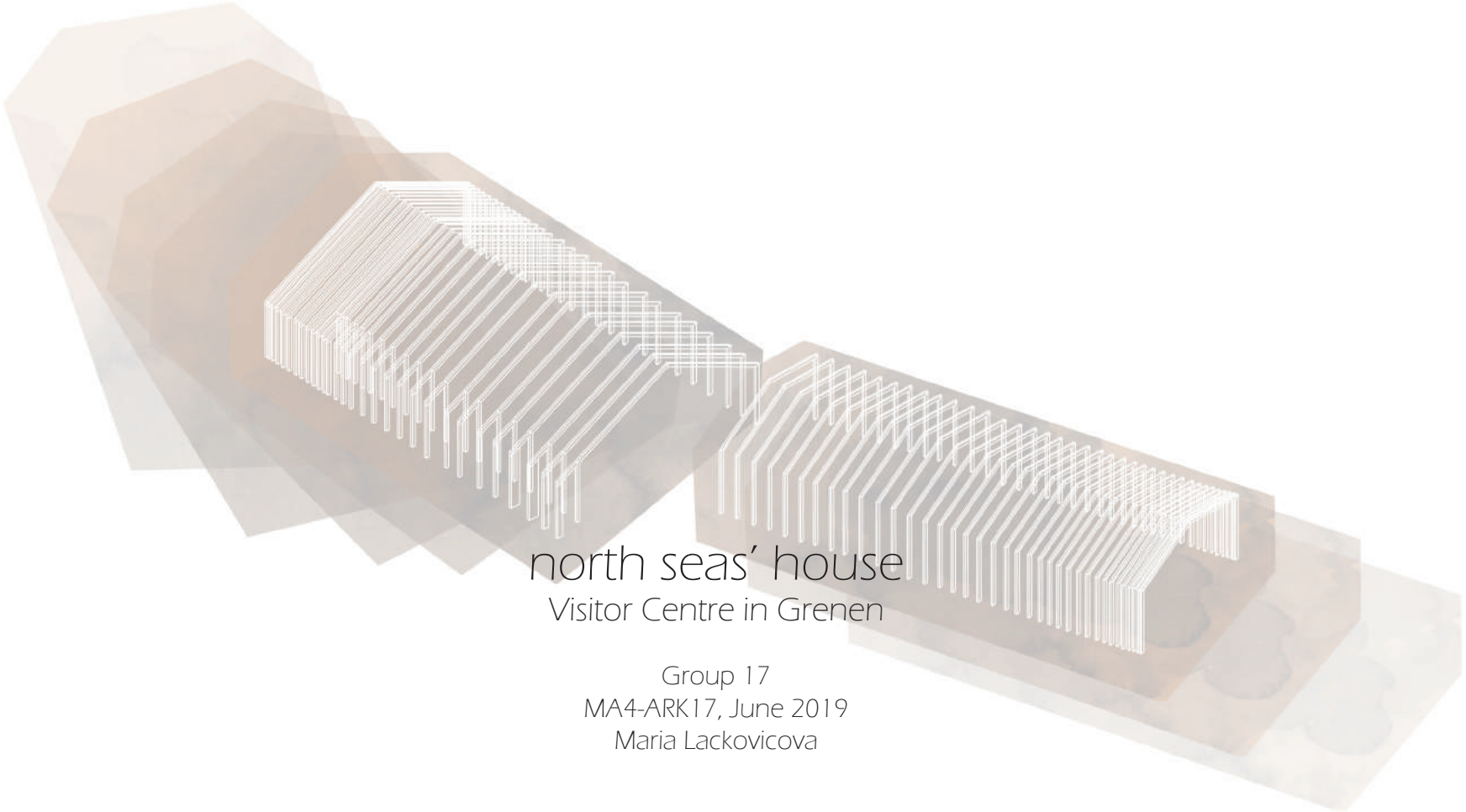


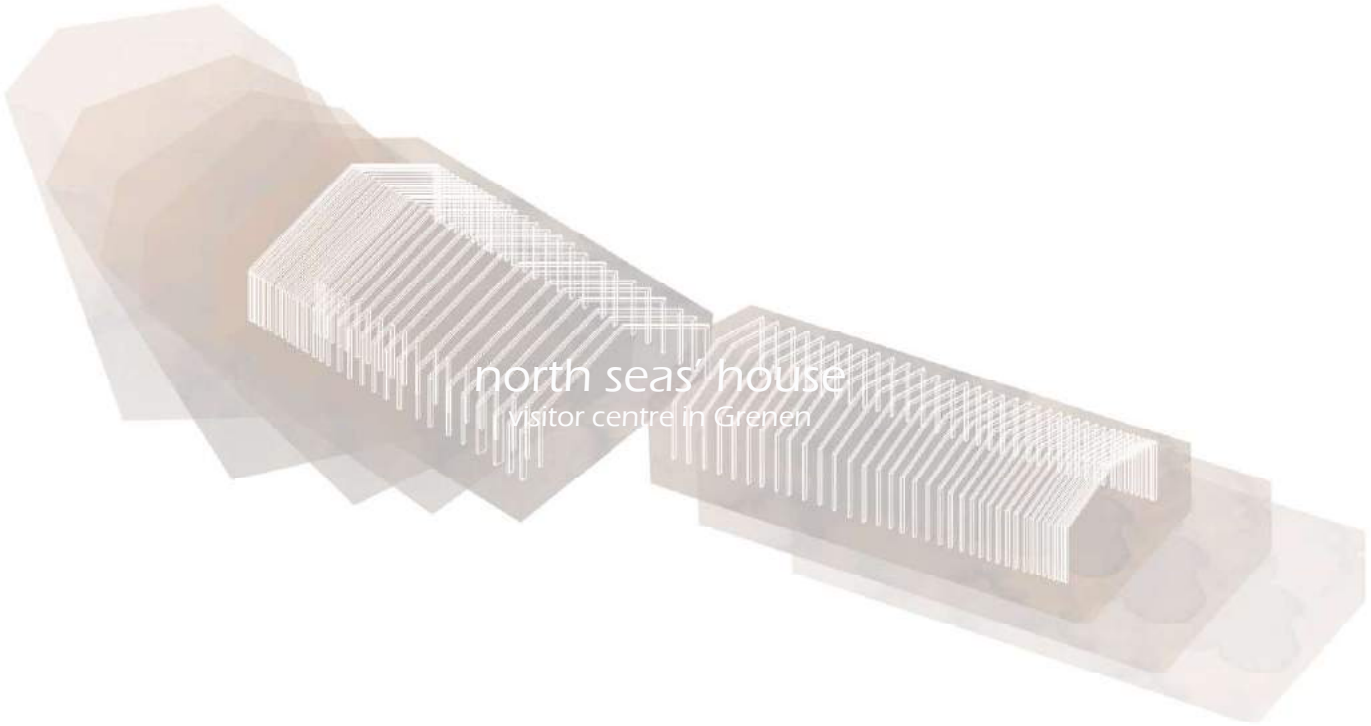
north seas' house

Visitor Centre in Grenen

Group 17
MA4-ARK17, June 2019
Maria Lackovicova

Summary

The project aims to design Visitor Centre for Grenen area, defined by sustainable approach with addressing of human senses and sensitive reflection on the specialty of the place.
In the design, the strong aspect was placed on creating a solution and a program for the area with the best possible outcome, regarding tourism, informational, nature protection, sustainable and also aesthetic aspects.
For these reason, the hub of small cabins and birdwatching towers were distributed in the area on the paths, that meets at its central point - Visitor Centre, The project is partly a refurbishment fro a estisting resstaurant, that leads the building through design changes to the zero energy requirements,


north seas' house
visitor centre in Grenen

PROJECT TITLE	North Seas' House
ABOUT	Master Thesis, MSc04 ARCH Department of Architecture and Design Aalborg University, Denmark
AUTHOR	Maria Lackovicova
PROJECT PERIOD	01.02.2019 - 23.05.2019
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PAGES	xxx
MAIN SUPERVISOR	Marwa Dabaieh
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Maria Lackovicova

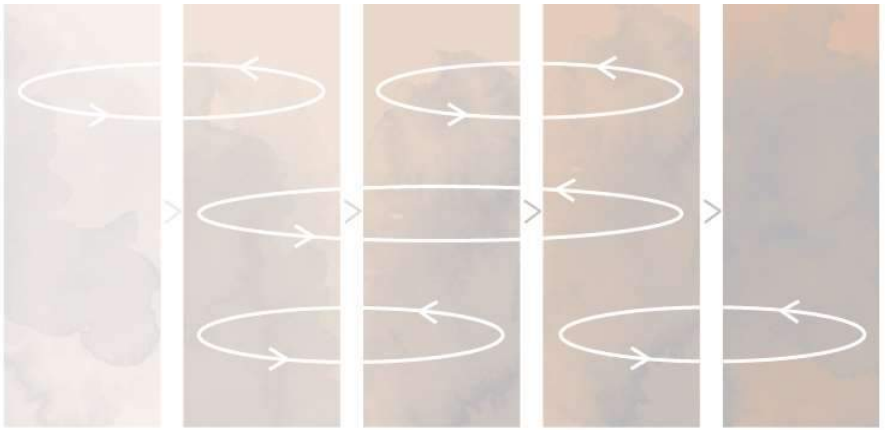
ABSTRACT

This thesis project in Architecture and Design represents design process and final proposal for Visitor Centre in Grenen, known as the top of Denmark, or the place where two seas meet.
The thesis is an academic proposal formed in two main themes: Sustainability and the Sensuality in architecture. The thesis propose sensitive approach to the area and the existing buildings, formed through refurbishment of existing buildings and improving their energy demand and extending them with newly built part, offering the extension of functions needed on the particular site. This combination is formed by the need of the function of visitor centre for Grenen area and extension of functions on the site for existing visitors, and also with vision of increasing the tourism potential.
The specialty of the place requires very understanding and thoughtful consideration in the design and in building intervention. Due to the specialty of location in very sensitive ecosystem of National Park, with wild nature and biodiversity, the building extend is limited to smaller size of building volumes and functions for the visitors. Therefore the proposal describes a refurbishment and sensible revitalization of the existing visitor area of Grenen elongated with a proposal for extension of functions in distant proximity of the Grenen area (Skagen). With this sensitive approach with high respect to the nature and wildness of biodiversity, the revitalized area will demonstrate the welcoming and sustainable wild natural environment for visitors to enjoy the immense untamed biodiversity of Grenen nature.

TABLE OF CONTENT

READING GUIDE

This Master Thesis portfolio is described in an eight chapters order. The overview of the content is found at the beginning in Table of Content and is subsequently repeated at the beginning of each chapter, to offer the reader an overview of its content. The illustrations are indicated through two letter numbering, the letter of the chapter followed by a number of the illustration within the chapter. The written content is referenced according to the Harvard method [Harvard, 2015]. At the end of the thesis project portfolio is attached in a separate chapter - Appendix. This sums only the most necessary final calculations and simulations that support the design.



ill. 1 - 1

METHODOLOGY

Designing an interconnected holistic architectural design containing retrofitting and revitalizing the area with new designing a new buildings (extension) in a national park is very complex and deep research demanding plan. Complete architectural, structural, energy engineering and legislative investigation is required in order to achieve a compound interconnected holistic and sustainable design proposal. The methodology of the designing is framed through the "Integrated Design Process" in five connecting phases introduced by Mary Call Hansen and Mary-Ann Knudstrup (2005)and is realized through two stages of concurrently run analyzes - the quantitative and qualitative methodology. The quantitative methodology focuses on measurable studies within an architectural and engineering aspect, whereas the qualitative methodology focuses more on a phenomenological approach considering atmospheres and human perception (Norberg-Schulz, 1984). Besides these approaches main problem statement idea formation and research focus is explained as an essential formation of the design in the integrated design process of North Seas' House proposal - the new vision of sustainable Visitor Centre and revital ized area for Grenen.

In illustration ill. 1 - 1, we can see the connection between the stages. The graphic was originally introduced by Mary Call Hansen and Mary-Ann Knudstrup (2005) as "Integrated Design Process".

METHODOLOGY

Integrated design process

Mary Ann Knudstrup introduced the theory of the Integrated Design Process, this is a theory of designing method that is ensuring the control during the design process and structure within its connections and interconnections in the complicated and diverse process of designing holistic solution. This method structure the control of multiple parameters that come into the process and aims to the problem solving and strategies until coherent solution in the design.The Integrated Design Process consists of five phases from the early stages that overlay and approach in steps final proposal of design solution. The process consists of loops between the phases and connects them to ensure reevaluation of the progress and allows return in changes on achieved knowledge from progressed phases.

PROBLEM STATEMENT

In this phase the problem in the certain site or scope of focus is identified and formulated. The presence of the problem is being clarified and forms general ideas for possible solutions. This phase is wide and general, but its relevance of the problem statement definition is the most important starting point to create a design that reflects on situation and reflects with solution.

ANALYSIS PHASE

In this second phase of the designing the site and its context, potential for the building and function, users needs, technology aspects, materiality and other relevant analysis is conducted. The knowledge collected during analysis forms new questions for other linked analysis. This complex and unique process aims towards obtaining the most relevant data which closer defines the concept and aims to further development. This phase include except theoretical studies and researches and written content, graphs, graphics, diagrams, physical and 3d models of the site and initial 3d models of possible volumes.

SKETCHING PHASE

This phase is defined by forming the theoretical data achieved in previous stages into physical sketching and creating possible strategies of the design. The alternative designs are proposed and compared, heading to the final solutions. This phase include the transformation from the sketching and analogue drafts into 3d models and computer modeling where the solutions are transfered with accurate engineering principles.

Call Hansen and Mary-Ann Knudstrup (2005) defined the sketching as the phase phase where the professional knowledge of architects and engineers is combined and provide mutual inspiration in the Integrated Design Process, so that the demands and wishes for the building are met.

ill. 1 - 2

SYNTHESIS

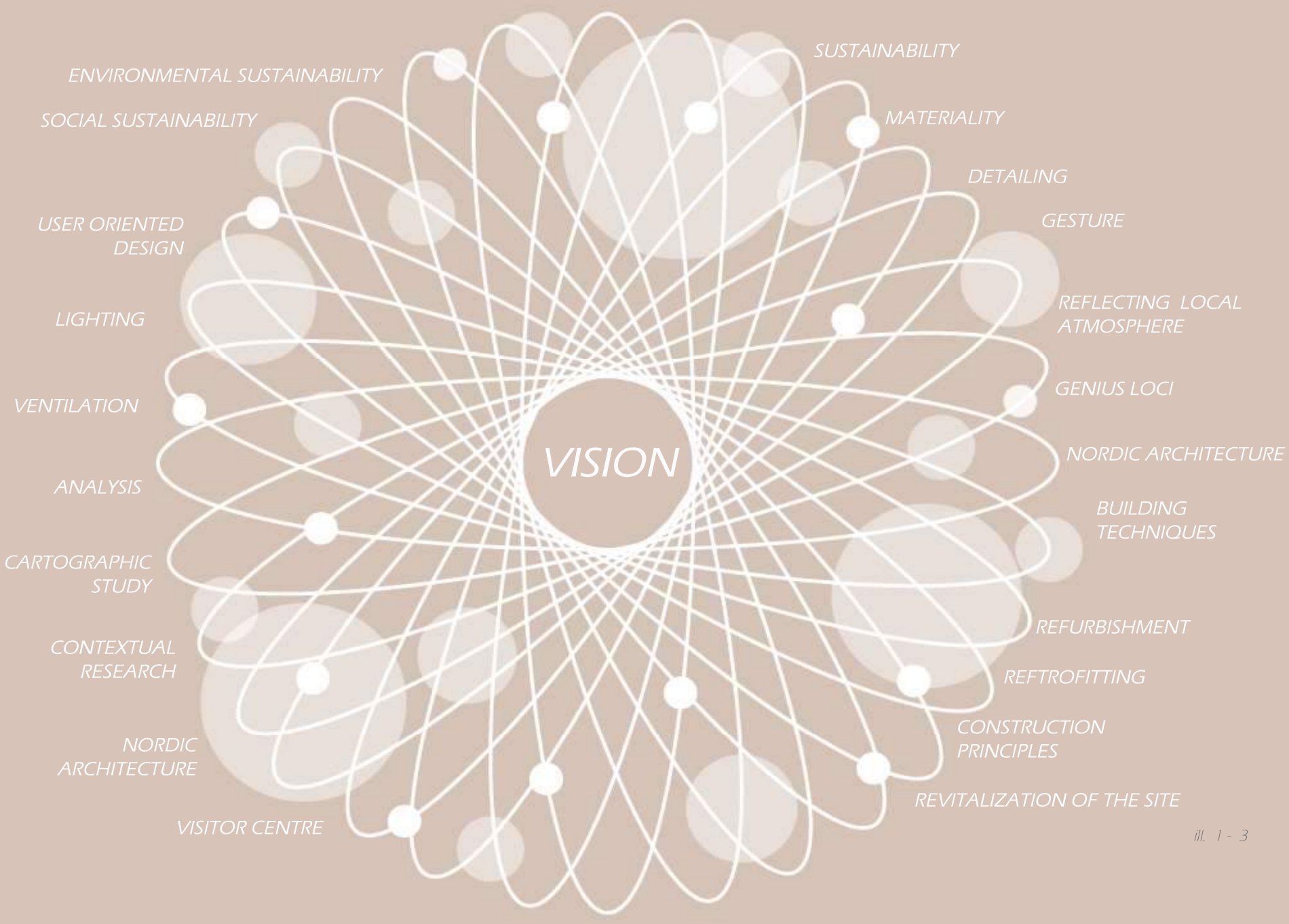
Call Hansen and Mary-Ann Knudstrup (2005) described The Synthesis Phase as a phase where the new building finds its final form, and where the demands in the aims and programme are met. This phase is a stage of the design where considered parameters comes together and in their interaction a final detailed building solution is created. This complex combination of all parameters is tested in simulations and the final building performance is documented in accurate numbers and calculations.

PRESENTATION

This final stage the project is presented in the final floorplans, views, computational exports of the design values, 3D and supplementing diagrams and pictures that clearly demonstrate the fulfilling of the design criteria and target values. The presentation besides the report portfolio also consist of the models and posters.

DIAGRAM DESCRIPTION

The diagram (*ill. 1 - 2*) was originally created by Mary-Ann Knudstrup as an Example of the interaction of the parameters in the Integrated Design Process, and was modified for the purposes of this particular design. Contained parameters present the most important influence on the proposal of the design for the sustainable architecture and describe their interrelation. Its extended version of all elements forming the vision is shown in *ill. 1 - 3*.


VISION
SUSTAINABILITY
MATERIALITY
DETAILING
GESTURE
REFLECTING LOCAL ATMOSPHERE
GENIUS LOCI
NORDIC ARCHITECTURE
BUILDING TECHNIQUES
REFURBISHMENT
REFTROFITTING
CONSTRUCTION PRINCIPLES
REVITALIZATION OF THE SITE
VISITOR CENTRE
NORDIC ARCHITECTURE
CONTEXTUAL RESEARCH
CARTOGRAPHIC STUDY
ANALYSIS
VENTILATION
LIGHTING
USER ORIENTED DESIGN
SOCIAL SUSTAINABILITY
ENVIRONMENTAL SUSTAINABILITY

ill. 1 - 3

APPROACH AND FOCUS

PRELIMINARY PROBLEM STATEMENT
RETROFITTING
REVITALIZATION
SENSING ARCHITECTURE
SUSTAINABILITY

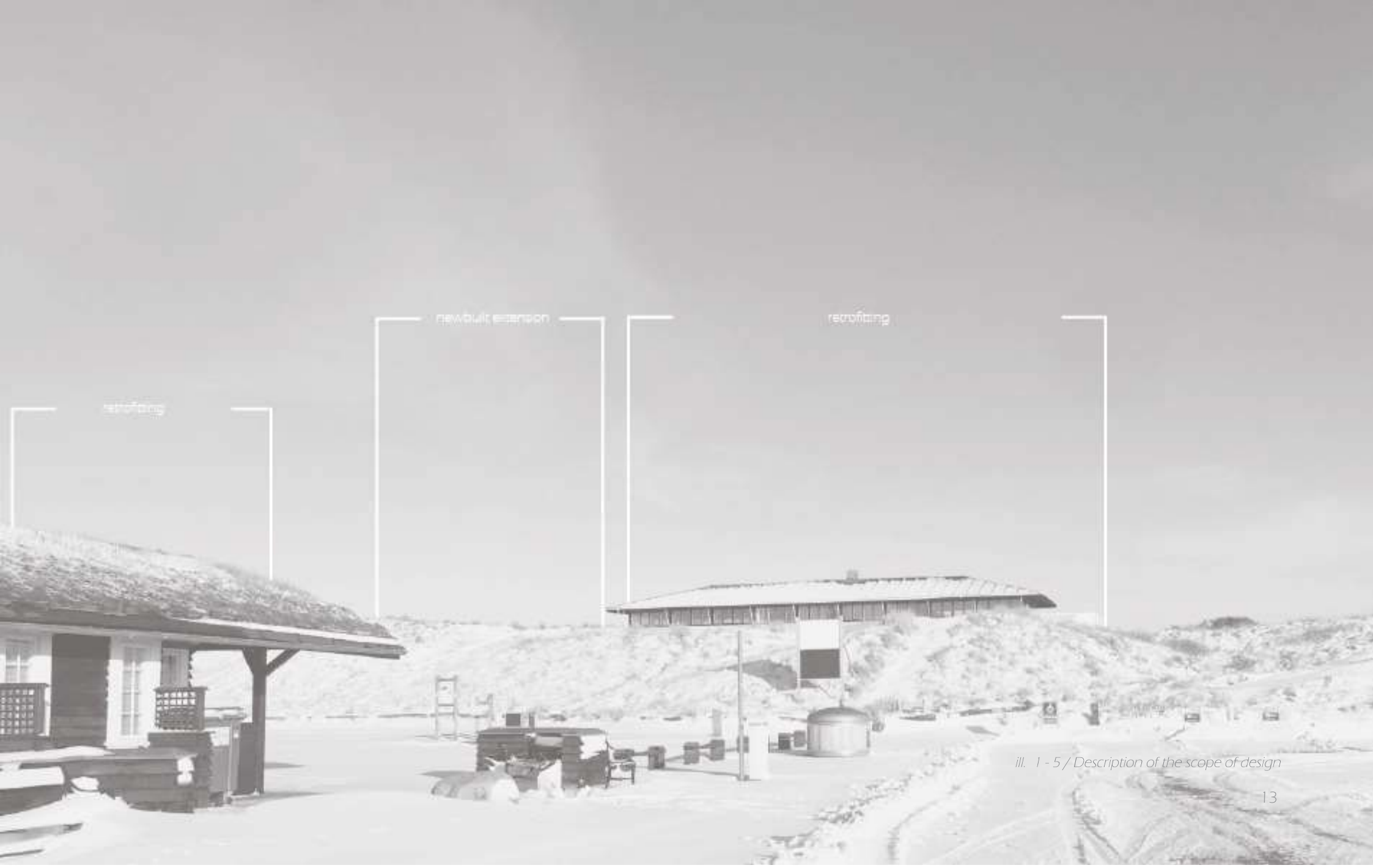
APPROACH AND FOCUS

In this part, the approach in the project is described, with its general focus and aim. Broad formation o design criteria are formed. The methods planned to be used in the project are introduced and objected. Secondary, four main themes of the project are described. Retrofitting of the existing building, revitalization of the extended area as a development plan, sensing architecture as a building approach of strong sensitive respond to existing wildlife, culture and buildings, and sustainability as a sheltering theme that is included in multiple aspects of the project.

PRELIMINARY PROBLEM STATEMENT

The beauty and speciality of the place welcome yearly more than 2 million visitors according to The official tourism site of the Top of Denmark. I believe, that by providing facilities and especially a shelter with service for all users and all visitors, we can improve the experience and increase the comfort of visitors and improve tourism in Skagen and Grenen. The official tourism site of the Top of Denmark states that 50 million visitors yearly visits Denmark, which makes only 4% of the visitors coming to the very north of Denmark, to the place where two seas meet. With providing conference spaces and guest rooms (limited number), I believe Grenen could become a very spectacular experience for scientific researchers visits, or for short conferences. However, there is a very important factor that must be carefully researched and applied on design, and it is the perseverance of nature and protection of the natural and untouched region. I aim to reflect sensitivity towards nature, compacting with the surrounding and benefiting the area, while addressing the users and their positive experience from the stay in nature. Preserving the existing building and improving their energy demand through refurbishment and extending the building with a newly built part that is sensitively responding to the location is the main aim. Secondary plan is the revitalization of the enclosed area. And finalization of the design approach is a general function development plan for Grenen and Skagen that covers functional needs for the area, that cant be fulfilled within the site and protection zone of national park, but are important for the local development and tourism potential (camping areas closer to Skagen, other functions in distant proximity from the Grenen site). This complex plan ensures nature protection, but also complete the demand for functions in its logical and responsible distribution.

ill. 1 - 4 / Site location



ill. 1 - 5 / Description of the scope of design

RETROFITTING

RETROFITTING EXISTING BUILDING TO IMPROVE SUSTAINABILITY AND ENERGY PERFORMANCE

Retrofitting is a renovation of a building defined by improvement of its energy performance through modification of its facade and structure in order to improve its energy efficiency and decrease its energy demand. Through energy efficiency retrofit of the building, the life span of the building is extended with its economical effects on operational costs and environmental impact. The economic and environmental impact is held through two steps, through avoiding demolishment and through its continuing lowered operational costs.

The Office of ENERGY EFFICIENCY & RENEWABLE ENERGY states that the goal should be to create a high-performance building by applying the integrated, whole-building design process, to the project during the planning phase that ensures all key design objectives are met (Paradis R; 2016). This process is aiming to increase value of the building, extend her usability, ensuring lower operation costs and more suitable indoor environment. Paradis R. in 2016 also advise on secondary improvements on the building, when deciding on the retrofit - upgrading the accessibility, safety and security. These aspects will be evaluated and taken into the process of integrated designing, when the strategies will be extended with these secondary uprhgrades on the building.

ill. 1 - 6 / Wind turbines

REVITALIZATION

Cambridge dictionary defines revitalization as the process of making something grow, develop, or become successful again. Merriam-Webster dictionary defines revitalization as giving new life or vigour to. Merriam-Webster dictionary also links revitalization to these synonyms: freshen, recharge, recreate, refresh, regenerate, renew, repair, restore and revive. Today the revitalization is defined as a many-sided effort including revalorization, restoration, reconstruction, modernization, and actions aimed at revival of a building, district or a town devastated in various aspects, also economic and social [Pawłowska and Swaryczewska 2002]. To summarize the currently used definition of revitalization, one might say that it is a form of action, being a part of urban policy, affecting the whole life of a city, the action combining respect for the past and local traditions with solving local problems of inhabitants, stated Wilczkiewicz, M. & Wilkosz-Mamcarczyk, M. in 2015. These authors also state that the revitalization processes the attention is drawn to revival of already inhabited (urban) areas, which with the passing of time have lost its functions. In another part of the journal they also state that revitalization doesn't have to be applied only for building, but can affect urban planning, landscapes or everyday life. Based on these statements from researchers, we can assume that revitalization is a broad topic, that as an act can affect a wide spectrum of built environment and settlements, but also other subjects. We can reformulate the revitalization as an intervention to the affected subjects should bring change that either return the function to a subject that lost its use, or to give that subject new function, or to simply bring life and revive, renew the subject.

REVITALIZATION

THE IMPLICATION FOR THE DESIGN

Mentioned theory might apply also for the area. Through revitalization, the area that doesn't use its potential, that might have been used in past, or haven't been used up till now, in order to improve the quality of the area.
Revitalization to the extended area of the site in Grenen-Skagen is aiming to improve the potential that the locality has, and have been used partly in past and is seldom used nowadays, but the locality doesn't use its full potential. Reviving the area can be than facilitated by functions in the visitor centre and can work as a complex plan for the Grenen -Skagen tourism empowerment without placing all the functions in strongly protected area of immediate enclosure of the site that is located in national park, rather than advise a complex plan for the area that cooperate and together create interconnected functions for visitors, distributed from Skagen to Grenen.
The scope of revitalization for North Seas' House project consists of a program of advice for designing and distribution of functions that after analyses of the area, its contextual, geographical, functional condition and analysis of potentiality can benefit the area on more levels. This way of extended development for the area is connected to the planned design of Visitor Centre that party is a retrofitting project of existing Restaurant De-2Have.
The analysis shows that area has a large potential for many more functions, that will also benefit the area and increase tourism. But the character of the wildlife and large present biodiversity

ill. 1 - 3 / Site location - enclosure

REVITALIZATION

THE IMPLICATION FOR THE DESIGN

at the northmost part of Denmark in a vast nature is not suitable to host larger area for leisure, relax and camping. These functions are beneficial, but can't be located in such virgin nature of National Park. This theory is supported by legislative for the building limits in the area. However, the area of Skagen is an ideal place to locate these functions. Its proximity to the site in Grenen is very suitable. The distance between Skagen and Grenen is 4 kilometres, which is a desirable distance for a hike or walk to this virgin nature. Revitalization of the area will then include guidance for maintaining and sustaining the walk paths, locating the camping parks with facilities, windsurfing and other functions in the extended area in closer proximity to Skagen. Visitors may then hike along the lighthouse, that will be thanks to revitalization more often visited and possibly extended in future with a small cafe. Afterwards, the hike continues to the very top of the land, where two seas meet. Visitors can take rest in the visitor centre - which is the main scope of the planned design, learn about the area, have lunch or coffee, visit museum and gallery, or simply rest or hide from accidental rain in the sheltered area. This will become an important aspect, to leave opened sheltered place for visitors who came from the hike and want to just sit and relax. The complex plan will not only benefit the local tourism and preserve nature but will maximize the experience of the visitors to explore comfortably the virgin natural environment Denmarks' northmost National Park - Grenen.

ill. 1 - 3 / Site location - enclosure

SENSING ARCHITECTURE

Human interaction with spaces is closely connected to all the senses. It is not only our conscious realization of space qualities. We perceive its qualities through senses first. Juhani Pallasmaa as a first stated that good architecture should engage the users on an experiential level offering them a multi-sensory experience. Juhanni Pallasmaa also states that Quality architecture involves its users both mentally and physically and interacts with the senses creating a memorable experience that goes beyond the tangible world. (Pallasmaa, 1996). Architectural theorist, Peter Zumthor described a sensory experience in architecture. According to Zumthor, experiential approach to design creates the atmosphere of a specific space. The atmosphere of a place gives it its identity and character. (Zumthor, 2006). Identity and character of the place are perceived by users very individually, and affecting and engaging users senses defines speciality for space and creates an experience in users.

A phenomenological approach to design is when space, material, light and shadow interact with one another, in order to create the most memorable experiences by awakening the senses. (Holl, Pallasmaa, Perez-Gomez, 2006, p.45) Therefore it is important to engage sensing its odour, its temperature, the sound materials or nature, wind blowing through the construction or windows and tactility of the materials. People also perceive an abstract quality of materials, such as concrete leaves impression of heaviness, soft interior materials leaves impression of safety and homeliness. Based on human interaction to these details, people make connections and sense the space from which we perceive impressions based on which we create memories.

THE IMPLICATION FOR THE DESIGN

ill. 1 - 7

Based on these theories some implications are formulated, towards which the project will aim. Through addressing the senses of users, special experiences and memories can be created and users overall impression can achieved new extension. The design aims to following:

Taste. The North Seas' House project include refurbishment of the building of an existing restaurant on the site, which function will remain. Visitors can dine with a spectacular view of the sea over dunes, they can order locally caught fish and seafood in fresh quality. Senses of taste can be fulfilled in the cafe too, or just on the covered terrace, where visitors can sit and enjoy their packed snacks.

Smell. The materials used in the building will be examined in LCC and LCA and based on their sustainability best choices will be chosen. Most likely wood will be the main material, which can be recognized by typical smell.

Touch. The tactility of the materials will be considered on both exterior materials for seating and pavement, but especially and foremost in the interior. The targeted sensation from the choices of material should contrast, but a sense of robustness but simplicity. The target is to make users experience and touch something very natural and imperfect, placed in the interior. The overall feeling that is desirable in the building is safety and comfort.

Hearing. Visitors can enjoy the sound of the sea from the terrace. The exterior revitalization can include interactive outdoor sculptures or placements for sound creation.

Sight. Spectacular views of the sea over dunes or the lighthouse will be offered from the building in sensitive consideration of the placement.

SUSTAINABILITY

Designing with a sustainable approach, aiming to achieve a holistic and sustainable outcome, is a process that requires analyses of the condition, setting realistic options, understanding the extent and its different approaches and ideas.
Sustainability is defined by more aspects, and they are a coherent combination between environmental, social and economic sustainability, that is also known as three pillars of sustainability. Nowadays designing for environmental sustainability is a request covered by the legislation in each country, in order to set the rules that ensure that required standards to be obtained. In Denmark, that required standards to be obtained. In Denmark, the energy demands for buildings is set by theDanish standard BR2020. In accordance with this standard, the building of The North Seas House Visitor Centre in Grenen aims to be designed.

ZERO ENERGY BUILDING

The aim of the project is to design a zero-energy building and to design conduct a retrofitting on the existing building, aiming for the quality of the low use energy building with its own production of energy, that will meet the criteria defined by the zero-energy building as well. The exact definition of the zero-energy building stated by the European Smart Grid Hub in 2011 is following "A zero-energy building is a building with very limited use of energy, which produces an amount of energy at least similar to the amount it uses. This means that there is no excess of demand over supply in terms of energy in such a building. The zero-energy building achieves this by renewable energy technologies implemented in the building fabric. Furthermore, it has to be connected to a smart electricity or district heating grid with which it can exchange energy and/or heat." (Denmark: A European Smart Grid Hub', Copenhagen Cleantech Cluster 2011).

SUSTAINABILITY

ENERGY EFFICIENCY AND SUSTAINABILITY STRATEGIES

1. energy and water systems at minimal consumption

2. minimizing of waste - recycling, reuse and minimal construction waste

3. daylight and energy efficient lighting

4. natural ventilation

5. renewable energy options

6. solar shading devices for windows combined with photovoltaics

7. high-performance windows

8. on-site energy sharing

9. security and safety of users

FRAMEWORK

SENSING THE SITE
POINTS OF INTEREST
SCOPE OF THE PROJECT

FRAMEWORK

In this part, general research and analysis of the framework of the project was conducted in order to justify the aim of the project and its scope. The general awareness and points of consideration underwent critical discussion and started forming potential criteria. The possibilities and potentials were compared. This part is a preface to problem formulation.

SENSING THE SITE

The beauty and speciality of the place welcome yearly more than 2 million visitors according to The official tourism site of the Top of Denmark. By providing facilities and especially a shelter with service for all users and all visitors, the experience from the place can be enhanced. The increase in the comfort of visitors can contribute to improve tourism in Skagen and Grenen. The official tourism site of the Top of Denmark states that 50 million visitors yearly visits Denmark, which makes only 4% of the visitors coming to the very north of Denmark, to the place where two seas meet. Recent visitor centre is located in Skagen, outsite common routes of tourists and significantly less frequently visited, comparing to the Grenen point. With new visitor centre inlcuding conference spaces and guest rooms (limited number), I believe Grenen could become a very spectacular experience for scientific researchers visits, or for short conferences. However, there is a very important factor that must be carefully researched and applied on design, and it is the perseverance of of nature and protection of the natural and untouched region. I aim to reflect sensitivity towards nature, compacting with the surrounding and benefiting the area, while addressing the users and their positive experience from the stay in nature.

ill. 1 - 8 / Skagen beach

POINTS OF INTEREST

ill. 1 - 9 / Points of interest

Grenen is a place in Denmark with a large potential, defined by large diversity, wild nature rich in fauna and flora, the beach of meeting two seas, where often seals are spotted. The dunes sheltering the specially protected biodiversity of flora, white also ornithological specialities - the migrating birds can be watched in this area. But also has the potential for offering new opportunities. (These aspects are deeper analyzed on p.82-93).

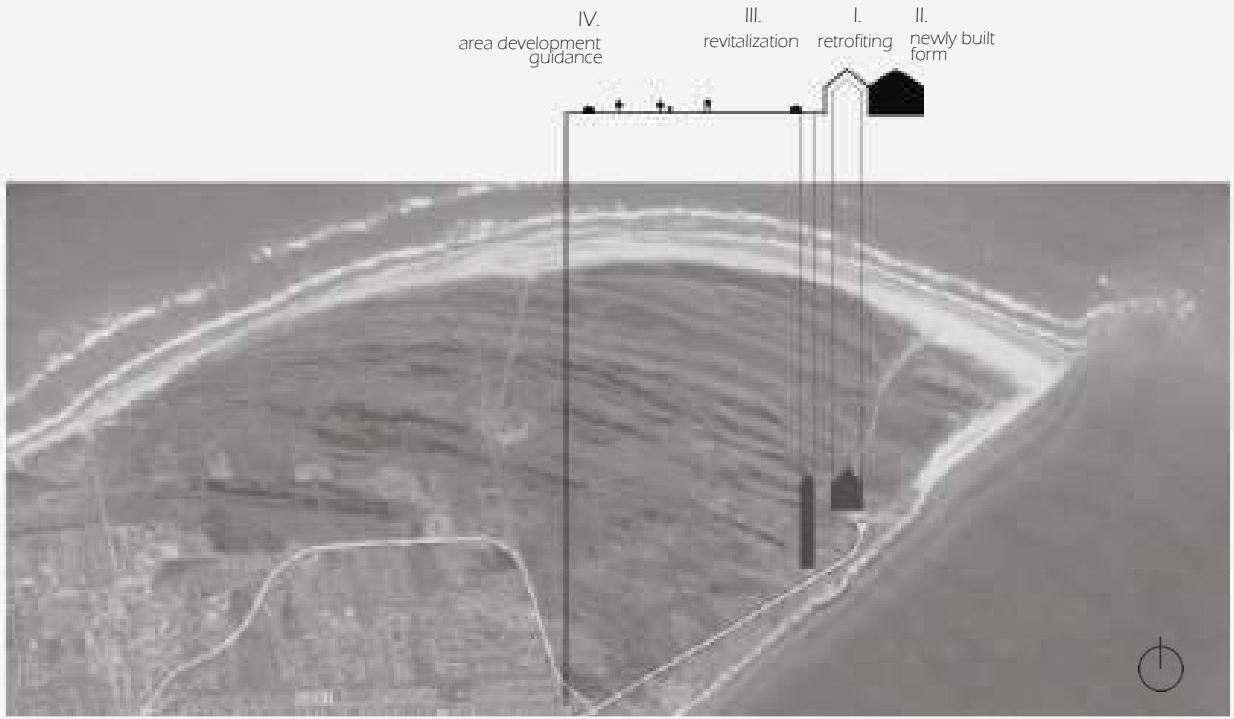
SKAGEN

The site is located in a place that connects more points of interest. Visitors on the site (29.1.2019) were questioned the reasons for visiting the area - Skagen and Grenen and their answers were analyzed. Most common answer for visiting Skagen was culture, visiting musem and shopping locally handcrafted souvenirs. Based on the analyses, these really are some of the strongest qualities of the Skagen.

GRENEN

Visitors stated their reasons for visiting Grenen, Firstl mentioned was the northernmost point of Denmark, and secondly it was eeing two seas meet, third reason were seals on the beach. The answers of the visitors strengthen the argument, that the area is already attractive by its geographical location. But Grenen has a lot more to offer, and a visitor centre is a great way to promote it.

SCOPE OF THE PROJECT



ill. 1 - 10 / Scope of the project

SCOPE OF THE PROJECT

I would like to present the scope of the project as a transparent projection of the genius loci and potential of the area and specialness of the place itself. I will approach the architecture, to be honest, respect the sense of the space and qualities, while not losing its quality and sustainable attribute.

My solution for the area is in four stages (ill 1-10). The first stage is retrofitting the existing building. The second stage is supplementing it with functions of visitor centre through newly built form, that will be extended but in limited size, in order to preserve preserve nature and follow the building limitations. This challenge is the art of sustainable approach that can be solved only through a thoughtful approach and strategic planning. The third stage is a revitalization of the surrounding area of a parking lot, paths and roads. The fourth stage is area development guidance. This is an important supplement to the solution that is decided to be done within the selected site. The analysis and studies brought implications for supplementing functions to the area of Grenen and Skagen that can strongly improve tourism. But these cant be placed on the site or in near distance of the site in the area of National Park. But the broader plan for development in larger proximity is needed, in order to justify the decisions and create a coherent solution for development of the whole area.

These four stages of design interconnect, embrace all functions and together creates a coherent and sustainable solution for the area.

PROBLEM STATEMENT

POTENTIAL FOR NEW VISITOR CENTRE
LOCATION OF THE SITE
TOURISM STUDY
VISITOR CENTRE DEFINITION
CASE STUDIES

PROBLEM STATEMENT CONCLUSION

In this part, the preliminary problem statement is formed based on the discussion from the framework, real data and deeper analysis into final problem formulation. This section describes and formulates the location and its potential and limitations with further advice for development. Explanation of function proposal is defined in the theory of visitor centre and analyzed in 3 case studies, with practica; design ideas implications.

POTENTIAL FOR NEW VISITOR CENTRE

Location of a Skagen is defined by several special features. It is Denmarks northernmost place, characterized by the extreme weather, rich culture of Skagen, interesting history of Grenen, unique beach where the two seas meet, large extent of the biodiversity, where visitors can see seals lying on the beach, watch migration of birds, these are one of many reasons, why every year millions of people come to Skagen Odde.

Potential of the area

The area is rich and has much to offer to the visitors, don't have enough information and therefore most of the tourists after visiting the point of meeting two seas, leaves or returns to Skagen and leave by train. The area deserves the visitor centre, that will provide information to the visitors about the number of possibilities for spending the time in Skagen Odde and exploring the area of national park. With a new visitor centre, tourist will be directed to understand the area and experience it in all its qualities.

Area development guidance

The visitor centre is much needed for the area of such tourism importance. Through new area development guidance, sustainable forms of using the potential for tourism opportunities are created. These will be advertised in the visitor centre and together will create a connected hub for visitors.

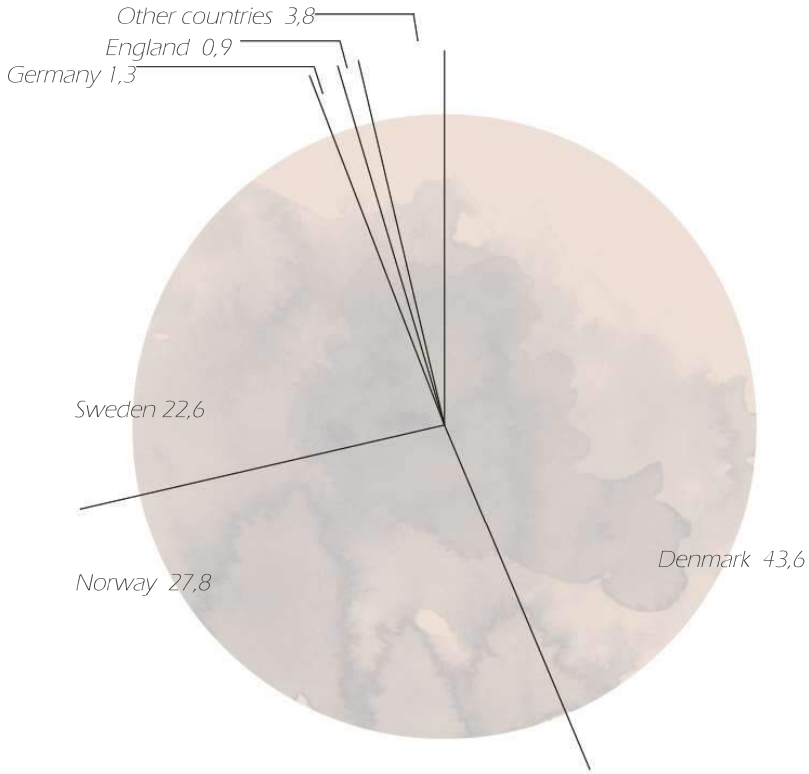
Future for tourism

The visitor centre will give a chance to host conferences or accommodate researchers, this will besides tourism also contribute to the research, and education.

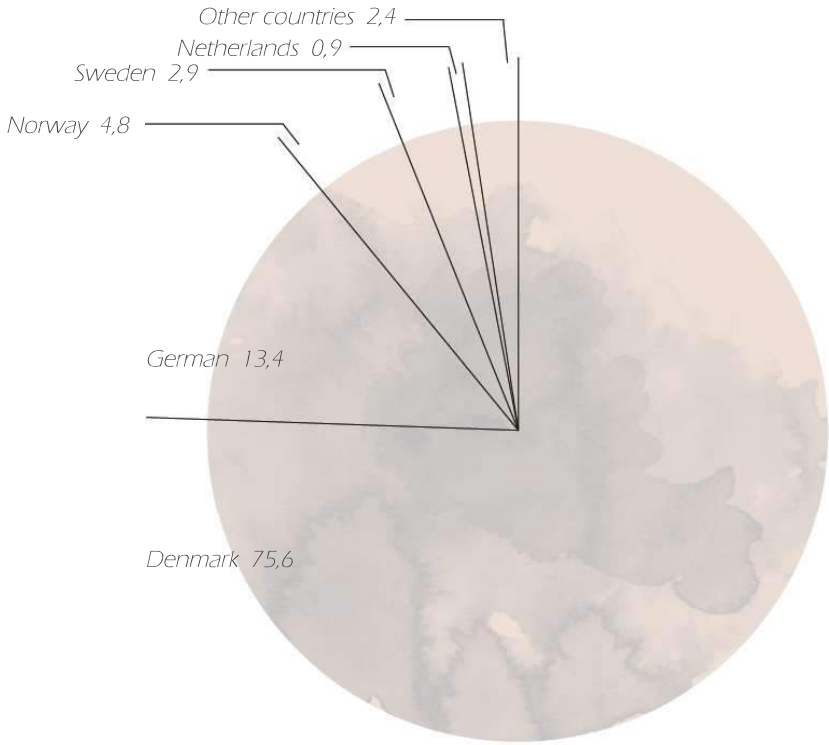
LOCATION OF THE SITE

ill. 1 - 11 / Site location - graphical focus

"North Jutland is the Danish coastal destination with the highest proportion of international earnings, 45% as opposed to a national average of 40% in 2011 (calculated on the basis of VisitDenmark 2014: 2), and the region has, therefore, been an integral part of the general story about the growing crisis of coastal tourism in Denmark. Compared with the early 1990s, nearly a quarter of international overnight stays had disappeared by 2007 (calculated on the basis of Danmarks Statistik 2014) and, after the onset of the financial crises in 2008, both domestic and international visitation first dropped and then stagnated at a lower level." (Brouder, Patrick et al., 2017). Based on this information we can see that tourism in Skagen Odde is decreasing. In the study Brouder and Patrick state that this is due to the financial crisis, that also has been clearly visible in the very north of Denmark. Commercial overnight stays in Frederikshavn, the local government district within which Skagen is located, dropped 12% from 2008 to 2010 (calculated on the basis of Danmarks Statistik 2014), but then recovered with regard to international visitors, domestic visitation stagnated at a lower level. (Brouder, Patrick et al., 2017). Until today the strongest focus of the local firms and public bodies is to improve tourism in North Denmark. Its strong focus and effort are coming from Fredrikshavn Municipality, which tries to improve the potential for tourism in the coastal areas including Grenen. Attracting visitors outside the summer season to increase tourism in a yearly number and also to distribute the business throughout the year is another of the tourism development missions that are discussed for North Denmark. In 2011 was established network Innovation Skagen 365, that brought together firms, public bodies and civil-society activists to develop new visitor-relevant activities. This formation aims toward strategies for increasing tourism. Studies on the possible tourism included biking trips, traditional music concerts and music festival, windsurfing and surfing, promotion of the local design and tailors in the area or geocaching. The attraction of creating a food tourism platform in North Jutland is a new supporting-tourism approach. Quality food is a potential additional attraction for visitors, and tourists constitute an additiona market for food producers. The ideal outcome would be an expansion of quality food production and extension of the tourist season – with improving the brand of the North Jutland region as an added bonus, stated James, L. & Halkier, H in 2016. They are however still secondary aspects. North Denmarks strongest potential and the reason for the flow of the tourists, except for the transit in Frederikshavn, is still Skagen Odde and Grenen - the place of meeting two seas, the northernmost place in Denmark. Skagen is a well-established, high-profile destination, combining natural and cultural resources with a strong brand in relation to the Scandinavian market, stated Brouder, Patrick et al in 2017.



ill. 1 - 12 / Diagram presenting the international tourists structure at hotels [MANTO A/S, LBB3 I/S, 2014]



ill. 1 - 13 / Dia grams presenting the international tourists structure in campings [MANTO A/S, LBB3 I/S, 2014]

VISITOR CENTRE DEFINITION

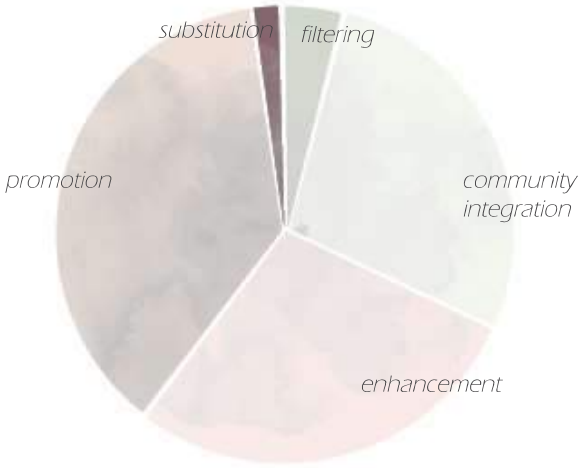
Visitor centre shelters all functions that might serve visitors in a particular place of interest. It covers a wider scope of local potential, encompassing the tourist attraction resources, on cultural, natural levels, historical or on many other levels. The visitor centre encompasses all potentials of the area and cumulates the options on opportunities of the region to facilitate the visitors with information, recommendations and possibly also with the aids needed on the particular points of interests.
The function and scope of coverage in the visitor centre is very individual and depends on the area, on the number of tourism opportunities and its development and extension through the accompanying commercial activity. The visitor centre should shelter existing scope of regional tourism potential and work as a core that gathers them all, provides information, manages and promotes the tourism of the area.

THE "FOUR PLUS" MODEL OF VISIOR CENTRE FUNCTIONING BY PEARCE
The "Four Plus" model of visitor centre functioning
In earlier work, Pearce (1991) and Moscardo (1999) identified four interlocking features of visitor centres. In later studies Pearce, P. (2017). extended the earlier work with the newly entitled "Four Plus" model of visitor centre functioning. The extended model (the plus function) draws in particular on the work of Fallon and Kriwoken (2003) and Simpson (2001) who emphasised the community functions and acceptance of the visitor centre

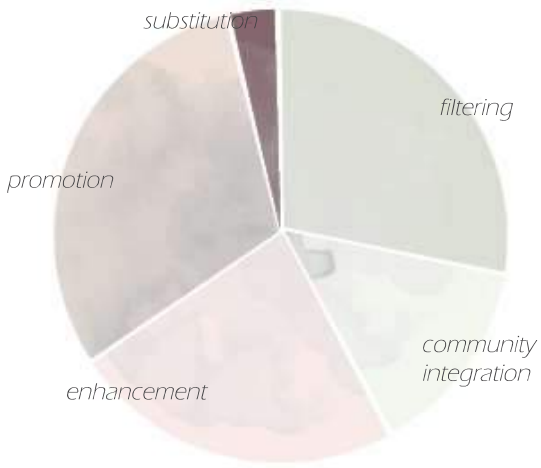
THE PROMOTION FUNCTION
According to Pearce, P. (2017) this role refers to the promotion of the city, area or region. It in- cludes the agenda of what to do in the area or where to stay. Pearce, P. (2017) also stated that commercial activities associated with this function are common and include the provision of booking services and local retail of the region's products. It can increace sales and economicall growth.

ORIENTATION AND ENHANCEMENT FUNTION
The second function of a visitor centre sees a concentration on the quality of the experience for the visitor. It attempts to provide displays, suggests new locations and generally informs visitors about features of the region to promote responsible behaviour. (Pearce, P., 2017).

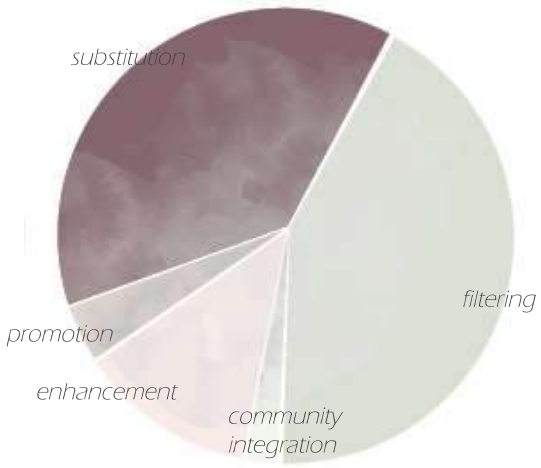
CONTROL AND FILTERING FUNTION
In this role, visitor centres seek to control the flow of visitors so that resources and settings come under less pressure. Typically such centres act as gateways and central points for visitor use of an area. This function may include suggestions for times of the day to visit set locations, alternative locations for less crowded experiences and the partial use of the centre in conjunction with other activities such as guided



Large "Gateway to a City"Visitor Centre



Smaller Visitor Centre along a Scenic Highway



Visitor Centre at Fragile Cultural/Hisotrical Site

Ill. 1 - 14 / Graphic interpretation of the Pearce's Visitor centres "Four Plus Model" for 3 types of visitor centres

tours or films to concentrate visitor numbers away from fragile sites or viewing areas. (Pearce, P., 2017).

THE SUBSTITUTION FUNCTION

Pearce, (2017) defines the fourth function of visitor centres to be a substitute for the tourist attraction or at least to be a substantial attraction in its own right. Visitors centres emphasising this function are often called interpretive centres or more simply are labelled as tourist attractions such as a Wildlife Centre. They occur in settings where the resource is inaccessible for many visitors (marine and demanding terrestrial environments) or where the resource is scattered and hard to appreciate from its component points (such as agricultural activities or historical battle sites) (Pearce, P., 2017).

THE PLUS FUNCTION

Pearce, P., (2017) extended the previously presented model of visitor centre consisting of four functions with the "Plus" Function. As Pearce, P., (2017) stays, the original model consisted of only visitor services components and non-visitor components were not included. Yet, visitor centres can act as community facilities for a range of local cultural and social events, particularly where space contains a theatre- or meeting room, states Pearce, P. in 2017. He also states the potential through its symbolic function to signal the importance and significance for tourism.

In Il. 1 - 14 we can see Graphic interpretation of the Visitor centres "Four Plus Model" for 3 types of visitor centres by Pearce, P. (2017). This graph compares three types of visitor centre and the amount of its 4 core functions, and fifth "plus"function - the community integration.

CASE STUDY I.

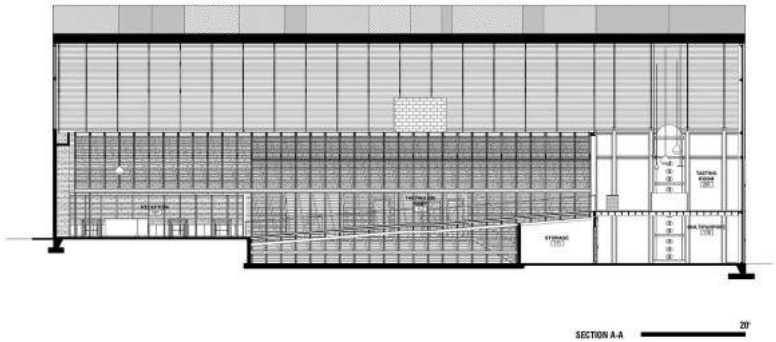
Wild Turkey Bourbon Visitor Center

This visitor centre was built in 2013 by De Leon & Primmer Architecture Workshop and is located in Kentucky, USA. The new black elegant simple shaped building was built as a function completing centre, to the large whiskey company - The Wild Turkey Bourbon Distillery Complex. In this area in Kentucky, the distillery occupies the very potential and charming area near Kentucky river. The original distillery under the name The Wild Turkey Bourbon was established by Thomas McCarthy in 1940 in Austin. Since 1855 the company runs a very recognisable business that is on a top of American bourbons. This company has a very strategic position on the market, but also its geographical context and location have its true potential. In 2013 the factory buildings were extended with the separately standing building that serves as a visitor centre. The extended scope of the location is defined by industrial buildings set in the wild countryside, on a west side from Kentucky river. Wild Turkey Bourbon Visitor Center was sensitively but very strategically placed on the land of original wild bourbon distillery, located south-east of main distillery buildings, set in the forestry area that ends with a slope towards the river. This river overlooking location in the enclosure to the whole industry of bourbon processing is strategic in aspects benefiting the visitor centre. Visitors on one hand are present in the centre of the bourbon production, while they are slightly set off from the industrial roads, into the natural setting, overlooking the river.

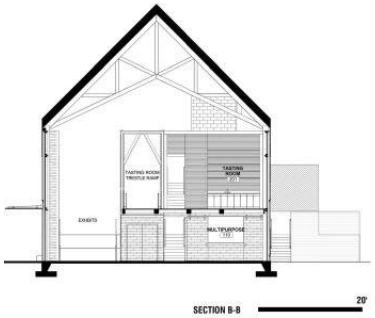
Wild Turkey Bourbon Visitor Center hides an interesting message between balancing the modern and edge breaking architecture but built on locally recognizable craftsmanship of the building tradition. The barn silhouette that is notable in the interior is an interpretation of Kentucky tobacco barns. it is turned inside out, the barn silhouette is the corridor shape covered with wooden cladding that blends into the wooden truss construction. The aesthetics of the centre are underlined with the beautiful construct of the monumental height and large tall spaces while approaching the human scale through the glass-covered facade, that opens the view into the open nature and distillery. The character that brings balanced transit between transparent glass walls and a solid wooden roof is empowered through semi-transparent parts of wooden lamellas. This gesture is translated into the interior finishing as well and approach users with its elegant simplicity and natural tactility of materials. Although the building from outside seems dark and very simple and minimalistic. The space that seems dark from outside, transform from inside, surprising visitors with an interior filled with light, view, openness and harmonic balance between the use of materials and exposed wooden structures that perform elegant and honest functionality.

ill. 1 - 15 / Wild Turkey Bourbon Visitor Centre - exterior

ill. 1 - 16



ill. 1 - 17

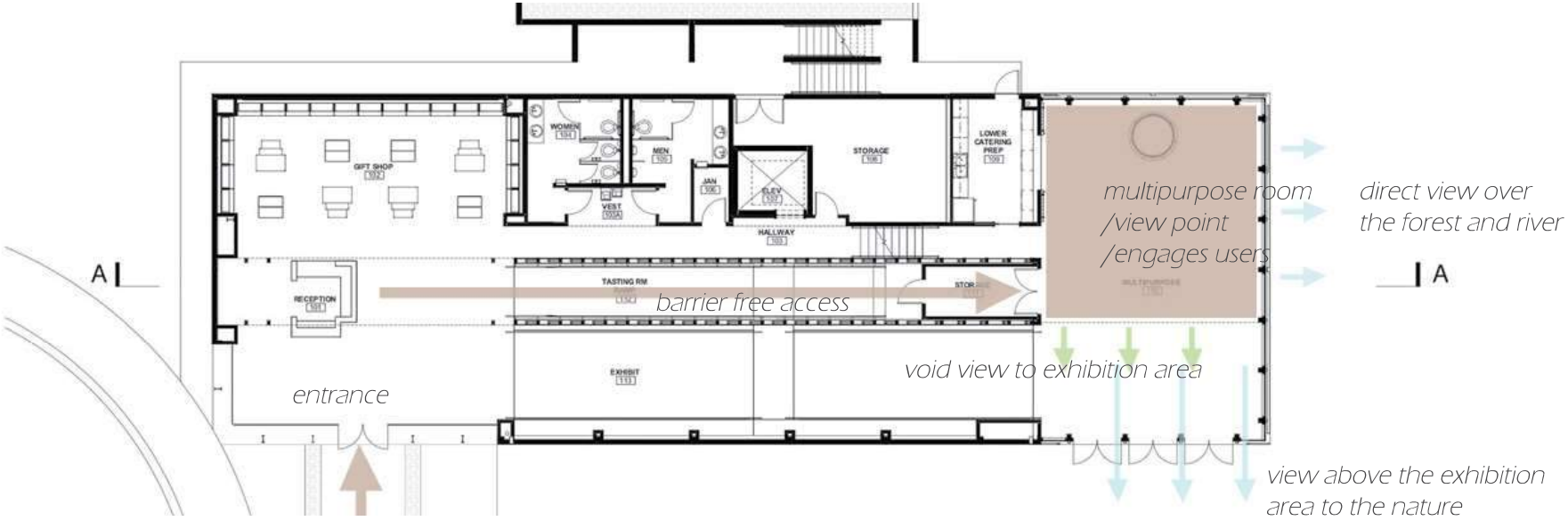


ill. 1 - 18

Wild Turkey Bourbon Visitor Center is designed in the longitudinal floorplan that welcome visitors with a reception and a gift shop right after the entrance, afterwards, the core of the building hides a ramp that is becoming iconic for the building. On the sides of the ramp are corridors that on the south part serves as an exhibition area, while most of the service functions are placed on the north part of the building, including toilets, elevator, storages and catering preparation area. The building on the entrance. level ends with a large multipurpose room, that is a mirrored floorplan to the entrance. On the upper floor, only a half of the floorplan continues, the rest creates an open void, that gives the interior monumental height, beautiful overviews from every corner of the building and gives it a spectacular openness. In the floorplan, this void is above the exhibition zone on the south part, while the service area remains on the north part on the upper floor. The tasting room is the place in the interior that receives the best views and invited the visitors to, therefore, discover the whole building.

The combination of glass and wood and transit from transparent, through lamellas into the solid wood is with its simple elegance working very well with the spectacularity of the view, that invited visitors to see the natural surrounding and the distillery, as the main reason. Similar principles of material tactility and simple forms empowering the view can be implemented on the North Seas' House project.

ill. 1 - 19 / Wild Turkey Bourbon Visitor Centre - interior



ill. 1 - 20 / Wild Turkey Bourbon Visitor Centre – analysis of design attributes

THE CONCLUSIONS FROM THE CASE STUDY

Wild Turkey Bourbon Visitor Centre is a coherent solution for the needs of the existing Wild Turkey Bourbon Factory. The floorplan and extent of the functions in the building respond to the needs of the design which aimed towards commercial purposes and opportunity for cultural trips for visitors. The North Seas House visitor centre will serve less commercial purposes and will shelter a wider range of functions, but there some identified valuable attributes in the design, that can be applied in the designing, some are mentioned in the ill. 1 - 20 and are further described below.

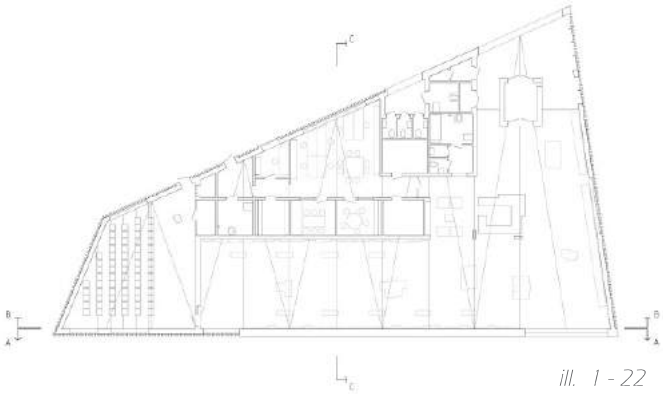
Floorplan

The simple, organized and logical distribution of functions within the building is a strong positive attribute of the design. The cooperation of the functions between each other and overlooks from the ramps to reception or from the multipurpose room on the second floor through the void to the exhibition area. The larger entrance with a reception and visually open space upon entrance is a possible implication to the designing. Natural intuitive orientation in the building is very important especially for public buildings, where visitors should feel welcome and relaxed and shouldn't worry about using and observing the building. The very positive part of the layout is placing room attractive for visitors - a "view room" at the end of the layout, so visitors are invited to discover the whole visitor centre and then enjoy the view from the last room of the building. Construction, detailing and tact on precision in wooden cladding adds to the positive impression in the interior.

ill. 1 - 21 / Wild Turkey Bourbon Visitor Centre - interior

CASE STUDY I.

Naturum Kosterhavet Visitor Center



ill. 1 - 22

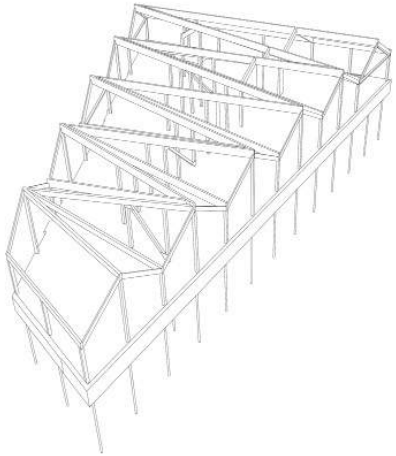
This visitor centre was built in 2012 by White Arkitekter and is located in Ekenäs, Sweden. The relatively large building (705m2) comparing to the surrounding buildings. The unusual irregular form that mimics the shape of the row of houses in its surroundings reflects on the tasks that it represents. Offering the area new building for visitor centre function with exhibition spaces, lecture halls, administrative offices, a library, a hands-on aquarium and a water laboratory. These functions also demand quite a large space. In this case, a new large form can negatively influence the rural character of the Swedish island of Sydkoster, Sweden's most westerly outpost. The roof mimics classic roof, however, is performed in a playful modern way. The pitched roofs from the sea site are in six gables, and towards the land in only in five. The gables are linked with diagonal connections that create the cracked origami look from above. In an allegory, this form copies the. form, while in a reality it is a completely new form, and this is empowered once the visitor gets inside of the building.

Great advantage and inspiration from this project can be taken form its approach of designing for minimal environmental effect. The project meets high demands on energy consumption of the building and the indoor environment. " The building has been tested and classified in accordance with the Swedish 'Miljöbyggnad' system and awarded the level Gold. The building has low energy requirements (calculated at 40 kWh/m2). It uses geothermal heating and consumes exclusively renewable, environmentally friendly electricity. " is stated in The Naturum Kosterhavet / White Arkitekter" 25 Oct 2013. ArchDaily. Accessed 19 Feb 2019.

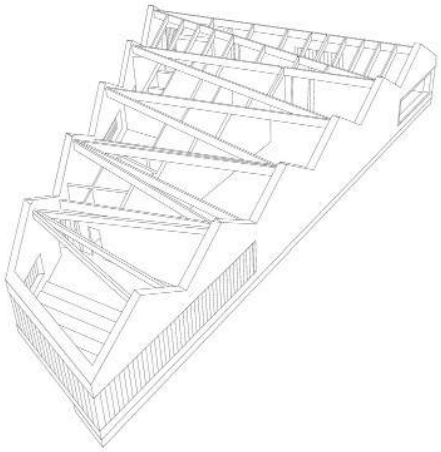
The building surprise with its spacious interior performed in the light wood cladding. The roof doesn't perform any unusual forms from outside, the formes exposed from the inside are spectacular and gives the space new dimension. The view to the sea is visible upon entering the building, from the reception, and from main long open space, that can host exhibition, meetings, public events or any other occasions needed.

The implications for the design from Naturum Kosterhavet Visitor Center is the approach of a sensitive setting of the building in a protected area. The challenging conditions, in this case, was existing buildings context and limited area to build. Similar limitations are challenging the design for North Seas' House in Grenen. The planned building is set in the National Park area of protection on level II and the area legally available for building is very limited and include only immediate surrounding around De2Have Restaurant. The design includes retrofitting of the De2Have Restaurant building and the approach is to blend these masses into homogenously continuous forms that create one retrofitted sustainable

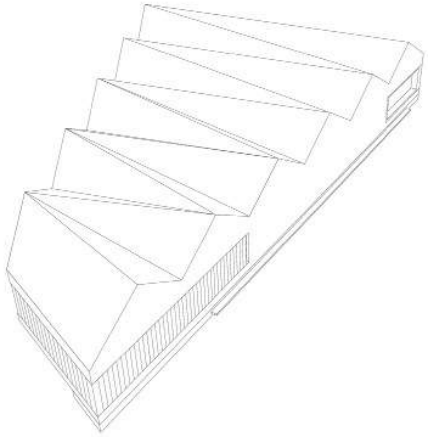
ill. 1 - 23/ Naturum Kosterhavet Visitor Centre - landscape setting



ill. 1 - 24



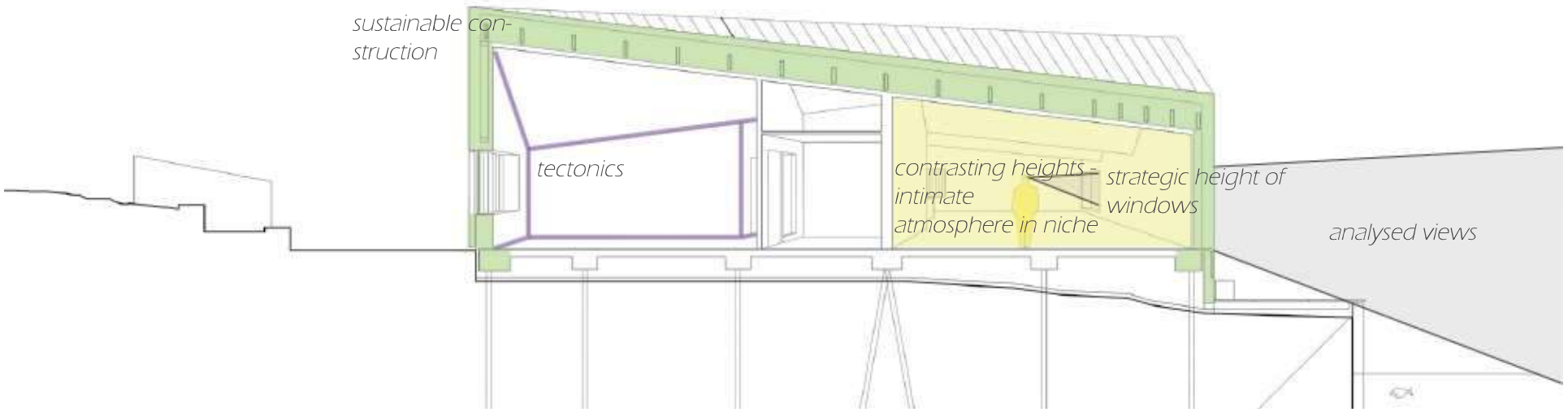
ill. 1 - 25



ill. 1 - 26

complex. The design of Naturum Kosterhavet Visitor Center reflected the built environment and the typical boat house character, while the North Seas' House in Grenen must reflect upon the wild nature of dunes and sea, as it is the context that the project is set to.
Next design implication from the project is its view to the nature and strategic placement of windows. Analysis of the views and its potential for the interior regarding placement in connection to the functions was considered. This view analysis will become a strong concept in the North Seas' House in Grenen. Importance of the views for more functions and its interconnection when designing the floorplans is very important.
Another very important design implication for the North Seas' House in Grenen from this project is its sustainable approach. The building achieved gold Swedish sustainability certificate and is defined as low energy buildings, that uses geothermal heating and uses only renewable environmentally friendly electricity. The ventilation supply was designed for minimal energy consumption in every month of the year. The water is supplied from a local osmosis unit. Most of the construction is performed in wood and this comes from certified forestry. Similar principles on sustainable approach and lowering the energy requirement will be applied on the North Seas' House project, including strong consideration on the materials use and its origin.

ill. 1 - 27/ Naturum Kosterhavet Visitor Centre - interior



ill. 1 - 28 / Naturum Kosterhavet Visitor Centre - analysis of design attributes

THE CONCLUSION FROM THE CASE STUDY

Naturum Kosterhavet is an excellent example of the sustainable visitor centre that sensitively reacts to the existing urban and natural context and with modest look offer a wide range of functions on a relatively large floor ratio scale. It sets a framework of the goals and attributes for designing the Noth Seas House project. This project shows its strong features in a sustainable approach, low energy demand and sustainable material choices. The material used in this project is presenting a creative and visual performance on the indoor cladding, which concedes the roof unusual form. This detailing and work with the material is an attribute that can inspire the approach to the material use for Visitor Centre in Grenen. In the illustration ill. 1 - 28 are noted some of the attributes, that might be inspiring for designing of North Seas House. The folded roof creates unusual spaces in the interior with a contrast of the hights. This condition creates niches and different atmospheres within the spaces. Lower ceiling creates niches with a more intimate atmosphere, this attribute of addressing the users is one of the principles in sensing architecture, including the tectonic approach of the design. The window openings are strategically placed within the building envelope, with tailored views that address users and also complement the whole form.

ill. 1 - 29 / Naturum Kosterhavet Visitor Centre - exterior

CASE STUDY III.

St. Ann's Warehouse Theater Renovation

ill. 1 - 13

The original building was like many other warehouses in Brooklyn destroyed by a civil war. The structure of the building was for decades left exposed to nature without a roof, which affected the condition inside and the condition of the structure.
Its location under Brooklyn Bridge is a popular neighbourhood, with potential for a new function. The ruins of the tobacco company took attention of the St. Ann's theatre company, who use the ruins for a new theatre. Under the expertise of the hired architectural firms of Marvel Architects, BuroHappold Engineering and Charcoalblue a complex study on building opportunities and potential for theatre was conducted. The renovation covered more than 2300 square meters, and created a large flexible performance area with spaces for events and comfortable spacious rooms for the actors and also for the visitors. The part of the building which was originally used as covered warehouse space was opened to become a garden, shaded with the historical walls. The roof was placed on the building after years of being exposed and was blended together with the glass brick structure that elegantly raised the building higher for the theatre needs of acoustic and visual qualities ensuring the access of needed daylight. The glass bricks are of solid material, therefore its acoustic qualities are suitable for the structure.
Sustainable approach
The renovation of this building was challenging on the legislative level, but also on the practical problems resulting from the building shell that spans for more than 7 meters and its arched large openings for windows and doors. The building was also registered in National Register of Historic Places and New York City Landmarks Preservation Commission had to approve this building intervention.
Zachary Griffin from Marvel Architects stated forAutodesk's Redshift publication "We decided that those walls would remain untouched and exposed on the inside of the building as well as the outside. In addition, to really function as a performance centre, St. Ann's needed about seven more feet in height. It was always assumed that we would do something above the existing walls." The retrofitting intervention was created through, what the architects define as a building within the building, consisting of steel, glass and plywood structure, preserving the historic walls. The function of the theatre carries specific higher requirements on the indoor environment. The ventilation and the heating such large spaces must be due to the large load of users strategically planned and distributed.
The building finally reached LEED Silver certification and reduction over a comparable building and also received several awards, such as AIA New York chapter, the Municipal Art Society of New York(which awarded the project Best Adaptive Reuse), and the

Ill. 1 - 30 / St. Ann's Warehouse Theater Renovation - exterior

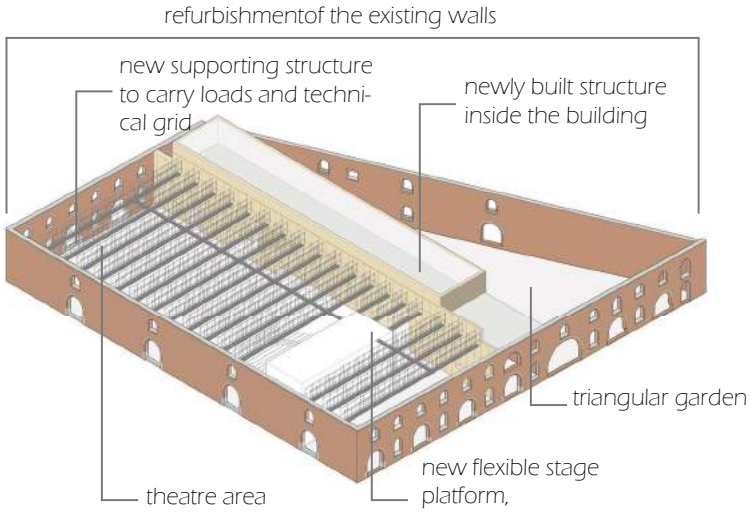
ill. 1 - 31

Urban Land Institute's New York chapter.
The project handled this big challenge of the building requirements, energy demand, sustainable approach and conservation legislative with a heritage sensitive approach that ensured all desired aspects, brought the building into life and added strong value to the neighbourhood. The information used in the article originates from Energy Efficiency in Historic Buildings: Why a Theater Company Chose Res urrection (Not Demolition) on www.autodesk.com/redshift.

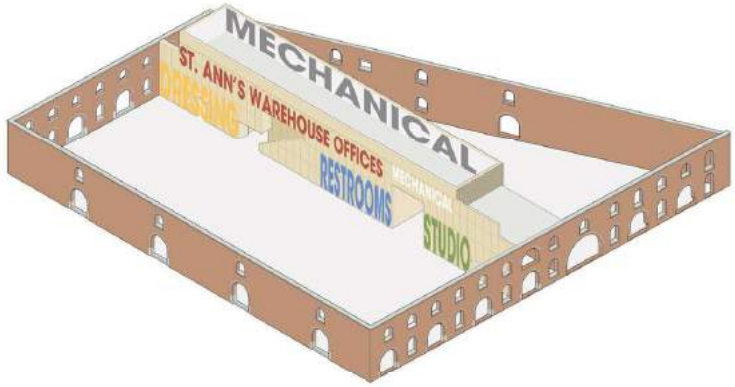
In illustration ill. 1-9 is displayed the original shell of walls and the building intervention. To be able to set the roof above the building, we can see that the building was split by a newly built structure into an exterior triangular garden and indoor theatre area. The indoor theatre area is supported by a new steel structure, that braces the load of the roof and carries the technical grid above the whole space. The new flexible storage platform is placed in the theatre area and with its flexibility creates a universal space, that can host various events.

In illustration ill. 1-9 is displayed the function designed in the newly built structure placed in the building. This structure is defined by low energy demand and good insulation properties, with one wall exposed to the garden. The functions sheltered in this new form are organized on two levels. On the ground level are situated functions that directly serve the users, such as dressing, restrooms and also a part accessible only for the actors. On the second level warehouse offices are located, together with all technical and mechanical rooms.

ill. 1 - 32 / St. Ann's Warehouse Theater Renovation - interior



ill. 1 - 33



ill. 1 - 34

A CONCLUSION FROM THE CASE STUDY

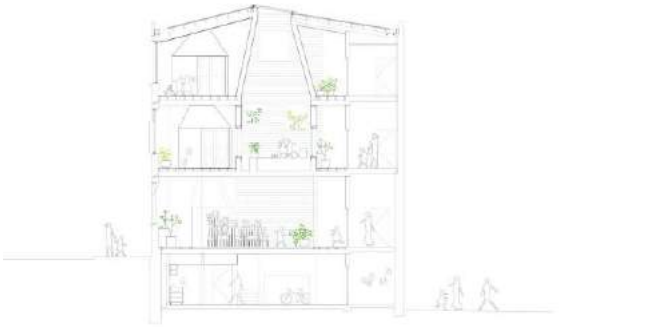
This retrofitting project is outstanding in its class, as bringing this building into life and giving it a new function gave new life to the area. This aspect might become a theoretical implication to the design of North Seas House in Grenen in a way of considering the offered functions, which might influence a change in the target groups and tourism potential of the area. This project offers many positive implications that should be considered and sets an inspiring example. The link between chosen materials and its contrast is defining the whole paraphrase of the contrast between new and old. This is performed with care to the details and also with this approach, users are addressed and become aware of the character of space. Users are engaged in the building and are invited besides the theatre function, to also enjoy the building from its yard side. This way of incorporating the users' flow and their needs in a cultural centre is an important attribute in order to achieve an inviting and engaging approach in sensing architecture.

The type of building intervention is a sustainable retrofit, the same principle is going to be applied to the North Seas House project in Grenen. The consideration of the balance between the sustainability, choice of materials, its feature, contrast or blend and exposure is an aim, that we are reminded in this case study to deeply consider. The scope of interventions are marked in ill. *1-33, ill.1-34.*

ill. 1 - 35 / St. Ann's Warehouse Theater Renovation - exterior during retrofiting

CASE STUDY IV.

East Sydney Early Learning Centre



ill. 1 - 36

The building was built in 2016 by Andrew Burges Architects in Sydney NSW, Australia. The scope of the project is a retrofitted 4 storey industrial building from the 1920s. located in the dense urban setting of Darlinghurst.

The project through a complete retrofitting of the building, including the whole structure, windows, door and an adaptive interior, created a new attractive space that nowadays serves as a 4 level childcare and community building. The project also included a complete renovation of the adjacent playground, that after renovation connected with the building through a new bridge. Within the project scope, was also an approach to revitalized the surrounding spaces, so a complete refurbishment of the public domain and a streetscape became a part of the complex renovation.

The original plan for the building was placing the childcare on lower 2 levels and housing the community centre on the top level. The architects came with a more strategic creative solution that brought more life into the street, through placing the access paths to the community centre that is located on the ground level. Thanks to this intervention, the street is more used and the renovated zone became more attractive for the existing urban neighbourhood. Connecting the childcare to the playground is through a bridge. This is an interactive and very favourite solution for children, that engage them and offers creative space.

The interior solution is mirroring the mini-city within the building, through small cubes, creating a city of children scale. Outside these little houses, the urban network is created and facilitate kids with many learning activities.

SUSTAINABLE APPROACH

The retrofitting of the building was conducted with in Australian regulation on sustainability and energy savings. "East Sydney Early Learning Centre / Andrew Burges Architects" 07 Aug 2017. ArchDaily. Accessed 1 Mar 2019 states that the sustainability objectives of the East Sydney Early Learning Centre were aligned with the City of Sydney 2030 Sustainability objectives. Initiatives included photovoltaic cells for rooftop solar capture, bio-filtration at the window openings through internal planters and landscaping, mixed mode ventilation and thermal zoning to contain and minimise areas of air-conditioning, alternative sources of user thermal comfort including solar boosted hydronic heating and radiators, extensive use of light wells to create daylighting deep into the internal fabric of the building, rainwater harvesting and use of water-efficient fixtures, green transport planning including cycle parking and staff change facilities, and a regime of material selection for sustainable materials including non-tox-

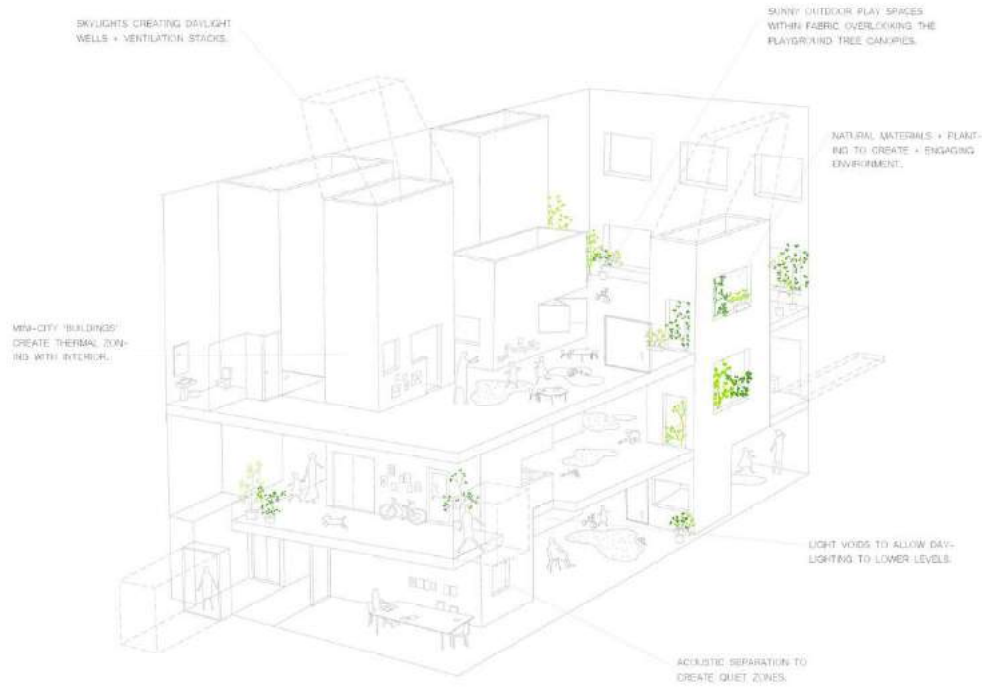
ill. 1 - 37 / East Sydney Early Learning Centre - exterior

ill. 1 - 38

ic materials with high recycled content and/or highly recyclable, low VOC finishes, low formaldehyde products & furniture, sustainable timbers, rapidly renewable and locally sourced materials.
The implication to the designing from the East Sydney Early Learning Centre is an upgraded solution that brings unexpected new interventions, that benefitted the urban context but also created a very creative and interactive solution.

East Sydney Early Learning Centre switched the functions, connected the playground with the childcare from the second floor and through this design, solved the children safety, but left the street be passable for users and even encouraged citizens to use the neighbourhood through offering the community centre function. The possible design implication from this strategy can suggest linking the buildings within the site together and also create more creative and interactive space for visitors, that might bring more comfort and more functions to the users.
A most important implication from the design of East Sydney Early Learning Centre to the North Seas House in Grenen is its sustainable approach that was achieved through many sustainable strategies. Some of the strategies are already planned for the design in Grenen, others will be

ill. 1 - 39 / Sydney Early Learning Centre - interior



ill. 1 - 40

shown in the process. The new ideas and implication to the design include the thermal zoning to contain and minimise areas of air-conditioning and cycle parking and staff change facilities. These are new implications for the design of the Grenen Visitor Centre, that haven't been incorporated in the sketching and plans. Through thermal zoning, the energy demand of the building can be lowered. Cycle parking can also include the cycle rent or new strategy for the cycling paths and use of the bicycles in the area, in order to decrease the vehicles coming to Grenen.

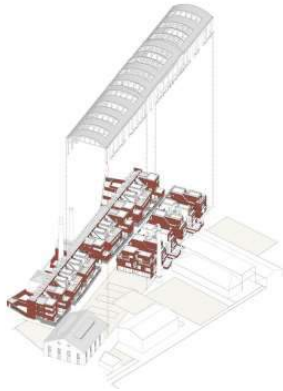
Social sustainability is often forgotten or the least included an aspect of the sustainable concept. In this project, social sustainability became a strong feature and therefore the project could become a real advantage to the existing area.

Based on the analysis, Grenen is visited frequent ly by the analyzed target group - the local visitors. These are the visitors coming from Skagen and surrounding, who identify themselves with the area and spends there a lot of time, many of them, spend there most of their free time or many of their weekend, repeatedly. Responsible social sustainability approach, can bring an extra approach toward these users and advantage the existing place for the local social hub.

ill. 1 - 41 / East Sydney Early Learning Centre - model

CASE STUDY IV.

Residential Building in Murano

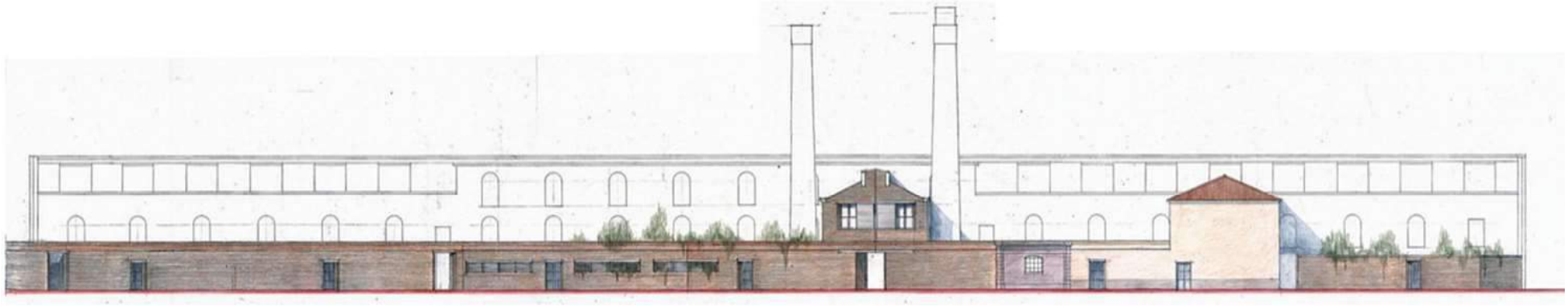


ill. 1 - 42

The third case study is a building of different function - residential building. Its qualities, however, inspire the design approach through its retrofitting of an old part, revitalization of the area and extension through a newly built form. The same design approach is aimed to be achieved in the North Seas' House of Grenen.
This retrofitting was built in 2015 by Studio Macola Architects in Murano, Italy. This formerly abandoned industrial area in Murano was brought to life and nowadays offers 36 flats in a very modern and sensitively revitalized area. The building consists of parts that are defined by the different quality of architectural designing. Part of the building is retrofitted and uses original parts of the factory. Inner parts of the building are new and serve as revitalization to the area with respecting the former visual features, such as shapes of the windows. The south-facing part of the project is cascade shaped newly build form, that brings new modern features to the area. These cascades are fitting to the original context and are characterized by the consistency of materials and colours and simple shapes. This newly built cascade residential block is designed with effective floorplans. Bathrooms have access to natural daylight and ventilation and achieve suitable indoor environment.
We can see in the floorplans that most of the unused former industrial site is now revitalized and is brought to new functions. The old materials are used for more purposes. Parts of the walls are retrofitted and used as a part of the building and old materials are reused for building purposes.
The interesting part of the design is the inner garden or the residential yard, that is created between the buildings. This part is going to be covered with curved roof overhanging the whole yard. This intervention visually resemble industrial roofs, that are purely practical. On this element we can see an analogy to the building pattern of simplicity, that is in such sensitive retrofitting and revitalization projects very important.

This project brings some ideas and some principles, that might inspire design implications for the North Seas' House.
The main design implication from the project is the sensitive balance between the new and the old and combination of the retrofitting and revitalization. In the design of North Seas' House, the connection of the old building of the restaurant will be retrofitted, but its sensitive attachment to the new form will be the challenge that will form the quality of the project. Both forms together must also achieve low energy demand and reach sustainability requirements.
Another design implication is the smart choice of the floorplan and very thoughtful consideration of the functions and their intervention in order to achieve

ill. 1 - 43 / Residential Building in Murano - exterior

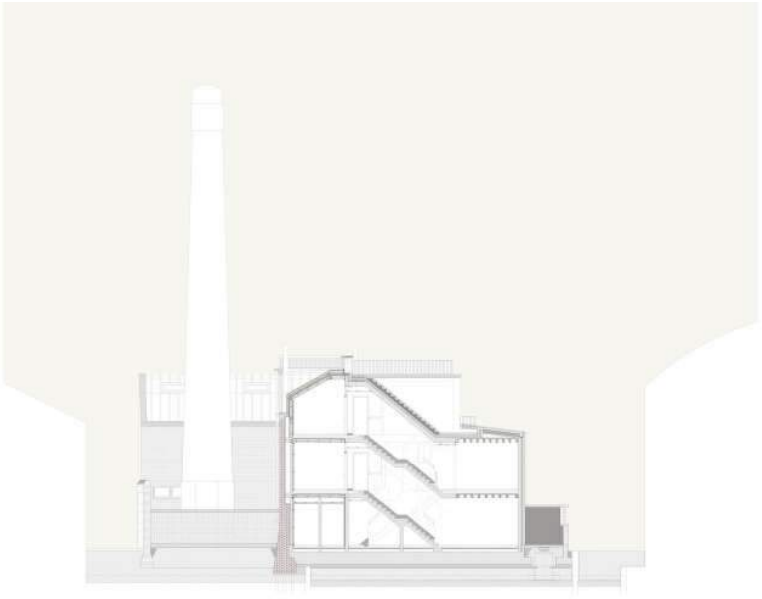


ill. 1 - 44

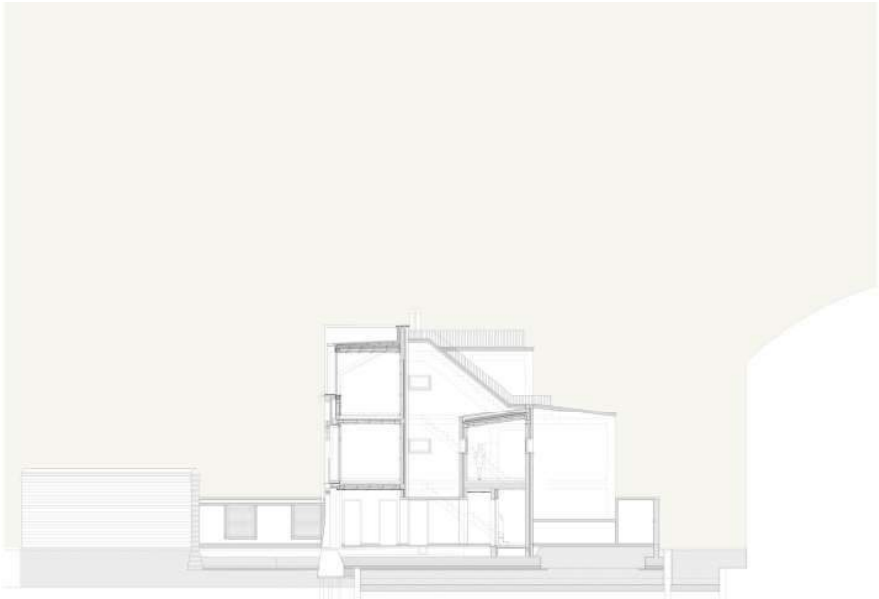
the best possible balance of the new and old, that feels like one coherent piece. In the design of North Seas' House, the old building of the restaurant is built on the most strategic place within the possible scope of the area for building the visitor centre. When designing a completely new building, the freedom of design and a strategic solution will allow a wider range of options. However, the limitation set by the existing building that will throw a shadow on part of site for a newly built form, or block the view, must be wisely solved in the design solution. The target is to create a good solution to achieve as high qualities, as the design without limitation would achieve.

Another design implication from The Residential Building in Murano is the principle of consistency in colours, materials, band a simplicity of the shape. This is a design implication to be used in the North Seas' House project. The form of the existing building will stay the same, with a changed roof, due to insulation limits of the existing roof. This allows the shape to open up to form a connection with the new forms. Thanks to this intervention that is supported by the sustainability principles. the possibility to create a consistent form that will look natural and that will remain simple. The overall gesture of the building, its colours and materials are aiming to form together a pattern of simplicity and consistency.

ill. 1 - 45 / Residential Building in Murano - exterior



ill. 1 - 46 Residential building in Murano, Section AA



ill. 1 - 47 / Residential building in Murano, Section BB

THE CONCLUSION FROM THE CASE StuDY

The Residential Building in Murano is an example of a large revitalization project, including retrofitting existing buildings set in the urban context defined by old houses of a heritage meaning. This project carries a definition of the beautiful balance between old and new. The accessible sources show that most of the structure possible to be used was effectively retrofitted and completed with new forms. This definition finds its parallel in the approach for designing the North Seas House in Grenen.

The similarity in the approach is the sensitive reaction to the extended context. And it is either wildlife and natural setting in the National Park in Grenen, or this large, abandoned factory site place in the heart of the heritage urban context of Murano.

The deserved outcome of the visitor centre project proposal for Grenen is to create a coherent form, that doesn't expose the difference between old and new. but sensitively connects with its context. This project presents the example of two forms blending together into one complex that is a half retrofitted but acts as a compact object, that complements sensitively the cultural heritage of the city.

The attributes of the design might suggest some implication to the design. This might be a consideration of the materials and colours used in the surrounded area and on the designed forms, it's mimicked features to be found on both elements to empower its identity.

ill. 1 - 48 / Residential Building in Murano - exterior

CASE STUDIES EVALUATION

Scheme evaluating attributes of the case studies

CASE STUDY	Setting in the context	Functions	Floorplan	Materials	Sustainability	Retrofitting
CASE STUDY I. Wild Turkey Bourbon Visitor Center	●●	●●●	●●●●	●●●	●●	—
CASE STUDY II. Naturum Kosterhavet Visitor Center	●●●●	●●●	●●●	●●●●	●●●●	—
CASE STUDY III. St. Ann's Warehouse Theater Renovation	●●●●	—	●	●●●●	●●●●	●●●●
CASE STUDY IV. East Sydney Early Learning Centre	●●●	—	—	●●●	●●	●●●●
CASE STUDY V. Residential Building in Murano	●●●	—	—	●	●●	●●●

ill. 1 - 49 / Scheme evaluating attributes of the case studies

Old and new balance contrast	User friendly	Sensing architecture	Construction and detailing	Conclusion on relevance
—	●●●●	●●●	●●●●	●●●◐
—	●●●	●●●	●●●●	●●●◐
●●●●	●●●	●●●●	●●●	●●●◐
●●●	●●●	●●●	●●●	●●●○
●●●	●●	●●	●	●●◐○

Five selected case studies were chosen upon the relevance and its possible applicability in the North Seas House Project. The scheme ill. 1 - 49 evaluating attributes of the projects ranks the selected attributes on a scale of four grades: lower - moderate - high - the highest and represent the relevance of the attribute to the North Seas House Project. The Lat column "Conclusion on relevance sums the average relevance and sets the general ranking of relevance. This conclusion is just orientational, as each of the attributes varies in its value.

Legend of relevance :

— doesnt apply ● lower ●● moderate ●●● high ●●●● the highest

PHYSICAL ANALYSIS

LOCATION OF THE SITE
CONTOUR ANALYSIS
WIND ANALYSIS
DAYLIGHT ANALYSIS
TEMPERATURE AND PRECIPITATION ANALYSIS
FUNCTIONS ANALYSIS
NODES AND LANDMARKS ANALYSIS
TRANSPORTATION ANALYSIS
VEGETATION AND WATER ANALYSIS
GRENEN WILDLIFE ANALYSIS
CONCLUSION OF THE PHYSICAL ANALYSIS
DESIGN IMPLICATION FROM THE ANALYSIS

PHYSICAL ANALYSIS

In this part, the preliminary problem statement is formed based on the discussion from the framework, real data and deeper analysis into final problem formulation. This section describes and formulates the location and its potential and limitations with further advice for development. Explanation of function proposal is defined in the theory of visitor centre and analyzed in 3 case studies, with practica; design ideas and implications.

LOCATION OF THE SITE

The site is located in Grenen dunes, in Denmark , the northernmost located area known as a place where two seas meet. The site is located on the east coast of the island with a distance of 100 meters from the sea. Its proximity to the closest city - Skagen and connection to transport nodes is 3,5 km.
The site is open in wild nature without existing urban context, in dunes with view to the sea and lighthouse on its south-south-east. The area is completed with parking lot on the southand connected with road, that ends at the point of planned site.

ill. 1 - 50 / Site location

LOCATION OF THE SITE

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ill. 1 - 50 / Site location

ill. 1 - 52 / Site - contour analysis

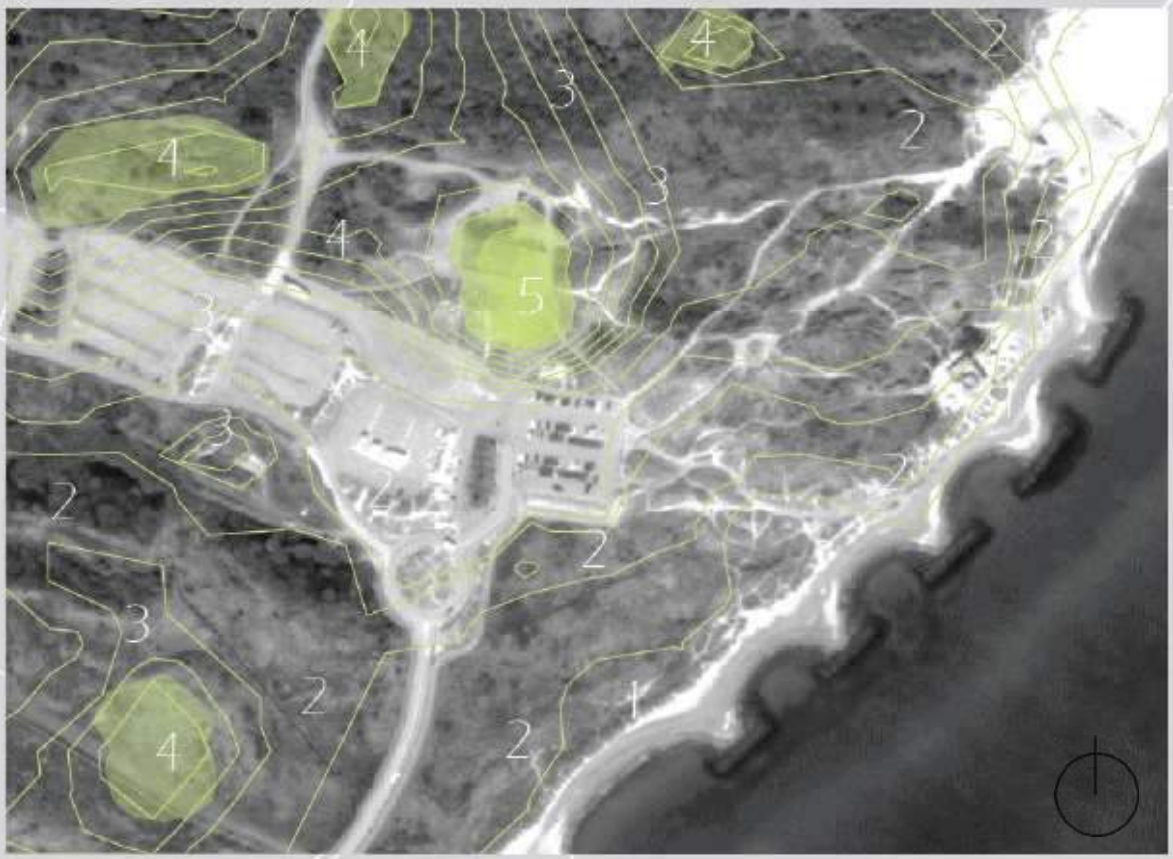

GRENEN, DENMARK
FREDERIKSHAVN
Nordjylland
AALBORG
RANDERS
Midtjylland
AARHUS
Hovedstaden
VEJLE
COPENHAGEN
ROSKILDE
ESBJERG
ODENSE
Sjælland
Syddanmark

ill. 1 - 51 / Site location


EXISTING BUILDING - RESTAURANT
EXISTING BUILDING - SOUVENIR SHOP
GRENEN - NORTHERNMOST POINT WHERE TWO SEAS MEET
SITE

CONTOUR ANALYSIS

The elevation condition of Denmark is defined by generally a low elevated land withouth hills. The highest natural point in Denmark is Ejer Baunehøj, that is 170,89 meters above sea level. The area of Skagen Odde characterized by, very low elevated land, that also carries many of the extremes within Denmark. Due to the position and narrow end of the land heading towards seas, the land in Skagen Odde reaches maximally 17 meters above sea level. When we move closer towards the site, land gets even flatter. We can see in the illustration ill. 1 - 52 the contour in close proximity to the site. Here the elevation is defined only by the dunes. Smaller dunes are in constant change due to the strong wind that through years cause their transformation. Within this frame, we can see, that the highest dunes and therefore the highest elevation within the scope of our potentially reasonable focus is located around already existing buildings.
The main building of the area - the existing building of the restaurant is for its strategic reasons placed on the highest dune, in the height of 5 meters above sea level. The contour in the surrounding draws heights of 1-2 meters in lower parts and up to 3-4 meters on the peak of the dunes.
Based on this contour analysis also the scope of the site was chosen and the decision to extend the building after retrofitting with a new form is due to the strategic placement on the higher dune. The flood protection and the durability of the building due to the rising sea level define the strongest argument for the location.

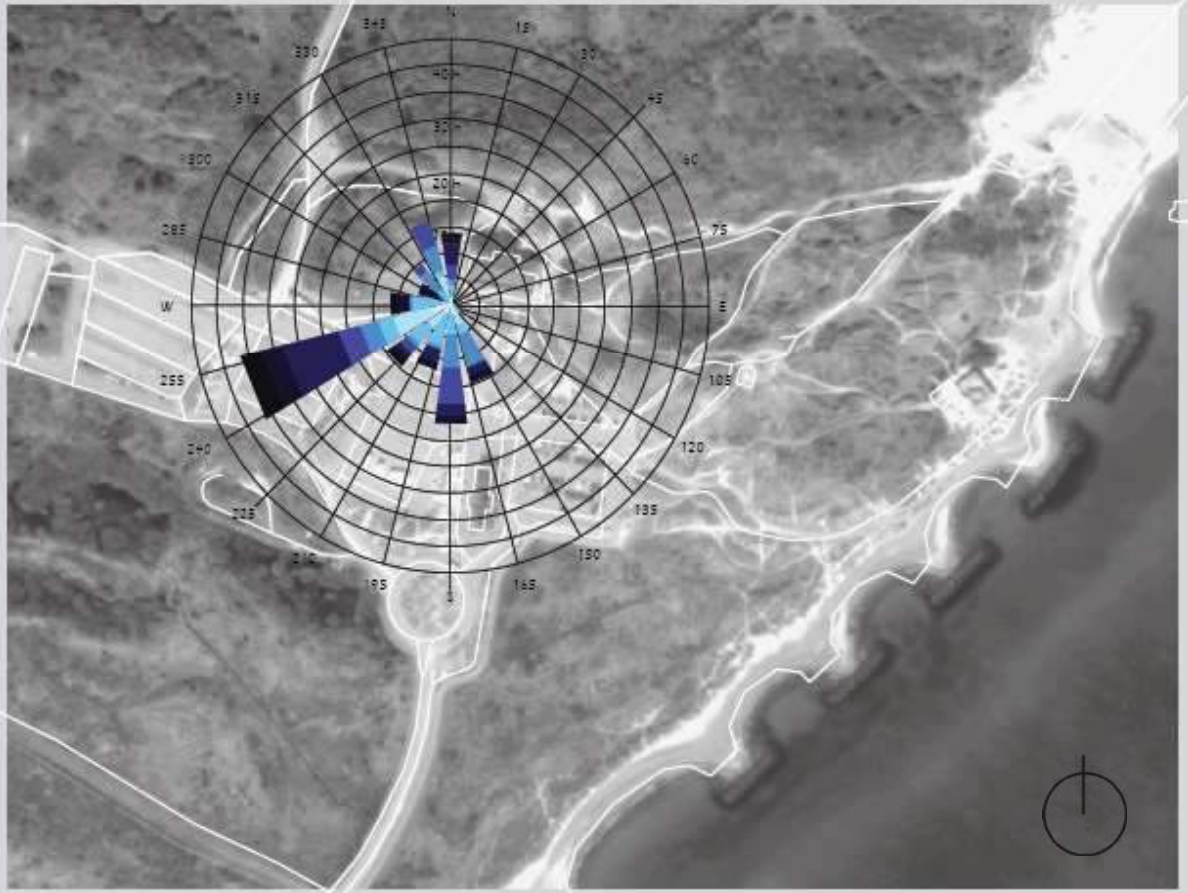


ill. 1 - 52 / Site - contour analysis

WIND ANALYSIS

Based on the statistics from windfinder.com (2019) wind in the area of Skagen Odde peninsula achieve based on observations taken between 07/1999 - 01/2019 daily from 7 am to 7 pm local time maximal speed on average per year of 25,93 m/s. This speed is very high and is caused by the geographical predispositions of the narrow flat peninsula. The wind can therefore also cause sudden changes in the weather. Wind not only forms the weather, but it also forms the land. Sand under the force of the wind moves within the peninsula moves. When the wind flows from in direction to the west, sand is moving towards this direction, and when oppositely wind blows from the west, san moves from the east shore above the land. Forces of wind also form the dunes, their size and width and even moves them with time. However, the most visible change to the peninsula, that is caused by natural means, is that the very top of the shore with years moves and slightly twists.

The wind mostly flows from east to the west (*ill. 1 - 53*), but as well constantly changes, which leaves its sign on the wild country. characteristics and can be seen on the grass growth, dunes and trees shape. Wind becomes a very important aspect to be considered for the design. Sheltering the exterior areas against the wind and orienting the building towards the leeward sides will be an exceptionally important consideration. This natural cause also has an effect on lowering the energy demand strategy, placement of the openings, as well as placement of the functions within the final proposed design.



ill. 1 - 53 / Wind analysis

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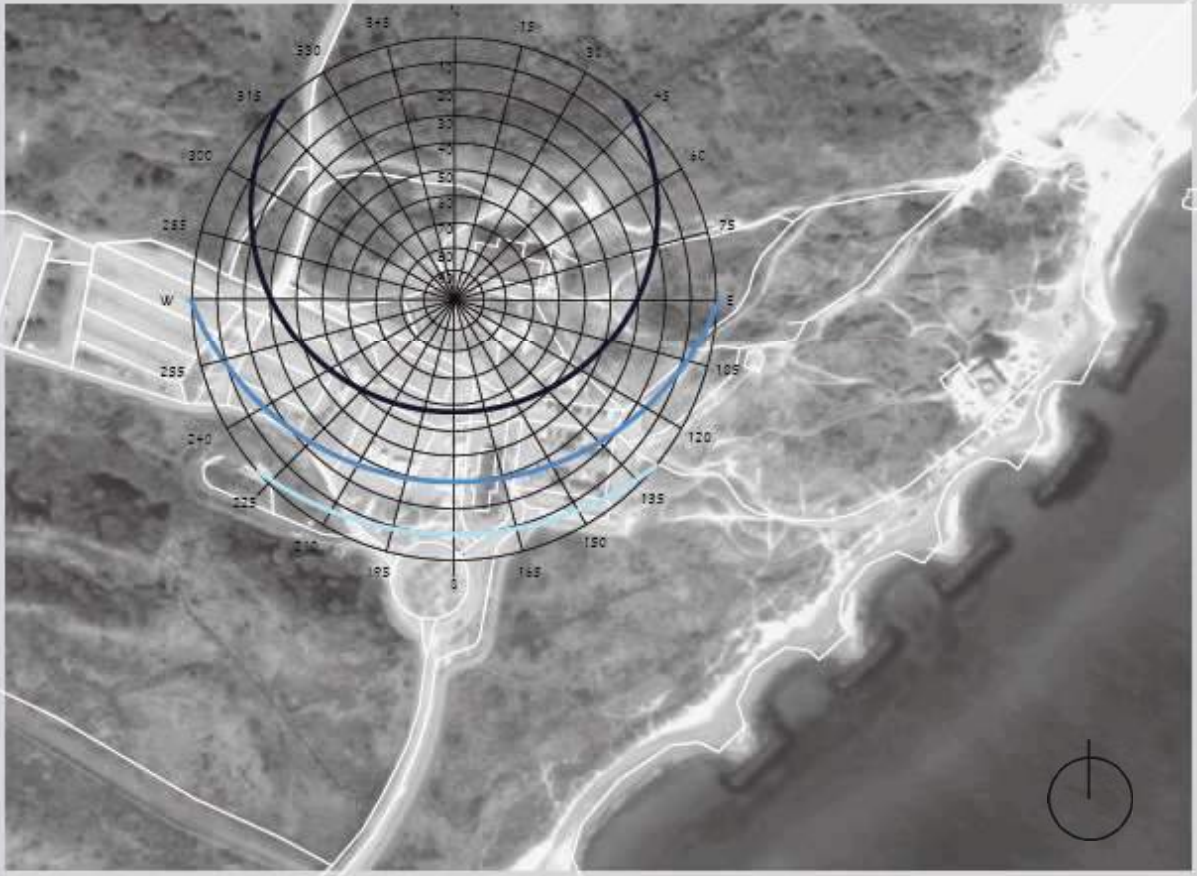
DAYLIGHT ANALYSIS

Grenen is located on the very northern part of Denmark, in the northern hemisphere. This location is therefore defined by a large difference in the length of a maximum number of daylight hours per day. In summer the sun achieves an altitude of 57 degrees. In these summer days, the amount of the daylight hours reaches up to 17 per day (*ill. 1 - 54)*. In the winter months, sun achieve the latitude of only 11 degrees, which results in very short days, defined by only about 6 hours of daylight per day. Grenen carries a phenomenon of a most northern located place in Denmark, therefore also most extreme conditions define the area - the day with shortest daylight hours a day and both the longest daylight hours a day within Denmark are in this area.

The character of the area is strongly defined through its cartographic characteristics. The flat narrow piece of land, exposed to the sea from three world sides, with a distance of only around 3 kilometres from east to the west shore above land. This, therefore, cause minimal possibility for clouds to occur, when they meet land masses. The clouds are fast winded off with the wind from the seas. The combination with also only small moisture released in this area due to the Norwegian mountains that shelter Skagen and cause the moisture to be in large part released there above land. Area of Grenen and Skagen is therefore defined as cloudless. The exposure of the narrow land surrounded by sea from three world sides, together with bright sky increase the levels of radiation in Grenen, comparing to the rest of Denmark..



Legend:

- *21st of December*
- *21st of March*
- *21st of June*

ill. 1 - 54 / Daylight analysis

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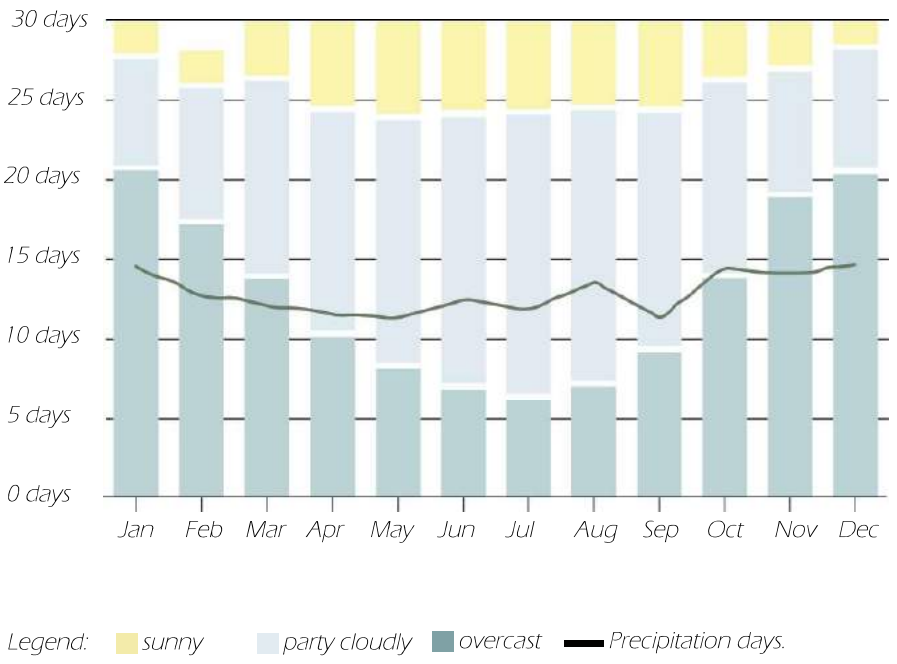
TEMPERATURE AND PRECIPITATION ANALYSIS

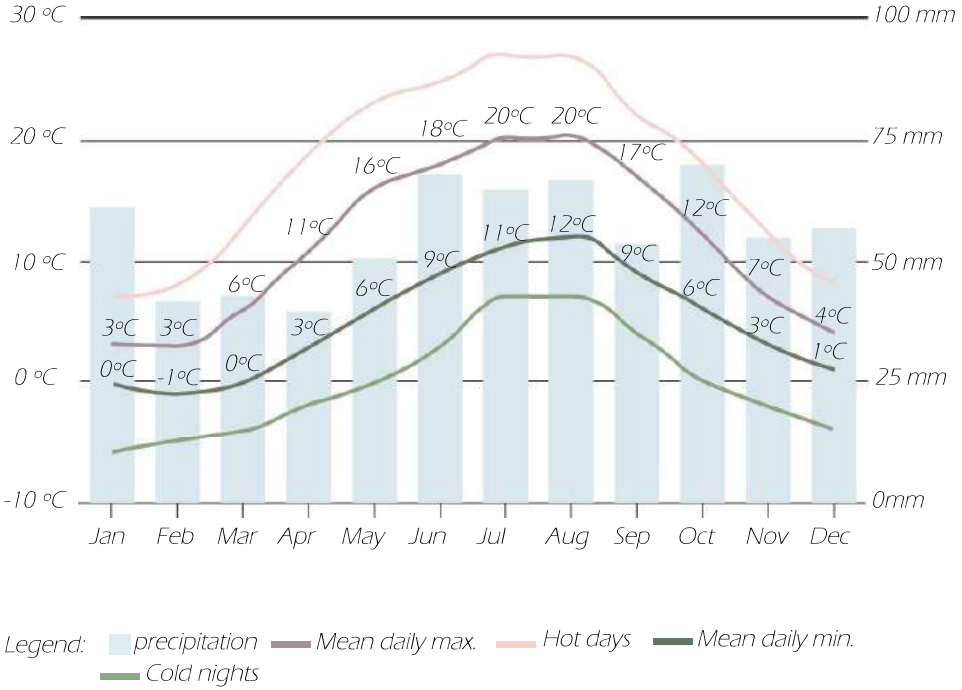
When designing the solution for the building, meteorological and climatological consideration is very important. It will have an influence on the choice of materials, facade, building characteristic, orientation but also the layout of floor-plan and existence of the functions and its extent. To consider the meteorological yearly statistic is an important aspect in this project, due to the significance of the understanding the needs of the visitors and meeting the demands that the ideal facility on the site should carry out.

The analysis of the sunny, partly cloudy, overcast and precipitation days is summarized in diagram ill 1 - 55. In this diagram days with less than 20% cloud presence in a day are defined as sunny days. Days with 20-80% clouds presence as partly cloudy and the condition with more than 80% of clouds presence are defined as overcast. This graph origins from meteoblue.com. For comparison, Sossusvlei in the Namib desert is one of the sunniest places on earth (meteoblue.com, 2019). It gains statistically 29,8 sunny days in July. The place on earth with Reykjavik, which statistically gains 1,2 sunny days in July. Grenen and Skagen statistically gain 6,5 sunny days in July, which is a sufficiently high amount of sunny days in comparison with other European cities and Scandinavian areas. For comparison, Copenhagen in July gains 6,3, Paris 7,2, Berlin 7, Stockholm 5,9, London 4,3 and Oslo only 4,1.

In the diagram ill 1 - 56 the "Mean daily maximum"present the maximum temperature of an average day for every month in Skagen.



ill. 1 - 55 / Cloudy, sunny and precipitation days



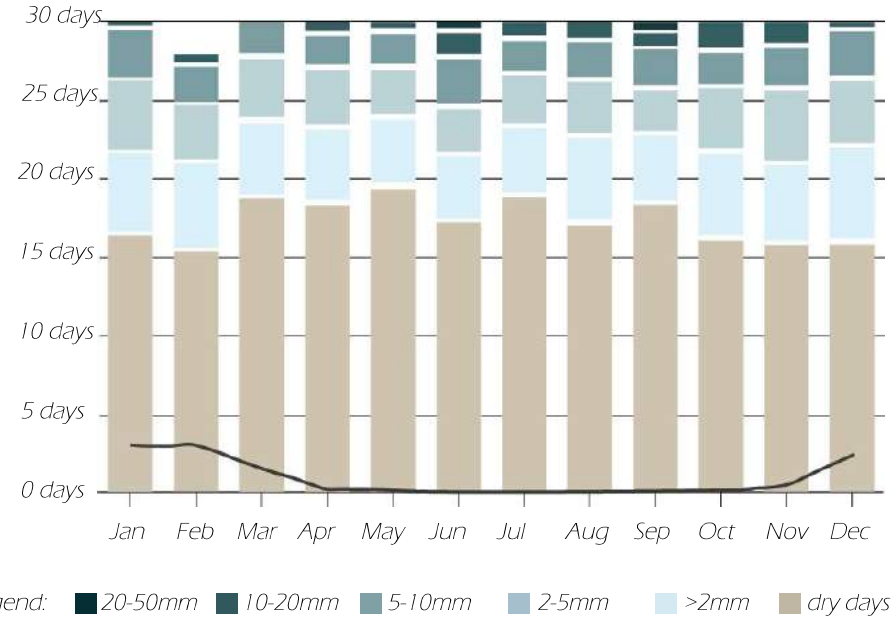
ill. 1 - 56 / Average temperatures and precipotation

TEMPERATURE AND PRECIPITATION ANALYSIS

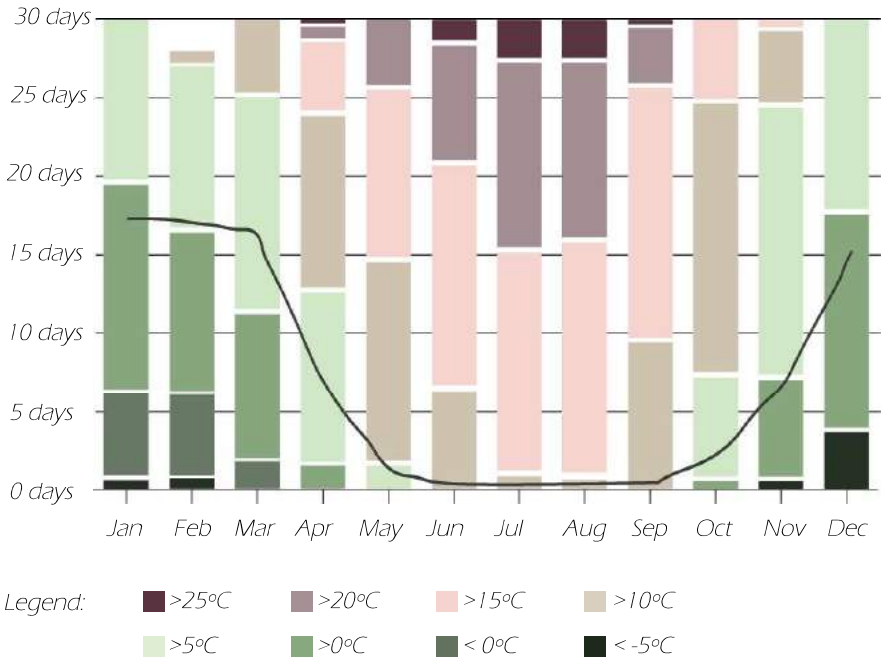
Same way is presented the "mean daily minimum", that represents the average minimum temperature. "Hot days" and "cold nights" show the average of the hottest day and coldest night of each month of the last 30 years (meteoblue.com, 2019). This graph origins from meteoblue.com and was set for visitors as the accurate prediction of weather for visitors. We can expect the mean temperatures as the highest probability of the weather condition with the possibility of hotter or colder days. The precipitation diagram ill 1 - 57 represent days per month with certain precipitation amounts. We can see an increase in the higher numbers on the values of precipitation above 10mm in comparison with other European cities. This increase, however, is not significant. July in Skagen area is defined by 0,2 days of 20-50 mm of precipitation, 1,1 days of 10-20mm, 2,3 days of 5-10mm, 4,1 days of 2-5 mm, 5,7 days of less than 2mm and 17,6 days stated as dry days.

The diagram of maximum temperature ill 1 - 58 represents the number of days in a month of certain temperatures. The levels of maximum temperatures for better understanding are generally lower comparing with European cities. Concerning summer temperatures, Skagen area (including Grenen) is comparable with northern Scandinavian cities, but with milder winters.

Used data are sourced from meteoblue.com, which analyzes weather data based on 30 years of hourly weather model simulations. The comparison of the statistic data around the world aims towards a better understanding of weather condition in context.



ill. 1 - 57/ Percipitation amounts



ill. 1 - 58 / Maximum temperatures

FUNCTIONS ANALYSIS

Grenen area offers an only limited amount of functions for visitors. The function, that is a recognized the node by visitors in the area is parking (violet colour in illustration ill. 1-59). Other functions for the area are facilitated in the building on the dune. These functions are a restaurant and museum. The museum is open for public, therefore its quite frequently visited by the tourists. Visitors can find Axel Linds' (there Danish / Swedish painter) paintings of Skagen but also the museum's sculpture collections. In the same building is located restaurant De2Have. From this restaurant, can visitors enjoy a spectacular view of the shore and sea over dunes. Besides these functions, we can find a small one level house built in typical Scandinavian way in the parking lot, There is a small souvenir shop on its eastern side. From the other side of the building are located public toilets. In close proximity from the site, on the south-southeast is located lighthouse. It is known as Skagen's Grey Lighthouse (Det Grå Fyr)that is since 1858 in use and is still open for public.

Besides these functions, tourists can find more functions, such as shops, restaurants, accommodation in nearby Skagen, that is located 4 km to the south from the site. Based on the analysis we can assume that the functions placed on the site are not balanced and that noncommercial functions are not offered in needed extent, as well as they are not clearly communicated to the visitors. Improvement in order of extending the functions (although in limited amount and volume due to the building regulation) on the place, can strongly improve patients experience and contribute to the improvement on the tourism in Grenen.

ill. 1 - 59 / Function analysis

NODES AND LANDMARKS ANALYSIS

Landmark's key physical characteristics are the uniqueness or memorability in the context. Landmarks often serve as orientation points, as their main feature is being visible, and help orientation in the area (Lynch, K.; 1960). In an extended area of the site in Grenen there are two landmarks that help the visitors to orientate in Grenen, they are Lighthouse (nr.5 in ill.1-60) and Restaurant (nr.2 in ill.1-60).Lighthouse is visible from the road from Skagen. This landmark can serve as a leading sign towards the most important point of interest of the area-Grenen point of meeting two seas. When reaching the lighthouse, a building rises from dunes - this building is Restaurant and it is the second landmark of the area. These two elements complement each other. The restaurant is hidden in dunes and is not visible from a far distance, it helps visitors to orientate in its close proximity, while Lighthouse is visible from far and gives orientation in distant proximity. Kevin Lynch in 1960 in his book The Image of the City states that nodes are strategic focus points for orientation like squares and junctions. The most important is the Grenen point of meeting two seas. This is a very important orientation point, as probably every visitor of Grenen heads towards this point. Second important node is parking. Every visitor passes this area and spends there time with parking. In a mental map of the visitors, this is often the starting and finish point. The interesting node of the area is the memorial. This node is placed on the top of the dune, which offers a spectacular view above Grenen, dunes and the sea at the horizon. From here several paths lead. Other nodes in the area are bunkers and souvenir shop.

ill. 1 - 60 / Nodes and landmarks analysis

TRANSPORTATION ANALYSIS

In the area of Skagen Odde is transportation defined by the existing connection of bus and train lines until Skagen. The nearby Frederikshavn connects internationally through its port and becomes a gate to welcome many potential visitors from Sweden and other Scandinavian countries In a closer context of the site, the main transportation connection is an asphalt road connecting Skagen and Grenen, ending with a roundabout connection at the asphalt parking area. This road is aligned with the path for cyclists. Most of the visitors come by car from the direction of Skagen and park the car in the parking lot. This fact can become a starting point for analysis of the potential bus connection from Skagen, visitor transportation options or another alternative for visitors that come by train to Skagen.
In the enclosure of the site, and in an orientation to the North and East from the site, the virgin area doesn't contain any reinforced surfaces from the parking lot to the north. But offers many paths for visitors consisting of the dust road and smaller walking paths. The dust road that leads to the North along the west side of the site and a network and facilitates as an access for the local minibus that takes visitors to the Grenen point We can see the most important transportation connections and paths marked on the map in illustration ill. 1 - 61. The extent of the roads is suitable and doesn't need any extension, oppositely, the extension of the roads will affect the area negatively, therefore the aim of the revitalization plan is to use the existing network of paths and roads effectively and create a connection to these exiting paths

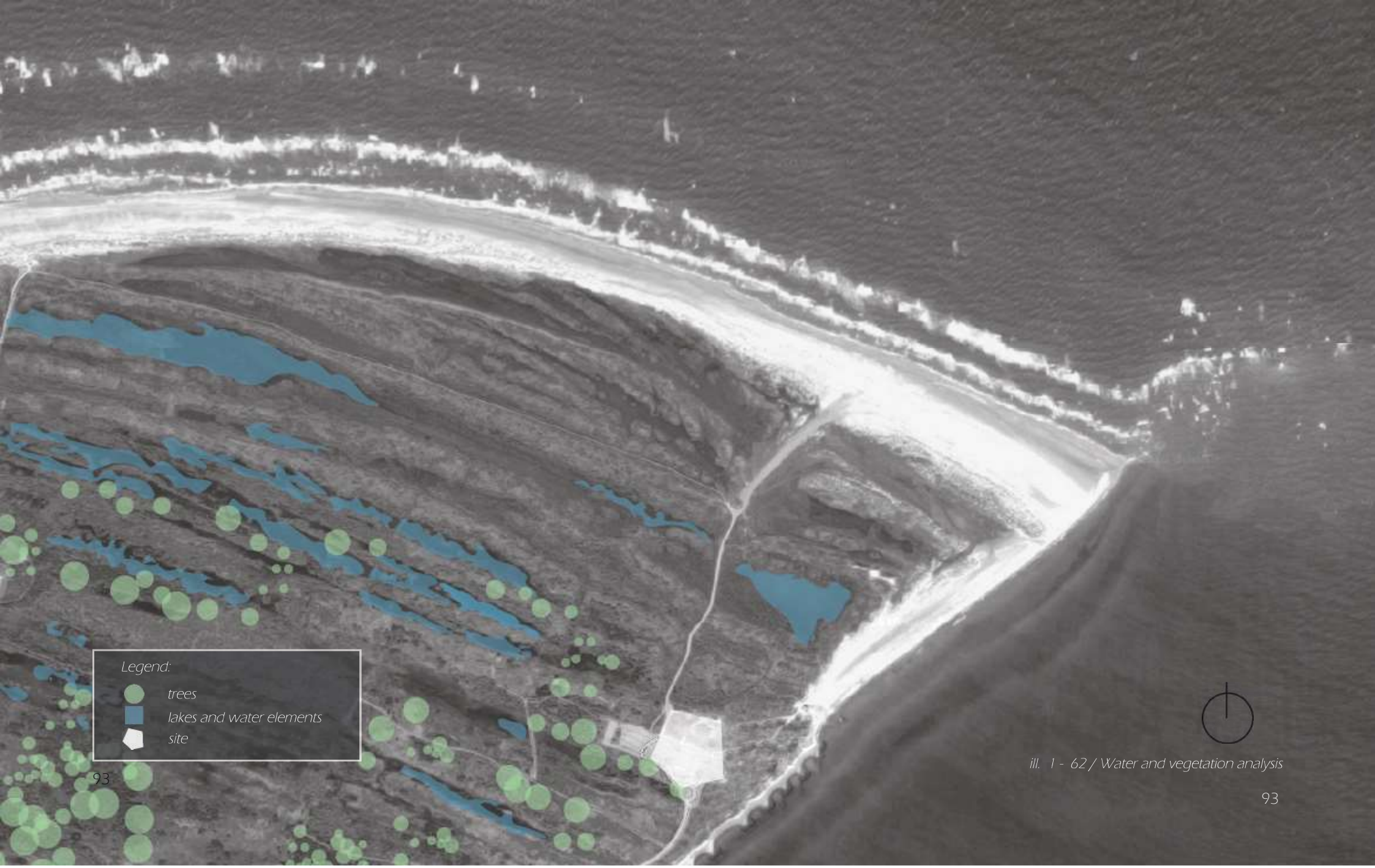
ill. 1 - 61 / Transportation analysis

VEGETATION AND WATER ANALYSIS

The special wild nature of Grenen is hosting large biodiversity. The pioneer plants such as creeps, shorelines and helmets roots in the new land with the white dunes facing the sea. Slightly further from the shore in the dunes can be found very rare plants that grow in damp dune habitations. In the dunes, you can find the little Nordic eyelash that grows only on the Skagen Gren. It makes it a so-called endemic species, and they are found only on few spots in Denmark. [Fredninger.dk: Skagen Gren, n.d.] Several of the Danish orchids, the cuckoo herbs, grow in lichens rich in lime [Fredninger.dk: Skagen Gren, n.d.]. Beautiful species such as swamp-hole soap, meat-coloured cuckoo, dune-hole soap and vendsyssel-cuckoo, the thousand guilders, knot quack, beach-star and Baltic ensian can be found in this wild nature. In the grass can be found many types of mushrooms, mosses and lichens that require quite special soil and moisture conditions. Several species of plants on Skagen Gren are listed on the Danish Red List, which is a list of rare, endangered and vulnerable species [Fredninger.dk: Skagen Gren, n.d.].

For exploring the wild nature of the rare species in Skagen Gren area is by botanicals recommended visiting Grenen in July. In this month the Branch Botanical World offers most colours. This could also be an indication for visitors interested in fauna or for study trips.

On the diagram ill 1-62, we can see the position of the trees and lakes. Around lakes, the specific species can be found. The whole area is defined by low height growth, from the analysis we can see from where higher trees start to grow.



ill. 1 - 62 / Water and vegetation analysis

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TRAILS AND ROUTES IN THE AREA OF GRENEN

In order to design the Visitor Centre that shelter more functions distributed in the area and counts in extending the engagement of visitors into the wider scope of the coast and land, the analysis of the existing trails and tracks was conducted. The shortest of the tracks is 3 km long and connects the Visitor Centre with the northernmost point of Denmark - Grenen. The great advantage of this track is that its barrier-free and accessible with the wheelchair of a baby stroller. Second, 3 km long track heads the opposite direction from the Visitor Centre - to the south. The special feature of this trail is that although its short and easy track, it leads through one of the most remarkable bird watching spots of the area. Starting from the parking lot, visitors reach the wild nature and passing the lighthouse, they return back to the Visitor Centre. The medium track is defined by the length of 6 km and this track heads to the east through the land until the Skagen Odde Nature Centre. This is the only building beside the Visitor Centre that is located alone in nature of Grenen, The tracks lead through the most important bird watching spots and virgin nature, but also two old bunkers. The 10km long track is defining a big circle around the area, when staring with heading south, visitors will first pass the lighthouse until the Det Hvide Fyr - The White Lighthouse, than turning to the west, passing the Skagen Odde Nature Centre, three bunkers until reaching the north-west shore. When turning back to east, visitors will pass bird watching spots, with the view of sea and Grenen point. The longest of the trails is Kultur-Natursti Trail, that draws long biking route and turns the bikers at this northernmost point, back towards the south.

ill. 1 - 62 / Trails and routes in the area

POINTS OF INTEREST

In order to form a coherent architectural design solution for the Visitor Centre and also the area, a wider study on possible points of interest and already functioning elements of interest was necessary to conduct. Visitor Centre will metaphorically shelter all possible visitor components in the area, and reflect on the condition through addressing the existing points of interest, creating new components in the area for the potential points of interest. This approach aims to analyze their distribution in the area and the potential logical connection between them. The study of the points of interest includes existing nodes and landmarks of the wider area, information provided by ornithologist and reservation specialists in an interplay of their sensible combination with the nature protection and tourism improvement.

In the map, we can see strong potential in the bird watching options that are located north-west and west from the site. This outcome from the conducted analysis aims towards enhancing this potential in the area. However a sensitive placement of the intervention to nature is a necessary requirement, as the birds shouldn't be disturbed from a close dis tance, and the design of the potential bird watching cabin (small dismantlable cabin) must be discreet and people inside must be hardly noticeable for the birds. The placement of the bird watching elements (birdwatching towers and cabins) will be placed on the existing paths, on which lies more points of interest. Through this way, new routes are created. Their placement is on the existing paths, and they connect more points of interest - the existing ones, and the potential ones that will be enhanced with the design. Through this strategy, visitors will be engaged in the area and will be invited to discover the options and beauty of Grenen, that they might not know before.

ill. 1 - 62 / Water and vegetation analysis

GRENEN WILDLIFE ANALYSIS

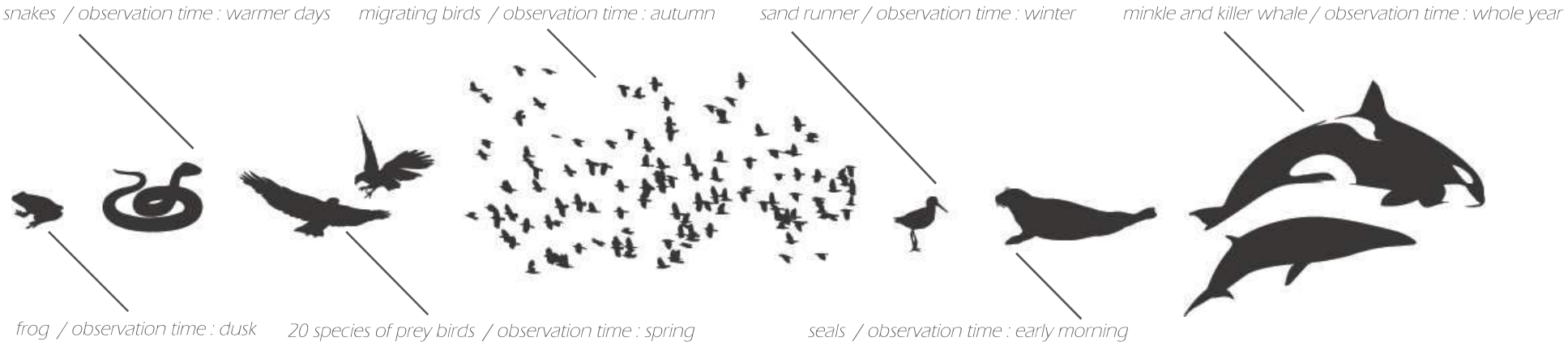
Grenen area is a favourite place for watching birds and ornithology researches. It is thanks to spring bird migration across Skagen Gren. This migration is known also as North Europe's largest and also as the migration of the highest variety of birds. Gliders such as storks and wide-winged birds of prey will always stay as long as possible over land, and only when the season forces them to do so will they travel across the sea [Fredninger.dk: Skagen Gren, n.d.].

Particularly interesting time to watch birds in Grenen is autumn. In this time seabirds as gannets, shearwaters, storm petrels and skuas especially in windy periods come close to shore.

Special and interesting is seeing the little agitated sand runner in the colder months. He is well known for his black legs, that resembles drumsticks when he runs on the sandy beaches.

Next particularly interesting time for birdwatching is spring. In this time around 20 species of prey birds can be seen above Grenen, , for example, king and sea eagles, these are very rare to spot. Among others also emperor eagle, snake eagle and large and small screaming eagle can be seen from at Skagen Gren dunes. Several hundred wide-winged birds of prey as buzzards and mountaineers turn hundreds of meters up on warm air currents before they fly via Skagen's Gren over the Kattegat to arrive at Sweden's west coast some hours later [Fredninger.dk: Skagen Gren, n.d.].

Very impressive can be the orchestral experience of frog spouts at the dusk. The loud sound is very



impressive and can be best heard in May or June If you visit Skagen Gren early in the day, you may be lucky to see seals lying on the outer sand tip [Fredninger.dk: Skagen Gren, n.d.]. The seals and grey seals that might be spotted can reach weight up to 300 kilos, this animal is also Denmarks heaviest mammal.

Whales can be spotted from the dunes of Grenen in the sea. Particularly minke whales and killer whales. The large whales are swimming from the North Atlantic into the down to 800 meters deep Norwegian waters which can bring them close to the Skagen Gren [Fredninger.dk: Skagen Gren, n.d.]. In the land, we can spot land mammals, one can encounter hares, deer and foxes in dunes and bushes. Among the reptiles, snakes are very common in the grass and sand. The data are sourced to Fredninger.dk: Skagen Gren, n.d.

A large number of visitors are an ornithologist, ornithology students and passionate nature lovers, who visit the area to see special species and experience large bird migration. There is a great possibility to enhance this speciality of the area, to improve tourism, but also to facilitate the needs of these particular visitors. Next very special reason for wildlife-oriented visits of Grenen are seals, they are spotted mostly very early in the morning. This can be a design indication, in order to offer seating and shelter for these visitors in the early morning. An open, free entrance sheltered area with seating for these visitors should be available to be accessible also before opening hours. The wildlife is summerized in ill 1-63.

ill. 1 - 63 / Wildlife analysis

CONCLUSION OF THE PHYSICAL ANALYSIS

LOCATION / CONTOUR / WIND / DAYLIGHT

LOCATION

The location of the site from analysis shows that the main building of the site is surrounded by dunes and is in very close proximity to the seashore. The position of the existing building on the site is north-east. with an area on its west side with legal permission for building intervention. The wider scope of the site planned for revitalization consists of the parking area and a smaller building.

The design implication from this analysis aims towards strengthening the idea of refurbishing the existing, main building, due to its strategic location and placement within the area. The analysis also shows opportunity to extend it to the west, where the dune remains and isn't interrupted by paths. Another argument for placing the extension to the west is the legal zone for building intervention, which is only limited around the existing building.

CONTOUR

The analysis shows that the contour around the existing building is most suitable for building, due to its highest level (5m). Larger dune of similar height and wider area of the same contour is located only on the north of the main existing building.

The design implication is locating the newly built extension on the west of the retrofitted building due to the contour height (4-5m). This ensures the durability and safety of the building against the flood protection, as well as ensures the view.

WIND

Wind in the location of the site based on the geographical predispositions of the narrow flat peninsula can achieve very high speed and this case sudden changes in the weather. Based on analysis wind also cause the formation of the land.

The design implication from the analysis aims towards strong consideration of the sheltering of the building and exterior areas against the wind. The placement of the new form can use the leeward area behind the building, that is protected against the direct wind from the east. During retrofitting strategies, the east part of the building and its insulation properties must be carefully considered. Last implication from the wind analysis is designing a large sheltered exterior terrace, where visitors can hide against the sudden rain brought unexpectedly by a strong wind.

DAYLIGHT

The analysis showed that Grenen has both the shortest and the longest day in the year within Denmark, due to its northernmost location. Daylight is influenced also by the meteorological

CONCLUSION OF THE PHYSICAL ANALYSIS

TEMPERATURE / PRECIPITATION / PARTIAL CONCLUSION

factors, and the area is also defined as the least cloudy or "cloudless" due to the flat and narrow land. The exposure to the sea increase the sun radiation and these factors aims towards high daylight levels, even a glare.
The design implication from the analysis aims towards strategic consideration of the window placement and size, as the daylight levels can reach high levels. Simulations of the daylight aim to the ideal indoor climate and will be necessary to achieve balanced levels in the interior.

TEMPERATURE
The analysis showed that the temperature in Grenen is lower when comparing to other European cities. The summer temperature is comparable to the northern located Scandinavian cities, however, Grenen is defined by way milder winters.

The design implication from these findings aims towards simulating mechanical ventilation, which might result in lower expenses for heating and cooling. Natural ventilation in the summer that can be more effective comparing to the warmer climates.

PRECIPITATION
The analysis of the precipitation on the graphs showed that Grenen is defined by many sunny days and generally low levels of overcast days. The clouds and the meteorological condition generally in the area bring less of the short rains, but the rain with high precipitation are more common in comparison to other European cities.
The design implication from the findings aims toward designing sheltered areas in the exterior to protect the visitors from the sudden and strong rains also outside opening hours.

PARTIAL CONCLUSION

The design implication and guidance from the analysis of location, contour, wind, daylight, temperature and precipitation is drawing the findings that form guidance for the design. These findings, that are stated after each analysis and summarized in the above text has to do mostly with the building placement, orientation and its form. They draw specific features that the building design should follow in order to reflect on the existing condition and circumstances the best way. Many design implications repeat as they reflect as a solution to more of the analysis obtained findings. The guidance is later summarized in the ill. X-X, where analysis and its keywords are gathered and its design implications are summarized and interconnected.

CONCLUSION OF THE PHYSICAL ANALYSIS

FUNCTION / NODES AND LANDMARKS / TRANSPORTATION

FUNCTIONS

From the analysis, we can see that the area doesn't offer a needed variety of functions. Its limited amount doesn't include any informational point and is narrowed to only commercial functions, limited by operational hours. Every user recalls strongly to the parking lot as a start and end of their visit to Grenen and often other functions are not used due to unclear communication of their presence to the users. More functions can be found in Skagen.

The design implication from these findings is one of the strongest analysis for designing because directly influence the choice of the functions in the centre. The possibility to offer functions on the site within the limitation of building regulation and preservation of the area is the main aim. But the implications from the research clearly aim towards extending new functions, points out the need for non-commercial functions, shelter and possibly toilets accessible outside operating hours. The findings from the analysis also point out the need for information point in the area, which strengthens the reasoning for the visitor centre in the spot.

NODES AND LANDMARKS

The analysis showed that the area has a lot to offer. The nodes and landmarks were analysed together. The main node of the area is Grenen point, meeting two seas, the reason for visiting this national park. Among the nodes for visitors, the parking lot becomes a strong node on their mental map of the area. An important landmark in the area is the existing building that will be refurbished, which gives it a powerful opportunity to strengthen its potential. Lighthouse is a landmark that serves as a distant orientation point.

The implication from the design is the potential from the existing building and its position, it already is a landmark, although not that many visitors visit it. When offering user-friendly spaces attractive for visitors from all target groups and enriching the functions to also non-commercial, the place will not only be a landmark but also will be a strong point on the mental map of visitors.

TRANSPORTATION

The analysis shows comfortable transportation of tourists until Skagen, through buses and train lines and nearby port in Frederikshavn. Asphalt road and cyclist path connect Skagen and Grenen, the options for transport are mainly cars and bikes. After Grenen parking lot only unreinforced paths lead in the area and this is an ideal condition that doesn't need any intervention.

CONCLUSION OF THE PHYSICAL ANALYSIS

VEGETATION AND WATER / WILDLIFE / PARTIAL CONCLUSION

A small bus that brings visitors to the beach uses the dust road.

Design implication using the suitable extent of roads without any need of extension, oppositely, the extension of the roads will affect the area negatively, therefore the aim of the revitalization plan is to use the existing network of paths and roads effectively and create a connection to these exiting paths.
Offering effective bu sustainable transportation from Skagen to Grenen, will be included in the designing, to help to decrease the number of cars polluting the area.

VEGETATION AND WATER

The analysis found that the area is rich on the water on the land, small lake formations are in lines all along the Grenen Odde. Vegetation from the analysis is rich in wild biodiversity, rare plants and endemic species. July is the recommended month by botanicals for visiting Grenen .

The design implication from this study is extending the target group to botanicals and visitors with observing natural endemic species. The visiting rate in July is high and this finding and orientation to this target group can increase visitors in this summer month.

WILDLIFE

The mentioned analysis shows very wide biodiversity of animal spieces from large sea mammals to land mammals, birds, amphibians or insects. Among them also protected spieces. The analysis shows that most potential centre of attantion among visitors are seals and wales and migrating birds. The analysis aims towards seasonal specification for watching particular birds and migrations and timing for potential watching of seals, these can be spoted in the morning. Largest migration of birds is in autumn, in spring most of the smaller spieces cumulates on the shore and prey birds are often seen in this period in large amounts. In winter rare sand runner cam be watched on the beaches.

Design implication from the analysis aims towards reasoning on the whole year potential for the bird watching, therefore orienting the target group of ornitology students and professionals is a strong potential. For morning seals watchers, sheltered terrace and seating in the early hours must be accessible.

PARTIAL CONCLUSION

The above-mentioned design implications forms the functional and vision formed concepts for the design. These are summarized in ill. X-X.

DESIGN IMPLICATIONS FROM ANALYSIS

	LOCATION	CONTOUR	WIND	DAYLIGHT	TEMPERATURE AND PRECIPITATION
ANALYSIS FINDINGS	+ surrounded by lower dunes + existing buildings needs retrofitting + strategic location of the main building + limitations for building interventions	+ low elevated land + strategic placement of the main building + dunes height: 1-5meters + higer dunes - flood protection and durability of building	+ high wind speed + general direction from East to West + constatly changing wind cause sudden changes of weather and unexpected rain	+ extremes of longest day and shortest day within Denmark + minimum of clouds + hight levels of radiation from the reflections from sea	+ lower temperature comparing to other European cities + temperature similar to Scandinavian cities but with milder winters + many sunny days + few overcasted days + less of shorter rains + common fast and strong unexpected rain
DESIGN IMPLICATIONS	+ RETROFTTING WITH SMALL EXTENDION AROUND THE MAIN EXISTING BUILDING	+ BUILDING EXTENSION LOCATED ON THE WEST OF THE RETROFITTED BUILDING + PLACEMENT ON THE CONTOUR OF 4-5M HEIGHT	+ SHELTERING THE NEW BUILDING, PARTLY SHELTERING BEHING THE EXISTING BUILDING + SHELTERED EXTERIOR AREA FOR VISITORS WHEN SUDDEN RAIN COMES	+ PLACEMENT OF WINDOWS + SIMULATIONS AIMING FOR BALANCED DAYLIGHT FACTORS FOR INDOOR CLIMATE	+ NATURAL VENTILATION + SIMULATIONS AIMING FOR MECHANICAL VENTILATION WITH LOW ENERGY DEMANDS + SHELTERED AREAS FOR UNEXPECTED RAIN + COLLECTING RAIN WATER + DRAINS FOR RAIN WATER

	FUNCTIONS	NODES AND LANDMARKS	TRANSPORTATION	VEGETATION AND WATER	WILDLIFE
ANALYSIS FINDINGS	+ museum and restaurant + nearby lighthouse + limited amount of functions on site + more functions are in Skagen + parking-node on mental map of visitors + no information about functions + no clear orientation in the area + no non-commercial functions	+ restaurant with museum + lighthouse - distant orientation point + parking - for users important node of their mental map + grenen point - main node of the area	+ bus and trains until Skagen + Frederikshavn port + asphalt road between Skagen and Grenen+cyclist path + car - most common transportation + small tourist bus driving until beach + no rainforced roads norther from site + existing paths for walking	+ endemic species + wide biodiversity + rare plants + July - recommended time for visiting by botanicals	+ bird migration observation - autumn + sand runner observation in winter + prey birds observation - spring + seals - early morning
DESIGN	+ EXTENDING FUNCTIONS ON SITE WITHIN LIMITAION BY BUILDING REGULATION + OFFERING NON-COMMERCIAL FUNCTIONS + NEED FOR INFORMATION STRENGHTEN REASONING FOR VISITOR CENTRE	+ NEW VISITOR CENTRE TO BECOME MORE VISITED LANDMARK IN THE AREA	+ NO NEED FOR ROAD EXTENSIONS + IMPROVING ECOLOGICAL AND SUSTAINABLE TRANSPORTATION BETWEEN SKAGEN AND GRENEN	+ EXTENDING THE TARGET GROUP TO BOTANICALS, RESEARCHERS OR VISITORS WITH THIS INTEREST	+ EXTENDING THE TARGET GROUP TO ORNITOLOGICAL STUDENTS AND PROFESSIONALS + SHELTERED OUTDOOR TERRACE WITH SEATING FOR VISITORS OBSERVING SEALS IN EARLY MORNINGS

ill. 1 - 64 / Design implication from analysis

CONTEXTUAL ANALYSIS

LOCAL PLANS
GRENEN - PROTECTED AREA
HISTORY
SKAGEN
SERIAL VISION
TARGET GROUPS

CONTEXTUAL ANALYSIS

In this part, the wider scope of contextual analysis is analyzed. This includes local plans and protection stage of Skagen Gren, but also other aspects from the local context that must be considered when designing a holistic solution for the design.

LOCAL PLANS

According to Frederikshavn Municipality's local plan portal, the local plan proposal in area of Grenen are limited to 2 planned projects. Lokalplan SKA.143-L.6 that is defined as military purpose project from year 1995. This project is distant from the site in radius over 2 kilometers. The other local building plan in Grenen area, in closer proximity to the site, of approximately 400 meters from the site is local plan SKA.O.05.24.01 - Bird mediation center, Skagen Lighthouse. This project is from year 2016 and connects to existing building of local landmark - lighthouse - Skagen Fyr- built in 1747 marked in ill. 1-65.
All other local plans are fairly distant from the proximity of the site and from the local context of the natural protected area of Grenen.
Local plan of Bird mediation center is connecting to the aim of the planned revitalization and retrofitting of the site and its buildings. It connects to the planned functions, and extend the potential interest for visitors. The improvement in the area will also complement the function and popularity of the Bird Mediation Centre.

ill. 1 - 65 / Local plans

GRENEN - PROTECTED AREA

Grenen belongs to the natural protected area, as stated by the EEA-European Environmental Agency, in IUCN management category II under national designation due to year 2007 under the Federal ministry and Danish Nature Agency. IUCN category II defines a national park, or large natural areas containing large ecological processes, wide range of species, natural biodiversity and ecosystems. These areas rich in environmental and cultural variety and specialty are potential for recreational opportunities. The areas protected through this category are in order to sustain their natural state and preserve its original species and its natural quality.

Another purpose of protection these areas is to maintain and manage visitor purposes and tourism, as for educational and recreational purposes, but also for its sensitive management without any biological or ecological lost caused to the natural areas. This category is focused on general maintaining of the whole ecosystem

Category II is not as strict as Strict Natural Reserve and therefore is defined with included tourist infrastructure.

The planning Act in Denmark, Consolidated Act No. 813 from 2007 states in §25, that simultaneously with publication in accordance with §24, the plan proposal shall be sent to the Minister for the Environment, other state, regional and municipal authorities whose interests are affected by the proposal and the relevant national park fund created pursuant to the National Parks Act.

ill. 1 - 66 / Grenen

THE BUILDING ON THE SITE

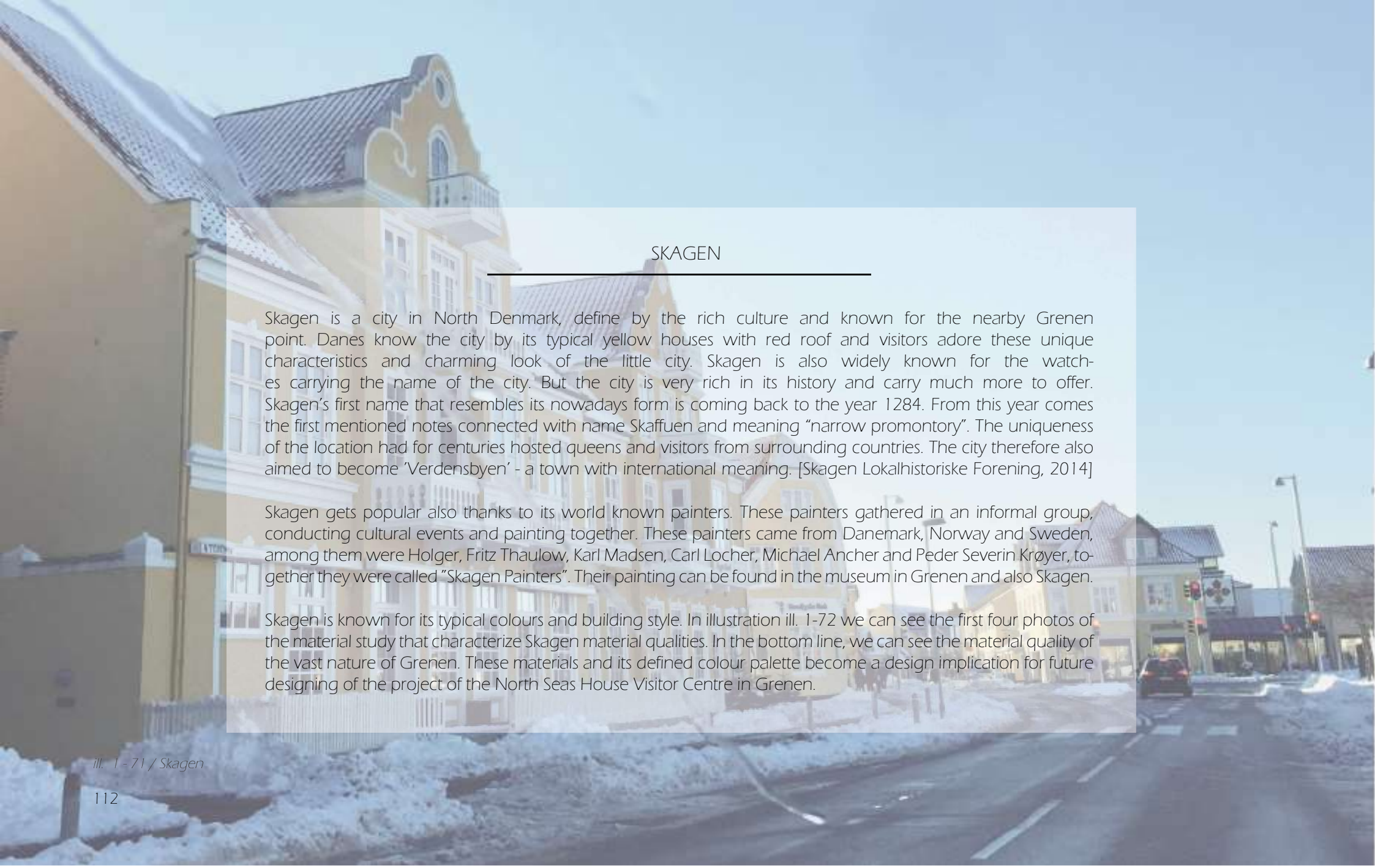
ill. 1 - 67

ill. 1 - 68

ill. 1 - 69

Grenen was a recreational area from at least 19th century. In 1898 the construction of The seaside hotel Grenen (*ill. 1 - 67)* was finished and afterwards the popularity of the place was growing. The hotel was large and contained many facilities for visitors, including a plane lane for aeroplanes taking off, tennis court yard and was rich in interior furnishment. Famous was the autograph room with autographs of the Siamese king and the Swedish king who spent idays in Grenen seaside hotel. On October 10th, 1938 hotel burst in flames (*ill. 1 - 68)*. Gustav Pedersen destribes the event for Skagensiden.dk as one of the last living fire fighters, who joined the rescue team. The entire eastern part burnt down, as the contruction was wooden. Later, during the war, the wing that was used by German occupants also burned down completely. Nowadays another building is standing in dunes - the Grenen Art Museum. It was built in 1959 but no longer on the ruins of the hotel, but on strategically the highest located point of the area, using the same old roads as an access. In 1977 the building extended its function with the restaurant and it is in used until nowdays (*ill. 1 - 69)*. For danes as well as foreigners, Skagen and Grenen is still popular destination and This building became new icon in the memories of the visitors.

ill. 1 - 70 / Restaurant on the wite nowadays



SKAGEN

Skagen is a city in North Denmark, define by the rich culture and known for the nearby Grenen point. Danes know the city by its typical yellow houses with red roof and visitors adore these unique characteristics and charming look of the little city. Skagen is also widely known for the watches carrying the name of the city. But the city is very rich in its history and carry much more to offer. Skagen's first name that resembles its nowadays form is coming back to the year 1284. From this year comes the first mentioned notes connected with name Skaffuen and meaning "narrow promontory". The uniqueness of the location had for centuries hosted queens and visitors from surrounding countries. The city therefore also aimed to become 'Verdensbyen' - a town with international meaning. [Skagen Lokalhistoriske Forening, 2014]

Skagen gets popular also thanks to its world known painters. These painters gathered in an informal group, conducting cultural events and painting together. These painters came from Danemark, Norway and Sweden, among them were Holger, Fritz Thaulow, Karl Madsen, Carl Locher, Michael Ancher and Peder Severin Krøyer, together they were called "Skagen Painters". Their painting can be found in the museum in Grenen and also Skagen.

Skagen is known for its typical colours and building style. In illustration ill. 1-72 we can see the first four photos of the material study that characterize Skagen material qualities. In the bottom line, we can see the material quality of the vast nature of Grenen. These materials and its defined colour palette become a design implication for future designing of the project of the North Seas House Visitor Centre in Grenen.

ill. 1 - 71 / Skagen

ill. 1 - 72 / Collage of mateerials in Skagen (upper line) and natural material in Grenen(bottom)

SERIAL VISION

Arriving at Grenen

To get to the site, visitors first pass the Skagen city. The bus and train lines lead to Skagen, with a good connection to Frederikshavn port, that connects Internationally with other Scandinavian countries. After arriving in Skagen, visitors have the option to walk, go by bike, or drive a car to the site. The distance between Skagen and Grenen is 4km. The two places are connected by asphalt road, that is aligned with the path for bikes.

ARRIVING AT THE GRENEN

After leaving Skagen, we pass the White Lighthouse, that is on our right, the asphalt road lead us to the roundabout on which we continue straight. As we can see in the illustration il. 1-73, in the first photo, the site is from Skagen not visible yet, the road is surrounded by higher pine trees. In the second photo, we can see that after a while, the lighthouse is visible, it is the landmark, that will well serve visitors as an orientation point. From this place, the site and the existing building to be retrofitted is not recognizable yet. Right after the Lighthouse is the ornithological station, hat we can see in the third photo. After passing the ornithological station we start to recognize a roof on the dune and a smaller building underneath (the fourth photo), this is from the distance of approximately 600-700meters from the building. In the fourth photo, we approach the roundabout near the parking lot and the small sou-venir shop if welcoming us to the area. The existing building of the restaurant is on the dune but from this close proximity is mostly hidden by the dune and we can only see its flat roof. In the last photo, we can see the view towards the building, from the parking lot. The building is hidden and barely seen, we can only see a peak of its roof behind the dune. This experience will form the design implication to the formation of the roof and newly built part, after consideration of the contrast between becoming a landmark, or just blending in nature.

ill. 1 - 73 / Collage of the photos - Arriving to Grenen

TARGET GROUPS

local visitors

nature interested visitors

elderly visitors

school trips

The proposal for the visitor centre aims towards addressing a wide range of the users and target groups. In order to ensure addressing all potential visitors, target groups consisting of specific characteristics were created (ill. 1 - 74).

LOCAL VISITORS

People living in the area are also particularly proud of the place they come from. Many local people take regular trips to the Grenen point, take their kids and grandkids for the walk to this wild nature, for a sunny walk on beaches. Its possible design implication is serving the area with commonly needed exterior aids, such as trashbin, seating and terrace for lunch break after hiking.

NATURE INTERESTED VISITORS

This target group cover all types of visitors, young students, single travellers, older visitors or groups. Their common interest is nature and they seek information, which the visitor centre can provide. After receiving the information, these visitors can take hikes on the path and observe nature with and understanding. Its design implication refers to the functions offered in the visitor centre.

ELDERLY VISITORS

This target group is defined by the seniors, who come to enjoy a day in Grenen without hurry. Comfortable cafe and place to relax also in the interior is an important aspect that aims to the design implications. Barrier-free designing, or universal design, that ease the accesses for the elderly is an aspect that will be included in the designing.

SCHOOL TRIPS

This target group consists of visitors of different ages, and sizes - from a small group of a biology club, until a whole high school class study trip. The pos

ill. 1 - 74 / Target groups 1

culture interested visitors

families

researchers

ornitology interested visitors

sible design implication is a capacity of the reception, sheltered areas, possibly conference or lecture room and educational options in the visitor centre.

CULTURE INTERESTED VISITORS

This target group seeks information about the culture of the area, including the culture of Grenen and Skagen, possibly the history of the site and lighthouse. Souvenir shop with books and booklets might become a design implication, also a room with video information or movie about the area can serve this target group.

FAMILIES

This target group is often defined by planned and effective travelling, during holidays or on weekends. Opportunities for children and aids for them, breast-feeding room, barrier-free access from the parking lot until the visitor centre and within the visitor centre is another design implication from this target group.

RESEARCHERS

This target group comes to the visitor centre for the conference, for specific research or just for focused research writing. This target group might need to overnight at the place and need conference rooms. These are the design implications for designing. The restaurant and cafe will be used during the stay of this target group.

ORNITHOLOGY INTERESTED VISITORS

Ornithologist, not only professionals but also students or laics with ornithology interest will be a common visitor in Grenen. The design implications aim towards informational functions.These visitors might observe the birds in early mornings, therefore the opportunity to stay in an exterior sheltered terrace with access to toilets is a strong design implication.

ill. 1 - 75 / Target groups 2

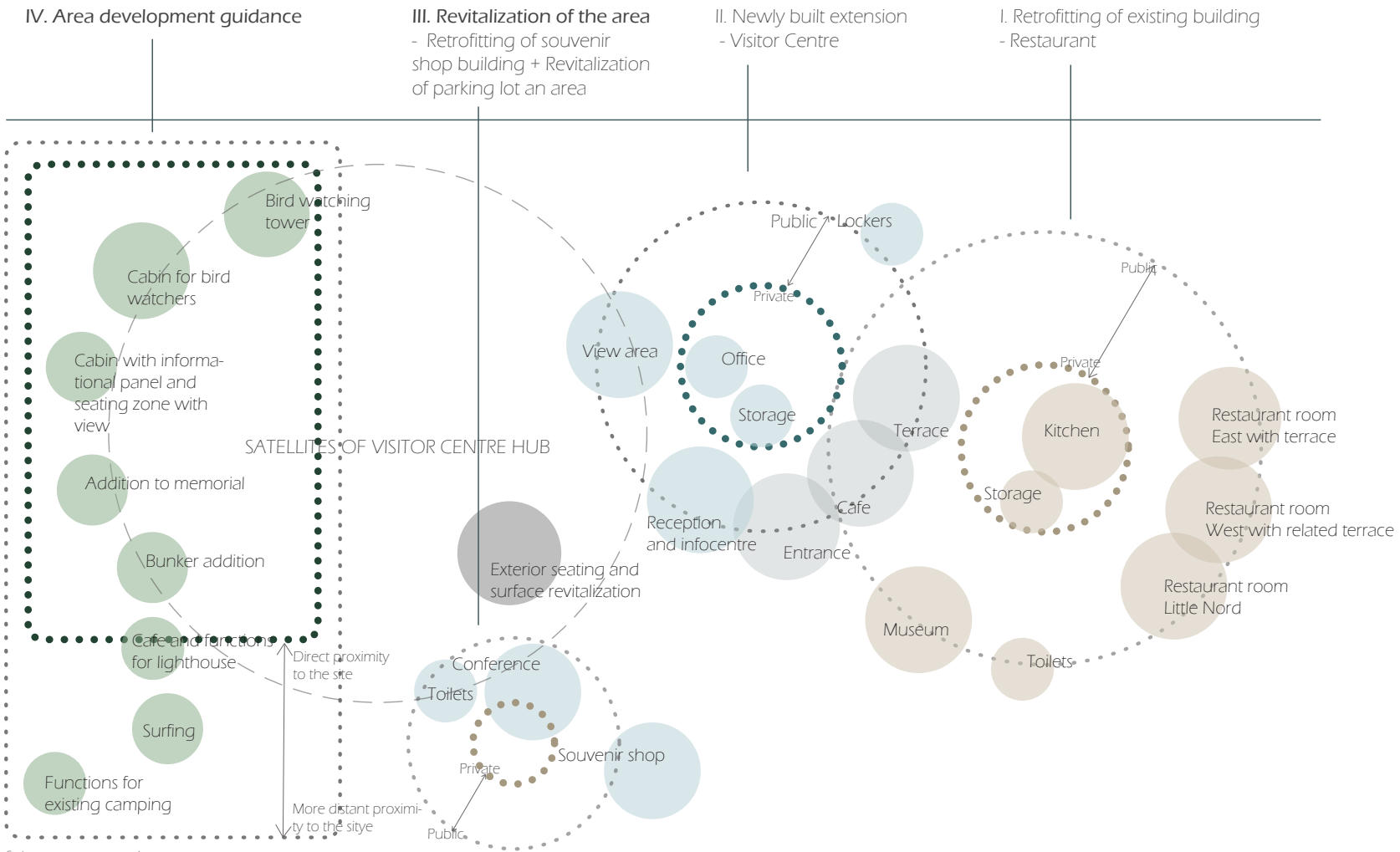
ROOM REQUIREMENT

SCOPE OF THE ROOM REQUIREMENTS
ROOM PROGRAM

ROOM REQUIREMENTS

In this part closer description of the room requirements, its possible connection and relation are stated. The section includes also detailed parameters of the room indoor quality requirements.

ROOM REQUIREMENTS



ill. 1 - 76 / Scope of the room requirements

ARRIVAL

Upon arrival, the parking lot welcomes visitors with more than 350 existing parking spots, and small iconic building built in traditional Nordic style. Parking is possible on the main parking lot, that is seen from the connecting road, and continues behind the building placed on the left. The arriving gesture should communicate welcoming and very clear layout, with understanding the possibilities for parking including buses and barrier-free access.

ENTRANCE TO VISITOR CENTRE

Intuitive navigation is the approach of the building organization on the site. The original building on the site nowadays carries the function of restaurant and museum, the building on the parking lot carries function of the souvenir shop. The Visitor Centre will become an extension of the main building (restaurant). Visitors must feel welcome to enter the Visitor Centre, as it becomes an entrance to the satellite hub of the little cabins in the Grenen area, offering visitors spectrum of information, functions and activities. The functions in the Visitor Centre are also non-commercial, informational and educational, with this approach the focus is on attracting the visitors to come, participate and enjoy the building without any hesitation or physical barriers. The Visitor Centre is connected to the outdoor sheltered area and terraces for visitors.

SOUVENIR SHOP - LECTURE ROOM AND SUPPLEMENT FUNCTION

This iconic building is a favourite and well remembered for visitors. Local people from Skagen and surrounding cities spend in Grenen a lot of time in their lives and this special place ties a lot of special memories to the local people for generations. The building with souvenir shop built in Nordic tradi- tional style with grass roof is a first building that welcomes visitors to the Grenen. This building carries special value, which should be preserved and in retrofitting kept in the original aesthetic feature.

RESTAURANT

The main building on the site carries two functions - Restaurant and Museum. The restaurant is a function that brings strong value to the site, as visitors often come from far and want to enjoy their time in the beautiful nature with dining break. This restaurant and its function are going to be preserved and the iconic restaurant will receive changes and a new look. Its connection will be directly connected with the new Visitor Centre extension of the building. Visitors should comfortably move between these two functions and perceive the restaurant as a function in the Visitor Centre.

MUSEUM AND CULTURAL FACILITIES

Museum in its existing version will receive a new look and will become a coherent part of the visitor

centre, connected to the other cultural facilities sheltered into one design.

EXTERIOR AREA
The existing parking lot and walking paths are in the recent extend suitable and further intervention into nature through creating new paths will not be suitable and could harm the wildlife in the area. The exterior area is going to be revitalized through the concept of strengthening paths around the building on the site and making the access barrier-free to each of the buildings and within then. The seating and trash bins are going to supplement the area in proximity of the site, in order to keep the area clean despite a large number of visitors. The exterior area is going to offer routes for walking, along to which will be placed cabins, that will offer a number of functions for visitors and bird two watching towers.

SATELLITE CABINS COMPLEX IN GRENEN
The complex solution for the area through the little cabins hidden in the dunes, offering shelter, seating, information panels, tables for dining, bird watching cabins and bird watching towers engages the visitors to discover the area and experience new possibilities or appreciate and enjoy the speciality of the wildlife and nature of Grenen. The distribution of the panels within the area is based on the possible walking routes for visitors, combined on already existing walking paths.

WALKING ROUTE A
Walking route A is a shorter walking route for visitors who wants to see lighthouse and enjoy shorter walking on the east coast beach, the stops along the paths are Lighthouse and cafe, the Bird Migration Centre, Bunkers, Memorial, Grenen point and cabin in the dunes which offer seating sheltered from wind and rain with beautiful view to the sea, where visitors can rest, dine or hide from the rain.

WALKING ROUTE B
This walking route takes visitors to the west coast through the wild nature and dunes, this area accommodates wild species of nature, as it's defined by larger untouched marshland with moss paddies in dunes. This area is ideal for watching birds, two bird watching towers are located along the route, cabin for watching birds in lower levels and with possibility accommodate ornithologist or nature specialist, that is lockable from inside and also a sheltered seating covered from wind and rain with beautiful view to the sea, where visitors can dine, or simply rest and enjoy the nature. This area is very unique and information panels offer information about the species they can spot in the dunes. This informational approach is motivational for visitors to discover the area and gain experience they might not know that Grenen offers.

INFOCENTRE

Function	Size	Functional demands	Lighting	Temperature	Humidity	Ventilation speed
Entrance area	25 m²	The entrance should be well siutated and visible and should include seating.	200-300lux	25 – 28°C	30-70%	≥ 025 m.s-1
Reception and infocentre	15 m²	This area should contain a receptionist who also can provide information and book trips	200-300lux	25 – 28°C	30-70%	≥ 02 m.s-1
Souvenir shop	20 m²	This part is connected to the reception, where the payemnt will be possible.	200-300lux	25 – 28°C	30-70%	≥ 02 m.s-1
Cafe	25 m²	The cafe will be located with importance on the view, in connection to terrace and reasonable proximity to toilets.	150-300lux	25 – 28°C	30-70%	≥ 02 m.s-1
Terrace	60 m²	The terrace must offer view and be at least party covered against rain and sheltered againt wind,	daylight + night 200lux	sheltered outdoor	sheltered outdoor	sheltered outdoor
Toilets	30 m²	The toilet contain min. 2 toilets in ladies section and 2 toilets in men section. Ideally accessible ouside operating hours	200lux	15 - 20°C	30-70%	≥ 025m.s-1
Lockers	20 m²	Lockers contain 50 boxes for free locking of personal belongings. Located close to reception	250-300lux	18 - 22°C	30-70%	≥ 03 m.s-1

INFOCENTRE EXTENSION - RETROFITTED SOUVENIR SHOP / NEW FORM

Function	Size	Functional demands	Lighting	Temperature	Humidity	Ventilation speed
Conference	50 m²	Conference room works as multifunctional room that can be emptied for exhibitions. This room offers view and needs connection to storage.	150-300lux	25 – 28°C	30-70%	≥ 02 m.s-1]
Accomodation	100 m²	Accomodation consists of 4 separate rooms that can be rented for researchers or public	150-300lux	25 – 28°C	30-70%	≥ 02 m.s-1]
Lecture room	20 m²	This smaller conference / lecture room is located closer to reception	150-300lux	25 – 28°C	30-70%	≥ 02 m.s-1]
Storage	15 m²	The storage facilitate especially conference room and accomodation service. It is located n connecion to the toilets and office.	200lux	15 - 20°C	30-70%	≥ 03 m.s-1]
View area	20 m²	This place is a public accessible area that offers view and seating	200lux	25 – 28°C	30-70%	≥ 02 m.s-1]
Office	15 m²	Office is located in proximity to storage and needs a suitable daylight for deskworks.	250-300lux	25 – 28°C	30-70%	≥ 02 m.s-1]

RESTAURANT

Function	Size	Functional demands	Lighting	Temperature	Humidity	Ventilation speed
Restaurant room East with terrace	80 m²	This room to be refurbished recently host 90 people indoors and 60 people outdoors	150-300lux	25 – 28°C	30-70%	≥ 02 m.s-1
Restaurant room west with related terrace	70 m²	This room to be refurbished recently host 70 people indoors	150-300lux	25 – 28°C	30-70%	≥ 02 m.s-1
Restaurant room Little Nord	30 m²	This toom to be refurbished recently host 35 people indoors	150-300lux	25 – 28°C	30-70%	≥ 02 m.s-1
Toilets	30 m²	The toilet to be refurbished contain 2 toilets in ladies section and 2 toilets in men section	200lux	15 - 20°C	30-70%	≥ 025m.s-1
Kitchen	60 m²	The kitchen to be refurbished consists of two parts, clean kitchen and cooking	250-300lux	18 - 22°C	≥ 80%	≥ 03 m.s-1
Storage	30 m²	The storage serves the kitchen. It include cold zone and dry zone and is facilitated with racks	200lux	10-17°C 5-7°C	≥ 75%	≥ 03 m.s-1
Museum	160 m²	The kitchen to be refurbished contain fixed exhibition and temporaty hosting exhibitions	250-300lux	25 – 28°C	30-70%	≥ 02 m.s-1

DESIGN CRITERIA

AESTHETIC / FUNCTIONAL / TECHNICAL

Sensing architecture that through its materiality and aesthetic characteristics defines all buildings into one recognizably coherent concept.

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AESTHETIC

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Sensing architecture that through its materiality and aesthetic characteristics defines all buildings into one recognizably coherent concept.

DESIGN CRITERIA

AESTHETIC / FUNCTIONAL / TECHNICAL

Design friendly to users with all needs, barrier-free access to the buildings and within them.

Welcoming concept that invites users into an active interplay of learning, receiving information about Grenen nature, opportunities and exploring the whole coast.

Revitalization of the parking lot, that recently consists of more than 350 parking spots, which is sufficient.

Design for all users, also outside operating hours, night stayers, early seals watchers or very late visitors.

FUNCTIONAL

Sheltered area, seating and terrace around/connecting the main restaurant building and the extension, that empowers the connection and hierarchy between functions

A layout that is easily understandable for users, empowered through intuitive orientation in the buildings.

Design concept extended to the surrounding area and cabin distribution designed logically on the walking routes, supplementing the function in the logical order and in carefully analyzed location and view.

Access to public toilets from the terrace and outside opening hours.

DESIGN CRITERIA

AESTHETIC / FUNCTIONAL / TECHNICAL

Energy efficient retrofitting of the existing building, in order to reach Zero Energy Building.

Designing retrofitting concept that lowers energy demand, improve the indoor environment through proper ventilation strategy and improved building envelope.

Carefully selected choice of materials, based on life-cycle assessment analysis.

Building defined by suitable daylight in all rooms in accordance with its needs (museum requires lower daylight levels).

TECHNICAL

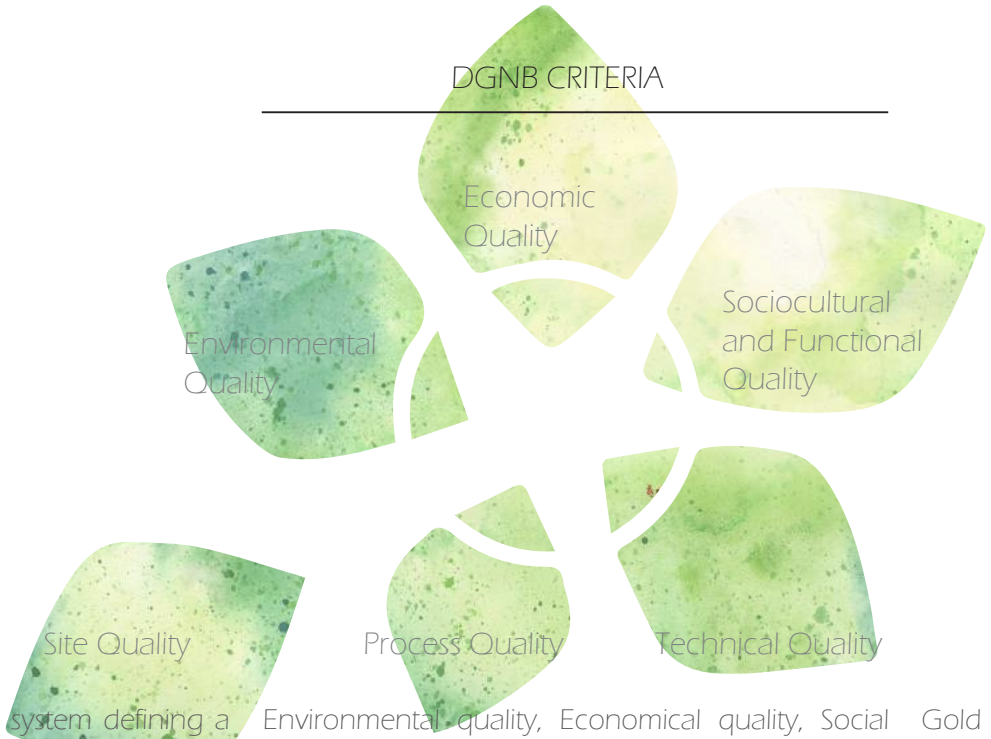
Building extension, that is defined by low energy demand, good indoor environment and efficient floorplan layout.

Designing with emphasis on environmental sustainability.

Designing with emphasis on social sustainability. Keeping the values recognized by the local people. Offering functions for volunteering or for work for immigrants that can improve their working experience and expertise.

Durable, effectively designed structure of the building.

DGNB CRITERIA



DGNB is a German certification system defining a holistic sustainability approach in architecture. It is presented by the Green Building Council Denmark (DK-GBC, since 2010).
DGNB is defined by six different categories that describe the requirements of certain fields of criteria by scores.DGNB categories: Environmental quality, Economical quality, Social quality, Technical quality, Process quality and Site quality (Dk-gbc.dk, 2017).

Environmental quality, Economical quality, Social quality, Technical quality are scored by 22.5%, Process quality is scored by 10%, the last criteria - Site quality has its own score and is calculated separately, for not affecting the building total score.
Each category is defined by sub-criteria, of which some are compulsory for the certification, and some are not. The weight of criteria is scored by 1, 2 and 3. Certification can be achieved in free types, Silver, Gold and Platinum. Where Platinum certificate defines the best sustainable approach. (Dk-gbc.dk, 2017).
The Grenen Visitor Centre project will implement Environmental, Social, Technical and Process Qualities of DGNB. Selected sub-criteria from the categories were chosen to be implemented in the design and to form the framework for the sustainable aproach of the design.

DGNB CRITERIA

ENVIRONMENTAL QUALITIES:

- ENV 1.1.13.2 Climate protection measures in guidelines, strategies and planning

Reducing the buildings' emissions throughout the life cycle as through keeping the existing building and using as much as possible from the existing construction and improving its quality and choosing the sustainable and environmentally friendly materials.

- ENV1.1. 7.3 Energy efficiency
- Reducing the overall primary energy usage and maximize the use of renewable energies is the approach integrated into the design, its form and orientation.
- ENV 1.1. 3.9 Effects of chemicals, air, water and soil contamination
- ENV 1.1. 14.1 Avoiding marine pollution
- ENV 2.4. 15.5 Natural habitats
- ENV 2.4.15.1 Biodiversity
- ENV 2.4. 15.9 Ecosystem and biodiversity values in decision-making processes

SOCIOCULTURAL QUALITIES:

- SOC 1.1 - Thermal Comfort

Thermally comfortable rooms and spaces, keeping the rooms at a suitable temperature in regard to its function and use.

- SOC 1.2 3.4 Indoor Air QUality - Reduction of premature death, promotion of good health/ well-being

Ensuring the quality of the indoor air.

- SOC 1.4 -7.3 Visual COmfort - Energy efficiency

The daylight that ensures a suitable environment for all functions in the buildings, the daylight in shared spaces, visitor area, conference room, a restaurant would achieve daylight factor of 3%, slightly lower levels are acceptable for a museum.

- SOC 1.5 -User control

In order to improve the indoor quality, maximal control, the design aims to dynamic facade options that allow control over ventilation, shading and daylight factor, in order to minimize costs on artificial lighting and mechanical ventilation.

- SOC 1.6 - Quality of outdoor areas

In this case, the outdoor areas are planned to be revitalized, paths between parking lot and buildings are planned to be improved to become barrier-free. The outdoor areas must be comfortable to use in most of the weather and season conditions for any potential users.

- SOC 1.7 -16.1 Crime

Safety and security is a two fault approach, in this case, creating the building that is resistant to the natural causes and offers safety for its users, with a strategic evacuation plan. As well as safety for the users through safe and non-slippery pathways, strengthen paths in selected parts for wheelchair comfortable use, light in the parking lot and shelter outside opening hours. This aspect offers an interplay of safety for building outside operating hours and balance between sharing spaces and general approach to address the comfort of the users.

- SOC 2.1 -Design for all

The building and the enclosed earea is designed to be barrier-free and accessible to every user.

- SOC 1.7. 11.7 Access to public spaces and green spaces

An approach that welcomes the public into the area, site and buildings is designed for the load of the large number of visitors and their public flow within the area.

- SOC 2.1. 8.5 Appropriate work for all men, women, people with disabilities

Designing building for everyone, accessible to everyone and without restrictions on its use, whatever their personal situation.

- SOC 2.1. 11.7 Access to public spaces and green spaces
- SOC 2.3 -Conditions for cyclists

Cycling is one of the most used commuting options for users, who don't commute by car. This option is planned to be strengthened with the design, therefore cycling paths are well sustained and new places for parking safely bicycles are planned.

- SOC 3.1 -Urban and architectural quality

The design should manifest the beauty of nature and become a transparent building part that harmonizes with the surrounding. On the other hand, the architectural qualities should become a sensual experience for the visitors and quality landmark for the area.

- SOC3.3 Plan disposition

The plan should implement the visitor centre entrance and information points that become the main inviting parts of the building, which becomes a challenge with two distant buildings with diffused functions. The aim of the design is to connect them together and create a visitor centre hub for the buildings, as well as a visitor centre hub for the area with the diffused satellite cabins.

TECHNICAL QUALITIES:

- TEC1.3 -Quality of the building envelope

Retrofitting the building envelope ensures lowering heat losses continued in the newly built form where the design strategy ensures a high-quality envelope with minimal heat losses. U values of all building components will be considered, thermal bridges, airtightness of windows and air exchange rate. Re-placement of the roof is considered, due to unsuitable insulation properties.

- TEC 1.3.7.3. Energy efficiency
- TEC1.4. Use and Integration of Building Services
- TEC1.5 -ease of cleaning the building

The design considers suitable cleaning and maintenance in the layout distribution and also in the material choices in the interior and exterior

- TEC 1.6. DIsmantling and recycling friendliness
- TEC 3.1 Mobility infrastructure


I. RETROFITTING OF RESTAURANT
AND NEWLY BUILT EXTENSION
II. RETROFITTING OF SOUVENIR SHOP
III. REVITALIZATION OF THE PARKING LOT
IV. AREA DIRECTLY ADDRESSED FROM THE VISITOR CENTRE
WITH SATELLITE CABINS AND LIGHT CONSTRUCTION
INTERVENTIONS ON NEW TRAILS (OF EXISING PATHS)
V. AREA DEVELOPMENT GUIDANCE

STORY OF VISITNG GRENEN

VISUAL STIMULATION

TACTILE STIMULATION

SOUND STIMULATION

SENSES

RELATING TO THE PLACE

FEELING WELCOME

UNDERSTANDING PLACE

MEMORIES

CONFIDENT ORIENTATION

POSITIVE EMOTION
- FASCINATION
-PEACE
-SAFETY

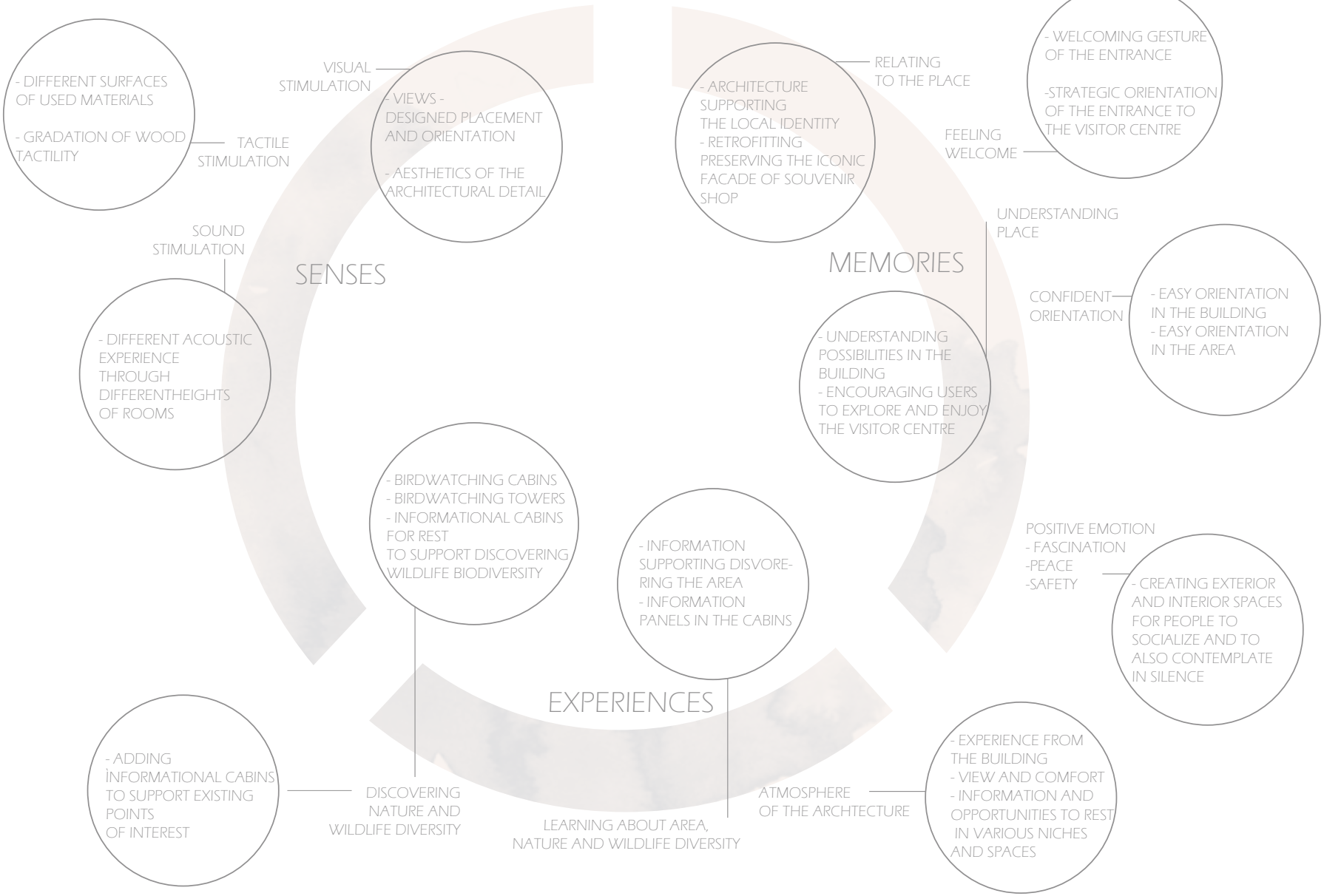
EXPERIENCES

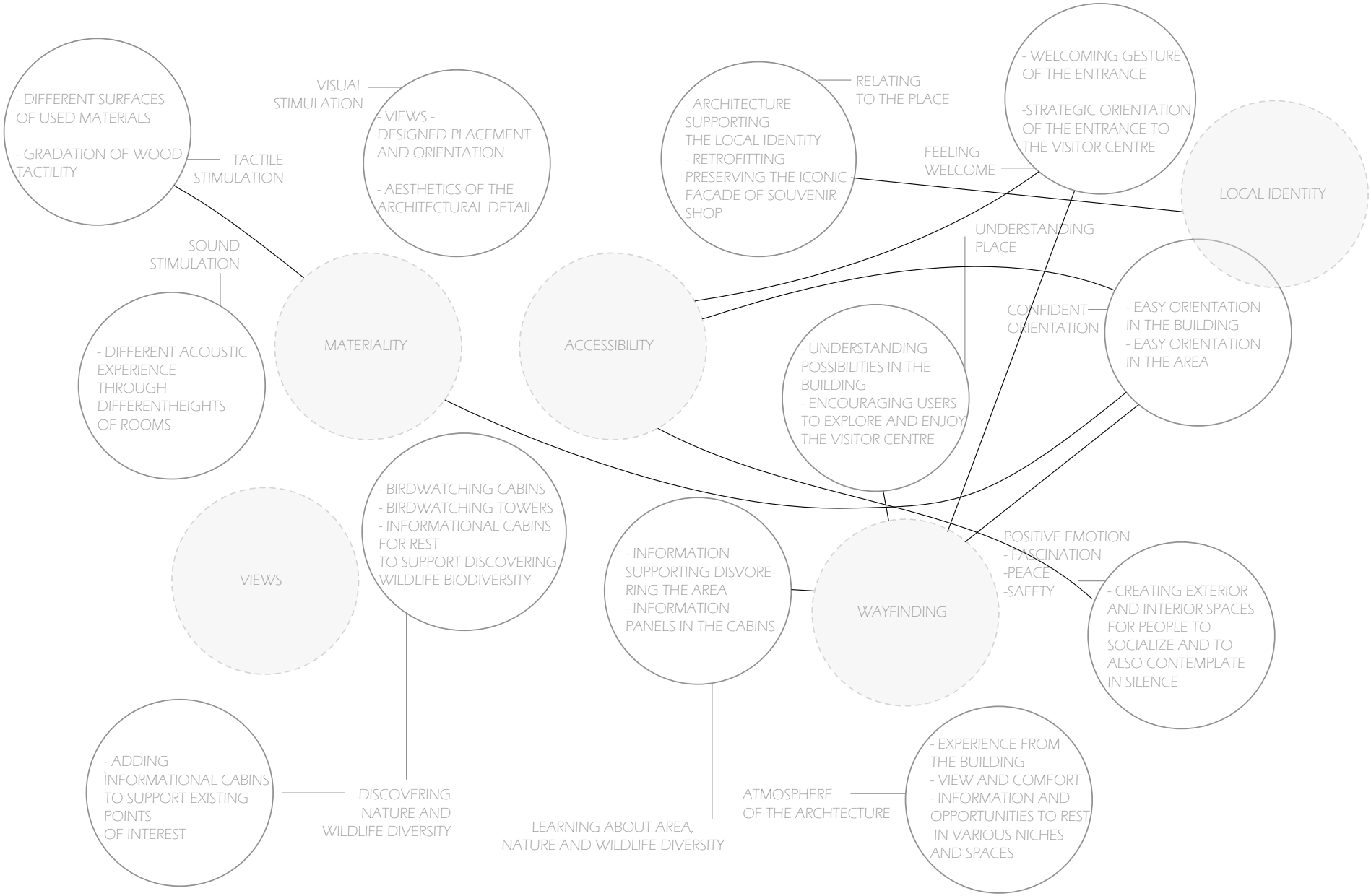
DISCOVERING NATURE AND WILDLIFE DIVERSITY

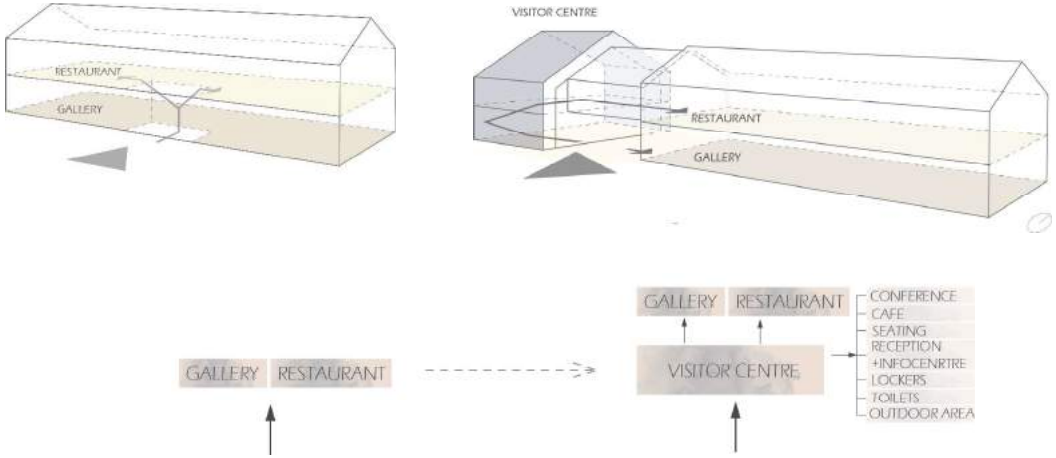
LEARNING ABOUT AREA, NATURE AND WILDLIFE DIVERSITY

ATMOSPHERE OF THE ARCHTECTURE

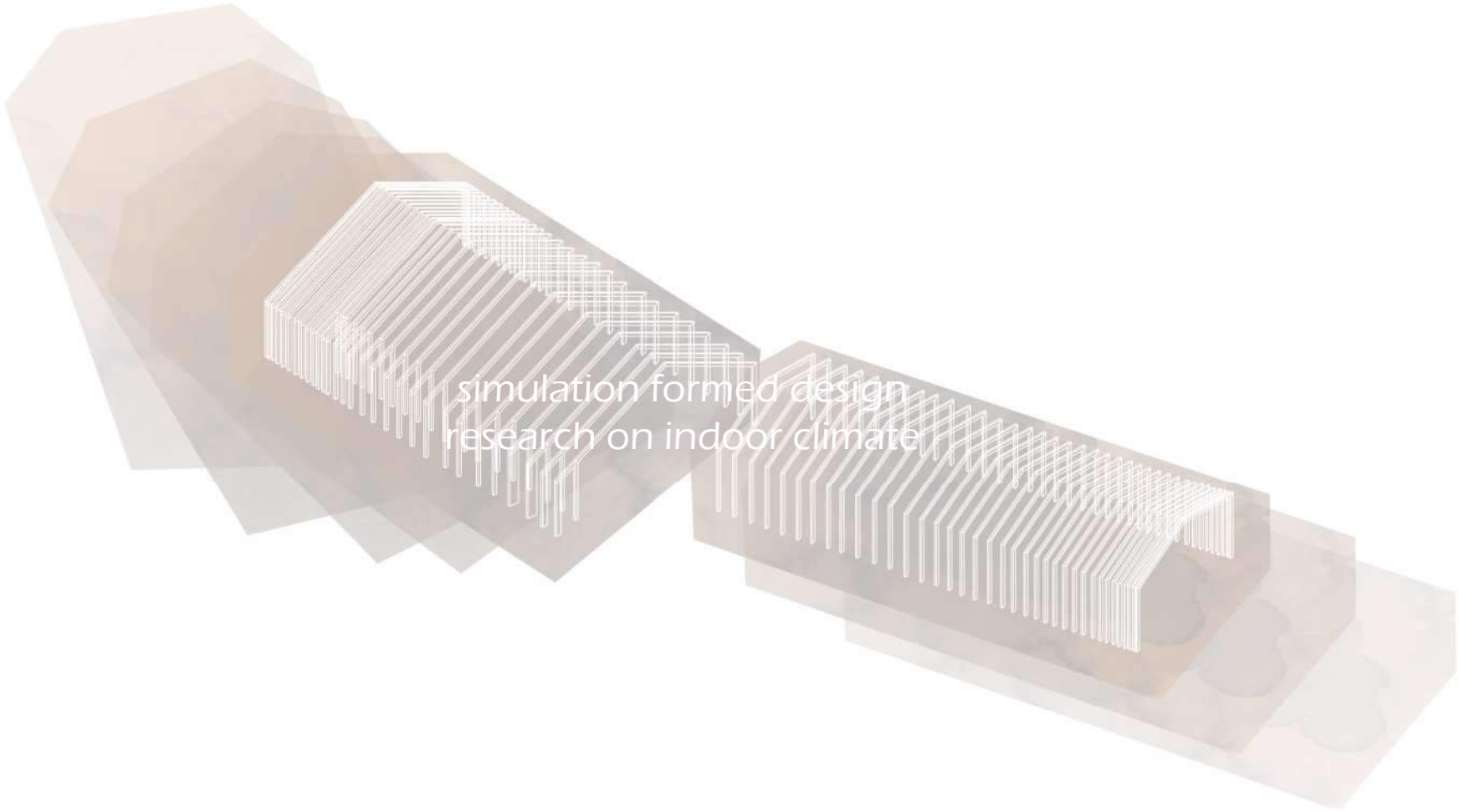
STORY OF VISITNG GRENEN



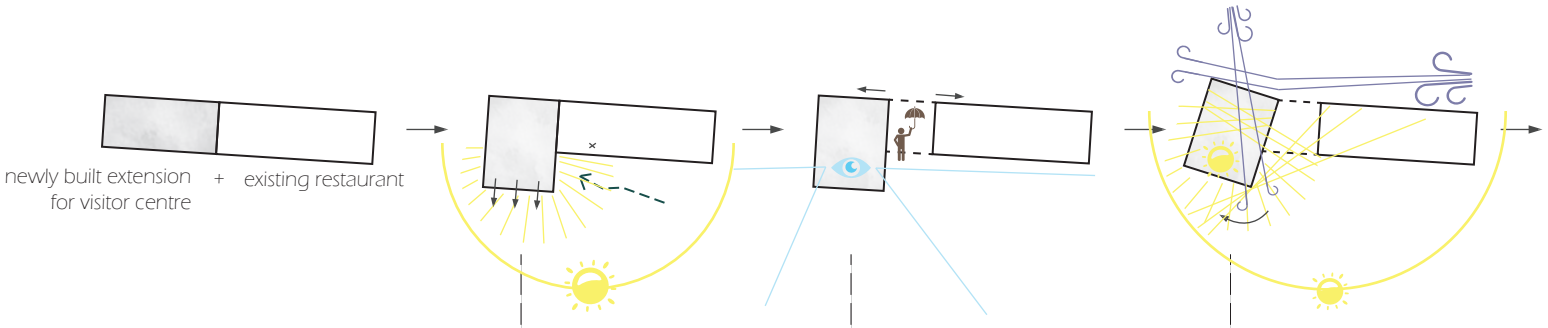

- DIFFERENT SURFACES OF USED MATERIALS
- GRADATION OF WOOD TACTILITY
TACTILE STIMULATION
VISUAL STIMULATION
- VIEWS - DESIGNED PLACEMENT AND ORIENTATION
- AESTHETICS OF THE ARCHITECTURAL DETAIL
- ARCHITECTURE SUPPORTING THE LOCAL IDENTITY
- RETROFITTING PRESERVING THE ICONIC FACADE OF SOUVENIR SHOP
RELATING TO THE PLACE
- WELCOMING GESTURE OF THE ENTRANCE
-STRATEGIC ORIENTATION OF THE ENTRANCE TO THE VISITOR CENTRE
FEELING WELCOME
LOCAL IDENTITY
SOUND STIMULATION
- DIFFERENT ACOUSTIC EXPERIENCE THROUGH DIFFERENTHEIGHTS OF ROOMS
MATERIALITY
ACCESSIBILITY
UNDERSTANDING PLACE
CONFIDENT ORIENTATION
- EASY ORIENTATION IN THE BUILDING
- EASY ORIENTATION IN THE AREA
- UNDERSTANDING POSSIBILITIES IN THE BUILDING
- ENCOURAGING USERS TO EXPLORE AND ENJOY THE VISITOR CENTRE
VIEWS
- BIRDWATCHING CABINS
- BIRDWATCHING TOWERS
- INFORMATIONAL CABINS FOR REST
TO SUPPORT DISCOVERING WILDLIFE BIODIVERSITY
- INFORMATION SUPPORTING DISVORE-RING THE AREA
- INFORMATION PANELS IN THE CABINS
WAYFINDING
POSITIVE EMOTION
- FASCINATION
-PEACE
-SAFETY
- CREATING EXTERIOR AND INTERIOR SPACES FOR PEOPLE TO SOCIALIZE AND TO ALSO CONTEMPLATE IN SILENCE
- ADDING ÌNFORMATIONAL CABINS TO SUPPORT EXISTING POINTS OF INTEREST
DISCOVERING NATURE AND WILDLIFE DIVERSITY
LEARNING ABOUT AREA, NATURE AND WILDLIFE DIVERSITY
ATMOSPHERE OF THE ARCHTECTURE
- EXPERIENCE FROM THE BUILDING
- VIEW AND COMFORT
- INFORMATION AND OPPORTUNITIES TO REST IN VARIOUS NICHES AND SPACES



Existing entrance to the restaurant and gallery is shared from the south.
When planning on combining the visitor centre with the restaurant, the flow of the visitors must be considered, and as the location is a peak point - not a passing point, the redesigning of the entrance and guiding the visitor flow must be well considered.
The ideal version for designing entrance in this case would be one entrance for all functions, sheltered as a visitor centre and afterwards redistributed to other functions. This however must not compromise and disadvantage the restaurant.
The design of the visitor centre would for this reason also not include comercial food store or other food shops. Small cafe that can serve as a community kitchen or as a part time job for disabled or refugees or other disadvantages user groups.


simulation formed design
research on indoor climate

DESIGN PROBLEM : ENTRANCE TO THE VISITOR CENTRE



COMPUTATIONAL
ENGINEERING

FLOW
articulating entrance

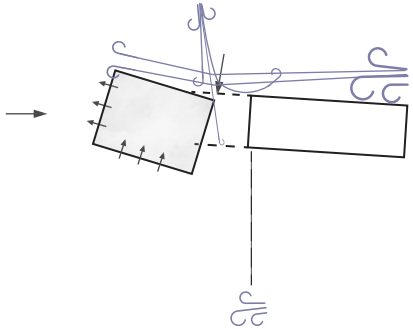
DAYLIGHT
extruding mass
to receive more daylight

VIEW
extruding the mass creates
more potential for views

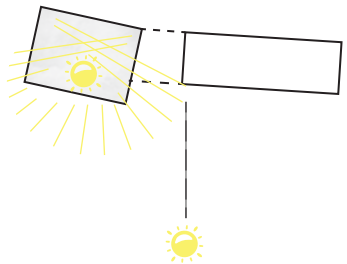
EXTERIOR SHELTERED AREA
opening mass to create
exterior space for seating

WIND CONSIDERATION
sheltered area covered from the wind
building rotated in consideration of the wind

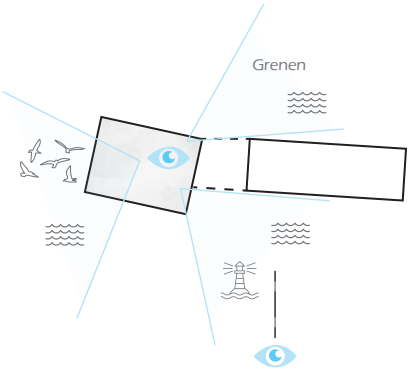
DAYLIGHT CONSIDERATION
rotation supporting the improvement of
the daylight quality in the building



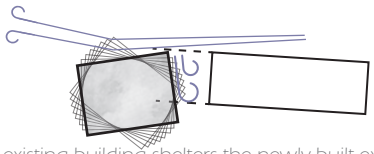
GRASSHOPPER SIMULATIONS
OF WIND TUNNELS
Geometry recommended angles
and forms to best performace



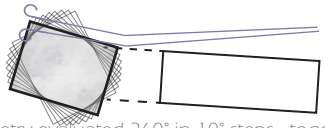
GRASSHOPPER SIMULATIONS
OF SUN RADIATION AND DAYLIGHT
Geometry recommended angles
and forms to best performace



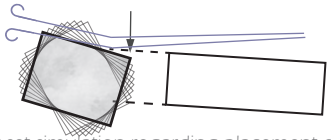
VISUALIZATION OF THE VIEWS
Geometry recommended angles
and forms to best performace



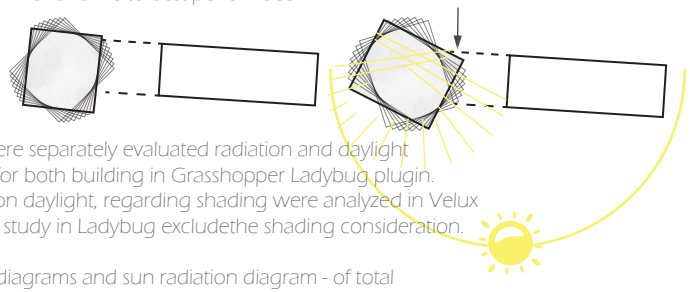
The existing building shelters the newly built extension. The wind blowing mostly from East to West in this angle creates very suitable condition for the new building, but the worst outcomes for the sheltered area, as it creates wind tunels, that twists in uncomfortably high speed.



The geometry evaluated 360° in 10° steps - together 37 versions (36+1 in GH). The most suitable degree than, after excluding the simulations with windy shaltered area defines most suitable the rotation by 20 degrees from the base condition in the clockwise direction.

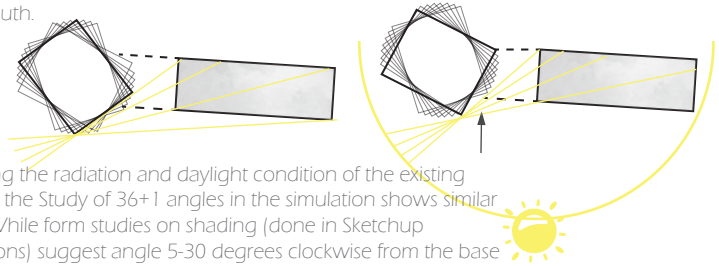


Separately set simulation regarding placement of the building in the defined rotation shows better results on the new building, when being pushed to the south, with the eposed corner sheltered from the wind by existing building.



In the study were separately evaluated radiation and daylight consideration for both building in Grasshopper Ladybug plugin. Deeper study on daylight, regarding shading were analyzed in Velux Visulalizer. The study in Ladybug excludethe shading consideration.

The sun roses diagrams and sun radiation diagram - of total radiation, diffused and direct radiation were compared and clearly suggest rotating the building towards sun, in order to expose the building towards the sun and let the daylight deeper in the building, minimally shaded by the existing building.
The new building shows better results, when being slightly pushed to the south.



Regarding the radiation and daylight condition of the existing building, the Study of 36+1 angles in the simulation shows similar results. While form studies on shading (done in Sketchup simulattions) suggest angle 5-30 degrees clockwise from the base position. Which exposes the walls towards the sun, creates minimal shading, in this case on the existing building. (This is in the ratio of the walls 2:3).
Oppositely, better results for the existing building is when newly built form is pushed slihtly towards north.

Based on the conducted analysis, the outcomes from both wind, and also sun radiation and daylight analysis were compared and the outcomed are well comparable, with no large differences.
The chosed rotation of the building is 20degrees clockwise from the base position. The corner and the position of the building in North - South orientation is chosen to aligh the building of the existing restaurant. This support the daylight for existiing restaurant, which is stronger argument in this case. The supportive argument is the view from the northen part of the building towards sea.

MATRIX OF SIMULATIONS AND DESIGN ANALYSIS

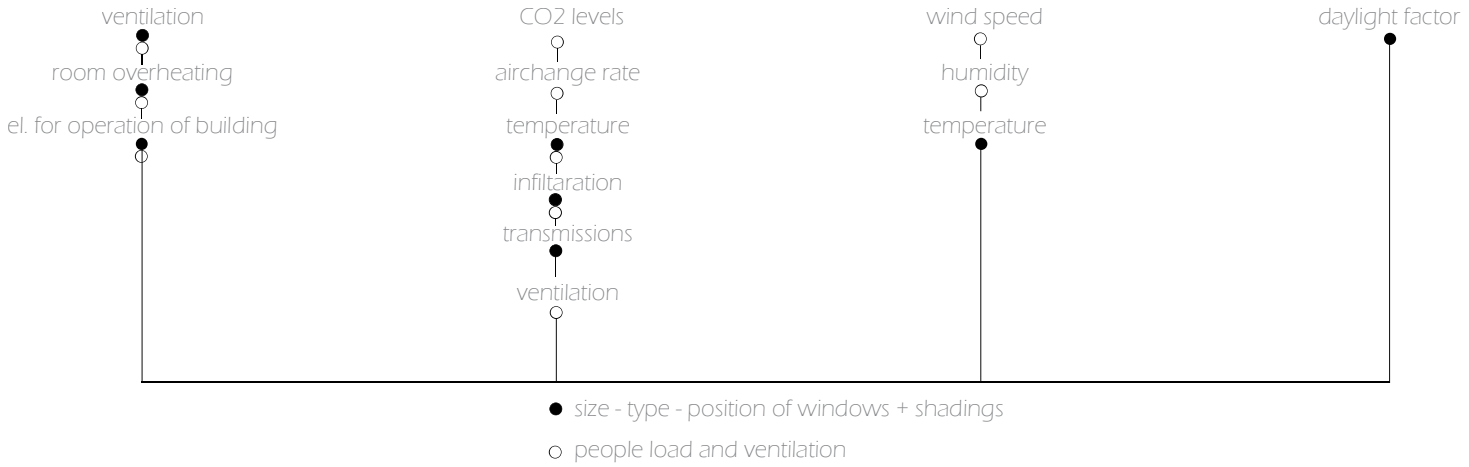
ENERGY PERFORMANCE AND THERMAL COMFORT CONNECTI NG MATRIX

Be18	BSim	Ladybug	Velux Daylight Visualizer

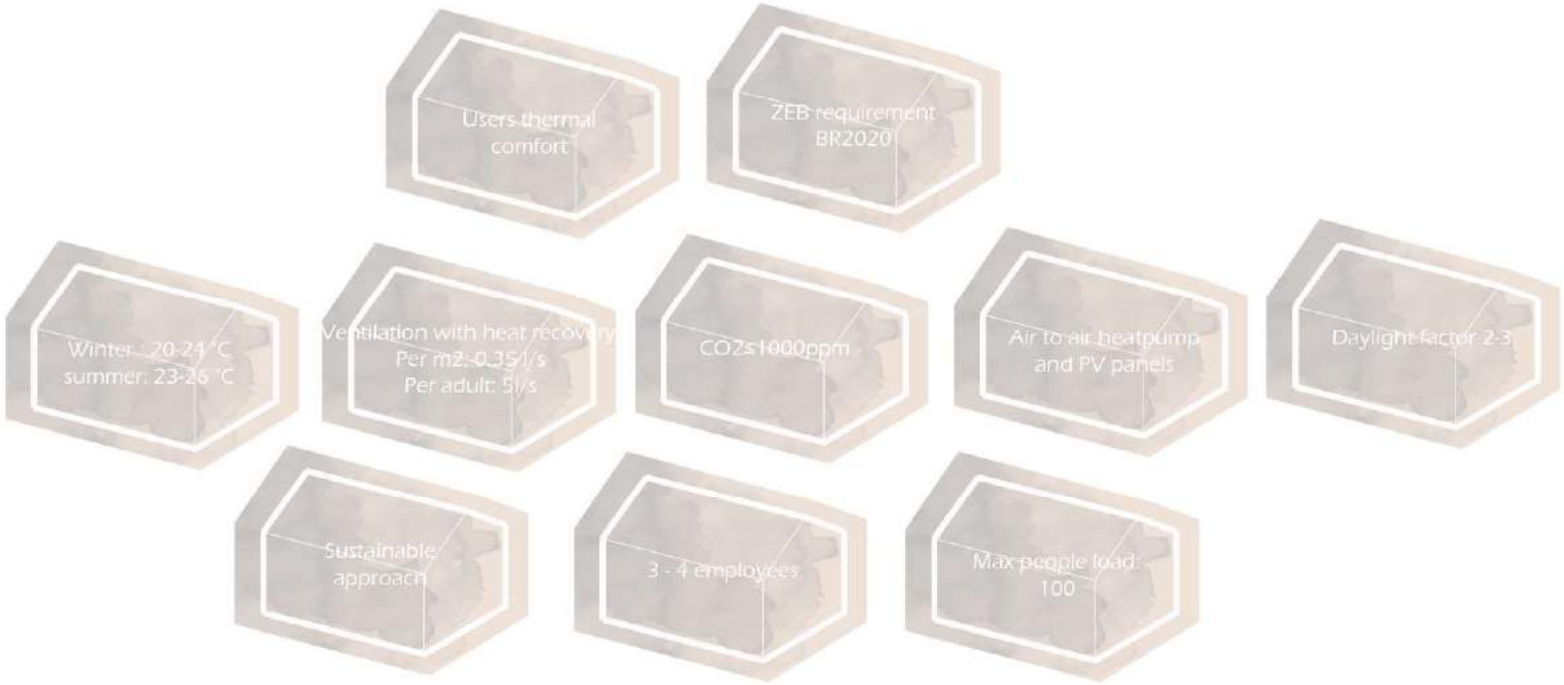
GENERAL FOCUS

energy framework	thermal indoor climate energy consumption	indoor comfort	daylight factor

SPECIFIC FOCUS ON CONNECTED PARAMETERS



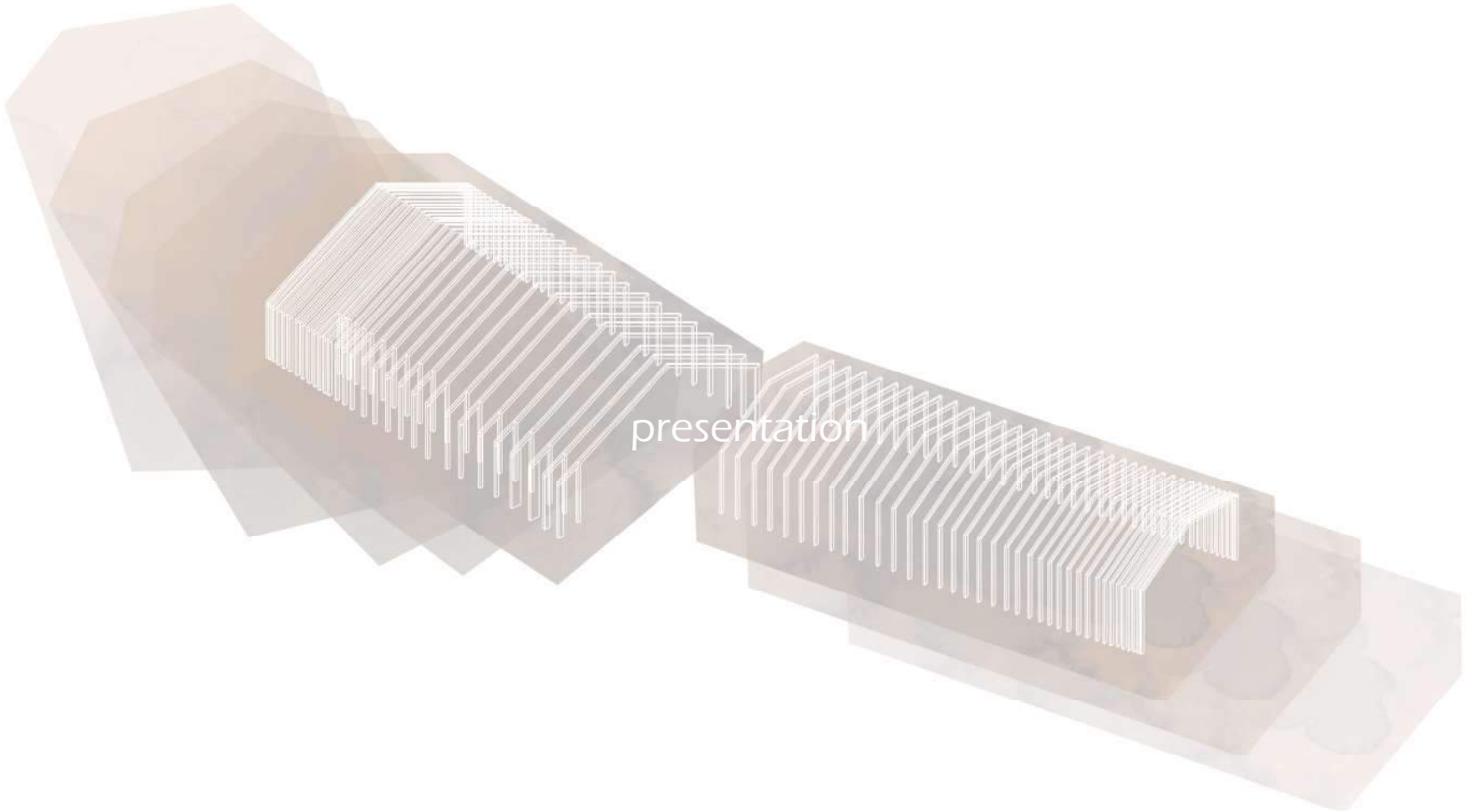
ill. 1 - 84



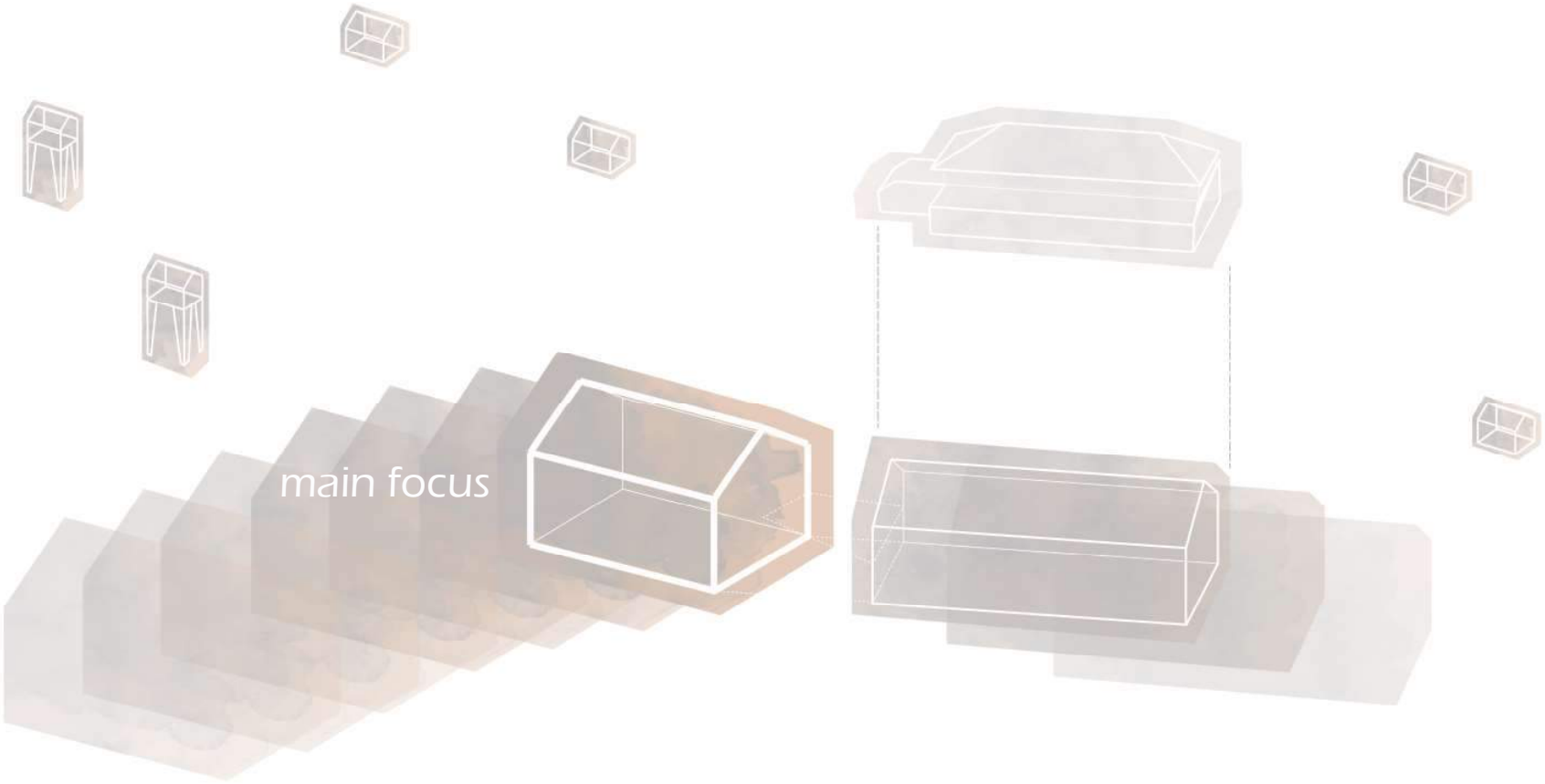
ill. 1 - 85

The approach to the project aimed to design suiatble indoor environment in the building, supporting the passive strategy to achieve the most comfortable indoor climate throughout the year in every part of the building.

Four simulation tools were used to test the quality of the indoor environment. Each of the tool simulates different parameters. Through comparison or the energy performance of the building, and the indoor environment parametrs we can compare and test the changes. Through this strategy of testing the building with small changes in each parameter we formed the building (explanation in annexes). Above mentioned are the principles that were directing the study in the simulation metrix.



presentation



ill. 1 - 86


Bunker
Birdwatching cabin
Bird watching area
Rescue station
Bunker
Bunker
Birdwatching tower
Birdwatching cabin
Birdwatching tower
Bird watching area
Informational cabin
Small informational cabin
Visitor Centre
Bunker
Bunker
Bunker
Migration Centre
Skagen Fyr - Skagen Lighthouse
Bunker

Ill. 1 - 88

BUILDING LOCATION

The Visitor Centre is designed on the east side of the existing restaurant. The design is performed as a coherent conjunction of the retrofitted exiting restaurant and a new form. The position of the building is within the buildiing restiriction in the area, that defines the zone around the restaurant as the only allowed location to build. This supports the notion of the importance of renovation and retrofitting. The buildings are visually connected and plend in the surrounding dunes visually.

Ill. 1 - 89

BUILDING SITE

Newly built part - the Visitor Centre is placed on the dune that is in recent condition 600-700 mm higher than the level of the ground floor of the existing restaurant. After evaluation of the area and its later ascpects, the dune is lowered, as it is not stabil from the north, and also the ground can later be used for construction ot the rammed earth walls.
Both buildings are therefore buildt on the same level and are connected. They a become cojoined element, visualy and functionally.

THE NORTH SEAS' HOUSE

Grenen is a protected area defined by great importance to the natural heritage and biodiversity. This area is well known and well remembered by locals and tourists. The building intervention into the wild land is conducted with the most sensitive approach of respecting the wild landscape and its atmosphere. The design proposal aims to offer function and information for visitors in the building that softly blends into the country and invites visitors to discover and enjoy the area of Grenen.

ARRIVAL TO THE GRENEN

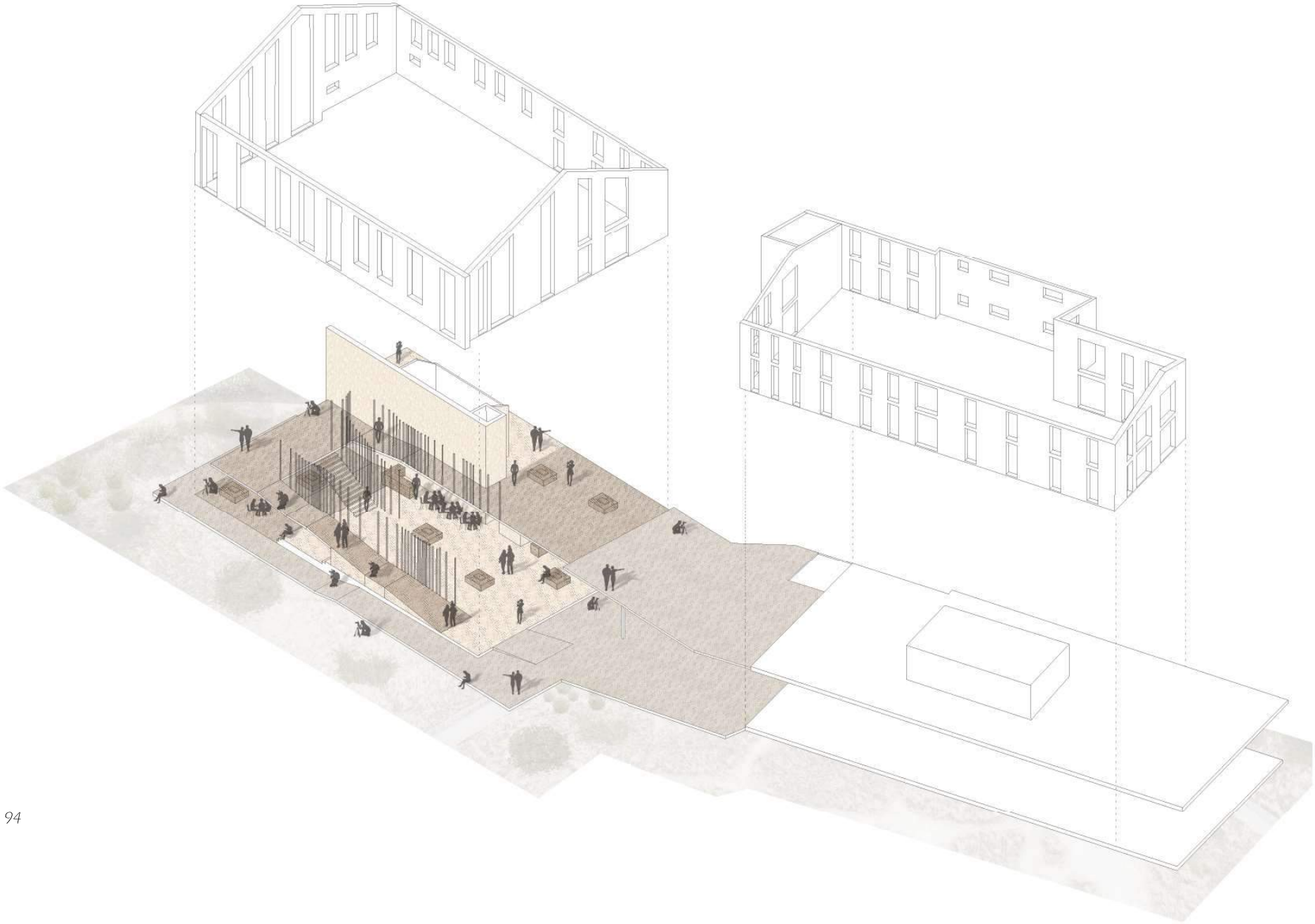
When arriving to Grenen, a timber frame linearity drawn shape is seen behind a dune. The linear frame seen from far resembles a one form, that is disappearing in the middle, where the timber frames are loosing its density and are opening up.
When coming close, the pathway set in the dune is leading visitors towards the Visitor Centre, that opens up, as its front facade is standing out in slight inclination. The front facade with entrance facing the path of visitors is articulating the welcoming gesture to invite visitors in.

ill. 1 - 93

VISITOR CENTRE AS SHELTER

Grenen is five kilometers distant to the Skagen. The weather definition for the area is characterized by extremes in weather and fast changes. Due to wind, rain might come unexpectedly. Visitor Centre is designed to offer shelter in the wild dune landscapes for its visitors. The capacity of the building is simulated for up to 100 people at the time. But outside operating hours, in early mornings, or late night, exterior sheltered areas will offer visitors a safe place to hide and rest.

Beside the main building, featherlight cabins and birdwatching towers are offering shelter for the visitors at any time on the expended paths in the Grenen dunes.

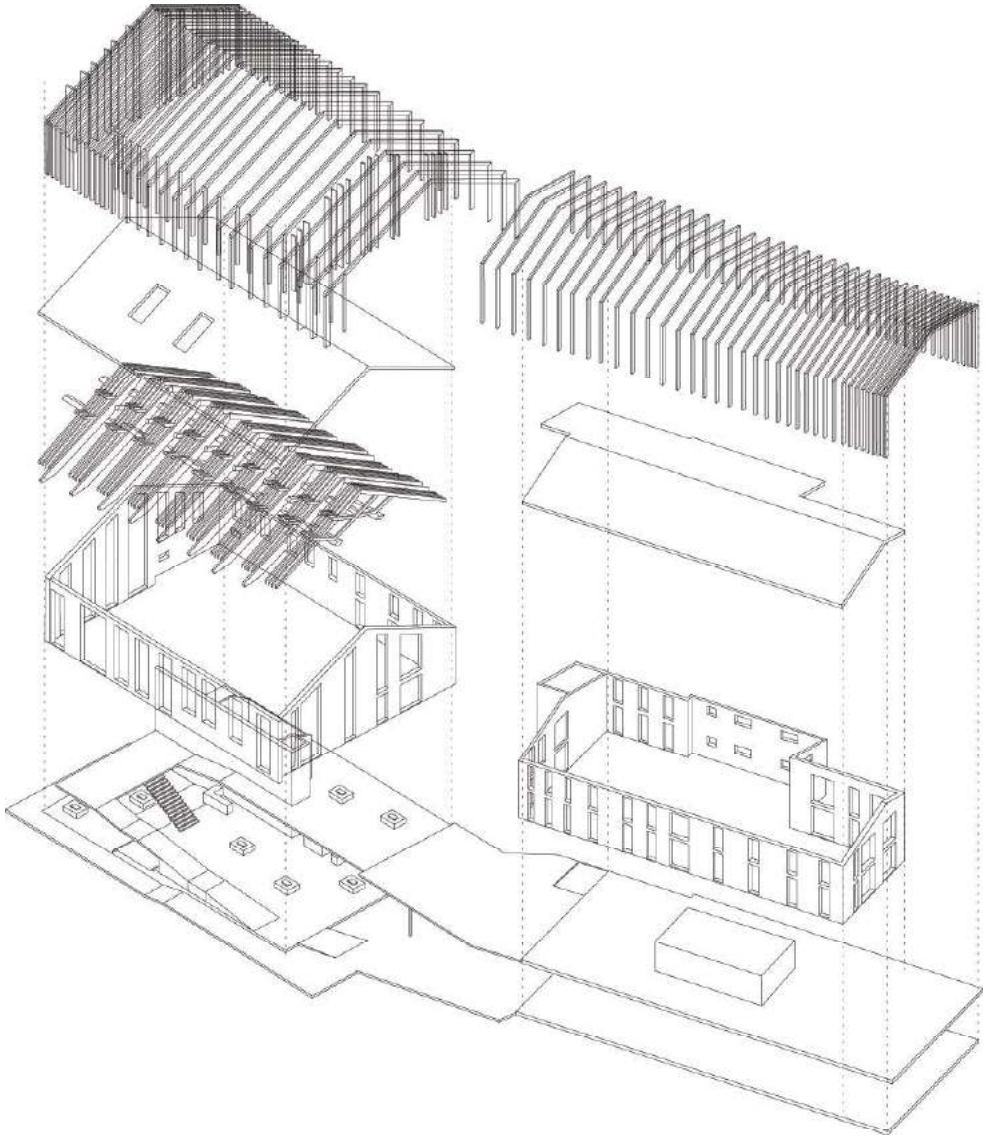


ill. 1 - 94

WAYFINDING AND INTUITIVE ORIENTATION

The design aim towards users intuitive orientation and wayfinding sense.
The building changes the path of visitors, and besides the Visitor Centre offered functions, it also leads guests to the restaurant. For the buildings to become one coherent and understood complex, tthe wayfinding and orientation in building must be clearly readable for visitors.
The design strategy is built on a large dominant ramp, that is seen directly from the entrance. The ramp slowly rises along the walls and turns up towards the second floor and restaurant. It is visually inviting visitors to follow the path and all along offers a stunning views of the area, so the visitors,

The wayfinding is articulated in three ways, through material colour, material tactility, and through a linearity that is found in the interior, creating also a various atmospheres. In the graphic we can see the the materials gesture and contrast,



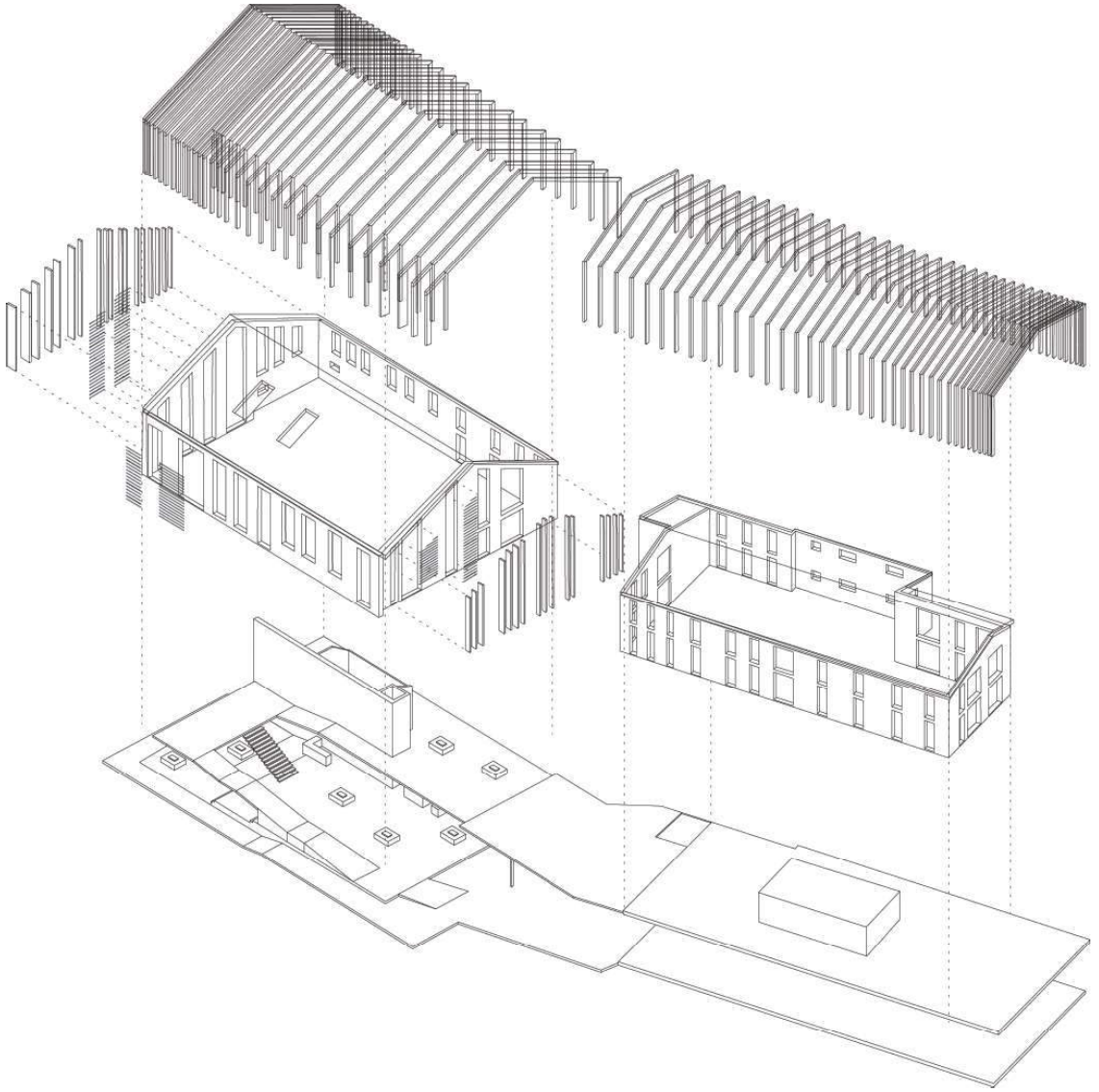
ill. 1 - 95

WOOD AND LINEARITY AS A DEFINITION

Linearity was chosen as a definition for the design detailing and structure. The building is designed with a sustainable approach, therefore the materials and construction process was considered in designing. Wood defines the North Seas' House from outside until details. The ramp is a timber frame - partly supported from bottom and party hanged. Most of the construction is based on timber. The wooden pattern is used in the design as linear guidance and is clad in the longitudial direction. The linearity from the exterior vertical beams is translated also in the long windows. These create throughout the day a very interesting shadow game, as the exterior timber frame strauctur primarily shades the building, but as it is designed in a relatively thin frames,

designed in a relatively thin frames, the frequency of beams is higher and the shadow theater on the inside is more stunning, while still ensuring the desired shading factor for overheat prevention (simulation in annex). The impressive beams of the double inverted inclined crossed frame are exposed to the interior and work as a reverbration absorbent.They also blend with the linearity, that is defined by the long hanging handrails, that are increasing, and losing its density, by which are creating open spaces, exposure and view, or in a more dense frequency of the placement are creating an intimate niche for visitors to sit and rest. This linearity is also becoming a guiding element, as they follow the ramp and are visually giving the user perception of a faster and

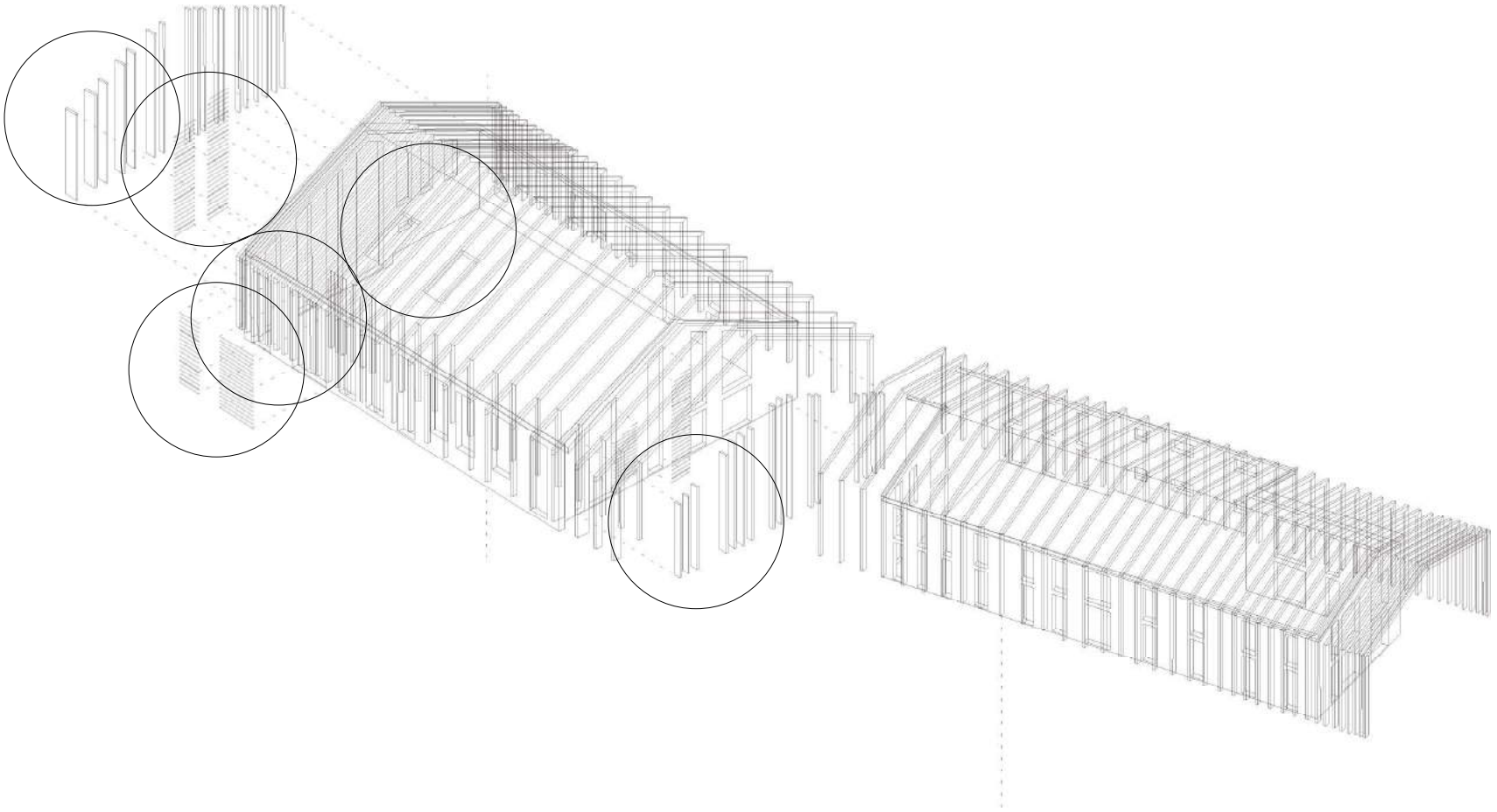
more dramatic perspective, that invites users to walk use the ramp. The wood but have many faces and works different ly in the building. The tactility and colour define a different meaning. Users are led from lightest wood to the darker, as coming deeper to the building. The soft surface invites people to sit and rest. The lighter surface can also be found in the lecture room. This is a gesture of a different function. Visitors heading to the restaurant follow the path of the same darker wooden floor. The lighter building signalizes a change and also not a transition space - rather than an intimate space. The lighter surface supports the daylight factor and atmosphere in the room, as the northwest located room is the most critically naturally led.



ill. 1 - 96

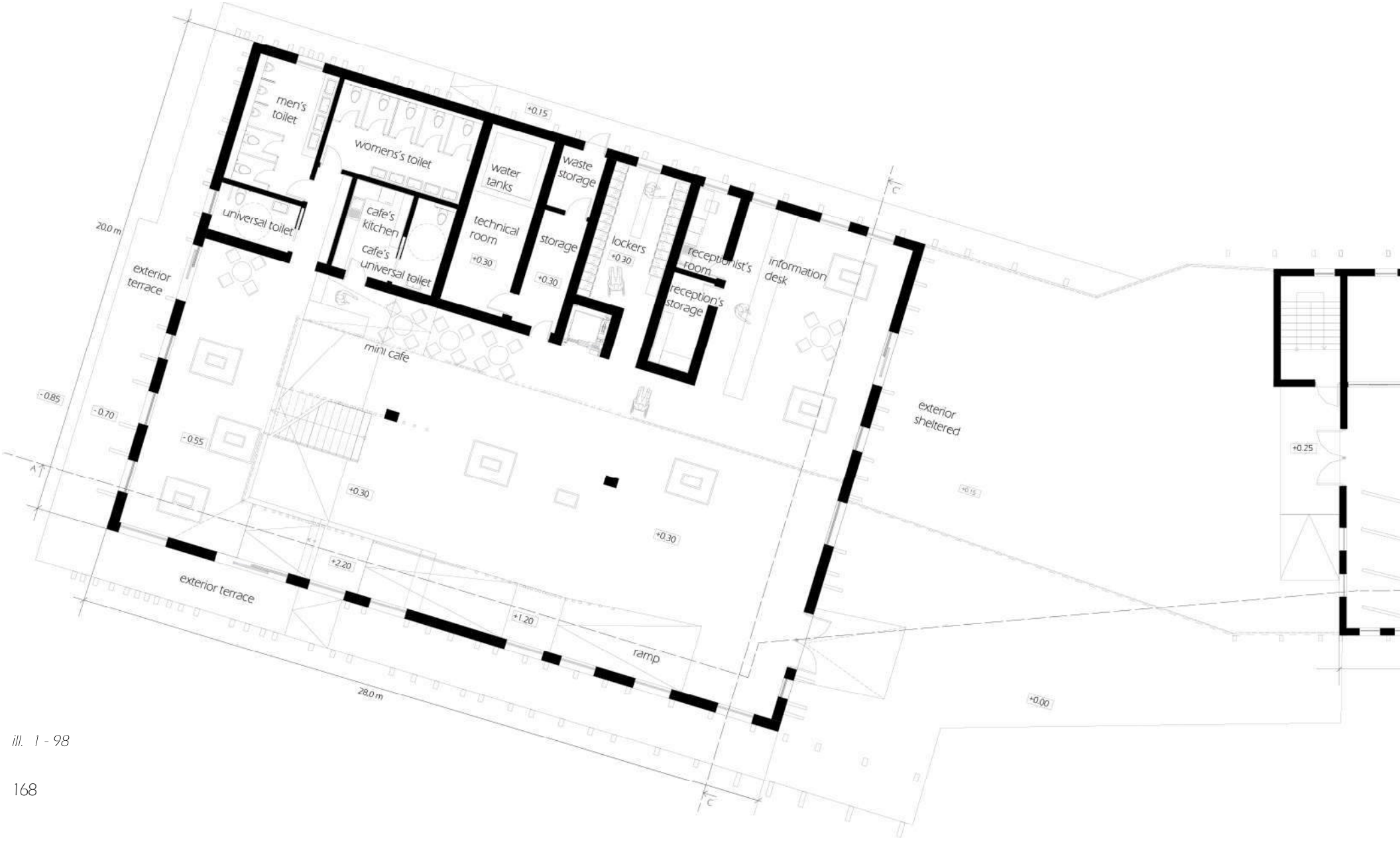
INDOOR CLIMATE RESEARCH

Based on the simulation where were especially taken in account overheating, transmission losses, temperatures throughout the year, ventilation rates, daylight factor and energy consumption was evaluated the best possible combination of window openings and its shadings. The shading structure is tailored to perform the best exterior shading for each window. The overall conclusion was a vertical timber frame, covering the whole mass, that connects the two buildings visually and cools the structure with its function as an exterior shading element. The design limitation desired to define the frame structure as a connecting shell covering both buildings and losing its placement frequency in a transition between both masses, imitating a one singular form, disappearing in the middle. The frame is on the new building performed in doubled columns on the south, providing a shaded exterior pathway.



ill. 1 - 97

The frame however would not comply needed shading performance, especially on the most critical windows. Therefore east and west shading panels were extended on the southern part of both east and west facade.
In order to achieve suitable daylight factor, 15 on-wall frames were removed from the south-west side of new building and 2 skylight windows were added to the roof. These changes improved indoor climate without effecting its visual feature. In the last stage the east and west shading panels were designed in the exact sizes and lengths as the simulation supported with best performance. These changes were combined with an exterior shading blinds, applied on 2 windows on east facade, and additionally added on 2 windows on south and west facade, to minimize the energy consumption on cooling in summer months. windows. Therefore east and west shading panels were extended on the southern part of both east and west facade.
In order to achieve suitable daylight factor, 15 on-wall frames were removed from the south-west side of new building and 2 skylight windows were added to the roof. These changes improved indoor climate without effecting its visual feature.


men's toilet
womens's toilet
water tanks
waste storage
universal toilet
cafe's kitchen
technical room
storage
lockers
receptionist's room
information desk
cafe's universal toilet
reception's storage
exterior terrace
mini cafe
exterior sheltered
exterior terrace
ramp
20.0 m
28.0 m
+0.15
+0.30
+0.30
+0.30
+0.30
+0.30
+0.30
+0.15
+0.25
+0.00
+2.20
+1.20
- 0.85
- 0.70
- 0.55
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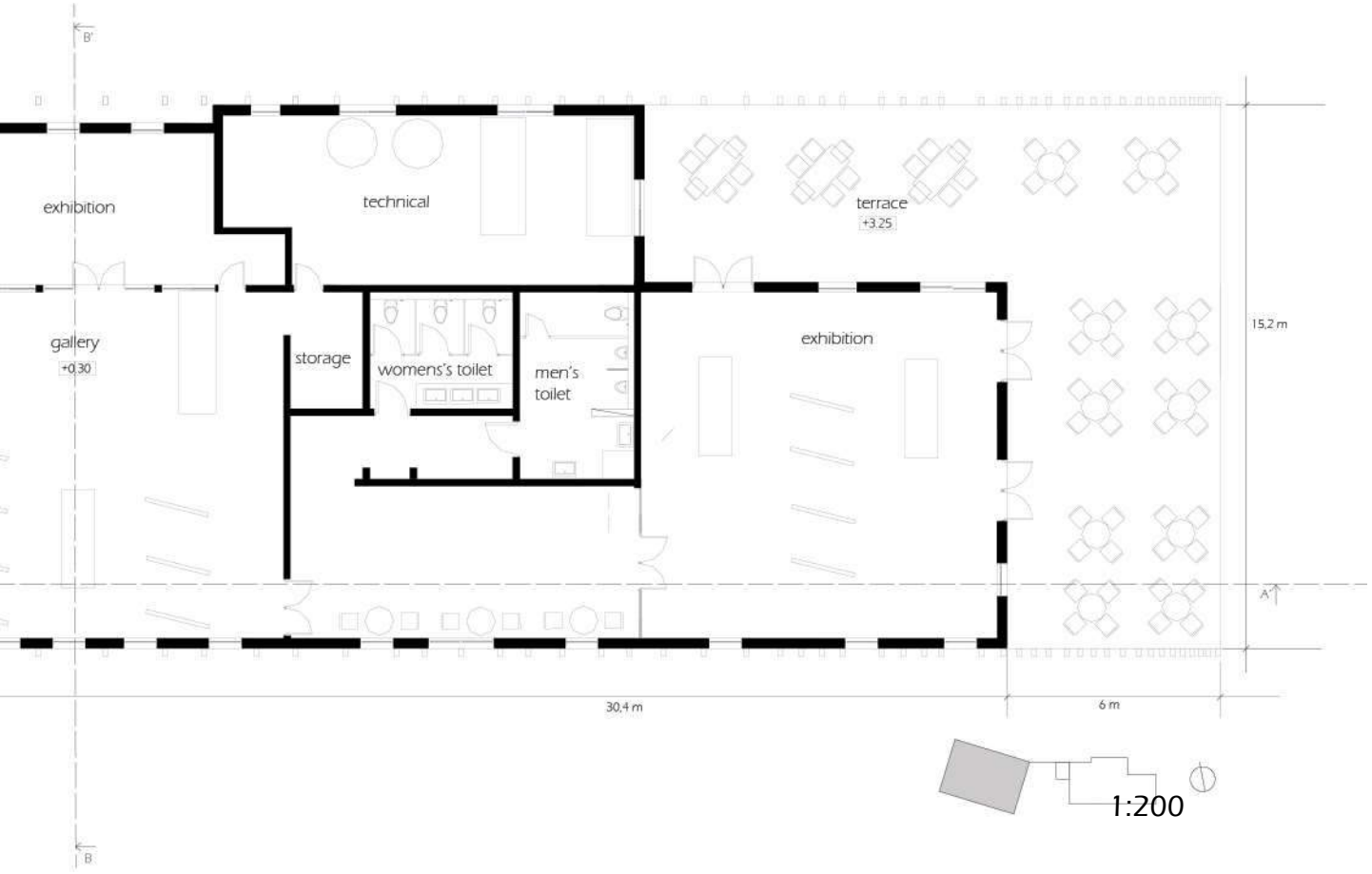
FLOORPLAN

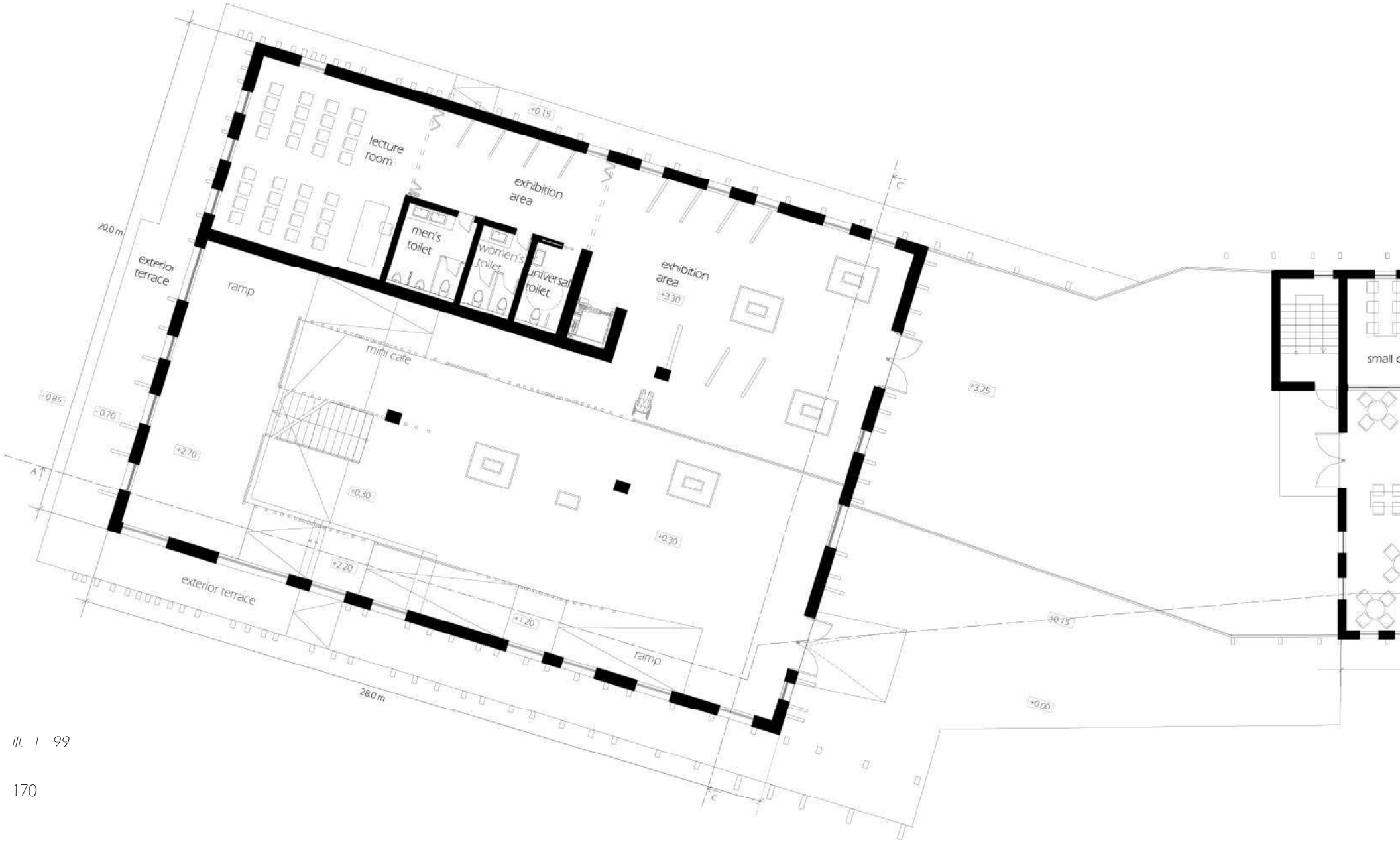


The arrangement on the ground floor of new Visitor Centre is formed by the user flow and climate analysis. Orientation of the building from the wind simualtion of wind tunnels and sun path and radiation together with expected entrance refers to design the technical and operational rooms to the north west corner.

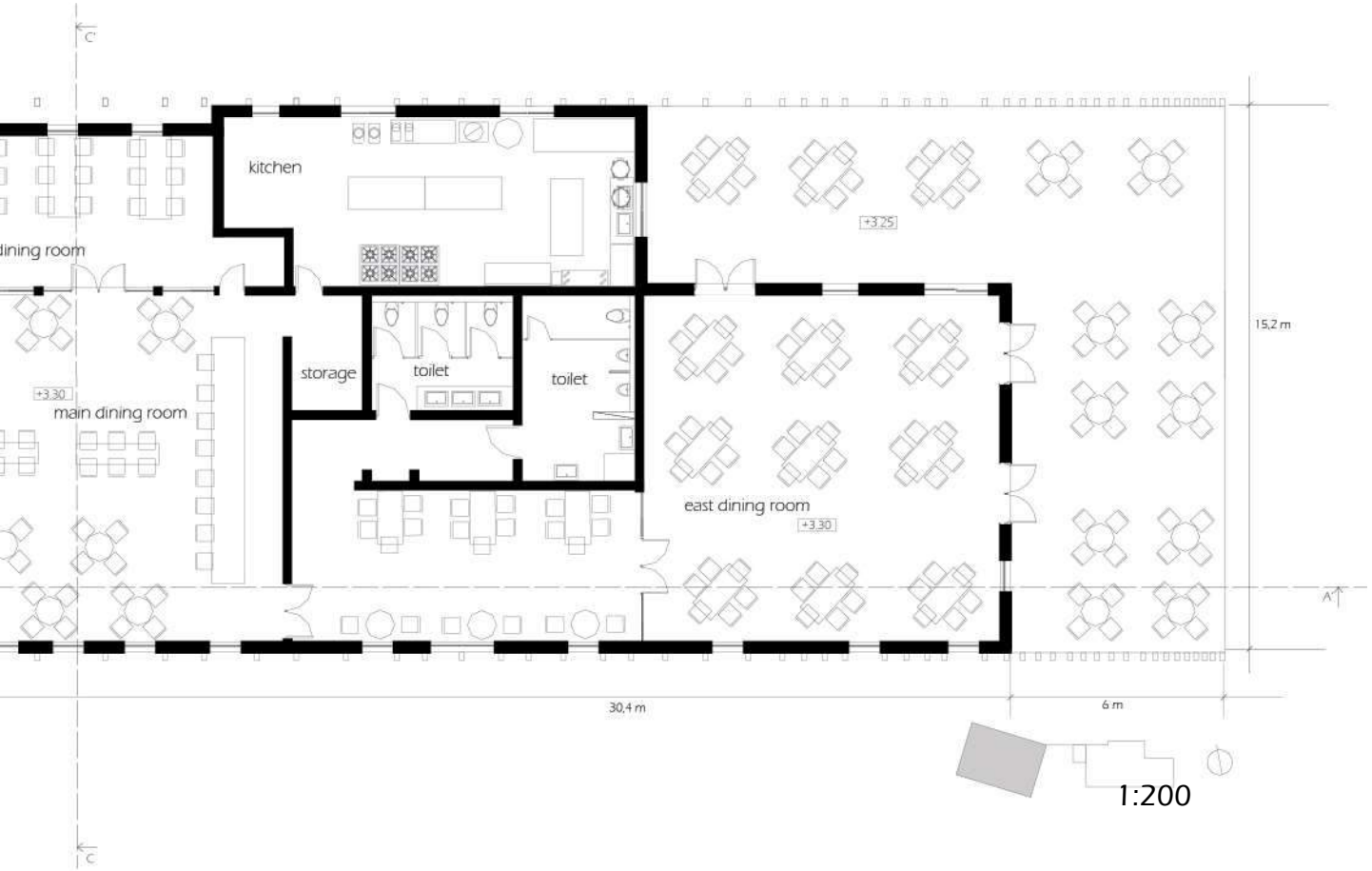
The Visitor after arrival to the building recognize different heights of the ground floor, the raising ramp, wiith panoramatic view, underneath witch opens a hidden area with lower height, that offers vivitors a comfortable and home like seating with great view opportunities and in summer with an access to the exterior terrace.

On the ground floor visitors can get a coffee in small social cafe, the whole building is accessible for all, regardless disabilities, thanks to a panoramatically placed ramp. Lockers are open for visitors to use at any time, before their hike. The information desk upon the entrance also care about the emplyee, The back room and storage with informational journals are easy to reach. Elderly people can sit here with view and see the Grenen point, dunes, and grandchildren plaing outside.

From esterior sheltered area visitors can enter gallery directly


lecture room
exhibition area
men's toilet
women's toilet
universal toilet
exhibition area
exterior terrace
ramp
mini cafe
ramp
exterior terrace
20,0 m
28,0 m
+0.15
+3.30
+3.25
+2.70
+0.30
+0.30
+2.20
+1.20
+0.15
+0.00
-0.85
-0.70
A
A
C
C
small c

ill. 1 - 99



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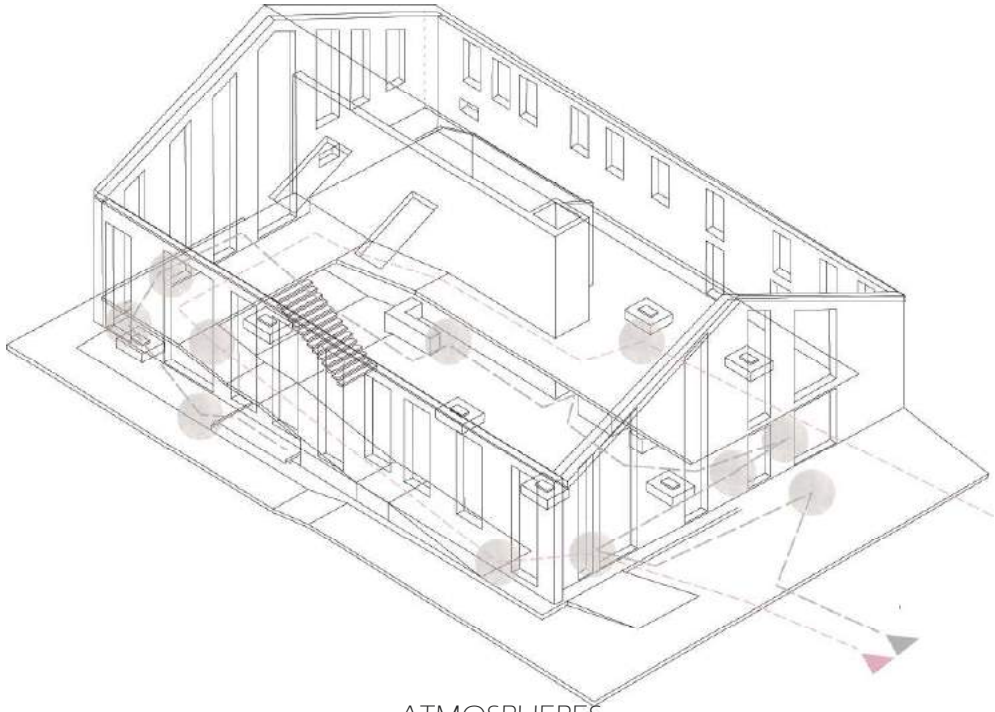
FLOORPLAN FIRST FLOOR

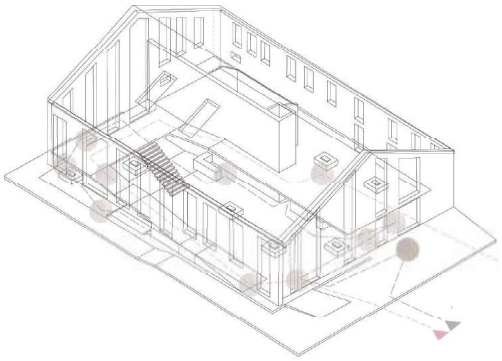
On the upper floor visitors are direclty led to the exterior terrace with amazing view to the lighthouse, sea and grenen point. From here they can enter the restaurant. This path will be most frequented, as we expect visitors to want to have highest view and largest panorama experience. This supports the idea, that leading visitors through visitors centre to restaurant is not going to decrease its visiting rate, opporitely, its going to increase it.
The upper floor offers veratil space of lecture room that can be close with panels and enlarged whenever needed, with access to toilets, included barrier free toilet. Lift is also available for those in rush and in need.



ill. 1 - 100

ATMOSPHERES

Visitor Centre offers spaces for sitting or watching with different atmospheres, where visitors can sit and enjoy activities or simply the view from different heights and angles.
Pink path describes fast track- directly by the ramp to the restaurant. Grey path leads visitors to the seating spots and view spots, that offer different atmospheres and are defined by different qualities. From space that connects people with exterior and offers exposed summer experience in connection to the exterior and view to the west, until a intimate upstairs areas that hides a lecture room with intimate character that can host school trips or hosting lectures, or can simply extend to the upstairs exterior exhibition area through movable panels that creates versatile space under the inclined wooden roof with one of the most stunning views.



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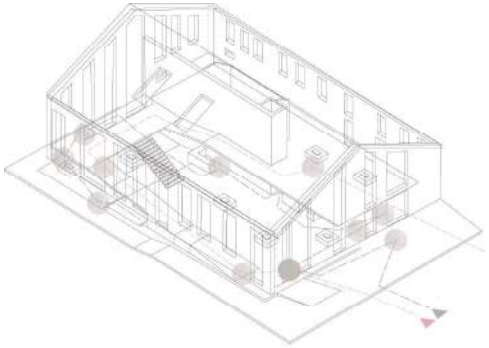

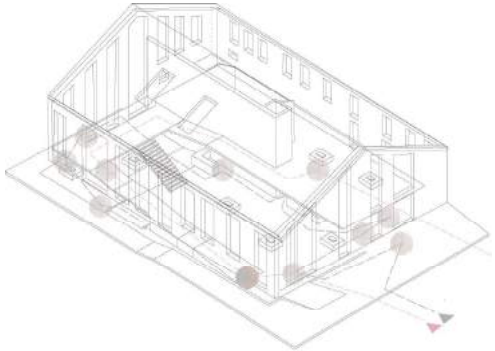

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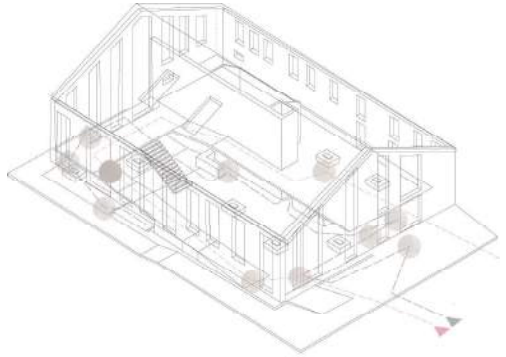

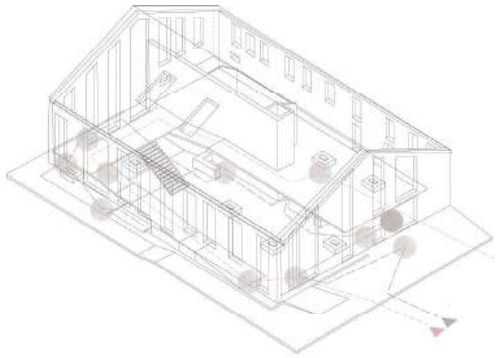

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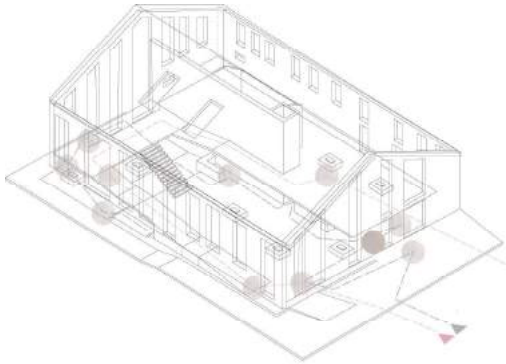

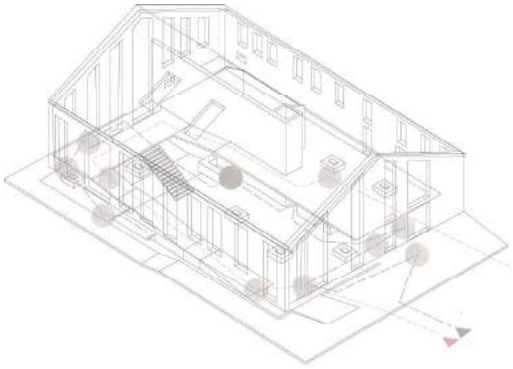

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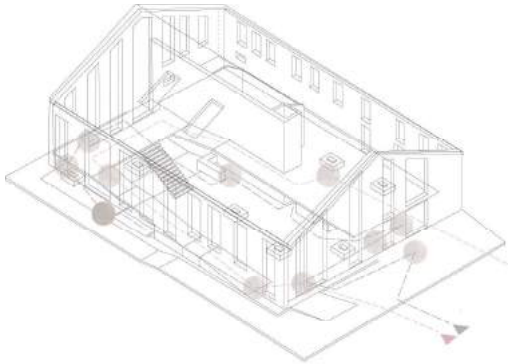

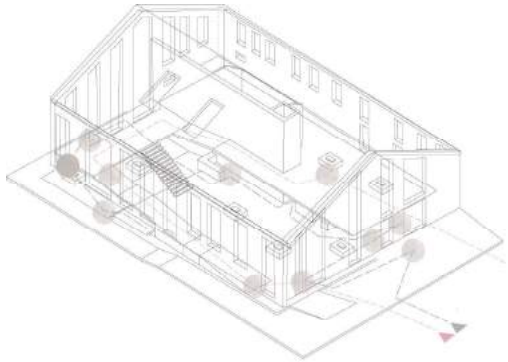

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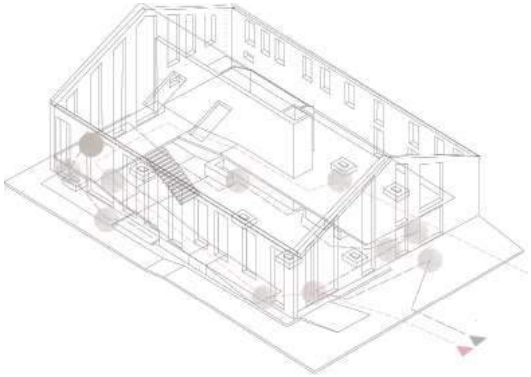

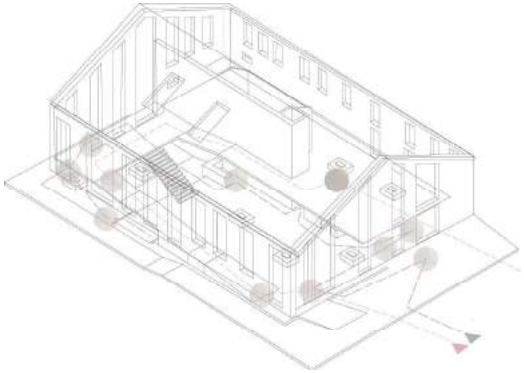

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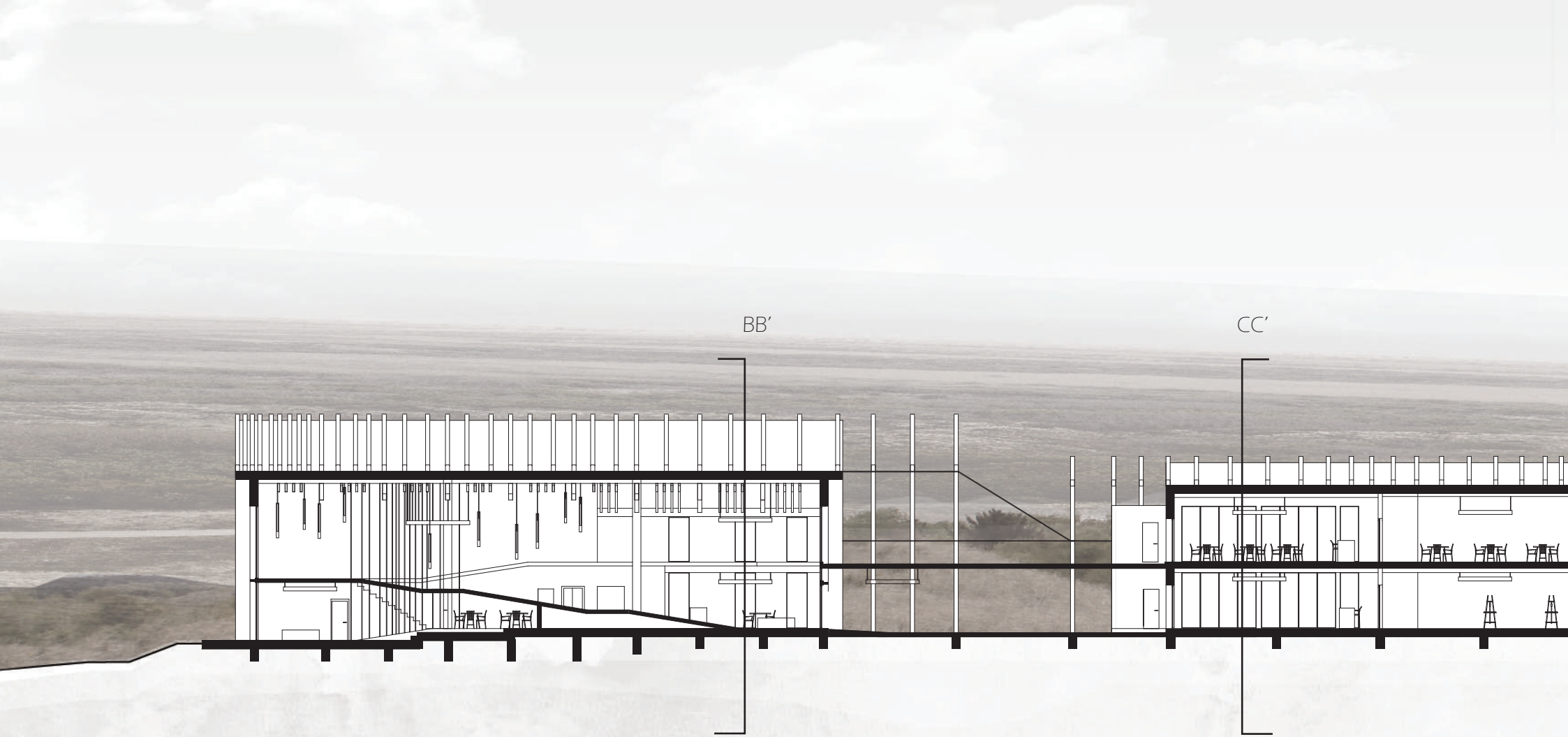

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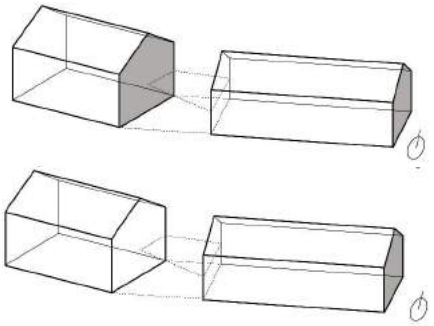
SECTIONS

The heights of the newly built building were developed with consideration of the heights of existing building, The existing building have relatively low height, therefore loweing the dune under newly built part was evaluated.
From statical view, but also access and safety of visitors, when coming from north, lowering dune becomes a positive change.
The heights define lowered terrace, to avoid leaking into interiors and water canals along the building built in the floor, to keep the paths safe.



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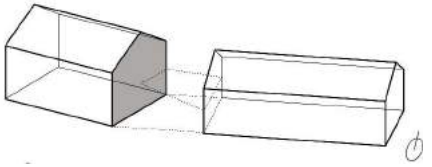

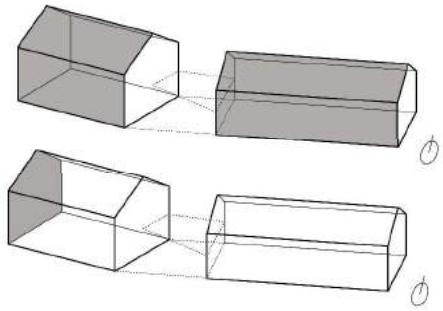

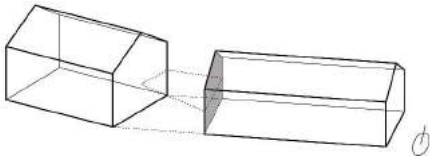

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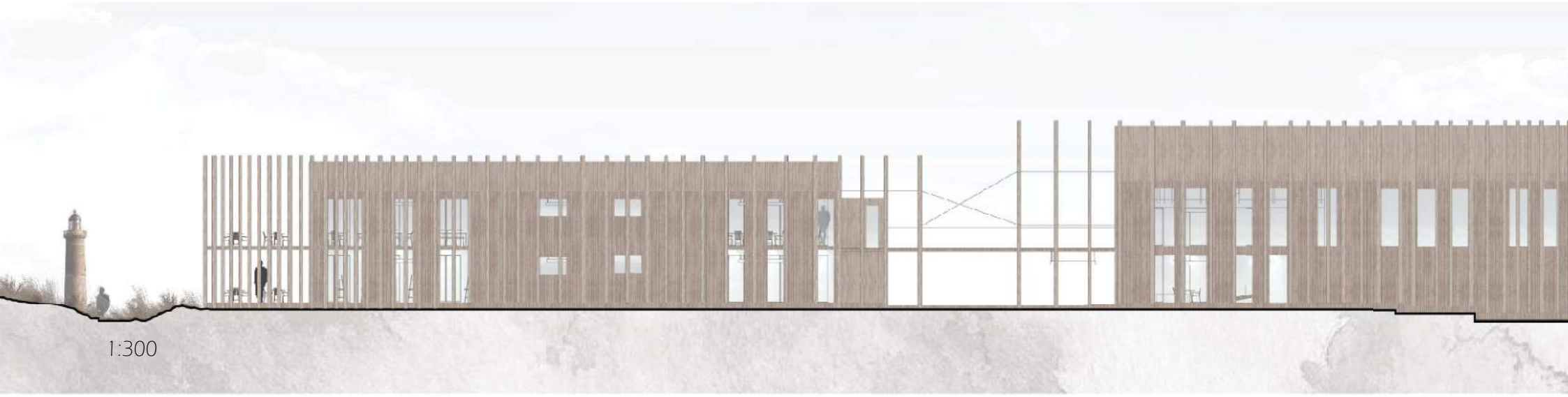

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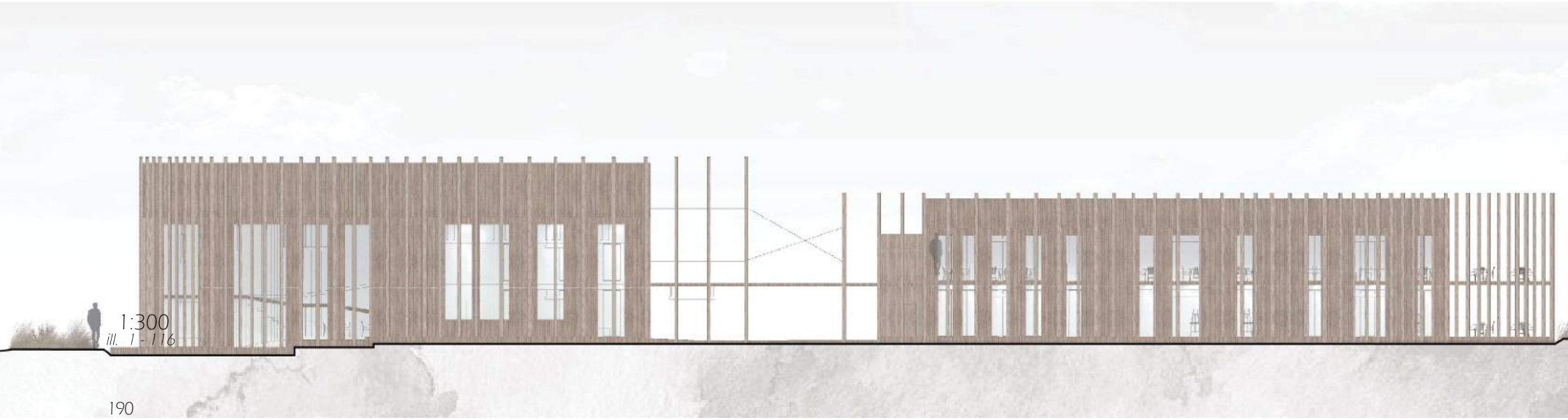

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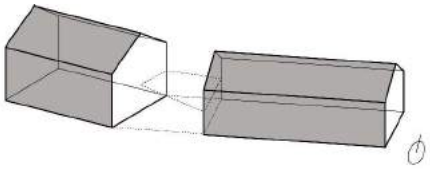
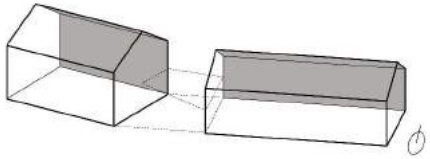




VIEWS

The buildings views expose a main material, that is used on both exterior wall cladding, and also ground cover - the Ashwood.
This wood transformes when exposed to the exterior condition and looses its tone into a silver fading. This wood was chosen for these qualities, as after years the exterior will blend in tone well with the surroundsing. The Windows are barely seen from outside, the are in Velux 3 layers glazed version with partly hidden frames. The openabe parts are located in connection to the niche seating and atmosphere zones.

MATERIAL CHOICE

The whole building is constructed in timber. The decision was made in support with existing studies stating the timber construction as a more sustainable choice, among other construction materials. This theory is supported in the study 'Contribution of timber buildings on sustainability issues' (Hafner, Annette. (2014). "In general wooden buildings have lower greenhouse gas emissions in construction and a high share of primary energy renewable bound in material (heating value). Additional calculations of timber buildings in life cycle show benefits in lower abiotic resource depletion which could get an important factor for resource efficiency in future." (Hafner, Annette. (2014). However, the measures from LCA define a complete analysis of the material from its resource until its disposal. This can cause large differences in the sustainable aspect of the timber construction. Therefore the wood chosen for the project is harvested and manufactured as close to the site, as possible, minimizing transportation costs and its emission footprint. Another reason for choosing wood is its lowest energy input invested in the material during manufacture, comparing to other construction material. As this requires to be powered by non-renewable fossil fuels, the environmental impacts are lower in case wood processing. On-site work and construction process requires as well minimal demand of using energy from fossil fuels and doesn't contaminate the area. Timber construction is least invasive construction that can be performed in the protected area of Grenen. The wood chosen for the project is Brimstone Ash, that is sold by DSH wood and is sourced from Scandinavian countries, Sweden but also Germany and Denmark. Brimstone Ashwood is very suitable wood for the construction due to its strength, weight-bearing properties and its durability. Colour properties of the wood are defined with a generally lighter colour. Ash is very well known for its water resistance. The building requires to be built from the materials that ensure a long lifespan and minimal maintenance treatments. Brimstone Ash can be sourced from North Germany, therefore the transportation costs are acceptable when compared to the benefits that the wood may provide to the project. Brimstone Ash Modified Profiled Timber Cladding is used on the exterior, which after years gain a silver patina, that will contrast with preserved softer and warmer tone on the inside but will visually blend into the colour atmosphere own to Grenen.

Rammed earth
Bearing structure
in technical part of the building

Brimstone Ash superwood
Cladding for wall and roof
Aged: 3 years after installation

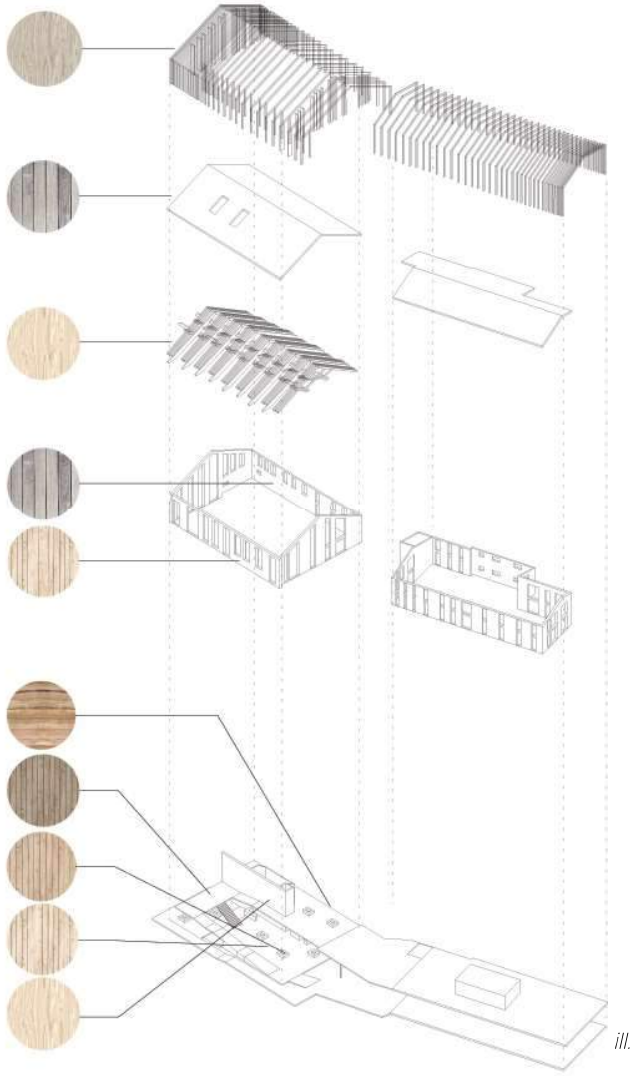
Beechwood
Used for furniture in the interior

Brimestone Ash exposed cut
Used for wall cladding and beams

Brimestone Ash exposed cut
Used exterior shading structure
Aged: 3 years after installation

Brimestone Ash treated
and impregnated floor cover
Used for interior flooring on ramp and guiding zone

Brimestone Ash treated
and impregnated floor cover
Used for interior flooring on most of surfaces



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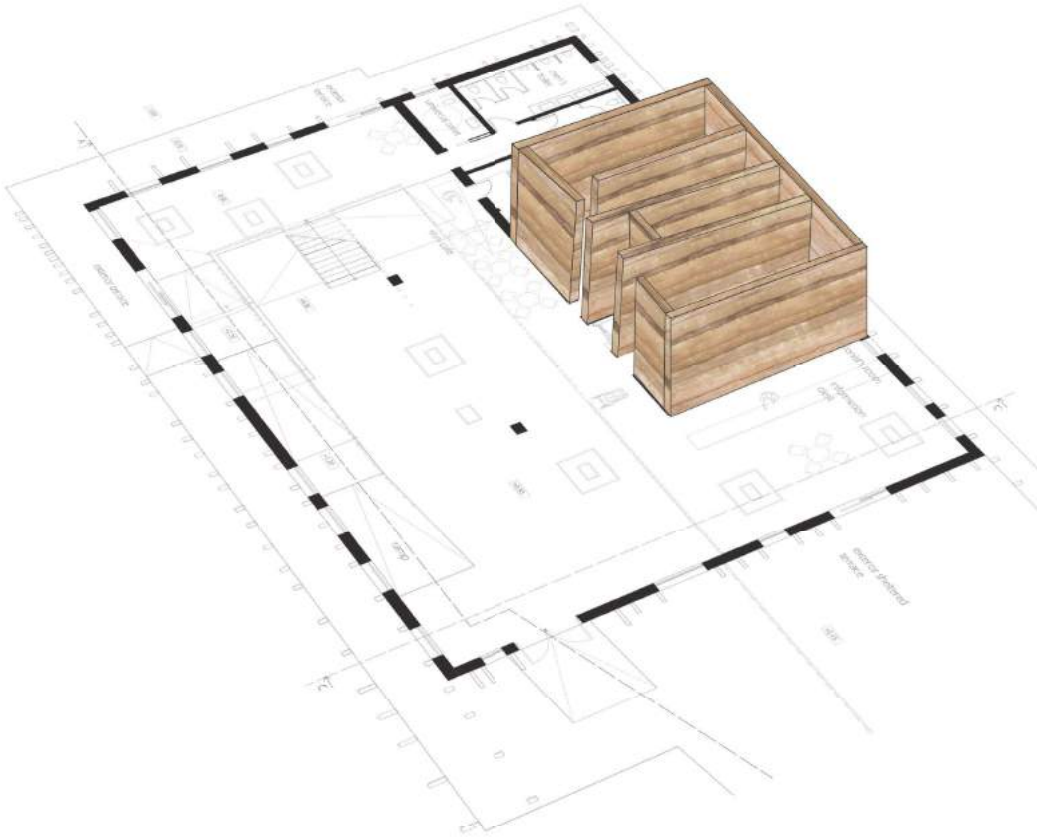

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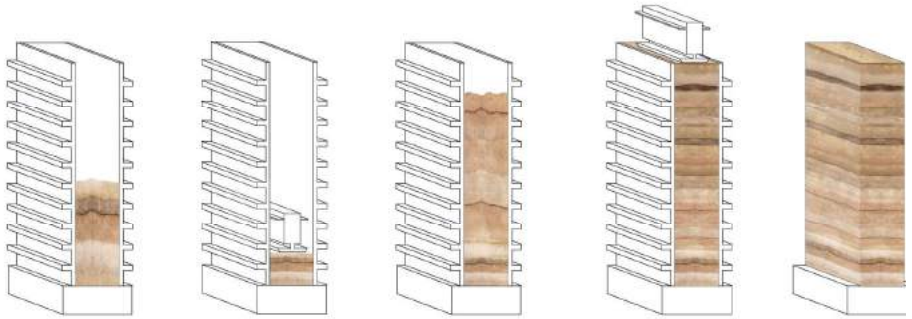

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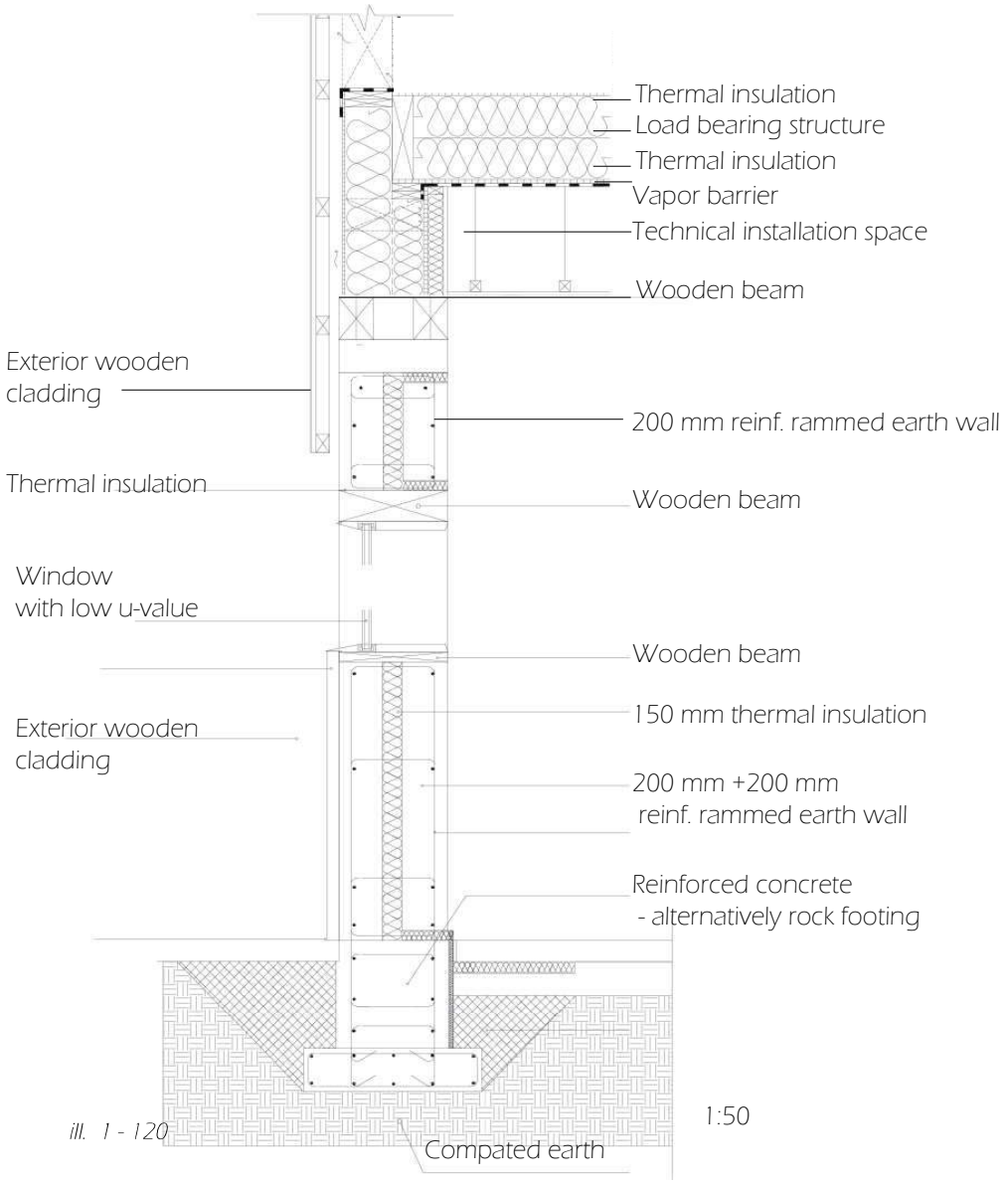
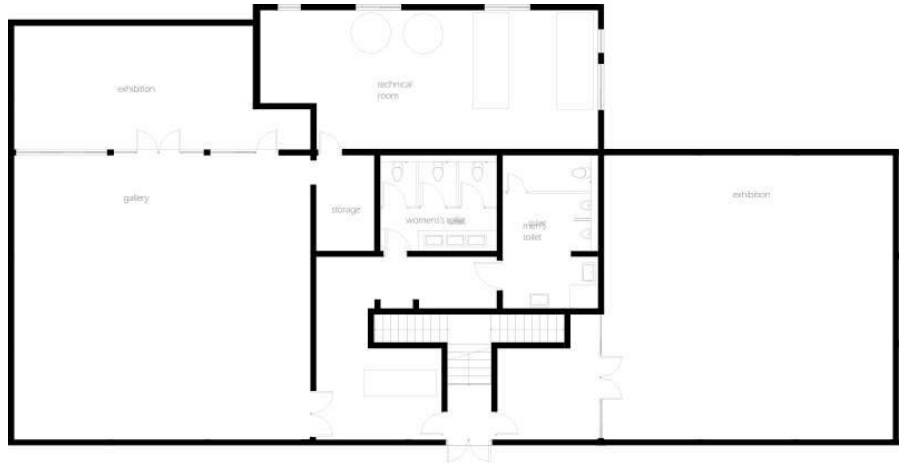


ill. 1 - 120 1:50

RAMMED EARTH

Building contains a zone with functions, touching the north facade. This part include small kitchen for cafe, toilets, including barrier-free toilet with prioritized access, storage spaces for information desk, room for receptionist, lockers, but also lift and technical servicing rooms, that were design to be in the centre of the function zone, in order to ensure the most efficient pipe installation for water and waste management. The construction material for this part needs to be fire resistant and therefore ensure longer life and minimal maintenance (or reparation) requirements of the building, The material chosen for constructing this part is rammed earth. This material in comparison to standardly used concrete is more sustainable and ensures minimal invasions during construction. Marwa Dabaieh (2014) states in the technical report on 'Building with Rammed Earth', that the rammed earth walls are fireproof. "Standard 400mm thick rammed earth wall can be used as a load bearing in constructions up to four stories high" (Marwa Dabaieh, 2014). This solution draws the most sustainable approach and fits the project very well, as the newly built part is planned to be placed on the dune on the west, with lowering the dune by a meter, which results with a ground that can be

EXISTING RESTAURANT



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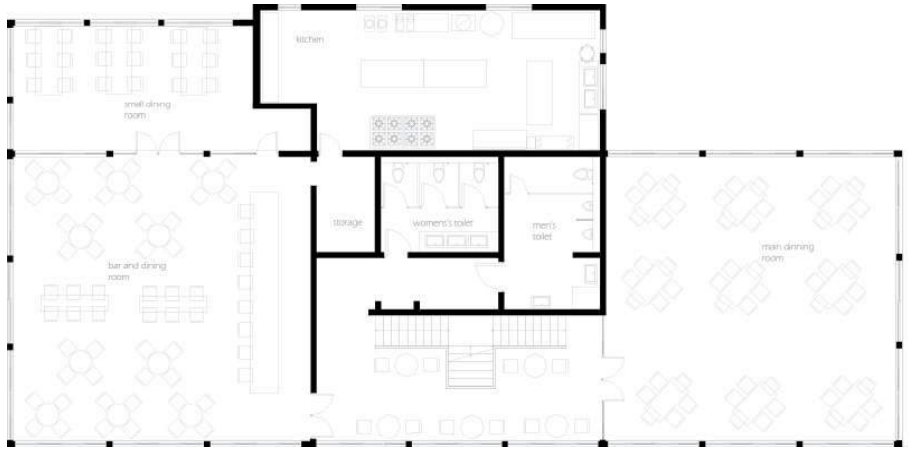

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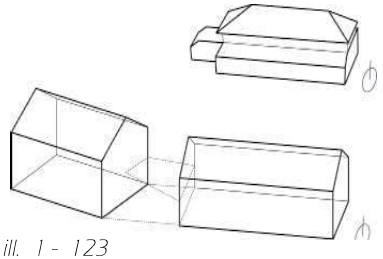

ill. 1 - 123

The existing restaurant and gallery were defined by building envelope of unisnulated walls and old wooden windows with one layer glass. The u values were evaluated to be unisuitable and causing large transmission costs. The energy was sourced from boiler runned on oil burning. The area doesnt have district heating access. These aspects mean an unsustainable power to run the building, which demand is very high. The owners due the costs close the building for winter period, however, they the heating is necessary in some weeks in the the period April - October. The groundfloor that is used as gallery doesnt have any windows on east south andwest wall. The daylight factor in most of the space is 0.

Due these facts the building was refurbished and after all changes is reached energy consumption of only 16,7 kWh/m2 a year. The original calculation showed expected consumption of 487 kWh/m2 a year, if the building was used whole year.

The changes inlcuded creating window openings, with frame shading, insulating walls, insulating floor meetings and replacement of the wall, that was shown as large contributor to heatloss. The boiler was replaced with air to air heatpump. The electrical demand was balanced with designing PV panels on the roof. The required size of the PV panel is 30 square meters, which is equal to 19 pieces of the panels. The roof is shaped and oriented in very suitable orientation with inclination of 40degrees, which is ideal for potential of the PV panels functioning. The new staircase was designed for the fire safety, that can be used when the visitor centre is closed, although opening hours of restaurant are shorter than the opening hours of the visitor centre.

ILLUSTRATION LIST

ILLUSTRATION LIST

ILLUSTRATION LIST

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