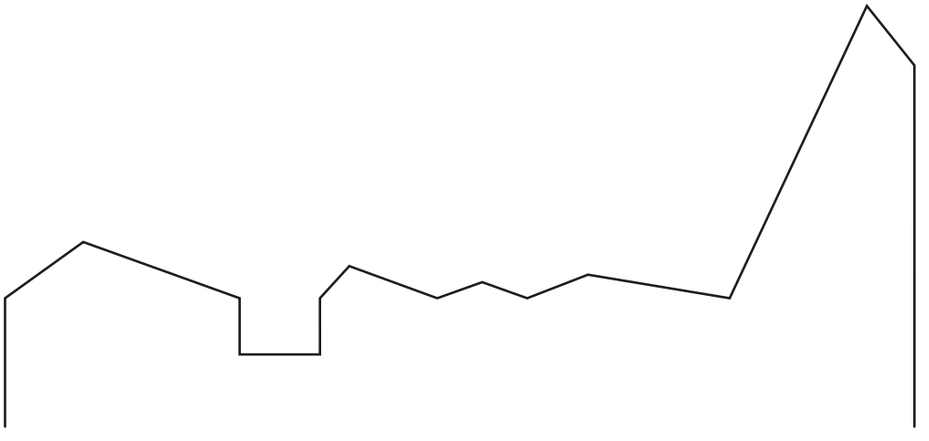

SVENDBORG LIBRARY

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MSc4 - Arch14 - September 2016 Architecture & Design, Aalborg University

ABSTRACT

This master thesis thesis presents a design proposal for a new library in the port of Svendborg. The library is situated at the artificial island Frederiksøen, which used to function as a shipyard and today, makes an essential part of the maritime history and identity, which have characterized the town of Svendborg for centuries. The Danish architectural office Vandkunsten have developed a masterplan for Fredriksøen and will be used as a point of exit, regarding the future development of the site. The placement of a new library at Frederiksøen will add a new layer to the history as well as identity of the place and again connect the city of Svendborg with the port and its maritime culture. The development of the library and placement will set the framework for a unique experience, which integrates the industrial atmosphere of Svendborg in the very basis of the architectural concept. The library will act like a landmark for the city and be the natural social meeting point for the whole city of Svendborg.

PROJECT TITLE

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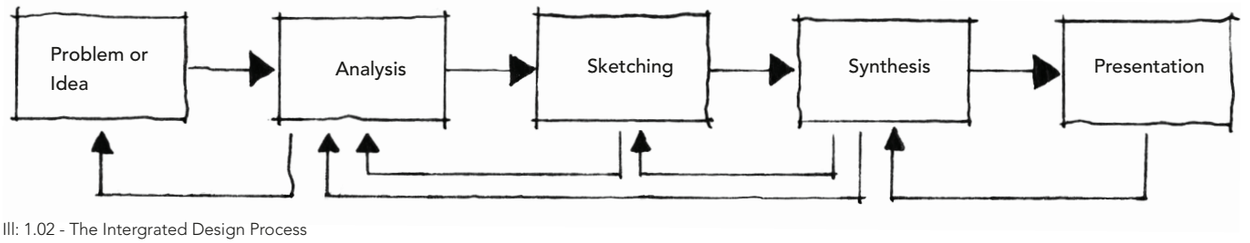
MOTIVATION

The Public Library is currently facing many challenges. On one side the public library functions as the most visited cultural institution, however the library analysis also shows that less people, use it for book lending. These challenges may indicate a shift in use, where changes in societal patterns, social needs and digitalization, might be the cause. This means that the function of the public library have to be reassessed (Moos- Bjerre, 2014).

The newly constructed culture house Dokk1, in Aarhus, have reconsidered the traditional use of the library. Dokk1 contains both Aarhus main library and consular services, however it also houses several activities, such as concerts, children's theater and study cafes. Dokk1 therefore have more varied functions, than the traditional public library. From being a place where you borrow books and seek information, to also being a meeting place for the local community. A reconsideration of the concept regarding the library, can therefore help to ensure a social cohesion within the community, through the establishment of a modern venue and knowledge center. A neutral public meeting space, where social barriers become invisible, and people can meet regardless of age, gender, interests, ethnicity etc. And space that can provide people with an insight and overview into the constant flow of information, which society generates.



Ill: 1.02 - The Intergrated Design Process

METHODOLOGY

THE INTEGRATED DESIGN PROCESS

The method of this thesis project is based on an academic and scientific approach to engineering and architecture, developed by Mary Ann Knudstrup, (Knudstrup, 2004) at Aalborg University. Knudstrup describes a phenomenologically founded approach, named the I*ntegrated Design Process*, as an iterative process, which is based on identifying and connecting the aesthetical, functional and technical aspects of an architectural project. The model is a problem-based tool, explained through five phases which interact and guide the architectural engineer in a 'back and forth' between critical topics in the design process. The method maintains an academic and critical approach to complex building design, where problems and hypothesizes are formed and developed and tested.

PARAMETRIC DESIGN

Furthermore, the integrated design process can benefit from the utilization of parametric and digital software, which emphasize the iterative loops, between design generation, interpretation and analysis, and provide continuous feedback which can aid the architectural engineer in the decision making-process. (Oxman, 2010). Therefore, much work will revolve around CAD software, such as Rhinoceros 5 which can produce mathematically precise representations of curves and geometry. Plug-ins for Rhino, Grasshopper, and Karamba, can bridge spatial investigations and form-finding and structural analysis.

THE PROBLEM PHASE

The framework for the project is developed through the investigation of critical tendencies and the gathering of information concerning contemporary library architecture in Scandinavia. Problems and challenges are defined in order to create a point of departure for the project. This phase includes performing interviews of the target group and an investigation into the setting and background of the project.

THE ANALYSIS PHASE

The information that has been procured in the Problem Phase is approached and analyzed. The studies evaluate the cultural, historical and contextual background of the site, along with investigations of sense of place, surrounding infrastructure and climate analysis. Furthermore, project-specific criteria for logistics, functionality and architectural quality are addressed and discussed in close collaboration with the client. The outcome of the analysis, the design criteria, is organized into a program which specifies target values for energy, indoor climate, spatial experiences and functionality. In order to determine project-specific values, a vision for the project is defined.

SKETCH PHASE

In the sketch phase, the challenges and design criteria, which were addressed in the analysis phase, are resolved physically in order to work toward a solution which meet the demands and wishes for the building. In this phase, the professional parameters of the architect and the engineer interact and inspire a solution. Parametric software is integrated in the early conceptual phase in order to compliment the architectural and spatial qualities with technical feedback. The initial development of a tectonic principle is central for this thesis. In this process, the digital workflow with rendering and parametric simulation are complimented with analogue design-methods such as hand sketching, drawing and physical model-building.

SYNTHESIS PHASE

Through an evaluation of the experience, atmosphere and rationality of the concept, the building is continuously optimized, revised and redrawn in order to reach a Hellenistic level of synergy where all elements interact and work together. The performance of the building is documented through detailed calculation models and organized into a project proposal which fulfill the aims and demands of the program and the vision.

PRESENTATION PHASE

The project is presented according to the approaches, subjects and dilemmas. The presentation displays the aesthetic, functional and technical qualities of the project, and points out how aims, design criteria and target values of the client are fulfilled in the design (Knudstrup, 2004).

Ill: 1.03 - The library, Copenhagen. north-west, Denmark, 2009, COBE Architects, Transform Architects. ▶

NORDIC ARCHITECTURE

The Nordic identity in architecture have received international attention for nearly a century and was made famous by some of the great masters of modernism such as Aalto, Utzon and Asplund etc.

NORDIC ARCHITECTURE

The Stockholm exhibition in 1930, mainly led by the Swedish architect Gunner Asplund, marked a shift from Nordic Classism to Functionalism. The driving force behind the exhibition Gregor Paulsson described the architecture of Functionalism as: "The architectural form was a style of freedom, the social function an expression of equality: to cancel out class differences and raise the environmental standards of the backward population groups in the outward form of society as in the inward" (Lund, 2008, p 20). The Functionalism is light and sophisticated in its expression and its development is closely linked with the ideals of the model for the Nordic welfare state. During the 1930s, the Scandinavian Functionalism was developed with a sense towards scale, humanism and with the use of local and natural materials. (Lund, 2008). The Danish architect Kay Fisker characterizes Nordic architecture of the time, as a harmonious architecture rooted in the regional culture, in relation to materials, structure and architectural form: "There is a natural, inevitable uniformity about this architecture which, in the given regional circumstances, leads to the use of particular materials, structures and forms" (Lund, 2008, p 18). Kay Fisker characterize the regional culture and norms, as a focal point in relation to the notion of the Nordic tradition. Kenneth Frampton, architectural critic, further describes the term of regionalism in his strategy of Critical Regionalism, where he puts a critical view on the concept of the modernist tabula rasa.

CRITICAL REGIONALISM

In the text *Towards a Critical Regionalism: Six points for an architecture of resistance* the architectural critic, Frampton argues that; "The fundamental strategy of Critical Regionalism is to mediate the impact of universal civilization with elements derived indirectly from the peculiarities of a particular place." (Frampton; 1983, p 21). Critical Regionalism describes a strategy to recapture the local environment and atmosphere of space, which is threatened by today's globalization. Frampton argues that Critical Regionalism concerns the importance of the local region, with inspiration in the culture, its critical relation to the climate, light and topography meanwhile adapting to the global modernization to cultivate a contemporary architecture (Frampton, 1983).

NEW NORDIC

The exhibition *New Nordic – Architecture and identity* held at the Louisiana Museum of Modern Art in 2012 was exploring the identity and culture of Nordic architecture. The exhibition describes a new tendency in relation to contemporary Nordic architecture, with the focal point towards a new playful architecture, which choreographs our behavior through movement and sensation (Andersen, Schelde, 2012)
This focus is also expressed in the essay *On performative regionalism* by Barbara Allen, which opposite Frampton in
Towards a Critical Regionalism takes it point of departure in the region as something which is socially constructed. She describes the region as "(…) a collection of shared geographically located identities. It is a locale in which share an identity, or at least participate in compatible social practices." (Allen, 2007, p 422). She further adds that the idea of Performative Regionalism should therefore "(…) be, in large part, based on the spatial dimensions of people's practices and normative behaviors. So any investigation of regionalism must begin with an investigation into what people actually do in that region that mark them as a part of that place." (Allen, 2007, p 422). Allen is not neglecting the importance of the architectural history or locale materials in relation to the regional, but is rather suggesting a focus towards culture referring to the social constructed. The architecture thereby have the potential to motivate and affect a specific cultural behavior on an individual or social plan. This means that architecture can act as a performative scene for the individual social constructed allowing the architecture defining its own history and identity to a place. (Andersen, Schelde, 2012)

Allen enhances the Nordic architecture in relation to the social constructed, and focus on its potentials and ability to create and develop a place. The Library by Cobe and Transform located at Rentmestervej in the area north-west, Copenhagen is a good example of how a library with an iconic quality can provide a new identity to a whole district. When choosing the site of the library in Svendborg, the placement will therefore be considered a a strategic tool in relation to the future development of the town. At the same time a future library in Svendborg should adept and recapture the local environment and atmosphere of the space.

THE LIBRARY AS MEETING PLACE

NORDIC HUMANISM

The Nordic identity is also associated with democratic and humanistic approach to architecture, which is seen in the Danish architect Jan Gehls ideas and approach to urban design. This chapter will focus on the the potentials of the library as meeting place, with which is also discussed in the article *Biblioteket som mødested* (Hvenegaard Rasmussen, Jochumsen & Skot-Hansen 2013) on the basis of Jan Gehls theories of urban planning.

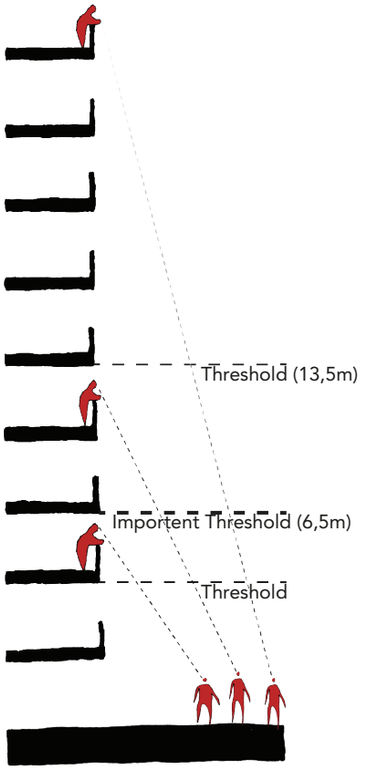
THE LIBRARY AS MEETING PLACE

In his book *Life between buildings* Jan Gehl lists three types of outdoor activities in public spaces: the necessary, the optional and social. *Necessary activities* includes everyday tasks such as, going to work, shopping groceries, or running errands etc. These activities depends little on the quality of the physical environment.
Optional activities are often impulsive activities and takes place, under optimal climate conditions. This category includes recreational activities such as, sitting down to enjoy the street life, sunbathing, or eating at a café. These activities highly depends on the physical quality of the outdoor space and is therefore important in relation to the physical planning of an urban space.
Social activities include all types of social communication between people such as conversations, greetings or simply passive contact as seeing or hearing other people. These activities, are also described as resultant activities as they derive from either necessary or optional activities and therefor depend on the presence of others in a public space. (Gehl 2011 p. 11-16)
According to Gehl all these three categories combined is what makes urban spaces in the city meaningful and attractive.

These three types of activities can be translated directly to the public library space. The necessary activities can be compared with the main function of the traditional library, where the purpose of coming to the library is to borrow material from the library collection. Optional activities in the library could include sitting down to enjoy the public life in the library or to participate in different activities. The last category *social activities* derives from the presence of other people in the library and includes conversations, to play or passive contact as seeing or hearing other people and is defining the library as a place in the public space. (Hvenegaard Rasmussen, C, Jochumsen, H, Skot-Hansen, D , 2013).

VERTICAL COMMUNICATION

In relation to the social activities, Gehl has further analyzed the possibility to communicate vertically between ground floor and multi-story buildings. He concludes that communication is relatively good until second floor, while it becomes more unclear at third and fourth floor. From fifth floor and abve, details cannot be seen and people cannot be contacted nor regonized.
(Gehl 2010 p. 41). This is relevant as we are working with a multi-story building with communication vertically between the storeys.

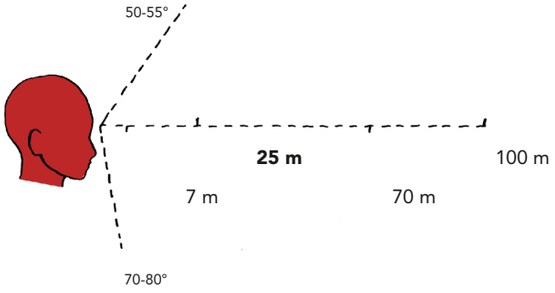


Ill: 1.04 - Vertical communication

DISTANCE AND PERCEPTION

The sense of sight plays an important role regarding the creation of a social library. The distance of 25m is important as it defines a social visual field, as it is possible to observe facial features and the mood of others within this distance. (Gehl 2010 p. 34-35)

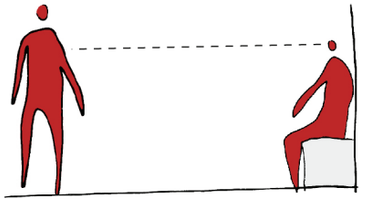
100 m – You are able to observe movement and posture.
50 – 70m – People can be recognized.
22 – 25m – Facial features and emotions can be read.
7 m – Makes it possible to have a conversation.
0.5 - 7m – The shorter the distance is between the range of 0.5-7m, the more you are able to have a nuanced and articulated conversation.
(Gehl 2010 p. 34-35)



Ill: 1.05 - Distance amd perception

EDGE ZONE

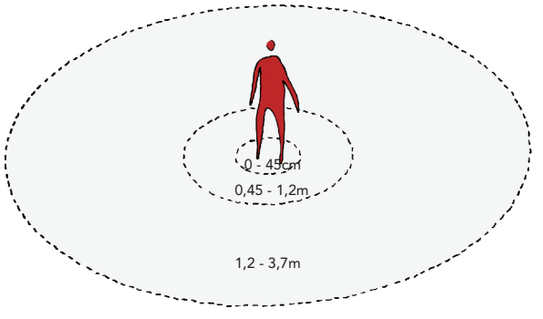
Jan Gehl is arguing that the seeing and hearing contacts are emphasized as the most important form of social contact in a public space. Watching other people is the greatest attraction in the city and by watching other people we learn and is inspired by the society around us. (Gehl 2010 p. 23-24). Unhindered sightlines to other people is therefore important compared to creating life in the library.
People prefer to walk, sit or stand at the edges of a public space facing the pedestrian traffic. This is because as the edge zone provides a discreet "safe" place where people only can be approached from their front and a good view of the public space. (Gehl 2010 p. 137), which also should be considered in the library.



Ill: 1.06 - Edge zone

COMMUNICATION AND DISTANCES

Intimate distance (0-0,45m) - This distance is closely connected to our feelings and at this distance strong emotions is shared.
(Personal distance (0,45-1,2m) - The personal distance is the distance at which family members or close friends is for example debating important topics.
Social distance (1,2-3,7m) - This distance concerns a more formal distance and is for example taking place when people want the hear and see a public event but at the same time do not want to take part in the event.
(Gehl 2010 p. 47-48)



Ill: 1.07- Communication distances

TECTONICS

The architectural tectonic framework of the project takes it point of departure in tectonic theorists Kenneth Frampton and Marco Frascari.

POETICS OF CONSTRUCTION

The notion of tectonic is according to Frampton deriving from the Greek word tekton meaning the carpenter or builder, from which the word architekton, or master builder evolved from. (Frampton, 2001, p. 3-4)
The tectonics is according to Frampton defined as, *poetics of construction* relating to its expressive potential, and the creation of space. Frampton is describing an artistic dimension of tectonics, which is experienced through the built, which "(…) is first and foremost a construction and only later an abstract discourse based on surface, volume, and plan (…)" (Frampton, 2001, p. 2).

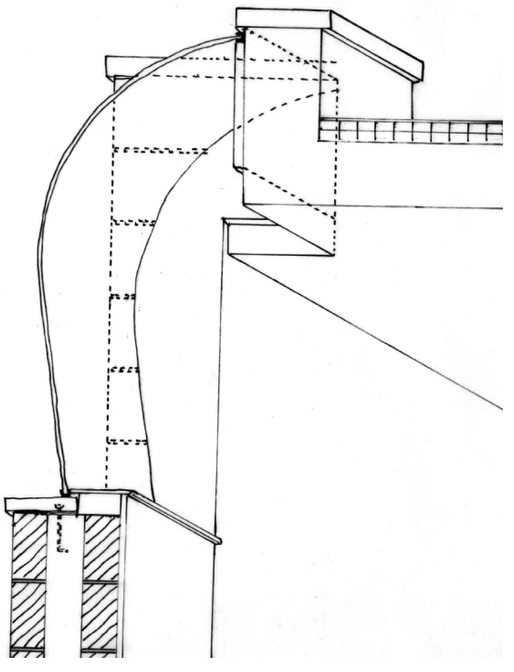
TELL-THE-TALE-DETAIL

In addition to Frampton, Marco Frascari describes in his essay, *Tell-The-Tale-Detail*, the importance of the practical and aesthetic norms, which comes together to form the architectural detail. The practical norms is understood through the double notion of technology, which is described as "logos of techne" (construction) which relates to the physical qualities of architecture and joining building parts, and "techne of logos" (construing) which is associated with the cultural aspect and the act of creating meaning. The detail can not only be construction, without a construing and vise versa. (Frascari, 1984 p. 23).
The detail is therefore seen as the link between construction and construing. Frascari is further defining the detail as a joint, and describes two different kinds of joints. "Details can be material joints," as in the case of a capital, which is the connection between a column shaft and an architrave, or they can be formal joints, as in the case of a porch, which is the connection between an interior and an exterior space." (Frascari, 1984 p. 24)
According to Frascari the joint can be understood as something physical and something spatial. He further adds that "In architecture, feeling a handrail, walking up steps or between walls, turning a corner, and noting the sitting of a beam in a wall, are coordinated elements of visual and tactile sensations" (Frascari, 1984 p. 24).
The detail therefore ties a meaning through the perception of the architectural space and bodily experience, which correlates with the tactile and visual sensations of the detail. (Frascari, 1984)
The art of detailing is really the joining of materials, elements, components and building parts in a functional and aesthetic manner" (Frascari, 1984 p. 23)

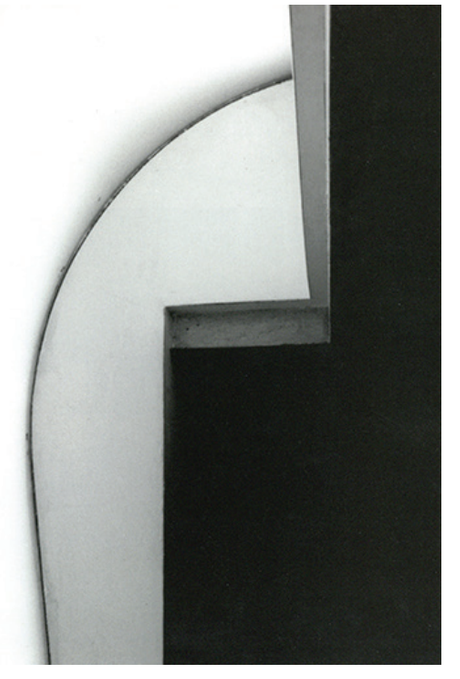
DIGITAL TECTONICS AS A METHOD

The digital tools today offers new ways of exploring the construction and material in an aesthetic and functional matter.
To create a design that is not only durable, but a design where the structure is optimal according to different load combinations, the tectonic method in this project takes it point of departure in the methodology of Performance Aided Design (PAD). (Parigi 2013)
Performance aided design describes a method which provides an intuitive understanding of the structural behaviour from a parametric design environment. performance aided design, can through exploration, and different design iterations, provide feedback loops of the building performance.
This enables the possibility to work with complex structure, and to make optimizations according to specific challenges. Embedded tectonics therefore lies within the possibility to create structures that perform best possible according to the contextual challenges, but also relates to the overall concept and gesture of the building (Parigi, 2014).

The tools implemented to investigate the structural principles, are Autodesk Robert structural analysis and Grasshopper3d with the plugins Karamba and GH2R.



Ill: 1.08 - Sketch, Window detail, Stretto house, Texas, 1992, Steven Holl



Ill: 1.09 - Window detail, Stretto house, Texas, 1992, Steven Holl

THE NORDIC PUBLIC LIBRARY

It can be difficult to predict how the library will develop in the 21st century. During the last 25 years, the public library has developed more radically than even before. The transition from industrial- to information society, has gradually transformed how we picture and use the public library. A mix of cultural development and innovation in technology, is outdating the contemporary library, which is in a constant state of flux. In order to determine a point of view of the prospects of change in the Nordic public library, we have to investigate how the public library first originated in Scandinavia.

ORIGIN

The public library emerged in the early 1900s. It was inspired by the free American libraries, however, soon the Nordic library developed its own distinct profile which was deeply rooted to the introduction of the welfare state. Throughout the 20th century, the Nordic countries, Denmark, Sweden, Norway and Finland have been investing in the concept of 'social capital'. In this period, the public libraries became icons for a new type of setting for civic democracy and public value. Furthermore, investing in educating the population became a main benefactor to the Nordic countries being successful democracies today. (Larsen, 2006)

NEW OPPORTUNITIES

As the percentage of the population which is engaged in some form of higher education increased, a need for new intellectual hubs in the city, where minds could meet, study and exchange knowledge emerged. This has created a drastic shift between the core functions of the conventional library, which has had to adapt in order to stay relevant. Today, the Nordic Public library is gradually becoming as much about people as it is about books. The appreciation of the library space as a container for intellectual gathering and interaction, has become as vital for society as the provision of access to the cultural record itself. This has created new challenges but also new opportunities in contemporary library design.

MODERN LIBRARY ARCHITECTURE

According to Shannon Mattern, (Worpole, 2013) there is a tendency in modern library architecture, to be 'free form' architecture, which compared to 20th century libraries, doesn't have a distinct architectural type. New types of library design questions the already tried and traditional ways of organizing a library and reconsiders what it means to reflect values which can enhance the function of space of exterior as well as interior. The many considerations, such as sense of place, context, access to information, layout, circulation, flexibility, indoor environment and deployment of staff, creates a large diversity in contemporary library architecture. (Worpole, 2013)

THE TRADITIONAL & THE CONTEMPORARY

The contemporary library typically utilize an in-street-level retail entrance, which ensure clean transition between inside and outdoor space, and an open plan solution with easy circulation and interaction between zones. Bookshelves hava a human scale, reading niches have a view, and atriums and natural lighting are used throughout the buildings. Contradictory to this, the archetypical Neo-classic library of the 20th century, had a defensive and hierarchical design, characterized by imposing steps and entrance halls. Circulation was restricted inside the library space which was organized in a dimly lit, lounge type of setting. Reading niches were discrete and separated by tall bookshelves requiring ladders. (Worpole, 2013) The main function of the traditional library was to preserve and provide access to the cultural record whereas the contemporary library is more focused on learning and the provisioning of the tools to study the cultural record, not only the record itself. Furthermore, where the services of the traditional library was meant for chosen target groups only, the contemporary library caters for everyone irrespective of wealth and lifestyle.

PUBLIC ARENA

The setting of the main space of the library has developed from a 'public lounge' type of space, to that of a 'public arena', where the staff moves freely between zones and hubs. In the open floorplan, the staff provides a dynamic service, and are seen as information navigators, not custodians like previously. In the traditional library space, staff was organized around static information desks, in comparison to today's libraries which have satellite desks. (Worpole, 2013) Furthermore, the library space has developed from being a single-minded and highly homogenic space for book storage or curation, to a diversified space which focuses on the creation of informal meetings, where people can read, discuss and explore ideas.

FOUR PILLARS OF LIBRARY DESIGN

According to Alice Crawford, both the traditional and the contemporary library can be described as maintaining a series of common functional attributes. Crawford describes four pillars of the 20th century library as a split between curation, research and learning, publishing and creating a public domain in the library space itself. For the conventional library, Crawford argues that the four pillars are essential in order to create a balanced and diversified library organism. "Removing one 'pillar' in its entirety will unbalance the role of the library." (Crawford, 2015) Diagram: Traditional balance vs. contemporary balance.

FOUR PILLARS OF LIBRARY DESIGN

DOKK1 has been under development for a decade. It is an iconographic building, situated at the harbor-front in the Danish city of Aarhus. The media-library is resting on a raised platform, which is accessible through sculptural staircases, connecting the platform with street level. By lifting the platform, the traffic is divided from the outdoor areas, giving a 360° view of the harbor. The platform function as a safe public playground for kids to play. The interior is characterized by a focus on harbor materials, and the open plan. It has a large foyer area, which houses partners, such as a café and the civic association of Aarhus. An urban landscape, creates a mixed stay and transit zone, suited for informal meetings. It has an exhibition room for testing of new technologies, a 'news room', a 'music room' and a 'free room' among several others. Info galleries highlights the library's expertises and resources, so they are not tucked away on the internet.

▲ Ill: 1.10 By raising the library, it allows the traffic to pass under the building and at the same time makes it possible to have a 360° view of harbor and Århus bay.

◀ Ill: 1.11 The sculptural staircase in Dokk1 formes a learning landscape and gives a new experience each time you pass it.

THE LIBRARY IN THE CITY

A SHIFT IN FUNCTIONS

Ken Worpole is a renowned British architectural writer and critic, who argues that the new way we use the library necessitate a major shift in the way modern public libraries are developed and commissioned.

The contemporary public library shares its attention equally between the collection of books and providing a space where the individual can seek to create a private domain in a collective space. Furthermore, the library as an institution, has developed from having a single minded purpose to carrying the weight of several. Many libraries have developed into 'cultural powerhouses or intellectual hubs' which provide a wide range of services that meet the demands for intellectual space in the knowledge-based society.

PUBLIC DOMAIN

Worpole refers to an American urban sociologist named Ray Oldenburg, who argues that the contemporary library has developed into being one out of three main sites of human existence. The other two sites being at work, and at home.

What distinguish the contemporary library from other public domains and meeting places in the city such as cafés, theatres and museums, is the empathic play between the individual and the collective in a 'free for all' and non-commercial setting, in a society which otherwise, is becoming increasingly commercialized. Today, libraries can be located in shopping centres, at schools, sports halls, experimentariums and other cultural buildings. The library is a desirable neighbour, because it can revive an area which is deserted in the evenings. (Worpole 2013)

USER GROUPS

The relevance of the contemporary library in the city, becomes apparent due to the fact that a wide range of target groups are attracted to the new services that have become an integrated part of today's library. Children families are attracted to the library's children zone, where children can learn and play through digital and interactive media. Furthermore, adults and students utilize the workstations of the library to study or work, and IT-cafés are attracting the teenagers and youngsters to the library, where they can play videogames and watch TV. The elderly user has the possibility of going to the library to read a book, a newspaper or to attend a class or seminar. The general population spend more time in the library than previously, and therefore one could argue that there is no typical library user anymore. (Larsen, 2010)

Quality architecture is a major success criteria of modern libraries, because it reveals the value of having a public and cultural meeting place which attracts a diversified audience. The library is evolving from being a service station to becoming a destination, and welcoming designs can bring in people who have never thought of using a library before. (Larsen, 2010)

CURRENT TRENDS AND TENDENCIES IN SOCIETY

A tendency in public spending is to prioritize the development in urban centres over local communites. The lack of funding, has consequences for the library design in the outer-rim. A significant challenge for community libraries today, is to adapt to a decline in resources and an increase of costs to equipment and management. The need to create more efficient libraries and trim expenses has shifted the core functions of the library and therefore our present meaning of the library is changing. (Worpole, 2013) Automated services and digitalization of the cultural record gives the opportunity of maintaining a shared collection between a network of partner libraries, instead of putting the expenses to maintenance on each and every library institution. Where some core functions of the library is not apparent for one individual library, it is instead carried out by another partner in the collective library organization. Furthermore, the possibility of having a digital collection of the popular record creates the opportunity for reserving more space for classrooms, internet cafés and exhibition space as well as under-supported printed collections. (Crawford, 2015)

HJØRRING LIBRARY

Hjørring Library is located in a retail shopping mall. Characteristics of the library, is the focus on atmosphere, experience and interaction, with a clear visual interior layout called; 'The Thread of Consistency', which guides the user through the library. The main library space is organized in a single open plan, which is subdivided in dynamic zones and event areas. One zone include a children library; 'The Big Book', where you can record reviews, and listen to other people's reviews. Another zone, is emphasized by private niches, meant for listening to sound-books.

▲ Ill: 1.12 - Hjørring Library in Metropol, Denmark, 2008, Schmidt Hammer Lassen Architects. The different functions are linked together by the red thread, which goes through the interior of the library and is shifting character on its way through the library forming tables, display of book material, different zones etc.

◀ Ill: 1.13 - Study/ Group rooms..

HERNING LIBRARY

Herning library is innovative in how they prioritize the spatial resources accessible to them. A clear hierarchy of lowering book shelves into an open basement, while preserving the space in level with the street as a public domain containing selected literature only, - approximately 10 % of the holding. Stairs, and hallways are also used for stay, in an environment which is highly focused on creating a digital, public living room that embrace technology. Personal computers and workstations, reading zones and an open coffee shop, create a diversified public square, oriented towards creating space for events and activities. The library is highly automated. Loans and the handing in of books is a self-service, however the outgoing staff approach passers-by on their own initiative, offering passers by a personal service, - or just a small talk.

Ill: 1.14 - Main entrance from Østergade, which forms and urban street through the library connecting the pedestrian street of Østergade with the train station and bus terminal. ◀

Ill: 1.15 - The main part of books have been placed on a lower level named “the deep” thereby prioritizing the social space and functions. ◀

Ill: 1.16 - Herning libray, Herning, Denmark, 2014, GPP Arkitekter. ▶


FORDYBET

VISION OF THE 21ST CENTRURY PUBLIC LIBRARY

PROSPECTS

The traditional medium of knowledge, the book is a symbol which most people identify with a library. Still, how controversial it might be, it is worth discussing if access to the record could be through the digital platform only. Furthermore, the thought of entirely digitalized libraries could be seen as an attack on the fundamental and traditional understanding of what a library is. However, one could argue that the 'social function of the library is needed even if the book is not.' (Worpole, 2013) Space where minds meet, converse and interchange, matters as much as providing access to the cultural record in its digital or conventional form. Therefore, even though communities may not be ready to give up the book entirely, book storage will take up less physical space. To display front covers instead of entire collections would make way for events, exhibitions, multimedia devices, reading and work stations and free areas which can be used as the user wishes.

"The book provide the focus of the library ideal, and always will, but it is the meeting of minds, the conversations and the interchanges, the everyday humanity of sharing a common intellectual space with other people, that matters equally". (Worpole, 2013)

Worpole argues, that the age of the book is not over, far from it. There is a general increase in publications of specialized texts and popular literature. Publishing will still be an integral part of the role of the library. Furthermore, learning and education will be prioritized as a natural consequence of the need to align the aging population to new technology and means of communication.

THE LIBRARY AS A DESTINATION

The success of the library lies in ensuring the library developing from a service station to a destination, where every visit to the library is not repetitive experience, but a new experience. Partnerships are important in order to move away from being a homogeneous institution, because it considerably impairs innovation, and therefore the future of the library is a collaboration between professions, which provide more variation in what the library can offer the user. This demands new management expertise from the staff which has to be more outgoing. Furthermore, by creating space, which can be booked by the user 24 hours a day, 7 days a week can take user involvement to a new level. The staff may not necessarily be responsible for all events and activities in the library, and this may decrease the workload of the staff, so they can spend their resources in other areas. By giving the role of social intermediary to the user, events and activities can be organized on the user's premises. This demands a flexible interior layout which emphasize how the library is used daily, where movable walls or shelves can be disassembled or 'rolled away' and moved freely by the user, as long as they are put back afterwards. Materials, such as a flooring of sprung parquet could be integrated to make way for activities such as dancing, gymnastics or others.

INTERPRETATING THE LIBRARY

The cultural resources accessible to this generation, are wider than in any other generation. This development will continue throughout the 21st century. A critical matter in this development, is that the library has to be adaptable in order to survive an unknown cultural and technological future. Therefore the architects approach should be based on the principle that space is an agent of chance, and ensure his point of departure, always stems from the user's needs. The challenge of library design of the 21st century is not to invent a new library, but to develop and re-interpret the values of the old. 21st century libraries will be site specific in their configurations and their programmes will be adapted to meet the local social and demographic circumstances of the target group. Service and interaction will continue to take place by automated loan and book service machines, SMS or internet. Coreography is organized around zones and access ways. Stay and transit are in the same areas of the library. This create an open minded space, for informal meetings. Due to the fact that the physical library is dictated on how the users move around, one can argue, that the library space could be considered a public domain, similar to the space you experience in an urban setting. (Larsen, 2010)

CONSLUSION

Throughout the 21st century, the Local community libraries will be on the retreat due to budget cuts and polarization of the public sector, but the public network will remain at the heart of the cultural infrastructure. The public library which caters for everyone irrespective of wealth or lifestyle, will still be relevant in communities, and a countermeasure to marketization and development of a consumer based society. Furthermore, quality architecture directly affects experience and aspirations of the user, and can emphasize the informal meeting, where people can meet each other and be a private individual in a collective setting irrespective of individual circumstances, - combining the best of both worlds.

Ill: 1.17 - Dokk1 have become the new cultural meeting place for the city of Århus, and is used among other by students who come to study. ▶

Ill: 2.01 - The harbor of Svendborg

02

The Assignment

User Analysis
Context of Svendborg
Site selection
Climate conditions
Site and history
Development plans
Sense of place

Illustrationsliste kort:
Google earth V 7.1.2.2041 (July, 10, 2014). Svendborg, Denmark. 55° 03’ 36”N ,10° 36’ 44.91”Ø, Eye level 1,22 km, Google 2016 [August 20, 2016]

USER ANALYSIS

SVENDBORG LIBRARY

The library is the largest cultural institution in Svendborg, however in order to meet new demands and needs to capacity, the municipality of Svendborg has proposed to build a new main library at a new, more visible location.
Today the current Libraries in the municipality of Svendborg consist of 6 local libraries situated in smaller towns, and a central library located in Svendborg which handles the majority of the administrative tasks. (Svendborg bibliotek, 2015)

HISTORY

The library of Svendborg was built in 1937 and was meant to support the idea of Svendborg as an education city, with Business College and upper secondary school forming a campus located in the city centre.
The situation today has changed and Business College and the upper secondary school have spread throughout the city.

A FUTURE MAIN LIBRARY

The ambition of the municipality of Svendborg, is to increase the value of the library for its citizens through new architecturally appealing facilities and to provide new services and activities in collaboration with new partners in the local community. In order to increase accessibility of the library, it is a wish to extend the opening to 24-hours a day, by introducing self-service and automatization in the library.

A new library should also lift the task of increasing the collaboration between education facilities, by providing suitable space for studying and stay. In order to move away from the idea of the library being pictured as solely a communal institution, a modernized library should attract the non-user, and emphasize a social role as an active house and informal meeting place. The capacity of a future main library is estimated to be approximately 4000-5000 m². (Svendborg bibliotek 2015)

BOOKS

The lending of books have decreased by 15% over a three-year period, although the book is still the most popular material in the library, Svendborg library estimate that most users of the library will be using digital services. (Svendborg bibliotek, 2015)

USER WISHES

- More and betterstudy and workspaces
- Longer opening hours, even if some of these hours will be unmanned
- More options to lend download and stream books, music, etc.
- Several new physical books on the shelves
- More activities, workshops, events and more

(Svendborg bibliotek, 2015)

Ill: 2.04 - Map of Svendborg showing the site of the existing library.

Ill: 2.02 - Map showing the municipality of Svendborg.

Ill: 2.03 - Map showing the the city center of Svendborg.

Ill: 2.05 - Svendborg library main entrance.

Ill: 2.06 - Svendborg children library.

Ill: 2.07 - Svendborg book collection.

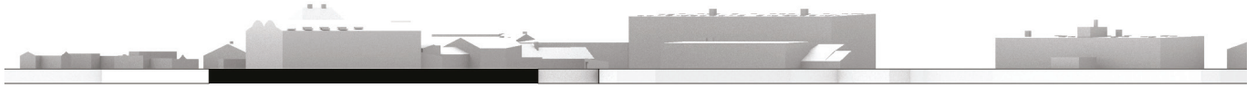
Ill: 2.08 - View from old main entrance.

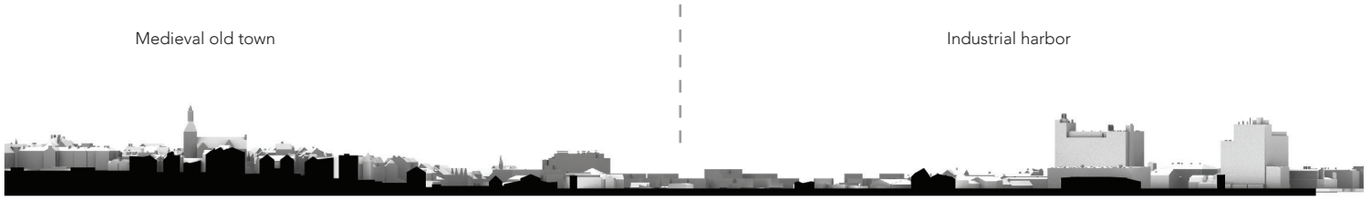
CONTEXT OF SVENDBORG

SVENDBORG CITY

The city of Svendborg is besides its harbor environment also characterized by its unique topography. The center of Svendborg is placed on a hilly landscape, which surrounds the harbor environment and the train station of Svendborg. When walking around and experiencing the town it was noticed that even though the harbor and center of Svendborg is geographically close connected, the landscape and traffic creates a barrier between the transition of the harbor and city center of Svendborg.

Ill: 2.09 - Section C - 1:500 Section of the industrial scale of Fredriksøen.





Ill: 2.10 - Section B - 1:500 Section of the industrial scale of Fredriksøen. ▲

Ill: 2.11 - Topographic map - 1:10 000 Topographic map of the center of Svendborg. ▶

Ill: 2.12 - Section A - 1:500 Section showing the clear division of the old dense medivial town of Svendborg which is placed on a hilly landscape and the large scale of the industrial harbour. ◀


A
B
C

SITE SELECTION

The placement of a new library building on the harbour, could emphasize Svendborg´s maritime and cultural history and identity as a port city. By placing a library at the harbour, cultural activities will naturally follow, and could connect the experience of the South-Funen Sea with the life of the city. The challenges of developing a library at the harbour, is the relatively demanding resources needed. However, it has architectural potential, and could contemplate future development of the harbour area and act as the binding institution between city and harbour. The activity and use of the library depends on the future development of the harbour area, which is currently underdeveloped. Advantages when building at the harbour, are the short distance to public transport and parking. Compared to developing a library in the city-center, the library will be less accessible for pedestrians and cyclists and have limited possibility of combining a visit to the library with everday tasks. However, a new library at the harbour could brand Svendborg as the cultural powerhouse of South-funen, and this have great accessibility to tourists and contemplate the local community and businesses at the harbour. (Svendborg Bibliotek, 2015)

Ill: 2.14 - Mapping of Svendborg and selection of a new site in Svnedborg


12
10
SITE 2:
JESSENS MOLE
The library could act as the binding element between medieval city, and the industrial harbor of the 19th century. The general development plans for this area, includes establishing housing and businesses along the harbor-front, which together with the marina, would create an attractive city space for stay. The library could contribute to this idea, and would be placed close to the existing train- and bus-stop, along the main road which separates the city from the harbor.
The library and the shipyard. The municipality have decided that several of the existing industrial buildings are to be conserved and renovated in order to preserve the cultural identity of the city. A future main library at Frederiksøen could therefore take advantage of the existing buildings, and could co-exist with ideas of establishing a maritime researchcenter along with spaces for young entrepreneurs. Locating a library here, would supplement the idea of creating a cultural island, which you travel to by land or sea.
14
15
SITE 3:
FREDERIKSØEN
13
11
9
SITE 3:
FREDERIKSØEN
13 OLD SHIPYARD
14 FREMTIDSFABRIKKEN
15 KAMMERATERIET

CONCLUSION OF SITE SELECTION

Placement of the library at Frederiksøen is chosen. The ideal location can resolve the target of creating a library building which act as a catalyst for branding the identity of Svendborg as a cultural city.

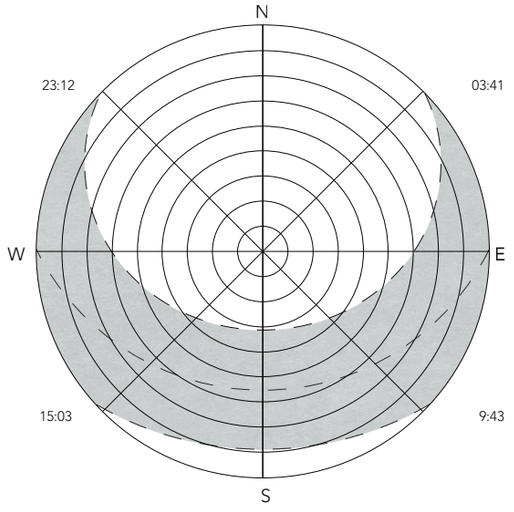
Locating the site at this location, creates the framework for an unique experience which integrates the industrial history of Svendborg in the very basis of the concept The library can contribute to the establishment of a creative environment of innovation planned for the location, and thus resolve the potential of creating new alliances and partnerships between the established businesses and the library. Furthermore, in regard to the development plans, the library can emphasize the 'green thread' that connects the city centre with the harbour, and the 'blue thread' which runs along the harbour-front as it creates a destination point. The site is visible from most of the city, and it is accessible both by land and sea. This would attract the people of Svendborg and act as a landmark for visitors to the city.

CLIMATE CONDITIONS

As the site is situated at an exposed location, experience at the site changes from day to day, depending on the weather conditions. The site is oriented towards the south, and is exposed to wind, rain and sun as the site recieves no immediate shading from neighbouring buildings or vegetation. As seen on illustration (2.15), the sky is clouded 53 % the year in the area. In this case, limited direct sunlight and the relatively wind blown location can make the site less attractive for outdoor stay as it affects the thermal comfort of pedestrians. Even though, the daylight conditions are ideal at the site 28 % of the year, as it recieves direct sunlight throughout the day, from morning to evening.

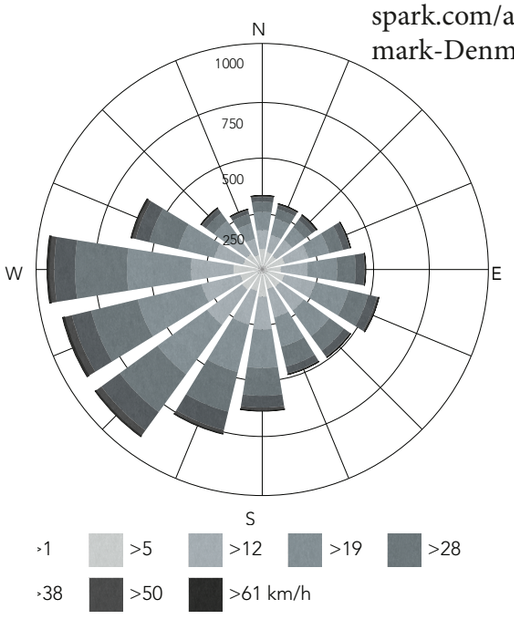
Ill: 2.15 - Map of site in the scale of 1:1000.

Skal i illustrationsliste _ https://weather-spark.com/averages/28828/Odense-Syddan-mark-Denmark



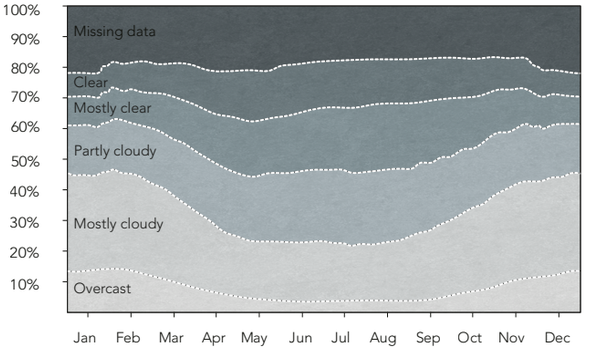
SOLAR PATH DIAGRAM

Ill: 2.16 The length of the days differs with 12.51 when comparing the longest and shortest day. The 21st of June the sun rises at 03:41 and sets at 23:12. The shortest day is the 21st of December where the sun rises at 9:43 and sets at 15:03.



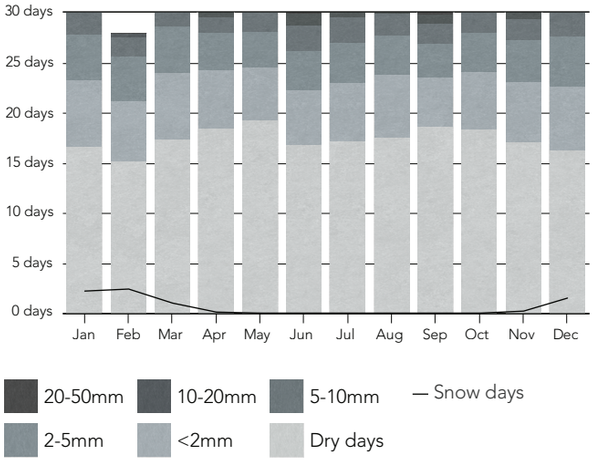
WIND

Ill: 2.17 The wind rose for Svendborg illustrates how many hours per year the wind blows from a certain direction. The wind in Svendborg is mainly comming from West and South-West.



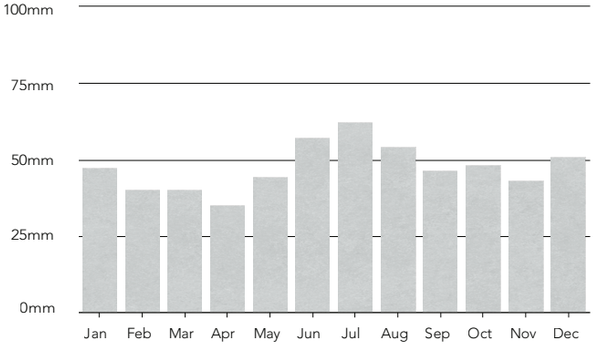
CLOUDS

Ill: 2.18 July 24 is the clearest day of the year while, the December the 26 is the cloudiest. The sky is either overcast, mostly cloudy or partly cloudy 53% of the year while it is mostly clear or clear 28% of the year. [Weatherspark]



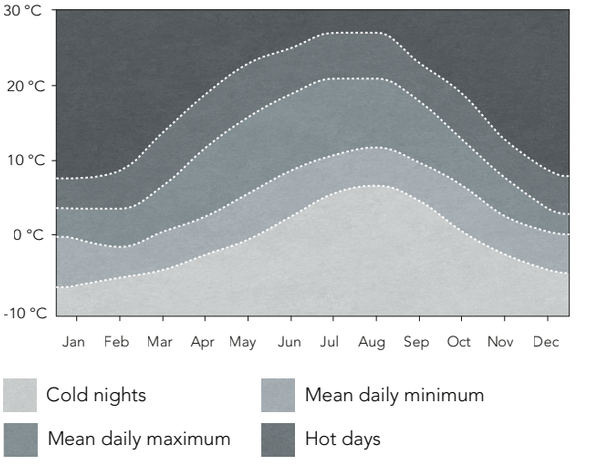
PRECIPITATION AMOUNTS

Ill: 2.19. he precipitation diagram illustrates how many days a month a certain amount of precipitation is reached.



PRECIPITATION

Ill: 2.20 The diagram shows the general amount of perception reached pr. month.

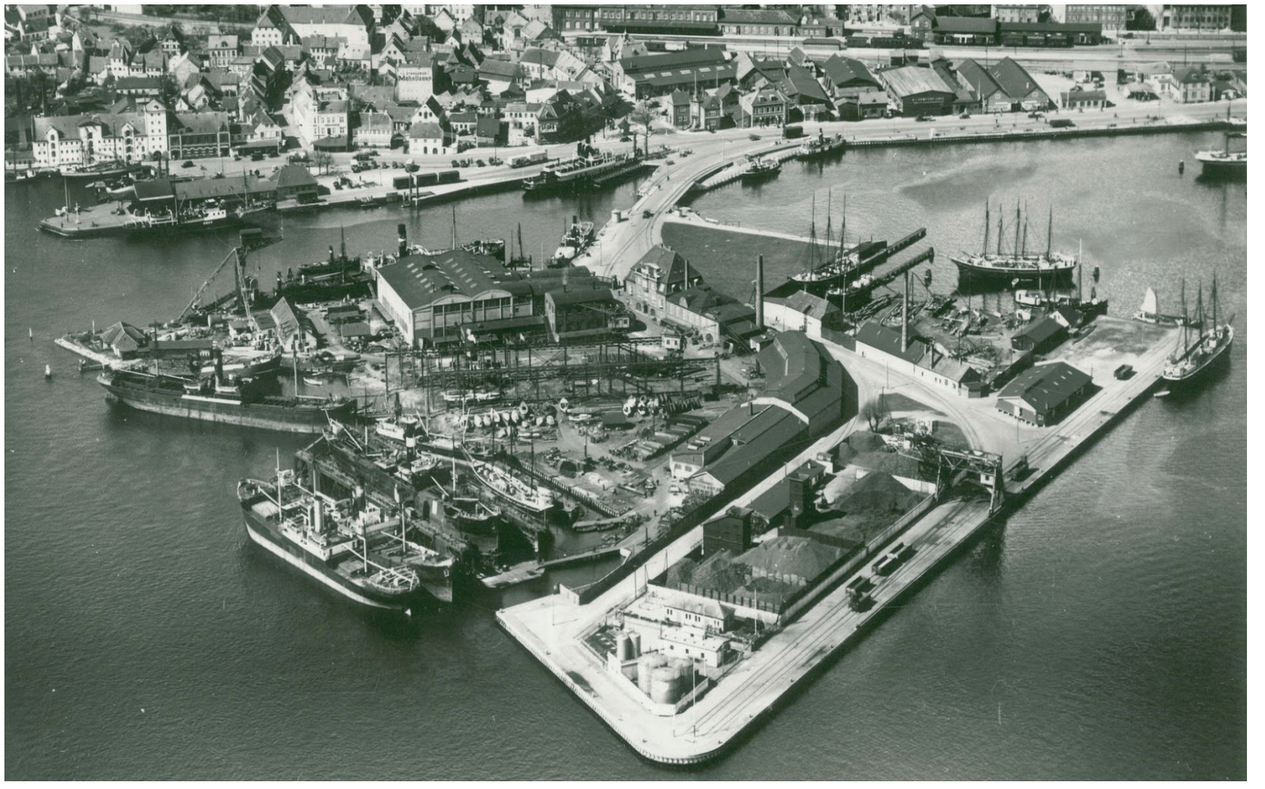


TEMPERATURES

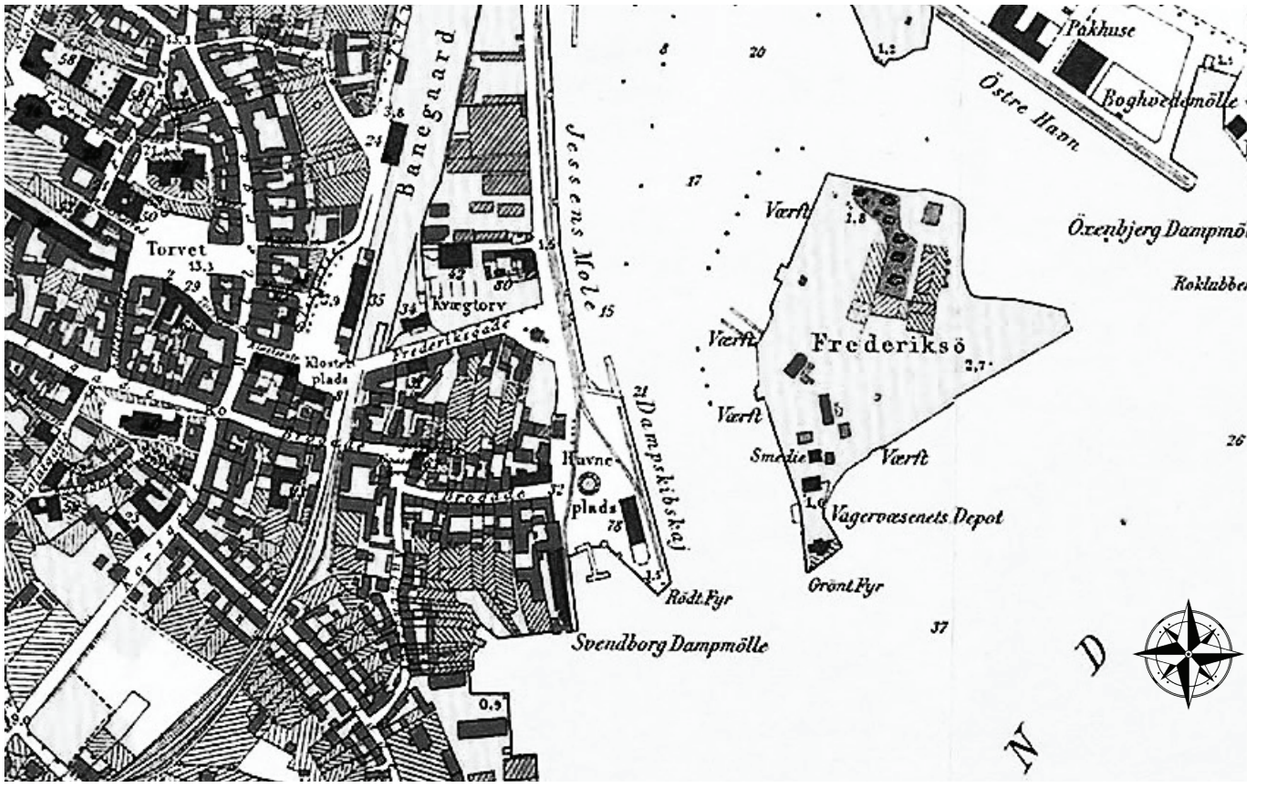
Ill: 2.21 The “main daily maximum” and “main daily minimum” illustrates the average maximum and minimum temperatures while hot days and cold nights illustrates the hottest day and coldest night of each month.

SITE AND HISTORY

The origin of Frederiksøen is closely intertwined with the expansion of the naval industry in Svendborg. It was originally a sandbar, however during the 18th century, Frederiksøen grew as ships threw their ballast when reaching the port of Svendborg. As the harbor area was deepened to allow larger ship access, excess material was filled onto the sandbar, gradually creating the artificial island, which today makes up Frederiksøen. (fremtidenshavn.dk, 2016) Once established, Frederiksøen was soon put to use as a dock and building berth, and soon thereafter, steamship shipyards emerged which took up the majority of the land area of the island. The buildings and facilities were large of scale and industrial in their appearance. Among these buildings, was The arched hall which currently neighbors the site. Therefore, The Arched hall has historic value to the people of Svendborg, and it act as a reminder of the golden age of naval activities and shipbuilding that for centuries has characterized the harbor and lifestyle of the area. At the tip of the site, an old lighthouse once was erected.



Ill: 2.22 - View of Fredriksøen anno 1948



Ill: 2.23 Typographical Map Svendborg anno 1907

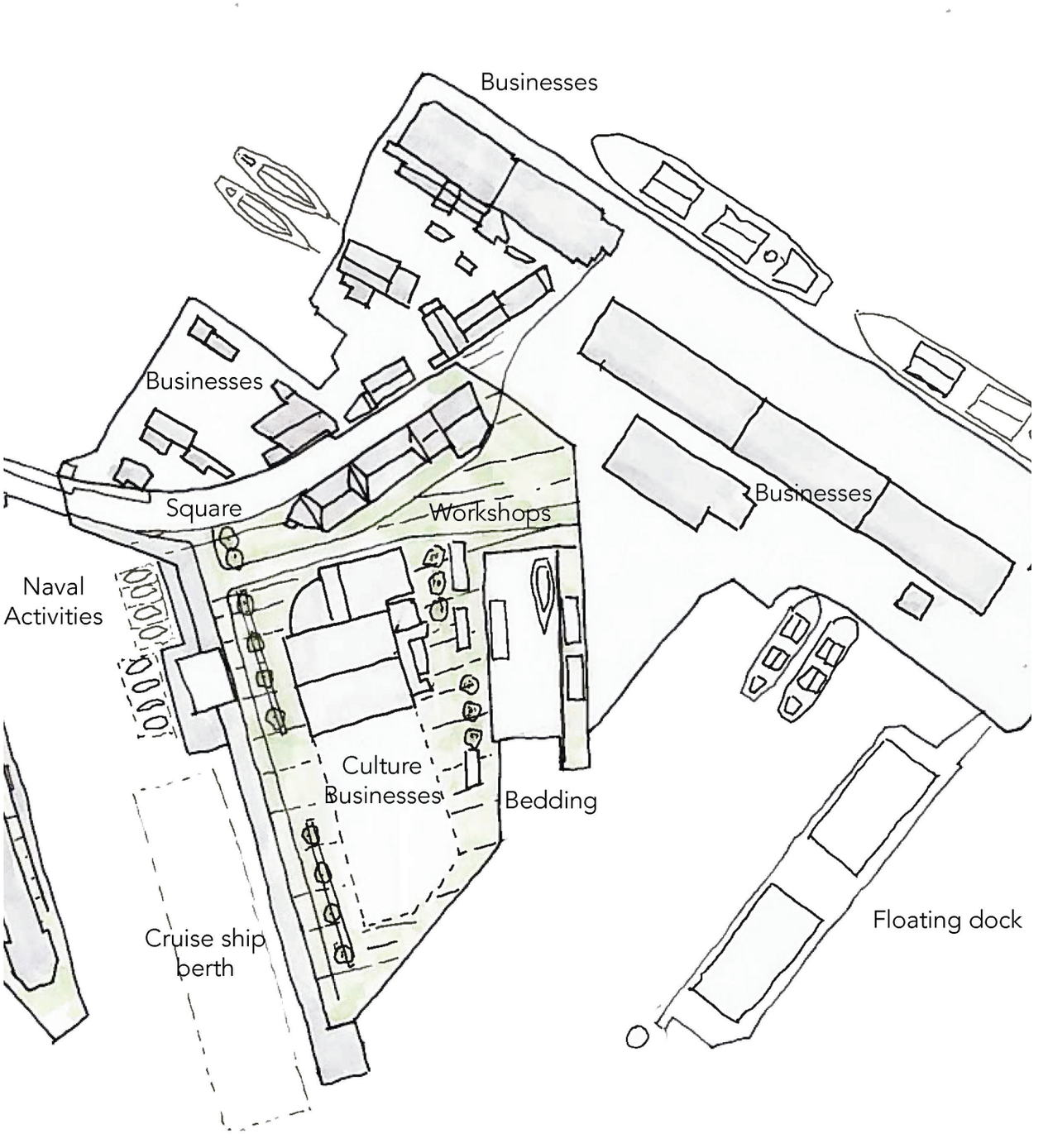
Ill: 2.24 - Frederiksøen

DEVELOPMENT PLANS

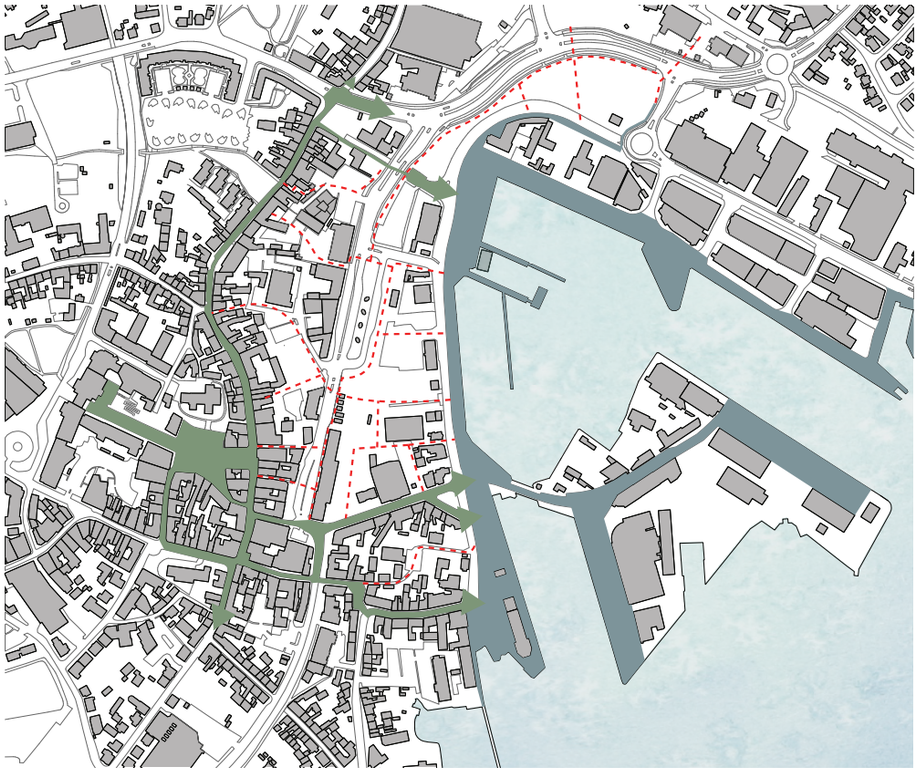
In collaboration with the muncipality of Svendborg, the danish architectural office of Vandkunsten has developed an area-plan for Frederiksøen. As a point of exit, the plan sets the frame for future development at the site.

An urban flow is lead across the bridge connecting Frederiksøen to the city, and a recreative area is established a the quay facing the city. The recreative area provides the setting for stay and transit at the squares sorrounding the site, as well as and maritime activities at the harbor quay. The arched hall is renovated and 'opened up' and display activities related to small upstarts and businesses and workshops developed around the bedding at the shipyard. (Fremtidens Havn, 2014).

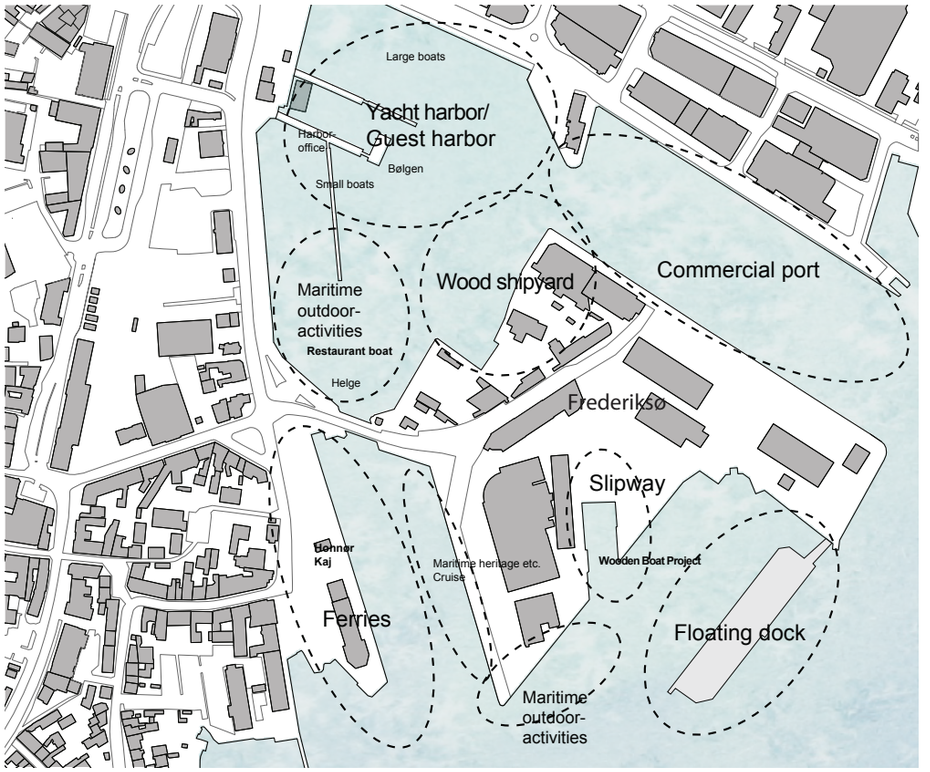
The placement of a new library building on the harbour, could emphasize Svendborg´s maritime and cultural history and identity as a port city. By placing a library at the harbour, cultural activities will naturally follow, and could connect the experience of the South-Funen Sea with the life of the city. The challenges of developing a library at the harbour, is the relatively demanding resources needed. However, it has architectural potential, and could contemplate future development of the harbour area and act as the binding institution between city and harbour. The activity and use of the library depends on the future development of the harbour area, which is currently underdeveloped. Advantages when building at the harbour, are the short distance to public transport and parking. Compared to developing a library in the city-center, the library will be less accessible for pedestrians and cyclists and have limited possibility of combining a visit to the library with everday tasks. (Svendborg Bibliotek, 2015) However, a new library at the harbour could contemplate future development of the harbour area and act as the binding institution between city and harbour. The activity and use of the library depends on the future development of the harbour area, which is currently underdeveloped. Advantages when building at the harbour, are the short distance to public transport and parking. Compared to developing a library in the city-center, the library will be less accessible for pedestrians and cyclists and have limited possibility of combining a visit to the library with everday tasks. However, a new library at the harbour wusinesses at the harbour. (Svendborg Bibliotek, 2015)



Ill: 2.25 Sketch of development plan made by Vandkusnten ▶



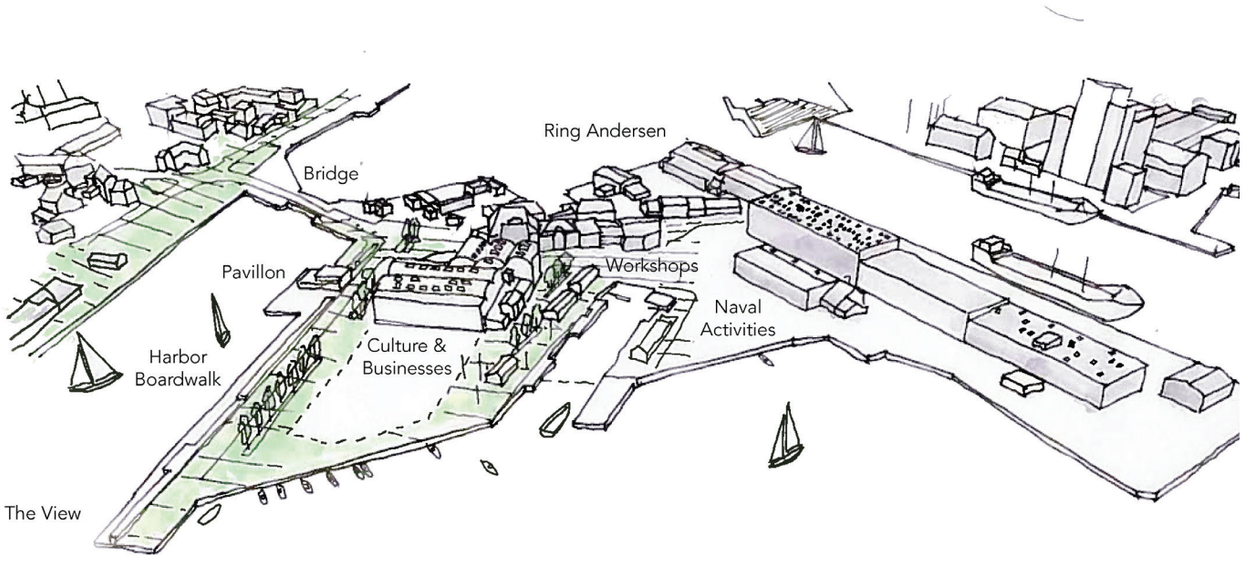
Ill: 2.26 Pedestrian flow.



Ill: 2.27 Activities on water.

FLOW & HARBOUR STRATEGY

The placement of a new library building on the harbour, could emphasize Svendborg´s maritime and cultural history and identity as a port city. By placing a library at the harbour, cultural activities will naturally follow, and could connect the experience of the South-Funen Sea with the life of the city. The challenges of developing a library at the harbour, is the relatively demanding resources needed. However, it has architectural potential, and could contemplate future development of the harbour area and act as the binding institution between city and harbour. The activity and use of the library depends on the future development of the harbour area, which is currently underdeveloped. Advantages when building at the harbour, are the short distance to public transport and parking. Compared to developing a library in the city-center, the library will be less accessible for pedestrians and cyclists and have limited possibility of combining a visit to the library with everday tasks. (Svendborg Bibliotek, 2015)



Ill: 2.28 Sketch og development plan made by Vandkusnten

SENSE OF PLACE

The site is situated at an ideal location towards the south, surrounded by a large open area which has natural qualities such as relation to the harbor, a stunning view, and the large amount of sunlight hours. However, the concrete platform which makes up the site, lacks natural shelter and the existing architecture has no immediate relation to the human scale. Steel fences limit access to the worn out wharf, and the site is often wind-blown due to the exposure to the South-Funen Sea. The site has an authentic industrial setting, where smaller boats and ships occasionally lay to qay, however pedestrians also experience a sense of placelessness due to the lack of direction and purpose at the site. Currently, the arched hall stands empty, and the general lack of activity at the site, creates a need for inspired interaction that emphasize the natural qualities of the place and its environment.

Ill: 2.29 - A boat docking at the site

- The library is to act as a catalyst for branding the identity of Svendborg.

- To create a landmark which represents the cultural vision of Svendborg, and complentates the identity of te city

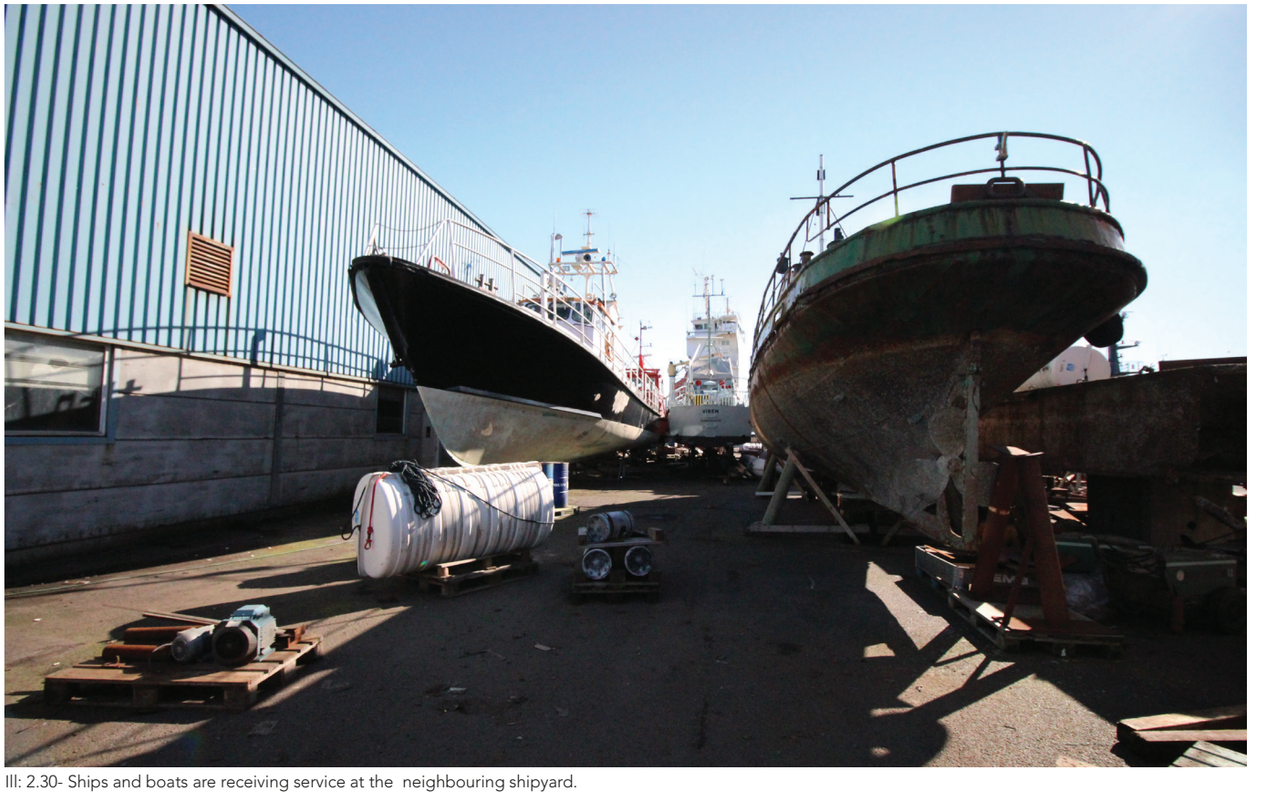
- To decrease the scale of the outdoor space, by subdividing outdoor space and volume of the library building.

- The library is to create the framework for experiences, community fellowship and meetings in the city.

- The library is to contribute to creativity and innovation through the creation of new alliances and part nerships.

- To create a building which gives something to the harbor. This is done by creating the possibility of having an elevated 360 degree look-out of the sorrounding city and harbour.

- To create a sunlit square at the southern tip of the site meant for stay and with close connection to maritime activities.



Ill: 2.30- Ships and boats are receiving service at the neighbouring shipyard.

Ill: 2.31 - The open area neighbouring the shipyard.

Ill: 2.32 - Open area situated towards the city harbourfront.

Ill: 2.33 - Maritime activity at the site.

VISION

The vision of this project is to explore the potentials of a contemporary redefinition of the traditional library into a modern venue and knowledge center. As a project proposal for Svendborg municipality, it is the ambition to accentuate the contextual identity with the library as a cultural beacon for Svendborg as a seaport. This is approached through a refined conduct of spatial interaction of people as well as a thorough analysis of the cultural impact of libraries throughout history. The project will reinterpret recent scientific studies of key functions for a dynamic diurnal rhythm related to the library typology.

Ill: 2.34 - Panoramic view of the site and the arched hall.

Ill: 3.01 - Mood picture.

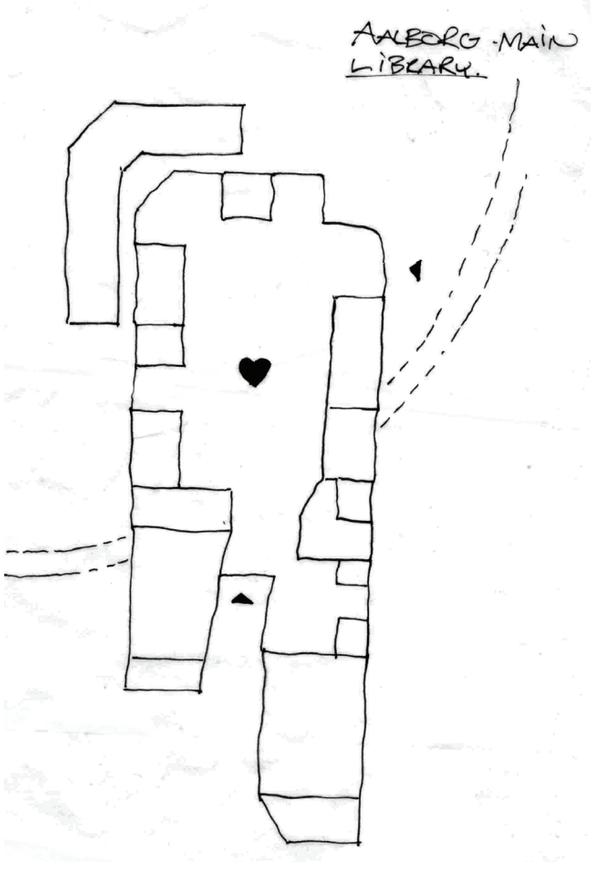
03

Design Brief

Development of the Spatial Program
The Four-Space-Model

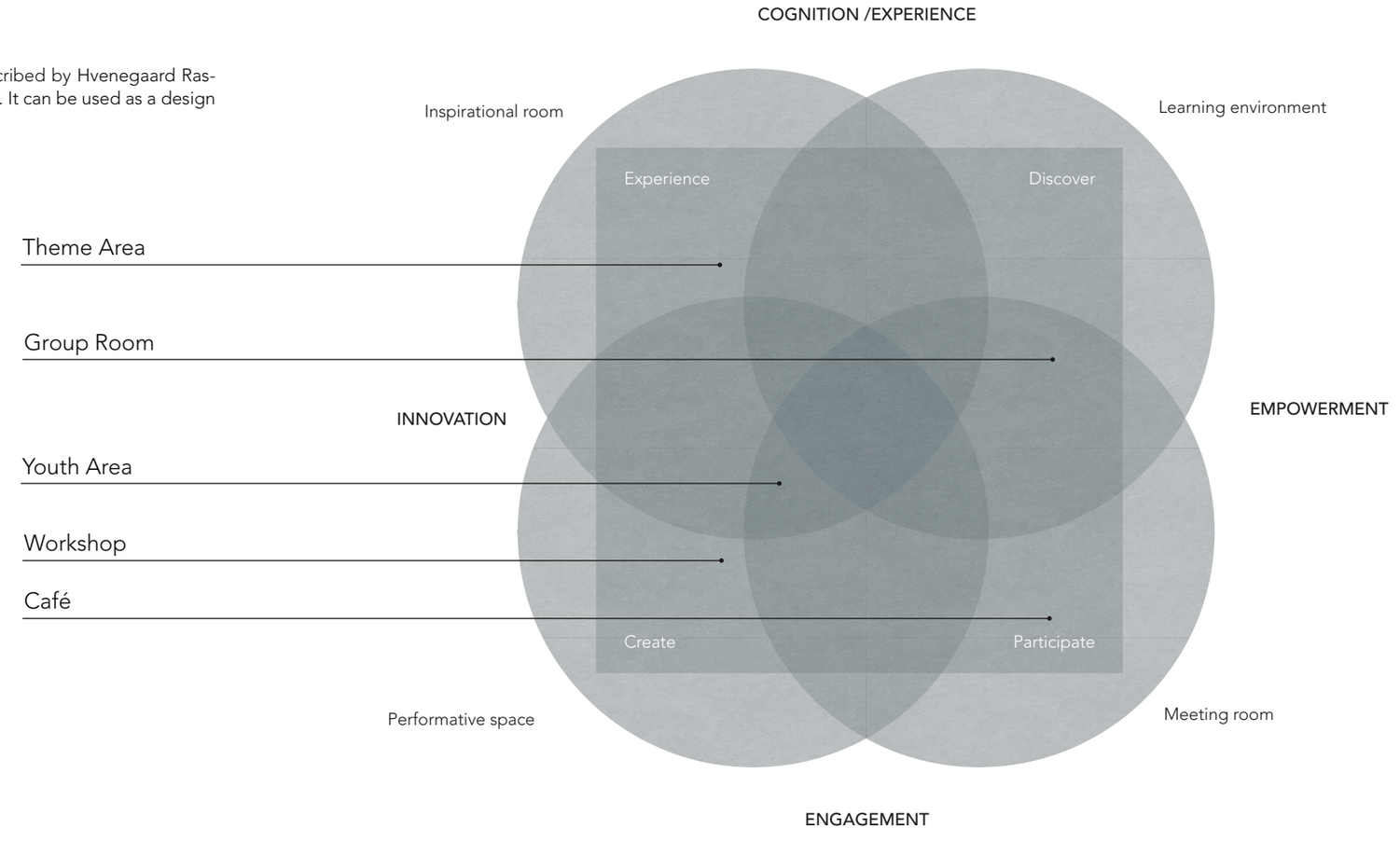
DEVELOPMENT OF SPATIAL PROGRAM

Svendborgs vision for a new library can be explained by examining 'Firerumsmodellen', an analysis method developed by the Danish 'Informationsvidenskabelige Akademi'. The model describes four rooms; The inspiration room, the Learning room, the meeting room and the performative room. The rooms, are not seen as purely physical, - they can also be supported by digital services. However, the four rooms overlap in the physical library space and its arrangement as well as offers, programs, presence of staff and partners.



Ill: 3.02 - Plan sketch of Aalborg public library:
The main space in Aalborg central library is designed like an open flexible square, with access to the different librray spaces, which provides an easy overview of the functions.

Ill: 3.03 The four-space model as described by Hvenegaard Rasmussen, Jochumsen and Skot-Hansen. It can be used as a design tool as well as an analysis method.



THE FOUR-SPACE MODEL

The four-space-model is an useful design tool which can be utilized in the development of a library building program. The model was first published in 2010 in a Danish report on public libraries by the Committee on the Public Libraries in the Knowledge Society, and it describes four key physical and virtual spaces which make up the Nordic public library. (Nissen & Carlsen, 2014).

According to the model, the library's main objective is to support the creation of 4 values: Experience, engagement, empowerment and innovation. According to Skot-Hansen, the four values should not be considered in isolation, but seen as overlapping functions that interact both physically and virtually. Furthermore, the model indicates a vision of creating a library typology which consists of four different overlapping spaces. (Nissen & Carlsen, 2014).

The following, presents a roomprogram, developed in collaboration with Svendborg Library,. The program is plotted into the four-space model in order to analyze how these values are fulfilled. As seen in the model, functions can posses several values, and can therefore not be considered as falling in one category only.

Functions which can be implemented in the inspiration space could be: Exhibition areas, event areas, or a book shop. But an inspirational space could also materialize in a more organized form, such as a selected representation of the collection, where material is organized by themes or atmospheres.

Functions which characterize the activities of the performative space can be a youth area with interactive games, study cells for writing, or a children's library with sound and video. It could also be in the form of music schools and workshops which is under the guidance of partners to the library, such as professional artists, developers or designers. Furthermore, a central performative space is the event area which makes possible a broad range of activities.

Functions which characterize the learning space could be: a conference room, course rooms, learning labs and study rooms or cells.

Spaces which can be designed for the planned meeting could be reading lounges, group rooms, a corner at a café as well as the open public domain or arena. The casual and the accidental meeting can also happen at key functions in the library such as at the children's library, at entrance areas, at a net-café and also in the space between functions, which could be in the form of an open square or smaller social niches near access ways.

Performative Space	No.	Unit area	Total area	Natural light	View	Outdoor connection	Comments
Children & Family Area	1	120	120	■	□	□	An interactive playground area which focus on experience, exploration and creation. Targets families and tweenies in the age group of 2-6 and 7-12 years old.
Youth Area	1	90	90	■	□	□	A zone which focuses on teenagers and the youth. It can contain functions and facilities not immediatly connected to the function of traditional library. This is done to attract non-users.
IT-Café	1	50	50	□	□	□	A digitial café which focus on the digitial and online experience. The area is soecifically oriented towards internet browsing, streaming and computer games.
Event Area	1	60	60	■	■	□	An area for activities and events which can be booked by the user 24-7. The space includes a stage and an open area, free for use. Activities could be a dancing class, a small concert or a trade fair.
Workshop	1	60	60	■	■	■	A collective workshop which focus on craftmansship, and the design and production of ideas generated by the user.
Music School	1	30	30	■	■	□	A space for music classes and performance art. It provides suitable facilities, instruments and equipment for a creative process. Can be incooporated with the multi-purpose hall.
Laboratory	1	30	30	■	■	□	A create laboratory which focuses on the use of new technology such as 3d printers, or new media such as virtual reality glasses. The creative process is under the guidance of tutors.
Multi-Purpose Hall	1	200	200	□	□	□	An enclosed room for larger events and presentations and classes. Can be booked by partners to the library as well as citizens.
Multi-Room	1	30	30	■	■	□	An enclosed room for smaller events and presentations. Can be booked by partners to the library as well as citizens.
Total	-	-	670				

Meeting Space	No.	Unit area	Total area	Natural light	View	Outdoor connection	Comments
Entrance Area	1	200	200	■	■	■	Consists of one main entrance which is connected to a foyer. The area emphasize transit, meeting and should express the first impression of the library in a meaningfull way.
Reception Area	1	50	50	■	□	□	The reception/information area has dynamic, outgoing and staff which can move freely between satelitte desks and provide service and guidance throughout the open library plan.
Café	1	80	80	■	■	■	Can be centrally placed towards activities or a view, where the user can experience the library or the site in an informal and cozy manner.
Social Nichés	12	12	144	■	□	□	Nichés which emphasize the accidental or planned meeting, are situated at key positions in the open-plan library in a lounge type of setting.
Open Library Space	1	800	800	■	□	■	The binding element of the library, where functions and people meet in an open space. The area emphasize the meeting, flow and interaction between the offers the library provides.
Total	-	-	1384				

INSPIRATION SPACE

The space for meaningful experiences and inspiration gathering. Story-telling and artistic expressions transform the perception and sense of the library and make the user move beyond the familiar choice of loan. The space therefore emphasizes the irrational and the emotional atmosphere and can mediate a multitude of aesthetic experiences, programs and activities which also can attract the non-user to the library.

PERFORMATIVE SPACE

The space for involvement, innovation and activity. The space values the creation of artistic expressions through the meeting of art, music, craftsmanship and culture, and provides the tools to do so. The space can also act as the means of mediating and publishing the user's work and their products as well as stage the activities performed.

Inspiration Space	No.	Unit area	Total area	Natural light	View	Outdoor connection	Comments
Exhibition Area	1	120	120	■	□	■	Automated self service. Has a clean spatial transition between outside, and the open library plan.
Book Shop	1	40	40	□	□	□	Displays the popular litterature available for purchase. The book shop can also order topic specifical litterature home for the user.
Quiet Niché	4	6	24	■	■	□	An individual room meant for listening to sound-books, reading or browsing the internet.
Theme Areas	10	10	100	□	□	□	Selected popular litterature is organized in rooms according to theme such as fiction, Myster & Crime, Drama, Travel ¸ Health & Lifestyle, Nature, Science, History, Culture & Art and Sports.
Total	-	-	284				

Learning Space	No.	Unit area	Total area	Natural light	View	Outdoor connection	Comments
Reading Lounge	1	1	80	■	■	□	An enclosed and relaxed room suited for reading, and events held by reading clubs.
Course room	2	40	80	■	■	□	A room for collective education and learning, where both the user and partners to the library can organize meetings and lectures.
Study Niché	10	2	20	■	■	□	A room suited for individual studies.
Group Rooms	5	8	40	■	■	□	A group room for studying. Can be used by individuals or groups.
Digital Room	1	40	40	□	□	□	For classes in IT, digital tools, internet browsing and after education.
Study Area	1	80	80	■	□	□	A learning zone which emphjasizes studying in a collective and open environment.
Total			340				

INSPIRATION SPACE

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LEARNING SPACE

The space for information gathering, empowerment and discovery of knowledge. Learning in the library is an offer which happens through activities, courses and interaction between people and media. In this space, learning takes departure in the users own experiences and their wish to define their own learning needs. This happen in an informal environment, which emphasize collective dialogue and play but also creates possibilities for individual studies.

Space for Books	No.	Unit area	Total area	Natural light	View	Outdoor connection	Comments
Book Sorting	1	40	40	■	■	■	An automated zone where lent material are delivered for the sorting machine. The area implies self service and it has a clean spatial transition towards the open library plan.
Reservations Pick-Up	1	40	40	■	□	□	A pick-up zone where reserved material are organized and easy to access.
The Book Collection	1	600	600	■	■	■	Contains the cultural record of litterature and media consisting of 200.000 materials. The collection is organized alphabetically.
Book Storage	1	300	300	■	□	□	The main storage room for books which is not currently part of the displayed collection.
Total	-	-	980				

Service Facilities	No.	Unit area	Total area	Natural light	View	Outdoor connection	Comments
Nursing Room	1	30	30	□	□	□	Enclosed room for 0-2 year old and parents. Includes a small playground, place for prams and a place for nursing.
Service Room	4	15	60	□	□	□	Room for equipment regarding the service, cleaning and maintenance of the library.
Technical Room	4	15	60	□	□	□	Provides access to technical installations, such as the climate system and the boiler.
Storage	4	15	60	□	□	□	Storages for equipment belonging to the music school, the workshop, the course rooms or the café. The storage rooms also contain the not used furniture or equipment of the ibrary.
Toilets	10	5	50	□	□	□	10 mixed toilets and 2 large toilets for the disabled user.
Total	-	-	260				

SPACE FOR BOOKS

The space for meaningful experiences and inspiration gathering. Story-telling and artistic expressions transform the perception and sense of the library and make the user move beyond the familiar choice of loan. The space therefore emphasizes the irrational and the emotional atmosphere and can mediate a multitude of aesthetic experiences, programs and activities which also can attract the non-user to the library.

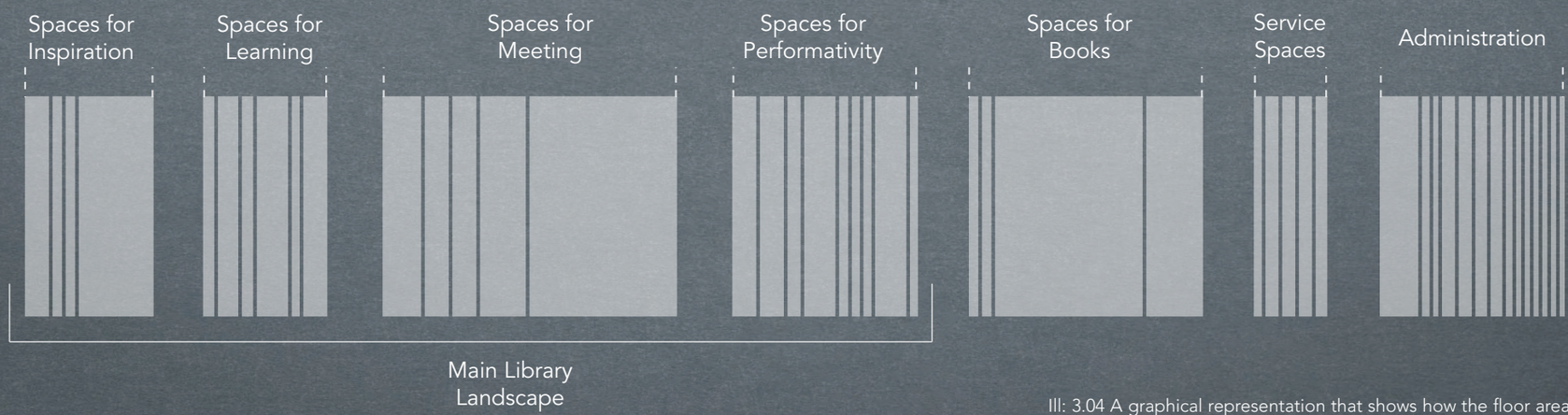
SERVICE FACILITIES

The space for information gathering, empowerment and discovery of knowledge. Learning in the library is an offer which happens through activities, courses and interaction between people and media. In this space, learning takes departure in the users own experiences and their wish to define their own learning needs. This happen in an informal environment, which emphasize collective dialogue and play but also creates possibilities for individual studies.

ADMINISTRATION

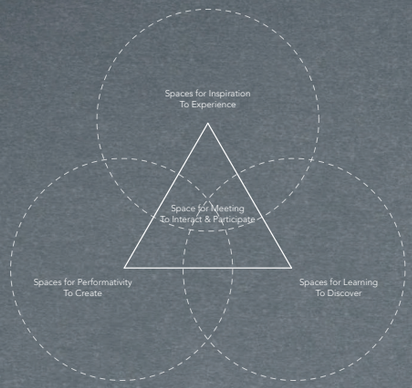
The space for information gathering, empowerment and discovery of knowledge. Learning in the library is an offer which happens through activities, courses and interaction between people and media. In this space, learning takes departure in the users own experiences and their wish to define their own learning needs. This happen in an informal environment, which emphasize collective dialogue and play but also creates possibilities for individual studies.

Administration	No.	Unit area	Total area	Natural light	View	Outdoor connection	Comments
Open-plan office	1	180	180	■	■	■	The main office space, where each member of staff has a workstation.
Management	1	25	25	■	■	□	The management consists of: Director of Library, Head of audience development and Staff- and development manager. Should have space for smaller meetings.
Secretariat	1	10	10	■	■	□	The room should be placed near or in connection to management
Meeting rooms (large)	2	30	60	■	■	□	The three big meeting romms should have the possibility to seperate and join by folding walls.
Office Cells	2	12	24	■	■	□	The three big meeting romms should have the possibility to seperate and join by folding walls.
Dinning area/Kitchenette	1	50	50	■	■	□	Should have space for 30 seats. The staff eats in 2 teams.
Lounge Area	1	30	30	■	■	□	A space for transit and stay which connects the administration. Includes office niches.
Dressing/Toilet Room	1	4	4	□	□	□	A changing room with a shower and a toilet.
Wardrobe	1	4	4	□	□	□	Clothes and working clothes should have the posibility to be stored safely in the wardrobe. A locker for each employee.
Copy/Print room	1	8	8	□	□	□	For Scanners, printers, equipment
Archive	1	8	8	□	□	□	For documents and paperwork
Server/technical rooms	1	4	4	□	□	□	A technical room, with servers, routers, etc.
Storage	1	4	4	□	□	□	For equipment, service closet etc.
Total area			441				

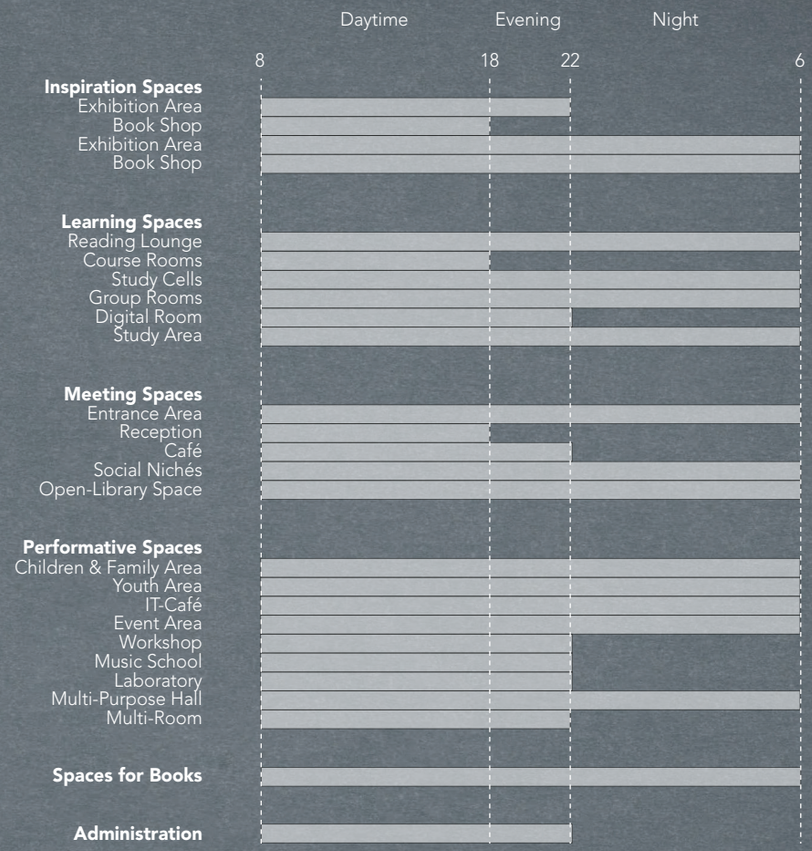


Ill: 3.04 A graphical representation that shows how the floor area is distributed in the spatial program. The spatial program is divided into the 7 categories which each represent a core function of the library.

Ill: 3.05 - Functional programming is based on the four-space model . The meeting space act as the binding element between the three core values of the library, Learning, Performativity and Inspiration. (Own illustration, 2016).



Outdoor Facilities	No.	Unit area	Total area
Recreative Area	-	-	-
Look-out	-	-	-
Harbour bath	-	-	-
Promenade	-	-	-
Entrance Area	-	-	-
Activity Space	-	-	-
Cruise Ship Quay	-	-	-
Quay for boats	-	-	-



Ill: 3.06 The daily rythm of the Library. The chart describes at which point during the day, evening and night the spaces of the library is available for use. (Own illustration, 2016)

OUTDOOR SPACE

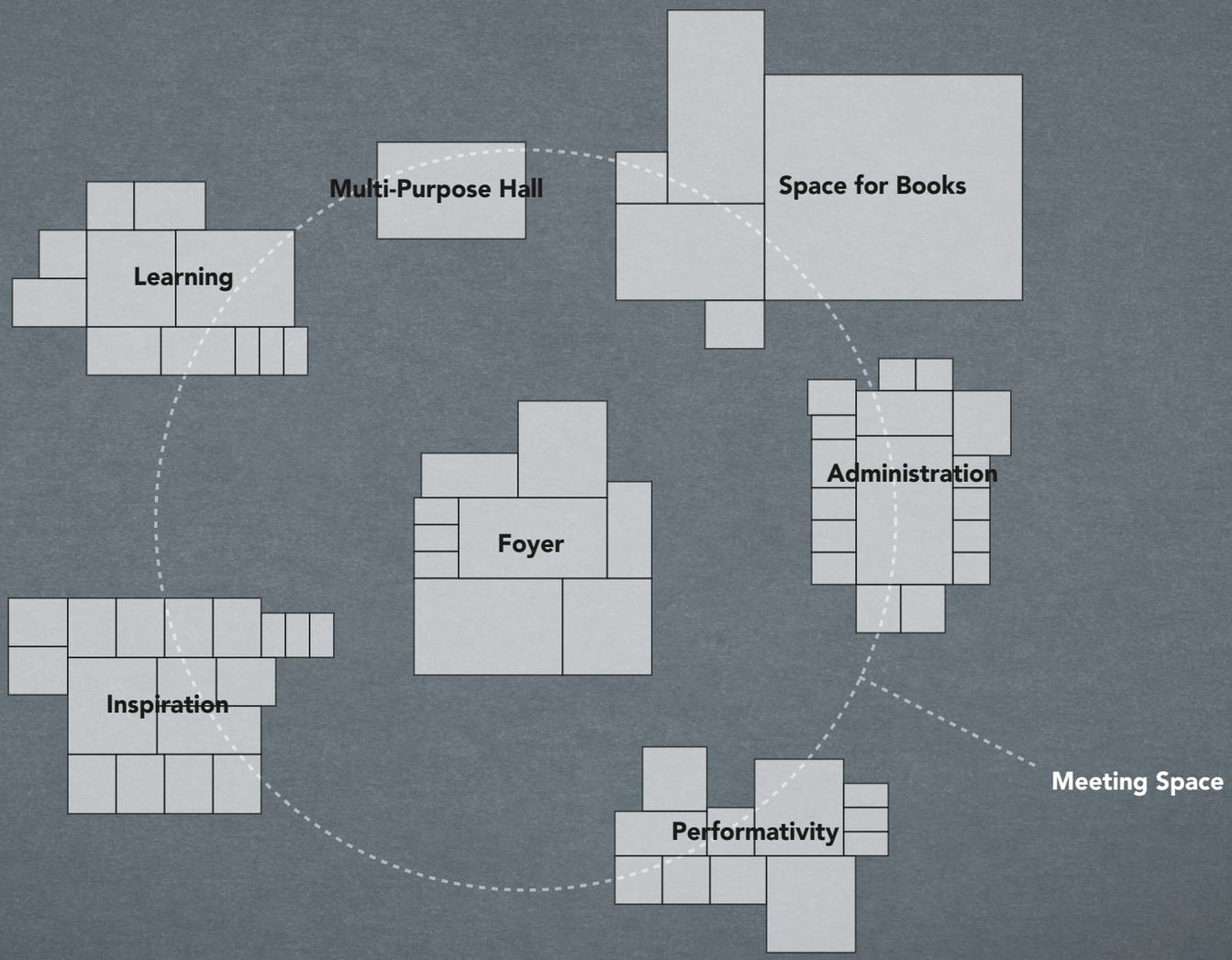
The space for meaningful experiences and inspiration gathering. Story-telling and artistic expressions transform the perception and sense of the library and make the user move beyond the familiar choice of loan. The space therefore emphasizes the irrational and the emotional atmosphere and can mediate a multitude of aesthetic experiences, programs and activities which also can attract the non-user to the library.

ZOONING

The functions is organized according to their mutual relationship. The aim is to make the functions benefit from one another, and to create a spatial principle which emphasize the creation of the four values, Innovation, Engagement, Empoverment and Experience. The zooning takes into account activity and useability of the individual rooms in order to create clusters which ensures life and interaction between the users and the functions which makes up the library.

FINAL PROGRAM

The functions is organized according to their mutual relationship. The aim is to make the functions benefit from one another, and to create a spatial principle which emphasize the creation of the four values, Innovation, Engagement, Empoverment and Experience. The zooning takes into account activity and useability of the individual rooms in order to create clusters which ensures life and interaction between the users and the functions which make up the program.



Ill: 3.07 The spatial programming is inspired by the four-space model. As seen the program is divided into clusters and connected through an open-plan solutation which act as a meeting place.

Ill: 4.01 - Sunrise seen from view deck.

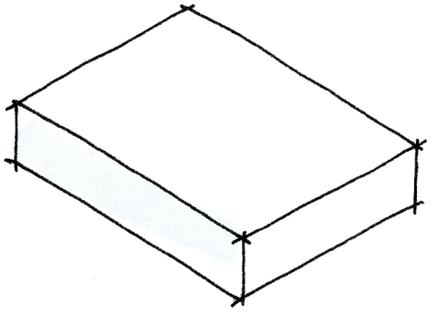
04

Presentation

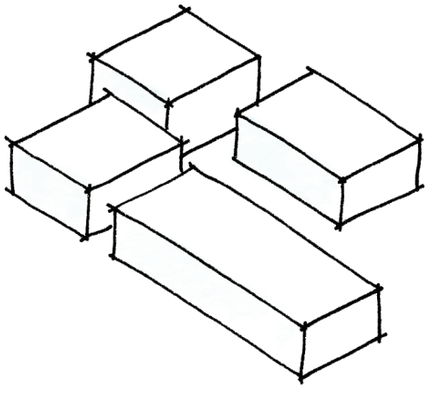
Concept
Masterplan
Elevations
Mainentrence
Plans
Daylight
Sections
Details
Courtyard
Viewdeck

CONCEPT

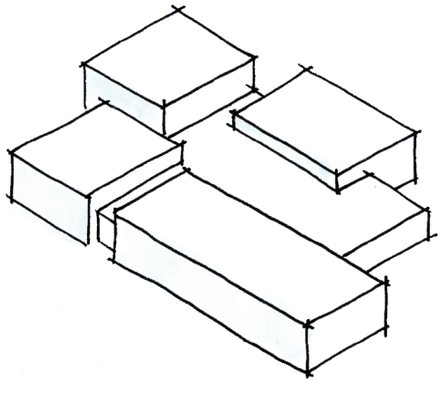
The building must accommodate the common demands of a library, but also to a high extend meet the modern requirements for a social public building. It should function as a cultural institution as well as a meeting place, and thereby create a social cohesion within the community, it should become a neutral place, for all people across social barriers, a space where everyone can seek information and knowledge. The building must be able to accommodate larger social events, but also more intimate meetings. It must provide spaces for creative innovation, but also spaces for concentration and contemplation. As a larger social public building, the library must relate to the context, but also be visible as a landmark.



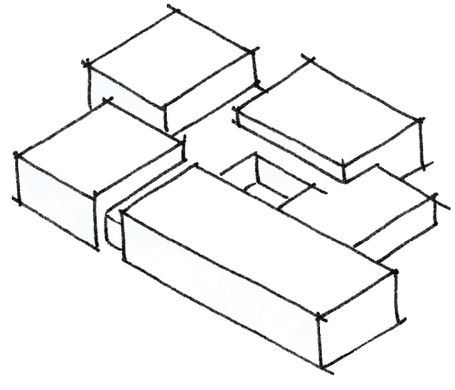
▲ Ill: 4.02 The compact volume enables the possibility to work with an open foyer within ground level. A transparent foyer that connects the interior and exterior, and shows the activity within.



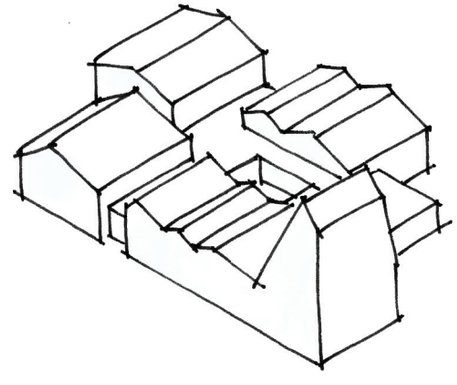
▲ Ill: 4.03 To generate a more horizontal flow within the building, and to break down the scale of the compact volume, it have been broken into four smaller volumes.



▲ Ill: 4.04 The foyer is now placed as a combining element between the volumes. The transparent foyer creates a visual connection between the volumes and the context. The foyer will function as an open and social space, where the higher levels provides space for contemplation.



▲ Ill: 4.05 To introduce an outdoor area, and to ensure daylight within the foyer, a courtyard have been introduced. The courtyard further creates a more intuitive circulation within the foyer.



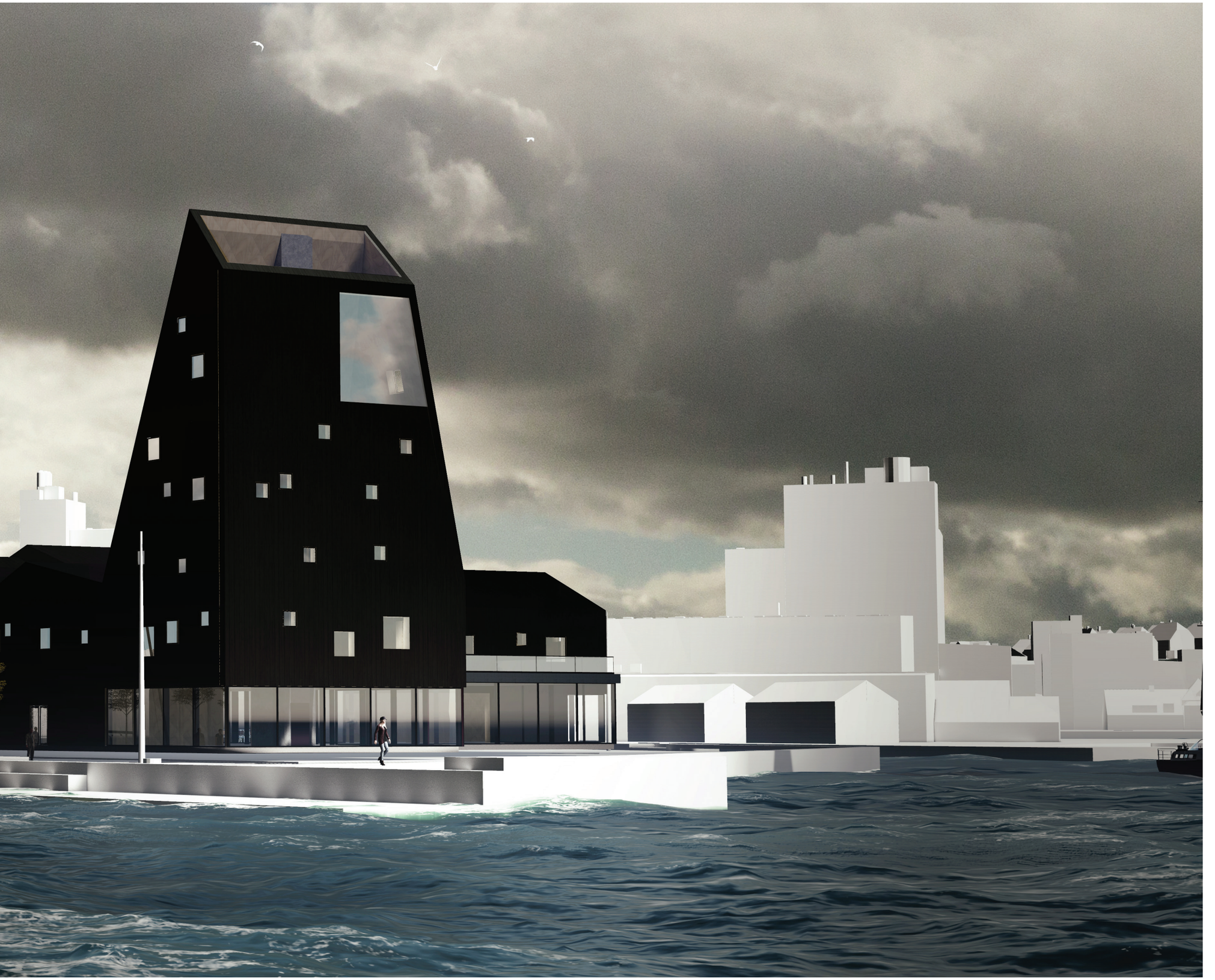
▲ Ill: 4.06 References have been found within the surrounding environment at the harbour. The buildings have been designed with references to the traditional wooden boathouses and the lighthouse, making a contextual aware building, which is also visible as a landmark.

Ill: 4.07 - Masterplan in the scale 1:1000

MASTER PLAN

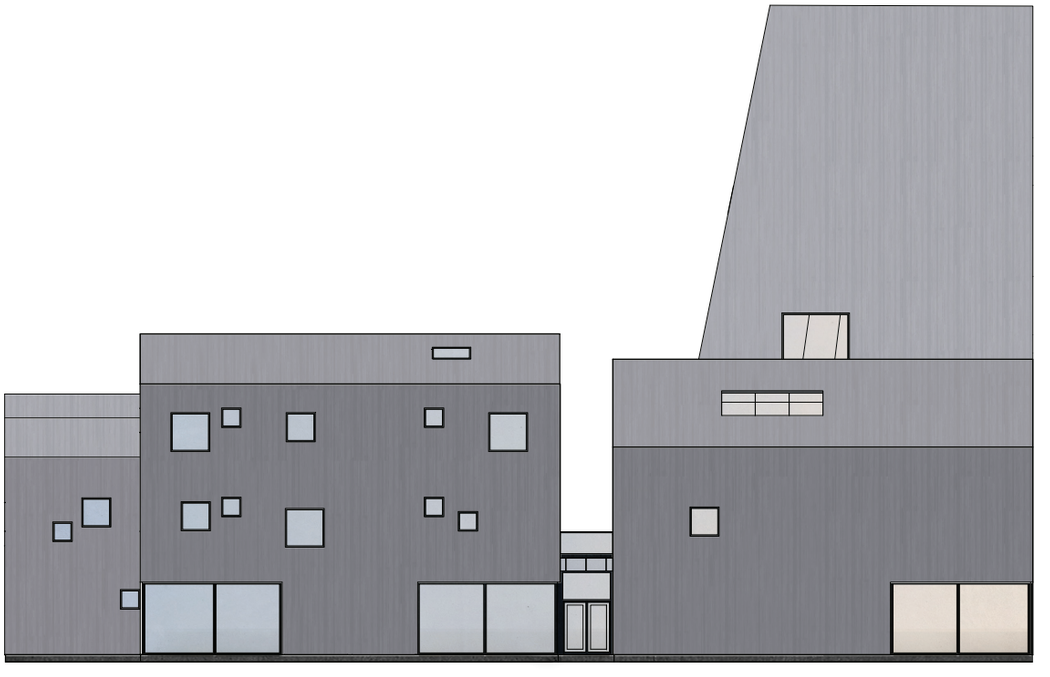
The library have a prominent placement directly out towards the water, at Svendborg harbour. With an entrance towards west, mainly intended for visitors that arrive by foot or bike, with a relating bicycle parking placed north of the volumes. The entrance placed at the east façade, is mainly intended for visitors that arrive by car, where a parking space is planed further east. Along the eastern coastline, a football field and playground have been placed.
The placement of the library, further ensures the possibility for visitors to walk along the coastline, and enjoy the spaces provided by the library, along with the view.

Ill: 4.08 - View from water



ELEVATIONS

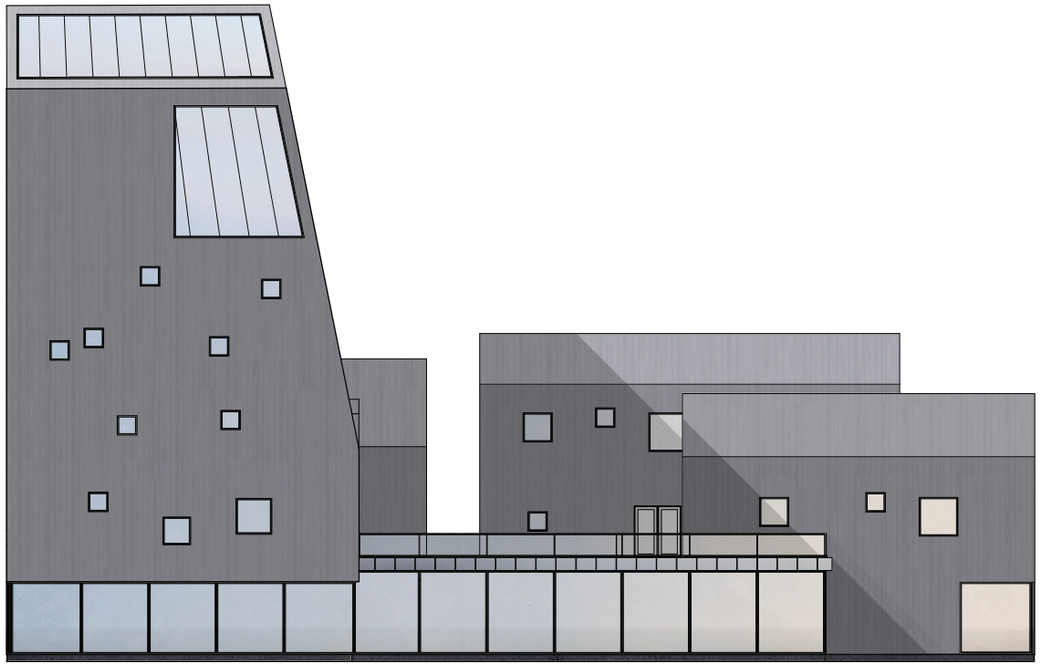
The design of the facades relates to the environmental placement at Svendborg harbour, by creating references towards the maritime surroundings. The library will add a new cultural function, to the otherwise industrial waterfront, and it must thereby stand out within the context and function as a landmark. The library in form refers to the traditional pitched roofed boathouses, and the tower to towards the lighthouse, that can guide the visitor, and function as a landmark on the harbour front. The black painted wood is used as the cladding material for the exterior facades. This contrasts the warmth of the wood used as the interior cladding material, but also the hard industrial materials used within the context, and still referencing the maritime environment at harbour. The building thereby differs from the industrial context, but still relates to the maritime surroundings. A playful placement of the windows within the volumes, have been chosen to create a more playful expression within the façades, and different light variations within the volumes. The window placement should secure a more unformal atmosphere within the library, and help to create a space where learning, creativity and social interaction is in focus. A cultivation of the boathouse.



Ill: 4.09 NORTH ELEVATION

▲ III: 4.10 SOUTH ELEVATION

0 1 2 3 4 5 6 7 8 9 10 [m]



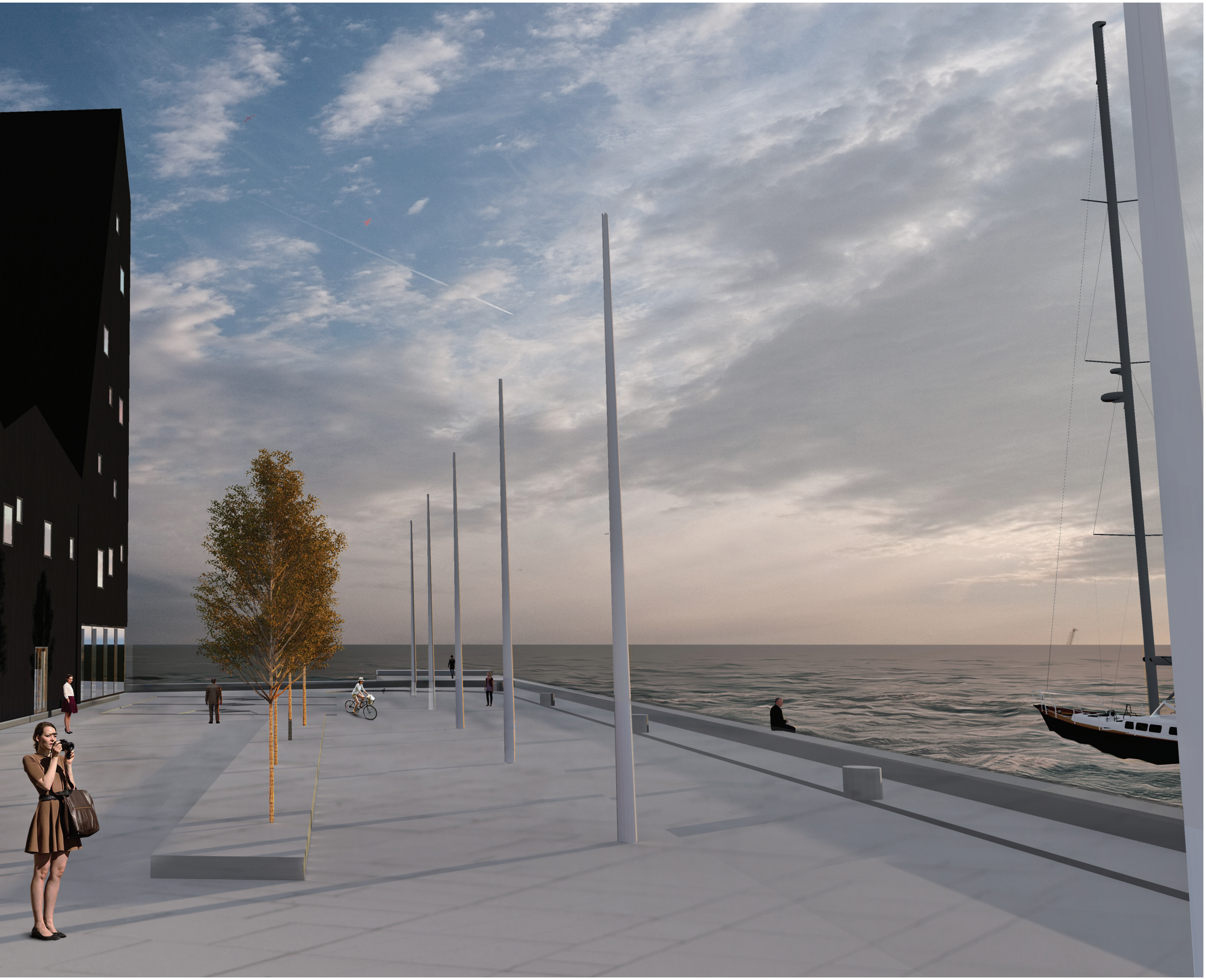
Ill: 4.11 NORTH ELEVATION

Ill: 4.12 NORTH ELEVATION

Ill: 4.13 - Entering the library at the western entrance. The public space along the west elevation provides the possibility for visitors to enjoy the sunset. ▶

MAIN ENTRANCE

The main entrance for the library, is placed along the west facade of the complex, this entrance is mainly intended for guest that arrive either by foot or by bicycle. Parking for bicycles have therefore been placed along the western road. When approaching the library, you walk down along a path, with the west façade along one side and water along the other, always with a direct view out towards the ocean. The entrance is placed logically between the two volumes, and slowly becomes visible when the visitor walks along the façade, guided by the tower placed at the end of the road.



PLANS

The arrangement of the four volumes connected by an open foyer, is made visible within the plan, through different floor materials. Wood flooring have been chosen for the volumes, emphasising a more warm and domestic atmosphere, and concreate floor within the foyer to visualise the more fluid separation of the interior and exterior, where concrete also have been used as paving within the nearby surroundings. The transparency of the foyer further helps to maintain visual connections between in- and outside, and by opening the volumes out towards the foyer, it also secures visual connection across the volumes. A courtyard have been placed within the foyer, to help furnish the open space, by dividing it into smaller areas, and to create a more logical flow within the building, when the visitor moves between the different functions. The main flow within the library have been orientated horizontally, by placing the social and most practical functions within ground level.

When entering the library you are automatically meet by a circular reception, where the visitor can receive help regarding their personal errands. Book loan stations are placed nearby, and the drop off zone along with book reservations is further placed centrally, with close connection to the west entrance, providing the visitor with an easy and quick access thereto. Here the book storage, delivery and storage is placed to optimize the practical efficiency of the book handling.

Within the same volume a public café have been planned, with seating areas out towards the southern façade, and a undisturbed view out over the water. There is a visible connection from the café seating in the foyer, out towards the children library, providing the possibility for parents to enjoy a cup of coffee, while supervising their children. The large staircase leading up the first floor, provides the possibility to function as an amphitheater, where the adjacent event area within the foyer provides a multifunctional space for different activities and exhibitions.

In connection to the children library a nursing room have been placed, making it easier for parents with different aged children to supervise them. The volume which borders against the arched hall, contains both a workshop area and a laboratory. The functions is placed in close relation to each other, to create synergy between the creative activities. The volume will function as an area with high activity, and a correspondingly high level of volume. The youth are have therefore been placed in close connection to the workshop area, where the sound level won't be disruptive.

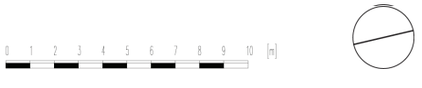
The open plan of the ground floor, provides the possibility to accommodate different sizes of social activity, along with spaces for creativity, fun and games, emphasizing its function as a more vivid and vibrant level.

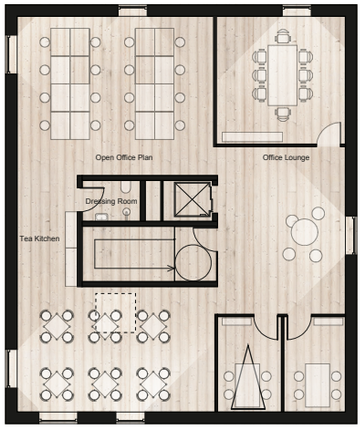
The spaces on the remaining plans, are more clearly defined, and focuses more upon creating quiet areas for concentration and contemplation, for studying and reading. The administration is placed in two levels, making it equivalent to the size of the arched hall. The auditorium is designed with a large window out towards west, providing it with a view out over Svendborg city. The bookcases within the large volume that contains a larger reading and study lounge, are placed to create smaller study areas within the open space. The levels of the tower both contains more intimate study areas, and the highest level a large window with a undisturbed view over the ocean. The roof of the foyer also functions as a large outdoor terrace, connecting the volumes on the first level.

Ill: 4.14 - Ground floor plan ▶


Nursing Room
Niche
Niche
Homework Area
HC
Mini Cinema
Niche
Niche
Wood Workshop
Space for Creativity
Service
Storage
Storage
Laboratory
Niche
Exhibition
Reception
Book loan
Magazine area
Exhibition/
New book material
Event area/
exhibition space
Niche
Youth Area
Info screen
Activity zone
Fun & Games
Book loan
Drop-Off Zone
Reservations Pick-Up
Book Sorting
Amphi staircase
Service
Service Desk
Kitchen
Niche
Book Storage
Delivery
Gate
Storage
Staff area
Storage
Kitchen
0 1 2 3 4 5 6 7 8 9 10 [m]

Ill: 4.15 - 1. floor





Ill: 4.16 - 2. floor

Ill: 4.17 - 2. floor tower

Ill: 4.18 - 3. floor tower

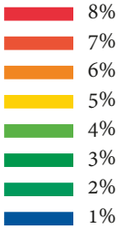
DAYLIGHT

To create a light that is not only optimal according to daylight requirements, but a light that also creates different experiences by contrasting dark and light areas, a more playful placement of the windows have been chosen. The daylight requirements state that a 2% daylight factor is sufficient for workspaces, this daylight factor have therefore also been considered sufficient for working and reading within the library. To see if this requirement is met, daylight studies have been performed in Velux Daylight Visualizer, in a 0,85m height, the same height as a workstation (Arbejdstilsynet, 2007). The studies shows that the requirements are met and that there are plenty of spaces for work related activities, but also that the library contains several darker areas, planed for different activities. The children library, can here be used as an example. The light space along the façade is planned as a homework station, where the high daylight factor is advantageous. Within the darker area of the open spaced room a mini cinema have been placed, and thereby utilizing the low daylight factor. The contrast of the daylight, creates different experiential qualities within the building, by creating spaces within space, contrasts and effects (HenningLarsen, 2015).

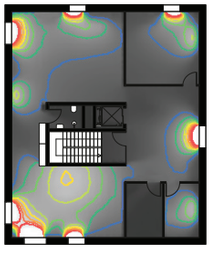
AVERAGE DAYLIGHT FACTOR

Ground floor:	4,1%
1. floor:	2,6%
2. floor administration:	2,1%
2. floor tower:	2,8%
3. floor tower:	9%

DAYLIGHT FACTOR

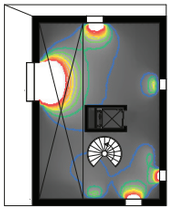


▲ Ill: 4.19 Groundfloor daylight visualisation

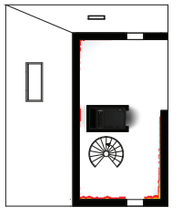


▲ Ill: 4.20 2. floor administration visualisation

▲ Ill: 4.21 1. floor daylight visualisation

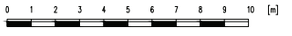


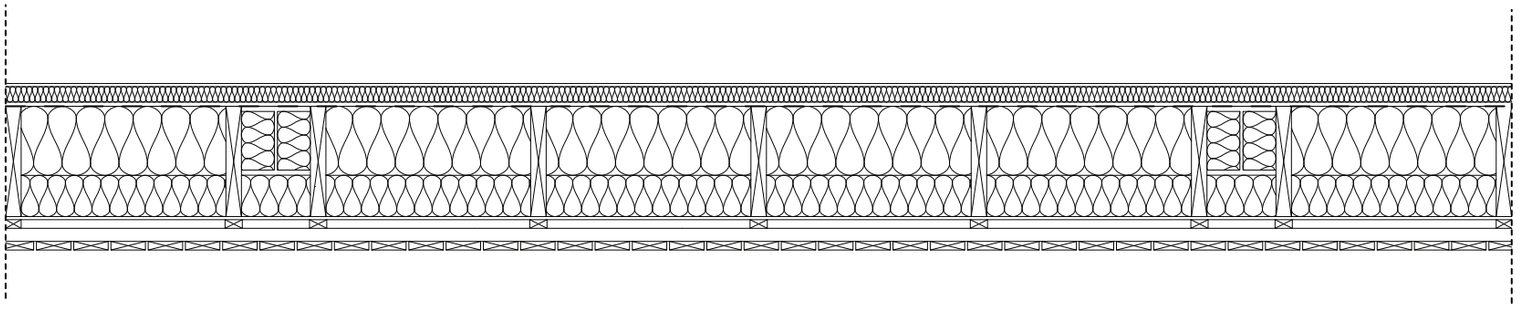
▲ Ill: 4.22 2. floor tower visualisation



▲ Ill: 4.23 3. floor tower visualisation

▲ Ill: 4.24 - Within the section, the pitched roof structure becomes visible. Towards north the height of the building are designed to meet the arched hall, after where the flow created by the roofs height and angels, slowly decreases, to afterwards raise and create a tower at the end, out toward the water.
The warmth of the wood, chosen for the interior cladding, contrast the black painted wood, chosen for the exterior



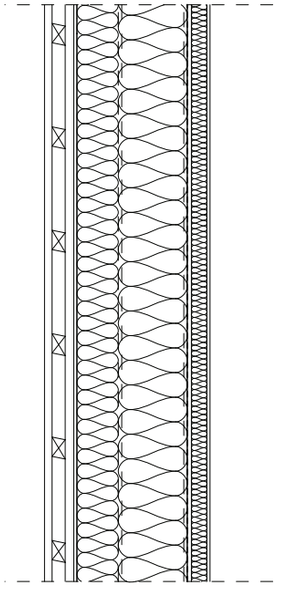


▲ Ill: 4.25- 1:20 - Cross section of external wall

DETAILS

PREFAB

The main loadbearing structure is made of steel structure, with visible HEB steel columns with reference to the old industrial steel yard. After erection of the structural steel, the wall is ready to install as a modular system made of prefabricated timber cassettes.

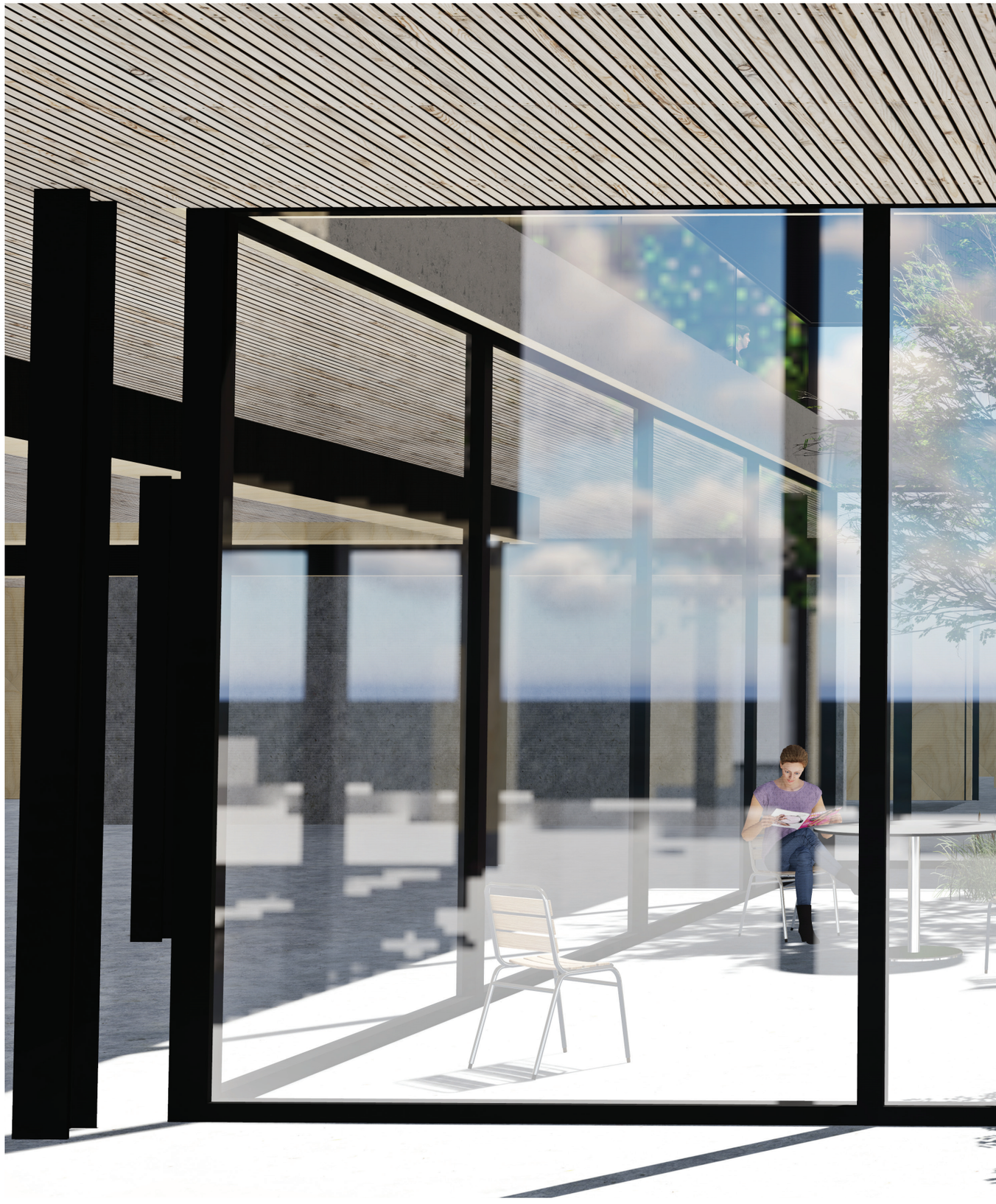


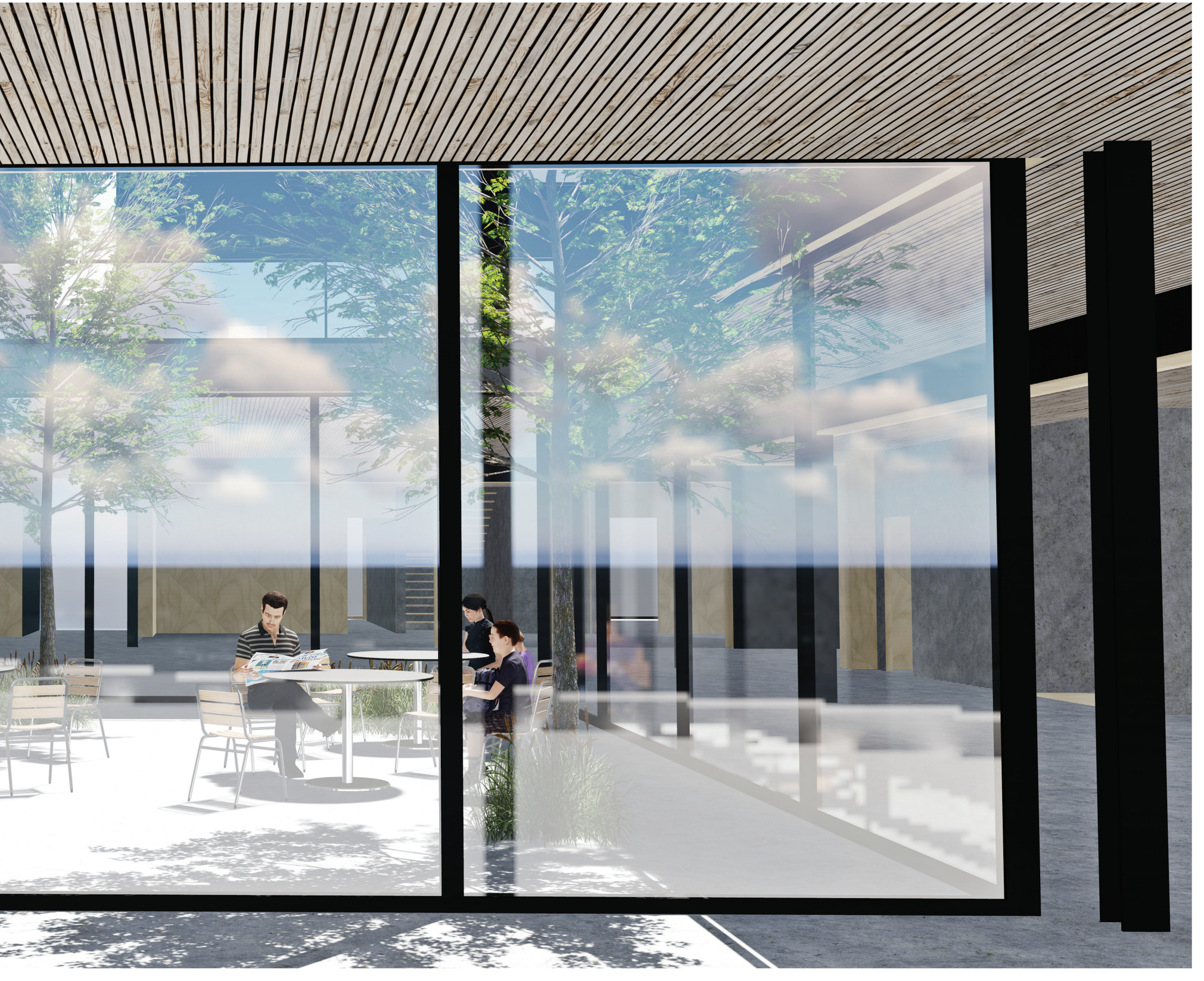
◀ Ill: 4.26 - 1:20 - Detail of external wall

COURTYARD

The secure daylight within the deep space of the foyer, the courtyard have been introduced. The courtyard, secures a high daylight factor within the foyer, and together with the concrete floor and steel columns the atmosphere becomes more industrial, and contrasts the warmth of wooden volumes. The courtyard further creates a limited outdoor space within the large foyer, thereby dividing the space into smaller niches and areas, but still maintaining the transparent qualities and visual connections within the foyer. The courtyard further provides an outdoor space, sheltered from the sometimes strong winds that can occur at the harbour front.

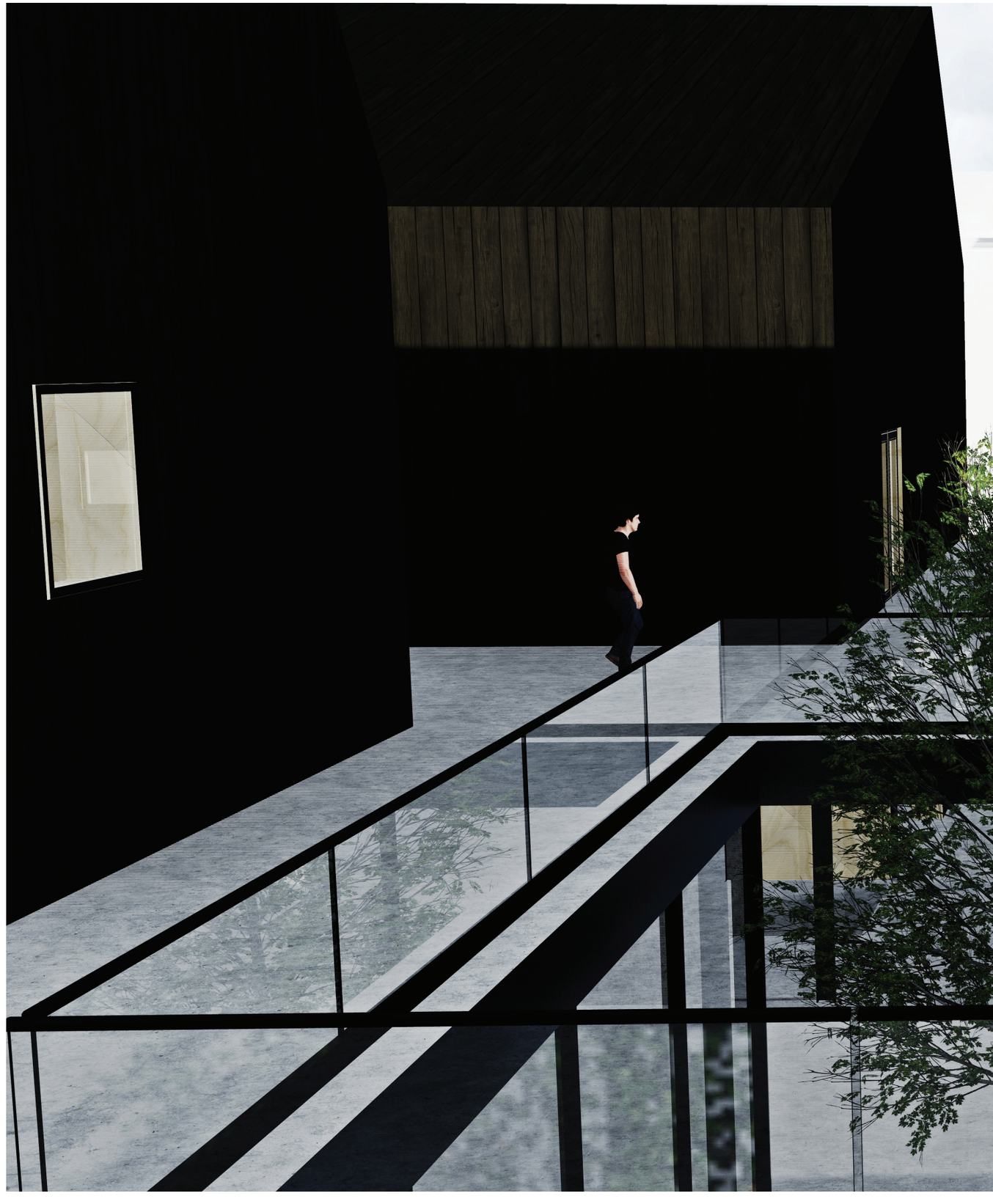
Ill: 4.27 - View within the courtyard. ▶

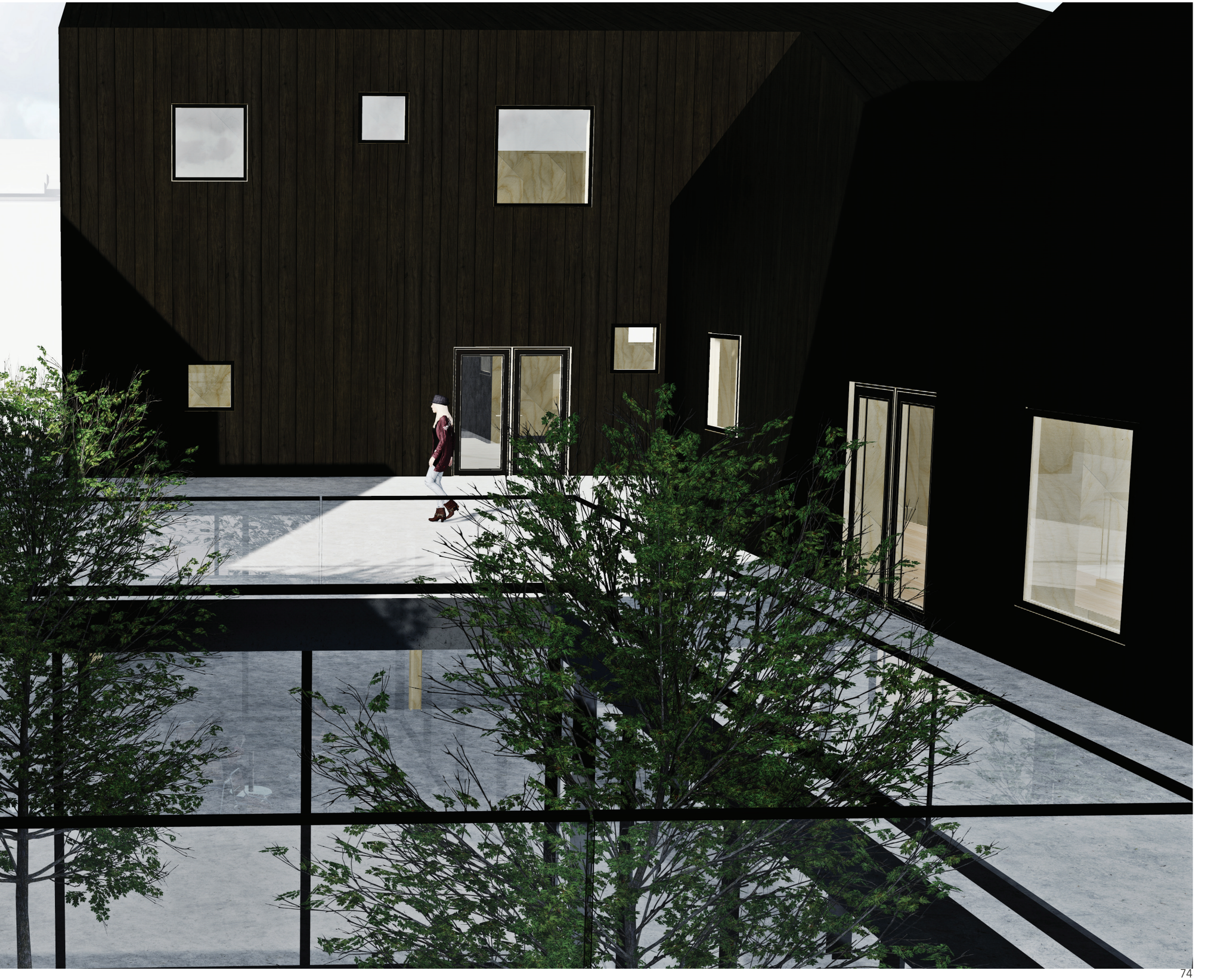




VIEW DECK

Ill: 4.28 - Out on the terrace, on top of the foyer, the scale of volume decreases. The volumes here seems as smaller boathouses, creating a small defined community,

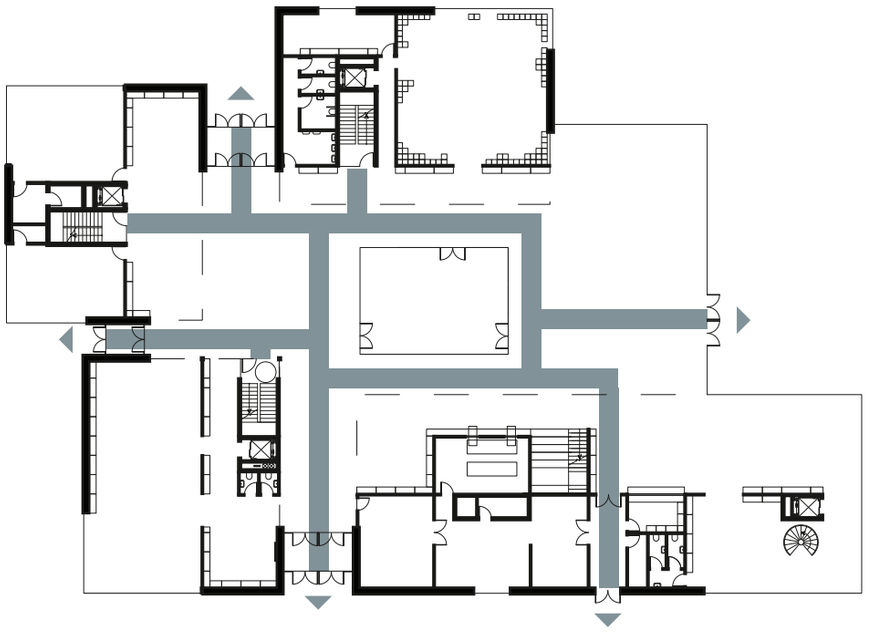




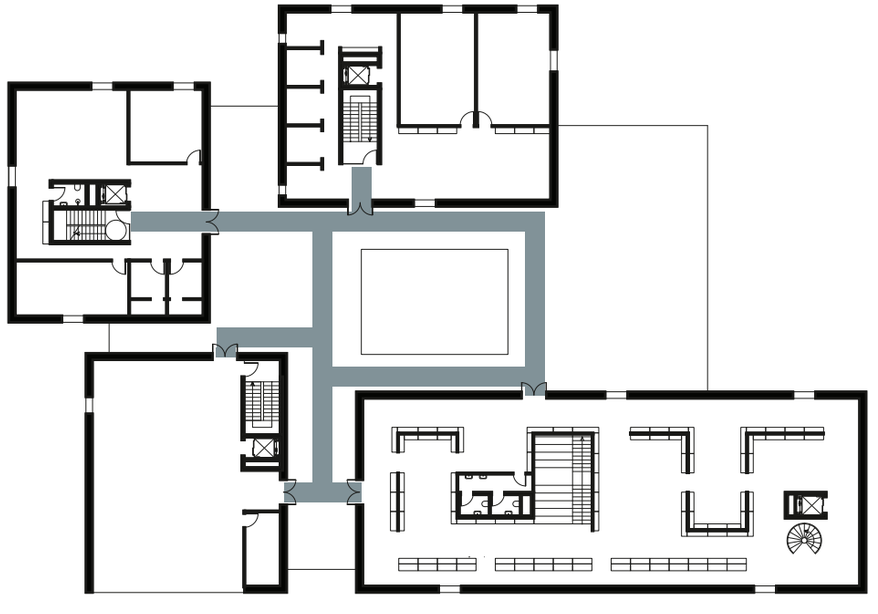
FIRE EXIT PLAN

A building should be designed to accommodate evacuation easily and safe, either through escape routes or directly to the outside. The scheme shows the available fire escape routes and the placement of fire exits in the complex. The escape routes have been designed to be 1300mm wide, to ensure the fastest and most efficient evacuation of people, and the fire exits have been placed within a 25m radius from every place in the building.
To meet the fire regulations, the materials have been chosen and treated, to increase the time before the collapse of the building in case of fire. The cores, containing stairs and elevators is made in concrete, and are therefore not combustible and functions as fire sections within the building. The steel construction have been treated with fireproof paint, and the plywood chosen as the interior wall material classifies as a type K1 10 D-s2,d2 cladding. This means that the cladding material must for a period of 10 minutes, protect the bearing construction behind (Rockwool, 2016). The building will be categorized as Application Category 3, a building that accommodates guests during the day. They will not necessarily be familiar with the buildings escape routes, but they will be able to bring themselves to safety. Each room will be equipped with automatic sprinkler systems, and smoke detectors (Bygningsreglementet, 2014).

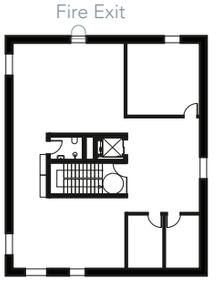
Ill: 4.29-4.33 - Fire exit plan - 1:500 ▶



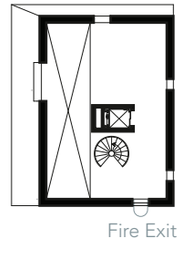
Ground floor



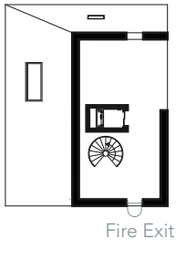
1. Floor



3. Floor

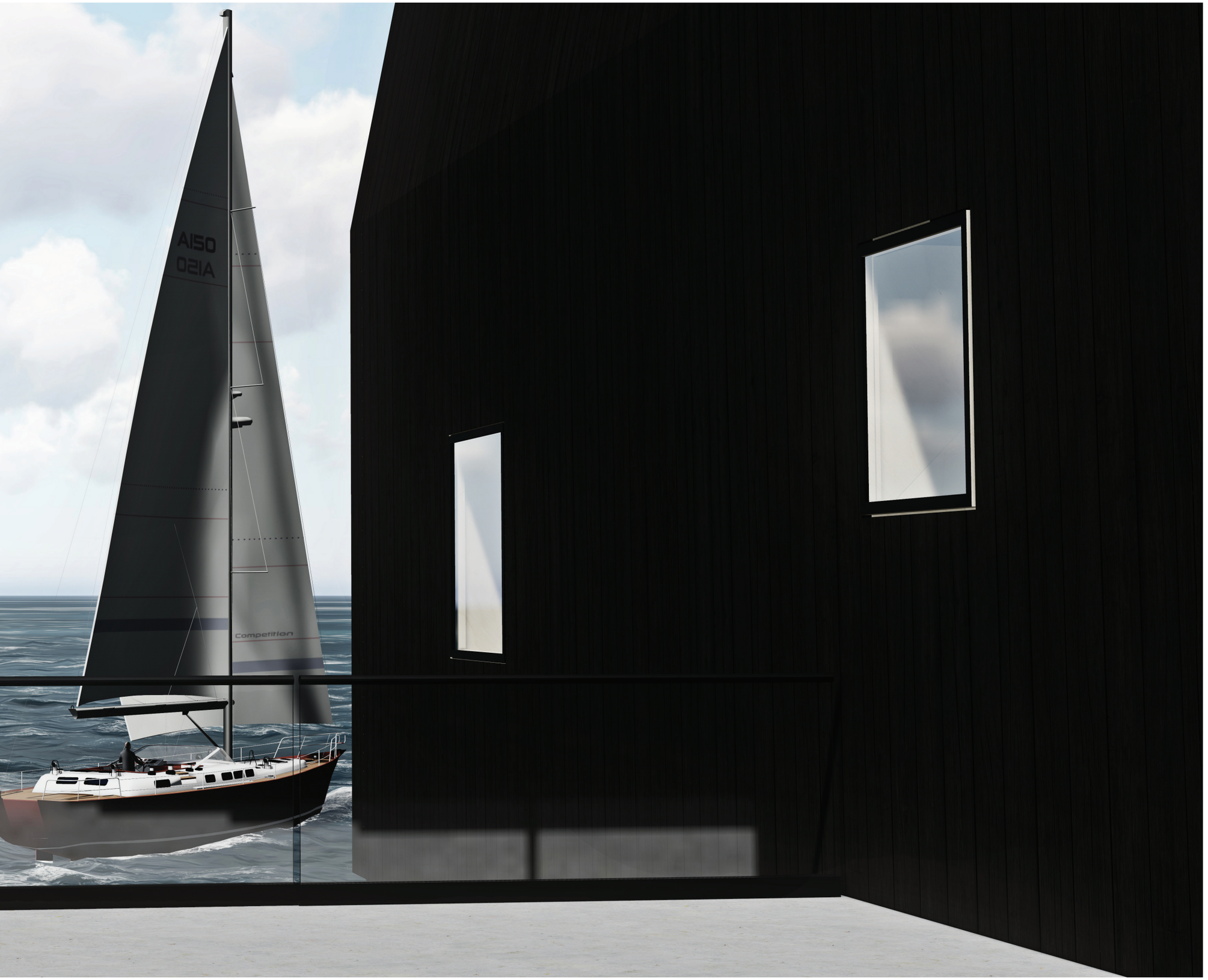


Tower - 3. Floor



Tower - 4. Floor

Ill: 4.34 - View towards north


A150
021A
Competition

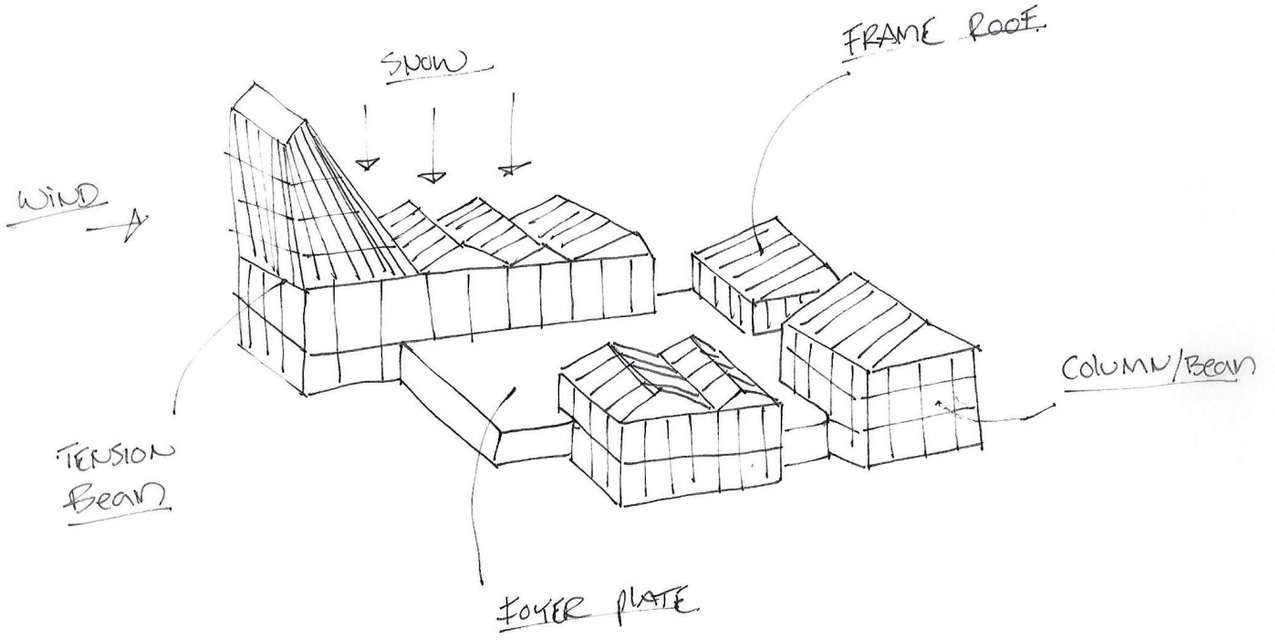
POINT OF DEPARTURE

Svendborg is an industrial seaport with shipyards producing steel ships. To extend this industrial identity, steel is chosen as the structural material for the building.

Steel is relatively elastic and has high strength and rigidity. This makes it possible to create large-spans and thin structures.

05

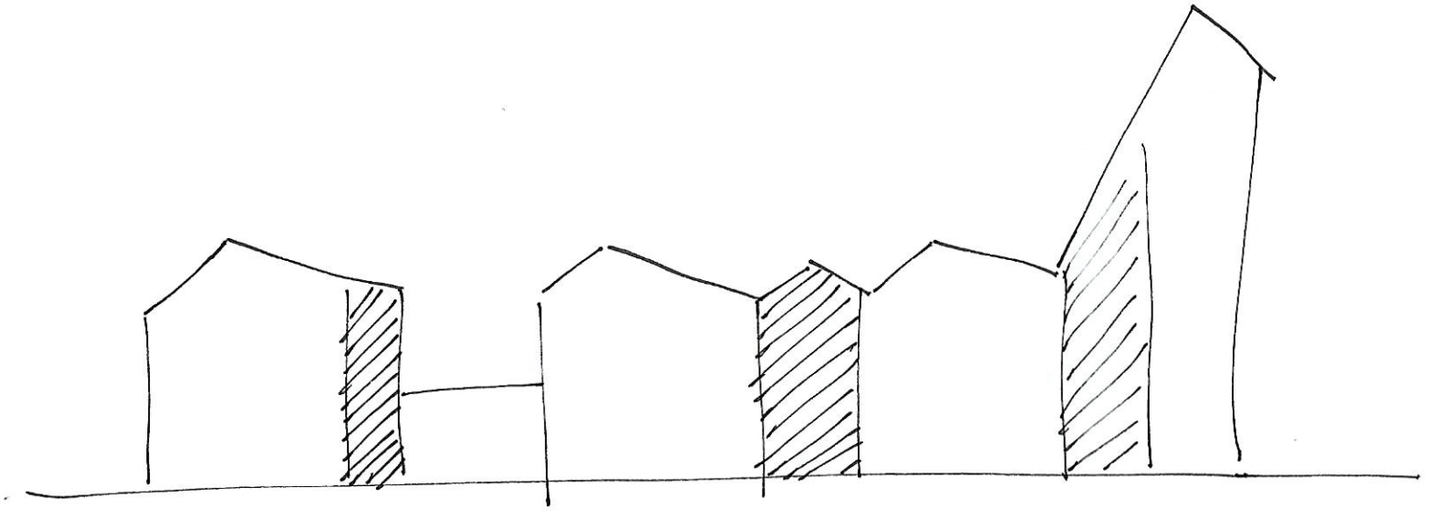
Structural calculations



STRUCTURAL CONCEPT

The following presents structural investigations and thoughts regarding the architectural whole as well as in depth verification of a selection of structral elements.

Ill: 5.02 The overall structural concept for each volume is a beam and column steel structure. (Own illustration, 2016)



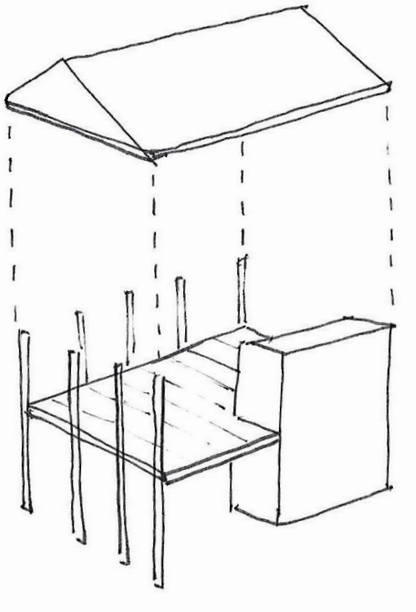
Ill: 5.03 Structural stability is ensure by means of incorporating stabilizing cores. (Own illustration)

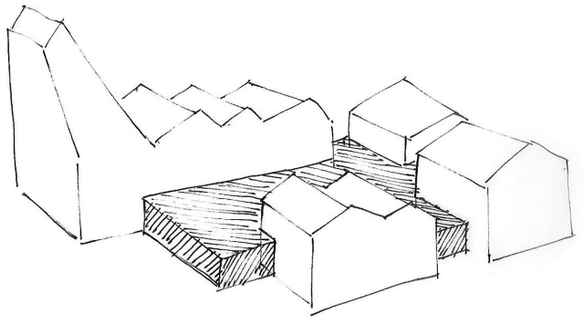
STABILITY

The basis of the system is a column-beam principle. However, in order to create the desired saddle-roof geometry, resembling boathouses, a frame structure is implemented into the system. The saddle roof frames are connected to the column beam system through a ring-beam, which act in tension. This creates a rigid system in the volumes.

Furthermore, the meeting space of the foyer, act as a structural plate, which are supported by the structurally stable volumes. The idea is the foyer act as the binding element, where both community, functions and structure meet.

Ill: 5.04 SHorizontal forces are translated from the facade, to the concrete cores through a beamdeck, which act as a plate. (Own Illustration, 2016)

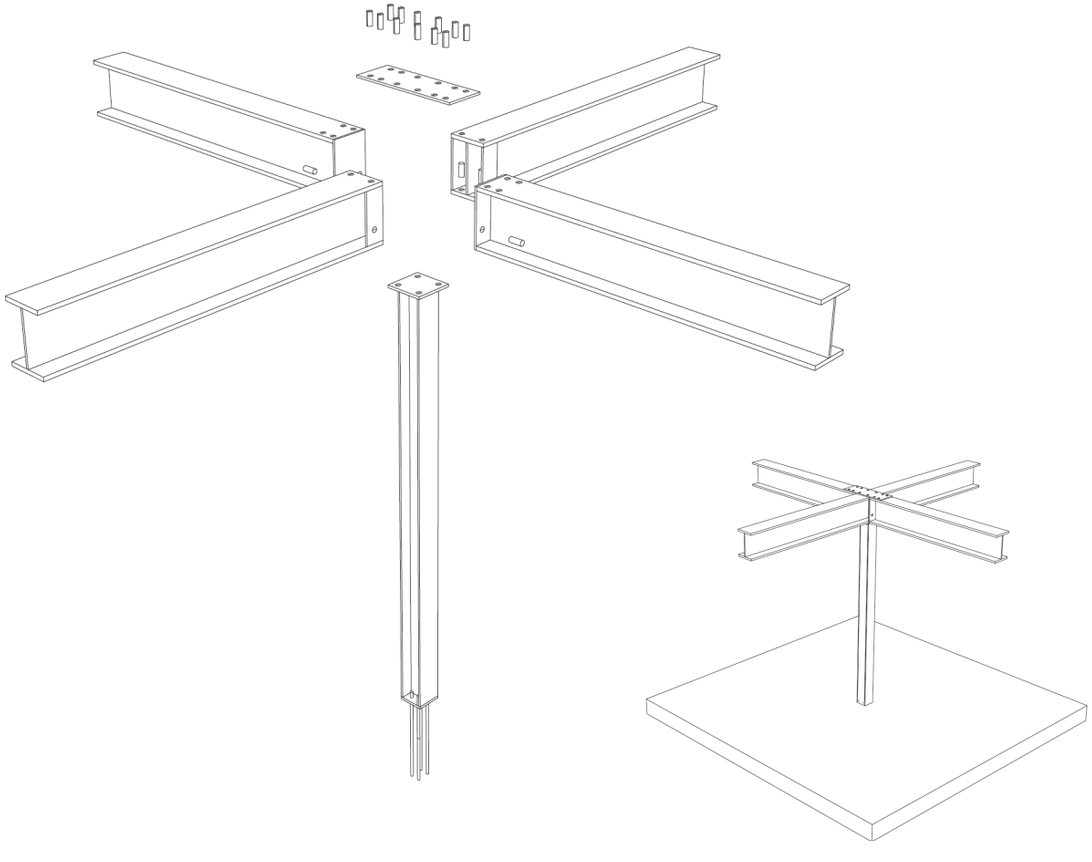




Ill: 05 Selection of the foyer. (Own illustration, 2016)

THE FOYER CONSTRUCTION

The following chapter presents the structural calculations performed on two essential structural elements of the presented design of the foyer, a column and a beam. As a point of departure, loads and load combinations are calculated based on the developed structural plan. The calculations form the foundation for preliminary structural investigations, which focus on structure, material properties, and architectural expression of the column-beam structure in the foyer grid. As a basis for the calculations, critical members in the structural grid of the foyer, are selected for manual verification.



Ill: 5.06 Assembling the structural elements of the foyer.

JOINTS

The I-beams are bolted together by a plate on top, and the column is bolted to the bottom of the HEB members.

FIRE STRATEGY

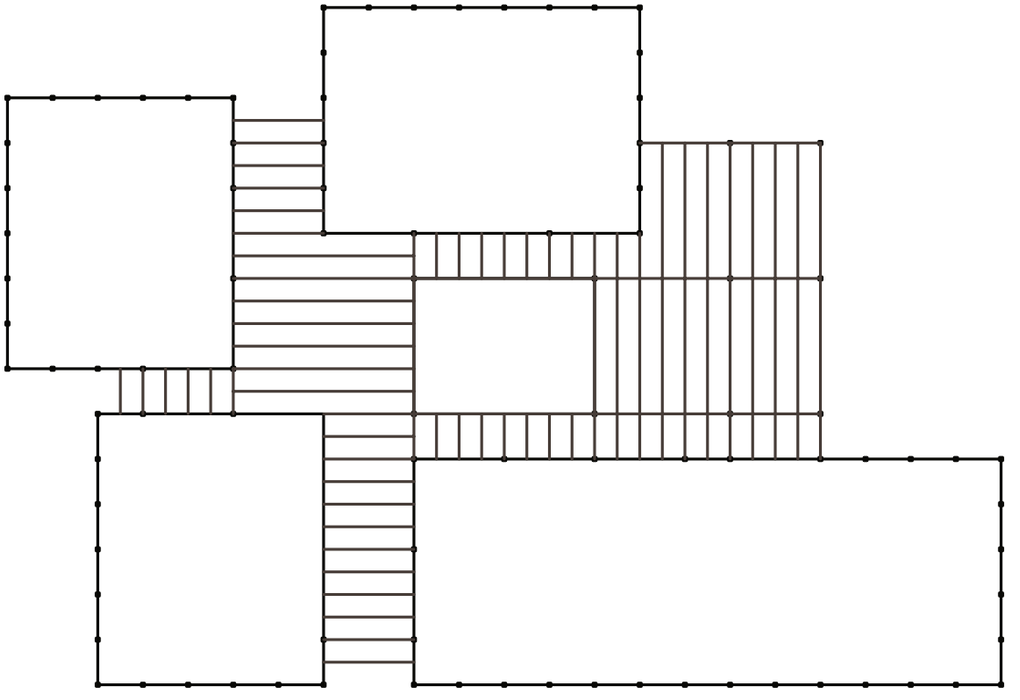
The biggest hazard of using steel as structural material is related to fire situations. Excessive heat reduces the yield stress of the steel enough to make it loose its loadcarrying capacity. In order to compensate for this disadvantage, the structure is treated with a fire-resistant paint, and the building is supplied with an automatic sprinkling system.

CRITICAL ELEMENTS

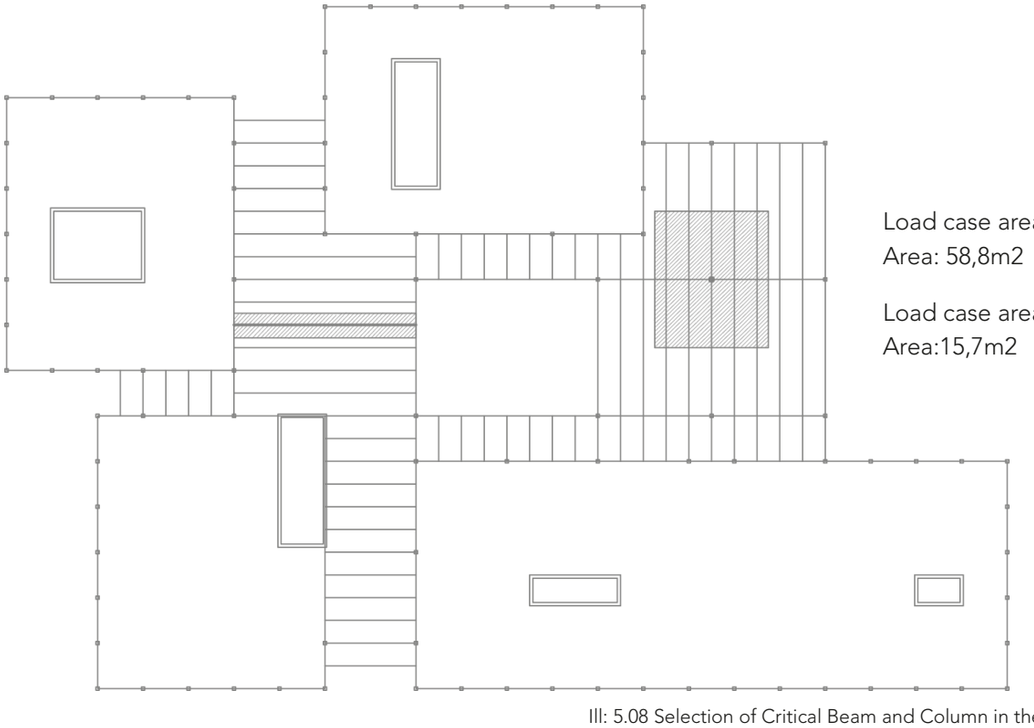
The critical beam selected for verification is a member with the biggest span of 11.2 metres and a load-case area of 15,7 m^2.

The most critical column is supporting the biggest span of the beam-structure, thus it also carries a higher dead load, with a load-case area of 58,8 m^2.

The dimensioning of the structure is based on these two critical elements in order to create a uniform structure. The dimensioning, which is carred out digitally in Robot Structural Analysis, is verified manually in the following.



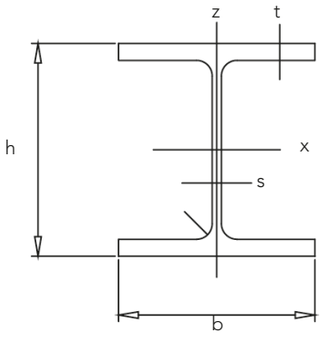
Ill: 5.07 Beam Plan of the Foyer construction.



Load case area for the column
Area: 58,8m2

Load case area for the beam
Area:15,7m2

Ill: 5.08 Selection of Critical Beam and Column in the Foyer (Own illustration, 2016)



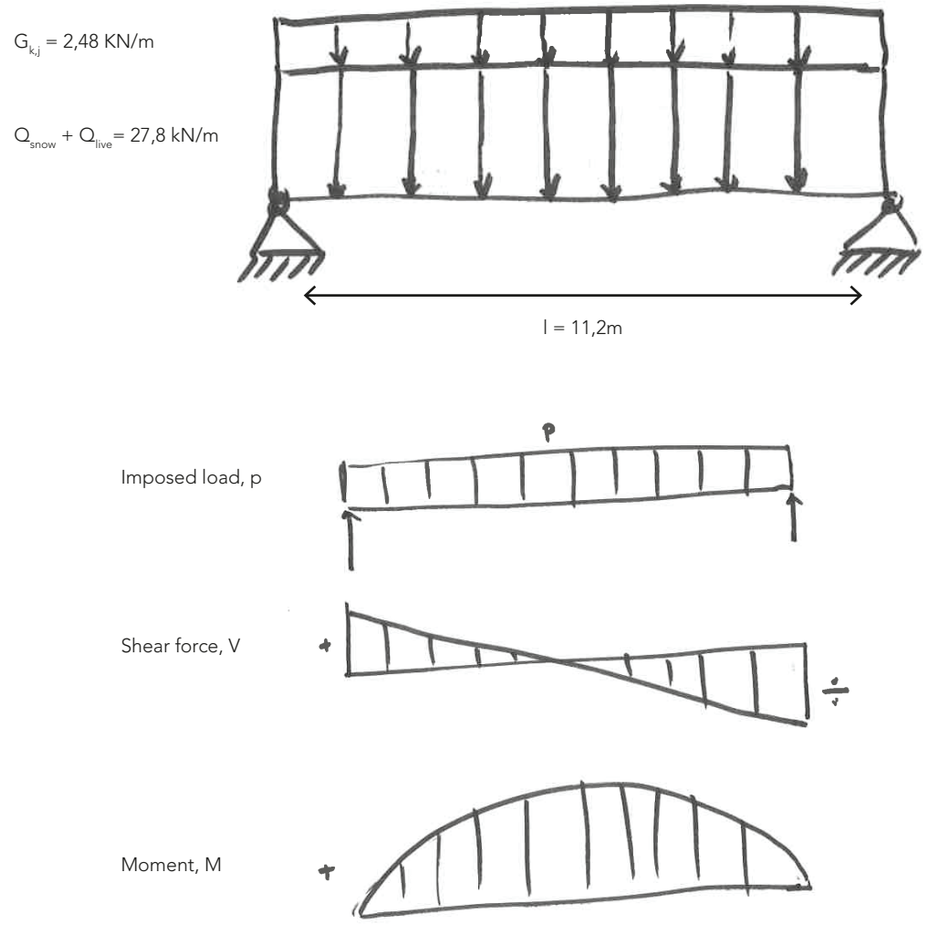
Ill: 5.09 HEB 450 I-profile

BEAM VERIFICATION

The following calculations will present various load cases which have an effect on the dimensioning of the structural system of the foyer. The calculations are based upon detail drawings, as well as site- and building specific data. In the following, a scenario is set up which describe the snow loads, live loads and dead load applied to the column-beam structure of the foyer.

When dimesnioning structural elements, we compare the imposed loads of permanent load, snow load and live load to the strength of the element, which depends on the internal reaction forces (ormal force, N, shear force, V, and moment, M).

The beam is a tension rod subdued to a uniformly distributed load which results in the reaction forces depicted in ill. 04.



Ill: 5.10 Sketch of beam and reaction diagrams.

Ill: 5.11 Calculation of permanent loads, foyer beam (Own illustration, 2016)

$m = p \cdot V$

$q = \frac{m}{A} \cdot \alpha$

	p $\frac{kg}{m^3}$	$\frac{kg}{m^2}$	$\frac{kg}{m}$	l m	h m	A m^2	n -	m kg
Concrete	2400	-	-	-	0,008	15,6	1	299,5
Insulation (ProRock 180)	-	19,8	-	-	-	15,6	2	617,8
Steel Beam HEB 450	-	-	171	11,2	-	-	1	1915,2
							Total	2832,5

PERMANENT LOADS

The dead load is calculated according to the prescribed situation. The dead load consists of a set of permanent loads including the self-weight of the construction as well as the material layers which make up the roof.

The self-weight of the roof is determined in table xx.

$$G_{k,j} = 27{,}8kN$$

$$G_{k,j} = \frac{27{,}8kN}{15{,}8m^2} = 1{,}76\frac{kN}{m^2}$$

$$G_{k,j} = 2{,}48\frac{kN}{m}$$

VARIABLE LOADS - SNOW LOAD

The snow load is determined according to the national annex, DS_EN 1991-1-3 regarding persistent / transient design situations, where;

$$s = \mu_i \cdot C_e \cdot C_t \cdot S_k$$

- s *the snow load applied to the roof* $[kN/m^2]$
- S_k *the characteristic value of snow load on the ground* $[kN/m^2]$
- μ_i *a snow load shape coefficient*
- C_e *an exposure coefficient*
- C_t *a thermal coefficient*

The characteristic value of snow load on the ground is set to s_k=0,9kN/m^3 corresponding to any given location in Denmark. The shape coefficient is derived from the shape of the roof, which has an angle between 0-30°. Therefore, μ_i=0,8. The exposure coefficient is dependent of the shape and nature of the site. Since the building is situated at a windswept location at the tip of the harbor front, it is exposed to wind on all sides. C_e=0,8. The thermal coefficient is a reduction factor based on the thermal transmittance through the roof, which causes snow to melt. C_t=1,0

$$s = 0{,}8 \cdot 0{,}8 \cdot 1 \cdot 0{,}9\ \frac{kN}{m^2}$$

$$s = 0.576\ kN/m^2$$

$$Q_{snow} = 0{,}8\frac{kN}{m}$$

VARIABLE LOADS - LIVE LOAD

The live loads are determined according to DS/EN 1991-1-1, table 6,1 – Categories of use, based on category C5. This category is described as: Areas susceptible to large crowds, e.g in buildings for public events like concert halls, sports halls including stands, terraces and access areas and railway.

$$Qk = \frac{5\ kN}{m2}$$

$$Q_{live} = 7\frac{kN}{m}$$

VARIABLE LOADS - WIND LOAD

Loadbearing cores of the volumes provide horizontal stability. Therefore, we ignore the wind load in the column-beam calculation in the foyer.

SERVICE LIMIT STATE - LOAD COMBINATIONS

The steel beams are to be verified according to DS_EN 1990_2007 table 6.5.1.

$$E_d \leq C_d$$

C_d *the limiting design value of the relevant serviceability criterion*

E_d *the design value of the effects of actions, determined on the basis of the relevant combination*

According to the partial factor method it is to be verified that the design value of the effect of the design actions is less than or equal to the design value of the equivalent resistance. For each relevant limit state, the design value of the effect of actions must be derived. To achieve this, the actions which are considered to be able to occur simultaneously are combined in turn as the leading variable action. (Parigi, 2013)

$$E_d = \sum G_{k,j} \text{ "+" } Q_{k,1} + \sum \psi_{0,1} \cdot Q_{k,i}$$

$G_{k,j}$ *the permanent load* [kN/m]

$Q_{k,1}$ *the leading variable action* [kN/m]

$Q_{k,i}$ *the accompanying variable action* [kN/m]

$\psi_{0,1}$ *a combination factor which takes into account the reduced probability of simultaneous occurrence ofr the most unfavorable vales of several independent actions.*

$$E_d = 9{,}73\frac{kN}{m}$$

Table 06 displays the partialcoefficients for the load combinations of the service limit state and ultimate limit state. The partial coefficients are determined according to table 6.10b, National Annex.

CALCULATION OF SLS

It is to verified that the deformation of the beam is within a limit of

$$u_{allowed} = \frac{L}{400}$$

The final deformation is calculated according to Eurocode 5, (2.2).

$$u_{max} = \frac{5 \cdot q \cdot L^4}{384 \cdot E_0 \cdot I}$$

q *is the influence of the characteristic loads*

E_0 *is Youngs modulus*

I *is the moment of inertia*

L *is the length of the member*

$$u_{max} = \frac{5 \cdot 9{,}73\frac{kN}{m} \cdot 11200mm^4}{384 \cdot 210000 \cdot 798 \cdot 10^6 mm^4}$$

$$u_{max} = 11{,}9mm$$

$$u_{allowed} = \frac{11200}{400} = 28mm$$

$$u_{allowed} \geq u_{max}$$

The service limit of the beam is fulfilled for the relevant load case scenario.

Ill: 5.12 Combination factors, foyer beam (Own illustration, 2016)

K_{FI} = 1,0

Eurocode 1

	Permanent Loads unfavorable $Y_{G,j}$	Permanent Loads favorable $Y_{G,j}$	Accompanying variable load $Y_{Q,i}$	Leading variable load $Y_{Q,1}$	Combination factor $\psi_{0,i}$
Live load dominating	1,1	0,9	1,5	1,5	0,3
Snow load dominating	1,1	0,9	1,5	1,5	0,6
Dead load dominating	1,2	1	-	-	-

-

STR 6.10b

Ill: 5.13 Resulting characteristic & design values of the effect of actions for a foyer-beam (Own illustration, 2016)

	Characteristic Values Service limit state $\frac{kN}{m}$	Design values Ultimate limit state $\frac{kN}{m}$
Live load dominating	9,73	13,1
Snow load dominating	7,48	9,73

STR 6.10b

ULTIMATE LIMIT STATE - LOAD COMBINATIONS

The combination of action for the ultimate limit state is determined according to table 6.5.3 and can be described by the following expression.

$$E_d = \sum Y_{G,j} \cdot G_{k,j} \text{ "+" } Y_{Q,1} \cdot Q_{k,1} + \sum Y_{Q,i} \cdot \psi_{0,i} \cdot Q_{k,i}$$

$G_{k,j}$ *the permanent load* [kN/m]
$Q_{k,1}$ *the leading variable action* [kN/m]
$Q_{k,i}$ *the accompanying variable action* [kN/m]
$Y_{G,j}$ *partial coefficient for the permanent load*
$Y_{Q,1}$ *partial coefficient for the leading variable action*
$Y_{Q,i}$ *partial coefficient for the accompanying variable action*
$\psi_{0,1}$ *a combination factor which takes into account the reduced probability of simultaneous occurrence ofr the most unfavorable vales of several independent actions.*

The consequence class is determined according to Eurocode 1. The library is categorized as a public building, which has significant chance of loss of human life in case of a structural failure. Since the library doesn't fit in category 1 or 3, we consider the library being a consequence class 2 type building.

The load combinations for ULS are calculated for each relevant scenario where the live load, the snow load and the dead load in turn are defined as the leading action.

$$E_d = 13{,}1 \frac{kN}{m}$$

CALCULATION OF ULS

Horizontal forces are non-existent as simple supports do not translate horizontal forces.

$$M_{max} = \frac{1}{8} \cdot q \cdot l^2$$

q *Maximum bending moment*
l *MPa Resulting tension in the member*

$$M_{Ed} = \frac{1}{8} \cdot 13{,}1 \frac{kN}{m} \cdot 4m^2$$

$$M_{Ed} = 209{,}6\text{kNm}$$

Calculating the maximum bending moment for the material, and the resulting moment in the beam.

$$\sigma_{Ed} = \frac{M_{Ed}}{W_{el,y}}$$

M_{Ed} *Maximum bending moment*
σ_{Ed} *MPa Resulting tension in the member*

$$\sigma_{Ed} = \frac{209{,}6\text{kNm} \cdot 10^6}{3550000}$$

$$\sigma_{Ed} = 59\ Mpa$$

$$\eta_{ULS} = \frac{\sigma_{Ed}}{W_{el,y}} \cdot 100$$

η_{ULS} *Utilisation rate for the Ultimate limit state*

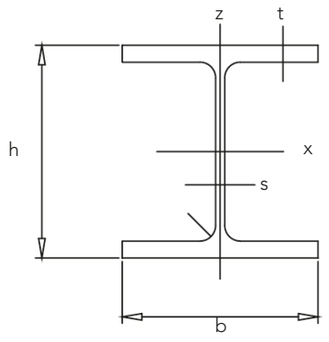
$$\eta_{ULS} = 18{,}2\%$$

By reaching an $\eta_{UL} \leq 80$ %, we do not consider buckling to be an issue.

Ill: 5.14 Geometry of a HEB 450 beam & Material data for Steel S355.

Length	L	11,2	m
Resistance Moment	$W_{el,z}$	3550000	mm^2
Moment of Inertia	I_y	171	mm^4
Mass pr. m	g	171	kg/m
racteristic Strength of Steel S355	f_y	355	Mpa
Design Strength of Steel S355	f_{yd}	323	Mpa
Youngs Modulus	E	210000	Mpa

Teknisk Ståbi, 2012



Ill: 5.15 HEB 200 I-profile.

COLUMN VERIFICATION

The column is a centrally imposed pressure rod. The column is dimensioned regarding deflection, which depends on the length and support of the column.

The column is simply supported to the floor, and roller supported at the top. Therefore the calulation length of the column is equal to the actual length, $l_s = L$.

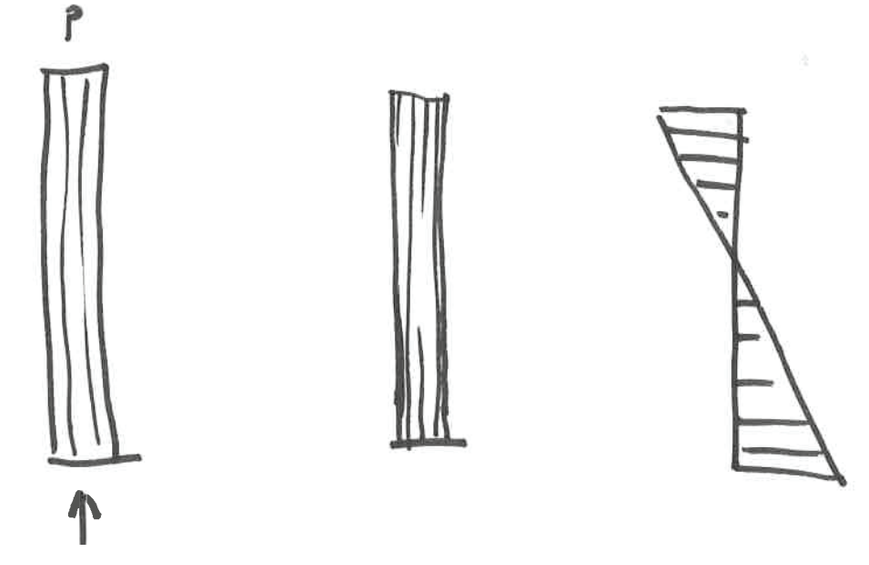
$Q_{snow} + Q_{live} = 5{,}6kN$

$G_{k,j} = 116kN$

Imposed load, p

Shear force, V

Moment, M



Ill: 5.16 Sketch of column and reaction diagrams.

PERMANENT LOADS

The dead load is calculated according to the prescribed situation. The dead load consists of a set of permanent loads including the self-weight of the construction as well as the material layers which make up the roof.

The self-weight of the roof is determined in table 10.

$$G_{k,j} = 116{,}1kN$$

$$m = p \cdot V$$

$$q = \frac{m}{A} \cdot \alpha$$

	p $\frac{kg}{m^3}$	$\frac{kg}{m^2}$	$\frac{kg}{m}$	l m	h m	A m^2	n -	m kg
Concrete	2400	-	-	-	0,008	58,8	1	1129
Insulation (ProRock 180)	-	19,8	-	-	-	58,8	2	2328,5
Steel Beam HEB 450	-	-	171	49	-	-	-	8379
							Total	11836,5

Ill: 5.17 Calculation of the dead load of the column and roof structure of the foyer.

VARIABLE LOADS - SNOW LOAD

The snow load is determined according to the national annex, DS_EN 199 1-1-3 regarding persistent / transient design situations, where;

$$s = \mu_i \cdot C_e \cdot C_t \cdot S_k$$

$$s = 0{,}8 \cdot 0{,}8 \cdot 1 \cdot 0{,}9 \ \frac{kN}{m^2}$$

$$s = 0.576 \ kN/m^2$$

VARIABLE LOADS - LIVE LOAD

The live loads are determined according to DS/EN 1991-1-1, table 6,1 – Categories of use, based on category C5. This category is described as:: Areas susceptible to large crowds, e.g in buildings for public events like concert halls, sports halls including stands, terraces and access areas and railway.

$$Qk = \frac{5 \ kN}{m2}$$

VARIABLE LOADS - WIND LOAD

Loadbearing cores of the volumes provide horizontal stability. Therefore, we ignore the wind load in the column-beam calculation in the foyer.

ULTIMATE LIMIT STATE - LOAD COMBINATIONS

The combination of action for the ultimate limit state is determined according to table 6.5.3 and can be described by the following expression.

$$E_d = \sum Y_{G,j} \cdot G_{k,j} \text{ "+" } Y_{Q,1} \cdot Q_{k,1} + \sum Y_{Q,i} \cdot \psi_{0,i} \cdot Q_{k,}$$

$G_{k,j}$ *the permanent load*
$Q_{k,1}$ *the leading variable action*
$Q_{k,i}$ *the accompanying variable action*
$Y_{G,j}$ *partial coefficient for the permanent load*
$Y_{Q,1}$ *partial coefficient for the leading variable action*
$Y_{Q,i}$ *partial coefficient for the accompanying variable action*
$\psi_{0,1}$ *a combination factor which takes into account the reduced probability of simultaneous occurrence ofr the most unfavorable vales of several independent actions.*

Ill: 5.18 Calculated load combinatens for the foyer-column.

	Characteristic Values Service limit state E_d	Design values Ultimate limit state E_d
Live load dominating	420,3	560,4
Snow load dominating	326,4	314,6

STR 6.1(

The load combinations for ULS are calculated for each relevant scenario where the live load, the snow load and the dead load in turn are defined as the leading action.

Ill: 5.19 Calculation factors, foyer column

$K_{FI} =$ 1,0

	Permanent Loads unfavorable $Y_{G,j}$	Permanent Loads favorable $Y_{G,j}$	Accompanying variable load $Y_{Q,i}$	Leading variable load $Y_{Q,1}$	Combination factor $\psi_{0,i}$
Live load dominating	1,1	0,9	1,5	1,5	0,3
Snow load dominating	1,1	0,9	1,5	1,5	0,6
Dead load dominating	1,2	1	-	-	-

-

STR 6.10b

ULTIMATE LIMIT STATE

It is to be verified that

$$N_{b,Rd} \geq N_{Ed}$$

$\mathrm{N_{b,Rd}}$ is the design strength of the column.

N_{Ed} is the allowed strength of the column.

Number of Slenderness

First, the slenderness is calculated according to a centrally affected column-member as defined by the expression. (Teknisk Ståbi, 6.5.1)

$$\lambda = \frac{\frac{l_s}{i}}{89{,}4 \cdot \epsilon}$$

Breaking length/slenderness

l_s is the calculation length of the column. According to table 3.6.1, $l = l$ for a column with a pinned joint at the top, and a simple (solid) support. The radius of inertia is indicated in table 6.8. The value for i_z in the weak axis of the profile is used. For a HEB 200 profile, i_z=50,7mm. Furthermore, the relative material parameter for Steel S355 is used. ϵ =0,814.

To prevent the column from buckling, it is to be proved that:

$$\lambda > 3$$

$$\lambda = \frac{\frac{4000mm}{50{,}7mm}}{89{,}4 \cdot 0{,}814} = 1{,}08$$

Design Strength

The design strength of the column, $\mathrm{N_{(b,Rd)}}$, is determined through the expression

$$\mathrm{N_{b,Rd}} = \frac{\chi \cdot A \cdot f_y}{\gamma_{M1}}$$

A is the cross section area of the column element.

γ_{M1} is a partial coefficient for the material

Where X is a column reduction factor. According to table 6.5.1.2 in Teknisk Ståbi, a column in case c with a number of slenderness of approximately 1,0, has a reduction factor of X=0,540. For a column with cross-section class 1, X_{M1}=1,2.

$$\mathrm{N_{b,Rd}} = \frac{0{,}540 \cdot 78{,}1 \cdot 10^2\ mm^2 \cdot 355 \frac{N}{mm^2}}{1{,}2}$$

$$\mathrm{N_{b,Rd}} = 1247{,}5kN$$

$$1247{,}5kN \geq 560{,}4kN$$

Utilization Ratio

$$\frac{560{,}4kN}{1247{,}5kN} \cdot 100 = 45\ \%$$

Ill: 5.20 Relative material parameter, column for Steel S355.

Relative material parameter	ϵ	0,814

Table 6.31,Teknisk Ståbi

Ill: 5.21 Reuction factors for a HEB 200 column

Column Reduction factor (z-axis)	χ_z	0,843
Column Reduction factor (y-axis)	χ_y	0,964

Table 6.30 ,Teknisk Ståbi

Ill: 22 Partial coefficient for a column
(Own illustration, 2016)

For a column	λ	1,2

Table 6.1,Teknisk Ståbi

Ill: 5.23 Material data for Steel S355

Characteristic Strength	f_y	355	Mpa
Design Strength	f_{yd}	323	Mpa
Youngs Modulus	E	210000	Mpa

Table 6.2 ,Teknisk Ståbi

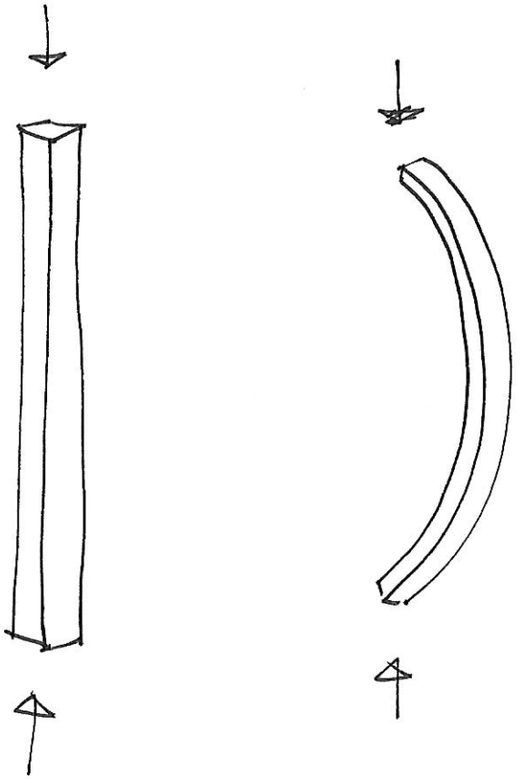
Ill: 5.24 Geometry of a HEB 200 column

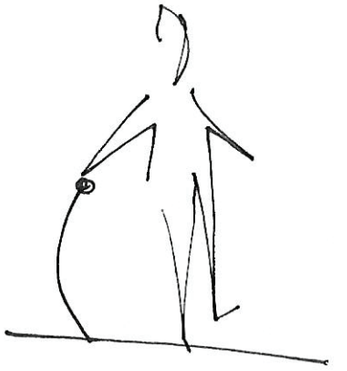
				multiplication factor
Column Length	L	4,0	m	1
Profile height	h	200	mm	1
Profile width	w	200	mm	1
Radius of inertia (z-axis)	i_z	50,7	mm	1
Moment of Inertia (z-axis)	I_z	20,0	mm^4	10^6
Mass	g	61,3	kg/m	1
Area of Cross-Section	A	7,81	mm^2	10^3

Table 6.8, Teknisk Ståbi

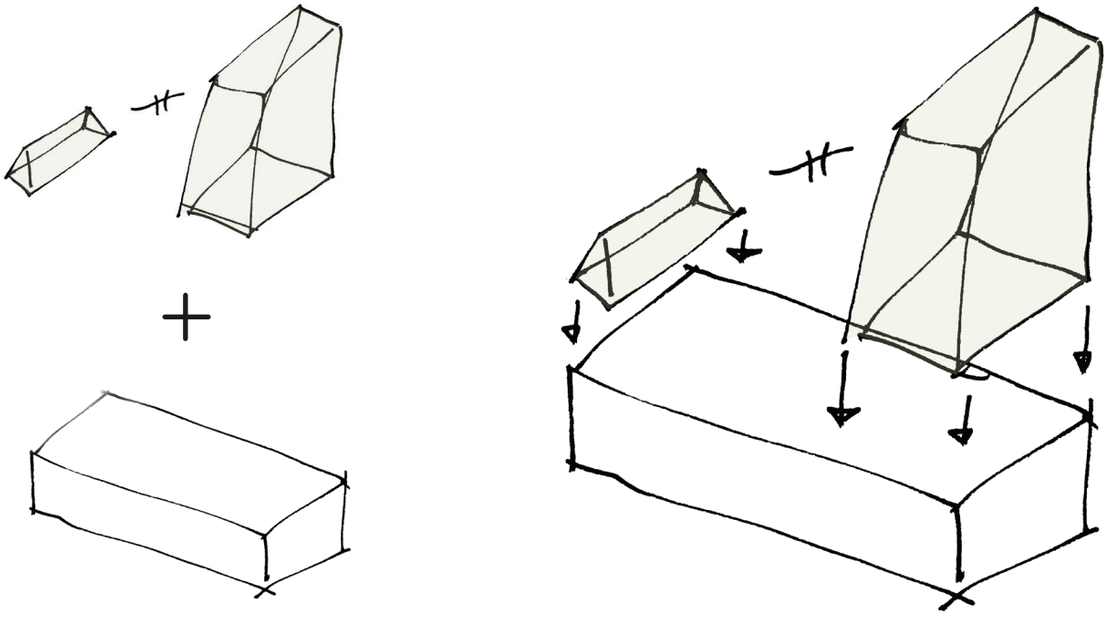
OVERSIZE

In order to prevent the critcal load of the column of being reached, the column is dimensioned as having a low utilization ratio. If the column reaches the critical load, the column becomes unstable and buckles.





Ill: 5.25 Buckling, foyer column



Ill: 5.26 Two geometries create the structural point of exit for the main volume.
(Own illustration, 2016)

STRUCTURAL INVESTIGATIONS ON THE TOWER

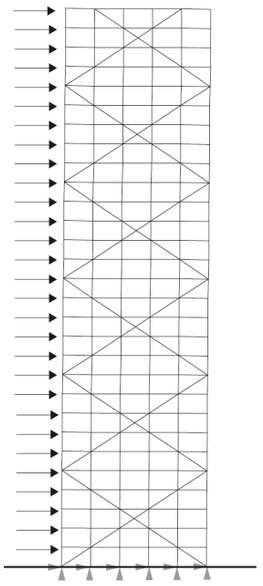
The following explores the structural performance of the saddle-shaped tower. This is done in order to understand the structural behavior of the geometry.
The overall structure in the main volumen is a beam-and-column steel structure with a stabilizing core. The roofs and the tower asks for a different constructural concept as it is exposed to different loads than the rest of the main volumen. With its hight of 25 meters the tower structure is both exposed to vertical loads and remarkable horizontal loads by the wind.

In order to understand how the geometry reacts when imposed to horizontal action forces, we look into high-rise systems. As seen in illustration 22. Introducing a load ring in the structural concept is advantageous to stabilise and accomodate the horizontal wind load.

Pictured individually, the tower structure acts as a fixed column, where the lateral loads are transfered through the frames to the foundation.This effect is caused by iimplementing fixed joints between the members of the tower.

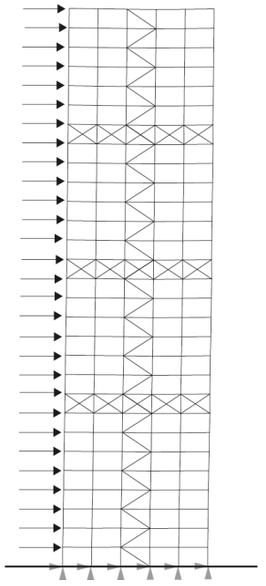
In contrast to this, implementing a horizontal outrigger with a centrally situated core, the fixed joints become supperficient. By working with a loadbearing core and an outrigger, the lateral loads are transfered to the foundation. This principle utilize simple supports.

Tower Study
(All towers have fixed ground supports)



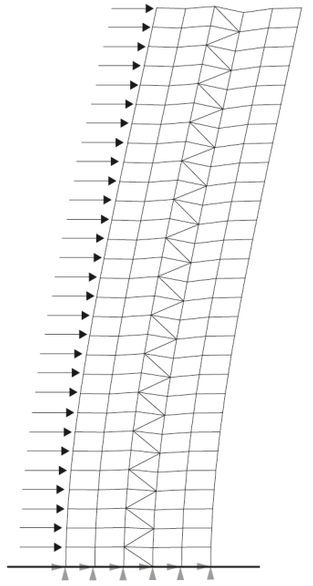
Crossbracing

Simple supports
translates Tx, Tz, Rx, Ry, Rz



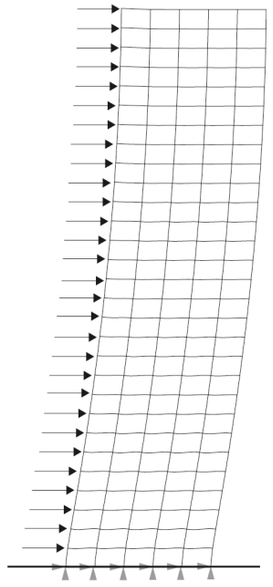
Core + Outrigger

Simple supports
translates Tx, Tz, Rx, Ry, Rz



Core

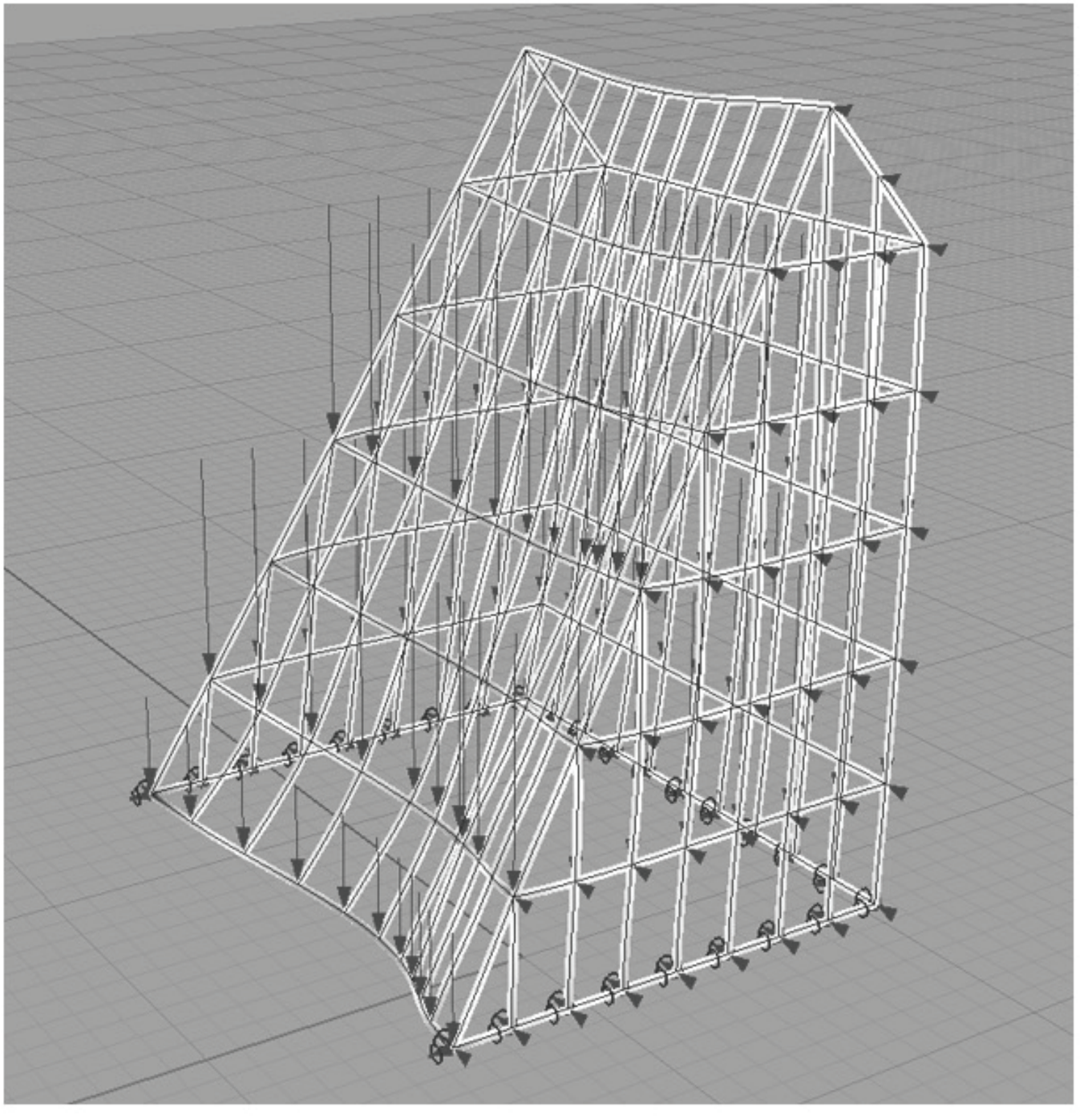
Simple supports
translates Tx, Tz, Rx, Ry, Rz



Frame

Fixed supports
Only translates Rz

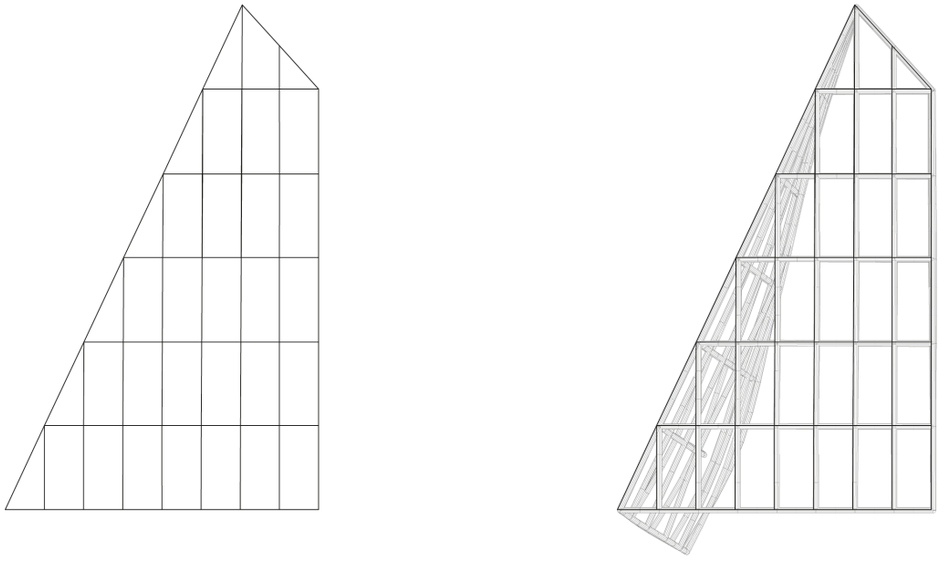
Ill: 5.27 The illustration is based upon the Karamba Script, High-RiseSystems. (Karamba.com)



Ill: 5.28 Preliminary structural investigations are perfomed using Karamba.

FRAME STRUCTURE STUDY

The frame principle is selected for further investigations in Karamba. The frame structure is affected by the combination of vertical and horizontal force vectors, describing wind, snow and live loads. The geometry reacts by deforming.

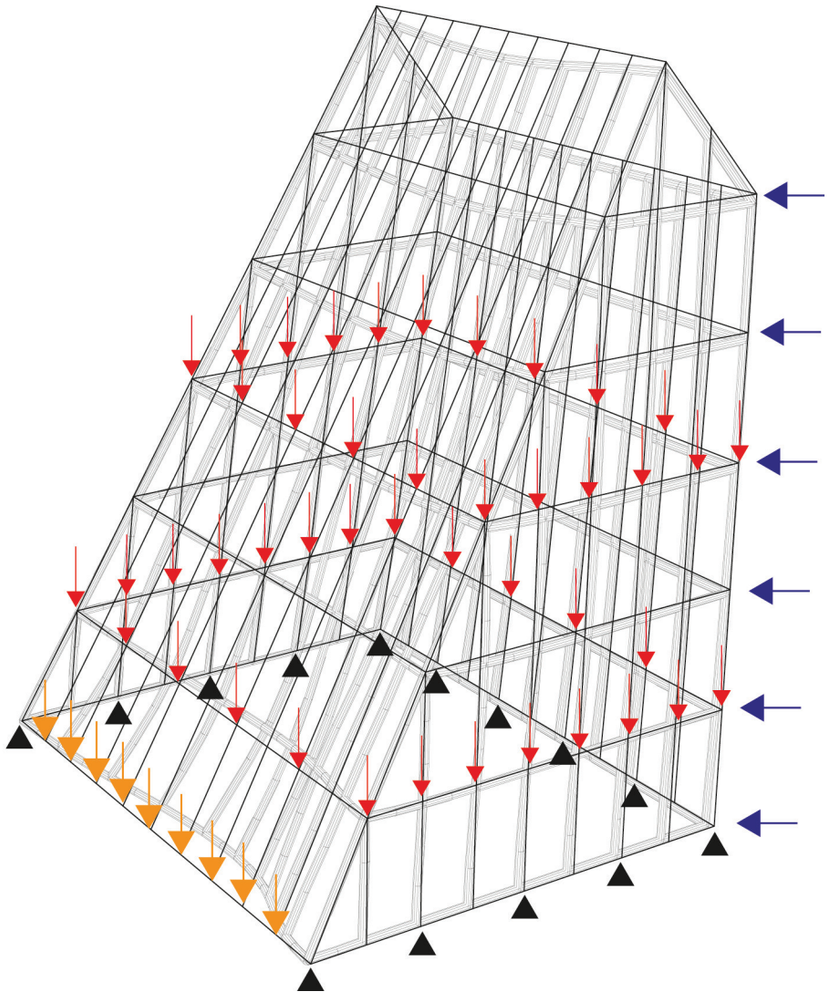


Maximum Displacement
60,5mm
Mass
90.274kg
Cross-Section
Circular/Hollow (d=200mm) (Wall thickness = 26mm)

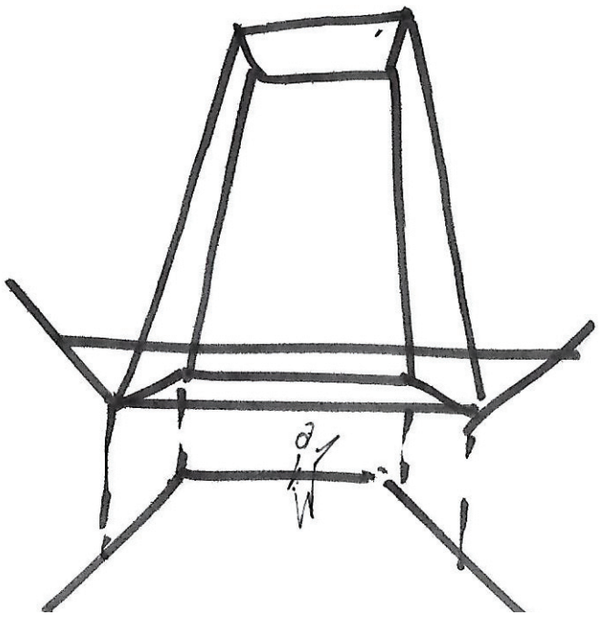
Actions / Reactions

Windload: 60kN
Snowload 130kN
Liveload: 1618kN

Ill: 5.29 Principal Deformation of structure in tower.



Ill: 5.30 Loadcases and supports, tower.



Ill: 5.31 Loadcases and supports, tower.

CRITICAL ELEMENTS

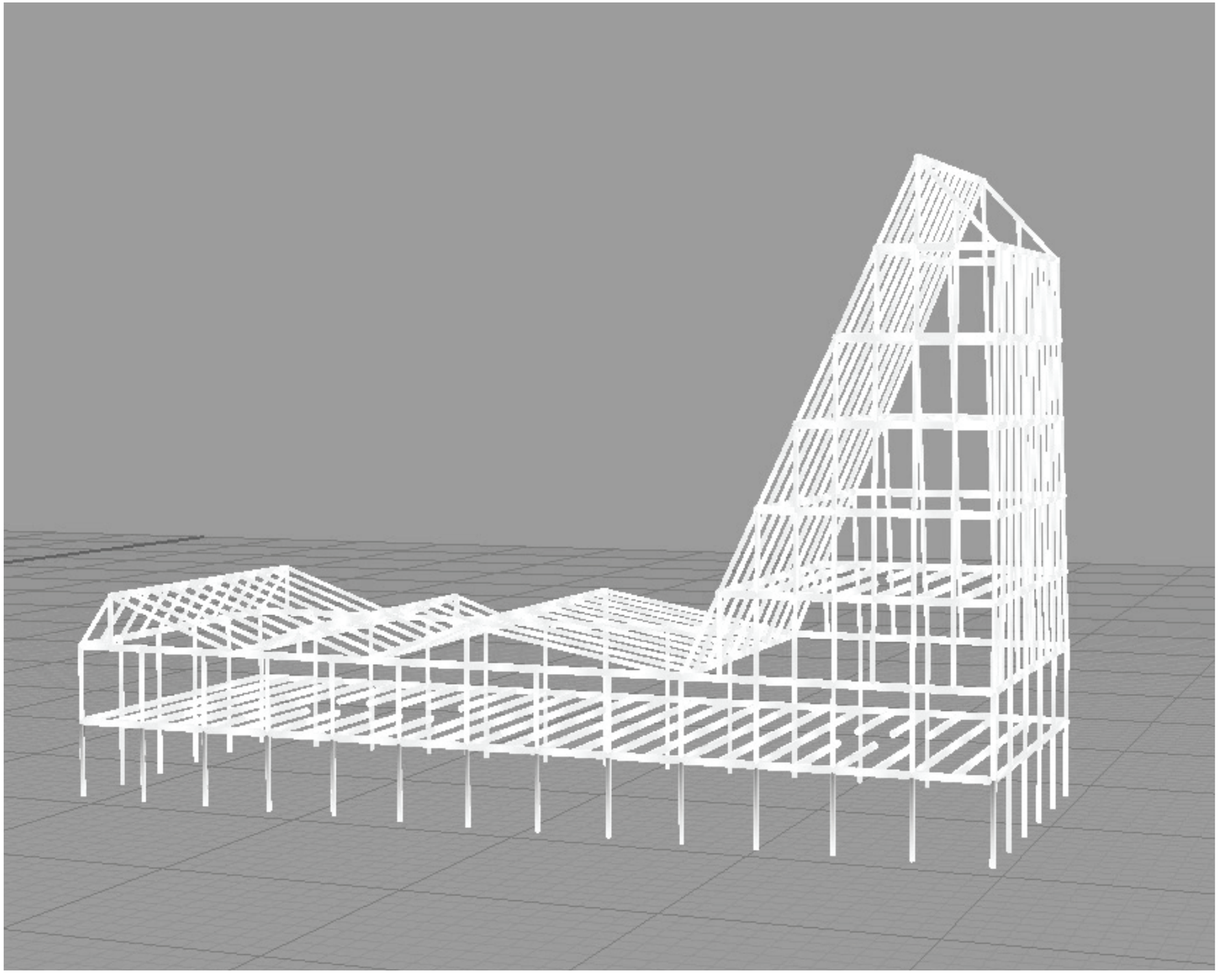
Based on observations of the behavior of the frame structure in Karamba, the critical elements which deflects the most can be uncovered.

As seen in illustration 25, the most critical beam is at the bottom ring of the tower. Due to the dent in the roof, the combined snow and dead load of the roof deflects the member. The direct solution could be to introduce several columns, or a loadbearing core, however, the interior of the tower asks for a open space without columns.

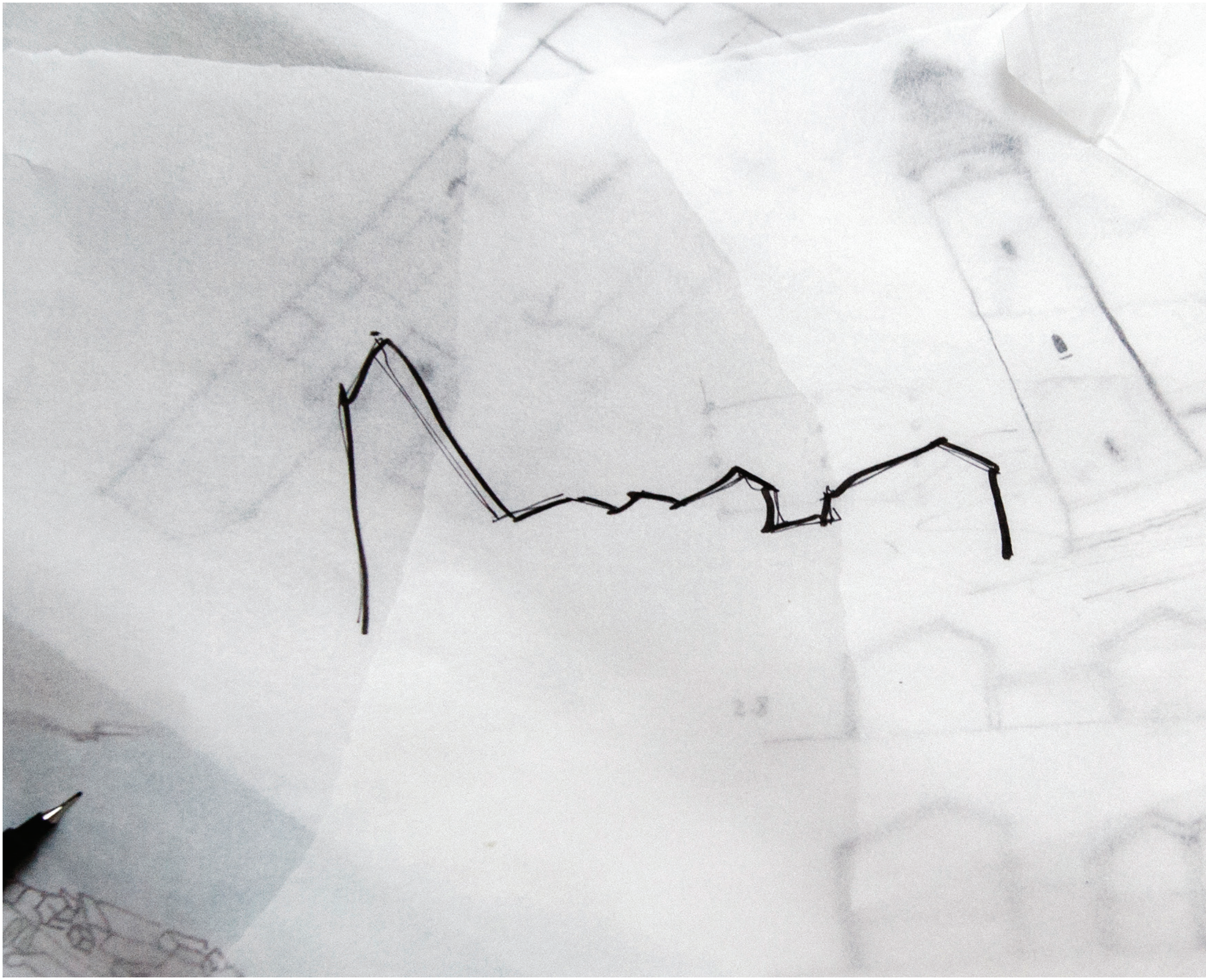
NEXT STEPS

Preliminary investigations have been performed in Karamba, and an understanding on how the structural system of the tower reacts to the application of loads has been achieved. As a potential next step, the structural system could be verified using the FEM method.

Information regarding the geometry, the supports, and the loadcases of the structural system, can be exported to Autodesk Robot Structural Analysis using the GH-2Robot plug-in for Grasshopper. In Robot Structural Analysis, the exact Service Limit State and Ultimate Limit state can be calculated, and the structural system can be optimized. The optimization process can take departure in the evaluation of utilization ratios structural members.



Ill: 5.32 Static Model of Main volume.



Ill: 6.01 - Design process

06

Design Process

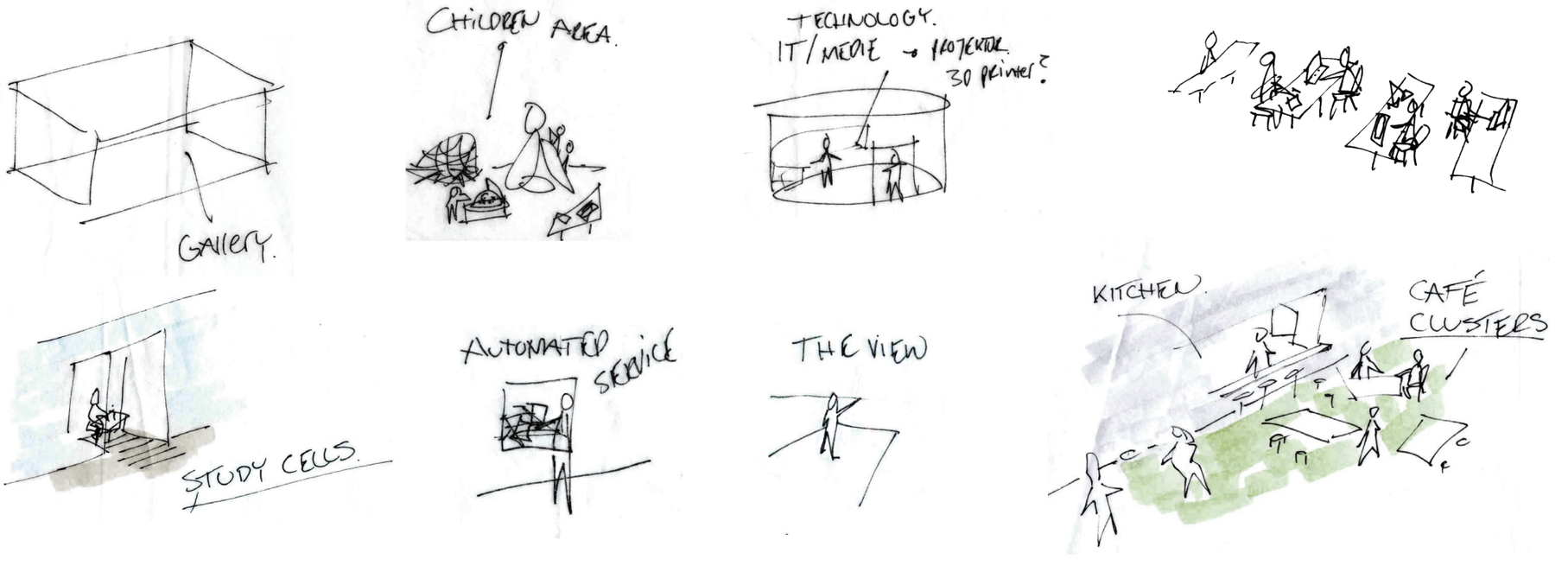
Development of the Spatial Programe
Design Parameters
Vision

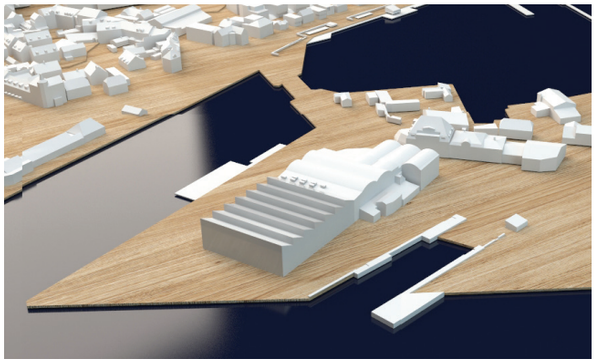
INITIAL INVESTIGATIONS

The first round of sketching investigated different spaces according to different functions. These studies where made to establish their atmospheres, which then helped to develop different concepts for the placement of the functions. The concepts where made into specific volumes, which then was placed on the project site to gain a better understanding of the project program, and its proportions according to the context.

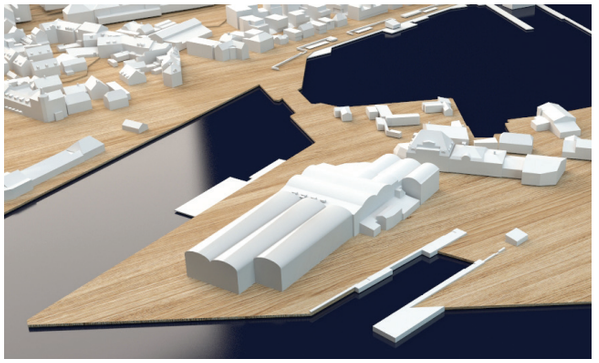
Different compact volumes were tested, and evaluated on their potential for interaction with the context, and how it invites the visitor to engage with the surrounding outdoor spaces. Due to the open and public function of the library, a solution with a transparent ground floor was chosen. The social activity within the ground floor is visible for external visitors within an open foyer, and thereby invites the visitor in from all sides.

Ill: 6.02.6.09 - Programming the library ▼

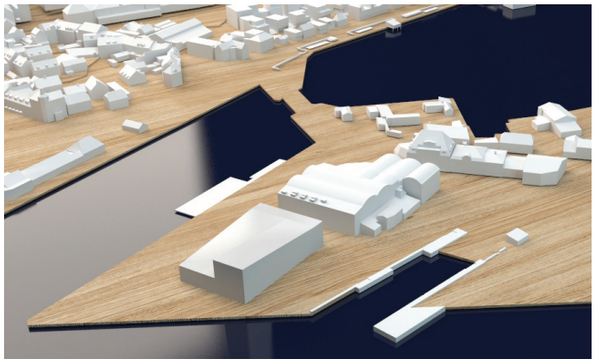




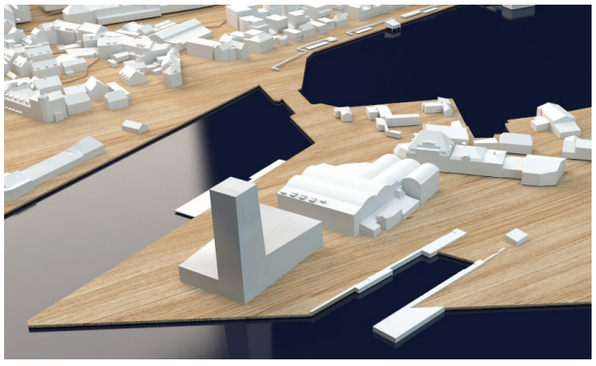
Ill: 6.10 - Volumestudy



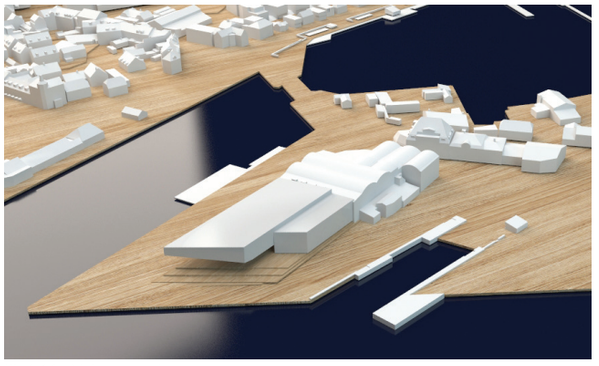
Ill: 6.11 - Volumestudy



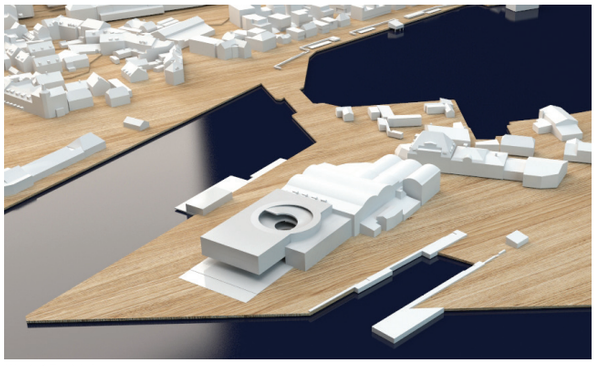
Ill: 6.12 - Volumestudy



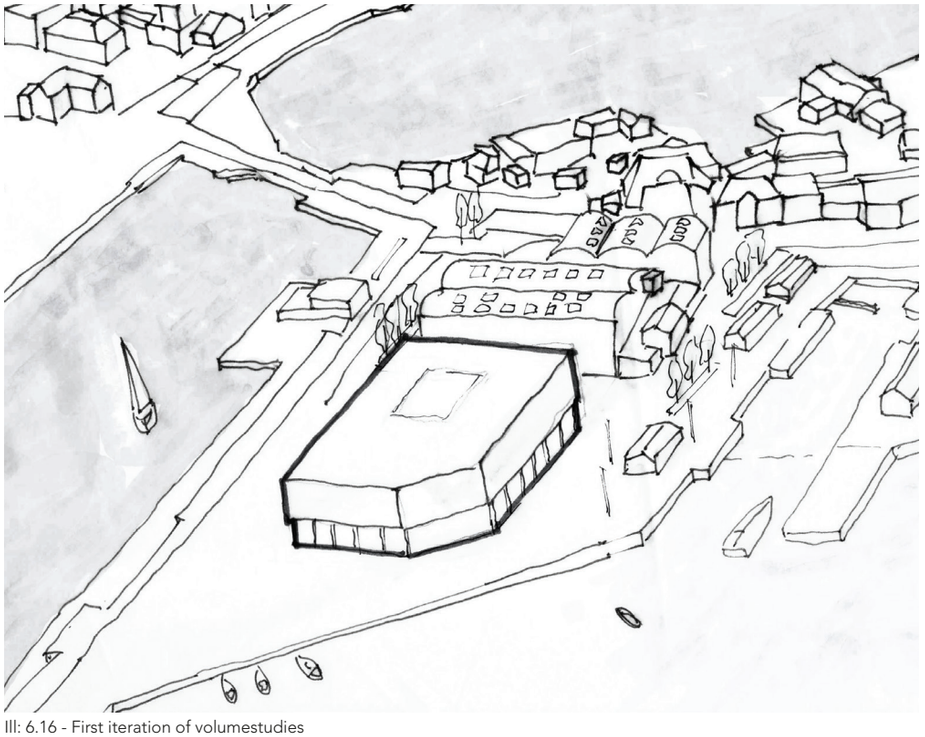
Ill: 6.13 - Volumestudy



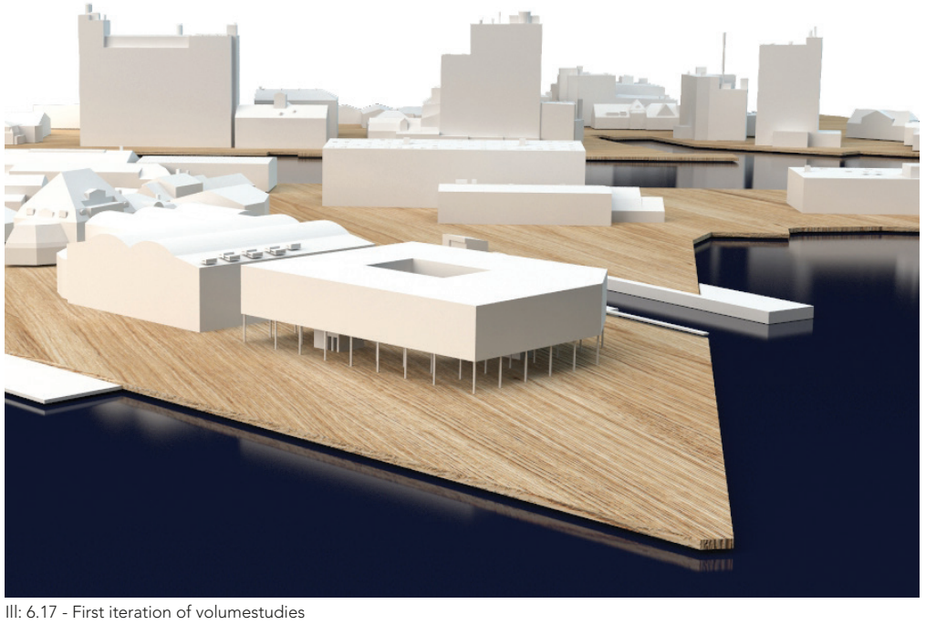
Ill: 6.14 - Volumestudy



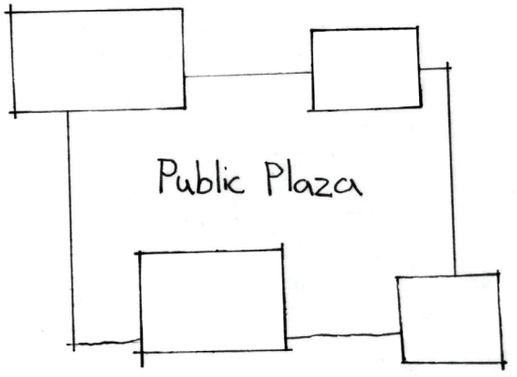
Ill: 6.15 - Volumestudy



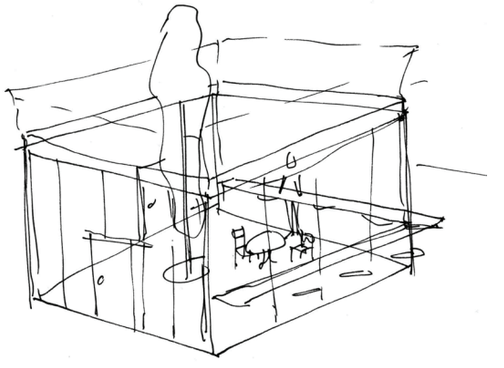
Ill: 6.16 - First iteration of volumestudies



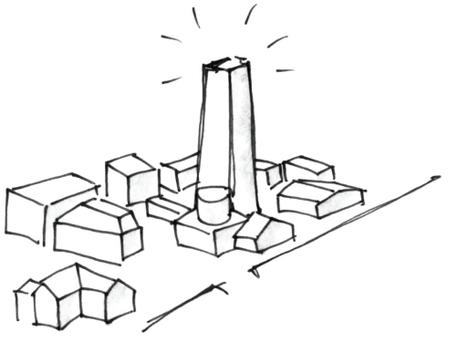
Ill: 6.17 - First iteration of volumestudies



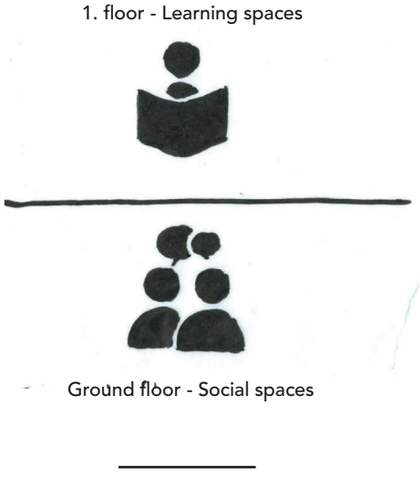
Ill: 6.18 - Inspiration - Layout
The urban plaza will function as a social place where people move through when going between the different function. The space will be a place to see and hear the life in the library and in general feel the atmosphere in the library.



Ill: 6.19 - Courtyard.

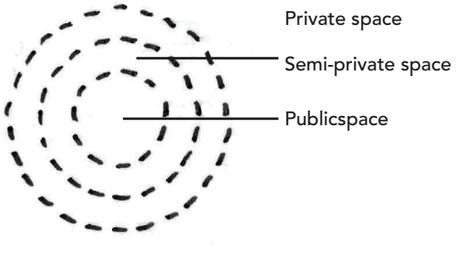


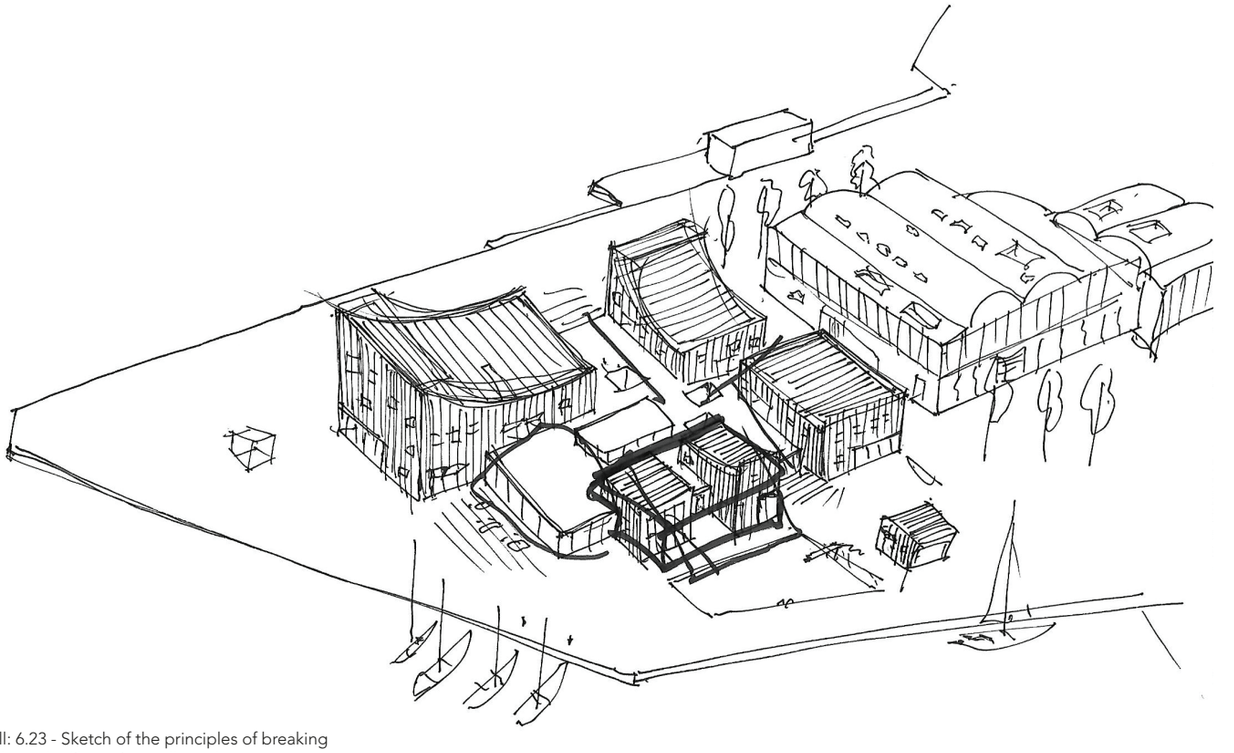
Ill: 6.20 - The idea of the landmark



Ill: 6.21 - Idea for placement of functions. Dividing the learning spaces and social spaces.

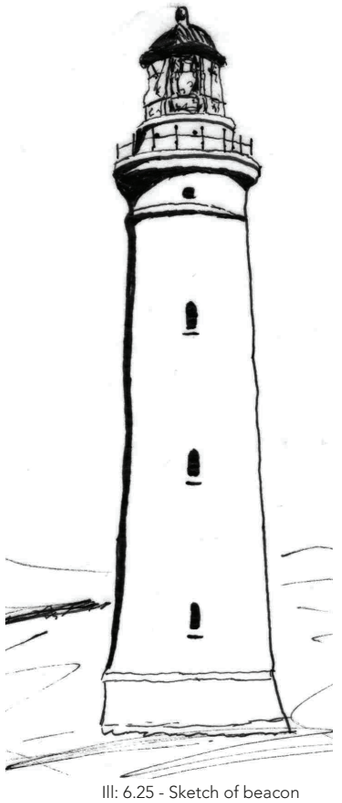
Ill: 6.22 - Idea suggesting a differentiate regarding the privicy of meeting spaces within the library.



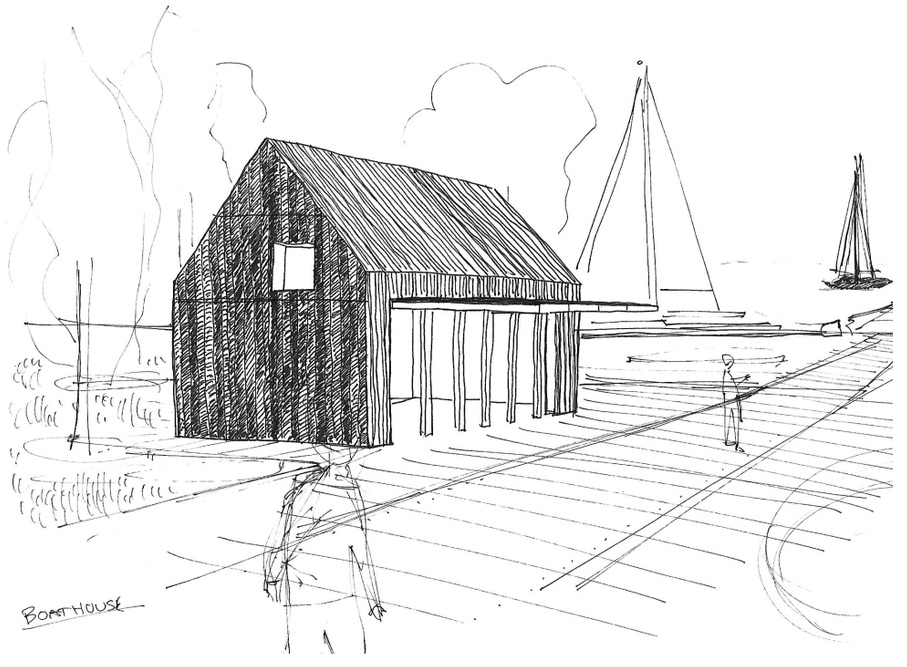


Ill: 6.23 - Sketch of the principles of breaking down the library in smaller volumes.

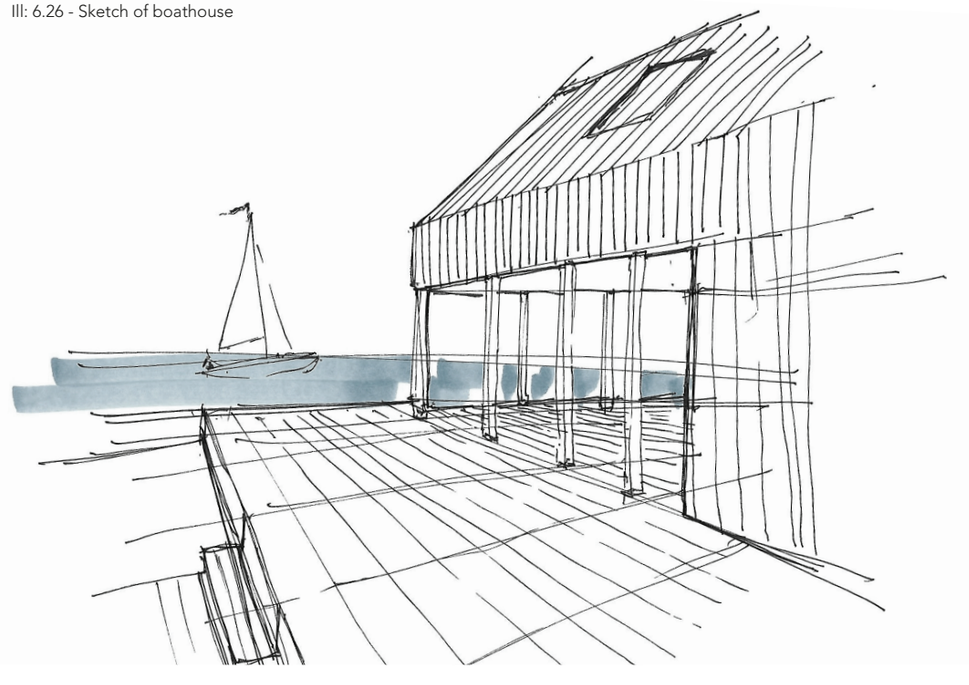
Ill: 6.24 - Sketch of the principles of breaking down the library in smaller volumes.



Ill: 6.25 - Sketch of beacon



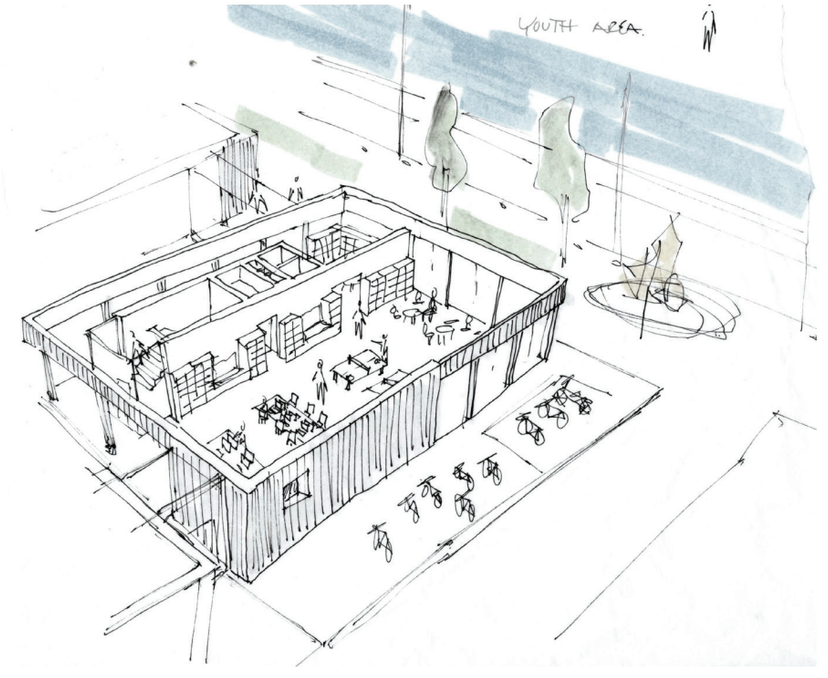
Ill: 6.26 - Sketch of boathouse



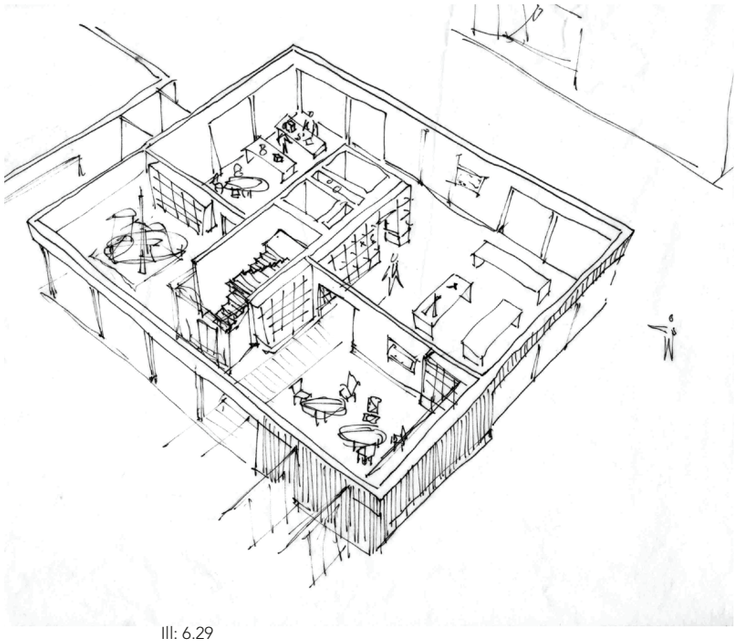
Ill: 6.27 - Sketch of boathouse

PRIMARY CONCEPT DESIGN

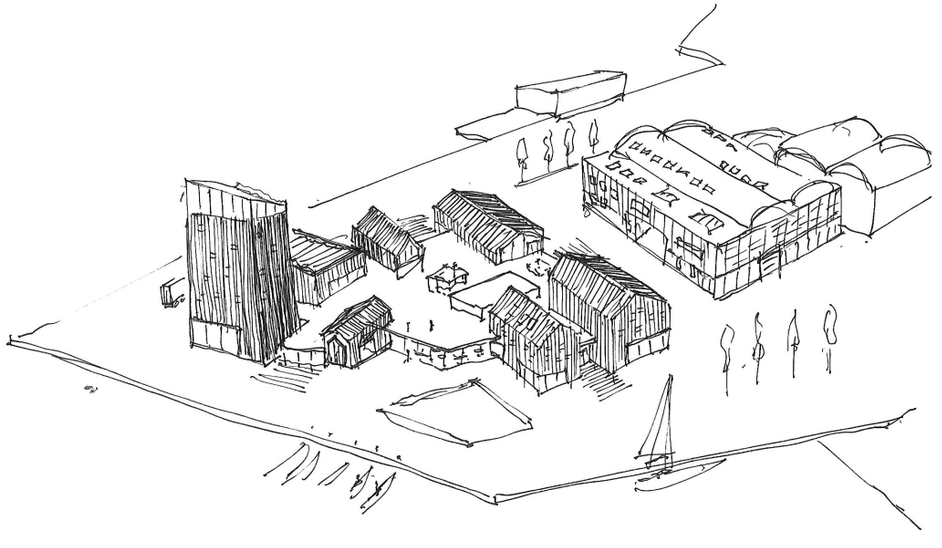
Through the analysis of the site, a primary concept for the design have emerged. With inspiration in the maritime harbour environment, the idea to reference the closest neighbourhood emerged. The sites placement at Svendborg harbour, contains many environmental references, where the architecture of the traditional wooden boathouses with their pitched roof refers both to the domestic and the maritime. The architecture of the guiding lighthouse, that functions as a landmark for the city and the citizens. A landmark that can light up the city, but also in the future highlight the development and growth of the harbour environment at Svendborg, and still reference the old function



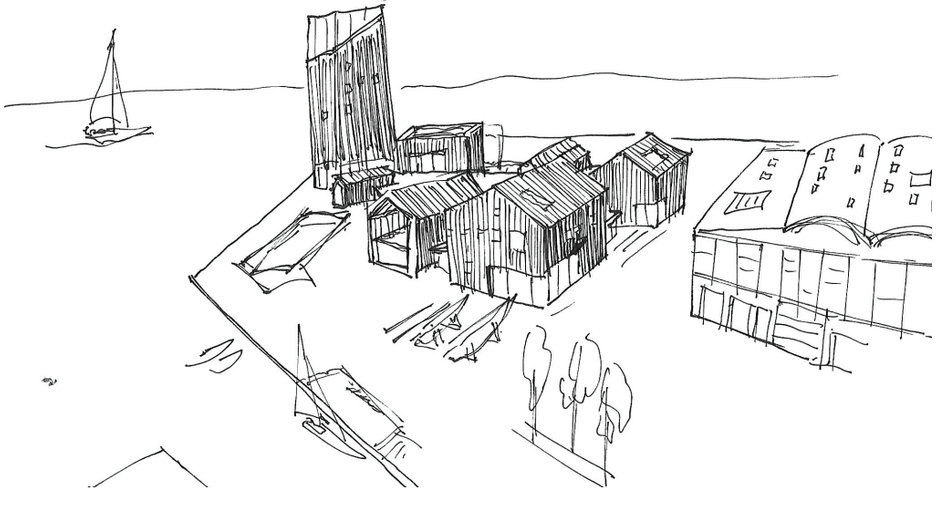
Ill: 6.28 - Sketch



Ill: 6.29



Ill: 6.30 - Sketch

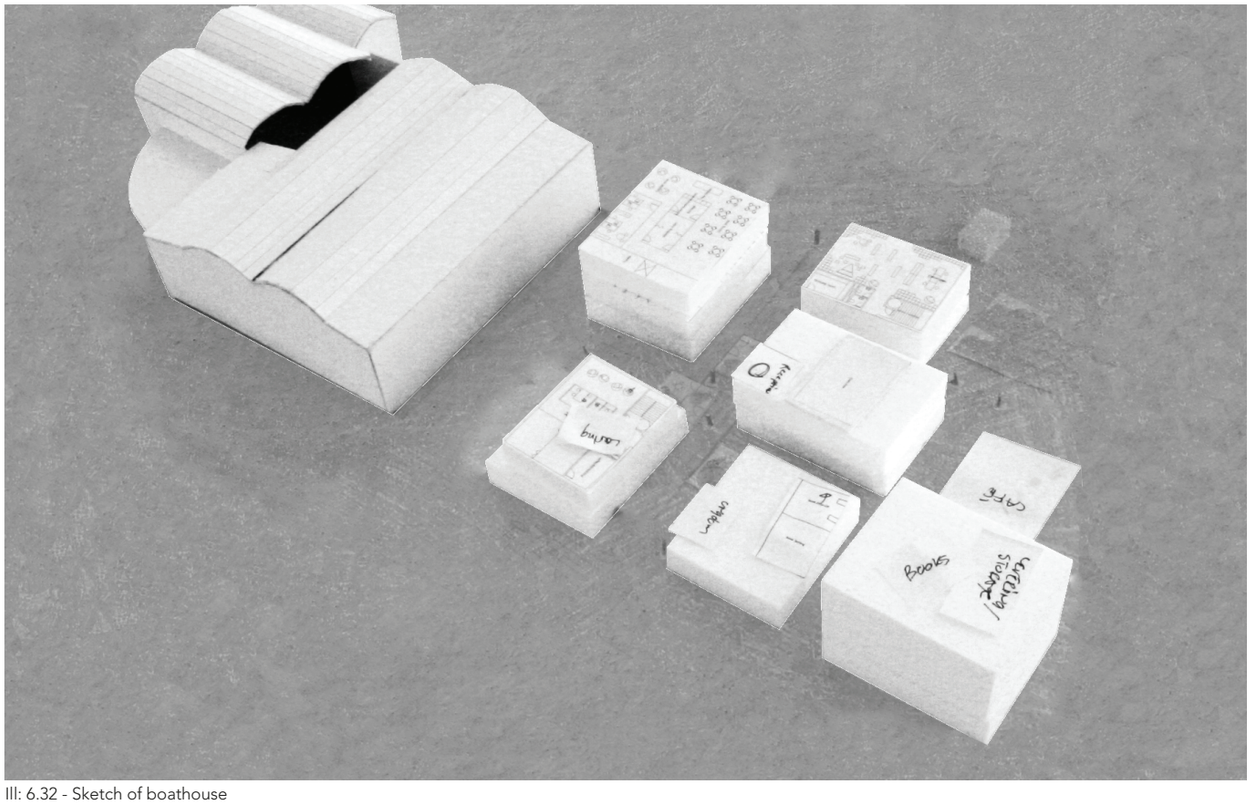


Ill: 6.31 - Sketch

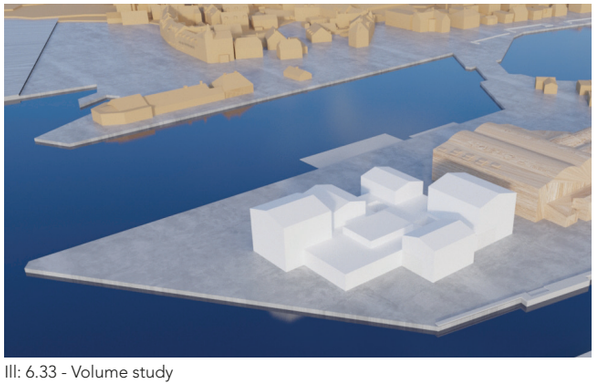
VOLUME STUDIES

Different configurations and proportions of the volumes have been tested, according to their relation to the context. The surrounding context is characterized as large industrial buildings, and in order to relate to these, the library have to complement their scale, to obtain an equal status in the cityscape. The prominent placement of the library at Svendborg harbour with water on three sides, invites for a landmark. A tower have therefore been introduced as a modern interpretation of the traditional lighthouse, which will compliment the high industrial buildings in the background, and help to promote Svendborg harbour as a new cultural space.

The different configurations of the volumes where made, and evaluated according to its overall configuration, and its scale when arriving to the site where the lighthouse must guide the visitor down the harbour and into the library. The building must further complement the industrial buildings in scale, in order to obtain the wished status as a landmark. The arched hall placed the north of the site, is the only directly placed neighbour. The larger volumes have therefore been placed along this building to make the library seem more prominent when approaching



Ill: 6.32 - Sketch of boathouse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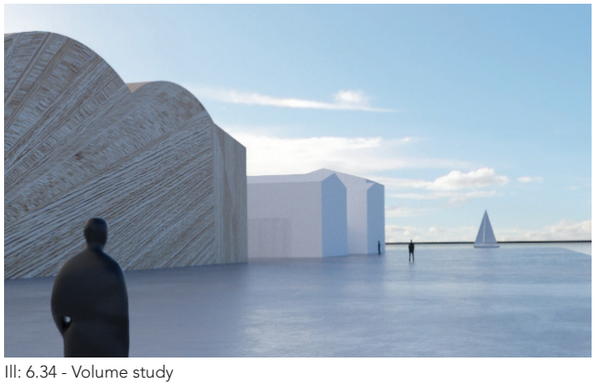
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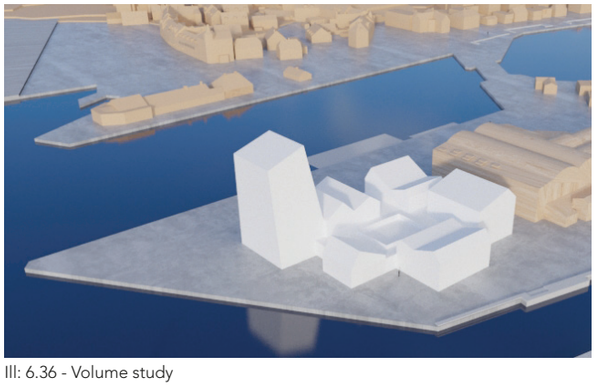
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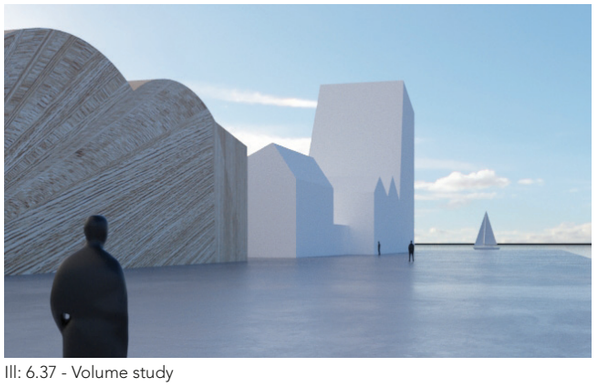
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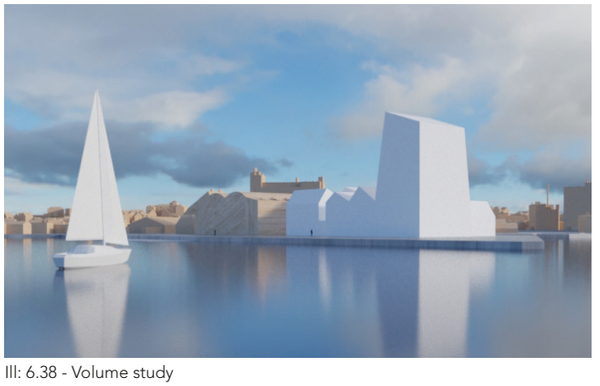
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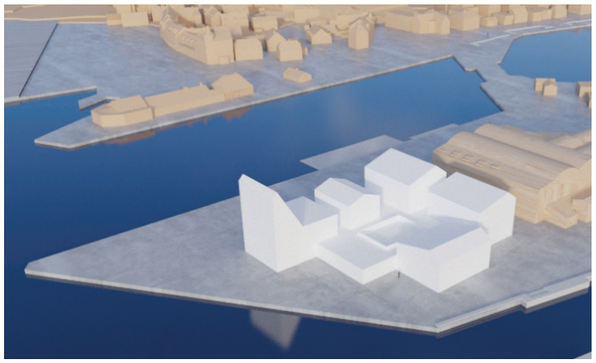
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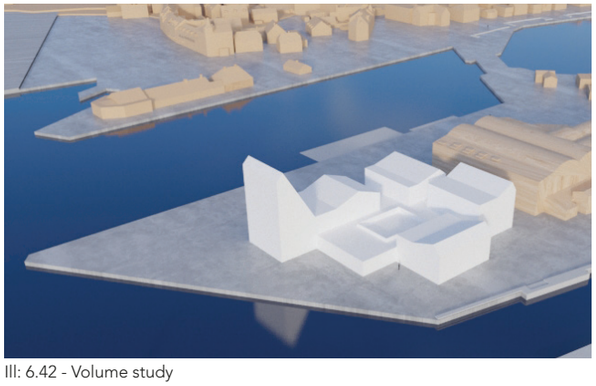
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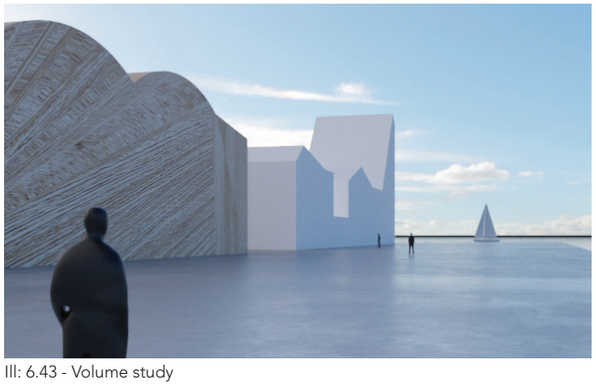
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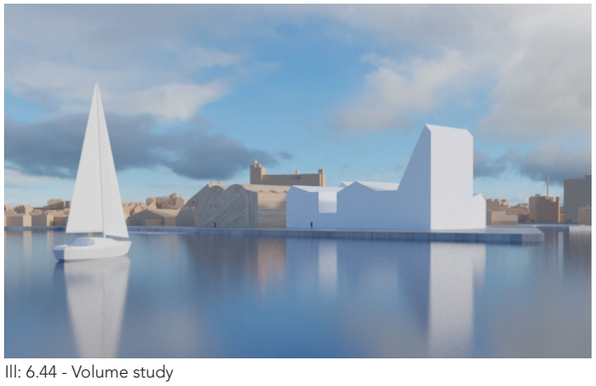
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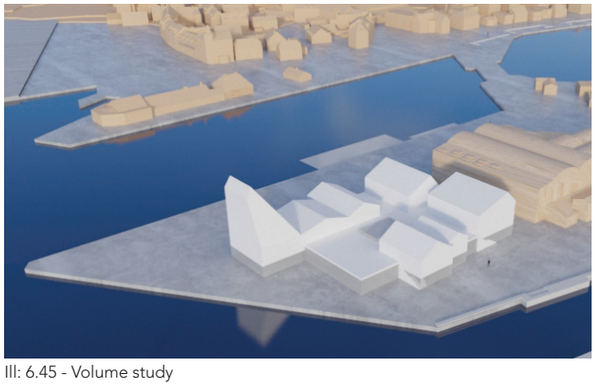
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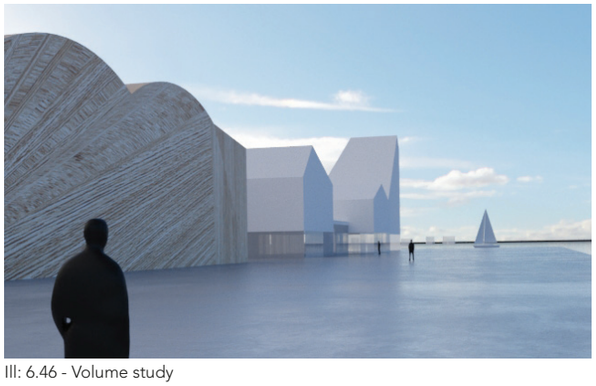
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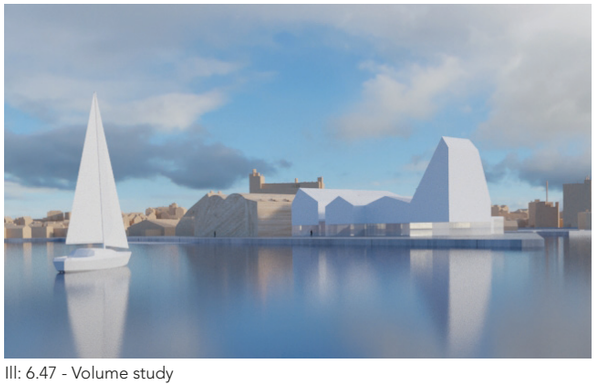
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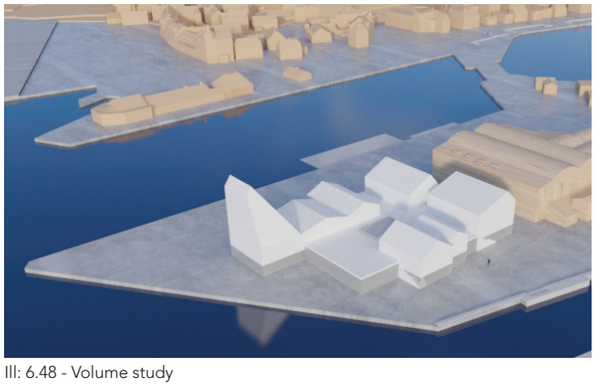
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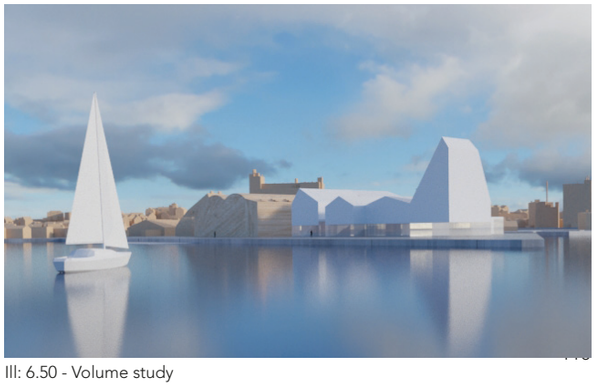
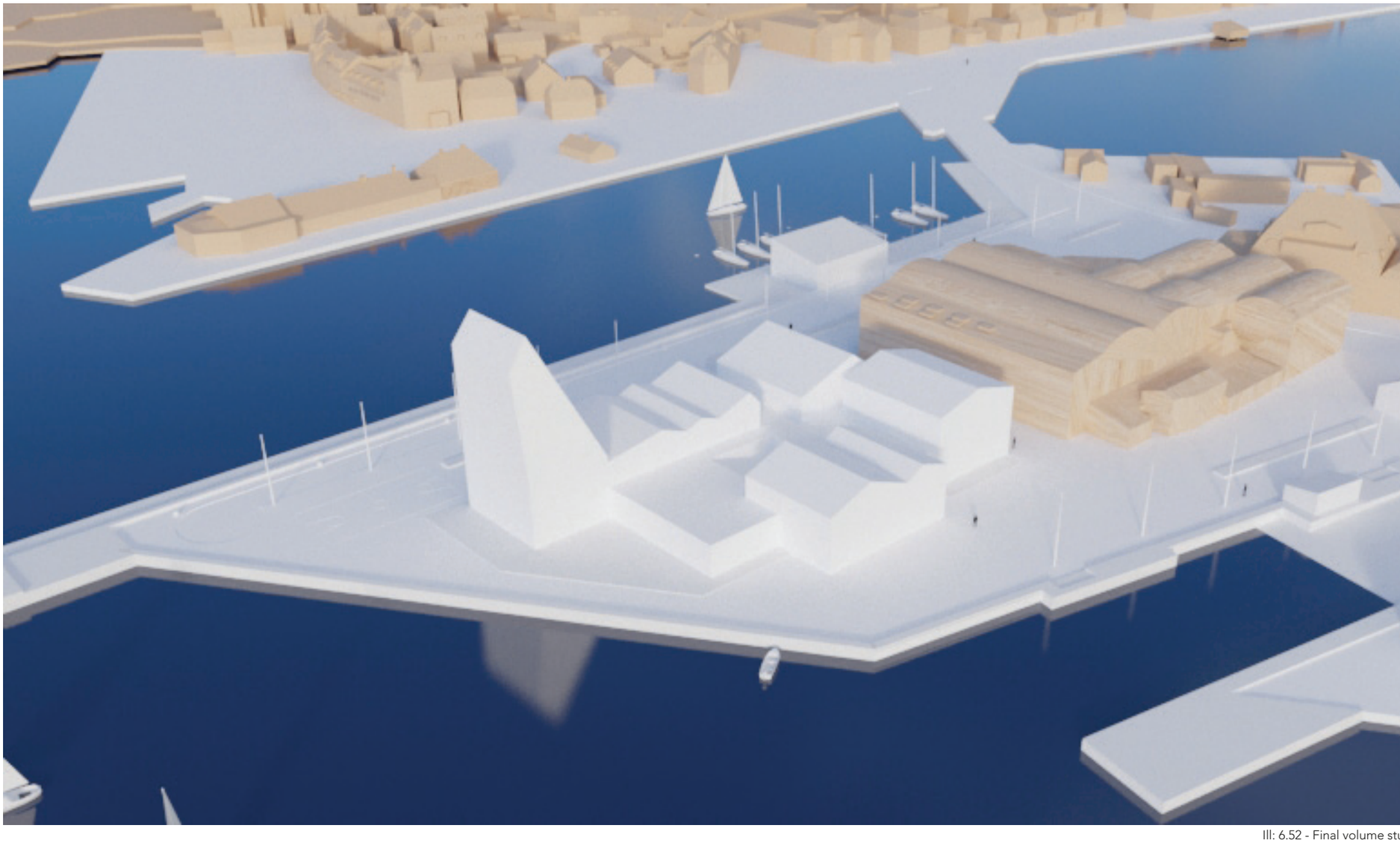

Ill: 6.50 - Volume study

Ill: 6.51 - Final volume study

FINAL VOLUMES STUDY

The final configuration of the building, consists of four pitched roof volumes, referencing the old boathouses, each containing their own identity and function. The tower placed at the end of the harbour refers to the traditional lighthouses, and functions as a guiding element for the visitors. The complex is combined by an transparent foyer, functioning as an open plaza, and creating a connection between all the activities within the volumes. A social and public building, that will become a landmark at Svendborg harbour.



Ill: 6.52 - Final volume study

07

Epilogue

Conclusion
References

CONCLUSION

The design proposal for Svendborg library deals with the shift in use that many public libraries are facing today. The role and identity of the library has experienced a shift, and moved from being a single-minded place where the user is offered a service, to being a place for the mediation and sharing of cultural knowledge, values and experience. The 21st century library plays a central role in the development of a collective relation between people, connecting the city and creating social meeting centres.

The new role of the library, challenges the previous framework for the physical space of the traditional library, which likewise, has to undergo changes in order to keep up with modern requirements and use.

Svendborg harbour is still to a large extent characterized by its former industrial identity. However the industrial activity at the harbour is in decline. The artificial island Frederiksøen, have for a period functioned as a no place, with limited functionality and occasional use only. The transition from industrial to cultural harbour front, is therefore highly desirable for the municipality of Svendborg. The placement of a new library is therefore an obvious choice, to kick-start this transition. The library can catalyse the branding of Svendborg as a new cultural city while maintaining a clear connection with its proud maritime history.

The library will provide the city with a social meeting place for the community, a public space where people can meet across social barriers, a space for inspiration, creativity, learning and social interactions. To secure these qualities within the library, the four space model, have been used when selecting the most desirable function. The functions have been chosen according to how they interact with each other, and how they create activity within a transparent and open ground floor plan. The library spaces provides the possibility for visual connections between functions and transit areas, and creates a setting for activities can occur in between. For example, a parent waiting, for his child that is playing in the children library. He may enjoy a refreshment within the café area, and maybe find interest in some of the newly showcased books. Furthermore, the mutual relationship between space and functions can catalyse the interaction between a broad spectrum of activities and user groups of the library, while providing an interesting space for the natural and informal meeting in the city.

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