hunting the dwelling

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preface

this report is a master thesis project in architecture at architecture, design and media technology at aalborg university.
the project is a 1200 m^2 residential project on a five hectare site just outside brønderslev in north denmark. the clients wish to build a residential house with a hunting retreat. the project is supported by jesper thomsø from ideal-arkitekter who is working with the clients from brønderslev.

the project has developed around a personal interest in residential design, and how we can learn through a multidisiplinary understanding of how to live and build. the focus is on tectonic design with a holistic approach to sustainability.
a combination of inspiration mainly taken from australian and scandinavian architecture forms an interdisiplinary design; a design adapting to the nature and how we live.

they came, they saw, they adapted, they sustained
-aboriginal culture

table of contents

architecture has to be effort, love and suffering
-peter stutchbury

methodology

this chapter presents the chosen methods utilized in the project.

integrated design process

the integrated design process has been taught on several semesters during the bachelor programme at architecture & design, and the method is developed by associate professor mary-ann knudstrup.
the idp is a project orientated working method focusing on an interative process combining knowledge from architecture and engineering, by simultaneously solving complex problems when designing architecture. the idp will ensure architectural coherence, and in this project, resulting in a tectonic design.
to obtain the best process there's five phases to follow. see ill.01.
(knudstrup, 2004)(msc1 group 2, 2011)

problem/idea phase is the beginning of a project where the idea evolvs, and the problem is developed and described.

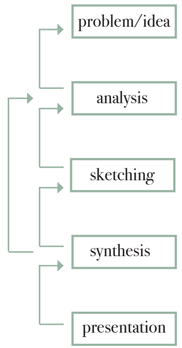
analysis phase provides together with the problem/idea phase a framework for the rest of the project also called the programme. it encompasses all analysis, information and aims.

sketching phase is where sketches and the professional knowledge from the programme are worked through to produce creative ideas and solutions combined with the parameters.

synthesis phase is where the design takes it's final form. the parameters from the programme and the ideas from sketching phase are worked into one final design meeting the vision.

presentation phase is presenting the qualities and aims of the design in a presentation that clearly shows the final achieved design.

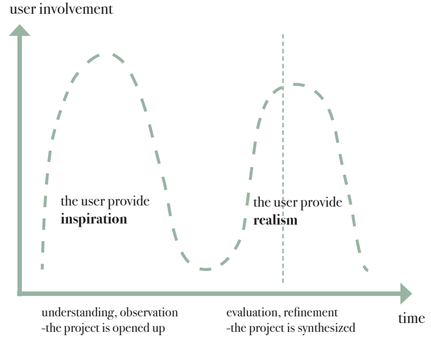
it's important to notice that the integrated design process is an interactive process done in several rounds, and the process is presented as a linear process in the report to make it clear for the reader.



ill. 01, idp (knudstrup, 2004)

user involvment

to design for people it is very important to understand their life and to derive insight about their behavior, perceptions and needs. in designing for a specific client you ask the user how to help.
i will use the clients in the problem/idea and analysis phase of the project as inspiration relating to the user diagram below ill.02 and the idp.
from the sketching phase and onwards the focus is on the design, and the clients contribution will mainly be shown as design parameters and additional inspiration.
progressing to the phase of realism, which is further beyond the thesis, the design proceeds into the construction phase and the clients will be involved again in the final decision making. (cinark research, 2010)



ill. 02, user involvment (cinark research, 2010)

tools

be10 is a calculation programme use to calculate the energy need in buildings and to make sure it meets the building regulation energydemands.
vectorworks has been used for technical drawings in 2d and sketchup has been used for quick 3d studies of the design.

motivation

housing design seems a simple task; everyone has live in a home and so has at least the benifit of the first-hand experience. in practice as in teaching, however, the 100 m² of average dwelling prove a challenging puzzle to solve, time and time again. (leupen and harald, 2011, page 9)

housing design seems like a straigtforward task and many, non architects, attempt the task to design their own dream house, the least hires an architect to do the job. unfortunately the architectes are loosing more and more small scale projects as housing projects, and most of the work left for architects now a days are the big scale projects and competitons.
if you look at buildings world wide only 5 % of the buildings are designed by educated architects. at a more local level mainly focusing on contemporary scandinavia architecture i think that we in general are loosing the passion and understanding for the well designed and together with the world developements are focusing more on time, money and easy solutions. we are moving forward but we forget to learn from our past and use the simple things we know that works. (ibelings and powerhouse, 2012)

my motivation for this project is very simply based in our proud design culture, i am inspired by the simple methods and the well designed; the beauty of living in a house specially designed for you and your values. the easy choice and the ignorance motivates me to work on a project, focusing on that little something ekstra a deliberate design can give to the project that clients never thought they needed.

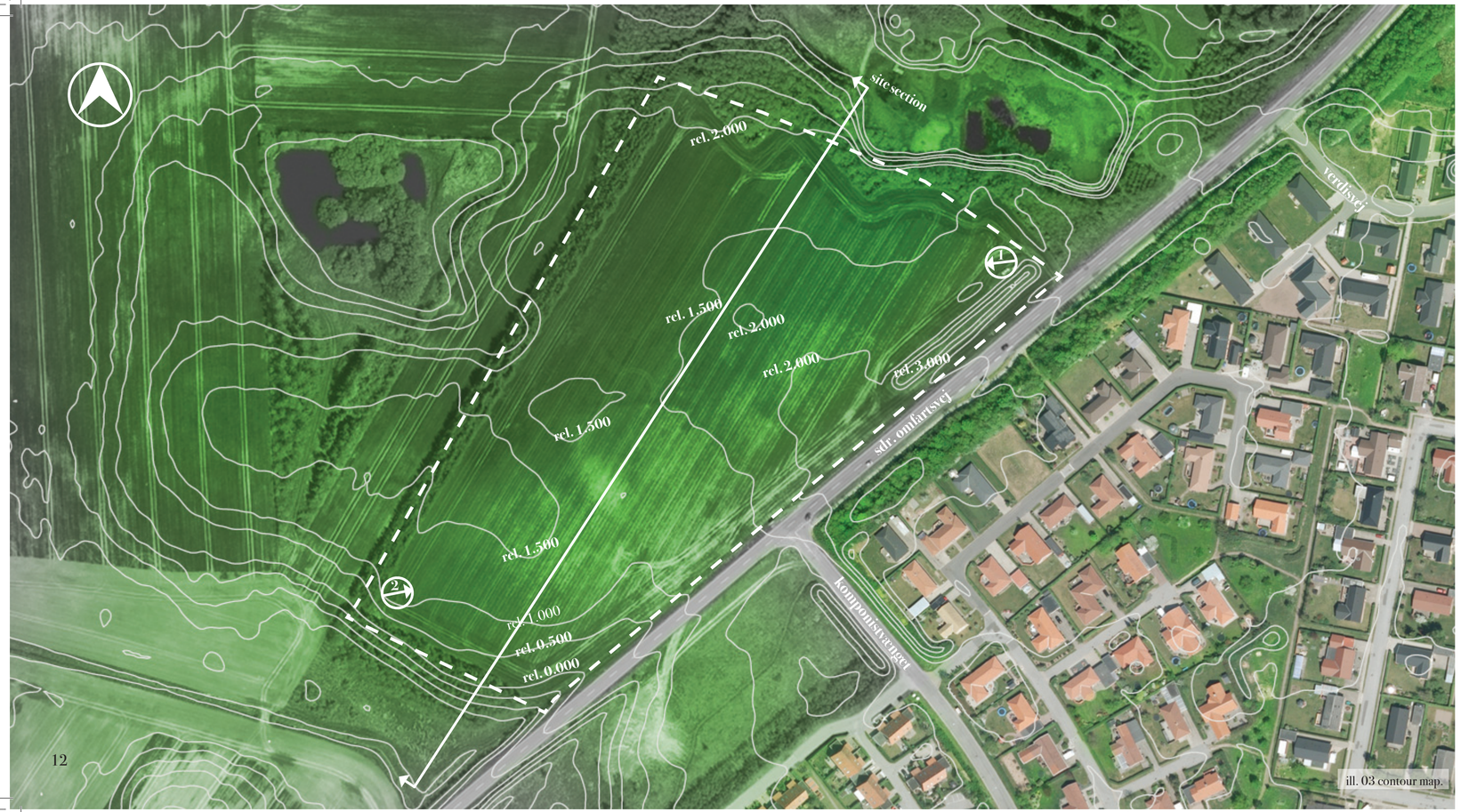
beauty is universal - architecture is personal.
-peter stutchbury

site

the building site is located in north jutland in the town of brønderslev. the site is right on the municipality border in west brønderslev. there's no local developement plan for the site or the areas sourrounding the site.

with just under 13.000 inhabitants brønderslev is one of the bigger towns in north jutland. brønderslev is a lively town and educational opportunities are abudant which, makes it an ideal area for families with children.

from the site there's a direct road to highway e39 with only 30 km to the big city of aalborg with internetional and domestic aalborg airport.



ill. 03 contour map.

site analysis

the project site in brønderslev is owned by the clients and has so far only been used as rural land.
it's situated west of sdr. omfartsvej, the southern beltway surrounding brønderslev. via sdr. omfartsvej there's direct access to the highway and also direct access to the remaining land own by the clients.
from the site, just across the road, there's a bus stop with busses connecting to brønderslev and surrounding towns. through the residential area east of sdr. omfartsvej and also direct via sdr. omfartsvej into brønderslev there's a safe bicycle lane with only 500 metre to shopping, sport and recreational areas.
the site is around 4.5-5 hectare and measures 310 metre lengthwise. the site contours are fairly simple with only 1,5 metre in hight difference but sloping down around the boundary line (see ill.03). north of the site there's a small area with walking tracks and a small lake with a minor jetty for swimming in summer.
the site is open towards sdr. omfartsvej and bound by plantation towards the north, west and southern surroundings.

ill. 04 site section, not to scale.

ill. 05 site panorama 1.

ill. 06 site panorama 2.

sense of place

the area around the site is a low density residential area with big areas of plantation and farming fields. the areas of natural beauty makes the place seems far away from brønderslev even though it's right on the border of town.

the residential area east of sdr. omfartsvej is in general a new built area with most houses being in traditional brick and built within the last 20 years, but the area is still showing signs of traditional farming and agriculture.

with the area being right on the border of town it offers amazing views of nature and possibilities. the natural elements are mostly controlled for farming and only few areas with wild plantation.

ill. 07-15 sense of place.

you can't really say what is beautiful about a place, but the image of the place will remain vividly with you
- tadao ando

clients

the clients are a family of five people currently living outside brønderslev on a big industrial farm. they own many hectare of land including the site the wish to build on. the breadwinner is a farmer himself, managing af big industrial farm with many employees and he himself is working in the field daily, plus owning a bigger company in another industry. the family has three young kids still living at home and studying at the local school.

the family wishes to build a new family home on the site closer to brønderslev. a house that isn't practical charactersized by their work in the farming industry, but is a home where they can retreat, relax and be a family. also the house needs to be a gathering place for the people working on their farm during breaks and meetings. the family' big hobby is hunting and has achieved numerous of small and big trophies on their many hunting trips. they now wish to also build a hunting retreat used for friends to stay during hunting events, but also as a business, hiring out weekend stays in the retreat including hunting on the land own by the family.

the family has a budget of 12 millions danish kroner and their wish is to build a 1200 m^2 house; on the following page the clients' spatial programme is listed.

furthermore the clients have expressed their need for a low maintenance house and the importance of a sustainable self-suffient solution, to secure the possibility of living in the house for the rest of their life, no matter what their economic situation might be in the future.

architecturally the familiy has no wishes for the design of the house but they've mentioned a traditional but yet contemporary wing farm. (three to four wing farm') they see the practical aspect of having the different functions gathered in one place.

there is an indian proverb or axiom that says that everyone is a house with four rooms, a physical, a mental, an emotional and a spiritual. most of us tend to live in one room most of their time but, unless we go into every room every day, even if only to keep it aired, we are not a complete person.

this programme illustrates the clients wishes and simple needs. a more detailed programme with added functions relating to the actual requirements and flow and function digrams are to be found on the following pages. (page 24-25)

residence

- master bedroom
- three bedrooms
- bathrooms
- guest room
- kitchen, living and dining area
- tv room

utility/work area

- garage, three cars
- laundry
- store room
- utility area
- depot area
- office/study

hunting retreat

- guest rooms
- bathrooms
- industrial kitchen
- dining area
- lounge area
- storage

the dwelling

ask an eskimo, an australian or a normade what a dwelling is to them and you'll get answers in the same term of feelings but totally different when it comes to structure, functions and expectations; yet these are all dwellings, but what makes a dwelling a dwelling then. a dwelling can be anything once it is occupied, once it is lived in; a house, a tent, a cave. *"occupants, not designers, make the house a dwelling, a home, simply by living - dwelling -there."* (leupen and harald, 2011, page 18)

but again, what is a dewlling and what should a dwelling provide and show about the people who live there? a dwelling should provide shelter and protection, it should devide the uncertain world outside and the controllable world inside. besides that the dwelling and it's placement should reflect a certain identity of the occupants and the environment and communicate a certain trend and developement in architecture and our culture. (leupen and harald, 2011)

the project, designing a dwelling, takes its point of depature in the clients the dwelling is designed for; they have certain needs depending on how they live their life and how they see the world.
we have learned from our ancestors what is necessary to survive and then we add to our needs learning and developing with time and our culture and society.
i am taking inspiration in the very simple way of living and combining this with the clients needs. in both designing the home and the retreat the focus will be the same, but the spatial needs different, considering the diversities in permanent and temporary stay.

i can't force architecture to become a home or a temporary stay to feel like home, but i can make the best conditions for the users to make it their home.

hunting

"jeg smækkede riflen til kinden, fandt bladet på kalven og trykkede af.
våbnet klikkede!
hjortkalven var væk i ét nu.
forfjamsket trak jeg bundstykket tilbage. et rygende patronhylster faldt ud af riflen."

"jeg rejste mig op. benene var stive af kulde. jeg vaklede ned mod skudstedet. det var snart solnedgang, jeg måtte skynde mig."

"nå, der var ingen tid at spilde. jeg måtte have slæbt dyret ud af buskadset og tilbage på fast grund. jeg greb fat i de lange ben og asede og masede, mens jeg langsomt meter for meter trak det store dyr tilbage til lysningen.
faktisk var jeg glad for, at det ikke var en hjort, jeg baksede med. det havde jeg aldrig overlevet.
mens solen kastede sine sidste stråler ned mellem birketræernes grene og gav hele sceneriet et postkortagtigt udseende, brækkede jeg hinden, inden jeg ilede ud til bilen og påbegyndte hjemturen til uggelhuse. øm og træt, men godt tilfreds." (karsten andersen, side 114-116)

the above quotation from the book: bukkejæger, gives an insight of the hunting experience. an experience of being in the nature, being one with the nature is part of the bigger understanding of what hunting is. it's not just about having nice guns and shooting animals, there's much more to it.

so how can architecture add to this experience? can architecture extend the involvement? can architecture relate to the experience and make you feel like you are still in the field, eventhough you retreat to civilisation and return to the forest next morning?

these are the questions i'll ask myself and aim towards a design focusing on the familarity to nature and the total experience.

classification of privacy

the design challenge is mixing living and work and i think it is important to understand when the family is being private and when the family is at work. the family has a need for the house not only to be a home, but it also has to play an important role in their professional life. therefore i find it necessary to understand, which functions need to be private and official and when they need to be. in the spatial programme on the next page there's a category outliningen when a space is private, private/official or official.

a space is 100 % private when it is only used by the familie and then it is considered a space where they can retreat and be themselves. a space is considerede private/official when it is to be used by the family but also by the employees on the farm. the hunting retreat is understood as 100 % official since it can be used by strangers.

private - family

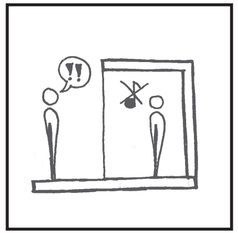
private/official - family & work

official - hunting retreat

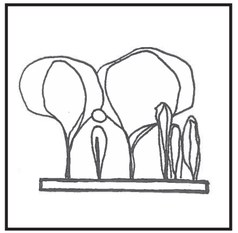
it's important that the design portrays the family life and the working life in one integrated design solution, by working with different scales considering the use of space. spaces used by many people at the same time is working in a bigger scale rather than the space used by one or few people of the family.

privacy can also be understod very different; when do we feel private. i understand and devide privacy into three images: acoustic privacy, visual privacy and perceived privacy, see ill.16-18.
some rooms don't need the understanding of privacy, but those who do mostly work with acoustic and visual privacy of the spaces; perceived privacy is more a feeling or a happeningen; a child hiding under a blanket, a walk in the nature etc. visual privacy is when other people can't see you, and maybe they can or can't hear you. acoustic privacy is when people can see you but can't hear you or you can't hear them. the spatial programme also devides the spaces into acoustic, visual and perceived privacy.

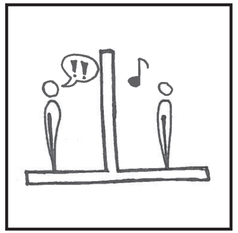
the full understanding of visual, acoustic and perceived privacy is very personal and individual from person to person. we often don't have the same needs for privacy in specific rooms; though it is an interesting way of creating a feeling in the spaces and therefore i'll use the aspect of privacy as a design parameter in the project. a parameter that puts focus on the material, the view and the feel of a space and helps define the tectonic aspect of the design.



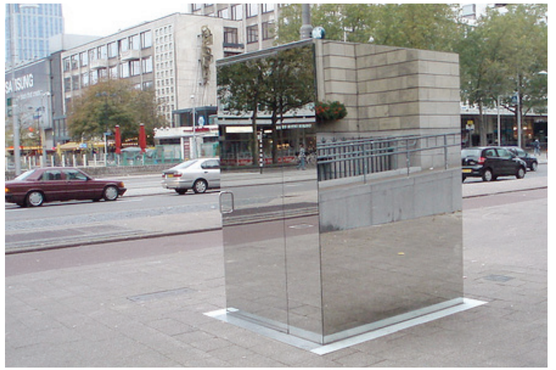
ill. 16 acoustic privacy



ill. 17 perceived privacy



ill. 18 visual privacy



ill. 19 the one way mirrored loo. visual, acoustic or perceived privacy?

spatial programme

the spatial programme has been worked out based on wishes and needs from the clients. during the design process the programme has developed, there's been functions added as a result of new information and requirements.

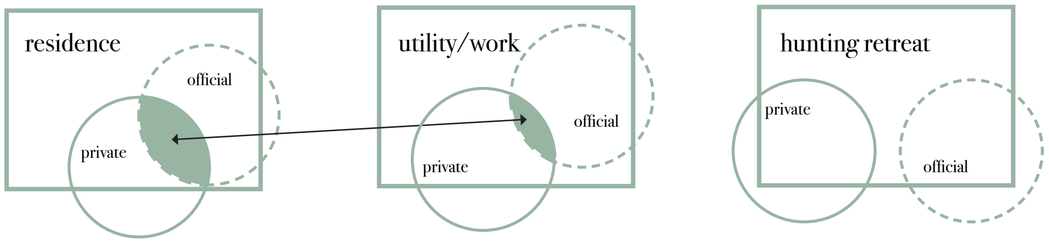
the spatial programme contains simple information and requirements for the functions. besides that the programme deals with the classification of privacy relating to the user of the function and the privacy feeling relating to the experience when obtaining stay in a specific space. both requirements have been discussed on previous pages. (page 22) finally the programme deals with the view of the specific room or function. should the view be a shared, a private or a framed view. since almost every room needs a relation to the nature the obvious focus is on the view.

room specification	units	area m^2 pr. unit	function	privacy classification relates to function	privacy feeling relates to the space and awareness	view share, private or framed
residence						
kitchen, living, dining	1	100 m^2	20 pers. for employees during breaks etc.	private/official		shared
pantry	1	6 m^2		private		
master bedroom	1	30 m^2		private	acoustic and visual	private
en suite	1	12 m^2		private	acoustic	private
walk-in closet	1	18 m^2		private		
bedrooms	3	18 m^2	bedrooms for three kids	private	acoustic and visual	private
guest room	1	15 m^2	for staying guest of the family	private	acoustic and visual	private
bathroom	1	10 m^2	shared bathroom for kidt and guest	private	acoustic and visual	private
tv-room	1	50 m^2	for the family to retreat	private	perceived and visual	shared
main entrance	1	10 m^2		private		framed
hall way	1	? m^2		private		framed
wc	1	8 m^2	wc in relation to kitchen	private/official	acoustic and visual	
terrace	1	? m^2	terrace with outdoor kitchen	private	perceived	shared
parking	1	? m^2		private		
offices	2	18 m^2		official	perceived	shared

room specification	units	area m^2 pr. unit	function	privacy classification relates to function	privacy feeling relates to the space and awareness	view share, private or framed
utility/work						
garage	1	60 m^2	space for three cars	private		shared
laundry	1	18 m^2	laundry for the family	private		
storage	1	20 m^2		private		
technical room	1	? m^2	heat pump, solar cells, water tank etc.	private		
depot	1	40 m^2	systematic storage for the family	private	visual	
bathroom	1	12 m^2	convenient bathroom usable after work	private/official	acoustic and visual	
back entrance/hall	1	10 m^2		official		
utility room	1	20 m^2	for the employees during working area	official		
parking	1	? m^2	for employees	official		
hunting retreat						
kitchen	1	25 m^2	industrial kitchen	official		framed
dining area	1	100 m^2	for about 40 persons	official	perceived	shared
lounge area	1	60 m^2	with woodburning stove	official	perceived	shared
guest room	4	20 m^2	double rooms	private	acoustic and visual	private
en suite	4	10 m^2		private	acoustic and visual	private
utility area	1	40 m^2	clean-up gear and area for butchering etc.			
rallying point	1	? m^2	morning and evening traditions	official	perceived	
wc	3	2 m^2		official	acoustic and visual	
storage	1	15 m^2		official		
main entrance	1	6 m^2		official		
hall way	1	? m^2		official		
parking	1	? m^2	3-20 cars	official		

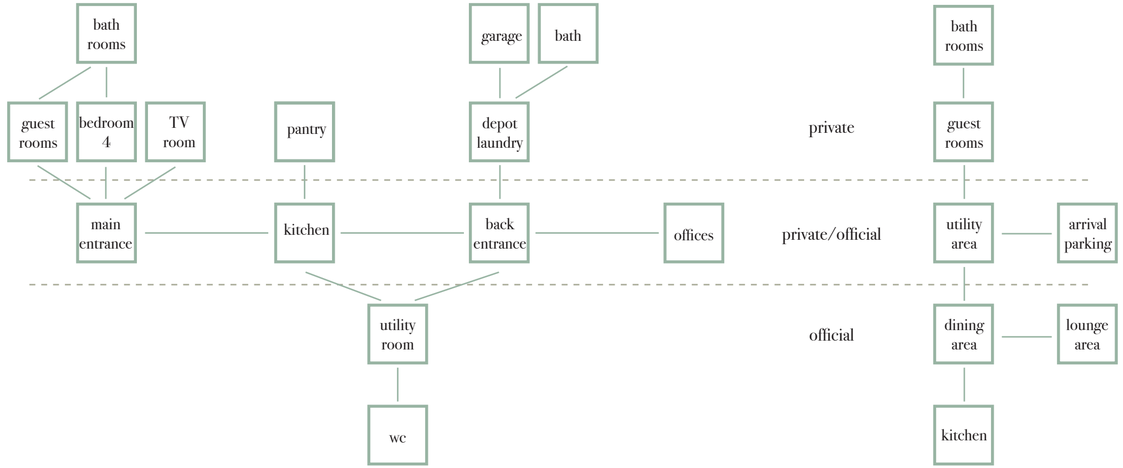
flow between main functions

this diagram shows the human flow between the main buildings. in each building there is private and official functions and in two cases functions that combines both the private and the official.
the flow between buildings are from the collision areas allowing the private areas to be 100 % private. the hunting retreat is not directly related to the two other buildings and therefore not shown as connected yet. the right combination of the main functions will be worked out in the early stages of the design process.



function & privacy diagram

the below diagram combines the residence and utility/work area as one building and seperates that from the hunting retreat into two seperate buildings to give a clear picture of the relation between the functions. the hunting retreat is considered an official building but the functions inside the building acquires a seperate classification expressed in the digram.



inspiration

this chapter speaks about my realation to architecture, what drives me and what inspires me. the chapter will relate to the following pages including the tectonic and sustainable design approaches.

i think what is interesting about the architectural profession is that, also mentioned earlier, everyone has an opinion about architecture and most have been inspired in a certain way they find architecture interesting, and that's whether you're an architect or not. the finest assignment and what satisfy me as an architect is listening and understanding the client and being able to direct the design in a way where you can supprise with a solution that inspires and overwhelms both the architect and client.
but not only the clients needs should be a parameter when design, i think that architects have a responsibility to guide our clients into something bigger than just their personal needs. therefore i find great inspiration in architecture that relates to our nature and our land and appreciates, via our architectural choises, the world that we live in.

during my time in australia i learned that there's a big difference in how australian and danish architects think architecture. australians are inspired by their anchestors and their land. in denmark we are moving towards a pragmatic period provoked by inflexible building regulations. yes there's a climate perspective as well, but in general i wish that we in denmark used our proud design traditions to design more well designed buildings with beautiful detailed solutions that gives value to the spaces as we did back in time.

via precedents in case studies i will approach ways of working with spaces, materials, nature, structure and people in architecture. working approaches that in developing architecture supports my thoughts about the dwelling and my tectonic and sustainable beliefs. these working methods will act as inspiration during the sketching phase.

europeans have a very rigid, logical approach. australians are much more flexible and tend to think on their feet, you need to be adoptable.
-the global mail, 2012, june.

tectonic and sustainable design approaches

this chapter highlights my take on the techinal part of the project giving an understanding of tectonic and sustainability as design approaches in the designing of the project with tectonic being the main focus point.

tectonic

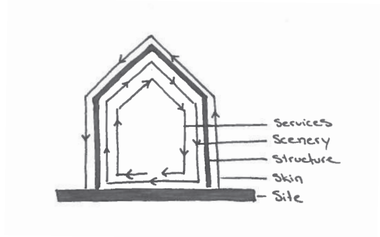
erroneously the word tectonic directs our thoughts towards the engineering of a building, which to some degree is right, but mostly its about the architectural and aesthetic qualities of engineering.
gottfried semper speaks about "raumgefühl" when he talks about tectonics, how does the room feel, what are our perception of things and what is our visible impressions of the space.
juhani pallasmaa also speaks about this in his book: *the eyes of the skin*, which is about the experience of what we interprete and reconize, it's our personal experienze and our way of understanding the building and it's space, an integral part of our thinking about architecture.

to interpret a building or a space we need to relate to something; this integral part of our thinking about architecture can often refer to what we already know, which is our traditions og our culture, whether it's the building culture or how we live.

> *"the way in which we anticipate the future defines the meaning that the past can have for us, just as the way in which our ancestors projected the future determines our own range of possibilities. thus for gadamer, vico's formula entails that we understand history not simply because we make it but also because it has made us; we belong to it in the sense that we inherit its experience, project a future on the basis of the situation the past has created for us and act in light of our understanding of this past whether such understanding is explicit or not." (studies in tectonic culture, 1995, page 24-25)*

the above quotation speaks about how we use out past to creat our future; our way of understanding and creating relates to our traditions.

tectonic is for me how architecture speaks and about creating a building which is thought through in every layer so that it is understandable and united. to understand a building i need to see construction, material, joinery, services and the site come together and speak the voice of the product.
(studies in tectonic culture, 1995) (leupen and harald, 2011)



ill. 20 tectonic layers in architecture.

sustainability

sustainability is a big subject to handle in one project and many people have different opinions on how to work with sustainability in designing architecture.
this project deals with the thought, to sustain via a holistic understanding of sustainability, but approaching this via small initiatives making a difference in the bigger perspective.

the general understanding of making sustainable architecture is often through technical improvements to the building as making the building self-sufficient, working with mechanical ventilation, energy-sufficient windows etc.
to achieve coherence between tectonic and sustainability, the approach to sustainability will be more in realation to the natural og cultural image of architectural sustainability and dissociate with the strict sustainable understanding.
it's important to be able to control your own comfort in the house. the project will aim to meet the 2020 energy frame for new buildings via an energy analysis in be10, but with a critical take on the 2020 demands. hereby said that i won't compromise on the tectonic design to achieve certain demands within the energy fram.

also i will put into consideration that the project contains many square metres, and how can the buildings be use when the family wish to sell the project. is it possible to take over by another familiy og be usable for companies.

the main design focus is on tectonic design and the sustainable issue will be a secondary factor in the design process.

casestudies

gehrdt bornebusch, hald lake home, 2003 jutland, denmark.

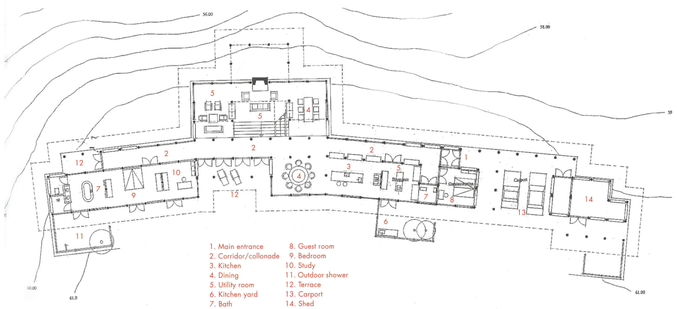
the hald lake home by bornebusch is situated on protected land with great views and wooden landscape.
the scheme of the house is dominated by the large sloping wooden roof which is supported by round wooden colums. the interior walls are either of glass or formed by cabinets and from the cabinets there are glass partitions up to the ceiling.

there's three common used materials in this building, wood, glass and granite, which really strengthens the concept of the house, only intensified by the simple structure of columns organized in a grid and forming a colonnade, running the length of the house. the simplizity in materials and structure gives the house a feeling of calmness with open spaces extending the 'column forrest' to the real forrest, unifying the two elements.
the house opens up towards the nature, which seems vulnerable, but by using the trees in the landscape and the slooping roof of the house is still yet protected.

the house sits on a slightly sloping site, which bornebusch has followed and allow for the building to change in levels. looking at ill. ?? the house seems closed and only in one level, but entering the house the structure opens up towards the nature.

the column structure in the house makes the forming and planning of the floor plan an easy task, but also a very strict design. this is an example of very well thought simple architecture connecting to the nature and using the structure as a guidance tool in the design.
(udsen)

ill. 22. interior of hald lake house



ill. 21. floor plan of hald lake house

ill. 23. facade of hald lake house
ill. 24. exterior of hald lake house

peter stutchbury, invisible house, 2010 blue mountains, australia.

invisible house is a summer house in the blue mountains two hours drive into the wild from sydney. the landscape is amazing and has also been the first priority when designing the house. the house is build on a location with amazing views and a site sloping down towards west, which is a directional parameter for the design of the building.
the house sits in the contours and follows the lines of the landscape, while the sculptural roof emphasises the horizon and reflects the sky to translucent the building in the landscape.

the story of belonging has been the main concept through the design process and directs the spatial design of the house towards an appreciation for the land. the structure is quite special but yet simple with the big overhang concrete roof supported by concrete columns allowing for big glass sliding doors to enclose the space but without hiding the context. in this project the structure has been choosen specific for best possible integration of a foreign implementation.

"invisible house can be there or cannot, architecture represents values, both current and beyond. if the roof, with water, reflects the sky this building will never be found – until it is discovered." (stutchbury, 2010)

ill. 25. interior invisible house

ill. 26. exterior landscape invisible house

ill. 27. facade invisible house

glenn murcutt, ‘riversdale’ boyd art center, 1999, west cambewarra, nsw, australia.

the education center contains old venacular buildings and in 1999 the big center with adjoining accomodation was built in the context of the excisting buildings.
the new buildings design by glenn murcutt has won numerous prizes recognized for architectural excellence.

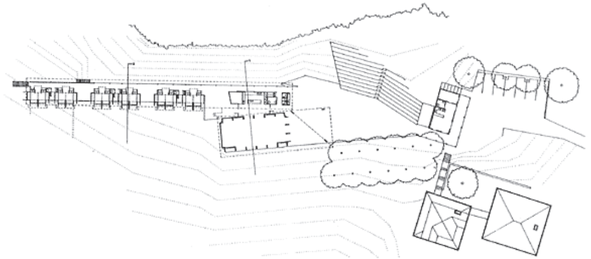
the boyd art center is situated right next to the shoalhaven river and offers spectacular a view, from the main functions, of the landscape, and with a helping hand from the interior the spaces focuses their attention on the landscape. the building is seen as a recognition of the landscape.

the new project contains an open plan hall area, a commercial kitchen, a big covered forecourt and accomodation.

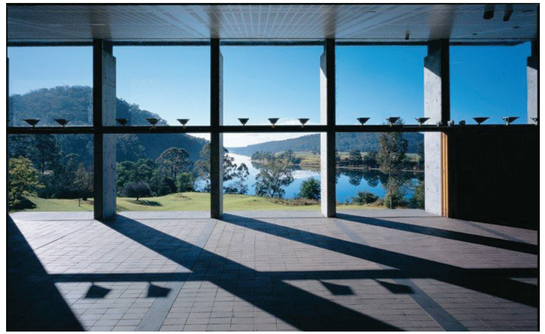
the open plan hall is formally placed at the arrival as a greek temple. also the hall has been placed on a fake stylobate terrace with a colonnade of big concrete columns. this unconsciously classical formality has been toned down by the use of new materials such as a corrugated iron roof etc.

the colonnade allows for big timber sliding doors, which opens up to the view and direct acces into the landscape.
the boyd art center is a comtemporary building with design inspiration from the accient greek classic architecture.

the education center is mostly used for student, masterclasses, big celebrations like weddings etc.



ill. 28. floor plan riversdale



ill. 29. interior riversdale

ill. 30. exterior riversdale

jørn utzon, kingohusene, 1961, helsingør, denmark.

kingohusene is a project from jørn utzon, combining additive architecture, courtyeards and natur into one sensuous element.

the atriumhouses has been designed with inspiration from the souhern countries with closed, anonymous facades towards the roads and open facade towards the yard and nature.
also against the roads there's been placed trees to draw the attention away from the house - the private zone.

materials has been chosen to gently place the buildings into the landscape.
further more the additive buildings have been displaced and relates to each other in a course through the landscape following the contours of the site.

from the residences you can experience the nature 24 hours a day and see the changes cycle of nature in both the courtyard and the close nature.
(sommer, 2009)

ill. 31. exterior kingohusene

ill. 32. site plan kingohusene

ill. 33. exterior kingohusene

the four previous casestudies are four different examples on how architecture can be directed towards the nature, but yet be so different in materials, spatial needs and construction. the forming is approaching the nature, but the choises made are comming from specific functions and materials guided by culture and needs. i find all of these precedents interesting because they are designing architecture with a holistic approach both to tectonics and sustainability. casestudies of architecture designed with the nature, relating to and respecting the land.

design vision

is it realistic to design with the focus on the simple and the necessary in a world where we crave for the hole.

focusing on the simple aspects of permanent and temporary stay, the vision evolves from a holistic understanding of how to live and obtain stay, in relation to our life and our culture.
via architecture, embrace the scandinavian nature, through an extrovert expression, and the use of local materials resistant to exposure, encourage the simple life of a family.

first step in developing the house

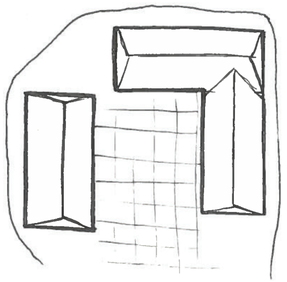
the traditional three to four wing farm typologi has inspired the clients and espicially the husband sees big opportunities and advantages in creating a horseshoe typologi surrounding a big courtyard. the easy access between the buildings in a wing typologi eneables the client to gather all his work, home and hobby activities/functions. furthermore the courtyard created in the center provides a framework for the traditional hunting ceremonies, opening and closing the hunt.

the thought about creating a wing farm combinging the three functions: residence, work and hunting into one typologie is tempting and i understand where the family's inspiration is coming from therefore this is where i take my point of departure in the designing process.
two wings combined for residence and work and one seperate wing for the hunting retreat (see ill.34), very simple, but the many squaremeters requred by the family seems to get the wing typology out of porportions.

during the sketching phase i couldn't move my thoughts from the issue of privacy when combing so many functions into one building. to me it's clearly that some aspects of the clients life has been put forward and considerations about how to live in what first and foremost should become a home has been forgotten during the revelation of a typologi that combines functions. from own experiences and experiences fra acquaintances i know that combing work and home and allowing unknown people into the privacy of family is not to prefer.

moreover i was very excited about the site. located just outside brønderslev with a great area and possibilities of really using the site as a parameter in the creating and designing process. the wing farm typologi doesn't consider the site and the area at all. it could be placed on any given site and locations.

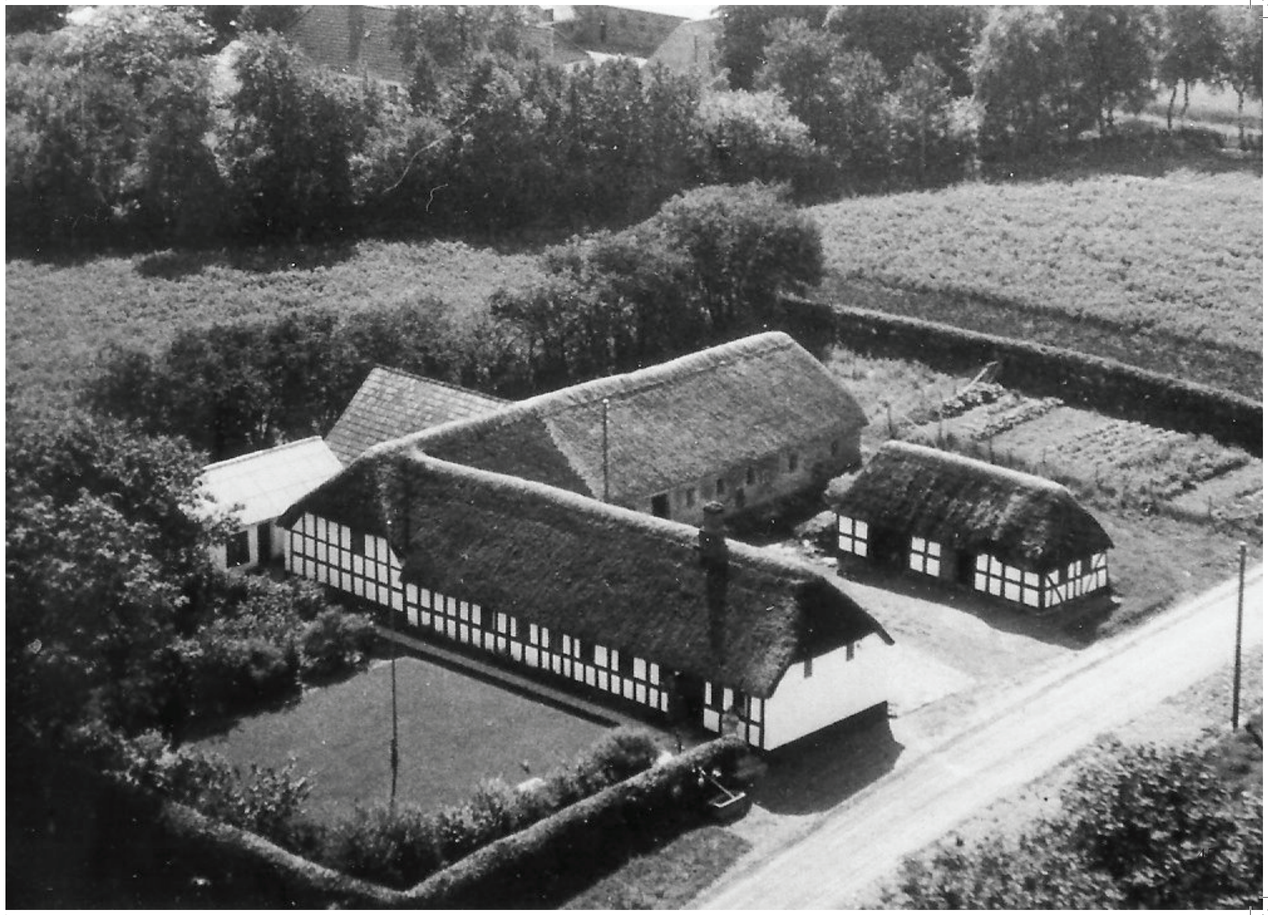
therefore i set up the design task and start analysing the site further, looking at options to seperate some of the functions and created an experience on the site.



not to scale

Signe Beck 6/5-14

ill. 34 three wing farm typologi



ill. 35 traditional wing farm.

design parameters & focus points

create spaces based on the clients requestes as a guideline for the functional needs.

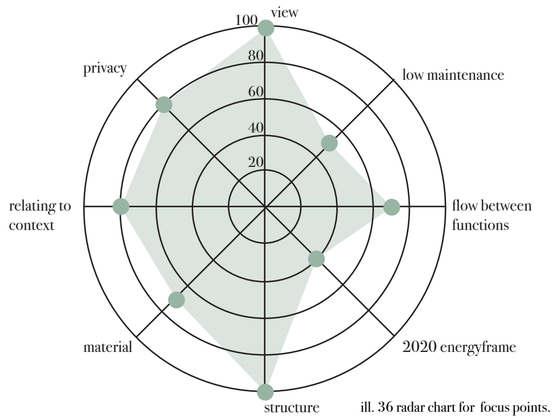
create with respect for the nature allowing to shape and place the buildings.

create belongings through raw material erasing the inside outside boundary.

create integrated sturctural solutions expressing the spatial feel and identity.

create identity in the space through view and privacy classification.

the above explains the different design parameters and what they give to the buildings through the design phase.
next is the radar chart explaing the importance of the focus points and where the main focus is and where the limitation of the design is.



ill. 36 radar chart for focus points.

the design task

the design task is pretty much set by the clients, but as discussed in the programme i think it's necessary that the architect takes charge and adds to the design to improve the options for a better integrated design.

the client has set up som specific needs, which i through a design will show is possible with a more laid back attitude and an innovative approach to traditions mixed with modern methods.

also the family has big demands for many square meters and i don't think these demands has been thought through. my task is to show that limited space can do the job by creating different zones within the space.

furthermore i will introduce a "different" design than normally seen in today's denmark; a design with focus on tectonic aspects of structure and materials. i will work on how to implement innovative details, inspired by australian and nordic architecture, into a building culture with strict building regulations, but still aspire to reach the 2020 energy frame.

last but not least the main focus is on creating the space through material, specific views and creating a certain privacy. the wish is to give a tectonic feel to the space and the buildings.

overall the buildings should express simplicity and characteristic; a design to understand as you experience the buildings.

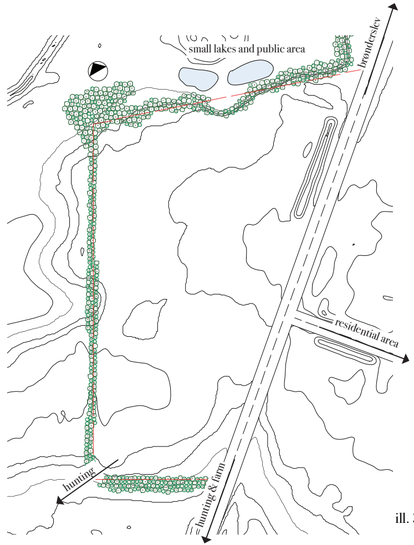
next is the design process followed by the design presentation on page 104.
the design process is presented as a linear process focusing on one subject at a time to show how dicisions have been made, showing diagrams, drawning etc. with an explaning text.

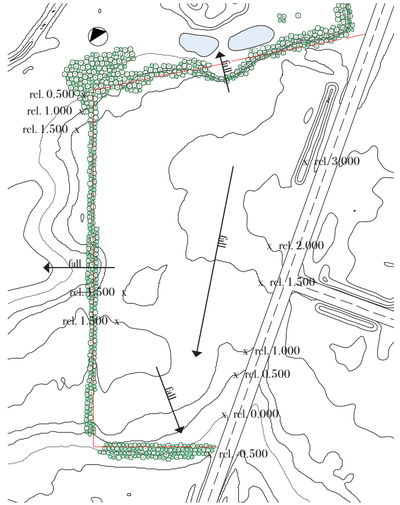
making small architecture and big landscape.
-tom kundig

developing a site understanding

the site

understanding the site and it's possibilities is important to place the buildings in the right spot, but also to use the nature and the context in designing the building.





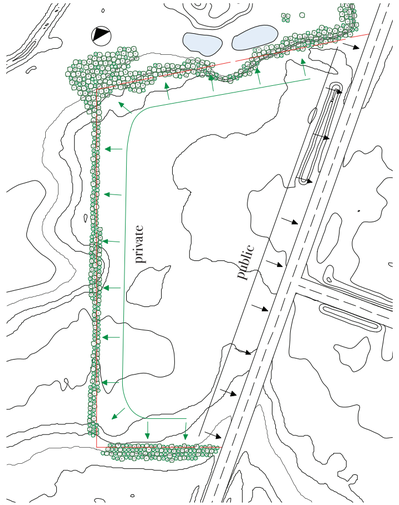
ill. 37–42 site analysis.

contour line levels

the site is faily leveled sloping slightly down towards south west allowing for great views.

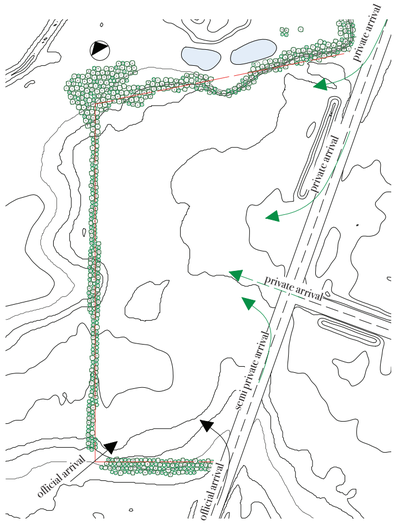
urban privacy program

the site is situated directly next to road towards south, which allows for public view. opposite north, east and west, which is towards field and makes for the private view in both directions.



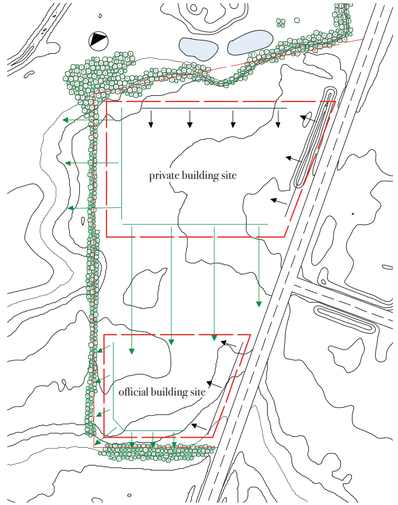
arrival

arrival to site is mainly from north east and south west. from north east the family arrives to the residence. from south west the client arrives from the farm including the employees and also when arriving from the hunting area it's from south west and west.



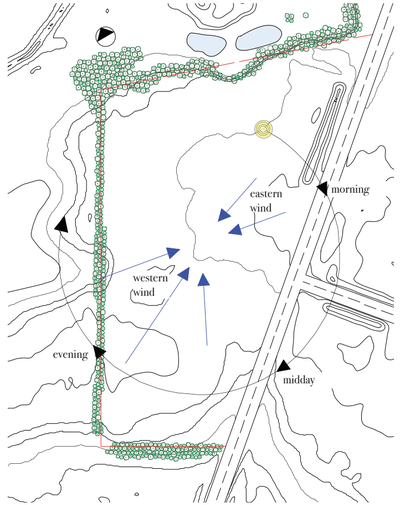
placing functions

relating to the before diagrams there's two obvious building sites. a building site placing the residential building north on the site and the hunting retreat south on the site. this allows for the residence to have a private view towards the hunting retreat and the hunting retreat to have a unspoild view relating the building to the nature and connecting in the direction of the hunting areas.
the further design process deals with design of two seperate building, the residential and the hunting retreat.



urban sun and wind diagram

below diagram shows the sun path going south around the site. the wind conditions are mostly wind from west and occasionaly east.



the main construction

working with techtonic one of the most important design parameters are the structure of the building. with structure meaning, the construction; designing a structure that supports the tectonic combination of the design parameters.

requirements for construction:

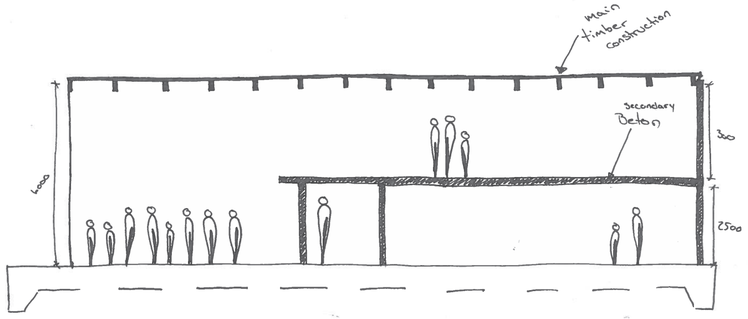
the construction must allow for both small and big scale spaces relating to the classification of privacy in the buildings. small and big scale in the form of wide and small span.

the construction must allow for open facade to create and frame the view and connect with nature.

the construction and the material must express a tetonic feel via exposure and simplicity.

the construction must add an aesthic feel to the space and amplify the view and space.

the construction must be a simple element in the building adding value to the other elements.



ill. 43 section of early concept construction.

first construction study was base on the scale of the construction being able to relate to the internal rooms and their function.
from the very beginning of the project it's been important to seperate work and family into two main functions, both demanding different from their spaces.

ill.43
this concept section shows the early thought about the construction. two different construction, one relating to big official scale spaces accomodating many people at once and a construction for the small private scale accomodating the family. already at this stage the i was very sure that concrete and timber should be the main construction material.

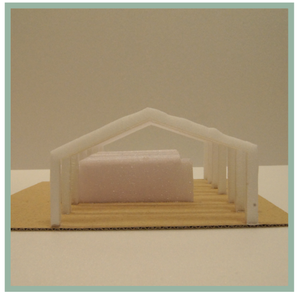
at this stage there was no further studies on what kind of construction but more studying the space within the construction.

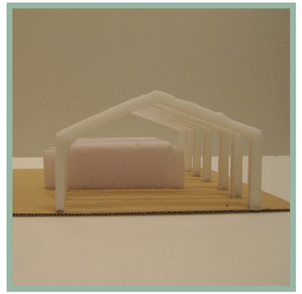
ill. 44a & ill. 45b
shows two different frame constructions working with the height of the facades and what that does to the view and the internal space.

ill. 44a
has a construction with same facade heights. this construction dosn't really make the internal rooms changable and dosn't help devinging the coming zoones within a big space.

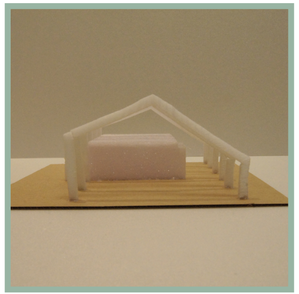
ill. 45b
opposet the before construction this construction has facades with different height that defines the space within.

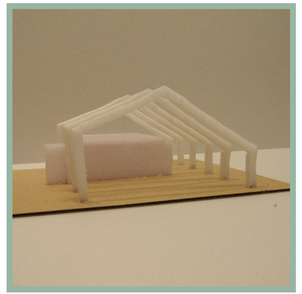
this simple study gave me great basic understanding of what i need from the construction and how i can utilize the construction in designing for the other parameters.





ill. 44a radar chart for focus points.





ill. 44b radar chart for focus points.

in relation to the early studies on construction i made a construction diagram to get an overview of the different possiblities in relation to the design paramenters and what is most appropriate for the two buildings. relating to the construction requirements page52 it's important to notice that the construction should be visible in the interior for the tectonic feel and understanding of the structure, therefore this a played a key role in the assessment of the material and the stucture.

the constructions in ill. 45b has been choosen simply from knowledge and previous experiences. the the diagram evaluates the construction in relation to scale, span, functionallity, tectonic and easthetic.

the material analysed in ill. 45a has been choosen simply from my own interest and what i think could be intereseting to work with. the material is evaluated in relation to being used as the construction material for big and small scale. consequently this is not a study on cladding material etc.

concerning material, timber and concrete was choosen as the two main construction materials used. they are both very strong aesthetic and they add lightness and character to the space.
construction wise a plate and slab system was choosen to provide frame around the small scale spaces. this structural system is relating to the main concept diesussed on the following pages.
for the bigger scale spaces a frame construction was choosen. the frame construction is very simple structurally and strong conceptual.

material	timber	steel	concrete
big scale	soft expression, express light construction. big span needs to be laminated timber	hard aesthic expression but light feeling sturcture	hard and simple aesthic feel - big dimensions. express a heavy structure
small scale	soften the feel and aesthic of the room but is better used as stud walls or cladding	-	strong structure and gives tectonic character to the space.

ill. 45a material diagram.

construction	scale	span	functionallity	tectonic	aesthetic
column/beam	privat small scale	small/medium	creates small room but needs walls and floors	not a strong tectonic feature construction but allows for variation.	many different choices of materials to create a certain feel.
truss	official big scale	big spans	allows for great open facades but still devided by columns	less tectonic and needs to be in steel	focus on construction removes focus from the view. there's a lot going on.
single element	official big scale	big spans	allows for great open facades.	strong tectonic expression. construction might be "complex"	complex construction will give big dimensions on material and move focus from aesthic of the building.
plate/slab	private small scale	small/medium spans	creates more intimate and private spacea	strong tectonic construction simple -concrete preferable.	
frame	official big scale	big spans	open facade but devided by columns. easy and strong construction, allows for small dimensions	strong simple structure timber or steel	different choices in material to create and aesthic feel in room.

ill. 45b construction diagram.

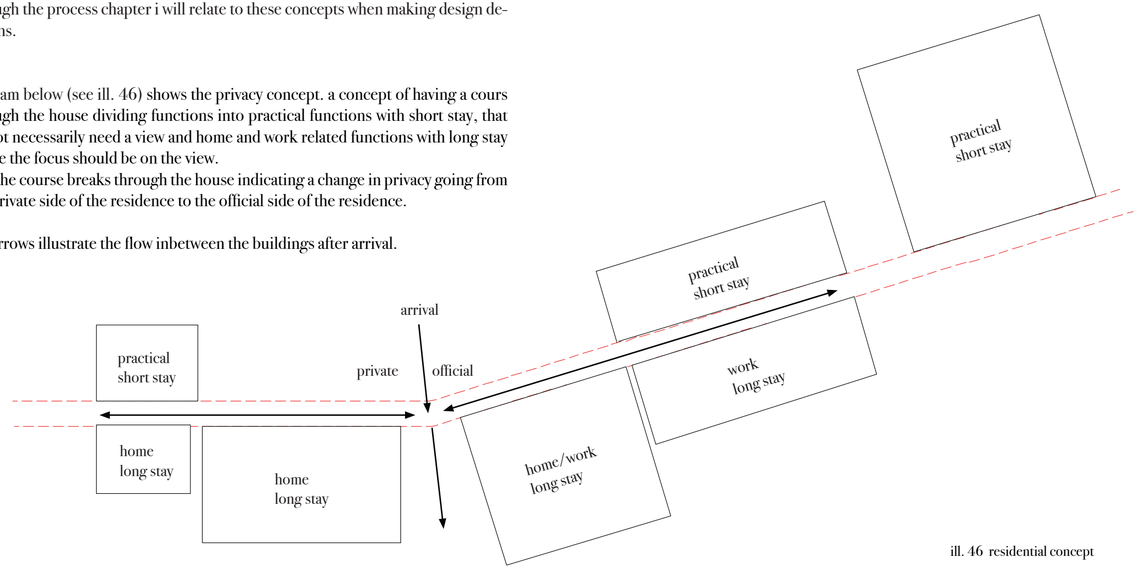
building concept - residence

these concepts are a result of a long process of sketching on both buildings and working with different constructions.

the concepts are presented now early in the process, since they are relating to the construction, but the following design process will also show stages of the design before this final concept was envolved.
through the process chapter i will relate to these concepts when making design decisions.

diagram below (see ill. 46) shows the privacy concept. a concept of having a cours through the house dividing functions into practical functions with short stay, that do not necessarily need a view and home and work related functions with long stay where the focus should be on the view.
also the course breaks through the house indicating a change in privacy going from the private side of the residence to the official side of the residence.

the arrows illustrate the flow inbetween the buildings after arrival.

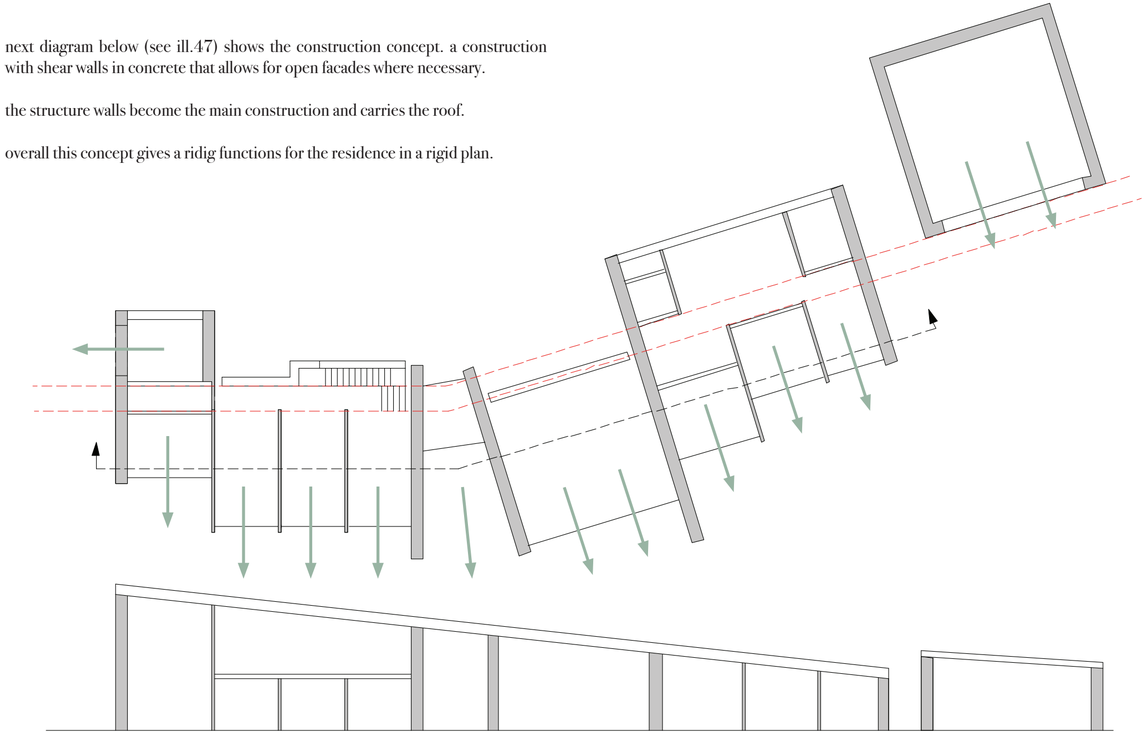


ill. 46 residential concept

next diagram below (see ill.47) shows the construction concept. a construction with shear walls in concrete that allows for open facades where necessary.

the structure walls become the main construction and carries the roof.

overall this concept gives a ridig functions for the residence in a rigid plan.

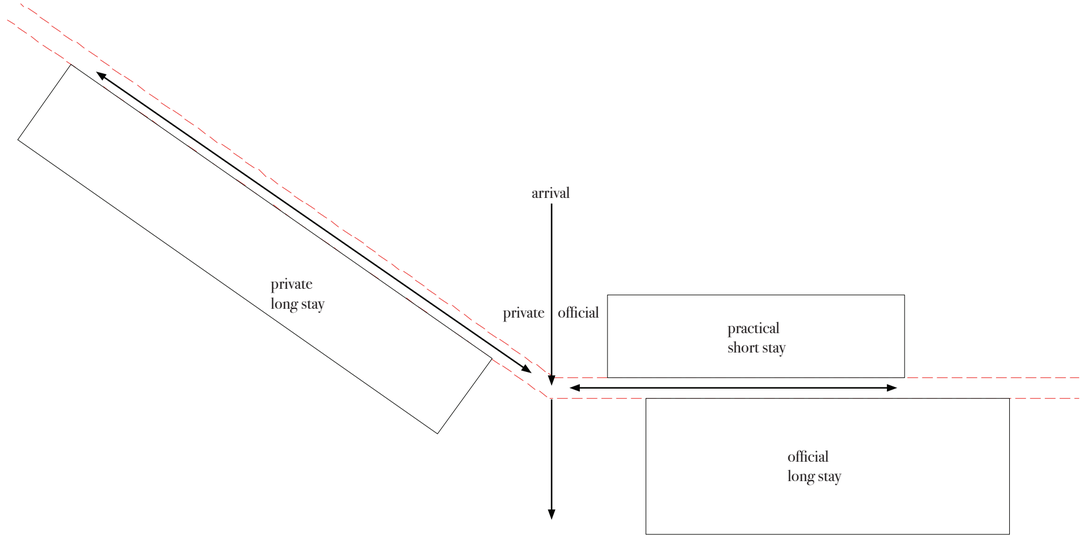


ill. 47 residential concept

building concept - hunting retreat

concept diagram below (see ill. 48) is the privacy concept for the hunting retreat. same as the concept for the residence it is deviden by a course course dividing the function into practical functions and the official and private functions with long stay and where the view and relation to the nature is important.

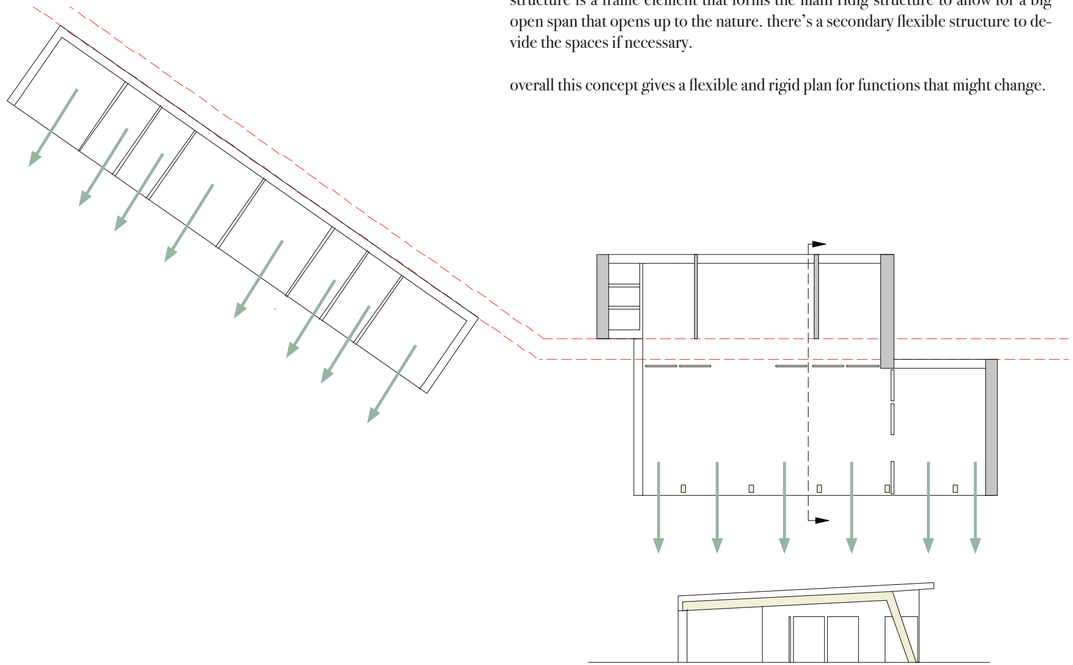
the arrows illustrate the flow inbetween the buildings after arrival.



ill. 48 hunting retreat concept

below is the construction diagram (see ill.49) for the hunting retreat. the main structure is a frame element that forms the main ridig structure to allow for a big open span that opens up to the nature. there's a secondary flexible structure to devide the spaces if necessary.

overall this concept gives a flexible and rigid plan for functions that might change.

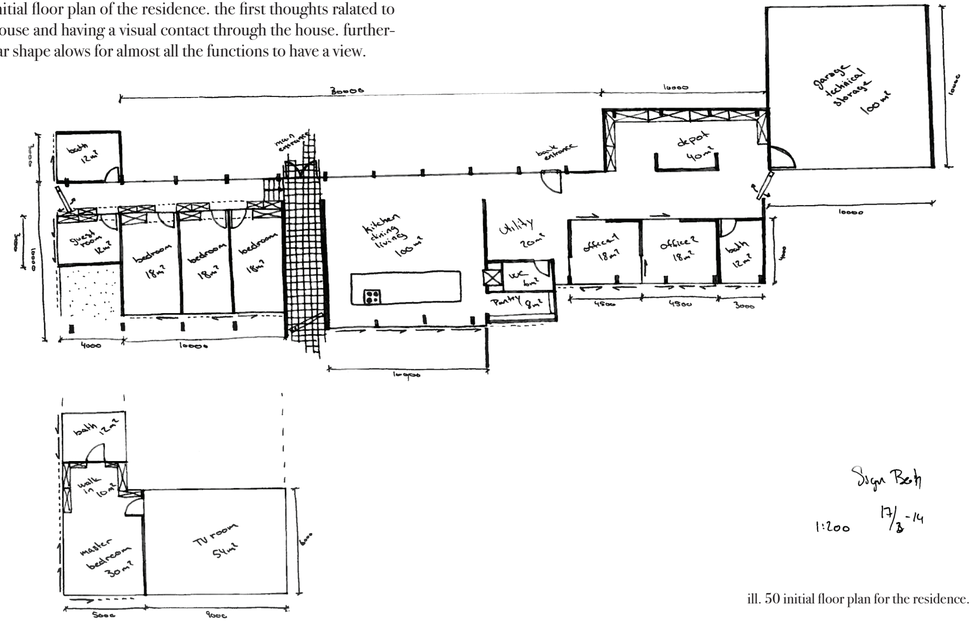


ill. 49 hunting retreat concept

designing the residence

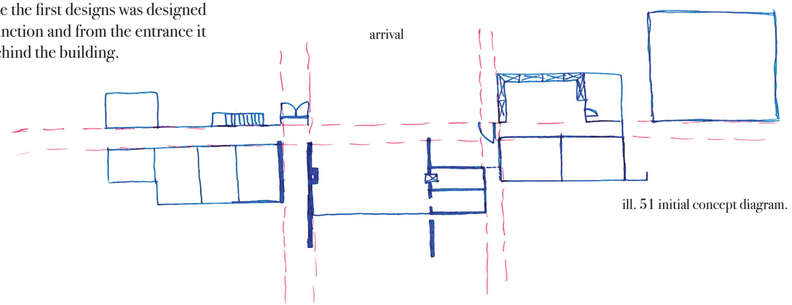
the following chapter is showing the design phase of the residence. the progress is shown via different working methods relating to the actual method used and the stage of the progress.

the sketch below is the initial floor plan of the residence. the first thoughts ralated to the course through the house and having a visual contact through the house. furthermore this long rectangular shape alows for almost all the functions to have a view.



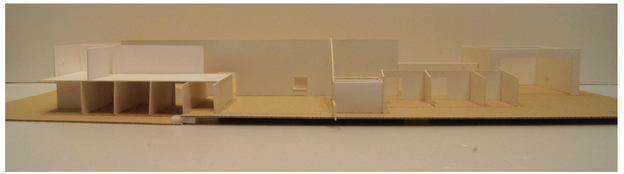
ill. 50 initial floor plan for the residence.

this sketch is the first concept sketch relating to the initial floor plan. the clients need to combine work and home into one building therefore the first designs was designed with the focus of having two entrances one for each function and from the entrance it should be possible to get a direct view of the nature behind the building.

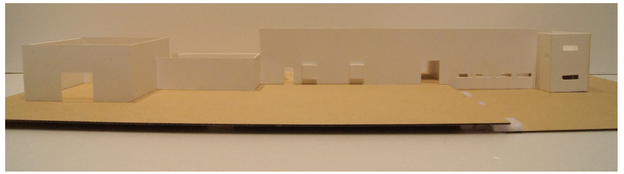


ill. 51 initial concept diagram.

these two photos are of the first working model. the model illustrates the differece in the two facades. towards south west the facade is open towards the nature to create view. the north east facade is closed with small openings. these facades relates to the above concept sketch. upon arrival to the house you can't see the view behind, but when entering the house you first glance will be a quick introduction to the nature.



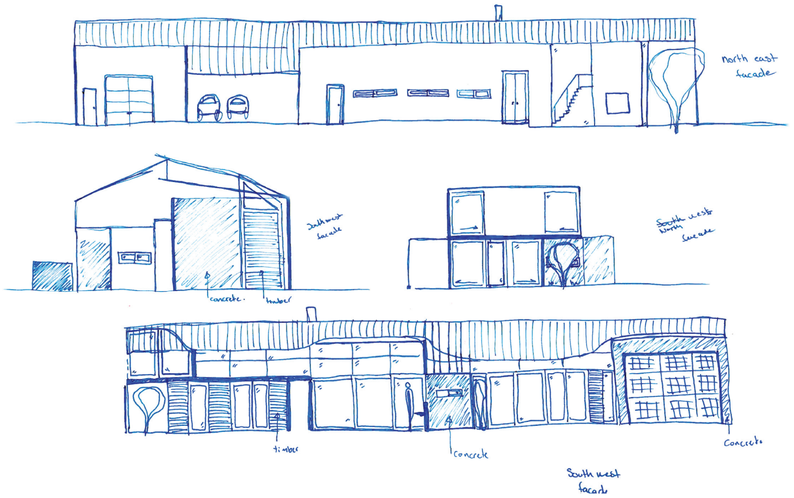
ill. 52 open south west facade.



ill. 53 closed north east facade.

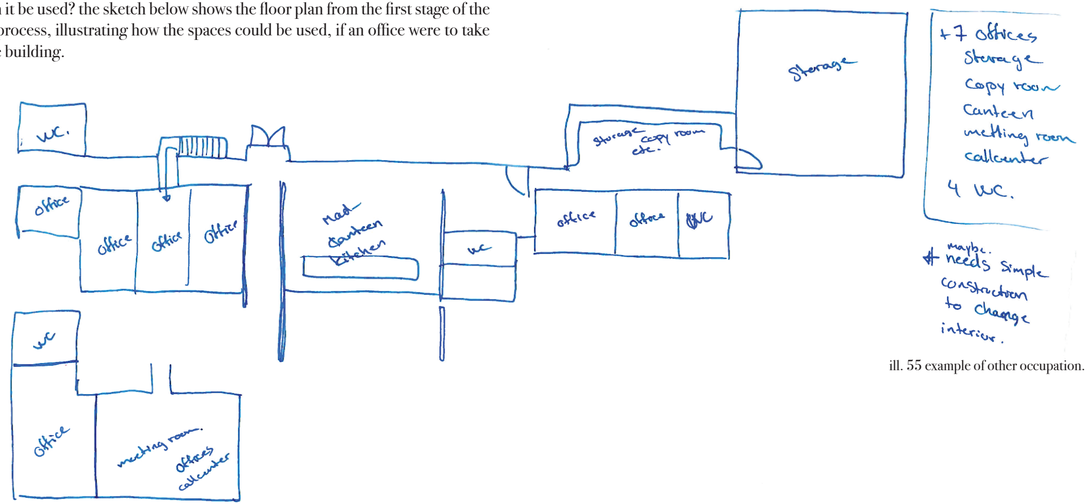
following the design process in floor plan, the design has been tested in elevation aswell, to get an understanding of the how the interior is shown in the facades, and how it relates to the shape of the roof.

from this elevation study i quickly learnt that with a horizontal roof some of the rooms would have a double high seiling, which in the case of the small official functions would be too high.
following this, the roof became an important study during the process. relating to the concept the roof should be the calming element of the house. therefore there's a seperate chapter on the roof design further in the design process on page 80.



ill. 54 closed north east facade.

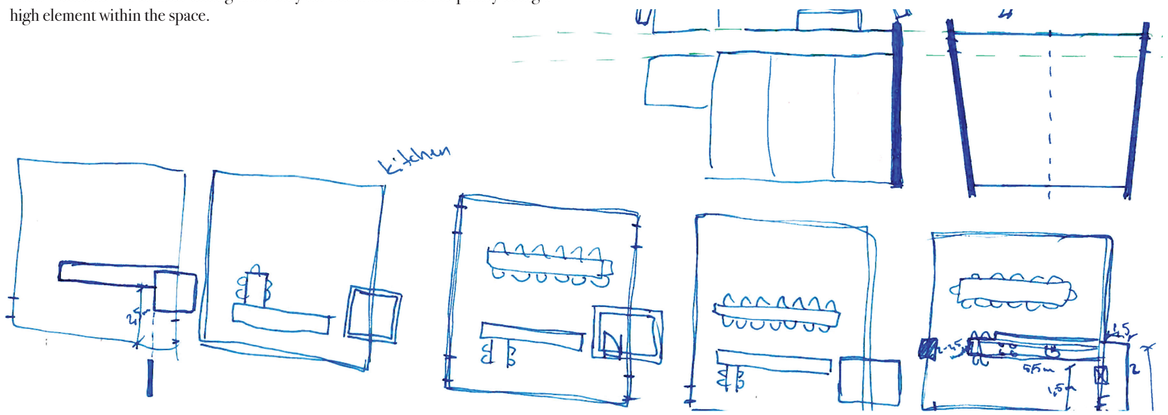
while working on the floor plans one of the main focuses was on the clients need for big spaces and many square metres. more square metres than necessary for the functions they need in my opinion. while trying to minimize the spaces respectfully i also thought about the likelihood, that one day the clients can't live in this big house anymore. what are the possibilities for others to take over the house and how can it be used? the sketch below shows the floor plan from the first stage of the design process, illustrating how the spaces could be used, if an office were to take over the building.



ill. 55 example of other occupation.

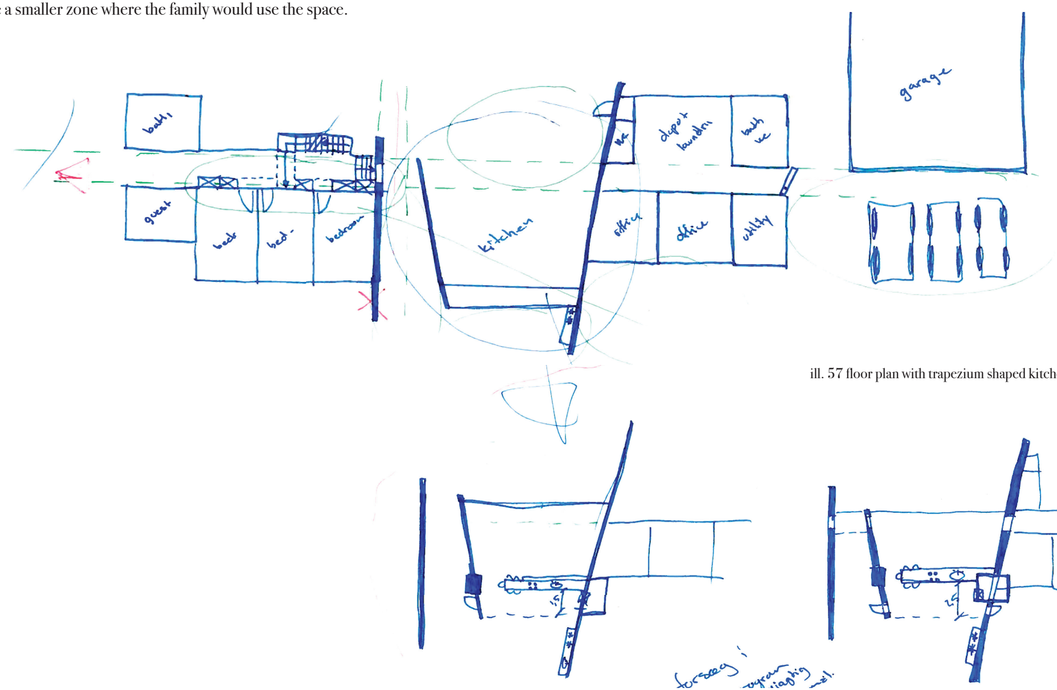
following working on reducing the square metres one of the very critical spaces is the kitchen. the clients have demanded from the beginning that the kitchen be 100 m^2.
furthermore the kitchen is used as a private and an official function, so relating to the scale criteria the kitchen has to be big, scale wise, when housing many people, but the kitchen also has to work when it is only used by the familiy of five people.

the sketches below shows different options on how to zone the kitchen. the main idea is to use the kitchen bench to devide the space into two zones within the space. other elements is a smaller dining table only for the familie and the pantry being a high element within the space.



ill. 56 kitchen studies.

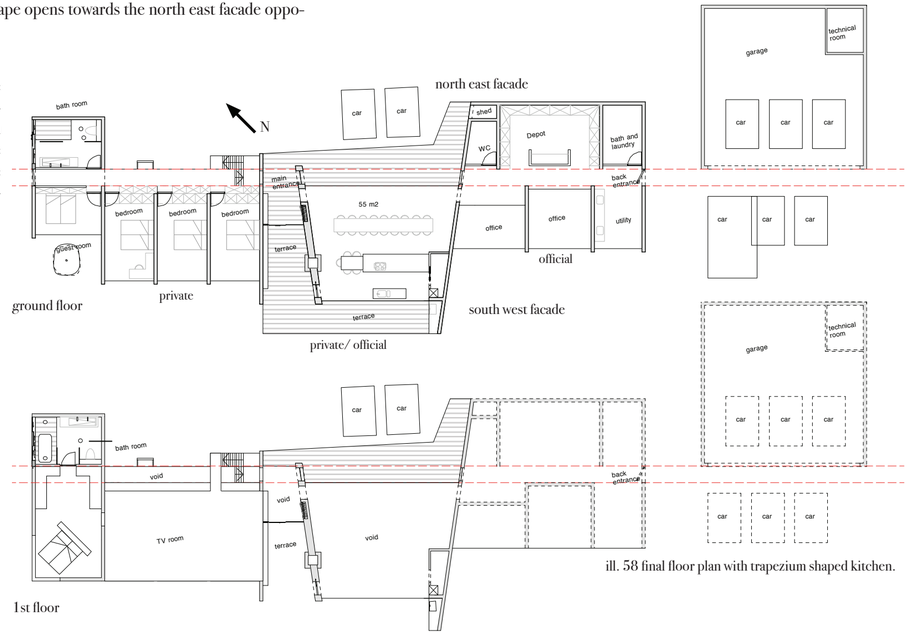
the process of working in one space in a bigger scale directed the design towards a kitchen formed into a trapezium shape. the trapezium shape helped narrow the space and create a smaller zone where the family would use the space.



ill. 57 floor plan with trapezium shaped kitchen.

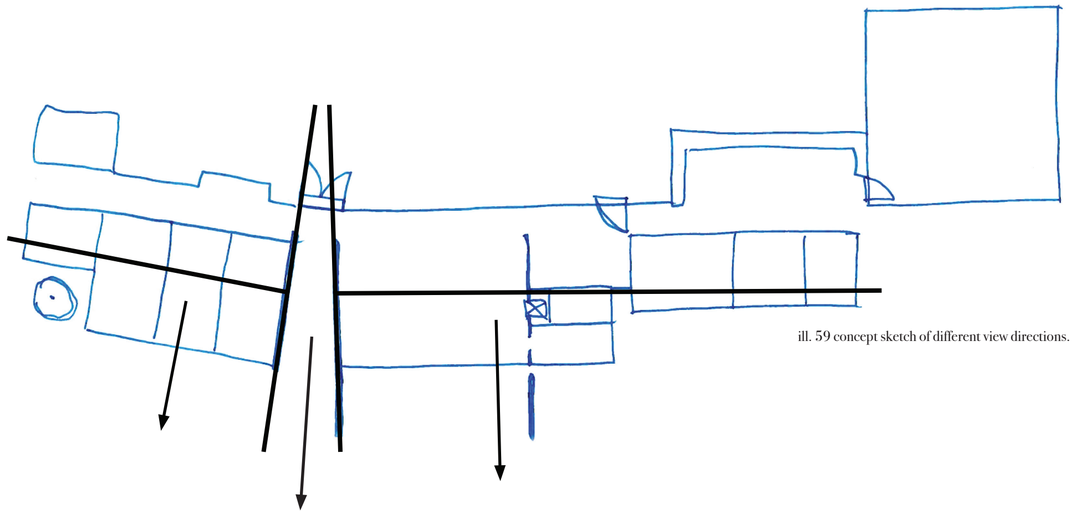
even though the zoning of the kitchen makes sence with the trapezium shaped space the overall design doesn't live up to the concept of opening towards the view. seeing the trapezium shape in a floor plan the shape closes towards the nature instead of opening up. instead the shape opens towards the north east facade opposite of what i am trying to achieve.

another place to improve is on the view directions. optimal is to create a changeable view depending on the function. in the floor plan the private, the private/official and the official functions are all directed towards the same view.



ill. 58 final floor plan with trapezium shaped kitchen.

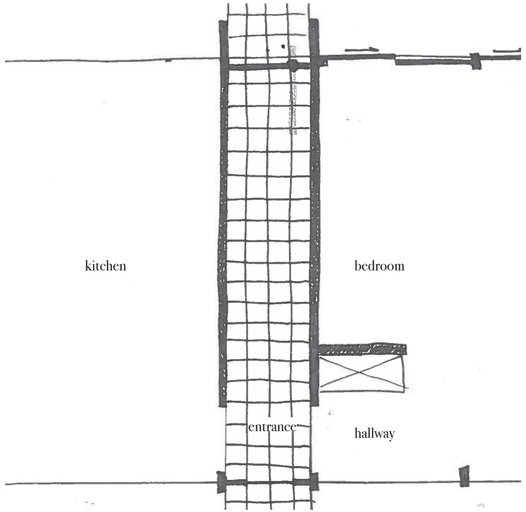
below is a concept sketch of how the building changes when changing the angel of the two building parts each side of the entrance. with only a small degree variation the private and official parts achieves two different views.
this concept drawing and the drawing on the before page leads to the final design.
the design is presented on page 70 and in the final presentaion on page 104.



ill. 59 concept sketch of different view directions.

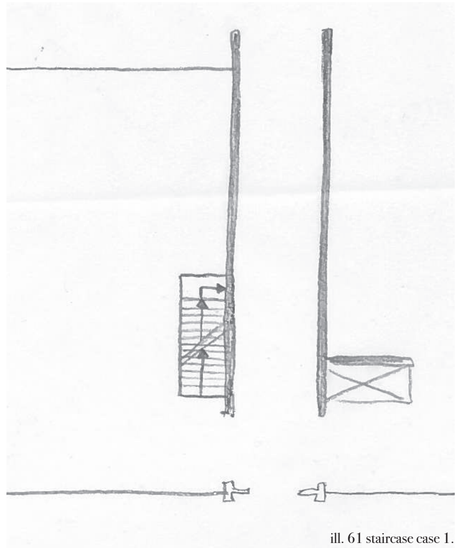
placing stairscase in relation to privacy classification

this chaper illustrates the specific study of where to place the staircase working from the privacy classification. ill. 60 shows the floor areas around the main entrance and the studies are worked out from this illustration.
this is one example on how i have used the classification of privacy to design the floor plan.



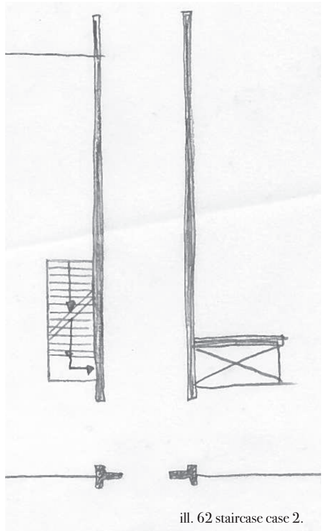
ill. 60 floorplan sketch.

ill. 61 shows the staircase situated in the kitchen with direct access when entering the kitchen. this case breaks the privacy barrier since all the people entering the kitchen has accessibility to the stairs and the 1st floor.



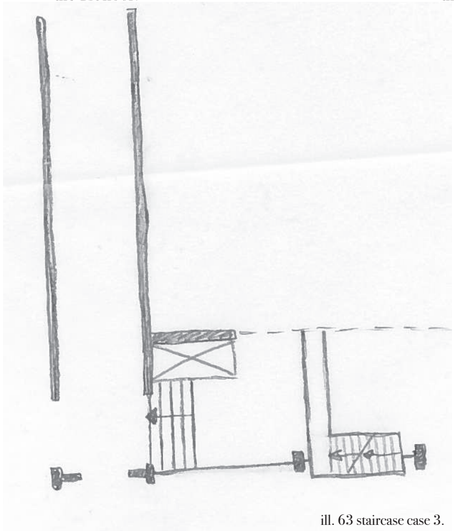
ill. 61 staircase case 1.

ill. 62 shows the staircase also situated in the kitchen, but with access from the private zone of the kitchen. this prevents the direct accessibility for people in the kitchen although the visibility is still present.



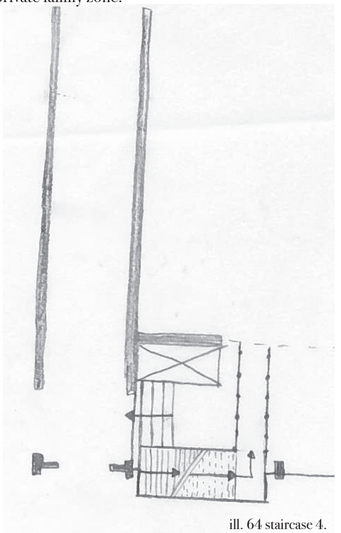
ill. 62 staircase case 2.

ill.63 shows the staircase now situated in the hallway in the private area of the building. to access the stairs you'll have to enter down into the private zone of the hallway and change direction to walk up the stairs. this case makes for a 100 % private accessibility, but there's a conflict when having guest of the family and they have to enter the private zone to access the living room on the 1st floor.



ill. 63 staircase case 3.

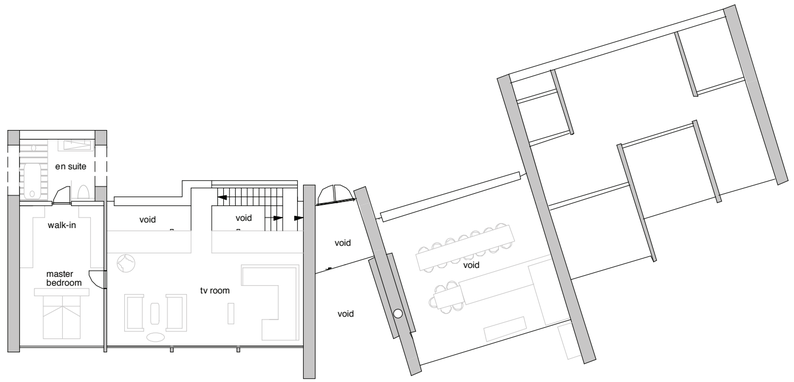
ill. 64 shows the staircase situated in the hallway in the private area of the building. without entering the private area of the hallway there's access directly to the 1st floor, which makes this option the preferable. the staircase is placed in the private area of the building since only the family or guests of the family needs to enter the 1st floor and at the same time without having to enter the private family zone.



ill. 64 staircase 4.

final floor plan - residence

ill. 65a-b are the final drawings of the residence. for the full site plan please go to presentation on page 104.

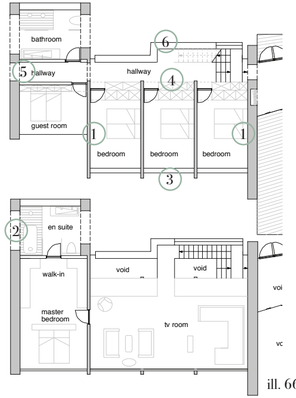


ill. 65a-b final floor plans the residence. 1:200

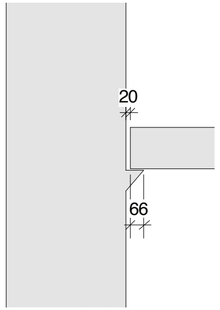
tectonic details

parallel with the design phase i have worked in details to understand the bigger perspective of how the design collaborates with the construction and the overall understanding of the building. all the details underline the tectonic expression within the building.

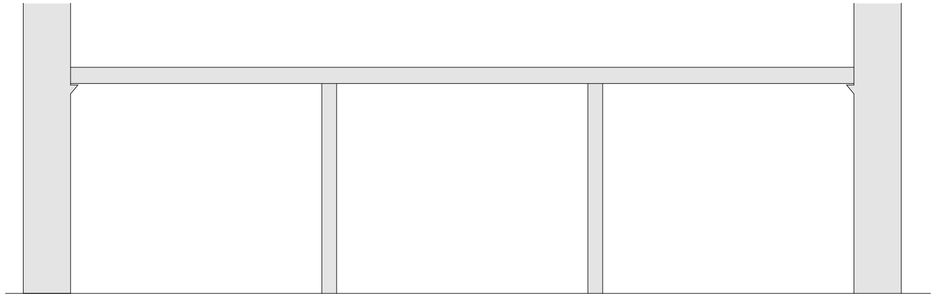
1 - 1st floor deck
first detail is a simple detail showing how the 1st floor deck is carried by the concrete walls and lies off on a simple concrete corbel from the two bigger concrete walls. the concrete corbels are poured and formed together with the concrete walls. the visual construction is shown in the interior and gives a quality of a pureness and honesty to the space.



ill. 66 floor plan guide.

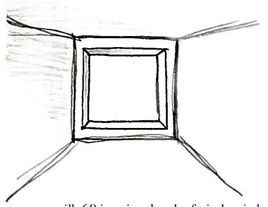


ill. 67 corbel detail 1:50

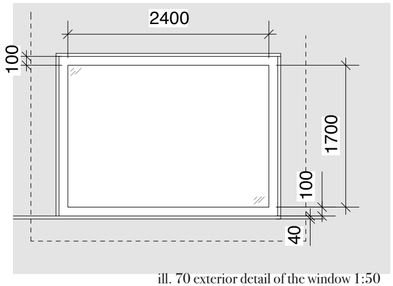


ill. 68 1st floor deck 1:50

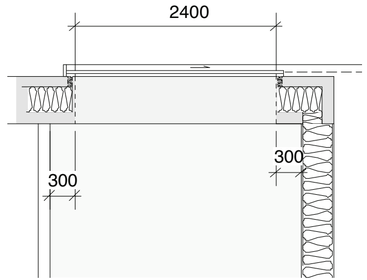
2 - window opening in the en suite
second detail is a detail of the window opening in the en suite on the first floor. it's one big window that slides to the side (see ill.70) the window frame is set outside the concrete wall. this means that the window opening becomes an integrated feature in the bathroom and the big sliding window allows the user to open the facade towards the private nature. by placing the window frame outside it expresses the shear wall concept. the window is attached to the wall instead of being integrated into the window opening in the wall.



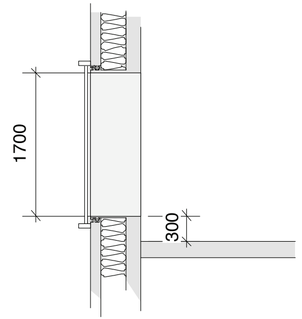
ill. 69 interior sketch of window in bathroom.



ill. 70 exterior detail of the window 1:50

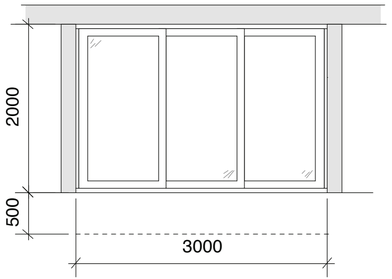


ill. 71 horizontal section detail of window opening 1:50

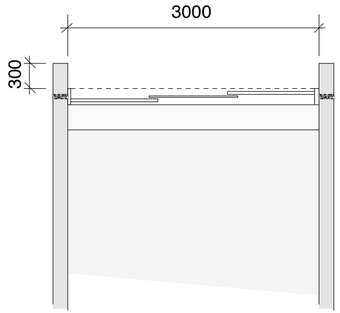


ill. 72 vertical section detail of window opening 1:50

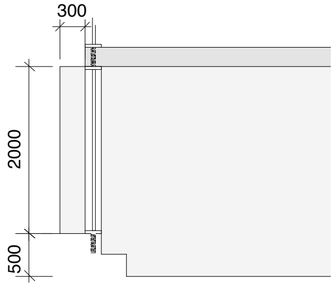
3 - wall and door detail from bedroom
third detail is from one of the bedrooms on ground floor level. the ‘exterior‘ wall becomes one big opening with sliding doors. the opening is pulled back 300 mm to accentuate the shear walls in the exterior and to graduate the privacy of the outside space. ill. 75 shows that the floor level is lower 500 mm below terrain. this lowering intensifies the focus on the outside nature when the horizon becomes closer to eye level. also the lowering gives the space a cave feeling, a feeling of privacy projected by the nature.



ill. 73 exterior detail of door 1:50

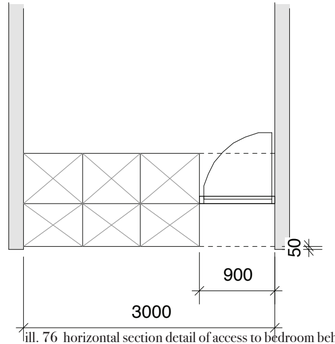


ill. 74 horizontal section detail of door and walls 1:50

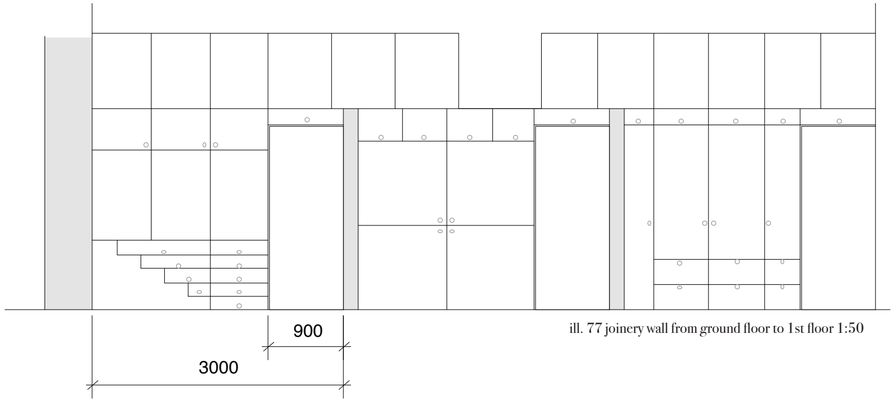


ill. 75 vertical section detail of bedroom. 1:50

4 - joinery wall between structure walls
fourth detail shows a joinery wall going from ground floor to first floor. the joinery wall becomes the wall between the hallway and the bedrooms. access to the bedroom is through the joinery wall. this narrow access emphasizes the attention to the nature and the view and strengthens the cave feeling and privacy of the space.
the structure shear walls are enxtended 50 mm beyond the joinery to express the construction and the deck is hidden behind the joinery to set focus on the shear wall structure throughout the house.

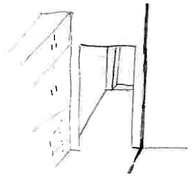


ill. 76 horizontal section detail of access to bedroom behind joinery wall 1:50

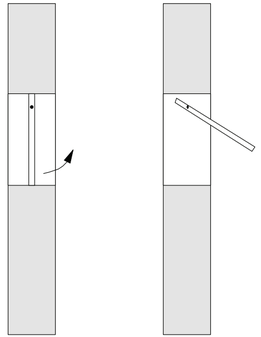


ill. 77 joinery wall from ground floor to 1st floor 1:50

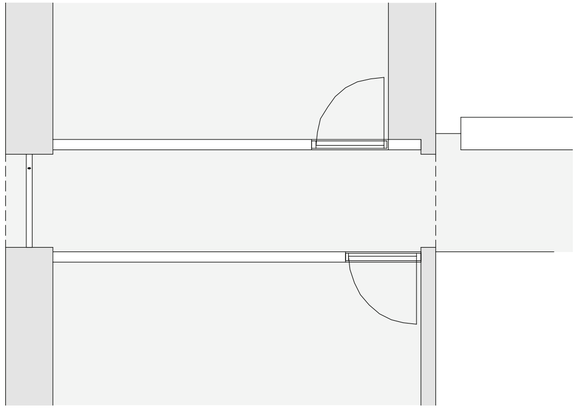
5 - end of hallway
fifth detail is from the end of the hallway. as the fourth detail the shear walls are extended 50 mm into the space. this encloses the end of the hallway from the rest of hallway and underlines once again the main structure of the house. (see ill. 78 and ill.80)
the door from the hallway to the outside is a heavy door placed in the middle of the door opening without a door frame. it is a freestanding pivot door. once open, it extends the hallway to the nature. opposet from the window detail 1 this door is placed inside the door opening, but as a freestanding element emphasizing the door opening.



ill. 78 sketch of end of hallway from joinery to enclosed space by extended shear walls

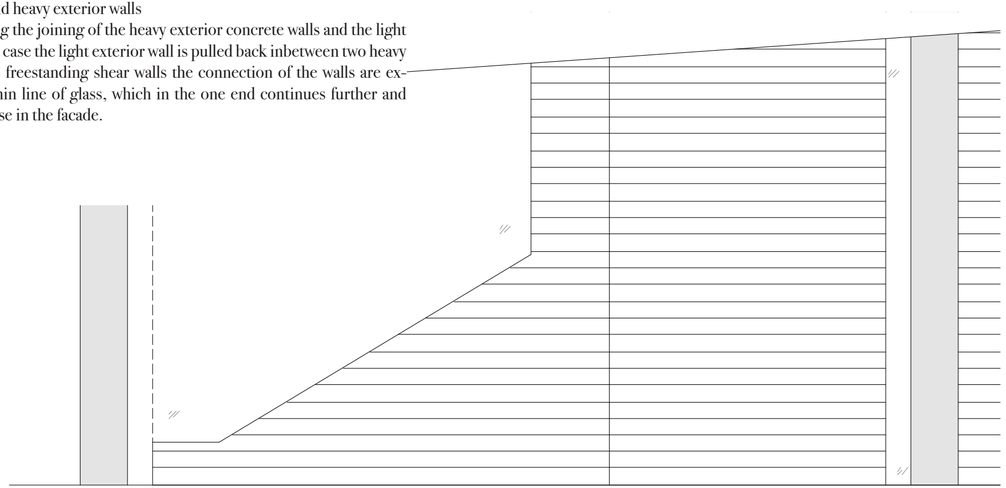


ill. 79 horizontal section through door 1:50

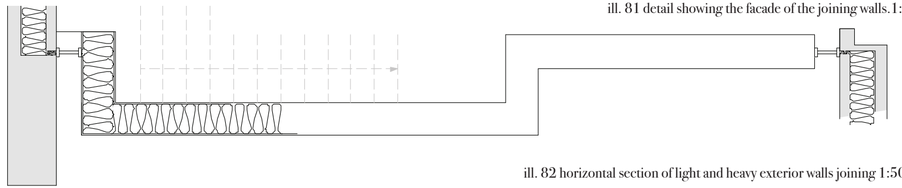


ill. 80 horizontal section of door opening and shear walls extension 1:50

6 - joining of light and heavy exterior walls
sixth detail is showing the joining of the heavy exterior concrete walls and the light exterior walls. in this case the light exterior wall is pulled back inbetween two heavy walls. to express the freestanding shear walls the connection of the walls are expressed through a thin line of glass, which in the one end continues further and expresses the staircase in the facade.



ill. 81 detail showing the facade of the joining walls. 1:50



ill. 82 horizontal section of light and heavy exterior walls joining 1:50

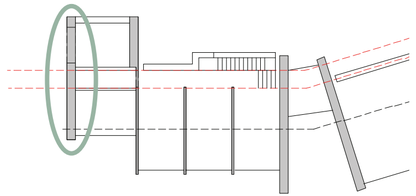
shear walls

the main construction concept of the residence is the shear wall elements. speculative it's interesting to know if the shear wall is still seen as a construction element when having big openings in the wall. an example of a critical element is the north west facade of the residence (see ill. 83), which has two openings into the bathrooms and a door opening (see ill. 85). earlier in the design process the following example was more interesting since the wall had more openings. (see ill.84)

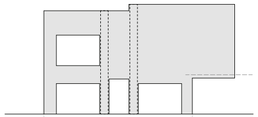
a shear wall resists in-plane loads opposite to a plate element, which resists cross loads. therefore a shear element is often stronger and is mostly used as the main construction in buildings.

through a quantitative research i'll show that the critical wall element can carry and bring the vertical forces to the foundation, despite the openings.

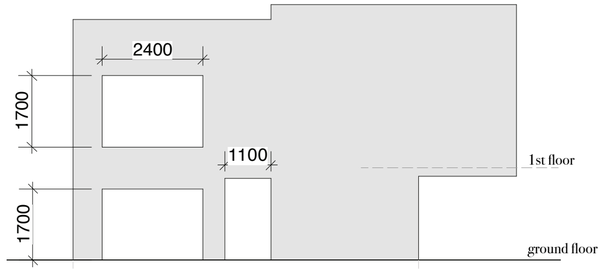
ill. 86 shows the vertical loads that seak to the area in the wall where it is led to the foundation.



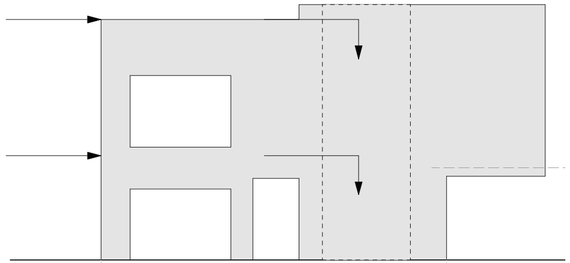
ill. 83 wind loads to foundation 1:100



ill. 84 example early stages of design process.



ill. 85 critical share wall 1:100

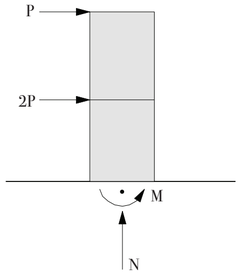


ill. 86 wind loads to foundation 1:100

illustration shows the loads P and 2P affecting the wall section.

the wall section is considered as a beam element in the wall.

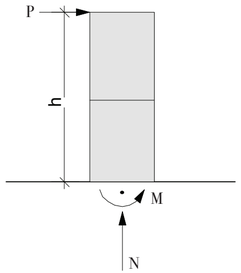
the loads P has to be led to the foundation.



we know that:

$\sum M = 0 = M - P \times h$

$\Rightarrow \quad M = P \times h$

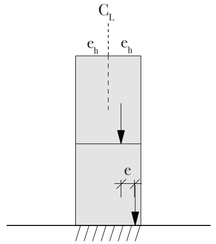


ill. 87-90 wind loads to foundation 1:100

illustration shows the loads being displaced from the center line down through the wall element. the shear is e.

we know that:

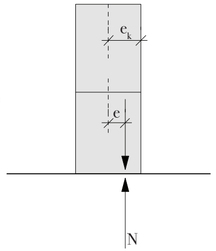
$e = M / N$



for the wall element to be stable it is required that

$e < e_k$

it means that the width of the wall elements need to be sufficiently high.



if $e > e_k$ then the width of the wall is not enough to carry the horizontal loads. alternative is to compromise on the design or to raise the weight of the wall element.
alternatively more complicated models as to how to transfer horisontal load to the foundation needs to be adapted, such as forinstance stronger models, where the entire wall with openings is being modeled.

the roof design - residence

with a quite heavy building construction the overall design-wish is to create a roof which express a simple and light roof element layed on top of the residence building. the roof should help simplify the full building and help the main construction relax in the landscape.

the two projects, invisible house by peter stutchbury and hald lake house by gehrdt bornebusch both in their own way precents a design with a light roof seen as an element characterizing the building in two different way. the roof in invisible house help align the building with the horizon and the hald lake house roof opens and closes the building towards the nature.
both examples deals with different building requirements than the 2020 energy fram we have in denmark at the moment and therefore it is a great task to achieve a roof this thin in this project.

relating to the concept of having the building split into two sections being the HOME section and the practical section, the roof should be changable and show this division in the main roof element both external and internal. the main idea internal is having exposed beams in the HOME section and a plain ceiling in the practical section to express the change. the idea external is a simple double lean-to roof also expressing the change (see sketch below).

the following pages takes you through the process of designing the roof so that it meets the requirements for the design of the roof, but also the requirements for the interior of the house.

please not that the following drawings are working drawings illustrating the process, they are not to scale and the measurements can be different from the final drawings.

ill. 91 invisible house

ill. 92 hald lake house

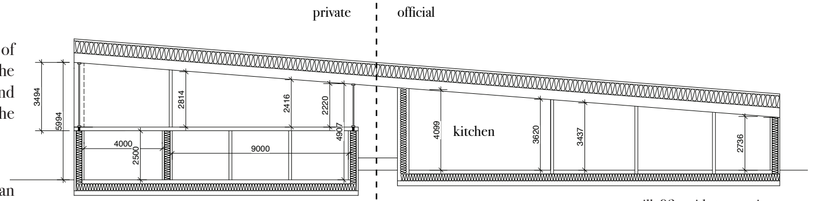
to achieve proportional ceiling heights in the spaces of the house i am working in the longitudinal section of the house, working with the sloping of the roof element and the minimum and maximum heights in the ends of the house.

this process has been done in many more stages than showed, trying different sloping degrees and possibilities to find the right solution where the ceiling height and the spacious feel meet the demands.

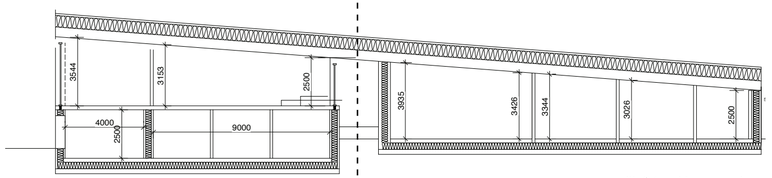
ill. 93
this was the first working section with a maximum height of 4000mm in the kitchen area. this is an extreme example where the ceiling height get to big in almost every room both in the private end - and the official end of the building.

ill. 94
in this section i lower the roof to a height in the right end of the building to 2500 mm and at the same time lower the ground floor 500 mm under terrain. this gives an even bigger ceiling height on the 1st floor but a better and lower ceiling height in the official rooms of the building.

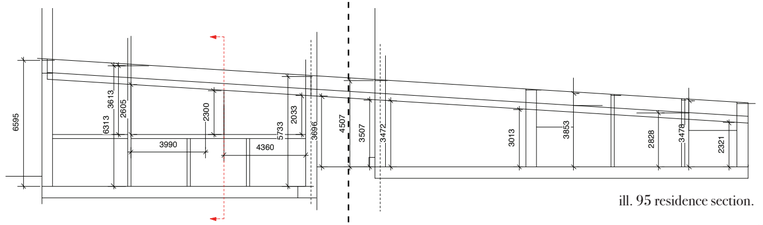
ill. 95
this is the final and best solution with the best conditions for both ceiling height and spacious feel.
the sloping of the roof has been changede to 4 degrees and with the lowered ground floor (500mm) in the private end this solution meets the ceiling height demands.



ill. 93 residence section.



ill. 94 residence section.



ill. 95 residence section.

roof construction - residence

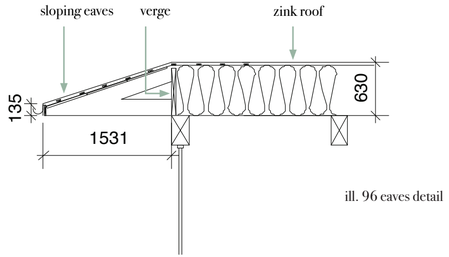
the next pages will discuss the process of the final detailing of the roof design and the roof construction.

to obtain the 2020 energy frame you'll need up to around 600 mm of insulation in the roof construction. this thickness including the construction means the thickness of the construction becomes quite a dominating element opposite to what first was the wish for the roof. and if that wasn't enough the beams also has to be visible, which means the insulation can't be "hidden" inbetween the beams.

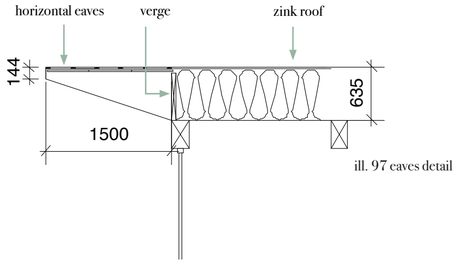
even though the thickness of the roof becomes quite thick i have worked on different constructions, mainly working with the eaves details and the sloping of the roof surface to make the roof look thinner.

ill. 96
the illustration shows a construction with closed eaves and exposed rafters with soffit boards between rafters. this construction hides the verge and the thickness of the insulation, but the eaves drop in the roof surface makes the roof look heavy and the roof surface is bending down over the building and does not look suspended above the building.

ill.97
the illustration showns a construction with open eaves and exposed rafters and soffit boards between rafters. opposite the above construction this construction shows the verge, but focus is on the very end of the roof surface, which in this case becomes very thin. the thin roof end makes the roof look very thin and light and the roof looks almost flying above the building.



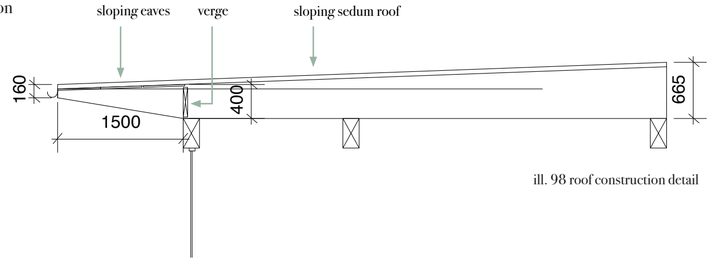
ill. 96 eaves detail



ill. 97 eaves detail

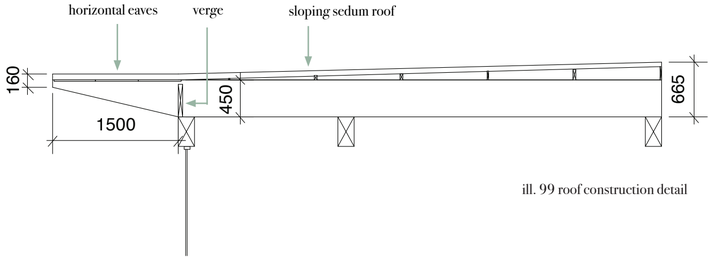
the open eaves construction is to prefer, but this construction has a flat roof. the wish is to have a lean-to roof so i try out for another similar construction

ill.98
this construction proceeds with the open eaves construction and instead of a flat roof this construction has a slightly sloping roof with only 2 degrees.
the sloping of the roof can be seen from outside, but inside the interior of the building the ceiling is still horizontal with visible beams.
to obtain the sloping roof and keep the thickness of the roof to the minimun at the ridge of the roof i have to lower the insulation thickness to around 400–450 mm at the verge.



ill. 98 roof construction detail

ill.99
this construction is similar to the construction above, only difference is the horizontal eaves. with a slightly sloping roof surface there's a risk of the roof looking heavy like the construction with closed eaves. therefore i make horizontal eaves, giving the roof element a lift, making the roof look even more light and flying above the building.



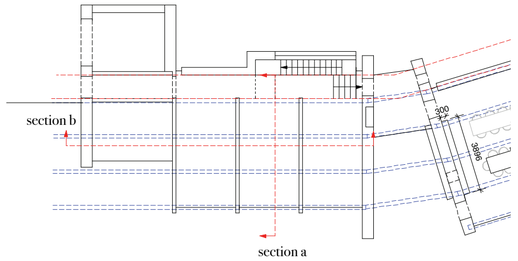
ill. 99 roof construction detail

roof construction - residence

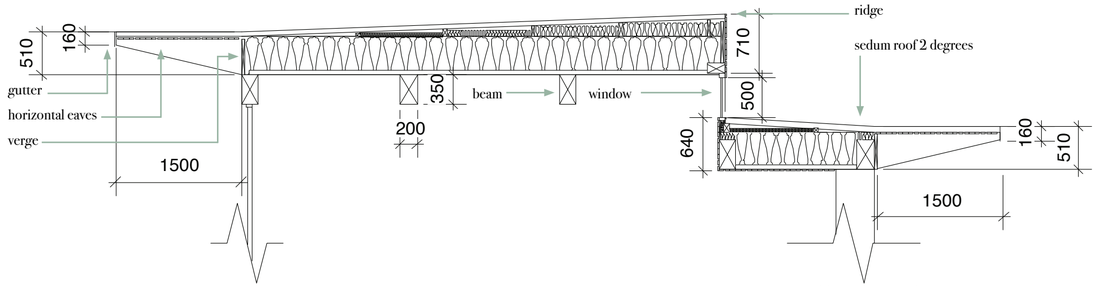
below you'll see the full construction section of the roof with a slooping roof surface and horizontal eaves.

the section has been place in a critical point where there's a conflict between the difference in ceiling height, from the practical side of the residence and the home side of the residence. the pratical side has visible beams, which characterize the side of the residence as a space to obtain stay with a view, in contrast to the practical side with a plain ceiling and a hidden constraction.

the critical point is placed where the access from the staircase to the 1st floor is. here there's a need for enough ceiling height under the low ceiling.



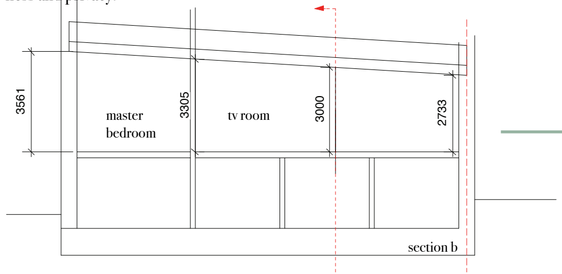
ill. 100 information floorplan - section a



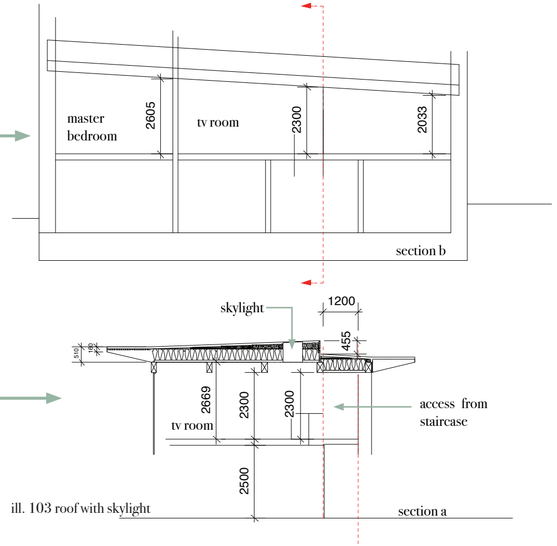
ill. 101 section a - roof construction with vertical window

ill.102
after finding the most appropriate roof design and construction i started looking at what this did to the inside ceiling height, when having a big height difference from the practical side to the home side. looking at the critical point mentioned on the previous page i need atleast 2200 mm clerance to access the 1st floor from the staircase (see section a) . the roof design with a vertical window results in big ceiling heights in the tv room and the master bedroom (see section b). too big heights for rooms classified as private space, and it does not give a feeling of calmness and privacy.

ill.103
to avoide the big ceiling heights i change the vertical window into a skylight, which gives a lower ceiling height that lives up to the classification of privacy i wish to obtain in the master bedroom and the tv lounge (see section b).
further more this design minimises the ridge height and changes the expression of the double lean-to roof to an thin and light roof element.



ill. 102 roof with vertical window



ill. 103 roof with skylight

the roof material - residence

green roof - sedum roof

the material choice for the roof has change through the different stages. many requirement has play a part in the dicision making. the three most important were:

integrate with the context.
integration of solar cells.
no maintanance.

the first material discussed was dark clay tiles because of the modest expression and easy integration of solar cell shingles , but clay tiles would demand a medium level of maintenace.

next step was a rheinzink roof with no level of maintenance and easy integration of solar cells, but the zink expression would stand out in the context, being a different color than the surrounding plantation.

last material chosen for the roof was a green sedum roof. a green roof would integrate the building perfectly into the context and demand a low level of maintenance, once a year like every other roof. the only disadvantage being no integration of solar cells. it would be a shame to put solar cells on the roof, first thing, plantation would get no sun and the cells would stand out and eliminate the expression of the roof in the context.

with the ralationship between the building and the context being one of my main design parameters the final roof will be the green sedum roof and the solar cells will be standing on the ground and not on the roof.

from veg tech there's and easy solution for sedum roofs. with the roof sloping 4 degrees and less the thickness of the sedum roof becomes only 55 mm and alows for a thin expressen in the roof ends.

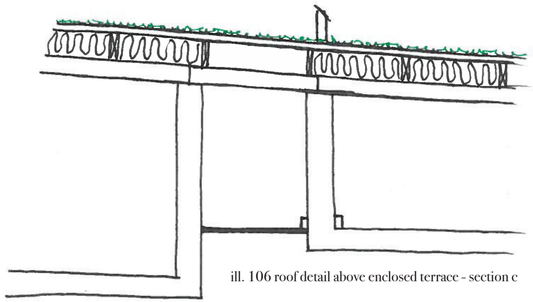
ill. 104 example of a green roof to integrate a building into the landscape.

ill. 105 example of sedum roof with integrated skylight windows.

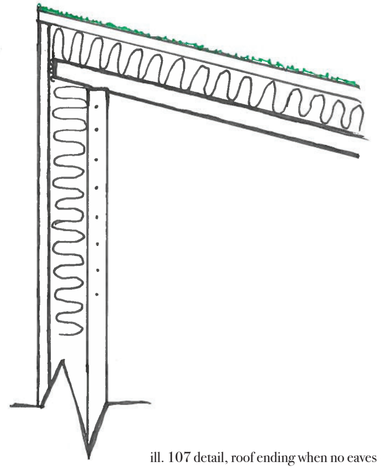
other roof details - residence

ill. 106 shows the terrace under the roof. above the terrace the full construction is visible to the user, which means no ceiling or insulation as part of the construction.

ill.107 shows the end of the roof where there's no eaves. the exterior part of the concrete wall extends alle the way to the green roof while the beam lies off on the interior part of the concrete wall, the support wall.



ill. 106 roof detail above enclosed terrace - section c

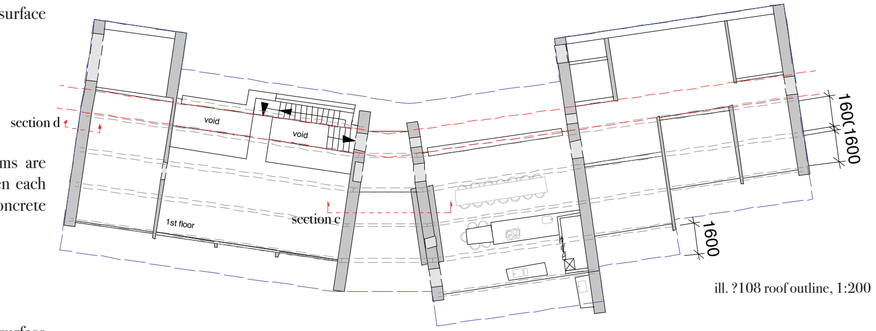


ill. 107 detail, roof ending when no caves - section d

the roof - residence

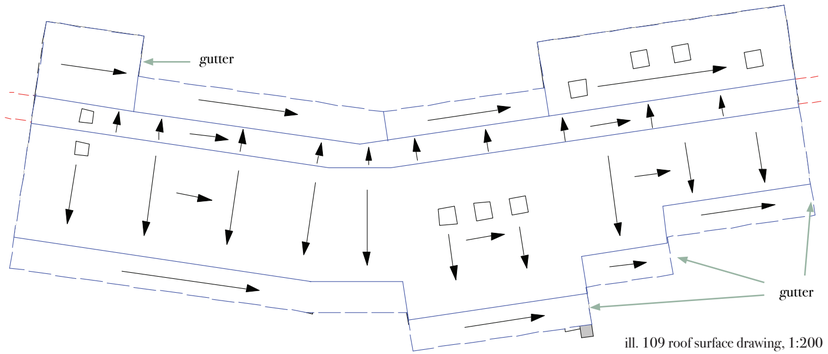
ill. 108 and 109 shows the final roof surface design.

ill.108
in this illustration the main roof beams are shown with 1600 mm distance between each beam. the beams are supported by the concrete walls.



ill. ?108 roof outline, 1:200

ill.109
this drawing is showing how the roof' surface is sloping. the main roof is sloping towards the south west and north east facade while the entire roof surface is slooping towards south east.

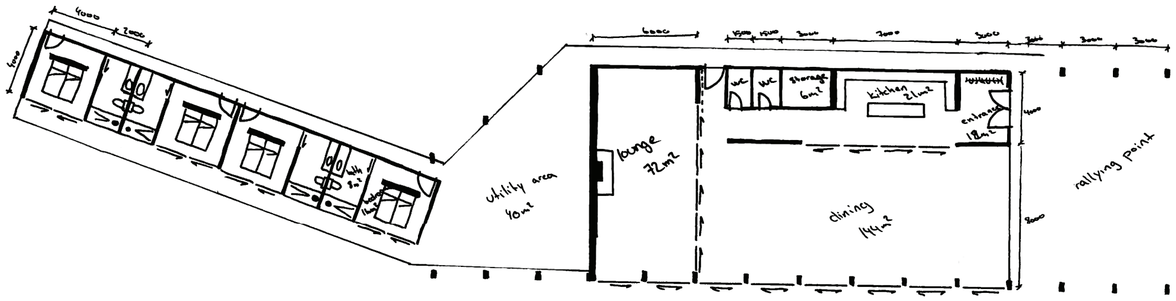


ill. 109 roof surface drawing, 1:200

designing the hunting retreat

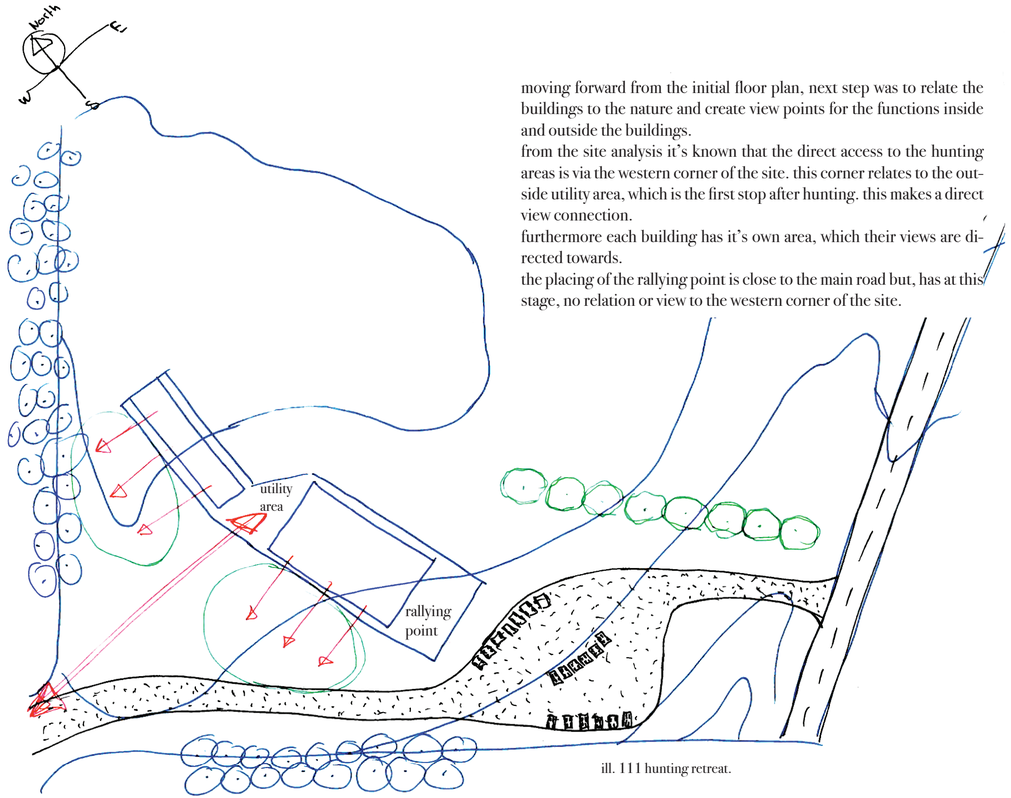
the following chapter is showing the design phase of the hunting retreat. the progress is shown via different working methods relating to the actual method used and the stage of the progress.

the sketch below is the initialy floor plan of the hunting retreat. two buildings seperating the official functions and the private functions of the hunting retreat. the two buildings reflects the activities of the hunting retreat, sleeping and official activities. the two buildings create an outside space for the utility area. also there's a rallying point for the beginning and endings of the hunting activity. the initial floor plan led to further considerations regarding the placing of the rallying point, the m² within the building and how to approach the landscape outside and use the view as a design parameter.



ill. 110 initial floor plan sketch

moving forward from the initial floor plan, next step was to relate the buildings to the nature and create view points for the functions inside and outside the buildings.
from the site analysis it's known that the direct access to the hunting areas is via the western corner of the site. this corner relates to the outside utility area, which is the first stop after hunting. this makes a direct view connection.
furthermore each building has it's own area, which their views are directed towards.
the placing of the rallying point is close to the main road but, has at this stage, no relation or view to the western corner of the site.

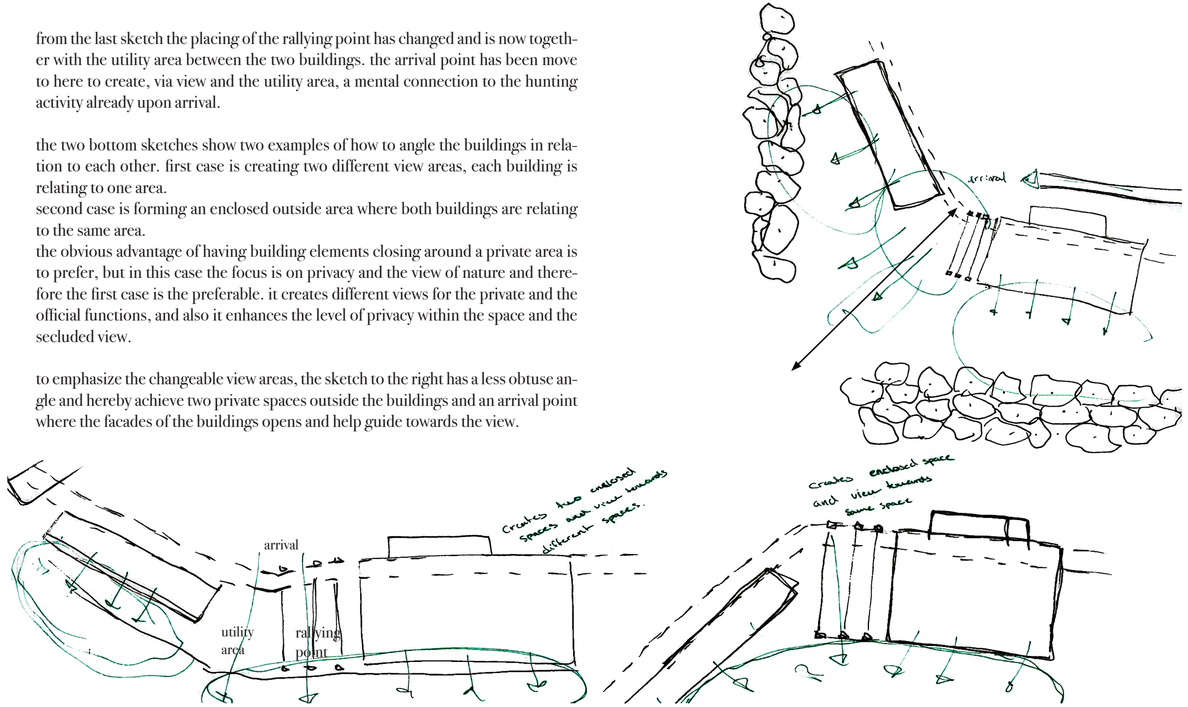


ill. 111 hunting retreat.

from the last sketch the placing of the rallying point has changed and is now together with the utility area between the two buildings. the arrival point has been move to here to create, via view and the utility area, a mental connection to the hunting activity already upon arrival.

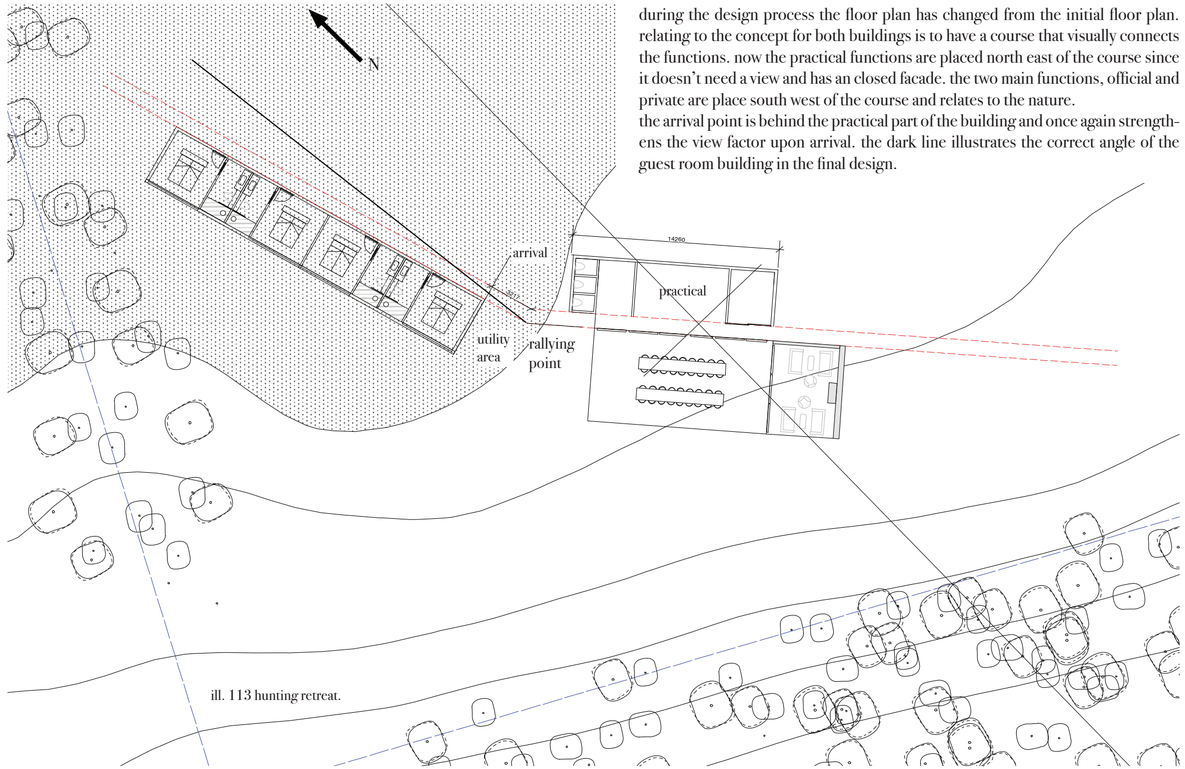
the two bottom sketches show two examples of how to angle the buildings in relation to each other. first case is creating two different view areas, each building is relating to one area.
second case is forming an enclosed outside area where both buildings are relating to the same area.
the obvious advantage of having building elements closing around a private area is to prefer, but in this case the focus is on privacy and the view of nature and therefore the first case is the preferable. it creates different views for the private and the official functions, and also it enhances the level of privacy within the space and the secluded view.

to emphasize the changeable view areas, the sketch to the right has a less obtuse angle and hereby achieve two private spaces outside the buildings and an arrival point where the facades of the buildings opens and help guide towards the view.



ill. 112 hunting retreat.

during the design process the floor plan has changed from the initial floor plan. relating to the concept for both buildings is to have a course that visually connects the functions. now the practical functions are placed north east of the course since it doesn't need a view and has an closed facade. the two main functions, official and private are place south west of the course and relates to the nature.
the arrival point is behind the practical part of the building and once again strengthens the view factor upon arrival. the dark line illustrates the correct angle of the guest room building in the final design.



ill. 113 hunting retreat.

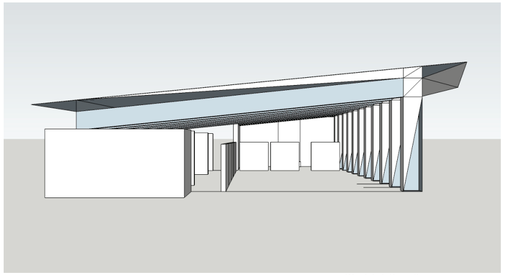
designing the frame structure.

while designing the building there's been a parallel process designing the frame structure. the following pages are going through some of the studies leading to the final design.

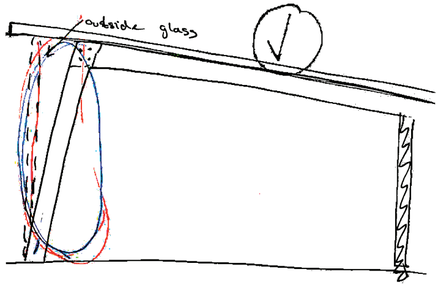
first step wast to find the design of the frame.

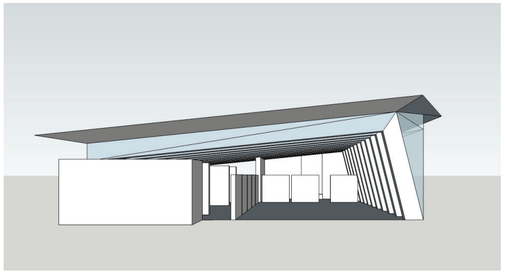
ill. 114 first structure is a simple structure with a vertical column supporting the beam. with this structure the glass facade has to be placed inside or outside the column. at first this structure seems rather simple and doesn't give any special quality to the space.

ill. 115 second structure has a column that is leaning into the room. at first this seems like the structure is pulling away from the nature outside, but after further analysis the structure protects the space from the outside and by placing the glass between the columns and the outside the inside space extends out toward the nature through the colonnade.
this second structure is the structure chosen as the final frame structure.



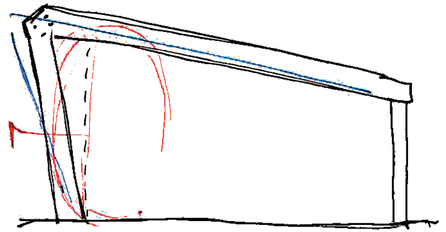
ill. 114 first frame structure.

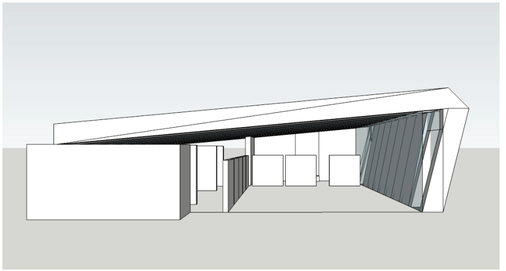




ill. 115 second frame structure.

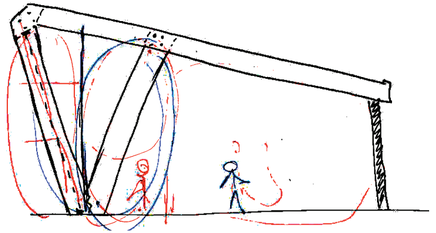
ill. 116 third structure has a column leaning out towards the outside and thereby the structure is approaching the nature and guiding the view. the column leaning outside strikes as unstable and when placing the glass inside the structure it is almost bloking the view, where as if placing the glass outside the structure it creates small spaces, which are hard to utilized in a space used for dining.

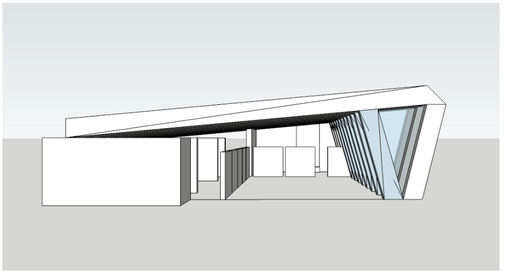




ill. 116 third frame structure.

ill. 117 fourth structure is a very steady structure, but becomes to heavy for the overall building purpose.

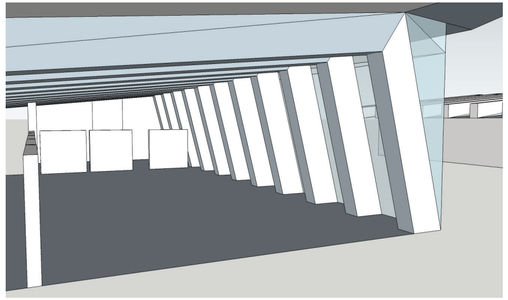




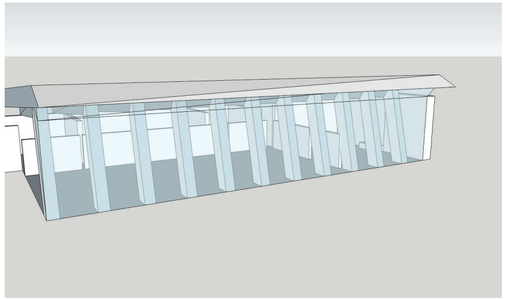
ill. 117 fourth frame structure.

moving on with the second structure the next step was to get the right amount of frames to fit the wanted expression.
the important design parameters are creating frames for the view and an aesthetic beautiful and simple structure that accentuate the the view.

ill. 118 and 119 shows a colonnade with 1500 mm between each column. looking at the facade from an angle within the space it's hard to actually get a view outside, because the columns are blocking the view (see ill. 118). and looking at the facade from the outside (see ill. 119), the facade looks rather closed.
also the amout of columns seems exaggerated compared to the space area and only a roof to be carried. the dimensions of the beams and the columbs would be rather small and unnoticed. this would make the structure insignificant. more over the dimensions of the structure could be oversized to fit the right expression wanted, but that would be a waste of material and make a dishonest structure.



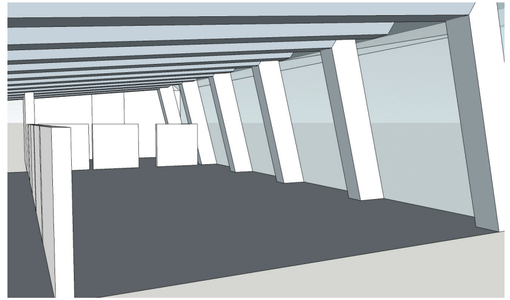
ill. 118 second frame structure, interior.



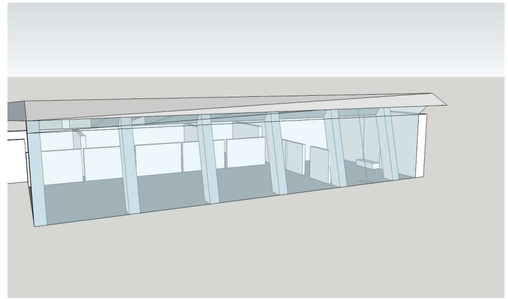
ill. 119 second frame structure, facade.

on ill. 120 and 121 the columns has been moved to now having 3000 mm distance between each other.
opposite the before study this case now has an open facade with columns allowing for a view from almost any angle in the room. besides that the structure seems right to carry only a roof construction and only six frame structure carrying the roof could give som significate dimensions of the beam and column.

the next step is calculating the dimension of the beam. for the beam there's some preferable dimensions, which the calculations will aim to achieve.
an interesting dimensioning of the cross section of the beam would be 250 x 400 mm. this dimensioning will express the beam just enough to make it significant in the space, and still it won't look too heavy with the risk of overshadowing the importance of the view.
in relation to the calculations it's impontant to notice, that the roof construction calculated on is a simple construction, with insulation between the rafters on top of the visible main structure. on top of the rafters there's a rhein zink roof. this is only for the calculation, the final roof material is a green roof, but has to be neglected in the following calculation.



ill. 120 final frame structure, interior.



ill. 121 final frame structure, facade.

dimensioning the frame construction

when knowing the construction of the roof, it is possible to start working on the dimensions of the frame construction.
it is important to consider the cross section of the beam and the column to achieve the right expression of the room.

in this case where the frame element is visible in the room, the element should accentuate the view rather than screen the view.
at the same time it's important to get the right dimensions on the element so that the element is visible and by it's shape being able to guide towards the view.

previous design studies came to a distance dimension between columns to be 3000 mm.

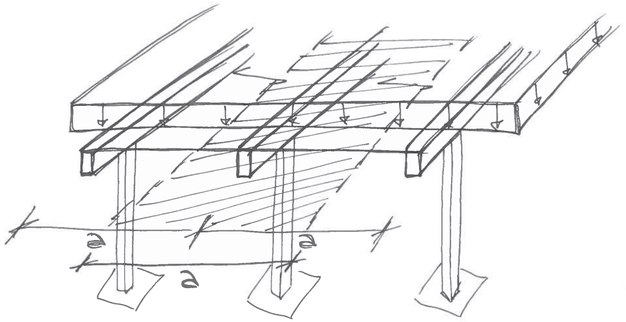
with this dimension a (see ill. 122) it's possible to find the the total load on the one beam within the distance 3000 mm.

for full calculations please go to appendix.

when calculation on the loads on the roof the ultimate limit state for the load combination becomes:

p = 3 meter × (2,807155 kN/m²) => p = 8,421465 kN/m

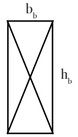
this means that when calculating on the dimensions of the beam, the beam has to be able to last the load of 8,42 kN per meter.



ill. 122 construction drawing.

to simplify, the calculations have been done for a horizontal beam.
worst case is a beam with no overhang roof, meaning supported by the end of the beam.
for a beam like this the maximum torque is $M = 1/8 \times p \times L^2$

to find the the dimensions of the beam i use the ultimate limit state formula to isolate h_b which is the height of the beam.



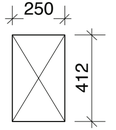
$$h_b > \sqrt{\frac{6\,M_{(maks)}}{f_{md}\,b_b}}$$

$$h_b > \sqrt{\frac{6\,(1/8\ p\ L^2)}{27{,}1\ \text{MPa}\ b_b}} = \text{min. dimension af } h_b$$

to obtain an acceptable width of the beam i set b_b to be 250 mm.

$$h_b > \sqrt{\frac{6\,(1/8 \times 8{,}42\ \text{kN/m} \times (13475\text{mm})^2)}{27{,}1\ \text{MPa} \times 250\ \text{mm}}} = \sqrt{169247}$$

$h_b > 411{,}4\text{mm}$



this calculation shows that a beam 250 mm wide needs to be a minimum of 411,4 mm high to take the load calculated in the load combination.

this calculation is done for laminated wood as the material of the frame construction. laminated wood has more strength than construction timber, this means that i can achieve a thinner cross section of my beam.

also the construction timber is more expensive than laminated wood and the expression of construction timber will seem more heavy and dominant that laminated timber. if to do the same dimensioning for construction timber the height would become 433,6 mm for the strongest and most expensive construction timber.

final floor plan - hunting retreat

ill. 123 is the final drawing of the hunting retreat. for the full site plan please go to presentation on page 104.

ill. 123 final floor plans of the hunting retreat. not to scale.

energy analysis - be10

to check the energy use of the building there's been worked out an energy analysis in the programme be10 to check if the main building of the hunting retreat acheives the 2020 energy frame. also the programme can help verify the design and strategies.

the energy frame for 2020 is 25 kWh /m² per year. the hunting retreat building has a total energy requirement at 22 kWh /m² year and therefore meets the 2020 energy frame requirement.
the excessive in rooms is 0,0 which means there's no overheating in the rooms. unfortunately be10 only shows results for the whole building and does not specific analysis the enclosed spaces, but be10 gives a good indication of wether the building design is optimal in relation to the energy demands.

there's a few small differences in the energy analysis being different from the last changes but they doesn't have an influence on the final result. one of them being that the material on the roof in the energy analysis is calculated for clay singlets, but the rest of the construction is exact. also the energy analysis is showing 100 m² solar panels, these are to be neglected since they have no effect on the total energy requirement.

the energy analysis calculates with only natural ventilation. heating is from a heating pump and a wood stove in the lounge area and there's 40 m² of solar cell.

the windows are all places outside the frame, which gives no shadows on the glass at any time. to control overheating from the big western glass facade, this facade is calculated to be in solar control glass. this gives an outside reflection of the landscape and protects the stuffed trophys inside, without reducing the value of the internal space.

full numbers and information from be10 can be found in the appendix on the enclosed disc.

key number kWh/m² year

energy frame br 2010	total energy frame
	80,8
	22,4
energy frame low energy buildings 2015	total energy frame
	46,7
	22,4
energy frame buildings 2020	total energy frame
	25,0
total energy requirement	**22,0**

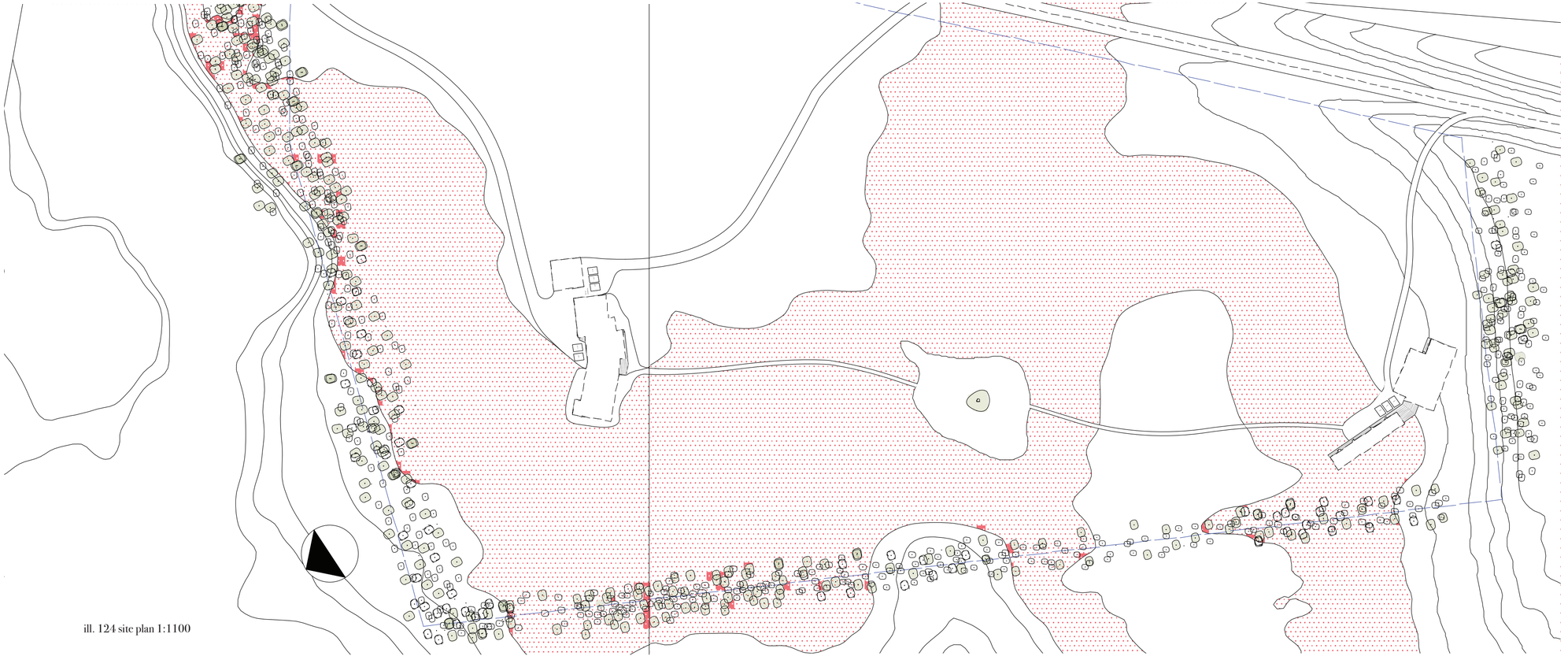
contribution to energy requirements	
heat	21,0
el. for operation of building	0,5
excessive in rooms	0,0

presentation

the presentation is a model based presentaion showing, exterior and interior through model photos. also it presents the final site - and floor plans. for more detailed final drawings please see drawings folder.

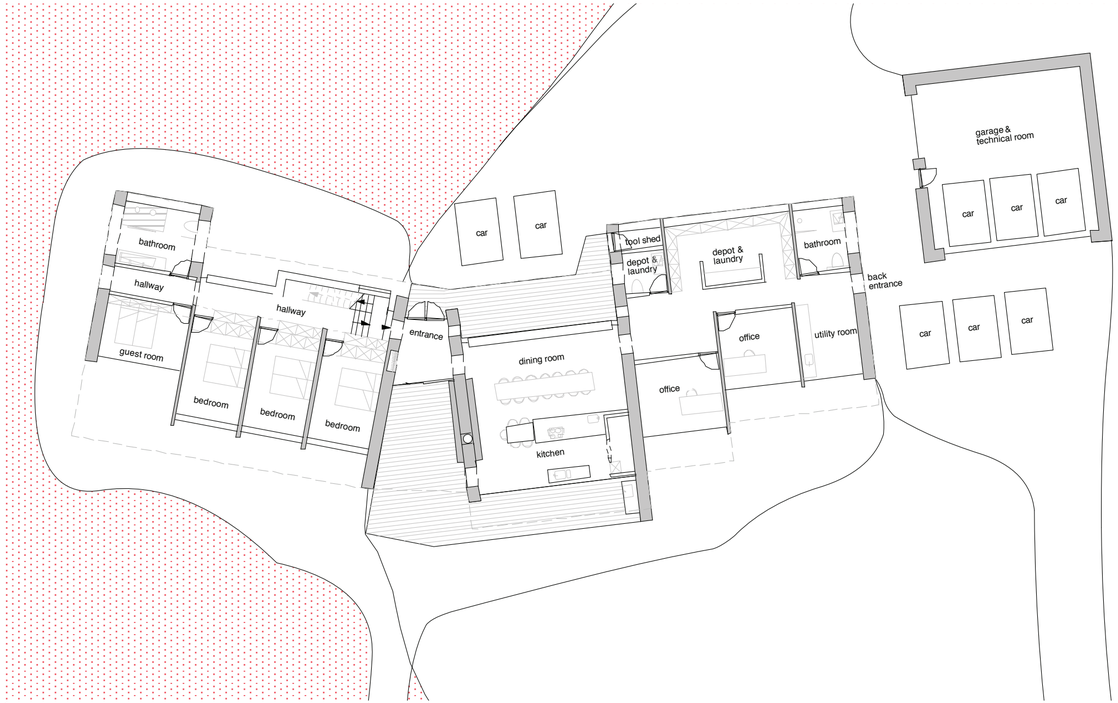
ill. 124 is the final site plan showing the siting of the buildings on the site.
there's a walking path from the residence to the hunting retreat leading through a field of flowers and giving a changeable experience.
it's possible to access the residence from brønderslev, which is the private access road and then it's also possible to access from south west, from the farm, which is where the employees arrives from and it has a seperate parking space in front of the garage.
there's grass all the way around the building creating a small distance to the flower field.

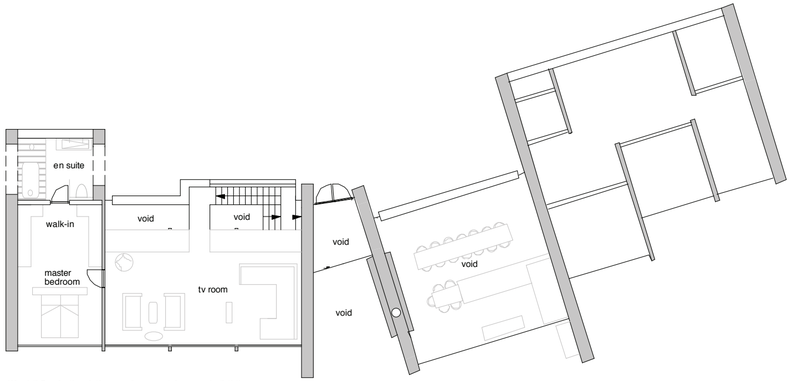
the same goes for the hunting retreat. it has one access road, which is from the south west in the direction of the hunting areas.



ill. 124 site plan 1:1100

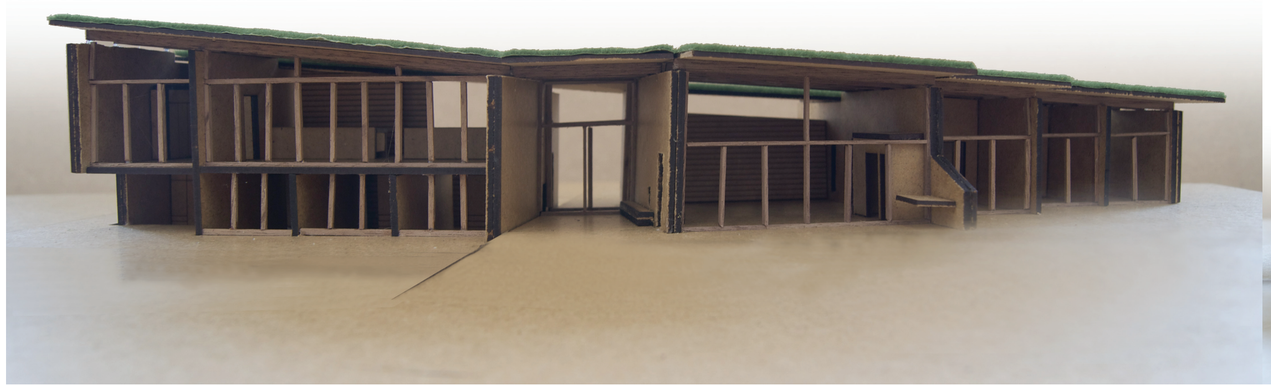
residence



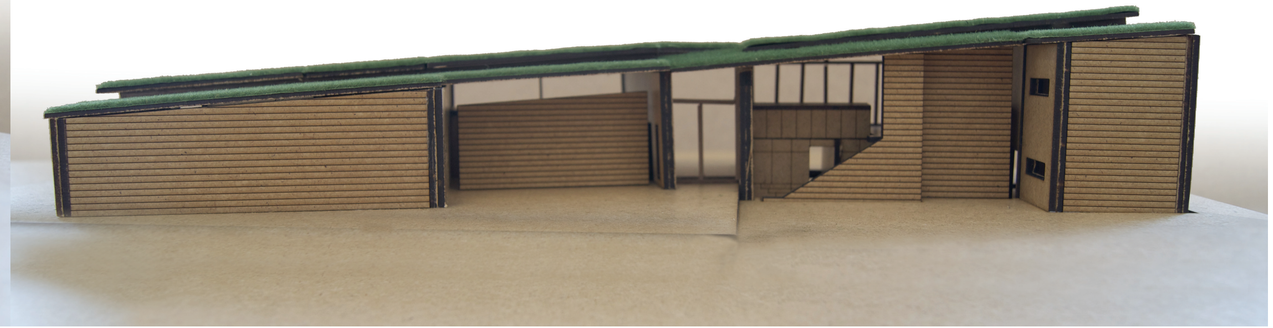


ill. 125a-b final floor plan residence 1:200

residence



ill. 126 south west facade of the residence.



ill. 127 north east facade of the residence.

residence

ill. 128 south east facade of the residence.

ill. 129 north west facade of the residence.

ill. 130 south west facade of the garage.

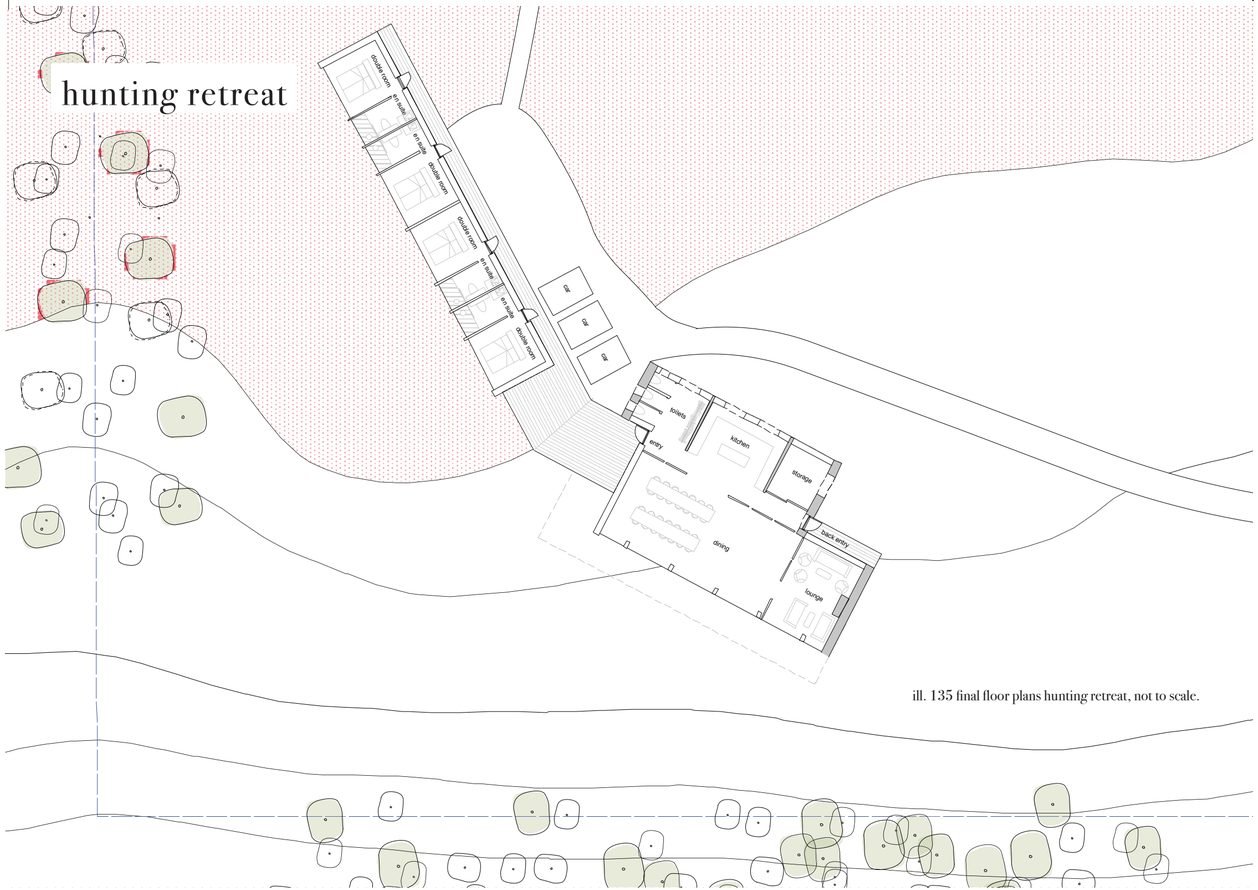
ill. 131 north west facade of the garage.

ill. 132 presents the south west facade of the residence focusing on the exterior outside the kitchen. the nature is extended all the way to the terrace paving. the outermost roof beam is visible in the facade and the rafters from the roof construction is visible under the eaves.

ill. 133 presents the interior of the kitchen with a view towards the south west nature. the roof beams are visible and supported by the concrete walls. there's an built-in pantry and a big kitchen bench extended to a small dining table in front of the fireplace.

ill. 134 presents the interior of the first bedroom. the bedroom has a view towards south west and is lowered below the terrain, with two steps down to floor level. all interior is in concrete, also the corbel carrying the deck above.

ill. 135 presents the interior of the first bedroom. the interior is seen from the outside, with the nature extending all the way to the sliding doors. in the back of the bedroom the closet is visible with the access giving door to the bedroom, through the joinery wall.



ill. 135 final floor plans hunting retreat, not to scale.

hunting retreat

ill. 136 south west facade of the hunting retreat.

ill. 137 south east facade of the hunting retreat.

ill. 138 north east facade of the hunting retreat.

ill. 139 presents the main building of the hunting retreat. the building and it's interior is seen from outside. it shows the open south west facade with the roof overhang and the nature extended all the way to the facade. the frame construction is visible through the glass facade and in the background the flexible walls devide the dining room with the hallway.

ill. 140 presents the interior of the main building of the hunting retreat. the big dining room extends to the lounge room only devided by the flexible walls. the frame construction allows for a great view through the south west facade.

conclusion

presented in the report is a realistic design project developed for a specific family in brønderslev. the final master project in brønderslev presents a development of both public and private architecture. a project designed for one specific family, but it also presents a design, which can be utilized for many purposes.

the vision was to develop a simple design for a modern family with big needs. through an understanding of the basic needs of the family, i have purposed two buildings that separates the public and the private in an understandable concept. a concept that deals with floor plan understanding and construction elements providing a simple framework for family values and working environment.
the floor plan separates the functions into private and public spaces and that separately deals with internally ranking of the functions into the practical spaces with short stay not demanding a view and the functions for home and work with long stay demanding a view. this separation is visual in both the exterior and the interior.
the construction elements underlines this division of public and private in the buildings and gives a simple a very understandable overview of the floorplan.

the buildings privacy classification is also set up to direct the building towards the nature. by opening the facades where necessary the building accepts the nature and the view orientations directs the building elements towards an appreciation and presence.

there's been put a lot of thought into the details to give the building a level of detailing, combined with materials that emphasises the value of spaces. throughout the project i have drawn inspiration from detailing and designing in nordic - and australian architecture. design wise the ideas and visions are very similar, but the possibilities are very different. with a different climate, a different energy frame and different building regulations it's most difficult to obtain the same design visions, as in australia, in denmark and the other way around. what i personally wanted to experience in this project was how much i could push the design and what these choices would mean in relation to the danish standards, with this being a realistic project. the proposed buildings are in many ways very different from the typical buildings being build in denmark and to obtain the right level of detail, these buildings could become quite expensive to build.

despite the construction price my main focus has been on the tectonic design and to be aware on the compromises necessary in relation to make this a realistic project. the final proposal achieves a design that emphasizes the design value on architecture and it works towards a successful example of architectural quality and individuality and it creates a coherence between, design, structure, material and site.

reflection

when finishing a project there's always lot of thoughts left behind. in the following chapter i will reflect upon some of these considerations and discuss pros and cons of the process and the final design.

it is hard to decide when you have achieved the best possible solution for a design, you never seem to be able to say this is the best and final design, but at some point through the process, you'll have to stop and proceed with the presentation of design.
during the presentation phase the design kept changing and new ideas comes to mind, it's like that in every project and that will never change when working towards a variable result.
one of the major thoughts in this project is about the structure, what could i have achieved if using the first frame construction in the very first steps of the process. did my project miss out on something unique by going with the share wall structure. questions like this can only be answered by doing the process all over again, but what's important to remember is that you want to achieve so much and sometime some decisions and requirements take you in one direction, which you'll have to accept. it is okay to think what if, it means the process hasn't stopped and maybe these thoughts can benefit in another design process.

the way we work with architecture at architecture and design at aalborg university is in many ways very strict and it is expected to have a programme that puts together a vision and evolves into a concept. this gives a smooth and easy to understand design process. this very strict process i find to limit the experiential part of the design process, both in the sketching phase, but also the synthesis phase. i personally wanted to experience more in the design, but in many ways i feel that my design is being controlled by restrictions from building regulations, energy frames and also by myself in the design process. on one hand you can say that this helps my project delimits from any design strays, but also i think it limits the potential of design.
during the process i have made decisions that work 'against' e.g. the energy frame by deciding on a specific construction detail, that defines the design and combines the building, but is working to my disadvantage when trying to achieve the 2020 energy frame. one can argue if it is okay to do so, but i personally believe that this is to be acceptable and has defined my project to examine critical design choices. in a project like this it illustrates the circumstances when designing in a country link denmark vs. australia. the facts are interesting to discuss through the design; whether you prefer one way or the other is a personal stance.

to achieve an energy analysis for the design i did a be10 analysis on the main building for the hunting retreat. as explained earlier in the report the hunting retreat building meets the requirements for the 2020 energy frame. without any design compromises this building meets the requirements in be10, but the results and the specific requirements for the spaces has not been inspected in bsim. the hunting retreat building is a very simple building and with only a few simple initiatives the building passed the test. it would be quite different if i had done it for the residence building. i am sure it would be possible to achieve the 2020 energy frame, but with changes that might interfere with the overall design. it's a difficult subject to discuss because it mixes our architectural beliefs with the bigger topics of sustainability.
i personally do not like the fact that our buildings are becoming small robots telling us when to feel cold and when to feel warm. looking specific at ventilation we can without any discussion conclude that energy wise this mechanical ventilation is the optimal choice, at least for office building or similar, but i am not convinced that it is worth putting into our homes. i have chosen to use only natural ventilation in the project well aware that this means more heating during winter. the natural ventilation underlines my choice of the simple living and being aware of the nature. it is a much bigger discussion and i am not sure we will ever find the right answer, but what i want to illustrate with the project is that we always have a choice, if natural ventilation is an important factor then there's other ways to achieve the energy frame; as long as you are aware of the process of integrating the strategies into the design.

when dealing with a real client it was important to understand their wishes and demands for a future home. i used a lot of time understanding exactly what quality of living they wanted since some of their requirements and inspiration confused me with their family life. i feel that in every design it is the architect's job to guide and inspire the client to open up for new possibilities they've never thought of.
from the beginning the clients were very clear on their functions and had their mind set on a specific square meter number. in my opinion this number was out of proportions so one of the things, among others, i took as a challenge was to show this design possible, but with less square meters than the clients first expected. creating spaces with opportunities rather than spaces with enough floor area is a challenge in itself, but making people believe your ideas is an even bigger challenge. is it okay to skip the client's expectations and what can the outcome be. through this project i am guiding the clients and showing the optimal solution in my opinion; i think that is the finest job as an architect.

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a beautiful building should also make a beautiful ruin som day.
- louis kahn