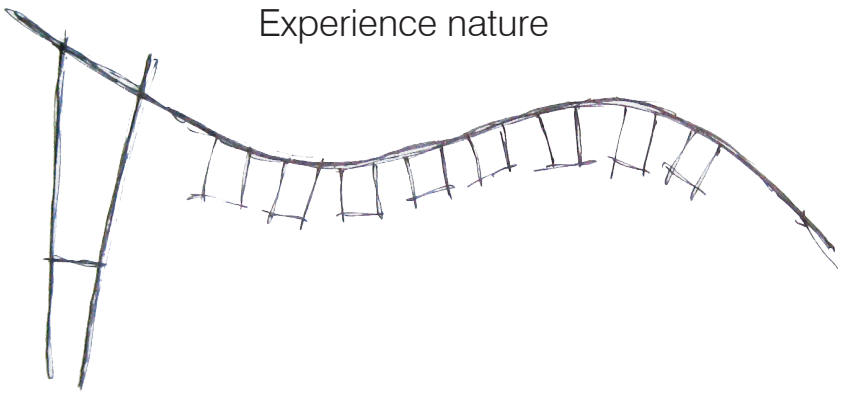
Skagen Seaside Hotel

Experience nature



Abstract
English

This project concerns the design of a new seaside hotel at Grenen in Skagen. The idea originated from a local plan of potential for Skagen from 2014, when the idea to restore an international seaside hotel on Grenen is included. It is also relevant because a large majority in the Danish parliament in August 2014 opened up a pilot project to promote coastal and nature tourism. This allowed up to ten areas in Denmark to obtain dispensation to build houses or other tourist facilities in spite of the coastal protection and coastal zone.
The former seaside hotel was unique for its time and a trademark of Skagen. A luxurious place with a unique location, which revitalized the mind and body. With the construction of a new seaside hotel on Grenen, I have wanted to build it in a contemporary architectural design and not imitate the former seaside hotel that belonged to a completely different time and style. Today's tourists are not looking for luxury in the traditional sense, but want to get unique experiences in an authentic environment.
With respect for nature and in light of the increasing energy demands of modern architecture, it has been a key area of focus to create a building with a low energy demand and a good indoor climate. During the design process, I have been focused on optimizing the buildings' energy need to the extent that the view to the north and the large north-facing glass panels allow.

In the design process, I found inspiration from the unique dune landscape that has been created and shaped by the forces of nature for thousands of years. The contrast between the soft, dynamic dunes and the solid and static concrete bunkers from the war has also been a major source of inspiration. My design parameters have been found through a methodical approach with the use of drifting and mapping. From this, I have designed a hotel with its own modern expression that offers a relaxing sanctuary for the guests and with a close interaction with nature. At the same time, it has been important to create an optimal design for the daily operation and with a natural flow between functions and levels in the main building.

The building design frames nature as an essential element in the experience of being at the seaside hotel. This is meant to encourage the guests to go out and interact with nature, feel the strong west wind and see the foam sprayed, when the two seas meet at the top of Denmark.

Synopsis
Dansk

Dette projekt tager udgangspunkt i at skabe et design for et nyt badehotel på Grenen i Skagen. Idéen er udsprunget fra en lokal potentialeplan for Skagen fra 2014, hvor idéen om at genopføre et internationalt badehotel på Grenen indgår. Det er også relevant, fordi et bredt flertal i Folketinget i august 2014 åbnede op for en forsøgsordning til fremme af kyst- og naturturismen. Derigennem kunne op til ti områder i Danmark få dispensation til at bygge boliger eller andre turistfaciliteter på trods af strandbeskyttelseslinjen og kystnærhedszonen.

Det tidligere badehotel var unikt for dens tid og et varemærke for Skagen. Et luksuriøst sted med en unik placering, der gav helse for krop og sind. Med opførelsen af et nyt badehotel på Grenen, har jeg ønsket at opføre det i stil med dens samtid og ikke efterligne det tidligere badehotel, der tilhørte en helt anden tid og byggestil. I dag søger turister ikke luksus i den traditionelle forstand, men ønsker at få unikke oplevelser i et autentisk miljø.

Med respekt for naturen og set i lyset af de stigende energikrav til moderne arkitektur, har det været et centralt fokusområde at skabe en bygning med et lavt energibehov og et godt indeklima. Der har i designprocessen været fokus på at optimere hotellets bygninger energimæssigt i en udstrækning, som udsigten mod nord og de store nordvendte glaspartier tillader.

Jeg har i designprocessen ladet mig inspirere at det unikke klitlandskab, der er blevet skabt og formet af naturens kræfter i tusindvis af år. Kontrasten mellem de bløde bakker og de solide betonbunkere fra krigen har også været en væsentlig inspirationskilde. Mine design parametre er fundet via en metodisk tilgang med brug af drifting og mapping. Jeg har med designet ønsket at skabe et hotel med sit eget, moderne udtryk, der skaber ro og helse for gæsterne i samspil med naturen. Samtidig har der været fokus på at skabe en driftssikker bygning med et flow gennem husets funktioner og niveauer. Bygningsdesignet skal i scenesætte naturen, som det vigtigste element ved oplevelsen af at være på hotellet og skal give gæsten lyst til at gå ud og interagere med naturen, blive blæst igennem af vestenvinden og se skumsprøjtet, når de to have mødes på toppen af Danmark.

Title page

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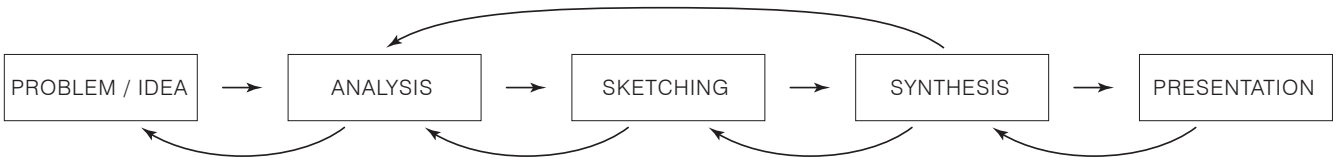
Contents

METHODOLOGY

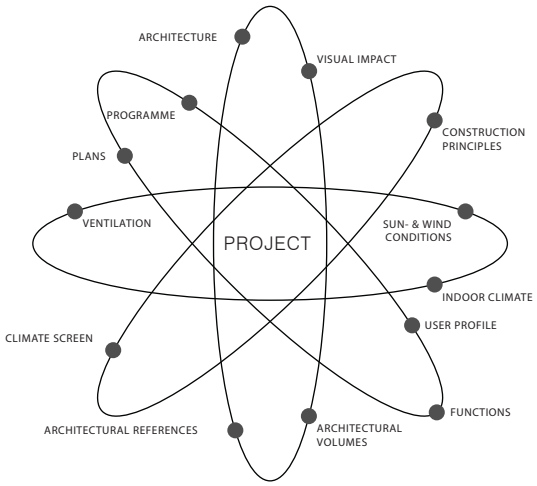


To ensure that the engineering and architectural knowledge is applied in the design process to solve and control the complex problem that can occur between all the different parameters, that are involved in modern building culture, there had to be a working method. Therefore the working method of Integrated Design Process (IDP) will be used as defined by Mary-Ann Knudstrup,

This working method IDP deal with the design process by dividing it into five block there doing the project development will ensure a intertwine and interrelating between them. They are: problem, analysis, sketching, synthesis, presentation.

This method will also enable the designer to have a better control when creating holistic, sustainable architecture (the holistic sustainable architecture approach will be described later), because methods ensure that the different parameters will be considered and integrated in the project during the process. The IDP is an iterative process that allows to overlap between the five phases that doing the design process makes it possible to integrate new discoveries and decisions in parallels processes.

The main goal for this working method is to ensure that the control of all the parameters will provide the design process with increased results of the design, functionality, technical, and aesthetic solutions. This together in relation to a critical, analytical and theoretical approach should end up to form a synthesis with integrated values of the functional, technical and aesthetical aspects.



In my perception of how to form a design for my project, case studies will be used by analyzing architectural work form other architects to see how they have done and in that way be able to exploit and developed design solutions that can be integrated into my own design as Simon Unwin describe it; " Architecture is an adventure that is best explored through the challenge of doing it. But as in any creative discipline, the adventure of architecture can be informed by looking at what others have done and, through analyzing their work, trying to understand the ways they have met the challenges." (Simon Unwin, 2003 p.15)

To be able to asses relevant knowledge that can be used to support the design proposals in a more direct way, there is used an approach to analyzing the architecture as Steven Holl has described as; "To understand interplay between experiential phenomena and intention, we dissect the whole and analyze our partial perceptions. In the following study, projects are shown not as totalities, but as fragments, organized thematically according to distinct phenomena. As in direct perceptual experience, architecture is initially understood as a series of partial experiences, rather than a totality". (Holl, Steven, 2008 p.42)

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SUSTAINABLE APPROACH

The existing building mass and new constructions have an impact on the global climate in a way where it needs to be decreased. It can be done by involving scientific knowledge on climate and energy in the design process in a way that will supply the architectural design with a new quality.

In the year 2020 Denmark's emissions of greenhouse gases should be reduced by 40 percent. The building mass has an impact on a very large proportion of Denmark's total energy consumption, which are something that will affect the way we design our buildings in the future.

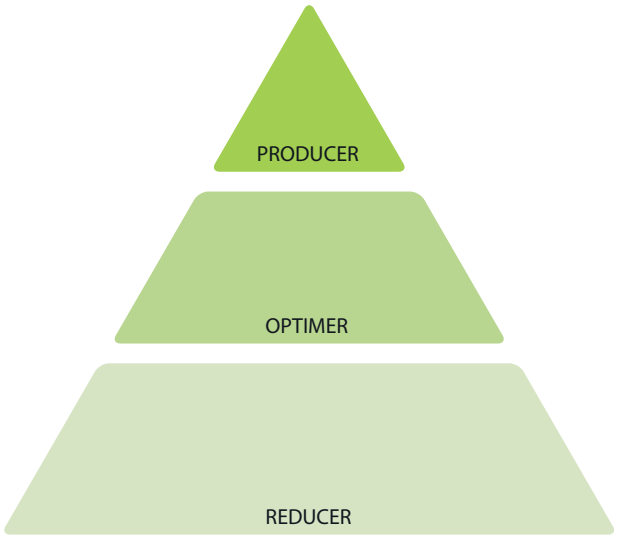
To meet the importance of reducing the energy demands and ensure a healthy environment for the coming generations, the objective of this project will be to create a building where aesthetics and energy efficient architectural design comes together in a perfect way.

About 40 to 50 percent of a building energy consumption is locked into the design, so it is important that the architectural ideas are designed to achieve results that could potentially help to save energy and meet the energy requirements. Already from the beginning there will have to be integrated sustainable solutions as a part of the design to improve the energy demands for the design as best possible.

This will be achieved through the facade design where the architectural treatment can store great energy and provide potentials by controlling daylight and the sun's effect on the building's indoor environment. Further more there will be used ventilation, cooling and heating abilities to minimize the need for technical solutions in the construction.

This means that the project will deal with a holistic approach, where environmental, social and economic aspects meet each other. (Larsen, Henning (2012) P.5-10)

To achieve a comfortable and energy efficient building design in between interaction of architecture and technology there will be used inspiration from DGNB principles that are adapted to Danish legislation and building traditions.



The sustainable pyramid divides building design into three stages.

1. REDUCE - through a good design
2. OPTIMIZE - through technical solutions
3. PRODUCE trough integrating renewable energies.

The goal of the method is to remove the energy demand.

To implement the use of sustainable principles early in the stage of design I use the following working method.

The reduce principle concentrates on how to reduce energy demand in a building design with passive strategies as: light, space and form. This strategy is cheap to integrate early in the process and will be effective for energy reduction in the building's entire life span.

The optimize principle reduce the energy demand through the technical systems of the building, such as: ventilation system with a heat recovery unit or that is cheaper in energy operating cost and reduce the carbon emission.

The producer principle is concentrated on the integrations of renewable energy production such as: hydro, wind, solar, geothermal, tide and wave energy. They will account positive in the energy demand, but this system is quite expensive at the time, have a short live time and do not improve the quality of comfort for the building.

ENERGY

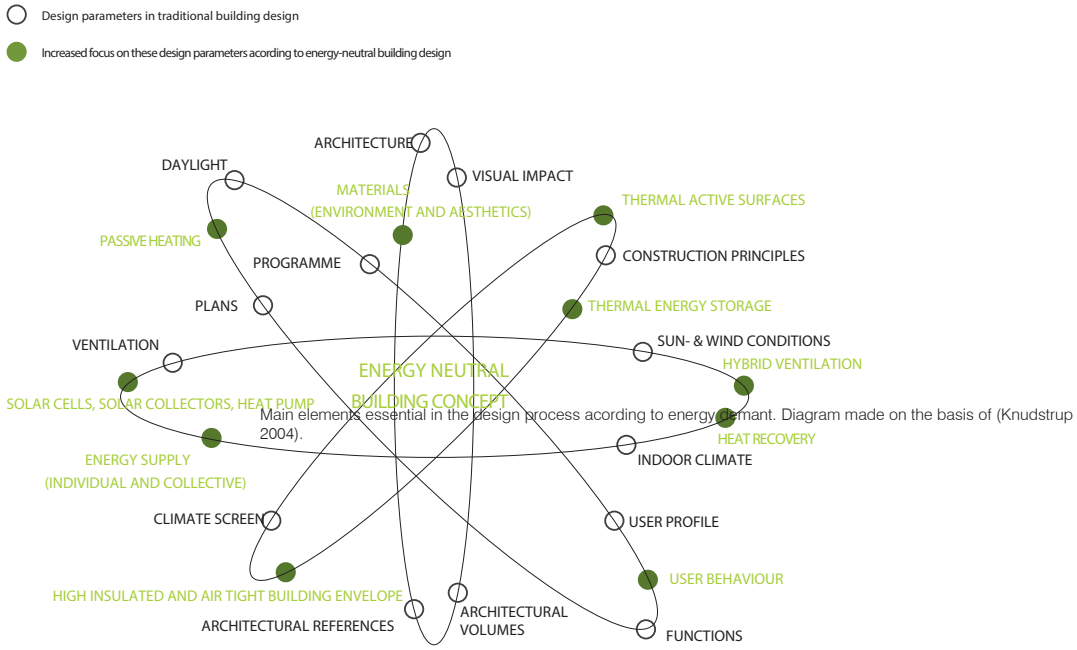
Today's rapid climate changes put focus on the reduction of CO2 emissions and by this promoting sustainable and energy efficient designs. The Danish government has made a politic strategy with a target of Denmark being a fossil independent society in 2050 that instead uses renewable energy sources. This strategy becomes an important factor for the content of the Danish 2020 energy standard, as the building energy demand plays a significant role in ensuring the transition to fossil independent society with renewable energy sources. Klima-,Energi-,og bygningsministeriet (2015)

To reduce energy demands in 2020 standards it is difficult to achieve more by insulation on the building envelope, instead the control of user behaviour and reducing on device energy demand will become important issues for reducing the energy demands. (Bejder, A. 2014)

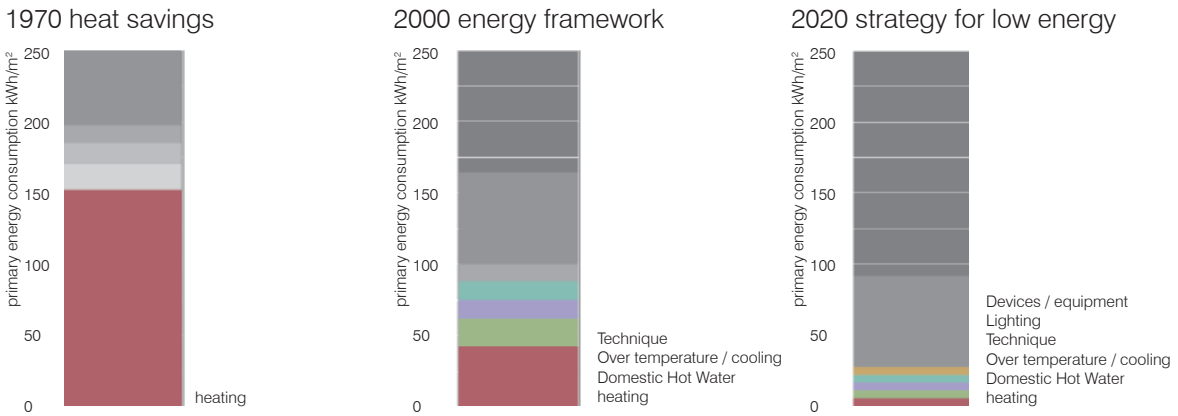
To make it work in practice it becomes important from the beginning of the design process to integrate engineering and architectural aspect on energy strategies and technologies not to impair the buildings performance or architectural qualities. This will for the design process acording to energy demand include increased focus on the design parameter that ensures the energy efficient solutions in the building design as shown on the illustration of energy neutral Buildings concept (Bejder, A. 2014). The illustration there is a modification of Knudstrup integrated design diagram (Knudstrup, M. 2004) should not be seen as the energy efficient parameters become more important than the others in the aspect of manage a project but just as highlighted parameters according to energy demand. To divide the degree of importance for this energy neutral parameters the pyramid method shown in the illustration before will be used.

Here it's important to remember that it's not only the efficient energy demands that are important to integrate in a building to make it sustainable. There also have to be thought on how to supply its users with good conditions such as; good daylight, spatial experiences, functionalities, comfortable indoor climate in the form of light, air, temperature and good acoustics, that by parallel workflows ensure a holistic approach where architecture, comfort indoor climate and energy is incorporated. (Bejder, A …2014)

In order to fulfill BR10 demands on an energy frame for a hotel the Danish energy 2020 standard for hotels must not exceed 20 kWh / m^2 per year for heating, cooling, ventilation and hot water. *(Anvisning SBI-230)*



Main elements essential in the design process acording to energy demant. Diagram made on the basis of (Knudstrup 2004).



ILL//-- Energy stradegy changes from 1970 to 2020 goals by Marsh, R. (2011),

Motivation

I have always been fascinating by the creation of physical objects and how the experience of its presence has mental influence on our human mind. My background as a carpenter in combination with my completion of my engineering and architect education at Architecture and Design at AAU has let me be involved in the multidisciplinary field of architecture and design. Two main focuses at the education programme for me was in studying sustainability and tectonic which gave the basis for the various projects. The two main fields of sustainability and tectonic have different approaches to involve the design solutions, but are affecting each other and should not be seen as individual aspects but in a holistic approach to improve each others needs and demands. Where in a tectonic point of view the material, structure and detail of a building becomes a fundamental condition of making architecture, with its possibility of providing authentic meaning in what we see, touch and smell by interaction with architecture. Sustainability becomes an important part to fulfill the demands that is needed to ensure a sensible development in the field of environmental, social and economic approach to architecture. To work in the median between sustainability and tectonic with a holistic approach is how I see the significance of being an engineering architect.

In the origin of architecture a building was a simple shelter for protection from tough weather and enemies, the kitchen facility was a simple fireplace, bath and toilet facility was done in the environment of nature and it had a sustainable approach by using renewable materials that was recycled by nature again without extra carbon emissions.

Today the way of creating renewable architecture has become a complex process with many factors that need to be managed with well integrated strategies to handle the many parameters of creating architecture that is sustainable and with a holistic strategy.

I therefore see the holistic focus on how architecture, comfort, indoor climate and energy become important elements to keep our buildings design healthy places to live according to the fact that we in average spend more than 90 percent of the daily hours in them, (*Klima-, Energi- og Bygningsministeriet 2014)*. They have a great influence on our everyday life quality and use of recourses. This interest of a holistic approach is an important part that will be a general basis for my project of making a seaside hotel, which you will be introduced to in the introduction on the next page.

Introduction

Recreational places and wellness activities where you tend to your physical and mental health have become popular getaways in a hectic everyday live. Today's society demands more of the individual and our work and home life interfere with one another. This lifestyle has increased the need to visit places that allows you to relax and connect to the present moment and your surroundings in a natural enviromment. In this perspective I have decided to concentrate my master theses on a design for a new seaside hotel at Skagens Odde, which is part of a new plan of potential for Skagen presented by the municipality of Frederikshavn.

Grenen

Potential plan for Skagen

The government has presented a progress plan for Danish tourism which includes 23 points that will help to attract more international tourists to Denmark in the future. Some of the subjects referred to on how coastal and nature tourism should be developed are:

- Development of Danish coastal tourism on the West Coast and around the Baltic Sea
- Nature must be used more actively as part of the tourism product, including the new national parks
- Development of cycling tourism of international class
- Tourists' satisfaction with food experiences is to be increased

Minister for Housing, Urban and Rural Affairs has, in a new progress plan for Danish tourism made upon a report by the Research Centre for Coastal Tourism in 2013, stated, that coastal tourism must have a quality boost wherefore there has been selected 20 holiday destinations that require a quality boost and help to make it more attractive for tourists to visiting.

Ambitions for SKAGEN as an international coastal holiday town

As the area of Skagen is the second most visited tourist place in Denmark next to Copenhagen, tourism has a great impact on the recently presented plan of potential that was made in cooperation between the local citizens, associations and professional actors as a tool for developing tourism in Skagen. Its primary purpose is to attract more international guest all year round, who can contribute to the further development of Skagen. The different development ideas in the potential plan are valued on four core targets and they are: Physics, Narration, Intelligence and Business.
One of the main ideas that were suggested was the development of a new seaside resort at Grenen as a high quality tourist destination that will enhance Skagen as a brand and by that increase the overall tourism in the area of Skagen. In the plan of potential they have named some ambitious characteristics for the project of creating a seaside resort at Grenen, which should be able to provide:

- An offer of accommodation in unique surroundings
- World class architecture and interior
- Pampering in terms of wellness and gourmet dining
- Facilities such as spas, health and beauty treatments
- Narratives and traditions associated with Skagen as targets for recreation with a specific appeal to attract international tourists.
- A place that attracts audience with a quality conscious
- A place that creates strong bonds of loyalty from the tourists of Skagen
- A place where the expected number of international cruise guests may be attracted to a return visit (Plan of potential 2014)

This ambitious proposal has been valued in a report by a professional advisor who has made an economic preliminary study of Grenen seaside hotel to see if the project is economically profitable and if the above characteristics for the project have relevance for Skagen or need to be modified. They found the creation of a high quality bath hotel economically profitable if it is placed close to where the old bath hotel at Grenen was placed in the beginning of the 1900. The bath hotel should be able to offer a high level of service and have a strong attachment to the place with focus on nature, culture and history in relation to Skagen. There should be a gourmet restaurant that will give support to the bath hotel's popularity. In comparison with other international seaside resorts they have valued, that a wellness facility not will have a positive effect on the economy, but as the bath hotel is placed close to nature and the beach it seems logical and necessary with certain elements of wellness and health. The report also emphasizes that it is important that the seaside hotel in every aspect contains authenticity and have a strong profile. The place also demands a sustainable building design where it can be considered to use wood as the main build material in a modern reinterpretation of the old seaside hotel. If the idea of a seaside hotel succeeds, it will give Skagen a boost that will bring benefit for tourists, the local population and other hotels in Skagen. It will require 80 to 100 rooms to guarantee an efficient operation of the seaside hotel and they estimate a gross area of 10 000 m2 for a hotel. This will need a lot of dispensation in this area and therefore a building with multiple floors would be preferable Thomsen, H. (2014).

The information from the plan of potential and the advisory rapport will be used to create a realistic proposal for a programme and as a design parameter for the seaside hotel. An interview with Lene Kappelborg, managing director at Turisthus Nord is used to get a valued confirmation on the information that has been collected from a person who has many years of local experience with Skagen.

The atmosphere and importance of Skagen Seaside Hotel anno 1912
To get an understanding of the history of the site as well as its possibilities, I will bear in mind this excellent description of the former seaside resort, which was located at Grenen in the same environment that exists today. It can provide information about the use of the hotel and the atmosphere, which gives inspiration and background knowledge for the design of the new seaside resort anno 2015.

"There is hardly a hotel worldwide that has such a peculiar location. Looking at it from a distance, you would think that it has come sailing as a Noah's Ark and was washed up on the sandy beach." So says the hotel's own pamphlet "Skagen Seaside hotel at Grenen - Denmark's Health Source" from 1912.
In the years from 1897 to the Second World War Skagen Seaside hotel at Grenen was Denmark's finest and created great attention, with its unique location, and attracted visits from both home and abroad.
The impressive building was built in 1897-98 and designed by Thorvald Jørgensen. The hotel was built in a Norwegian log style and inspired by the Norwegian stave churches. The seaside hotel was the most luxurious and exclusive of the era. The hotel had 100 rooms, a dance salon, reading rooms, libraries, a billiard parlor and bowling alley. Moreover, you would find tennis and badminton courts. Due to the success of the hotel, it was expanded to have more than 200 beds in the 1914.

A typical day description of life at the seaside resort:
"You jump out of bed, go to the window and turn it up! The air from the sea flows into the room so morning fresh and salt, that you probably can feel it on the tongue, when you lick your lips."
The appetite arises immediately, sounds the promise, and the guests could look forward to a breakfast of coffee, tea, chocolate and milk with butter and bread and little pastries. Afterwards it was time for a refreshing sea and air bath on the beach. At "12 1/4" it was time for lunch, a delicious cold table with a hot meal followed by coffee on the porch, from where one could enjoy the view of the sea and the 300 ships, which daily rounded the tip of Grenen. Then it was time for siesta in a warm sand pot and then five o'clock tea with all kinds of cakes. At "6 1/2" there was dinner with three dishes of heavy-prepared food, dessert and coffee on the porch or out in the open.
In the evening there was dancing twice a week. There was also a game hall with billiards and chess as well as a tennis court, bowling and a place designated for gymnastics, stone cutting, fencing and heavy and lightweight exercises. Then of course, there were excursions with the possibility of a trip to Kandestederne or you could rent a sailboat.
In 1914 the hotel was extended and with its more than 200 beds was thus one of the largest. It also had its own airport - Skagen Airport, so guests had the chance to land with their own private planes.
In 1938, lightning struck down in the hotel's east wing and shortly after the occupation made Germans move into the fine old seaside hotel and it did not survive another fire and the war.

Today it is only a dream that the seaside resort will be constructed in exactly the same place. A dream that is still alive among many of those, who remember the impressive sight of the hotel in the magnificent dunes of Denmark's outermost tip. Skagen. (1912)

Tourism in Skagen today

In many ways Skagen is the history of Danish coastal tourism. The city and the area have fascinated generations, when they have made the trip to the top of Denmark. The guests in Skagen experience Danish culture up close and the city contains every day life and holiday life in a beautiful combination. The city and the area's natural environment with beaches, harbor, landscape, the built heritage and the unique light has throughout all time fascinated tourists.

Holiday tourism incl. day visitors constitute the majority of sales in Skagen. Tourism is an important source of income and creates jobs in Skagen, which is an important target for Skagen in the coming years. At the hotels in Skagen today the guests are mainly Danish, Norwegian and Swedish, but there are beginning to be more international guests and Skagen expects an increase in cruise guests visiting Skagen in the future due to an enlargement of the harbour facilities.

The vision for the future of Skagen:

"Skagen - no matter the weather always worth a trip: In Skagen we will attract international customers with spending power. Through a common focus on internationalization and quality development in everything we do, we will make it attractive to do business and be part of the tourism industry in Skagen all year round. Welcome to the tourists Skagen - an attractive, international seaside town - all year. " (collective vision developed at Vision Workshop (potential level))

Visitors from Norway, Sweden, Tysland and England

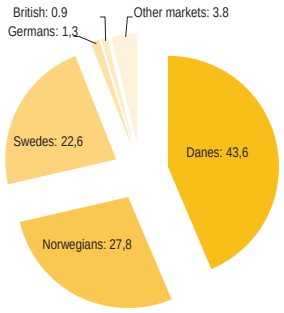


Fig. 1. Guests in hotels with over 40 senge

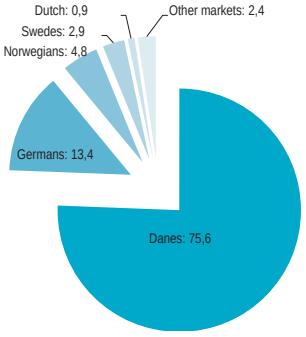


Fig. 2. Guests at the campsites

The general information that is acquired on a national and regional level will be valuated during an interview with Lene Kappelborg, who is director at Turisthus Nord. The interview covers her view on a seaside hotel at Grenen based on her many years of local experience in Skagen, how Skagen works year round and what is important to Skagen. Together with the collected information this will be used as a basis to come up with the best condition and possibilities for a seaside hotel. I have made some bullet point that recaps her key messages from the interview:

Ill. Lene Kappelborg

Interview with Lene Kappelborg Head of Tourism in Skagen Feb. 17th 2015

- In Skagen there are more than one million overnight stays a year.
- Skagen has good conditions for all year tourism.
- Doing the high season in July there are more than 50,000 tourists visiting per day.
- Skagen has a very good butcher, bakery and other shops in high quality and has more than 30 restaurants, which are open all year round.
- Grenen is the main attraction and it has more than 1.5 million visitors a year.
- The main part of the tourists in Skagen are Danish and after that Norwegian, Swedish and German are the most
common.
- There is a focus on attracting tourists who appreciate gastronomy, cultural and natural experiences with a high level of quality to the right price.
- The industry harbor is the largest source of income close accompanied with the tourist area where the harbour has just been extended to benefit both the industry and tourist area.
- An international seaside hotel at Skagen will attract more international tourists, create more jobs and will ensure more overnight stays that again improve the basis for all year tourism.
- If the seaside hotel is to be a succes the geographical location has to be on Grenen, where the possibility of a view of the two seas has an important significance.
- It is of great importance to the seaside hotel that is in close proximity of the city and its' shops and museums in order to create life and opportunities for the hotel guests.
- A unique quality of Skagen is that you can be surrounded by 1000 of people and just by moving 100 meter away from the hectic place you are able to find peaceful surroundings if its needed.
- She has not meet a local "Skawbo" who does not think that it will be a fantastic idea with a seaside resort at Grenen, because it will generate jobs and make the brand of Skagen even stronger.
- She does not fear that the protected nature at Grenen will be destroyed by building a seaside hotel that of course has to be well integrated and with respect of the surrounding nature.
- The area at Grenen has a unique quality of being very changeable, which can be seen at some of the bun kers
or on some of the dunes in the landscape.
- The tip of Grenen is very changeable doing the day, which is a unique characteristic that do not apply to a normal coastline.
- There is a fantastic scenery of different bird migrations doing the season.
- As a project that is estimated to cost around 300 million DKK there has to be some profit to make it a positive success in the long term.
- It will be a unique experience to be at a hotel that is placed at Grenen.

(Kappelborg, L. 2015)

User profile

Ill. Vacation

I have used my knowledge of the current tourist basis at Skagen and the new type of international tourists that they want to attract on order to create a user profile for the seaside hotel.

The main user profile for the seaside hotel are Danish couples as well as foreign couples looking for a unique experience provided by a peaceful seaside hotel in a beautiful, natural environment away from the hectic everyday life, but close to the beautiful city of Skagen with many cultural offers and shopping. They are not looking for luxury in the old-fashioned sense with silk sheets and golden tabs, but meaning and content by authentic experiences. The resort is not reserved for the upper class, but a place where the whole middle class can save money to go for a unique weekend stay for special occasions.

The guest at Skagen Seaside Hotel appreciates:

- High service, exclusive shops, health and pampering
- Peace and time for yourself to refuel and revitalize
- Being able to get delicious, healthy Nordic food and high-quality cuisine
- Both spectacular and local nature experiences and the opportunity to be active in nature and get access to the landscapes
- Walking and running in the dunes and woodlands
- Interesting cultural experiences
- Lying on the beach and immerse in thick books
- Good port facilities with an urban environment with the possibility to meet other people.

Nordic architecture and identity

Ill. nordic arcitecture

To ensure that the building has an authentic expression this project will Phenomenologically have focus on Nordic architecture, where some of the common denominators apply to history, cultural heritage and geographical location as well it deals with the way of designing, constructing and using the building.

This has given Nordic architecture a characteristic identity that can be described as:

- The simplicity of design and content
- The strong adoptions to the surroundings.
- The socially and functionally well-anchored architecture. (Marianne, L. 2014)

This is compared to the tendency of globalization, where nationalities and cultures are being blurred, it becomes important to remember the identity that is specific for the given location, area or region. It should not be seen as having to go back to the traditional building methods, but rather in how to use the geographic quality and the location in new ways. The identity of Nordic architecture has a sensible interaction between the cultural roots and the traditions in relation to the global perspective that is an unavoidable term of today. (Kjeldsen, K. 2012)

Local building traditions

Traditional climate-adapted architecture in Skagen:
The predominant westwind in Skagen has a visual influence on the shape of the buildings and its close surroundings in order to reduce wind strength, cooling effect and provide shelter. This is characterized by a city that consists of densely spaced low houses with a simple and closed form and fences set up to protect their small gardens. This has the effect that the wind slide over the rooftops and leaves a micro-climate with a more pleasant climate in the form of shelter and higher temperature. (Dahl, T. 2008)

The houses' appearance and construction techniques:
Many of Skagen's houses are beautiful and well preserved and the houses are to a great extent characterized by the yellow color and the red tiled roof with white ribbon.
It is clearly visible that the local building tradition has been given its character by the use of tiny details that constitutes the identity that Skagen is known for: from the outside they have sealed the roof by the ridge and down the gable with mortar to secure it against the wind. Whereby it becomes a local identity to use this 'sweeping' method with lime as chalky white ribbon that stretches along the red roof. It has become an important little detail that if not included in the building design it destroys the big picture. (Kulturstyrelsen 2015).

In such a rough climate with a lot of salt and sun in the air, the use and treatment of materials become important factors. As most types of iron would be corroded in aa few years, it is only stainless steel that is durably in this kind of climate. Wood for cladding on the building has also proven as a good material to use if it is treated in the right way. Treatment with acrylic paint has a bad effect on the wood as it becomes wet all the way though over the year, but there has been good experiences with the traditional use of raw linseed oil and fungicide and thereafter to wait until the wood is dry enough to be painted. (Emborg, L. and Kragh, K. J. 2000)

This information of knowledge from the past is seen as very important issues, when the design of the building form has to be shaped and what kind of materials that by experience has proved its durability in this kind of climate conditions. The local building tradition also helped to design a building with an identity that applies to the local history, cultural heritage and geographic location.

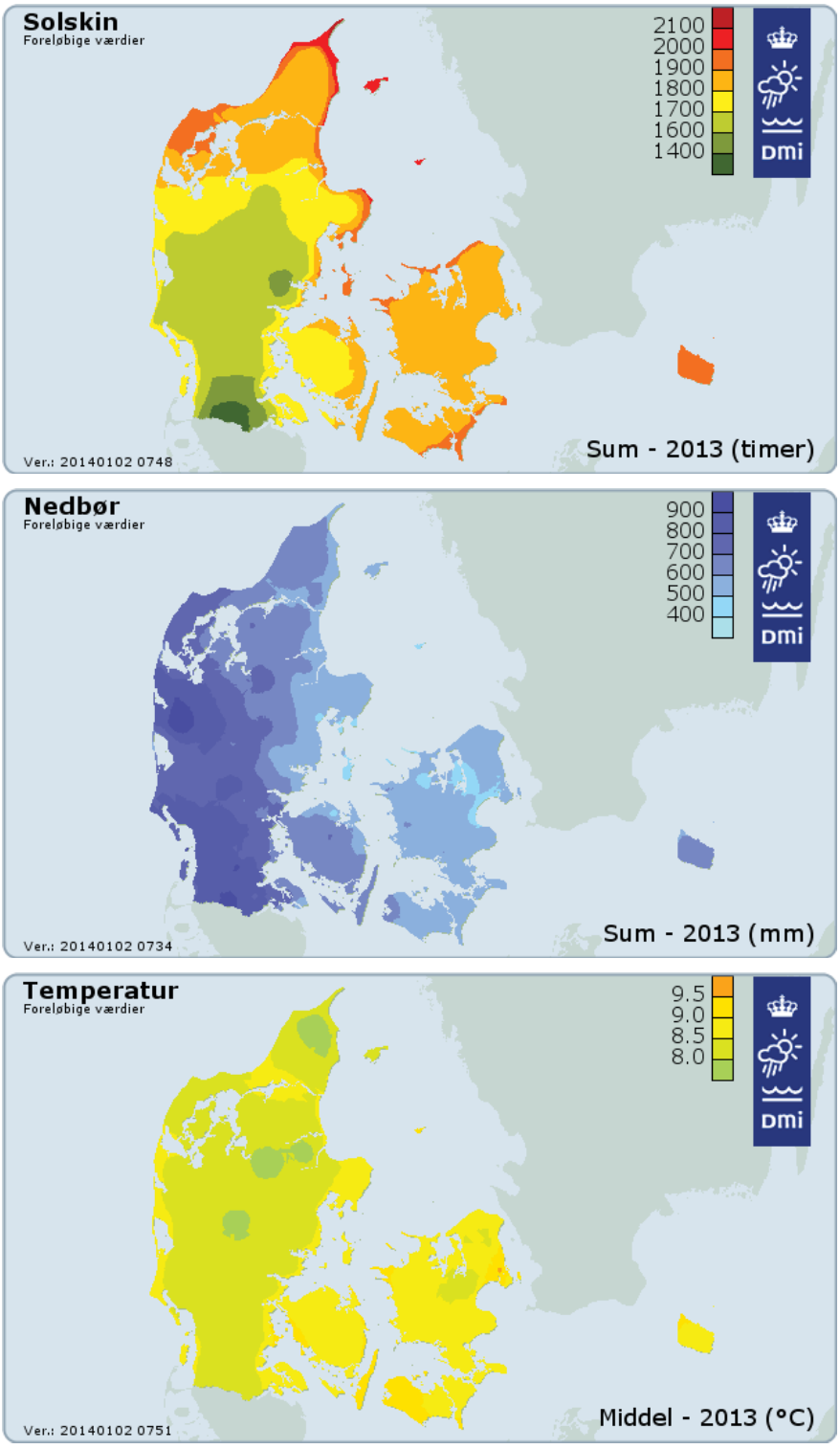
Climate at Skagen

General condition

Denmark is located in the temperate climate zone by having cool summers with average temperature around 16 C. and moderate winters with average temperature around 0,5 C.

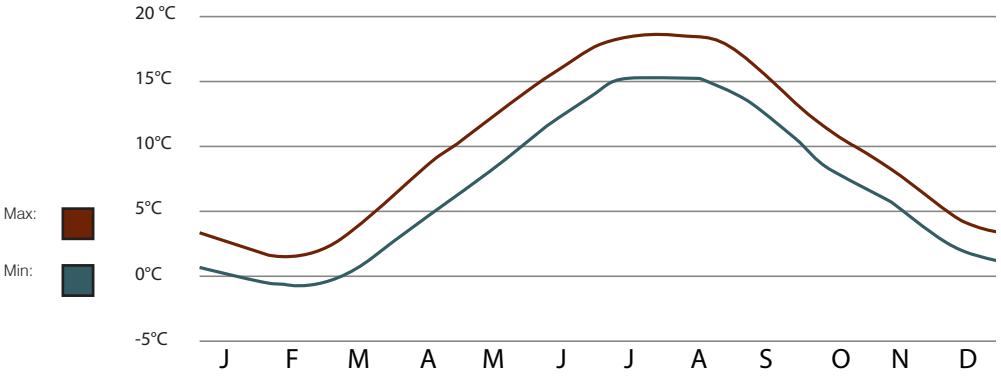
The Gulf Stream deliver warm water to the sea around Denmark, which ensures small differences in temperature between summer and winter due to the seas' smoothing effect that works by obtaining and releasing heat to the surroundings with impact on coastal regions as Skagen.

Rain fall is greatest in autumn, while it rains less doing the period of spring. But the average rain fall pattern in Denmark shows differences from region to region as it is shown on the illustration. (Den Store Danske A, 2013).



ILL// Cappelen, J. (2014) Annual weather condition a year.

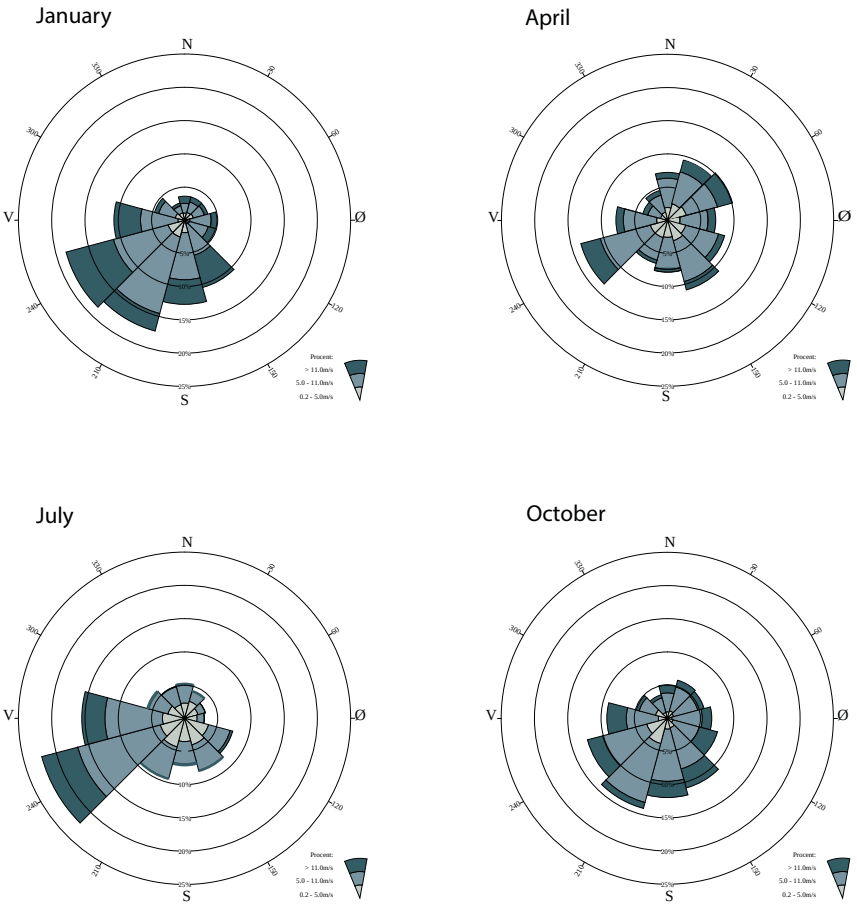
Annual temperature a month



Wind Condition

the most frequent wind direction in Denmark is west where the number of days with strong winds varies form 30 days inland to almost 170 days at the area of Skagen. Hurricanes by the Danish cost are most common in the winter season and strike in an average each 3. to 4. winter season, they can result in wind gusts with speed op to about 50 m/s (almost 190 km/t)

The information of the wind condition at Grenen had to be taken in to consideration of the design solutions where it can be an advantage for natural ventilation principle, as the construction will be designed and dimensioned after the impact of the wind loads. To ensure a comfortable micro climate around the building there will be taken care of reducing wind velocity by deflecting the air in a way there not creates turbulences on the ground. The common west wind can be used as phenomenal experience of wind that is characteristic for this specific place.
Se Camilla Brunsgaard lecture 4 sem om vind forhold I landskabet….



III. // Wind roses of Skagen, shows there are various wind conditions doing the seasons, it is measured by DMI over a ten year period at Skagen lighthouse. The main wind direction varies between SW, which also provide the highest wind speed (Cappelen, J & Jørgensen, B,1999)

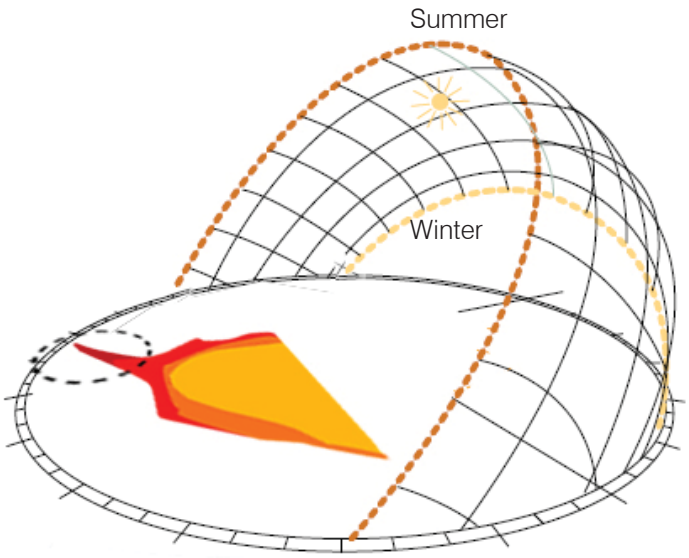
SUN

When it comes to sun hours the region of Skagen is the sunniest spot in Denmark - not just because the land is too narrow for the clouds to occur when they meet land masses, but also because Skagen is sheltered by the Norwegian mountains where air masses already have released a large part of their moisture. (Aagaard L.H 2011).

Sun Radiation

The sun's altitude on the sky varies with the seasons and therefore the maximum number of daylight hours varies. In summer the sun stand higher above the horizon by having an altitude of 57 degrees on the sky and gives op to 17 hour of daylight. In the winter the opposite happens as the latitude is only on 11 degrees and there are only about 6 hour with daylight. (Siewertsen, B. 2008)

At Skagen there is a number of characteristic nature phenomena, as it is the most northern point, which include the longest and shortest day in Denmark. The combination of the small land, bright sky and the surrounding sea increases the amount of light radiation in Skagen in relation to the rest of the country, which is why it is also the so-called 'land of light.'

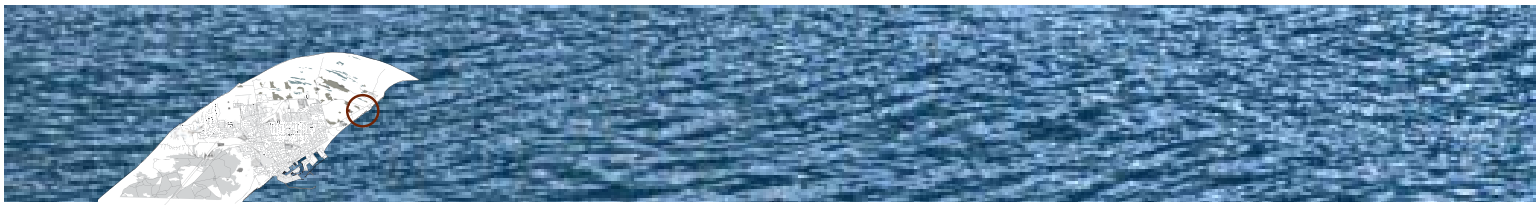


Path of the sun summer on 57 degrees and winter on 11 degrees

ILL// Sun average a year Cappelen, J. (2014)

Site selection

Grenen the top of Denmark



My first thoughts and research to find the best possible location for the seaside hotel.
To get closer to a location for a seaside hotel some preliminary studies in visiting and exploring different locations on my own body have been done.

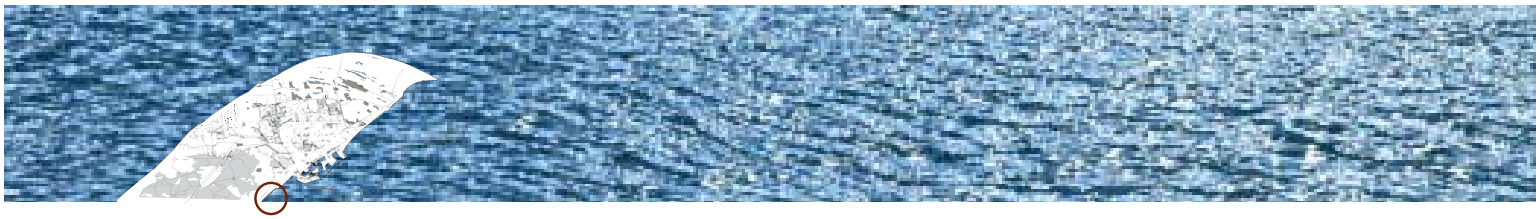
It seems quite logical to put the seaside hotel on Grenen the top of Denmark between the two seas, where the old seaside hotel was also located in the past in the beginning of the 1900s.

Grenen consists of sand dunes around the edge and the land in between is mainly vegetation of sea buckthorn and other bushes with some pine and birch. Furthermore Grenen offers a very special natural phenomenon in Denmark that attracts over 1 million visitors a year, which is to see the two seas collide at the top of Denmark. The view from the top of the dunes or on top of Denmark gives a fantastic view over more than 180 degrees of sea. For passing cruise guests there is also a great visibility to the area and on land there is a well-developed infrastructure with good connection to the city.

But Grenen has from the time when the old seaside hotel was placed there changed quite significantly as it has become one of Denmark's biggest tourist attractions, which involve a lot of visitors a year and thereby a large parking area for motorists and buses have been built. Geographically, the coastline has moved farther away to the east from the possible location of the seaside hotel and the surrounding sandy beaches and dunes are not the same unique experience of unspoiled nature as it has been in the past.

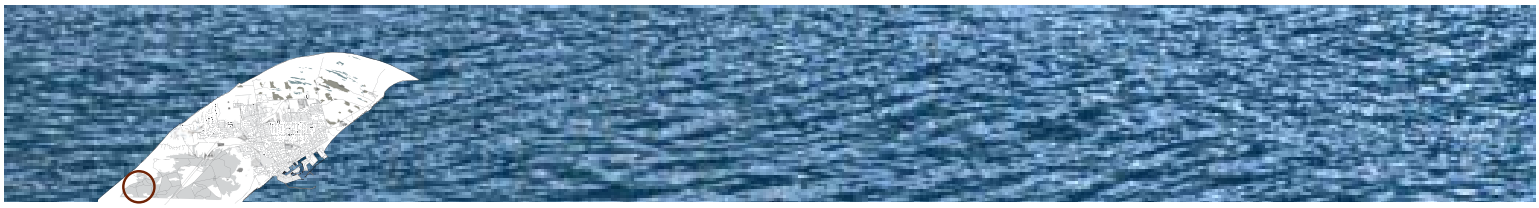
The many visiting tourists and geographical changes in the landscape have made me do some extra research to see if there is a possibility of another location for the seaside hotel in the area around Skagen. There was sought for a location for the seaside hotel that already by the way you enter the site will be able to give the feeling of isolation from the outside world, providing space away from a hectic everyday life in rest and contemplation for own thoughts amongst a fascinating wild and untouched nature with the sea as the great phenomena that creates the identity of the place.

South of Grenen on the east coast



The area, which is located close to the city, has great natural qualities by consisting of dramatic dune formations from an old dune. The landscape's topography allows shielding from the surrounding environment and the forest in the background increases the possibility of beautiful walks that offers quality of sea, sand dunes and forest.
But in the summer period the beach in this area is very popular and there are sailing large cruise ships, cargo and fishing ships just north from the selected location where the large industrial port also shoots up with buildings. There is also risks of a distinctive unpleasant smell from the fishing industry, so there is not only good qualities from placing the seaside hotel here. Another downside is that is does not have a view of the most famous phenomenon of Skagen - Grenen, the tip of Denmark, and the colliding of the two seas.

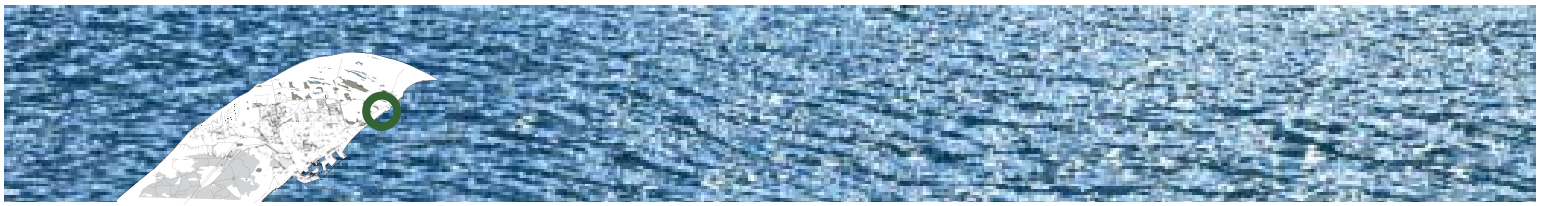
South of the Grenen on the west coast in a beautiful natural landscape



The plot is located in a nature reserve on the wild west coast just 3 km south of the old part of Skagen, where great plains with dramatic dune formations and sandy areas create a unique experience of being alone and isolated from the outside world without being able to see human remains in the landscape. The large dunes also creates a shelter from the wind somewhere around them, close to the plot there is large forest plantation that appeals to do walking or cycling.

The major moving dunes located off the coast makes the area difficult to build on and create infrastructure. The large dunes also make a barrier for the potential of view to the sea, which make it difficult to use the panorama of the sea as a quality for the site. The distance from the town also creates a barrier for the guest as you do not just go for a walk in to town. This can cause that there is only basis for having visiting guests at the seaside hotel doing the summer period and not all year.

Conclusion on site selection



My studies of the given locations have led me to consider the strengths and disadvantages up against one another that in combination with an interview with Lene Kappelborg, director at Turisthus Nord with her broad experience and know-ledge of the area made me choose Grenen as the most attractive place for a seaside hotel. It offers great possibilities to integrate unique nature and the specular scenery with a great view of the sea as a parameter for rest and immersion and to be used as a get away from a hectic everyday life. The close distance to the city provides a positive basis for having visitors all year round and brings better options for the shops and catering in the city. The seaside hotel has a beneficial location to create a strong trademark for itself and bring more value for Skagen city as it offer a very good visibility for the offshore cruise guests and other visitors that pass by on land. (Kappelborg, L. 2015)

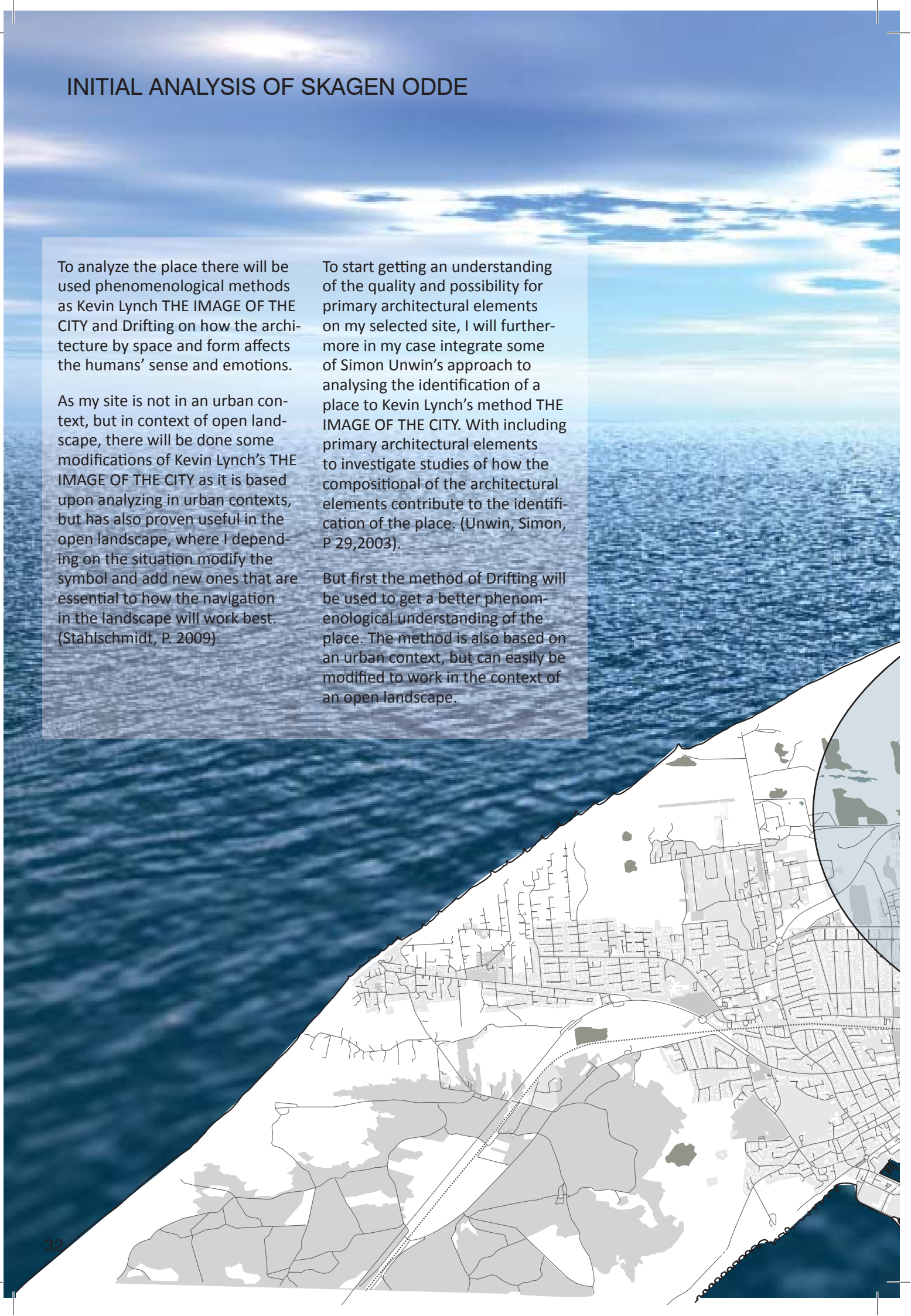
INITIAL ANALYSIS OF SKAGEN ODDE

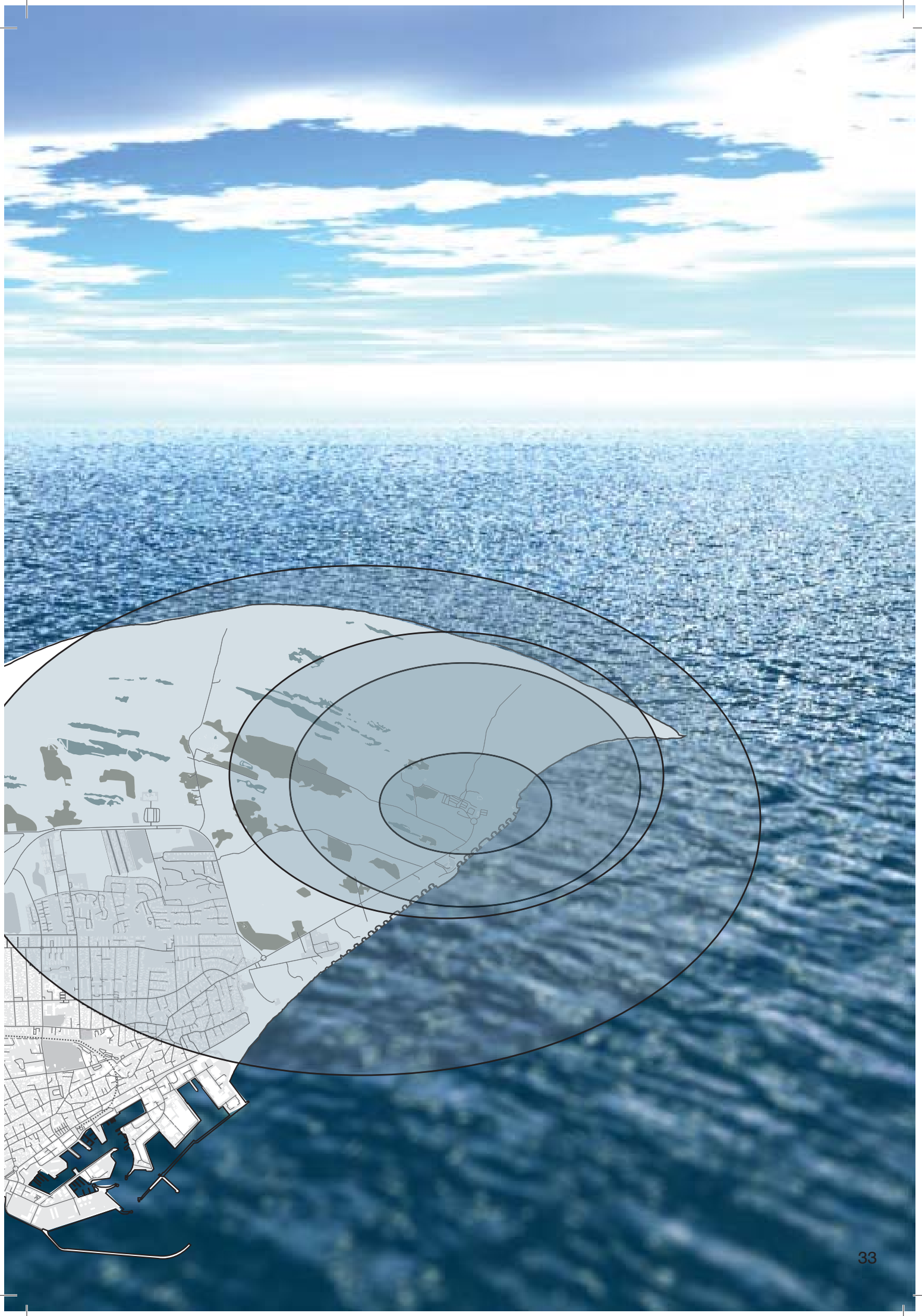
To analyze the place there will be used phenomenological methods as Kevin Lynch THE IMAGE OF THE CITY and Drifting on how the architecture by space and form affects the humans' sense and emotions.

As my site is not in an urban context, but in context of open landscape, there will be done some modifications of Kevin Lynch's THE IMAGE OF THE CITY as it is based upon analyzing in urban contexts, but has also proven useful in the open landscape, where I depending on the situation modify the symbol and add new ones that are essential to how the navigation in the landscape will work best. (Stahlschmidt, P. 2009)

To start getting an understanding of the quality and possibility for primary architectural elements on my selected site, I will furthermore in my case integrate some of Simon Unwin's approach to analysing the identification of a place to Kevin Lynch's method THE IMAGE OF THE CITY. With including primary architectural elements to investigate studies of how the compositional of the architectural elements contribute to the identification of the place. (Unwin, Simon, P 29,2003).

But first the method of Drifting will be used to get a better phenomenological understanding of the place. The method is also based on an urban context, but can easily be modified to work in the context of an open landscape.

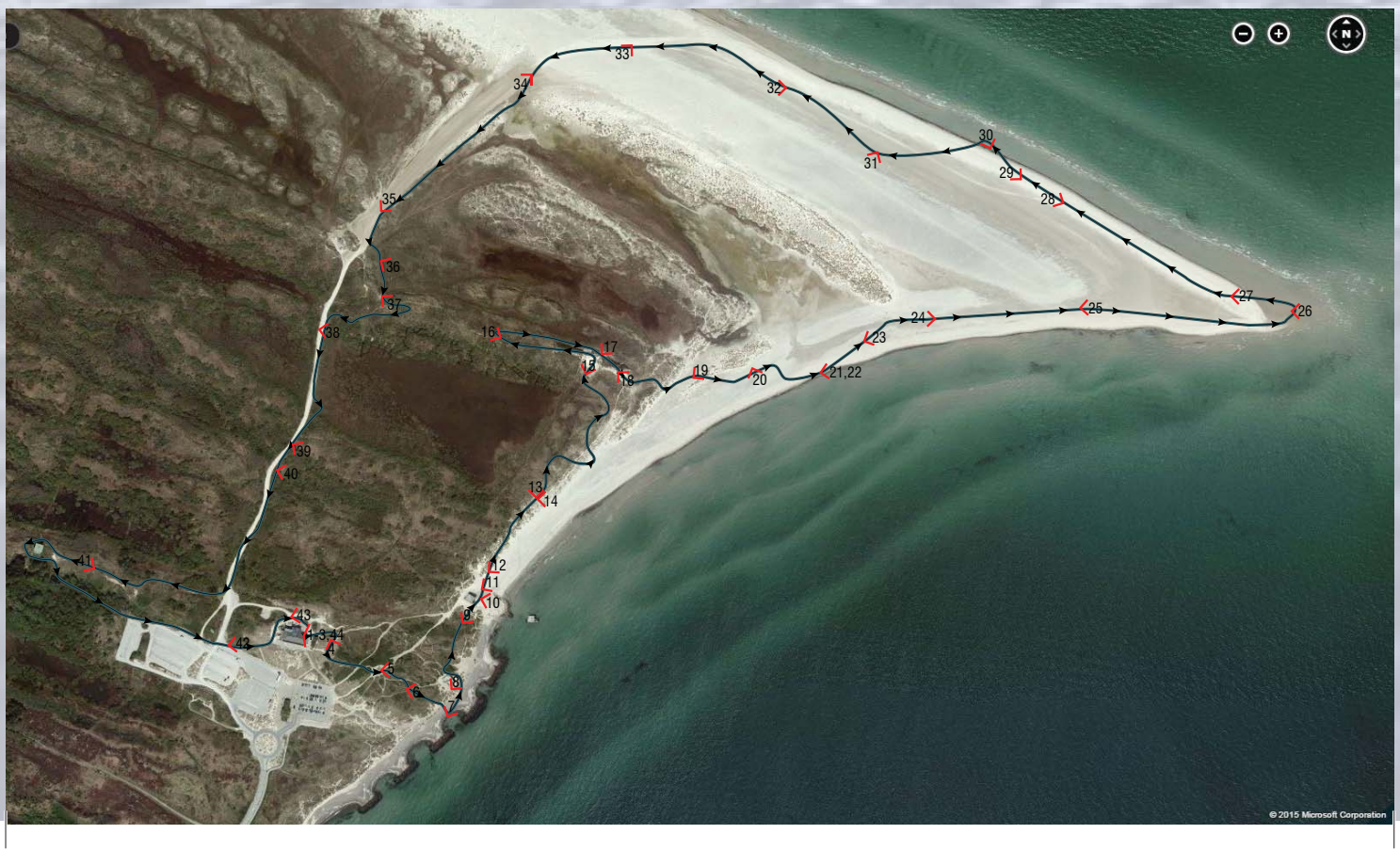




Drifting

The method Drifting is based on the way we act as tourists and in my situation driving around in a unknown landscape to search for new impressions or something special. I let the interest and curiosity drive me through the landscape, where I perhaps will find exciting spaces or elements in the natural environments or maybe a “secret “ spot that I find pleasant to be.

To use the method I will start by defining an area and then walk around randomly. Turn in between some bushes in the landscape, walk around a group of trees and climb a hill if it seems interesting. Doing the walk I register the route on a map and take a photo and note down every time I record something of interest. After the tour I will evaluate my registrations. (Marling, G. 2011)



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Conclusion on Drifting

Doing the drifting I experienced a diversity in the form of topography in the landscape with different vegetation and the elements having different expressions. Some seems soft and changeable as the sand, water and sky. Others seem hard and stationary as the concrete bunker that occurs in between the soft elements and the trees in the bushes that seems old and gnarled.
The micro climate changed radically as I was moved around in the area. If I was standing on an open or high point the wind was tough and cooling down, but when I just moved a few meters further the wind was disapearing and if I was at the sunny side of a sand dune the sun also heated up the place.

By spending time out there the animal life occured in form of many sea birds and some Icelandic sandpipers. At the tip of Grenen I was lucky enough to see two seals resting in the vegetation and I saw rabbits, a foxhole and many footprint from animals.
As I was staying in Skagen for three days I visited the area of Grenen several times, where I experienced the same drifting route in different weather conditions and doing different times of the day. It showed me different appearances of the place, where the color of the sky has a great impact on the mood at the place and the changing formation of the tip of Grenen surprised me by large changes doing the day and the small sand dunes behind the stone on the beach was shifting in relation to how the wind was blowing.

By the time I have been spent on Grenen it have given me a deeper understanding of how to get the best possible site and design for a seaside hotel in this area according to the climate conditions, view possibilities and where to place it in a manner that does not disturb the untouched nature and at the same ensure that other visitors at Grenen do not disturb the guests of the seaside hotel.

Mapping by Kevin Lynch's "The Image of the city."

The method works by generating visual characteristics to make it possibly to navigate by using the anatomy of the place. In the method there are five key elements that are used to map the characteristic elements that help us to navigate through an area. (Lynch, K. 1960)

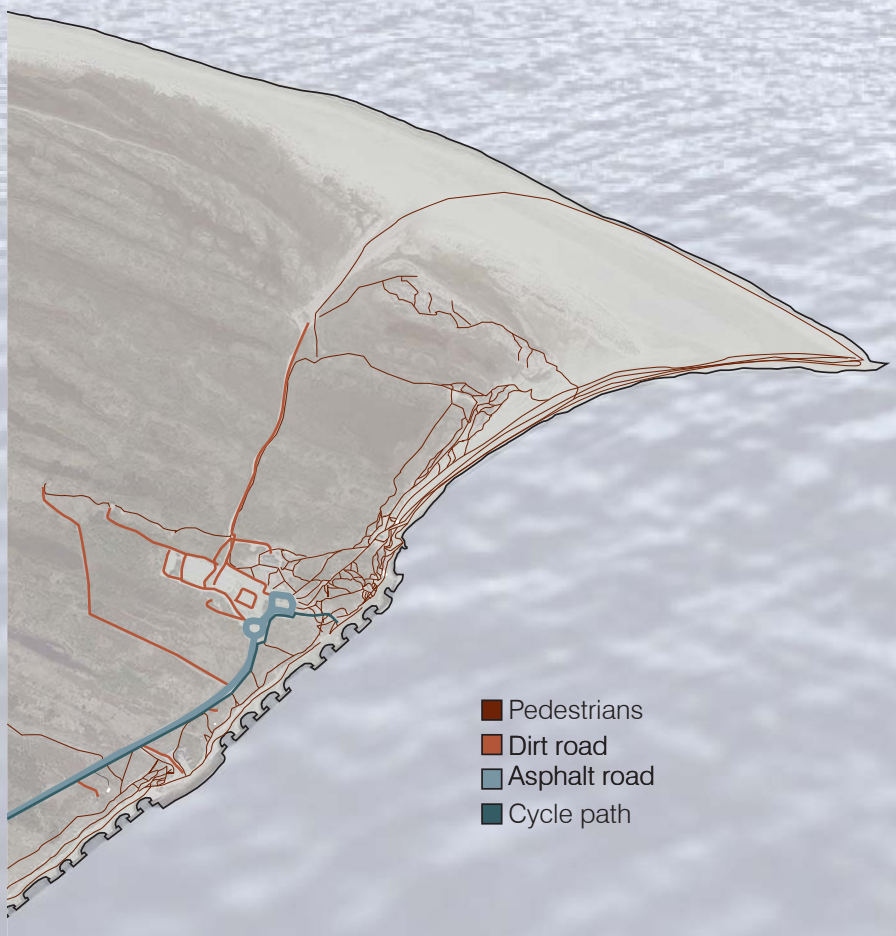
'Edges'
'Paths'
'Districts'
'Nodes'
'Landmarks'

‘Edges’.

Edges are defining the space limitation between different areas where the more or less permeable vegetation just behind the dunes shape a boundary that together with the sea as a natural limitation makes the sandy area between them the most attractive area to reside on.

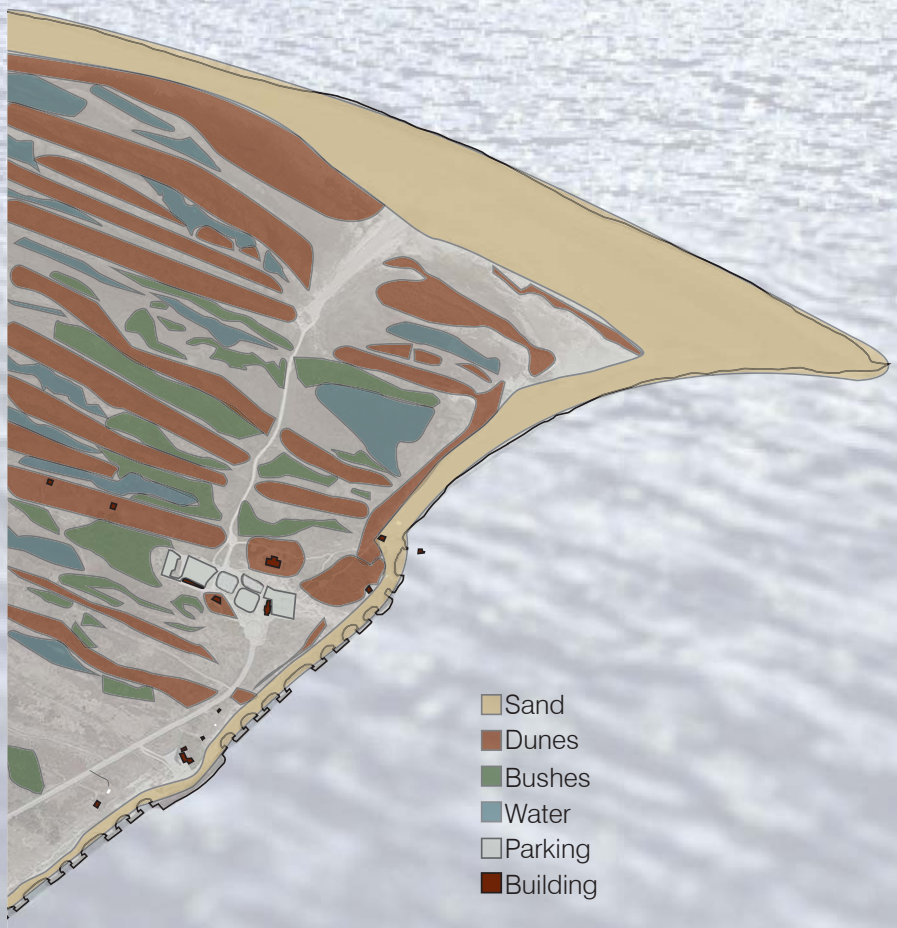
‘Paths.’

The main traffic is directed to the top of Grenen, where there are fast driving traffic on the asphalt roads just before the roundabout, which there after become soft traffic. This transforms again on the public parking area into walking on the sandy path. They occur in a complex system in the landscape that led you to the top of Grenen or to some more or less secrete place in the nature.



‘Districts’

They consist of different characteristic areas with their own uniform identity.

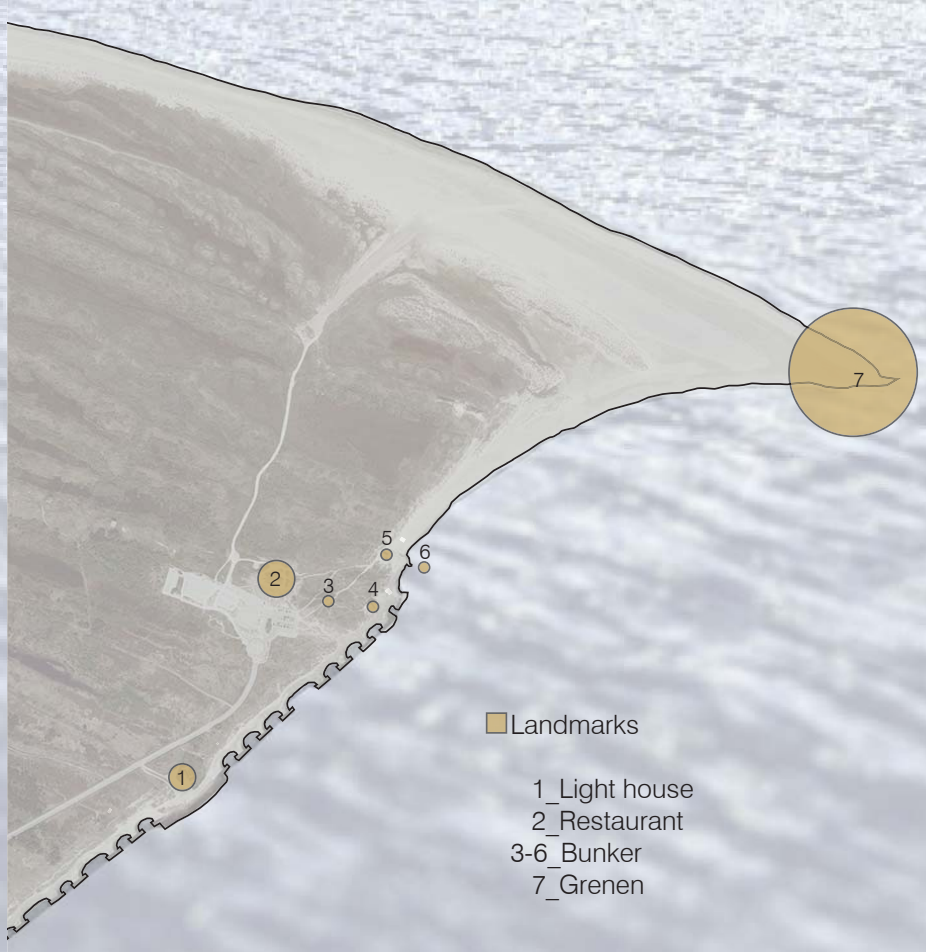


‘Nodes.’

Strategic points that you can pass, which mainly occurs in relation with intersections of different roads / path systems. The top of Grenen as the main attraction for the area becomes one of the main nodes together with the parking area, where people group up. The bunkers that are placed on the beach and in the landscape of the dune also become strategy nodes, where people meet and cross each other on the way to the top of Grenen.

‘Landmarks’

Landmarks can be used as orientation points and they normally occur as physical objects both in large and small scale, where the light tower can be seem from almost everywhere in the landscape both doing the day and night. The restaurant “De 2 have” can be seem from most places in the area as it is located on a dune. The bunker with their strong contrast to the surroundings are also elements that contribute to the orientation of the area. With its location on the top Grenen can be seen from a long distance down on the east coast, which also have a great navigation power for the area.



Conclusion

By analyzing the area with these five key elements, I have obtained a better understanding of; how the area is used, where most people are staying and which elements have their own characteristics in apperance, visibility form or distance. This analysis has inspired me to ideas of how a seaside hotel can be placed or emerge without disturbing the untouched nature, how it can acquire optimal conditions for a view of the two seas and how to avoid the many tourists who visit Grenen.

I am trying to use the dune landscape both to elevate the seaside resort to achieve a better view quality and to create a barrier from the tourist parking area.

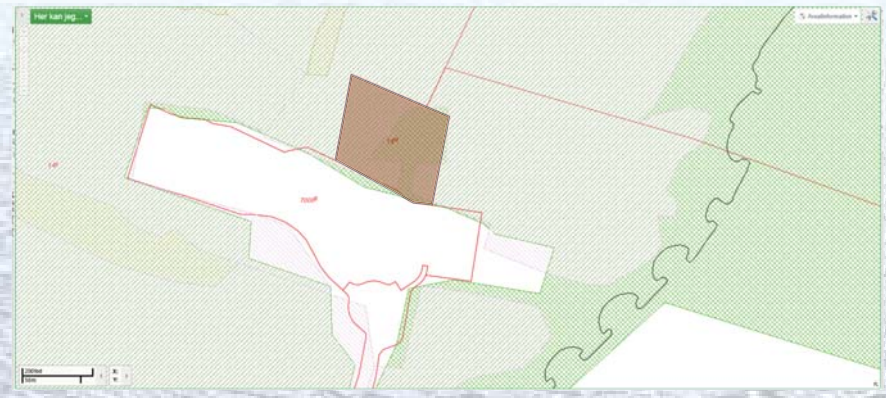
It should be done in such a way that when you stand close to the seaside hotel in the untouched surroundings – nature will not be disturbed by the building mass of a huge hotel, but when you are at a distance the hotel should appear as a landmark, that can be seen both from a cruise ship or when you arrive from south at the asphalt road.

This will be tested in the following volume study with a method that will provide me with a better understanding of the quality and possibilities for my selected site. To do so I will include some of Simon Unwin's approaches to analyzing the identification of a place with/by including primary architectural elements to investigate how the composition of the architectural elements contribute to the identification of the place. (Unwin, S. P29, 2003).

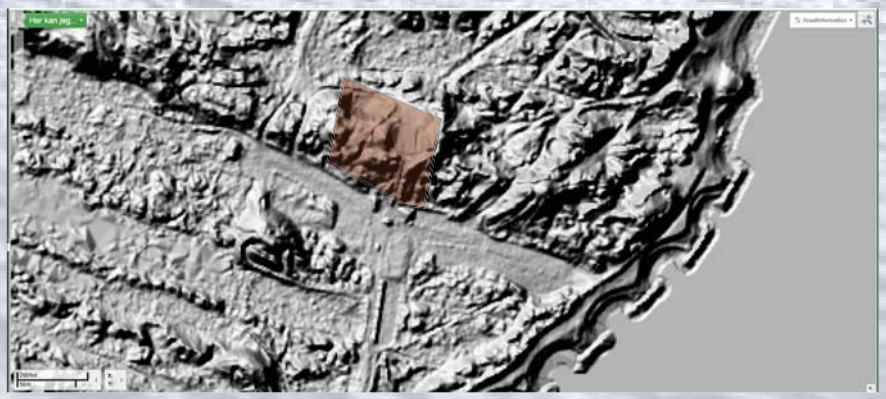
Map information

As the area of Grenen is protected by a couple of national and EU restrictions in form of beach protection, preservation of dunes, protected moorland, Nature 2000-area and Grenen preservation, it leaves only a limited area around the current settlement as the restaurant “De 2 Have” and the parking lot as a possible place for a seaside hotel to be built. The hotel can advantageously be built in several floors in order to stay within the restricted area. (Thomsen, H. 2014)

In this project the focus will be on land register 14at, where the restaurant “De 2 Have” is placed today as a possible building site for the seaside hotel, as it contains certain qualities in terms of geographical location, where the level of quotas allow a favourable advantage for the possible view. The land register14at has an area of 7829 m2, where the 6726 m2 have status of preservation of dunes, which requires a dispensation, whereby a design that identifies with the surrounding environment would have an advantage in the possibility of using all the area of 14at land register to the seaside hotel complex.



Topographic maps show the steep dunes inside the landscape as memories from the past, where the costal line was different.



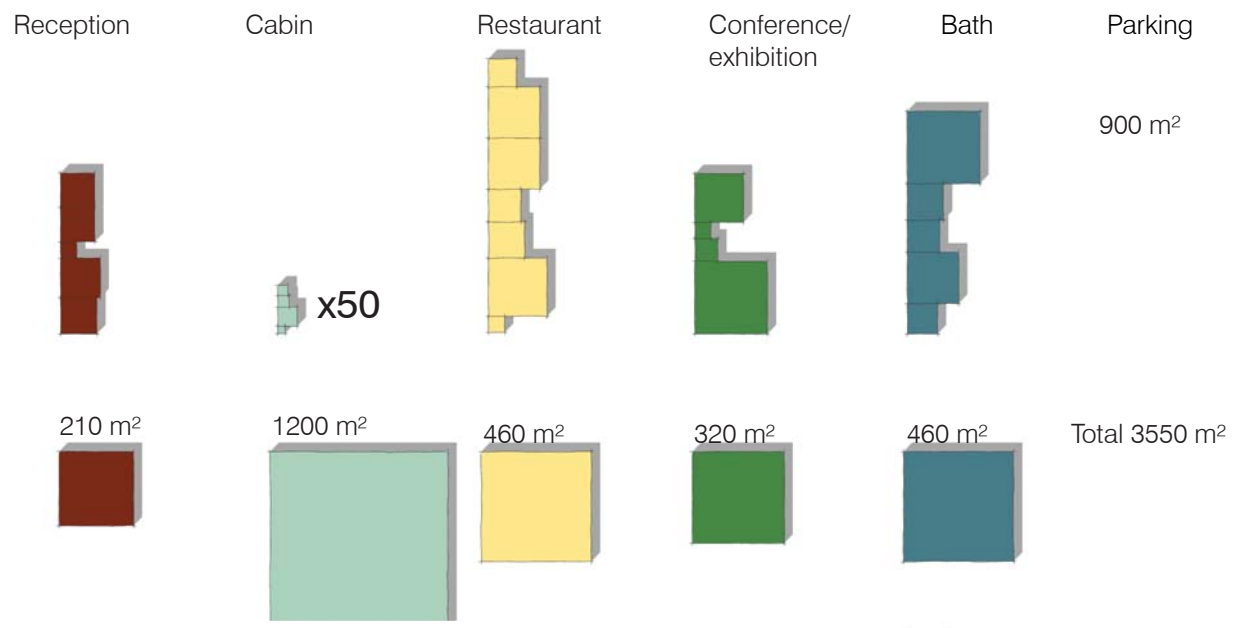
Maps from 1954 show the remainings from the old seaside hotel placed a little to the west from the restaurant today and show how the coastline has moved by time.

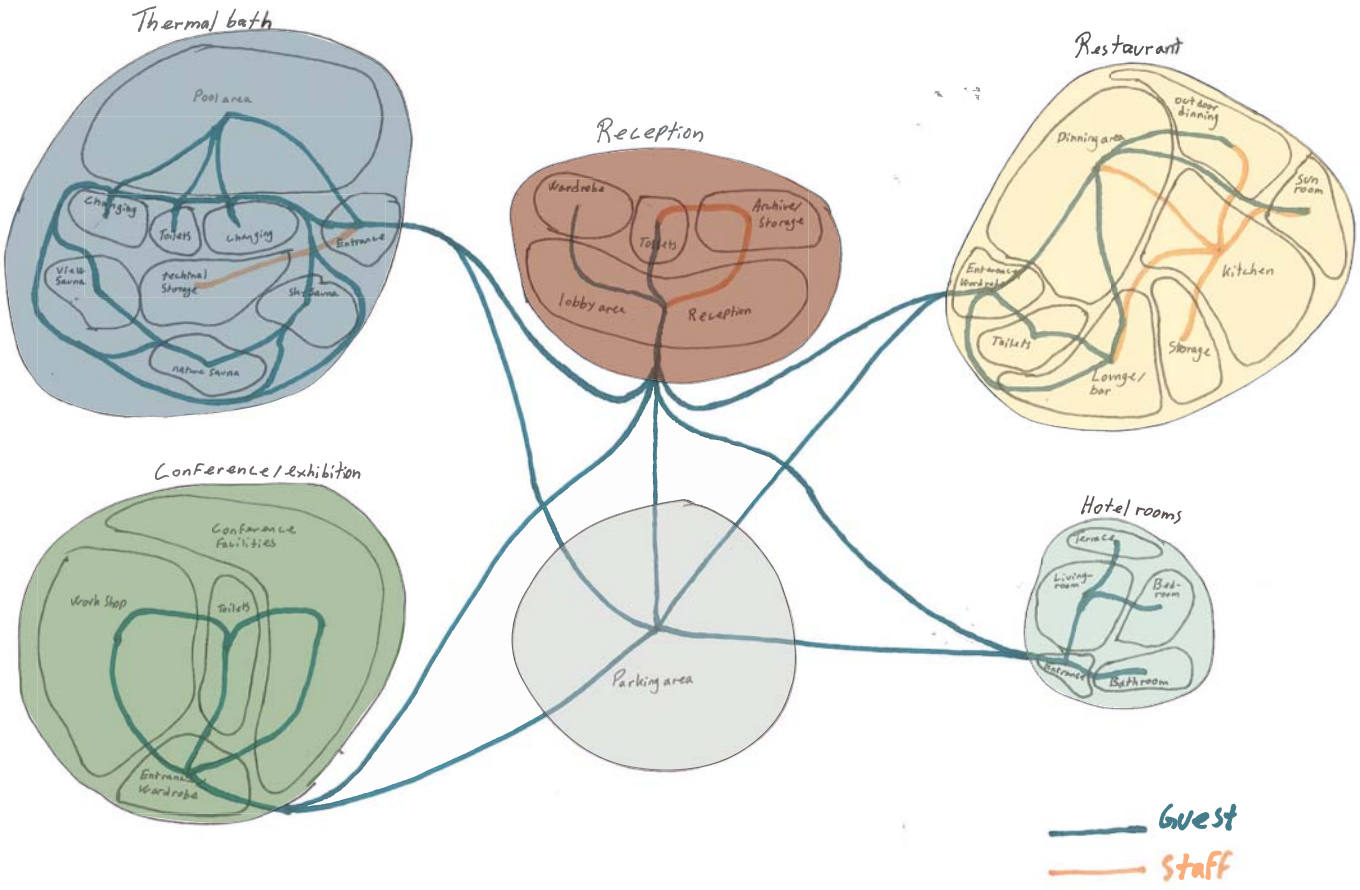
ROOM PROGRAM

Function	Amount	Estimate size	Level of intimacy	Potential of view
Reception:		**50 m²**		
Reception	1	45 m²	+ + + + + +	+ + + + + +
Archive / office room	1	60 m²	-	-
Lobby/hall	1	20 m²	+ + + + + +	+ + + + + +
Wardrobe	1	130 m²	+ + + + + +	+ + + + + +
Heated area				
40 hotel cabins consists of:		**2 m²**		
Entrance	1	15 m²	+ + + + + +	+ + + + + +
Living room	1	8 m²	+ + + + + +	+ + + + + +
Bedroom	1	4 m²	+ + + + + +	+ + + + + +
Bathroom	1		+ + + + + +	+ + + + + +
		4 m²		
Terrace	1		+ + + + + +	+ + + + + +
Restaurant area consists of:		**10 m²**		
Wardrobe	1	130 m²	+ + + + + +	+ + + + + +
Dining area	1	50 m²	+ + + + + +	+ + + + + +
Lounge/bar	1	40 m²	+ + + + + +	+ + + + + +
Sun room	1	100 m²	+ + + + + +	+ + + + + +
Dinning / Breakfast	1	100 m²	+ + + + + +	+ + + + + +
Kitchen	1	30 m²	-	-
Storage	1	320 m²	-	-
Heated area		30 m²		
Trash disposal area	1	100 m²	+ + + + + +	+ + + + + +
Outdoor dining	1	130 m²		
Unheated area			-	-
Conference/exhibition spaces:		**200 m²**		
Cultural hall	1	20 m²	+ + + + + +	+ + + + + +
Toilets	4	10 m²	+ + + + + +	+ + + + + +
Wardrobe	1	90 m²	+ + + + + +	+ + + + + +
Workshops	1	230 m²	+ + + + + +	+ + + + + +
Heated area				
Bath		**100 m²**		
Pool areas	1	35 m²	+ + + + + +	+ + + + + +
Changing rooms	2	20 m²	+ + + + + +	+ + + + + +
Sauna	3	170 m²	+ + + + + +	+ + + + + +
Heated area	1	50 m²		
Outdoor bath	1	200 m²	+ + + + + +	+ + + + + +
Technical & storage	1	250 m²	-	-
Unheated area			-	-
OTHERS		**45 m²**		
Cleaning rooms	1		-	-

Quality of light	Ventilation demands	Description (function demands and spatial potential)
Combination of natural and artificial light		The reception should greet the guests with a welcoming atmosphere that guides the guests onward in the building
Artificial light		
Combination of natural and artificial light		
Artificial light		
Combination of natural and artificial light		It should mark the transition to a sheltered environment
Mainly natural light		Should atempt to create a relaxing and frame the outdoor nature
Mainly natural light		An intimate room to sleep with an view to the outdoor nature
Artificial light		Pratical and simple facility
Natural light		Possibility to enjoy sun and stay outside close to the cabin
Artificial light		Neutral presence in the room
Mainly natural light		Quality of being authentic with a stunning view over the two seas
Combination of natural and artificial light		Cozy place that allows to be private or more public
Mainly natural light		A bright and warm atmosphere with a stunning view of the two seas
Mainly natural light		Quality of being authentic with a stunning view over the two seas
Combination of natural and artificial light		Practical operation system for kitchen staff and waiter staff
Artificial light		
Natural light		Should have a neutral presence of the place
Natural light		Should be close to nature with stunning view over the two seas
Combination of natural and artificial light		A place for exibitions and conferences in a public atmosphere
Artificial light		Practical and simple facility
Artificial light		Neutral presence in the room
Mainly natural light		Appeals to relaxing with a stunning view
Artificial light		Practical and simple facility
Combination of natural and artificial light		Should be cozy and intimate
Mainly natural light		Make you feel nature with stunning view over the two seas
Artificial light		Should be easy to enter for service but not interrupt the guest
Artificial light		
Artificial light		Should be easy to enter for cleaning staff without interrupting the guest

Function diagram



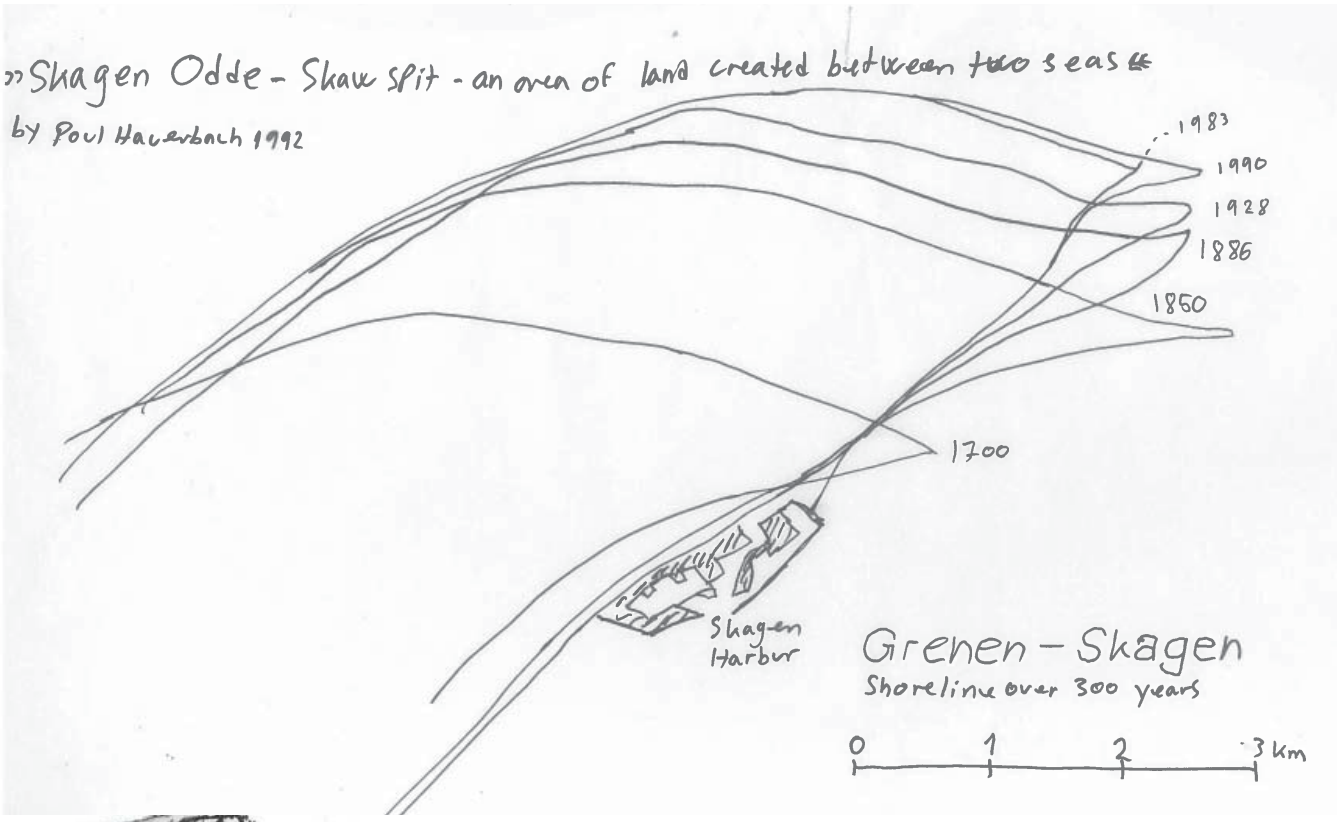


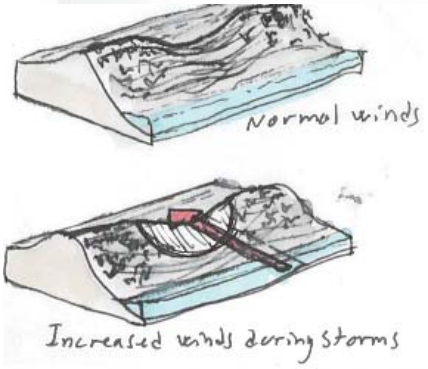
Creation and conservation of the unique dune landscape of Grenen

The wind and sea are the main building masters of the unique dune landscape of Grenen that has emerged within the last 5 - 6000 years. Today the geological dune land forms are still developing by the result of a large abundance of sand the sea transport up from the west coast and deposit on North strand. This phenomena has just by the last 100 years added landmass for about 1 km further into the sea. By time this has gradually formed the characteristic inland topography with east-west ridges called 'rimmer' separated by hollows called 'dobber'. The dune landscape of the old ridges and hollows have been preserved by flora and fauna that has slowly been implemented, and can be seen as a kind of memories from the past that is kept in place by the vegetation. (Morten P. 2006).

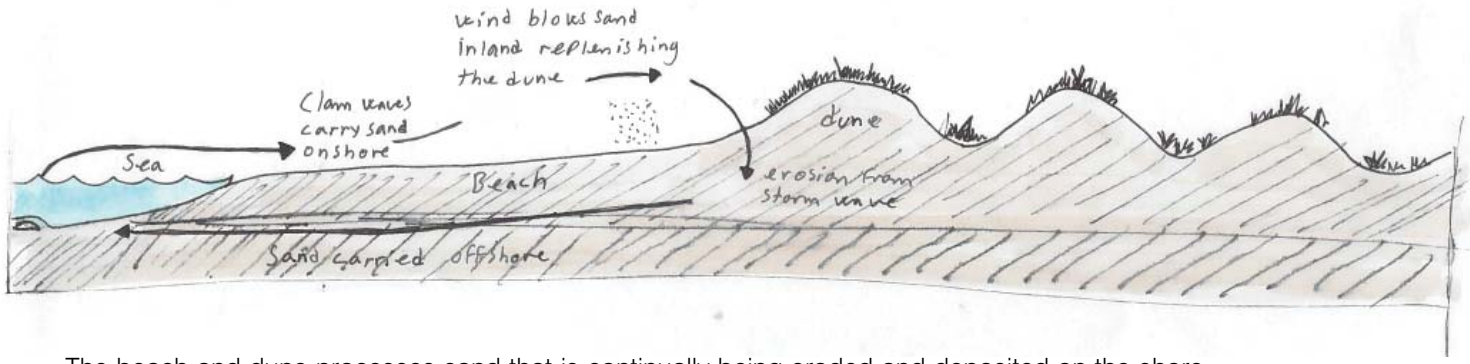
The dune landscape's main function is to provide natural shore protection and with its habitat for unique flora and fauna, it is important to understand the consequences for the environmental and biological systems, when interrupting the unique landscape at Skagen Odde by adding a seaside hotel.

The dune vegetation is important for capturing and anchoring windblown sand and while dune vegetation has adapted to a harsh, demanding environment, it is quite fragile to human disturbances.
This means that the dune landscape by people's indiscriminate use of dunes can damage or destroy thousands of years of geologic processes in one instant. Therefore it will be necessary to manage the activities correctly, to ensure that the dunes at Grenen remain intact for future generations. It can been done by limiting access to the beach by creating pre-designed access routes to minimize disturbance and make people aware about the area's unique natural phenomena and its vulnerability to human interruptions (Huron L. 2015).





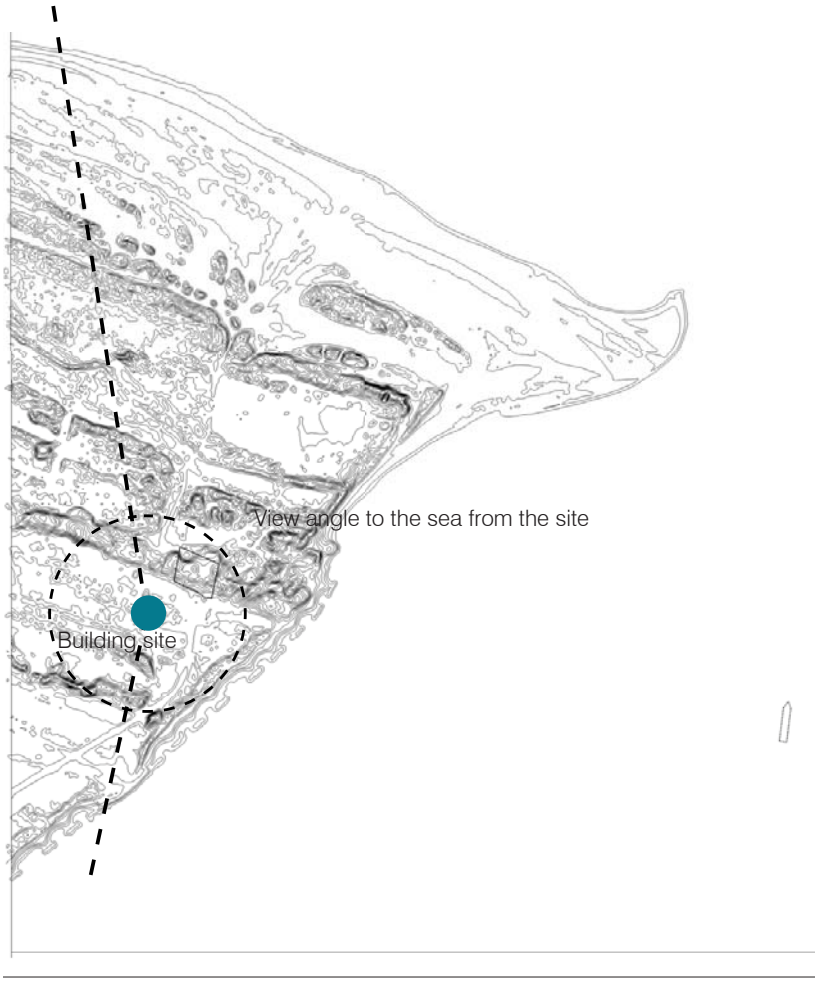
Formation of a blowout. Destruction of dune vegetation exposes the dune to wind erosion.

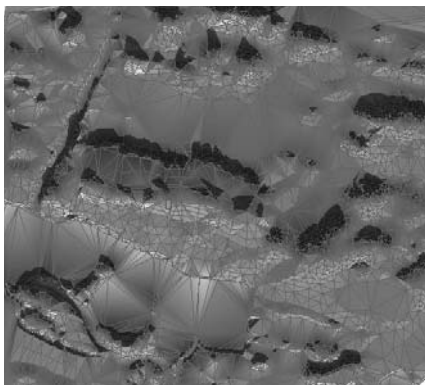


The beach and dune processes sand that is continually being eroded and deposited on the shore by waves. Storm waves will erode the beach, taking the sand offshore and forming a sand bar. The sand bar acts as a temporary protective berm, absorbing wave energy that would otherwise reach the shore causing even more erosion. Once the storm subsides, gentle waves will gradually bring the sand from the sand bar back to the shore and re-attach it to the beach. Once onshore, the sand is then prone to movement by wind until sand dune grasses have arrived.

View

The view of the dune landscape and the two seas are important factors and characteristics for Skagen that have to be integrated into the design solution. The view angle of the seas from the site is in a northwest to northeast direction. As the view angle is placed in the north, the northern light is investigated to establish, which qualities the northern light possess and that should be taken into account when placing and designing the building complex.




Top view on site with sun and shadow

Qualities of a view to the North:

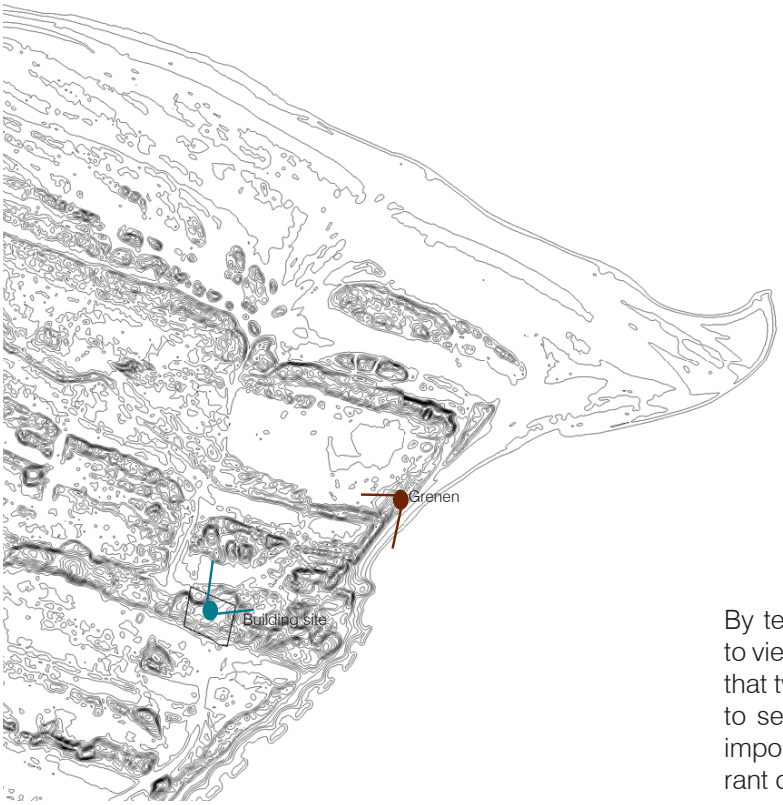
- Sun on the landscape
- Diffused light soft shadow
- Blue collared
- Light remains fairly constant throughout the day
- South light, because as the sun moved, the light would be constantly changing, in both direction and intensity
- No overheating problem
- Windows today are well-isolated and do not make cold draft problems

picture split in tree, soft base-horisont-light bright sky

There are three possible view levels from the building: ground level with nature up close, the horizontal line with view of the two seas and a sky-line with the sky.

The environment is ruled by natural forces impacting the area, which maps clear seperated areas with their own atmosphere by the materiality and texture.

Volume studies of the building form



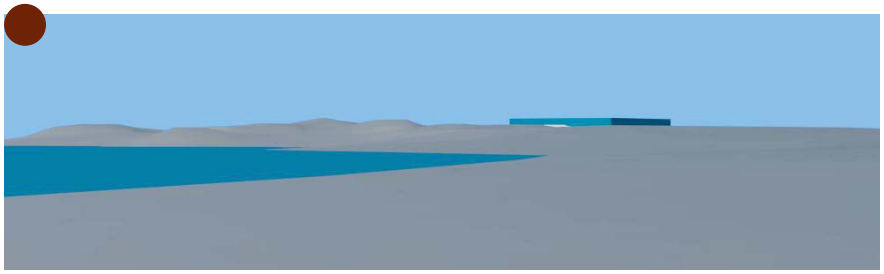
By testing different levels according to view from the building site it shows that two floors are needed to be able to see the tip of Denmark, which is important knowledge for the restaurant design.

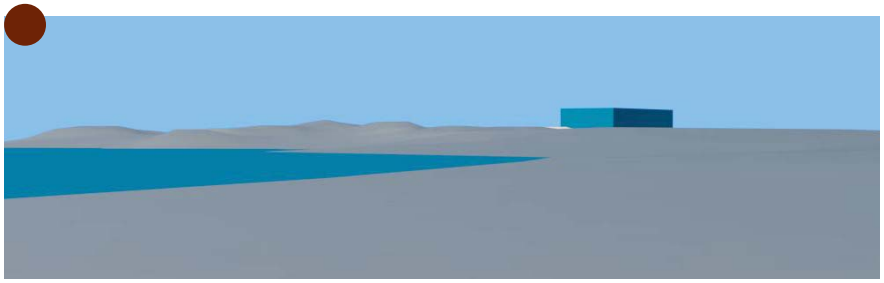
Top of dune

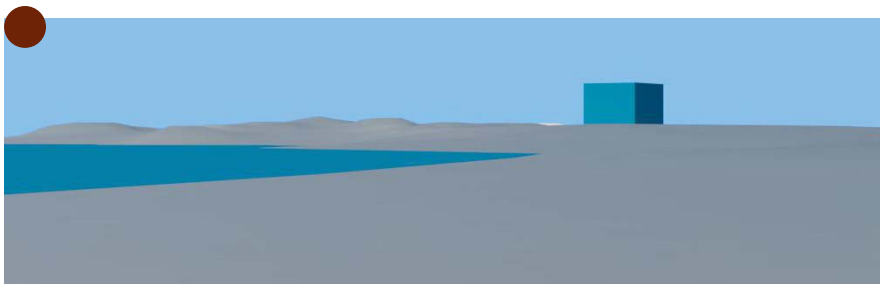
Two floors above

Three floors above

The mass of the building is almost hidden by one floor and very visible by three floors high, which become relavant to take in to consideration in relation to the estetic relation with the sourrounding context.





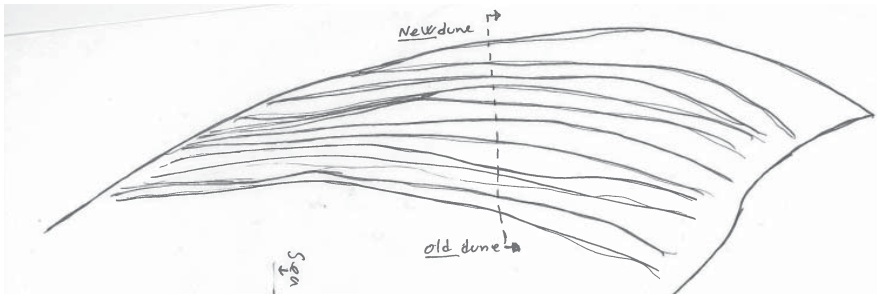


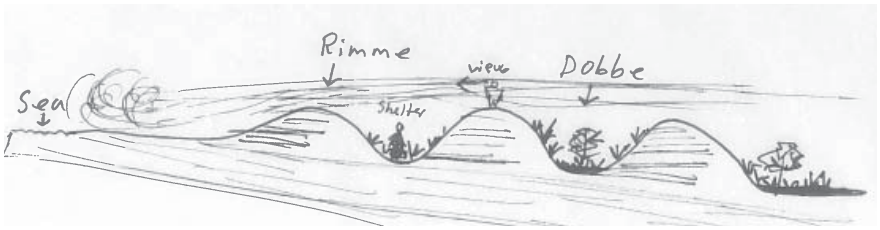
Qualities of rimme and dobbe

The characteristic landscape of the rimmer and dobber, which have their individual qualities that can be used as design paremeters in the building functions.

Quality of rimmer:
Good view to the surrounding area, dry and sandy ground, small vegetations, unprotected against nature forces - you feel the elements.

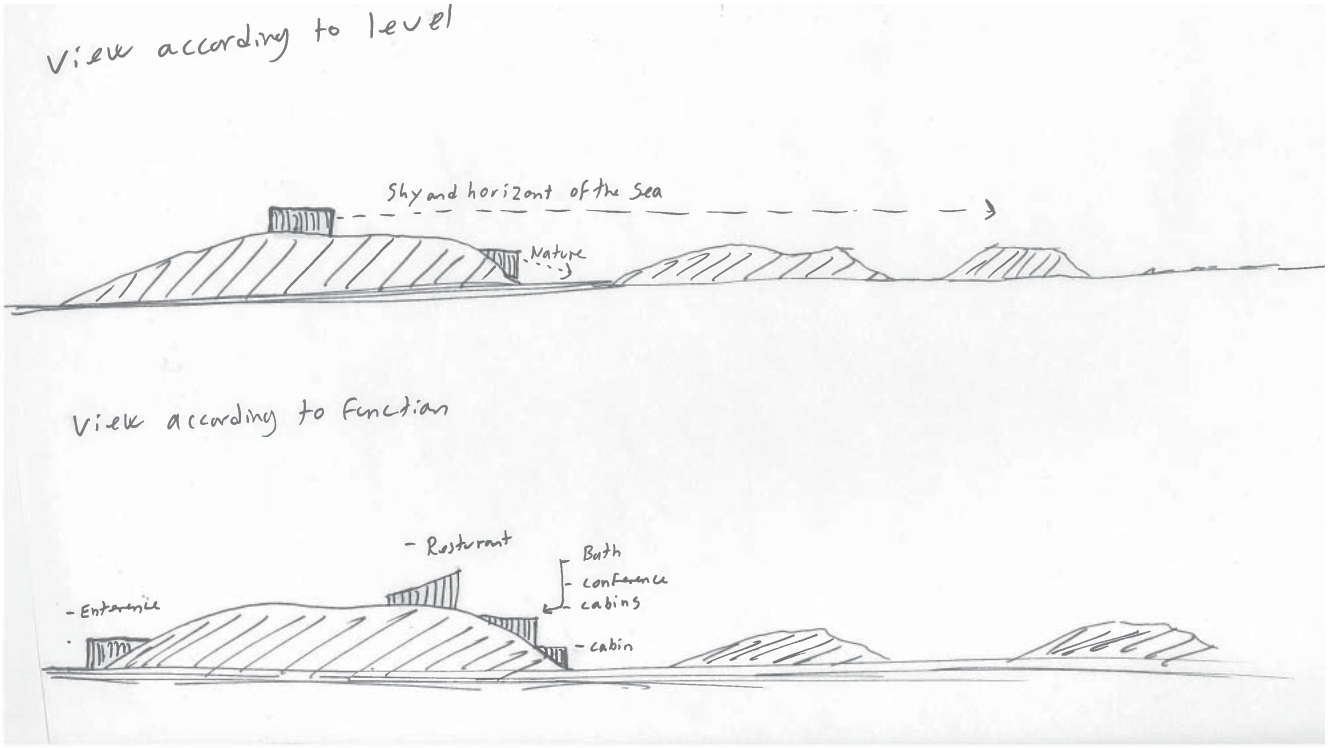
Qualities of dobber:
Close to the near surroundings of rich vegetation of fauna and animal life, shelters from the tough weather conditions, which creates a more comfortable micro climate.






View from a dobbe (low)


View from a rimme (high)



View according to room function

The different functions of the building can benefit from the view in different ways. Some will benefit from being placed in the higher levels with a view of the dune landscape and the two seas such as the restaurant, where the view is an essential attraction and part of the dining experience.

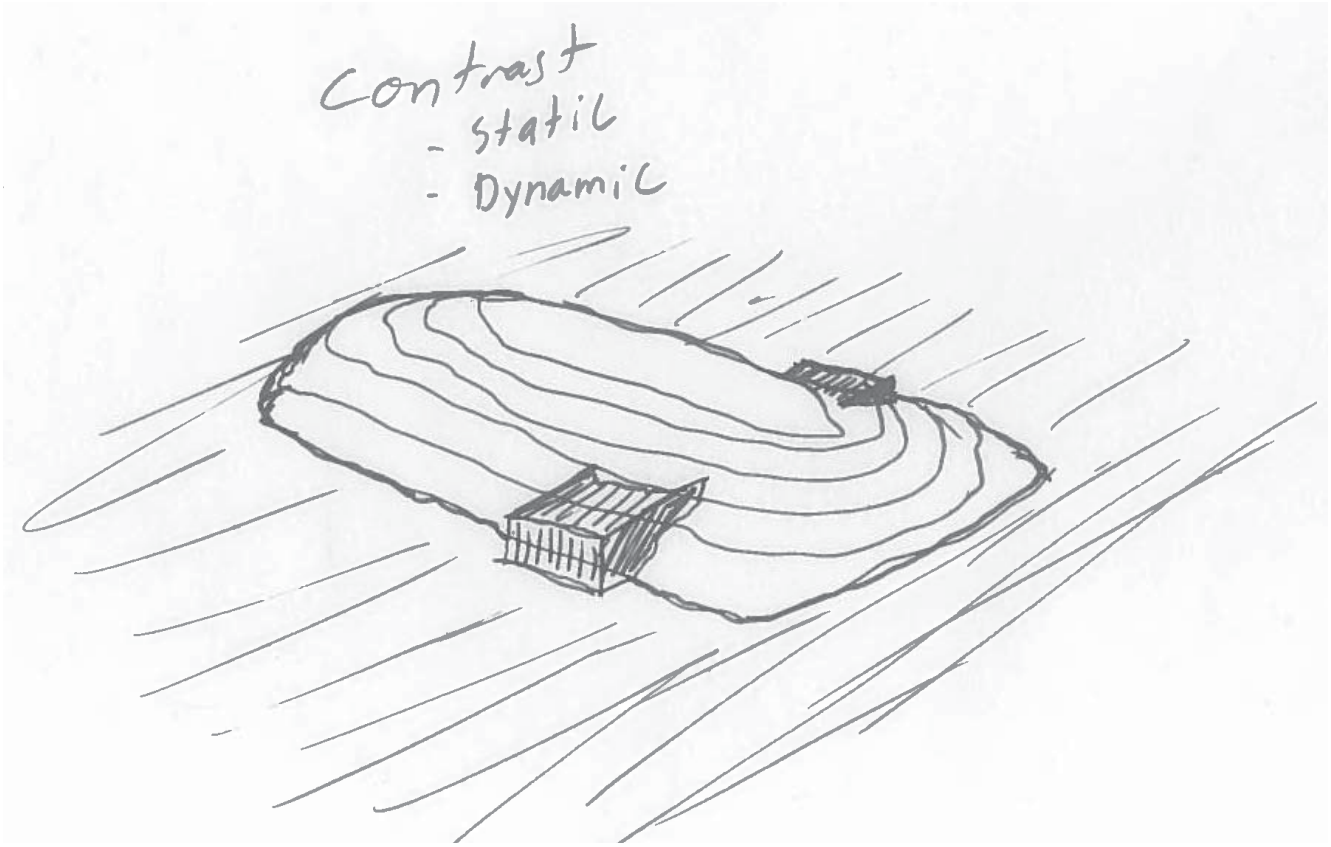
The conference room needs a good indoor environment with the option to open up or close of to the surroundings outside. The view is not an essential asset to the conference room as the focus point is at the lecturer/speaker.

The treatment area contains private zones such as massage rooms, which advantageously can be placed in an area with high privacy without the necessity of having a great view. The semi private and public zones of the treatment area such as the sauna and pool would benefit from having a great view of nature without interruption from human activities.

The cabins are flexible to the benefits of the view. They can be added a unique quality by being placed on ground level with a close interaction with nature outside or on a higher level with a good view of the landscape outside and the horizontal line.

The entrance requires easy access and can benefit from being placed at ground level.

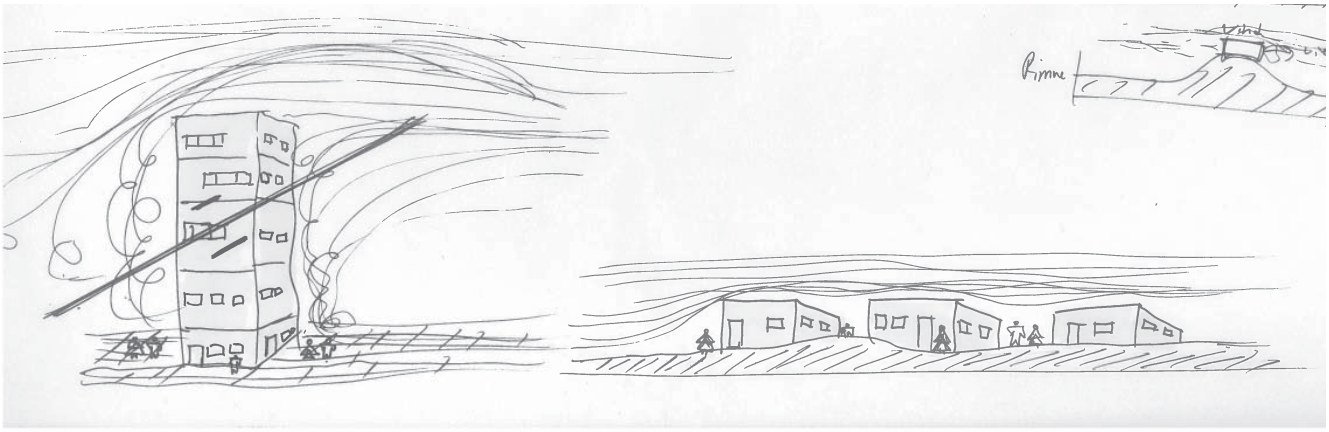
Dynamic / static elements in the area



The German bunkers from the Second World War form a strong static contrast to the dynamic and natural landscape of Grenen. The static elements underlines the history of nature and humanity intertwined. The two contrasts highlights each other's existence and character.

Local building tradition

In order to design a form that adapts to the surroundings, the design parameters from the local building tradition will be a inspiration for the design. Wind, scale, orientation and materiality are essential corner stones in shaping the local building tradition and will be taken into account in the new design for the seaside hotel.

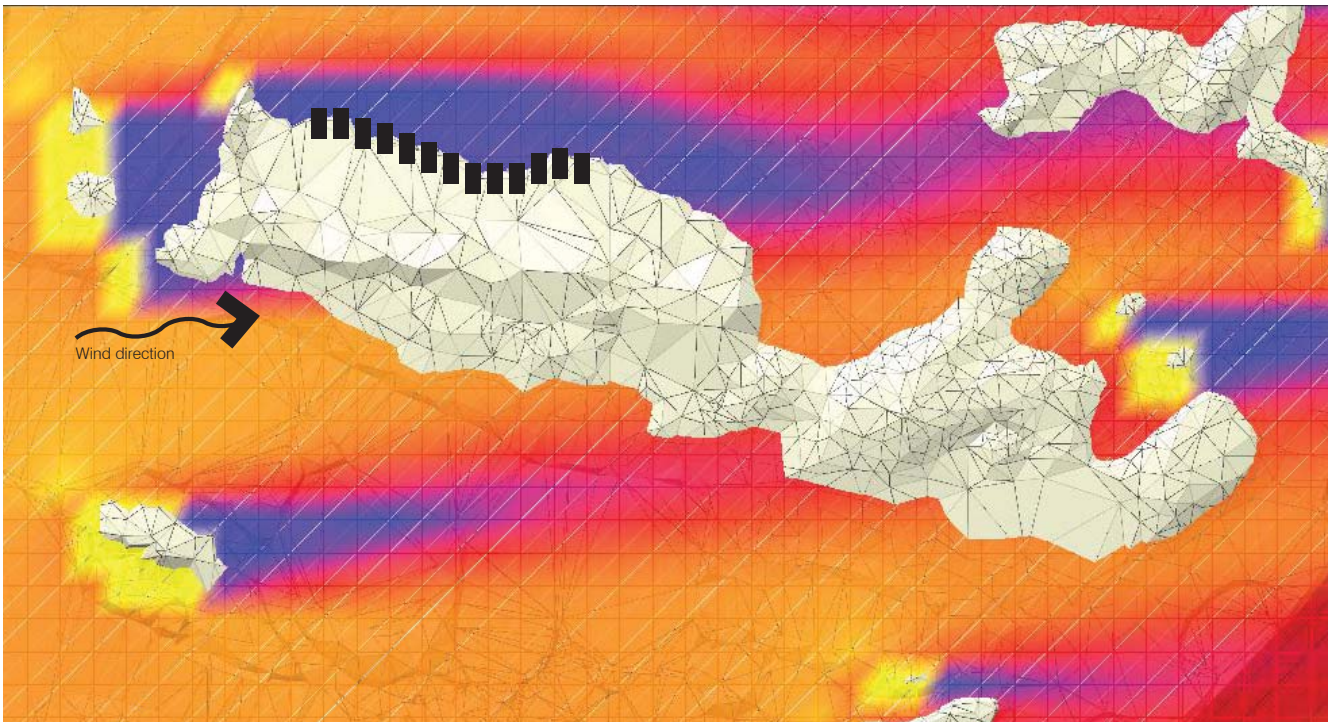


Wind conditions at the site

I will now conduct the same analysis of how the wind condition effects the dune landscape and the wind loads on the building mass in order to implement this into my placement and design of the seaside hotel.

The illustration is simulated with the common west wind and show that the north part along the edge of the dune is a calm wind zone.

The strategy for the placement of the building mass in relation to the wind will be to follow the northern edge of the dune. This will create a row of building mass that are partly integrated into and along the dune, which make them less exposed and have the advantage of shielding each other from the wind.

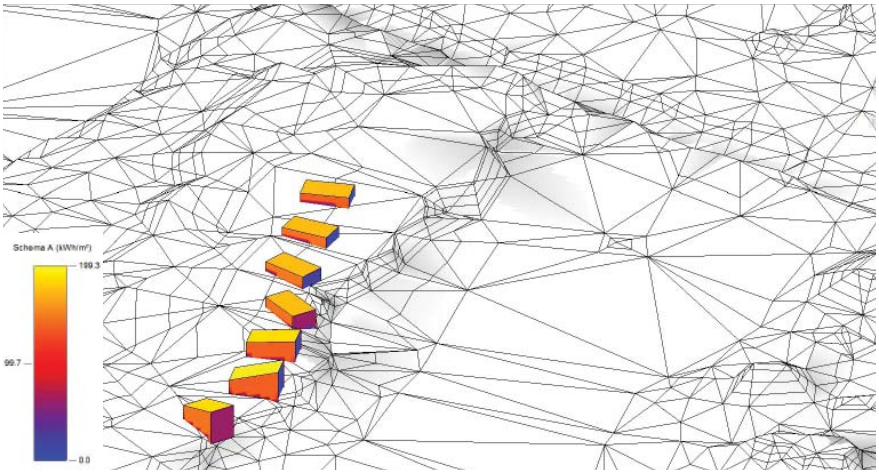


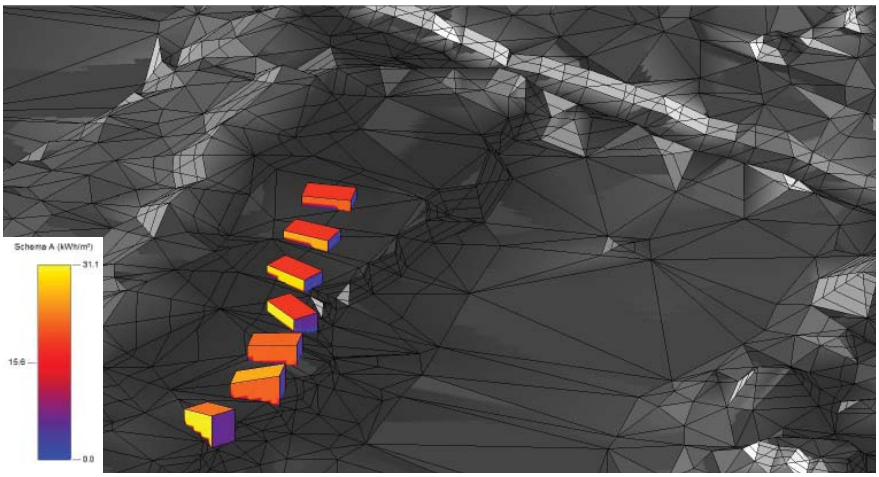
Wind simmulation on dunalandscape, with west wind.

Wind design on topographic context model.

Sun

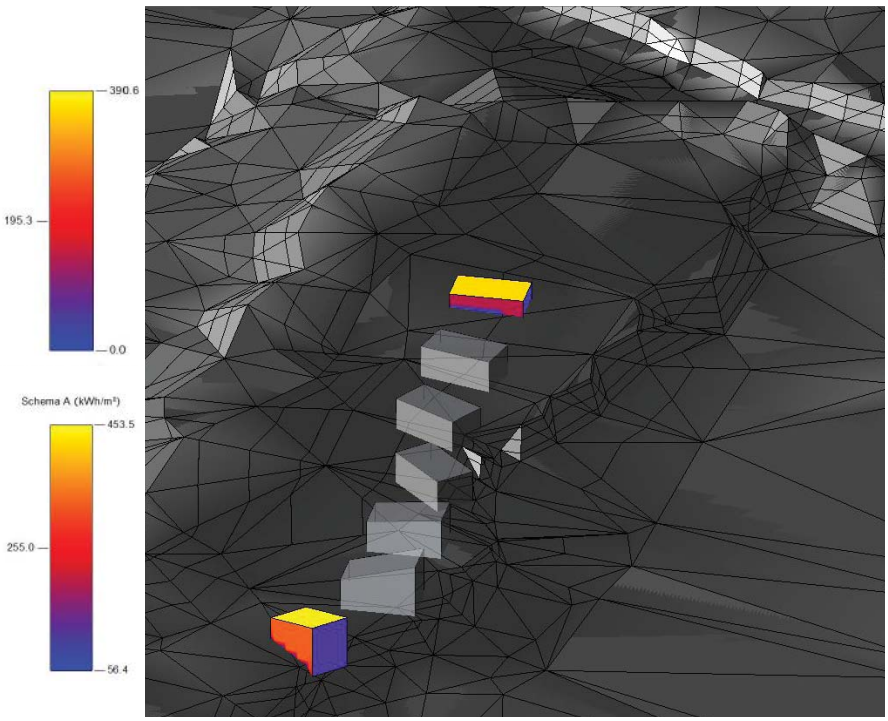
Here I will analyse the effect of the sun on the dune landscape and the building mass to get a better understanding of my site and the building design in relation to sun.



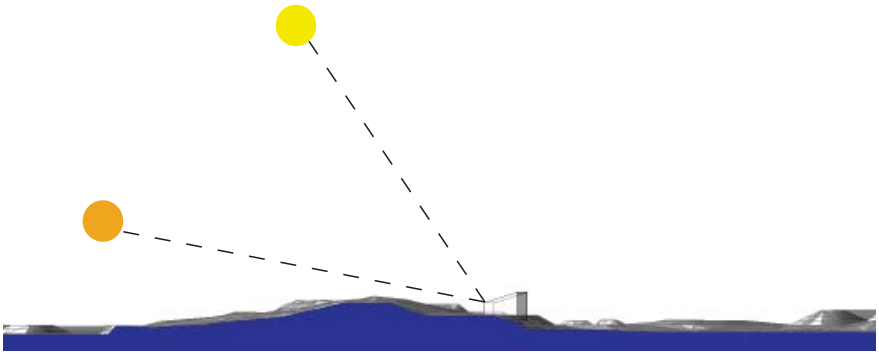


By testing the sun radiation on the different facades in relation to orientation an angle with a more energy efficient shape has been formed.

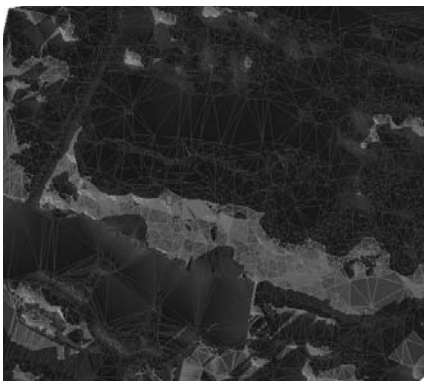
There is an huge difference in the effect from the sun radiation between the summer and winter period where it could be an advantage to be able to save some of the large energy loads from the period of summer to be used in the period of winter.



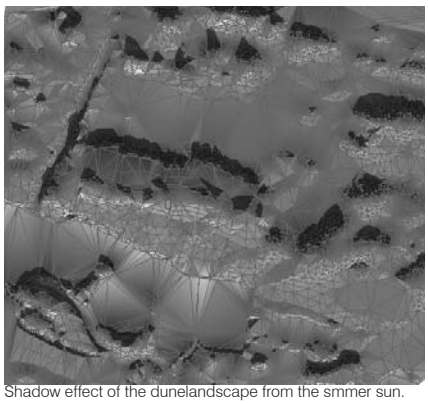
The optimized form has according to the regular box been changed in a 45 degree north northeast direction, which lets it gain more sun in the morning hours. The sloped roof also gives a better possibility to optain the sun radiation, which has an overall effect on the annual amount of kWh/m2.



The element is hidden behind the ridge of the dune, but it is leveled in a certain high that allows the roof structure to gain sun radiation from the low angled winter sun.



Shadow effect of the dune landscape from the winter sun.



Shadow effect of the dunelandscape from the smmer sun.

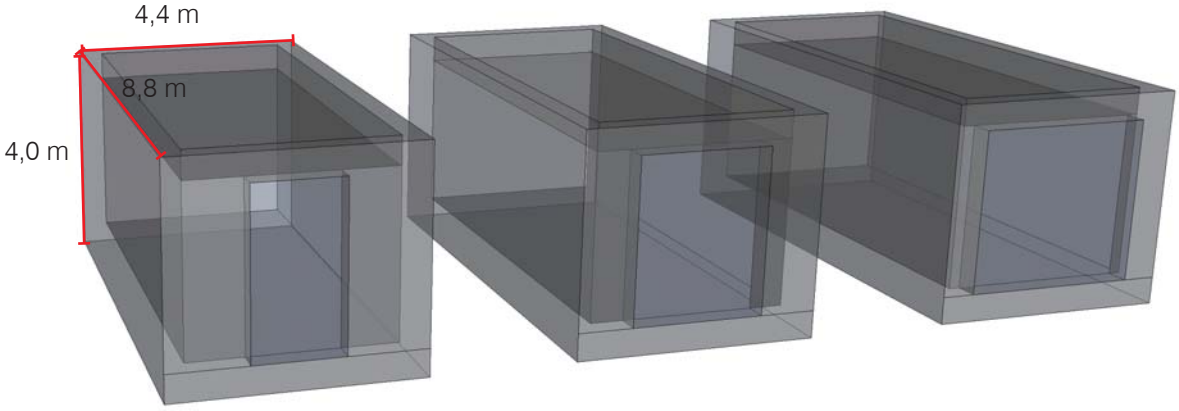
VOLUME STUDIES OF THE CABINS

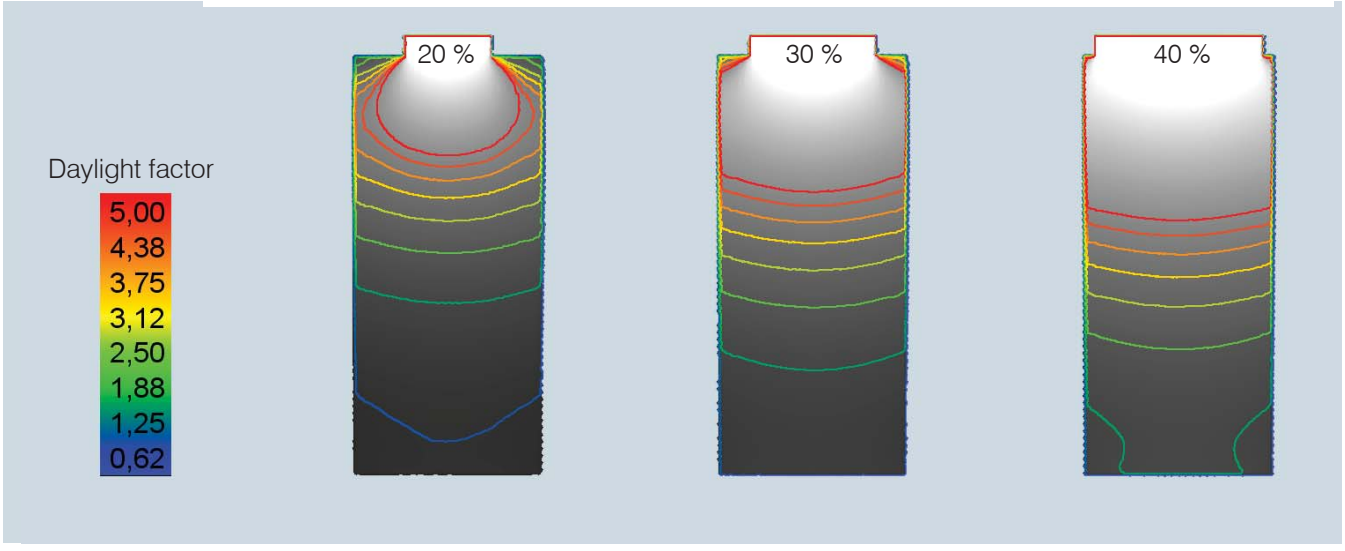
Light and energy studies

Some pre-studies of the light conditions have been done in order to ensure a good daylight factor, where the size and orientation of the windows have been challenged.

By testing three different window sizes, it becomes clear, that there is not a liner proportional effect on how deep the light is entering the cabin, which is an important fact to have in mind, when I am going to test the energy consumption for the cabin.

By choosing the middle size window on 30 percent of the floor area, I have investigated on how much direct sunlight will be illuminating the cabin according to the orientation in three different time slots: 09:00, 12:00 and 15:00 on the date 1st of March. This gives a better understanding of how efficiently the cabin design will be able to gain energy from the sunlight.



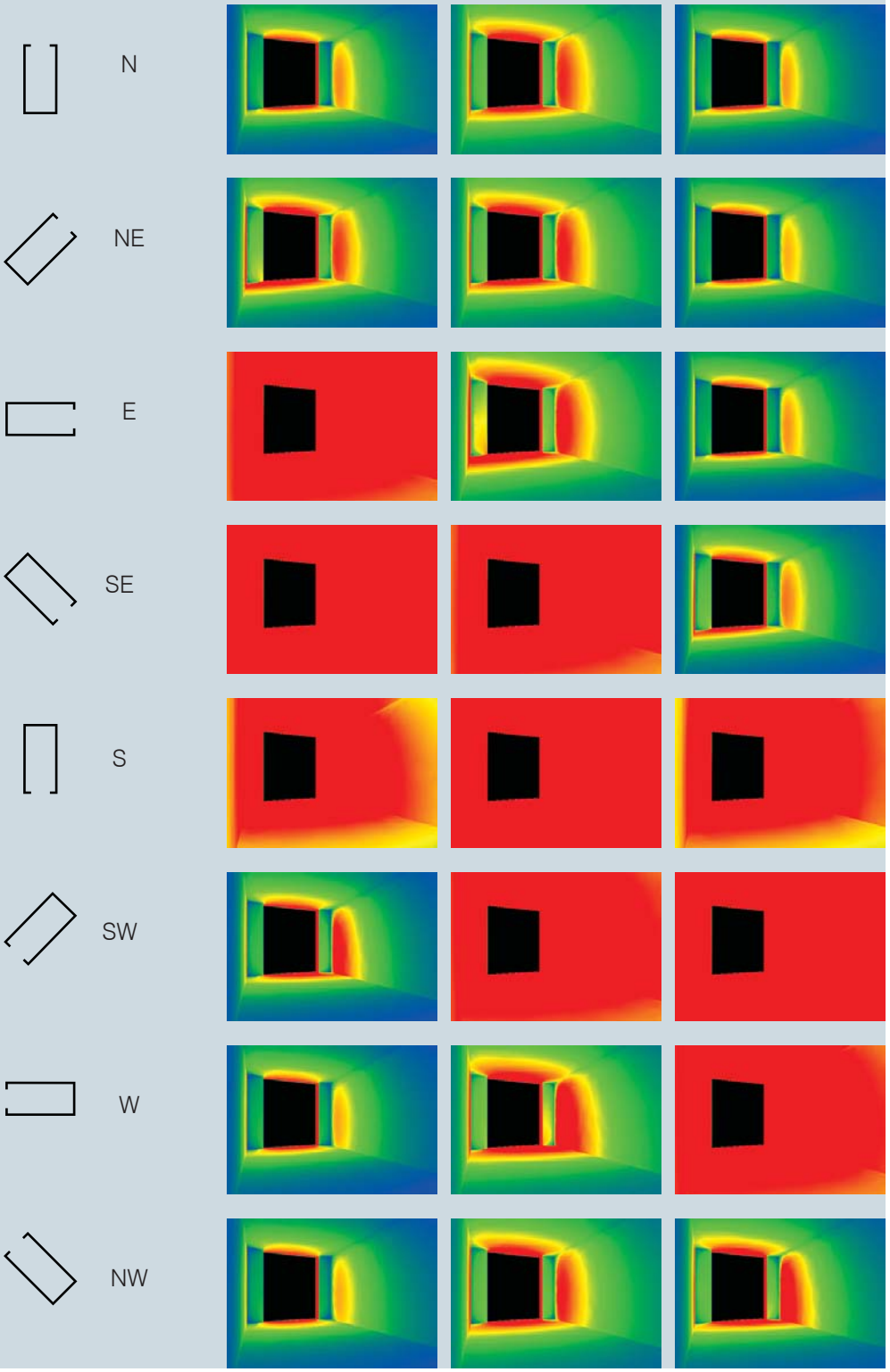


Daylightfactor

Lux

500
438
375
313
250
188
126
63

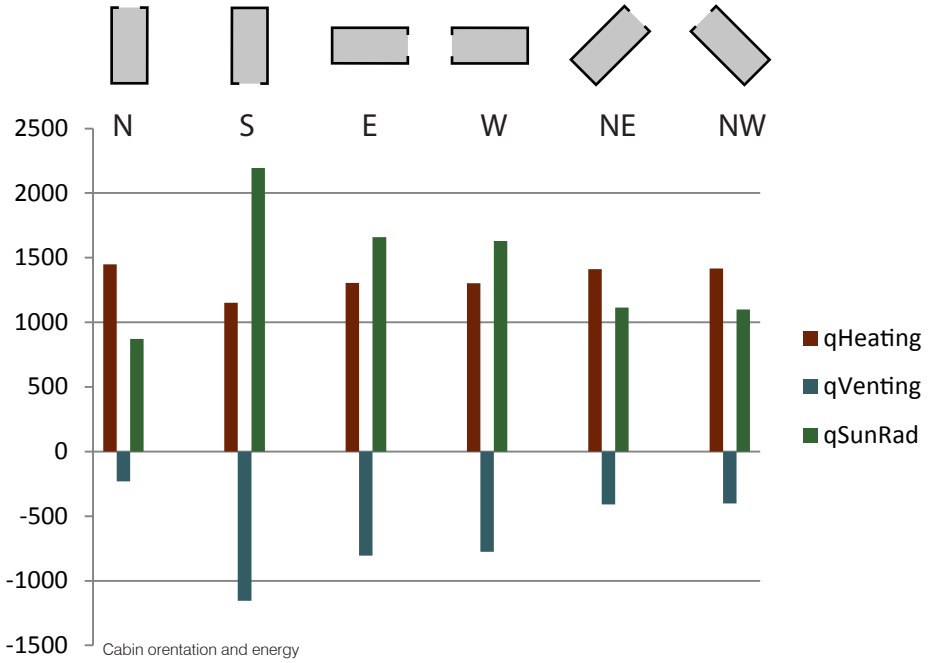
Light study with window size on 30 % of the floor area by the 1st of March



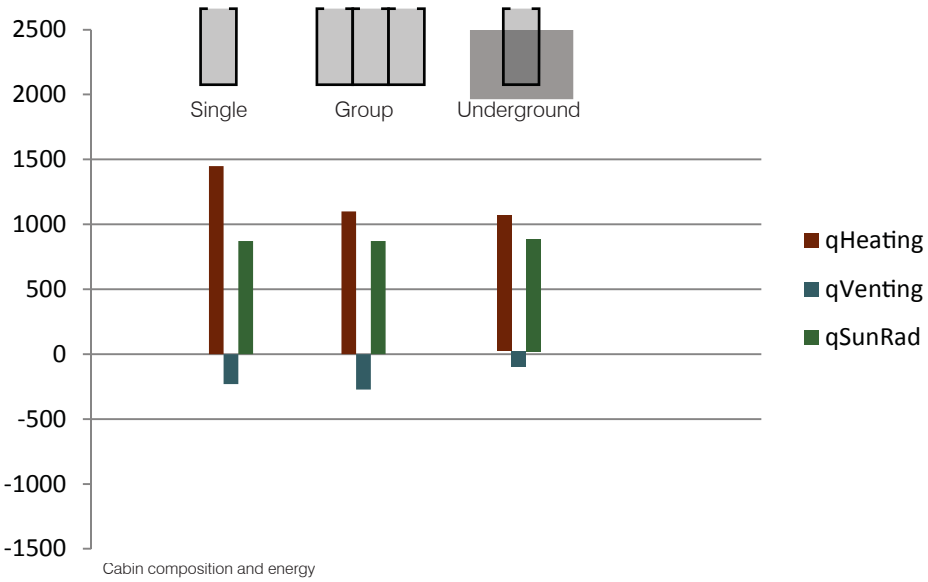
Prestudies for cabin energy demands

Here I have conducted a Bsim study of the energy result on heating, venting and sun radiation for the cabin with a highly insulated exterior wall construction and a 30 percent of the floor area window size. This is important knowledge to gain in order to integrate the energy consumption for the cabin early in the design process.

My energy result tests are focused on the orientation of the window, grouping of the cabins and placing cabin partly underground in order to see the differences and ensure a sustainable solution.



Cabin orentation and energy



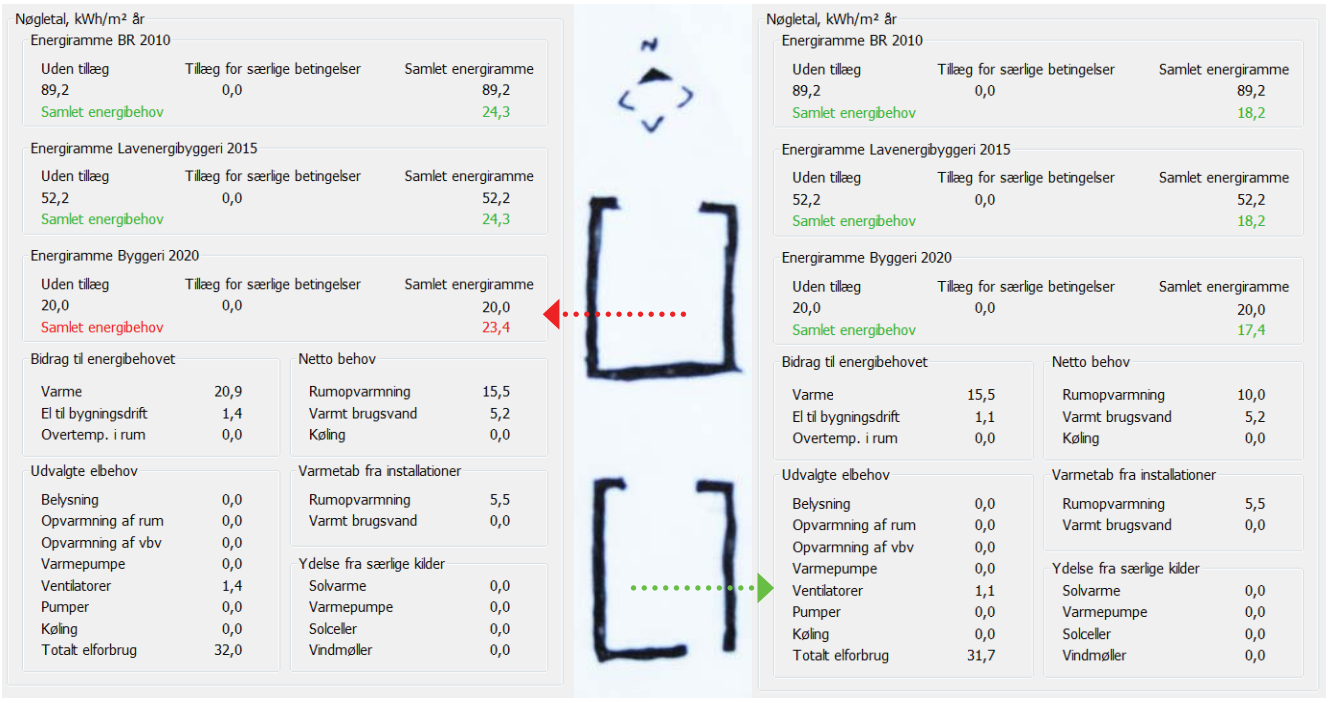
Cabin composition and energy

Energy frame

To get a more precise estimate for the total energy demand for the cabin, the results gained from Bsim are afterwards used in the Be10 program. Here the insulation, orientation of the window, heating season and venting needs are calibrated to see, if the 2020 energy demand can be reached in a realistic way.

By only having a north facing window it becomes a challenge to achieve the 2020 energy frame as the contribution to the heating demand can not get passive sun heat.

By placing a small area of south facing window in the building the result of contribution to the heat demand was dropping and the energy demands get closer to the 2020 energy frame of max 20 kWh/m2 per year.

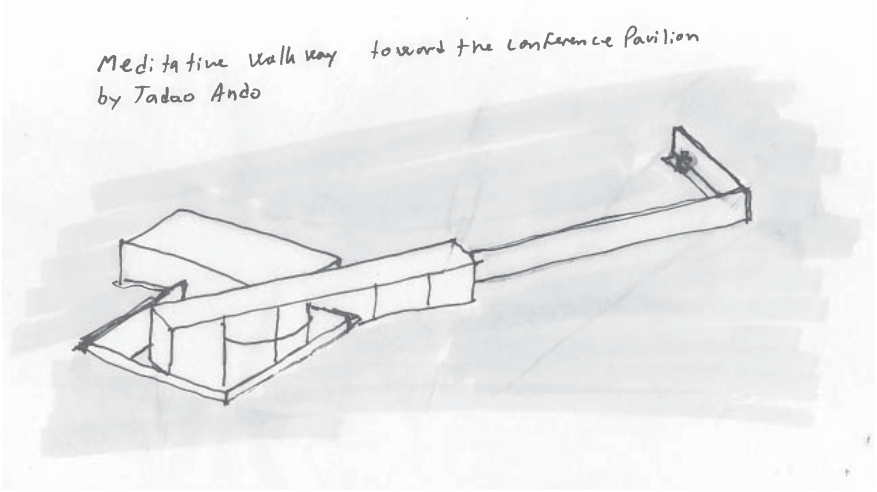


Transmissions

Relation to nature

To be in or look at nature seems to have a positive effect on our wellbeing and comfort. A natural environment has a calming effect, which creates a better mood and less stress. The unique, natural landscape at Grenen constitutes the perfect environment for using it actively by walking in the dunes and swimming in the sea or passively by looking at it. This can be used as an important design parameter for the building design by ensuring a good relation to the outdoors.

Meditative walkway toward the Conference Pavilion by Tadao Ando ILL//-- by Marsh, R. (2011),



Transmission in relation to the site conditions

The guests of the hotel often lead a civilized and hectic everyday life and the arrival at the seaside hotel should create a transmission into a tranquil place surrounded by unspoiled nature, wildlife and a calm atmosphere. Different means can be used to create this physical as well as mental transmission zone from the parking lot to the cabins.

-From car - Hotel - Cabin
-From Civil - mix - nature
-From Stress - mix - relax

Transmission study

There is a transmission, when you are in the gap between the modern hectic lifestyle and on your way to visit a place that allows you to relax and connect to the present moment and your surroundings. This transmission can be used as an integrated part both in respect to the physical and mental arrival at the seaside hotel.

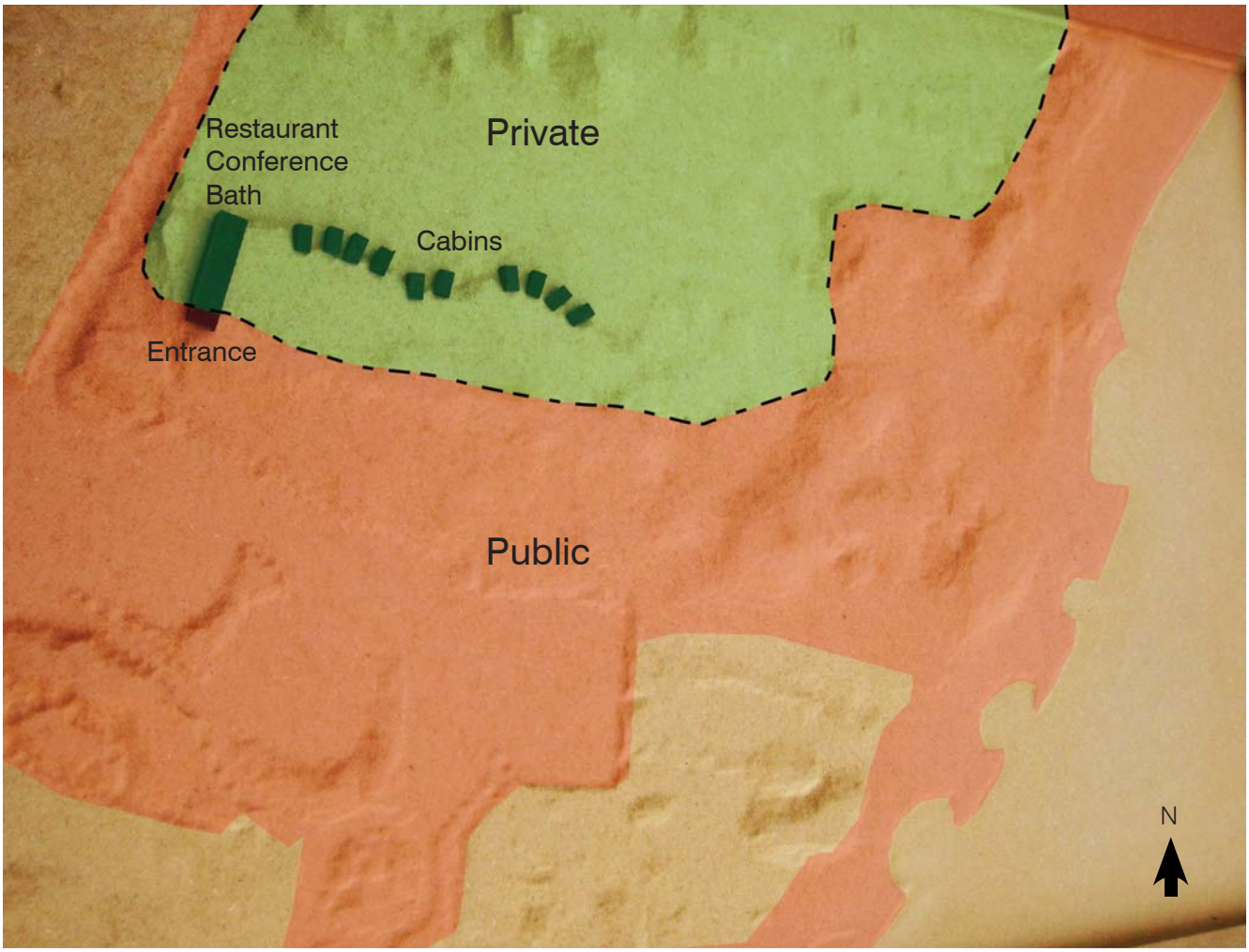
As an example, one can study the conference pavilion by Tadao Ando, where a tall, concrete wall guides the guest along a small path, where only one person can pass at a time. It creates a world of its own and a meditative transmission zone, where the guests have time to concentrate on themselves and their own thoughts without any disturbances. This clears the mind of the guests and prepares them to absorb the many impressions, when they arrive at the conference pavilion. The wall also has a psychical dividing effect creating two sides, which can be used to divide a site into different zones. Finally, due to its height and solid material the wall generates a volume and form that has a strong visual effect and expression.

Dividing of site: public / private zones

The area at Grenen can be divided into a public zone and a more private zone. The tip of Grenen with the two seas colliding attracts more than 1.5 million people every year, which creates a lot of human traffic from the parking area and along the beach to the tip. It proposes a challenge to create a seaside hotel with a calm atmosphere in the unspoiled nature, when it lies in so close proximity to one of the most visited places in Denmark.

However, close to the public parking lot, just behind the large dune, you find a much more private area with unspoiled nature that is not in direct line to Grenen. It therefore lies untouched by the many tourists and offers a unique spot for placing a seaside hotel with a unique view of the iconic tip of Grenen. The public and private qualities of the site provides the seaside hotel with a good infrastructure with easy access as well as unspoiled nature.

The illustration present a plan solution upon the different functions of the building and how they can be placed in relation to the private and more public zones.



Plan solution upon the different functions of the building and how they can be placed in relation to the private and more public zones.

Case studies

There has been done cases studies to examine different aspects in relation to the project. Villa Vals exemplifies building underground, which was an initial idea in the project, and address the feeling of being in a protected cave. Juvet Landscape Hotel was used to learn about building in a sensitive natural environment and creating a focus on the nature outside by having an understated interior. To understand the feeling of being a guest on a gourmet seaside resort, I paid a visit to Strandgaarden seaside hotel on Laeso and studied the traditional Svinkløv Bath Resort.

Svinkløv Bath Resort, authenticity

Svinkløv seaside resort is the history of how an old wooden building placed in the middle of the dunes in Han Herred's wild and untouched nature is affected and how the resort itself affects the owner, employees and guests by the unique harmony between the building, nature and the people. Part of the secret behind the seaside resort is to be found in the special factor of a strong relationship that connects people to the place.
The building is designed in a style that fits well with the location and the landscape, which also made it easier to get a building dispensation to place it in the first row of the dunes. This locating gives many advantages for the building as when the sun rise in the summer season on the eastern windows and the light falls all the way through the building and the same happens again at sunset, where the sun brings red rays through the building. Another advantage for the building is that it is placed just behind a high dune, which ensures protection from the heavy south western storms that appear in this area.

It is all about feeling and experiencing the eternally changing sky, the light over the ocean and the changing colours of green and brown at the hillside. It is in this context that the natural environment constantly is present in the everyday life of the hotel.

The building's atmosphere and the visitors' behaviour are controlled by the weather and surrounding environment, where it happens time after time that busy guests after a few days, change rhythm and come to relax. It only takes a few early summer mornings, a couple of long walks and a sunset or two seen from a teak chair in front of the terrace before it happens.
Those who can understand and feel the interaction between nature, architecture and people runs the risk of being caught in Svinkløv bath hotel's magic, but it is hardly the worst thing that can happen.

The guests social position has changed from the early 1900s to to day, where guest in the past mostly were very wealthy citizens who could afford a stay, where today the guest consists of a much wider range of the Danish population. (Emborg, L. and Kragh, K. J. 2000).

Conclusion
To capture the authenticity of a place it is relevant to focus on the interaction between architecture, nature and the people as a tool to increase focus on the natural experience of the place. This lets the users feel that they are a part of the natural environment and take more responsibility. This condition will be used to develop a design solution for my project where the authenticity in form of history, nature and tradition are important factors for a seaside hotel on Grenen in order for it to be an attractive tourist destination with space to relax and connect to the surroundings.


Svinkløv
Badehotel.

Villa Vals, building underground

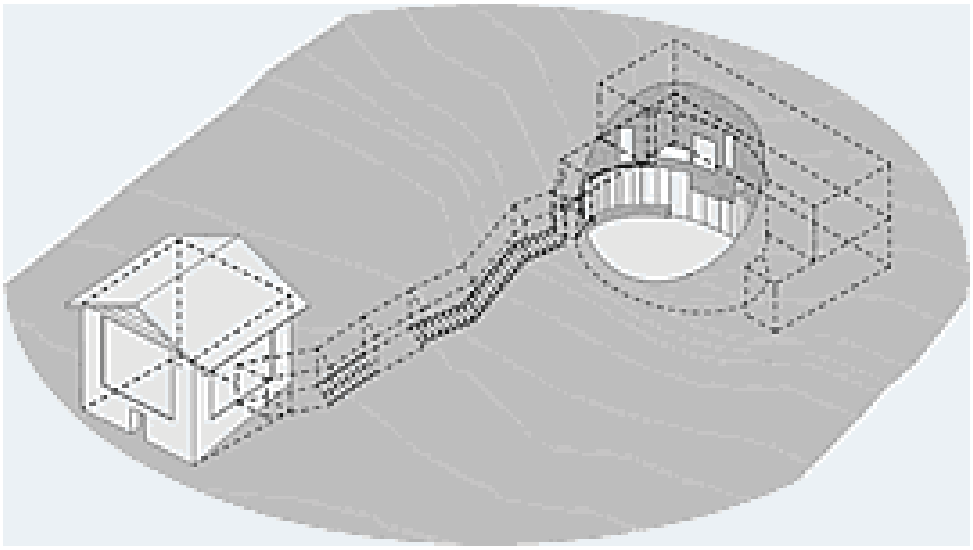
Location: next to the famous Therme Vals in Schweitzerland
Designers: Bjarne Mastenbroek_ SeARCH and Christian Müller_ CMA

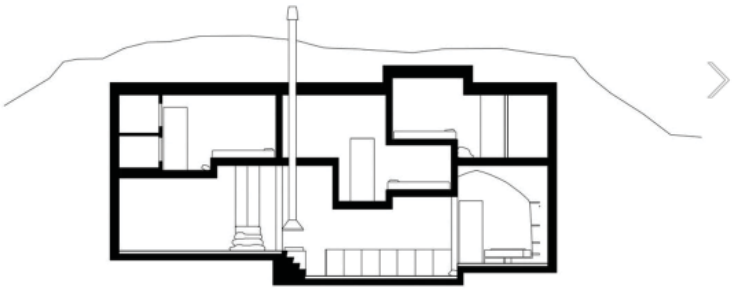
"Villa Vals makes you ready to go back to the city" (De vilde huse. 2014)

This case study lets me get an insight in the possibility of how to build a different and unique modern holiday home underground on a hill side so that it does not disturb the surrounding natural landscape, but still have a great view of the scenery across the valley and a good indoor comfort. As it is more expensive to build underground the space has to be used as efficiently as possibly, which has been done by using complex levels for the different plans that address the function and needs of a specific room, whereas for example the bedrooms have a lower ceiling height than the living room. The complex levels of the different plans also address that the different rooms are able to put you in a different mood and state of mind, as Bjarne Mastenbroek mentioned in the interview that "architecture is about putting you in a certain state of mind."

The entrance of the house is connected from a different place that does not disturb the private place on the terrace. Local building materials and traditions have been used to build the house, where stone concrete and wood are used in a way where they work well together. The windows are dictated by the topography of the hill to orientate almost in the same direction, but they frame the view in a way where it does not have to be all the view, but just a certain part, which makes it more powerful, it just have to be carefully selected. (De vilde huse. 2014)

This way of building underground also addresses how we as humans originally was born to be cave men, which brings us down to the essence of protection and what a house present when being underground. Where you have one entrance and then you have everything around you in just one room. You were feeling save underground, which is an essential factor for us as human in order to focus on other things. This can be related to the sense of safety, when we were lying in a fetal position inside the womb of our mother, where the sense of safety was complete. A home is in its simplicity a place that is able to comfort and to shelter. (De vilde huse. 2014)





Juvet Landscape Hotel, respecting nature

Location: Valldal Norway
Designers: Jensen & Skodvin Arkitektkontor

«The idea emerged as an opportunity to exploit breath taking scenery with minimal intervention»

This case study has great references to my concept of a modern seaside hotel that should be able to give the guest a unique authentic experience with the natural surrounding landscape in focus and how modern architecture is able to go hand in hand with the principles of the local building tradition.

Juvet Landscape Hotel is a meeting between the raw Norwegian nature, cultural history and modern architecture. It makes you feel that you are living in nature, as when you are staying in a tent, but just more comfortable. The concept of Juvet landscape hotel appeals to the modern tourist's need for getting a unique experience.

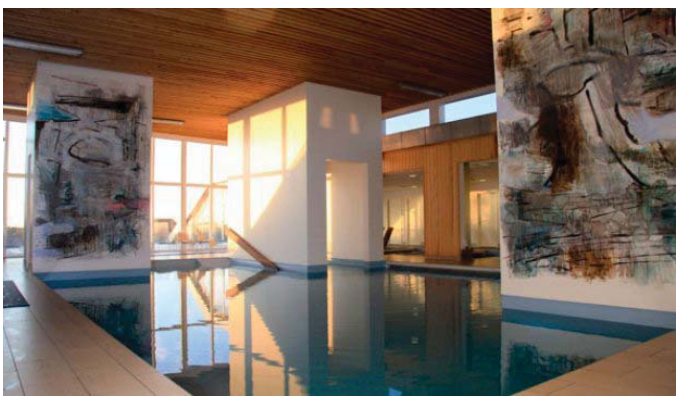
The cabins are understated by having no paintings on the wall and by painting them black inside, using the concept of a 'camera house' where the windows become the lenses, that focus on what it is all about – the beautiful scenery outside. It creates a focus on nature and you should not be sitting inside looking at it thorough a lens, but rather be getting out there and use it. As the owner Knut Slinning mentions in the interview to a question on what kind of hotel it will be; "It is not a hotel but an experience of nature".
Dinner is served on a long table in the old wooden handcrafted stable building, where the guests are sitting together and as most of the guests have parallel interests for architecture or design and nature experiences, the talk is running great across the table.

The building method makes a minimal footprint on nature by not using excavator and dynamite, but only having eight pieces of 40 mm columns to lift and carry the load of each cabin. Each cabin has a different form that is dictated by the surrounding trees, which are not to be removed. (De Vilde hoteller. 2014)

Strandgaarden Seaside Resort, the experince

Location: Laeso, island
The building: 275 years old renovated building in the traditional building tradition.

By having a stay on Strandgaarden Seaside Resort I got the opportunity to experience on my own body, what it means to be a guest on a seaside resort that is able to serve you with a unique, authentic and gastronomic gesture. A part of the hotel complex is situated inside a unique, old thatched cottage that still contains its originally interiors in the living rooms, its characteristic low ceiling height and paned windows, which gives you a unique and authentic experience. The restaurant is also situated in the old thatched cottage and is a very important factor of the seaside resort's popularity, where they serve gourmet dishes, which are designed upon local food whereas the lobster is the most popular food, which also characterizes Læsø. Another unique ingredient of Læsø is the sea salt, which they produce in an old manner and the rest product is used for wellness in a thermal bath and treatment centre, placed nearby Strandgaarden Seaside Resort. It gives the hotel guest a great bonus that they are able to get a unique thermal bath and treatment experience delivered by the local sea salt production. Around the old thatched cottage there has been build modern cabins, which gesture the guest with luxury and comfort of what is needed to have a great stay. This includes a small entrance, where you have the opportunity to go to the toilet or in to the living/bedroom. All the cabins have their own personal entrance and terrace with direct access to the surrounding landscape, which makes you feel closer to nature and gives you a sense of freedom.



Vision

I want to design a seaside hotel that does not disturb the experience of the unspoiled nature, but at the same time is visible to the world around.

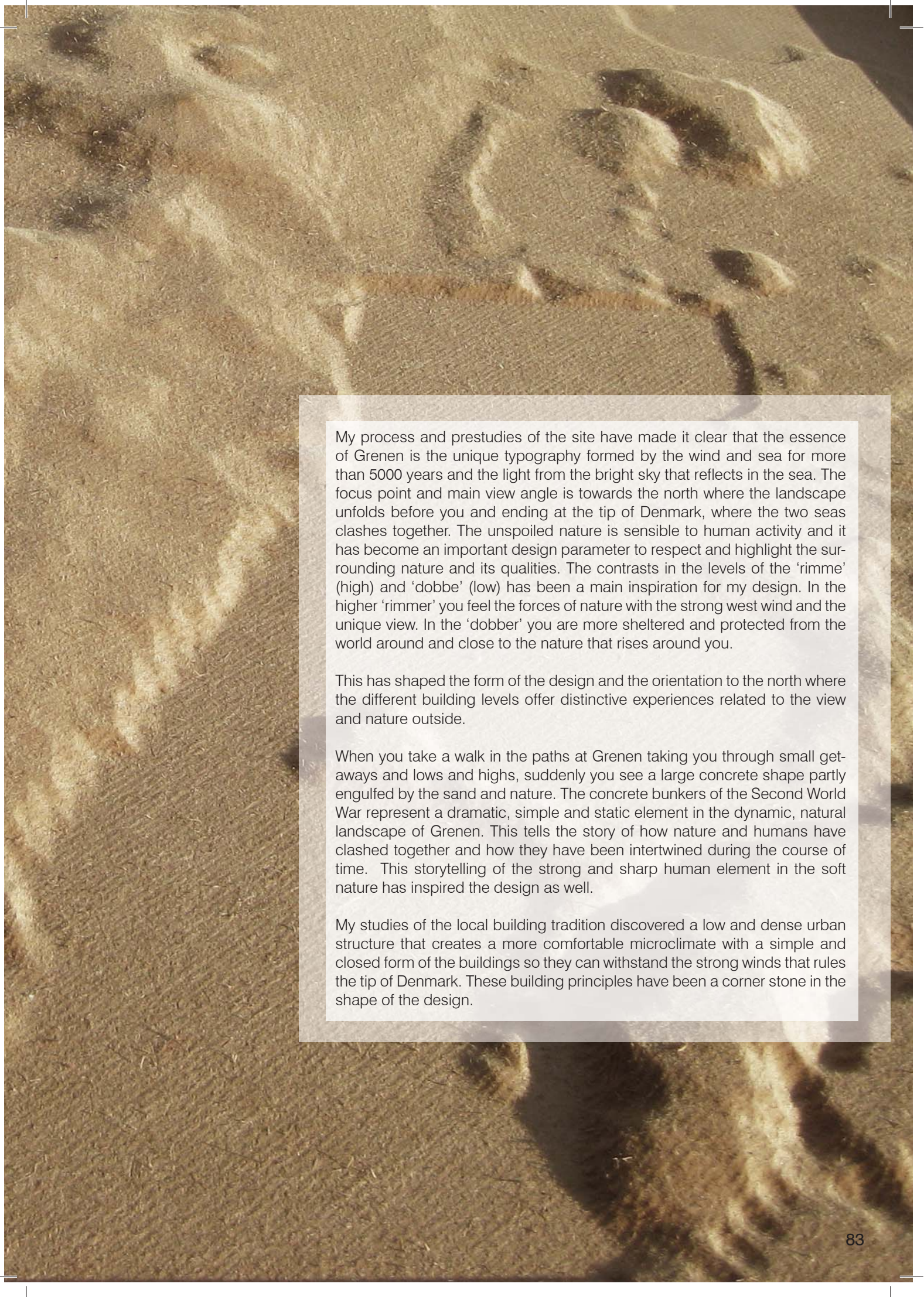
Moreover, I want to create a building design that frames nature as the main experience and with this create a relaxing oasis for body and soul.

The building design should have a simple expression as a static contrast to the dynamic dune landscape and by this the hotel and nature highlights each other's existence and characteristics.

As the view angle to the North is an essential parameter, I want to create a building where the design gives the optimal view, but at the same time is energy efficient with its northwards windows.

The atmosphere of the hotel appeals to people who seek content and meaning by authentic experiences.

Design



My process and prestudies of the site have made it clear that the essence of Grenen is the unique typography formed by the wind and sea for more than 5000 years and the light from the bright sky that reflects in the sea. The focus point and main view angle is towards the north where the landscape unfolds before you and ending at the tip of Denmark, where the two seas clashes together. The unspoiled nature is sensible to human activity and it has become an important design parameter to respect and highlight the surrounding nature and its qualities. The contrasts in the levels of the 'rimme' (high) and 'dobbe' (low) has been a main inspiration for my design. In the higher 'rimmer' you feel the forces of nature with the strong west wind and the unique view. In the 'dobber' you are more sheltered and protected from the world around and close to the nature that rises around you.

This has shaped the form of the design and the orientation to the north where the different building levels offer distinctive experiences related to the view and nature outside.

When you take a walk in the paths at Grenen taking you through small getaways and lows and highs, suddenly you see a large concrete shape partly engulfed by the sand and nature. The concrete bunkers of the Second World War represent a dramatic, simple and static element in the dynamic, natural landscape of Grenen. This tells the story of how nature and humans have clashed together and how they have been intertwined during the course of time. This storytelling of the strong and sharp human element in the soft nature has inspired the design as well.

My studies of the local building tradition discovered a low and dense urban structure that creates a more comfortable microclimate with a simple and closed form of the buildings so they can withstand the strong winds that rules the tip of Denmark. These building principles have been a corner stone in the shape of the design.

Initial sketches

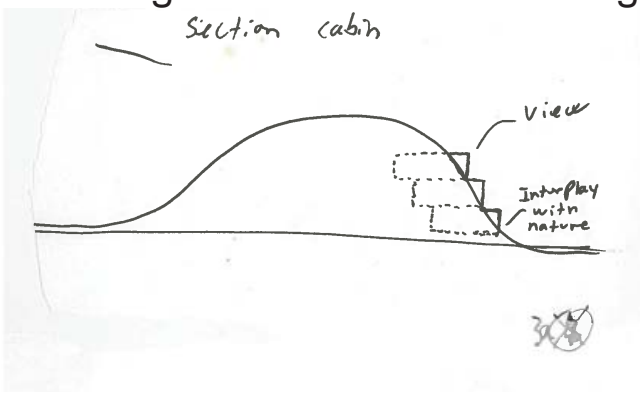
In the early stages of the process before my final pre-studies I tried to kick off the design process by idea generating different initial designs by sketching, 3D digital modelling as well as hand modelling. Here I explored different shapes and forms for conceptual design ideas as well as the placement of my building mass on the site. The material generated and tested in this phase has been part of shaping the final design by keeping the durable ideas and discarding other ideas.

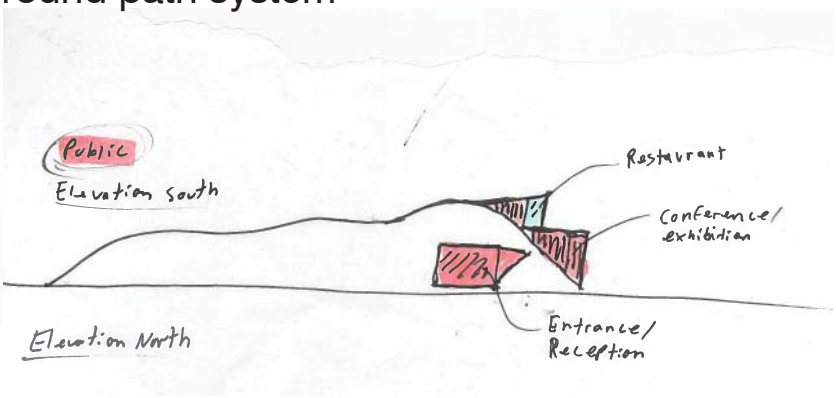
I started out by creating an underground design, where the building was hidden within the dune. I initially wanted to hide the building underground so that it did not disturb the nature and unspoiled experience of Grenen. It gives the guest a higher sense of privacy, when hidden away from the popular pathway to the tip of Grenen. It gives me the opportunity to give the hotel a large volume for the functions of the building. But I concluded the dune simply was not high enough to accommodate the entire building. To cover all the functions I would have to add sandy onto the dune, which would make the dune stand out from the rest of the dune landscape making it twice as high. It would look human made and then the idea of an unspoiled natural environment would be lost. It would also be a very expensive way to build and it could potentially destroy the dunes and be an unnatural element.

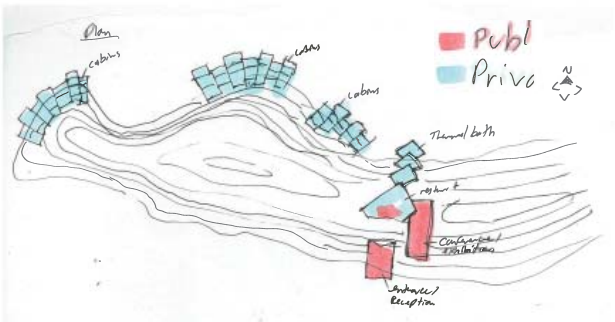
It lead me to a different and more visible design without an underground path system. I created a main building for the public functions such as reception, conference, treatment area and restaurant. The private hotel rooms have been placed in cabins with a connecting path system to the main building. I started by doing volume studies of the cabins and I placed them according to the early studies of orientation. I placed the main building in the center of the site with cabins on both side to give a symmetrical distance to the cabins. I tried to shape the language of the building where I used simply forms to create the design.

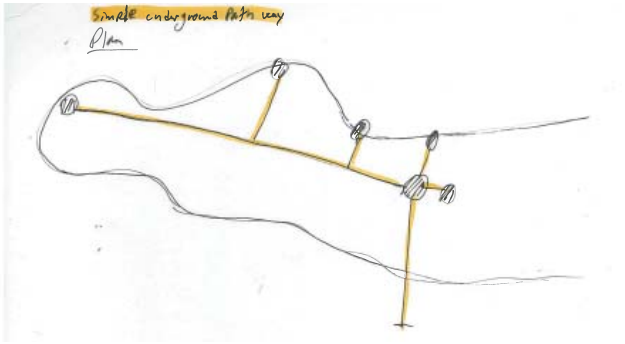
The cabins were simple boxes placed in connecting sets and in two levels to optimize the energy demand. For the main building, I wanted to create a more ionic design visible from a distance, but still with a simple form and in respect for the surrounding nature. The placement of the main building in the center made the daily operations of the building difficult such as the delivery of utilities. These initial tries and sketches led me to the final design proposal.

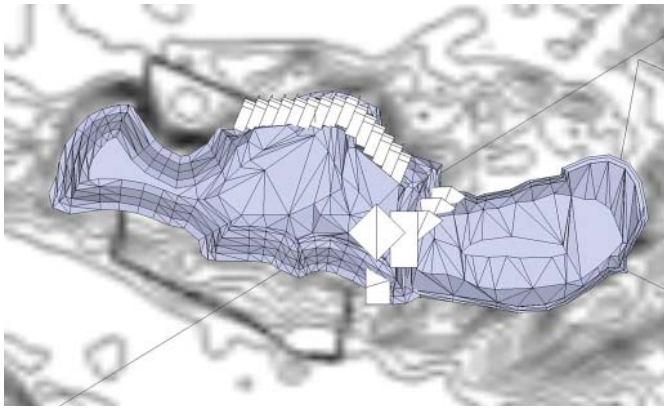
Design of an idea with a underground path system

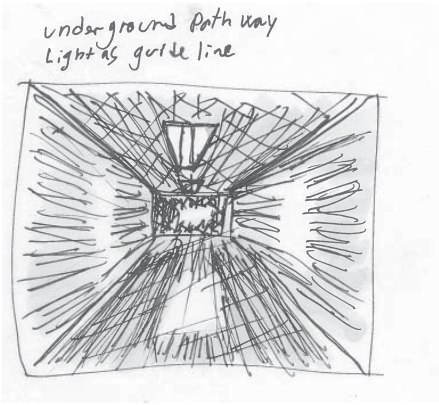


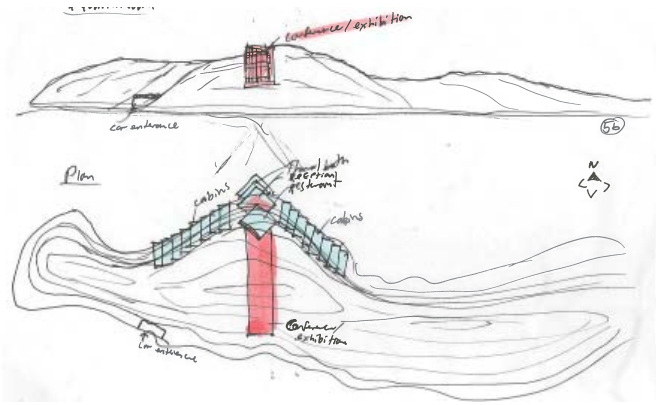


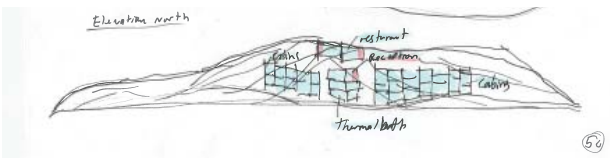


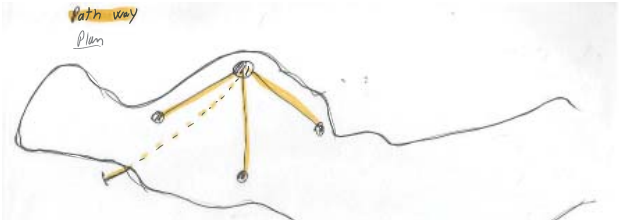




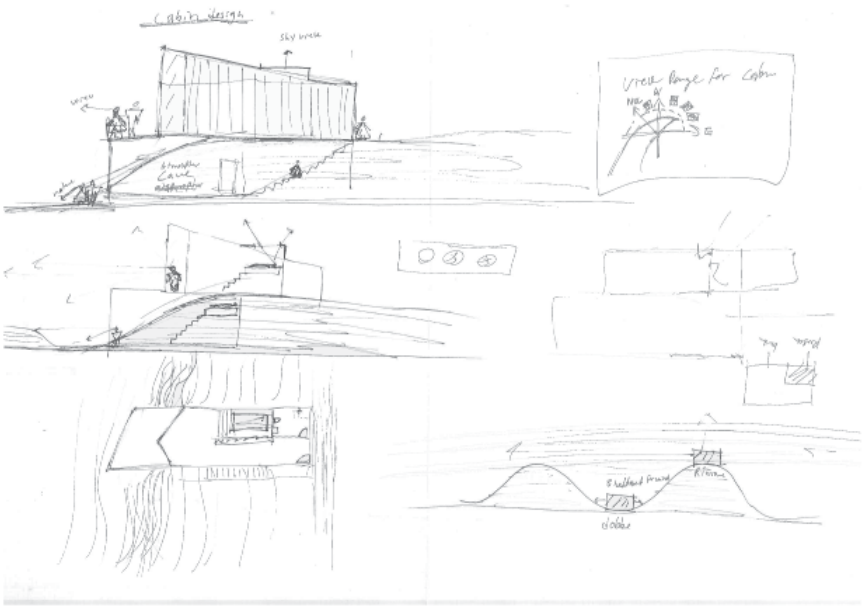


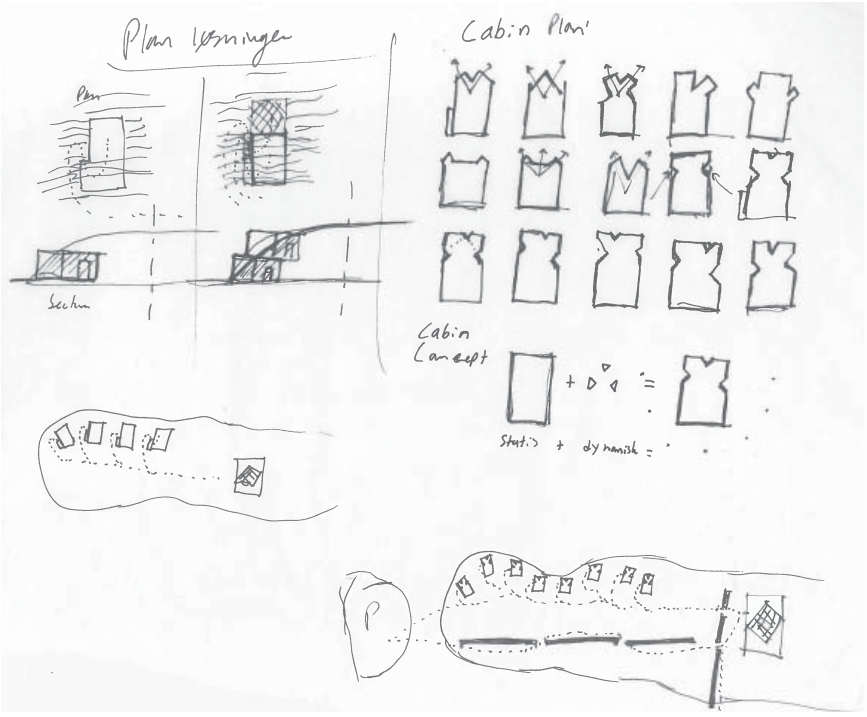




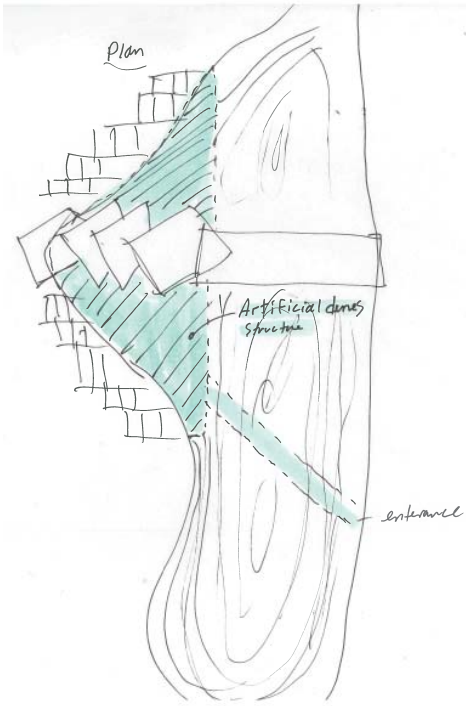


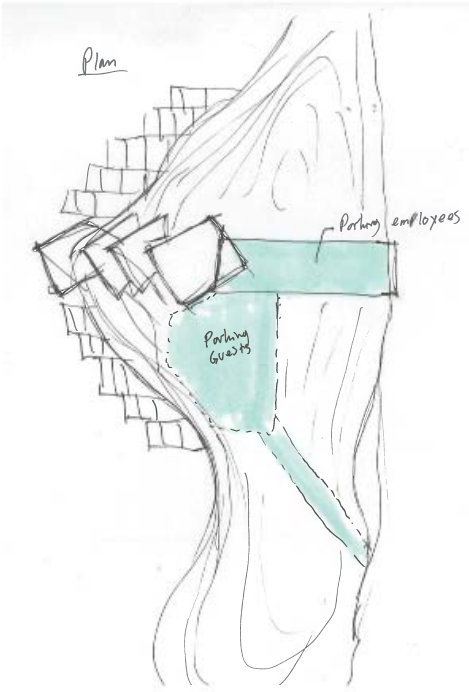
Design on cabin, view, orentation etc.

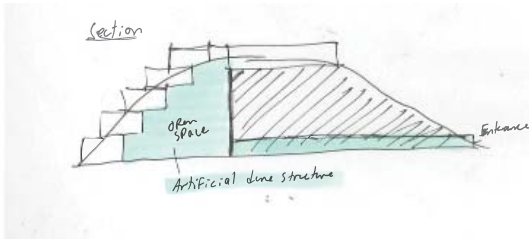


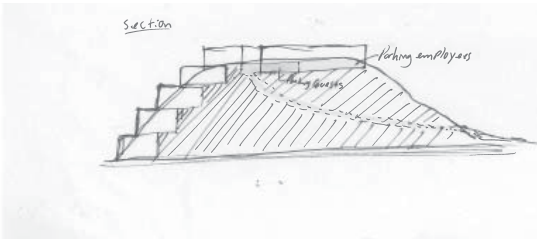


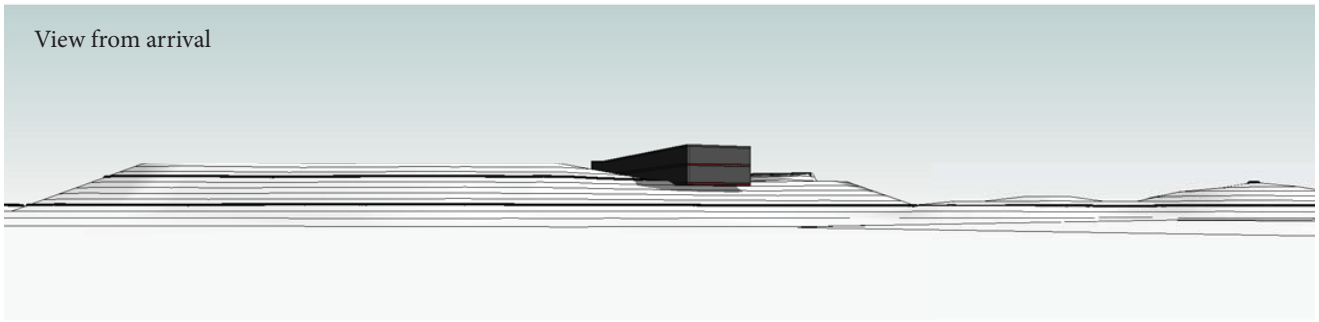
Design proposal underground spaces

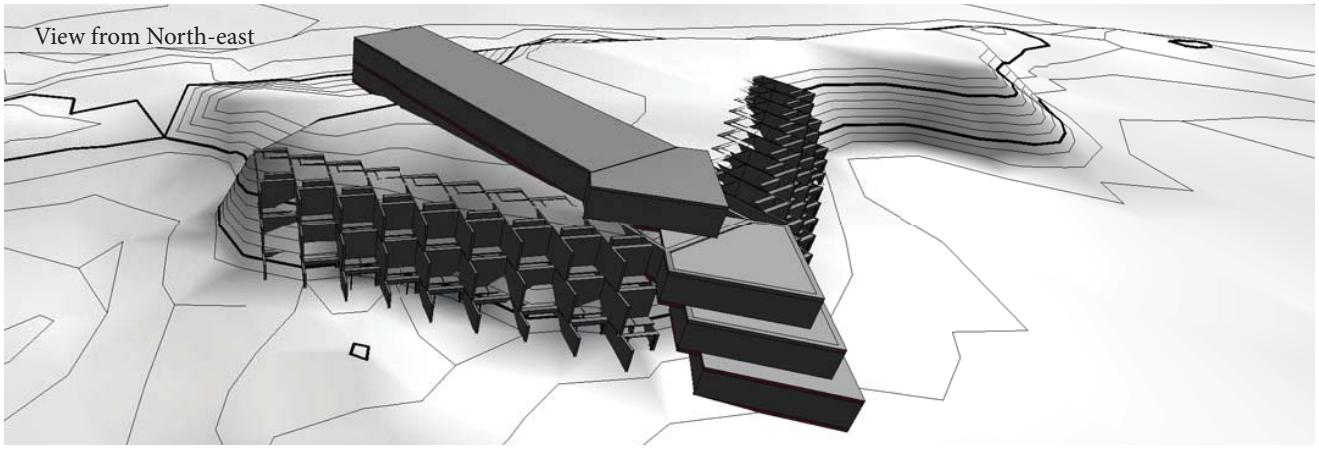




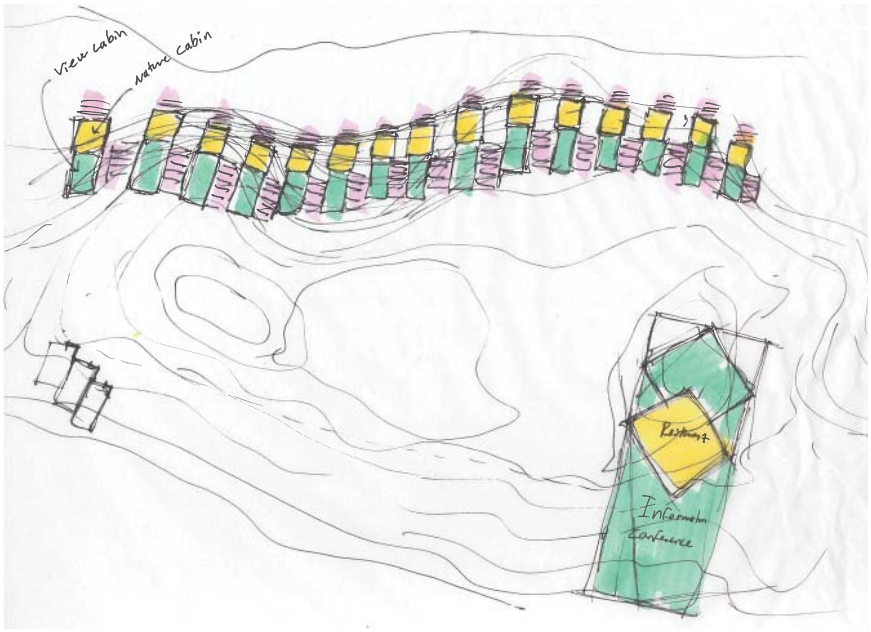


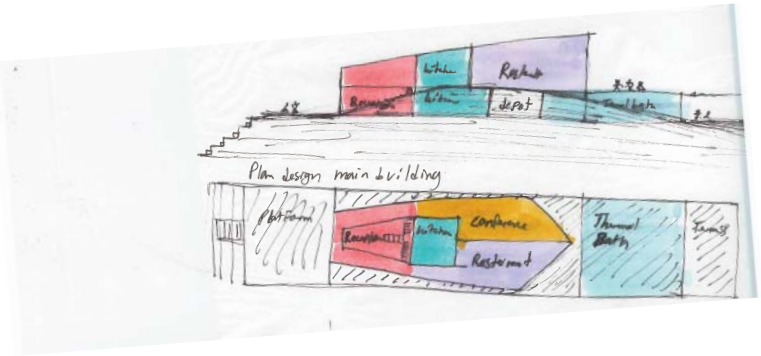


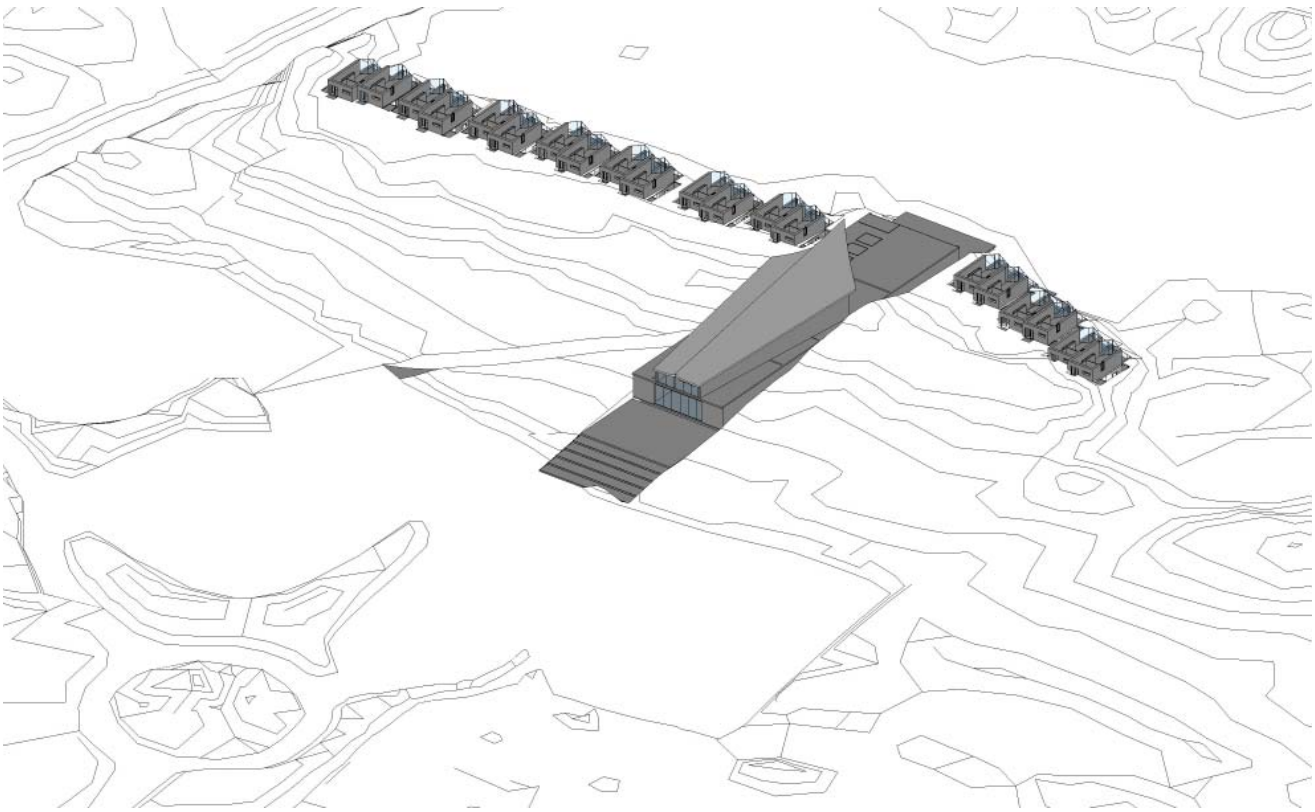




Design proposal cabin and main building seperated



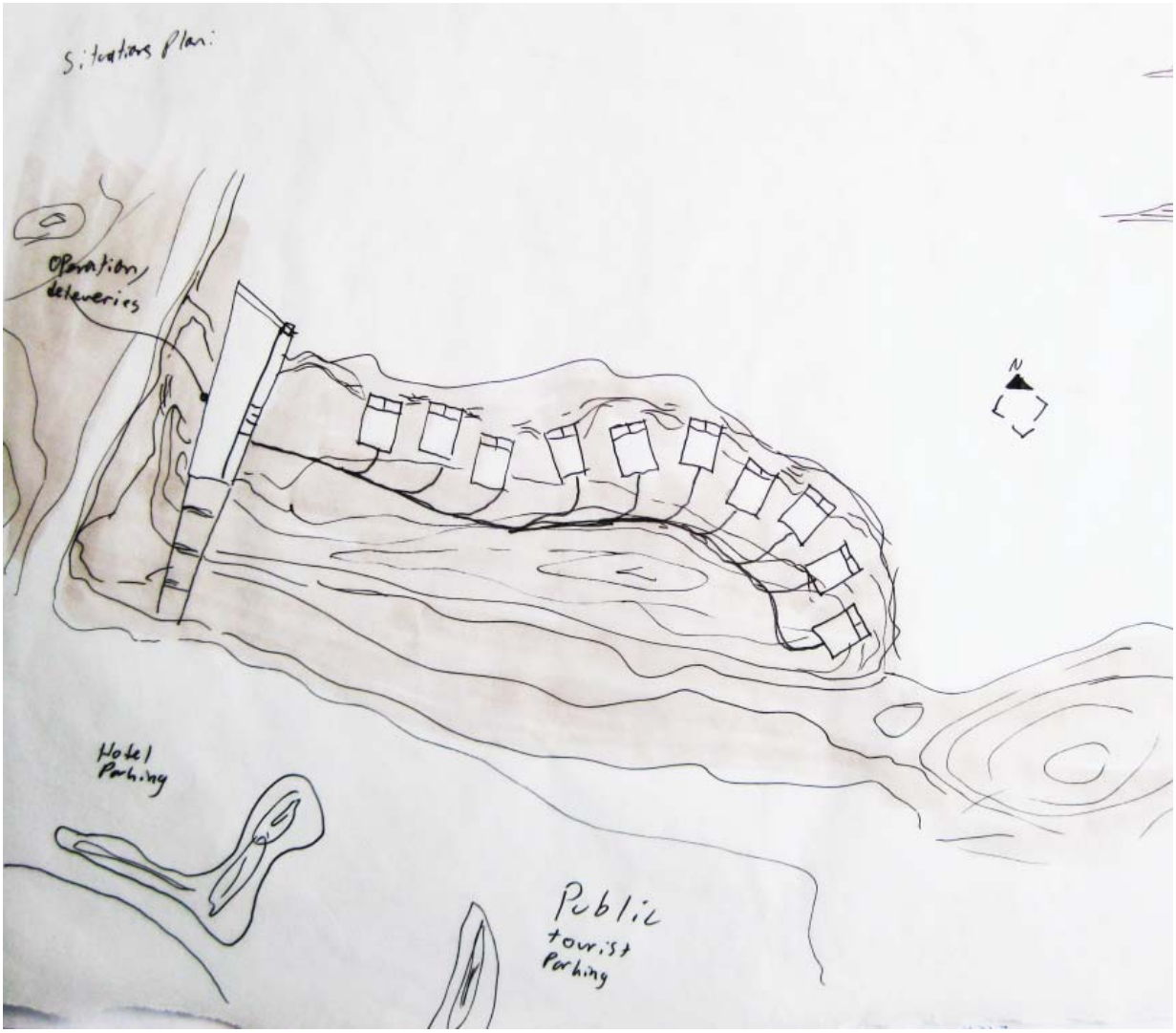




Final plan solution

After my initial attempts to place the hotel complex on the site, I have modified the placement of the building mass to this final plan solution. The main building has been moved westward with all the cabins on its south side. This gives an ideal location for the main building in relation to accessibility and the daily deliveries and operation of the hotel. Furthermore, the main building is no longer a dominant factor in between the cabins, but has its own zone and is connected to the cabins via a path system. Its placement to the west part of the parking lot shields the hotel guests from the mass tourism in the more public zones towards the tip of Grenen. It also removes the flow of people in the main building away from the cabins creating a more complete, private zone for the hotel guests.

The cabins are placed and angled to follow the edge of the dune, which integrates them into the flow of the landscape and gives them an optimal placement in relation to the dominant wind conditions.



Situation plan for final solution

Materiality

The contrast between the static and the dynamic is also implemented into the use of materials. Materials are not only experienced by the eye, but also by touching their tactility. The use of several senses elevates the experience of materiality. In my project the contrast between outside and inside differentiates in expression. The outside is meant to have a rough, raw and study expression with a clear reference to the concrete bunkers. The interior should be more warm, welcoming and soft in its materiality.

The materials have also been selected for their sustainable properties. Wood is a natural material, which is readily available and easy to obtain in Denmark as well as being a renewable resource. Furthermore, wood has many physical properties in relation to the use of shaping and designing in many ways, which is of great importance in architecture. Concrete consists of natural materials as stone, sand, water and cement. It can withstand all types of climate for many years without maintenance or the need for replacement. The asphalt roofing works as a solar collector and a sustainable solution in the building design.

> The skin reads the texture, weight, density and temperature of the matter.
> [Pallasmaa, 2012-1]

Glass

Large glass facades to the north is used to create a transparent connection between the inside and the natural landscape outside. It also gives a good daylight factor for the employees.

Illustration: Glass

Asphalt

Asphalt roofing is a commonly used material in coast areas as it can withstand the climate and salted air.

Illustration: Asphalt roof

Concrete

Outside
To achieve the raw and unpolished expression on both the cabins and main building, I use an in situ concrete surface with a finish with an imprint of wooden battens. The concrete can withstand the strong climate on the top of Denmark and ads to the sturdy and solid design language with a reference to the existing bunkers. The strong look with a patina that ages over time contributes to the guests feeling of safety and hiding away from strong weather.

Illustration: Concrete outside

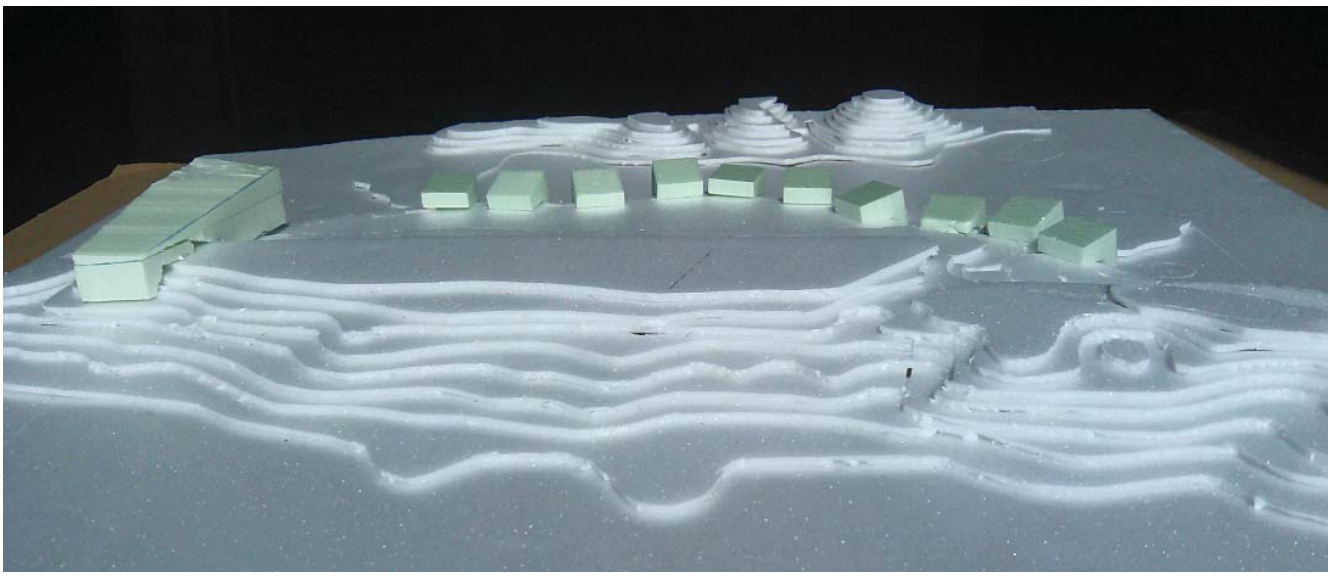
Inside
On the inside of the main building and cabins concrete is also used as an inner wall to give the sense of a solid envelope. The concrete inside has a smooth and polished texture to give it a more welcoming gesture and a softer touch.

Illustration: Concrete inside

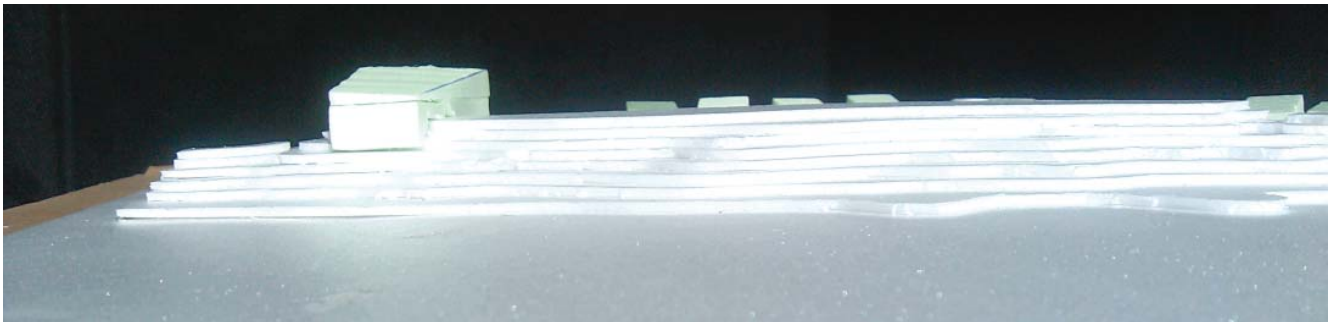
Wood

Oak has been used for the floors, steps and integrated furniture for the cabins and the reception desk. The softness of the wood is a contrast to the dense and cold concrete with is warm and organic expression. On the floors, the oak gives a soft touch to the bare feet.

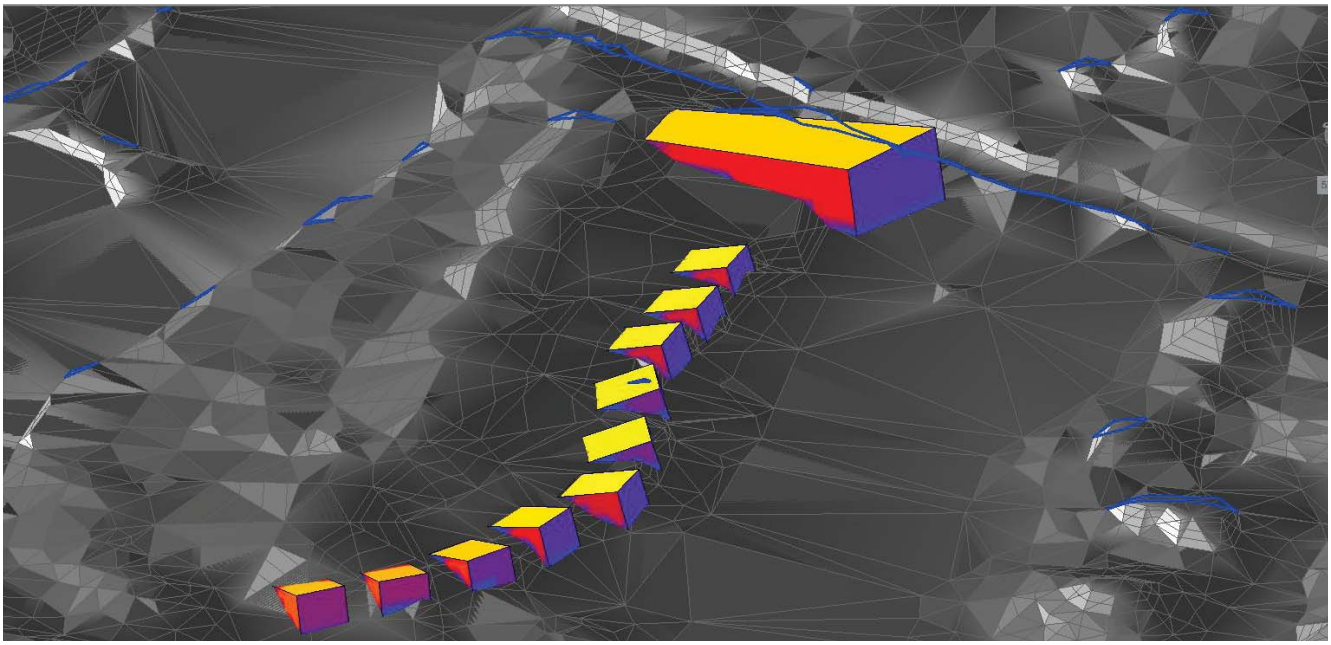
Illustration: Wood



Cabins and main building integrated into the dune landscape.



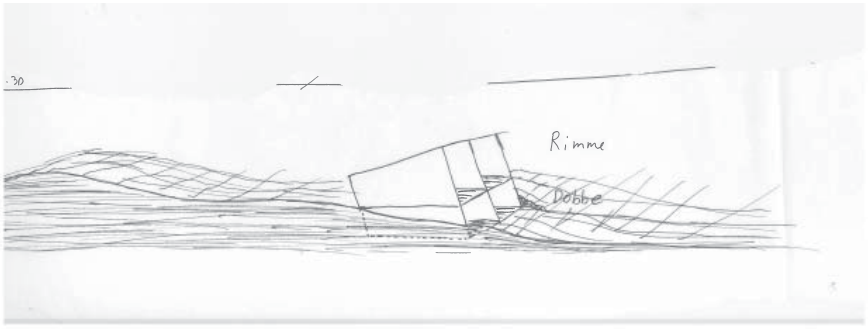
View from arrival shows that the cabins are hidden and the main building becomes the focus.



Annual simulation on sun radiation

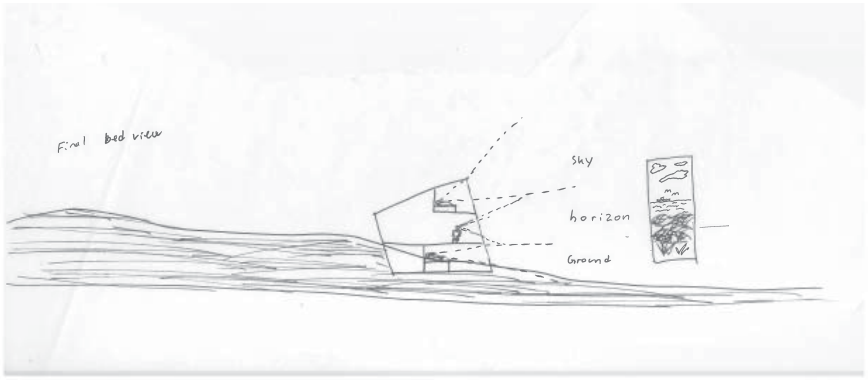
DESIGN PROPOSAL CABINS

The shape of the cabins is a result of the design parameters found during my research with a main focus on energy efficiency and orientation. One cabin block consists of four units – two half underground the dune and two above. This has been done according to my energy studies and conceptual approach inspired by the 'rimme' and 'dobbe' principal on the two levels of the building units. The two different types of cabins should be able to put the guests in a different state of mind and mood.



The building's atmosphere and the visitors' behaviour are controlled by the weather and surrounding environment, and after a few days the busy guests change rhythm and come to relax. The strong relation to nature lets the guests feel that they are a part of the natural environment and take more responsibility.

All cabins have been designed with an understated and simple interior that frames and puts focus on the beautiful scenery outside. This should encourage the guests to go out and experience the nature first hand. It is not a simple hotel room, but an experience of nature.

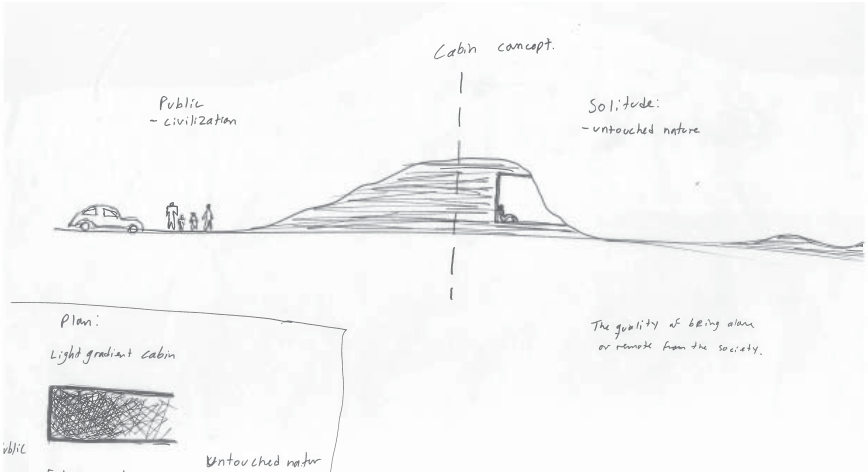


The functions of the cabin have been compromised as efficiently as possible in order to minimize the footprint on the natural landscape. The closed, simple formed envelope of the cabin ensures a lower energy demand for the building.

The cabins have been integrated into the edge of the dune. This feature has been inspired by the bunkers that emerge as a static element in the dynamic nature. Furthermore, in contributes to minimizing the intervention in the natural landscape as well as lowering the energy demand.

Dobbe cabin (low)

The ‘dobbe’ cabin on ground level has a strong reference to a cave atmosphere that feels protected and safe. When you enter the cabin you will gradually go from the dark entrance zone towards the light on the glowing wall that is illuminated with light from the large window hiding in the front. Here the guest is presented with one of three possible level of views that can be integrated into the design; the ground view of the dune up close, which creates a close connection to the nature just outside. The bed has been elevated and withdrawn from the window in order to enhance the sense of lying in a more private and safe cave within the room. Here you are secluded from the outside world and protected from the natural forces looking out onto nature.

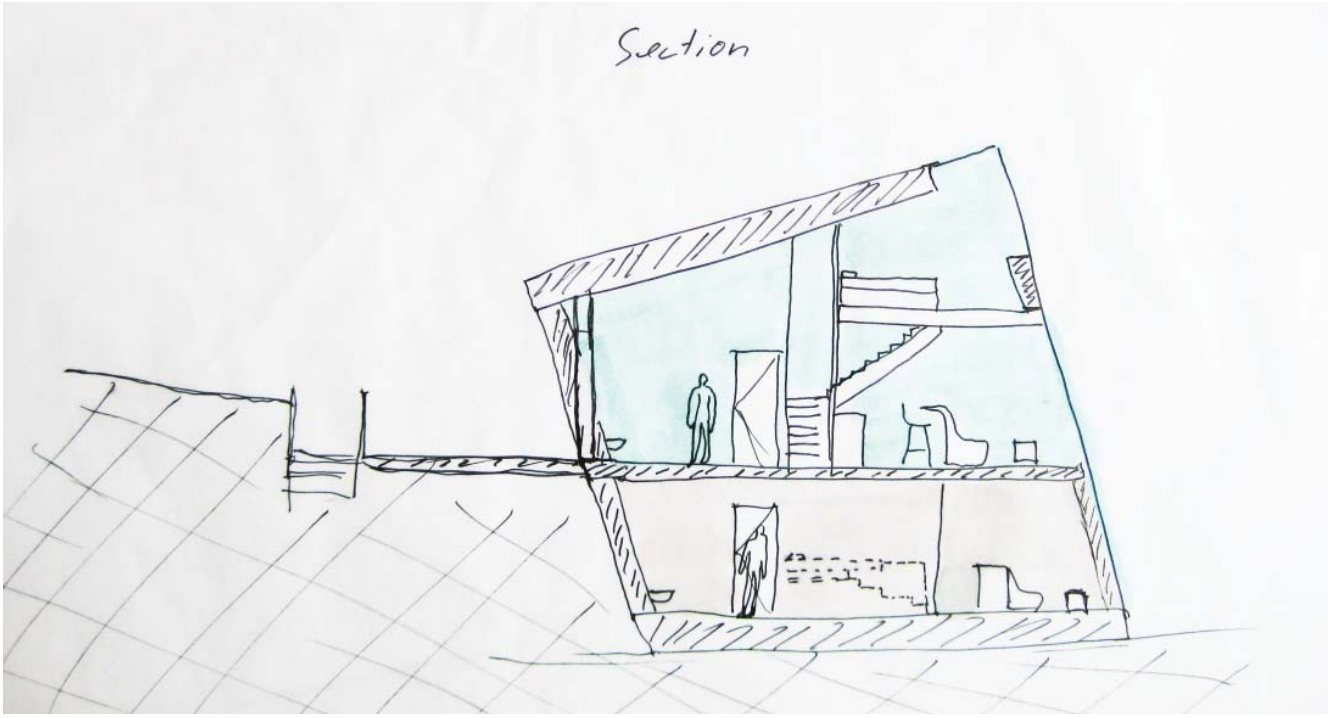


Concept for the Dobbe atmosphere

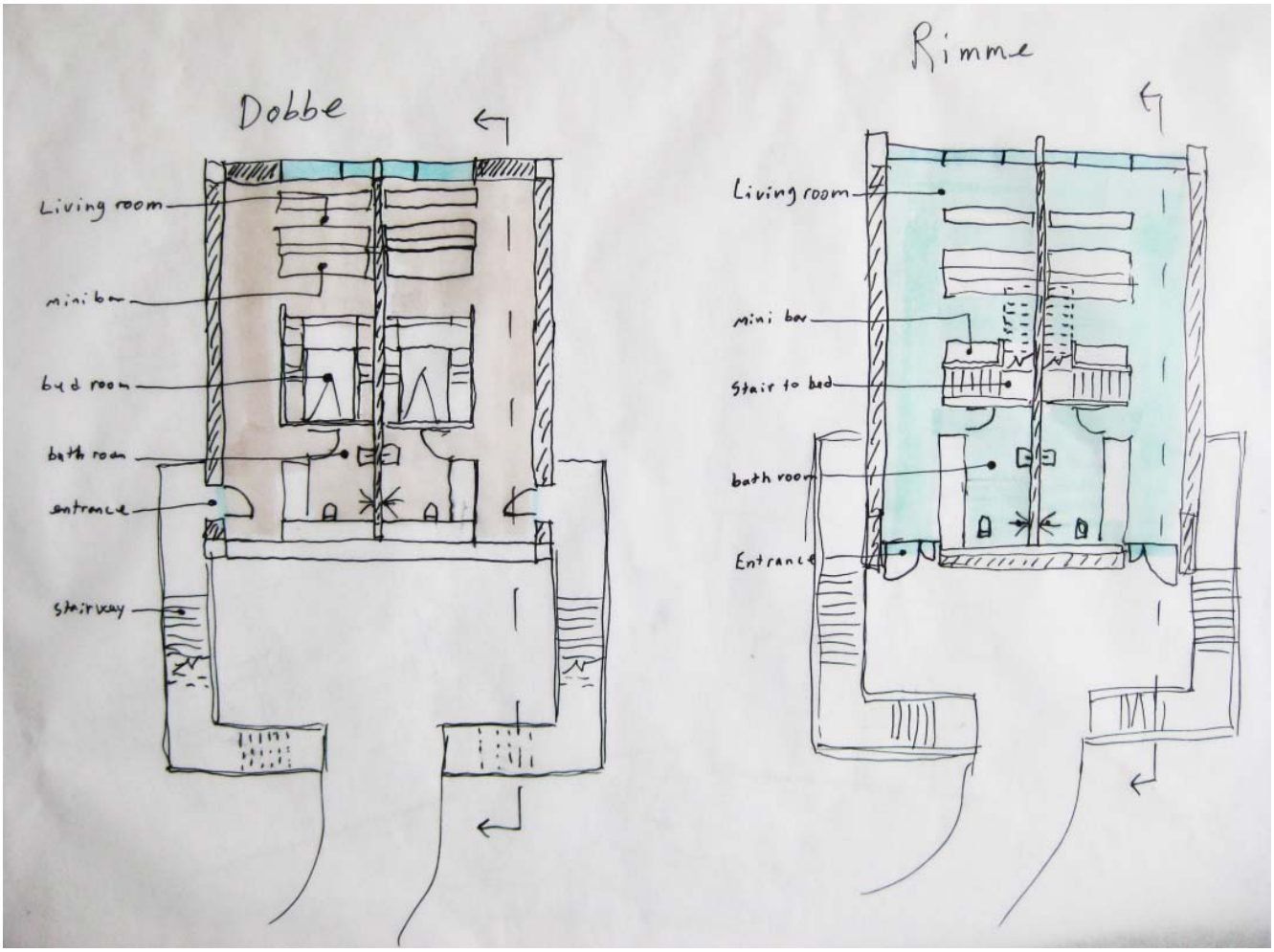
Rimme cabin (high)

The ‘rimme’ cabin is the upper cabin in level with the top of the dune. This cabin has been designed as a double high room, where the guests have the two other possible view levels; horizontal and skyline. The living room on the first floor has a horizontal view of the dune landscape and the two seas, while the bedroom on the second floor has a view of the sky. When you enter you are able to see both the horizontal line and the sky though the window at the front. This gives a more light and transparent atmosphere, when you enter the cabin. In the living room, the frame of the window dominates the entire end wall, which gives a larger view angle at the horizontal line. The level of the bed has been elevated to a second floor close to the roof with a skylight to create an atmosphere of lying close to the sky. To increase the privacy of the bedroom the lower part of the window has been made solid.

Concept for the Rimme atmosphere



Section of cabin



Plan of cabin level

Thermal indoor comfort

The integration of passive and active elements is used to encure a good indoor comfort zone and the energy frame for 2020 is used as a indicative guideline as mentioned in the chapter of energy.

The calculation programs Bsim, Be10 and Velux visulizer are used as help to manage the energy needs for the building, which adress some important indoor climate paremetres that affect people:

- Thermal environment according to the level of heat.
- Athmospheric environment according to breathing bad olfaction.
- Optic environment according to perception of light.

The cabin design is compared with dwelling, where there must an air change on at least 0,5 pr hour (0,3 L/s m2) to ensure a good thermal and atmospheric comfort.

There is inn let of fresh air in the living and bed room and out let in the bath room.

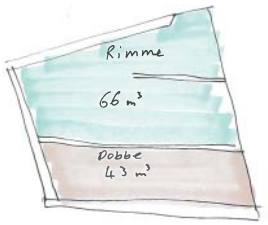
For natural ventilation doing the period of summer a part of the window facade will be able to open. Doing the period of winter there will be a mechanical ventilation with heat recovery to ensure fresh air.

A good ventilation strategy becomes an important factor to maintain peoples well-being and the health of the building construction. The ventilation system should be able to manage heat recovery in cold periods to minimize the energy demand. It should be able to adabt to the different room function according to the activity and clothing condition.
See appendix for activity and clothing graph.p)

Calculation on the cabin air change:
(see appendix p.)

Dobbe cabin = 0,36 L/s m2

Rimme cabin = 0,55 L/s m2



Rimme cabin

Dobbe cabin

To be able to refine the indoor comfort for the cabin they were tested in Bsim for heating, venting, ventilation, sun radiation and CO2 level.

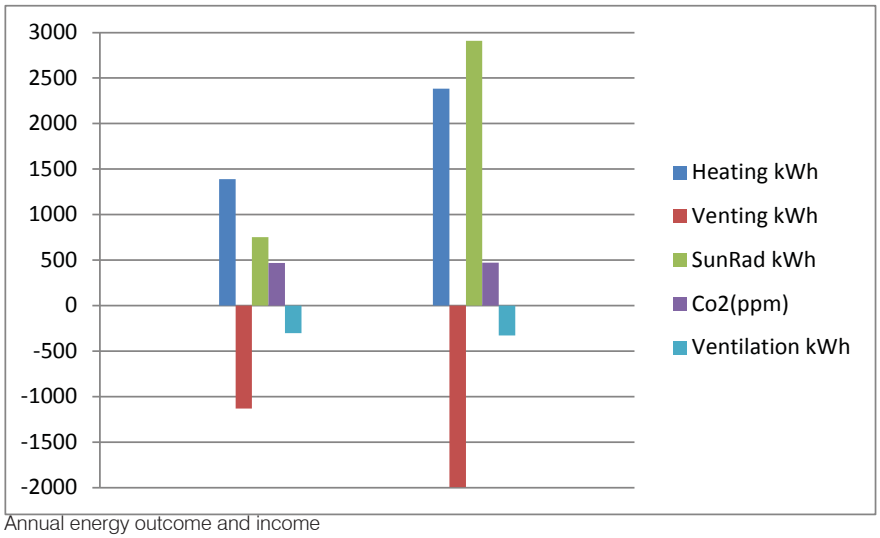
The rimme cabin with its skylight and southward glassdoor was only given some overheating above 26 and 27 degrees celcius May to August, even that the south door is shaded by the angle of the building design and the skylight gives an opportunity for stack ventilation, which is a more effective way to ventilate the heat out from the building.

The dobbe cabin has in a period from May to September still a little need for heating to keep the temperture above 20 degrees celcius.

Both the scenarios of overheating and heating challenge will gain advantage from an energy efficient cooling / heating system called ThermoMax that will be an integrated part of the cooling and heating. ThermoMax is able to benefit from the concrete thermal capacity in a smart way. As the system is an overall heat and cooling concept for the entire complex it will be explain later on in the chapter of the main building.

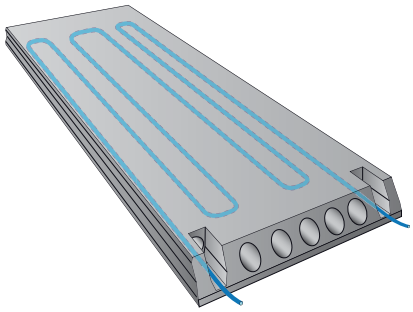
By testing the energy frame for one housing group consisting of 4 cabins in Be10 programme I got a result close to the 2020 frame.

To reach the standards the amount of North and South facing glass on the cabin, the high insulated construction and the ventilation strategy have an important effect for the output.



Annual energy outcome and income

Function of a *TermoMax* element



Key figures kWh / m2 year

Energiramme Lavenergibyggeri 2015		
Uden tillæg	Tillæg for særlige betingelser	Samlet energiramme
35,8	0,0	35,8
Samlet energibehov		22,8

Energiramme Byggeri 2020		
Uden tillæg	Tillæg for særlige betingelser	Samlet energiramme
20,0	0,0	20,0
Samlet energibehov		21,8

Bidrag til energibehovet	
Varme	19,3
El til bygningsdrift	1,4
Overtemp. i rum	0,0

Netto behov	
Rumopvarmning	17,8
Varmt brugsvand	13,1
Køling	0,0

Udvalgte elbehov	
Belysning	0,0
Opvarmning af rum	0,0
Opvarmning af vbv	0,0
Varmepumpe	0,0
Ventilatorer	1,4
Pumper	0,0
Køling	0,0
Totalt elforbrug	30,5

Varmetab fra installationer	
Rumopvarmning	1,4
Varmt brugsvand	0,0

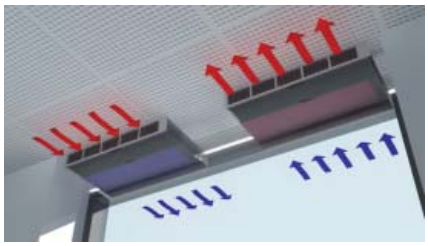
Ydelse fra særlige kilder	
Solvarme	0,0
Varmepumpe	0,0
Solceller	0,0
Vindmøller	0,0

Ventilation system

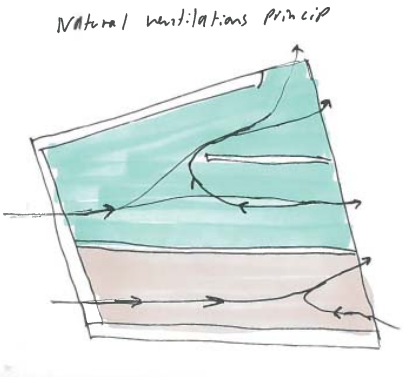
For mechanical ventilation system there is used a facade integrated design that is easy to install without piping. The system can both run as a decentralised unit or in together with more units. The system utilise the fresh air outside the building directly, at the same time as 85 percent of the heat in the exchanged air is recovered and reused. The chosen model is able to move 72 m3/h (Inventilate 2015).

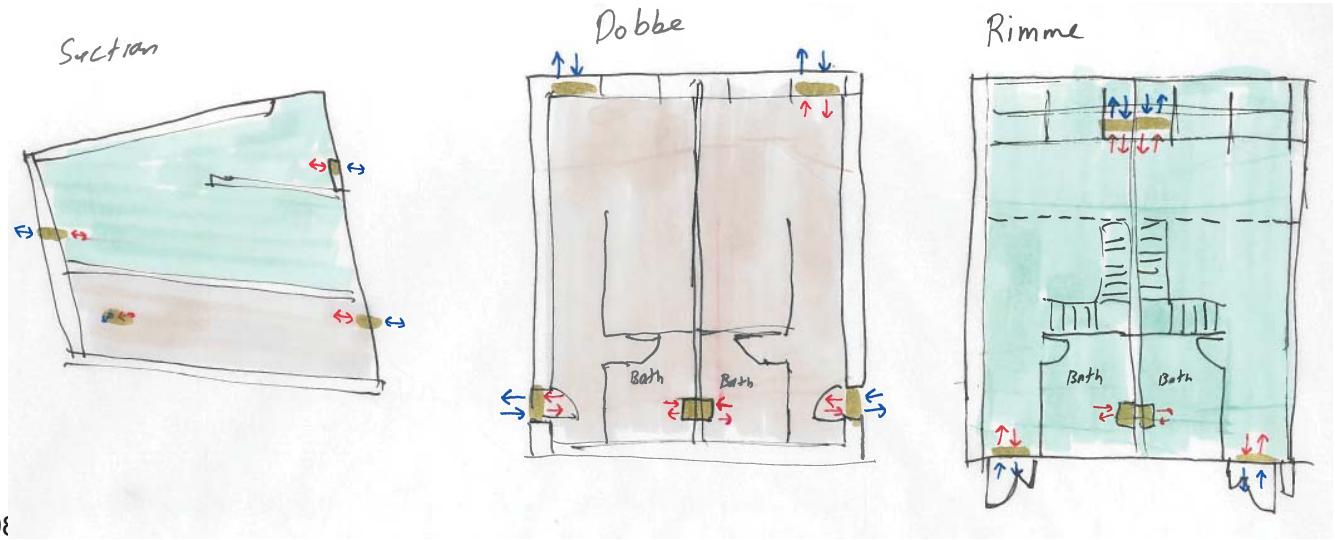
The total need for air change for the rimme cabin is on 71,3 m3/h whereas one unit is cabable to ventilate one cabin volumen with fresh air. But not to let one unit rum on max speed to handle the air change there will be at least two pr. cabin, which also give an advantage of room ventilation in more zones and minimizes the noise level from the unit. For the bath room there is designed a special unit that is still able to recover the heat and ensure the air flow does not mix with the other room.(see appendix for thecnical specifications and calcutions p.146)

Ill. .. Integrated design solution of ventilation unit



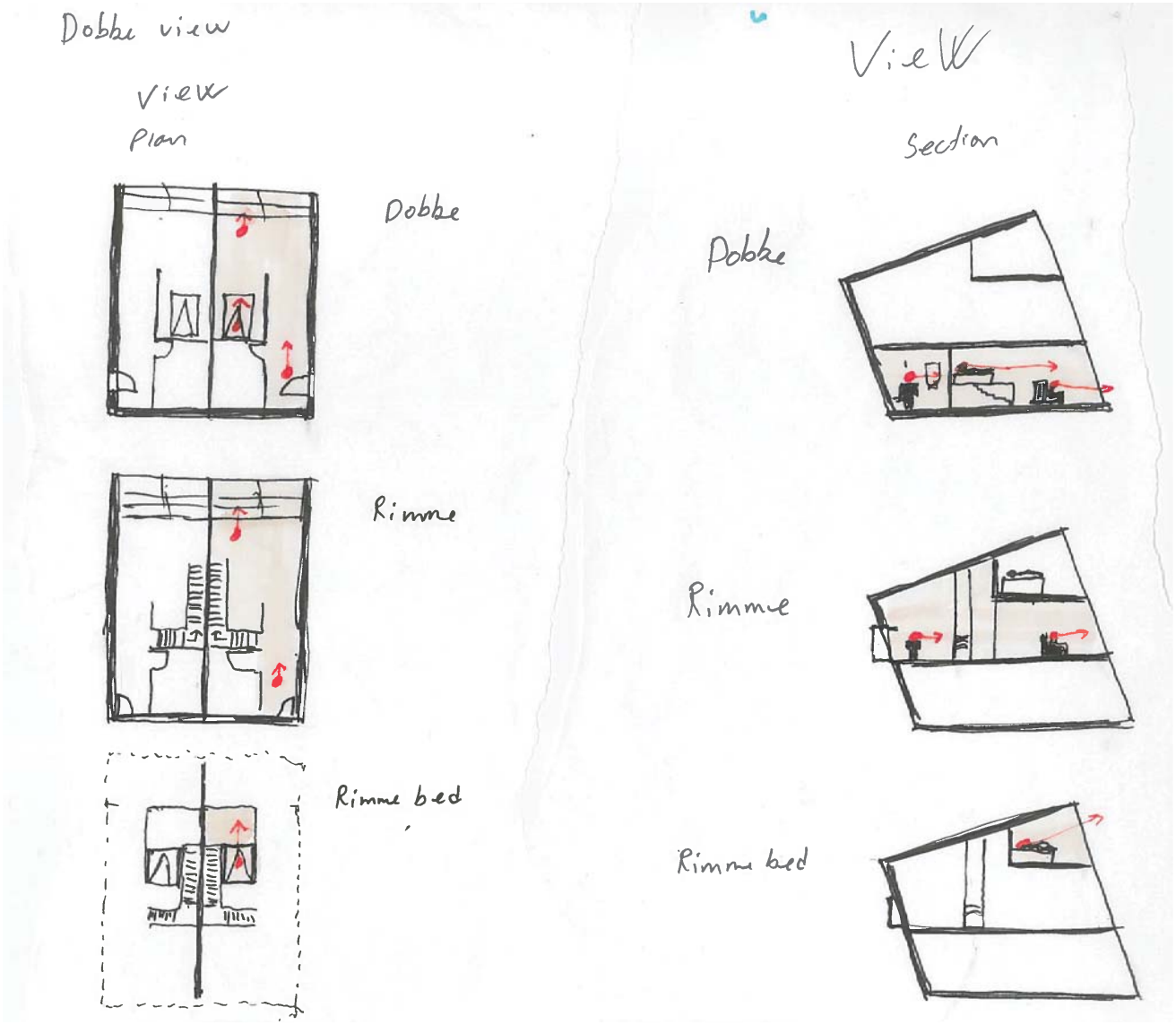
Ill. .. Principle of ventilation unit





Facade design

The important spots for view in the cabin design have an influence on how the facade construction should be to get the most optimal combination for both view, atmosphere and energy. These parameters have to be merged together and a simulation in Bsim has helped to combine the glass area according to energy transmission. Velux daylight programme for a good daylight factor and sketches and 3D modelling for a physical and digital study of the atmosphere and construction.

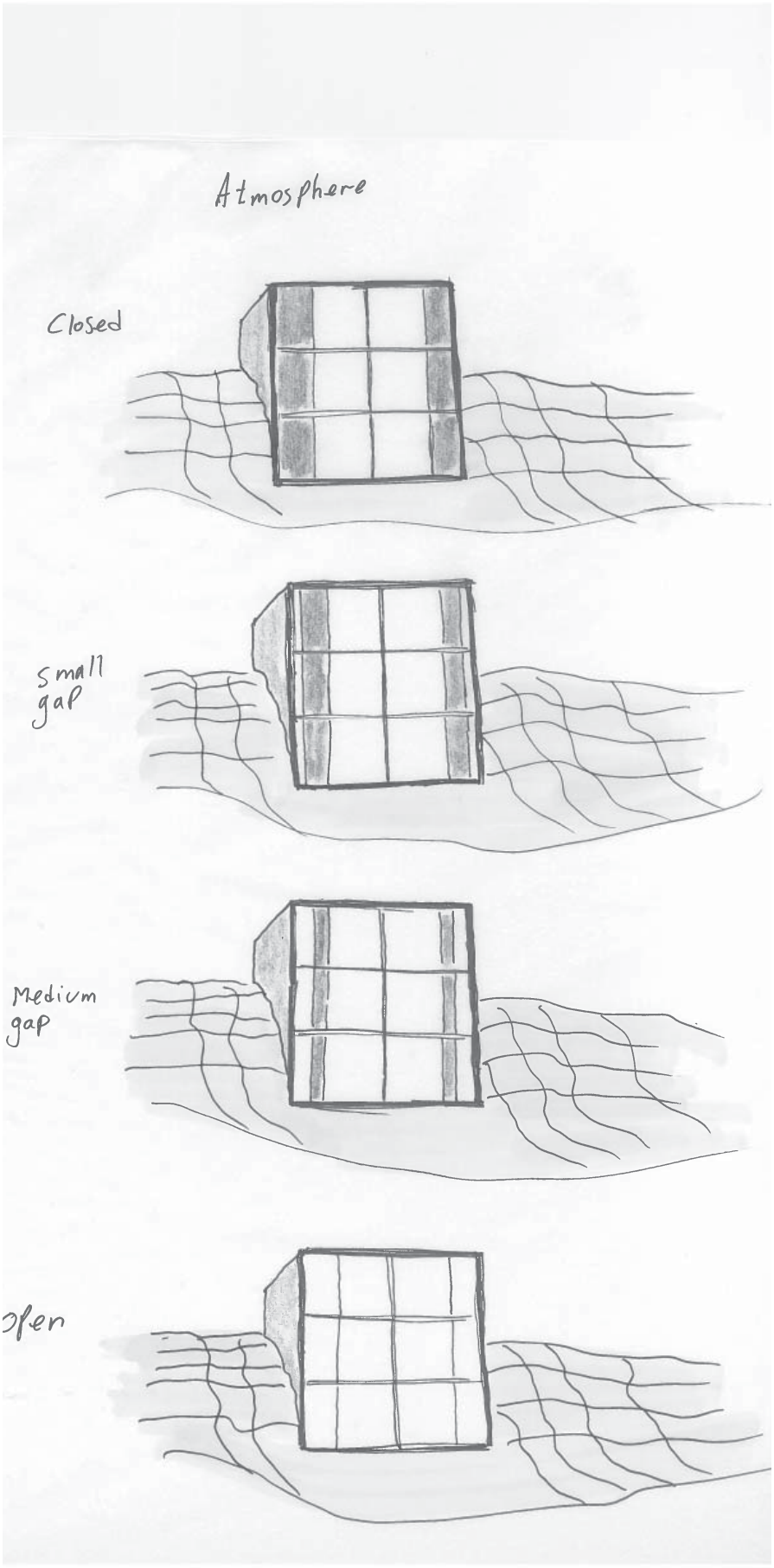


Model study

Phycial modelling has been used to test the atmosphere by different facade setups.

Dobbe cabin

Rimme cabin



The facade design tested in Bsim for energy transmission. The result is for a group of cabins.

Closed
19230 kWh/m2 per year

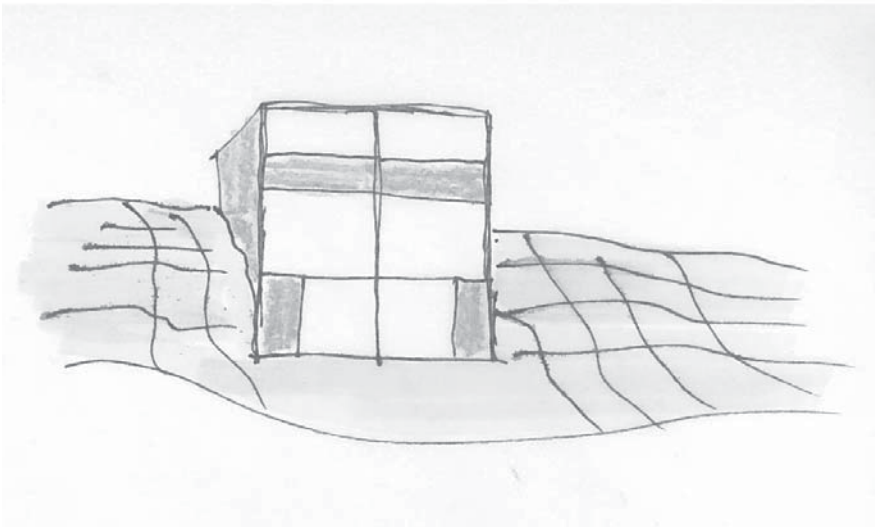
Small gap
20574 kWh/m2 per year

Medium gap
21906 kWh/m2 per year

Open
23226 kWh/m2 per year

Result

The workshop lead to the result of a facade that is able to meet the atmosphere of being in a cave mood in the dobbe cabin and to be in a more transperent mood in the rimme cabin. It also has an advange in regards to energy demand as part of the glass has been made solid with a better u-value. These solid squares are placed according to where peoples private sphere become more important as in the bedroom.



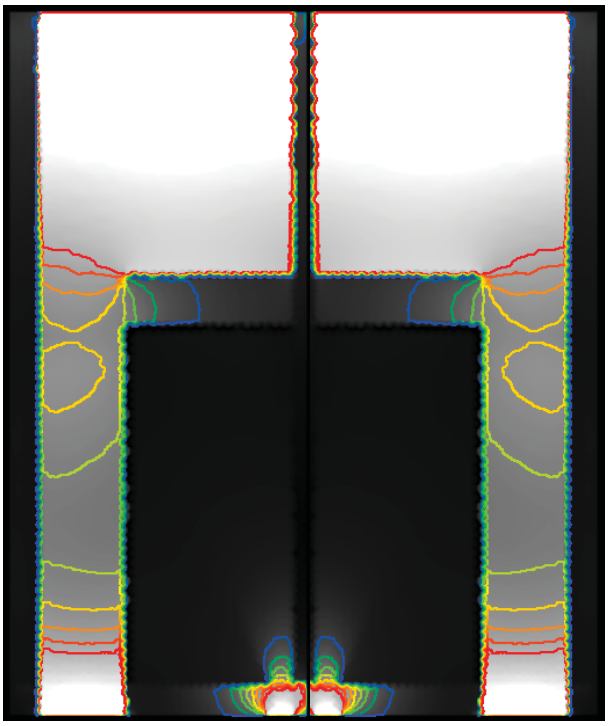
Rimme: transparent atmosphere

Modified model

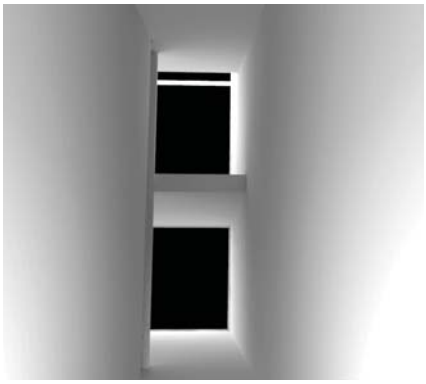
Dobbe: cave atmosphere

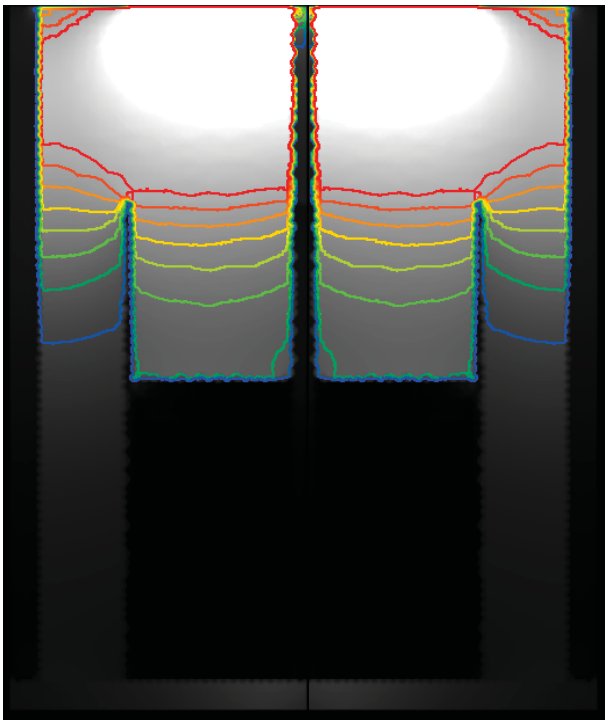
The daylight factor is in general on a high level in both cabin types, and the atmosphere of cave and transparency that was tested in the physial model study above is also clearly seen through these digital light studies. The black area is space for the bath room where the rimme cabin has a small window integrated in the corner.

Daylight factor



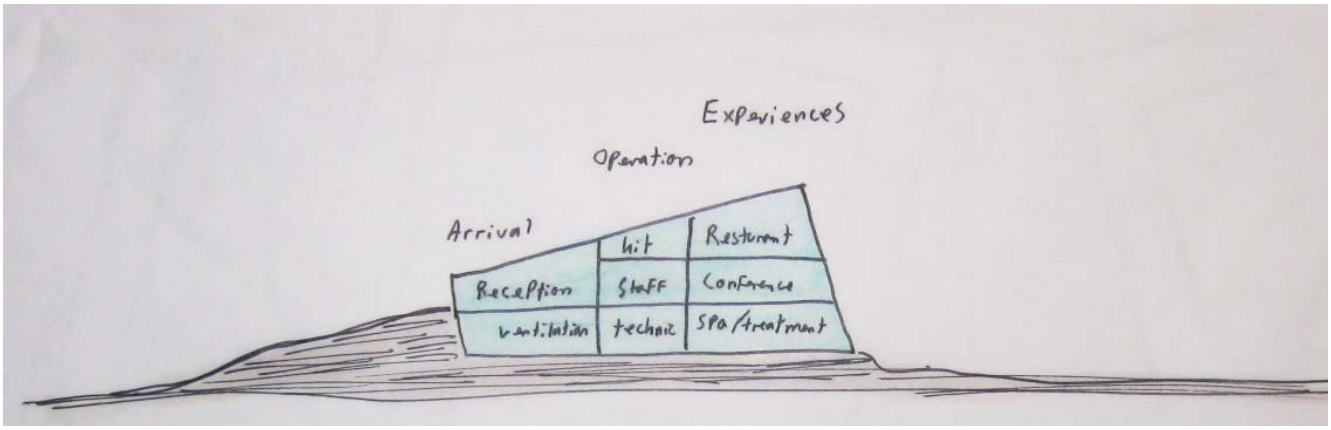
Rimme

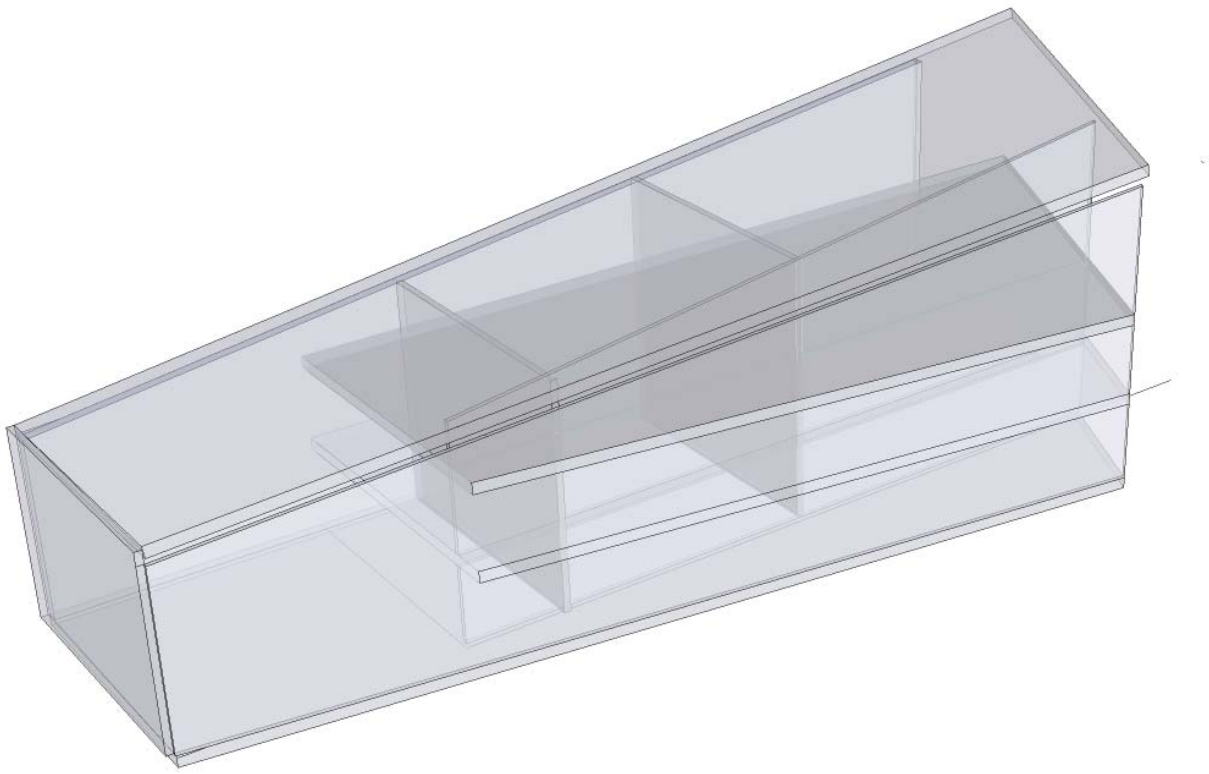




Dobbe

Design proposal main builing



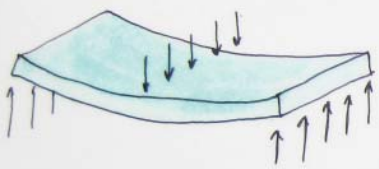


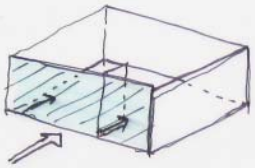
Design opun plate and slice system.

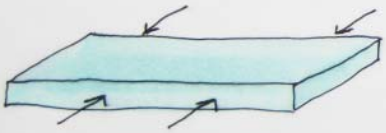
Construction principle

I have made a structural solution for the construction system with the use of the static properties that are in the plate and slice system.

Plate function - the ability to transfer loads perpendicular to a flat surface.

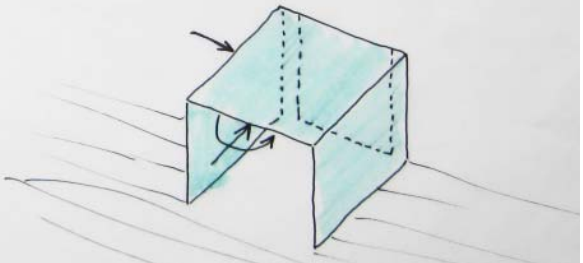






Slice function - the ability to transfer loads parallel with or just in a plan.

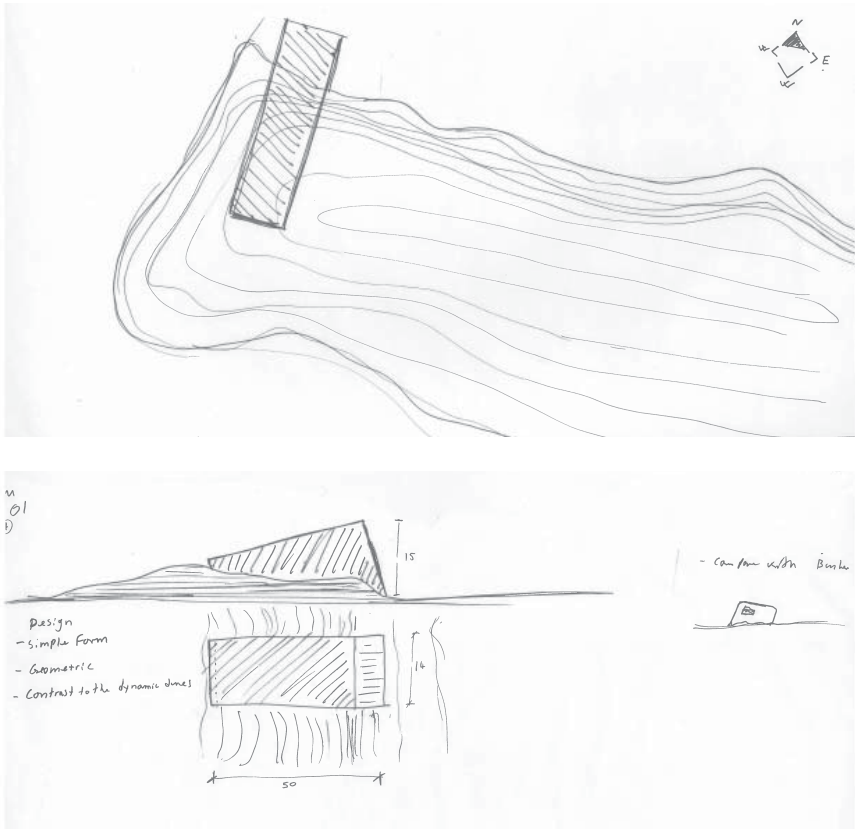
stable slab- slice with three fixed support lines.



Shape

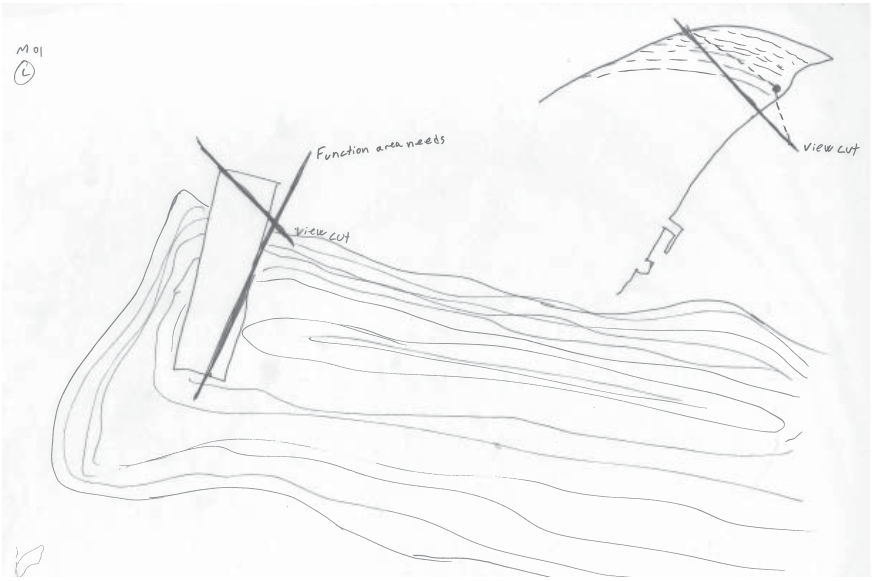
The design of the main building is a result of the same design parameters used to shape the cabins with a focus on energy efficiency and orientation, but in a much larger scale. This is necessary to accommodate all the space demanding functions of the main complex such as the restaurant, conference and treatment facilities as well as the daily operation of the building. The large scale makes it visible from a distance and the main icon for the hotel and the attraction of people's attention both from the seaside as well the arrival site to the south.

The exterior of the main building has been created in the same design language and with the same characteristics as the cabins. The same materials and shapes are used to make a familiar connection and a united expression for the whole complex. The main building also has a strong reference to the concrete bunkers.

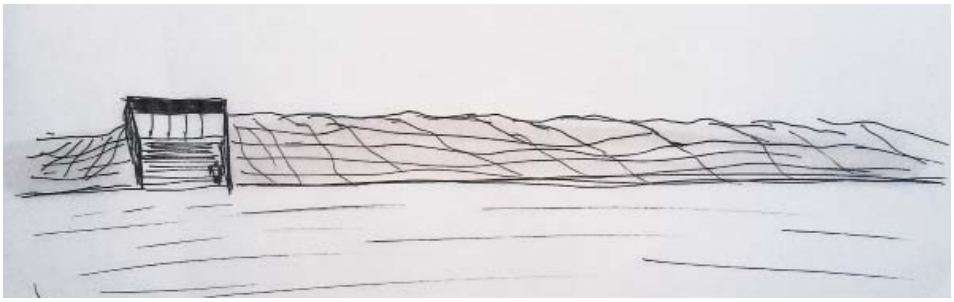


Shape of the main building

The large scale of the building started out as a large rectangle volume placed right angled according to the ridge of the dune. To optimize the angle of the view of the two seas the front of the rectangle has been cut perpendicularly to the tip of Grenen. In order to optimize the volume composition of the functions a line has been integrated according to the need of the functions. These two lines have adjusted the shape of the main block. The building has also been tilted in a manner that opens up the building to the north and is more grounded towards the south. This has been done to achieve a larger facade and broader view angle to the north in order to include more of the natural scenery, which should be the center of the experience of staying at the hotel. It downsizes the building to the south, which makes the south facade adapt to the level of the surrounding dunes.

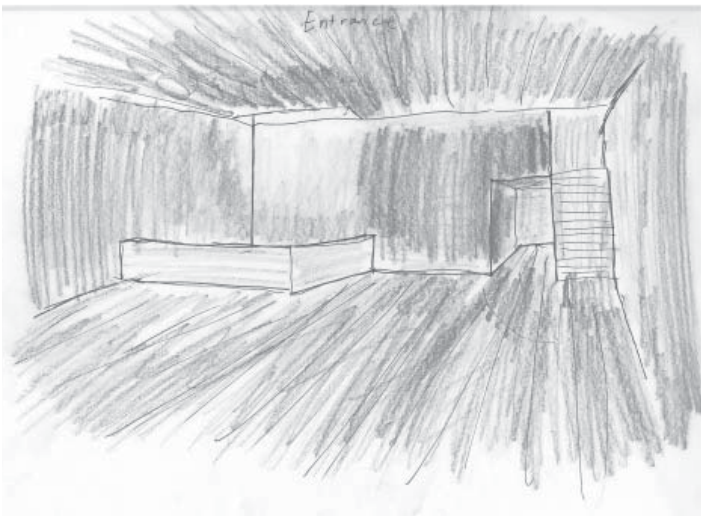


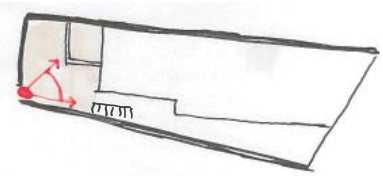
The end facade to the south is made visible by contrasting the dune, while the other parts of the complex are hidden in the dune landscape from this angle. This makes the entrance the only visible indication of the hotel and it naturally becomes the attraction for the guests leading them to the right place of entrance.

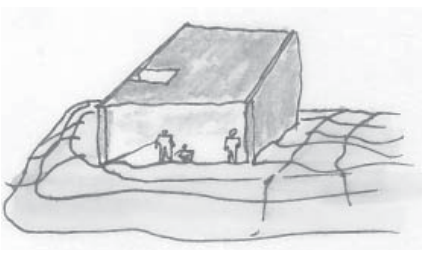


The entrance

The guests should have the feeling of going into the dune when they enter the entrance and come to the reception area, where a dimmed lighting simulates the dune atmosphere. To put focus on the reception a stronger illuminated zone of light has been created by letting light stream down from the skylights. The area of the staircase has an illuminated light that makes it more welcoming to the guests. All the light effects have been tested in a physical model.







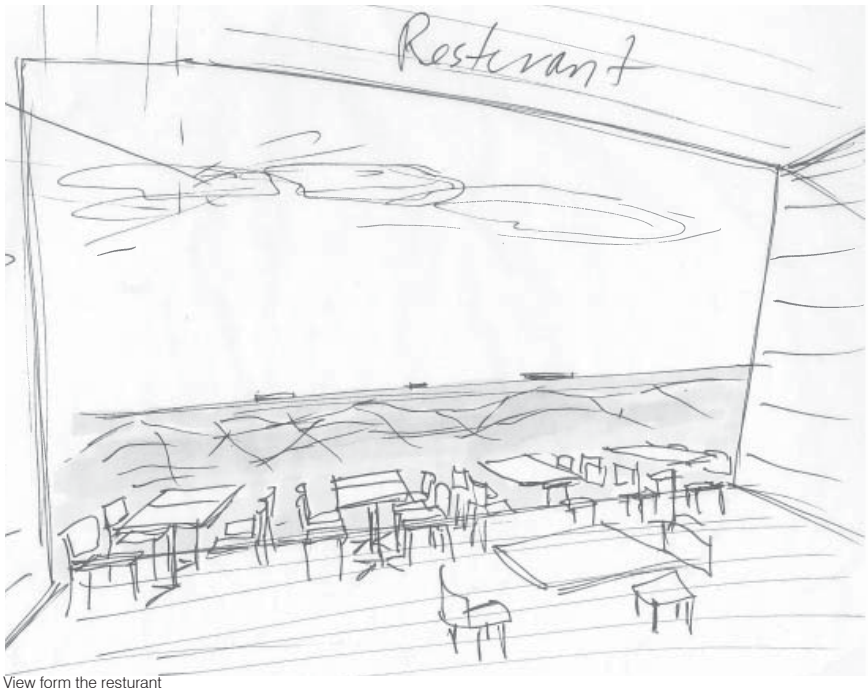
Restaurant

The area of the staircase is the transmission zone that leads you to the other levels of the building

If the guests go up the staircase they will be meet by a hallway, where they are able to see a framed view of the landscape, which will draw them towards the restaurant. In the restaurant, a large glass facade offers a panoramic view of Grenen and the two seas. The location on the second floor gives an elevated view that is perfect for observing the landscape at a distance and to let the eye wander along the horizontal line of the very tip of Denmark and the open sky. Because the view is orientated to the north, the guests will look out on southward dunes that are sunlit in the land of light. The guests have the opportunity to look upon an environment untouched by humans; a landscape shaped by the natural forces of sea and wind.

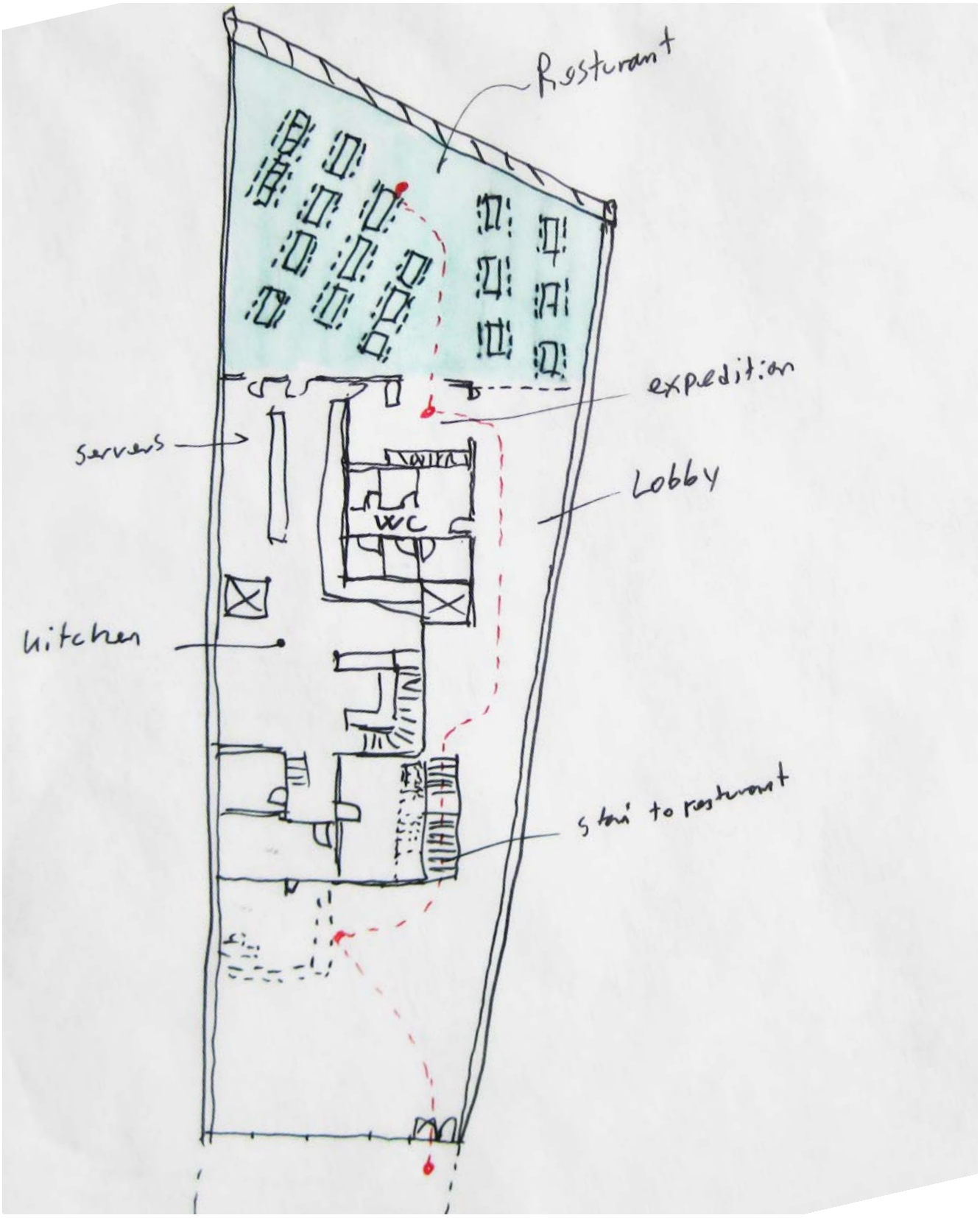
View form the hallway

The interior of the restaurant is kept simple in its choice of materials and decoration. The simplicity of the room is a contrast to the expressive view outside. Like in the cabins, this has been done deliberately to put focus on nature, which is the main experience of staying at the hotel. It adds to the gourmet dining experience, which should be authentic in its choice of local food such as seafood and buckthorn.



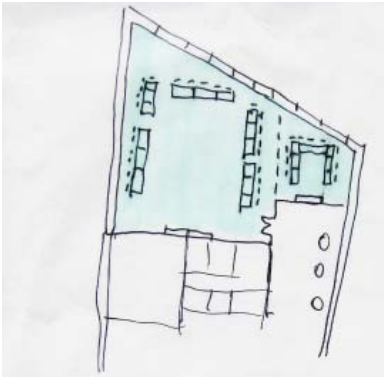
View form the resturant

Second floor

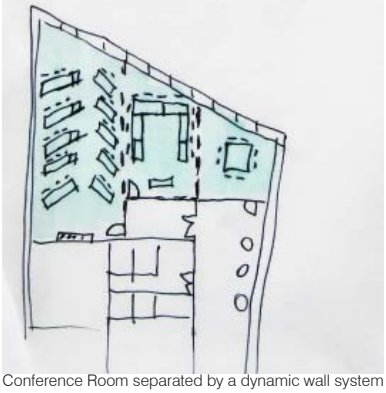


The conference

The conference facilities are located on the first floor and is a supplement to the private guests and the restaurant in order to improve the occupancy of hotel all year round and especially in the weekdays. The conference is a large room, which can be transformed by a modular system into smaller sections allowing different kind of events and meetings to be held at the hotel. The main function of the large window area is to create a good daylight factor for the conference and a view of the landscape. The projection screen is placed at the wall opposite the window, so the guests are not blinded by the light and the blinds does not necessarily have to be put down for a presentation.

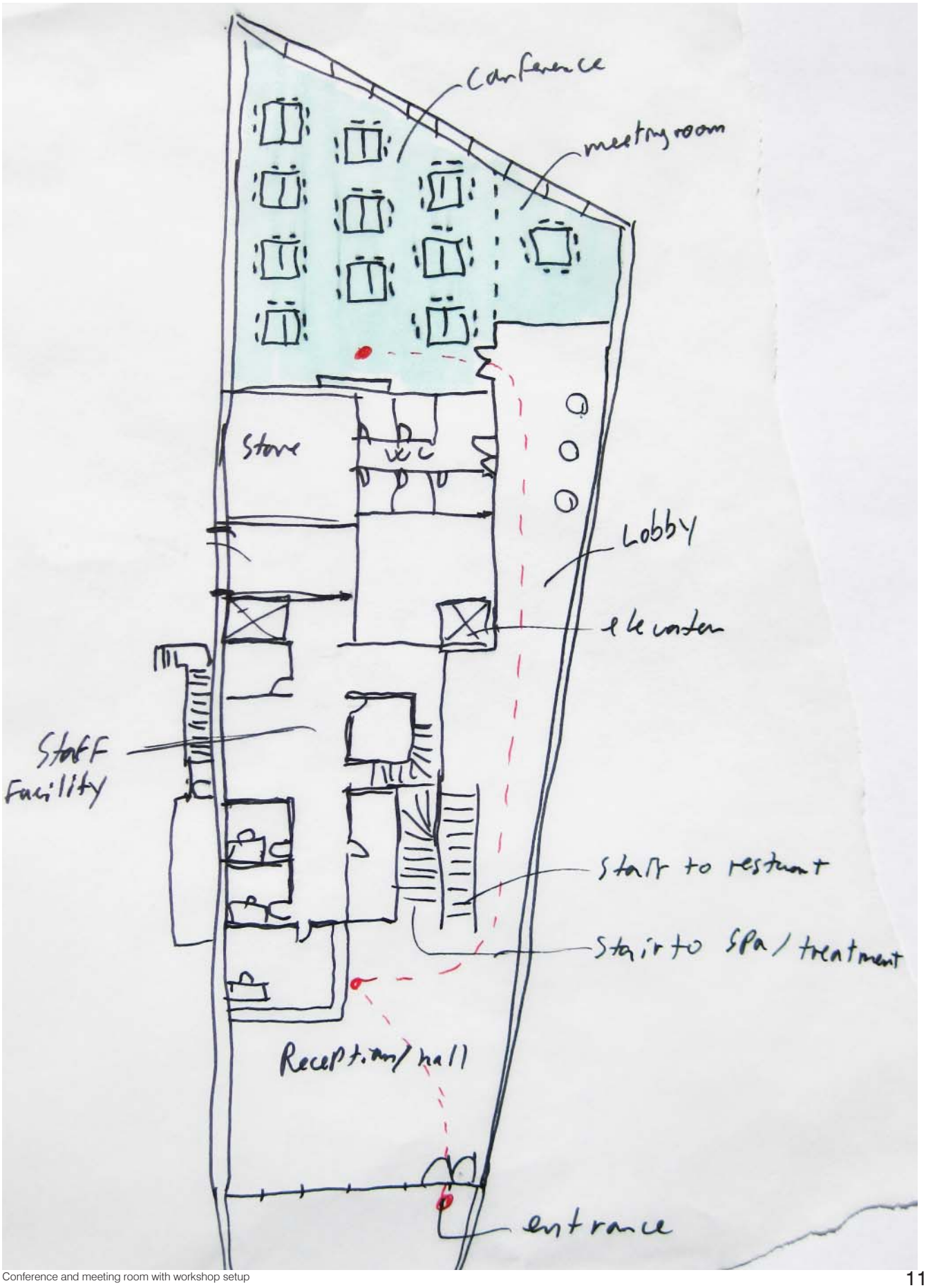


Seminar or conference setup



Conference Room separated by a dynamic wall system

First floor



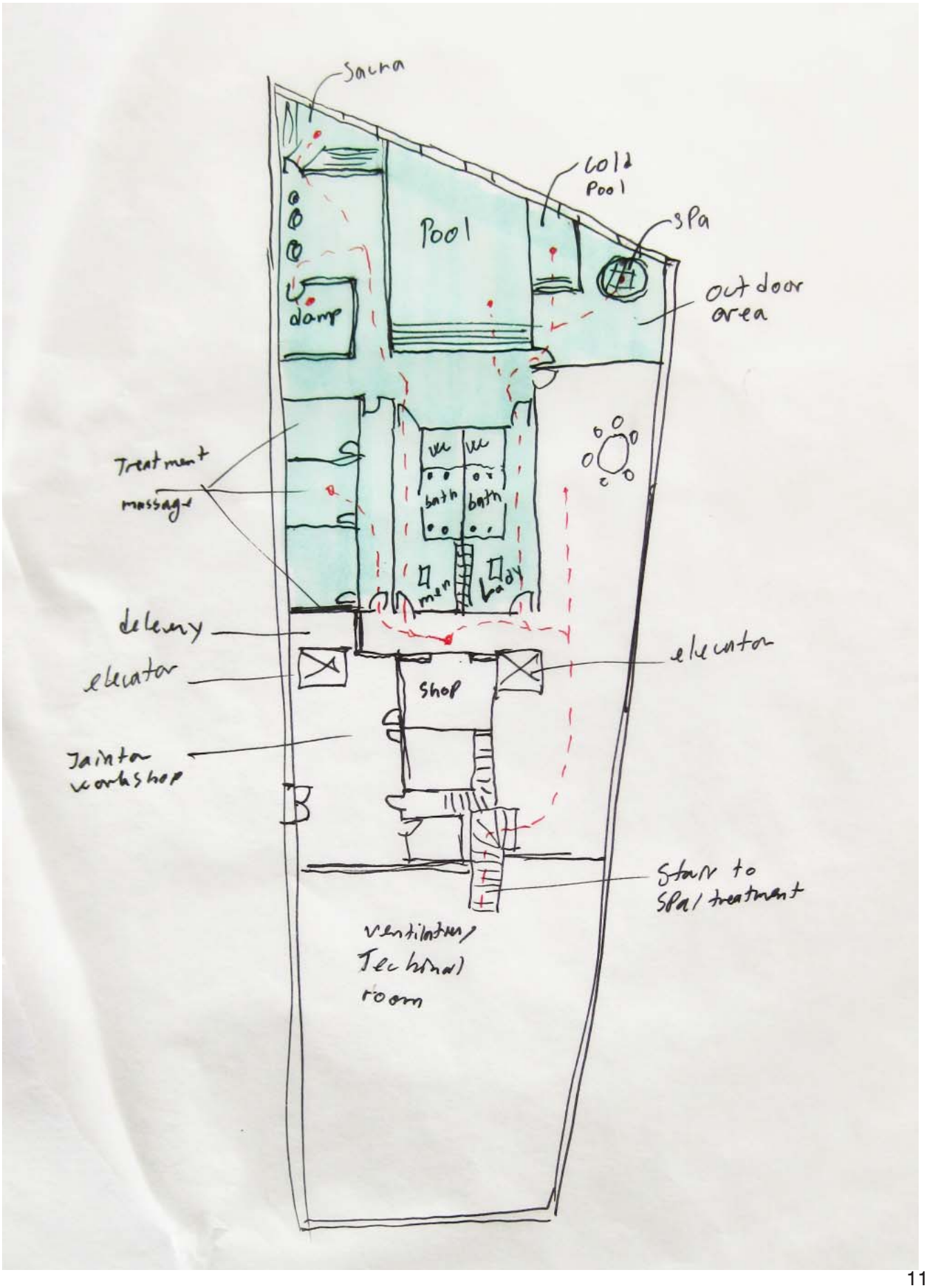
Conference and meeting room with workshop setup

Spa and treatment

Nature is the main source of healing, when guests stay at the new seaside hotel, where the treatment center on the ground floor is a supplement to this. The treatment area consists of private massage and treatment rooms as well as a public area with a variety of different treatment facilities. The location on the ground floor offers a close interaction with nature especially in the outdoor area.

The sauna is placed against the glass facade to the north to give a touch of nature that the guests can immerse themselves in while sitting there. This can be combined with an outdoor cold bath, where you feel and hear the elements of nature. The cold salted water gives you a refreshed feeling and triggers healthy endorphins in your body. Afterwards a hot outdoor bubble bath awaits, where the heat returns to the body, while you can lean back, close your eyes and breathe in the fresh, salted air. When the heat becomes too intense, an indoor swim with a view of the dune landscape awaits and the treatment ends with a revitalizing steam bath with salt peeling. After this the guests are totally relaxed and ready to take a walk in the twisted paths in the dune landscape, retreat to their cave bed with a view of nature or to have a delicious gourmet meal in the restaurant with an amazing view of the two seas in the horizon.

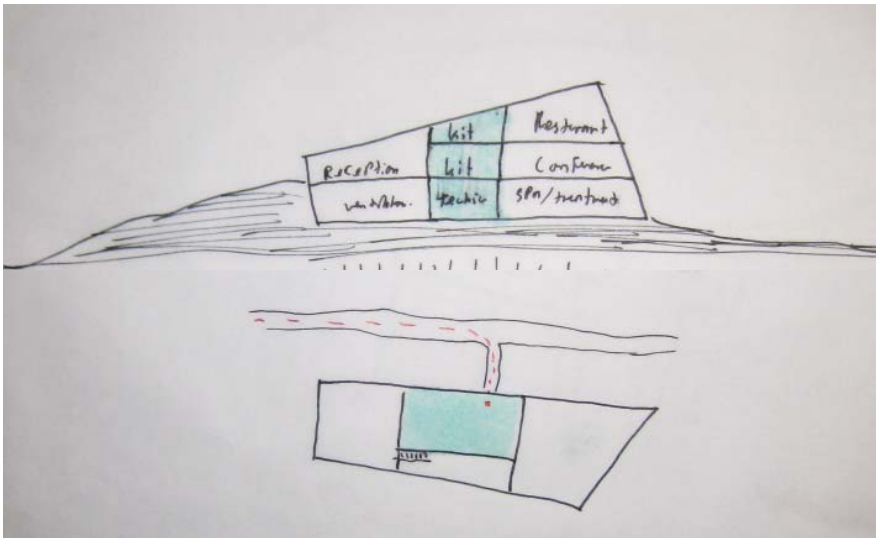
Ground floor



Operation of the building

To ensure an effective daily operation of the building these activities have their starting point at ground level in the private area west of the building with a good accessibility in relation to the typography and they are hidden away from the public zones. The deliveries can be distributed in the building by elevator that is placed next to the delivery zone. This private core is present on all three levels of the building, where employees handle the daily operation of the hotel.

On ground level you find the arrival and delivery zone. On the first floor, there are offices for the administrative staff and a seating area as well as laundry and storage. On the second floor you find the kitchen and space for storage of food. The kitchen is designed to handle 100 dishes in the restaurant and has specific zones for the chefs and the serving staff. The kitchen is connected directly to the restaurant and the staff can reach the conference area by stairs or elevator.



The operation core in the building with direct access for delivery.

Thermal and atmospheric indoor climate

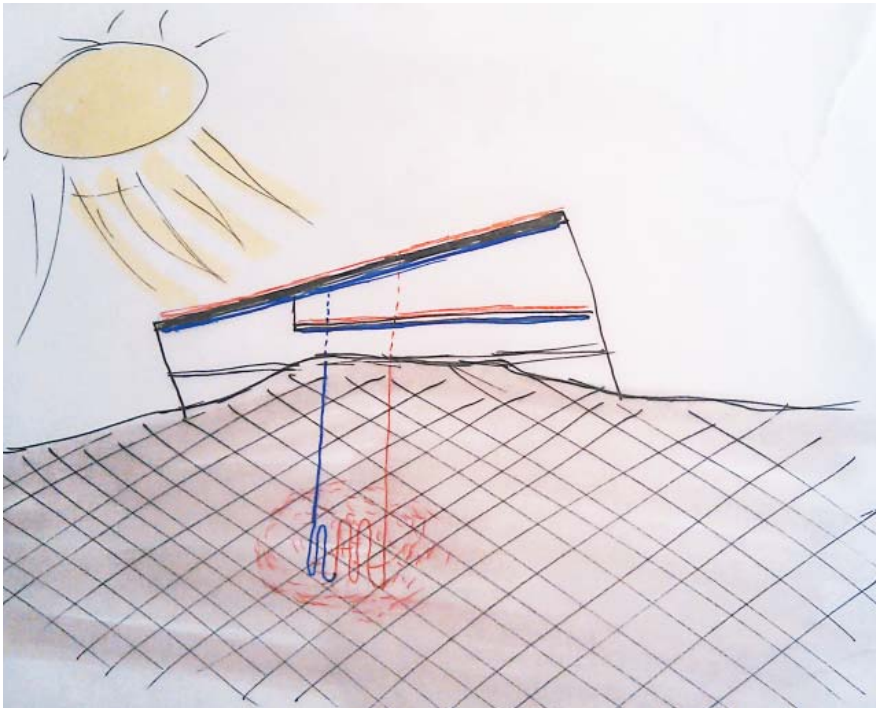
In well-isolated modern buildings cooling is often the main problem for the building not heating. The thermal and atmospheric indoor climate for the restaurant and conference in the main building have different needs in regards of air change to ensure that each room has a good and comfortable indoor climate.

This calls for a system that is able to adjust the air change and temperature for different amounts of people and equipment loads doing the day. In order to be able to control the large amounts of CO2 and olfication in the building a VAC (ventilation and air conditioning) system with a good heat recovery unit is necessary.

In this perspective there will be integrated an energy efficient method to cool and heat the building mass called the ThermoMax system. I have consulted the construction company A/S Trigon in Frederikshavn on this matter, because they apply the ThermoMax concrete elements to their own building complex.

ThermoMax is concrete elements that have heating/cooling pipes embedded. With this system you are able to absorb excessive heat from the building in the warm summer period and thereby cooling the complex. The absorbed heat will be stored in the geothermal mass underground and brought up to heat the building, when needed in the winter period. This guarantees a comfortable indoor climate as it works as floor heating during the winter and cooling from the ceiling during the summer period.

With this system a large amount of energy will be reused and is very rentable to produce. The southward roof construction of the cabins and main building can advantageously be used to capture more sun heat into the geothermal store system. To optimize the roof construction for the ThermoMax element system it will consist of a black layer of asphalt on top of the high-density concrete.

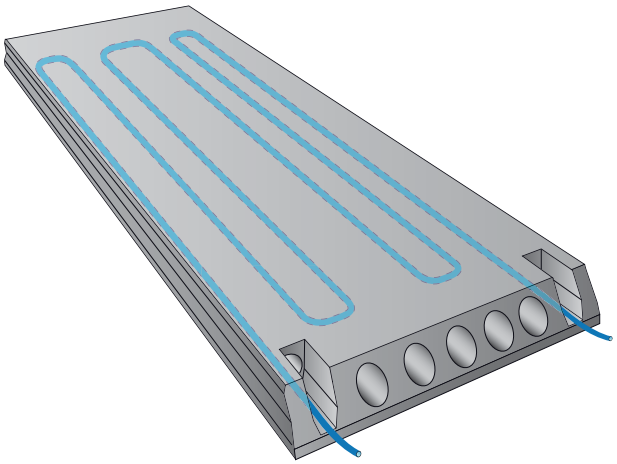


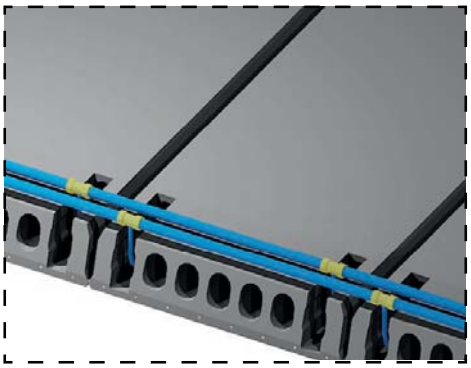
The method can save up to 75-85 percent of the energy demand for cooling. It gives a beneficial option to minimize the diameter of the VAC system, as it does not have to carry air for cooling, but only to supply the indoor climate with fresh air. Without the ThermoMax system for thermal cooling and heating the pipe diameter should be:

Main pipe - 1000 mm
Distribution pipe – 630 mm
Final distribution pipe – 315 mm

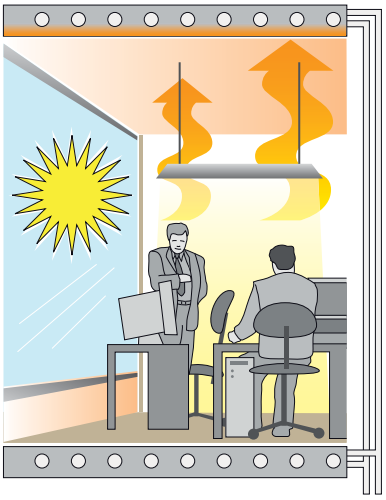
The implementation of ThermoMax can reduce the air change to 1-2 times per hour to secure a fresh air, while the normal air change should be 4 -6 times per hour to ensure a fresh air as well as to cool the air to a comfortable level.

Function of a *TermoMax* element

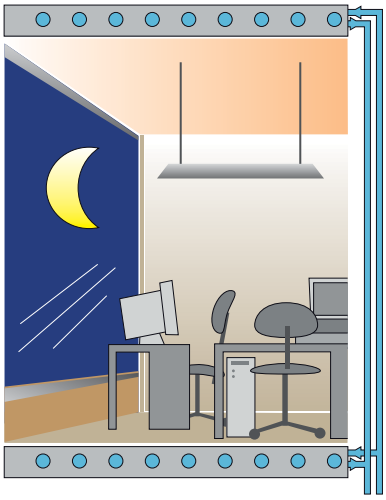




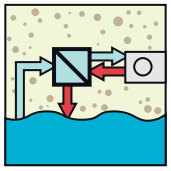
Example of pipe joints between *TermoMax* hollow core slabs.



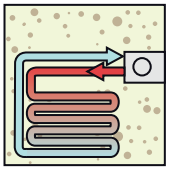
Doing the day the heat accumulate to the building construction.



Doing the night water supply through the pipe system will absorb the excessive heat.

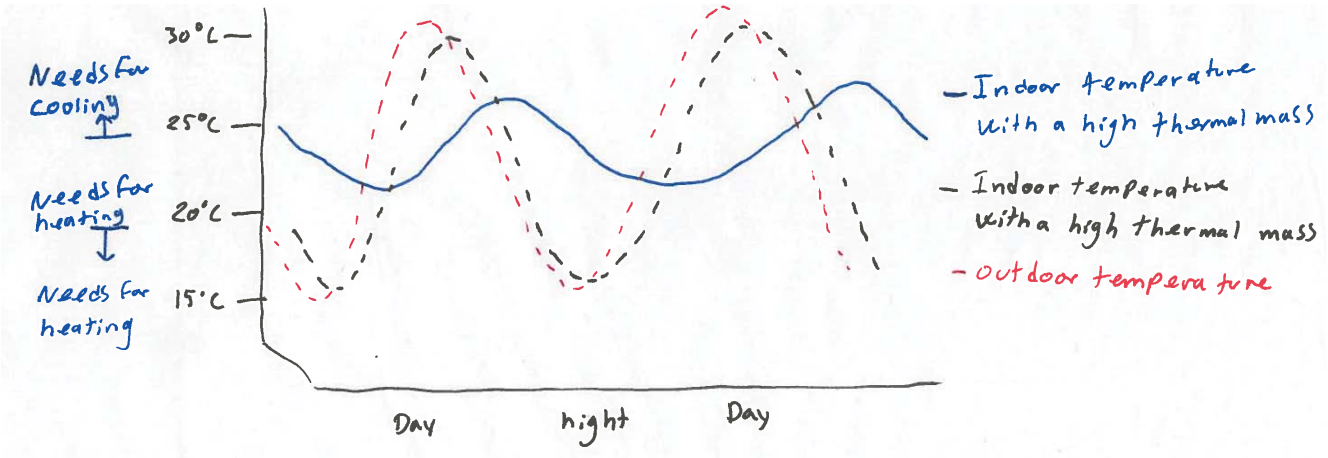


Groundwater



Geotermisk varme/
Cooling

Cooling by using method with natural element.

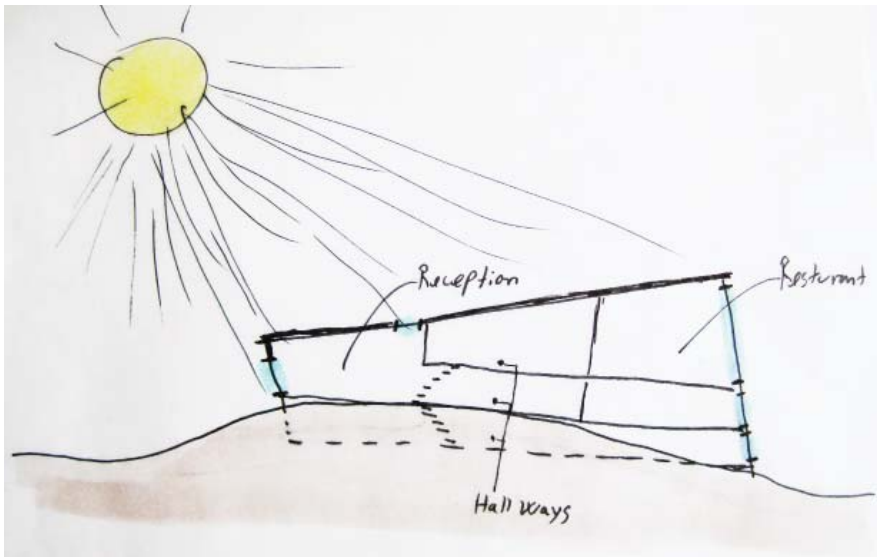


A building mass of concrete with a high thermal mass is good for equalize the need for heating and cooling.

The large glass facade

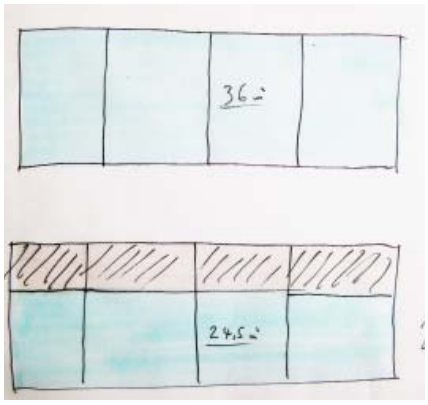
The large glass facade against north has the main function to give a good view and ensure the daylight factor is held. Problems in relation to cold air droppings should not be a problem by using ta hree layers of window glass system with a good u-value. Overheating is not a problem because of the orientation against north - northeast.

At the south glass facade at the enterence room sun heat is partly shaded by the angled wall. Do to the double high room, the roof light and the connection to the hall ways it is possible to use a stack ventilation principle, which will be usefull in the period from May to August according to a test made in Bsim.



Bsim test of the overheating problem in the reception area.

By reducing the glass facade from 34 m2 to 27 m2 the overheating issue decreases and because the full effect of the stach ventilations and the connection to the hallways was not a 100 procent implemented in the result of simulation, it seems to be an acceptable solution.

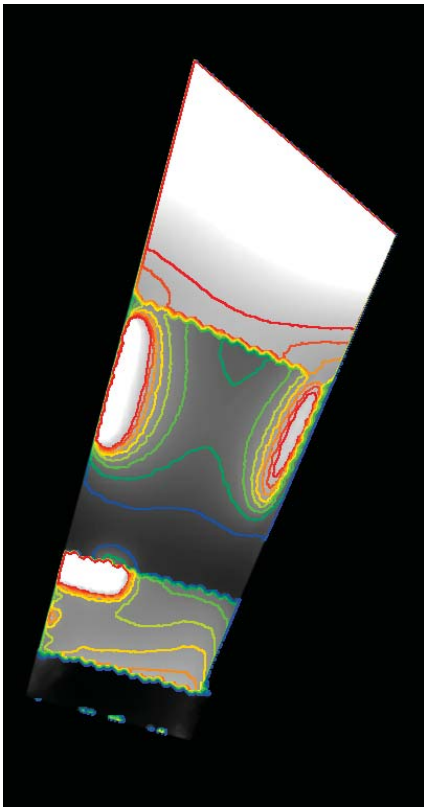


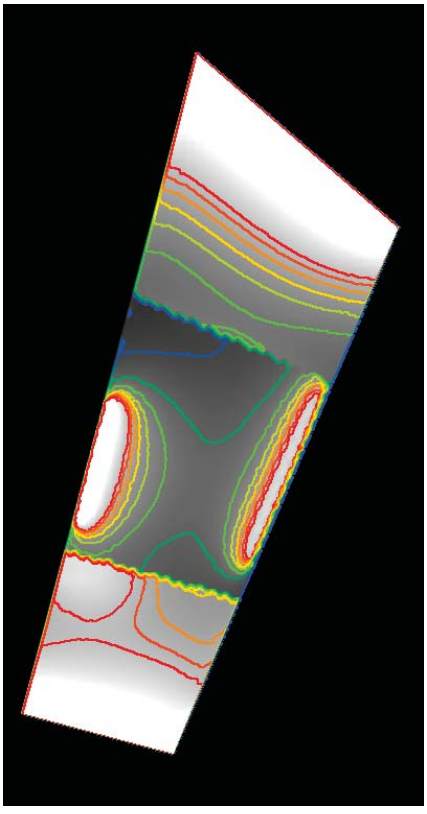
179 houer above 26 °C

118 houer above 27 °C

98 houer above 26 °C

53 houer above 27 °C





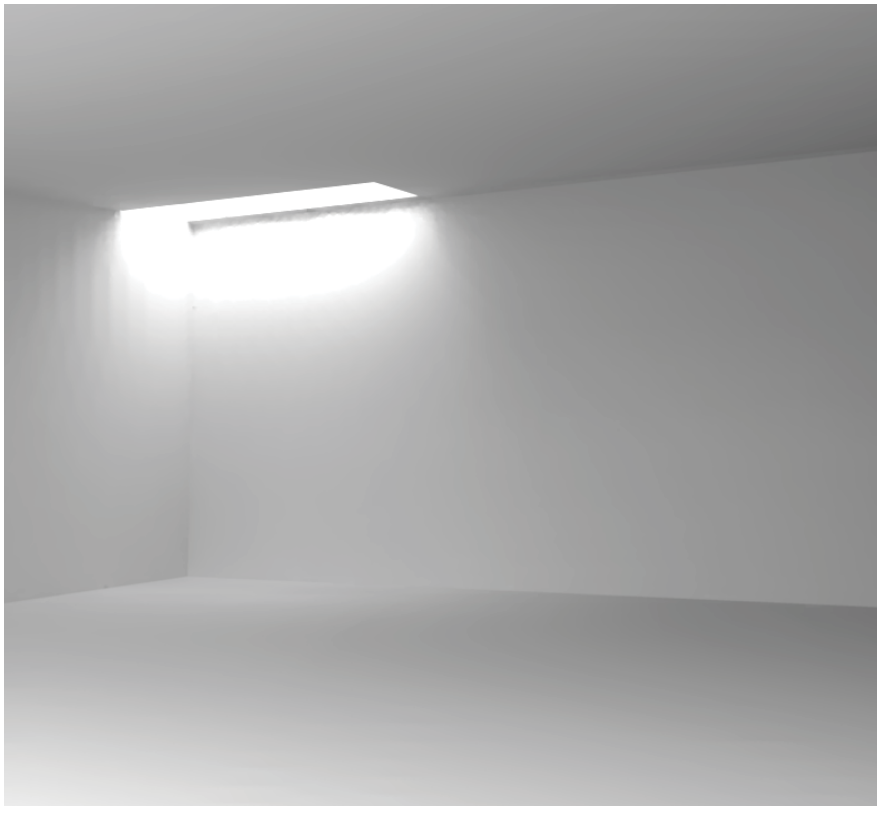


Illustration with illumination in the reception zone

Fire proofing

Category

Hotels are in the Danish regulation Sbi - 230, characterized
as safety class 5. this is defined as buildings used for
overnight stay, where users are not familiar with the buildings escape routes(BR 2010, kap 5.1.1)

Fire escapes

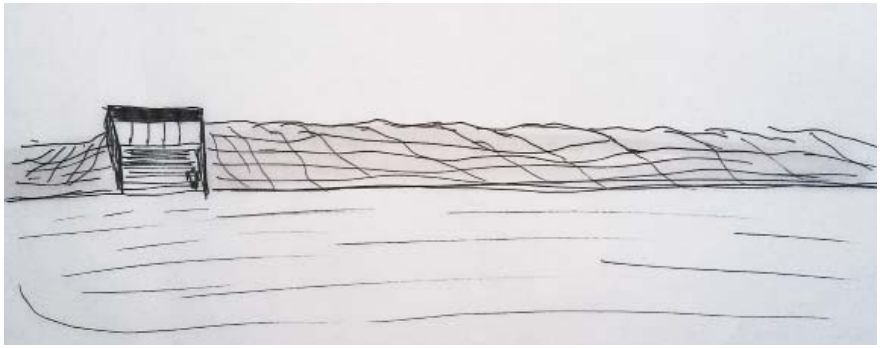
The fire stradegy of the main building encure there not is more than 25 meter to the nearest fire exit. This is done by place a firestairs on the west facing wall there connect the resturant and conference with the outdoor groundlevel. In the Spa and treatment on ground level is there fire exit by the outdoor area.

Fire escape less than 25 meter from the blue spot, the same system is on each floor.

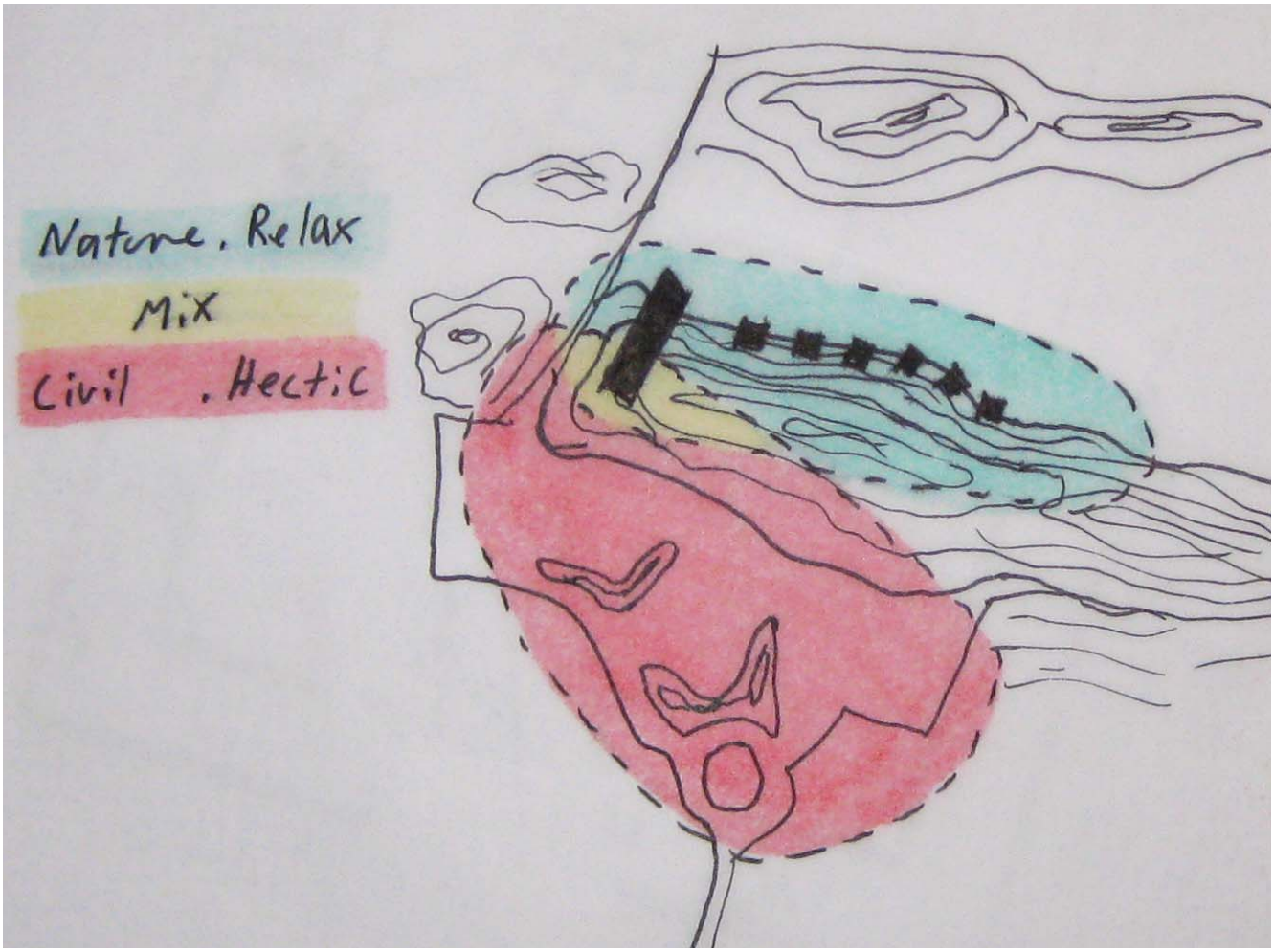
Transmission concept

The transmission already starts, when you drive out of Aalbaek a small town south of Skagen. A magnificent natural dune landscape unfolds on both sides of the solitary road. When you arrive at Skagen you drive through the city along its traditional yellow brick houses and onwards until nature surrounds you again and you reach the top of Denmark. Here a roundabout leads you away from the public car park, where tourists travel to the tip of Grenen, and to a more private car park.

Here the final transmission from the hectic civilization and to a relaxing refuge begins. You step out of the car and your eyes are drawn to the visible entrance facade emerging from the dune with an indicative staircase. The very long staircase allows you to absorb the many impressions from the building, the beautiful landscape, the wind and the fresh sea air. You move away from civilization and step into the mixed zone of the entrance hall. From here a network of twisted paths lead you directly out into nature, where your cabin awaits or to the restaurant, conference or tretment area by the stair. On your way to the cabins, the dune shields you from the strong winds and hide away the car park leaving the hectic civilization behind. You put your card in the door and enter your own private sphere overlooking the untouched nature and the merging of the two seas.

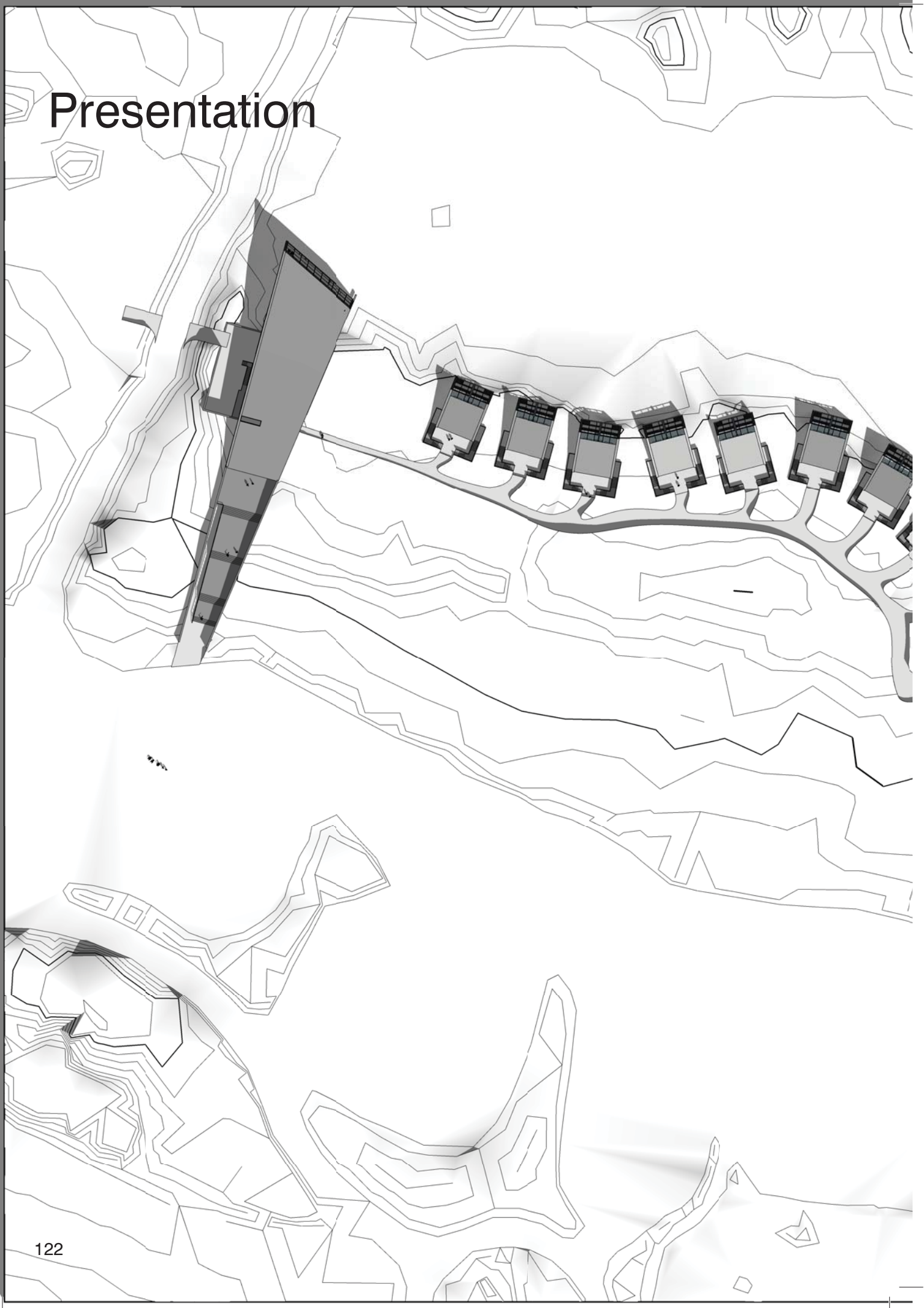


The dune landscape from the parking lot covers the cabins, but the entrance of the main building emmerge from out the dune.



Concept for thansmissions zone

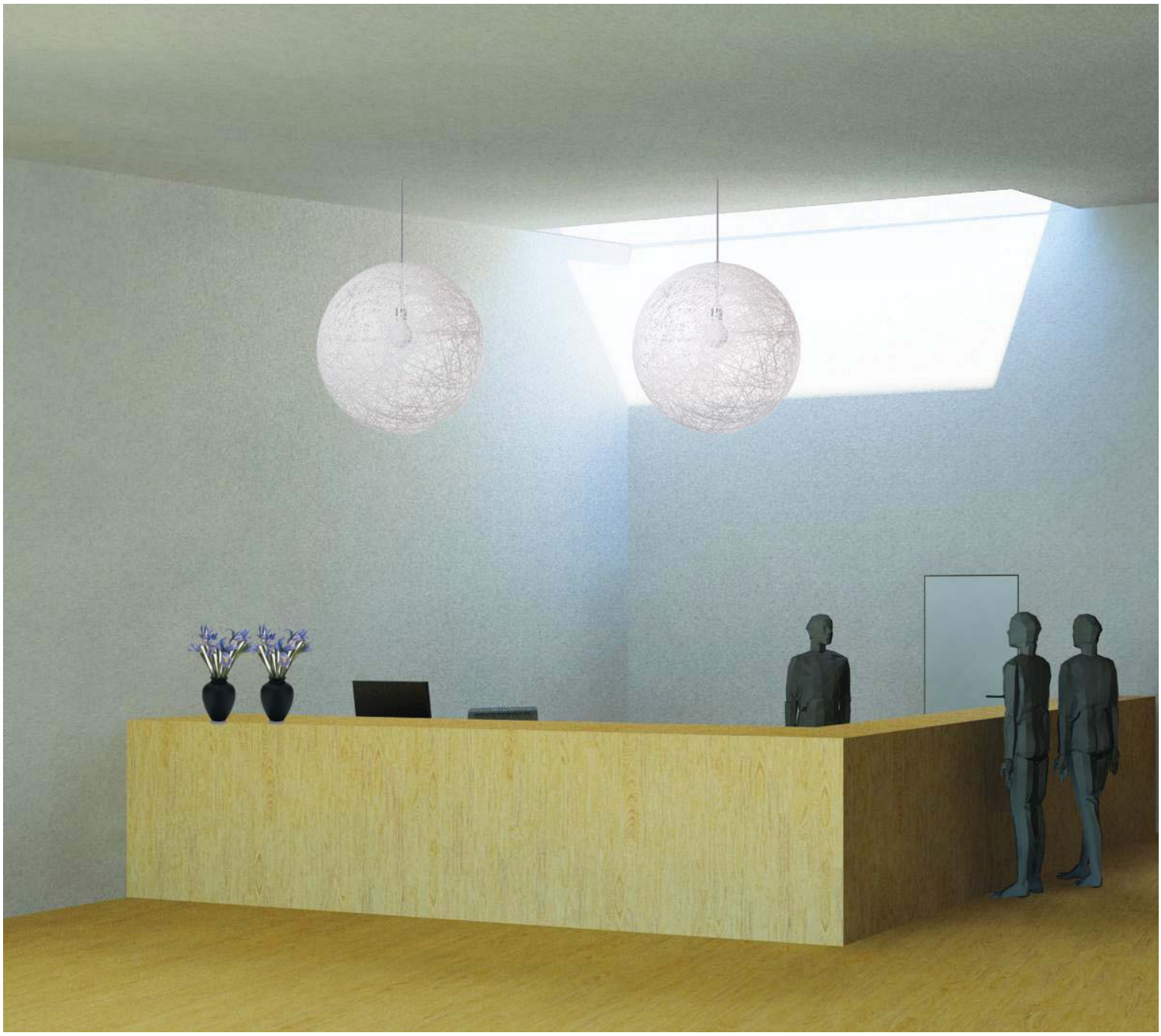
Presentation




1:1000
N

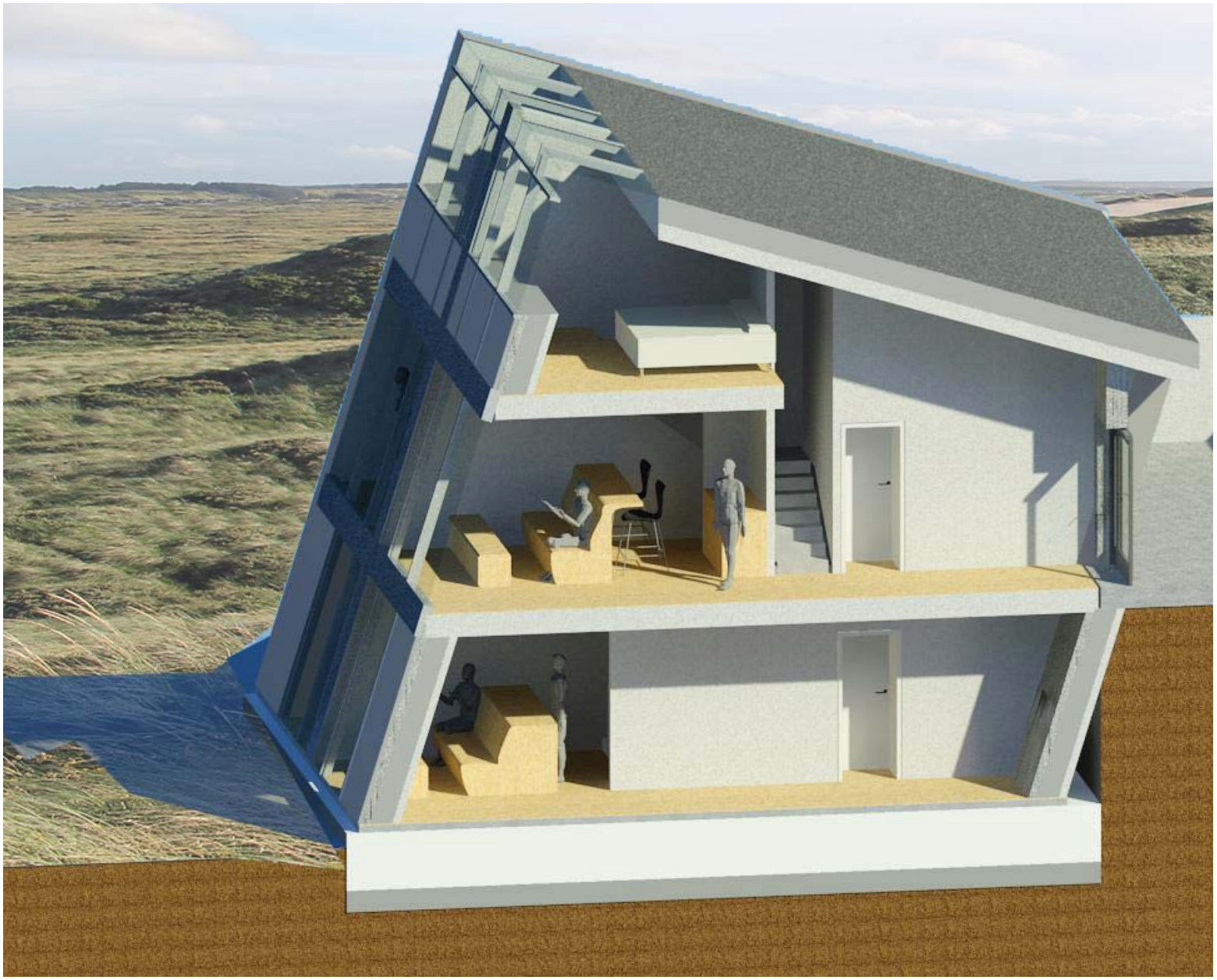
Arrival

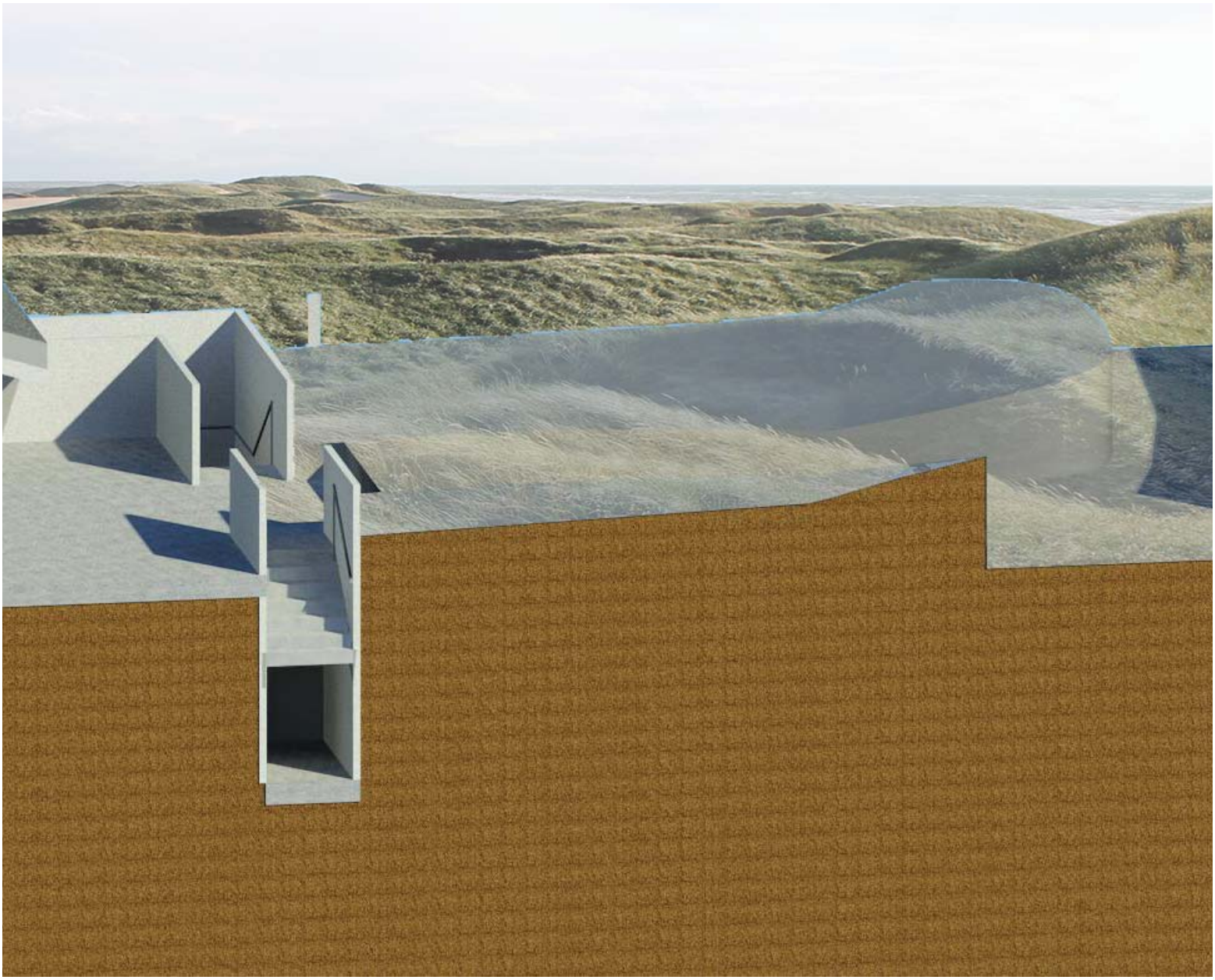
Entrance



Pathway to cabin

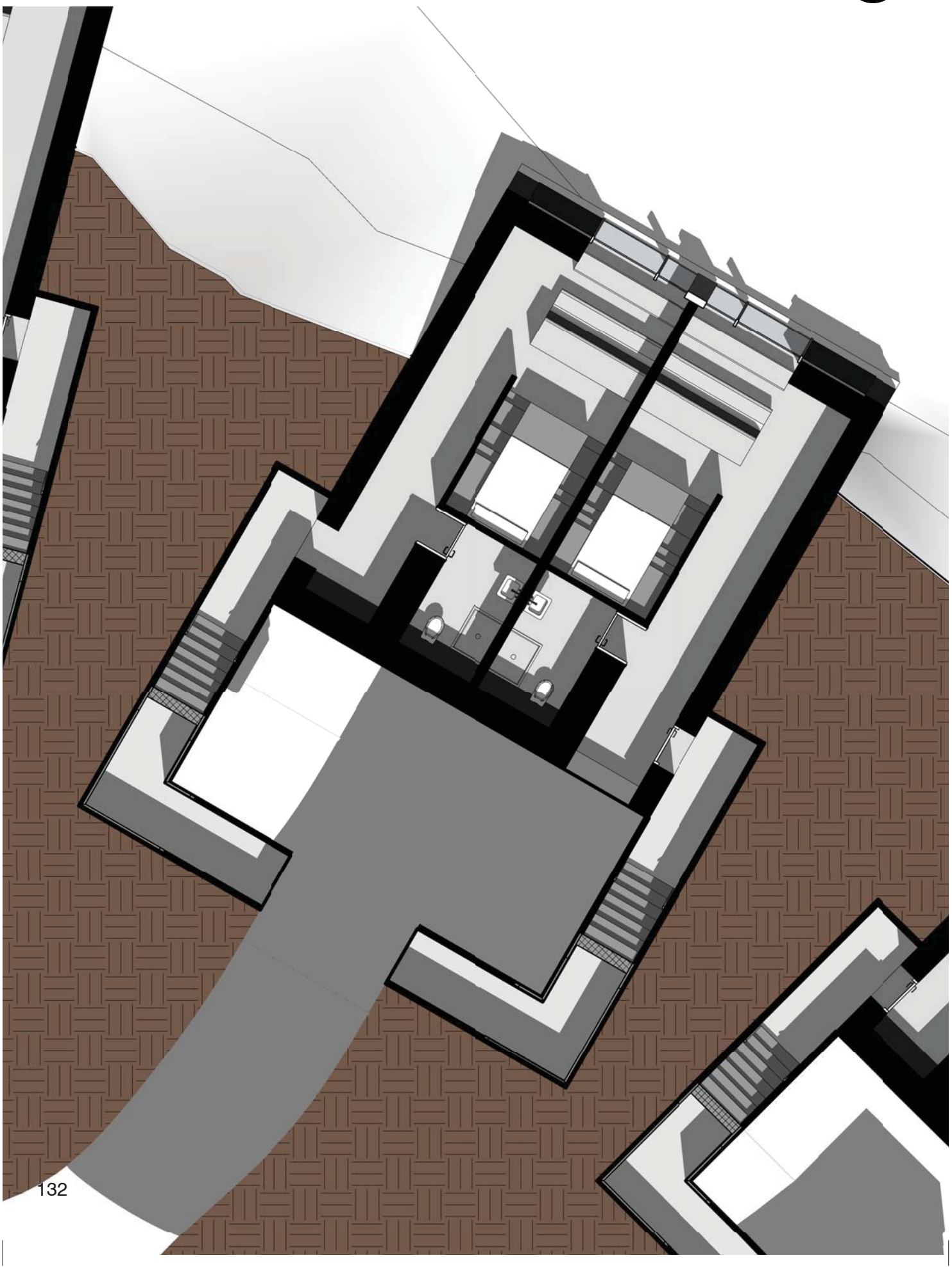
Section_cabin





Plan_Dobbe

1:100

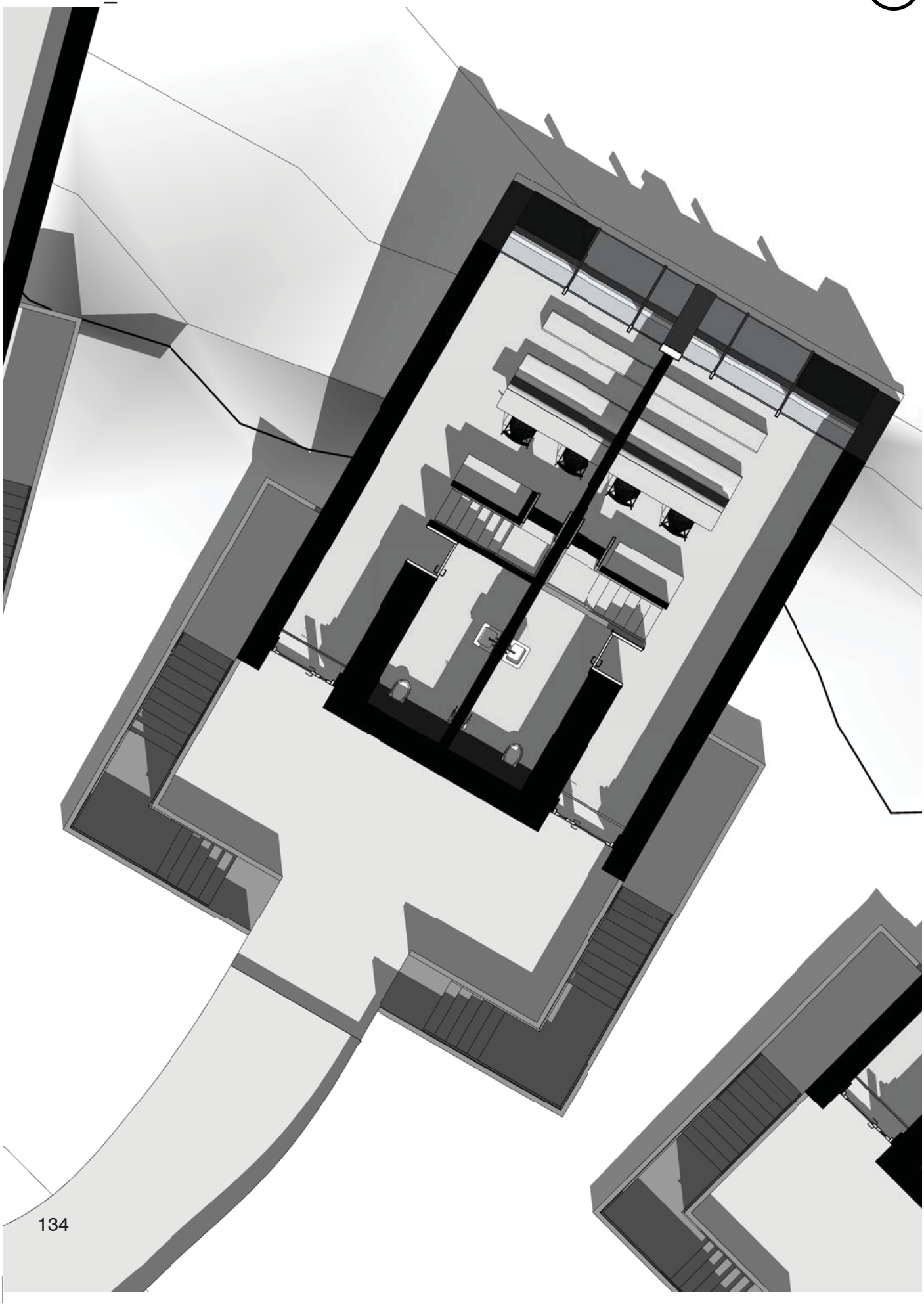


Entrance_Dobbe

View_Dobbe

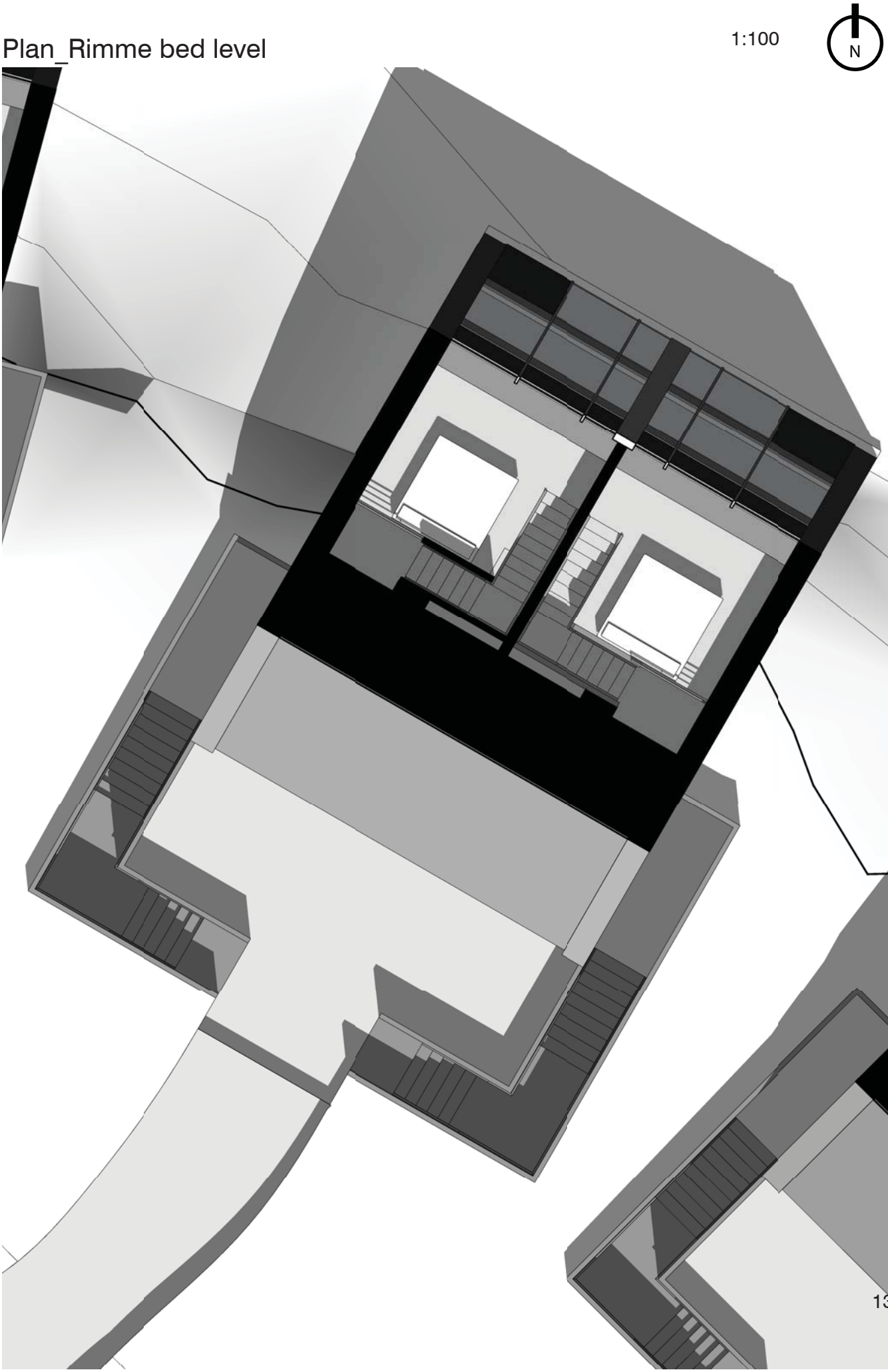
Plan_Rimme

1:100



Plan_Rimme bed level

1:100

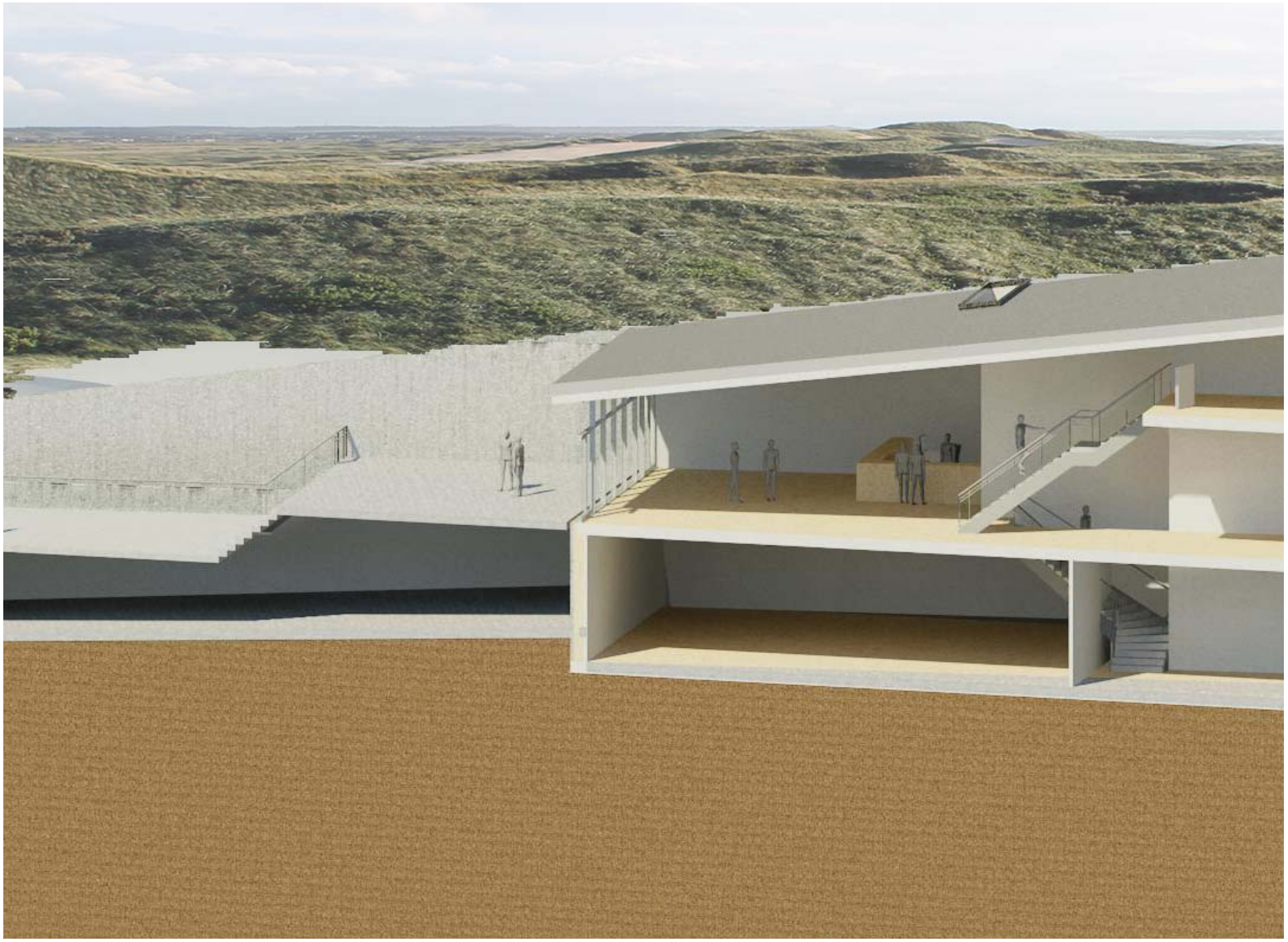


Entrance_Rimme

View_Rimme

View_bed level Rimme

Section_main building

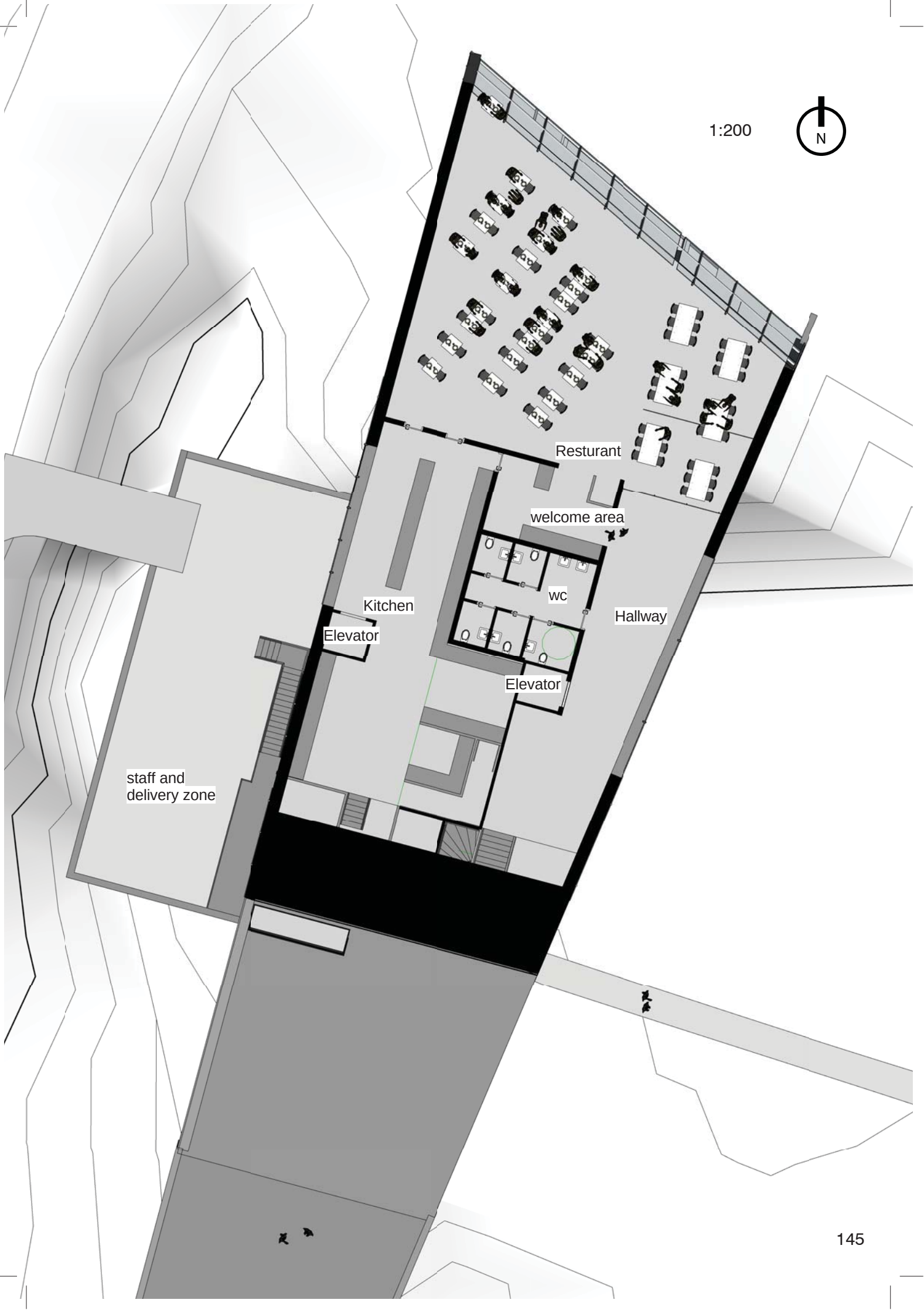


Hallway to resturant

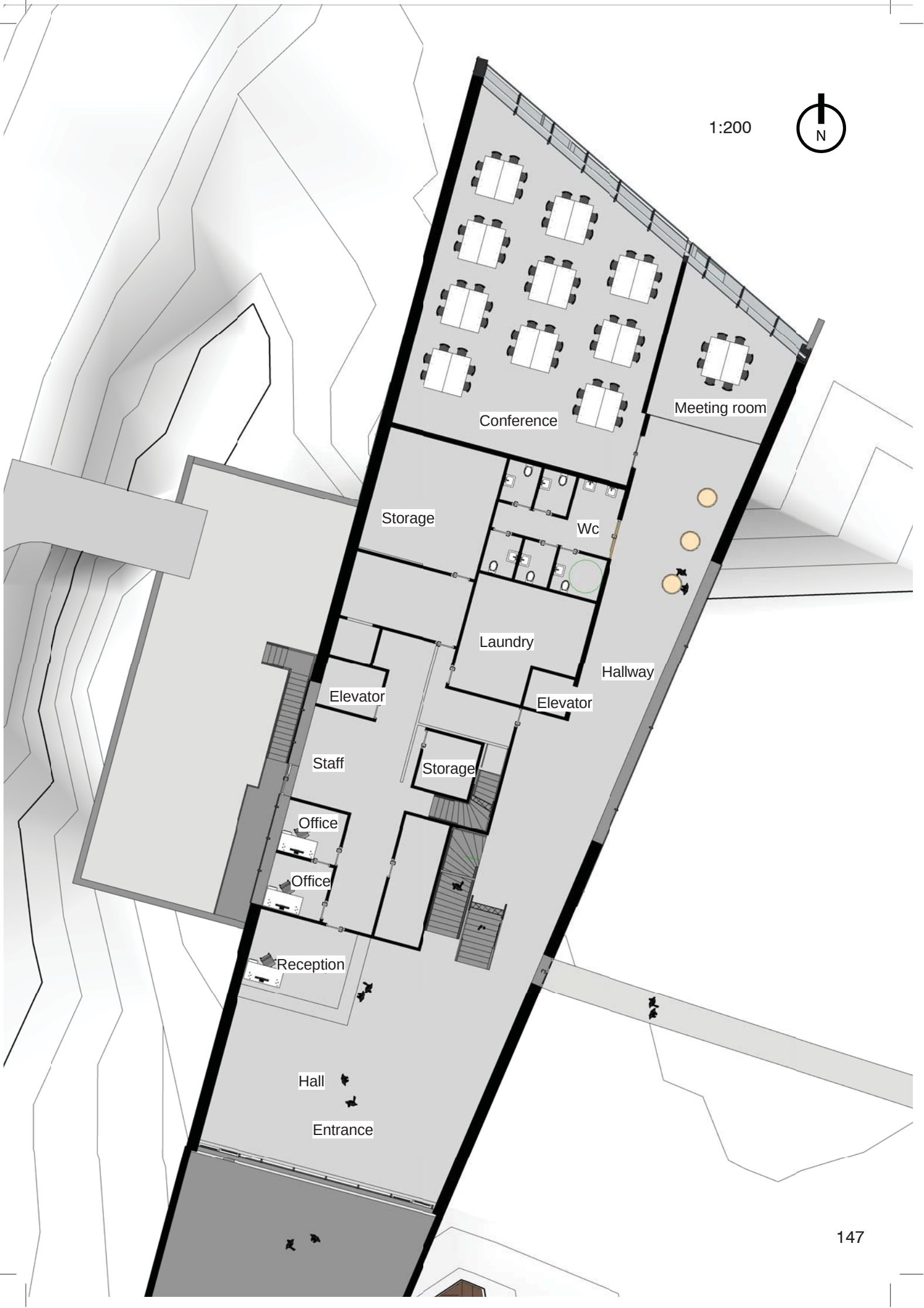
Resturant

Floorplan Resturant

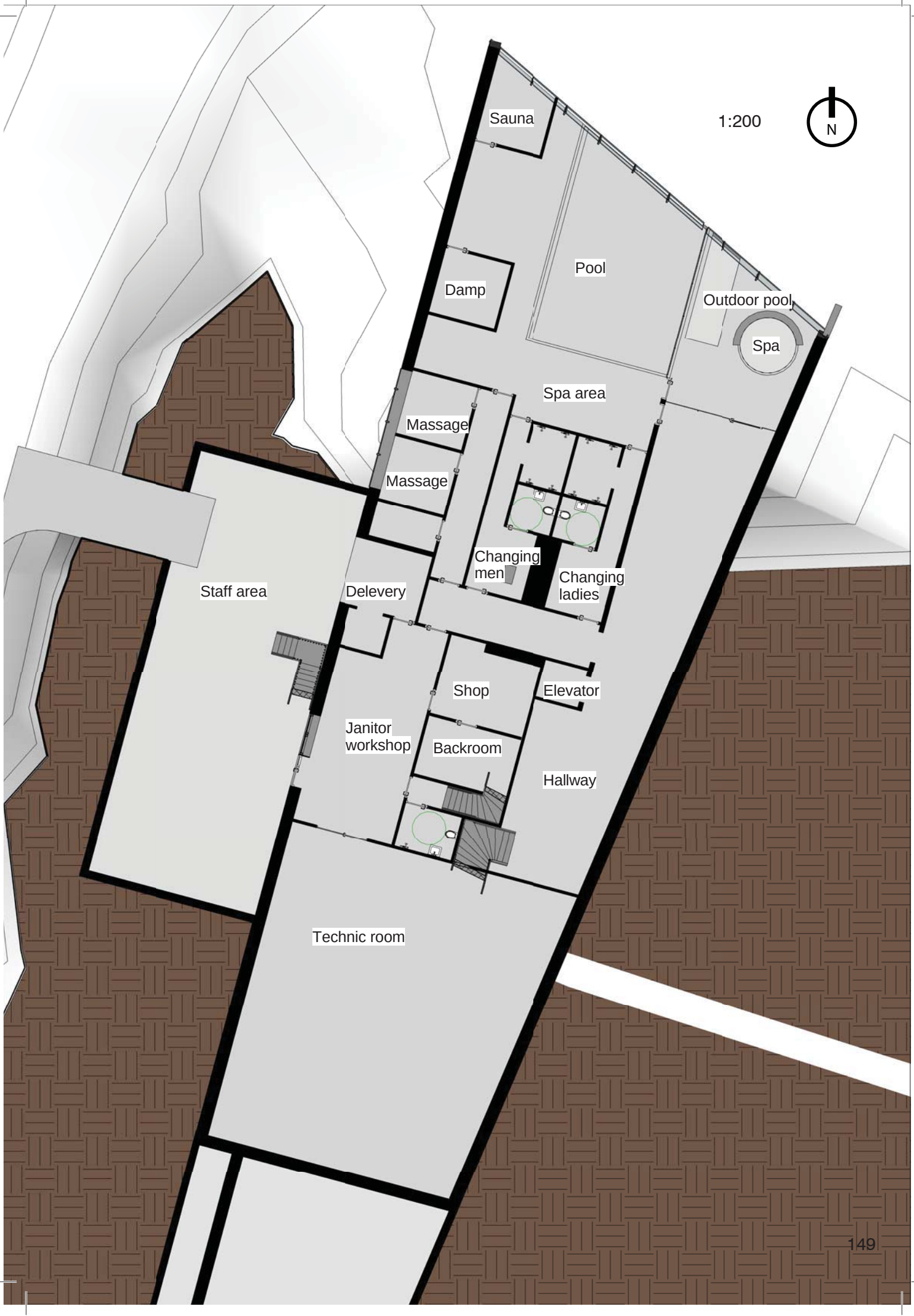
1:200


1:200
N
Resturant
welcome area
wc
Kitchen
Hallway
Elevator
Elevator
staff and
delivery zone

Floorplan conference


1:200
N
Conference
Meeting room
Storage
Wc
Laundry
Hallway
Elevator
Elevator
Staff
Storage
Office
Office
Reception
Hall
Entrance

Floorplan spa and treatment


1:200
N
Sauna
Pool
Damp
Outdoor pool
Spa
Spa area
Massage
Massage
Changing men
Changing ladies
Staff area
Delevery
Shop
Elevator
Janitor workshop
Backroom
Hallway
Technic room

Reflective conclusion

My ambition for the project was to design a seaside hotel that does not disturb the experience of the unspoiled nature, but at the same time is visible to the world around. I wanted to create a building design that frames nature as the main experience and had an energy efficient profile.

I started of my process by conducting a thorough analysis of the site. I did so via a stay in Skagen, where I visited Grenen several times and through drifting, got a sense of the place firsthand, its traits and moods. By using Kevin Lynch's method of mapping, I got a clear understanding of the site's specific elements and overall anatomy. To specify the user profile for the seaside hotel, and what ambitions there were in the local area, I had an interview with the director of tourism Lene Kappelborg. All this helped to idea generate and establish guidelines for the placement and design of the hotel and to identify a user profile.

The large, daily flow of tourists to the tip of Grenen presented a challenge in relation to the location of the hotel on a site so close to the public parking area and tourist flow. It was important for my hotel to create a public and private part, so that it has a visual element that invites people in, but also provides a quiet and private part, which is only for hotel guests. At the same time, the location needed to make room for the daily operations of the building, the delivery of utilities and arrival of staff. I met these challenges by placing the main building to the west on the site, where I could connect it to an already established track, proving a good infrastructure for daily operations and create a greater distance between the main building and public parking. By placing the cabins along the ridge of the dune it reads more naturally into the landscape, and their placement semi-submerged into the dunes hide them away from the public to the site, where the civilization and flow of tourists are.

In the design phase, I have analyzed case studies with different focus areas, which has given knowledge and inspiration in regards of; how to relate and frame the nature in the design, create moods and build underground, create transmissions and the atmosphere of being at a seaside hotel. The form language has been designed with inspiration from the case studies and the characteristics of the dune landscape and unique nature at Grenen.

I wanted to create a static contrast to the dynamic dune landscape inspired by the concrete bunkers. Therefore, my building concept was focused on the use of large, geometric shapes that was integrated into the dune landscape. The simple form and expression has been underlined by applying concrete, glass and wooden materials that gives it a raw and solid look on the outside and a simple, but more warm and welcoming expression on the inside.

The orientation to the north with the dunes and the two seas has been essential to the design and has defined lines that has given direction to and formed the building complex in away, which gives the main building and the cabins the given optimal view of the landscape in different levels. It was important to involve nature in the experience of the hotel and it has been a strong design parameter for the complex. By integrating nature and a unique view in the design, it has created different atmospheres at different levels in both the main building and cabins. I have created an experience line at the front of the dune to the north, while the more practical functions of the hotel faces south. The line of experience has created a flow and interaction between the buildings and nature and in between the various building elements.

With much thoughts and effort, I have been able to establish an operational core of all operational functions in the main building, which moves at all levels. This creates a flow for the employees and the daily deliveries to the hotel, without it disturbing the hotel experience for the guest.

To create an energy efficient design, I have worked with integrating passive energy strategies, where sunlight has been difficult to integrate, because of the limited south-facing facades. The advantage of this has been that it limits overheating during summer. Guided by my light and energy studies I have replaced parts of the north-facing windows in the cabins and south-facing glass facade at the reception with solid fields, which limit the transmission of heat. I have utilized the south-facing roof as a sun collector using a geothermal system, which makes it possible to absorb and store heat from the summer that can be used for heating the cabins in the cold months. I was able to create a good indoor climate in the most energy efficient way by the combination of a conventional ventilation system and ThermoMax, which is able to regulate the temperature with the help of the concrete's ability to absorb heat.

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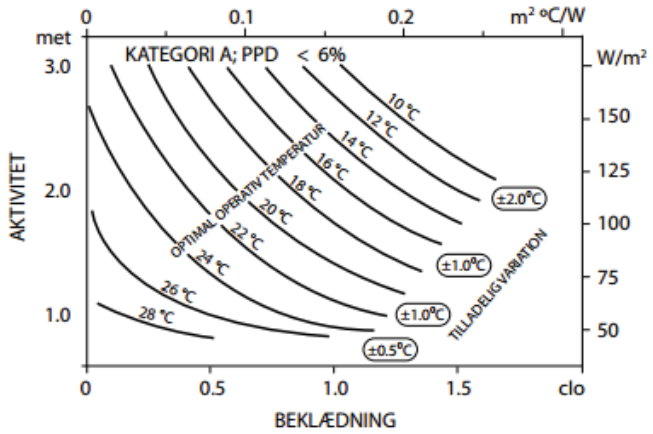
Lene Kappelborg: http://nordjyske.dk/nyheder/aalborg/lene-kappelborg-bliver-ny-turistdirektoer/be3f06dc-f1a8-43d4-bdb5-4133ab7c9b41/7/1515

Appendix

ill of different room functions according to activity and clothing.

Cabin	Met 1,2	Clo 0,1 summer / 1,5 winter
Resturant	Met 1,0	Clo 0,7
Conference	Met 1,0	Clo 0,7
Lobby	Met 1,6	Clo 0,1 summer / 1,5 winter
Bath	Met 2,8	Clo 0,1
Kitchen	Met 2,0	Clo 0,7

I DS/CEN/CR 1752 ses specifikationer over de tre forskellige kategorier af kvalitet af det termiske indeklima for andre typer bygninger.



Figur 4.1. Optimale operative temperaturer som funktion af aktivitet og beklædning (se: andre kilder 6)

Air change

Table of requirements for volume flow for ventilation of the different room categories:

Dwelling:

Kitchen 20 l/s (BR)
Utility room/ storage room 10 l/s (BR)
Bath room 15 l/s (BR)
Toilet 10 l/s (BR)

Hotel:

Lobby 3 – 15 l/s · person

Restaurant 10 l/s m ^{2}

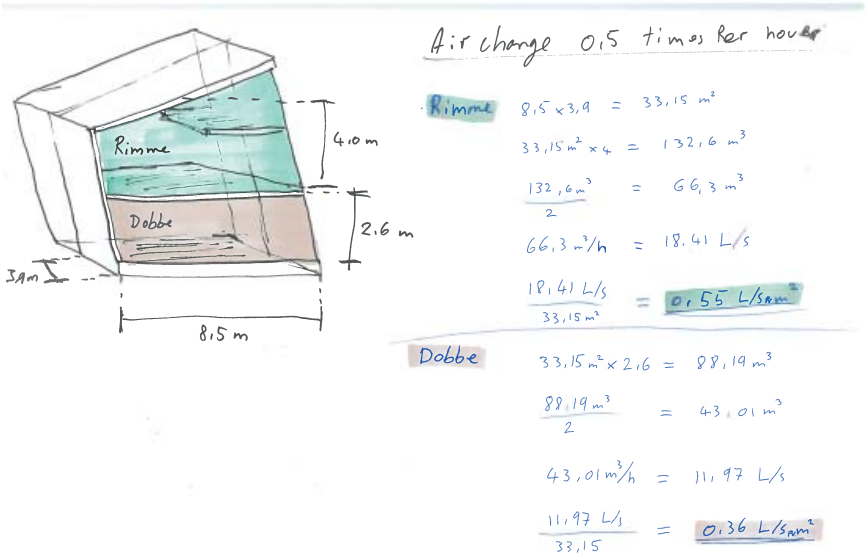
Conference room 15 – 30 · person

Reception:

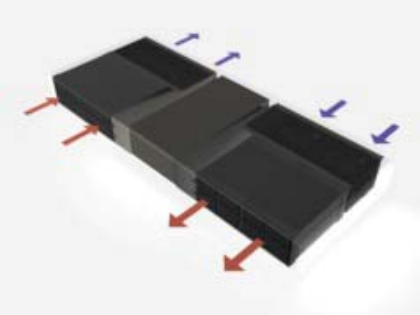
Staff room
Changing room 8–12 l/s · m ^{2}
Dining room 8–10 l/s · m ^{2}
Resting room 15 l/s · person

Office:
Modul offices 15 – 20 l/s · person

Claus M. (2007)



Technical data on mechanical balanced micro-ventilation from InVentilate



The specialized unit for bath rooms ensures that there not will get over-pressure in the room in order to not mix the air with the other rooms. In-ventilate (2015).

Nominal air volume:	MV4 per set: 72 m^3/h
Heat recovery (dry air):	> 85 %
Energy efficiency	300 J/m^3
Capacity	30-130 %
Noice level	30 dB (A)
Network communication system	LON

Calculation on number of ventilations unit.

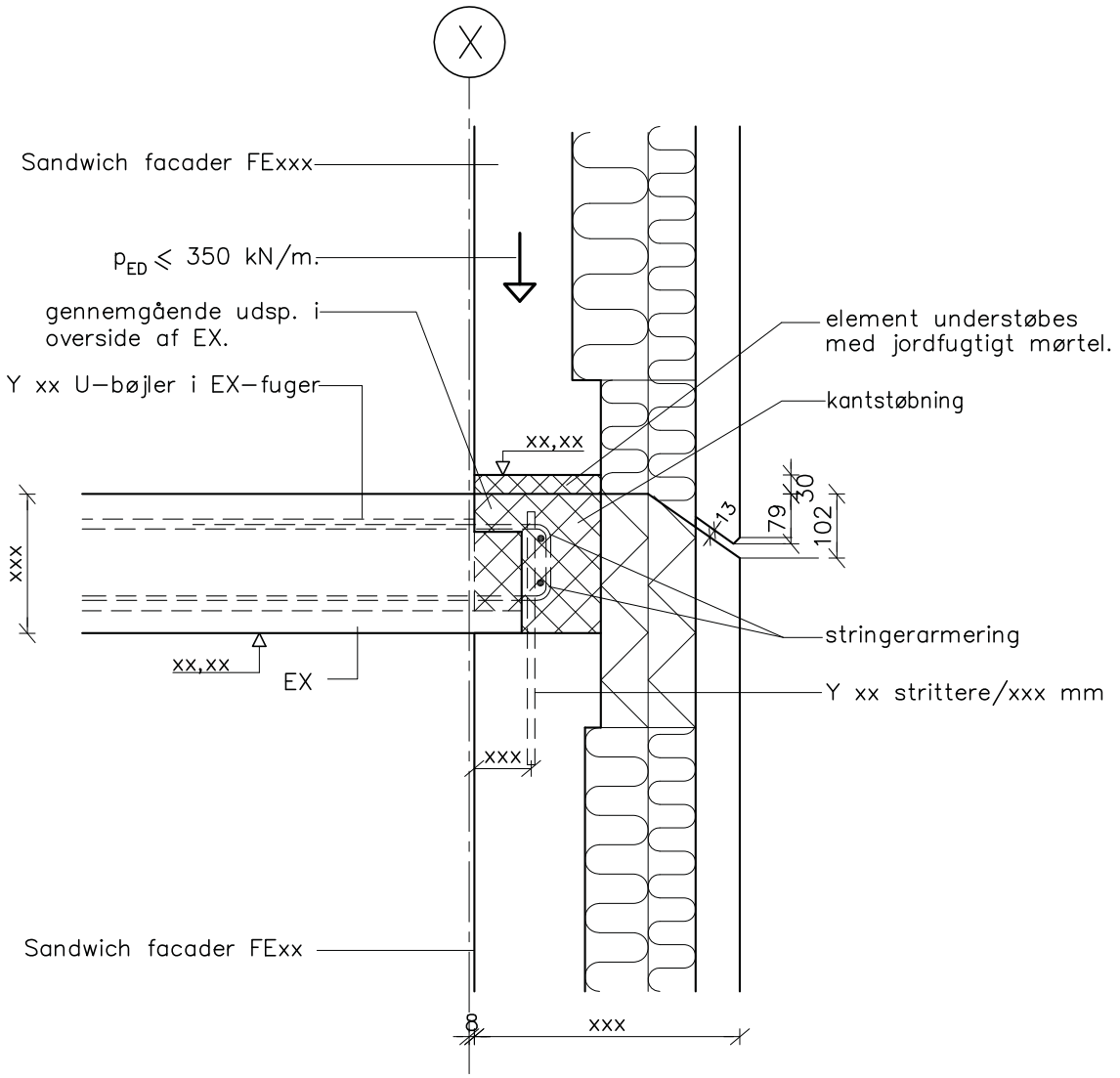
Rimme: 36 m2 floor area

055 L/s m2 = 1,98 M3/h m2 = 36 m2 * 1,98 m3/h = 71,3 m3/h

The dimensioning of the construction

To have a reasonable idea of the dimension for the construction of the building I have consulted the company Spæncom, where I explained my building design and its span according to dead load and dynamic load.

Spæncom has suggested PX32 as safe to use for a span of 15 to 16 meters for the roof construction and up to a 13 meter span for the floor decks. The office and kitchen areas belong to the CC2 class. In the restaurant and conference where the dynamic load varies more the CC3 criteria applies, which can possibly lead to a small increase in the height of the deck element. Furthermore, a leveled top layer of 60 to 80 mm is needed to level the floor plan and minimum of 65 mm overlap on 150 mm loadbearing wall constructions or beams. This gives a deck thickness of about 400 mm. This has to be added by 300 to 500 mm space for ventilations, fire and other techinal system to run the building.



Samling mellem EX / sandwich facade (bærende) (etagekryds)

NOTE:
Vederlag for EX:
Ved dæklængde ≤ 7.2 m: min. 65 mm; Ved dæklængde > 7.2 m: min. 80 mm;
Detail er gældende, hvor linielast fra ovenstående sandwich facade er ⩽ 350kN/m

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Sag Standardsamling
EX/FE (bærende – etagekryds)

Sag nr.
Tegn. nr. D2.131