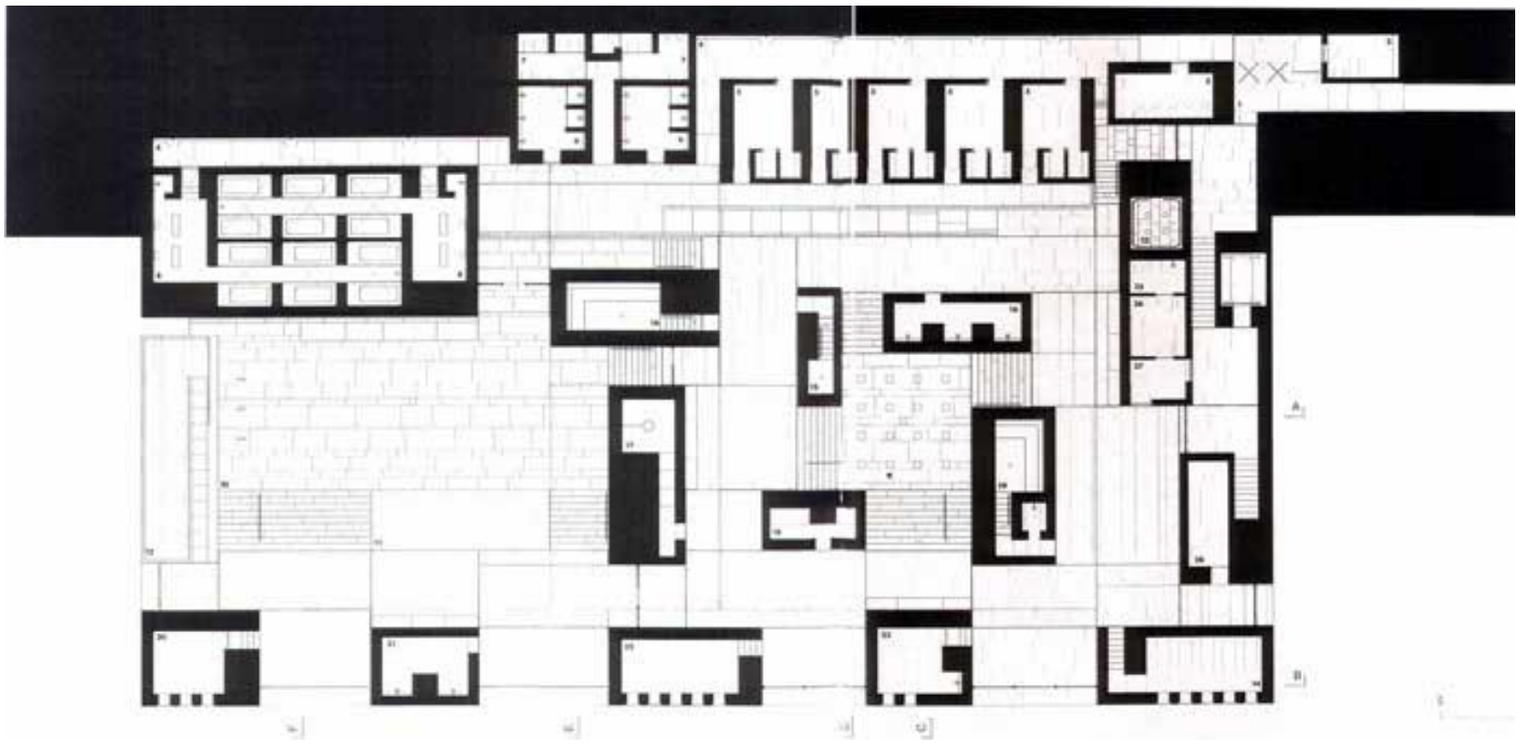
The Suisse architect Peter Zumptor drew a new thermae in Vals in 1996, the existing bath was from 1960íes and had to be either closed or renovated. The thermae uses both wet and dry bath traditions, but mostly the wet bath is represented. The building is constructed as a rectangular structure with the grey-green Vals-gneis stone, which is a local material and is also quite used in the contextual buildings. The building is dug partly into a mountain side, and this is used in the placing of the different spaces inside; far inside the building, the spaces are small and have a cave-like feeling to them. When moving more and more away from the mountain, the spaces get larger, and more open. Many visitors have been there and they are stunned; „a unique archaic bathing and therapeutic landscape imbued with quiet sensuousness".

The facilities in the therme are many; "fire pool" 42°C, cold plunge pool 14° C, rough hewn spring grotto, deliciously scented flower pool, sounds of stone reverberating with intrinsic igneous music, drink grotto with 30° C spring water, indoor pool 32 ° C, outdoor pool 34 ° C, steam rock and a sweat-bath rock.

Inside the main room a stairway leads below the bathing level to a floor dedicated to the wellbeing of the guests. The therapies and treatments offered here are designed to relieve tension and pamper: masks, exfoliation, baths, wraps, massages, thalasso* and aromatherapy and furthermore it is possible to book other special treatments.

* The therapy is applied in various forms, as either showers of warmed seawater, application of marine mud or of algae paste, or the inhalation of sea fog. Spas make hot seawater and provide mud and seaweed wrapping services. The effectiveness of this method of therapy is not widely accepted as it has not been proven scientifically.

Down stairs, the Vals-gneiss is polished and smooth – velvety con-



ill. 60 Plan of Thermae in Vals

ill. 61 View toward the fire room with red color

crete walls with noble brass door handles on the mountain side; the treatment area on the valley side. From the separate massage rooms there are unique views to the landscape, which almost becomes the guest's own personal picture.

The areas are truly different; the effect is marvelous, the design of different setting result in different moods by using special qualities, light, and texture.

As Peter Zumptor explains, the design process was focused on the mystery of the nature of stone inside mountains –for darkness and light and the sounds of water and stone in different spaces.

"We envision a special kind of collage of old and new that doesn't draw on striking contrasts and dramatic juxtapositions, but whose strength comes from clever fusions, from finding joy in the organic evolution, delight in hybrids. By 'crossing' the old with new, we hope to generate the kind of architectural energies that only a special context like this affords."

Peter Zumptor

The Vals therme is not a showcase for the latest aqua gadgetry, water jets, nozzles or chutes. It relies instead on the silent, primary experiences of bathing, cleansing oneself, and relaxing in the water; at different temperatures and in different kinds of spaces; on touching stone and water.

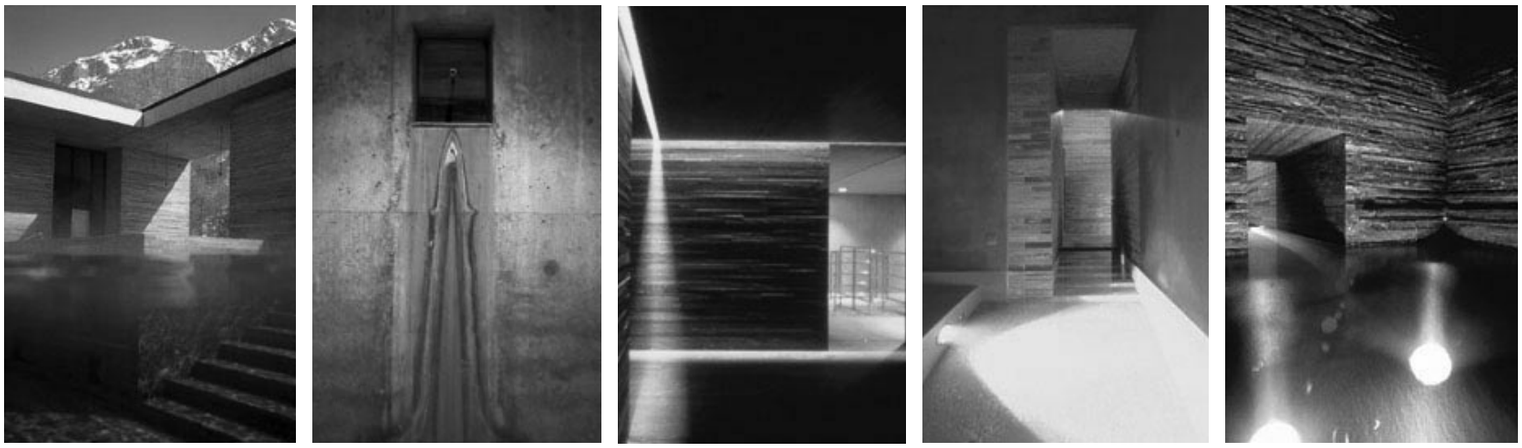
The building is a technically ordered, architectonic structure which obtains a natural form. Within the homogenous stone mass it retains a clear sense of a strong design idea; the idea of hollowing out. This seems extremely appropriate for the nature of the site.

The Roman tradition has a great translucent influence, the wet spaces are everywhere, which is typical for the Roman bath, though the Swiss thermae has a hot rock for steam, most of the spaces are wet. The small spaces inside the grottos in the Thermae in Vals have a relation to the compact spaces in the Finnish bath tradition.

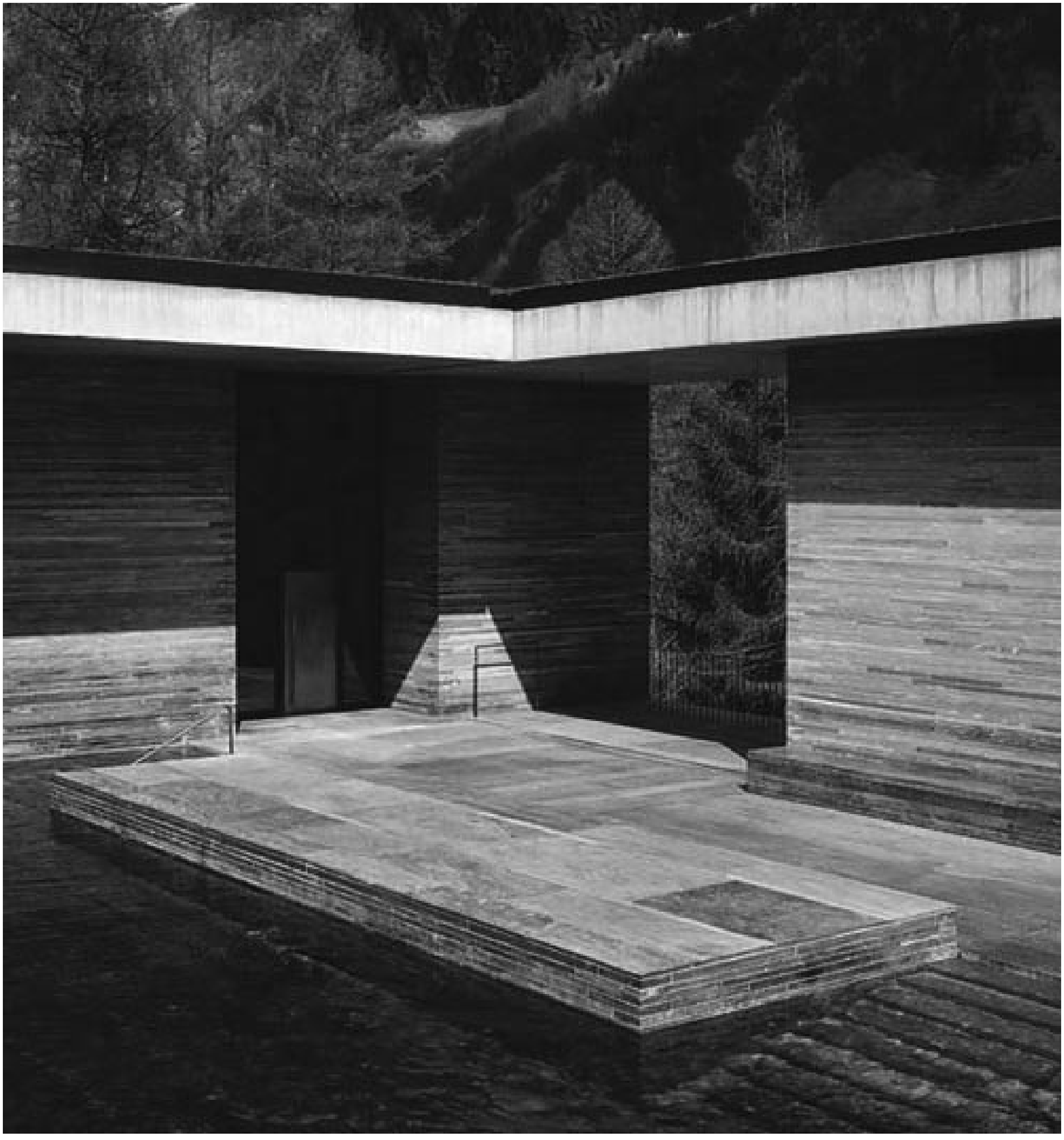
The challenge is to design the building according to the site conditions, both regarding architecture and the use of materials.

[Vandkulturhuse]

[http://www.therme-vals.ch]



ill. 62 Photos of Thermae in Vals



ill. 63 Outdoor pool

[Vandkulturhuse]

Roman Bath

Back in the antique Rome the population spent a lot of time in the Thermae´s. The concept of the roman bath is inspired by the Greek influences in south Italy. The traditional materials are stone and tiles and the spaces were quite often large and curved.

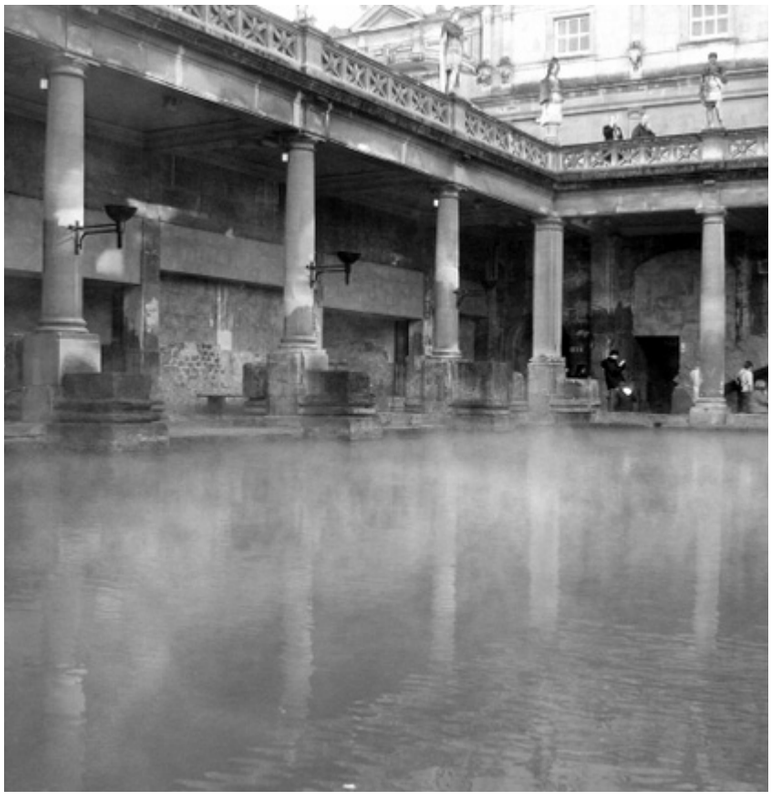
They used the heat from the hot springs from the volcanoes to heat up particular parts of the bath. Later the Romans artificially created heat in the rooms, by leading heat from big owns under the floor of the bathing areas. The Thermae consisted of several different rooms; a dressing room, a sweat bath, a hot bath, a tempered bath and finally a room for the cold bath, in some Thermae´s there also were medical baths like sulfur baths. The order of how they used the baths was not always the same; sometimes they used the cold bath first.

The baths opened before noon but it was common to bathe in the afternoon. The users were men, women, rich and poor, and most Thermae´s were free to enter. Most of the large complexes had separate areas for men and women. Some of the smaller ones allowed men and women in separate hours, later on the emperor allowed entrance for both men and women together. Most inhabitants used a couple of hours in these complexes every day.

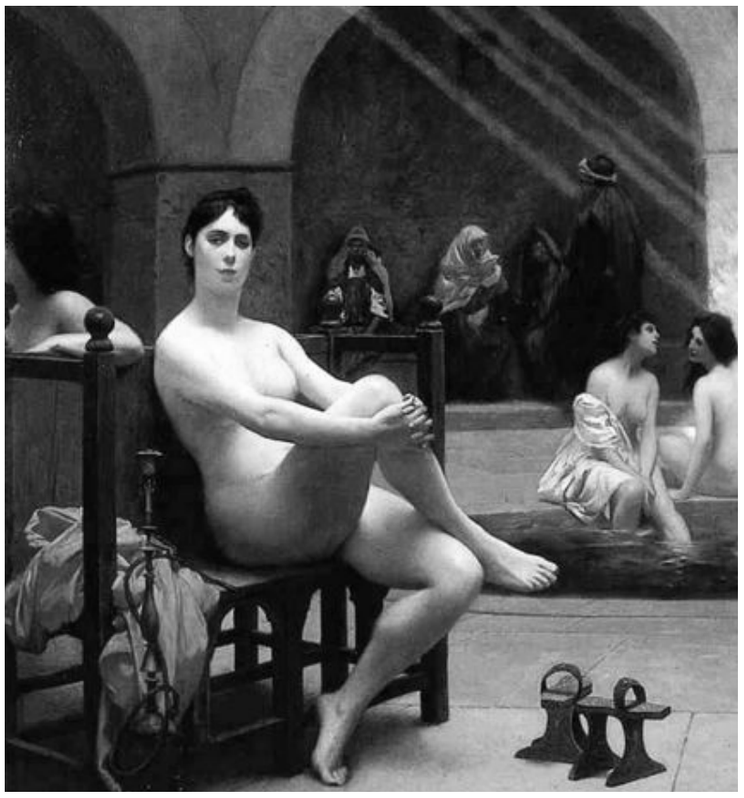
The biggest complexes, needing 188.000 cubic meters of water every 24 hours, did not only offer different baths, but also food, drinks, sex, doctors, sports, library, listening to lectures or music, walking in the aisles and looking at works of art. So the great antique Thermae´s have some similarities to the wellness resorts we know in contemporary times, and less in common with our swimming halls.

[Politikkens bog om Romerne]

[Romerne; dagligliv i det romerske imperium]



ill. 64 Roman outdoor hot pool



ill. 65 Experience of a Roman bath

Finnish Bath

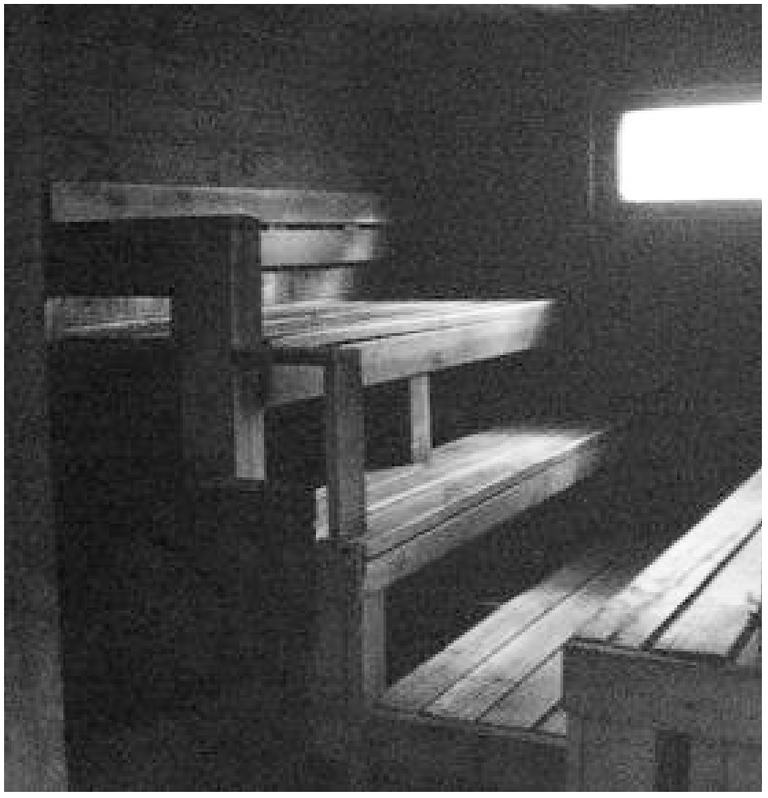
Traditionally the Finnish sauna was a family facility, but today it is used in a variety of functions; socializing, sealing business deals and also as a healing cure for many types of ill-beings. The earliest chronicles of Finnish sauna is from 1113, the writer was a Ukrainian historian, and he wrote about many sauna-going events.

Most saunas are private and physically a part of the family house, but public saunas is more and more common and every hotel has one. Originally the sauna was taken naked, but this has changed at least in the public saunas. The Finns regard the sauna as a nonsexual place, traditionally a place for meditating and bathing.

The chimney sauna is driven by a log fire and it stables the life at summer cottages. The real smoke sauna has no chimney, so the smoke is kept inside just until the people enter it. The smoke has a darkening effect on the wood, this is also a part of the experience, and sometimes even the breathing has a wooden taste to it. In the top of the sauna the temperature rises to 120 degrees, but most Finns consider the most satisfying temperature to be 80 degrees.

The real Finnish tradition dictates one to take a ladle and throw water on the sauna stove to release steam, and then strike oneself with a fresh birch twig. This improves the blood circulation, which have a cleancing effect and it will give the skin a pleasant smell. When the heat is enough, a fast plunge into a lake or snow and then return to the hot sauna, this cycle is repeated several times. The swim and the aspect of the hot and cold is such an integrated part of the sauna experience, that in the winter the Finns cut holes in the ice and jump in.

ill. 66 Finnish bath house, typical small size



ill. 67 Finnish sauna with wooden interior

SPACES

Spatial Program

For the development of the site the municipality made a spatial program. The square meters given in the competition material is shown here with a black square, and the squares filled with color represent the spaces where the square meters are decided both with considerations for the Danish standard for swimming halls and for a consistency of the sizes of the rooms, see ill XX. The program is divided into four categories; common, wellness, treatment and technique. The spatial program shows architectural and technical values for different rooms, these values are used further on in the design process. Many of the functions in the building have a large amount of salt and a relatively hot temperature, this set clear demand for the materials. The materials should have qualities that cope directly with the impact of the functions.

FUNCTION	M²	HEIGHT	QUANTITY	USERS	USAGE	LUX	TEMPERATURE	EXPERIENCE
COMMON								
Store	40	4	1	15	10-18	300	20-24	open
Store deposit	25	3	1	2	10-18	200	20-24	-
Office	25	3	1	2	09-22	200	20-24	-
Office deposit	15	2,5	1	1	09-22	200	18-26	-
Server room	5	3	1	1	09-22	200	18-26	-
Copy room	5	3	1	1	09-22	200	18-26	-
Toilet, personel	3	2,5	1	1	09-22	200	18-26	-
Room, personel	25	3	1	10	09-22	200	20-24	private, cozy
Locker room W/M	100	4	2/4	75	10-21	200	20-24	clean, private
Salt water room	100	8	1	30	10-21	400	26-30	large, social, light
Salt inhalation	8	2,2	1	8	10-21	200	26-42	small, private
Foot bath	6	2,2	1	5	10-21	200	26-30	small, moist, social
Indoor spa	10	3	1	10	10-21	300	26-40	in touch with salt water
Cafe	180	3	2	50	10-18	400	20-24	social, activity, light
Kitchen	35	3	1	3	10-18	300	18-26	-
Cafe deposit	25	2,5	1	1	10-18	200	18-26	-
Room for movement	100	3,5	1	25	10-21	400	20-24	open, large
Relax ect	30	2,5	1	15	10-21	300	24-30	warm, view
Terracce	200	-	1-3	10	10-21	-	-	wide ope -view
Sun space	55	3	1	10	10-21	400	26-30	hot, lig, view
Clean clothes deposit	20	3	1	1	09-22	200	18-26	-
Dirty clothes deposit	30	3	1	1	09-22	200	18-26	-
	1042							

ill. 68 Spatial program including architectural and technical demands

Size

For comparing the total amount of square meters of 1.151 m2; the church is only 237 m2 and the land register is less than 4000 m2, see ill XX, this calls for an in-depth investigation of organizing the spaces. Here it is seen that the total square meters in the Common area is dominating the other two main areas; Wellness and Treatment. The spaces in the Technical group are prioritized less than the other three.

The large rooms are all a part of the Common facilities, and the Technical spaces are quite small compared to the contents of them. The spaces for Treatment are many; there are often demands of privacy in these rooms.

FUNCTION	M²	HEIGHT	QUANTITY	USERS	USAGE	LUX	TEMPERATURE	EXPERIENCE
WELLNESS								
Alga mudd	45	2,5	1	4	10-21	200	30-40	color, hot, wide
Wellness room	90	3	4	6	10-21	300	26-30	private
Sauna	15	2,2	1	8	10-21	200	26-42	dark, small, view
Steam	20	2,2	1	8	10-21	200	26-42	dark, view
Solarium	20	3	2	1	10-21	200	26-30	-
Cold water	20	2,2	1	3	10-21	300	20-24	deep, tall, dark
Wellness deposit	15	3	1	1	10-21	200	18-26	-
	225							
TREATMENT								
Salt bassin	95	4	1	10	10-21	300	26-30	light, open outward
Treatment room	65	3	5	2	10-21	300	20-24	introvert
Clinic room	20	3	1	2	10-21	300	20-24	functional
Secretary room	25	3	1	2	10-18	200	20-24	functional
Toilet	4	2,5	2	1	10-21	200	18-26	-
Handicap toilet	4	2,5	1	1	10-21	200	18-26	-
	213							
TECHNIC								
Caretaker office	10	3	1	1	09-22	200	20-24	-
Caretaker deposit	20	3	1	1	09-22	200	18-26	-
Treatment waste	12	3	1	1	09-22	200	18-26	-
Cleaning	15	3	1	1	09-22	200	18-26	-
Laundry	15	3	1	1	09-22	200	18-26	-
Technic	15	3	1	2	09-22	200	18-26	-
Garbage room	**87**							

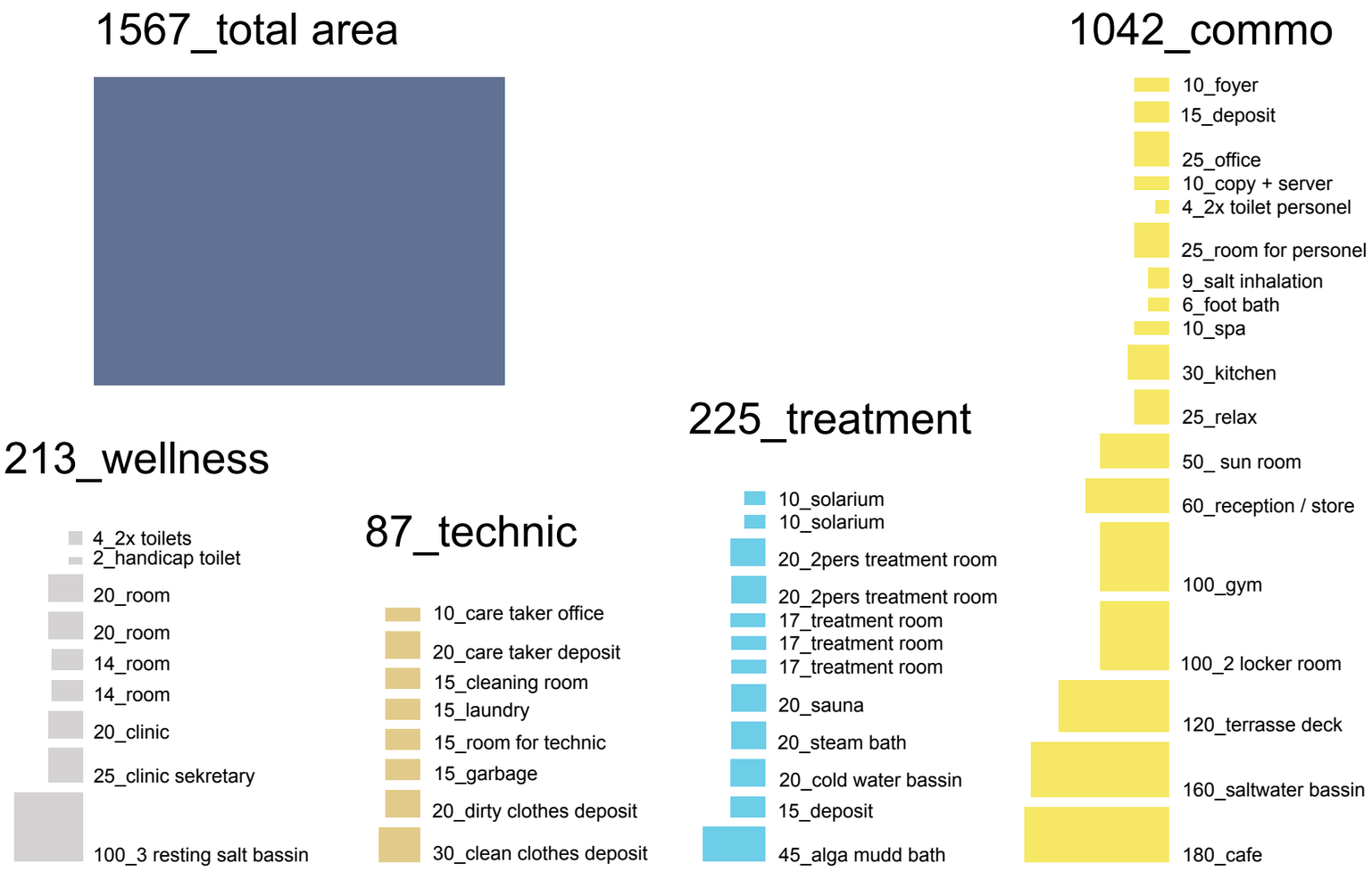
Organization of Functions

A roughly decided organization of the spaces, see ill. XX, is made with consideration for the different needs of the guests i.e. psoriasis or ordinary guests.

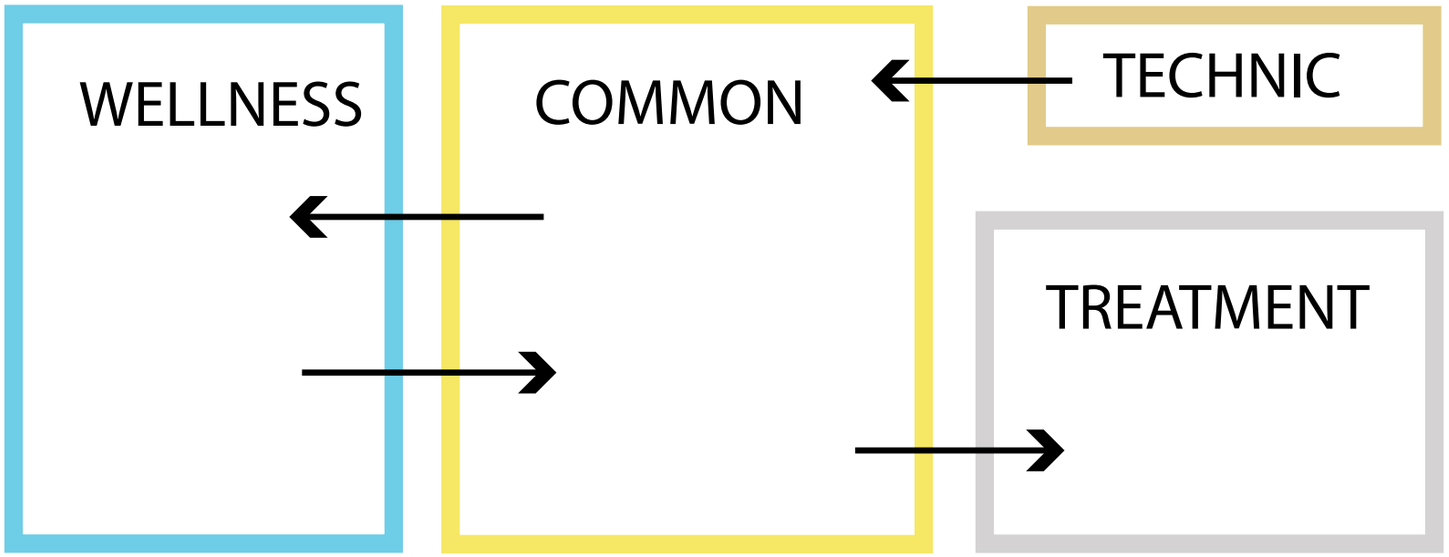
Another overall principle of the organization is to use the spaces for common functions as a distributional area for the both the wellness area and the treatment area. The technical spaces are kept away from the guests to avoid confusion and accidents. The concept of placing the common facilities in the middle, makes expanding of the treatment and wellness areas more flexible; the users of the wellness area are not allowed to interrupt the users of the treatment spaces.

In order to give the guests in the treatment area a private and relaxing experience, the area must have a distance to the common spaces. The guests of the treatment area are allowed to use the common facilities in addition to the private spaces. There must be a boundary between the common facilities to the other areas, the guests should be able to guide them self around in the resort.

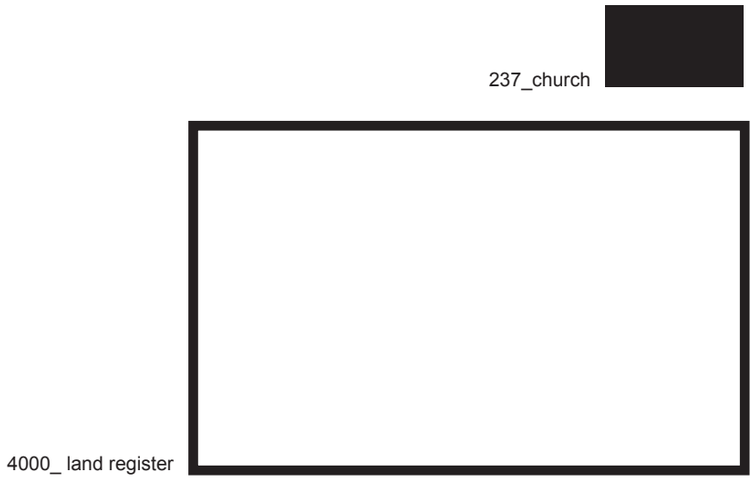
The views provided at the site have a tremendous quality, these should be exposed to all the guests, and here the visitors in the common areas have a high priority, also because these areas are for all the guests of the resort. The views from the wellness and treatment area are calmer and reach only the immediate surroundings of the site.



ill. 69 Squaremeters divided in the four groups



ill. 70 Overall organization of functions



ill. 71 Squaremeters in church and on register

Experiences

To focus the design some spaces are chosen to be prioritized higher than the rest. Here the five most important spaces are shown. In each space the experience is an additional design parameter, on top of the other design parameters that rule the entire building.

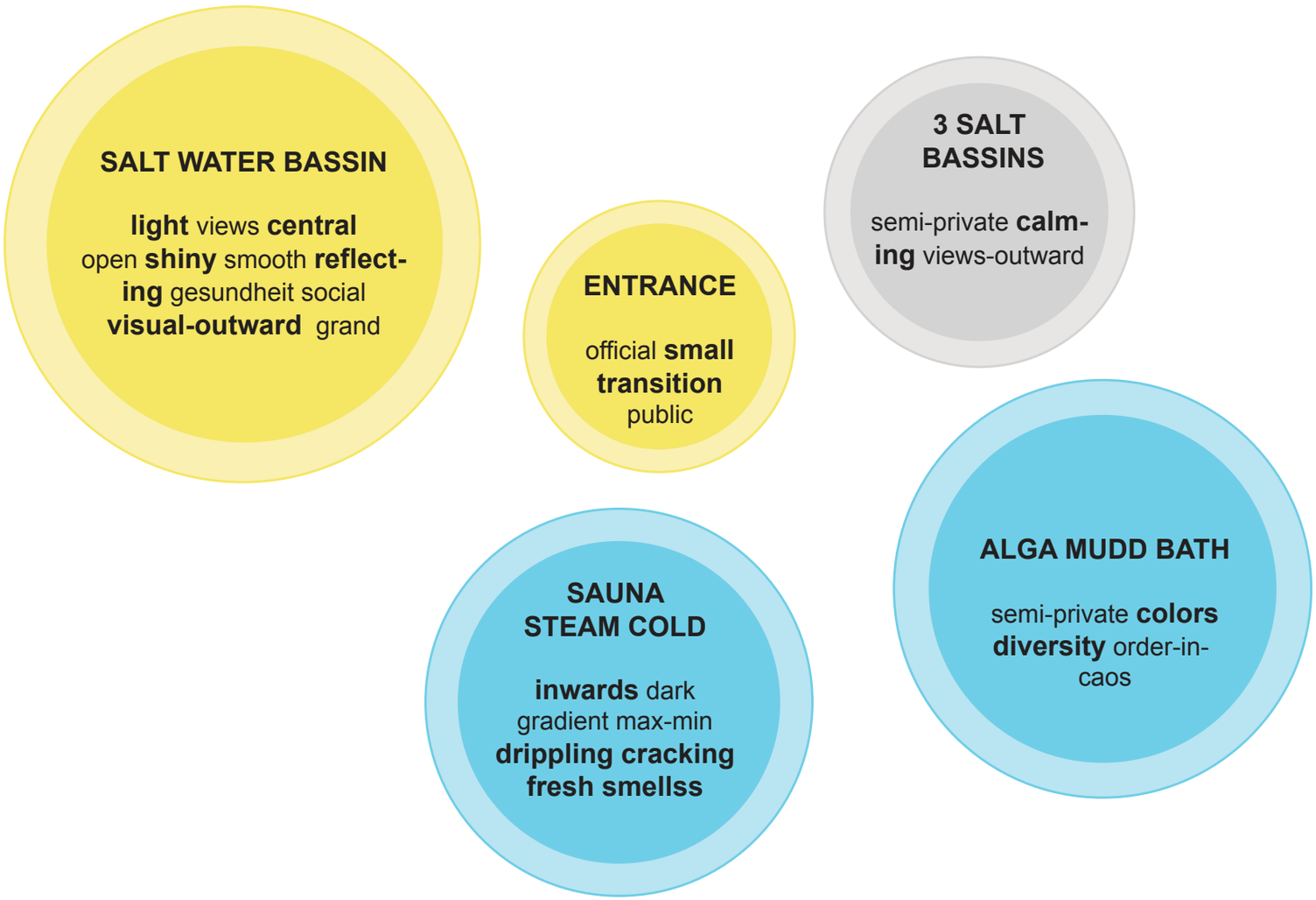
The two yellow belong to the common area, the two light blue belong in the wellness area and the grey in the treatment area. These spaces are considered as the main spaces in the building; there the functions can contribute to the desired experience.

During the design process the described experiences will be sough through both calculations and models.

The room for the salt water basin must provide the guest with an experience of openness and light. The space should be interpreted as a central and social space where everyone can meet and continue the tour to the other areas of the resort.

The alga mud space has to offer a semi private atmosphere. The color of the mud should be reflected in the space and hereby create the identity of the room. The experience of this space is characterized by the different treatment and the color should be inspired by the green alga's.

In the three small rooms of sauna, steam and cold bath, the overall experience should be the compactness and the introvert feeling of one self. The functions of the spaces are different, and their identity has to dominate each space. In the sauna the feeling of dryness can be experienced through a cracking sound, or rough material. The steam bath is wet and here the surfaces are smooth to enforce the sense of the wet environment. The cold bath differs from the other two by an opposite temperature. This bath is similar to the steam bath, so the environment must also underline the wet, but cold element.



ill. 72 The experiences desired in five spaces

The three basins of salt water have to be connected to the central salt water basin and the alga mud bath in regards of experience and “location”. The room should like the alga mud bath, offer a semi private atmosphere, further more the space has to link to the beach outdoors, and to the real salt water basin; the sea.

When entering the bath resort, the first room should be interpreted as a formal and functional space. It needs to obtain a smaller amount of square meters, and will hereby become a sort of tunnel toward the real deal; the bath.

Target Groups

The overall target group for the resort is adults from the age 16. Mainly the visitors are tourists, but also a steady group of people with psoriasis are using the resort as a part of a regular treatment. The inhabitants on the island are also a part of the overall target group, but during the entire summer season, the inhabitants are outnumbered by the tourists.

The users of the common facilities vary both regarding age, origin and gender. Here people can swim, enjoy the many functions and spend quality time with each other.

The wellness area is also used by the mix of guests, mainly those who prefer to relax and be more private, than the guests using the common facilities.

The treatment area is only for the visitors that buy a special ticket, mainly ones with psoriasis or other skin deceases. Here the regular guests are not allowed and the spaces are calm and offer absolute privacy for the patients.

The technical areas only entrance for the technical manager is allowed. The guests are not allowed here and the transitions from this area to the other are well protected.

EXPERIENCE	LIGHT	SOUND	MATERIAL	SIZE
A	floating, falling inside	water splashing, flowing	smooth reflecting light colors	large 300-400m³
B	controled views		salt consistant	medium 200-250m³
C	controled view darker..		mosaik, darker colors	small 80-100m³
D	minimum dark	water crack water drip water falling	wood tiles tiles	very small 30-50m³
E	functional	music	bricks/tiles wood	“tunnel” 60-70m³

ill. 73 Experience program

Recapitulation

The knowledge of Læsø as an island, the history of the salt industry and the registration of Vesterø, provides a basic understanding of the area of the site.

The registration and following analysis gives both concrete and abstract information of many different aspects of the site. Parts of this information contribute to the design parameters and hereby affect the design process directly. The essence of the area is quite modest and has a natural sense to it. It is important for the new building to be able to link to the existing context; otherwise the building will look foreign at the site. By using materials that are suitable for the site, both considering color and texture as well as physical properties, the mass can link directly to the site. Also the shaping of the new volume has to relate to the existing natural shaping of the landscape. The linking to the existing context, do not exclude new shapes, colors or textures.

Vesterø Havnekirke has only been visible at Vesterø Havnegade in 52 years, but through this time it has gathered a local story both for tourists and for inhabitants, this story is very important to pass on in the new building. The nave of the church itself is relatively small even though it is the largest room in the church; 20 x 7 x 5 m.

The spatial program includes goals for different aspects of the building and its performance; these will function as concrete design parameters. In the first part of the design process the overall measurements and categorization of the spaces will be used, and later on the more specific demands for each space will be solved.

The theory chapter provides knowledge of overall climate conditions, technical issues and traditions of baths.

An overall technical issue in this project is to reuse the church in a sustainable way; mainly regarding the indoor climate and the energy performance. The indoor climate is dependent on the ventilation of the building and the pollution. The basic design of the building is very important when regarding the energy performance; especially the volume to surface ratio and the orientation. The calculated values for these aspects are very useful in the design process in order to achieve an optimal design.

The rich experiences that are a part of the Thermae in Vals has a tremendous value, and can be used as an inspiration in the design process of the resort at Læsø. The concept of creating different experiences in one building is quite persuasive, and must be recognized as a powerful concept for the project.

All together the Program for this thesis project is a frame setting introduction to the design process. The analysis and the theory set the foundation for the design parameters which are to be used in the design process. During the design process new knowledge will be applied in the design, and this theory will be used and mentioned in the design process in the report and described in the Appendix.

VISION

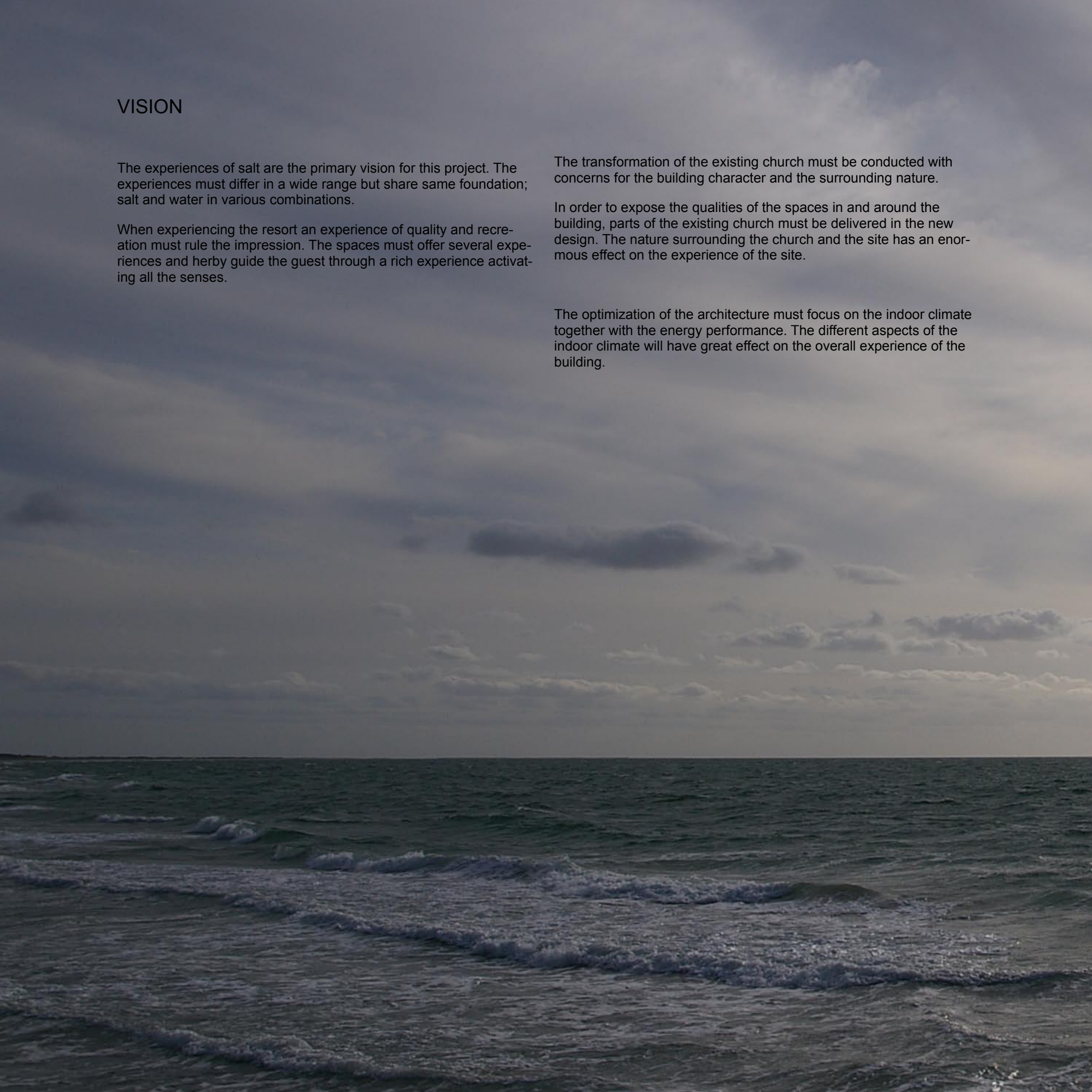
The experiences of salt are the primary vision for this project. The experiences must differ in a wide range but share same foundation; salt and water in various combinations.

When experiencing the resort an experience of quality and recreation must rule the impression. The spaces must offer several experiences and herby guide the guest through a rich experience activating all the senses.

The transformation of the existing church must be conducted with concerns for the building character and the surrounding nature.

In order to expose the qualities of the spaces in and around the building, parts of the existing church must be delivered in the new design. The nature surrounding the church and the site has an enormous effect on the experience of the site.

The optimization of the architecture must focus on the indoor climate together with the energy performance. The different aspects of the indoor climate will have great effect on the overall experience of the building.



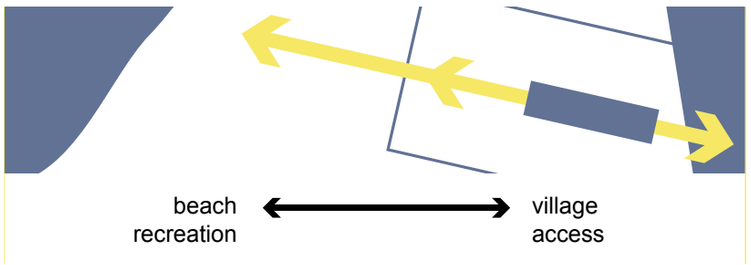
Problem Statement

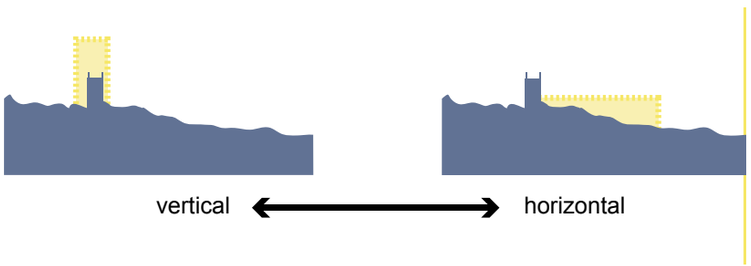
“How can the existing church be transformed, remaining the character of the building, in to a new hybrid space for rich experiences of salt and water?”

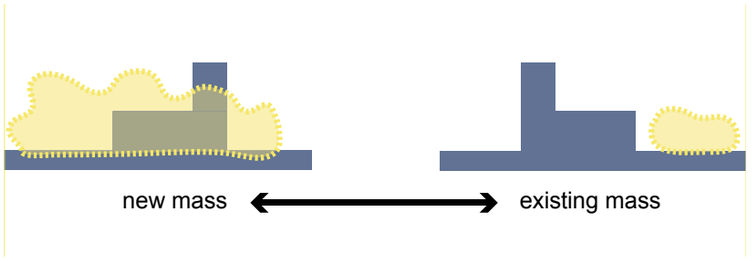
DESIGN PARAMETERS

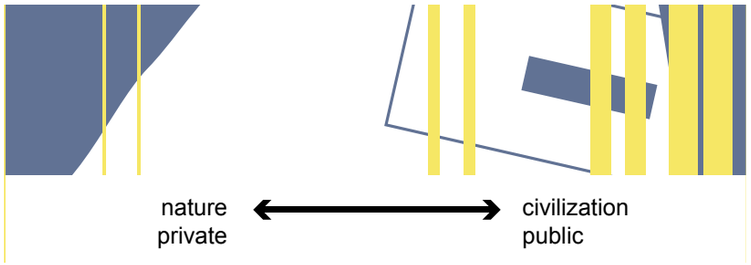
“a **parameter** is a quantity that serves to relate functions and variables using a common variable when such a relationship would be difficult to explicate with an equation. In different contexts the term may have special uses. “

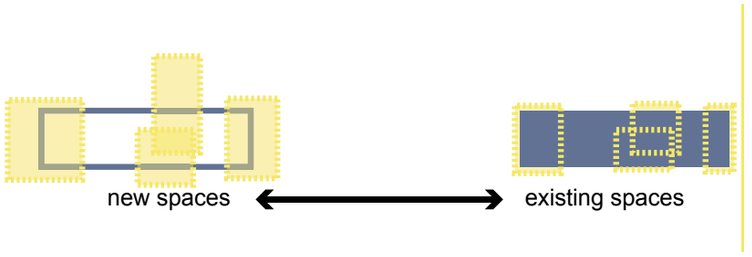
[www.Wikipedia]











ill. 75 The experiences desired in five spaces

ill. 76 Mass distribution and space distribution

PROCESS

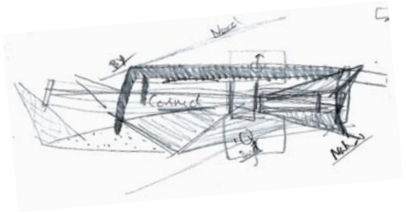
ARCHITECTURAL CONCEPT

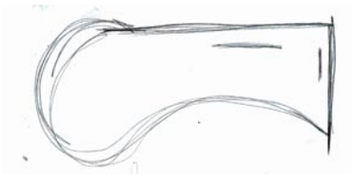
- INTERNAL
  - Zoning
  - Flow
  - Experiences
  - Transformation
  - Views
  - Daylight
  - Indoor Climate
- EXTERNAL
  - Shape
  - Facade
  - Materials
  - Energy
  - Outdoor site
  - Ventilation

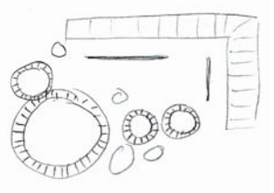
The PROCESS describes parts of the entire process. The process has been an iterative process based on the IDP, as described in the Method chapter. Most of the subjects shown here have influence on other subjects in the process, but are presented separately here, to ease the understanding.

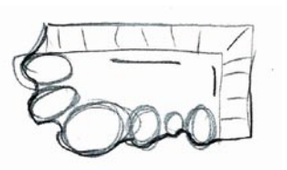
Different sketch solutions are shown in a chronological progression to reflect the actual process. The text describes first the focus areas in the specific theme, i.e. Zoning. The middle section describes the process briefly and the last section describes the resulting idea.

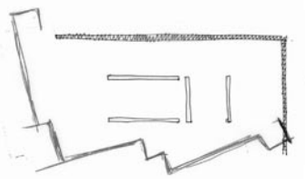
ARCHITECTURAL CONCEPT

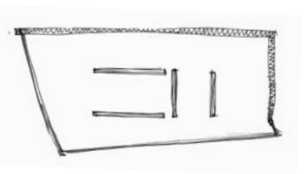


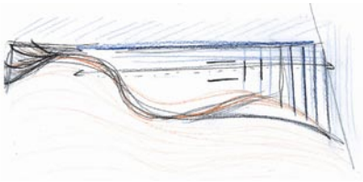


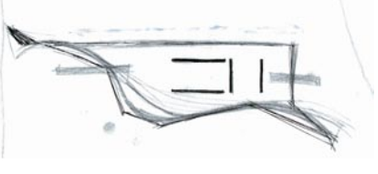


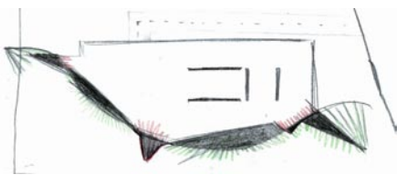












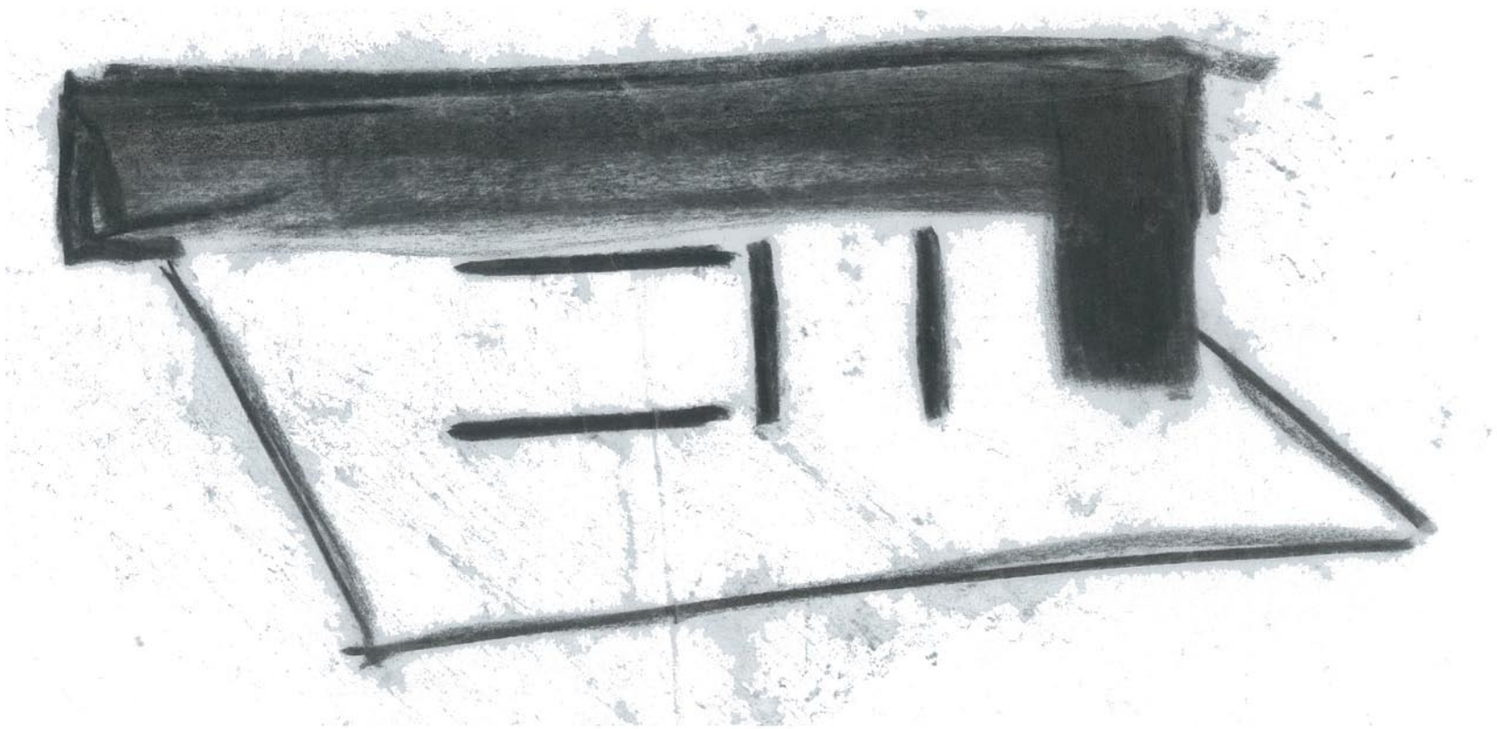
The architectural concept focuses on how the mass is distributed at the site and how it relates to the surroundings.

After deciding the main concept, the architectural concept was processed. The overall process has focused on the compactness and the shape of the southern outline. Tests of the shape vary from organic curvy outline to an almost square-ish outline. Regarding the use of energy, compactness was a very important aspect to implement in the concept. The sketches show concepts with an almost cubic footprint, ones where the form is longer according to the site proportions and ones with serrated forms.

The design parameters from the PROGRAM are used in the development of the concept. The concept attempts to merge the two districts; the village and the beach moor. The concept consists of two poles of contrasts. On the northeast side an abstraction of the civilized village is dragged up from the south, cuts a corner and continues out towards the beach moor. The southwest side is an abstraction of the natural beach moor, which is dragged in from the west and forms a path toward the village in the east of the site. The two sides have several describing characters attached, see ill XX. The dualistic aspect in the concept is sought to be reflected through the design. The north of the resort is a protective back spine, and the south contains the essence of the resort: salt and water.

North

village
straight
cold
closed
functional
hard
rough
absorbing
simple
control

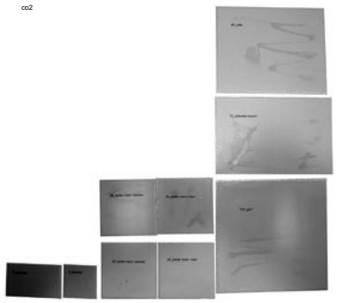


South

beachland
diverting
warm
open
experimental
soft
smooth
reflecting
complex
recreation

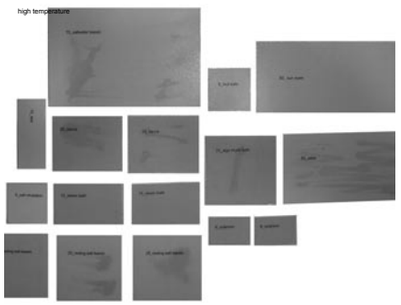
INTERNAL

Zoning



ill. 1 keep it simple; orthogonal line from the village, curving line from the beachmoor.

ill. 1 keep it simple; orthogonal line from the village, curving line from the beachmoor.



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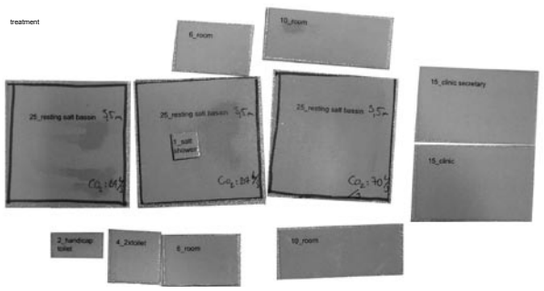

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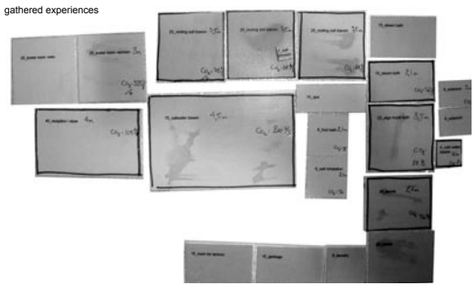

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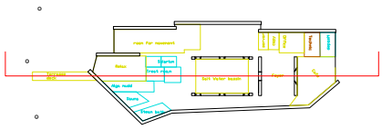


ill. 1 keep it simple; orthogonal line from the village, curving line from the beachmoor.

ill. 1 keep it simple; orthogonal line from the village, curving line from the beachmoor.

Zoning

By using zoning as a method of creating the interior design, the focus can be both on the architectural and the technical essence. The technical properties contain the strategy of heating and ventilation. The spaces with special experiences can be placed in the zones where the indoor climate will underline the desired experience. This concept ensures an integration of the technical and architectonic matters already in the early design phase.

The zoning can be made with concerns for different aspects; temperatures, humidity, CO2, functions, low room height, footwear areas and experiences. A study of sizes was made to see; the size of each room, the sizes of different zones and the total size of all rooms on the site plan. These bricks were used during the process to plan different zones. The zones were planned with different considerations, see ill XX. If considering temperatures, the idea is to gather the rooms with high temperature, to decrease the total surface of hot rooms, and hereby the rooms will lose less heat compared to the loss from several single placed rooms. The experiences and the functionality of the building was overruling the zones, which caused some rooms to be a specific place, regardless of the zoning rule.

The actual zones are mainly spilt into functionality; café+arrival+shop, lockerroom+distribution shaft, central saltwater+spa+3 resting salt waters, alga bath +cold bath, aso.

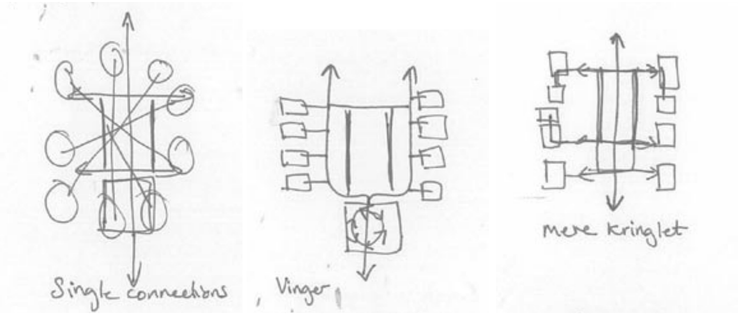
The experiences provided along the flow in the building overruled some technical zones. The division of the high temperature zones is not purely bad for the indoor temperature, because spreading out the cores with high temperature inside the large space with a relatively high temperature results in a more evenly distributed temperature inside, and avoids hot and cold areas.

Some rooms have to be placed among each other, to ensure a functional use of the programs they contain. The treatment area is kept together only the three semi-common salt baths are placed away from the rest of the rooms. They are placed across the central space in order to give possibility for interaction between the guests of the resort.

The arrival area is combined with the cafe and shop. The arrival area is planned for use of footwear and is placed before entering the locker rooms. The cafe and the facade are opening up towards the village, and hereby the arrival area becomes a part of the urban space in the village.

The solution with baths in only one floor has practical qualities of safety, cleaning and short duct work. From an experience point of view the baths could benefit by the placement in separate floors. The division of the baths can give more possibilities for creating interesting flows between the spaces. To optimize the practical qualities of the resort, a plan with all baths in one level is sought out. The different sketches have to some extend fulfilled this whish, and others also have a few baths in 1.floor.

Flow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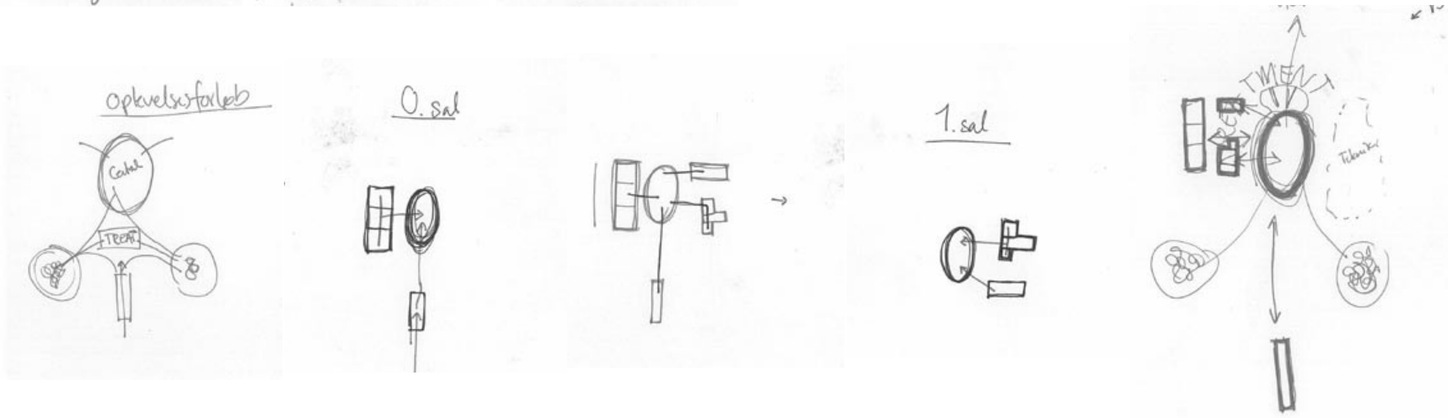
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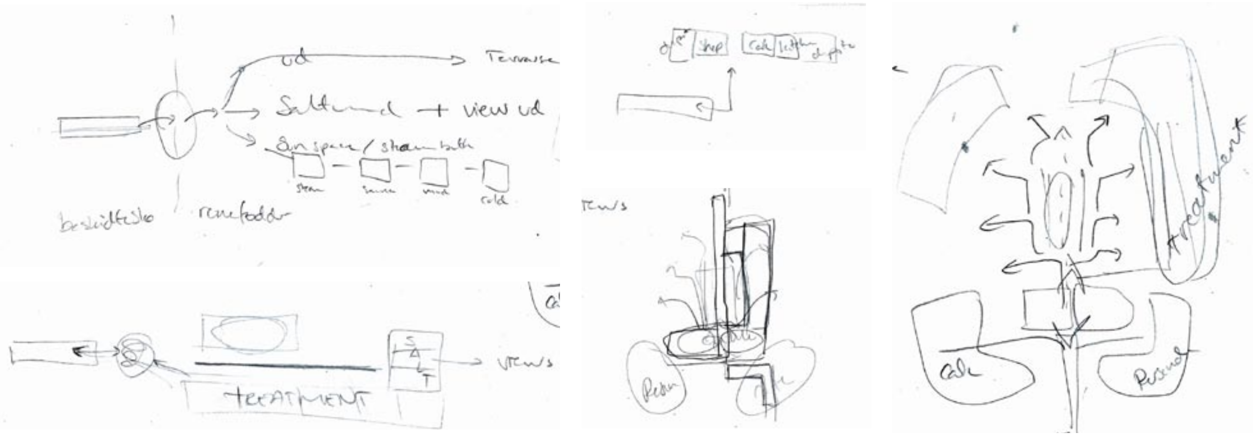
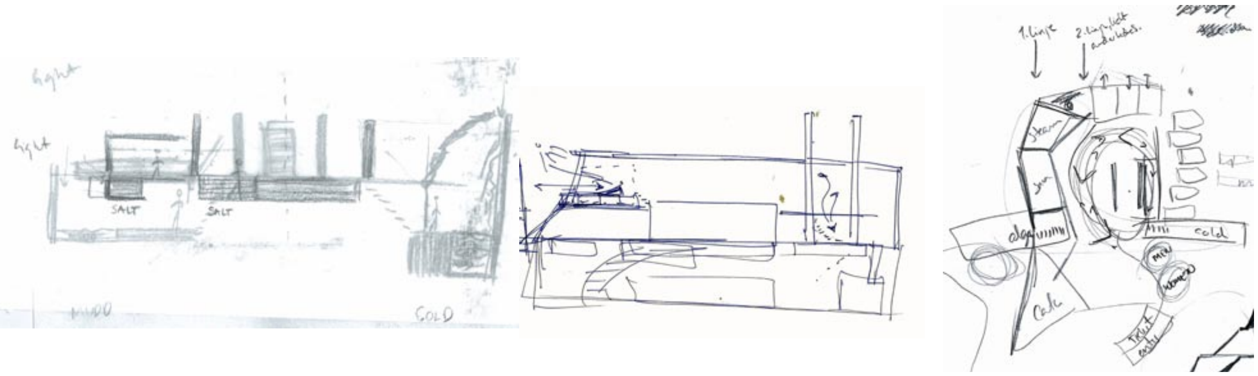

TREATMENT
views


SALT
SALT
cold

Flow

The flow strategy in the building is to distribute the guests in the bathing areas easily and have a logical organization. The flow of the three target groups is diverging, and the overall flow must consider all needs of these groups.

During the process of creating a suitable flow strategy, tests of linear, circular and wing flow have been investigated. The linear flow is more useable in a larger complex, in this build the flow should be concentrated in order to create spaces of privacy and social common spaces. When using linear and wing as patterns for the flow, the guests are spread out, and a common social experience is not created. Testing the circular flow problems with having connection to all spaces arose. For some rooms in the building a contact to the central space is destroying the functionality and experience of the rooms, or the experience of arriving to a certain room can be destroyed.

The central space of salt and water must distribute the main flow, in order to become a central space. The demand for privacy in the area for treatment calls for a wing solution of the flow, by this the ordinary users of the wellness rooms will not be lead into the area for treatment. The combined flow, of wing and circular pattern, has qualities for both privacy and creating a central space. The combined flow also reflects which of the two building mass one is located in.

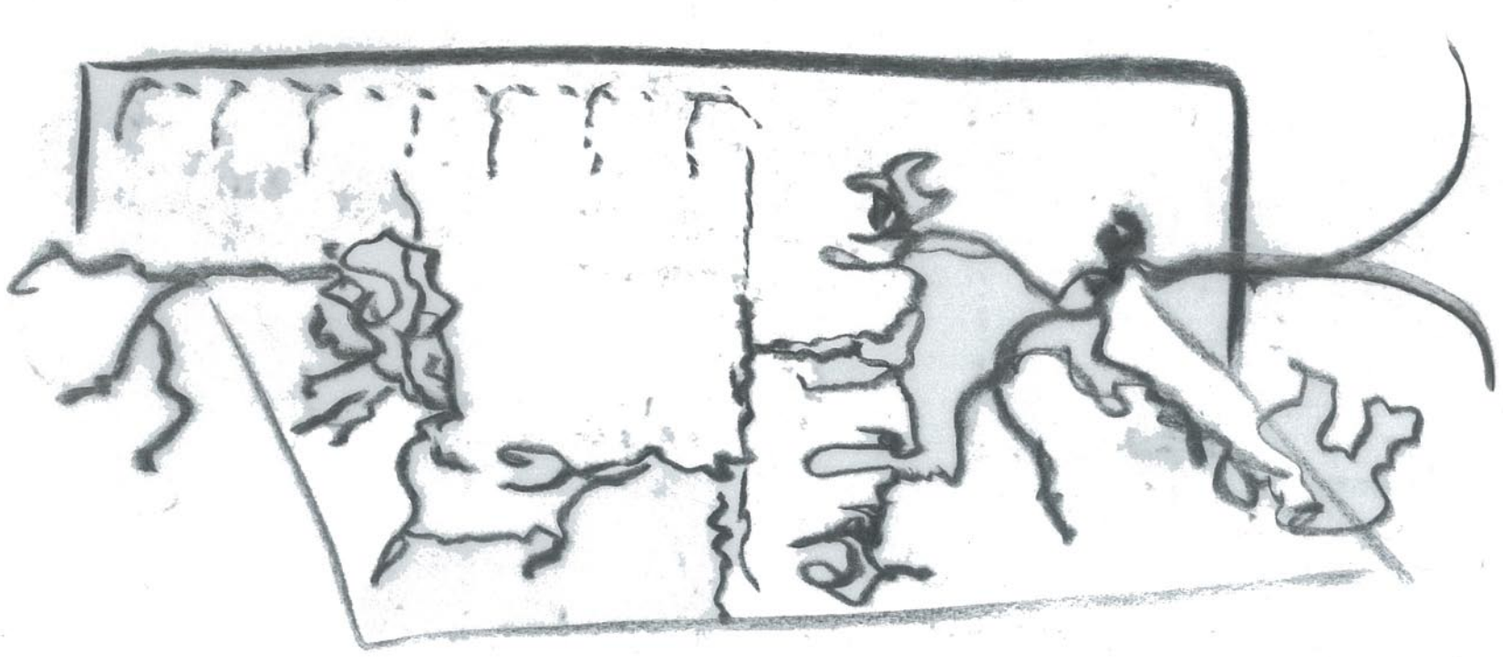
The transition between the interior and exterior flows through the two masses where they meet each other, see ill XX.

The courses of which the spaces are placed are important to assure a continuation of interesting experiences throughout the building. Different small courses are investigated; the guests with psoriasis, couples, single persons and the personnel at the resort.

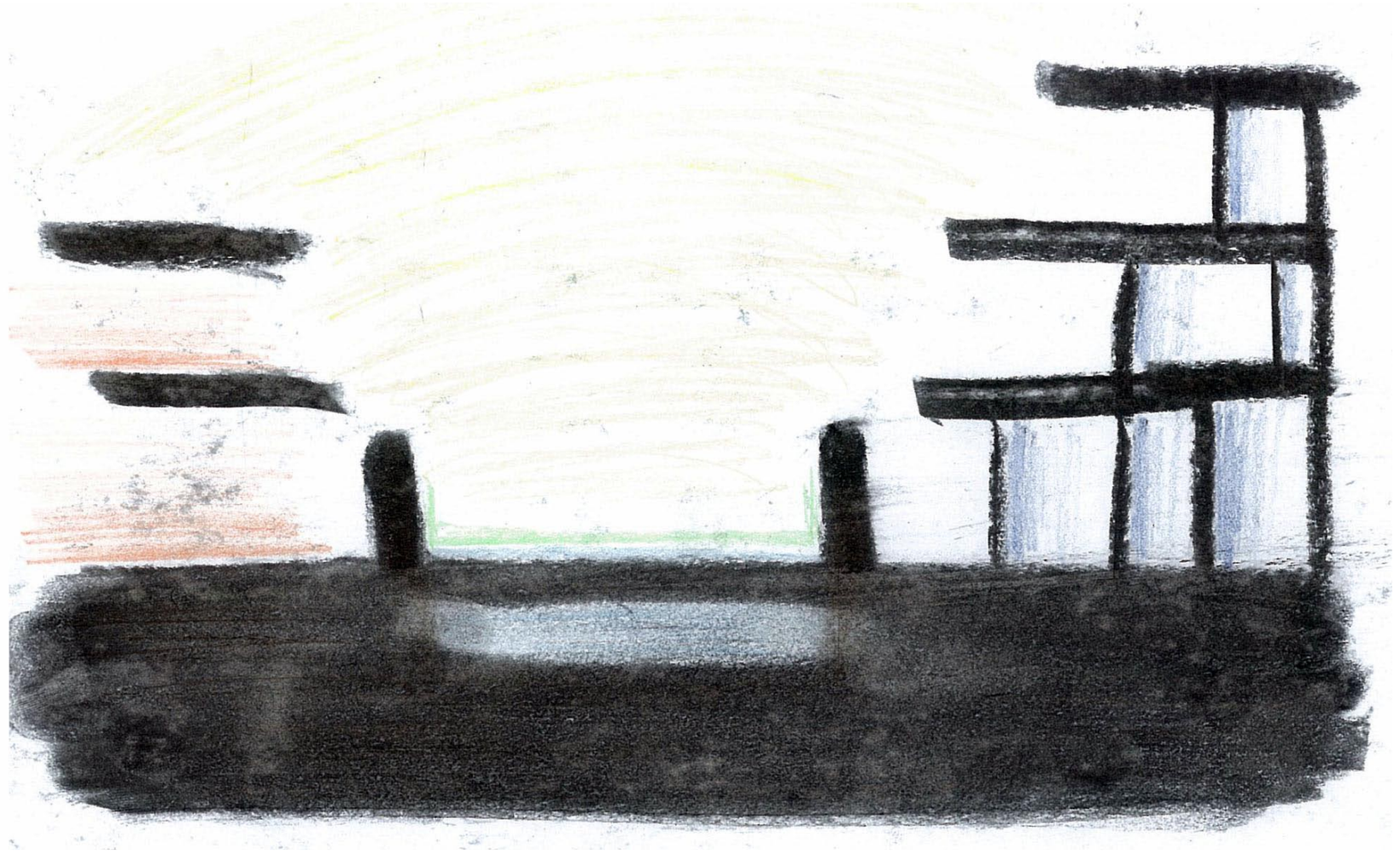
Guests with psoriasis are offered treatments of varying duration, some guests stay at the resort for many hours, and some only come in to get a single treatment. Between several treatments the guests use the common and some wellness spaces in the resort, see ill XX. The other regular guests are not allowed in the treatment area, but the guests with psoriasis are also allowed in the common areas.

The couples or groups also have a quite long trip around the resort; they use all the common spaces and some wellness spaces, but are not allowed in the treatment area, see ill XX. These groups spend long time at the resort, to experience the full body of the resort.

The guests using the resort alone are often more focused on the relaxing effect of the resort. They use fewer spaces and generally spend a shorter amount of time there. The popular spaces for the single guest are the gym, spa´s, saltwater, relaxing space and the sauna. The course of a single person are often quite direct and less random, see ill XX.



Experiences

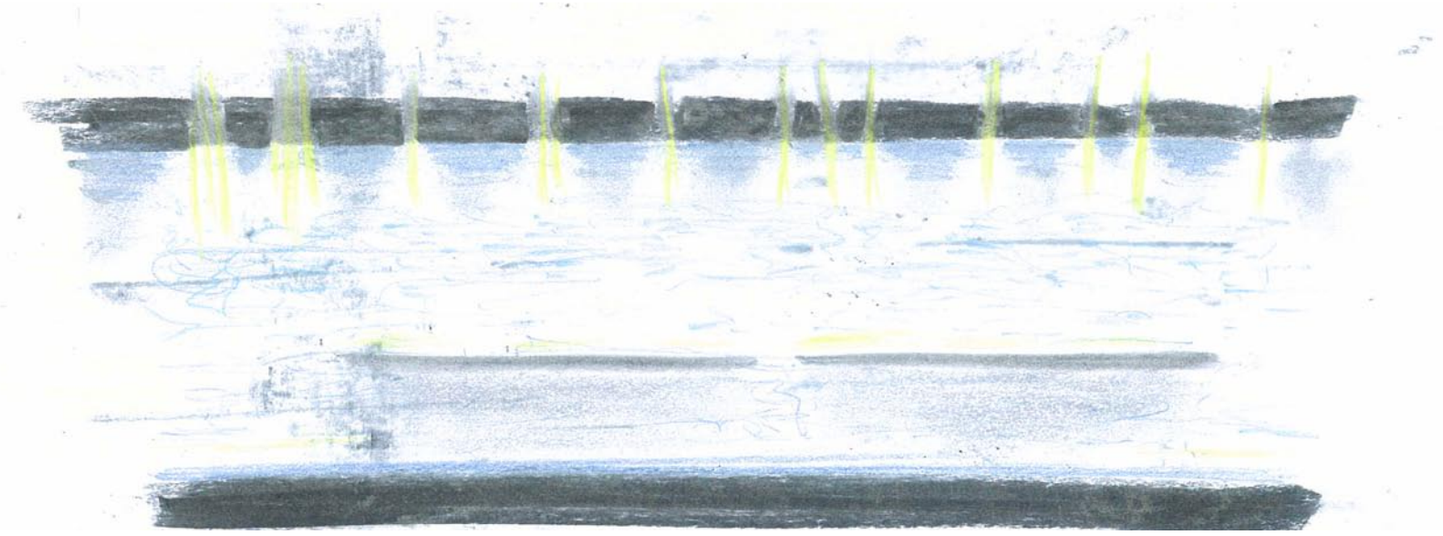


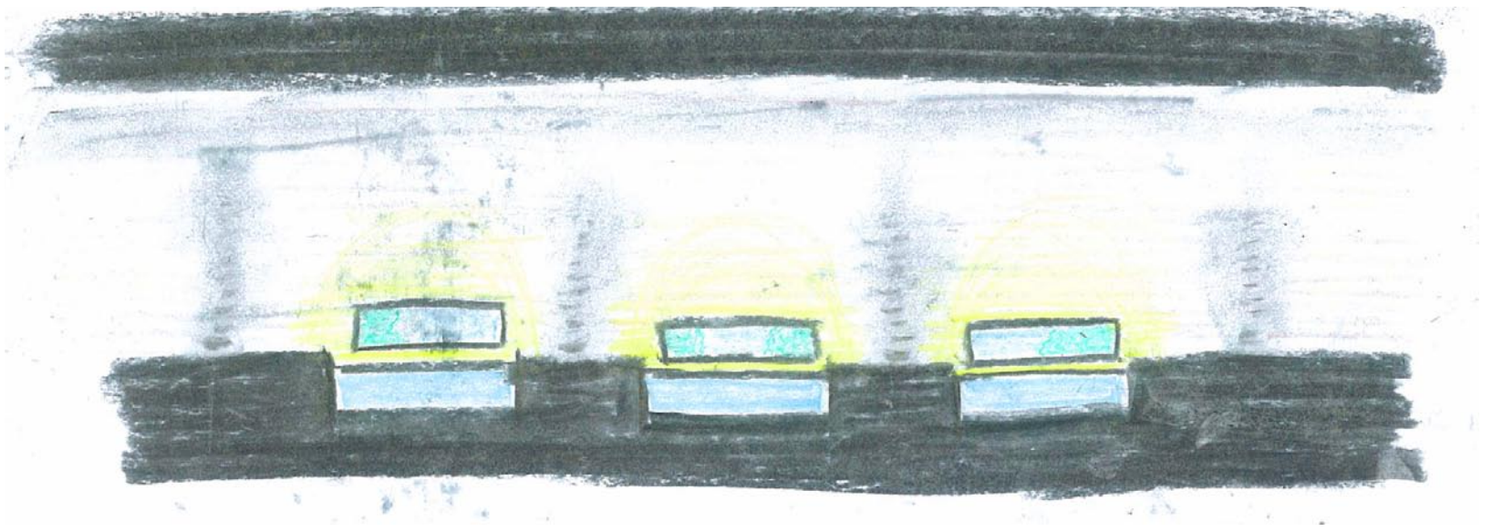
The overall experience of the resort should reflect the history of the church and the salt. The religious history of the original building should not overrule the experience of the new function; the resort, but be an additional historical experience of the building, referring to the past where the church was in charge of the salt production on the island.

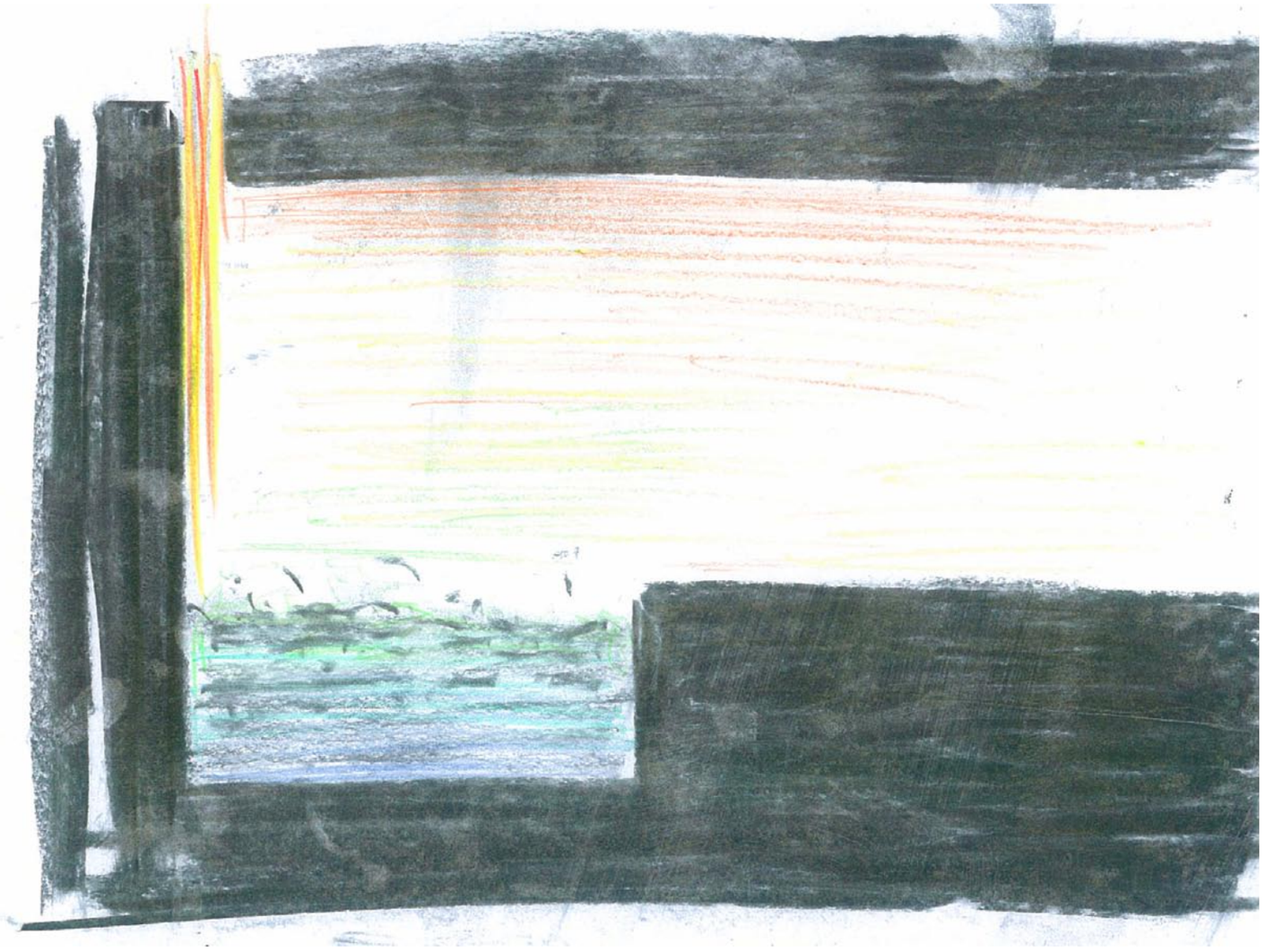
Developing the spatial experiences have been inspired by another successful bathing resort; Therme Vals in Switzerland. All though the site is very different than the relevant site for the project, the thinking and developing of the desired experiences in this project, is influenced by the Therme in Vals. Throughout the planning of the entire building new potentials for spatial experiences has emerged, which expands the list of experiences shown in the PROGRAM.

A division of the spatial experiences can be done; small, dark spaces and large, light spaces. Their placement, proportion, and texture of material are important factors when designing a spatial experience.

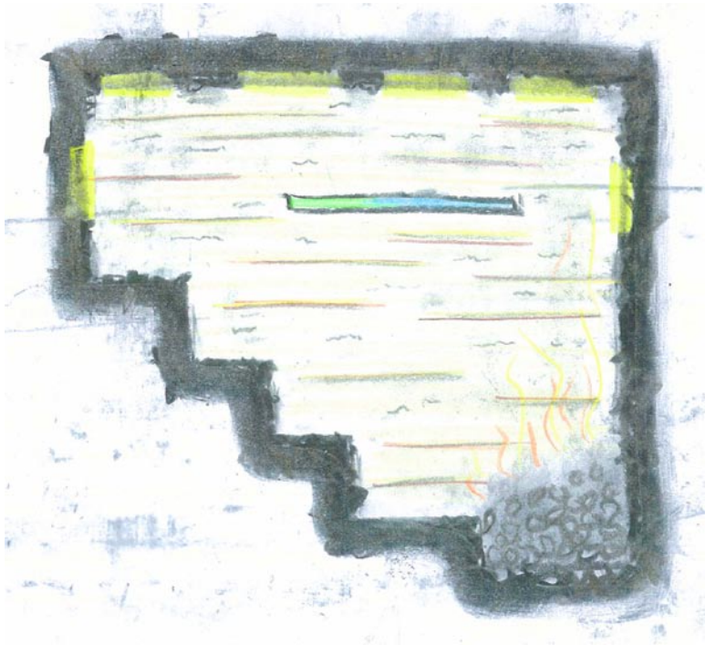
The really dark experiences are placed in the basement, where only sparse daylight can come in. The light spaces are placed with good possibility for lots of daylight. The texture of the material is very important in order to create a special experience of the room. The materials for the spatial experiences shall follow the already used material in the neighboring mass, but can be processed to reach a texture of the material, that will underline the wanted experience.

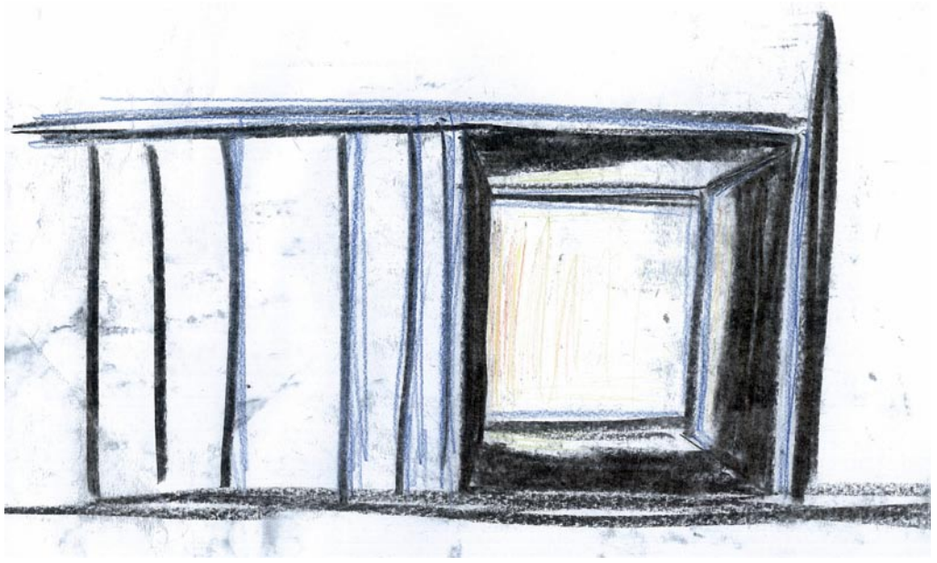


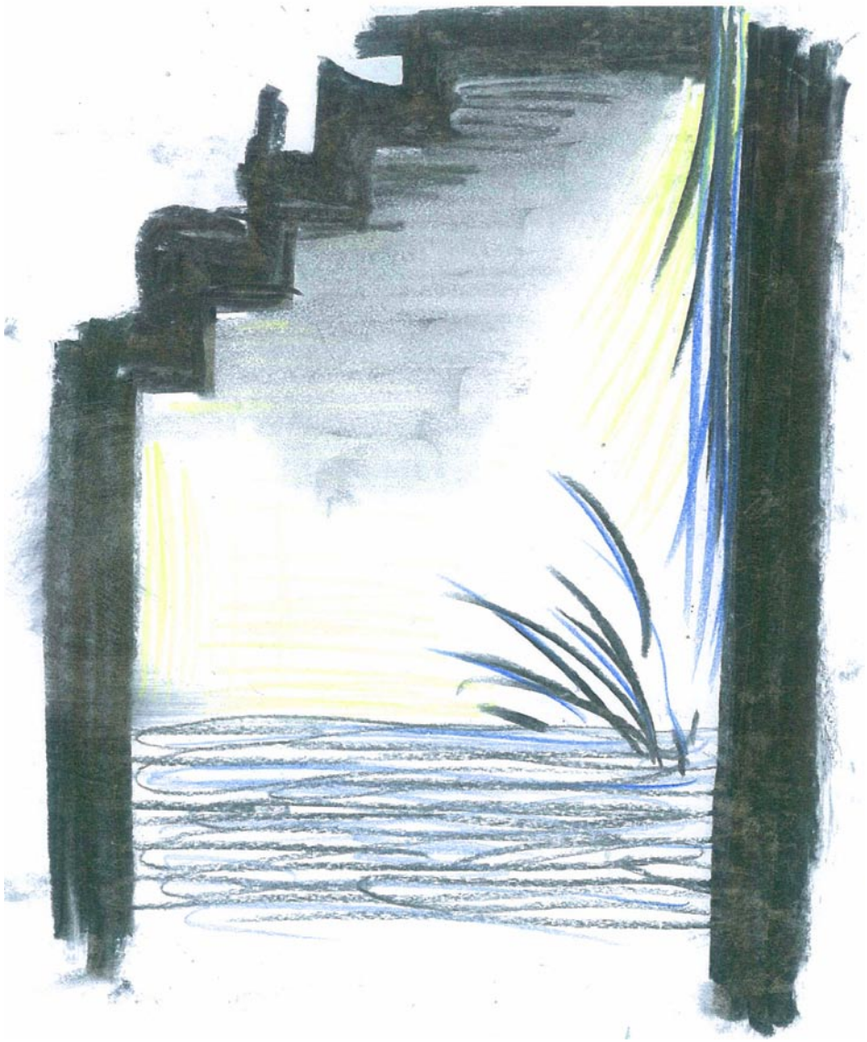




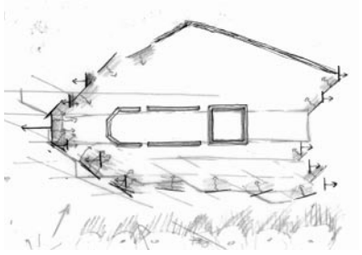
Experiences

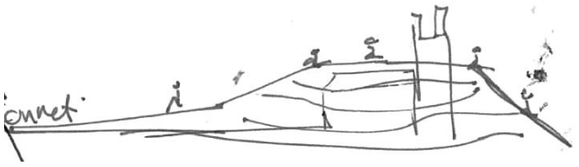


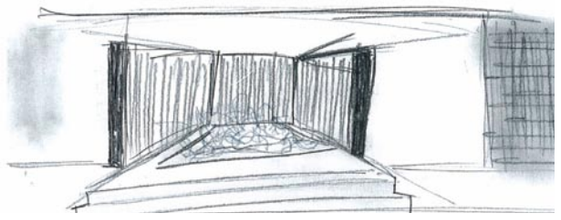


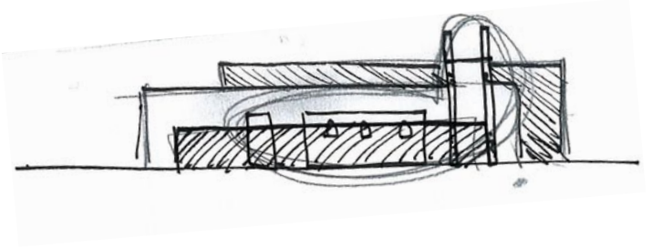


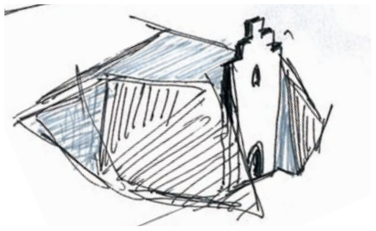
Transformation











Transformation

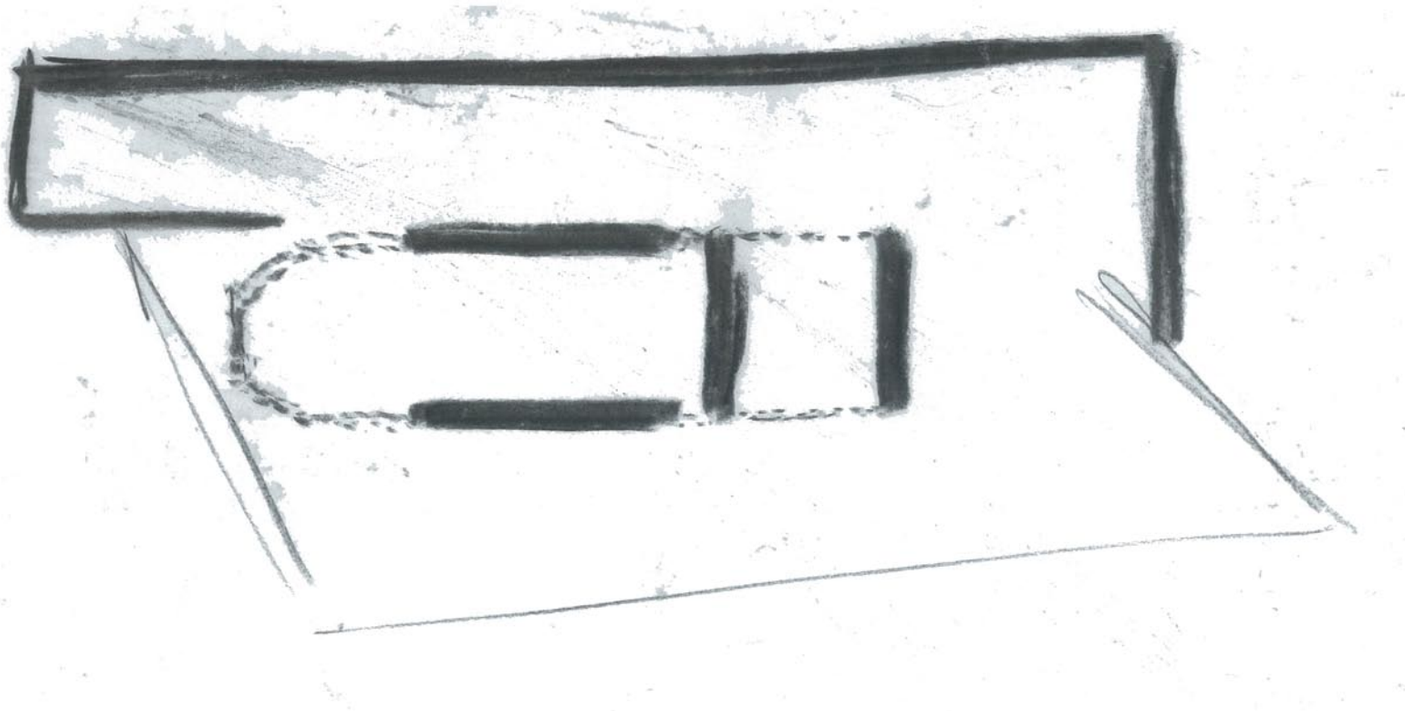
The transformation of the existing church into a new bathing resort must be designed with care for the valuable parts of the existing building. The criteria for a successful transformation are if the new planning functions perfectly with the existing building elements.

From the beginning the idea was to re-use as much of the existing church as possible. The entire tower was kept because of the iconic importance for the building to be seen from afar. The walls around the main space of the church was cut open and two sets of walls were kept and the end of the main space, the altar. The consequence of keeping so much of the church was that the story of the new function would be highly undermined by using such a dominating part of the church. Further analysis/ design process showed the real valuable elements of the church consisted of two sets of walls. The two gables and part the two walls in the main space of the church, see ill XX.

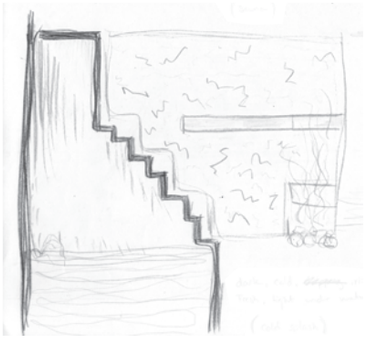
The meeting between the two layers/histories was quite difficult to solve. The character of the old, bumpy building elements was to appear clearly, and should not be overruled by the new mass. A practical problem would also be to connect directly the new parts with the old. To solve these problems, a small distance of 20cm between the new building elements and the old parts of the church would give both layers aesthetic credit.

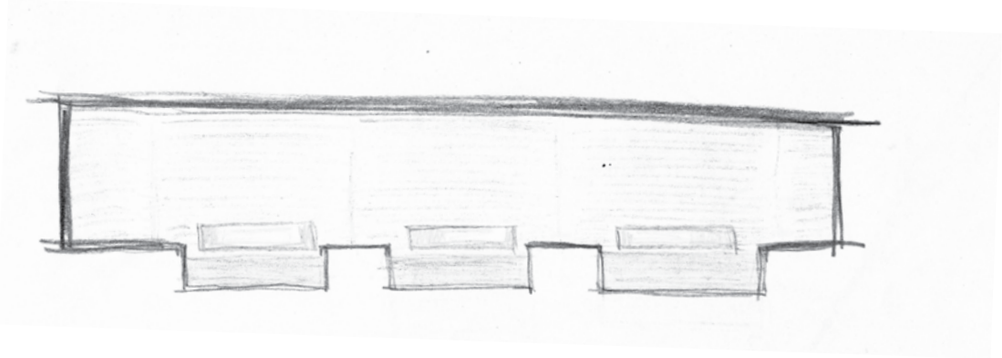
Keeping the tower as both an exterior and interior element would give large problems regarding thermal bridges. Either the tower had to be captured into the interior space or the tower walls should be only external elements. In the beginning the idea was to shove up the light mass through the tower, and hereby support the tower as a focal point, especially from the seaside. Later on a wish of having the gables on the inside, enabling the guests to touch them, caused a solution with a transparent case around the two gables, continuing up from the light mass. This solution was quite dominating for the exterior expression, and the effect of the two church gables were more hidden, compared to the previous solution.

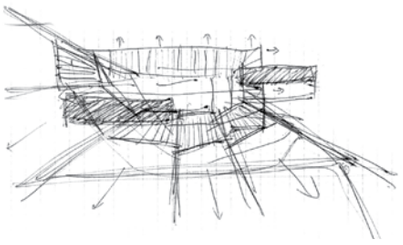
A solution of having the shape of the heavy mass meet the material of the light mass inside the tower was developed and the qualities were the enforcement of the focal point of the church tower, a great experience of light when moving up and down the stairs inside the tower and the external expression of the building was strengthen by the light mass shooting up through the tower.

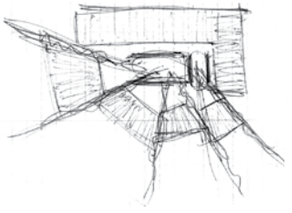


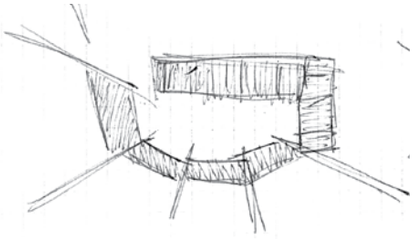
View

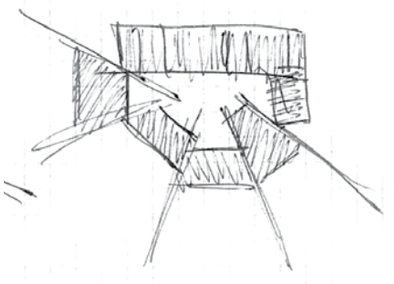


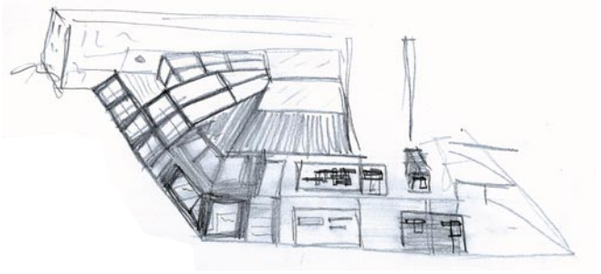


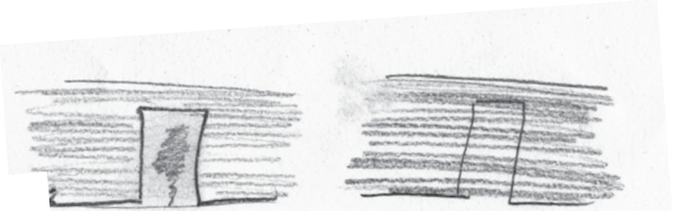












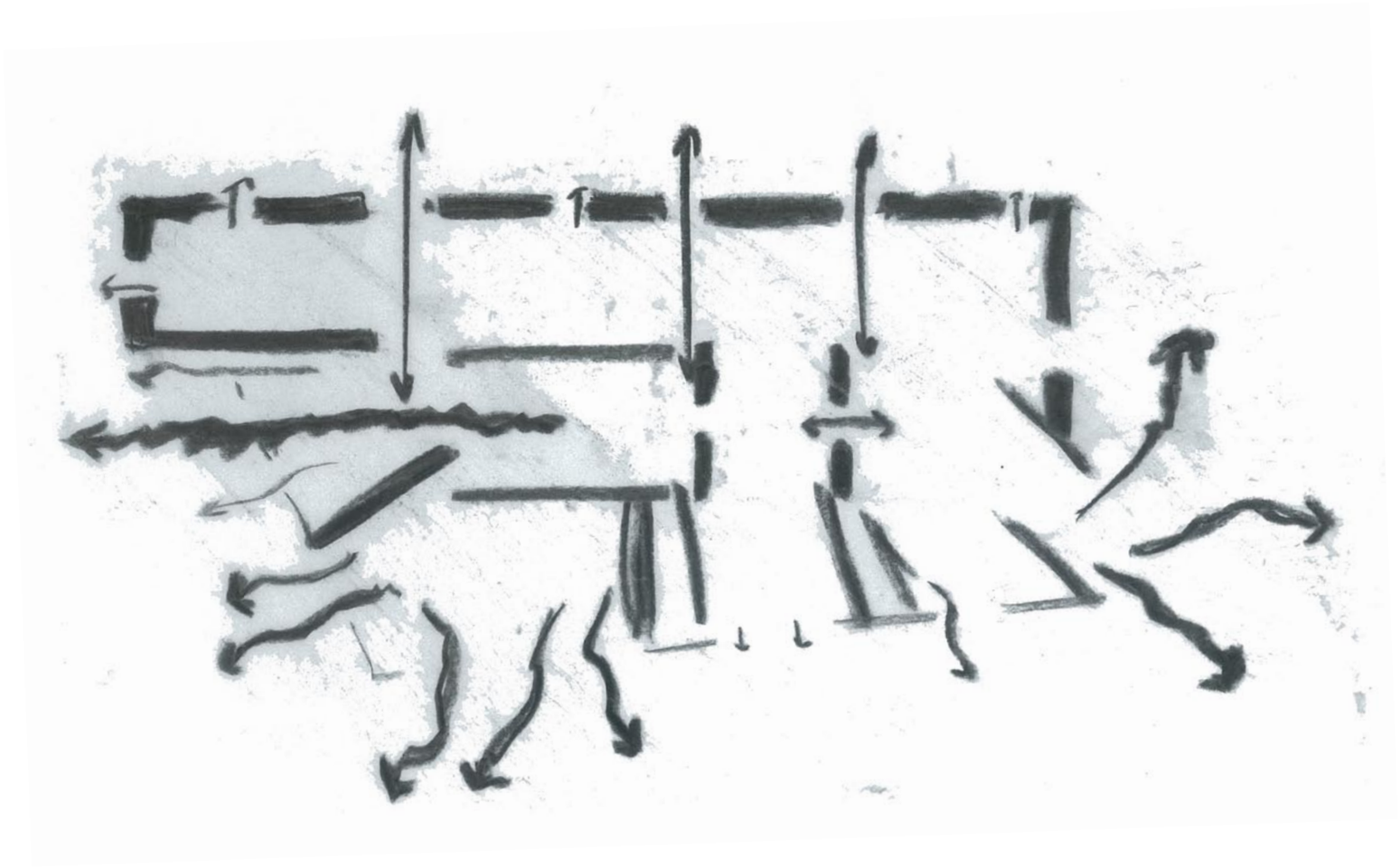
View

The strategy of the views is determined by the need for view in each room, but also which potential the view has from the specific location. The wish for certain views can collide with wishes for the expression of the facades. The process of these two subjects has been overlapping and hereby creating qualities for the internal and external spaces.

From the beginning the view toward the beach moor was intuitively connected with the large space for common saltwater. The view from small hot rooms, like the sauna and the steam bath was minimized both regarding the heat loss and the need for view. Testing the views in physical models, resulted in some quite confusing facades, with very mixed expressions, see ill XX. A model with total view from all the south area was tested to see how it would look, even though the energy use in such a building would increase a lot and the indoor climate would be extremely difficult to control. The heavy and dark block behind the total transparent mass on the south side, showed no relation between the two masses, and they became foreign to each other.

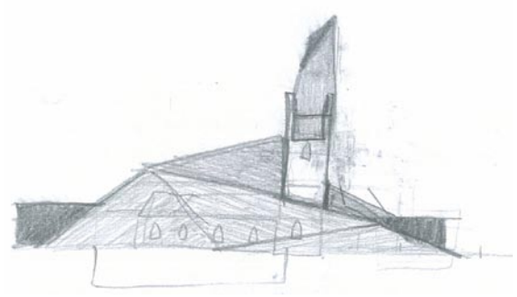
The specific needs for view in each room were not changed, but the solution of how to provide the views were altered. Some windows are raised in height to provide a view of tree top and sky, hereby avoiding the view of a parking area north of the building. This principle was also used in the private treatment rooms, where no views from the outside were allowed.

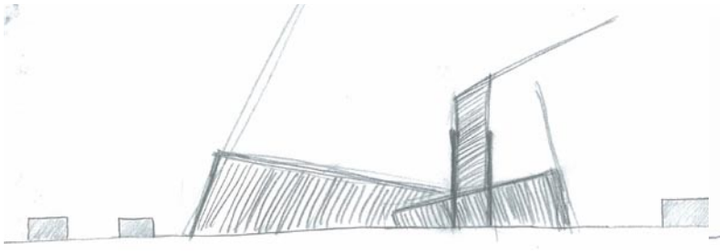
The shape of the building must create a compliment to the surroundings. The new building layer must also fit into the existing church elements. The shapes of the two parts of the building must have a clear relation to the district they represent; the village and the beach moor. The relation between the two masses should be achieved through the material and the façade expression.

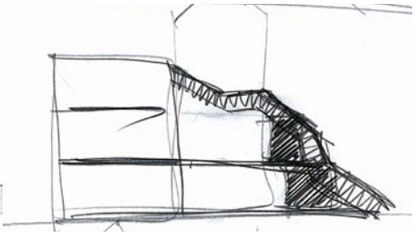


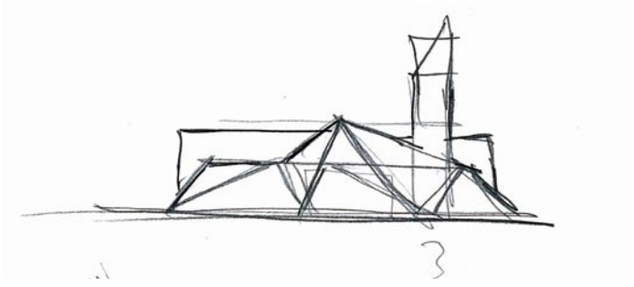
EXTERNAL

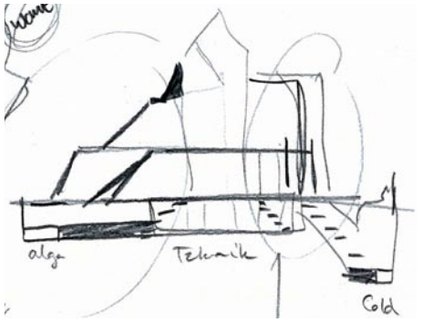
Shape

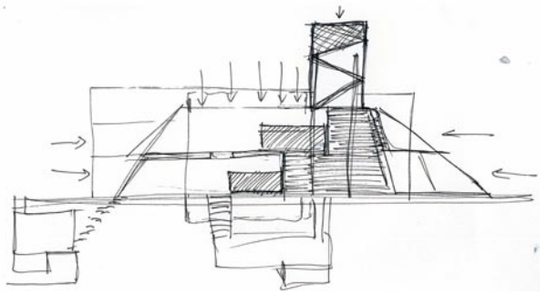


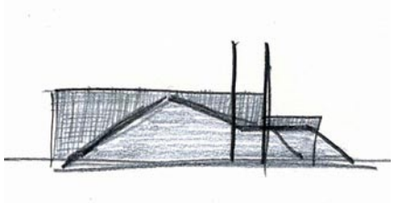


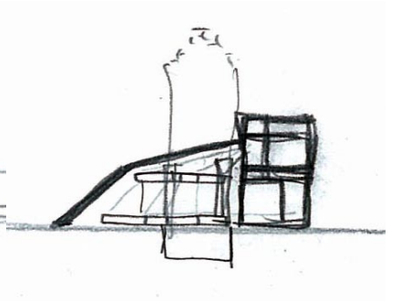


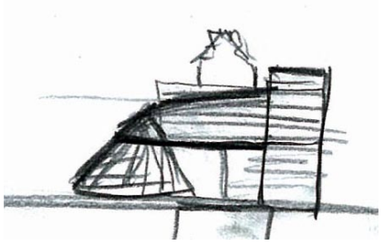








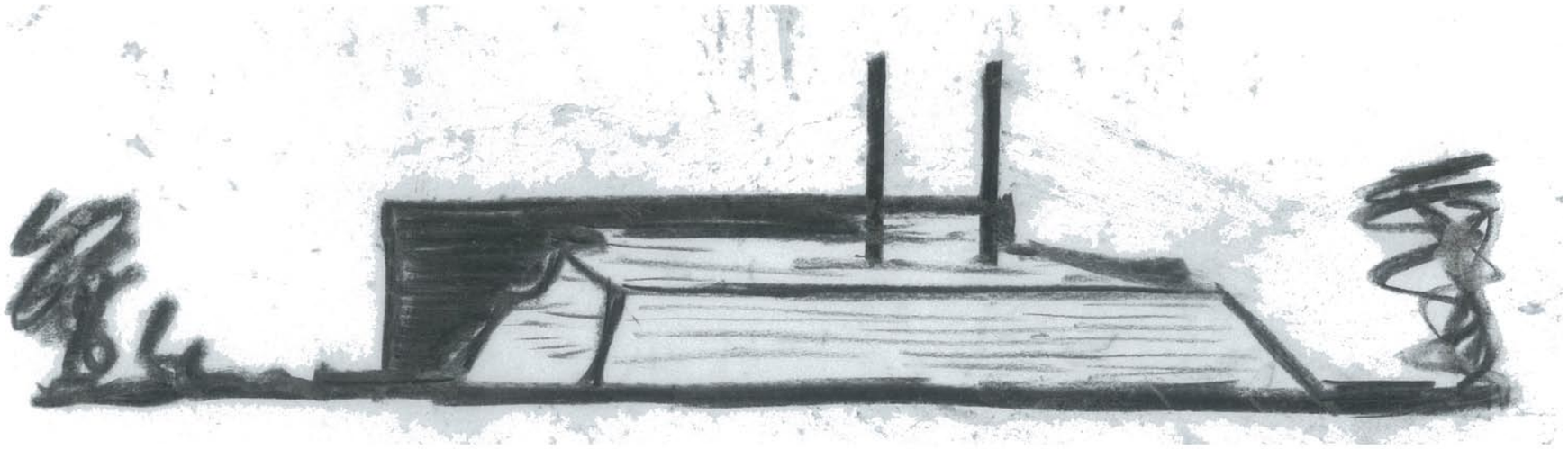




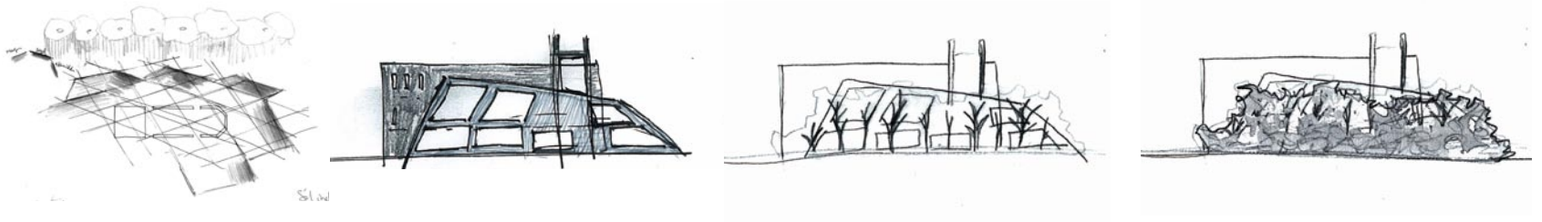
The expression of the building is tested to figure out how the mass should be distributed. Throughout the process the shape has been determined by different factors; the compactness, the stylized natural shapes at the site and the different experiences in the interior. The proportions have mostly been decided by the scale of the existing parts of the church, and the environment of the site. Proportions of the volume have changed through the process, to test how the mass should occupy the site, and how the energy use was influenced by the shape. The expression of the building mass must not feel excessive at the site.

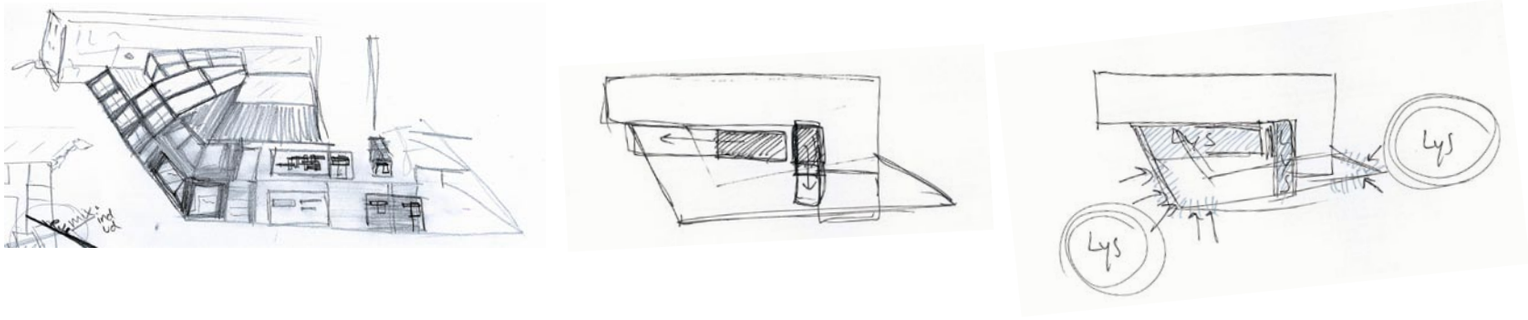
The light mass on the south side have had proportions of a dominant mass and the heavy mass on the north side have been scaled down, to be overruled by the light and of the building, see ill XX.

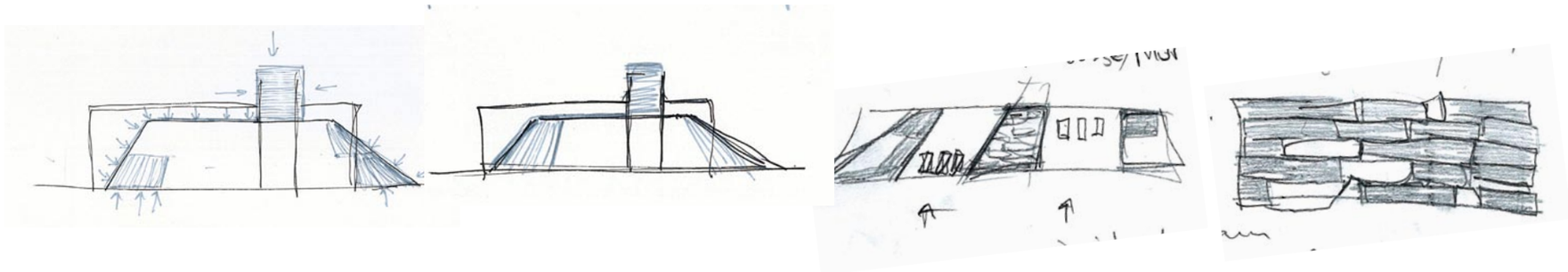
The shape of the two meeting places for the two masses, in east and west, must have a clear expression of which one is ruling. The overruling mass can be dominant in several ways; proportion, facade or material. The overruled mass in the southwest must have an open, light expression of contact to the outdoor. The opening in the east end is likewise placed in the overruled mass, here the straight heavy mass, see ill xx. The shape of the mass is influenced by a combination of the interior needs and the outdoor site.

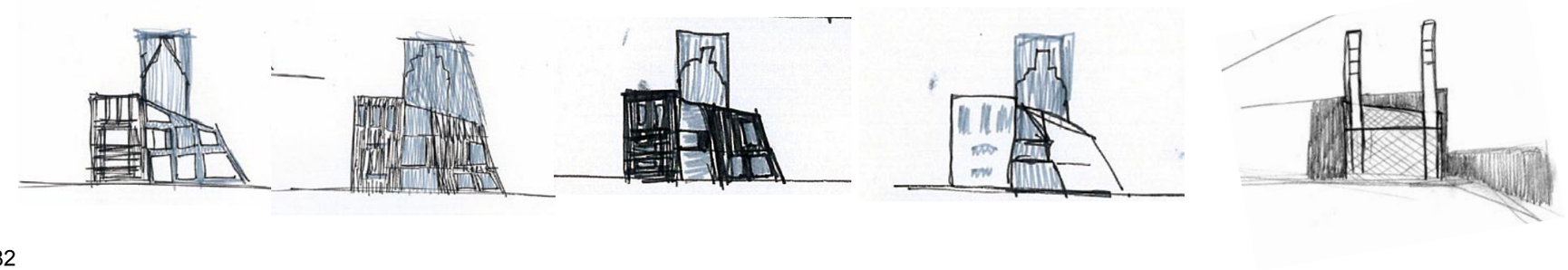


Daylight







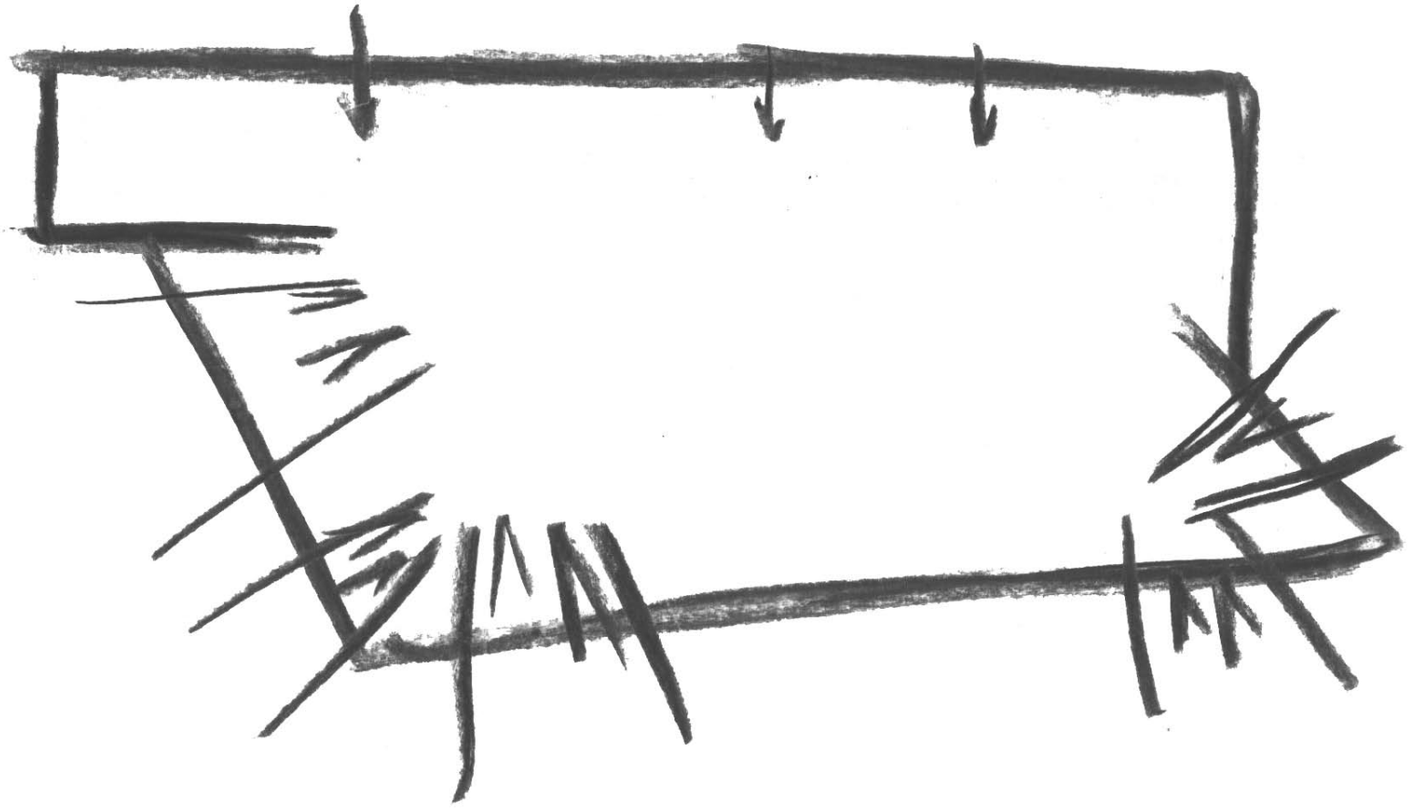


Daylight

In order to use the daylight, the openings of the building must be placed and sized both with concerns for the overall lighting and the energy used for heating. The concept for lighting follows the overall concept for the building; small, darker spaces on the northern side and large, lighter spaces on the south side.

For some time, the daylight had a large impact on the shape of the outline, because the wish of dragging light as far into the building as possible. This meant that the building should have a large facade directly towards south, which would have a strange and less logical occupation of the site. Basins with water would reflect a great amount of light into building, which will make the central space more illuminated. Be06 calculations of several different solutions of the openings confirmed the theory about having most window area in the south facade. Still a good result was achieved by orientating the building less to the south, and hereby occupying the site in a way that allows for views across the site, see illu XX. Later on the orientation of the building followed the limits of the site precisely on the north side, and on the south side it turned toward south, in order to let light far into the building.

The daylight is especially important in the central space and the space for the three salt baths. Here the light falls into the space and is reflected in the bright materials there. The daylight in the treatment area is less dramatic, and is brought into the spaces through semi transparent walls of the rooms. Here artificial light is used to ensure enough light for the work spaces. In the alga bath and the cold bath the daylight is falling into the space from the upper part of the space which is cutting through the surface of the earth. The light is reflected through the shafts and let into the spaces.



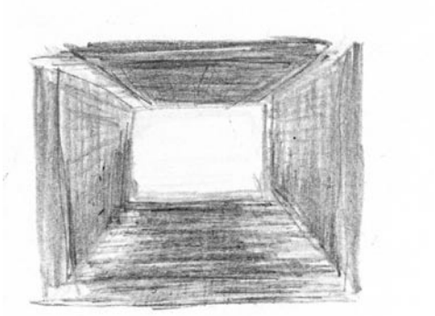
Indoor Climate

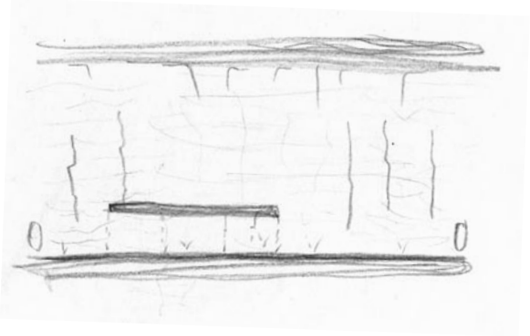
To evaluate the indoor climate and the energy performance of the building, calculations of PPD are made and simplified models are set up in Be06.

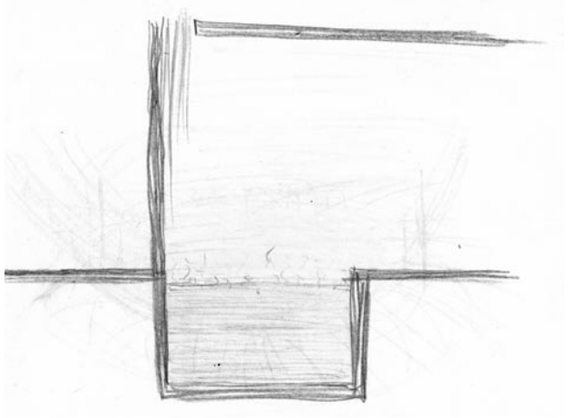
The bathing resort set several and different demands for the indoor climate compared to a residential building. Ventilation is set by the use of the specific rooms, which are divided in two main categories; stay and work spaces, and spaces with functions where special processes take place. The resort contains both categories.

In rooms for stay or work the physiological loads from the people are the ones to design and dimension the ventilation system by. In rooms with functions, the specific processes in the room determine the design and dimensions of the ventilation.

The bathing resort set several and different demands for the indoor

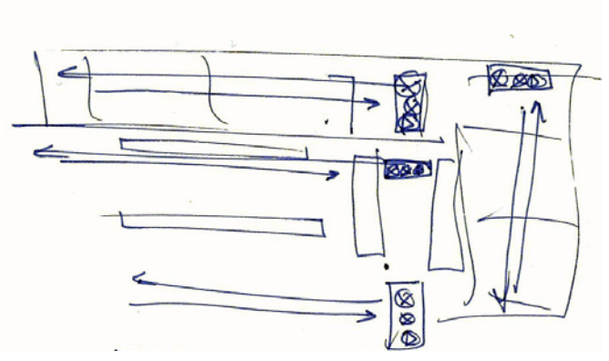






Room	Evaporation h/-1	CO2 h/-1	PPD %
Locker room	0,7	5,2	39,9
Saltwater	0,6	0,9	6,6
Foot bath	2,5	4,6	7,0
Alga bath	1,7	3,7	6,4

Ill. 45 Air pollution and PPD

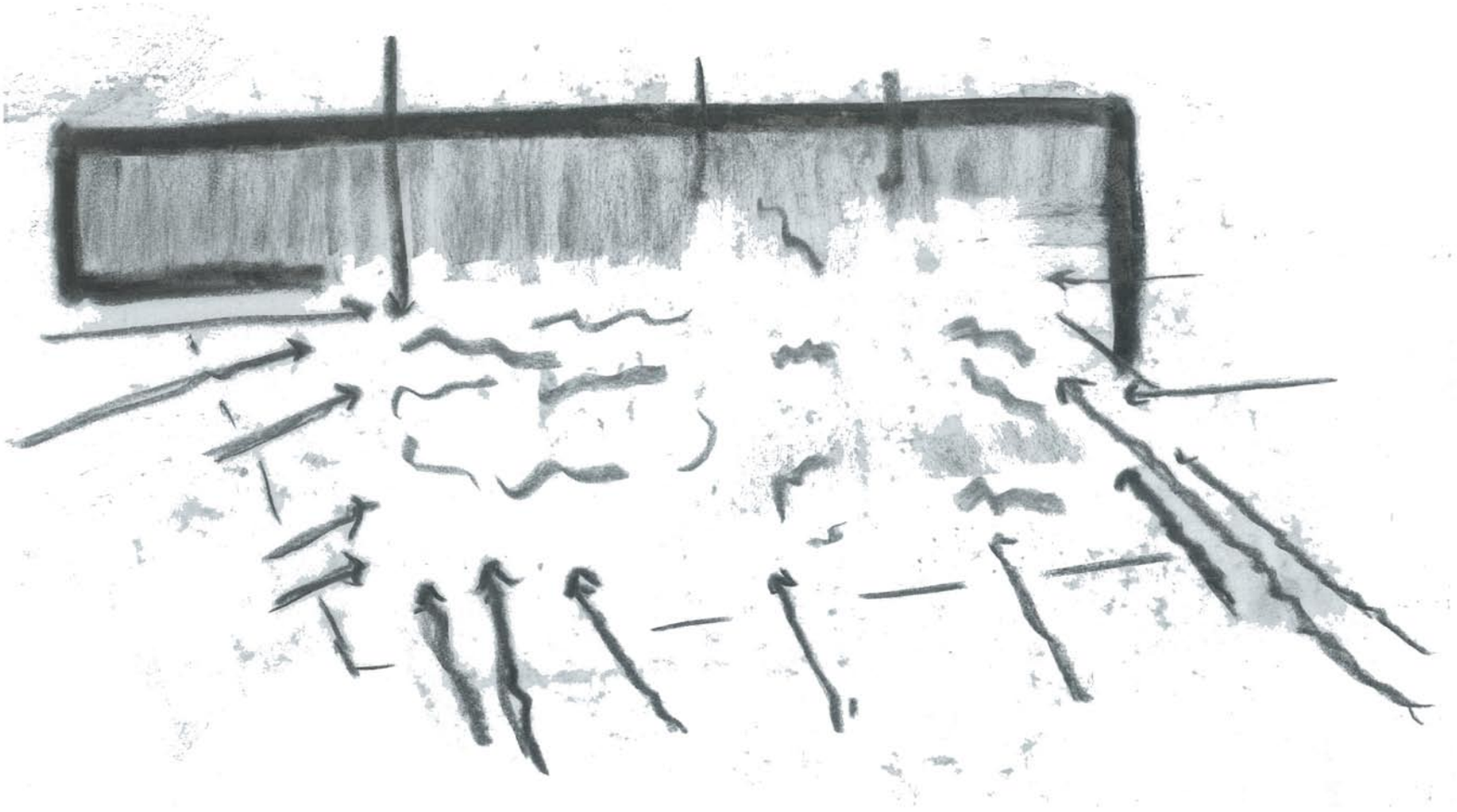


climate. To evaluate the indoor climate in chosen rooms, the method of PPD; predicted percentage dissatisfied is used through the process.

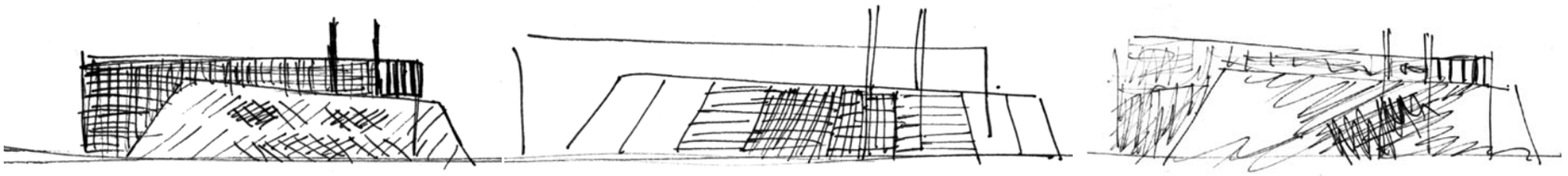
The PPD is calculated in different rooms; the locker room, central space for salt water, café, sauna and a treatment room. In these rooms the PPD vary quite a lot from 6% to 39%, see ill XX. The calculation is developed for evaluating the indoor climate in rooms with ”normal” conditions, like temperatures of 20-22 degrees, clothing of 1-1,2 clo, humidity of 55% and activity of 1 met. In this project these aspects vary a lot, so during the process only rooms with “normal” conditions are tested regarding the indoor climate. The rooms chosen for evaluation represent a group of similar rooms with same conditions. The chosen rooms are the café, treatment room, office and gym, see ill XX.

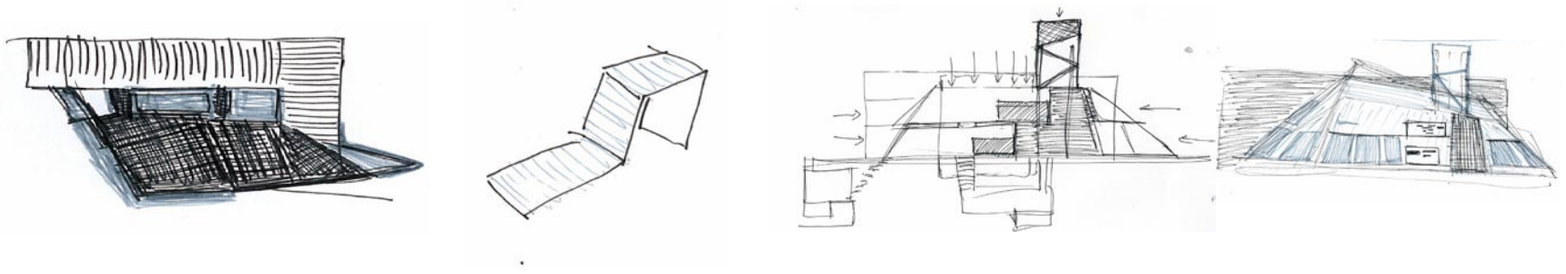
The thermal indoor climate is regulated by the mechanical ventilation systems, and during the hot periods of the summer, natural ventilation can be used as a supplement. Openings in the roof can let out the hot polluted air, by using the principle of stack ventilation. The building is ventilated by four ventilation aggregates; north, south, east and the mid section, see ill XX.

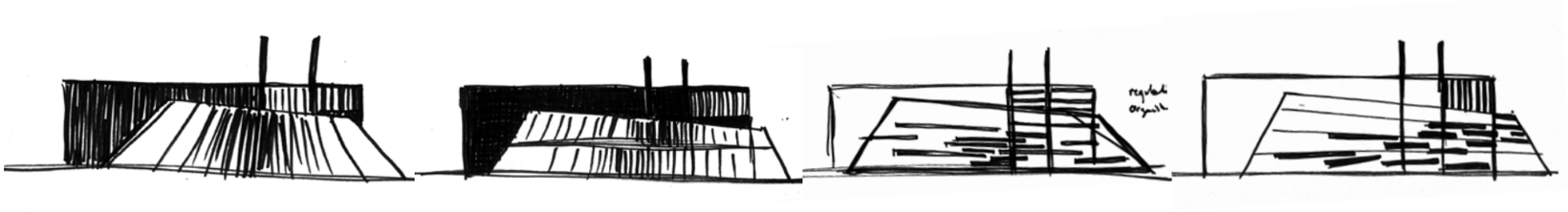
The rooms with same conditions are placed together in large zones, as much as the overall functionality allows it. Between the treatment zone and the bathing zone, glass walls are placed to avoid a too much mixing of the air in the different zones. When opening the doors between these zones, some degree of mixing will occur; the size of the mixing could be investigated, to evaluate the importance of that aspect. This investigation is not made, because of the limited amount of time and the changing of the focus of the project. In some rooms the need for ventilation diverges from the ventilation set for the relevant zone, this special need for ventilation can be met by implementing aggregates that can regulate the ventilation. These rooms are placed with concerns for the functionality and the flow of experiences they are a part of. The regulation of ventilation can be provided by implementing the number of in- and outlet that is needed, or to scale the size of the in- and outlet in the specific room.

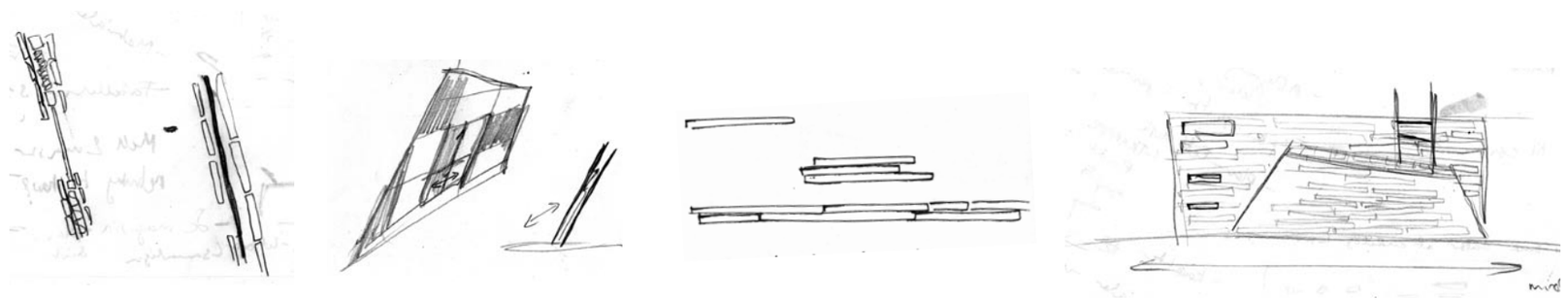


Facades









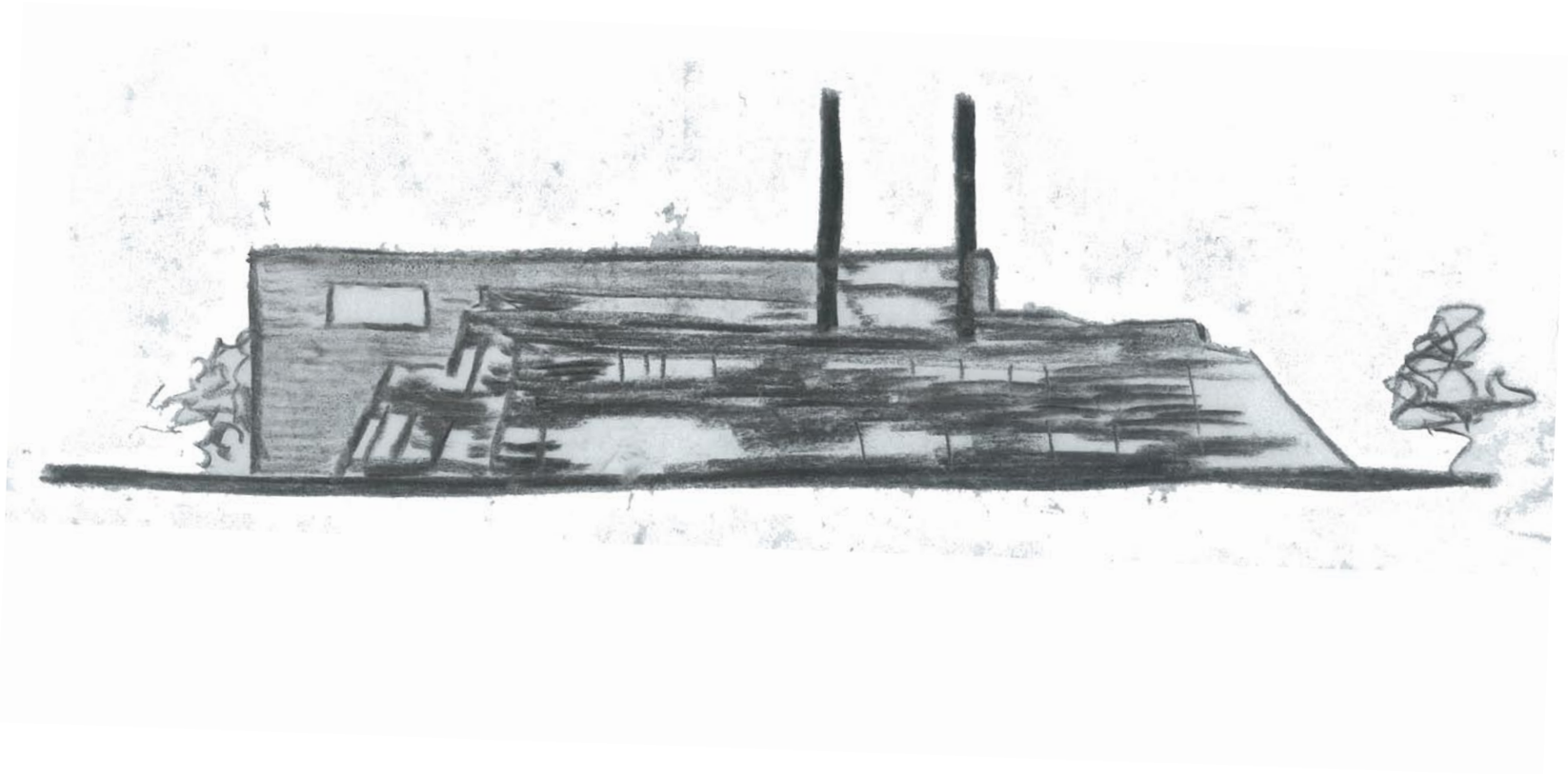
Facade

The facades of the building must express the two different stories, and also functions together as a hole. The facade of the northern mass must be more closed off and have small openings to give light to the small interior room in this side. The south facade must on the other hand be open and light in the expression. The facades must also reflect the function of the interior spaces.

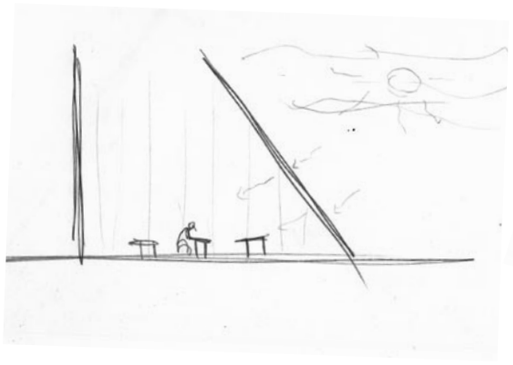
The surface of the facades has a great importance of how the overall expression of the building will be.

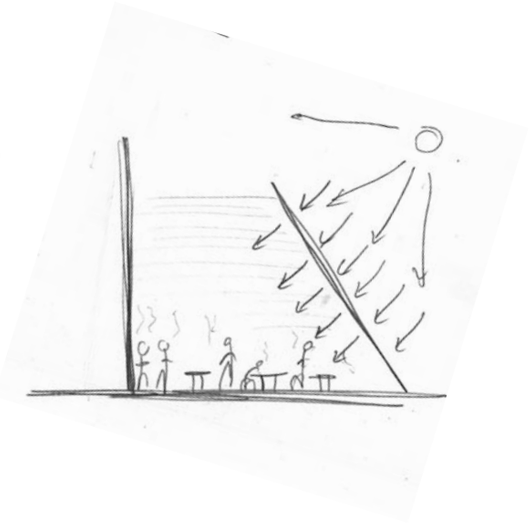
To test how two contrasting façades would look like, a total glass facade was made for the south. The transparency of the glass would be a powerful contrast to the dark closed facade on the north side. The glass facade resulted in an extremely problematic energy use, and the indoor climate would be very difficult to control. The daylight through the glass facade was impossible to control; the dark spaces of the sauna and steam bath had to be put into cores that only have small openings, these cores would reduce the heat loss, because the cores were pulled away from the façade, and the heat loss through the building envelope was avoided. Hereby the heat transmitted through the core would contribute to the heating of the large warm area of the baths in the south side. Besides this, the expression of the two contrasts masses together was quite chaotic. The connection between the two masses was destroyed and the technical issues of this solution were too large. Concerning the energy use of the building, an idea of using solar power cells as a covering for parts of the south façade developed. Placing the solar cells was done with regards to the expression of the facade and the electric effect of the cells.

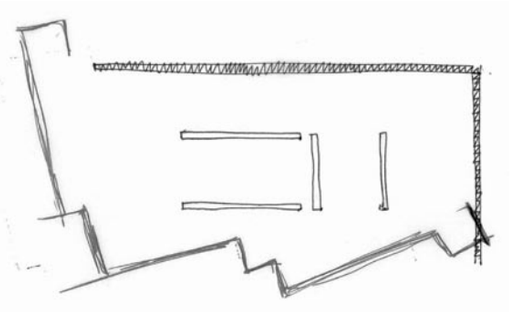
The facades of the two masses have a clear connection. They are covered with the same material, only the openings in the two facades are diverging. The façade of the north side is closed off by the material, and on the south side the material is more spread and there are more and larger holes in the material. In both masses glass is used beneath the façade material. The surface and textures of the facades is related to the character of the mass it is attached to. The north facade has regularly distributed material that follows the lines of the regular shape. On the south facade the material is placed according to the bending lines of the shape, here the lines change, so the façade will also reflect this change. The roof on the south façade has a perfect angle for an effective production of energy using solar cells. The impact of the solar cells is lowering the energy use of the building considerately.

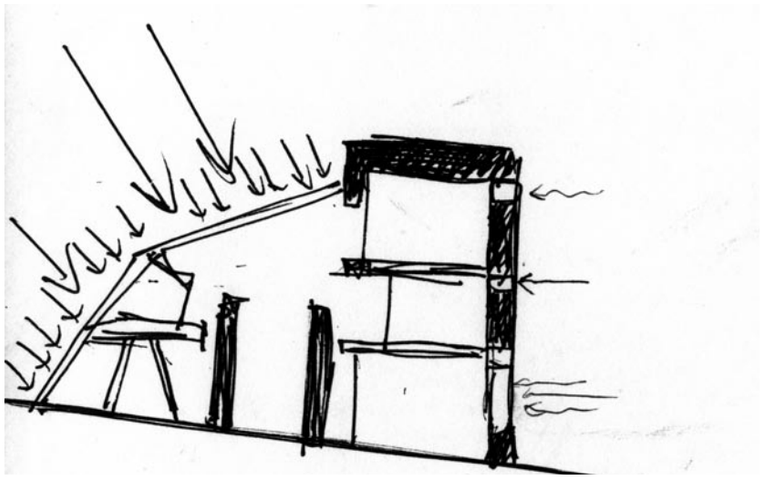


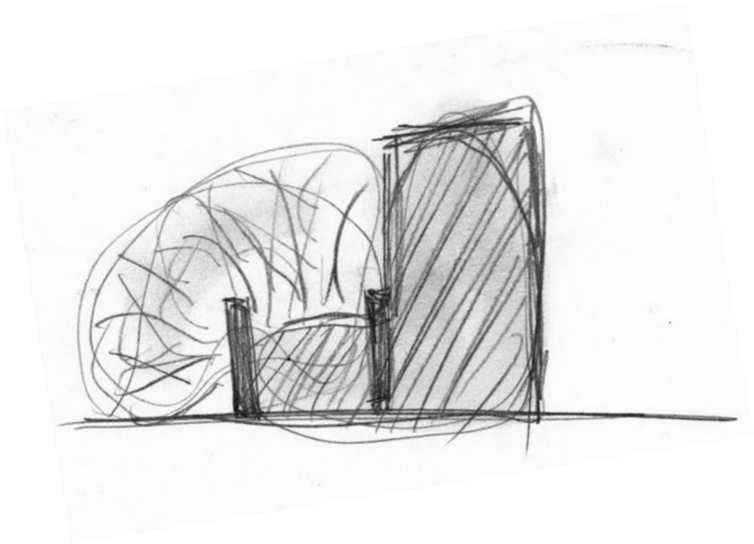
Heating











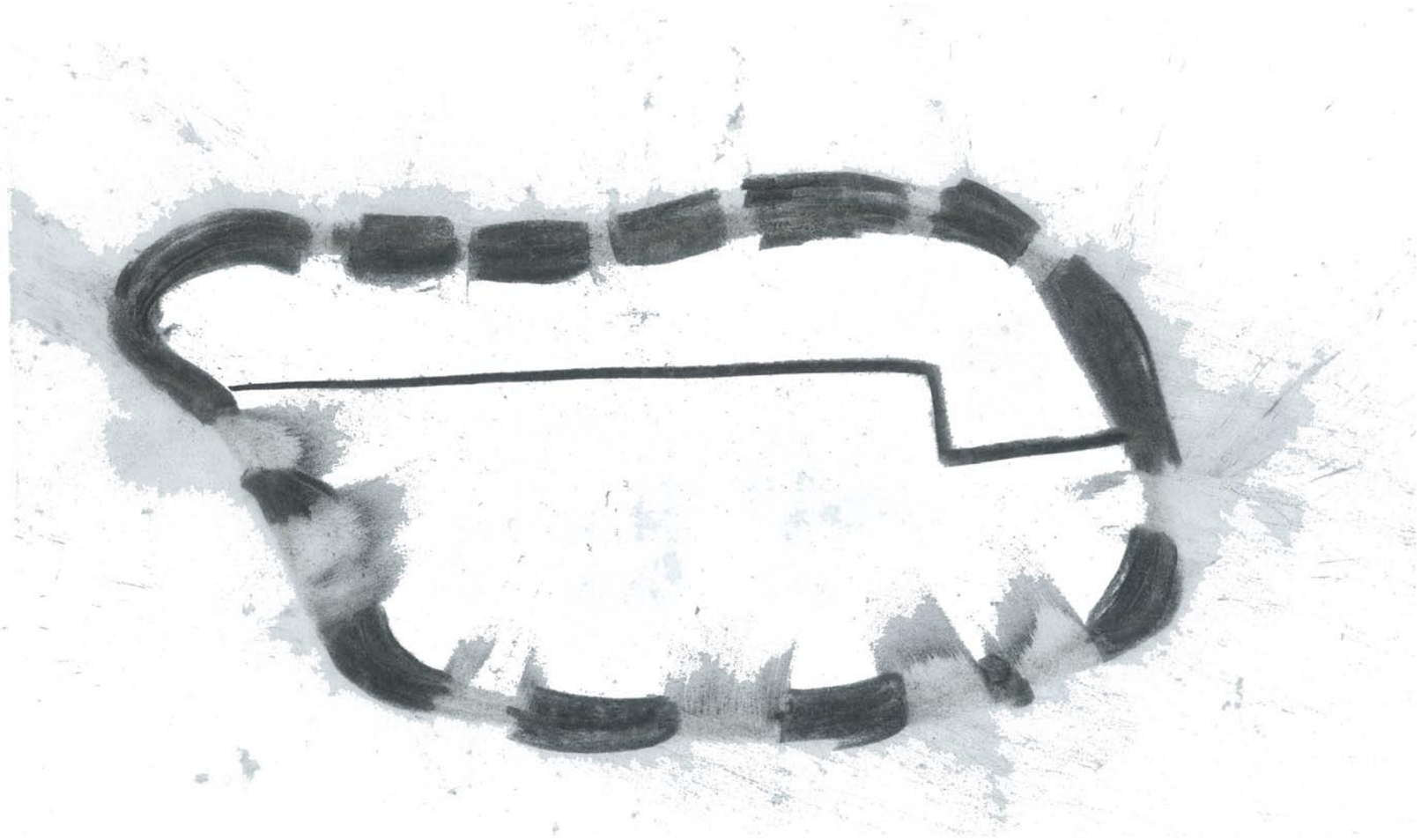
The heating strategy is part of the foundation for the architectural concept of having an open facade towards south and a closed facade toward north. In order to achieve a reasonable energy use for the building focus has been on the solar gain, minimizing the heat loss and zones with hot temperatures.

During the winter season it is especially important to gain solar heat through the windows. In the beginning the orientation of the interior was directed to the south, for letting the sun rays release as much heat and light inside the rooms as possible. Later on the Be06 calculation showed only a small difference of orientating the room to south or more south west, see ill XX. If keeping the orientation of the rooms to the south, and keeping a long building fit to the site proportions, the outline of the south facade would be quite serrated, see ill XX. The serrated outline would create a larger surface to lose heat from and create several construction joints to lose heat through.

The calculation of a solution with relatively large glass areas in the south, Be06 shows no signs of overheating during the summer. When the indoor temperatures are relatively high; 27 degrees, the tendency of overheating is less of a problem, because the heat gain will only help to reach the high temperature.

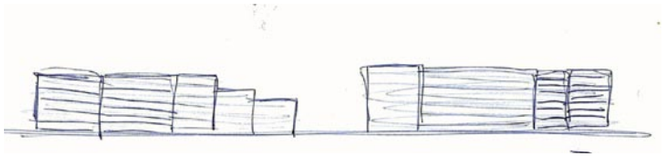
In the café area which is also placed in the south, the normal temperature of 24 degrees can easier be overheated. Especially in times where many guests also sit in the café, the pollution of CO2 will also increase. These two factors can results in a bad indoor climate.

The high use of energy could be lowered by implementing solar power cells on the south orientated facade. When calculating the same solution in Be06 with 40 sqm. solar power cells, the energy use decreases considerately, see app C.

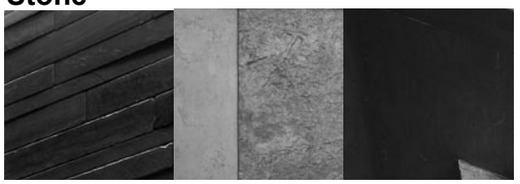


Materials

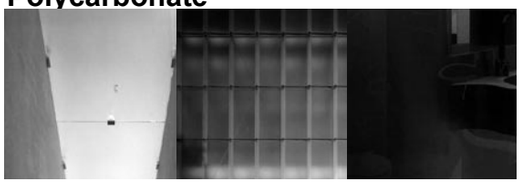
Concrete



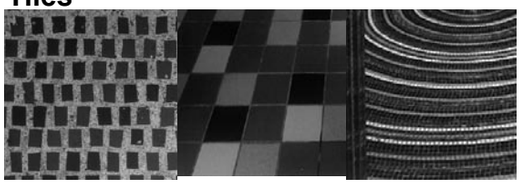
Stone



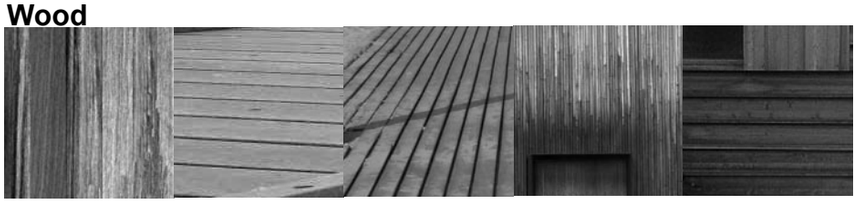
Polycarbonate



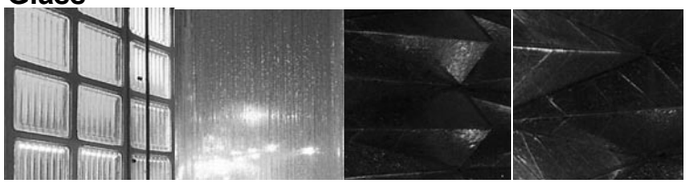
Tiles



Wood



Glass



Material

The materials of the facades should underline the expressions of the two masses, and also complement each other. The relation to the surrounding nature and village is also very important regarding the materials, especially the resistance toward the harsh climate is crucial. The idea of using materials is very simple; only few materials are needed, but the texture and color must change to meet the wishes for the different experiences.

The interior materials for a bathing resort must have properties of low maintenance, high resistance for water, salt and chlor. When choosing interior materials for a bathing resort the important properties are also moist rejection and sound absorption. It can often be difficult to find a material with such qualities; because a hard moist rejecting surface often has very bad qualities of sound absorption. The exterior materials must be able to resist the harsh climate conditions, mainly caused by the wind and the amount of sand and salt in it.

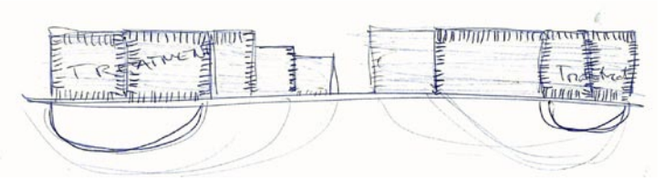
A material study is made early in the process in order to reflect on the choice of the right materials. When considering the material of glass, a lot of different types of glass come in mind, and likewise with other materials, see ill XX.

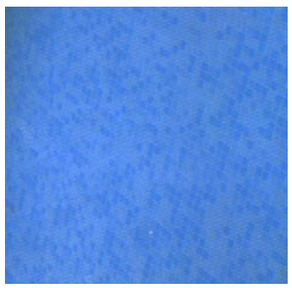
In one solution the two exterior constructions consisted of slate and wood, for respectively the north and south facade. The interior materials were also slate and wood, but the materials here were processed in a finer way, so the surface was less rough in the northern area of the interior and more reflecting in the south area. In some spaces where a special experience must be reached, the materials were processed in jet another way, to underline that spatial experience. In this solution the materials did not quite relate to each other, and the feeling of two totally different areas of the building, north and south, was too dominant. The use of solar cells on the south walls is quite problematic for the expression of the façade the materials are too different from each other.

Wood and moist

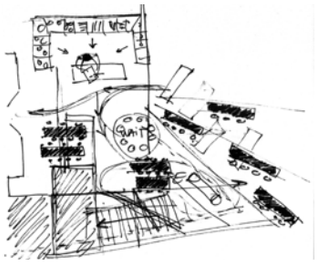
In general problems with wood and moist environments can easily occur. But the key to avoid a destruction of the wood is to keep a stabile level of moist in the air. When the fibers of wood changes between obtaining humidity and releasing humidity, the wood are slowly destroyed. Besides this property the wood has good insulating quality, and also good acoustic qualities.

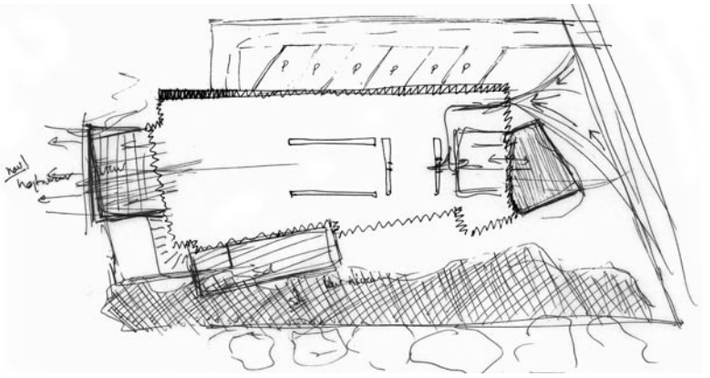
The choice of material is rough grey concrete with clearly visible lines from the laths, on the north façade and thin smooth light grey concrete and wood from larch tree on the south façade. Both larch and concrete have good resistances toward the outdoor climate. The visible framework on the rough concrete on the north façade has a strong relation to the larch boards on the south facade, which gives the entire building a common expression. The boards used for the framework of the north façade, has the same proportions as the larch boards attached to the south façade, which will underline the coherency of the two masses. The interior materials are divided in wet areas, where tiles are used, and smooth concrete in the dry northern rooms, and polished larch in the dry south rooms.

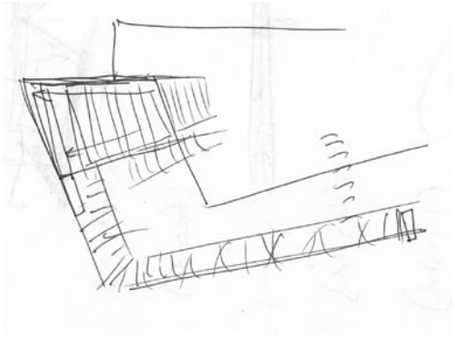


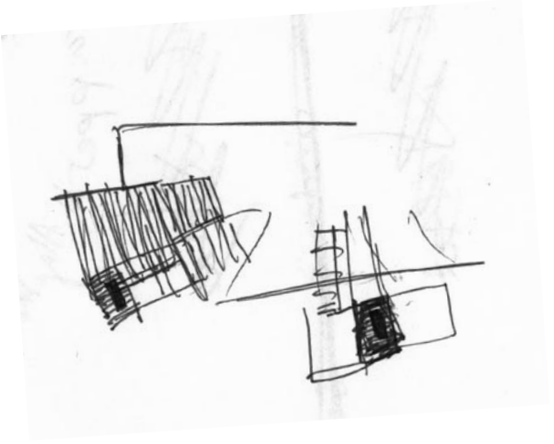


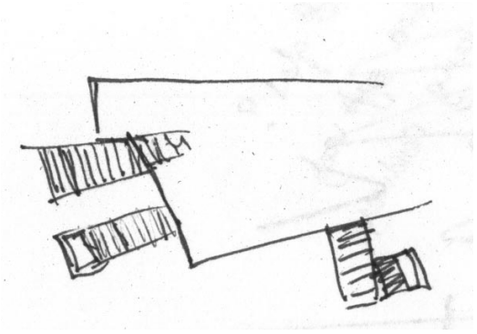
Outdoor plan

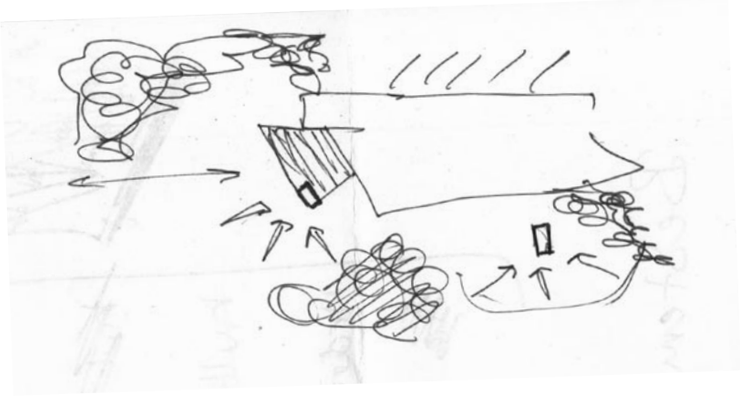


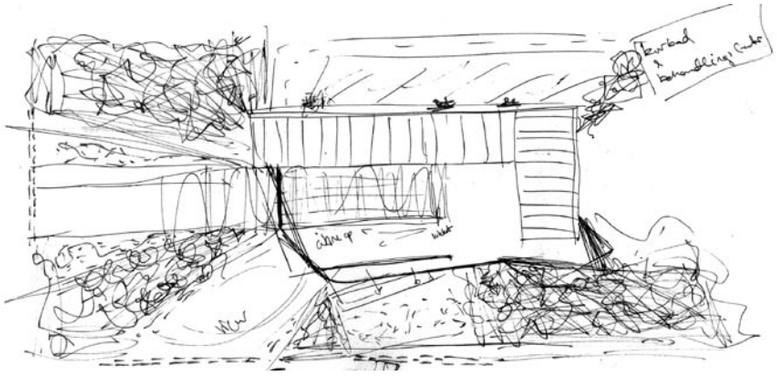










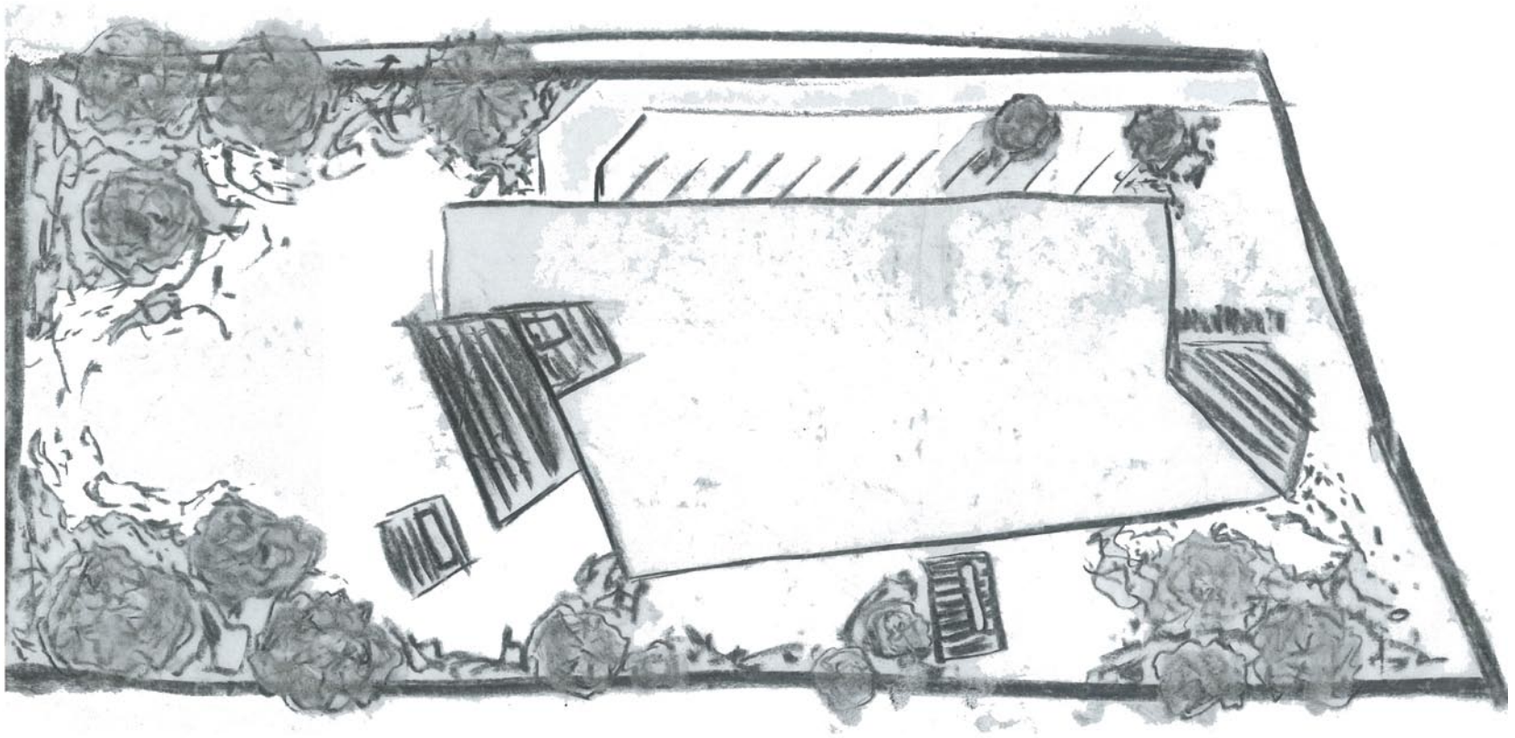


Outdoor

The outdoor plan is very important for a building with much transparent facade. The site has great potentials for views and for experiencing the beach moor. The idea is to sculpt the vegetation; to cut the trees where a long view is desired and grown extra dense bushes where the view is focused on the vegetation.

The terraces were planned with concerns for the exterior shape and for the experience of extending the interior spaces outside. The shape of the terraces and the modeling of the vegetation were planned by the desired views.

The ground level terraces in the west should have a clear direction towards the beach; the view should reach the top of the sand dune before the beach. The terrace in the east is planned as an extension of the cafe, to create an outdoor contact to the village and in the café space on 1.st floor an exposure of the view toward the land is created. On 1.st floor in the west part, a terrace is placed with visual connection to the large terrace in the ground floor. The difference between the two terraces is the view; from the 1.floor terrace one is able to see the sea while sitting in a hot spa. The two light cases placed in the free space of the garden, is leading daylight down to the two baths beneath. Platforms around the light case, creates a ground for these concrete boxes sticking up from the ground. The platforms also provide semi-private sitting areas, withdrawn from the common and central spaces in and around the resort.



Energy

When designing a building with another function as residential building, there is a possibility of getting an amendment to the regulation of energy. A bathing resort will always have a larger energy use compared to a residential building, regardless of how optimized the building would be. The amendment for a cultural building with several technical processes is simply the extra need for energy, because of high ventilation, lighting, hot water supply, heating or cooling. The building must, under “normal” circumstances obtain the frame of energy use; 95 kWh/m2/year. The information of the building mass is typed into Be06, and then the ventilation, lighting, and other factors, are set to the normal values, and then the energy frame of max 95 kWh must be met.

The admendment of BR08 (7.2.3 Stk 2)

> ”For bygninger eller bygningsafsnit med behov for fx et højt belysningsniveau, ekstra meget ventilation, et stort forbrug af varmt brugsvand eller lang benyttelsestid eller bygninger med stor rumhøjde forhøjes energirammen med et tillæg, der modsvarer det beregnede energiforbrug hertil”

[http://www.ebst.dk/br08.dk/br07_02_id109/0/54]

During the process testing the design in Be06, the energy numbers by far extended the allowed energy class of 95 kWh. The first tests in Be06 showed results of 800 and 500 kWh. This result showed a huge need for optimizing the design. The building mass had to be more compact, there was too large surface area compared to the floor area, and the façade was too serrated. After a session of redesigning and redrawing the building and organizing the interior spaces, new calculations were made, the result was already improved significantly. By reducing the ratio of surface to area, the ability of keeping a stabile temperature inside the building is improved. The result of this test was 100 kWh/m2/year, which is quite good for a bath house.

The gables of the tower of the existing church are bridges for the cool outdoor temperatures to come inside. When capturing the set of walls in the central space, these walls become part of the indoor environment, and will function as heat accumulators for the hot air inside. When the gables are a part of both the inside and the outside, there will be a problem. This problem must be prevented, and a consequent solution is to be very clear about the capturing of the existing walls; the two small ones are inside, the two tall ones are outside.

A problematic area could be the café, because of the varying use of the space. The large difference in how many uses are in the café combined with the large window area toward south can result in a bad indoor climate. The temperatures could vary too much and this would perhaps coincide with the pollution of CO2 from the exhaust of the many users in the room.

The problem can be solved by optimizing the ventilation system with a sensor that measures the rising amount of CO2, and then increases the ventilation to avoid an indoor climatic problem. To avoid high temperatures in the hot periods in the summer, a shading strategy of planting trees just outside the window areas would be used, this will prevent the rays from the sun to release the heat inside the café. Depending on the size of the specific problem further shading could be necessary.

Basin	Type	Temperature	Depth	Area/ person	Circula.time
Foot bath	relax	26	0,2	0,50	0,1
Saltwater	light exercise	26	1,5	1,00	1,0
Spa	relax	26	0,7	0,50	0,1
3 saltwaters	relax	26	1,3	0,75	0,5

Ill. 45 Basin schedule

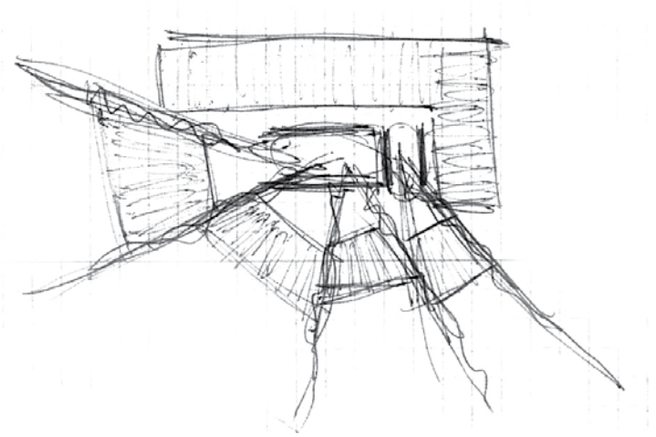
Ventilation

As mentioned previously, the ventilation is very important for both the indoor climate and the energy use. To achieve a good indoor climate a sufficient rate of air change must be applied, but the more ventilation a building needs, the more energy is consumed.

In the competition material guidelines for basic aspects of the different baths and spaces are documented. These values are checked in the Danish norm for swimming baths DS418 to see if these values were reasonable. For the central saltwater space a wish of basic aspects of; air temperature: 28 C, water temperature: 26 C and humidity: 65% were documented.

The indoor climatic conditions are set by four aspects; air temperature, air velocity, humidity and surface temperature. These aspects must be at levels that provide comfort for the bathing guests, the personnel and ensure the construction of the building against condensation on the surfaces of the building. There are conflicts between these goals, but all must be at levels that are acceptable, even though they do not provide perfect comfort.

Together with this, the ventilation rate must be balanced, to ensure a relatively high temperature and a low air velocity, this is important in a situation where the users are wet and half nude; the sensing of the indoor climate is quite different than a situation with “normal” clothing and temperature. The combination of draught and low temperature is the worst scenario for the sensing of a bathhouse.



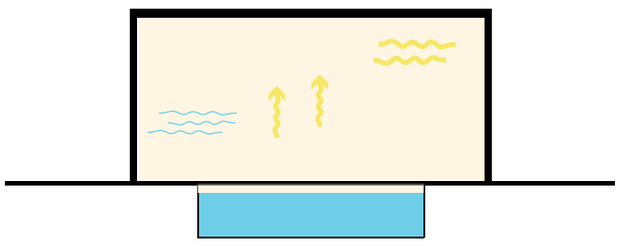
Overall ventilation strategy

A mechanical ventilation system is necessary to maintain the specific demands of temperature, humidity and low air pressure in a bath house, see ill XX. During the summer natural ventilation will be used as supplying ventilation, but the building could not achieve the special indoor climate only using natural ventilation, mainly because of low outdoor air temperatures in the largest part of the year.

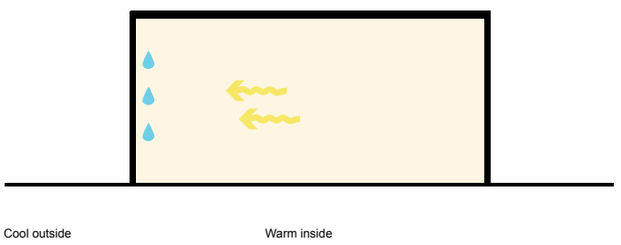
The inlet air roughly contains 2/3 re-circulated air and 1/3 fresh air. The re-circulated air is already moist and has a high temperature. The amount of recirculation air regulates the humidity. The fresh outdoor air is preheated before inlet but during the hot summer periods the outdoor air is blow directly into the building.

Placing the inlets and outlets is determined by the concentration of the pollution and must be placed in order to avoid draught. The outlets are often placed where the pollution is largest, to remove the polluted air without letting it mix too much with the clean air. The inlets are placed where the need is largest and where the possibility of mixing air is largest.

[Study trip: Haraldslund]



Ill. 45 Humidity, evaporation and temperature



Ill. 45 Condensation caused by cool wall surface

Mixing Ventilation

There are two main types of mechanical ventilation; mixing and displacing. In this project the mixed ventilation is preferred, because it will counteract the formation of areas with clean and polluted air. The displacement ventilation can result in draught, because of cold air being blown into the room, and hereby displaces the hot polluted air. This will be a serious problem in a bathing resort, because people are especially disposable to feel the draught. The idea of mixing the fresh and used air is to blow the fresh air into the area of used air, and hereby lower the pollution rate, will create an acceptable air quality.

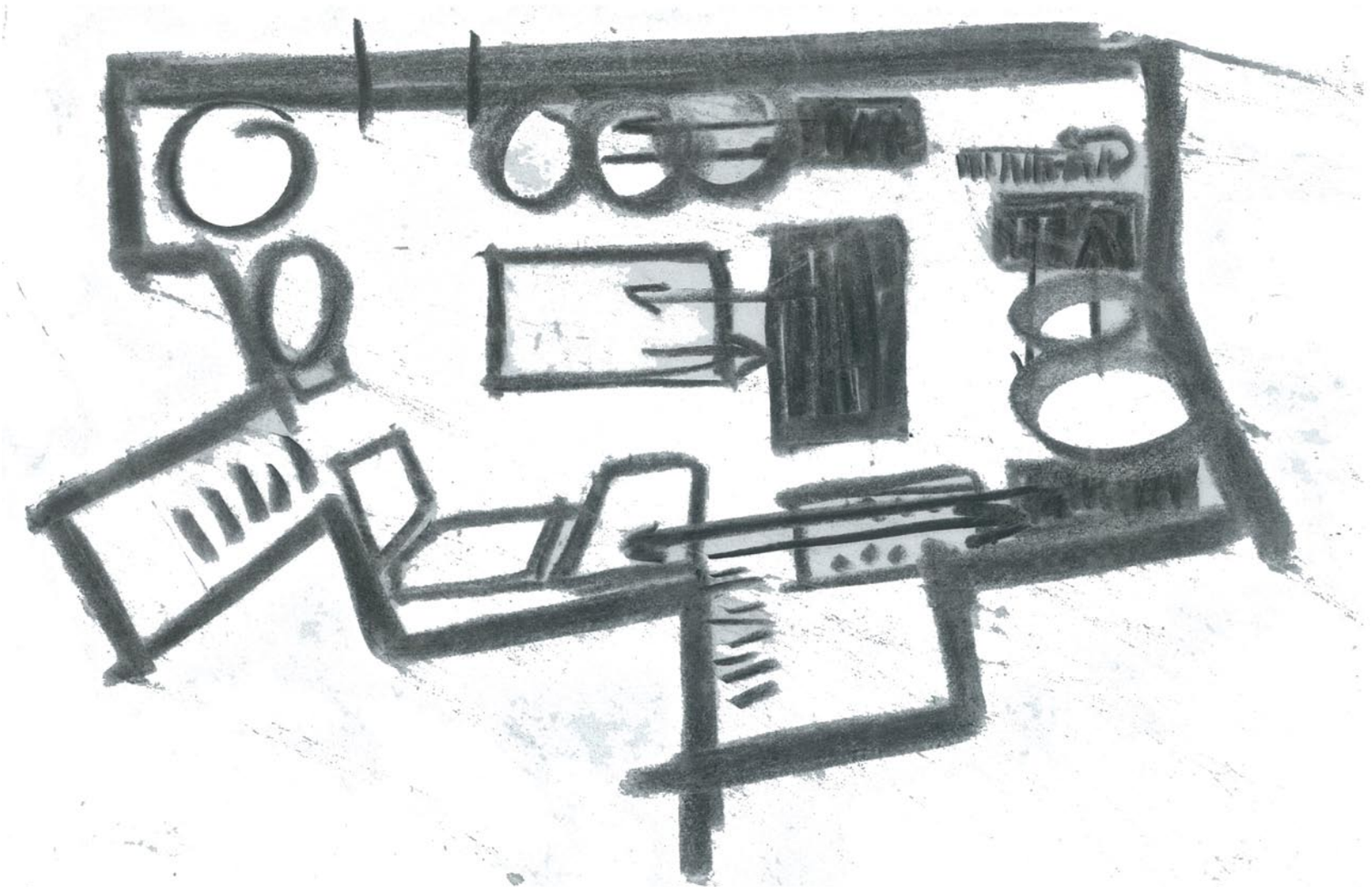
Under pressure

In general the air pressure in a building containing large amount of water must be negative. The ventilation in the locker rooms must ensure a sleight under pressure, compared to the area with the large salt water basin, so the humid air from the salt water basin will be sucked in to the locker rooms, and exhausted from here, see ill XX. This will ensure the moist air from penetrating the envelope construction of the building and hereby create a moist environment for different kinds of molds.

[Ventilation og varmegenvinding]

Condensation

The evaporation from the baths cause the humidity inside, also the exhaling air from the users contribute to this amount, but because it is a very small part of the total amount of evaporation, it is not considered in the calculation of evaporation. In order to avoid condensation on the windows, aggregates for inlets is placed underneath the win-



dow, so the fresh dry air can blow up in front of the window and absorb some of the moisture in this area, see ill XX.

Ducts/pipes

Both the mechanical ventilation and the water cleaning system are placed in the basement. The air is transported via ducts up through the two decks, and is distributed into the rooms by ducts in the decks. The deck is dimensioned with consideration for the transportation ducts for air and water and has a depth of 60 cm. The circulation of water between basin and cleaning system goes directly through the ground floor. Almost all baths are placed in the ground floor mainly of contextual reasons but there is also a considerately technical reason; the short pipes for water. The cleaning system is placed in the near distance to the several baths. The outdoor spa´s placed in 1.floor is placed for the contextual quality available; the view. The cold bath and the alga bath are placed in the basements, also providing short distance for the water pipes.

Heat

The heating of the hot zone is influenced by several factors; the technical facilities, the solar gain, the users and artificial light.

To keep air temperatures of 28 C inside the building, the mass can have a thick insulation or have a high heating rate. Through calculations in Be06 it is seen that the combination of an effective insulation, providing a low U-value, and a relatively high heat appliance, from both internal gains and the hot inlet air, can heat up the building. Raising the amount of insulation in the building envelope, is both expensive and has a high energy use in production of the insulation, all this can be minimized by considering the overall design, solar heat gain and the internal heat gain.

Heat Recovery

The idea of heat recovering is to recycle the heat from the air going out. Instead of losing the heat in the polluted air, the heat is recovered and transferred to the ingoing air. Recirculation of the indoor air is necessary to keep the balance of the humidity. The device of recirculation is often placed in the top of the room, which allows for a redirection of the rising hot air. This system adjusts the amount of new fresh air with the amount of reused hot air. In general the fresh air is only 1/3 of the re-circulated air, this relation keeps the humidity stabile.

[Ventilation og varmegenvinding]

[http://vbn.aau.dk]

Room		Temperature Celsious	Humidity %	Dewpoint Celsious	Air Vapour. g/kg luft
Locker room	air	26	60	17,2	13
	water	36	100		40
Saltwater	air	28	65	21,8	17,0
	water	26	100		23,5
Alga bath	air	28	65	21,8	17
	water	35	100		38
Spa	air	20	75	23,2	18,5
	water	8	100		38,0
Cold bath	air		55	10,0	8,3
	water		100		7,0

Ill. 45 Results from i-e diagram, used in the calculations of ventilation

PRESENTATION

SALT BATH

2D

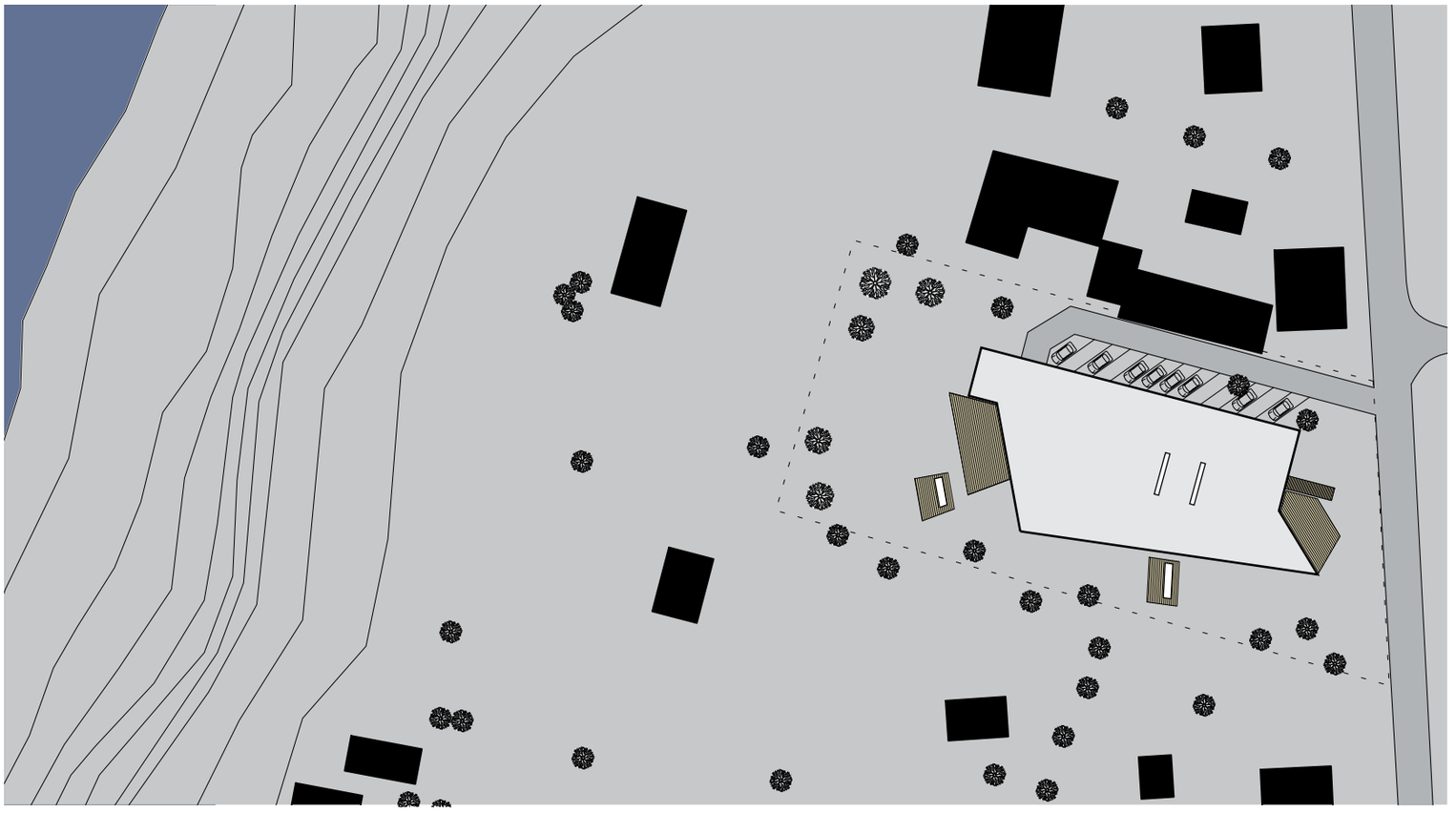
Site plan	1:5000
Outdoor plan	1:500
4 Plans	1:250
2 Facades	1:300
2 Sections	1:300
Technical Plan	1:200
Technical Section	1:200

3D

Beach South
Beach North

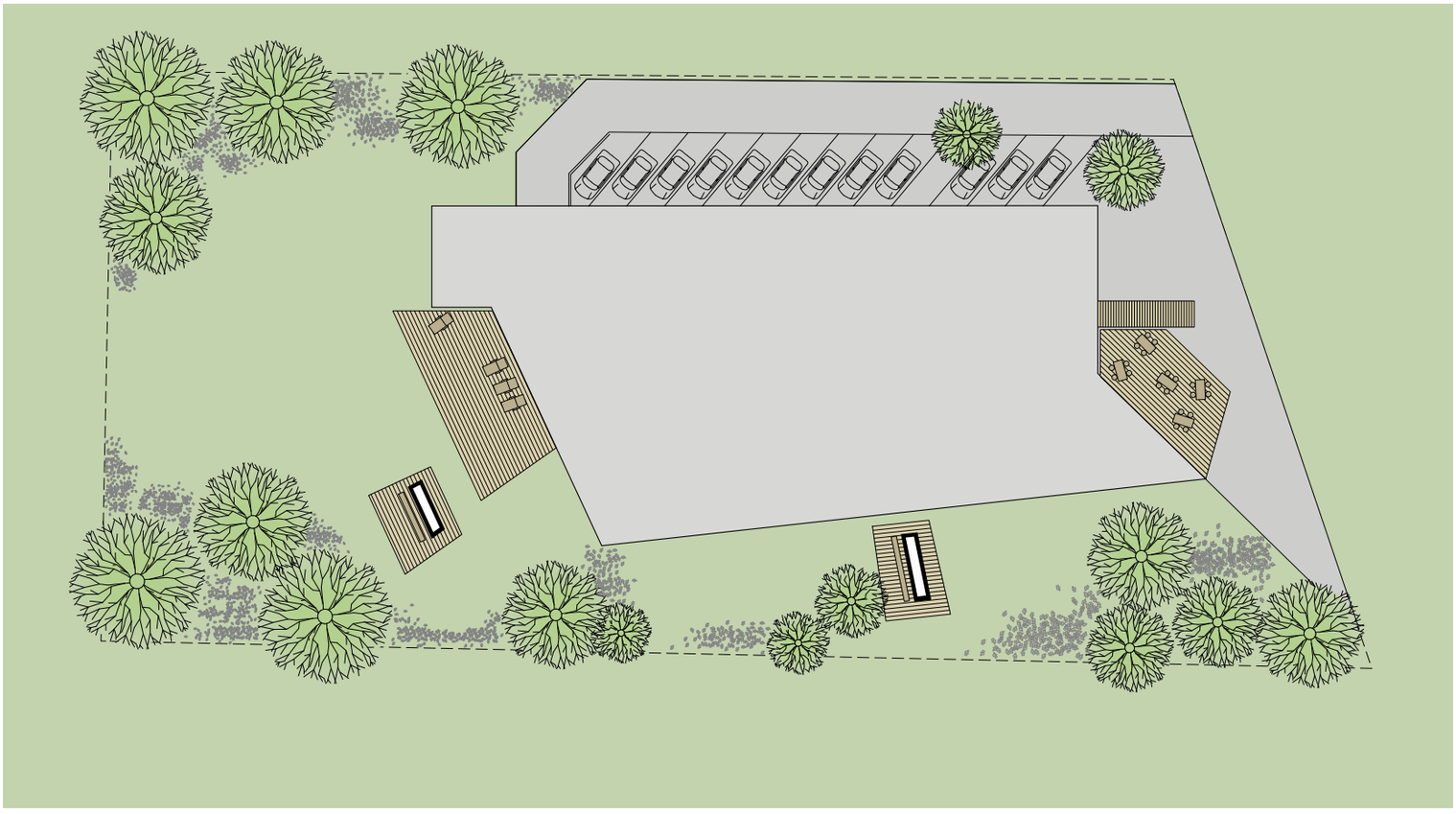
SITE PLAN

1:1000



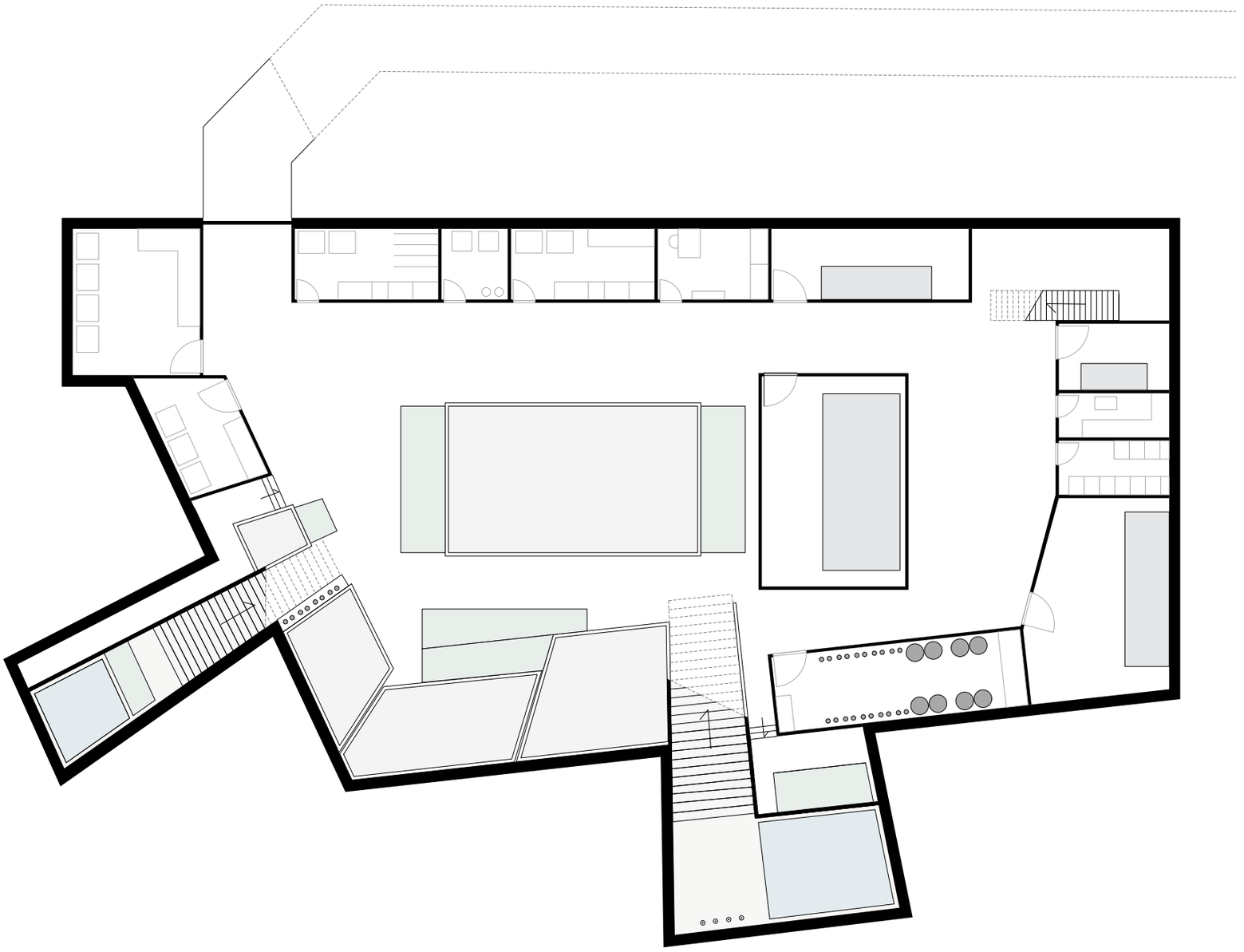
PLAN -outdoor

1:500



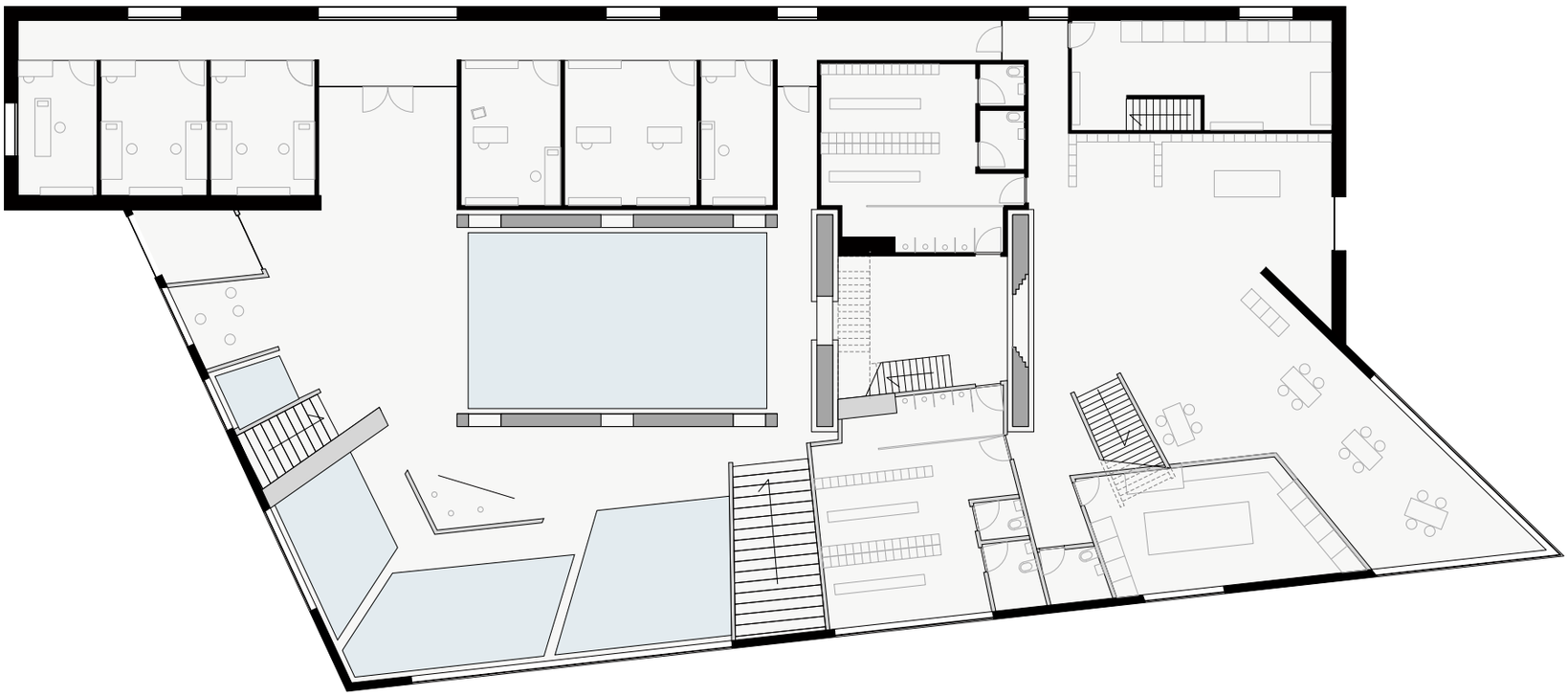
PLAN -basement

1:250



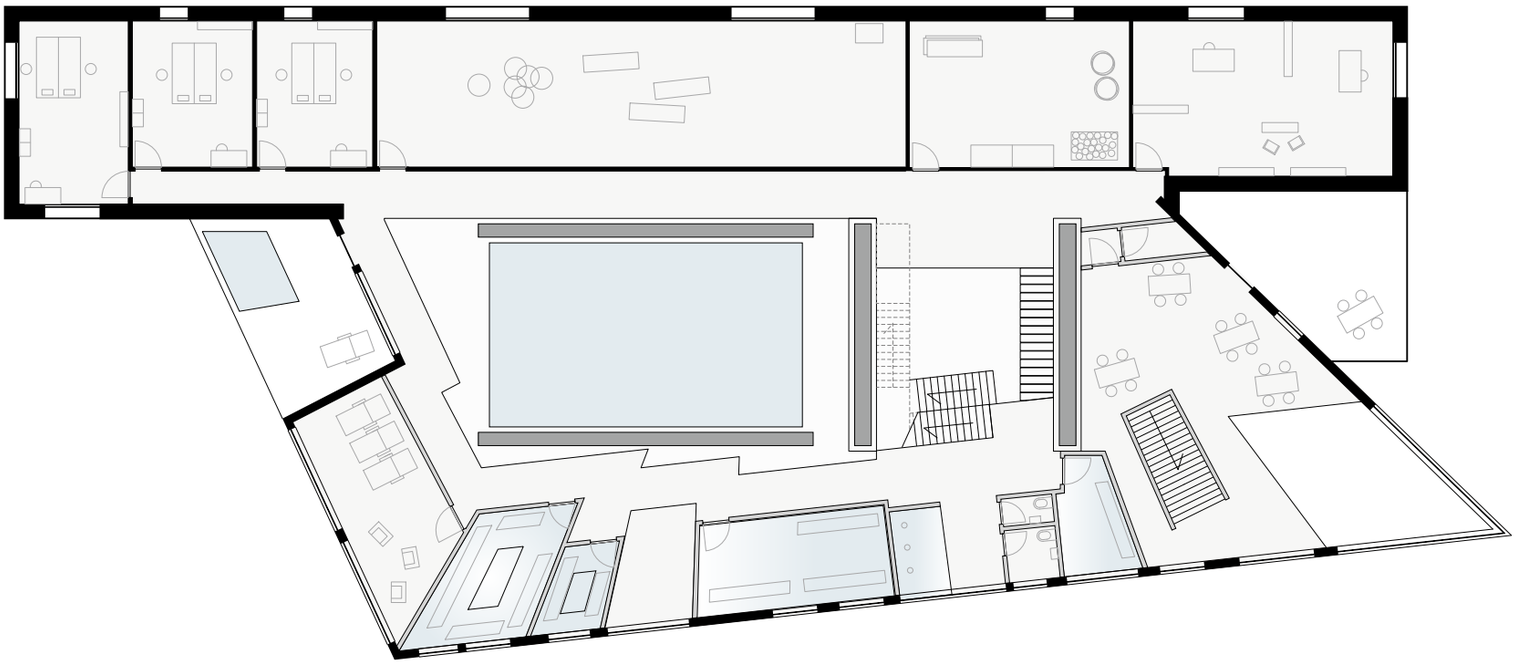
PLAN -ground floor

1:250



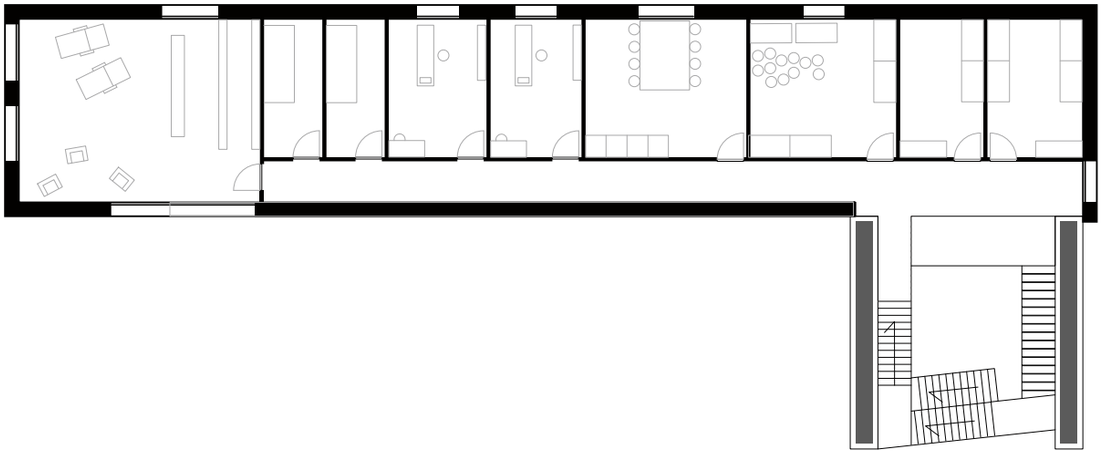
PLAN -1.st floor

1:250



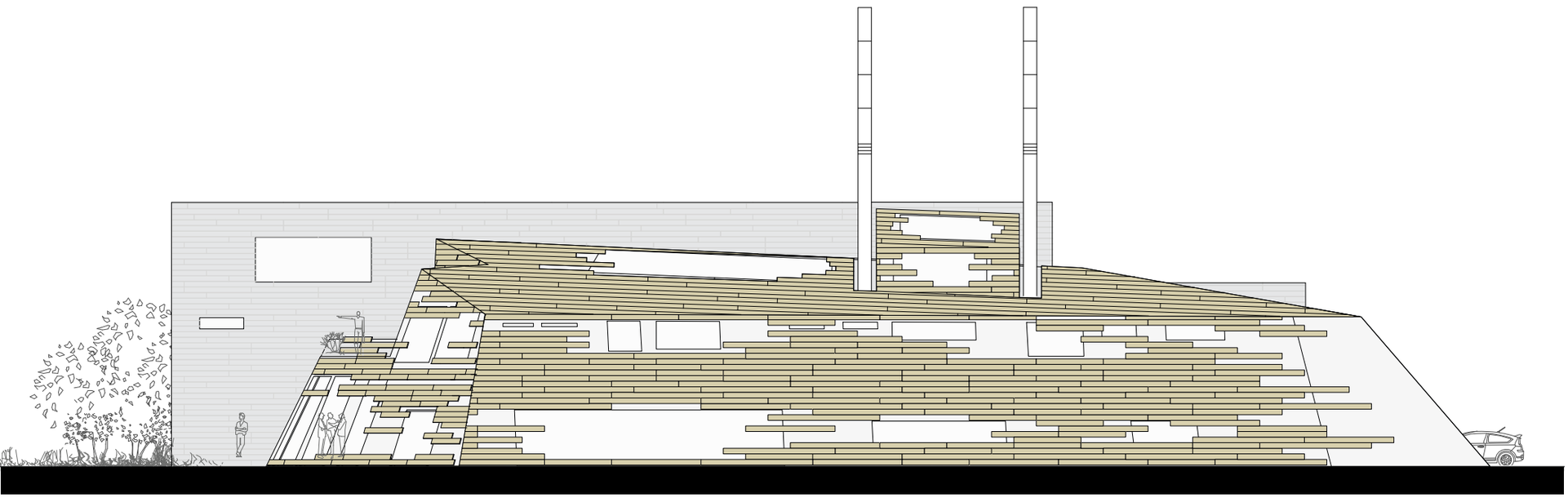
PLAN -2.nd floor

1:250



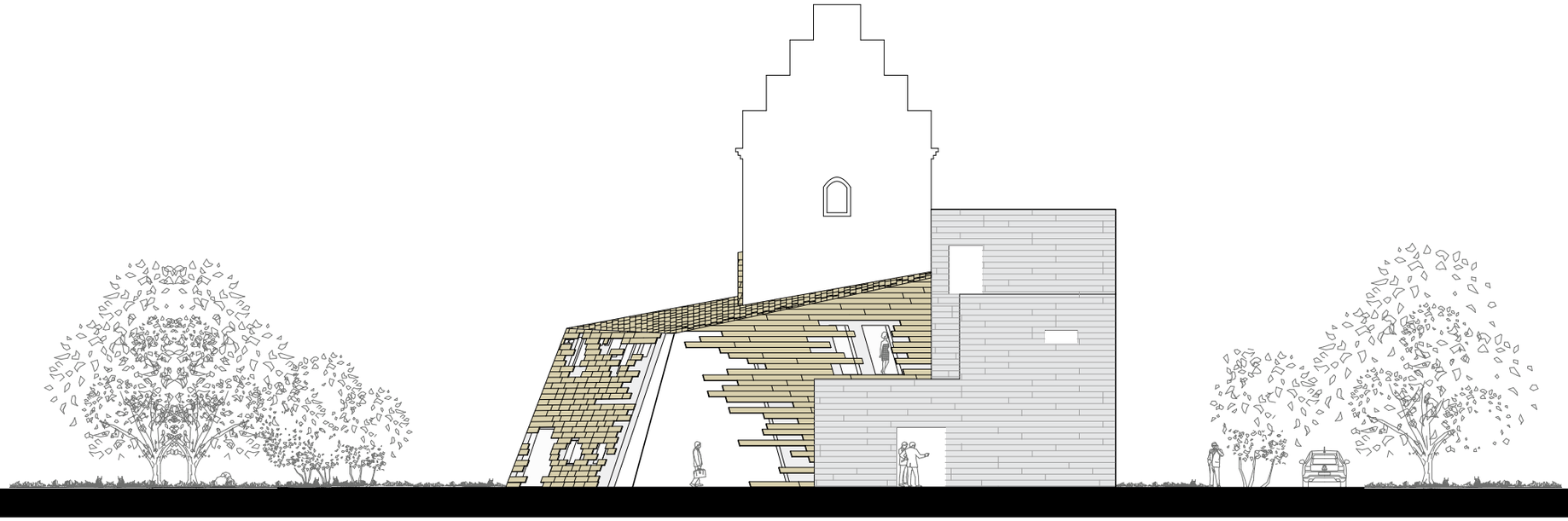
SOUTH FACADE

1:250



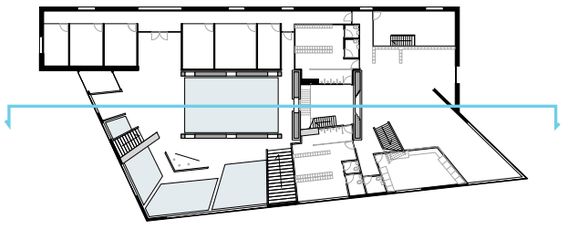
EAST FACADE

1:250



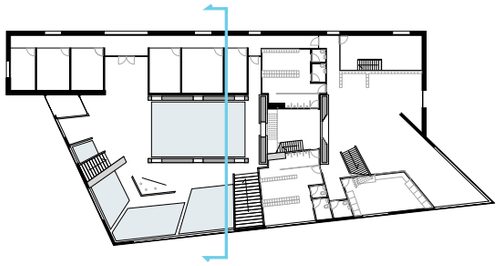
SECTION A-A

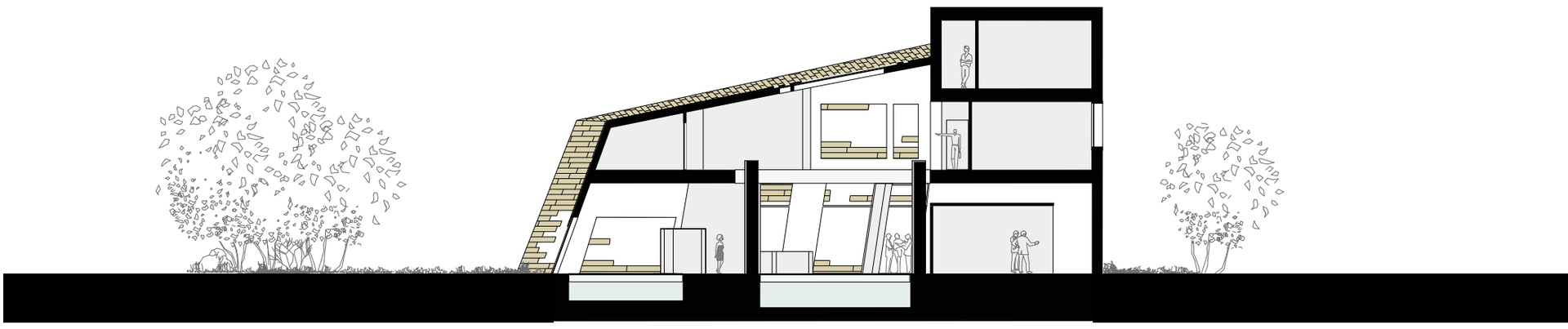
1:250



SECTION B-B

1:250

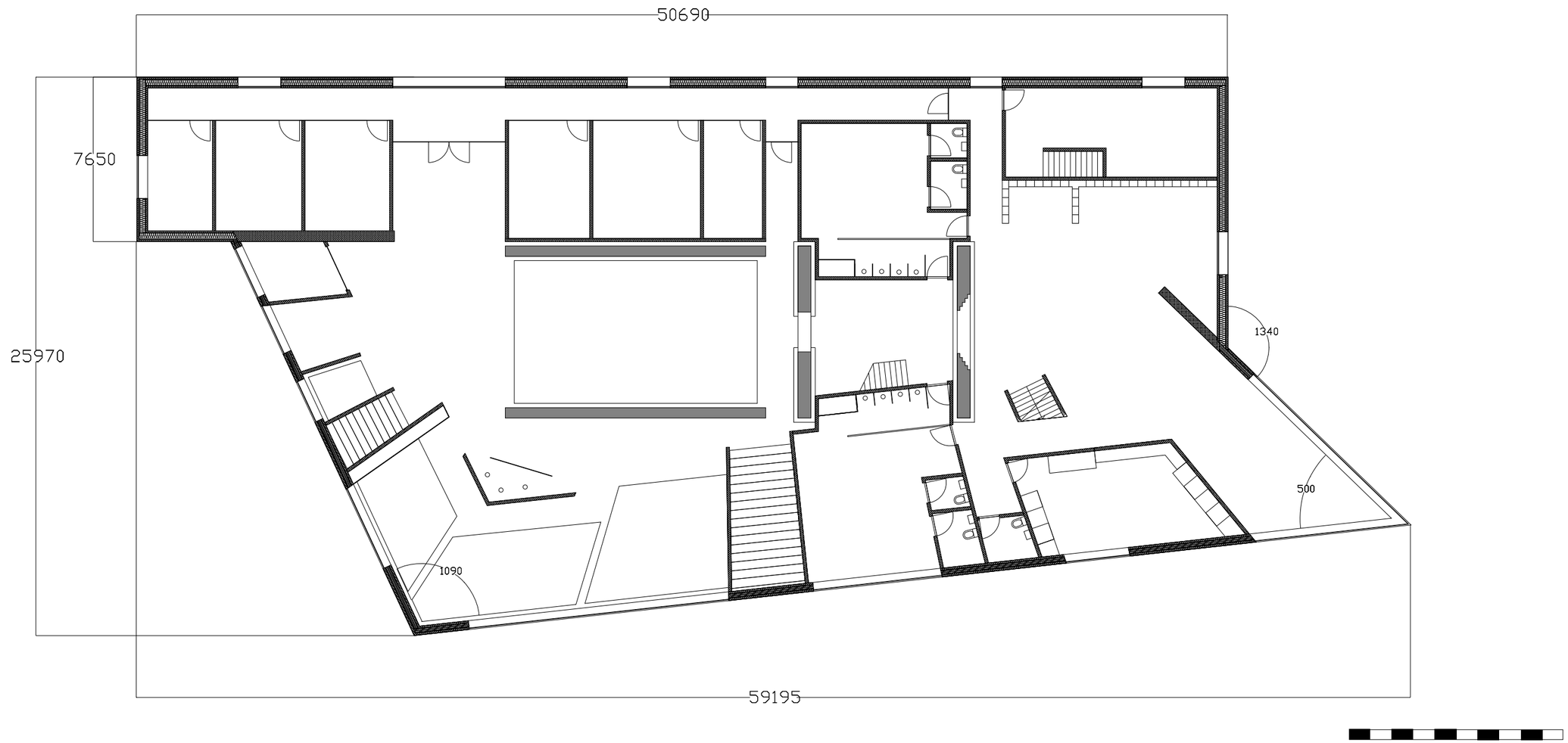




ill. 8 Salt baskets

TECHNICAL PLAN

Ground plan 1:200



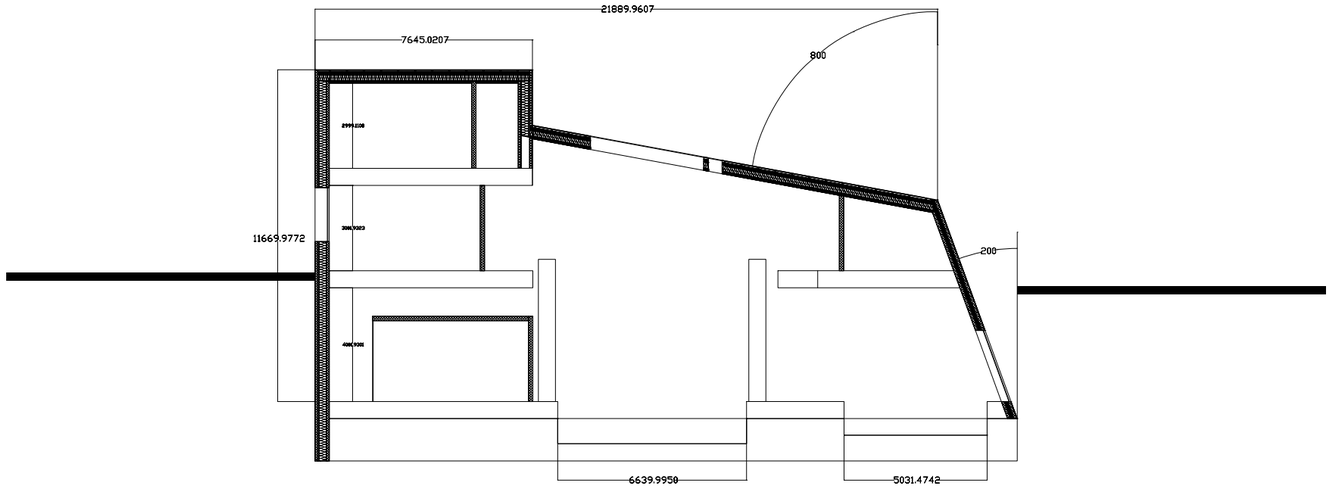
TECHNICAL SECTION

Cross section 1:200

North Wall: 50 cm

Concrete	10
Ventilated airspace	8
Wind cart	2
Mineral wool	29
Concrete	10

U-value: 0,12



South Wall: 41 cm

Wood	1
Concrete	10
Ventilated airspace	0,1
Wind cart	0,2
Mineral wool	20
Concrete	10

U-value: 0,17

VISUALISATION

From beach_south

VISUALISATION

From beach_north

EVALUATION

EXTERNAL

The reflection of the two districts; the village and the beach moor, in the two masses surrounding the existing church walls has succeed considering the amount of adaption and the amount of rethinking the surroundings. The heavy mass on the north side, reflect the human build village, with massive materials and orthogonal lines and shapes. The light and inclining mass on the south side reflects the character of the beach moors, through the layered facades, the almost random placed wooden boards and the reflection of light in the glass and smooth concrete. The reflection of the two relevant districts creates coherence between the building masses and the site.

The contact between the village and the sea is achieved through the building, visually and according to the flow through the building. The three walkways in the northern mass on each floor, leads the mind and view to the sea. The serrated walkway in the south side connects more to the actual site, especially in the space with the three salt basins. Here the views are directed to the garden outside and creates contacts with the nearby experiences.

INTERNAL

The feeling of the stories of the two masses around the church is clear. The guest is always aware of the location in the building because this is shown in the shape of the spaces, materials, daylight and character of the air. The difference between the northern area and the south area is communicated through the spatial experiences, mainly caused by respectively orthogonal and inclined walls. The mix of open and closed spaces on the south side creates contrast to the spaces in the strict, functional and regular north side.

Contact to the site is achieved through intense visual connections and also physical connections are designed by implementing the terraces and the garden in the overall planning of the spaces, in this sense the outdoor site becomes part of some indoor spaces.

The bathing resort will also become a significant part of the social life in the village because the café is placed between the bathing area and the village. It will be easy for the guests to come in and drink a cup of coffee and meet with friends. The outdoor space between the Vesterø Havnegade and the entrance and the café further support this social life. The café will function as a meeting point and as a place to sit and be entertained by the social activities. This integrates the building and the function in the village, and creates a common ground.

EXPERIENCES

The different experiences in the building are created through spatial creativity, location in the building, daylight and choice of materials. The combination of these aspects has brought experiences that expand the general experience of the resort in different ways. The placing of the open large spaces in the ground floor of the south side provides a common area for all the guests, here they meet and talk. From the ground floor two stairs lead down to two different baths under the ground. The cold bath is deep and tall, the temperature is very dominating for the experience down there. The space for the alga bath is on the contrary; warm, wide and low. These two opposite baths gives the guests two very strong experiences with water. In the south side on the second floor the experiences are more introvert, the spaces are smaller and this offers a more private and intense experience. This will be quite different than the experiences in the ground floor. The spaces in the north side are orthogonal and regular spaces; these are used for more calm and neutral functions, like treatment rooms and deposits. This division of the type of spaces is made with concerns for the concepts of contrasts.

TECHNICAL

The overall strategy of the technical design is logic and functional. The energy performance of the building is very acceptable considering the cultural function and the importance of a cultural expression of the building. The building could have been more compact, but the idea of reflecting the nature ruled against the total compactness.

The method of zoning has in some cases been overruled by the flow of experiences through the building. Though no large compromises have been made; the result of dissolving the hot core of rooms in the warm zone of the building, ensures a stabile temperature in the entire warm zone.

CONCLUSION

Considering the vision of the project, the design is very satisfying. The experiences created in the different spaces are derived multiple use of the water and salt from the Island. The building leaves space for the kept parts of the church; the gables function as focal point outside, and the walls from the main space in the church spans a space for the essential part of the bathing resort; the salt water. In this sense the church keeps it own character and the two new masses spans new spaces around it. The new bathing resort functions as a hybrid space; exposing the old church and the new bathing functions.

The concept of designing two masses around the church, representing two poles of contrasts in the surroundings, has shown to be highly suitable for the actual site.

The indoor climate in the rooms are very good, most rooms achieve a category B. The locker rooms do not achieve any standard of indoor climate, but these two rooms are not used for long time stay. The energy demand of the building is relatively low, especially when considering all the energy demanding processes inside the building. The building achieve a energy demand of 90,1 kWh/m2/year, which is below the required demand of 95 kWh/m2/year.

APPENDIX A

3. Vision - overordnet introduktion til opgaven

Læsø Sydesalt er i dag et stærkt brand indenfor kvalitetsfødevarer i Danmark. Sideløbende med dette er Læsø Saltsyderi og historien om saltet et af de fremmeste eksempler på oplevelsesøkonomi i Danmark.

Over de seneste 4-5 år er brugen af saltet til udvortes brug i form af restlage, badesalt, cremer mv. vokset. I dag udgør denne dimension, bl.a. gennem psoriasisbehandlingen på pilotprojektet Læsø Kur & Helse, et eget forretningsområde.

Meningen med Læsø Kur & Helse er at udbygge behandlingsdelen til et seriøst kurcenter, der både indeholder velvære-dimensionen og et skandinavisk psoriasiscenter.

Placeringen af centeret i Vesterø Havnekirke indeholder en stille henvisning til saltets kobling til ”kirken” gennem tiderne. Visionen er at Læsø Kur & Helse skal fremstå som et unikt bud på anvendelsen af en kirkebygning til verdslige formål – i pagt med historie og natur.

3.1. Baggrund

Den høje himmel og det særlige lys, er det første man bemærker, når man færdes på Læsø og man skal ikke være længe på øen før den særegne natur fanger ens opmærksomhed. Strand-enge, klitter og heder er elementer i en naturmosaik, hvor også det ekstraordinært rene vand indgår. En helt særlig plads på øen har saltet, som har været en del af øens historie siden Middelalderen.

I 1991 genoptog man saltsydningen i den rekonstruerede middelalderhytte ved Rønnerne på øens sydside. I de 15 år, der er gået, er projektet vokset til en turistattraktion med ca. 50.000 besøgende årligt og en virksomhed med en årsomsætning på 8-9 mill. kroner.

For 4 år siden blev der taget endnu et skridt, med baggrund i saltproduktionen, ved at starte et pilotprojekt for behandling af patienter med hudlidelsen psoriasis. Der har nu været 10 hold patienter i behandling på forsøgsanlægget med fine resultater. Samtidig blev der indledt et arbejde med at etablere et permanent kur- og helsecenter for øens gæster, beboere og, som særlig målgruppe, patienter med psoriasis.

Læsø Kur & Helse indrettes i Vesterø Havnekirke med tilbygning af nye bygninger. Havnekirken omfatter 237 m2 i grundplan og ligger på en 3920 m2 grund.

Det er en stor udfordring at ombygge en landsbykirke til andet formål.

Kunsten er, dels at bevare det monumentale udtryk i bybilledet, med stor respekt for den nøjsomme natur og de ydmyge omgivelser bygningen står midt i, og samtidig skabe en bygning af høj kvalitet der udstråler helhed, tradition og historie, men selvfølgelig også er inspireret af det nye formål med den formgivning og symbolik, der kan hentes i det.

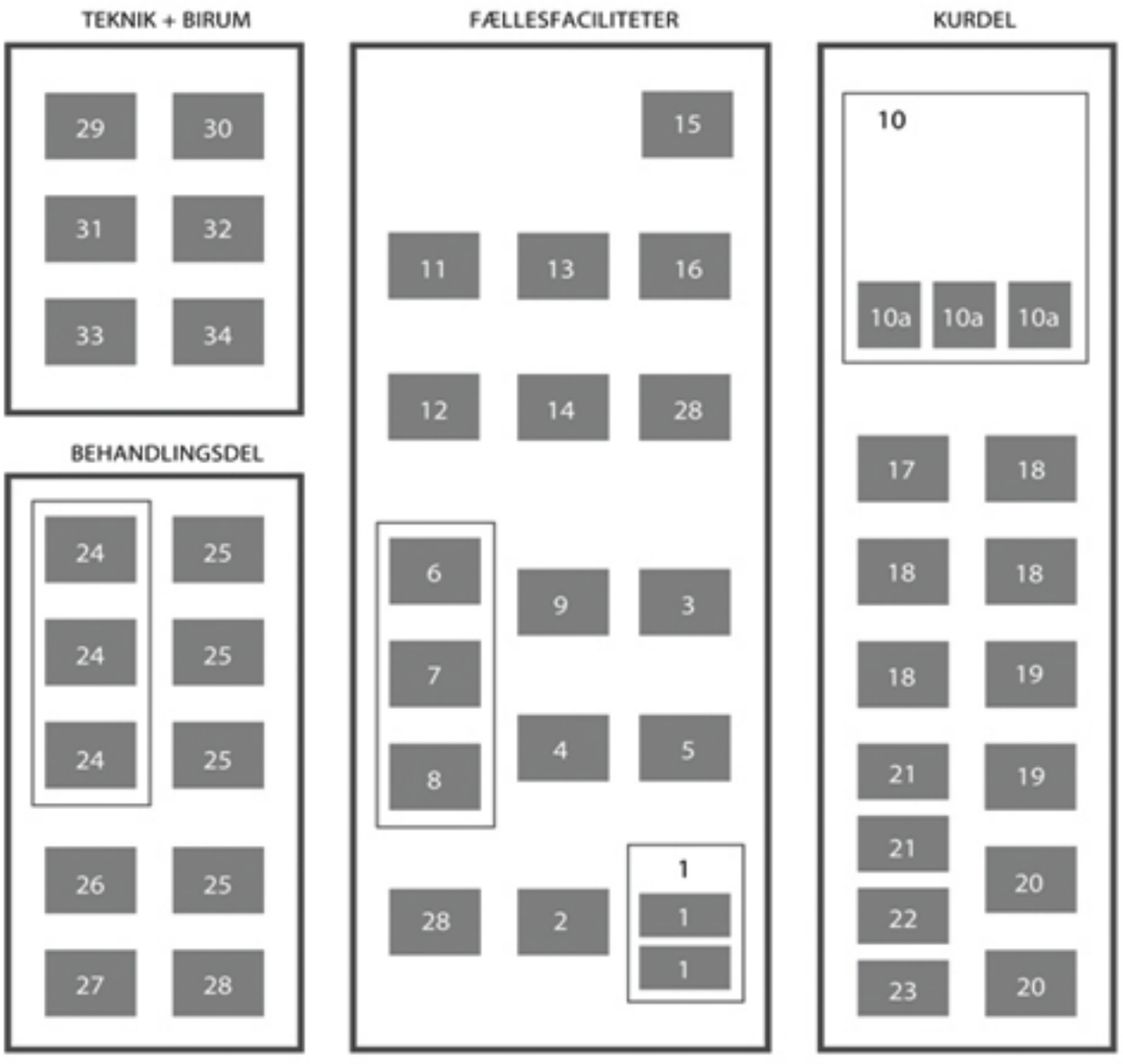
Stedet skal baseres på Læsøs naturlige forekomster af salt grundvand og havalger. Centeret skal bygge på veldokumenterede resultater og metoder – og koble disse med Læsøs profil som afslappende ferie og rekreationssted. Det er visionen, at Læsø Kur & Helse skal fremstå som den førende seriøse udbyder af salt- og thalassoterapi i Skandinavien.

Læsø Kur & Helse etableres i Vesterø Havnekirke, der ligger som et vartegn ved indsejlingen til Læsø. Det giver nogle spændende arkitektoniske og naturmæssige rammer. Samtidig binder kirkebyggeriet en sløjfe på den historiske sammenhæng mellem Læsø, salt og kirke, idet Viborg Domkapitel i århundreder ejede Læsø og var hovedkraften bag saltproduktionen på Læsø fra 1100-1652.

Der er stiftet en erhvervsdrivende fond, ved navn ”Læsø Fonden”, der ejer Læsø Kur & Helse – og ligeledes ejer Læsø Saltsyderi. Læsø Fonden får Læsøs borgmester som formand, en stærk forretningsmæssig ledelse og et etableret netværk indenfor såvel sundhedssektoren som turisterhvervet.

3.3. Læsø- en ø i Kattegat

Læsø er den største ø i Kattegat, beliggende omtrent midtvejs mellem Frederikshavn og Göteborg. Øen er nok mest kendt for sin saltsydning, der i dag er en velbesøgt turistattraktion, lige så vel som den udgør en central del af øens historie. Gårde med tangtage - de såkaldte tanggårde - bliver også ofte fremhævet som en central del af øens fortid og nutid. Øen er et populært feriemål for især danskere, tyskere, nordmænd og svenskere, der gennem feriesæsonen har mulighed for at overnatte på de mange hoteller foruden på øens vandrehjem og dens to campingpladser.



1 Foyer
1 Reception
1 Butik
2 Depot - Butik
3 Kontor
4 Serverrum
5 Kopirum
6 Toilet - personale
7 Kantine - personale
8 Omklædning - personale
9 Omklædning - 75 personer
10 Bassin
10a Vandstråle
10a Spa - 10 personer
10a Slatinhalation - Fodbade
11 Café - Ikke nødvendigvis et rum
12 Køkken
13 Bevægelseslokale
14 Relakseringslokale
15 Udendørs dæk
16 Solhave
17 Alge- og mudderterapi
18 Behandlingsrum
19 Sauna
20 Dampbade
21 Solarie
22 Koldtvandsbassin
23 Nærdepot - Kur
24 Saltvandsbassin
25 Behandlingsrum
26 Klinikrum
27 Kontor - sygeplejersker
28 Toiletter
29 Pedel
30 Rengøring
31 Vaskeri
32 Teknik
33 Affald
34 Depoter

Foruden Saltsyderiet og tangtagene er øen særlig kendt for sin unikke natur og sine fødevarer. Ud over saltet er især jomfruhummer og honning kendte produkter. Gennem en årrække (fra starten af 1990'erne og frem til 2006) udspillede der sig således den såkaldte "bi-krig" på øen. Denne stod mellem henholdsvis biavlere, der foretrækker den gule bi og avlere, der foretrækker den brune bi. Denne "krig" blev regelmæssigt nævnt i medierne.

Læsø er Danmarks mindste kommune. Og er også efter kommunalreformen en selvstændig kommune, Øen har ligesom andre danske småsamfund oplevet en generel tilbagegang i befolkningen gennem de sidste 10 til 20 år. Samtidigt er fiskeriet - der var det centrale erhverv op gennem 1900-tallet - gået tilbage til fordel for erhverv med relation til turisme.

3.4. Beskrivelse af grundlaget for og indholdet i Læsø Kur & Helse

Læsø Kur & Helse kører i dag som psoriasis-pilotprojekt i en foreløbig klinik på Vejgaard i Byrum. Med flytning af klinikken til Vesterø Havnekirken og tilføjelsen af en velvære-del får Læsø Kur & Helse et stort løft.

3.4.1. Hvad er Læsø Kur & Helse?

Læsø Kur & Helse er et behandlings- og kurcenter primært baseret på det saltholdige grund-vand på Rønnerne syd for Læsø. Det samme vand som danner basis for Læsø Saltsyderis produktion af kvalitetssalt.

Ideen bygger på Læsøs historie som er præget af salt. Siden 1100-tallet har der været saltudvinding på Læsø og i dag foregår der økonomisk bæredygtig saltsydning på Læsø Saltsyderi ud fra samme teknikker som anvendtes for 1000 år siden.

Siden starten i 1991 har Læsø Saltsyderi udviklet sig fra et forsøgsprojekt til en virksomhed med uvurderlig betydning for Læsøs omdømme. Ideen til Læsø Kur & Helse er opstået i direkte forlængelse af Saltsyderiets aktiviteter.

3.4.2. Kur

Udbygningen med en kur-del skal ses som en naturlig kobling mellem projektets behandlingsdel og Læsøs store rekreative værdier og deraf følgende turisme.

Stedet skal indeholde saltbade, behandling med alger og mudder samt en række terapitilbud. Centerets profil vil være båret af det salte vand og af de fore¬komster af havalger der findes ved Læsø. Konceptet kaldes Thalasso og kendes fra andre steder i verden med tilsvarende gunstige naturforhold, f.eks. det franske Algotherm-center i Bretagne.

Kur-kunder vil blive tilbudt en bredere vifte af tilbud end psoriasispatienterne. Det vil bl.a. omfatte salt- og mudderbade, saltpeeling, varme- og lysbehandling samt massager og andre terapier. Der vil desuden være mulighed for en række bløde bevægelsesformer som yoga og tai chi.

3.4.3. Behandlingsdel

Læsø Kur & Helse har kørt som pilotprojekt for psoriasisbehandling i 3 år med dokumenterede resultater, der er på højde med resultater fra Det Døde Hav i Israel. Det er påvist at der er søgning til tilbuddet, selv under de nuværende ydmyge rammer. Med udvidelse af kapaciteten og iværksættelse af det aftalte samarbejde med Helserejser, vil Læsø Kur & Helse være det skandinaviske alternativ til opholdene ved Det Døde Hav. Ligeledes vil centeret udgøre et egentligt psoriasiscenter i Danmark med behandling, undervisning, forskning og udvikling.

På baggrund af de hidtidige erfaringer vil Læsø Kur & Helse tilbyde egentlige ophelingsforløb for psoriasispatienter på 4 uger. Hertil kommer korte forløb på 1-2 uger som dels vil have terapeutisk virkning, dels vil virke forebyggende. Disse behandlingstilbud vil suppleres med en psoriasisskole, diverse særarrangementer omkring kost og motion samt produkter til hjemmebehandling.

Temaet for centeret er Thalassoterapi og dermed de gavnlige effekter som salt, alger og mudder har på diverse lidelser samt på vores hud og organisme generelt.

3.4.4. Salg af produktserie – salt og alger

Læsø Kur & Helse vil lancere sin egen produktserie baseret på saltvand og havalger. Grundlaget herfor eksisterer allerede i form af restprodukter fra saltsydningen og i form af en serie udviklet af firmaet Læsø Saltcare. Produkterne sælges i dag via Matas og via agenter i blandt andet Sverige, Norge og Tyskland. Læsø Saltsyderi og Læsø Saltcare er gået sammen om at udvikle yderligere produkter til lancering i 2006 og 2007.

Læsø Kur & Helses primære ydelser vil være omkring temaet salt og alger. Saltbade, sprayning med restlage fra saltproduktionen og cremer baseret på saltlagen har vist sig at være effektive midler til behandling af psoriasis og en lang række andre hudlidelser af forskellig sværhedsgrad.

Erfaringer fra Sydeuropa viser at der er et stort potentiale i tilsvarende produkter og behandlinger baseret på algerigt mudder. Analyser har vist at algeforekomster ved Læsø har samme sammensætning som de der anvendes til behandling i Sydeuropa.

3.5. Konkurrencegrunden

Vesterø Havnekirke er placeret på en strandgrund på knap 4.000 m2 i kote ca. 4,5 -6,2 over havets overflade. Kirken er meget synlig fra havet og ved indsejling til Vesterø Havn ses kirketårnet meget tydeligt som det hæver sig over byen.

Kirketårnet ses tydelig når man bevæger sig rundt i byen – ligeledes ses toppen af tårnet når man går på stranden langs hele øens vestkyst. Der etableres stiforbindelse direkte fra stranden til centeret.

3.6. Vesterø Havnekirke

Læsø Kur & Helse skal indrettes i den eksisterende Vesterø Havnekirke samt i en ny tilbygning. Den eksisterende Havnekirke omfatter 237 m2 i grundplan. Tårnet er ca. 17 m højt til kip og der er en fantastisk udsigt over det meste af øen. Der er kælder under en lille del af kirkeskibet.

Kirken er opført i år 1954 Ydermure består af hvidkalket murværk og taget er i rød tegl. Kirkens facader skal påregnes renoveret og der skal påregnes udskiftning af taget.

Der findes ingen eksisterende tekniske anlæg / installationer som kan genanvendes.

3.7. Plangrundlag

Kommuneplanen indeholder følgende forhold som skal overholdes: Bebyggelsesprocenten må ikke overstige 40 %. Bygningshøjden på nybyggeri må ikke overstige 8,5 m.

Dispensationer: Såfremt der kan forudses dispensationer bør dette fremgå af det afleverede materiale.

Det kan påregnes, at Læsø Kommune giver dispensation for energirammen i eksisterende kirkebygning.

3.8. Trafikale forhold

Vesterø Havnegade er hovedfærdselsåre fra havnen og ind i landet. I sommerhalvåret hvor der er et stort trafik-rykind ved hver færgeankomst - og afgang er biltrafikken intens. Derfor er det vigtigt, at der etableres godt udsyn når man skal fra parkeringen og ud på vejen igen. Da øen også er kendt for at være en cykel-ø skal der også tages hensyn til de bløde trafikanter.

3.9. Besøgende og personale på Læsø Kur & Helse

De besøgende på Læsø Kur & Helse vil have forskellige behov – eksempler på kunder er:

- En del vil være psoriasispatienter der komme for at få en konkret behandling .
- En del vil være psoriasispatienter der er i styret behandling under hele opholdet på 4-uger.
- En del stor del af publikum vil på kurophold, hvor der er en defineret behandlingspakke inkluderet.
- En del være drop-in besøgende, som køber adgang til centeret og derefter træffer beslutning om evt. behandling.

3.10. Lidt fra hverdagen

”Grethe er psoriasispatient og er på Læsø på et 4-ugers behandlingsophold. Mandag til lørdag møder hun på centeret til behandling kl. 8.00. Centeret er endnu ikke åbnet for offentligheden, men på Læsø foregår tingene lidt uformelt, så fordøren står åben og Grethe går selv ind og klæder om. Hun hilser på sygeplejersken og bliver hjulpet op i saltbadet sammen med de øvrige patienter.

Efter en times saltbadning bruser Grethe sig og lægger sig op i centerets solhave. Hun har en god bog med og nyder at ligge i varmen og slappe helt af – halvdelen af solhaven er skærmet af til patienterne, men hun kan på lydene høre at der så småt dukker kurgæster op i centerets øvrige rum. Kl. 12 mødes hun med de andre patienter i cafeen til en let frokost – igen er der sat en skærm op så patienterne kan sidde lidt for sig selv. Grethe synes nu ikke det nødvendigt, men særligt i den første uge var der nogle af de hårdest ramte psoriasispatienter der var glade for afskærmningen.

Efter frokosten tager Grethe et hvil i relaksrummet inden hun vender tilbage til et par timer i solhaven. 14.30 er det tid til dagens anden saltbehandling. Grethe er på sin tredje uge og huden har klaret behandlingen flot – så efter aftale med lægen får hun et saltbrus og lader efterfølgende saltet tørre ind på huden. Efter en halv time bruser hun og bliver smurt ind i creme. Dagens behandling er overstået og hun er klar til at gå hjem – ah hun smutter nu lige op i cafeen og snupper en kop kaffe først inden cykelturen hen til hotellet.

Knud og Ellen har været på Læsø med børnene i 17 år, hver eneste efterår, undtagen 2002 hvor deres datter Lone skulle giftes med sin Gio. Brylluppet blev holdt hos Gios forældre i Sienna – og Toscana var da også dejligt. I år har de glædet sig til at se det færdige resultat af byggeriet i Havnekirken. De var nu noget skeptiske da de sidste år på Saltsyderiet så plancherne med vinderprojektet, men de måtte godt nok overgive sig allerede før færgen lagde til i Vesterø. Det var knagme blevet flot. Og det var altså smart at man allerede på færgen kunne bestille billet og få en tid til behandlinger. De var inde med færgen kl. 13 og her halv fire lå de så og flød rundt i saltvandsbassinet og nød livet. Det var endda lykkedes den søde pige på færgen at sælge Ellen en mudderbehandling. Der sagde Knud altså stop. Ellen skulle til kl. 17, så kunne han jo tøffe hen i Brugsen og købe ind til aftensmad. Han kunne ikke helt slippe tanken om at det der med en fodbehandling måske var en idé i morgen?

Endelig havde Folmer hele familien i bilen igen. De skulle bare lige ned på Kur & Helse. Han havde været så heldig at det lige passede med at han kunne få en tid til massage tirsdag eftermiddag, hvor Kirsten i forvejen var til vandgymnastik – og så havde de lokket teenagesønnen Henrik væk fra pc'en. Han skulle til prøvetime på det nye ungdomshold i bevægelse: "powerboys". Det var nu helt sjovt at have noget at gøre sammen igen. Men det havde altså taget det meste af tre timer inden de kom derfra igen. Og det havde været en halvdyr fornøjelse, for Kirsten havde lokket ham til at købe et gavekort til hans søster Gudrun. Gavekortet lød på en Kur-weekend på Læsø med behandlinger og det hele betalt på forhånd. Nå ja med lidt held havde hun jo kun sølvbryllup en gang."

3.11. Børn

Børn vil primært være i centeret i patientgrupper i forbindelse med behandling for psoriasis eller andre lidelser – eller i forbindelse med andre planlagte aktiviteter. Der kan dels være tale om svømme- og bevægelsestilbud til børn, dels forløb med motorisk handicappede etc. Der vil også kunne arrangeres særlige tidsrum reserveret for børn. Læsø Kur & Helse er dog et kurcenter og har ikke faciliteter af badelandstypen.

I indretning af behandlingsdelen skal det være indtænkt at der vil være behandling af børn. Opholdet for psoriasishold for børn vil være arrangeret i tæt samarbejde med Læsø Skole og ungdomsskole samt foreningslivet, hvor man vil udbyde undervisning og aktiviteter for børnene. Psoriasisskolen, hvor der undervises i kost, livsstil mv. for psoriasispatienterne vil have et særligt tilrettelagt forløb for børn.

3.12. Personale

Der vil være store udsving i antallet af personaler på centeret. I absolut højsæson vil der være 16-18 personer på arbejde på en typisk dag, fordelt over perioden 9-21. Ved absolut lavbelastning af centeret vil personalet bestå af en tilknyttet person, der låser sig selv og en gruppe ind – det kunne fx være et yogahold eller lignende. Der stilles således store krav til en simpel og funktionel indretning med stor skalérbarhed.

Stampersonalet på centeret vil udgøres af "all-roundere" som kan forestå booking, check in, løbende tilsyn og renhold samt instruktion i centerets faciliteter. Hertil kommer en teknisk pedel og egentligt rengøringspersonale. Endelig vil gruppen af tilknyttede behandlere være en meget central personalegruppe. Disse vil typisk være freelancere som i lavsæsonen kommer til bookede aftaler, men som i højsæsonen vil være fuld tid på centeret. Ved psoriasishold vil der være sygeplejersker tilstede hele dagen og besøg af læge en dag ugentligt.

4. Konkurrenceopgaven

Med udgangspunkt i de unikke eksisterende forhold som Vesterø Havnekirke udgør med sin fantastiske placering med stor synlighed fra indsejlingen til øen, skal deltagerne komme med forslag til en samlet arkitektonisk bearbejdning af kirken med tilhørende nybyggeri. Det fremtidige anlæg kan stå som et vartegn og det er op til deltagerne at vurdere graden af dette.

Ligeledes skal udearealerne disponeres så der bliver en arkitektonisk sammenhæng med omgivelserne.

Deltagerne skal have fokus på følgende:

- Kobling mellem den traditionelle kirkebygning og nyt byggeri.
- Genanvendelse af kirkens særlige rum og kvaliteter.

• Indpasning i den bymæssige og landskabelige sammenhæng med havet som nærmeste nabo.

Udbyder har ikke på forhånd lagt sig fast på hvor i anlægget de forskellige funktioner skal placeres. Det er op til deltagerne selv at vurdere. Håndteringen af den daglige blanding af patienter og kurgæster skal nøje vurderes. Det er naturligvis et krav at alle de funktionsbestemte krav overholdes men den indbyrdes placering er op til deltagerne at disponere, blot kravene i programmet overholdes.

Bygherren ønsker ikke at fastlægge krav / ønsker til situationsplan. Det er de bydende som skal fremkomme med forslag til dette.

Forslaget skal indeholde en redegørelse for hvorledes der på et senere tidspunkt kan udføres en udvidelse op til en bebyggelsesprocent på max. 40 %.

Det generelle kvalitetsniveau til basisbygning, lofter, vægge, gulv, tag, døre, vinduer, belysning, installationer m.v. skal være gode gedigne og robuste materialer og udføres med gennemprøvede byggemetoder.

Erfaring fra øvrige lignende anlæg viser, at saltet og saltindholdet i luften, er meget medvirkende til nedbrydning af de forskellige materialer bl.a. elastiske fuger, låse, dørgreb, hængsler, maling på træværk, skruer, søm o.s.v.

Rengøring af de saltbelastede områder vil ske med højtrykspuling.

Materialerne skal være miljøvenlige og rengøringsvenlige og skal indebære et minimum af vedligeholdelse samt lave driftsudgifter.

Bygningens beliggenhed nær ved havet, og de stærkt saltholdige bade bygningen skal rumme betyder, at bygningen vil blive påvirket af et stærkt aggressivt saltmiljø, både udvendigt og indvendigt.

Det er derfor vigtigt, både af hensyn til udseende og økonomi, at der bliver valgt materialer, der er bestandige i miljøet, således at bygningen altid fremstår positivt i gadebilledet og vedligeholdelsesudgifterne reduceres til et minimum.

Energiforbruget i institutionen er en afgørende faktor i driftsøkonomien. Det skal derfor gennemtænkes og indtænkes i projektet, hvordan vedvarende energikilder udnyttes i videst muligt omfang. De tekniske anlæg og installationer skal udføres med rentable energispareforanstaltninger, f.eks. varmegenvinding.

De udvendige arealer skal tilpasses, så de falder ind i området og bliver et tilskud til området.

Udsigtsmulighederne skal udnyttes mest muligt, dog skal udsigten fra kur-området favoriseres.

Forslagene skal generelt sætte fokus på tilgængelighed. Der skal således som udgangspunkt være tilgængelighed for alle til alle dele af centeret. Det er op til deltagerne at komme med forslag den mest egnede udnyttelse af etagerne.

Centeret kommer til at indeholde adskillige installationer som skal være smukt indtænkt i forslaget. Her tænkes specielt på ventilations-, vandbehandlings-, belysnings- og opvarmningsdelen. Der skal påregnes fremføring af forholdsvis store ventilationskanaler til samtlige rum og disse skal kunne udføres med særlig hensyntagen til den eksisterende bygnings kvaliteter.

I kælderen indrettes teknik til vandbehandling, ventilationsanlæg og forsyningsanlæg for el, vand og varme og disses arealbehov er betydende.

Vandkvaliteten i de forskellige bassiner har stor betydning for centerets klientel og drift og skal som minimum opfylde nugældende normer og bestemmelser .

Vandbehandlingsanlæg kan kræve udlignings- og opsamlingstanke samt doseringsrum.

APPENDIX B

Calculations: Excel

SPACE	AREA	WET AREA	VOLUME	PERSONS	CONCURRENCY	ACTIVITY	CLOTHES	TEMP. AIR	TEMP. BATH	HUM AIR	VAP.	SAT. V
	m2	m2	m3		factor	met	clo	C	C	%	g/kg	g/kg
											read from ix diagram	
Reception	15		45	7	0,5	1,6	1	20-24		55		
Store	15		45	15	0,5	1,6	0,5	20-24		55		
St. depo	20		60	2	1	1,6	0,5	20-24		50		
Office	20		60	2	1	1	1	20-24		55		
Off. Depo	20		60	1	1	1	1	18-26		55		
Serv + copy	10		30	1	1	1	0,5	18-26		50		
WC p.	4		10	1	1	1	0,5	18-26		55		
Room p.	20		60	10	1	1,6	0,5	20-24		50		
Locker room	100	50	300	75	0,5	1,6	0,04	20-26	37	65	13,5	
Salt Water	150	75	412,5	30	0,5	1	0,04	28-30	28	65	17	
Salt inhal.	9		22,5	8	1	0,8	0,04	26-42		65		
Foot bath	9	9	22,5	5	1	0,8	0,04	26-28	30	65	13	
Indoor spa	12	10	55	10	1	0,8	0,04	26-30	40	80	18,5	
Cafe /lecture	70		210	50	0,5	1,6	0,5	20-24		55		
Kitchen	30		90	3	1	2,6	0,5	18-26		55		
Cafe depo	20		60	1	1	1,6	0,5	18-26		55		
Gym	100		400	25	1	3		18-22		55		
Relax	50		150	15	1	0,8		24-30		55		
Sungarden	50		125	10	1	0,8		26-30		50		
Clean clo	20		60	1	1	1,6	0,5	18-26		50		
Dirty clo	20		60	1	1	1,6	0,5	18-26		55		
Alga mudd	40	25	75	4	0,5	0,8	0,04	26-30	40	70	16	
Well room	60		180	2	0,5	1	0,5	26-28		55		
Sauna	16		40	8	1	0,8	0,04	90-95		12%		
Steam	24		60	8	1	0,8	0,04	44-46	100	98	??	??
Solarium	26		48	1	1	0,8	0,04	26-30		50		
Cold bath	10		40	3	1	1	0,04	18-22	8	55	8,3	
Well depo	20		60	1	1	1	0,5	18-26		50		
Salt basins	80	60	330	10	0,5	0,8	0,04	28-32	30	70	18	
Treat room	66		165	2	1	1	0,5	20-24		55		
Clinic	15		45	2	1	1,2	0,5	20-24		50		
Secretary	20		60	2	1	1,2	0,5	20-24		50		
WC	4		10	1	1	1	0,5	18-26		55		
Handicap WC	4		10	1	1	1	0,5	18-26		55		
Care taker	20		60	1	1	2	0,5	20-24		55		
Treat waste	20		60	1	1	2	0,5	18-26		55		
Cleaning	12		36	1	1	2	0,5	18-26		55		
Laundry	9		27	1	1	2	0,5	18-26		50		
Technic	9		27	1	1	2	0,5	18-26		50		
Garbage	15		45	1	1	2	0,5	18-26		55		
Vent syst.	128		640	1	1	2	0,5	18-26		50		
Water clean.	80		400	1	1	2	0,5	18-26		60		

Δx ACCEPT/	AIRCHAN. E	AIRCHAN. CO2	RESULT. /	VOL CURRENT	CONVERSION		n , PRESCRIBED /M2		PERS. HEAT
g/kg	h^{-1}	h^{-1}	h^{-1}	m3/h	l/s		(l/s)/m2		W
ap.)]	[eva./(vol*Δx	/((1010-350)*vol)]	[1000(concur.*17*act*pers)	[resul air chan.* vol]	[vol / 3,6]		[conversion / area]		[act.*pers*100]
			3,2	3,2	144,2	40,1			1120
			6,9	6,9	309,1	85,9			2400
			1,4	1,4	82,4	22,9			320
			0,9	0,9	51,5	14,3			200
			0,4	0,4	25,8	7,2			100
			0,9	0,9	25,8	7,2	North		100
			2,6	2,6	25,8	7,2		2,0	100
			6,9	6,9	412,1	114,5			1600
	8	0,7	5,2	5,2	1545,5	429,3			12000
	8	0,6	0,9	0,9	386,4	107,3			3000
			7,3	7,3	164,8	45,8			640
	8	2,5	4,6	4,6	103,0	28,6	East		400
	8	1,7	3,7	3,7	206,1	57,2		2,8	800
			4,9	4,9	1030,3	286,2			8000
			2,2	2,2	200,9	55,8			780
			0,7	0,7	41,2	11,4			160
			4,8	4,8	1931,8	536,6			7500
			2,1	2,1	309,1	85,9	South		1200
			1,6	1,6	206,1	57,2		1,7	800
			0,7	0,7	41,2	11,4			160
			0,7	0,7	41,2	11,4			160
					0,0	0,0			#REF!
	8	3,4	0,5	3,4	257,8	71,6	Midle		0
			0,1	0,1	25,8	7,2		2,2	320
			4,1	4,1	164,8	45,8			200
			2,7	2,7	164,8	45,8			640
			0,4	0,4	20,6	5,7			640
			1,9	1,9	77,3	21,5			80
			0,4	0,4	25,8	7,2	Basement		300
					0,0	0,0		0,4	100
	8	0,6	0,3	0,6	196,9	54,7			0
			0,3	0,3	51,5	14,3			800
			1,4	1,4	61,8	17,2			200
			1,0	1,0	61,8	17,2			240
			2,6	2,6	25,8	7,2			240
			2,6	2,6	25,8	7,2			100
					0,0	0,0			100
			0,9	0,9	51,5	14,3			0
			0,9	0,9	51,5	14,3			200
			1,4	1,4	51,5	14,3			200
			1,9	1,9	51,5	14,3			200
			1,9	1,9	51,5	14,3			200
			1,1	1,1	51,5	14,3			200
			0,1	0,1	51,5	14,3			200
			0,1	0,1	51,5	14,3			200

APPENDIX C

Energy: Be06

To calculate how much energy a building uses, some input data must be know; the energy used in the building and the energy produced inside the building. The program Be06, is used to optimize the design and to document the energy use of the building. In the process estimated values are used, since no in-depth knowledge of the project engineering is investigated. The u-values, electricity for ventilation, daylight factor and heat loss from pipes are based on knowledge from previous lectures and projects.
[Varmetab fra Installationer]

During the first part of the design process, simple investigations of orientation and window orientation and size, were made.

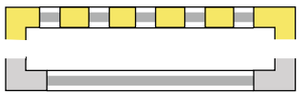
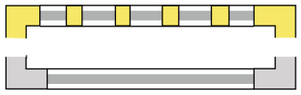
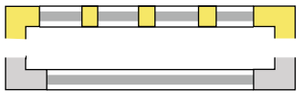
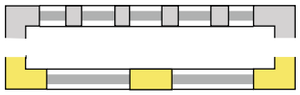
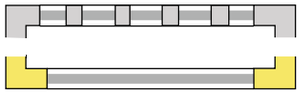
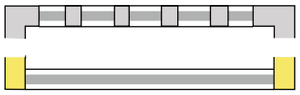
High insulated boxes were placed with different orientations. The

	Orientation	kWh/m2year
	-20 , 160	9
	00 , 180	9
	15 , 195	9
	20 , 200	9
	30 , 210	10
	40 , 220	12

ill. XX. shows the optimal orientation regarding the energy use. The orientation toward south and 20 degrees east and west gives quite good energy levels.

A small investigation of window orientation and size were made, to get an idea of how these aspects would affect the energy use and the daylight factor inside the rooms. A moderate amount of windows to the north and a large amount of window to the south showed good result in the high insulated boxes. Since the design of the bathing resort had less insulated walls the size of the windows had to be smaller to achieve a low energy use of the building.

When realizing the importance of the orientation and the window

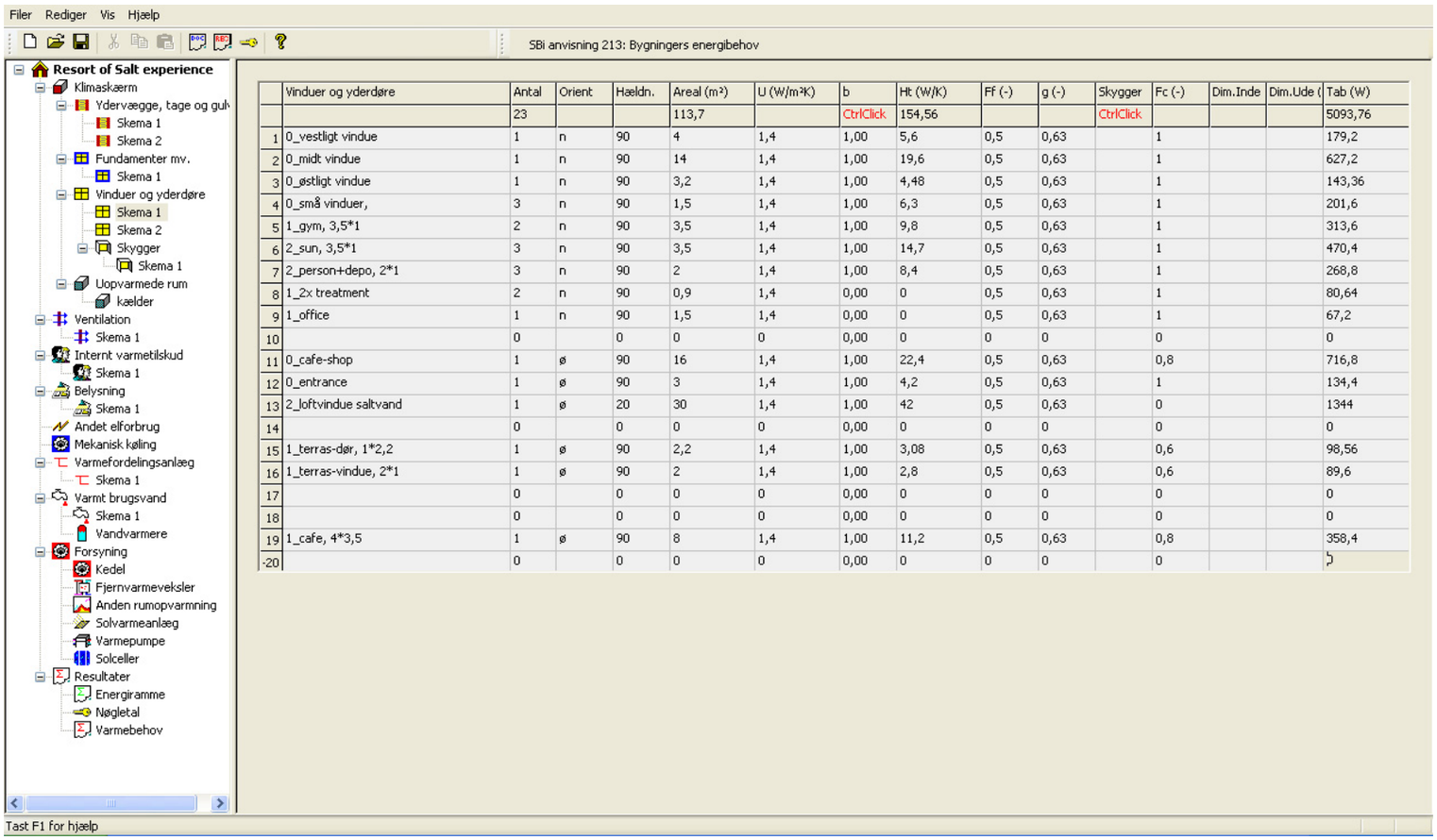
Wlindows north	Daylight Factor	kWh/m2year
	3,4 %	14
	4,1 %	15
	4,7 %	15
Windows south		
	3,2 %	17
	4,1 %	15
	4,9 %	13

size, several calculations were made in Be06 to test the actual design. The first designs had to large window areas toward south and too much heat was lost, compared to the heat gain. The high indoor temperatures were difficult to maintain when designing large window areas.

The data from the resulting architecture was put into the program and the energy use was 100,1 kWh/m2/year. This value is higher than the allowed 95 kWh/m2/year. The calculation was done again, only changing the ventilation rates and the artificial light. Then the energy use dropped to 90,1 kWh, which is better than the allowed 95 kWh.

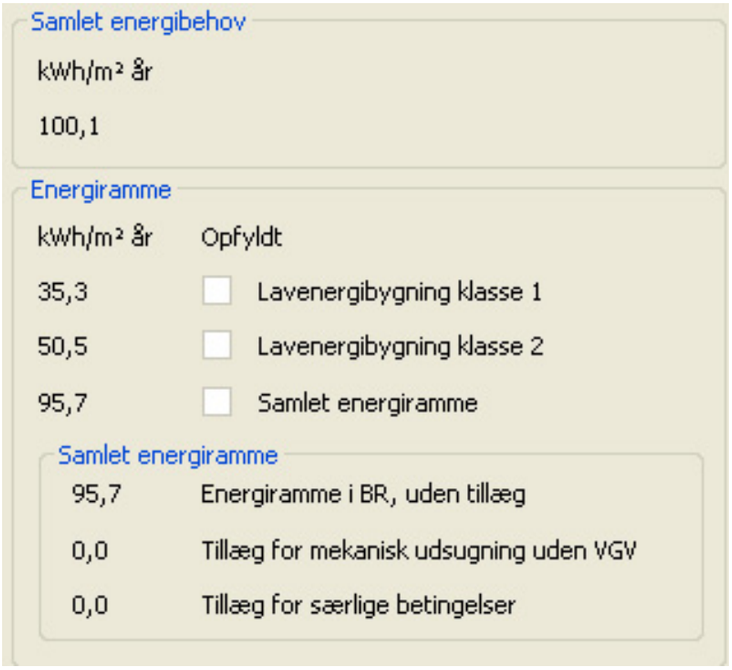
The building is quite compact and has reasonable openings, when considering the function of the building as an important building in the village. A residential house would maybe be easier to design with high compactness, because it has an entirely other function.

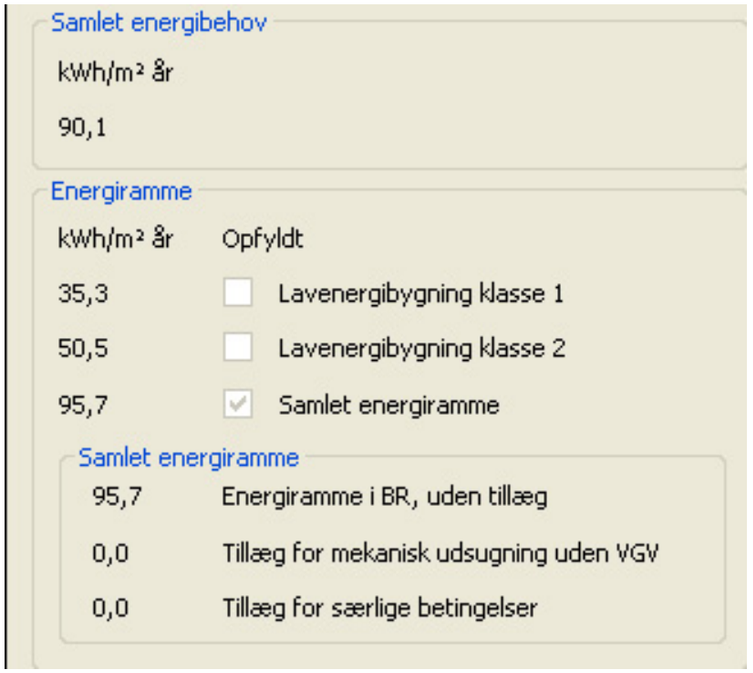
The energy demand can be lowered by implementing solar power cells in the design. If applying 40 sqm solar cells on the skew southern roof, the energy demand will drop to 50,4 kWh, which is just below the standard of low energy class 2 which is 50,5 kWh. The solar cells are not implemented because of aesthetical reasons; the desired expression of the building was difficult to obtain with the solar cells on the roof. This aspect could probably be solved if the focus in the design process was on active energy strategies.



	Vinduer og yderdøre	Antal	Orient	Hældn.	Areal (m²)	U (W/m²K)	b	Ht (W/K)	Ff (-)	g (-)	Skygger	Fc (-)	Dim.Inde	Dim.Ude (	Tab (W)
		23			113,7		CtrlClick	154,56			CtrlClick				5093,76
1	0_vestligt vindue	1	n	90	4	1,4	1,00	5,6	0,5	0,63		1			179,2
2	0_midt vindue	1	n	90	14	1,4	1,00	19,6	0,5	0,63		1			627,2
3	0_østligt vindue	1	n	90	3,2	1,4	1,00	4,48	0,5	0,63		1			143,36
4	0_små vinduer,	3	n	90	1,5	1,4	1,00	6,3	0,5	0,63		1			201,6
5	1_gym, 3,5*1	2	n	90	3,5	1,4	1,00	9,8	0,5	0,63		1			313,6
6	2_sun, 3,5*1	3	n	90	3,5	1,4	1,00	14,7	0,5	0,63		1			470,4
7	2_person+depo, 2*1	3	n	90	2	1,4	1,00	8,4	0,5	0,63		1			268,8
8	1_2x treatment	2	n	90	0,9	1,4	0,00	0	0,5	0,63		1			80,64
9	1_office	1	n	90	1,5	1,4	0,00	0	0,5	0,63		1			67,2
10		0		0	0	0	0,00	0	0	0		0			0
11	0_cafe-shop	1	ø	90	16	1,4	1,00	22,4	0,5	0,63		0,8			716,8
12	0_entrance	1	ø	90	3	1,4	1,00	4,2	0,5	0,63		1			134,4
13	2_loftvindue saltvand	1	ø	20	30	1,4	1,00	42	0,5	0,63		0			1344
14		0		0	0	0	0,00	0	0	0		0			0
15	1_terras-dør, 1*2,2	1	ø	90	2,2	1,4	1,00	3,08	0,5	0,63		0,6			98,56
16	1_terras-vindue, 2*1	1	ø	90	2	1,4	1,00	2,8	0,5	0,63		0,6			89,6
17		0		0	0	0	0,00	0	0	0		0			0
18		0		0	0	0	0,00	0	0	0		0			0
19	1_cafe, 4*3,5	1	ø	90	8	1,4	1,00	11,2	0,5	0,63		0,8			358,4
-20		0		0	0	0	0,00	0	0	0		0			0

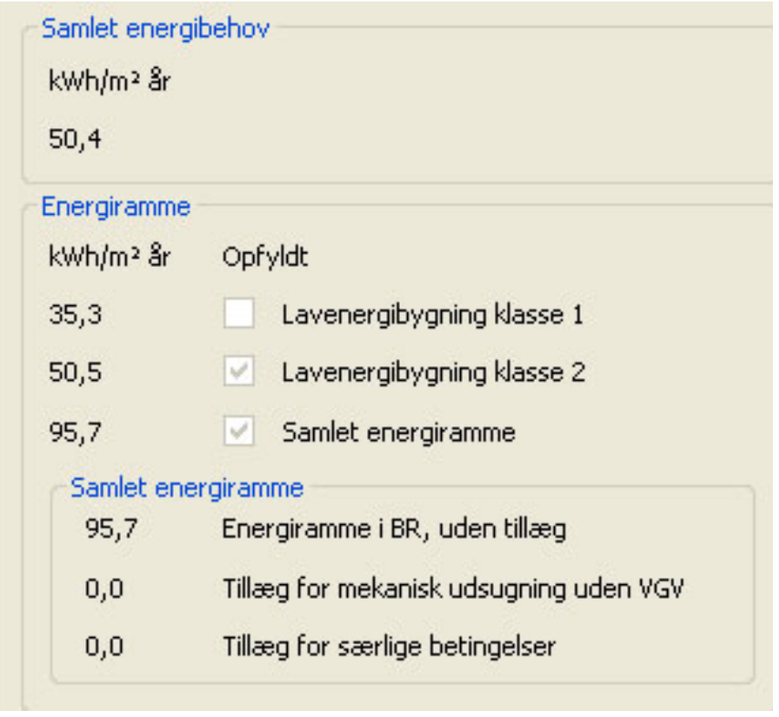
	Ventilation	Areal (m²)	qm (l/s m²)	n vgv (-)	ti (°C)	El-VF	qn (l/s m²)	qi,n (l/s m²)	SEL (kJ/m³)	qm,s (l/s m²)	qn,s (l/s m²)	qm,n (l/s m²)	qn,n (l/s m²)
	Zone	3368	Vinter			0/1	Vinter	Vinter		Sommer	Sommer	Nat	Nat
+1	Nordlig fløj	843	1	0,85	0	0	0	0,3	1,2	1	0	0,3	0
2	østlige fløj	470	2	0,85	0	0	0	0,3	1,2	2	0	0,3	0
3	sydlige fløj	430	1	0,85	0	0	0,3	0,3	1,2	1	0,3	0,3	0
4	midt fløj	525	2	0,85	0	0	0,3	0,3	1,2	2	0,3	0,3	0
5	kælder	1100	0	0,85	0	0	0	0	1,2	0	0	0	0





	Ventilation	Areal (m²)	qm (l/s m²)	n vgv (-)	ti (°C)	El-VF	qn (l/s m²)	qi,n (l/s m²)	SEL (kJ/m³)	qm,s (l/s m²)	qn,s (l/s m²)	qm,n (l/s m²)	qn,n (l/s m²)
	Zone	3368	Vinter			0/1	Vinter	Vinter		Sommer	Sommer	Nat	Nat
+1	Nordlig fløj	843	2	0,85	20	0	0	0,3	1,2	2	2	0,3	0
2	østlige fløj	470	2,8	0,85	20	0	0	0,3	1,2	2,8	2	0,3	0
3	sydlige fløj	430	1,7	0,85	27	0	0,3	0,3	1,2	1,7	4	0,3	0
4	midt fløj	525	2,2	0,85	27	0	0,3	0,3	1,2	2,2	4	0,3	0
5	kælder	1100	0,4	0,85	20	0	0	0	1,2	0,4	0	0	0
6		0	0	0	0	0	0	0	0	0	0	0	0
7		0	0	0	0	0	0	0	0	0	0	0	0
8		0	0	0	0	0	0	0	0	0	0	0	0


Beskrivelse
Nyt solcelle anlæg
Solceller
40
Panel areal, m²
s
Orientering, N, NØ, Ø, ...
25
Hældning, °, 0, 10, 20, 30, ...
0
Horisont afskæring, °
3
Skygge til venstre, °
0
Skygge til højre, °
1,8
Peak Power (RS), kW/m²
0,8
System virkningsgrad (Rp), -


Samlet energibehov
kWh/m² år
50,4
Energiramme
kWh/m² år
Opfyldt
35,3
Lavenergibygning klasse 1
50,5
Lavenergibygning klasse 2
95,7
Samlet energiramme
Samlet energiramme
95,7
Energiramme i BR, uden tillæg
0,0
Tillæg for mekanisk udsugning uden VGV
0,0
Tillæg for særlige betingelser

APPENDIX D

Indoor Climate: PPD

Indoor Climate: PPD

The building contains several different rooms, with different processes. In the central space with salt water, processes of re-circulation, evaporation, co2 pollution and high temperature are quite significant for the indoor climate. Comparing the central space with the treatment rooms, where there is little co2 exhaust, no evaporation and less ventilation is used, the indoor climate is very different.

The PPD calculation is made for a representative group of the spaces in the building. From the ill.XX from the program, it is seen that the locker room has a high PPD; 39,9%, not achieving any standard, mainly because of the high activity level combined with high temperature and humidity. These cannot really be changed, because it is the use of the space, the processes that results in the high PPD. Extra ventilation in this room can be a solution of the problem, but this must be done without causing draught. It can also be read that the alga bath and the salt water has very good PPD; 6,4% and 6,6%, achieving a category B. This is a very satisfying result, since these spaces are the ones for stay. Here the guests stay for a relatively long amount of time, and the indoor climate is very important for the experience of the spaces. The locker rooms are not made for long stay, they are only a transition zone, hereby the result can be acceptable.

Vurdering af Indeklima — *INPUT kræves i de hvide felter!*

Varmebalance, person

Fysiske parametre ifølge ISO 7730

Lufttemperatur	**28,0** C	PPD =	6,4 %	
Middelstrålingstemperatur	28,0 C			
Relativ fugtighed	65 %RH	Fugtigt		
Middel lufthastighed	0,1 m/s	Lav (bolig, kontor)		
Beklædning	0,04 clo	Nøgen		
Aktivitet	1 met	Siddende arbejde		

Vurdering af Indeklima — *INPUT kræves i de hvide felter!*

Varmebalance, person

Fysiske parametre ifølge ISO 7730

Lufttemperatur	**28,0** C	PPD =	7,0 %	
Middelstrålingstemperatur	28,0 C			
Relativ fugtighed	60 %RH	Fugtigt		
Middel lufthastighed	0,1 m/s	Lav (bolig, kontor)		
Beklædning	0,04 clo	Nøgen		
Aktivitet	1 met	Siddende arbejde		

Vurdering af Indeklima

INPUT kræves i de hvide felter!

Varmebalance, person

Fysiske parametre ifølge ISO 7730

Lufttemperatur	**28,0** C	PPD =	39,9 %	
Middelstrålingstemperatur	28,0 C			
Relativ fugtighed	63 %RH	Fugtigt		
Middel lufthastighed	0,1 m/s	Lav (bolig, kontor)		
Beklædning	0,04 clo	Nøgen		
Aktivitet	2 met	Siddende arbejde		

Vurdering af Indeklima

INPUT kræves i de hvide felter!

Varmebalance, person

Fysiske parametre ifølge ISO 7730

Lufttemperatur	**28,0** C	PPD =	6,6 %	
Middelstrålingstemperatur	28,0 C			
Relativ fugtighed	63 %RH	Fugtigt		
Middel lufthastighed	0,1 m/s	Lav (bolig, kontor)		
Beklædning	0,04 clo	Nøgen		
Aktivitet	1 met	Siddende arbejde		

Vurdering af Indeklima

INPUT kræves i de hvide felter!

Varmebalance, person

Fysiske parametre ifølge ISO 7730

Lufttemperatur	**24,0** C	PPD =	9,5 %	
Middelstrålingstemperatur	24,0 C			
Relativ fugtighed	55 %RH	Fugtigt		
Middel lufthastighed	0,1 m/s	Lav (bolig, kontor)		
Beklædning	0,5 clo	Shorts, T-shirt, sandaler		
Aktivitet	1,6 met	Siddende arbejde		

APPENDIX E

Studytrips: Læsø and Haraldslund

To register the site, building and surroundings a study trip is necessary. The sense of the island was captured and interpreted as a quite tourist minded island. The registration of the surroundings consisted of walks mainly along the Vesterø Havnegade and the beach, and from the beach to the actual site. The build bathing house; “Læsø Kur” was studied both on the outside and on the inside. This last registration is not included in the program, since this thesis project has different aims than “Læsø Kur”.

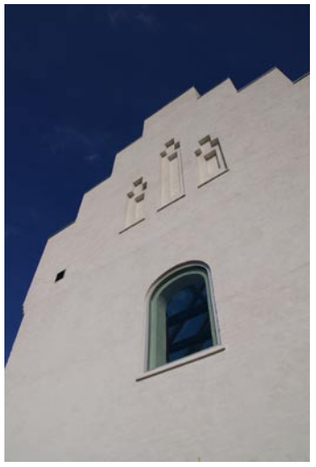








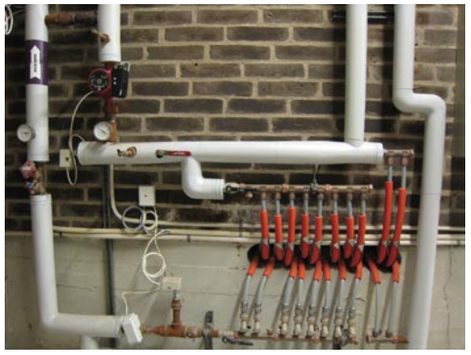


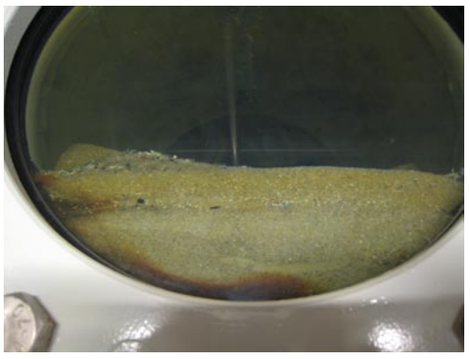



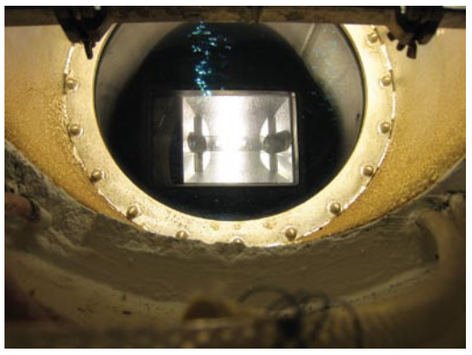
APPENDIX F

Haraldslund

Harldslund

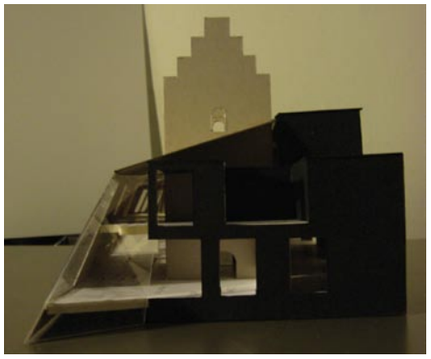
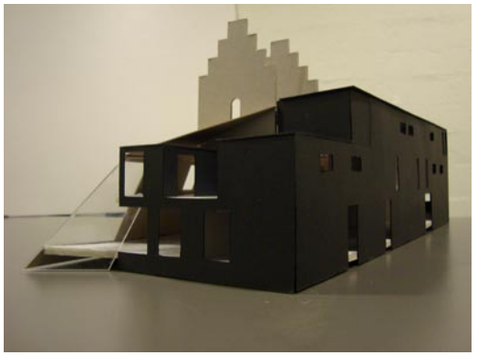
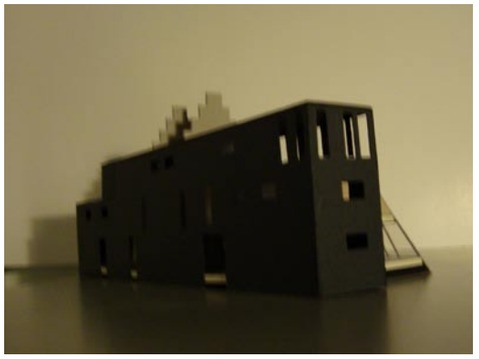
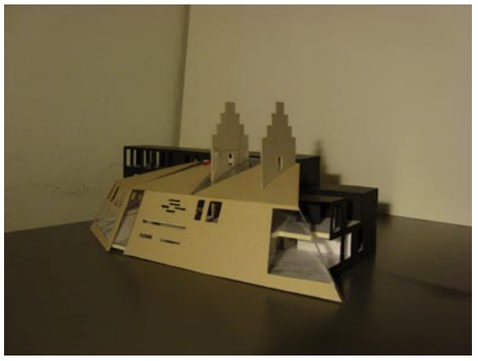


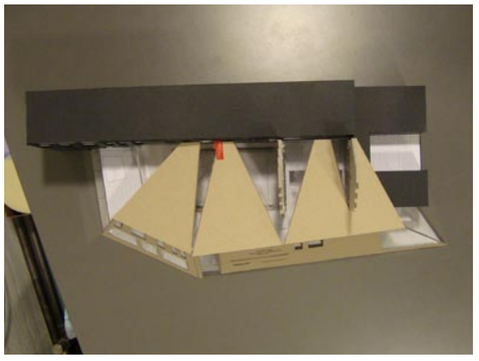


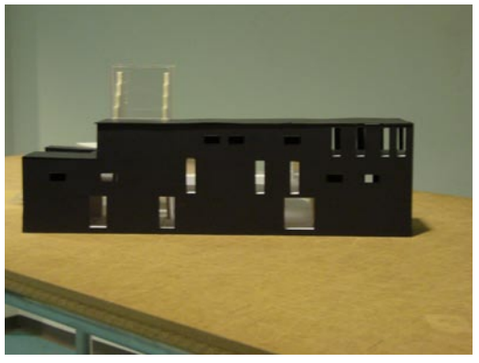
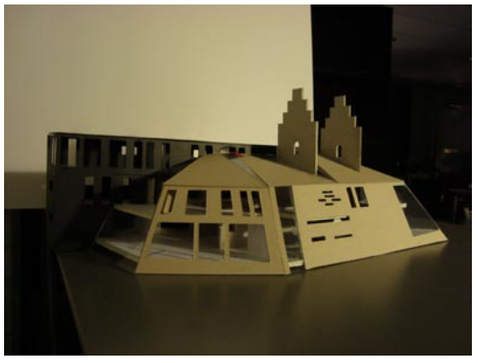


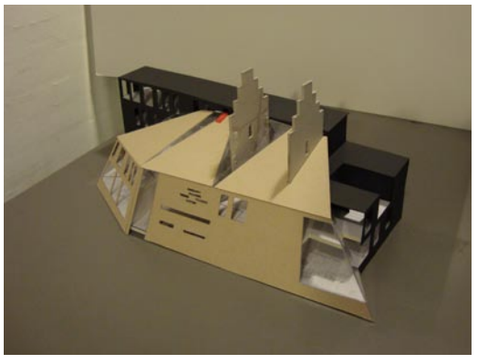
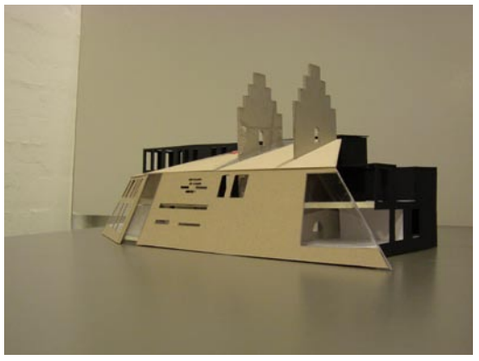
APPENDIX G

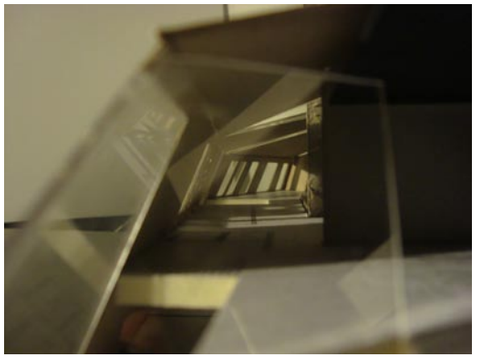
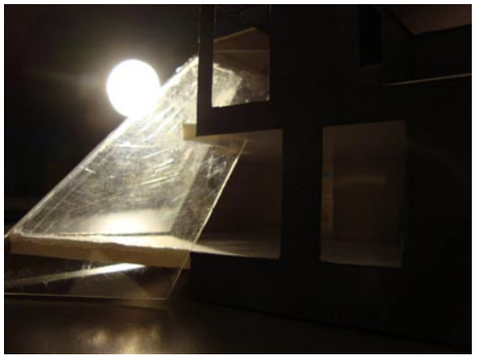
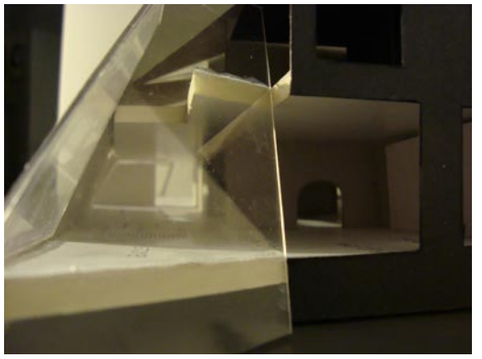
Model photos

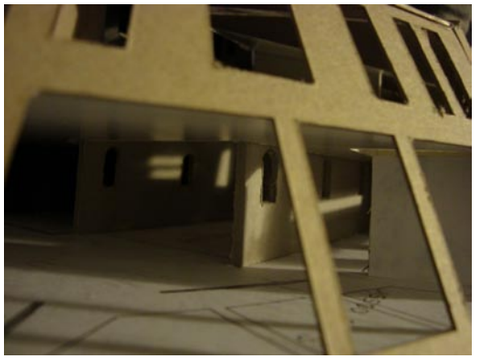
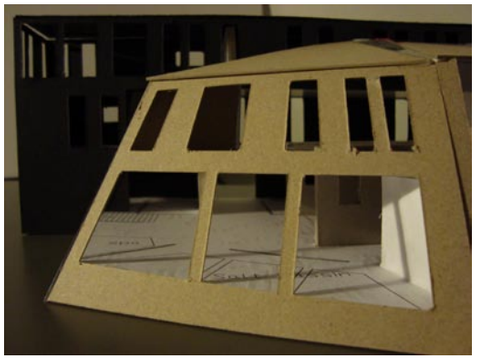
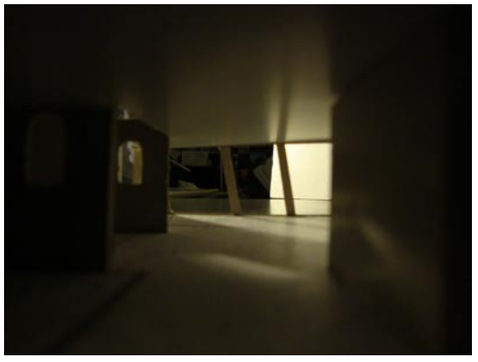
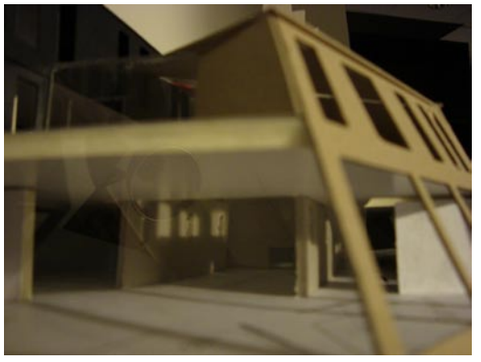





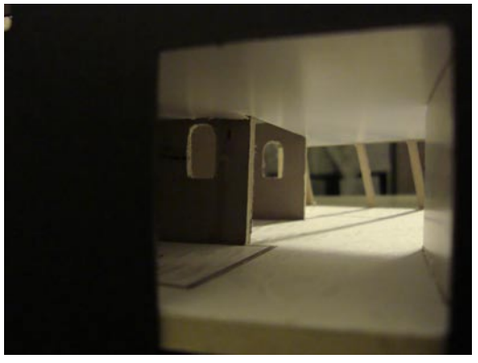


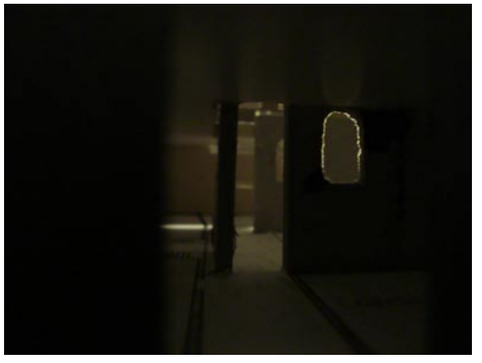



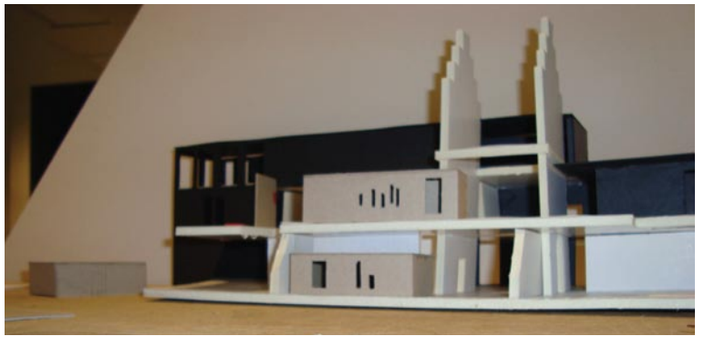



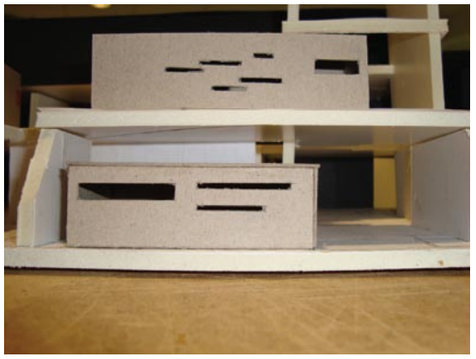




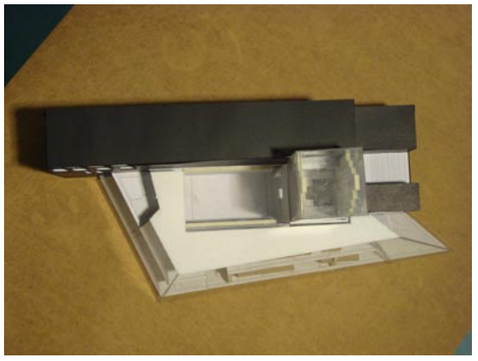





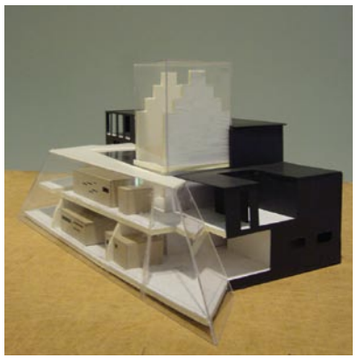


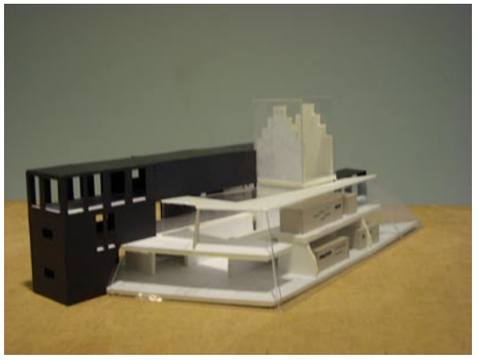


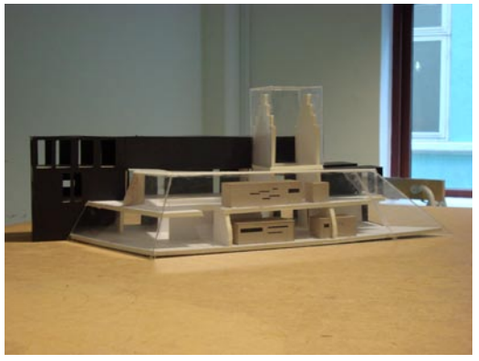


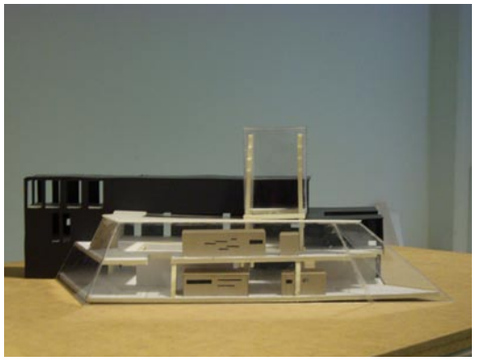


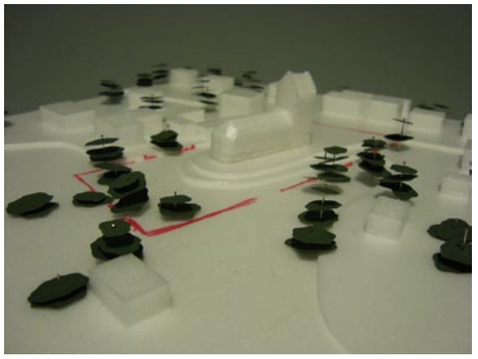
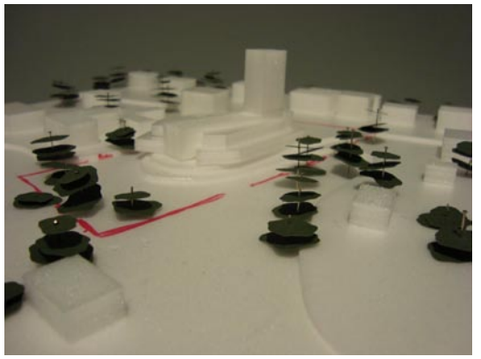
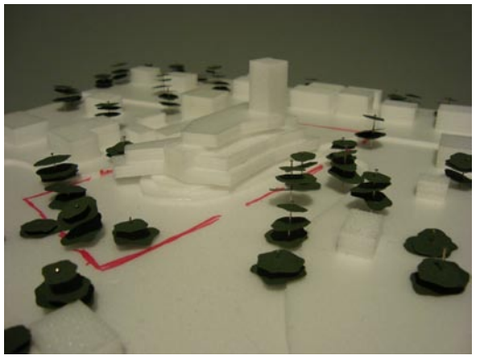
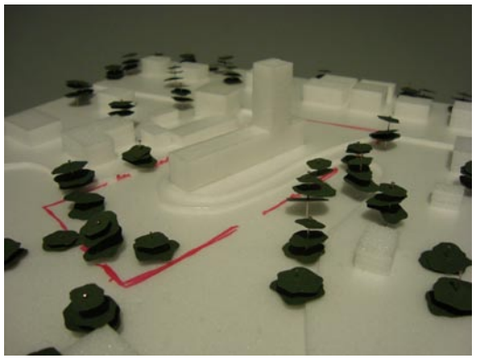
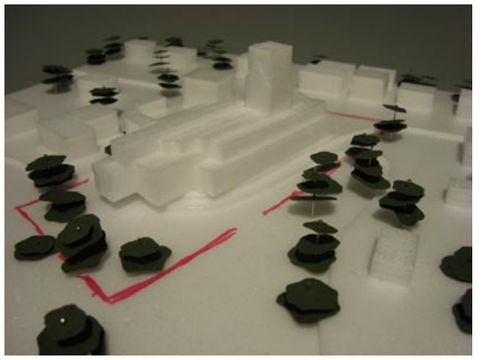
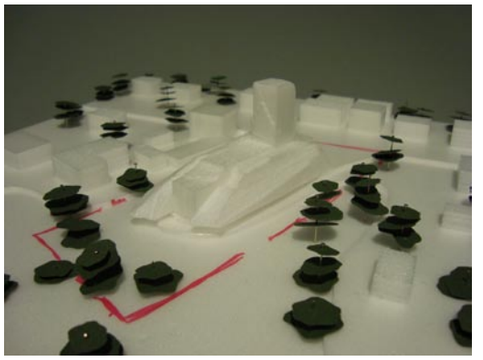
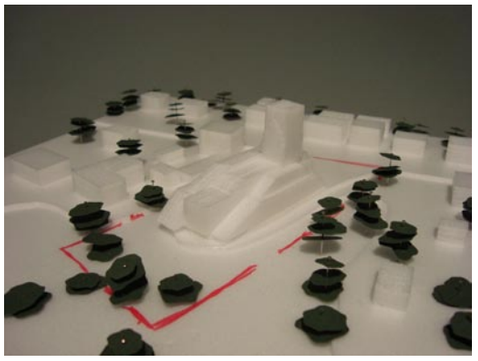
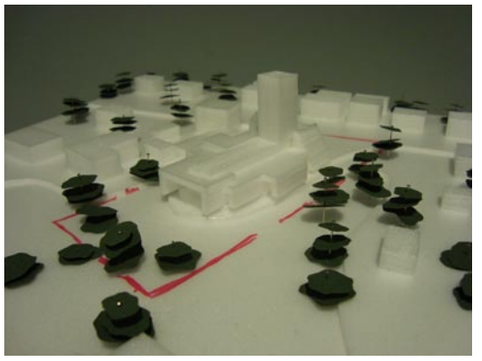












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