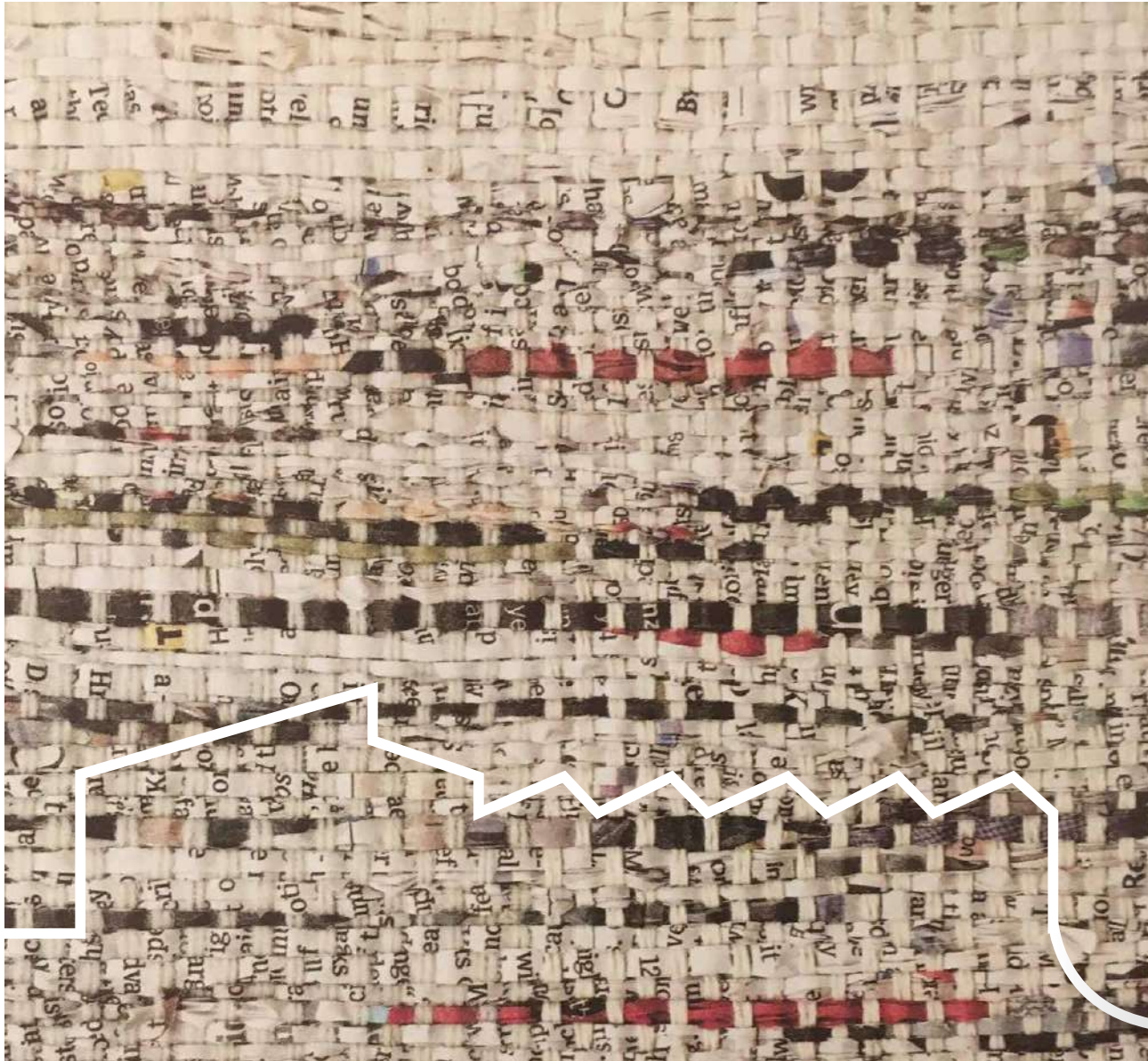
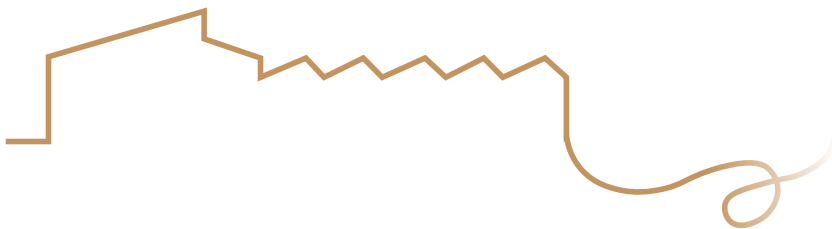




THE
SCHOOL
FOR
TEXTILE
CRAFTS



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Graduation Project

Crafts in the City - The School for Textile Craftsmanship

Chair of Urban Architecture
Technical University Delft

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Introduction

Craftsmanship used to be the origin of the production of goods ever since the existence of human life. Any natural material used to be manipulated manually and made into an object of use, be it adobe for house building, timber beams for furniture making or linen yarn for cloth fabrication. The type of material remained the same, however the way of manipulation has changed strongly over the centuries.

Mechanisation and industrialization have moved manual production away from the hands, towards machines.

In Europe, craftsmanship played a major role in the economy until the industrialisation. Dating back to medieval times, the acquisition of a certain craft used to be taught in craft schools in which apprentices gained knowledge of the manipulation of different materials. Masons, carpenters, sculptures, weavers etc. were each consolidated in guilds that promoted the respective craft.

Today, craftsmanship has almost been fully replaced by industrial mass production.

Also, the education of traditional craftsmanship has almost completely disappeared from European culture.

Mechanisation, however, has led to mass production of goods which in turn has become the cause of environmental damage, both on nature and on humans. Considering the effects

of the industry on the wellbeing of the planet, craftsmanship has started to be reconsidered in many different fields of production. The statement "less is more" has become much more than the modernist desire for minimalism in architecture * - it has become a statement against mass production and a plea for a sustainable fabrication of goods. Today's handmade production has the potential to bring about a smaller quantity with a better quality and strongly reduce the negative impact on the environment.

Craftsmanship therefore needs to be given a new platform in the European culture, a platform that promotes the education and exertion of the traditional practice in a modern society.

This research deals with the re-introduction and re-interpretation of crafts in the 21st century in the Dutch context. Focussing on the crafts of textile it explores the specifics of textile production and proposes the conceptual framework of a school for textile craftsmanship in the city of Delft.

The main research question

"In which way can a school for textile craftsmanship contribute to the urban fabric of Delft and function as a stimulating learning environment?"

runs like a thread through the whole research and is subdivided in four different research questions which all inform the design in different parts.

What is craftsmanship?

What are the requirements of a craft school?

What is the urban fabric of Delft and specifically of the Gasthuisplaats?

In which way can architecture represent textile craftsmanship and function as a didactic tool?

*"Less is more" was originally stated by the German architect Ludwig Mies van der Rohe, representative of modernist architecture in the 20th century.

Properties of a woven structure

The fabrication of textiles, more specifically the craft of weaving, is most likely one of the oldest crafts of humanity. Its basic principles of interlacing two parts of threads at right angles to each other has not been changed much over the centuries. (Treggiden 2018) However, the amount of material used for weaving has been enlarged in connection with the inventions of synthetic fibers.

It can be assumed that the first examples of woven structures pre-date the spinning of yarn. Fences or shelters were constructed by interlacing grasses or reeds into a woven structure which is seen as the precursor of weaving with yarn (Treggiden 2018). Over the time, various exemplars of looms were invented that steadily preceded the making of textiles in quality and quantity. Today, a woven textile has the same properties as centuries ago, the interlacing of horizontal and vertical yarns (warp and weft) has not changed.

From past to presence

The making and using of textiles has accompanied mankind ever since the first textile was woven. People all over the world use textiles everyday. Different elements of textile such as the type of fibers, the colors, the patterns and the weaving techniques used in the process of making the textiles give evidence of different historical, cultural and individual backgrounds.

Various different techniques of weaving have been used all over the world as also various weaving looms have been developed. Different cultures have different histories of textile production, like the chinese silk textiles that date back to the 12 century or the woven carpets of arab countries that were inherent parts of nomadic people.

Both, the silk textiles as well as the woven carpets are still of great cultural and economic meaning to the countries they originate from. Europe also has its own history of textile production which today tends to be almost forgotten. As with many other forms of craftsmanship, also the craft of weaving has been undergoing the changes of industrialization. What had once been exclusively done by hand has become more and more mechanized up to the point that the crafts of weaving has almost been forgotten.

In Germany, only 100 years ago the Bauhaus school of arts and crafts was a leading institute for manual textile fabrication that brought about weaving craftsmen who had great impact on textile production in Germany and beyond.

In the Netherlands, the textile production played a big role in the economy in the 19 century in which every third working person was employed in the textile industry. Cities like Tilburg and Eindhoven were so-called textile cities until the 1950 in which the local production rapidly decreased (textielNet, 2017). Many large manufacturers did not have the possibility to cope with competing countries as well as the increase of cheap import products and were forced to close down their local production one by one. In this context, also the crafts schools for textile craftsmanship were closing down.

Environmental impact of contemporary textile production

Today, a large majority of the textiles that are being sold on the European market have not been produced locally but are imported from third world countries in which a large number of people are being exploited in outsourced industries that have their roots in the western



society (Leach, 2020).

The concept of fast fashion dominates the fashion industry: clothes are being sold for low prices which stimulates the consumption which in turn leads to an acceleration of the production. However, the profit made in this business does not reach the last parts of the trade chain: the people in third world countries that produce the clothes. Inhuman work and live conditions as well as child labor are the tragic facts behind cheap fashion articles sold in Europe (Leach, 2020).

On top of that, the fashion industry causes 20% of the global wastewater and is responsible for 10% of carbon emission. Large amounts of textile waste are being landfilled or burned every year (UN environment programme, 2019).

In order to raise awareness for this current consumption of fast fashion in relation to a large amount of discarded textiles, the fashion brand Eileen Fischer has made a statement with an art installation “waste no more”. A pile of old clothes represents the throwaway society and poses the questions which value textiles has once it is not new anymore. This particular fashion brand invests in the reuse of fashion articles and proposes alternatives to casting off old textiles.

Eileen Fischer is by far not the only fashion brand that discusses the issues of fashion

consumption. More and more designers raise their voices in this discourse and explore possibilities of sustainability in the textile industry.

The fashion industry is also not the only industry to be looked at when talking about production of textiles as a whole. However, it takes up a large percentage of all textile production and is used exemplary to display the controversy.

The re-introduction of textile craftsmanship

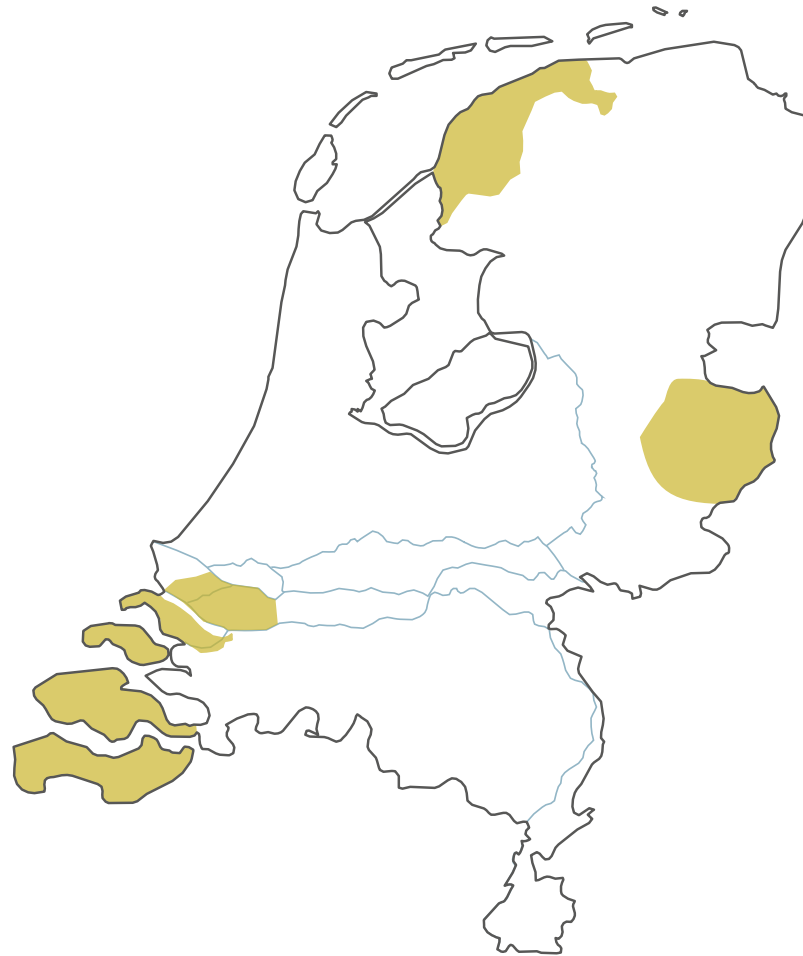
Considering the above mentioned issue of mass production in the textile industry, the re-introduction of the manual fabrication of textile is a proposal to change perspective on (fashion) consumption and state the opposites. If mass production advertises a large amount of cheap items of poor quality, crafted textiles provide a small amount of good quality to prices that justify the craftsmen’s labor. If mass production happens overseas, crafted textiles are manufactured locally.

Aleksandra Gaca, textile designer in Delft states that “the traditional craft of weaving will never disappear, it is a unique way of making textiles” (2020). She advocates for a paradigm shift by recommending that the “young generation should be taught about

the value of textiles” and therefore encourages that the “craft of weaving needs to be shown to them”.

The design of the school for textile craftsmanship reintroduces the craftsmanship of textile crafts in the Dutch context and thereby intends to create awareness for the local production of clothes. It is supposed to act as a platform that promotes the education and exertion of the traditional practice in a modern society.

The school itself contributes to solving the issues of fast fashion by making a plea for craftsmanship in general, and provides a platform for education as a starting point for a sustainable future of textile production.



2 Craftsmanship

In order to be able to implement the traditional practice of manual textile fabrication into the modern context in which textiles have long been mechanically produced, it is important to understand the production process itself. By comparing the traditional with the contemporary fabrication of textiles, it will be possible to give a definition of contemporary craftsmanship.

Using the example of the natural resource of flax, the material biography gives insight in the production of a flax textile. The illustrations show the traditional labor intense steps of manual treatment of flax plants as well as the contemporary treatment by machines. The traditional procedure gives evidence that the properties of the resource demand respective treatment techniques. Each step in the treatment is executed individually by hand.

Today, the workmen have almost been fully replaced by the machine. The process has become optimized, the single steps of treatment have become integrated in an automated process. Therefore much larger quantities can be achieved by machine production.

The changes from hand to machine in the treatment process of natural resources resemble the changes that have taken place in the fabrication process and use of the materials themselves. The industrial weaving machine has replaced the hand loom.

Overall, the material biographies propose an answer to the question

“What is craftsmanship?”.

By comparing the traditional with the contemporary fabrication of a piece of textile it becomes clear that the material properties themselves have not changed over time and still dictate the respective treatment today as they did in the past. Industrialized production can not be blot out from the contemporary fabrication anymore, however, this does not exclude the manual production techniques. Resuming the above said the following definition of contemporary craftsmanship is proposed to be a guiding theme for the research:

Contemporary craftsmanship is focusing on hand production by incorporating modern techniques to produce high quality products locally.

FLAX

Today, flax is the only natural fibre that is still being cultivated in large amounts in Western Europe. The Netherlands is one of the three biggest flax producing countries besides France and Belgium. In total, these three countries counted ca. 117.000 acres of agricultural land for flax cultivation in 2018. One acre of land can produce up to 20.000 km of flax.

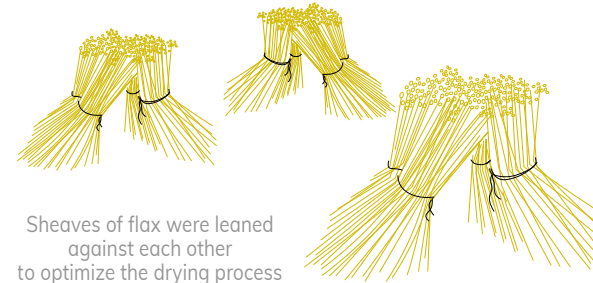
PAST



Farm laborer used to pull out the plants by hand



The so called vlasroterij was a roasting plant in which the flax was soaked in warm water for ca. 100 hours.



Sheaves of flax were leaned against each other to optimize the drying process

Big water bassins, ret chambers with watertight doors and a firing place with a chimney characterize a vlasroterij. These buildings, used in the middle of the 20th century, now belong to historic sites of the Netherlands.

HARVESTING

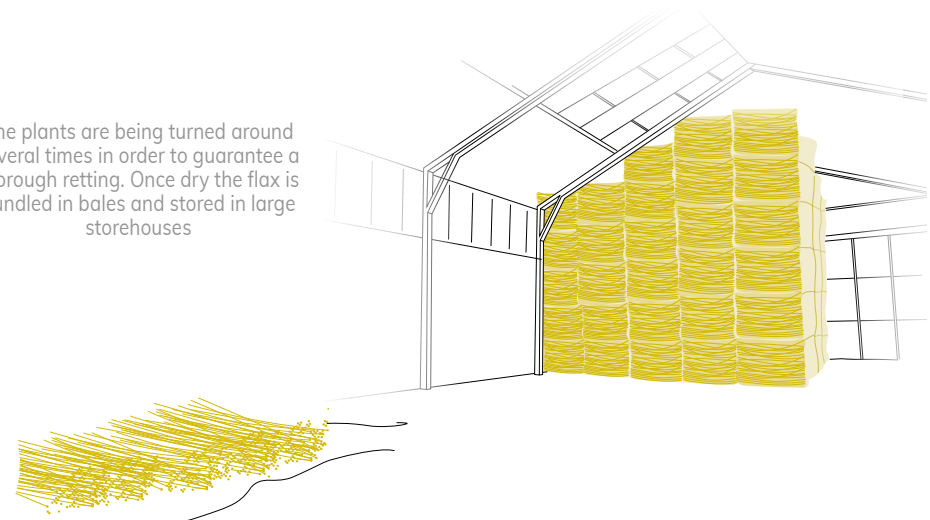
RETTING

PRESENT



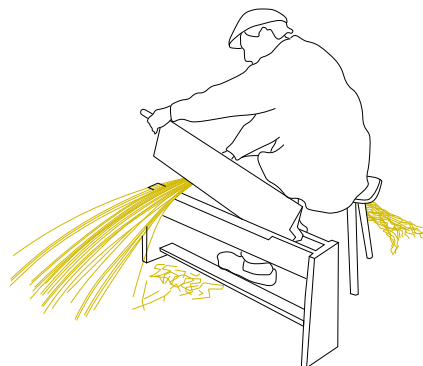
Today, agricultural machines uproot the plants with special flax puller fixtures

The plants are being turned around several times in order to guarantee a thorough retting. Once dry the flax is bundled in bales and stored in large storehouses



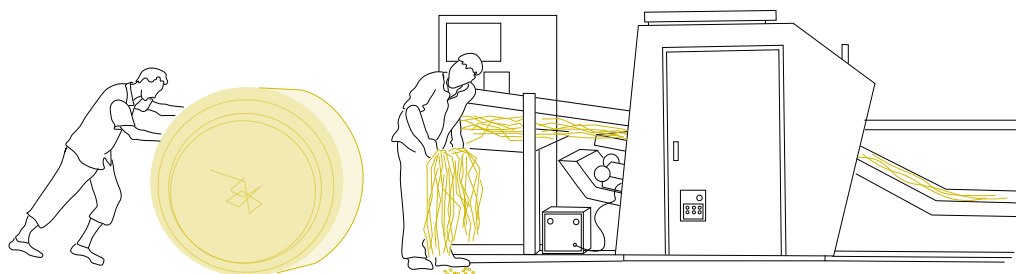


The heckle is a wooden tool used for threshing the flax which separates the stems from the seeds.



The flax fiber was broken open with the break, a wooden tool that cracks the main structure of the stalks into smaller segments.

DRESSING



The automatized dressing process is performed by three machines: one for threshing out the seed, one for breaking and separating the straw from the fiber, and one for further separating the broken straw from the fiber.

HARVESTING

The growing cycle of the flax plant is short. Sowing takes place at the beginning of April, only 80 days later the flax is blooming with little blue flowers for one day. The plants mature another 20 days until they are being harvested in June. Due to the fact that the flax fibers are not only in the stem but also in the roots, the plant is never cut but fully uprooted. Flax is an annual plant and needs to be sown out again the next year.

RETTING

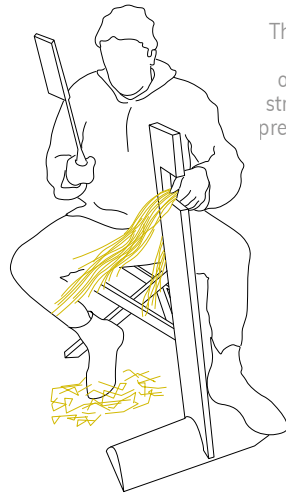
In order to free the flax fibers from the inner core and the outer skin of the stalks, the plants need to be soaked in water and dried afterwards. This can be done in different ways, the most ecological is by spreading the plants out on the field where they are exposed to rain, dew and sun. During this time the pectins that hold the fibers together dissolve and release the fibers that become brittle and easy to break.

DRESSING

Before the flax is being processed, the flax is threshed in order to separate the seeds from the stems. The seeds are being used as crops for the following year, for the fabrication of line seed flour and oil, for cosmetics, for the color industry and animal feed. The dressing process consists of three steps in which the straw is separated from the fibers:

1 - The breaking breaks the structure of the stems and softens the stalks

PAST



The flax was held over a wooden trestle and is treated with an oscillating knife which removes straw particles from the fiber. The preciser the sutching, the better the quality of the fibers was.

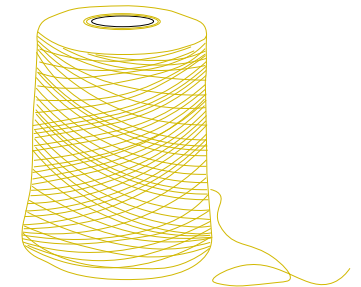
The fine heckling was done with various sizes of heckling combs which have a bed of nails-sharp, long-tapered steel pins driven into wooden blocks.

Short and long fibers were separated from each other. The short fibers were a by-product of which ropes were made whereas the long fibers were further processed into yarn.



The hand spun yarn did not have an even structure but shows little irregularities.

Through the pushing of the pedal the spinning wheel turns continuously which transfers the turning onto the bobbin. Bundles of flax were manually laced on the bobbin - the fast rotation twists the fibers to a yarn.



DRESSING

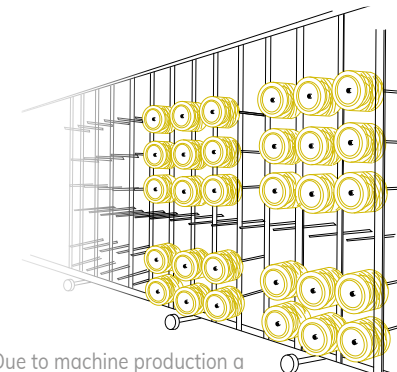
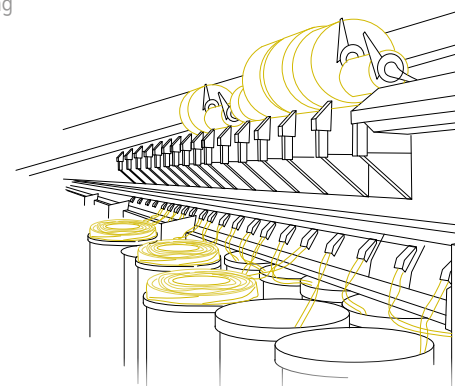
SPINNING

PRESENT

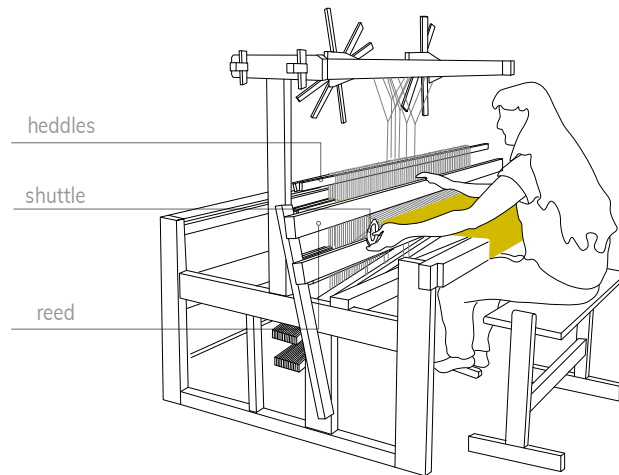


The refining machine processes the heckles the fibers to a fine state so that they can be used for spinning.

Large bundles of flax are placed into the industrial spinning machine



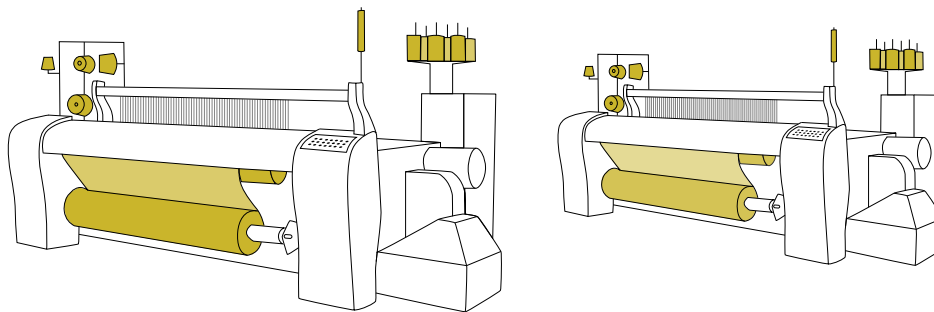
Due to machine production a large amount of bobbins can be spun at once. The structure of the linen yarn is even.



All elements on the hand loom function manually. The warping is done by hand which takes a few hours.

The reed moves by the pressing of pedals, the shuttle is sent back and forth through the warp threads by hand.

WEAVING



The fully automatic warping machine is computerized. Many looms work at the same time and are controlled by a central computer monitoring system that detect faults and does quality checks.

2 - the scutching removes parts of the straw from the stalks and increases the softness of the fibers.

3 - In the heckling - again the flax is being heckelt, this time in a much finer process, which removes the last bits of straw. The fibers have now become soft enough to be spun.

Only long fibers are being spun to yarn, short fibers are a by-product and are used for low-graded products such as ropes.

SPINNING

In this process the fibers are spun into yarns of different weights and thicknesses. The fine yarns are wet spun. The processing of flax is completed once the yarn is spun. It is now called linen yarn. Bobbins with the linen yarns are being delivered for warp and weft yarns to linen weavers. The yarn still has the original color of flax, dyeing occurs once the textile is woven.

WEAVING

On the weaving loom weft yarns are interlaced with warp yarns which produces the textile. Different heddles that are moving up and down separate the warp threads whilst the reed is closing up the weft threads. The shuttle is moving forwards and backwards, interlacing warp and weft yarns.



3

Places of textile production

In order to become familiar with the production of textiles, both the traditional and in the contemporary, interviews with textile designers and craftsmen as well as field trips to different places of production were being conducted.

A total of four semi-structured interviews with textile designers from the Netherlands, Belgium and Great Britain have been undertaken, either in a personal or a digital conversation or by means of an inquiry. Two textile ateliers have been visited in Delft and Amsterdam as well as the Textile Museum in Tilburg.

Overall, this part of the research played a very tangible role in the understanding of the craft itself: by seeing people work on looms, by touching different fibers, by hearing about individual approaches in the creation of textile, much information could be gained. Out of the number of interviews and field trips, the following three display the variety of places in which the craft of textiles is being performed.

In order to reflect on the individual atmospheres of the places as well as the type of textile and the different aspects of the making as good as possible, the following observations and findings are being recorded in a descriptive way, in which answers to interview questions as well as elements of the spaces, appearances of the textiles, sounds of machines, amount of people present are being mentioned.

The examples serve the purpose to research textile itself and the different spatial requirements of production.

De ambachtelijke weverij, Amsterdam

site visit and interview with Sytze Roos
9th May 2020

The weaving studio of Sytze Roos is located on the ground floor of an old office building which nowadays provides space for artist ateliers and craft studios. De ambachtelijke weverij consists of one single room of about 50 m² in which looms of different sizes stand closely next to each other, long shelves of colorful bobbins decorate the walls, and a little kitchenette provides a warm cup of tee.

Sytze Roos is the founder of the weaving studio which he runs as a school for people interested in weaving on the loom. Throughout the week he runs several courses which are designed for six month in which the participants learn all they need to know in order to be able to work independently on the loom. Most of the participants are women. The studio has a somewhat domestic atmosphere, not only because everyone is wearing slippers in order to keep the loom's pedals clean, but also because of the informal setting of the

description of the weaving studio:

small, intimate space
manually interlacing warp and weft
„weaving is constructing“
rhythmic, steady, constant work
head to hand
little group of textile craftsmen

room, the narrowness of corridors between the looms and the little amount of people working there. It seems as if everyone knows each other. Once the loom is clamped and the warp is winded on the reel, the person who is weaving enters a steady pace of movement of the hands and legs.

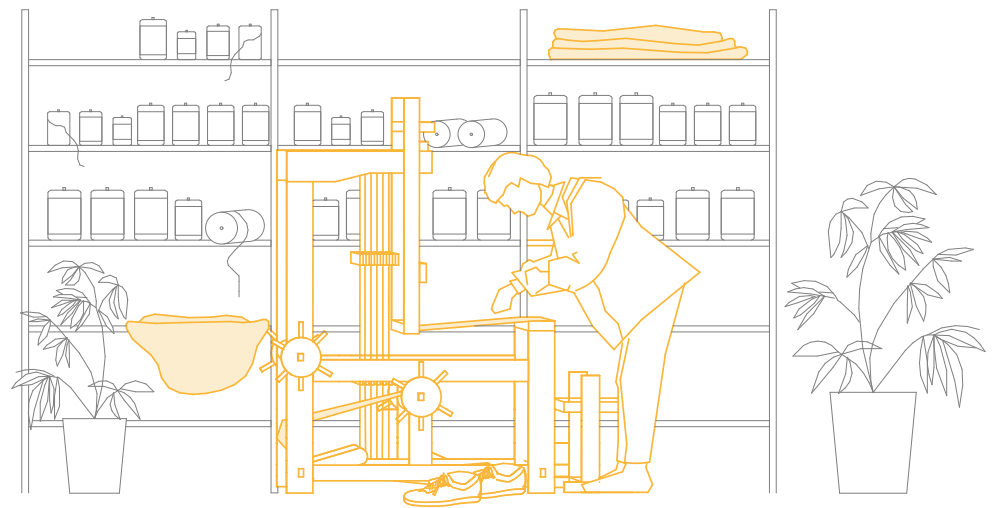
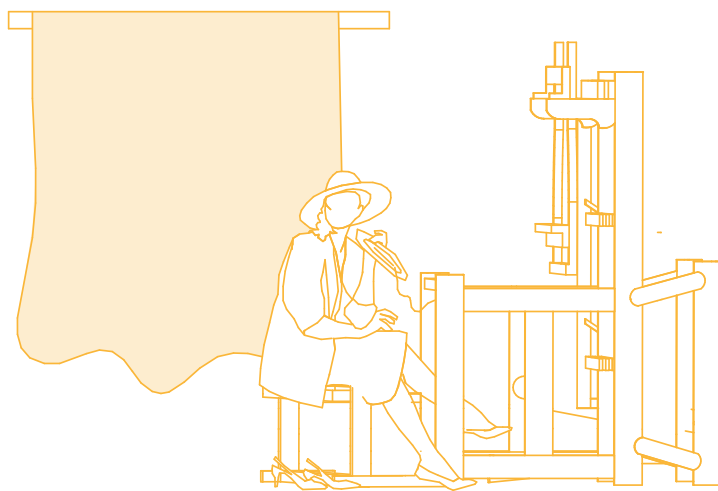
The weaver and the loom take up about 1m² and this is the space on which a towel, a scarf or a blanket comes into being in a contemplative working process of many hours. Every part of the work requires patience, the clamping of the loom alone can take up to a whole day. Hundreds of weft strings need to be set in the right position before the weft string can be brought into action. Once the weaver is busy with his work, one only hears the rhythmic sound of the clapping of wooden elements and the breathing of the weaver.

The studio is free from any art piece, besides a banner with a poem, the walls are blank and do not stimulate any inspiration. The students of the weaving course learn to get their inspiration from the craft itself. The more they weave, the more they should find their inspiration and develop their own handwriting. Sytze himself does not work with any inspirations from outside the textile itself. To him, the constructional thinking stands above the conceptual.

The technique of interlacing warp and weft

equals construction: weaving is constructing, according to him.

After having studied the craft of weaving at different schools in the past, Sytze keeps improvising with weaving techniques and researches new ways and forms of two and three dimensional textiles. One of his pieces is a 4m long, 1,5m wide cloth, consisting of yellow, pink, green and blue fibers. The longer one looks at the piece the more one gets lost in the depth of the structure of horizontal and vertical lines.





Textile Museum Tilburg

site visit on 4th August 2020

The textile museum in Tilburg is the only place in the world where design, art, fashion, heritage and innovation in the field of textiles come together (Textiel Museum, 2020). The museum combines the history, presence and future of textiles in one place: a permanent exhibition displays ancient weaving looms and the industrialised development of the loom's mechanics, different temporal exhibitions show contemporary textile designs, and the Textile Lab is the place for experiments and innovation with textiles.

Specifically, the latter was the subject of observation. The historical weaving mill has today been transformed into a modern factory in which the various possibilities of weaving, crocheting, lasering, tufting and broduring are being explored with modern technologies such as the industrialized jacquard loom (Textiel Museum, 2020). It is a place where textile designers from all over the world produce their designs in large amounts with excellent qualities.

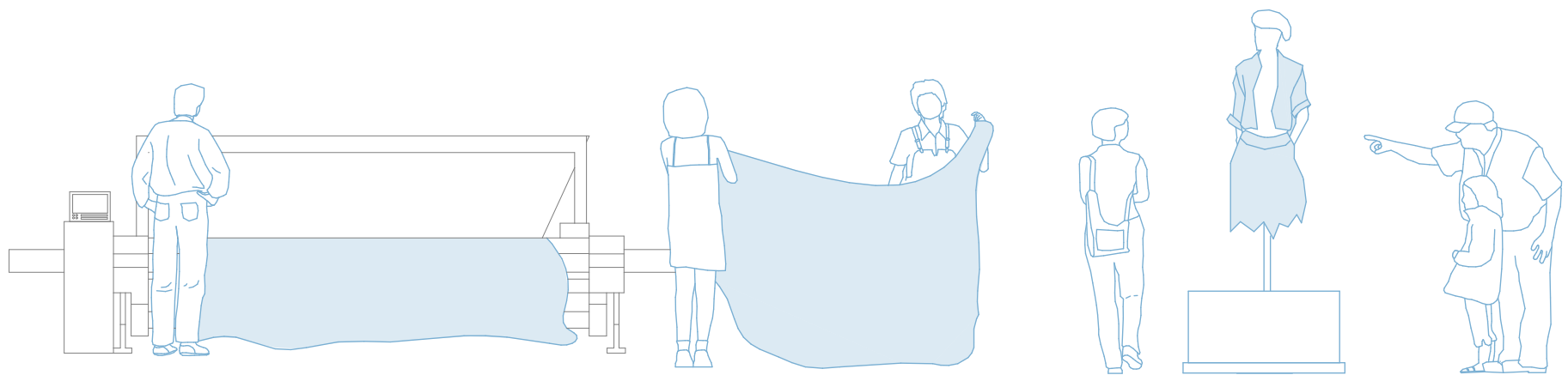
The design of a textile usually starts with an idea that is being transferred to the loom by hand. By manually weaving small samples, the properties of the textile can be developed

before they are being implemented on the jacquard loom (Aleksandra Gaca, 2020). Once the digitized design of the textile is being transferred to the jacquard loom, it takes a very short time until the fabric is completed. A jacquard loom has about four times the size of a traditional loom and works fully automated.

The large hall of the Lab gives room to a variety of weaving, crocheting and tufting machines, which produce continuous chattering sounds that predominate any other sounds. The making of the textile is loud and fast and impetuous.

description of the machine hall:

industrial space
noisy, robust machines of metal
high speed fabrication of large quantities
digital operation of the loom
many different textile artists



Luca School of Arts, Brussels

interview with Marie Mees
28th May 2020

The textile artist Marie Mees runs her own firm and teaches textile design at the campus Sint Lukas of the Luca School of Arts in Brussels. The students run a three year bachelor + one year master program in which they start with the foundation of weaving techniques and proceed with the design of their own ideas which they then produce by hand and by machine. Besides the education in the field of history of art and textile, material science, research methods and technology, the emphasis lies on learning by doing: by understanding the principles of interlacing warp and weft by hand, acquiring manual skills and developing the design on paper to a tangible textile object.

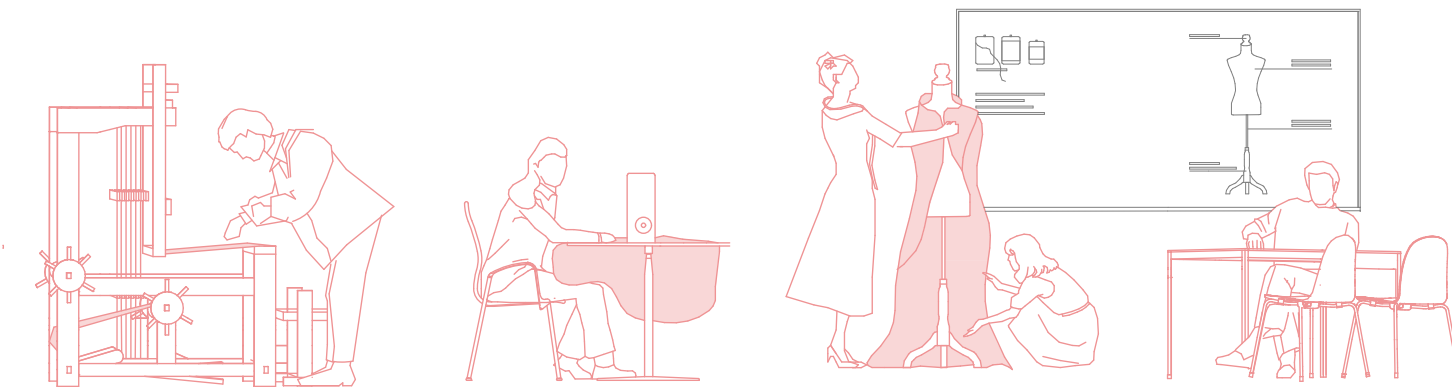
The students are encouraged to experiment, invent, explore and finally exhibit their work. Studio spaces filled with sketches, computers and material samples belong as much to the everyday life as the large exhibition hall in which the objects all have their appropriate places.

The type of the students' work ranges from a singular piece of fabric to a tailored piece of cloth to a furnishing object, some of small, others of large size. The way in which the students present their work differs from the

exhibition of the object on one defined spot in the exhibition hall to the showing of the textile in action by the artist himself in a kind of scene play to an outdoor installation. The interior of the exhibition spaces is kept simple in layout, the walls are painted in light colors in order to let the exhibited objects stand out the most. The incidence of day light through large windows plays an important role for the optimal display of the textiles.

Marie Mees herself prefers these light, reserved spaces most for her own creativity - "I like zero-space to fill it in with whatever". To her the flexible use of a working space is important as one never knows how large the next design will be. To be able to change the space according to the textile's need is an essential requirement.





description of the weaving school:

studios, workshops, classrooms, exhibition rooms
individual work vs. group work
theory and practice
designing, crafting, writing
manual and industrial techniques
students

Overall, it can be concluded that these three specific examples represent three different types of environments in which textile is being fabricated. The size of the spaces matches with the way of working and it becomes clear that the production and exhibition of textiles requires different spatial conditions. All three places are learning environments in which theory, practice and exchange of textile production is being cultivated.

The atelier of Sytze Ros has a focus on the manual practice of textile fabrication and is a place where exchange amongst different craftsmen takes place. The Textile Lab on the other hand has a much bigger emphasis of exchange of knowledge and practice due to its scale and possibilities. The practice however is focused on industrialized production. Lastly, the Luca School of Arts represents a place in which theory and practice in the field of textile design encounter each other.

Conceptual framework

Based on additional interviews with textile artists and craftsmen as well as the above stated reference studies of the atelier, the lab and the school it can be concluded that the design for the school of textile craftsmanship is supposed to be a learning environment in which the above stated theory, practice and

exchange of the craft is being transferred.

The summary of reference studies are concluded in the drawing of a conceptual section which answers the research question "What are the requirements for a school for textile crafts?"

Two different scales approach the different dimensions of the school - the architectural configurations and necessities, as well as the (internal) organisation of the school. The different floors in the tailor's dummy represent different steps within the education process of the students and give insights in important aspects of the textile craftsmanship - the students first learn to make the textiles themselves by weaving on hand looms and later on design and produce different kind objects (interior or fashion related) from the textile.

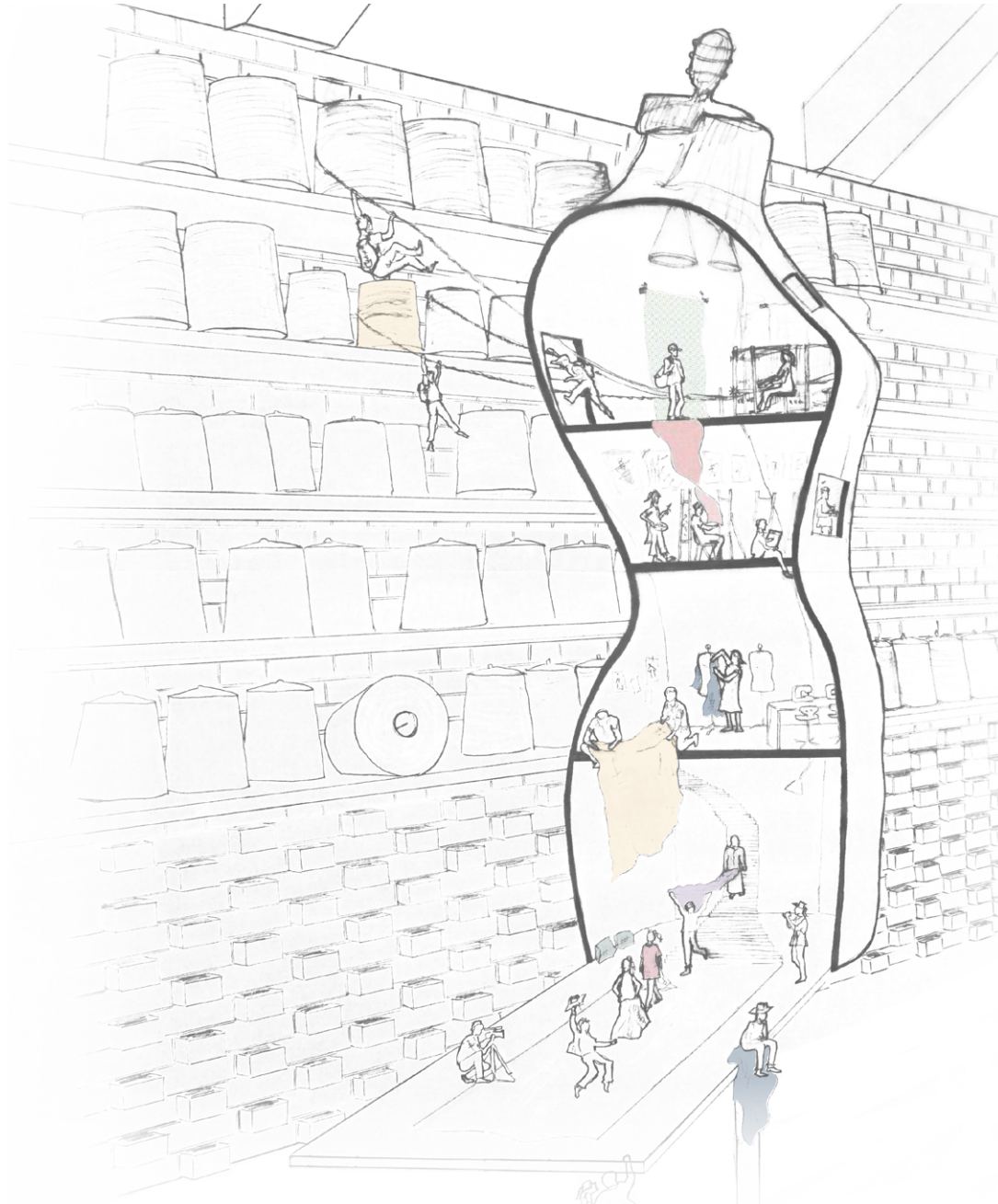
It becomes obvious that the school's program embraces the traditional fabrication of textiles as well as the contemporary production and thereby conforms with the definition of contemporary craft: focusing on hand production by incorporating modern techniques to produce high quality products locally.

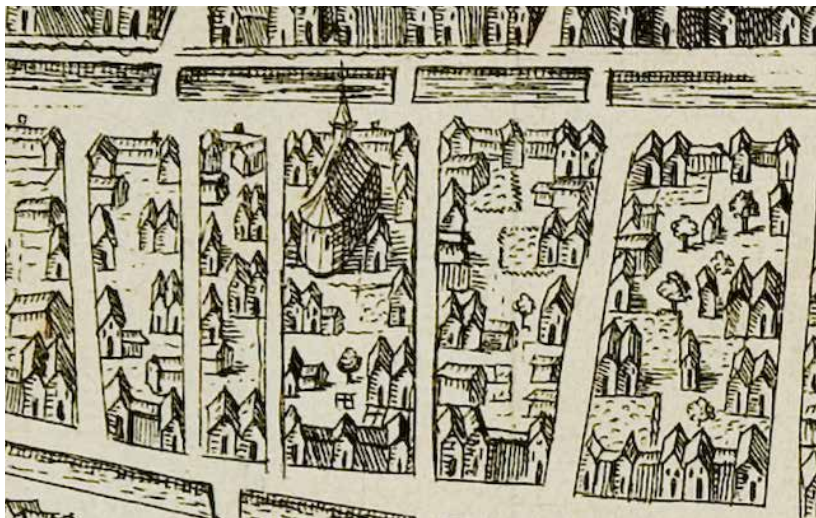
Besides the courses of action within the education, also the entry and exit to and from the school are being indicated in the section to metaphorically illustrate the difficulties related to the crafts of textiles. As crafts are

less and less important in the current (Dutch) society, the choice to study the 'rare' subject of textile crafts demands determination and commitment. Also the (first) career steps are financially challenging because the little demand on the market for handmade textiles makes sustaining difficult.

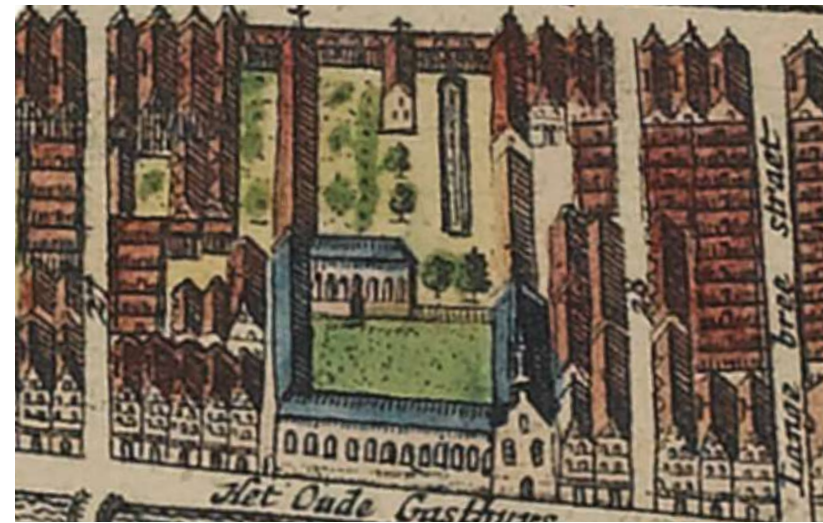
These problems help to consider the relation of the school to its context: socially, spatially, economically. Which other functions does the school need to increase public interest in the textile craft?

conceptual section of tailors's dummy that summarizes the different parts of the research concerning places of textile fabrication and serves as a starting point for the programming of the school for textile craftsmanship





Gasthuisplaats 1560



Gasthuisplaats 1649



Koornmarkt 1729



Koornmarkt 1860

4 Delft and the urban fabric of the Gasthuisplaats

In order to contextualise the conceptual draft of a textile school a physical location needs to be considered.

A place always consists of different elements regarding its building history, population and use. These different layers can be described as the warp and weft that interlace to form the fabric of the place. According to research conducted at the TU Delft, the term urban fabric “refers to the physical urban environment (elements, materials, form, scales, density and networks), and to its psychological, socio-cultural, ecological, managerial and economic structures” (TU Delft, 2020).

The Gasthuisplaats is the hypothetical site for the design of the craft school. Located in the historical center of Delft it is a place with a rich history dating back to the 12th century. It is also a place on which many different building typologies are assembled and a place which many different people groups use for different purposes.

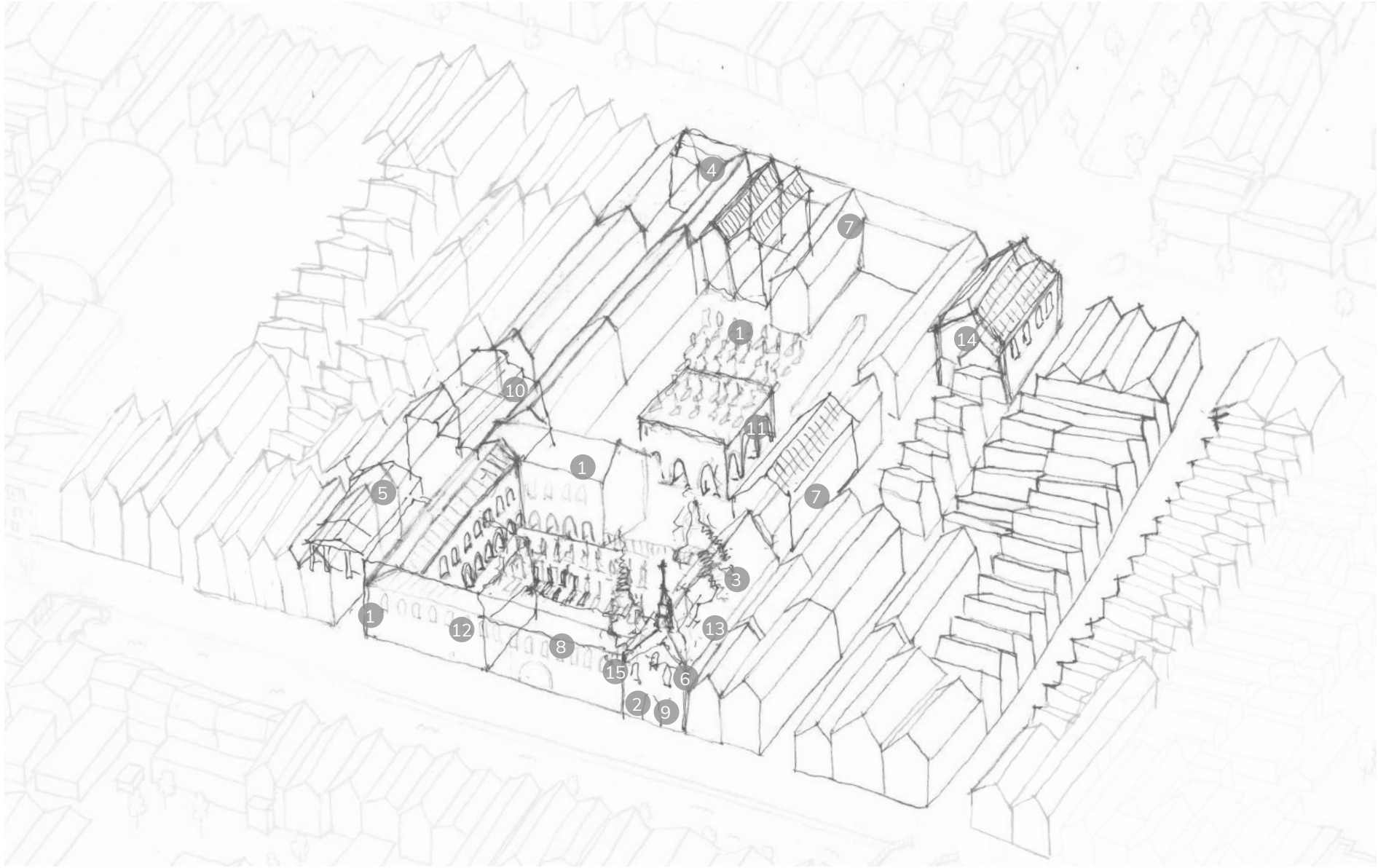
Overall, the analysis of the plot poses the question “What is the urban fabric of Delft and specifically of the Gasthuisplaats?”

In order to be able to capture the variety of spatial and social aspects of the site, different types of maps analyse different conditions. In this way the complexity of the site is being split in separate parts which gives attention

to the individual aspects. However, the sum of the maps show in which way these conditions interweave with each other and characterize the site.

Besides objective elements, also subjective perceptions are being mapped. The latter is a representation of the human perspective on the space.

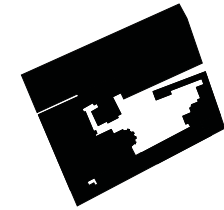
The thorough examination of the Gasthuisplaats makes it possible to design a master plan in which the school for textile craftsmanship plays the major role but also the public spaces, the accessibility, the front and back sides of (existing) buildings and the overall densification of the site it being taken into consideration.



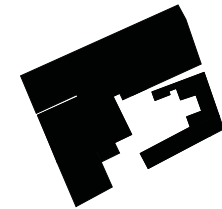
HISTORY

The Gasthuisplaats can already be found on early maps of Delft dating back to the 12th century. The site experienced continuous alteration and served many different purposes over the time.

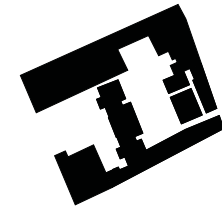
- 1251 ① Construction of Monastery
- 1263 ② Construction of Heilige Geest Hospital + Chapel + Graveyard
- 1549 ③ Damage by fire, Reconstruction + Extension
- 1600 ④ Densification
- 1862 ⑤ Construction of Synagogue
- 1864 ⑥ Demolition of Church, Construcion of School
- 1895 ⑦ Old Buildings replaced with Desinfection Building, Fire Engine Station + Pharmacy
- 1899 ⑧ Old Buildings replaced with Hospital + new wing of Hospital
- 1922 ⑨ School moves out, Building transformed into Accomodation for Nurses
- 1929 ⑩ Construction Wilhelmina School
- 1930 ⑪ Open Air Pavillion for Hospital + Parking
- 1968 ⑫ Demolition of Hospital, Nurses Accomodation remains, Parking
- 1970 ⑬ Nurses Accomodation turns into Music School
- 1973 ⑭ Construction of Catholic Community Center
- 2000 ⑮ Flex-Working Space "De Zuster"



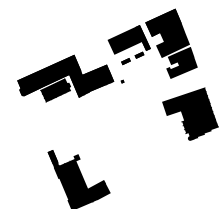
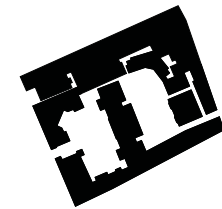
1832



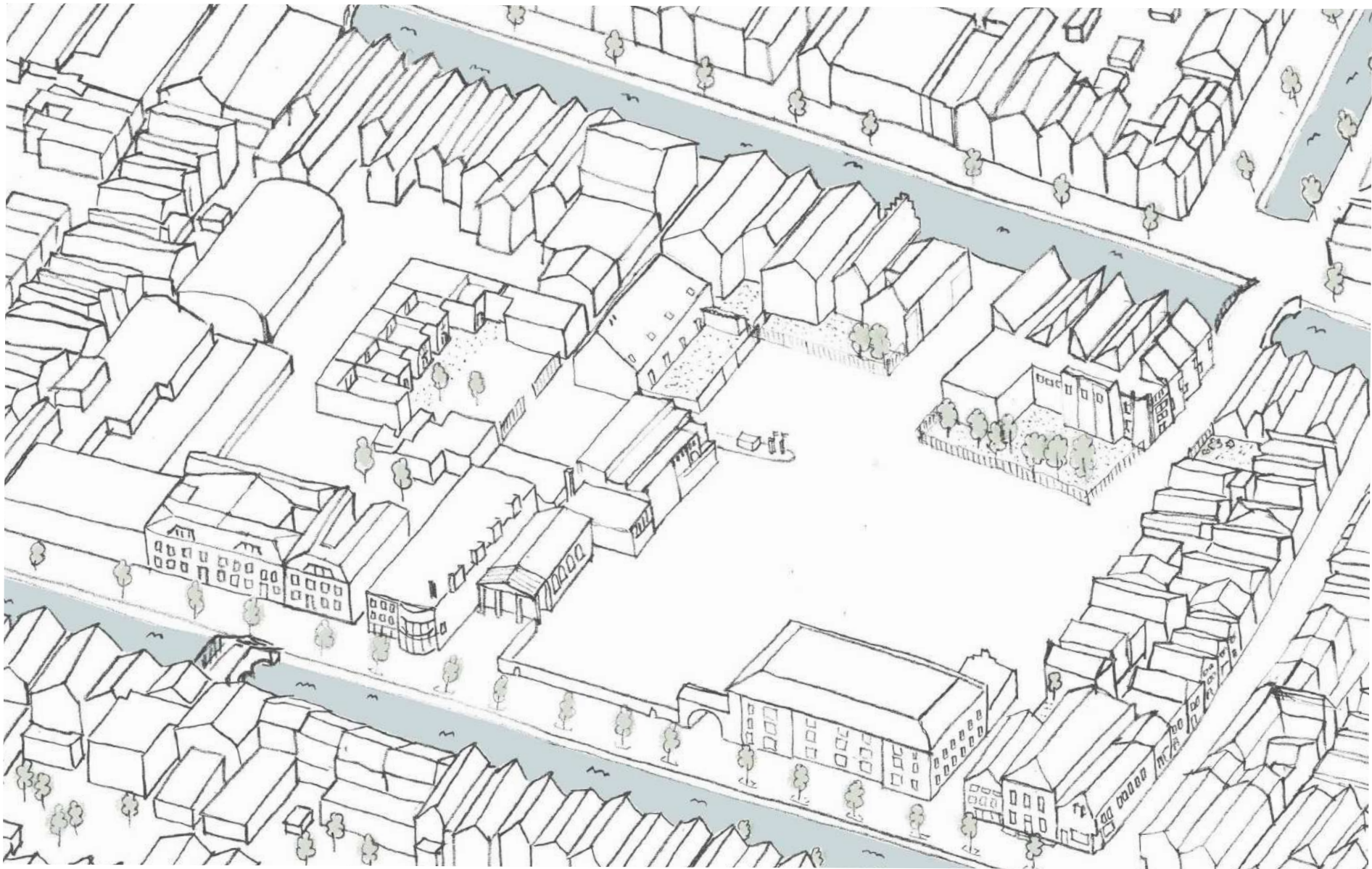
after 1864

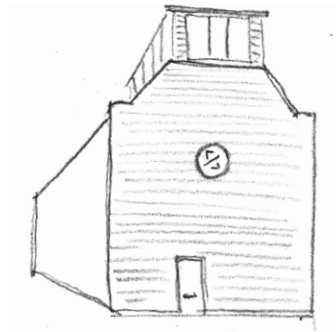


1898



2020

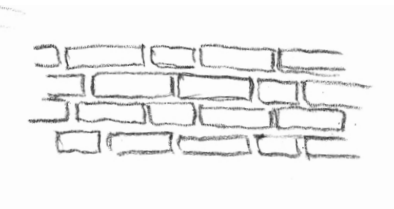




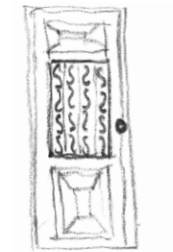
„De Zuster“



old school building



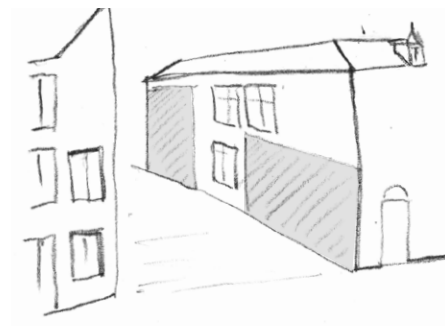
many different bricks, bonds and joints



wrought iron elements



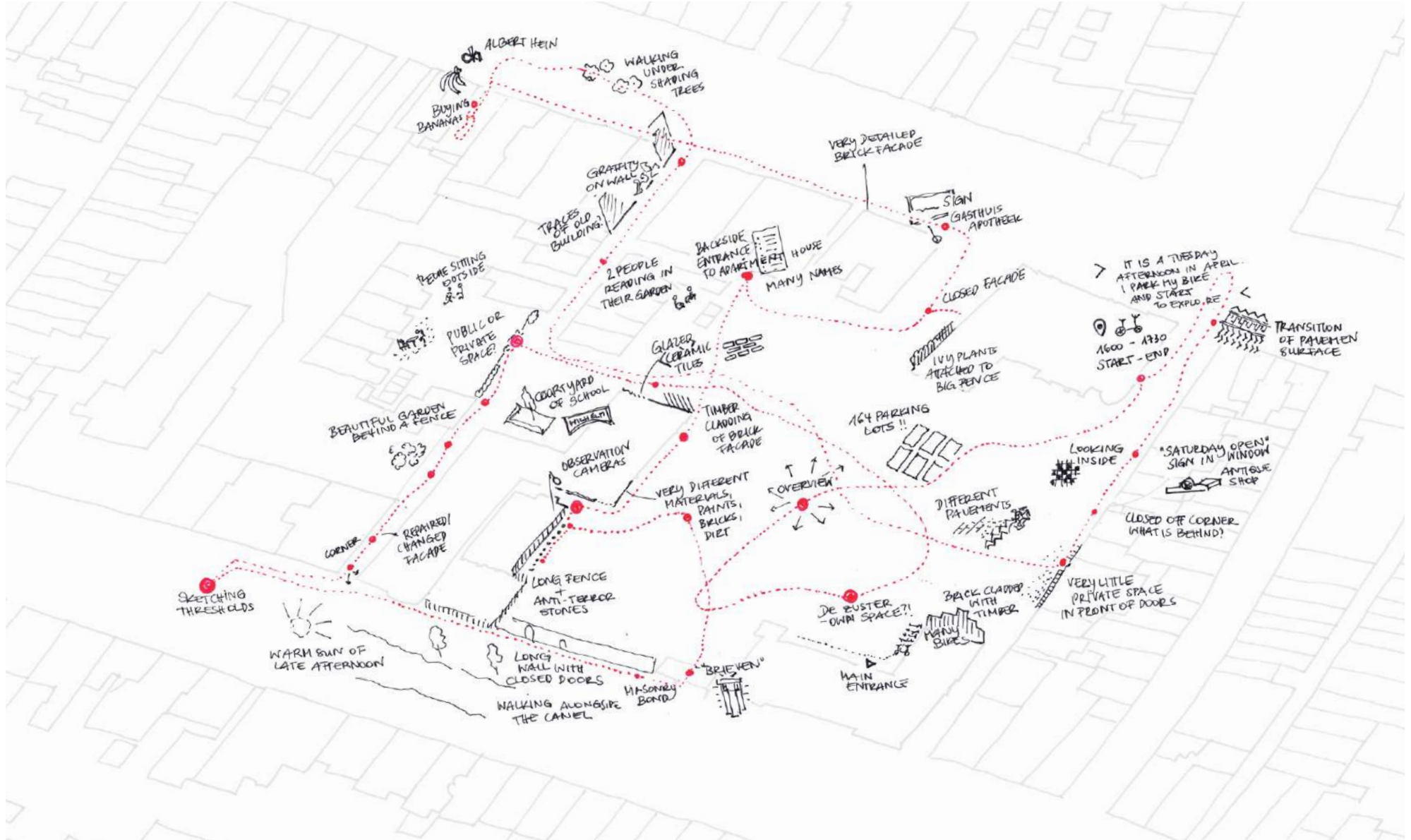
led glass window

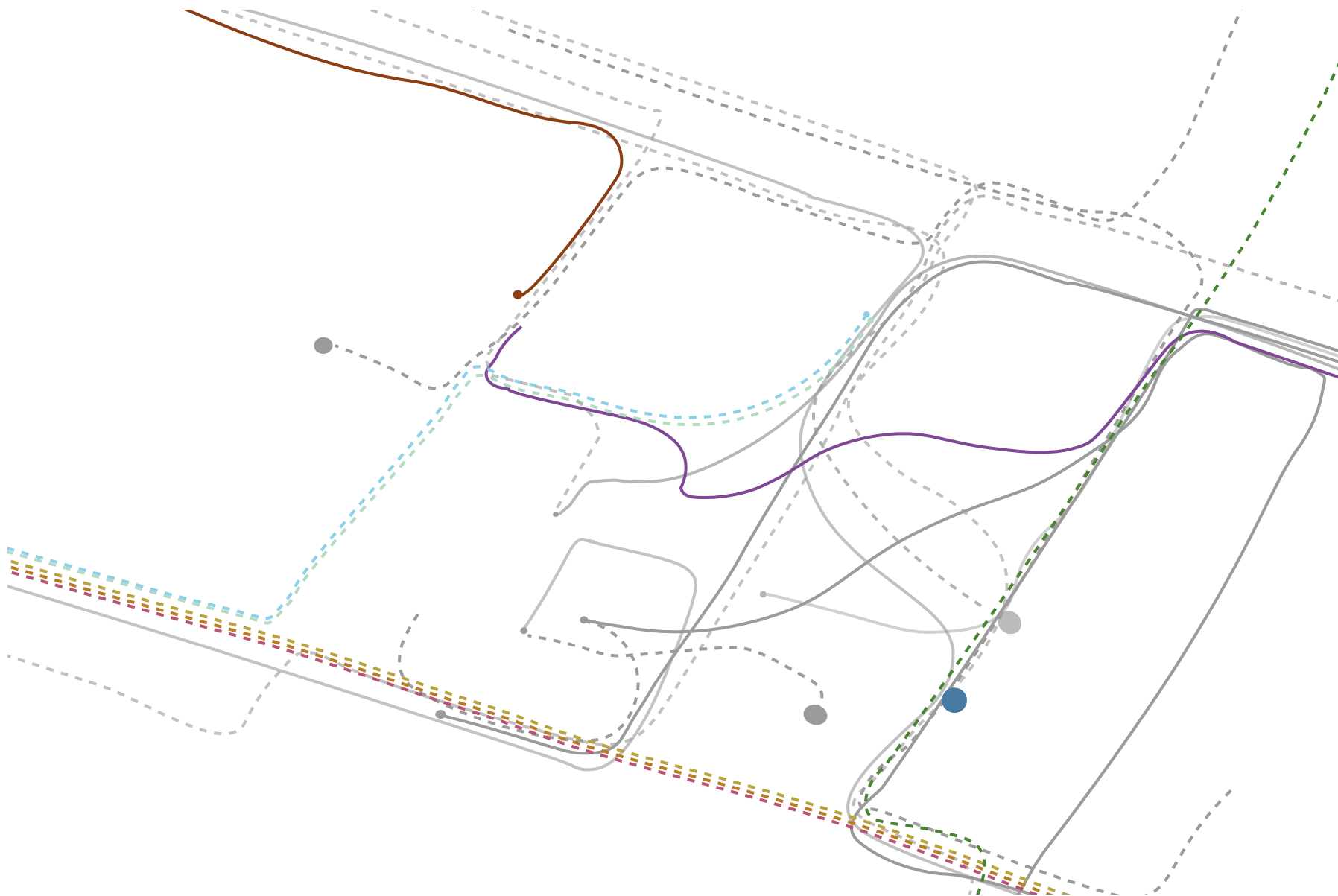


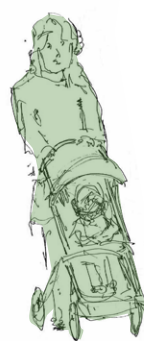
traces of former building

TRACES OF THE PAST

Spread all over the Gasthuisplaats are traces of the past. Details on facades or house entrances tell stories of former buildings, traditional crafts and ancient building techniques.







PEOPLE

The Gasthuisplaats is mainly used for transition between the Koornmarkt and the Brabandse Turfmarkt. Pedestrians, cyclist and car drivers use the streets equally.



24 HOURS CARS

The 4230 m² of the site are predominantly filled with cars. During the day the change over rate of cars is high, during the night more than half of the lots are occupied by residents' cars.



5 Representation of textile

No building without textiles

“Textile is everywhere - it is the main product we are surrounded by - you sleep on it, you wear it, you sit on it” (Gaca, 2020). Apart from buildings that are still under construction, there is hardly any architecture in which textile is absent. Textile is in fact omnipresent in a building: mainly in the inside in form of furnishing objects (one can think of curtains, pillows, blankets, etc.), but also on the outside of the facade (for example sun shading elements). Considering the different textiles that are present in a building one recognises that they influence the aesthetic character of a room but none of them determine the actual configuration, the structure of the room itself.

Obviously, textiles can not be used to construct a room, not to mention an entire building. Although innovative research is conducted, by individual textile designers but also by academic institutions, to explore the capacities of textiles and maximise its capacity - extending it three dimensionally or making it a self-supporting structure, the properties of the resources that textile is made from do not allow it to become a material for the construction of a building. However, many architects have sought to still use textiles as building materials - by mimicking them with other materials.

KnitCandela
Zaha Hadid Architects

experiment to extend three-dimensionality of textile -
KnitCandela is a thin concrete shell built on ultra-lightweight
knitted formwork

Curtain Wall House
Shinguru Ban Architects

Bahrain Music Center
Kerten Geerst David Van Severen



Bauhaus Dessau
Walter Gropius. 1923

one of the early examples of a curtain wall facade

Tchoban Foundation
Sergei Tchoban. 2013

detail of pattern in casted concrete facade

Helix - the family cocoon
Siam Cement Group. 2015

prototype of 3D concrete printing

example of metal facade
a3gm

administration office Textilverband
behet bondzio lin architekten
2017

Different imitations

The analogies with textile are more or less direct, but one can always recognize the original properties, expression or even use of textile: interwoven structure, fragileness, movement, pattern, etc.

The following examples show in which way textile is mimicked by other materials in the recent past.

With the progress of industrialization in the building industry, glass could be used in larger amounts for facades than ever before - a wide spanning steel construction allowed the facade to be completely of glass that was hanging from the structure - the so-called curtain wall was born. Here, the hanging character of textile is being mimicked.

The movement of a piece of textile - twisted, (un)folded, creased or stretched out has much been imitated in the shape of buildings of various materials.

The imitation of textile-like patterns can be done with various different materials. The molds in which concrete is casted can leave patterns to the surface of the wall, once the mold is removed. Lately, experiments are being undertaken to use concrete for 3D printing - a way in which even new patterns made of concrete can be generated that resemble textile structures.

he ascribes four different manufacturing processes used in architecture:

The first resource he describes has flexible, tenacious, properties, and can resist rupture easily; the second is soft, plastic, at the same time able to harden - once cast into a mold keeps its shape unchangeably. The third resource is rod-shaped, plastic and can resist especially longitudinal forces whereas the fourth resource is hard, of a "dense state of aggregation", resists crushing, can be shaped variably and assembled in regular pieces to steady systems (Semper, 1869). Each of these four materials processed according to their individual properties bring about what Semper calls four categories (of art): The textile art, the ceramic art, tectonics (carpentry) and stereotomic (stone cutting)(p.10).

Out of these four, the textile art has been existing for the longest, Semper calls it the "primordial art" (p.13) and continues to explain that ceramics, carpentry and stone cutting originate from the textile art and receive their "typology and symbols" from it (p.13).

In his essay *The Four Elements of Architecture* that he wrote a decade in advance of *Style*, Semper introduces the "primordial hut" as the prototype of all architecture. He defines four elements that this hut constitutes of: the hearth, the mound, the roof and the enclosure.

Of these four, the hearth (fireplace) is most

Metal is used for facade cladding in ways that make the building seem clothed in a metal dress.

And at last, brick, which is perhaps a building material that has been used the most and for the longest time in the history of architecture to mimic the pattern and interwoven structure of textile or the movements of a piece of cloth. All these very different examples show the variety in which textile is indirectly used in architecture. They all translate textile in one or the other way into structure, pattern and shape. Some of these examples have a very clear reference to textile, some of them are less obvious and may be object of discussion. However, it has become clear that architecture and textile have a certain relationship. This instance has already been discussed almost two centuries ago by Gottfried Semper, a german architecture theorist of the 19th century who is the originator of the "principle of dressing" (*Bekleidungstheorie*) - a theory about the relation between textile and architecture.

Gottfried Semper and the principle of dressing

In his book *Style in the technical and tectonic arts*, or, *Practical aesthetics* Semper identifies four categories of natural resources and according to their material properties

important element that needs to be protected from influences of nature by the mound, roof and enclosure. Later on in *Style* Semper relates these four elements to the four categories of applied art: the hearth is related to ceramics, the mound is associated with stone cutting, the roof related to carpentry work and the enclosure to textile arts.

Semper describes this enclosure more detailed by referring to wickerwork as the predecessor of textiles: “Wickerwork, the original space divider, retained the full importance of its meaning, actually or ideally, then later the light mat walls were transformed into clay, tile, brick or stone walls. Wickerwork was the essence of the wall. Hanging carpets remained the true walls, the visible boundaries of space. The solid walls behind them were necessary for reasons that had nothing to do with the creation of space; they were needed for security; for supporting a load (...)” (Semper, 1851, p.104).

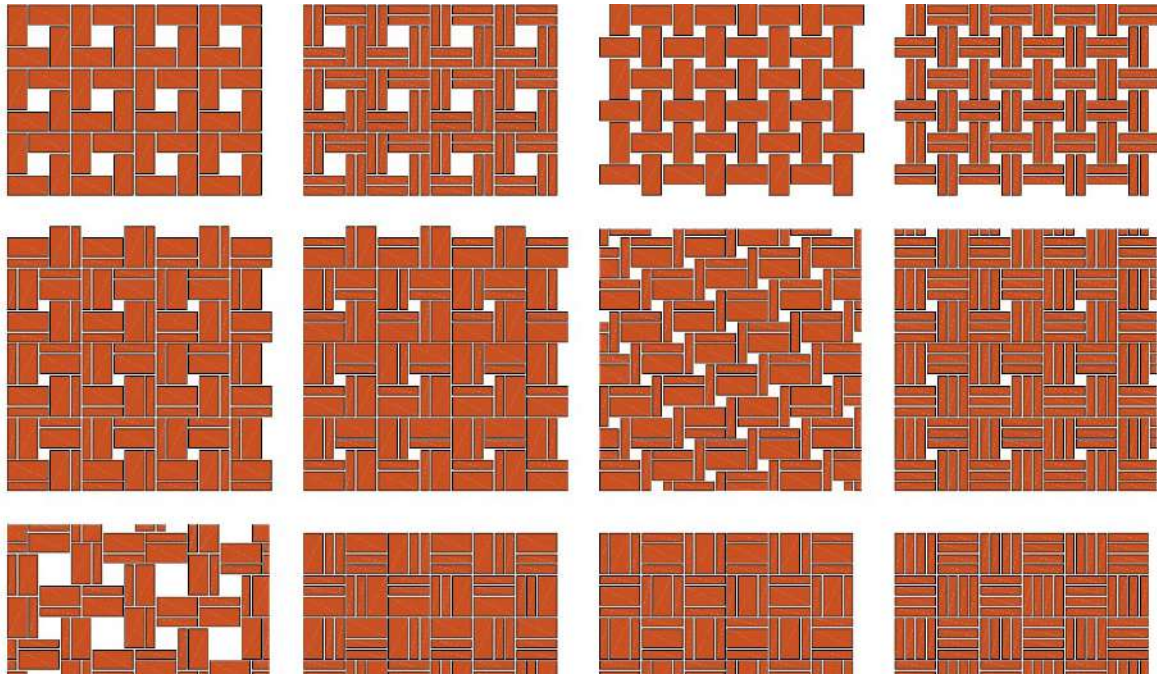
From this passage one can infer two major things. Firstly, that “weaving becomes associated with establishing domestic space, ‘the means to make a “home”, the inner life separated from the outer life.’” Secondly, it becomes clear, that although the solid wall was inferred from weaving, the textile elements of the space are independent from the load bearing construction (Garritzmann, 1989). The latter is the main statement of

Semper’s ‘principle of dressing’: the dressing of space, the ornamentation as the essence of architecture that has priority over the structural core of the building.

The ornament itself, originating in the craft of weaving, can be understood as the result of a process, the process of weaving (Gleiter 2013).

If according to Semper each wall originates in textile craft “the essence of the wall as a formal principle should be maintained even if the material from which the wall is built changes” (Garritzmann, 1989). The ornamentation of a wall is therefore the result of the making of the wall, not the architect’s invention (Gleiter 2013).

Clearly, the properties of the material the wall is made from play an important role for this. This statement refers back to the four materials mentioned earlier that were attributed to four art forms, depending on their properties. It can be concluded that “when Semper conceptualizes the influence of material on form-making, he also considers the tools and procedures that were applied to the material in the process of form making” (Garritzmann, 1989). He advocates for the material as the starting point of the form.



Material as the starting point of the form

Taking Semper's theoretical background as basis for the relationship of textile and architecture one can summarize the following: Textile craft can be seen as the forerunner of the wall. Therefore, "(t)he association of the wall's origination with textile craft implies (...) that the general formal aspects of textile should be responded to in the design of walls and facades also today. They should always refer to the formal DNA of textile, the first spatial enclosure" (Garritzmann, 1989).

Moreover, the design of the wall itself stems from the knowledge of material properties and the process of the making. The 'dressing' of a building is not the finishing touch but the essence of the architecture. Structural elements of the building are subordinate to the 'dressing', meaning that the appearance of a building is not based on its structural character but on its constitution of space.

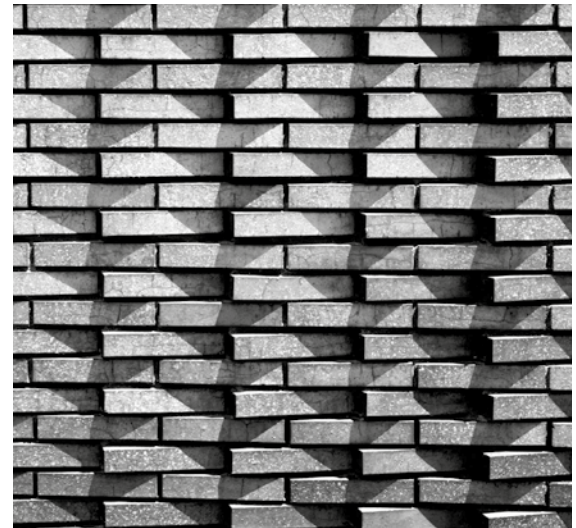
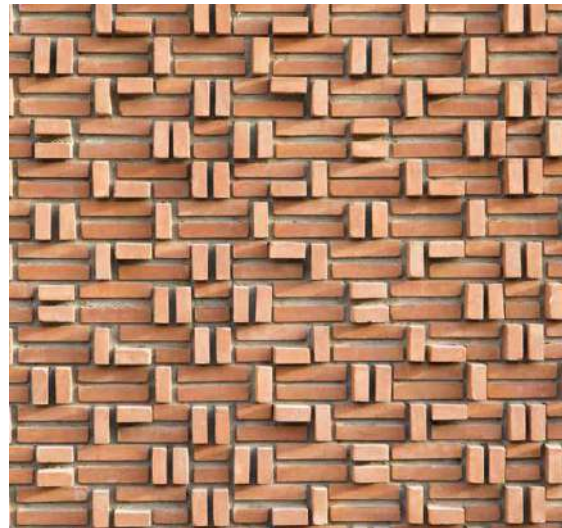
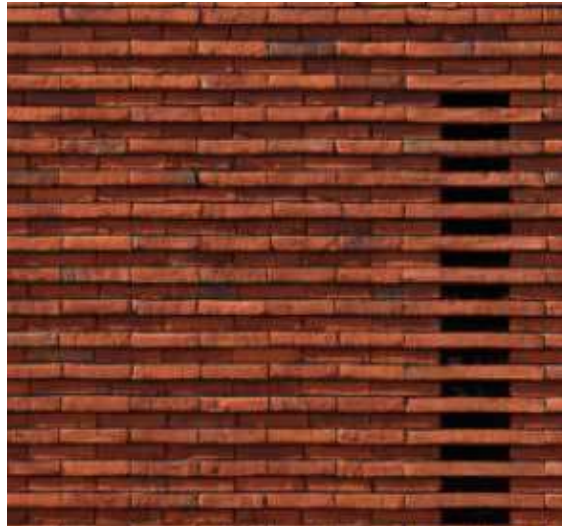
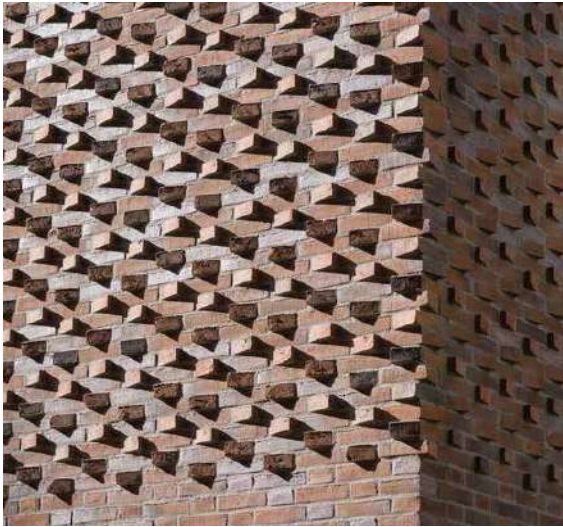
Based on this summary one could review the previous examples of mimicry of textile in architecture and wonder whether the curtain wall in fact represents any Semperian textile analogies? One could also question in which way the 3D printed depiction of textile is a product of a process that generates the

ornament or the product of a design that desires the result of an ornament.

Much could be argued about these questions and more questions could be raised. Rather than evaluating existing buildings one could also ask how the design of a new building would have to look like, following Semperian theory.

Coming back to the materials themselves it is relevant to ask which materials could in fact be used best in order to mimic textiles?

Here, it might be helpful to consider the original properties of textile again, like already mentioned in the beginning of this paper: interwoven structure, fragileness, movement, pattern, etc. A piece of fabric comes into being through the interplay of warp and weft on the loom that cause the intertwining of yarns. "Weaving is constructing", states weaver Sytze Roos (2020). One could translate the horizontal stringing together of the yarn on the loom into the horizontal stacking of stones. The lining of the loom in regular intervals demands for regular shapes and sizes of stone. Koen Mulder, architect and researcher, identifies that the "the units of bricks in a masonry bond are comparable to weaving dimensions" (2020).



The translation into bricks

Also Garritzmann proposes bricks as analogy and formulates the translation from weaving to masonry in his words: "(A)ll bonding patterns resemble textile patterns in the first place. They develop a formal motive (the bonding pattern) from the technical necessity of joining the bricks, just as weaving patterns emerge within the technical constraints of warp and weft. The use of two contrasting colors of brick intensifies the resemblance of the bonding patterns to ones used in textile. The most decorative brick patterns, in which the function of the bonding is subordinate, evoke the strongest association with textile patterns (1989).

He refers the use of brick back to Semperian theory and argues that the "brick tectonics of dressing develops the articulation of the facade from the 'constructedness' of the dressing itself. It realizes its aesthetic concept through the technically necessary joining of bricks. The brick tectonics of dressing explores the creation of decorative pattern on a smaller and on a larger scale. The bricks can be stacked in all possible directions for this purpose" (1989).

Koen Mulder, states with astonishment: "Designers should ask themselves why they could have build walls by simply stacking bricks on top of each other, without seeing the affluence of patterns that is hidden in the

stacking of bricks. Every weaver (...) should be astonished that you as a designer have neglected this aspect" (2016, p.5*).

He is particularly intrigued by the variety of patterns that can be achieved in masonry work which "give the material a changing appearance, depending from the distance from which they are being looked at. The pattern creates a layered surface in which primary and secondary bonds fight for attention" (Mulder, 2016, p.5 f.*).

To him the use of material as a starting point of the form means that the pattern evolves from the process of making: brick by brick the masonry work rises horizontally and meanwhile the pattern develops vertically and arises from within the process (2020).

Also Aleksandra Gaca experiences a similar technique in the process of weaving in which she develops new patterns while horizontally developing the fabric (2020).

It becomes obvious, that brick is a material which can be used to translate textile into architecture.

The many different bonding patterns in which bricks can be stacked to walls allow for experimentation, variety in color is another important feature to take into consideration. As the material is being used as the starting point of the form, the mimicry of textile is according to Semper's theories.

Didactic architecture

As said before, didactic architecture in the context of a textile crafts school means that the building itself represents the textile craft and therefore stimulates awareness and curiosity toward the craft. This is an ambition that concerns the communication of architecture with its (urban) context. Another part of didactic architecture is the way in which the building communicates with the people inside: the craftsmen, artists, students, visitors etc. Asked where she gets her inspiration from, Aleksandra Gaca answered that she is inspired by

A facade inspired by Guntha Stötzl

The wall hanging “5 Chöre” by Guntha Stötzl serves as an inspiration for the facade design of the textile crafts school. As mentioned in the beginning the Bauhaus school of arts and crafts in Germany played an influential role for the textile production in Germany as well as in other European countries. Guntha Stötzl was the first female teacher at the Bauhaus school from 1925-1927. (Bahr and Kirschner, 2019) During these years she produced many tapestries that are popular up till today. Her work stimulated many of her students, amongst which was Anni Albers who became

a well known weaver herself.

The tapestry “5 Chöre” displays the extravagance of the craft in pattern and use of color.

By translating this piece of textile into a brick facade, a very obvious connection between the craft and the architecture is made. The different layers of bricks stacked on top of each other refer to the woven character in a semperian fashion. The facade of a single layer of bricks surrounds the timber construction of which the building is made of, like a dress clothes a body. The choice of a masterpiece by Guntha Stötzl is meant to be a homage to her who was a forerunner in her times. In the figurative sense the school for textile craftsmanship is also supposed to be functioning as a forerunner by creating a platform for a traditional craft in the modern society.



Conclusion

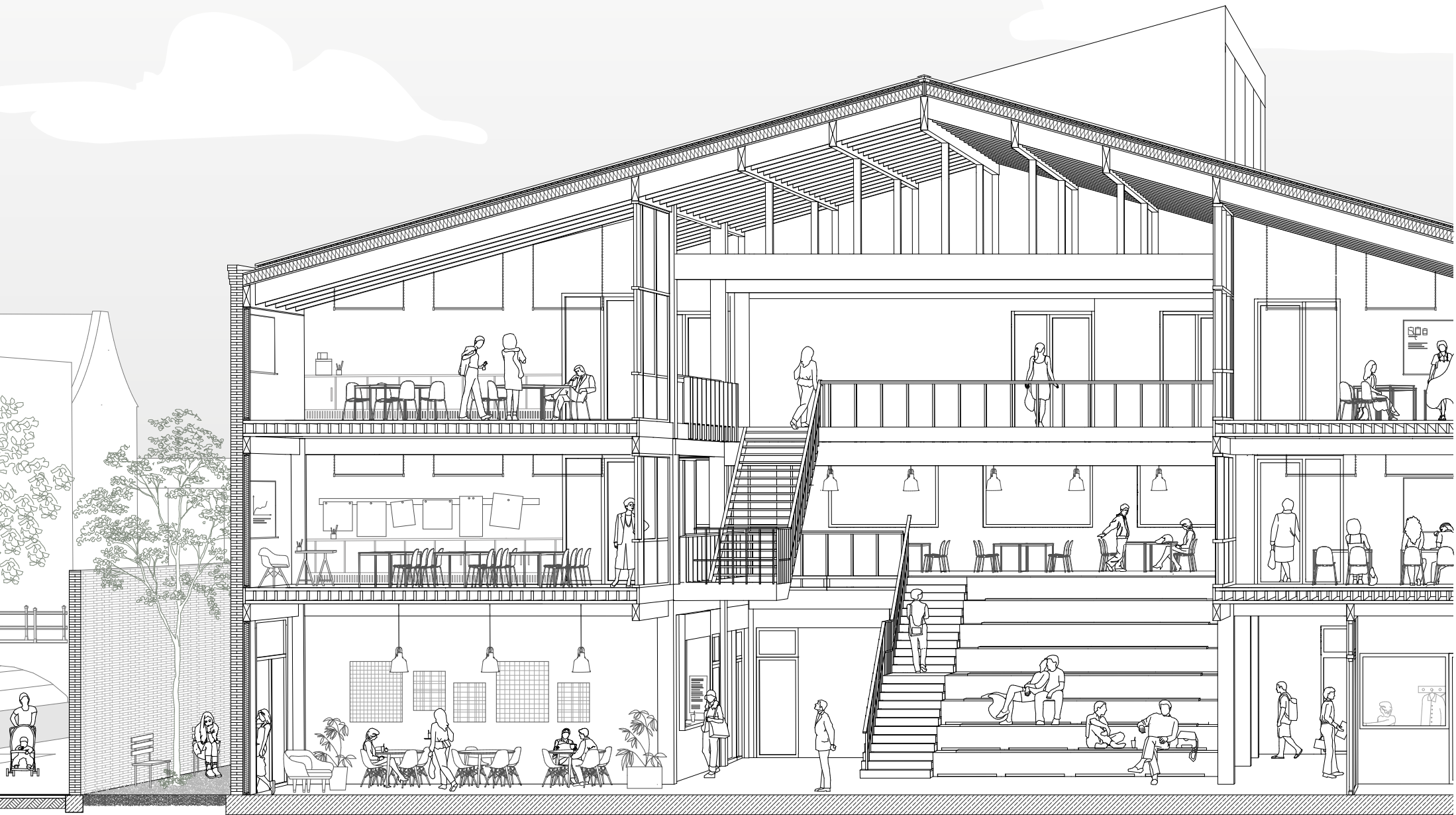
The different parts of the research have explored the craft of textile itself, analysed places of textile production, have outlined the urban fabric of the building site and finally examined the translation of textile into brick as building material for the facade of the school. A summary of these parts informs the design of the craft school. This can be seen in the three dimensional section of the design:

The school blends into the fabric of the Gasthuisplaats by integrating the historical wall alongside the Koornmarkt into the intimate outdoor space of the ground floor, as well as creating a public space in the center of the Gasthuisplaats. The volumes of the school are shaped according to the neighbouring buildings which creates a representative part next to de Zuster and a long stretched part between the two sides of apartment houses. Large window openings oriented to the Brabantse Turfmarkt allow the visitor insight into the machine hall of the school, which is one of the didactic elements of the design.

The functions in the building reflect the places of textile fabrication of the research and combine theory, practice and exchange in multiple ways. Traditional hand weaving as well as contemporary machine weaving exist next to each other - the spaces in which the textile fabrication takes place are visually connected to provide moments of exchange. Students, professional craftsmen as well as

visitors find their places in the different rooms of the school and have several opportunities for encountering each other, for example on the stairs in the entrance hall, the benches in the exhibition floor or in the machine hall. Lastly, the section transfers the way in which the timber structure is clothed with a skin of brick on all sides.

Overall, it becomes clear that the design for the school of textile craftsmanship is rooted in the knowledge of the craft itself, the understanding of urban fabric and material as the By reintroducing the craftsmanship of textile crafts in the Dutch context, the design creates awareness for the local production of clothes and thereby contributes to solving the issues of fast fashion in its own unique way. The school for textile craftsmanship in Delft is a platform for education that acts as a didactic starting point for a sustainable future of textile production.





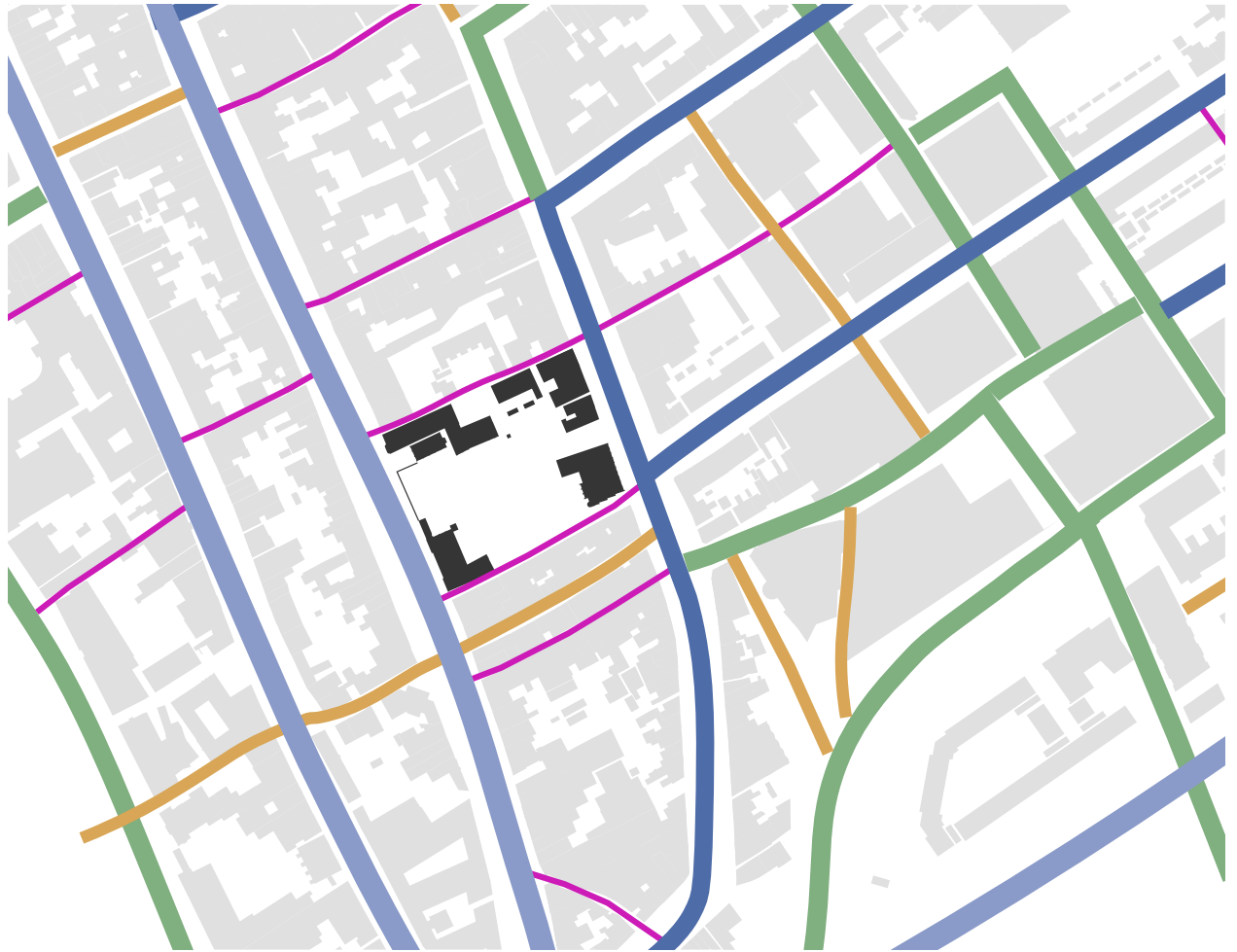
three dimensional section 1:100

Architectural drawings



- main canals
- side canals
- main streets
- side streets
- narrow streets

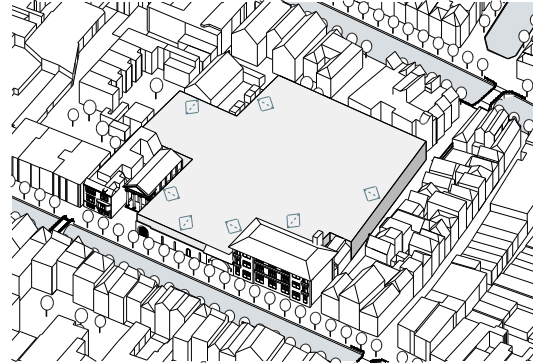
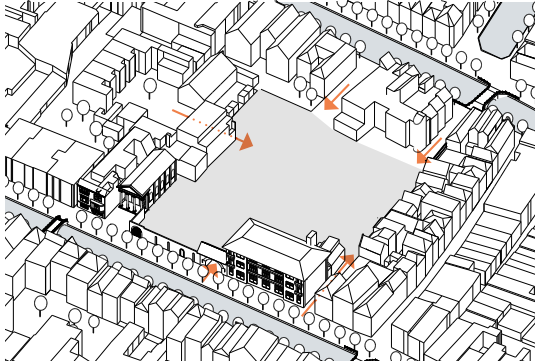
Analysis of urban fabric



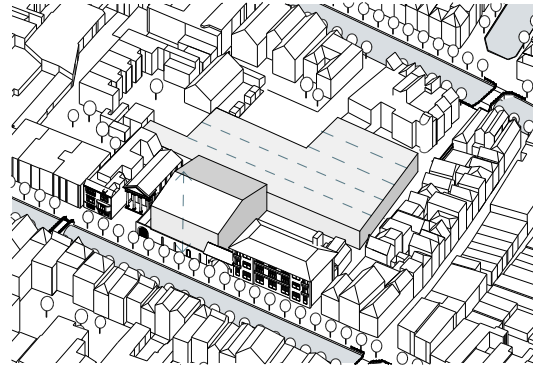
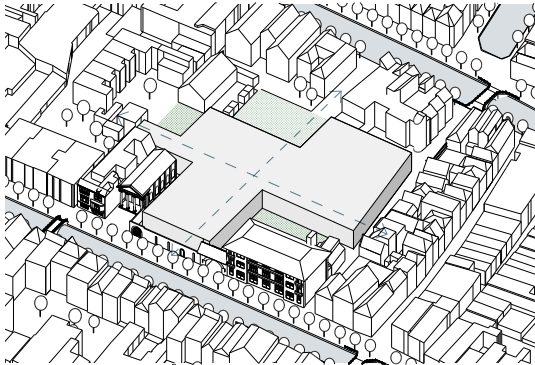
schematic analysis of the infrastructure of the historical city center of Delft

canals and streets of different sizes are interwoven with each other

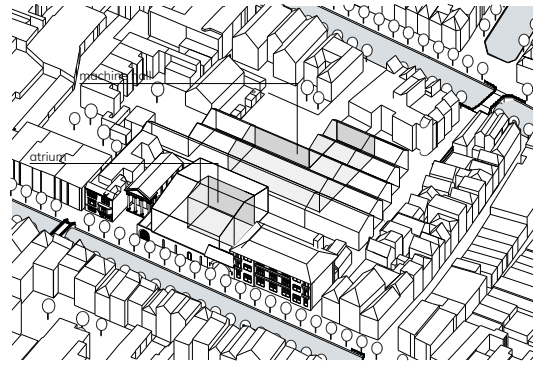
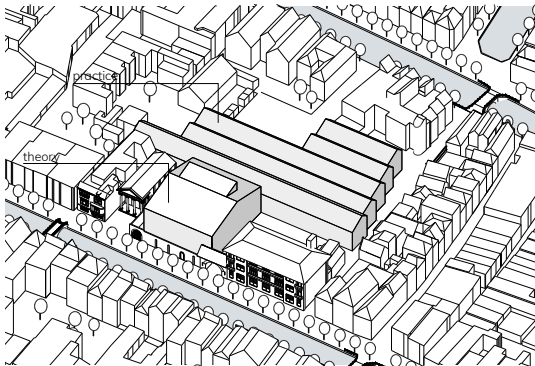
The Gasthuisplaats is positioned between two main canals as well as two narrow streets which give the building side an extrovert primary as well as an introvert secondary character.



filling the site with potential building volume

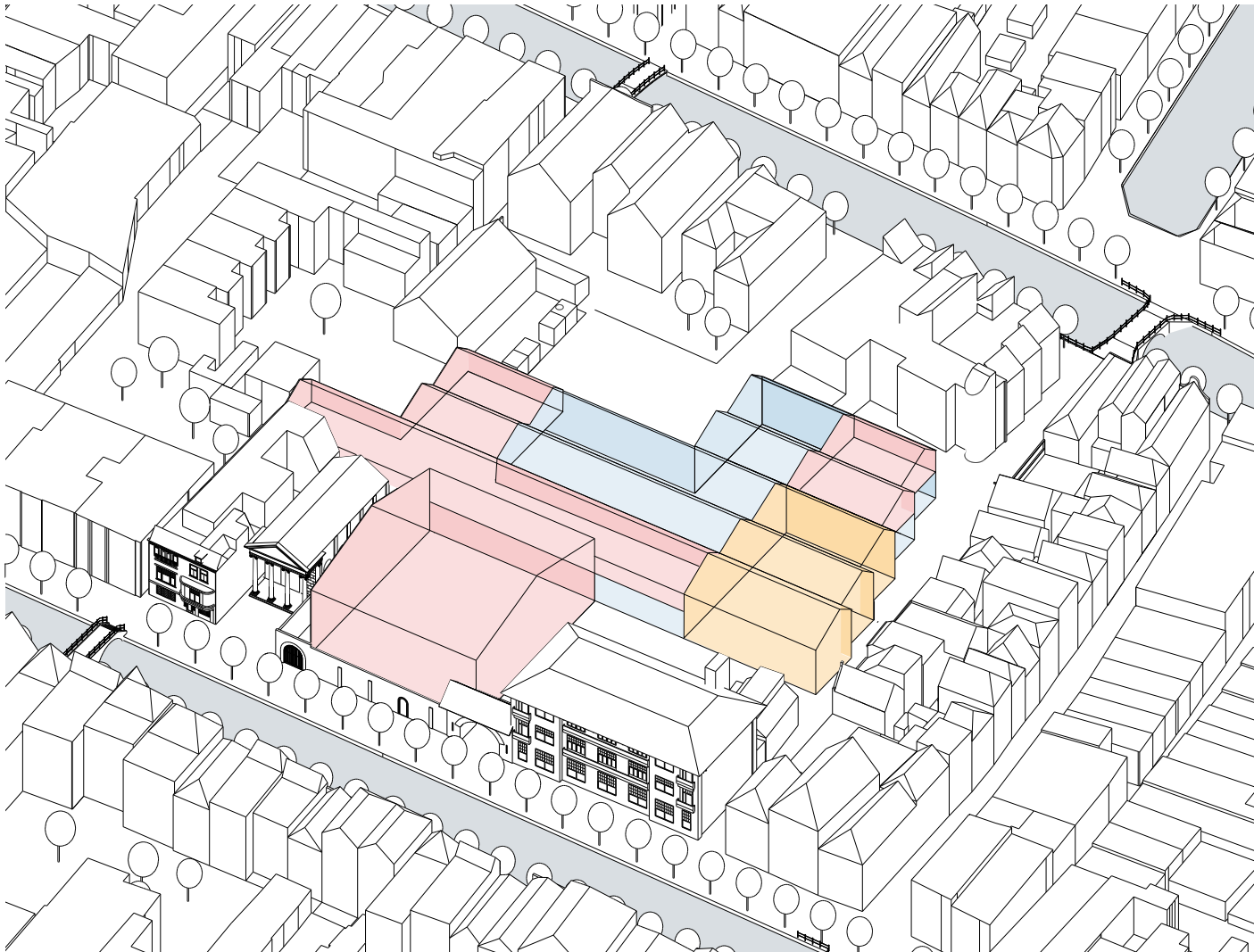


adjusting volumes according to infrastructural access to the site while creating public spaces

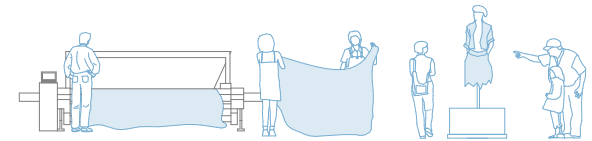


dividing volumes in theory and practice parts, creating central hearts in each part

development of urban volume



positioning theory, practice and exchange places within the building



plans



site plan 1:1500

Floor plan ground floor 1:500

Theory

- 1 main entrance
- 2 auditorium hall
- 3 cafeteria
- 4 kitchen
- 5 library
- 6 conference room
- 7 head master office
- 8 first aid room
- 9 teachers room

Practice

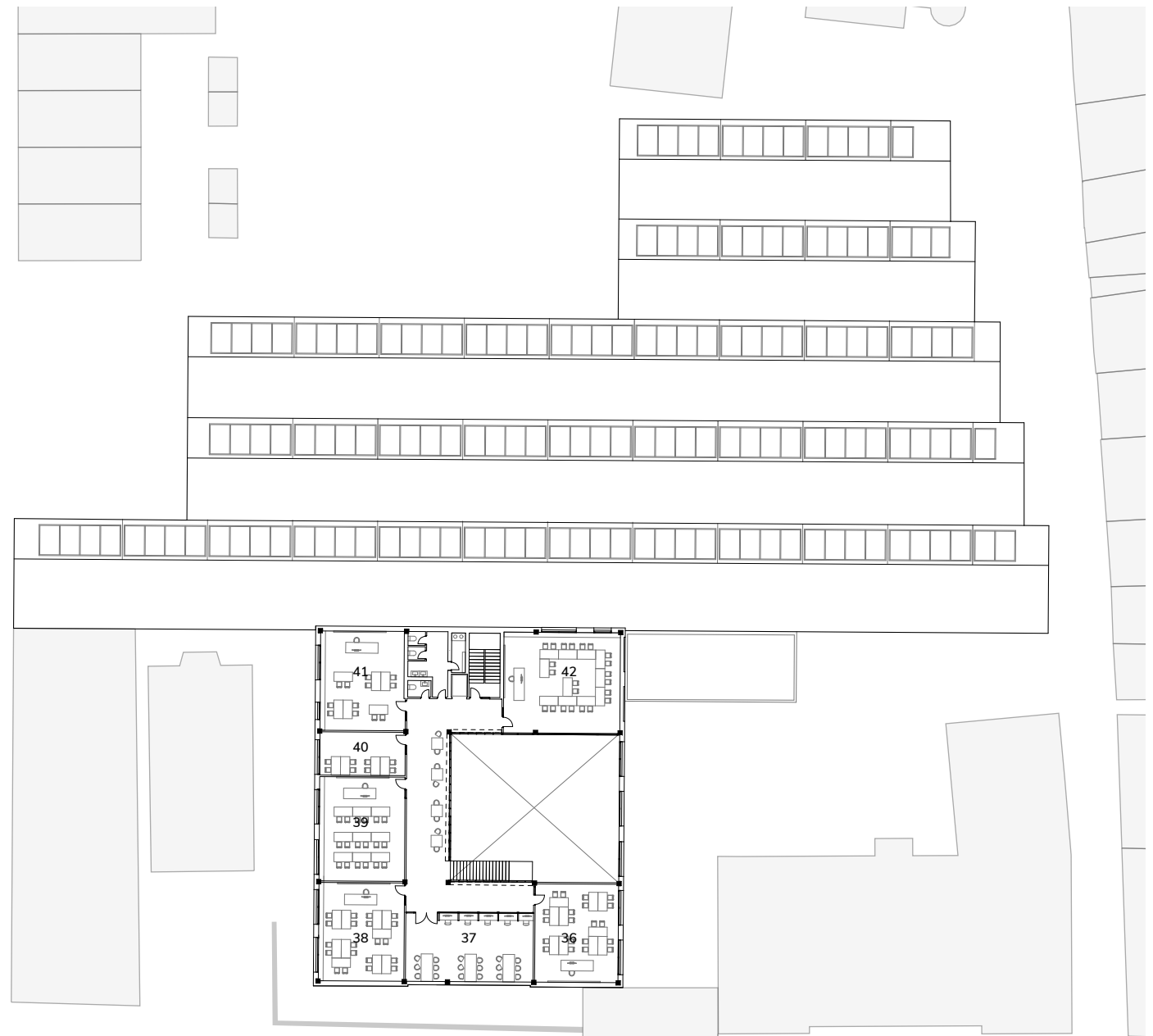
- 10 exhibition hall
- 11 machine workshop + magazine
- 12 lazercutting workshop
- 13 digital lab
- 14 loom hall
- 15 museum
- 16 café
- 17 kitchen
- 18 staff room
- 19 cloak room
- 20 artist studio I
- 21 artist studio II
- 22 artist studio III





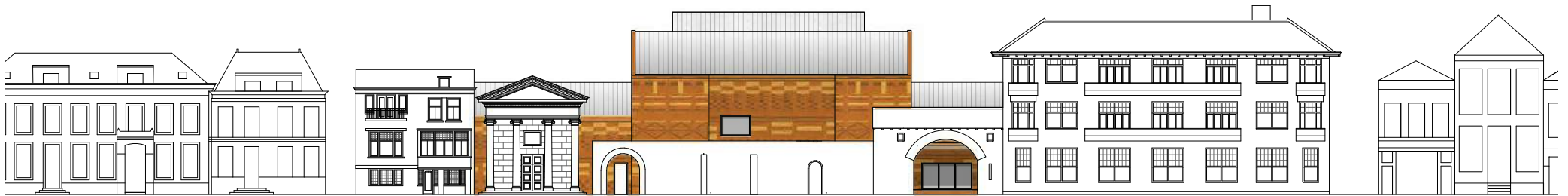
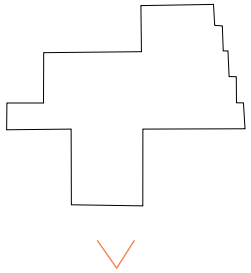
Floor plan first floor 1:500

- 23 class room
- 24 library
- 25 self study space
- 26 office
- 27 office
- 28 class room
- 29 hand loom hall
- 30 weaving studio
- 31 design studio
- 32 fashion studio
- 33 artist studio IV
- 34 artist studio V
- 35 artist studio VI



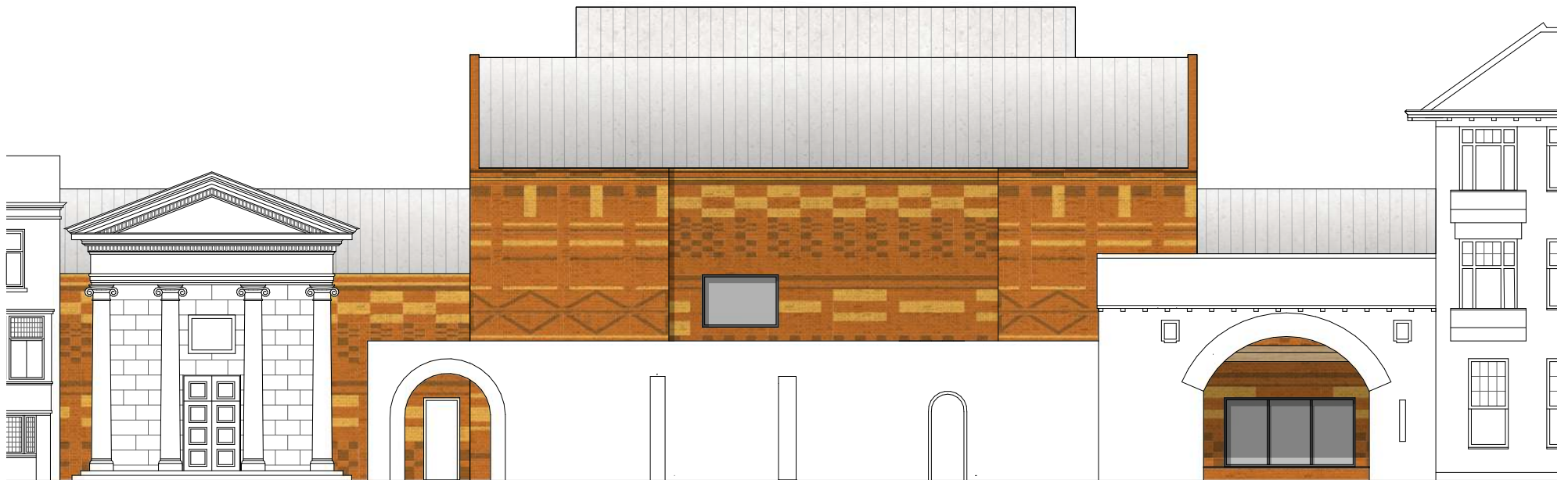
Floor plan second floor 1:500

- 36 class room
- 37 media room
- 38 class room
- 39 class room
- 40 office
- 41 class room
- 42 class room

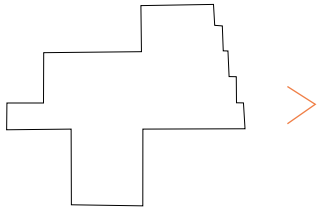


elevation Korenmarkt 1:500

elevations and sections



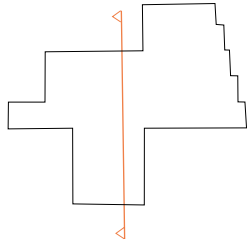
elevation Korenmarkt 1:200



elevation main entrance 1:500



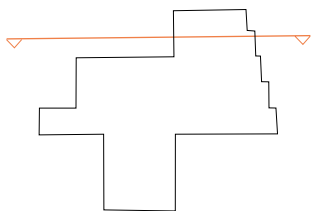
elevation main entrance 1:250



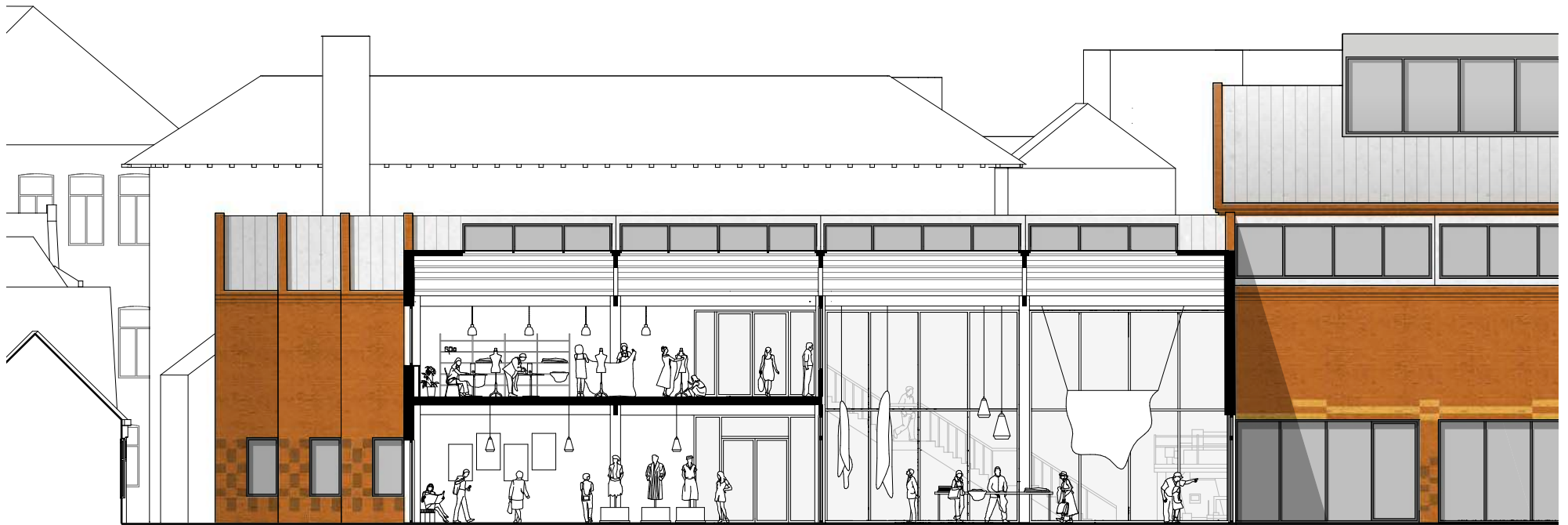
section 1:500



section 1:250

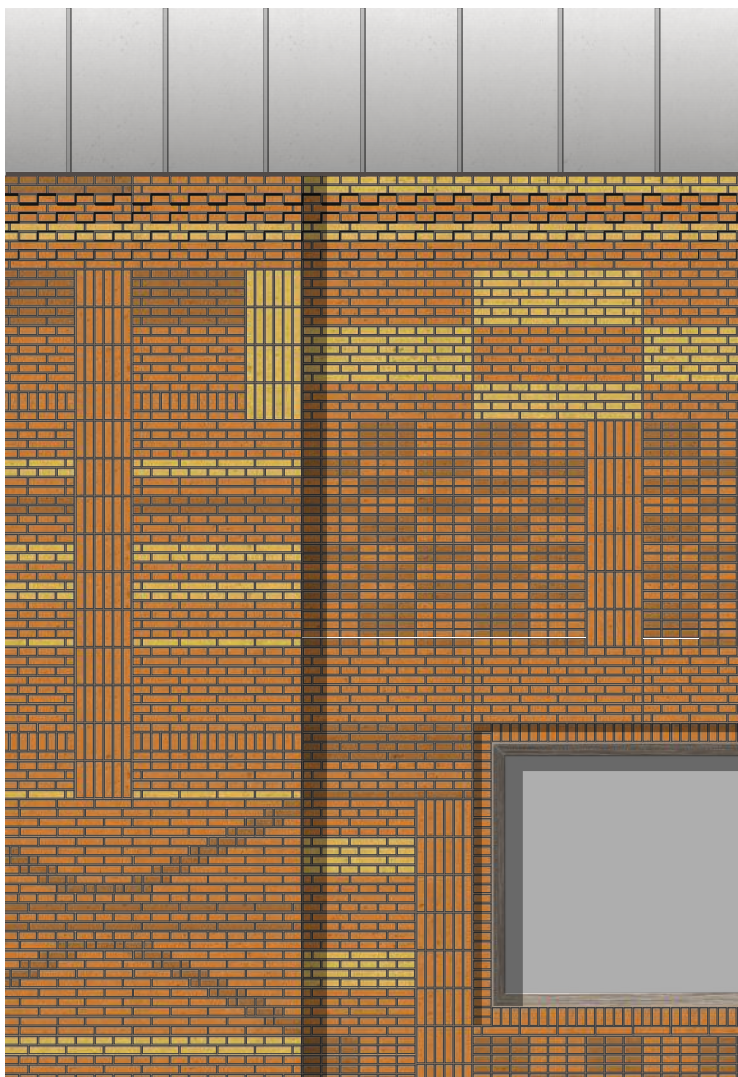


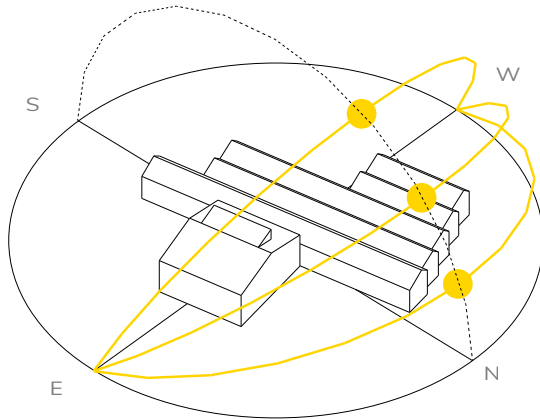
elevation with section 1:500



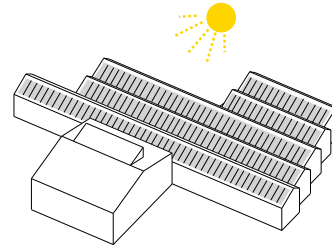
elevation with section 1:200

facade detail

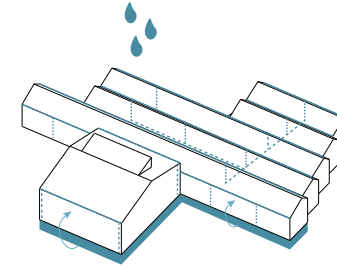




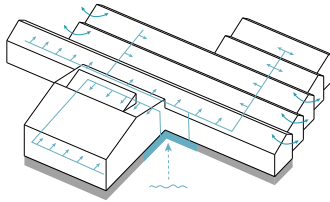
1 sun orientation



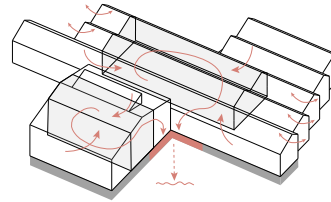
2 photo voltaic integrated in roof



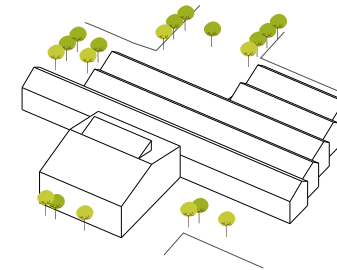
3 rain water re-use



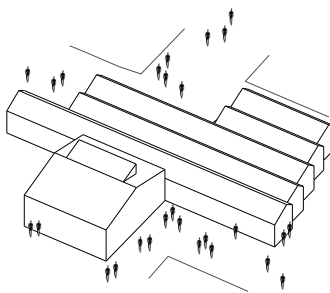
4 fresh air cooled/ heated by ATEs



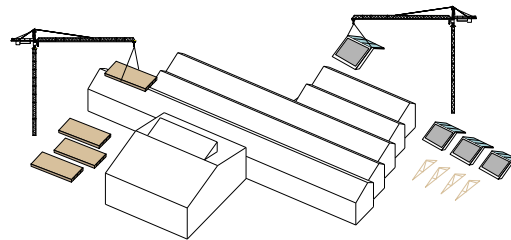
5 exhausted air released into atrium/ machine hall and extracted



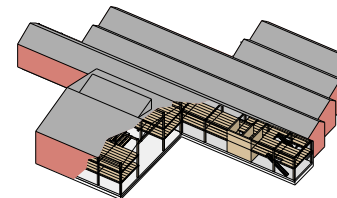
6 increase of public green and thereby enhancing biodiversity



7 creating meeting places that enhance social vitality



8 modular, prefabricated building elements



9 CLT/ GLT, re-used bricks and zinc cladding

Building technology concept

The design of the school for textile craftsmanship incorporates many aspects of sustainability concerning the function and use of the building over time, the use of (building) material, the social integration and spatial configuration as well as different technological features regarding ventilation, heating/ cooling of the building, water and energy supply.

Overall, the sustainability concept of the design is based on the re-use of (natural) resources and intends to interweave use and energy efficiency, aesthetical appearance and functional proficiency, spatial configuration and environmental needs with each other.

Nine sustainability aspects form the conceptual framework for the building technology elaboration and formulae the overall environmental position of the design.

1 The building is positioned in east-west direction. Large shed roofs as well as a dormer window allow for indirect light during the day and natural ventilation possibility when desired. Most of the rooms positioned under these windows are in need of indirect light.

2 Over 900 m² of solar voltaic panels are integrated in the zinc cladding of the roof and provide a large part of the electricity of the building.

3 The total amount of roof surface amounts to ca. 3.300 m². The rainwater collected from the roofs is being stored in tanks in the basement re-used for grey water purposes within the school.

4 + 5 An aquifer thermal energy storage (ATES) is used for cooling and heating of the building through ventilation mechanisms. Depending on the season of the year fresh warm/ cooled air is released into the rooms via air dispenser. The exhausted warm/ cool air is released into the atrium/ machine hall (by the use of air pressure) from where it is extracted. The majority of the school is centrally heated/ cooled, however, the artist studios have a decentralized heating system which suits the individual use of the studios better.

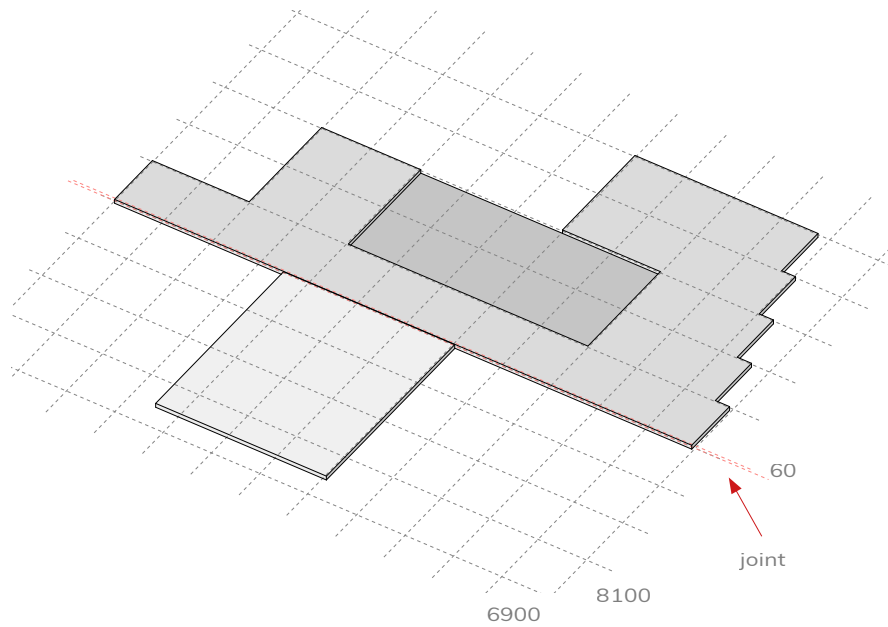
6 Through the creation of public green on the site the biodiversity of the Gasthuisplaats is enhanced. Added greenery contributes to the ecological wellbeing of Delft.

7 The former parking lot is being transformed into a place of education, creativity and leisure which contributes to the social sustainability of the place.

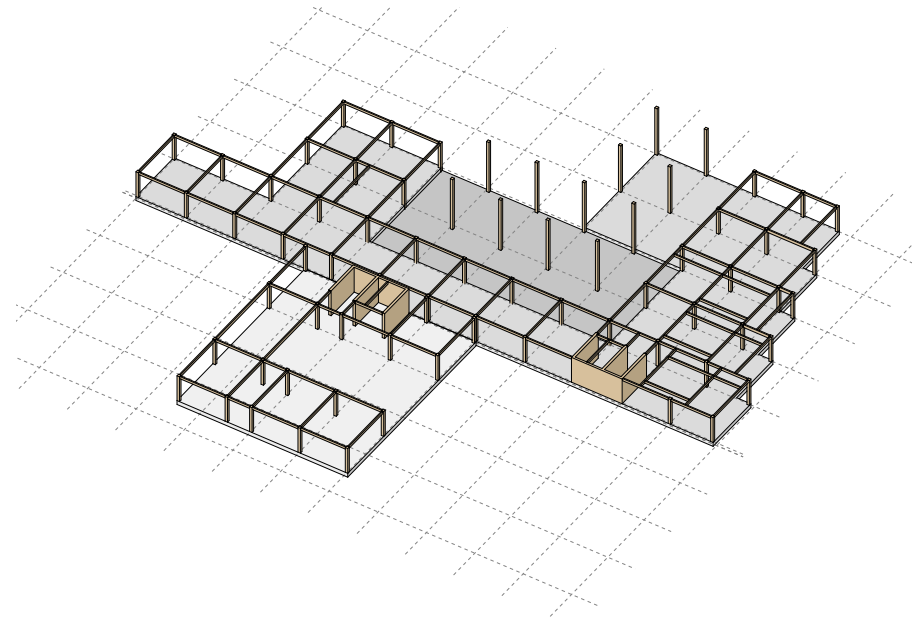
8 A variety of modular elements (timber frame construction of roof and walls, lignatur floor, prefabricated square-framed work) simplify the construction process on the site.

9 Main material used for the load bearing construction is CLT/ GLT. The facade consists of re-used clay-fired brick and durable lime mortar. The roof is clad with zinc which in comparison with aluminium is more CO₂ neutral in production. Zinc roofs are also of low maintenance need as no plants are growing on it.

Nine building technology schemes that build the conceptual framework for the design of a sustainable structure, facade and climate regulation

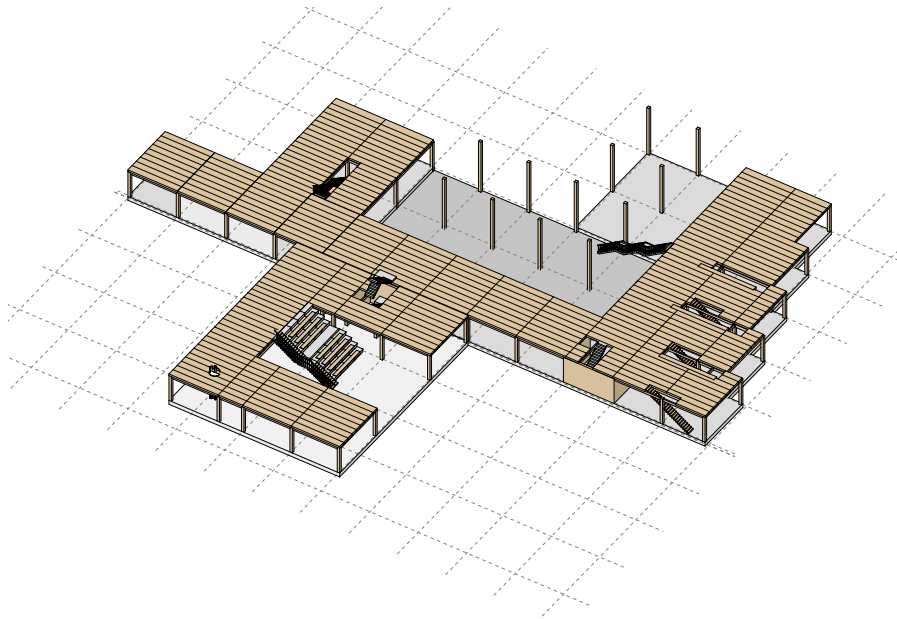


The building is designed on a grid of 6900 x 8100 mm and consists of two structurally separate parts (gap of 60 mm) in order to avoid torsional tension. It has a floor space of about 2950 m² which is built on concrete strip footing. The ground floor of the building has a concrete floor.

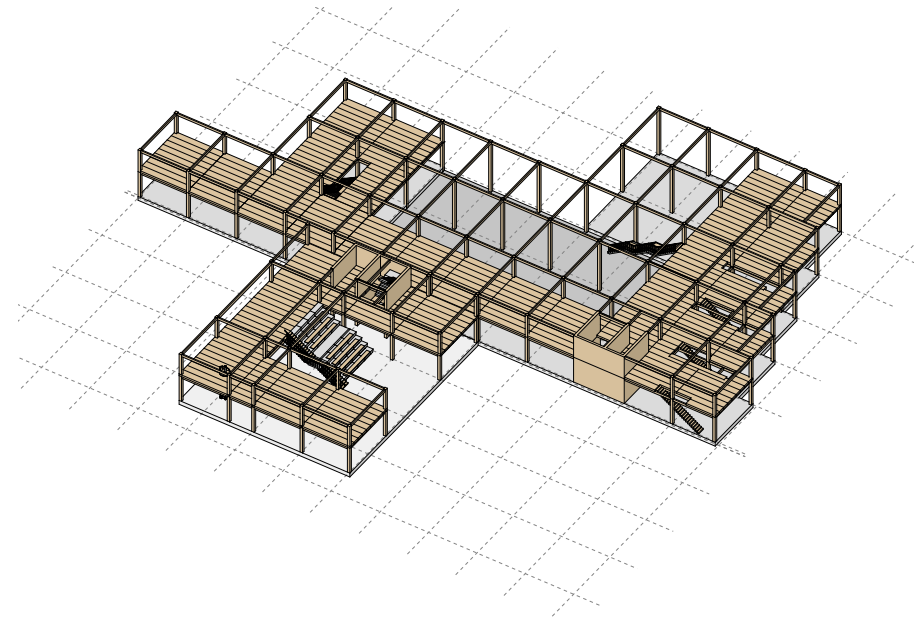


The loadbearing timber frame construction consists of GLT post and beam and has two stiffening cores of CLT walls. The cores are the places of the vertical access (fire staircases and elevators) as well as toilets and facility rooms (electricity, riser and downcomer pipes for ventilation and water).

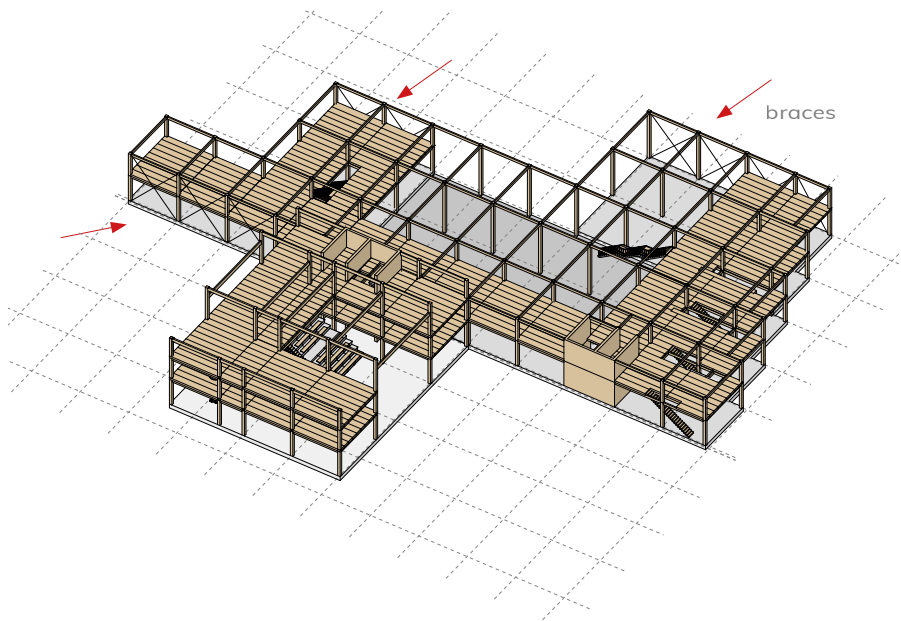
structural composition



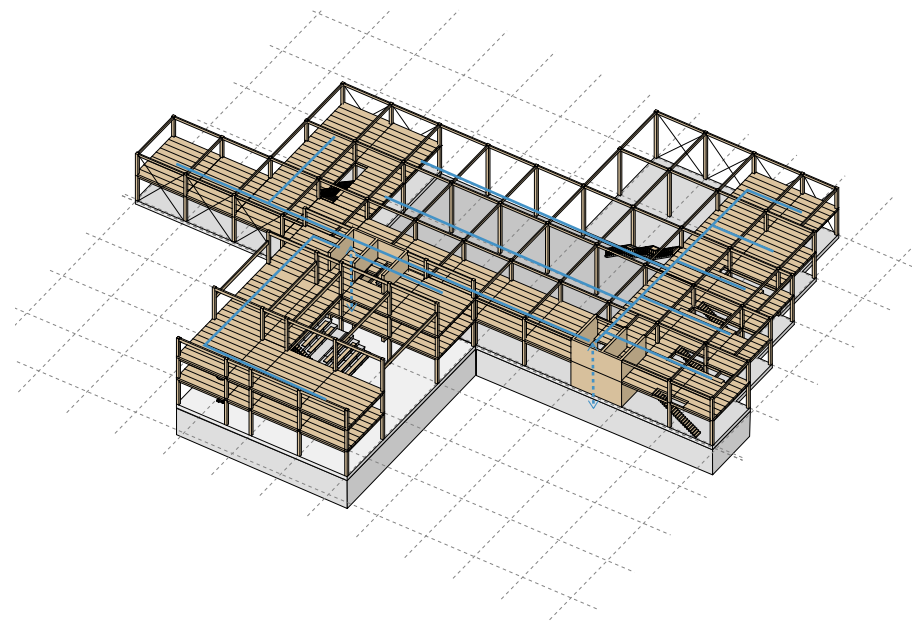
Lignatur floor elements are positioned on top of the GLT beams, spanning longitudinally. Ventilation pipes as well as electricity cables are integrated in the hollow floor elements. On the first and second floor the Lignatur floor is covered by linoleum. Representative staircases are positioned in atrium, machine hall, library and artist studios.



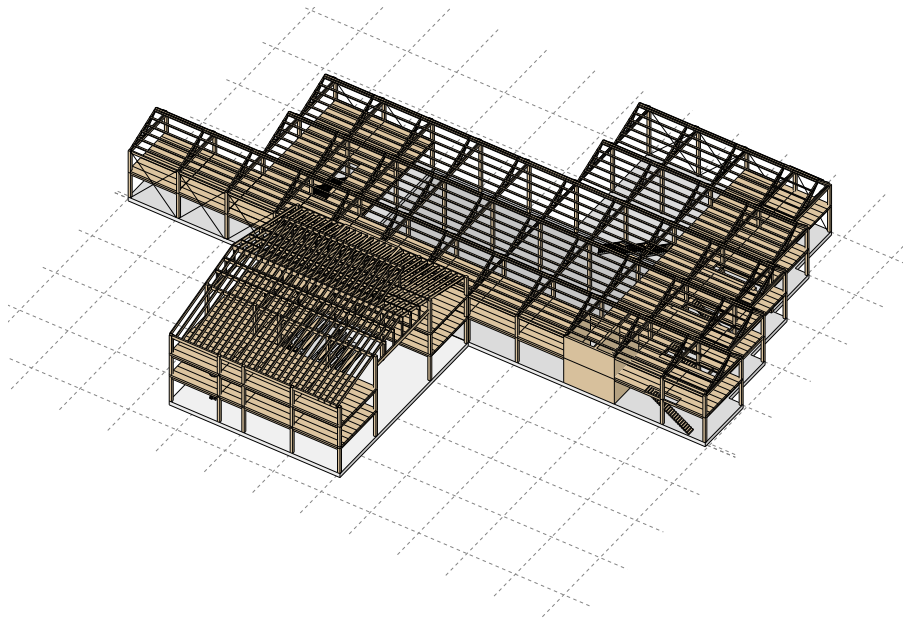
Post and beam structure continues all throughout the building. The GLT columns are connected with each other through steel pins.



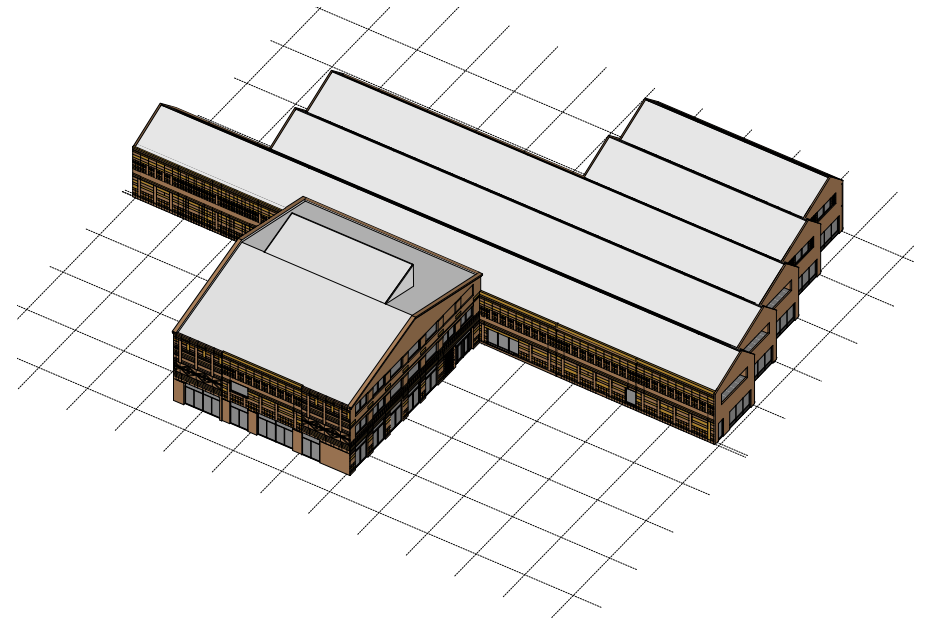
Steel bracing is added to timber structure in order to avoid torsion forces.



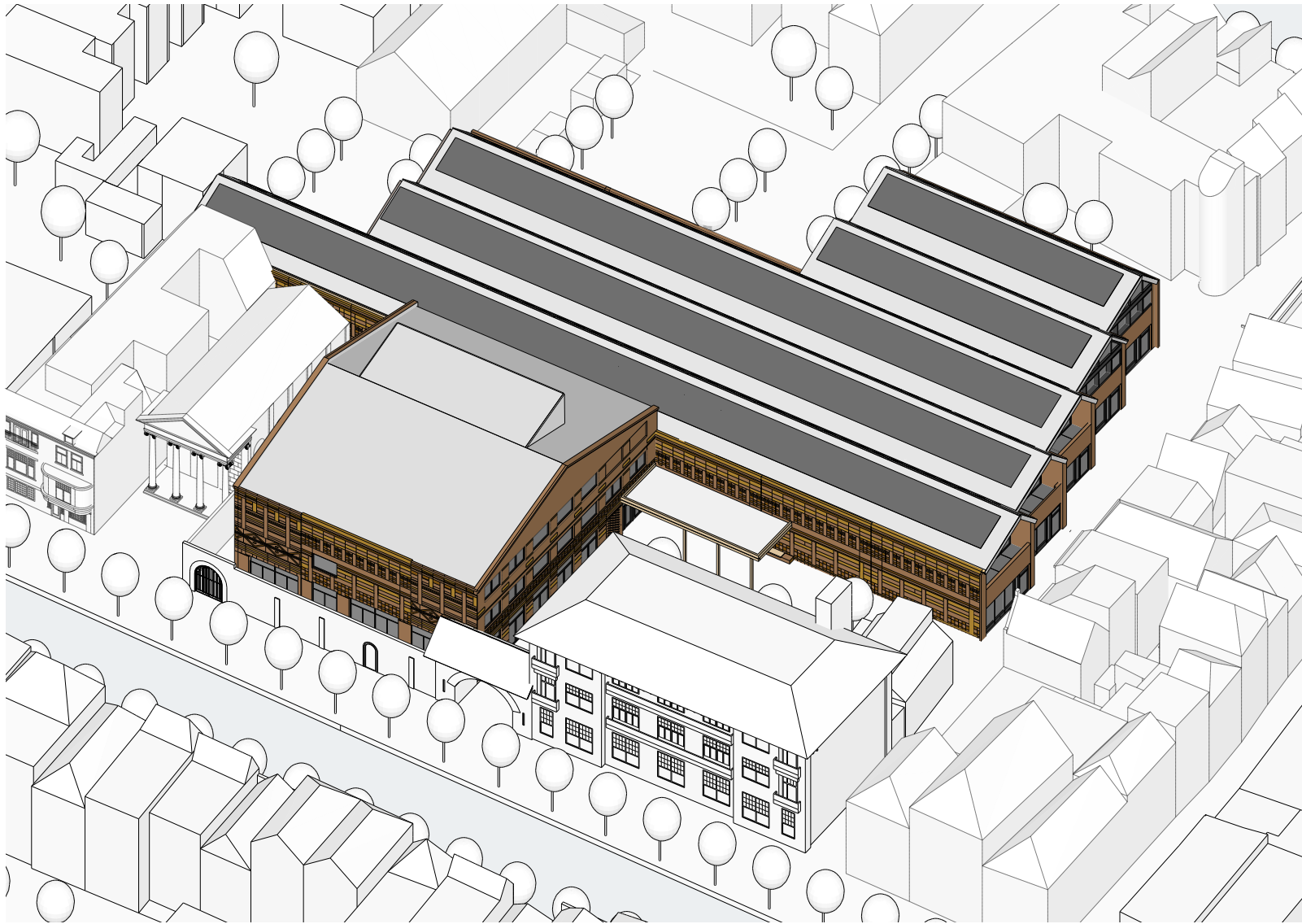
Ventilation pipes are integrated either in hollow floor elements (class rooms) or are hanging free in the machine hall.

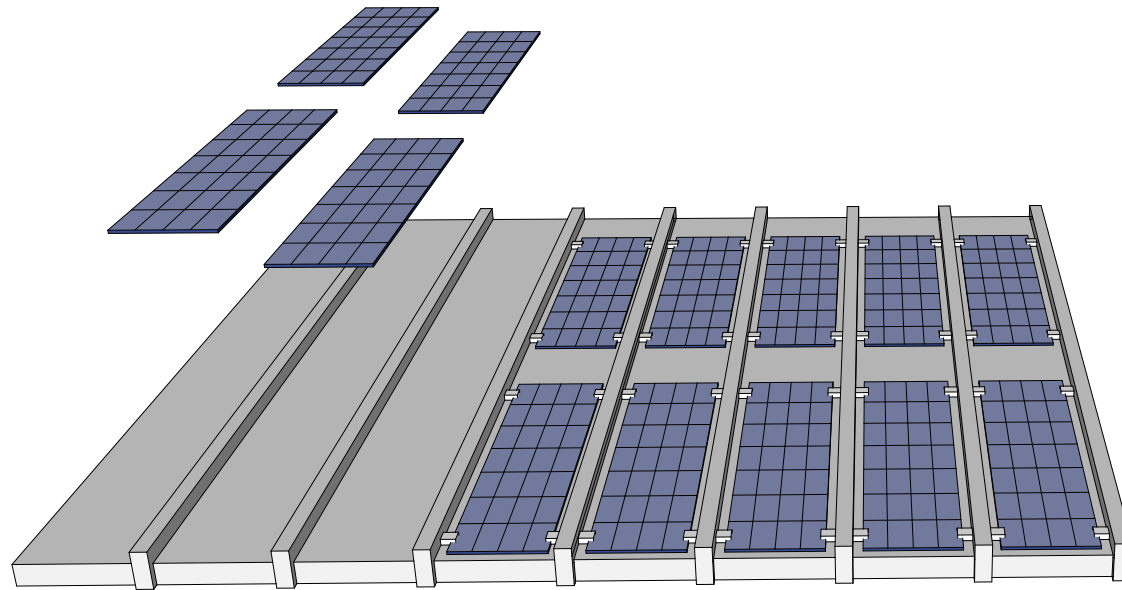


The roof construction consists of GLT timber trusses, which are prefabricated elements.



The facade is made of re-used clay fired bricks (Dünnformat 240 x 115 x 52 mm). The roof is elements are made of a timber frame construction which are cladded with zink.





The roof has a standing seam zinc cladding with integrated photovoltaic panels which are south-east oriented. The PV panels are lower than the standing seams so that they do not disturb the aestetical appearance of the zinc cladding.

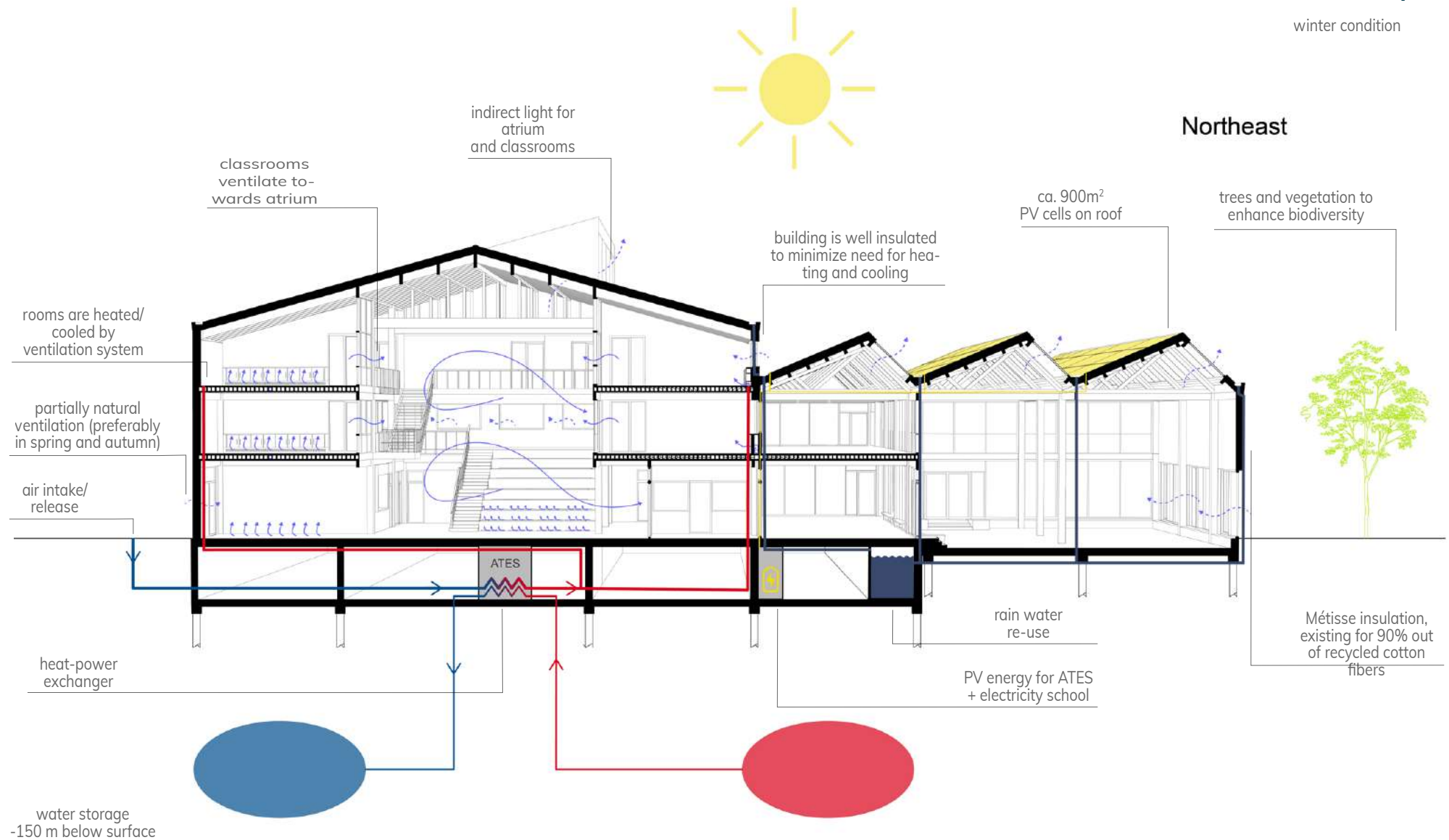
environmental position:
re-use of water (rainwater - greywater), energy (heat-
power-exchanger) and materials (bricks, insulation
material)

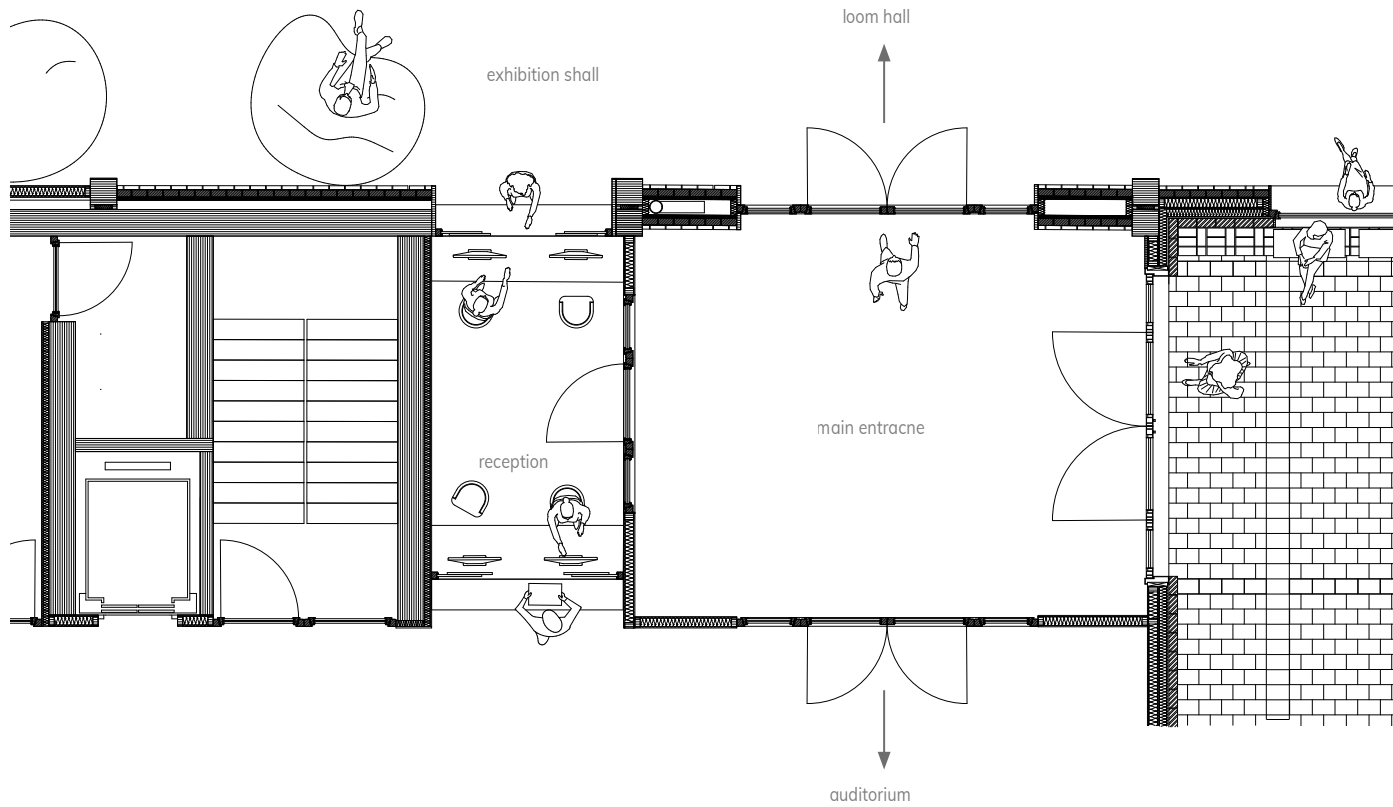
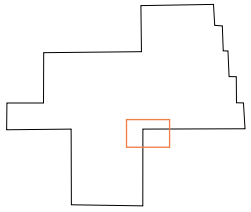
The use of the building and energy sufficiency are
interlaced.

climate concept

winter condition

Northeast

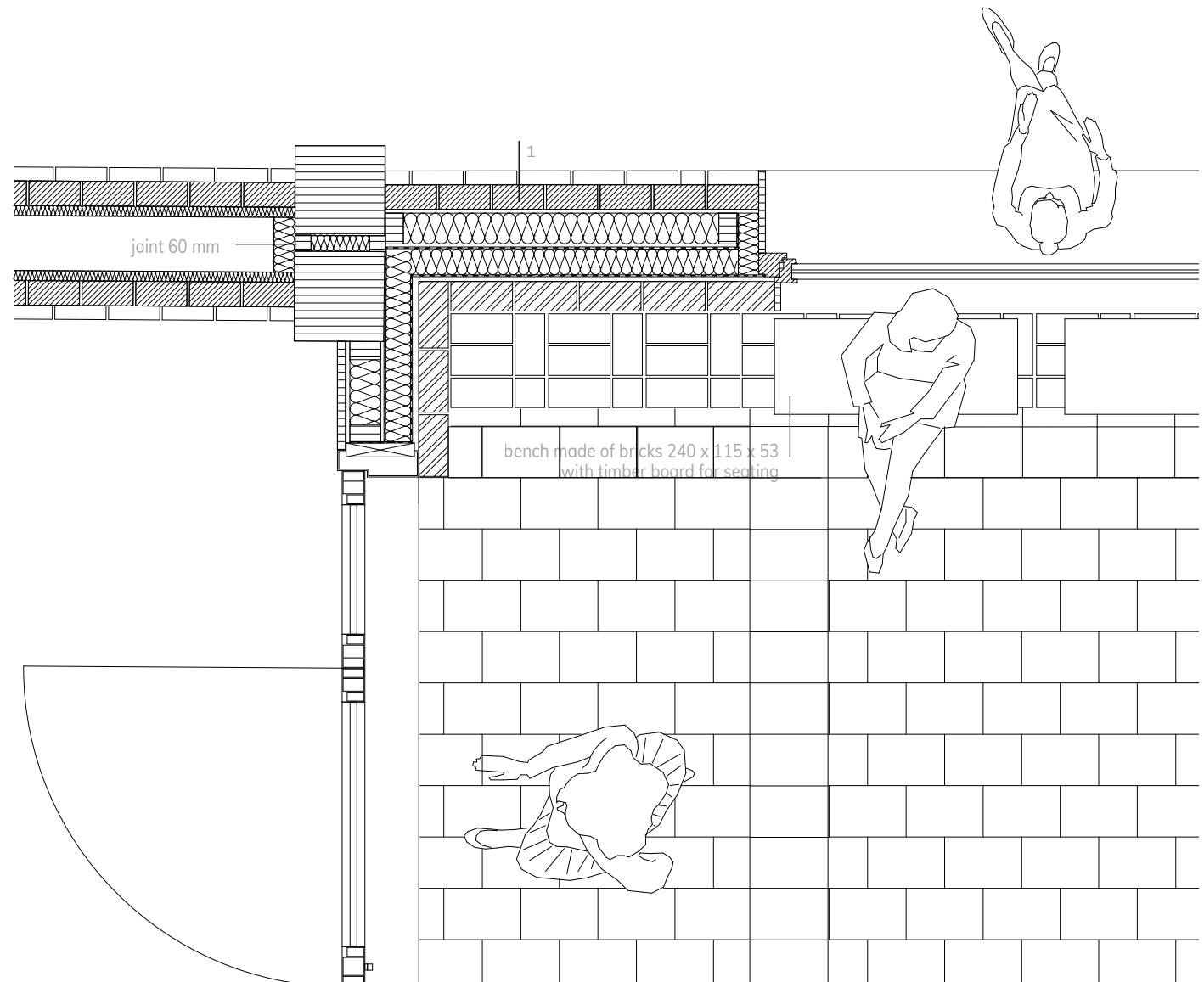




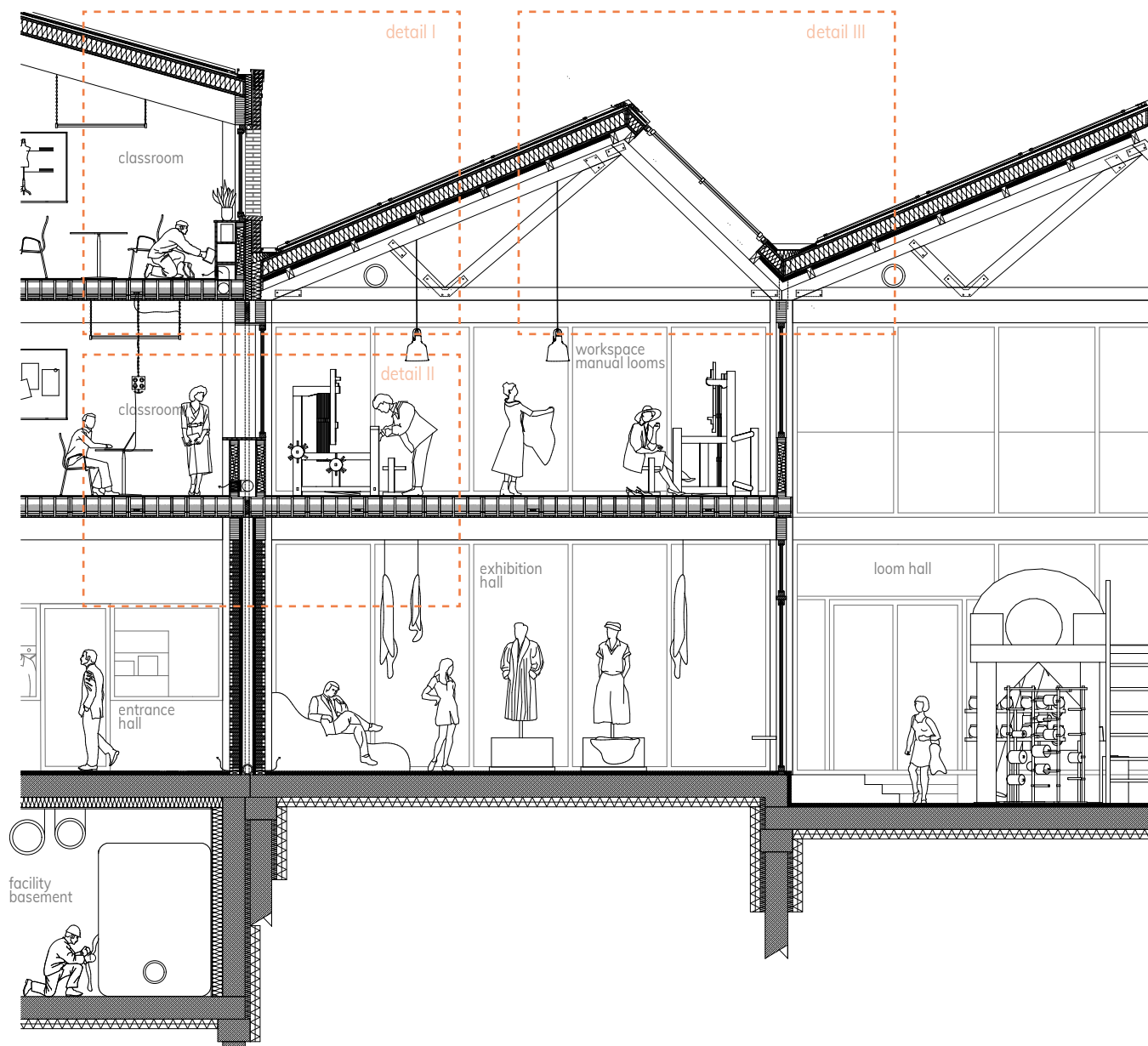
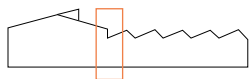
horizontal section 1:100

structural details

- 1: facade
- brick wall 95 mm
 - timber frame construction, modular element 150 mm, insulated with Metisse insulation
 - damp open layer
 - insulation 18 mm
 - damp closed layer
 - ventilation gap 35 mm
 - facade cladding brick 115 mm

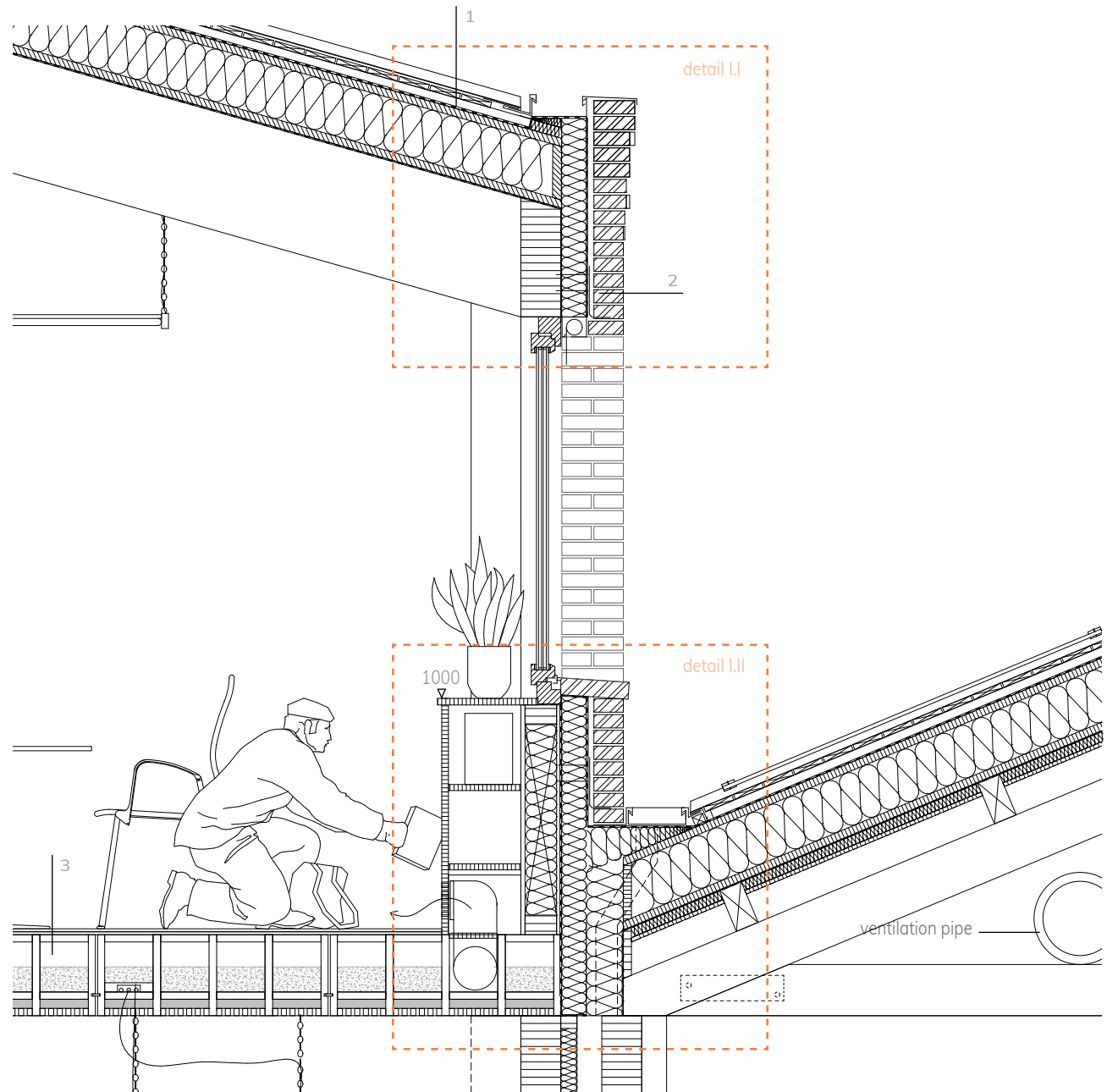


horizontal section 1:25

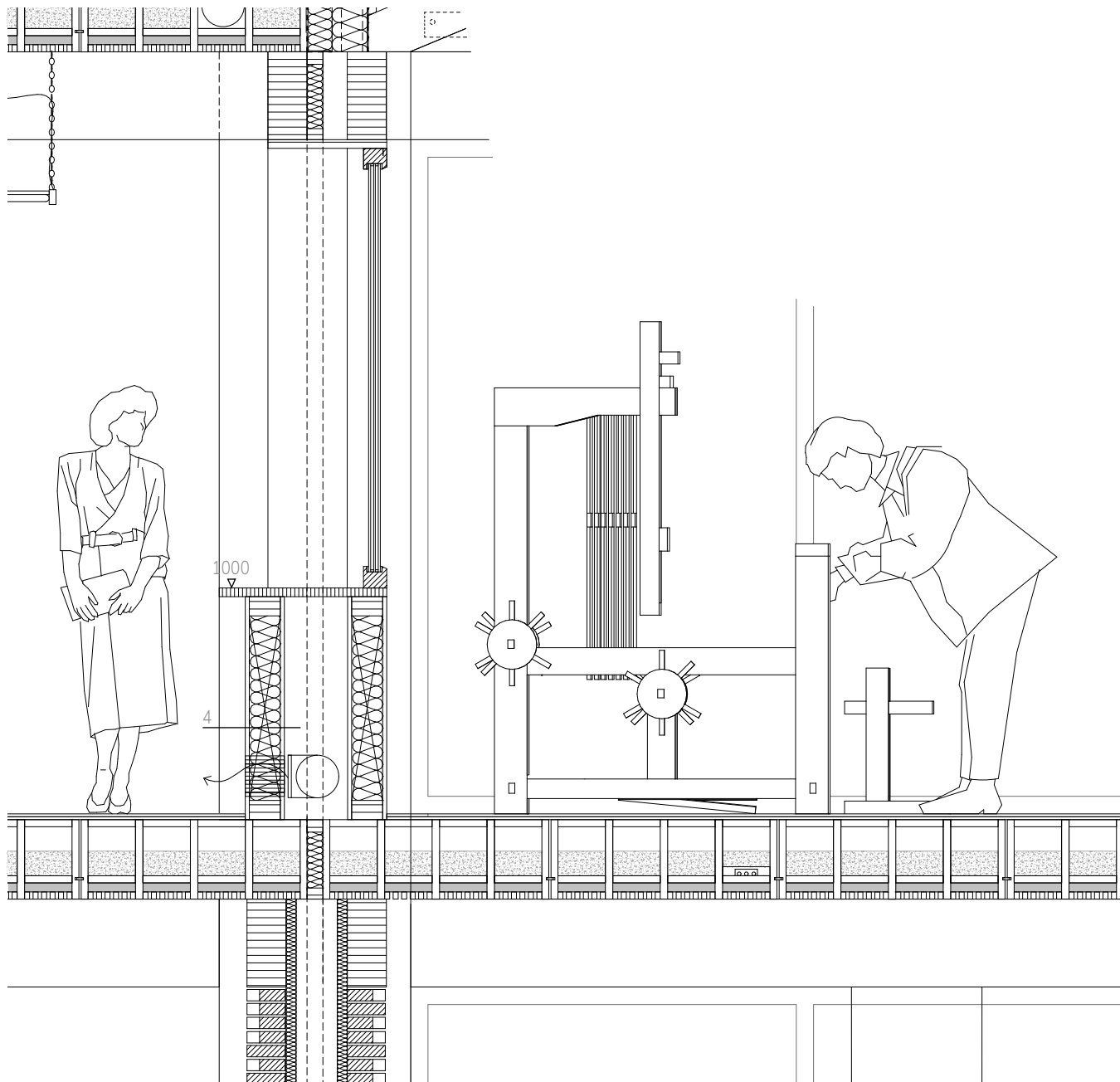


vertical section 1:100

- 1 : roof
- zink cladding
 - timber batten 30 mm
 - damp closed layer
 - ventilation gap 40 mm
 - damp open layer
 - timber frame construction, modular element 250 mm, insulated with Metisse insulation
 - GLT truss, 420 mm
- 2: facade
- GLT beam 250 mm
 - damp open layer
 - insulation 180 mm
 - damp closed layer
 - ventilation gap 35 mm
 - facade cladding brick 115 mm with brick anchor
- 3: floor
- linoleum floor covering 3 mm
 - lignatur floor element 420 mm, modular (with integrated insulation screed and acoustic absorption gabs)



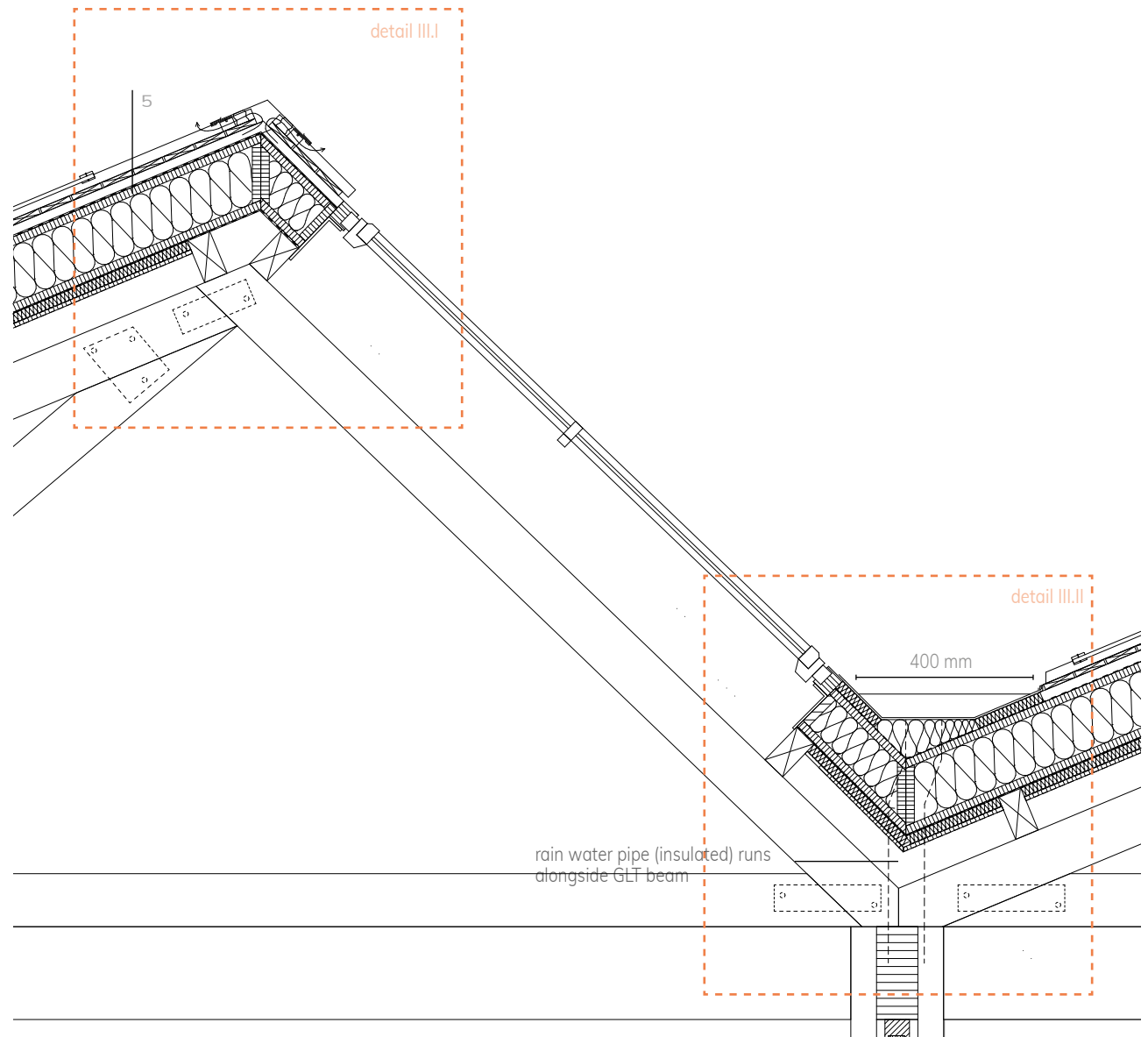
detail I 1:25



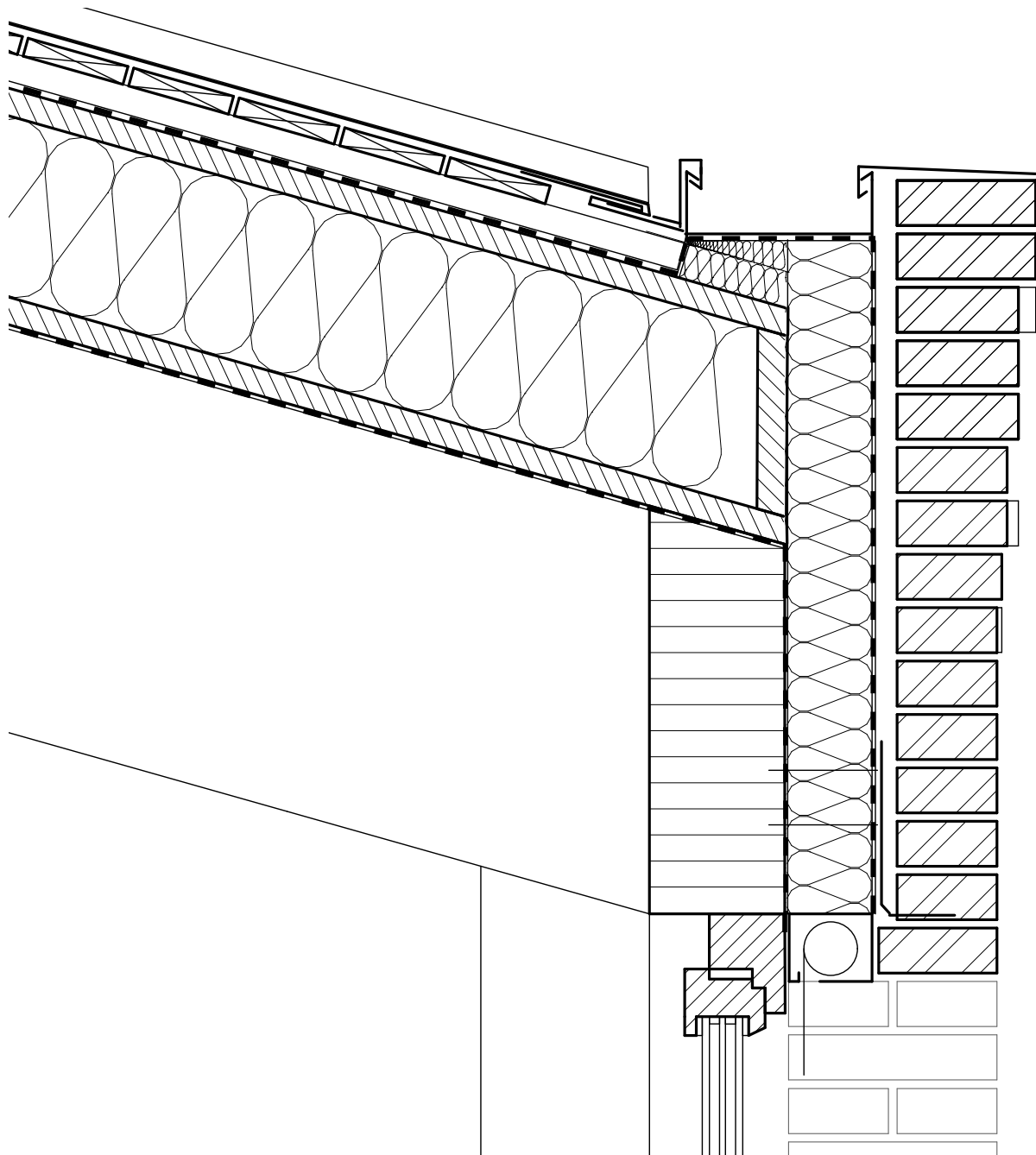
- 4 : wall
- timber frame construction, modular element
150 mm, insulated with Metisse insulation
 - installation space 200 mm with ventilation pipe 175 mm
 - timber frame construction, modular element
150 mm, insulated with Metisse insulation

detail II 1:25

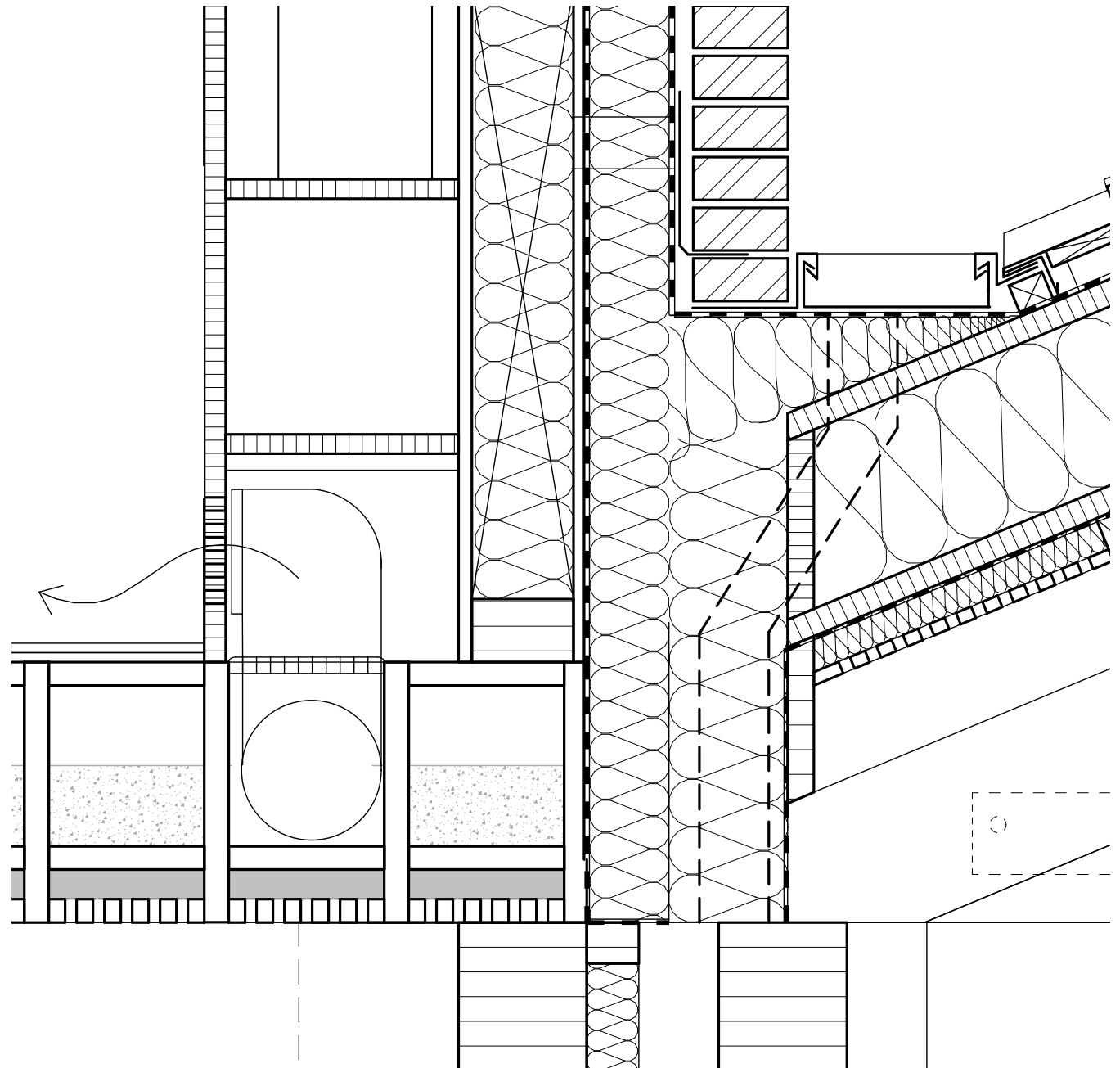
- 5 : roof
- zink cladding
 - integrated photovoltaic panels 25 mm
 - timber batten 30 mm
 - damp closed layer
 - ventilation gap 40 mm
 - damp open layer
 - timber frame construction, modular element 250 mm, insulated with Metisse insulation
 - timber counter-batten 170 x 90 mm
 - acoustic panel 55 mm
 - GLT truss, 200 mm



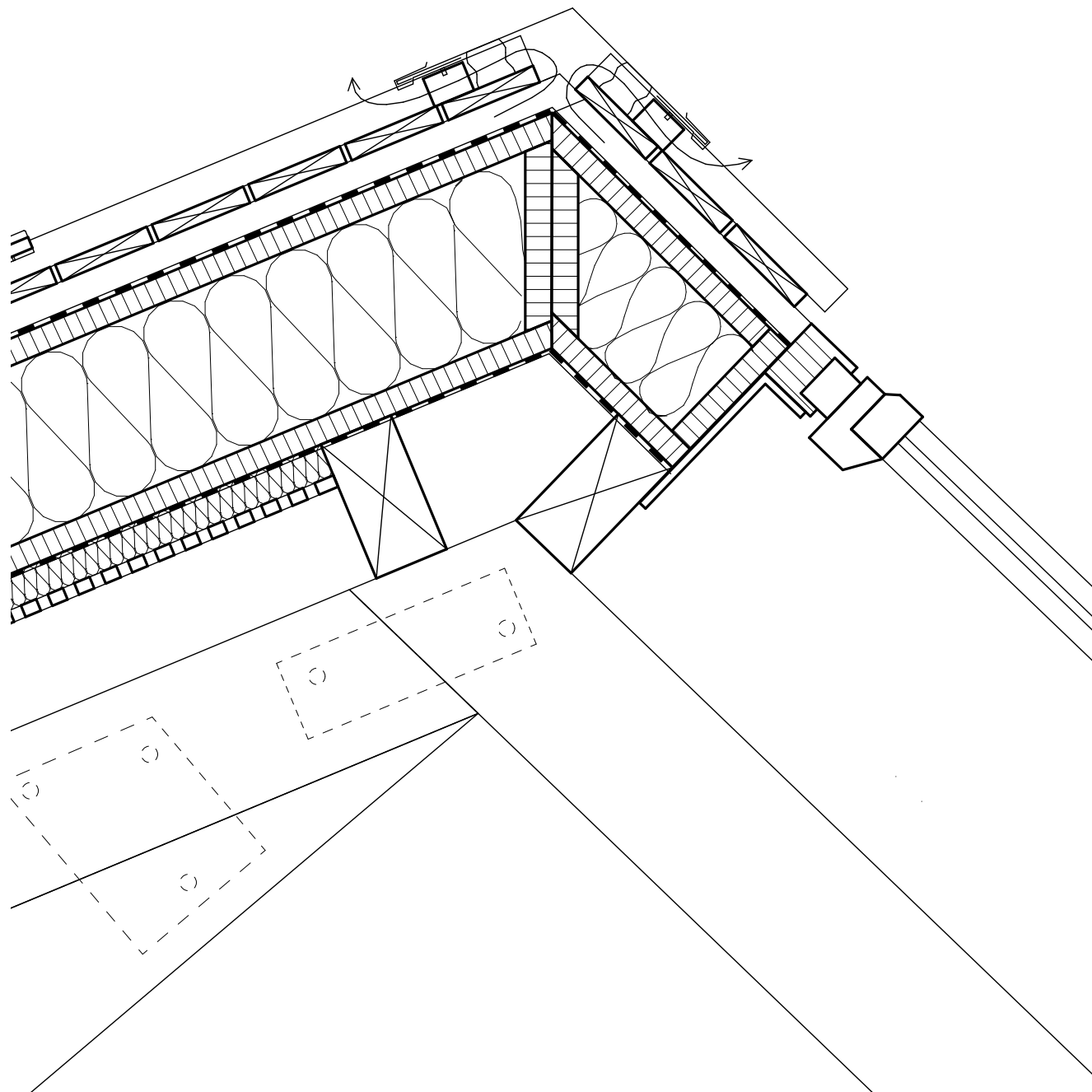
detail III 1:25

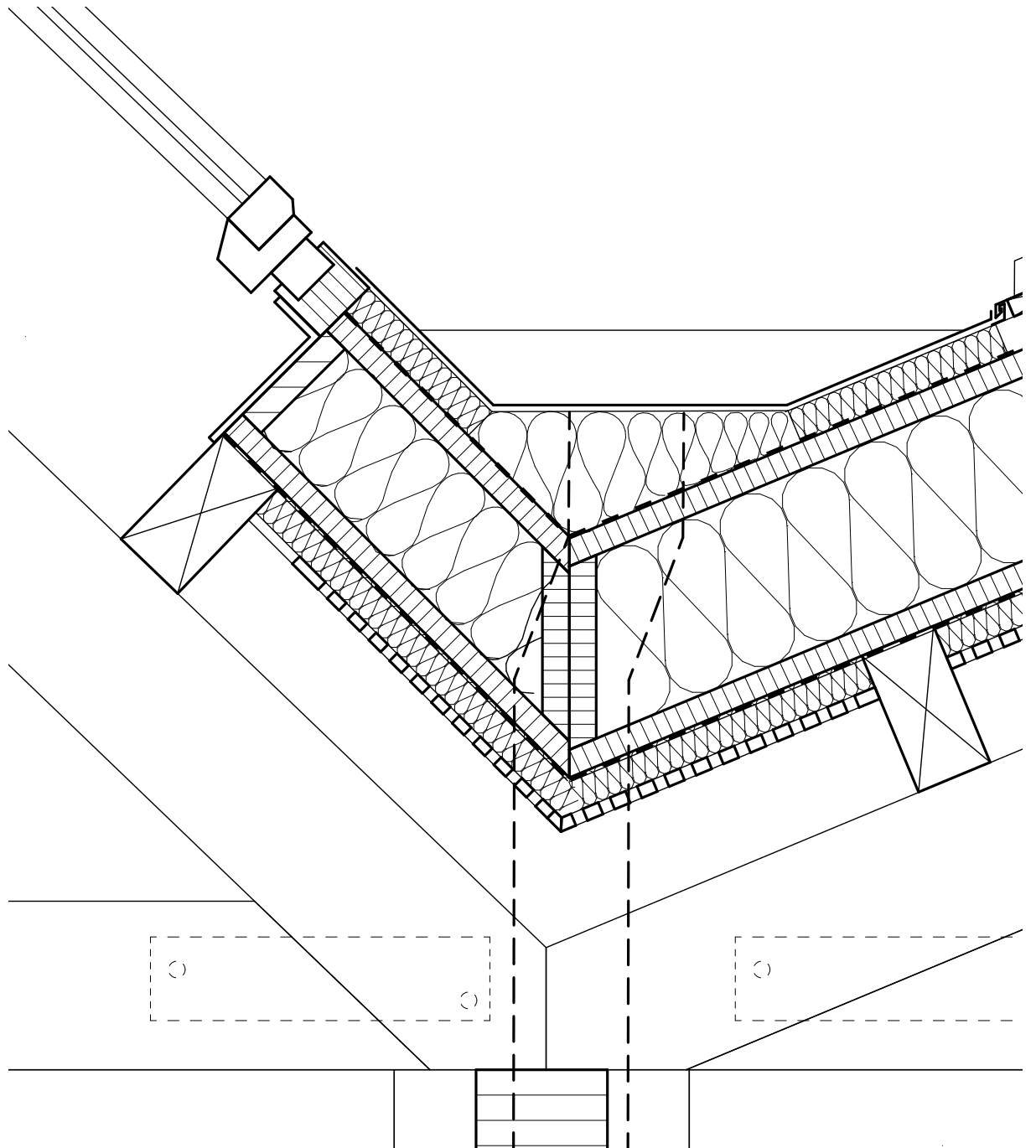


detail I.I 1:7,5



detail I.II 1:7,5





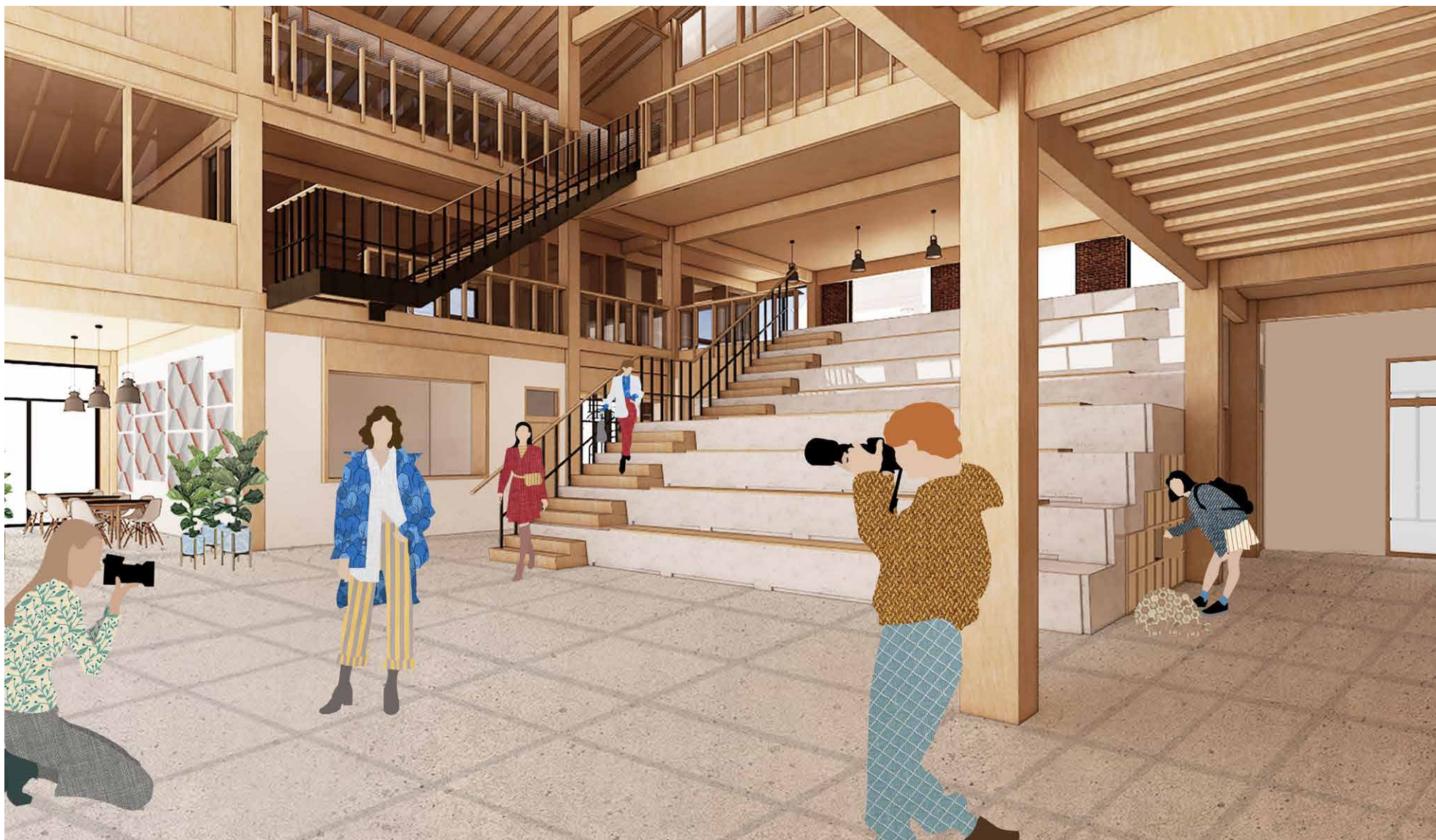
detail III.II 1:7,5

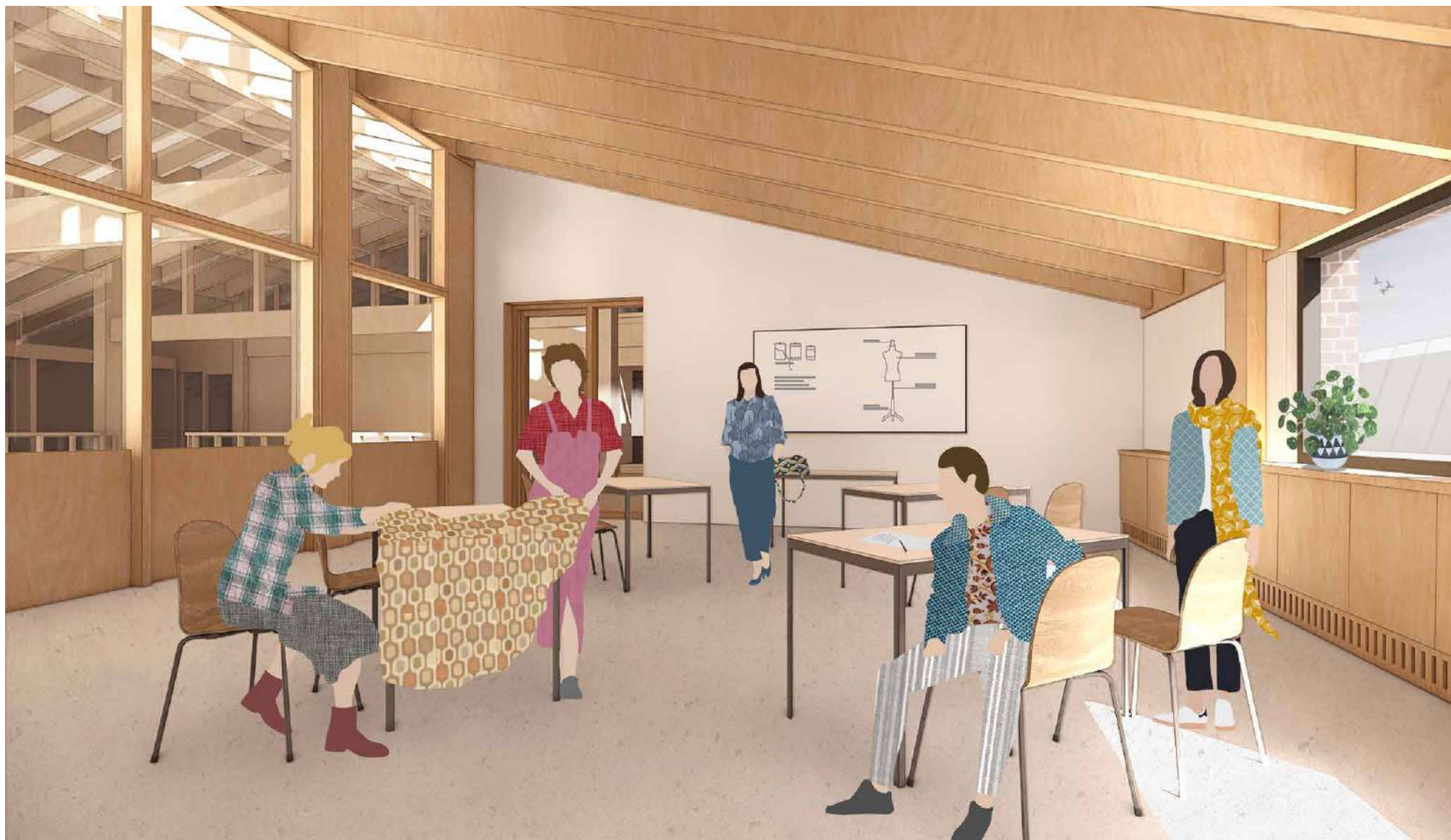
artist impressions



















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