Eindhoven University of Technology

MASTER

Learning from a building

Haus am Moor

de Nies, Rico

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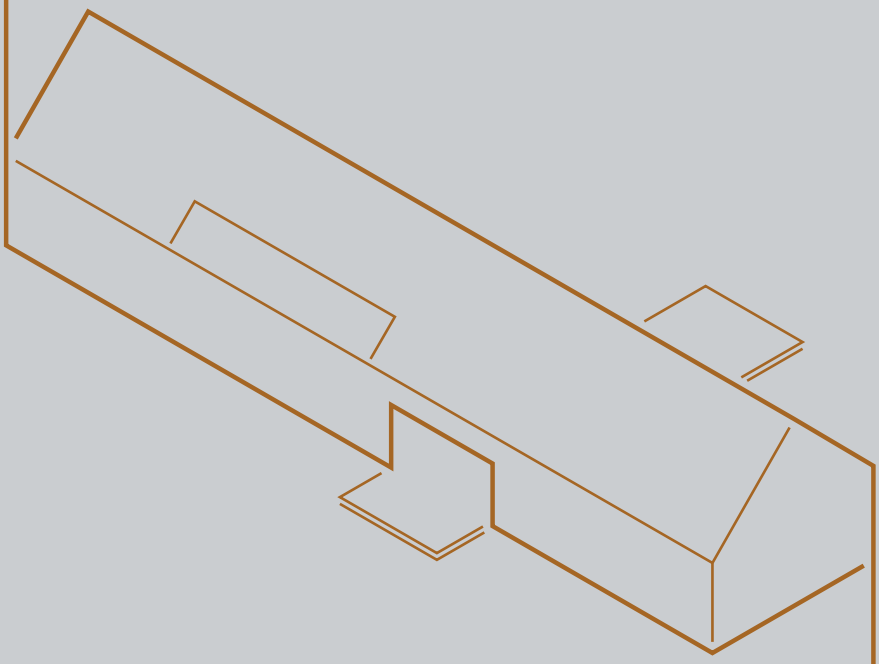
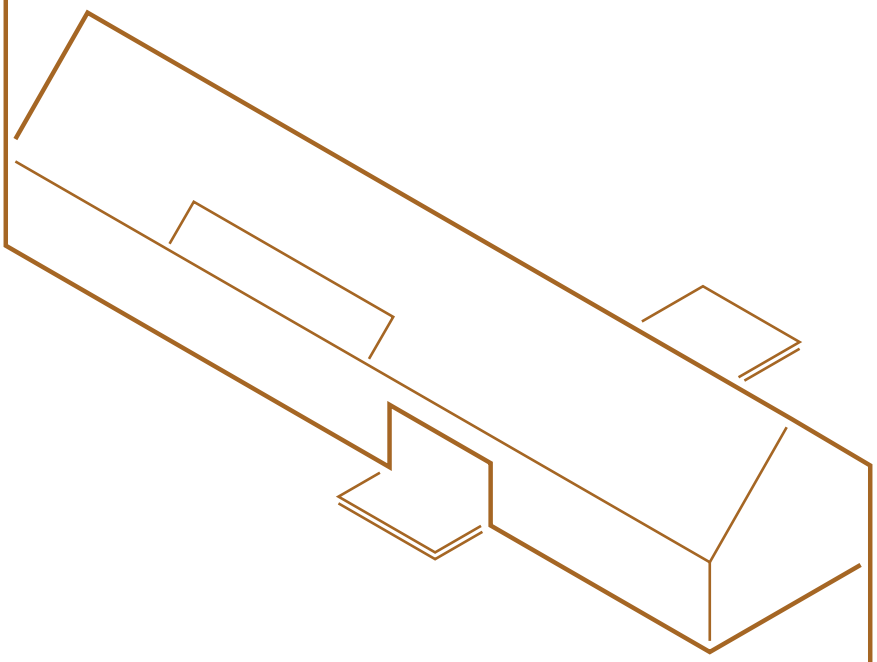
Learning from a building

Haus am Moor

Rico de Nies





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Graduation studio	Masterly Apprentice II
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Learning from Haus am Moor

Graduation Studio "Masterly Apprentice II"

Abstract

This graduation project is part of the graduation studio 'Masterly Apprentice II' at the Eindhoven University of Technology and is documented in two booklets. The first booklet contains an essay on the theme 'vernacular' and the analysis of Haus am Moor by Bernardo Bader. The second booklet contains a design proposal for a dairy farm with tourist accommodations, the Hoamat-Käsefarm, in Krumbach.

The theme 'vernacular' is explored through a collective essay 'Intellectualization of intuitional and cultural knowledge'. In addition to this essay, the research delves deeper into the definition of vernacular architecture in order to find a connection to contemporary architecture, which leads to the analysis of Haus am Moor, designed by Bernado Bader. This analysis focuses on four leading themes within the work of Bernardo Bader: holistic design approach, regional commitment, craftsmanship and low-tech sustainability.

The findings from the analysis of Haus am Moor are translated into guidelines for the design of the Hoamat-Käsefarm. The function and design of the building are influenced by the region and shaped to its final state with craftsmanship and low-tech sustainability.

Content

Introduction

The 'Masterly Apprentice II' graduation studio is an ongoing graduation studio which is in its 11th generation of the master program AUDE (Architectural Urban Design and Engineering). Each quarter of the year masters studies are completed and a new generation enters the graduation studio. This creates a continuous flow of knowledge and fresh ideas into the studio.

The aim of this studio is to learn from an architect by analysing one specific building. The chosen architects are based upon a theme which changes between every generation. The theme of this generation is 'Vernacular'.

This booklet contains an analysis on Haus am Moor, designed by Bernardo Bader, with a connection to vernacular architecture. The building is located in Krumbach, a small village in the Vorarlberg district, Austria. The study contains an in-depth analysis of the building according to four themes which are derived from the work of Bernardo Bader: holistic design approach, regional commitment, craftsmanship and low-tech sustainability. From these four themes multiple lessons and guidelines on how these influence the work of Bernardo Bader are derived. These are then used in designing the Hoamat-Käsefarm. The resulting design is the subject of the second part of this bundle.

Essay

Intellectualization of intuitional and cultural knowledge

By R. de Nies, L. Neufert, W. Pars and M. Sironi.

The first who used the term vernacular in an architectural context was Bernard Rudofsky in his exhibition and book 'Architecture without Architects'. According to Rudofsky(1987), the vernacular is the main source of reference for a correct architecture, being in harmony with nature and going against the general Architectural trend of Modernism, which, according to him, had distanced architecture from the individual and obfuscated the relationship it had with the natural world. He promoted the idea that an individual's built environment should reflect the history, culture, and climate of his or her immediate surroundings (Crow, 2007). Thus, he is stating that the architectural environment could reflect on spontaneous architecture through the way it is in harmony with the immediate surrounding.

However, what exactly is vernacular architecture?
After Rudofsky many others have given their own interpretation of the term, arriving at categorizing three macro groups of vernacular architecture: domestic, religious, and agricultural. In general, the elements that unite the definitions given for vernacular are the geographical factors, the survival of regional characteristics, materials, and climatic solutions. Vernacular architecture is shaped by the environment, national as well as cultural context, and is strongly defined by the availability of local materials and technologies and shows the cultural aspects, the beliefs, behaviors, and social structures of its place.

The visible relation vernacular architecture has with its surrounding is exemplary for an architect according to Rudofsky. But while the appearances of these buildings is an unconscious result of embedding a culture, that locally developed generation upon generation, in the act of designing, architects find themselves in a different context. There is a relevant difference between the ancient people who have built vernacular architecture at first and architects who make an intellectualized version. Primitive people that erected vernacular or spontaneous buildings used local materials because they were limited to their direct surrounding. It is evident in the fact that for ancient communities the surrounding landscape was their available source. They did not have the possibility of traveling greater distances and transporting from far away.

Whereas, architects today are not limited to the surrounding of their buildings nor to one source of knowledge but instead have the possibility to obtain material and information from all over the world. In general, the architect seeks answers to specific needs and conditions through an intellectualization. In regard to Vernacular architecture, the mental process of intellectualization creates inevitably a distinction between the original term of 'vernacular', that is almost a naïve and practical reaction to specific circumstances, and into what it has evolved after having been theorized.

Quite often the so-called vernacular architecture which is created nowadays is not anonymous and spontaneous but rather designed in very intentional ways by using the vocabulary of traditions and solutions learned through generations of practice and based upon the availability of particular materials and profoundly affected by climate. This creates an aware reproduction of local styles to create a connection to the local identity. Moreover, architects nowadays can count on the availability of knowledge of different building techniques, own first only by the population who developed it.

Using a figure of speech, The expression 'vernacular architecture' could be understood as an Oxymoron. Referring to the book, New vernacular, of the writer and curator Vicky Richardson, the vernacular can be defined as the unconscious work of a craftsman whose knowledge is the result of a cultural transmission accumulated over generations. On the contrary, architecture involves a premeditated design process with a conscious recourse of the intellect. Although the origin of these two words is controversial the line that divides them is not very defined, as there is often a meeting place between these two approaches. It is when the consciousness and intuition of a craftsman, of rural culture, is used as a starting point in approaching a design process.

We could, therefore, say that the meaning of the contemporary definition of 'vernacular architecture' describes more an approach in adopting the 'spirit of the vernacular' for the design development. Rather than a style, it describes the architect's intention to take inspiration and reflect in the designs on aspects such as local architecture, scale, landscape, local culture, and the idea of continuity with the past. Through a premeditated design process the architect, or someone on his behalf, intellectualizes an intuitional cultural knowledge. Some aspects of the contemporary idea of vernacular architecture can be traced back to the late nineteenth century, in some ideologies of the Arts and Craft movement. Like their use of local materials, the search for harmony with the landscape, and the adoption of simply utilitarian structures. During the second half of the 20th century, there was tension between two currents of thought. A conflict between applying universal ideas of modernism to any solution and the need to refer to specific cultures and characteristics of the place. The former may be generally associated with the canons of neoclassicism, the Beaux-Arts and the recent International modernism. The second, in contrast with the modernist notions of progress, adopts the spirit of vernacular as a tool to connect the idea of civilization and the Genius Loci, the sense of place.

In Kenneth Frampton's(1981) essay, 'Critical regionalism: Modern Architecture and Cultural Identity', he, reflecting on the work of central figures like Utzon, Ando, Snozzi, Siza, tries to find common ground, an in-between architectural position, that is both rational and intuitive. Referring to the importance of a vernacular attitude towards architecture, Frampton(1981) describes it as related to; "the manner in which a building relates to the topography and with the occupant's acknowledgment of a building, who never interact with it in a linear way but rather through personal intuition, impulse, chance, and circumstances." According to Frampton, a more suitable term to explain this contemporary approach, that today is being built accordingly to vernacular solutions and closely connected with the characteristics of the place, may be Regionalism.

In conclusion, for architects to embed the identity of the place in the design more than copying and implementing aspects of the place is needed. Within a 'regionalism' approach the architect needs to intellectualize the place. Intellectualizing vernacular phenomena allows the architect to understand the reasoning behind the decisions which were made over decades by people who were building spontaneous and anonymous. An architect who has intellectualized spontaneous action of building will determine techniques that go at the roots of sources. Therefore, the architect achieves the ability to manipulate ancient techniques and old traditions which can be reinterpreted in contemporary architectural solutions that not only establish a continuity with the past but also embed the local identity in the design. This creates a connection with the environment based on the identity and not only by visual similarities which would be the case without intellectualizing the vernacular. Intellectualising the vernacular creates a place where the users can orient themselves towards the world they live in. Edward Relph(1976) points out that without this local orientation the users "are lost and without identity".

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Figure 1: Interior Haus am Moor

Haus am Moor

Designed by Bernardo Bader

Vernacular architecture

Figure 2: Stöckli, cottage preserved from the 18 century

Vernacular architecture

Defining vernacular in architecture

The Masterly Apprentice graduation studio aims to learn from one architect and one of their buildings, in this case with a link to vernacular. The task for the 11th generation is finding an interesting architect, building and subject with a connection to vernacular. The chosen architect defines the path of the graduation project, so it is important to choose an architect and building that sparks enthusiasm and curiosity.
In order to choose an architect with a link to vernacular, it is first of all important to have a clear understanding of 'vernacular', and what within the meaning of vernacular architecture is appealing to further analyse with a building in mind.

Vernacular originates from the Latin word Verna meaning home-born or slave. This became the Latin word Vernaculus, meaning domestic or native (Oxford. (n.d.-c). The meaning of vernacular can be diluted to being specific to a place and its culture. According to the Cambridge dictionary, vernacular architecture is defined as "a local style in which ordinary houses are built" (Cambridge, n.d.). 'A local style' and 'ordinary houses' seems a little reductive to summarize vernacular architecture.
To further define vernacular architecture the definitions by Bernard Rudofsky and Sibyl Moholy-Nagy are studied.

Bernard Rudufsky defines vernacular architecture in the book 'Architecture without architects, an introduction to non-pedigreed architecture' as "that it was not designed by architects, but that it is a joint venture. It is a folk architecture that is realized by the people themselves by people without an architecture education. Because these buildings were built by members of the community and the residents of the building itself and this architecture was usually built from locally available or produced materials, the bond between the home and the environment was strengthened" (Rudofsky, B. 1964).
This definition helps to define the meaning of vernacular architecture as a process taken place because there was a need for a building. The local materials and knowledge together with the culture and environment created the end product. Sibyl Moholy-Nagy defines it similarly way but talks about the anonymous builder instead of folk architecture. She adds a part about the 'automatic' sense of aesthetic in the anonymous builder. He builds based on physical and spiritual needs where the strength of materials is as important as cultural aspects in the building.

The anonymous builder was acting on intuition responding to a need to start building but from there on implements aspects from the region being materials, local knowledge, environment and cultural aspects which are important to him and his people (Moholy-Nagy, 1957).
Sibyl Moholy-Nagy also discusses the selected building materials by the anonymous builder, "he selected building materials and methods based on their availability and fitness for the given purpose this while keeping in mind the response of the material to time and climate, in other words how they aged. The 'native architect' was also aware of economy while building, not in the terms of maximum output for the minimum input but more in the terms of preventing waste. Economy in indigenous architecture means maximum advantage of all given factors" (Heynen, 2019).

The architecture without architects or the anonymous builder built on the demands of its time with the knowledge based on the region. This resulted in different buildings around the world. Consequently, there are different typologies around the world, each reacting to the climate and materials of that region. The typologies follow the rules of the region, not an architectural style. Vernacular architecture is a type of architecture based on the traditions and expertise of local builders, which originate from building in the same environment for a long time. This leads to buildings specific to that location. The buildings were a result of the availability of materials and the knowledge of how to use them together with the cultural influence of the region. The creation of a vernacular building was a common matter. The builder and his demand for a building fitted the community and used the local knowledge and materials to create an 'economic building'. This knowledge ensures the quality of the building, a building that will last using the minimal amount of materials required.

The definitions provided by Rudofsky and Moholy-Nagy help to create criteria's to search for an architect and building with a link to vernacular. The building needs to fit the context, so by using regional concepts one can create a building that fits that specific place and becomes part of the surrounding and imbeds it with the local culture. Using local materials and knowledge a building can be created that fits the region and continues to develop the region's architecture. More importantly, one will create a building that fits the user. The building is a reaction to a specific need of the user.

Haus am Moor

Figure 3: Bernardo Bader

Bernardo Bader

Vernacular architecture

Now that the definition of vernacular architecture, as well as my main points of interest, are clear, the search for a architect and buildings that meet the criteria begins. A design shaped by the region and that implements local materials and knowledge to create a design around the user. The user is central in the design process to create a design that fits the needs of the user. While looking for buildings I came across the work of Austrian architect Bernardo Bader.

Bernardo Bader grew up in the Vorarlberg district where he came in contact with handicraft and building culture that is strongly rooted in the community of Vorarlberg. He studied architecture at the University of Innsbruck. During his last year, he started working at Dietmar Feichtinger Architectes. After graduation, he worked there for another year but noticed that he missed a dialogue with clients and the environment. At Dietmar Feichtinger Architectes it was not uncommon to make a design digitally in Paris for a project in Hamburg and to not meet the client nor see the site. This lack of interaction between the client, the site and architect was the start for his architectural firm in Bregenz, Vorarlberg (Fiel, 2014).

At his firm, he focuses on the close connection between the client and himself, as Bernardo Bader himself says, "I somehow need to feel my client, the user of my product along the way" (Fiel, 2014). Bader finds it difficult to work in an anonymous situation where you do not know the client and are not able to relate to the client. "the only thing left to do is come up with a well-intentioned design and just hope that it will work out in the end" (Fiel, 2014).
To ensure a design is created that is shaped around and fits the user, Bader looked for craftsmen to work with when setting up his own architectural office. These craftsmen were capable of great work, were willing to have a dialogue and work with a young architect (Haele, 2010). This dialogue is an important aspect within the work of Bernardo Bader because it allows him to take detailing into account from the start which helps him to create a design that fits the user.

Bernardo Bader architects created a clear opinion over time that "you cannot escape the area you work in, similar façades and materials combinations arise and that's fine. It is not about the variation of the outside, which finish is used, shingle or slates. It is about the functioning of the building, how a family uses the building in the best way" (Jung, n.d.). Vernacular architecture is often an inspiration in the work of Bernardo Bader as he says that the most interesting buildings are the "Buildings, most of which were not designed by an architect. Agricultural buildings, very simple architecture. Buildings designed to be relaxed and of a certain logic, not academic intent" (Jung, n.d.).

To summarise, Bernardo Bader's work is a combination of refinement and clarity. He connects the existing cultural identity with the contemporary in a holistic sense. He understand the region and its building culture which enables him to create a design which is embedded with local aspects. He designs with this knowledge a building around the user making the design fit the user as well as the environment. To shape the design around the user Bader pays full attention to all the details, which are then skillfully handcrafted in collaboration with various skilled people to achieve the best possible result for the user. Vernacular typologies and concepts are a source of inspiration throughout the design process to create a design that is embedded with cultural aspects of the region.

Figure 4: Haus am Moor

Haus am Moor

Designed by Bernardo Bader

The work of Bernardo Bader consists mainly out of schools, day-cares and houses. The building that has been selected for further analysis is Haus am Moor. Haus am Moor is a single-family house with a small office which is located in the village of Krumbach, Austria, and was completed in September 2013. Haus am Moor was chosen because it uses vernacular concepts, concepts found in the region to embed the local culture in the building and help the building fit in the context. The building is shaped around the user and with the care of detailing and craftsmanship a building is created that has the expression of a fully detailed furniture piece rather than a house.

Haus am Moor is a long stretched rectangle, one-and-a-half story volume with a pitched roof. The building is located at the end of a little settlement and is placed in the landscape in a way that creates a public side and a private side. Haus am Moors floor plans are divided by a platform that runs from side to side as can be seen on 'Figure 5' and 'Figure 8'. The left side of the platform contains the house, the right side the office space. There is no other connection between the house and the office except the platform. The building is situated north-south, with the living area directed to the south. The entrance of Haus am Moor is located towards the settlement (east side), this entrance is accessible by the platform.
On the opposite side of the building, the west side, the building starts to open up towards the landscape and the platform flows out of the building reaching into nature. This creates a connection to the meadow around the building.

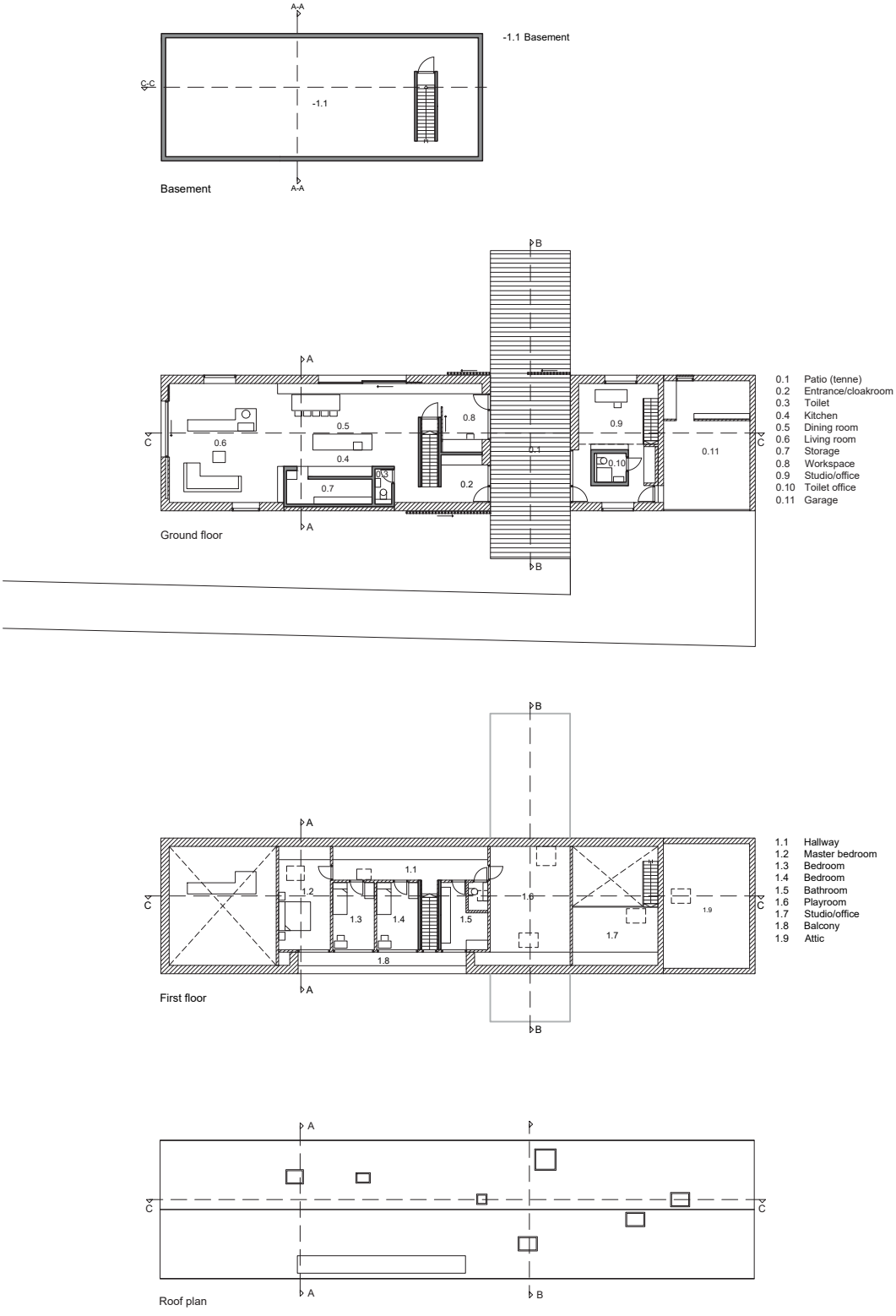


Figure 5: Floor plans Haus am Moor,1:400

Figure 6: Kitchen Haus am Moor

Figure 7: Living room Haus am Moor

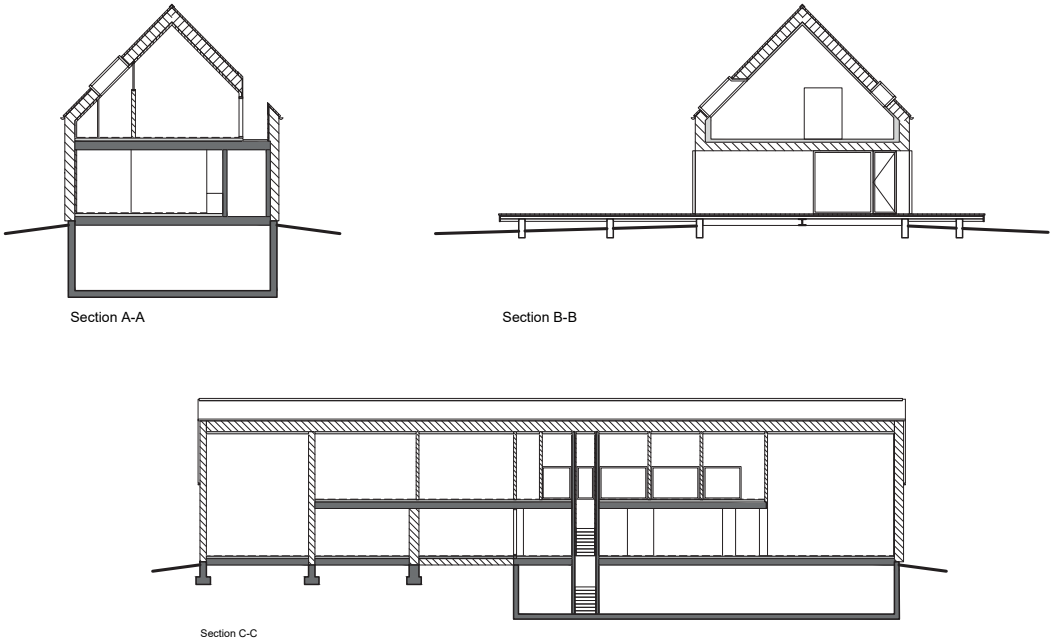


Figure 8: Sections Haus am Moor,1:300

Figure 9: Office space Haus am Moor

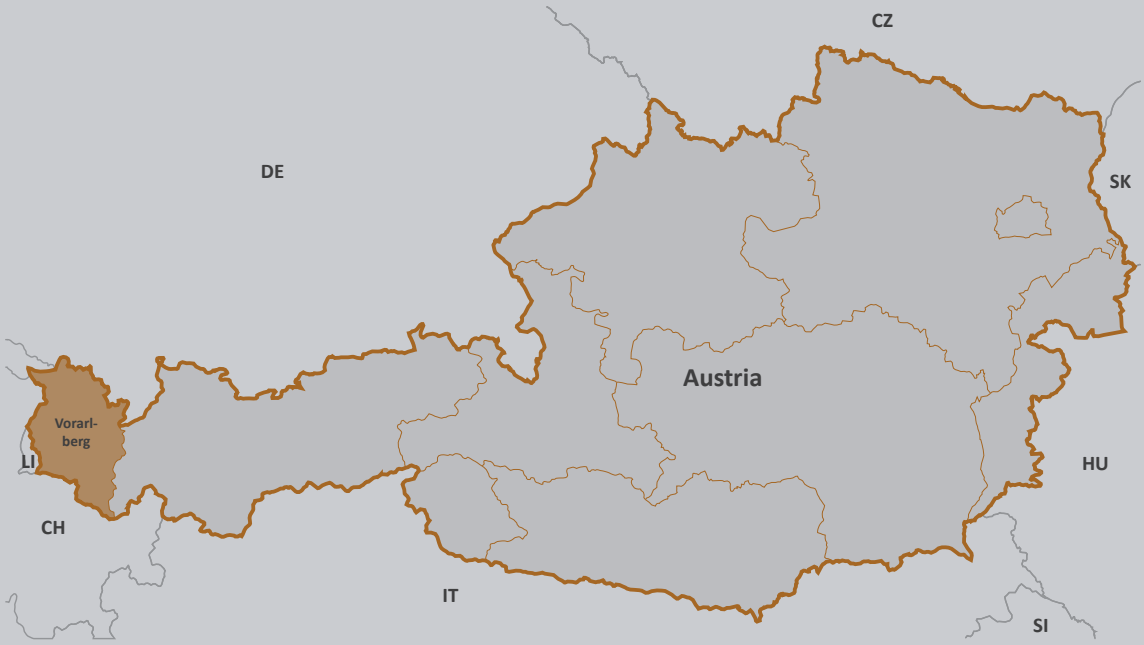
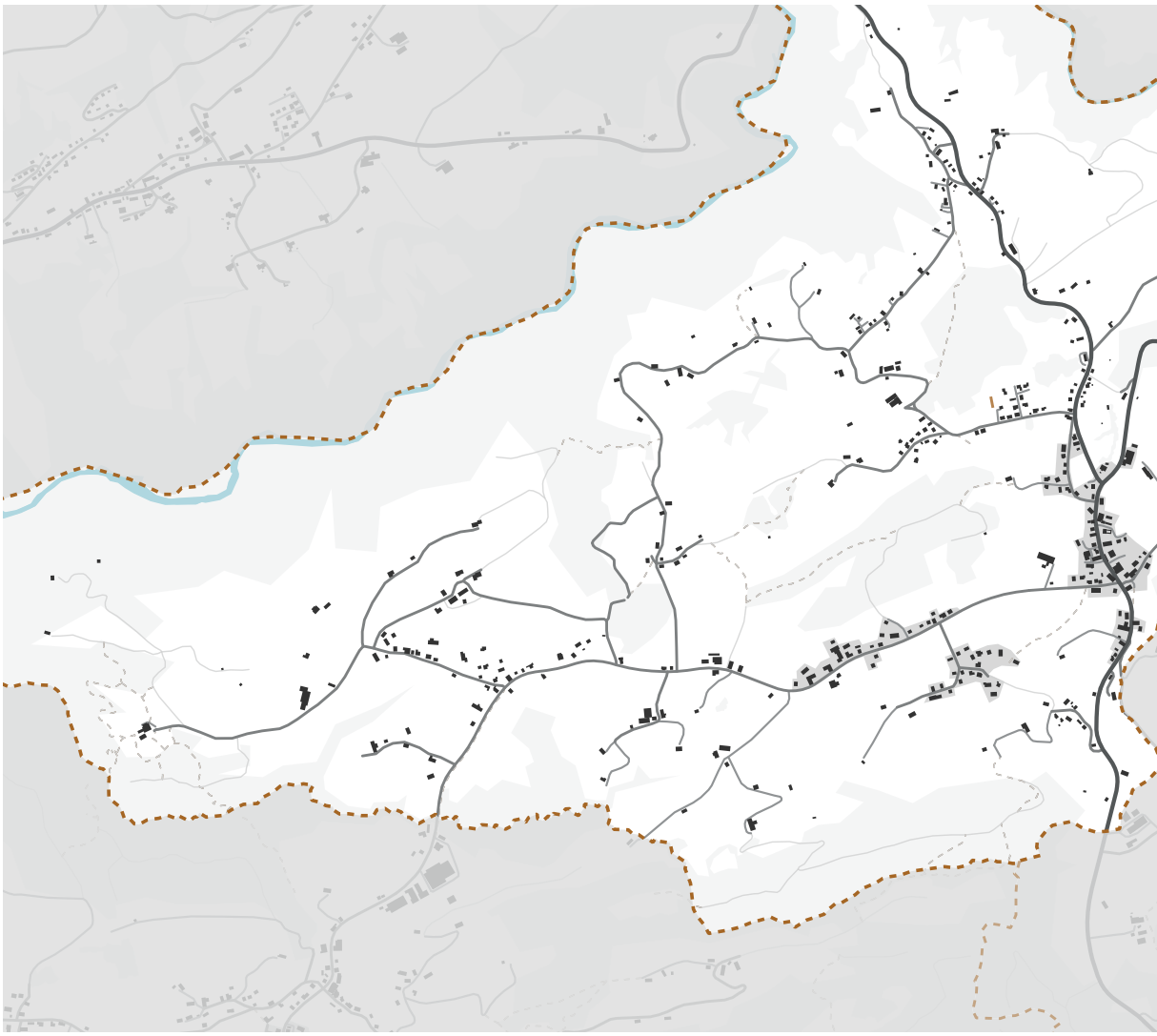


Figure 10: Map of Austria

Figure 11: Map of Vorarlberg



Krumbach

Bregenzerwald

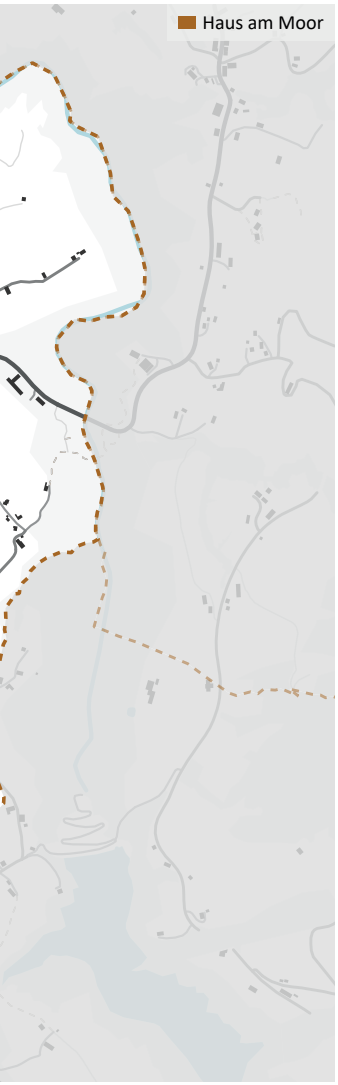


Figure 12: Krumbach

Haus am Moor is located in Krumbach, which is located in the Bregenzerwald district, part of the Vorarlberg state in Austria. Vorarlberg has had a lively architectural scene for decades which resulted in the forming of the 'Vorarlberger Bauschule' in 1960. Shortly after the formation of the 'Vorarlberger Bauschule' movement the 'Vorarlberg design artist' was formed. This was the introduction of contemporary architecture and critical regionalism to the area which can still be perceived throughout the work in the region today. The movement was based on notions such as clear lines, minimalist forms, limited use of natural resources, blending in harmoniously with the surroundings, and most importantly affordability.

The critical regionalism became an important aspect of the building culture in Vorarlberg. The delicate relationship between the existing fabric of vernacular architecture and the newly created structures has grown to become an important aspect of the local architecture. The architecture created in Vorarlberg is a prime example of taking care of these aspects whilst simultaneously creating a design which fits the demands of the client. The architecture in Vorarlberg shows awareness of the context, which exist of different layers of historic evolution. It uses knowledge from the region and connects this to new national and international developments. This results in architecture with a response to the context influenced by innovations. ('Vorarlberg', n.d.).

The Bregenzerwald district is known for woodworking and cheese making craftsmanship (Bregenzerwald Tourismus GmbH, n.d.). The Bregenzerwald consist out of the city of Bregenz and 24 villages. Krumbach, one of these villages, is rather small, with only about 1050 inhabitants on 8.71 km² (1 January, 2019).

To the west of Krumbach one can find the Rossbad nature reserve, which is part of the nature park Nagelfluhkette, the first cross-border nature park between Germany and Austria.
The Rossbad reserve is a mixed landscape, it consists mainly out of natural mixed forests and moor areas (biotopes). Krumbach has one large and 13 small biotopes scattered around the village ('Gemeinde Krumbach', n.d.).

Figure 13: 1. Bus stop Zwing

Figure 14: 2. Bus stop Unterkrumbach Nord

Figure 15: 3. Unterkrumbach Süd

Figure 16: 4. Bus stop Glatzegg

Figure 17: 5. Bus stop Kressbad

Figure 18: 6. Bus stop Oberkrumbach

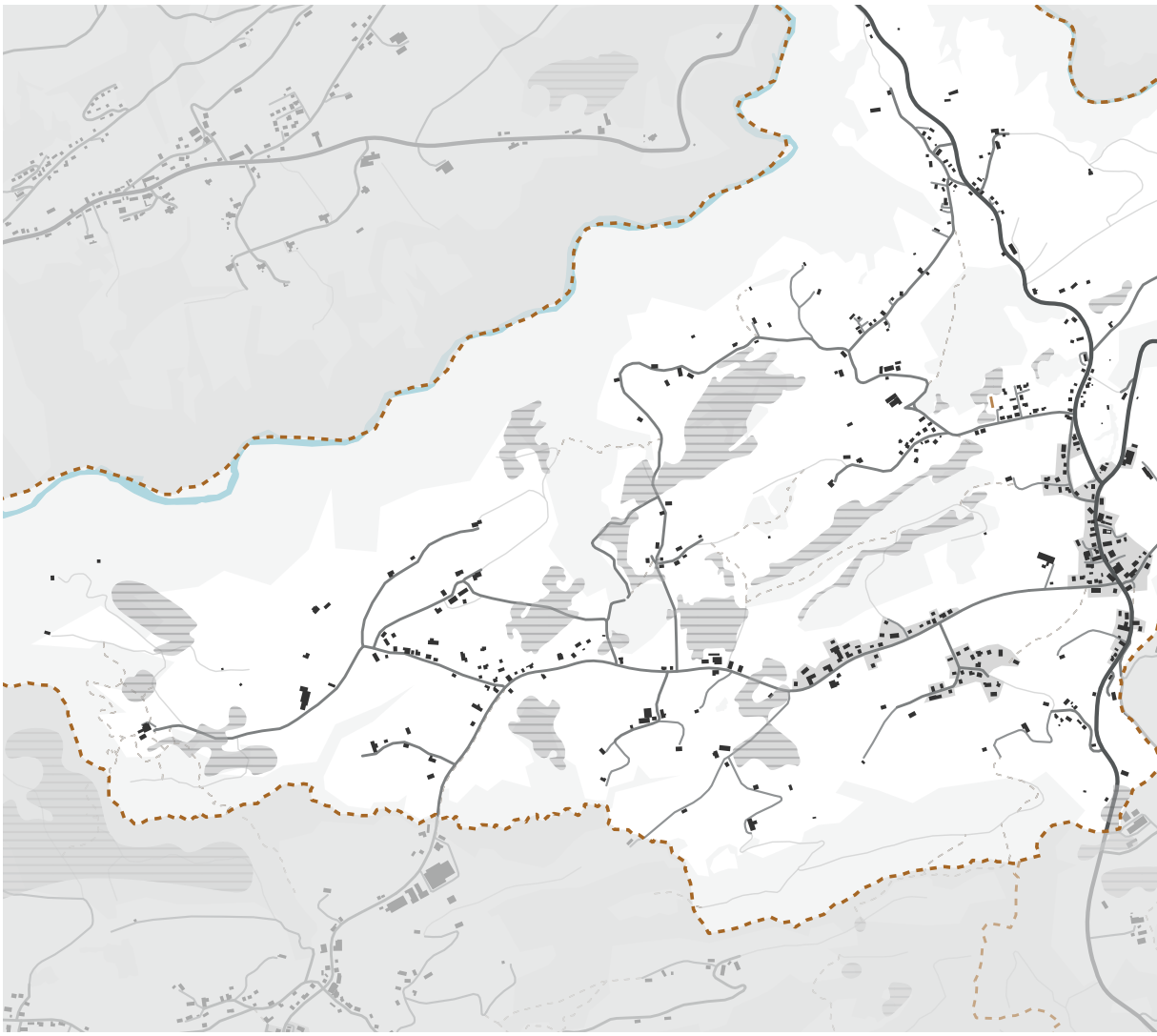
Figure 19: 7. Bus stop Bränden

Figure 20: Krumbach center

The economy of Krumbach is mainly based upon the craft of wood working and small scale agriculture revolving around cows. Krumbach tries to create a third economic base beside crafts and agriculture which is tourism. The village tries to attract tourism to the moors with a initiative is called 'the moor Krumbach project' ('Gemeinde Krumbach', n.d.). The project supports the sustainable development of the community while preserving the moors. To attract tourism and preserve the moors they created three main moor walking routes with benches by every single moor. These benches display information about the plants specific to that moor.

The municipality is investing in architecture in order to continue the work on the environment and the preservation of the ecological living space in Krumbach. 50 years ago they began a structural development for the village with architecture competitions for public buildings. New architectural projects in the village are from well-known Austria architects like Hermann Kaufmann, Bernardo Bader and René Bechter ('Allgemeine Information', n.d.), but also international architectural projects are organized by Krumbach. The best example of this is the project BUS:STOP, which was an international competition to design seven bus stops. The price for the competition was a vacation to Krumbach for all seven winners. The base for this project is the bus stop in the centre of Krumbach created by Hermann Kaufmann, Bernardo Bader and René Bechter, now seven more bus stops were placed around Krumbach designed by the following international architecture firms who collaborated with local architects to create the designs ('Projekt', n.d.):

1. Zwing by miljan Radic located in Chile partnered by Bernardo Bader
2. Unterkrumbach Nord by Ensamble studio located in Spain partnered by Dietrich
3. Unterkrumbach Süd by De Vylder Vinck Taillieu located in Belgium partnered by Thomas Mennel
4. Glatzegg by Wang Shu and Lu Wenyu located in China partnered by Hermann Kaufmann
5. Kressbad by Rintala Eggertsson architects located in Norway partnered by Baumschlager Hutter Partners
6. Oberkrumback by Alexander Brodsky located in Russia partnered by Hugo Dworzak
7. Bränden by Sou Fujimoto located in Japan partnered by Bechter Zaffignani.



Moor

Krumbach

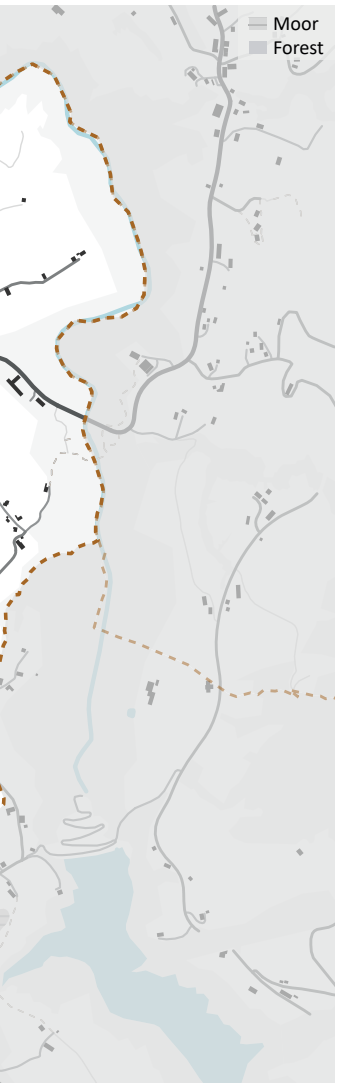


Figure 21: Locations of the moor

One of Krumbachs unique qualities is its landscape. The 14 moors, varying in size, are located throughout Krumbach. A moor is a wetland with spongy soils that have their own specific characteristic biotopes. These biotopes have their own plants which only grow on the moor, these plants attract a wide range of animals.

The soil in a moor is constantly saturated with water from rain or a local source such as a creek. This wet, spongy soil was formed by dead plants which are preserved under wet, low-oxygen conditions. This results in a specific biotopes where only a selected range of plants can grow. The result is a clear definable line in the landscape between the meadows and start of the moors. (Hugron, Bussieres, & Rochefort, 2013)

Figure 22: Vegetation of a Moor

Figure 23: Moorraum, viewpoint over moor

Figure 24: Benches along the moor route

Figure 25: Information displayed on benches

The moor Krumbach project connects the benches with three moor walking routes that go through Krumbach. At one of these stops is also a viewpoint located that gives a view over the local moor. This viewpoint is called the Moorraum and is designed by Bernardo Bader, Rene Bechter and Paul Steurer. The benches and the viewpoint are displayed on a map of Krumbach 'Figure 26'.

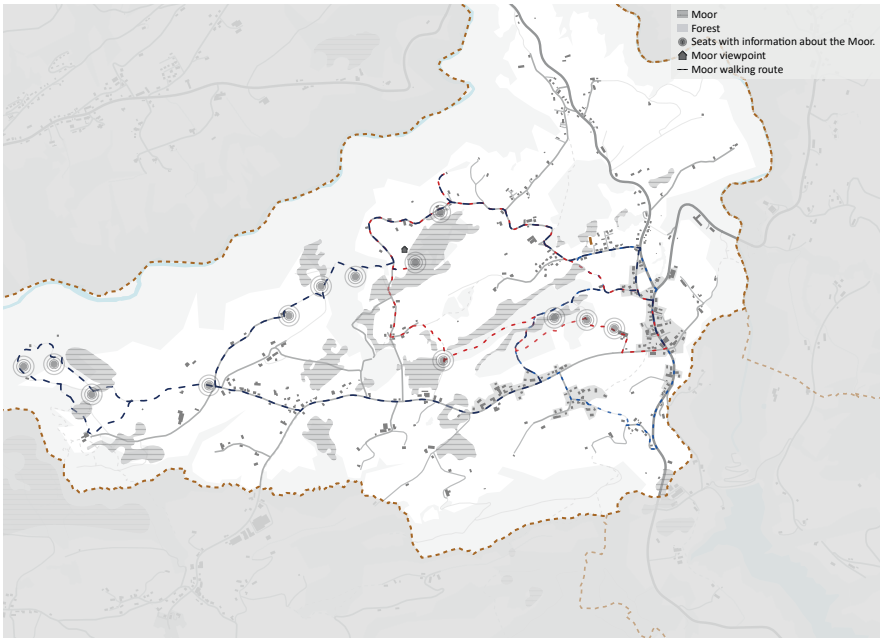


Figure 26: Three main walking routes along the moor with benches

Themes

Holistic design approach

In the work of Bernardo Bader

Bernardo Bader has a holistic approach to architecture. This approach functions as an overarching theme, a design principle consisting of several ideas to help him create a design. When analysing Haus am Moor and looking at other work of Bader I found three main themes which I think help him to create a 'holistic design'. These three themes are regional commitment, craftsmanship and low-tech sustainability.

The holistic design principle can be described as a sense of 'baukultur' in the design. 'Baukultur' is a well know phenomenon in Austria. It is "essential for creating a built environment that is considered worth living in. In addition to social, ecological, and economic aspects, Baukultur also has an emotional and aesthetic dimension. Its creation, appropriation, and use are social processes that are based on a broad understanding of qualitative values and objectives" (Bundesstiftung-baukultur, n.d.).
The work of Bernardo Bader connects the cultural identity of a place with the wishes of a client into a design. This design is about creating a good building for the user and its environment.

This sense of 'baukultur' and shaping the building around the user can be defined as a holistic approach towards architecture. The Oxford English dictionary defines holistic as: "characterized by the belief that the parts of something are intimately interconnected and explicable only by reference to the whole" (Oxford, n.d.-a). Everything is interconnected and complements each other. Each aspect is necessary to create a result.

In architecture this can be translated into not only wanting a roof over your head but also valuing other important aspects such as aesthetic, energy use, functionality, culture and context. The holistic design approach in architecture enables architects to account for all these things. The work of Bernardo Bader connects the cultural identity and diversity of a place to a design which at the same time creates a usable and sustainable design for the user.

The Haus am Moor analysis is structured in a way where I first define a theme and then analyse the design based on the definition of that theme. Then other themes follow.

Regional commitment

Definition of the theme

Bernardo Bader Architects work with the philosophy that you cannot escape the region you work in. This philosophy follows Bader's statement: "The kneading of available typologies to create something self-contained illustrates the methodology of finding rather than inventing" (Jung, n.d.). To be able to find, rather than invent, they focus on finding concepts in the region, reinterpreting local typologies and using local knowledge and materials. To understand why he commits to the region the analysis first delves into the importance of local typologies and how a region is important to a typology, after which it goes into the use of local knowledge and materials.

Typologies and the region they are located in are strongly connected. Aldo Rossi, for example, has argued that types have evolved throughout history, their aspects varying depending on society, culture, period and location (Jonghoon & Han, 2018). The connection between a typology and the region is defined by the qualities of that region, the place is it located in. Norberg-Schulz uses Voillet le Duc to describe 'place': "With place we mean a totality, made up of concrete things having material substance, shape, texture and colour. Together they determine an environmental character or atmosphere" (Smith, 2012, p. 364). Norberg-Schulz elaborates this in his essay called 'Genius Loci', on the connection between the place and the typology and the interaction between the two. He defines this interaction as 'locus', by which he means "a relationship between a specific situation and the buildings that are built on this place" (Rossi, Barbieri & Kurpershoek, 2002, p. 119). A place or a region creates its own identity based on the local conditions. This creates a typology that refers back to materials, shape, texture and colour which are merged in a building specific to that location. It becomes a typology when the building is a solution to problems faced in that region where the community starts to recreate the same type because it works. Regions with their own typologies lose their identity when typologies from elsewhere are implemented in the region. This shows the importance of implementing impulses from the region into a building to ensure that the identity of the region and its typologies are protected.

Bernardo Bader finds and uses typologies to further evolve the building tradition and the typology rather than create a building based on ideas that are unfamiliar to the region, which would break the link between the region and the designed building. He finds positive aspects in a typology and explores the architectural principles within this typology.

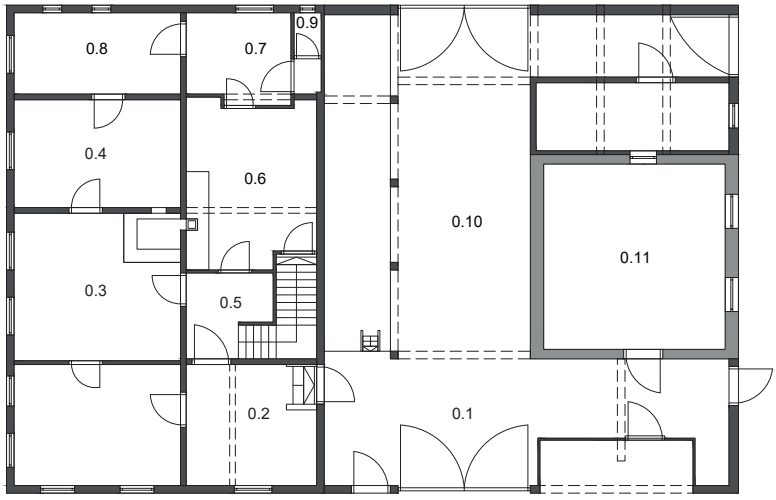
He modifies the typology to create a design that fits its purpose, the design still reflects the society and culture of the region while at the same time fitting the user. The result is a design that doesn't break the link to the region. To be able to develop the typology and the building culture of the place it is important to understand the region and its culture. This knowledge can be derived from the typologies as Andrew Singletary wrote: "an architect or planner raised in the 1960s suburbs is unlikely to be as aware of the ideal environmental setting of a farmhouse as a builder from the 19th century, who was raised in that rural landscape. And when we lose that building, we lose the artefact of that knowledge" (Mayes, 2014). Building upon an existing typology allows the knowledge and culture to be developed and stored for the future.

Applying the knowledge from existing typologies and evolving these typologies allows the building culture to exist and evolve. In the Bregenzerwald the building tradition is based on wood ('The Elegance of Wood ', n.d.). They have a quality approach to wood which ensures the sustainable harvesting and fabrication of wood in the region. Consequently, since that wood is a long-lasting material, it still looks great after centuries. This is the result of the level of care with which the wood is selected, felled, dried and worked. This knowledge still exist because they keep on evolving the building culture instead of implementing new impulses from somewhere else.

To conclude, Bader is aware of the context he is building in and uses local typologies and knowledge to create a design which fits the client and the current time, while at the same time embedding the region in his design. He understands the rural builder of a farmhouse and the choices they made, and with this knowledge, he can create a design which is a further development of the building culture in this rural area. As John Ruskin wrote it in his book 'The seven lamps of Architecture': "that spirit which is given only by the hand and eye of the workman" (Ruskin, 1989). This spirit is visible in the building and shows the craftsmanship of the time, the use of materials. The understanding of craftsmanship in the built environment is a very important aspect which allows him to embed the regional culture in the design and use the knowledge of craftsmen which is preserved in Bregenzerwald. This links the regional commitment to the next theme, craftsmanship.

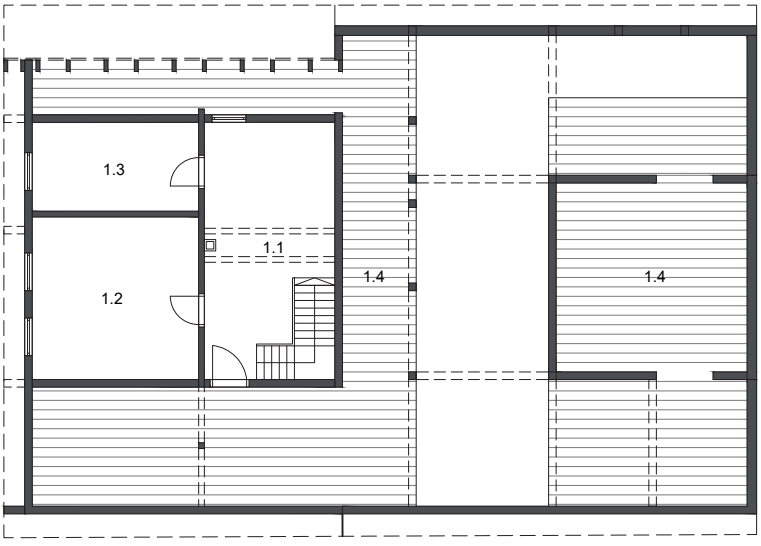
Figure 27: Bregenzerwaldhaus

Figure 28: Typical barn in the Bregenzerwald



0.1 First shed
0.2 Second shed
0.3 Living room
0.4 Bedroom
0.5 Hallway
0.6 Kitchen
0.7 Dinning room
0.8 Third Shed/bathroom
0.9 Toilet
0.10 Tenne/Breezeway
0.11 Barn

Ground floor



1.1 Hallway
1.2 Bedroom
1.3 Hallway
1.4 Storage (attic)

First floor

0 1 5

Figure 29: Floor plans Bregenzerwaldhaus, 1:200

Regional commitment

Haus am Moor analysed based on the theme

Bernardo Bader's design was influenced by the region. He was inspired by two vernacular typologies from the Bregenzerwald region. The layout of Haus am Moor is inspired by the Bregenzerwaldhaus and the shape and exterior expression are inspired by agricultural barns found in the region.

The Bregenzerwaldhaus was the first type of farm in Austria where the house was combined with the agricultural buildings. It combined these two under one roof (Fabach, Mennel, & Pfeifer, n.d.). The main feature of the Bregenzerwaldhaus is that these two functions are disconnected under the roof by a tenne (breezeway). This tenne functions as space for movement but also for the circulation of air and disconnecting the living area from the business side ('Bregenzerwald Farmhouse', n.d.).

The Bregenzerwaldhaus typology creates a 'hoamat', meaning homeland. It refers to the area you call home, it describes the house and everything around it (Cecilia & Levene, 2019, p. 13). It creates a small world on its own where both work and living take place.
The Bregenzerwaldhaus typology can be diluted to the combination of living and working under one roof. This creates the 'hoamat'. Both placed in a single volume creating a small world on its own where everything takes place.

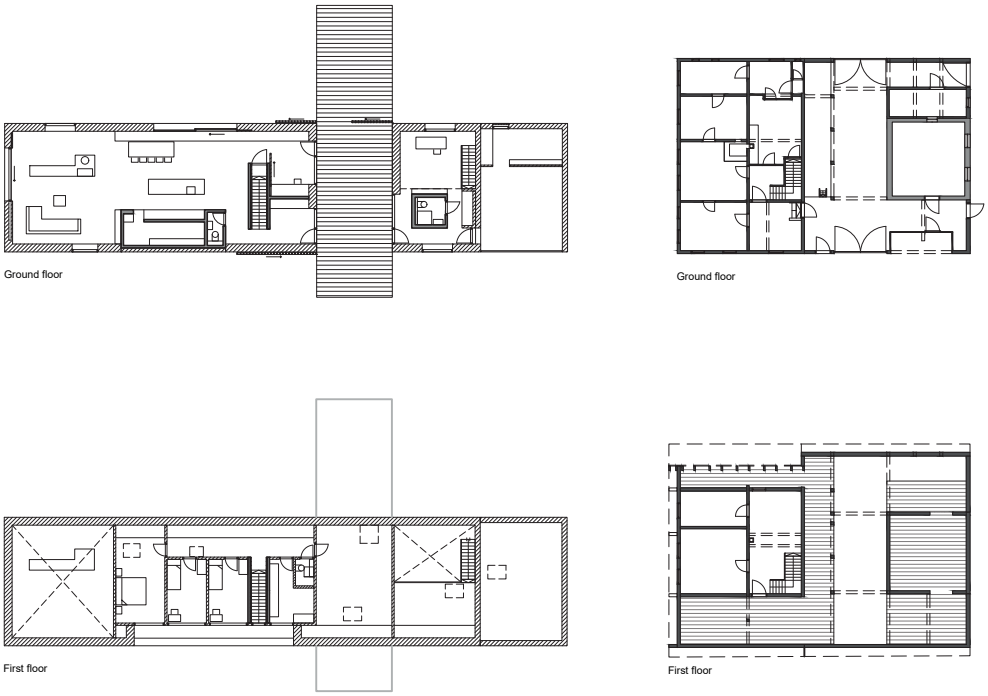


Figure 30: Haus am Moor next to Bregenzerwaldhaus, 1:500

The Bregenzerwaldhaus typology is evolved to create a design for Haus am Moor which fits the user, who wanted a house with an office space. Haus am Moor uses the same division as the Bregenzerwaldhaus, in the front is the living located and at the backside the business. To make the typology fit the client the overall scale of the house has become bigger and the business part smaller, because the agricultural function has changed to an office function, hence taking up less space. The function of the tenne stayed essentially the same, circulation space disconnecting the living area from the business side. The tenne in Haus am Moor has become multifunctional, as it also functions as winter garden which can be closed off with sliding doors that still allow sunshine to enter and heat this space during the winter.

Figure 31: Heated spaces analysed, 1:500

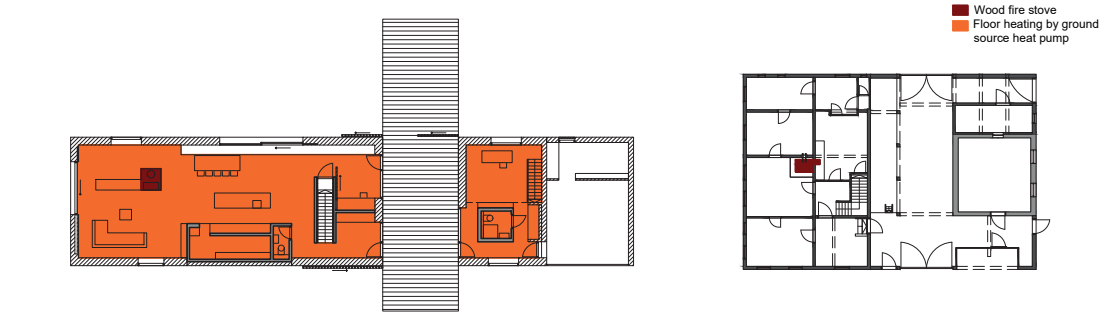


Figure 32: Heating method analysed, 1:500

Haus am Moor uses a fireplace as a central point in the design of the floor plan of the living space, which is also the case in the Bregenzerwaldhaus. There the heating was done by a wood fireplace which was located central in the floor plan in-between the kitchen and living room. Holes between the living- and bedroom allowed the bedroom to be heated as well.
In Haus am Moor the wood fireplace is located in the middle of the living room. It is placed so centrally because of the importance of the wood fireplace in Austrian culture, a place where the whole family gathers. In Haus am Moor it is not the main heat source, but it functions to create a central gathering point in the building for the family. The main heat source for Haus am Moor is a ground sourced heat pump combined with floor heating.

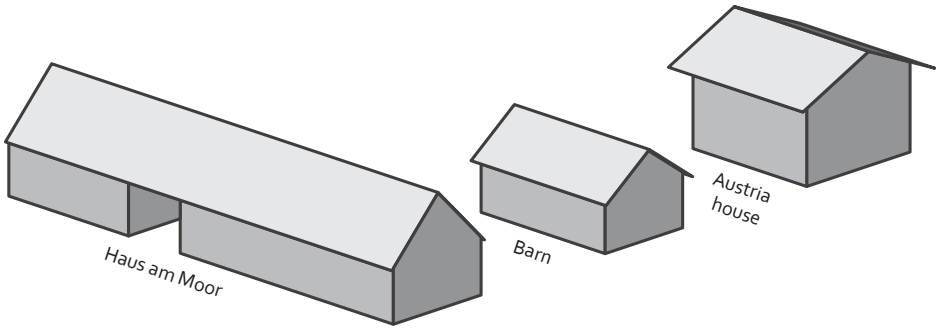


Figure 33: Haus am Moor it's volume is derived from a barn

Figure 34: Haus am Moor

Figure 35: Typical barn

Figure 36: Austria typical house

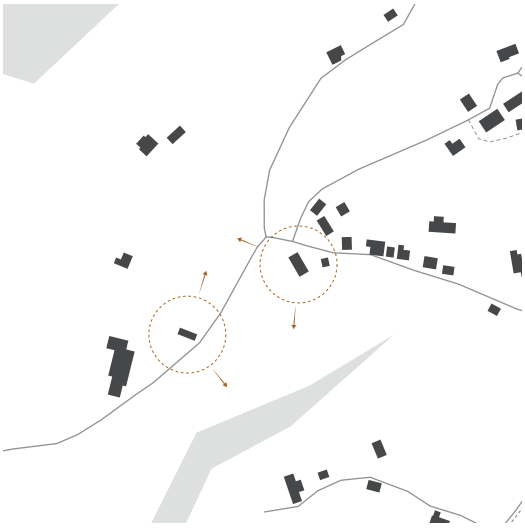


Figure 37: Barn typology located at the end of the settlement

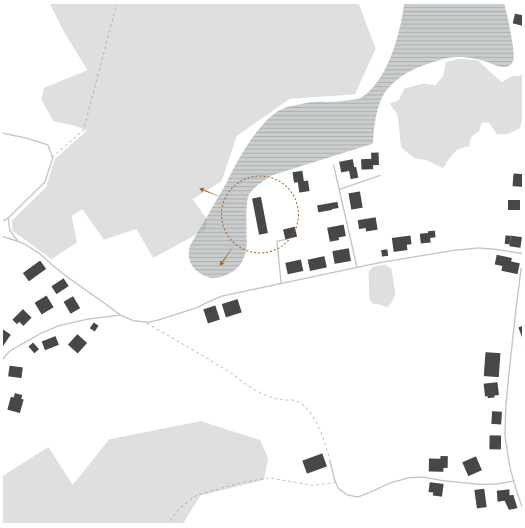


Figure 38: Haus am Moor located at the end of the settlement

Secondly the agricultural barns. Agricultural barns are the other local typology Bernardo Bader was inspired by. In the Bregenzerwald barns are located at the end of a settlement, closest to nature. The barns are mostly rectangular shaped with steep gable roofs, in contrast to typical Austrian houses which often have a square to a rectangular shape and low slope roof. The agricultural barns in the Bregenzerwald have a typical façade finish, the timber battens method. This façade finish is a fast method of protecting a building against rain by using vertical planking of wood. This method is less labour intensive than the façade finish of typical Austrian houses, which use wooden shingles as finish where every shingle is nailed individually onto the building.

The location defined the use of the barn typology for the design of Haus am Moor. Haus am Moor is located at the end of a little settlement towards nature. The design bridges the gap between the settlement and the landscape with the moor located next to the plot. To make the program for Haus am Moor fit the shape of a barn the barn is translated to a simple section. This section is stretched until a volume is created which fits the program of Haus am Moor. To make the building match with the region it adopts the visual aspects of the barn typology, a rectangular shape, steep roof and timber battens method as façade finish.

With the use of these two typologies described above, a design is created which is a lot bigger than the buildings in its vicinity but still fits in the context. The design fits in the context because it expresses the local architectural language. The building is the next step in the development of the local building culture.

Craftsmanship

Definition of the theme

Analysing regional commitment demonstrated how reading existing typologies in a region give us insight into how materials and skills have been used over time. Bernardo Bader uses the knowledge embedded in the regional craftsmanship to create designs that fit the building culture of that region. To do so, Bader looks for craftsmen to collaborate with. To understand why he looks for this collaboration, I first analysed the local craft, the meaning of craftsmanship, and lastly how it is implemented into the design.

Vorarlberg has a great craft culture, it is an important part of the community. Growing up in Vorarlberg Bernardo Bader has always been surrounded by people creating and appreciating craftsmanship (Jung, n.d.). The knowledge of the particular craft is passed on from master to apprentice and while the craft is essentially the same, innovation is happening throughout, ensuring that the quality of the craft today is still superior in the Vorarlberg district ('The Elegance of Wood ', n.d.). This conservation of craftsmanship which happens in Vorarlberg alines with the definition of a craftsman by Richard Sennett in his book 'The craftsman'.
According to Sennett craftsmanship is about "the skill of making things well" (Sennett, 2008, p. 9). Craftsmanship revolves around "an enduring, basic human impulse, the desire to do a job well for its own sake" (Sennett, 2008, p. 9). "The craftsman explores dimensions of skill, commitment and judgment in a particular way. It focuses on the intimate connection between hand and head. Every good craftsman conducts a dialogue between concrete practices and thinking" (Sennett, 2008, p. 9). While implying not only "the skill of doing things well, but also an intrinsic motivation to deliver work of good quality" (Sennett, 2008, p. 9).
First, let's define the meaning of skill. According to Sennett: "The generic answer is that skill is a trained practice. (Sennett, 2008, p. 37).
Good quality of work, according to Sennett: "One answer is how something should be done, the other is getting it to work. This is a difference between correctness and functionality. Ideally there should be no conflict, in the real world there is. The absolutist in every craftsman, each imperfection is a failure; to the practitioner, obsession with perfections seems a prescription of failure" (Sennett, 2008).

It is important to work with objects on subjects to become a good craftsman. This is the way to acquire knowledge and skill, because doing so in the presence of experienced craftsmen allows the apprentice to experience the work at first hand and learn from the master. This process happens in the 'workshop'. "Every craftsman has to learn from experiences rather than fight them" (Sennett, 2008, p. 10).
A workshop is a place where the master and apprentices work on a collective goal. Sennett argues that, "craftsmanship draws on what children learn in play's dialogue with physical materials". Craftsmanship is based on three basic abilities which all can be learned. "The ability to localize, to question and to open up" (Sennett, 2008, p. 277).

To conclude, Bernardo Bader collaborates with craftsmen to create the best possible for the client. To generate this best design Bader has dialogues with craftsmen during the design process, since the detailing of the building is part of the development of the design. The dialogue acts in the same way as the 'workshop'; a place where people bond over one end product both searching for the best outcome. This dialogue is a process of questioning and evolving based on each other's knowledge.
By working with local craftsmen he is able to use their knowledge on local materials which can be implemented in the design creating a link to the region. Working together with local craftsmen ensures that the locally sourced materials are harvested, treated and processed in a durable way. This method results in designs who are detailed to perfection, all aspects becoming part of the design, including elements which are often added to the building at the end such as curtain rails. For Bernardo Bader, the design would probably not have been complete without the implementation of these elements.

Figure 39: Haus am Moor with weathered materials, 07-09-2019

Figure 40: Concrete surface in Haus am Moor

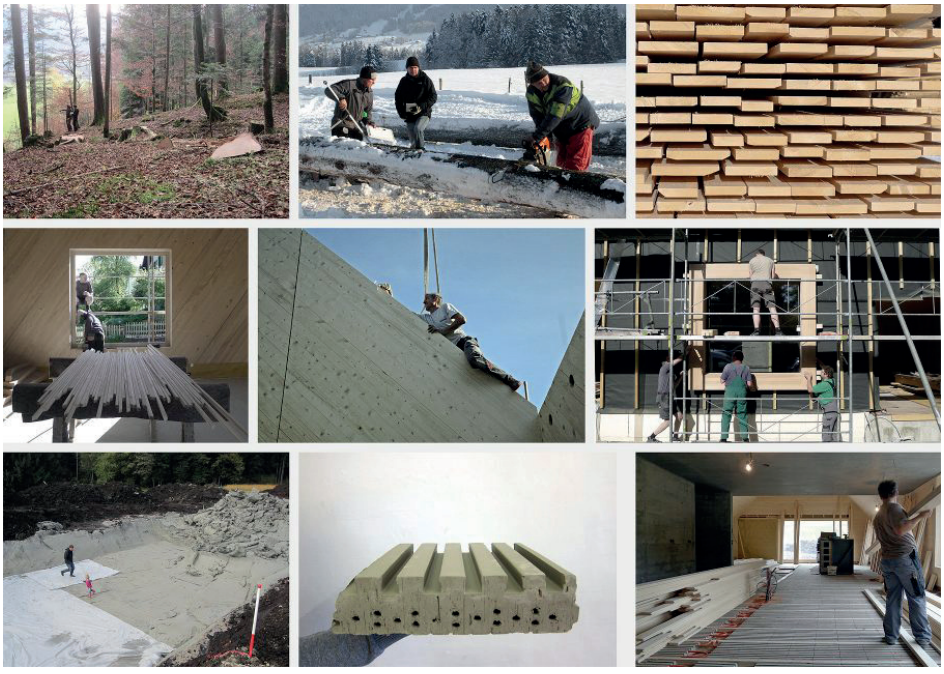


Figure 41: Craftsmanship used building Haus am Moor

Craftsmanship

Haus am Moor analysed based on the theme

Bernardo Bader used locally sourced knowledge and materials for Haus am Moor. The locally sourced materials in Haus am Moor are wood, clay and concrete. This is the point where regional commitment connects to craftsmanship.
All the wood used for the Haus am Moor originates from 60 trees which were located on a plot owned by the clients 15km from the site. Bader, together with a local forester, selected 20 spruce trees and 40 silver fir trees. The trees were felled during the phase of the new moon in December, this is when the moon is barely visible. This is a traditional time to fell trees and scientist have confirmed that this is the best time to fell trees due to the lower sap flow which makes the wood more durable and makes the wood dry better with less tear in the wood (Golden, n.d.).
After felling the trees a local sawmill cut all the trees into usable parts. This was done with a lot of care to ensure there was as little waste as possible. Nearly, every part of the tree was used. For the construction of the house no engineered wood products where used. All the wood used in the house originates from the 60 selected trees, this also includes doors, the kitchen and some furniture.

While excavating for the basement a large quantity of clay was discovered. The clay originates from the moor area next to the plot. The clay was transported to a local brick factory and formed into 60cm thick blocks with channels for the floor heating system.

When you take a closer look at the façade the materials and detailing become apparent.
For the façade a couple of different materials were used based on which material properties best fits the application. Because Bernardo Bader designs a building that is appropriate now, but also in the future, he is exceptionally aware of the materials and their properties. The knowledge of how materials change over time is an important aspect of this. With this knowledge, Bader is able to create a dynamic façade that contains materials that all change colour overtime, and keep on complementing each other over time ('The Elegance of Wood', n.d.).

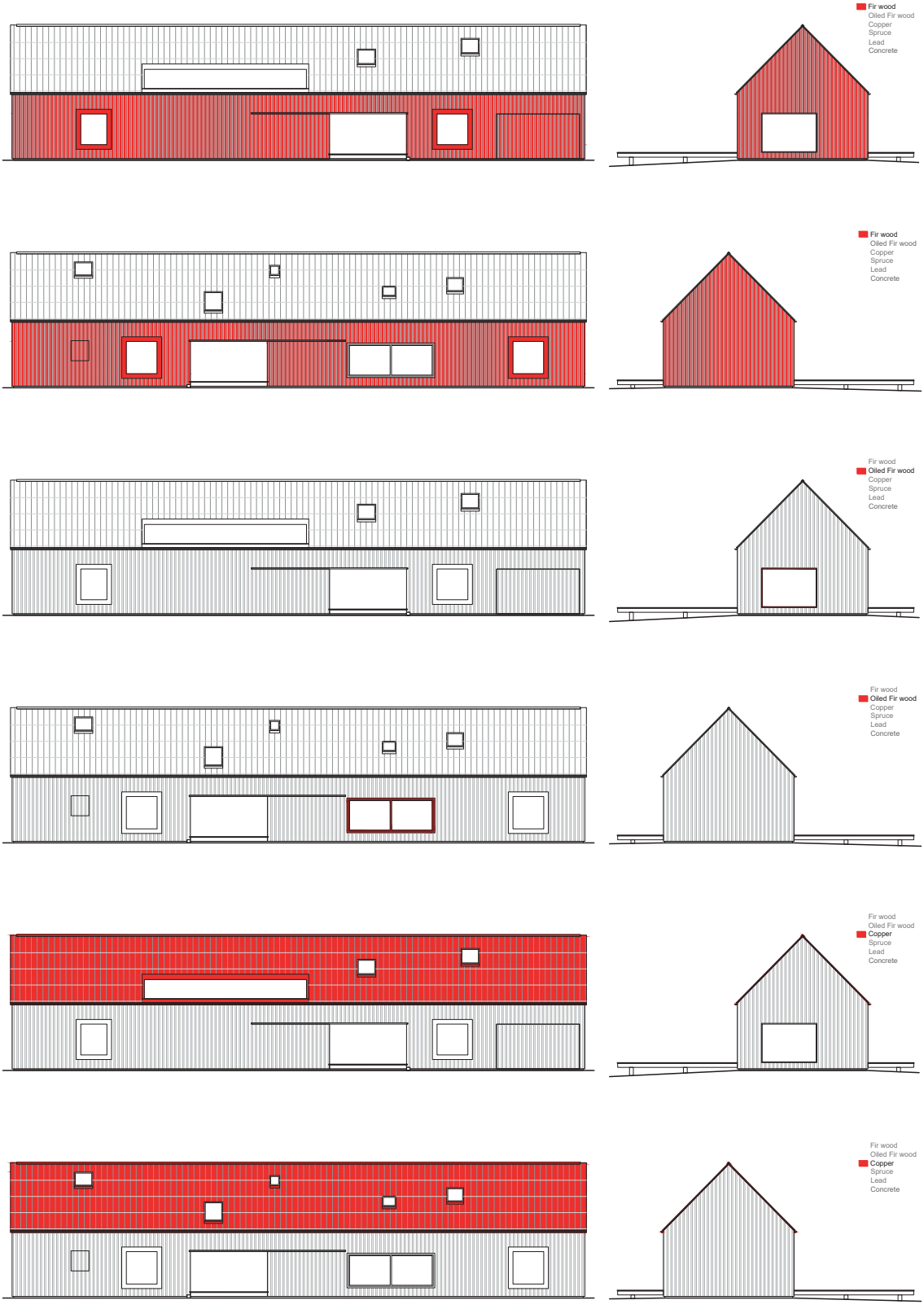


Figure 42: Materials used for the façade,1:400

The materials used for the façade are fir, spruce, copper, lead and concrete. Fir is the main material on the façade is fir. It is used because it is a durable material when used correctly. This means that the wood is untreated, ventilated and disconnected from the ground so it will not suck up moisture and start to decay. Fir is used for the façade cladding, framing around the windows and window frames. Bernardo Bader uses the wood in two ways to create a façade with more depth, untreated and treated (meaning it is oiled). The untreated wood changes colour overtime while the oiled wood stays the same colour, but this wood needs to be maintained. Because the oiled wood requires maintenance it is less favoured. Therefore, it is only used by the two sliding windows in the living room. The reveal and window frames are oiled so they keep the original wood colour. This creates a noticeable difference between the façade, which consist of fir which will change colour to grey as time passes, and the oiled part which will retain their original brown/orange colour.

The roof is made from copper, a durable material which offers a good resistance against many weather elements which makes it an appropriate material to use as the roof. Copper is durable because of the corrosion which happens on the surface which protects the material underneath it, this makes it a material that requires little maintenance (JTC Roofing contractors LTD, n.d.).

The use of copper for the roof caused an unexpected problem. The copper gable roof created a Faraday cage which blocks telephone signals from going through the cladded surfaces, creating the problem that there is only service in the living room and the office space.

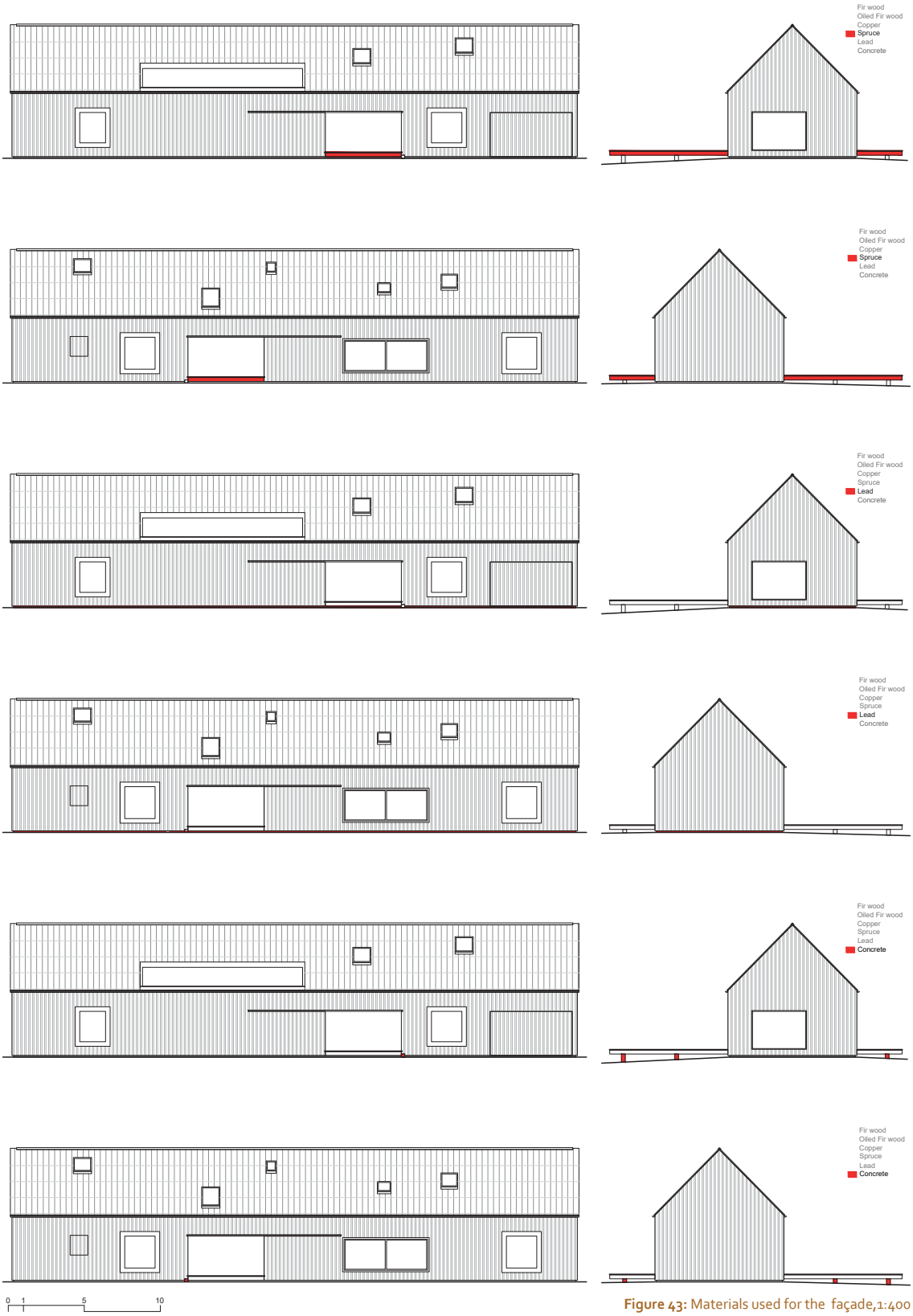


Figure 43: Materials used for the façade,1:400

Spruce is used for the platform causing it to age differently than the façade. Spruce will change colour overtime to a darker grey, offering a contrast to the light grey of the fir wood.

The fir façade cladding needs to be disconnected from the ground. Surrounding the entire façade is a pebble path with a width of 30cm which ensures that water will flow away and prevent the wood from sucking up moisture. Lead is used to fill this gap between the façade and the ground. Lead will not decay when in contact with wet soil, thus makes the building rainproof.

The steps and columns for the platform are made of concrete. This ensures that the material touching the ground is capable of handling the conditions of the ground.

Because the building is located in Austria, snow is a recurring phenomenon. In indigenous architecture, the mountain dwellers were aware of the destructive power of avalanches and insulation property of snow. The buildings were designed with a little snow barrier on the roof for the insulation while at the same time making sure that the destructive power of the snow sliding off is kept to the minimal. To keep this layer of snow on the roof, the roofs had a 22-degree angle and logs where placed horizontally on the roof (Hjorth-Hansen, Holand, Loset, & Norem, 2000, p. 332). In line with his commitment to the region, Bader chose to use a roof scape inspired by barns in the Bregenzerwald, meaning a gable roof of 45-degree angle. This created a problem, as it would not be keeping snow on the roof and ensuring that the snow will slide off in a safe way. To solve this problem, the roof was fitted with horizontal pipes called snow guards. The snow guards give the snow something to hold on to and prevent all the snow and ice from avalanching off the roof all at once causing damage to the building, landscape or create dangerous situations for people and animals. The snow guard functions by allowing ± 10cm of snow or ice to connect to it and prevent it from sliding off the roof. The main function is safety but at the same time, this layer of snow or ice is an extra insulator (Alpine SnowGuards, n.d.).

The knowledge of how materials age and how they need to be mounted so they are less likely to decay, show the craftsmanship of preparing the materials as well as mounting it. The building shows how with the help of skilled craftsmen a building is created which is both refined and durable.

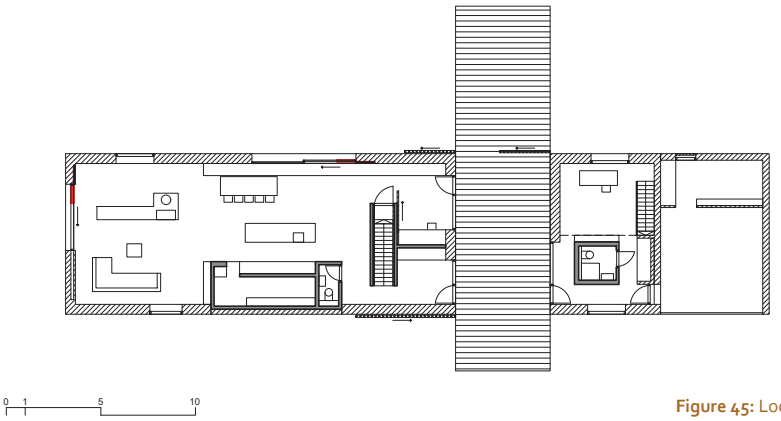
Figure 44: Interior is the merging of wood and concrete

The interior of the building expresses itself as a carefully created furniture piece where it is not obvious how it is mounted. The walls are seamless, no screws or other fixing methods are visible. This is done by clicking the fir boarded panels/planks in each other and securing them where they meet (Detail inspiration, 2013, pp. 1387-1393). This level of refinement is embedded in the craft culture of the region. The craftsmen know how to mount the wood without it showing, which delivers an end product which has become typical for that region.

The level of detail in the building shows the dialogue between the architect and the craftsman. Detailing is part of the design process and dialogue between the architect and the craftsman. The design needs to be functional and shaped around the user by implementing functional parts in the detailing and design it shows that build is an answer to the user. There are several good examples of integrating functional parts into the design. These elements shows that Bernardo Bader is aware of the influence these elements have on the design, and that they needed to be detailed to ensure that it became a part of the design and not an aspect that was added later.

The visible concrete on the ground floor also expresses craftsmanship, because the material has an almost organic expression. The concrete invites you to touch it, which is in contrast to normal concrete which is hard and cold. The concrete shows all the ridges and grain of the wood used for the casting whilst still being very soft and smooth to touch. The concrete embraces and becomes part of the wooden context in its own way. The concrete is soft and warm to touch and has an organic expression similar to the wooden floors, wall finish and furniture.

To show how these functional aspects are integrated in the design two examples are showed. By recreating the detailing for the building an interpretation is made on how functional aspects as well as construction and craftsmanship contribute to the design.

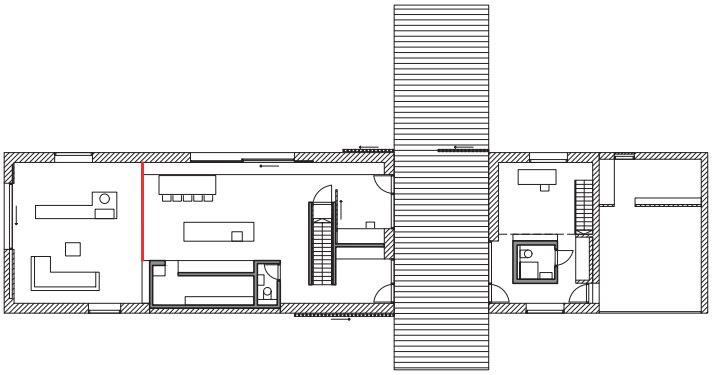


The integration of an insect screen in the design. The insect screen is hidden in the wall and can be pulled out of the wall for a meter to connect to the sliding window. This practical piece has become part of the entire architecture with its thick wooden frame. This shows the level of refined detailing and how it is possible to subtly include these functional parts if it is done by skilled people.

Figure 45: Location of insect screens integrated in the wall.

Figure 46: Window with insect screen located in the wall

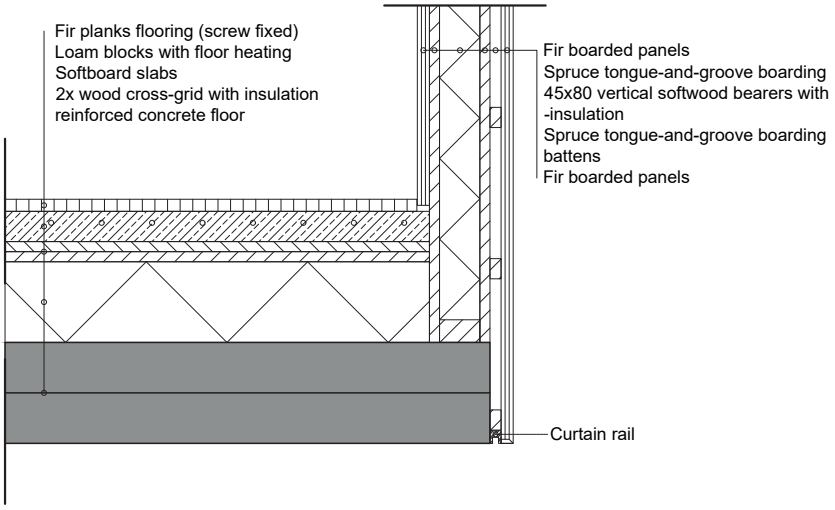
Figure 47: Insect screen pulled out of the wall



0 1 5 10

Figure 48: Location of the curtain rail in the living room, 1:15

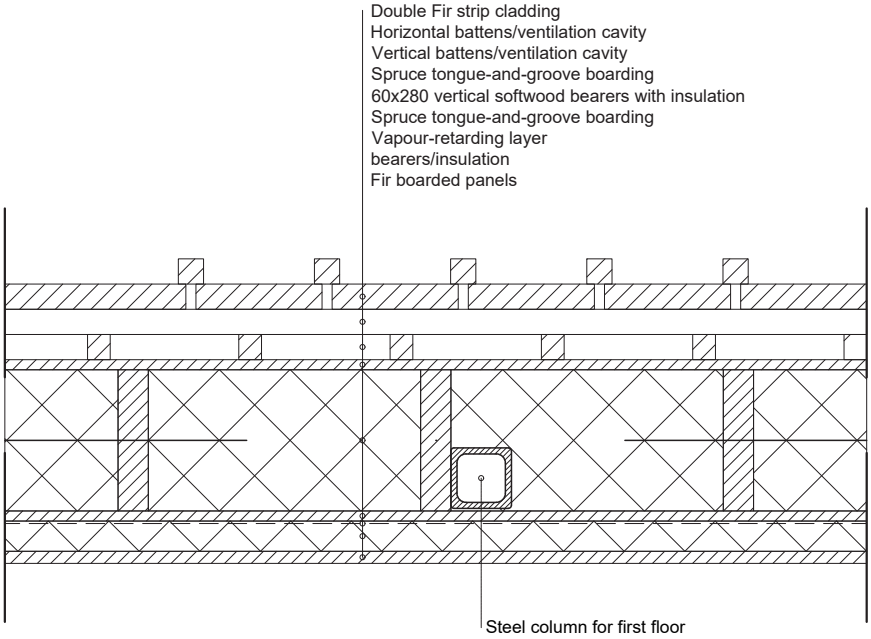
The curtain rail between the kitchen and living room. The curtain rail is detailed away between the first floor and the wall on the first floor. For the rail to be fitted there, the fir boarded panels are shifted away from the constructive wall to create space for the curtain rail.



0 0,1 0,2

Figure 49: Vertical detail of the curtain rail in the living room, 1:15.

Figure 50: Curtain rail in the living room



Main construction (steel) for the first floor detailed away in the timber frame wall.

Figure 51: Horizontal detail of wall build up with steel construction for first floor, 1:15.

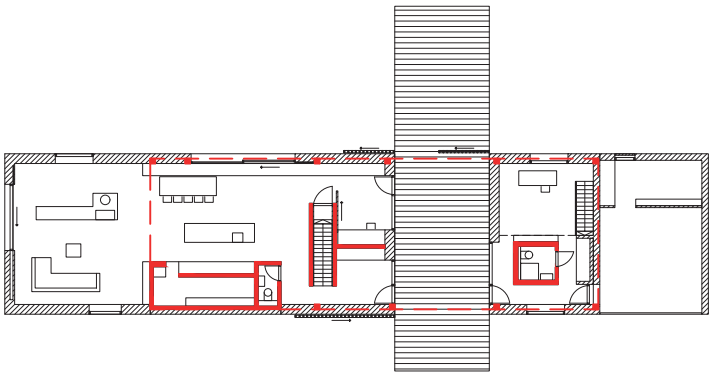


Figure 52: Main construction, concrete core and floors with steel columns, 1:400

0 0.1 0.2

Concrete floor connecting to the steel construction which is detailed away in the timber frame construction of the exterior wall. The fir boarded panels connect with a small seam to the concrete floor and fir floor finish expression the refinement of the building.

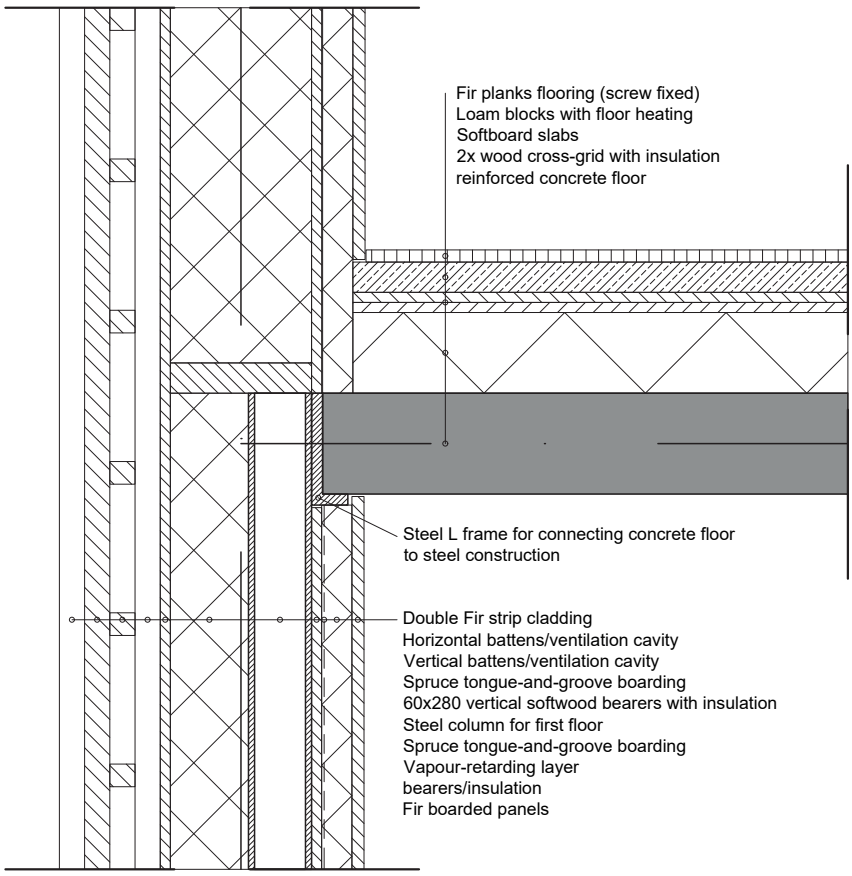


Figure 53: Vertical detail of connection between wooden shell and construction, 1:15

Low-tech sustainability

Definition of the theme

Bernardo Bader uses regional commitment to create a design that has aspects of the region and its culture embedded in it. The design is based on typologies and the building culture of that place, the typologies and building culture often show sustainability solutions for that region. These sustainable solutions are often low-tech solutions which have been used for decades to make the buildings usable. Sustainability has become an emphasized item in architecture, but it is not an indicator for good architecture according to Bader, as he explains that "good architecture should always be sustainable. Energy efficiency and sustainability are of no use if it is not good architecture and the concept is rejected by the users after 15 years" (Jung, n.d.). This refers back to the holistic design approach, the concept of the building must fit the user and sustainability is just a part of that.

Sustainable solutions for buildings can be divided into two categories, low-tech solutions and high-tech solutions. Low-tech solutions are passive and indirect solutions, high-tech solutions are 'smart'-systems (technological innovations).
High-tech solutions are based on a smart system that monitors and adjusts aspects of the building to fit the user's needs. This can range from automatically controlled air conditioning to the more sophisticated systems such as the use of green walls. High-tech solutions often use a lot of energy to be able to create a sustainable building (Shari, 2018). The building is, in essence, reacting to design flaws if it needs all of these systems to make the building usable.
Low-tech solutions are often more economical, they are based on the local climate and materials which makes it perfect for buildings in that region. Low-tech sustainability starts with a passive design which does not need the latest technology to create a usable design. Passive designs use low-tech solutions to make the building usable. These solutions could be natural ventilation, controlled solar gain or night-time cooling (Shari, 2018).

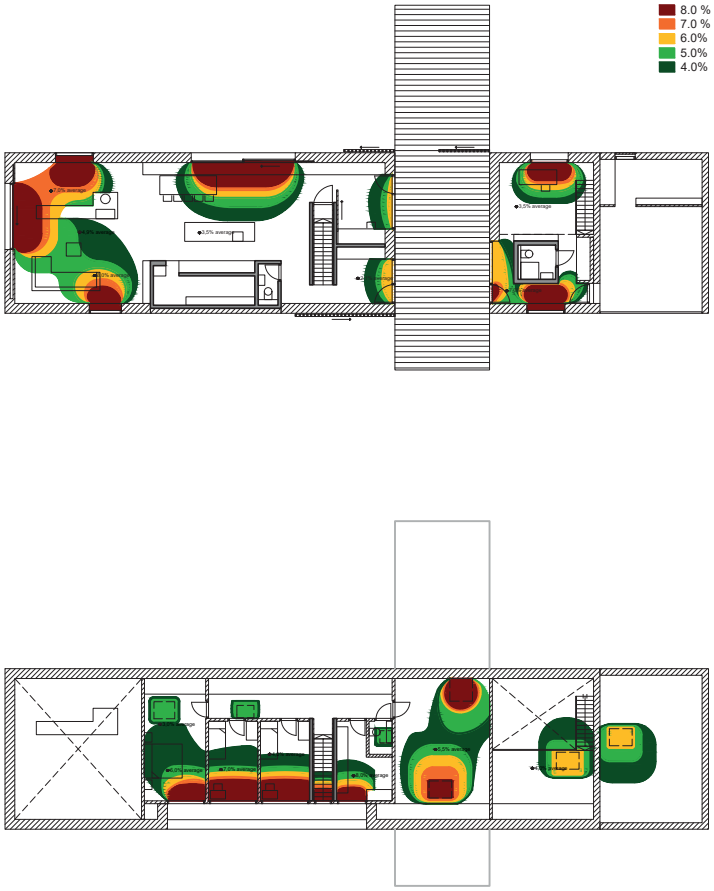
With his regional commitment, Bernardo Bader looks for vernacular solutions to make his building sustainable. These vernacular concepts are low-tech solutions to problems faced decades ago but that are still relevant. This means that these solutions are viable and most likely will be in the future. Sustainability in architecture lays for a big part in its permanence.

Permanence according to the Oxford English Dictionary means "continuing or designed to continue indefinitely without change" (Oxford, n.d.-b).
Architecture is by definition meant to be permanent: "It is to serve a practical and aesthetic goal over an in-definite period of time" (University of Pretoria, n.d.). Vitruvius introduced this definition to architecture in his work 'ten books of architecture'. He touched on the subject under the name 'firmitas', which he described as the "ability of a building to endure, based on its own material strength and soundness of construction; often defying both nature's and time's deteriorating effects" (University of Pretoria, n.d.). To further define permanence in architecture, there is a metaphor that seems rather fitting: "If left to itself or discarded from the human world, the chair will again become wood, and the wood will decay and return to the soil from which the tree sprang" (University of Pretoria, n.d.). Being permanent in architecture consists out of different cycles, the longer the interval between the cycles the more permanent it is thus the more durable it is.

To conclude, creating a sustainable design is largely a holistic approach to designing a building, creating a design using good materials and which is designed for the user. Good materials will last for a long time, but more importantly, a building designed for the user ensures that the user will keep using the building, which in turn ensures that the design is not rejected after a short period, making the whole design more durable.
To create a building that fits the user and its context, the design of Bernardo Bader uses low-tech solutions which can be found back in vernacular architecture from the region. He uses vernacular concepts and evolves them to make the concepts fit the design and the needs of this age. By using these concepts he creates a sustainable design which expresses the region's characteristics throughout the design.

Figure 54: Good light conditions in the interior, hallway on the first floor

Figure 55: Concrete construction on the ground floor giving mass to the building



0 1 5 10

Figure 56: Windows placed based on the best light conditions inside, based on Velux values

Low-tech sustainability

Haus am Moor analysed based on the theme

Usability of the design is an important aspect of creating a durable and thus a sustainable design.
One of the ways Bernardo Bader creates a design which is pleasant to use is by ensuring there is enough daylight in the building. The windows look randomly placed in the façade but they are not. The window placement is not based upon a proportion system or simulating vernacular typologies but they are placed based upon the best light conditions on the inside. To be able to select the best placement for the windows a light study for Haus am Moor was made with help of Velux software program and with a scale model in a lightroom (Velux, 2013).
The window placement is determined with the help of this study (see figure 'Figure 56'), but at the same time, it may not be at the expense of use. For example, there are only two windows on the ground floor on the eastern side (the public side) to ensure privacy, on the first floor there is a balcony with two-meter high windows to the eastern side, which allows the rising sun to enter the bedrooms and bathrooms. The windows on the southern and western side (the private area) are bigger, allowing light to enter the ground floor.

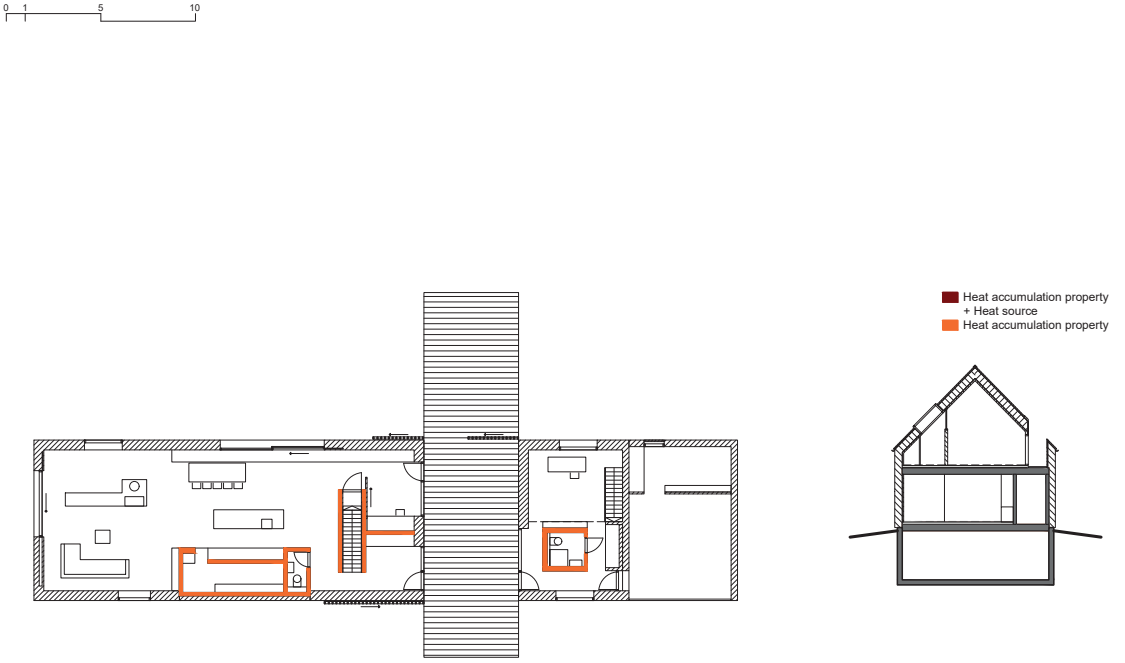


Figure 57: Location of core with heat accumulation property

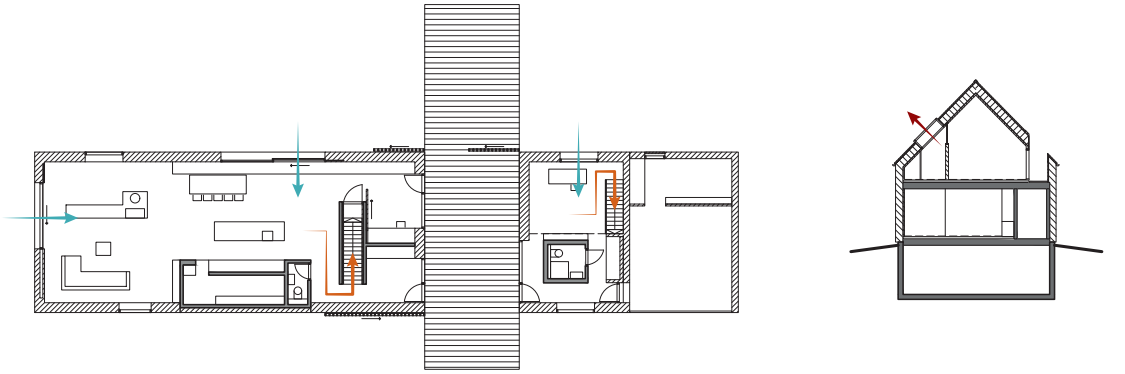


Figure 58: Natural ventilation to cool building

For the building to create a usable and pleasant indoor environment Bernardo Bader uses low-tech sustainability solutions inspired by concepts used in the region. He used the concept of thermal mass and the vernacular concept of a chimney.

As mentioned before, for the construction of Haus am Moor Bader decided to use two main materials, wood and concrete. The building has a concrete core with a wooden shell. The wooden shell is built with a timber frame structure and the concrete core consists out of three parts plus the concrete floors. To be able to carry the concrete first floor, steel columns were placed in the timber frame structure.
The reason for these two materials is because of the accumulating property of the concrete core and the highly insulating property of the wooden shell. These two materials create the possibility to use a heating principle which is manageable with low-tech, vernacular solutions. In the winter the core is heated and constantly radiates heat allowing the possibility of low-energy heating. This property fits perfectly with the use of a heat pump which supplies a constant low-temperature flow.
Using the vernacular concept of a chimney allows the building to use the thermal mass, also during the summer. During the day the core soaks up the heat while cooling the building, then using the vernacular concept of a chimney, the building uses natural ventilation throughout the night to cool the core down. This is done by opening a window on the ground floor and opening a window in the roof which creates airflow and lets the hot air escape through the roof. The vernacular idea of a chimney is implemented in a modern way. Both the windows on the ground floor as well as the windows in the roof are remotely controlled and are fitted with rain sensors. This allows the building to use this concept of cooling, even when nobody is home, and makes it safe to use because it knows when to close and open again.

Learning by recreating

Figure 59: Hallway Haus am Moor

Recreating chosen picture of Haus am Moor

Within the 'Masterly Apprentice II' graduation studio there is a returning practice of choosing an interior picture from the analysed building and recreating this picture with a model. The final goal is to make the model resemble the chosen picture as closely as possible.
I chose a picture taken in the hallway of Haus am Moor because I like the contrast between the wood and the concrete which both express themselves as perfectly crafted materials. They express the care that Bernardo Bader, in collaboration with craftsmen, show for the materials used in the design.
The wood connects seamlessly with each other and has a thin margin connecting it to the concrete. The concrete expresses a kind of glossy softness. This, together with the way the light enters from the living room and the staircase, makes this picture express what the building is about, namely the detailing of materials and how the light works in the building which is fully thought out to create an interior which is designed to be liveable and a nice environment to be in.
After making the model I was able to visit the building and take a look at the hallway in real life. It was a dark morning, and with the lights on you can see how glossy and warm the concrete walls are. Visiting the building confirmed the choice of the recreation of this space. This space with its soft expression on both materials is exactly what is experienced throughout the whole design.

For me, making the model was about understanding the material structure together with how the architect envisioned this space to be. Building the model was mainly about getting the surface of the concrete right and how the light enters the space.
For the model, I used real concrete and tried to recreate how the light interacts with the concrete to deliver this glossy, warm finish of the walls. Recreating the materials helped me to understand the craftsmanship behind it.

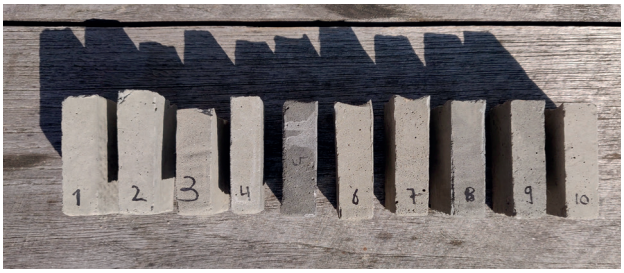


Figure 60: Concrete samples with different mixtures

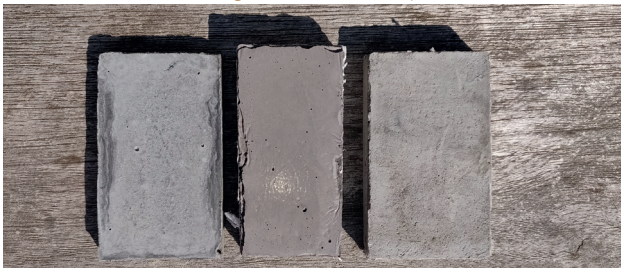


Figure 61: Final samples with different castings, middle one is the chosen result

Figure 62: Mixing cement, sand, water and pigment

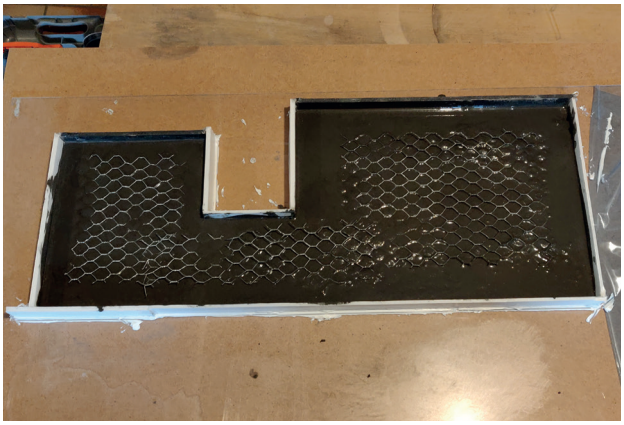


Figure 63: Casting and reinforcing top element

I made several samples of different concrete mixes to create concrete with a smooth glossy expression. These samples varied between the different ratio of cement, granulate, sand and water. After several attempts it became clear that normal concrete is too grey and too pale, so some concrete colouring was required to recreate a concrete with a matching colour. To get a smooth glossy finish I tried different casting methods and wet sanding samples.
To make the model workable with the chosen material a scale of 1:10 was chosen to reproduce the picture. By making these samples it became apparent that the scale 1:10 could create a problem because normal concrete has granulate in it, which would give away the scale. So the mixture to create the concrete for the model consist out of cement, sand, pigment and water. Plastic foil between the casting and the concrete created the best result for a glossy finish on the concrete. However, using plastic foil between the casting and the concrete created the disadvantage that, were the plastic foil was not fully stretched, some folds would appear and this would be visible in the concrete. The final and chosen method was pouring the concrete with the visible side down on a sheet of acrylic with a casting made of foam board. The acrylic ensures that the water sticks on the surface (hydrophobic) making it less likely to keep air trapped at the surface and because concrete copies the mould the concrete gets a smooth, glossy finish.

The walls on the original picture have a spongy texture of darker sports. To create the sponged expression the acrylic sheet was sponged with a mixture of concrete colouring and water before the concrete was poured into the mould and after drying the concrete was again sponged with the same mixture.

The wood in the model appears as a soft shiny wood with clear grain and knots. This wood grain and knots created a scale problem for using normal wood. The wood used for the model is balsa wood because it has a soft expression and small grain texture similar to the scale 1:10 used for this model.
To create the same lines of planks the lines were scratched into the wood and with wood dye the knots were drawn on to the balsa wood.

Figure 64: Adding pattern to concrete with colourant and sponge

Figure 65: Adding wood to the model

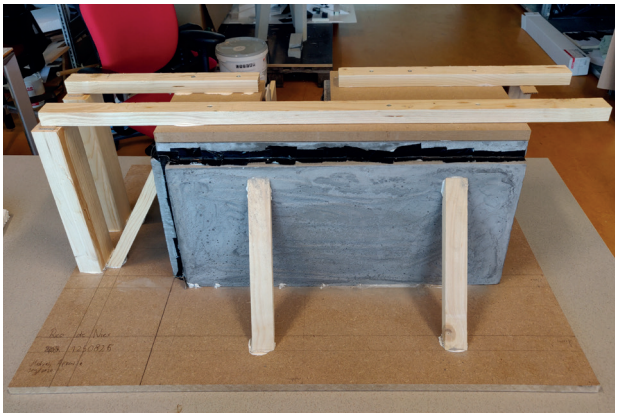


Figure 66: Assembling of parts

The most challenging aspect of the model was the scaling and material finish. To simultaneously get a glossy finish on the concrete while at the same time showing a spongy surface proved to be a challenge. To create this soft finish an understanding of the ability of concrete was needed and became apparent during the making of the samples.

Lessons learned from making the model:
Recreating the picture emphasised the importance of craftsmanship in the end product. The capabilities of these craftsmen make it possible that the materials express themselves in such a way that you perceive the material differently than normal. Normally, when looking at a concrete wall, the roughness, the hardness and coldness are expressed. Here the craftsman is capable of creating such fine work that this material expression changes to finesse, glossy and softness.
What makes this space a Bernardo Bader space is the fact that two simple materials almost seem to become an art piece. In combination with the way the light enters this makes this little space a pleasant and welcoming space. As this is the view from the entrance this space immediately introduces the building as a warm building which hints towards the way materials are used throughout the building.

In the end, the making of this model became more about understanding the importance of craftsmen and the properties of these materials. In the original picture, the light gets diffused in the living room and the staircase, spaces which are outside the frame. These spaces are not made in the model, it seems that these spaces influence the light in the original picture more than I initially expected. Also, the recreation of the knots on the wood created a different outcome despite making several samples, the wood soaked up the dye making the knots appear bigger than intended.

Figure 67: Hallway Haus am Moor

Figure 68: Hallway model

Conclusion

Lessons learned from the work of Bernardo Bader

Holistic design approach:
A very important aspect of the work of Bernardo Bader is understanding the client and creating durable architecture. Understanding the client creates a base for a design with a concept that fits the client and addresses aesthetic, functionality, usability, as well as allows the design to be used to its full extend and prevent the concept from being rejected. At the same time appropriately applying good materials allows Bader to develop durable architecture. Bader looks at things that are familiar and try to understand what is behind them, finding rather than reinventing.

To create a holistic design, three main themes were diluted from Bader's work: regional commitment, craftsmanship and low-tech sustainability.

Lessons on regional commitment:
The house is inspired on the Bregenzerwald dialect word 'Hoamat' which means homeland. It refers to the place you call home, the house and everything around it. It is a place where everything takes place, from work to living, it is a small world on its own. The meadow around the building is as important as the house and the working area. This attitude towards creating a living space is rooted deeply into the Bregenzerwald culture.

Bernardo Bader's design is partly about understanding history. Nearly everything has, in some way, been done before. Bader uses knowledge from the region to create a design. This begins by understanding the history of the area, the craft, typologies, and even more importantly, the intention behind it. He tries to understand how they build over centuries and how they evolved it, to the point where he is the one to evolve it further.

Lessons on craftsmanship:
Bernardo Bader creates architecture as if it is a custom tailor made suit. He is capable of doing so by understanding and using craftsmen in the design process, but also because he starts to pay attention to detailing early on in the design process. This allows him to create a design which embeds functional parts in the design to create a something complete for the user. The use of skilled people ensures the quality of the building and the creation of spaces that are pleasant to stay in.

Lessons on low-tech sustainability:
Bader uses the idea of finding rather than reinventing to create the concept and shape of his architecture, but also uses this to create a liveable design. He uses vernacular concepts which are low-tech solutions to create a usable and sustainable design. This shows that you should not be afraid of embracing low-tech aspects in a time were more and more high-tech solutions are sought after. Using vernacular concepts that can be found throughout the region means that they are viable solutions based on local materials and climate. Using these and developing them to fit the building allows the building to be sustainable by itself without using technological innovations.

Conclusion

The work of Bernardo Bader is about creating architecture that fits the context and its users in a design, which at first glance, seems a simple design. The architectural language is straightforward and seemingly simplistic. Haus am Moor is not the centre of attention within an urban landscape, this way the designs could merge into the existing settlement with older and vernacular architecture.

The building fits the context because the design is derived and shaped from its context in a straightforward manner. These shapes are implemented in a simple architectural language which still creates a connection with the surrounding while being different than the surrounding buildings. When getting closer to the building the design starts to express the sophistication and level of detail which is different from the first architectural language the building shows, simplicity and straightforwardness.

Bernardo Bader is capable of creating this design by using regional commitment to create a simple architectural gesture to fit its context, a design which becomes part of the landscape and does not need to be the centre of attention. When the general shape of the building is created, the design evolves from the inside out with the user as its main focus. The design is about the use of the building. The design starts to be developed further and further, always at a detailed level in collaboration with craftsmen to ensure that the craftsmanship in the design is guaranteed.
The design uses vernacular concepts to make the building usable and user friendly, again referring to its context, and creating a connection to the local culture. The detailing of the design makes the building feel complete, every connection and seam are considered and make the building express itself as a furniture piece rather than a building.
At first, the building expresses a very simple architectural language, but when getting closer and interacting with the building the design starts to show a high level of detail. Up close the building is more complex, but still has coherency. The building still allows the context to be the centre of attention and highlights beautiful views over the landscape. This level of detail is only achievable because Bernardo Bader is aware of the detailing in the design process and collaborates with craftsmen to create a building which is created around the user. The building shows the importance of attention to detail in the design process as well as the connection between the architect and the craftsmen.

The creation of architecture with a simple architectural language, which fits the context while at the same time designing the building around the user is what makes Bernardo Bader's architecture stand out. The design is bigger than the surrounding buildings, but by carefully extracting elements from the surrounding area the building starts to express the language of the region. The result is a building that fits the context despite being bigger and more modern than the surrounding buildings. The building expresses that it is the next step in the development of the local architectural language.

Anecdote

After contacting 'Bernardo Bader architects' it was clear that receiving drawings and having an interview with Bernardo Bader would not be possible. The only thing left to do was writing a letter to the inhabitants of Haus am Moor and send it to Austria, hoping that they would react and were open to my request of visiting the building. After a couple of weeks without any response, I was left to conclude that it was not possible to see the interior of the house.

Following this conclusion a short trip to Austria was made to view the village, the area around Haus am Moor and the exterior of the building. On the day of arrival, nobody was home at Haus am Moor. To make sure that I had done everything to increase the chance of being able to view the house from the inside, I wrote a letter and put it in the letterbox hoping for a response the next day. The letter consisted of a story about my study, my choice for Haus am Moor and the analysis using the photo model. When leaving the letter, the name sign at Haus am Moor turned out to be very familiar, the Bader family. Mrs. M. Bader contacted me at the end of that same evening, saying they normally do not invite people to view the interior of the house because they receive this request very often, but the letter with pictures of the photo model was so interesting that they were willing to make an exception.

It was possible to view the house on the morning of the day of departure. Welcomed by Mrs. M. Bader I was able to view the entire house from the inside, and it was possible to have a very open conversation about the use and special aspects of Haus am Moor. Despite the language barrier this conversation turned out to be an enlightening and motivating conversation.

After having the opportunity to see the interior of the building, the architecture and care for detail became even more special. The quality of finish throughout the building was of a level I had never seen before, every material felt natural and warm and at the same time, everything was functional.

Hereby I would like to thank the Bader family and especially Mrs M. Bader for her time, the warm welcome which was given to a foreign student from the Netherlands, and the opportunity to see Haus am Moor from the inside.

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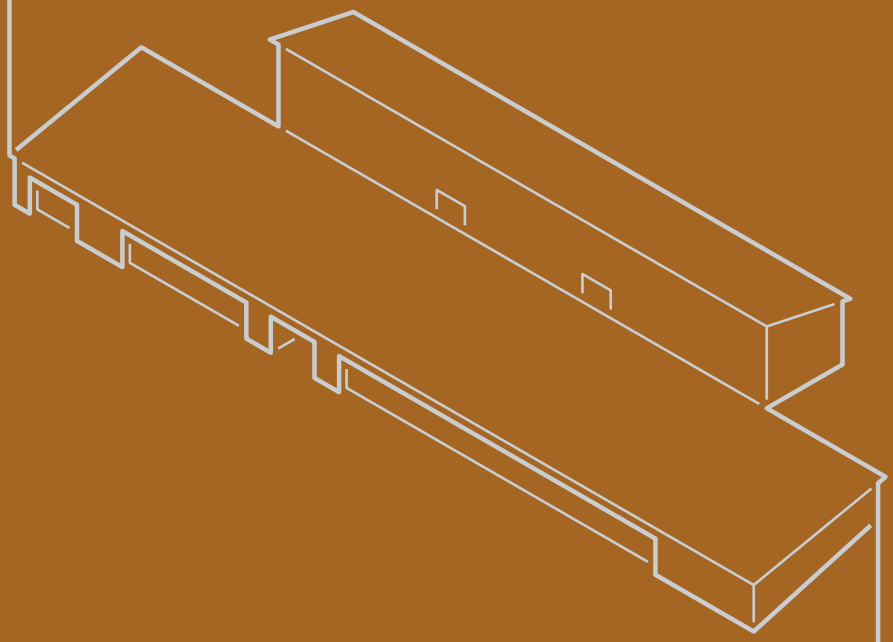
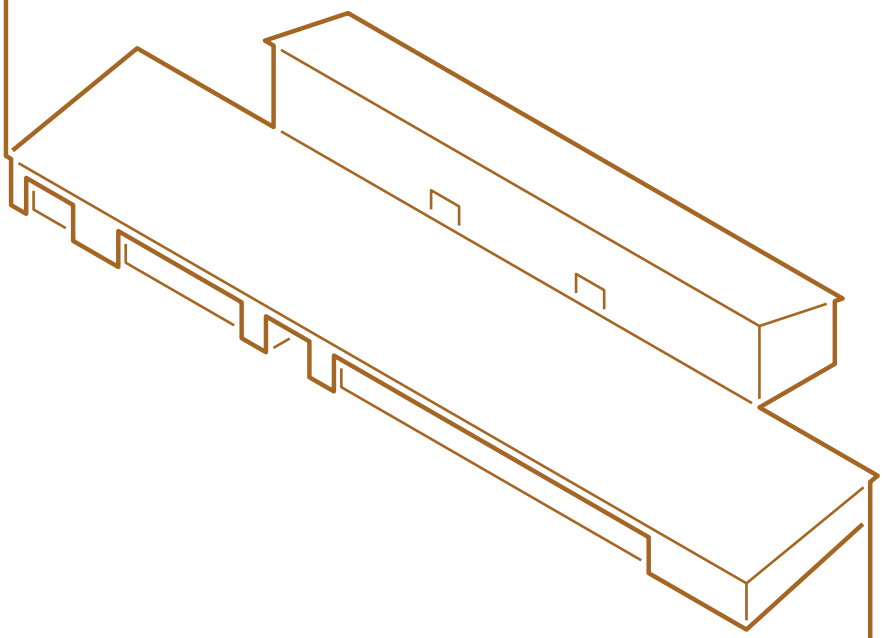
All other pictures and drawings are produced by the author of this booklet, Rico de Nies

Design of a building

Hoamat-Käsefarm

Rico de Nies





Eindhoven University of Technology
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Master program	Architectural Urban Design and Engineering
Graduation studio	Masterly Apprentice II
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Design of a building

Graduation Studio "Masterly Apprentice II"

Content

Introduction

This graduation project is part of the graduation studio 'The Masterly Apprentice II' at the Eindhoven University of Technology. The graduation studio consists out two parts. The first is to learn from a master architect and the second is to reflect on these lessons and use them to create their own design. The first booklet contains the analysis of Haus am Moor in Krumbach, Austria, designed by Bernardo Bader. This booklet is the second, a design proposal for a Hoamat-Käsefarm in Krumbach, Austria. The design proposal focuses on three main themes which were derived from the research and analysis of Haus am Moor: regional commitment, craftsmanship and low-tech sustainability. These themes are not simply copied. The reasoning behind the use of these themes has been analysed, as well as what has been achieved by applying them. Based on this research and analysis, aspects of these themes are integrated into the design of the Hoamat-Käsefarm.

The building presented in this booklet is a Hoamat-Käsefarm, a place for people to live, where cows are kept and cheese is made, with a connection to tourism and the landscape. First, the chosen program is defined based on the region after which the location for the design was chosen. Then the lessons learned from the theme 'regional commitment' are used to shape the design to fit the context. Next, the design and its concepts are shown using various drawings and images. Then I will elaborate on how the lessons learned from the theme 'craftsmanship' are applied to shape the design around the user and show how the materiality and detailing create the overall design. Finally, using the lessons from the 'low-tech sustainability' theme, the design decisions which make the design sustainable are defined and explained.

It is advised to read the analysis booklet of Haus am Moor before reading this booklet to get an understanding of the themes and the references made throughout this booklet.

Programming

Figure 1: Krumbach located in Bregenzerwald

Creating a viable program for a peripheral village

The analysed building Haus am Moor is located in Krumbach, within the Bregenzerwald, which is part of the Vorarlberg district in Austria. Analysing Krumbach showed the importance of the Moor in Krumbach. Krumbach is investing in attracting tourism to the village with a specific focus on the moor. There is, for example, the initiative of moor walking routes that display information about the moors located around the village. Krumbach is also investing in architecture impulses to further develop Krumbach. Throughout Krumbach, projects can be found made by several well-known architects from Austria, as well as projects by international architects.

Krumbach is a small village with around 1050 inhabitants ('Krumbach', n.d.). Designing a building for a small village in a rural area meant that the building and its program should fit the village and not be a design based merely upon romanticism and fantasies which are not realistic for a small village. For example a small village like Krumbach should not create big plans with the hope that those plans will result in more people coming to Krumbach. To define a program which would be viable for a small village in a rural area, I analysed the model created by Gion Caminada for Vrin, Switzerland. This model consists out of two parts, a thesis on how to strengthen less developed regions, so-called peripheral regions, and four points for a healthy economy in order to create a steady base for the small village of Vrin. The thesis is on the importance of designing the cultural landscape and development of peripheral regions. Gion Caminada argues that "policies nowadays are used to determine how landscapes evolve and try to keep steady incomes in these peripheral regions, these policies have not been able to prevent mass migration from peripheral regions meaning that agriculture stayed one of the most important aspects of the economy of peripheral regions" (Caminada & Conzett, 2015). Caminada's nine theses on how to strengthen peripheral regions consider the contribution of architecture and urban planning together with what to look for in these peripheral villages.

The following two points from 'the nine theses on how to strengthen peripheral regions' helped to define and understand the importance of investing in local qualities to create a program that is viable for peripheral villages.

The first point called, 'peripheral regions as catalyst', "Exploring and utilising the potential of peripheral regions as a catalyst for raising their profile in larger regional centres, to eventually develop strongly in their own rights" (Caminada & Conzett, 2015, p. 136). This shows the importance of searching for unique aspects in the peripheral village. Krumbach is investing in its unique qualities and is emphasising these. They are aware of the moor and how architecture both give impulses for protecting the local culture and attract tourism. The moor makes Krumbach unique in the Bregenzerwald which enables it to profile the village differently than the other villages.

Second point called, 'authentic and holistic agricultural economies in mountain regions', "The appearance of today's cultural landscape was largely moulded by agriculture and forestry. The economy in mountain regions is unlikely to survive in the future without subsidies from the public purse. By manufacturing premium quality products, made possible by specific conditions in a specific locality mountain regions could attain greater economic dynamism" (Caminada & Conzett, 2015, p. 137). This show the importance of creating a product which is location-specific in a peripheral area. For Krumbach the location-specific qualities are the moors, moors are characteristic biotopes with their own plants which only grow on these moors. The plants that grow on the moor can be used to create a product specifically referring to this area, a location-specific product.

One point of the Vrin model on 'how to establish a healthy economy' helped to define the importance of a program where a quality product is produced to make the building viable for the village. Hence, Caminada argues that "smaller remote villages depend on exports to national markets; local demand alone is insufficient to maintain commercial viability. Agricultural product may well be exported, but only if it is manufactured competitively and marketed as a niche product. Other production lines in remote regions are potentially viable, but only if local resources such as stone or water can be processed and exported as high quality products. As other regions are active in the same sectors, quality must be high enough to withstand competition" (Caminada & Conzett, 2015, p. 104).
This demonstrates the importance of creating a quality product to make it viable for a peripheral region. Looking at the agriculture in Vorarlberg and the Bregenzerwald, it becomes apparent that there is one product produced which is high in the social and economic order. This is the Bregenzerwald cheese (Vorarlberg tourismus, n.d.). Creating this cheese under the right circumstances ensures that it can be labelled as a quality product, meaning that this product can be viable for a peripheral village.

Vorarlberg has a tradition of dairy farming and owes this to its geographical conditions. The importance of cheese in the district can be traced back to the 14th century where there are records from the monastery of Mehrerau near Bregenz implementing a cheese tax. The cheese culture evolved over the centuries, to the point where it became a luxury product in the 19th century. The first cheese-making school was opened in Doren, Bregenzerwald in 1901, and in the 1930s Vorarlberg produced more than half of Austria's cheese export. This changed In the 1970s. Due to the modernisation trends in agriculture, the dairy cooperatives went from 120 in total to 30, causing a big blow to the local craft culture in Vorarlberg. When entering the European Union in 1995, the dairy cooperatives were afraid of another big decrease in dairy cooperatives. To prevent this from happening the 'KäseStraße' was established. The KäseStraße, meaning cheese route, is an initiative of dairy cooperatives in the Bregenzerwald with as goal the preservation of regional small-scale dairy cooperatives and profiling the Bregenzerwald region as a cheese region (Maass, 2018).

The Bregenzerwald region can profile itself as cheese region because of the cultural landscape with its meadows and pastures around its 24 villages. The cheese created in the Bregenzerwald is often based on silage-free milk. Silage is a type of fodder made of crops that have been preserved by fermentation aimed at creating a food stock for the winter ('Silage - an overview', n.d.).
The cheese made in Bregenzerwald is made of milk from cows that do not get this silage, which allows the end product to be labelled silage free. Only 2% of dairy farms in Europe produce a silage-free product (kaesestrasse, n.d.). The reason for not using silage is because of the nutrients, which affect the quality and taste of the milk ('Silage - an overview', n.d.). Because the percentage is so low silage-free products can be labelled as a quality product, which in turn means it has a higher value. A decline in the use of silage creates the problem whether there is enough dried hay and grass for the livestock during the winter. This also means that the amount of cattle a farmer can keep is based on the amount of hay they can make during the summer. Because of the higher value of the product it becomes possible to farm on a smaller scale. This trend can be seen throughout the Bregenzerwald with farms that have, on average, a livestock of twenty cows plus young cattle (Laendle, n.d.).

From the analysis of the 'nine theses on how to strengthen peripheral regions' and the 'Vrin model on how to establish a healthy economy' by Gion Caminada, it can be concluded that creating a steady base for a design ensures that it can function in a peripheral village. To create a steady base for a design that is viable in Krumbach the function of the design touches on the agricultural sector. Especially the making of silage-free milk, which then is made into cheese, creating a quality product. Using herbs from the moor, making it even more location-specific, another aspect is added to the product which makes it a unique quality product.
With this as a base, a secondary function can be added to the design that responds to the ambition of Krumbach of attracting tourism with a link to the moors. This way a program for a design has been created that both focuses on the local agriculture and creation of a quality product but also focuses on creating a connection to the moors and tourism.

The program

The program of the design focuses on it being an addition to Krumbach. To do so, the program consist out of two parts, a part aimed at contribution to the local economy and a part which focuses on the ambition of Krumbach regarding attracting tourism to the village. In the first part, the program focuses on the local dairy and cheese culture with a connection to the specific natural treats of Krumbach, the moors. In the second part the program focuses on creating a connection between the local dairy culture, the moors and tourism. This resulted in the following program to make the design viable for the village of Krumbach: a small scale cattle farm of 20 cows, cheese artisan space, cheese cellar and farmer's house. To connect these functions and the tourism of Krumbach the following functions were also added to the program: a cheese classes space, shop/café, and tourist accommodation. The design also guides day travellers through the design, connecting the building to the moor walking routes, reinforcing Krumbach's ambition.

The inside and outside space that a cow needs are essential in creating a program for a dairy farm. The program is defined with the help of a reference building, Desentis by Gion Caminada, together with literature.
The outside space required for a cattle farm is determined by the number of cows. A cow needs 50m² of meadow a day and eats around 8kg of grass during that period. On average, a meadow needs 24 days to recover from being grazed. This means that for 20 cows together with a 24-day interval 24.000m² of meadow is needed. The cows graze during a period of roughly 6 months after which it becomes winter and the cows go inside. This means that during the summer hay needs to be preserved for the six winter months. This makes the total required space for the cattle 4.8 ha. ('Weiden', n.d.).

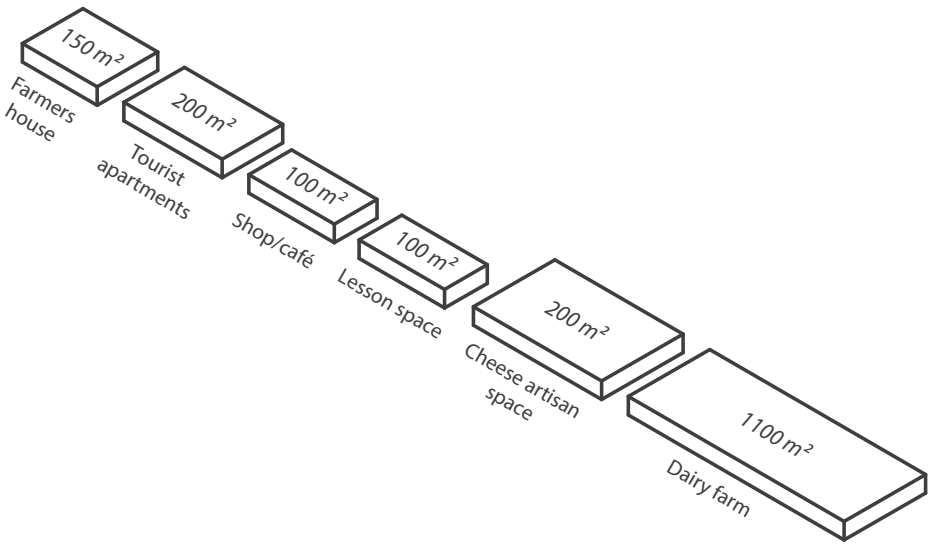


Figure 2: Program translated to volumes for volume study

The indoor space required for the cattle strongly depends on the way the farmer wants to keep the animals. Dairy production is about creating a quality product where the animals have an essential role. This means that the cows are treated with care and they have enough space to roam around. To be able to design a building for the cows, I used the cattle barn in Desentis, Switzerland by Gion Caminada as a reference. Desentis is a good example of how cows can be kept in an animal-friendly way with enough space for each cow (Caminada & Conzett, 2015, pp. 195-202). To be able to create an animal-friendly design, the floor plans of Desentis were analysed and diluted to measurements per cow. These measurements were then multiplied for a dairy farm of twenty cows, resulting in a program of roughly 1100m² for the barn.

The program for the cheese artisan function was also diluted from a reference project. The project 'The Farm of 38° 30°" by Slash Architects and Arkizon Architects showed that roughly 200m² should be sufficient for the cheese artisan function (Rojas, 2017).

Defining the program for the required spaces for the functions with the square meters provides an overview of square meters with which a volume study can be started.
The following square meters per function are used; 1100m² dairy farm, 200m² cheese artisan space, 100m² cheese classes (Metzler naturhautnah, n.d.), 100m² shop/café (Rojas, 2017), 130m² for the farmer's house (at home in Europe, n.d.), and 200m² for the tourist accommodation. This adds up to a total of 1830m² for the entire program.

Regional commitment

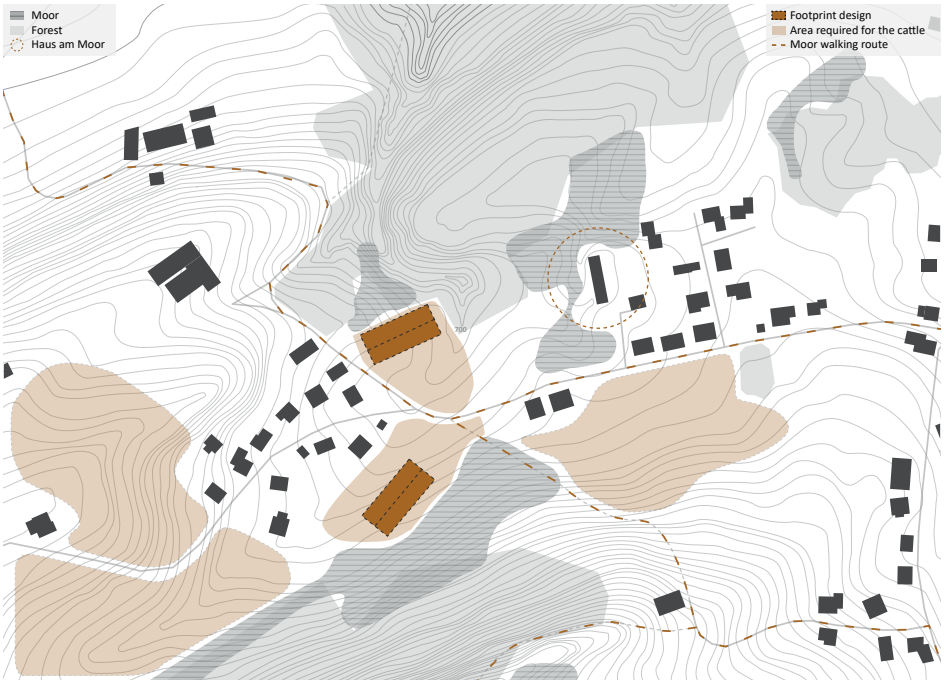


Figure 3: Footprint design projected over the landscape

Figure 4: Chosen location with area needed for the cattle

Regional Commitment

Placement

Within the graduation studio 'Masterly apprentice II' it is preferred that the designed project is within a visual distance of the analysed building. The preferred location for the design is thus in the vicinity of Haus am Moor with a possible connection to one of the moor walking routes that go through Krumbach. There are three walking routes in Krumbach, two of them run through the area around Haus am Moor. To find the best location for the design, the rough square meters for the building as well as the meadow required for the cows is projected on the landscape around Haus am Moor.

The placement of the design was chosen based on the connection to the unique quality of the region, a moor, the connection to the moor walking routes and the ability to finish the existing settlement. The chosen location allows the design to interact with one moor walking route and is close to another one. The design is placed between the existing settlement and the moor. It becomes part of one of the existing settlements in Krumbach, this way it will not break the settlement principle that originated in Krumbach. Placing the design close to the moor allows the design to use this unique quality for both the production of cheese as well as tourism.

Figure 5: Old path of moor walking route

Figure 6: Relocate path moor walking route to create connection with design

Regional Commitment

Relocating part of moor walking route

One of the moor walking paths is partly relocated to create a better connection between the routes and the design. The path is relocated so that it runs through the design following the ambition of the project to connect the agriculture to tourism and the moors. The part of the moor path that is relocated functions as a connection between two moor walking routes and to create a loop.

This path runs along the landscape and detracts from the environment and ambition that the moor walking routes represent. It follows a road also available to cars and thus does not enter into a dialogue with its environment. It runs along a forest and continues briefly on a paved path through the moor. Changing this particular part of the path is not only beneficial to the design but also makes the moor walking route embrace what it is about. The path gets redirected through the forest and a part of the moor. Now, the path allows interaction with nature which is what 'the moor Krumbach project' is all about. The people using the path walk on the soil and will feel the difference between the hard soil of the forest and meadow which is in contrast to the soggy soil of the moor, which moves under your feet.

Figure 7: Placement of volume in Krumbach

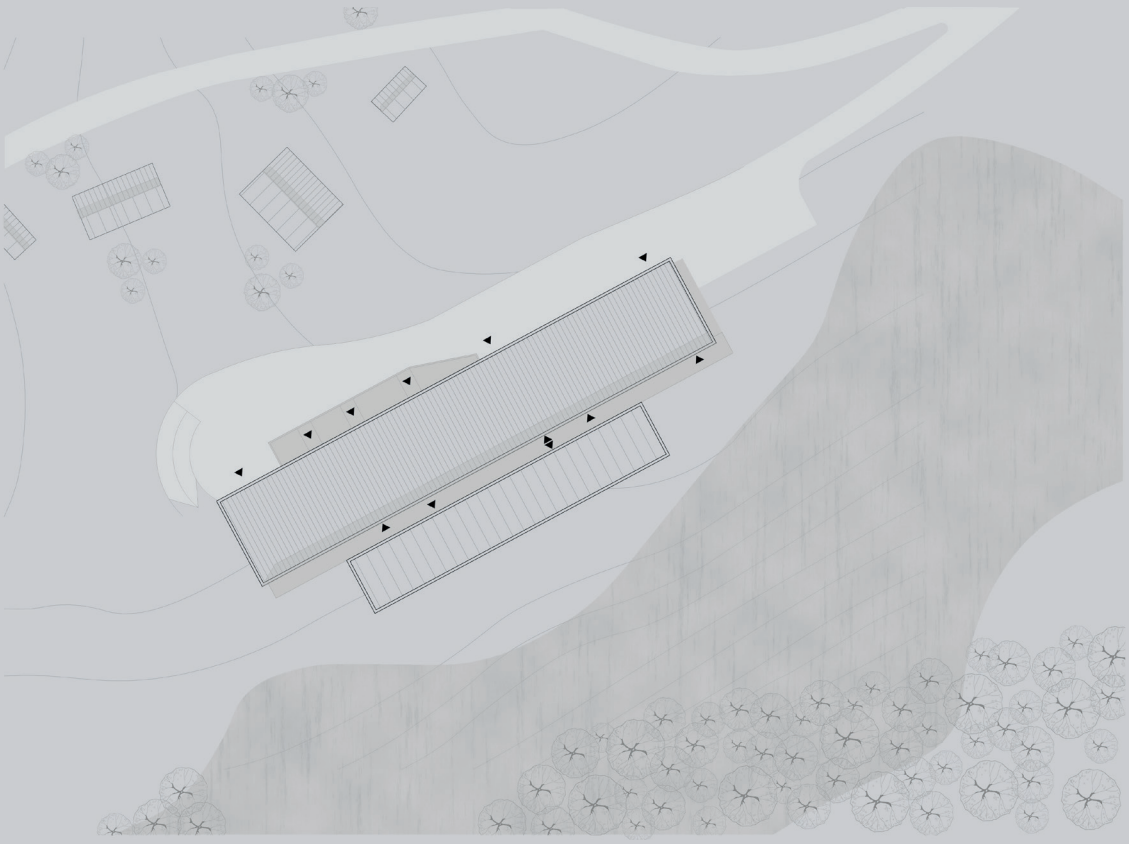
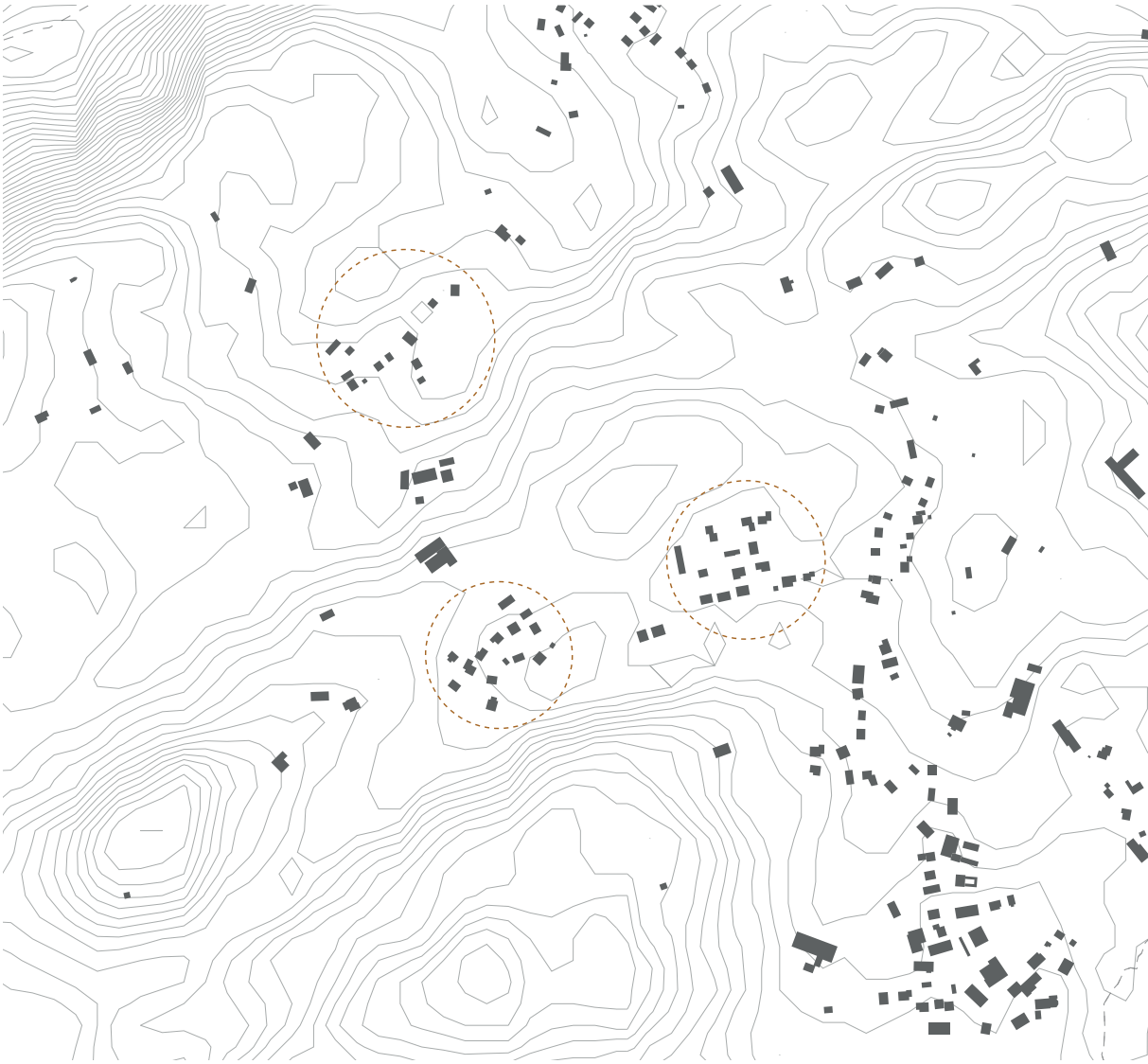


Figure 8: Volume placed towards the moor



Regional Commitment

Existing settlement

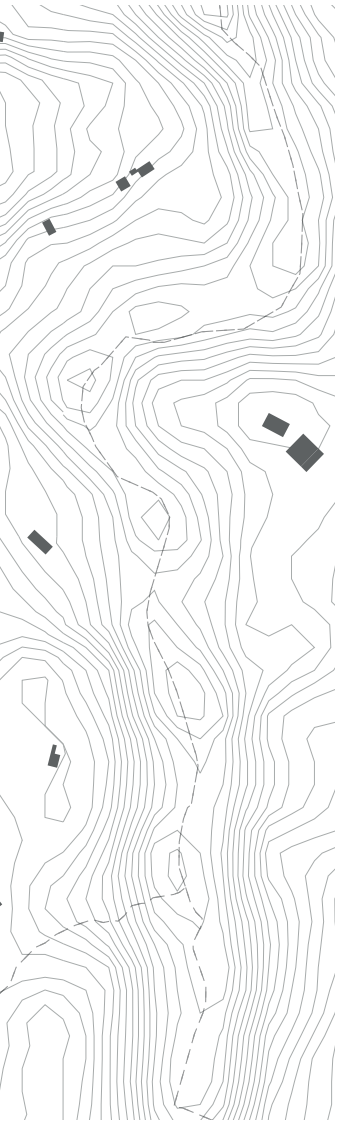


Figure 9: Location analysed settlements in Krumbach

The design is placed at the edge of an existing settlement. It is a little settlement of houses across the settlement that Haus am Moor belongs to. Krumbach consists mainly out of small settlements scattered around an open hilly landscape. These settlements scattered around Krumbach give it an open character, where small settlements flow into the meadow in addition to some small forestry and moors.
To get a better understanding of the settlements in Krumbach and to create guidelines which could help to create a design which fits the context, three settlements were analysed. The three analysed settlements are the one that Haus am Moor is part of, the one chosen for this design and a neighbouring settlement to the first two. This analysis, together with the lessons from the analysis of Haus am Moor, will strengthen the commitment of the design to the region.

To gain a better understanding of the settlements the analysis focuses on the buildings as well as how they are perceived in the landscape. The footprint, the elevation with building height and consequences of placement in the landscape are projected schematically.

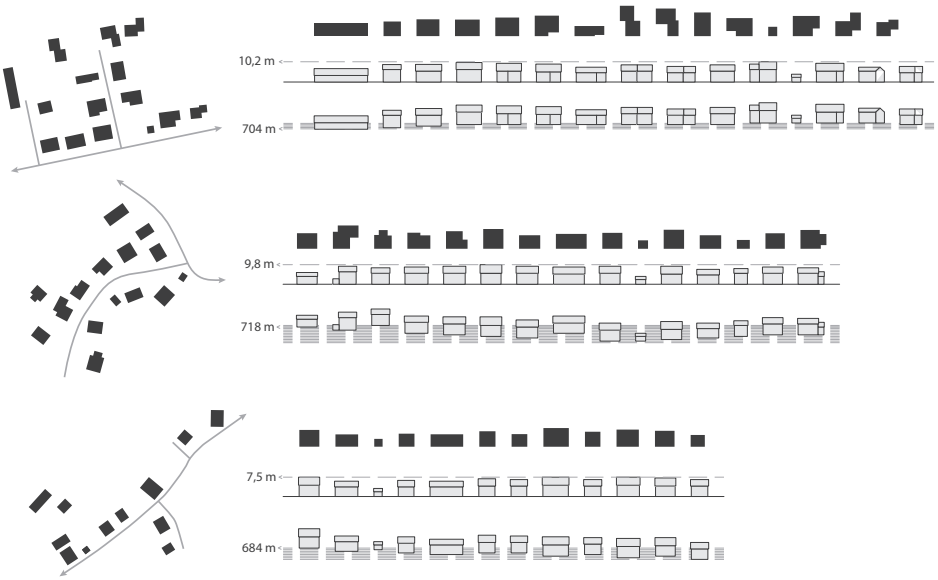


Figure 10: Analysis of three settlements in Krumbach

Figure 11: Analysis of four building in these settlements

The footprint of the buildings in the analysed settlements shows that the main shape is a rectangular shape with some slight deviations on this shape. The elevation shows that the height of the buildings in the settlements is very similar, with minimal differences.
The elevations placed in the landscape show that this is the point where the settlement starts to become more dynamic and the buildings are perceived differently. With the help of the second graph it can be concluded that the diversity in the settlements is created by the landscape. The buildings themselves do not differ too much from each other. Only by placing them in the landscape a dynamic settlement starts to appear, which is perceived as free-standing structures with different heights and shapes.
The façades of four buildings, located in one of the three settlements, were drawn to get a better understanding of the height of the façade, gutter, ridges and roof angles. The main shape of the houses in the settlements is rectangular with small variations on this shape, the roofscape is generally small with a 20 degree angle. This smaller roofscape creates a building with relatively larger façades.

The conclusion is essentially that one should not hold back from embracing a rectangular shape for the building. Using a bigger façade with a smaller roofscape will refer back to the existing buildings in the settlements. A dynamic design can be created by using the height difference the landscape offers, letting the landscape define the perceptible height of the building helps to create a similar dynamic visual play in the design as is happening between the buildings in the settlements.

Regional Commitment, shaping the design

Creating a 'hoamat'

The design is focused on creating a 'hoamat'. The word 'hoamat' is from the local dialect in the Bregenzerwald. It is a building where both daily life and work take place, always with a connection to the meadow and farmland. Hoamat means homeland, a small world that functions on its own (Cecilia & Levene, p. 13). Hoamat can be found back in typologies that generally belong to the area of the Bregenzerwald. This was also an inspiration for Haus am Moor. In Haus am Moor the hoamat is created by placing the living and office functions in the same volume, creating a space where the family can work and live with a connection to the meadow around the building. Creating a hoamat is broader than merely creating a place for a family with living and working connected to the meadow around it. A Hoamat can exist out of different functions with different people functioning in it. In the vernacular typology of Bregenzerwaldhaus, for example, three generations often lived together with a farmhand and a maid. This shows that a hoamat is not about family ties but about creating a place where a small world can function. Hoamat is a place where different functions and people are united in a compact structure which interacts with the meadow around it (Cecilia & Levene, 2019, p. 15).

In the design, a hoamat is created by interweaving multiple functions into one building. The design creates an interaction with its surroundings by using regional commitment to create a building inspired by the typologies in the region. The building itself creates interactions between the functions, the user and people passing. The whole design reaches into the landscape, becoming part of the context. With the help of craftsmanship and low-tech sustainability the design is shaped around the different users, which is essential in the existence and functioning of a hoamat.

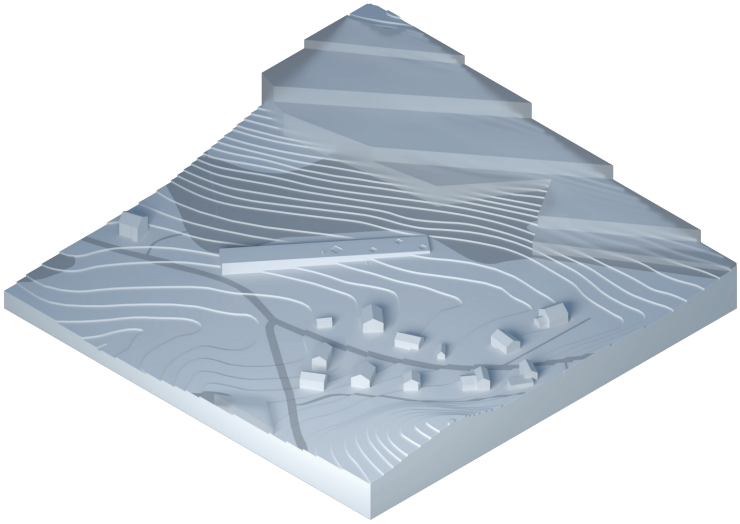


Figure 12: First volume study in landscape

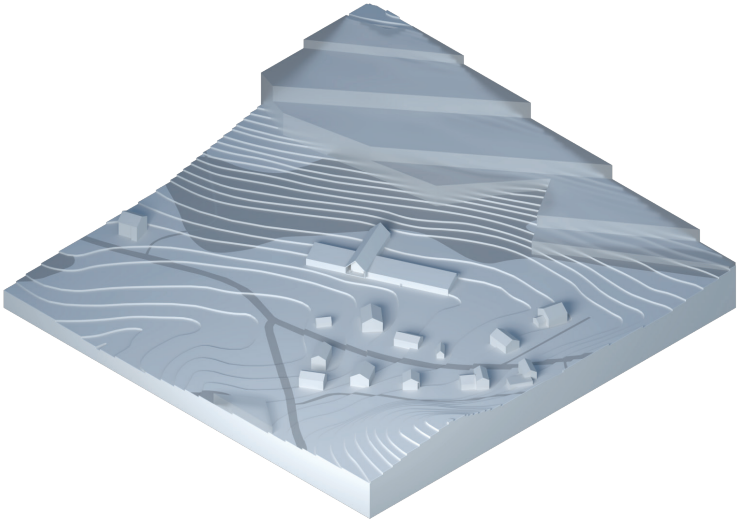


Figure 13: Second volume study in landscape

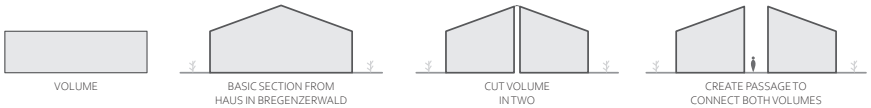
Regional Commitment

Research for placing volume

The placement of the volume at the chosen location was reached by analysing successive volumetric options. The volume of the building should be placed and shaped in such a way that it creates a connection with the moor and the moor walking routes that run along the chosen location.
The volume must also safeguard the 'hoamat' created within the design. From the analysis of Haus am Moor it became clear that Bernardo Bader was inspired by the local architectural language. He used this local architectural language as a base, after which he adapted it to fit his program. This strategy allows him to develop a building that is larger than the local architecture but still speaks the same language. As a result, even though the building is larger than the surrounding buildings, it fits the context and it is the next step in the local building culture.

To derive at the final design a sequence of successive volume studies was done.
Creating one volume, where the functions are placed in a linear sequence, creates a clear hierarchy between the functions and refers to a 'hoamat', a small world on its own. By fitting the functions in one volume the building becomes very long and overwhelming for its context. Placing it in the landscape creates a division in the landscape, two sides of the landscape located on the opposite sides of the building. This can be seen on 'Figure 12', this way the volume is so big it is overwhelming to the context it should be part of.
To overcome this, the functions are placed in two volumes. These two volumes are separately placed in the landscape where they individually interact with the mountain and join each other at an intersection, as can be seen on 'Figure 13'. This makes the volume smaller to perceive but the crossing of the two volumes create tension in the overall shape. The two volumes are perceived as individual, breaking the expression of a 'hoamat'.

Figure 14: Common Austria house in the Bregenzerwald



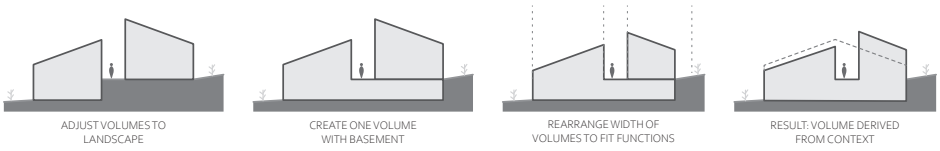


Figure 15: Concept used to shape the design

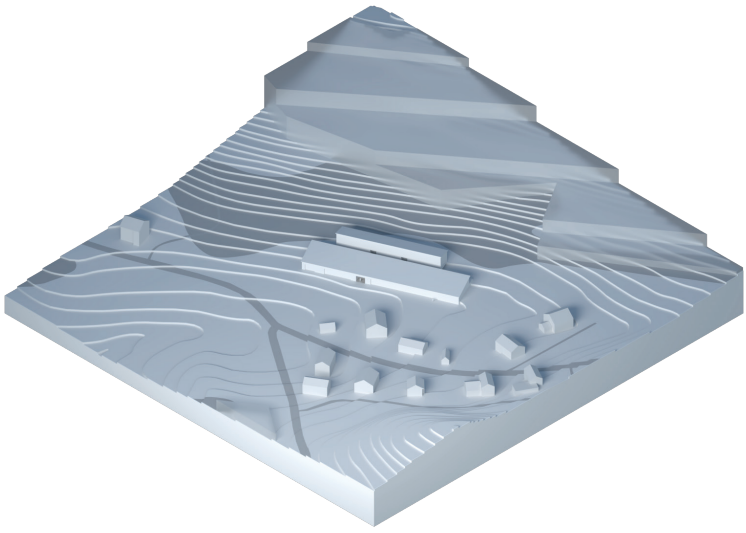


Figure 16: Final volume in landscape

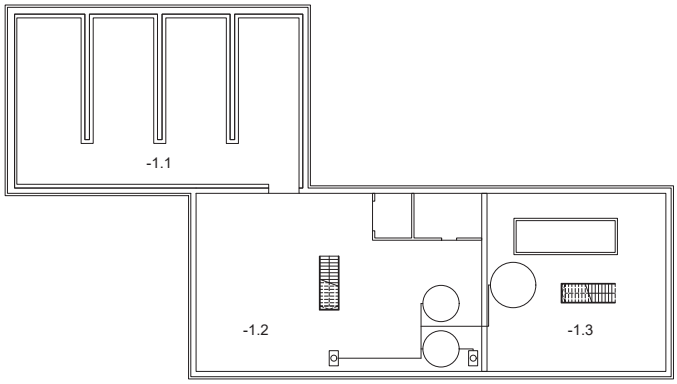
Using two volumes can help to make the building smaller to the eye and fit the context as long as they are part of one gesture that creates the 'hoamat'. To shape a volume that consists of two parts and fits the context, a method derived from Haus am Moor is used. Bernardo Bader uses a local vernacular typology with its architectural language and strips it down to a section. This section is stretched to fit the program.
This idea is implemented but the typology used is perceived as a starting point. As Bernardo Bader says: "what fascinates me about farmhouses is their ability to unite many different functions in a single compact structure. And things get interesting when there is no prior image to follow, or existing images are no longer viable" (Cecilia & Levene, 2019, p. 13). Approaching the existing typology as a beginning, a typology that is no longer viable, starts a development based upon the region. The design becomes the next step in the building culture of the place which is embedded with architectural and cultural aspects of the place.

The final volume starts by diluting a basic section from a general house in the Bregenzerwald with a 20-degree gable roof (Figure 14). The volume is divided into two to create a volume which is smaller to perceive and separates the working from living, public from private. Creating two volumes next to each other creates a passage between the two volumes connecting them. Both volumes follow the original shape safeguarding the expression of one volume where everything happens referring back to a 'hoamat'. The next step is the placement. Both volumes follow the line of the landscape, this means that both volumes now have their own height because the building is located uphill. This shift in height creates the possibility to connect both volumes with a basement. Creating a basement means that the building volume above ground is less perceivable and fits better in the context. The width of the two volumes are rearranged to better fit the functions in the volumes. The lower volume is for the business functions of the program which becomes bigger, the higher volume is for the living functions of the program which becomes smaller.

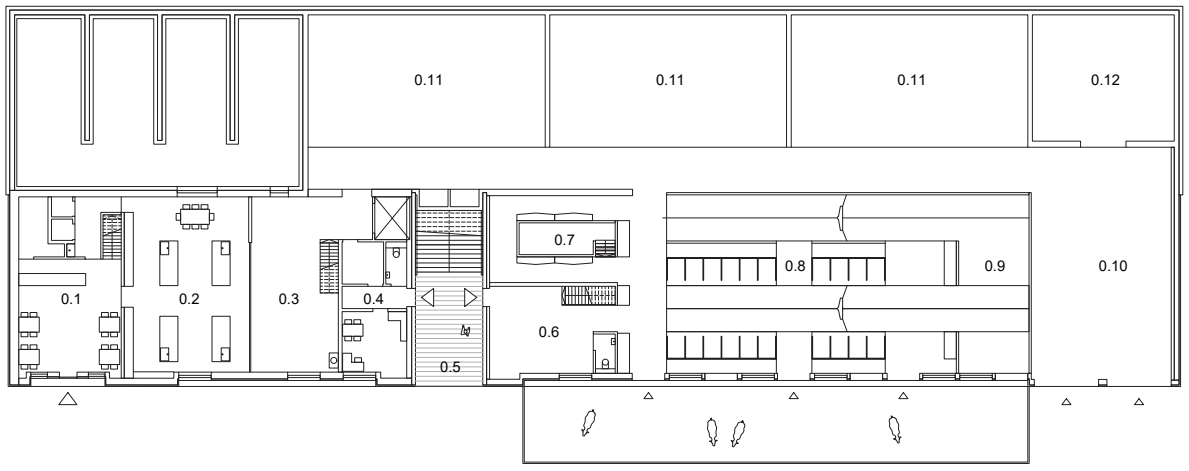
The result is a volume derived from a typology found in the context. The starting typology is developed based on the functions it houses and the 'hoamat' it creates. The volume is shaped by exploring the architecture of the context as well as the landscape. The volume becomes the next step in the development of the local architectural language.

Hoamat-Käsefarm

-1.1 Cheese storage/resting place
-1.2 Storage cheese artisan space
-1.3 Technical space barn



0.1 Shop/Cafe
0.2 Cheese lesson space
0.3 Cheese artisan space
0.4 Office space
0.5 Hallway
0.6 Barn storage
0.7 Milking
0.8 Cattle
0.9 Young cattle
0.10 Machine storage
0.11 Hay storage
0.12 Dung storage



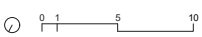


Figure 17: Floor plans, 1:500

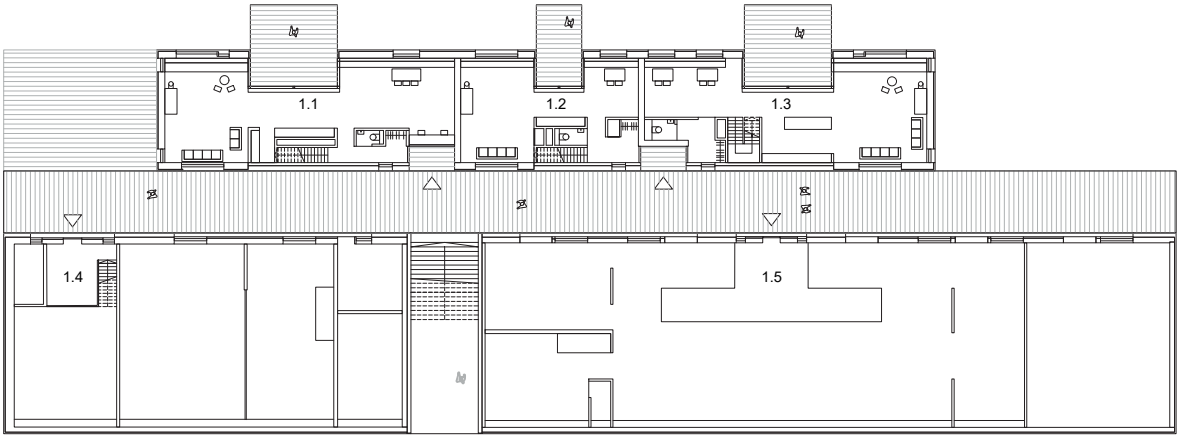
Hoamat-Käsefarm

Design explanation

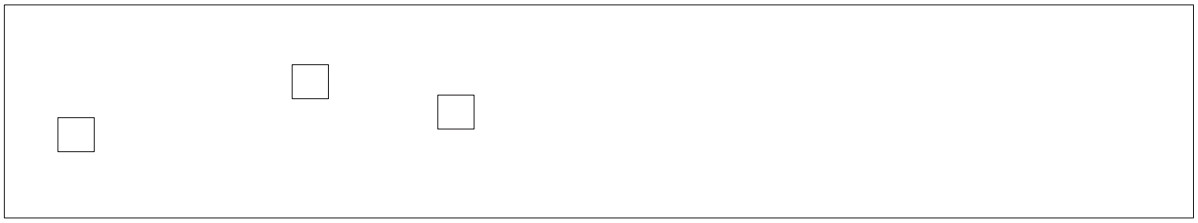
All the decisions described above resulted in a design that starts with creating a 'hoamat', a little world on its own consisting of work, living and the surrounding together with the people who make this world function. The design consists of a barn, cheese artisan space, cheese classes space, shop/café, farmer's house and tourist accommodation. The design interacts with the landscape passers-by. The functions are placed in two volumes above ground which are connected with a basement. The living and business volumes are above ground, separated by a passage. The passage creates a central route connecting the two volumes and creates a connection between the functions and passers-by. The passage is connected to a moor walking route and to a hallway through the business side which gives access to the lower laying courtyard and parking spots.

The business volume is a long stretched volume with a barn, cheese artisan space, cheese classes space, shop/café and cheese cellar. The business volume is cut through with a hallway which keeps it as one volume but disconnects the clean side of the business with the dirty side. Creating of food separated from where the cows are kept. The ground floor of the business volume is pushed into the mountain where it becomes the foundation for the living volume. The spaces that need daylight are placed towards the front and the other spaces are placed back into the mountain. The business side is partly fitted with a basement, which is used for technical aspects of the business volume, and an entrance to the cheese cellar.

1.1 Farmers house ground floor
1.2 Tourist apartment ground floor
1.3 Tourist rooms ground floor
1.4 Passage entrance shop/cafe
1.5 Platform above cattle



2.1 Farmers house first floor
2.2 Tourist appartment first floor
2.3 Tourist rooms first floor



0 1 5 10

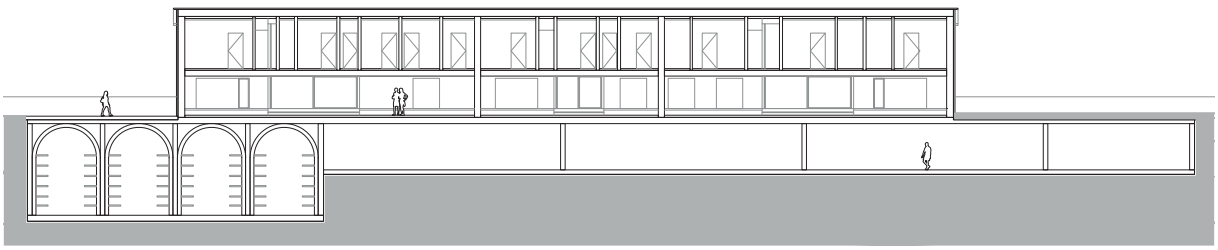
Figure 18: Floor plans, 1:500

To allow people to interact with the cattle, a platform in the barn is created that is accessible from the passage.
Because the design is meant for a small number of people some functions can be shared. The shop is the entrance for the cheese classes space and they share the same toilet facilities. The farmer and cheese artisans share the same office space with a kitchen to allow contact between the people working there. This allows people from the two functions to socialize as there will only be one or two people at work in both spaces.

The living volume consist out of a house for the farmers, a two-bedroom apartment for tourists and three rental rooms for tourists, with shared functions on the ground floor. The layout of all three are similar and based on an open ground floor where the users can socialise, and a more private first floor which revolves around sleeping. The landscape view from both floors is important, to create a better connection with the landscape the living volume is placed 0,5 meter into the mountain. Winter gardens are placed in the living volume in order to create a connection with the landscape and let the building flow into the landscape. These are placed on landscape height to allow the user to walk from the outside space into the landscape.

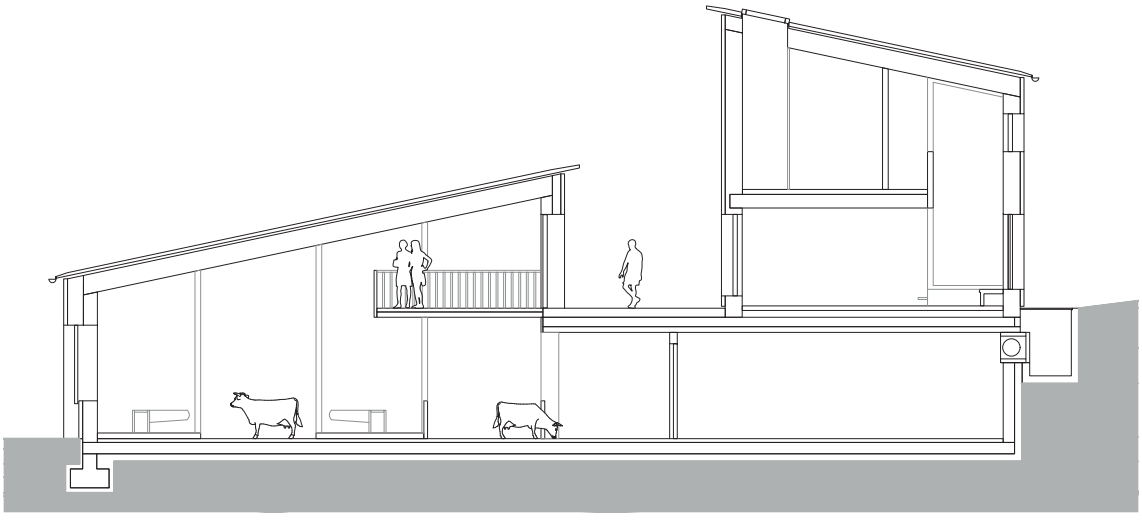
The design encompasses public and private functions, the entrances to the buildings are placed in recessed parts of the façade to emphasis them in the volume. To emphasise the public functions the entrances to these spaces all have the same expression. The public entrances are located at the front of the shop, the back of the shop at the passage and the platform in the barn located at the passage.

The farmer's house has additional storage space located in the business volume because the farmer's house does not have an attic or basement. This storage space is accessible from the passage located on the opposite side of the entrance to the house.



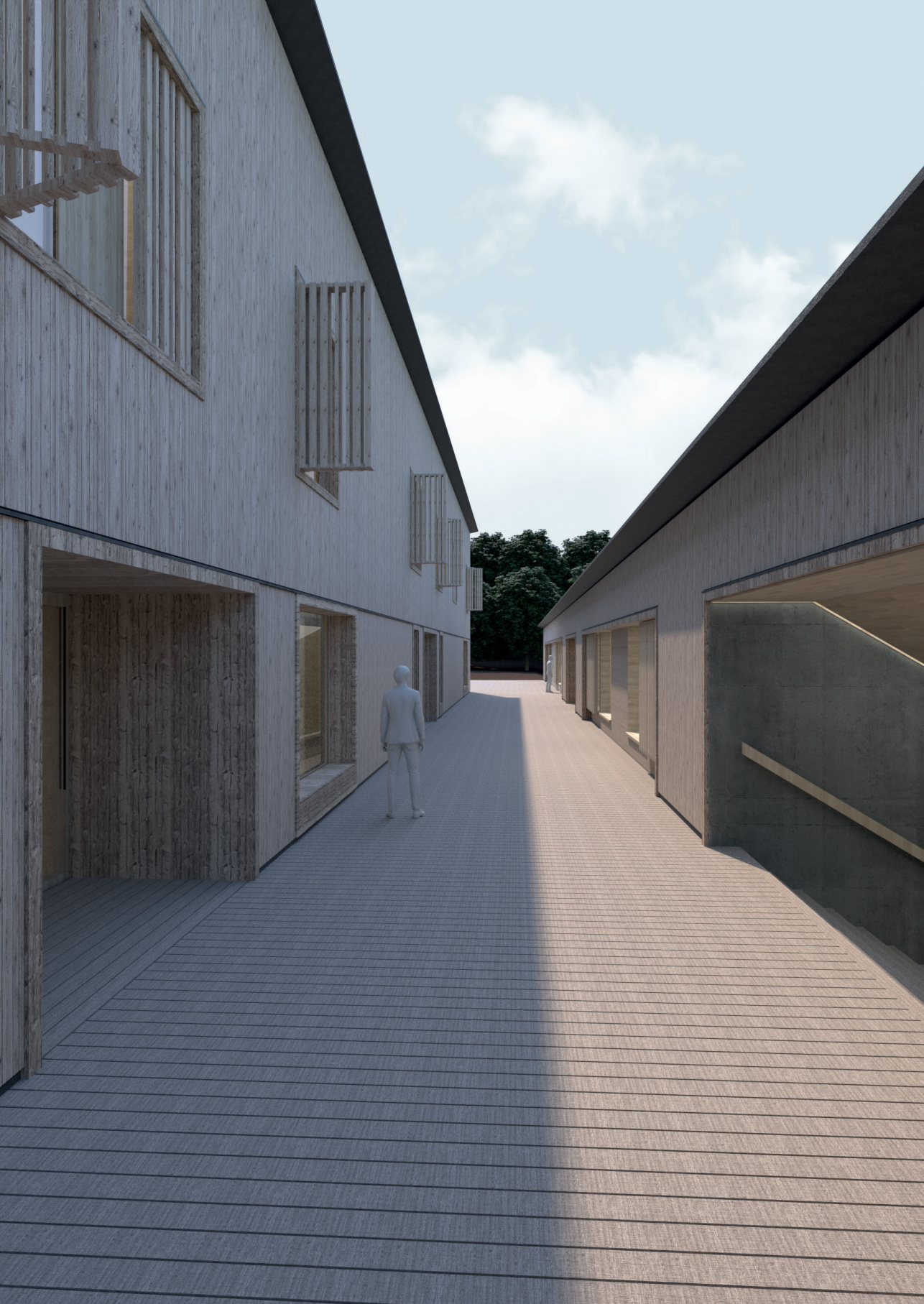
0 1 5 10

Figure 19: Long section, 1:500



0 1 5

Figure 20: Short section, 1:200



Hoamat-Käsefarm

Construction

The construction for the business volume consists of two parts. The floors and the structure located underground that create the foundation for the living volume are made of concrete, the other construction of the business volume consists of a fir wood construction that follows a grid of 4800mm and 2400mm by 3150mm and 2950mm. The grid uses two measures on the x-axis as well as on the y-axis to create a better layout for the floor plans. These dimensions arise from the barn where the dimensions for the cows have determined the distance between the grid lines.
The construction of the living volume consists of a concrete core with concrete floors. The concrete floor is carried by the concrete core together with steel columns which are located in the timber frame construction and by the window frames of the winter garden. The concrete cores have a technical shaft integrated that contains pipes going up and down.

The two volumes together form one constructive unit. Both are enclosed by a timber frame construction. The timber frame construction stands on its own with a high insulation value. Using a timber frame constructions gives the possibility to place an extra timber frame element on the inside of the building which houses technical elements such as sockets, switches and light fixtures.

Figure 21: Construction floor plans, 1:500

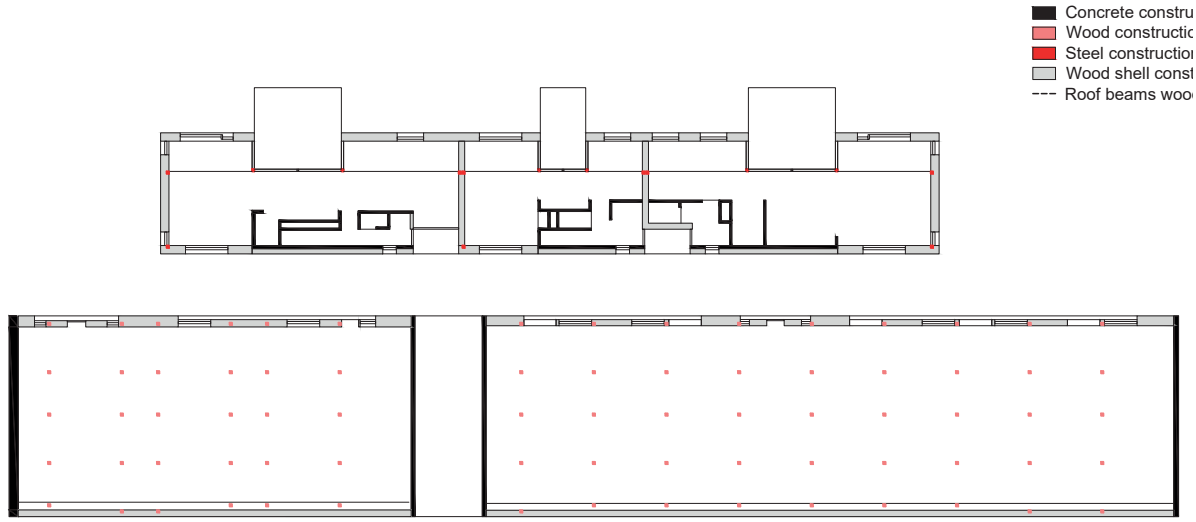


Figure 22: Construction floor plans, 1:500

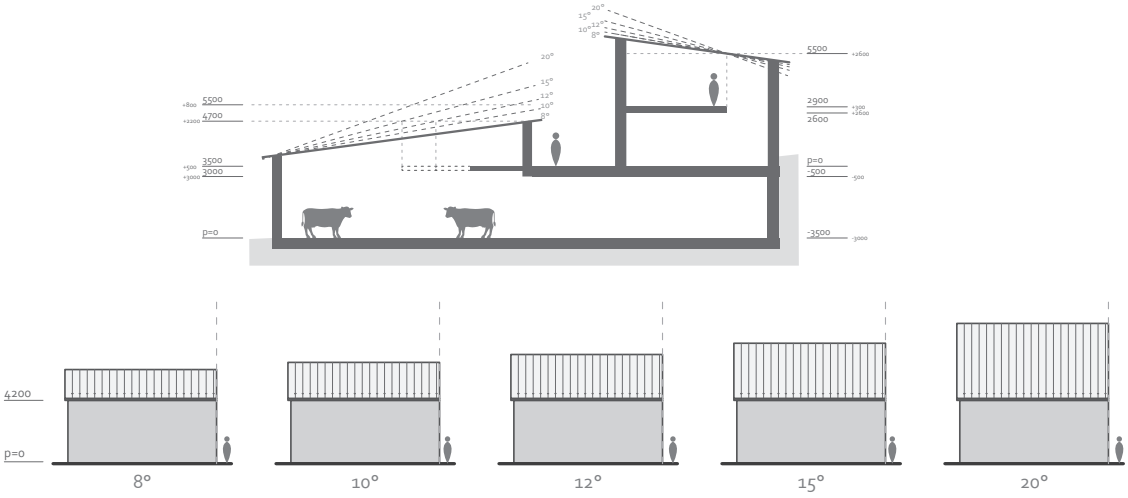


Figure 23: Angle of roof defines the visibility of the roof scape

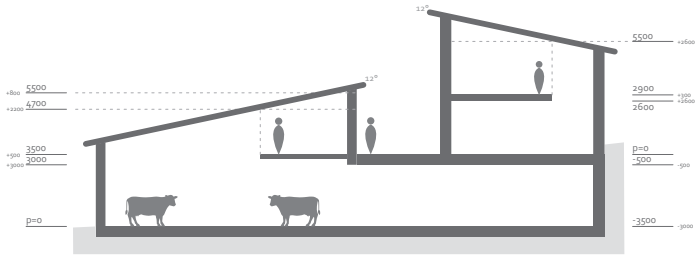


Figure 24: Chosen roof angle of 12°

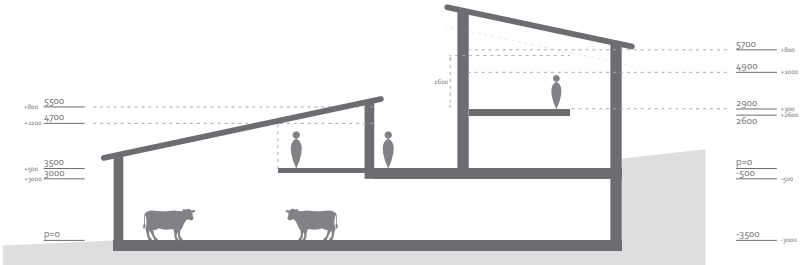


Figure 25: Stretching the living volume higher

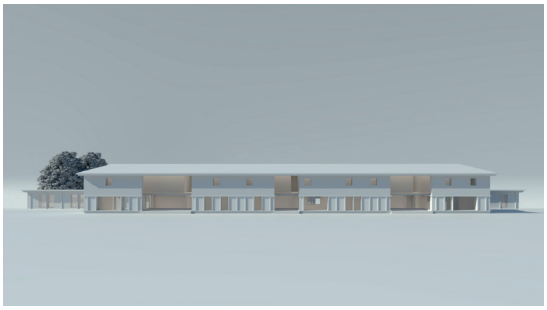
Hoamat-Käsefarm

Façade research

Bernardo Bader used regional commitment together with a holistic approach to define the façade of Haus am Moor. The regional commitment steered Bernardo Bader towards local barns. The façade finish, as well as the main shape, are derived from these barns. The holistic approach makes the functioning of the user in the design essential. This meant for the façade that the window openings are positioned to get the best lighting conditions on the inside.
Getting inspired by the surroundings and creating the best conditions for the user inside the design are the starting points of the façade research and placement of the windows.

First the façade research
The design of the façade is based upon the ability to find aspects in the surroundings which help to create a connection to the context. Different aspects found throughout the Bregenzerwald are used to create the façade. Different aspects of the region are used in one façade design, thereby expressing the architectural language of the region.

The first step in the façade design was redefining the roof angle. The analysed buildings in the surrounding settlements show a small roofscape with an angle of around 20 degrees. Because the width of the designed building is bigger than these buildings, a 20-degree angle would create a big roofscape. To make the building fit the surroundings better the roof angle has been reduced to a 12-degree angle. This results in a roofscape which is relatively small when viewing the building from the settlement and at the same time it still refers back to the roofscape which can be found back in local settlements. To make the living volume more pronounced and create a better interior space the roof is raised one meter higher. Raising the roof one meter ensures an improved view over the landscape from the first floor of the living volume. It also creates a bigger difference between the two volumes which refers back to the difference between the buildings in the settlement. The landscape creates the dynamic appearance of the settlements.



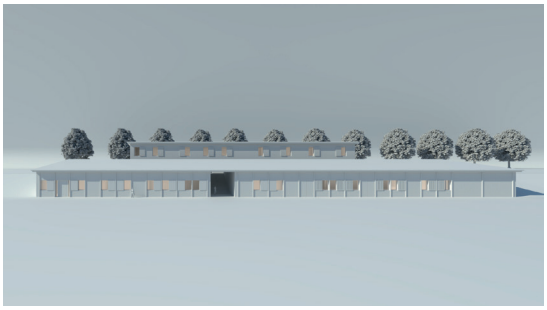
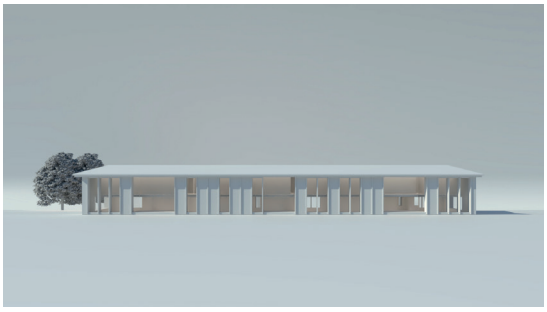


Figure 26: First façade option



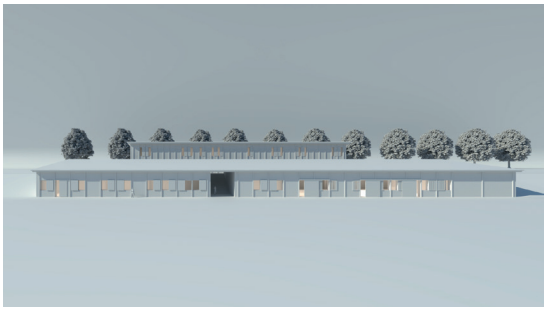


Figure 27: Second façade option

Figure 28: Passage not perceivable in its entirety with second façade option

To create the final façade, successive façade options were analysed. Two of these options are discussed.
The first option was to give both volumes their own expression to fit the function it houses. In the Bregenzerwald it is common for the buildings that consist out of a business and living area in one volume to use different façade finish at the front (living) of the building compared to the back (business). The two volumes are disconnected aboveground and both have their own expression, which creates a design that does not express a 'hoamat', they both function on their own.

The second option was to use a structured façade. This option embraces the rural context of the design. Several options with this idea were tested, options where the two volumes would have their own structural rhythm or where they have the same. The best option seemed to be the one where the living rhythm is twice the one of the business volume. The building uses the same general architectural language but the living is more refined, referring to its function. Using this structured façade creates a problem in the passage, both façades are not perceivable in their entity because of the structure in the façade. The structure hides the façade, which goes against the function of the passage where it should have an open character, being an in-between space, part of the whole with the possibility for the user and people passing-by to interact with the functions.

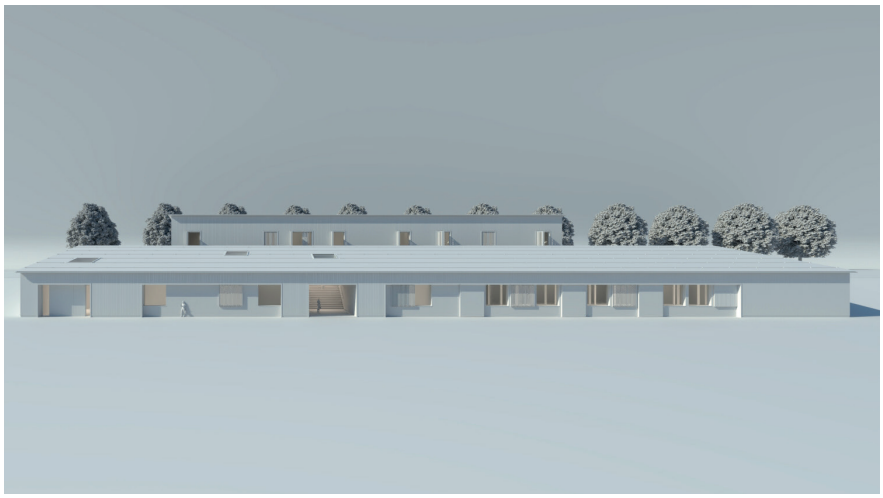


Figure 29: Final façade from settlement

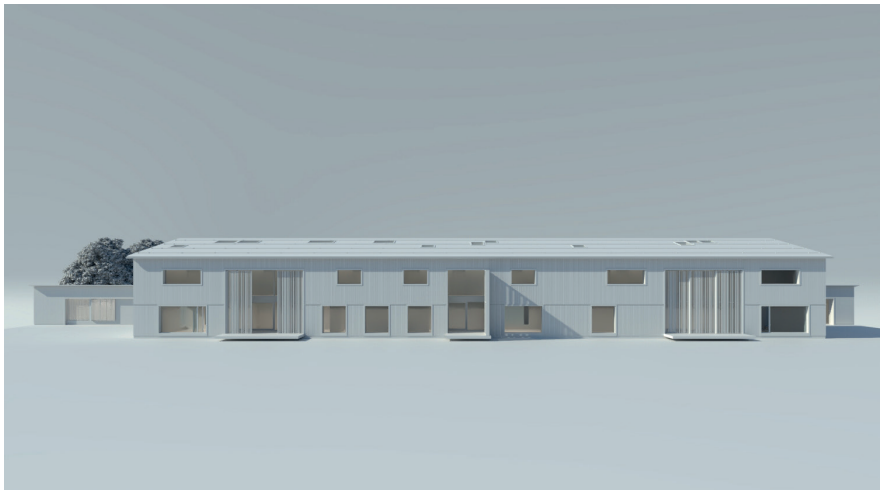


Figure 30: Final façade from the moor

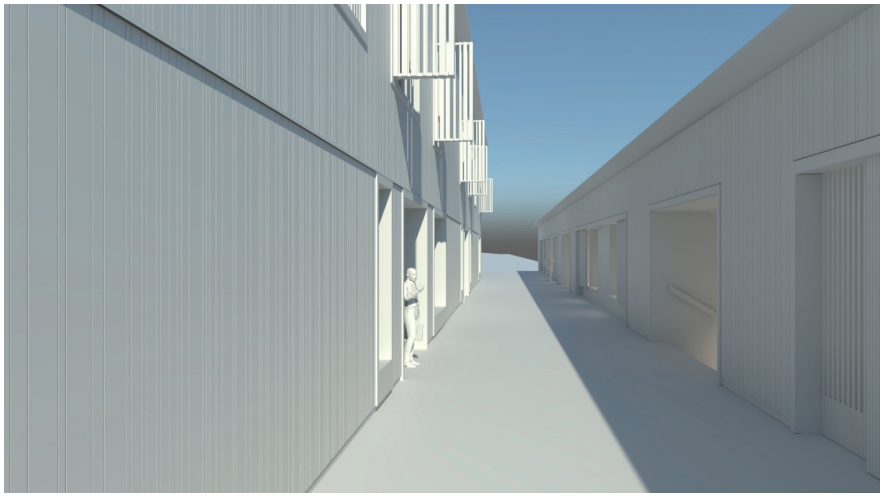


Figure 31: Final façade from the passage

The chosen façade is a result of the conclusions from the first two options. The façade finish is inspired by the region. Bigger buildings in the Vorarlberg district often use three or four different widths of timbers on the façade. This façade finish creates the expression that the building gets more refined and detailed the closer you get to the building. From further away these different widths are harder to perceive when getting closer to the building the façade starts to show the dynamic use of these planks.
The chosen façade finish uses this principle. Three different widths of planks are used on the façade. The façade on both volumes use this principle making them part of one architectural gesture. To make the living volume more refined the façade is divided in two. This creates a more detailed and refined façade which refers back to its function. This refinement of the façade of houses is used throughout the Bregenzerwald where they are more detailed compared to the business buildings, which have less detailed façade finish.
To create a more dynamic façade, recesses are added to the façade of both volumes. The recesses break the long façade and create a place where the building allows interaction to happen between the inside and outside.
The result is a façade which uses aspects found in the surrounding area as inspiration. This helped to create a façade that is based upon the region, and allows the design to fit in Krumbach and its evolving architectural language.

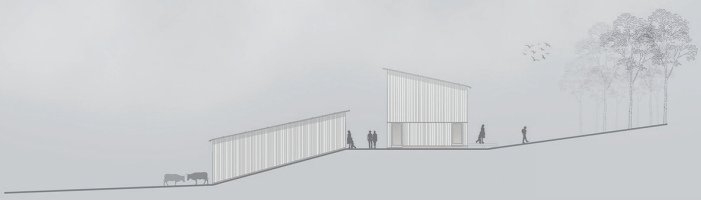
Façade from the moor

Façade from passage, living volume

Figure 32: Façade living volume

Façade from the passage, business volume

Façade from the settlement



Façade from the side

Figure 33: Façade business volume and side façade

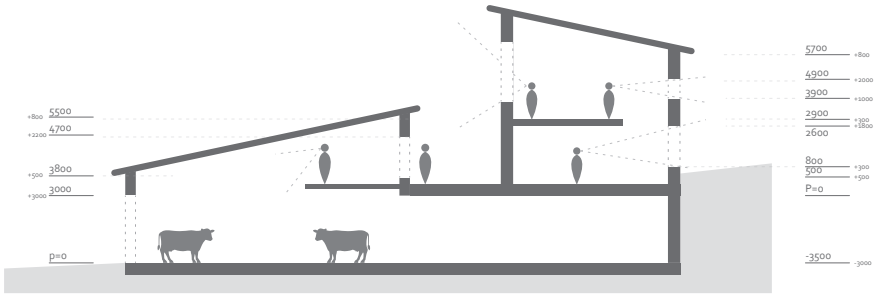


Figure 34: Stretching the living volume higher

Figure 35: Stretching the living volume higher

Hoamat-Käsefarm

Placement of windows

The placement of the windows is based upon the best conditions for the user. The best conditions for a user are defined as a landscape view, enough privacy, allowing interaction and creating sufficient daylight in the spaces. This fits the definition of a holistic design approach defined in the analysis booklet. The holistic design approach is, other than the desire of a roof over your head, also about the importance of aspects such as aesthetic, energy use, functionality and context.

First I will discuss the living volume. To give the user the best view over the uphill landscape the living volume is lowered 0,5 meter into the mountain. To ensure that rain and snow are not destructive to the building when gushing down the landscape a gutter is placed in front of the living volume. The lowering of the volume creates windows that are just above landscape level and frame the transition from the meadow into the moor. The windows are placed at a height where the user can enjoy this view sitting down as well as walking around.
The windows in the façade facing the passage are placed at the entrance and living room. This creates the possibility for interaction between the user and the passage. The farmer's house has an additional window that allows an interaction between the reading space and the passage with the connection to the hallway. The windows in the side façades offer a view of the scenery from the couch and from the bench, which is part of the interior placed at the moors façade.
On the first floor, the windows in the façade facing the moor are placed to give a view over the landscape from the bedroom doors. Opening the door gives the user a horizontal view over the moor. The windows placed in the façade facing the passage give a view from the bedrooms over the small valley with the settlement and a small moor. The light in the bathrooms enters through skylights to ensure privacy in these spaces.

The windows for the businesses are placed in the recesses of the façade. They are placed based on the best conditions for the user. The windows are placed in the rhythm of the construction where the windows change with sliding doors on the barn side.
The windows in the façade facing the passage allow interaction to happen between the functions in the building and the passage. The windows facing the façade provide a view over the settlement and at the barn side sliding doors give the cows access to an outside space.

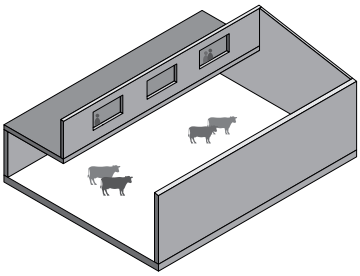


Figure 36: Interaction from passage through windows

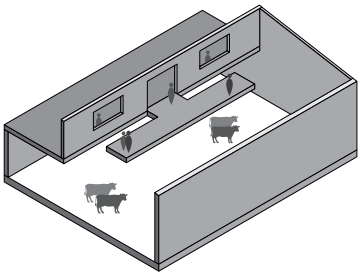


Figure 37: Interaction from platform with cattle

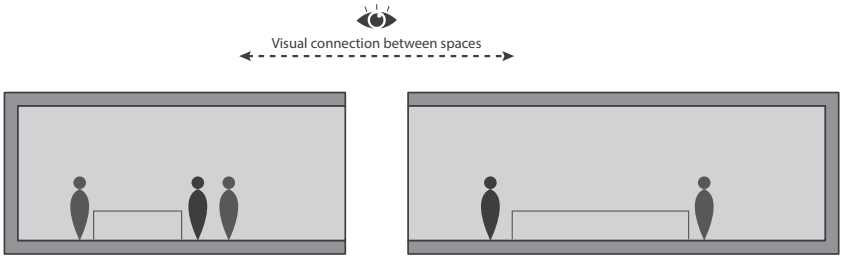


Figure 38: Interaction between cheese lessons space and cheese artisan space

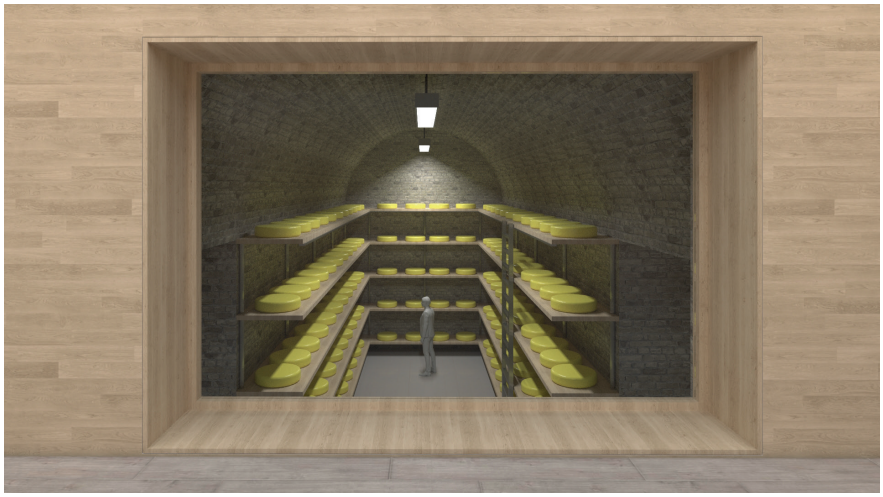


Figure 39: Interaction between cheese lessons space and cheese cellar

Hoamat-Käsefarm

Interaction

The design is about creating a world on its own that passers-by can also temporarily become part of. Achieving this interaction an important design aspect. The design lets the building interact with the surroundings, the functions interacts with each other and lets passers-by interact with the functions. To facilitate this interaction different spots throughout the design are implemented.

The placement of the windows and recesses are important to create a connection between the design and surroundings. With the use of the recesses, the building pulls the landscape into the building volume. With the passage and the outside spaces of the living volume, the building reaches into the landscape creating an easy transition into the landscape.

The interaction between the functions and people passing by is facilitated in the recesses of the building together with the passage. These recesses invite people to take a closer look through windows located in the recesses and look inside. The windows in the recesses are large windows which provide a view of what happens inside these functions. To create a more intimate interaction between the cows and the people passing by, a platform accessible from the passage is created. This platform allows people using the passage to interact with the cows on a more intimate level.

The interaction between the functions takes place in the cheese classes space, which has a visual connection to the cheese artisan space. Here, an interaction between the learning and the masters doing their job is created. The cheese classes space also has a visual connection to the cheese cellars.

Hoamat-Käsefarm

Sliding element

Sliding elements are used in the design to create a dynamic façade which closes off a space. The use of sliding elements in the design is derived from the region. Buildings in the region use window shutters to protect the building from aspects of the climate. The use of shutters in front of the windows in modern buildings has become less important with the implementation of high insulated glazing. The use of shutters is translated into the design to function differently while at the same time referring to the architectural language of the surrounding. The sliding elements are used differently throughout the design.

The sliding elements are located by the winter garden in the living volume, the bedroom windows in the living volume facing the passage and the recessed façade of the business volume. The living volume has different sliding elements than the ones used in the business volume. The elements used in the business volume are whole panels that slide in front of the windows next to it. The sliding elements used for the living volume are more complex. These sliding elements slide in half parts which rotate as one element, this way the rotating element is smaller and creates a more dynamic façade with elements moving outwards of the façade.

Figure 40: Sliding element winter garden closed

Figure 41: Sliding element winter garden open

Figure 42: Sliding element bedrooms closed

Figure 43: Sliding element bedrooms open

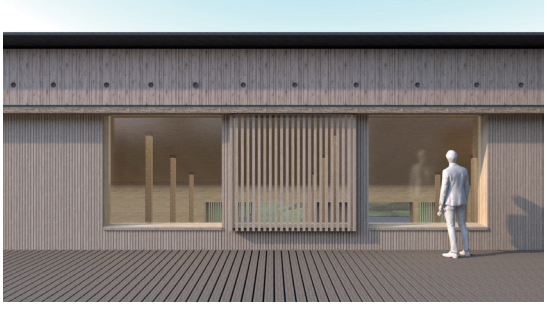


Figure 44: Sliding element business volume closed

Figure 45: Sliding element business volume open

The winter garden uses a sliding element to create a space which can be closed off and heated by the sun during the winter and opened to create an outside space. The sliding element works as two or three panels, depending on the length of the winter garden. The elements slide to the south-east side of the façade, where the whole panel can be rotated outwards. The rotation outwards of the façade creates a dynamic façade where it reaches into the landscape together with the platform. The elements rotate on the north-east side to create the least amount of shadow in the winter garden.

The sliding elements used by the bedroom windows are slide-rotation elements to give it the same architectural language as the ones used for the winter garden. These elements work as two panels which fold together to create an element which has a 90-degree angle to the façade. This creates a dynamic façade with elements moving outward and elements that interchange between the bedrooms between being open and closed.

The sliding elements in the business volume are used to ventilate the barn. To create a coherent façade for the business volume, the same sliding elements are also used at the windows in the cheese artisan space. Here, they do not function as ventilation but are placed to create a coherent façade. The sliding elements located at the barn side of the business volume are placed in front of an opening in the façade. Sliding the element to the side opens the façade and allows air to enter the barn. When opening the element, it slides in front of the windows next to it. This creates a consistent but also the dynamic expression of the façade where there is always one open part made of glass or the opening in the façade and a closed part, the sliding element, which switch positions.

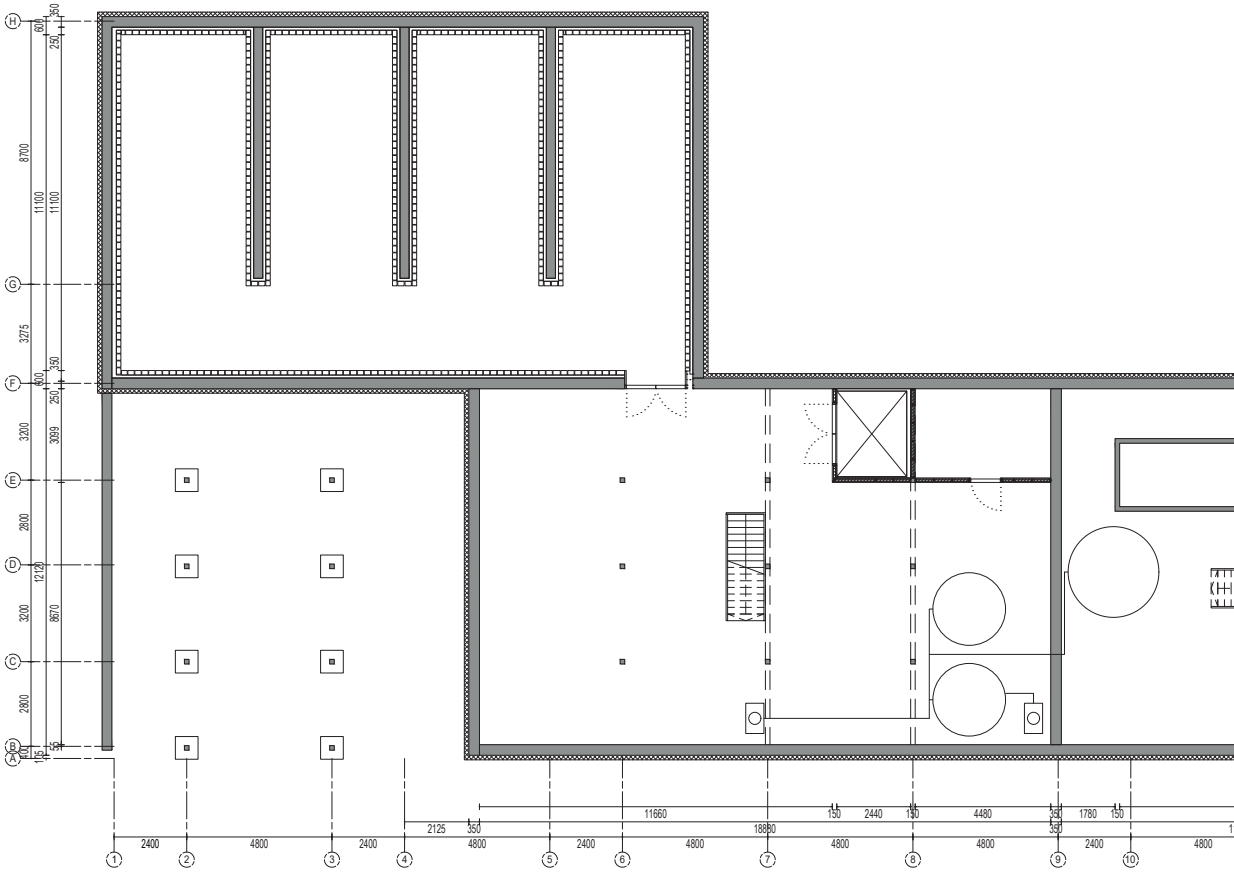
Craftsmanship

Craftsmanship

Craftsmanship in the design

Bernardo Bader uses craftsmanship to create a building which fits the user and is designed to a point where the whole building expresses itself as a fully detailed furniture piece. By using regional craftsmen, the design creates a connection to the region using the local knowledge and use of materials. To achieve a design centred around the user and is embedded with craftsmanship Bernardo Bader starts to detail early on in the design process. This allows him to have control over the design and all the aspects that are involved to create a usable design.

The design of the Hoamat-Käsefarm revolves around the user. To create a design that fits the users, it is important to understand the users and how they are functioning in a certain space. With this knowledge, a design can be created which tries to incorporate all functional aspects into the design. This makes it possible to start designing with the user in mind, and start the detailing early on in the process to create a design which fits the user and surroundings like a tailor-made suit.
An ambitiously high level of detail is wanted because it creates a space which is complete and allows the user to function to its full potential in the design. To embed the region in the design on a detailed level local craftsmanship is used. The use of local knowledge together with local materials creates a connection to the existing building culture of the region. Interacting with the building creates a link to buildings in the region which are built based on the same building culture expressing the same quality of craftsmanship and care for materials.
The design creates a simple volume with an architectural language inspired by the buildings in the area. This means that the design has a simple architectural language derived from the region which creates a connection to the context and does not become the centre of attention. The craftsmanship and detailing of the design become more apparent when getting closer to the design and interacting with the building. To give an insight into the materials and detailing the detailed floor plans are first displayed after which the materiality and detailing of the design are explained in more detail.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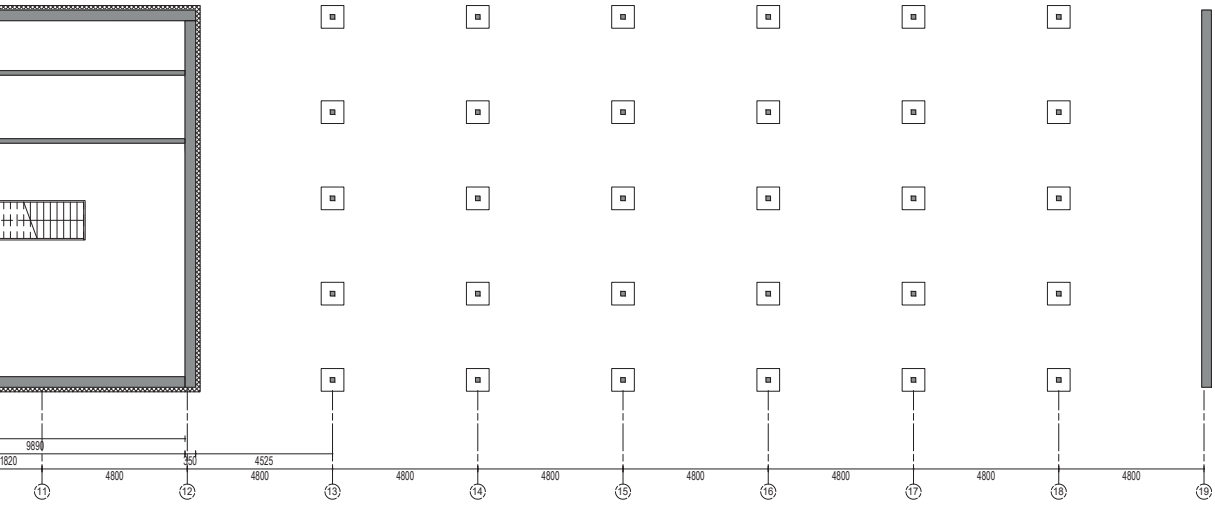
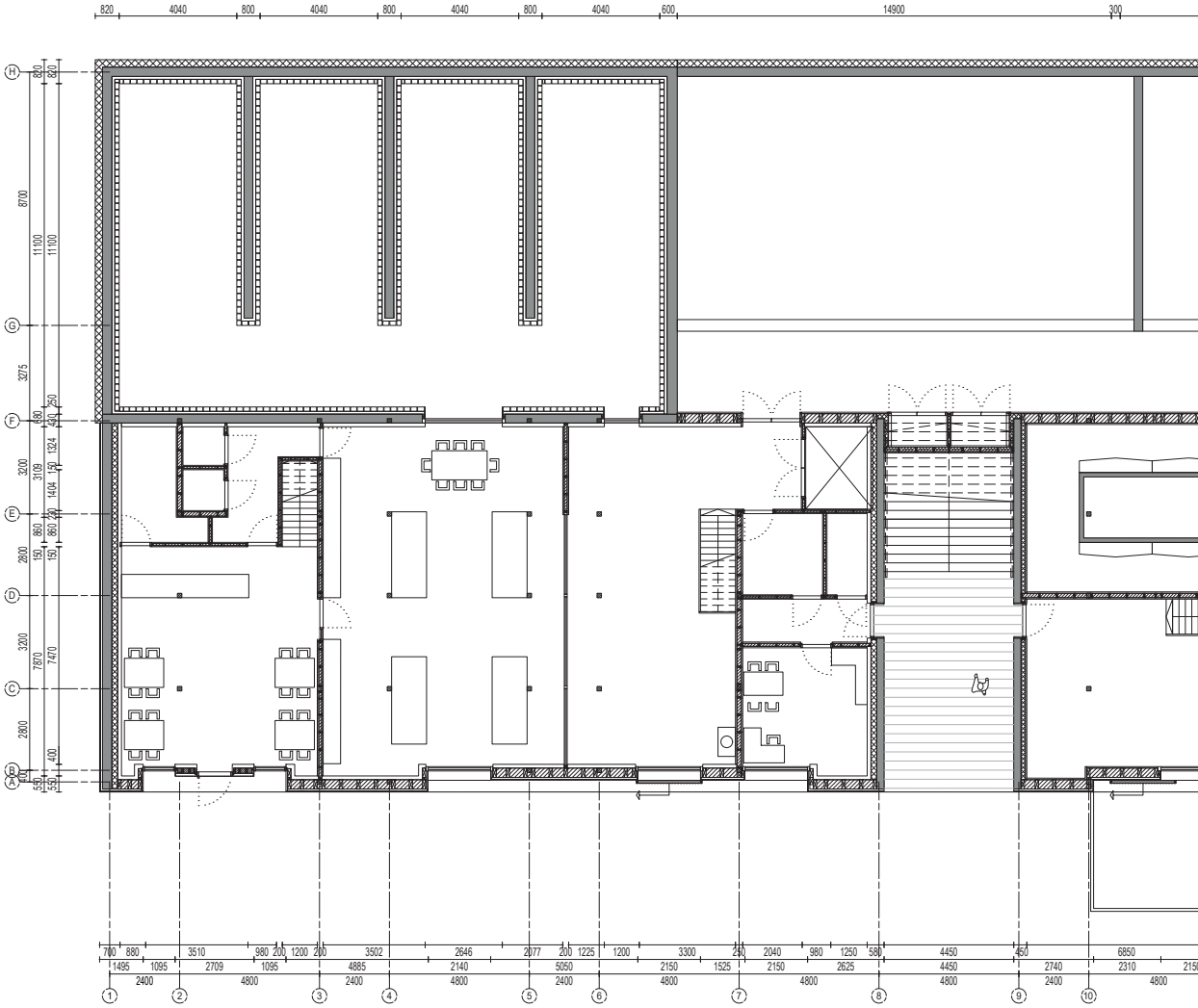


Figure 46: Basement, 1:200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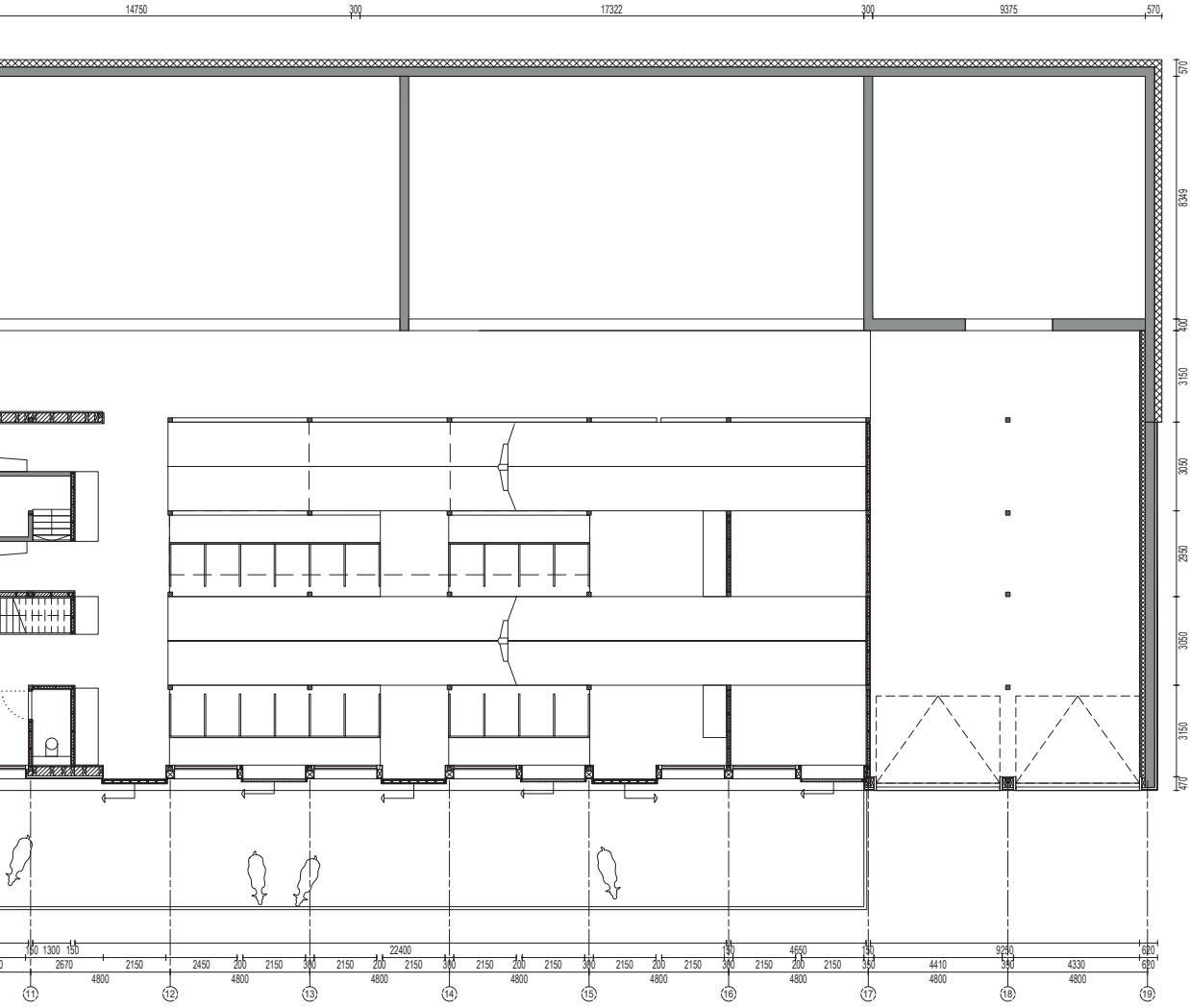
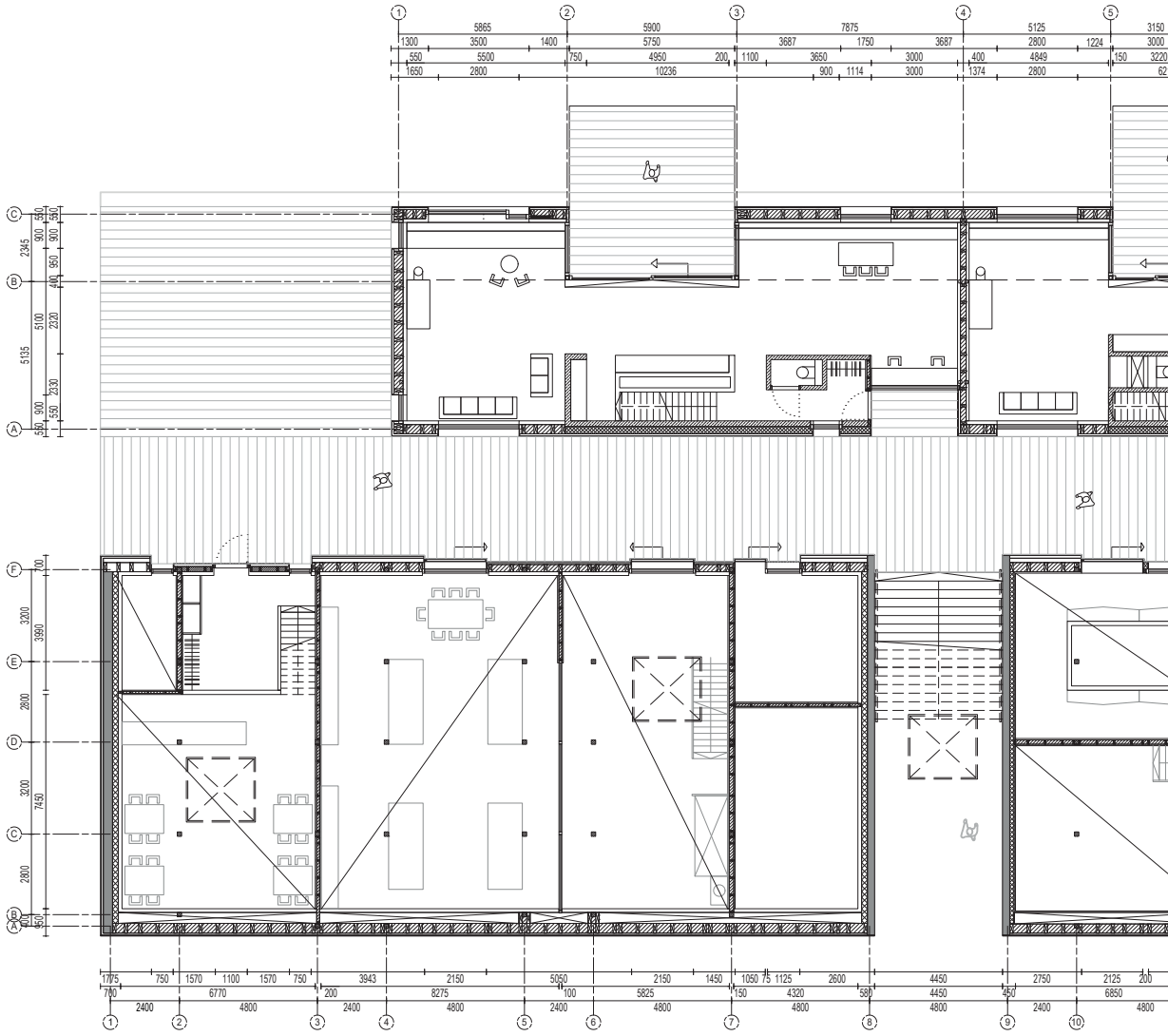


Figure 47: Ground floor, 1:200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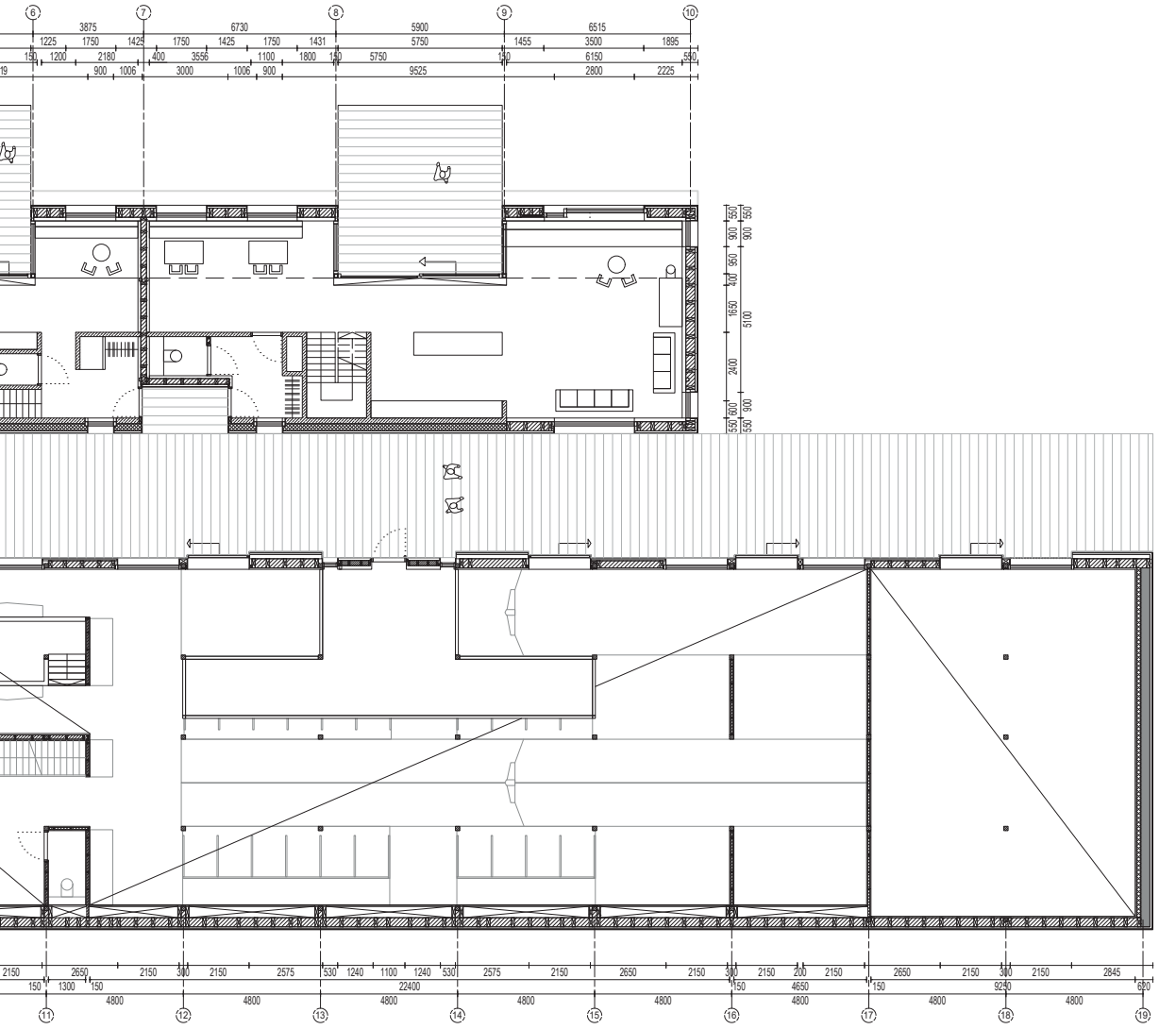
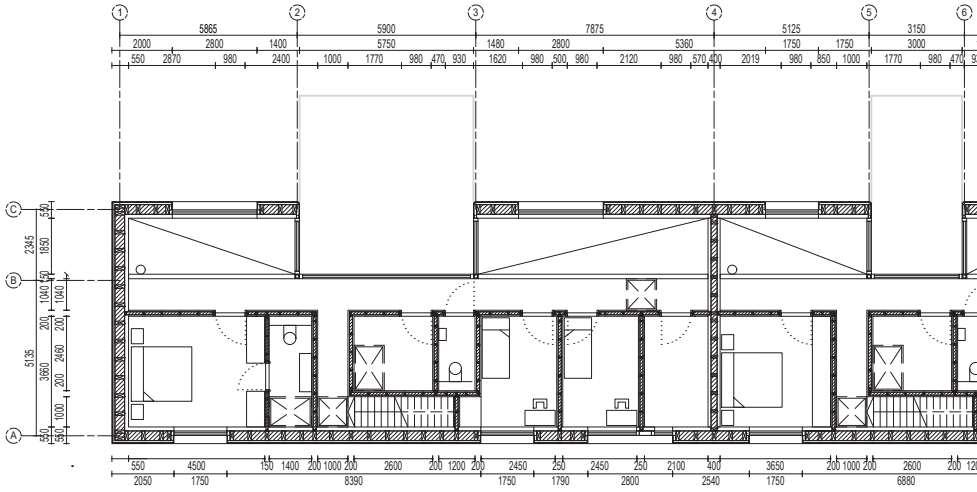


Figure 48: First floor (ground floor living volume), 1:200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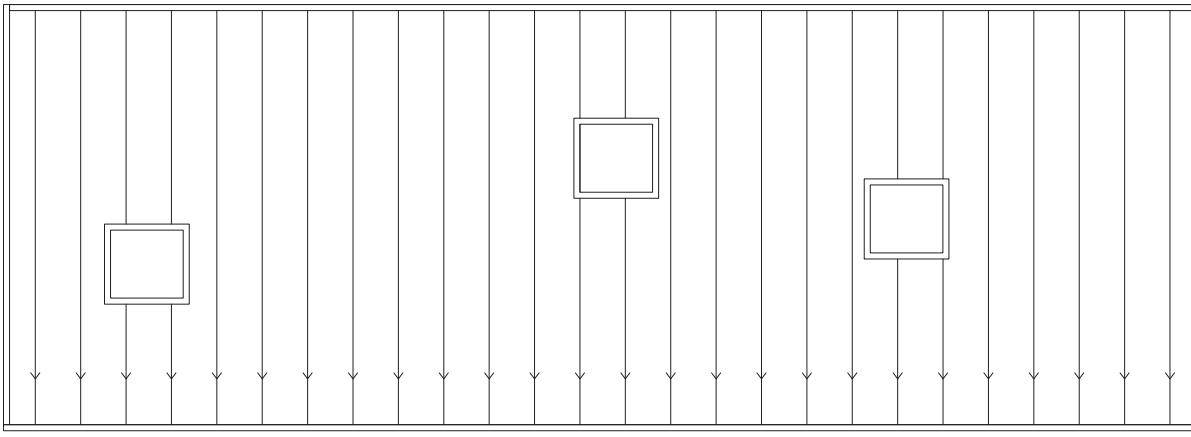


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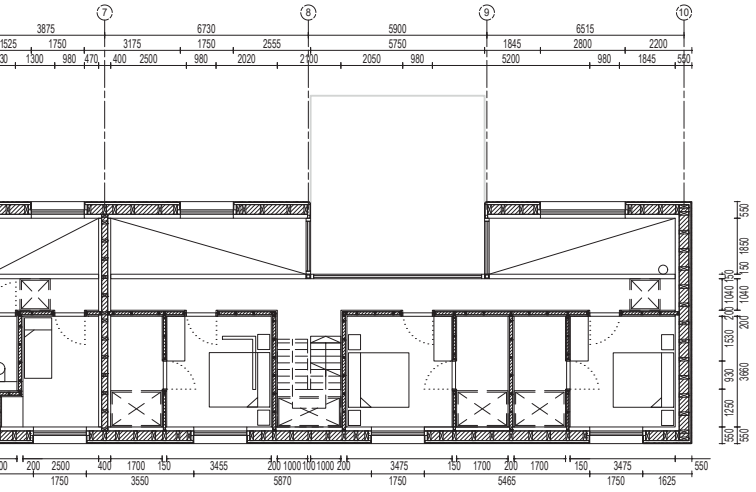


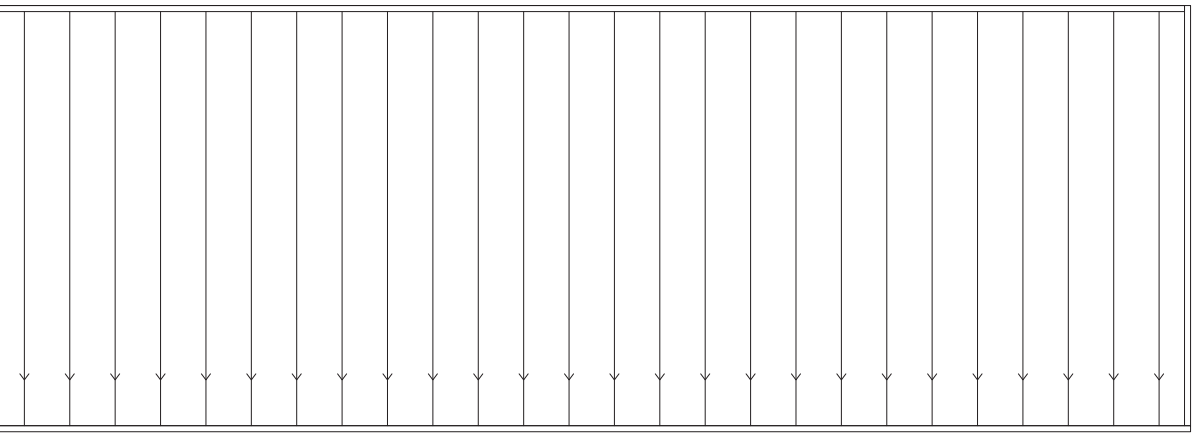


Figure 49: Second floor (first floor living volume), 1:200

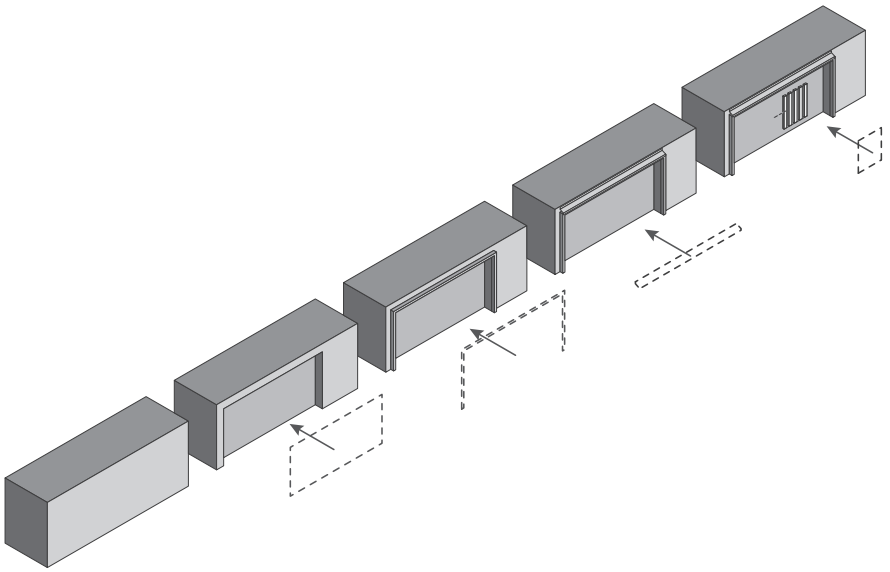
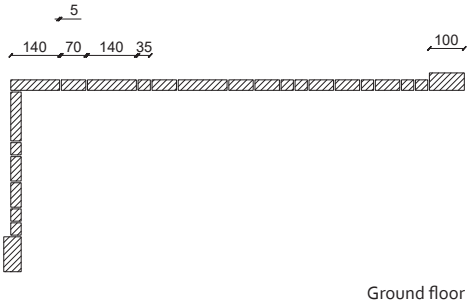


Figure 50: Façade consisting out of five elements

Figure 51: Façade finish



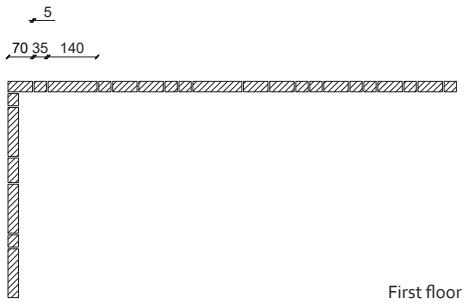


Figure 52: Measurements façade finish

Craftsmanship

Materiality

The materiality of the façade consists out of three main materials: untreated fir wood, larch, and copper. The interior consists mainly out of fir wood and concrete. The façade consists out of five parts, façade finish, frames around the windows plus the recesses in the façade, copper strips, façade in these recesses and sliding elements.

The façade finish is inspired by bigger buildings in the Vorarlberg district, which use a finish made of planks with three or four different measurements. This façade finish creates an interaction with the user. The play in the façade of these different widths is harder to perceive from a distance, making the design more defined and more detailed when getting closer to the building.

The façade finish consists out of three different plank sizes. The three measurements are a multiplication of the first measure, 35mm becomes 70mm becomes 140mm. There is a space of 5mm between the planks which allows the wood to expand and contract due to moisture and heat. The three different sizes are placed in a manner where the 35mm and 70mm will never be placed more than twice at a time and the 140mm kind will never be placed more than once at a time.
To make the living volume more pronounced and have a more detailed expression compared to the business volume, the large façade is split into a bottom and top part. These two parts are disconnected by a copper profile to create more depth in the façade but this also ensures that rain will flow over the top of the wood making it less vulnerable to decay. The planks on these two parts have a different rhythm which makes the façade more dynamic when getting closer towards it. The planks are placed in a seemingly random order, but are in fact placed to fit the frames in the façade. Every plank for the façade is drawn to ensure that the planks fit the façade with the frames. This also ensures that the craftsman can create the desired end product.

The material used for the planks is fir. Fir is chosen because it is a common tree in the timber industry of Vorarlberg and the weathering property of fir fits the application (Dangel, 2010, pp. 67–69). The wood is mounted untreated which means it will slowly turn to light grey, silver over time due to the weathering of the materials. Applying it untreated makes a low-maintenance material. By disconnecting the façade from the ground the untreated wood is protected for the moisture coming from the ground, making it less vulnerable to decay.

Figure 53: Frames façade

Figure 54: Copper strip façade

The frames in the façade are placed around the windows and recesses. The frames are placed in the façade to emphasise these spots and create more depth in the façade. The frames have a width of 100mm and are 20mm thicker than the façade finish. This creates a small difference between the façade and the frames which creates a subtle shadow play.
The wood used for the frames is larch. Larch is chosen because of the weathering property of the wood, the wood is mounted untreated which makes the wood turn from a darker brown colour to a dark grey colour over time. Using larch ensuring a difference between the frames and the main façade when the building is new but also when the building starts to change colour due to the different ageing of the materials.
The recesses of the frames are materialised in the same wood as the frames, larch wood. This is done to create a coherent colour pallet in the façade.

The copper strips in the façade are placed above the frames and in between the separation of the façade of the living volume. These strips are placed in the façade for two reasons. First, it helps to protect the wood from water lying on top of the wood, which would make it incredibly vulnerable to decay. Secondly, it creates more depth in the façade, the strips are visible for 40mm creating a subtle shadow and colour play in the façade. Copper is chosen because of the durability of the material together with weathering property of copper (Hisour, n.d.). Copper starts to change colour to a darker grey, brown colour over time fitting the weathering properties of the other materials used in the façade.

Figure 55: Façade recessed parts

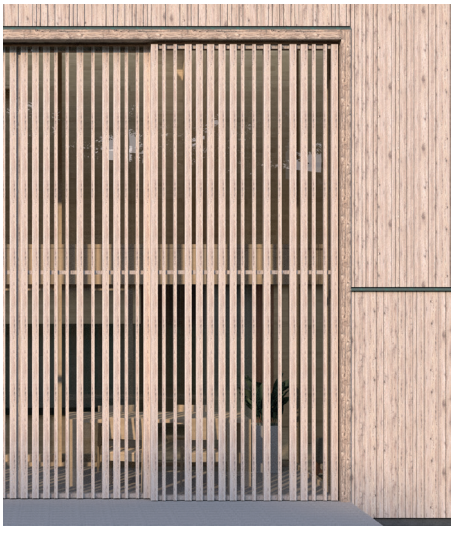


Figure 56: Rhythm of planks sliding element living

Figure 57: Rhythm of planks sliding element business

The façade in the recessed areas of the business volume is made of planks with a width of 50mm. The use of smaller planks creates a subordination towards the main façade, it is the second part of the façade. The smaller repetition emphasises the façade lying deeper and being smaller, but it remains part of the whole. The material used for these planks is fir, the same material as the main façade. The same material is used so that the material emphasises the connection to the main façade.

The sliding elements are located by the winter garden in the living volume, the bedroom windows in the living volume facing the passage and the recessed façade of the business volume. The elements of the living volume have the same measurements for the planks as the façade finish. The planks switch between 35mm and 70mm. For the winter garden, the element consists out of fir wood and acrylic to allow the space to be closed off while still letting light in. For the sliding element by the bedrooms, the element consists out of fir planks and openings as the element is not there to physically close off the space.
The elements of the business volume use the same measurements for the planks as the façade in the recesses parts. The elements consist out of planks with a width of 50mm changing between fir wood and acrylic to create an element which closes of the holes in the façade but still lets light pass through.

Figure 58: Contrast between concrete en wood in the interior

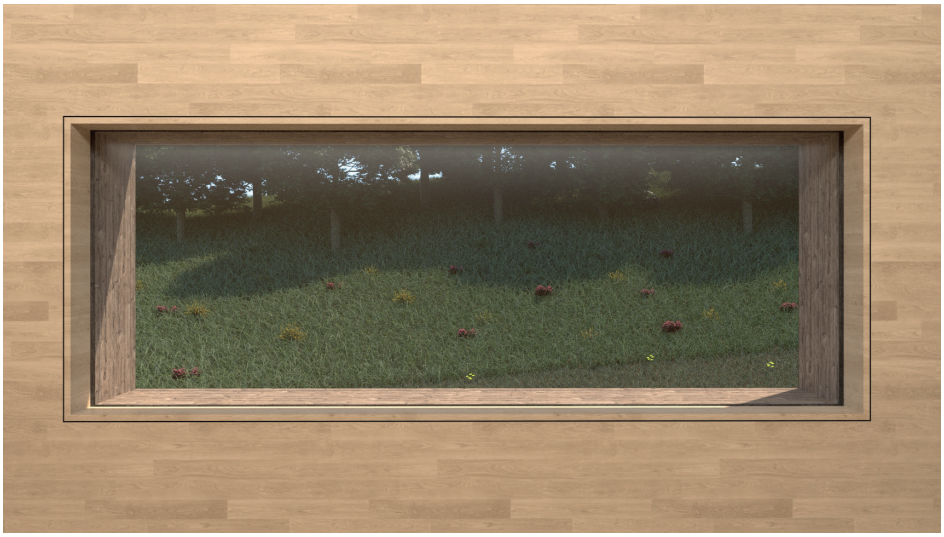


Figure 59: Window frames hidden behind fir element

The interior of the building.
The building craft in Vorarlberg revolves around wood but the building craft in Vorarlberg has also been implementing concrete more and more with the same care for detailing as they show towards wood (Grosse, n.d.). For the interior of the design, the main materials used are wood and concrete. The chosen wood is fir, an easy material to work with. The knowledge around how to use fir wood and create finely detailed spaces is embedded in the craft culture of Vorarlberg. The craft culture implements concrete in the same way as they do for the wood. The desired expression is achieved by taking care of the casting mould and the way the material is finished. The result is a material which expresses the craftsmanship comparable to how the wood shows this.

Using fir wood and concrete in the interior starts a dialogue between a dark and a light material that both have a warm and soft expression. The concrete is visible because of its use as a sustainable solution, which will be explained in more detail further on in the booklet in the chapter 'low-tech sustainability'. The visible concrete surfaces are treated with the same care as the wood, meaning that the concrete is soft and organic because of the mould that is used. The mould consists of wooden planks which give the concrete an organic appeal because it copies the wood grain. By polishing the concrete it becomes soft while still heaving the wooden plank structure on the surface.
The ceiling, wall and floor finish consist out of fir planks. Between the inside reveal and the wall finish are fir elements connecting the wall finish to the window frames. These fir elements in the reveal hide the window frames of the non-opening windows, and part of the window frames of the window frames which can be opened. This creates an unobstructed view over the landscape in which the windows are mere holes in the wall letting the landscape flow into the interior. The fir is processed differently for each application. The wood used for the walls and ceiling is sanded which results in a soft surface. The wood used for the floors is milled to create small ridges on the surface for grip.

Figure 60: Rough finish for the materials in the barn

Figure 61: Refined finish of materials in Cheese lesson space and cheese cellar

The materials used for the barn function of the business volume have a less refined material finish since it is a working environment. Here, imperfections are embrace and the cows are allowed to be in contact with the materials. The columns are made out of fir as well as the wall finish and ceiling finish. The walls located underground are made of concrete. The rough appearance of both the wood and the concrete are embraced in line with the application.

The other side of the business volume is finished with the same care as the living volume using fir wood as the wall and ceiling finish. However, the floors are finished with tiles. In the shop/café, people will walk around with their shoes on, in the cheese classes- and cheese making spaces this ensures that the surfaces are cleanable and hygienic.

For the cheese cellar, additional material is used. The cheese cellar consists out of four loam brick vaults. Loam bricks are used because they have a good moisture-regulating property which is essential for the maturing of cheese, further described in the chapter 'low-tech sustainability'. Loam is locally extracted from the ground and pressed into bricks. The loam bricks defined the shape of the space to vaults because bricks can be used for walls and roof if they are used in a vault shape (Stulz & Mukerji, n.d.).

Craftsmanship

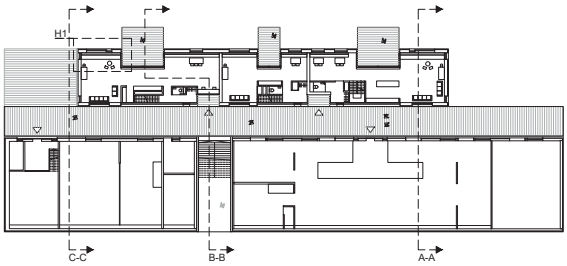
Detailing

The importance of detailing early in the design process has already been addressed with the introduction of craftsmanship. The detailing shows how the chosen materials and craftsmanship come together in the design. Three sections and two horizontal parts of the design have been detailed. These show how, with the help of detailing, a design is created around the users. It shows how the functions flow over into each other and how the passage allows interaction to happen between the functions.

The detailing also shows how the two main volumes are connected on the ground floor that reaches into the mountain, creating one overall volume. It also shows how the rain can pass the building with the use of a rain gutter to collect the water from the mountain and diverting it away from the building. This rain gutter then gives the opportunity to also place technical aspects in it.

The detailing elaborates further on the façade and in its sliding elements, the winter garden, the interior bench located at the moor façade and the connection between the lower laying courtyard, hallway and passage.

The details are shown first in their entity at a scale of 1:100 after which parts are enlarged to a scale of 1:50.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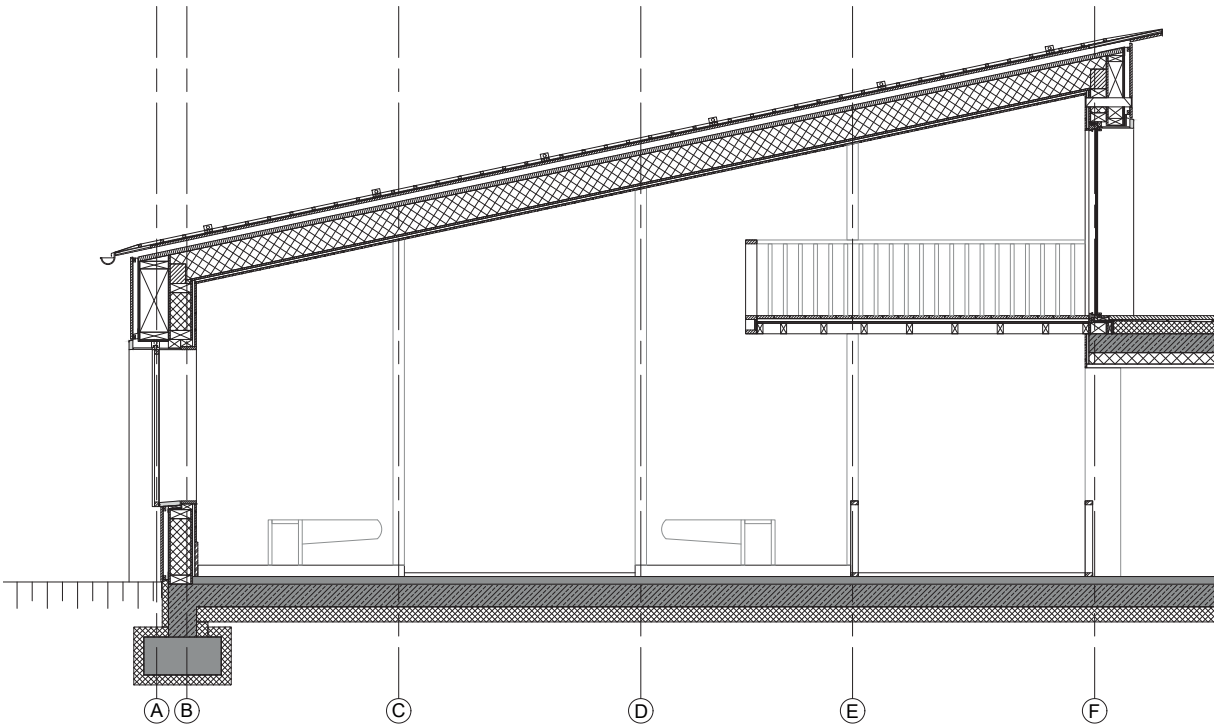
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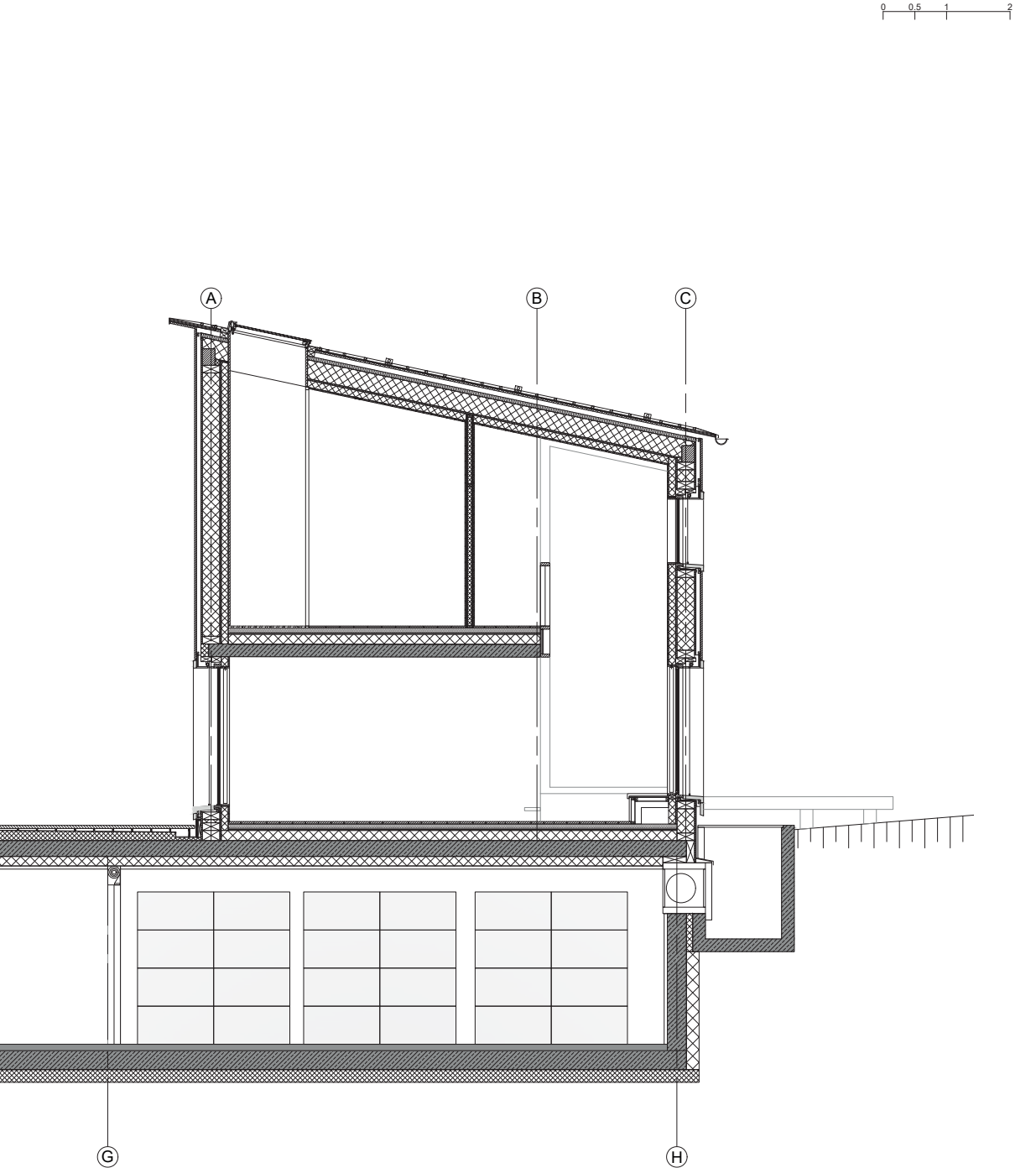
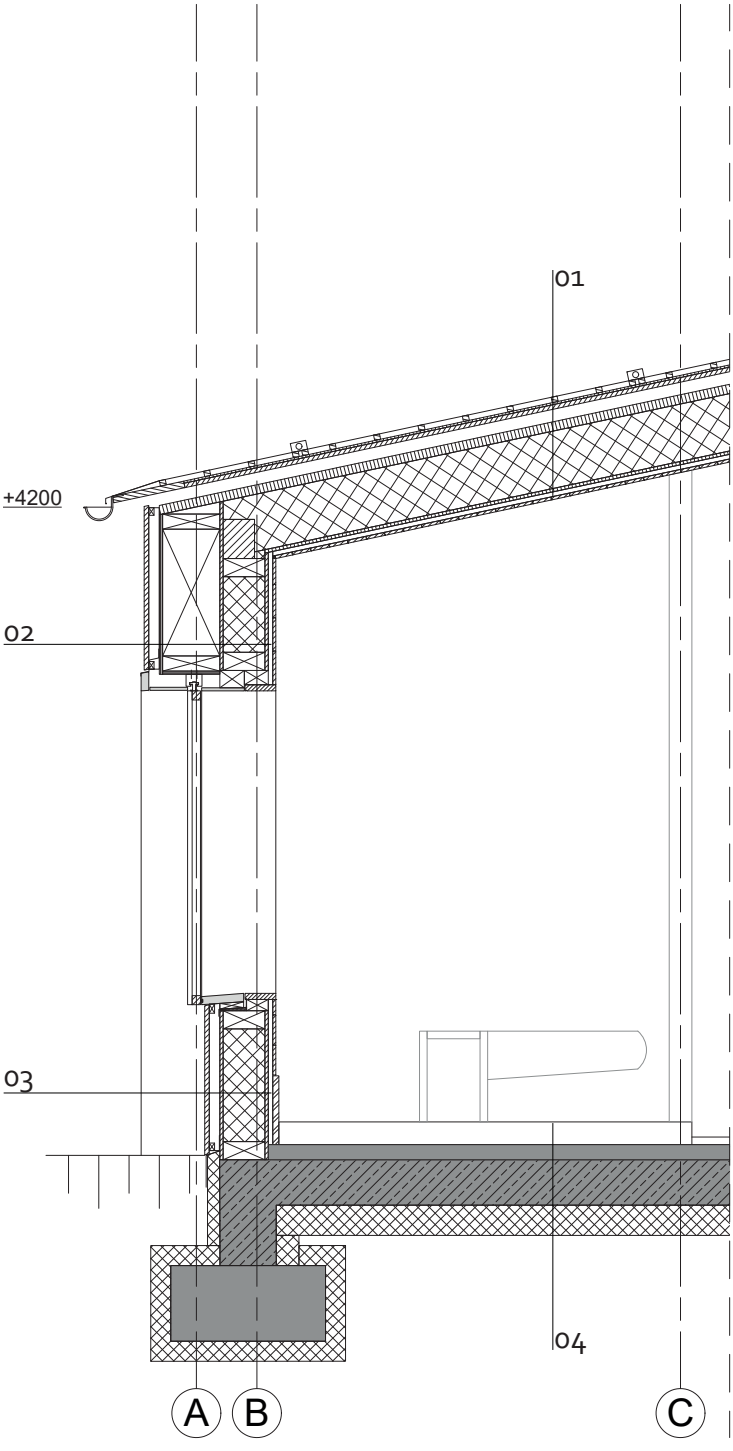


Figure 62: Section A-A, 1:100



01 ROOF

snow protection (6 rails)	
roof covering - copper	
battens	44mm
counter battens	80mm
sealing layer	
wood fibreboard	60mm
timber layer	280mm
OSB	22mm
sub-construction, installations	110mm
fir panelling	20mm

02 EXTERIOR WALL

fir façade	30mm
battens, ventilated cavity	70mm
sealing layer	
wood fibreboard	22mm
solid structural timber	
+ insulation	280mm
OSB	22mm
sub-construction, installations	50mm
fir panelling	20mm

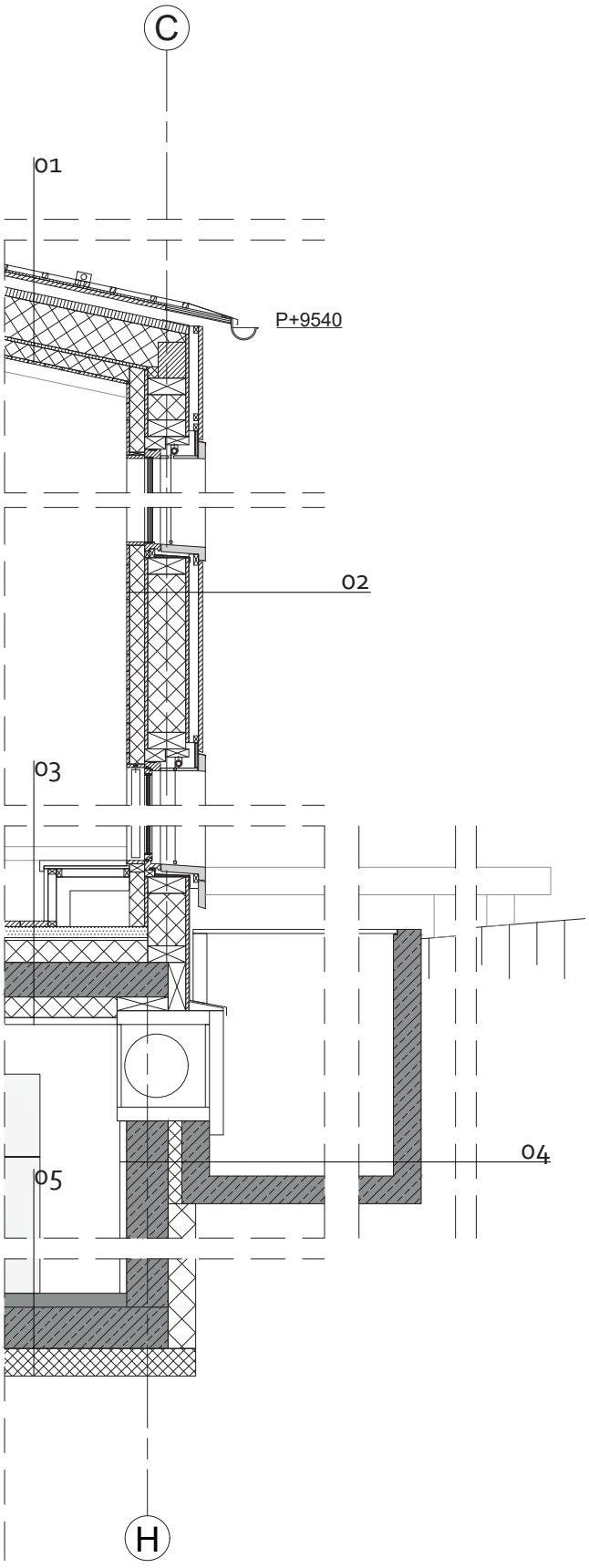
03 EXTERIOR WALL

fir façade	30mm
battens, ventilated cavity	70mm
sealing layer	
plywood	22mm
structural wood element	380mm
wood fibreboard	22mm
solid structural timber	
+ insulation	280mm
OSB	22mm
sub-construction, installations	50mm
concrete vertical element	40mm

04 FLOOR

free stall barn, sawdust	150mm
cement screed	100mm
concrete structural floor	300mm
insulation	200mm

Figure 63: Section A-A, 1:50



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01 ROOF

snow protection (4 rails)	
roof covering - copper	
battens	44mm
counter battens	80mm
sealing layer	
wood fibreboard	60mm
timber layer	280mm
OSB	22mm
sub-construction, installations	110mm
fir panelling	20mm

02 EXTERIOR WALL

fir façade	30mm
battens, ventilated cavity	70mm
sealing layer	
wood fibreboard	22mm
solid structural timber	
+ insulation	280mm
OSB	22mm
sub-construction, installations	110mm
fir panelling	20mm

03 FLOOR

fir panelling, milled for grip	40mm
cement screed, floor heating	100mm
sealing layer	
insulation	160mm
concrete structural floor	250mm
insulation	150mm
sprayed cement finish, (fire proof)	50mm

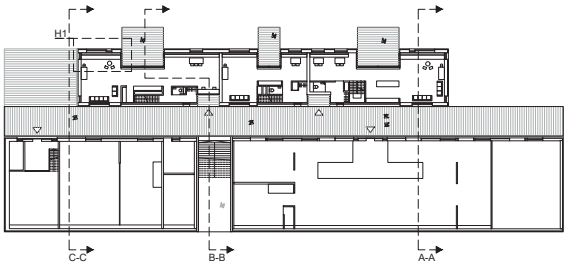
04 EXTERIOR WALL BASEMENT

concrete rain gutter	200mm
sealing layer	
insulation thermal bridge (structural)	100mm
structural concrete wall	300mm
sprayed cement finish, (fire proof)	50mm

05 BASEMENT FLOOR

cement screed	100mm
concrete structural floor	300mm
insulation	200mm

Figure 64: Section A-A, 1:50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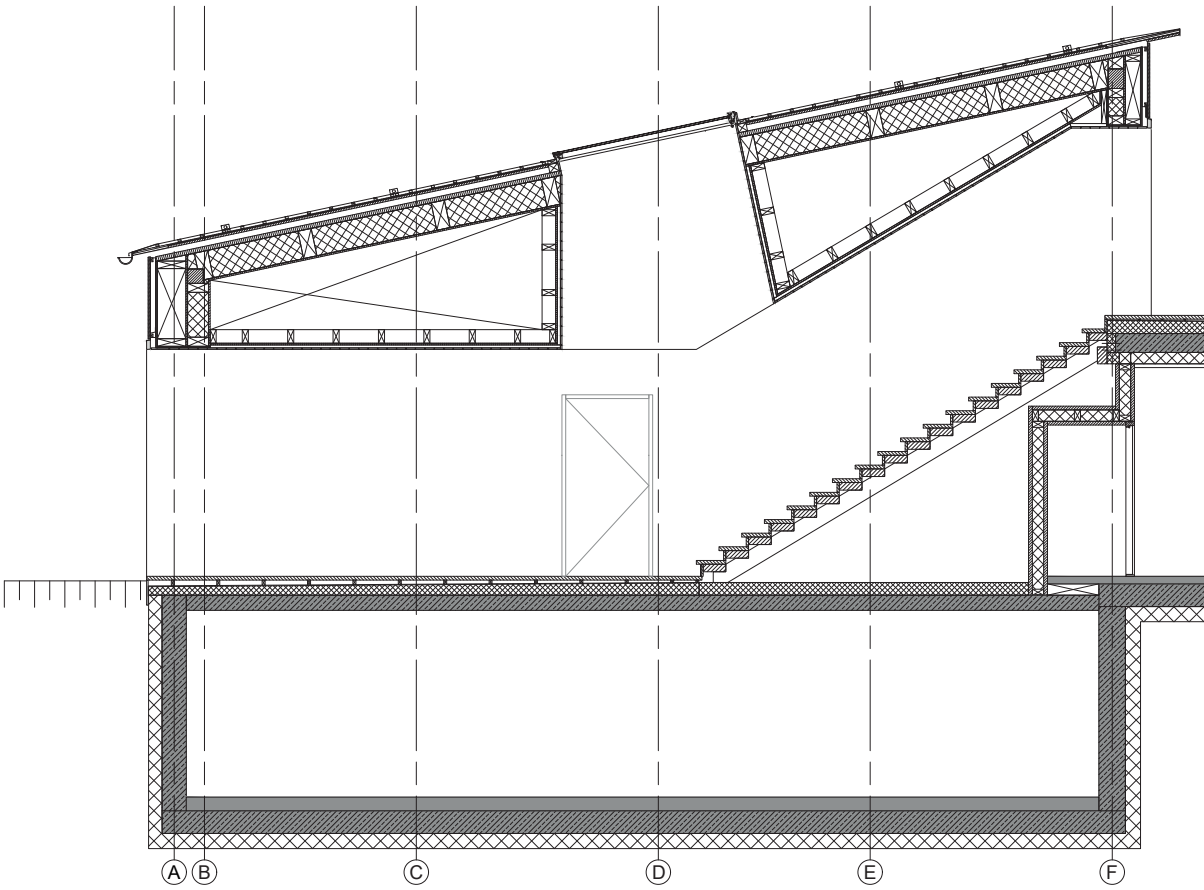
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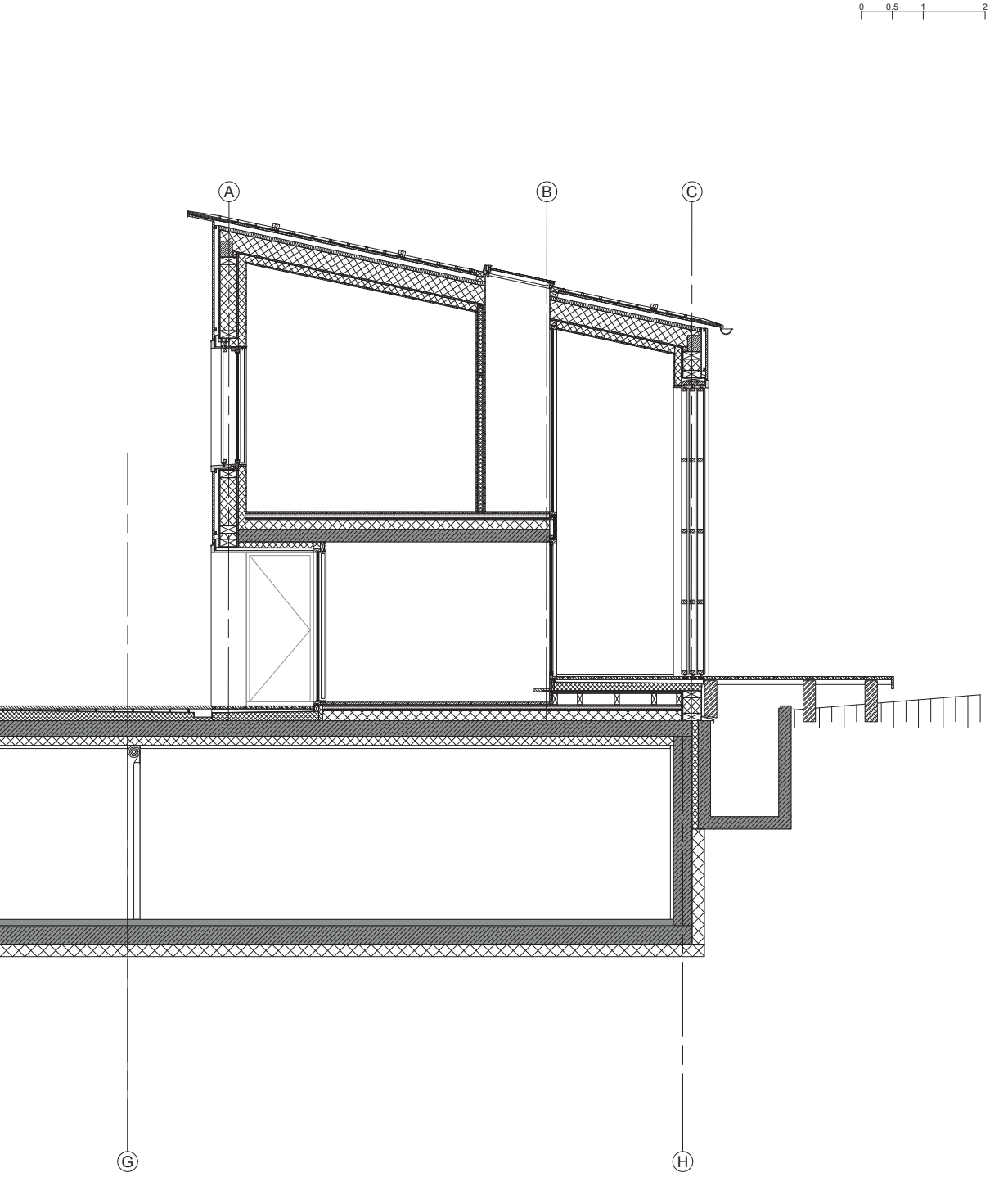
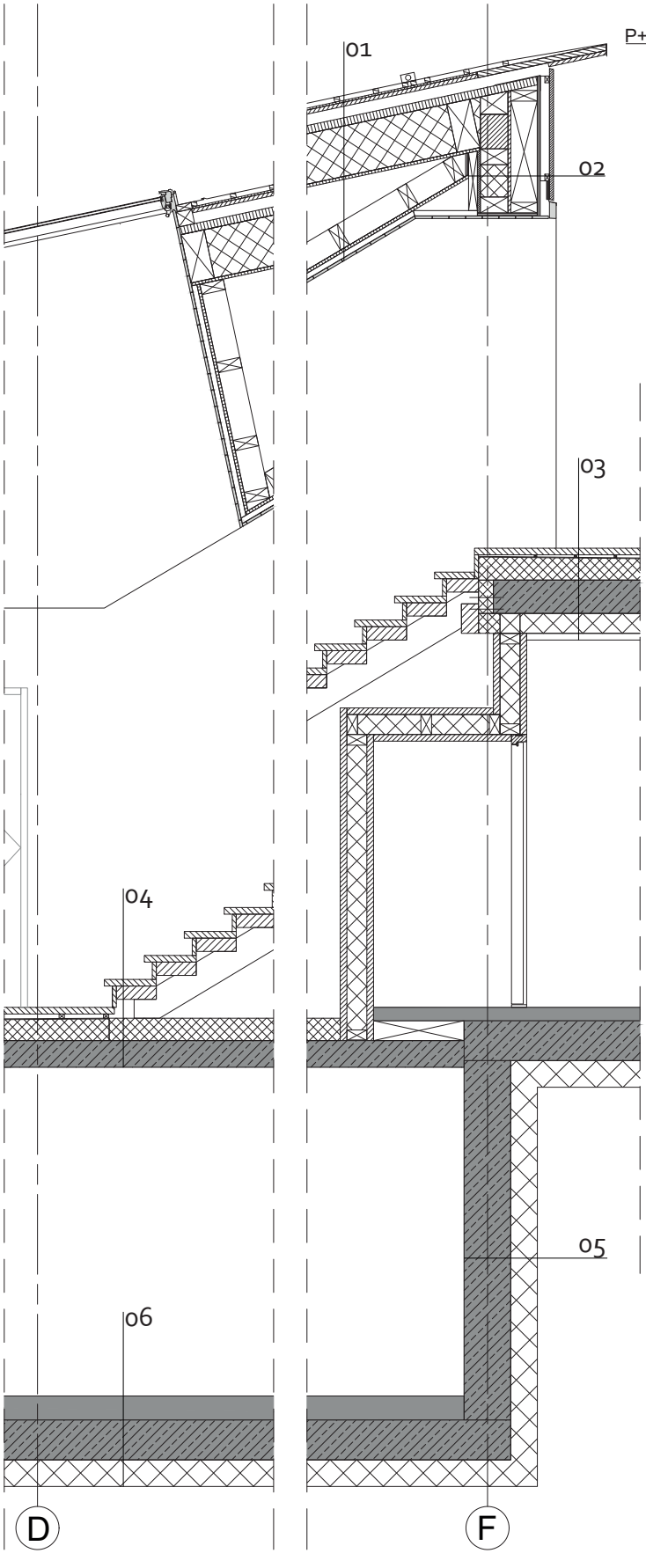


Figure 65: Section B-B, 1:100



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01 ROOF

snow protection (6 rails)	
roof covering - copper	
battens	44mm
counter battens	80mm
sealing layer	
wood fibreboard	60mm
timber layer	280mm
OSB	22mm
sub-construction (varies starts at)	380mm
OSB	20mm
sub-construction	40mm
larch panelling	20mm

02 EXTERIOR WALL

fir façade	30mm
battens, ventilated cavity	70mm
sealing layer	
plywood	22mm
sub-construction	200mm
wood fibreboard	22mm
solid structural timber	
+ insulation	280mm
OSB	22mm
sub-construction, installations	70mm

03 PASSAGE FLOOR

spruce panelling, milled for grip	30mm
battens	20mm
sealing layers	
insulation with slope	170mm
concrete structural floor	250mm
insulation	150mm
sprayed cement finish, (fire proof)	50mm

04 HALLWAY FLOOR

Spruce staircase	50mm
fir stair construction	260mm
insulation	170mm
concrete structural floor	200mm

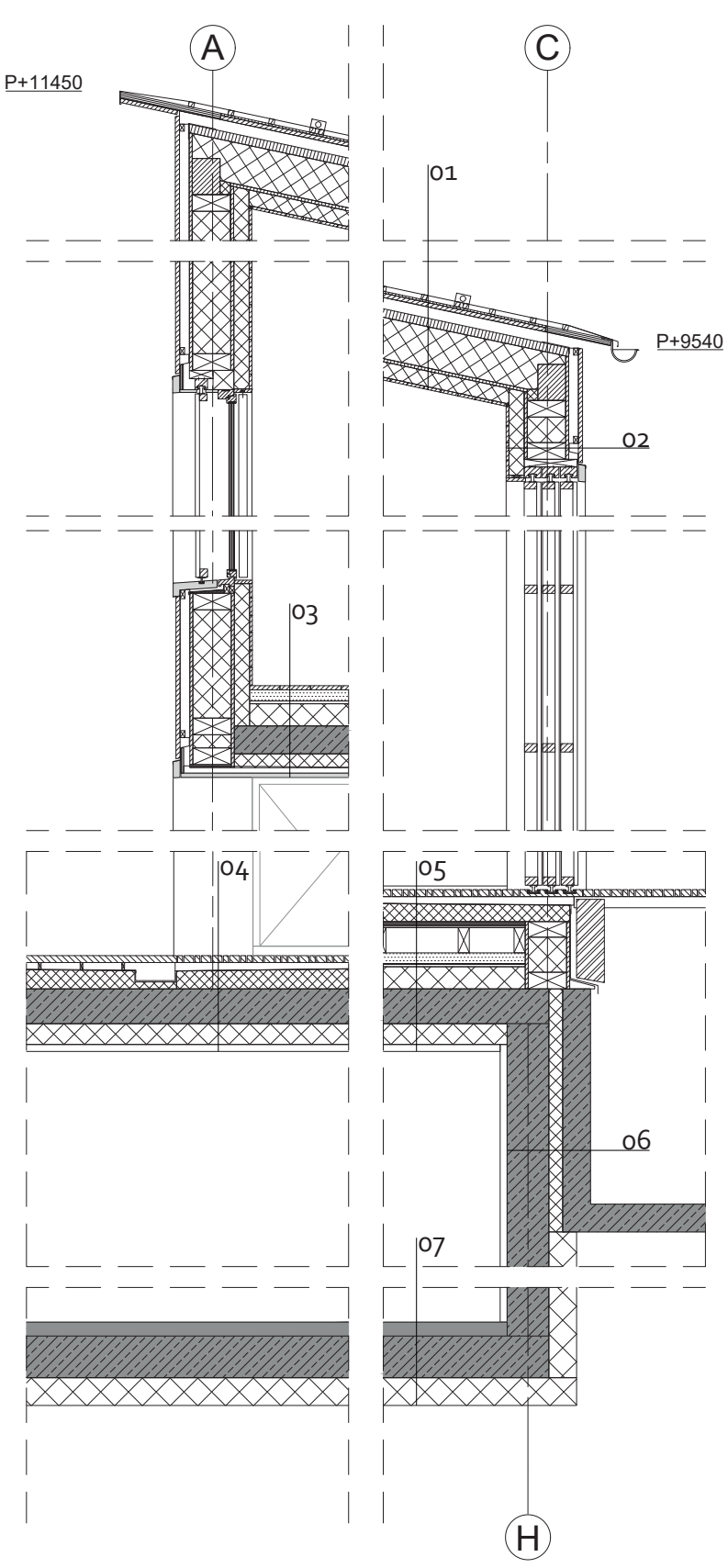
05 EXTERIOR WALL BASEMENT

insulation	200mm
structural concrete wall	350mm

06 BASEMENT FLOOR

cement screed	100mm
concrete structural floor	300mm
insulation	200mm

Figure 66: Section B-B, 1:50



0 0.2 0.5 1

01 ROOF

snow protection (4 rails)	
roof covering - copper	
battens	44mm
counter battens	80mm
sealing layer	
wood fibreboard	60mm
timber layer	280mm
OSB	22mm
sub-construction, installations	110mm
fir panelling	20mm

02 EXTERIOR WALL

fir façade	30mm
battens, ventilated cavity	70mm
sealing layer	
wood fibreboard	22mm
solid structural timber	
+ insulation	280mm
OSB	22mm
sub-construction, installations	110mm
fir panelling	20mm

03 FIRST FLOOR LIVING

fir panelling, milled for grip	40mm
cement screed, floor heating	100mm
sealing layer	
insulation	160mm
concrete structural floor	200mm
insulation	100mm
sealing layer	
battens, ventilated cavity	40mm
larch panelling	30mm

04 PASSAGE FLOOR

spruce panelling, milled for grip	30mm
battens	40mm
sealing layers	
insulation with slope	150mm
concrete structural floor	250mm
insulation	150mm
sprayed cement finish, (fire proof)	50mm

05 WINTER GARDEN FLOOR

spruce panelling, milled for grip	30mm
battens	40mm
sealing layers	
insulation with slope	140mm
plywood	44mm
sub-construction	180mm
cement screed	100mm
sealing layer	
insulation	160mm
concrete structural floor	250mm
insulation	150mm
sprayed cement finish, (fire proof)	50mm

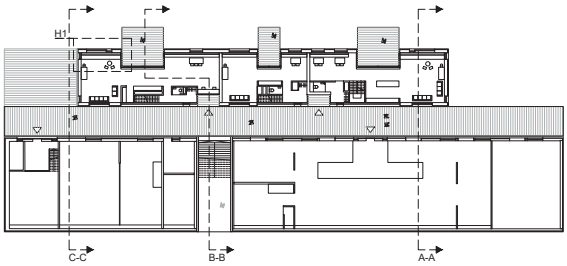
06 EXTERIOR WALL BASEMENT

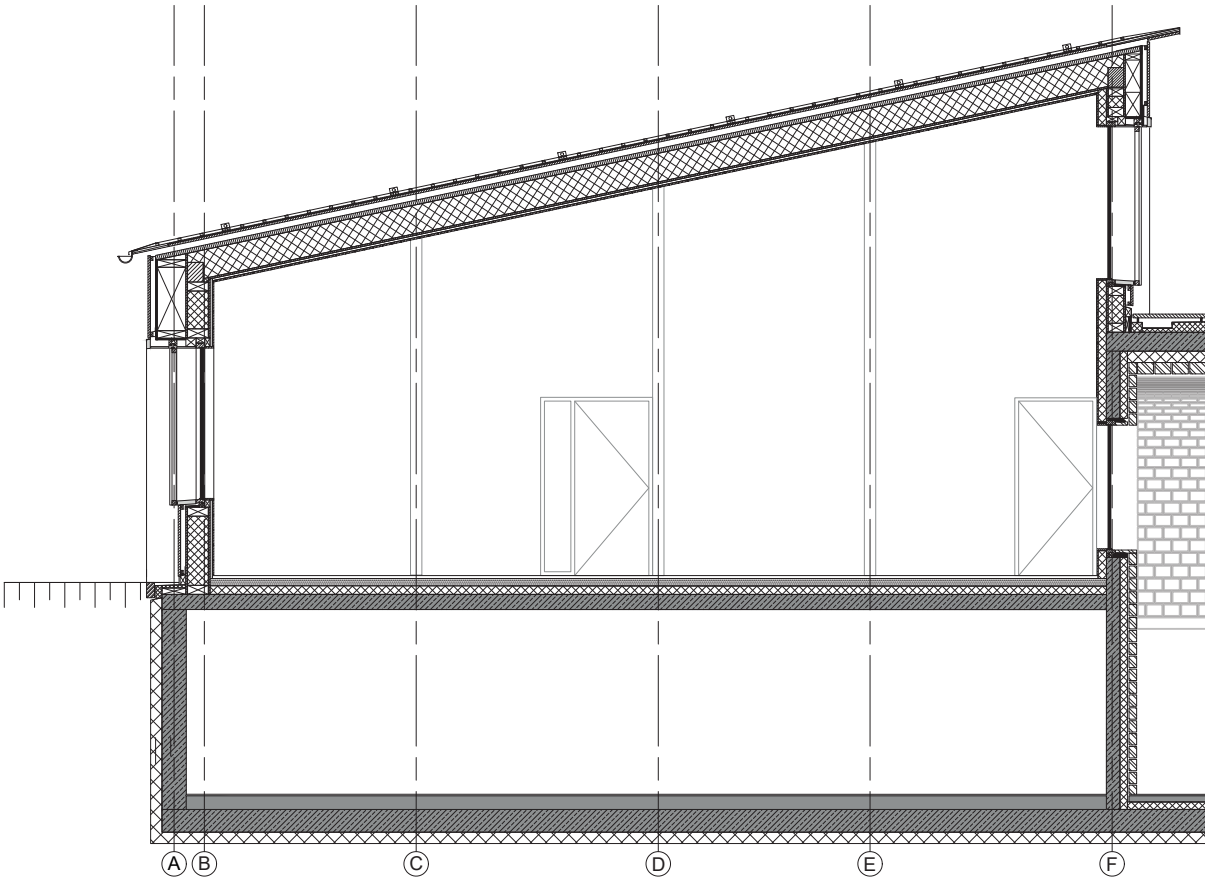
concrete rain gutter	200mm
sealing layer	
insulation thermal bridge	
interruption	100mm
structural concrete wall	300mm
sprayed cement finish, (fire proof)	50mm

07 BASEMENT FLOOR

cement screed	100mm
concrete structural floor	300mm
insulation	200mm

Figure 67: Section B-B, 1:50


H1
C-C
B-B
A-A


A
B
C
D
E
F

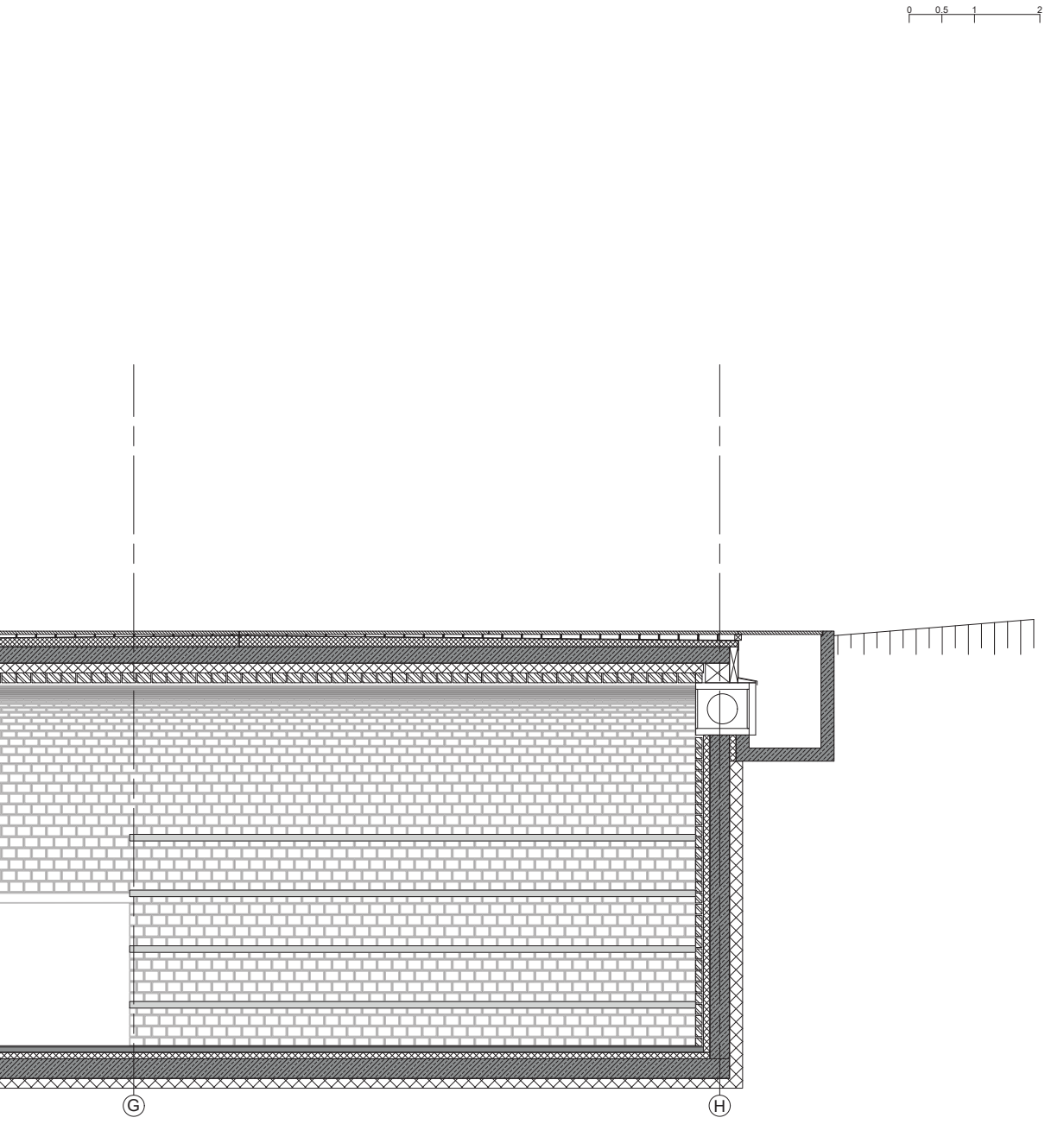
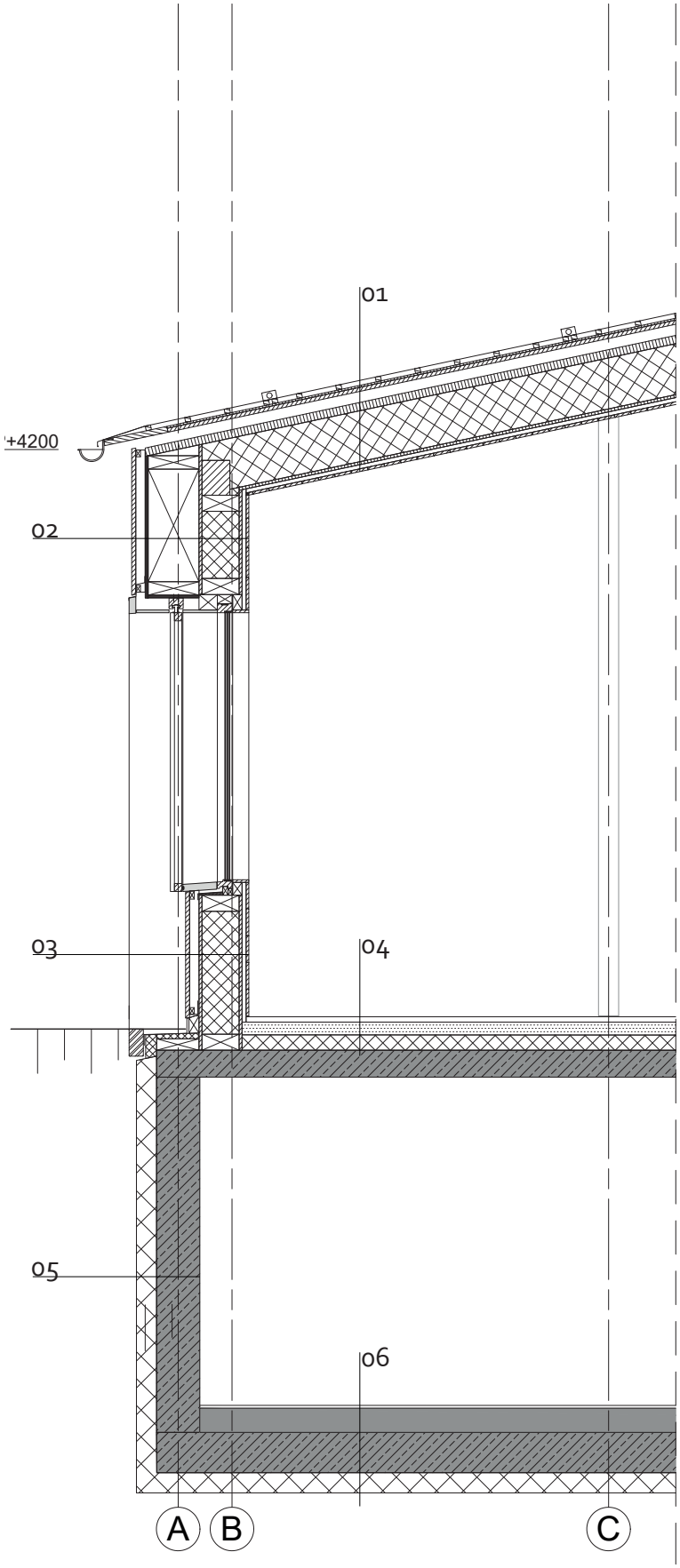


Figure 68: Section C-C,1:100



0 0.2 0.5 1

01 ROOF

snow protection (6 rails)	
roof covering - copper	
battens	44mm
counter battens	80mm
sealing layer	
wood fibreboard	60mm
timber layer	370mm
OSB	22mm
sub-construction	40mm
fir panelling	20mm

02 EXTERIOR WALL

fir façade	30mm
battens, ventilated cavity	70mm
sealing layer	
plywood	22mm
sub-construction	370mm
wood fibreboard	22mm
solid structural timber	
+ insulation	280mm
OSB	22mm
sub-construction, installations	40mm
fir panelling	22mm

03 EXTERIOR WALL

fir façade	30mm
battens, ventilated cavity	70mm
sealing layer	
wood fibreboard	22mm
solid structural timber	280mm
+ insulation	250mm
OSB	22mm
sub-construction, installations	40mm
fir panelling	22mm

04 GROUND FLOOR

tiles	40mm
cement screed	100mm
sealing layer	
insulation	100mm
concrete structural floor	200mm

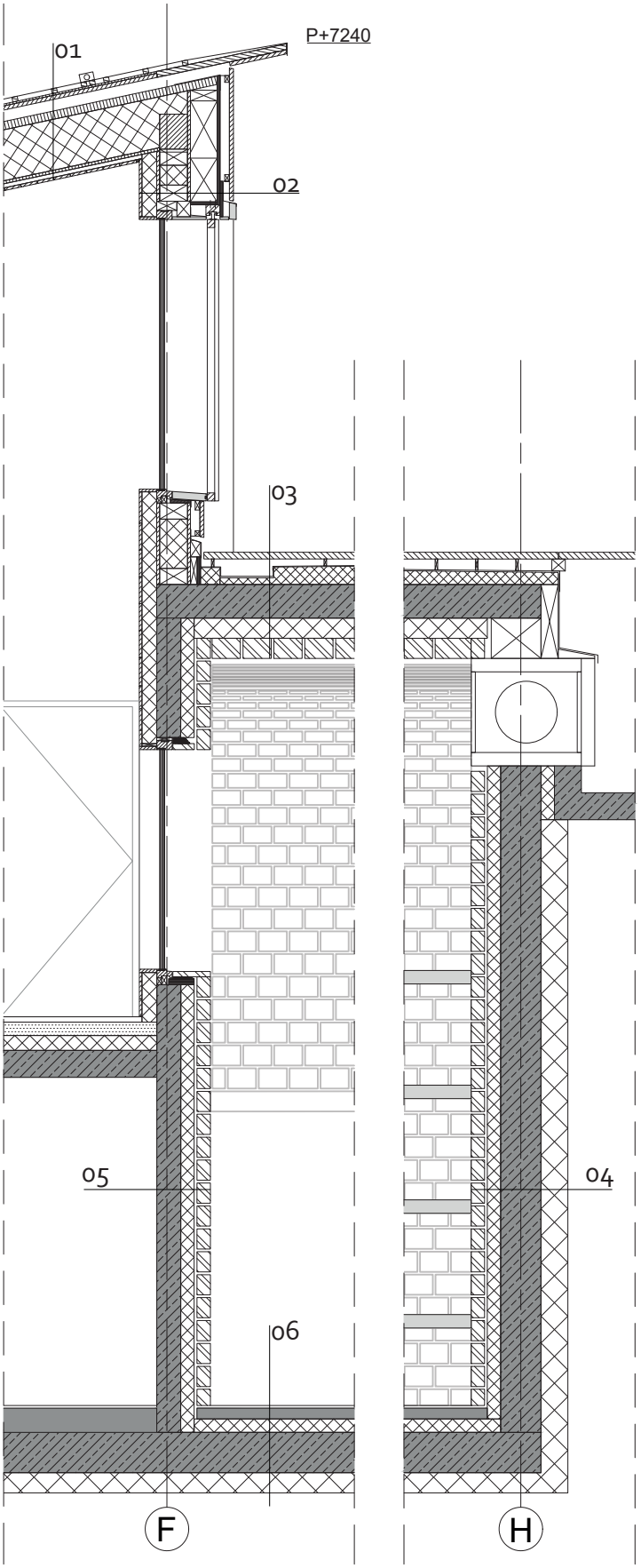
05 EXTERIOR WALL BASEMENT

insulation	200mm
structural concrete wall	350mm

06 BASEMENT FLOOR

cement screed	100mm
concrete structural floor	300mm
insulation	200mm

Figure 69: Section C-C,1:50



0 0.2 0.5 1

01 ROOF

snow protection (6 rails)	
roof covering - copper	
battens	44mm
counter battens	80mm
sealing layer	
wood fibreboard	60mm
timber layer	370mm
OSB	22mm
sub-construction	40mm
fir panelling	20mm

02 EXTERIOR WALL

fir façade	30mm
battens, ventilated cavity	70mm
sealing layer	
plywood	22mm
sub-construction	200mm
wood fibreboard	22mm
solid structural timber	
+ insulation	220mm
OSB	22mm
sub-construction, installations	110mm
fir panelling	22mm

03 PASSAGE FLOOR

spruce panelling, milled for grip	30mm
battens	40mm
sealing layers	
insulation with slope	170mm
concrete structural floor	250mm
insulation	150mm
cavity	20mm
loam bricks	150mm

04 CHEESE CELLAR WALL

structural concrete wall	200mm
insulation	100mm
cavity	20mm
loam bricks	150mm

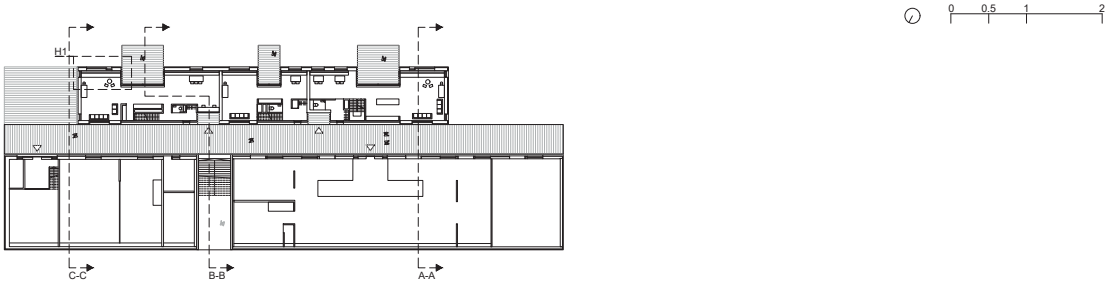
05 EXTERIOR WALL CHEESE CELLAR

insulation	200mm
structural concrete wall	300mm
insulation	100mm
cavity	20mm
loam bricks	150mm

06 CHEESE CELLAR FLOOR

tiles	40mm
cement screed	100mm
insulation	100mm
concrete structural floor	300mm
insulation	150mm

Figure 70: Section C-C,1:50



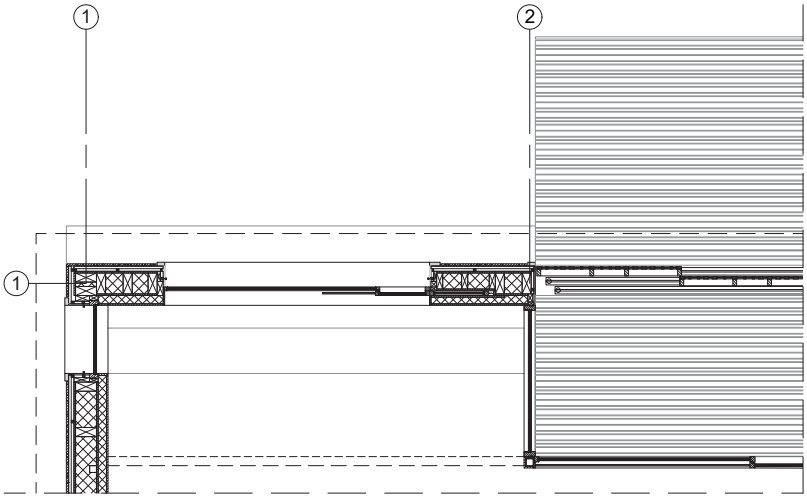
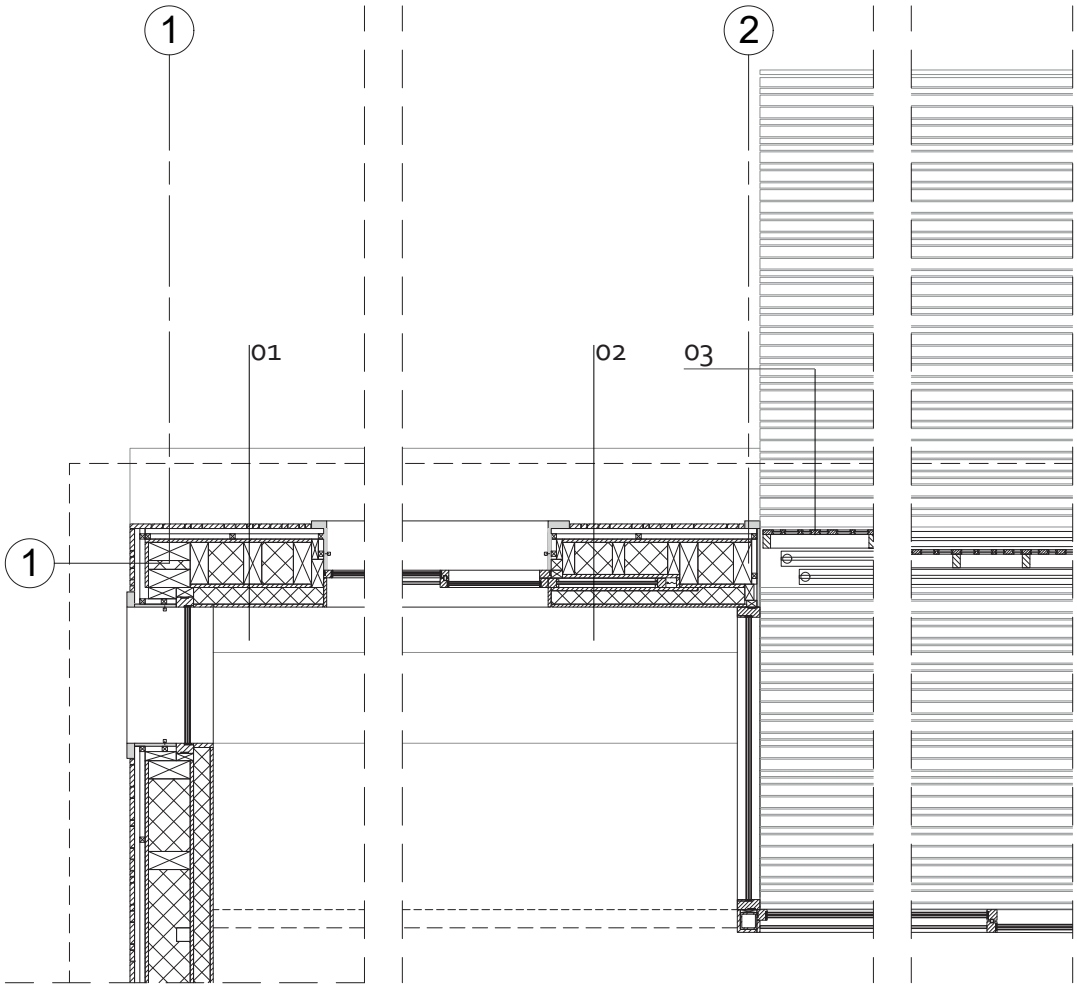


Figure 71: Section H1, detail of windows and winter garden living, 1:100

Figure 72: Section H1, detail of windows and winter garden living, 1:100



01 EXTERIOR WALL

fir façade	30mm
battens, ventilated cavity	70mm
sealing layer	
wood fibreboard	22mm
solid structural timber	
+ insulation	280mm
OSB	22mm
sub-construction, installations	110mm
fir panelling	22mm

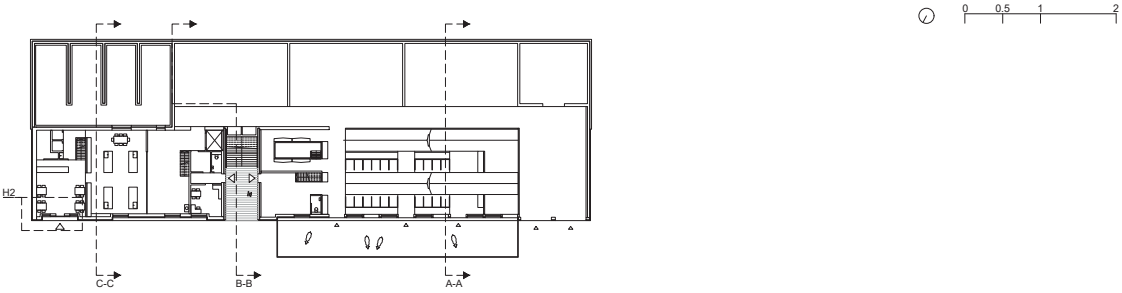
02 EXTERIOR WALL WITH INSECT SCREEN

fir façade	30mm
battens, ventilated cavity	70mm
sealing layer	
wood fibreboard	22mm
solid structural timber	
+ insulation	210mm
OSB	22mm
cavity for integrated insect screen	66mm
OSB	22mm
sub-construction, installations	88mm
fir panelling	20mm

03 SLIDING ELEMENT WINTER GARDEN

fir interchanged with plexiglass panelling	30mm
structural timber frame	120mm
metal rotate and sliding rail	

Figure 73: Section H1, detail of windows and winter garden living, 1:50



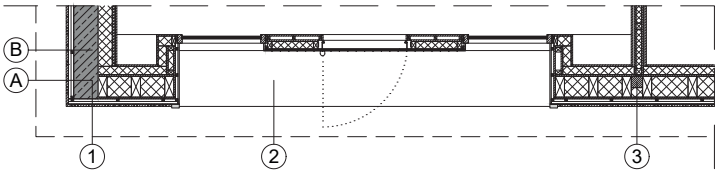


Figure 74: Section H2, detail of public entrance, 1:100

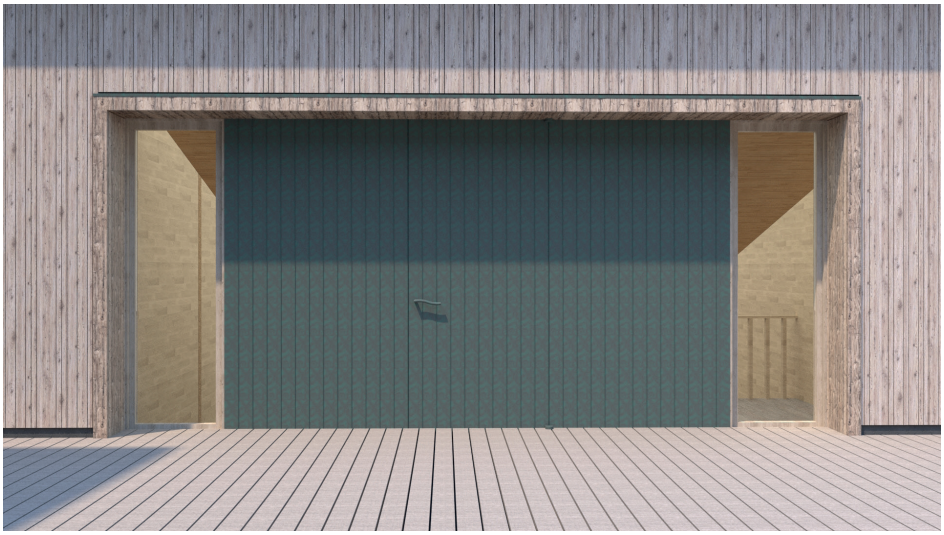
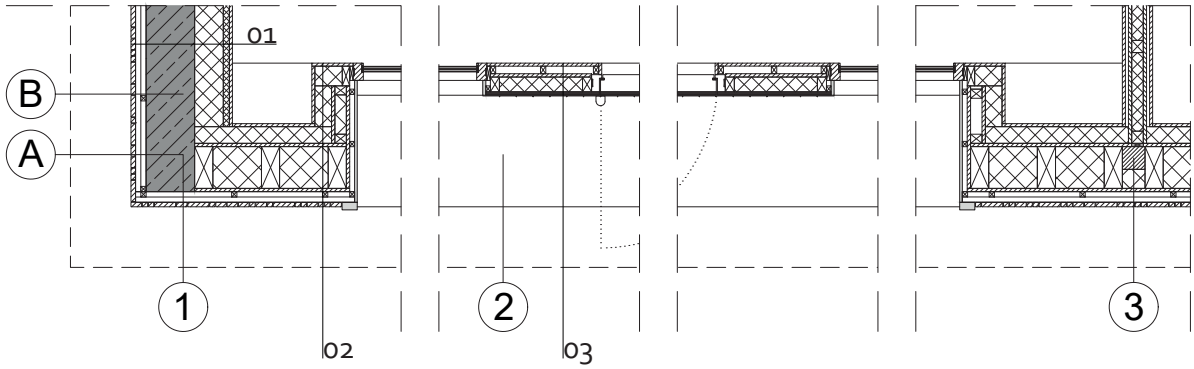


Figure 75: Public entrance



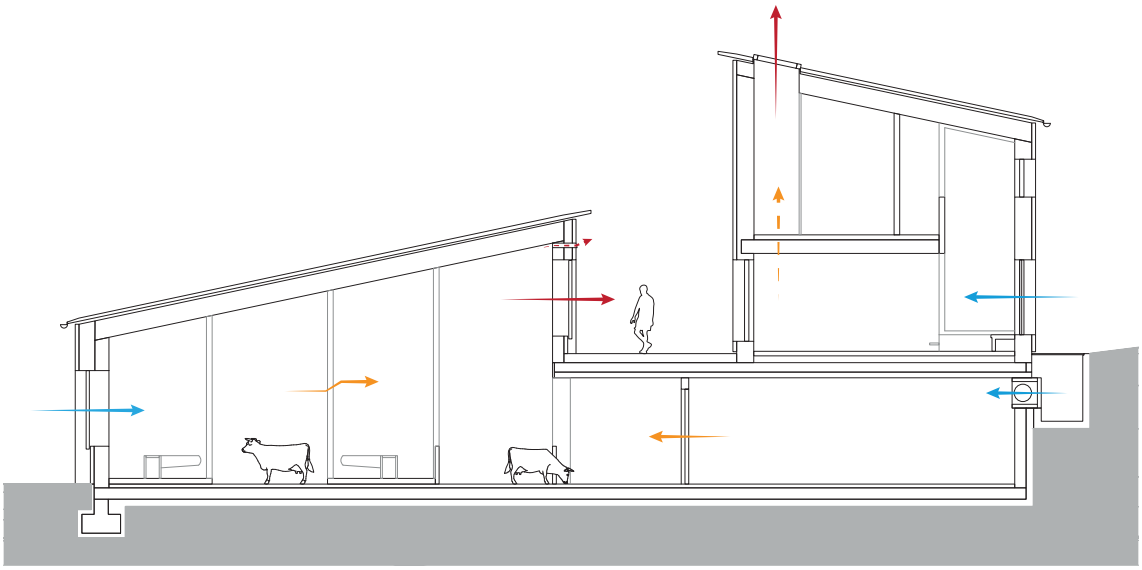
01 EXTERIOR WALL	
fir façade	30mm
battens, ventilated cavity	70mm
sealing layer	
structural concrete wall	320mm
insulation	200mm
sub-construction	40mm
fir panelling	22mm

02 EXTERIOR WALL WITH RECESS	
fir façade	30mm
battens, ventilated cavity	70mm
sealing layer	
wood fibreboard	22mm
solid structural timber	
+ insulation	280mm
OSB	22mm
sub-construction, installations	110mm
fir panelling	20mm

03 PUBLIC ENTRANCE	
hammered and welded copper	
sheetspanelling	
plywood	22mm
solid structural timber	
+ insulation	100mm
OSB	22mm
sub-construction	50mm
fir panelling	20mm

Figure 76: Section H2, detail of public entrance, 1:50

Low-tech sustainability



0 1 5

Figure 77: Natural ventilation in design,1:200

Figure 78: Ventilation shafts in façade for constant ventilation of the barn

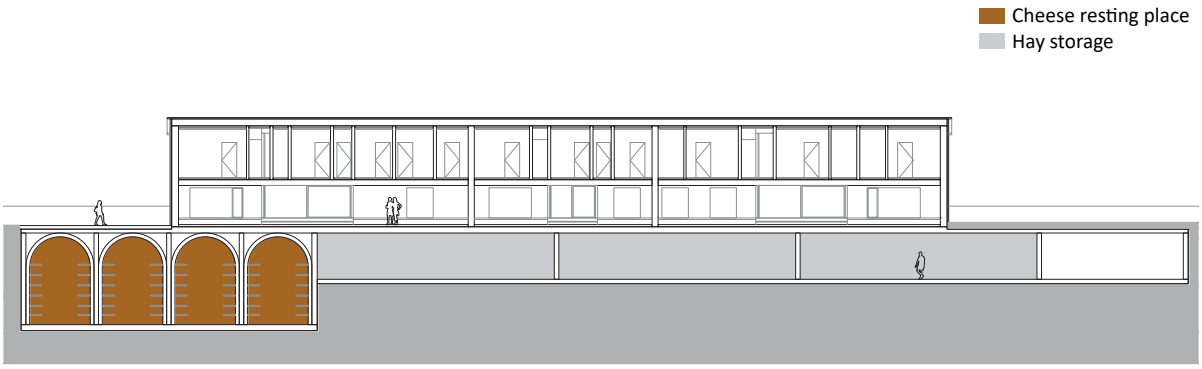
Low-tech sustainability

Implementing local low-tech concepts in the design

As mentioned earlier on in the booklet, Bernardo Bader uses low-tech sustainability to design the building around the user and create a pleasant indoor environment.
Designing a building which focuses on the user creates the best situation for a building to be used for a long time and not be rejected after a short period, thus making the whole design more durable. For Bernardo Bader, implementing low-tech sustainability meant getting inspired by vernacular concepts. Vernacular concepts are often solutions to problems faced in that region. They are solutions specifically created for the local environment together with the local building craft. These solutions are often still viable today. Implementing local vernacular concept in the design helps to create a building that suits the user based on the context. The design of the Hoamat-Käsefarm contains several low-tech sustainability decisions that make the design user friendly and more durable.

To manage the temperature of the design the idea of natural ventilation is used. The living volume uses the vernacular concept of thermal mass and the chimney effect; the business volume uses air flow together with placing functions underground which helps to regulate the temperature.

The living volume uses its concrete construction on the ground floor together with the first floor itself to create a thermal mass. The concrete construction is part of the heating and cooling system of the building. During the winter this thermal mass has constant radiation of low temperature which warms the building, this is done with the help of a heat pump. In the summer the thermal mass soaks up the heat during the day which makes the interior cooler. Together with the use of a chimney effect the building's core is cooled during the night when the temperature outside lowers. This is done by creating a circulation of air where the building opens a window in the highest part of the roof to use the property of hot air which rises. This process is automatized to ensure the building can use this concept when necessary. This ensures that the farmer's house and tourist accommodation are self-regulated.

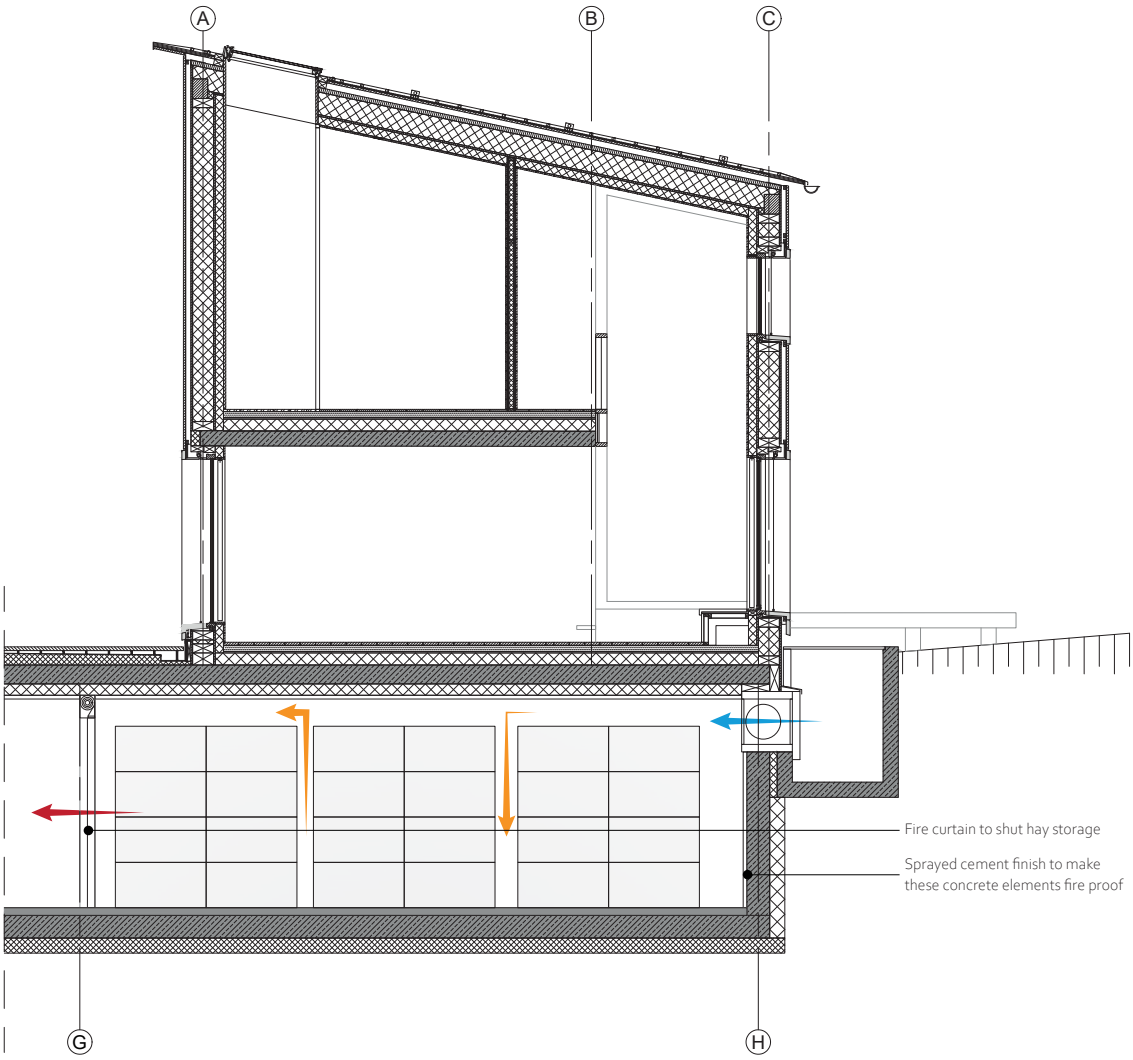


0 1 5 10

Figure 79: Functions strategically placed underground, 1:500

To regulate the temperature in the barn, the farmer can use the sliding elements at both sides of the building to open the façade. The openings are located diagonal to each other to ensure that air needs to travel through the space. There are additional ventilation spots on the façade facing the passage on the highest part of the roof to allow constant ventilation.
In the business volume, functions are located that require a steady and controlled environment. These functions are placed underground, which is a common solution in the region. Cellars are used to preserve and store products because the ground has a steady temperature with minimal fluctuation during the year (Builditsolar, n.d.). The idea of creating spaces underground to create a controllable environment is applied to two spaces of the business volume: the cheese resting place and the hay storage, which were also calculated with the help of the reference project 'desentis' by Gion Caminada.

The cheese resting place is positioned underground in a loam brick cellar. The low-tech sustainable decision here is that cheese needs a dark and moisture-regulated space to mature. The temperature of the room can be regulated more easily because it is located underground where there are only small changes in temperature during seasons (Bubel & Bubel, 1991). The moisture regulation is for a big part done by the loam bricks. Loam brick are pressed and not baked which means that the moisture-regulating property of the loam is preserved. This means that the brick absorbs moisture from the room when it is damp and releases it when the air in the room becomes dry again (Schittich, 2001, pp. 38–41).
Placing it underground means that there is no direct heat from the radiation of the sun and no direct light to enter the space to affect the quality of the cheese. There are two windows to give a view into the cheese cellar, these bring diffused light and can be blinded if needed.



0 0.5 1 2

Figure 80: Section hay storage with air circulation and fire proof materials, 1:100

The hay storage is also strategically located in the basement. In vernacular agricultural typologies, hay is stored in the attic because there is natural ventilation. Storing hay in basements is done on small scales by households in Austria because it is a dry and dark space.
Storing hay in an attic has two big disadvantages, as moisture from rain can touch the haystack, ruining the winter feed. Secondly, dried hay is a very big fire hazard, dried hay which is in contact with moisture which can come into the hay from natural ventilation and can make the hay 'sweat'. This so-called 'sweating' of the hay can result in spontaneous ignition of the hay start disastrous fires for building and cattle (Henning & Wheaton, n.d.). Storing hay in a basement has one big disadvantage, as there is minimal ventilation which is needed to prevent mould (FNT, n.d.).

To create a safe environment, ensuring that the hay will not go to waste and make it fire safe, the same strategy as the cheese cellar is implemented.
The best way of storing hay is in a dry space, very low moisture content, dark (no sunlight) and ventilated well. This ensures that the hay is not going to mould or sweat (FNT, n.d.).

Placing the hay storage spaces from the design in the basement creates a controllable space. The basement is dry and dark. With the rain gutter placed in front of the façade facing the moor, a space is created where ventilation ducts can enter the basement out of sight. This ensures that the hay storage spaces are also ventilated. Using an automatic ventilation system with moisture retraction the hay is ventilated in a constant matter. The placement of the hay storage underground is a low-tech sustainable decision. Using an automated ventilation system is not necessarily a low-tech option but the importance of ventilation for hay is so large that using this system ensures the quality of the hay where natural ventilation is an uncertain factor. These two aspects together create development on concepts found in the region to ensure the quality of the hay.

Because the hay storage spaces are located in the concrete basement which is finished with a fireproof layer it becomes a fire-safe environment. The hay storage spaces can be closed off by shutting the ventilation together with a fire curtain at the entrance of the space. This, together with the materials which can withstand a short fire, create a safe environment for the stable.

Conclusion

Conclusion

The Hoamat-Käsefarm is designed to create a connection to Krumbach and the ambitions of the village. The result is a design which should be viable for Krumbach as well as the user, increasing the chance that the concept and building will last for a longer time. The design is strongly influenced by the themes and lessons learned from the analysis of Haus am Moor. The reinterpretation of the same themes for the design means that the design has similarities but mainly builds on the reasoning behind the themes. The result is a well-reasoned and structured base for a design. The user is central in this design, where the aim is to design the building around the users, making the building fit the users like a tailor-made suit.

The first incorporated theme is regional commitment. The linear building is placed in the landscape, starting a dialogue with the landscape and the existing settlement. The arrangement of the program together with the façade contains a clear reference to the architecture found in the region. The second theme is craftsmanship. Craftsmanship is used to shape the design around the users. The materiality and craftsmanship create a link to the region where the care of detailing allows functional aspects to become part of the design. The building acts like a tailor-made suit for the user, being aware of the different functions located in the building. Low-tech sustainability is the final theme. Solutions found in the region are used to control the building's environment. This creates a design which uses low-tech solutions and material properties to control the buildings environment, in turn creating a design which regulates itself without the user having to do much.

To achieve a connection between agriculture, living and tourism, the concept of interaction has been implemented. The tourist accommodation creates a visual connection to the moor, and the building itself creates a connection with the moor walking route. By implementing different spots in the design where people can interact with the functions, transparency is created between the agricultural part of the design and tourism. The design allows the tourist to become part of the agricultural scene where they can interact on a close level with the cattle and learn to make cheese.

The design creates a 'hoamat', a small world on its own. People can become part of this small world by staying in the tourist accommodations, by taking cheese-making classes, use the shop/café to taste the product or by simply passing by. The design embraces the landscape it is located in and becomes part of the context.

Finally

Reflection

After a year of hard work, the graduation project has been finalised and it is time to reflect.

The first part of the graduation process consists of an analysis of a chosen building. The theme for my graduation was vernacular, which is a very broad term. This term offered the possibility to look for an architect and building which uses fine detailing and the region it is located in to create an end product which fits like a tailor-made suit. When analysing the chosen building, the craftsmanship of the building became less inspiring but by visiting the building and having the chance to view the craftsmanship from the exterior as well as the interior, the building sparked my curiosity once again. I wondered how the building, which is bigger and differently shaped than the buildings around it, is capable of fitting in the context. The craftsmanship of the building was also on a level I never witnessed before. Everything was detailed to perfection, functional aspects were part of the design and the materials used invited you to touch them and appreciate the craftsmanship.
After the analysis of the chosen building, I was free to choose a function and type of building. Seeing how Haus am Moor became part of the context and fits the village of Krumbach the search started for a program and design that fits the context and the village of Krumbach.

Wanting to focus on two aspects to make the design fit Krumbach, I created a large program consisting out of different functions. The scale of this program created the biggest problem in my graduation project. Krumbach consists mainly out of settlements consisting out of houses. My program opted for a building multiple times bigger than the buildings found in the surrounding area. Creating a building that still fits the context and expresses the architectural language of that region was a difficult journey. The volume study and fitting the program together with the façade were the parts where I struggled to find new insights to further develop the design. This is the point where I learned that it is very important to be critical of your own work. When you are stuck or completely convinced of your ideas, it becomes hard to take a step back and (re-)evaluate. The tutoring sessions together with dialogues with fellow students made me aware of how important it is to take a step back and critically look at the design decisions you make, especially when you are stuck or fully convinced of your ideas. This made it possible to filter the good aspects out of the design and take the design to the next step.

At the end of this one year journey, I can look back and say that, although it was not an easy route, I am satisfied with the end product.

Acknowledgement

First of all I want to thank my tutors Jacob Voorthuis, Jan Schevers and Sjef van Hoof for the tutoring and sharing their knowledge and expertise. I also want to thank my fellow students in this generation of the studio, Lion, Marco and Wietze for the conversations we had during this graduation project.

I want to offer a special thank you to the family Bader and in particular Mrs M. Bader, for her time and allowing me in their home to visit Haus am Moor to experience up-close what the architecture of Haus am Moor is about.

In addition, I want to thank Laura Martens who helped me to check my English writing and Koen Akkermans for joining me on the adventure to Austria.

Finally, I want to thank my family and friends, particularly my mother Mariëtte and Paul, for their unconditional support and motivation during this last year.

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