# BUILDING IN 1:1 SCALE
# LEIKEGØTA
## A MEETING PLACE IN VANG

AAR4623 TOPOLOGY, TYPOLOGY AND TECTONICS
NTNU FACULTY OF ARCHITECTURE AND FINE ART

NTNU
Norwegian University of
Science and Technology

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# INTRODUCTION

This book presents the process and result of designing and constructing the 'Leikegøta' project, situated in Vang in the Valdres region. The designers and craftsmen for the job were 19 architecture students from the NTNU University in Trondheim. The constructing process took place within two weeks in April 2016.

Valdres is a region in the eastern part of Norway, extending northbound towards the west coast over the mountains. The settlement in Valdres emerged based on agriculture, hunting and forestry, and is famous for its strong traditions within music, artisan craft and building culture.

Vang is the westernmost of six municipalities in Valdres and has around 1600 inhabitants. It is located halfway between Bergen and Oslo, where the typical eastern agricultural landscape and inland climate merges with the dramatic mountain scenery of western Norway. Throughout history, the ties have been stronger to the west.

## THE COURSE

Designing and constructing 'Leikegøta' is a part of the spring semester course, AAR4623 – Topology, Typology and Tectonics. It is initiated and taught by the Department of Architectural Design, History and Technology at the Faculty of Architectural Design and Fine Art at NTNU. The main subject for the 2016 course was to develop a strategy and design for a newly established housing area in a part of Vang called Hensåsen. The 'Leikegøta' project is built on the contemplated playground for this housing area. It is intended as a meeting place and a common ground for people from all ages in the surrounding area.

The course aims to develop a tectonic and a site-specific approach to architecture. It is about a basic understanding of architecture and about the global environmental and social challenges of our time. The intention is to strengthen the professional skills of the architects, in order to respond to the needs of society today. The American poet Ezra Pound (1885 – 1972) wrote: "Music degenerates if it moves too far away from dance, and poetry shrivels if it becomes too remote from music and song." In the same way, architecture has its own origin, and if it moves too far away from it, it loses its effectiveness. The renewal of an art means rediscovering its deepest essence.

The course investigates the meaning of using local resources in architecture. The question might seem controversial in a time when architecture and construction technology seem to be concerned with the use of materials from all over the globe. In Norway, bricks are import from Belgium, wood from Lithuania and Siberia, natural stones from China, glass from France etc. It seems like the main part of industrialized building industry today is interested to operate in a global context , risking to overlook


VANG
VALDRES
E-16
BEGNA BRUK AS
NORSK MASSIVTRE AS
BERGEN
OSLO

values in the near surroundings. The course will discuss how global and local understanding can enrich one other in a dualistic relationship. The meaning of "the local in the global and the global in the local."

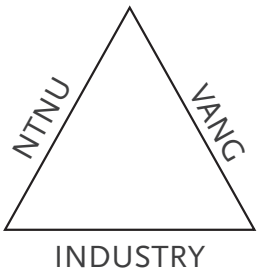
## RESEARCH

The involvement of NTNU in the Hensåsen housing area development, is strongly integrated in the 3 – year FoU research program TRE I VALDRES 2018 – sustainability as a function of the development of regional social conditions and local wooden based enterprises.

The overall research questions to be investigated is:

1: The impact of constructing in a local society when it comes to value a traditional building culture in a industrialized production of today.
2: The impact of constructing when it comes to value local raw materials, local competence in handcraft and industrial construction.
3: The dilemma between applying existing materials and the possibility to invent new products.
4: The impact on local economic, social and cultural life when construction of houses and the architecture is based on local materials and competence.

## PARTNERS



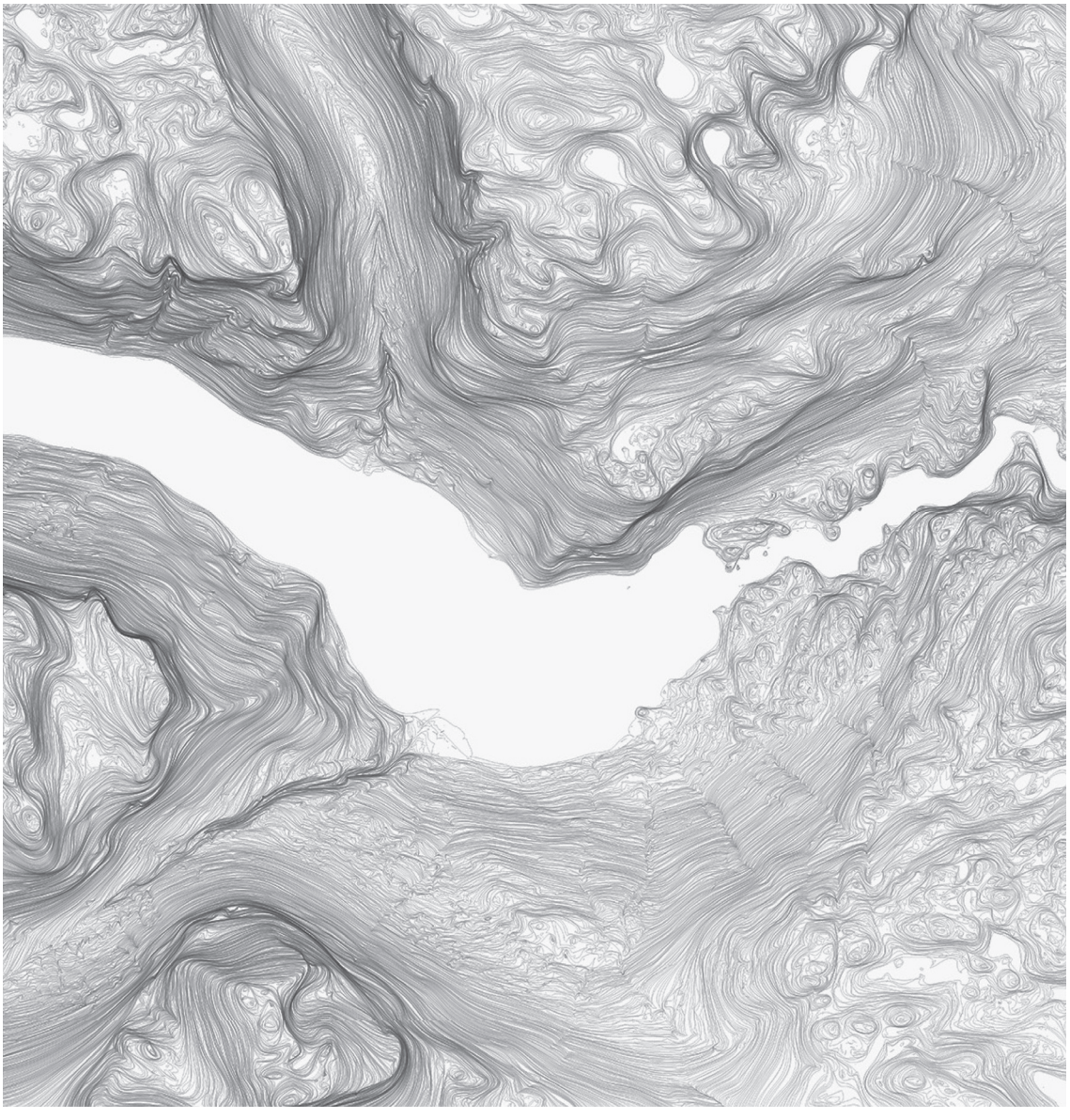

For the 'Leikegøta' project, as well as TRE I VALDRES 2018 PROJECT, the investigation is founded on three parts and interaction between each of them:

A: Vang
Local partners: The local Development Organization Innovangsjon SA and the Municipality in Vang

B: Industry
Local partners is Norsk Massivtre AS, producing solid wood elements, and the Begna Bruk AS sawmill, delivering high quality spruce.

C: NTNU
NTNU – Department of Architectural Design, History and Technology. Research team on "Materials and constructions".

— MARIUS WAAGAARD, ARNSTEIN GILBERG AND FINN HAKONSEN



# CONTENT

# VALDRES

## VANG / HENSÅSEN

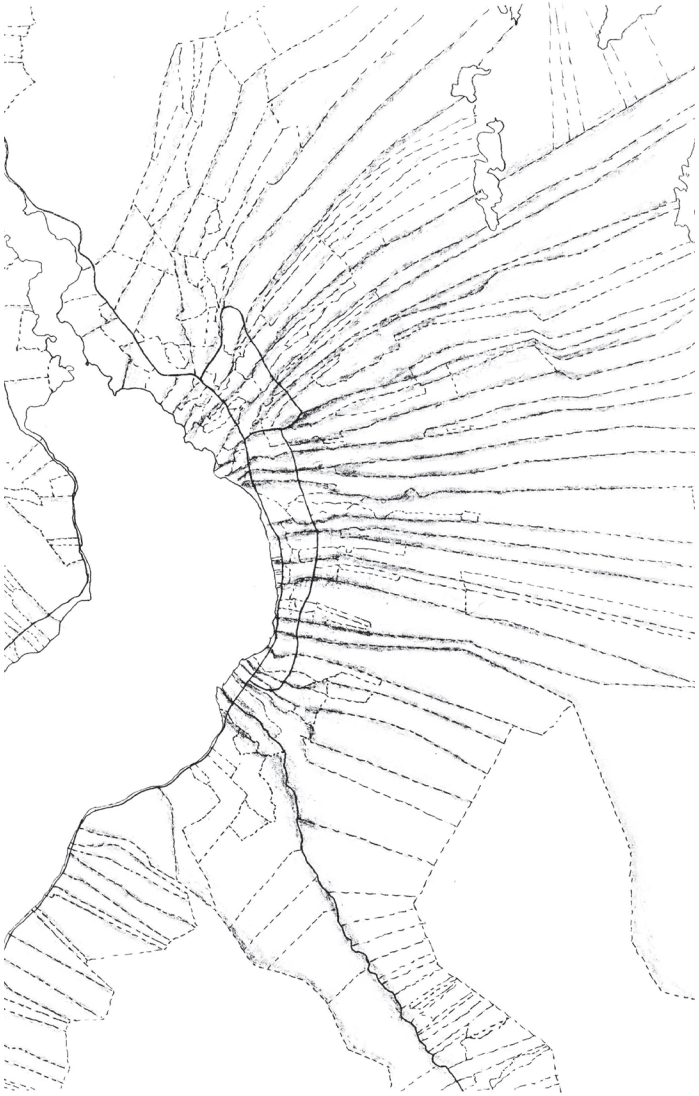
# VANG IN VALDRES

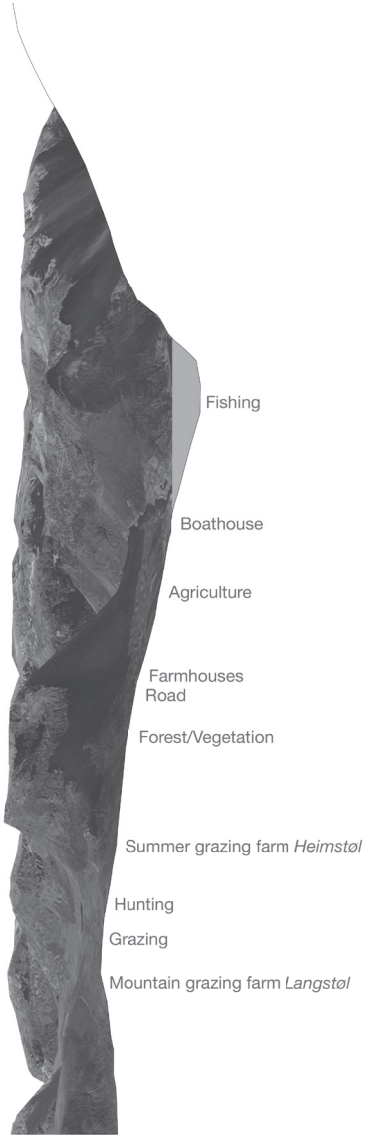
Vang in Valdres is the place where eastern Norway meets western Norway. When you are travelling from east to west through Vang, the scenery changes drastically. Lowland and rolling hills turn into wild mountains and fjords. Even the climate changes from dry to wet and from cold to milder temperatures. Many travellers have felt the experience of this change as they make their way through Vang, the last chance to rest before crossing the mountain. This route has a long history as the main connection between east and west since the Danish King built the King's Road in the late 18th century. This made it possible to cross the mountain with horse and carriage. The road later lead tourists to the mountains, and Vang became popular as a destination among the upper class of society and foreigners. Today, the main attractions are alpine peaks and good skiing conditions, but also the closeness to nature and peace from everyday life.

Remains of settlements from several thousand years ago were found in Vang. This is because the ice from the ice age 8-9000 years ago melted here first. The farmers have mostly been relying on the nature through the years, though with some income from travellers. The importance of farming is visible in the immediate landscape in Vang and you can see that the land is divided in to parcels stretching from the lake and up to the mountains. The parcels were arranged so that every farm had access to the different recourses found in the big landscape, from fish to farmland, the forest and up to the mountain.

In the transition between the parcels we often find a clear trail called "gøte". The gøte has been used by the farmers as a transportation route within their parcel and is often lined with stones. Though the property lines and ways of farming is in a process of changing today, the parcels and the gøte are still visible and remain an important part of the cultural landscape.

Vang has today around 1600 inhabitants and is facing the problem of depopulation that is common in rural areas in Norway. A firm called Innovangsjon SA is taking an initiative to turn this tendency, with a goal of showing Vang as an attractive place to live and work and a belief in the future of the place among the mountains. Their ability to initiate successful projects has been internationally recognized.




Fishing
Boathouse
Agriculture
Farmhouses
Road
Forest/Vegetation
Summer grazing farm *Heimstøl*
Hunting
Grazing
Mountain grazing farm *Langstøl*

# HENSÅSEN

## FIRST ENCOUNTER

Arriving for the first time. An encounter with the unknown.

A snow-covered plateau leading into the forest, tall spruce, and a steep valley.
A secretive, white carpet of snow.
Soft, wavy contours creating a dreamy landscape.
An occasional birch breaking through the surface.

Silence.

Then nineteen students.
Wading around in the deep snow.
Trying to grasp the essence of the place.
Observing. Sketching. Measuring. Taking notes and photos.

Absorbing.

In search of the pieces, together creating the puzzle.

## UNDERSTANDING

A step back.

Trying to connect the dots and to understand the character of the place - the bigger picture.

Dense clusters of trees surrounding the site.
Behind them, the mountains form a backdrop, meeting with the skies.
Continuous lines only broken by the tree tops.

Ahead the view opens up towards the valley and the mountains on the other side.
The bottom of the valley and the fjord below.
The road curving along the steep side of the valley, in between the fjord and the cliffs, leading upwards to the lake of Vangsmjøsa.

Towards the south, Hugakollen is reaching up from the gentle mountains of eastern Norway.
Further west, Grindafjell is watching over the farmland and the village below.

Across the lake, further west, you enter Jotunheim, with its wild, jagged peaks, glaciers and crystal blue waters.

Here.

In the centre of all this, where east meets west, the project would find its form over the coming weeks.

## THE REVELATION

Second time around.

Returning to what you thought you knew.
Changed by time and weather.
Spring had made it's entry.
The once so smooth carpet, now full of creases.

Wrinkled and torn by temperatures and underlying vegetation.
But still holding on to the secret of what's hiding beneath.

With shovels and high hopes we go to work.
Eager to reveal the origin, and the base of the coming construction.
Working through snow and vegetation, to discover a gift of nature.

A terrain so rich in contrast, for spaces to be made, and stories to be told.

From the steep cliff in front, facing the valley, the plateau rises up.
Two ridges of beautiful rock leads into the landscape.
In between a natural amphitheatre is forming.
Covered with vegetation, a soft contrast to the adjacent stone.

On the eastern ridge, drawing a line into the landscape, overlooking the creek and the valley, and gently touching down on solid rock, the project would find its place.

# COMPETITION

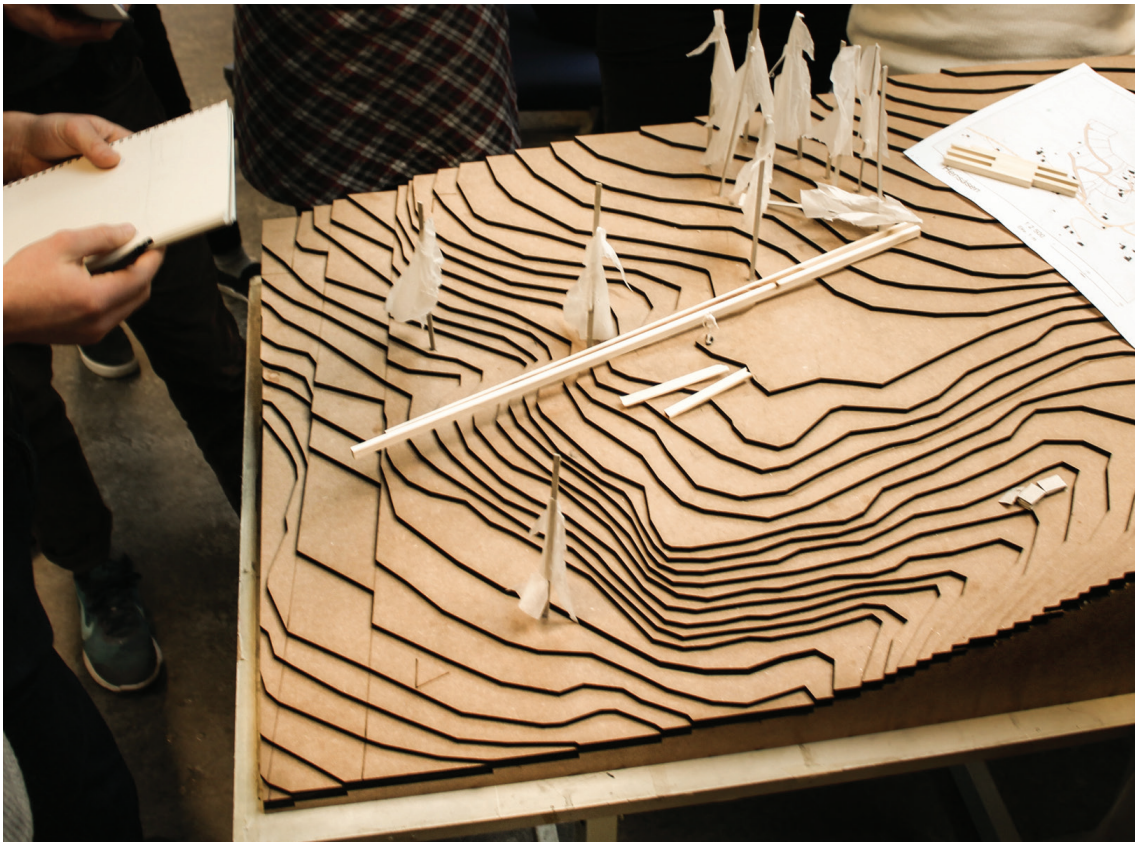
FIRST STAGE / SECOND STAGE

# FIRST STAGE

The design process of Leikegøta started with a competition divided into two steps. The students worked in different groups and got to investigate the site and what could be build there. At the end of the competition the students gathered in one big group to develop the final design together.

The first competition was about gathering several ideas for the design. The proposal was supposed to be something that could be build on a plot reserved for a playground, something that the community could use and to show local materials and building techniques. The students worked in groups of five, and ten proposals were delivered.

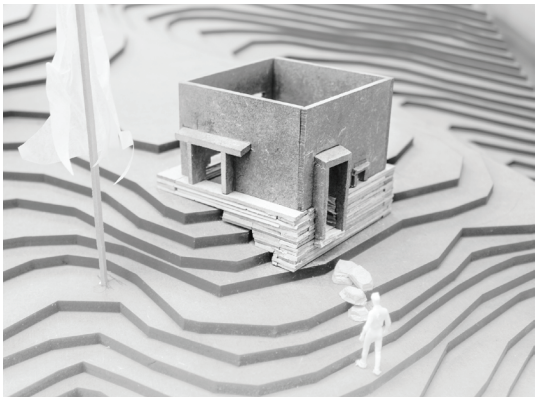
Together we chose three types of designs to work further with. The chosen ones were the “tun”, the grid and frames. These were chosen because of their clear concepts and by interest of the students and teachers.



KRISTIAN M. BJØRNLAND
CÉDRIC WEHRLE
FRANZISKA DOHM
SOFIA JERNBERG
ELISE S. ROLSTAD

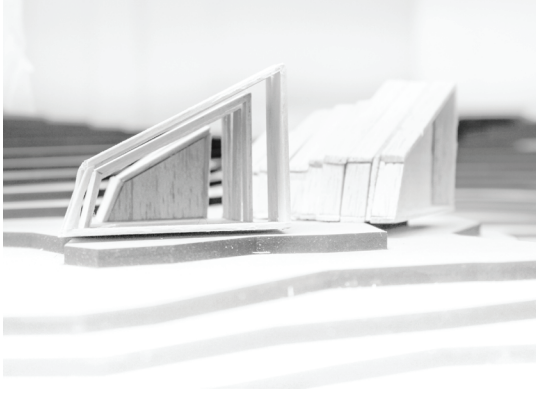
## OUTSIDE IS INSIDE

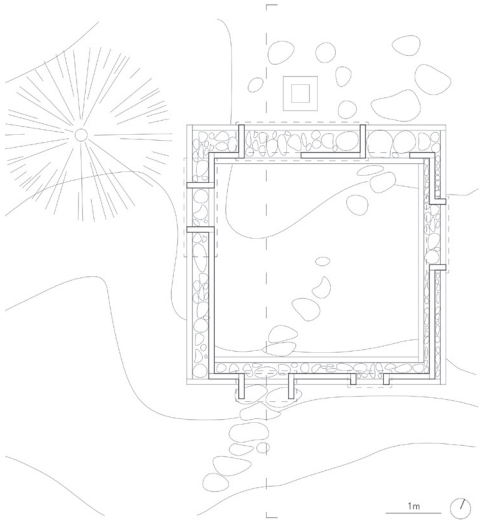
A portal to the housing area, the nearby farms and the hiking trails; a place to start an excursion. You enter a volume without a roof, an interior that is outside. The openings frame and invite you to look at and explore the outside. In the thickness of the walls are benches, covered spaces and a fireplace. The stacked wooden walls are anchored in the stone base that follows the topography.



## FRAMES

A place to go after a hiking trip. Two buildings that look almost the same but contain two different functions. One is a sheltered room with a view towards the fire. Here you could hide when the weather is bad or if you want to sleep. The other is a room facing the sun and the view. The buildings are made with massive wood frames with the same shape, but different sizes to create the variations in the spaces. Inside the room the frames become the furniture by using a finger joint system.

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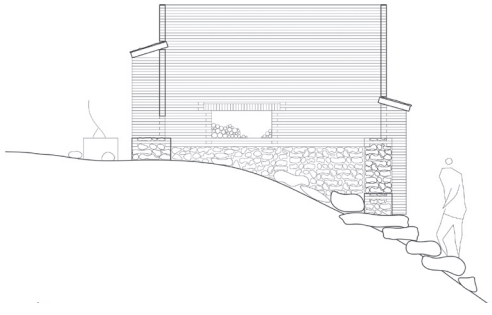
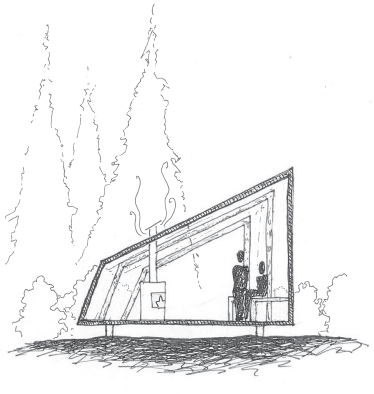
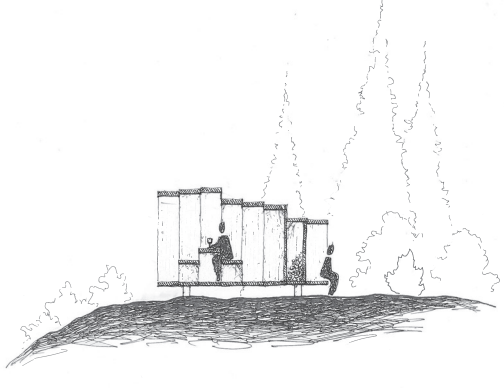


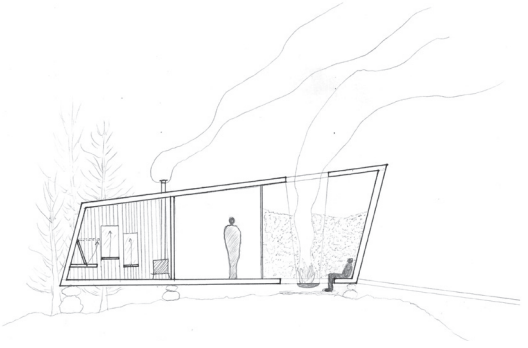




MARTHE VAAGLAND
MORTEN MATHISEN
SOFIE THESTESEN
JUHO REMES
PIERRE GÉROUDET

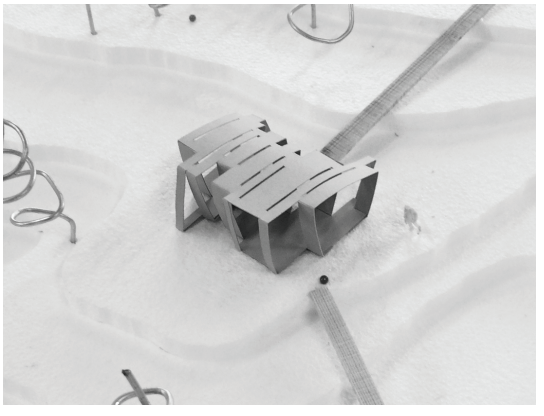
## FRAMING

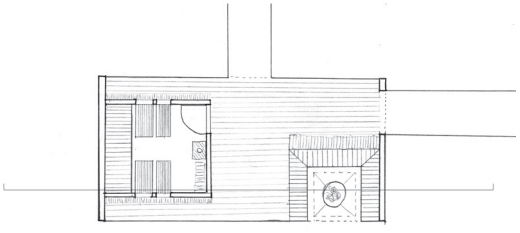
Focus on a simple and well organized plan. One closed and sheltered space close to the trees in the west, and one open and exposed space facing the view and the sun in the south. Benches and tables in the closed space are foldable by using the stacked element's finger joint. This also makes the facade dynamic because folding the elements reveals the windows. The path leads through the structure without interfering with the spaces for sitting down.

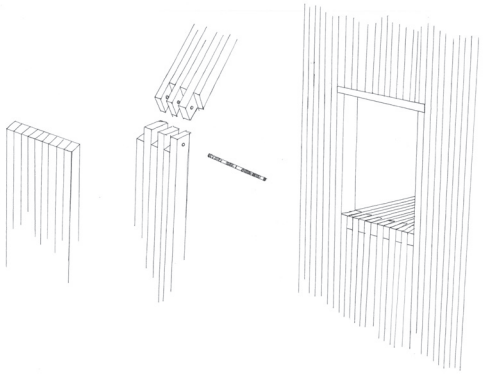


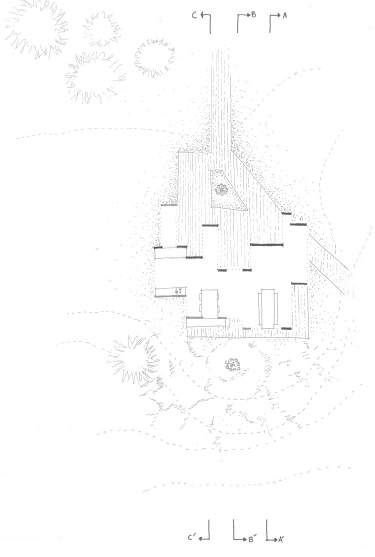
## VERTICAL FOLDING

A structure sprung out of folding massive wood elements, creating a structure shaped by the functions. A sheltered fireplace in the back, an open sun deck in the front, a kitchen and a more closed part for sleeping on the west side.





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A
C'
B'
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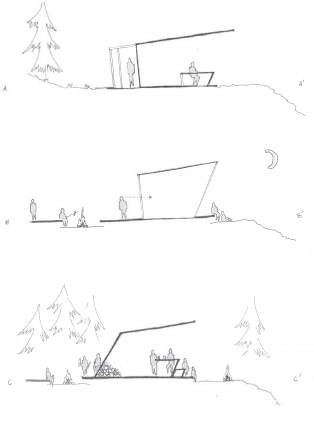
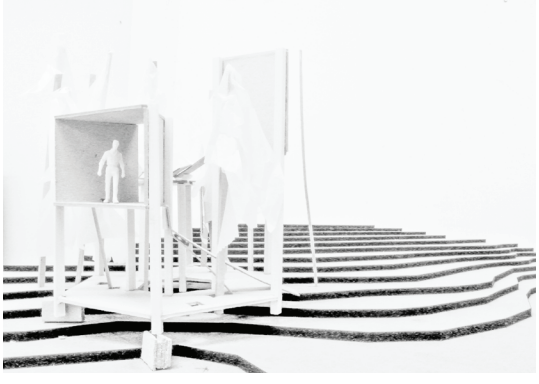

A
A'
B
B'
C
C'

AURÈLE PULFER
TOBIAS LAMADE
SIMEN B. MALDE
ZOÉ BOURRET
KAREN THERESE LUND

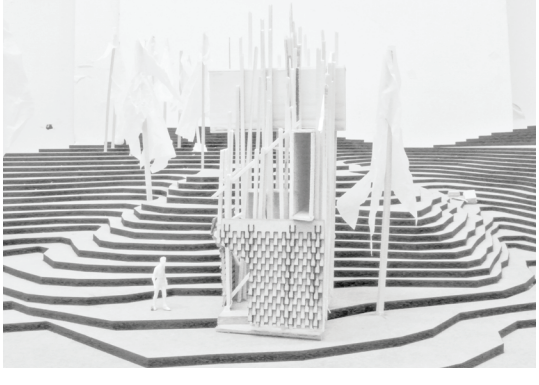
## TREETOP VIEWPOINT

Three tree huts following a grid system that is situated around the fireplace. The huts are linked by wooden bridges. The one at the top is a viewpoint, the next is a terrace and the last is a playing area.



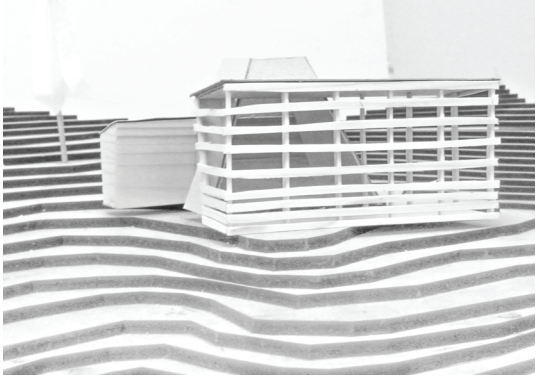
## FROM THE GROUND UP

Based on the verticality of the treetop viewpoint and the logic of the grid, this proposal seeks to reach a common ground for the two. A strict framework of 1 x 1 meter columns acts as the skeleton or the chandelier on which the massive wood elements are placed, framing the view towards the south and west. The base of the project contains a fireplace and is clad in slate stone, and as one reaches up the massive wood is clad with wooden shingles.



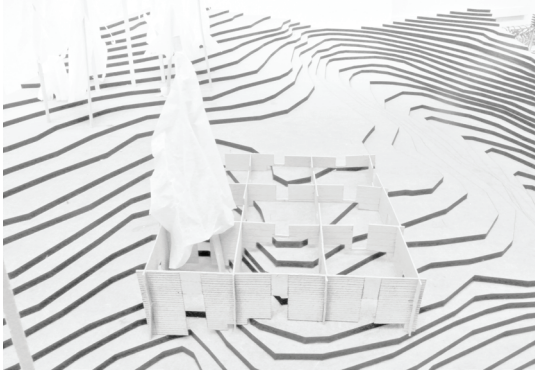
## AROUND THE FIRE

Three volumes are connected. One is a fireplace and is surrounded by sitting and sleeping areas. The volume towards the valley is open, a place to sit and eat. The volume in the back is more closed and a place to sleep. The chimney gives this place warmth.



## GRID

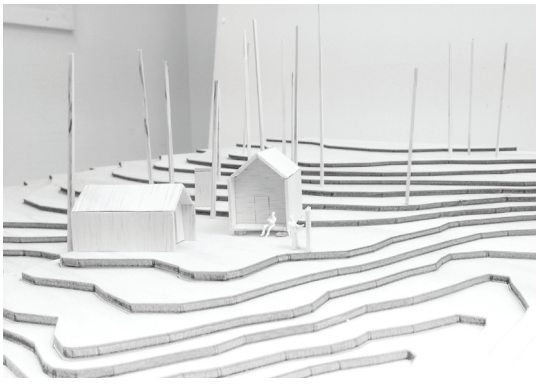
The project is a confrontation between a simple and regular grid of 3 x 3 meters and the natural topography. Walking through the project is an exploration of different spaces and views and works as a threshold to the nature. The different cells are suitable for flexible use: the most sheltered ones are where you would want to sleep or make a fire, the ones with the lowest walls are a nice place to enjoy the view and eat something. The construction is based on simple stacked massive wood corners.



SILJE SANDVIN
THOMAS SKINNMOEN
STEPHANIE WÜNSCH
NIKLAS PROFORS

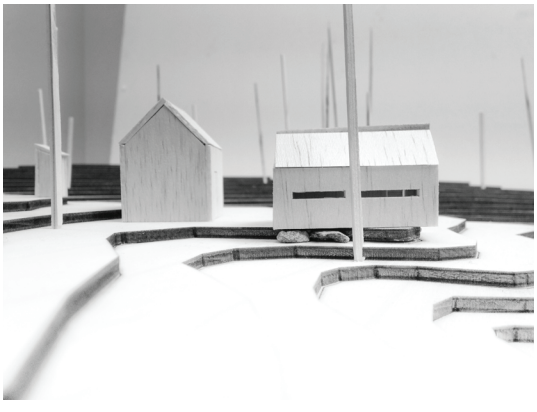
## TUN DESIGN A

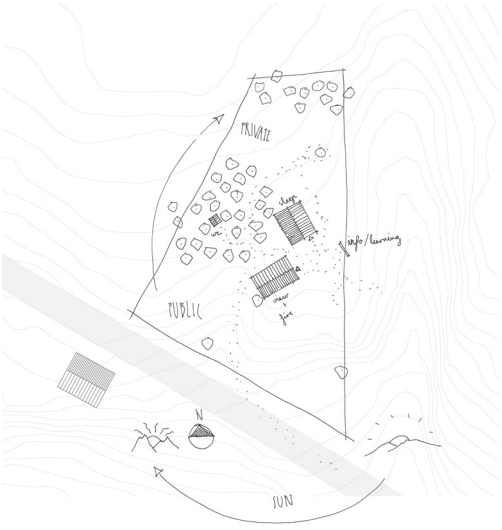
A meeting place in the area. One  house for sleeping, the other for a fire and the view. One raised from the ground, the other down into the ground. Openings in the gable walls, that are turned into the tun. One building is more public than the other. Traditional in form and splitting functions.



## TUN DESIGN B

Turning the building with the long side in to the plateau gives a bigger outdoor area between the houses. The functions are split between making a fire in the low building and sleeping in the high building . The materials are local, stone, massive wood and wooden shingles.

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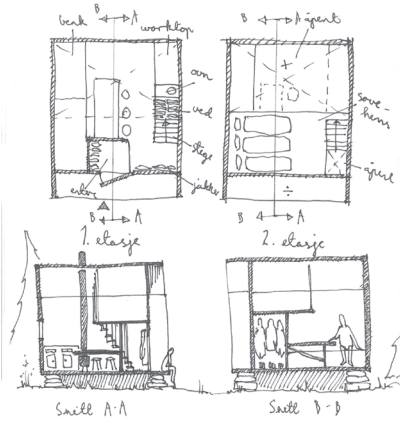
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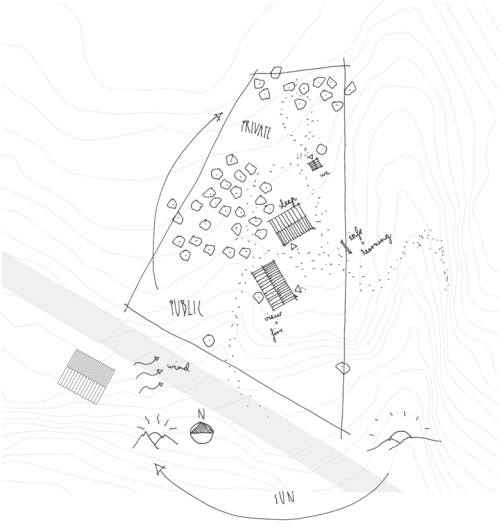
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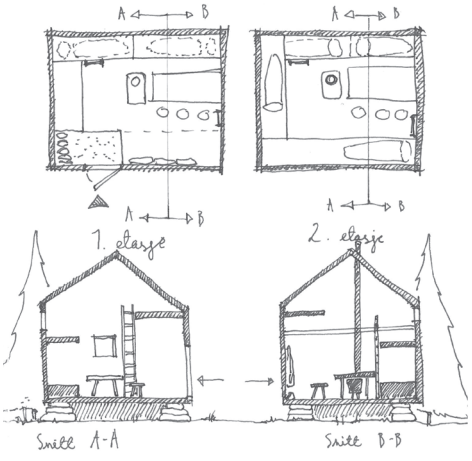
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Snitt B-B

# SECOND STAGE

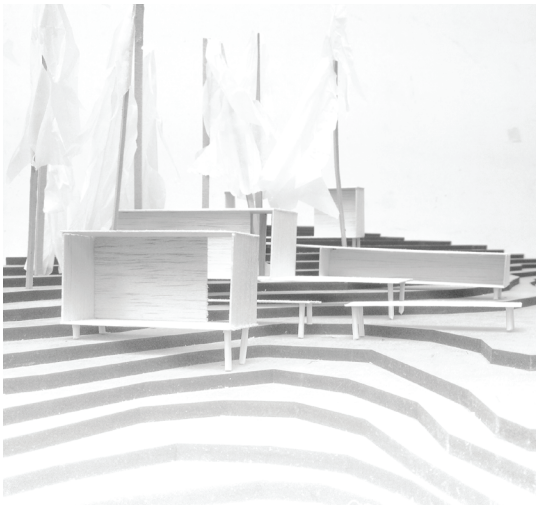
After having chosen the three main concepts the students were rearranged in three groups to investigate and clarify the program and construction. Five new designs emerged.

Again we were to decide together, but now only one concept was to be worked on further. A lot of discussions and talks were done before we could choose, and after a long day we settled for one. Some of the reasons was the way it worked with the terrain and the site, another was the possibilities to work with several types of building materials.

## FOLDING IN THE WOODS

ELISE S. ROLSTAD
FRANZISKA DOHM
SOFIE THESTESEN

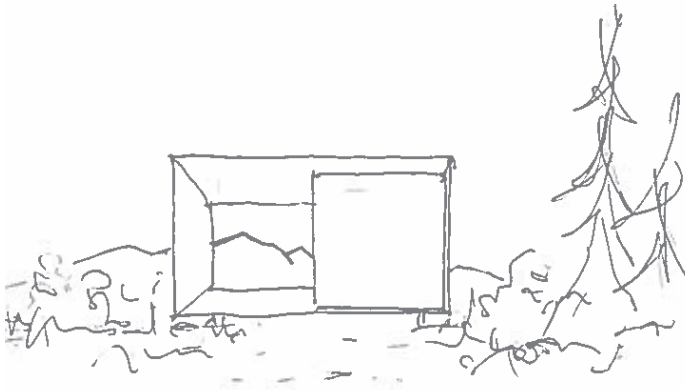
Simple lines. Frames of massive wood connecting the wood with the open area on the site. No special program, but the frames have different openings and sizes to give them a variety in use. The shapes create spaces in between with different qualities. Open, sheltered, a fireplace, trees. The ground becomes the floor and the frames the furniture. A place to explore.

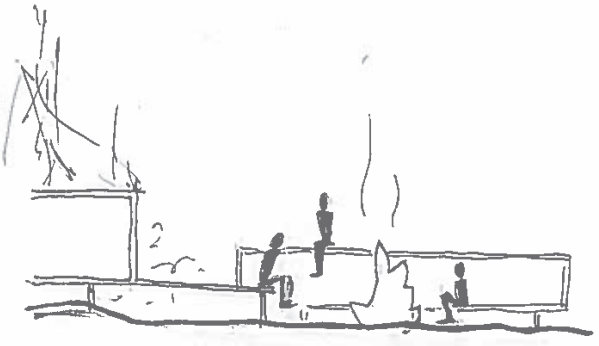


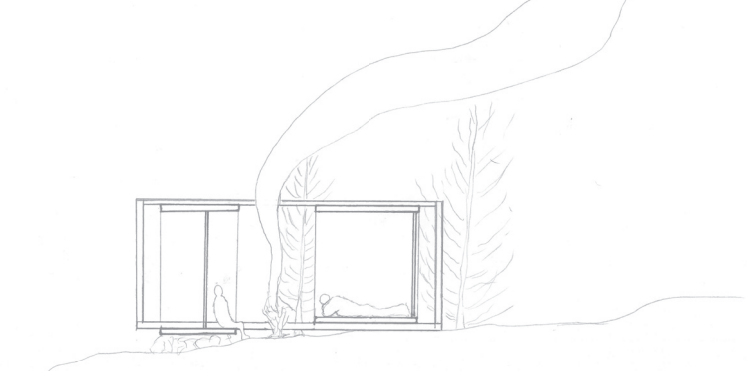
## PERPENDICULAR FRAMES

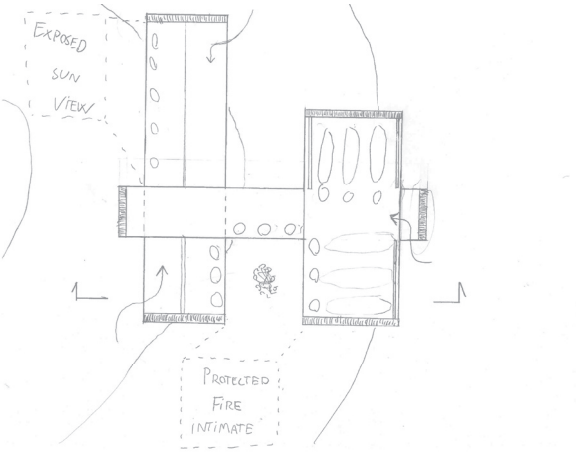
MORTEN MATHISEN

Three rectangular frames connected and overlapping perpendicular to the next. Only three foundation points by having one of the frames spanning over the depression and another frame resting on it and spanning to the other end of the depression. Spaces created both within the frames and between them.





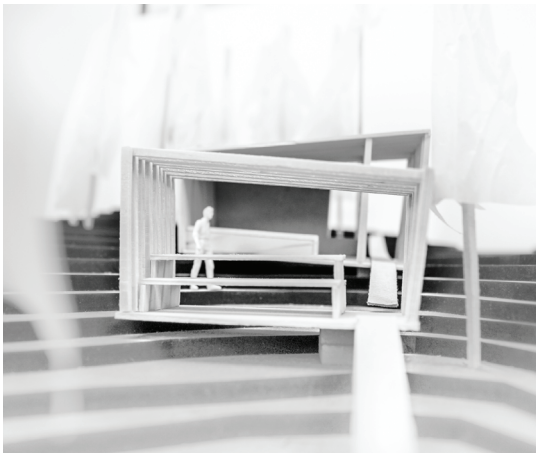



EXPOSED
SUN
VIEW
PROTECTED
FIRE
INTIMATE

## GRADIENT

SOFIA JERNBERG
JUHO REMES
PIERRE GÉROUDET

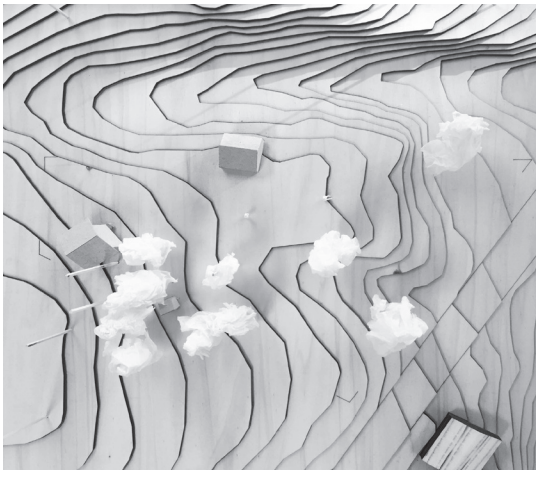
Three frames with specific functions connected through a walkway leading up to the playground. The structure is graded from the open to the private. First an open pergola with seating next to the fireplace, then a kitchen area and at the end a closed of sleeping area.

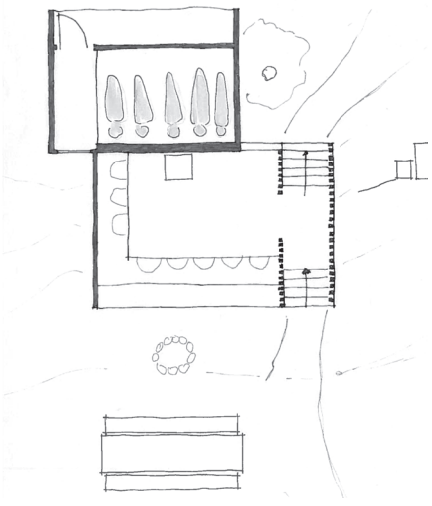


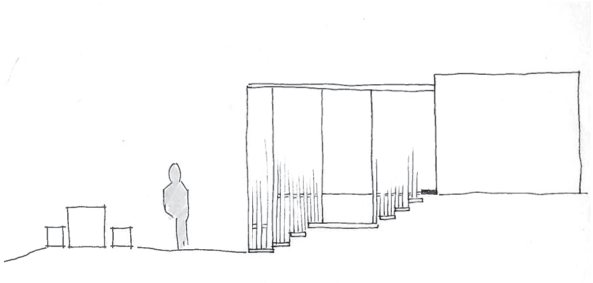
## IN BETWEEN

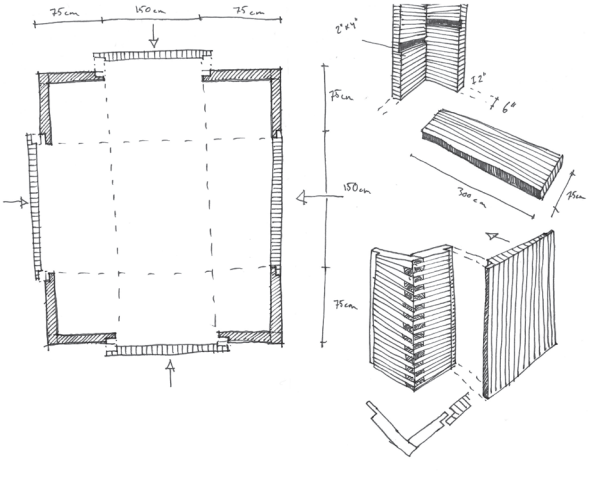
SILJE SANDVIN
THOMAS SKINNMOEN
STEPHANIE WÜNSCH
NIKLAS PROFORS
KAREN THERESE LUND

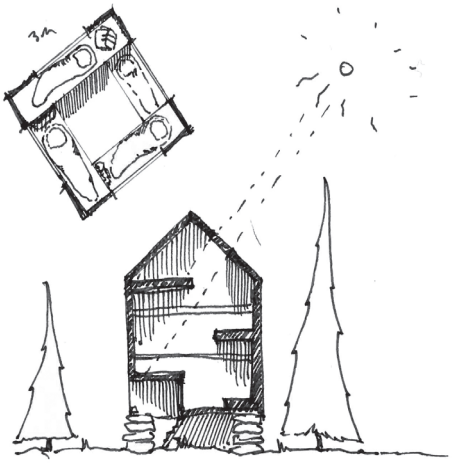
As a continuation of the tun design this proposal has the functions split between different buildings. The sleeping cabin has beds stacked upwards and around the centre. The firehouse is intimate and with the fire in the middle. The buildings are placed more out on the site, but still work together to define the outdoor space.





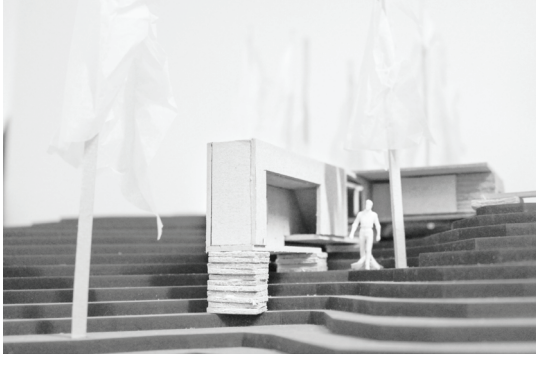



75cm
150cm
75cm
2"x4"
75cm
22°
76°
150cm
300cm
75cm
75cm

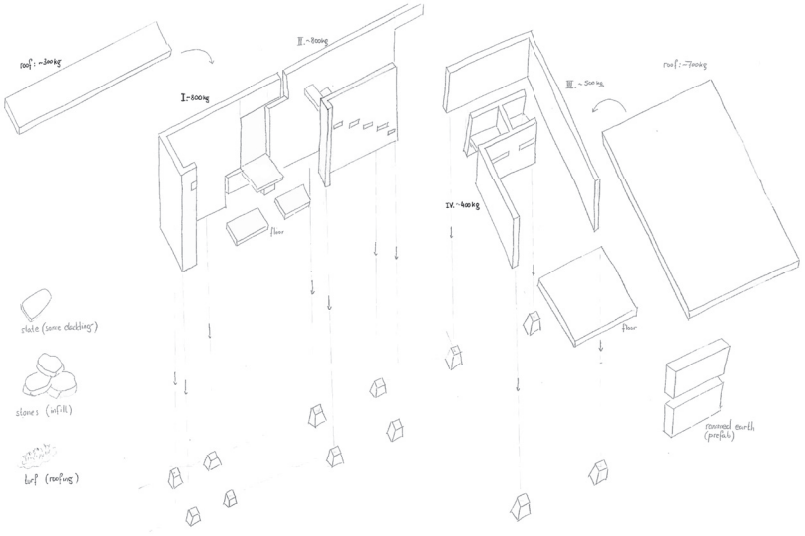

3m

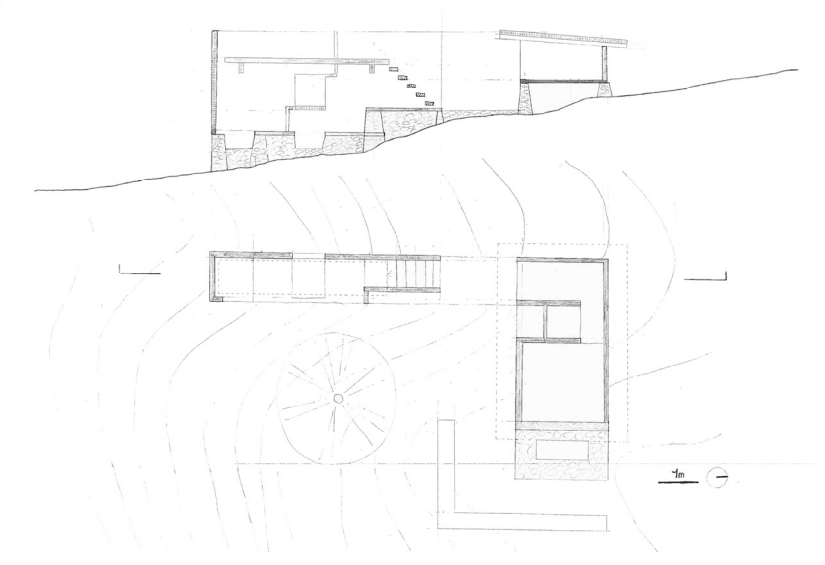
## THE WALL

SIMEN B. MALDE
KRISTIAN M. BJØRNLAND
CÉDRIC WEHRLE
TOBIAS LAMADE
AURÈLE PULFER
MARTHE VAAGLAND
ZOÉ BOURRET



A wall stretching along the site. A wall that is more than a wall: it uses the opportunities given by the natural landscape to create a sheltered space, a viewpoint, a fireplace and a cabin. The whole project works as a threshold giving an entry point to the neighbourhood, leading the visitor up on the hill towards the fireplace. It stretches along a small valley and makes a corner around a small hill and a tree. This way, the project doesn't occupy the plateau and has a discrete presence in the landscape. It protects the user from natural elements and the landscape becomes a part of the project. The construction is made with the locally available materials and uses each material for what it does best, namely stones, rammed earth and massive wood elements that are prefabricated and then assembled on site.


roof: ~200kg
II. ~800kg
I. ~800kg
III. ~500kg
roof: ~700kg
IV. ~400kg
floor
floor
slate (some cladding)
stones (infill)
turf (roofing)
removed earth (prefab)


1m

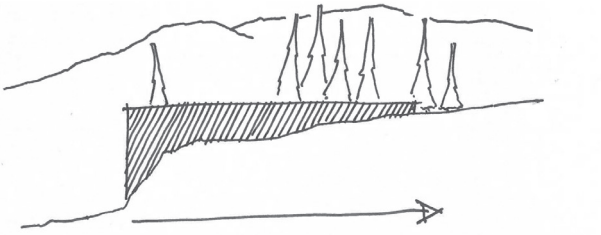
# PLANNING

## CONCEPT / PROCESS

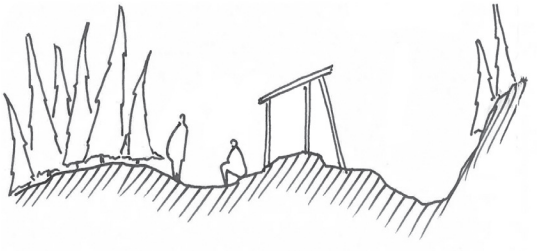
# CONCEPT

## THE LINE

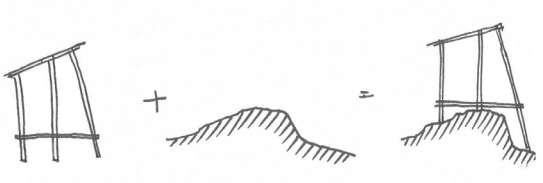
It all started with a line.
A line into the landscape.
To emphasize the topography and to highlight the situation.
Leading the way.
Not like a point, but a movement onwards.



What needs should this line fulfil?
Situated in a common space - a playground in a coming neighbourhood.
It should be a place to meet.
A place to chat, to play, to climb, to hide, to run, to sit in peace, to light a fire, to gather around and to feel safe.
A place for the four seasons.
Where you could sit in the morning sun, sheltered from the gusting winds blowing down the valley.
Or enjoy the warmth of the last rays of sun, while it is setting over the mountains in the west.
A shelter for rainy days, and a base for snow and games.
A place where you would bring your family, or meet up with your friends.
Where the kids can explore, and the parents sit in peace.



In the meeting between this movement and the unknown terrain, a challenge arose.
How would this line be able to find it's place in a topography of uncertainty?

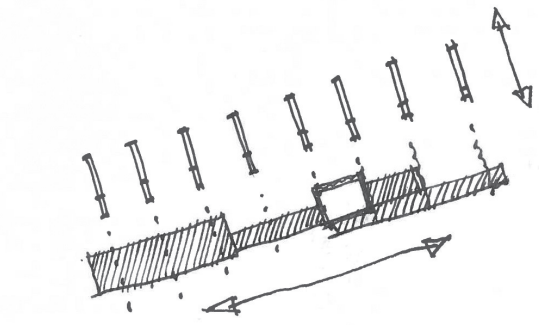


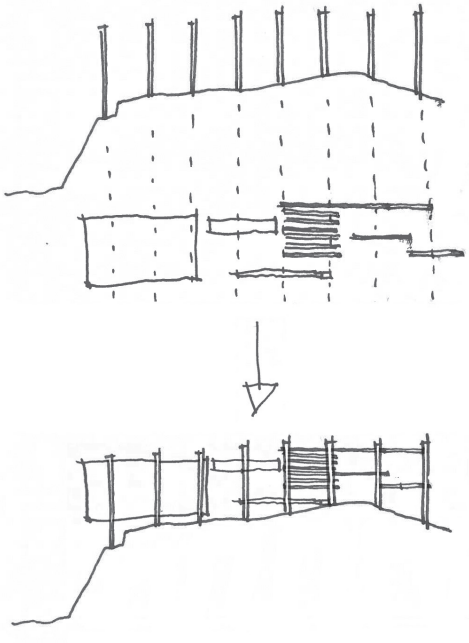
The answer was found in an adaptable system.
A set of light frames repeated along the axis.
A system flexible and capable of adjusting to the situation it was placed in.

Within the frames, the functions were placed.
The serving elements.
Given form from massive wood.
Slabs and boxes.
Solid.
Contrasting with the light structure.
Suspended from the ground.
The frames and the boxes.
Carrying and bracing.
Relying on each other.

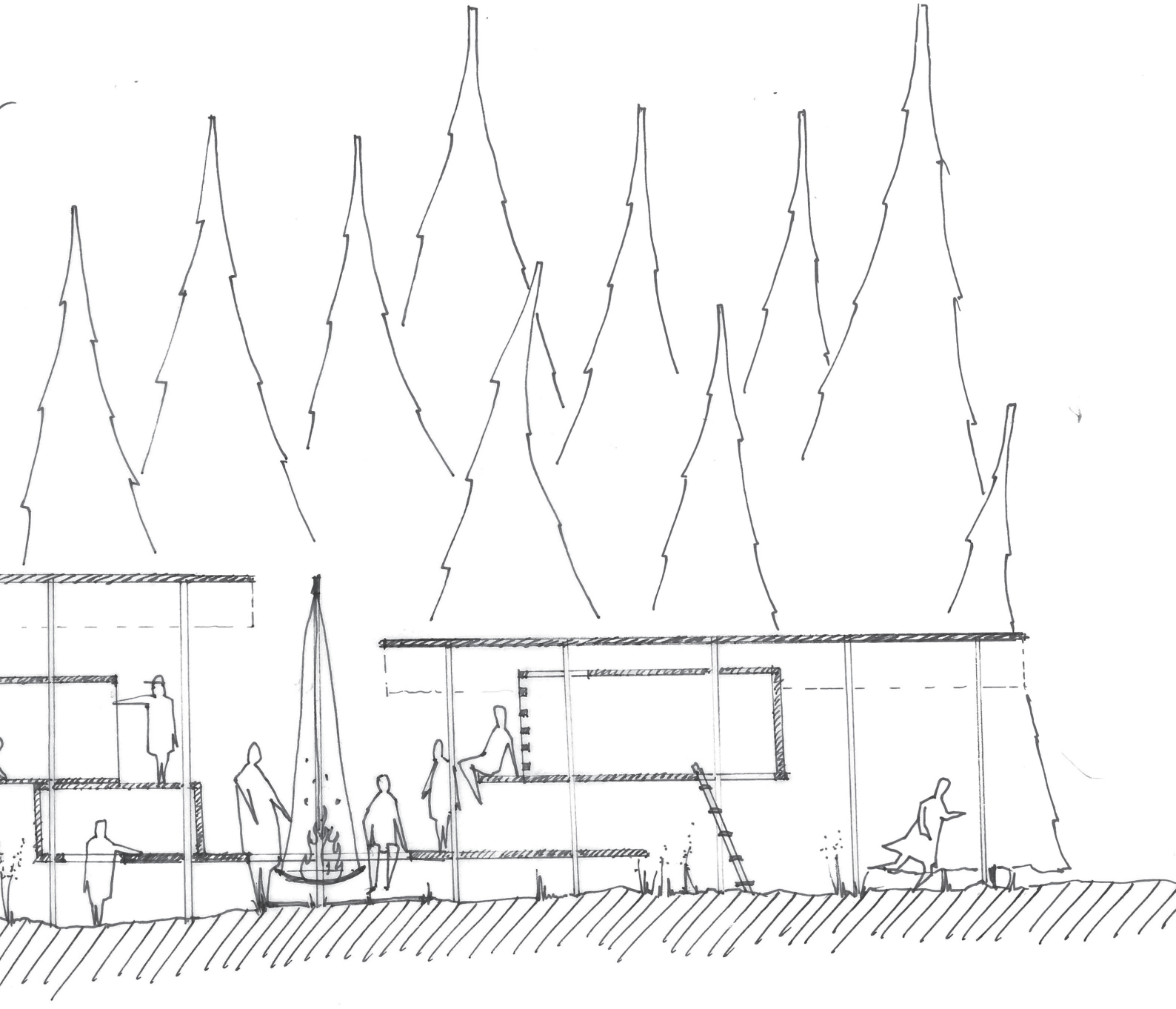
A composition.
Series of obstacles were combined to create porosity and circulation.
Allowing for playfulness and exploration.
Elements whose purpose were up for interpretation.
Over. Under. Through. Between. On top. Behind. In front. Around. Inside. Along.

A dialogue.
With the surroundings.
Creating spaces and situations.
A symbiosis between the built and the existing.
Telling stories untold.





SWINGS
NET
VIEW
MAIN ACCESS



# PROCESS

## DESIGN TO PRODUCTION

During the design process we kept constantly working on a 3D model in Rhino. Thanks to one common master file with a defined grid and origin point, it was easy to adjust and redraw several parts of the design at the same time by different student expert groups.

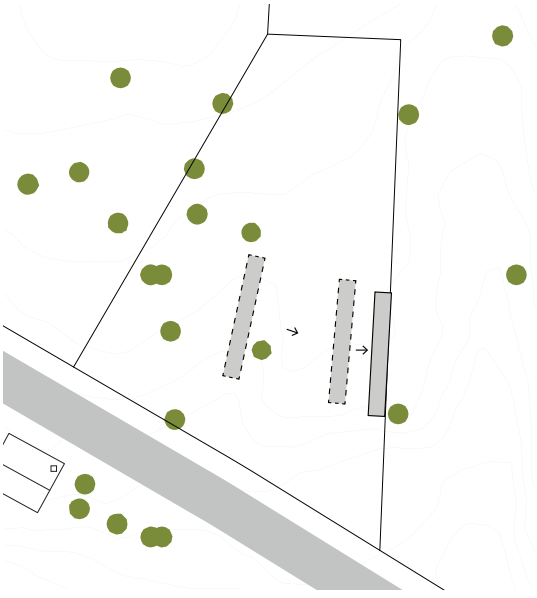
Meanwhile one team started to develop a Grasshopper script that translates the 3D design into useful numbers for cutting lists needed in the building period. The flexibility in the code gives the possibility to change the design even in a late phase. Because it is linked to the geometry, the script outcome adjusts while the 3D model gets changed. Therefore, the 3D model needs to be as accurate as possible. Small incorrect details can affect the outcome immensely and lead to mistakes in the building process. So, using this technology should be considered from the very beginning of the design.

Although we had produced cutting lists for all the timber work of the project, we ended up just using it for several parts such as battens, light constructions, crossbeams and a few special massive wood elements that could not be cut after the assembly. Furthermore, the lists were helpful concerning material calculations.

△ Rendering of the final model.

| CROSSBEAMS | POSITION | LENGTH |
|---|---|---|
| | 0A - 0B | 1482 |
| | 2B - 2C | 1334 |
| | 3B - 5B | 1329 |
| | 4A - 4C | 2733 |
| | 6A - 7A | 1638 |

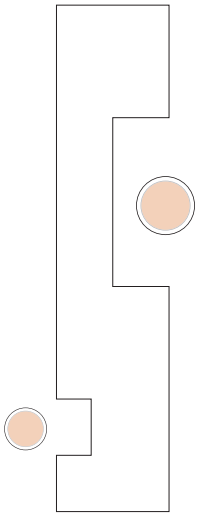
△ Example of a cut list. The frames were given names according to posistion and to make it easier to place other parts.



## PLACEMENT

When placing the project on site, we first considered having it as a windbreaker on the west side of the plot. The thought was to protect the plateau from strong winds coming from the valley. There was also a tree close to the project that could help make an anchoring and a interplay with the site.

After some discussion, we found that it would be better to allow for afternoon sun on the plateau, as we think this is a time of day when the site will be most in use. Therefore, moving the construction to the east side of the site made more sense, providing more shelter from the eastern snow-and rainfall.



## FIREPLACE

We wanted the fireplace to be a core in the project, a place for warmth, cooking food and gathering.

At a time we were working with several different places to have different settings and opportunity to make a fire. A fire for a sunny day, one for a rainy day, one for a windy day, one for cooking, one for warmth.

In the end we decided the placement of the fireplace at the site the last week working. After moving the entire construction the plateau became a natural position for the fireplace.

## FRAMES

After the decision to use repeating frames in the Wall was taken, we started investigating different options. Starting from the basic shape of a vertical space stretched in the project length, we set a maximum length of five meters for the columns, the length that the sawmill could produce. To allow some flexibility and make the frame rigid in itself we extended the width, trying different configurations, lengths and angles.

Once we had tried placing the different options on the 1:50 landscape model, we had a round of discussion, landing on extending the frame on the tall side towards the east. The idea was that this extension would offer a space for a walkway and a wider space where needed.

After deciding upon the frame layout, we marked it up in 1:1 on the ground to get a feeling of the dimensions, resulting in a final shape of about 1.6 meters wide. The roof slope was set to be 22 degrees, ideal for slate stones, while the inclined wall facing the east held an angle of 80 degrees.

△ Five different frame options in 1:50. The rightmost one was selected and tweaked later on.

△ Testing out the frame in 1:1 size.

▷ One of the frame models on site that we decided to orient so that the sloping wall would face the creek.

## SLEEPING BOX

The idea of a separate part for sleeping has been strong in the development of the project. The idea was to place the sleeping part north on the plot, furthest away from the road. This was to keep the sleeping in a more private part of the site, surrounded by trees.

The initial idea was to have one part for sleeping and one part for the children to play. The sleeping part was incorporated into the climbing tower, as we made some cutbacks on the amount of material.

△ Old version of the sleeping house. Different levels of decks make it possible to climb and sleep.

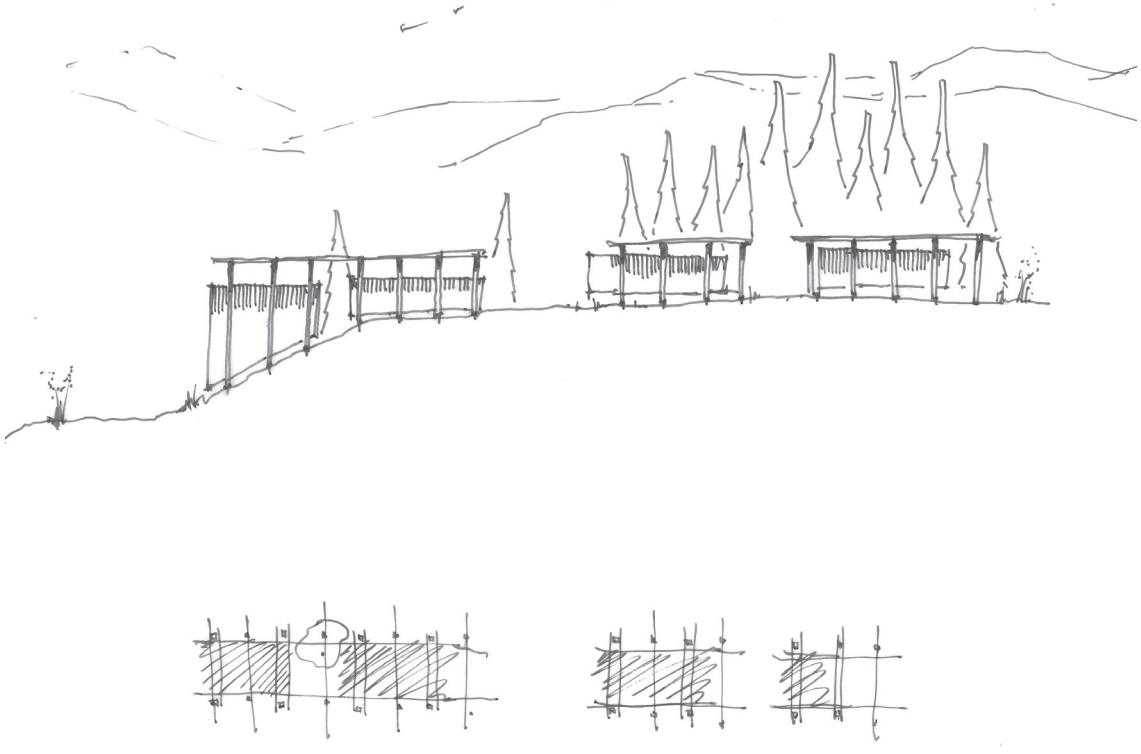
## CLIMBING TOWER

Developing the climbing tower was a long process, involving all of the students and varied between different work groups.

The system of the climbing tower was developed as a series of platforms in between frames or parallel to them. From there we developed a cladding to protect children from falling outside the structure.

We then decided to combine the place for sleeping for sleeping and playing. We saw that the climbing could generate more activity and circulation in the sleeping part and that the structure wouldn't become a dead end.

There is something nice about the idea of climbing up to the sleeping deck, like in a tree hut or a bird nest. You also get the possibility to use the decks as a goal for the climbing and as a hiding place for the children.

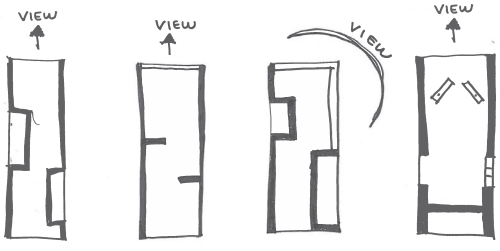


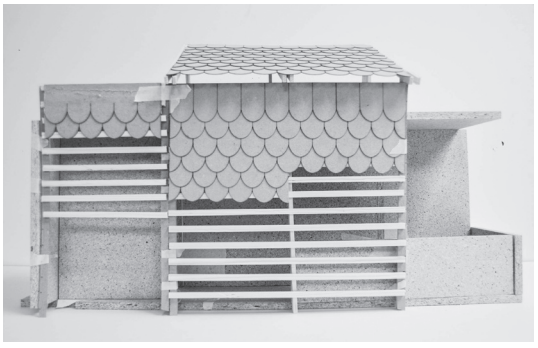
△ The construction with three parts. The view box, the playground and the sleeping box.

## VIEW BOX

In order to create spaces around, in contact with and under, “the view box” was designed as a sensual experience, feeling the light and the nature from inside a closed space. It is intended to differentiate between being out in the open, feeling the direct impact from the surroundings, and to be completely sheltered, yet sensing perhaps the nature in a greater way. A thoroughly play with the imagination is required.

A step from the rock into a closed space, facing a painting: small holes in the wall, spread from the floors to the roof, casting beams of light across the room. Intensified after entering and closing the door behind. Through the holes, the nature is shimmering between an open world outside and a sheltered world inside. A feel to open up and see more. Two large doors can be pulled, and the mountain Hugakollen is inside the room. A view towards the other side of the valley is filling the space.



◁ We worked a lot with models to test out ideas. Here is some models testing cladding, shape and lights.

▷ One of the view box models with a cantilivered box and climbing rope.

# CONSTRUCTION

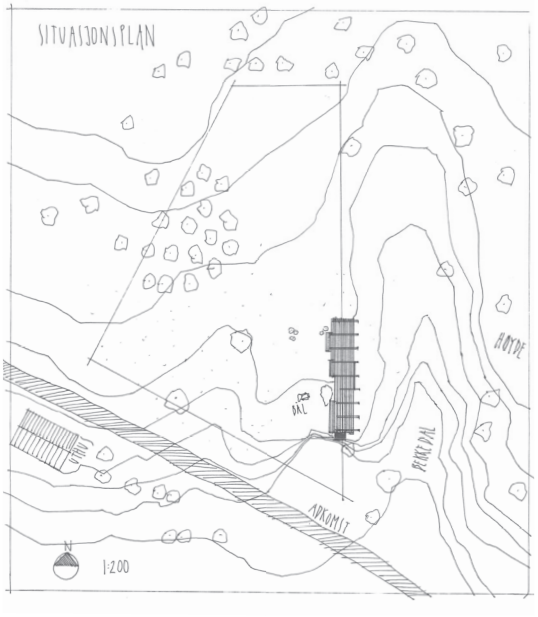
SHAPING THE LANDSCAPE / MEETING THE GROUND
/ FRAMES / MASSIVE WOOD / SKIN / DOORS

# SHAPING THE LANDSCAPE

The first task was to make sense of the site by removing the snow and some of the small bushes, as well as probing the ground for bedrock. This work helped to determine the exact placement of the building, exploiting and enhancing the existing terrain features.

Some natural stones were sourced from Røgn farm and the shores of Vangmjøse to build an access path and a fireplace.

The building helps to reveal the inherent qualities of the site: an amphitheatre towards the mountains, a cliff to climb upon, a dialogue with the slope on the other side of the creek.



△ Cutting down bushes.

△ Discussion on site developed the project further. The placement of the fireplace was tested and moved from the original position.

▷ The space between the stones marked a natural path to the construction. Local stones were used to make it easier to enter.

# MEETING THE GROUND

We quickly experienced that it was hard to project the horizontal placement of foundations down onto the uneven terrain. After trying out different methods we eventually found one that we believed would work. First we needed to get the A and B-line parallel and with the correct distance between them. We did this by setting up poles on both sides of the site and span a thread between the poles. Then we made marks on the thread and used the plumb line to get the position down onto the terrain.

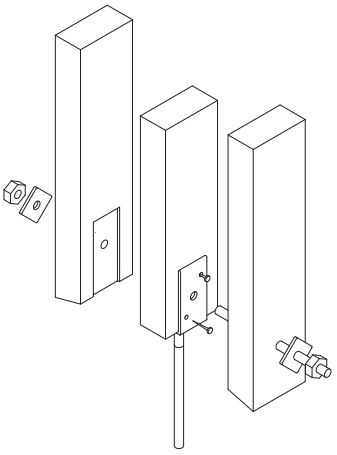
After this we tried to cross-check all measurements before we started drilling the holes. We didn't have the right tools in the beginning so we didn't manage to get consistent numbers. This led to a lot of frustration and slowed down our progress a lot. When we eventually got the Leica working we found out that the foundations positions were better than our cross-check. Only minor adjustments were made before we could start drilling.

Punctual foundations were chosen in order to touch an uneven and only roughly measured ground. Steel column shoes are inserted into holes drilled into the bedrock, and a steel bolt connects them to the wooden columns.

The wood is lifted from the rock, and it's end cut at an angle for the water to drip.

△ Measuring the site to find the foundation points.

▷ Drilling the foundation points.

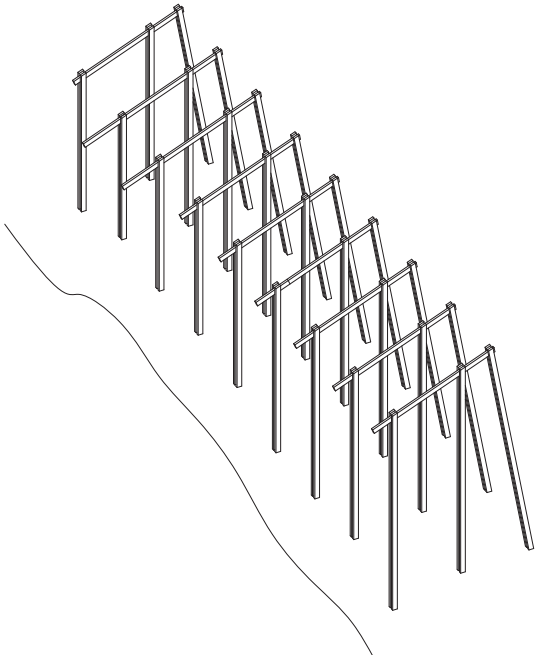


# FRAMES

The frames imprint a rhythm and they are the same on the top to form the roof, but the columns can extend as much as they need to meet the rock.

The feet of the columns, as well as most of the crossbeams were precut and pre-drilled at the factory before being assembled on site.

The beams support the massive wood elements, that in turn help to brace the structure.



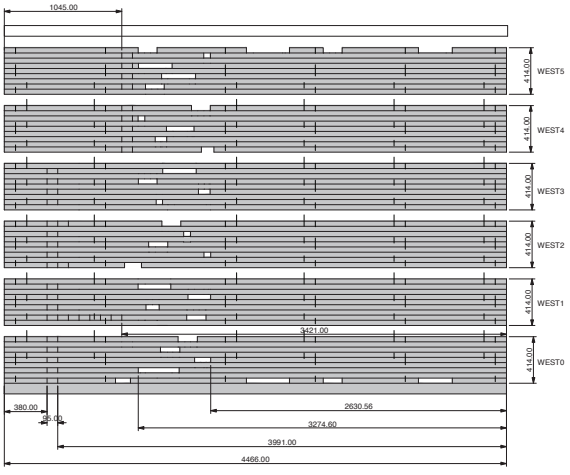
▷ Almost all the frames are in place. The size of the construction becomes visible.

# MASSIVE WOOD

The fabrication of the massive wood elements – the view box and the floors – took place at the Norsk Massivtre factory in Begnadalen. The work was carried by a group of eleven students during one week. Nine 46 x 95 mm planks of spruce were stacked and screwed together to form elements, which were assembled to form the parts.

The floors that are exposed to the rain have long slits to let the wind dry the wet wood.

The finished pieces were transported by truck from the factory to the site, and lifted into the structure by crane. They were then screwed to the beams and slidden between the columns, leaving a gap for the wood to expand.




△ Assembly drawing for one wall in the view box.

▷ Sawing the edges of a massive wood element.

△ Making a massive wood element in the jig.

▷ Making a complex element by hand.


UT
EXIT


△ Massive wood sections before assembly.

◁ Mounting two elements.

△ Assembly of the view box.

▷ The view box beeing lifted in place at the site, directly in to the frames.

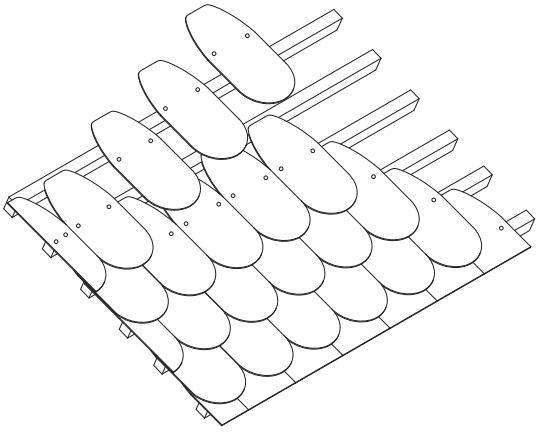
# SKIN

Slates and wooden shingles protect the construction from the water and the wind. Wood is used on the western facade, and stone on the roof.

The shingles are made of the heartwood of pine from Elsrud gård in Viker, and nailed to the wooden structure.

The slates were once covering an old house in Begnadalen, and laid with the help of the Valdres Folkemuseum. About one thousand slates were placed on top of each other and nailed to the battens below. The numerous holes and asperities in each piece gives us a glimpse of their history.

The cantilevered exposed slab is covered by a single stone, sourced less than five kilometres from the site and split using a hammer and a chisel.



△ Wood shingles are used to cover parts of the western facade.

△ Digging up slate stones on a local farm.

▷ Cutting the slate stones.

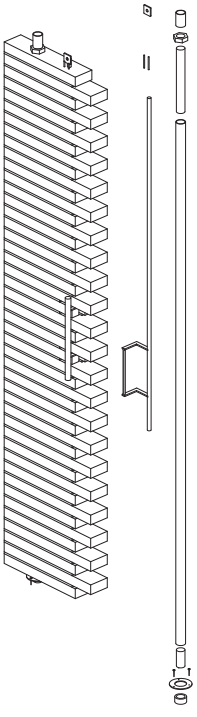
△ Covering the roof with slate stones.

▷ Splitting a stone.

# DOORS

The doors are made with stacked elements that are glued together and pivoting around a metal tube. Pushing the handles down unlocks the doors that open – as in a barn – towards the outside.

Sit on the bench in the back to enjoy the modulated light or cross the threshold to find yourself in the crown of the trees, facing the mountain, five meters above the ground.



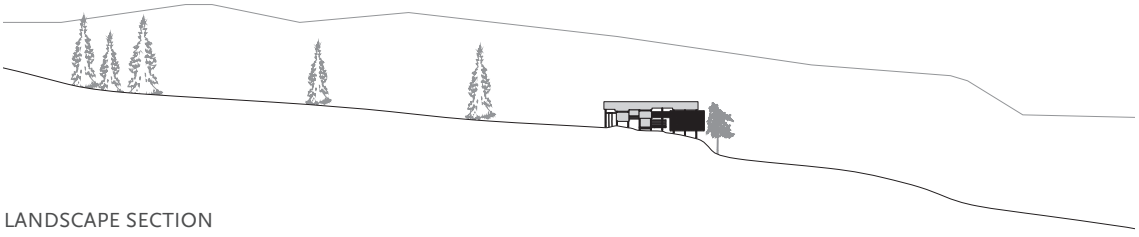
◁ Putting up the doors in the construction.

▷ Drilling holes for the doors.

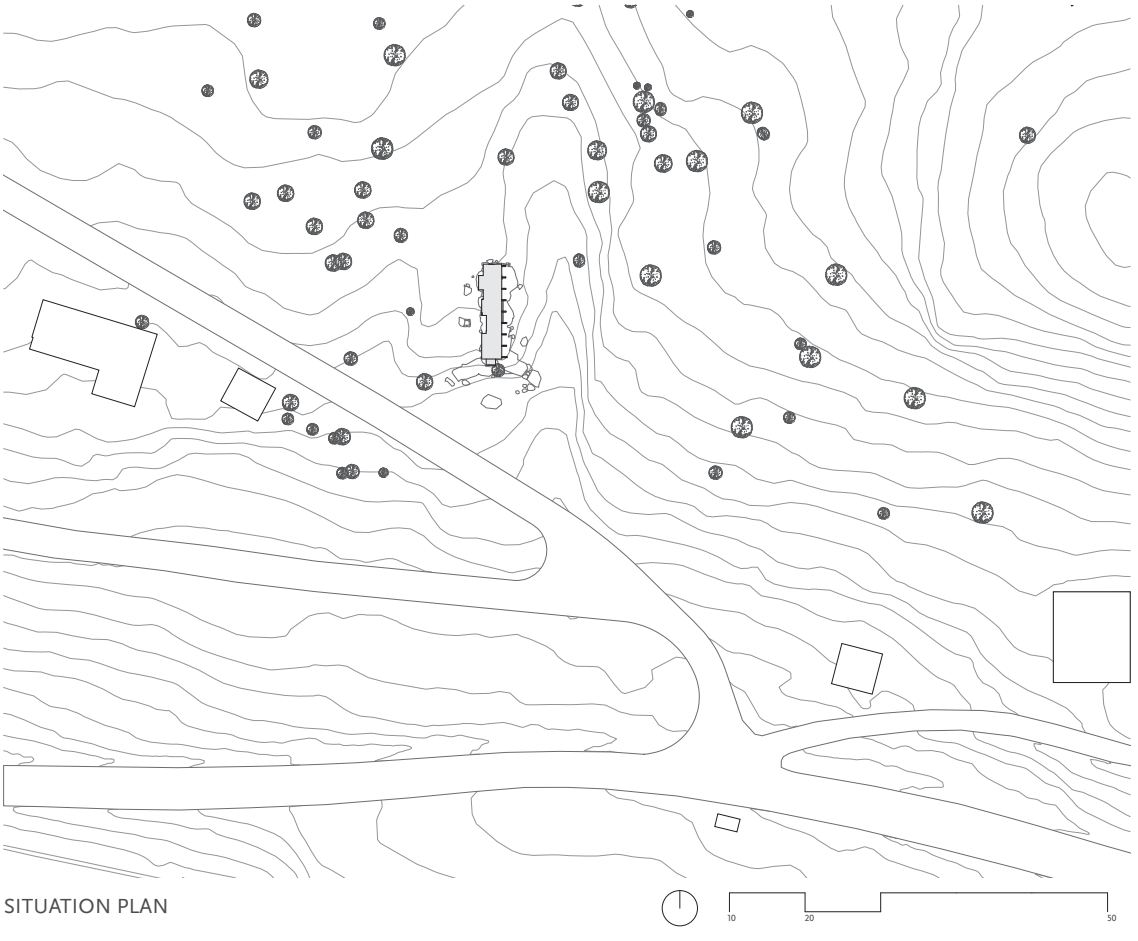
# LEIKEGØTA

DRAWINGS / PICTURES / REFLECTION

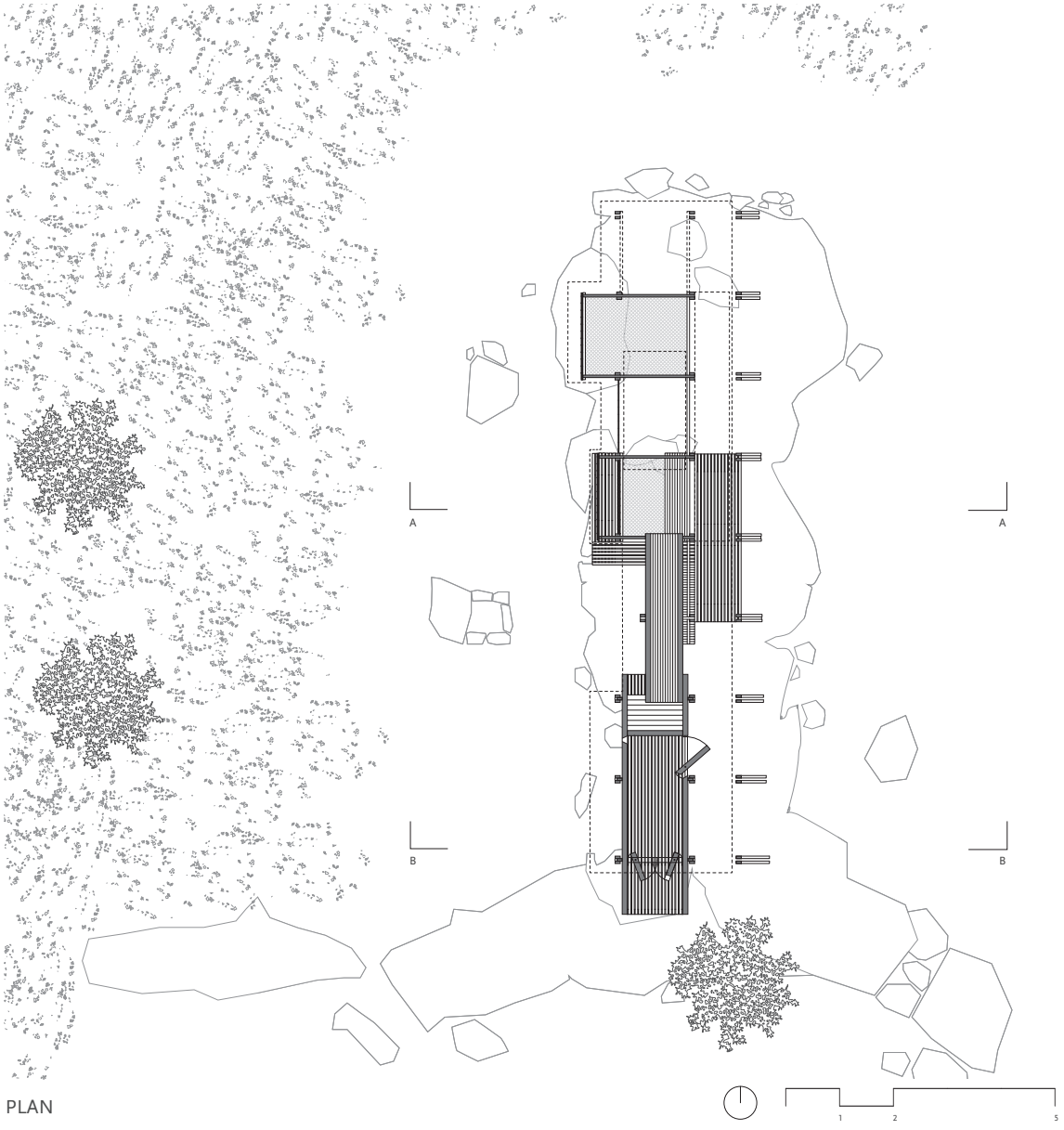
# DRAWINGS



LANDSCAPE SECTION

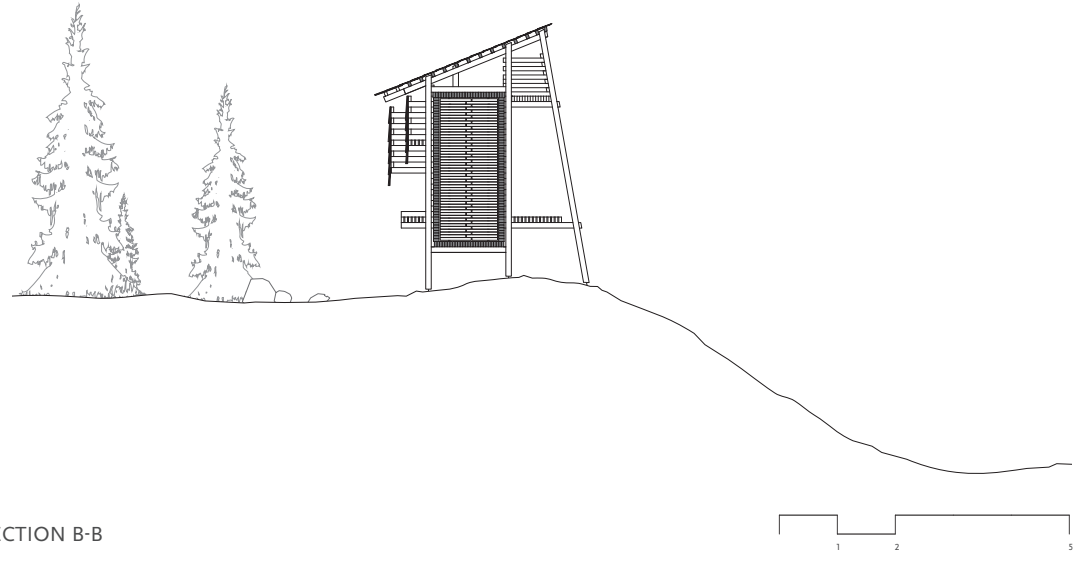



SITUATION PLAN

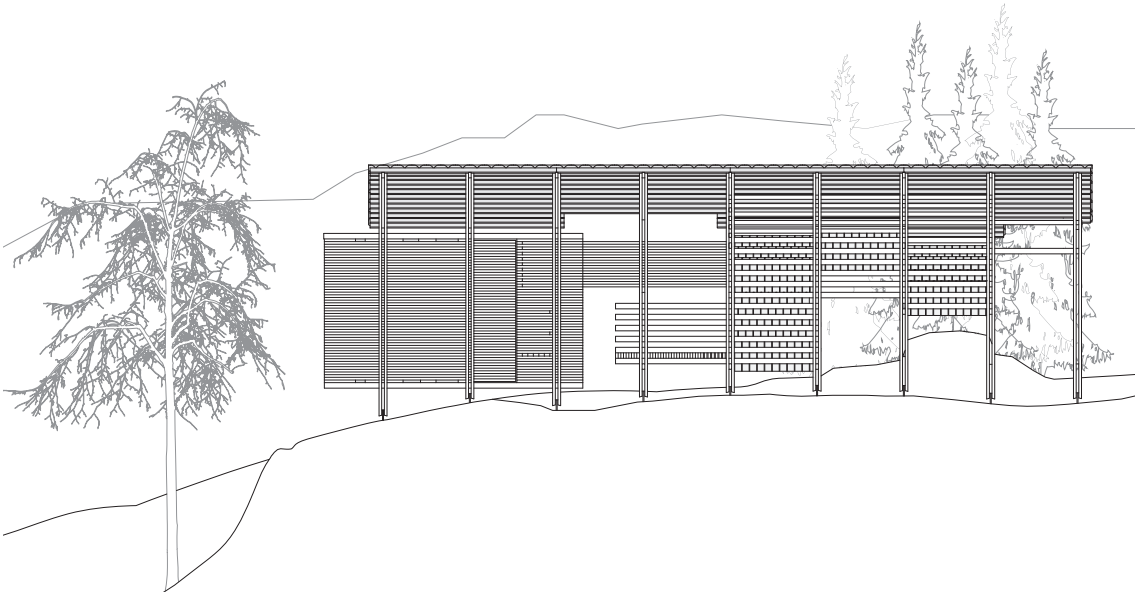



PLAN

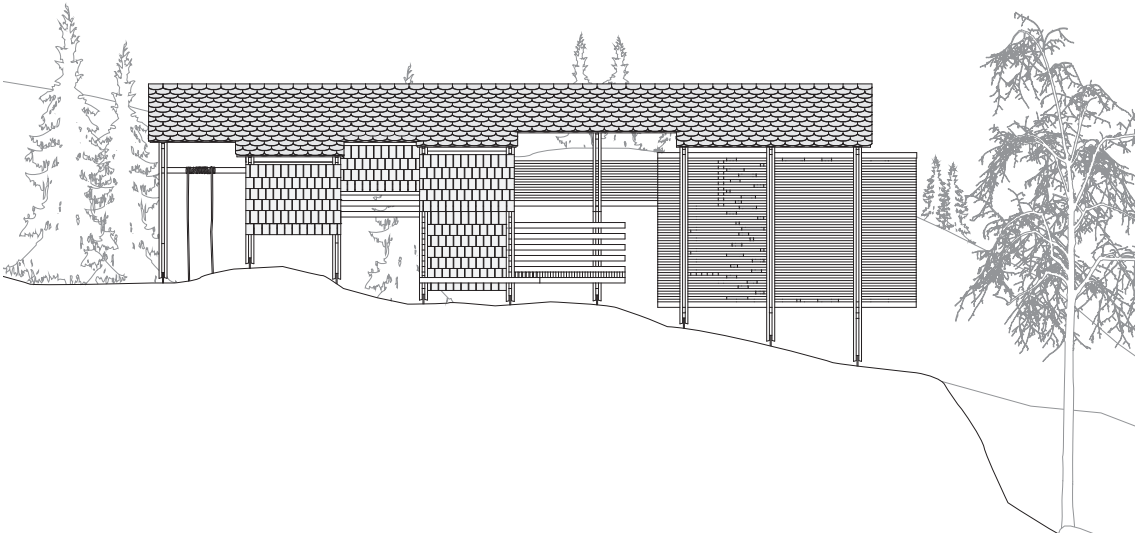
SECTION A-A



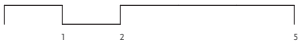

SECTION B-B



ELEVATION WEST



ELEVATION EAST



# PICTURES

# REFLECTION

Experimenting of how to build and how to work with materials in scale 1:1, has vitalized teaching in architecture the last two decades. This way of teaching, in addition to the more well-known abstract conceptualization in the studio at the University, has become more and more recognized.

Behind the effort of teaching architecture in scale one to one, there are comprehensive ongoing pedagogical and esthetical discussions within academia. How can we establish an understanding, which includes experiences and knowledge of so different characters?

Might we today possible learn from the ancient Greek philosophers about the ideas of Episteme, Techne and Phronesis:

• Episteme contains the theoretical, abstract and provable, which normally is understood as, the true notion of scientific knowledge.

• Tecne is what Aristoteles understand as, questions related to production and also to the production of products. The act of production Aristoteles describe as poises. The notion of Poises here means, to make something which did not exist before.

• Phronesis is the ethics and political value, where humans always belong to a society. This again means the ability to decide what is good, meaningful and useful for mankind.

To gain knowledge when being in a creative process of learning architecture, can mean to apply these three qualities from Aristoteles into play, not separately, but to bring them all three in interplay.

To study architecture in scale 1:1 seems to give a deeper understanding of the inherent form of a material. About this theme the Finnish architect Juhani Pallasmaa writes: “It is obvious we need an educational change with regards to the sensory sphere, for us to discover ourselves again as physical and mental beings in order to fully use our capability and become less vulnerable to manipulation and exploitation.”

When constructing the ‘Leikegøta’ in Vang within two weeks in April 2016, it became an intensive experience, when students had to think about time as an additional element in the creative process. The process of the work, more and more took over and little by little, the distinction between making and creating vanished.

— FINN HAKONSEN

# PROJECT PARTICIPANTS

## STUDENTS

Kristian M. Bjørnland
Zoé Bourret
Franziska Dohm
Pierre Géroudet
Sofia Jernberg
Tobias Lamadé
Karen Therese Lund
Simen B. Malde
Morten Mathisen
Niklas Profors
Aurèle Pulfer
Juho Remes
Elise S. Rolstad
Silje Sandvin
Thomas Skinnemoen
Sofie Thestesen
Marthe Vaagland
Cédric Wehrle
Stephanie Wünsch

## TEACHERS

Steinar H. Dyvik
Arnstein Gilberg
Finn Hakonsen
John H. Mork
Ina Samdal
Marius Waagaard

## EXTERNAL CRITIC

Peter Sørensen

## CONTRIBUTORS

Arild Øvergaard
(Norsk Massivtre AS)

Odd Arne Rudi
(Valdres Folkemuseum)

Hallgrim Rogn
(Innovangsjon)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# SOURCES

### PHOTOGRAPHS

Kristian M. Bjørnland
Zoé Bourret
Franziska Dohm
Sofia Jernberg
Tobias Lamadé
Simen B. Malde
Hallgrim Rogn
Sofie Thestesen
Silje Sandvin
Marthe Vaagland
Marius Waagaard

### PEN DRAWING

Thomas Skinnemoen

# BOOK EDITORS

Finn Hakonsen
Karen Therese Lund
Silje Sandvin
Sofie Thestesen
Marius Waagaard
Cédric Wehrle

# SPONSORS

Kvismo Sag AS

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Vang Kommune

The use of 1:1 building with wood is an important educational tool at the faculty of Architecture and Fine Art, NTNU in Trondheim. By designing and developing the students achieve competence in materials, collaboration and workmanship. Such skills are important for architects who want to create innovative wooden architecture.

During the spring of 2016 4th and 5th year architect-students developed and built a meeting place and playing ground while exploring different ways of building with wood. The place is Hensåsen, Vang.

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