GROWING GREEN

Preschool at Svalebogatan 52

MASTER THESIS CHALMERS ARCHITECTURE
OLA KLÅVUS & ARVID TÖRNQVIST

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GOTHENBURG MAY 2012
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CHALMERS

CHALMERS UNIVERSITY OF TECHNOLOGY
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MPARC & MPDSD

ABSTRACT

For many years the major Swedish cities have had problems with a lack of sites for preschools. Often the problem has been solved with short term solutions such as barracks on football fields and vacant lots. In Gothenburg and especially in the area Majorna-Linné it has become difficult to find free lots that are suitable for building preschools. A natural step is therefore to look at existing preschool lots and how they could be used more efficiently.

With Growing Green we want to create a green alternative to common preschools, but also an environment that encourages the children to grow up to be green citizens thinking about their environment.

This is a proposal for a replacement of an existing preschool at Svalebogatan 52 in Kungsladugård, Gothenburg. With our preschool design we aim to create a building based on an understanding of the needs of children, the preschool curriculum and the Reggio Emilia approach.

Reggio Emilia preschools are normally built as single story buildings with a central square and therefore have a relatively large footprint on the site. In our project we explore how such a preschool can be built in compact volumes on a small site in an urban context, leaving as much as possible of the site for the children to play on. Working with compact volumes has also been an important base for creating a building that can live up to the international passive house certification.

We also want to investigate how the site can be used as efficiently as possible for outdoor activities and how garden space and playgrounds around the preschool can be used as a shared space by the pupils and the inhabitants of the area.

Another major goal in our work is to create a building that fits the site, but at the same time has a generality and flexibility that enables it to be used for other purposes and to be built in a variety of sizes in other locations.

We want to present the municipality with an attractive and green alternative to the makeshift buildings that are set up to house children today. We have strived to question the common way of designing preschools and thereby want to inspire others to think in new ways.

TABLE OF CONTENTS

INTRODUCTION

BACKGROUND TO THE PROBLEM

Gothenburg like most major cities in Sweden has recurring problems with insufficient housing for preschools. This leads to ever-growing classes and temporary housing solutions turned permanent.

We both have children in kindergarten and therefore this is a subject close to our hearts. We also have personal experiences of worn-down buildings and uninspiring locales that cannot accommodate the pedagogical intentions of today's childcare.

Preschools are traditionally a subject that has been neglected by most architects in Sweden as well as in the other Nordic countries. In recent years this seems to have changed, and architectural magazines have published an increasing number of articles on the subject. Many new preschools in Sweden and abroad have very high architectural and pedagogical ambitions.

We have chosen to make a project out of a real situation where an old preschool needs to be changed in one way or another to match new demands on ventilation, functionality and size. The plan from the municipality so far is either to have the house heavily refurbished, demolished and rebuilt or simply replaced with standard modules.
Our plan is to make an attractive alternative to the prefab standard modules to show the politicians what kind of qualities a well built and thought-through kindergarten could bring not only to the children and personnel but also to the neighbourhood.

The site for the new preschool is about 2500 sqm and situated in the corner of Svalebogatan and Blåvalsgatan. The current address of the preschool is Svalebogatan 52.

AIMS AND OBJECTIVES

- To create a Reggio Emilia preschool in a compact volume freeing as much as possible of the site for the children to play on.

- To create a sustainable passive-house preschool focusing on healthy materials, functions, recycling and the integration of pedagogy and ecology.

- To create a building that is well adapted to the site, but with the generality and flexibility to be able to be scaled and easily adapted to other sites and needs.

DESIRED RESULT

The thesis will result in a replacement for an existing preschool. The outcome will be a building design for a preschool that fulfils our goals and objectives presenting the municipality with an attractive and green alternative to the makeshift buildings that are set up to house children today.

The concept of sustainable development can be hard to grasp. The subject is already compulsory in Swedish elementary schools, but we think it could be introduced to kids at an even younger age in a playful way. We want to create a building where ecology, recycling and the environment is visualised and integrated in the building as a part of the children's daily life. We will try to find ways to visualize the buildings technical systems as well as the buildings and its inhabitant's position in the natural ecosystem. Power-production by solar panels, food grown in greenhouses and waste composted and turned into soil are some examples of simple pedagogical tools that could be used. We believe this can help the children develop an interest for these issues that they can take with them as they grow older.

Another aim in the project is to make a low-energy preschool which demands quite a lot of research and design. This process will force us to realize our sketches all the way into detailed drawings to really understand the construction.

METHOD AND THEORY

Our preschool has developed from an interplay between the actual design process and theoretic studies of literature and other preschools. We began the process by gathering information about preschools in books and by studying other projects and master theses from previous years. We studied different pedagogical ideas and came to the conclusion that Reggio Emilia was closest to our own views.

We have also visited a number of preschools to get a good understanding of what daily life at a preschool is like for the children and the teachers and to get a better understanding of the spatial requirements. During the visits we also took the opportunity to ask the teachers about their work and workplace and views on pedagogy.

We then visited the site and made a thorough analysis of the site and the surroundings. All this information we took with us when we started to sketch, first by hand and in physical models and later on in the computer.

PRESCHOOL DESIGN

Preschools can be designed in a number of ways and they vary a lot in different countries. In Sweden the layout and size of preschools differ greatly depending on pedagogical ideas but also depending on the amount of money the municipalities are willing to spend. The municipalities normally have their own building programs defining the spaces required for different functions in a preschool, but they don't always tell much about spatial qualities and functions.

The report *Inredningsplanering – En planeringsmodell för inredning i skolor och förskolor [Interior planning - A planning model for school and preschool interiors*] published by The Swedish Association of Local Authorities and Regions lists a number of criteria that can help create a good preschool environment.

The report states that the preschool should be self-instructive. The children should be able to tell the purpose of each room and if it is a room for play or quiet activities. The preschool should be arranged with clear functions for each room such as play rooms and workshop rooms. This could both have to do with the physical appearance of the room, its size and shape and the furniture put in it. The study mentions five criteria that are vital for a good preschool environment:

- Good overviews indoors and between the inside and the outside of the preschool
- Common space like a play hall, workshop, atelier and outdoor environment
- The possibility for smaller and bigger groups to be secluded
- Transports should be done in corridors and hallways and not through rooms for children
- Cooperation and cooperative use through flexible plan layout

The amount of loose furniture like chairs, tables, cushions and mattresses that can easily be arranged and rearranged in different forms is also crucial to encourage the children's different games and activities. The same goes for the preschool garden where a large amount of loose planks, trees, stones and wild nature encourage the children to be more active and creative. The loose material enables the children to give the garden different layouts from day to day.

According to the study another important issue to consider is to minimize the amount of space used for communication and use as much as possible of the area for the pedagogical functions. Rooms which also function as passages may cause stress among both children and teachers and should therefore be avoided.

REGGIO EMILIA

Reggio Emilia is a pedagogical philosophy developed in the preschools of the town Reggio Emilia in the north of Italy after World War II as a reaction against fascist ways of bringing up children. The pedagogy is based on humanistic values and the belief that all children are born rich and intelligent and with a strong urge to explore the world. The pedagogy also stresses cooperation, solidarity and the children's individuality and differences.

The pedagogical philosophy is not meant as a set of rules to follow, but rather an approach that should always be adopted to the time and place.

Reggio Emilia first came to Sweden in the eighties and soon became popular. The traditional Swedish preschool pedagogy share many of the views on knowledge and solidarity and on children being competent and independent and therefore the new ideas soon gained a strong position here. Sweden is one of the countries with the most Reggio preschools outside of Italy.

Reggio Emilia preschools puts great emphasis on the preschool environment. The spatial ideas of the philosophy is the part that has been most important for the design of our preschool.

The book *Children, spaces, relations – metaproject for an environment for young children* by Giulio Ceppi and Michele Zini is based on a project carried out by a group of architects, designers, teachers and pedagogues in the town Reggio Emilia in the north of Italy examining the physical spaces for young children. The book gives guidelines on how to work with the Reggio Emilia pedagogy and what to consider when creating spaces for young children. In the book a number of keywords or elements are listed that are important in Reggio Emilia preschools.

Recognizability
The preschool should have an identity of its own but be flexible and adaptable to change over time

Horizontality
The horizontal layout is a physical manifestation of a space without hierarchies where both all rooms and the people inhabiting them are all equally important.

The central piazza
The piazza, the central square, is an important feature in Reggio preschools. All the main spaces of the preschool face the square and it eliminates the need for corridors and other spaces exclusively for communication and frees space for children's activities. The piazza functions as a meeting place where the children are fostered in social relations and group dynamics.

Transformability and flexibility
The preschool environment should be adaptable to short- and long-term change and manipulation by both children and teachers. Short-term change can be achieved with wall panels, screens or other types of partitions but also with movable furnishing elements.
To enable long-term changes the technical systems of the building should be flexible and enable the spaces to be uses for different functions over time. It could also imply the possibility to add extra rooms or enlarge the building.

Atelier

The atelier is an important part of Reggio Emilia preschools and used for experiments, research and creative work in the visual arts. In the Italian Reggio preschools a special teacher with an artistic education is assigned to the atelier and working together with the classroom teachers to support the children's learning and creativity.

School as workshop

The whole of the preschool in seen as a workshop where each space is organized with this in mind and meant to foster the will to explore. This also means all the spaces should be open for the children to explore, including the kitchen and staff facilities.

School and community

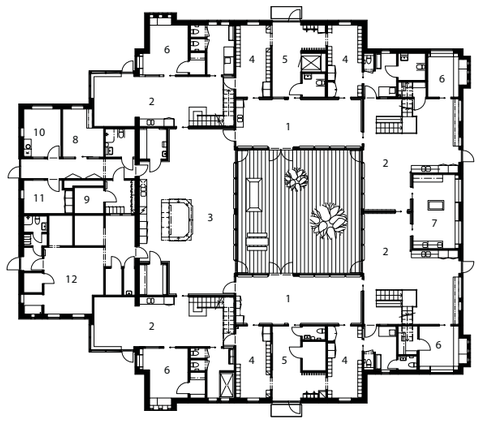
The preschool should interact and blend in with its surroundings. It is also meant to be equipped to function as a meeting place that can be used for other activities after school hours.

Inside-outside relationship

Each preschool is situated in a specific place and time with changing weather, seasons and time of the day and this should be visible also from the inside. The relationship between inside and outside can also be emphasized with spaces that are partly outside like porches, verandas or courtyards and with outside installations that makes the forces of for example wind and water visible.

Transparency

Another important issue in a Reggio preschool in transparency, the possibility to look from one space to another and comprehend the built structure.

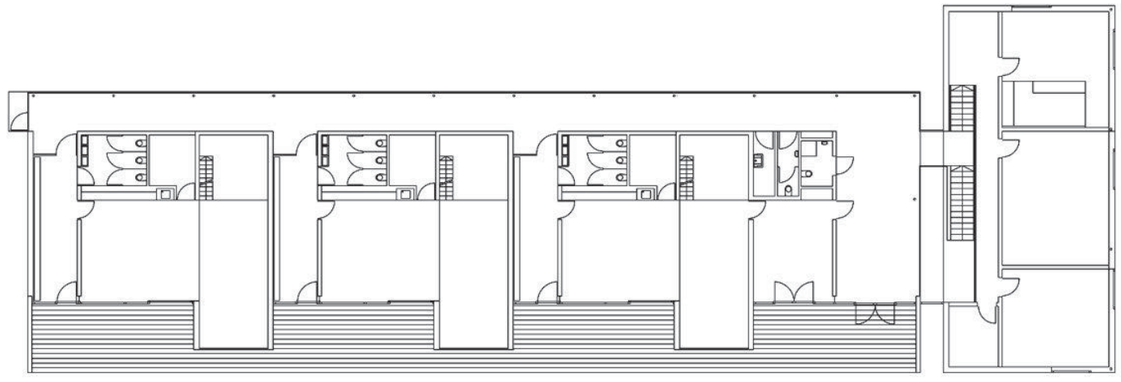


Matildelunds preschool, Kumla, Sweden by SWECO architects

Communication

A lot of emphasis is put on communicating and displaying the work and projects carried out at a Reggio Emilia preschool. The artwork produced by the children form a "second skin" covering the preschool. The preschool therefore needs walls where two- and three-dimensional objects can be hung to display the ongoing activities. To observe and document the preschool needs adequate equipment such as tape recorders, cameras, video cameras and projectors, but also spaces where the teachers can work with and archive the documented material.

The Reggio Emilia pedagogical philosophy also puts great emphasis on creating spaces for the children which speaks to all the senses. The preschool should have various types of lighting, materials with different colours and textures but also give the children possibilities to experience different smells and sounds.



INSPIRATION

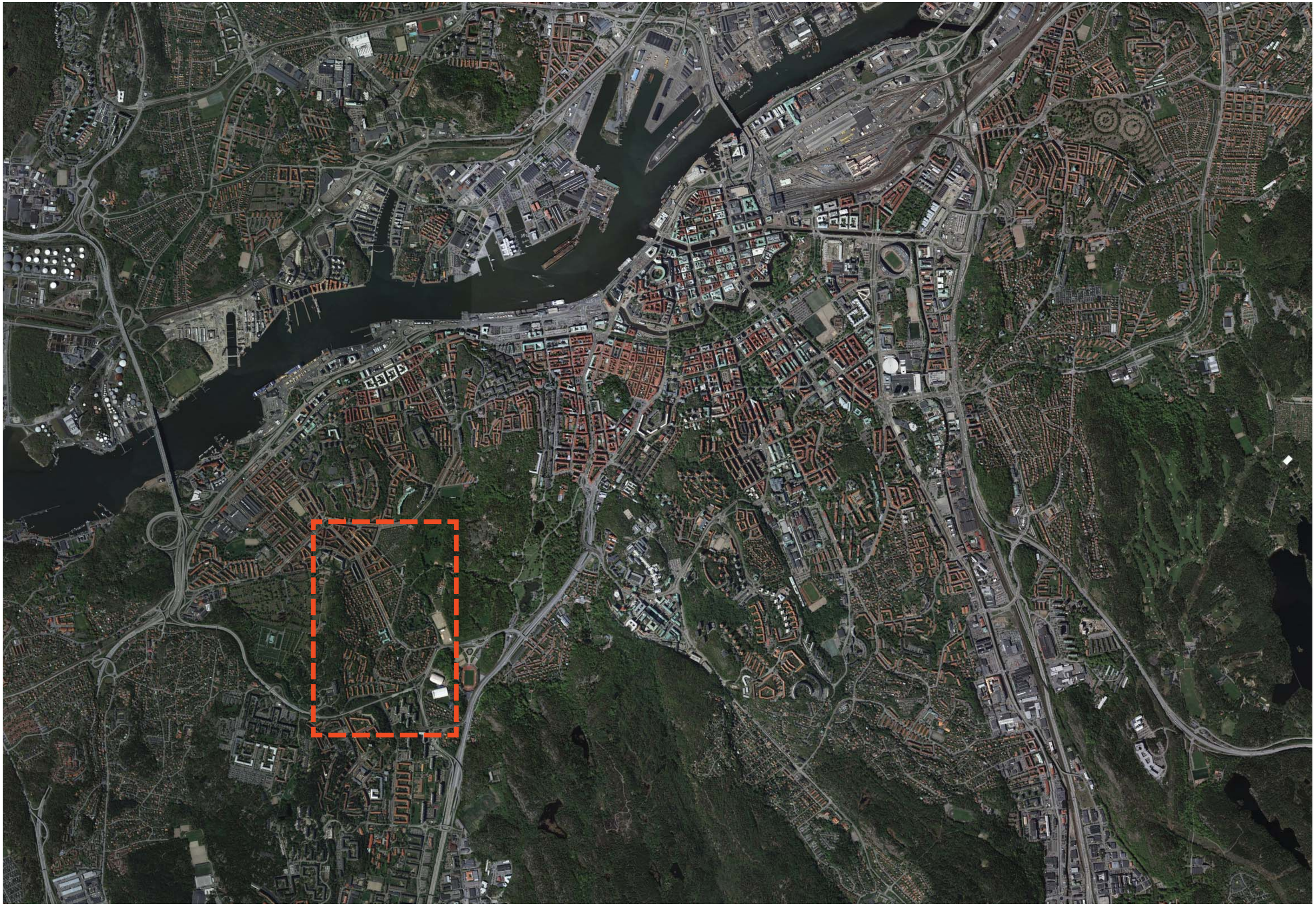
Designing a preschool can never be only about the shape, the facade or the materials but at the same time these aspects of a building for children are often neglected. The main purpose of an architect designing a preschool is to make a good educational building where the children can live and thrive for many years to come. The building must however not only fulfil demands on soundness and safety; it must also provide its users with a platform for both learning and reflection. Ultimately a preschool is an extension of the pedagogical curriculum where building and pedagogy strengthens each other.

A lot of time in the project has been dedicated to the study of reference projects. We have studied literature on the subject and read about different pedagogic views. We chose to work with the Reggio Emilia pedagogy, which have shaped the layout of the building.

We have visited a large number of architectural blogs and websites in search of inspiration for the building design and concept.

Visiting a number of preschools and talking to the teachers has also given us invaluable insights in the daily life of a preschool that we could never have gotten from just reading books.

We also visited the Gothenburg municipal archive for building permits and gathered drawings from preschools built in the city. Studying the drawings have been a useful way of learning more about spatial needs and solutions for entrances, departments and other parts of a preschool. All the sources of information has been useful and inspiring but in very different ways.



PROJECT AREA

MAJORNA-LINNÉ

Majorna-Linné
Majorna is one of Gothenburgs oldest districts outside the city centre. It is often presented as an example of a city district with mixed use and a lot of small businesses.

Majorna is one of the most attractive districts in Gothenburg due to a good mix of services and habitats but also because the district has a mix of apartments and villas ranging from simple dwellings to luxury housing.

Kungsladugård
Kungsladugård is the southern part of the city district Majorna-Linné and houses about one third of the dwellings in the district.

Most of the apartments in the area is situated in “Landshövdingehus”, three story apartment blocks with an uplifted basement story made of stone and two wooden stories on top most of them built between the First and the Second World War. According to the building regulations wooden houses were only allowed to be built up to two stories in height but by raising the basement story up above ground the houses could actually be built three stories high.

South of Mariaplan, the central hub of Majorna, the apartment blocks are mixed up with rowhouses which had until then not been very popular in Sweden. The area also contains villas in a small scale town-like manner clearly influenced by garden cities in England and Germany.

Children in Majorna-Linné
Majorna-Linné has the highest amount of children born of all city districts in Gothenburg and the nativity is comparable to areas that have a higher rate of villas. Although about 14 percent of children born in Gothenburg are born in Majorna-Linné there is a considerable migration of families from the district and only about 8 percent of children in school age lives here. Every batch of children entering preschool is reduced by about 45 percent before the age of five. This poses great problems for the planning of schools and preschools and demands solutions that can handle the variations.

Preschools in Majorna-Linné
There are 54 communal preschools in Majorna-Linné and a variety of private childcare solutions such as parent cooperatives and private daycare centers.

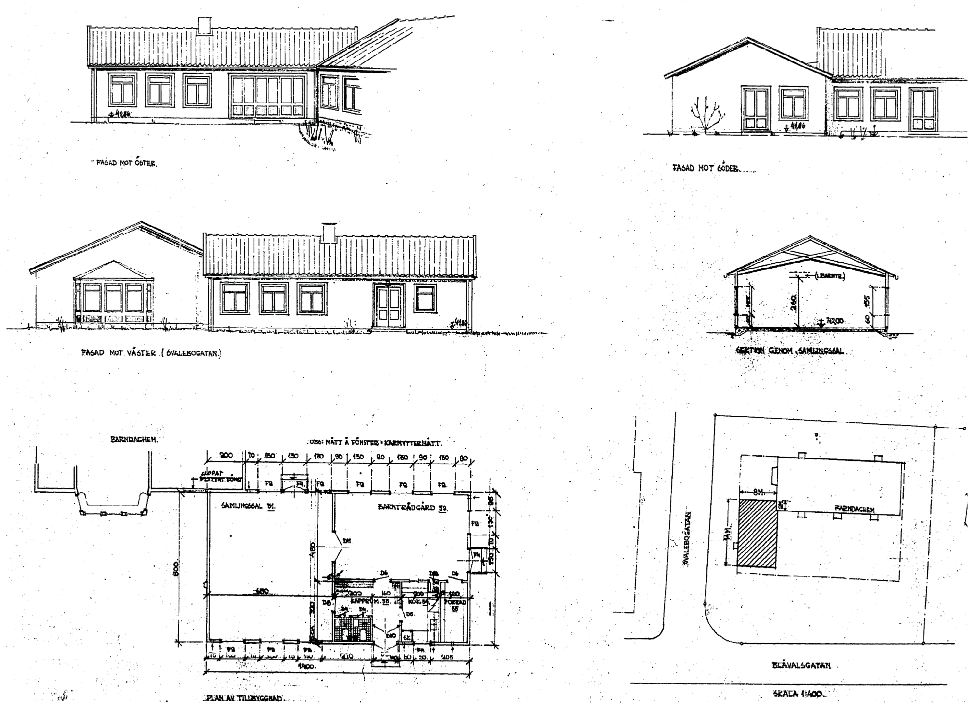
HÖGSBO - SVALEBOPLATSEN

Svaleboplatsen
South of Kungsladugård, bordering the city district Högsbo-Frölunda-Askim the small scale villas are replaced with a homogenic area built in the late fourties. Here the houses are characteristical three story apartment blocks made out of unornamented brick or plaster. The buildings are situated in straight lines following the curve of the slope to the west.

Originally this area was called Högsbo after the small cottages and orchards situated uphill to the south. As the city expanded in the fifties Högsbo became a city district of its own and the original area from the forties came to be a part of Kungsladugård. The area is sometimes refered to as Svaleboplatsen which is also the name of the small park next to the site. This is however a name that is rarely used and people often still refers to the area as Högsbo.

Svaleboskogen
Svaleboskogen is a small forest area bordering Kungsladugård to the east and Västra kyrkogården, one of Gothenburg main cemetaries to the west. The forest is often used for recreational purposes and recent plans to develop parts of the forest has had to be postponed due to strong opinions among the population.

Svaleboskogen is an asset to all the preschools and schools in the area and is often used for education and exploration.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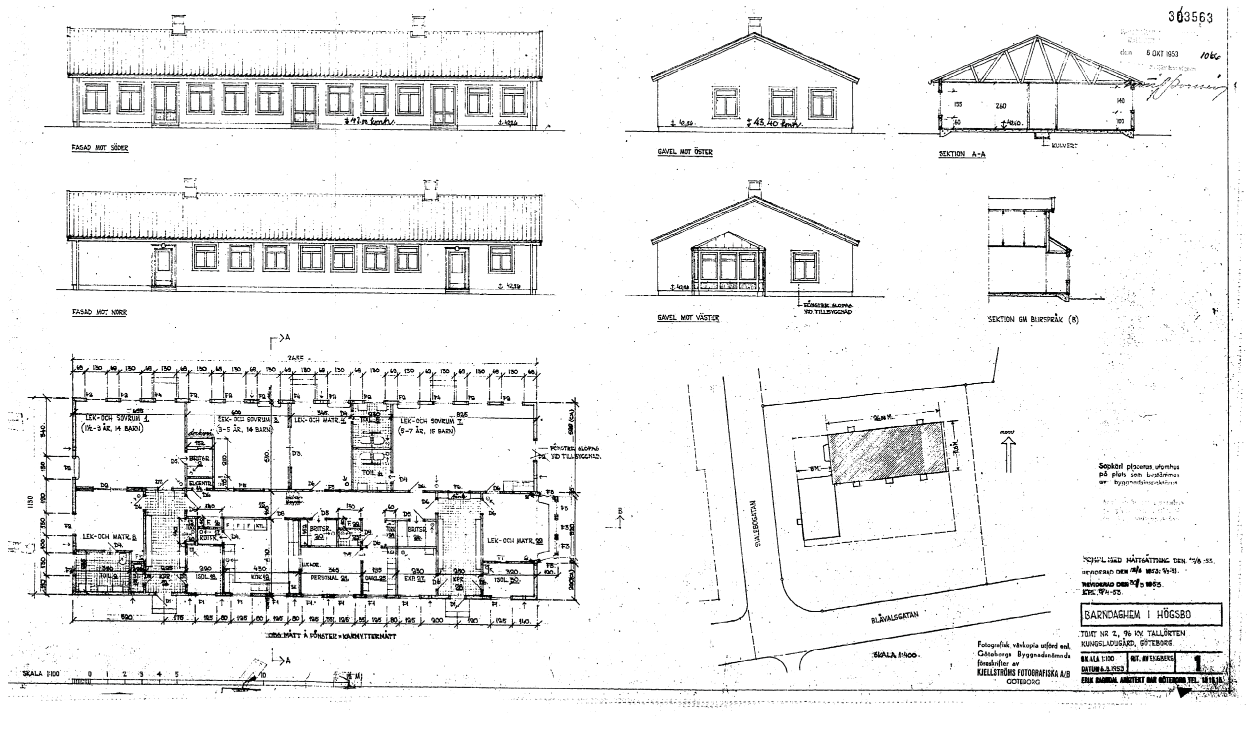
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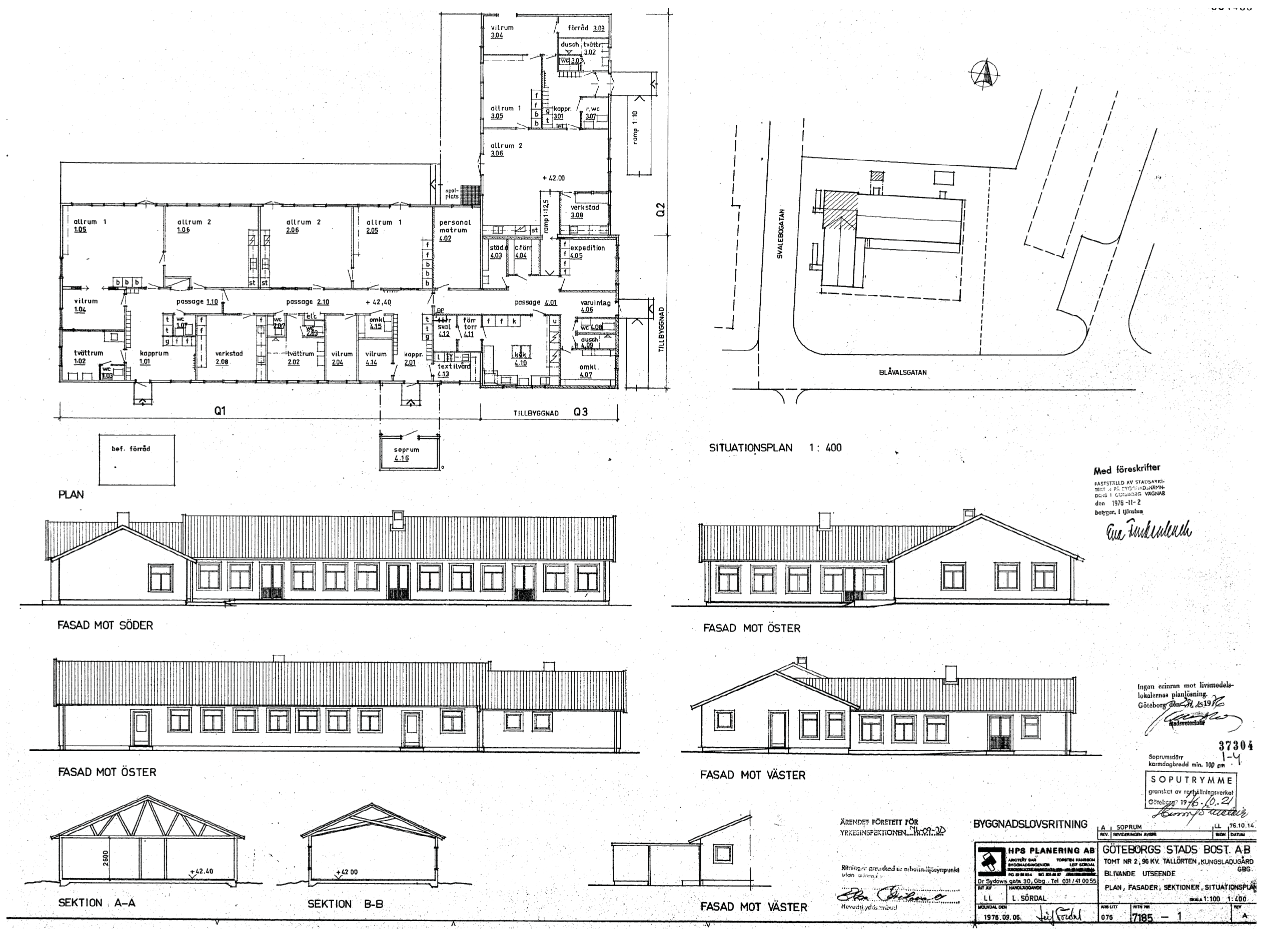
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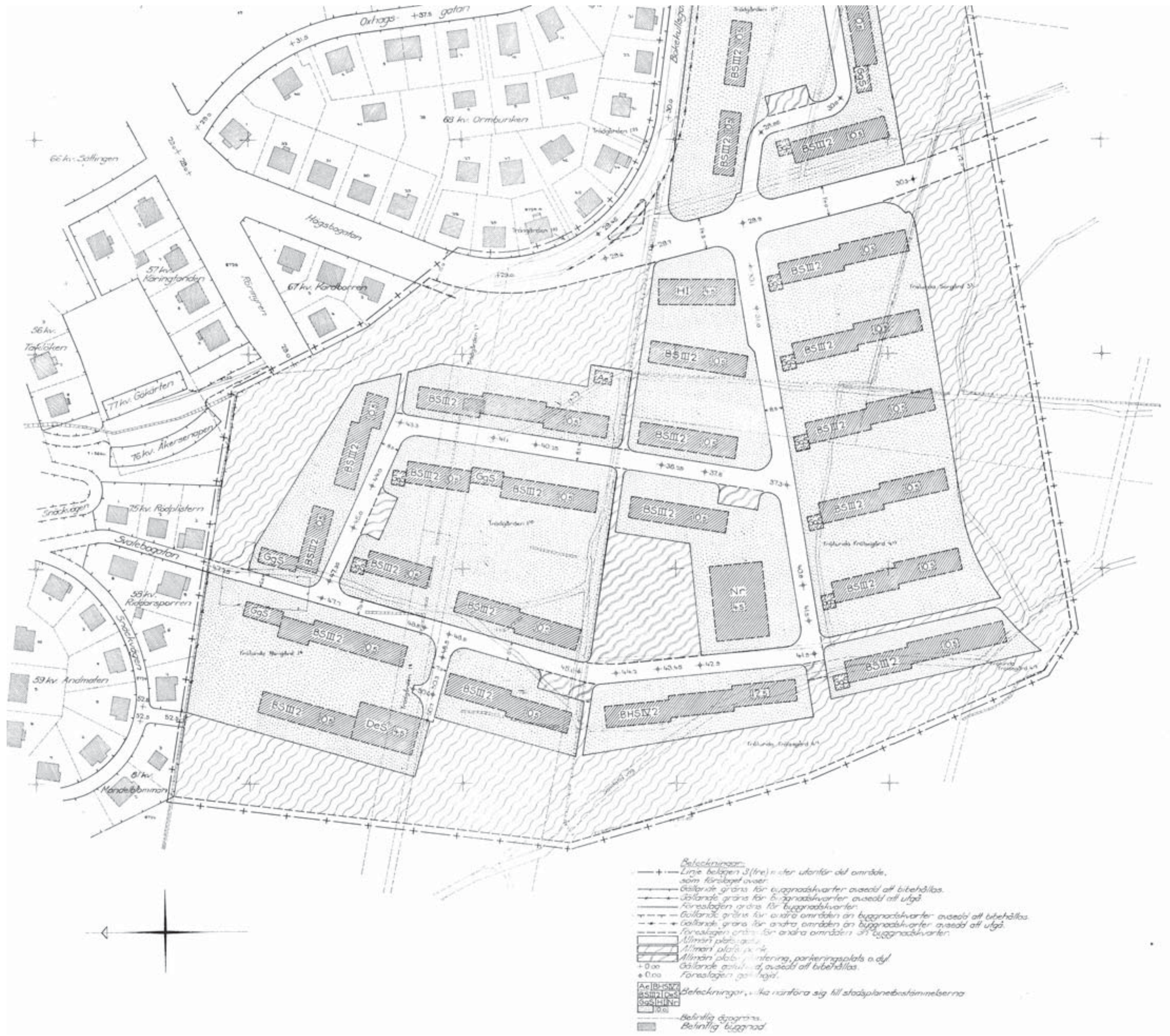
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Högsbogatan
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56 kv. Tofslöken
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76 kv. Åkersenapen
75 kv. Rödplistern
Svalebogatan
58 kv. Riddarsporren
59 kv. Andmaten
Snäckvägen
Bekkahultsgatan
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Beteckningar:

THE EXISTING PRESCHOOL

As can be seen in the local plan from 1947 a site for a preschool was defined from the beginning of the planning of Svaleboplatsen. The original preschool was constructed in 1953 and consisted of two buildings situated in a L-shape but only connected in one corner. Later additions in 1976 connected the two buildings by adding a separate kitchen in the corner. The same shape and divisions of the two buildings has been preserved up until today with only minor changes to entrances and indoor connections.

Today there is a problem keeping the ventilation and construction up to date when the house is used in different ways compared to what it was built for. A preschool department in Majorna-Linné consists of about 20 pupils and 3 teachers in average. The airflow in the existing preschool allows about 35 pupils plus teachers in a building divided into three departments, potentially housing up to 60 pupils. In combination with new demands on the pedagogical areas this is a strong argument for rebuilding or exchanging the existing building.

The site today

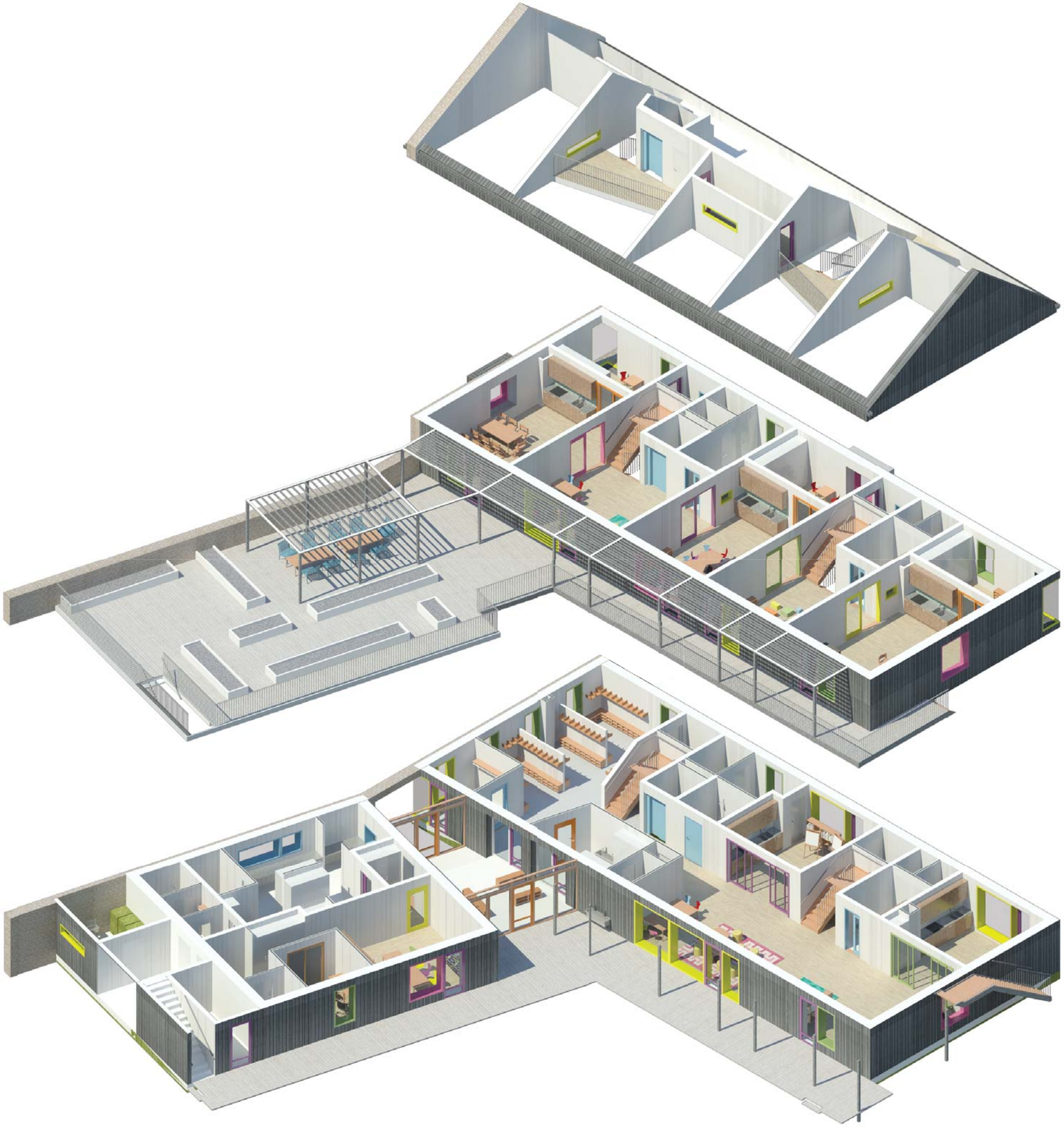
The existing preschool is located in the corner of Svalebogatan and Blåvalsgatan. To the north of the preschool site there is a parking lot and a park with a playground. Unfortunately this asset is seldom used even though the playground at the preschool is very small. Across the street to the west is the small forest Svaleboskogen.

The site is about 2500 sqm, but only about half of it is used as a playground. The preschool is placed in the north-western part of the site lining both the street and the entire northern border towards the park. A considerable part of the site along the street is unused and considered a widening of the pavement. At a previous stage one of the entrances were placed towards the street but it has moved inside the fence on the southern gable.

The entire schoolyard is built up and levelled to the street on the west side. This creates steep slopes on the edges of the site to the east and south. The natural difference in elevation is not used to enriching the schoolyard but the height has rather been seen as a problem that had to be eliminated.

The schoolyard is partly shielded from the sun by a screen of trees lining the southern and eastern borders. Two apple trees stand at the centre of the yard shadowing the few patches of grass that has been preserved. The yard has two small buildings, a playhouse and a building for storing outdoor equipment. At the back of the building towards the park there are two buildings; one for garbage and one for storing trolleys.

The northern volume has a long unshielded facade facing south and there are considerable problems with high temperatures in the playrooms facing this side. A wooden porch lines the southern facade and it is often used for afternoon snacks as well as performances.



THE PROPOSAL

IDEA

Our aim has been to create a preschool combining the qualities of the Reggio Emilia pedagogy with the stability and flexibility of a modern regular Swedish preschool. Further we wanted to explore if such a program could be contained in a two storey building on a very small site, addressing sustainability on a city planning level as well as in the building itself.

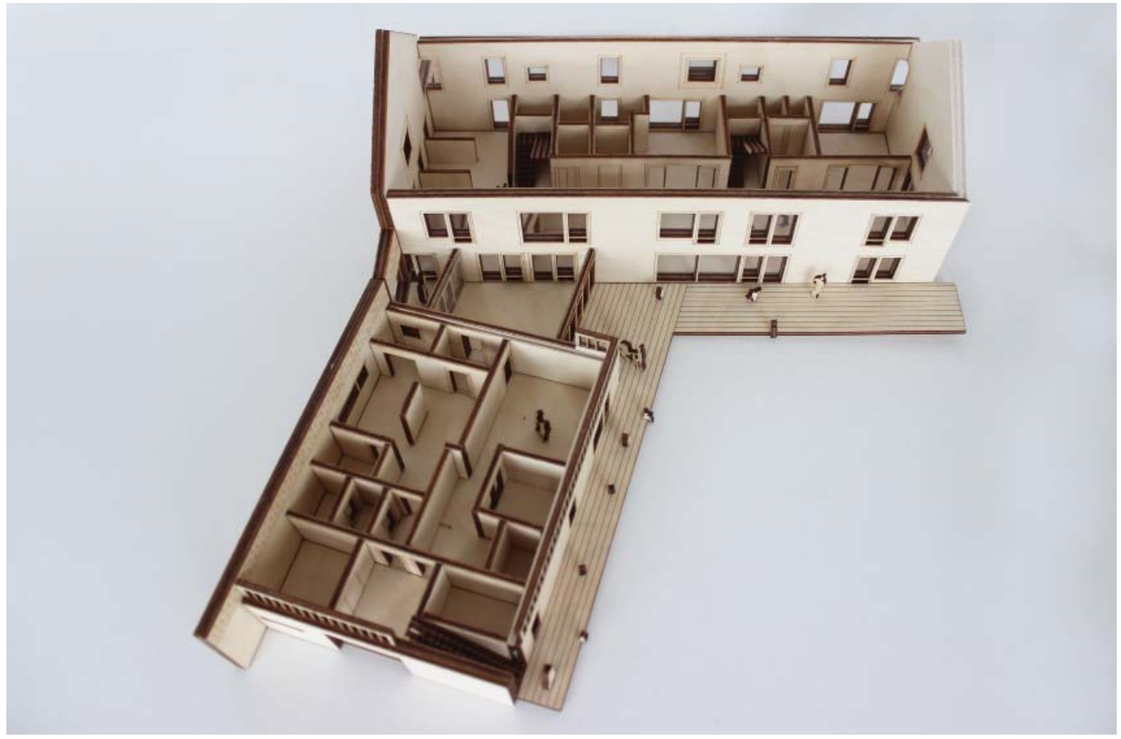
Eco-design
Our objective has been to create a passive- or preferably plus energy preschool on a small urban site, minimizing the buildings footprint and thus maximizing land use.

To create a building that functions as a pedagogical tool has also been an important issue to address in connection to sustainability. By integrating design elements that visualizes ecological cycles such as energy production and use, cultivation and collecting rainwater a discussion of sustainability can be initiated.

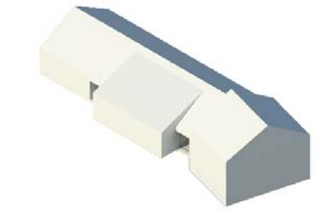
Functional spaces - Exciting spaces
A preschool building has to address two major issues; to be functional for both children and staff and to be exciting, to encourage play and free thinking. This preschool aims to provide a variety of spaces ranging from simple square rooms for rest and private play to common playrooms where the ceiling almost vanish in the far distance five meters above the children's heads.

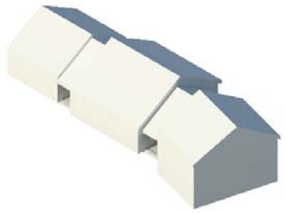
Flexibility - open/close
A preschool has to have some measure of flexibility since both pedagogy and the amount of children in different groups varies considerably over time. Our plan allows different kinds of divisions but also total openness on the upper floor where the entire floor can be used as a single unit from gable to gable.

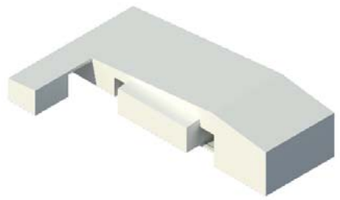
Outside - inside
Since a considerable part of the preschool day consists of outdoor activities the connection between indoors and outdoors is an important issue to address. Unlike a traditional preschool this preschool just has one main entrance and connection to the playground. On the other hand there are several connections to the outside along the south facade and also from the ateliers to the park north of the site.

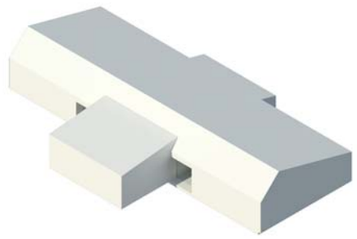


WORK PROCESS



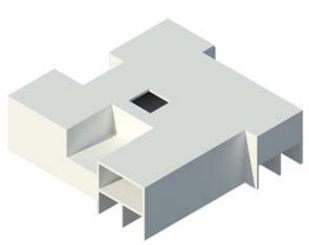


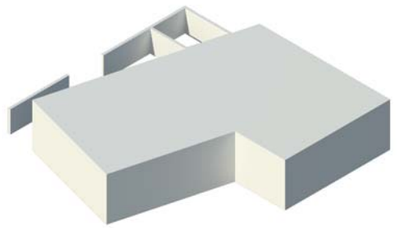




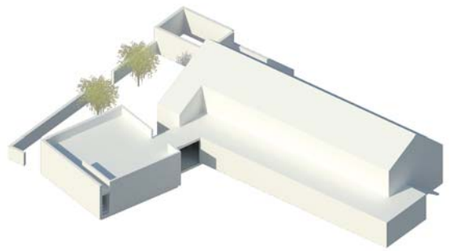
One of the primary goals of our work process has been to design the entire project in a 3D-model through the use of BIM-software (Building information model).

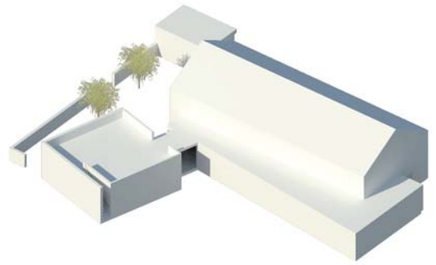
Early on in the project we decided to make a landscape model of the site and its surroundings to get a clear view of our workspace. As the project moved along it became obvious that the 3D-model was a huge benefit but also a delimitation to our sketching. A simple physical model in paper and styrofoam complemented the computer environment and during the rest of the sketching process we alternated between hand made drawings and computer modelling.

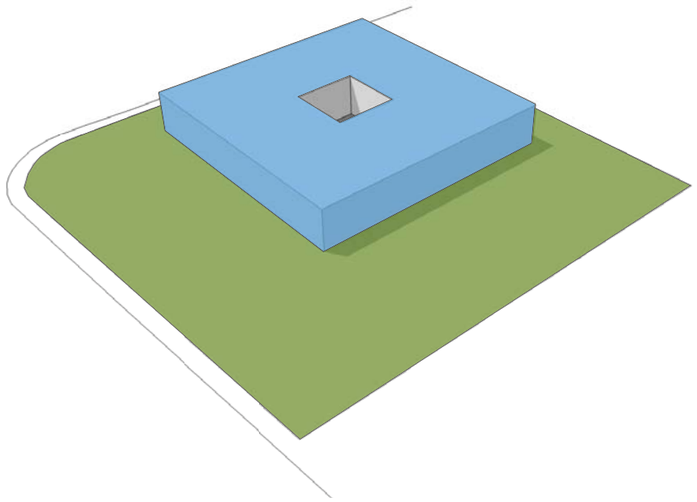




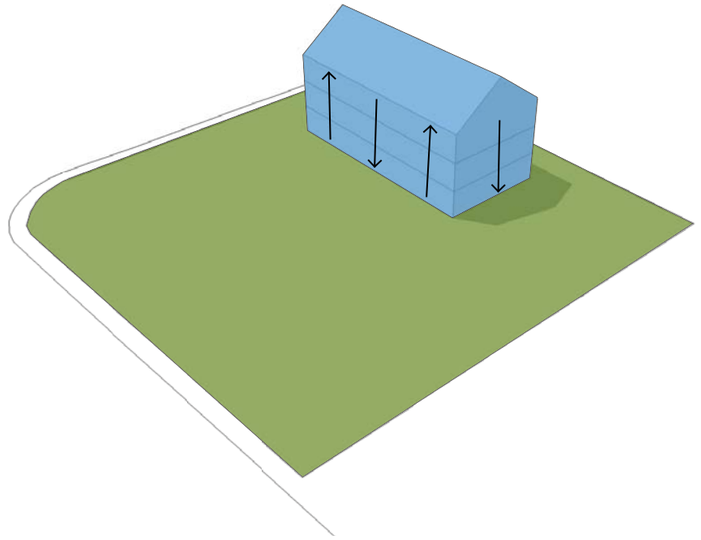
All in all the BIM-modelling has been a huge benefit for the project. We have been able to see the whole building in three dimensions and actually walk through it, try out different materials and get all the drawings and illustrations from the model. The downside is that the model takes a lot of time to make and it is hard to leave anything out like if you make a two dimensional drawing where you just draw what you want to show. On the other hand you can easily see if something doesn't work out and many mistakes can be avoided.



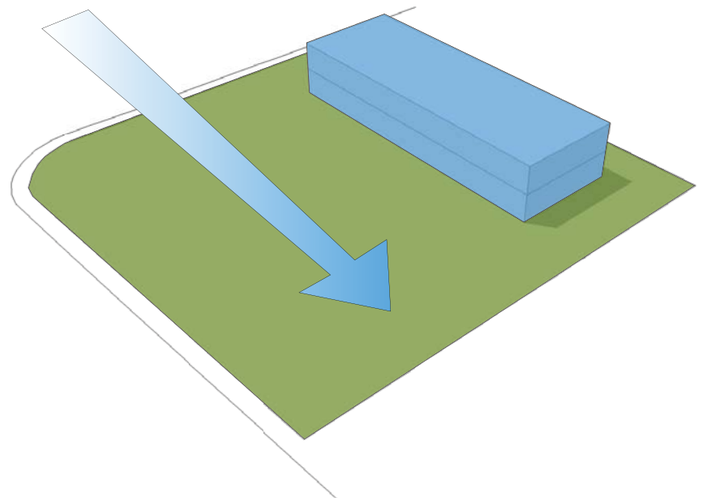




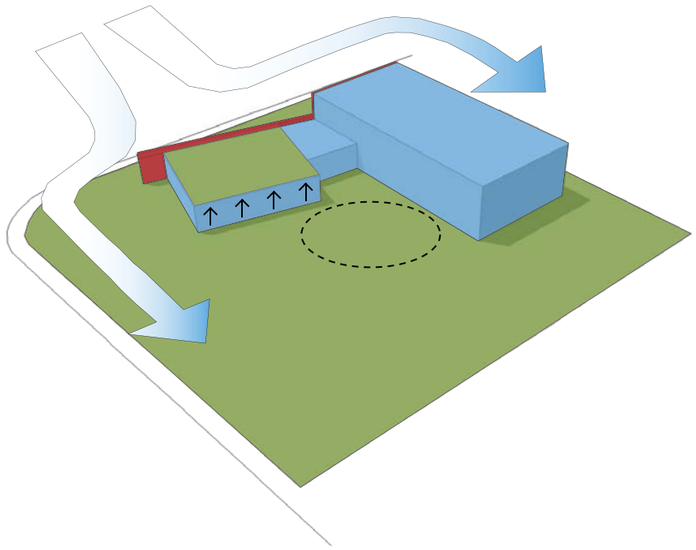
A regular Reggio Emilia preschool has a big footprint on the ground and which in our context would leave little space for playing outdoors and cuts of the connections to the surroundings. It also has a big facade area which makes it hard to build as a passive house.



A high compact building has a small footprint on the site and a small facade area and leaves a lot of space for playing outdoors. The site can be divided into different play areas and the trees on the site can be saved.

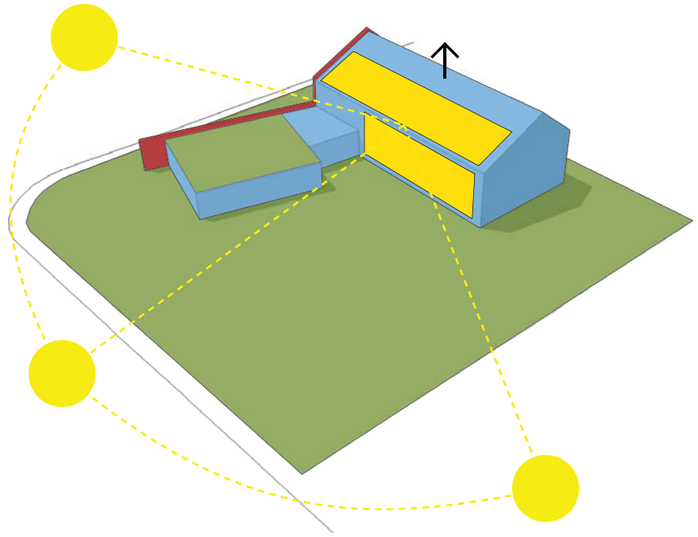


A two storey building along the northern border has better indoor connections but no protection from weather or the nearby street



To create a secure outdoor playing area and a shelter from the wind and the traffic the kitchen and staff facilities are placed in a separate low volume. To avoid reducing the garden the volume is given a flat roof which adds another level where the children can play.

The site now has two courts, a secure forecourt for leaving and picking up the children and a playground on the garden side.



The northern volume has a long facade facing south. By giving the building a pitched roof an ideal area for putting solar panels is created. Rainwater from the roof is collected in ponds where the children can play.

To avoid overheating in the summer and provide direct access to the garden the building is given a balcony and a pergola. The two volumes are connected with a wind catcher to keep a steady indoor climate.

CONCEPT

With our preschool design we aimed to create a building based on an understanding of the needs of children, the preschool curriculum and a Reggio Emilia approach. We also wanted the building to adapt to the topography and built environment of the site. The preschool should be a positive and inspiring addition to Svaleboplatsen. The building is meant to have a generality and flexibility that enables it to be used for other purposes but also for this design to be built in a variety of sizes in other locations.

The building is designed for about 60 children divided into three groups with their own homebases. The spaces are flexible with large common areas for creative and explorative activities. Light and playfulness have shaped the design and colour scheme for the building and the furniture. The rooms are light and spacious with large windows with deep niches and a low sill height where the children can sit and read, draw or look out at the surroundings. The rooms have a close connection to the outdoor garden and the roof terrace.

The building has a common entrance through a wind catcher connecting the street and garden entrance and forming a natural meeting place for children, teachers, parents and visitors.

The heart of the building is the piazza, the common square, with a stage and plenty of space for physical activities. Directly connected to the square is the atelier for artwork, construction and water play and the pedagogical kitchen where children and grown ups can bake together.
The homebases, situated on the first floor, are divided in a rest room and a playroom. Between the homebases are common playrooms with stairs leading down to the common square and up to the lofts. Along the southern facade towards the garden are weather protected spaces under the balcony where the children can play, eat, create or sleep in their strollers.

To achieve a building that can live up to the passive house standard the building is made up of two compact, well insulated and airtight volumes. The windows are high performing and the building has a heat recovery system. Solar panels on the roof produce electricity that can be used in the building or be delivered to the grid.

The special character of the house makes it easy to spot for the children as they approach from the north. A variation in window sizes and colours makes it easy for the children to locate "their" windows. "Look, there's the green window where I use to wave to you as you leave for work".

The common entrance is highlighted and easy to spot. One of the pedagogues welcomes the children in the cloakroom and then passes them on to the common playroom or the activity rooms on the second floor. Generous windows with deep window sills makes perfect spots to wave the parents on their way.

SITE PLAN

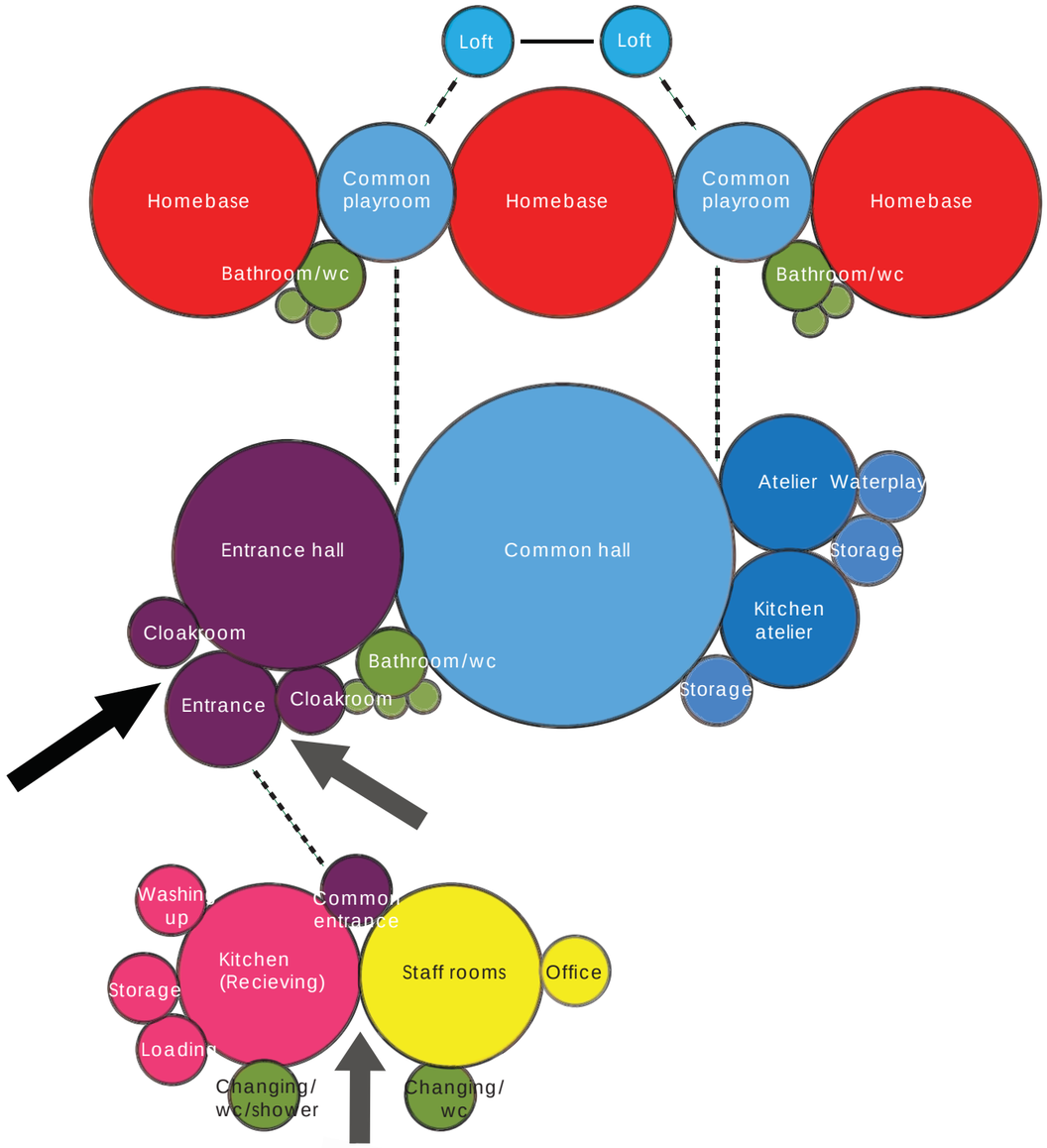
The building is situated in the North West corner of the site and consists of two volumes in an L-shape that act as a shelter between the street and parking lot to the north and the garden on the south side of the building where the children play. The two volumes are set at an angle to create an inviting forecourt towards the street that acts as a first outdoor room when entering the preschool and an assembly place for children and parents when leaving it. The main entrance is situated between two preserved trees in the fold between the volumes in the middle of the forecourt. South of the entrance a shallow pond for collecting storm water is constructed where the children can play under the supervision of the teachers. The staff entrance and a secondary entrance for goods and garbage disposal are placed at the south side of the lower volume.
In the northern corner of the forecourt a low, open-sided shed houses the strollers. Beside the shed there is a door connecting the forecourt to the open backside of the site and the park beyond.

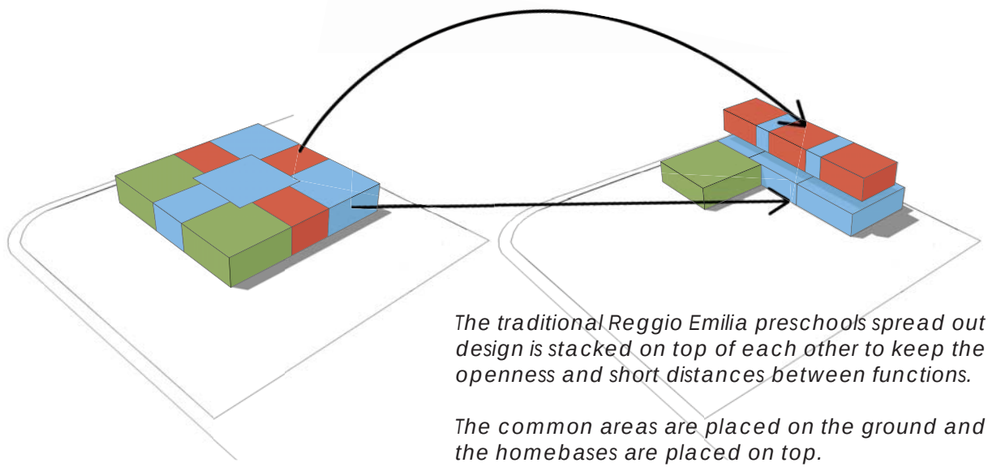
Connecting the site to the nearby park has been an important strategy to extend the children's playground. The new building would be about twelve meters shorter than the existing building in the eastern corner of the site, emphasizing the connection and openness between the two spaces. Keeping the northern side of the building unfenced and open to the park also gives a feeling of being connected to the surrounding areas.

Along the perimeters of the site towards the street in the south and the nearby building in the east, nature is allowed to grow wild, creating a miniature forest for the kids to play in along meandering paths and through tunnels in the underbrush. In this corner that has previously been built up the site is excavated to adapt to the surrounding landscape and create a more exciting playground with slopes and different levels. In the slope a small amphitheatre in built for outdoor gatherings.
In the north east corner where the forested part of the site connects to a little hill, a fireplace and a sheltering roof is constructed to allow outdoor picnics.

Along the southern façade the balcony provides shading for the common hall and creates a shelter from the elements outdoors over parts of the wooden deck that runs along the whole of the façade towards the garden. The part of the garden closest to the building has a stricter layout with a sand pit and a hill with a slide snaking down one of its sides. Rubber asphalt paths allow the kids to bike and run around the playground. At the forecourt and in the southeast corner of the building rainwater is collected and then allowed to stream down to a pond in front of the building and another one in the lower south-east corner.

The flat roof of the southern building volume is also part of the garden. It is connected to the balcony lining the southern façade. All the home bases and common play rooms along the southern façade direct access to the balcony and roof terrace. Stairs lead up to the balcony in the north-east corner of the building and to the roof terrace in the south west. The stairs make it possible to walk outdoors from one side of the building to the other and at the same time function as a fire escape. Both the roof terrace and the balcony has a pergola roof which functions as solar shading and creates an intimate space underneath, where the children can eat, play and create. The roof terrace also functions as vegetable garden where the children can grow their own vegetables and fruits.





The traditional Reggio Emilia preschools spread out design is stacked on top of each other to keep the openness and short distances between functions.

The common areas are placed on the ground and the homebases are placed on top.

FUNCTIONAL DISPOSITION

There is a clear distinction between the two building volumes where the larger volume to the north houses all of the pedagogical functions and the southern volume houses staff rooms and kitchen.

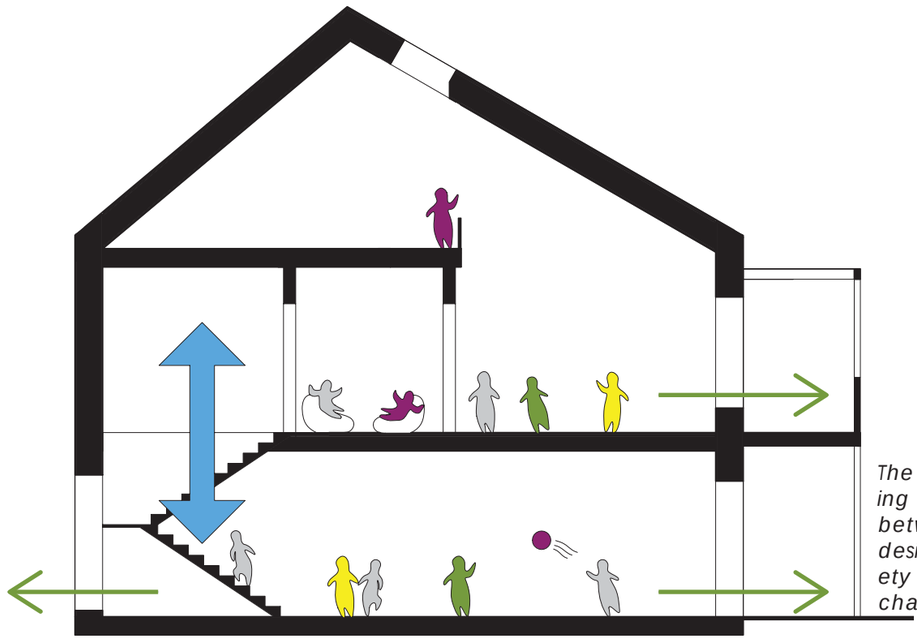
As you enter the building in the common entrance between the two volumes you have easy access to both sides of the building.

The pedagogical volume has an experimental disposition based on thoughts from Reggio Emilia. The entrance floor is dominated by common rooms such as cloakrooms, ateliers and a common hall for assemblies and play.

The first floor houses homebases and common playrooms in a flexible layout that allows different dispositions of departments over time. Above the first floor two lofts creates cosy secluded play areas.

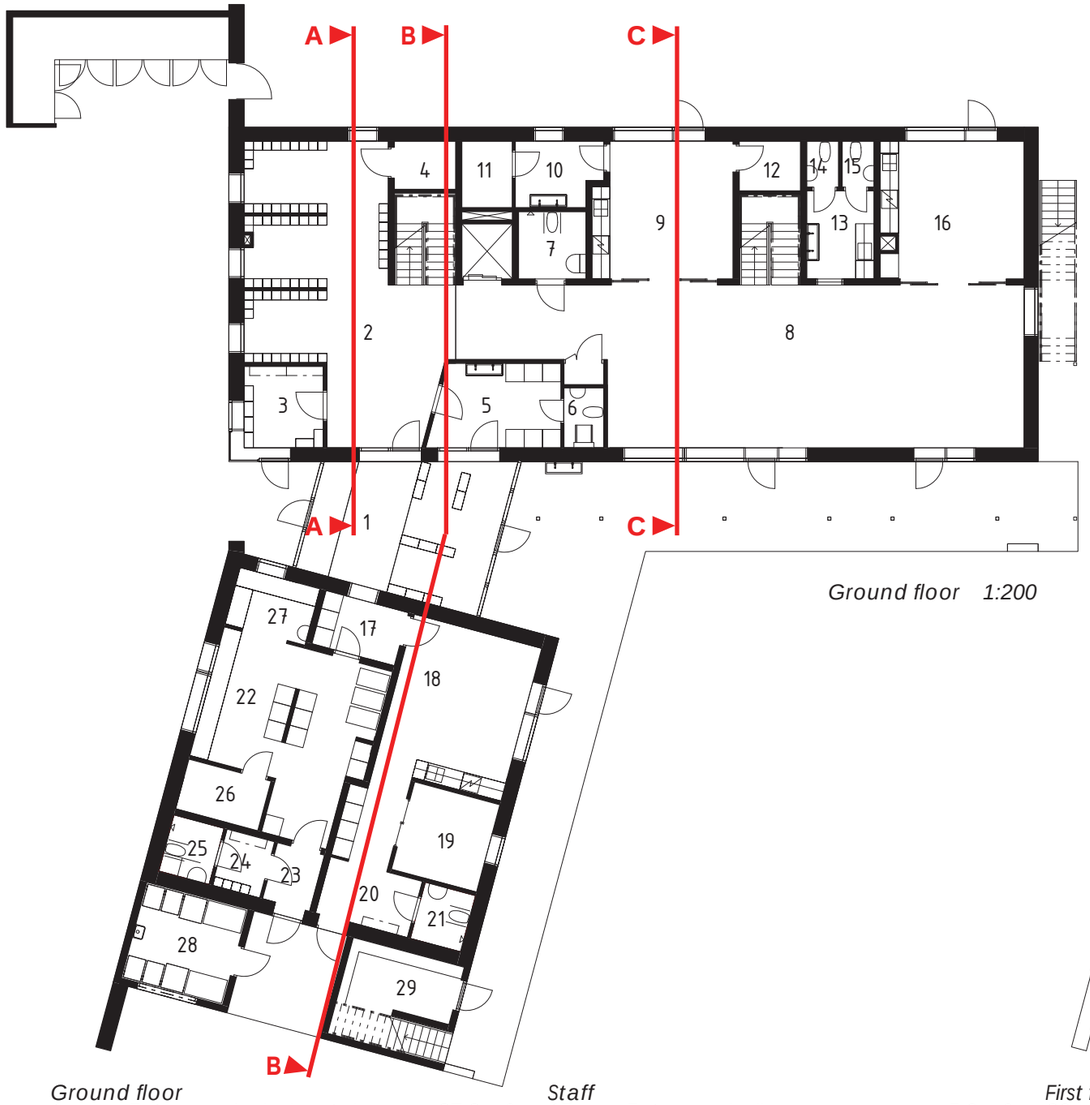
The staff and the kitchen areas can be accessed both from the common entrance as well as from a private entrance from the south. All loading and garbage disposal is located to the southern entrance. The staff rooms consist of a common room and an office for documentation. There is also a bathroom with space for changing.

The kitchen is designed as a receiving kitchen for lighter cooking and preparations for breakfast and afternoon snacks.

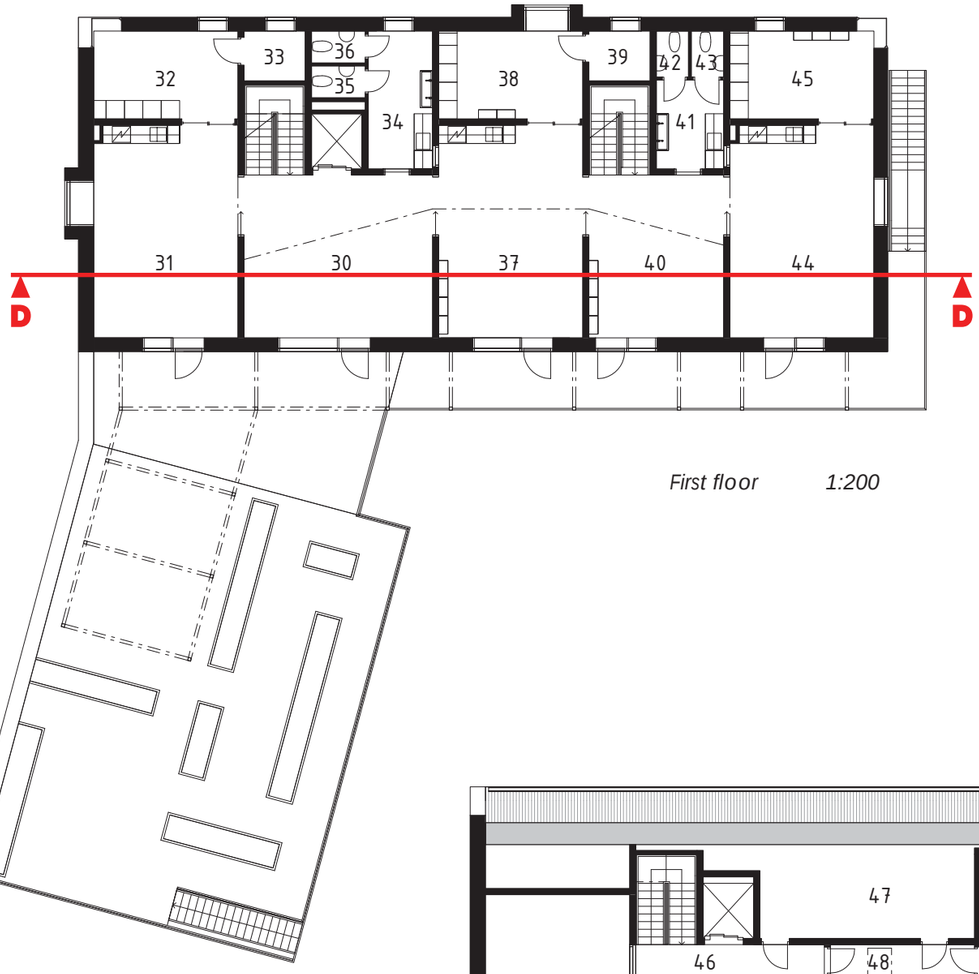


The three storey building has short distances between functions. It is designed to house a variety of rooms with different character.

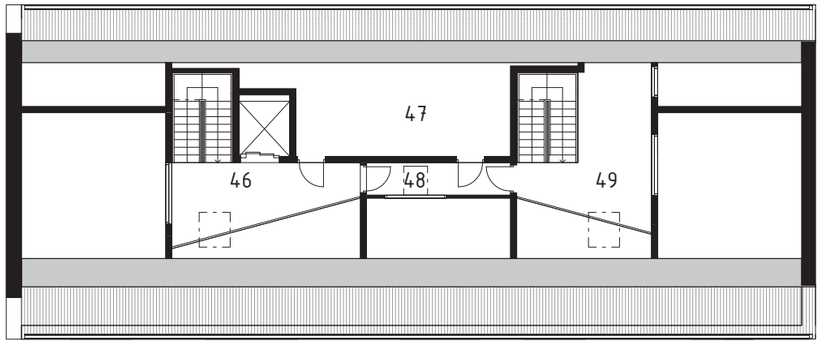
DRAWINGS PLAN DISPOSITION



Ground floor 1:200



First floor 1:200



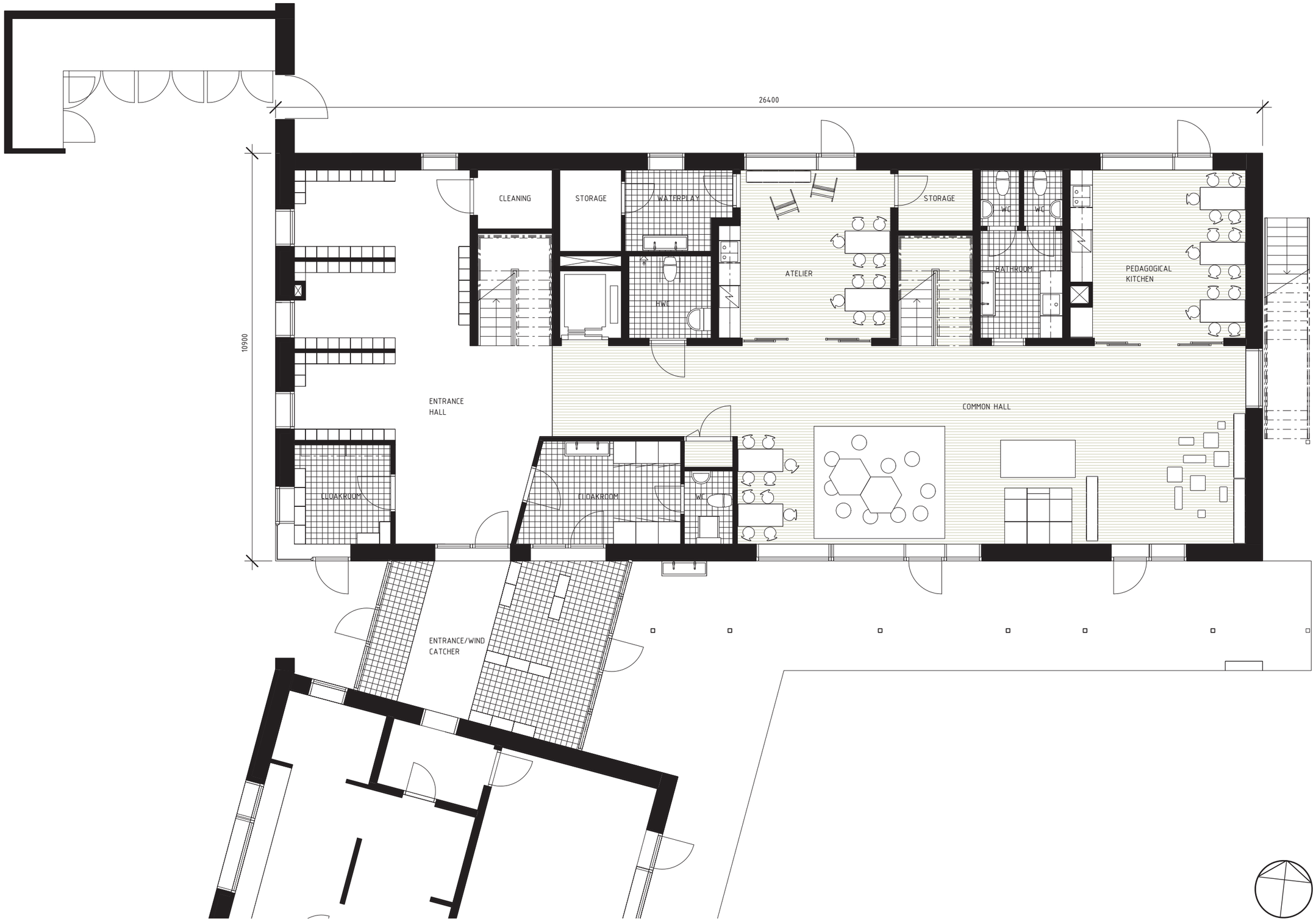
Second floor / loft 1:200

Ground floor		
1.	Entrance / wind catcher	27,0 m²
2.	Entrance hall	54,4 m²
3.	Cloakroom	7,4 m²
4.	Cleaning	3,1 m²
5.	Cloakroom	11,1 m²
6.	WC	2,5 m²
7.	HWC	4,8 m²
8.	Common playroom	76,9 m²
9.	Atelier	19,8 m²
10.	Waterplay / grouproom	5,8 m²
11.	Storage	3,6 m²
12.	Storage	3,3 m²
13.	Bathroom	6,3 m²
14.	WC	1,6 m²
15.	WC	1,6 m²
16.	Kitchen atelier	20,7 m²
Total		250 m²

Staff		
17.	Entrance hall	5,0 m²
18.	Staff room	27,8 m²
19.	Office	8,5 m²
20.	Entrance	5,9 m²
21.	HWC	3,2 m²
Kitchen		
22.	Kitchen	24,1 m²
23.	Goods reception	3,0 m²
24.	Changing	3,1 m²
25.	HWC	3,2 m²
26.	Storage	4,7 m²
27.	Washing up	5,3 m²
Garden		
28.	Garbage room	11,1 m²
29.	Garden storage	9,0 m²
Total		94 m²

First floor		
30.	Common playroom	32,6 m²
31.	Activity room / homebase	32,4 m²
32.	Playroom / homebase	13,5 m²
33.	Storage / playroom	3,2 m²
34.	Bathroom	9,4 m²
35.	WC	1,8 m²
36.	WC	1,8 m²
37.	Activity room / homebase	32,6 m²
38.	Playroom / homebase	13,5 m²
39.	Storage / playroom	3,3 m²
40.	Common playroom	23,3 m²
41.	Bathroom	6,4 m²
42.	WC	1,6 m²
43.	WC	1,6 m²
44.	Activity room / homebase	32,4 m²
45.	Playroom / homebase	13,5 m²
Total		223 m²

Second floor / loft		
46.	Loft	11,9 m²
47.	Fan room	42,6 m²
48.	Playroom	5,0 m²
49.	Loft	18,6 m²
Total		78 m²
Grand total		645 m²
BRA		711 m²



Ground floor 1:100

GROUND FLOOR

The ground floor is entirely constituted by common functions and rooms. The main entrance is situated in between the two volumes and connects both to the entrance hall and the staff rooms to the south. The northern volume is divided in two halves; the western half where all functions connected to the logistics coming in and going out has been placed and the eastern part that is a common space shared by all.

The eastern side of the building houses a big common playroom for physical activities like climbing, running around and building. It is also the place for assemblies and meetings for the entire preschool and a room where the work done by the children can be displayed. The room has a portable stage for plays and singing and one part of the room contains big textile blocks for building. If different groups of kids use the room at the same time, parts of the room can be divided with curtains running in rails in the ceiling.

Directly connected to the common hall there is an atelier for artwork, construction and water play and a kitchen atelier where the children can bake and cook together with the teachers. In the atelier and the common hall different groups of children can work and create together in projects with different themes.

In order to give the building as much flexibility as possible the common hall can be divided into a homebase for a group of kids. One of the ateliers will then be used as a pedagogical kitchen as a part of that homebase.

After the morning assembly some of the children choose to be in the atelier painting. The teacher opens up to the outside so the children can choose to paint among the trees in the park.

In the common hall a tall pillow-tower is constructed but some of the constructors breaks away in a frenzy chasing a ball.

Ground floor / kitchen *1:100*

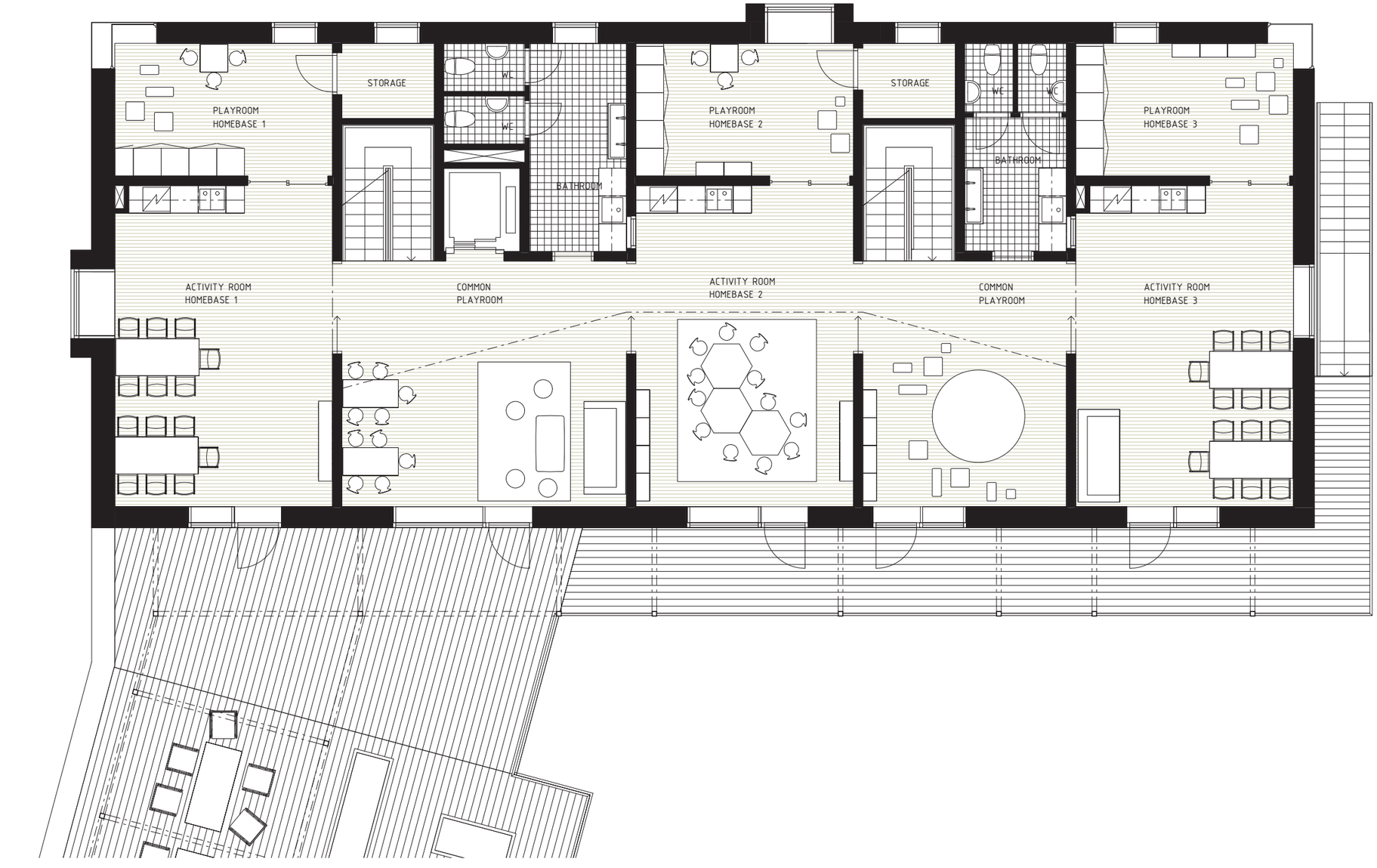
KITCHEN AND STAFF

The southern volume houses the kitchen and the staff rooms which are accessible through a common entrance from the wind catcher. The kitchen in this proposal is a reception-kitchen that receives precooked food from the nearby elderly home. The kitchen is fully equipped except for some of the machines needed for large scale cooking.

The kitchen area has a separate entrance for goods in connection to the storage room. This is also where the kitchen personnel have their changing room and toilet. Garbage room and recycling is convinently placed under the same roof right outside the south entrance.

The staff rooms are accessible from the entry-hall and are placed along the east façade facing the playground. Here the staff has an office for paper work as well as for private meetings and a common room where the staff can rest and eat. The staff has easy access to the playground through a door in the common room. There is also a more secluded entrance by the kitchen door in the south.

Having finished the washing up after lunch the kitchen staff can sit down for a while with some of their colleagues for a much needed lunch break. In the common room of the staff area they can sit comfortably watching the green playground outside while eating their lunch.



First floor *1:100*

FIRST FLOOR

The homebases are the childrens private place in the pre-school. Here they gather in the morning and it is also the place where they have their meals. The smaller room of each homebase is used for storytelling and more calm activities. This is also where the children have their naps in the afternoon.

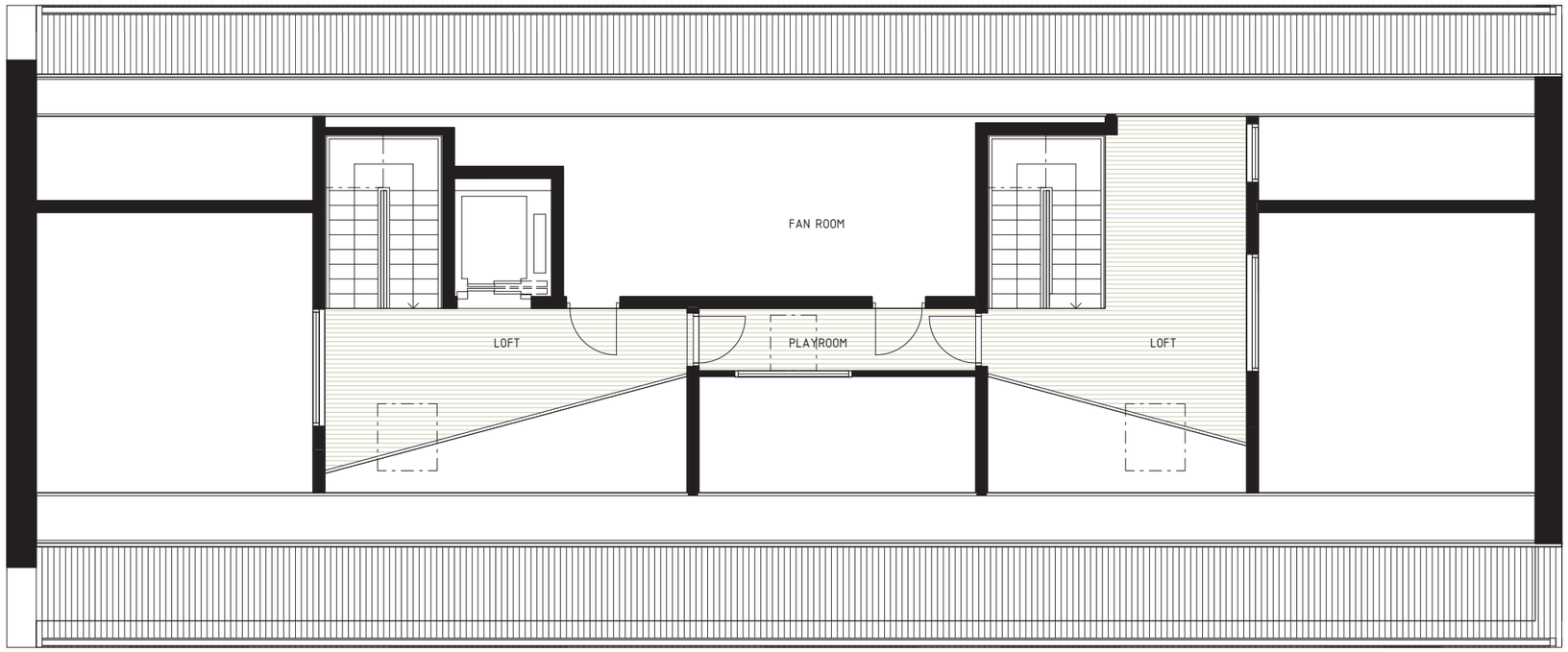
The homebases for the kids are situated on the first floor. There are three homebases, one at each side and one in the middle, divided by common playrooms in connection with the staircases. The rooms have sliding doors that left open can create one big play area from one side of the building to the other. The tight connecting between the rooms makes it possible for the homebases to easily cooperate and help each other out.

The homebases have their own kitchens for making and heating up simple dishes. Dining-tables are set in the main room and can be used for play as well as for eating. The homebases also consists of another smaller room for resting reading and playing. The bathrooms for changing diapers etc are accessed from the common area.

From the common playrooms stairs lead up to lofts for playing and hiding out on the second floor. From the lofts the kids can peep through windows at the other kids playing in the other room below. This area also contains the fan room for the building.

All the homebases and common play areas have direct access to the common roof terrace which acts as an outdoor extension of children's indoor spaces. Here you can go out and play without putting on all your clothes and shoes in the summer.

Lunch is being prepared in the eastern homebase. One of the kids is already seated at the table, waiting to be served. A girl sits in the window sill watching the birds outside. Soon the ruckus of daily life in a preschool will be replaced with a focused silence over lunch.



Second floor / loft *1:100*

SECOND FLOOR / LOFT

The second floor is accessible via stairs in the common areas that leads up to lofts overlooking both the stairs from the entrance level, the homebases and the common rooms.

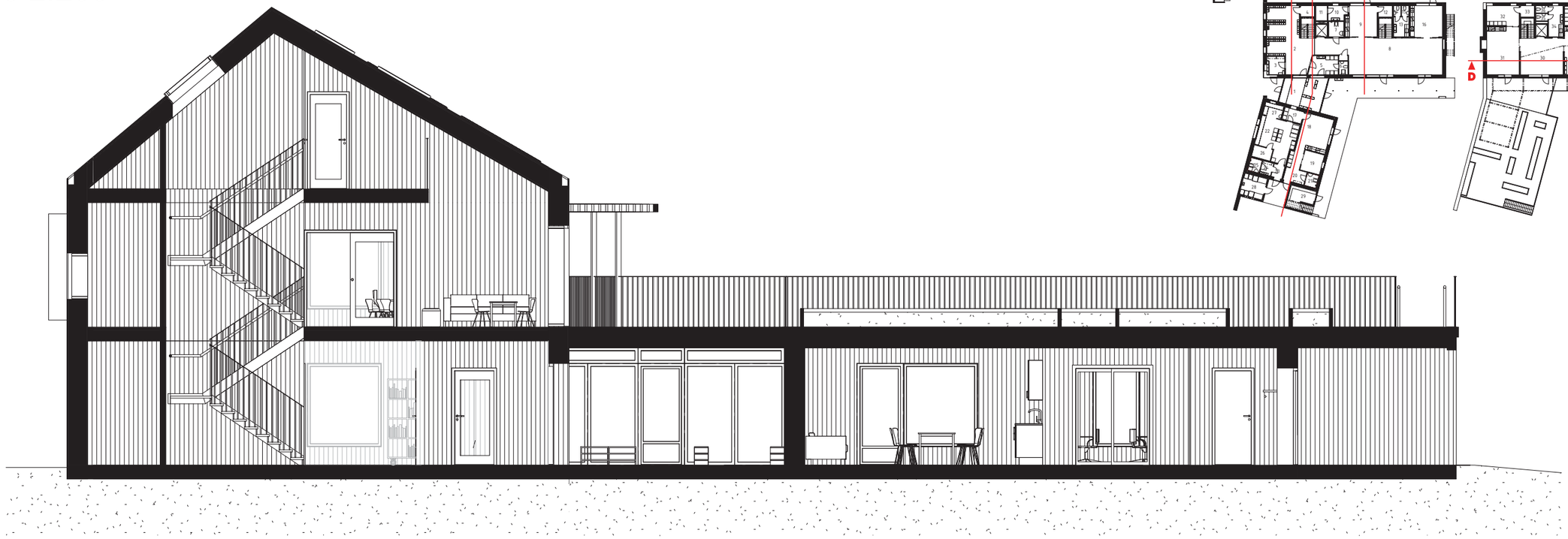
Up here the children can make their own secret hiding place where they can play undisturbed. Small windows to either side gives an overview of the rooms on the first floor and an opportunity to peep at the kids playing below.

The eastern loft is big enough to house some furniture in a cosy corner for reading and resting. The western loft is more like a balcony with views of the common room and the western homebase. The two lofts are connected by a passage over the central homebase.

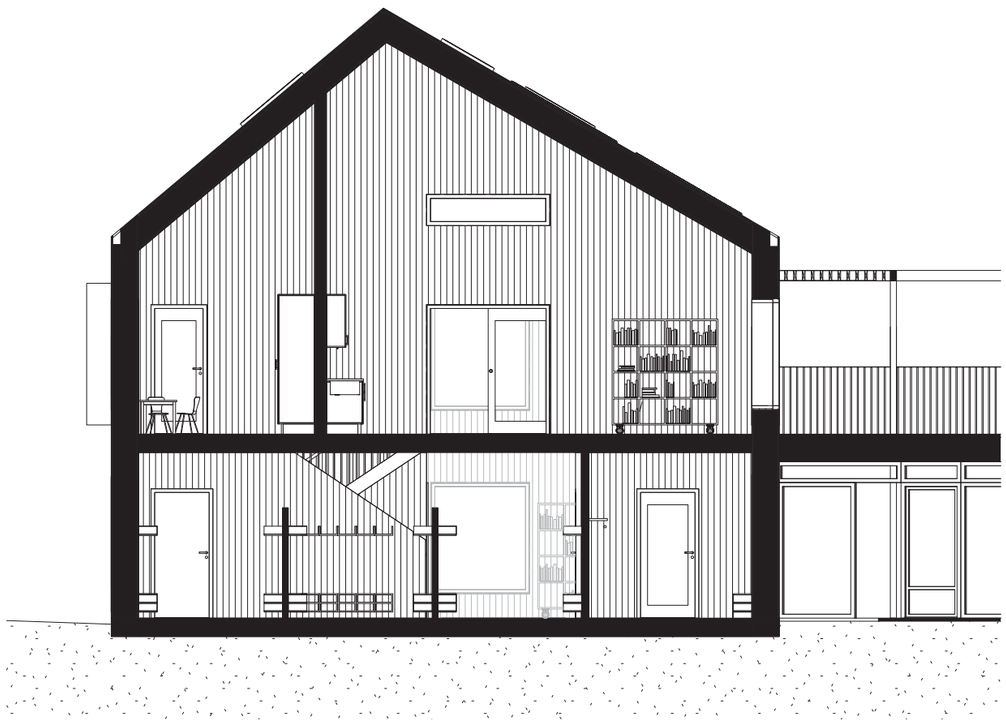
The main fan room is situated under the pitched roof to the north, expanding over the stairs to either side of the building. To make the second floor accessible the elevator extends up to the loft.

In the common playroom some children have met over an interesting book. Sitting in the sofa by the window they make a perfect object for their friends, laying flat on their bellies, spying from the loft.

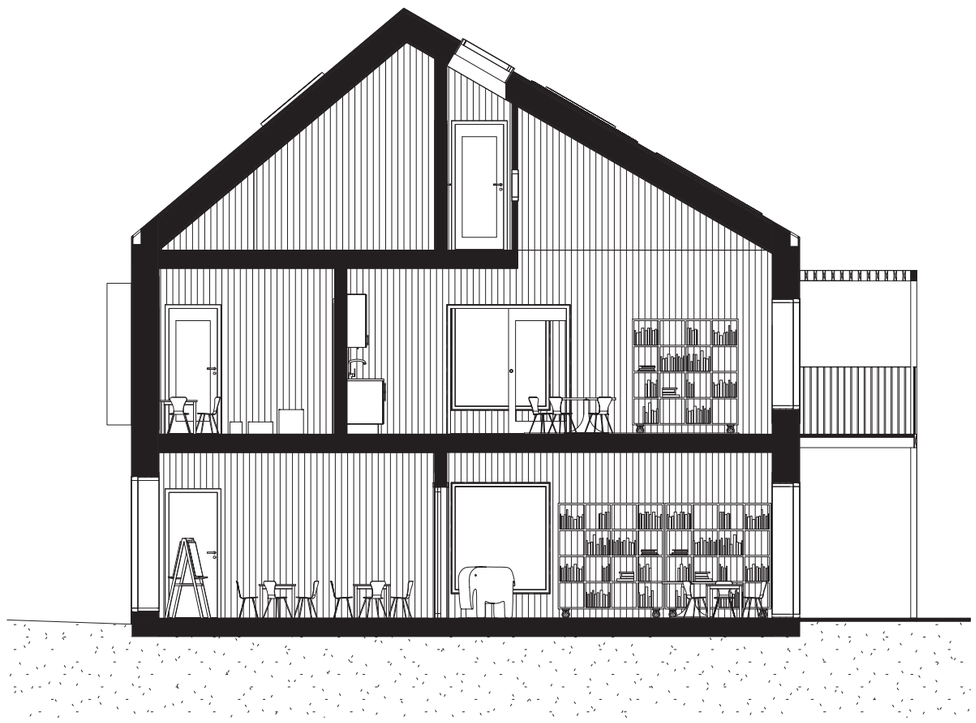
SECTIONS 1:200



Section B-B 1:200



Section A-A 1:200



Section C-C 1:200

SECTIONS 1:200

Section D-D 1:200

3D-section D-D 1:200

MATERIALS

Our aim has been to design a building that in itself is a pedagogical tool to teach children about construction and the environmental impact of buildings. It is natural in this context to replace the existing wood building from 1953 with a brand new wooden design that better responds to the criteria of a preschool today.

We have chosen to work solely with natural and renewable materials. We wanted to use materials with tactile qualities produced in a way that can easily be understood by small children.

The entire outer shell will be built around a massive wood structure insulated with cellulose fibres. By using Swedish wood a lot of carbon dioxide can be bound into the structure giving the house a positive CO^2-balance.

On the outside the walls and the roof are clad with a standing wood panelling except the western façade where the wood is replaced by a yellow brick wall towards the street that mirrors the surrounding buildings and gives the forecourt an urban character.

The heavy window sills stand out with their bright colours giving the buildings a more playful tone. On the wooden sides of the building the windows are set along the façade to create niches to sit in on the inside. On the western façade towards the street, the windows have been pushed into the wall to enhance the feeling of a massive wall.

On the walls inside the building has a structured wooden panelling. The walls are painted white to brighten the rooms and give the children a white canvas to cover with their creations. Bright colours on doors and window frames as well as few selected painted walls contrasts to the white and give a sense of readability and belonging.

All the floors except bathrooms, toilets etc. are covered with bamboo, an extremely strong and durable material that can be easily cleaned. It is even approved for use in hospitals.

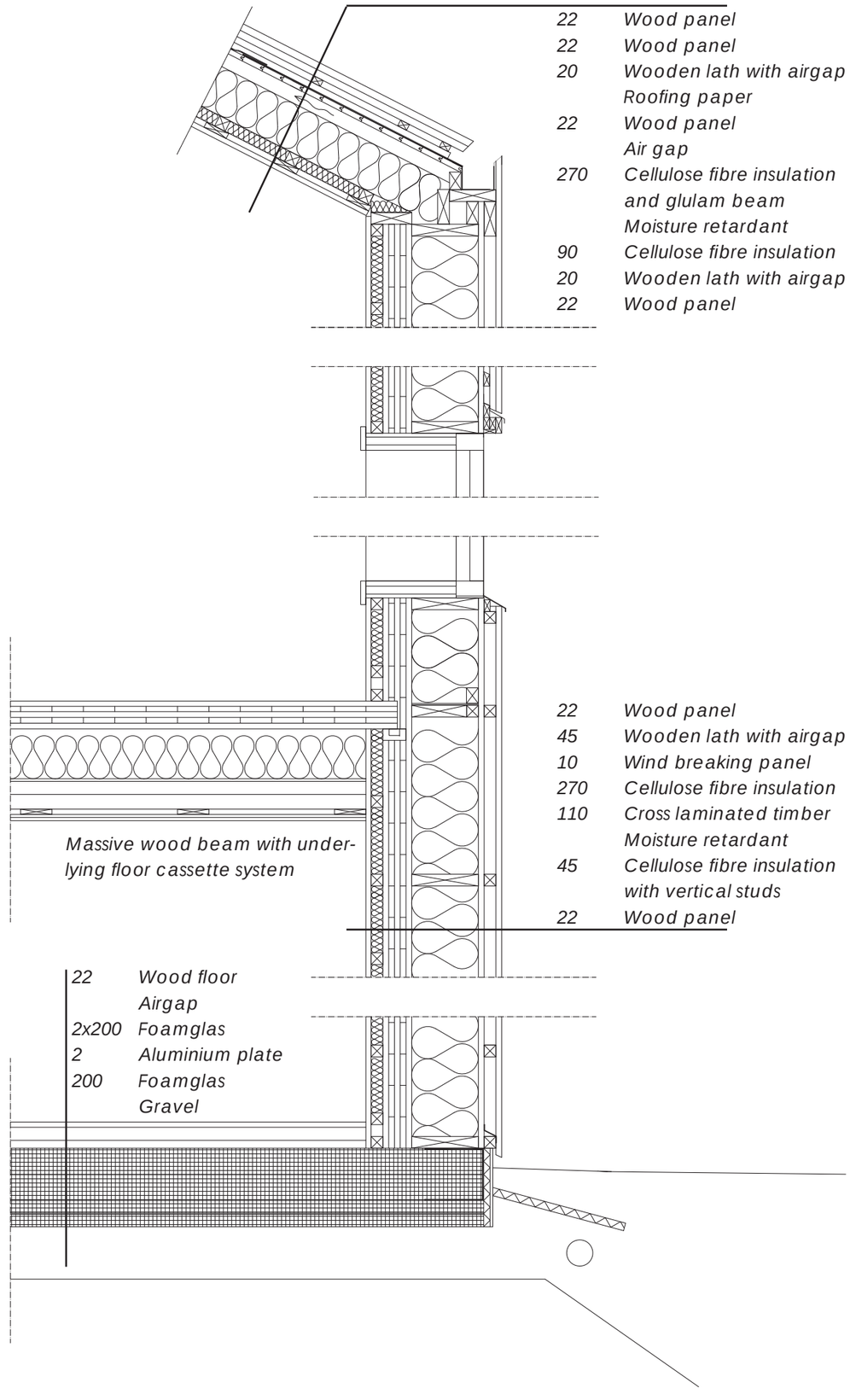
CONSTRUCTION

The entire construction is built around a framework made out of massive wood panels. The combination of massive wood beams and cassette systems makes a solid construction that can handle heavy loads and long distances. The intermediate floor spans the whole width of the building making the inside walls flexible.

The roof is clad with wood as well, a traditional Swedish roof system called “faltak” with overlapping planks. To emphasize straight lines and smooth wooden feeling of the building the gutter is placed behind the wooden panel.

The building, except for the underwork is insulated with cellulose fibres made out of wood. To achieve passive house standard the building has to be very well insulated but also airtight. To achieve an airtight layer around the building envelope an extra layer of insulation behind the wooden panel on the inside protects the barrier. Most of the installations can be placed in this layer to minimize penetration of the buildings envelope.

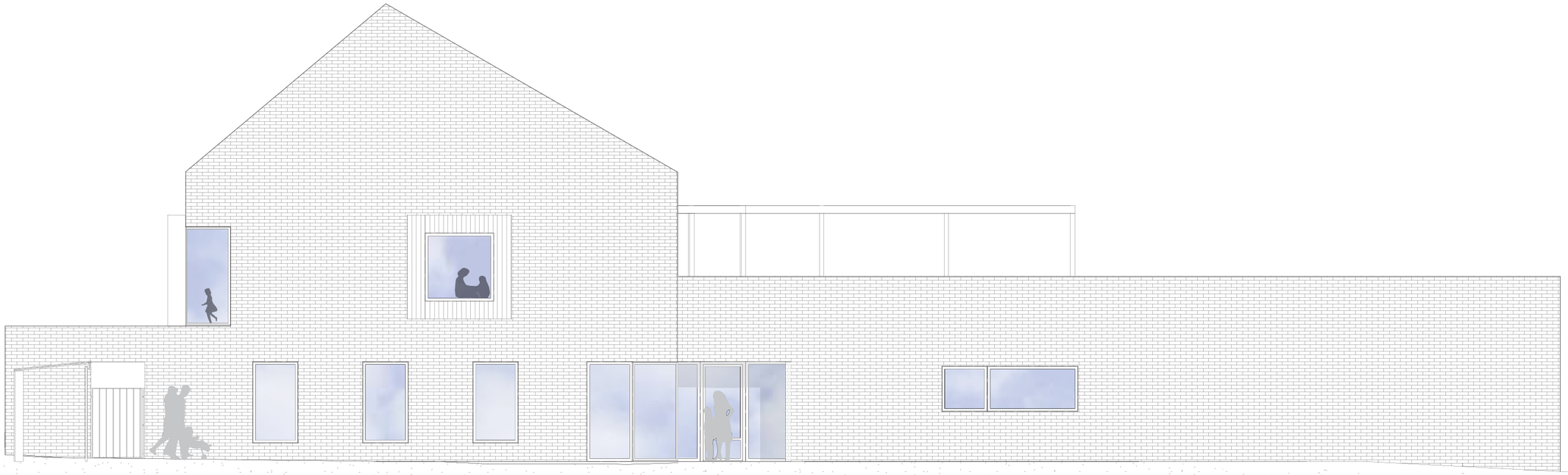
The ground slab is made out of Foamglas, a material that is made out of recycled glass that has been expanded with gas. Foamglas has excellent insulating qualities, doesn’t transport any water and is resistant to all funguses and moulds. Though it is still an expensive material, Foamglas is a material that would ideal for public buildings like preschools in the future.



FACADES 1:200

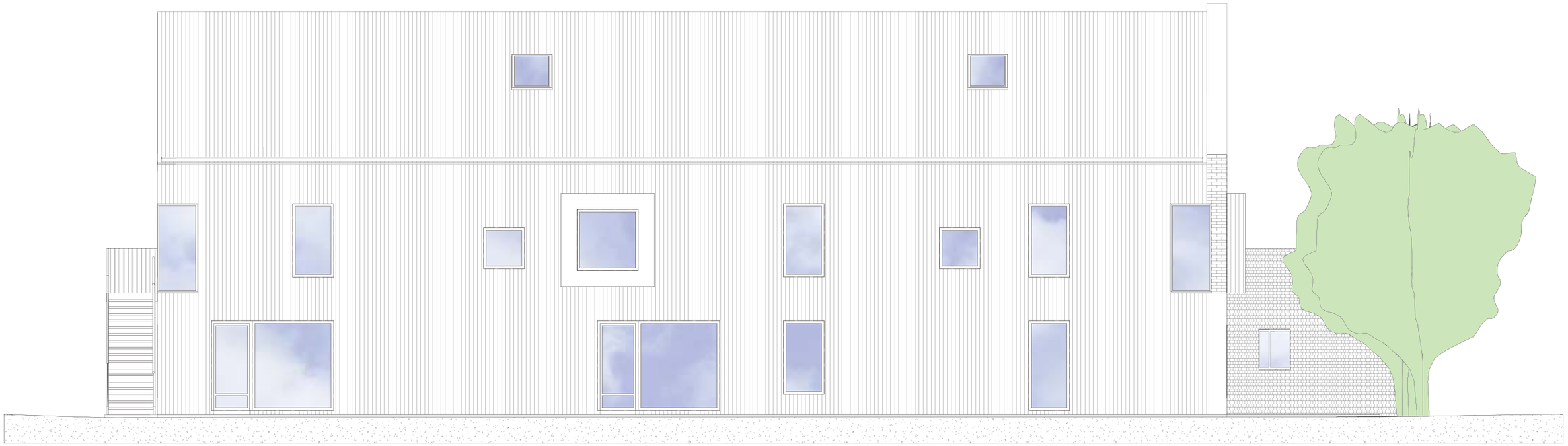
South elevation 1:100

FACADES 1:200

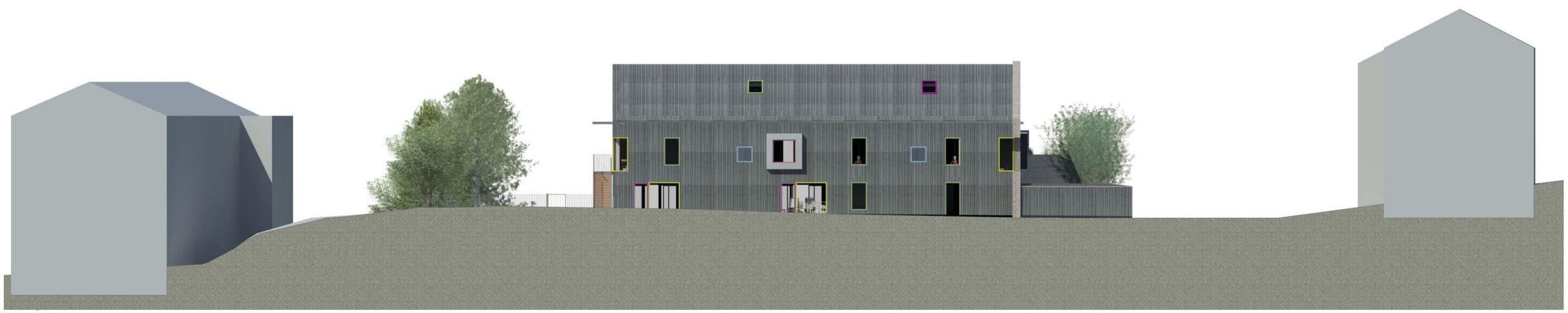


West elevation 1:100

FACADES 1:200



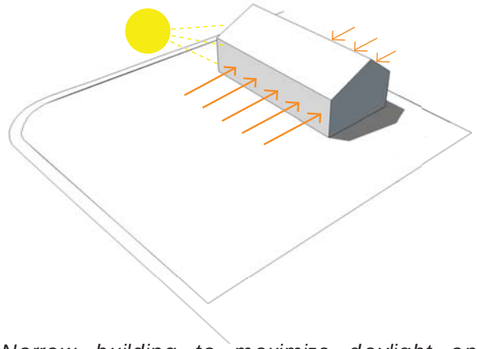
North elevation 1:100



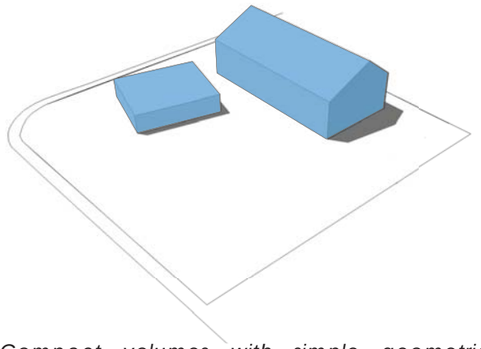
FACADES 1:200

East elevation 1:100

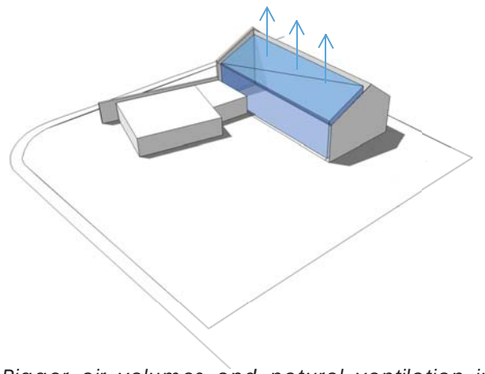
PASSIVE HOUSE PRINCIPLE



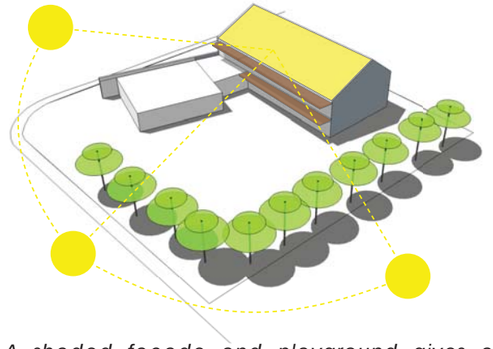
Narrow building to maximize daylight and avoid artificial light



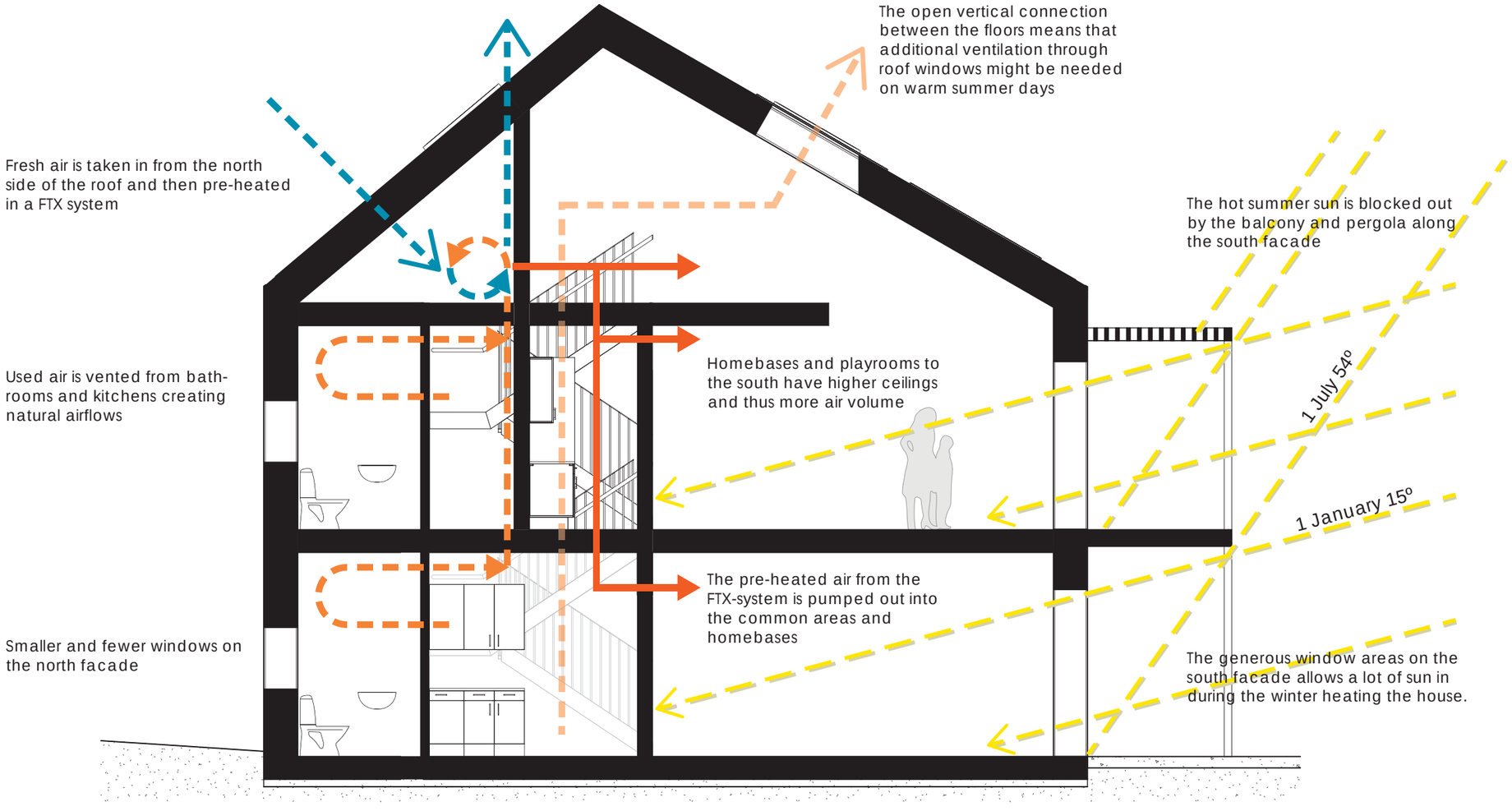
Compact volumes with simple geometric shapes are easier to make passive houses



Bigger air volumes and natural ventilation in public areas to the south gives a more even indoor climate



A shaded facade and playground gives a better climate in the summer. Solar radiation is converted to electricity on the tilted roof



PASSIVE HOUSE TECHNIQUE

To address the upcoming EU-regulation where all new buildings should be “near-zero energy”-buildings by 2021 the government has begun to issue a series of demands. These demands falls well in the line with the work of Passivhuscentrum that works to promote the idea of houses without traditional heating.

A passive house is basically a super-insulated and extremely airtight building that uses the heat provided from its inhabitants and electrical appliances as well as solar radiation for heating. But the passive house is also a delicate system that has to be balanced. An FTX-system controls the ventilation, preheating the outside air using the warmth from the used air vented out.

Solar radiation has to be considered in a passive house. Although it is a prerequisite for a passive house to use passive solar energy to heat the building in the winter, it is also of great importance to consider over heating in the summer.

Public buildings built with passive house techniques often have other problems than private housing. A common problem in preschools is overheated rooms to the south. Generous solar shading has to be provided to block out the summer sun. It could be favourable to locate larger rooms with higher ceiling to the south to provide more air volume. Summer ventilation through roof windows is another way to handle overheating.

Plus energy house

A passive house is the perfect base for the next step in the building evolution; the plus energy house, where all the energy needed in a building could be produced locally.

The roof of a preschool could be a perfect place for mounting solar panels that provide energy for the school and feed excess energy to the grid, creating profit for the municipality.

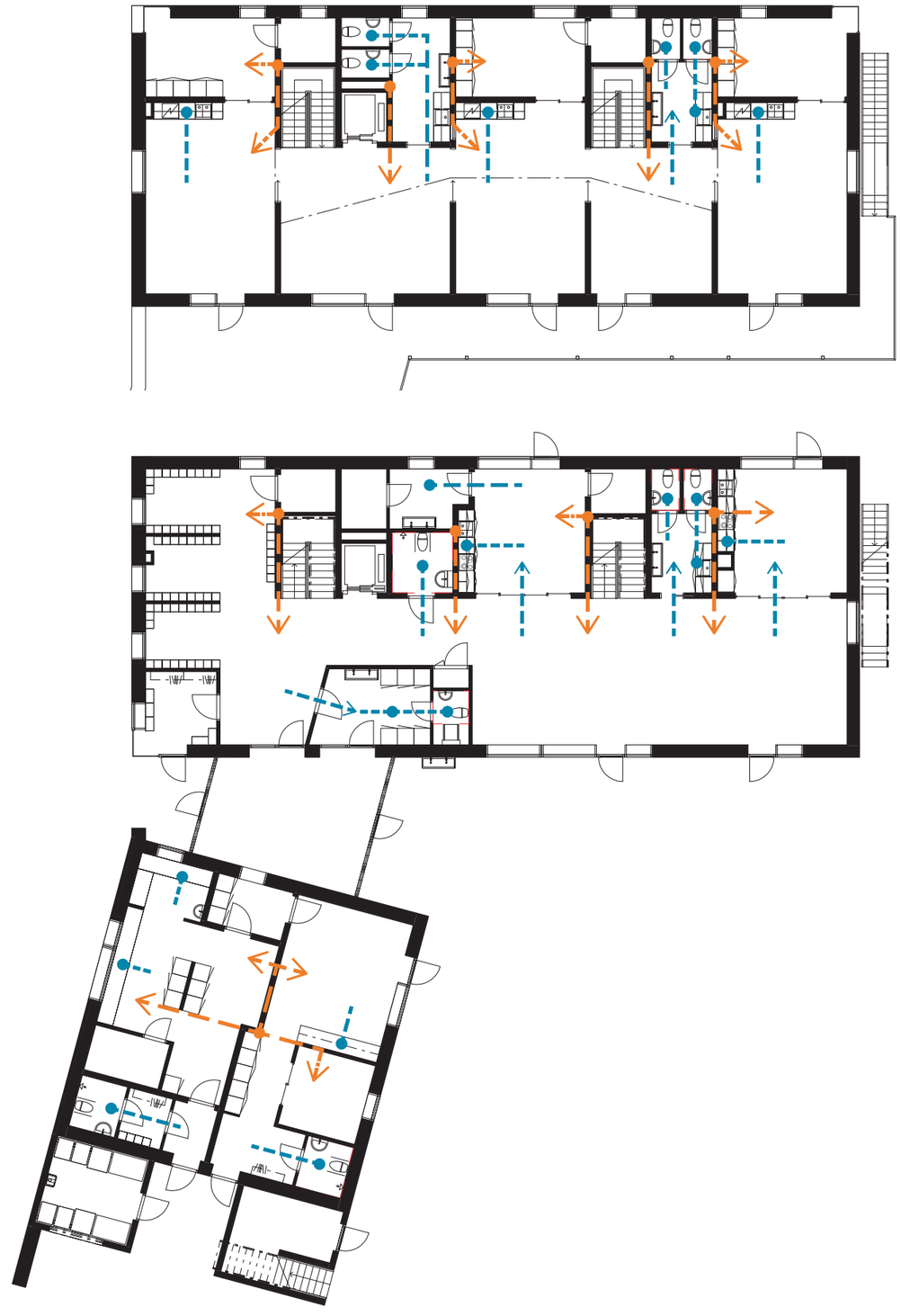
During the summer when the preschool is empty the passive energy collection continues providing a net gain of energy over the year.

VENTILATION LAYOUT

The FTX system is placed centrally in the larger volume in between the two staircases on the third floor. Air is taken in from the roof on the north side of the building and is then preheated in the FTX-system. Fresh, preheated air is then distributed down to the lower levels in ducts placed along the core functions around the staircases. Used air is collected from kitchens and bathrooms and is then reused in the FTX system.

By concentrating the ventilation to one central spot in the building the ventilation ducts can be shortened thus cutting energy losses.

The kitchen and staff areas are ventilated through a separate system placed centrally in the kitchen. This system also has its air supply from the roof and the used air is collected from bathrooms and kitchen fans.



ENERGY CALCULATION

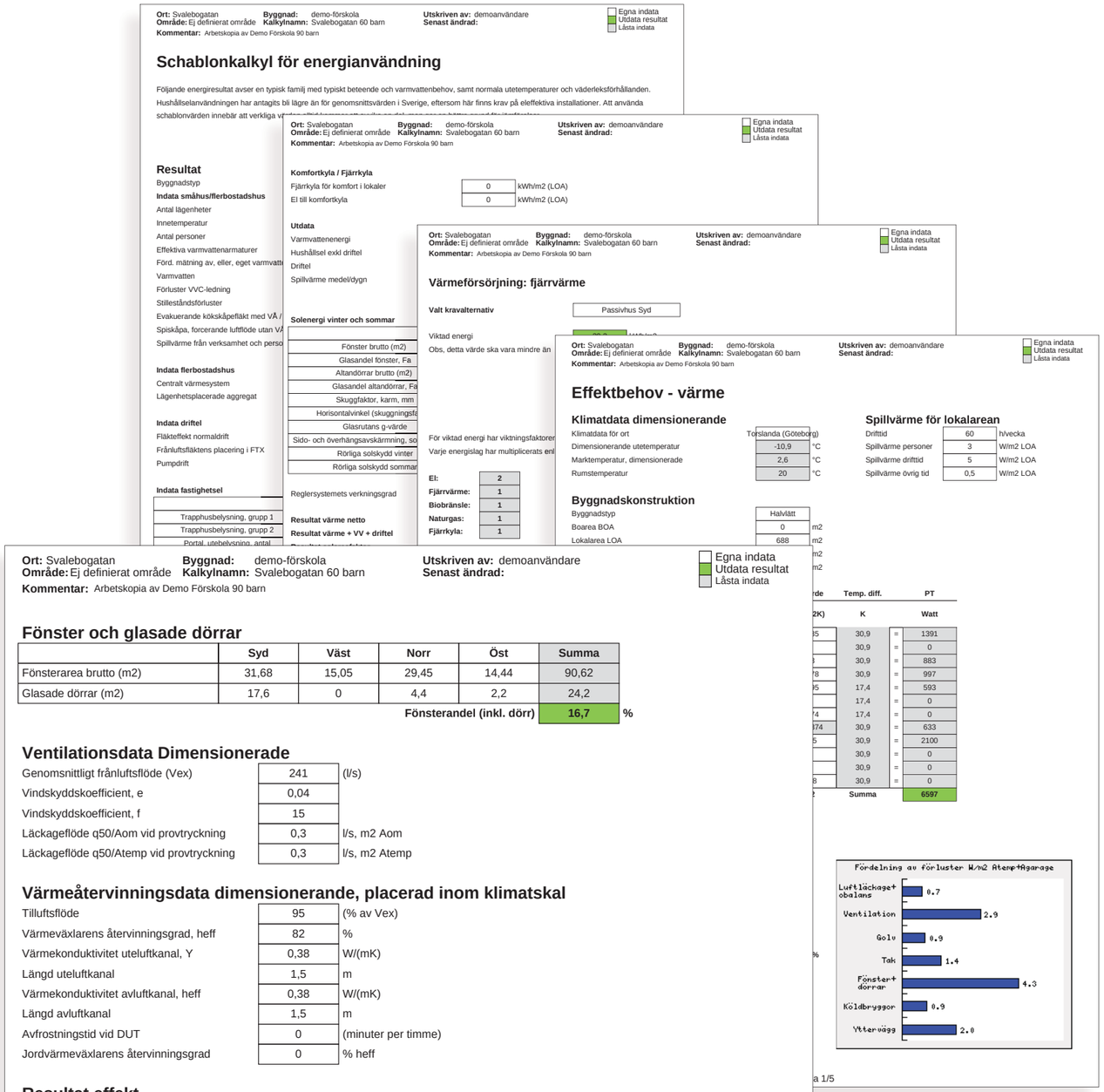
To confirm our passive house design we have made the energy calculations made available by www.energihuskalkyl.se, a development project in cooperation between ATON technical consultants and the municipalities of Västerås and Linköping to assess the energy performance of buildings. Although the calculations are not meant to be used as proof of a buildings performance it is still an extensive calculation that includes most of the critical aspects and it can therefore be seen as a pointer to the real buildings performance.

Passive house standards

There are several passive house standards in Europe. The Swedish standard FEBY was originally design for the south of Sweden and had similar values to the European standard. Later on it was adapted to Swedish conditions and the allowance of added energy per square meter was raised.

A preschool of a comparable size and shape as in this project has an allowed energy supply of 10 W/m² in a European context and 12-16 W/m² according to the Swedish standards.

According to the energy calculations we made our building has a need of 10,1 W/m² added energy for heating which places it near the international standard. The calculation does not however include the much glazed wind catcher in the centre of our building as a heated area. As a design concept we decided to treat this part of the building as a semi-heated area but that can be an issue of debate.



Ort: Svalebogatan **Byggnad:** demo-förskola **Utskriven av:** demoanvändare
Område: Ej definierat område **Kalkylnamn:** Svalebogatan 60 barn **Senast ändrad:**
Kommentar: Arbetskopia av Demo Förskola 90 barn

Egna indata / Utdata resultat / Låsta indata

Schablonkalkyl för energianvändning

Följande energiresultat avser en typisk familj med typiskt beteende och varmvattenbehov, samt normala utetemperaturer och väderleksförhållanden.
Hushållselanvändningen har antagits bli lägre än för genomsnittsvärden i Sverige, eftersom här finns krav på eleffektiva installationer. Att använda schablonvärden innebär att verkliga v

Resultat
Byggnadstyp
Indata småhus/flerbostadshus
Antal lägenheter
Innetemperatur
Antal personer
Effektiva varmvattenarmaturer
Förd. mätning av, eller, eget varmvatt
Varmvatten
Förluster VVC-ledning
Stillestånds förluster
Evakuerande kökskåpefläkt med VÅ /
Spiskåpa, forcerande luftflöde utan VÅ
Spillvärme från verksamhet och perso

Indata flerbostadshus
Centralt värmesystem
Lägenhetsplacerade aggregat

Indata driftel
Fläkteffekt normaldrift
Frånluftsfläktens placering i FTX
Pumpdrift

Indata fastighetsel

Trapphusbelysning, grupp 1	
Trapphusbelysning, grupp 2	
Portal, utebelysning, antal	

Komfortkyla / Fjärrkyla

Fjärrkyla för komfort i lokaler	0	kWh/m2 (LOA)
El till komfortkyla	0	kWh/m2 (LOA)

Utdata
Värmvattenenergi
Hushållsel exkl driftel
Driftel
Spillvärme medel/dygn

Solenergi vinter och sommar

Fönster brutto (m2)	
Glasandel fönster, Fa	
Altandörrar brutto (m2)	
Glasandel altandörrar, Fa	
Skuggfaktor, karm, mm	
Horisontalvinkel (skuggningsfa	
Glasrutans g-värde	
Sido- och överhängsavskärmning, so	
Rörliga solskydd vinter	
Rörliga solskydd sommar	

Reglersystemets verkningsgrad

Resultat värme netto
Resultat värme + VV + driftel

Värmeförsörjning: fjärrvärme

Valt kravalternativ Passivhus Syd

Viktad energi
Obs, detta värde ska vara mindre än

För viktad energi har viktningsfaktorer
Varje energislag har multiplicerats en

El:	2
Fjärrvärme:	1
Biobränsle:	1
Naturgas:	1
Fjärrkyla:	1

Effektbehov - värme

Klimatdata dimensionerande

Klimatdata för ort	Torslanda (Göteborg)	
Dimensionerande utetemperatur	-10,9	°C
Marktemperatur, dimensionerade	2,6	°C
Rumstemperatur	20	°C

Spillvärme för lokalarean

Drifttid	60	h/vecka
Spillvärme personer	3	W/m2 LOA
Spillvärme drifttid	5	W/m2 LOA
Spillvärme övrig tid	0,5	W/m2 LOA

Byggnadskonstruktion

Byggnadstyp	Halvlätt	
Boarea BOA	0	m2
Lokalarea LOA	688	m2
		m2
		m2

Fönster och glasade dörrar

	Syd	Väst	Norr	Öst	Summa
Fönsterarea brutto (m2)	31,68	15,05	29,45	14,44	90,62
Glasade dörrar (m2)	17,6	0	4,4	2,2	24,2

Fönsterandel (inkl. dörr) **16,7** %

Ventilationsdata Dimensionerade

Genomsnittligt frånluftsflöde (Vex)	241	(l/s)
Vindskyddskoefficient, e	0,04	
Vindskyddskoefficient, f	15	
Läckageflöde q50/Aom vid provtryckning	0,3	l/s, m2 Aom
Läckageflöde q50/Atemp vid provtryckning	0,3	l/s, m2 Atemp

Värmeåtervinningsdata dimensionerande, placerad inom klimatskal

Tilluftsflöde	95	(% av Vex)
Värmeväxlarens återvinningsgrad, heff	82	%
Värmekonduktivitet uteluftkanal, Y	0,38	W/(mK)
Längd uteluftkanal	1,5	m
Värmekonduktivitet avluftkanal, heff	0,38	W/(mK)
Längd avluftkanal	1,5	m
Avfrostningstid vid DUT	0	(minuter per timme)
Jordvärmeväxlarens återvinningsgrad	0	% heff

Resultat effekt

Infiltration	13,6	l/s
Systemverkningsgrad	82	% heff
Värmeväxlat luftflöde	229	
Oväxlat luftflöde	12	
Summa förlustflöden Vf	67,6	l/s
Effektbehov ventilation	**2505**	**Watt**

Värmetillskott - internlast

-0	**Watt** (bostadsdelen)
-2186,9	**Watt** (lokaldelen, veckomedelvärde)

Specifikt Värmeeffektbehov (PH / Atemp+garage) **10,1** **Watt / m2**

Tilluftstemp. utan eftervärme, Jsupply,min	14,3	°C
Värmeeffekt via tilluften om max Ttemp 52 C	10347	Watt
Specifik möjlig eftervärmareffekt	15	Watt / m2

	Temp. diff.		PT
(2K)	K		Watt
5	30,9	=	1391
	30,9	=	0
	30,9	=	883
8	30,9	=	997
5	17,4	=	593
	17,4	=	0
4	17,4	=	0
74	30,9	=	633
5	30,9	=	2100
	30,9	=	0
	30,9	=	0
8	30,9	=	0
	Summa		6597

a 1/5

THE GARDEN

A wooden hut and a firepit makes up a campsite in the corner towards the park.

A shallow pond activates the forecourt and gives the children

Rainwater from the house could be collected to form a brook running down a small hollow in the southe-astern part of the site.

The roof of the lower building can be used for urban agriculture or just as an extension of the playground.

A landscape of low hills clad with rubber asphalt encourages physical development and can function as seating.

The southern and eastern parts of the garden is treated as a small forest.

A grassy hill with a slide makes a good centerpoint of the playground and the bike route.

An amphitheatre on the slope beside the brook could be a simple but effective meeting place.

The site 1:500

THE FORECOURT

The forecourt is designed to reflect the nearby buildings and the urban scale. The entrance to the site is situated in between to trees aligned to the main entrance. The court is designed to be a safe and delimited place for children to be alone for a few moments as their parents are packing their things indoors.

In the northern corner of the forecourt an open-sided shed houses the strollers and a gate leads out to the pathway at the back of the building.

Two small lawns and a shallow pond makes a nice spot for a small group of children to play and explore.

THE PLAYGROUND

The main entrance to the playground is situated in the south-west corner beside a massive willow. From the entrance you have a direct view over the playground and the surrounding trees.

Directly inside the fence the ground is shaped as a group of small hills clad with rubber asphalt.

Beyond the hills stands a long set of swings inside a wooden fence. The pathway through “the garden” starts at the back of the swings.

A hill with a slide dominates the centre of the playground. The slide runs down in one of the parts of the sandpit. The north part of the sandpit is for playing and building in the sand.

A pathway for running and biking runs around the hill and the sand pits and then extends to the north.

THE GARDEN

The site is lined with trees along the south and the eastern border. The vegetation is allowed to grow more freely here obscuring the fence and the border. A pathway along the fence follows the variations in the landscape and gives the children new views of the preschool and it’s surroundings. The pathway is sometimes open to the skies and sometimes it is hidden under a roof of low hanging branches and willow tunnels.

In the south-eastern corner of the site a small hollow is used to lead a brook for day water treatment from the building. The slope beside the brook is tapered and used as an amphitheatre for appearances and assemblies.

East of the house a wooden hut and two logs have been placed around a fire pit for barbecue and afternoon snacks. It is important for children to understand and be careful around fire and a fire pit is often an appreciated part of schoolyards.

The north-eastern part of the site is closely connected to the playground and park north of the preschool. A gate in the fence leads to a pathway along the hill just north of the border. Flexibility of land use, where the preschool can use municipal ground to play could be an important strategy for the future in urban areas.

REFLECTIONS, DISCUSSION

During the work with the master thesis we have learned a lot. The project has given use a good insight in the different aspects of preschool design. It has also given us interesting insights in pedagogies and how to apply them to form a building. To have the time to design a project from the first sketch to building details has been very fruitful.

We started the project with a will to investigate new ways of building a preschool. We studied different pedagogies but soon felt that the Reggio Emilia approach and its pedagogical ideas lay closest to our own views. This posed a big problem since we had a tiny plot and a traditional one story Reggio preschool would leave just a strip of land around the building for the children to play on. How could we adapt the popular Reggio approach for such an urban site? In a time when it is getting increasingly hard to find plots to build on in our major cities building higher can be a natural solution. We wanted to find out if it is possible to build a preschool with the same qualities as a one story Reggio preschool, but with the functions stacked on top of each other.

To solve the problem we came up with a new preschool typology. The *piazza* was kept on the ground floor and used to eliminate corridors, while the homebases which normally surrounds the square where moved to the first floor. By placing all the homebases together, the different groups can collaborate easily and we were able to shorten the distances and eliminate the need for corridors. The open layout on the second floor also gives flexibility for the teachers to decide how the spaces should be divided between common areas and areas dedicated for a single group.

Another aspect of flexibility that we have been seeking throughout the project is the scalability and tranformability that could make the building exportable to other sites. We wanted to explore a form and layout that enabled it to be adapted and scaled to house different amounts of children depending on the needs. We therefor decided on a building with simple volumes where new rooms could easily be added at the gables.

To make a sustainable passive house was another goal with the project. To live up to the international passive house standard we made a building made up of compact volumes with thick insulation and with high performing windows. The calculations we made shows the building will well live up to the high set standard for a passive house.

Building sustainability is not however just about the energy performance of the building. You have to look at the buildings whole life span to measure its environmental impact. In a world where things in general tend to have a very short life span we wanted to show an alternative with healthy and durable materials. A building that is meant to last.

Another part of that strategy was to put the major part of the load bearing structure of the building in the exterior walls to allow as much flexibility as possible to change the interior spaces for future needs or to convert the building into something else than a preschool.

Reggio Emilia is not a set of rules; it is an approach that should be adapted to the local situation and time. In that sense our work was well in line with the pedagogical approach itself. We wanted the building to work in the same way, as an inspiration that could be adapted to new times and places. We wanted to present a green and attractive alternative to regular preschools and we hope that our preschool typology can inspire others to think in new ways.

The roof terrace

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STUDY VISITS

Brämaregatan 2D preschool, Utkiken, visited 16 december 2011

Ceresgatan 16 preschool, Björken, visited 2 januari 2012

Lantmätaregatan 20 preschool, Fjärilen, visited 15 december 2011

Svalebogatan 52 preschool, visited 12 januari 2012

Wieselgrensgatan 11 preschool, visited 14 december 2011

Östra Keillersgatan 3, preschool, Månen, visited 5 januari 2012

Övre Hallegatan 21 preschool, Pannkakan, visited 15 december 2011