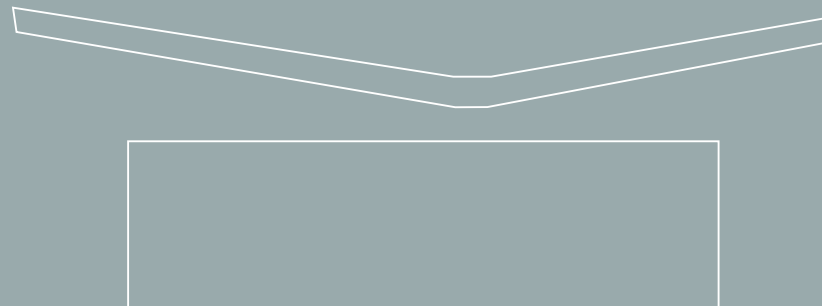


VISITOR CENTRE HARESKOVEN

a link between nature and culture



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ABSTRACT

This Master Thesis concerns a design of a Visitor Centre in Hareskoven Northwest of Copenhagen. The project is based on an assignment drawn by EFFEKT Architects in 2009.

This is a presentation of investigations of nature in relation to culture today and a tectonic study. The studies have facilitated a design process and finally a building design. A discussion of how these parameters effects and stimulate the architecture is carried out. This thesis explores the meaning of nature today and how build and grown can interact through architectural affection. It is unfolded through the exploration on interaction between material, structures and direct context. The framing of nature becomes a key element in reaching this interaction through contrasting the nature.

TABLE OF CONTENT

06.	Methodology	55.	South Elevation 1:200
07.	Motivation	56.	West Elevation 1:200
		57.	North Elevation 1:200
		58.	Sections
09.	INTRODUCTION		
10.	Tectonics	62.	Framng the nature
12.	Natur - Cultur	66.	Emphasising the wall
		68.	Building Structure
14.	CONTEXT	70.	Joining of the beam
16.	Historical perspective	72.	Gutter detail
18.	Context	73.	Window detail
20.	Sitetuation plan 1:5000	74.	Wall detail
		75.	Window detail
23.	THE NARRATIVE OF THE PLACE		
24.	Serial Vision	77.	PROCESS
28.	Flora & Fauna	78.	Building volume
30.	Genius Logi	79.	Roof experssion
		80.	Roof structure
33.	PROGRAMME	81.	Framing
34.	User Dempgraphic		
36.	Building Programme	83.	EPILOGUE
		84.	Discussion
39.	PRESENTATION	85.	Conclusion
42.	Development	86.	Sources
46.	Masterplan 1:1000	87.	Illustrations
48.	Arrival		
50.	Plan 1:200	89.	APPENDIX
52.	In Between	90.	Structural Calculations
54.	East Elevation 1:200	95.	Solar Shading

METHODOLOGY

This paragraph represents the methodological approach from the overall problem presented in the project description to the final result. The project of designing a Visitor center in Hareskoven takes its point of departure in the integrated design process to connect different aspects such as functional, aesthetical, spatial, social, and tectonic. This approach defines the guideline of creating a product that responds to the complexity of the various perspectives.

Five phases describe the process; problem/idea, analysis, sketching synthesis and finally a presentation. Due to the iterative character of the process, it will assume non-linearity in this way of progressing. Thus, the phases are processed simultaneously and reconsidered according to previous phases with particular reference to optimize the product

The project is initiated by framing the subject of the assignment and the formal guidelines. From this, the assignment is narrowed down into an overall problem that will be processed thoroughly in the analysis.

With reference to create a program to commence development of ideas and concepts, the analysis forms the basis. The analysis spans from cartographic depiction of the site to a phenomenological approach to get an overall grasp of the site, in order to illustrate problems and potentials of the area. This ultimately constitutes a declaration of what is the genuine objective.

The sketching phase is a process of working with both the physical context and the spatial requirements of the Visitor Center. Model workshops and sketching are the primary means of merging aesthetical, functional and technical demands.

In the synthesis the shape of the project progress into something more specific by working with an architectural concept, functionality and aesthetic considerations. These are all revised according to the concepts of tectonics in order to create a beautiful and durable design.

Finally, the representation of the product mediates the final design of the Visitor Center in Hareskoven.

MOTIVATION

This Master Thesis is based on a subjective perspective accession of combining aesthetics and technique with a site-specific analysis, taking its point of departure from academic studies of Architecture and Design and through professional experience.

I wonder, if architecture is generating a entity if not relating to the context of which it inhabits. The importance lies in the understanding of the whole, of the scale in context to the site, but also in function. The understanding of the span between architecture and its context, large as small. However not to forget the understanding of place and the space it generates, interior as exterior. [Zumptur, 1998] p.8

To understand architecture in relation to context, one is to understand the content of context in which the architecture are located.

Room or space means a place cleared or free for settlement and lodging. The spaces receive their being for location and not from "space". A space is something that has been made room for, something that is cleared and free, namely within a boundary where as the boundary is that from which something begins its presence.

Martin Heidegger [Frampton, 1995]

Site is not a secondary concern, but a very essential part of the architecture, and the understanding of site must draw on both an objective reality and a subject perception. Places are never empty, they have their own narrative construction, or they exist in personal experiences and collective memories, whereas space is representations created by its environment.

The site is created through the act of planning and design. It is evident that places then are professionalized into becoming personalized, claiming to capture the foundational nature, the truth, of the place [Site Matters, 2005]. I wonder, if intervention cannot occur until the site is brought under control by a professional discourse, if a professional narrative for a multitude of shared histories is to be made.

I investigate nature in relation to culture, creating a dialogical interaction between site and built. By digging into the narrative as both physical and mental parameters of a site-specific location, I aim to create architecture from those aspects.

Whoever taking into act, that when interfering with the origin of at site, new narratives occurs. It is my belief that the role of architecture is to generate and enlighten the qualities of its surroundings, that nature and the built is complementary, both contrary and complementary of one another. Yet, nature is often perceived as a contrast to culture, the human act, instead of a complementary of the two. The human tendency today is to move away from nature to settle in the city, in which they become more and more dense. Through a new need and tendency of creating green interventions in the city, I state that the large contrast between nature and city has created a new need for humans to interact with the nature.

With thought of the development of humans and their way of living, it is my intention to create a link between the city and nature. This link is important in order to elevate qualities of everyday life. A Centre in Hareskoven is to communicate the interests of the nature, making the forest reachable, creating frames for knowledge distribution and an understanding of nature through interaction.



INTRODUCTION

TECTONICS

Tectonic is defined by the Greek as craft of carpentry; a builder. Adolf Heinric Borbein describes tectonic as; the art of joining. An assemblage, not only of building parts, but also of the objects. He talks about an aesthetic perspective, that specifies the work and production, and not a goal of utilities. Stating that the term tectonic is an aesthetic judgement. [Frampton, 1995]

I find that architecture and construction cannot work without each other, a composition of both. The building is first and foremost a construction, in which construction sets the frame for the architecture. The construction contributes as a space-giving element, but space is created by many different elements and not necessarily only by the construction itself. This leads to my wonder, if the term tectonic aspires to be aesthetical rather than technological? The poesy of construction?

Though the term space as known today was not used until 1894, I agree with August Scharnow's statement, that the feeling of space is the driving principle behind all architectural form. When talking about the built as a construction, space is architecture created within the limitations of construction. By this, not meaning that construction is excluded from architecture. From needs occur space and space is a reconsideration of constructional and structural modes. Tectonic favors not any particular style, but is the art of construction, as it is the craftsmanship in which aesthetics arises.

I find the reconsideration of constructional and structural modes to involve details, as the detail is the poetic of construction. By means not only of materials and joining elements, but also detailing the relation and narrative of place in which, the architecture inhabits. The unavoidable earthbound nature of buildings is as tectonic and tactile in character, as it is scenographic and visual. Tectonic in relation to architecture as a representation of feelings, takes into account the general meaning, which lies in the etymology of the word tectonic, [Karl Gottfried müller's handbuch der archäologie der kunst, 1830]. The affinity and discussion lies in our understanding of the connection between poetry and technique, not only aesthetic choices, but also ethical content of its cultural contribution.



ILL. 01 - THE NORDIC PAVILLION, SVERRE FEHN

The beginning.

In "Four Elements Of Architecture", 1853, Gottfried Semper attempts to explain the origins of architecture through an ethnographic approach. The four elements take their point of departure in primordial dwellings; the earthwork of the soil, the heart of fire, the framework/ roof of the carpentry and the lightweight enclosing membrane. He describes the roof, the building shell and the earth excavations as jointly surroundings protecting the heart, the fire. On the basis of this idea, Semper classified the building craft into two fundamental procedures. The tectonics of the frame, in which lightweight, linear components are assembled, to encompass a spatial matrix. And the stereotomics of the earthwork, wherein mass and volume are conjointly formed through the repetitious piling up of heavyweight elements depending upon load-bearing masonry [Frampton, 1995].

Martin Heidegger describes topographic through the phenomenological presence of things in themselves, giving their constancy and pith, but at the same time the source of their particular mode of sensuous pressure. Architecture is situated at the interface of culture and nature. Building is as much about the ground as it is about built form. Therefore the discussion of the nature – culture relation is too important in the tectonics of architecture. Being close to agriculture, its task is to modify the surface of the Earth in such a way as to take care of it. As of building the site, it is as much place-making and passage of time, as it is about space and form. [Frampton, 1995]

"Tectonic as a certain expressivity arising from the statical resistance of constructional form in such a way that the resultant expression could not be accounted for in terms of structure and construction alone." – Eduard Sekler

In distinguishing between the core form and the artistic representation of the same element, Karl Bötticher interpreted the term tectonic, as signifying a complete system binding all parts into a single whole. In which tectonic are to assemble building parts becoming the art of joining. By this, leading back to craftsmanship of carpentry and the poetics of construction as art, however here the artistic dimension is neither figurative nor abstract. At the state of the art, the craftsmanship has become highly cultivated, rather than the nature of survival man creating a fireplace and a shelter.



ILL. 02 - SINGLEFAMILY HOUSE, KLAMPENBORG 1933, ARNE JACOBSEN

The detail.

Stepping further into the art of the craftsmanship in his essay "The Tell – The Tale Detail", Mario Frascari talks about the detail as an expression of the process of signification, attaching of meaning to man-produced objects. He never mentions the term tectonic, however his thoughts of detail relates very much to the poetics of construction. To Frascari the detail is the loci, the spirit of the space. "The detail tells the tale". Whether it is the tale of construction or a tale of the narrative, the discussion lies in our understanding of the connection between poetry and technique. However the art of detailing is really the joining of materials, elements, components and building parts in a functional and aesthetic manner.

Context.

Through the concept of the site and the principle of settlement, the environment becomes the essence of architectural production. From this vantage point, new principles and methods can be seen for design. Principles and methods that gives precedence to the sitting in a specific area. [Frampton, 1995]

The built and context are complementary in architecture. Architecture is the relation between conditions of the context, and what architecture can gain by it. The nature has through its own laws of tectonics, the ability to evoke an emotion, the aesthetic emotions of nature in humans, which makes us feel smells, colors and sounds, within the order of nature. Experiencing architecture is just as much experiences through the body as through the eyes, the feeling obtained by the place, space or room. I find the tectonic, through its elements, to emphasize this feeling as the relation between place and space, interior and exterior. Whether a relation occurs, or if there is a clear distinction between the two.

Gesture.

The forest being the context, is important not to overlook the narrative of the site. It has roles and laws of its own, which one is to respect in order not to destroy natural forces. Therefore the gesture is to create variation of an inside-outside relation. Emphasising different relations to the forest, the architecture is to frame important elements of the place. The framing of elements occurs through contrast, putting one in a very specific situation.

The forest obtains many different elements, a whole universe of it own. When stepping into this universe, these elements become one, embracing and making one loose focus between elements. Framing out single elements one becomes very much aware of, what is being looked at, being experienced. Contrasting the wild reinforces this experience in which built acts both as contrary and interacting.

Nature. The definition of it depends on the eyes, which sees. Our perception of nature and our relation is rooted in norms, values and moral and has changed significantly during time. Some sees nature purely as the living, as trees and animals, but nature also contains the dead things as soil and stone, which is bound to the earth surface. Nature often tend to be experienced from distance, “what is out there”, not involving everyday- and work life appearing aesthetic rather than practice. The view of nature often appears to be an unapproachable piece of land.



ILL. 03 - FOREST PAINTING - JENS JUEL

As human we belong to the nature, however the human acting and thinking does not. We are Culture in contradiction to Nature. Our way of thinking and talking about nature has very early been defined by a perception of the world created by a divine, supernatural creator. By this perception the nature is earthbound, connected to the physical presence, of human life on earth. It is “what is down there” and the natural human life is within the nature and not its contradiction. However the nature seems to have become a contradiction to the human way of living in the most of the world today.



ILL. 04 - SKYSCARAPER SAN PAOLO, BRASILE

As much as the forest can be frightful it can also be the idyllic place oppose to hardness of the City. The idyllic is what unfolds under the open sky and from a city point of view the unfolding under the sky stretches until where the urban begins. The nature appears to be fare away from the human everyday life and its indoor culture setting the nature into an idyllic context of “what is out there”. However “what is out there” is not necessary what unfolds under the open sky, but can be frightening and unfolded under the roof of dense treetop and the nature then appears as a place for adventure.

Within the city the nature too finds its place. It is the living, the organic and low tech in contrast to the vibrant and ever growing city. The green nature here is man made, grown and kept and it stands in contrast to the mechanical, synthetic and the high tech. What is related to nature has become symbol of nature, products of natural element against the synthetic. Nature today has been used as a brand leading back to our relation to nature perceptions as aesthetic. Being adapted into something else, as wood turned into a book shelve, cork turned into a dish mat, is it then still nature? Who set the agenda of what is NATURE? [Hans Fink; 2003].

Nature is not necessarily contrary to culture as human are a part of the nature cycle, it is the human acts which is not. I find that culture and the human needs relates to nature. Human action affects every element on earth, some of which is less fortune and destroying, others relates to our way of living with nature. The interesting question is the how nature is perceived? It all falls back on the eyes, which sees, relating to the context and background of the viewer. Nature today is still perceived as the wild unfolding outside the build, however an interesting tendency of growing the city has arose along with the cities becoming more and more dense. The nature and rustic has become an interior. Rooftops are being used as gardens and when space is freed green elements pops up. This signifies that the human still are depending on nature, however it is no longer wild and needed for physical survival. However I state that it is needed for mental survival as the need for nature become very evident along the city becoming denser. With the densifying of the city a need to brake away from it occurs. The perception of the nature today challenges the romantic and idyllic picture of nature; it is there to used. Perceived as their own property and applies new functions to it, as to be a place for exercise, play or reflection.



ILL. 05 - BIG FOOT, MICHAEL KVIUM



CONTEXT

HISTORICAL PERSPECTIVE

The forest of Hareskovene is among the oldest forests in Denmark, and the sloping landscape shaping Hareskovene was formed at the end of the last ice age, 10.000 years ago. The character of the forest has changed during the last millenniums and is today covered in a variation of native forest, consisting of beech, oak and birch, and plantation forest mainly dominated by pine.

From around 4.000 B.C man sought inlands to cultivate the land, and they used the forest for grazing their domestic animals. From these first settlers remains of old stone dolmen are scattered around in the forest .

During the war against the Swedish in 1658-1660 most of the forest were cut down, in order to build fortifications, and keep the citizens of Copenhagen warm during the winters. Due to the vast demolition of the forest during the war it later became a protected forest. King Christian 5th established in 1687 the ruler-straight paths, that still dominate the forest today. The paths, laid out in the pattern of a star, served as hunting paths to track down and tire out animals.

In 1906 a railway between Copenhagen and Slangerup was establish. A railway station built in Hareskoven, today serving as a stop on the S-track, connects the forest with the city of Copenhagen. Together with the Hareskov Pavillon, the new railway created a well-attended picnic area for the Copenhageners until it burned down in 1950 .

Today the forest is a place for recreation of citizens of the many smaller neighboring towns, using the forest for walks, runs, mountain biking and different smaller associations.

From early days Hareskoven has been used by man, traces of this are still evident in the many well-kept paths, old burial places, and areas of plantation. It is evident, that the forest has a character of being compounded by the wild nature and human interaction, altogether giving the forest a character of being a meeting between nature and culture.



CONTEXT

Hareskovene are situated Northwest of Copenhagen in between Bagsværd, Ballerup and Værløse. The forest of Hareskovene consist of Kollekolle, Bøndernes Hegn, Store Hareskov, Lille Hareskov and Jonstrup Vang and represent a total area of 888,1 hectare. The central part named Store Hareskov represents one third of the entire area. The nature varies from dense vegetation to open meadow areas as well as valleys with lakes and bogs. The vegetation is characterized by beech, pine, oak, linden and maple. The S-train runs along the Southern forest edge of Store Hareskov, and the station is in the middle of Hareskov only 30 minutes from Copenhagen central station.



HARESKOVEN IN RELATION TO DENMARK



HARESKOVEN IN RELATION TO COPENHAGEN



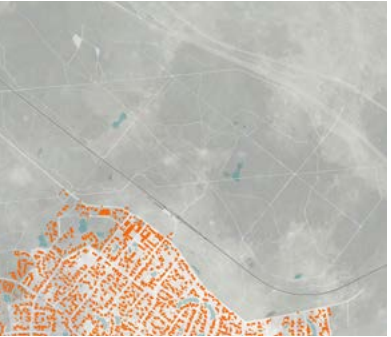
HARESKOVEN IN RELATION SURROUNDING CITIES



O1. The 7-star path



O2. Hareskov station



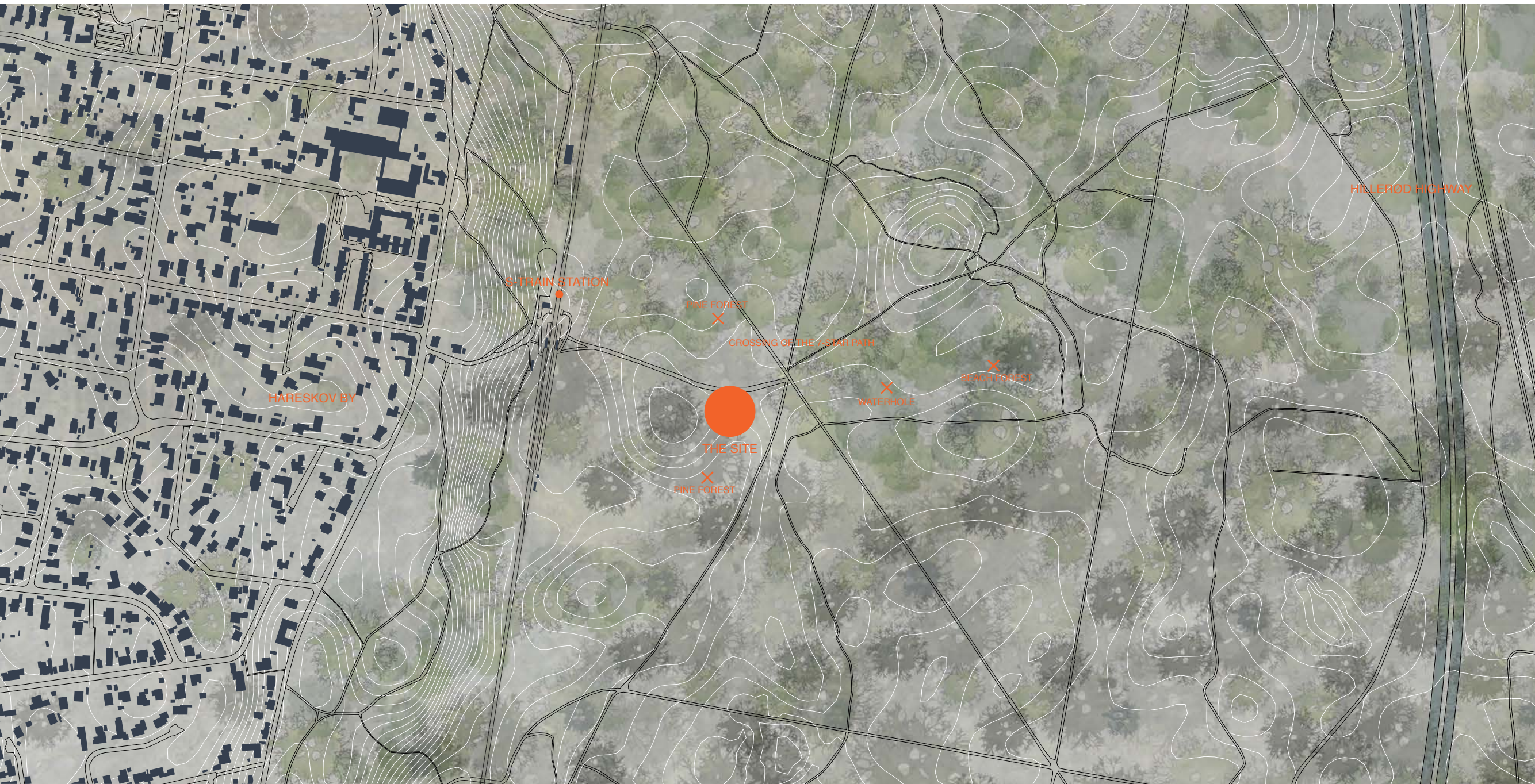
O3. Hareskov City



O4. Hillerød highway

HARESKOVEN SITE MAPPING

SITUATION PLAN 1:5000



1:5000 LANDSCAPE SECTION



From the situation plan and landscape section it is evident that Hareskoven is situated in close relation to dwelling and transportation indicating that it has a great potential of being emphasised as a place excursion activities not possible in the dense city. The close connection to the s-train underlines opportunity of the forest being an extension to the city. By its close distance its natural that citizens of Hareskove are using the forest as an extended backyard for spare time activities. A Centre making space for those will emphasise the forest as a place which being able to be inhabit by everyone.



THE NARRATIVE OF THE PLACE

SERIAL VISION

Arriving from the station one is to be met by a clearing welcoming the guest to the forest. The open area narrows down to a wide path, a boulevard shaped by the contours and trees of the place, guiding the guest further into the forest. Thus smaller paths leading in other directions from the arrival seams to be the axe naturally guiding one to further exploration. Further in, not fare from the station, the path narrows from the opening emphasised by the tree-tops reaching in over the path framing the axe.



ILL. 06 - ARRIVAL AT HARESKOV STATION



ILL. 07 - THE CLEARING NARROWING DOWN



ILL. 08 - THE PATH LEADING INTO THE FOREST

Due to the slight docked terrain a full overview, of what is coming, further in is not to be made. Then at the highest spot, the landscape flattens out into a clearing. Here the path opens to the forest floor creating a pause in the otherwise continuously and direct path. Here the Visitor Centre will be situated. Straight ahead towards East of the site the trees and the wild vegetation continues endless into the depth of the forest. Towards South the site is embraced by a continuously pine forest planted in a strict grid creating a meditative vertical rhythm. Facing West the docked landscape creates protection for the site slightly as being in a dale. Standing on your tiptoe the station are to be caught a glimpse of. Turning North towards the path, one came from, scattered trees become more and more dense, finally creating a pine forest. Stepping out onto the path again, further exploration leads one to the star shaped path system continuing throughout the forest.



ILL. 09 - MOVING UP THE SLOPING PATH



ILL. 10 - ARRIVING AT THE SITE

NORTH VIEW



BEECH BUSHES

PINE TREE

THE PINE TREE PALNTATION

SOUTH VIEW



BEECH BUSHES

THE SLOPING LANDSCAPE SEEN FROM THE SITE UP TOWARDS THE PINE FOREST

THE PINE TREE PALNTATION

EAST VIEW



BEECH TREE

PATH LEADING FURTHER INTO THE FOREST

WILD BUSHY FOREST SOIL

BEECH BUSHES

THE PINE TREE PALNTATION

WEST VIEW



THE SLOPING LANDSCAPE SEEN FROM THE SITE TOWARDS THE S-TRAIN

BEECH BUSHES CREATING A CARPET ON THE FOREST FLOOR

THE PATH TOWARDS THE S-TRAIN

FLORA & FAUNA

Hareskoven is rich on various plantations but are mainly dominated by beech forest, however the forest is also marked by coniferous forest, oak, lime and maple.

With many plantations of coniferous forest it is evident that the forest is not to grow wild and that the forest has been used for production. Small beech trees appear to grow dense and randomly throughout the forest. When planting a forest, many trees are planted at once. When they start to grow, the strong trees grow big, surviving, and the weak dies and the vegetation over time becomes scattered appearing random and more as the image of a forest we know of.

The forest floor however appears wild and to grow from the rules of nature. It becomes the carpet covering the floor in kontras to the endlessly tall trees growing from it.



ILL. 11 - ELEMENTS OF THE SITE

01. A bird's nest. 02. Stump of tree from a cut down tree. 03. Horse tracks. 04. Wild grass. 05. Beech tree. 06. Sponges growing on stacked logs. 07. Rush in the swamp. 08. Tree trunks of coniferous tree. 09. Beech tree. 10. The top of coniferous tree. 11. Daisy flower. 12. Hare steps

GENIUS LOGI

The understanding of the term atmosphere is very individual. A place, building, space or a person can create a certain atmosphere, whether it is natural or a given one. Atmosphere is about first impressions caused by an emotional sensibility, where craft and material composition gives rise to something unique. Ones perception of nature and relation to it is about norms, values and moral, resolving in the understanding of nature to be very individual.

When arriving from the station, stepping into Hareskoven an opening appears to welcome one to forest. Embraced by its natural elements trees, soil, leaves, stones, and fallen branches a sudden silence occurs. The opening drags one deeper into the forest. Not that the forest at this specific place is very dense, but one is, by the branches of the trees creating a roof, lead further into the deep of the forest. From the forest entrance smaller paths can be taken, however the opening narrows down into a wide path, almost pointing, towards a deeper exploration of the forest. This forest is certainly not an untouched forest with its boulevard like paths and plantation of pine trees. The forest floor gets to grow untouched, while trees are neatly taken care of. However moving through the landscape, old tree stumps and freshly fallen trees with its big roots pop up now then. In the landscape the path appears as a strict element, which is to be followed, whereas trees, the bushy landscape and shifting topography is to be experienced from a distance. Moving along the path through the forest one is to experience the interplay of mood setting elements of the surrounding, underlining the atmosphere and one finding their way through exploring the landscape, reaching a clearing. Here one can take a pause as having reached the site. Only few, but very tall trees occupy the site and create a natural space for the Visitor Centre. From the site, the topography rises towards South and West, from where one arrived by the S-train, creating a dale, emphasising the space of the site. Towards West one can, when standing on their toe looking over the slope, orientate



where they came from. Over the slope towards South, a strict grid of pine trees appears, with branches reaching towards the sky, creating a vertical rhythm of newer ending columns holding an important roof. The vertical density creates an edge towards the unknown and unexplored, and becomes the boundary of the side opening up for new adventures. East of the site the landscape flattens, here smaller and bigger trees interact, scattered still, but becoming denser and denser further into the forest. This site, created by light, topography, elements of the forest and their combination creates a setting for a space of both exterior and interior.

From this clearing different views occur, from being in eye height with the ground, to be looking into a repetition of tree trunks, to a long view down the wide path into the depth of the forest. Though it is not wild nature, the atmosphere of a forest enclosing one is present, and through its ever-moving landscape, the feeling of the forest becomes the freedom to abandon the path and hide away. To explore the forest further, it is evident that the forest holds more, than what the eyes can see. The sound of fallen leaves and small stones moving under the shoes when walking through the forest, breaks the otherwise silence of the place. Footsteps in the mud become an evidence of ones presence - at least for a while.

However being slightly hidden by the sloping topography the cultivated world is present at all times. When stepping of the S-train the surroundings are not exactly welcoming one to the forest, in fact it is hard to tell, where to go from here. When passing the boundary between the S-train and the forest edge, walking 200 m along the boulevard-like path, one gets a sense of direction. Not knowing the forest it is hard to orientate where to go and how far the distances are, as the forest seems enormous, making one very small and loosing sense of scale. Loosing sense of scale is a quality of the forest, as it can be a place to retreat or explore. However the arrival and the first 200 m is a barrier making it hard to get into the mood of exploration.

The site gives space for at pause before moving deeper into the forest and therefore a place to create a link between culture and nature. By its shifting views to the context it makes an interesting point of departure for further exploration.



THE PROGRAMME

USER DEMOGRAPHIC

Due to its close relation to Copenhagen and its easy access by the S-train, Hareskovene have a great potential to become an integrated part of the everyday life for the residents of Copenhagen. The use of a forest has changed, and people see it as their own, therefore many activities have moved for being a part of the forest. A forest is no longer something which is out there but something nearby, a break from the busy city. An anchor point will create a link between nature and city making the forest even more reachable.

Today there is a high level of activity in the forest of Hareskovene. A large network of paths generates great opportunities for hiking, running and dog walking. Having the longest mountain bike track, at 26 kilometers in Denmark, many mountain bikers come here to. In the Southern part of Hareskovene an exercise route with obstacles challenges strength and balance. For less physical activities the forest offers fire-places, shelters for overnight guests and lakes to fish in. This shows a great effort of making the forest a place to be used for many different types of activities and people. From this perspective the Visitor Centre is to set the frame for a variety of users, from the everyday forest visitor, to associations having their activities in the forest, to institutions having a field trip to the forest. All of whom do not need a place to stay inside, but a place to set frames for their activities, to inform and guide them in their purpose. Situated in relation to the S-train the Centre will be the first stop on their exploration.

The Centre should embrace diversity and therefore the users benefit from each other. The research is to convey their work to other forest visitor, and the “other” forest visitors are to participate in the work of the researchers making the users of different purpose interact. The forest guest should be met by a vibrant place, with the opportunity to experience and challenge their body and brain around nature, culture and outdoor activities. The Centre contains interior but also exterior spaces providing shelter and generating inspiration to different activities in the forest, as well as creating a link between humans and nature. Here the visitor is given the opportunity to borrow materials, given information and activity inspiration in order to experience the forest in new ways, and is hereby distributed to the different areas of the forest. After opening hours the Centre is not to be a closed element in the forest, but through architecture creating exterior spaces and shelter where information can be obtained and exploration and activities can continue.

“everyday” visitors

The “everyday” forest visitors are families or groups of friends, who visit the area for a walk around the forest. The intentions of this group vary from enjoying the forest, picnics, collecting objects or to exercise. They will use the Centre for gaining information, renting equipment, participate in activities, and seek shelter. Within this group are also the neighbours to the forest, seeing it as their extended backyard where they can take a run or walk their dogs. These will be the most frequent users of the forest.

Institutions

The institutions are users, that use nature in relation to their education or research. It can be seminars or other institutions with the interests of nature. They will use the Centre for teaching, lectures and research and will need classrooms, research space and storage for equipment. Other institutions using the Centre are kindergartens and school classes, who will be arriving from the station. They will use the forest for play and exploration, as an excursion or for nature and exercise days. This group will use the Centre as their classroom and spaces around the building as sheltering elements from the endless forest.

Associations

The associations vary in interests from high to low activity, as sports, nature, historical and culture, and they will use the Centre for those activities, having it as their base. The different associations will be frequent users of the Centre, sharing the space between them from classrooms to toilets, kitchen and storage.

The Centre should be diverse and in its architecture unite the variety of activities. The visitors are to interact with each other during their visit in Hareskoven, and the Centre is therefore to be flexible. It is the welcoming element when arriving from the station, and to be visible without disrespecting the terms of the forest.



ILL. 12 - USERS OF THE FOREST

BUILDING PROGRAM

The Centre is to be diverse and in its architecture to unite the variety of activities. The visitors are to interact with each other during their visit in Hareskoven and the Centre is therefore to be flexible. It is the welcoming element when arriving from the station and to be visible without disrespecting the terms of the forest.

GENERAL DEMANDS

Domain	Functions	Size	Amout	Functional use
PUBLIC AREA				
	Café	60 m²	1	Low activity, eating and drinking coffee.
	Kitchen	15 m²	1	Outdoor kitchen with carning facilities.
	Exhibition, Foyer, Wardrobe	150 m²	1	Entrance of the house, space for info and exhibition, a place to put bags and coats.
	Shelter	25 m²	1	Outdoor covered area for sleeping or excursions.
	Storage	15 m²	2	To store facilities of the house and elements for schools or associations.
	Toilets	30 m²	4	The toilets are both indoor and outdoor, the outdoor toilet is open at all times.
	Campfire	60 m²	2	A fineplace area for cooking food, whit cowered area attached.

SEMI PUBLIC

	Workshop	80 m²	1	For all kinds of workshops envolving the forest.
	Class Room	60 m²	2	For school, institutions and others to use.
	Association room	40 m²	1	A space for associasions to at have belong in the house.
	Café kitchen	30 m²	1	A kitchen serving the café, can be used at arrangements as well.

NON PUBLIC

	Officies	20 m²	2	For the staff working in and with the house
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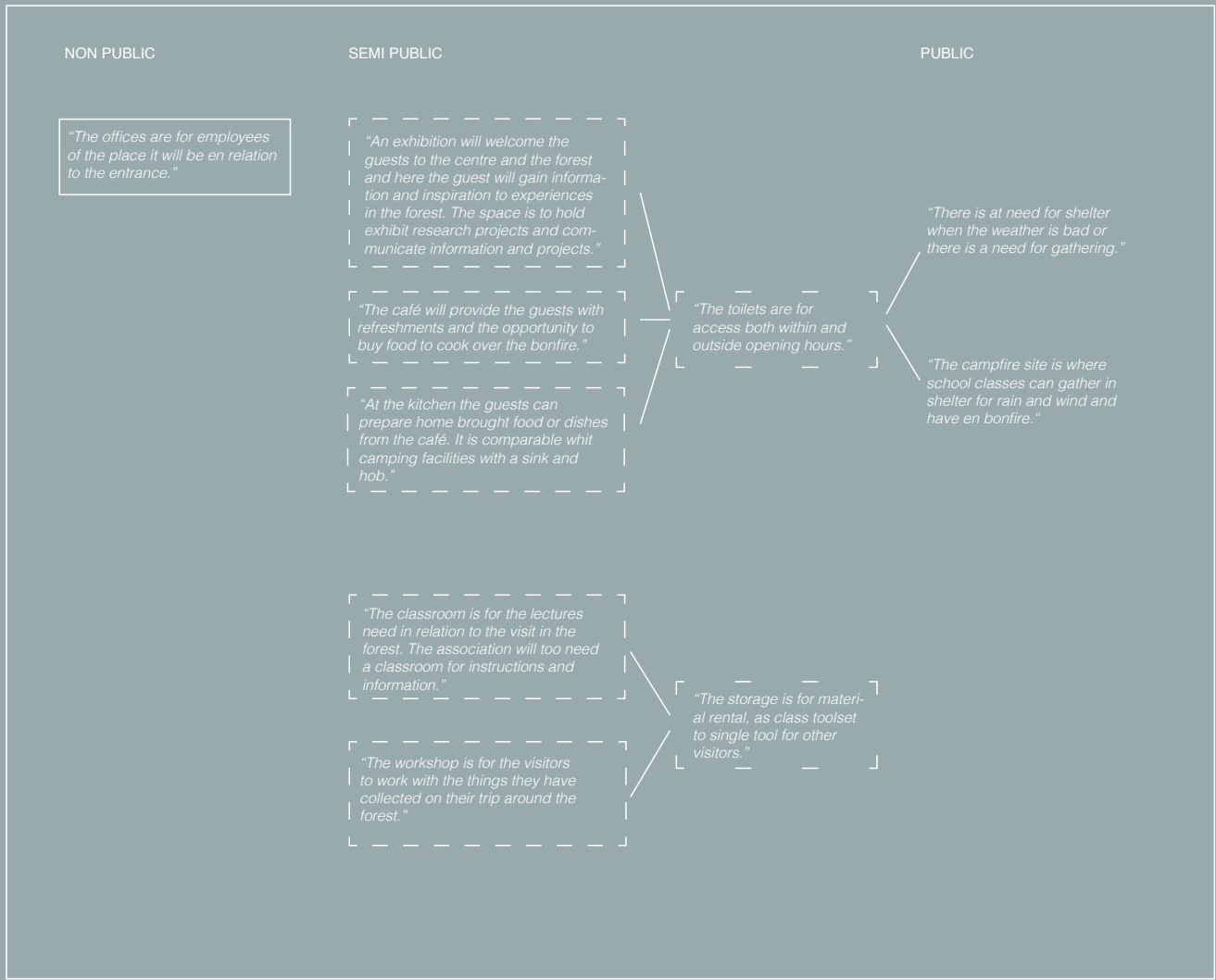
ARCHITECTURAL DEMANDS

Light	Views	Atmosphere
● ● ●	● ● ● Overlooking the outdoor activities	Of being sheltered while opserving the nature
● ○ ○	○ ○ ○	
● ● ●	● ● ● Having a visual connection to the workshop	Blured boundary between building and nature,being embraced by the building when further in.
● ● ●	● ● ○	Of seeking shelter from the weather observing the nature
○ ○ ○	○ ○ ○	
○ ○ ○	○ ○ ○	
● ● ●	● ● ●	Of the warmness where stories are told. An extented space of the building

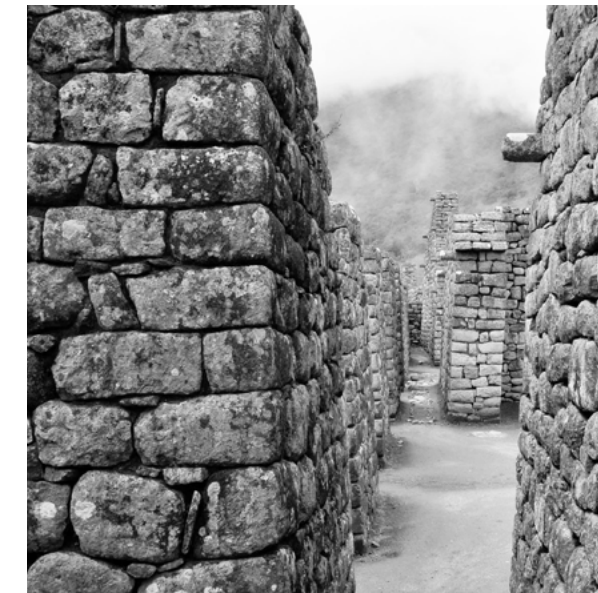
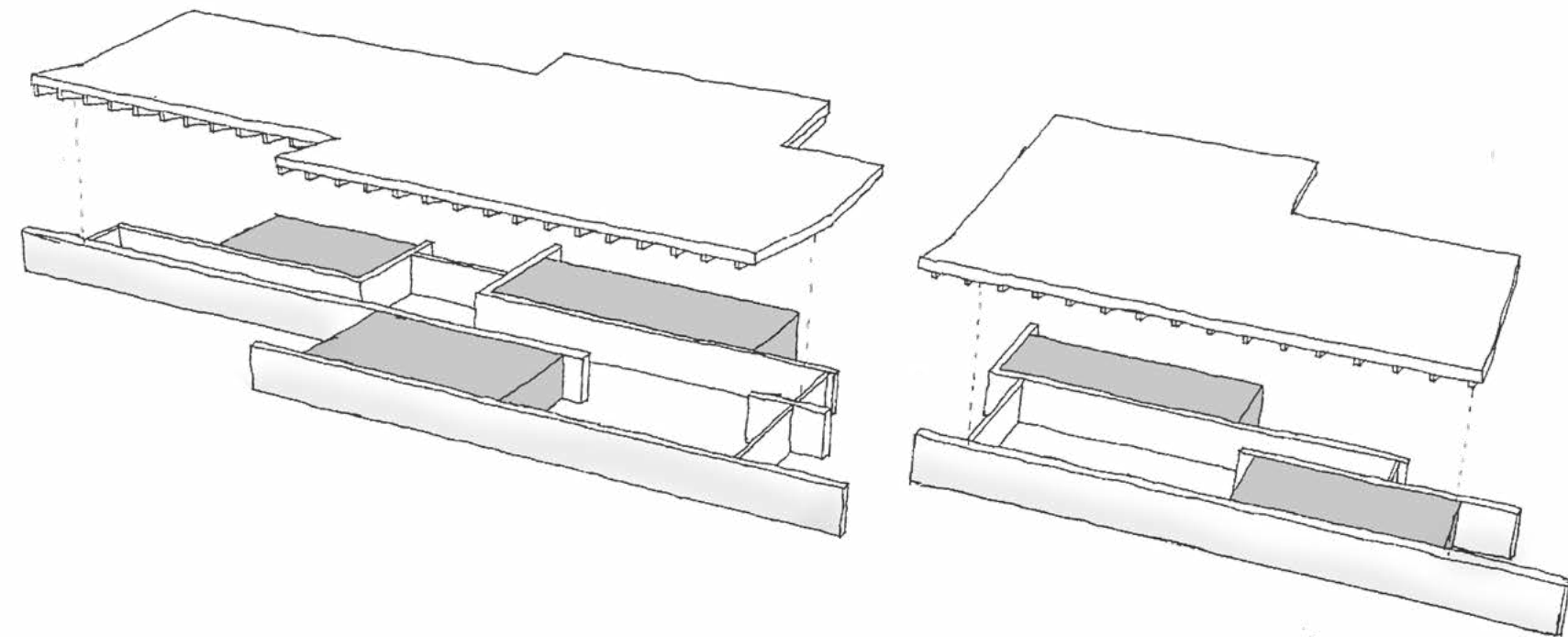
● ● ○	● ● ● Having a visual connection to arrival area and high activity	Of the forest becoming a part of the building. Making a fluent transition between the two
● ● ○	● ● ● Directed towards selected elements of the forest.	Being able to retract. Framing single elements of the forest.
● ● ○	● ○ ○ To the endless forest the outdoor activity.	Being embraced by the buildig allowing the the forest enter when wanted.
● ○ ○	○ ○ ○	

● ○ ○	○ ○ ○ A long view pointing away from high activity giving calm	An enclosed space making it able to watch the nature protection
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PROGRAM RELATION

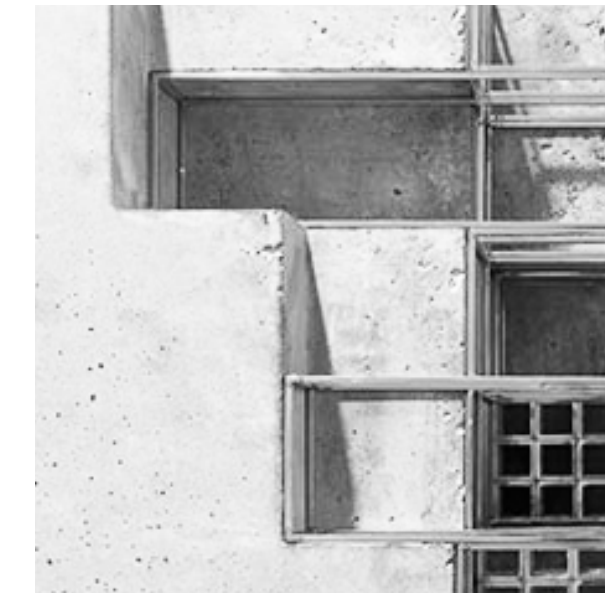


PRESENTAION



ILL. 13 - MACHU PICCHU, PERU

The Wall
The concrete wall is the earthbound object, rising from the ground. It cuts through the landscape creating a path along it. The wall creates shelter, a protecting fortification.



ILL. 14 - DETAIL OF KENZO TANGE TOWERS, CARLO SCARPA

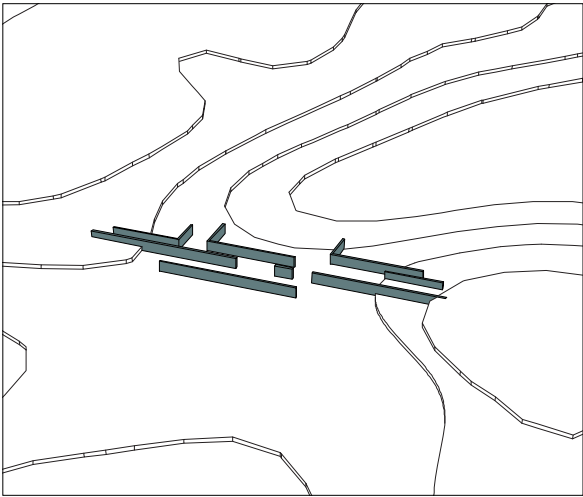
The "in Between"
The space defining element. Blending in with the landscape, but with a rich interior, a place to stay protected from the outside world.



ILL. 15 - NOVARTIS PAVILLION, MARCO SERRA

The Roof
The roof is the linking object, joining all elements, reaching towards sky creating shelter, for what is beneath it like the crown of trees.

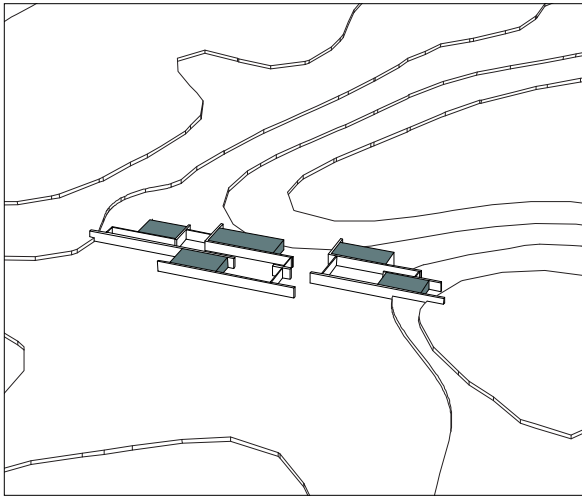
DEVELOPMENT



ILL. 16 - WALLS CUTTING INTO THE LANDSCAPE

The Walls

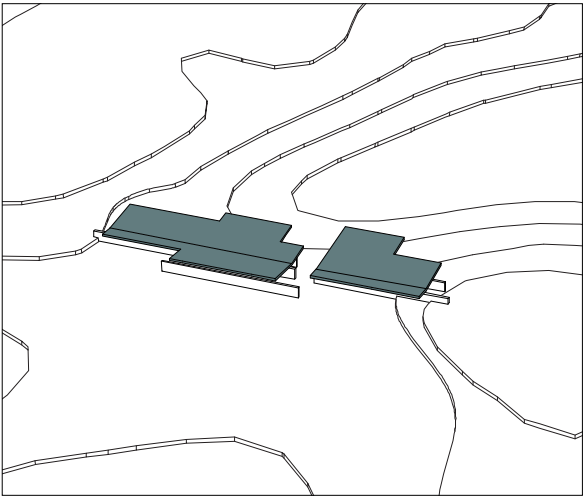
The concrete walls are growing from the forest floor stretching in an East-West direction guiding one further into the forest. The walls are the directing element of the building interacting with the landscape. The walls facing South are shaping a small L to open up towards the sun.



ILL. 17 - SPACES OCCURRED FROM THE IN BETWEEN

The Volumes

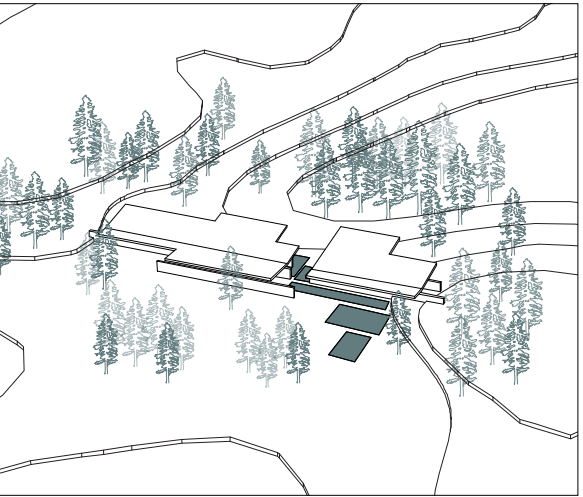
The volumes are placed in between the protecting walls creating interior spaces of the building. As these spaces need sunlight most of them are facing south.



ILL. 18 - THE JOINING ROOF

The Roof

The roof is the element closest to the treetops, and is in its structure therefore reaching towards the sky. The large butterfly structure joins the entire structure and creates covered outdoor spaces along the guiding wall and additional spaces when needed.



ILL. 19 - THE RELATION TO CONTEXT

Pavement

The pavement is leading one into the building. It is raised slightly from the forest floor to make one aware of the shifting in movement. The pavement widens in between the two building volumes creating a physical connection. Contrasting the forest floor the pavement creates situations for stay.

THE MATTER OF MATERIALS

The building is composed by three main structures, together setting the frame of the Visitor Centre. In between those are more layers emphasising the architecture of the building. As the interaction between the building and the forest is such a large story of the architectural language, the treatment of material in relation to the structure is inevitable.

The walls. The earthbound heavy elements and loadbearing concrete walls are only broken by the most necessary openings, symbolising protection through heaviness and strength. When being build the walls appear new and clean. However as time passes the concrete will age becoming one with its context as the landscape will grow wild around it and the life of the forest will make it, its own.

The in-between space. The interior spaces created for stay and absorption furnishes the spaces in between the heavy walls, build up by a wooden structure. These interior spaces symbolise a stay, contrasting the vibrant movement along the concrete wall through the building and out. As the warm sense of wood stands in contrast to the concrete, their functions become each others contradictions in which the discussion of the material treatment are inevitable.

The roof. The structure linking the elements of the building into one. Slightly lifted from the carrying wall with its "wings" pointing upwards. Having to appear light the structure of the roof is constructed in glue laminated timber in contrast to the coldness of a steel beam. Making aware of its movement upwards the beams are exposed to the visitor, being able to follow their direction all the way out of the building. Around the building the roof structure creates covered spaces when needed relating to the functions of the building.



ILL. 20 - CONCRETE SLAPS



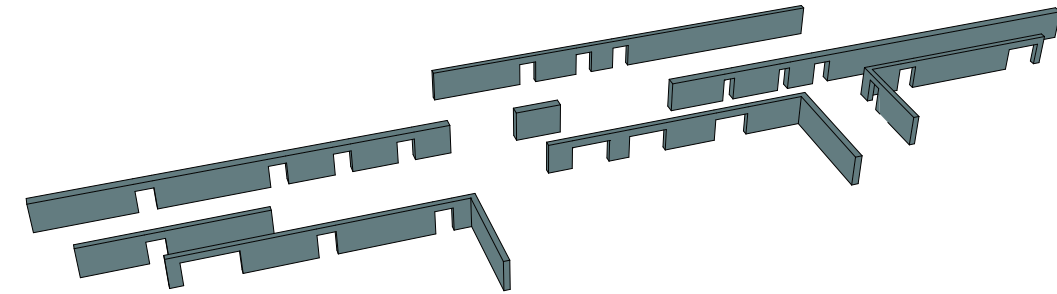
ILL. 21 - CONCRETE WALLS



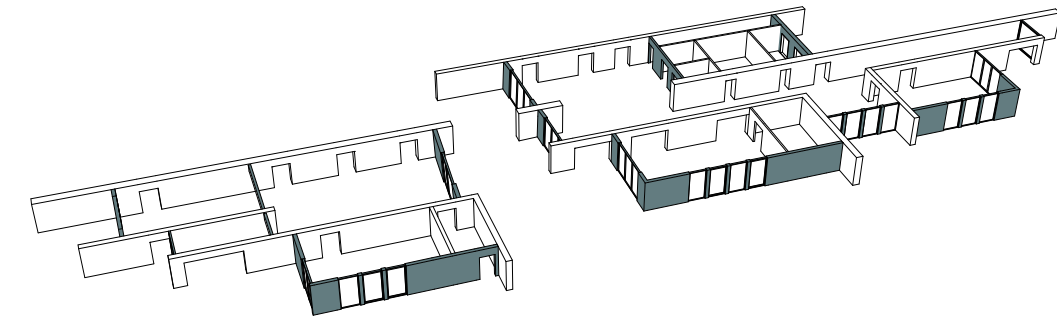
ILL. 22 - EXTERIOR AND INTERIOR WOODEN SLAT CLADDING



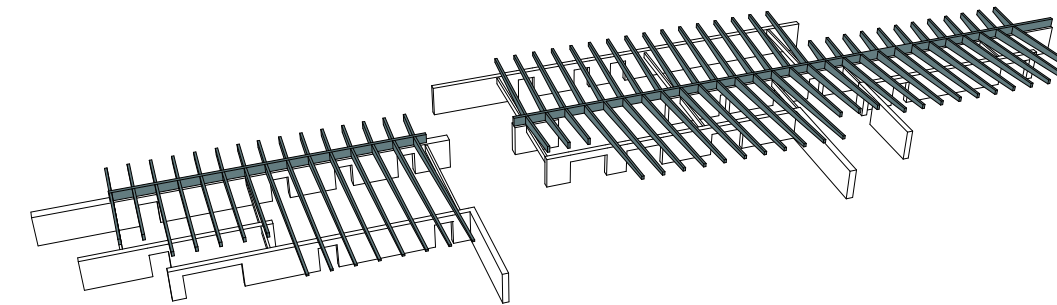
ILL. 23 - GLUE LAMINATED TIMBER



ILL. 24 - THE SYSTEM OF THE WALLS



ILL. 25 - THE SYSTEM OF THE IN-BETWEEN



ILL. 26 - THE SYSTEM OF THE ROOF

MASTERPLAN 1:1000

The Visitor Centre is situated in close relation to the S-train station creating a physical link between the city and nature. The Centre is to be seen from the station where a wide path leads past the site and further into the forest. The Centre stretches into the landscape guiding one through it and into the landscape. From the gravel path concrete slaps are creating a path through the forest floor guiding into the building and further through on to the other side. The slaps are a guiding element as well as opportunities for stay. The Visitor Centre is one building despite its two volumes. As it is a Visitor Centre of the forest, the building is to create spaces around it, opening up to the nature in reaching toward the forest instead of surrounding it. The cut between the two volumes are connecting the North side of the building with the Southern. By the shifting in the building volumes, an interacting between the two appears creating an exterior space. The roof stretching over the building creates covered areas around the built connecting the exterior and interior space, relating to inside and outside activities of the centre.



ARRIVAL

When approaching the centre one is met by the building stretching, almost growing into the landscape and covered by its floating roof. Coming closer one is led away from the boulevard like path of gravel into the concrete slaps. Laid heavily onto the forest floor, the slaps are creating a contrast between the grown and the built, making one aware of stepping of the forest floor.

The slaps appear as stepping-stones varying in size from narrow to wide pointing towards the main entrance of the building.

Here one is guided along the long concrete wall into the main entrance of the Visitor Centre. The feeling of being led along the wall is reinforced by the cantilevered roof stretching towards the sky creating a cover. The roof and wall stops as another wall reaches out, and the path has led one to the entrance covered by the cantilever of the other roof. From here the path opens up with slaps spanning between the two buildings connecting them before continuing around the corner.



PLAN 1:200

The path leads directly to the main entrance, where one is met by the foyer and exhibition space. The large open space holds an orientation point, various exhibitions and a wardrobe. Surrounded by the concrete walls this is a space of movement, distribution further into the house or further into the forest. The end wall is clad with plywood furnished as storage. In here one can find the wardrobe. Standing in the middle one is able to follow the beam structure stretching respectively in the North and South direction. In between the beams a wooden lamellar ceiling is acting as acoustic panels for the hard surfaces of the concrete. Openings in the concrete wall create a connection to the café facing South, here the guest will be able to overlook the outdoor activity. When moving from foyer to café a transition of materials appears from the heavy concrete to the warm appearance of wooden walls, embracing one and emphasising the place for stay. From here the café opens up to the context through a direct view to the forest.

Walking further into the centre from the foyer, the space narrows into a wide hall where first toilets, then offices are to be found behind a concrete wall. From here the hall opens up again into a niche, letting the forest float into the centre through its large façade of windows. The niche creates space for a pause in the long movement through the building. When moving further down the hall one is enclosed by the continuous concrete walls, making the hall appear as continuing into the landscape. Along the way, on the left facing North, one gets a glimpse of the forest through narrow windows, making one aware of the contrast between what is out there and in here. To the right, the wall makes one aware of the association room through window openings, creating a connection between the hall and room. One becomes aware of an activity on the other side. The hall ends at a large window with a door, allowing one to continue out into the forest.

From the foyer a visual connection between the two buildings is underlined by open window façades, emphasising the building as one. On the other side is the workshop. When stepping into the workshop, the continuousness of the heavy concrete walls make one aware of the building stretching towards the S-train cutting into the landscape. As for the foyer the glue laminated roof structure can be followed throughout the building with wooden lamellas in between. The concrete walls of the workshop make space for two classrooms. One appears as an extension to the workshop furnished by a plywood wall also containing storage. By the second classroom on the left, one moves through the heavy wall to enter. Doing so, wooden structure characterizes the room to emphasise the space as a place of absorption. Through the workshop, between the two classroom walls, a niche appears in a narrow hall with the back wall continuing into the landscape. The windows invite the forest in. Here one can sit almost outside or move out into it.

As the elements of the concrete stretching into the landscape and the wooden structure creating space, the shifting of movement in the building stages the differentiation between movement and stay.



IN BETWEEN

The separation of the building creates a space for flow through the building, moving from the gravel path at North to the South side of the building. By the shifting in the building volumes a space for stay is created linking one building with the other. The space is read as an interior with the sky as a roof. Due to the connected functions on either side of this space, a natural flow across it will erase the boundary between inside and outside, and the spaces will float together as one.



EAST ELEVATIONS 1:200



Looking at the east and west facade the appearance of the lifting roof becomes very clear by its glue-laminated beams stretching towards the sky. The roof structure reaches further than the building volume creating covered outdoors spaces where needed. Facing east the cantilever emphasises the outdoor area related to the niche connected to the workshop. In the background the cantilever provide cover over the main entrance.

SOUTH ELEVATIONS 1:200



To the South the building opens up towards the forest facing the sun, penetrating the treetops. Facing the Southern sun this is where the building create spaces for stay. Here the continuous concrete wall steps in the background for at while, as the wooden structure pops out of the structure inviting for stay. In the background the guiding walls continue into the forest. Above the wall, the window band underlines the floating roof landing softly on the building.

WEST ELEVATIONS 1:200



Facing west cantilever emphasises the outdoor area connected to the association room. As the concrete walls stretches in the east-west direction the wooden façades are the dominating material emphasising the spaces created between the concrete walls.

NORTH ELEVATIONS 1:200



1:200 NORTH ELEVATION

Facing North, the building is dominated by the heavy concrete walls stretching and reaching for the landscape. Shifting lengths of the walls invite one to come closer to the building and to move through. Narrow windows give glimpses of the inside activities. To emphasise the wall as the continuous element the window sits on the outside becoming element attached onto the wall.

SECTIONS

South section AA

This section shows the experience of close and open elements through the building. It shows how one is able to walk from landscape and moving all the way through the building along the continuous concrete wall, in the end reaching the end of the building to then move further out into the forest. The section shows the shift in the building from it being open, bringing in direct light, to being closed only lit by the defuse light.

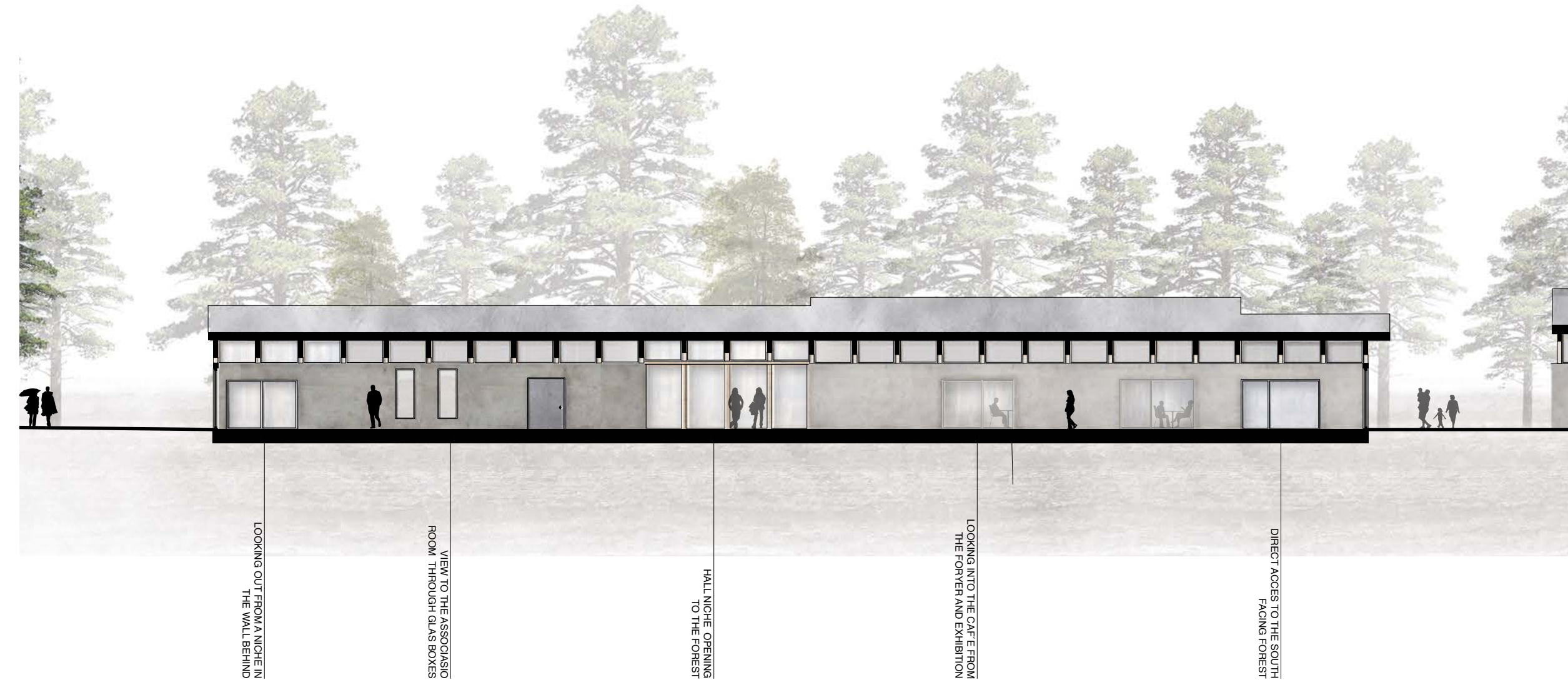
Cross section BB

This cross section looks West towards the entrance from the inside, showing the relation between the foyer and exhibition space. This gives the impression of an experience of walking from the open rough concrete walls of the foyer into warmer wood furnished space of the café. In the section the roof structure shows how the roof moves across the spaces continuing out giving shelter in front of the café and generating as solar shading, when the sun is high on the sky. The cross section also shows how the building interacts with the North and the South of the building.

Cross section CC

The cross section looks West crossing the workshop and the classroom to the left, facing the wall holding the second class room and the end window looking out. The section shows a visual relation and interaction between the workshop being a high activity space, and the classroom being a space of absorption. From this section it is evident, how the cantilever of the roof structure are covering the path leading to the building and creating space.

SECTION AA



SECTION BB



SECTION CC



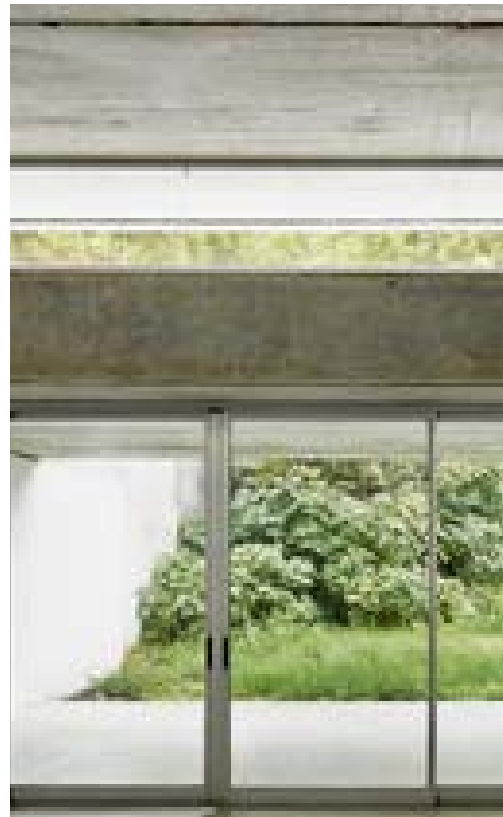
FRAMING OF THE NATURE

The nature holds many different elements. Being in the forest it becomes difficult to differentiate between those, as all elements together create a full impression of a forest. In order to differentiate between the elements of the forest, they are to be framed. Doing so by contrast makes one aware of this particular element. It is the finest task of the building to emphasise these elements not giving them all away at once.

The concrete walls are the contrast, the built in contrast to the grown. Through openings in the heavy walls, elements of the grown are framed through out the building. A different frame for a different atmosphere.

The classrooms are closed elements, wooden boxes in between the concrete walls. Here is given space for absorption. The classroom placed as an extension of the workshop is facing the sloping landscape falling down towards the room. When stepping into the room a window appears at the very end of the room. By being the dominating window sitting in a height of 450 mm, it frames the forest floor meeting the building, and making one aware of what one steps on when being outside. As the room is dug half way into the landscape, it appears as though it is moving right through the window. As the concrete walls continues from the inside and out cutting through the sloping landscape, the contrast between the built and the nature is underlined, reinforcing the atmosphere of looking at and experiencing the nature as many different elements.





ILL. 27 - THE NATURE GROWING INTO THE BUILDING



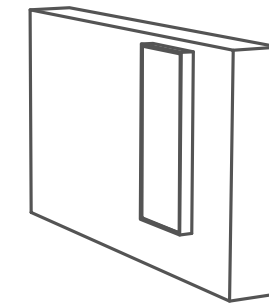
ILL. 28 - THE DETAIL OF THE WINDOW



ILL. 29 - THE DETAIL OF A WINDOW OPENING UP TO THE NATURE

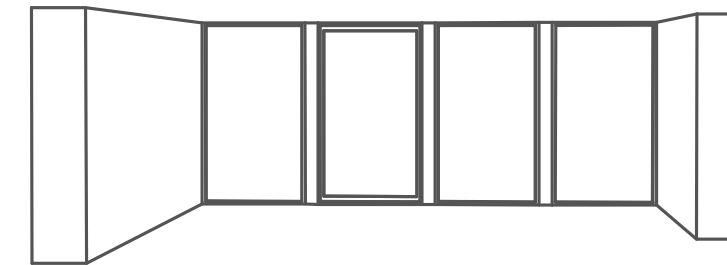


ILL. 28 - THE DETAIL OF THE WINDOW ERASING THE BOUNDARY BETWEEN INSIDE AND OURSIDE.



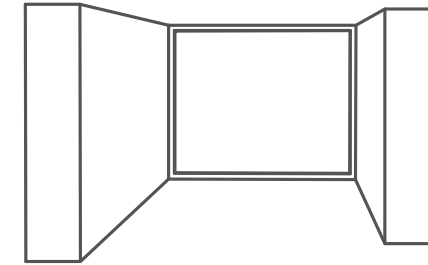
Distance

In some places the grown appears as being experienced from at distance through narrow holes. Here the wall is the boundary between one and nature emphasised by the window frame, being places on the outside of the wall, the dominating element.



Melting

At some places one are giving the whole experience at once, as the forest is dragging one into it, telling a story that there is more to it, than the eye can se. Here are big window openings allowing the building and the grown to float together.



Infinity

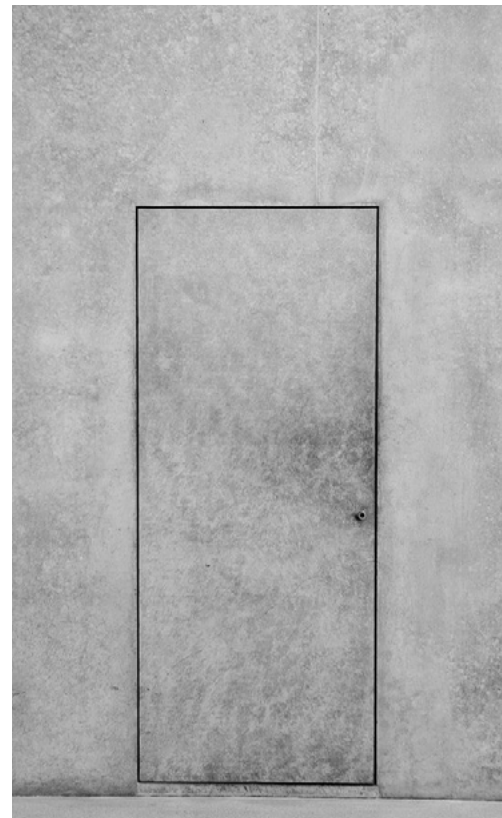
At other places the wall seems infinite cutting into the landscape making the forest floor, become the building floor with only a window to stop it from doing so. When standing here the outside view is limited. As the wall is minimising the view, one becomes a part of just that piece of forest the eye can see, minimizing the number of elements.

EPHASING THE WALL

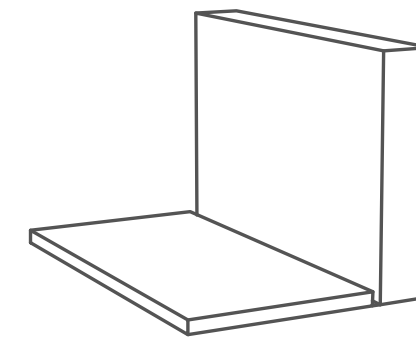
The heavy concrete walls are the main element of the building, as they stand as the storytelling of nature, while creating protection from what is out there. The walls are the earthbound, grown through the forest floor, and by its direction guiding one further into the forest.



ILL. 30 - THE DETAIL OF THE FLOOR MEETING THE WALL

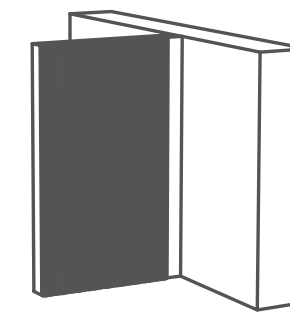


ILL. 31 - THE DETAIL OF THE DOOR BEING A PART OF THE WALL



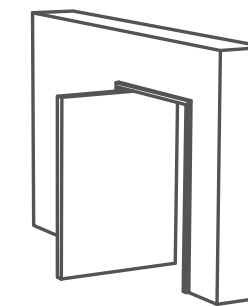
The floor

To emphasize the wall within the building as an element, the polished concrete floors are subtracted a few centimeters from the wall. This underlines the wall as a free-standing element and the floor as secondary.



Wall to Wall

In between the concrete walls are wooden boxes creating interior space. To show a hierarchy between the guiding concrete walls and the space-giving wooden boxes, the wooden lamellar facades are subtracted slightly from the concrete, emphasizing the difference in the two elements.



Cuts

As the continuousness of the concrete wall cutting through the landscape also is experienced from the inside, cuts in the wall allowing one to move from one room to another are done carefully. Not to interfere with the experience of the continuousness, the door openings are made from slim steel frames with concrete doors matching the material of the wall.

BUILDING STRUCTURE

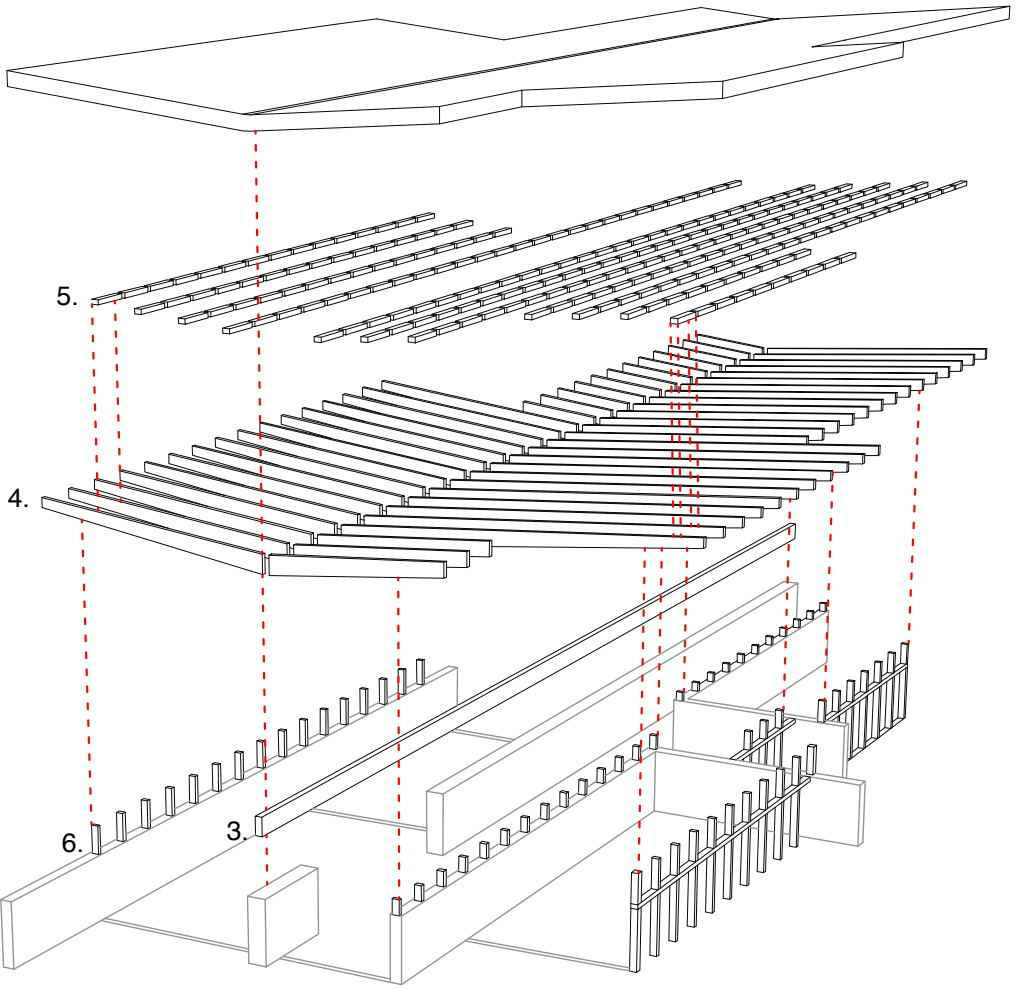
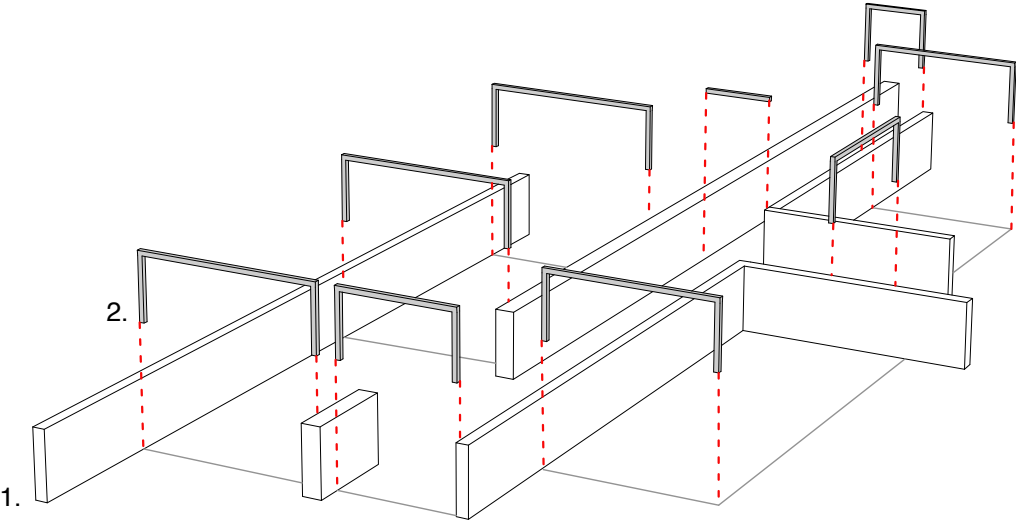
The structure of the Visitor Centre is a collaboration between three parts, a heavy structure as a guiding architectural element, a stabilizing light frame system creating in-between spaces and the “floating” roof providing shelter.

The heavy system is a 120 mm load bearing reinforced concrete wall placed parallel to each other. The South facing walls have a concrete wall orthogonally placed to them. A frame system made from a lighter structure to stand in contrast to the heavy concrete, made from laminated timer frames acts to stabilise the concrete wall from the perpendicular forces. The frames enclose the space through out the building, and either claddd by plywood boards creating wall furniture containing storage, or as wood lamellar functioning as acoustic panels.

The roof consists of a structure resting on the heavy walls and wooden columns. A 250 mm by 800 mm glue laminated timber beam is stretching through each of the building volumes resting on a central concrete wall. From this beam, 200 mm by 800 mm beams are attached, narrowing to 250 mm by 400 mm. To stabilize the beams stabilising crossbeams are placed orthogonally between the beams through.out the structure. Columns resting on the concrete wall and supporting the roof structure absorbs forces of the crossbeams, transferring them down into the foundation.

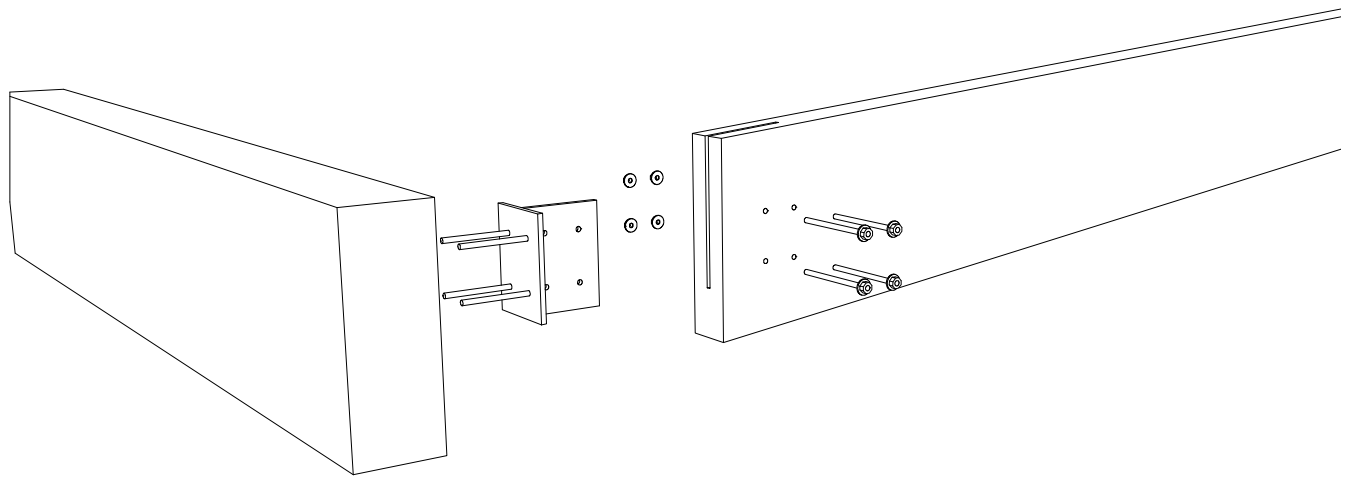
Due to the span of 10.000 mm of the glue laminated timber beam going through the one building volume, I find this to be a critical part of the building, as it has to carry not only its own weight, but the weight of the rest of the roof structure above it too. A calculation is carried out for this part of the roof structure.

- 1. Heavy concrete wall
- 2. Frame system
- 3. 250 x 800 Glue Laminated timber beam
- 4. 200 x 800 Glue Laminated timber beam
- 5. Stabilising crossbeam
- 6. Supporting columns

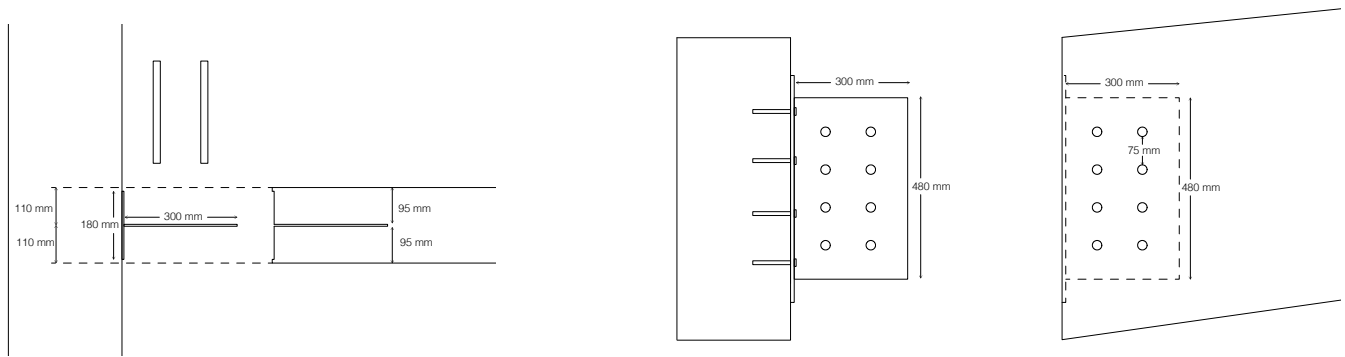


JOINING OF BEAMS

As the structure appears as one element floating over the walls, the joining of the main beam and the beams attached to it appear simple. To achieve this, a flush mounting is made by bolting a metal plate on the outside of the main beam having a perpendicular metal plate fitting in a cut into the beam. Bolts are holding it together on each side of the crossbeam. By this method the joint between are slightly hidden and only the bolts appear visible. See illustrations below.

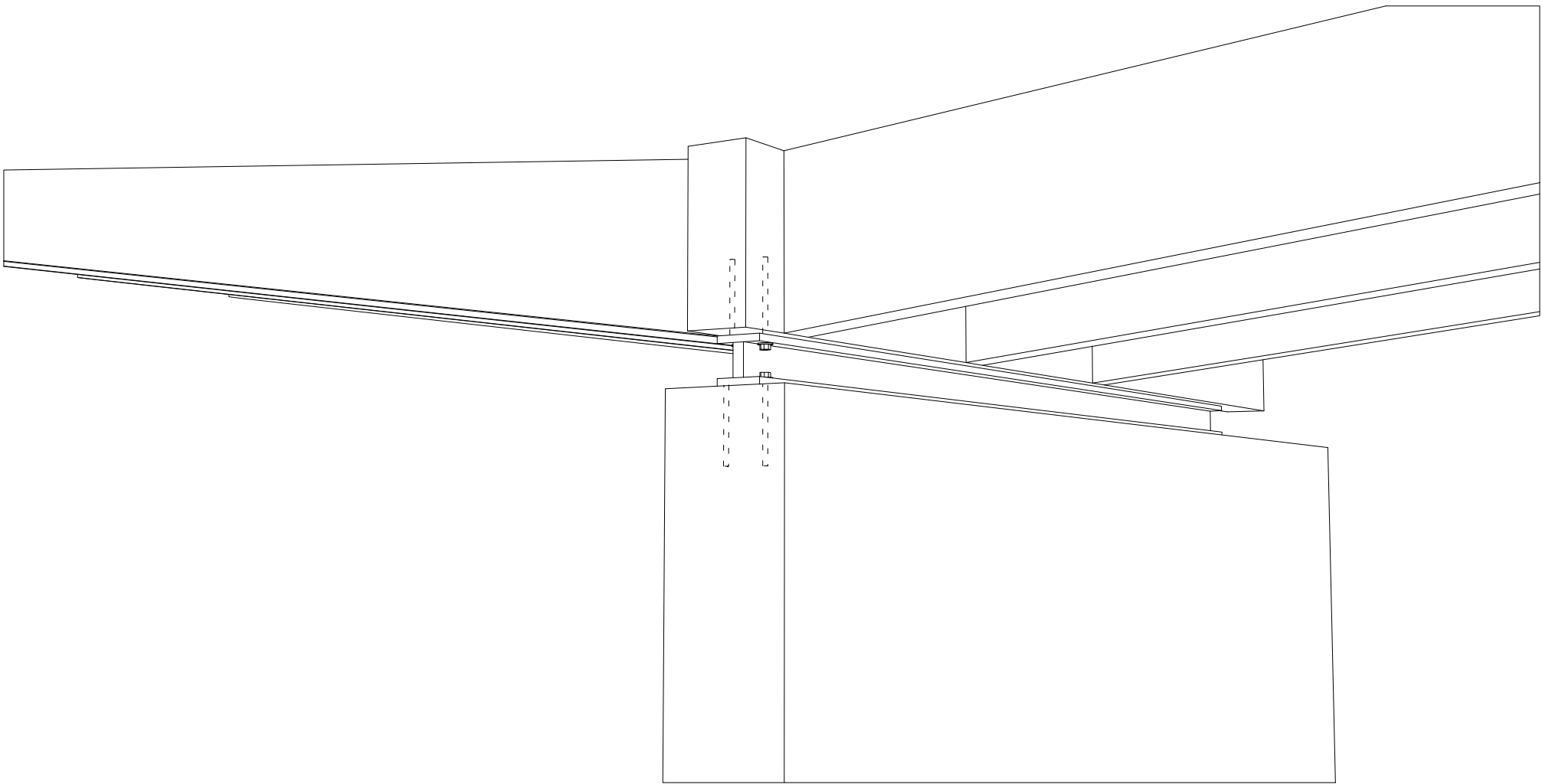


CONCEPT DRAWING OF THE JOINING DETAIL



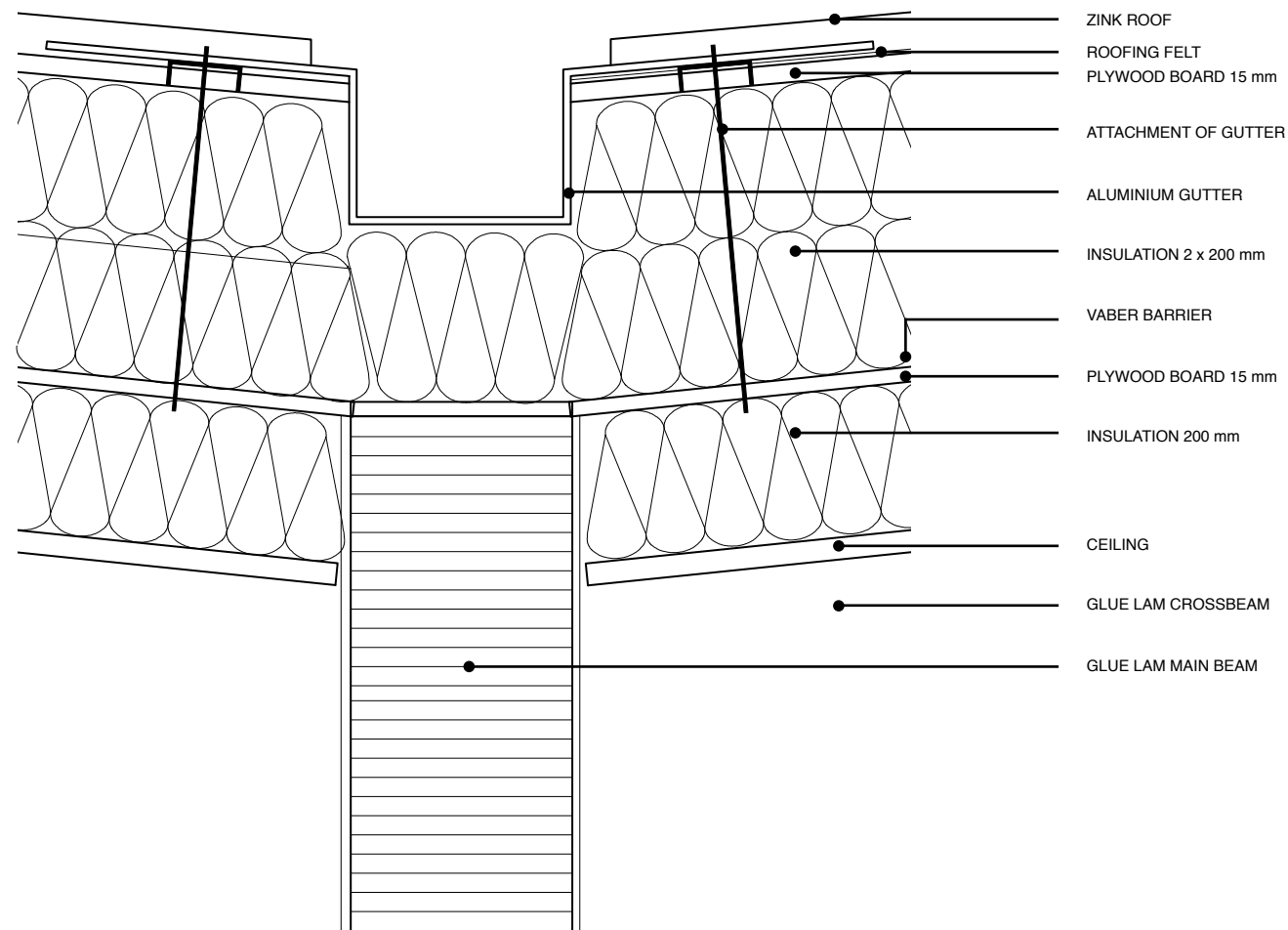
PLAN SECTION OF JOINING DETAIL 1:20

SECTION OF JOINING DETAIL 1:20



GUTTER DETAIL

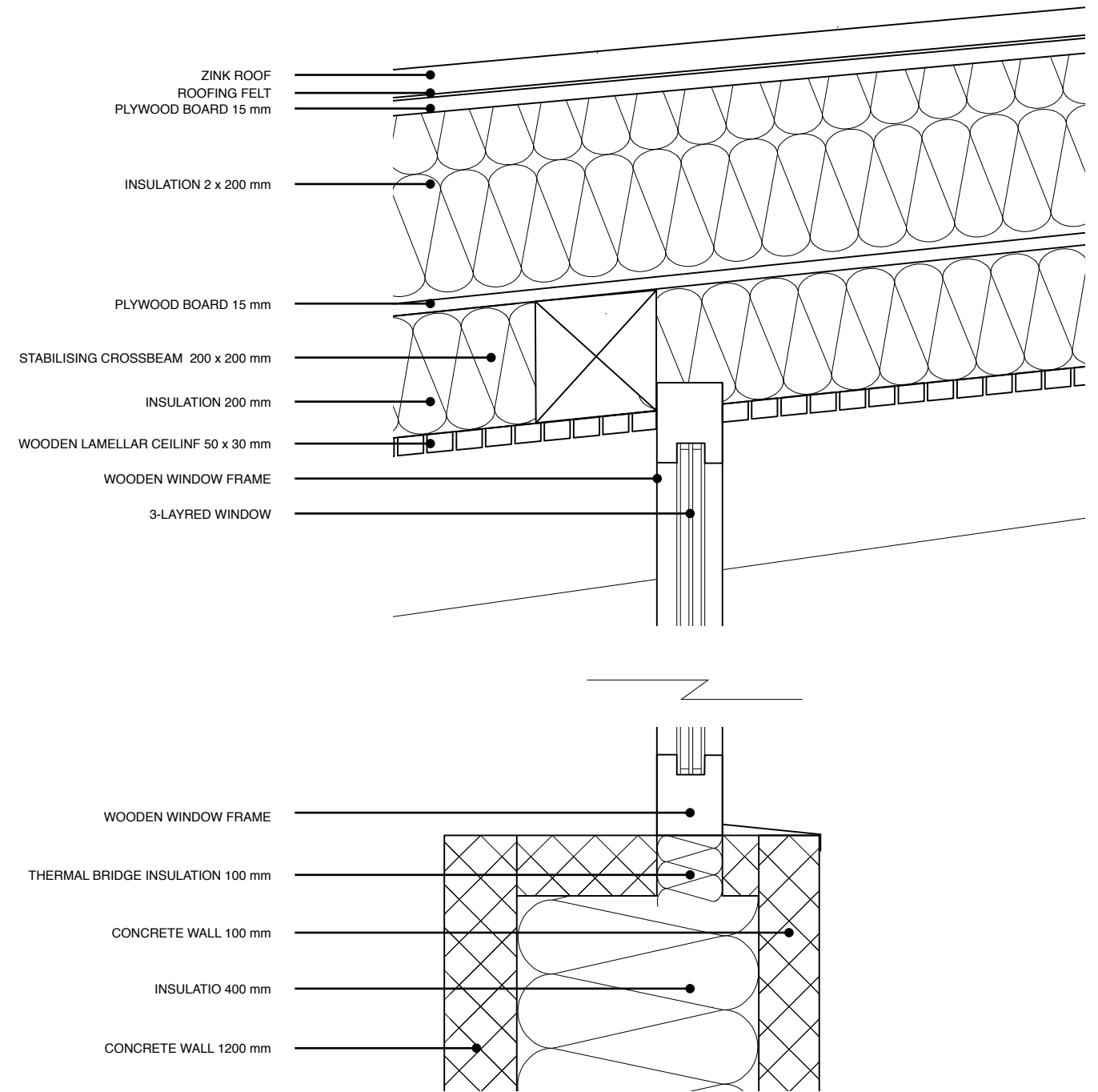
The gutter is placed where the two roof slopes meets in order to make it a part of the roof detailing, rather than it being an attached element. The gutter runs all the way through the roof ending by pouring out the rainwater directly onto the forest floor obtaining the water. This detail underlines the building as an element in the forest, as the rainwater becomes very visible when falling directly from roof onto what is beneath it.



1:20 SECTION DETAIL - THE GUTTER

WINDOW DETAIL

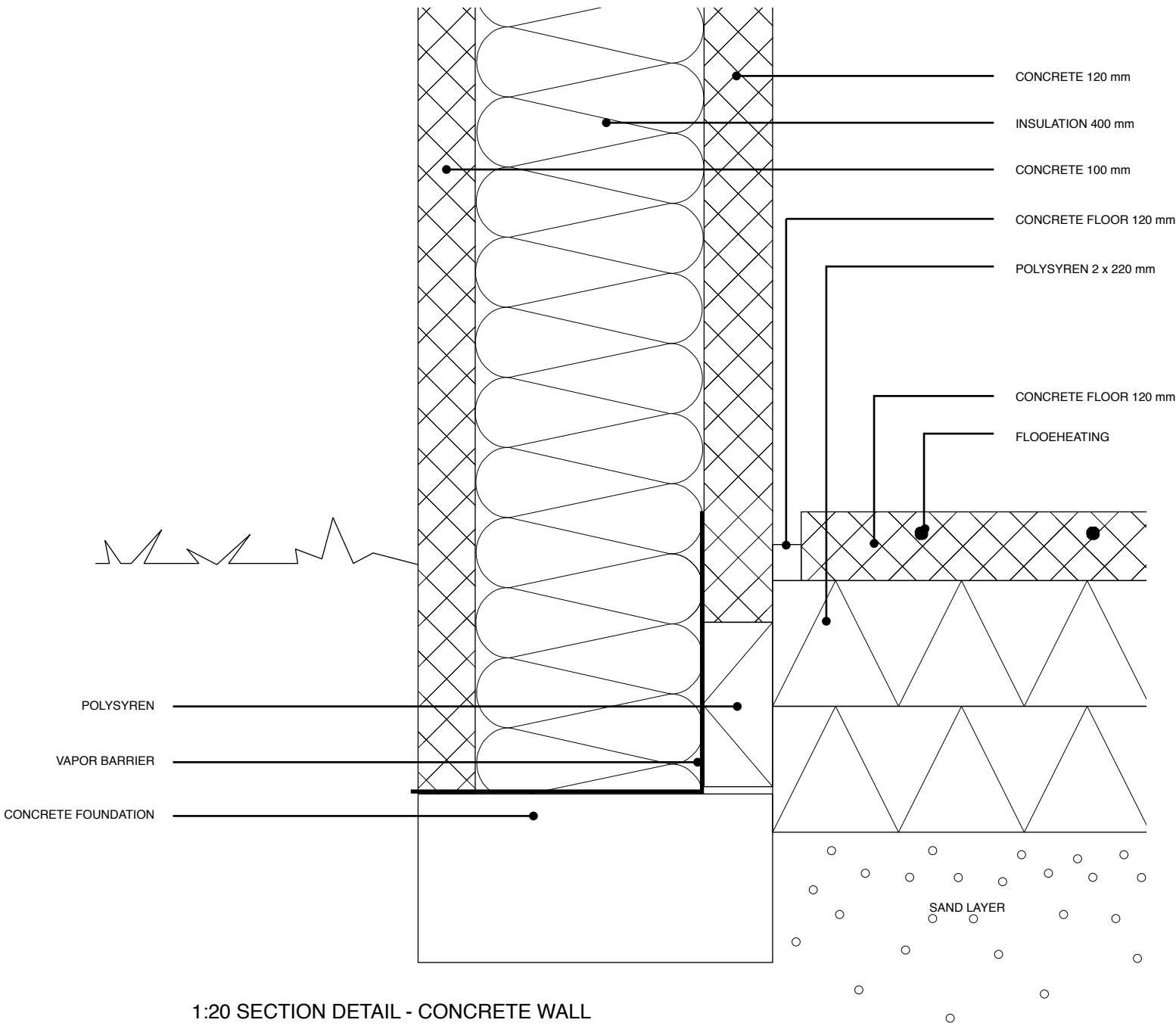
The window meeting the roof is the physical connection between the roof and walls, as well as being an important light giving element of the building. Being placed high up, the window allows natural light to enter fare into the building. As the walls and roof have two very different functions, the window bands in between the two are to step into the background as much as possible in order to underline the walls as one and roof as something else. The windows sit between the glue-laminated beams allowing the beams to have one continuous movement through out the building not ending before they are out in the



1:20 SECTION DETAIL - WINDOW

WALL DETAIL

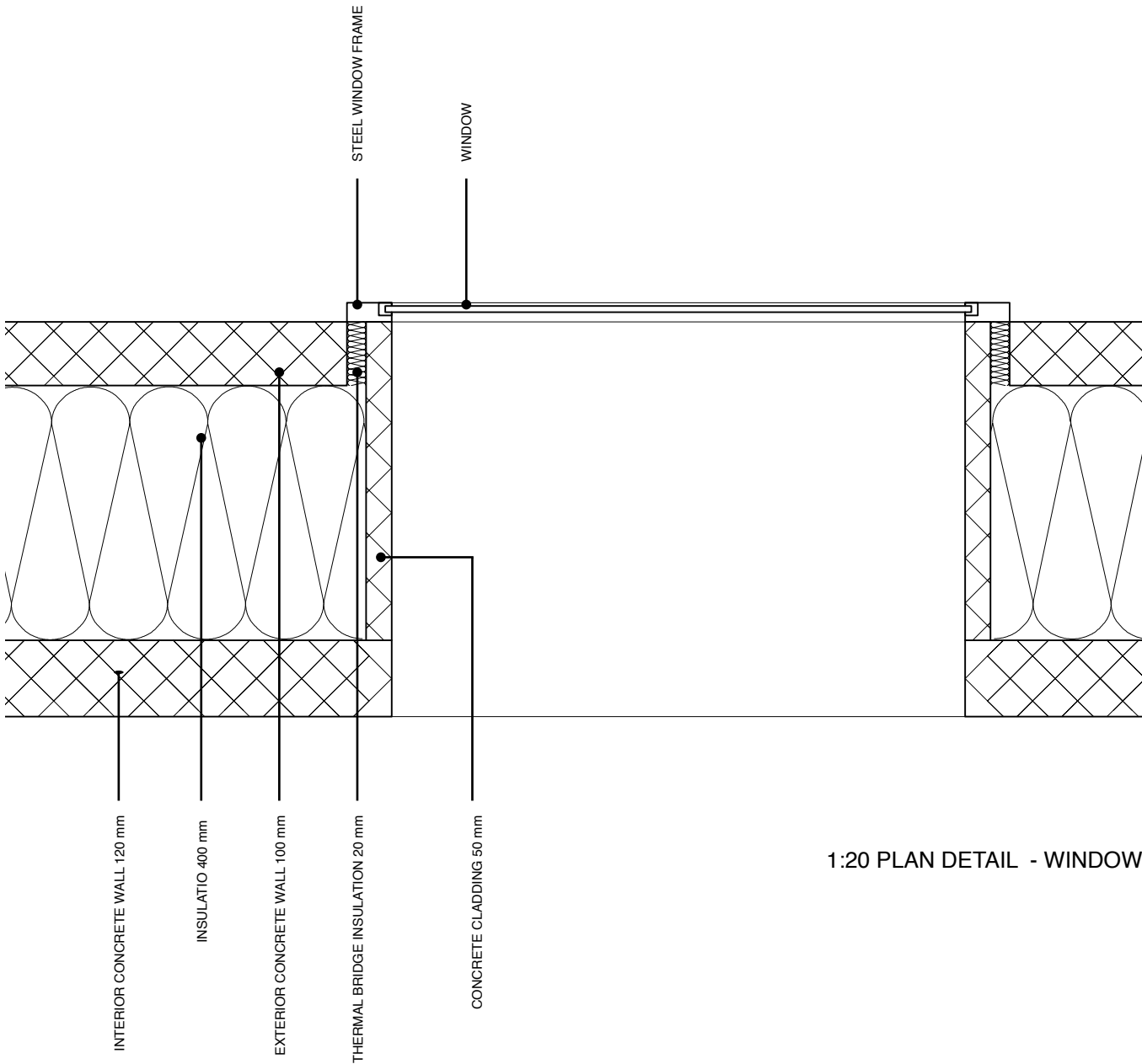
The detail shows the concrete walls functioning as a heavy guiding element. The principle of the detail is the same for all of the concrete walls. To emphasise the wall as heavy growing from the forest floor, the exterior concrete continues with the same thickness all the way down to the foundation. On the interior a gap between the wall and the floor emphasises the heaviness and continuity.



1:20 SECTION DETAIL - CONCRETE WALL

WINDOW DETAIL

This window detail shows, how they appear as an attached element on the concrete wall to emphasise the heaviness and guiding of the wall. This detail is the same for all the narrow windows placed on the Northern facing walls.



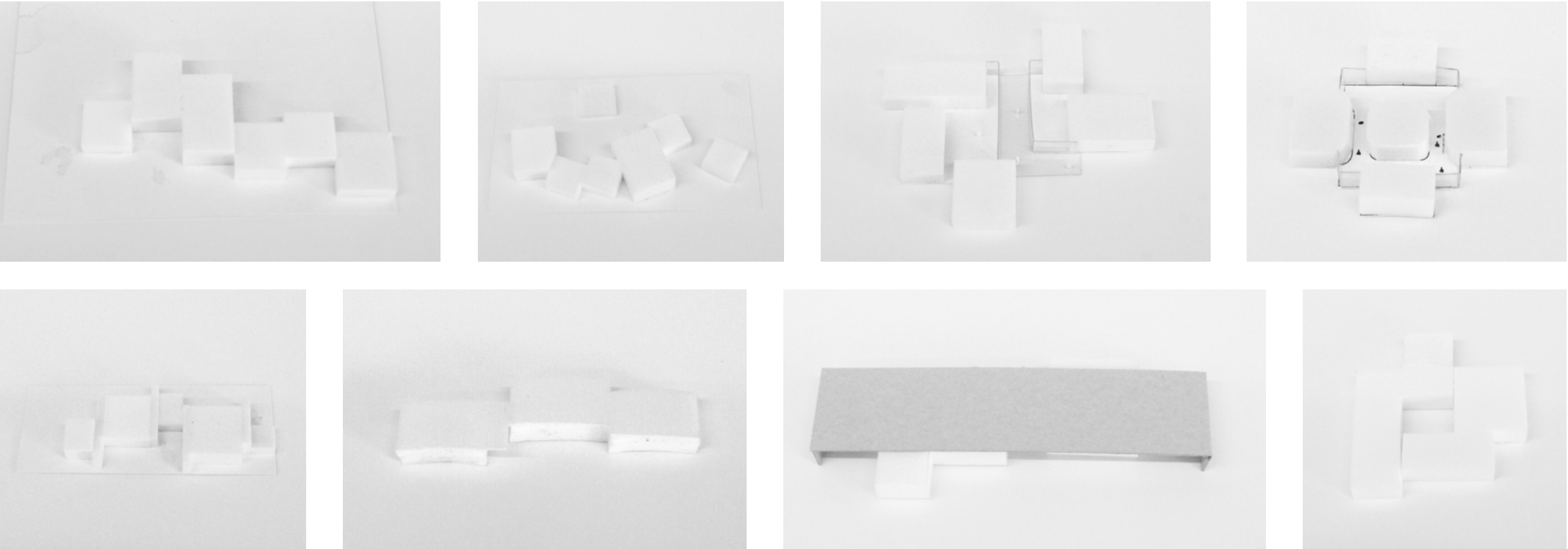
1:20 PLAN DETAIL - WINDOW

THE PROCESS

BUILDING VOLUME

Building volume. The studies of the building volume were an investigation of several elements; from the approach of creating and connection to its context. In the process, the building volume became an important element to create a relation to the nature. With the approach of the built contra the grown its placement in the landscape was an important factor. This study involved investigations about how to make an interaction between building and nature. First approach was a series of shifted volumes around a courtyard creating an outdoor space within the building. In that way the nature is integrated in the building, while also creating exterior spaces around the building. As this would make the building introvert, not unfolding into it surrounding it became evident, that this did not achieve the desired wish to interact with

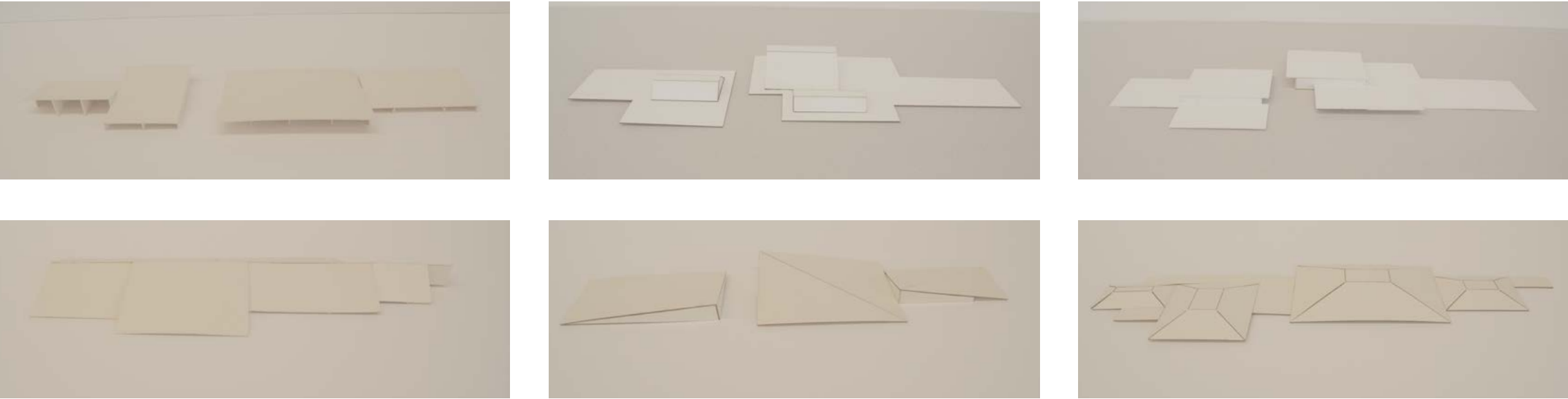
the forest, as the activity would be kept within the building. Learning from that, the interior space was directed towards the context. From that the studies began, investigating how to reach into the forest by shifting volumes in different direction. As the function demands makes the building very dominant in its context, creating a barrier between the arrival from the gravel path and South, the decision of a cut across the building occurred. The cut opened up for an opportunity for further interaction between the building and the nature by being able to bring nature closer to the building, as if the two would merge. From here further investigations, on how to make the built grow into the landscape contrasting it trough material choice, led to the development of the concrete wall becoming the guiding, protecting element and the enclosed wooden wall as embracing space giving elements.

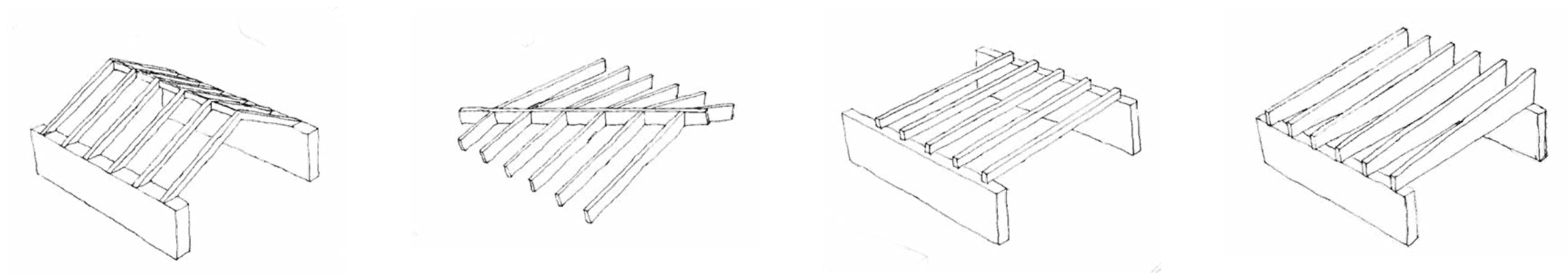


ROOF EXPRESSION

The expression of the roof. From the development of a building volume it became evident, that with the heavy earthbound walls as a very strong character, the roof would be the joining floating element, compounded by different elements. Though, the roof should not be a lid on the building, but emphasise the direction and heaviness of the walls. Along with this followed the investigation of how to bring in light from above in order to control views to the forest, and bring in light where the concrete wall would not allow opening. The first studies evolved emphasising different spaces of the building, resolving in making the roof structure very heavy. Though some qualities were taken into account in further investigations. These involved a lifted roof pointing upwards in one direction, giving light from under the roof and the approach of letting the

roof cantilever create covered outdoor spaces. When trying to lighten the roof structure, it lead to a fragmented roof, completely resolving in the roof appearing chaotic and emphasising the direction of the building even less. The roof studies led to a discussion about how to emphasiz the direction of the building, resolving in taking point of departure in the studies of the pitched roof. In these studies the roof ridge were creating a longitudinal direction by creating a straight line following the direction of the building. Through elements of the many different studies, the roof took shape to emphasize direction and to appear as a floating element reaching towards the treetops letting in light from the lifted slaps.

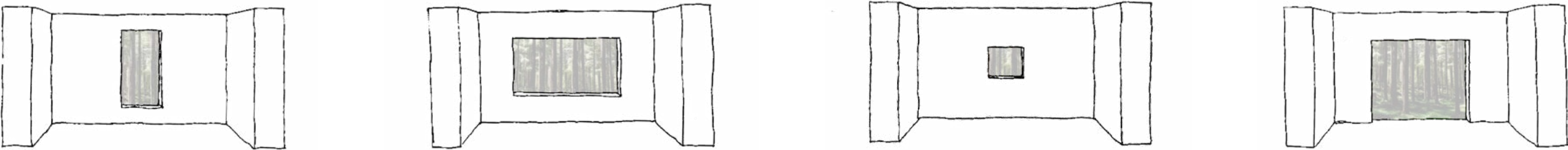




ROOF STRUCTURE

The structure of the roof. The roof structure is developed along the studies of the roof expression therefore the structure were to speak a similar language. As the intention of the wall was to appear honest in material and language, the structure of the roof were to be honest too in exposing its construction to the visitor. As the language of the building is to read the walls and roof as separate elements, the meeting between the walls and the roof structure was an important parameter of the structure. Two main studies of the structure dealt with the structure of a pitch roof or a struc-

ture familiarised to it and the structure of the repeated crossbeam. The pitched roof structure appeared as a continuation of the wall taking away the focus of longitudinal direction, whereas the structure of the crossbeams worked better in creating a difference between the wall and roof. However the crossbeams spanning from one wall to another is very heavy in its appearance and gives an oppress atmosphere. With the knowledge of the effect caused by the structure the development of the roof continued in the direction of lifting the structure from the walls.



FRAMING

Framing. In the discussion on how to see, experience and interact with the nature, the importance of view to the forest are not to be overseen. This discussion led to investigations on what to reveal of nature and how much. Stating that visibility occurs from the contrast the studies led to the investigations, on how much contrast is needed in order to frame a view. From the investigations it is evident that the biggest contrast creates the biggest attention by focusing on a small point. From here the contrast are adjusted depending on the wanted view. To make the visitor aware of different elements of the forest and through out the building the frames would vary in shape and placement.

A big window from floor to ceiling is breaking the boundary between inside and outside. The very small and squared window makes the nature appear as a painting on the wall. The rectangular tall window creates a distance to the nature making it seem infinite. Another window by the floor, makes nature seem near, almost sitting in it. The studies made me aware of how the direction of a window creates different views, setting different atmospheres.

EPILOGUE

DISCUSSION

Choosing the Visitor Centre of Hareskoven I found the physical frame of my theoretical investigations of how architecture can generate as a link between humans and nature. This being a university thesis I have had the freedom of limited restriction, making it possible to explore the spatial qualities generated by materials as architectural elements. This has given me the freedom to explore the gesture of framing the nature in a context, where the nature relation is the primary object of focus. A first hand this thesis has given me an understanding of how nature can be perceived, asking the question of "what nature has come to mean for us and how do we interact with it?". The main discussion arose from the discussion of the cities becoming denser, making less space for the nature. As I use this as a point of departure to suggest a Visitor Centre in Hareskoven, I find it important to create a link between nature and culture. It can be discussed if this link is not already there, as the S-train is already physical connecting Copenhagen with Hareskoven. However I find the Visitor Centre to underline that connection by being an anchor point in the forest improving the use of the forest.

However I have come to note that along with the city becoming denser, humans have become more creative in making alternative nature elements. From need rises opportunities? The interesting is, that nature has become more prioritized in the city and as dwellings and workspaces already occupies the large space, nature appears as dots through out the city. In my opinion making the city greener than one large park, would do as the pup up on roofs, sidewalks, inhabiting parking spots and growing on building. By green meaning green as the colour. Green as environmental is a whole other discussion. And though, the green wave also has its roots in the contemporary discussion of sustainability, in which people has become more aware of the nature. Never the less these green elements are not spacious, enough to allow one to brake away from the busyness of the city, in that way not competing with a forest.

The discussion about the built and the grown leads to the discussion on how to build in the nature. In this it is obvious to discuss what defines nature. If it is the pure untouched that defines nature, is not to be found many places in the world, as the cultivated world has made their mark on more or less everything in their universe. All nature in Denmark is cultivated, if not grown then needy taken care of. That being said a great respect for the nature should still be made. Then how do we build respectfully in nature? Do we build around it or is the architecture adding an extra layer to it? I claim that the architecture is to compliment the grown, and that it is hard to differentiate between the two, as they are both man-made. What differentiates the two is, that the built as a structure is planned and constructed, and the grown is a system on its own based on processes of the nature. In that way they are both each other's opposites and conditions in the complete architecture. Through the building my aim was to create a space and atmosphere both appealing to the senses of the grown and the intellectual of the built structure. Doing so by reaching for the aesthetics making us feel the smells, the colours and the sounds, which seems chaotic and without hierarchy in nature. The space is something created, as the place I already there. However after interference it is transformed into becoming a new place. The transformation of the place of the Visitor centre was inevitable. The building has the purpose to house pre-decided functions, but in order to create the architecture of the building it is indeed important to recognize the narrative of the place and its contextual relation. How do the architecture compliment its context? I find it important too, as what is important in this particular, place and what can it offer to the architecture? Claiming it is was the individual element of the forest being important, I chose to emphasise these by framing them through the architecture. By that saying, that when building in nature the architecture should emphasise the narrative of the place by recognizing it as its contextual relation.

An untouched subject of mine is the direct discussion of the sustainability. Through this project I have worked entirely with a different perspective, as to work purely with architectural quality. However my direct opinion to sustainability is first and foremost, that the architecture should be of such a quality, that it can last forever. I argue, that many sustainable aspects are to be a common part of the architecture through working with the indoor environment, quality of materials and notion of the context. In the Visitor centre all of those have been very essential factors through out the process making, the narrative and detailing of the building. Therefore I state, that the sustainable approach to some extend has been incorporated in the design

I end this discussion without proposing this project as a final answer of how to build in the nature, but rather as one potential way founded in the beforehand investigations, staging the discussion of building in nature.

CONCLUSION

I ask myself if architecture can generate as a link to nature making an emotional impact on us. In this project the fundamental role in architecture is considered as being the mediator of an atmosphere represented by the narrative of the place, the material and the culture, from where the project departs in the notion of the nature. In this conclusion I seek to explain my main reasons behind the Visitor Centre of Hareskoven.

The notion of a narrative in architecture has influence on the experienced architectural quality. The narrative can be told through tectonic articulation of gesturing details. Herein it has been my main ambition to explore the possibility of the tectonic detail as framing the nature.

The theoretical discussion evolves the potential of the tectonic detailing as the detail of the narrative. Emphasising the narrative of the forest the heavy walls of the building represent the narrative of the earthbound protecting element rooted in the landscape. The gesture of the architecture is to make one aware of the forest by framing it in its right element. Through interplay of structural principles and aesthetics a contrast to the forest appears paying a complement to its context.

The wall.
The detail of the wall is both a poetic, structurally and functionally construction of how the building takes shape, becoming the extra layer of the forest. As the architecture is placed in the agriculture, its task is to modify the surface in such a way as to take care of it. The detailing of the wall forms the guiding element grown from the forest floor of solid concrete walls that structurally becomes the carrying part. The parallel projected walls reaches out into the landscape acting as to guide one both into the building and into the forest.

The spaces in between.
The spaces, that have occurred from between the concrete elements, are made from wooden wall structure stretching into the landscape in the cross direction of the concrete walls, interacting with the forest. As a clearing in the forest these spaces become inhabitable spaces inviting for a stay in the building. The gesture of these spaces generates an interaction between inside and outside neutralizing the boundaries between the building and the forest.

Interaction with the forest
The path making a cut through the building creates a connection between north and south emphasising the building as an inviting element in the forest. The continued walls and many entrances in both a longitudinal and cross direction set ground for a crossing flows through the building. This allows a natural movement through the building, while making it easy approachable when arriving from all directions of the forest. The spaces around the building set the frames for interaction between indoor and outdoor activities.

In my conclusion of the Visitor Centre I find the building to have several layers as a painting being repainted over and over again, where each layer adds depth to the building. With these layers the building are able to hold different qualities from being a place for stay and absorption to a transit point being a part of the forest path. Through the architecture the building is able to add quality to the forest by holding functions of many interests. As an anchor point in the link between culture and nature the building is a welcoming base making the guest aware of the forest.

SOURCES

Frampton, Kenneth
Studies in tectonic culture - the poetics of construction
in nineteenth and twentieth century architecture
1995
MIT Press, Cambridge, Mass.

Frascari, Marco
The tell-the-tale detail, Via, no. 7, p. 22-37.
1984

Knudstrup, Mary Ann
Arkitektur som integreret design
2005
Aalborg Universitetsforlag.

Loos, Adolf
Spoken into the void, pp 66-75
1982
MIT Press, Cambridge, Mass.

Sheridan, Michael
Mesterværker
2011
Strandberg Publishing

Fink, Hans
Et mangfoldigt Naturgreb
2003
Aarhus Universitet

Hauxner, Malene
Med himmelen som loft
2002
Arkitektens forlag

Zumthor, Peter
Thinking Architecture
2005
Birkhäuser

Zumthor, Peter
Atmospheres
2003
Birkhäuser

Teknisk Ståbi, 22nd edition
2013
Nyt Teknisk forlag

WEB:
NATURSTYRELSEN
02.02.15 – 05.02.15
<http://naturstyrelsen.dk/naturoplevelser/naturguider/hareskovene/>

<http://naturstyrelsen.dk/publikationer/2009/mar/kort-om-skovens-drift-lille-hareskov-og-jonstrup-vang/>

<http://naturstyrelsen.dk/lokale-enheder/lokale-nyheder/2011/jan/naturcenter-droppes/>

<http://naturstyrelsen.dk/naturbeskyttelse/skovbrug/statsskovene/handlingsplan-naturnaer-skovdrift/>

<http://naturstyrelsen.dk/publikationer/2009/mar/kort-om-skovens-drift-lille-hareskov-og-jonstrup-vang/>

Haresov station.
04.02.15
<http://evp.dk/index.php?page=hareskov---farum>

Vegetation
04.02.15
http://gggix.dk/doc/eksempler_paa_naturen_i_gladsaxe.pdf

A Conversation with Adam Caruso and Peter St John
12.02.15
<http://www.carusostjohn.com/text/knitting-weaving-wrapping-pressing-interview/>

Buildings matters
12.02.15
<https://buildingmatters.wordpress.com/semper/>

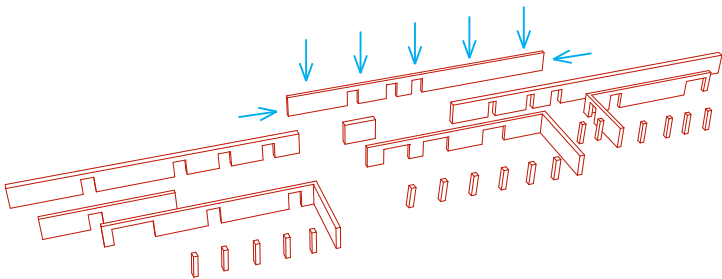
ILLUSTRATIONS

- ILL. 01 - THE NORDIC PAVILLION, SVERRE FEHN
- ILL. 02 - SINGLEFAMILY HOUSE, KLAMPENBORG 1933, ARNE JACOBSEN
- ILL. 03 - FOREST PAINTING - JENS JUEL
- ILL. 04 - SKYSCARAPER SAN PAOLO, BRASILE
- ILL. 05 - BIG FOOT, MICHAEL KVIUM
- ILL. 06 - ARRIVAL AT HARESKOV STATION, OWN PICTURE
- ILL. 07 - THE CLEARING NARROWING DOWN
- ILL. 08 - THE PATH LEADING INTO THE FOREST
- ILL. 09 - MOVING UP THE SLOPING PATH
- ILL. 10 - ARRIVING AT THE SITE
- ILL. 11 - ELEMENTS OF THE SITE
- ILL. 12 - USERS OF THE FOREST
- ILL. 13 - MACHU PICCHU, PERU
- ILL. 14 - DETAIL OF KENZO TANGE TOWERS, CARLO SCARPA
- ILL. 15 - NOVARTIS PAVILLION, MARCO SERRA
- ILL. 16 - WALLS CUTTING INTO THE LANDSCAPE
- ILL. 17 - SPACES OCCURRED FROM THE IN BETWEEN
- ILL. 18 - THE JOINING ROOF
- ILL. 19 - THE RELATION TO CONTEXT
- ILL. 20 - CONCRETE SLAPS
- ILL. 21 - CONCRETE WALLS
- ILL. 22 - EXTERIOR AND INTERIOR WOODEN SLAT CLADDING
- ILL. 23 - GLUE LAMINATED TIMBER
- ILL. 24 - THE SYSTEM OF THE WALLS
- ILL. 25 - THE SYSTEM OF THE IN-BETWEEN
- ILL. 25 - THE SYSTEM OF THE IN-BETWEEN
- ILL. 27 - THE NATURE GROWING INTO THE BUILDING
- ILL. 28 - THE DETAIL OF THE WINDOW
- ILL. 29 - THE DETAIL OF A WINDOW OPENING UD TO THE NATURE
- ILL. 30 - THE DETAIL OF THE FLOOR MEETING THE WALL
- ILL. 31 - THE DETAIL OF THE DOOR BEING A PART OF THE WALL

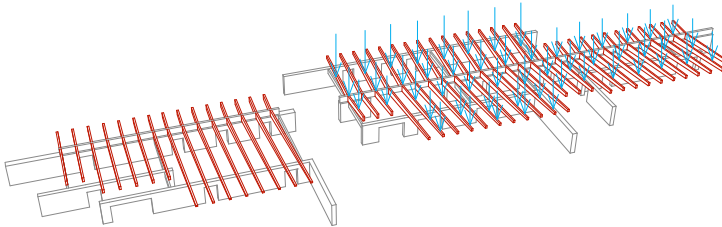
APPENDIX

STRUCTURAL CALCULATIONS

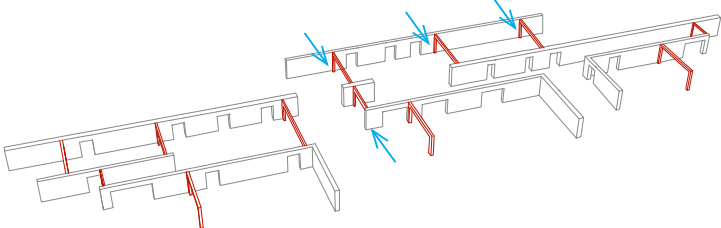
STRUCTUREL SYSTEM



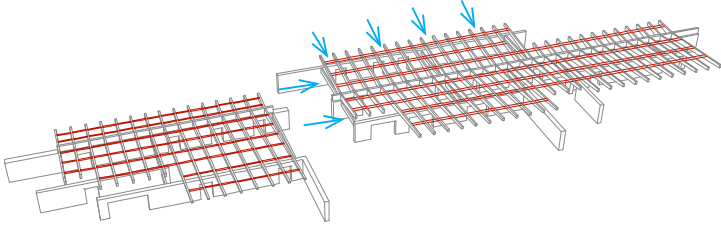
01. The concrete walls and timber columns are the main loadbearing system, taking the vertical forces from the load above and horizontal forces on the ends of the slaps.



03. The glue laminated timber beams creates the mainstructure of the roof. The beams take the vertical forces from the loads from above such as the roof construction and the snow load.



02. The secondary frame structure acting as stabilising system to the concrete walls, taking the perpendicular forces transfered from the windload on the concrete walls.



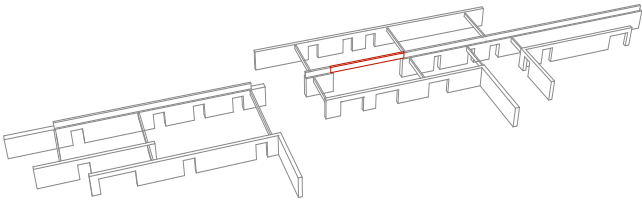
04. Crossbeams between glue laminated timber beams shaping the roof acts as stabilising system to hold the beams into place. These are taking taking horizontal froces on the roof such as the wind load.

STRUCTURAL CALCULATIONS

GLUE LIMINATED BEAM

The structural system of the Visitor Centre consists of a continuous loadbearing concrete wall appearing as the backbone of the building stretching into the forest. The roof appears as a floating element embracing the structure of the plan landing on the loadbearing wall and by that the walls and roof appears as two individual elements. The structural system of the roof is repeated glue laminated beams angled according to the desired angle creating the desired expression.

This calculations take their point of departure in the largest cantilever of the roof (where is this?) as this is considered to be a vulnerable construction, as it is considered a free standing object in contrast to the other beams having two fix points. The beam structure are stabilized with transverse timber rafters hidden within the roof structure, thus working as a plate. The beam structure is constructed in Glue laminate GL 32h. (Teknisk Ståbi, table 7.1, pp. 304). All of references to Teknisk ståbi are from edition 22.



The selected beam to calculate

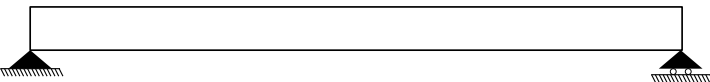
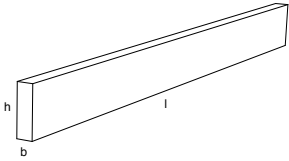
Material definition for GL 32h timber:
(Teknisk Ståbi, 22.udg, table 7.1 and 7.2, pp. 304-305)

Characteristic strenght:	32 MPa
Calculated strength:	14.8 MPa
Elasticity (E _{0,k}): Axial elasticity	11100 MPa
Density (ρ):	430 kg/m ³
Limit of application class:	2, covered structure

Live load (p)
The live load is the variable loads such as people and furniture. The live load of this structure is determined from the application class H, as the structure mainly carry the load of the roof construction. (Teknisk Ståbi, table 4.7, pp. 145)

$q = 0.0 \text{ kN/m}^2$

Dimensions:
h = 800 mm
b = 250 mm
l = 10.500 mm



The gluelaminated beam is a simple supported beam resting on the loadbearing concrete wall. The peace being calculated on has a free spand of 10 m. In the drawing above it is considered without load effecting it.

Dead load (g)
The dead load is a permanent load of the roof structure. The load is affected by the elements of the construction. In the calculations below the loads for each element are calculated.

$$g_{\text{wooden beam}} = h \cdot w \cdot \rho \cdot g_{\text{gravity}}$$
$$g_{\text{wooden beam}} = 0.8\text{m} \cdot 0.4\text{m} \cdot 430 \text{ kg/m}^3 \cdot 9.82\text{m/s}^2 = 1.4 \text{ kN/m}$$

In order to calculate the total permanent load for the beam one are to take the load of the structure resting on the beam into account.

Secondary beam construction

$$\rho_{2. \text{ wooden beam}} = 430 \text{ kg/m}^3$$

$$g_{2. \text{ wooden beam}} = 0.4\text{m} \cdot 430 \text{ kg/m}^3 \cdot 9.82\text{m/s}^2 = 1.6 \text{ kN/m}^2$$

$$\text{Total} \quad 1.6 \text{ kN/m}^2 \cdot 10 \text{ m}^2 = 16 \text{ kN}$$

Suspended ceiling

$$\rho_{\text{suspended ceiling}} = 380 \text{ kg/m}^3$$

$$g_{\text{suspended ceiling}} = 0.025\text{m} \cdot 380 \text{ kg/m}^3 \cdot 9.82\text{m/s}^2 = 0.93 \text{ kN/m}^2$$

$$\text{Total} \quad 0.93 \text{ kN/m}^2 \cdot 56 \text{ m}^2 = 52 \text{ kN}$$

Total load of Insulation affecting the structure

$\rho_{\text{insulation}} = 30 \text{ kg/m}^3$

$g_{\text{insulation}} = 0.5\text{m} \cdot 30 \text{ kg/m}^3 \cdot 9.82\text{m/s}^2 = 0.15 \text{ kN/m}^2$

Total $0.15 \text{ kN/m}^2 \cdot 94 \text{ m}^2 = 14. \text{ kN}$

Total load of zink affecting the structure

$\rho_{\text{zink roof}} = 371 \text{ kg/m}^2$

$g_{\text{zink roof}} = 0.006 \cdot 371 \text{ kg/m}^2 \cdot 9.82\text{m/s}^2 = 0,22 \text{ kN/m}^2$

Total $0.22 \text{ kN/m}^2 \cdot 94 \text{ m}^2 = 20.7 \text{ kN}$

Total load of roof structure above the beam

$$g_{\text{load above beam}} =$$
$$16\text{kN} + 52\text{kN} + 14 \text{ kN} + 20.7\text{kN} = 102.7 \text{ kN}$$

Snow load (s)

The snow load is a variable load, affecting the structure vertically:

$s = \mu_1 C_e C_t S_k$

$\mu_1 = \text{roof shape factor, } < 30^\circ \text{ sloping} \qquad 0.8$

$C_e = \text{Local exposure factor} \qquad 1$

$C_t = \text{Thermic factor} \qquad 1$

$S_k = \text{characteristic value of the terrain} \qquad 1.0 \text{ kN/m}^2$

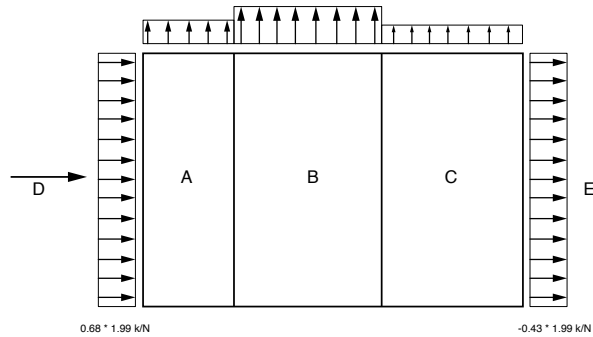
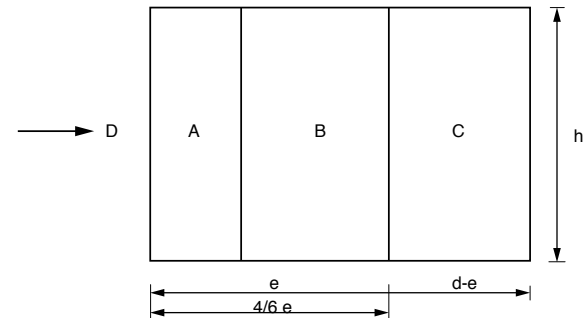
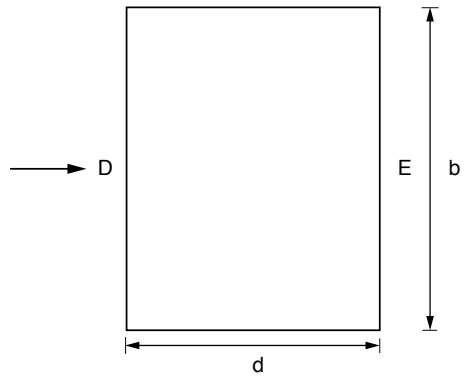
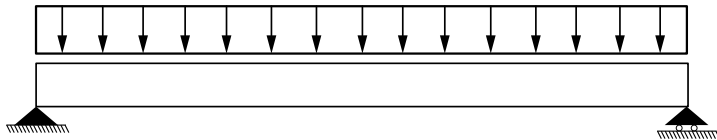
$$s = 0.8 \cdot 1 \cdot 1 \cdot 1.0 = 0.8 \text{ kN/m}^2$$

Snow equal distribution on the roof:

Area of roof: $10.5 \text{ m} \cdot 9 \text{ m} = 94.5 \text{ m}^2$

$s = 0.8 \text{ kN/m}^2 \cdot 94.5 \text{ m}^2 = 75.6 \text{ kN}$

Equally submitted snowload



Wind load (q)

The wind load is a variable load affecting the structure horizontally on the concrete facade. As some of the concrete walls have a large area exposed to wind, they are to be stabilized perpendicular to the surface. To dimension the stabilizing system wind load are to determined.

Prior the calculation of the wind load, the terrain factor k_r are to be calculated according to the terrain category III

$k_r = 0.19 \left(\frac{z_0}{z_{0,II}} \right)^{0.07}$

$z_0 = \text{length of roughness} \qquad 0.4 \text{ m}$

$z_{0, II} = \text{length of roughness category III} 0.3 \text{ m}$

$k_r = 0.19 \left(\frac{0.4}{0.31} \right)^{0.07} = 0.1939$

The peak wind load is calculated according to following

$$q_p(z) = \left(1 + \frac{7}{\ln\left(\frac{z}{z_0}\right)} \right) \cdot \frac{1}{2} \rho \left(v_b k_r \ln\left(\frac{z}{z_0}\right) \right)^2$$

$z = \text{height of the construction above ground level: } 3 \text{ m}$

$z_0 = \text{length of roughness} \qquad 0.4 \text{ m}$

$\rho = \text{Density of air (teknisk st bi, p 130)} \quad 1.25 \text{ kg/m}^3$

$v_b = \text{basic wind speed} \qquad 27 \text{ m/s}$

$k_r = \text{terrain factor} \qquad 0.19$

$$q_p(3) = \left(1 + \left(\frac{7}{\ln\left(\frac{3\text{m}}{0.4}\right)} \right) \right) \cdot \frac{1}{2} 1.25 \text{ kg/m}^3 \left(27 \frac{\text{m}}{\text{s}} \cdot 0.19 \ln\left(\frac{3\text{m}}{0.4}\right) \right)^2$$

$q_p(3) = 1.99 \text{ kN/m}$

From form factors of the fa ade, C_p is determined according to the shape of the structure.

$b = 36.3 \text{ m}$

$d = 7.7 \text{ m}$

$h = 2.8 \text{ m}$

e is determined by $2h = 5.6 \text{ m}$, which means that $e < d$ ($5.6 \text{ m} < 7.7 \text{ m}$). The wind zones of $e < d$, on the vertical walls are applied se. ill ?

$A = e/5 = \frac{5.6 \text{ m}}{5} = 1.12 \text{ m}$

$B = \frac{4}{5} \cdot e = \frac{4}{5} \cdot 5.6 \text{ m} = 4.8 \text{ m}$

$C = d - e = 7.7 \text{ m} - 5.6 \text{ m} = 2.1 \text{ m}$

Correlation factor, ρ

$\frac{h}{d} = \frac{2.8 \text{ m}}{7.7 \text{ m}} = 0.36$

As $\frac{h}{d}$ is ≤ 1 , $\rho = 0.85$

Following for factor are calculated according to the above determined peak wind C_p (Teknisk St bi, udg. 22, p 148)

$A = -1.2$

$B = -0.8$

$C = -0.5$

$D \cdot \rho = 0.8 \cdot 0.85 = 0.68$

$E \cdot \rho = -0.5 \cdot 0.85 = -0.43$

The value of the form factors and characteristic wind pressure are applied to the building as followed. (see ill. ?)

The area of the north – eastern wall:

$A_{\text{area}} = 2.8 \text{ m} \cdot 36.3 \text{ m} = 101.64 \text{ m}^2$

$G_D = 101.64 \text{ m}^2 \cdot 1.99 \text{ kN/m} \cdot 0.68 = 137 \text{ kN/m}$

$G_E = 101.64 \text{ m}^2 \cdot 1.99 \text{ kN/m} \cdot (-0.43) = -86.9 \text{ kN/m}$

$G_A = (36.3 \text{ m} \cdot 1.12 \text{ m}) \cdot 1.99 \text{ kN/m} \cdot (-1.2) = -96.9 \text{ kN/m}$

$G_B = (36.3 \text{ m} \cdot 4.8 \text{ m}) \cdot 1.99 \text{ kN/m} \cdot (-0.8) = -277 \text{ kN/m}$

$G_C = (36.3 \text{ m} \cdot 2.2 \text{ m}) \cdot 1.99 \text{ kN/m} \cdot (-0.5) = -75.8 \text{ kN/m}$

$D+E = 137 \text{ kN} + 86.9 \text{ kN}$

Load combination (P_d):

$P_d = (K_{FI} \cdot g) + (s)$

$K_{FI} = 1.0$ (Teknisk Ståbi, p 143)

$P_d = (1.0 \cdot 102.7 \text{ kN}) + (1.5 \cdot 75.6 \text{ kN}) = 216 \text{ kN}$

In order to calculate the total of load, the above calculated P_d are to be divided into the line length of the beam (10.5m).

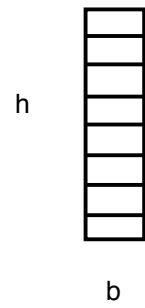
$P_{d(\text{total})} = \frac{Pd}{\text{Lime length}} + g_{(\text{wooden beam})} + q_{(\text{wind load})}$

$P_{d(\text{total})} = \frac{216 \text{ kN}}{10.5 \text{ m}} + 1.4 \frac{\text{kN}}{\text{m}} + 1.99 \frac{\text{kN}}{\text{m}} = 23.96 \text{ kN/m}$

Momentum of resistance (W) (cross section)

$W_x = \frac{1}{6} \cdot b \cdot h^2$

$W_x = \frac{1}{6} \cdot 250 \text{ mm} \cdot 800 \text{ mm}^2 = 2.66 \cdot 10^7 \text{ mm}$



Bending moment (M)

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

$P = \text{permanent last} \quad 23.96 \text{ kN/m}$

$L = \text{længde} \quad 10.5 \text{ m}$

$M_{\text{max}} = \frac{1}{8} \cdot 23.96 \text{ kN/m} \cdot (9 \text{ m})^2 = 330 \text{ kN/m}$

Calculated bending stress (σ)

$\sigma_m = \frac{M}{W} \leq f_{m,d}$

$f_{m,d} = 14.8 \text{ MPa}$ (teknisk ståbi, pp. 305)

$\sigma_m = \frac{330 \frac{\text{kN}}{\text{m}} \cdot 10^6}{2.66 \cdot 10^7 \text{ mm}^2} = 12.4 \text{ Mpa}$

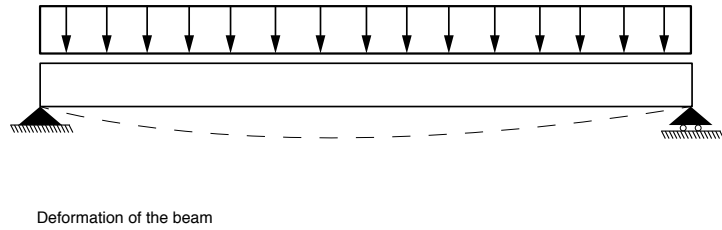
$\sigma_m \leq f_{m,d} \approx 12.4 \text{ MPa} \leq 14.8 \text{ Mpa}$

As the calculated bending stress (σ) is smaller than the calculated strength f_{m,d} the beam is dimensioned within the allowed frame, with a tendency of being over dimensioned. The choice not to change the dimensions of the beam is an aesthetic choice.

Serviceability limit state

Accepted deflection:

$U_{\text{max}} \leq \frac{l}{400} \quad \sim \frac{10.500 \text{ mm}}{400} = 26.25 \text{ mm}$



Deformation of the beam

Calculated deflection (U)

$U_{inst} = \frac{5 \cdot P \cdot l^4}{384 \cdot E0, k \cdot I}$

P_g = Dead load

In order to use the previous calculated P_g, the load is to be divided into the line length of the beam (9m)

$\frac{102.7 \text{ kN}}{9 \text{ m}} = 11.4 \text{ kN/m}$

$P_s = \text{Snow load} \quad 75.6 \text{ kN/m}$
 $E_{0,k} = 11100 \text{ MPa}$ (teknisk ståbi, 304) $11100 \text{ kN/m} \cdot 10^3$

$I = \frac{1}{12} \cdot b \cdot h^3 \quad 170 \text{ mm}$

Deflection dead load (g):

$U_{inst} = \frac{5 \cdot 11.4 \frac{\text{kN}}{\text{m}} \cdot 9 \text{ m}^4}{384 \cdot 11100 \text{ kN/m} \cdot 10^3 \cdot 170 \text{ mm}} = 0.0052 \text{ m} \approx 5.2 \text{ mm}$

Deflection snow load (s):

$U_{inst} = \frac{5 \cdot 75.6 \frac{\text{kN}}{\text{m}} \cdot (9 \text{ m})^4}{384 \cdot 11100 \text{ kN/m} \cdot 10^3 \cdot 170 \text{ mm}} = 0.0066 \text{ m} \approx 6.6 \text{ mm}$

Deflection wind load (q):

$U_{inst} = \frac{5 \cdot 1.99 \frac{\text{kN}}{\text{m}} \cdot 9 \text{ m}^4}{384 \cdot 11100 \text{ kN/m} \cdot 10^3 \cdot 170 \text{ mm}} = 0.0066 \text{ m} \approx 9.0 \text{ mm}$

As U_{max} ≥ U_{inst} in all of the tree cases has a deflection smaller than the accepted deflection at 22.5 mm, the glue-laminated beam is dimensioned within the limit.

SOLAR SHADING

The large cantilever do not only serve as outdoor space given and shelter given, it serve also as light giving in the building. By its, at some places, long cantilevering the roof prevent the building from overheating during the summer. The top windows, placed in a height of 2.8 m, allows the winter sun to enter the building. With its height the light will enter far into the building. However, the Visitor Centre are placed a large amount of high trees, in which will be the dominating factors in providing shade and allowing sun to enter .

