Eindhoven University of Technology

MASTER

Practical architecture school

de Haan, J.

Award date:
2016

Link to publication

PRACTICAL ARCHITECTURE SCHOOL
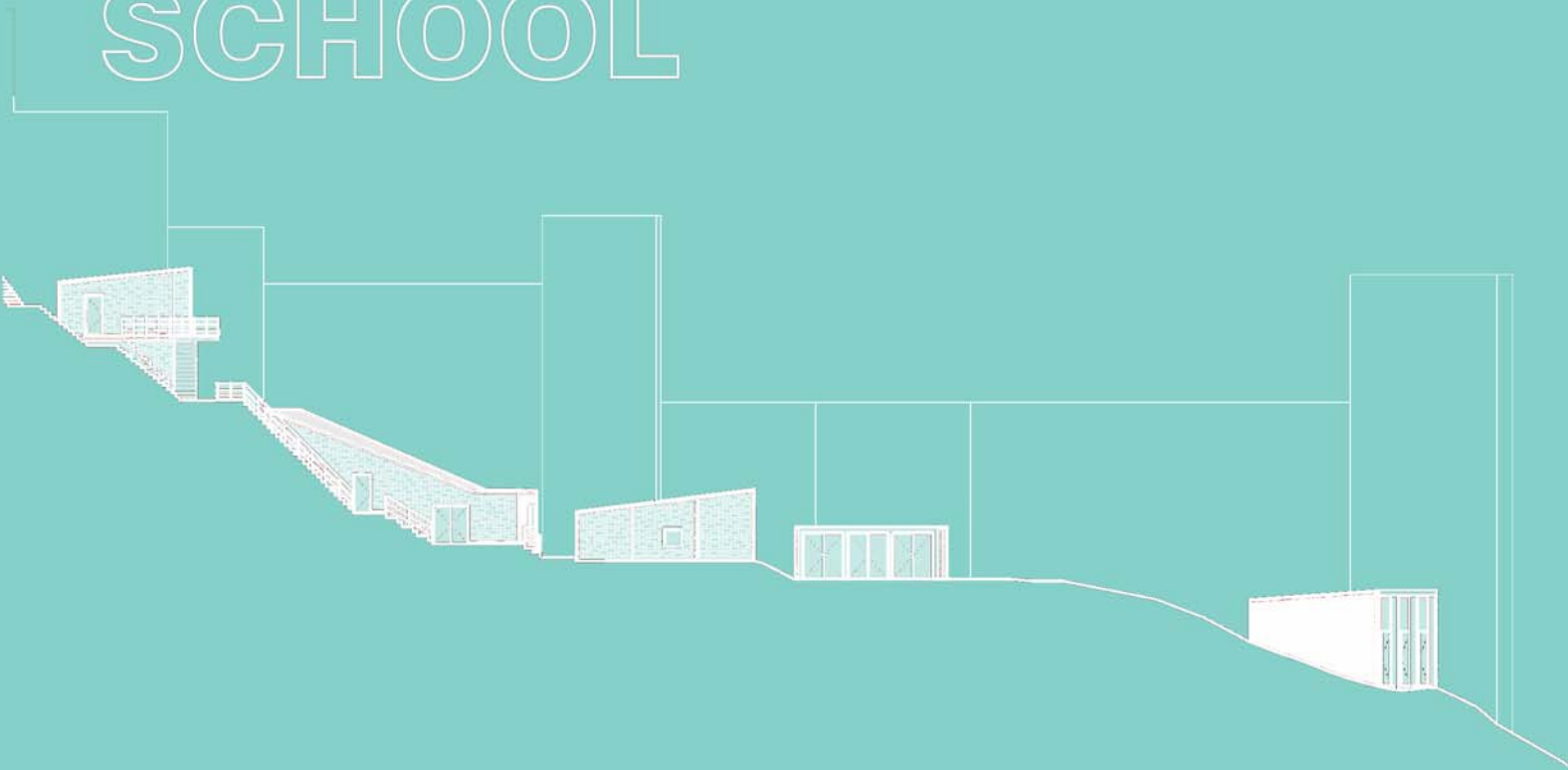
PRACTICAL ARCHITECTURE SCHOOL

Julia de Haan
0816656

CONTENT

This report provides insight in the process and outcome of my research and design for the graduations studio interactions, at the technical university of Eindhoven. The theme of the studio is interactions and the objective of the studio is to incorporate the transfer of knowledge within the design.

The studio revolves around Switzerland and Northern Italy. The selected location is Bellinzona, Switzerland: a city in the rural area of the Alps. Several educational functions are already located here: a library, campus, an archive and an engineering school. As addition to these functions, the subject of my design is a practical architecture school. Because of the poor accessibility by nearby villages, living quarters for students are included. By research and comments, this program specified into a private, practical architecture school for 50 students.

The school should be a place for interaction, for conveying knowledge and living together. Architecture can help to fulfil this task, concluding in the research question:

How to design a contemporary practical architecture school in Bellinzona?

The literature study of living and learning communities: monasteries, English universities and the American campus, in combination with four case studies will provide tools on which the design is based. Researching didactic systems is also conducted to provide a better insight in the didactic system of the practical architecture school.

The design is the result of the research. This design is divided into the explanation of the location, concept, masterplan and the separate buildings. The drawings, plans, sections and facades, are added in a separate booklet.

RESEARCH

The research is a combination of the development of the building typology and the didactics of higher education. The relation between type, organization and didactics is compared by theory and case studies, to find the answer to the research question: How to design a contemporary practical architecture school in Bellinzona?

The research is divided into three parts; the brief history of typology, the current situation and the didactics. The research is concluded into the architectural language of the contemporary school building, which contains form and organisational preferences and a statement about the architectural elements, which form the foundations of the design.

The first part of the research will focus on the living and learning community. The living and learning typology started with the establishment of the monastery: a building for a group of people who dedicated their lives to their belief in god. This highly regulated community, consisting of only men or women, lives together for the rest of their lives by strict predefined rules while learning from each other. This typology developed further in a school typology: the English University. Crossing overseas the system remained the same while the typology changed towards the American Campus and its detached buildings in an open landscape.

In the second part the general design theory is discussed. The historic form and organisation of the school building and its development are described. In this part the position of Herman Hertzberger is highlighted, who has written a theory about the design and use of school buildings.

Four case studies are intervening in the theoretical part, to bridge the design theory and the didactics. These case studies consist of architecture or art schools on a small scale: the Glasgow school of Art, The Bauhaus is Weimar, Taliesin West in Arizona and the Berlage Institute in Amsterdam.

To finalize the research the didactics are discussed. This part of the research is focused on the current Swiss school system, and its organization, the two other architectural universities and the didactics of the practical architecture school which I designed.

The architectural language will conclude the research and point out the focal points of the research which were used as cornerstones for the design.

THE MONASTERY

The monastery is the oldest example of a living and learning typology. Here a community of males or females lives in cohabitation, who are not related to each other by blood but choose to live together. Within the walls of the monastery the monks or nuns live, eat, work and pray together. Also spiritual broadening is an important part of their lives, which is achieved by conversations or studies. The monks are under the guidance of the Abbot, the head of the monastery, in a regulated community. They reside in the monastery for the rest of their lives, following a set of rules on which their daily ritual is based.

There are various types of communities following different rulesets, including rules about living, learning, working and praying. Each order offers a specific rulesets and is followed by many monasteries spread over several countries. A selection of the various orders is made and will be described briefly.

The first order is the order of Saint Benedict. In these monastic houses the monks follow the rules of Saint Benedict, which describe the monastery as a school where earnestness should be considered without leading to unnecessary severity. The order lives in silence and obedience, following a simple lifestyle. They must provide for their own subsistence through work, by making and selling cheese and bread or growing vegetables, and form an autonomous monastic community. Six till seven times a day they go to the chapel to pray and all meals are consumed together. (van der Plas,1993)

The next discussed order is the Franciscan order. This is mendicant order without own possessions. The monks live a life of teaching and spiritual development. The rulesets are based on three focal points: poverty, servitude and nonviolence. The monks sell their properties and give to the poor. They take nothing with them, even no bread. They strive towards a life without violence and arguments. The Franciscan order believes in personal and spiritual growth but also want to belong to a community, where the monks support each other.

The last example is the order of Cistercians of the strict observance, which is better known as the order of the Trappist. The order of the Trappist also follows the rules of Saint Benedict,

taking the three vows of stability, fidelity to monastic life and obedience. The monks take an oath of secrecy, not allowing them to speak but used hand signals instead. The daily schedule of the community consists of three tasks: common praying and studying, the work task, consisting of manual labor, and resting. These three things are housed in three parts of eight hours: eight hours work, eight hours praying and eight hours resting. Because of the manual labor the Trappist monasteries can produce and sell self-made products to provide income for the maintenance of the monastery, like cheese or bread. (van der Plas,1993)

All previously discussed orders have a specific structure in their tasks and daily schedule. Their life is devoted to praying, working and learning in harmony with each other. This specific lifestyle requires specific spaces. Spaces where everyone can join: a space for eating and praying, and spaces which are devoted to resting, spiritual broadening and learning, which can be more personal.

To connect the community of the monastery to the typology two case studies are used. These are the monasteries of Sint Benedictusberg and Sainte Marie de la Tourette of the Saint Benedict and the Dominican order. Both monasteries are relatively young, the Sint Benedictusberg was finished in 1968 and La Tourette in 1960, but the general monastery typology is still present in the design.

SINT BENEDICTUSBERG

The monks of the Sint Benedictusberg live by the rules of Saint Benedict, which frame a quiet and practical living arrangement. Here the Abbot and brothers live together, work, pray seven times a day and are self-sufficient. They live in the convent, but there is room for visitors. Guests, only men are allowed in this case, can stay at the monastery for several days for retreat. During this time they can attend prayer services and join dinner. (Coolen, 2012)

The community consists of two layers, the abbot and the brothers, and lives by a strict daily schedule.

ARCHITECTURAL LANGUAGE

The monastery is developed over two periods of time. The construction of monastery started in 1922 and was designed by architects Dominicus Böhm and Martin Weber. In 1923 the construction was discontinued and after the Second World War the monastery was abandoned. In 1951 new monastic life blossomed which resulted in the task to complete the monastery. Architect Hans van de Laan designed the monastic church and parts of the interior, which was built between 1967 and 1968. This monastery is one of the most important examples of the architecture of the Bossche school and is a national monument.

The monastic design follows the well-known architectural form of the medieval monastery. The medieval monastery, with its enclosed courtyard, keeps the community safe and the cloister provides covered paths between the monastic spaces. The building houses places for leisure and private prayer. This typology is still visible in the modern design of the Sint Benedictusberg.

ORGANIZATION

The monastery is formed around an enclosed courtyard surrounded by the cloister. Because of this organization all spaces are directly connected with the courtyard, placed on the other side of the cloister. The spaces, bedrooms, dining room, library and workspaces, are placed adjacent to each other, surrounding the cloister and the inner garden.

The spaces are linear aligned along the cloister. The rooms are located on three floors, and the spaces are divided by function in a vertical division; on the ground floor are the workspaces, the first floor is dedicated to praying and at the second floor are the sleeping quarters. Adjacent to this vertical division the monastic church and meeting areas are places separate from the monastery, to preserve the privacy of the abbot and brothers from the public domain.

The division between private and public continues in the inside structure, where the guest rooms are on a the other side than the rooms for the residents. Since the community exists of two layers, the brothers and the abbot, the spaces are used by all residents. Only specific rooms for preparing the service and a special study for the abbot differ from the common spaces.
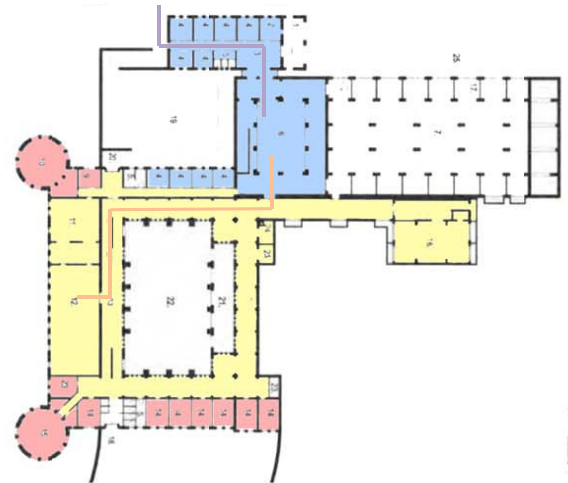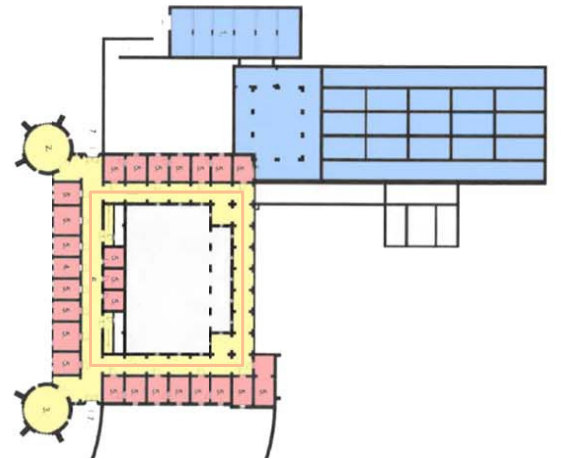
LEGENDA
public route   public
private route   semi-private
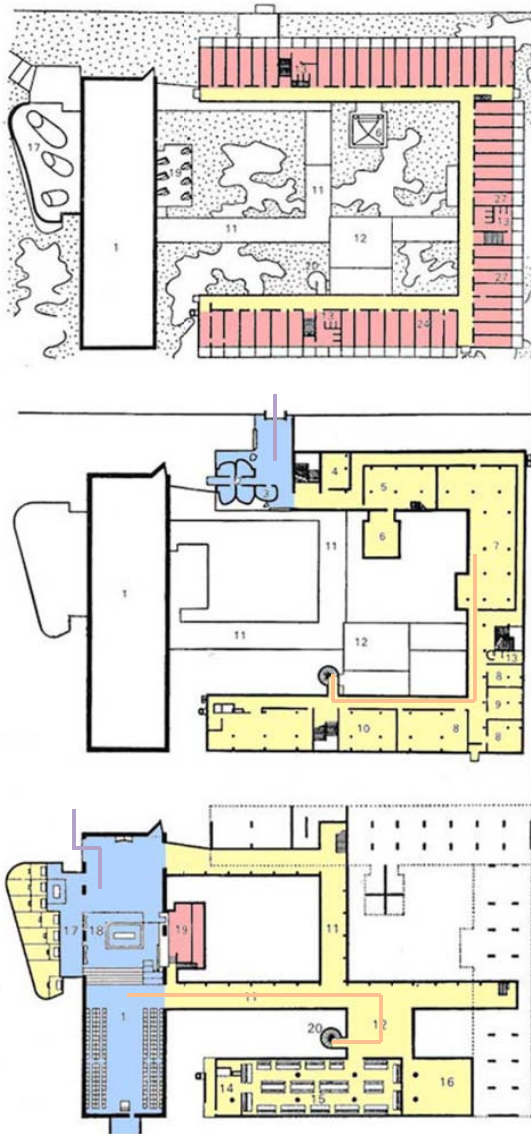   private

figure 1: Sint Benedictus: function and routing

figure 2: Stainte Marie de la Tourette: functions and routing

ROUTING

The strict daily schedule provides a strict routing through the building. Since every day at the same time the same spaces are visited, the monks walk a specific path together. The routing starts with the Morning Prayer, where the brothers walk from their bedrooms to the church for praying. After praying they walk together to the dining room. Next their paths separate for their personal activities as reading, praying or working, to gather again at the next prayer. When walking the route to the cloister there is complete silence. Guests, who stay in the monastery, have a separate route from their bedroom to the church, so they don't intervene.

SAINTE MARIE DE LA TOURETTE

Sainte Marie La Tourette is a Dominican monastery. Dominican orders exist of preaching brothers who choose the life without possessions and therefore depend on charitable gifts. In return they provide pastoral care to the people, which is why regularly these orders are located close to towns, as the Saint Peter and Paul Abbey. (Potie, 2001)

The monastery of la Tourette is a place for teaching. The first members of the order were sent to the universities of Paris and Bologna to become professors in theology. Nowadays they are teaching the novices, who spent several years at the convent, their knowledge. So this monastery is also a school, an order of teachers and students. There are the teachers, who are also monks, and the students, the novices. Also there is a possibility for visitors who can go in retreat. (Copans, 2015)

The inhabitants of the monastery live by a strict daily schedule. Every morning the monks read silently, for which each monk requires an altar which is placed in the lower church. Afterwards the monks have a meal together while they listen to a reading without sound and without dispute. Every evening the monks meet in the chapter-room to discuss their communal life and make decisions.

ARCHITECTURAL LANGUAGE

The monastery is designed by Le Corbusier in late modernist style and was finished in 1960. The building consists out of reinforced concrete and features three differences in façade treatment: the loggias in the form of brises-soleil, the "pans de verre ondulatoire" and the vertical elements which reach from floor to ceiling and provide the glass façade with a pattern.

The monastery of La Tourette is placed upon a mountain hill with no buildings around or ruins to build upon. Still the form of the medieval monastery can be recognized: the building encloses an inner courtyard. However, the chapel and the convent itself are separated, opening up the courtyard. Also the building is built on pillars, preventing it from reaching the ground, entirely opening up de courtyard. The last modification is the change of the cloister from surrounding the courtyard to dividing the courtyard, connecting the convent to the chapel through the open space.

ORGANIZATION

The building has a central framed, rectangular form, formed with adjacent spaces. It had a vertical organization by function. The entrance floor is devoted to study, with lecture rooms, a library, reading rooms and an oratory. Also there are multiple study rooms for different members of the order such as the students and monks. The upper floor is devoted to resting and the lower floor is for praying and dining, during which the reading takes place.

The church, which is a public part of the monastery, is separated from the rest of the building. The meeting spaces however, which are also used by visitors, are placed in the private part, at the entrance of the monastery.

ROUTING

Because of the daily schedule, there is a clear routing through the monastery. Every morning the monks and students gather in the atrium on the lower floor, after which they move together through the corridor towards the church. Here they have their Morning Prayer and private reading, which takes place in the side area of the church. The central area of the church is used for collective praying and singing. After Morning Prayer they move to the dining hall, where the monks are seated on their fixed positions. After the meal there is time for studying and praying, which takes place

in specific study rooms, the library or the private rooms. This schedule repeats multiple times a day.

SUMMARY

The communities of the monasteries live strict scheduled lives, which also showed in both study cases. Besides differences in the communities itself, with two layers or multiple layers, there are also differences in the sternness of the schedule. This effects the organization of the monastery.

At Benedictusberg the monks learn from each other by engaging in conversations. They have a similar rank and thus make use of the same spaces and all take part in decision making. At La Tourette there is a difference in order, which not only reflects in the division of the community in monks, teachers and novices, but also in the organization of rooms. At La Tourette specific areas are assigned and used by specific groups; a novice study room, a study room for the monks and a common room for the monks to make decisions, where the novices do not participate in. There are also common rooms, as at Benedictusberg, which are for instance the library and the dining hall.

Both communities have in common their isolated living arrangement from the outside world. There living area is kept separate from the public spaces where the visitors can come and pray or ask for advice. The monastery churches are accessible from the outside as well as from the inside, by a separate path and are placed on the lower floor, together with the dining area. Above are the study areas and the living quarters.

Even though there is a difference in the structure of the community, the organization schemes show equivalences between each other. Both are based on the medieval typology of the monastery, including the inner courtyard and the cloister. Also the organization of functions shows similarities. These similarities show a connection between the monastic community and the typology.

To support the connection between the school community and the school typology, the English University and American Campus are researched with focus on the link between typology and didactics, which forms the learning community.

figure 3: Merton College

figure 4: Sidney Sussex College

ENGLISH UNIVERSITIES

In the origins of the English university, students could attend the lectures of selected teachers but living arrangements were missing. At this time, students were staying in monastic houses or lived together in a hostel under the direction of a master. Both living arrangements where set without educational structure. (Turner, 1984)

In the fifteenth century the first colleges, which included living quarters, made their appearance. The buildings formed a closed quadrangle, as the traditional monastery, containing all major requirements. A chapel, a dining hall which was also used for lectures, scholar and masters' chambers and quarters for the head of the college were included, as is shown in the pictures of the Merton and Sidney Sussex college.

The English university adopted the enclosed quadrangle shape from the monastery, simply because the monastic and collegiate programs where almost identical. The buildings house communities for unmarried men and boys, which include spaces for sleeping, eating, instructions and religious services. Additional the enclosed quadrangle was the defence from the outside, the control over the students inside and the efficient use of the small site within the city where the building could be constructed on the perimeter.

Over time the English college transformed, both on educational and architectural level. The program became less strict, providing the students with more personal time, and the courtyard opened up to one site, providing the outside space with better ventilation.

DIDACTICS

"At their origins in the twelfth and thirteenth centuries, Oxford and Cambridge had been modelled on the University of Paris, both in their curricula, based on the dialectical analysis of Christian doctrine, and in their methods of operation."

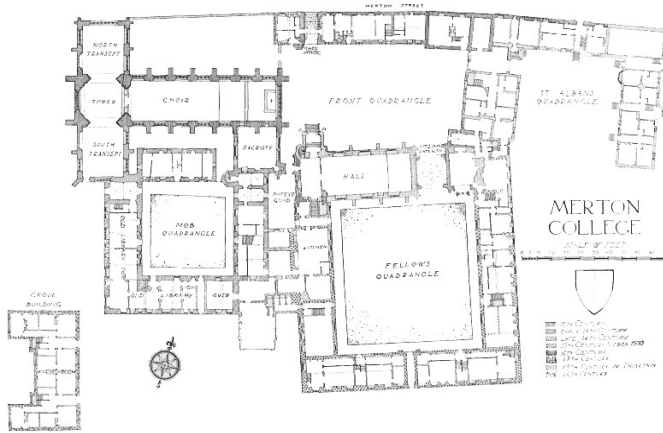- Paul Venable Turner
(Turner , 1984, p.9)

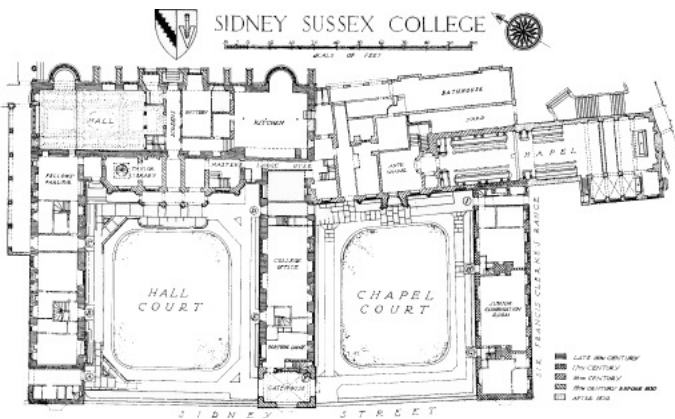The curriculum of the Christian doctrine requires students to

come in terms with God's nature and informs them about the redemptive plan. The education generally consists of self-study, almost no lectures were given at that time. The religious and political turmoil of the late sixteenth century provided Oxford and Cambridge with the opportunity to strengthen their education and reform their curricula with the introduction of science. The Christian doctrine slowly shifted towards science.

The school functioned upon the collegiate system, which included students and teachers living on the school property. Since at that time the schools were only for men, the community was quite similar to the one of the monastery: it was about living, learning and praying together.

The collegiate system and classical curriculum did not require a lot of academic facilities. Since lectures where limited, only a few classrooms where needed. Since the courses relied on a small number of standard texts, large libraries where unnecessary. (Turner, 1984)

Most universities continued with the traditional system of education, with the emphasis on religion and limited classical curriculums.

ORGANIZATION

The base form, the quadrangle, is adopted from the traditional monastery, since the program of the monastery and the collegiate system are nearly identical. Additionally, the enclosed quadrangle functioned as potential defence from the outside and gave the ability to close off the college. The enclosed form gave the authorities control over the students keeping them from rebelling, which was a major concern during the growth of student registrations. Within the building all required functions are placed. Even though the students shared a room for sleeping, they did have their private, small, space for studying, since classrooms where not ordinary at the time. According to the collegiate principle, all faculty members where required to live within the school estate with the students, to foster the transfer of knowledge.

The first development in the organization is the transformation of the quadrangle, for example at Cambridge, where one side was

left open, facing the world and reflecting the new ideals, rejecting the monastic tradition.

SUMMARY

The monastery and the English university have a lot of similarities in building typology and community. The residents, students and teachers, stay inside the perimeters of the building where the environment is highly controlled and regulated, concentrating on religious and academic matters, as in the medieval monastery. Academic spaces, religious spaces and living spaces are clustered together, connected by courtyards. The main difference between the monastery and the English university is the duration of stay in the community. At the monastery the monks reside for the rest of their lives, while at the English university the students stay for several years.

AMERICAN CAMPUS

America rejected the European cloister structure in favour of separated buildings in an open space, set up as an academic village. Since the buildings are separated, they give an opportunity to experiment with different shapes and design, appropriate for the specific function it houses. This ideal is so strong in America that later on, when the schools are located in cities where land is scarce, they often go to considerable expense or inconvenient solutions to simulate a rural spaciousness. An example of this strong ideal is the relocation of the Massachusetts Institute of Technology from Boston to Cambridge in 1916. Here, a new spacious campus was built on the banks of the Charles River. (Turner, 1984)

At the beginning, the separate colleges were spread over the landscape to meet the needs of the local inhabitants. They were placed at the border of the city instead of the inner city to provide Indians with education. Because of this development the different colleges could respond to the local needs in contrast to the centralized universities in England. However, despite the new typology, the American Campus is, just like the English university, still creating an autonomous community. The separate buildings become a miniature city.

figure 5: Harvard University Campus

"Each college or university is an urban unit in itself, a small or large city. But a green city. The American university is a world in itself"
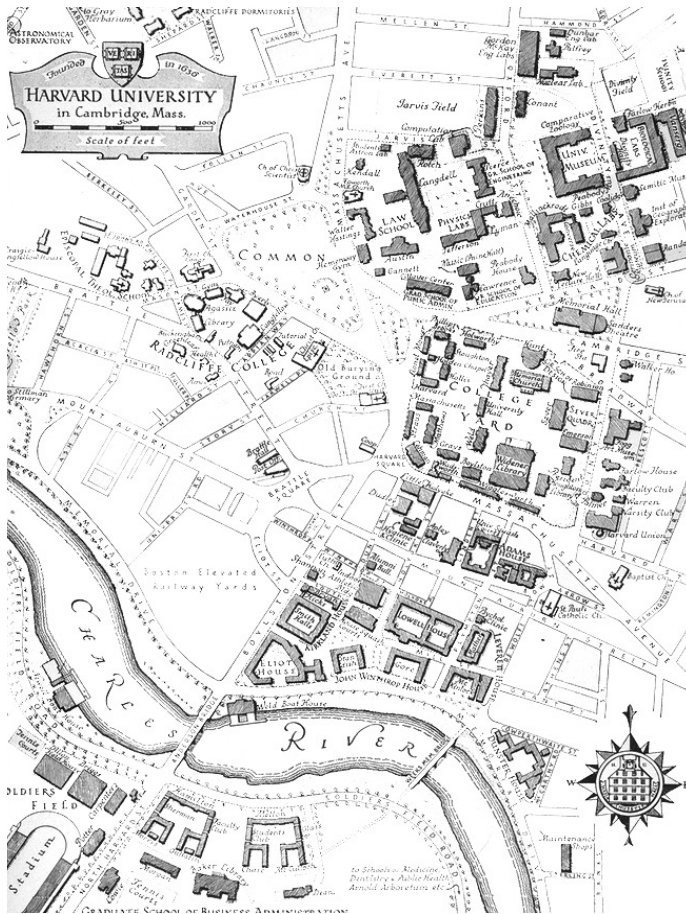
– Le Corbusier
(Borrero, 1993, p. 82)

This miniature city originally grew without planning. Over time it slowly expanded with more buildings. The campus formed its own distinctive physical qualities, self-containing community and architectural expression of educational and social ideals. It developed under the vision of the educator and the architects, expressing the correlation of the educational ideals to the physical planning. Nowadays complete masterplans are developed, planned landscapes and high standing architectural buildings, appropriate for the vision and didactic program of America's higher education.

DIDACTICS

From the beginning America was committed to the English collegiate system, even though it would be much easier and cheaper for the founders to adopt the Scottish model and house students and board in town, leaving the school with the sole responsibility of teaching. However, the founders were resolute in the collegiate belief that higher education is only fully effective when students eat, sleep, study and pray together in a tight community. This set the program for later colleges and has remained an American educational ideal ever since, despite the changing circumstances and curriculum.

The curriculum of the colonial college is largely inspired by the traditional classical format, based mainly on Latin and Greek studies and theology. Since the University followed the collegiate system, the emphasis was put on self-study, where the students had to memorize passages from textbooks, instead of classes, which made classrooms unnecessary. The texts where minimal and short, which eliminated the library. The central hall was the centre of college life: it was the lecture hall, the dining hall and general living space. The students shared bedrooms but had a private space for studying, similar as at the English university, and also the faculty members where obligated to live on campus, according to the collegiate principle.

During the nineteenth century, there was a call for innovation, increasing the scientific studies and implementing trades in the curriculum. The collegiate system was criticized for its religious orientation, strict discipline and the narrowness of its curriculum which was based on recitation and had no choice of studies. The curriculum changed towards specialized professional training and research, including lectures and assignments. Critics wanted to shift from the collegiate system towards a solely learning and research system as was common in German universities, but the traditional collegiate system remained dominant in America.

ORGANIZATION

Since the American school system was committed to the English collegiate system, these ideals are present in the organization of the American Campus. The Campus developed over time, starting with the central hall. This central hall houses the lecture and dining hall and general living spaces, for sleeping and studying. When the enrolments increased, the campus could develop further.

The American campus favored a spatial pattern with separate structures in an open landscape in contrast to the English University. (15) This distinctive deviation results from several reasons, such as: (i) the vastness of the landscape which requires a uniform vision on planning, (ii) a practical concern for fire, since the buildings in America where made of wood instead of the English masonry structures and (iii) the religious significance, since the American Puritans did not want to be connected to the Christian school or the monastery, therefore they separated the buildings entirely.

Just as the English Universities developed, the American Campus developed. The architecture turned to the use of new materials, relation to the outdoors, geometric and simple forms, clean lines: a modern style for schoolhouse architecture. Massive structures embodied the ideas of "defence, safety and permanency". The building was "an instrument of education, a machine for learning". Harvard is an example of the development of the American Campus.

"The buildings of Harvard at the end of the colonial period thus embody several concepts of planning. The underlying pattern was a continuation of the English collegiate quadrangle, as revised and opened up in the Puritan colleges at Cambridge"

- Paul Venable Turner
(Turner, 1984, p. 8)

The buildings where set as separate elements placed in a row, all facing out to the world. Essential to this opening-out process was the separation of buildings, an innovation that had appeared even at the earliest stages of Harvard's growth. "This extroverted attitude towards planning clearly reflected the educational and social ideals. While committed to the collegiate ideal of students and teachers living together, the school also considered itself an integral part of the larger community." This became the typical American campus. The American college was turned outwards rather than inwards, directing itself to the community or to nature. The physical plan was the clearest evidence of this orientation.

It is clear that the collegiate system of the English university and the need to form a community is still present in the American Campus. There is a difference in form, the enclosed quadrangle against the extrovert character of the separate buildings. This started with the difference in religion, which directly made America reject the closed form of the quadrangle, relating it to the Christian monastery. Also the constant growth of the campus, starting with one single building and developing further, may be part of the decision to keep the buildings separate. One thing is clear: there is no big difference in the didactics so that could not be the cause.

SUMMARY

Both the English university and the American Campus started with an equivalent curriculum of the collegiate system. However, the typology is fundamentally different. Even though the same functions are included, first one hall and sleeping quarters and growing to multiple study spaces, the structure is different.

Since both the closed quadrangle, which is enclosed and saves

space, and the separated fireproof building have good reasons for their form, it provides a solid argument at that typology and didactics are not connected to each other. Changing the didactics over time and not changing the typology supports this statement.

Nowadays the same typologies are still built, used and extended. New didactics are fitted in the well-known structures. In the next chapter, the building type itself is discussed, diving deeper into the organization of the learning spaces itself.

Next to typology, also the building type developed over the years. In the former chapters the typologies of the inner courtyard and the campus are discussed. In this chapter the inside organisation of the school building itself is discussed. The description of the development of the organization in floorplans and usage creates an argument for the use of a specific theory.

The school building started with the one room school which soon developed to a formal, multiple story building consisting of connected rooms and a staircase which was the start of the school type. The first change away from these formal and traditional institutional buildings towards the informal one story modern buildings was introduced by Dwight Perkins, a famous school designer. Together with Frank Lloyd Wright, Walter Burley Griffin and other architects they designed a lot of schools, including the University of Nankins, and where called the "Prairie school architects". Their style included long horizontal lines of brickwork, continuous windows and large roof overhangs. An innovative example from this period is the Skokie school, built in 1922, with its classrooms opening up to the courtyard, providing every classroom with an outdoor entrance and a skylight. Eliel Saarinen joined the team of the Perkins Firm and together they designed the Crow Island School in 1940. (Brubaker,1998)

Educational Facilities Laboratories (EFL), funded by the Ford Foundations, encouraged innovation in the fifties. Collaborating with educators, architects and suppliers, they promoted studies and the use of movable walls for flexible space. They also explored new building methods to build faster, cheaper and better and explored the use of new media as television.

"The president of the EFL, dr. Harold Gores, inspired educators and architects to explore new concepts [as flexible use and ovable walls] for school buildings, sites, equipment, and curricula."
- C. William Brubaker
(Brubaker,1998, p. 43)

The open plan was one of the important innovations of the EFL, which influenced the basic designs of schools in the sixties. Open spaces which can be flexibly divided according to use. Most of the open spaces where eventually divided into classrooms.

In the Netherlands, the first development towards open up the classroom came from Willem Dudok. In the theory of Dudok the schools should be more than a closed off space and should be used in multiple ways, instead of being vacant for the half of the day. It should be about combining spaces, opening them up to the hallway and using movable walls to create an appropriate space for the function. Opening the spaces to the outside, letting fresh air in and providing the room with a private outside space which could be used for learning. (Quist, 2005)

Sjoerd Schamhart also writes about the connection between the spaces. He creates glass showcases between the classroom and the hallway to demonstrate the activities inside. He combines relatively small classrooms with a limited number of workplaces in the hallway, so the students can work freely. He combines the traditional classroom with a new form of connection between the different areas. (Verstegen, 2008)

In his essay "van een open naar stimu-lerende omgeving" Ton Verstegen writes about the next step, which originates from the change of functional approach to an approach on activities. According to him this expresses itself in an open learning environment. There are no rooms for specific function and learning is not bound by a fixed time of place. The spatial layout is zoned by function with amounts of light and noise pollution. The open learning space is about contrasts between certain areas, providing them with own characteristics while keeping the spaces as a whole. This flexible architecture is also known from Mies van de Rohe and Eliel Saarinen, and seems like a logical conclusion in theory and practice for school buildings since the program changes over time.

The didactic system had shifted from studying the literature and classical lectures towards work groups. Now we are living in a knowledge economy, which asks for a specific type of education that is relevant to a society preoccupied with business, industry, expansion and progress. The school typology has to provide flexibility, connectivity and spaces for social and educational encounters. (Kuhn, 2012)

In the current trend of education, there are implacable regulations set by the government. The growth of the enrolment of students, the expansion on the organizational scale and the transformation
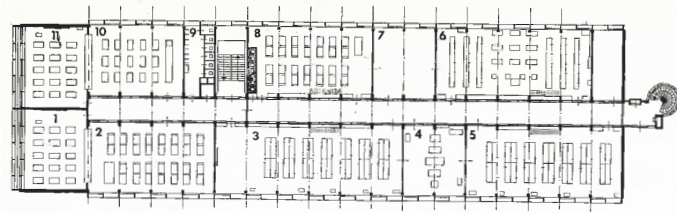
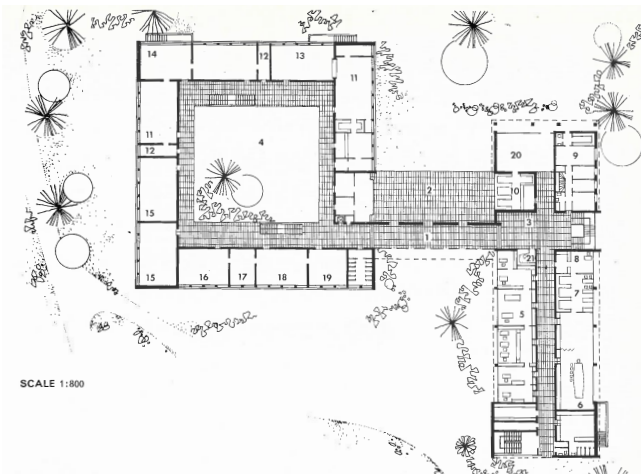figure 6: hallway, first Cristian trade school, Amsterdam

SCALE 1:800

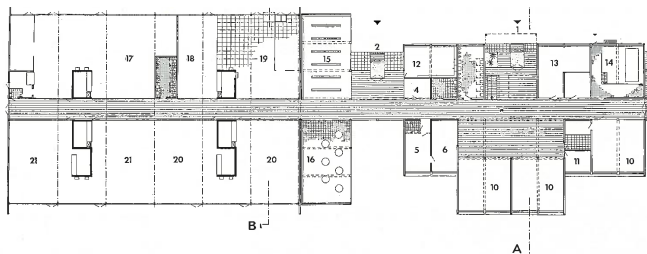figure 7: atrium, women's training college Essen

figure 8: open plan, trade school, Gertruidenberg

of school buildings towards big open spaces brings enormous spatial opportunities which must be exploited, leaving the traditional hallways behind.

Nowadays, buildings for higher education are designed with an open plan. Small classrooms make space for big, light, open work floors, connecting all workspaces with each other providing no personal space. So even though this trend provides flexibility in the use of space, which gives possibilities in use, the identity of the space disappear.

The development lingers between the use of closed space and the open connections between them. Still all the possible organizational schemes are used: the hallway, the atrium and the open space, visible in figure 6-8. In his book "Ruimte en leren" Herman Hertzberger states that nowadays architects pay more attention to the formal building style instead of the spatial possibilities, as stated earlier: changing the façade instead of the plan, the organization seemed untouched. Hertzberger combines the theories of opening up the classroom and strengthening the bond between the students through a series of architectural interventions with the idea of a continuous learning landscape. (Hertzberger, 2008)

To continue with this development of the organization of the school building, the theory of Herman Hertzberger is selected. He describes an organization of personal and communal spaces within the open space, a combination of the commonly used classroom and the popular open spaces of the contemporary school buildings.

HERMAN HERTZBERGER

Herman Hertzberger has developed spatial themes and conditions for school buildings, which he has been designing for over fifty years. Over time, his developed spatial themes have always remained the same. Buildings must be durable, provide a spatial framework and have to respond to the new views about education without needing to undergo any fundamental changes. Also expansion must be possible, since school enrollments are still increasing. (Hertzberger & de Swaan, 2009)

Cross-section / Dwarsdoorsnede

Cross-section / Dwarsdoorsnede
Cross-section / Dwarsdoorsnede

figure 9: Waterrijk primary school Eindhoven

"Architects should not get involved in debates about
education; instead, they should create spatial conditions
that will benefit learning in a general sense."

- Herman Hertzberger
(Hertzberger & de Swaan, 2009, p. 9)

The type of regular school building: rows of classrooms and
corridors running through. Herman Hertzberger wants to design
the classroom less as an enclosed unit and use the corridor as
learning spaces, thus expanding the opportunities for learning.
He states that currently known corridors don't belong in a school,
instead the corridor should be a space to meet others and help
against overcrowding the study spaces. In his designs he modifies
the corridor to a meaningful area, making spaces suitable for use
by smaller groups, while class instructions can take place in the
classrooms.

figure 10: Ringsted primary school Denemarken

"What matters first and foremost is to articulate the
space so as to create as many places as possible
where people can work individually or in groups,
fulfilling the necessary spatial conditions."

- Herman Hertzberger
(Hertzberger & de Swaan, 2009, p. 10)

By using all kinds of architectural resources, full height or
half height walls, steps, stories or elevated areas, he creates
boundaries and thus separations from the rest of the area,
providing seclusion while still being part of the learning community.
Conditions that enable the students to concentrate on their own
work while they are at the same time aware of others and what
they are doing.

The space should continue in a unified spatial entity where
students should be aware of each other's activities and exchange
knowledge. By the use of one central entrance and an interior
central square the community can benefit, collective spaces which
belong to the school. However, specific stated needs for spaces
result most of the time in autonomous spaces who work on their
own and not as a whole within the building.

The small spaces should be taken into consideration within the
whole. Therefore an element of architecture which can provide a
relationship between all the separate elements and can give the

figure 11: stedelijk gymnasium Leiden

figure 12: stairs as meeting place

figure 13: open space as workplace

opportunity to emphasize their distinctness could be interesting. This spatial comprehensive theme is for Hertzberger the system of streets and squares; the open, shared spaces and closed off, exclusive spaces. This can be daylight, the use of heights and the creation of public zones, creating different domains; the communal domain for meeting and the more private domain for studying with transparent boundaries. This gives the students and teachers a possibility to characterize their personal domain, providing the spaces with an identity.

Then there is the central square, a space without territorial claim, which is used by everyone and where it is unlikely to escape anyone's attention. A single spatial entity. This in combination with the transparent learning environment should promote the social cohesion.

Hertzberger calls himself a social architect and tries to contain the social relationship between public and private and transforms it in a spatial relationship. He creates a continuous space shifting from very public to very private. By making spaces more private, students are more likely to take care of a place since they feel responsible.

Public spaces are left open and easily accessible while the more private spaces are closed off and harder to access. The inside is visible through window, so the user of the space can choose what he wants the outside world to see, in contrast to the open space where the student is completely exposed. Within these layers of private and public space, Herman Hertzberger adds other spaces, for example leaving a little corner for a coffee machine with a table and chairs, a hall between two corridors and an alcove which overlaps half of the classroom door, visible from the classroom but not from down the hallway. What happens to these spaces is unpredictable, since there is no specific program. It can be used for everything.

In the schools Herzberger creates a game of looking and being watched, concealing and revealing, showing and observing. He wants to provoke meetings, connections between people; eyes that meet, the exchange of words, stop moving and drink coffee. A non-committal meeting, which can begin and stop at any time.

"The steppes that double as an amphitheater have become the trademark of Hertzberger's school buildings"
- Abraham de Swaan
(Hertzberger & de Swaan, 2009, p. 33)

These are no sacred spaces, but spaces to sit down, make small talk, have a drink and eat. Of course, it can also be a place to organize extracurricular programs. The stairs are a place where people can sit without having to comply with any formalities which are customary by sitting at a table; a space to sit and observe, and be observed by others.

This game of sightlines continues further than observing and being seen. It also continues in the small windows which allow passengers to look inside the classrooms. These windows can be used as exhibition space, to display the work of the students, letting the other students and visitors know what this class has achieved; providing this space with an identity.

With different architectural elements Hertzberger tries to keep the space as one entity, but also provides small groups with their own space. By letting them be aware of each other, they treat each other with respect and behave, and can show each other their work and learn from each other, forming one community.

Hertzberger used all kind of architectural elements, as the communal stairs and the working niches, to connect spaces and students changing the classroom to a learning landscape.

This concludes the research on typology and school type. The next chapter will provide a better insight into the school type of the art and architecture school and its didactics.

SUMMARY

Hertzberger leaves the didactics and the programs separately from its theory of designing school buildings. So his theory in designing school buildings cannot be compared to the changes in didactics. However, his theory can bring possible design methods to improve the community life which is planned in the practical architecture school of Bellinzona.

He focuses on the cohesion of spaces within the school, the small work spaces which are connected to the big communal space in the middle. He wants to give students a space of their own to work, but keeps them part of the overall community instead of putting them behind a wall. To increase this feeling of community and identity, there are windows, corners, places to sit, sightlines, everything to connect people with other spaces in the building and with each other. This way they can observe and also be observed. By exhibiting personal features, the place can get an identity, and be a specific space within the community of the school.

To provide a good insight into the typology of an art or architecture school, four cases studies are undertaken. These cases are selected by their size, only small schools are selected to provide a fair sample, and the comparability of the program, thus the art and architecture selection.

The four case studies are: Taliesin West in Arizona, the Glasgow school of art, the Bauhaus in Weimar and the Berlage Insitute in Amsterdam.

figure 14: Taliesin West

figure 15: Glasgow school of art

figure 16: Bauhaus Weimar

figure 17: Berlage institute

RESEARCH | CASE STUDIES

TALIESIN WEST | ARIZONA

Taliesin West is built in 1932 as Frank Lloyd Wright's winter home and summer school. Later the summer school developed in an architecture school and over time de grew to an entire estate. Over time more buildings where added and old buildings were modified by the students.

Frank Lloyd Wright was an American architect, writer and educator. He creates organic architecture, architecture which is in harmony with the environment. Over the years he build all sorts of buildings, wrote 20 books and was the leader of the Prairie School movement. In 1991 he was recognized by the American Institute of Architects as "the greatest American architect of all time". (Brewster, 2004)

In 1931 Frank and Olgivanna Lloyd Wright announced their plans to form a school. "learning by doing" was the motto and the fine arts are the center of inspiration. Next to learning, the students work and care for each other and the estate, working on the gardens, the house and cooking and cleaning. The philosophy of the school came from Wrights aunts, who founded a school based on the "learning by doing" principles. This made an impact of Wright, supporting the traditional apprentice system, which he had experienced himself. Later, Wright build his school on the same place as the school of his aunts, working with the same principle but now devoted to architecture and arts. Wright's wife Olgivanna was educated in music and dance, by the philosophy of spiritual development, hard work, self-discipline and self-awareness, which corresponds with the learning philosophy of the architecture school. (http://www.taliesin.edu/)

Next to the "learning by doing" philosophy, the school works on a master apprentice ratio. All students live on campus, most of them in a room. A part of the curriculum is to live in a shelter, one the students built themselves or one they reshaped to research. This way the students can shape the qualities of the living space. The students have to stay within the perimeters of the school site through the entire academic program. If the student wants to leave the property he has to ask for permission and there is a maximum of 25 days of leave a year.

figure 19: drafting room and living spaces

figure 20: drafting room

figure 21: garden room

Even though Taliesin doesn't look like a normal school, the curriculum and courses in design and theory are equivalent to the Swiss school program with 4 semesters of which one semester is on the other campus.

DIDACTICS

The school program exists of a similar program as the Swiss educational program, with classes, theory, history and project work. This is essential to provide the students with a valuable diploma. However, Frank Lloyd Wright had another plan for this school. In Taliesin it was about living, working and eating together, learning from each other, and learning to work with your hands.

The students work on practical tasks, as reshaping the estate and building a shelter, but next to that they also worked with Wright himself in his firm, drawing together on the projects that were designed by Wright and his employees. This is the master apprentice ratio, learning by working under the supervision of a tutor.

ORGANIZATION

The campus is laid out in different volumes, spread over the landscape with at the north the visitor spaces, the library, and the auditoria.

A central position on the plan is taken by the drawing room and the dining room, with on the south the living spaces. The living spaces are divided in student rooms and apartments for teachers. All spaces are naturally linked together and are connected by walkways. The buildings are not placed in a fixed form, but follow the patterns of the landscape, playing with the differences in the height of the ground surface. Inside, as well as outside, the rooms are linked together and to the outside space.
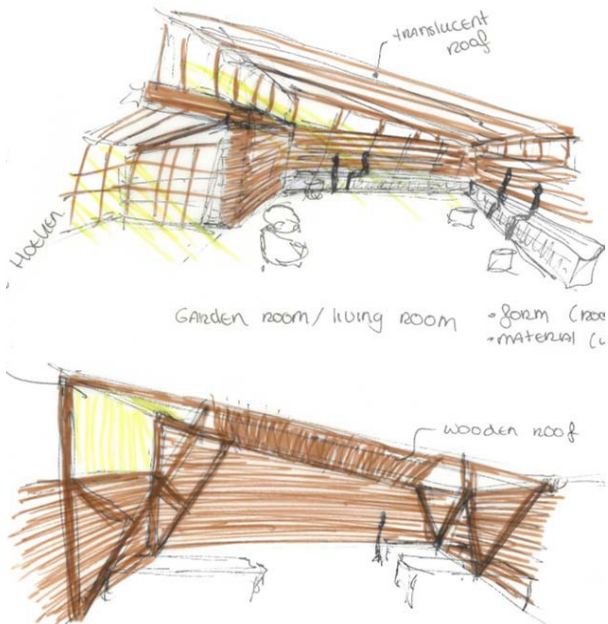
figure 22: architectural language

ARCHITECTURAL LANGUAGE

Wright felt that Arizona needed its own architecture, complementing the low horizontal landscape. He decided to use the materials of the place, constructing the walls out of stacked, local rocks, filling them with concrete. Translucent canvas is used for the roof, to let the natural light in. The canvas is carried by wooden, laminated rafters which span the room. All buildings on Taliesin are constructed in this similar way.

The buildings are all set in the landscape and exist of one building layer. The materials of the landscape are used in sights, outside as well as inside: these materials and structures are visible, giving character to the estate and unity among the different buildings.

figure 23: detail
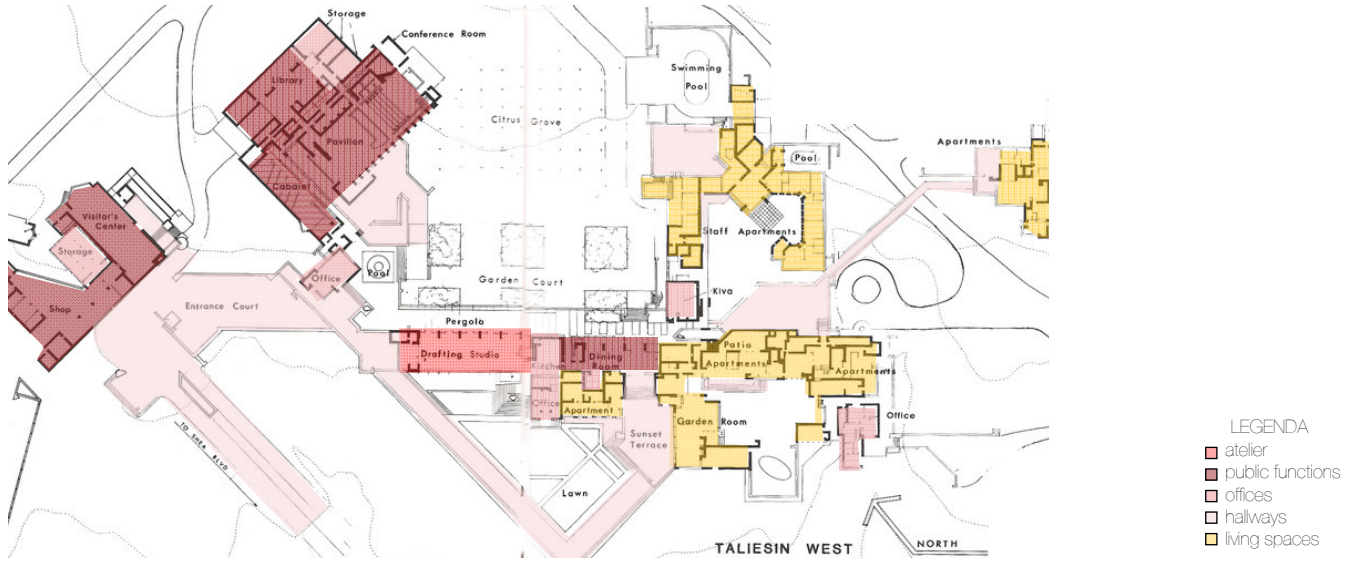
figure 24: functions
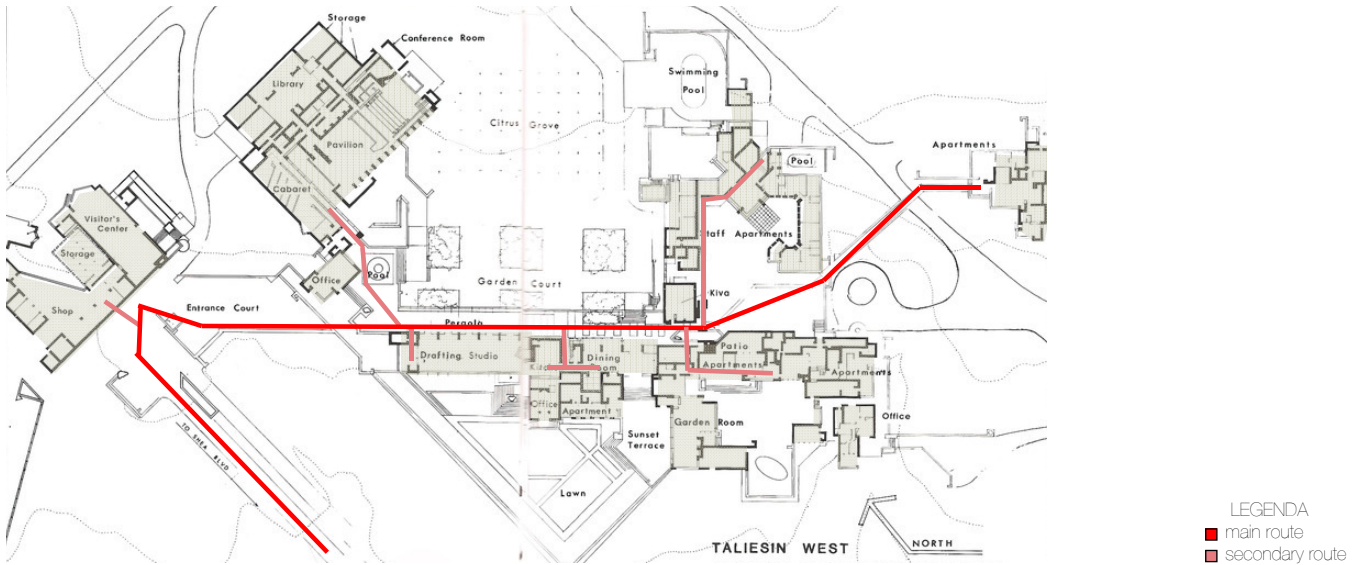
figure 25: routing

GLASGOW SCHOOL OF ART | GLASGOW

The Glasgow school of art was built between 1897 and 1909 in the city centre of Glasgow. The design was made by Charles Rennie Mackintosh and exists of one building built within a building block.

Mackintosh was a Scottish architect, designer and artist and was one of the most famous representatives of the Arts and Crafts movement, which was a revolt against the era of the industrial revolution and the mass production. He studied at the Glasgow school of Art in the evening while working at a local architecture firm when he was 16. Together with three relatives he formed the Glasgow Four, who used elegant, vertical lines in their work. Characteristic about Mackintosh himself is the use of the rosebud. (Buchanan, 1989)

His most famous work is the design for the Glasgow school of Art, which was constructed in two parts. The first part was finished in 1899 while the second part, under which the library, was finished in 1909.

The school building houses the classrooms, a library, an exhibition space, an auditorium, the director's office and rooms for the professors and a dining hall. The students don't live in the school building but in the city itself. After studying they go home or do extracurricular activities which are also not accommodated in the school.

The pictures show the front facade, the exhibition space, the library and the atelier. On these pictures the materialization of the stone façade, the small iron window frames, the wooden roof structures and the stucco walls are visible, as is the height of the studio and exhibition space and the incoming light.

DIDACTICS

The school of art exists of three academic departments: the school of architecture, the school of design and the school of fine art. All those departments have their own academic program and research centers. In the beginning of the school of art, great importance was placed on drawing.
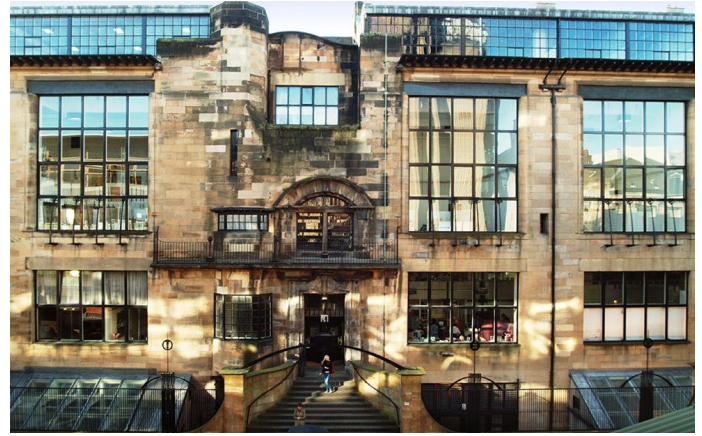
figure 26: facade

figure 27: exhibition space

figure 28: work space

figure 29: architectural language

Now the school is internationally recognized as one of Europe's leading university-level institutions for the visual creative disciplines. The studio-based approach to research and teaching brings the different disciplines together.
 The students work in inter-disciplinary studios, where they learn and help each other, be critical and experiment. Since the beginning the role of the Glasgow school of Art has been continuously evolving and redefining itself to reflect the needs of the communities we are part of, embracing in the late 19th century fine art and architecture education and recently, digital technology. (http://www.gsa.ac.uk)

ORGANIZATION

The building has an e-shaped plan and the functions are placed in a linear arrangement. According to the program requirements all classrooms should communicate with each other directly by the hallway. In the design this hallway is in the middle of the building and connects the different floors with each other by three staircases. These hallways are wide, giving enough space for exhibiting the artwork made by the students and places to sit.

The functions are also divided by the hallway. The atelier function with the big windows is facing north, where the steady daylight is which is perfect for working and drawings, since there is no direct sunlight. These ateliers have high ceilings creating a big spacious room. The dining room, the cloak room and some atelier spaces, are faced south. These spaces have direct sunlight, creating a nice seating area for dining and creating nice shadows for redrawing existing objects. The exhibition space is also faced south, but here are no windows in the facade, only roof lights.

The routing of the building is clear. The path of the front door passes by the porter and takes the visitor towards the grand central stairs. Here is a possibility to turn left or right to the class rooms and by walking upstairs the visitor enters the exhibition space, a high space full of daylight, and, at other side of the hallway, the director's office.

ARCHITECTURAL LANGUAGE

The Glasgow school of Art is designed with a great emphasis on the details. The stone façade with its window frames, the details in the leaded glass windows, the figures in the doors, on the chairs in de tiling of the floors. Small details which occur everywhere in the building.

On a bigger scale it is the use of the materials, the stone exterior, the stucco inner walls and the wooded roof structures, which is different in every room. This different use of roof structures, in combination with the difference in placement of windows by function and the white walls, is the architectural language of the Glasgow school of architecture. Useful spaces especially designed for their function with interesting details to make the building and architectural language exiting.

figure 30: roof structure

23

■□ TREE/WOMAN IN GROUND-FLOOR DOORS
Stained-glass, height 90 cm
These glass panels also work when lit from the front
Door of Studio 25
Door of Studio 26

figure 31: leaded glass inserted in school doors

24
Charles
DESIGN
SCHOO
Pencil a
Hunterian
Mackintos
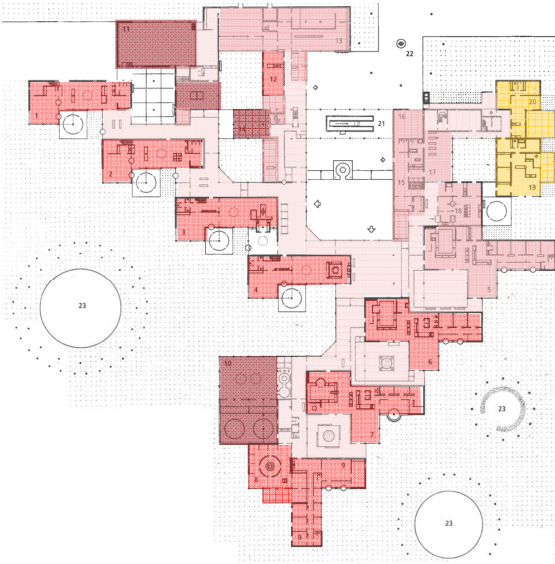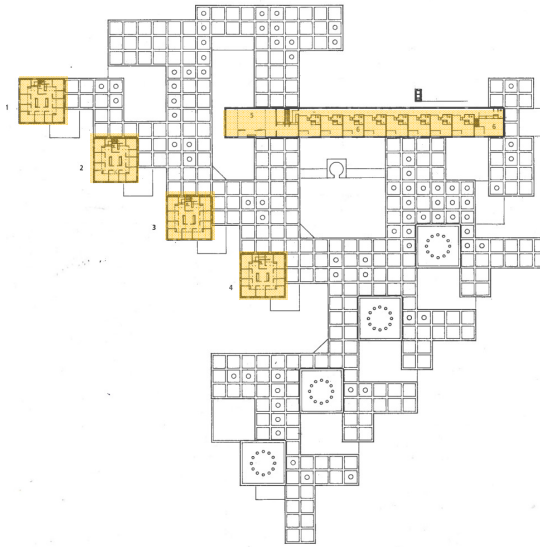
LEGENDA
- atelier
- public functions
- offices
- hallways
- living spaces

LEGENDA
- main route
- secondary route

figure 3

BERLAGE INSTITUUT | AMSTERDAM

The Berlage Institute is established in 1990 to save the Orphanage by Aldo van Eyck in Amsterdam. The Orphanage was on the brink of demolishment and the institute could save the building. The orphanage was built with the idea of a macro city by Aldo van Eyck.

Also van Eyck was a Dutch architect, worked as professor at the technical university Delft and was founder of Team 10 in 1953. He designed influential buildings as the Burgerweeshuis and became, together with Team 10, one of the first and most influential representatives of the structuralism.

In the first year of its existence the Berlage Institute had no more than sixteen students, which where Dutch as well as international students.

DIDACTICS

The Berlage Institute was founded at the instigation of the then Minister of Welfare, Health and Culture, with an explicit cultural objective; as a workshop to serve for architects who wanted to delve further into their artistry after their training. This cultural function was important for the position of the Berlage Institute. Over the years there has been a shift from the individual workplace model to the working group of the studio model.

"People come here to become proficient in a number of skills, such as working in multidisciplinary teams, working in an international environment, and in studio related practice design research into practice-related issues." Rob Docter, manager of Berlage Institute (van den Bergen & Vollaard, 2012

Because the Berlage institute was a cultural institution, it was not fixed to a curriculum or program. It was a post academic, 2 years degree for people who already did their master and had work experience in the field. It gave the students a place to discover new interesting developments in the field accompanied by important architects and designers.
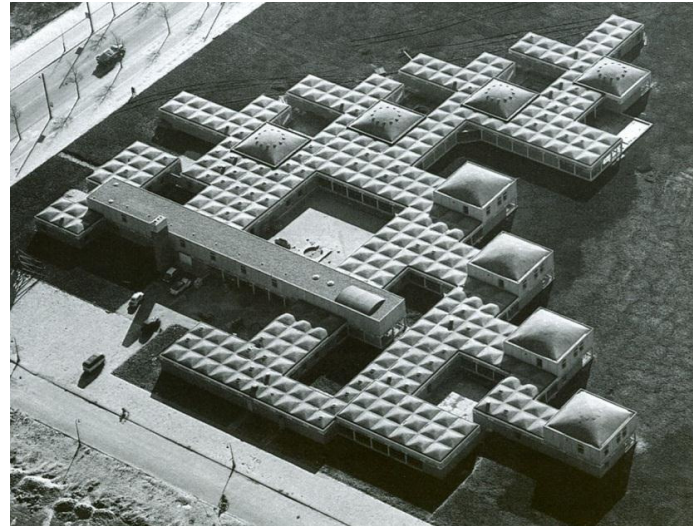
figure 34: overview

figure 35: facade

The Berlage Institute wants to remain small; even now a maximum of 36 students is maintained.

ORGANIZATION

The place was earlier modified and then restored by Aldo van Eyck, but no drawings from the restoration could be found. Therefore the original drawings are used as a starting point.

The building was not build for the purpose to accommodate the school, but an orphanage. This is why the form and architecture of the building is less important than the program for this research.

The building is spread on the landscape, and has a free form. One height is used, and in total the building has two levels. Most of the rooms are located on the south or the east, as are the common rooms, the library and the sport hall. Hallways, offices and the directors' home are located on the north. On the second floor are the original sleeping spaces of the children

Van Eyck's design for the Orphanage was based on a plan for a small city. He created a building with many in-between spaces to break down the hierarchy of the rooms. The building is constructed out of two sizes of modules, a smaller size for the residences and a larger size for community spaces. (Metz, 1991) (Fracalossi, 2011)

For using this space as atelier, the direct sunlight may be a problem. However, since the Berlage Institute is a school for already working architects, the students mostly work in the evening, which may solve some problems.

figure 36: interior

figure 37: interior

translucent roof

GARDEN ROOM / LIVING ROOM

• form (roo...
• material (...

figure 38: architectural language

wooden roof

WORKSPACE - location on map unknown
SOURCE: wmf.org - TALIESIN.w

translucent dak

walkway

figure 39: functions

LEGENDA
- atelier
- public functions
- offices
- hallways
- living spaces
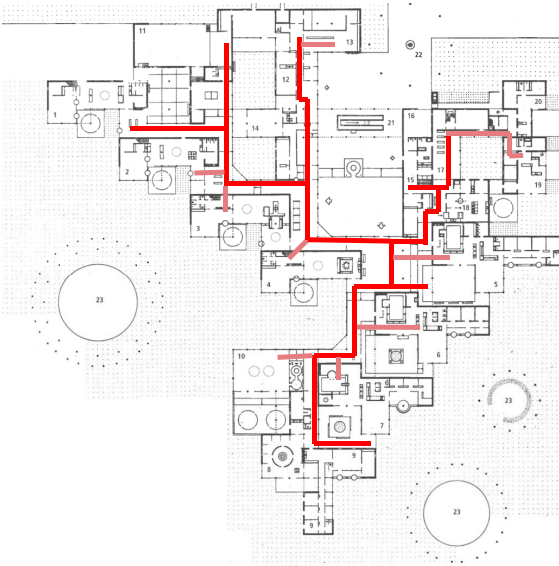
figure 40: routing
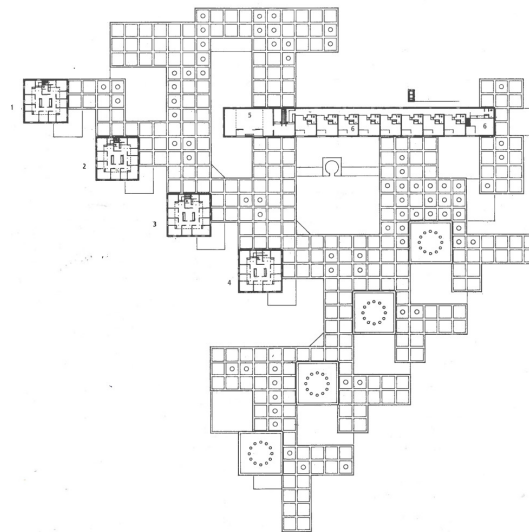
LEGENDA
- main route
- secondary route

BAUHUAS | WEIMAR

The Bauhaus school in Weimar was built as an Art school and designed by Henry van der Velde. Later, in 1919, the Bauhaus was founded here by Walter Gropius, to bring all forms of art together. The Bauhaus was a merge from the Grand Ducal school of Arts and Crafts and the Weimar Academy of Fine Art. Gropius stated that art should once again serve a social role, and there should no longer be a division between the craft-based disciplines.

Academic requirements for enrolment were dispensed, such that talented young people could study at the Bauhaus Weimar irrespective of their educational background, gender or nationality. Between 150 and 200 students were registered. (http://bauhaus-online.de)

In the first years of its existence the school did not have an architecture department. Similar as in Glasgow the students don't live in the school but in the city. There is an organization which provides student housing.

The pictures show the building, with on the north façade the big windows of the studio spaces and on the south façade small windows, behind which are smaller rooms, probably offices. More studio spaces are placed under the rooftops.

DIDACTICS

The school was merged from two schools, a practical school and a theoretical school. Instead of the academic theory, the Bauhaus relied on another concept of education: education in creative methods and the individual development of the students' artistic talents. The program consisted of practical components, such as iron, glass and woodwork in the workshops, as well as a theoretical part which took place in classrooms. (Wick, 2000) (James-Chakraborty, 2006)

First the student should pass the theoretical and the practical parts of the school, after which the student would leave the school to gain work experience. After this period, if the experience was good enough, the student could enrol in the architecture department.

figure 41: north facade
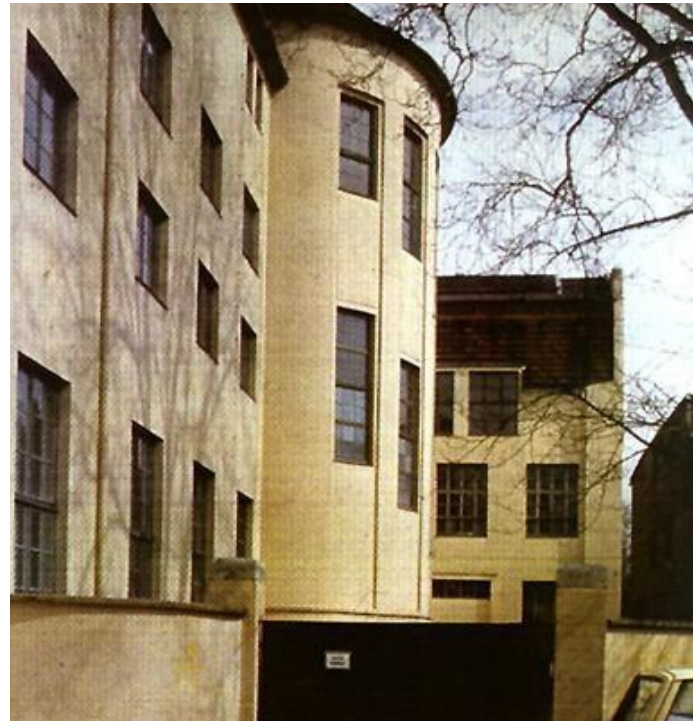
figure 42: south facade

figure 44: studio space

ORGANIZATION

As in the Glasgow school of Art, the entrance is in the center and the building is layout around a straight hallway which enters all rooms.

The building is designed in a linear organization, with on both sides of the hallway spaces. As in the Glasgow school of art, the big studio spaces are located on the north side of the building with big windows. The studio spaces are two stories high providing spacious working rooms. Offices and storage are located on the south side.

The end of the hallway on the left is closed off with a big square room. This room also has a double height floor. This space is probably the former library and maybe an exhibition space.

figure 44: staircase

figure 45: routing

LEGENDA
- atelier
- public functions
- offices
- hallways
- living spaces

figure 46: routing

LEGENDA
- main route
- secondary route
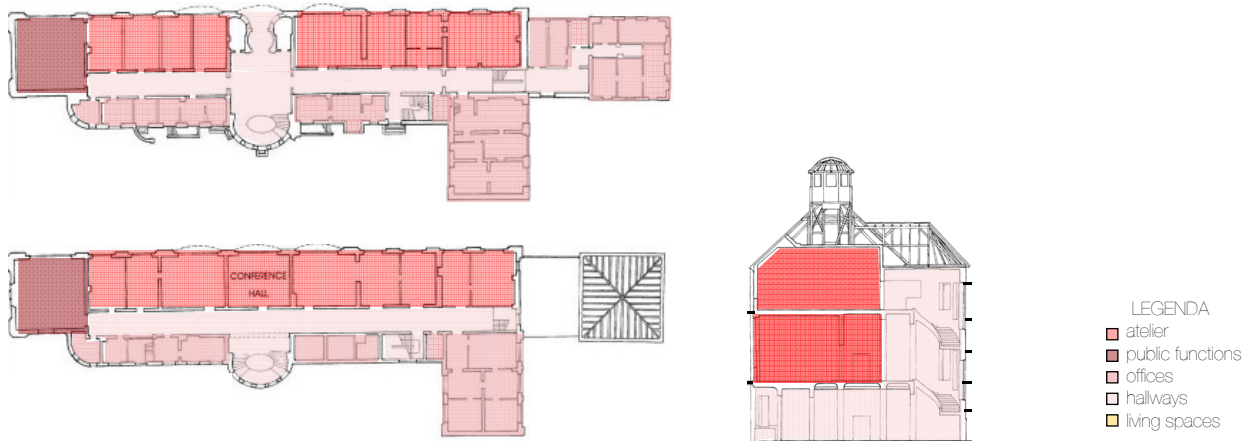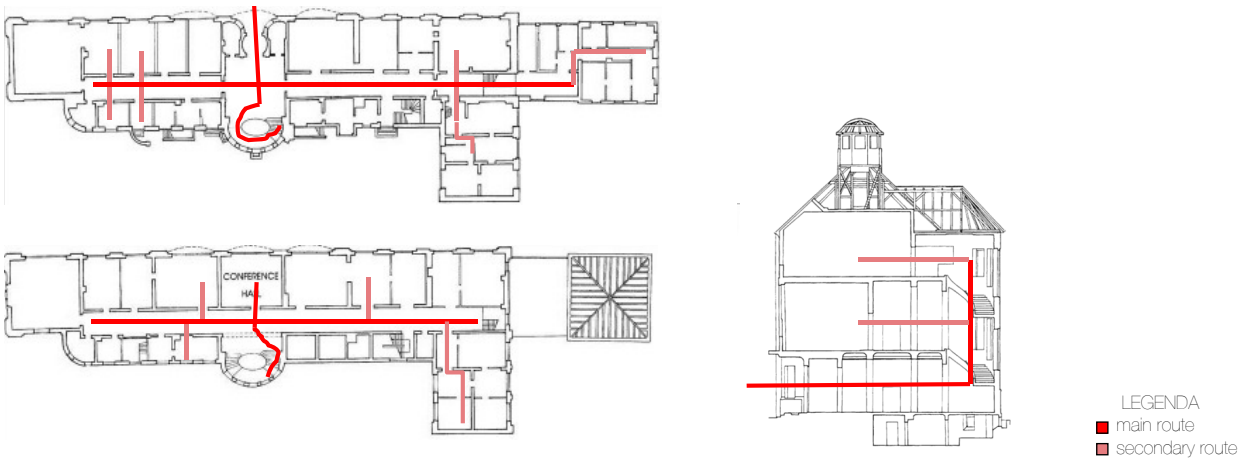
CONCLUSIONS

The case studies show two variations in situations; the compact schools with a central hall, multiple floors and no outside space and the one level structures spread over the landscape opening to the outside space. These differences could be the result of the location; the small plot within the building block of the city, or the infinite space of the open, unbuilt landscape. However, all have a comparable function division. The big windows of the ateliers are places at the North, while at the South the living and relaxing areas are located. A practical organisation, making use of the steady northern light at the working areas and the warmth of the sun in the relax spaces.

The main conclusion of the case studies is the use of architectural language. All four buildings use specific architectural elements which resulted out of the function, the materials of the surrounding, or the common building methods, to provide the spaces with one identity.

For Taliesin it are the big wooden trusses, which are supported by a stone base which is build out of materials from the surrounding. At the Glasgow school of art is are the stucco white walls in combination with the dark wooden ceiling constructions and the eye on details. Also the façade of the building, made out of natural stone, fits within its context. And at the Berlage Institute it are the returning square blocks which form the ceilings of the spaces and hallways, visible in the plan. These architectural elements create a unity within the building.
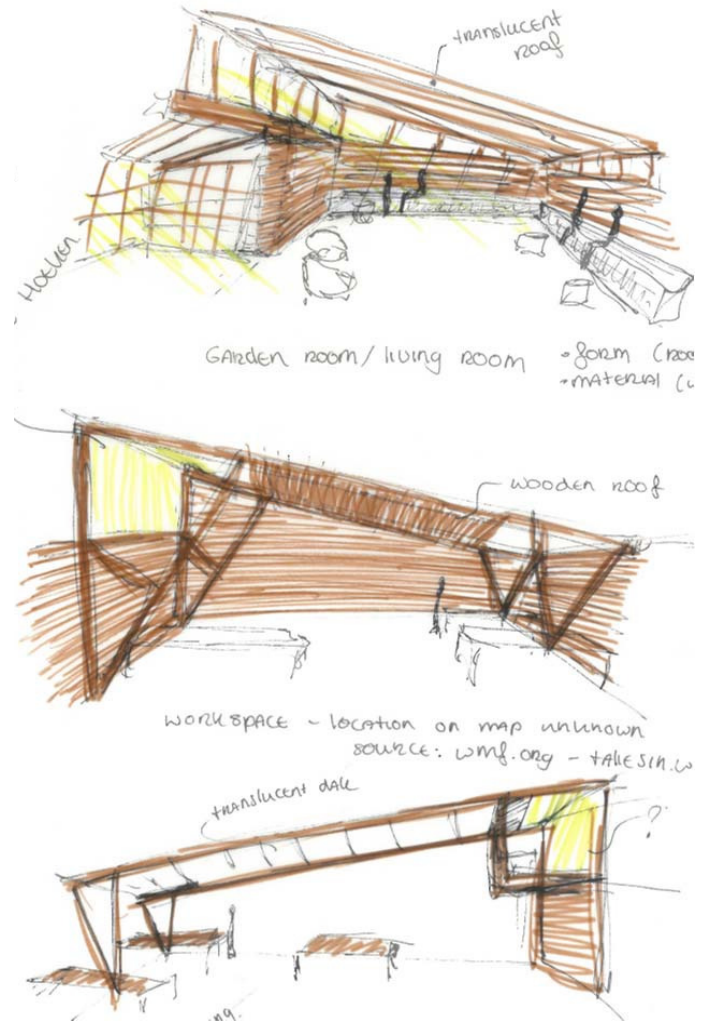
figure 47: Taliesin West

geplerstende ans

figure 49: Berlage institute
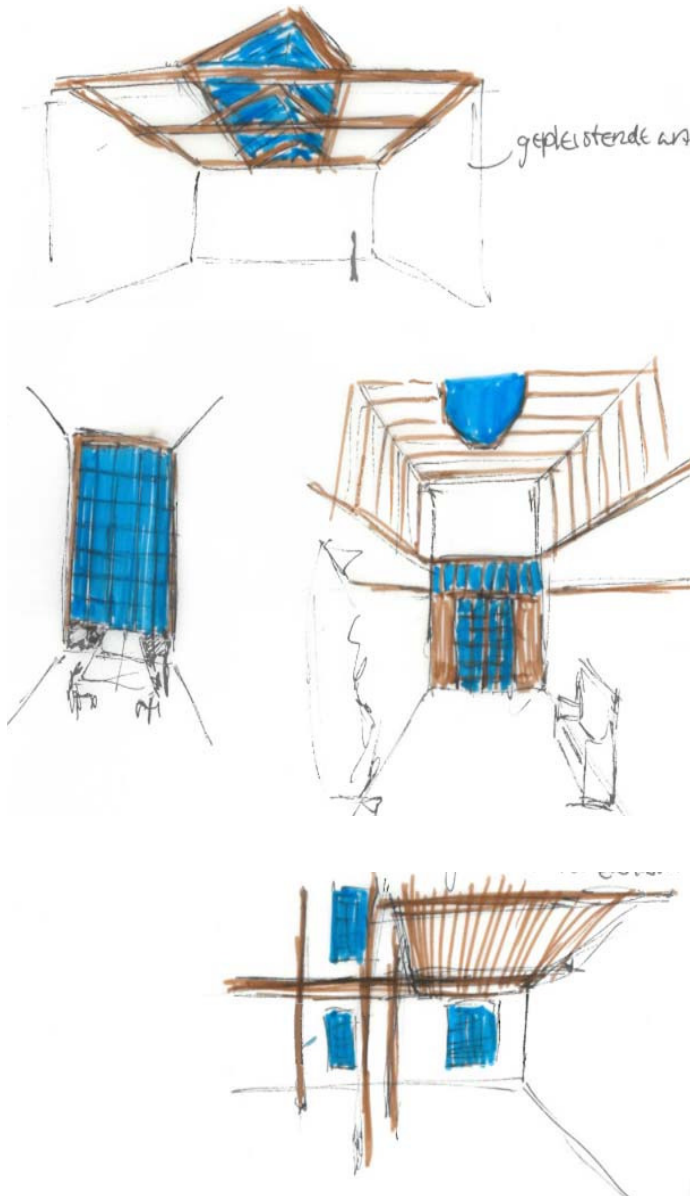
figure 48: Glasgow school of art

WALKWAY

SWISS SCHOOL SYSTEM

Previous research informed about the existence and importance of the differences between school systems and didactics and their development. This part of the research is about the Swiss school system and the didactics of higher education which is well known for their quality. By researching the two well-known architecture schools in Switzerland, a proper program and didactic system was found for the practical architecture school in Bellinzona which has been useful for the architectonic design. (http://www.arc.usi.ch/)

The architecture school in Mendrisio and the ETH Zurich are researched because of their specific way of teaching and the use of the mandatory school program itself.

PROGRAM

The school system is divided into three main phases: a three-year Bachelor of Science degree, a two-year Master of Science and the completion of nine months of practical training. This standard program is supplemented with public lectures, exhibitions and possibilities to complete educational and cultural offerings at the school.

Years are divided into two semesters. The first two offer introductory training, then four semesters completes the Bachelor of Science and afterwards another four semesters for the Master of Science. The last semester is the diploma project. Students are required to complete an internship in a professional studio, with a minimum total duration of two consecutive semesters, between the fourth and the fifth semester of the BSc course , in order to acquire the essential skills in the use of design tools. By the end of the MSc each student will have produced nine projects and completed the Diploma work.

To secure Europe-wide parity, Switzerland adopted the European system for assessing university studies, known as the European Credit Transfer System (ECTS). Students gain the ECTS credits for each course only by passing the relevant examination. At the end of each semester the student is required to have gained a pass in a design examination plus theoretical subjects for a total of 30 ECTS.

ACADEMY OF MENDRISIO

The academy of Mendrisio is part of the Università della Svizzera italiana (USI) and uses an interdisciplinary teaching model. Practical work in the design studios is combined with technical scientific courses such as history, art, philosophy and social studies.

The academy of architecture is located on the campus, which also contains various administrative, educational, research, study and service buildings and is located in the small town of Mendrisio. The arrangement makes the school similar to the American Campus model.

The school provides residence for 70 students in studio apartments on campus. For living off campus the academy has an office to help students with finding their accommodation in the city itself.

DIDACTICS

The university of Mendrisio is well-known for the presence of international professors as well as students from different countries, which continues in a rich variety of interaction of teaching and cultural socialization. The faculty offers place to 700 students, to control the dimensions and the close teaching relationship. Studios contain a maximum of 24 students which work under supervision of a professor, who is an architect, and at least two assistants.

Each Diploma design studio will generally contain a maximum of 12 students, supervised by a professor and an architect-assistant. The studios facilitate the preparation and comprehension of the context in which the project is to be completed. The professors are assured of flexibility in the choice of the different projects regarding the territory chosen.

The strength of the didactics of Mendrisio is the small scale and personal connection between student and teacher during all years of the study. Since it is a small school there is a possibility to react directly to the students' individual process and let them choose their own way to explore the approach best suited for them.

ETH ZURICH

The department of architecture of the ETH Zurich is bigger than the one of Mendrisio. There are seventeen independent chairs, focusing for example on history, theory, technology and landscape.

The Department of Architecture is one of the most highly ranked faculties of architecture in the world. It owes its prominent position to both the high quality of the teaching and the outstanding results in research. The teachers on the departments have experience in their own architectural practice.

The department of architecture is also placed on a campus site, as Mendrisio. Because this geographic situation and the need of expansion, a new campus was built in the outskirts of the city, housing the departments of architecture, civil engineering, biology, chemistry, materials science and physics.

DIDACTICS

The teaching of design and construction focuses to building practice as well as in-house research. Questions of building practice and their validation in the context of the built environment, taken together with knowledge gained from basic research, are inseparable themes of the architectural education.

The focus of the ETH is on research. Important subjects from the perspective of architecture and urban design are on the topics of future cities, energy, climate change and sustainability. (https://www.arch.ethz.ch)

SUMMARY

The Swiss higher education program is equivalent to the Dutch program for higher education. There are 5 study years, the Bachelor and the Master phase, divided in projects and classes.

For the specific didactic view, Mendrisio focusses on the personal connection between student and professor while ETH Zurich turns towards the importance of the in-house research in the program. For the architectural school in Bellinzona the practical side of architectural education is important and must be the main component of the education, in combination with the mandatory school program.

RESEARCH | DIDACTICS

The private practical architecture school of Bellinzona will have fifty students living on campus, ten students a year, and eight teachers working there. They work in close cooperation. Since the school is located on the slope of the mountain, the natural Swiss environment is close by, having an impact on the program.

There are multiple architecture schools in Switzerland and all over the world, schools with different programs, goals and didactics. To be able to provide the students with an official architecture diploma, a restricted program must be followed. This program includes a set of subjects and projects as is visible in the architectural education of the ETH Zurich and the Academy of Architecture in Mendrisio. The Swiss architectural program exists of education in architectural history, theory and project work in the form of ateliers. They work with the well-known ECT program: 4 periods where each period consists of courses and a design studio. In addition there are workshops such as writing and graphic design.

For the architecture school in Bellinzona, the main example was set by Taliesin, the architecture school of Frank Lloyd Wright, located in Arizona and Wisconsin. Here the motto is: "Learning by doing". At Taliesin the students are designing and working on the estate and are required to the inhabitation of a shelter in the desert of Taliesin West, to research the living conditions. They have to design the shelters themselves and build them or modify an existing shelter. This way Taliesin grew and changed over the years of existence from a summer school in tents to the buildings as seen and admired present day. (http://www.taliesin.edu/)

Since the Bellinzona architecture school is constructed at once, this modification process is not included in the program. Instead there is a building site where small projects are constructed to provide the students with practical knowledge and useful building skills.

The basic elements of living, learning and working at Taliesin have remained in much the same as they began and evolved under the leadership of the Wrights. The students continue to learn experientially, alternated by more formal classes and workshops. The natural landscape and open spaces at both campuses provide settings perfect for studying the relationship between the natural and built environment.

SUMMARY

The mandatory program which is required to provide the student with an architectural diploma is the main part of the educational program. The hands-on approach is the second part of de educational program, providing the students with space and materials to construct their own project within the Swiss landscape. This part of the didactics will need a specific space within the landscape: a building site.

The practical approach in combination with the close collaboration between students and teachers makes the practical architecture school a unique place to study in Switzerland.

figure 50: dessert shelter Taliesin

figure 51: dessert shelter Taliesin

The conclusions of the research form the base for the design of the practical architecture school in Bellinzona. These conclusions are divided in typology, building type and didactics.

TYPOLOGY

Both the closed quadrangle as the campus design can be the typology of a learning community. The first will be a community closed from the outside world, build on the perimeters of the plot inside the city, while the campus with its spread buildings is at the border of the city, using the landscape as open space instead of closing it off or shutting it out. The typology research showed that both the English University model, with the closed quadrangle, and the American Campus can house the architectural program. In both cases the didactics are not linked to the typology. However, the campus typology can adapt better and more natural to the sloping landscape of Bellinzona.

The case studies provide another look on the typology. In all four cases, the living quarters are separate from the learning building. At the Glasgow school of art, Bauhaus and the Berlage institute, living spaces are not included. At Taliesin, where living is part of the organisation, the living spaces are placed in separate buildings. This separation of functions indicates a preference for the campus typology, housing the residents in different buildings.

Both the sloping landscape and the case studies provide good arguments to use the campus typology. Since the didactics have no preference within this typology, the campus model has endured.

The research on building type in combination with didactics showed a similar conclusion to the typology research. Didactics and facades changed but the inside of the building stayed the same. Architects tried to connect both didactics and typology with architectural techniques, but kept returning to the adjacent classrooms and hallways, which do not necessarily fit the project based didactics. Herman Hertzberger designed the learning landscape which provides a variety of spaces for all different activities but keeps them connected to each other and to a big, central, communal space.

The case studies show some similarities with these conclusions. The traditional classroom hallway model occurs in both the Glasgow school of art and the Bauhaus. However, at Taliesin this model is abandoned and the hallways are interchanged with outside paths and direct connection between spaces. The classrooms are not adjacent to each other, but spread out, letting the landscape and nature pass between the buildings.

The literal landscape of Taliesin and the learning landscape of Hertzberger explore the new possibilities of the school type, suiting the project based learning system and leaving the corridors behind.

The case studies provided more insight into the design for an architecture school, such as the big studio windows on the north where the ateliers are placed and the location of living spaces to the south. Also all case studies have a central space, a space where all students meet each other as the dining hall. This dining hall is placed in the center of the building and is meant for meeting, talking and eating, as the central communal space of Herman Hertzberger.

Both the use of the learning landscape and a central communal space will be applied in the design of the practical architecture school.

ARCHITECTURAL LANGUAGE

The four case studies conclude that the architecture school is in need of a specific architectural language. In Taliesin it are the big wooden trusses, in Glasgow school of art the wooden ceiling constructions and the stucco walls and Bauhaus the squared plan, elements that provide unity and gives the schools their own character. With this architectural language, the pavilions can differ in form but continue to be one unity.

With one specific architectural language the pavilions can be linked to the landscape by the use of materials, as at Taliesin and Glasgow school of art, and to city, by construction type. Since the program of the school is a practical architecture school, the architectural language will show how the building is constructed and which materials are used.

DIDACTICS

The Swiss higher education program is equivalent to the Dutch program for higher education. There are 5 study years, the Bachelor and the Master phase, divided in projects and classes. Both architecture schools in Switzerland have their own didactic preferences, dividing them. At Mendrisio, the focus is on the connection between student and professor, while at ETH Zurich the use of in-house research is the most important.

At the practical architecture school the focus lies on the practical execution of the designs. Next to the standard architectural program, which is mandatory, the hands-on approach is present in the construction of the projects within the Swiss landscape. This didactic preference is also present in Taliesin, where the students build their own shelter on the estate,

The research also shows a close collaboration between students and teachers. In Taliesin the students and teachers all live on the property, while at Mendrisio the teachers go home but since the school is kept small there is still a personal connection between the students and the teachers. This is also a focal point in the design, making a close collaboration possible between students and teachers. This will be achieved by the teacher-student division instead of including living quarters for the teachers, as is achieved at Mendrisio.

DESIGN

The program for the practical architecture school is a living and learning environment for fifty students, eight teachers and one director. The students live and sleep on the estate while the teachers and director go home in the evening.

SPATIAL FUNCTIONS

The research provides certain requirements for the school functions, and the practical addition to the program requires a construction area. Because the pavilions are separated by function, all buildings have different spatial requirements. These requirements are described here.

The functions are divided in living and learning spaces, the central, public area and the outside area. The relation diagram provides a first set-up for the organisation of the functions.

LIVING

Eight living pavilions are constructed providing space for seven till eight students each. Here they can eat, sleep and relax.

Requirements:
- Live together in small groups
- All units have a living room
- Have outdoor space
- View of the city of Bellinzona

WORKSPACES

There should be individual workspaces, spaces to work with a group and one classroom for instructions. In the case of group workspaces the table setting should be adjustable. Also the construction site is counted as a workspace for practical work.

- Lectures
- Classrooms
- Construction site

Requirements:
- Quiet room
- Small rooms for groups of twelve
- Should be able to work outside the year group with other students
- Outside space available for study, thinking and building

CENTRAL AREA

The central area houses the common functions such as the dining hall, the library, the auditorium, the offices and the exhibition space.

Dining area
- Open space
- Related to the outside

Auditorium
- Enclosed space with few distractions

Library
- Big open space with books
- Smaller reading places

Teacher's office
- Meeting space
- Office space
- Directors room
- Kitchenette

Exhibition Space
- Northern light

OUTSIDE AREA

The outside area is a combination of the natural landscape, walking paths and the central square with outside auditorium.

Most of the interaction will take place around the central point where all central functions are located. Here, the students eat together or take their breaks on the stairs. Other interaction will take place on paths, which connect all the buildings together.
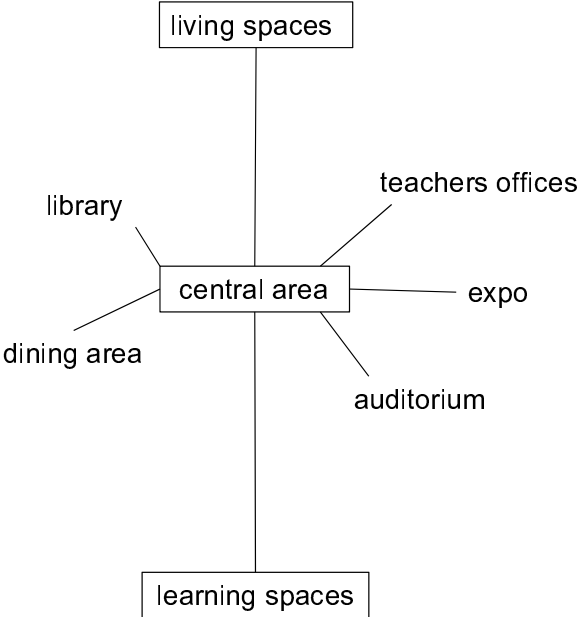
figure 52: relation diagram

In Bellinzona multiple educational functions are already present. There is a campus with higher education in administration and economics and an engineering school. Also there is a library and an archive. The practical architecture school will provide an addition as educational function.

Since it is the construction of a practical architecture school, the traditional building method of Bellinzona is reviewed first, followed by the chosen location.

BUILDING METHODS

Visiting the area of Bellinzona, three different structures where standing out from the comparable stucco facades, showing their building methods and use of material: buildings which were created with the materials of the site, suiting the landscape. These where Castle Grande, Curzutt and Chur. These buildings characterise construction in the mountains, which matches the location and function of my design for the practical architecture school.

Castle Grande is constructed out of stacked natural stone blocks in mortar. With the restoration design, Aurelio Galfetti played with the combination of old and new building methods, creating an intervention with straightened stones and concrete. Curzutt is a village in the mountains and is also constructed out of stacked natural stone. It exists of small buildings placed close to each other, leaving almost no place for nature.

Chur is a village constructed out of wood. The buildings have a stone base, to protect them from the weather, with on top a wooden structure where the inhabitants live and secure their storage.

The context of Bellinzona provides building methods of stacked natural stone and stacked wood from the surroundings.

location

Castle Grande   Castello di Montebello

location

figure 53: Bellinzona

figure 55: Chur

figure 56: Curzutt

LOCATION

The design of the practical architecture school is a design for a community living on the school premises and does not have to leave the school. A small scale school with all functions included: it provides living and learning functions and a dining hall, library and an auditorium where extracurricular activities can be organised.

The location on the slope of the mountain provides the school with enough space and distance to separate from the city, to become their own community. It is slightly higher than the city center, providing a nice view over Bellinzona, but still in walking distance of the main street. This way the school can be a free standing community, while still connecting to the city of Bellinzona.

The school is located on the mountain slope underneath Castello Montebello. It is a site with different angles in the sloping terrain, from almost flat to very steep. These differences in heights indicate specific use of the landscape.

There are no specific statistics for the soil of the site. The statistics (https://map.geo.admin.ch) state a crystalline rocky ground which is a little stony. Pictures of the mountain, which are taken a little higher on the slope at the Castle Monte Bello, provide a more complete overview of the landscape, presenting a combination of grass, plants and stones.

From these and other pictures of Bellinzona, it can be concluded that the steep areas are rocky and the slightly sloping areas are covered which a layer of sand and plants and grass, as is visible on the picture of the site.

figure 57: location

525 m

307 m

238 m
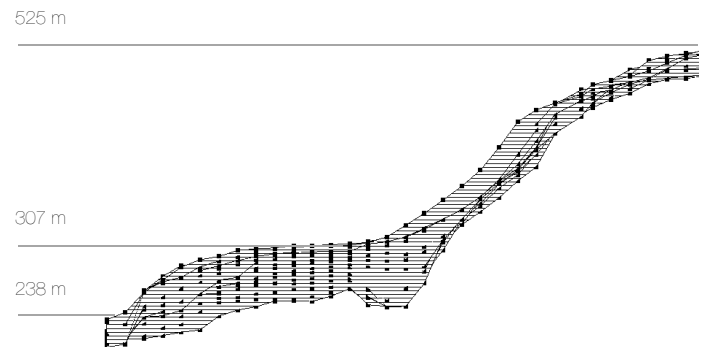
figure 58: height differences
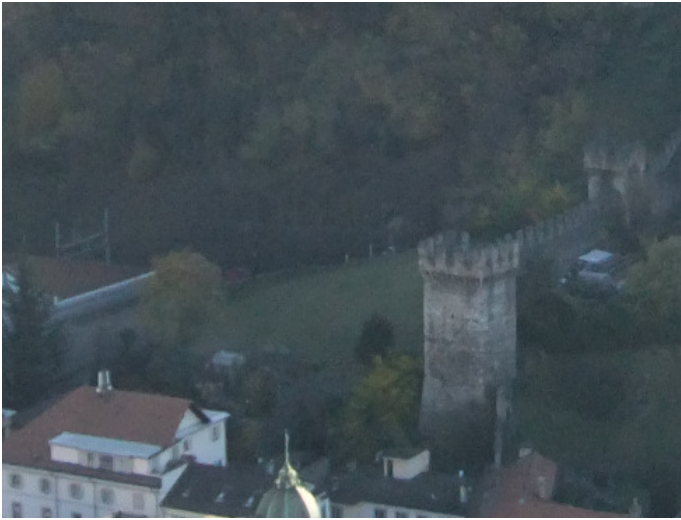
figure 59: location

figure 60: ground covering

figure 61: ground covering

The combination of the typological research and the possibilities of the landscape, provide a solid base for the use of the pavilion typology. The American Campus, separating living and learning, and Frank Lloyd Wrights Taliesin will stand as example, combining pavilions with the outdoor space and using the scenery at its best.

DIVISION

The research shows the separation of functions. Living and learning are completely separated from each other or at least placed in another building on campus, specifically designed for its function. This separation in function is applied in the division of the practical architecture school.

Since the shape of the plot is a rectangle, the functions are divided in the longest direction. The division is In three parts: the center, the north and the south in the direction of the city. On the north, on the steep slope, are the living quarters, providing the students with a beautiful view on the city. In the south are the workspaces, as here the ground is more flat, providing a good spot for the building site and learning spaces.

CENTER

The public functions are located in the center, as is supported by the research. These functions include the library, eating area, the auditorium and the offices. These buildings are surrounding a public area, which is the hearth of the campus: the open auditorium. Here all students will meet, connect and talk. The element of the open auditorium stairs of Hertzberger will be included in this center to use this area at its fullest.
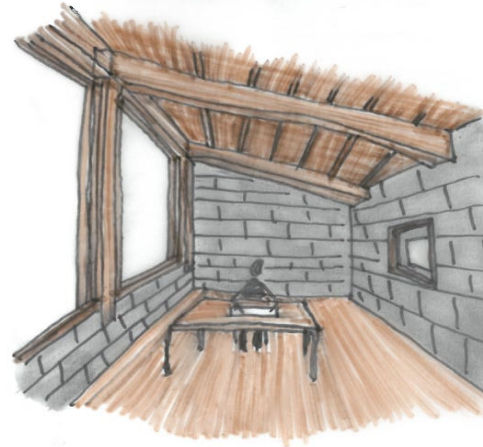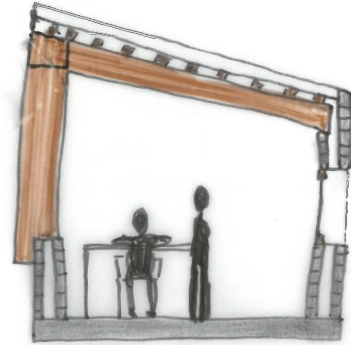
figure 62: architectural language
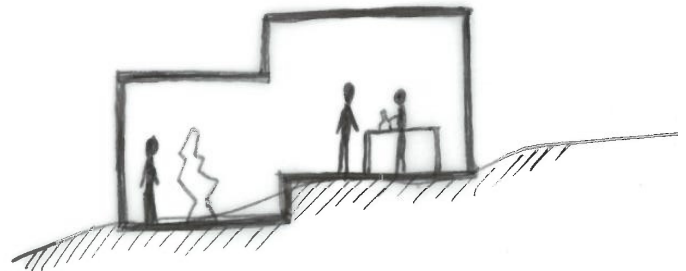
figure 63: form follows mountain
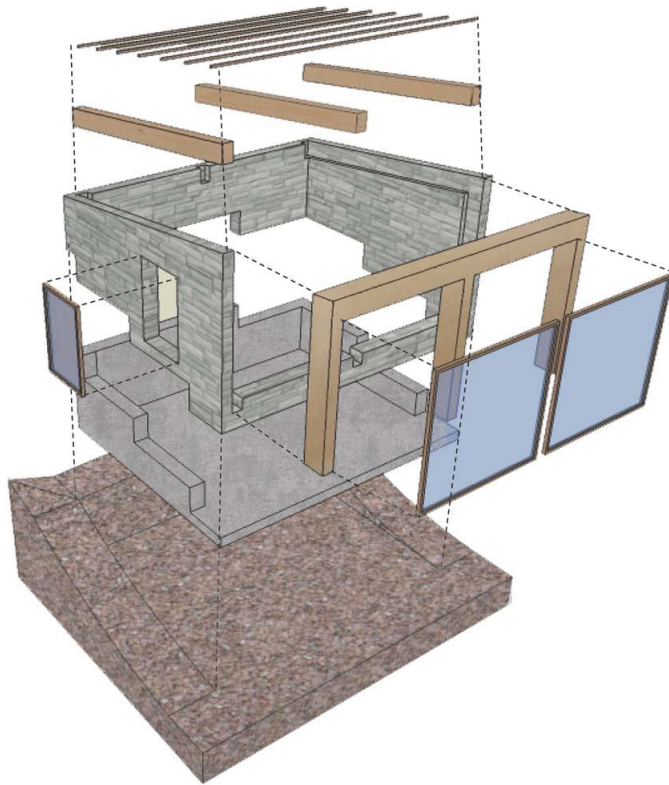
figure 64: architectural laguage exploded view

ARCHITECTURAL LANGUAGE

To create unity between the pavilions of the practical architecture school of Bellinzona, one architectural language is needed, as is concluded in the research. The typology is set on the pavilion type, appropriate for the functions and the landscape of the mountain.

The architectural language should fit in with its context: the mountain, Bellinzona itself and the surrounding villages. Taking a closer look at this context the stone construction of the Castle Grande and the wooden structures of Chur are the original building style of the area. This use of material and technique is the base and a modern version of these structures will form the architectural language of the school. Since it is a practical school, the buildings must reveal their structures and show how they are build. This concludes in exposed natural stone walls, staged on the exposed concrete foundation and closed of with the exposed wooden ceiling beams.

Because of the different functions facilitated by the buildings, different facades are needed: closed off facades, for privacy and shading with small openings for the view and light, and big glass surfaces for public spaces and for spaces that require more light, for instance the drawing rooms. The closed off walls are formed out of stacked stones, providing a strong base. Small openings will be made by perforations, counteracting series of windows and keeping the wall intact as a closed heavy plane. To increase this aspect, the window frame is placed backwards. On the big glass surfaces a wooden structure is used which is filled up by glass. This structure continues in the roof structure and continuous in the underlying wall to create a connection between the elements.

This is the modern architectural language of the practical architecture school, as is shown in the architectural language images and the exploded view.

The practical architecture school is based on the pavilion typology, which results in multiple buildings: a different building for each function. All the buildings are placed on a specific position on the slope which fits the landscape, the functions and the "learn by doing" approach, matching with the program of the practical architecture school merged with the Swiss landscape.

The explanation of the design starts with the explanation of the masterplan and exists of four parts: the general masterplan, the division in functions, the use of the height differences in the landscape and the use of the outside space.

GENERAL PLAN

The buildings are scattered over the landscape. To position the buildings, multiple criteria play a role: criteria provided from the research and criteria provided by the landscape.

The research showed that the buildings should be divided by functions around a central area and that the hallways are outdated. The buildings are set apart, creating a division in function, and by the use of the pavilion typology, the hallways are reformed to outside spaces, paths and the natural environment.

The central space should be a place for meeting, a communal area for everyone, concludes the research. In the masterplan the central area is enclosed by the communal pavilions with behind them the living and learning pavilions. This enclosed area is the outside auditorium where students can meet, talk and watch a performance.

To finalize, the research showed a specific way of entrance of the natural light into the workspaces. These spaces should have windows facing north to provide then with steady daylight. This results in the placement of the workspaces to the north. The living spaces have no requirements regarding light but they are placed higher on the mountain to provide them with a better view of the city. By placing the terrace sideways, southern sunlight can hit the deck.

All buildings are designed to facilitate specific functions and are created with the founded architectural language. The masterplan and pavilions form a unity.
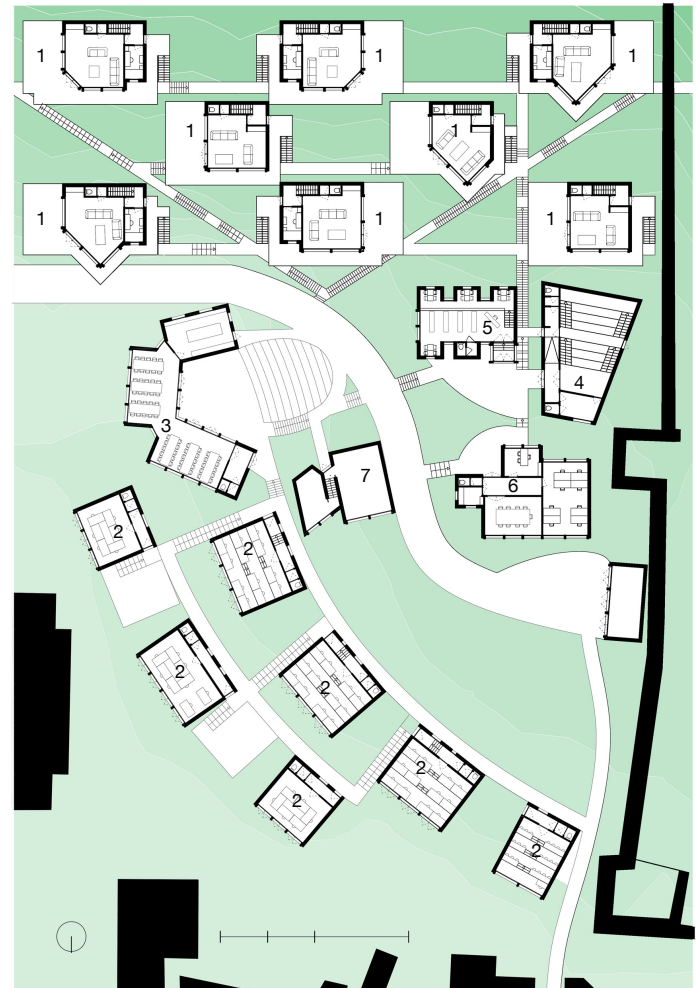
LEGENDA
☐ buildings and paths
■ existing buildings

1. living pavilion
2. learning pavilion
3. dining hall
4 auditorium
5. library
6. teacher's pavilion
7. exhibition space

figure 65: masterplan

figure 66: masterplan: functions

FUNCTIONS

The functions are spread over the landscape as resulted from the research. In the center is the communal area (red), in the north the living spaces (bleu), and in the south the workspaces (green). The construction site (orange) is positioned between the central area and the learning spaces on a slightly sloping terrain.

Central area
After entering the terrain, the visitor enters the central area. The dining hall, the library, the auditorium, the exhibition space and the teacher's pavilion are located here. This area is the most important part of the school, here the community strengthens and the extracurricular activities take place. To emphasize this importance, the buildings are designed with a free form, influenced directly by the function and the landscape, creating interesting spaces inside and outside.

Living pavilions
The living area is placed on the hillside, overlooking the campus and the city. The buildings have a rectangular form, resulting from the adjacent, rectangular bedrooms on the ground floor. On the first floor is the living room, which differs per building, to provide each building with its own characteristics.

Learning pavilions
The learning function is placed on the flat part of the terrain. There are three different types of spaces: a working space for personal project work, spaces for group work and a classroom for small lectures. Both the individual working space as the classroom follow the landscape by stepwise following the natural slope of the landscape. The spaces for group work have a flat floor surface, enabling the table setting to be changed by the change of use.

All spaces are linked together with paths and squares, following the slope of the natural landscape.
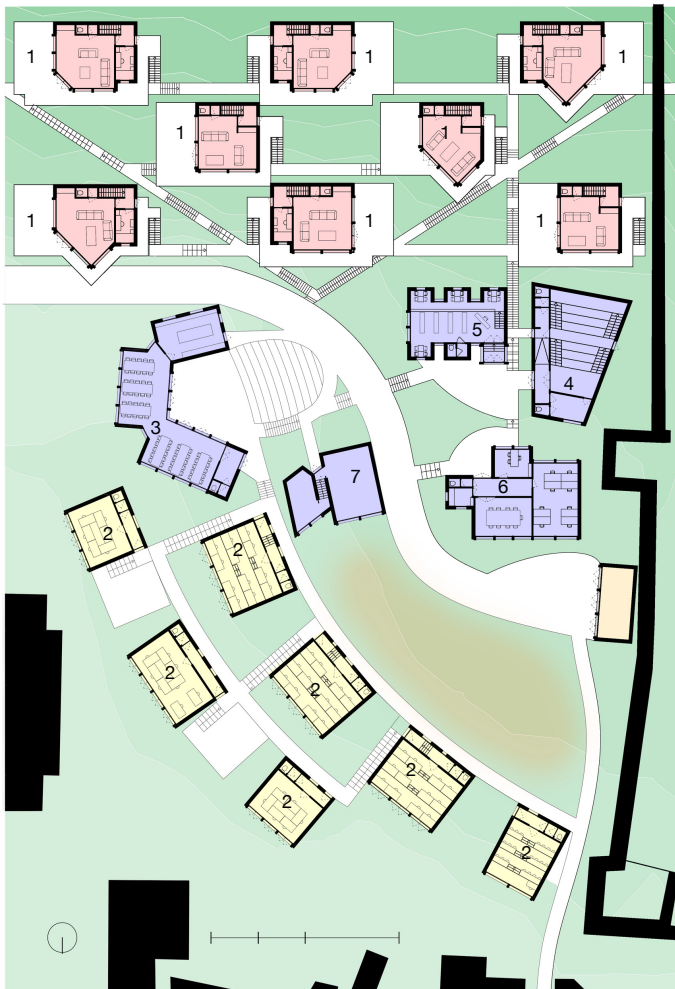
USE OF THE LANDSCAPE

The site has a natural slope landscape. At the north, the living area, the hill is very steep while at the south, at the central area and learning spaces, the landscape is nearly flat. This natural form of the landscape is used for the position of the pavilions.

At the central area the buildings are positioned to surround the central square. The buildings follow the landscape, using the natural slope to create the steeping floor of the auditorium and the upstairs reading spaces of the library. The dining area surrounds the stage of the outside auditorium and in addition forms a sound barrier from the train track below. Also the outside areas use the slope of the landscape: the outside auditorium, the staggering terraces of the library and the teacher's pavilion. By connecting the terraces with ramps and stairs, the natural landscape is still present in the central square by the different levels of the landscape.

The learning spaces are placed alongside each other and follow the natural flow of the landscape. By placing them on two levels, and shifting them a bit, all spaces are provided with a view on the city. The paths connecting the learning pavilions are connected to each other by stairs, following the slope of the landscape.

The living pavilions are placed on the steep hill. This hill is evenly steep over the whole area, so the buildings can be positioned next to each other. The living pavilions are placed evenly divided over the landscape to provide all living spaces with enough natural greenery around. The pavilions are linked with each other by paths and stairs, following the landscape. By using straight lines, the walkways and circulation remains clear.
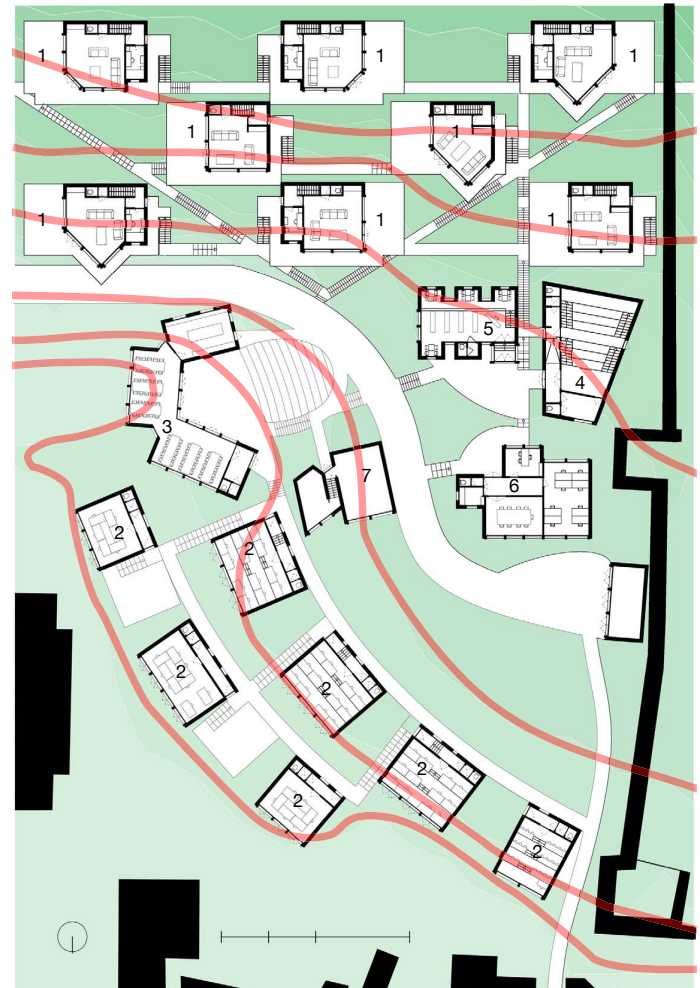
LEGENDA
☐ buildings and paths
■ existing buildings
■ following landscape

1. living pavilion
2. learning pavilion
3. dining hall
4 auditorium
5. library
6. teacher's pavilion
7. exhibition space

figure 67: masterplan: use of the landscape

a. private terrace
b. outside auditorium
c. terrace
d. construction site
e. outside working spaces

figure 68: masterplan: outside space

OUTSIDE SPACE

The outside space is a combination of paths, squares and the natural greenery of the hillside. To retain as much of the natural landscape as possible, the buildings are placed equivalent over the site, giving the natural landscape the possibility to run through the campus site.

The central square consists of the outside auditorium, the entrance road to the station, the terraces of the library and the teacher's pavilion. Here the students and teachers can sit and meet each other while still being in touch with the natural landscape of the mountain. The road can be used by vehicles and is used for the distribution of building materials and stock replenishments. Because the paths, squares and road are made out of the same material, natural stone gravel, they form a unity, creating a continuing path over the site.

The living pavilions feature an outside space as well. To provide the pavilions with a terrace, which is difficult because of the placement on the steep hillside, the terraces are placed on the underlying construction of the bedrooms. These terraces are connected to the paths by stairs and also provide the entrance of the living spaces.

At the learning area there are outside learning spaces so that the students can work outside with nice weather. These learning terraces are placed between the learning pavilions and have a flat surface. The path extending to the south creates a direct link between the campus and the city centre of Bellinzona.

DESIGN | BUILDINGS

As is explained in the masterplan, all pavilions are designed to house a specific function. The different functions and corresponding designs are discussed it this chapter, starting with the living and learning pavilion, followed by the central area and finishing with the outside area. The plans, facades and space are shown to provide a clear image of the pavilions.
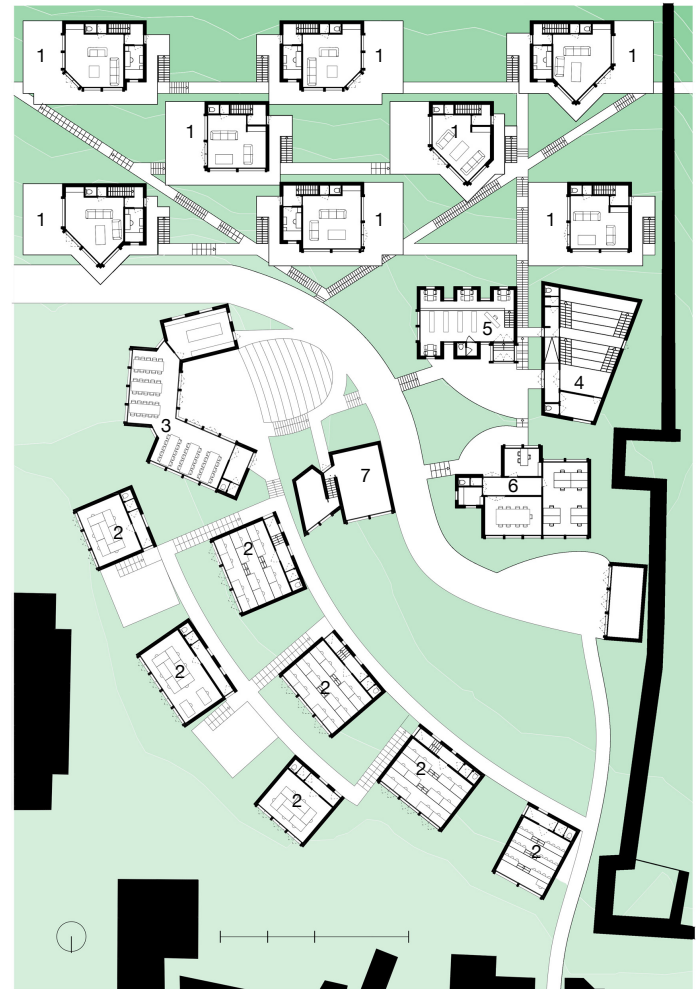
1. living pavilion
2. learning pavilion
3. dining hall
4 auditorium
5. library
6. teacher's pavilion
7. exhibition space

figure 69: masterplan

figure 70: overview

LIVING PAVILION

The living areas are located on the steep mountain slope. There are eight living pavilions, which house five till seven students each. All living pavilions consist of the same bedrooms, a living room with big windows and a private roof terrace on the side so that the midday sun can shine on the terrace.

The pavilions are directed to the north, and all bedrooms have views over the city. The apartments are on a steep slope, which supported the division for two stories. On the ground floor the bedrooms are semi embedded in the mountain and have small windows. On the first floor the living room is set with large windows and access to the roof terrace. The living room is equipped with a kitchen for the preparation of small snacks or drinks.

All pavilions are designed on a similar base of bedrooms, but feature a different design for the living room, providing the house with its own characteristics. These living rooms are designed with the same architectural language so that the structure remains the same and the construction is relatively easy.
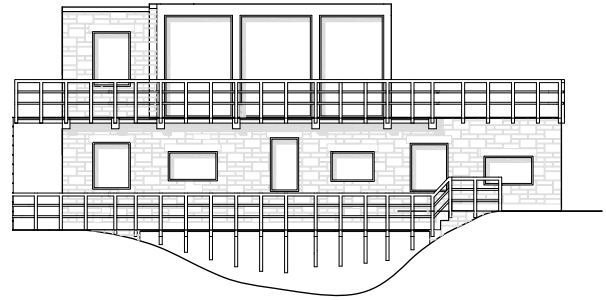
figure 71: facade
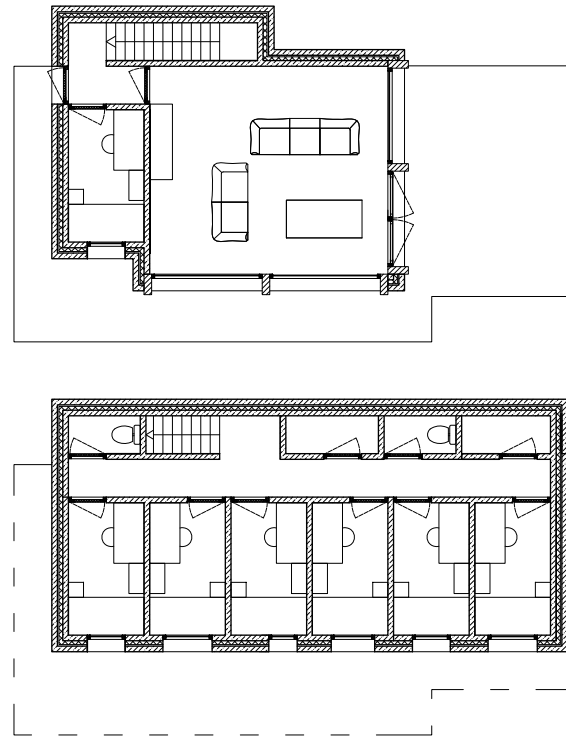
figure 72: plans

figure 73: interior

LEARNING PAVILION

There are three types of learning pavilions: the pavilion for individual work, for group work and the small classroom. All pavilions feature a space for learning, a hallway and a toilet, and have a big window for the entrance of natural light. The layout of the tables is focused on the large windows, so the students get the maximum amount of light on their desk.

The individual workspaces follow the landscape and provide a working space for twelve students. It can also be used by a teacher and ten students, of a single year, where the teacher can help the students in a personal setting. The pavilions for group work can be used by different sized groups, and the table setting can be changed. Here project discussions or presentations can take place. With nice weather the glass doors can be opened to let fresh air in.

The small classroom can be used for lectures or instructions and provides space for groups up till 21 students, two grades. The classroom follows the sloping terrain and is a small version of the auditorium.

All learning buildings are designed with the architectural language, and the individual learning pavilion is presented in the images.
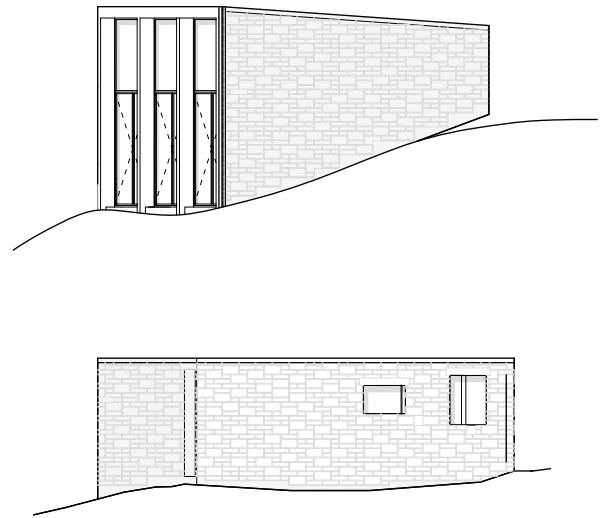
figure 74: facade
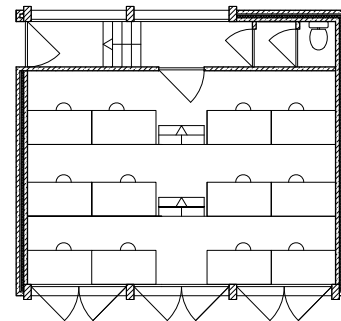
figure 75: plans

figure 76: interior

DINING HALL

The dining hall is placed on the central square, and exists of three interlocked rectangles: one is the kitchen and the other two rectangles provide space for the dining area. The rectangles are placed in a half circular form to bridge the railroad, embrace the outside stage and provide the dining area with a view of the city and the central square. Also this elongated shape resulted in a fairly slim section, providing the space with a lot of daylight.

The building is constructed out of the architectural language. The kitchen is an introvert part of the building and thus exists of natural stone walls with small windows, as are the hallway and toilet at the other end of the building. The dining area, in the middle, has an extrovert character, opening up to the outside space with big windows to the city side and large patio doors to the square which can be opened with good weather.

The building is built as a bridge structure, providing more space to the central area. This means that the dining hall is supported with a concrete structure.
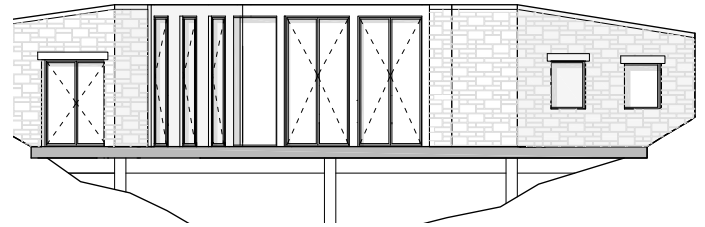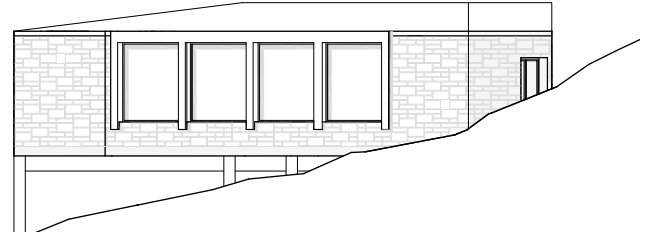
figure 77: facade
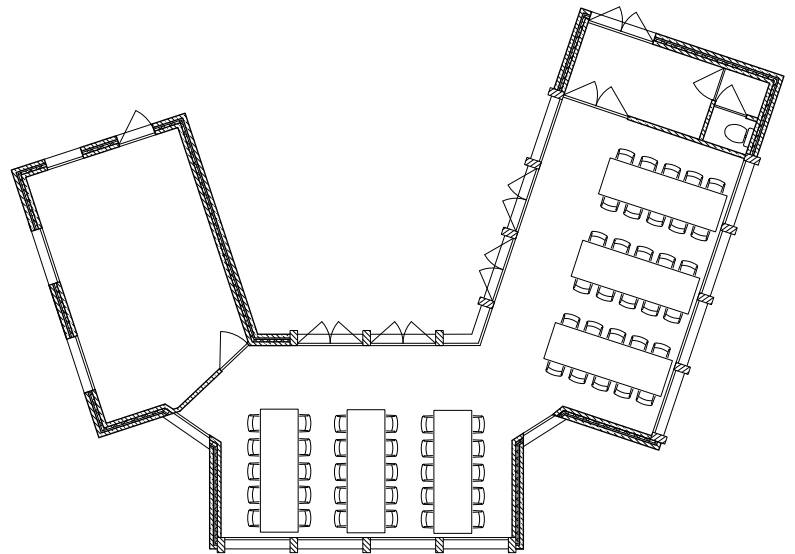
figure 78: plans

figure 79: interior

AUDITORIUM

The auditorium is located at the end of the square and has an introverted character. Because of its function, the lecture space is closed off from the outside world to discourage distraction. Since the auditorium has a sloping interior, the direction is determined by the direction of the slope of the mountain: the building uses the natural pleating of the landscape.

The auditorium has two points of entrance, one in the front and one in the middle. These doors are glass doors, to provide the hallway with natural light and to provide the visitor with a look inside. When entering, the visitors can move directly through the hallway into the auditorium space. The shape of the auditorium is based on the standard form of the type, which tapers to the speaker. Behind the stage there is a room for preparation and at the side there is a corridor to enter the auditorium and the toilet and wardrobe. The auditorium has an extra exit at the other side, in case of an emergency.
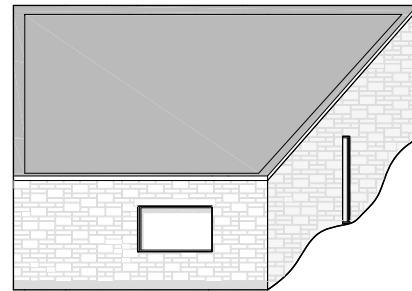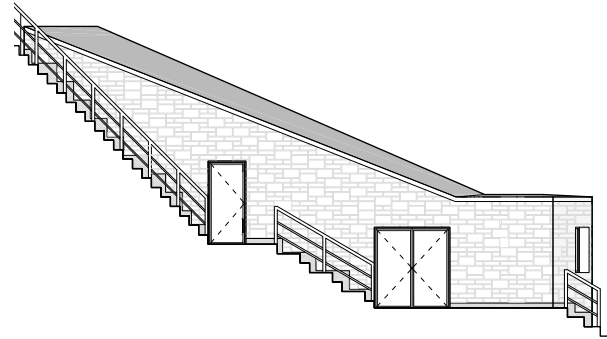
figure 80: facade
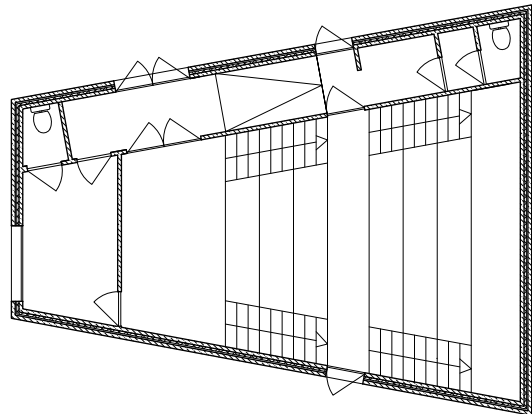
figure 81: plans

figure 82: interior

LIBRARY

The library is placed at the end of the square, next to the auditorium. The library consists of a central hall, where the bookcases are placed, an entrance hallway and small reading areas.

At the entrance the stairs take the visitor up to the central hall. Here is another flight of stairs, to bring the visitor to the reading areas, the librarian desk and the book cases. A big window to the west lights the space and provides a view on the central square. Small reading areas in the form of niches are linked to the central space. These niches provide a secluded space to read, which is a result of the theory of Herman Hertzberger. These niches are places on the ground floor, but also on the first floor, where the building moves along with the landscape. In between these niches big windows are placed to provide the central area with more natural light.

The library is closed off with a sloping, wooden structured roof, spanning all spaces and creating unity within the building.

Outside of the library is a terrace, which makes it possible to also read outside. The terrace is placed on the south side of the library, to make use of the natural shading of the structure.
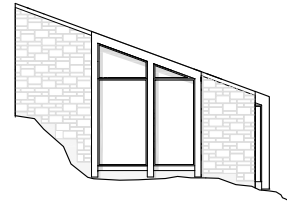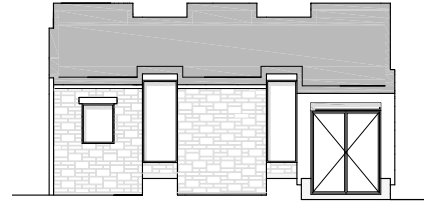
figure 83: facades
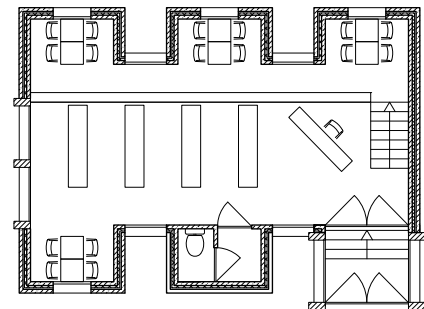
figure 84: plans

figure 85: interior

TEACHER'S PAVILION

The teacher's pavilion is located between the central square and the building site, providing the teachers with an overview on the mountain slope and the construction area, but blocking the workspaces from the central square, which is a place for meeting and not for working. The pavilion houses a working space for the teachers, a director's office, a kitchen and a conference room.

The building is formed by the passing road and the space requirements of each room and is built up out of natural stone walls and big windows for the office rooms and conference room. The kitchen is a closed off space with small windows.
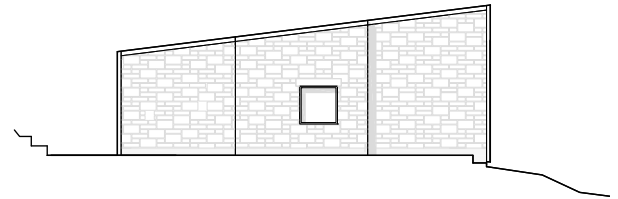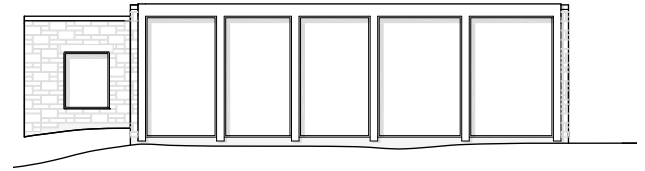
figure :86 facades
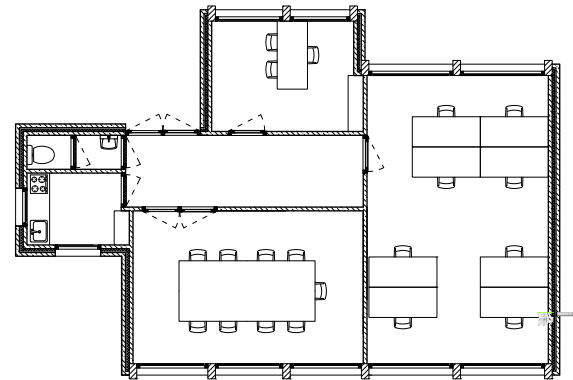
figure 87: plans

figure 88: interior

EXHIBITION SPACE

The exhibition space provides a space for exhibiting the work of students and inspiring projects from outside of the school. The building is divided into two spaces, a small exhibition space and a large one, which are to be used separately from each other.

The building is placed between the dining hall and the teachers pavilion and covers a big difference in height. For this reason, the small exhibition space is lower than the big exhibition space. Both spaces have a floor to ceiling window to the north to provide the space with natural daylight.

Both spaces have a rectangular floorplan, and have a minimum width of three meters, to provide enough space to exhibit a piece and walk around it. The straight solid walls provide opportunities to hang exhibits on the wall.
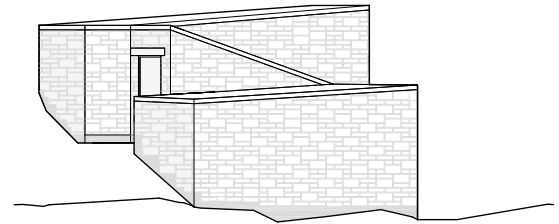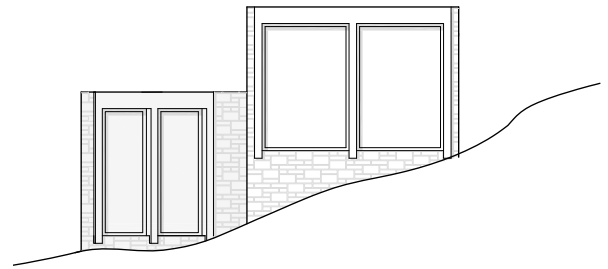
figure 89: facades
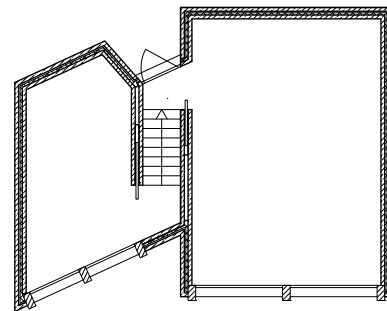
figure 90: plans
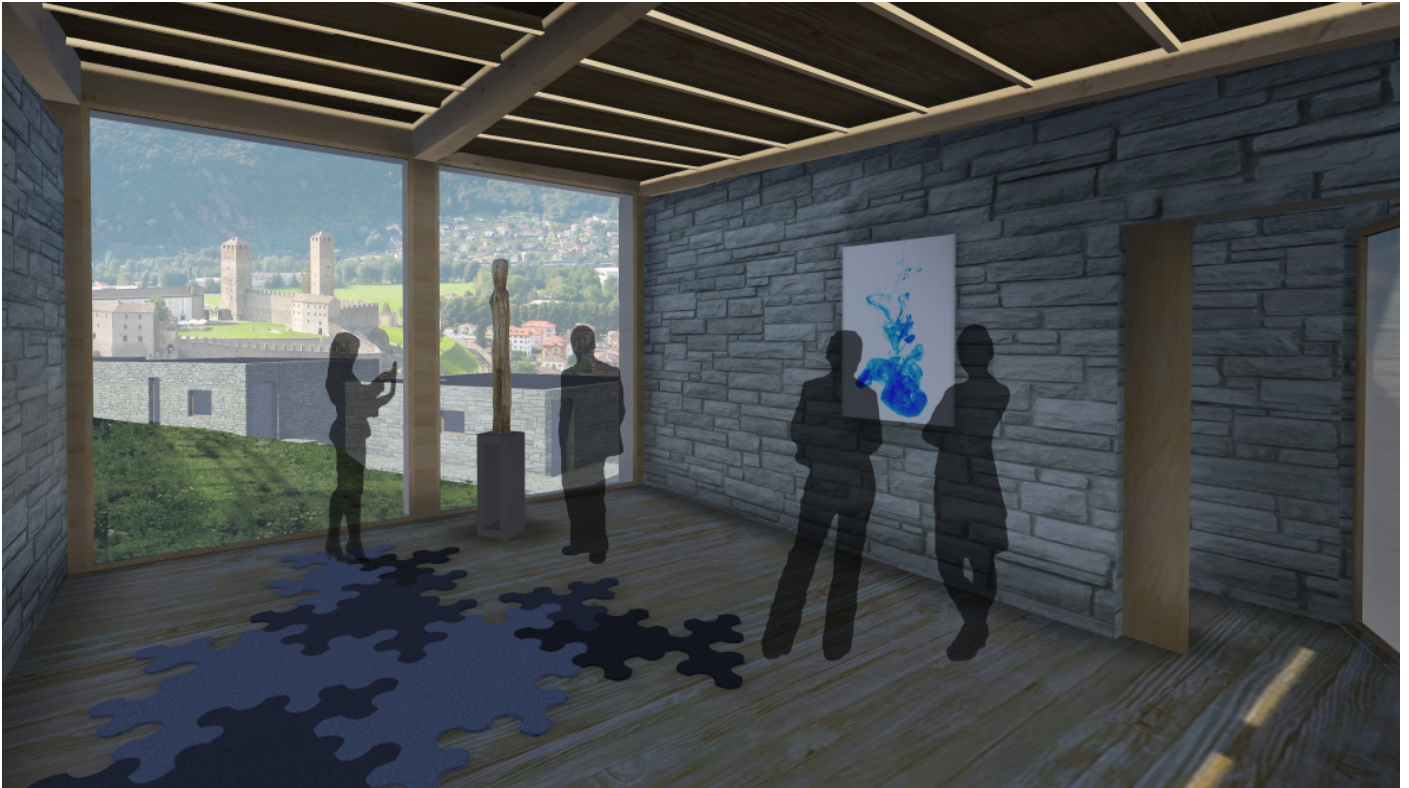
figure 91: interior

OUTSIDE AREA

The outside area exists of the central square with the outside auditorium and the terraces, the outside learning terraces and the living terraces. Also the construction site and paths connecting the elements are included.

The outside area is a combination of the natural landscape and the created paths and terraces to serve the school program. Here the renders provide a good overview how both the landscape and the adjustments work together to form the learning landscape.

figure 92: construction site

figure 93: outside auditorium
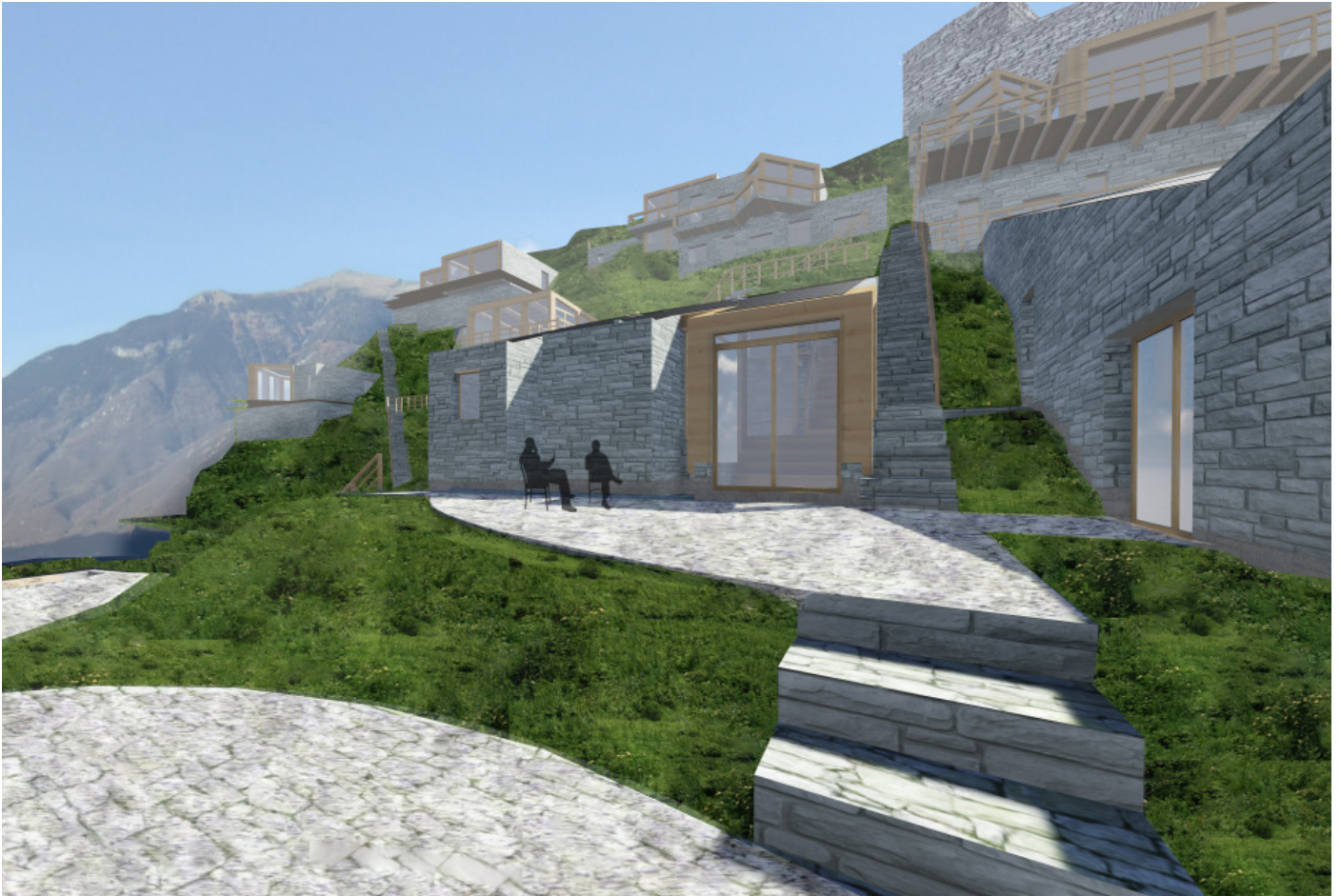
figure 94: library terrace

figure 95: outside workspace

The school will house a practical architecture school, which concludes in the practical and visual use of materials and techniques. To create a bond with the environment and the local building style, materials from the surroundings are used.

The materials which are available are granite, which can be cut from the mountain, and pinewood, which grows in the area. Because of the placement of the buildings and the steep hill, parts of the mountain will be quarried, as is visible in the figure. This material can be used as building material.

PREPERATION

Before the construction can start, a road has to be constructed for the inlet and outlet of materials and machinery. Here parts of the mountain already have to be quarried.

The next step is to quarry the other building bases; this process is made visible on the pictures. First holes have to be drilled, after which a belt saw can cut the stone. The complete block, which is about 3 by 6,5 by 13 meter is taken out in two parts and is transported to the nearest factory, Onagoro Graniti, at 11 km distance for the rest of the cutting process. Since the blocks are big in size and the sawing process of a single block takes approximately 3-5 days, plus the need of a big specified machine, supports the choice to remove this process from the building site. In the factory the blocks will be cut in 3 different sizes: 30x10, 15x10 and 30x20 cm with the base thickness of 10 cm. Afterwards the stones can be transported back to the building site. (Blaazer,2006) (http://www.stonecontact.com/quarries-3844/bodio-nero-quarry)
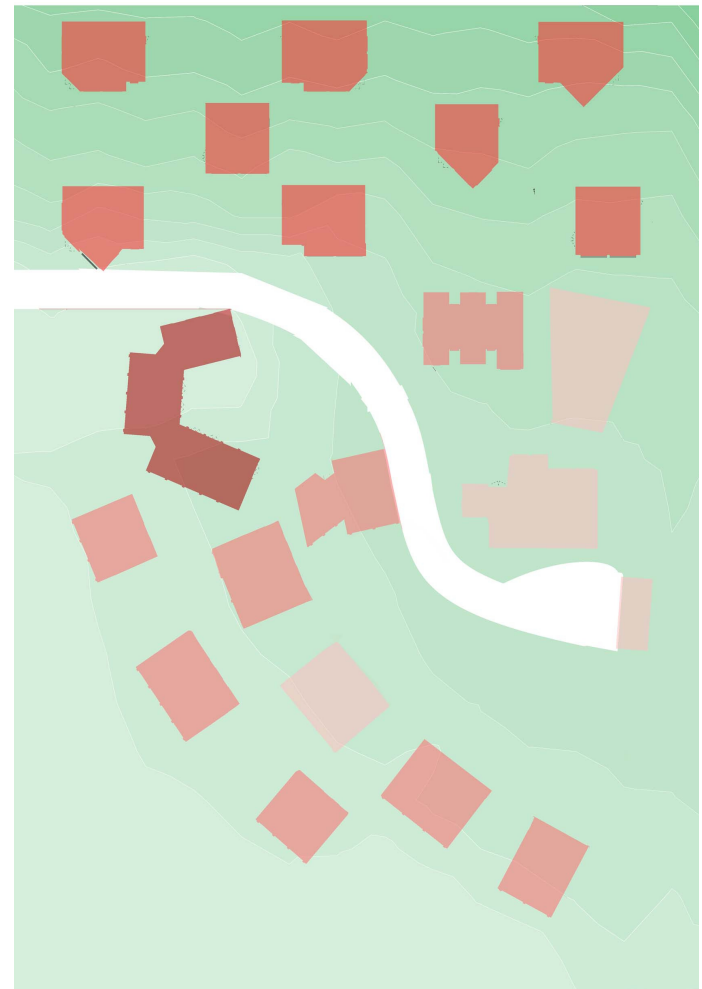
LEGENDA
- elevated structure
- granite quarry
- sand quarry
- no quarry, follows the slope
- paths, construction site and storage

figure 96: masterplan: use of the landscape
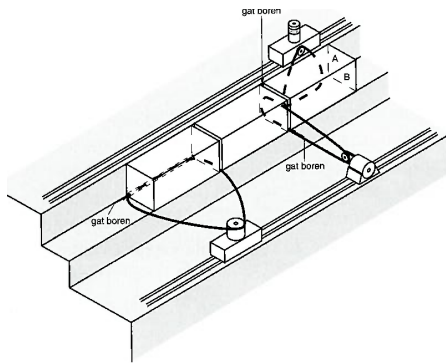
figure 97: quarry method granite

7.6   **Omschrijving van enkele**
natuursteensoorten CONSTRUCTION

7.6.1   **Inleiding** For the construction, first the concrete foundation is poured, ending just above ground level. On top of this foundation, the stones can be laid, which are hold together with mortar. The bricks will not be laid in a specific bond, counteracting a bond.

On top of the stone structure, the pinewood structures are placed. These structures have to be sustainable because of the
7.6.2   **Stollingsgesteente** weather and therefore will be impregnated with chemicals. This will be done before the wood arrives at the building site where small changes as shortening can be done. The building will be finished by placing the roofing, which is EPDM.

figure 98: equipment

7.6.3   **Afzettingsgeste**

CONCLUSION & REFLECTION

The practical architecture school is a place for learning from each other and working with each other. The conveying of practical and theoretical knowledge is a focal point and the design should support this. The design is a combination of multiple functions in a small scale plan on a mountain slope. The small scale of the plan, in combination with the open spaces fits with the landscape, nature and the rural area. The position of these buildings on top of the mountain slope is a reflection from the research in combination with the context, as it the architectural language. This is the answer to the research question: How to design a contemporary practical architecture school in Bellinzona?

CONCLUSIONS

The typological research did not provide a proper conclusion in typology, but did highlight in the missing link between form and didactics. The closed quadrangle and campus are both suited to house the school, but the campus can adapt better to the sloping terrain of Bellinona. The case studies support this by the separation of the living and learning functions, concluding in a pavilion typology where each function has its own building.

The literature research showed the abandoning of the traditional hallway, linking spaces and creating an open learning area. In combination with the case study of Taliesin, the hallway is reformed to outside space. The case studies and research also argue for the use of a central area, providing the students with a communal space to connect with each other. This is implemented in the central square, with outside auditorium, and the surrounding public buildings. The living quarters and learning pavilions are positioned on the north and east side of the center, following the sloping landscape.

The case studies show a specific architectural language of elements that bring unity in the buildings. With this architectural language, the pavilions can differ in form but continue to be one unity. This architectural element for the architecture school in Bellinzona was the use of materials from the context, building methods and the visual details of the buildings, demonstrating how the buildings are constructed.

For the didactics the use of the mandatory Swiss program is applied, in combination with the practical part of the architecture school. In the examples all Swiss architecture schools have their own speciality, the speciality of the architecture school of Bellinzona is the practical addition, also present in the case study of Taliesin. The practical buildings site is an addition to the school which supports this, as is the visual detailing of the school buildings.

For possible following up projects I like to recommend to spent more time in the research on building on a sloping terrain in the mountains and the building methods of the context, in this project the building methods of the surroundings of Bellinzona. This can provide better insights in possibilities and use of materials and improve the design.

CRITICAL EVALUATION

For the critical evaluation the process is evaluated. The objectives have been achieved, but the process did not go smooth. The research took me a long time, first focusing on the monasteries and English universities, putting myself in a different direction. When adding the American campus and the didactics the objective became more clear, providing me with a better focus point of what to do and how to do it. Looking back at the research and design period, I should have worked on the research and design simultaneously, providing myself with more time to develop the concepts and design in an earlier stage and thereby creating more insight in the missing knowledge and thus specific research.

The design is the outcome of the research. The design could have been developed further in my opinion, bringing new difficulties and better solutions to the surface. Now I provided an answer to the research question, but I don't think it is the only possible outcome. However, it does correspond with the research and the choices I made.

In the end I am proud of the results, knowing that time always gives an endpoint to a project. I had pleasant time working on the project, knowing that what I produced is something which I can support.

BIBLIOGRAPHY

LITERATURE

Brewster, M (2004, july) Frank Lloyd Wright: America's Architect, Business Week.

Blaazer, A. van Gessel, F.T.H. (2006) Bouwproducten. Amersfoort: ThiemeMeulenhoff.

Brubaker, C. (1998) Planning and designing schools.   London: McGraw-Hill.

Buchanan, W. (1989) Mackintosh's masterwork : the Glasgow School of Art. Berlin: Ernst.

Coolen, F.W.A (2012) Baden en bezinnen : heroriëntatie Abdij Sint Benedictusberg te Mamelis. Eindhoven: Technische Universiteit Eindhoven.

Copans, R. (2015) Arkhitekton - Convent Sainte-Marie de La Tourette. https://www.youtube.com/watch?v=OrlAA7m4QiA.

Compain, F. (2011) Architecture, dessau Bauhaus, Retrieved from: https://www.youtube.com/watch?v=u-lVejSt3BI.

Fracalossi, F. (2011, august) Ad Classics: Amsterdam Orphanage / Aldo van Eyck. Archdaily. http://www.archdaily.com/151566/ad-classics-amsterdam-orphanage-aldo-van-eyck

Hertzberger, H. (2008) Ruimte en leren. Rotterdam: Uitgeverij 010.

Hertzberger, H., de Swaan, A. (2009) The schools of Herman Hertzberger. Rotterdam: 010.

James-Chakraborty, K (2006) Bauhaus culture : from Weimar to the cold war. Minnesota: University of Minnesota Press

Kuhn, C. (2012, march) Typology Quarterly: Schools, architectural review. http://www.architectural-review.com/archive/typology/typology-quarterly-schools/8625738.fullarticle.

Metz, T. (1991, january) Berlage Institute naar het Weeshuis van Aldo van Eyck. http://www.nrc.nl/handelsblad/1991/01/26/berlage-institute-naar-het-weeshuis-van-aldo-van-eyck-6954750.

Potie, P. (2001) Le Corbusier : le Couvent Sainte Marie de La Tourette. Berlin: Birkhaeuser.

Quist, W. (2005) Het werk van Dudok, 100 jaar betekenis, Delft: delft digital press.

Turner, P. V. (1984) Campus: an American planning tradition. London : MIT Press.

Unknown (2010, february) Schools of thought: Herman Hertzberger. Architecture Today. http://www.architecturetoday.co.uk/?p=3491

van den Bergen, M., Vollaard P. (2012, may) Het Berlage Instituut in veranderende tijden, archined. https://www.archined.nl/2012/05/het-berlage-instituut-in-veranderende-tijden

van der Plas, M. van der (1989). Abdijen in de Lage Landen en de mensen die er wonen. Baarn: Arbor.

Verstegen, T. (2008) Een traditie van verandering : de architectuur van het hedendaagse schoolgebouw. Rotterdam: NAi uitgevers.

Wick, Rainer K. (2000) Teaching at the Bauhaus. Ostfildern-Ruit: Hatje Cantz

FIGURES

1. Adapted from Baden en bezinnen : heroriëntatie Abdij Sint Benedictusberg te Mamelis. (p. 73-74) F.W.A Coolen 2012, Eindhoven: Technische Universiteit Eindhoven.

2. Adapted from http://plansofarchitecture.tumblr.com/post/94757110663/le-corbusier-sainte-marie-de-la-tourette-convent.

3. Reprinted from http://www.british-history.ac.uk/sites/default/files/publications/pubid-543/images/fig1.gif.

4. Reprinted from http://www.british-history.ac.uk/sites/default/files/publications/pubid-1307/images/fig83.jpg.

5. Reprinted from http://casualtraveler.com/wp-content/uploads/2014/12/Harvard_University_map_older_date_unknown.jpg.

6. Reprinted from School buildings 2 (p. 221) K. Otto, 1965, London : Illiffe.

7. Reprinted from School buildings 2 (p. 51) K. Otto, 1965, London : Illiffe.

8. Reprinted from School buildings 2 (p. 200) K. Otto, 1965, London : Illiffe.

9. Reprinted from The schools of Herman Hertzberger (p. 44) H. Hertzberger & A. de Swaan, 2009, Rotterdam: 010.

10. Reprinted from The schools of Herman Hertzberger (p. 46) H. Hertzberger & A. de Swaan, 2009, Rotterdam: 010.

11. Reprinted from The schools of Herman Hertzberger (p. 48) H. Hertzberger & A. de Swaan, 2009, Rotterdam: 010.

12. Reprinted from https://www.archined.nl/wp/wp-content/uploads/2004/05/HH3_01.jpg.

13. Reprinted from https://www.archined.nl/wp/wp-content/uploads/2004/05/HH4_01.jpg.

14. Reprinted from http://zeshida.com/taliesin-west-aerial-view/

15. Reprinted from http://acdn.architizer.com/thumbnails-PRODUCTION/1a/17/1a17acf6e24237421f992010314891a4.jpg

16. Reprinted from http://www.travelwriticus.com/holidays/world-heritage-sites/

17. Reprinted from http://farm8.static.flickr.com/7459/12220238115_df183e8fd2_m.jpg

18. Reprinted from http://www.architectmagazine.com/practice/seeking-the-wright-path-at-taliesin-west_o

19. Reprinted from https://en.wikipedia.org/wiki/Taliesin_West

20. Reprinted from http://dome.mit.edu/bitstream/handle/1721.3/27493/114743_cp.jpg?sequence=1

21. Reprinted from http://archpaper.com/wp-content/uploads/2014/08/twest_gardenroom.jpg

23. Reprinted from http://blogs.artinfo.com/objectlessons/files/2012/05/taliesin-west.jpg

24 Adapted from http://hikearizona.com/t2011/05/18/5929-888888_1305704426-07.jpg

25 Adapted from http://hikearizona.com/t2011/05/18/5929-888888_1305704426-07.jpg

26. Reprinted from http://studyabroad.arcadia.edu/files/programs/gsa-front-view.jpg

27. Reprinted from http://www.gsa.ac.uk/research/cross-gsa-profiles/b/brownrigg,-jenny/

28. Reprinted from http://qz.com/718031/summer-books-the-psychology-behind-a-perfect-beach-read/

30. Reprinted from Mackintosh's masterwork: the Glasgow School of Art (p. 64) W. Buchanan,1989, Berlin: Ernst.

BIBLIOGRAPHY

31. Reprinted from Mackintosh's masterwork: the Glasgow School of Art (p. 34) W. Buchanan,1989, Berlin: Ernst.

32. Adapted from http://www.gsaarchives.net/archon/?p=digitalli-brary/digitalcontent&id=1085

33. Adapted from http://www.gsaarchives.net/archon/?p=digitalli-brary/digitalcontent&id=1085

34. Reprinted from http://www.arcam.nl/en/burgerweeshuis/

35. Reprinted from http://www.anp-archief.nl/page/17953/en

36. Reprinted from http://www.arcam.nl/en/burgerweeshuis/

37. Reprinted from http://www.michaela-satke.de/lesen.html

39. Adapted from http://www.archdaily.com/151566/ad-clas-sics-amsterdam-orphanage-aldo-van-eyck

40. Adapted from http://www.archdaily.com/151566/ad-clas-sics-amsterdam-orphanage-aldo-van-eyck

41. Reprinted from http://benoitvandeputte.blogspot.nl/2012/03/het-bauhaus.html

42. Reprinted from http://www.alamy.com/stock-photo/bau-haus-university-weimar.html

43. Reprinted from https://www.smow.com/blog/2010/07/bau-haus-uni-weilmar-summaery-2010/

44. Reprinted from http://dondenomola.deviantart.com/art/Bau-haus-Weimar-1-133594556

45. Adapted from https://eng.archinform.net/projekte/1468.htm

46. Adapted from https://eng.archinform.net/projekte/1468.htm

50. Reprinted from http://taliesin.edu/

51. Reprinted from http://taliesin.edu/

53. Adapted from http://www.citedelenergie.ch

54. Adapted from http://www.myswitzerland.com/

56. Adapted from http://www.ticinotopten.ch/

97. Reprinted from Bouwproducten (p. 252) A. Blaazer, F.T.H. van Gessel, 2006, Amersfoort: ThiemeMeulenhoff.

98. Adapted from http://www.stonecontact.com/quarries-3844/bodio-nero-quarry

PRACTICAL ARCHITECTURE SCHOOL

DRAWINGS

Julia de Haan
0816656

CONTENT

auditorium

living pavilions

workshop

construction site

learning pavilions

teacher's pavilion

library

exhibition space

learning pavilions

living pavilions

outside auditorium

learning pavilions

dining hall

learning terrace

masterplan
plan
scale 1:250

0   2.5   5   10m
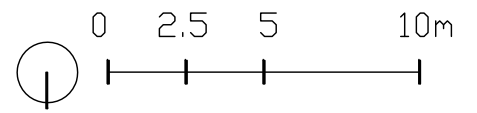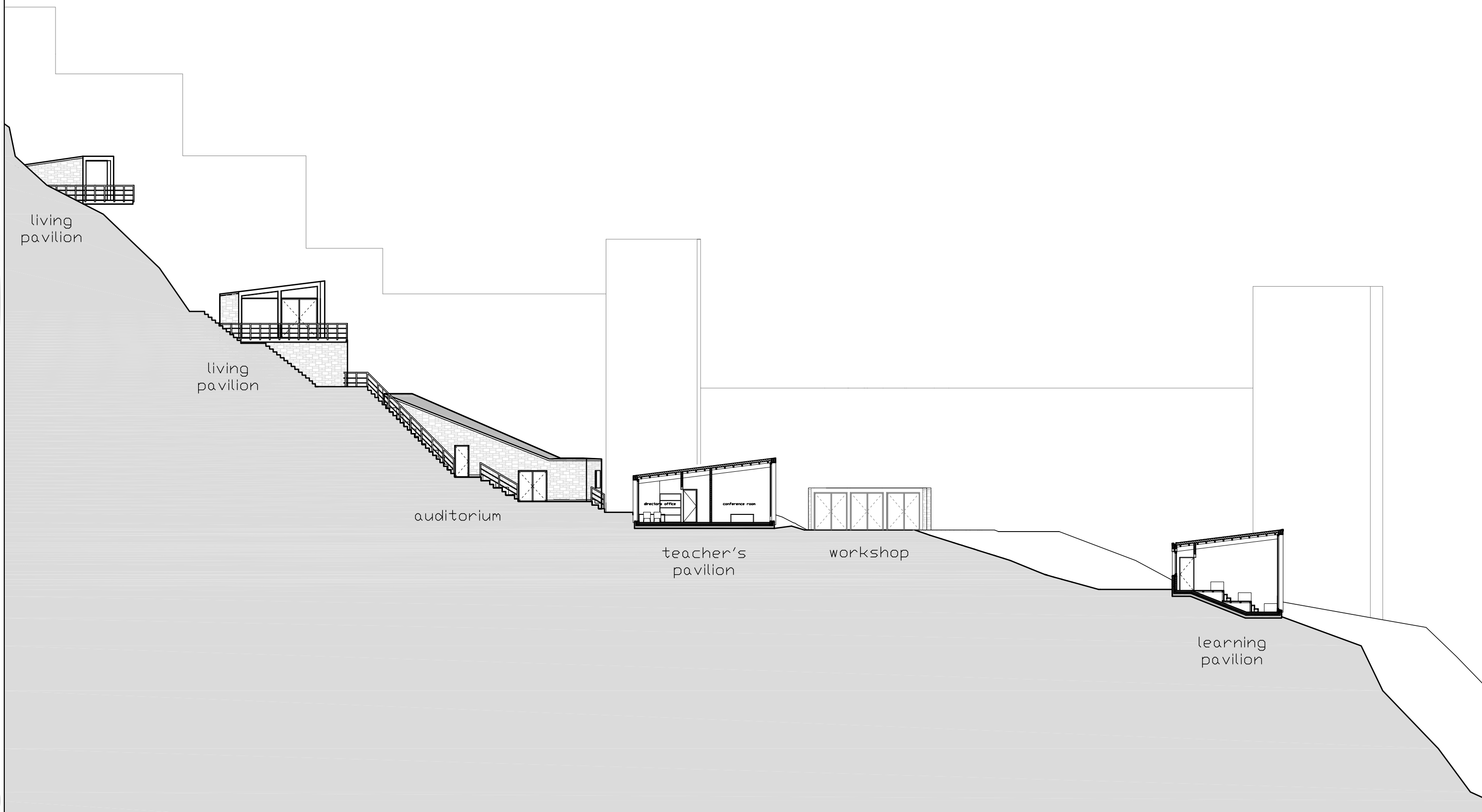
living
pavilion

living
pavilion

auditorium

director's office   conference room

teacher's
pavilion

workshop

learning
pavilion

masterplan
section
scale 1:250

0   2.5   5   10m

kitchen

hallway

bedroom

shared living room

shared terrace
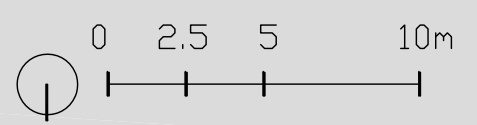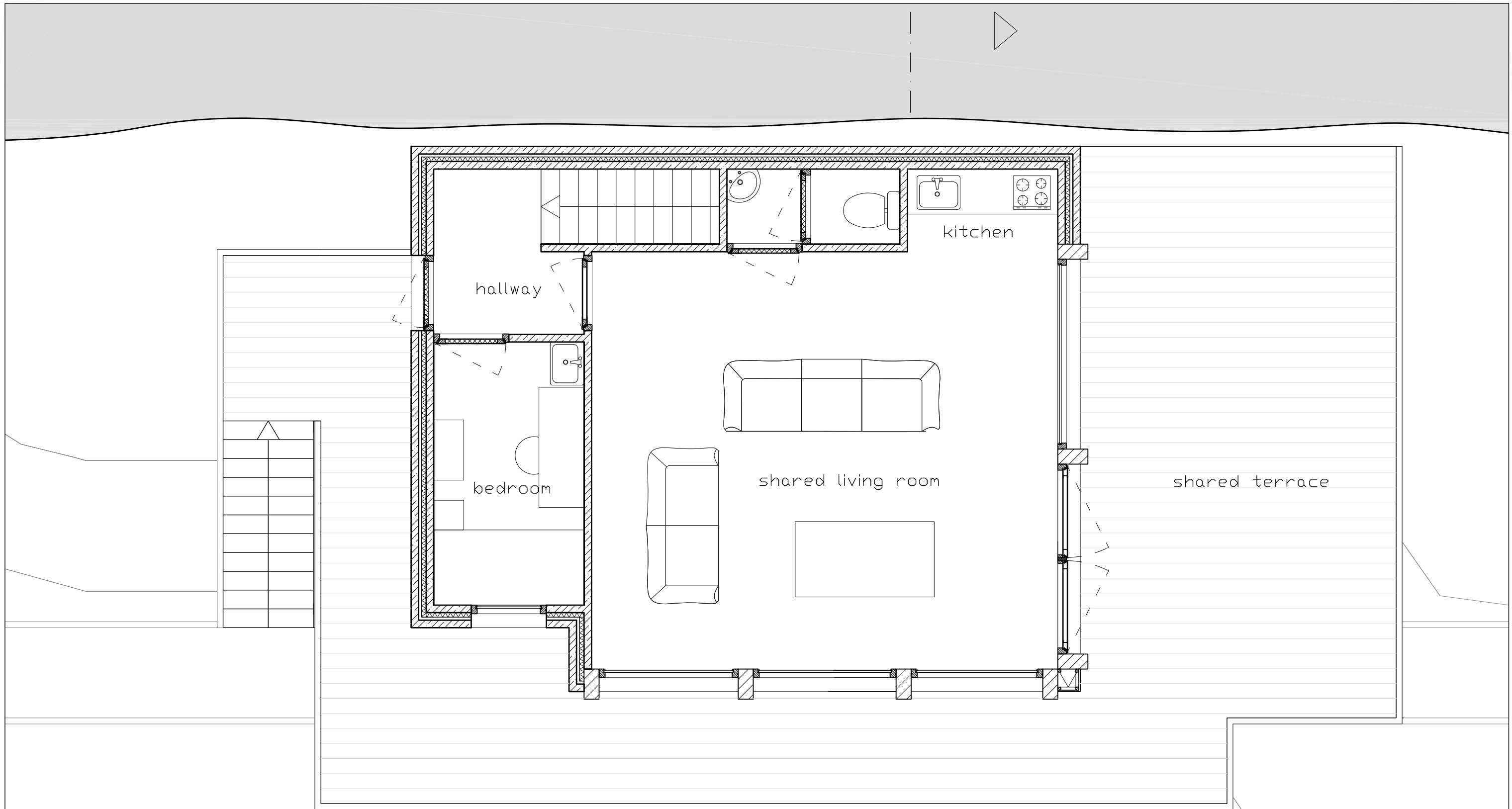
living pavilion
first floor
scale 1:50

0   1,5   1   2m

hallway

bedroom
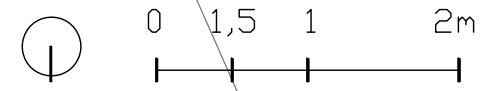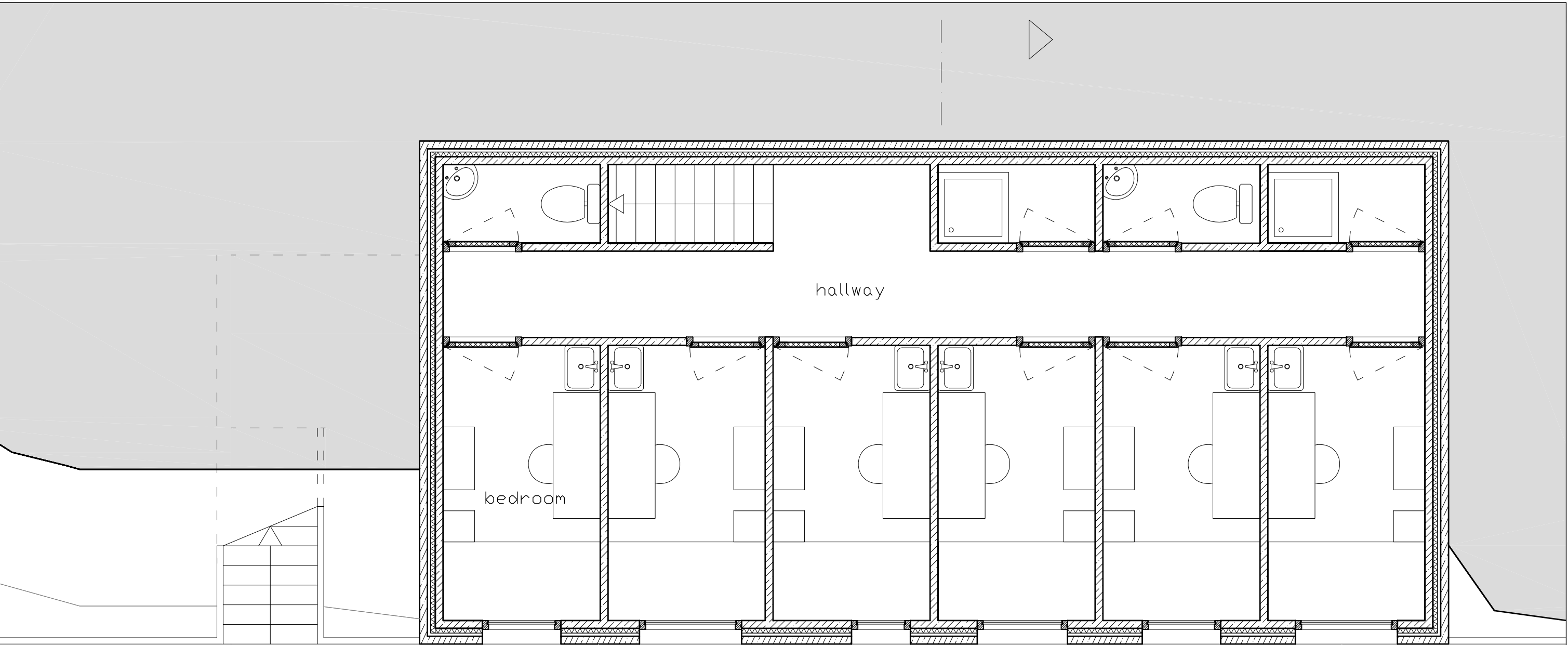
living pavilion
ground floor
scale 1:50

0 1,5 1   2m

shared living room

bedroom
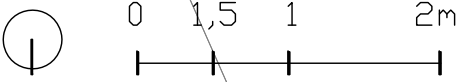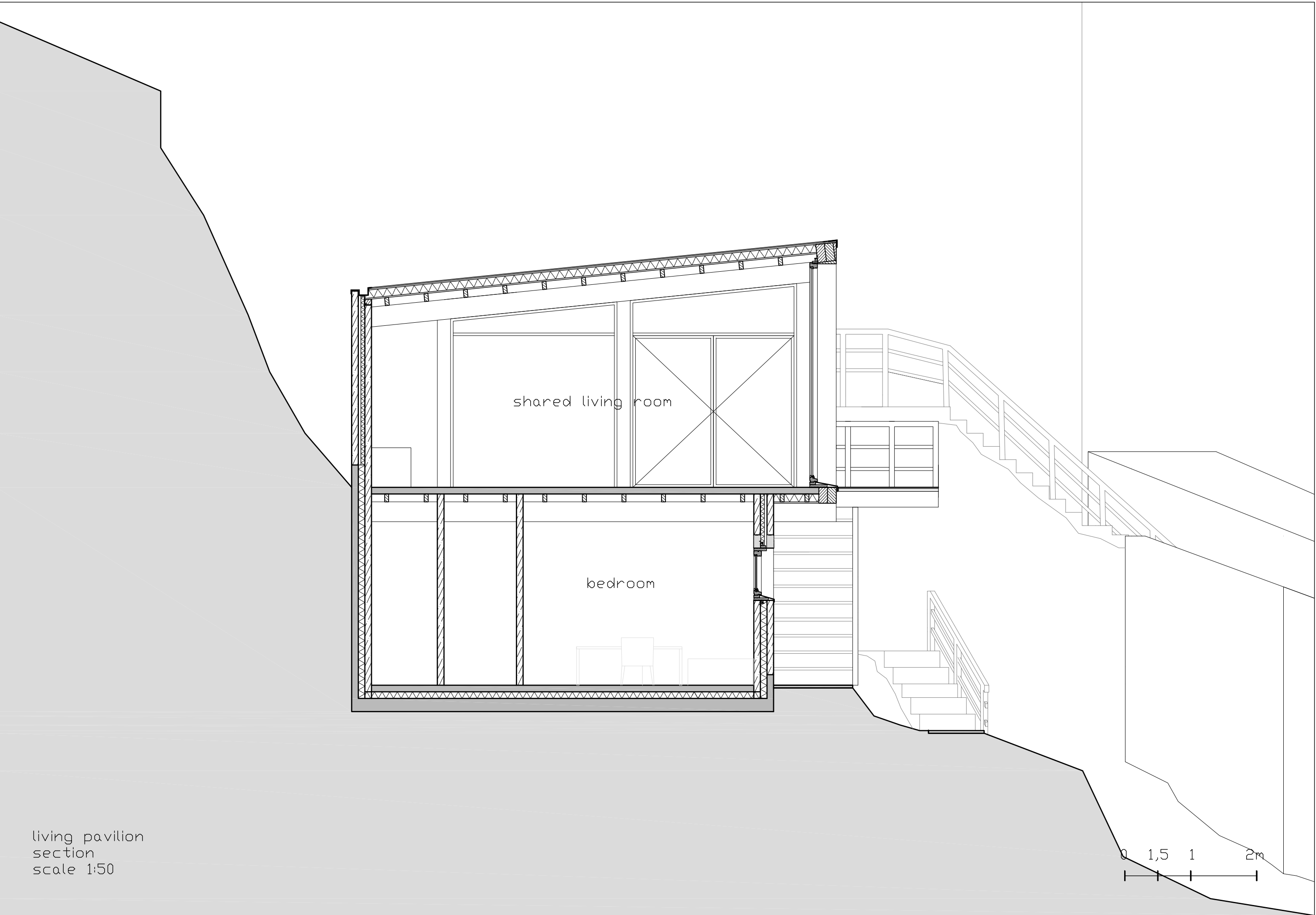
living pavilion
section
scale 1:50
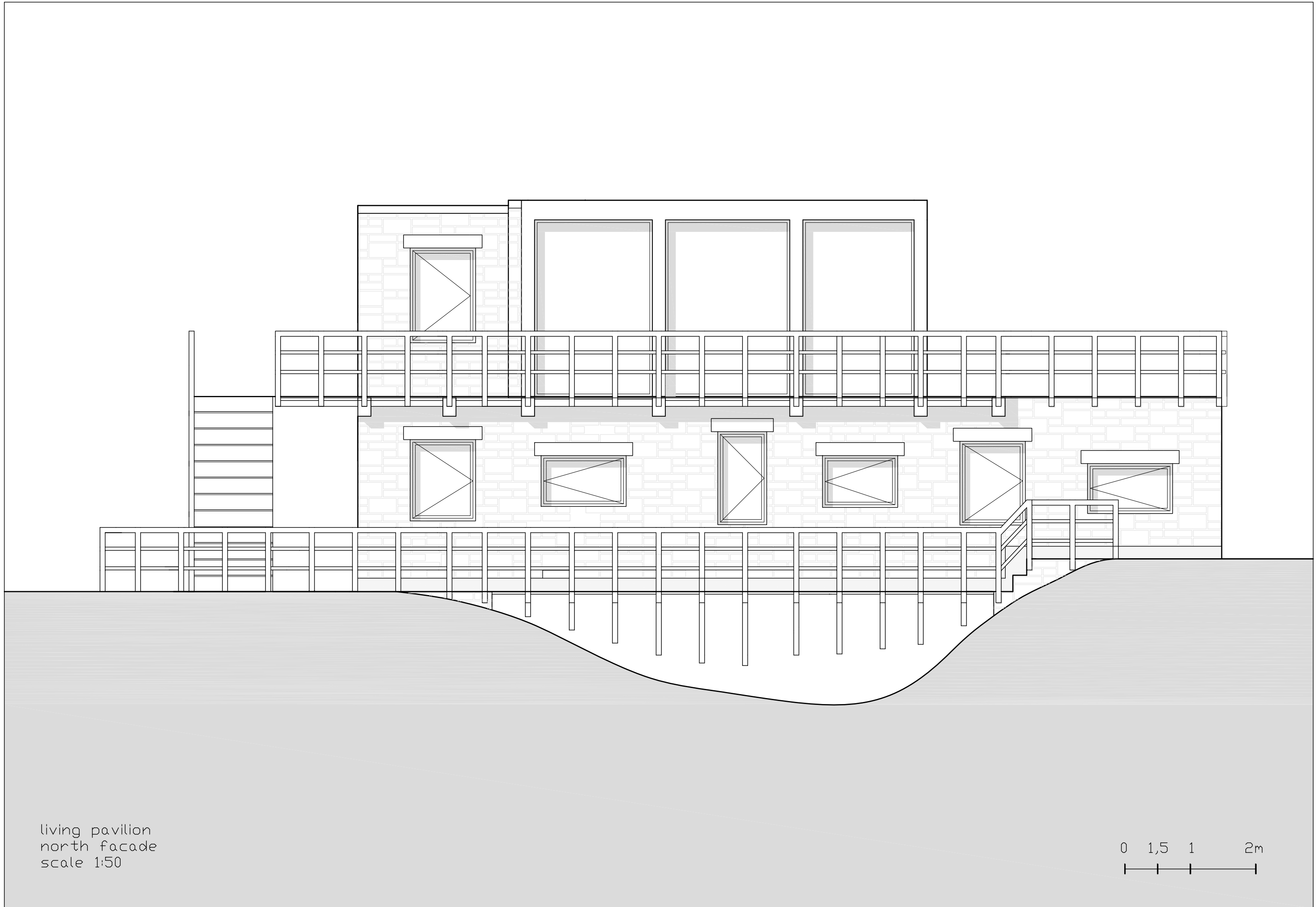
0 1,5 1   2m

living pavilion
north facade
scale 1:50

0 1,5 1   2m

living pavilion
east facade
scale 1:50

0   1,5   1   2m
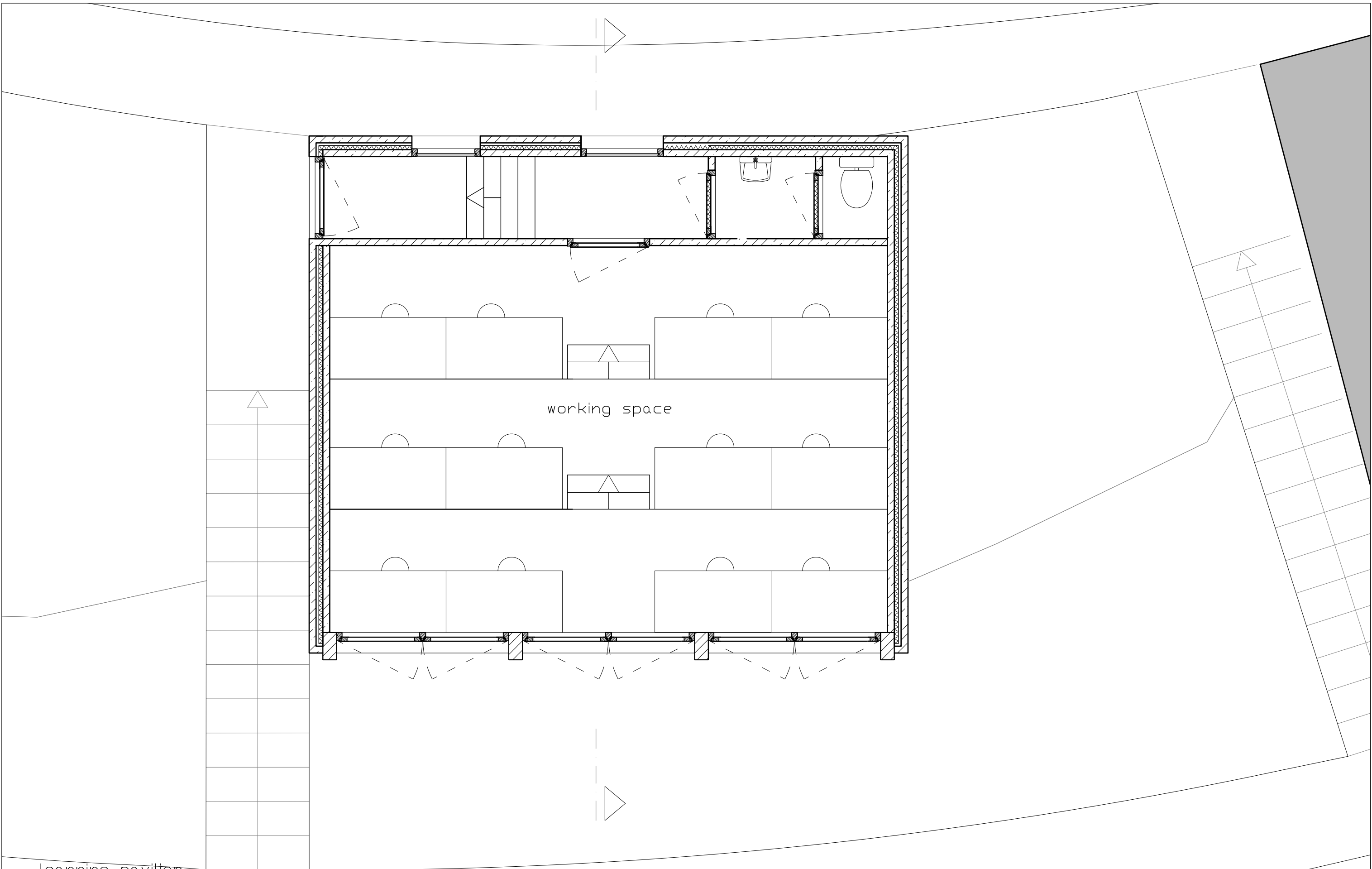
working space

learning pavilion
plan
scale 1:50
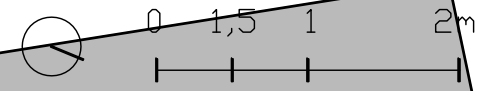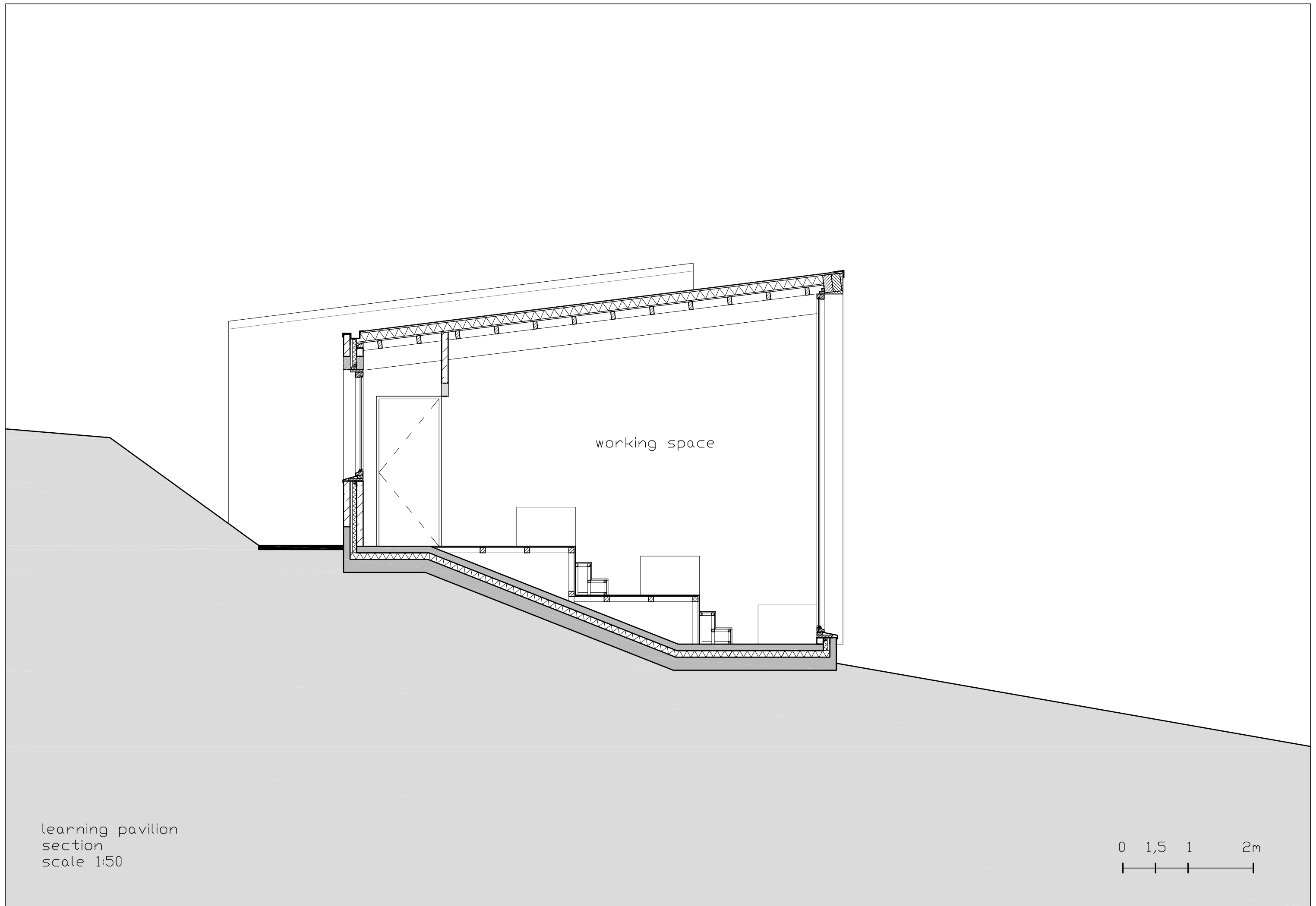
0   1,5   1   2m

working space

learning pavilion
section
scale 1:50

0   1,5   1   2m

learning pavilion
north facade
scale 1:50
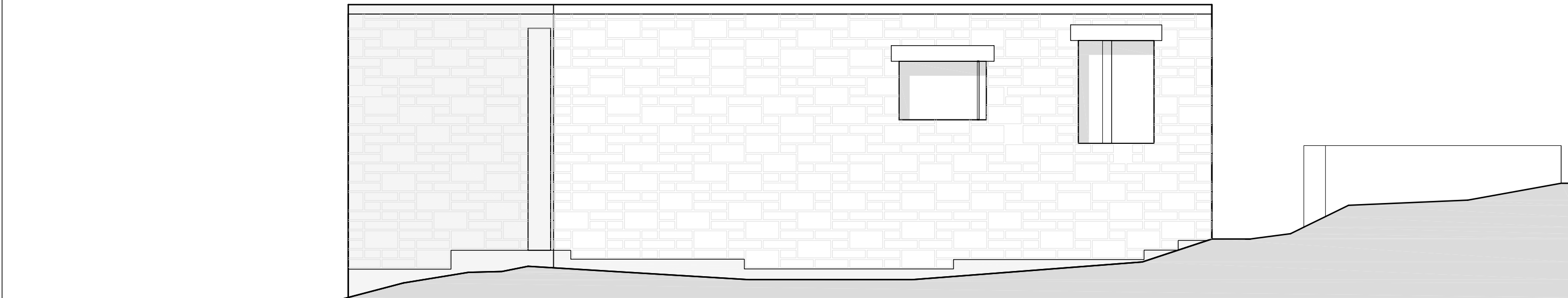
0 1,5 1   2m

learning pavilion
west facade
scale 1:50

0   1,5   1   2m

kitchen
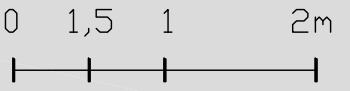
dining hall

dining hall
plan
scale 1:50
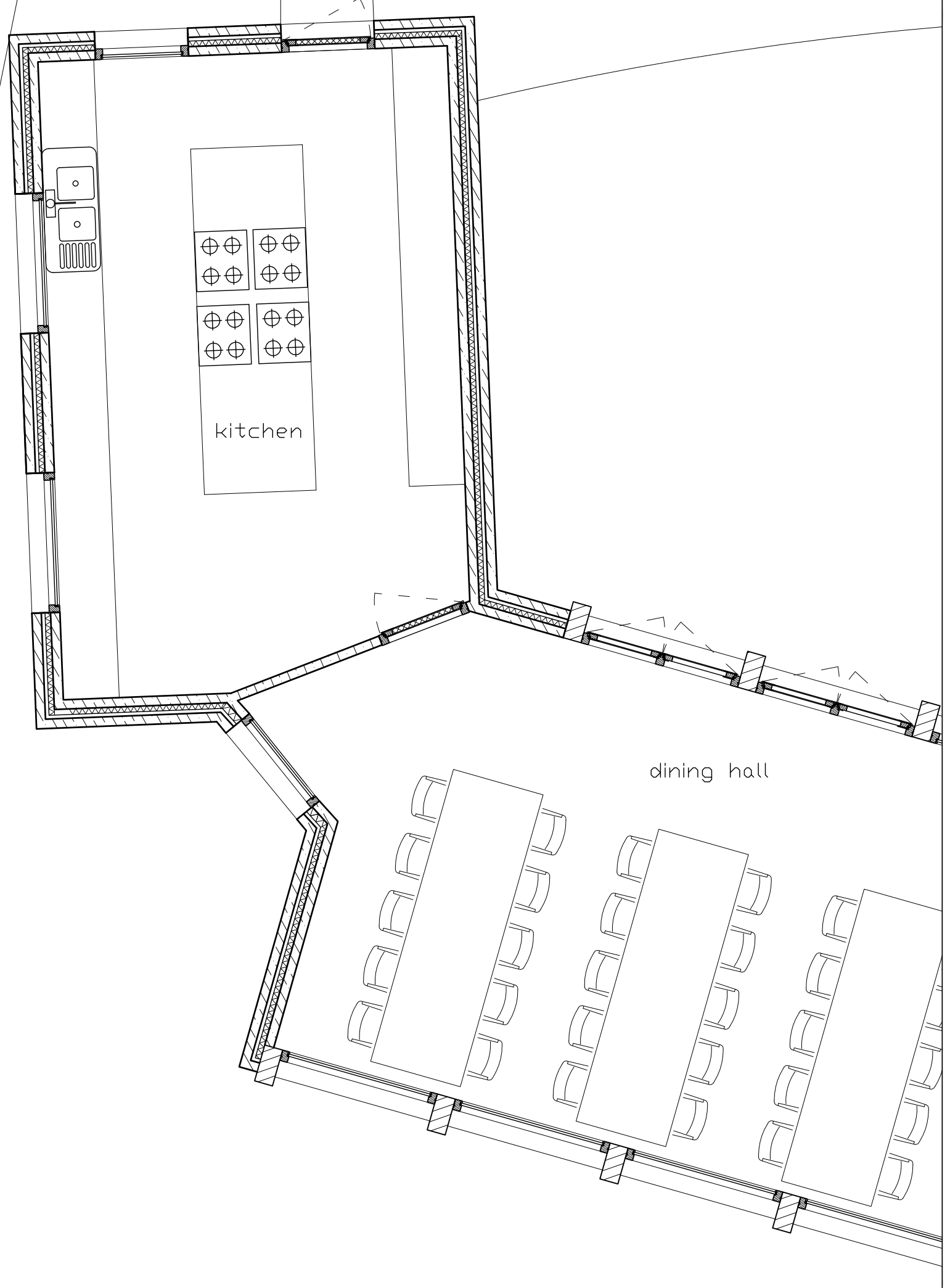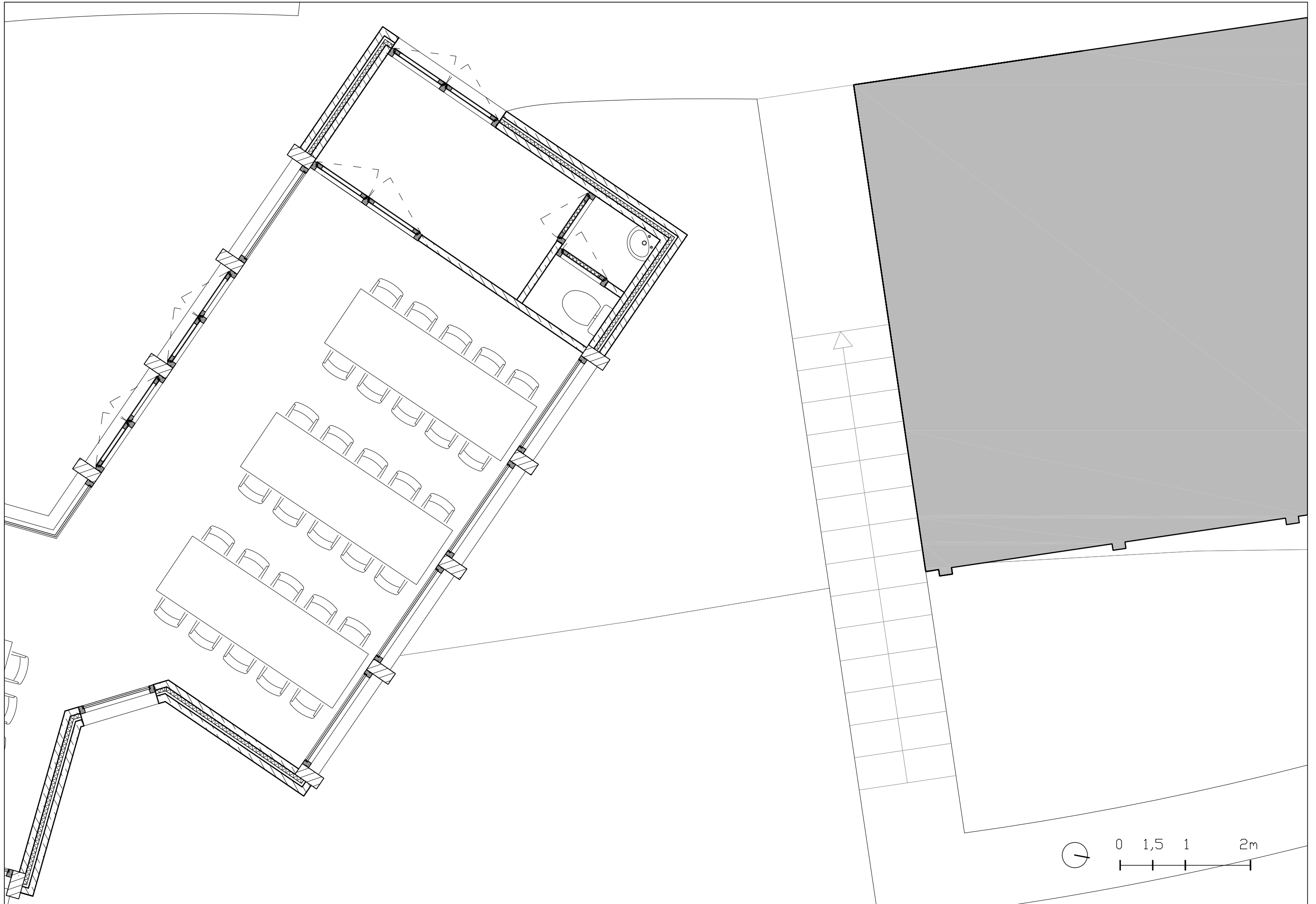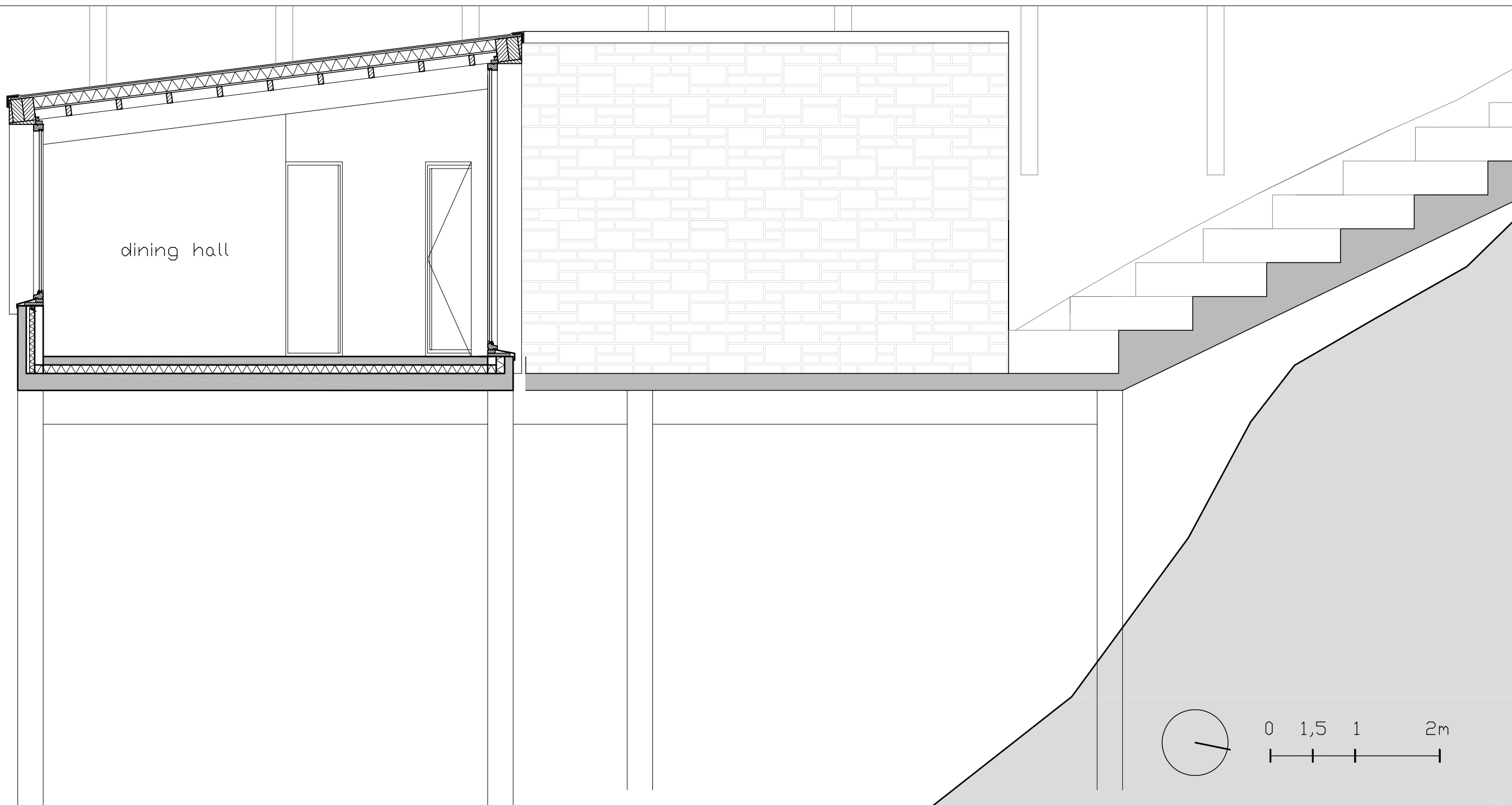
dining hall

dining hall
section
scale 1:50
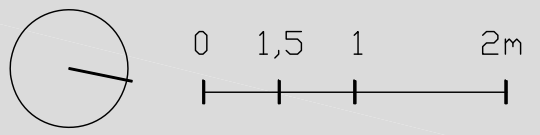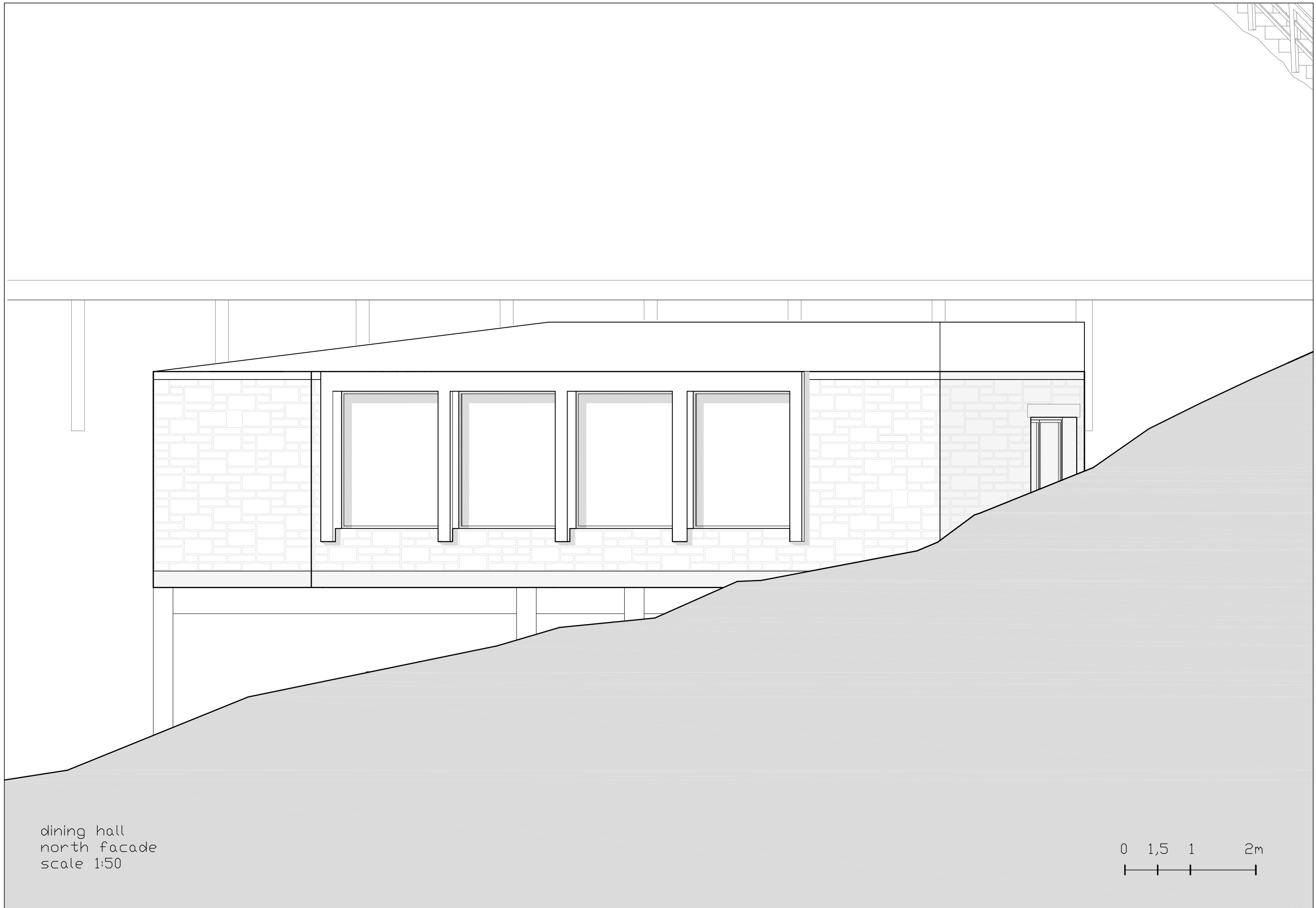
0 1,5 1   2m

dining hall
north facade
scale 1:50
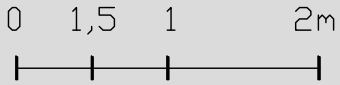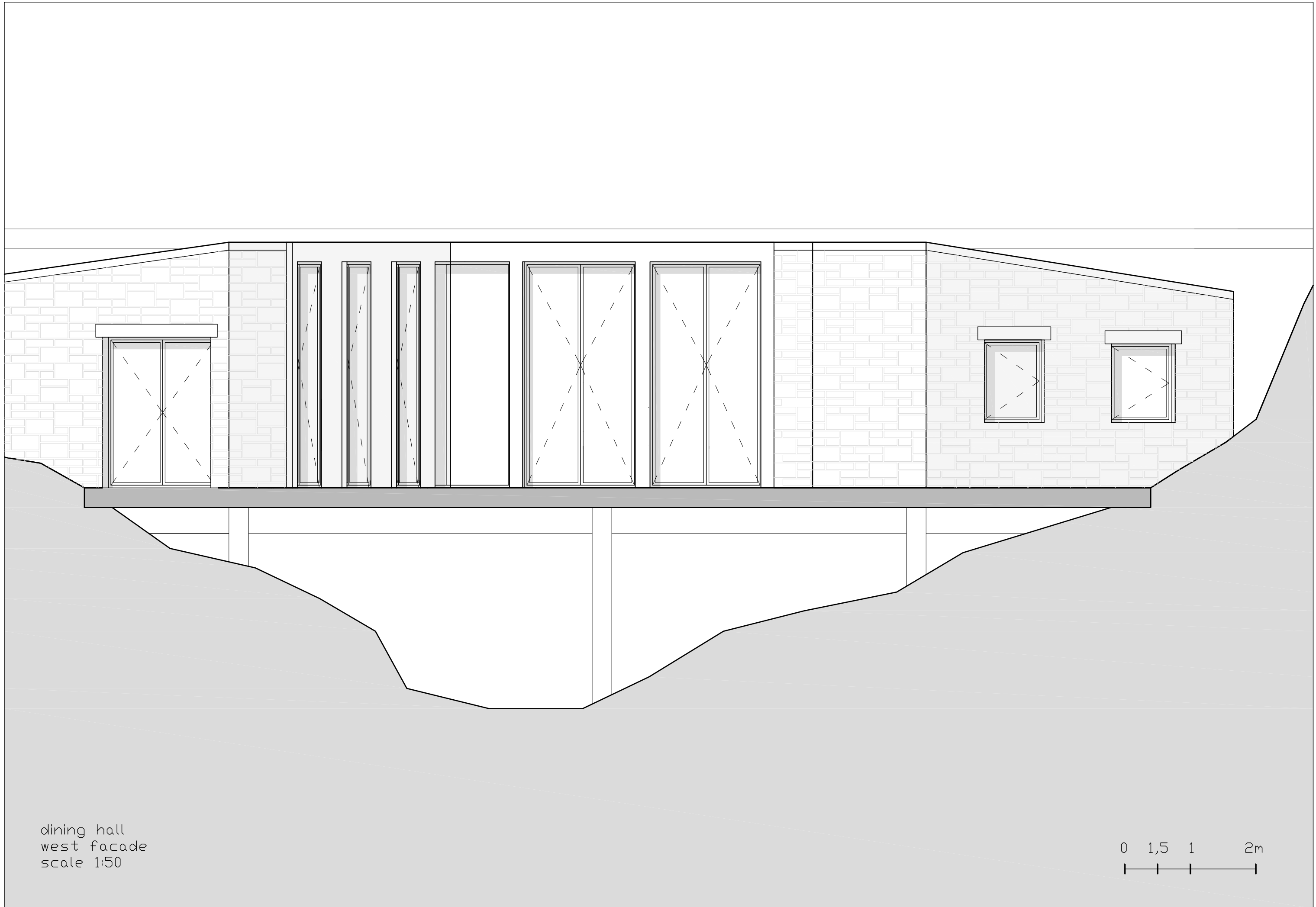
0 1,5 1   2m

dining hall
west facade
scale 1:50
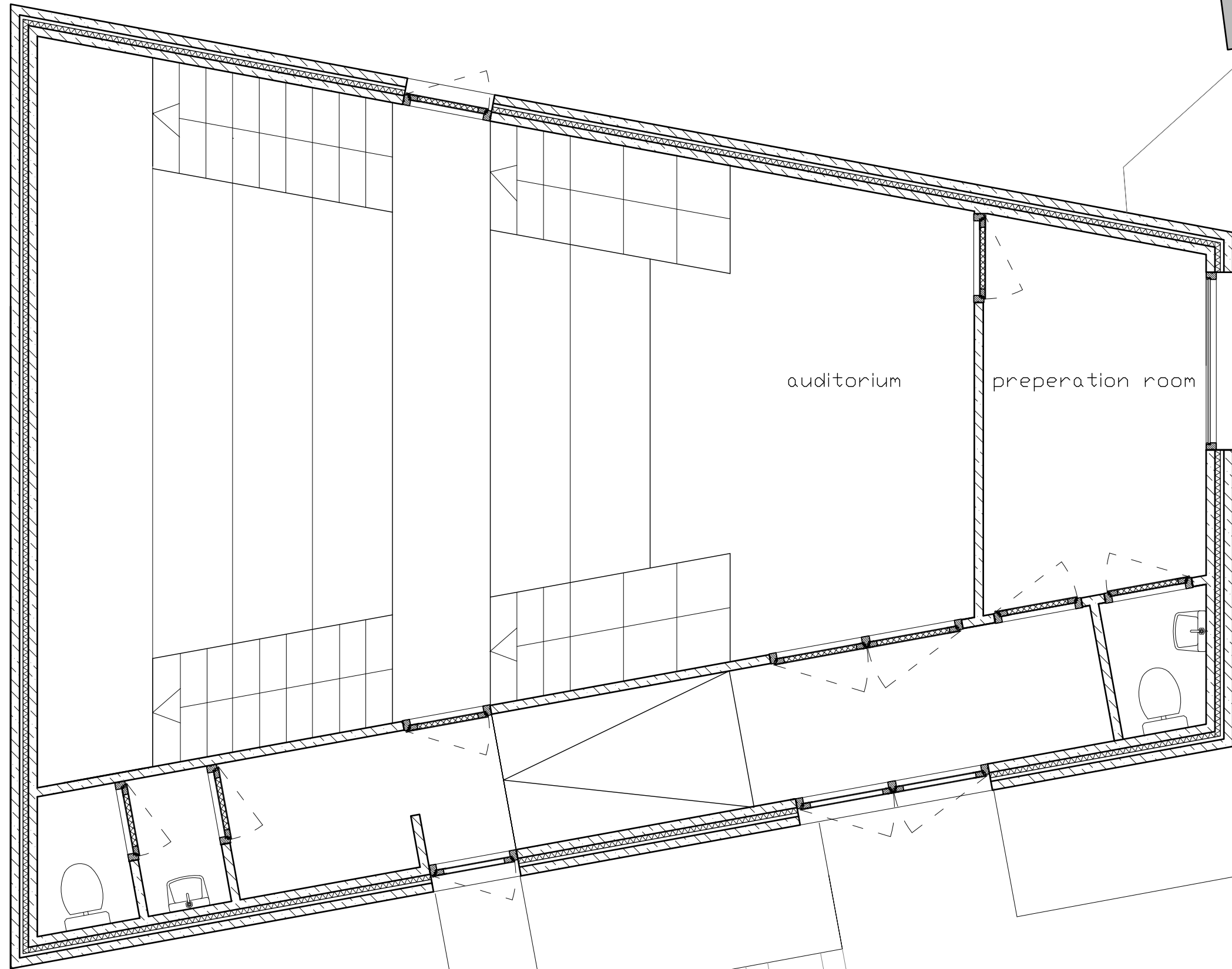
0 1,5 1   2m

auditorium

preperation room

auditorium
plan
scale 1:50

0   1,5   1   2m

auditorium

preperation room
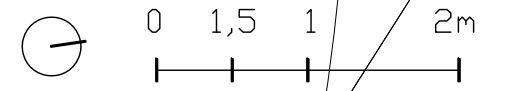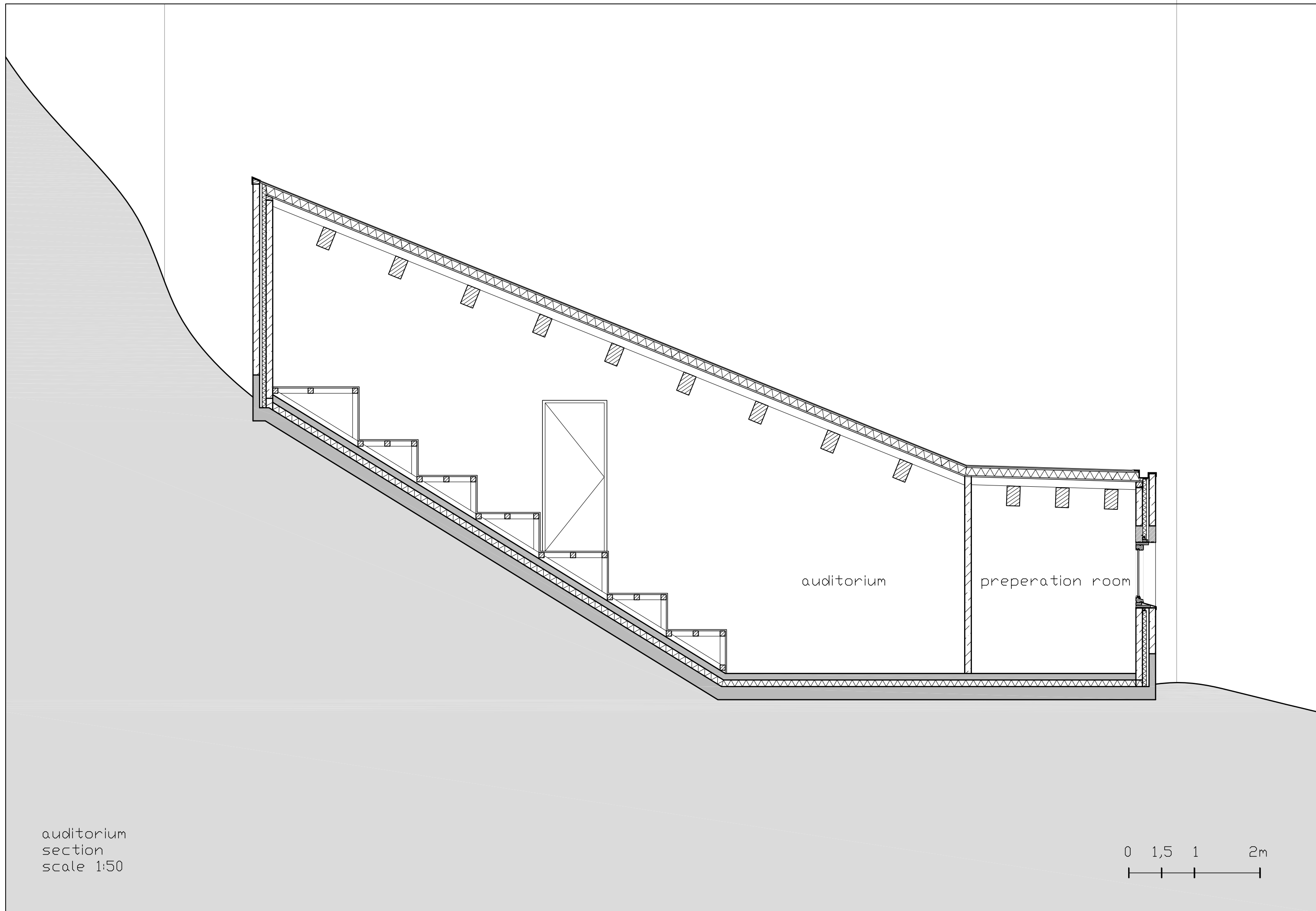
auditorium
section
scale 1:50
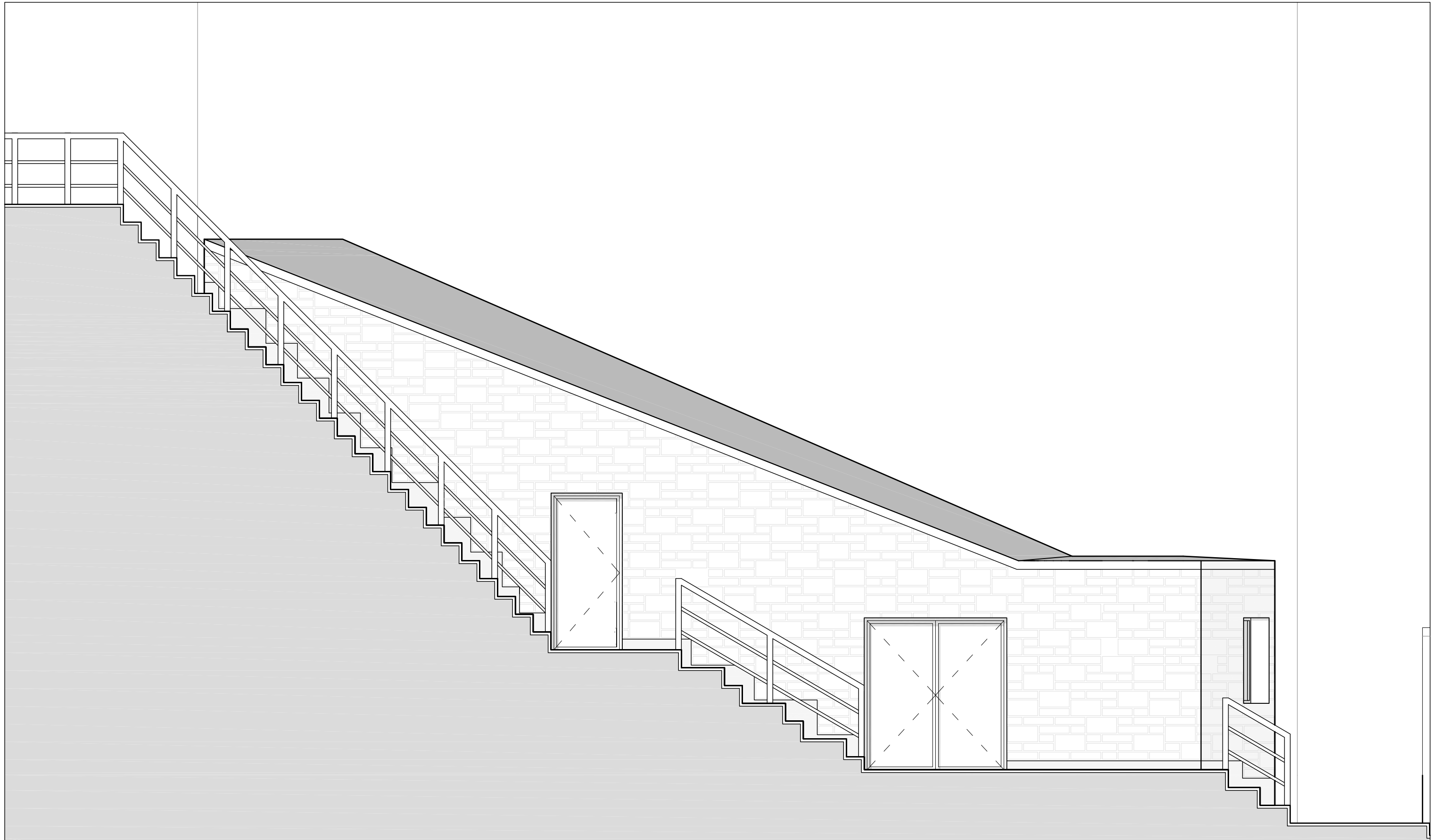
0   1,5   1   2m

auditorium
east facade
scale 1:50
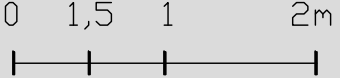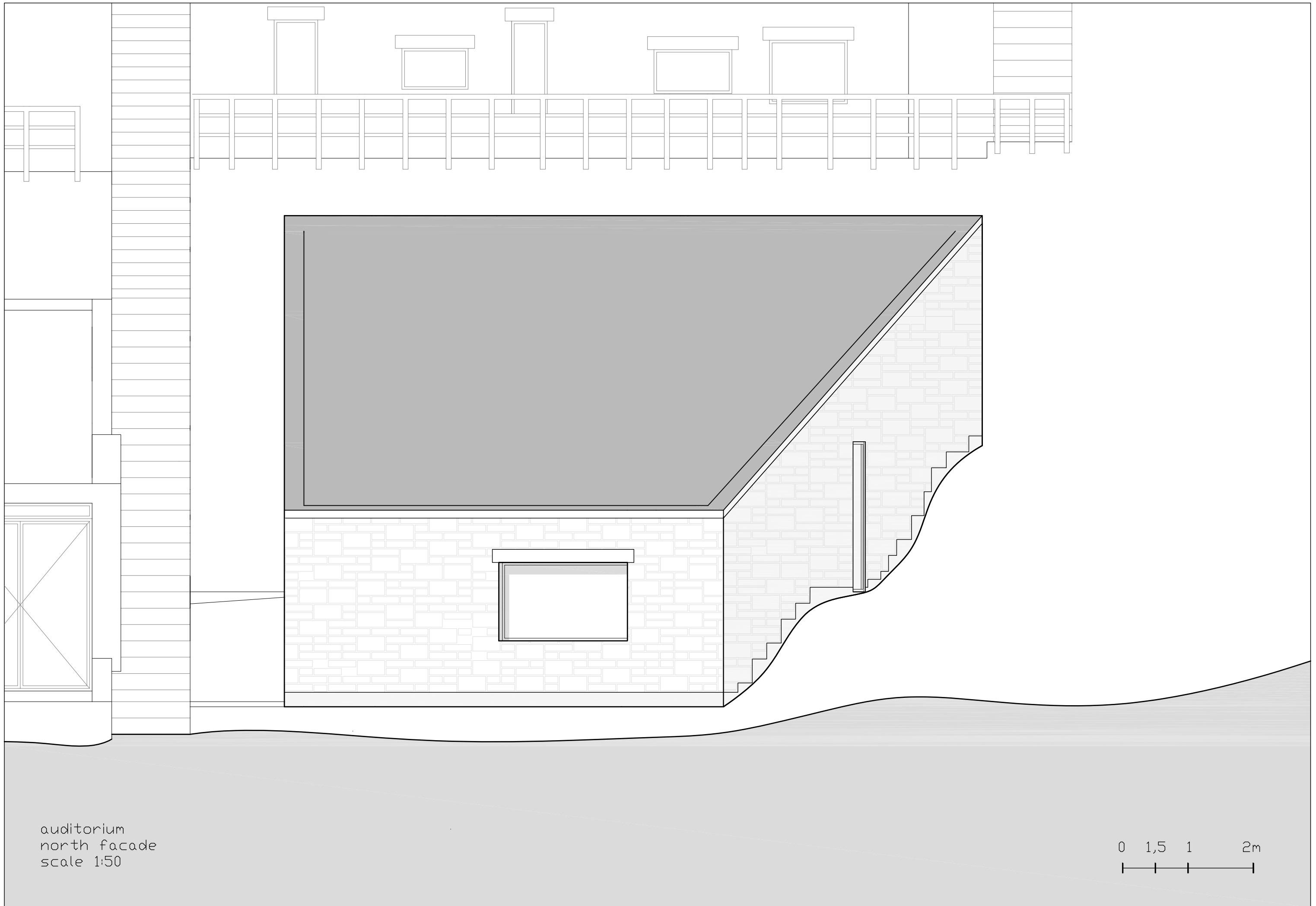
0   1,5 1   2m

auditorium
north facade
scale 1:50
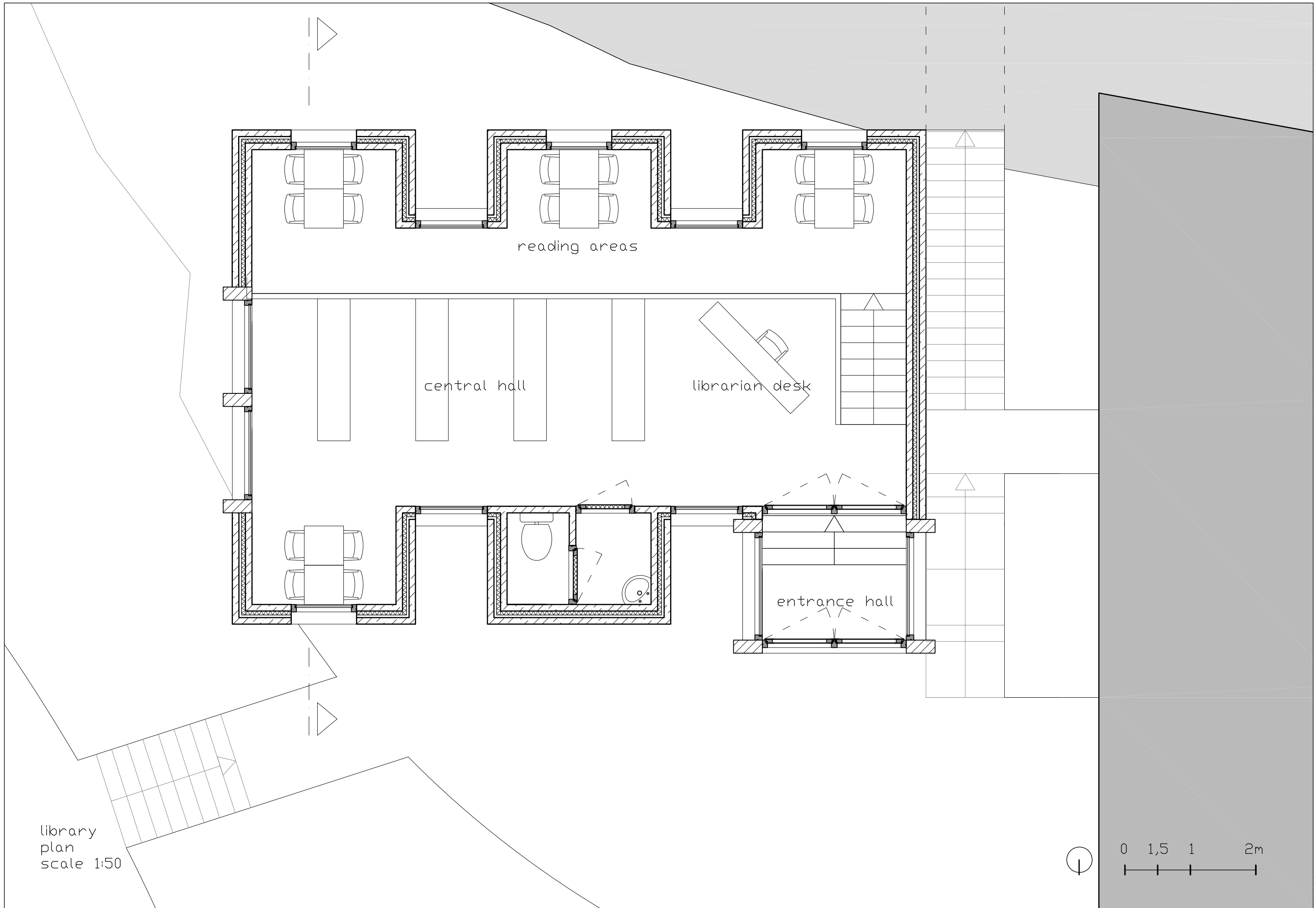
0 1,5 1   2m

reading areas

central hall

librarian desk

entrance hall

library
plan
scale 1:50

0   1,5   1   2m

reading areas

central hall
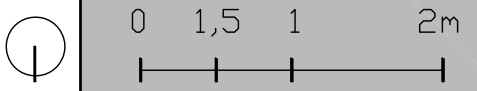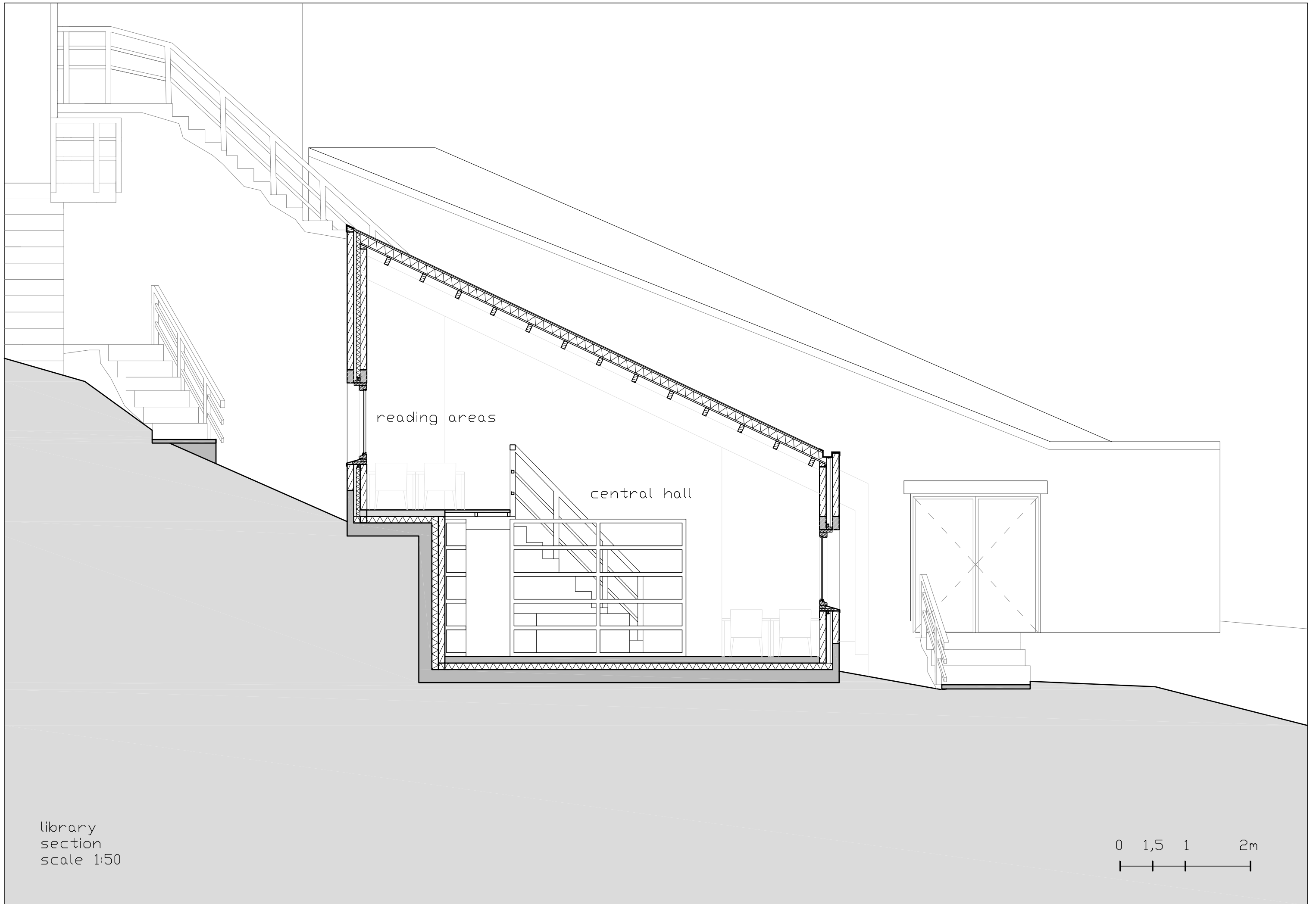
library
section
scale 1:50

0   1,5   1   2m

library
north facade
scale 1:50

0   1,5   1   2m

library
east facade
scale 1:50

0 1,5 1   2m

directors office

kitchen

office space

conference room
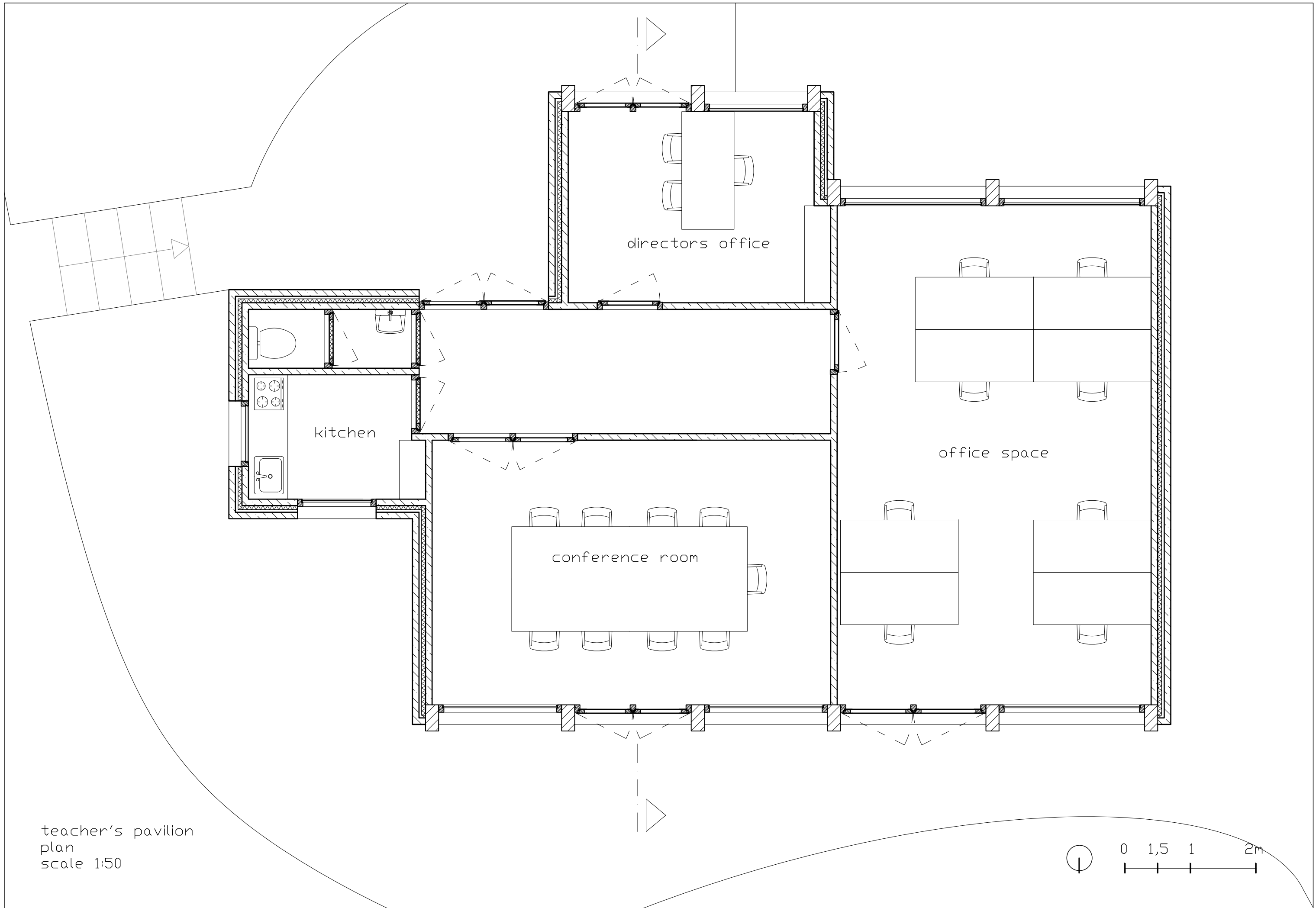
teacher's pavilion
plan
scale 1:50

0   1,5   1   2m

directors office

conference room
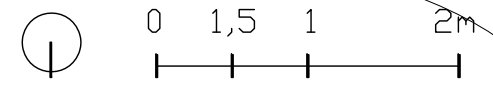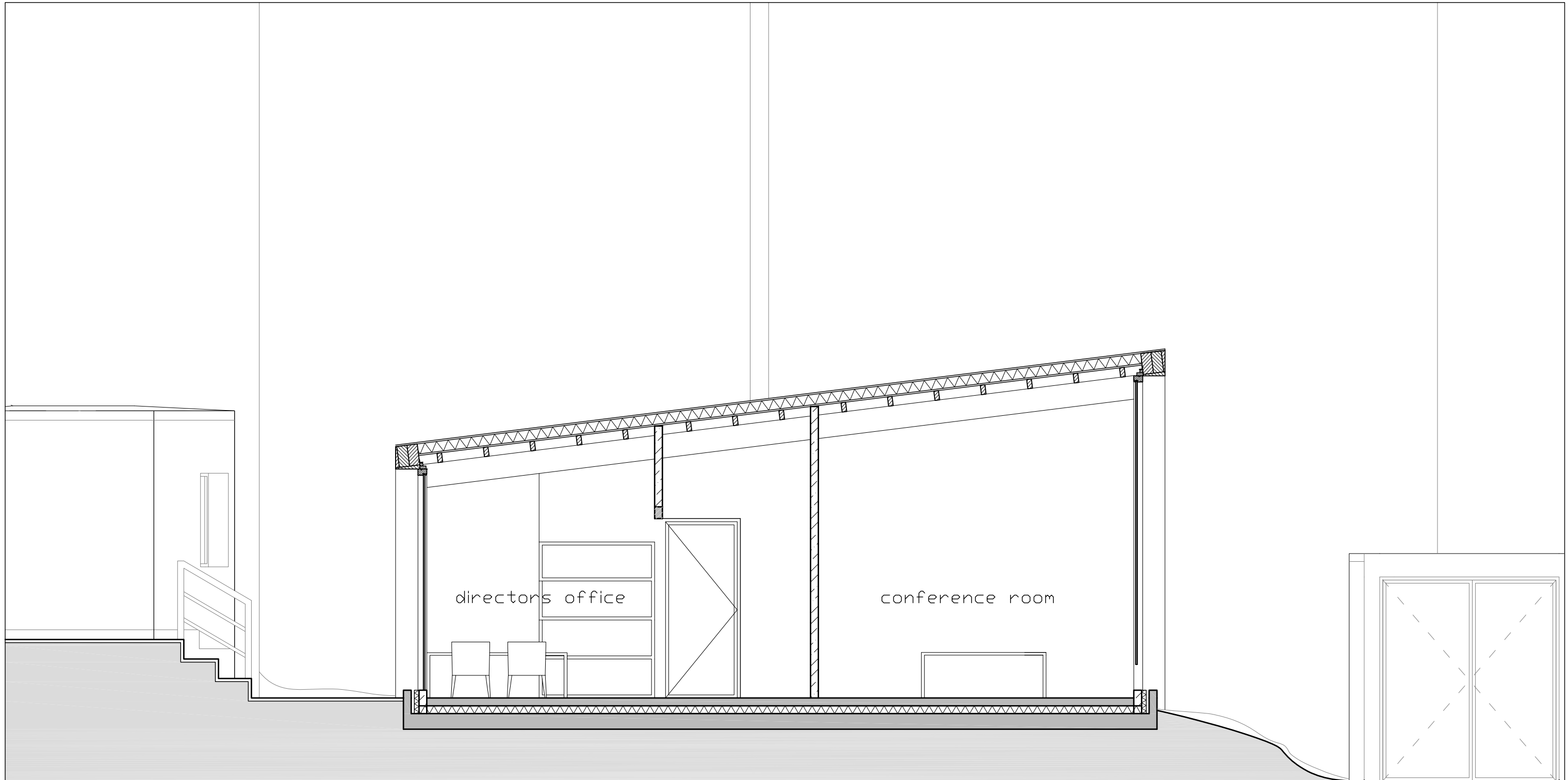
teacher's pavilion
section
scale 1:50
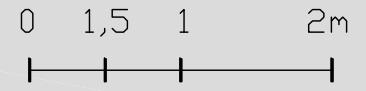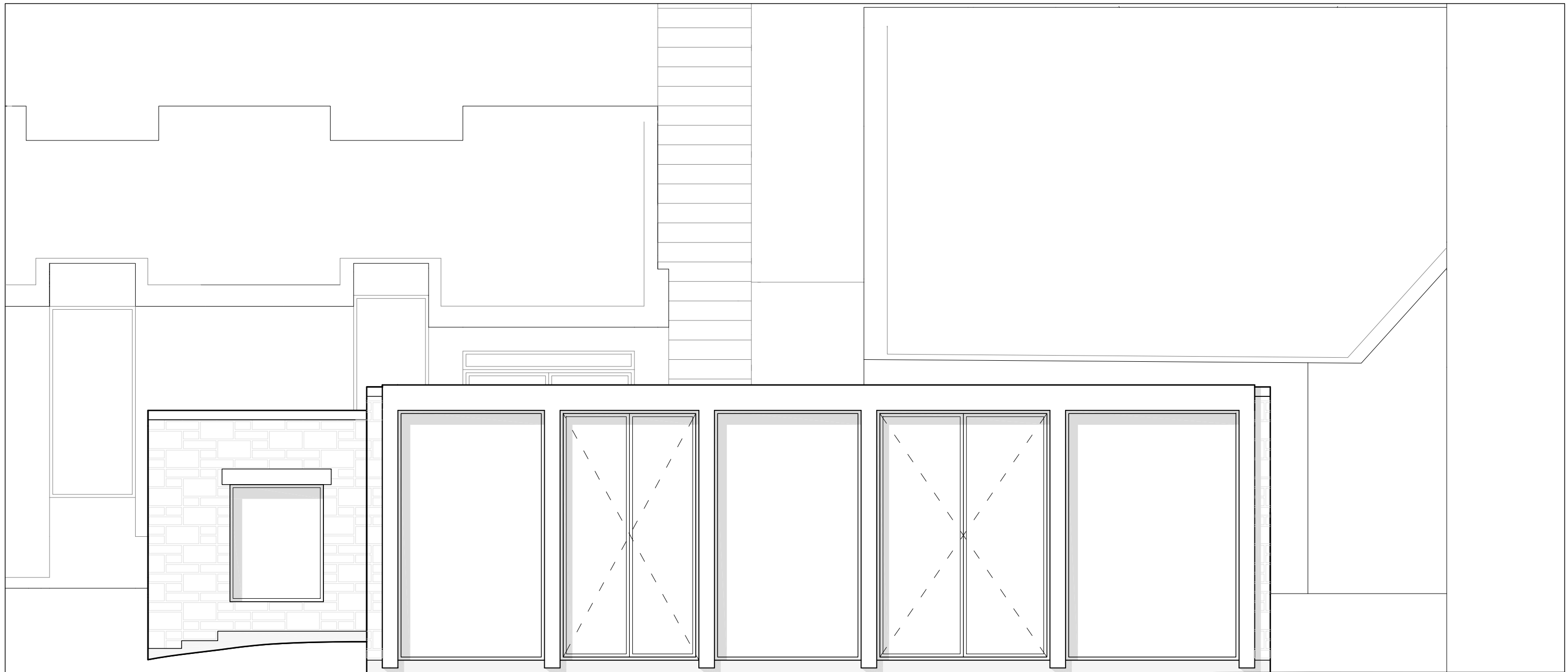
0 1,5 1   2m

teacher's pavilion
north facade
scale 1:50
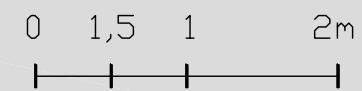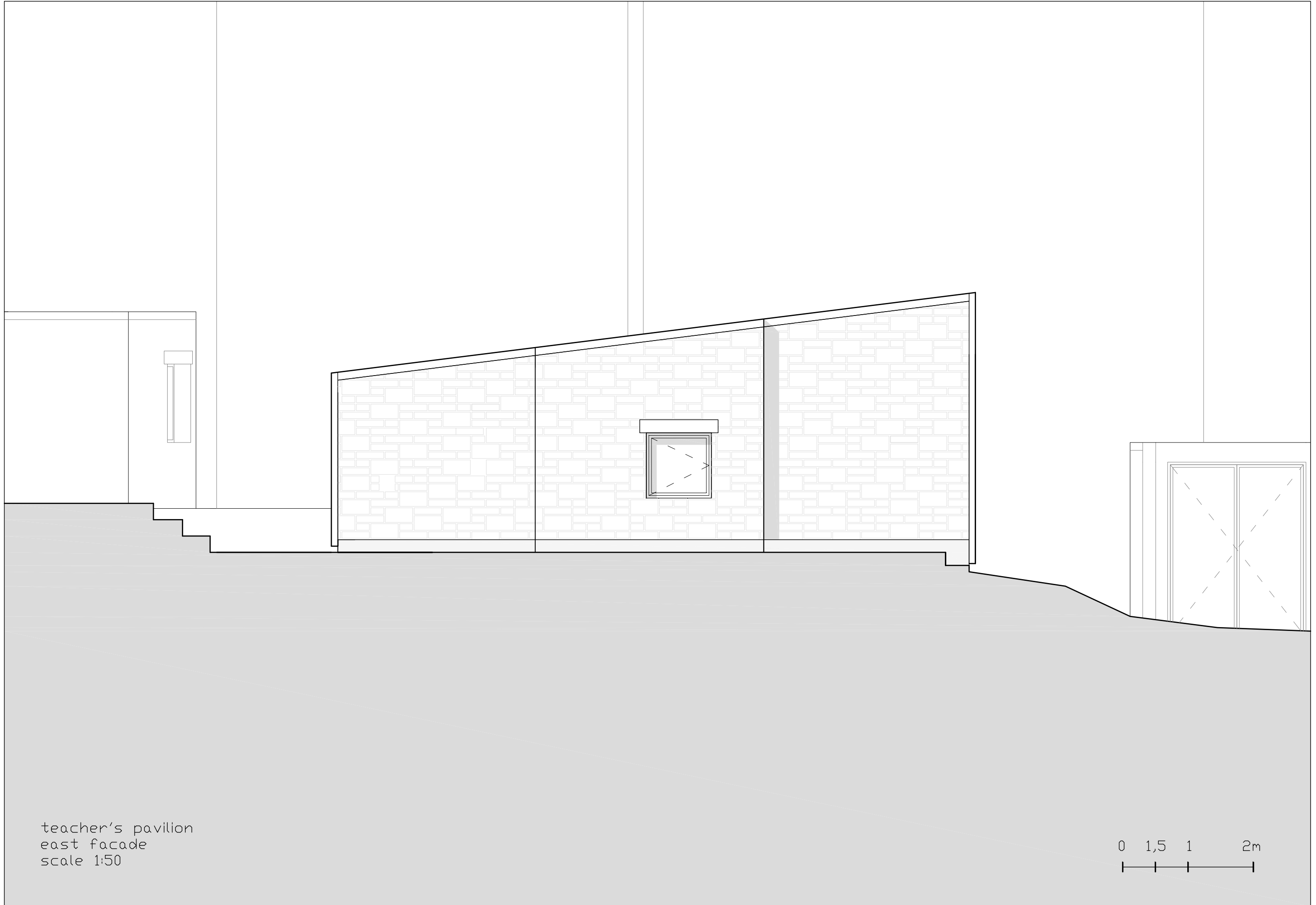
0   1,5   1   2m

teacher's pavilion
east facade
scale 1:50
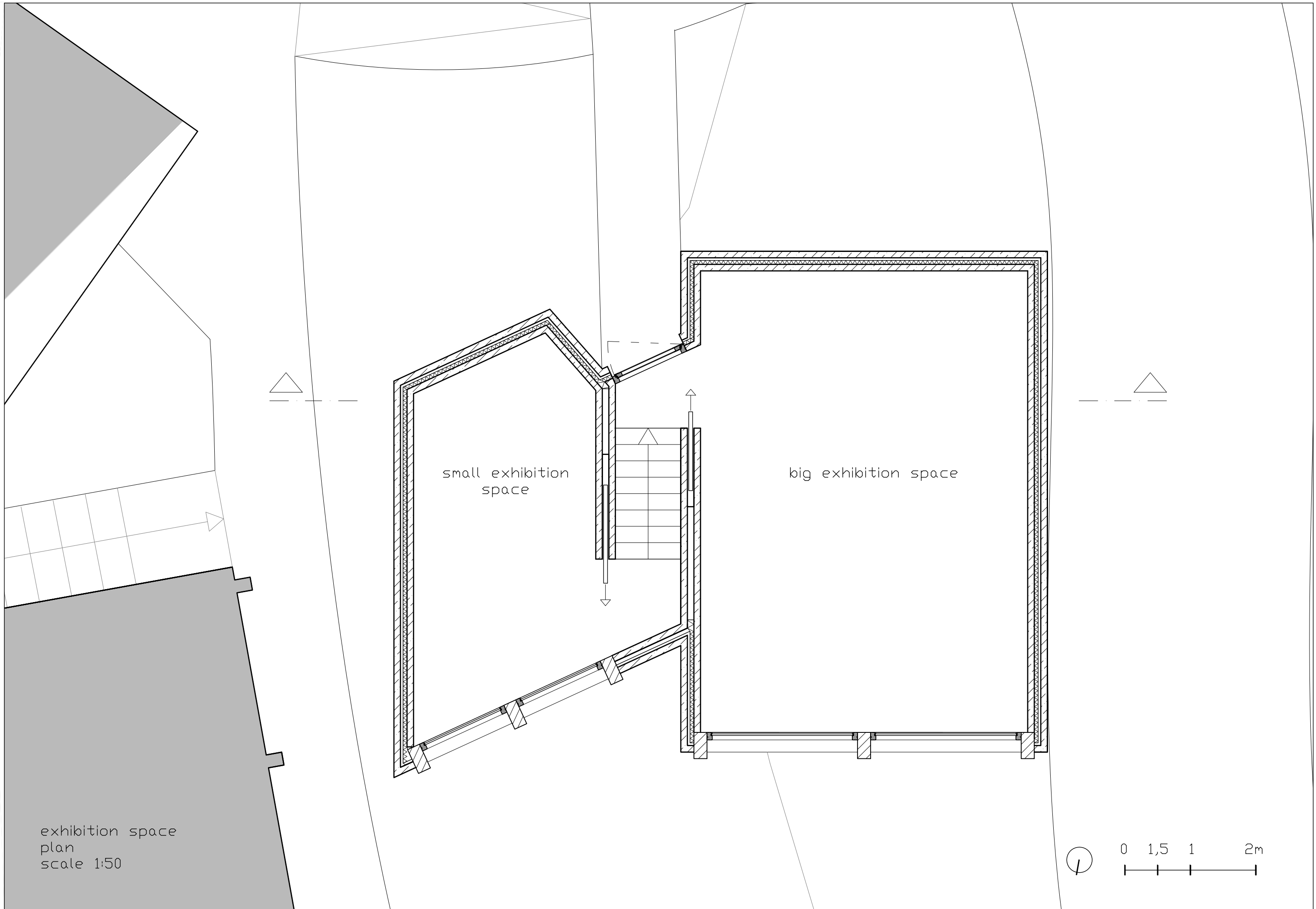
0   1,5 1   2m

small exhibition
space

big exhibition space

exhibition space
plan
scale 1:50

0   1,5   1   2m

big exhibition space

small exhibition space
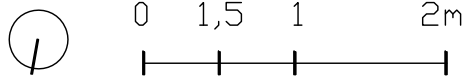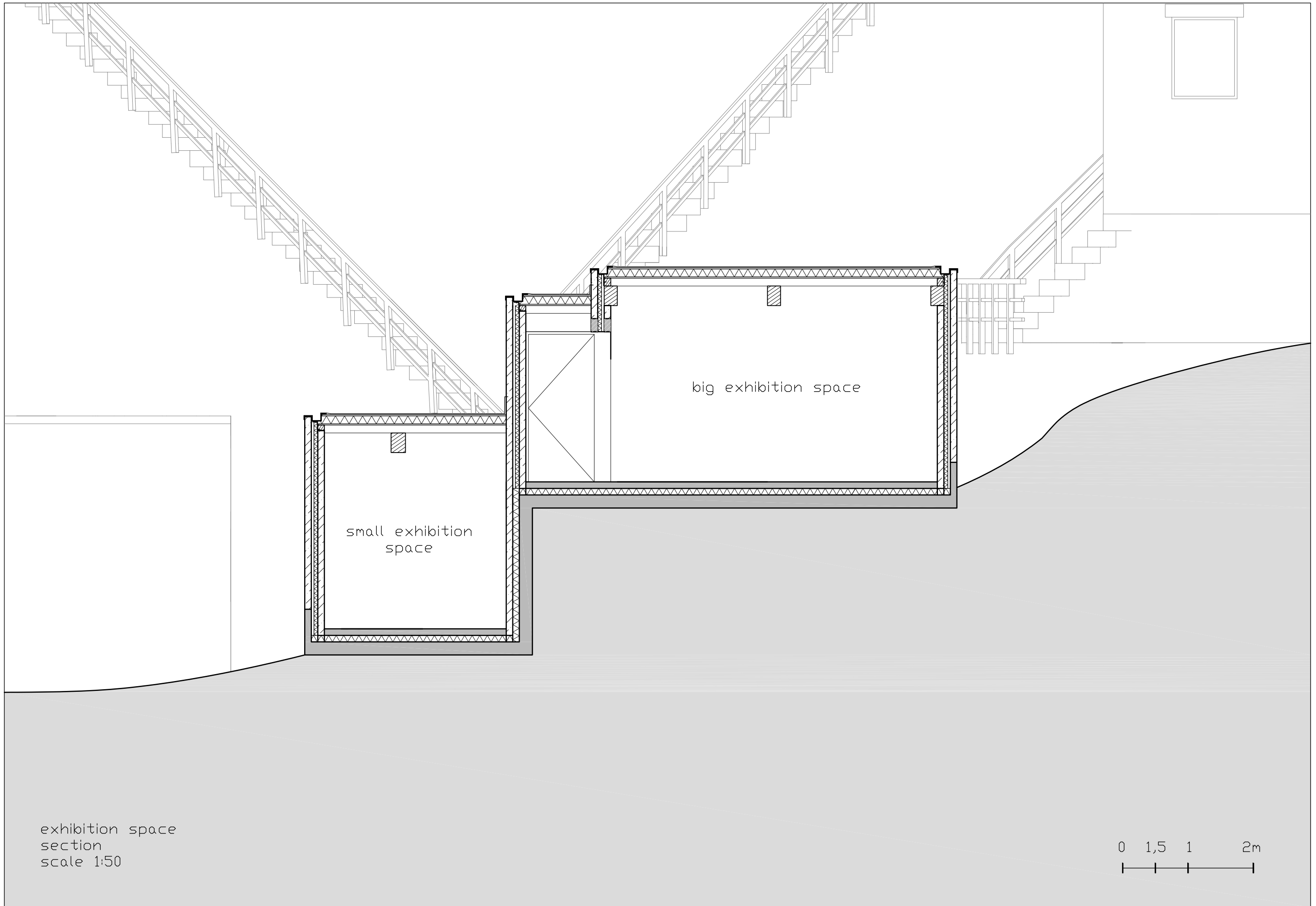
exhibition space
section
scale 1:50

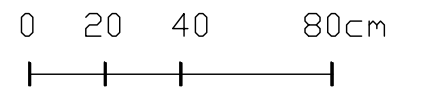0   1,5   1   2m

exhibition space
north facade
scale 1:50
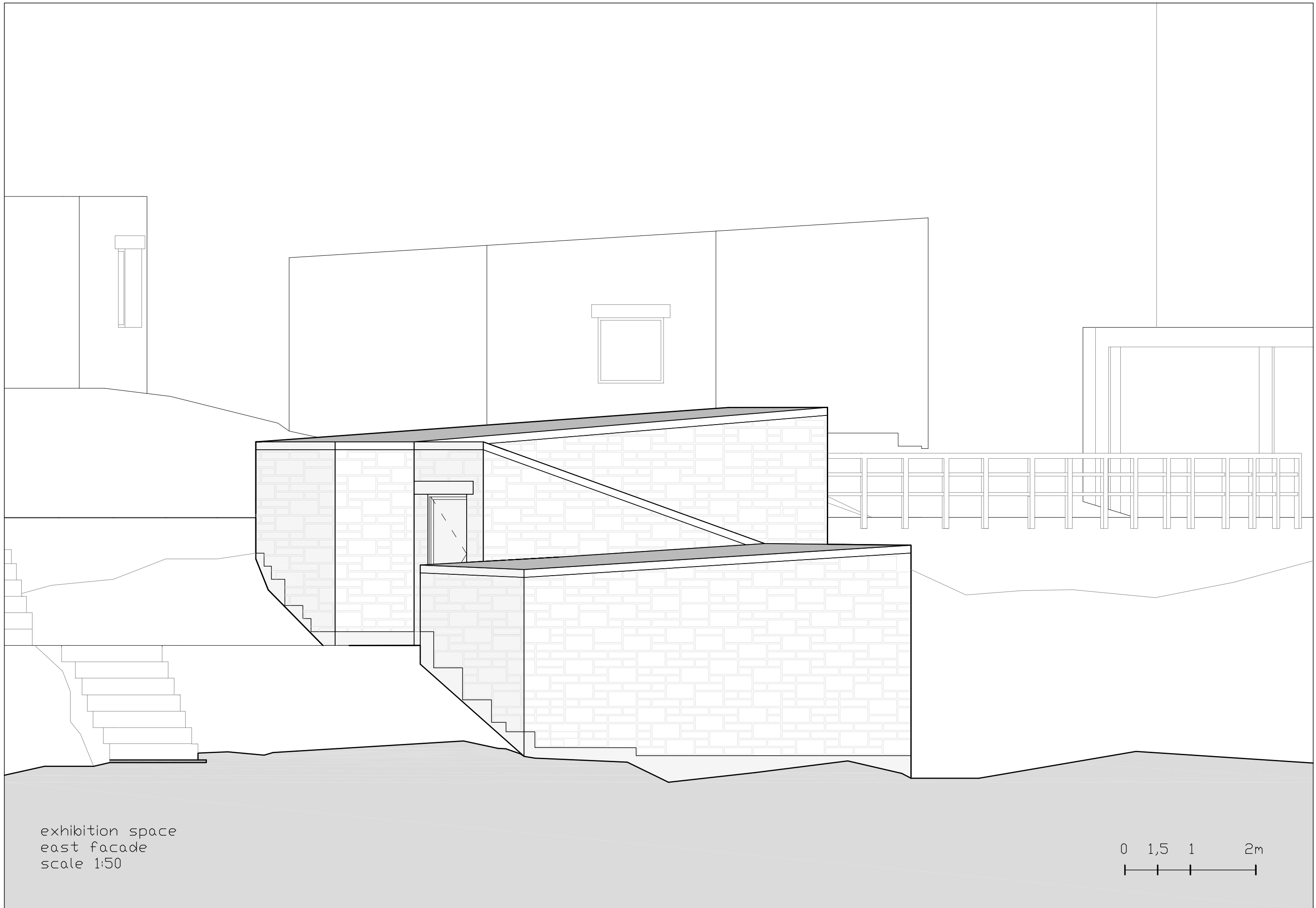
0   1,5   1   2m

exhibition space
east facade
scale 1:50

0   1,5   1   2m

protruding wooden pillar
from outer wall

windows and doors
outlined with inner wall
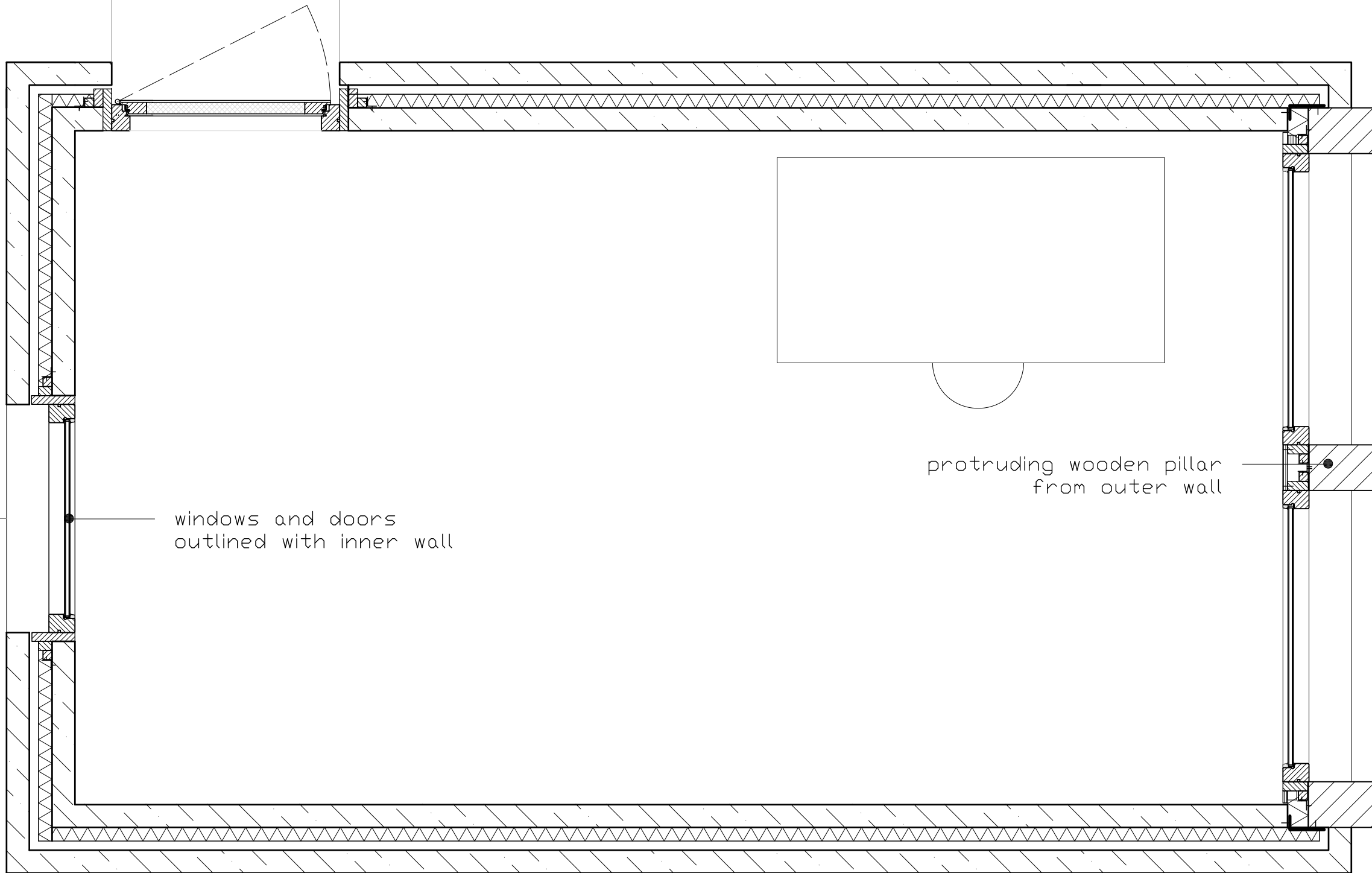
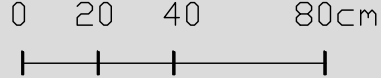concept plan
scale 1:20

0   20   40   80cm
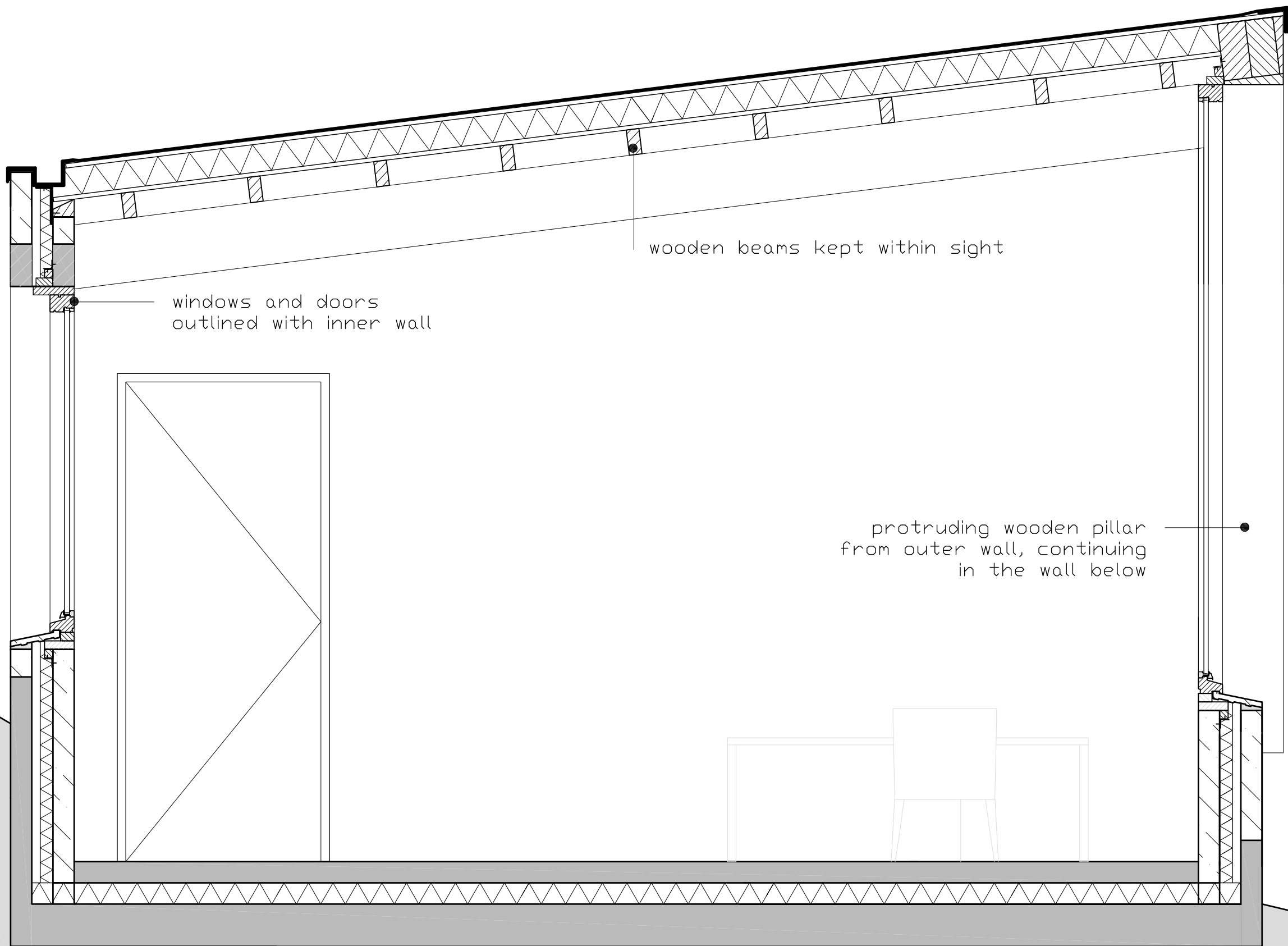
wooden beams kept within sight

windows and doors
outlined with inner wall

protruding wooden pillar
from outer wall, continuing
in the wall below

concept section
scale 1:20

0 20 40   80cm

EPDM roofing

aluminum gutter, integrated
in the wall to keep unity in
detail, irrespectively the
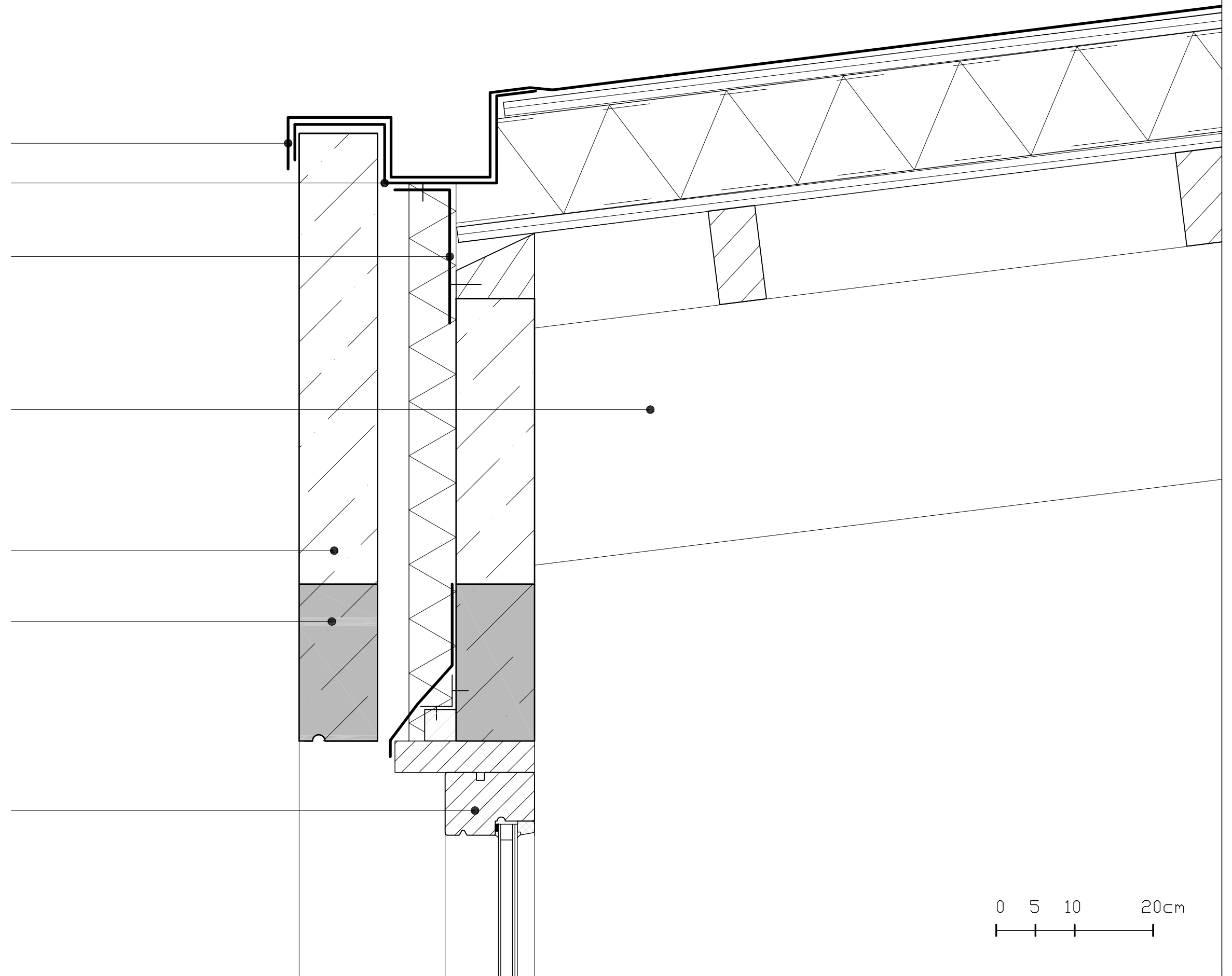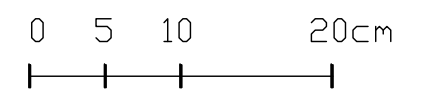difference in steepness or
the direction of the roof
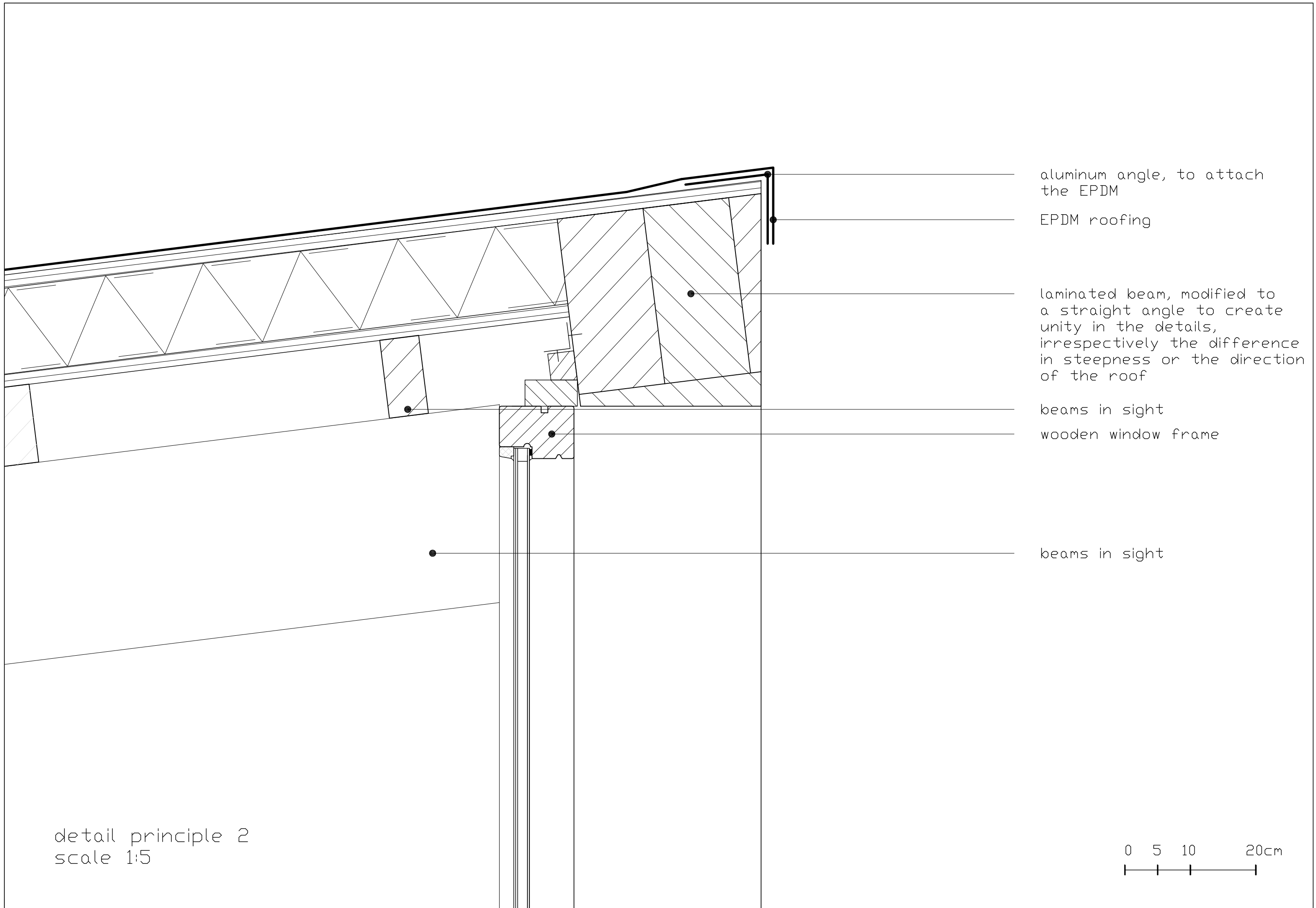
beams in sight

natural stone wall: granite

stone lintel

wooden window frame

detail principle 1
scale 1:5

0   5   10   20cm

aluminum angle, to attach
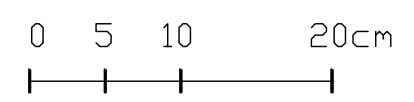the EPDM

EPDM roofing

laminated beam, modified to
a straight angle to create
unity in the details,
irrespectively the difference
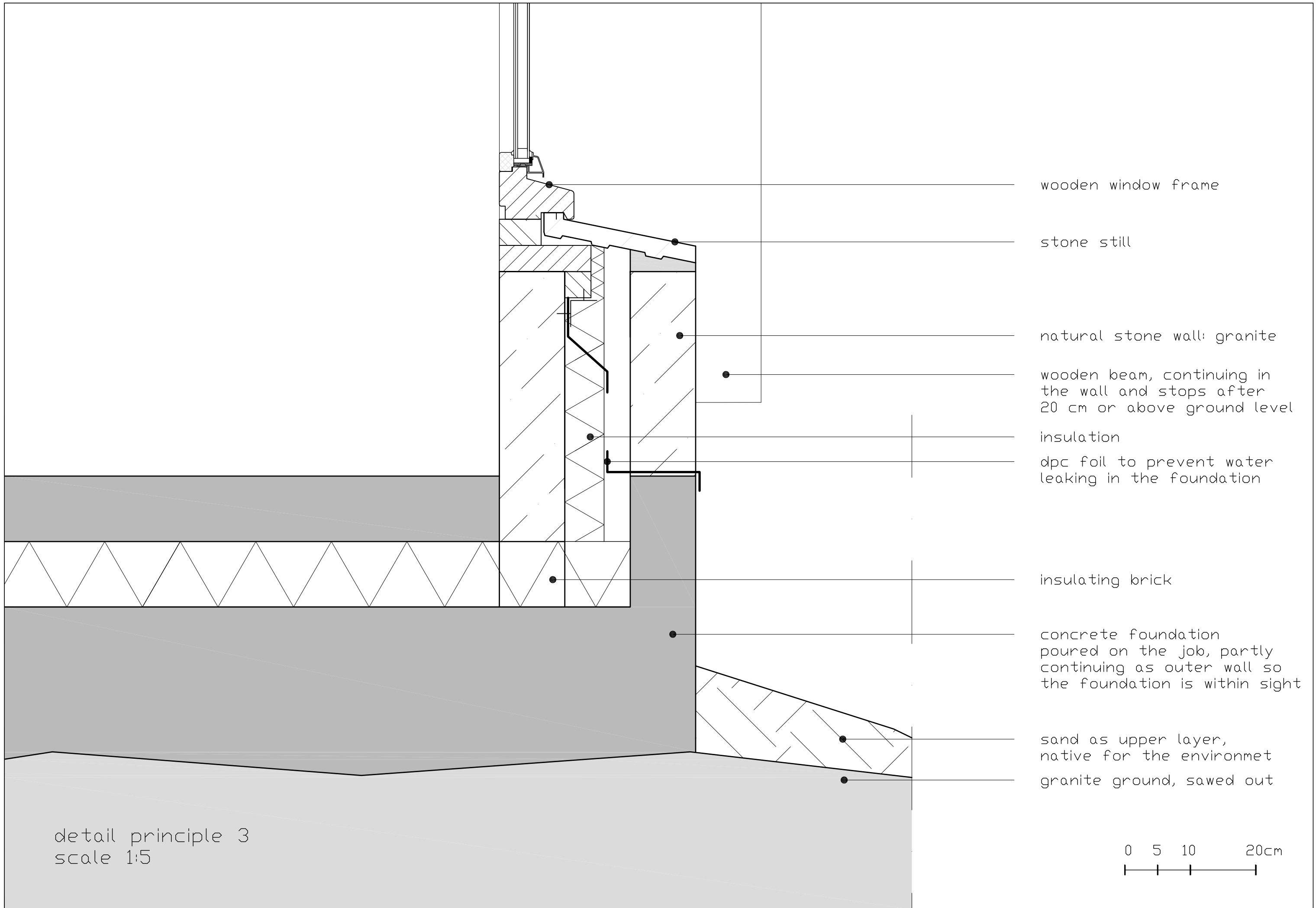in steepness or the direction
of the roof

beams in sight

wooden window frame

beams in sight

detail principle 2
scale 1:5

0   5   10   20cm

wooden window frame

stone still

natural stone wall: granite

wooden beam, continuing in
the wall and stops after
20 cm or above ground level

insulation

dpc foil to prevent water
leaking in the foundation

insulating brick

concrete foundation
poured on the job, partly
continuing as outer wall so
the foundation is within sight

sand as upper layer,
native for the environmet

granite ground, sawed out

detail principle 3
scale 1:5

0 5 10   20cm