Architecture of Resistance

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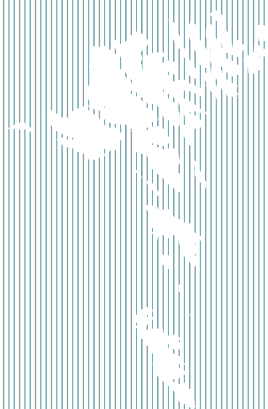

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Abstract

The presented architectural proposal is a design of a housing complex for Runavik, Faroe Islands.

The project is a response to the urban development and its implicit necessity of a strong direction related to their identity.

The thematic focus on an architectural approach that intends to provide comfortable and unique spaces that perform well in harsh conditions.

The understanding of the site, its natural features and identity is the base for an architecture that seeks to understand vernacular traditions through a contemporary light.

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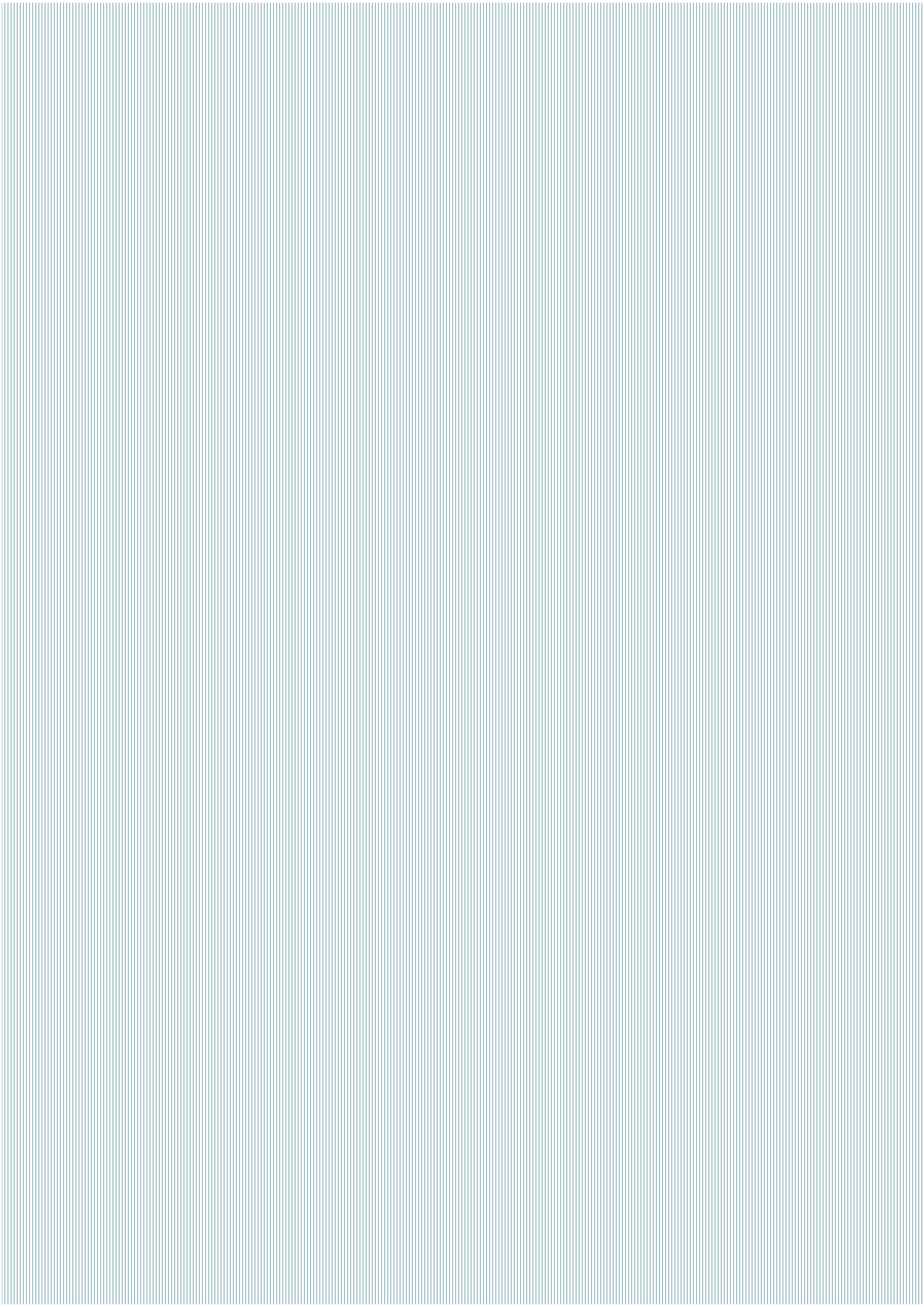


Introduction

Foreword
Motivation
Methodology

Foreword

The presented architectural proposal is a design of a housing complex for Runavik, Faroe Islands.

It deals with the thematic of building in a steep terrain and allowing life in harsh conditions.

The proposal sought the understanding of the site, in order to relate to it and explore how its natural conditions and vernacular solutions could inform a contemporary design that serves its users and their needs.

Motivation

The proposal focuses on the understanding of Architecture as a shelter that responds to reality, time, climate, landscape and daily life.

The development of a housing complex in a harsh environment will allow us to think about not only the issues related to the most intuitive and perceptive part of Architecture, such as inhabited space, light, comfort and intimacy, but also in the necessity of a complete performance facing the environment.

When dealing with harsh environments, Architecture is decisive for enabling living conditions; the boundaries are pushed when good structural performance, resource management and design accuracy are vital. We believe the cohesion between the several aspects of a project drastically improves people's lives.

The task of designing a housing complex appeals to us in a way it is extremely related to people's everyday life and needs. There are a technical and practical aspects that have to be solved and thought threw, but the fact that these are the most intimate spaces for their users is what is challenging, since it is related with essential subjects for Architecture; more specifically, the graduation of privacy, tension between indoors and outdoors, articulation of spaces, light, materiality and its details, comfort and practicality, among others.

The Faroe Islands seem to be an excellent place for the project in a way it provides a challenging and inspiring site. There, the landscape plays the main role and the harshness of its climate reveals Nature's magnificence. It is also a place that requires a deep understanding of its physical conditions and its specificity; in order to do so, we consider the study of regional and vernacular traditions has a way to gather knowledge and mindfulness when dealing with a place like this.

The vernacular tradition functions as a way to respond to the problems and conditions of a specific site where common people found optimal solutions for the use of space throughout time. These conditions are the same we are dealing with now, so the understanding of these principles and mechanisms should allow us answering the same problems in a contemporary way.

We believe both the landscape and traditions are great inspirations for a creative and innovative design that reveals the Faroese identity still being strongly connected to the present, its modern techniques and new ways of living.

Methodology

When starting a design process it is important to organize the formulation of the proposal in stages, however is also necessary to understand their interdependence and the non-linearity of their development.

We believe the Integrated Design Process by Mary Ann Knudstrup is a quite complete attempt of description for the architectural process, however, it misses in someway the idea of relation between problem and solution, not only as the starting and finishing point of a development, but also as two poles of a negotiation through the three activities of analysis, synthesis and evaluation, as Bryan Lawson defends in How designers think.

Both of them were relevant to the understanding of the general process, the first when it comes to recognize the weight of an integrated method that seeks from the beginning to articulate all the several aspects of the project, allowing them to inform each other; the last, due to its more realistic and liberating approximation to the complexity of the design process and its flow.

The Integrated Design Processs
The Integrated Design Process intends to clarify the design process in Architecture; it identifies the different phases architects go through when working on architectural proposals. It also develops the idea on how this process is not linear but works in loops, being every phase informing of the others.

It helps us to understand how a controlled and cohesive project could be developed, since it is a theoretical description of a com¬plex process that tries to gather in a cohesive way very different aspects such as Concept, Aesthetics, Functionality, Technology, Construction, Sustainabil¬ity. These should not only be coherent between them, but they also should enlighten each other for a strong and integrated solution. It recommends the acquisition of several different tools that would test and study the parameters of the project.

The articulation of design, functional, technologic and constructive aspects helps clarifying decisions and to make them as realistic and optimal as possible. However, is not simple and requires a lot of effort and experience to take advantage of its full potential.

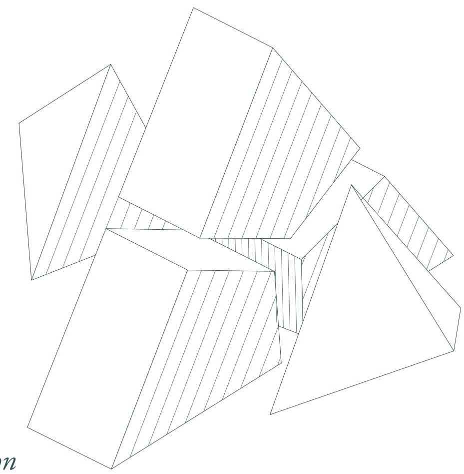
The Integrated Design Process phases are Problem Formulation, the Analysis, the Sketching phase, the Synthesis phase and the Presentation of the material. After, there will be presented a short description of each moment on the project.

Problem phase
On the Problem Formulation part we focus on un¬derstanding the challenge and get familiar with the problem. It is neces¬sary to create a base for the next phase, making sure of what is needed to proceed.

Analysis phase
The analysis involves getting a deeper knowl¬edge of the site, its character and its relevant as¬pects, such as the climate, sun exposure, historic analysis and sound analysis, among others. The process of studying references and case studies for the several aspects of the proposal is initialized.

Sketch phase
The sketching phase is the beginning of the studies in design, structure and space, with assistance of graphic and digital tools, sketches, physical and digital modelling.

Synthesis phase
In the synthesis phase, the exploration of the parameters takes place as well as the refinement on the relationships between form, structure and space. The changes are made according to the information



Ill. 1 Bryan Lawson's design process diagram

obtained by the analysis on the different aspects, ending up affecting each other and justify decisions that needed to be made. As one moves along through the development of the project it gets more coherent.

Presentation phase
After this, is about moving to the details and the presentation phase, developing everything that is required to communicate the proposal such as plans, sections, elevations and spatial visualizations.

The Working Flow
Bryan Lawson goes beyond in the explanation of the course of the design process, as represented later. Getting familiar with the problem implies the search for an optimal solution, in the sense we are able to understand the complexity of the problem as soon as we start testing solutions. Only by doing this, we are able to realise their strengths and weaknesses and become aware of the several demands of the project.
In this manner, the phases described before don't follow each other linearly, but in loops and sometimes take place at the same time. (*Lawson,* 1994)

For example, following the advice of starting the sketching with the analysis phase allowed us to take conclusions earlier on the design and to become more conscious when analysing the site and problem. On the other hand, it also permitted to see what could be worth to analyse and what to skip.

Framework

Architecture of resistance
Critical regionalism
Tectonics

Architecture of resistance

Modern Architecture had decreased in a way the concerns with well being when designing space. In one hand, because it brought along with it several new processes and techniques to control the environment and shape it according to its users' needs more in a corrective than in a preventive way. On the other, the fascination with the new possibilities did somehow blur the most elemental ideas linked to Architecture since the beginning of times: shelter and comfort.

Now that the warning signs related to energy consumption are clear and unavoidable, there is an effort to reduce and control, through the design parameters, the escalating energy requirements.

There are several aspects that differ according to location, when thinking about climate. In fact, "climate consist of a series of interactive systems, in which the individual climate parameters, such as heat, humidity, air movement and light, each contributes to the health of the whole with its own dynamic system." (*Dahl,* 2008)

The understanding of the role of each climate element in the site is fundamental in order to optimize the project performance. The design parameters should naturally be related to how the project responds to the climate and how do they guarantee the comfort of its users given the site's specific conditions.

Vernacular tradition is brought back when dealing with climate control by its optimal qualities, modesty and adequacy to the site. Ironically not made by architects, reveals itself as a pure response to the site and to the users needs; these kind of solutions are essentially realistic, economical and long lasting.

By its practical character, is extremely important to understand the Vernacular neither in a sentimental way nor as a role of terms that one can use in a composition.

According to Amos Rapoport theory, the difference between the copy and the real assimilation of the Vernacular traditions has to do with understanding of it not as a design artificer, but as concepts, models and theories that are linked with behaviors and users. (*Rapoport,* 2006)

When seen as a model that can be analyzed, it is more possible to understand the principles and mechanisms that work behind it and use them to answer the same problems in a contemporary way.

In the case of Runavík, it is possible to know from the analysis that the main aspect responsible for the harshness of its climate is the wind, not only for its speed but also for the absence of natural barriers, the proposal deals with an open hillside. Naturally, this will be a main concern when designing the outdoor spaces and the projects' masterplan; focusing on sheltering the spaces and driving the wind away from them.

When building on the coast, architects must also be aware of the symbiotic air-change based on thermal differences between sea and land. During the day, the sun heats up the earth as the sea keeps cool, the warm air rises and a cool breeze coming from the sea flows to replace the warm air; then at night the situation inverts, so the wind turns going from the coast to the sea. (*Sørensen,* 2008)

An example of coastal architecture that tries to create shelter from the wind is the village of Sønderho in Fanø, Denmark. Is interesting to analyze the relation between the wind forces coming from West and its masterplan.

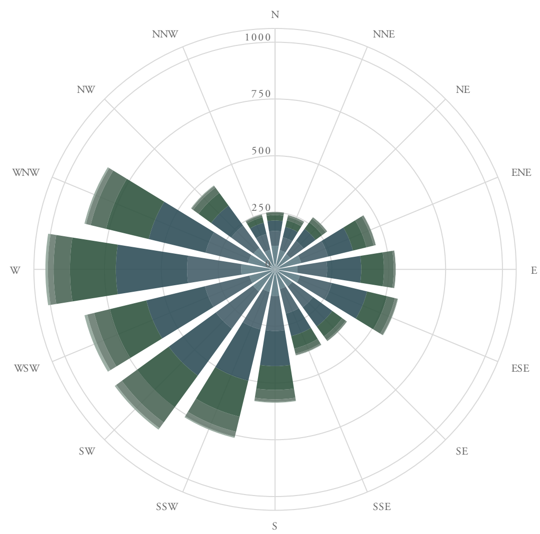
The houses are oriented in the same axis as the wind; they are kept closed together and tend to have a porch or entrance working as a wind lock.

There is a lot more to comfort and perception of a space than the way it relates to climate, in the same way, Vernacular architecture is more than sensible ways to respond to it.

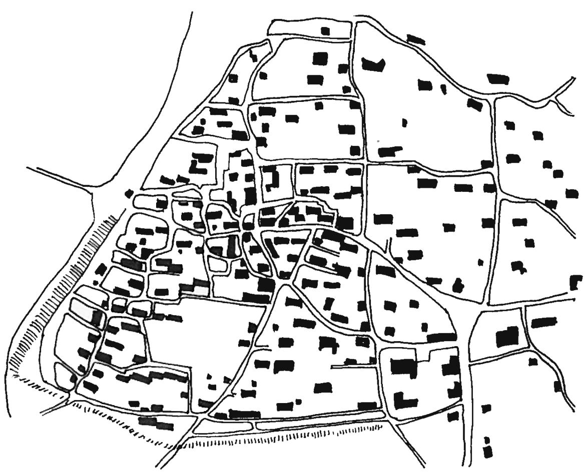
We believe these solutions reveal sometimes the character and essence of a place, which is hard to describe and comprehend, especially in a place as the Faroe Islands.

The expression "Architecture of resistance" is used to describe the proposal not only in the sense the houses have to be built to resist to the harsh climate but also in a way they respond to the present and the site's identity, as an informed way to understand tradition in the present times.

"Regionalism as the mediator between both [History and progress], as a focus on the present, as the middle ground between these two Post-Modern positions. Is the "critical basis from which to evolve a contemporary architecture of resistance", free from fashionable style forms, an architecture of place rather from space, a way of building sensitive to time and climate, a concept from the environment where the body as a whole is seen as being essential to the manner in which is experienced."
(*Frampton,* 1998)



Ill. 2 Wind diagram



Ill. 3 Plan of Fanø

Critical Regionalism

Critical Regionalism in Kenneth Frampton's perspective deals with the problematic Architecture is now facing: how to take part in universal civilization without loosing the authenticity and values of one culture? How to balance past and future without pending neither to a rootless, modern, global architecture, nor to a nostalgic and numb attitude?

This position tries to find the common ground between History and progress, to move on from the past, learning from it, and promoting a future that cherishes the values of one culture instead of the modern tools and processes themselves.

In other words, it has to do with understanding the time and place and how they can inform an architectural proposal that balances the best aspects of the past and present time. In this manner, is a way not to fear the unavoidable modernization escalating process that can mean a "sort of subtle destruction and spreading of a mediocre civilization" (*Frampton*, 1996); what will happen if the new methods and techniques were not understood as a tool to express deeper concerns and values than form and utility.

"The "in order to" has become the content of the "for sake of"; utility established as meaning generates meaningless." (*Arendt, H.*, 1989)

Critical Regionalism is strongly connected to the identity, culture, climate, landscape, and light of a specific place. For this reason, this approach sees each project in a particular way and requires an extended analysis in order to assimilate the site's character and later, realise how it could be treated in a contemporary way. (*Frampton*, 1996)

It is not about returning to the past or forcing its presence, but to understand what can come naturally from the pre-existences, how have people dealt with the same conditions before, how much of the vernacular traditions are essential to keep the place's identity intact and how they can inspire new spaces, materiality, compositions.

It analysis the tradition and deconstructs the modern techniques and puts them in dialogue, in order to achieve a balance that adds value to the site and its intricate both to its place and its time. (*Frampton,* 1998)

In any way does Critical Regionalism restricts creativity, it breaks ground into the understanding of a site and its possibilities, allowing for stronger and pertinent architecture with layers of meaning and detail, far apart from the sense of "placeness", discomfort and frustration of some contemporary architecture, which is the prove that "modernization is no longer liberative per se" and there is a real need to reconnect with the "perennial identity of all". (*Pessoa*, 1928)

Besides this, Architecture in opposition to other Arts has a strong functional character that is extremely demanding. In Marshall Berman words, "Liberative architectural form is invariably critical when it is set against the chaotic, exploitative, alienating environment of everyday life." (*Berman,* 1982)

As architects, is fundamental to understand how people lead their lives and what their needs are, so we are able to design pleasant, comfortable and practical spaces that serve their users and offer them a reality that reflects their essence and values, this can only be done looking back.

For this reason, is related to passive strategies, since it explores the way users, not architects, have built their spaces and optimized them through time, facing the climate, landscape and other natural conditions they

Ill. 4 Picture of Saksun

Ill. 5 Picture of Saksun

needed to adapt to in their daily life. This type of architecture is therefore integrated and preforms well to its environment, many times taking advantage features that could at first represent an obstacle to living conditions.

"Vernacular architecture comprises the dwelling and other building of the people. Related to their environmental contexts and available resources. They are customary owner or community built, utilizing traditional technologies. All forms of Vernacular architecture are built to meet specific needs, accommodating the values, economies and ways of living of the cultures that produce them." (*Oliver*, 1997)

The study of Vernacular tradition will hopefully inform the design of the housing complex and allow it to dialogue with the Faroese landscape, people and conditions.

The proposal will come out stronger and preform better than if it was done unmindfully the background, especially in such a characteristic place as this. It will require nevertheless an analysis and selection of which knowledge and costumes make sense nowadays and an understanding of how modern techniques can enhance them. Critical Regionalism is a "recuperative, self-conscious, critical endeavour" to apprehend the vernacular tradition through a contemporary light. Is the "critical basis from which to evolve a contemporary architecture of resistance" (*Frampton*, 1996), free from fashionable style forms, an architecture of place rather from space, a way of building sensitive to time and climate, a concept from the environment where the body as a whole is seen as being essential to the manner in which is experienced.

In this line of thinking, one can assume that this kind of approach tries to find the core defining elements of a place and its character, the ones that should be present when designing a project for this place, independently from time or formal considerations. The architecture will fit if those qualities were assimilated.

When dealing with the Faroe Islands, there is a natural desire to relate to the landscape in some way, due to its expressivity and its dramatic natural elements.

Nature is unquestionably the protagonist and is important for the proposal to find its expression within Nature, building the site, dialoguing with it and exploring its features.

It is natural to find the idea of shelter when looking to some vernacular examples and how they propose a clearly different space inside them, they do this without contrasting with the landscape in any sense, neither volume wise nor materially.

It is also helpful to understand how to deal with these kinds of slopes and how the architecture takes advantage of them in their outdoor and indoor spaces.

The way light is treated is also interesting, since it is connected to the restrictions for openings due to the strong winds.

If some sights of the Faroese essence could be retained, the poetics of the place would be the same of the spatial articulation and the human intervention would be balanced with Nature, complementing it.

For people, the proposal would constitute a place where they would be proud to live in and which realises their identity.

Tectonics

Tectonics in architecture can be defined as a "principle that relates to a poetic of construction" (Frampton 1995). It is a concept that has been the object of many discussions since the last century, as it concerns some of the main aspects of Architecture, such as construction and structure, and how they relate to each other to ensure stability and coherence in a project.

The aim of this text is to provide a synthetic overview on some of the definitions of this term and explain how it is going to relate to the project.

According to german architectural historian Eduard Sekler, before attempting to a more precise definition of tectonics it is necessary to specify the difference of significance between construction and structure. He defines structure as an ordering principle that organises the forces at work in the building in a system that will give it stability, such as the system of post-and-lintel.

Construction, on the other hand, is the material execution of that principle and defines materials and ways it is realised. Tectonic is achieved "when a structural concept has found its implementation through construction the visual result will affect it through certain expressive qualities which clearly have something to do with the play of forces and corresponding arrangement of parts in the building, yet cannot be accounted for by terms of construction or structure alone" (*Sekler,* 1965).

These themes are also studied in Carles Vallhonrat 's "Tectonics Considered. Between the Presence and the Absence of Artifice", where he introduces the importance of gravity and of the characteristics of the materials as major influences on the final tectonic form. He speaks of the different roles that materials assume depending on their position - surface, structural, filler etc - and of how it is crucial to assign to each the role that fulfils their potential and achieves an overall coherence in the building in terms of statics and atmosphere.

He discusses the role of the surface as something that has a "problematic lineage" since if they are "used without regard of the frame or the structural concept, thereby turning the wall into a panel" but that if coherently integrated with it "they assume a legitimate role, since we know that a material will have a different task to perform in the center of a wall than on its surface" (*Valhonrat,* 1988).

This part raises the issue on how to combine the different components in one unity, which details have to be considered in order to achieve that.

In this regard, Marco Frascari formulated a definition, in his study about Carlo Scarpa's architecture, in which he exemplifies the art of detailing as "the joining of materials, elements, components and building parts in a functional and aesthetic manner" (*Frascari,* 1984). In his conception, a detail in architecture is always identifiable with a joint.

This can be either material, such as the connection between two or more components, or formal, such a corridor - the connection between rooms.

Details in Architecture are not only visual but take into consideration the materiality of it, that add greatly to the atmosphere of a space.

Frampton uses the example of Alvar Aalto Säynätsalo town hall, to show that the way the Finnish Architect guides the visitor through the building, not only by shaping the rooms but also by articulating the progression of spaces with a strong materiality, that can be accounted as "a tectonic display reinforced by non retinal sensations" (*Frampton,* 1995).

Ill. 6 Picture of Go Hasegawa House in a Forest, Nagano

From the massive architecture of the entrance, dominated by bricks and small windows to the light timber lined roof of the chamber of the council, whoever walks in those spaces, upon arriving to the chore of the building, can feel the smell of polished wood and feel the "floor flexing under one's weight together with the general stabilisation of the body as one's enters a highly polished space" (*Frampton,* 1995).

Another venture in defining atmospheres in buildings through materiality and shaping of the space belongs to Swiss Architect Peter Zumthor, who dedicated an entire book on this theme.

He describes the atmosphere of a space as the combination of factors that are able to move the person who is experiencing it. Those factors are connected to all the senses and and they can be defined as "the air, the noises, sound, colours, material presences, forms" but also "people" (*Zumthor,* 2004). From this quote is possible to deduce that some of these components are contingent, but some are dependant on the designer, that has to facilitate somehow the creation of this atmosphere.

The creation of the right atmosphere and spaces has to be taken into account since the beginning, while defining the masterplan.

In the Faroe Islands wind is a key aspect to consider since they have strong wind blowing most part of the year. Sheltered common spaces are very much sought after, since community living is the basis of the faroese society. The detailing and designing of those spaces in between the buildings will hopefully lead to a stronger and cohesive proposal in tune with the needs of the future inhabitants. This will be possible thanks to an attentive study on how the wind will work with the different placing of the volumes.

Since the project is dealing with homes, it is necessary to determine which shapes and which materials are essential to keep in touch both with the surroundings and the culture.

In this regard, Frampton quotes the Italian Architect Vittorio Gregotti when he affirms that “the manner in which tectonic detail may be combined with traditional type forms, modified in light of today’s needs but free from gratuitous novelty, in such a way as to articulate the qualitative difference separating irresponsible speculation from critical practice” (*Frampton,* 1995).

This implies taking into account the new technologies and improvements achieved in the field of Architecture and Engineering, without being overwhelmed, but instead work with them as a tool to move forward and evolve the cultural identity of a place to avoid to only be reminiscent and nostalgic of the past.

Frampton concludes: “the full tectonic potential of any building stems from its capacity to articulate both the poetic and the cognitive aspects of its substance. Hence mediate between the technology as a productive procedure and craft technique as an anachronistic but renewable capacity to reconcile different provocative modes and levels of intentionality.
Thus the tectonics stands in opposition to the current tendency to deprecate detailing in favour of the overall image” (*Frampton,* 1995).

When building in the Faroe Islands there is the practical issue of dealing with their sloping rock soil, that makes the choice of materials relevant both in terms of structure and shape since they also have to withstand the force of the wind.

The synthesis between traditional techniques and solutions with the new improvements of technology and parametric design will inform the final result and find new solutions that take into account the cultural heritage of the site.

This underlines the significance of achieving an over all consistency of design, that will hopefully end in what Zumthor defines as “beautiful form” (*Zumthor*, 2004), which is the final outcome of the combination of all of the components that helped to shape a “form” that is the resultant of everything taken into account while designing. This form is not something you actively work on, instead it is the resultant of when every factor in the project coheres in an optimal way.

Ill. 7 Picture of the Listasavn Føroya in Tórshavn

Cultural Identity

Nature and Landscape
Social aspects
Outdoor spaces
Housing culture in the Faroe Islands

Nature and Landscape

In the Faroe Island the landscape is a key feature. Its peculiar shape has greatly influenced the life of its inhabitants and contributes to their national identity. The compact size of the archipelago and the number of its different heights make it eligible to be called "a land of mountains in the ocean" (Jacobsen 1936).

Ill. 8 Picture of Vágar, Faroe Islands

Ill. 9 Picture of the mountain coastline

Coastline

The faroese coastline is 1,289 km long and to have a comprehensive outline of it, it is necessary to divide it in two very different types: the outer coastline and the coast of the fjords. (*faroeislands.fo 2016*)

The first one is often abrupt and jagged in shape. This makes it unapproachable for most part of it. In its proximity there are also stand alone cliffs, which were once part of the coastline now destroyed by the waves.

The coast of the fjords is composed by slopes that go quietly into the sea. These have level terraces called *harmar*, that are the outermost part of the layer of basalt of which the islands are made of. (*Jacobsen* 1936)

These formations reveal the vulcanic origins of the archipelago.

Ill. 10 Picture of Skálafjørður

Fjord

By making deep cuts into the rock the fjords make space for some shelter of the open ocean, here the water is calmer and the mountains offer some shelter from the strong wind: for this reason most of the settlements are along their edges.

There are five main fjords divided in the islands: Funningsfjørður, Skálafjørður, Sørvágsfjørður, Trongisvágsfjørður and Vágsfjørður.

The biggest one is Skálafjørður in the island of Eysturoy, where our project site is located. (*visitfaroeislands.fo* 2016)

Ill. 11 Picture of the mountains in Faroe Islands

Mountains
The mountains rise of a lot of meters in a restricted space, making their slopes very steep, especially in the northern islands where the peaks are 600-760 meters heigh. The highest point of the Faroes is Slættaratindur with its 880 meters of height. It is interesting to note how mountains in these islands don't have trees on them, but only grass, this is because of lack of soil on their slopes and the wind. (*faroeislands.fo 2016*)

Ill. 12 Picture of Múli water dicth

Water

Practically every house on the Faroe Islands has a view of the water. It is in fact a very present element and one can see it not only in the sea, but also in the fjords that flank the mountains, lakes, streams, waterfalls and the running water ditches.

The presence of water reinforces the relation between Nature and the islands and defines the role it plays in the Faroese culture.

When analysing it, it is possible to see how connected they are to the sea, in their professional activities, industries, cultural practises, social events and above all the beliefs related to Nature and its magnificence.

The picture in this page corresponds to one water ditche, here one can observe how tremendous is the presence of water and how it shapes the landscape; it divides the site into different segments and the stream cause a sudden change in the topography.

It is fundamental to understand water as an element that informs and is incorporated in the project in order to cherish its relation to the site, not only for its physichal relevance but also for the meaning it has in the Faroese identity.

Social aspects

The population of Faroe islands descents from the Norwegian vikings, that arrived around the ninth Century, the same wave that established settlements in all the Nordic Atlantic islands, the Orkneys, the Shetlands and Iceland.

The remote location and the closed borders lead them to develop an own identity without major influences from the outer world until 1856, the year when the Danish Monopoly was ended.

The Faroese people have a strong attachment to their land this is well demonstrated by their national motto which is "tú alfagra land mítt", thou, my most beauteous land. Even if now they are open to the rest of the world they were still able to maintain distinct identity and language.

At the beginning, it was a society mostly based on farming. The traditional farms have their origins in the Norwegian model, for this reason they were not separated but were united in villages and hamlets.

This was especially also because the adverse climatic conditions and asperity of the landscape made the population stick together the feeling of belonging in a community is an ancestral feature in the Faroe Islands.

For the most part the culture in this country is still passed on verbally, since faroese did not exist as a written langue before the end of the Danish Monopoly and the harsh environment conditions did not favour the thriving of a cultural community. Despite that, it is rich in songs, dances and stories about norse mythology and life at sea, the performances of these composition still represent an important moment in the life of the communities.

Before 1856, the population had been around 5 000 people for centuries, living in a peaceful sense of community, this is because the climatic condition, the harsh land and the economic situation, that primary relied on farming, could not sustain more that that.

After the opening of the borders a commercial class arose. Fishery became more and more the main trade, since it was more profitable and agriculture diminished sensibly, considering that now it was possible to import from abroad the goods they did not have or that was to costly to harvest on the faroese soil.

This lead to an impressive growth of population that now is around 50 000 people. (*Jacobsen*, 1936)

Outdoor spaces
The main concerns when thinking about outdoor spaces are their disposition and configuration regarding the sun and the wind.

The sunlight is a very appreciated feature in the Faroe Islands, as mentioned before, in the winter there are not so many sun hours so it is very important to make the most of them. Also for the Faroese children, the opportunity of being outside when the weather is pleasing is very valued and awaited.

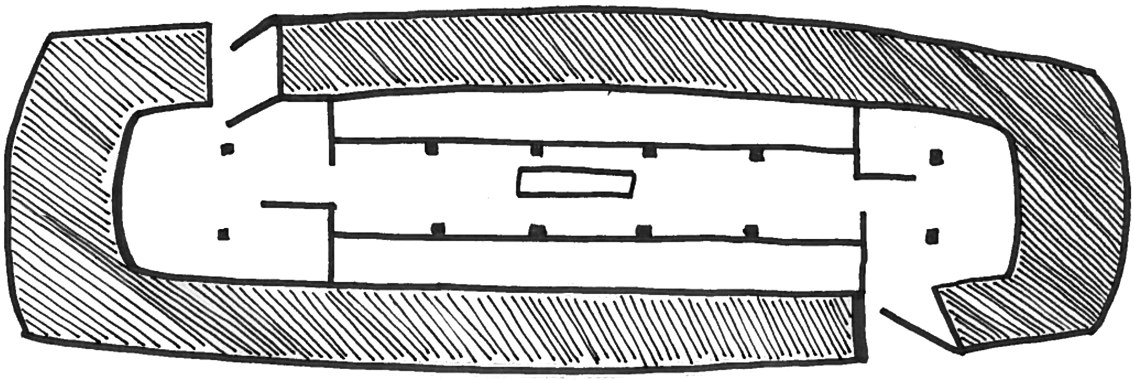
For the wind, the outdoor spaces should be designed considering its direction and how could their shape and volumetric drive it away from the common areas. Some solutions had been tested during time and along with the configuration of the landscape, it constitutes the reason for the angularity of some of the Faroese towns' plans.

Flat areas are often sought after as the preferred spaces for being outside, especially when articulated with the presence of some natural element such as water.

There are not many outdoor spaces in the Faroe Islands, in favour of houses with private gardens, however is observed when the architecture provides it, people gather together.

Ill. 13 Picture of Saksun scenery

Housing culture in the Faroe Islands



Ill. 14 Plan of the traditional viking longhouse

The viking longhouse

The first typology of settlements that can be found in the viking turf longhouse.They consisted in one main room, with the fireplace and smaller rooms that spanned their length. The main room was lined with two sides of benches, one was for seating the other ones was used for sleeping.

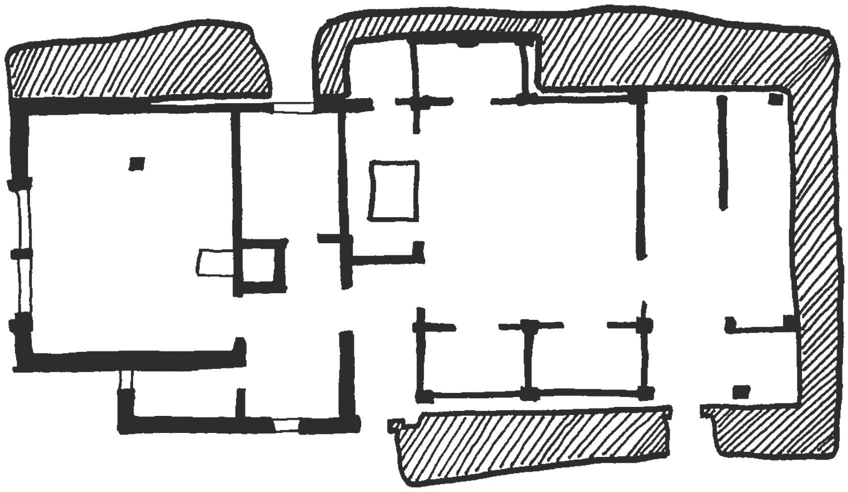
The smaller rooms were usually used for storage. The entrance had two doors, to protect from the drafts.

The footprint of the house consisted on the massive exterior walls, composed by two layers of turf blocks with a filling of gravel or dirt.

The roof had a structure of wooden rafters, usually made of drift wood since trees in the Faroe Islands were rare, and a layer of small three branches. Over them there was a layer of turf, on top of which there was living grass. The roof also had wood lined holes above each fireplace as a smoke outlet.

It was customary to have smaller buildings, as byre, around the main house for the livestock. These constructions followed the lines of the terrain, creating different patterns on the landscape and outdoor sheltered spaces, that were cultivated with vegetables and wheat and served as winter feed for farm animals.

Ill. 15 Picture of viking longhouse



Ill. 16 Plan of the traditional Faroese farm

The traditional Faroese farm
This typology was made of stone and turf with some woodwork, in the roof and on the front of the house. They usually had two rooms: the smoke room and the glass room.

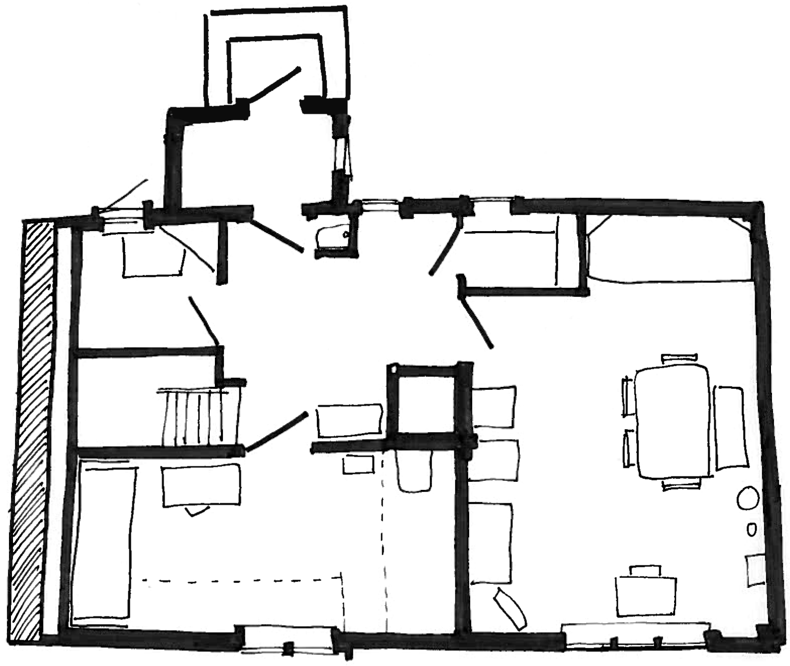
The smoke room served as the kitchen and was also the sitting room of the servants. There was neither ceiling chimney nor windows but a tiny hole in the roof offered an exit for the smoke from the open fireplace, like the viking longhouse from which it takes its point of departure.

In the glass room there where windows, guests were received there, and the head of the family had his sleeping quarters in this room. Round about the farm outbuildings, barns, stables and store houses lay in a group, following the Norwegian farm tradition.

The materials used were stone and driftwood, for the façades the driftwood was covered in tar giving to the house the characteristic black colour and roofs were made of grass.

In some cases wood had to be imported from abroad. Usually the stone wall was placed were the wind was the strongest, in order to shelter the rest of the house from it. (*Dirckinck-Holmfeld, K.,1996)*

Ill. 17 Traditional Faroese farm house in Saksun



Ill. 18 Plan of the traditional house

The traditional faroese house

The traditional faroese house was built up until last century, when it was replaced with larger houses with wooden panels or corrugated sheeting. It is usually black or brown because of the tar that protects the wood, with white painted windows, white fascia boards and a grass roof, on top of a whitewashed basalt stone foundation.

In this typology the smoke room had become the kitchen with a furnace or oven and a chimney, they had ceilings and windows like the other rooms. There were also a jamb oven that was fed from the kitchen with peat or coal. The room next to the living room could be heated from here. The alcoves in the smoke room and the beds in the glass room became separate bedrooms, located in end rooms in the attic.

In this typology stone was still used to protect the most exposed wall from the wind. The basement usually was used as a stable, so that the heat produced by the animals could help with warming up the house.

The cellar walls were made in stone painted by white wash.
(*Dirckinck-Holmfeld, K.,1996)*

Ill. 19 Picture of a traditional house

Ill. 20 Picture of the Hosvík

The Fishermen houses
The Fishermen houses are buildings structures at the harbors, which support nautical and fishing activities.

For this reason they are generally taller volumes made out of wood with no insulation.

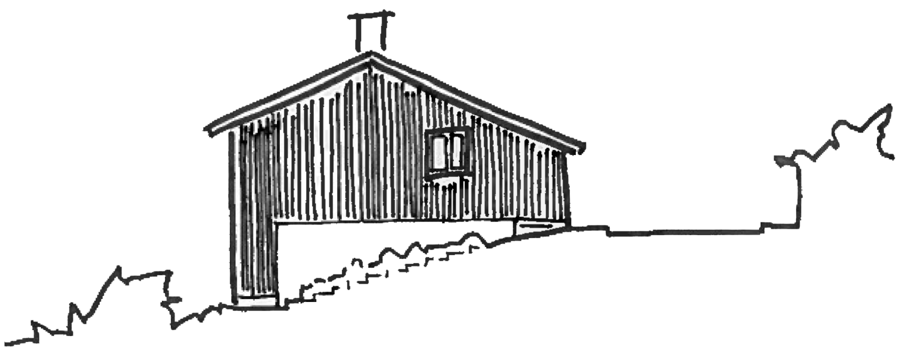
They seem to retain a similar expression of the old houses, being normally black, treated with tar or left unpainted. Their roofs are pitched and they have practically any openings except for the doors,

They are grouped in series of volumes instead of the usual warehouses.
(*Dirckinck-Holmfeld, K.,1996)*

The Modern house
Nowadays there is a tendency to return to more traditional construction.

A typical faroese home is on two levels, depending on the position in relation to the landscape the entrance is either on the first floor or the ground floor.

During the last century there was a transition from the house type



Ill. 21 Elevation drawing of the modern house

from wood to concrete, inspired by the modernistic european villas, and were originally unpainted and then painted with bright colours.

The building of these houses was continued up until the fifties when they were substituted with smaller and more practical one family houses. These were built of wood has a nailed wooden frame building on a concrete foundation. With the arrival of wood preservation oils, wooden houses came popular again. This typology was born due to the major housing development, and was greatly influenced by two factors. The first was the book "The Faroe Island House" by the faroese architect and former student in Vallekilde H.C.W. Tórgarð.

This book is a manual containing examples of faroese houses and suggestions on how to build new ones, in touch with the cultural heritage. Most of the houses in the book were made of wood. The other relevant factor was the competition wanted by the Føroya Sparikassi bank in 1961 where they asked for a single family house for a fixed price, related to the tradition. They built some of the winning proposal of the competition and later development referred to those results as well.

Case Studies

Tún
Tinggården
House in Stennäs
House in Atakashi

Tún, vernacular architecture

The "Tún" is the central space resulting from the arrangement of several buildings present in the Faroese towns.

It is an old tradition coming from the Norwegian ancestors and the way they organized their farmhouses.

We were able to find and visit examples of these building configurations on our trip to the Faroe Islands. The architect Osbjørn Jacobsen, in his studio, explained us how they worked and how common they were in the archipelago.

This kind of typologies is defended by the architects that try to oppose to the linearity that has been created with the development of the Faroese towns, that promotes the aggregation of single houses and large plots to the main road, without the possibility of public space or any kind of centrality.

On the contrary, the Tún promotes a meaningful relation between the several buildings and allow for a sheltered central space.

This division came with the farmhouses explained before; it has to do with the separation of the different functions of each building, such as living, storage, stables, sheds. After this the same spatial organization was taken by groups of families that lived in remote areas or worked on the same land plots.

The division of volumes generated a central space that was used for special occasions, such as wedding or funerals, in both of the cases. (Jacobsen, 2016)

Beyond the interaction of the different volumes, the climate was a crucial element to consider when analyzing different examples of this spatial principle.

It is possible to notice that this central space is sheltered from the wind, has a good solar exposure and the volumes are oriented to different views. When inside the cluster space, there is a clear separation from the landscape that is not so present anymore since the space is protected by the volumes, allowing accessibility to each of them.

Some of the examples of these are the Faroese villages in Torshavn, Norðagøta and Koltur.

Tinganes, in Torshavn, is an extremely dense example where the several angles of the buildings and their volumes are expressive and a particularly appreciated part of the city.

In Norðagøta, the Blasastova farmhouses are now converted in a museum; the complex is a series of farmhouses and a church gathered around a central space following the landscape.

For the project, it was essential to confirm the presence of the idea of a sheltered central space in the Faroese identity, and how it naturally improved the daily life of a community.

The masterplan was developed in this sense, so the volumes were organized densely, the outdoors sheltered by the buildings and gathering points provided.

These examples show an important spatial organization principle that is integrated with the landscape, protected from the wind, opened to daylight and exploring different views.

We were able to experience how the configuration of the buildings and the outdoor spaces improved the public space and revealed the character typically appreciated by the people using them.

Ill. 22 Masterplan of Koltur, Faroe Islands

Tinggården, Vandkunsten

Tinngarden by Vandkunsten architects is a social housing project built in 1978, in Herfølge, Denmark.

The complex is composed by 78 units, 1 common house, 6 groups of family houses each with its own common house. The houses normally have 87m^2; there are 4 different typologies in the complex and the common areas take about 10% of the proposal. (*vandkunsten.com,* 2016)

The design was developed with the residents collaboration and the main feature that makes it relevant for our project is the controlled way the architects dealt with the human scale in a dense project. It was possible for them to achieve a dense housing complex without loosing the qualities of single family houses, in fact its articulation promotes a stronger community feeling.

Each group of houses is organized around a square and a common house, then each of these clusters are articulated between them and with the community centre through the main street.

So there are groups of houses organized in clusters and clusters organized around larger common outdoors and the main street.

Jan Gehl describes the complex as a "physical structure [that] both physically and visually supports a social structure of the residential area." A hierarchy of indoor and outdoor spaces supports and organizes the community. (*Gehl*, 1961)

This project was also important as an example of a successful approach to a housing complex in a way it clarifies how it can be organized from the unit scale until its infrastructure.

It was also relevant to understand in which ways are architects able to promote contact between people and design spaces that fits their needs and lifestyles.

It is our intention to achieve a dynamic articulation of space that allows different users and activities.

However, in such a large scale project is essential to understand which is the best principle to implement the architectural ideas both for indoor and outdoor spaces.

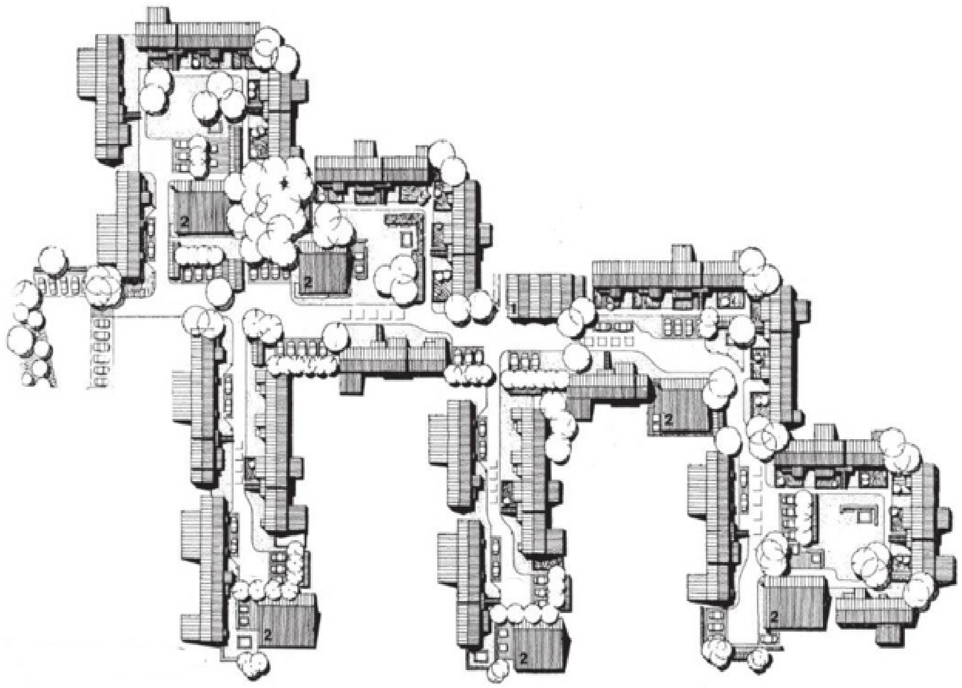
When working with the landscape is hard to find common structures that work for every area, on the other hand the challenge consists on narrowing down architectural forms that could take advantage of the site and fit into a larger system that allows a successful development of the project more as a whole than as a group of specific solutions.

This been said, is also fundamental to understand how can architects create diversity and flexibility, in order to accommodate different users and design a base that leaves open possibilities for life unpredictability.

Again, it is about finding a correct balance of a rational system that is intrinsically connected to Nature and the Faroese people, so it is possible to reach an innovative design that reveals the place identity and can be easily understood and possible to implement.

The different layers of this project were informative of the different levels that compose a housing complex, namely its infrastructure, larger common outdoors, private outdoors, parking, accessibilities, among others. It inspired several experiments and trials and also the clarification of these aspects and their articulation.

Finally, Tinggården explores the spaces volumetric and materially, in to reach a proposal that understands community living in a contemporary way, reaching complexity and variety without compromising the practicality and comfort in its spaces.



Ill. 23 Plan of Tinngården housing complex

House in Stennäs, Erik Gunnar Asplund

One of the chosen case studies is the house at Stennäs by the Swedish architect Erik Gunnar Asplund, built in 1937.

The first aspect that makes this example a useful one when designing our proposal is its relation to the site, adapting itself slowly to the landscape. The architect built this house for himself in a rural area near the sea. When built, the house was done with no modern services, the illumination and heating were provided by old-fashioned ways and the fireplace naturally played a very important role.

The house is secluded from its surroundings, gently positioned next to a bluff of granite, protected by a copse and facing the creek. The granite slope is around 6 m high and it is the most prominent characteristic of the site and it shelters the house to its western part, to where the porch is oriented.

The building doesn't touch the rock but is positioned in a way it creates a passage space, with a timber gate. When turning this corner, one can feel the transition between the western and eastern part of the house.

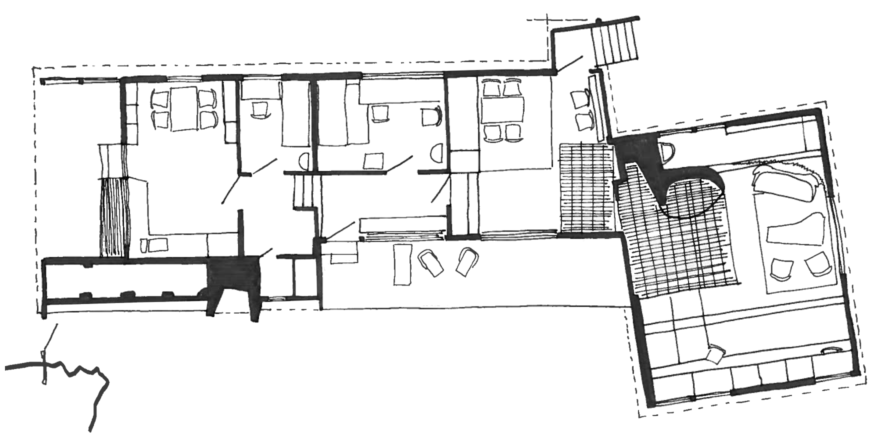
The house is developed towards south where the creek is and away from the rock, the floor changes levels three times to follow the slope, opening the house towards the water view.

The volume is achieved through the articulation of spaces along the slope and also for its indoor progression; being the linearity of the house broken by the turning of the living room volume, the most important space of the project. The importance of this space is marked by the position of the fireplace in its articulation node, the maintenance of the slopping ceiling, in opposition to the rest of the house, and by the largest window facing the creek. (*Blundell Jones,* 1987)

The deviation of the southern volume allows the view of the water for the upper living room, protects the porch area on the west and creates a different spatiality for the entrance.

The vernacular Swedish farmhouses inspired the project. Asplund developed the idea of a long house that is articulated into different spaces and where the chimney is particularly expressive and the fireplace curvilinear. The materials used, raw stone, brick, wood and render, were also part of Swedish traditions and contributed to a coherent and comfortable space.

This example relates to the project in the way it allows the site to inform its spatiality, both outdoors and indoors. The interpretation of the vernacular tradition is done in a consistent and creative way, what translates in a project that is extremely connected to the site and provides shelter and comfort to its users in a modern way.



Ill. 24 Ground floor plan

Ill. 25 Picture of the house facing south

House in Atakashi, Kazuo Shinoara

Throughout the development of the project, there were several examples that helped conforming a clear view on how to articulate the main aspects to retain from the traditional Faroese houses.

The idea was to achieve a differentiation between living and sleeping areas by its spatiality, light and atmosphere; for this, the project worked with function layout, heights and openings.

We found inspiration in some of the houses from the Japanese architect Kazuo Shinohara, namely his House in Ashitaka.

This is an inspirational example by the way the architect explores tradition in a modern way and reaches unconventional and pleasant spaces in volumes that although having a character of themselves remain connected to their context and tradition.

Besides this, in House in Ashitaka is possible to clearly identify a more dense area where the sleeping and server spaces are articulated together in order to yield space for the main living area.

The sleeping areas, storage and bathrooms naturally require not so expressive heights in opposition to the living space that takes the full height of the volume and discovers the roof construction. However, they are not disregarded, their proportion and articulation is particularly rich and unconventional, not as one would expect by its exterior.

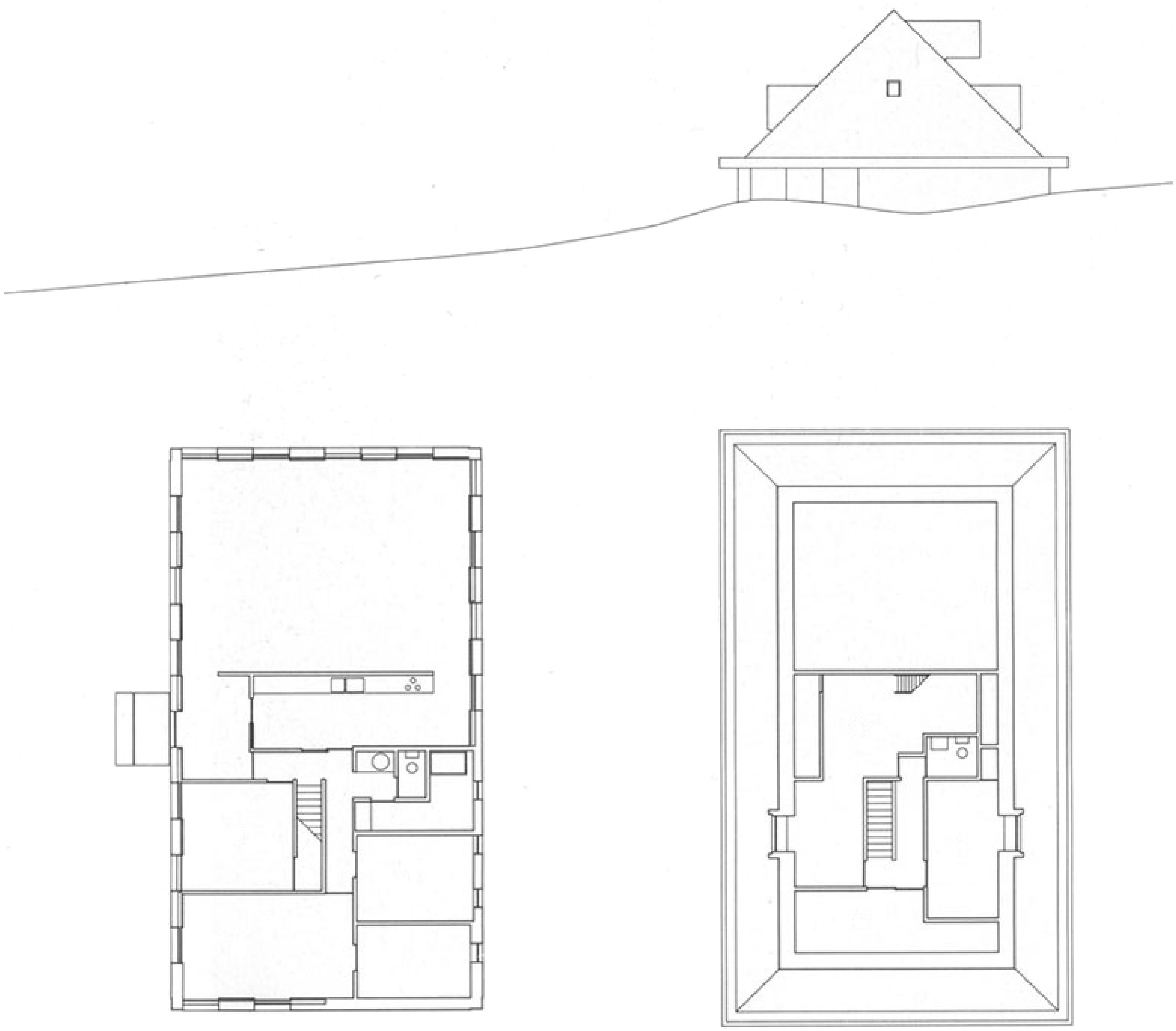
These two different worlds seem to coexist and enhance each other, in Olgiati's words: "When you look at the plans, it looks simple at first. When you look at the building, you think there is a direct affinity between what you see on the outside and what you expect on the inside. Shinohara lets secrecy and straight-forwardness coexist; so much that one could define the houses as being schizophrenic. However, there are always those moments when two seemingly disparate systems overlap because Shinohara carefully omits to build borders between two things. So, it is not a collage. The two realms are not pasted together. They remain separate but still communicate something that is beyond what each disparate system can suggest on its own. The complexity in Shinohara's architecture is achieved by means of a certain ambivalence that mysteriously knits the entire work together. I find this interesting because it appears less logical but at the same time it is very logical." (*Olgiati,* 2010)

The room articulation and the way the entrance works as a node in between the two sides of the house are also strengths of the project.

The entrance divides the house into private and public areas and allows proceeding either to a light and high volume or a darker space that leads to the different smaller rooms articulated around a core distribution space. Therefore, the architect proposes a rich variety of spaces concerning their volumes and the amount of light the experience.

This ability of proposing different kinds of spaces, maintaining the cohesion of the project was very important for our proposal since it was a way of reading tradition, exploring the expressive landscape and allowing it to generate the indoor space.

It also demonstrates how the structure can have an active role in the space without being overpowering, the roof is the main aspect of the project both for its outside character and its indoor atmosphere, not only in the main open space where one can read its full expression but also in the smaller rooms that are transformed by its angles.



Ill. 26 Section and plans for House in Atakashi

Place

The Faroe Islands
Archipelago
Fjord
Runavik
Site

The Faroe Islands

The Faroe Islands are located in the North Atlantic Ocean at 62º latitude North and 7º longitude West, approximately 430 km south-east of Iceland, 600 km west of Norway and 300 km north-west from Scotland.

The distance from Copenhagen to the Faroe Islands is approximately 1,300 km. The Faroe Islands comprise 18 islands, separated by narrow sounds or fjords. The total area is 1,399 km^2.

The largest island is Streymoy (375.5 km^2) with the capital, Tórshavn. The overall length of the archipelago north-south is 113 km, and 75 km east-west. The islands' highest point "Slættaratindur" is 880 meters. On average the land is over 300 meters above sea level. The total coast line is 1,289 km and at no time one is more than 5 km from the ocean.

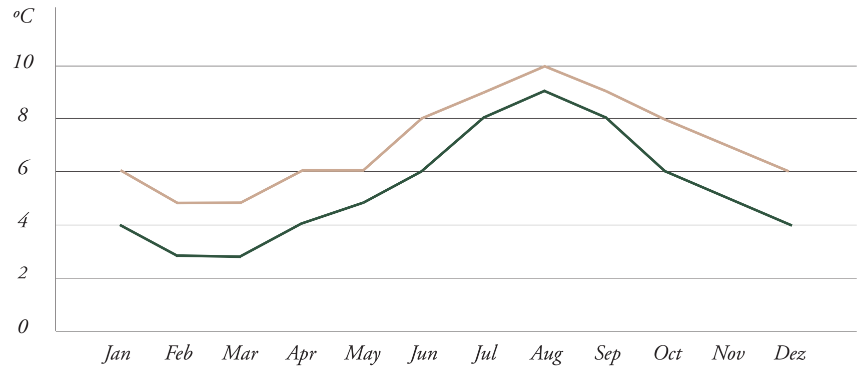
The Faroe Islands are of volcanic origin. They are part of the North Atlantic basalt area, stretching from Ireland to Greenland. The mountains are formed in a layering process, from the grey-black basalt formed by lava from the Tertiery period's volcanoes, interspersed by the softer red-brown tuff, which originates from the rain of ash preceding volcanic eruptions. Later the glaciers of the ice period restructured the original plateau, to an archipelago with high mountains, deep valleys and narrow fjords. (*visitfaroeislands.com,* 2016)

Ill. 27 Faroe Islands in the world map

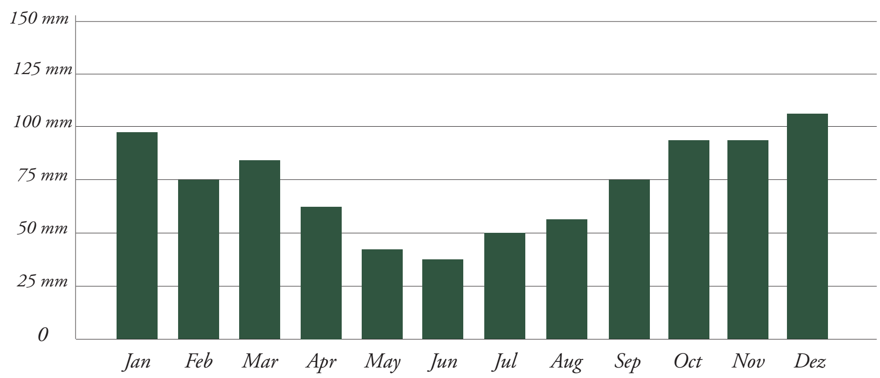
Ill.28 Plan of the Faroe Islands

Archipelago

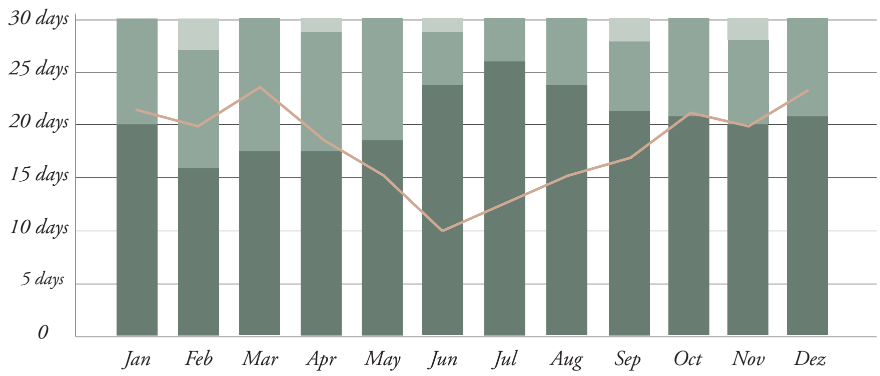
Temperature
The temperature on the Faroe Islands is relatively similar to Denmark; the maximum average daily temperature is around 10ºC in August and the lowest around 3ºC in February and March. It is warmer than expected and one of the reasons why snow isn't a defining condition.
It is also possible to assume there isn´t a great thermal amplitude.



Precipitation
Values above 150mm tend to indicate wet areas, as values under 30mm signify dry areas. In the case of the Faroe Islands, looking at the second table is possible to recognize that the proposal deals with a mild area regarding the precipitation, being it more expressive in the winter and beginning of spring. The maximum number of days that rains per month are about 22 days in March.



Clouds
This is an interesting aspect regarding the weather in the Archipelago, as one is able to see from the last table it is cloudy most part of the days in the month. This is important in order to understand the atmosphere present in the site and the importance of taking advantage of natural light. Sunny days were registered during February, April, September and November and no more than one per month.
(meteoblue.com, 2016)



Ill. 29Tables for Temperature, Precipitation and Clouds

Ill. 30 Plan of the Fjord

Fjord

Wind
The wind on the Faroe Islands is a defining condition, if not the most responsible for the harshness of the climate.

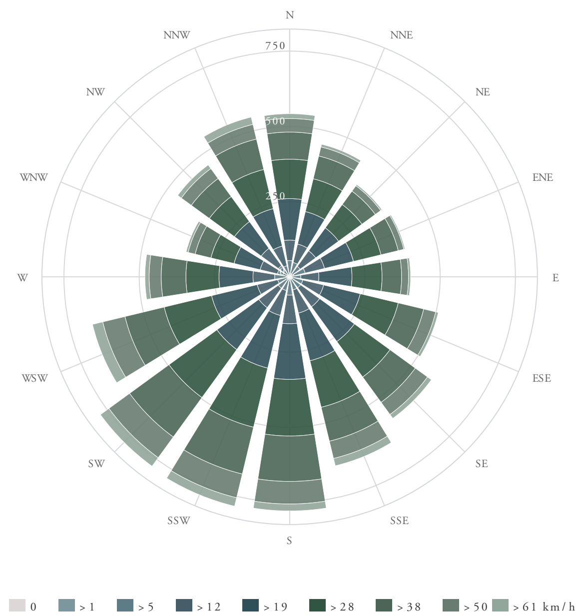
From the diagram, it is possible to perceive the main directions for the wind are north, southwest and South, with values that can reach 60km/h.
(meteoblue.com, 2016*)*

This is particular important for the design of outdoor spaces and the importance of the positioning of the volumes in order to shelter both the communal and private outdoor areas.

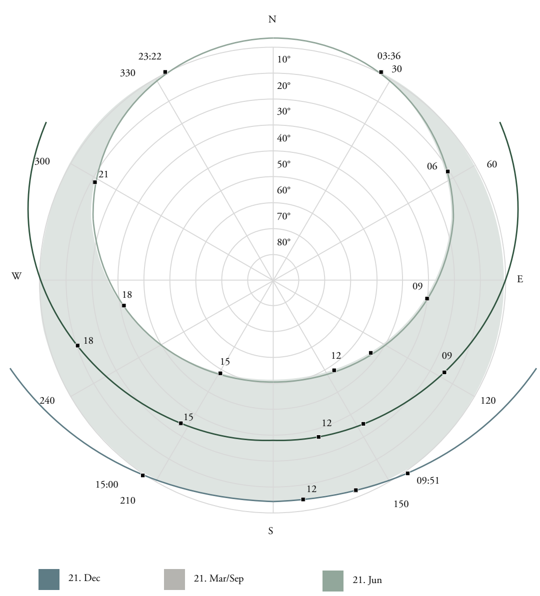
When visiting Runavík, we were able to experience winds with 30m/s speed and confirm that was nearly imposible to be outside except in an extremelly sheltered place.

Sun path
This is also an important feature of the Faroe Islands.

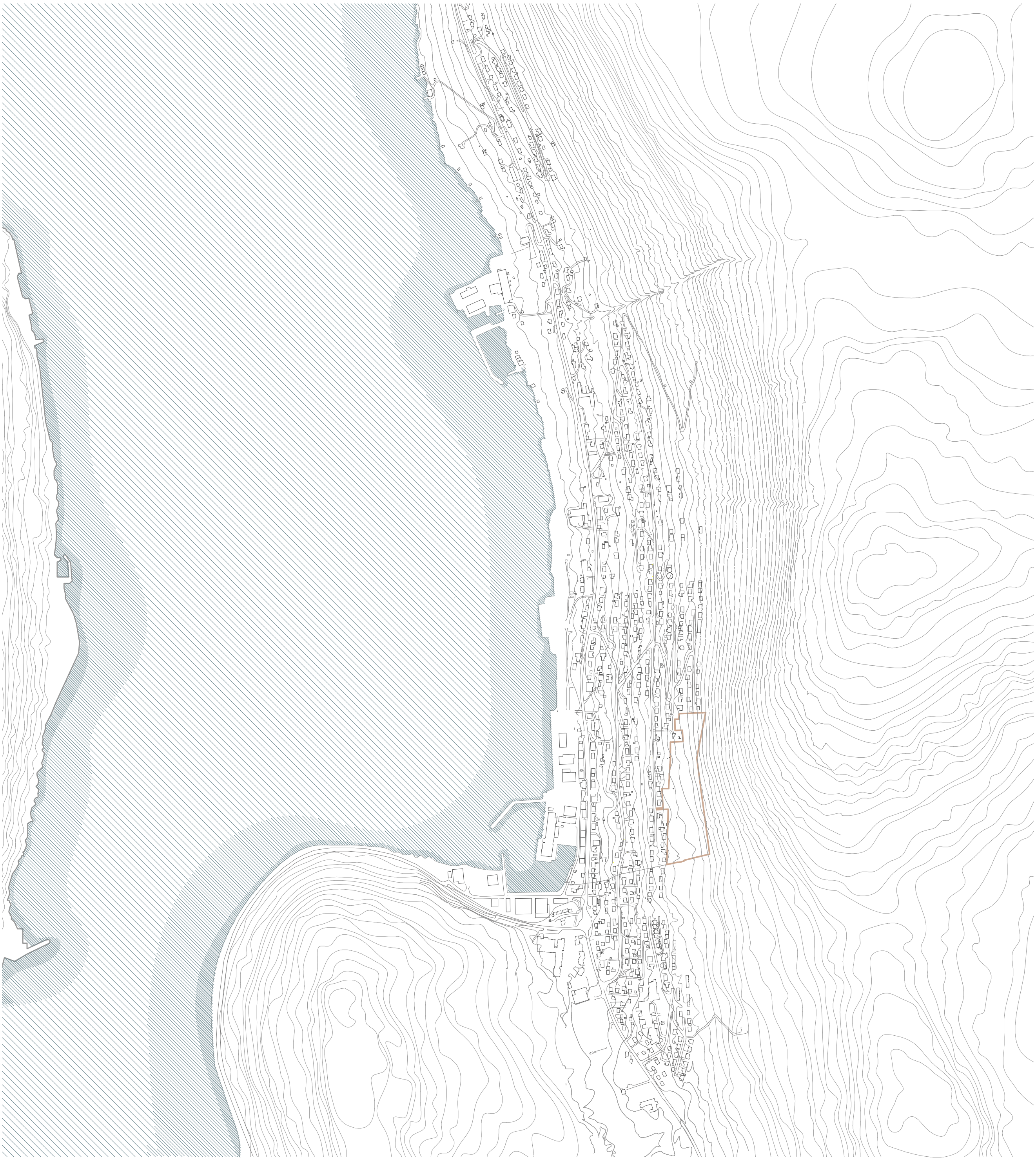
The days are very long in the summer, being the longest sun hour period 15 hours, and short in the winter time, with around 5 hours of light and a very low solar angle.
(gaisma.com, 2016*)*



Ill. 31 Wind diagram



Ill. 32 Sun path diagram



Ill. 33 Plan of Runavìk

Runavík

Runavík is the third largest urbanised area in the Faroe Islands, after Tórshavn and Klaksvík, counting 3 794 people. It is located on the east side of the Skálafjørður, on the island of Eysturoy.

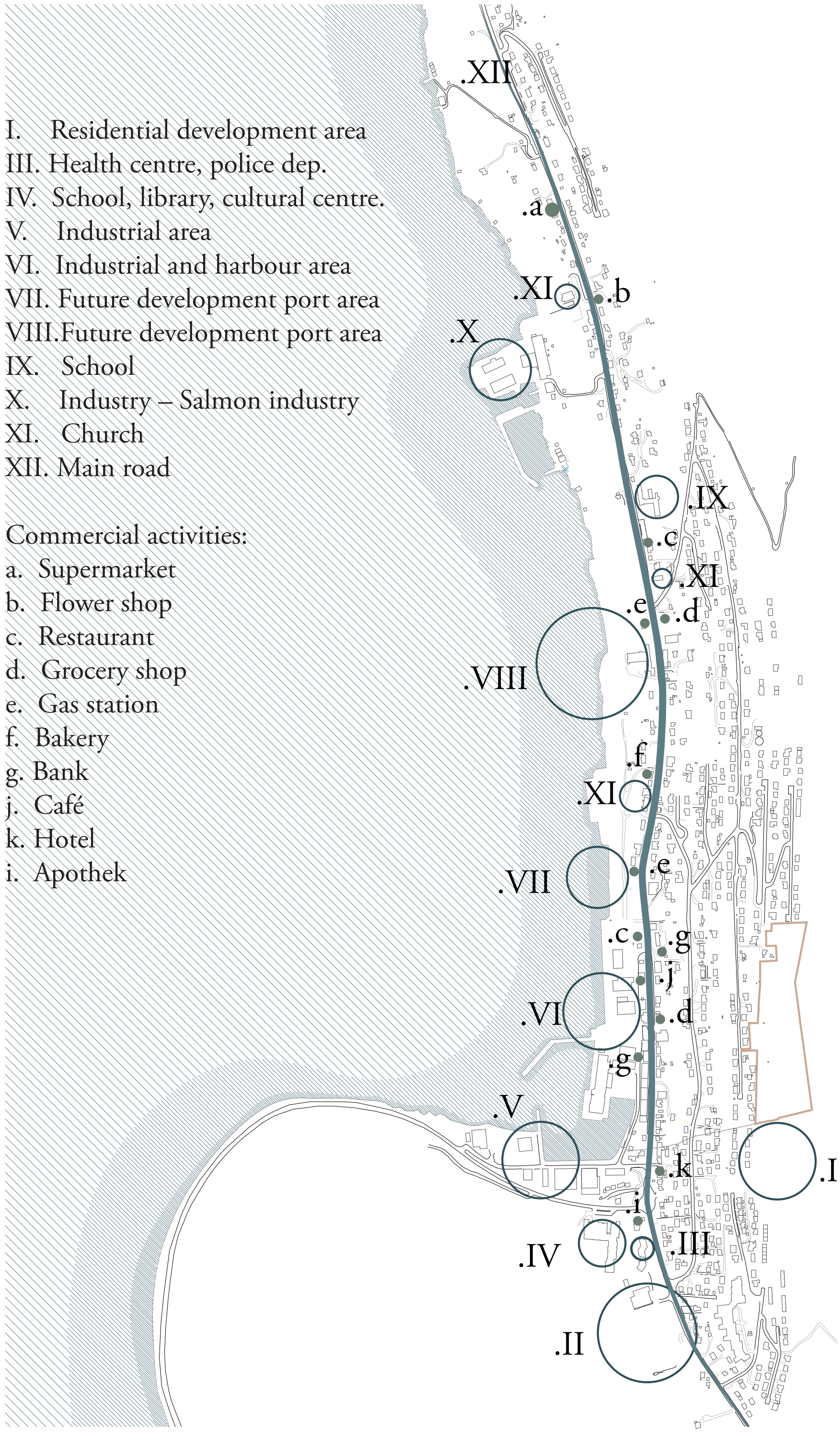
Nowadays, it works mainly as a transport hub due to the port and the tunnels that connects the municipality with the other islands and the sea. This is a positive feature of Runavík and one of the main reasons for its role on the urban development of the Faroe Islands.

There has been noticed some urban development of the villages near the coast, this is why the Municipality is interested on finding design proposals that also take advantage of the mountain.

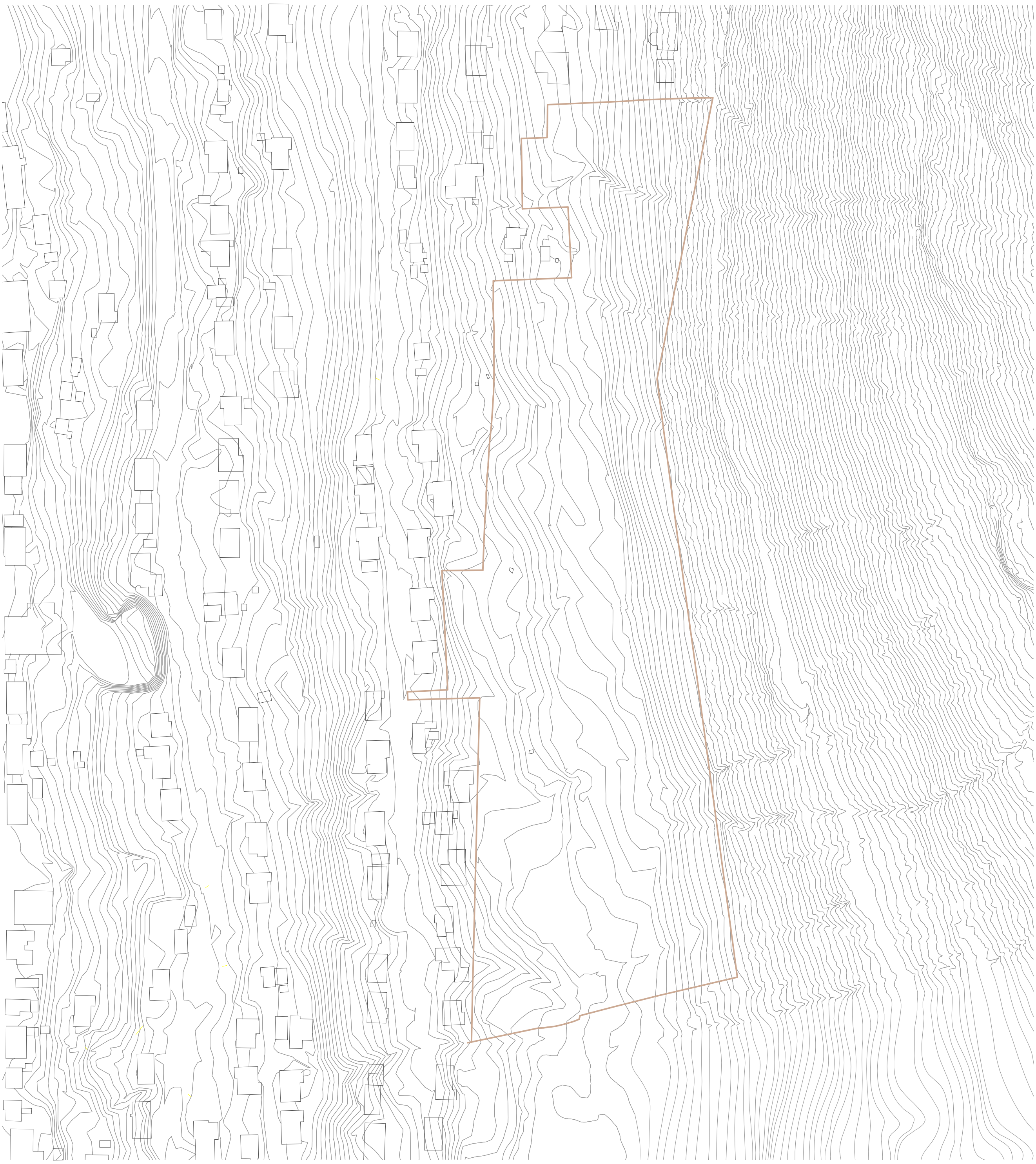
Landmarks and infrastructure
Runavík is manly a residential area. The productive services connected to the industry are connected to the sea, since the main industry is fishery.

The main road is where the commercial services and place of worship are located. Outside of this street the roads lead to the private houses.

In the south part, there is a school and a cultural centre, as represented on the diagram.



Ill. 34 Infrastructure diagram



Ill. 35 Plan of the site area

The site

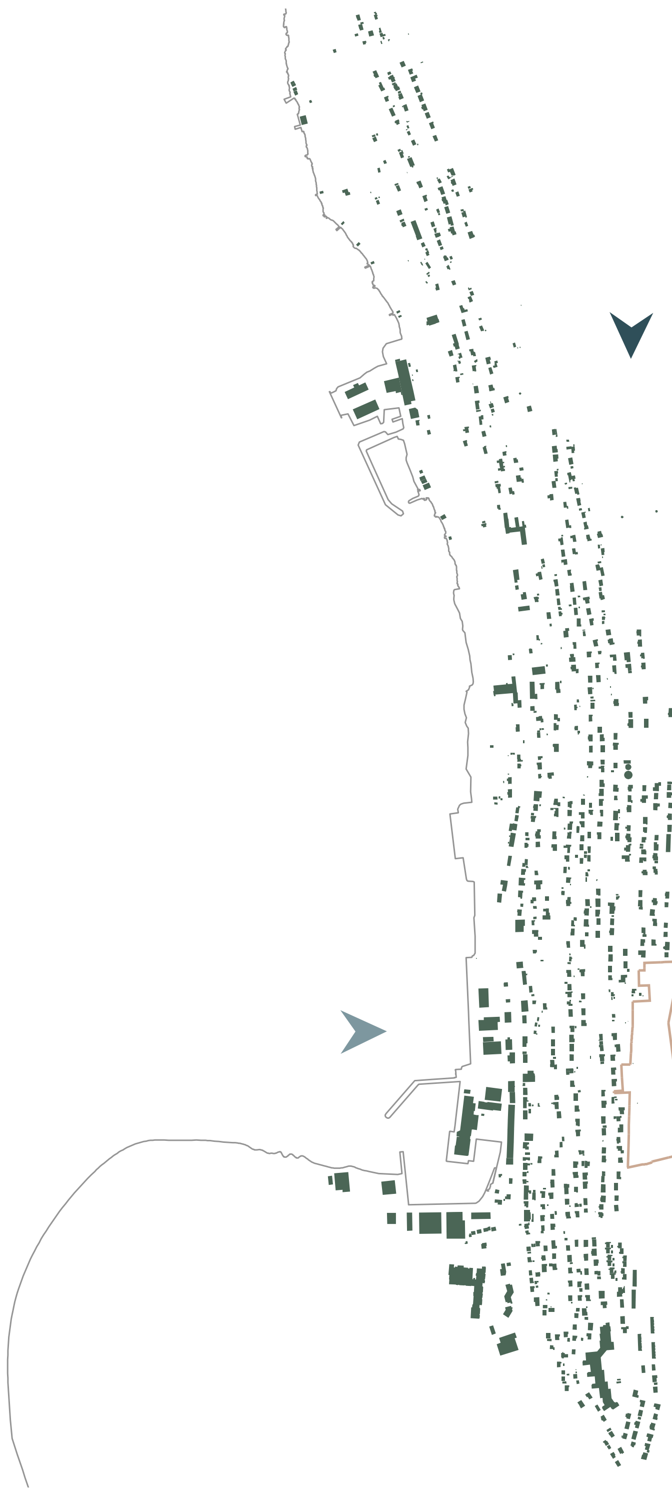
The area is located on Høgaleiti an inhabited hillside that is part of the future urban development. It consists on a trapezoidal shape of about 45 000m^2 with the longest side facing the fjord.

It is in all is an area of a steep terrain, open green, with no trees, now used by local farmers. The slope gets more expressive facing the north.

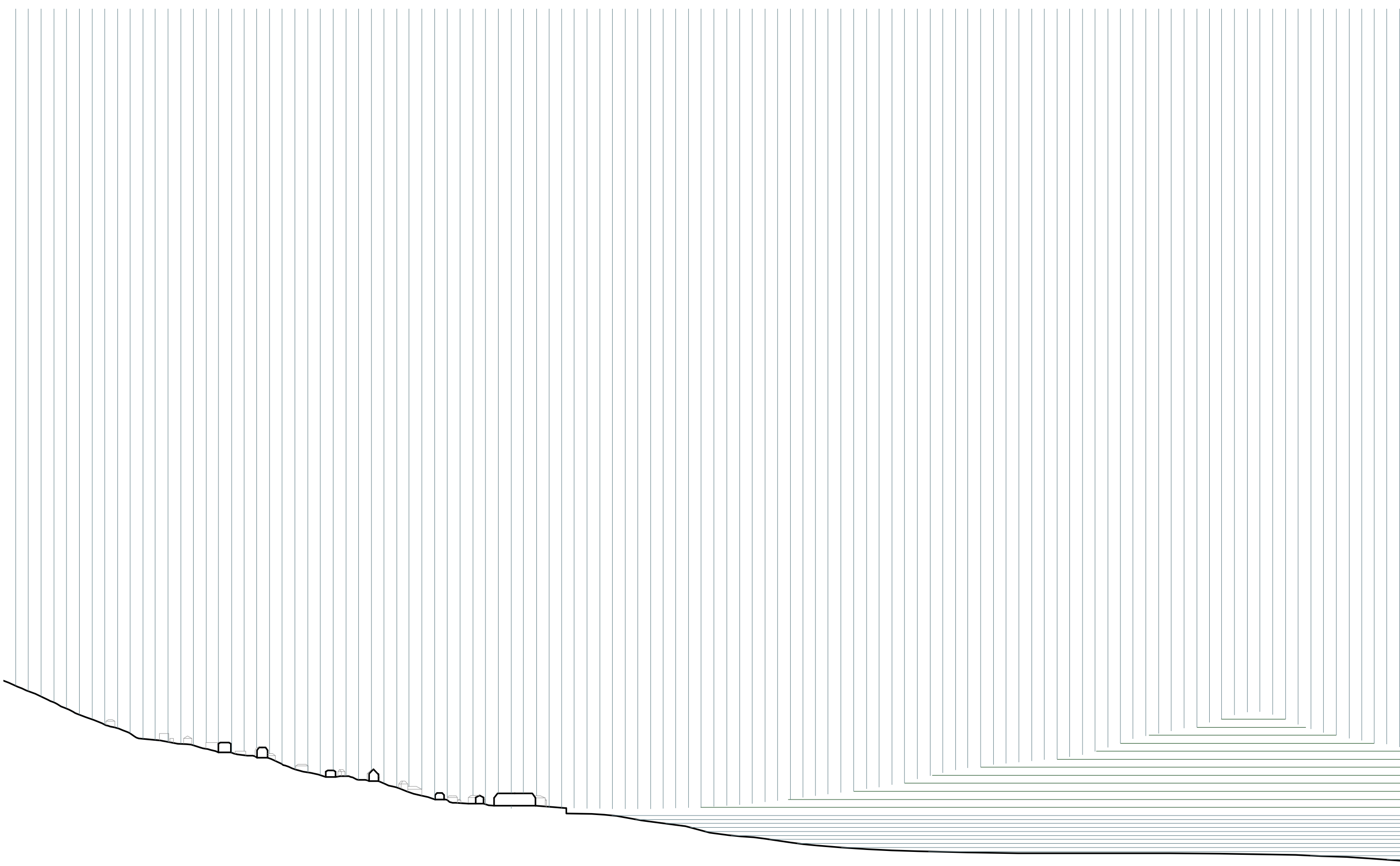
The hillside above, all the way to the mountaintop, is very similar to the site area with some occasionally bare cliffs. To the north and further down on the hillside, inhabited area with traditional residential family houses. To the south, a development area where two projects are ongoing, a sheltered accommodation, built as one-floor apartments and public apartments, built as two-floor apartments. None of these ongoing projects includes apartments in a larger scale that fits a family of three children.

The wind speed is about 40 m/s, which is above the standard codes in other Nordic countries.

The highest wind forces will come from the north when the wind will be pushed out through the Skálafiord. The most frequent wind direction is west to south-west, but the city is protected by the land on the western side of the Skálafiord.



Ill. 36 Wind diagram



Section of Skálafjørður

In this section, one is able to observe the relation between Runavík and Strendur, the town in front of it. The fjord, with a distance of around 1600 meters, separates these two mountains.

The height of the mountain where the site is located is around 260 meters, the other on its western side goes up to 600 meters. (*visitfaroeislands.fo,* 2016)

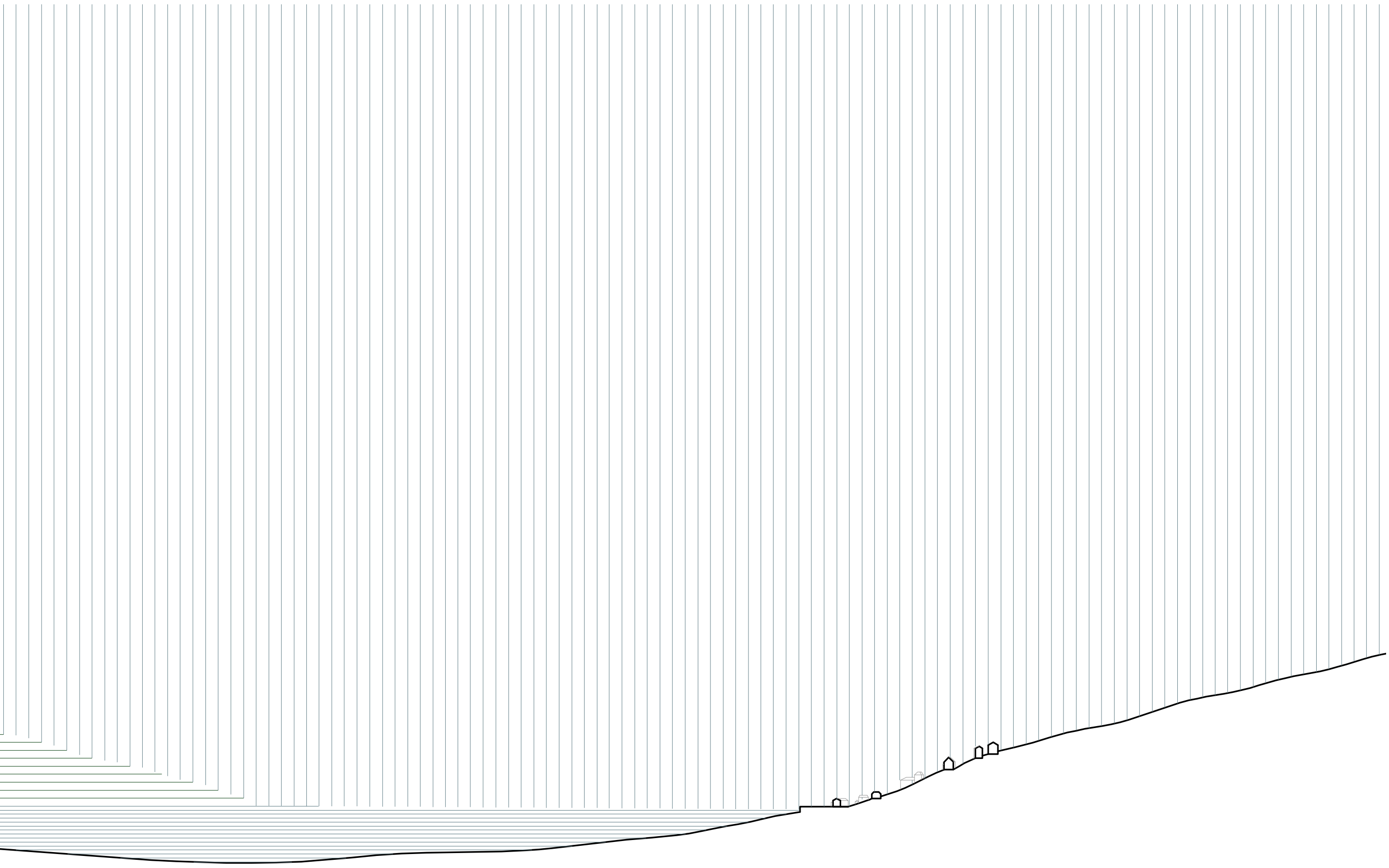
This implies that the site is sheltered from the most frequent wind coming from the west.

Regarding the south-western side of the site, there is the end of the mountain, where it reaches the sea, that sets up a protection relating to this side.

This is the reason why the focus of the concerns should be on the north wind that comes from the fjord in direction to the sea,

Since Runavík is in the corner of the fjord outlet, it also means that the waters here are calmer than they would if dealing with an open-sea port.

The fact that it has a very close relation to the sea but it is still sheltered by the mountains on its



surroundings makes it a particularly interesting place regarding its physical conditions and atmosphere.

There is a rich variety in its landscape, when looking from the site one can see mountains and their different heights and topography, the water, the towns and ports flanking Skálafjørður.

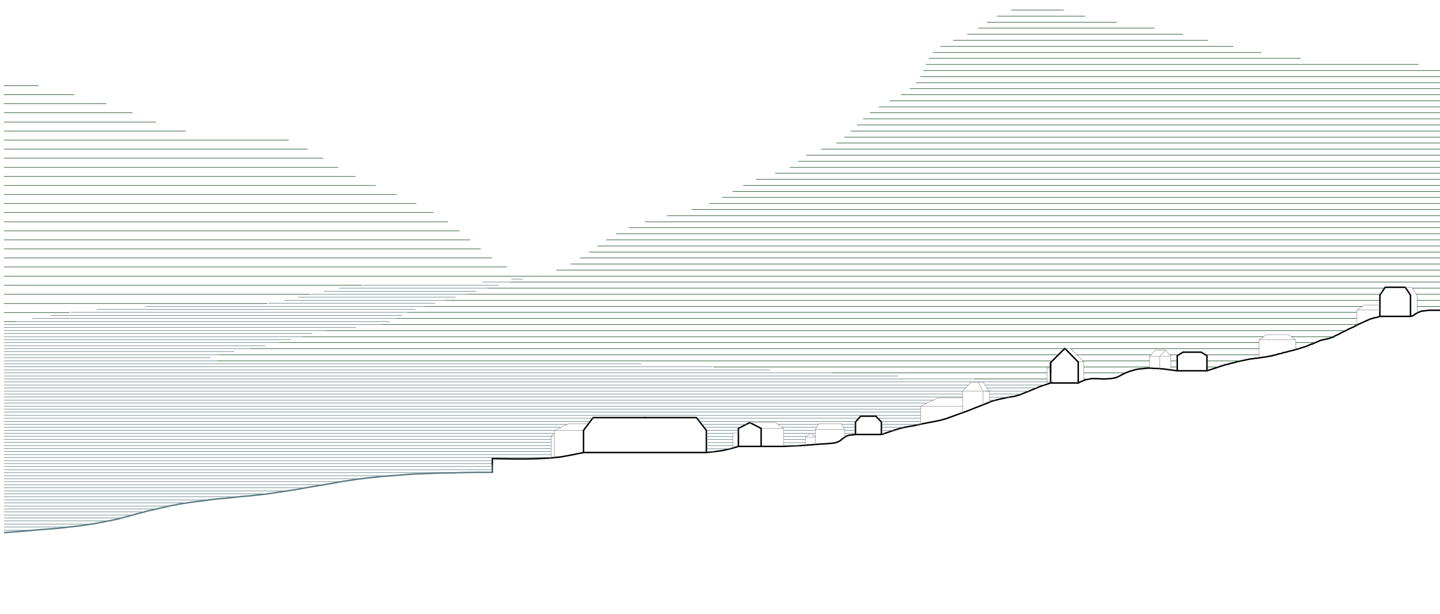
This is enhance by the weather and its irregularity, is common for the Faroese to say one can experience "all seasons in one day", so it is inspiring to imagine this specific location, when the skies are clear, or when there is mist or fog, and the changing of seasons.

Finally, it is relevant to understand the situation of being in an island composed by high mountains that end in the sea and are cut by it.

It is simultaneously beautiful and impressive, calming and baffling.

There is something dramatic and idyllic about the landscape in the Faroe Islands, where you can feel Nature intensity and how it asks for Architecture to dialogue with it and find its place within it, this is seen in their constructions, culture and values as a conditioning molder of their identity.

Ill. 37 Section of Skálafjørður

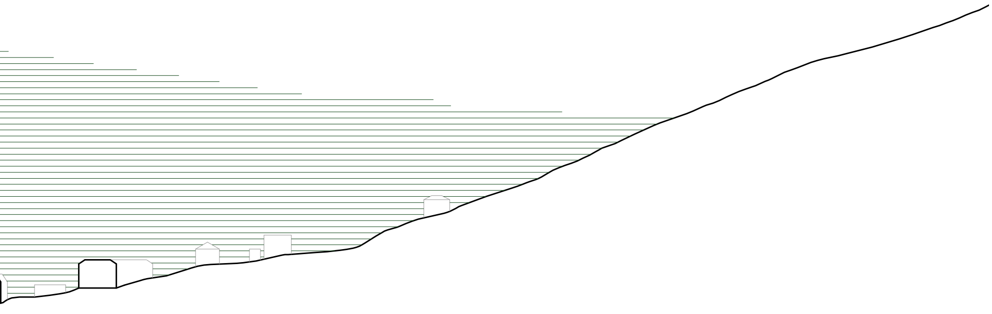


Section of Runavík

In this section is represented the evolution of the slope from the site until the port.

The slope can be divided in two parts for its inclination; it has a steeper side towards the top of the mountain and a relatively flatter area within it and towards the fjord. These angles of inclination are about 10º and 21º.

The houses follow the linearity of the landscape and are built parallel to the slope curves; the same is done for the roads since it is the more economic and practical way, avoiding extreme height differences.

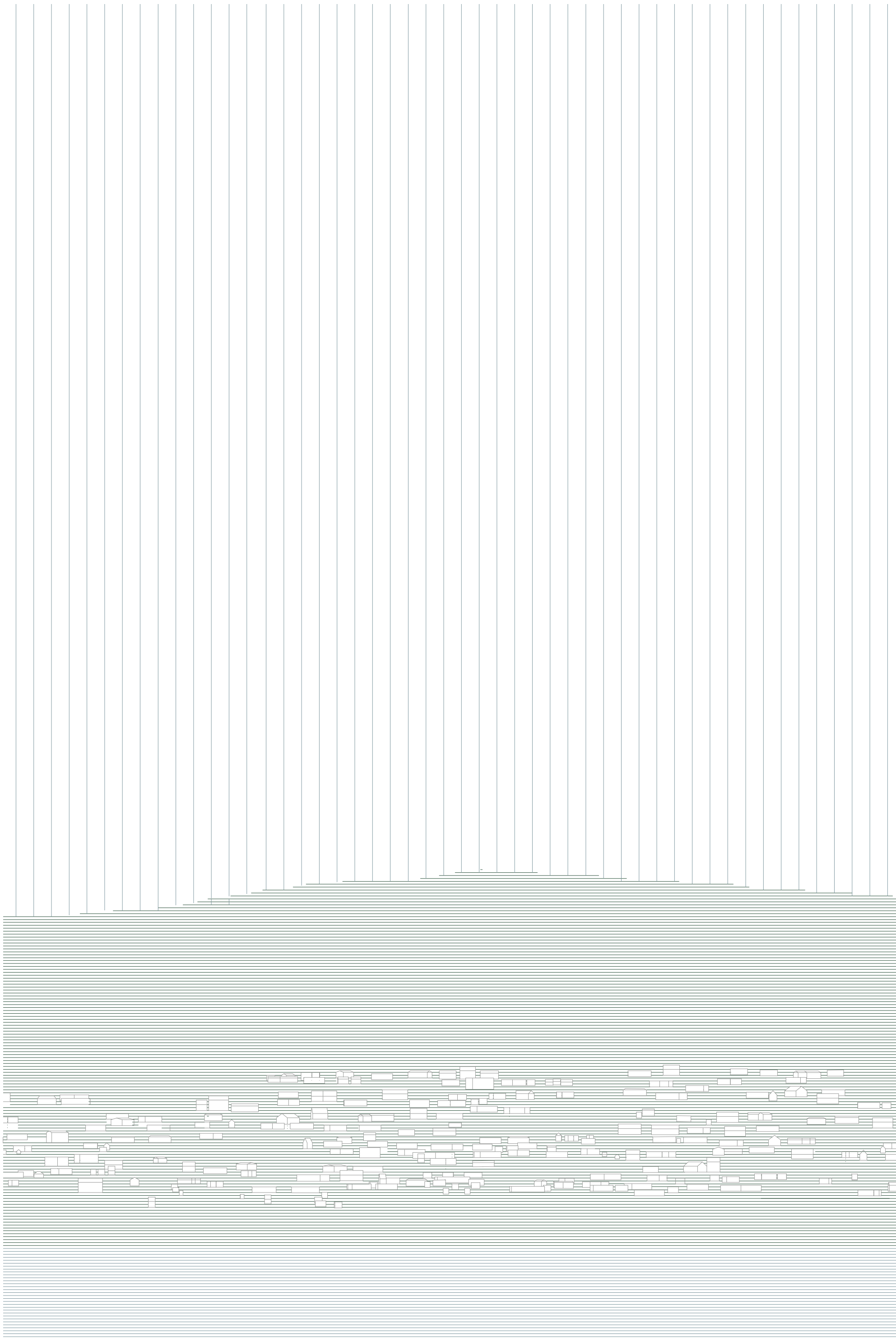


The shortest span of the houses is turned facing the wind so there is less area exposed to it. The openings generally face the fjord also for the fact that is hard to completely seal them and is common the existance of leaks that could interfere with the indoor comfort.

There is an absence of common areas along the slope due to the difficulty that represents to build on the landscape; this is translated in houses that are built next to each other in linear gestures parallel to the road. The buildings coexist but don't shape any public space and have no approach regarding different levels of privacy nor types of accessibilities. These are aspects that could be improved in the future development of the town.

Ill. 38 Section of Runavík

Elevation of Runavík



Here it is presented the elevation of Runavík, this is a common view from the harbor and Strendur, it is possible to notice the linearity of the urban planning and the organization of the houses around four main parallel roads.

The site is above the last line of houses, being high enough to see the habour and the extension of the fjord from all its area.

Ill. 39 Elevation of Runavík

Program

Introduction
Guidelines
Demography
User Groups

Introduction

Runavík is situated in the southern part of Eysturoy, its area is approximately 268 km^2 and has a population of about 3 000 people. Eysturoy is the second biggest island of the archipelago and Skálafjørður, the fjord that borders it, the longest on the Faroe Islands. The villages surrounding Runavík are growing to become an important urban area.

Runavík is experiencing a development since the past years on what concerns its industry, tourism and housing.

A tunnel project to link Runavik and the capital is being developed and intended to be complete in 2018, it will be 11km long and will amount for a decrease in the travel times.

It is important for the Faroese families to be able to live near the city, in fact it has been noticed that they rather live in smaller and less expensive houses in order to be connected to the centre.

This particular site is located on an undeveloped hillside between populated residential areas that are already part of the Municipality's development strategies. The program is based on the competition brief of the "Nordic Built Cities: The Vertical Challenge. How to build houses on a steep terrain".

Guidelines

The Municipality is interested on balancing economic and high living standards, there is a need to built denser and optimize the outdoor areas.

The proposal should explore the relation between architectural and natural elements. Instead of forcing its presence, it should assimilate the strength of the landscape on this specific site and enhance it.

The challenge revolves around being able to understand the site and how it could cherish the users' needs in the configuration of both family housing and community spaces. It is necessary to adapt to the surroundings and mould the project to the steep terrain, this will not only ensure and economically controlled proposal but also one that is connected to the site and its people.

Nature takes an important role in people's everyday life, so it is significant to establish a connection with the surroundings and offer the residents private and communal spaces. It is common to have spaces for urban farming, so the residents are able to have some animals and small plantations.

The relation to the centre is also required, however the roads should be reduced to the essential.

The common solution for the accessibility in the Faroe Islands is a main road that then disperses itself in private accesses for each home. It is incentivised to find a smarter solution that could also increase the community feeling and attracts people to the hillside.

The density should be seen not only as an economical advantage of the project but also as a way to promote the meeting between residents and provide a liveable environment all year round. In order to achieve this, the proposal should each a balanced articulation of spaces that delivers different levels of privacy and shelter.

The treatment of the public spaces is seen as a way of providing places for the families to meet, children to play, access the houses, completely structured by Nature, taking advantage of its configuration and reacting to its elements, giving people sheltered spaces where they can enjoy being outside. The site should be not only experienced in outdoor areas but also in sheltered indoor spaces that still relate to it by their form, tactile qualities, light, views and volumetric presence.

These common indoor spaces would be areas where potential services could be implemented, as the urban development of the area takes place,

Ill. 40 Project area, looking North

functioning as meeting areas for residents when the climate is harsher.

There is the desire to build smaller and smarter, having this in mind, is necessary to provide larger spaces that could be used by the residents for different purposes.

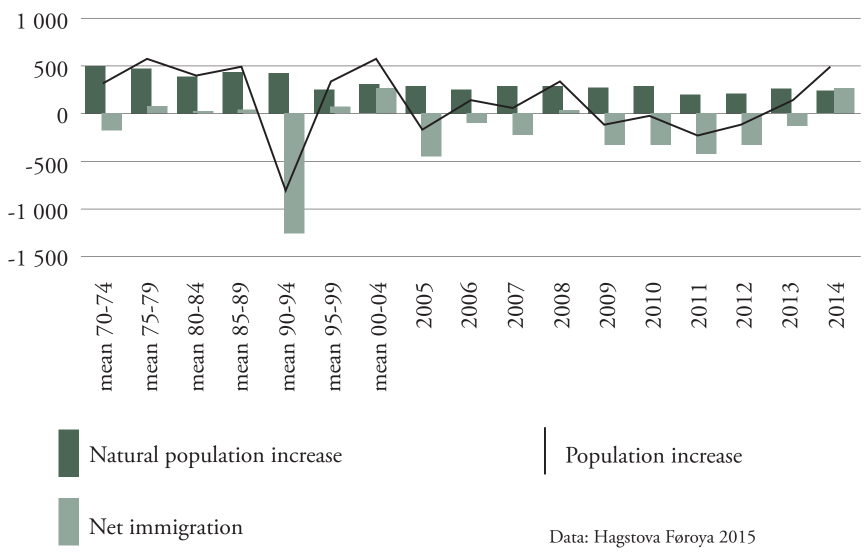
The privacy is a pertinent issue in the project, is vital to understand how the Faroese people live and the importance they give to private spaces; the entrances, the living spaces and private outdoor areas should be designed minding the intimacy required in order to achieve comfortable spaces and rich articulations.

The relation to the site should also be an argument to explore the old traditions and try to understand them through a contemporary light.

The typologies and the used materials should relate to the site and enhance the relation between Nature and Architecture, always foucsing on providing pleasant spaces.

Regarding the indoor spaces, the proposal should explore how the sequence of spaces is articulated with the slope. There should be attributed a lot of importance to the light and how the space could be treated in order to remain flexible and offer different spatiality and atmospheres.

Demography



In the recent years there has been an increase in the population of Faroe Islands, since economically and socially the conditions are improving. It registrated an increas of population of 1.08 % in the last year (*Hagstova Føroya,* 2015).

With a density of 35 inhabitants/ km^2, it is the second most dense country of Scandinavia after Denmark (*Hagstova Føroya,* 2015).

Regarding marriages, it is the first one with a number of 5.3 every 1000 people, and the last one in number of divorces with Iceland, 1.6 every 1000 people, it is also registrated the highest fertility rate of Scandinavia with 2 551 (*Hagstova Føroya,* 2015).

Typologies and Functions
The following table exemplifies the square meters and the functions needed for each housing typology.

The dimesioning of the different dwelings was based on the comptetition brief of the Nordic Built Cities Challenge.

It is important to specify that the parking space cannot be further away than 120 meters walking distance and according to Faroese regulations only 10% of the complex has to be handicaped accessible.

Ill. 41 Table of the Faroe Islands demography

Typologies and User Groups	Space	Units	Areas
Typology A			
Single	Bedrooms	2	11 m^2
Couples	Kitchen + Living room		19 m^2
Single with one children	Bathroom		6 m^2
	Washing room/ storage		11 m^2
	Private outdoor area/ balcony		12 m^2
	Minimum Gross Area		**70 m^2**
	Outdoor shed		12 m^2
	Parking space	1,5	
			Ratio 20%
Typology B			
Couples	Bedrooms	3	11 m^2
Couples with 1-2 children	Kitchen + Living room		50 m^2
Single with 2 children	Bathrooms	2	6 m^2 + 4 m^2
	Washing room/ storage		11 m^2
	Private outdoor area/ balcony		15 m^2
	Minimum Gross Area		**120 m^2**
	Outdoor shed		13 m^2
	Parking space	1,5	
			Ratio 40%
Typology C			
Couples with 2-3 children	Bedrooms	3	11 m^2
Single with 3 children	Kitchen + Living room		65 m^2
	Bathrooms	2	6 m^2
	Washing room/ storage		11 m^2
	Private outdoor area/ balcony		15 m^2
	Maximum Gross Area		**150 m^2**
	Outdoor shed		14 m^2
	Parking space	1,5	
			Ratio 40%

Ill. 42 Brief

Vision

Intensions
Design Parameters

Intentions

The aim of this project is to find solutions for life in challenging environments. We are interested in finding how architecture is influenced by the harsh conditions and takes advantages of the site to reach an increased value of both.

The site is the core of the proposal and should inform the design; passive strategies, the adaptation to the slope and structural principles will have consequences on the spatiality both for indoor and outdoors spaces, which we believe will lead to strong and pleasant spaces impregnated by a deep meaning of place.

We think that learning from the vernacular typologies and relating them to new technical design parameters is an optimal way to understand it. A return to the past, not with a nostalgic attitude but a learning one, in order to find a synthesis between the innovative designs and the know how of the traditional ways, optimised by time and use. This is achieved not only by looking at local examples of architecture but also by being informed with other cases that had to deal with similar conditions.

Finding a balanced and interesting articulation between private and public spaces and relating them to the human scale is crucial. The intention is to build denser houses while increasing the living standard; in this situation the efficiency of space in and around the residents plays a major role. Here usable outdoor common spaces are an important theme for the project in order to reinforce the sense of community inherits to the Faroe Islands.

Regarding the indoor spaces, we seek a positive synergy between them, its structure and atmosphere; it is our opinion that to explore how the sequence of spaces can be articulated by taking advantage of the slope, light, materials and flexibility will create comfortable and pleasing spaces for the users.

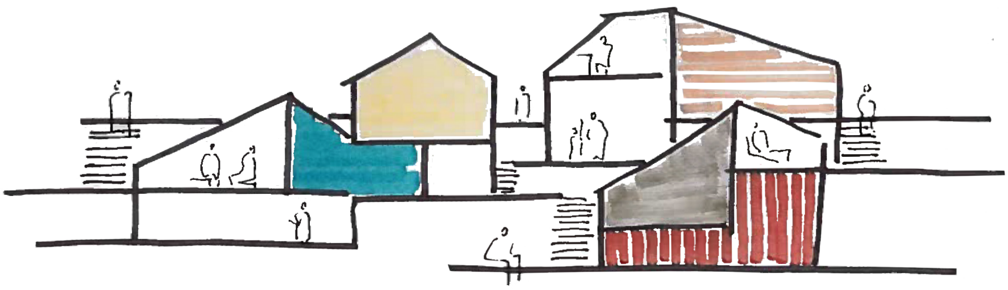
Design Parameters
After the analysis there are several areas that the proposal should address in its development, namely the relation to the site and its tradition, the optimization on the infrastructure, the articulation between indoor/outdoor spaces, the interior partition and its relation to natural light and openings.

Relatively to the site, the most defying features appear to be the slope and the wind. The slope because will unavoidably influence the design of the infrastructure and the complex itself, the proposal should seek a way to work with it and find its spaces within Nature. It is not only more economical and technical to do this, but among all is the possibility to design a proposal that establishes a strong connection to the site, reveals its identity and fits in the contemporary times embracing the old traditions, being more possible in this way to reach a complex where the Faroese people are proud to live in.

There should be investigated ways to deal with the infrastructure in order to optimize it and avoid the common typology for houses displayed along the street with private entrances to each home. We believe there is a way that could not only optimize the costs of this solution but also allow for a more liveable and pleasant community spaces in between the houses connected to the roads and Nature.

The relation between indoor and outdoor spaces has to so with how are they articulated, how is the graduation of privacy controlled, how are they differently sheltered and mainly, how should they be in order to fulfil the needs of the community.

The indoor spaces should be inspired on the vernacular and traditional homes of the Faroese, however should explore new ways to maximize natural light and allow some flexibility in the use of spaces, articulating them with the natural slope.



Ill.43 Interior and exterior spatial intentions

Concept

Landscape
Wind
Strategy

Landscape

The most prominent features that can be observed in the model of the site are the water ditches that go down the slope and the horizontal platforms that consist of natural terraces along the landscape.

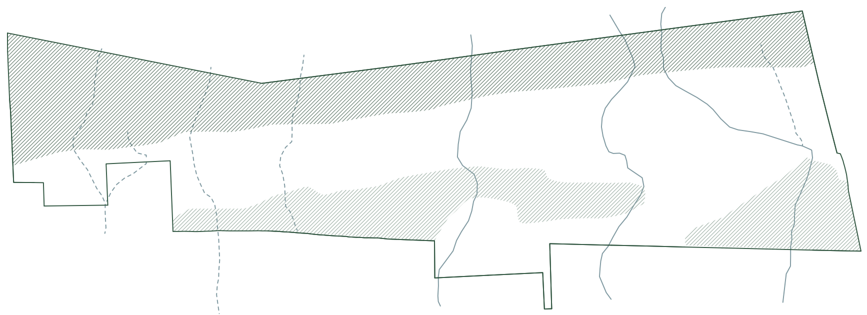
The site is divided by the water strings that can reach 10m deep. The topography of the slope is more dramatic towards the north, allowing flatter areas towards the south, these are represented in the diagram on the right, from white to dark green according to its intensity.

It was very inspiring to register and observe these physical features and understand how they condition the site both vertically and horizontally.

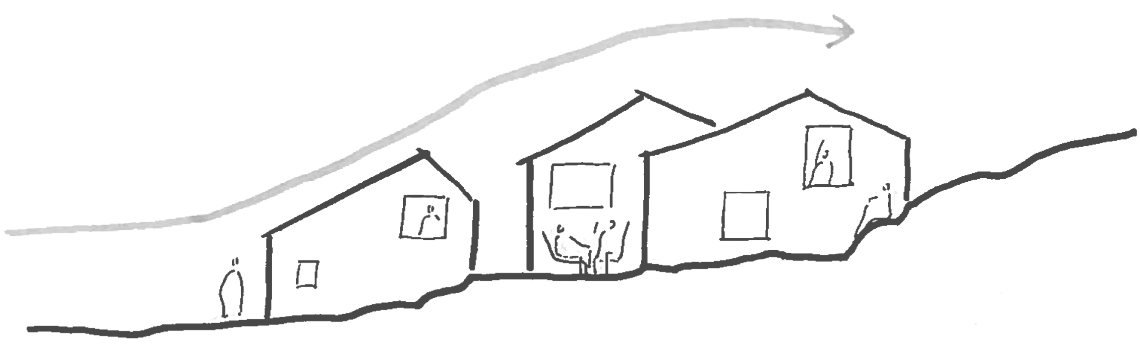
When designing a project that seeks to dialogue with the site and its character, it is fundamental to try to hierarchize its features in order to realize what to work with. The vertical and horizontal partitions seem to us the most elementary features.

These are the elements that compose a grid that could be read physically and conceptually, since not only they are the directions to follow and the elements that the architecture should celebrate, but also the correlation they could have with connections, outdoor areas and general spatial articulation.

Ill. 44 Plan of the site area

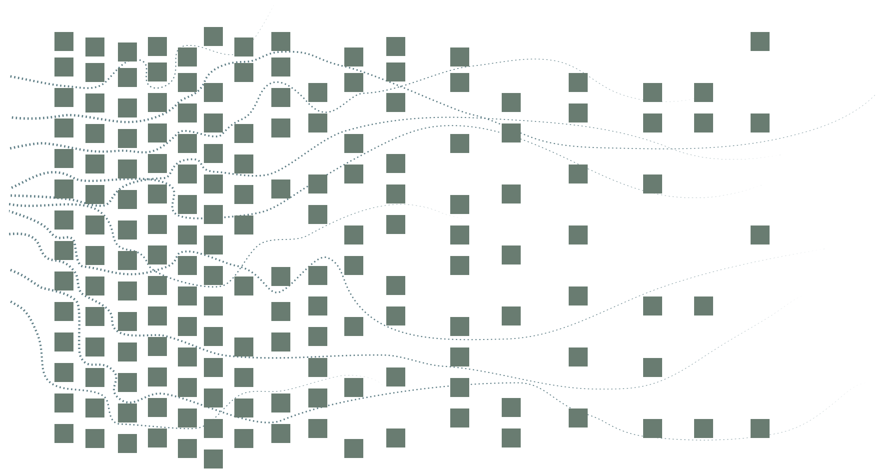


Ill. 45 Diagram of the different types of slopes and water ditches on site



Ill. 46 Sketch of roof sheltering spaces

Wind



Ill. 47 Wind diagram

The wind is the main climate aspect to control in this project; as stated before its speed can reach 40m/s (*Nordic Built Cities, 2015*).

The strongest wind force is from the north and the most frequent from west.

After some preliminary tests it was possible to see that the density of the volumetric presence in the complex could be the primary way to direct the wind away from the outdoor spaces. This is particularly interesting since the optimal way to do it is by establishing a connection between architecture density and the slope inclination.

If there are more volumes were the slope is steepest it seems to create break points for the wind to flow away from the flatter areas towards south.

This opens up the possibility of having larger open areas towards south, which is also nice for the solar exposure; and optimal and higher volume articulation in the north, what could mean the possibility of trying different stacking options where the slope is more intense.

Above is represented a diagram that shows the connection between the wind flows and the archietctural density of the complex.

Strategy

The strategy of the project concerns three different scales, what it should be for the site, for the community and for each family. All of them are rooted on the same idea, the creation of a spatial system that relates to the landscape and lets it enrich the architectural experience.

On a masterplan level the project proposes a system of volumes that considers the natural flat areas for the common outdoors and the water ditches as axis that punctuate the building areas and relate to semiprivate spaces connected to the families' units.

At the same time the project should take passive strategies into account, namely the sheltering from the wind on its outdoors, and the solar exposure; each house should be able to receive light from different sides and have views to the waterfront.

The complex should also be more than the sum of each volume. Instead, they should work together regarding the protection of the outdoors and the design of the in between areas and accesses to each unit.

The design should aim to find principles for the organization of the site, a system that can generate both indoor and outdoor spaces.

The built elements are inspired on the old Faroese traditions, where each volume is part of a group that defines and shelters a core. This space is meant for the community to gather and meet everyday, is a nuclear area both in its meaning and functionality. This space is protected by the volumes' disposition and the angles of the roofs that direct the wind away from the cluster both in plan and section.

The idea of lively and protected outdoors is increased by the stacking of units in each volume and the spatial articulation between living and intimate areas.

The roofs are a defining element on the project their shape and structure are optimized regarding their performance sheltering of the outdoor areas and the interior organization and spatiality generated, this is the main tectonic aspect of the project.

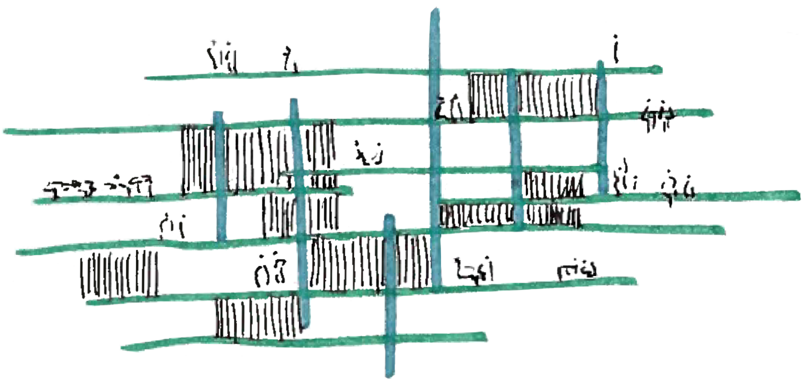
Besides this, the materials used inside and outside accentuate the spatial progression that is defined. The dark wooden boards and local stone used on the outside intend to emphasize the volumes' massive character and their inclusion in the landscape. The platform space is marked by the attenuation of a direct connection to the landscape and the starting of a warmer feeling provided by the light from the different openings, that anticipates the arrival at home.

The program of each house is displayed on a division of living and sleeping areas, inspired by the old farmhouses. This allows to work with different types of spatiality, one opened and lighter for the social activities, and other more intimate and quieter.

The living areas always explore bigger heights and natural night; discover the roof expression and the views of the fjord.

The bedrooms are more connected to the landscape, seeking for different ways to look at it through its diverse openings. Their materiality is also warmer and slightly heavier than the living areas, exactly to propose some intimacy and seclusion.

The access spaces are the nodes between the two areas. They work with the same materials from both and are always defined by the presence of natural light and larger heights. These spaces were also designed to be for staying. Since in this landscape it is required a lot of vertical connections, it is important to define corners and transition areas that are pleasant to be in.



Ill. 48 Concept diagram showing the articulation of architectural and natural elements

Presentation

Masterplan
Clusters
Units
Structural studies
Materiality and detailing

Masterplan

The masterplan had two main design parameters: the landscape and the wind. The aim of the proposal was precisely to explore how it could better respond to climate and site conditions, not seeing them as obstacles but taking advantage of them in the spatial configuration and conceptual genesis.

After the analysis, it was possible to identify an evolution of the slope from north to south. In the northern part, the site was extremely steep while towards south there were registered flat areas with large dimensions.

The flat areas on the Faroe Islands are very appreciated by people for outdoor spaces, the children seek these kind of areas to play and they constitute spaces where people naturally go and stay, what makes sense when considering the dramatic topography through the whole archipelago.

For this reason, it was coherent to the site's identity to take these areas for common outdoors; they would constitute natural platforms with views of the fjord where people would be expected to go. It was also compatible according to the solar exposure; if they were opened to the south, they would have more sun hours through out the day.

The wind was considered as a defining element when looking at the outdoor areas and how these should be sheltered. These areas would be more used if they provided sheltered in different climatic situations. From this point emerged the idea of establishing a relation between built and open areas, where the first would act as an element that would break the wind for the last ones by its design and positioning.

Besides this, their relation had another important aspect considering their definition: both built and open areas define a positive/negative relation. The architectural elements are positioned on the masterplan so that the outdoor areas are better defined and the placement of the common outdoor areas informs where the buildings could exist. The flatter areas would be used for outdoor spaces and the steeper ones for buildings, where the architecture could help the living conditions and the use of the space and its potential.

This articulation represented a coincident gesture with Nature, since it a result of the slope intensities and was done aware of the solar exposure, wind and water ditches.

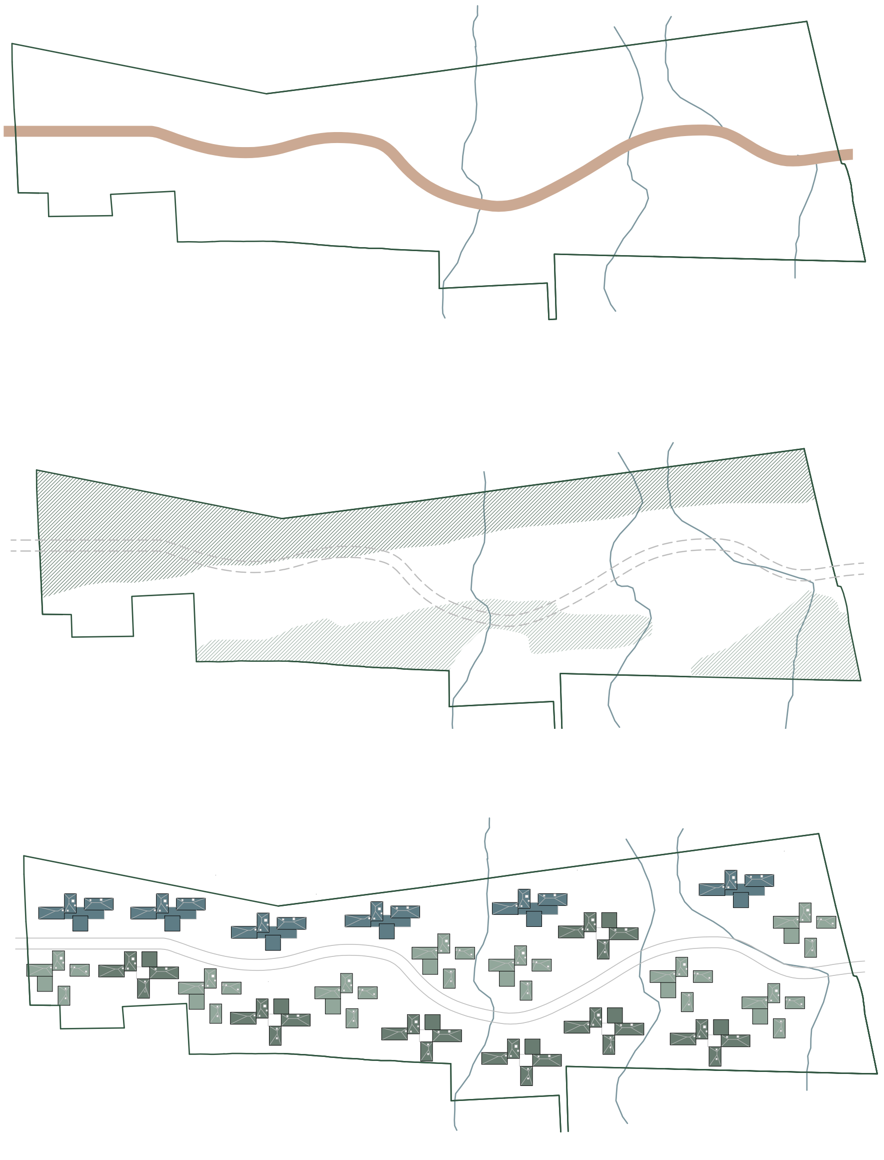
This water ditches were investigated after the study trips to the site, where we were able to register which water ditches were clearly recognizable and had potential to be used as a defining element for the common outdoor areas. The ones on the northern part of the site were practically invisible, while the southern ones, still covered in growth, could be seen and affected the topography.

It is possible to notice a hierarchy between spaces that also corresponds to the progression intended when the users arrive to the complex and until being inside their houses. There are large outdoors areas for all the residents, semiprivate platforms for each cluster and finally the units.

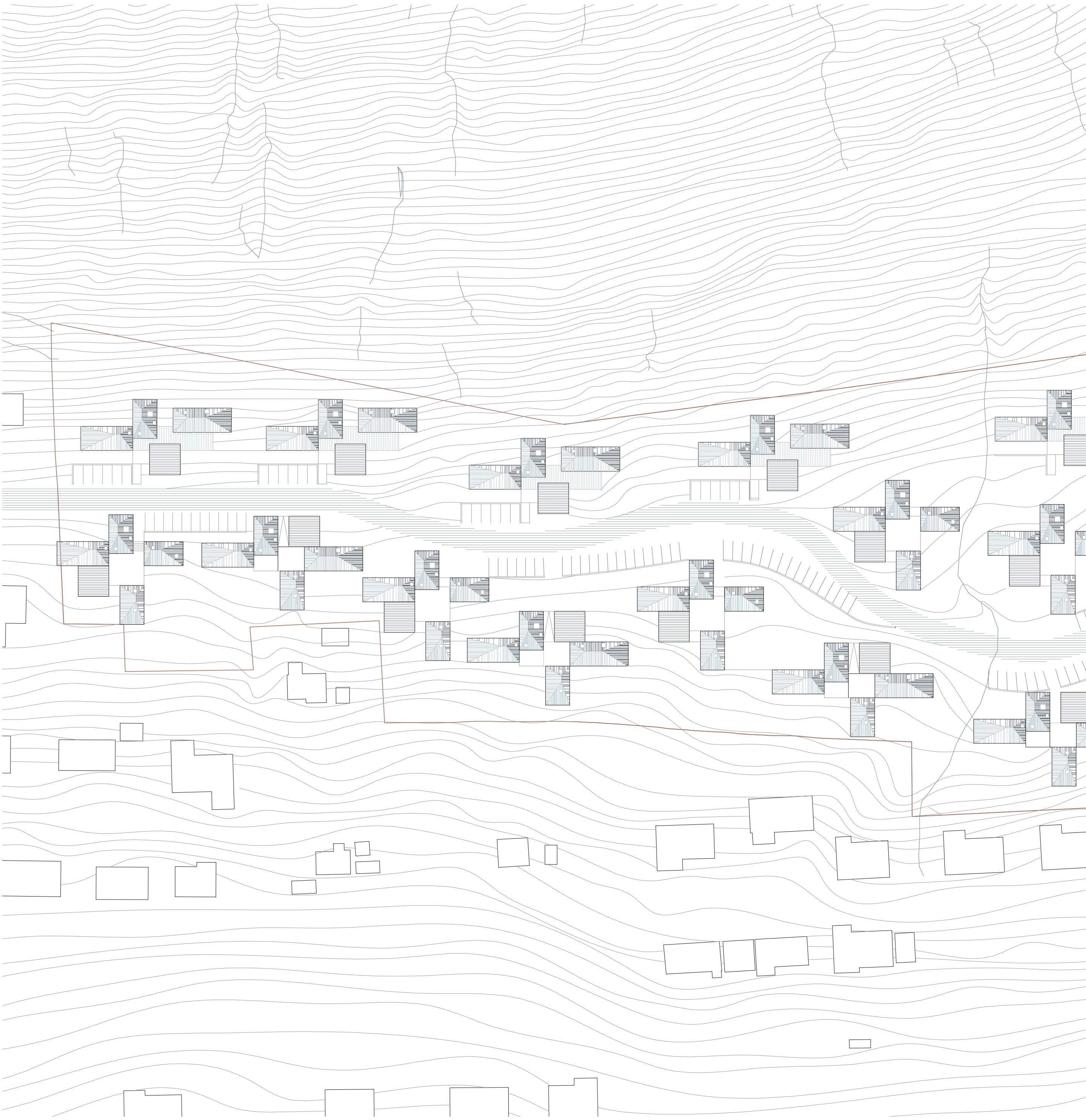
The first are strictly related to nature, while the units propose a clear different experience than being outside, this was very important to achieve without contrasting with the landscape.

Privacy wise, the spaces also present different degrees, this was important to create bases for different kinds of activities related to everyday life. "The physical structure both visually and functionally supports the desired social structure of the residential areas" (*Gehl*, 1961).

Considering the road, the objective was to minimize the infrastructure connecting it to the existing ones.



Ill. 49 Diagrams of the road, different steepnesses and built areas



Masterplan

On the masterplan is possible to observe the three types of clusters distributed by the different slope intensities. On the upper part of the site, there are distributed the clusters of the steep typology, on the bottom and towards south are placed both the mild and the flat typologies.

The road was done following the landscape curves but still serving every cluster, contradicting the linear systems of the new towns disesteemed by the Faroese.

The difference between the proposal and the pre-existent system is also possible to be observed.

The complex offers different centres and spaces, exploring a closer relation to nature. The volumes of the complex work together in order to shelter the common spaces, while the common house typology consists of a single-family house surrounded by a large plot with no connection to public space except its road access.

The parking lots are articulated with the road and provide the connection to each cluster. Their are formalized by the walls made from local stone, extended from the clusters, helping to level the outdoor areas; the idea was to vanish them into the landscape and allude to the old walls traditionally raised by the Faroese.

Ill. 50 Masterplan

Ill. 51 Ground floor level in 1:500 with 0,5 m level curves

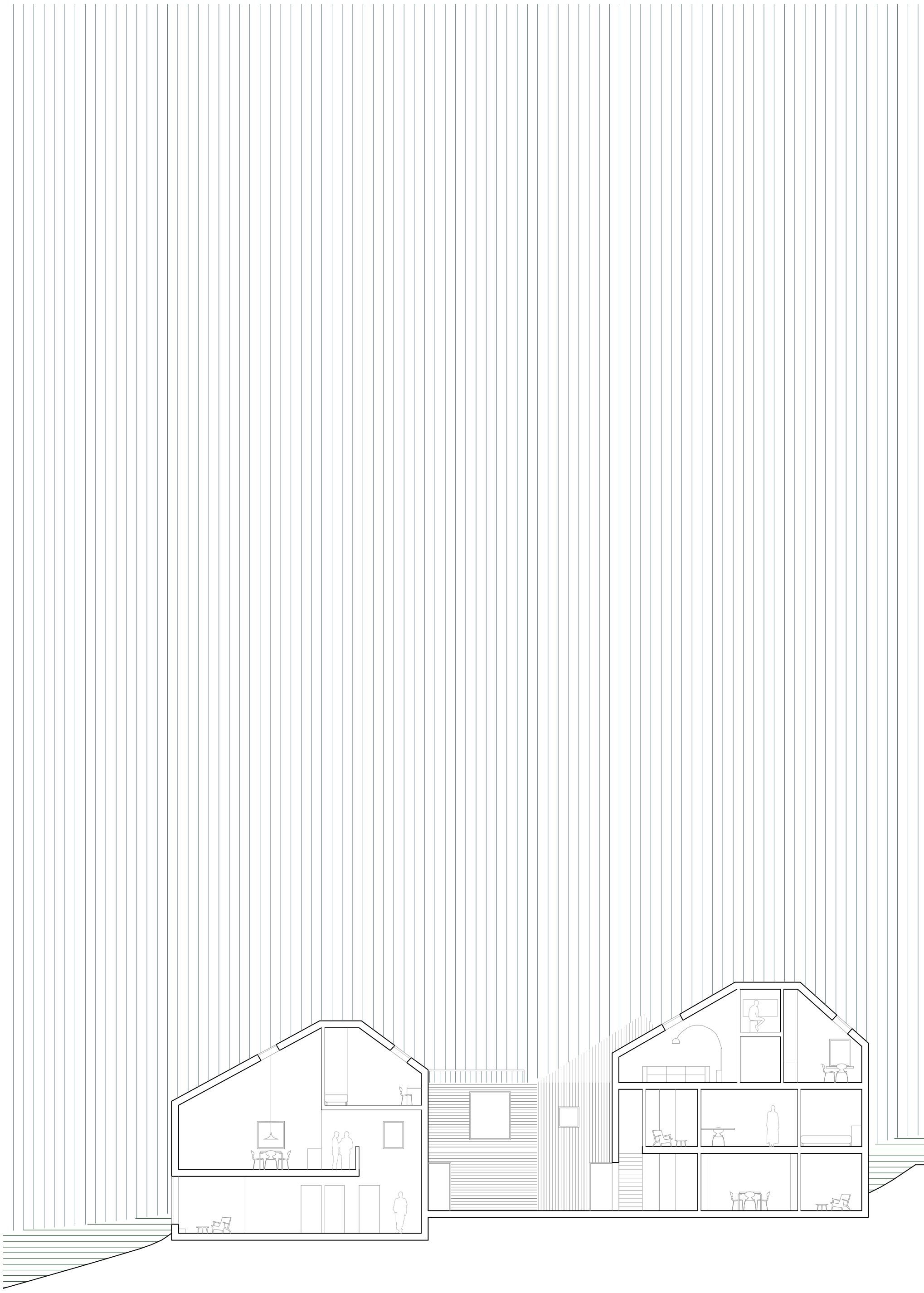
Ill.52 Vizualization of the outdoor areas

Section I

On the section is presented the evolution of the slope through the northern part of the site.

It is possible to observe how the volumes of the different clusters, in this case the flat and the steep, are placed in the landscape not demanding extended excavation processes.

Instead, the clusters are designed in height, allowing for the interior space to be altered according to the landscape.



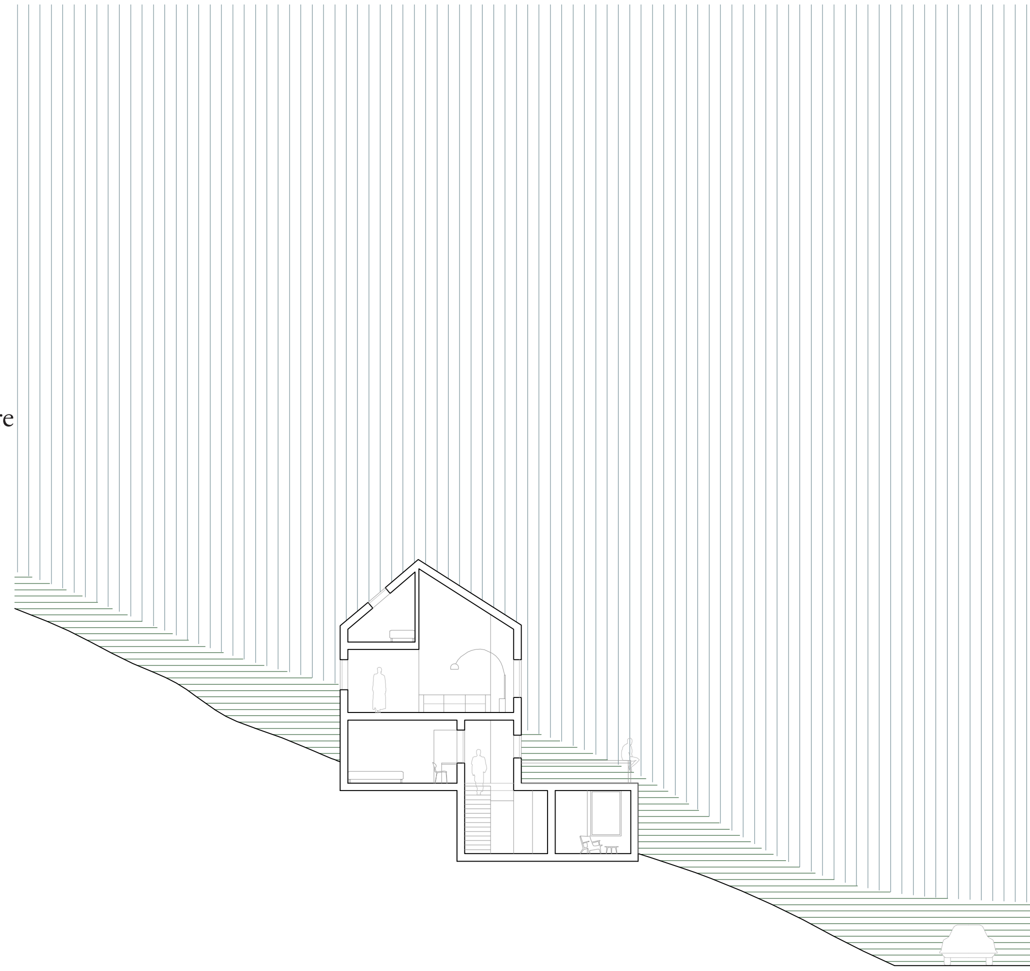
Ill. 53 Transversal Section in 1:300

Section II

This section presents a view of the complex towards south.

Here is possible to observe the steep and mild typologies and the way they are integrated with the slope.

Also the road is positioned dialoguing with the landscape, where the site allows it, the walls made of local stone protect the clusters from the road and parking lot and melt well with the landscape.

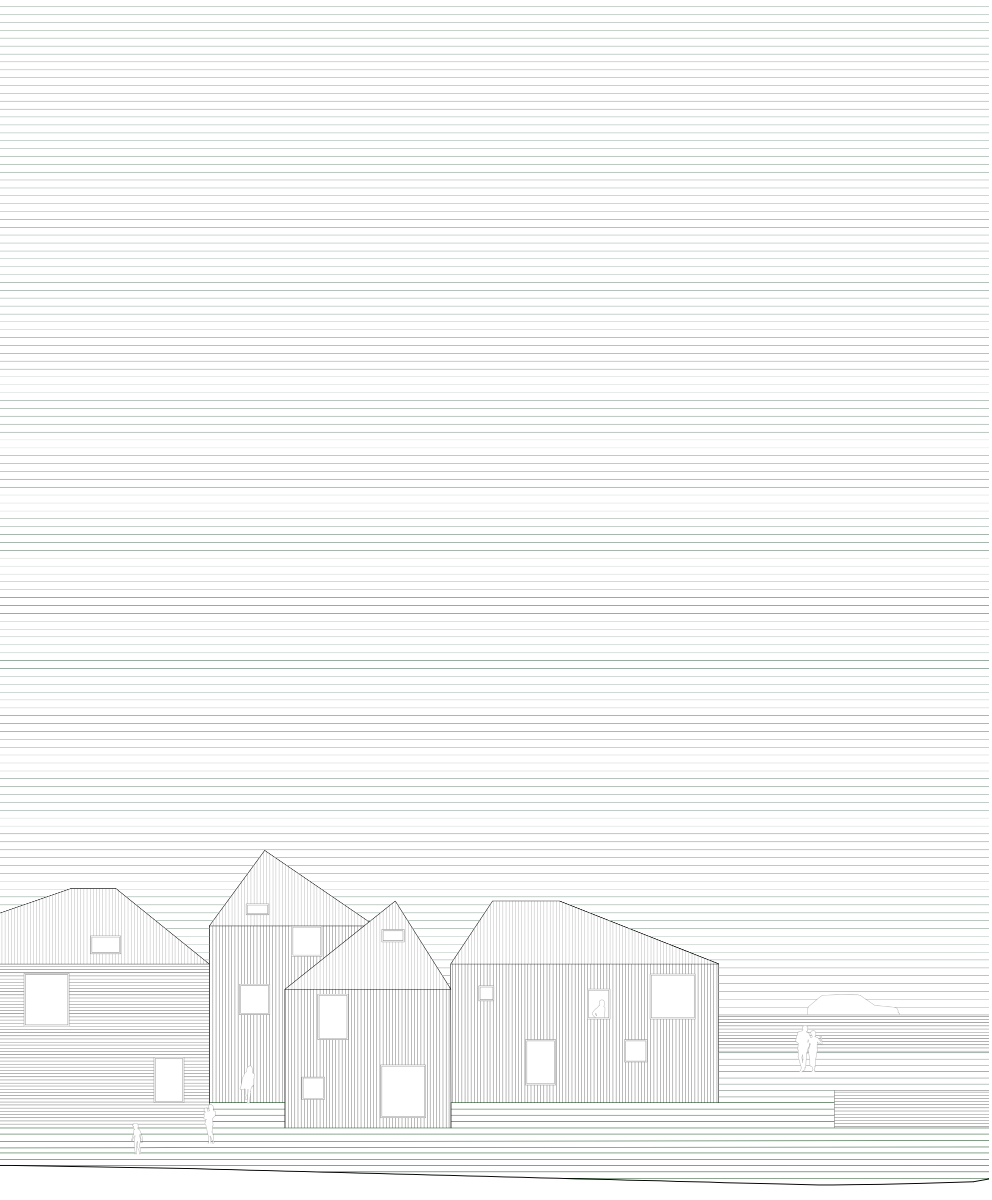


Ill. 54 Transversal Section in 1:300

Section III

The final illustration shows a longitudinal section of the complex.

Here is represented the dynamic between the clusters and how the outdoor areas are established in between them, sheltered from the wind and relating to the landscape.



Ill. 54 Longitudinal Section in 1:300

Clusters

The clusters explore the same concept as the traditional ones, a central shared space, "tún", that allows access to all the different units and represents a meeting point between neighbours.

It was important to create opportunities "to be with others in a relaxed and undemanding way" as described by Gehl. Therefore, these platforms intended to define different experiences from being completely outside in the landscape; instead, they establish connections to the different houses and a smaller part of the community.

The blocks generate the platforms not only by bordering them, but also by the rotation and shifting of the volumes when optimizing their performance against the wind. In this way the platforms gain a stronger significance, not only as space for the community but also as a result of a system composed by different volumes that work together to resist the climatic conditions.

This is an important feature in the Faroese culture, a sense of community and closeness between people to enhance everyone's living conditions.

On this idea of communal performance lies the importance of understanding the potential of this traditional model, its qualities related to tradition and climate, and its importance concerning people's behaviours and identity.

The optimization of the clusters was a looping process between their performance regarding the wind, structure and spatiality. The concept was deconstructed and interpreted it in a new way, exploring its stacking and interiority.

As represented in the diagram, there is an evolution from the old form of the "tún" to the one of the proposal.

The proposal is denser, clearly defined and the volumes have distinct orientations.

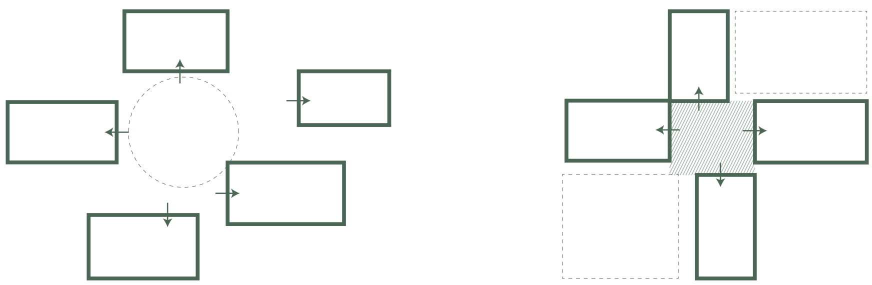
This was done testing the shifting and alignments of each volume regarding the wind, so the ones in the north part are always parallel to the wind while the others can assume different orientations, since the wind was primary diverted.

The relevant step of the new model consists on its capacity to generate more than the central space, the different orientations not only propose different views for the units, but also guarantee more privacy and the possibility of defining the common outdoor areas when articulated with other clusters.

Volumetrically, the character of the clusters always revolved around the idea of a massive form emerged from the landscape; the lower angles of the roofs merge with it and their materiality was chosen alluding to the old houses.

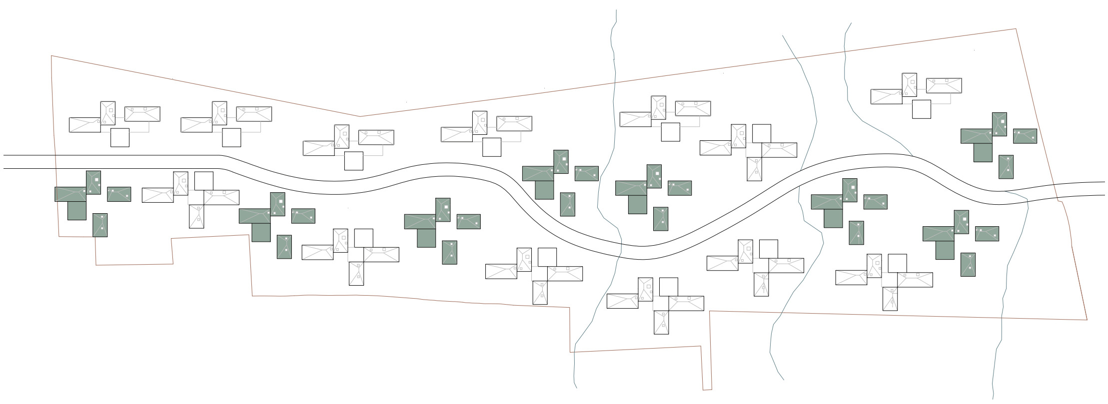
The dark wooden boards used in the façade have different spacing so they merge better with the surroundings and the foundation of the blocks is made from the local stone, having the same height as the walls of the outdoor and parking areas.

The following pages will showcase the three different clusters' typologies, from the flat to the steep.



Ill. 55 Diagram illustrating the "tún" principle in the old farmhouses, on the left, and in the proposal

Flat Cluster Typology



Ill. 56 Diagram of the display of the typology through the complex

Above is presented a diagram where is marked in green all the flat clusters in the complex.

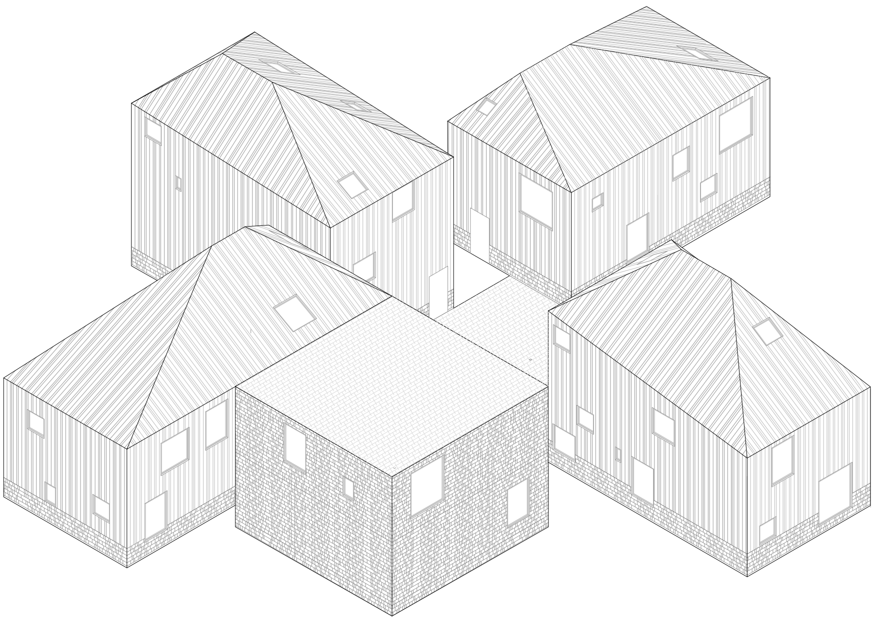
As mentioned before, there are three typologies in the complex distributed according to the different intensities of the slope.

This allowed working with the same spatial organization principle in three ways and, in this line, to solve the entire complex with the minimum amount of typologies. The difference between them has to do with the height of the different volumes, in the presented typology the difference is minimal, while in the steep cluster it reaches 3 meters.

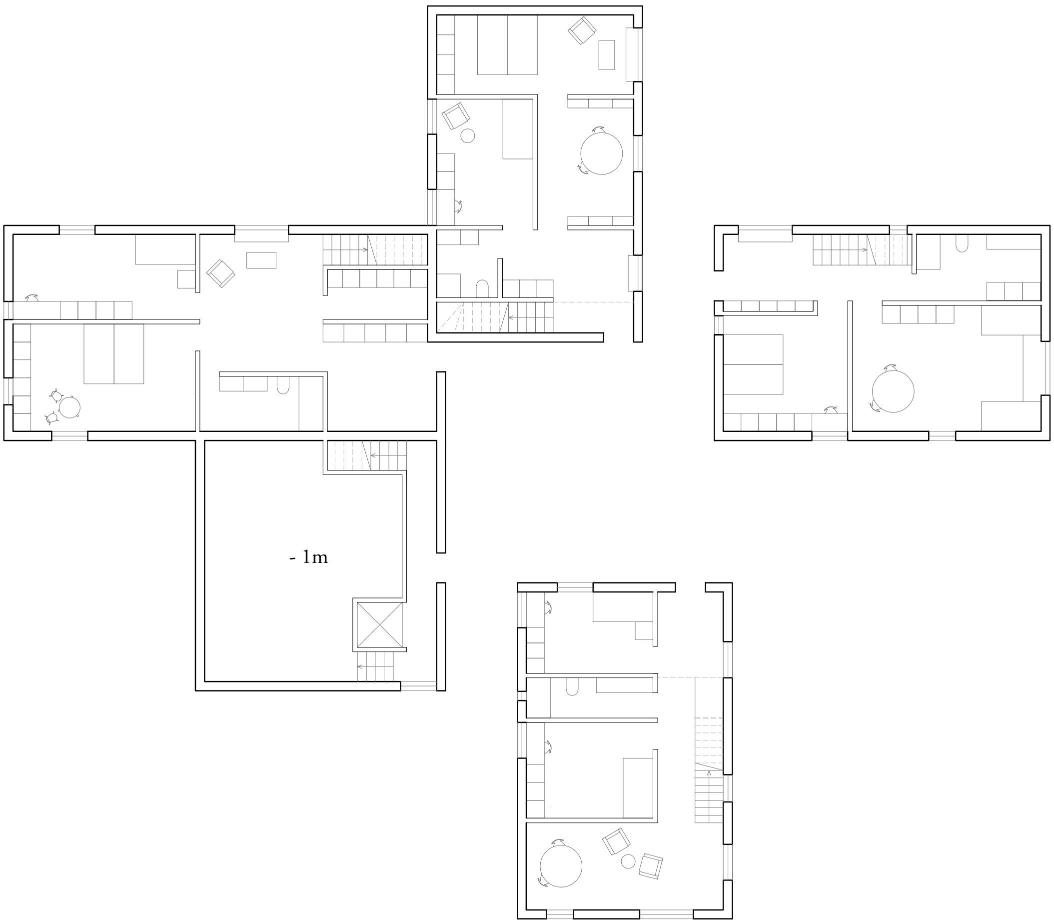
The clusters also promote different types of platforms, although they all are sheltered spaces and have a strong connection to the units in all of them.

The volumes were designed to relate to the image of the traditional houses very appreciated by the Faroese.

However the different units explore stacking principles that allow to fit more then one in the same volume and to explore different spatial geometries, dialoguing with the landscape. This will be presented in detail on the next chapter.



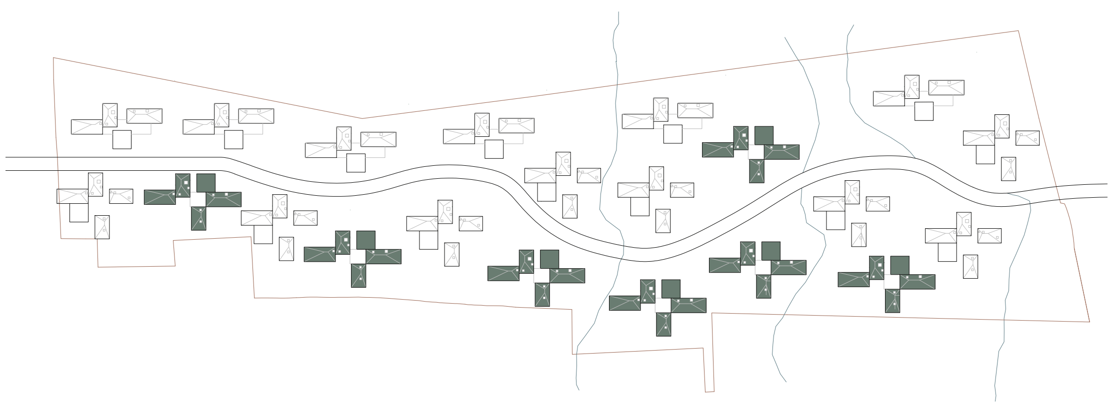
Ill. 57 Axonometry of Flat Cluster Typology



Ill. 58 Ground floor plan of the Flat Cluster Typology in 1:250

Ill. 59 Section drawing of the Flat Cluster Typology in 1:250

Mild Cluster Typology



Ill. 60 Diagram of the display of the typology through the complex

In this spread is presented the mild typology which is the one used in the transition areas between the slope and the common outdoors, being easy to articulate with both.

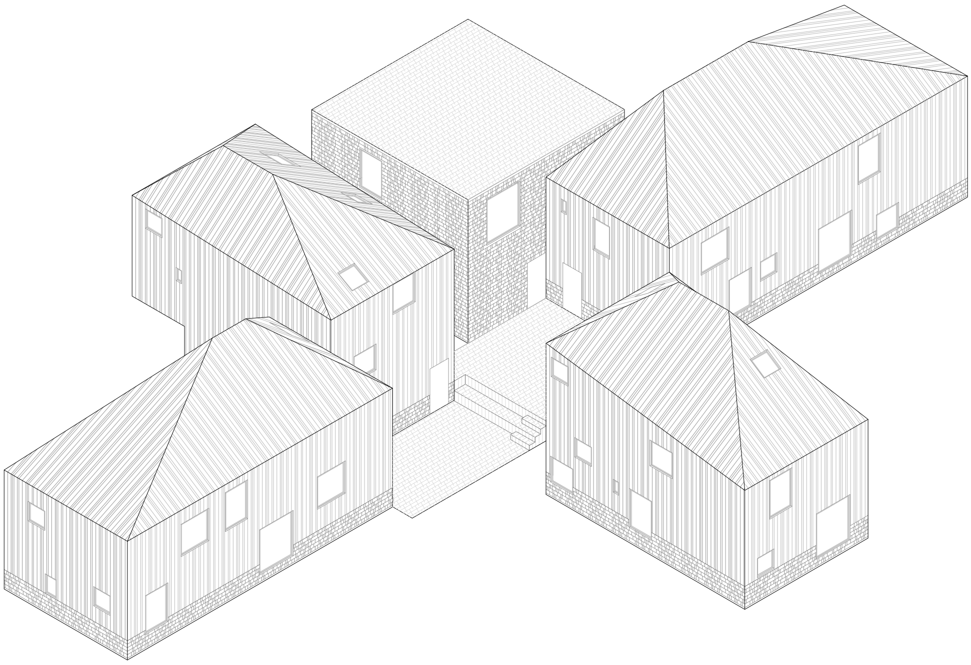
Its character is more longitudinal compared to the flat typology since it deals with more steepness.

Here the platform is also divided in two levels, allowing for a bench in the height difference with a view of the fjord, completely sheltered from the wind.

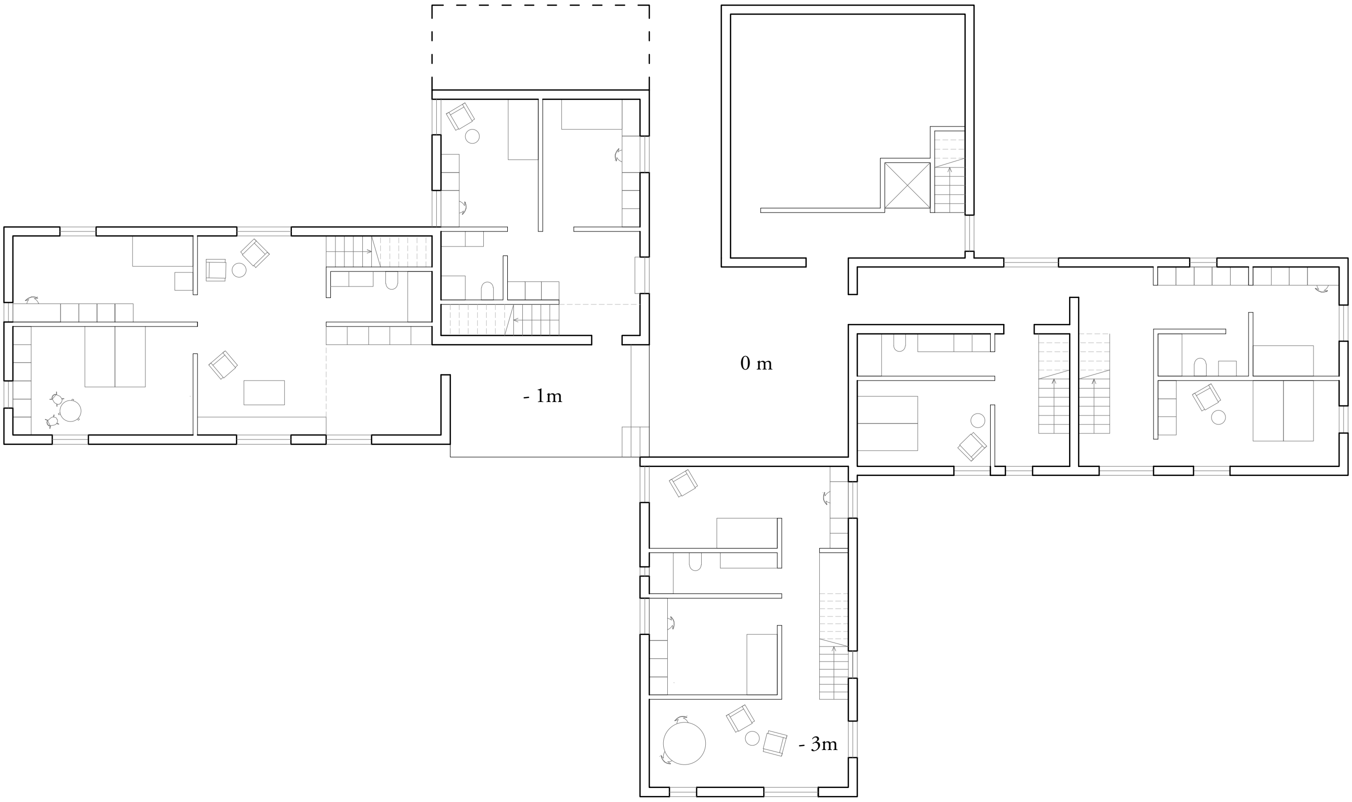
The volume sectioned in the next spread is placed 3 meters below the platform, meaning that the access is made from the living spaces floor, this permitted to create an handicapped accessible space since it would be possible to reach both bedroom and living spaces from the ground floor.

According to Faroese regulations, in an architectural project there must be provided 10% of accessible area for handicapped, it is low compared to Danish standards, this is due to the dramatic landscape.

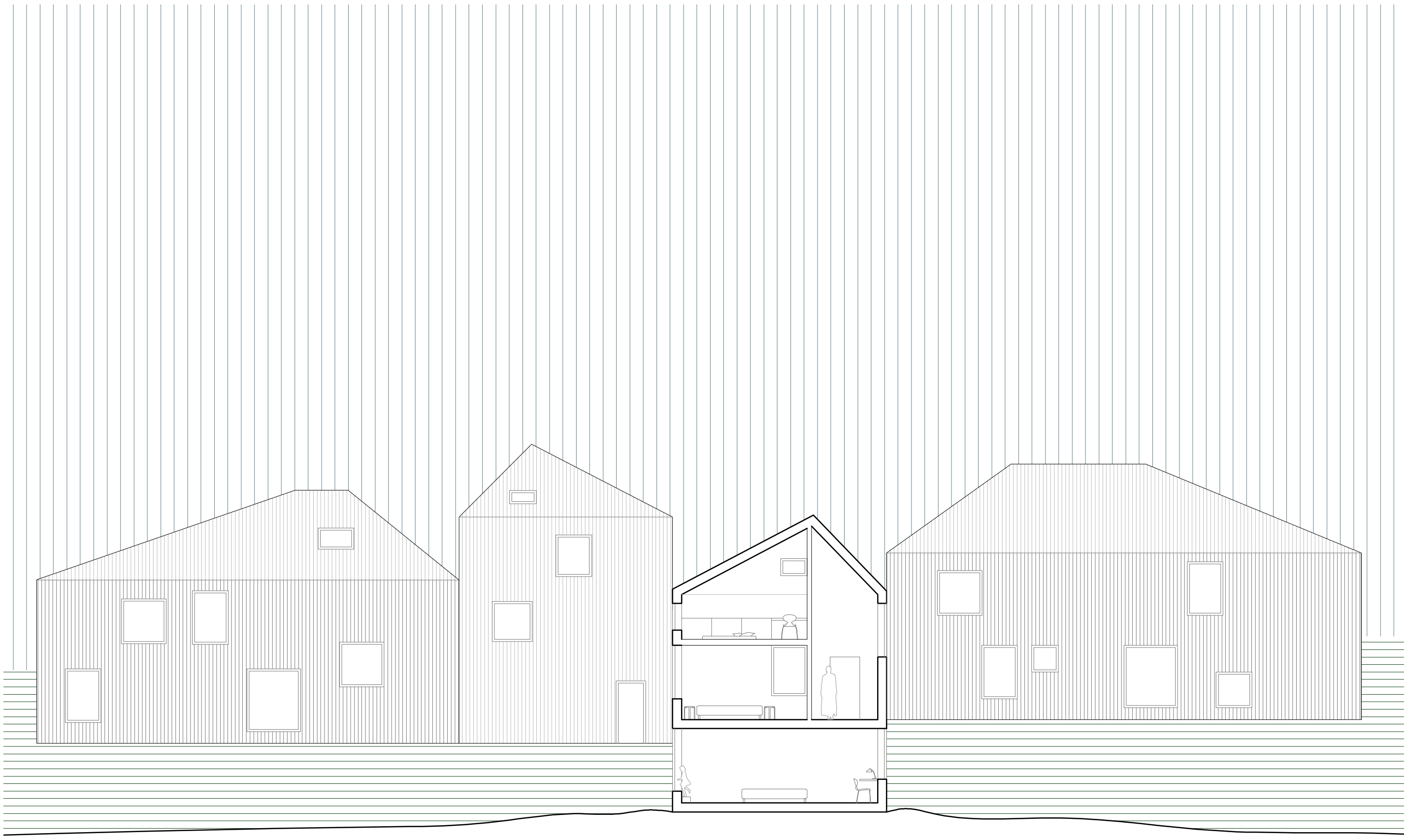
In the project 10% of the apartments are handicapped accessible from the parking areas until the interior of the apartments and all the common units have an elevator in case there are guests with these conditions.



Ill. 61 Axonometry of Mild Cluster Typology

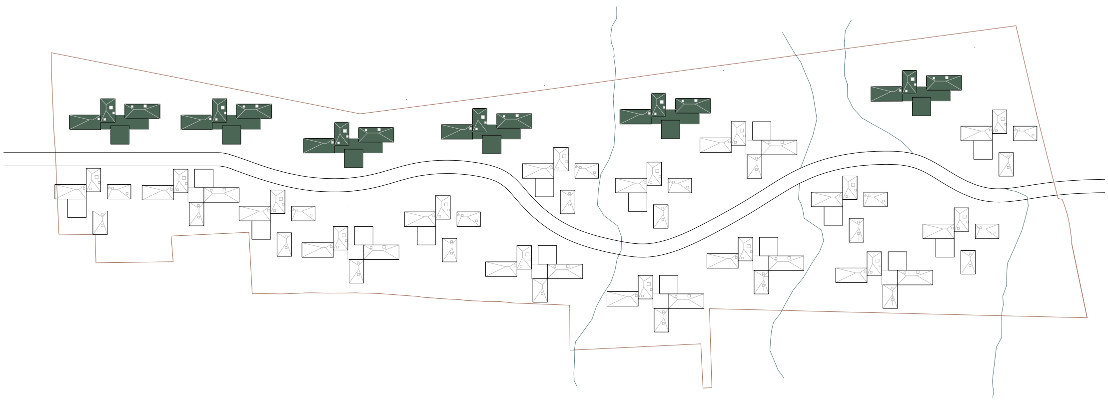


Ill. 62 Ground floor plan of the Mild Cluster Typology in 1:250



Ill. 63 Section drawing of the Mild Cluster Typology in 1:250

Steep Cluster Typology



Ill. 64 Diagram of the display of the typology through the complex

The steep typology is the last to be presented.

This is the one used for the northern part of the site where the slope is particularly evident, for this reason it has a linear character so it fits the landscape without demanding a lot of excavation.

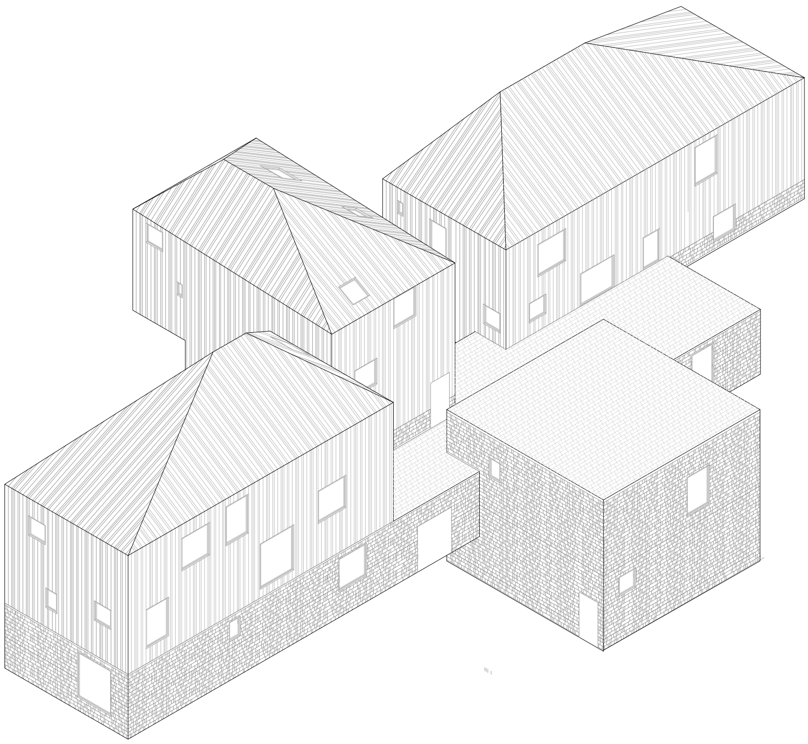
Naturally, it is also the cluster most affected by the landscape on its interior spaces.

The platform, in this typology, is defined in a different way due to the landscape.

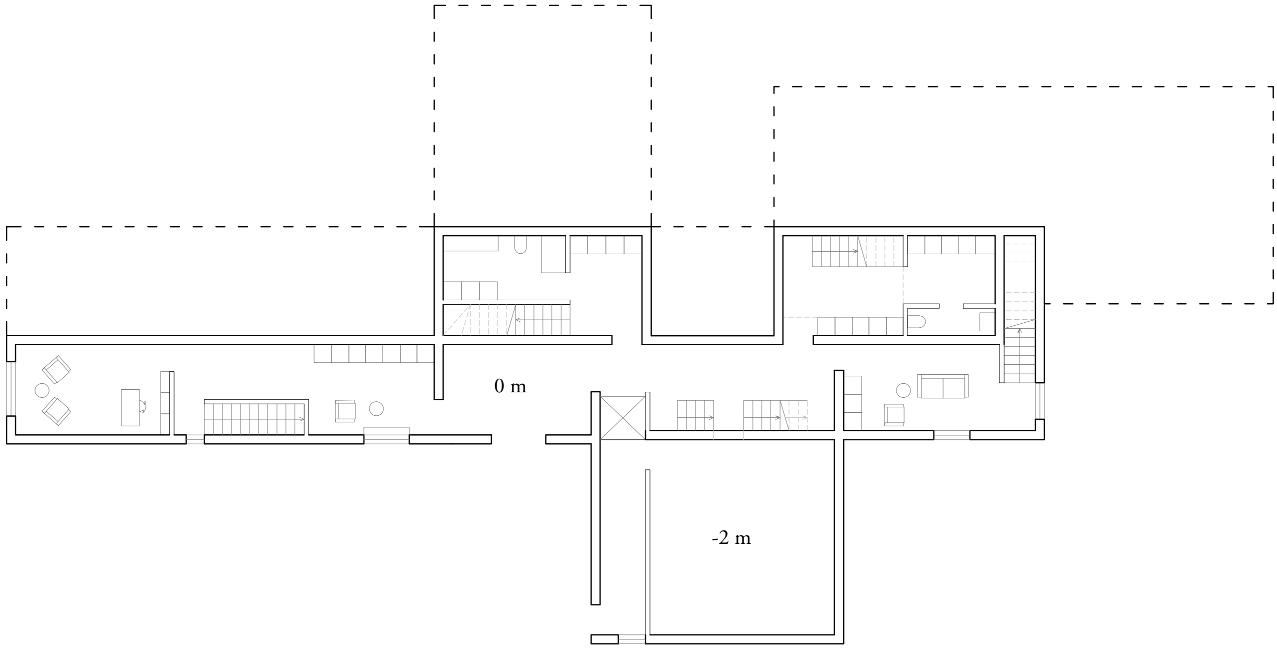
It still functions as the sheltered access core to all units in the ground floor, providing also a connection to the parking areas.

On the top floor, it is a terraced outdoor space connected to all the four living units and the common volume.

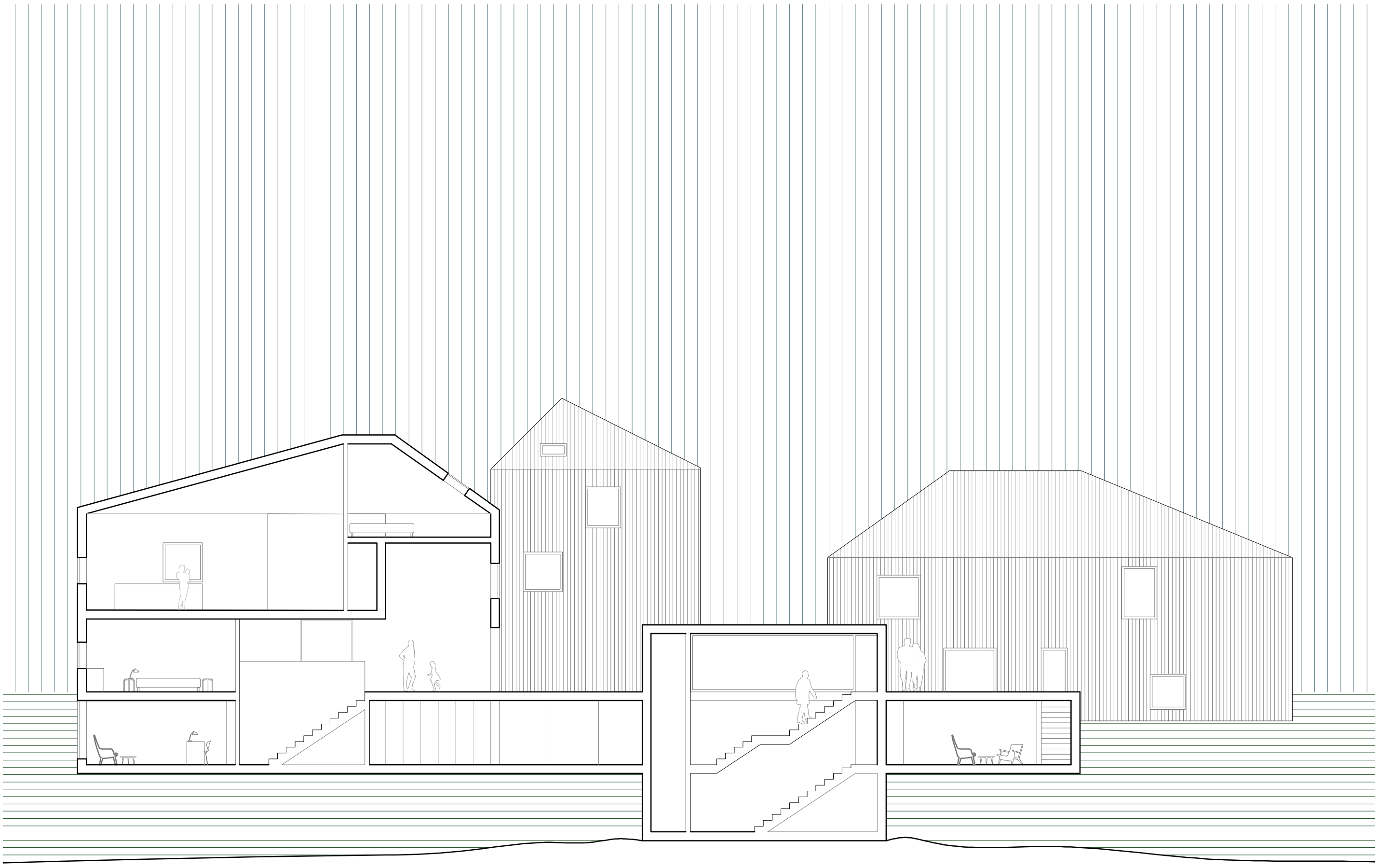
The terrace has different areas, all with views of the fjord and the landscape, these spaces are all sheltered from the wind by the building units.



Ill. 65 Axonometry of Steep Cluster Typology



Ill. 66 Ground floor plan of the Steep Cluster Typology in 1:250



Ill. 67 Section drawing of the Steep Cluster Typology in 1:250

Units

The indoor organization was inspired by the old traditional houses, in which the division of the night and day zones allowed for distinct atmospheres in these two areas of the house, where the entrance is the node between them.

The concept for the indoor spaces took inspiration in this base, its reinterpretation had to do with working with it from a section point of view, since it would allow to explore the slope and different height spaces.

The spaces for the living activities were intended to be light and open, where the families could have their meals and spend quality time together. The bedrooms are areas designed for rest, study or more individual activities, so the spaces could be richer and intimate.

Soon, this idea reveal the character of the two zones and how the living areas were naturally connected to light and views, and the bedrooms more connected to the landscape and the ground.

On the first case, the living areas were associated with the higher part of the volumes, since they would explore the height difference of the roof's inclination, shaped by considering the wind sheltering.

This was done since they were the common spaces and core of the house and would make sense for them to explore the most dramatic spatial element and have the most solar exposure.

To accentuate the light and the angles of the roof, white walls and ceilings were chosen; nonetheless, the floor and volumes of the kitchens and bathrooms have wooden cladding so they area still comfortable and pleasant to be in. With the location of the living spaces closer to the roofs, we guarantee optimal light, views and privacy conditions for each house.

The night zone is the more intimate one, as mentioned, in this way the wooden walls and floors were chosen to provide a warmer and comforting feeling to them. The openings in these rooms are connected to the indoor spatiality, for example associated with the desks, so one can study with a view of the landscape.

The entrance in the project not only functions as a node between the two areas, but also as a transition space where one can stay; the accesses to the rooms work as more private social areas, pleasant corners to be in while reading, or talking with someone.

This was a spatial quality that can also be observed in Asplund's House in Stennäs, one of our case-studies, to achieve it we had to guarantee that the spaces had appropriate dimensions and natural light.

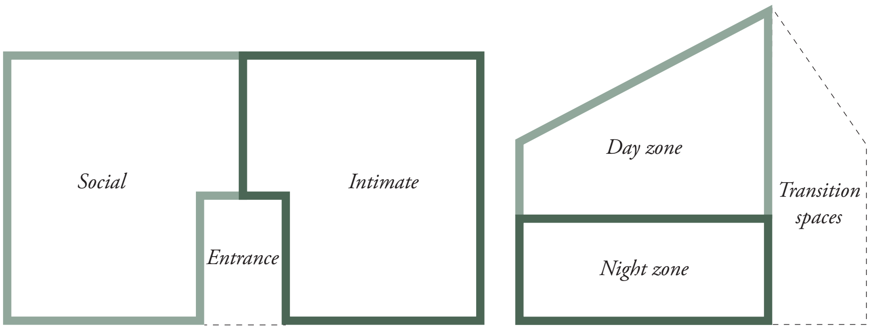
The light here is also an important aspect, the entrances in every apartment have a double height or a distinct opening.

Material wise, these spaces are also the connection between the two different atmospheres, white and wooden walls are used in order to accentuate the light and provide a warm feeling when walking inside.

Regarding the project morphology, the same volumes compose the three different typologies. In this way, the proposal was clear, coherent and we were able to provide the envisioned indoor qualities for all the volumes.

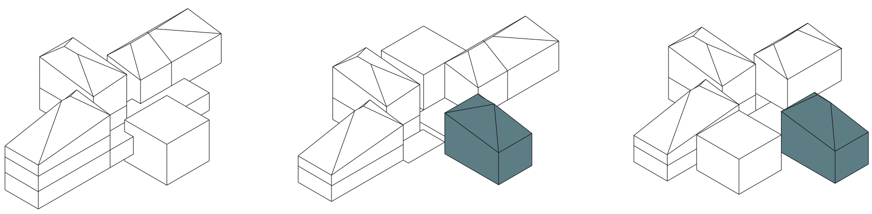
The volumes are articulated in different ways with the landscape in each cluster. However, the orientation of these volumes was kept so the spatial layout and openings could be used in the same way for the three clusters.

The proposal has six different types of volumes, being one of them a common building that supports the platform. In this chapter all the units will be explained in detail.



Ill. 68 Diagram illustrating the night/day division in the traditional houses, on the left, and in the proposal

Unit I



Ill. 69 Diagram of the same volume on the different clusters

Above is presented a diagram that shows which unit will be presented next and its positioning in the different clusters. In this case for example, the vertical volume, in blue, only exists in the mild and flat typologies.

On the next spread will be presented the drawings in 1:100 and a perspective section that intends to illustrate the different atmospheres of the unit.

The visualization illustrates the entrance space of this unit.

The idea was to create an open space full of light, which was pleasant to come in.

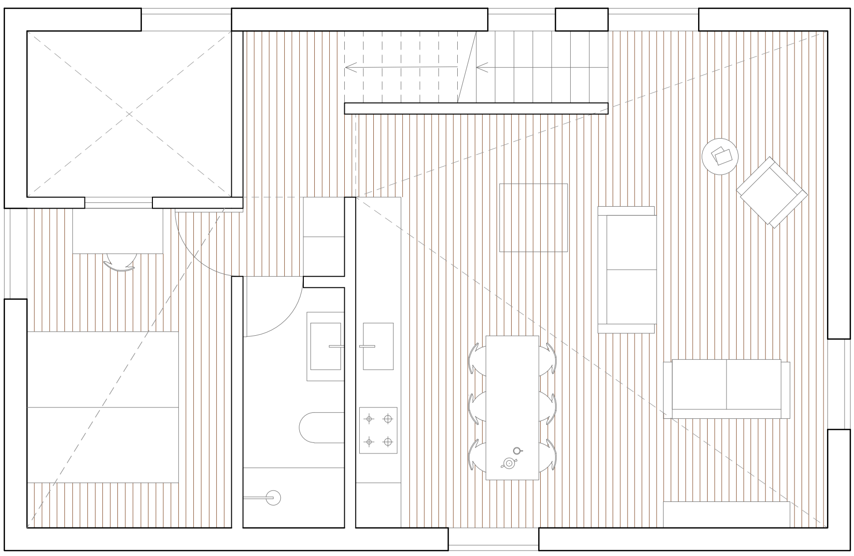
The double height provides more light to the space and creates dynamic interior views between the space and the others connected to it.

The window is placed relatively high so one can focus the attention on the inside, while still having a soft light coming in the space.

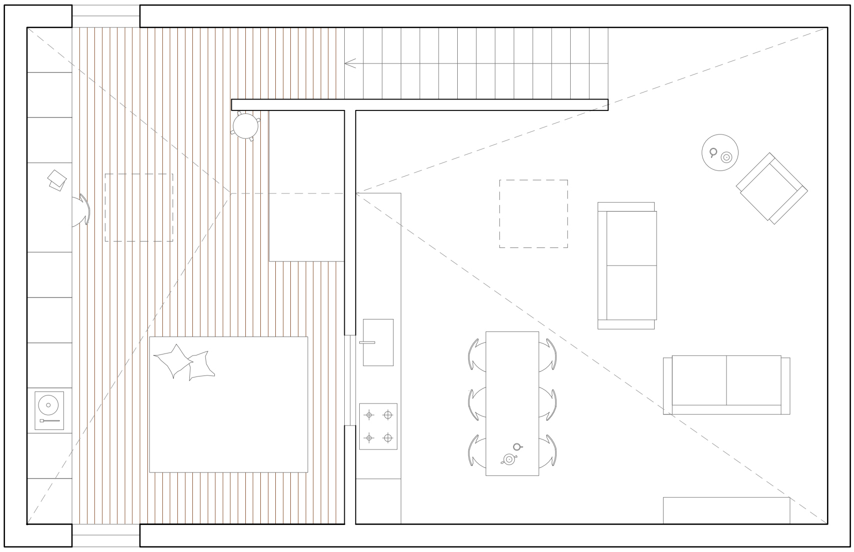
The materials of the floor and walls of the closets are in wood to provide warmth and the light walls to help spread the light through the space.

The closets are built in the stairs, to utilize the space underneath for storage.

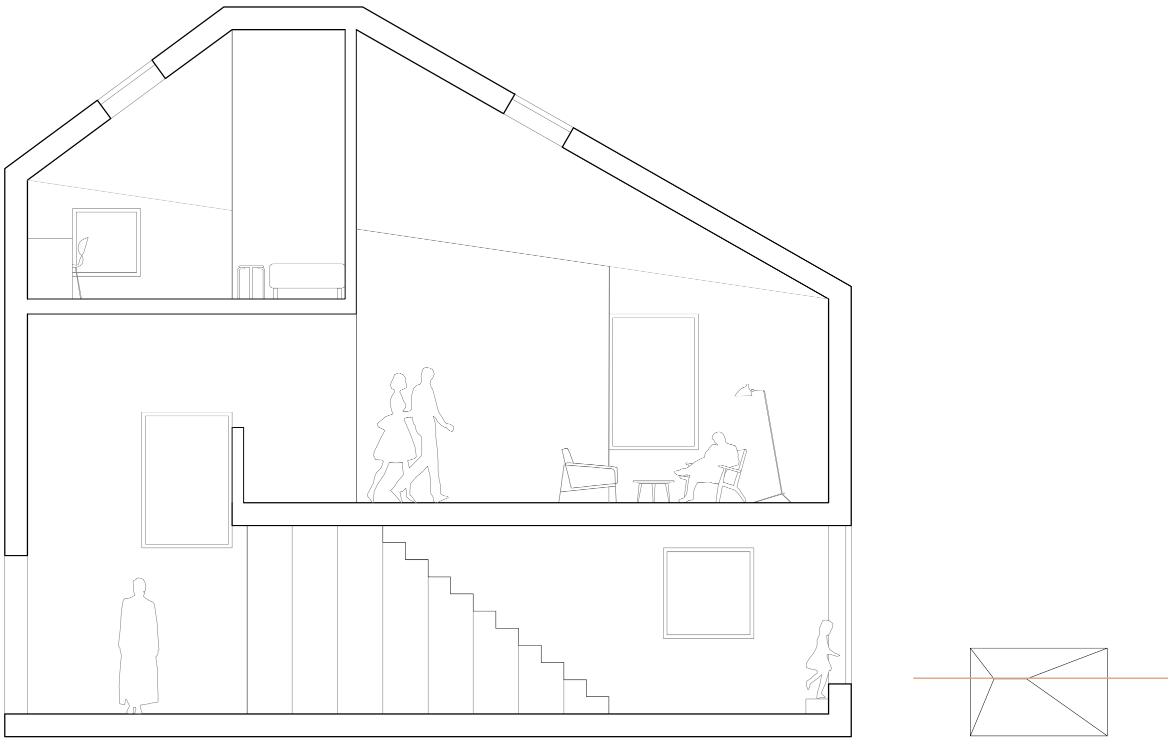
Ill. 70 Vizualization of the entrance space



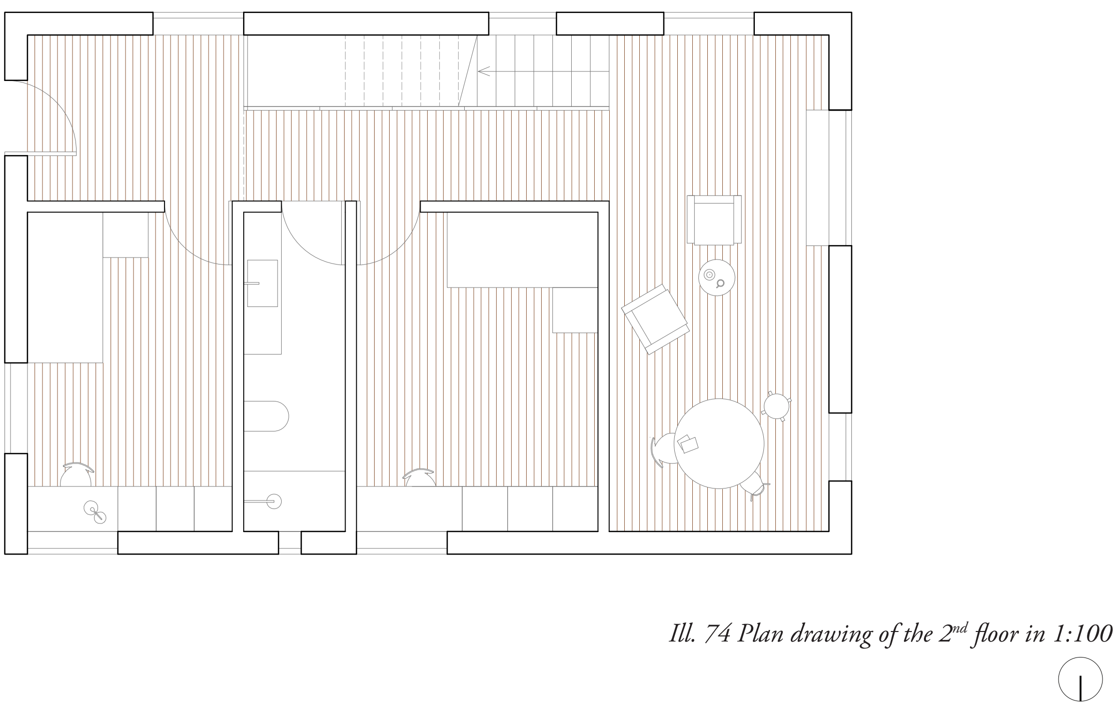
Ill. 71 Plan drawing of the groundfloor in 1:100



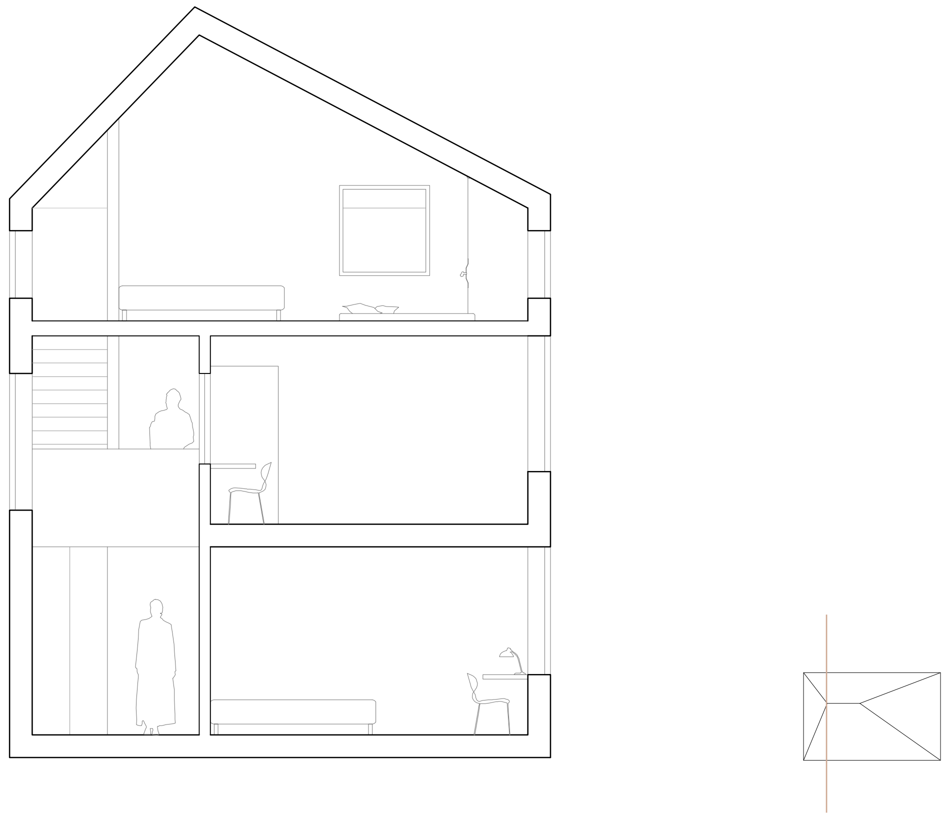
Ill. 72 Plan drawing of the 1st floor in 1:100



Ill. 73 Section AA' in 1:100



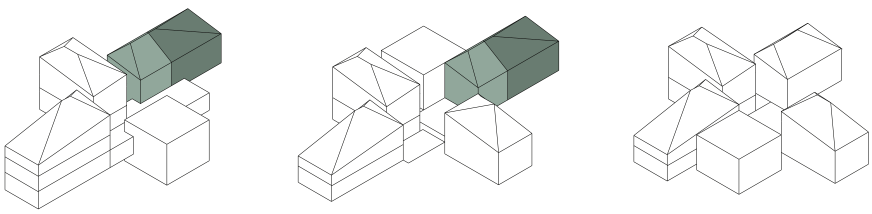
Ill. 74 Plan drawing of the 2nd floor in 1:100



Ill. 75 Section BB in 1:100

Ill. 76 Perspective Section in 1:100

Units II and III



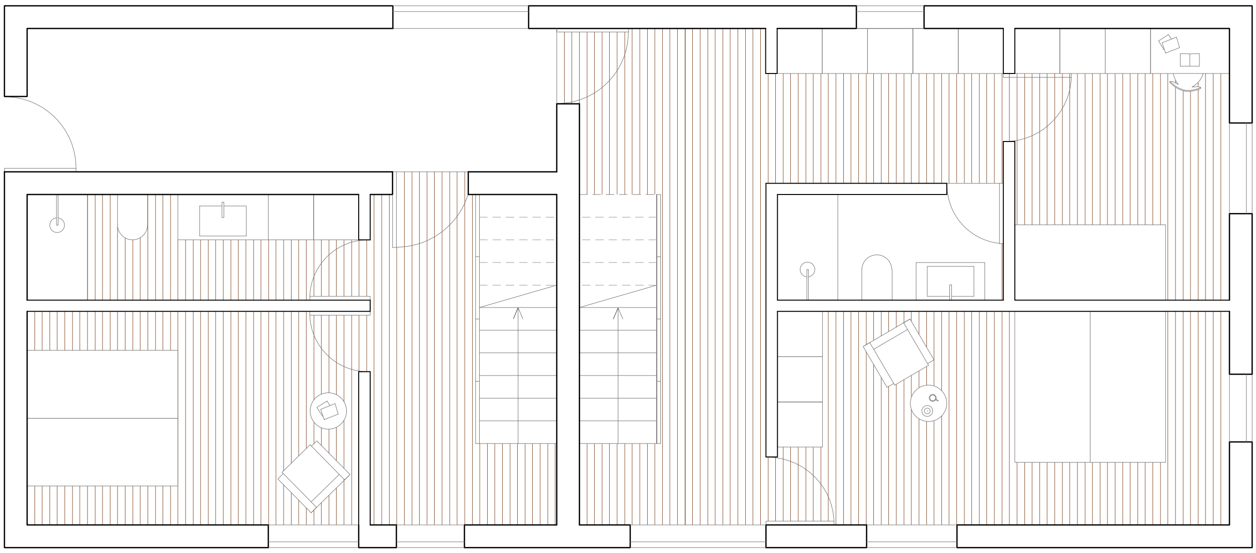
Ill 77. Diagram of the same volume on the different clusters

The living spaces, illustrated on the next page, were meant to have high ceilings and experience the angularity of the roofs; the spaces are more open and their volumes can explore light and views in an unconventional way. The walls and ceilings are white so they intensify the height of the roof and its diagonal lines. The structure is not shown since it provided a different kind of atmosphere than the one intended, it didn't feel so open and it increased the complexity of the space. Nonetheless we believe this is a tectonic space, as its expressivity is a result of the essential principle of the roofs structure.

"When a structural concept has found its implementation through construction the visual result will affect it through certain expressive qualities which clearly have something to do with the play of forces and corresponding arrangement of parts in the building, yet cannot be accounted for by terms of construction or structure alone". (Sekler 1965)

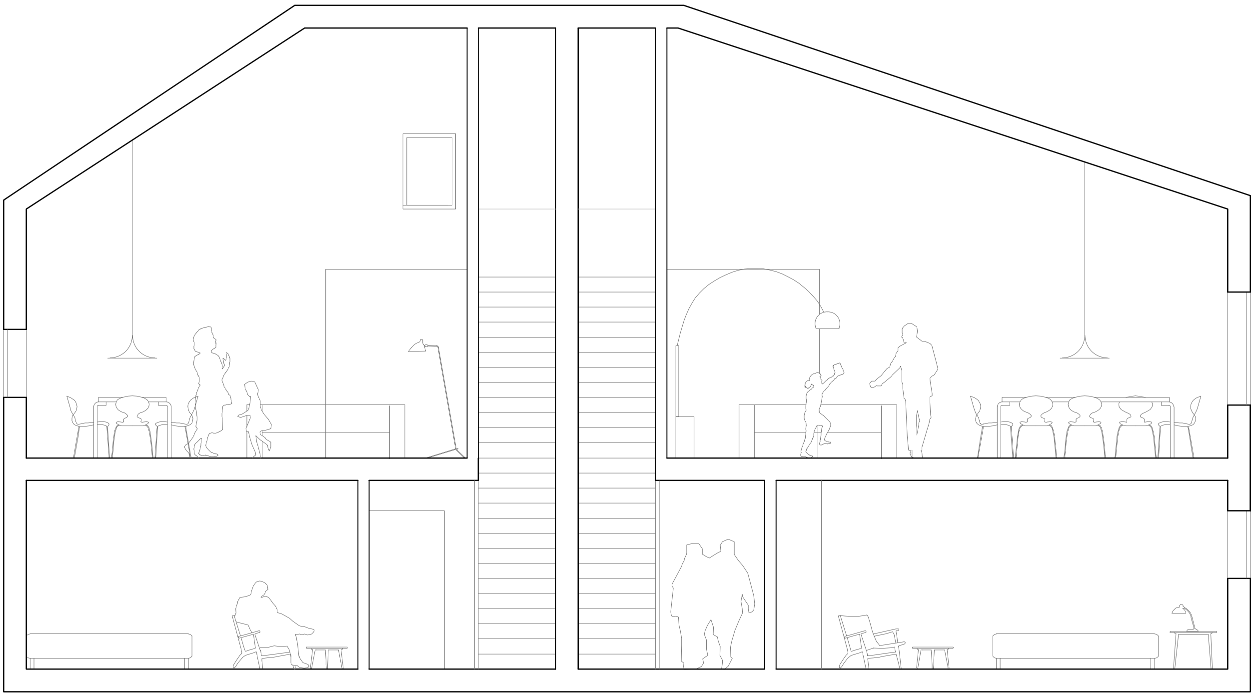
The strength of the space relies on the expressivity of the roof, whose angles were optimized integrating the three aspects of the design: interior space, structural performance and wind sheltering. The lines that define the space are a direct result of the roof beams.

Ill. 78 Vizualization of the living space

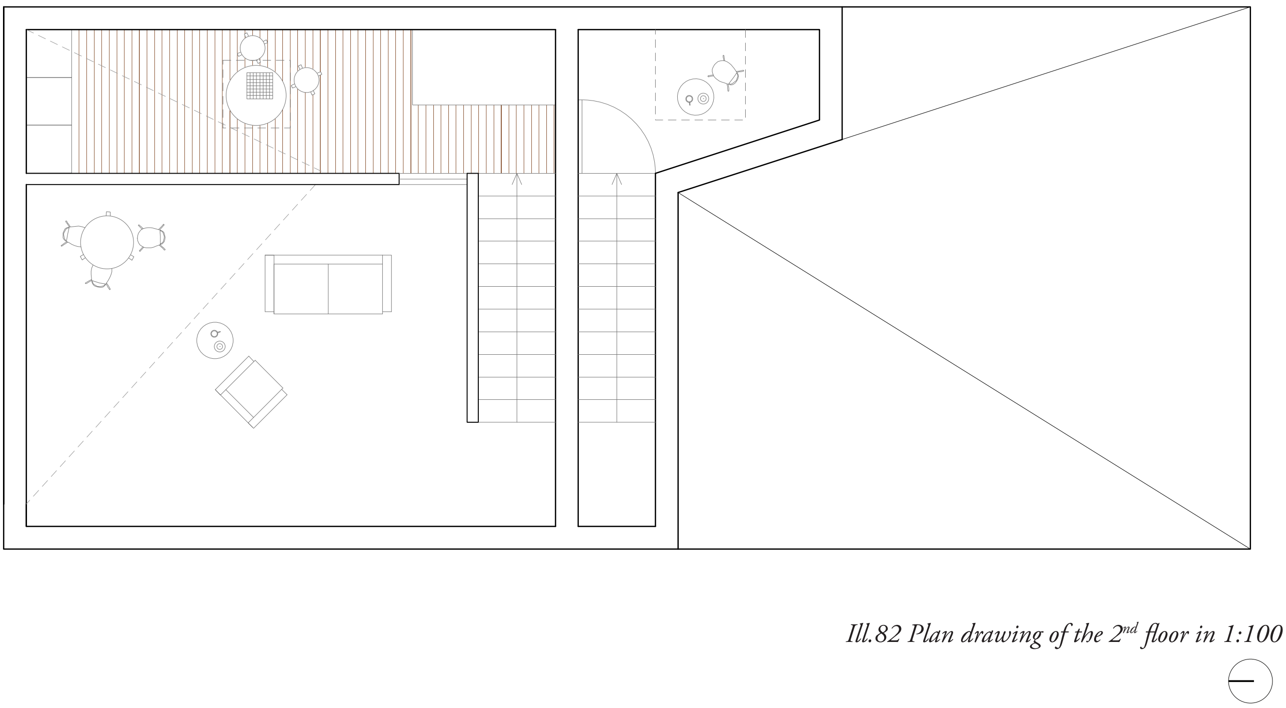


Ill. 79 Plan drawing of the groundfloor in 1:100

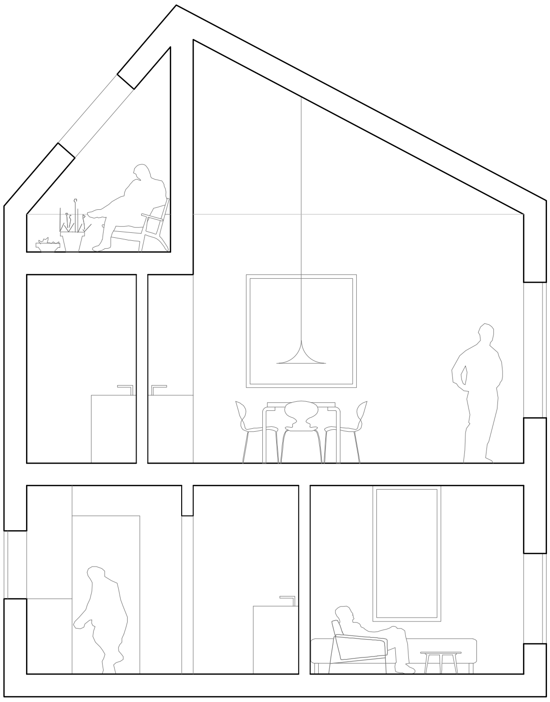
Ill. 80 Plan drawing of the 1st floor in 1:100

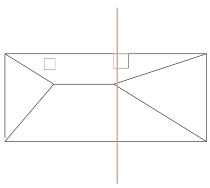


Ill. 81 Section AA' in 1:100



Ill.82 Plan drawing of the 2nd floor in 1:100

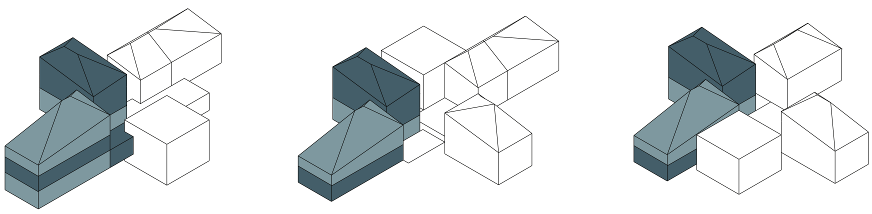




Ill. 83 Section BB in 1:100

Ill. 84 Perspective Section in 1:100

Unit IV and V



Ill.85 Diagram of the same volumes on the different clusters

The next volume to be presented has two units. The stacking of different units in the same volume is done not only to increase the density of each cluster but also to provide different views for the same unit.

In this case, both of the units have views of the fjord and openings facing south.

The visualization presented is a view from one of the transition spaces.

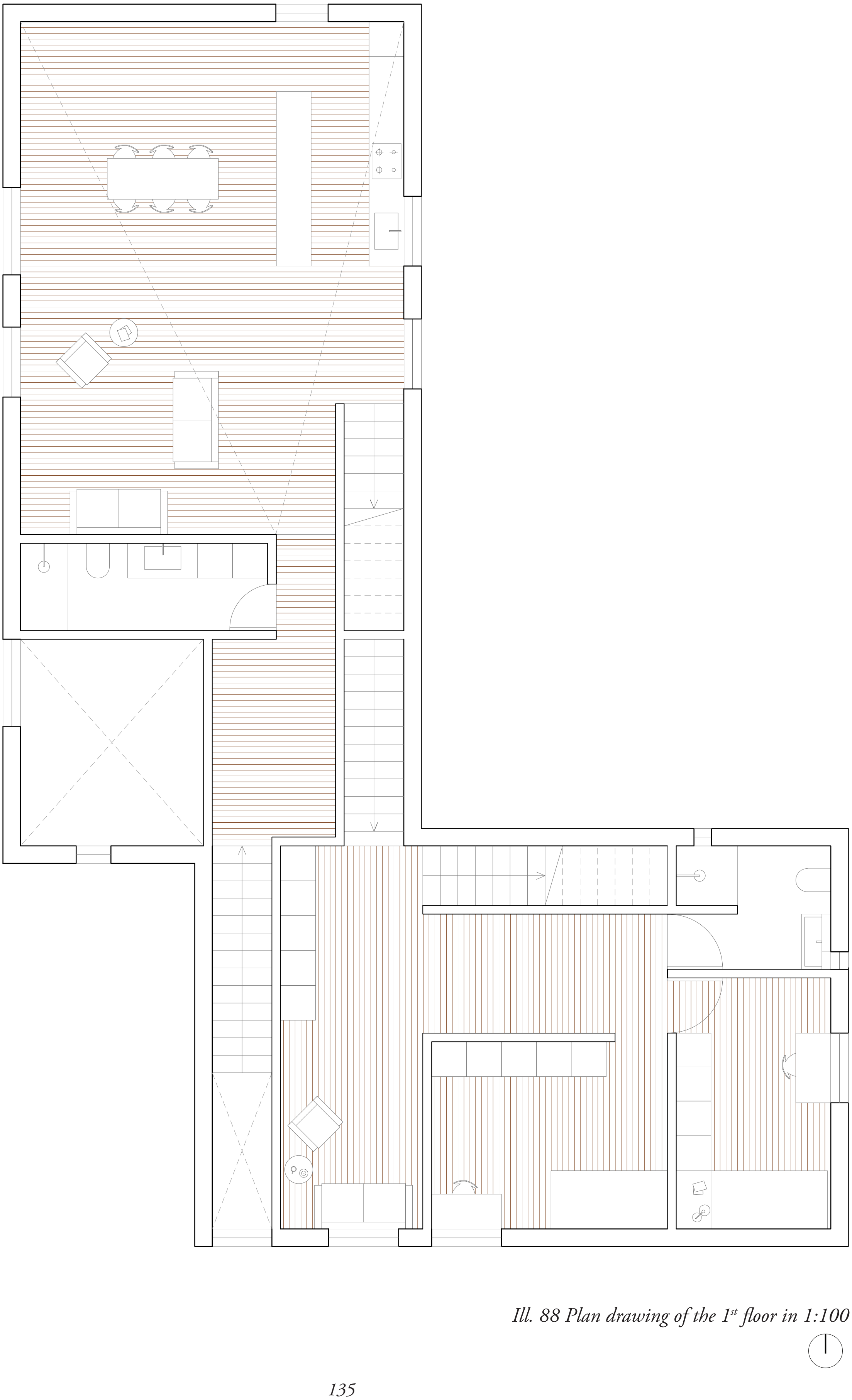
"The joining of materials, elements, components and building parts in a functional and aesthetic manner" (Frascari, 1984), this thought was important in the project considering the spatial articulation.

The goal was to have these spaces as places for staying connecting the night zone to the living spaces, this was particularly important since in a very steep landscape where stairs are unavoidable it is necessary to provide spaces that feel more than passages and corridors.

The feeling of always being in a space was one of the main goals when designing the interiors of the volumes, for this was necessary to think about the role of the openings and the succession of spaces.

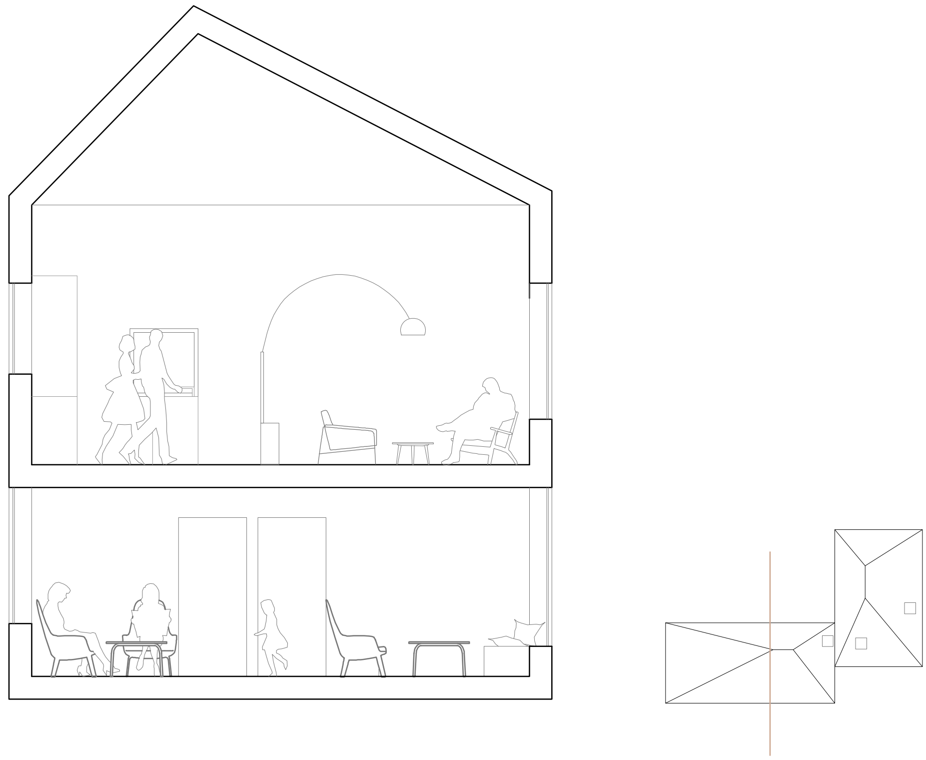
Ill. 86 Vizualization of the transition space

Ill 87. Plan drawing of the groundfloor in 1:100

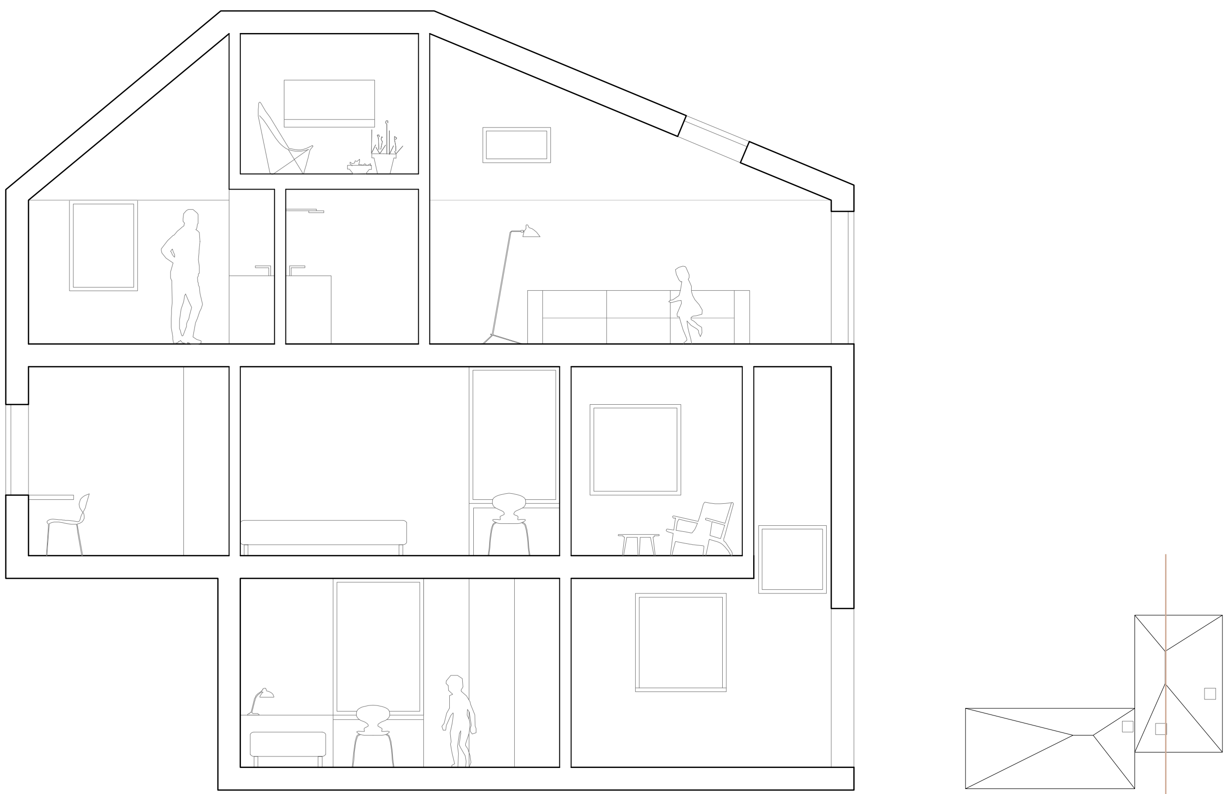


Ill. 88 Plan drawing of the 1st floor in 1:100

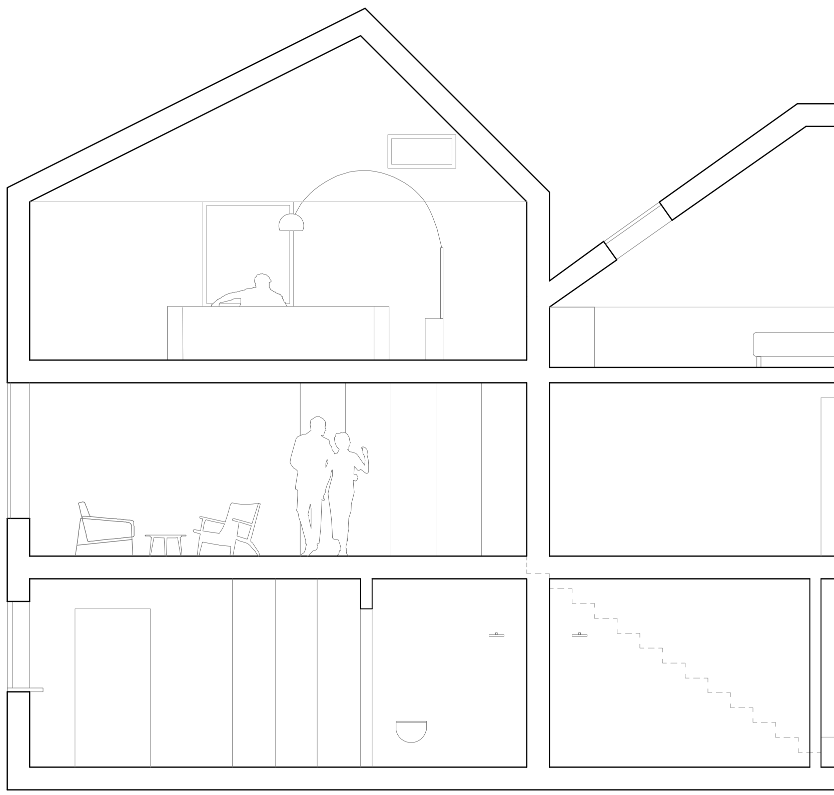
Ill. 89 Plan drawing of the 2nd floor in 1:100

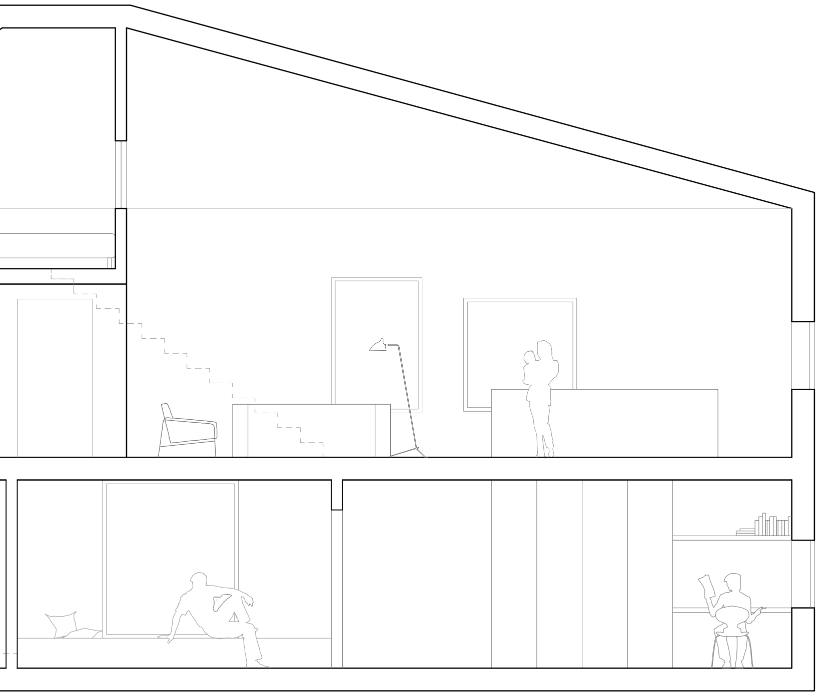


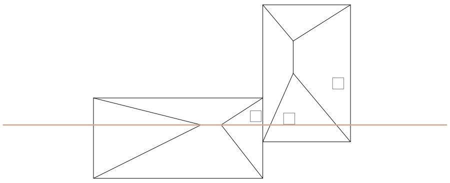
Ill. 90 Section AA' in 1:100



Ill. 91 Section BB' in 1:100

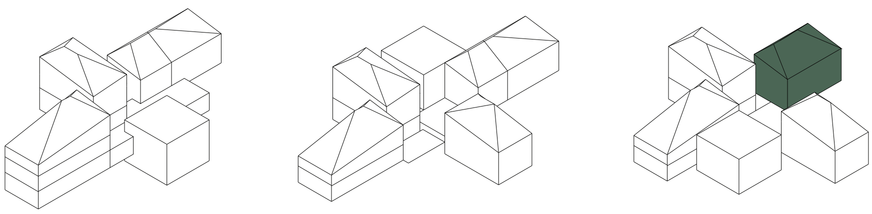






Ill. 92 Section CC' in 1:100

Unit VI



Ill. 93 Diagram of the same volume on the different clusters

As described before, the bedrooms where designed in order to have an intimate atmosphere.

The use of wood serves this purpose, since it provides a certain darkness and warmth to the rooms.

Also the placement of the openings has an implied meaning to the indoor use of space.

The windows are always related to some spatial quality, such as desks, accesses to the landscape, benches or, in this case, related to the beds.

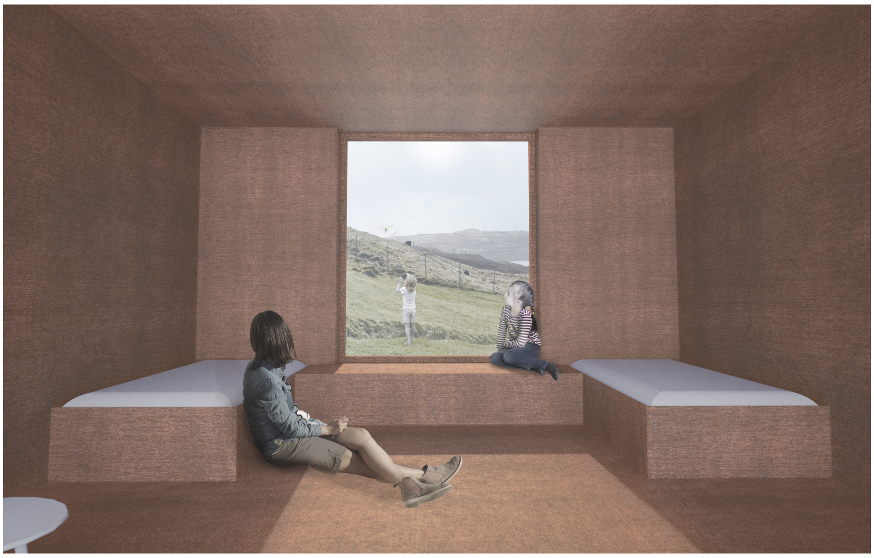
This was done in order to explore the relation the ground floors have with the landscape and the different slopes.

These features are details that suggest how the space could be organized in a subtle way, without restraining it.

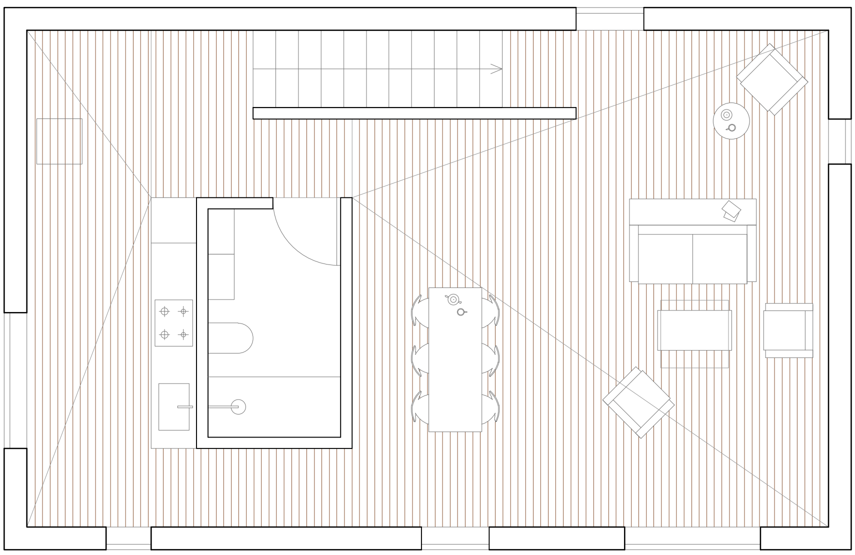
These rooms oppose to the living spaces, which are lighter and open, precisely to provide more quiet places that could allow for some seclusion and rest.

The bedrooms are also generally connected to the transition spaces, which are lighter and less private.

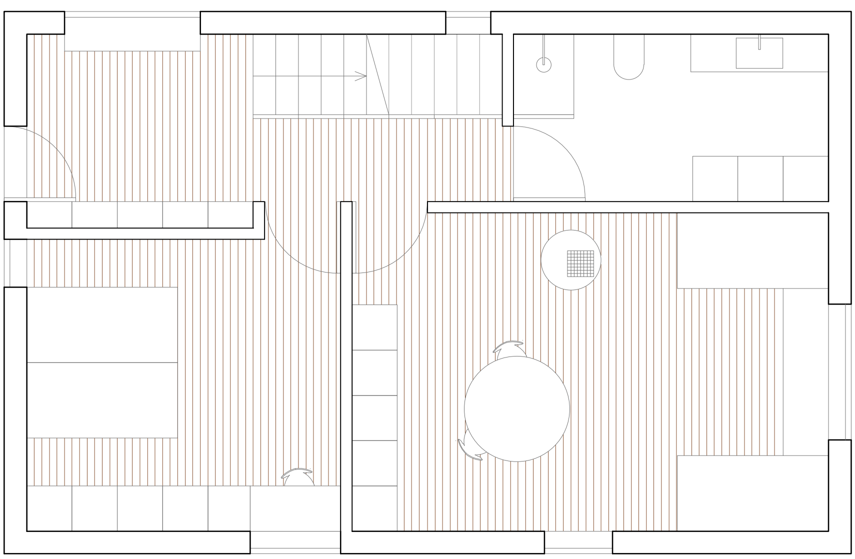
These precede the living areas, the most open and social area of the units.



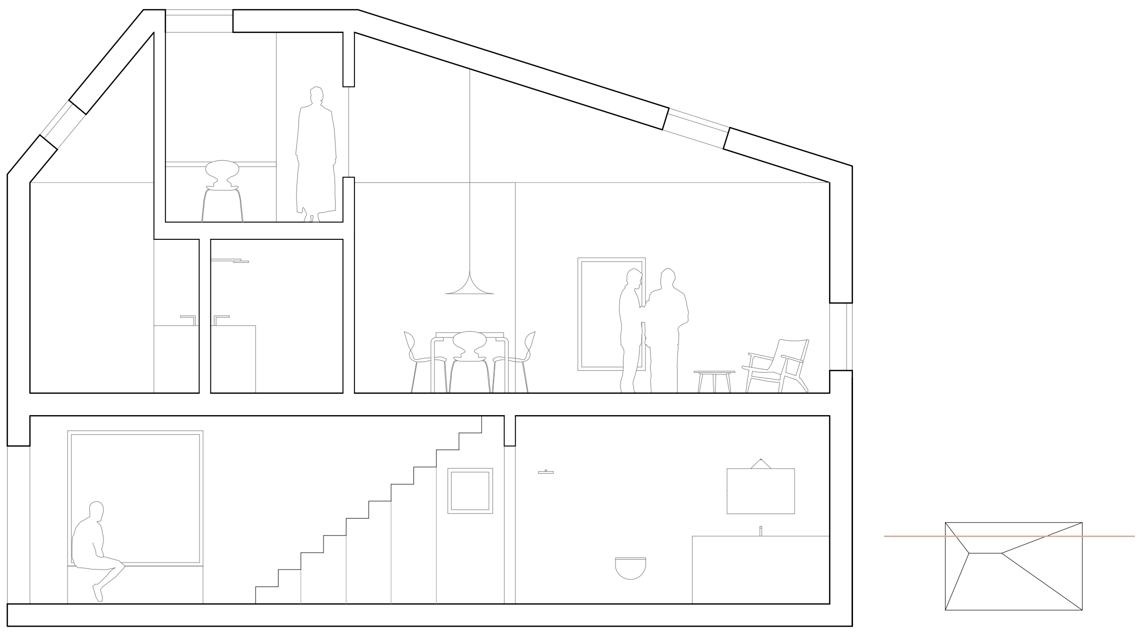
Ill. 94 Vizualization of the bedroom



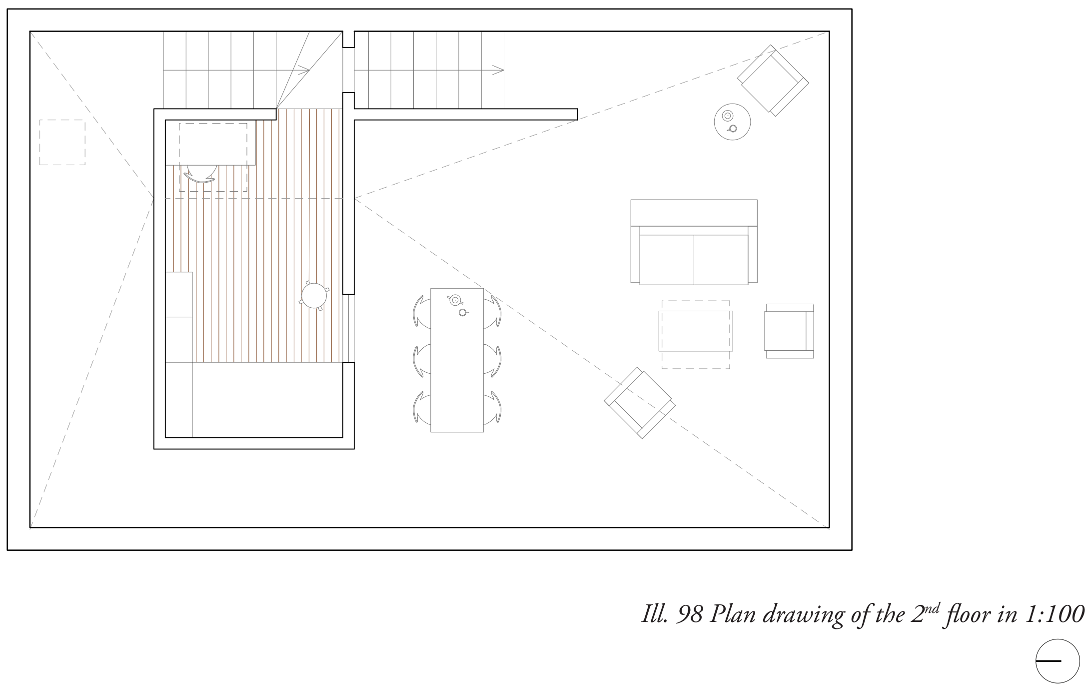
Ill. 95 Plan drawing of the groundfloor in 1:100



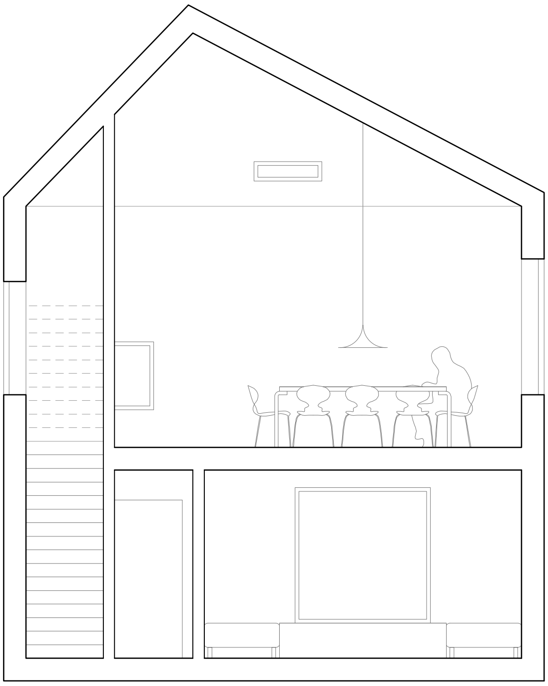
Ill. 96 Plan drawing of the 1st floor in 1:100

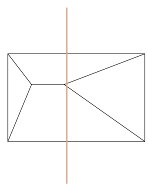


Ill. 97 Section AA' in 1:100



Ill. 98 Plan drawing of the 2nd floor in 1:100

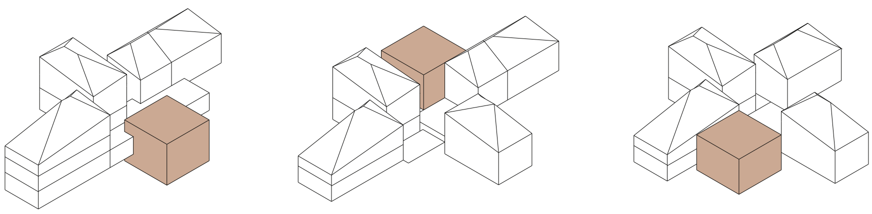




Ill. 99 Section BB' in 1:100

Ill. 100 Perspective Section in 1:100

Unit VII



Ill. 101 Diagram of the same volume on the different clusters

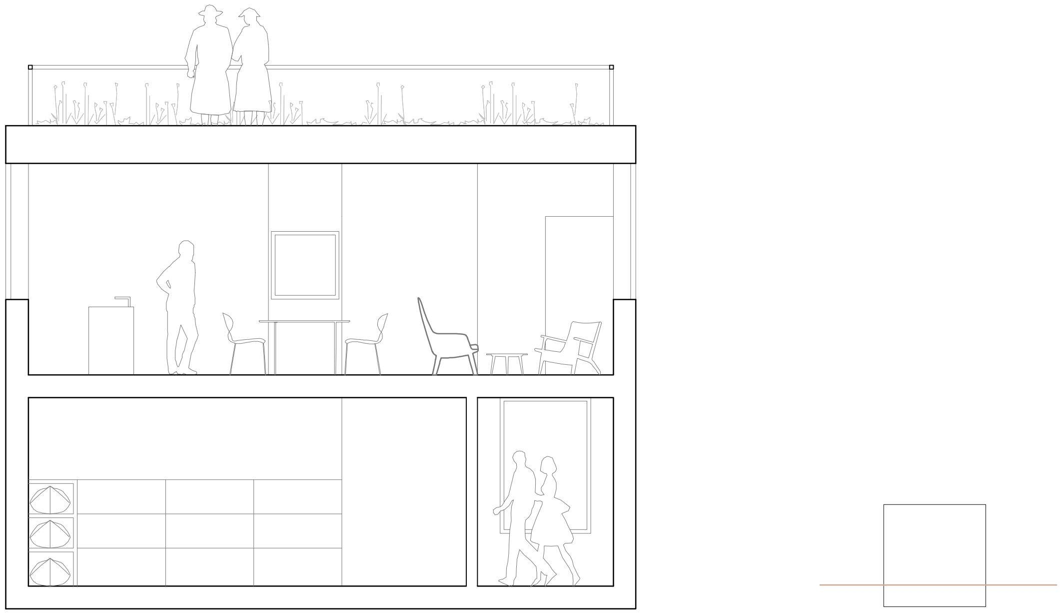
Finally, it is presented the common volume, existent on the three clusters.

This unit is a response to the necessity of providing an indoor space where the community could meet when the climate doesn't allow being outside.

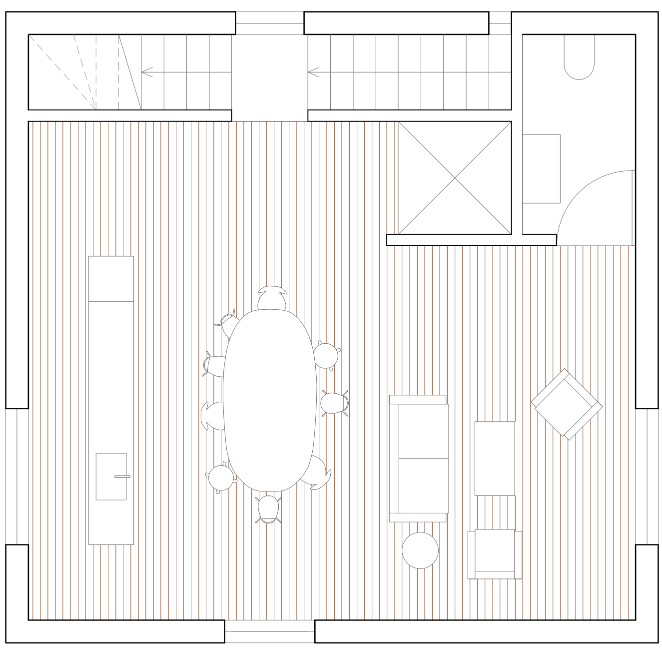
Moreover, it was necessary to provide storage space for each unit, with around 13m^2 each.

The volume presents a ground floor assigned for this use, a common room on the first floor, with a bathroom, tea kitchen and living space, and a roof terrace that alludes to the green roofs of the traditional houses, in this case with the possibility to be used by the families.

The volume also establishes a relation to the platform since all the living spaces have direct views to it.
There is also an elevator in each volume; this was done considering the possibility of having handicapped guests and to facilitate access to the platform on the steep cluster typology.

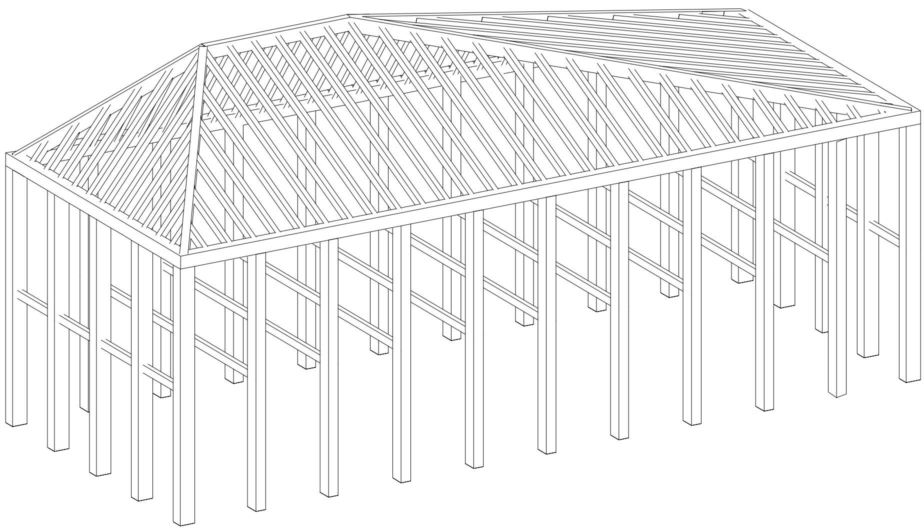


Ill. 102 Section BB' in 1:100



Ill. 103 Plan drawing of the 1st floor in 1:100

Structural studies



Ill. 104 Axonometry of the structure

The roofs are the core element for the materialization of the proposal's concept. In one hand they help directing the wind away from the platforms, on the other they concede the right atmosphere for the living spaces, open areas that explore heights, light and views.

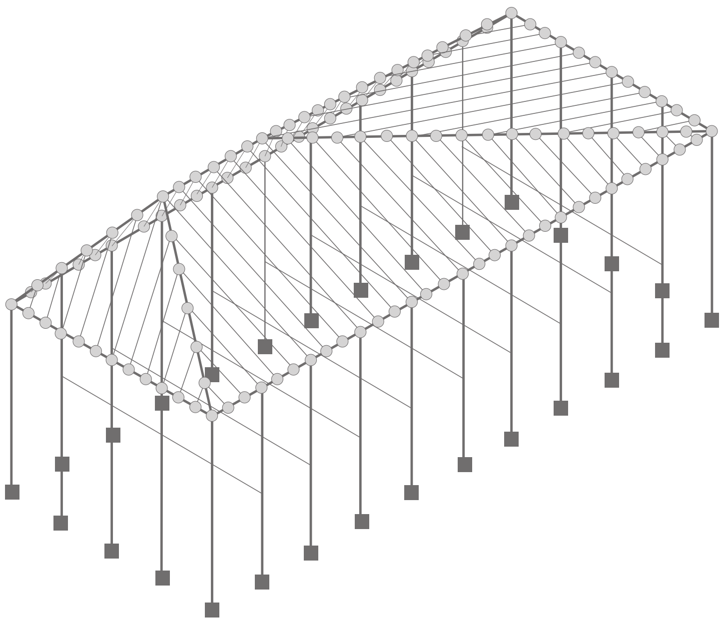
The optimization of the roofs' inclinations will be explained further in detail on the next chapter.

There are two main aspects regarding the spatial influence the roofs had in the proposal; the atmosphere of the living spaces and the partition walls' layout.

The ridge and hips' of the roof had consequences on the division of the interior space. This was done in order to always have clean open spaces for the living areas, where the lines of the diagonals could be the defining elements of the rooms. For this it was important that these lines weren't interrupted with any spatial divisions.

After this consideration, it was natural to start experimenting different ways to divide the space, both in plan and section, and to understand which functions could be accommodated in the different spaces. The diagram on the next page represents all the different layouts obtained on the units.

Ill. 105 Diagram of the spatial layout generated by the roof diagonals



Ill. 106 Statics diagram of the structure

When choosing the type of structure, it was taken into account its performance against the wind. A variation of the typical gable roof was the chosen direction, since this type is better suited for windy areas. (Gabitan 2015) . This is because it reduces the surface area perpendicular to the wind force and performs well with different wind directions.

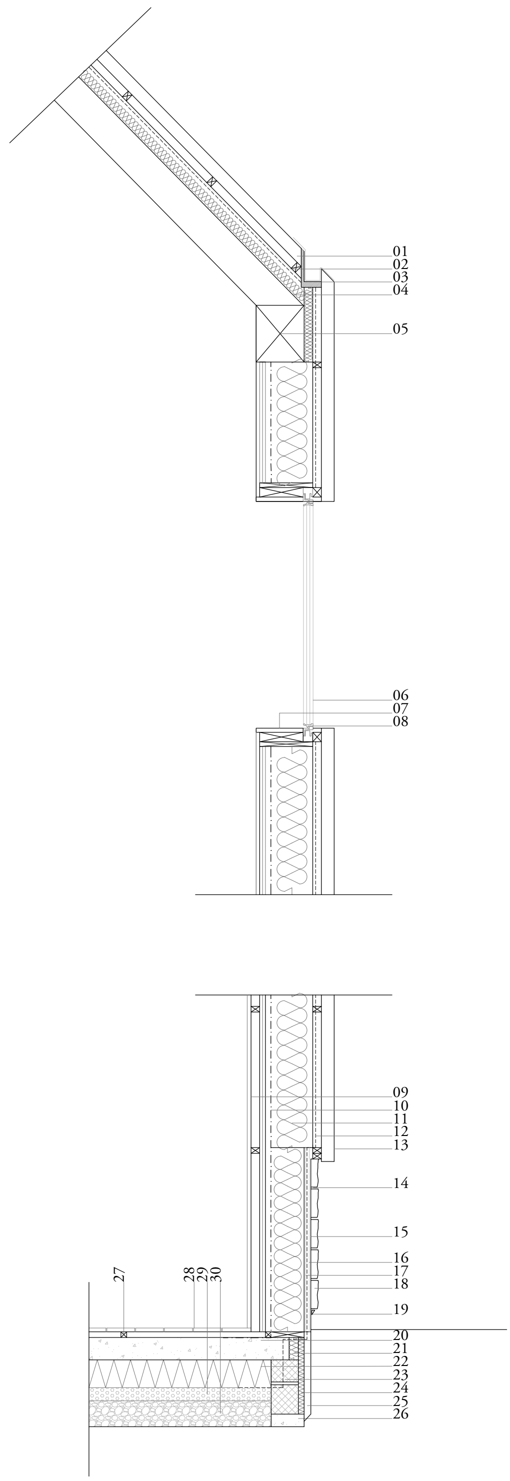
There were some important considerations: the meeting point between roof elements and pillars, and the inexistence of overhangs, to prevent any built up forces.

Thanks to a parametric simulation it was explored which would be the best inclination for each side of the roof and the influence of the structure on the interior spaces.

On a static point of view, the pillars are fixed to the ground and are pinned to the bottom beam, whereas the rafters are pinned in both ends to the beams. There are also horizontal connections halfway through the pillars that ensure a better distribution of the forces and guarantee a more stability to the system. The material chosen is Glulam, for its elastic properties and resilience. The class of strength is the Gl32h, which is the strongest, this is to ensure that the displacement is under the maximum allowed.

Materiality and detailing

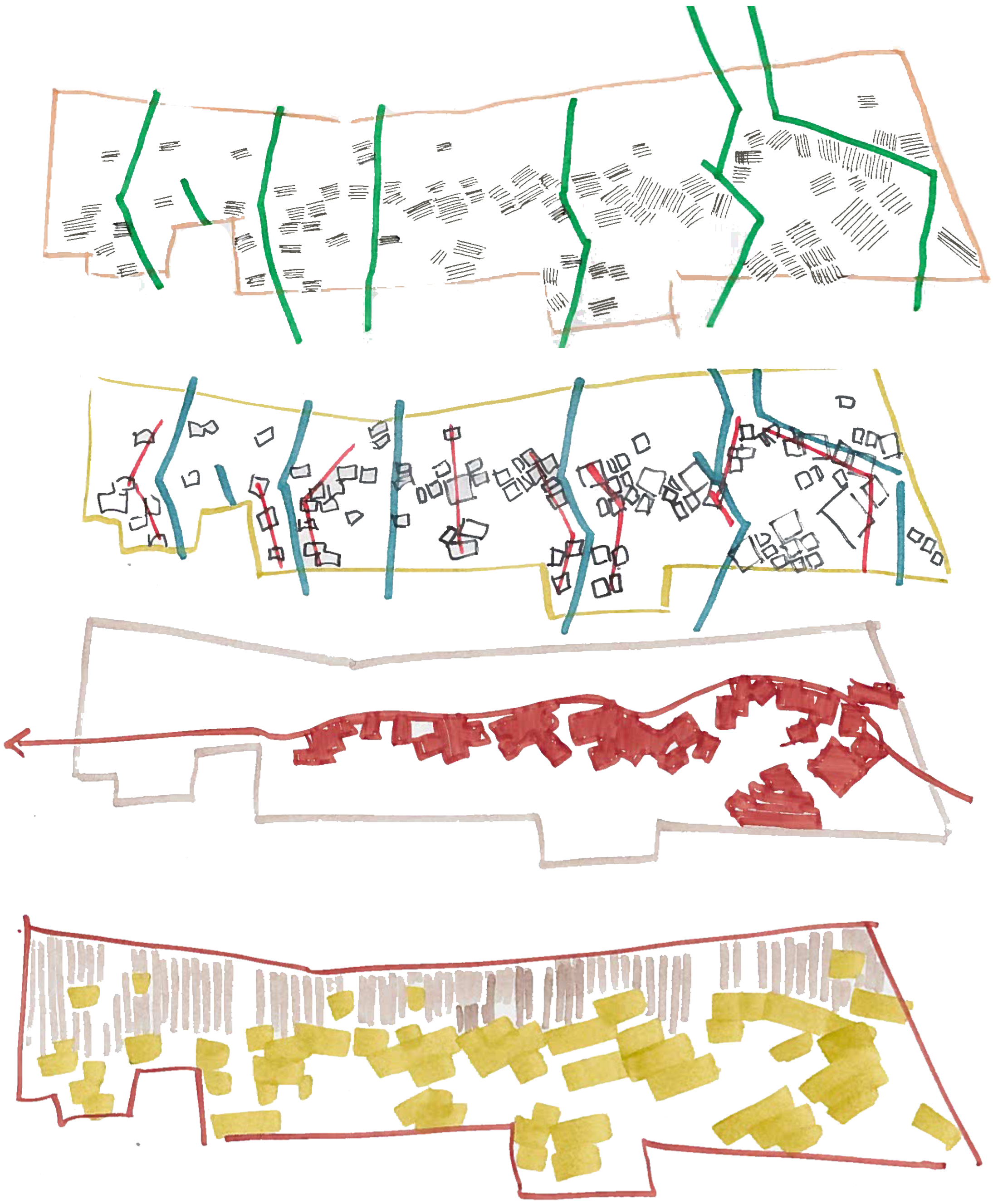
01 | Dark wood cladding, superwood AART profile, type 3
02 | OSB 20mm
03 | Concealed gutter
04 | Timber rafter 150x100mm
05 | Timber bottom beam 300x250mm
06 | Insulating glass panel 125 +250+125mm
07 | Pomeranian plywood coat
08 | Steel frame
09 | Pomeranian plywood cladding
10 | Vapor barriere
11 | Rockwool insulation 250mm
12 | Wind barriere
13 | Dark wood cladding, superwood AART profile, type 3
14 | Mortar joint
15 | Mortar setting beds applied to individual stone
16 | Galvanized diamond mesh
17 | Mortar scratch coat approx. 8mm
18 | Basalt local stone cladding
19 | Foundation weep screed lap moisture barriere
20 | Reinforced concrete 12mm
21 | Rockwool insulation
22 | Extruded polysterene insulation 20mm
23 | Concrete blocks
24 | Extruded Polysterene Insulation board
25 | Rubber Membrane
26 | Aerated Concrete
27 | Wooden battens 100x 30x 30mm
28 | Pomeranian plywood flooring
29 | Capilarity Barriere
30 | Gravel



Ill. 107 Detail drawing

Design Process

Site analysis
Density and Typollogies
Wind tests
Masterplan
Clusters
Wind tests II
Roof studies
Structural studies
Indoor spaces
Light studies
Materiality and detailing



Ill. 104 Consequences of the natural elements on the spatial organization

The guidelines of the project are intrinsically related to the landscape and climate, for this reason, the analysis of the site and its conditions was a strong starting point. The process began with the mapping of the site and its natural elements, namely the evolution of the slope, the presence of the water ditches and the existing roads.

For the slope it was possible to observe how it evolved from north to south, having progressively flatter areas in this direction. The water ditches represented not only a strong visual element, but also divided the site into segments with distinct topographies, from one to the other. Regarding the roads, there were two points of the site that connected to existing or on-going construction of roads that should be connected.

These were the main considerations to start to study where to implement the outdoor areas and where to build.

After the analysis, it was possible to understand that the Faroese when being outside often seek flat areas; the location of outdoor space should concern this aspect of the site, as well as its orientation and shelter from the wind. It was decided to have outdoor areas opened to south that could be shelter by the buildings from the north wind.This represented a coincident gesture with the landscape, since the flatter areas were progressively larger towards south and the steeper areas, which are harder to use for common spaces, to the north.

It also started to appear the idea of articulation between built and open areas and how they could inform each other.

The buildings besides playing a major role on the sheltering of the outdoor areas would also contribute to define them along with the landscape.

The trials for the road had in mind not only the optimization of this infrastructure, reducing it to the necessary to access the different areas, but also to make it an important axis for the outdoors.

The development of these areas was done in a way they shape the others. This system is a direct consequence of the character of the site and its advantages related to each space: the flatter areas for the outdoors, the steeper for the buildings.

This allows richer spatial articulations, protection to the in between spaces and the articulation of both with the landscape.

Density and Typologies

Themodel studies intended to help develop the idea of interdependency between building and open areas, and how these would relate to the natural elements of the site.

The tests were made in order to understand the scale of the flat and steep areas and how the building volumes would fit and interact with the landscape.

It considered a certain progression of density along the site so it guaranteed that the buildings could perform actively as wind protection and direct it outside the common areas.

With these tests, regarding the outdoor areas, we could observe that there weren't any flat areas in the north part of the site whereby the common outdoor spaces therefore should be platforms or terraces.

On the south, the flat areas reached so large dimensions that they would have the need to be defined by architectural and natural elements.

Regarding the building areas, there were made tests with three different dimensions of volumes (7x 10m, 5x 14m and 3x 23m), to investigate how different typologies would fit the various parts of the site.
Here we could see that larger volumes would allow more chance to define outdoor areas, as the thinner ones although they adapted easier to the slope, they didn't generate outdoor spaces neither protect them from the wind.

This was also helpful to see where some clusters can naturally be and how the vertical connections between them could work along with the water ditches.

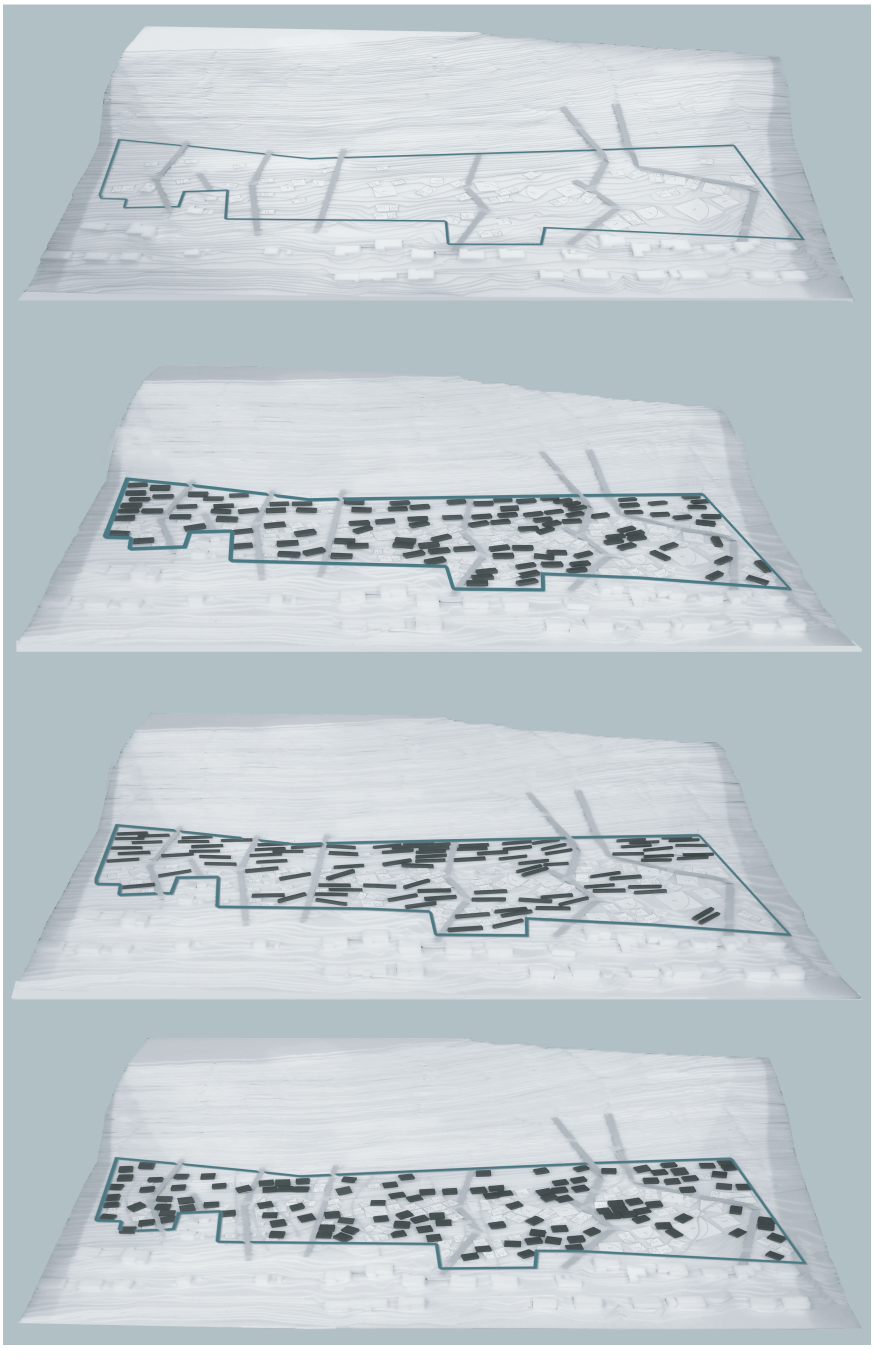
Besides that, it was clear the need of designing the outdoor spaces and try to achieve a strong co-dependency between built and void, so that they could define and benefit from each others.

The way the different volumes fitted the northern and southern part lead us to understand the necessity of working with different cluster types on both, some longer and narrow for the first case, others larger and capable of defining larger in between spaces, for the other case.

We also began to work with the idea of in between spaces, so it was no longer about the space inside and outside the clusters, but also how they articulate in between them and how it is possible to have larger and more confined outdoor areas.

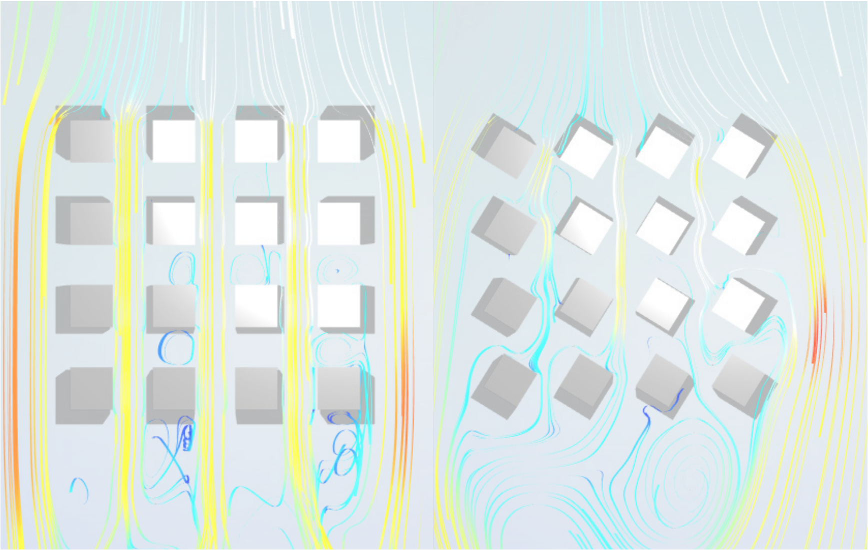
This could open up the potential of designing a proposal that has different common and private spaces that related to the landscape in several ways.

At the same time, wind investigations have been conducted in order to have some glimpses of how the spatial configuration of the different clusters could be arranged in order to relate not only with the landscape and orientation, but also to serve as a protection from the wind, so the outdoor areas could be used often.



Ill. 105 Studies in 1/500 model

Wind tests



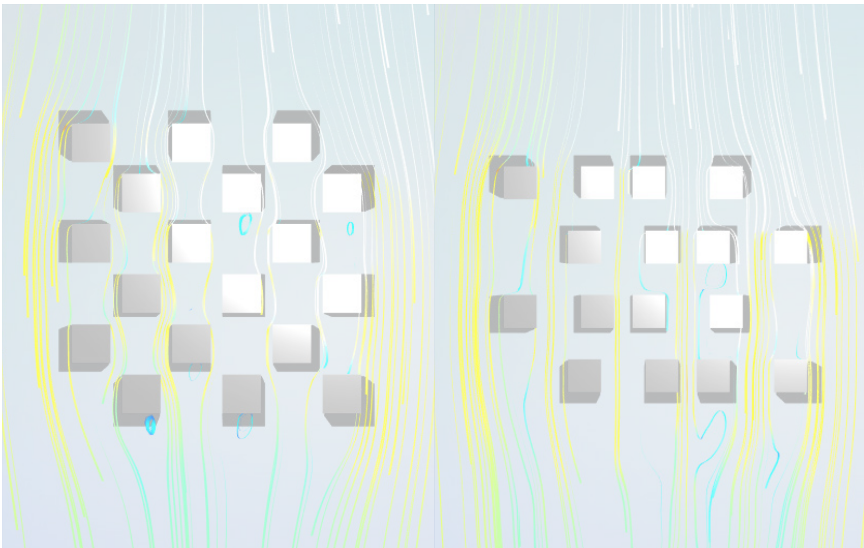
Ill. 106 Wind tests ran in FlowDesign

The wind tests were done in FlowDesign, which allows to investigate the wind flows and the pressure on the volumes' sides in a qualitative way, since the program specifies the wind speed and the scale of the volumes, so even if the first tests were generic, they had an correct base.

The idea was not to start immediately testing possible volume configurations for the masterplan and clusters, but instead understand how the wind would work at the site and how the sizes of architectural volumes would have consequences in the wind path.

Some dispositions were also tested and the parameters we worked with were the spacing in between the volumes, their angles, the shifting of their grid and the density.

We could quickly understand that the wind has a tendency to address to larger open spaces instead of more confined and angular ones, so for the volumes to have an active role on sheltering in between spaces they would have to be arranged close together so the wind is naturally driven around them. This confirmed the idea of the "tún", the vernacular examples of Faroese architecture were also placed close together in the landscape, so the communal



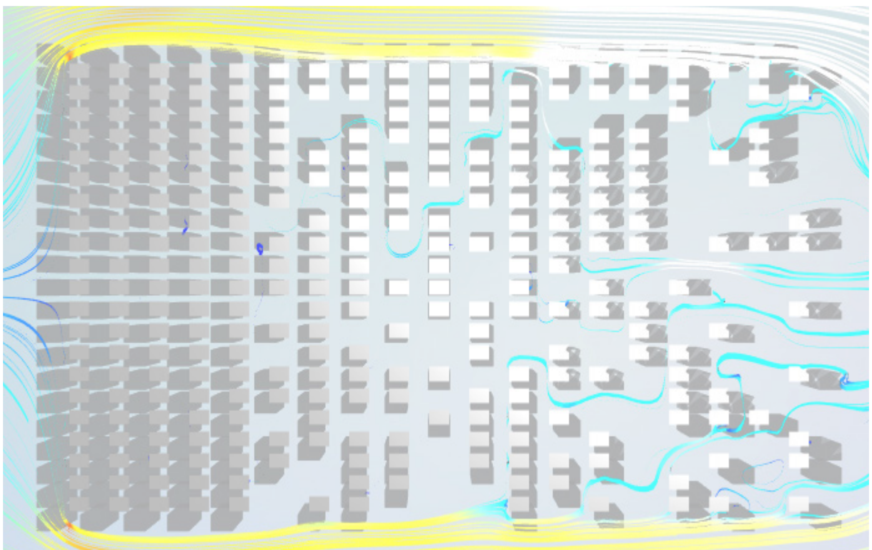
Ill. 107 Wind tests ran in FlowDesign

spaces in between have a not so straight connection to the nature but more to the buildings, due to the sheltering they provided.

For the open outdoors, it was clear that for them to be sheltered, we would have to use entire clusters to act as an obstacle and the positioning between cluster groups would also be important to drive the wind outside the common spaces.

On a smaller scale, we verified that different angles worked better for wind conducting and the shifting of the volume could not only assure outdoor areas sheltered from the wind, but also a decrease of the pressure on the volumes sides, in other words, the several lines of volumes would logically protect the next ones.

Although the angular rotation helped, we were able to conclude that the shifting and density were the actions that had major effect on both small and large scale, it was also important to reach this assumption since these principles are the ones that could be used as principles with different types of landscape, while the angular rotation had to be specified according to the place of the site we would display the clusters.



Ill. 108 Wind test ran in FlowDesign

These were the base considerations for developing the masterplan and to start crossing ideas for spatial configurations for the clusters and the different areas.

The thought of building on the steeper areas and leave the open ones for common outdoors could be read on the landscape topography an also on a climatic level, considering the wind.

Being aware that the strongest wind comes from the north, it is obvious that those were the areas that would have to work as a shield for the rest of the cluster. However, these areas also needed to be protected.

The idea was then to gradually break the wind along the complex and let it trace around it.

Articulating this notion with the principles tested before, it was possible to understand that the clusters have to be more condensed on the north part and progressively more separated towards the south, where they could allow for sunny and sheltered areas.

The outdoor areas would then be smaller and more cluster related, where the wind doesn't allow much wideness, and the common spaces for all the community on the south protected by the whole complex.

The road

The main concern for the road was the intention to have it as one easy connection between the several elements of the site, not only because it was requested on the brief, but also because it would have a minimum impact on the landscape.

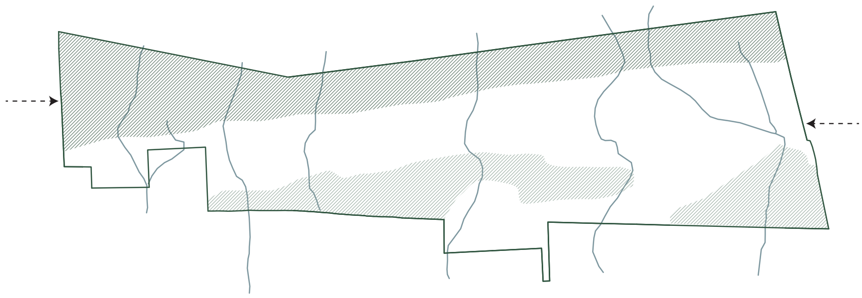
As mentioned before there were two existing roads on either side of the site that would naturally have to be continued .

On the steeper part of the site, the road had to be straighter since in very short distances it could reach a lot of height variation. On the flatter areas, the level curves presented to be more playful, which contribute to the possibility of reaching different parts of the site on the same height.

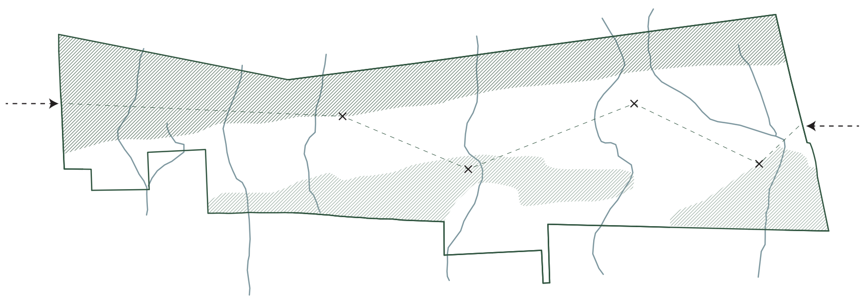
The drawing of the road also considered the mapping of the outdoor and built areas, so it would be done contemplating the possible places for the clusters, since we already knew they would be related with the different slopes.

These considerations contribute for a suggestion of sinergy between the landscape and architectural elements.

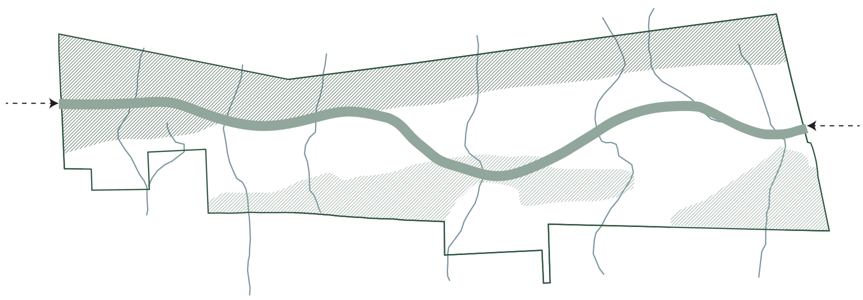
It was possible to design a solution close to the final one and that could also inform how to better position the clusters and their accesses.



Ill. 109 Diagram showing the existing roads

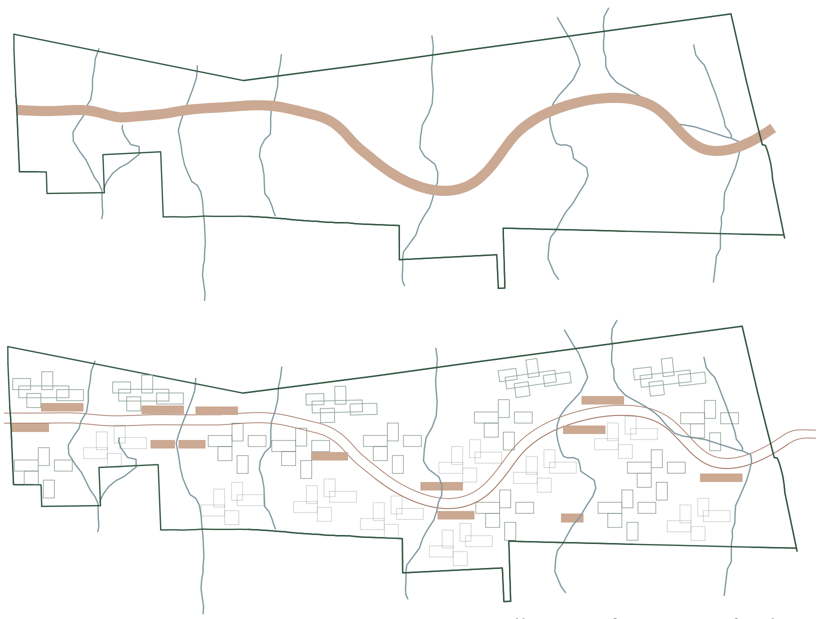


Ill. 110 Diagram showing the different areas to be connected



Ill. 111 Diagram of the final proposal for the road

Masterplan



Ill. 112 Infrastructure development

The development of the masterplan was done at the same time at the density, wind and volume studies. The main elements to work were the building and open areas and their infrastructure.

On the following pages are presented diagrams from March, on the top, and April, at the bottom. The diagrams intend to show some of the steps that were taken towards the elements described before.

On what the infrastructure is concerned, the road was designed in order to relate with the landscape and also to interconnect the different areas of the site; soon it had to be slightly modified in order to provide better access to the parking areas.

When the cluster's volumes were stabilized it was easier to start detailing the spaces imagined, such as the parking, vertical connections between the clusters and accesses to the water ditches and outdoors linked to it.

Regarding the clusters, one can observe that the first tests suggested numerous cluster types for the different areas, if on one hand they related well with the landscape, on the other we felt they weren´t generating interesting smaller spaces in between and were still very attached to the layout of single family houses.

Ill. 113 Typology development

Besides this, we were interested in achieving a principal of spatial organization that could work for several areas, instead of costum design each one of them; this was particularly hard since the project also had to dialogue with the landscape and climatic conditions, such as the wind and solar exposure.

On the second phase, it is evident an improvement of character of the clusters and a clear vision to each area. The difference had to do with the reading of the site into three clearly different areas, according with its different inclinations, what will be explained in detail further on.

Also the configuration of the clusters developed into volumes that generate space instead of bordering it, this means that they don't work only as single volumes flanking an open area, but structures with different corners, related to wind sheltering, that would generate more than one single space with different qualities and allowed better volumes and interior spaces.

The open outdoors seem to be more structured and closer to the initial ideas of a progressive opening towards south, it had still to be optimized and detailed since also they also exists in areas with a more expressive slope.

Ill. 114 Outdoor areas development

Working with the masterplan was also about balancing architectural and natural elements, the clusters should generate clear spaces in their cores but as one walks out of them the landscape should be kept untouched, and reducing the architectural intervention to what is strictly necessary.

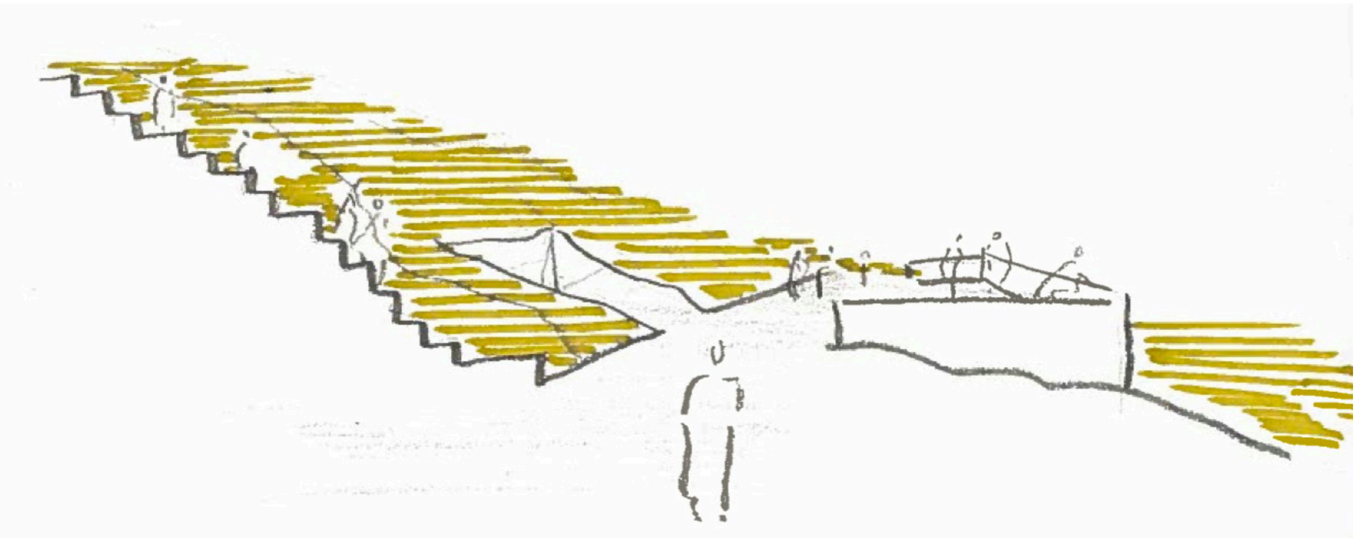
There were designed local stone walls extended from the clusters that would help with the soft leveling of the outdoor areas, the idea was to vanish them into the landscape and allude to the old walls traditionally raised by the Faroese families to divide their fields.

This tension between nature and architectural elements increases the experience of coming inside the houses.

First arriving into an open space very related to the Nature, and walking into progressively more defined and sheltered spaces until reaching the interior of the houses.

This also began to influence the materiality of the project.

On the outside, the volumes were thought to relate to the nature and the old houses being cladded with dark wood, whereas on the inside the materials used should express warmth and light.



Ill. 115 Initial sketch for the outdoor spaces

Clusters

The starting point for the clusters was, as mentioned before, the concept of the "tún" which was the central space of the old farmhouses configurations. It represented a sheltered space from the wind and a meeting point for the families that would use the space to access their homes. This duality of meaning and sheltering from the climate appealed to us to be the right way to develop the architectural proposal.

On one hand, it related to the landscape and tradition, in order to be able to design a proposal that explores passive strategies and takes benefit from the natural resources to enhance its character. On the other, there was potential to deconstruct the concept and interpret it in a modern way, exploring its interiority, density and height differences.

The clusters' design started from two different typologies that should relate to the landscape, one when it is steeper, other when it is flatter. The first was denser and didn't allow for large open spaces, instead it had to be terraced and stairs along the landscape that provided the vertical connections between the buildings.

The other kind of cluster was related with the flatter areas and its main aim was to help define the common outdoors. This type was also related to the landscape, however, the fact that the inclination wasn't so linear as the previous case made harder the attempts of finding an unique organizing principle, so the clusters would be changed significantly according to their placement.

One of the main focuses was precisely avoiding to design every part of the site, but to find the core of its character and translate it into architectural shapes that could be placed in more than one spot. This would conceptually be stronger, guarantee the coherence of the proposal and be more realistic when considering the detailing and construction phase.

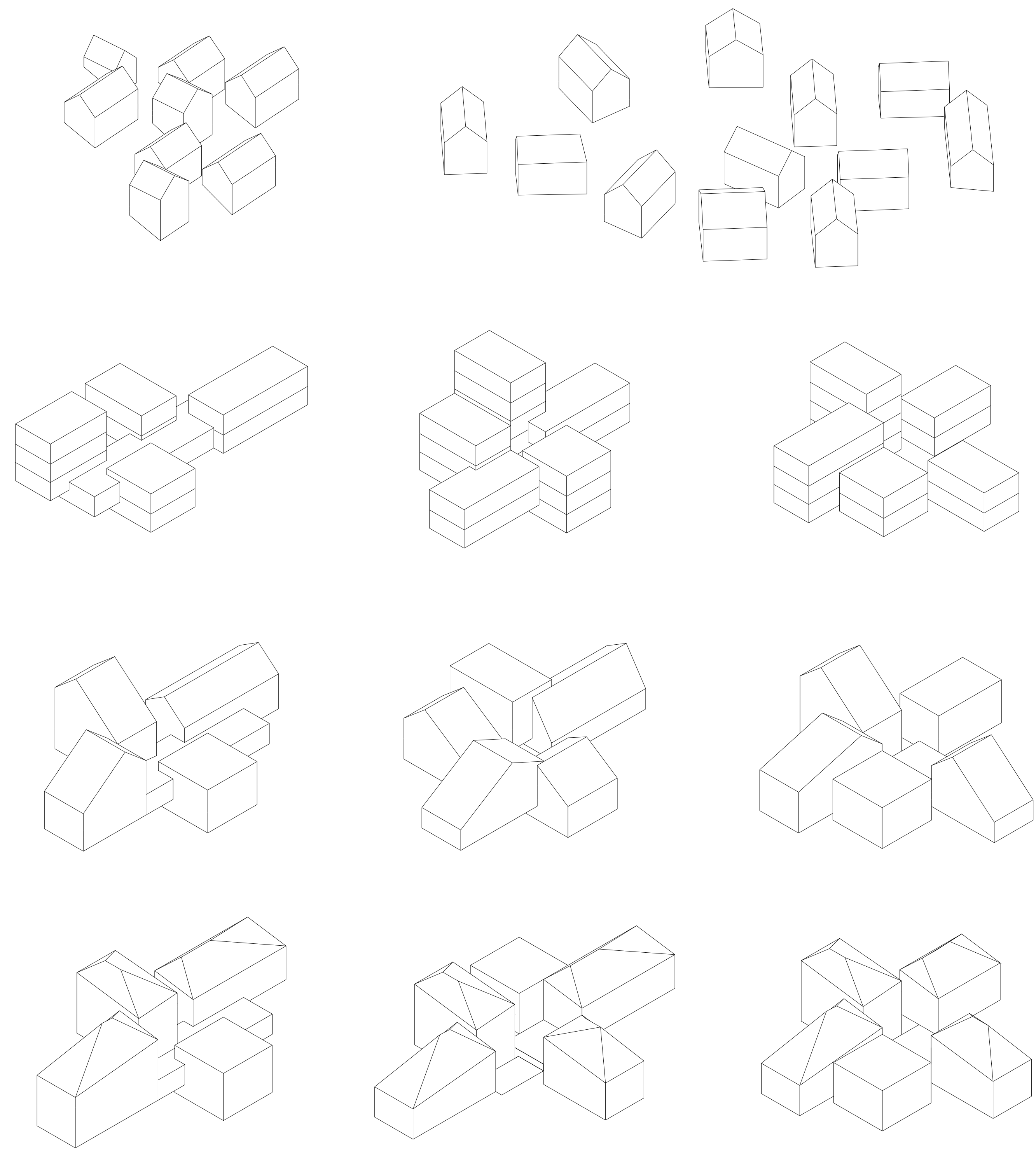
It wasn't a simple process, but we were able to identify throughout the site three areas with distinct topographies that have been mentioned as the steep, the mild and the flat areas. After this step, we were able to start designing clusters for each area, creating a dialogue between the volumes and the landscape levels, and finally implementing only three types of clusters according the site's topography.

Another consideration that helped clarifying the ideas for the clusters was the intention of being able to have more possibilities volume wise compared to the single houses' ones.

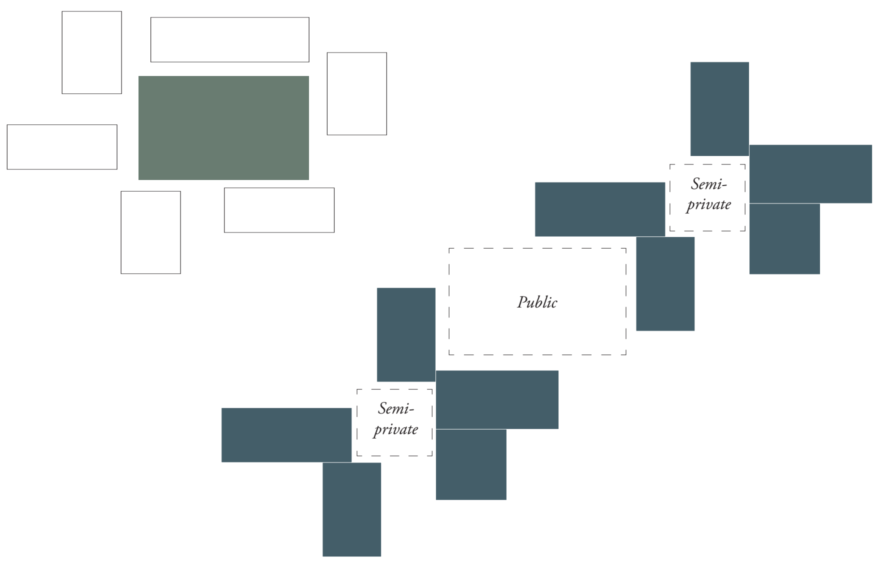
Since the beginning, the targets were for the landscape to have an active role in the sections of the volumes and let it influence the spaces. For this to happen the heights of the volumes had to be increased, the ways they interlocked improved and the roofs began to take an important position. Firstly, they were thought to protect the spaces around and in between the clusters, but soon we understood they would also be important structurally and for the indoor living spaces.

The optimization of the clusters was then related the synergy between the wind sheltering and the structural performance and how these would affect the proportions of the indoor spaces and the roof expression on them.

On the next page is presented a diagram of the different significant phases on the volumes' studies, the objective was to improve them regarding their ability to generate and shelter outdoor spaces, proportions, climate and structural performance and atmospheres of the interior spaces. It wasn't a linear process; these themes were worked on at the same time and crossed myriad times so that the result retained strength and complexity.



Ill. 116 Diagram of the evolution of the different typologies, from the initial phase, at the top, to the final, on the bottom



Ill. 117 Relation between clusters and outdoors

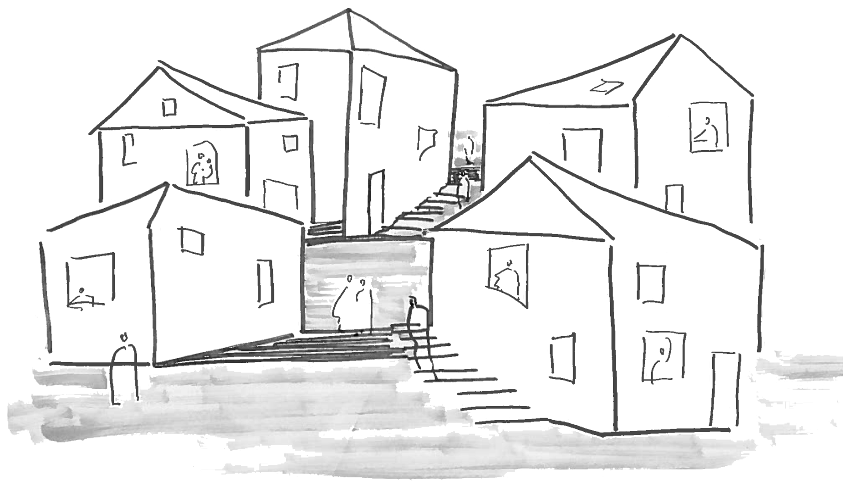
On this page is presented a diagram connected to the key step taken with the platforms.

As described before, the initial cluster configurations lacked the ability to set a graduation of privacy. It was clear the relation of the volumes and outdoor areas: they flanked them.

The example on the right offers more than being inside or outside, there is instead a spatial progression. The users have to their dispose different kinds of spaces with different degrees of privacy, the common areas and the platforms related to each cluster.

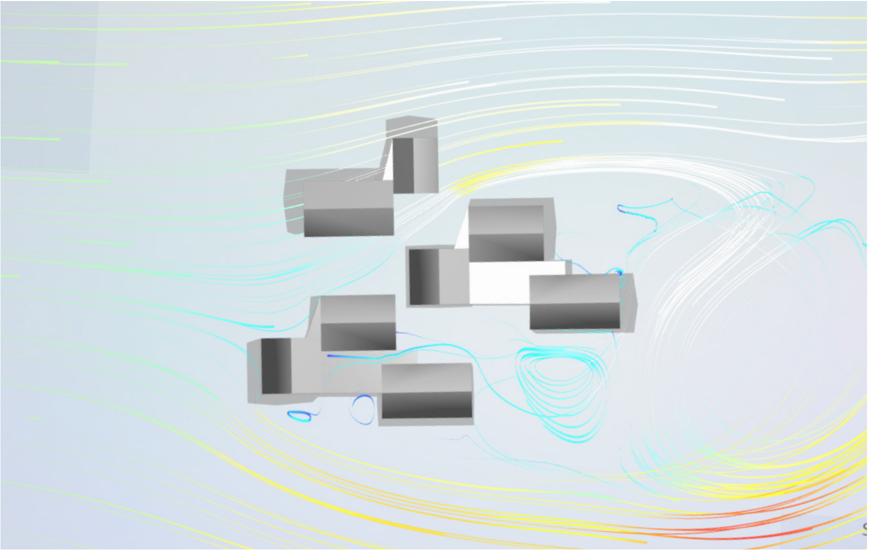
The platforms have an important functional and social significance, they create access points to all the volumes of one cluster, which implies that people would go there to access their homes and meet each other. It is also a sheltered space from the wind where children could play and be watched by their parents.

The community aspect of these spaces was also enhanced by the addition of a common volume where are organized the storage for the different units, a common room for meetings and gathering when the climate doesn't allow them to be outside and a common terrace sheltered from the wind and with a privileged solar exposure.



Ill. 118 Sketch of the level perspective from the platforms

Wind tests II



Ill. 119 Wind test ran in FlowDesign

On this scale there were also made winds tests in order to understand how the principles of rotation, shifting and density would help the display of the volumes of each cluster type. After this, we focused on the optimization of the proportions of the volumes and their heights.

As it is possible to notice from the first image, the initial cluster configuration showed that the wind was likely to be driven and controlled by the positioning and dimensioning of the masses. However, some of the principles seemed to work better than others.

In this case, we could confirm that the rotation wasn't effective in such scale, it would work if the proposal worked with large blocks but since the goal was to work with volumes that ensure the spaces' human scale and the volumetric relation to nature, it wasn't the way to proceed.

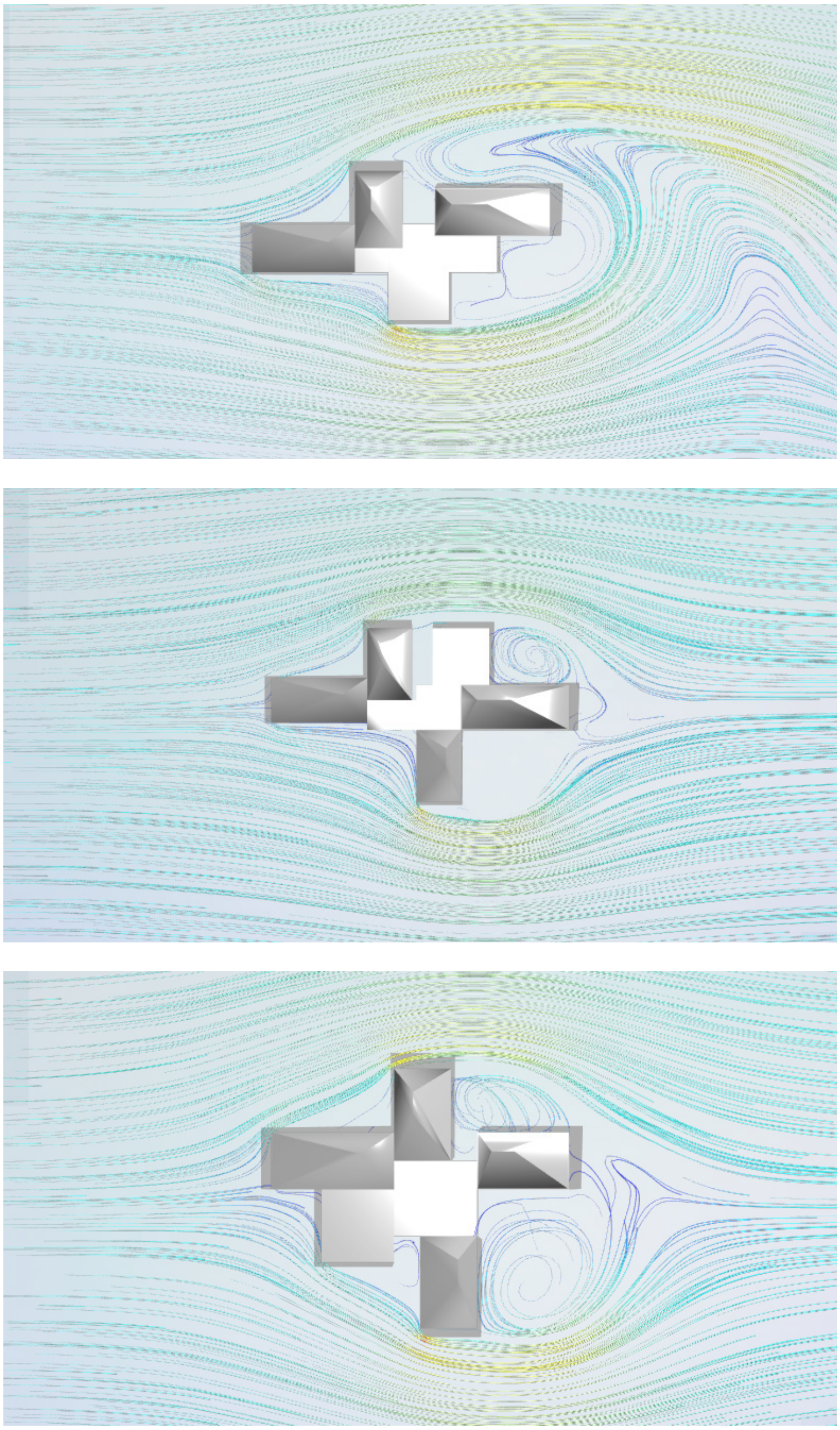
Besides this, the angular rotation created some problems with the possibility of creating fewer solutions for different areas, since they would have diverse consequences on the landscape and in this sense, on the buildings' interior spaces.

The shifting and the density demonstrate to be suitable for the volume articulation, it allowed to have variety in the orientation of the volumes since when related to each other, they did not longer needed to be parallel to the wind direction for an optimal performance. This was particularly important for the outdoor areas, since they required different angles for its spatiality.

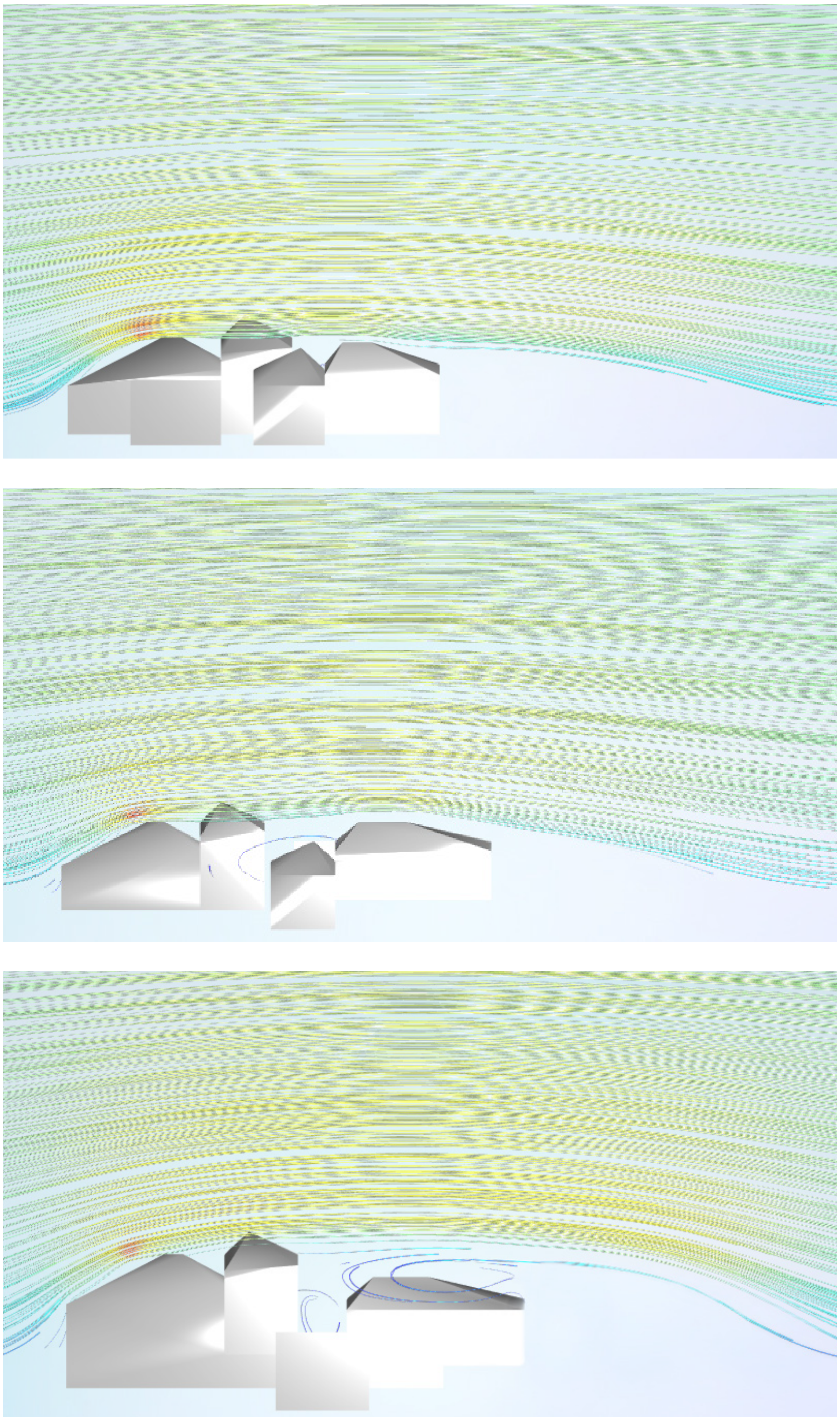
The dimensioning of each volume was also optimized in order to conduct the wind flows outside the platforms and the terraces of the common volume, the white spaces on the images. The volumes to the north are always parallel to the wind to reduce the area of exposure, since they have the hardest position, the others can be rotated to take advantage of the site slope, but their lengths had to be altered so the wind wouldn't reached the platforms.

On a larger scale the positioning of the clusters on the site was also studied since they are meant to work together on the sheltering of the outdoor areas. All the clusters performed even better when positioned closer to other one.

This tests represent what happens on a plan level, the heights and inclinations of the roof were also investigated, it was however a process done simultaneously to the structure development and the design of the interior spaces, which will be presented afterwards.



Ill. 120 Diagram of the evolution of the different typologies



Here one is able to observe how the clusters conform an obstacle to the wind.

The wind flows hit the first volume and the roof angle helps to direct it upwards, the inclination was optimized in a way the wind would reach the ground relatively far from the cluster, what would even be more attenuated by the positioning of other clusters that would react the same way.

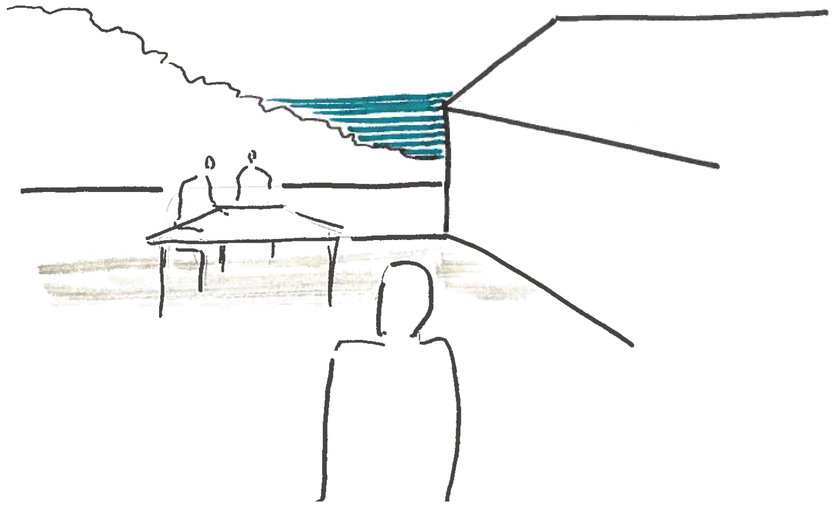
The idea for the airflow is to conduct at the north part, away from the open areas in the southern part. For the next cluster, the reaction would be the same, so the sheltering of the south has primacy over the north.

The gable roofs also represented a possibility of working with the two wind directions at the same time, so that the areas around the cluster could be protected for more than one volume.

In this way, the roofs represent the final protection from the wind, what is extremely important for the possibility to concretize the "tún" concept.

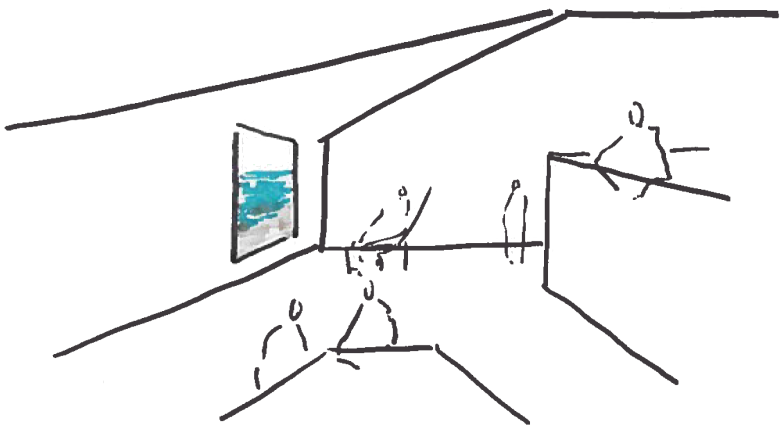
Besides that, they also demonstrated to be an important element concerning the tectonics of the project.

Ill. 121 Wind tests ran in FlowDesign



Ill. 122 Sketch of terrace spaces sheltered by the roofs

Roof studies



Ill. 123 Sketch of the living spaces

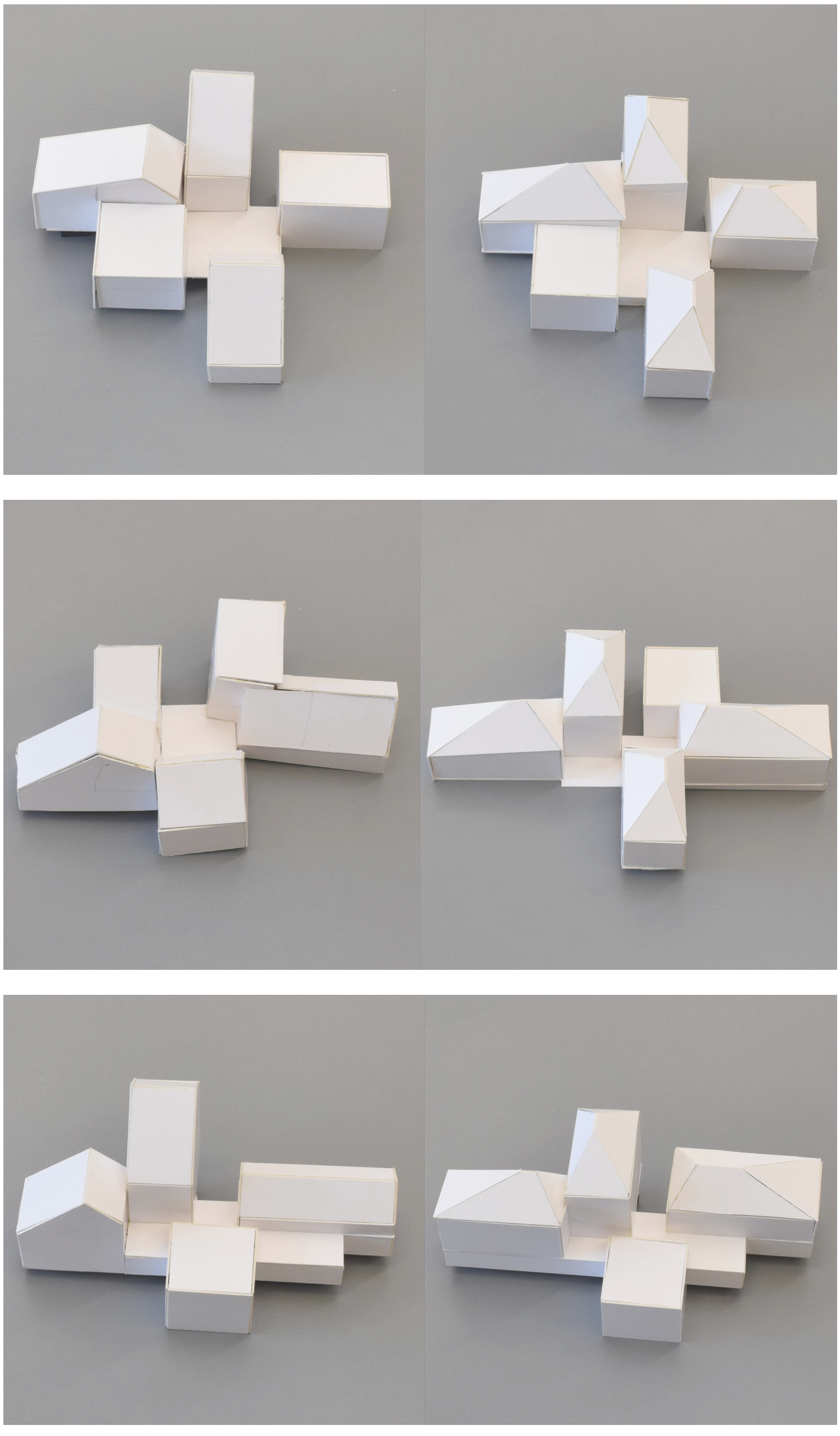
The roofs evolved from being pitched to gabled, as one can observe in the pictures of the models. This decision had to do both with their performance regarding the wind, but also with its structural behavior and interior consequences.

For the wind it ensured that the same roof could help shelter the outdoor areas from two wind directions: north, the strongest, and west, the most frequent. It was possible to articulate both directions in gable roofs, which are also known to be the preferred solution in hurricane areas. (*mymanatee.org*)

This also represented an improvement on the volumetric character of the clusters; the lower angles merge with the landscape and contribute the massive/ solid presence of the buildings.

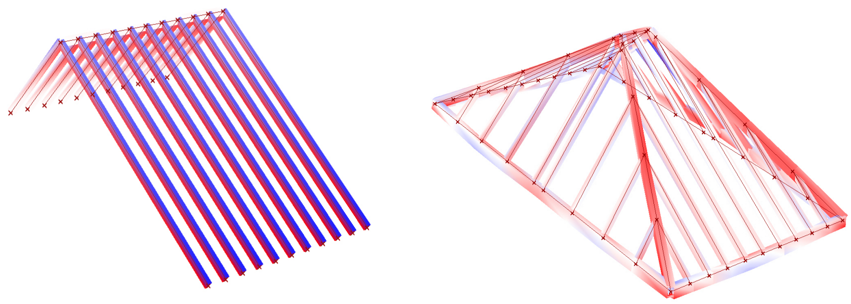
Regarding the interiors, it was closer to the initial ideas for the living spaces where the roofs should contribute to their atmosphere. The diagonal lines for the living spaces stressed the idea of openness and wideness when being inside the double height rooms.

During the process, the volumes were altered and structural solutions tested in order to understand which expression would correspond better to the ideas for the interior spaces.



Ill. 124 Pictures of 1:200 models

Structural studies



Ill. 125 Images taken from Karamba of the pitched and gable roofs

The structural studies had two important phases, the pitched and the gable roof.

The first was initiated as a process to explore how the roofs would work structurally according to the preliminary intentions concerning the wind, it was a general sollution more to explore possibilities and principles.

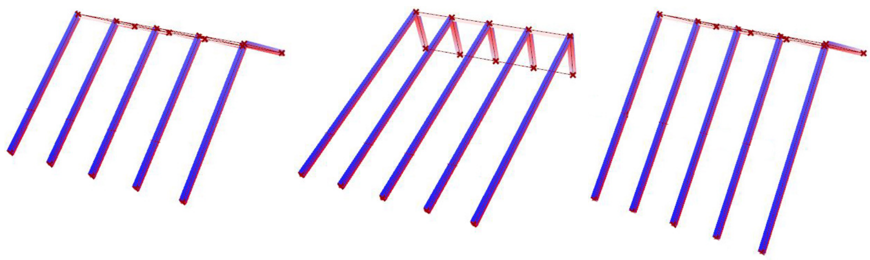
After this, the issue had to do with a process of crossing information between structure and architecture, so the indoor spaces achieved the qualities described before.

Pitched roof
The initial structural studies started with the analyses of a pitched roof model.

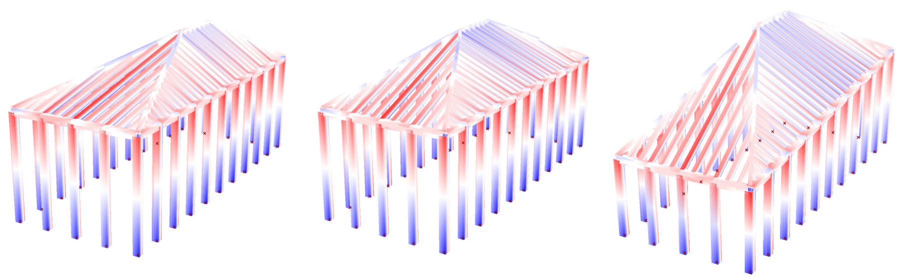
This was done since the intentions for the roof were not only to generate the main indoor spaces but also to shelter the platforms from the wind.

Considering these two aspects, soon the main topic was to combine them in an optimal way articulating them with the architectural vision.

The pitched roof was also a starting point to understand how to work with the stacking ideas, in order to reach some conclusions regarding the inclinations of the roofs that had



Ill. 126 Images from Karamba showing the displacement correction by height variation



Midpoint: 0,00

Highest Compression: 11, 27 kN
Highest Tension: 10,01 kN
Max Displacement: 15 mm

Midpoint: 1,50

Highest Compression: 10, 04 kN
Highest Tension: 10,31 kN
Max Displacement: 15 mm

Upwind roof: - 1,50

Highest Compression: 11, 38 kN
Highest Tension: 11,07 kN
Max Displacement: 16 mm

Ill. 127 Images taken from Karamba

to be more than 25º, so they could be effective when directing the wind, without compromising its structure.

The model had several parameters: the width and length of the roof, the number of elements, the height of the top beam, the position of the top beam (related to its base) and the height difference the upwind side had (related to the downwind that was fixed).

The studies were made on the most exposed element which in every cluster was always displaced parallel to the wind. The dimensions of the volume tested were 7x 10m. Naturally, the structure performed better, regarding its axial forces and displacement, if the number of elements increased. However, they seemed very overpowering, especially since the cross-sections used for the structure to work were larger compared to the results that could be obtained with the gable roof, which will be explained later.

Regarding the location of the top beam, we could confirm that the axial forces decreased when moved closer to downwind, however the displacement was bigger.

We were interested on finding out if it was possible to balance this fact with a height difference between both crosswind sides, since for the wind it would be better if the upwind side was larger.

This was possible to confirm, it was checked a decreasing of the displacement if the height was slightly different on both sides.

The optimal difference is around 4 meters, counting from the height of the top beam, to the lowest point of the upwind side, for example, if the roof was 2 meters high, the upwind side could go 2 meters lower than the downwind one.

This was important to understand that it didn't allow enough space for having two floors in the roof difference, but it would function very well for the living areas that would have the possibility of being double-height.

It was the first factor to influence the architectural proposal, all the living spaces, not only for light reasons and views, should be located near the roof in order to allow an optimization between the structure and the inclinations needed for the wind, since they were the only spaces where it would be meaningful to have more dramatic heights and an experience of the roof volume.

The issue with this kind of structural principle was the fact that the upwind elements had to have very large cross-sections, which wasn't pleasing for the indoor spaces, especially because the number of elements was also considerable.

The other limitation was the fact that these volumes were only sheltering the wind from one side and the indoor spaces were still not close to the ones imagined, so these were the parameters to improve.

Gable roof

After analysing the pitched roof structure it was concluded that a gable roof would be better suited for the project; not only it would perform better since it had the possibility of shelter the outdoors from both wind directions, but it would allow for a decrease on the visual weight of the structure, only 5 beams and rafters compared to the other where all the elements would be beams, and that can be too intense for housing spaces.

This type of structure infact would still be able to shelter the outdoor spaces while having less beams and smaller cross-sections of the elements. It also enriches the quality of the indoor spaces and provides a clear principle for the spatial division of the different rooms of the houses.

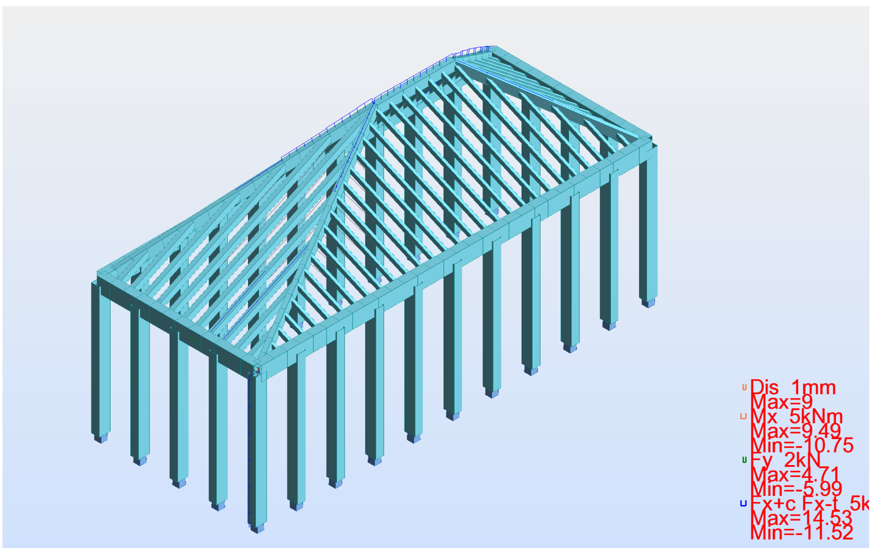
The first tests were run in Karamba. For this type of structure were considered similar parameters as the previous one, such as the different inclinations of the sides of the roof and different heights.

By analysing the inclinations of the upwind and downwind sides, it was possible to conclude that it was better to have a bigger inclination on the upwind side, that has the most utilised rafters, so that the stresses were more uniformly spread on the whole structure.

Through the testing of different scenarios, in which the highest point of the roof was shifted from the centre of the structure to the sides it was evident that if it was moved from the midpoint by 1,5 m the displacement was still the same as if it was in the center. However, the copression decreased and this shifting enabels the volume to provide shelter also from the west wind that, even though is not as strong as in the north, it still has some influence on the outdoor spaces.

Besides this, it also provides a clearer spatial division of the indoor spaces, since the walls' alignments come from the rooflines, so when in the living spaces, the walls respect the diagonals.

The last test that was run on this structure was to have the upwind side of the volume lower than the



Ill. 128 Axonometry of the first structure in Robot

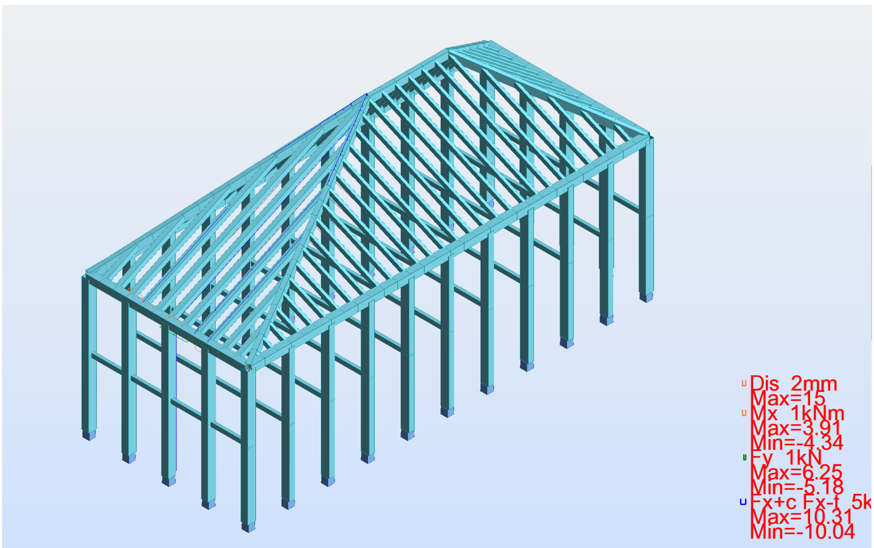
downwind side. It was possible to observe that in this solution both the axial forces and the displacement increase.

For these reasons, this design was implemented only when necessary, that is to say in the volumes perpendicular to the landscape, where the natural slope of it followed the roof inclination.
This principle allows also a more articulated spatiality in these units that have a smaller area than the ones parallel to the slope.

Finally, the cross sections of the most exposed volume were tested and optimised in Robot.

When the structure was firstly tested in Robot, the most stressed elements were the corners, where the sections of the bottom beam join with the upwind rafters and pillars, and the pillars themselves.

The first draft resulted in a working structure that had these cross sections that looked oversized even though the utilisation ratio was almost 1.00. This was because the pillars had to cover a height of 5 meters, since the volume walls are two storeys heights, and in order to withstand the horizontal force of the wind they needed to have a large cross section.



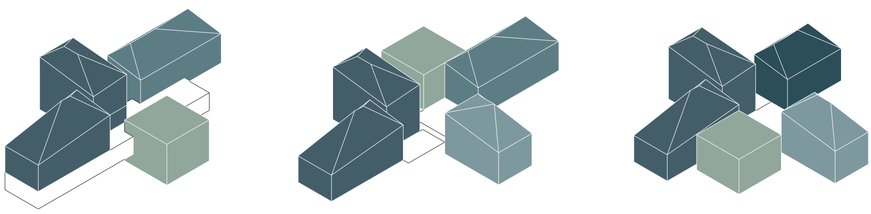
Ill. 129 Axonometry of the optimized structure in Robot

In order to reduce the overall size of the cross sections horizontal connections between the pillars were introduced at the height of the ceiling of the ground floor.

After further optimisation it was possible to reach a result that was satisfactory and looked proportioned, even though the displacement increased it is still verified (see appendix).

Roof Beam Upwind	h 32 b 15	h 28 b 15
Roof Beam Downwind	h 30 b 15	h 25 b 15
Top Beam	h 35 b 15	h 25 b 15
Bottom Beam	h 35 b 30	h 25 b 25
Rafters Upwind	h 20 b 16	h 20 b 15
Rafters	h 15 b 10	h 15 b 10
Pillars Upwind/Downwind	h 40 b 30	h 30 b 25
Pillars Sides	h 30 b 40	h 20 b 30
Horizontal Connections	-	h 15 b 10

Indoors spaces



Ill. 130 Diagram of the same volumes on the different clusters

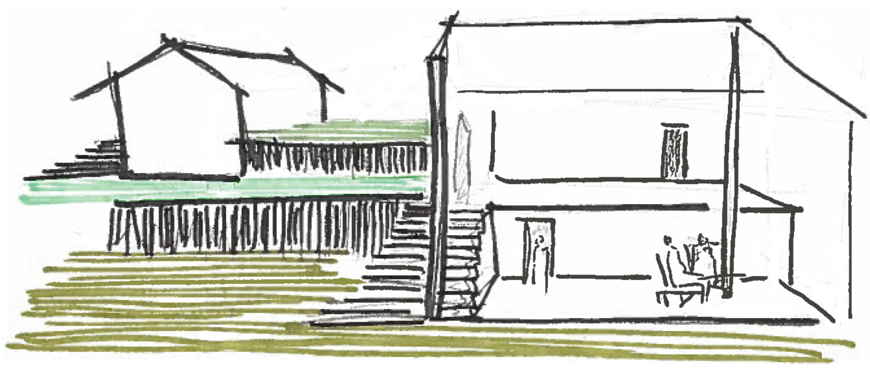
The development of the interior spaces had in mind two important principles: the definition of living and sleeping areas that should have distinct atmospheres, and the exploration of the different heights as a consequence of the different inclinations of the slope.

Once again, the site would inform the design; in this case it represented the possibility of working with different heights and volumetric arrangements, which coincided, with the ideas of openness and light for the living areas.

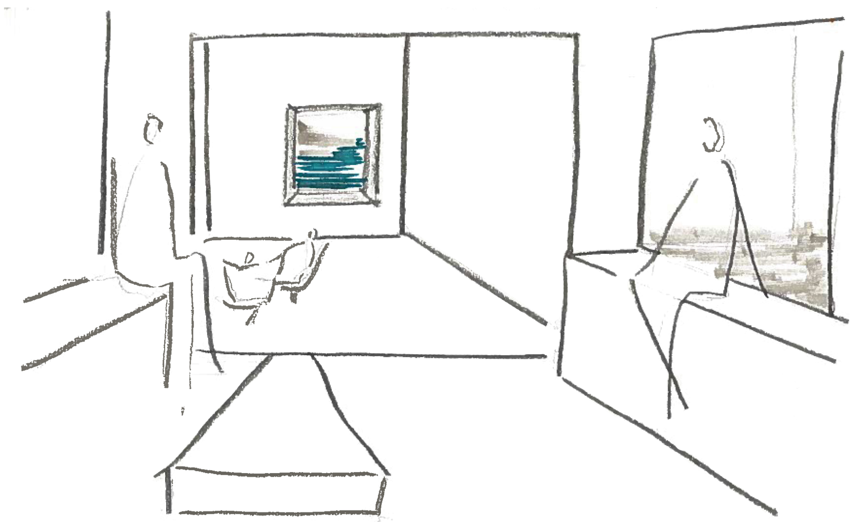
The main challenge was to both allow the qualities of the site to determine the design and at the same time apply this idea to three cluster types that must be able to be used for the whole site.

Soon we understood that wasn't possible nor desirable to design every volume of each cluster, it would be more interesting instead to find some common volumes that could be used on the three and concretized the spatial intentions for the indoors.

Above are represented the three cluster types and the volumes used in each of them. In total there are five different volumes with the same interior display that then are adapted to the different inclinations of the clusters' areas.



Ill. 131 Sketch of the consequences of the landscape in the indoor space



Ill. 132 Sketch of the spatial articulation

The alteration of the volumes when all the studies for the interiors were made also implied changes and adjustments on the masterplan. The two scales were never disconnected, which consisted on a demanding process of working but permitted for a coherent proposal.

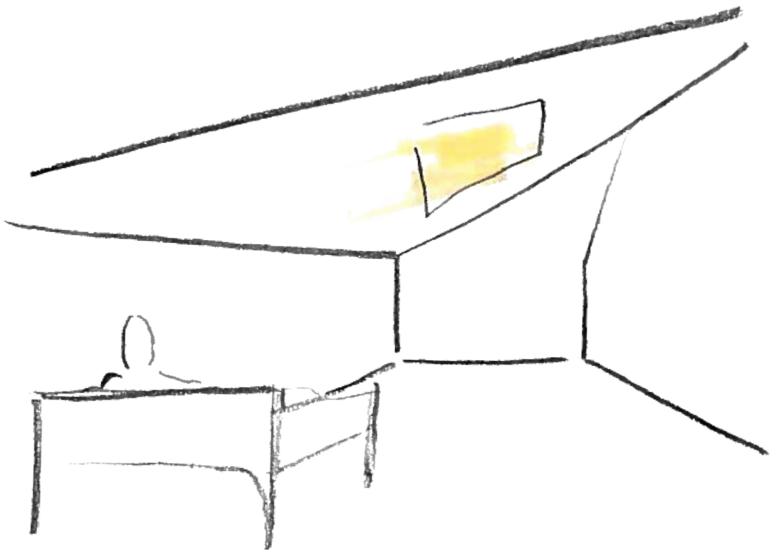
As mentioned before it was very important to see how the levels of the site could be brought to the volumetric arrangement of the space.

The living spaces were meant to have high ceilings and experience the angularity of the roofs, while the sleeping areas should be more quiet and darker.

This had significances for the layout of sections and plans, the living areas are the more open in both directions, associated with the higher part of the volume and their volumes can explore light and views in an unconventional way.

The sleeping part is more condensed and connected to the ground, allowing for details related to the bedrooms' windows and the different uses of the private spaces, such as sleeping, reading, seating, among others.

This differentiation naturally had consequences on the detailing of the project, namely on the displaying of the openings and the materials used.



Ill. 133 Sketch of bedroom window

Light studies

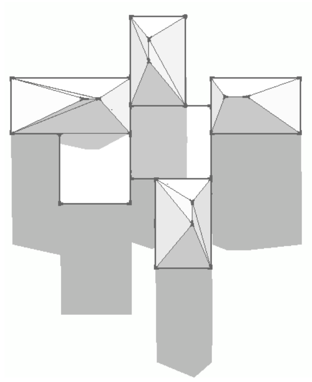
The light studies started with the investigation of each cluster's solar exposure. The tests concerned different times of the same day.

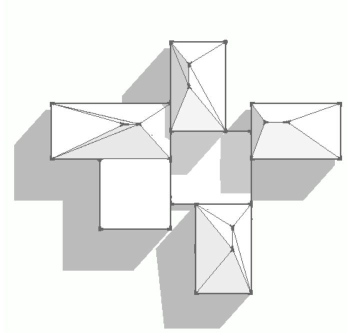
The day chosen for the test was 15/May and the different hours were 7:00, 10:00, 12:00, 15:00 and 18:00, presented from the left to the right side.

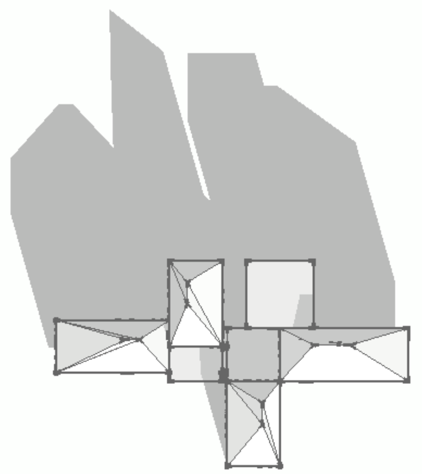
The main concerns were assuring the platforms had a good solar exposure and for the volumes not to overshadow each other. For example, in the mild typology was tested the distance between the two eastern volumes to understand how the lower floors would receive sun light with their proximity.

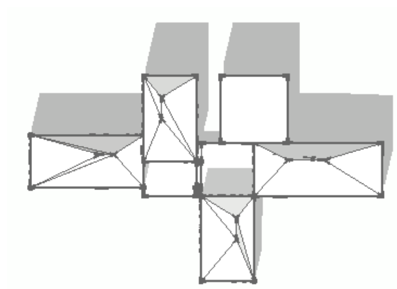
The conclusions were connected to the maximum heights of the volumes and the demonstration that different orientations for the volumes would be beneficial for the outdoor and indoor spaces.

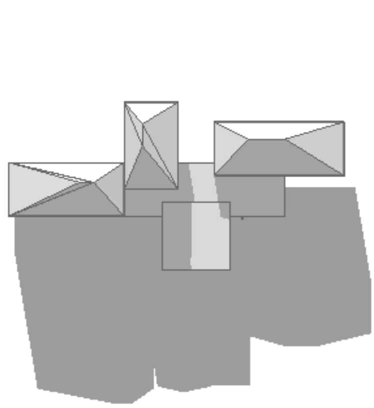
These considerations were important to relate to the wind studies, since naturally for the wind performance it would help that the volumes were close together, however, for the solar exposure, the opposite was verified. It was a matter of combining and testing different solutions to find a balance between the volume articulations.

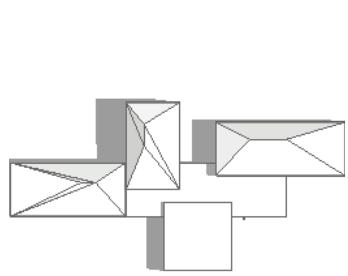


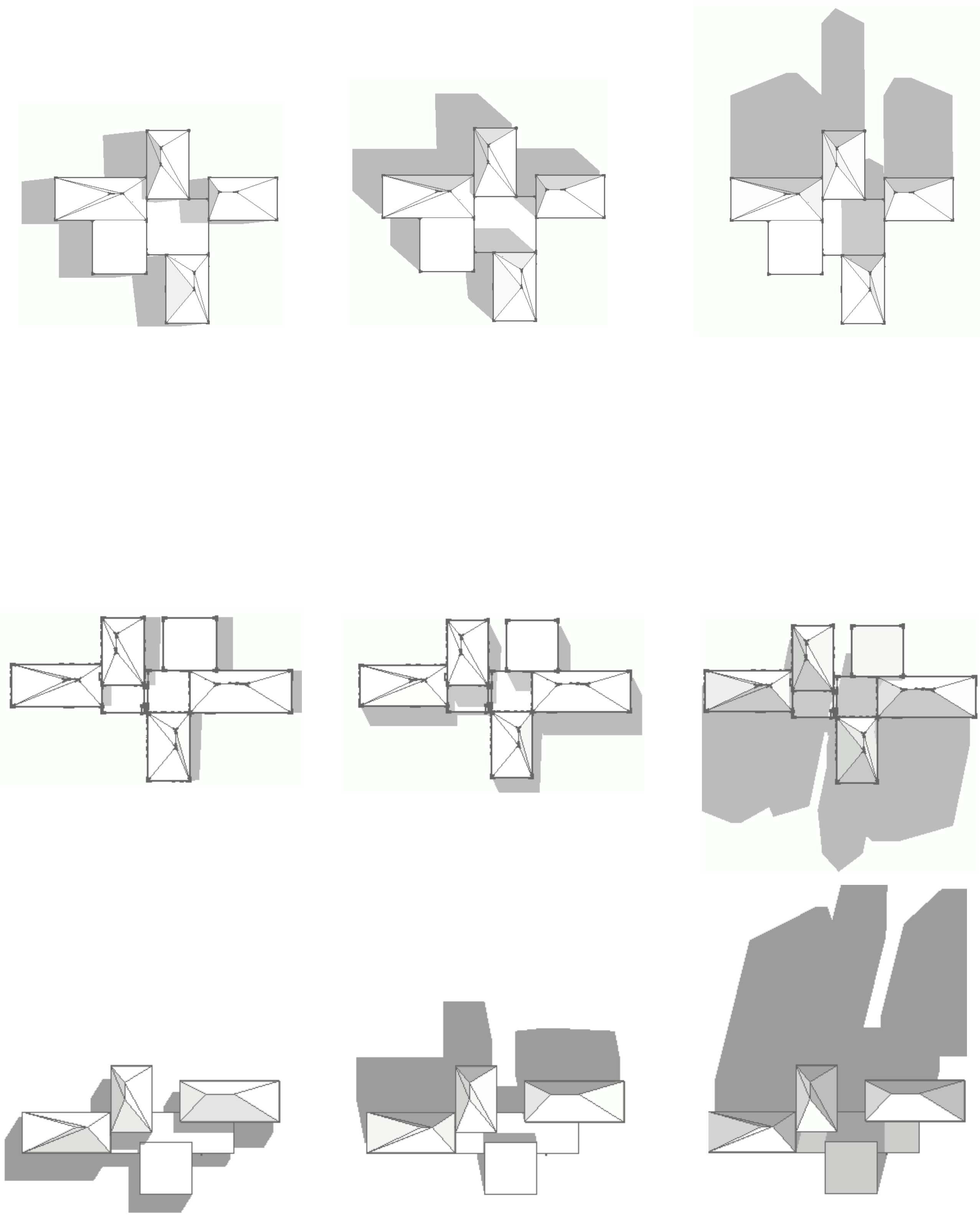




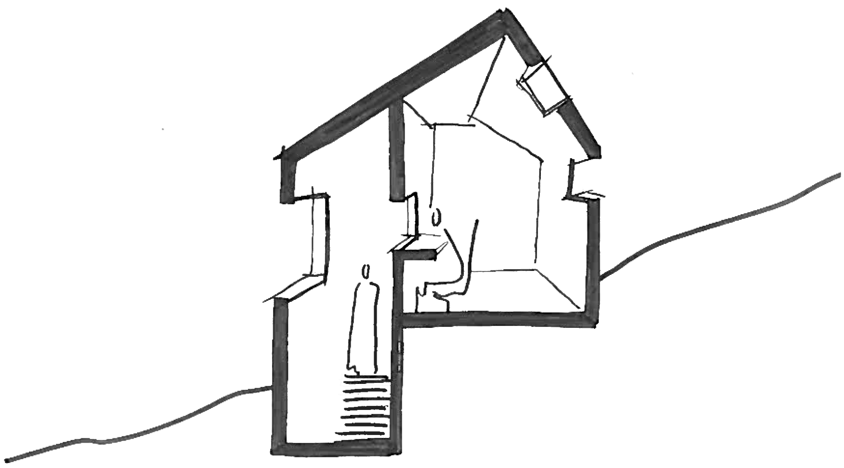








Ill. 134 Solar exposure tests



Ill. 135 Light studies in Velux Visualizer

The light in the project was approached from two perspectives: openings and atmospheres.

Regarding the openings general studies were made to understand the relation of their areas and number with the daylight factor which, according to regulations, 2% is the minimum requirement. This is, of course, an indicative number that doesn't translate in any type of space quality.

The tests were done in Velux Visualizer, which enabled to study the different areas daylight factor values and how the light spread in the rooms. We tested entire floors and specific rooms.

We wanted to work with the windows' sizes that would allow for different qualities and framing, some more oriented to provide light to the interior space, others for views or access to the landscape.

Moreover we were interested to see how the different heights of the openings would enhance the indoor activities such as reading in an armchair, seeing the landscape from a desk or the sky from a bed.

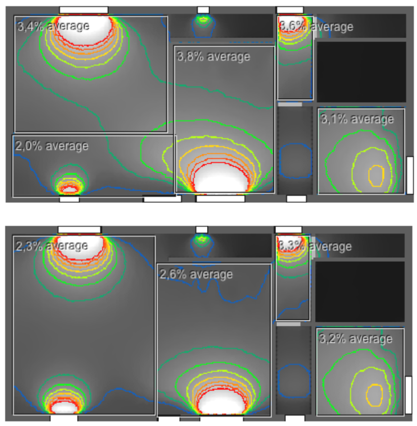
These ideas also contributed to more expressive elevations, as it wouldn't be so clear the floor division and when seen at night the dynamic of each house would be richer.

For the rooms, our initial attention was on determining which would be the minimum number of openings required for each room and its areas.

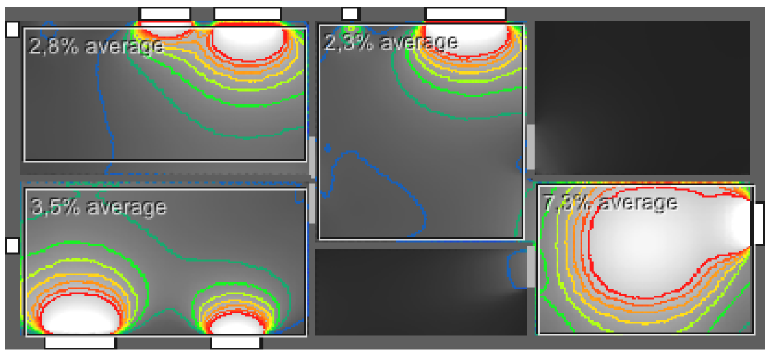
Here are presented diagrams of the initial studies that tried to find the minimum amount of windows according to some interior and elevation sketches.

Soon, one of the results of the program showed was the possibility of working with light and shades through the positioning of the windows, this particularly interested us since we believe that it also contributes for the spatial division in a room.
Whether in a bedroom or in a living room these lighter areas, highlighted by the presence of the shaded ones, attract people for living and staying activities, while the others are more suited for the placement of the beds or help clarifying how to move in the space.

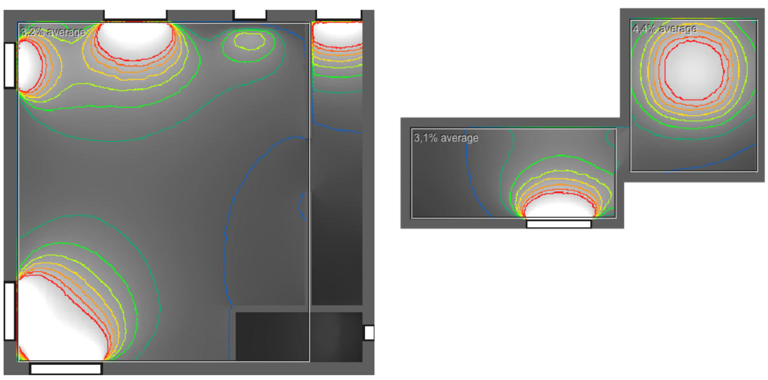
The height difference between the windows was also studied in the software, from that we concluded that these differences would help distributing the light more uniformly through the space without diminishing its daylight factor. This was important since the living spaces of the project are always large and double height spaces.



Ill. 136 Studies of the openings all leveled and at different heights



Ill. 137 Study of windows' proximity and light/shade areas



Ill. 138 Studies of the common room and platform access spaces

Materiality and detailing

The materiality of the project was one important mean of communication of the spatial concept.

From its exterior to the inside of each unit, the materials intend to express two ideas: the integration with the landscape exterior wise, and the spatial division of the night and day zones of each house.

For the exterior, dark wood and stone were used. The idea was not only to allude to the traditional housing on the islands, but also to reveal the massive character of the clusters' volumes as part integrated with the rock.

Several visualizations were made in order to explore how the materials should be treated and displayed. The stereotomy of the wooden boards for the façades was tested in order to find which would be the best profiles to express the vertical character of the volumes and a certain roughness related to the harsh landscape.

The window proportions and alignments was also an aspect that took some time, both physical and virtual models were done so the façades look harmonious and coherent with the indoor spaces.

Ill. 139 Sketches of the interior spaces

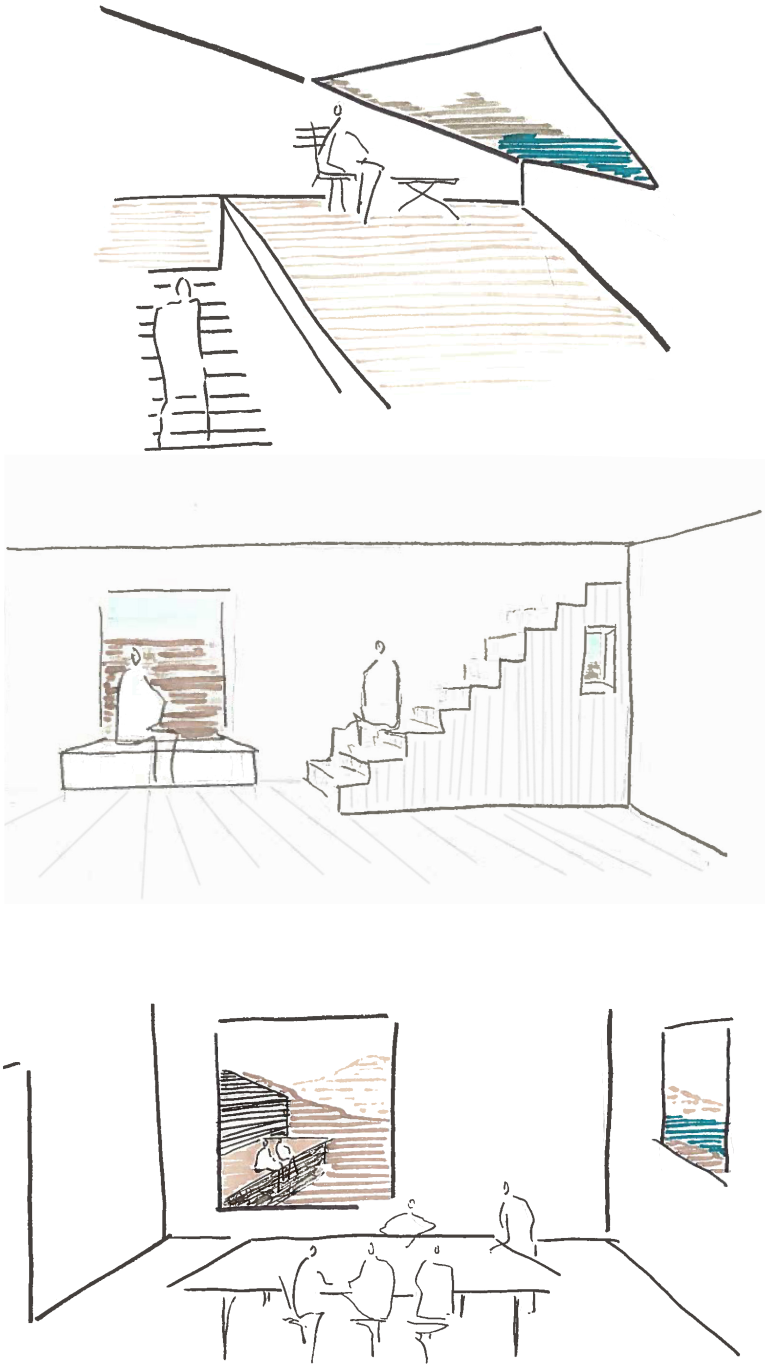
Ill. 140 Initial material trials

The method was once again trying to narrow down the situations we were working with to find some common factors. For the indoor spaces we noticed five important situations: the opening connected to the table (desk or dinning), the window that would provide access to the landscape or large views for the living spaces, the window that would be use for providing natural light were it would be lacking (such as stairs, entrance spaces or bedrooms), small opening for the bathrooms and the skylight.

These were the ones that seemed to us to define the majority of the situations indoors, after this it was a question of testing proportions alignments, see the consequence on the indoor disposition and retest on Velux.

Another important part of the detailing was the indoor spaces and their atmospheres. As mentioned before, the idea was to have a clear division between night and day areas, where the first would be light and open and the last more intimate and darker, as is shown on the render.

The entrance and accesses were designed to be the connection between both harmonizing their difference by using materials present in both cases.



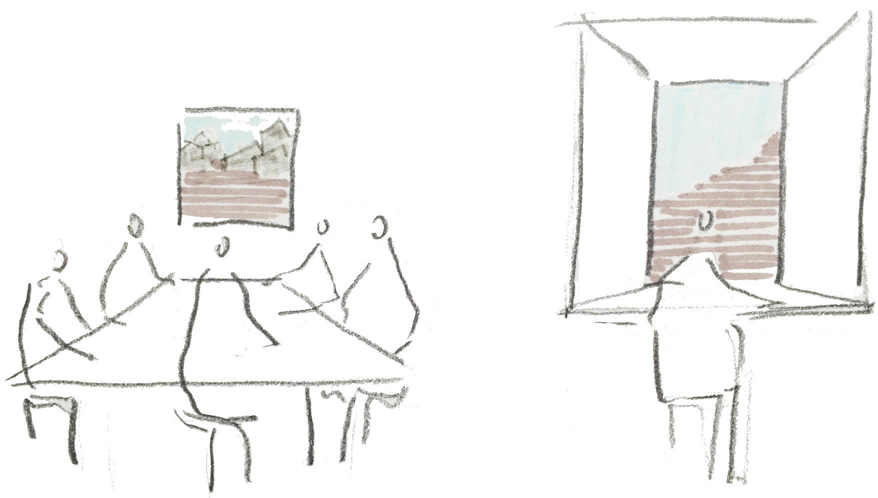
In a way it was about having a progression from the darker and quieter spaces of the bedrooms connected to the landscape to the large double height social areas connected to the views and the roofs.

Wood was chosen to be used in every space, more present in the rooms, precisely to achieve the idea of intimacy and tranquillity and also to connect the space to the earthy tones of the landscape. On the living spaces, it would be present in smaller elements such as furniture, or the kitchen and bathroom volumes, so that these spaces are lighter and clearly related to the view of the fjord and the sky.

Finally, the detailing of the spaces was the ultimate state of development of the interiors.

It was about concluding the imagined spaces and working on the connection between them, mainly on their relation to light but also on a furniture scale that intensify the architectural experience of each room, some of these examples could be seen on the presented sketches of the indoor spaces.

Ill. 141 Sketches of the interior spaces



Ill. 142 Initial spatial sketches

Epilogue

Conclusion

The proposal is a response to the urban development on the Faroe Islands and its implicit necessity of a strong direction related to their identity.

Nowadays, it is noticed a development of the Faroese towns according to linear systems that have the roads as main axis and large single houses attached to it, with no possibility of qualified public space.

The proposal opposes to this premise with the creation of a spatial hierarchy between outdoor spaces and built areas.

The housing complex is a result from an extensive process that had "Critical Regionalism" defined by Kenneth Frampton as a gauge. This was done in order to investigate which were the essential elements related to Faroese identity and read them as concepts and models that could be comprehended through a contemporary light.

This implied a selection and filtering of the traditional architecture qualities, so to understand which could inform and potentiate an architectural design for the present time and people.

It is not about returning to the past or forcing its presence, but to understand what can come naturally from the pre-existing conditions.

This means to comprehend how people have dealt with the same factors before, which of the vernacular traditions are essential to keep the place's identity intact and how they can inspire new spaces, materiality, compositions.

We believe this approach lead to a pertinent and strong architectural proposal, to an "architecture of place" that is rooted in optimal ways to provide comfort to its users understanding the potentials of climate and landscape as inspiration. (Frampton, 1996)

The "tún" concept and the connection between architectural, climatic and natural elements were present in the housing complex from its unit scale until its infrastructure.

It was an extremely challenging and rewarding assignment to take, it taught us how to approach a large and complex site. It made us understand the need to keep on clarifying and seek the core spatial principles, so one solution could fit various matters.

Nontheless, when working with the landscape is hard to find common structures that work for every area.

It is vital to design architectural forms that could take advantage of the site and fit into a larger system, seeking the development of the project more as a whole than as a group of specific solutions.

Diversity and flexibility should be provided, in order to accommodate different users. The idea is to design a base that leaves open possibilities for life unpredictability, especially when having families as residents.

The different typologies and spatial solutions create room for everyday family life aspects and uses.

In order to achieve this, the differentiation of zones was vital, since it intensified the graduation of privacy both indoors and outdoors.

Finally, it was gratifying to work with the several aspects of the project simultaneously. It required a slower process, but the coherence between its strands was accomplished, particularly in the role of the roofs.

These structures were fundamental for the definition of the atmosphere in the living spaces; they direct the wind away from the clusters and give character to the cluster's architectural form. Assuming a truthful tectonic character in the spaces, their atmospheres and performances.

Reflection

The project had a high degree of complexity and we are aware there are still several aspects that could be further investigated.

The working process of the project was stimulating to us since it required a lot of crosschecking of the different aspects of the proposal.

When it seemed we couldn't develop more the project because of significant doubts, the investigation of different aspects or scales always seemed to point the next step and clarified the direction to follow.

In this sense, we believe now it would be time to look back at the masterplan and articulate better the clusters with the landscape and in between them. This would for sure reveal new layers and meaning for the project.

It was also our desire to detail the outdoor areas around the clusters, so that the common spaces would have had the same level of thought as the units.

This would also imply designing the vertical connections in between the clusters and structures that support the use of the water ditches.

Regarding the roof structure, further developments and studies will be done. Specifically, we would like to investigate how the addition of a structural element could improve the registered displacement and how it would also affect the indoor atmosphere.

On the architectural form, we would like to simplify even more the accessibilities and investigate what could be done to facilitate the flows in such a steep landscape.

We also believe it would be positive to have a final view on the wind performance of all the clusters and optimize their positioning between each other and the outdoor areas.

Finally, on a detail level, as mentioned before, the detailing of the outdoor space would be the next natural step to take in the process, as well as a deeper concern with the joints of the structure and the used materials.

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Personal interviews

Hávarður Olsen
Osbjørn Jacobsen, Henning Larsen architects

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-All illustrations which are not listed above are own illustrations.

Appendix

Interview with Hávarður Olsen
Ratios and density
Calculations
Structural verification and analysis
Accessibility

Interview with Hávarður Olsen

Landscape

-What is the importance of landscape for Faroese people?

You have more respect for Nature; you see how great it is somehow… There are lots of these mountains that are just cut out, so you have a very sharp edge and when you see that it just stands out. It is hard to explain exactly…
When I stand outside and see the mountains I feel very fortunate to have it. It seems very empty in Denmark, there you are more surrounded by Nature, it is more present.

-What does it potentiate?

We really like to walk on the mountains. When you climb you have great overviews; like the wooden routes in Norway, there could be more used with something like that, we don't have any of it there.

-Which are the main conditionings?

It is very hard to build anything on the Faroe Island because it is so sloppy. You have to dig out the soil that is moist so you cannot build your house next to it, you have to do something to get rid of the moist. The same for roads, you have to account that you have to put earth on one side and dig out on the other. Regarding roads you have so many limitations you cannot have straight lines, you have to do curves in order to avoid extreme heights. Also with buildings, it helps a lot to consider the slopes right away, also because it doesn't look so natural if you have to dig too much.

-How would you describe the main atmosphere of the Faroe Islands?

This was something I consider yesterday regarding my project… Nordic countries have a very atmospheric light; Schultz describes the North as "the place of atmospheres". I think, regarding the Faroe Islands, they have a more mystical atmosphere, because there is a lot of mist and a lot of darkness. The Faroese music is very inspired by this sagas, and these weird people in the mountains, is something very undefined. I think mystical is a good description.
If you think of the houses, not always like these, but when you look to the Faroese houses you see a lot of weird angles and something not defined. You don't see the grid, which reinforces this idea of undefined.

-Do you think it is like this because of the climate?

It comes both from climate and landscape. If you go up the mountains, you see a lot of things. The fjords are a very different world.

Architecture

-Which are the main characteristics of traditional architecture on the Faroe Islands?

It follows the landscape. In general we respect the Nature a lot because we see how it is brutal. It speaks about following the landscape, not as individual artistic expression, but finding what is in the landscape, because for us it is the greatest thing, so when we are able to capture something about the Nature or the landscape, that is the highest quality.

-Which materials are mostly used? Why?

I think it has to be wood, it is the most traditional. We don't have wood, we import it, we also use stone and we also like a lot our stone but is an expensive material. Wood was always used to clad the buildings. I don't know exactly why…
We use also driftwood, even for cladding. And also tar, that is better than painting because it gets into the material and it lingers.

-Why are the houses in Torshavn red?

After the period of cladding the house s in driftwood and using tar, we found this material, cladding that is not wood and is more efficient an cheaper. The reason why there are so many colours is because it requires painting more often, so people start wondering why not use different colours. The culture changed a bit because everything was black and we were all at the same level. When this came around we had more individual expression and the society was reflected on that, the houses started to be a bit different, some bigger or higher. But it stands out in the summer.

-How are the openings?
The openings are the ones that have the most impact on our indoor comfort. Often we don't seal them off very well and just a slide of opening it will bring a lot of cold to the home because we have so much wind. I talked with a sustainable professional on the Faroe Islands and he said that is our biggest issue. Also for houses close to the sea, the windows towards the sea tend to rust. So we should consider openings on the sides.

-What about skylight?
That was more typical of the old houses, above the fireplace. But now we don't use it as often

-How does the graduation of privacy works?
-We always have an entrance; that is important. But then you are already in the public space.
Often you have to deal with the slope, so in one side you have stairs and the other we have a flat side, should I draw it?
You have the road and houses on both sides. On one you enter in the upper level, on the other you enter below because of the slope. but you want the view for the public side on the upper floor, so you have to go immediately to the upper floor, so you have some stairs you have to climb. There is a difficult with that because you have a basement with the car door so you that becomes the front door. This issue hasn't been treated well.

-How do buildings deal with the soil? Is the architecture massive or light structured?
We talked about this… We have the soil coming into the house, but you cannot build against the soil because of the issue with humidity, so you have a gap in between, some bumper where you can walk and access your garden or walk around the house.
I think our architecture is more massive. We have a wind speed of 50m/s and we have to make it strong enough for that. People older than me experience this wind in 1988, that took off so many roofs of houses and lots of people are afraid of the wind. Often we over dimension the roofs, so you don't even hear the sound, my grandmother for example if she hears the wind she cannot sleep. So we have this massive structures that seem more safe, is better to be safe than elegant in the Faroe Islands

-How and why are the volumetric of the housing?
The standard houses are always two floors because of the slope. Downstairs you don't have views, upstairs you do. They are generally along the road, against the slope in order to avoid a great height difference. But normally they are as simple as possible.
Often we do the roof with the slope, also when you see it from a far it seems like the mountain continues.

People

-How would be a great home for the Faroese?
I think a good home is to have a good program, how you position the functions in a way that is helpful. Also for families to think about what is the core and where are the views. And also about following the landscape.

-Which qualities are important when living in a community?
In the Faroe Islands is about not standing so much out, it is about equality. Not having someone going way bigger or with a better view.

Different could be but with no hierarchy.
I think if the architecture is there for support it we are a lot about the community. You see it for example near a lake or a river the kids are playing there which attracts the older people.

-How is the familiar dynamic?
The kids are very eager about going outside. And in the Faroe Islands, a good thing is that you never worry if your kid is playing outside, we feel very safe.
If the weather is nice none is inside. I see a lot of kids playing outside, even when the architecture doesn't support it, they find ways, like playing on the road, painting the roads to play some game…

-How do people spend their time when at home?
The kids are outside. The rest is very usual, TV, games, computer games… Football is a huge thing. Every men plays football, also on the weekends, is one of our community things. We don't visit each other often, because we don't have walking distance and we need the car. When you need the car you have to ask and you know you cannot use it for long because the family is very dependent of the car. You cannot by groceries often. You have to consider you are taking

the only vehicle of the house.

-Is it common then to be friends with your neighbours?
Yes, that is actually very common. Also because of the distance, you take the ones that are closer. Benjamin, he lived 50m from me. Our village is divided in 3 and the other two parts are more than a km distance. In our village we were the only ones our age and we have no similar taste.

- Which are their main needs?
Not different from other cultures. But the kids need to have space outside. Especially when you cannot always go outside, it builds up this tension of going outside.
Different from others maybe we need a kind of shed to have meet hanging, it is not heated, the wind can came through just not water.

-Which are their means of transportation?
Car.

Interior
-What is generally the heart of the house?
The kitchen used to be maybe now more the living room. The houses that have the kitchen as a heart are generally better, when you can combine the social part and the kitchen.

-Are the houses generally organized in levels or horizontally?
They are organised in levels because of the slopes.

-What is the role of light?
We don't have point light. Our light is indirect and diffuse. We don't have shadows and it is very white, some photographer says the light is so white and you can see it in the people, how white they are, there is certain blueness
It was very dark but now is a tendency to get more natural light, since there isn't much.

-What is the importance of privacy in the Faroese homes?
Everyone has their own house. We are expecting this when growing up, your castle. So not living in an apartment, something that you have for life.

Outdoor
-How important is to have a private outdoors space?
Very important.

-How important is to have a common outdoors space?
That is maybe even more important. For the kids and for a community to work.

-Which is the main factor to control when designing outside spaces?
Sunlight of course, when there is light you really want to go outside, when there is we are very fast in going and get the sun. And the wind, but is difficult to have everything, the view is to the water that is often when the wind comes from.
Henning Larsen in Klaksvík they studied the wind and had some sharp edges as a way to break the wind. But I also think generally is never sunny and windy at the same time.

-Do people spend their time outside?
Yes, when it is possible.

-How do the outdoor spaces relate to the slopes?
There are a lot of diverse spaces related to that question. Some find flat areas, some level it. But we don't have playgrounds in the slope, it doesn't make sense, but maybe there is a way to combine it.
I think when you climb up the mountains you really like to see all the slopes and landscapes, but when you are lower down you really try to look for flat areas. flat areas are very sought after. Also me as a kid, when I saw a garden that was flat it was a great thing… You can use it, you can play football. if you have something

very hilly, it is maybe beautiful but we cannot use it, or sit down on it. Even when you go to the mountains we love to find flat areas.

Climate

-How are the natural light and the importance of the seasons?

Alvar Aalto says there are two facades for a home. One for summer, the other for the winter and the night, where you have to design for the opening, you see the fireplace or the wood inside. You don't consider the shape itself but what you see from the inside.

I think it fits so well to the Faroese context. You have a very different view of the islands when you see them at night and winter because you see the windows with light, because of the slopes you have all these different angles and they are all very variant. Is important to design for both facades.

-Which are the main techniques used to shelter indoor/outdoor spaces from the wind?

Selling the windows, not so much about the envelope, we use 250 mm of insulation.

Trees you can do to break the window but we don't have a lot. Sometimes bushes also. But we don't do much to stop the wind, because we just don't go outside; also because

it I not always windy, is just that when it is wind, it is very windy.

-Does it snow a lot?

I don't really know, I think it is regular. It is also changing a lot. But I think it is like Denmark.

-How does the temperature vary?

Not a lot but in one day you can have all seasons, it can go from very sunny to snow, not so much about temperature, there is not a lot of variation maybe from -3 to the maximum of 20 degrees, maybe 3 days in the year.

-How do you think Nature shapes people's behaviour and architecture?

It makes us respect it a lot. Also something very faroese is in the islands we have generally horizontal edges facing a very vertical mountain. That clash makes Nature stand out even more.

I think it can shape you in that way. In Denmark I don't see Nature, I don't know about Nature. When I am in the Faroe Islands I can see it very clear it and hear it. You really feel it when you have it so expressive.

-Do you think maybe because of it you don't have the need for a very spectacular architecture?

Yes I think so. When relating to architecture, you always try to accommodate landscape. It is never the opposite, being architecture the dominant. I think it is a lot about finding what is good about the landscape and try to get that into a built environment.

There is a lot about the light inside, something very human, not so much about the form…I don't know how to explain. There is something more about the life inside, i haven't stabilised this yet.

Is something about that fireplace. Not about something great, this in a lot of ways. Like the tradition of the piller wales, everyone collects on the beach and it doesn't matter if you are a doctor or a carpenter, everyone is pulling their weight. We have to do it together. We also have to live together, because of the harsh environment. This is a very fundamental idea on the Faroe Islands.

Ratios

Number of Clusters: 22

of which:
- 6 of the Steep Typology
- 7 of the Mild Typology
- 8 of the Flat Typology

Total number of units: 91

of which:
- 44 of 150m^2
-34 of 120m^2
-13 of 70m^2

Approximate number of people: 395

Calculations

Self load
Gk= Aroof* Weight of timber
Gk= 104* 1,5 = 156 kN

Snow load
s=μw*ce*ct*sk
μw= shape coefficient= 1,2 (see Section 5.3.3(4) of the National Annex DS/EN 1991-1-3 DK NA:2015)

ce= exposure coefficient = 0,8 (value for windswept areas, see Eurocode 1.3 Table 5.1)

ct= thermal coefficient = 1 (Eurocode 1.3 Section 5)

sk = characteristic snow load value on the ground = 0,9 kN/m^2 (National Annex DS/EN 1991-1-3 DK NA:2015)

s= 1,2*0,8*0,9= 0,86 kN/m^2
Stot= s*Aroof = 0,86*104 = 89.85kN

Wind load
The wind arrives on the complex from two directions, North and West. From North we know its speed to be around 40m/s, from West is not as strong, however is the most frequent with a speed of 24m/s, for this reason both scenarios were considered.

In order to determine them the mean wind velocity, wind turbulence, peak velocity pressure and the wind forces had to be calculated. All the formulas needed are in the Eurocode 1.4.

Basic wind velocity North:
vb= 40m/s

Basic wind velocity West:
vb= 24m/s

Mean wind velocity

Vm(z)=cr(z)*c0(z)*vb

cr(z)= roughness factor
c0(z)= orography factor=1.0

Terrain category (for calculating the roughness factor): III (table 4.1, Eurocode 1.4)
Hence:
z0=0.3 m
zmin=5 m

cr(z)= kr*ln(z/z0)

z= height of the midpoint of the structure=12m
kr= terrain factor

k =0.19*(z0/z0,II)0,07

z0,II= 0.05 (Eurocode 1.4, Terrain Category II, Table 4.1)

k =0.19*(0.3m/0.05m) 0,07=0.215

cr=0.215*ln(12m/0.3m)= 0.7945
Vm= 0.7945*1*40= 31,7818 m/s

Wind turbulence

Standard deviation of turbulence:
σv=kr*vb*kl

kr=terrain factor=0.2154
vb=40m/s
kl=turbulence factor=1.0 (recommended value by Eurocode 1.4 section 4.4)

σv=0.215*40*1.0=8,6156 m/s

Turbulence intensity:
Iv(z)=σv/Vm(z)

Iv(z)= 8,6156 / 31,7818= 0.2711 m/s

Peak velocity pressure

q (z)=[1+7*I (z)]*1/2*ρ*vm2 (z)

ρ=air density, which depends on altitude, temperature and barometric pressure to be expected in the region during snow storms=1.25 Kg/m^3

qp(z)=[1+7*0.27m /s]*1/2*1.25*31,782= 1829,2574 N/m2= 1.829 kN/m^2

Wind forces

The wind forces are calculated based on the external forces on the structure:
Fw=cscd*Σ we*Aref

cscd= structural factor=1 (Eurocode 1.4, Section 6)
Aref= reference area of the structure
we= external pressure on the individual surface at height (ze)

we=qp(ze)*cpe

ze= reference height for external pressure
cpe= pressure coefficient for external pressure

Force on walls:
Fw=we*Aref

Since the height of the building is less than its height, qp(ze)= qp(z).

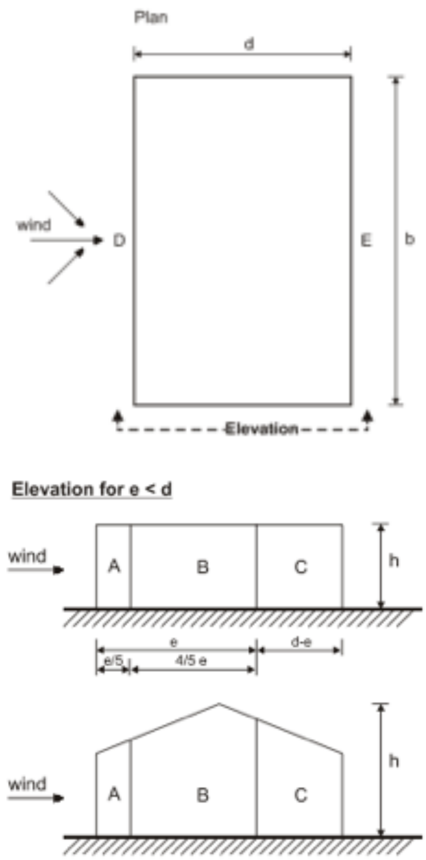
North wind
In order to calculate the different loads on each wall, they have to be divided in regions since the wind intensity is not equal on all the surfaces. To do so a parameter has to be determined (e), in relation to the base or to the double of the height, whichever is the smallest. (Eurocode 1.4, Figure 7.5)

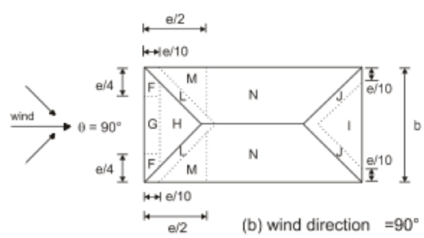
e= b= 6,6m (crosswind dimension)
Wall 1 + 3:
-Zone A:
Aref= 6m^2
cpe= -1,2 (see Table 7.1)
we= 1,829* (-1,2)= -2,1948 kN/m^2
Fw= (-2,1948)* 6= -13.1688 kN

-Zone B:
Aref= 26,83m^2
cpe= -0,8 (see Table 7.1)
we= 1,829* (-0,8)= -1,4632 kN/m^2
Fw= (-1,4632)* 26,83= -39.2576 kN

-Zone C:
Aref= 41,5m^2
cpe= -0,5 (see Table 7.1)
we= 1,829* (-0,5)= -0,9145 kN/m^2
Fw= (-0,9145)* 41,5= -37.9518 kN

Wall 2:
Aref= 29,63m^2
cpe= 0,8 (see Table 7.1)
we= 1,829* 0,8= 1,4632 kN/m^2
Fw= (1,4632)* 29,63= 43.3546 kN





Wall 4:
Aref= 42,84m^2
cpe= -0,5 (see Table 7.1)
we= 1,829* (-0,5)= -0,9145 kN/m^2
Fw= (-0,9145)* 42,84= -39.1772 kN

Roof:
-Zone F:
Aref= 0,82m^2
cpe= 0,5 (see Table 7.5)
we= 1,829* 0,5= 0,9145 kN/m^2
Fw= (0,9145)* 0,82= 0,75 kN
-Zone G:
Aref= 1,76m^2
cpe= 0,7 (see Table 7.5)
we= 1,829* 0,7= 1,2803 kN/m^2
Fw= (1,2803)* 1,76= 2,2533 kN

-Zone H:
Aref= 29,14m^2
cpe= 0,4 (see Table 7.5)
we= 1,829* 0,4= 0,7316 kN/m^2
Fw= (0,7316)* 29,14= 21,3188 kN

-Zone I:
Aref= 9,39m^2
cpe= -0,4 (see Table 7.5)
we= 1,829* (-0,4)= -0,7316 kN/m^2
Fw= (-0,7316)* 9,39= -6.8697 kN

-Zone J:
Aref= 5,22m^2
cpe= -0,7 (see Table 7.5)
we= 1,829* (-0,7)= -1.2803 kN/m^2
Fw= (-1.2803)* 5,22= -6,6831 kN

-Zone L:
Aref= 4m^2
cpe= -1,4 (see Table 7.5)
we= 1,829* (-1,4)= -2,5606 kN/m^2
Fw= (-2,5606)* 4= -10,2424 kN

-Zone M:
Aref= 1,56m^2
cpe= -0,8 (see Table 7.5)
we= 1,829* (-0,8)= -1.4632 kN/m^2
Fw= (-1.4632)* 1,56= -2.2826 kN

-Zone N:
Aref= 24,15m^2
cpe= -0,2 (see Table 7.5)
we= 1,829* (-0,2)= -0.3658 kN/m2
Fw= (-0.3658)* 24,15= -8.8341 kN

West wind:
vb= 24m/s
vm=0,7945* 1* 24m/s= 19,068 m/s
σv= 0,2154* 24* 1= 5,1696 m/s
Iv= 5,1696/19,068= 0,2711 m/s
q (z)=[1+7* 0,2711]* 1/2* 1,25* 19,0682= 0,658 kN

Wall 1:
Aref= 74,36m^2
cpe= 0,8 (see Table 7.1)
we= 1,829* 0,8= 1,4632 kN/m^2
Fw= (1,4632)* 74,36= 108,8035 kN

Wall 2:
-Zone A:
Aref= 5,94m^2
cpe= -1,2 (see Table 7.1)
we= 1,829* (-1,2)= -2,1948 kN/m^2
Fw= (-2,1948)* 5,94= -13,0371 kN

-Zone B:
Aref= 23,69m^2
cpe= -0,8 (see Table 7.1)
we= 1,829* (-0,8)= -1,4632 kN/m^2
Fw= (-1,4632)* 23,69= -34,6632 kN

Wall 3:
Aref= 81,52m^2
cpe= -0,5 (see Table 7.1)
we= 1,829* (-0,5)= -0,9145 kN/m^2
Fw= (-0,9145)* 81,52= -74,55 kN

Wall 4:
-Zone A:
Aref= 8m^2
cpe= -1,2 (see Table 7.1)
we= 1,829* (-1,2)= -2,1948 kN/m^2
Fw= (-2,1948)* 8= -17.5584 kN

-Zone B:
Aref= 34,78m2
cpe= -0,8 (see Table 7.1)
we= 1,829* (-0,8)= -1,4632 kN/m^2
Fw= (-1,4632)* 34,78= -50,89 kN

Roof:
-Zone F:
Aref= 5,29 m^2
cpe= 0,5 (see Table 7.5)
we= 1,829* (0,5)= 0, 9145 kN/m^2
Fw= (0, 9145)* 5,29 = 4,8377 kN

-Zone G:
Aref= 12,93m^2
cpe= 0,7 (see Table 7.5)
we= 1,829* (0,7)= 1,2803 kN/m^2
Fw= (1,2803)* 12,93= 16,5542 kN

-Zone H:
Aref= 22m^2
cpe= -0,4 (see Table 7.5)
we= 1,829* (-0,4)= -0,7316 kN/m^2
Fw= (-0,7316)* 22= -16,0952kN

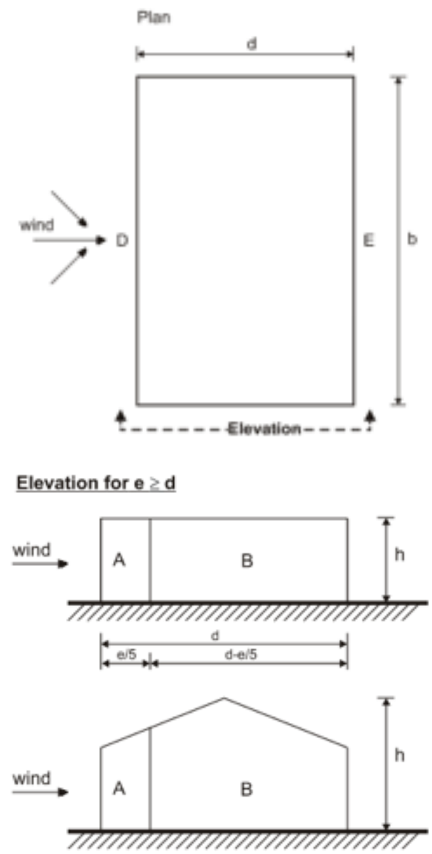
-Zone I:
Aref= 28,54m^2
cpe= -0,4 (see Table 7.5)
we= 1,829* (-0,4)= -0,7316 kN/m^2
Fw= (-0,7316)* 28,54= -20,8798 kN

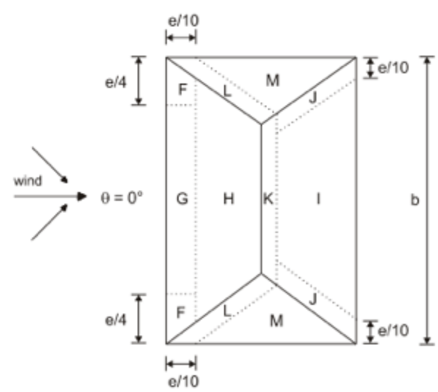
-Zone J:
Aref= 4m^2
cpe= -0,7 (see Table 7.5)
we= 1,829* (-0,7)= -1,2803 kN/m^2
Fw= (-1.2803)* 4= -6,6831 kN

-Zone K:
Aref= 2,77m^2
cpe= -0,5 (see Table 7.5)
we= 1,829* (-0,5)= -0, 9145 kN/m^2
Fw= (-0, 9145)* 2,77= -2,5331kN

-Zone L:
Aref= 5,5m^2
cpe= -1,4 (see Table 7.5)
we= 1,829* (-1,4)= -2,5606 kN/m^2
Fw= (-2,5606)* 5,5= -11,308 kN

-Zone M:
Aref= 30m2 (9+21)
cpe= -0,8 (see Table 7.5)
we= 1,829* (-0,8)= -1.4632 kN/m^2
Fw= (-1.4632)* 30= -43,896 kN





(a) wind direction =0°

Ultimate Limit State

"The 'Ultimate Limit State' combination is used when verifying the members in Robot. The combination is based on the snow load as the dominating load since this combination also factors the payload and the worst-case scenario therefore is met." (Jensen, 2015)

Gk = Permanent actions
Qk = Variable actions

ψ0Qk = Combination value
ψ1Qk = Frequent value
ψ2Qk = Quasi-permanent value

γG = Partial factor for permanent loading
γQ = Partial factor for variable loading
Qk,1 = Leading variable action
Qk,I = Accompanying variable action

$$\sum_{j\geq 1}\gamma_{G,j}G_{k,j}+\gamma_{Q,1}Q_{k,1}+\sum_{i>1}\gamma_{Q,i}\psi_{0,i}Q_{k,i} \quad \text{(EC0, equation (6.10))} \quad (2.13)$$

γG * Gk = 1,2* 156 = 190,32kN

Dominant snow load

γG * Gk = 1* 156 = 156 kN
γsnow* Qsnow = 1,5* 89,85 = 134,775 kN/m^2
γwind* ψ0, wind* Qwind =
1,5* 0,3* 39,17 = 17,6265 kN/m^2
1,5* 0,3* 31,11 = 13,9995 kN/m^2
1,5* 0,3* (-13,54) = -6,093 kN/m^2

Dominant wind load

γG * Gk = 1* 156 = 156 kN
γsnow* ψ0, snow* Qsnow = 1,5* 0* 89,85= 0
γwind* Qwind = 1,5* 39,17 = 58,755 kN/m^2
= 1,5* 31,11 = 46,665 kN/m^2
= 1,5* (-13,54) = -20,31 kN/m^2

Service Limit State

$$\sum_{j\geq 1}G_{k,j}+Q_{k,1}+\sum_{i>1}\psi_{0,i}Q_{k,i} \quad \text{(EC0, equation (6.14b))} \quad (2.24)$$

Dominant snow load

Gk = 156 kN
Qsnow = 89,85 kN/m2
ψ0, wind* Qwind = 0,3* 39,17 = 11,75 kN/m^2
= 0,3* 31,11 = 9,33 kN/m^2
= 0,3* (-13,54) = -4,062 kN/m^2

Dominant wind load

Gk = 156 kN
ψ0, snow* Qsnow = 0* 89,85= 0
Qwind = 39,17 kN/m2
= 31,11 kN/m2
= -13,54 kN/m2

Structural verification and analysis

Results | Messages

Member	Section	Material	Lav	Laz	Ratio	Case
184	bottom beam	Gl32h	5.77	6.93	0.82	12 Uls-Dominant S
29	Roof beamsUp	Gl32h	7.31	13.16	0.81	12 Uls-Dominant S
30	Roof beamsUp	Gl32h	7.31	13.16	0.76	12 Uls-Dominant S
28	Roof beamsUp	Gl32h	7.31	13.16	0.76	12 Uls-Dominant S
189	bottom beam	Gl32h	5.77	6.93	0.75	12 Uls-Dominant S
54	Roof Rafter Up	Gl32h	161.79	202.23	0.73	12 Uls-Dominant S
55	Roof Rafter Up	Gl32h	134.82	168.53	0.67	12 Uls-Dominant S
186	bottom beam	Gl32h	5.77	6.93	0.62	12 Uls-Dominant S
56	Roof Rafter Up	Gl32h	107.86	134.82	0.61	12 Uls-Dominant S
60	Top beam	Gl32h	6.93	11.55	0.61	12 Uls-Dominant S
48	Roof beamsUp	Gl32h	6.66	11.98	0.58	12 Uls-Dominant S
135	Roof rafters side	Gl32h	113.72	113.72	0.56	12 Uls-Dominant S
129	Roof rafters side	Gl32h	75.82	75.82	0.51	12 Uls-Dominant S
126	Roof rafters side	Gl32h	56.86	56.86	0.50	12 Uls-Dominant S
134	Roof rafters side	Gl32h	107.41	107.41	0.49	12 Uls-Dominant S
78	North Pillars	Gl32h	28.87	28.87	0.49	8 Uls-Dominant Wi
132	Roof rafters side	Gl32h	94.77	94.77	0.48	12 Uls-Dominant S
128	Roof rafters side	Gl32h	69.50	69.50	0.45	12 Uls-Dominant S
53	Roof Rafter Up	Gl32h	134.82	168.53	0.45	12 Uls-Dominant S
150	South Pillars	Gl32h	28.87	28.87	0.45	8 Uls-Dominant Wi
185	bottom beam	Gl32h	5.77	6.93	0.45	12 Uls-Dominant S
131	Roof rafters side	Gl32h	88.45	88.45	0.45	12 Uls-Dominant S
130	Roof rafters side	Gl32h	82.13	82.13	0.44	12 Uls-Dominant S
127	Roof rafters side	Gl32h	63.18	63.18	0.44	12 Uls-Dominant S

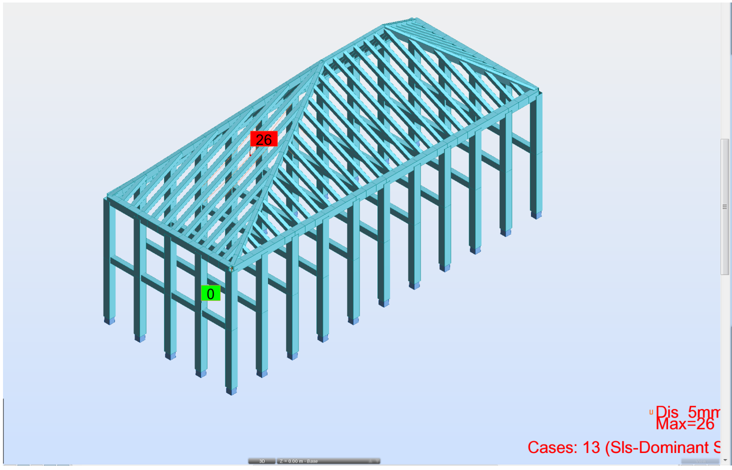
Table of the utilisation ratios from Robot Structural Analysis

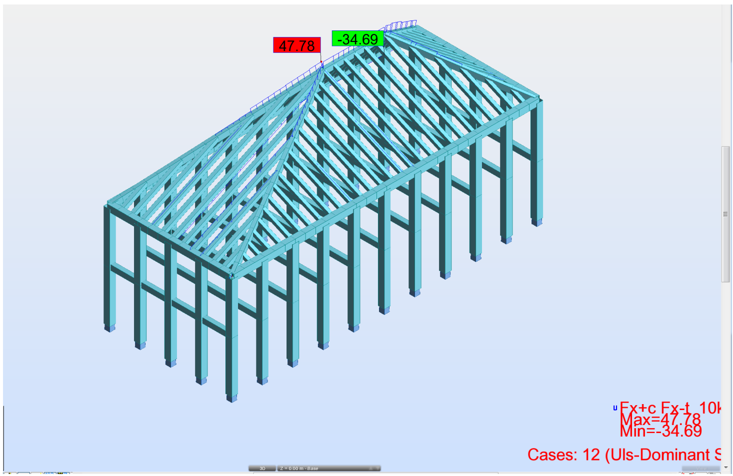
To make sure that all of the elements in the structure have a right dimensioning, tests in Robot Structural Analysis were carried out. From the table above is clear that every member is verified. Most of the stresses are located in the upwind parts of the structure, since the elements here have the longest length. The highest axial stresses are found in the top beam, where all the elements of the roof converge.

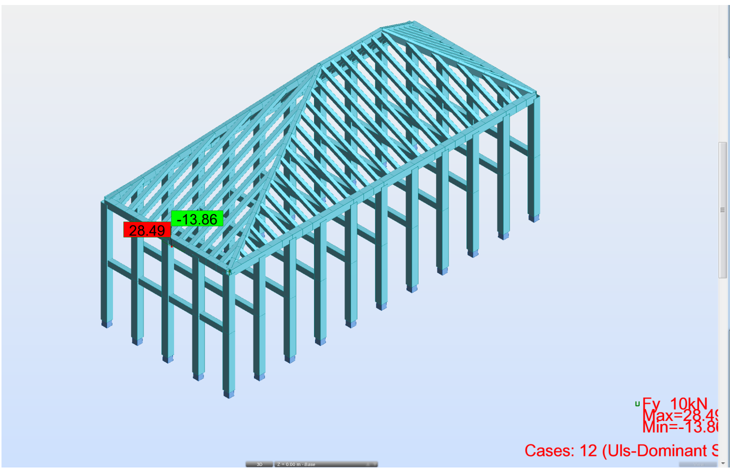
The maximum displacement of the structure has been investigated considering two SLS load cases, one with dominant wind and one with dominant snow, and it occurs with the second one. It is verified since 26 mm < 37,5 mm, which is the maximum displacement allowed (l/400, length of the longest span, 15m/400 = 0,0375 m).

The material is the Gluelam Gl32h, which is the strongest class. This is because by using the other strenght classes the displacement of the structure would be too high or the cross sections of the elements would be over dimentioned with a low ratios of utilisation.

In a further investigation, a solution that allow the use of a cheaper material could be found, for example by implementing a pillar to support the joint between the upwind rafters and the top beam.







Frames from Robot with the forces extremes (Displacement, Axial, Moment)

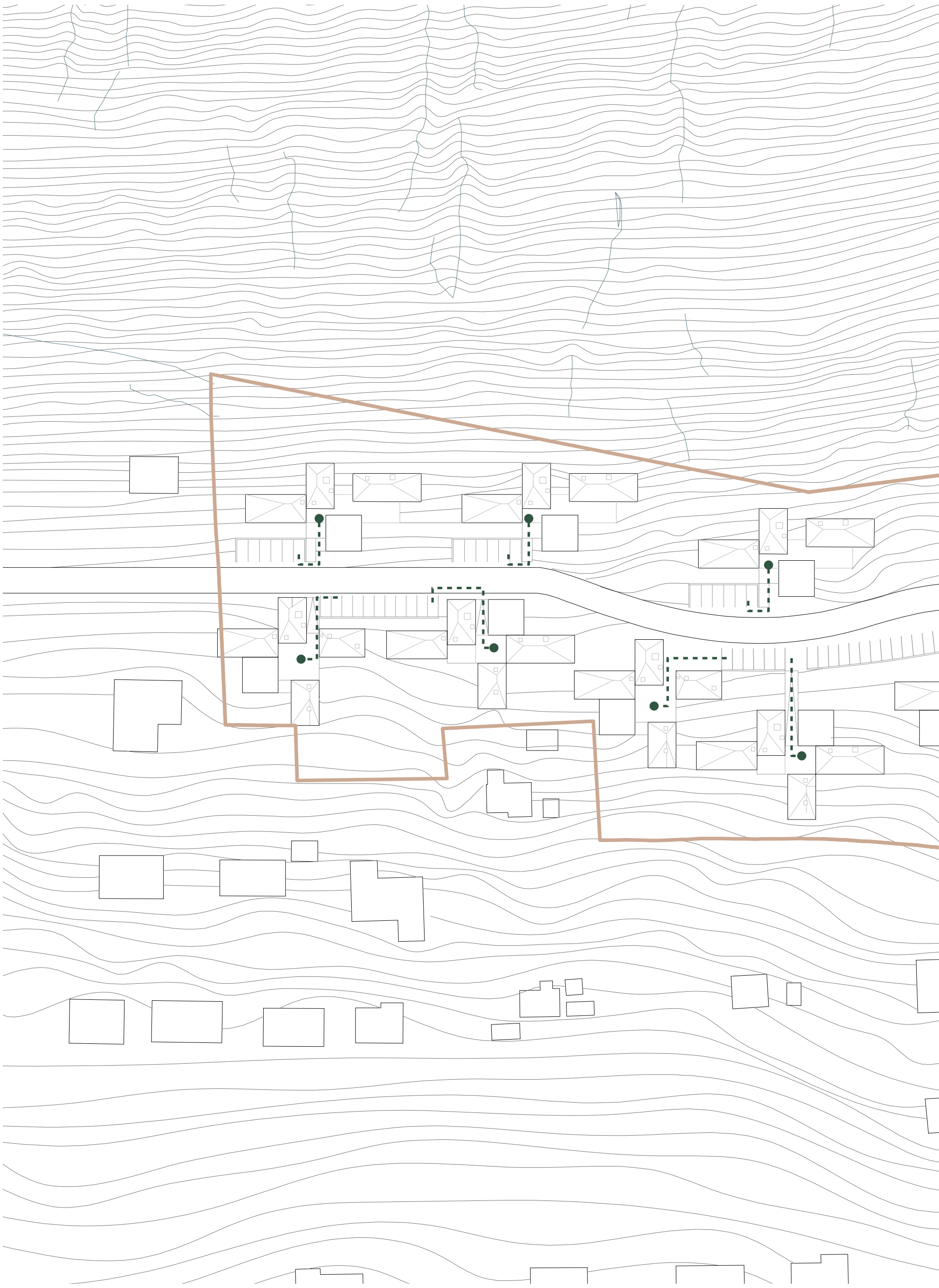
Elements	Sections (cm)
Roof Beam Upwind	h 27 b 15
Roof Beam Downwind	h 25 b 15
Top Beam	h 25 b 15
Bottom Beam	h 30 b 25
Rafters Upwind	h 20 b 16
Rafters Downwind	h 12 b 10
Side Rafters	h 15 b 10
Pillars Upwind	h 30 b 30
Pillars Downind	h 30 b 30
Pillars Sides	h 30 b 30
Horizontal Connections	h 25 b 15

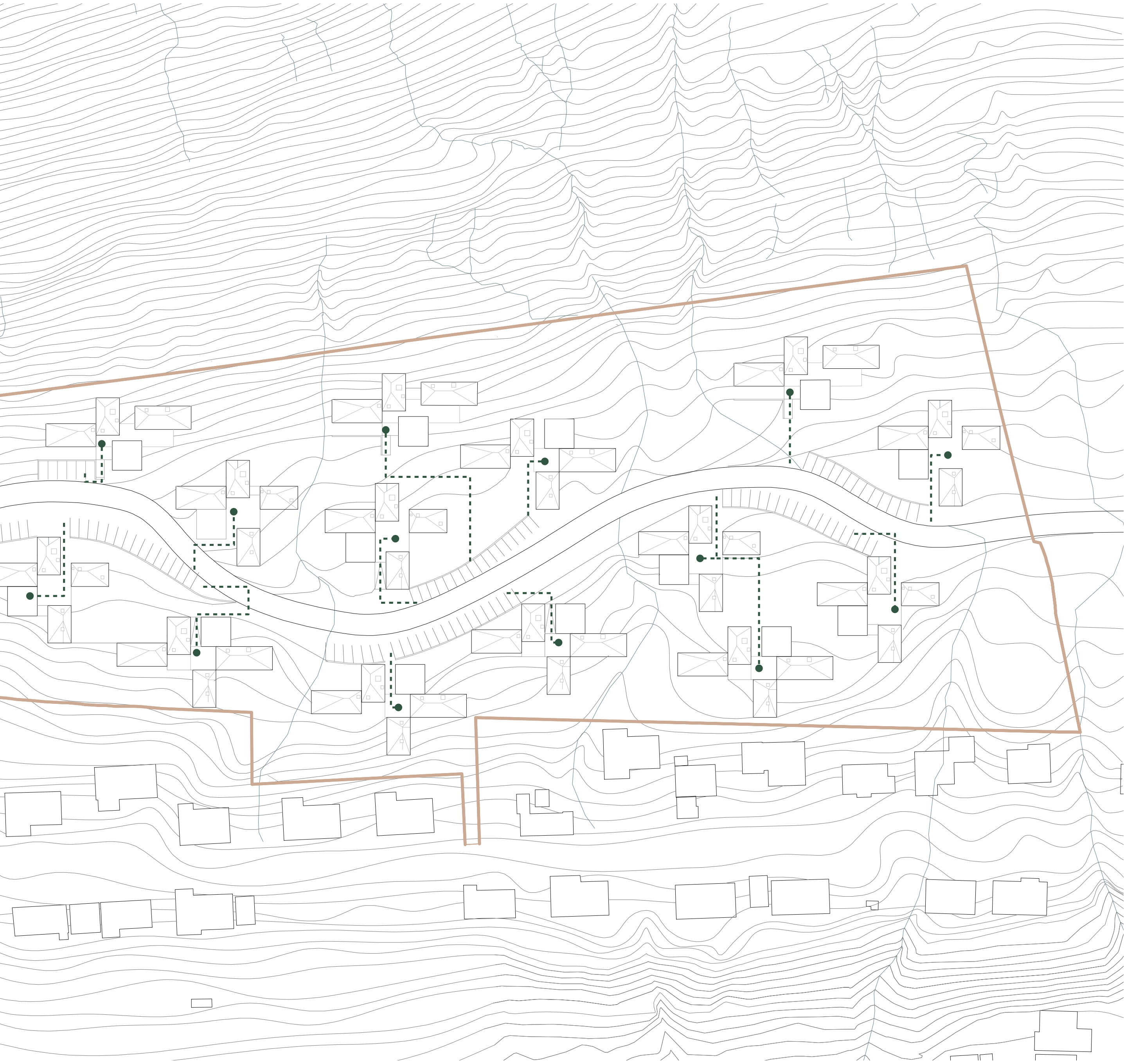
Table of the structural elements' cross-sections

Accessibility

On this spread is presented a diagram in order to demonstrate the accesses from the parking lots to each cluster.

On the following pages, are shown a diagram pointing which apartments of the complex are hadicapped fit and plan drawings of it.





Masterplan diagram with the accessibility

Handicapped accessibility

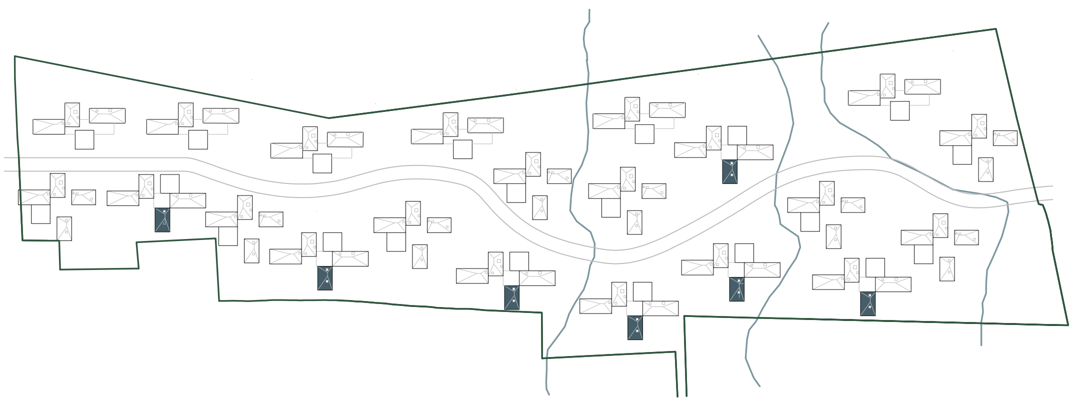
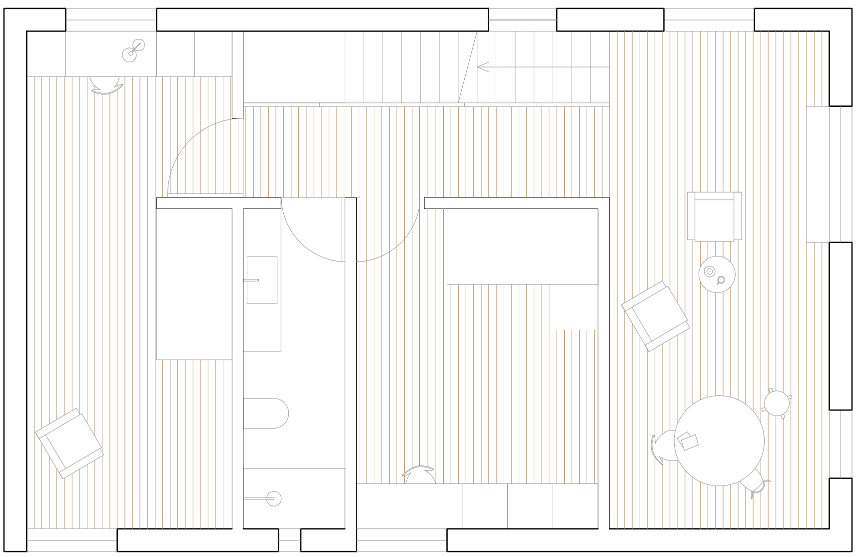
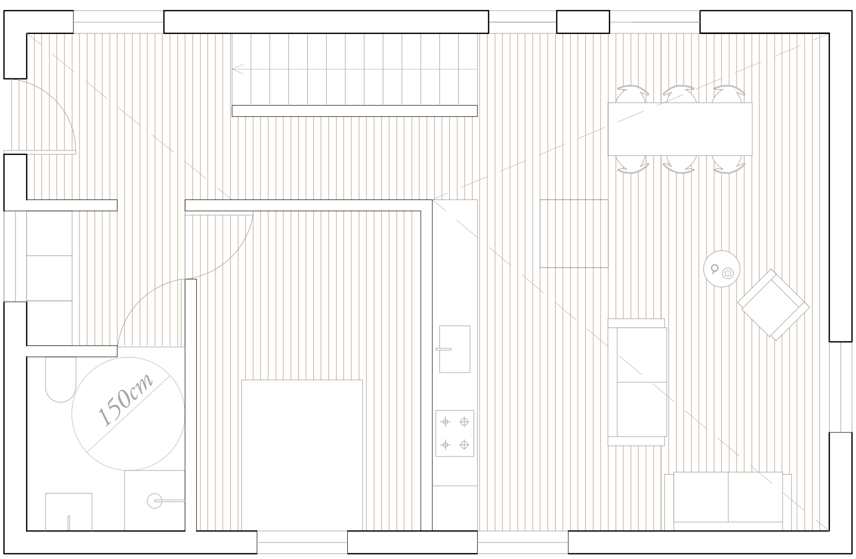


Diagram showing the units handicapped fit



Plan drawing of the 1st floor in 1:100



Plan drawing of the groundfloor in 1:100

Thank you