Diving Centre

by Mats Thomassen

Diving centre in Hvaler, Norway

Mats Thomassen//10th semester architecture//architecture&design//Aalborg University

architectural supervisor Peter Mandal Hansen//technical supervisor Poul Henning Kirkegaard

table of contents

Synopsis

The popularity of scuba diving has increased drastically since its beginning, and on a worldwide basis it has become a billion dollar industry. In Norway, there where between 1984 and 2004 certified over 50.000 divers, and between these ones 500.000 dives was made each year. (Thomsen, 2004)

My purpose with the design of a new diving centre is to create an image for the scuba diving in the northern environment. Generally, the sport relates to people's search for new experiences, and by combining architecture with the right environment the diving centre will be able to create an unforgettable experience.

Introduction

In this chapter there will be generated a clear idea
of the projects background and its intentions.
A scuba diving centre is not only depending on the architecture,
the given location and its surrounding underwater environment
also have a huge effect on the final product.

Diving

Human involvement with the underwater environment has strong historical links; from underwater warfare to pearling. They relayed mainly on their ability to hold their breath in order to earn their living, while the Australian aborigines possibly where the first ones to use a 'snorkel' breathing through their hollow reeds. However, as a recreational activity, snorkelling and diving is considered a relatively new sport, and the first safe, reliable prototype equipment for scuba diving was provided in 1943. (Jennings, 2007)

Snorkelling and free diving is sports who requires limited amounts of equipment, using most of your time at shallow water or at the water surface. Those seeking greater immersion can experience scuba diving (SCUBA stands for Self-Contained Underwater Breathing Apparatus). Scuba divers can regularly reach higher depths what requires training and practice; this develops necessary skills to become comfortable with the equipment and the underwater environment, in order to safely enjoy the experience this sport has to offer.

The foundation of this project relates to the fact that water based tourism, and especially scuba diving, are continuously increasing all around the world. Numbers given by the Professional Association of Diving Instructors (PADI), for example, estimates that 600.000 new divers are certified all over the world every year. This represents a growth rate of approximately 6% yearly, a number which can justify the forecasts of the World Tourist Organization (WTO). They believe in 'underwater sports'* to grow as large as the ski tourism sector, so the diving tourism market is expected to expand very quickly in the nearest future. (Garrod, 2008)
Diving tourism is basically described as individuals leaving their own residence, spending at least one night away; during this period they should at least participate in one or more diving activities before returning. This indicates why most divers take part in this sport. First of all many simply dive for the fun of it, to enjoy the freedom of being under water. Secondly much of it relates to the social aspect of being with the other participants, telling their tales afterwards. (Garrod, 2008)

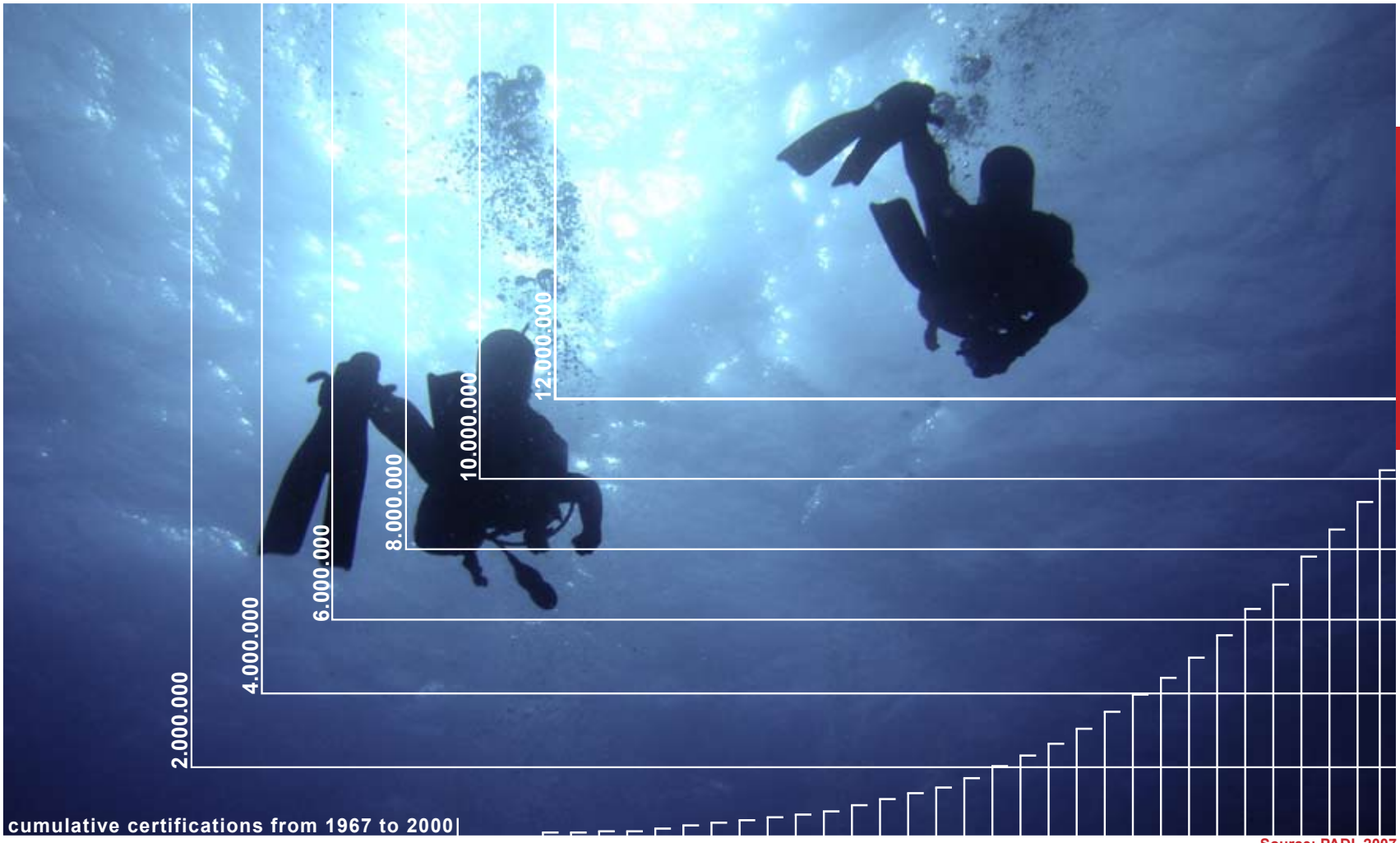
A massive increase in certified divers over the last few year, does not only make this a popular sport, it has also become a big business. Because of the the huge potential for money, there is as well a giant competition in grabbing clients all around the world. This means that the commercial value of what you have to offer will be important for the client's choice of centre. Here I see a potential of using architecture as an extra factor. First of all the design composition will enrich the total adventure of the stay, and secondly the right design will create a magnificent image of this particular diving centre.

Diving instructor Erlend Vaage says that it is the adventure people search, when they attend a diving class; they want to feel the nature and socialise in other ways. His experience has shown that the excitement for the adventure increases with the environmental conditions. The more nature the participants are able to take part in, the more satisfied they become. They want to sleep in bunk beds, provide their own food from the sea and totally change their way of living for a couple of days. Anything that can create a great story, people love to tell stories.

In my opinion, this is why the centre should be a combined resort for both more experienced divers, who only have need for a guide, and for the more inexperienced who have need for instruction. This can enrich the stay, when it makes a potential of achieving an exquisite atmosphere. The sport can establish an image for itself; experienced divers can shear their wisdom and stories with the students who want to create a relation to the sport.
Both single divers and groups should be welcome to join the centre at any time by booking. If they have the interest of diving in the area, experienced divers will be attracted from all around the world, while more inexperienced ones might have other missions. It could for example be a group of friends or a corporation which, during these days, wants to establish a closer relationship while learning to scuba dive. It is basically about giving scuba divers a possibility and reason to attend the site.

* Underwater sports is also including submarine excursions, underwater walks and other such activities

Picture - www.cardiffscuba.co.uk



Source: PADI, 2007

Red area shows the position of the diving centres location, while the right part are showing the group of islands belonging to Hvaler

Location

Based on his experience, Erlend Vaage has helped to pick out this location at Hvaler, in the south east corner of Norway. Hvaler is a group of many small islands and steep rocks; together they create a great environment for all kind of fish and shellfishes within short distance. He acclaims it to be one of his favourite places, both for diving and bringing students. It has an ability of always having a fascinating underwater life, where most of the submerged life belonging to a cold water environment is represented. At the same time it is only about an hour drive from Oslo and reachable by boat from the other site of the Oslofiord in less than 45 minutes. Cities like Gothenburg in Sweden and then also Copenhagen in Denmark have a reasonable distance, what makes it really accessible for people who wants to have a stay at the centre.

More precisely is the architectural field chosen to be at the two main islands of Lauer, which at the moment have no permanent residences. The northern island have a bigger assembling of summer houses while the southern island have only one spare time residence at the middle of this rock. The lack of houses at the southern island, generally relates to the permanent exposure to the rough open sea. Placing the centre at the north-east section of the southern island will create a certain demand to the construction; but it distances itself from the surrounding neighbours and in this way stays away from ruining their beautiful view.

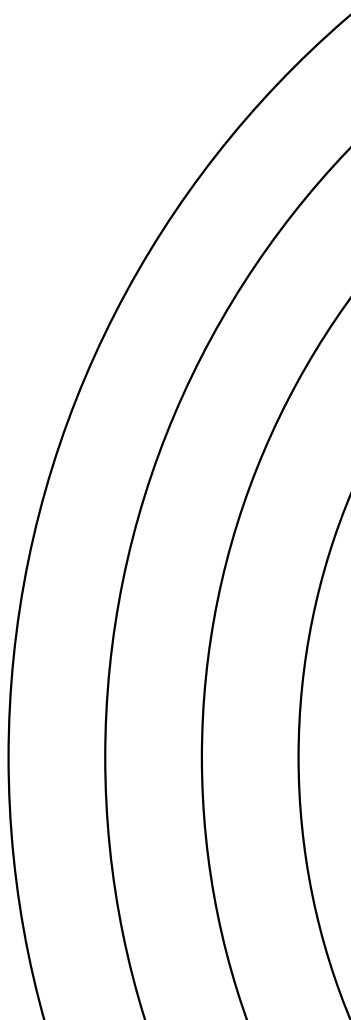
Even if the centre will be placed on the quieter side of the southern island, slightly screened off from the worst sea, its position still have contact with both the rough seaside and the more calm water between the islands. Walking across to the south end, you are able to spot the island Tisler 3 km away. Tisler is established as a nature reserve, where there is a massive assembling of different types of birds, which can be of huge fascination.

Hvaler spotted from the middle of the Oslofiord

* http://www.hvaler.kommune.no/inc/getfile.asp?ArtID=827&ContType=application/pdf

Geological is the islands of Lauer the same peak of one underwater mountain, this creates some shallow water between the islands compared to the water at the outsides of the rock; where it is steep and straight down. In the same area there are also a lot of different fishes and shellfishes, what makes it perfect for snorkelling or fishing between the scuba dives. At the same time the shallow water is perfect for diving lessons, what is of huge importance for running a place like this.

Placing the centre on an island, adds an extra dimension to the feeling of travelling away, since the attachment to civilisation more or less becomes eliminated. Before you even have reached the centre, the adventure has already begun when you either are being picked up at your arrival, or chose to take your equipment and swim out there. You might not know what you take part in or where you are going; while getting closer the excitement increases and is now an important factor of the total experience.
Given the great location and a fantastic underwater environment, it is up to the architectural composition to create a complete setting. From the first glimpse from the sea, and until you say good bye, the body should be triggered by the total experience. The architecture should provide an extraordinary dimension to the stay, what makes it worth visiting again and again.



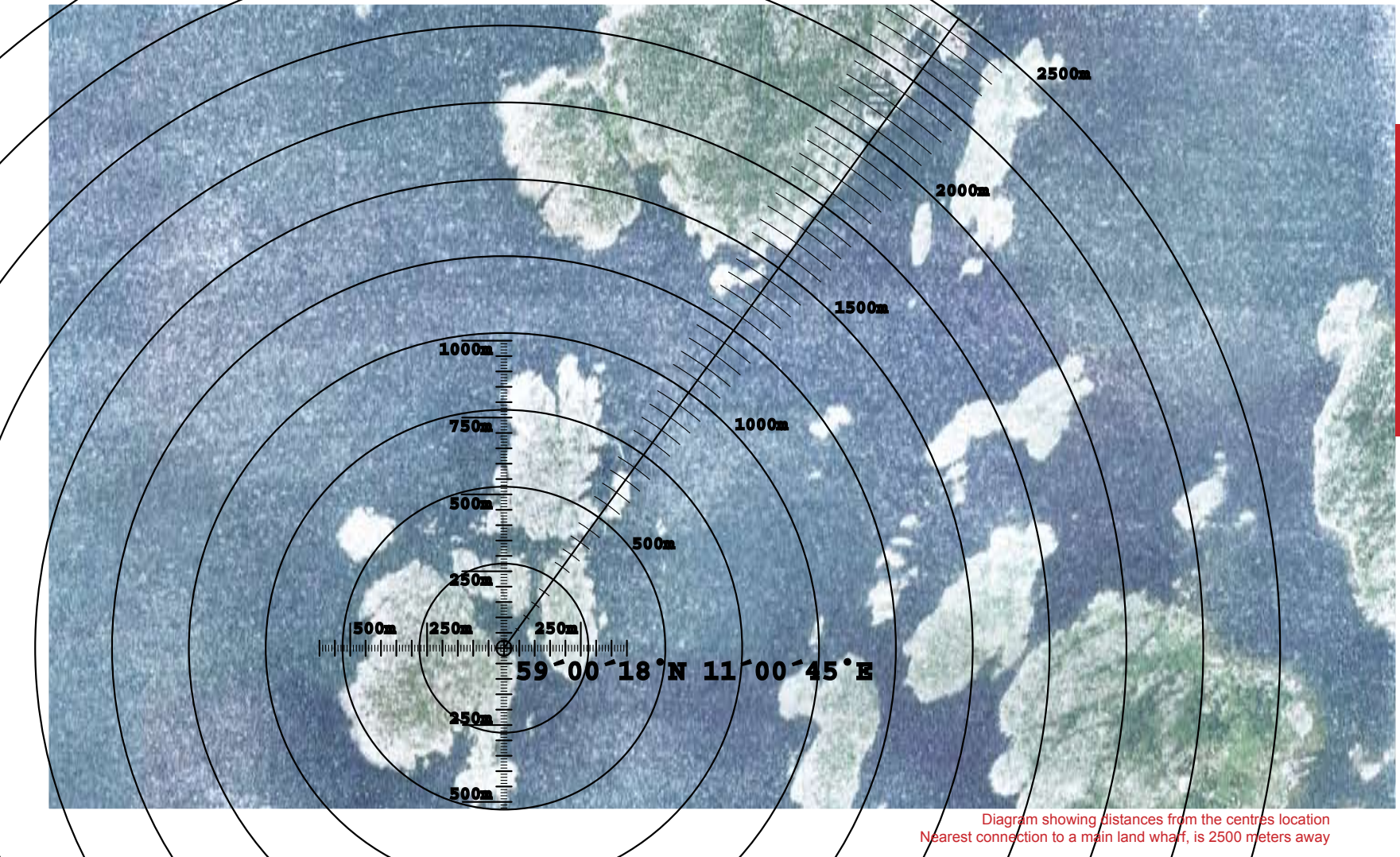


Diagram showing distances from the centres location
Nearest connection to a main land wharf, is 2500 meters away

Location of the project

Spatial program

The spatial program is worked out during a process, where the practical needs of a diving centre are mixed together with the social needs. The wanted diversity in the group of target have a space requirement for around 30 persons; it should be room for skilled divers at the same time as other takes part in a learning process. A maximum team for diving instructions should not exceed 16 persons , what means there will minimum be 14 spaces left for the rest of the divers including the crew which usually counts around 3-4 persons, relying on the situation.

A scuba diving centre is involving different types of practical needs. Especially the diving instructors prefer a given order for certain functionalities, since the flow in their daily routines partly depends on this. That all parts of the centre, which relates to diving, are placed close to the water, will avoid wet equipment from being dragged through the centres other facilities; for example would it be preferred to have the shower and wardrobe close to the entrance. Secondly should storage, workshop and the more practical elements related to the sport be kept within a short distance. Except from all the functions, there will as well be a need for more regular areas to cook, hang out and sleep.

The spatial program is listed with minimal space requirements and in a suggested spatial order, all based on their given functionality; it starts closest to the scuba diving scene.

The total area of around 275 square meters should only be seen as guidance for the design.

Pool – required to hold diving courses for beginners. Should incorporate two levels, one at 1-1,5 meter and one at 4 meters.

Wharf – provides the access from boat to shore

Showers 15m2 – will be in use for both rinsing equipment after diving and having a shower

Wardrobe 30m2 – place to get dressed before entering the water

Storage 20m2 – room for the centre's personal equipment; it should be locked

Repair shop 10m2 – a little workshop area for standard service of equipment

Air-compressor 15m2 – provides the possibility of refilling air to the cylinders

Meeting rooms 2x20m2 – classrooms for approximately 16 persons to hold diving instructions

Kitchen 15m2 – both indoor and outdoor cooking facilities for social dining

Common area 60m2 – space for eating and social hang arounds during the whole day

Lavatory 15m2 – simple conditions for your most basic needs

Sleeping area 60m2 – is preferred as common sections which contain simple sleeping solutions

Vision

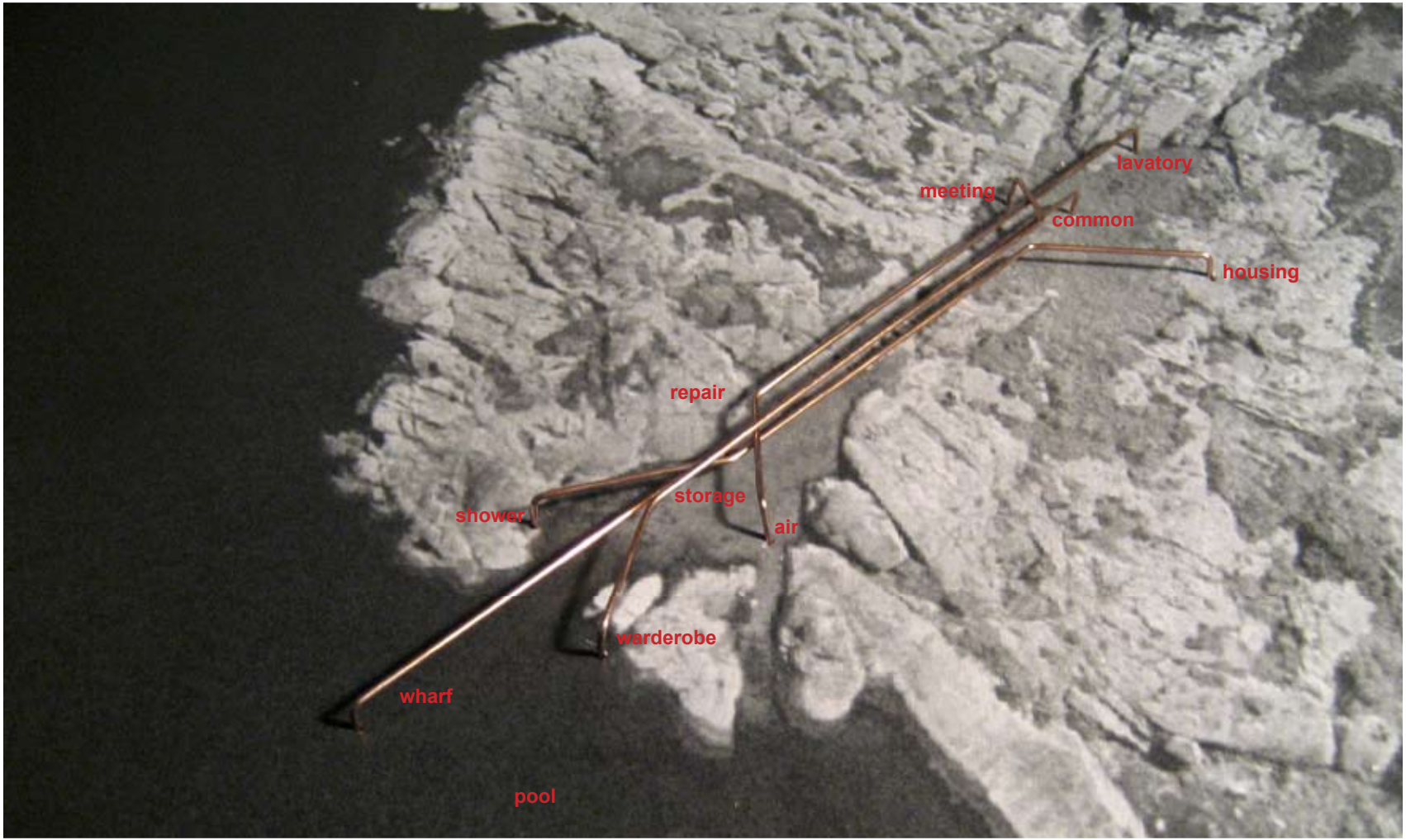
There is a criterion of this projects success, that it do not only expresses its relation to scuba diving, but as well become practically functional for both staff and divers. Scuba diving is generally a game of moving between water and land so it is important that the project communicates this transmission by its composition.
A wish will be to let the total combination remarkably stand out from the topography, but never forget that the nature is the main event. Functional spaces could preferably be comfortable, but at the same time let the natural influences from the site reach under the skin at any time. The architecture should provide, that attending this centre leaves more to the mind than only scuba diving; an atmosphere which enriches the stay will complete the adventure.

Panoramic view, shot from the inner parts of the bay and towards the open water
In the periphery you see the site

An approximated visualisation of the scuba diving centres position in the bay

The scuba diving centre

During this chapter visual diagrams and drawings will explain
the architectural ideas and solutions of this scuba diving centre.
As parts of the building are placed in the water zone,
tide becomes a visual factor; all the material will be presented at level zero,
while the water surface can have a general diversity of 80 cm during the day.



Conceptual site diagram explaining the idea of fragmented units along a given axis
The creek will be used as the buildings shelter, while it treach between the two environments

Site concept

With background in the given location and a wanted architectural expression, there is developed a diagrammatic concept for the building and how it relates to the surrounding impulses. When considering cities and urban spaces, architecture often turns out to be the main attractions of the city. Speaking of natural environments the opposite seems to be true; country tourists like their landscape to be as natural and unspoilt as possible. Architecture should in this way make the landscape habitable for tourists, at the same time as it brings out this authentic experience surrounding it. (van Dijk, 2004)

With this background there is a wish of framing the brutality of the nature in the area, and in addition keep the rock surfaces so untouched as possible, both visually and structurally. This will provide that the surrounding stands back in their original shape and by this avoid ruining the total experience of the landscape. Instead of having a building dominating the scene of the landscape, the landscape should dominate the building.

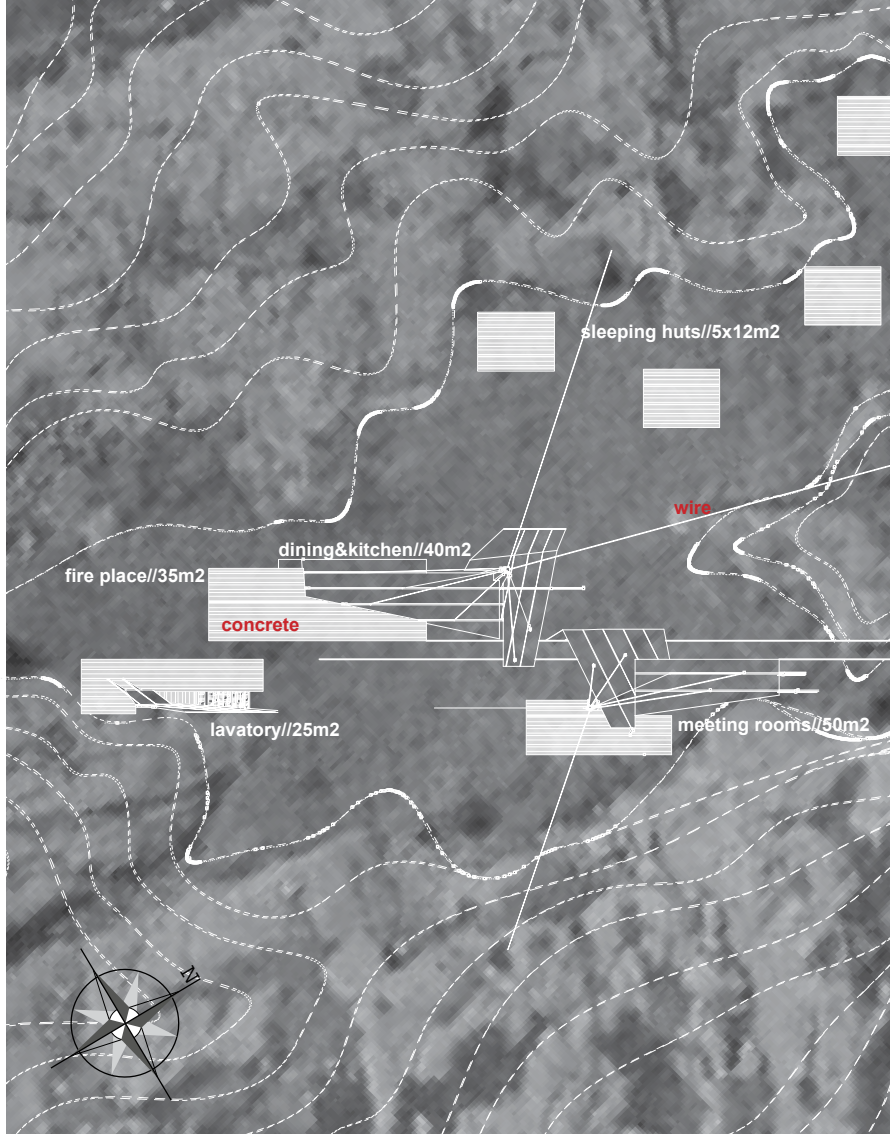
It is decided to take in use a little creek, which clearly expresses the transmission between water and land, what diving is about. The architectural composition should follow the patterns which nature has created in the landscape, and the valley between the rocks can now be used as a shelter for the scuba diving complex. While the sea breaks off within a short distance, you are now able to stay safe in the quietest section of the island. By keeping the scene of the open water screened off from the permanent view, the contrast will make it even more fascinating when you enter it.

As the diagram shows, a long central axis will connect the water with the shore, while fragments along this axis define the functional spaces required for the centre. Diving related units is placed in the water zone and the practical and liveable areas is established on the shore. Both the main sections are now in close connection to its belonging environment and the visual distance between them creates a clear image of two different situations.

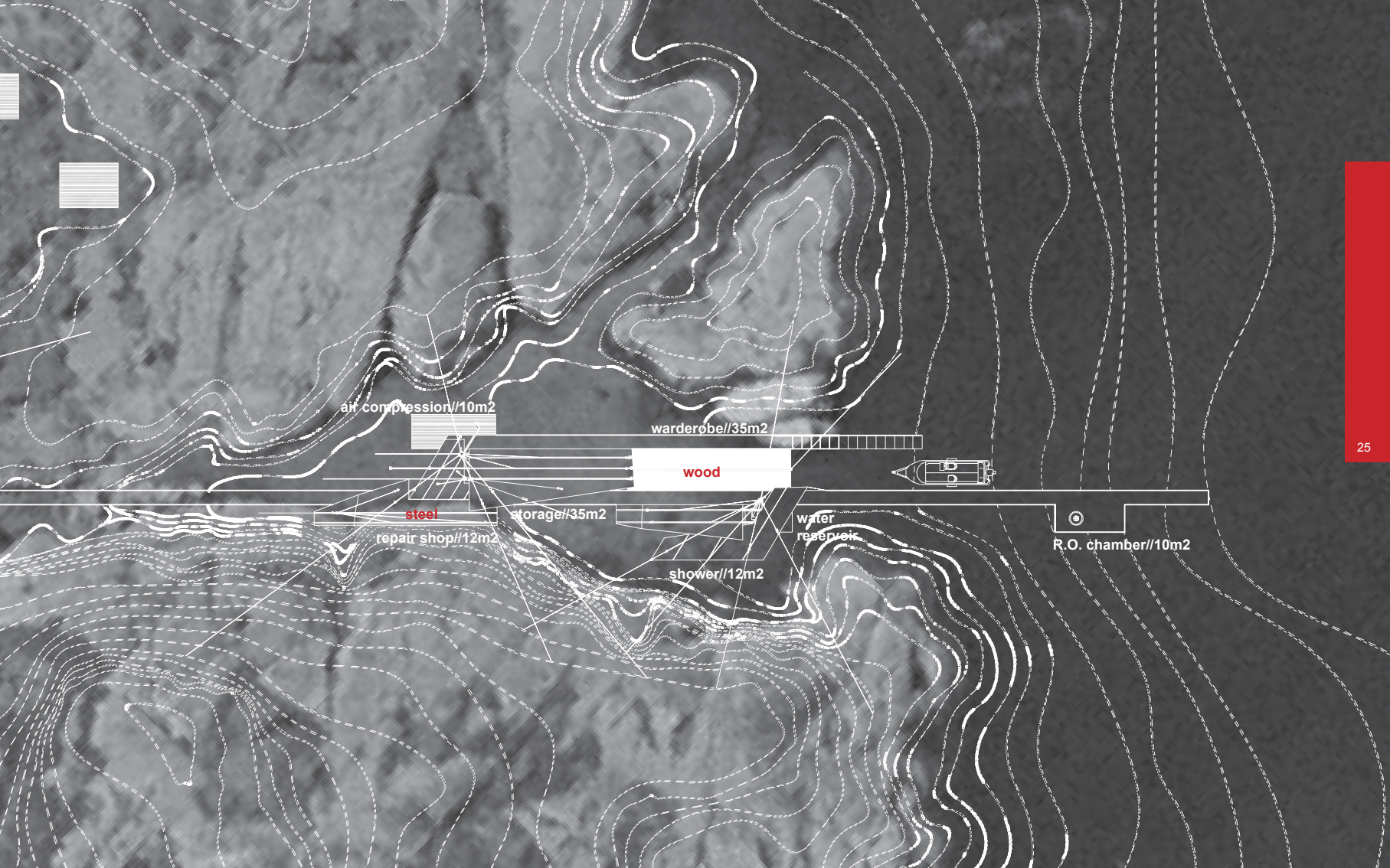
Building composition

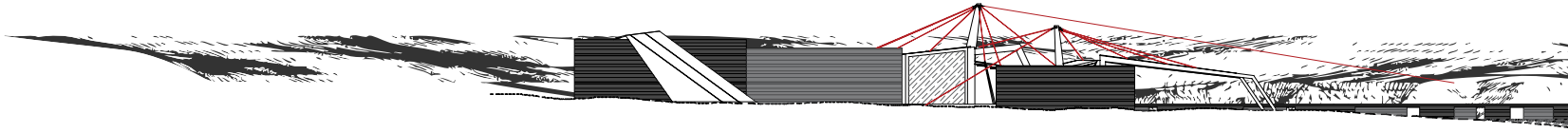
With a given length of 158 meters the complex reaches from the central parts of the bay and all the way to the end of the valley, in between the surrounding rocks. A concrete wharf is expressing a clear direction, while fragmented building units surround the axis and composes a fully functional scuba diving centre. Except from the wharf, concrete are used in rectangular building parts which is set in contrast to different triangular steel elements. Centrally placed columns are spreading out a layer of wires between the rocks and the steel structures. Except form stabilizing the construction, the wires give an impression of the rocks as solid elements, controlling the architectural composition.

From one end to the other, you have the wharf which reaches out like a pier and presents itself to the open water. Such a geometric element will achieve attention in the dynamic landscape, and indicates the position of the centre. At the same time it works as a shield for the parking boats and the 'open water pool'. After arrival, the wharf will gradually reveal parts of the centre which is hidden by the landscape. The fact that you move in a valley, creates a natural facade to the composition in shape of the surrounding rocks. How the composition covers and reveals the view in different ways creates multiple images along the way.
The first section by arrival, or after diving is placed in the water, here it is a clear dominance of steel compositions which brings out the dramatic feeling of the sport scuba diving. In the other end, there is a bigger dominance of concrete blocks which brings out the image of a secure shelter, for times when the weather becomes to rough. With the use of concrete elements, a horizontal line is created in the landscape where the wharfs permanent height of 1 meter above lowest sea level turns into a measuring line. To meet the water surface at any time there is at the upper wharf created a stairway and between the two wharfs there is placed a wooden pontoon.



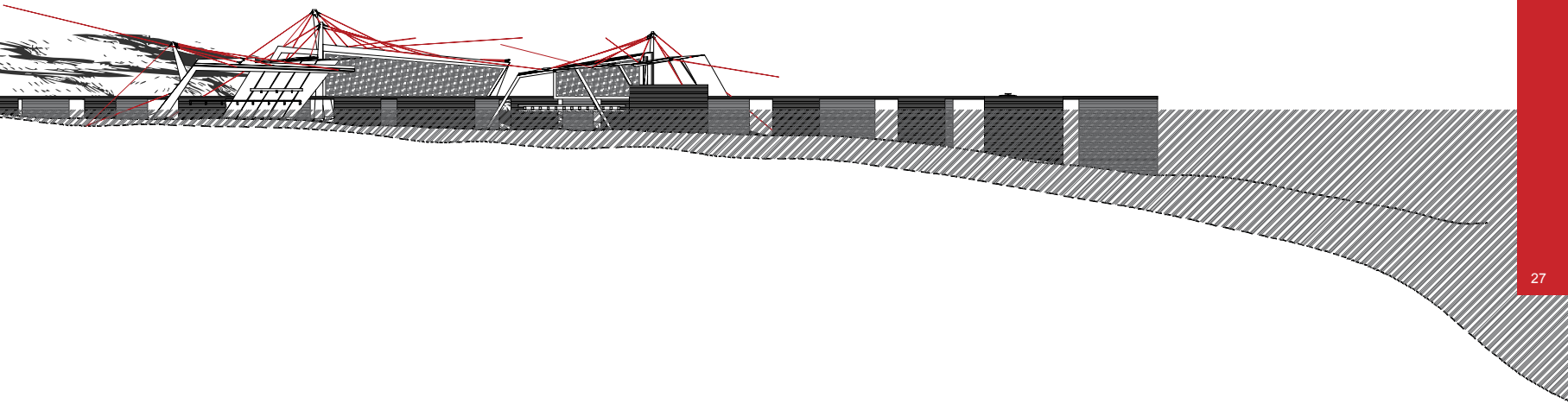
Siteplan 1:500


air compression//10m2
warderobe//35m2
wood
steel
storage//35m2
repair shop//12m2
water
reservoir
R.O. chamber//10m2
shower//12m2



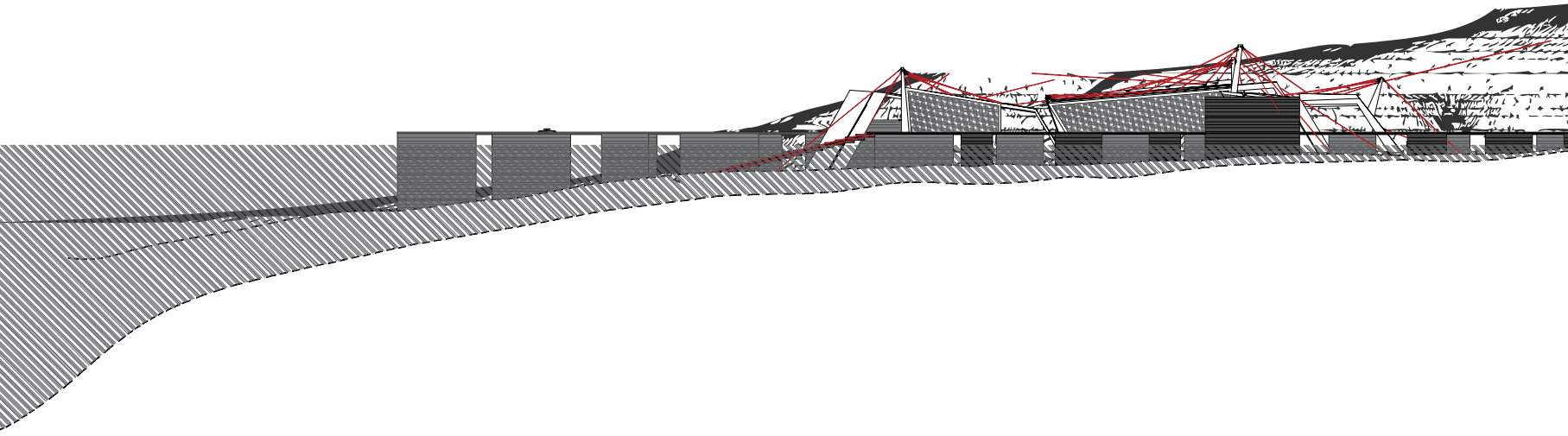
As the wharf disappears into the landscape, an expression of a concrete structure which evolves from the rock surface and into the wet element is defined. This building complex is progressively going underwater, and follows the diver from his safe location on land and into the new and daring environment under water. The wharfs concrete deck is carried by vertical walls which regularly appear along the axis; in this way the water can circulate naturally in between the structure and avoid water from being stuck in the cove.

While concrete sections separate outside from inside, steel spans is in another way creating open spaces which reveals itself to the surrounding nature. In areas which have the need, it is incorporated transparent materials in the facade for to create a physical separation between inside and outside. For the sections at land there are primary used polycarbonate plates to create weather barriers. Walls in the other end are incorporating three crossing layers of stretched metal creating a visual shield, while keeping the steel construction open aired.



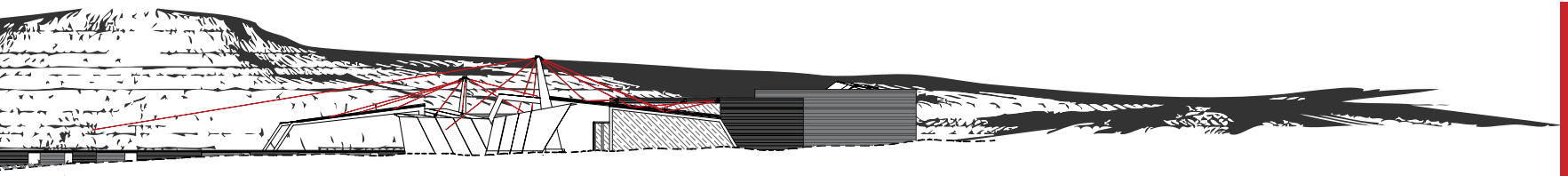
Free steel spans are defining open and dynamic spaces; to provide this expression there is combined cables with smaller roof beams. A visually thin roof structure is composed to make the steel look as light as possible in combination with the solid rocks and the concrete surfaces. Higher columns provide a remarkable angle between the top and bottom of the cable; visually it creates an image similar to certain marine vehicles. To provide stability for the columns and cables in all directions the wires are attached to the massive surrounding surface.

Elevation in south west direction 1:500



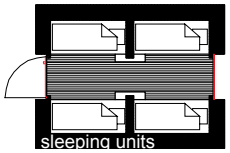
Elevation in north east direction 1:500

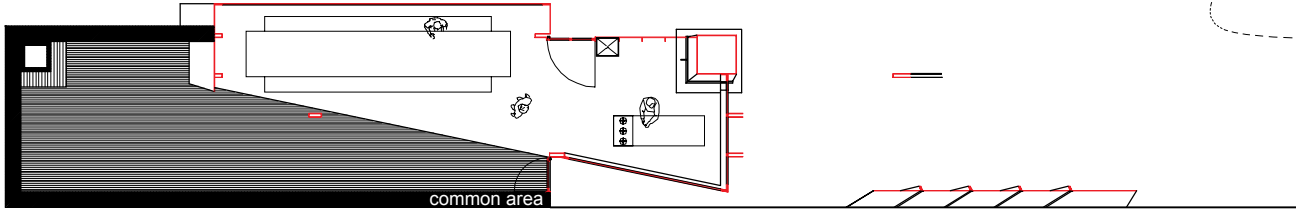
The big rock which creates a back to the building, is primarily what separates the centre from the open sea on the other side. Only the highest reaching masts and wires together with the concrete pier are all what one is able to spot at arrival. This is enough to create curiosity, without revealing too much of itself for the spectator. The whole story of the building is actually not given before you have moved along the whole distance of the axis.



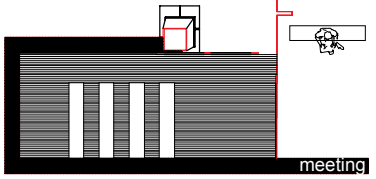
Also during the day this composition will have different expressions; generally does it relate to tide and the change in water level. At the highest level only the top deck at the wharf are visible; a floating concrete deck now become the image instead of the earlier hovering one. Now, the top of the wooden pontoons reach beyond the concrete line, what indicates the nature's dominance over the solid composition.

At the liveable area on the shore, there is used a bigger amount of steel facing the north west direction; in this way there is created a visual interface between the separated sleeping huts and the common areas. Opening up in this direction makes the intermediate space a zone for social gatherings and outdoor activities, when for example fishing, snorkelling or scuba diving no longer catches the interest.


sleeping units


common area


lavatory

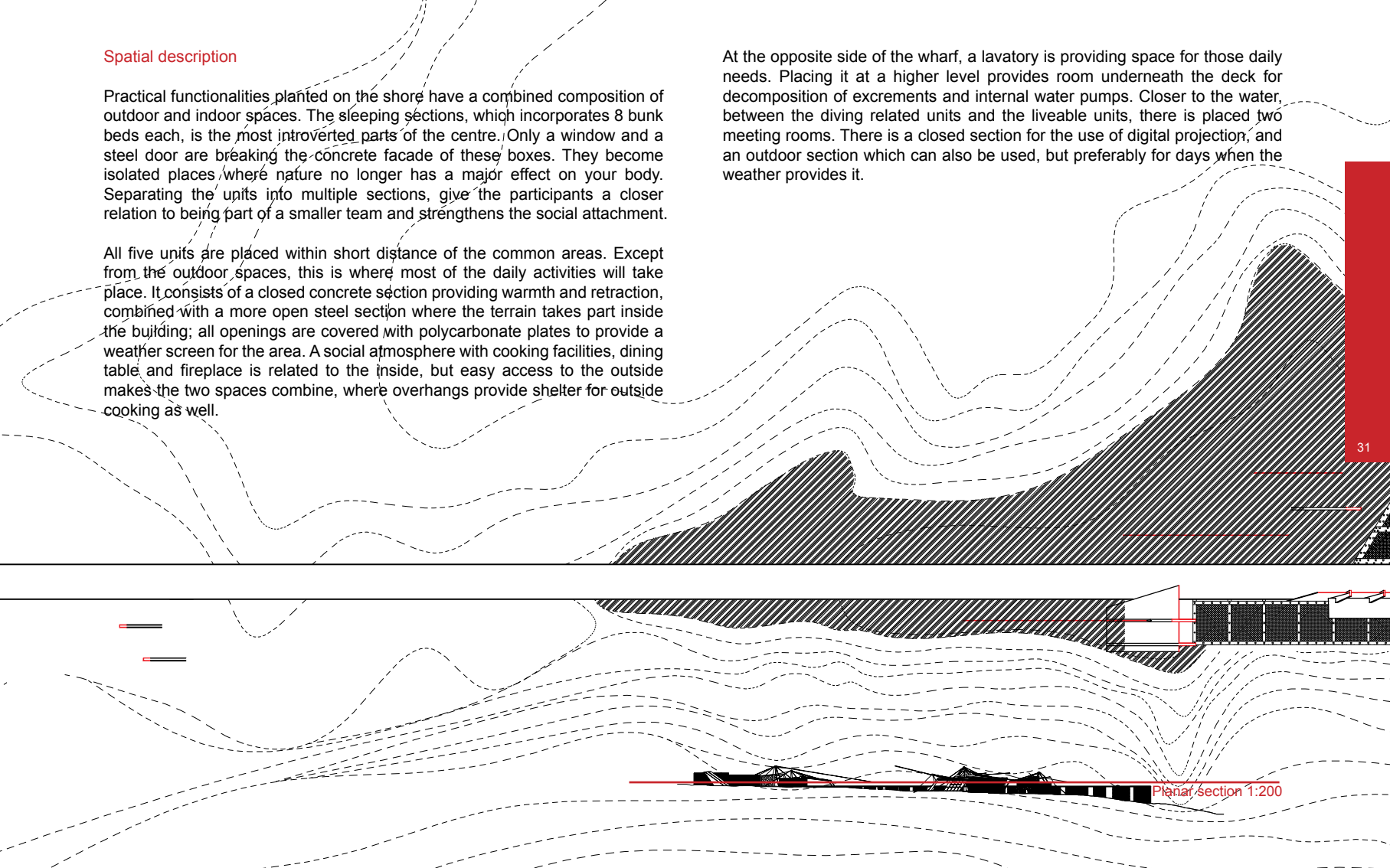

meeting

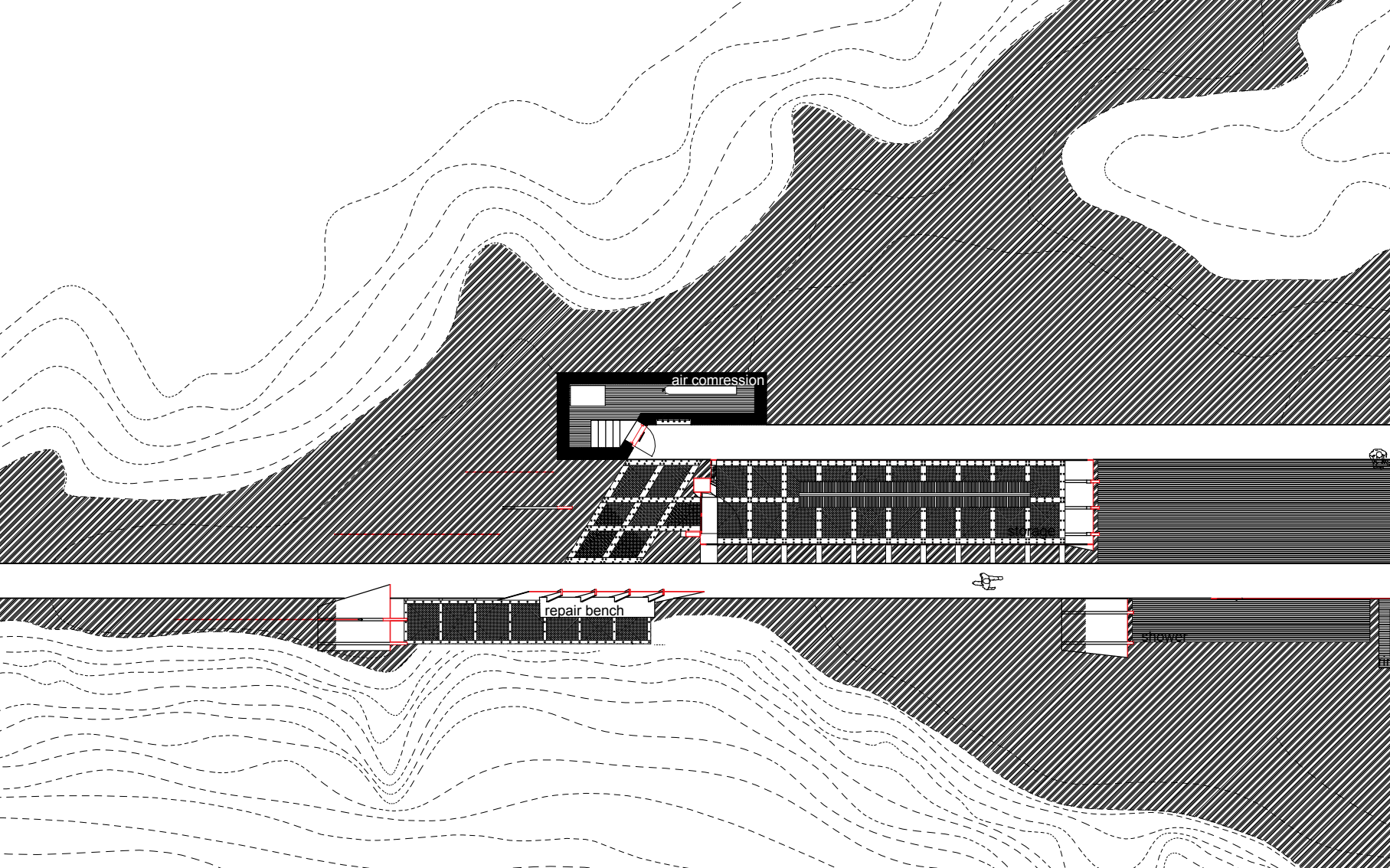
Spatial description

Practical functionalities planted on the shore have a combined composition of outdoor and indoor spaces. The sleeping sections, which incorporates 8 bunk beds each, is the most introverted parts of the centre. Only a window and a steel door are breaking the concrete facade of these boxes. They become isolated places where nature no longer has a major effect on your body. Separating the units into multiple sections, give the participants a closer relation to being part of a smaller team and strengthens the social attachment.

All five units are placed within short distance of the common areas. Except from the outdoor spaces, this is where most of the daily activities will take place. It consists of a closed concrete section providing warmth and retraction, combined with a more open steel section where the terrain takes part inside the building; all openings are covered with polycarbonate plates to provide a weather screen for the area. A social atmosphere with cooking facilities, dining table and fireplace is related to the inside, but easy access to the outside makes the two spaces combine, where overhangs provide shelter for outside cooking as well.

At the opposite side of the wharf, a lavatory is providing space for those daily needs. Placing it at a higher level provides room underneath the deck for decomposition of excrements and internal water pumps. Closer to the water, between the diving related units and the liveable units, there is placed two meeting rooms. There is a closed section for the use of digital projection, and an outdoor section which can also be used, but preferably for days when the weather provides it.

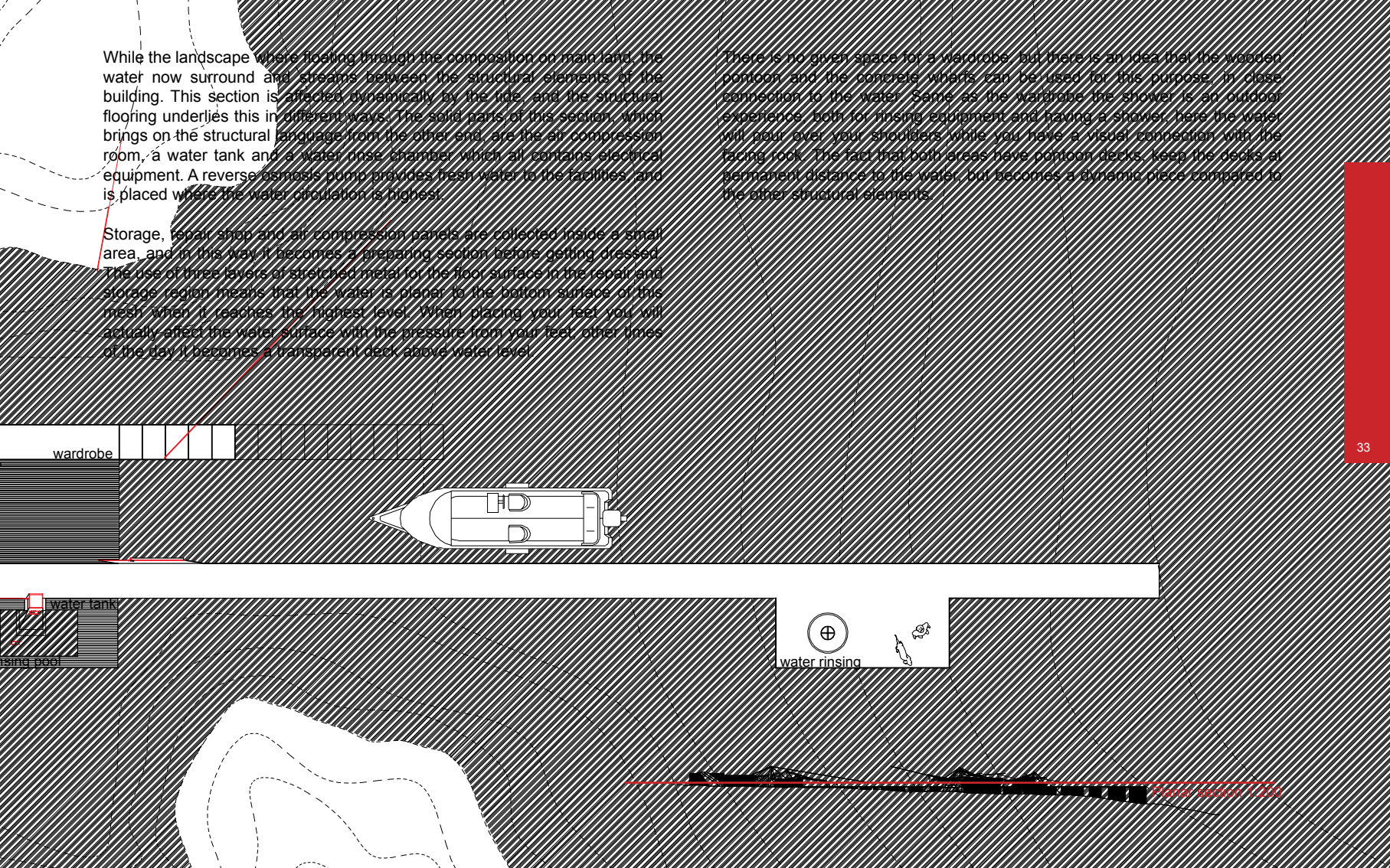



air comression
storage
repair bench
shower

While the landscape where floating through the composition on main land, the water now surround and streams between the structural elements of the building. This section is affected dynamically by the tide, and the structural flooring underlies this in different ways. The solid parts of this section, which brings on the structural language from the other end, are the air compression room, a water tank and a water rinse chamber which all contains electrical equipment. A reverse osmosis pump provides fresh water to the facilities and is placed where the water circulation is highest.

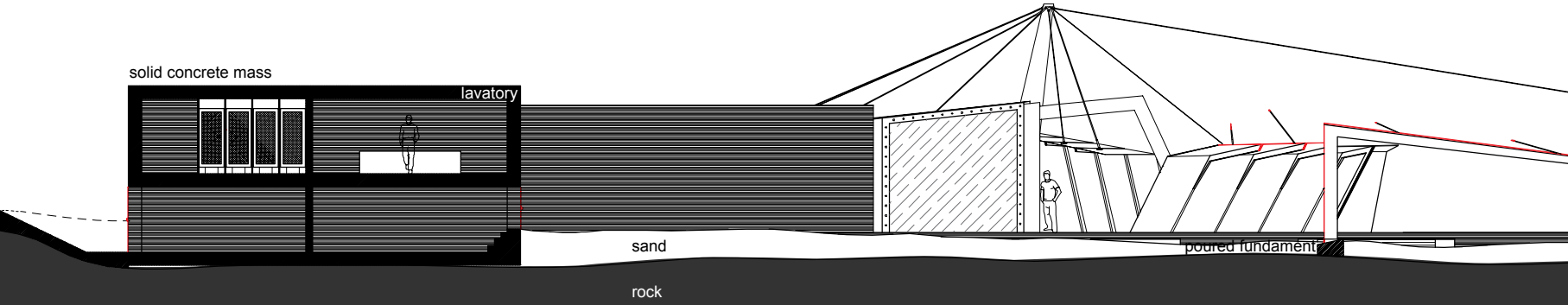
Storage, repair shop and air compression panels are collected inside a small area, and in this way it becomes a preparing section before getting dressed. The use of three layers of stretched metal for the floor surface in the repair and storage region means that the water is planar to the bottom surface of this mesh when it reaches the highest level. When placing your feet you will actually affect the water surface with the pressure from your feet, other times of the day it becomes a transparent deck above water level.

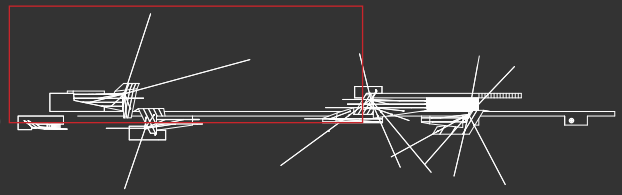
There is no given space for a wardrobe, but there is an idea that the wooden pontoon and the concrete wharfs can be used for this purpose, in close connection to the water. Same as the wardrobe the shower is an outdoor experience, both for rinsing equipment and having a shower, here the water will pour over your shoulders while you have a visual connection with the facing rock. The fact that both areas have pontoon decks, keep the decks at permanent distance to the water, but becomes a dynamic piece compared to the other structural elements.



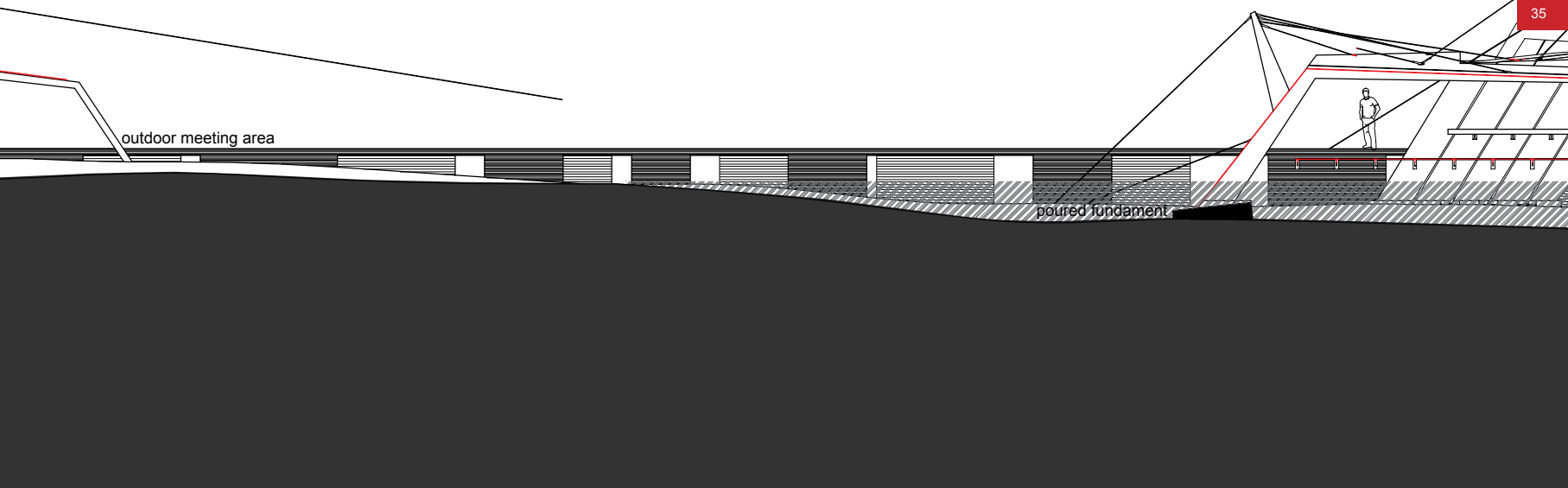
Structural composition

The architectural composition is based on the idea of keeping the cliff surface as untouched as possible. To provide this, most of the concrete volumes use their own weight and figure to stabilize themselves on the layer of sand, which already is presented at the site. Smaller concrete columns and platforms are on the other hand poured to the rocks surface, and work as fundaments to the steel compositions. Some of these fundaments are slightly visible above sand level while other parts of the steel are penetrating the surface; it creates the image of an evolving structure.

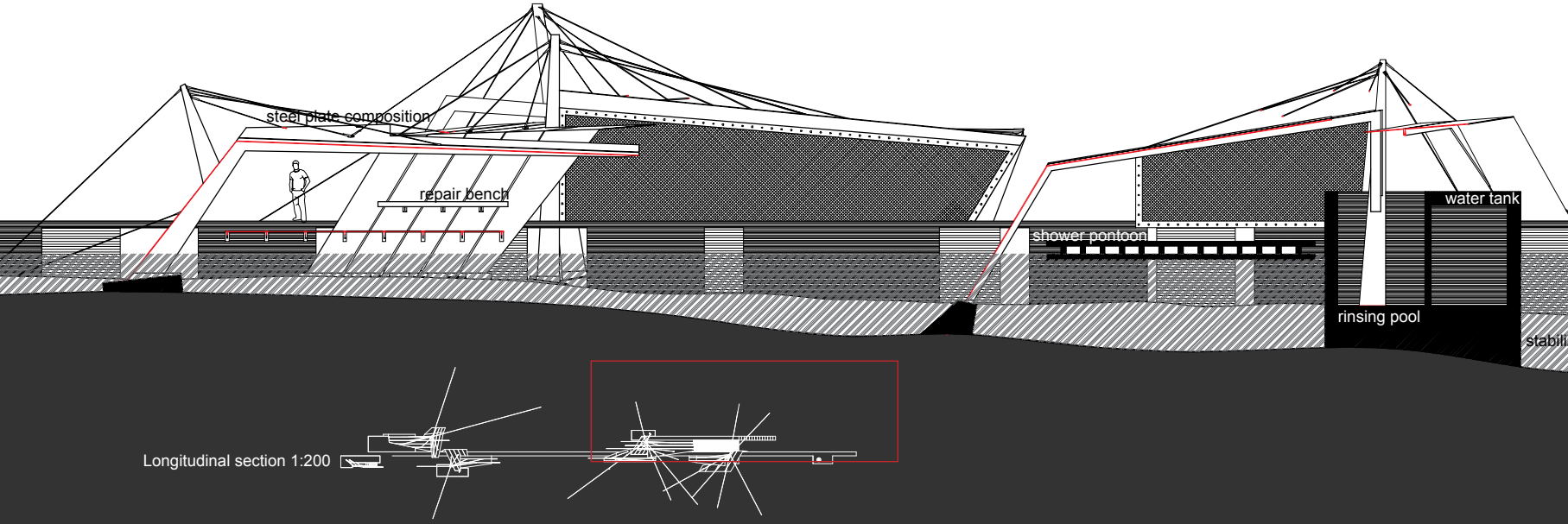




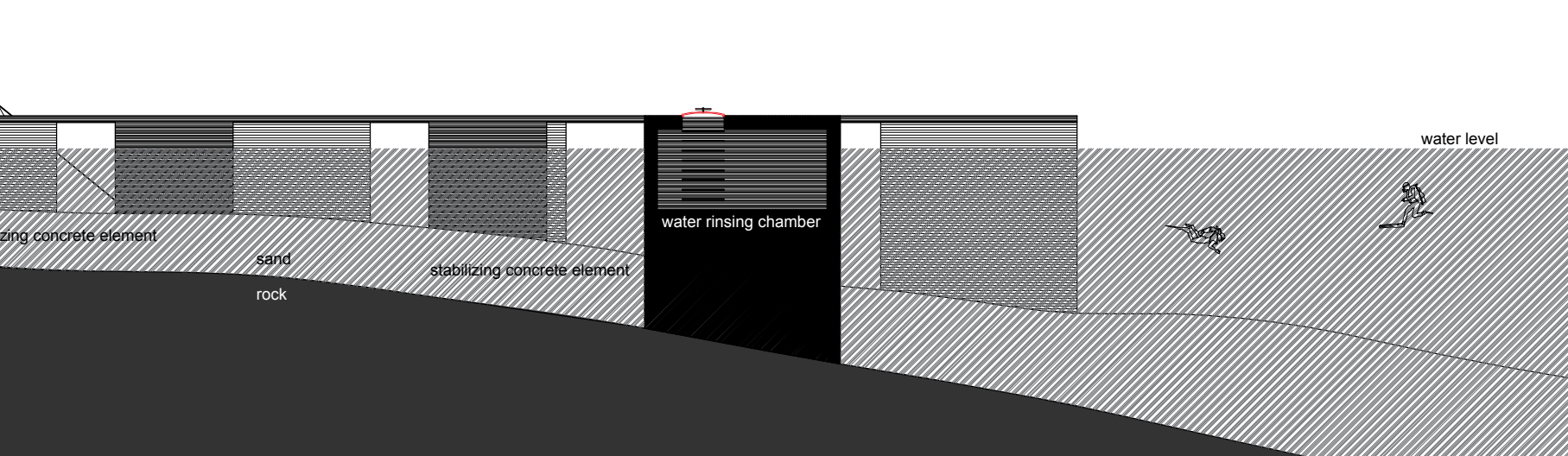
Longitudinal section 1:200


outdoor meeting area
poured fundament

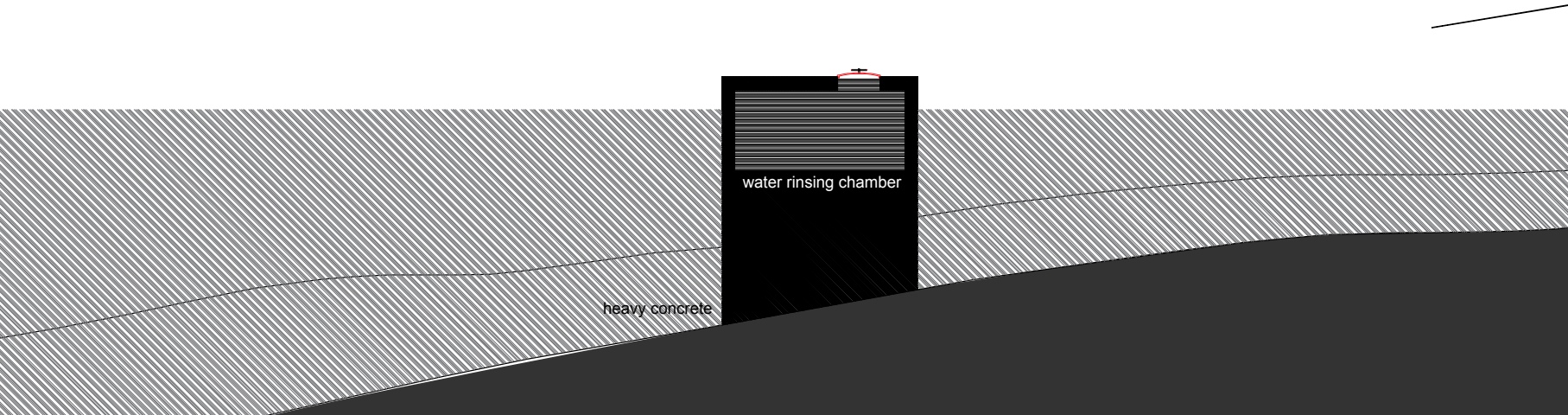
Caused to the fact that the rock surface have a steeper angle in the water zone the concrete, which make the R.O. chamber and the water tank, is poured to the rock surface. The wharf on the other way is supporting itself in the sand, and uses the other concrete elements as stabilizing points; some of the steel elements use these solids as fundament themselves. Except from the concrete fundaments, the steel constructions work like freestanding structures. To stabilise the structure in all directions a minimum set of two steel plates are always taken in use; they can now work together in two separate directions. All the plates are welded together to be in full connection, and make it look like they melt together into one bigger piece.

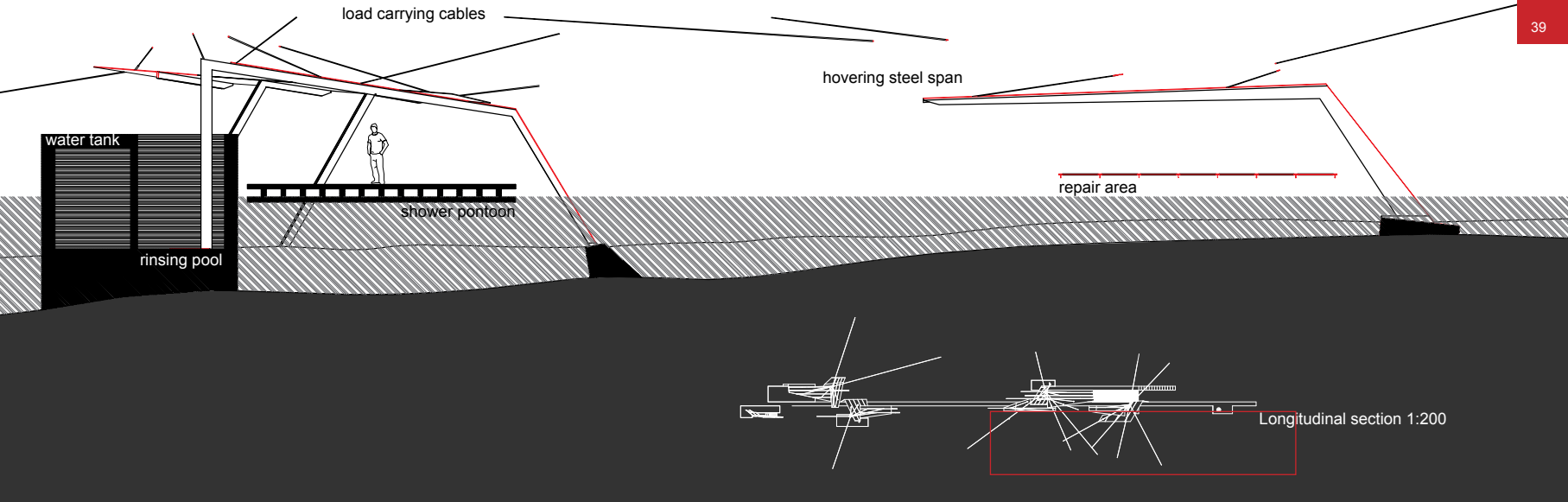


Longitudinal section 1:200


water level
water rinsing chamber
zing concrete element
sand
stabilizing concrete element
rock

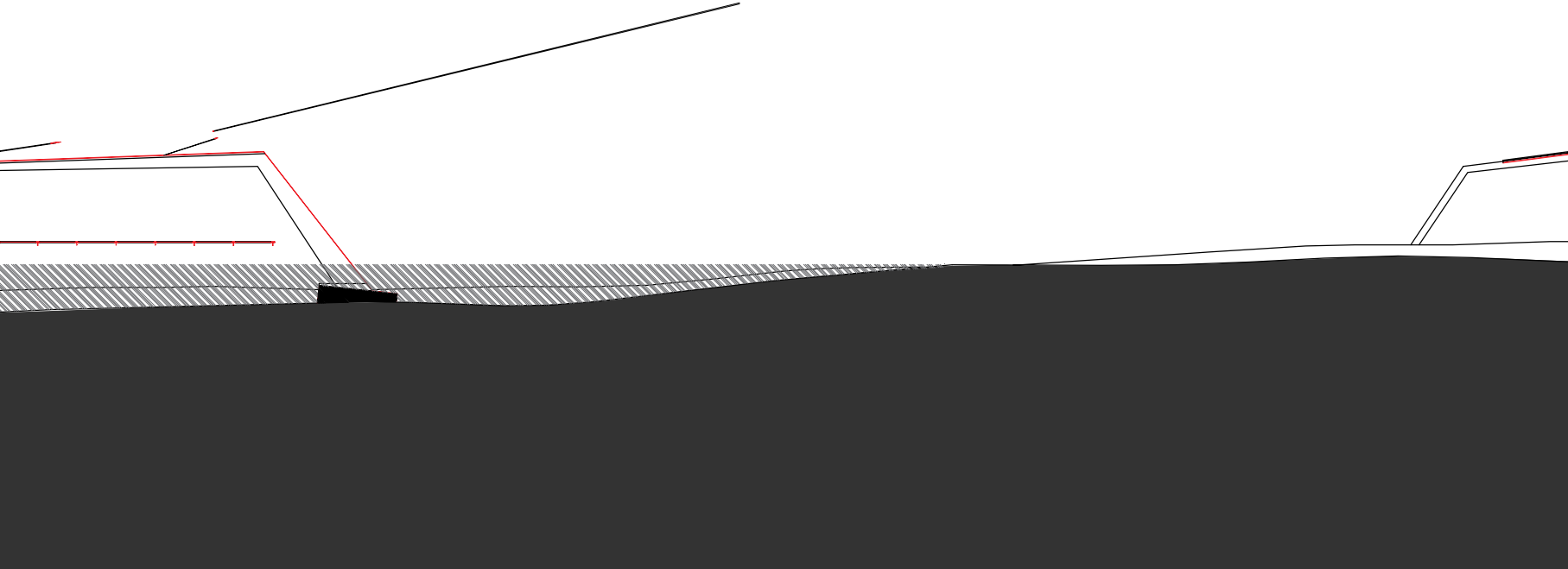
Steel components are basically working as roofing for bigger parts of the building; it covers up and defines different areas in the total composition. Cables avoid the use of heavier structural elements to carry the steel spans; it expresses steel as the light element. The three materials, concrete, steel and wood positions themselves differently to the water as an element. The heavy concrete solids which the water dominates, creates a visual effect of something that is on its way down under; this become amplified when the floating pontoons rises with the water level. Pretty unaffected from the change in tides, steel will stand back as hovering elements carried by the adjacent and dominating rocks. All together, the change in levels creates a varying expression of the building through the day.

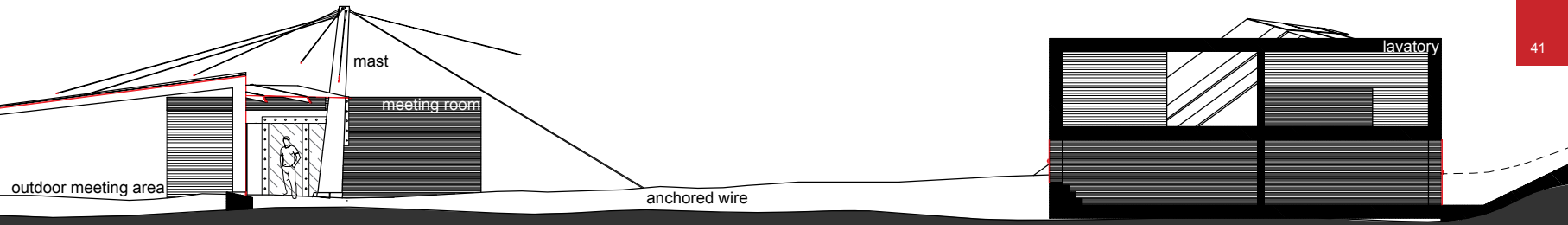


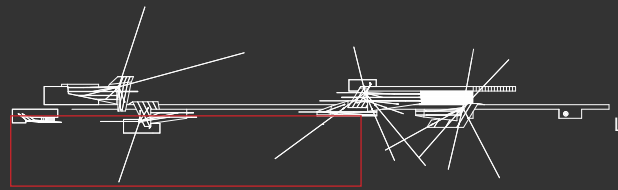


Longitudinal section 1:200

All the cables spread from different masts; some attach themselves to the buildings roof structure while others are anchored to the rocks for total stabilization. Each complex has their own cable source and this creates some central points defining a functionality at the place. There is one column each for the common area, meeting section and shower, while two poles dominate the practical area of storage, repair and air. This indicates the last section as the main pivotal point of the centre, since it have the closest relation to the sport of scuba diving.

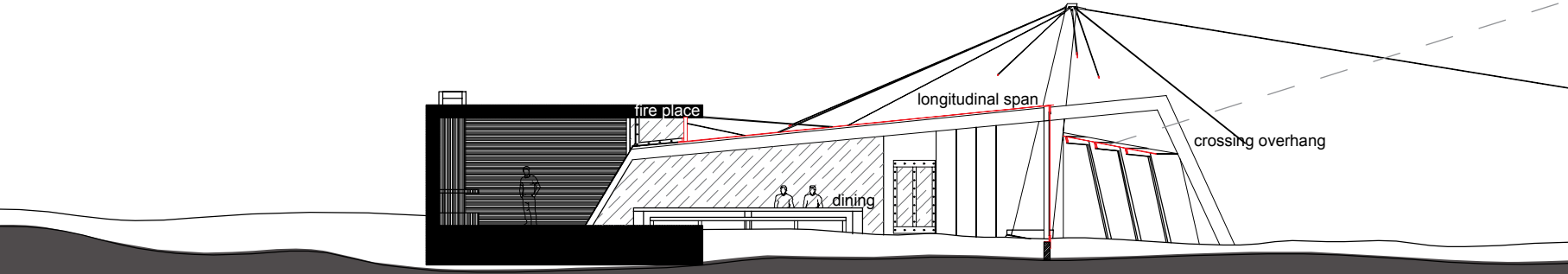


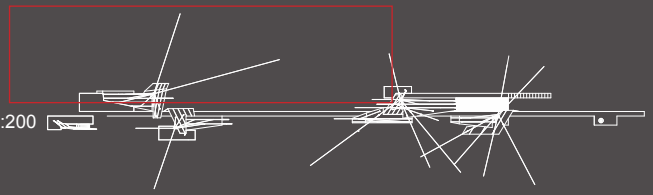




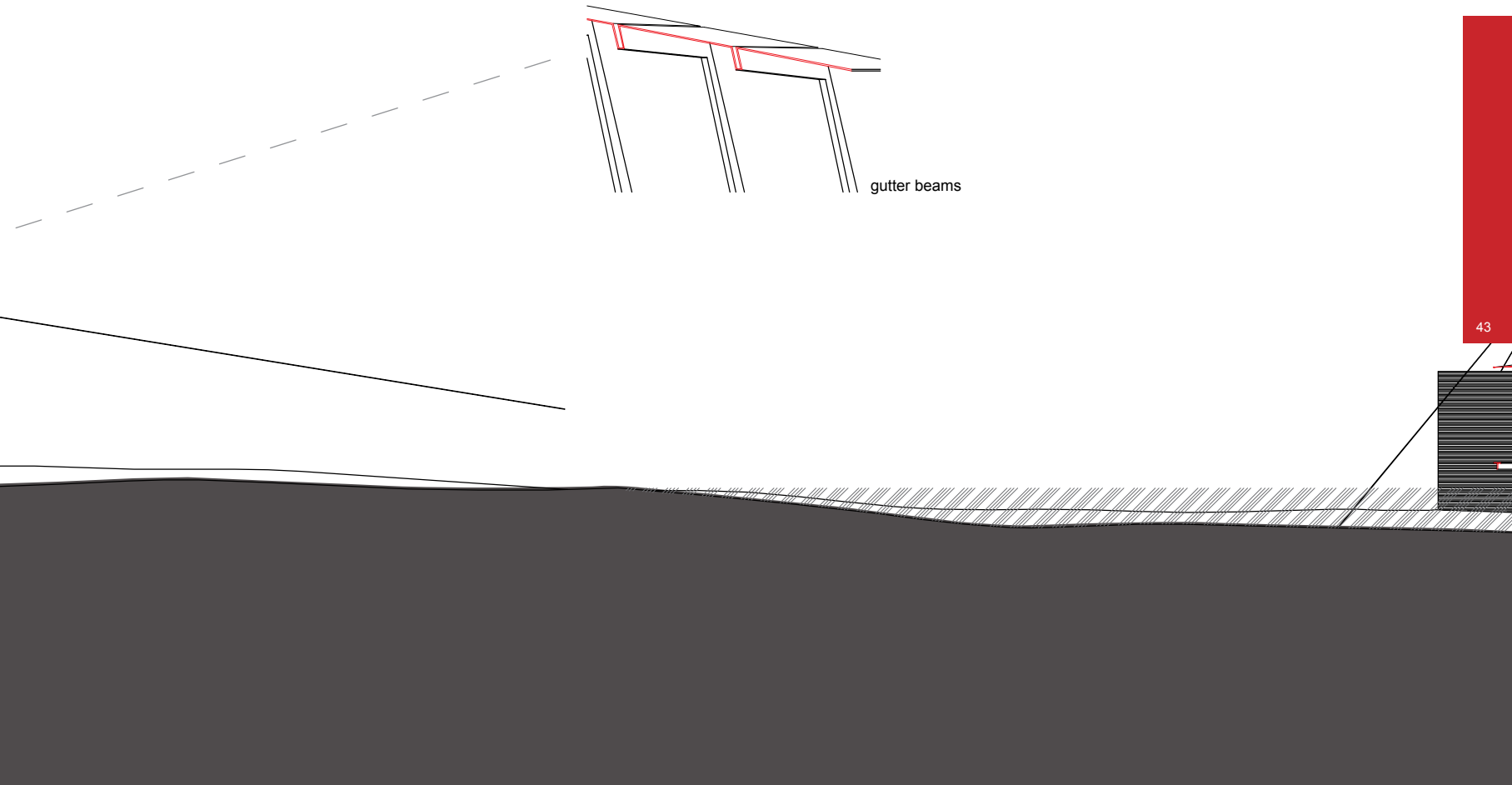
Longitudinal section 1:200

Steel spans running in the longitudinal direction covers up the different functionalities, while the crossing steel plates defines outdoor spaces. These overhangs become leading figures to the movement between different functionalities, while they define the entering areas. Underlying steel beams helps to carry the load while it underlines the given direction of the plate. The beam and the plate are made into one ongoing element, where the U-shaped beams create gutters to control flow of rainwater.

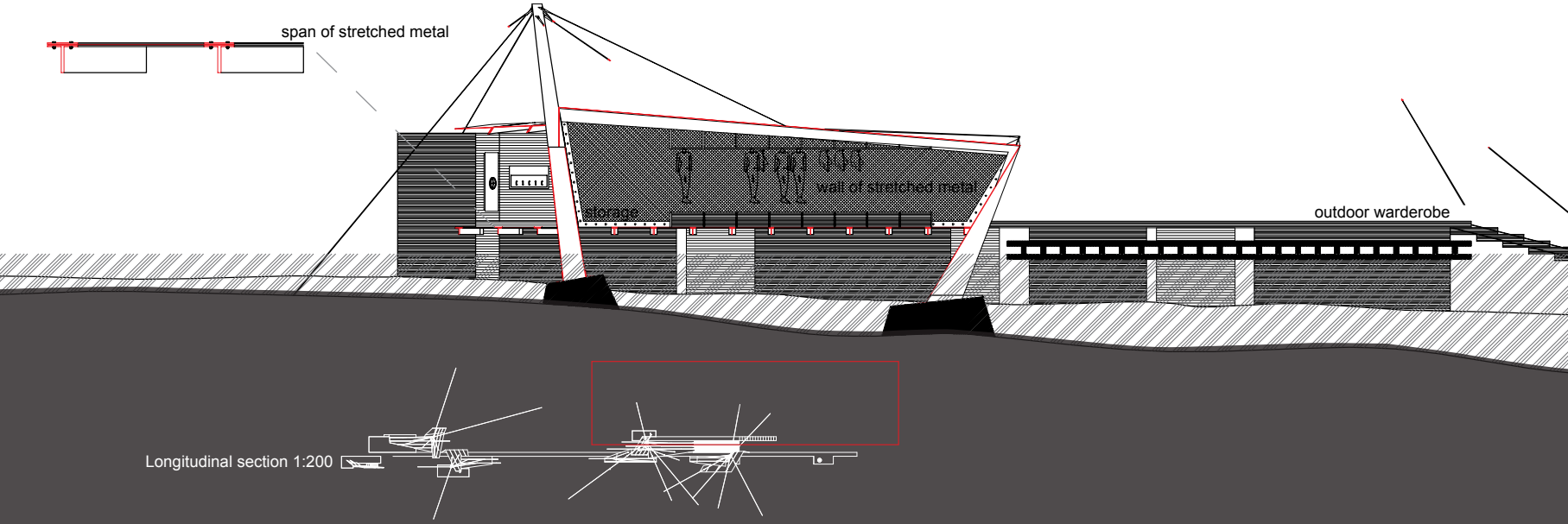




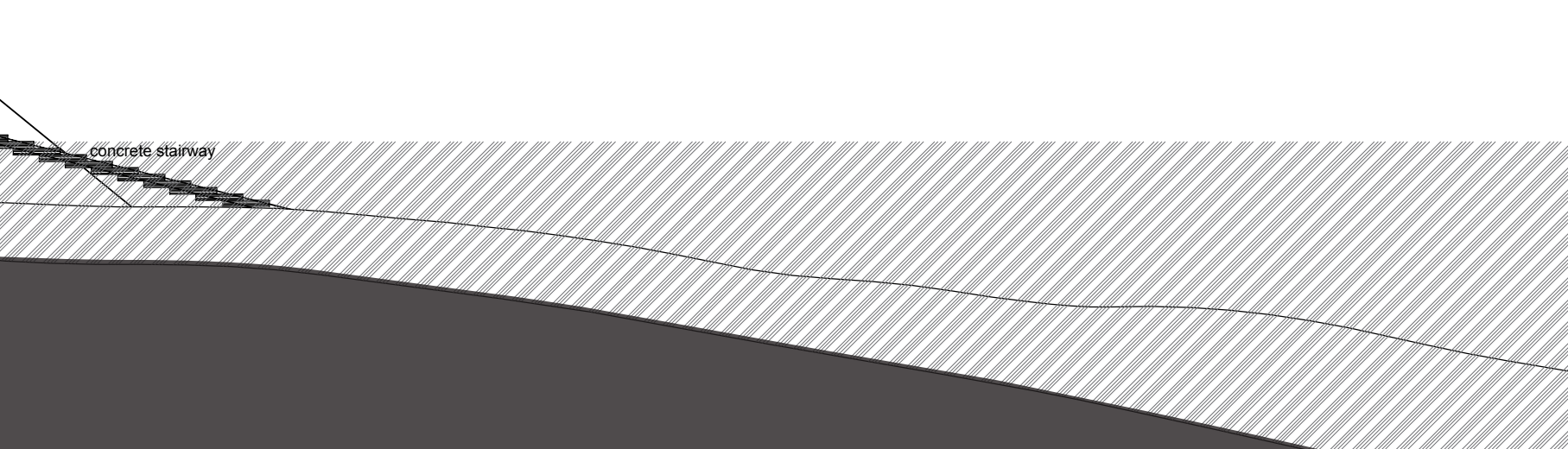
Longitudinal section 1:200


gutter beams

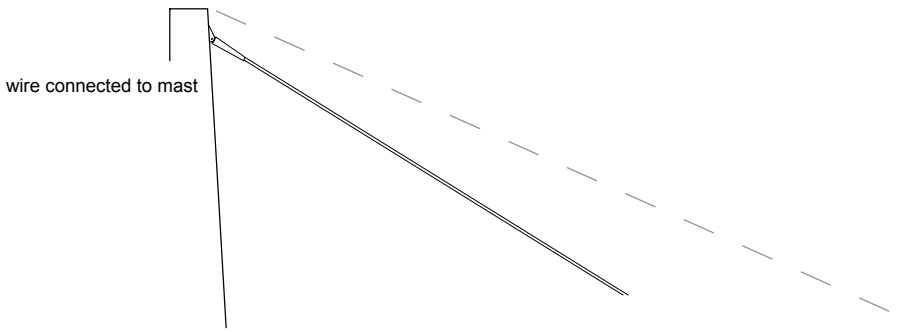
On a lower level beams run between the two concrete wharfs and make a load bearing structure to the floor area, which in this region is made by the three layers of stretched metal. To be able to keep the floor surface planar, the metal spans from one beam to another by being bolted to the underlying beams and a top steel plate. In the same way is the mesh of the walls spanned inside a steel frame which connects to the roof construction; polycarbonate plates are mounted to the surface in the same way. Another walk able surface is the stairway which leads into the water; it is created from stacked concrete blocks which are connected with two set of wires to keep them in position.

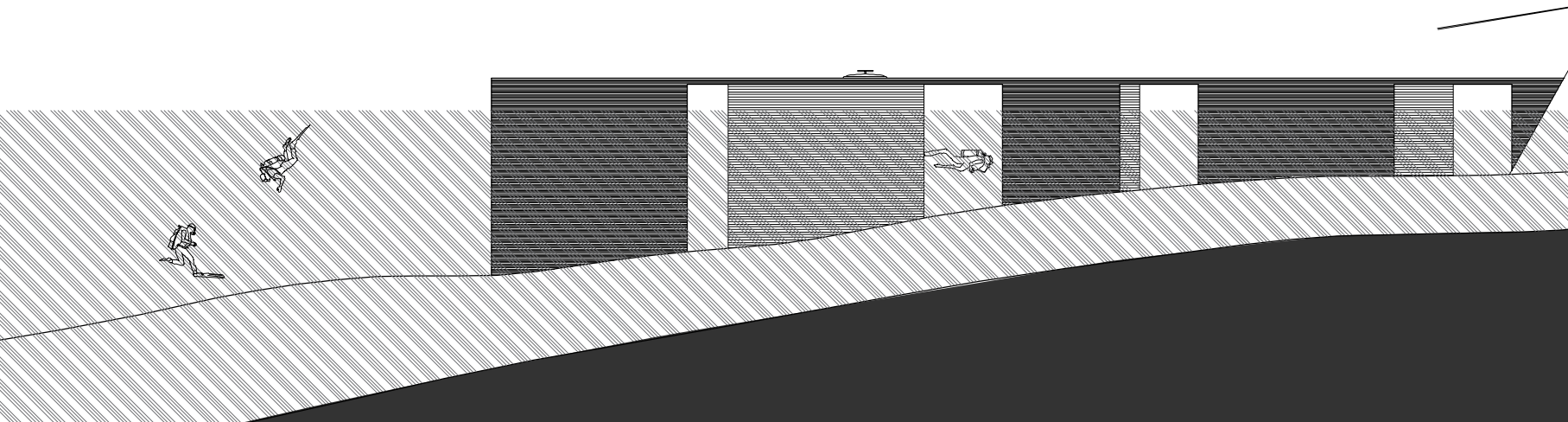


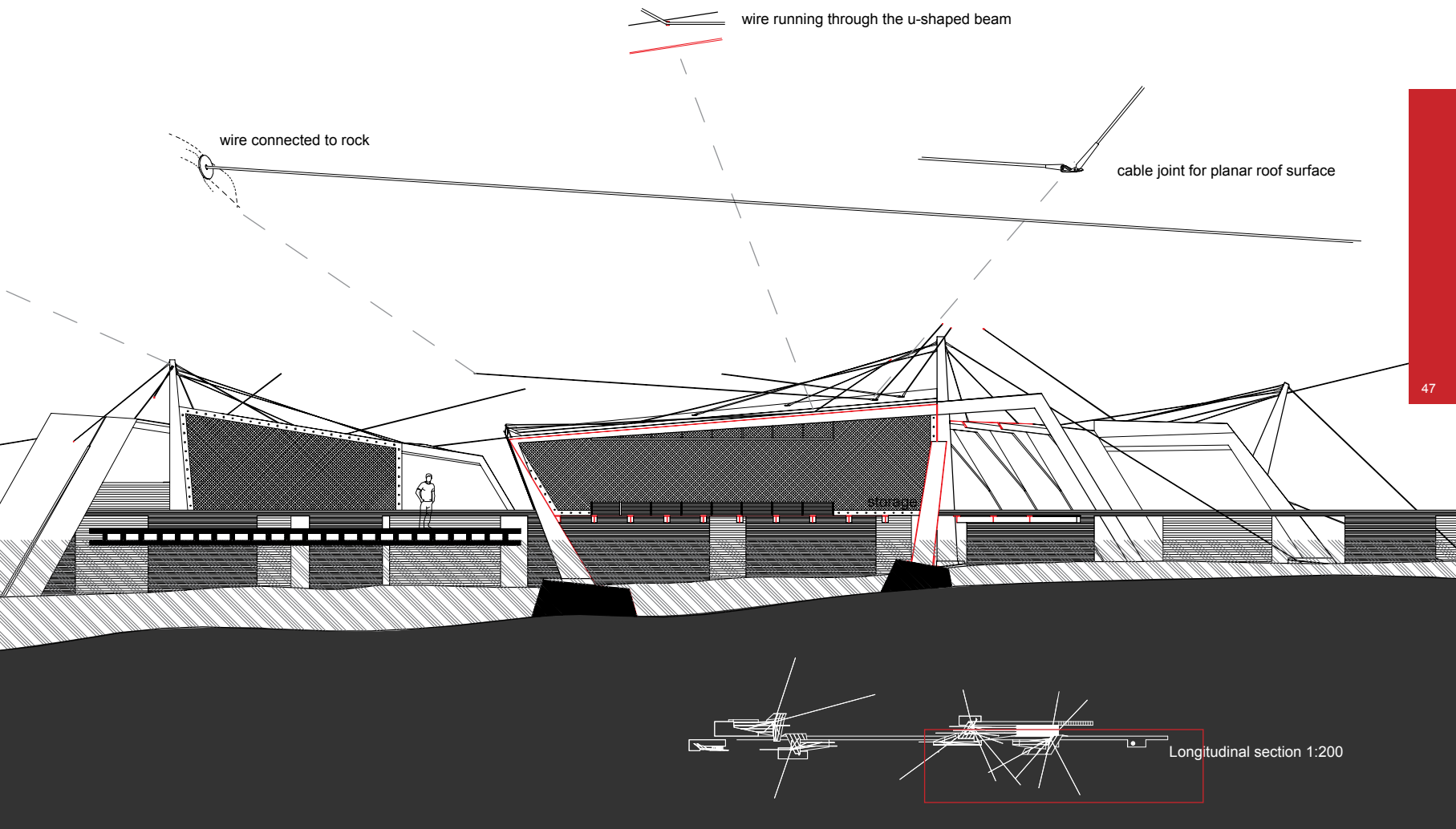
Longitudinal section 1:200


concrete stairway

The cables are connected to the roof surface in different ways, depending on the position of the end point. Some of the wires run down between the beams and through a pinned eye, while other bounce off from the roof surface. All wires are attached through a wire lock, and basically are all cable joints at the roof involving the same type. When it comes to the meeting between cable and rock, is the wire lock placed inside this stone; only visible part on the surface is this circular steel plate with a whole. In this way it underlines that the masts is the spreading source where the cables are strong penetrating element.

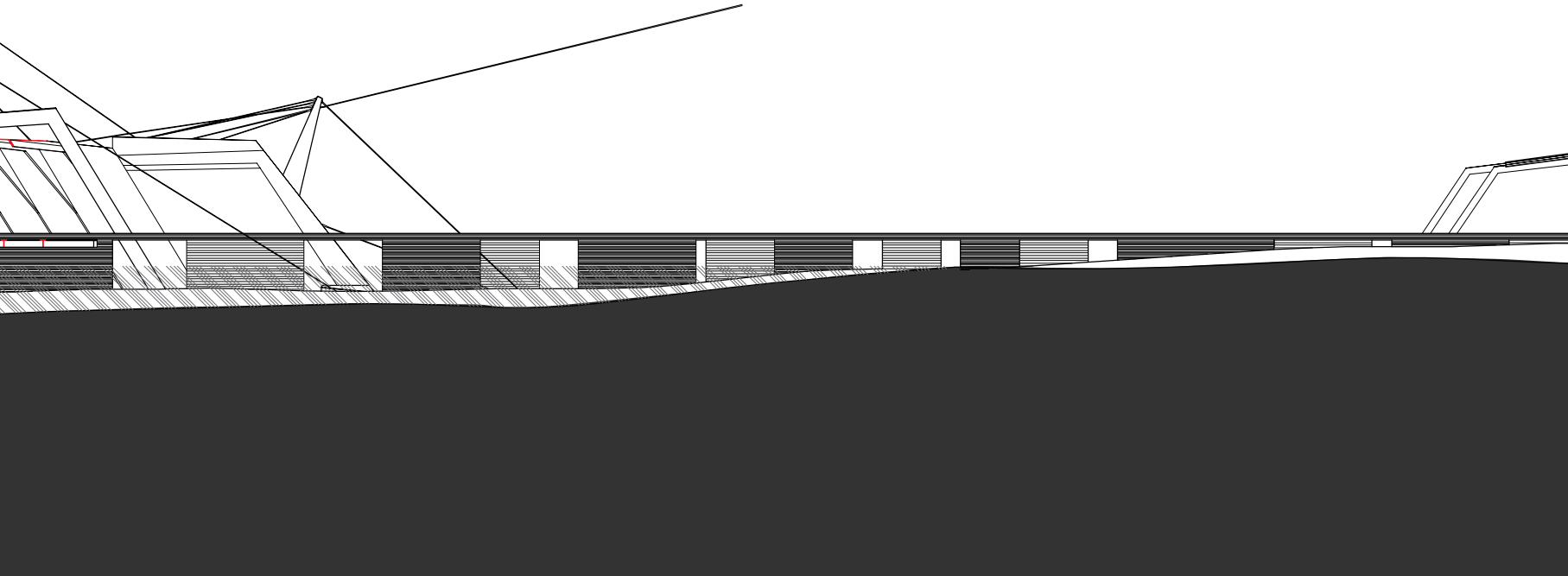


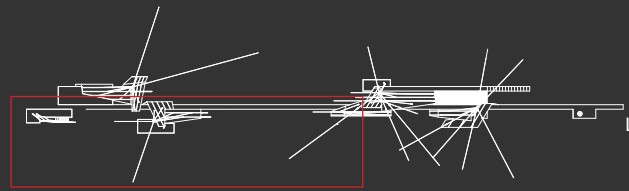




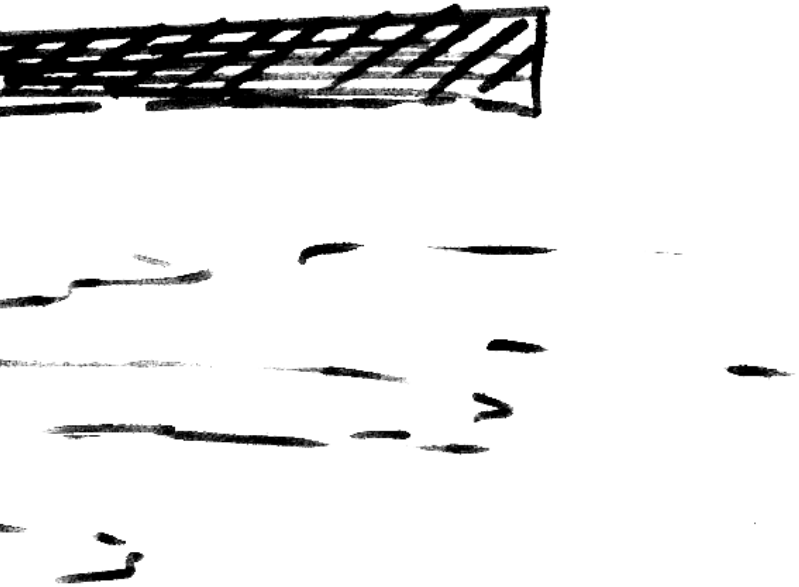
Longitudinal section 1:200

The structural solutions have been made as a combination of aesthetical wishes and constructional needs, but all together it has been important to let the different elements work in each others favour; contrast between the given shapes of each material will bring out a clearer language for the specific element. In this case it is the dramatic collision between shapes that takes part in expressing diving as a sport; a meeting between two completely different environments.



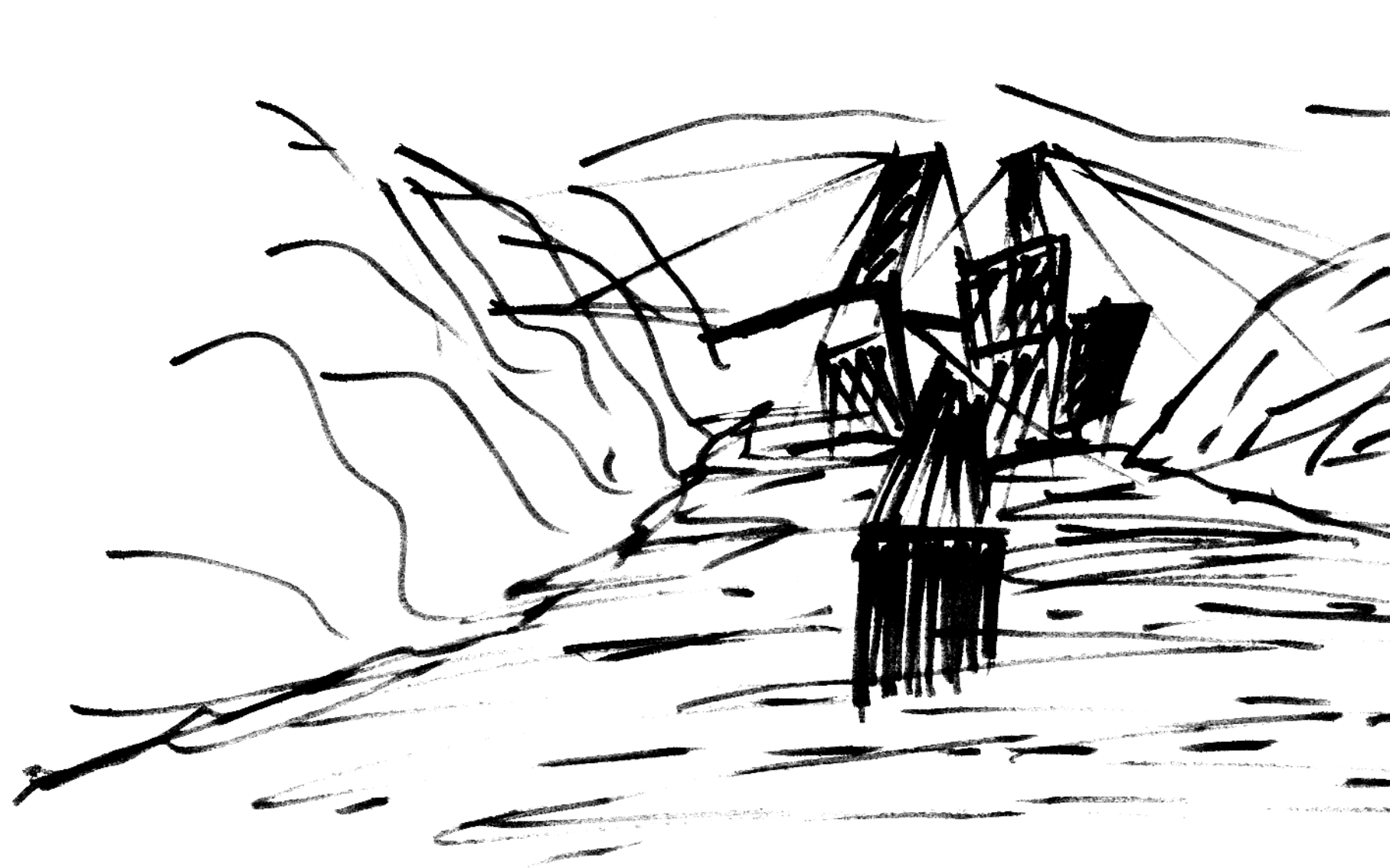


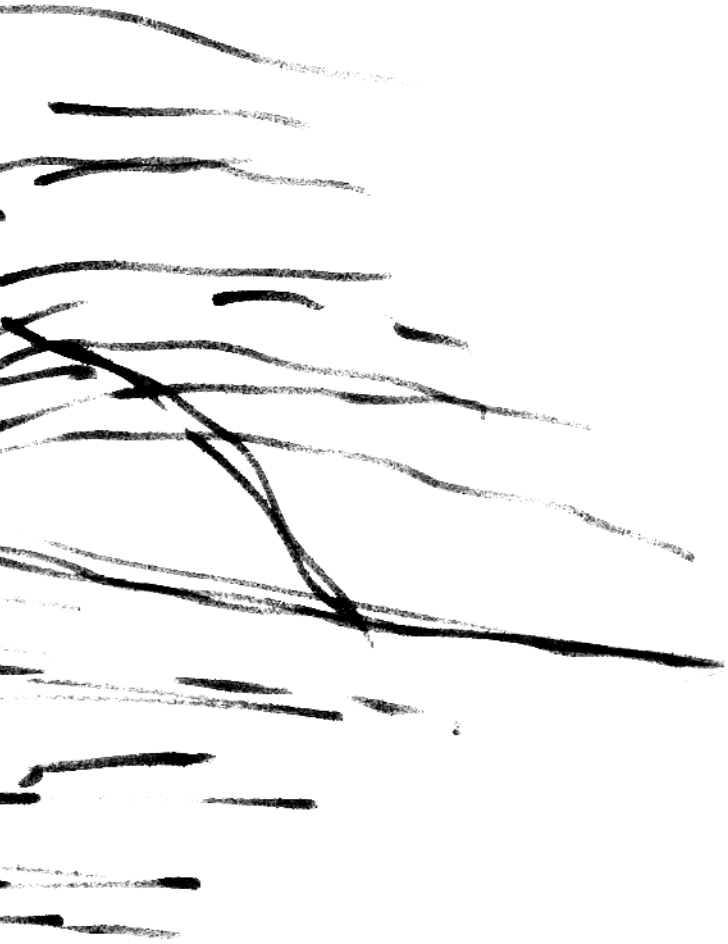
Longitudinal section 1:200



Atmosphere

The way how the building is adapting to the landscape makes it hide away from the view, so it can reveal itself one piece at the time. This quality is used to enrich the total adventure of entering the centre. First glance of the building will be the longitudinal wharf which breaks the water surface; at this point it clearly has a direction in between the landscape. Above the rock surface, you can spot small fragmented parts of the centre, what triggers the curiosity and increases the expectations of what hides in between the landscape.



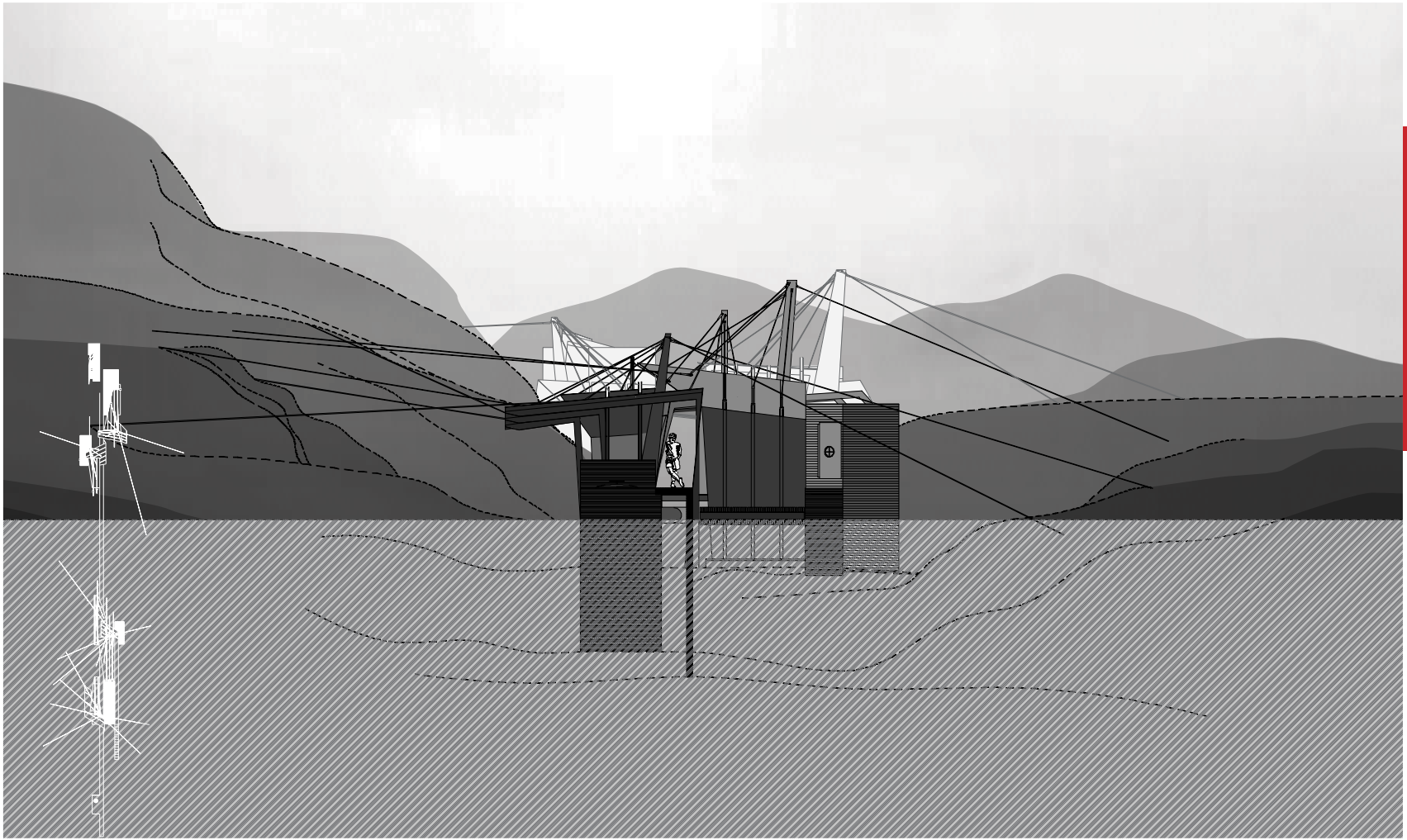


Turning around the corner you get introduced to the mix of diverse shapes relating themselves differently to the surrounding landscape. Structural elements are leaning in different direction while this structural mesh of wires seems to ensure that the pieces of this composition do not fall apart. Rocks on both sides combined with the building composition are diffusing the view. At this point it is not possible to see how long the path reaches or what you meet in the other end. Entering this wharf makes it clear that you now take part in an adventure; the building indicates that new impulses will come along under the whole stay.

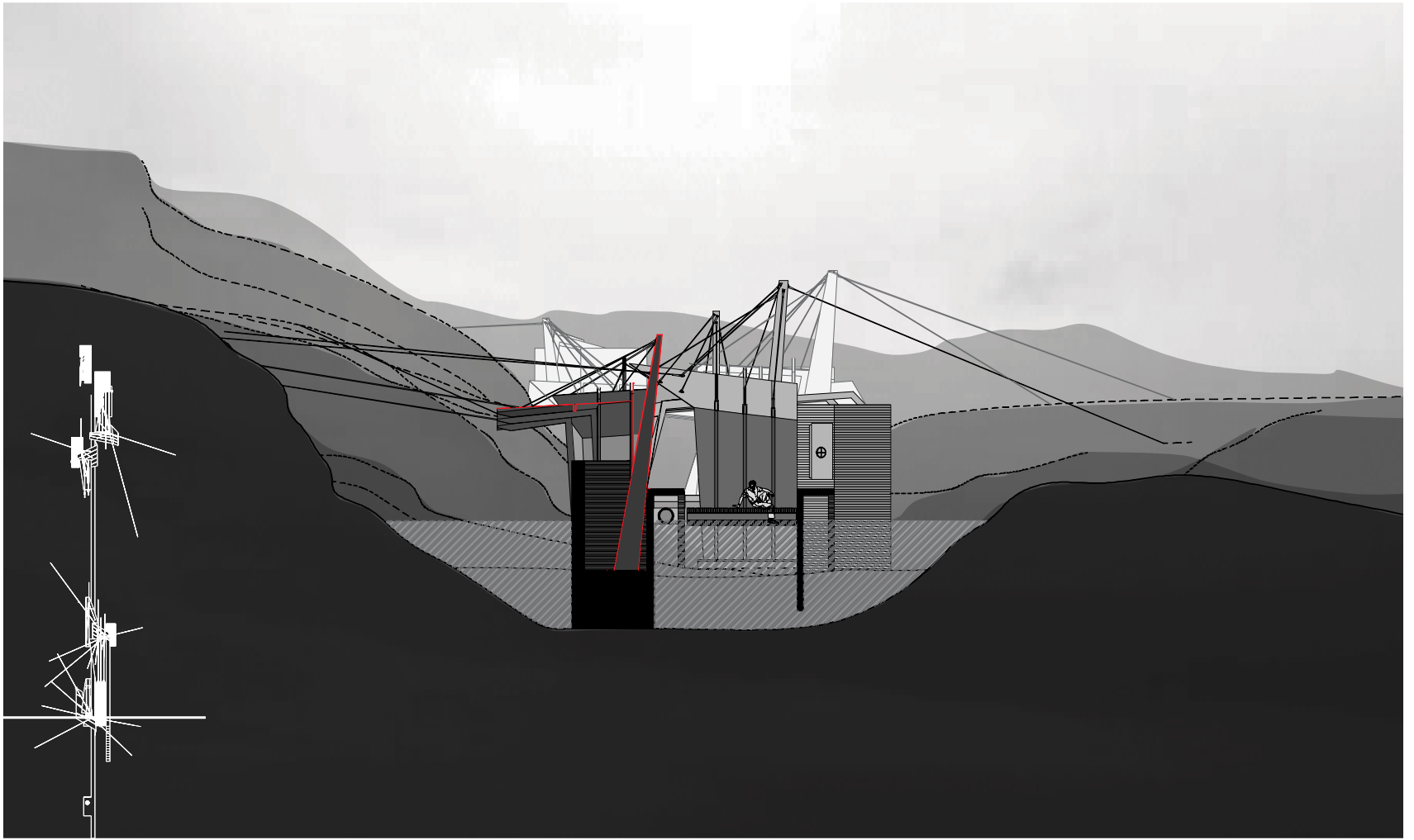
Serial vision

As a scuba diver you will sequentially experience the centre after arrival; from the first move new parts of the centre progressively reveal themselves more clearly. The two set of rocks which surrounds the building is naturally delimiting both angle and length of the sight; together with the dynamic structure this will produce new and interesting images from one end to the other. Exposing one functional space at the time creates a clear overview of the diving centre, which in the first place seems pretty complex. That you are able to achieve an understanding of the diving centres composition at such an early stage, will help everybody into having a pleasant stay.

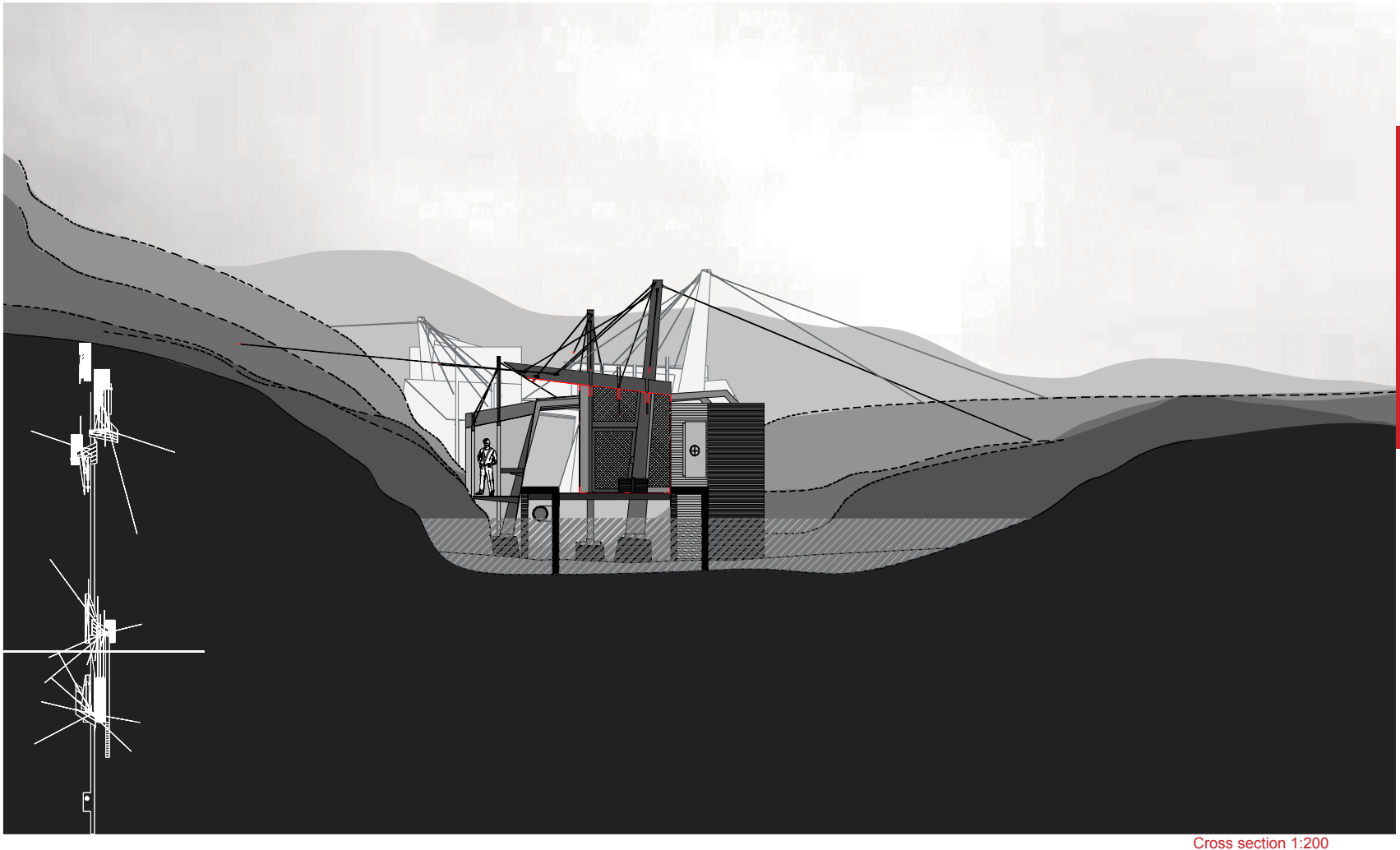
Every functionality is placed with a practical purpose along the axis; a general order describes the transmission from water to land and visa versa. A serial vision is created by the next 10 illustrations to define the spatial expression of the building; this is how the building will reveal itself to the participant while walking along the wharf after arrival.



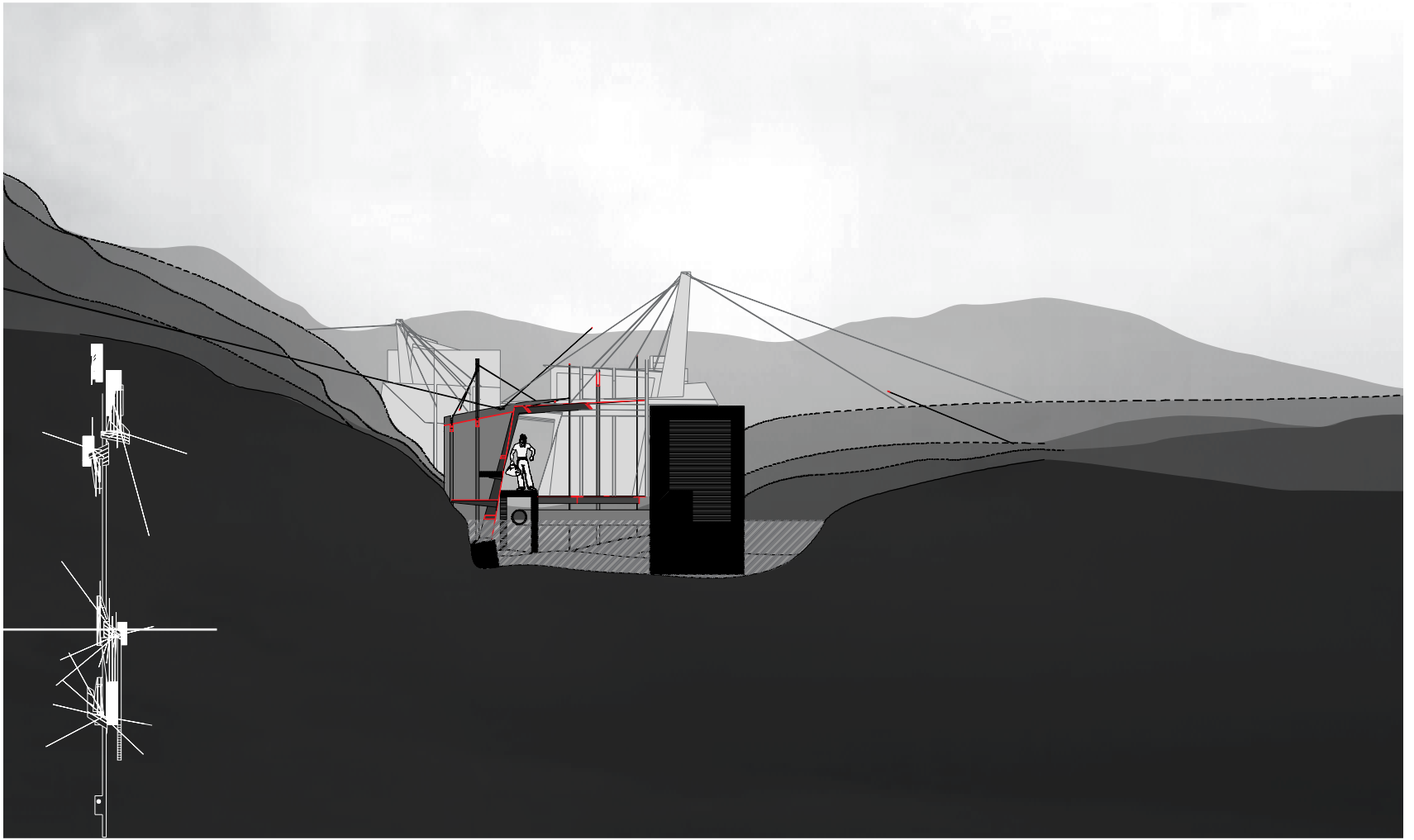
Front elevation 1:200



Cross section 1:200
Through rinsing pool

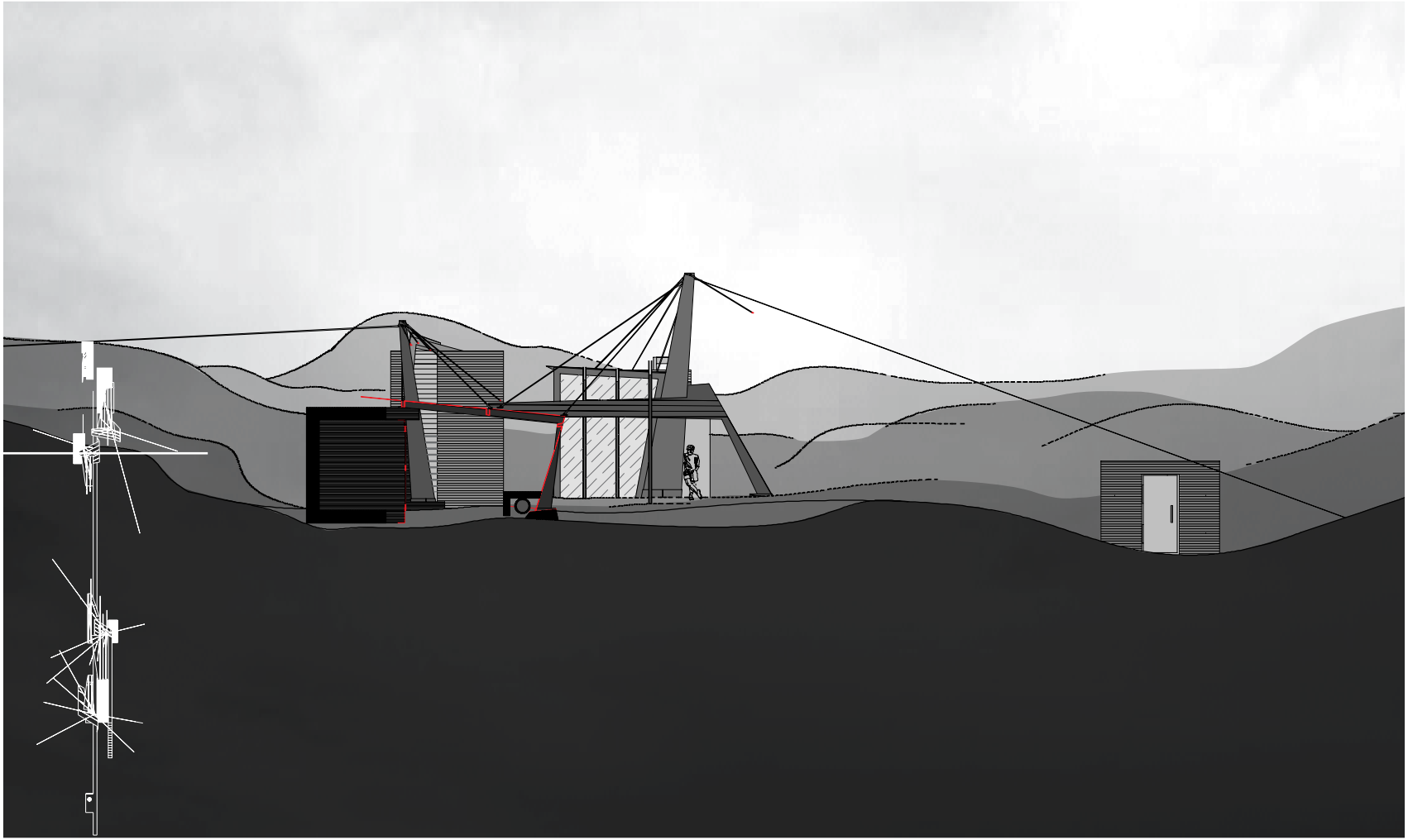


Cross section 1:200
Through storage

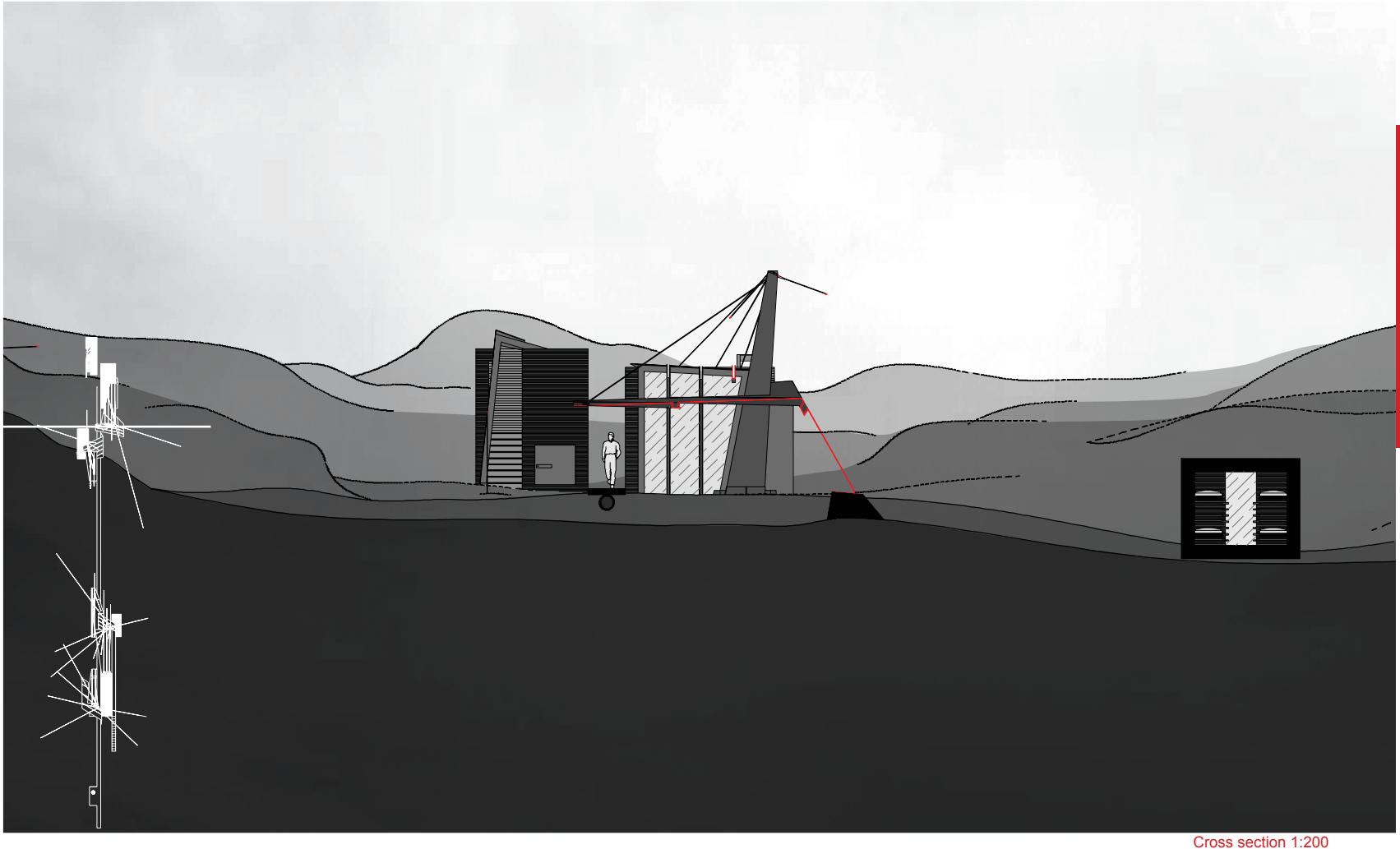


Cross section 1:200
Through repair shop and air chamber

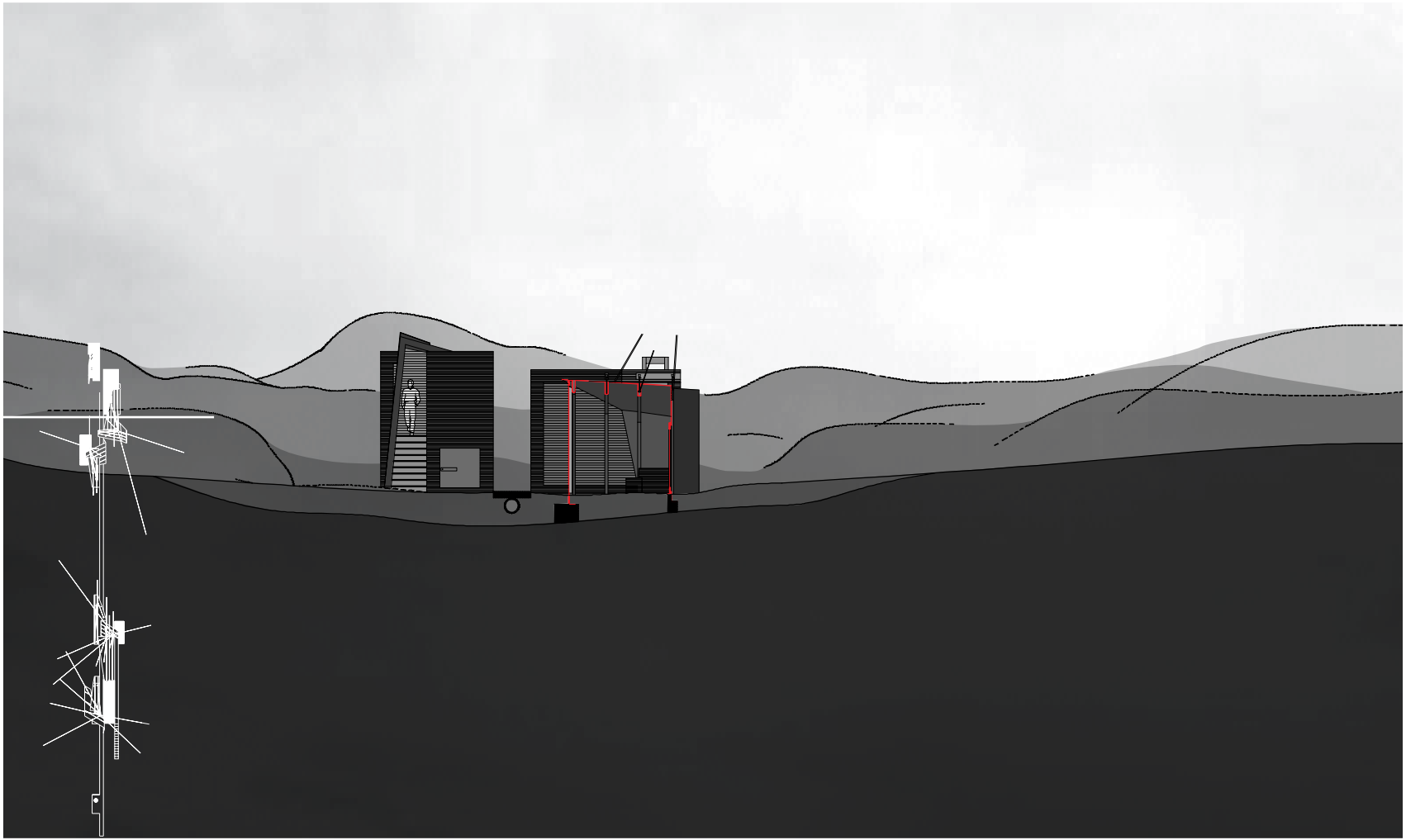
Cross section 1:200
Through wharf and sleeping unit



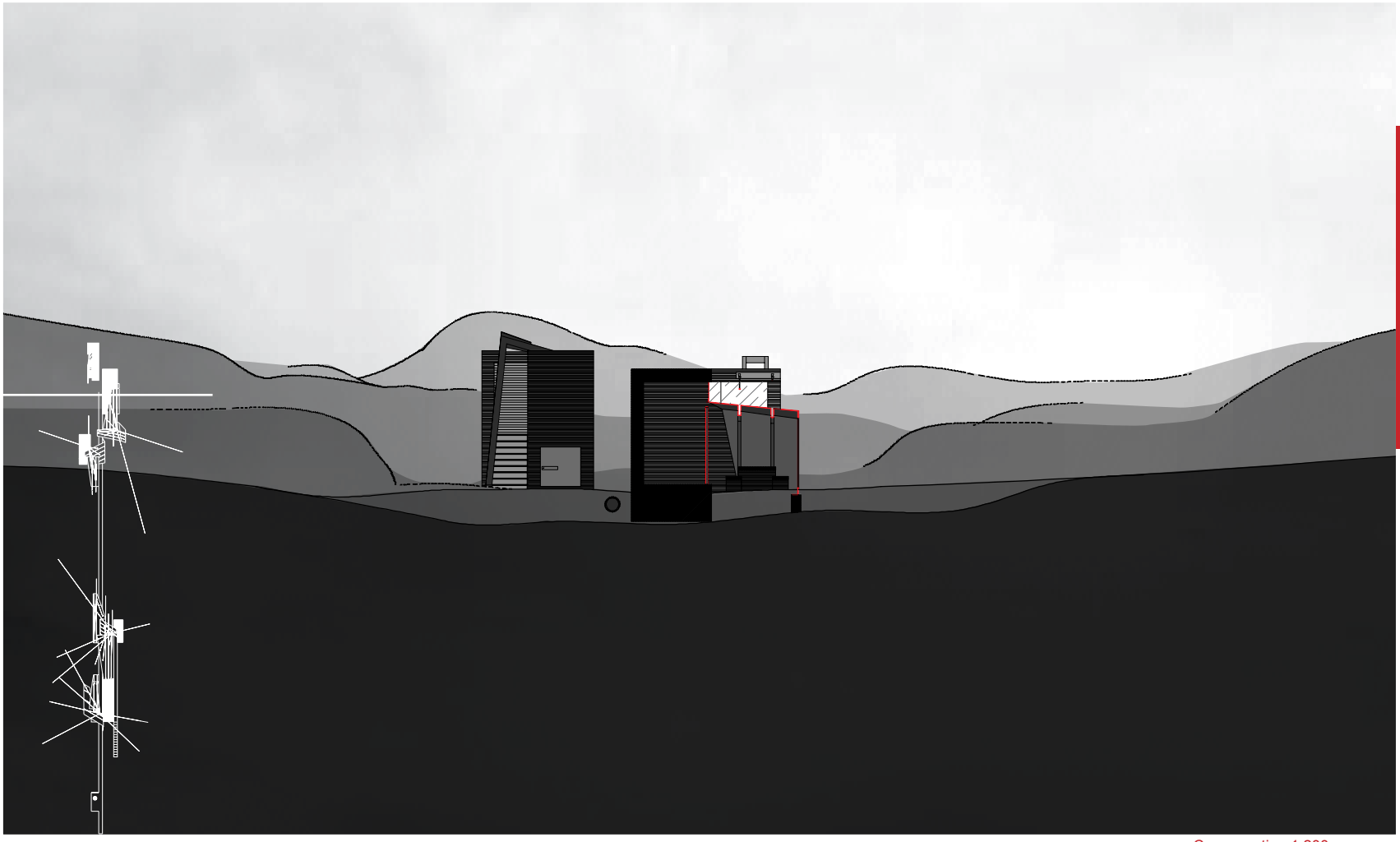
Cross section 1:200
Through meeting room



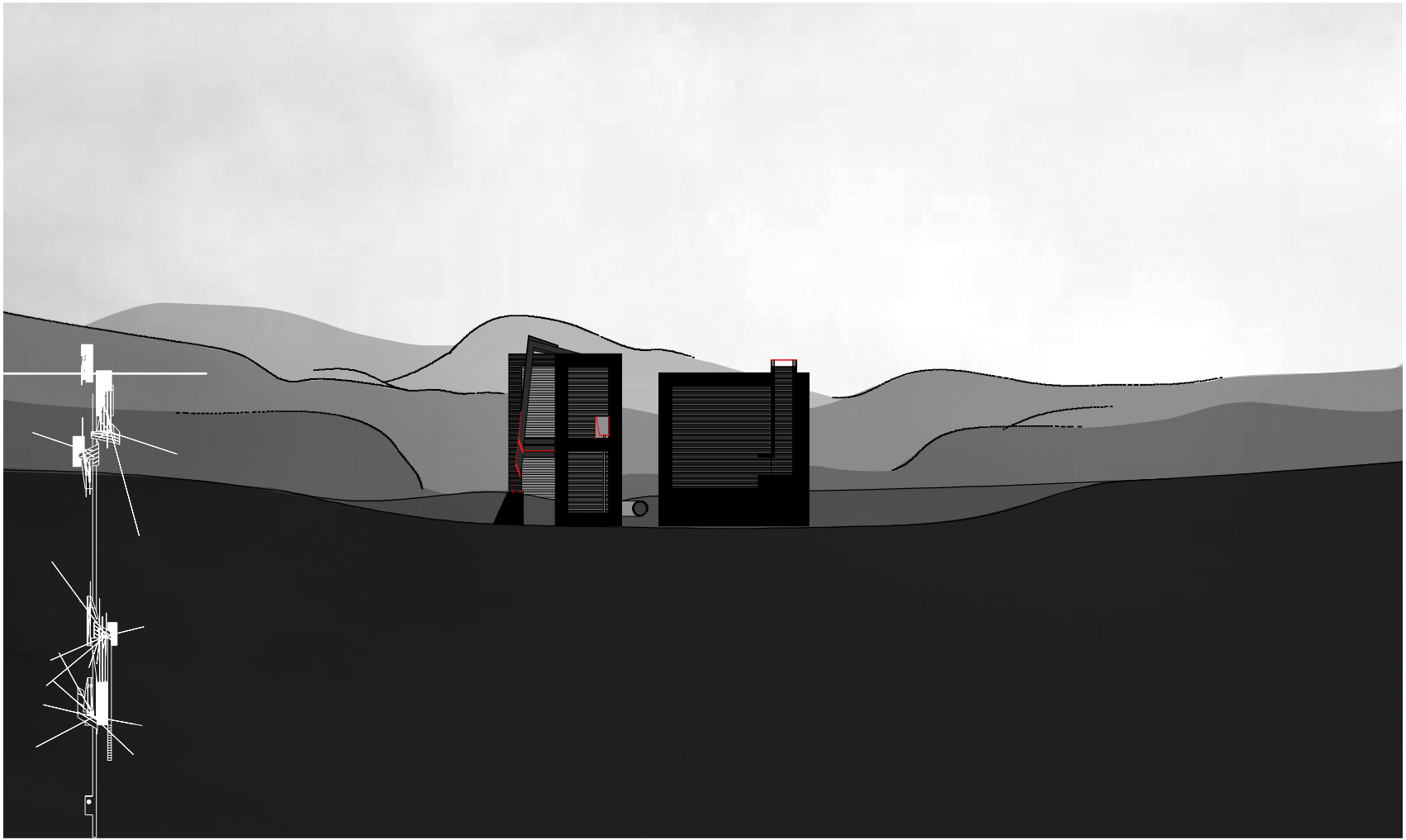
Cross section 1:200
Through sleeping unit



Cross section 1:200
Through kitchen



Cross section 1:200
Through dining area and fire place



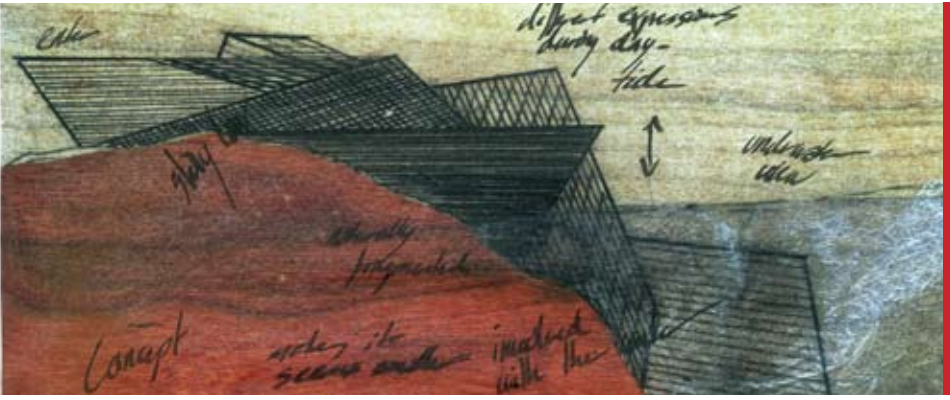
Cross section 1:200
Through fire place and lavatory

Materials

The shapes of the construction are of steel, concrete and wood. To achieve an interesting interaction between landscape and building it is important that the materials have the right aesthetical look. Use of cathode treated steel is providing protection to the materials corrosion, as well as it can achieve the right patina. Coated with a shielding layer of ironzinc-face in the zinc layer, will by time give the steel a natural red-brown look, what plays along with the natural influences of the salty environment.

Because it's surrounding rocks have a naturally rough look, it is wanted to create a smoother surface to the concrete material. Use of a brushed concrete facade will make it look even from distance, while it keeps the naturally evolved image at a close distance. To fulfil the natural expression of the materials, there is used spruce to get a nice grey surface by time.

The patina which the centre achieves is important to make it feel like a part of the surroundings. How the building changes image after time tells a story of a life from the day it got wrecked at this location and until now. Algae, plankton and other sea creatures will adapt to the surface and create new images all the time, especially the underwater environment becomes more and more fascinating.



Conceptual collage which explains the basic idea of a fragmented composition which connects to both land and water

The story behind

This project has been part of a massive process with experimentation in form of drawings, diagrams and especially models.
Intuitive sketching is basis for bigger parts of this project where different shapes have been expressed through 3 dimensional figures.
The process will be presented chronologically,
where the more specific parts which have inspired the final design is explained.

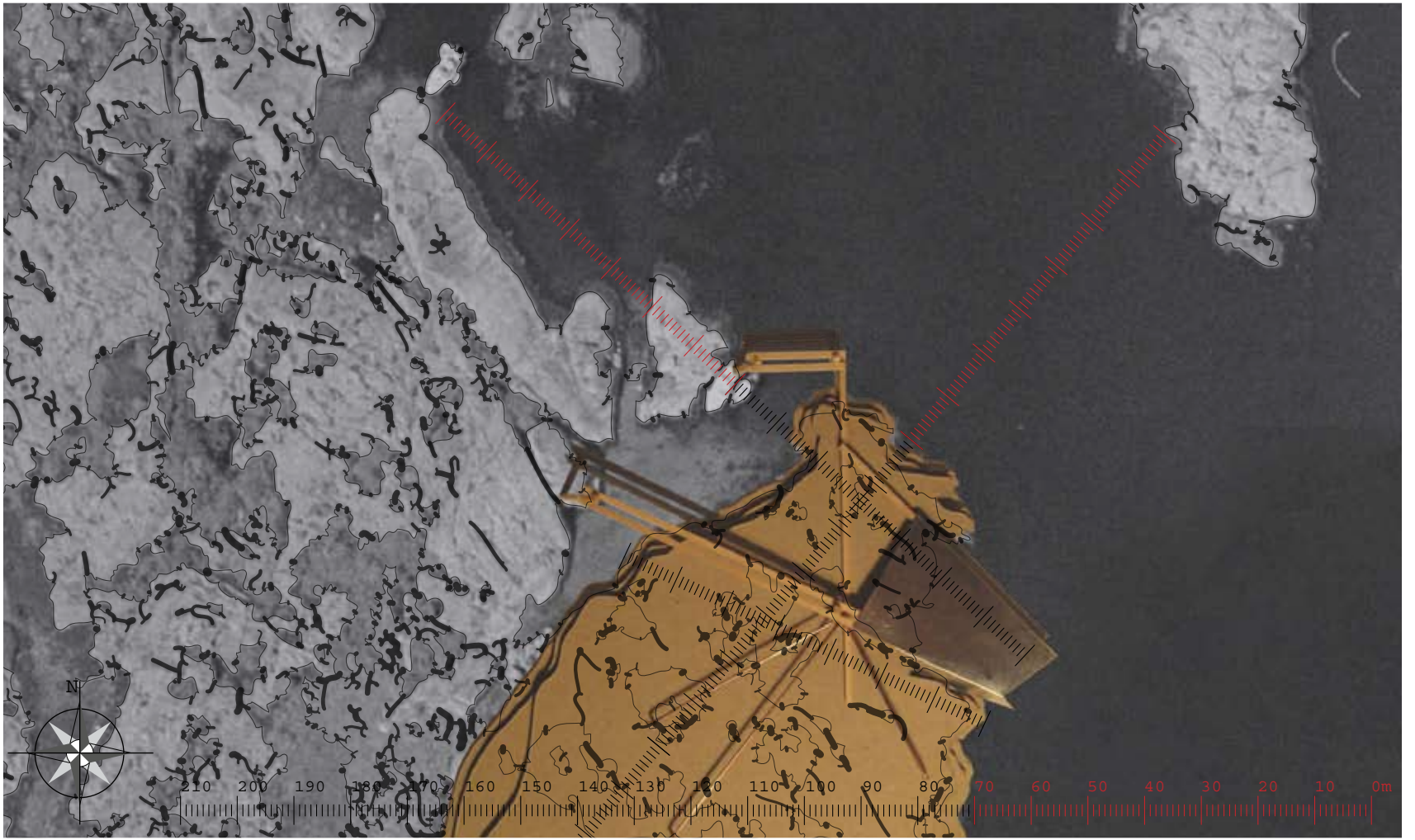
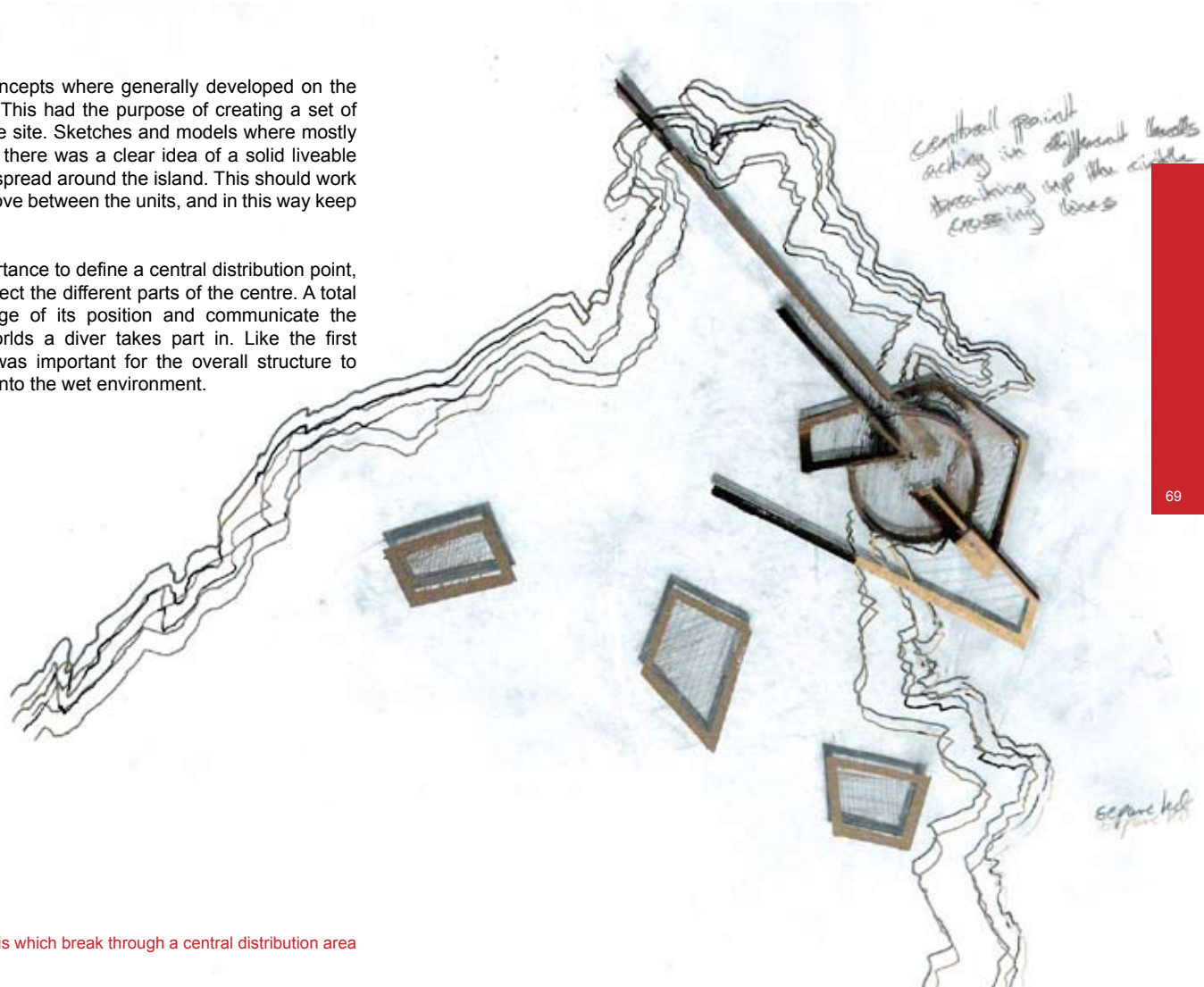


Diagram showing scale of the site, and concept for the building composition

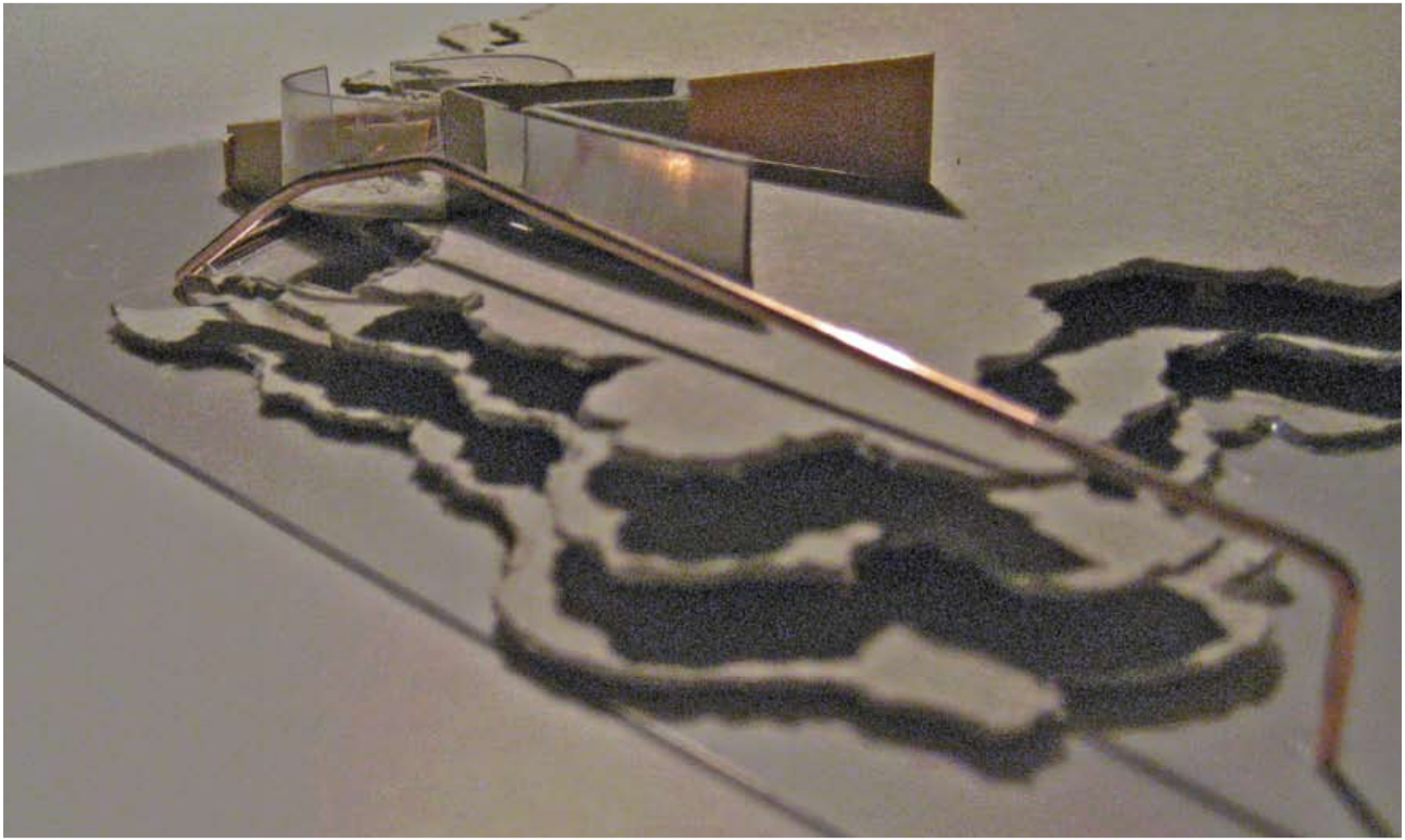
Preface

In the beginning of the project, concepts where generally developed on the basis of maps and planar photos. This had the purpose of creating a set of ideas before I was going to visit the site. Sketches and models where mostly defined on a conceptual level, but there was a clear idea of a solid liveable area and a lot of fragmented units spread around the island. This should work in the favour of having people to move between the units, and in this way keep it in constant touch with the nature.

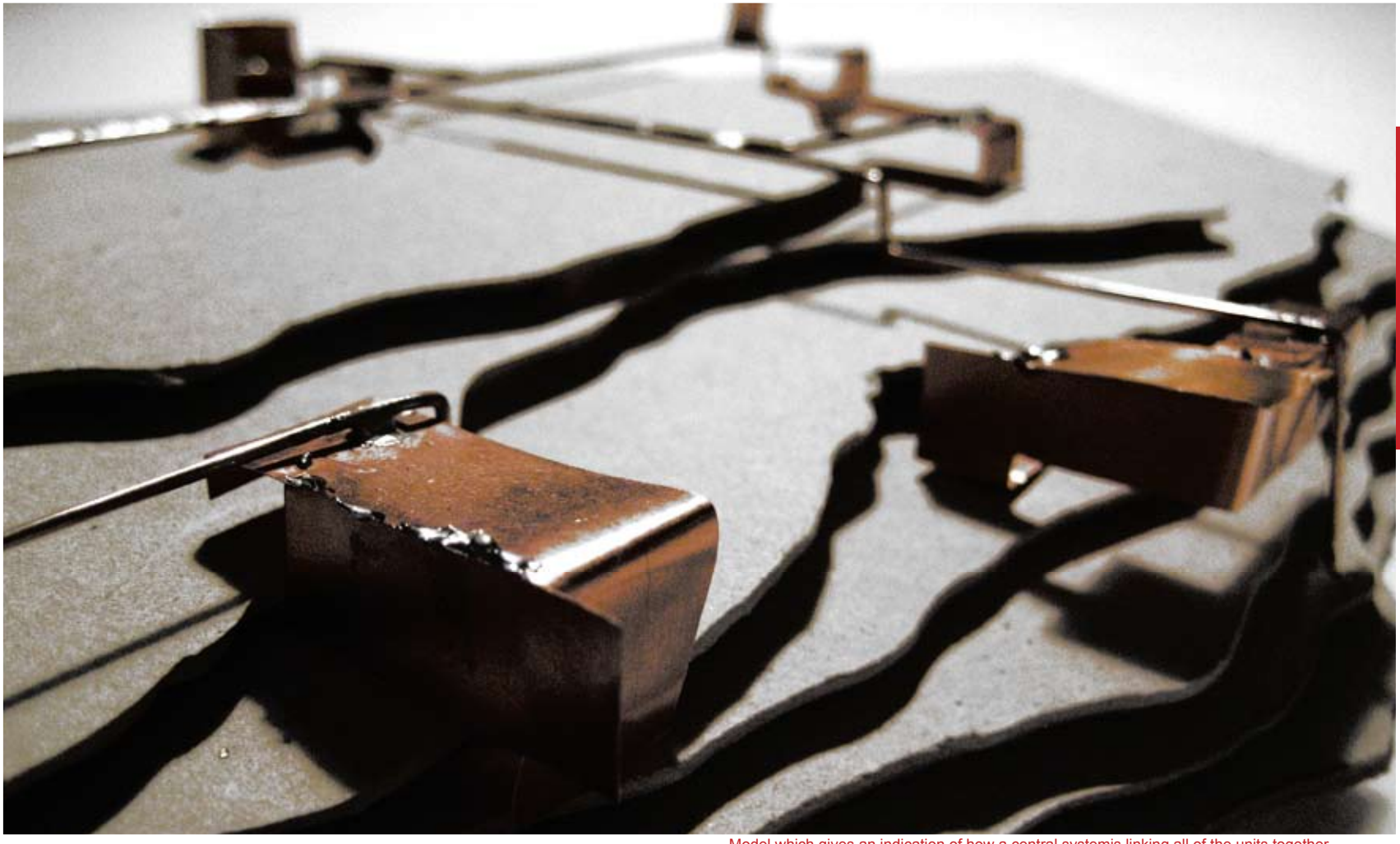
From the beginning, it was of importance to define a central distribution point, or a clear direction that could connect the different parts of the centre. A total composition should take advantage of its position and communicate the transmission between the two worlds a diver takes part in. Like the first sketches and diagrams show, it was important for the overall structure to naturally slide from main land and into the wet environment.



The remarkable axis which break through a central distribution area

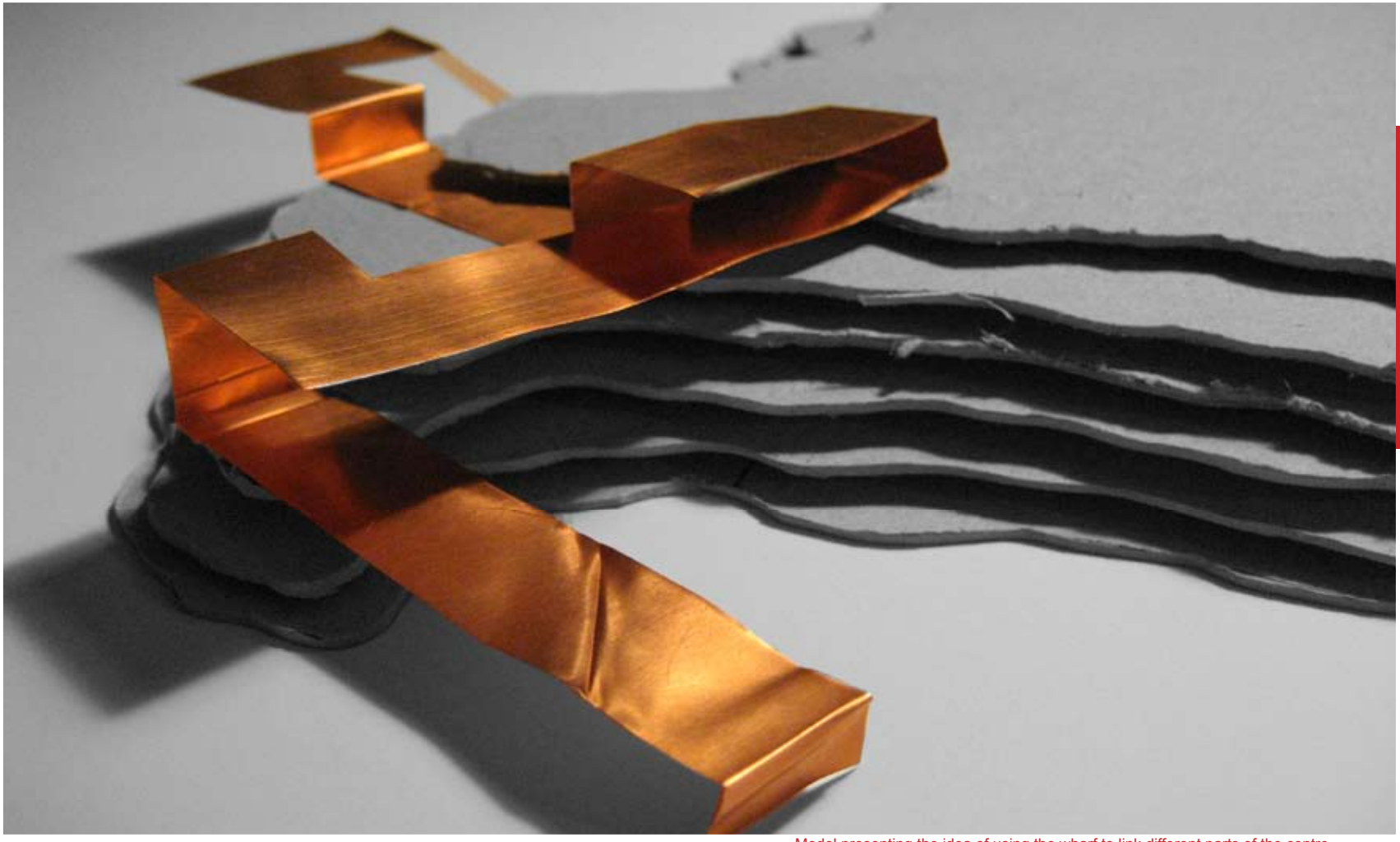


A facinating connection between land and water
Interesting mixture of different materials



Model which gives an indication of how a central systemis linking all of the units together
Foldable steel plates creates shelter for their functionality

Model which brings up the idea of letting main structural elements communicate the transmission between land and water



Model presenting the idea of using the wharf to link different parts of the centre
There is room for functionalities between the metal surfaces



Left to right

Me standing at the steep rock facing the cove
Area for the water based part of the project

The cove seen from inside the shore

Rush growing in connection with the cove
Area for the living part of the project

View from the middle of the islnad against the open water

The long slope at east side of the island



Excursion

To achieve a bigger picture for developing the basic ideas, an excursion to the site was necessary. I brought with me diving instructor Erlend Vaage on a daytime trip to the Lauer islands. He also introduced me to the facilities of Dykkersport in Oslo, a company which recently have moved into new facilities. This was a perfect possibility to achieve a general review about the need for space requirements and how they store equipment, machinery and so on. This was leading to the preliminary spatial program with a belonging spatial order.

Later, when we arrive at Hvaler it became clear that transportation to the island was as difficult as first expected. The only solution to bring ourselves out there was to get dressed for a swim; this whole journey, made my excitement for the site arise many levels. How we had to locate our way to something we not exactly knew where was, gave a triggering feeling in the body. A feeling I hope the divers as well will achieve when they arrive at the centre. Rocks at the location where both bigger and higher compared to what I first had expected them to be. A really slope side facing the open water did not harmonize with the steep hill facing the cove. They spoke two completely different languages, and the image of having an ongoing structure from one side to the other partly felled apart.

There was no doubt about that the area where exposed to rough impacts from the nature; except from stone there where only growing moor, and some rush in the lower areas. Houses around the island had placed themselves behind or in between different rocks, while their wharfs became their transmission to the water; an image which have inspired the rest of this project.



Left to right

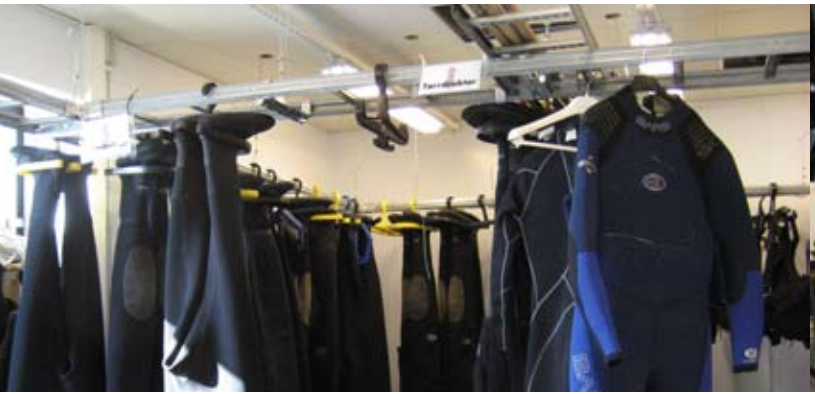
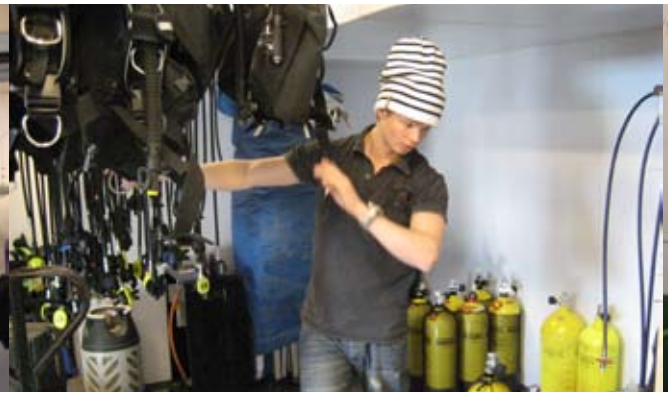
Wharf reaching into the water, site seen in the background at the right

A path created for transportation between the summer houses

Shelter made by a combination of concrete and wood

Staircase leading from a summerhouse to a wharf

Overview of all the surrounding islands


Left to right

Storage and drying of diving suits

Storage of air cylinders and belonging equipment
Person in the picture, diving instructor Erlend Vaage

Entrance where shower and rinsing pool are strategically placed in the corner

Air compressor and belonging cylinders

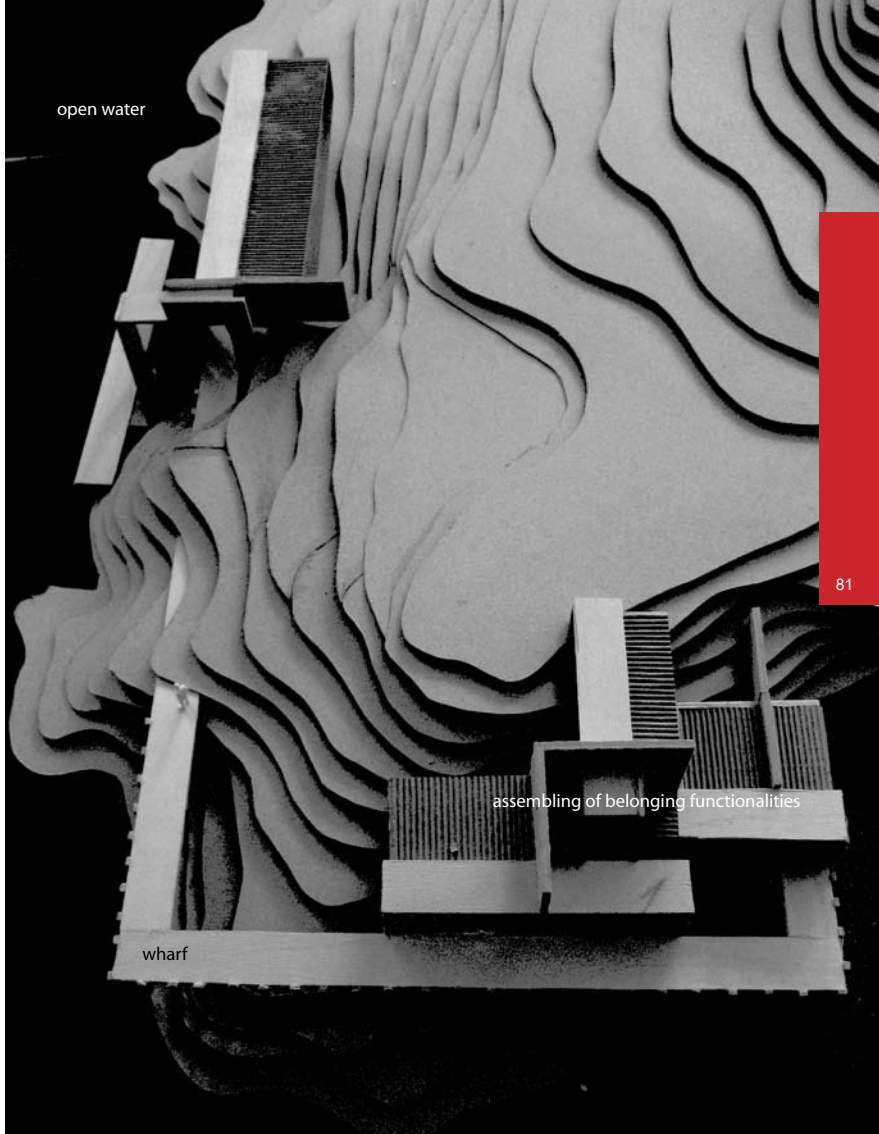
Air filling panel


concrete elements
wooden shelters
wharf
seaside

Further modelling

In the beginning, big parts of the centre where placed on the seaside of the island, while smaller practical parts where located in the quite bay. This with a wish of framing the rough weather conditions for participants at the centre. Generally there was an idea of using the wharf to connect all the different parts of the centre, into a bigger unit around the island.
How the wharf is going through and takes part in the whole composition is intriguing; but instead of using the wharf as an ongoing structure becoming roofs and walls, a vertical separation between the elements is later preferred. The use of concrete elements are thought to bring a solid base to the picture of light steel and soft wooden elements; how the concrete add security and stability to the picture of rather dynamic elements is worth to bring on. Some clear horizontal and vertical lines created by the wharf and the concrete walls, define some nice levels in the landscape, but the composition fails to emphasize the movement from water to land and visa versa. Instead of utilizing the possibilities which the site has to offer, the composition diffuses the drama produced by the landscape. Lack of a clear story between nature and building made these ideas a little weak; as well is the interaction between the units counteracted by its positions around the corner of the rock.

Models speaking the language of a long connecting wharf
Airy composition contra more solid ones,
where the wharf speaks the language of roofs and walls



Model where the roof breaks through the linear wharf
and creates a dynamic connection between water and land
Partly problematic that the separated units
does not have a clear interction between them

Part of the model at left picture
Shows the linear separation between roof and wharf
playing along with more solid concrete blocks

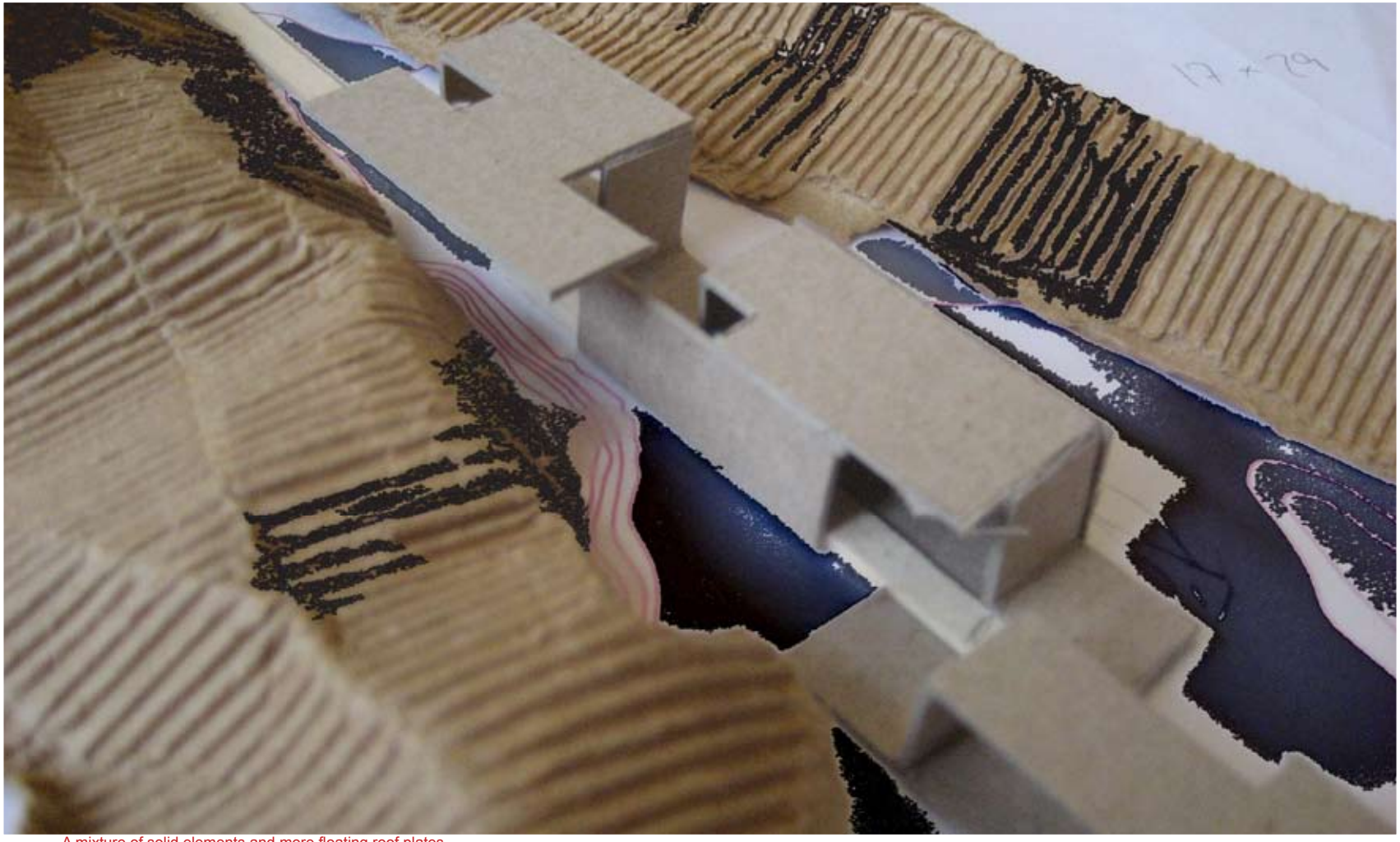
Central axis

Under the whole phase it was a main attraction to the little cove and the quietness it expressed. It felt natural to take advantage of the shelter which this little valley produces. Then it becomes a contrast between the areas you stay in and the environments you dive in; after a rough day in the field you now protect yourself in this little valley. Exciting is it that the surrounding rocks becomes a facade to the composition of the building, and its position in the water actually creates two new facades; the roof which can be spotted from around the island and the underwater environment, which as well will be taken in use.

Instead of having a wharf folding around, the overall concept for the centre is here to make this wharf run in one straight line from the water and on to the shore. Along this axis will the functionalities be placed in the order they are assumed to be used. This means that parts belonging to scuba diving as a sport will be placed in the water zone, while more practical parts related to the stay are placed on safe land. The placement drags you into the cove by arrival, where rocks on both sides frame your view while the wharf leads you through the landscape.

There is an idea of keeping the structure pretty open. The diversity of solid elements and slimmer roof plates should cover the useable spaces, what in this way creates a natural understanding of the primer functionalities; either it becomes a shelter or just a screened space. A natural connection between outdoor and indoor spaces reflects the full experience of scuba diving as a sport; man and nature in constant interaction.

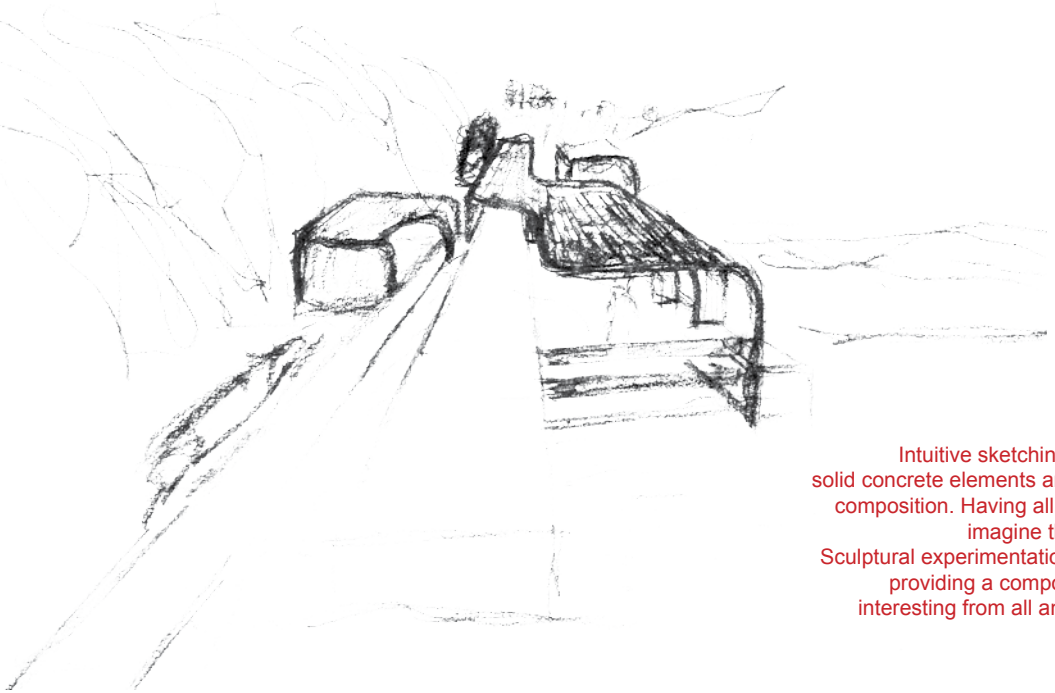
Model telling the story of units placed along the wharf
There is a clear separation between the units at land to the left and the ones placed in the water at the right



A mixture of solid elements and more floating roof plates
Even if the building are located in the water area, it establish contact to the surrounding rocks by opening up against them

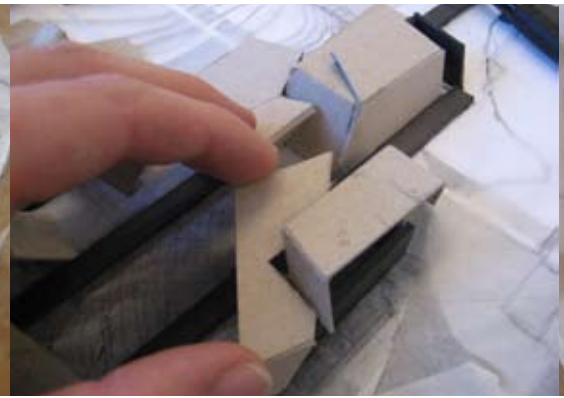
Use of linear solid elements at the bottom, while lighter structures cover areas for functional use
Interesting how it hides itself between the rocks and creates a whole new facade from naturally higher levels

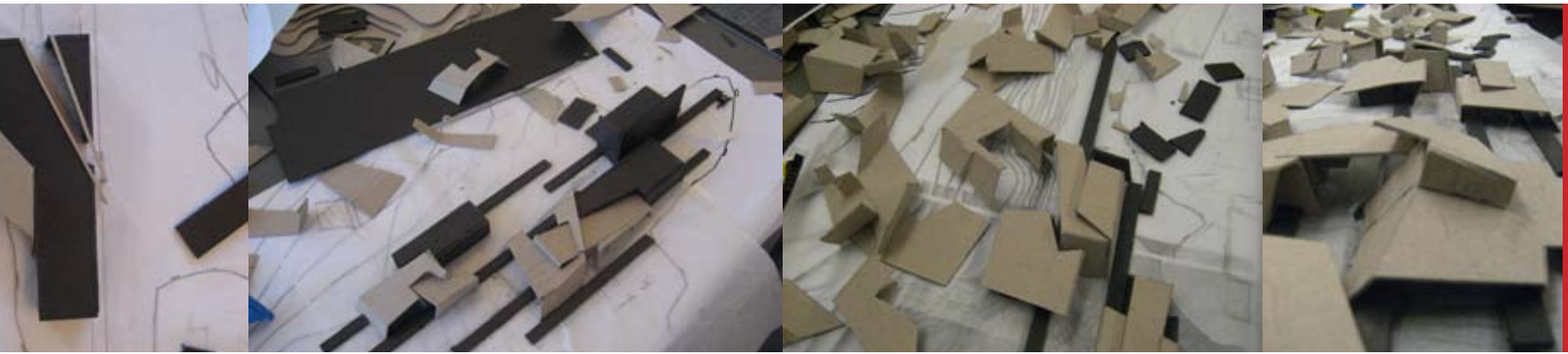
There is easy to imagine the pretty image when arriving between the surrounding rocks
Walking between the units along the wharf, you will spot both rocks and water between the structure



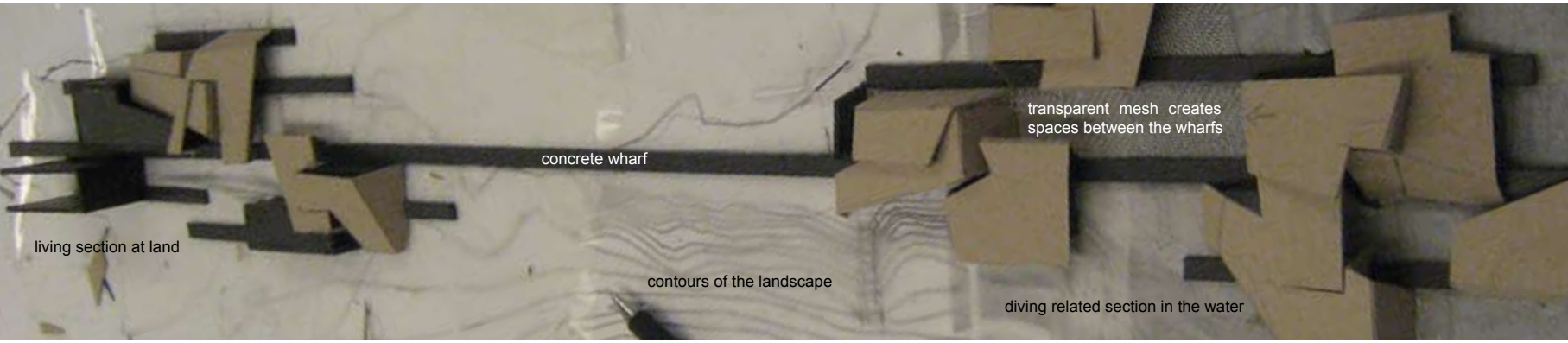
Intuitive sketching became an essential part of the ongoing project; solid concrete elements and light steel plates where mixed together into one composition. Having all the different facades, it was a lot easier to visually imagine the total picture through researches of model-work. Sculptural experimentations adjusted to the functionality of the program are providing a composition which is practical, exciting and aesthetically interesting from all angles.In this way the total stay will be enriched and become an unforgettable memory.





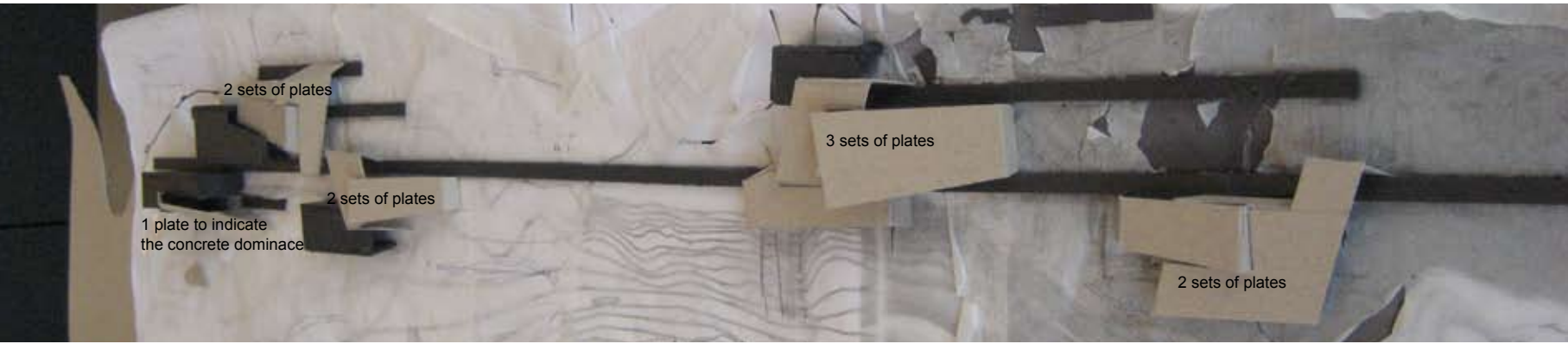
Generating model process
Sculptural and functional investigations where made by folding cardboard into different shapes
Grey cardboard is symbolising steel, while the black cardboard symbolises concrete volumes



The use of this long concrete axis surrounded by sculptural steel elements creates an interesting journey while moving from A to B. Each plate are in this phase folded around to become a frame; connecting two or more of these in different directions will stabilise the structure. It is easy to see in these models that when there becomes too many of them in the same area it turns into a bigger mess. A simplification of the composition would make it clearer and more understandable to take part in.
Positive to the composition is how the steel is eating itself into the concrete masses and defines a balance of power between the materials. The concrete defines comfortable spaces of privacy, while the steel gives an impression of openness. Other material elements are believed to create connections between the fragmented elements floating around in the landscape, and in this way produce a natural connection between structure and nature.


steel eats itself into the concrete

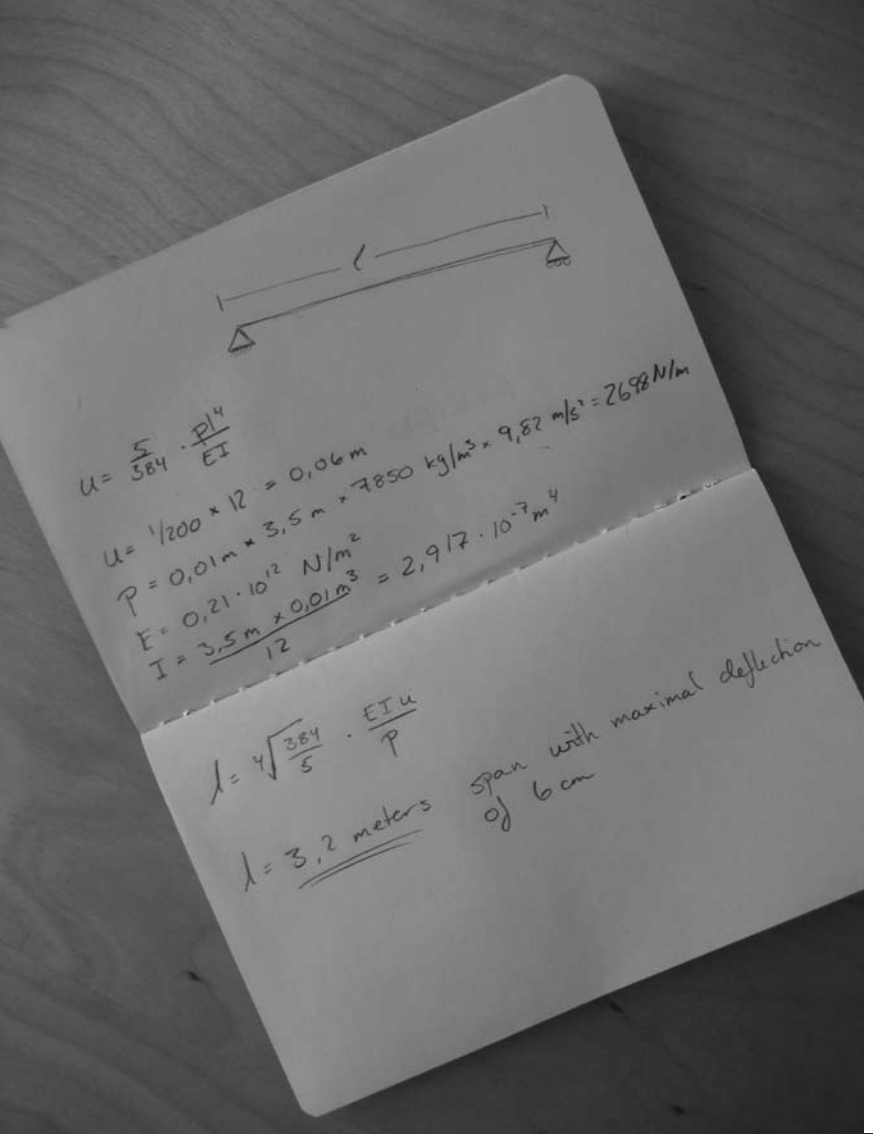

plates creates stability to each other



By simplifying the composition the image has achieved certain clarity; each set of steel plates are now limited to be between 2 and 3. At least one of these plates is now pointing out the main direction by having longer spans than the transverse plates. In contrast to earlier sketches it is now created a transmission between water and land through a clear line. The functional sections are no longer seen as individual sculptures; they now utilize the quality of the wharf by placing itself at the side of it, but without letting it dominate the expression.

The base at land is much more solid than the base in the water; in general does it bring a clear understanding too the two sections functionality. While the concrete elements are totally screened off and acts introvert toward its surroundings, the steel panels are airy and extroverted to the same nature. This creates a huge combination of liveable areas, what means that the centre will be used differently under varying conditions.

At this stage there where produced a general satisfaction of the building composition, and how it related itself to the valley.
To achieve a better understanding of how it would be able to carry the given steel spans in the most aesthetical way,
technical investigation where incorporated in the process.



Quick calculation which shows that a steel plate are not able to span much more than 3,2 meters out of the 12 meters it is calculated for here

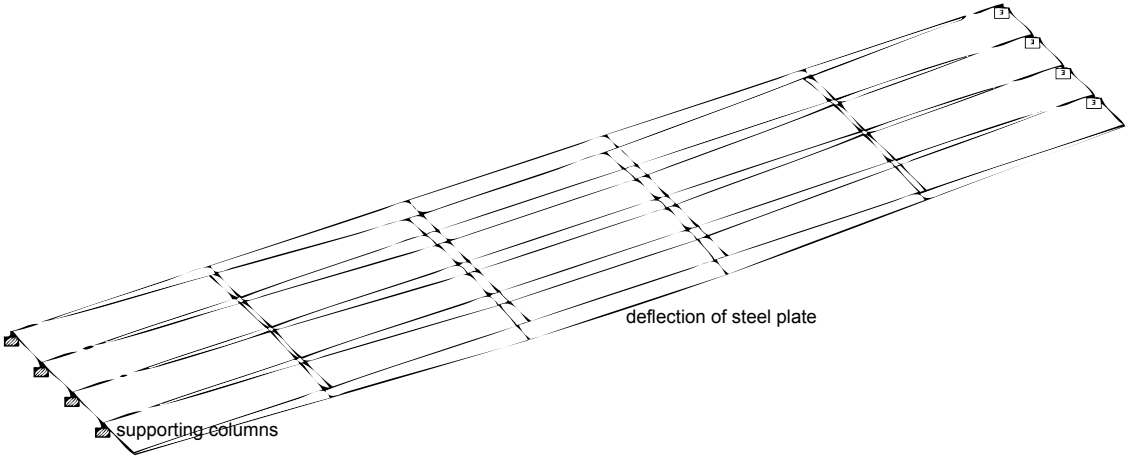
Technical investigations

It is both important and interesting to investigate the spans covered by the metal structures. A quick calculation shows that a 10mm thick steel plate, supported at both edges has the capacity of carrying itself for only 3,2 meters, without exceeding the given deflection of 6 cm. The deflections are in this calculation made out from a given span of approximately 12 meters. Of aesthetical wishes I wanted to keep the look of a thin structural plate; because of this there is a need to search for a constructional system to underline this visual expression.

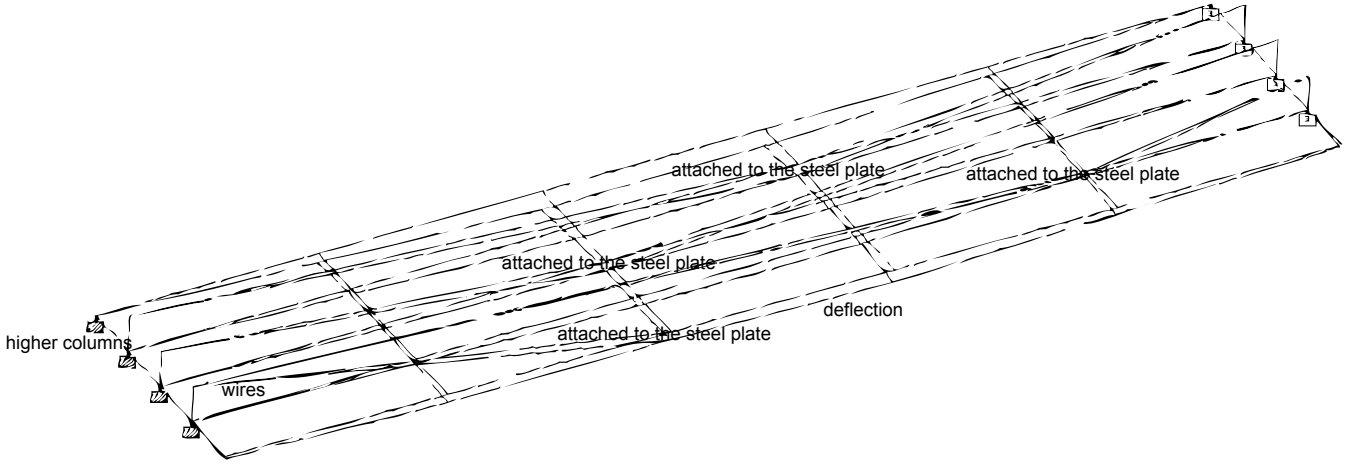
The structural calculation program StaadPro where used to produce ongoing results for the imagined structure. First of all was a 3-dimensional structure built up in the program, where materials and loads became added as information to the structure. In this way the program is able to produce numbers which tells you the statistic quality of your construction; it is easy to interpret both deflections and stresses for the material. The program brings out information which basically is enough to achieve an overview for further sketching.

There is made calculations for the biggest span of the composition, to create an overall understanding of what constructional requirements there is need for; the span is set to be 15 meters. A general rule is that a spans deflection should not overcome 1/200 of the length, equivalent to approximately 75mm. The stress factor relates to the strength of the given material; steel elements have a general possibility of pulling of from 235 to more than 400 MPa.

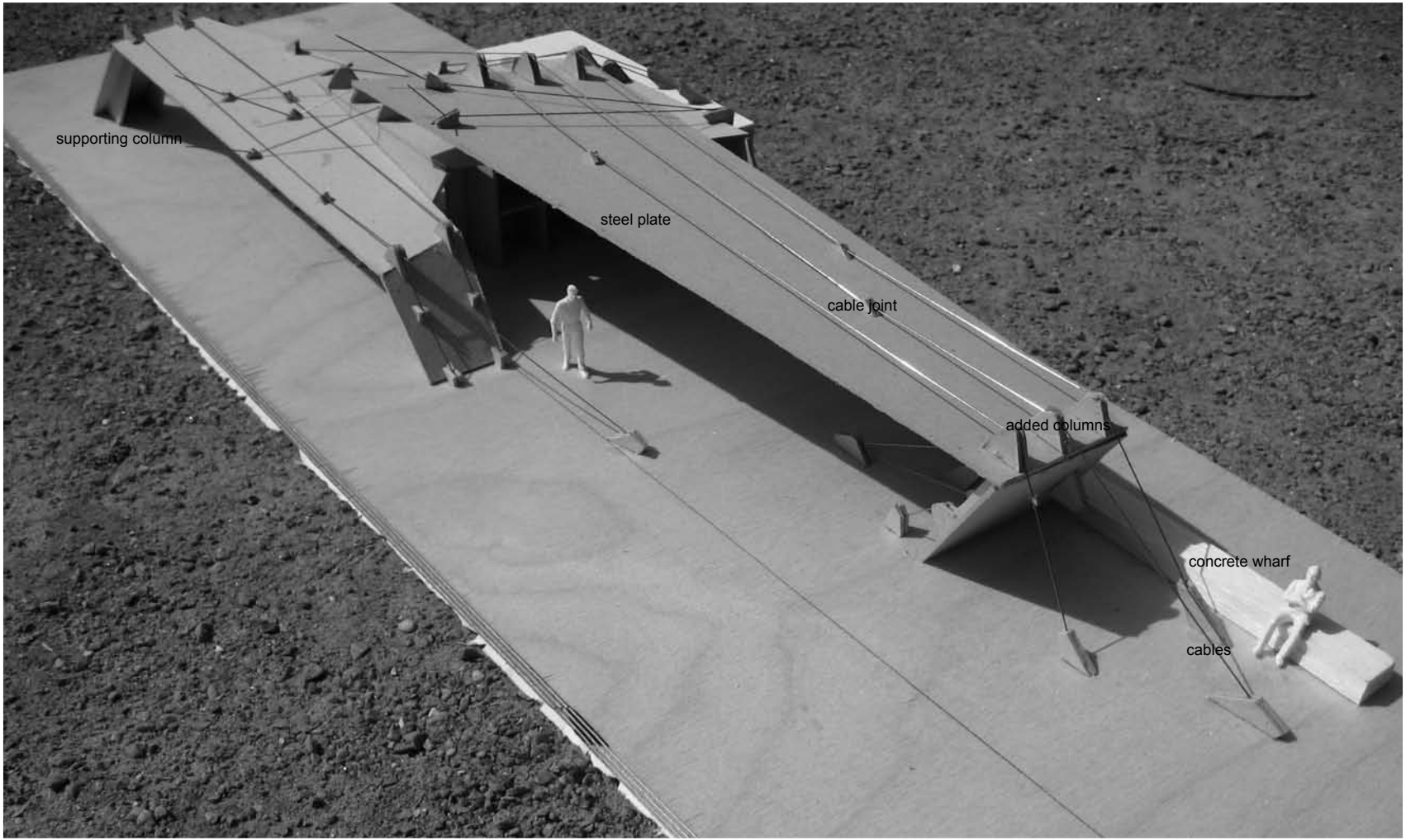
Typical loads for a roof construction are snow load and wind load. The wind load will in this case be out of question since flat roofs and overhangs generally work as contra weight to the gravity. Snow load is on the other hand slightly big in Norway, even if Hvaler have a mild climate there have to be estimated for around 3,5 kN per square meter.



First step in StaadPro was to attach beams to the bottom surface of the roof deck, but there where no wish in taking to much height away from the internal spaces. Experiments with different beam sizes shows a minimal requirements of about 50 cm all over, which is to massive.
The diagram show deflections when using 20 cm high beams; they turn out to be as much as 23 cm in the central areas.

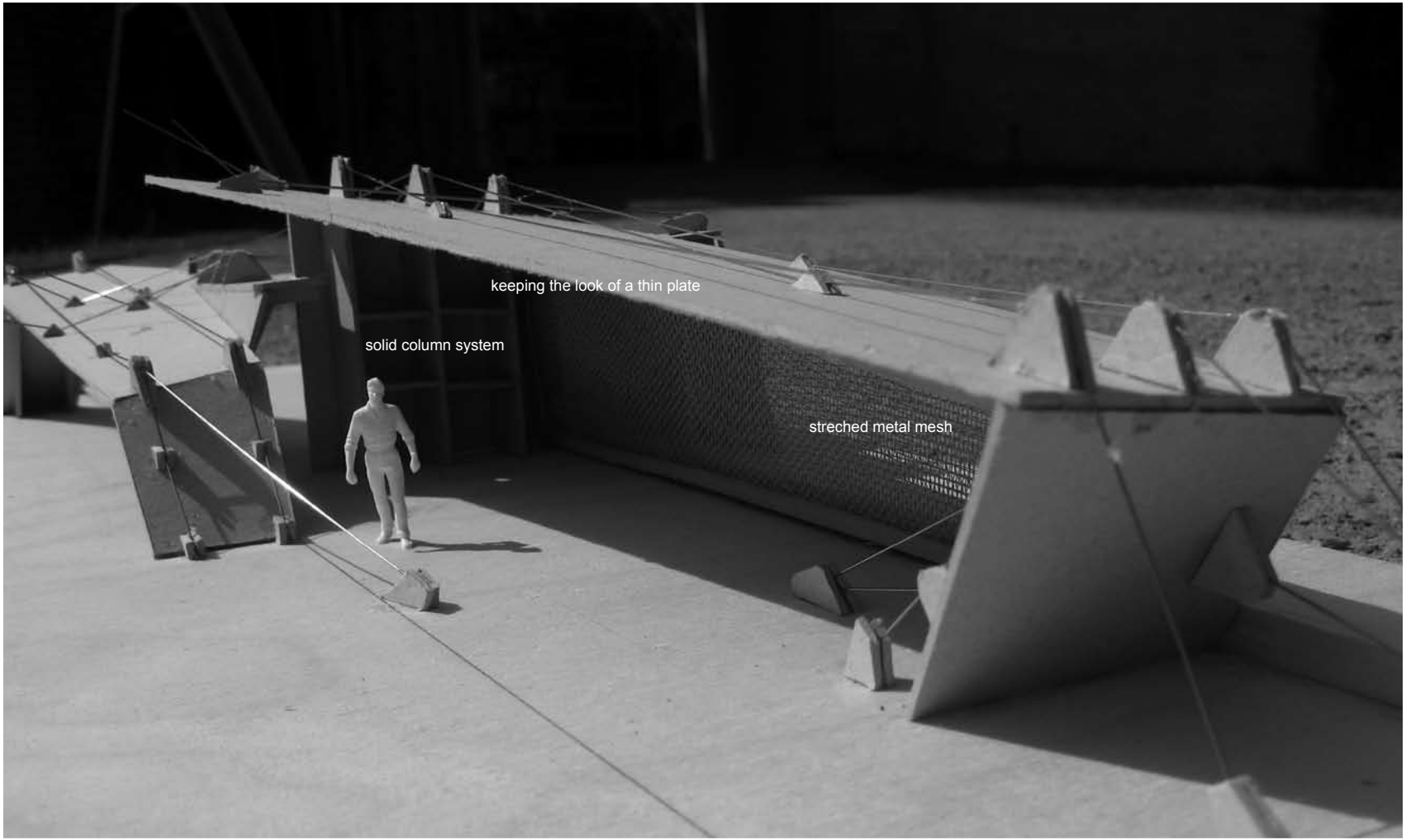


To keep the beam dimensions at a low level, maximum 20 cm, wires where incorporated to the structure. Placing the points strategically along the whole span will shorten the length which is used for the calculation.
As the model shows, the general idea was to let wires keep as short a distance to the structural surface as possible and become a covering mesh for the folded steel plates.
Results show that the inner parts of the construction now have fallen to around 15 cm.



Model experimenting with the visual image of incorporating wires
It creates a dynamic expression to a really plain surface

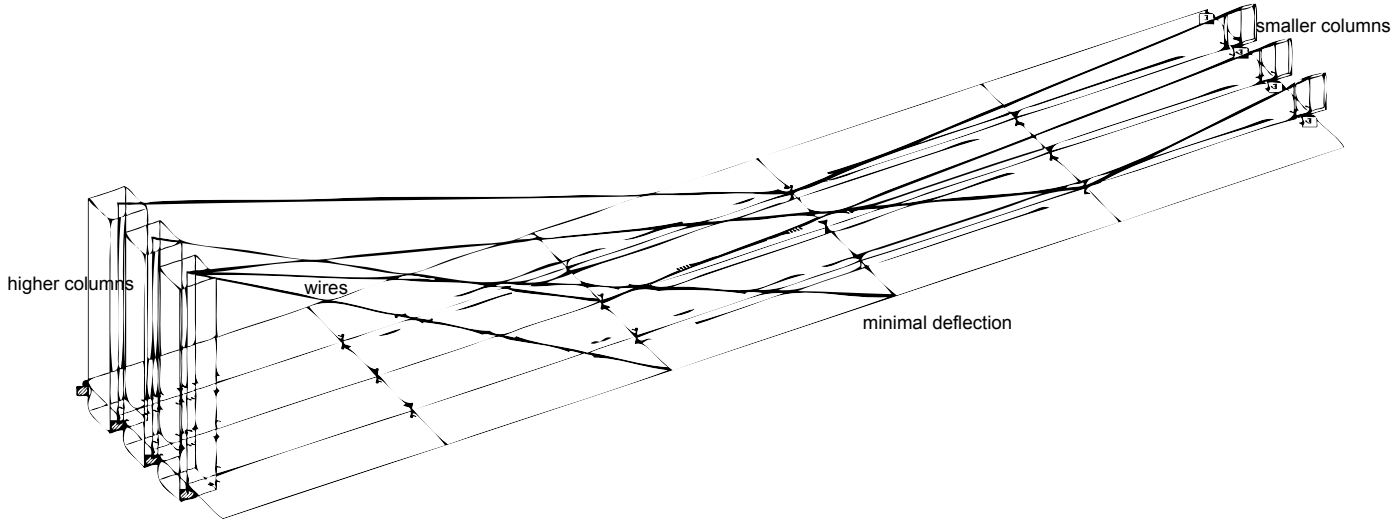
A dynamic use of beams and columns are supporting are working together with the wires
Important that the wires have angles so there is possible to utilize their capasity of pulling of tension



The spans which are possible to produce, will create large open spaces
A solid structure working with the vertical plates will transfer the forces to ground level

Even if there was aesthetically interesting; the running wires have to little an angle to take advantage of the materials capability; further experimentations show that the bigger angle a wire runs with, the better it is to handle forces. Use of columns make the wires reach higher, and central points at the plate now turn out to have a maximum displacement of 6 cm.
All the structural elements are keeping their maximal stresses underneath 300 MPa, which is significant to this structures stability. Except from only suspending wires between columns and the plates, there is an idea to utilize the strength which nature have to offer by letting wires attack the surrounding rock surface to create further stabilisation.

The use of this program during the design phase has given insight to the total need for a structural composition, what in the end gives the possibility of achieving a fulfilled design where structure and aesthetics are able to play together in a total picture. In this case, the combination between wires and steel plates are there to support each other in a dramatic expression.



Final word

The fact that diving primary relates itself to the underwater environment, makes it difficult to measure the projects success from this position. It must be predicted that the location lives up to the main event of the sports, which is to experience the life that take place under the surface. A diving centre will generally not interfere with the actual happening of the sport, so its main mission is basically to arrange a right atmosphere for the event. Before the centre has been taken in use, it is difficult to answer correctly if the project has achieved the right setting for scuba diving or not. Either way, an assessment of the product helps to indicate the capabilities which this product has to offer. To get the right impression of the architectural solution, it is important to look at the architecture from a diver's point of view.

Visually, this project can be defined as a piece of architecture where the story of an adventure becomes essential to its commercial value. The compositions way of creating a diffuse image, means that different individuals will achieve separate impressions of the diving centre during a stay. I will say that a place which people commonly are not able to define precisely, has the possibility of waking bigger interest to the human explorer than a situation which already is defined.
Reality of leaving main land to reach your goal, adds an extra dimension to the architectural expression; expectations get time to escalate during the voyage. Except from the specific individual, the first impressions will be influenced by both time and weather conditions; already before the centre is entered, different interpretations are made by the human spectators. The setting which this architectural composition produces, evokes curiosity from first glance searching for the next image.

It can be discussed if the total expression of the building harmonizes with the surrounding landscape; a clearer geometric shape could have become a nice contrast to the landscape and in this way emphasize the dynamism which nature has to offer. On the other side would a shape like this steal much of the attention and dominate the picture. In my opinion is the structural composition of this centre ensuring that people's imagination take part in the expression and produce individual stories during the stay.

Compared to other clearer and more geometric objects, the combination of shapes is together with the buildings position, turning the attention towards the dramatic landscape. How it relates itself to the rocks and the ground surface, arrange a pretty interesting setting. Attaching cables to the surrounding rocks both over and under the visual surface, brings out the strength in the landscape. It visually indicates that nature is the powerful part of the setting; it dominates the centre and seems to control its destiny.

Diving is about taking part in the natural element and really feel your presence. Keeping the structure open and exposed to the natures environment, has created a permanent contact between man and nature. It can not be defined as a housing complex, but more like different types of shelters. In some way, they will always be affected by the weathering conditions, either if it is rain, heat or cold it takes part in the totality. If an exposed construction like this is commercial competitive to a more luxurious arrangement depends on the client. Some people will generally avoid a place like this; but it does frame the sport and what it has to offer, bigger contrast to the daily living situation gives an even more memorable stay.
Moving in the vertical direction is mainly what scuba diving is about, while the building primary acts horizontally; a solution which leaves the excitement of going underwater to the actual performance of the dive. The longitudinal direction of the wharf creates a special atmosphere to the transmission between land and water surface; walking along the central axis, the distance give time to rejoice while preparing for your final step. Functional areas strategically placed along the wharf, provides that this distance becomes a journey between the two elements, where you have to go through one area at the time to reach the goal. Even if the composition seems complex and confusing in first place, wharf and the planar solution gives clearness and system to the daily sequences related to diving. That all practical parts around an act are taken care of becomes profitable to the total experience; it becomes easier to enjoy the stay.

Even if the building not directly takes part in the underwater environment, it still adapts to the marine environment. Fragments from the construction penetrate the water surface and gives support to the composition. Not only does it express the direction of the dive, it also creates an artificial scenery underneath the surface. For more inexperienced divers it becomes a place to play while they investigate this new world. Small living organism will attach to the construction and add patina to the centre, not only do the building have a

history to tell over water surface, but under as well. That this building is able to define its own history from the patina, gives characteristic strength to the total image. While it progressively changes character during the years, it also changes the base of the story; its presence in the landscape will be differently imagined from one visit to the next.

I believe that the strength of this project is lying in its ability to involve with the tourist during the whole stay. It is no longer only a functional piece of architecture, but as well a basic addition to the complete experience of the adventure. The constructional shapes have made the diving centre unpredictable and interesting, just like the underwater environment. Dynamic meetings between the different materials express the drama which scuba diving is taking part of; an element with fascinating shapes and creatures in all type of figures.

References

Thomsen, J.L, 2004 – Retsmedisin, Nordisk Lærebog,
FADL's forlag, Denmark. ISBN: 87-7749-323-0

Jennings, Gayle, 2007 – Water-Based Tourism, Sport, Leisure and Recreational Experiences,
Elsivier Inc, Oxford. ISBN: 978-0-7506-6181-2

Garrod, Brian, 2008 – New Frontiers in Marine Tourism, diving experiences, sustainability, management,
Elsevier Inc, Oxford. ISBN: 978-0-08-045357-6

van Dijk, Terenja, 2004 – Oase#64, Architecture and the Tourist Landscape,
NAi, Rotterdam ISBN90-5662-390-7

Scuba diving has seen spectacular growth in its popularity over the past decade. In that respect, I have designed a sketch proposal for a new diving centre in the region of Hvaler, Norway.

The project has the intention to produce a specific atmosphere, a setting able to raise the value of each diver's experience. Use of dramatic shapes and structures, creates an explicit connection between building and context; steel, concrete and wood are materials all used to accentuate the mightiness of the surrounding nature. Situated in the rocky landscape, the centre reveals itself to the visitors progressively as they approach; a picturesque quality which makes this composition intriguing and adventurous from first glance.