SPIELKINDERGARTEN

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SPIELKINDERGARTEN

“Children learn by doing”

Friedrich Fröbel (1782- 1852)

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JUSTIFYING REPORT

SPIELKINDERGARTEN

EXPERIMENTAL SPIELKINDERGARTEN

The purpose of this MasterArbeit is to design what I call a "Experimental Kindergarten".

Kindergarten in all the meanings of the word, a space for all-aged children before they start the school. This includes various stages as nursery child care; kindergarten as it is and preschool education.
Experimental in the meaning of not classical and definitely not passive building. The word experimental refers to the building but also to the education in a trial to put them together in one.

The experimental education is one where pedagogues have a passive role an children learn to decide and indeed they decide what and how to do activities.

This kind of education is based on the Montessori method which even though it exists from middle 50s it is still considered new and experimental in most part of the world. It is said that "children learn by doing" (Froebel), so in this context it is reasonable that in their early ages, children need more to discover by themselves than to be told how to manage everything.

Although the role of the teachers and pedagogues is even more important because they should be perceived as an invisible guide.

Thus, in their early years children don't need or don't have to learn from books or manuals and they don't have definitely the same rhythm and development grade.

Indeed, they need to work and discover their mobility, psychomotor activity, body language, contact with the world, perception, interact with other people, social basic skills, play, etc. and none of this knowledges are meant to be learnt on books.

In this educational context, the purpose is designing a building which not only makes it possible, but also supports and improves it as a teacher or pedagogue. It is the reason why the kindergarten will be designed as the third pedagogue or educator.

The building will be thought as a kindergarten as main and unique use, so it could be specifically designed to reinforce all the activities carried out there.

The main purpose is that children play with the building, learn from the building and make it their own space; avoiding completely the traditional conception of building as envelope for the human activities; no it will take part of them.

In order to achieve this purpose it is necessary that the designing process is carried out completely in every area that involves the architecture, not only the main envelope, but also the inner spaces, the outside playground, the vegetation and also the technical aspects, becoming an integral and complete project.

KINDERGARTEN AS THE THIRD EDUCATOR

·What is a kindergarten?

One KG is the place where children start their early education, it is the place where children get their first own independent contact with the world beyond their home. In fact, it should be their second home in their early childhood. What a kindergarden should never be, is the place where parents take their children so that someone can take good care of them during the day; because parents are also part of this early school and they should also take part of everything that happens there.

·What does a child need?

The basic answer to this question is SPACE; space where children can run, move, and carry on all kinds of activities. Much space. Nevertheless, the real answer is more complex because what they need is to learn from the world around them and for that what they need is everything you can find in real world: big-small spaces, softness-roughness, enclosed-open air spaces, human made- natural textures, straight-organic shapes, areas for running and areas for being quite; spaces where feeling small-big spaces, spaces where feel activated, spaces where feeling quiet, etc.

·How does children learn?

Basically they learn by experimentation and investigating the surrounding world, by trial and error. It is not easy and natural to learnf from other's failes or just believing that what others say is true, this is why they observe and self-experiment.

·Which experiences does a kind need for learning?

Children learn from every experience they have, even from the most small and insignificant. This is why they need to experiment as much as possible, not only in the positive way, also need a small amount of negative actuations to find out what is not good for them

·How much free-movement should a kindergarten tolerate?

As much as a child need. This means that children are more or less active during the day depending on their age. So, the radius of space where children can move is also related to it.Likewise, a baby doesn't need moving space, a small child needs a few metres around and bigger children can move around bigger spaces.

·How big should the space be in a kindergarten?

It should be accommodated to the age and development stage of the children who are staying on it, being the children density lower as older the children are.
We know that density in Europe moves between 10-25 m²/child but also know that should be higher.
"We have also known from as early as the mid 60s that too little space or too high density of children, not only leads into a feeling of being in a closet, but more fundamentally is associated with more agressive/ destructive behaviour, less constructive interaction and less quiet solitary play" Moore, Gary T. (How big is too Big? How small is too small? 1996)

·How open and flexible should the space be?

The space should be open and flexible in the measure that it should let children move in groups of different sizes, means; if the activities require what individual or small groups work the space should provide the required separations, but if all children need to stay together for one activity, there has to be a space for it.

·How much free-space/natur does a kindergarten need?

Kids move more and faster when they are outside that when they are inside, so we should try to dispose at least double outdoor space than indoor areas.

·How should the outside space be?

"There is a fine line between leaving the environment as natural as possible and designing it to provide tools for the many ways that children play" (The grat outdoors)

·How should natur connect with inside space?

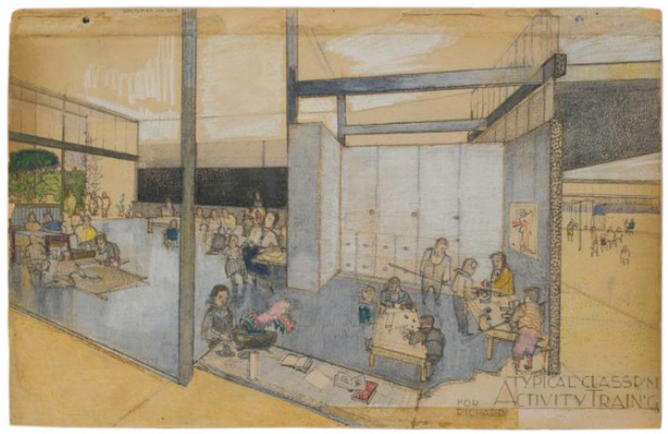
It is really important for children to be outdoors a significant part of the day. This means that the connection inside-outside is an important element for them. In my opinion it should not be only a visual connection, in fact it should be an interactive connection, i.e. that the changing point should be flexible and allowing children to do activities inside, outside, but also activities which concern both areas at the same time.

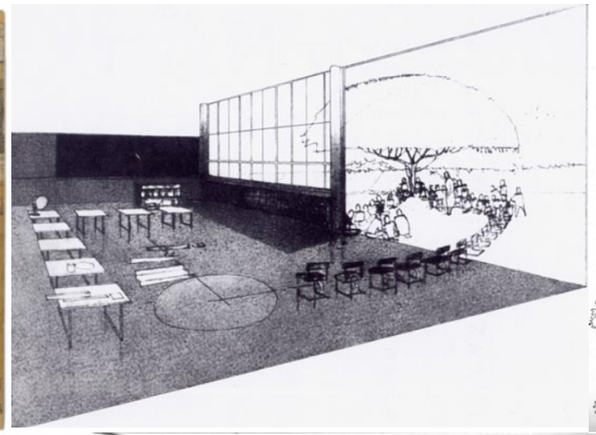
·How should the child feel in the kindergarten?

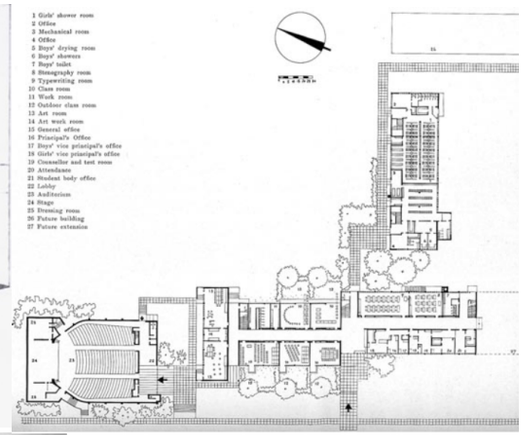
Like home, comfortable, happy and cheerful.

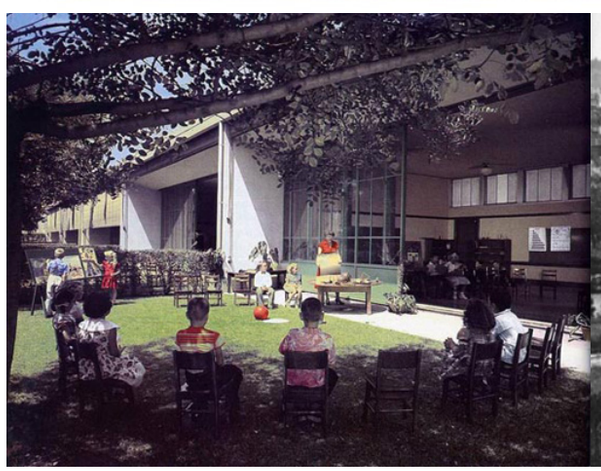
RICHARD NEUTRA

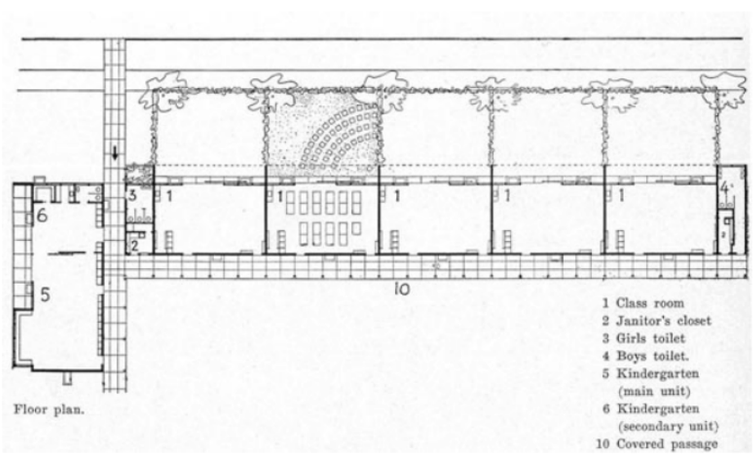
Emerson School (Los Angeles) 1938
Corona School (Los Angeles) 1935





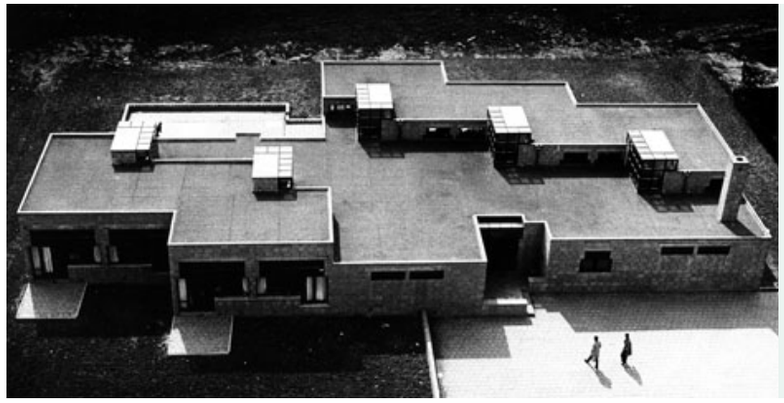


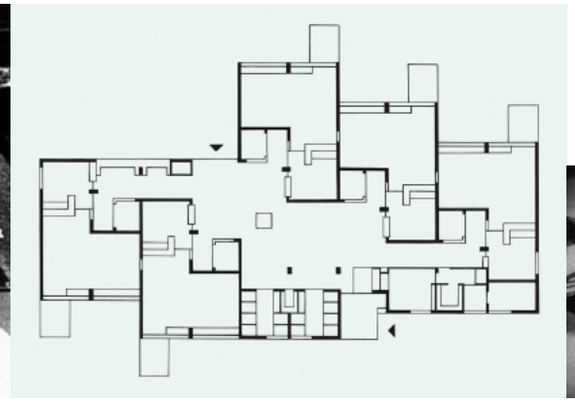


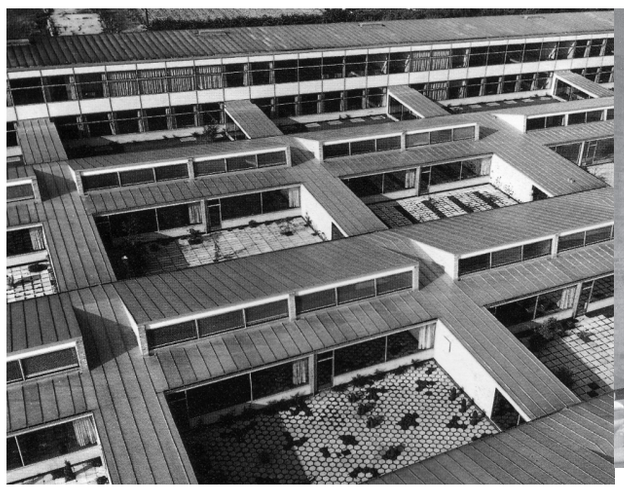


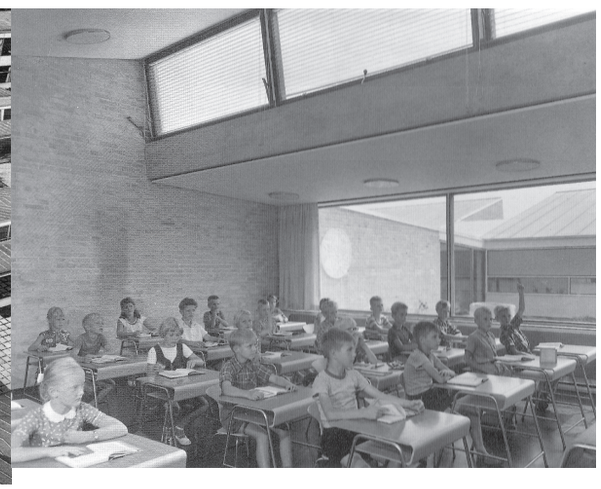
HERMAN HERTZBERGER

Montessori School (Delft) 1960



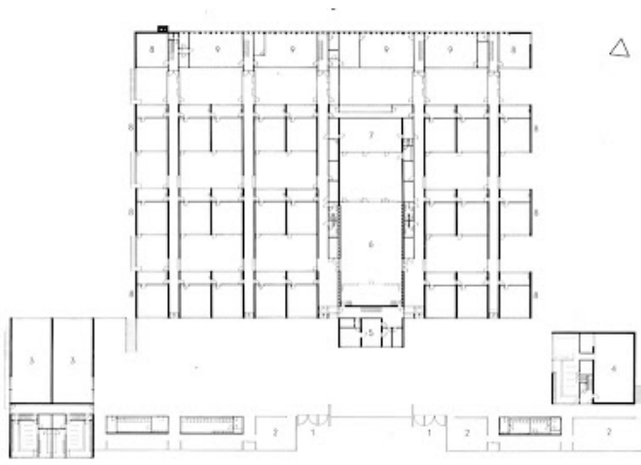




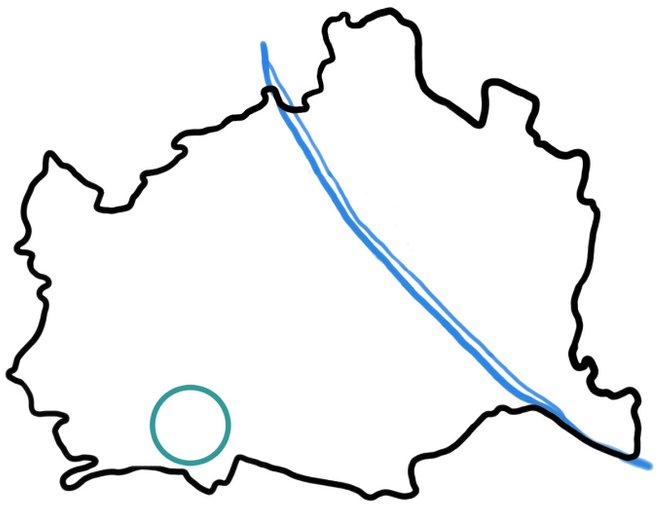


ARNE JACOBSEN

Munkegards School (Denmak) 1951



*Also many contemporary kindergartens have been analyzed in an independent portfolio.

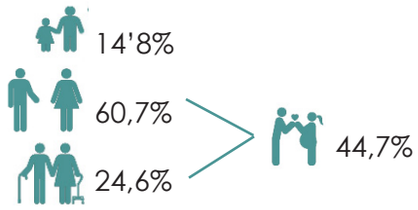


LASTENSTRASSE. 23 BEZIRK. WIEN

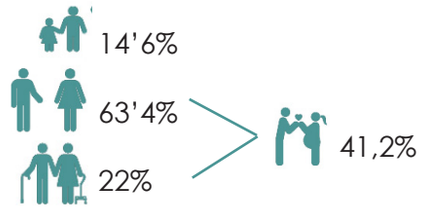
Liesing is the 23rd district of Vienna. Lies in the southwest of the city and borders Lower Austria along with the districts Favoriten, Meidling, und Hietzing. Liesing is the fifth largest district of Vienna and a third is natural areas.

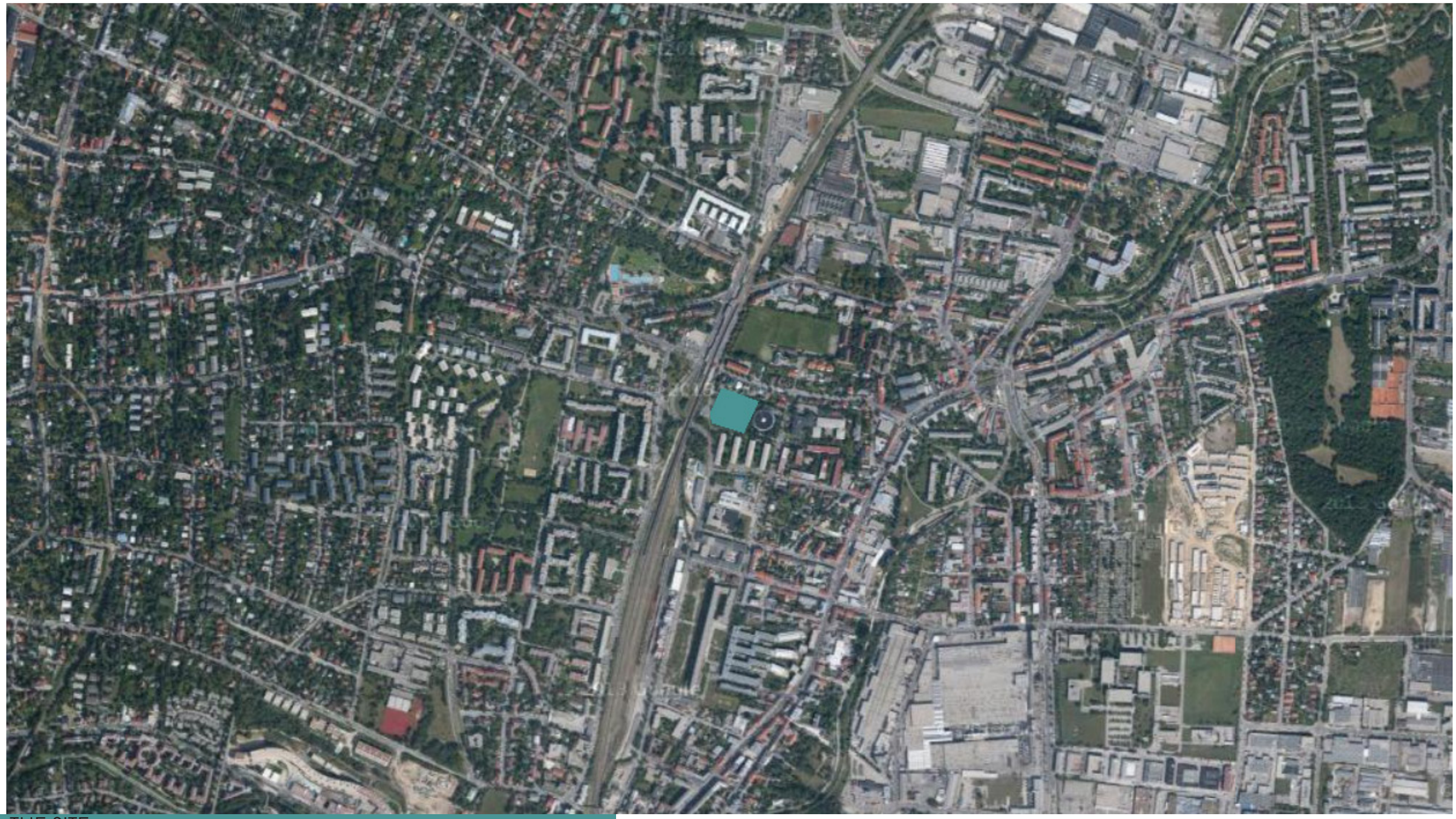
population: 95,263 hab density: 3,000/km^2 area: 32km^2 portion of Vienna: 7,7%

POPULATION DISTRICT:



POPULATION VIENNA:





THE SITE

SPIELKINDERGARTEN

Distances from kindergarten: ◯=1min + public transport

Site plan: plot + parking plot + access pedestrian street + train railways

The area surrounding the kindergarten is a residential zone in the 23rd district in Vienna. It is a low density area, with wide green spaces around the plot. The kindergarten is surrounded by a small pedestrian street among green spaces. There is a small parking plot in front of the west facade for around 20 cars. In a 5 minutes radius there are 5 different stops for public transport which connect the area with the rest of the city by bus and S-bahn.

The plot is a completely green space, covered of grass and with great variety of trees. It looks like a natural wild space lightly adapted to the children use in a way that leads to think about the project giving importance to the natural areas.
Thereby, the main considerations will be:

- Open the inner rooms to the outside
- Place the building all surrounded by green: edification ring + surrounding playground + central yard
- Leave main trees in their original position
- Give special importance to the old central willow as meeting point
- Work with the green space as few as possible
- Adapt the outdoor space for children but leaving it wild and natural.

"There is a fine line between leaving the environment as natural as possible and designing it to provide tools for the many ways that children play"

The great otudoors

THE PLOT

SPIELKINDERGARTEN

_pedagogical concept

_architectural concept

_formalization of the project

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_modells

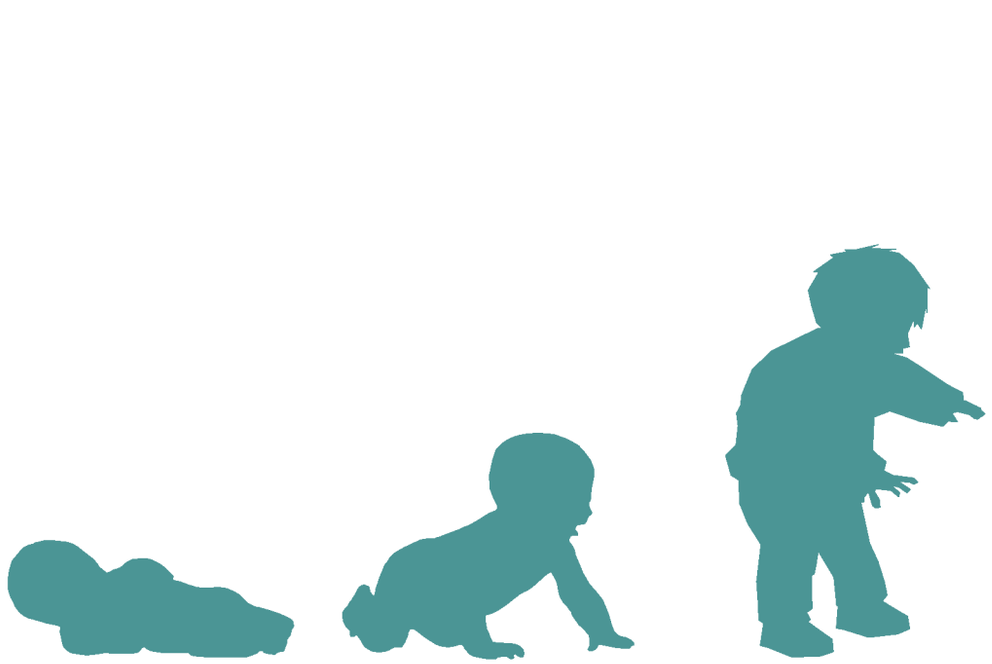
CHILDREN → FREEDOM TO **DECIDE**

EDUCATOR'S PAPER → IMPERCEPTIBLE **GUIDE**

~~GROUPS BY AGE~~ → 2 STAGES OF **DEVELOPMENT**

FIRST STAGE

THEY NEED HELP AND ASSISTANCE
IN ALMOST EVERYTHING THEY DO



NUMBER OF CHILDREN: 30 + 8 babies (eq to 2 + 1 groups)

SECOND STAGE

THEY CAN BY THEMSELVES:

_EAT
_COMUNICATE
_WALK
_USE BATHROOM

NUMBER OF CHILDREN: 80 (eq to 3 or 4 groups)

BUILDING TAKES PART IN THE EDUCATION

CHILDREN PLAY **WITH** THE BUILDING

CHILDREN LEARN **FROM** THE BUILDING

A KINDERGARTEN THAT ONLY COULD BE A **KINDERGARTEN**

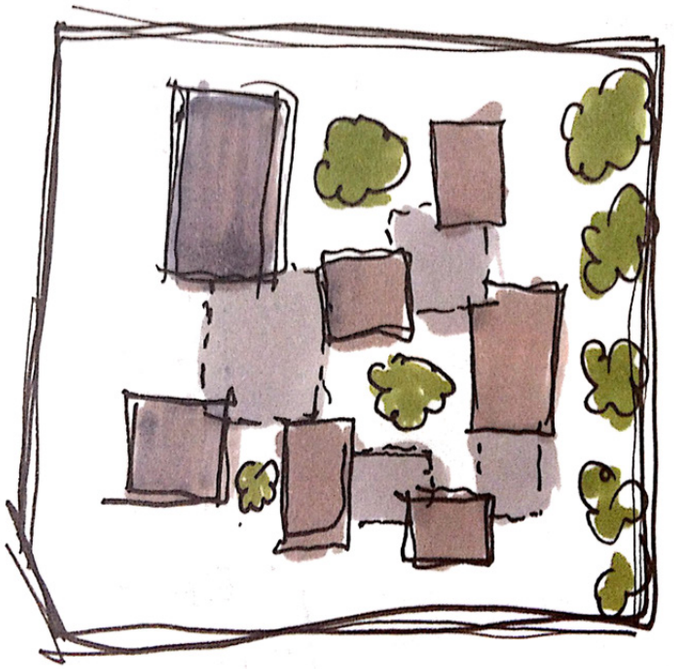
3

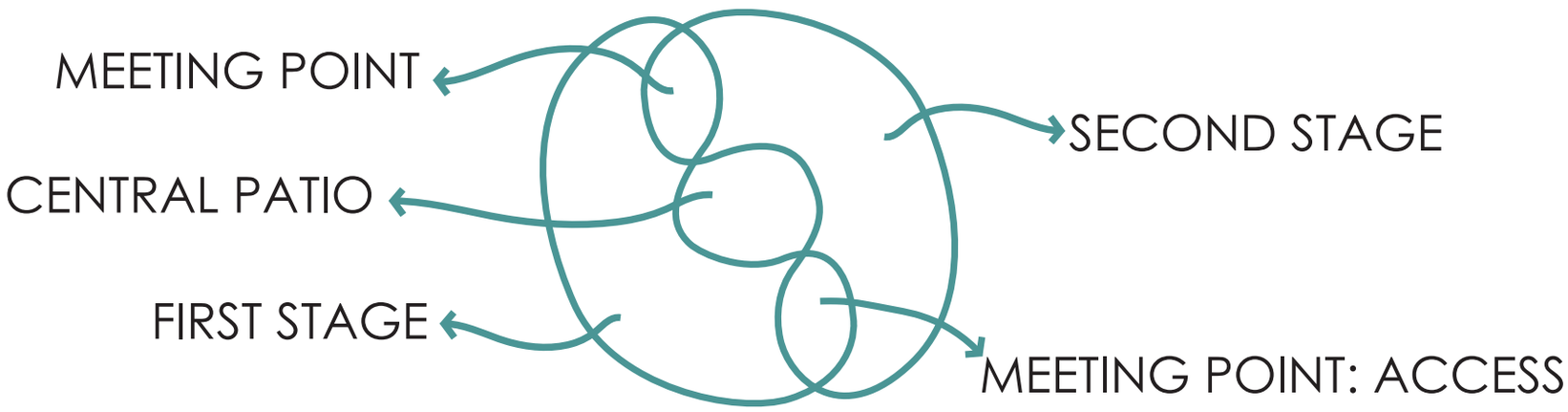
KINDS OF SPACE	DIFFERENT ELEMENTS	KINDS OF MATERIAL
OPEN	STRUCTURAL WALLS	CONCRETE
CLOSED	FUNCTIONAL WALLS	WOOD
FLEXIBLE (BUFFER)	COURTAIN WALLS	GLASS

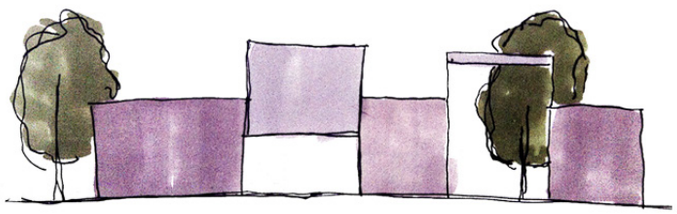
+ VEGETATION

ADAPTATION TO THE SHAPE OF THE VEGETATION

CREATE A CENTRAL PATIO → WILLOW





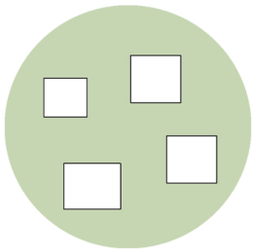


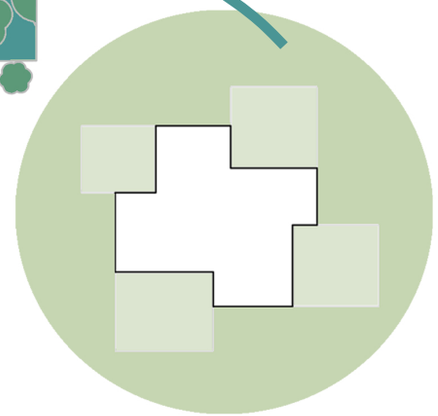
BUILDING TAKES PART IN THE EDUCATION

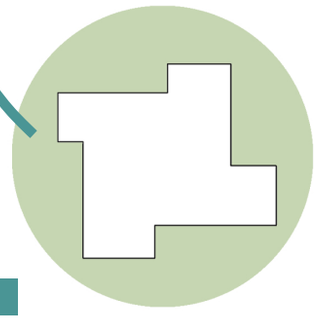
CHILDREN PLAY **WITH** THE BUILDING

CHILDREN LEARN **FROM** THE BUILDING

HOW TO PUT IT ALL TOGETHER?







FORMALIZATION OF THE PROJECT

SPIELKINDERGARTEN

KITCHEN

COVERED TERRACE

LR

+1

SR

PR +1

LR

CR

SR

CR

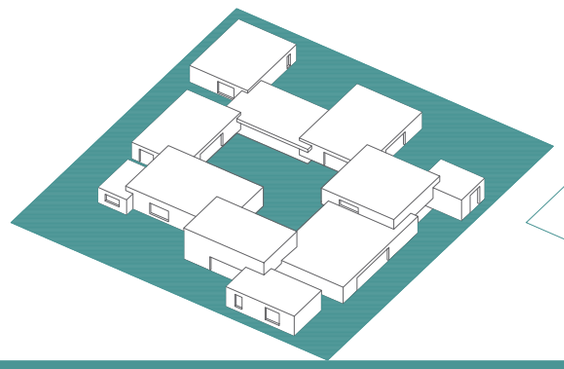
+1

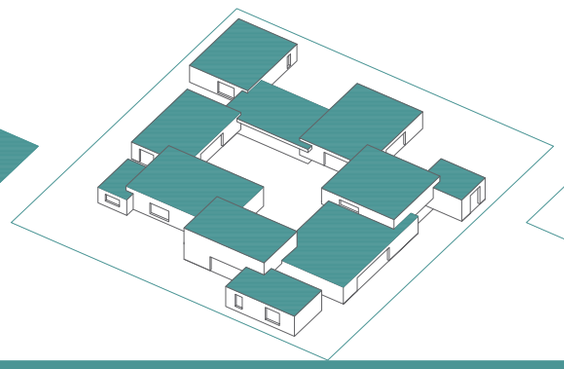
ACCESS

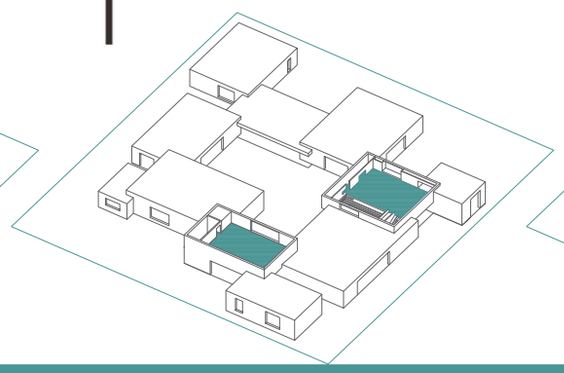
ADMINISTRATION

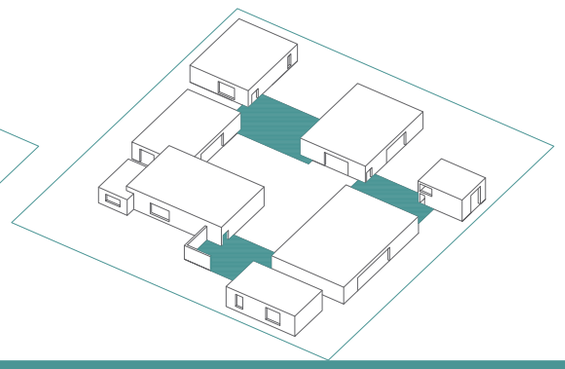
SECOND STAGE
COMMMON ROOM
PLAYING ROOM
LEVEL ROOM
SOFT ROOM

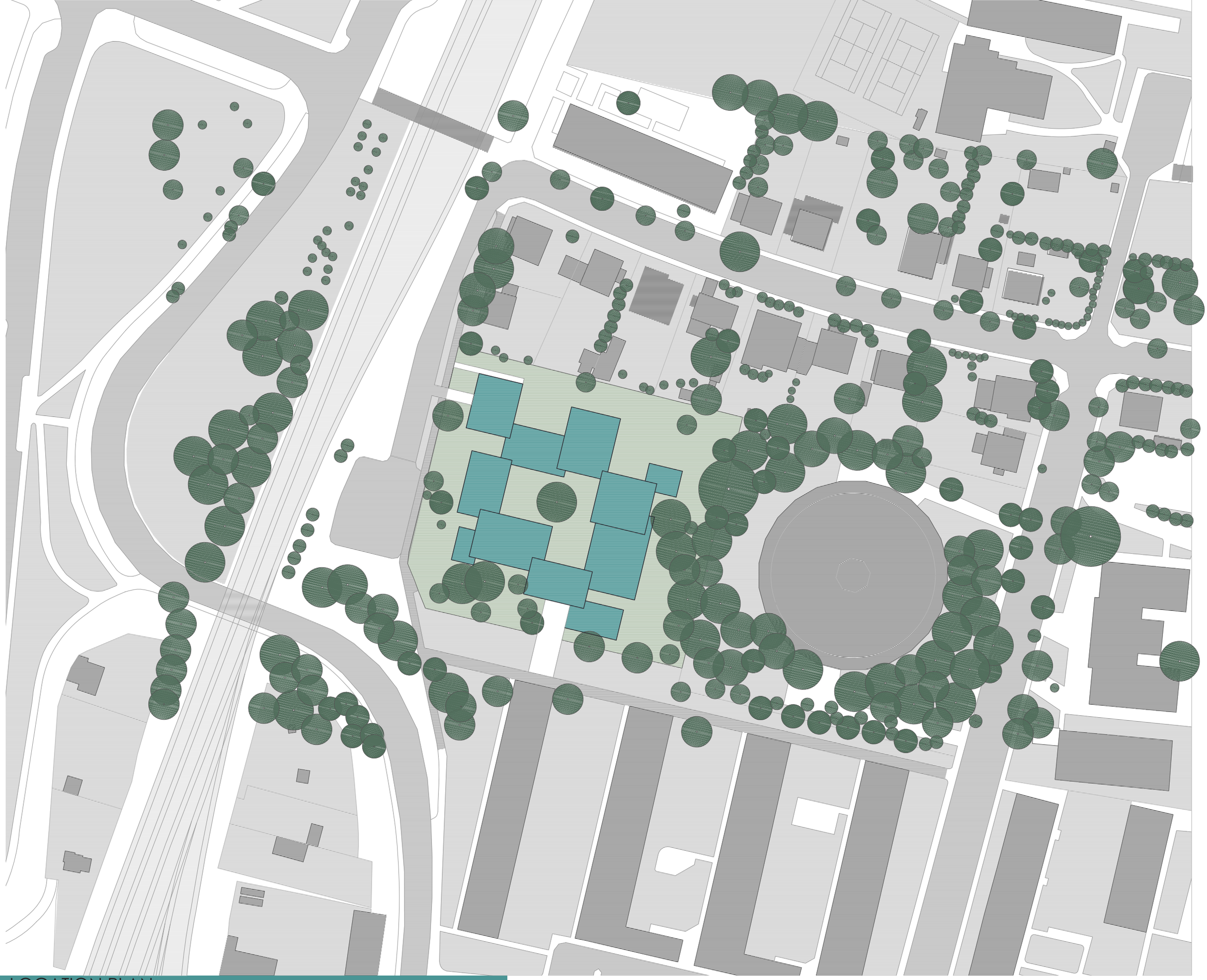
FIRST STAGE
COMMMON ROOM
SOFT BABY ROOM
LEVEL ROOM







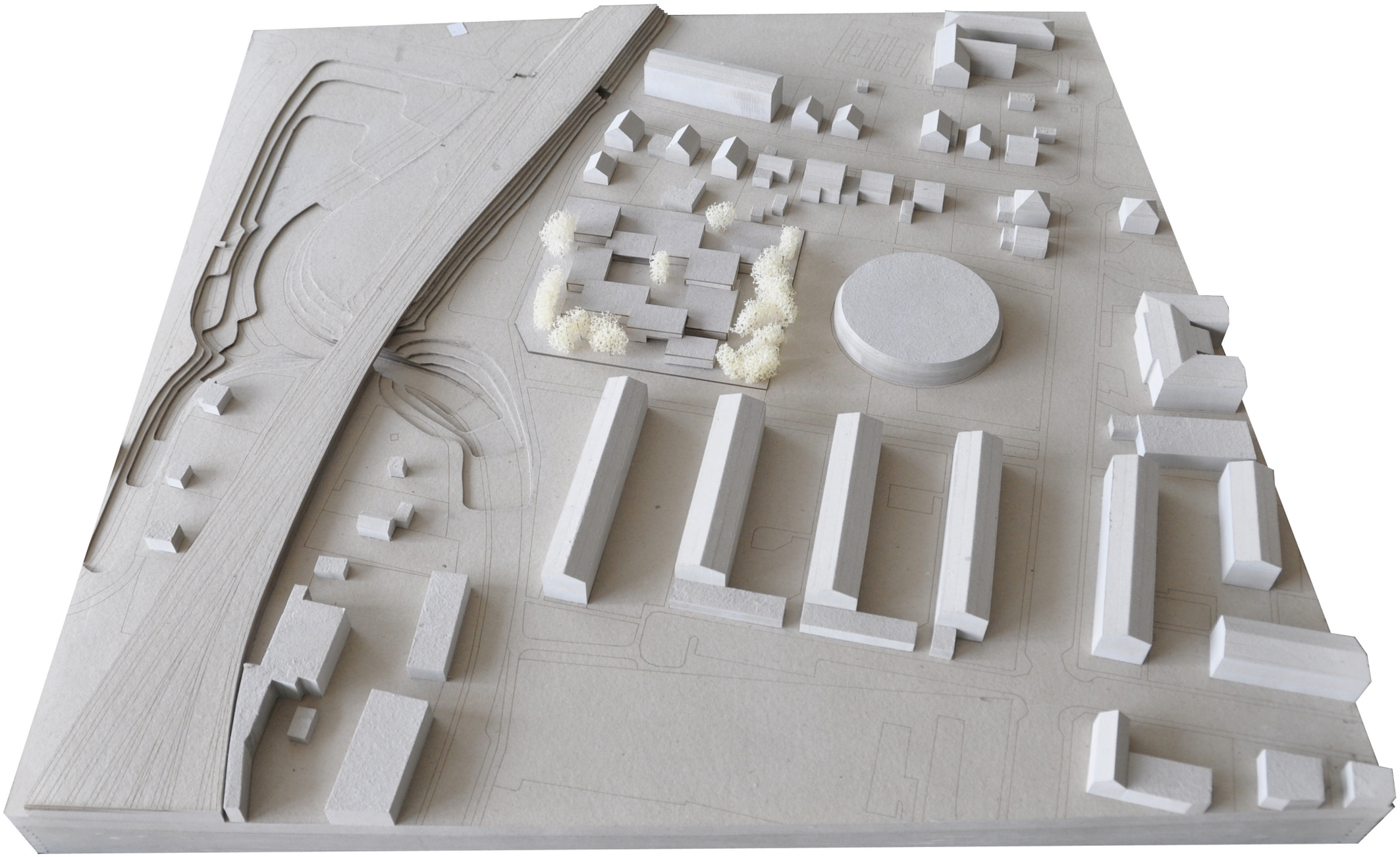




LOCATION PLAN

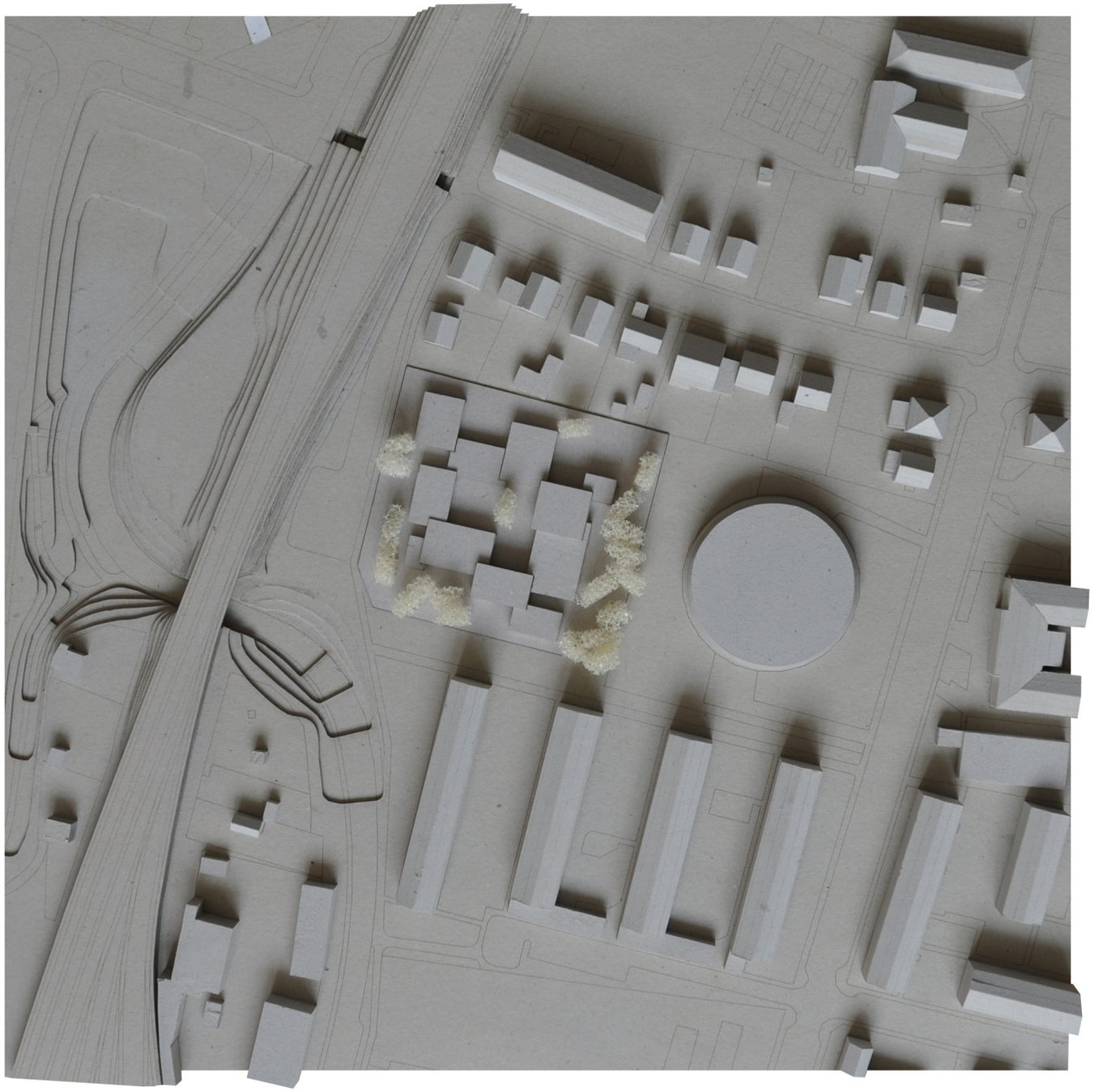
1_1000

SPIELKINDERGARTEN



MODELL PICTURES

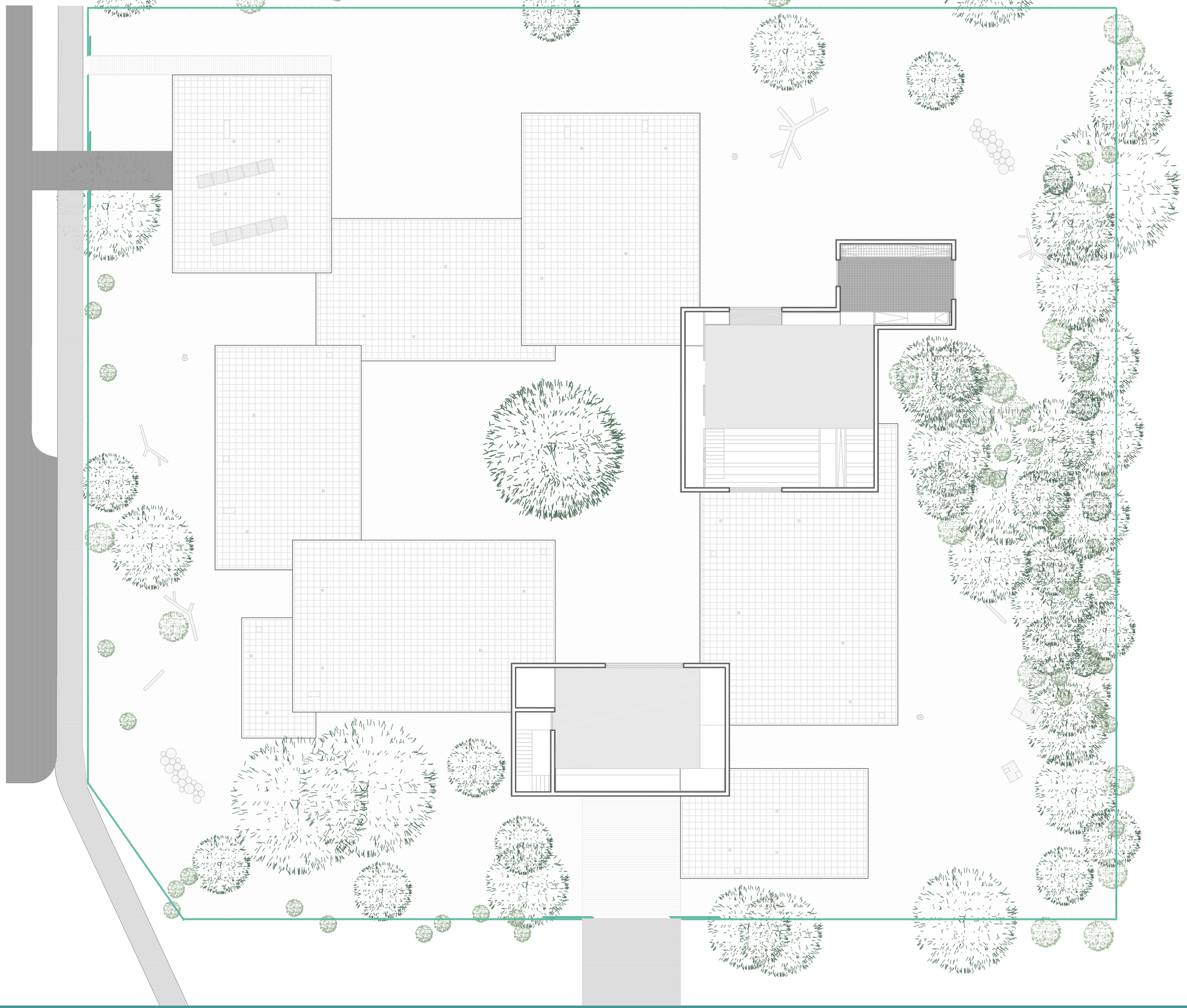
SPIELKINDERGARTEN

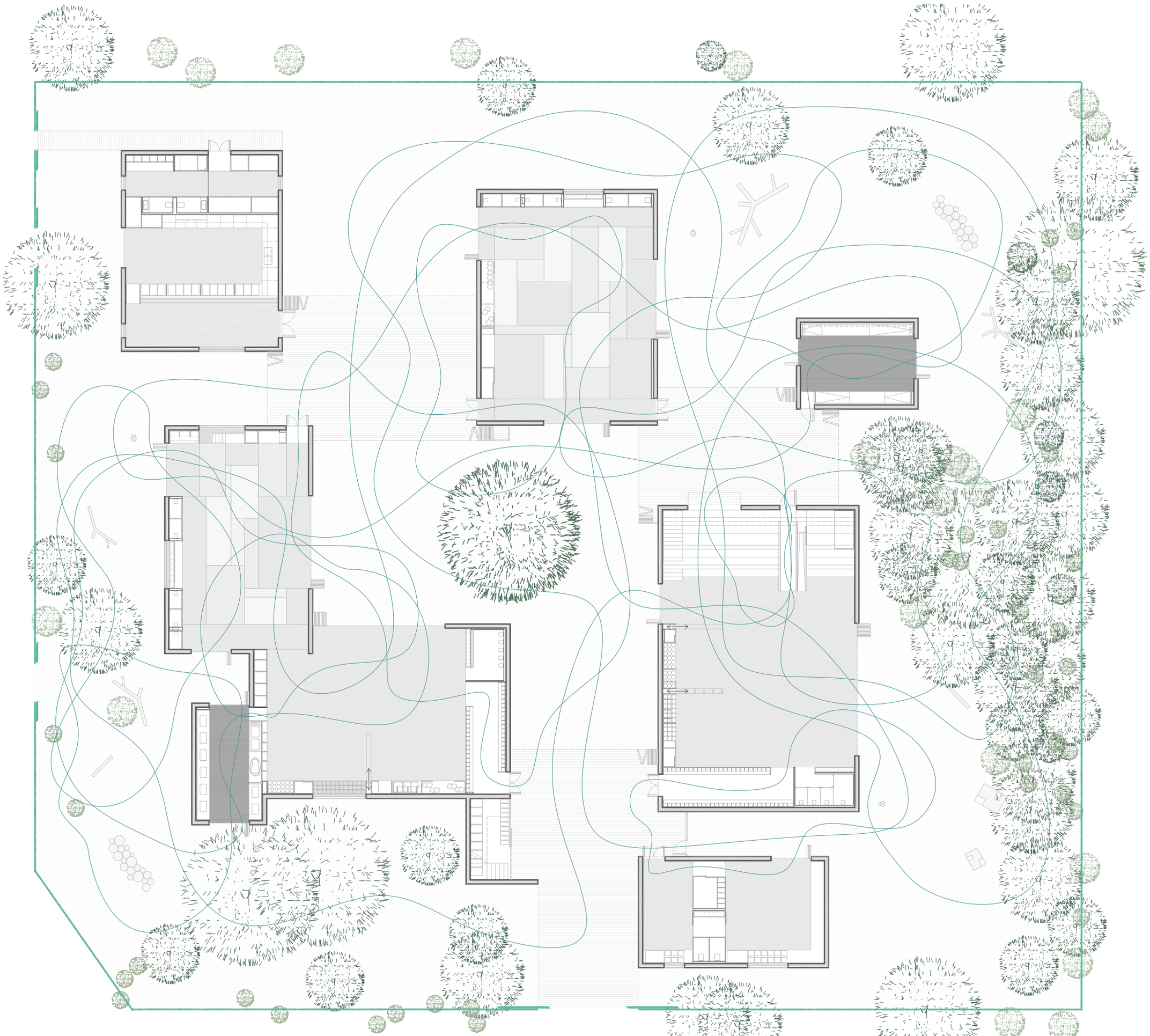


MAIN PLAN

1_300

SPIELKINDERGARTEN

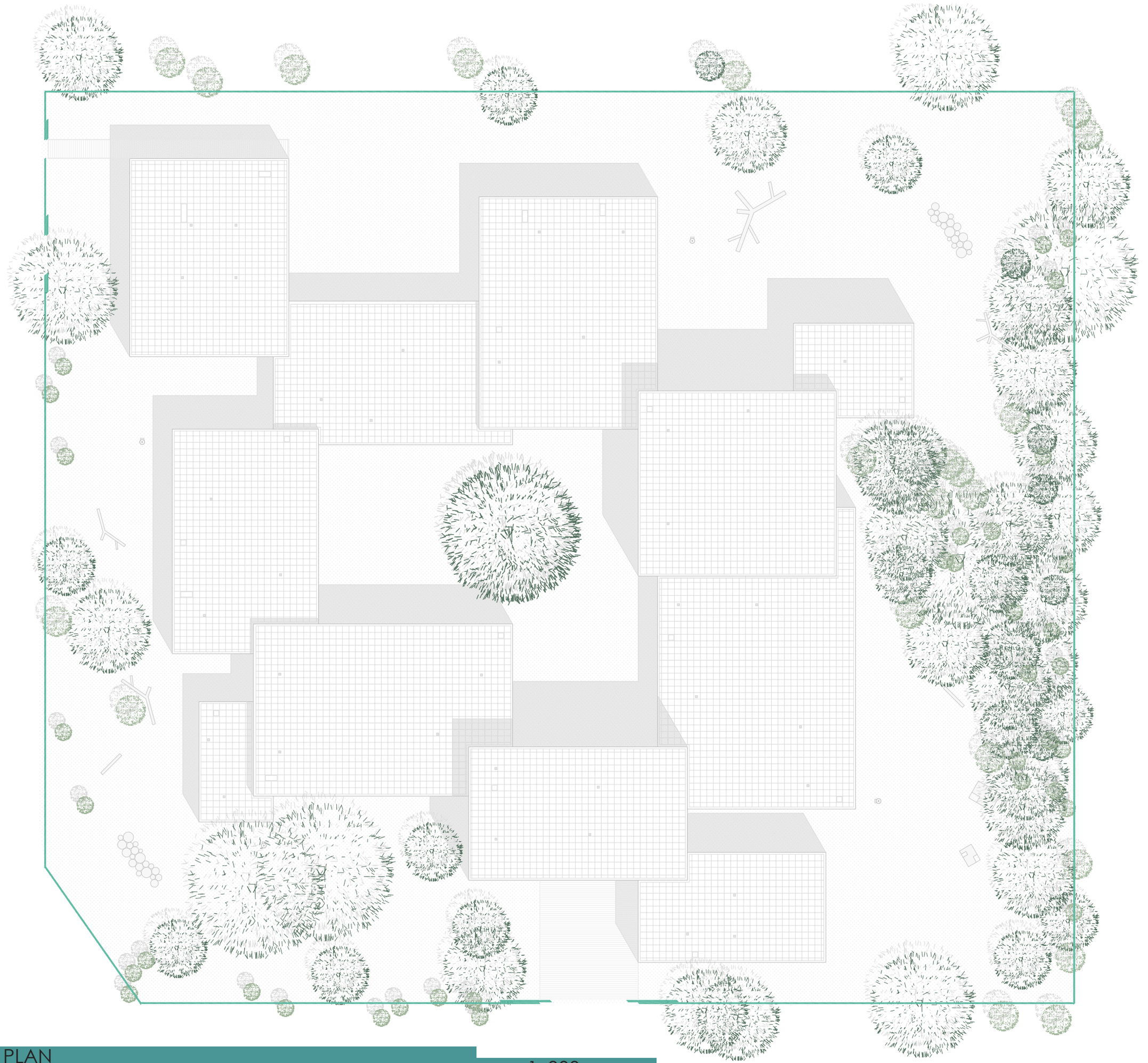




FLOWS AND MOVEMENTS PLAN

1_300

SPIELKINDERGARTEN



ROOF PLAN

1_300

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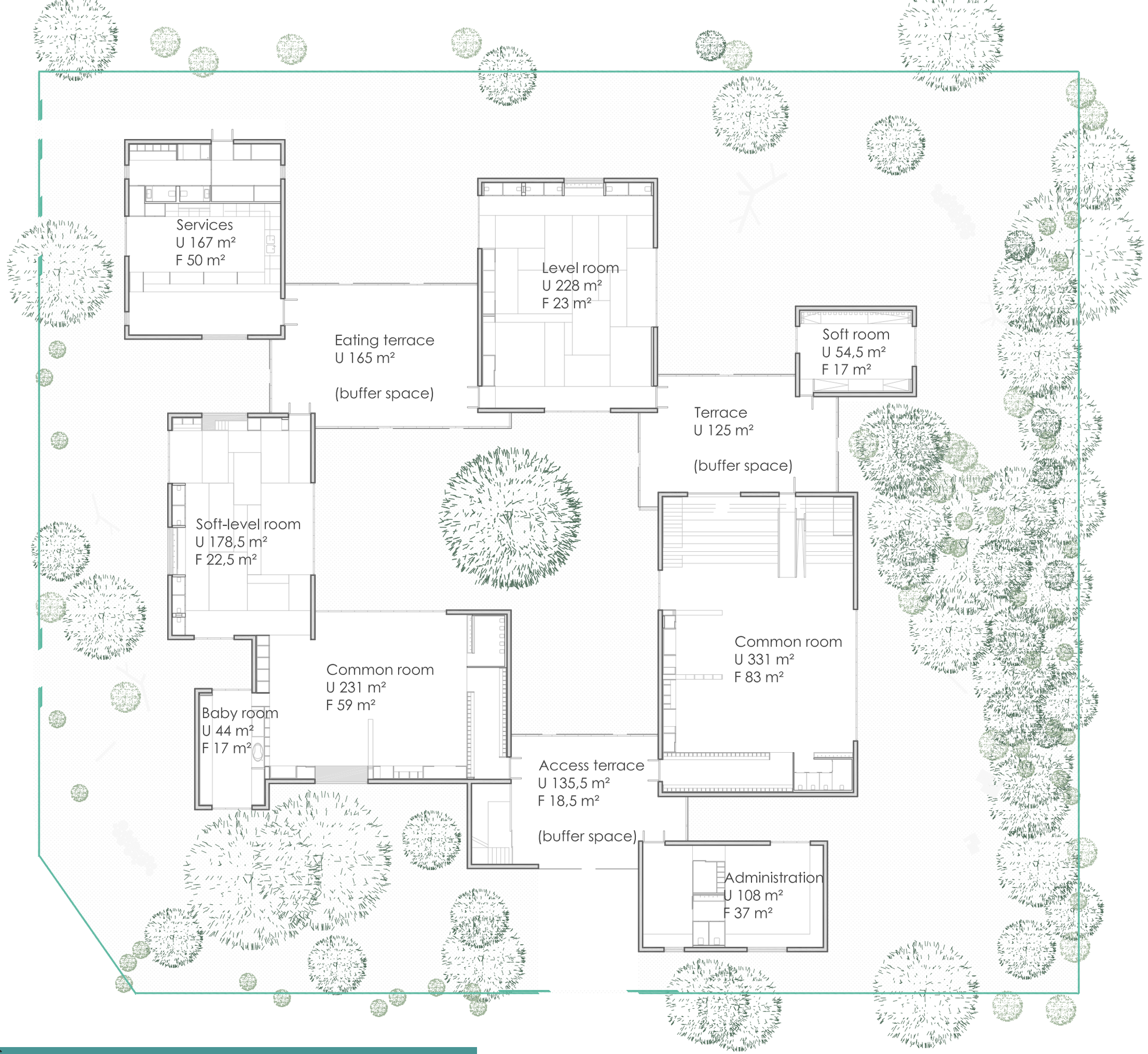
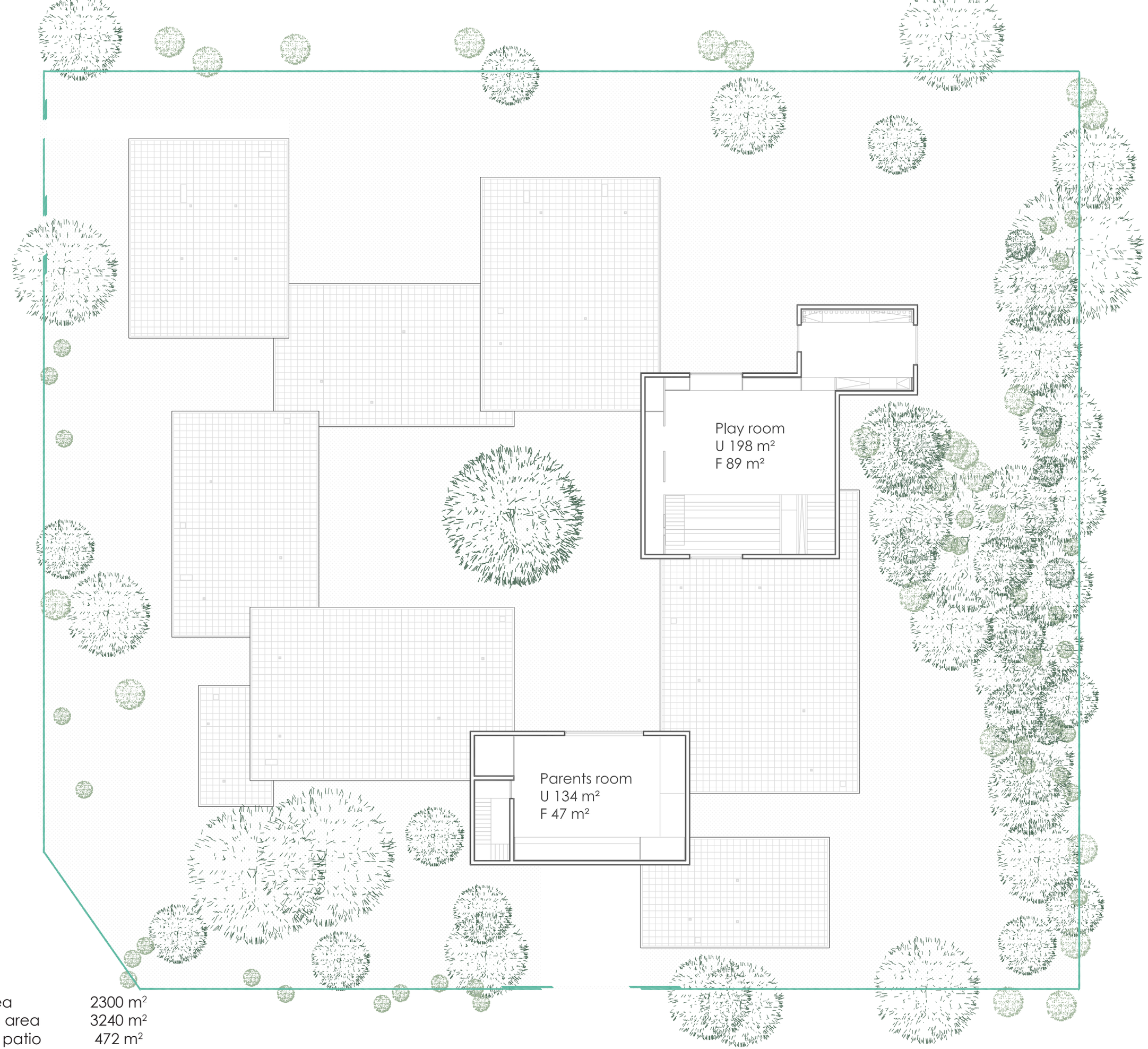
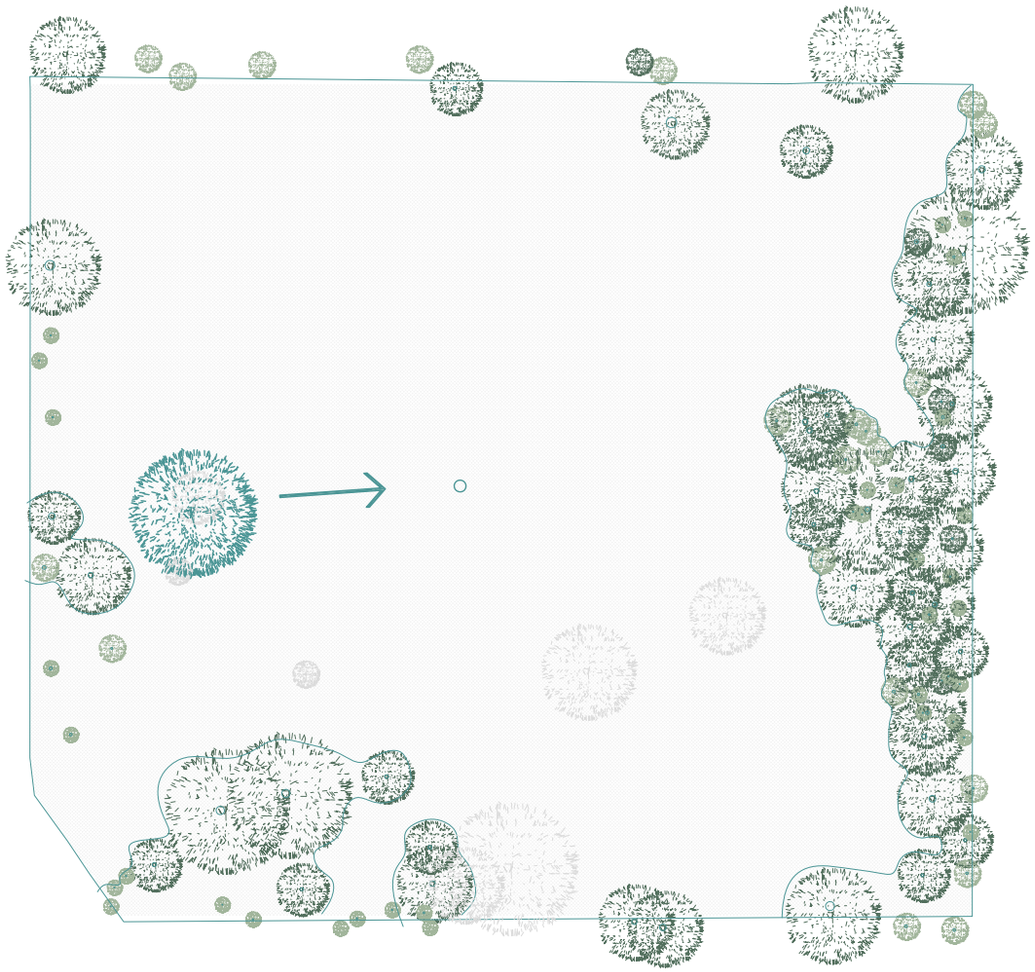


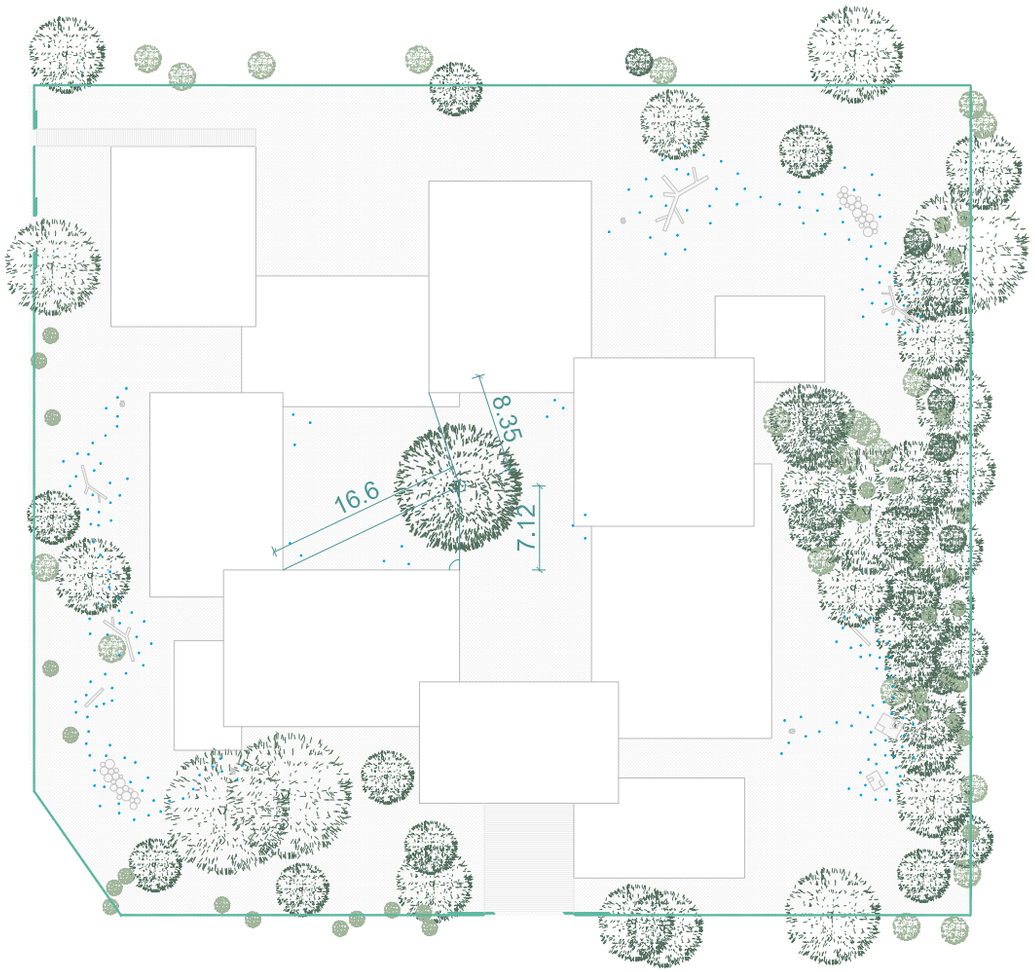
AREAS

SPIELKINDERGARTEN



Built area	2300 m²
Outside area	3240 m²
Central patio	472 m²
Plot area	5649 m²





REMOVED TREES CHANGED WILLOW KEPT TREES WOODED MASS GRASS LIGHTING PLAYING SETS

The open space is one of the most important areas in a children's early years. In order to keep the playground as natural as possible, the main decision has been to leave most of the trees in their original position. Nevertheless, it was necessary to change the position of the willow; the most important and unique tree in the plot. It will be placed in the very center of the building creating a central patio which connects every room, as a meeting point.

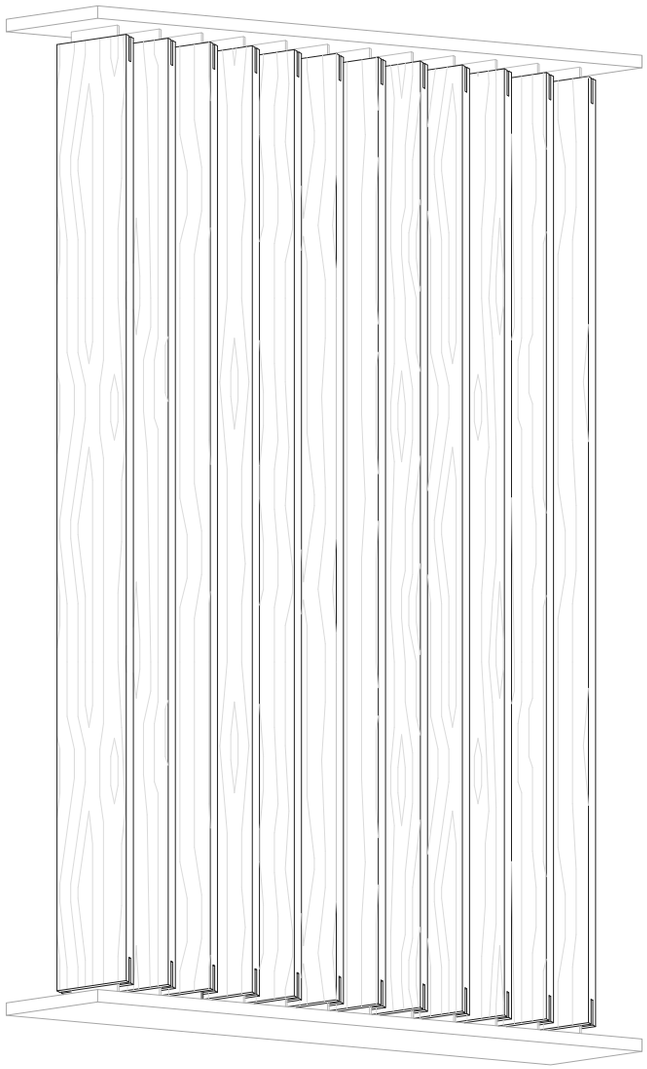
All other trees will generate a green mass around the main areas dedicated to children (east side + south-west corner), except 4 of the trees which will be removed to alllow the disposition of the building.The ground will stay green and wild, covered by grass, but there will be additions in order to make the space usable, comfortable and secure to the kids

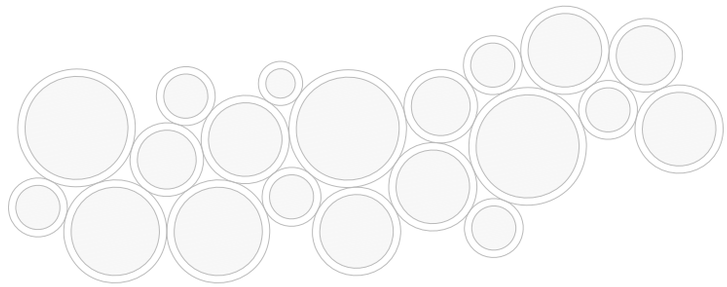
In first place, to enclose the garden and make it impossible for children to go out without permission, a wooden fence is installed with a high of 1,9m. The wooden planks would be turned so the children can see between them when they are near without possibilities to get stucked between them.

Also some playing sets and planting areas will be places on the garden. The playing sets are tree-inspirated, so they allow to keep a wild athmosphere at the same time that lets children play in modern facilities. They will be equipped with floor lights in case there is not enough sunlight in the early or late hours of the day.

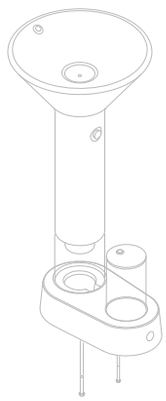
OUTDOOR PLAN

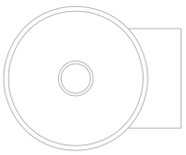
SPIELKINDERGARTEN





CYLINDER PLANTERS IN CHILDREN HEIGHTS 1_50



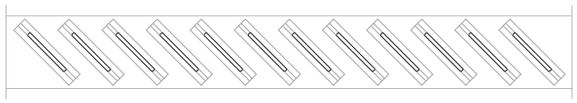


PLAYGROUND FOUNTAIN 1_20

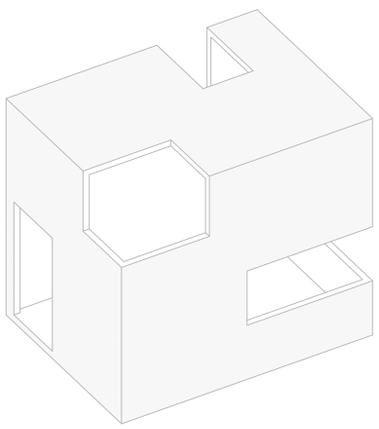
All the equipment in the outside will be children size. This means that, as seen in the pictures, the fountain will be 60cm high and easy to manipulate, with no projecting or moving parts.
Likewise the planting sets, are cylindric wooden planters in five different heights from 20 to 60 cm to allow all the kids to use them comfortably.

The playing sets are made up of two kinds of elements. Tree and house, both of them are wooden made and natural-looking.
The tree elements are, as seen in drawings, tree trunks disposed in a way that allow swings and ropes to be hanged and children to climb them without danger.

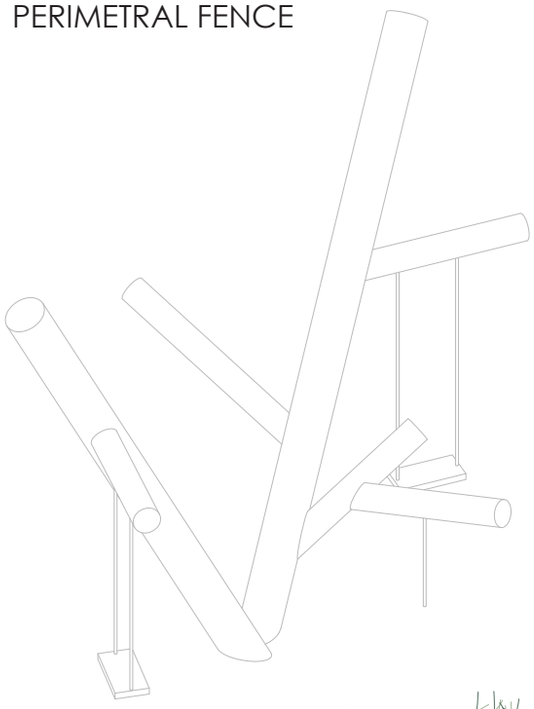
The house elements are wooden boxes with perforations made to get inside and observe the nature in all directions without being perceived.



PERIMETRAL FENCE

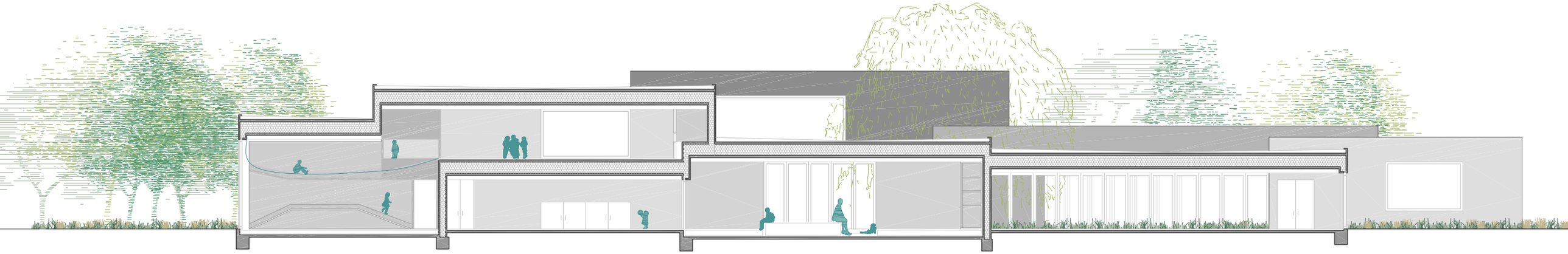


HOUSE ELEMENT 1_50



TREE ELEMENT 1_50

SECTION A-A'

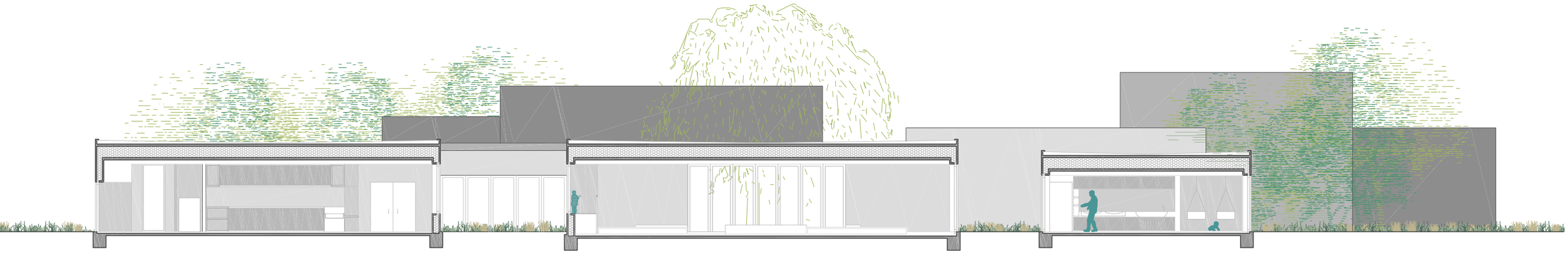


SECTION C-C'

SECTIONS

1_200

SPIELKINDERGARTEN



SECTION B-B'

SECTION D-D'

SOUTH ELEVATION

NORTH ELEVATION

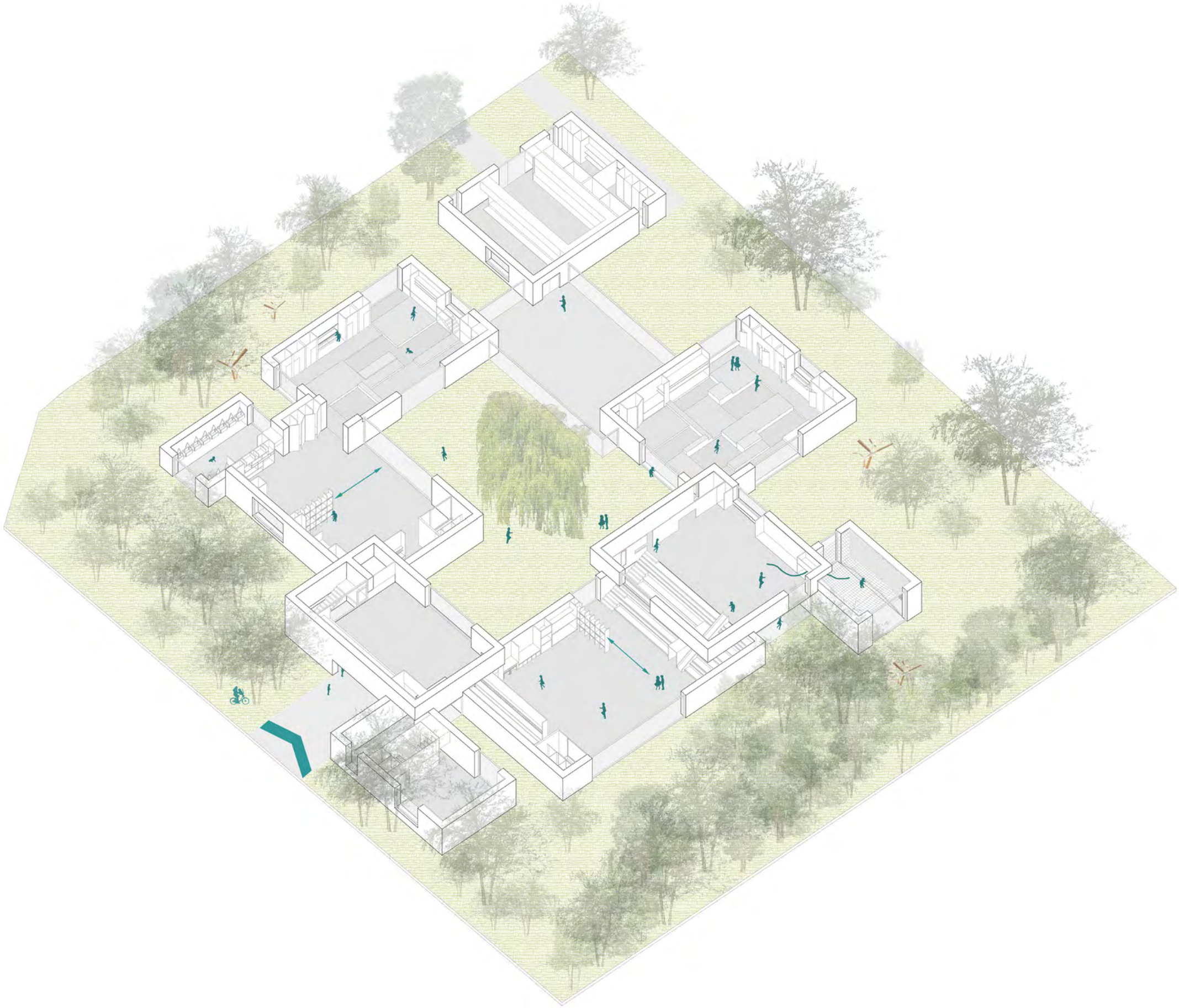
ELEVATIONS

1_200

SPIELKINDERGARTEN

WEST ELEVATION

EAST ELEVATION

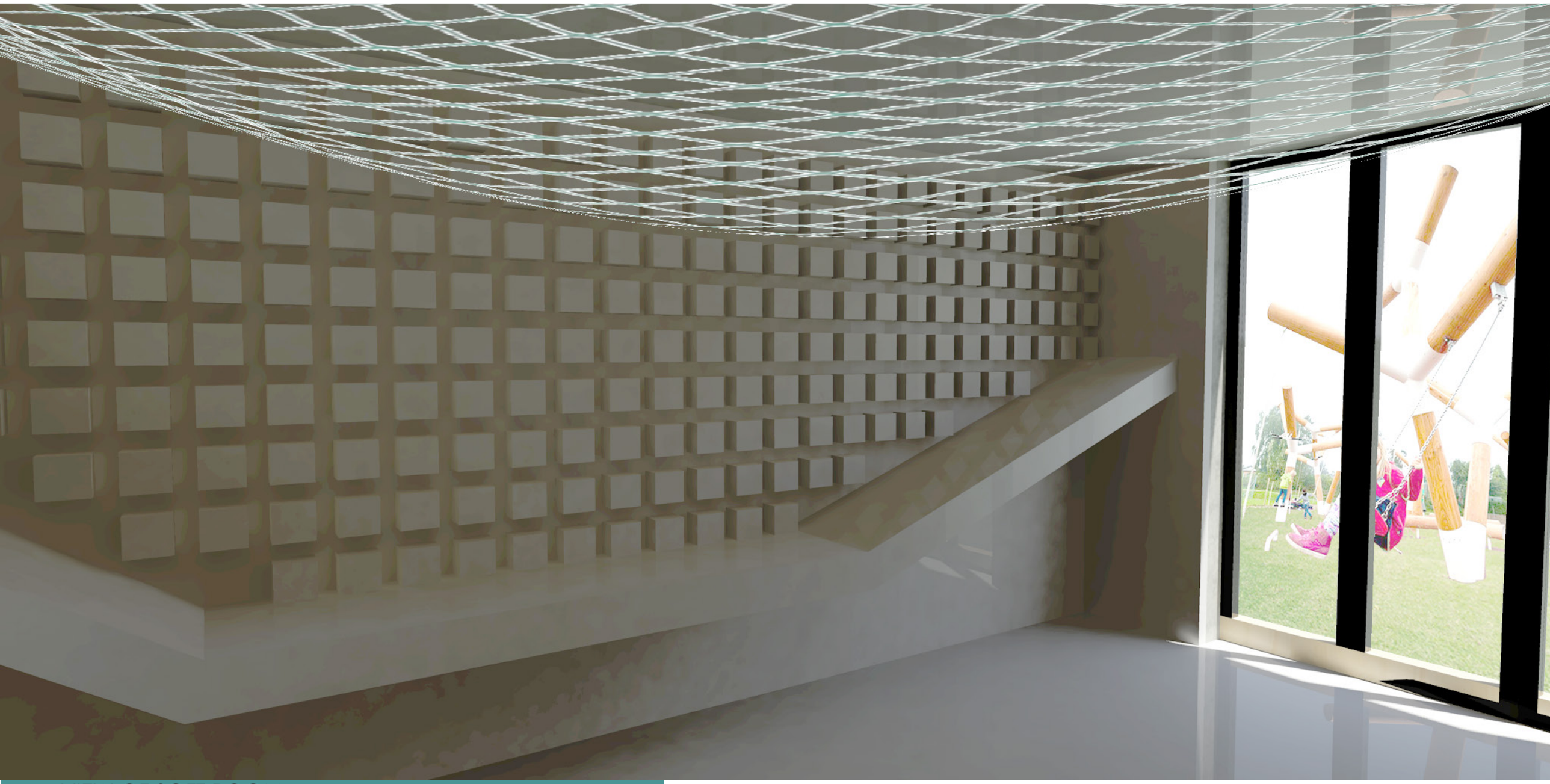


SPATIAL AXONOMETRY

SPIELKINDERGARTEN

GENERAL VIEW FROM PLAYGROUND

ISABEL GARÉS SALA matrikelnummer: 1341438 TUWIEN HB2 SS2014



VIEW OF SOFT ROOM

SPIELKINDERGARTEN

SECOND STAGE COMMON ROOM_ STAIRS TO PLAYROOM

FIRST STAGE LEVEL ROOM

SPIELKINDERGARTEN

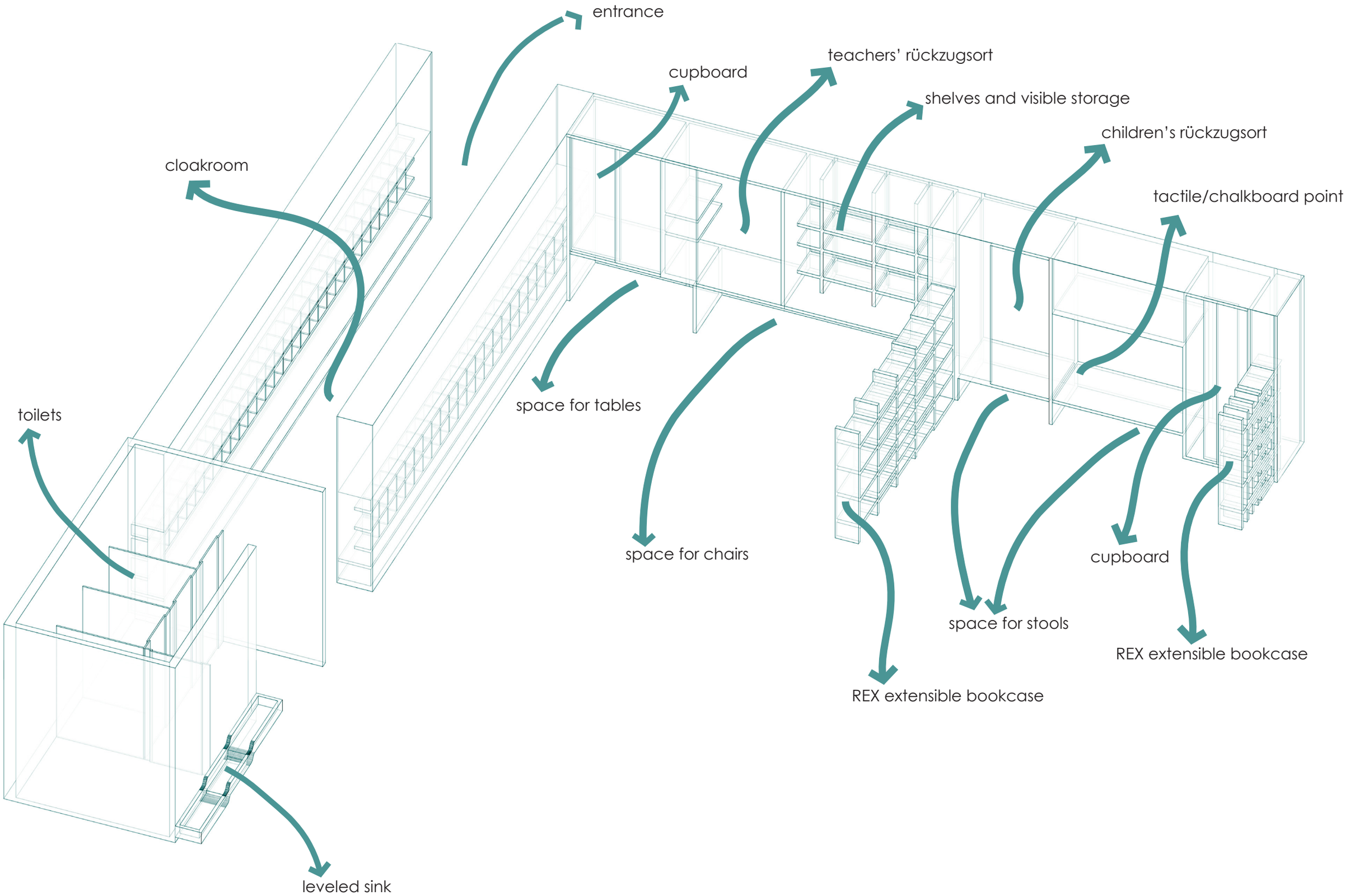
SECOND STAGE MAIN SECTION AREA

SPIELKINDERGARTEN

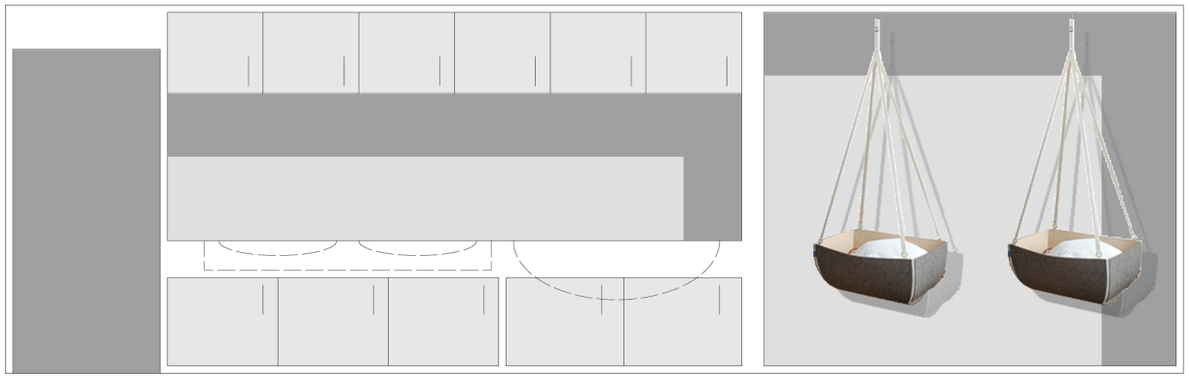
ENTRANCE

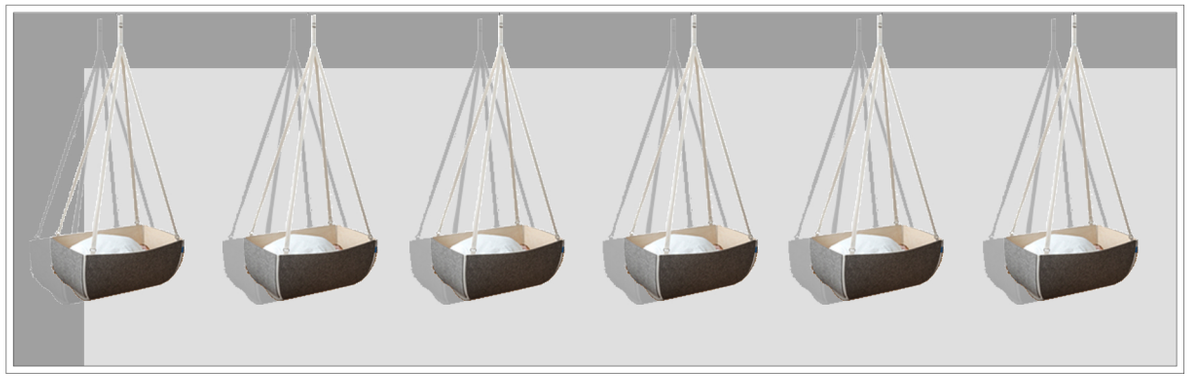
ISABEL GARÉS SALA matrikelnummer: 1341438 TUWIEN HB2 SS2014

SECOND STAGE COMMON ROOM CENTRAL FUNCTIONAL WALL + CLOAKROOM AND TOILETS FW

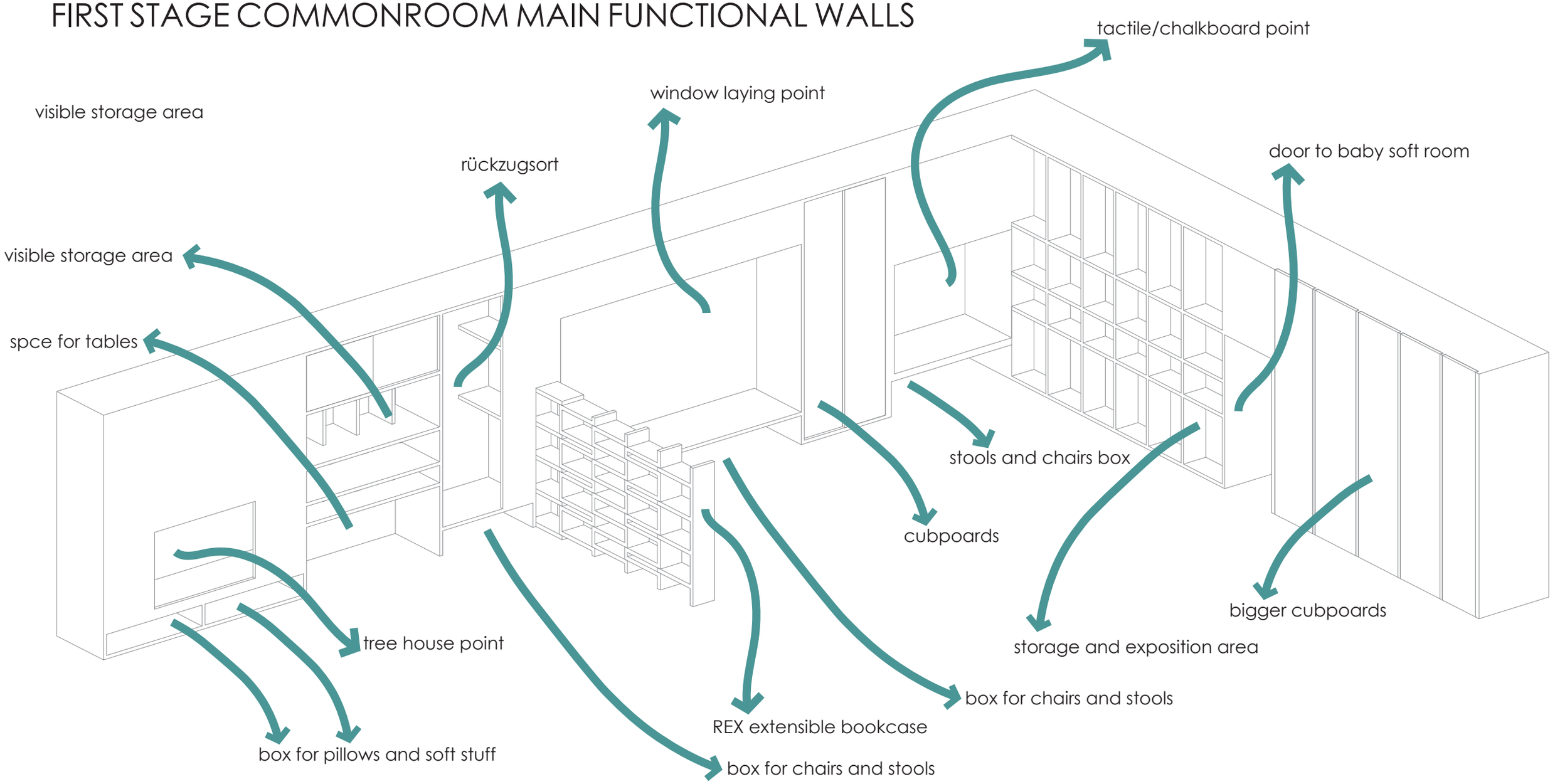


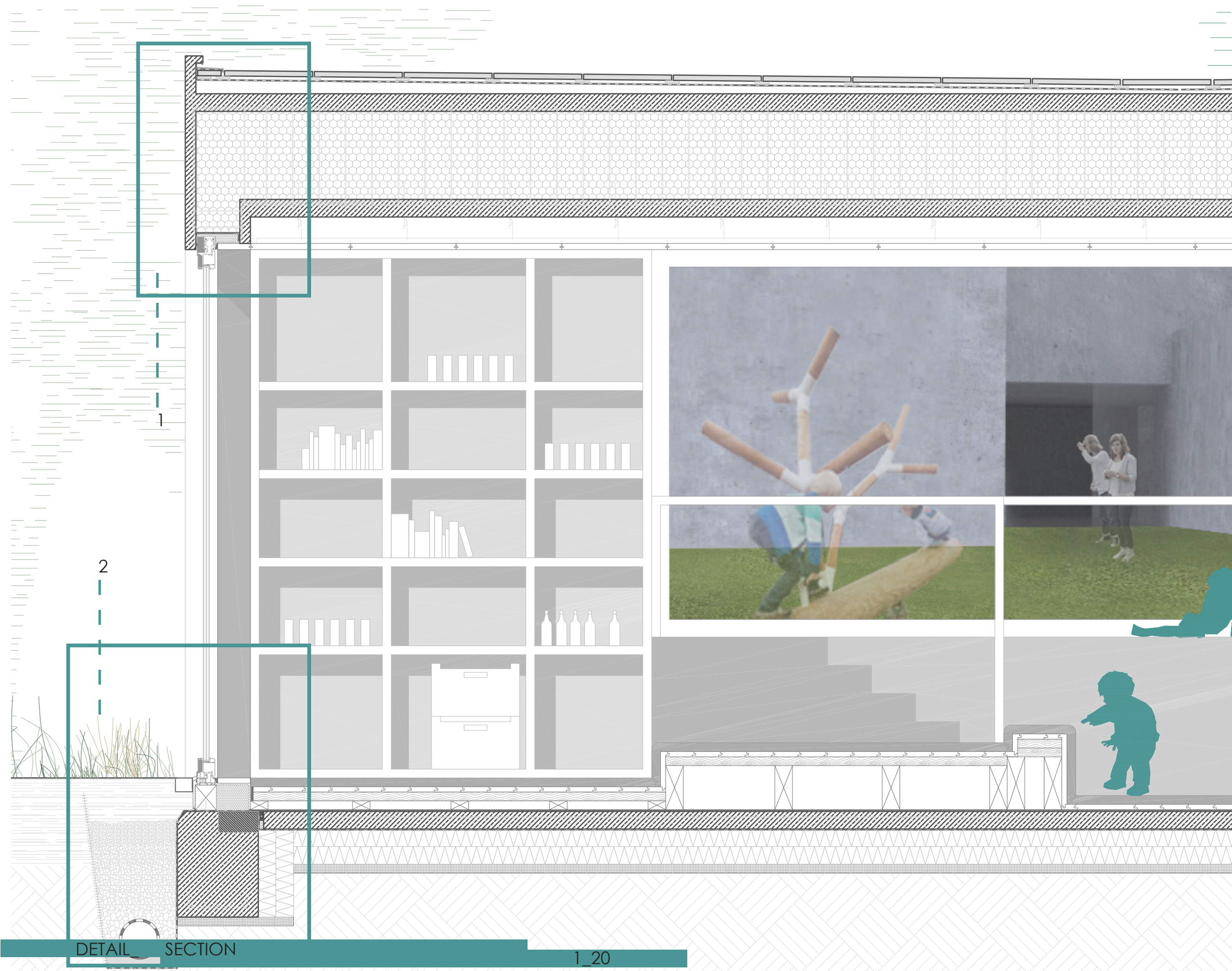
SOFT BABY ROOM FUNCTIONAL WALLS ELEVATIONS





FIRST STAGE COMMONROOM MAIN FUNCTIONAL WALLS

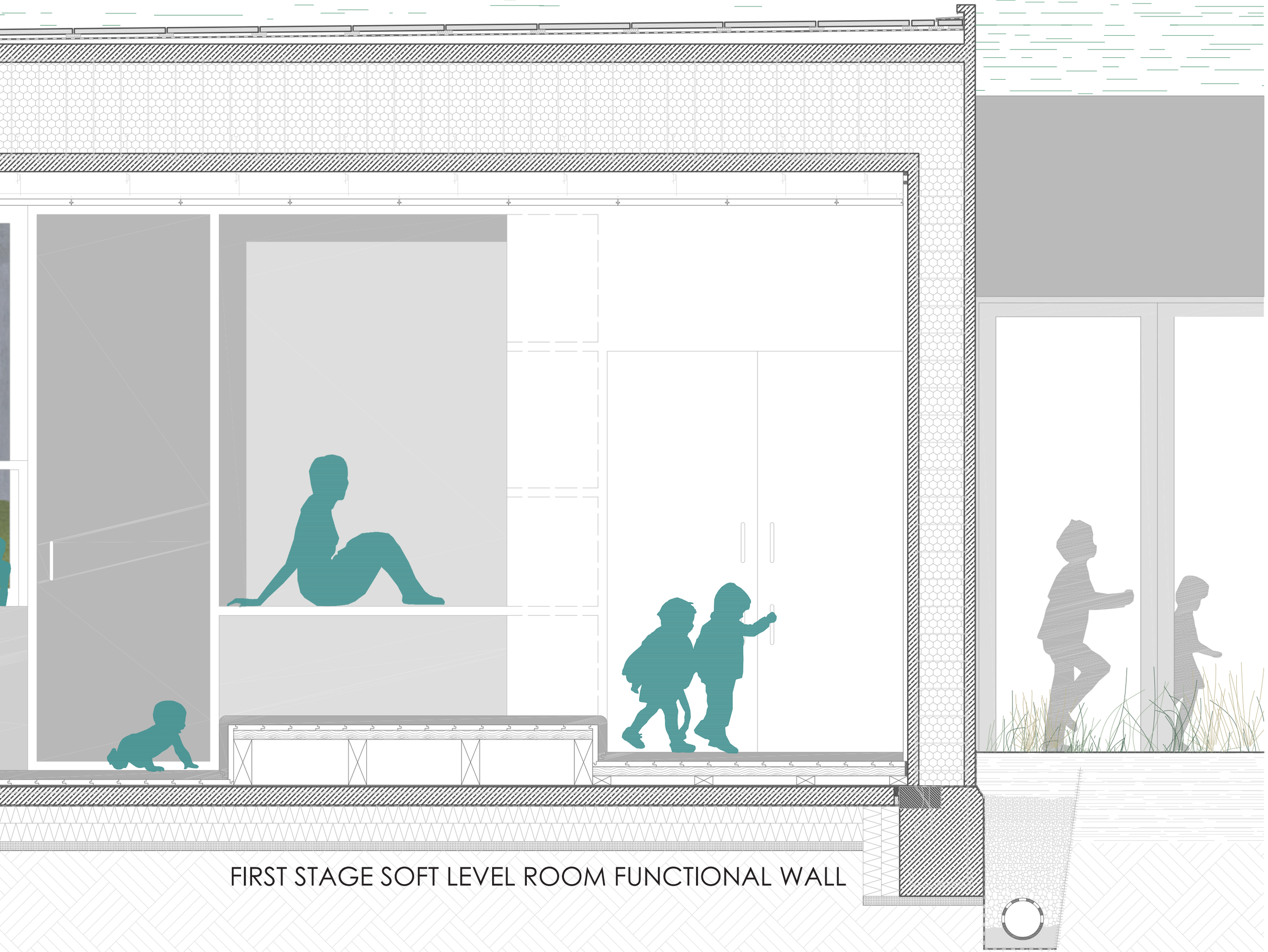




DETAIL_ SECTION

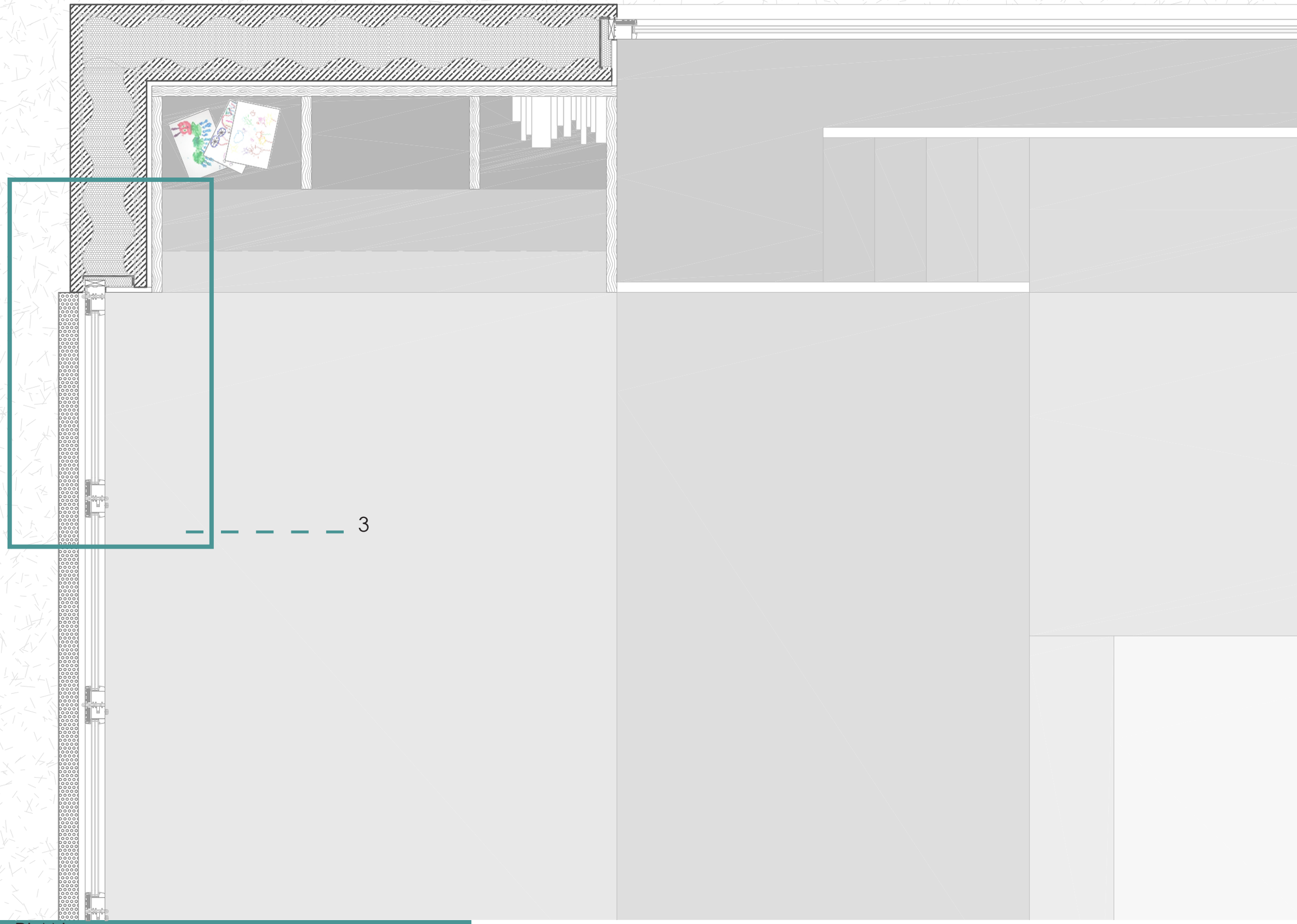
1_20

SPIELKINDERGARTEN



FIRST STAGE SOFT LEVEL ROOM FUNCTIONAL WALL

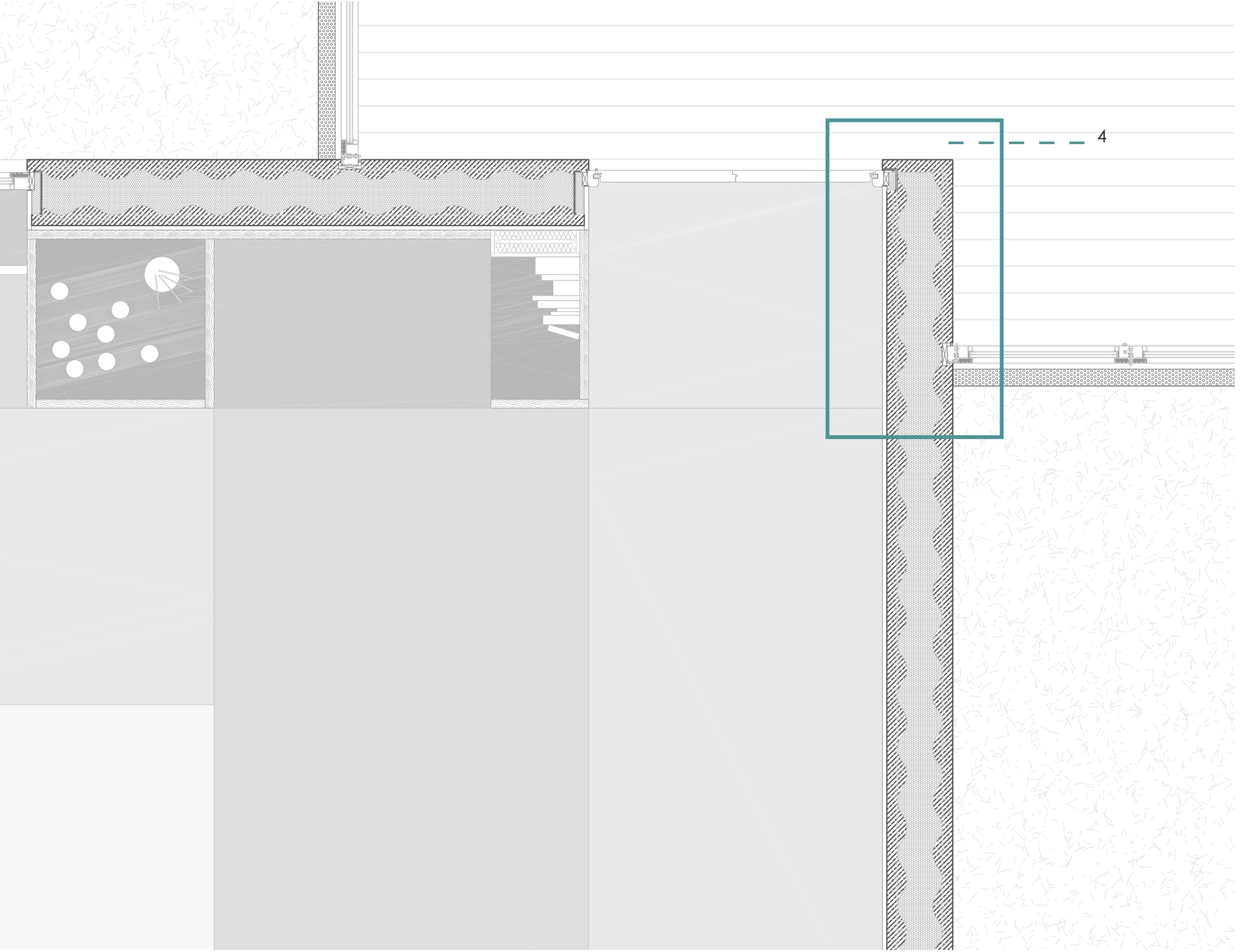
ISABEL GARÉS SALA matrikelnummer: 1341438 TUWIEN HB2 SS2014



DETAIL_ PLAN

1_20

SPIELKINDERGARTEN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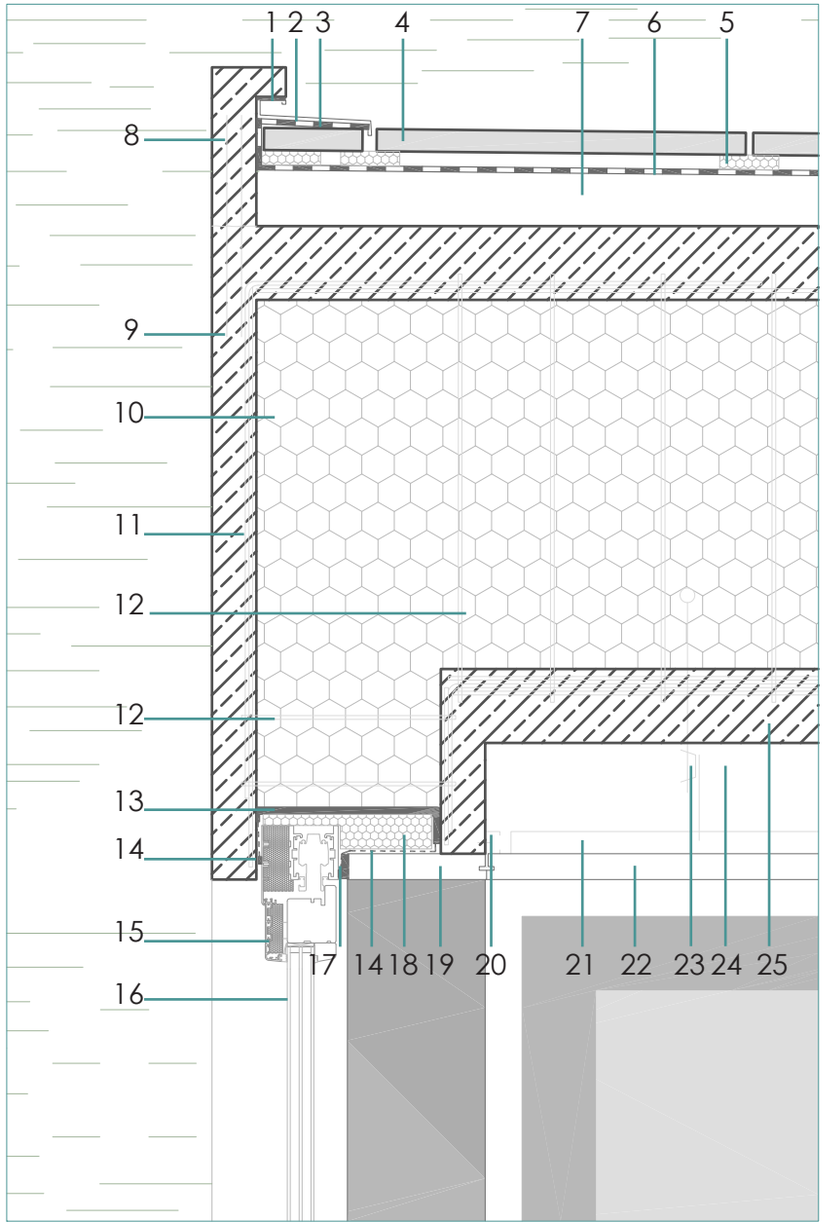
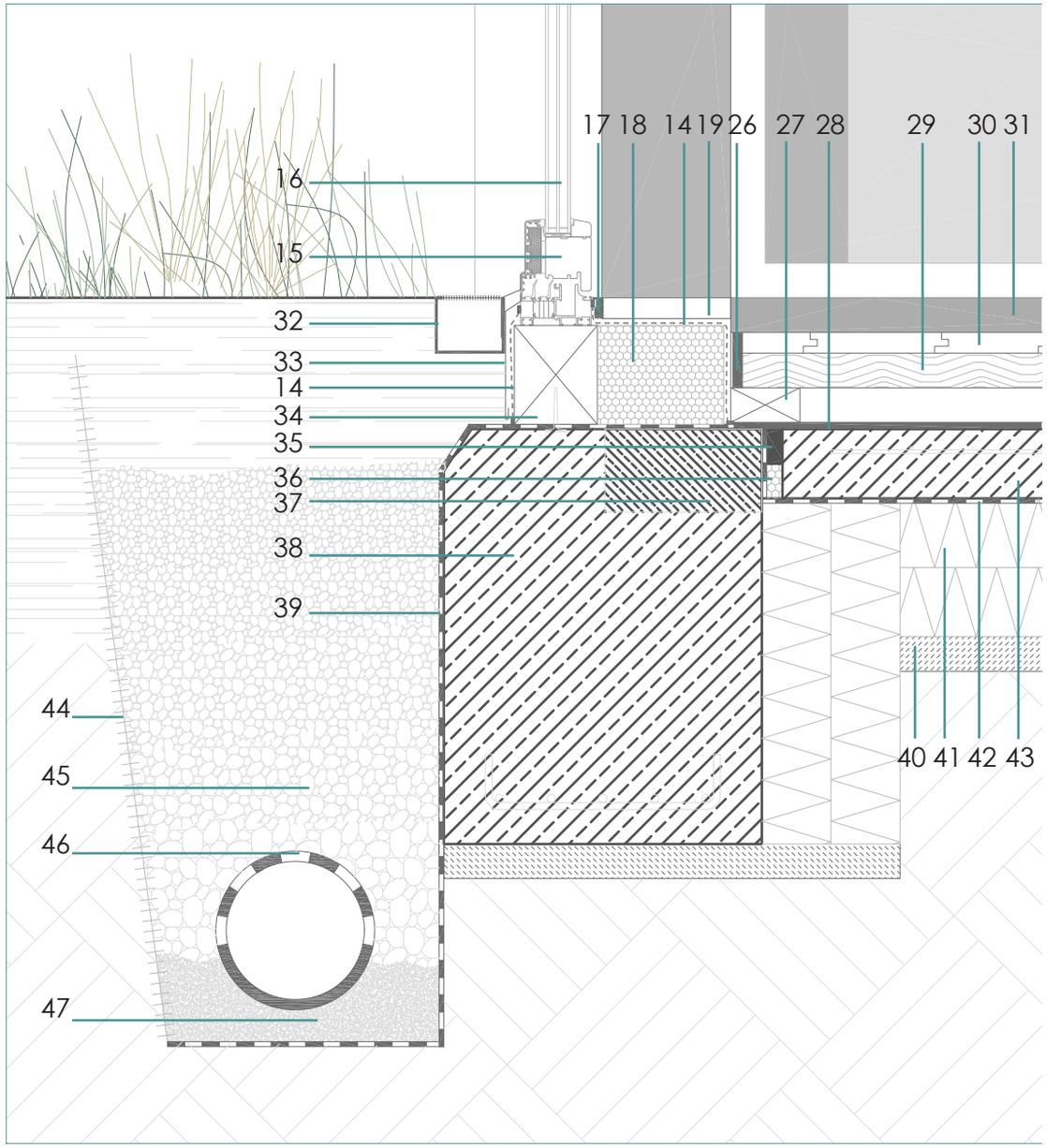
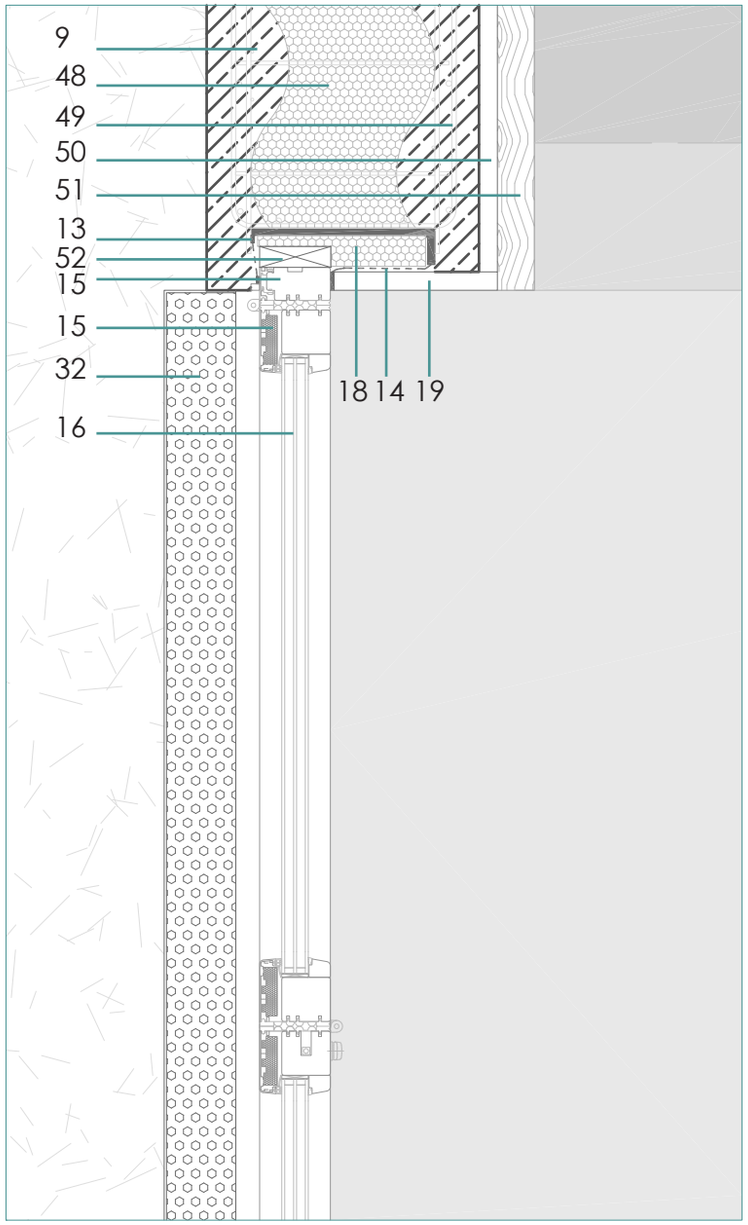
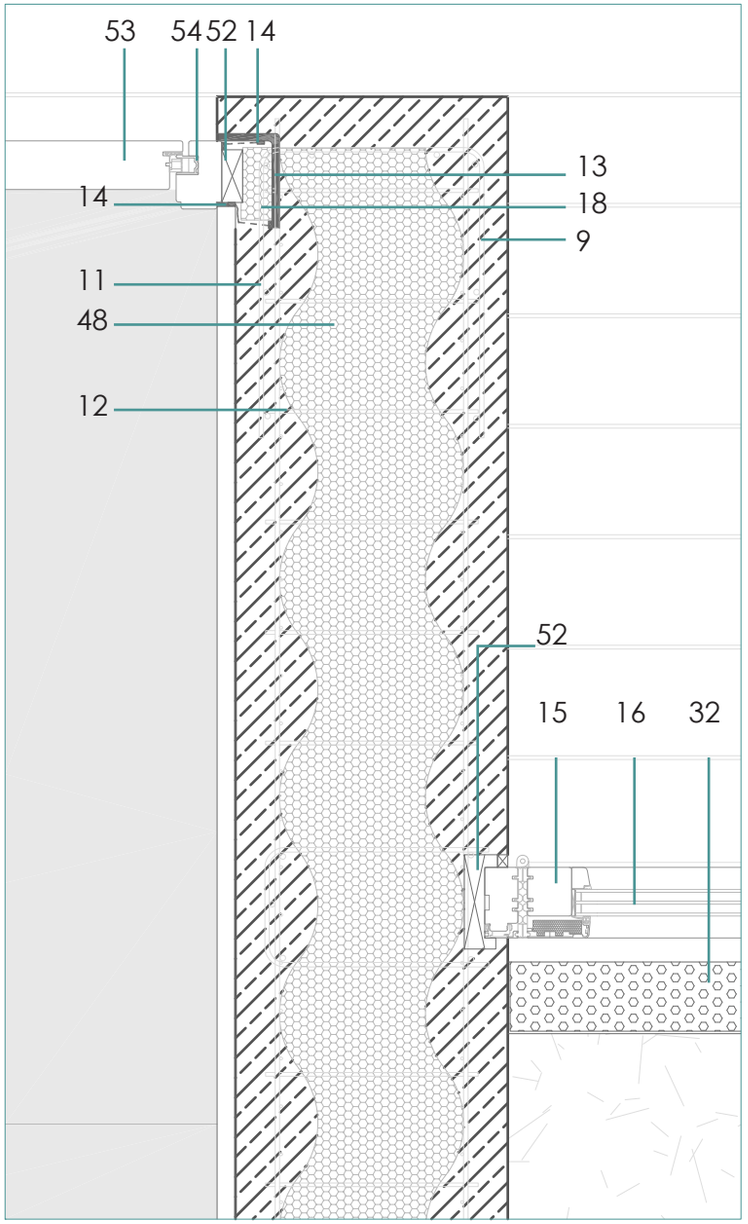




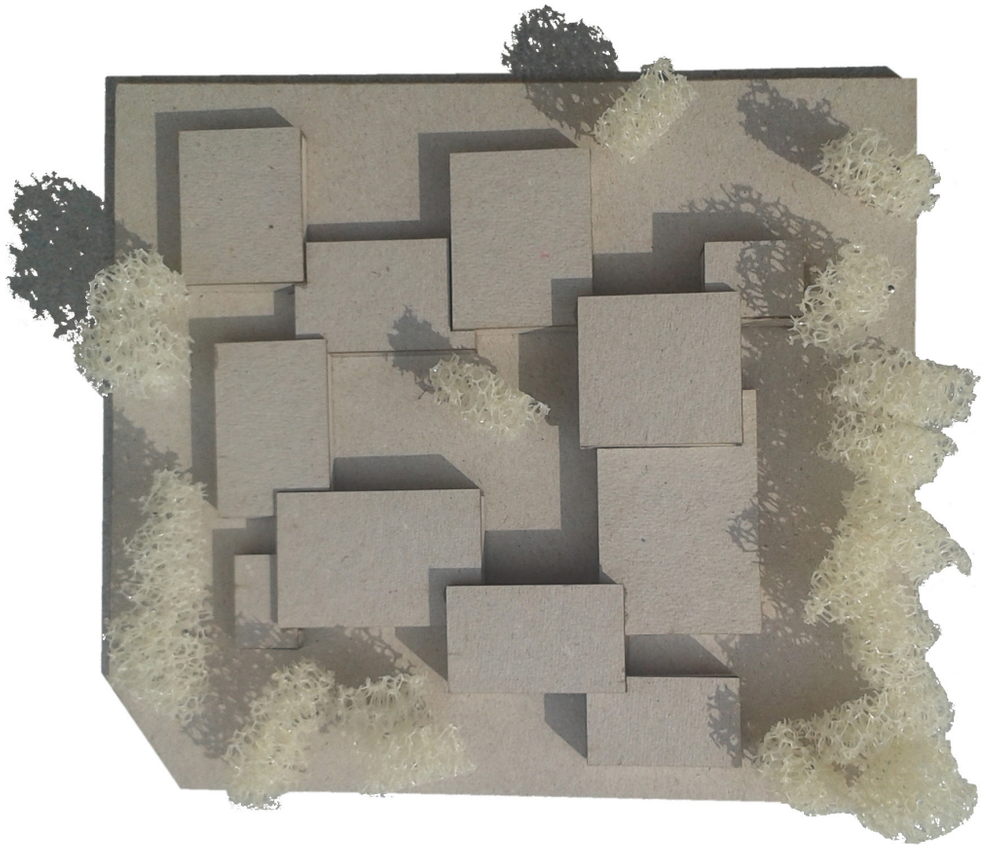
1_Silicon sealing cord
2_Aluminium plate 2mm.
3_Reinforcement waterproof sheet (asphalt sheet)
4_Light arlite concrete tiles (roof finishing) 50 x 50 cm
5_Rubber pads (tiles subjection)
6_Waterproof sheet (asphalt sheet)
7_Slope mortar (5cm in middle)
8_Concrete outer layer finish (using special formwork)
9_Outer layer of concrete (60mm)
10_EPS (density: 15Kg/m^3) Insulating core for slab 500mm.
11_Reinforcement meshes for concrete
12_Connectors between concrete layers (80 connectors/m^2)
13_U PVC profile
14_Semi-permeable sheet
15_Window frame Solarlux SL97 for passive houses

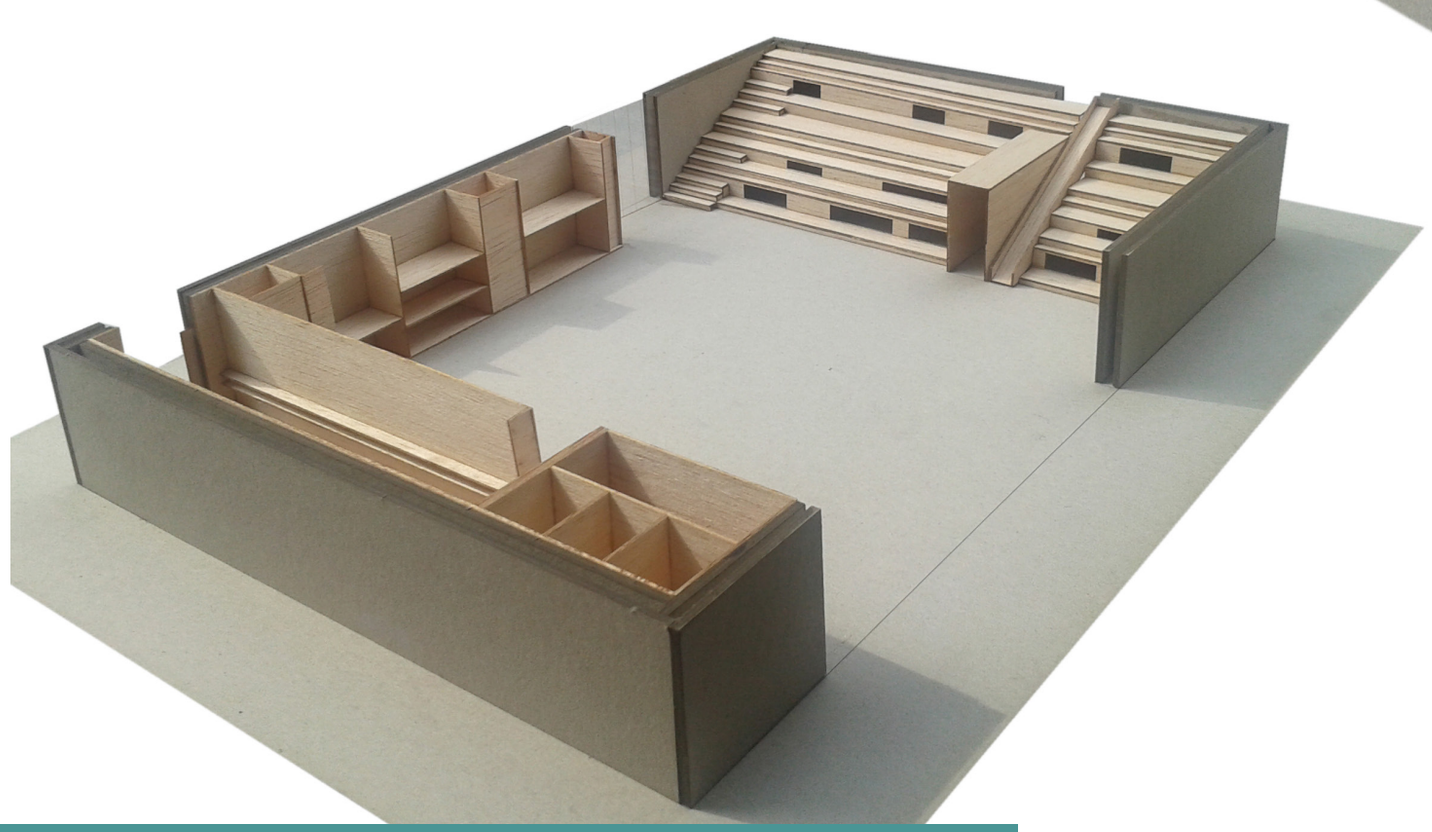
16_Triple glazing
17_Sealing cord
18_Hard insulation for window space
19_Wooden cover
20_Perimetral C aluminium profile for ceiling subjection
21_Longitudinal profile for ceiling subjection
22_Wooden ceiling 30mm.
23_Tether anchorage for ceiling
24_Space for installations (15cm.)
25_Down layer of concrete in slabs (100mm)
26_Neoprene (expansion joint for floor)
27_Wooden beam for leveled floor (only in level room)
28_High density sheet (vibrations and acoustic insulation)
29_Wooden beam for leveled floor (only in level room)
30_Wooden planks (HDF + white ash wood cover) 30mm.





31_Soft foam tiles for covering (only soft level room)
32_Drainage aluminium channel
33_Aluminium protection sheet
34_Wooden beam for window support
35_Neoprene expansion joint for concrete deck
36_Hard thermal insulation
37_Isokorb
38_Foundations
39_Waterproofing asphalt sheet
40_Cleaning concrete
41_Foamglass® hard insulation as lost formwork
42_Waterproofing sheet
43_Concrete deck (100mm)
44_Protective geotextile sheet
45_Drainage gravel
46_Drainage tube
47_Sand
48_EPS (density: 15Kg/m^3) Insulating core for walls 250mm.
49_Inner concrete slab in the wall 60mm.
50_Timber cladding
51_Functional wall wooden panel
52_Wooden beam
53_wooden door
54_Wooden door frame





MODELLS

SPIELKINDERGARTEN

_materiality

_construction

_structure

_facilities and CTE fulfilment

.sustainability	PASSIVHAUS
.ventilation system	PASSIVHAUS
.fire security	DB-SI
.accesibility	DB-SUA
.plumbing and sewerage	DB-HS
.electricity and ilumination	

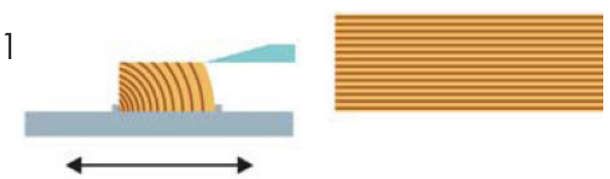
WOOD

The used wood is white ash in order to get a light and soft aspect.
The kind and shape will be different in each of the different uses. All elements (ceiling + floor) are made of plywood and covered with the ash wood in order to gain strenght.
All the wood will be cuted in quarters from the main trunk to get the same lineal aspect in all of them and avoid many distinct curved drawings in the wood. (As seen in the picture 1)

This way, the ceilings will be squared tiles (500 × 500 x 35 mm) with no visible joint to make easier further work on installations and ilumination.
The floor will be lineal plates (1187 × 142 x 30 mm) placed along the main direction of each room.

Functional walls will be made of 25mm or 50mm thick plywood panels forming all the designed spaces into the walls.

1



CONCRETE + WOOD

Main and most important materiasl in the project are concrete and wood. They are the inner and outer face of every room.
This big difference comes from the desire of giving the children different perceptions from two spces.

In outside space, concrete is rough and has a very special texture wich emphasizes the green caracter of the outside as a tiny city built into a forest.

Inside, wood gives to the inner spaces the softness and warmth that those kind of spaces need, where children can walk and run in barefoot and still keep comfortable.
Thereby, every single element in the room will be wooden made, the floor, the ceiling, the functional walls, the fixed and mobile furniture and the stairs.
To keep this wooden character, all the courtain walls will be folding glass doors for passiv house. They will be mixed, wooden frame on the inside and dark grey aluminium frame in the outside.

OTHER MATERIALS

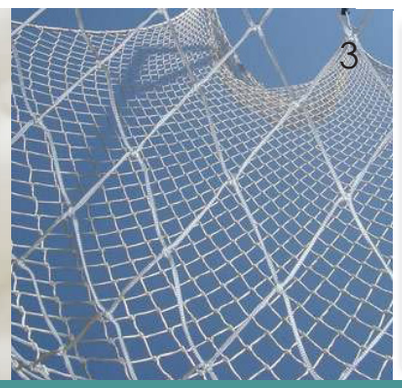
SOFT ROOM:It is a pecial place in the kindergarten, as it needs a special softness for the children to climb and jump. There is 2 kinds of softness; the first one leads to soft room and baby room, where wooden walls, ceiling and floor is covered with soft matresses (100mm for walls and 200mm for floor).
The second one is the small children's level room, where the leveled floor is covered by removable soft and thin panels to avoid corners and edges. (2)

TEXTILE NET: For the upper connection between playing room and soft room, there is a net (3) where children can jump to create a vertical connection between both playing spaces.

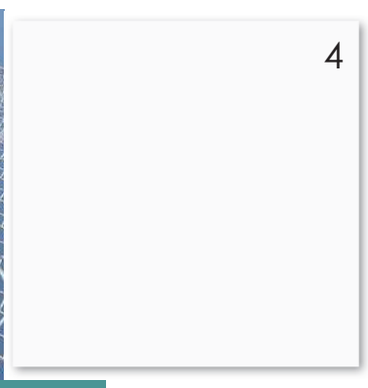
TOILETS FLOOR:To avoid using wood in wet areas, the toilets floor will be made of ceramic white tiles (4).

TACTILE POINTS:There are special points in functional walls, where children can investigate and discover new materials. These areas will be sitting places with different plastics (7) and textile°s (5,6), but also small blackboards (8) where they will draw and personalize their kindergarten in a children scale.

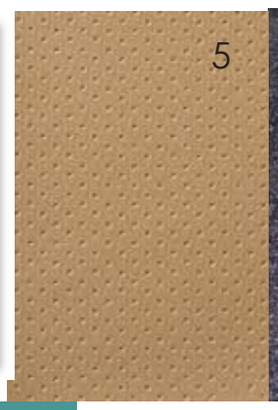
2



3



4



5

6

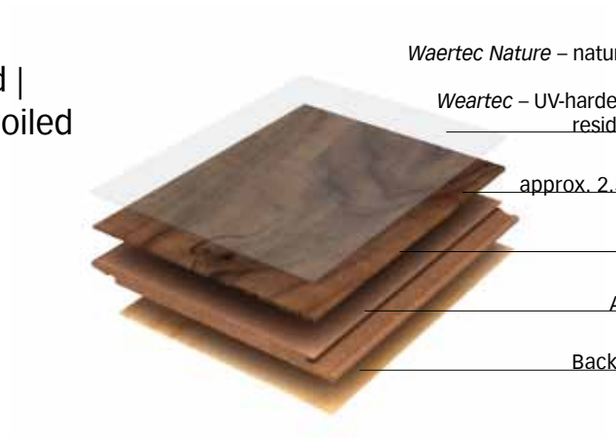
7

FLOORING

MEISTER

Product data
Longlife parquet PS 300 naturally oiled | UV-hardened oiled

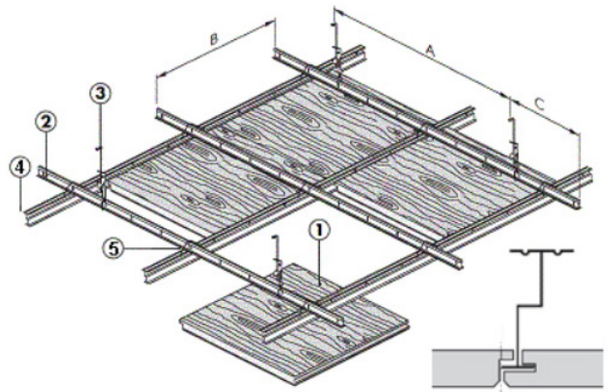
PS 300
naturally oiled |
UV-hardened oiled



Tests	DIN/EN standard	**PS 300** | naturally oiled	**PS 300** | UV-oiled
General data on product composition			
Type of covering:		flooring panel with top layer made of fine wood	flooring panel with top layer made of fine wood
Total thickness:		approx. 13mm	approx. 13mm
Effective measurement (length × width):		1187 × 142mm	1187 × 142mm
Product composition:		a. Weartec Nature – naturally oiled surface, ready for residential use b. Approx. 2.5mm fine wood wear layer c. HDF board (approx. 890 kg/m3 ± 3%) d. Backing (Nordic spruce veneer)	a. *Weartec* – UV-hardened oiled surface, ready for residential use b. Approx. 2.5mm fine wood wear layer c. HDF board (approx. 890 kg/m^3 ± 3%) d. Backing (Nordic spruce veneer)
Technical data			
Locking method:		Masterclic Plus	Masterclic Plus
Timber moisture:		Overall product: 7% ± 2%	Overall product: 7% ± 2%
Service life:		can be sanded down at least 2 ×	can be sanded down at least 2 ×
D_{fl}-s1 Fire behaviour:	EN 13 501	D_{fl}-s1 (normally inflammable)	D_{fl}-s1 (normally inflammable)
E1 HCHO Formaldehyde emissions (E1 = 0.1 ppm):	EN 717-1	≤ 0.05 ppm	≤ 0.05 ppm

CEILING

System overview



1 Lay-in tile "Prestige"
2 24 mm T-profile
3 Hanger
4 Z-profile
5 Connector spring

A: max. 1200mm
B: max. 600mm
C: max. 300mm

System
The tiles are profiled on two opposite edges. The tiles are simply hooked onto the Z-profiles, in the other direction the tiles are butted together. The bevelled edge of the tile creates a small V-joint between the tiles. The tiles can be demounted by lifting them up and then sliding the tiles downward from the Z-profile.

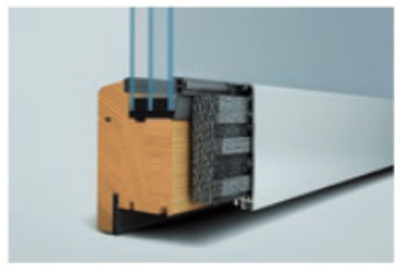
Material

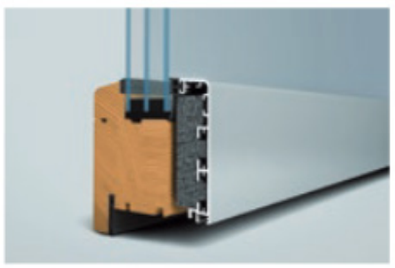
Base material : Medium Density Fibreboard (MDF), density 730 kg/m^3 . Fire resitant impregnated.
Face material : Wood veneer. For available wood types, see colours and finishes.

Finish
The straight edges of the tiles are finished. None of the base material is visible. The visible face of the tiles is standard finished with a clear UV-resistant polyacrylic varnish.

Fire retardent
The MDF-base of the tiles is impregnated with a FR substance, enhancing the reaction-to-fire properties of the tiles. Testreports

WINDOWS



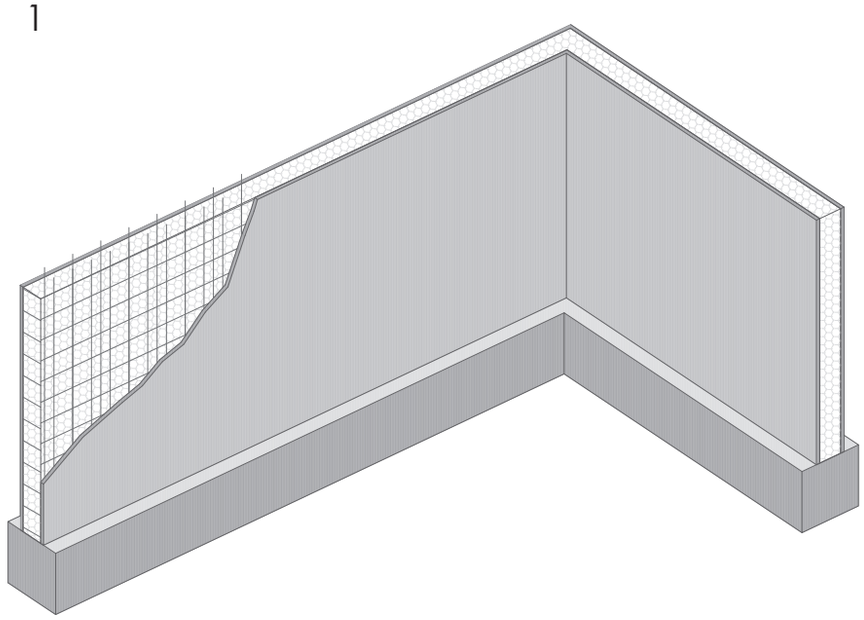


SOLARLUX®
glass in motion

MATERIALS_ TECHNICAL DETAILS

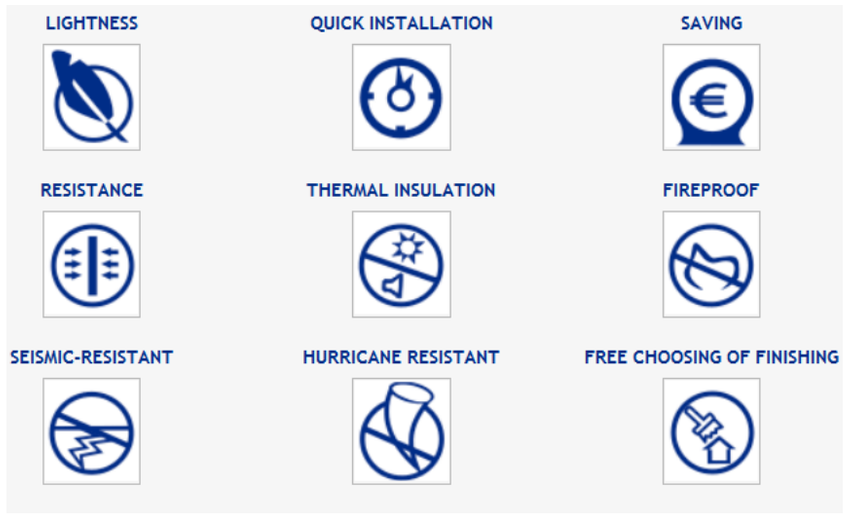
WALLS + SLABS

1



For the construction of the main elements as bearing walls and slabs, the choosen system has been BAUPANEL ®. (1)
BAUPANEL® is a seismic-resistant, thermally-insulating building system based on a set of structural panels made up of undulated expanded polystyrene with a basic frame attached to the panels' sides. The frame consists of highly resistant steel meshes and corrugates bars linked together with electrically-welded steel connectors.

Baupanel has been approved with the Technical Suitability Document (DIT) issued by the Instituto de Ciencias de la Construcción (Building Science Institute) Eduardo Torroja.
The flexibility of the projects and simplicity of assembly make possible any kind of building, from detached houses to high rise buildings. As it is thought as an open system, it also allows the combination with other traditional and non traditional building systems.
The panels are installed in the building site according to the layout of the walls, partitions and frameworks of your project and they are completed also on site by applying micro-concrete through a mechanism of pneumatic discharge.
Thus, the panels constitute the structural elements of the vertical and horizontal closings of a building. The structural function is calculated according to the Instruction of Structural Concrete EHE and others compulsory regulations in force in Spain or where the system is to be used.
This is a system of "fluid joints" since the join between the various elements of the system is continuous. Therefore, once the concrete has been discharged there are no horizontal or vertical joints.

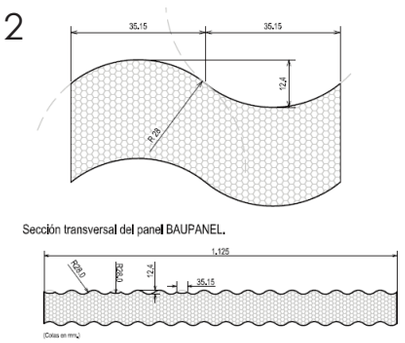


ADAPTED TO THE PROJECT

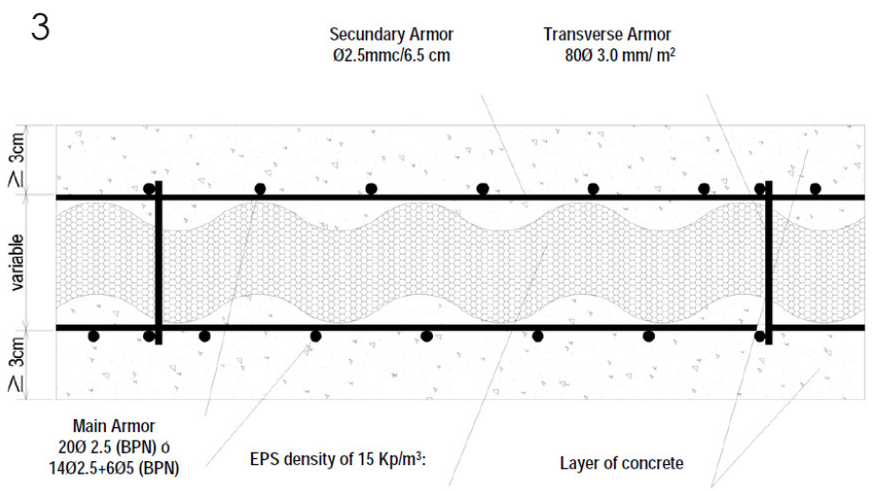
In adjustment to the requirements of the project, the used panel will be BPN type (3), wich allows the walls to be the structure of the building. Due to the demanding levels of thermal insulation required for a passivhaus, there has been choosen a special thick for the wall: 6 + 25 + 6 cm. This means, the wall is constituted by 60mm of concrete on both sides; the concrete in the inner side will be projected and finished roughly so the wood could be better accommodated afterwards. The outer side will be poured as it needs to be flat and good-looking because it will not be covered.
It will be very carefully poured due to the small thickness of the wall.
The polystyrene layer is be 250mm thick and it has a wavy surface (2) in order to improve the connection of the concrete layers and both layers of concrete will be connected by 80 steel connectors/m^2 of wall.

The roof slabs are BPF panels (4), but some adjustments have been done to the baupanel system due to the big distances between walls, this is also the reason of the thickness of the concrete layers of the walls.
The slab is constituted, as the wall, by a layers of concrete in both sides and the central insulation: 10+50+10cm. This high values are a result of the insulation and resistance requirements. In this case, the lower layer of concrete will be projected and the upper layer (compression) will be poured and treated.

2



3



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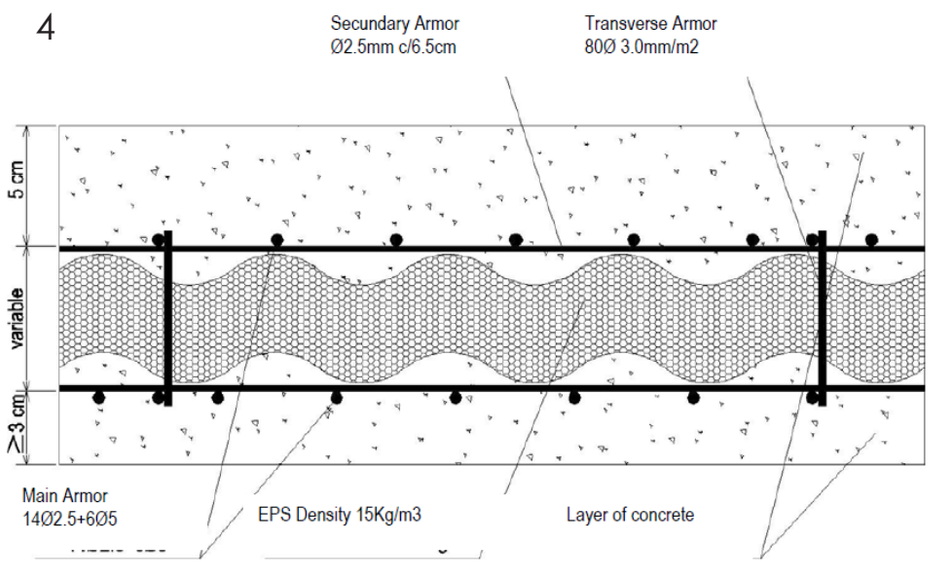


CONSTRUCTION

SPIELKINDERGARTEN

MATERIALS DATA SHEET

POLYSTIRENE

On the question of the type of polystyrene used in the manufacture of the panels, commenting that it is a material belonging to the E Euroclass and we use two types of density depending on the type of panel that is manufactured:

- Nominal density of 15 Kp/m3: In the remaining panels. Enough to withstand the pressure of the projected micro-concrete.

Other features:
- Thermal conductivity: 0.039 W / mK
- Steamed Resistivity: 0.15 mm Hg m2 day / g cm.
- Compressive stress at 10% deformation: ≥ 50 Kpa.
- Resistance to bending: ≥ 100 kPa

REINFORCEMENT STEEL

Deformed bars of steel Ø5 mm with B500S with elastic yield = 500 MPa

GALVANIZED STEEL

Galvanized steel bars smooth Ø2, 5 mm in longitudinal bars and Ø3, 0 mm connectors, with yield strength = 620 MPa and tensile strength of 700 MPa.
- Minimum elongation> 5%.
- Weight minimum galvanized. = 40-50 g/m2

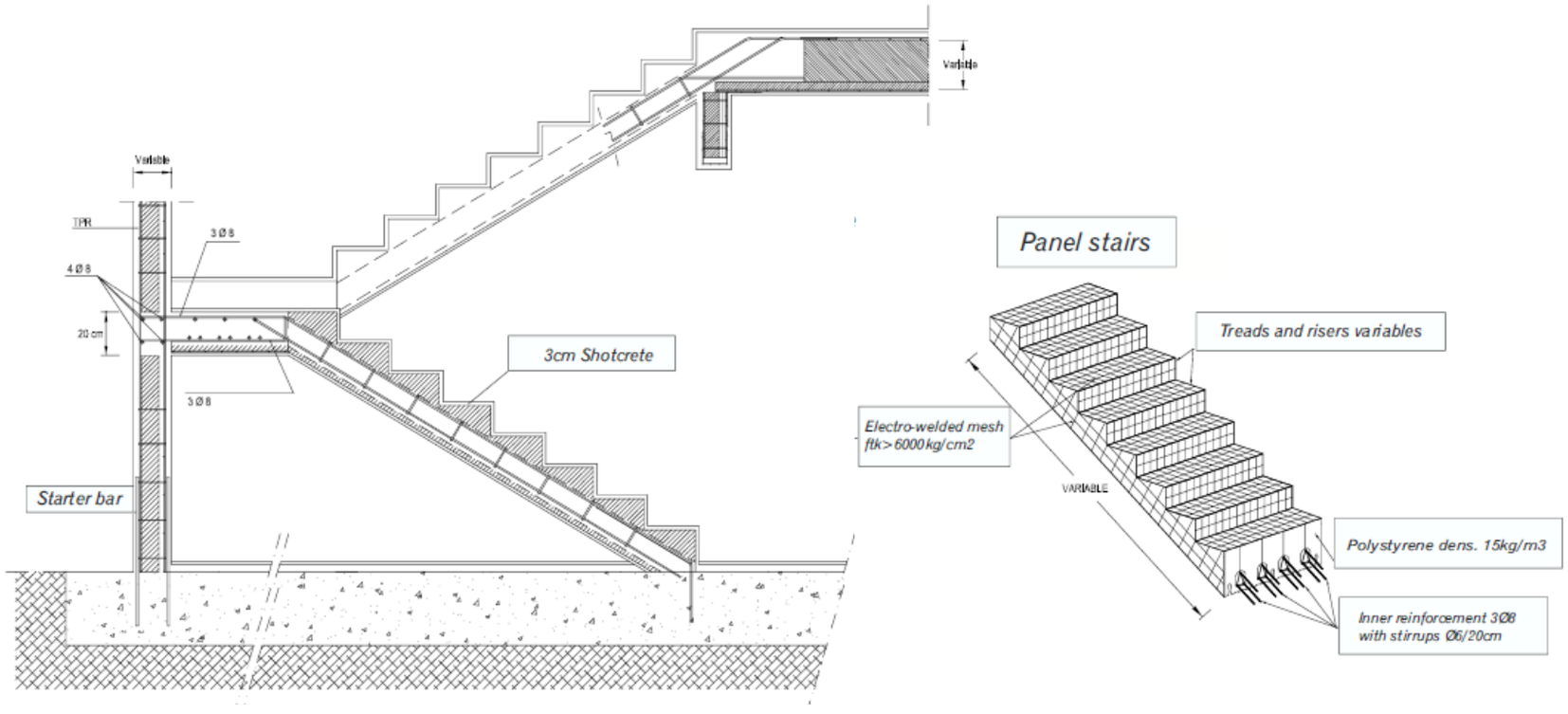
CONCRETE

- Concretes to comply with EHE-08, according to the general class of environmental exposure that the work is located.
- Thickness of concrete at least 3 cm on each side, measured from the outer face of the wave of the polystyrene core.
- Cements to employ CEM I or CEM II, of strength class 32.5 N/mm2.
- Natural or crushed aggregates, grain size analysis between 0 and 6 mm.
- Compressive strength ≥ 25 MPa.
- Water / cement ≤ 0.52.
- Water mixed with requirements that EHE-08.
- Volumetric ratio cement / sand = 1:3 - 1:4.5.

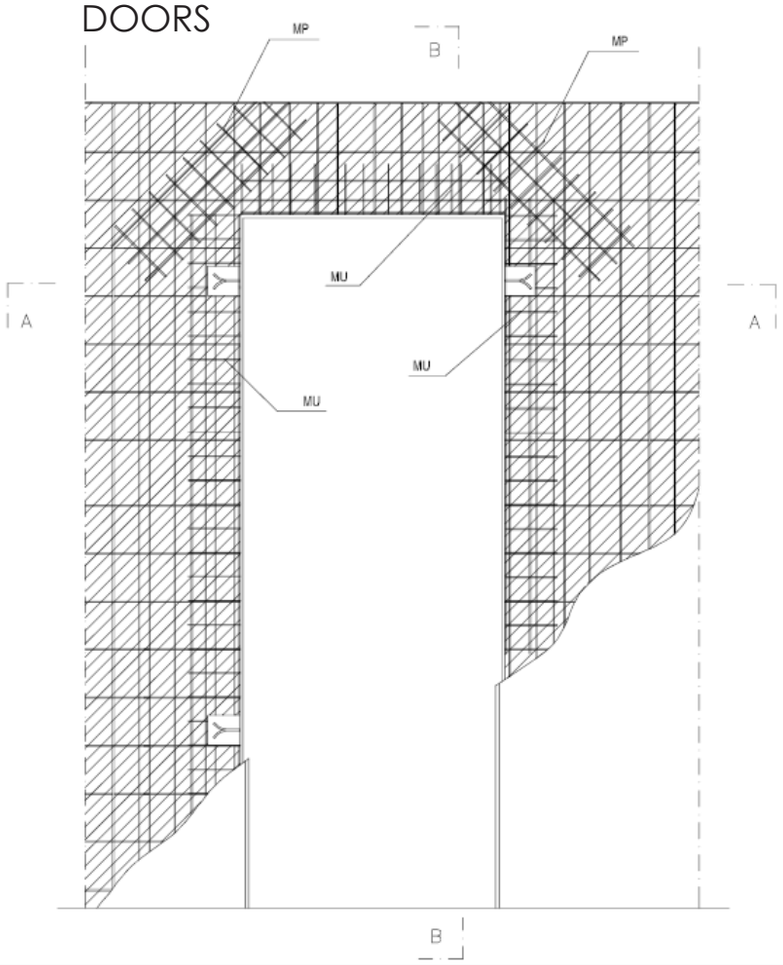
-You can use dry mortar industrial made by companies that have developed by quality labels, meeting the above requirements.

SPECIAL ELEMENTS

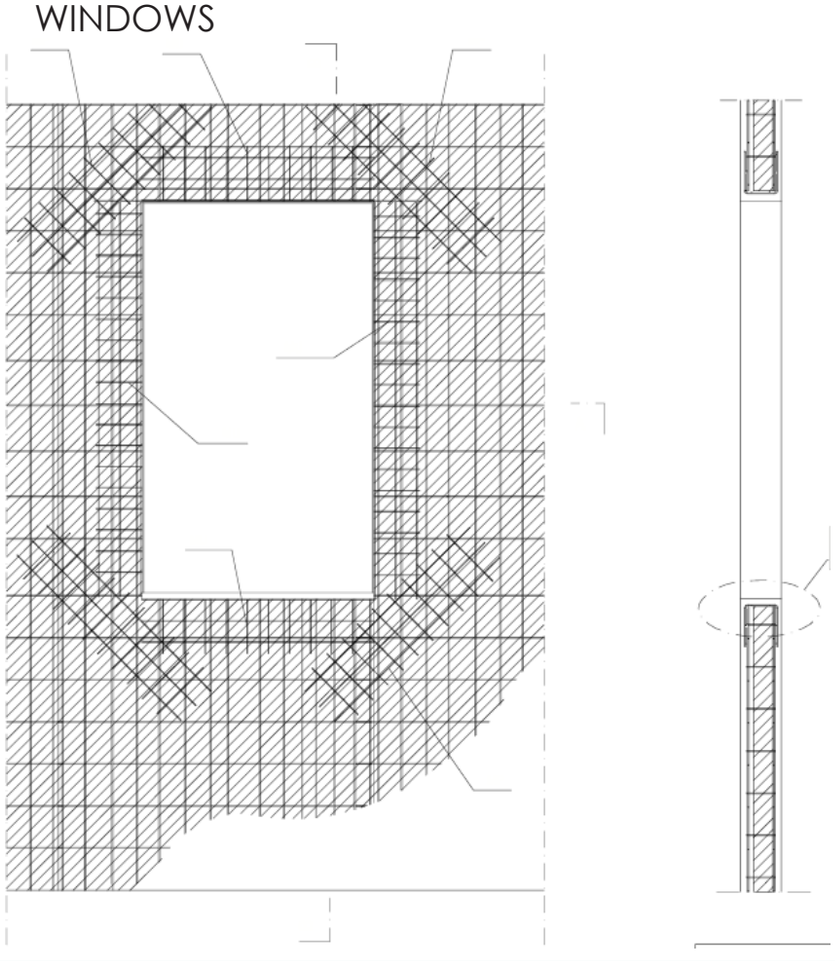
STAIRS

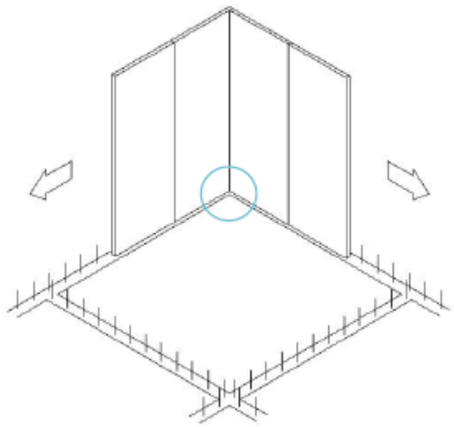


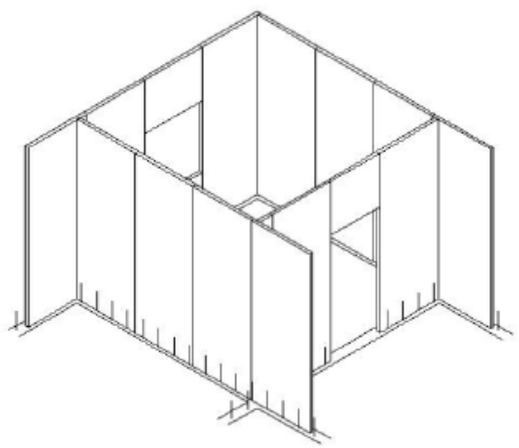
DOORS

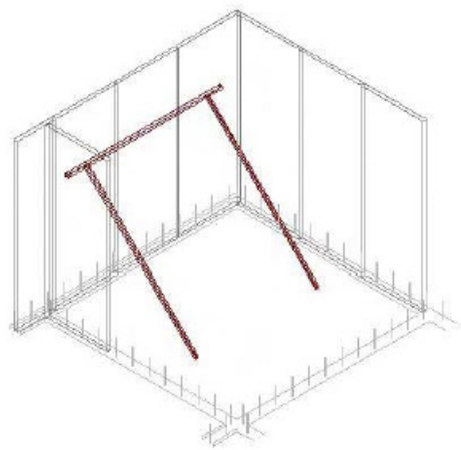


WINDOWS









BUILDING PROCESS

_Pouring the foundations concrete with the starter reinforcement for the walls.

_Place the insulation core in the starters and tie the reinforcements of the wall

_Install subjections in case of large paraments

_Vertical alignment of the panels

_Set the frames for windows and doors

_Collocation of reinforcement meshes in windows, doors and corners.

_Place the insulation core of slabs and roofs

_Set extra reinforcements in edges and tie them

_Place the elements as stairs and ramps and tie its reinforcements

_Place in the insultion core the facilities and installations

_Concrete application

_Surface preparation and finish

ISOKORB

AVOIDING THERMAL BREAKS

Although with BAUPANEL® main thermail break are avoided, there is a important break in the joint between the wall and the foundations.

This break would be smaller if the thermal insulation was collocated on the slab an not under it.

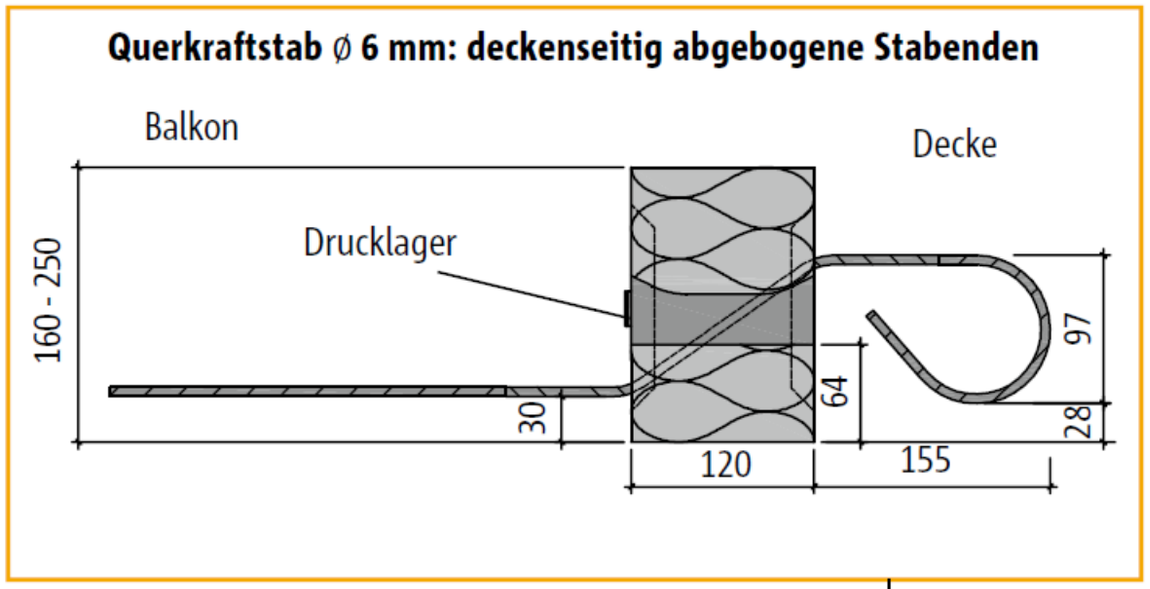
In that supposed case the bridge will only be the iner concrete part of the wall, in terrupting the continuity of the insulation.

Nevertheless, in this project the thermal insulation is collocated under the floor slab to keep the massive element inside of the thermal envelopment to keep the warm in the room.

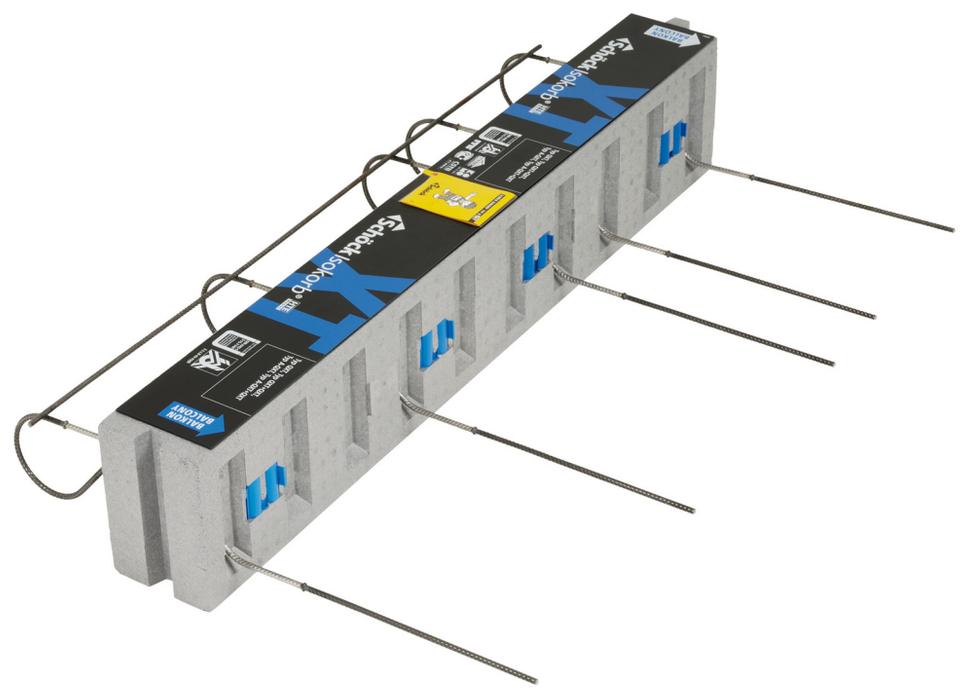
This way, the break is bigger because it is the foundation, the element which interrupts the insulation in the wall to the insulation under the slab.

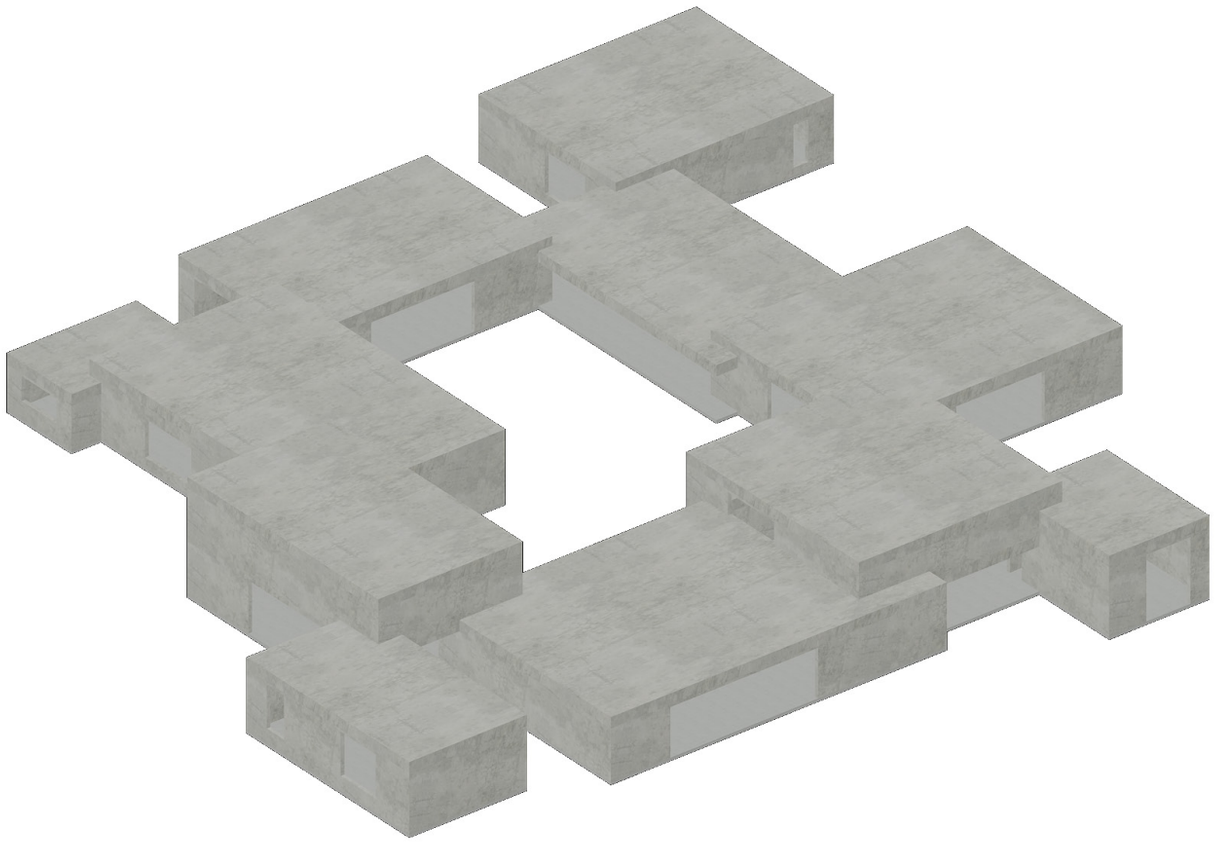
The solution is using Isokorb®; a conecting element that with a high insulation level connects the insulation in the wall with the floor insulation, creating a continue thermal envelopment.
It also connects the concrete in the wall with the concrete in the foundation using reinfircement steel bars.
It has a double function, thermal and structural.

The choosen model has been Typ QXT40, with a depth of 120mm and a width of 250mm.



Schnitt: Schöck Isokorb® Typ QXT 10 bis Typ QXT 40





STRUCTURAL CALCULATIONS

As explained before, the structural system is formed of bearing walls and slabs. Even though the rooms and distances between walls are quite big, almost all the slabs are roof slabs which means that main loads are considerably lower than in a walkable slab.
The BAUPANEL system works monolithically so it is very stable because of the bracing of the walls with themselves.

For the calculation of the validity of the structure, the rules of the EHE-08 (Instrucción Española del Hormigón Estructural) have been followed, as well as the CTE (Código técnico de la Edificación). For that the structural software ARCHITRAVE® has been used, by building a virtual modell of the structure, aplying the loads and finding which are the movements of the nodes of the structure and the resistance requirements.

In this part, all the loads and weights applicable will be explained and the validity of the structure will be determined.

The used concrete for the structure will have a resistance of 30N/mm^2.

1_STRUCTURAL LOADS

*All loads have been determined by the catalog of each element or alternatively by the CTE usual weight for building elements.

LOADS FOR ROOF SLAB (11x)		LOADS FOR 1ST FLOOR SLABS (2x)	
PERMANENT LOADS		PERMANENT LOADS	
_own weight (determined by the software)		_own weight (determined by the software)	
_light arlite concrete tiles (roof finishing):	0,5 KN/m^2	_wooden ceiling:	0,25 KN/m^2
_ceiling:	0,25 KN/m^2	_wooden flooring:	0,3 KN/m^2
_light slope mortar:	0,6 KN/m^2	_equal to inner partitions:	1 KN/m^2
VARIABLE LOADS		VARIABLE LOADS	
-service load (type G1: only for maintenance):	1 KN/m^2	-service load (type C1: school):	3 KN/m^2
-snow acumulation:	2'2 KN/m^2	-snow acumulation:	2'2 KN/m^2
-wind:	+0,38 KN/m^2 -0,16 KN/m^2	-wind:	+0,38 KN/m^2

CALCULATION OF SNOW LOAD:

For the calculation of the snow load, the ÖNORM B 1991-1-3:2013 has been used.

Tabelle A.1 – Ortsverzeichnis (fortgesetzt)

S_k= 2,2KN/m^2

CALCULATION OF WIND LOAD:

For the calculation of the WIND load, the ÖNORM B 1991-1-4:2013 has been used.

Tabelle A.1 — Grundwerte von Basiswindgeschwindigkeit und Basisgeschwindigkeitsdruck

$q_{b,0}$= 0,39KN/m^2 C_e=1,4 C_{p1}=0,7 C_{p2}=0,3 q_w=+0,38KN/m^2 q_w=-0,16KN/m^2

2_LOAD HYPOTHESIS

_HYPOTHESIS 1: Permanent loads
_HYPOTHESIS 2: Service loads
_HYPOTHESIS 3: Snow
_HYPOTHESIS 4: Wind

3_HYPOTHESIS COMBINATIONS

For the calculation and the fulfilment of the CTE, it is necessary to take into account two stages: the resistance of the structure (ELU) , related to the security of all the elements and the service of the structure (ELS), related to the maximum allowed movements of the elements.

COMBINATIONS FOR THE ROOF SLAB

COMBINATIONS FOR ELU:

$$\sum_{j\geq 1} \gamma_{G,j} \cdot G_{k,j} + \gamma_P \cdot P + \gamma_{Q,1} \cdot Q_{k,1} + \sum_{i>1} \gamma_{Q,i} \cdot \psi_{0,i} \cdot Q_{k,i}$$

_COMBINATION 1: 1,35*HYP1 + 1,5*HYP2 + 0,5*1,5*HYP3 + 0,6*1,5*HYP4
_COMBINATION 2: 1,35*HYP1 + 1,5*HYP3 + 0*1,5*HYP2 + 0,6*1,5*HYP4
_COMBINATION 3: 1,35*HYP1 + 1,5*HYP4 + 0,5*1,5*HYP3 + 0*1,5*HYP2

COMBINATIONS FOR ELS:

1 $\sum_{j\geq 1} G_{k,j} + P + Q_{k,1} + \sum_{i>1} \psi_{0,i} \cdot Q_{k,i}$

_COMBINATION 1: HYP1 + HYP2 + 0,5*HYP3 + 0,6*HYP4
_COMBINATION 2: HYP1 + HYP3 + 0*HYP2 + 0,6*HYP4
_COMBINATION 3: HYP1 + HYP4 + 0,5*HYP3 + 0*HYP2

2 $\sum_{j\geq 1} G_{k,j} + P + \psi_{1,1} \cdot Q_{k,1} + \sum_{i>1} \psi_{2,i} \cdot Q_{k,i}$

_COMBINATION 4: HYP1 + HYP2 + 0,2*HYP3 + 0,5*HYP4
_COMBINATION 5: HYP1 + HYP3 + 0*HYP2 + 0,5*HYP4
_COMBINATION 6: HYP1 + HYP4 + 0,2*HYP3 + 0*HYP2

3 $\sum_{j\geq 1} G_{k,j} + P + \sum_{i\geq 1} \psi_{2,i} \cdot Q_{k,i}$

_COMBINATION 7: HYP1 + HYP2
_COMBINATION 8: HYP1 + HYP3
_COMBINATION 9: HYP1 + HYP4

COMBINATIONS FOR THE FLOOR SLAB

COMBINATIONS FOR ELU:

$$\sum_{j\geq 1} \gamma_{G,j} \cdot G_{k,j} + \gamma_P \cdot P + \gamma_{Q,1} \cdot Q_{k,1} + \sum_{i>1} \gamma_{Q,i} \cdot \psi_{0,i} \cdot Q_{k,i}$$

_COMBINATION 1: 1,35*HYP1 + 1,5*HYP2

COMBINATIONS FOR ELS:

1 $\sum_{j\geq 1} G_{k,j} + P + Q_{k,1} + \sum_{i>1} \psi_{0,i} \cdot Q_{k,i}$

_COMBINATION 1: HYP1 + HYP2

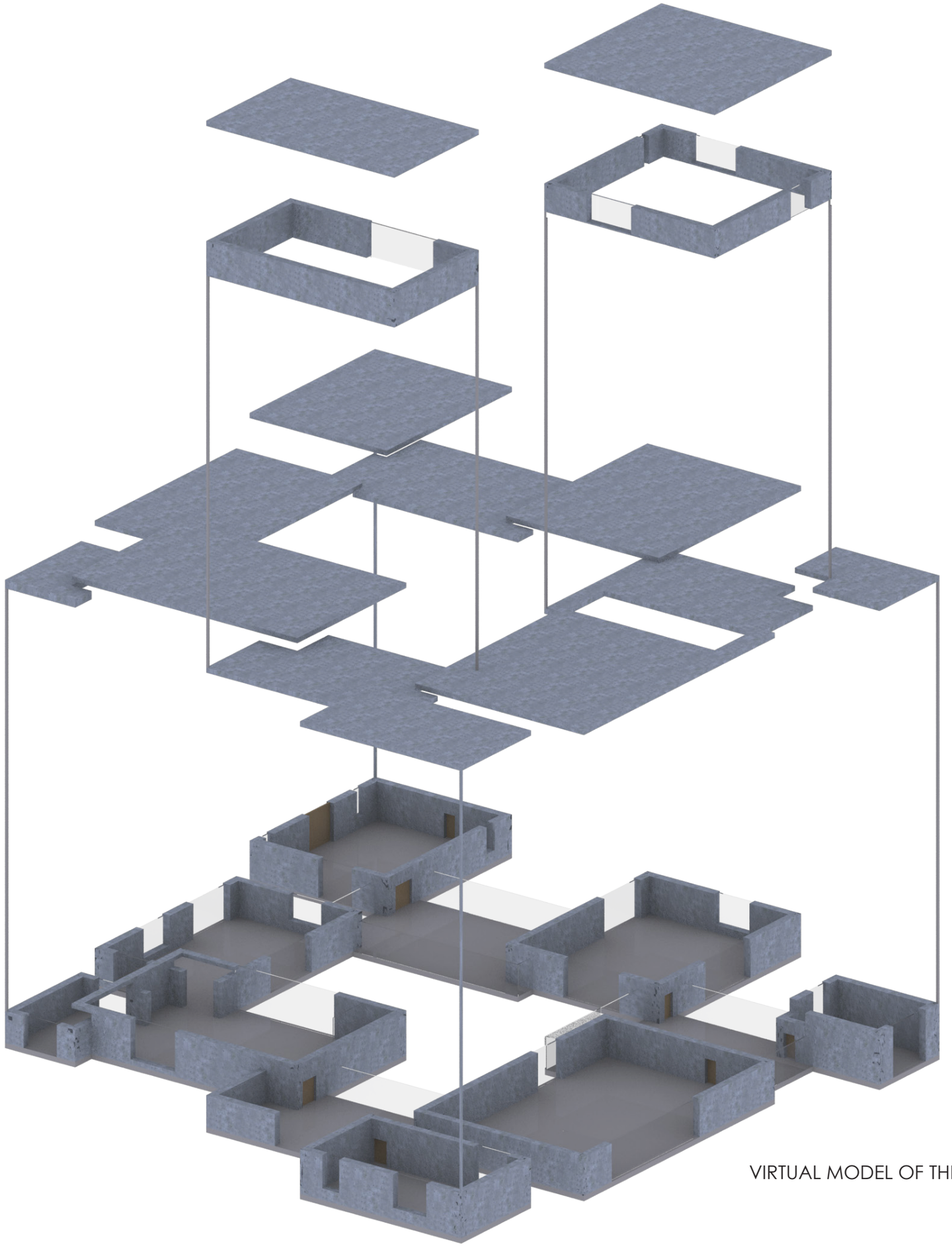
2 $\sum_{j\geq 1} G_{k,j} + P + \psi_{1,1} \cdot Q_{k,1} + \sum_{i>1} \psi_{2,i} \cdot Q_{k,i}$

_COMBINATION 4: HYP1 + HYP2

3 $\sum_{j\geq 1} G_{k,j} + P + \sum_{i\geq 1} \psi_{2,i} \cdot Q_{k,i}$

_COMBINATION 7: HYP1 + HYP2

This hypothesis will be inserted in Architrave so the software can determine the stresses and steins of the walls and slabs with ELU combinations and the movements of the structure with ELS combinations.



VIRTUAL MODEL OF THE STRUCTURE

MODELL OF THE STRUCTURE

Although the model of the structure has been built complete, only the most conflictive and representative part of the kindergarten will be calculate, to speed up the process.

The choosen part is the playroom, because it is the most important point, where all loads are concentrated and also there is a cantilivered area.

Even though the rest of the structure has not been calculated, it is not necessary because, having all the walls and slabs the same characteristics, they will fit the requirements if the most requested area does.

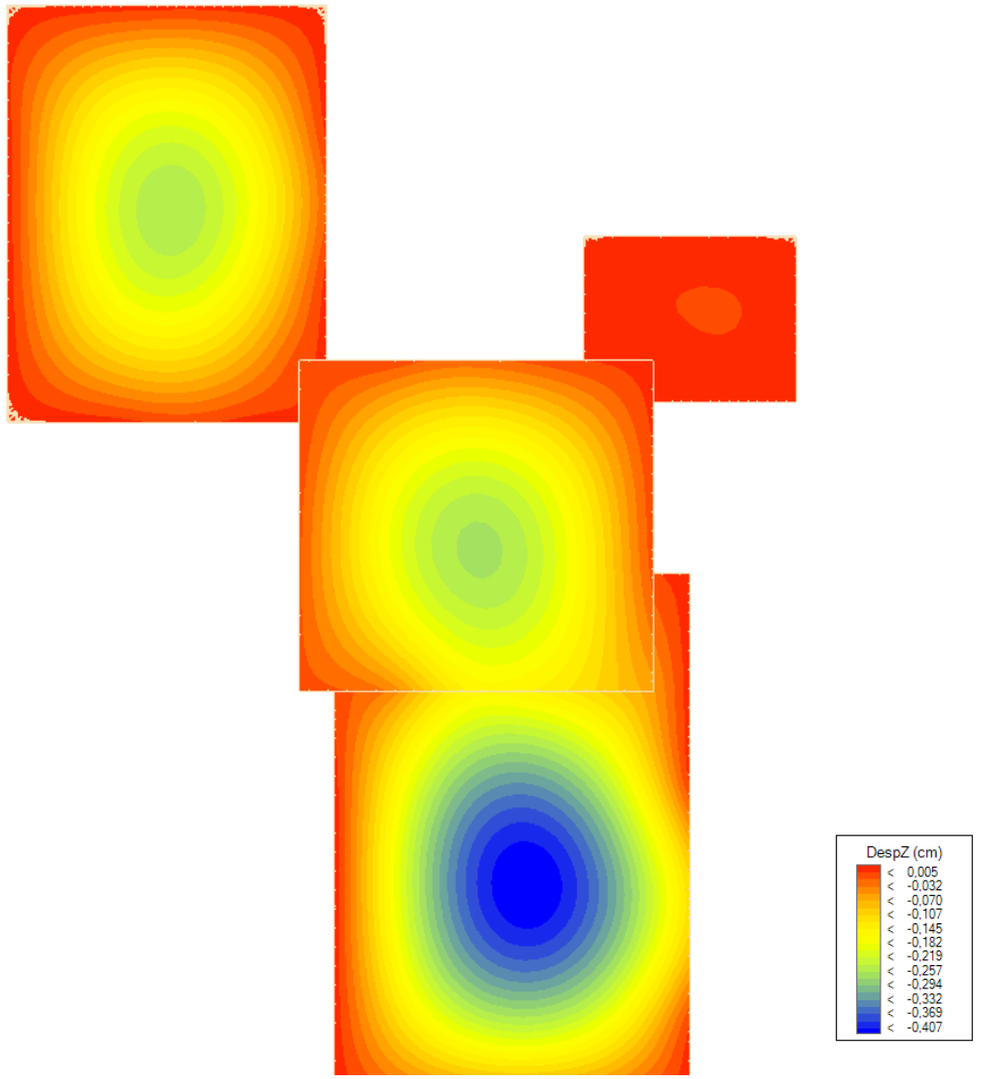
ELS: DISPLACEMENT OF THE NODES OF THE STRUCTURE

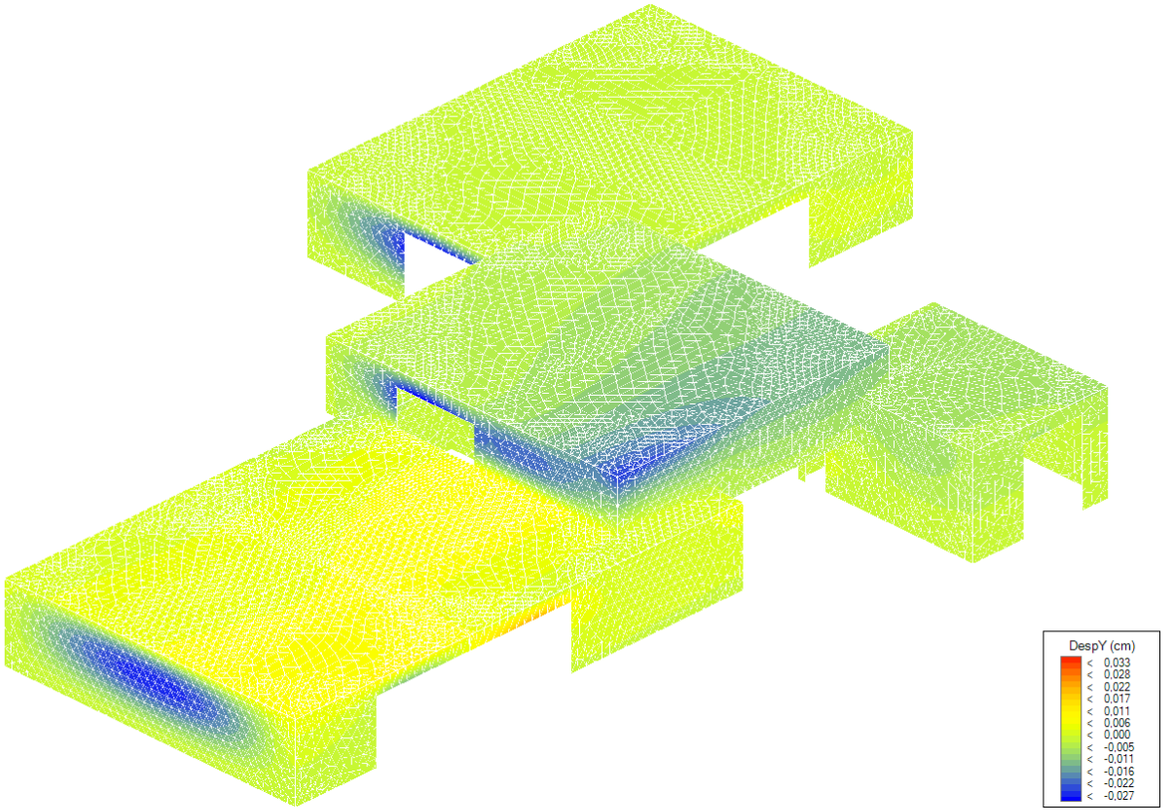
As seen in the pictures from Architrave, the largest movements of the structure are:

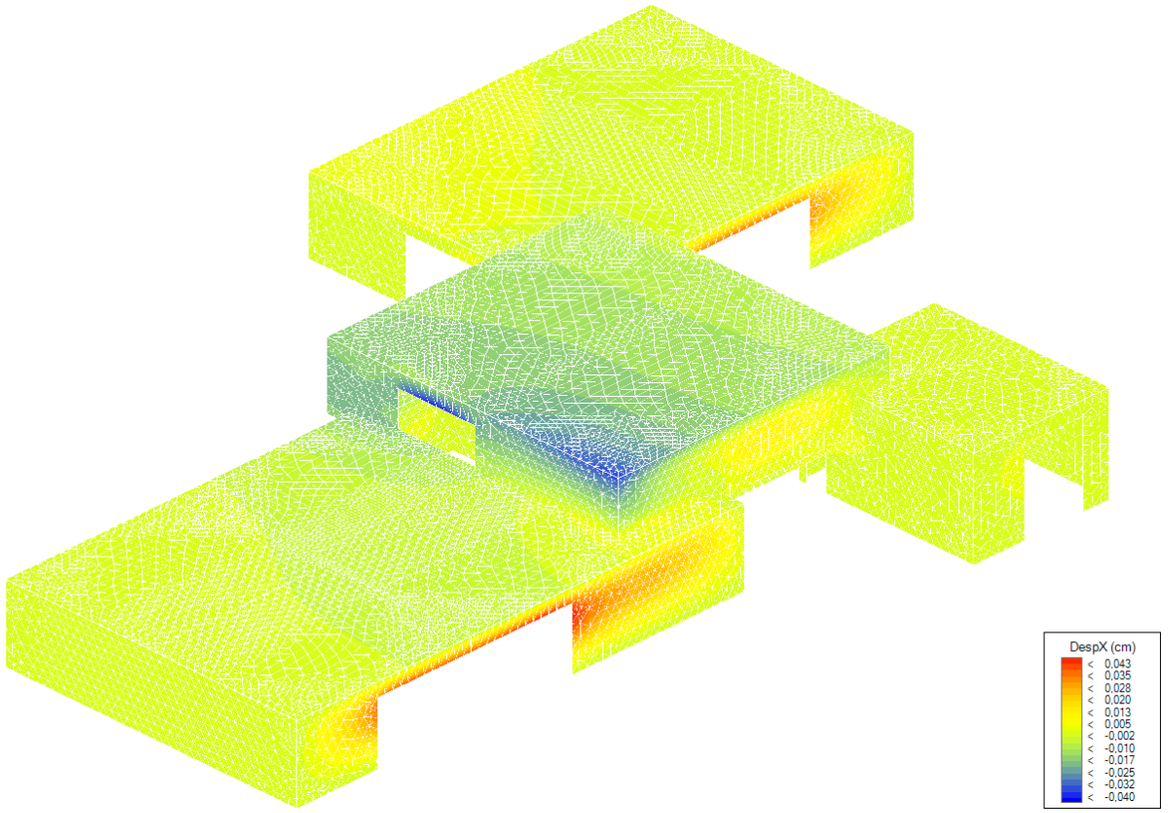
Vertical displacements in slabs: -0,407cm. +0,005cm.
This values fit correctly into the limit of L/300 for roof and floor slabs.
600/300=2cm
1500/300=5cm

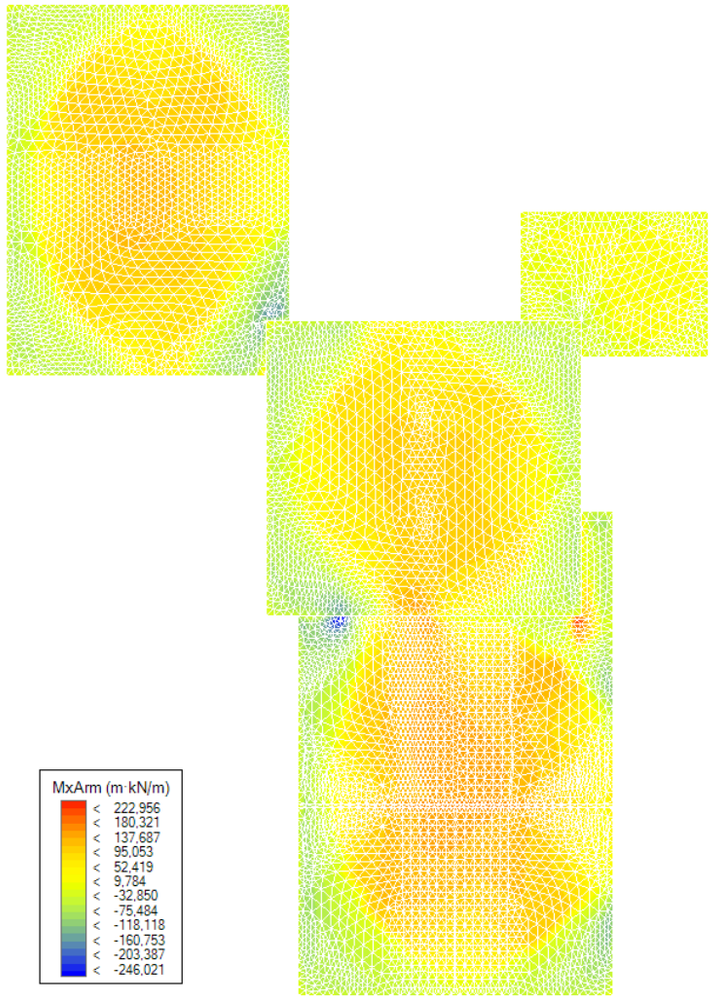
Horizontal movements in top of walls: -0,055sm +0,058cm
This values fit correctly in the limit of L/500 for walls:
300/500=0,6cm
350/500=0,7cm
400/500=0,8cm

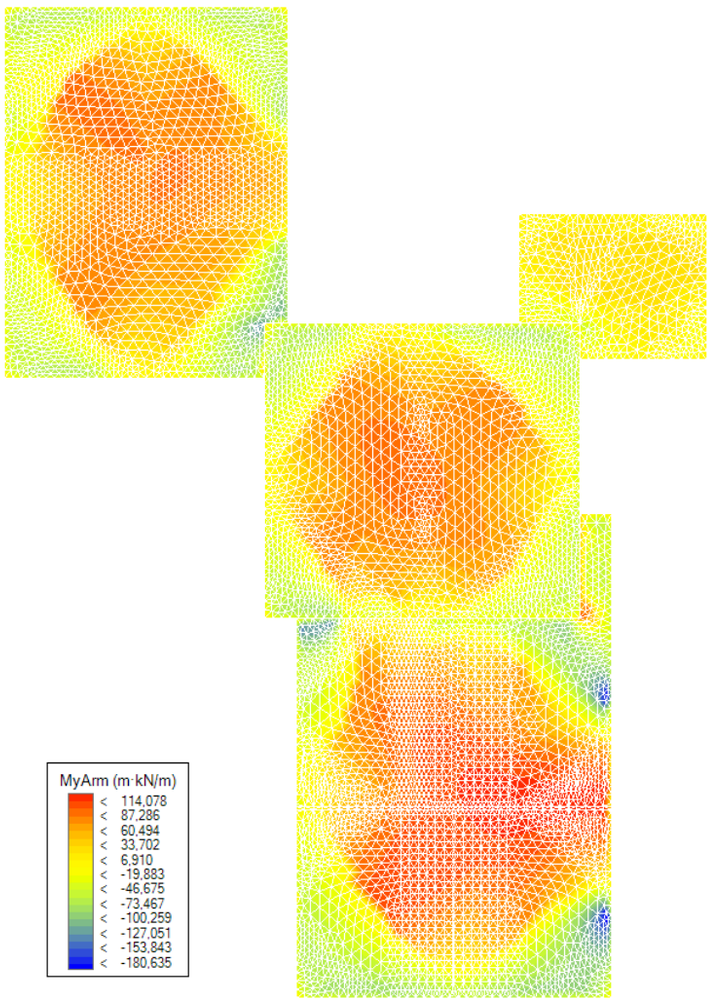
The designed structure acomplishes all the limitations and values for ELS.

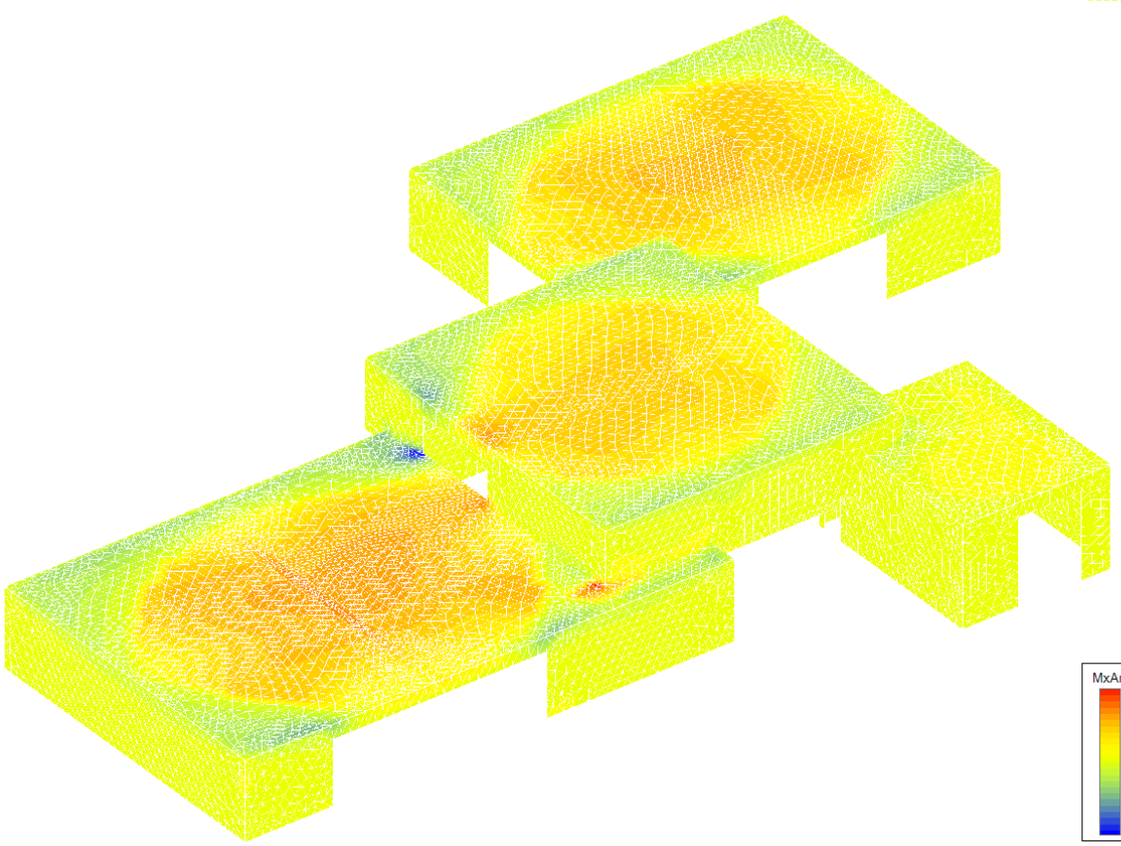


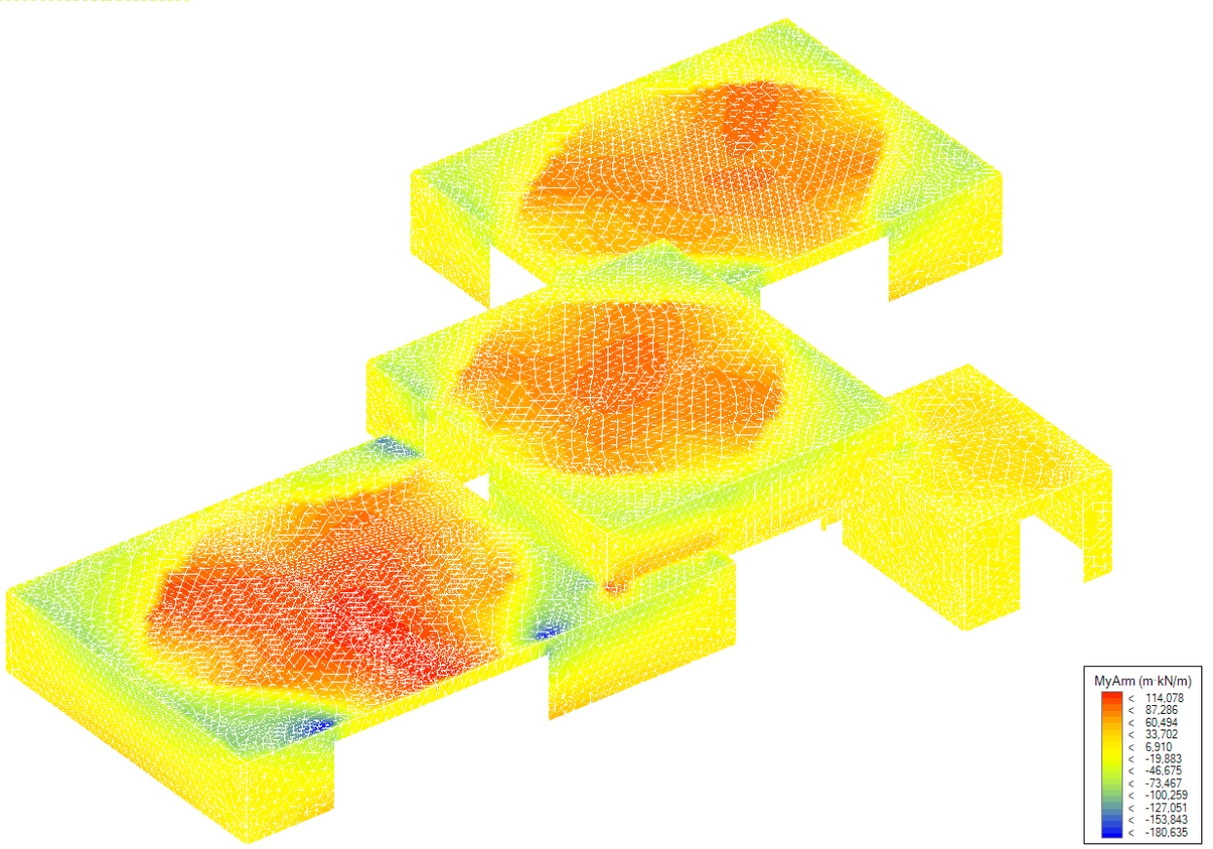












ELU: RESISTENCE OF THE ELEMENTS

Architrave software calculets by means of the finite elements method (FEM) how the loads affect to the structure by calculating how much the structure is able to resist and compares the values in order to check if the loads and the stress they generate are harder than the maximum that the real structure would be able to resist without collapsing using a security margins.

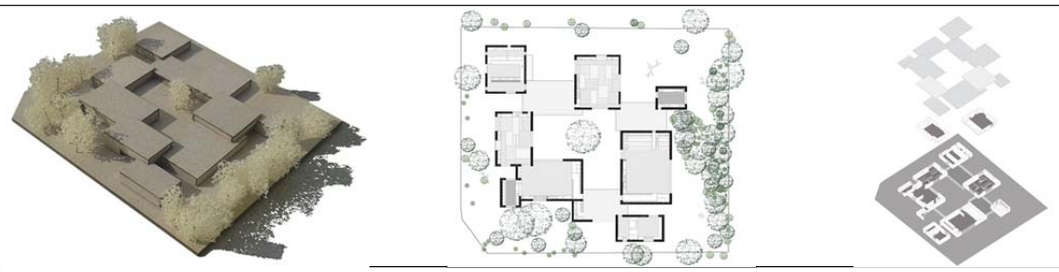
It is discernable in the pictures how loads are distributed into slabs and walls.

The designed structure also acomplishes all the limitations and values for ELU.

.sustainability	PASSIVHAUS
.ventilation system	PASSIVHAUS
.fire security	DB-SI
.accesibility	DB-SUA
.plumbing and sewerage	DB-HS
.electricity and ilumination	

FACILITIES AND CTE FULFILMENT

Passivhaus Nachweis



Objekt:	Playing Kindergarten	
Standort und Klima:	Wien Österreich	W - Wien-Hohe Warte
Straße:	Lastenstrasse 15	
PLZ/Ort:	1230	
Land:	Österreich	
Objekt-Typ:	Kindergarten + krippe	
Bauherr(en):		
Straße:		
PLZ/Ort:		
Architekt:	Isabel Gares Sala	
Straße:		
PLZ/Ort:		
Haustechnik:		
Straße:		
PLZ/Ort:		
Baujahr:	2014	
Zahl WE:	1	
Umbautes Volumen V_e:	6160,0 m³	
Personenzahl:	150,0	
Innentemperatur:	20,0 °C	
Interne Wärmequellen:	2,8 W/m²	

Kennwerte mit Bezug auf Energiebezugsfläche

Energiebezugsfläche: 1760,0 m²

	Verwendet:	Monatsverfahren	PH-Zertifikat:	Erfüllt?
Energiekennwert Heizwärme:	6	kWh/(m²a)	15 kWh/(m²a)	ja
Drucktest-Ergebnis:	0,3	h⁻¹	0,6 h⁻¹	ja
Primärenergie-Kennwert (WW, Heizung, Kühlung, Hilfs- u. Haushalts-Strom):	36	kWh/(m²a)	120 kWh/(m²a)	ja
Primärenergie-Kennwert (WW, Heizung und Hilfsstrom):	10	kWh/(m²a)		
Primärenergie-Kennwert Einsparung durch solar erzeugten Strom:	0	kWh/(m²a)		
Heizlast:	10	W/m²		
Übertemperaturhäufigkeit:		%	über 23 °C	
Energiekennwert Nutzkälte:	10	kWh/(m²a)	15 kWh/(m²a)	ja
Kühllast:	13	W/m²		

Kennwert mit Bezug auf Nutzfläche nach EnEV

Nutzfläche nach EnEV: 1971,2 m²

			Anforderung:	Erfüllt?
Primärenergie-Kennwert (WW, Heizung und Hilfsstrom):	9	kWh/(m²a)	40 kWh/(m²a)	ja

In Austria all kindergarten should be a passive house.
For the design and calculations, the Passivhause Standard has been used.

To declare a building a passivhaus, it is necessary to achieve some requirements in the quality of the thermal envelopment of the building and the quality of the construction.

This requierements are:
_The Space Heating Energy Demand is not to exceed 15 kWh per square meter of net living space (treated floor area) per year

_ The Primary Energy Demand, the total energy to be used for all domestic applications (heating, hot water and domestic electricity) must not exceed 120 kWh per square meter of treated floor area per year.

_ . In terms of Airtightness, a maximum of 0.6 air changes per hour at 50 Pascals pressure (ACH50), as verified with an onsite pressure test (in both pressurized and depressurized states).

The basic principles to achive the requirements are:
_Thermal insulation
_Passive house windows with triple glazing
_Airtightness
_Thermal bridge-free
_Comfort ventilation system with highly heat recovery.

In this project all this principles have been completely fulfilled, as you can see in the construction detail.

Besides, to achieve the needed levels for the certification, there is no heating system needed in the building, only the ventilation system with heat recovery will support an extra heating when necessary in less than 5% of the winter days.

The hot water will be supplied by a solar thermic installation with an acumulation system, the ilumination systems will be LED and A++ energetic certification, as well as all electrodimestics.

As seen in the certification sheet, Space Heating Energy Demand of the project is 6kWh/(m²a); the Primary Energy Demand is 36kWh/(m²a); and the airtightness would be (theoretical calculated) 0,3h⁻¹; however it must be verified when the building is finished in a pressurization test.

Passivhaus-Projektierung
U-WERTE DER BAUTEILE

Objekt: Playing Kindergarten

Keilförmige Bauteilschichten (Gefälldämmung) und ruhende Luftschichten -> Hilfsmittel rechts

1 Exterior wall

Bauteil Nr. Bauteil-Bezeichnung

Wärmeübergangswiderstand [m²K/W] innen R_{si}: 0,13 außen R_{sa}: 0,04

	Teilfläche 1	λ [W/(mK)]	Teilfläche 2 (optional)	λ [W/(mK)]	Teilfläche 3 (optional)	λ [W/(mK)]	Summe Breite Dicke [mm]
1.	Interior wood	0,200	Interior wood	0,200			25
2.	Interior concrete	2,500	Interior concrete	2,500			60
3.	XPS	0,035	XPS	0,035			250
4.	Exterior concrete	2,500	Exterior concrete	2,500			60
5.			Interior wood	0,200			25
6.			Blown Mineral Wool	0,040			40
7.							
8.							

Flächenanteil Teilfläche 2: 5,0% Flächenanteil Teilfläche 3: Summe: 46,0 cm

U-Wert: 0,133 W/(m²K)

2 Roof

Bauteil Nr. Bauteil-Bezeichnung

Wärmeübergangswiderstand [m²K/W] innen R_{si}: 0,10 außen R_{sa}: 0,04

	Teilfläche 1	λ [W/(mK)]	Teilfläche 2 (optional)	λ [W/(mK)]	Teilfläche 3 (optional)	λ [W/(mK)]	Summe Breite Dicke [mm]
1.	Interior wood	0,200					25
2.	Blown Mineral Wool	0,040					150
3.	Concrete slab	1,800					100
4.	Core insulation (EPS)	0,040					500
5.	Concrete slab	1,800					100
6.	Slope concrete	1,800					50
7.	Light concrete tiles	1,800					30
8.							

Flächenanteil Teilfläche 2: Flächenanteil Teilfläche 3: Summe: 95,5 cm

U-Wert: 0,060 W/(m²K)

3 Ground floor

Bauteil Nr. Bauteil-Bezeichnung

Wärmeübergangswiderstand [m²K/W] innen R_{si}: 0,17 außen R_{sa}: 0,17

	Teilfläche 1	λ [W/(mK)]	Teilfläche 2 (optional)	λ [W/(mK)]	Teilfläche 3 (optional)	λ [W/(mK)]	Summe Breite Dicke [mm]
1.	Wooden floor	0,130					30
2.	Impact sound insulation	0,040					10
3.	Leveling cement	0,700					50
4.	Concrete	1,800					100
5.	Foam glass	0,030					200
6.	Blinding concrete	1,500					50
7.							
8.							

Flächenanteil Teilfläche 2: Flächenanteil Teilfläche 3: Summe: 44,0 cm

U-Wert: 0,131 W/(m²K)

Passivhaus-Projektierung
U-WERTE DER BAUTEILE

Objekt: Playing Kindergarten

Keilförmige Bauteilschichten (Gefälldämmung) und ruhende Luftschichten -> Hilfsmittel rechts

4 Partition wall

Bauteil Nr. Bauteil-Bezeichnung

Wärmeübergangswiderstand [m²K/W] innen R_{si}: 0,13 außen R_{sa}: 0,13

	Teilfläche 1	λ [W/(mK)]	Teilfläche 2 (optional)	λ [W/(mK)]	Teilfläche 3 (optional)	λ [W/(mK)]	Summe Breite Dicke [mm]
1.	Interior wood	0,200					25
2.	Interior concrete	2,500					250
3.	XPS	0,025					200
4.	Exterior concrete	2,500					60
5.							
6.							
7.							
8.							

Flächenanteil Teilfläche 2: Flächenanteil Teilfläche 3: Summe: 53,5 cm

U-Wert: 0,118 W/(m²K)

U-VALUES

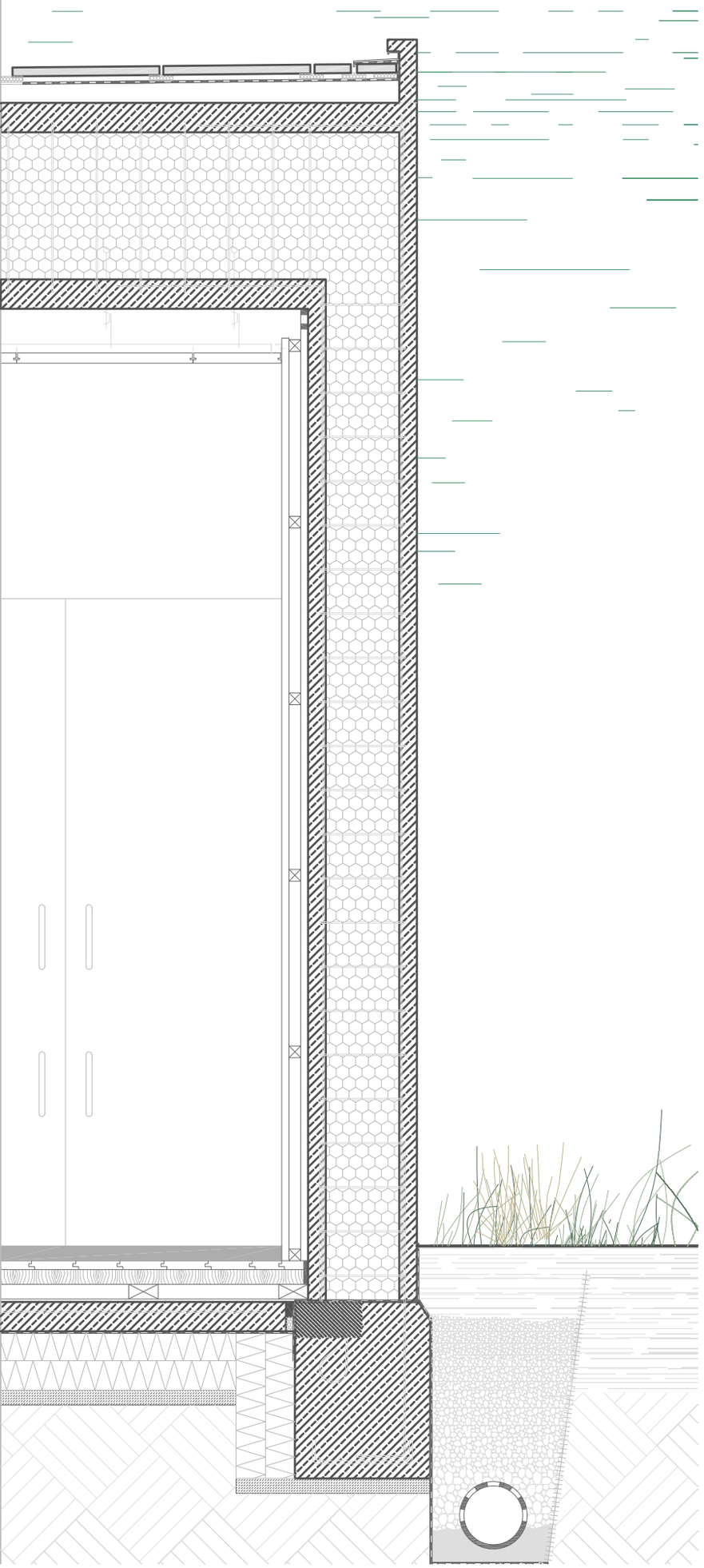
For the main calculation, it is necessary to set the U-values of all the surfaces of the thermal envelopment of the building.

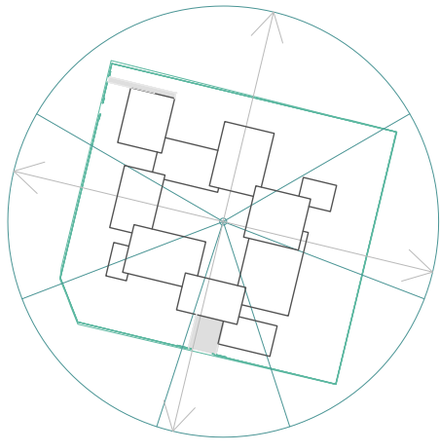
Far from being usual U-values for non passive buildings they are very low in order to avoid the heat losses.

The values, as the certificate sheets show, are:

_Exterior walls:	0,133 W/(m²K)
_Roof	0,06 W/(m²K)
_Ground floor	0,131 W/(m²K)
_Partition walls	0,118 W/(m²K)

PHPP 2007, U-Werte PassivHaus.xls





Kindergarten orientation

HOW DOES IT WORK?

The system (for cold climates) is based on the high levels of insulation installed in the thermal envelopment which keep heat inside avoiding losses.

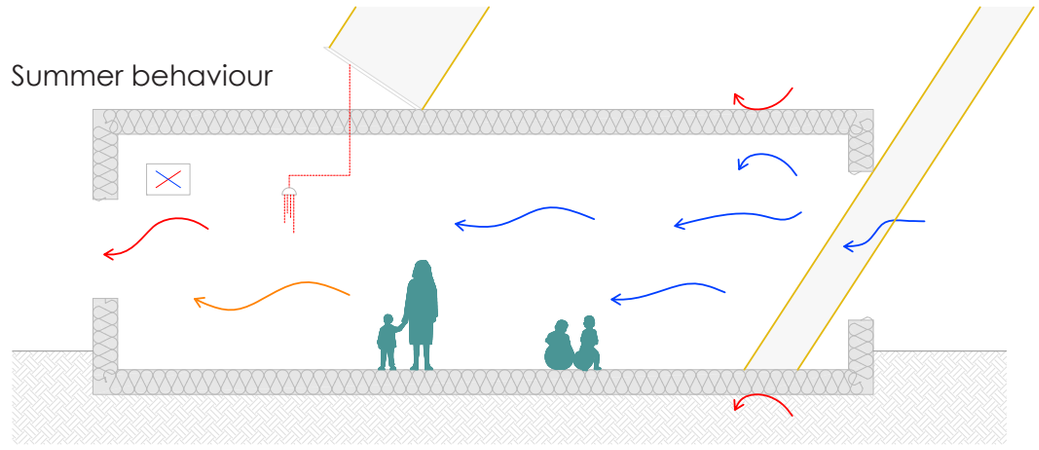
This is why the airtightness is so important, because it helps to keep the warm air in the room and prevents the entrance of cold air.

It is necessary to ensure a minimum amount of heat gains in order to remove the big heating sistems that usual houses need.
This gains usually come through the windows and due to human heat, because of that, it is really important the use of passivhaus windows and take good care of their size, position and orientation. They let the heat enter into the room but with a high g-value they create greenhouse effect and don't let most of the heat go back outside.

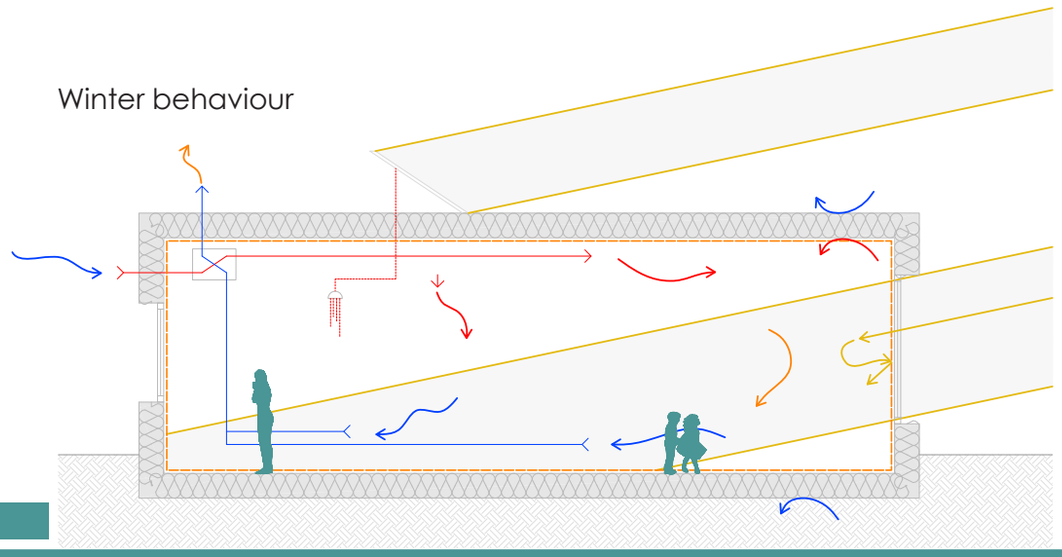
Finally, one of the most important elements in a passivhaus is the ventilation system, which must have high heat recovery. This system keeps the inside air clean and comfortable and at the same time uses the warm exhaust air to heat the new incoming fresh air.

In summer, the great openings will allow the fresh air to ventilate the spaces, while protections in windows will stop sunbeams from entering and directly heating the room.

Summer behaviour



Winter behaviour



SOLAR THERMIC:

In order to use a sustainable energy form, the hot water is generated by a solar thermic system with hot water acumulation.

The sistem will acumulate the necessary hot water for a complete use of the kindergarten during the day; nevertheless when due to weather circumstances there is no solar generation, the unvented hot water cylinder will provide using its heating spiral the neccesary production by connection to the electricity. This will only happen in the current location of the kindergarten a 5% of the days per year.

The solar collectors will be placed on the rooftop of the kitchen, in vertical line with the unvented hot water cilinder and the water supply connection.

The choosen solar colector, as seen in pictures, are solar collectors TopSon F3-Q, with a usable area of 2m^2.

WATER CONSUMPTION NEEDS:

Using Board 3.1 CTE HS4, the stablished consumption for a school is 3litres/person/day at 60ºC. This means that, assuming 135 people, it will be 405l/dat at 60ºC.

As passivhaus, the solar thermic contribution should be 100%, which means that all the water will be supplied by this istallation.

The energy needed to generate this amount of hot water depends on the average temperature of the water in the city net:

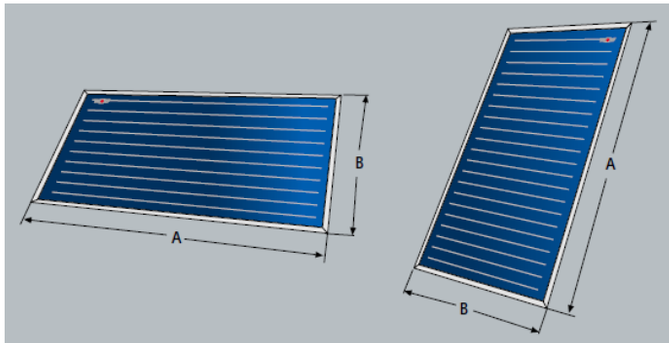
Average water Tª in Vienna: 8ºC
Energy required: 8916,80 kWh/year
Average solar radiation in Vienna: 1100,00 kWh/m^2/year
Solar collector average yields: 50%
% losses: 5%

Collectors will be placed completely oriented to the shouth: a=0 and their inclination will be the city latitude: β=50º

Using this paramenters, the minimum required area of collectors will be: 16,22m^2. Which means a minimum of 9 collectors.

To make the system more efficient and equilibrate the circuits, there will be 10 collectors placed in two groups of 5, with a total area of 20m^2.

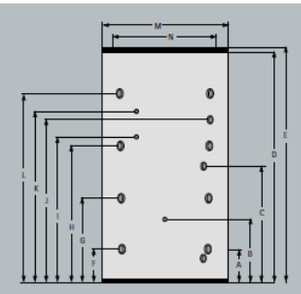
The accumulation system will require a minimum of 1000 litres. The choosen unvented hot water cilynder is modell BSP 1000 (in pictures) with a capacity of 1000litres of water at 60ºC.



Datos Técnicos*

Modelo TopSon		F3-Q
Largo	A mm	2099
Ancho	B mm	1099
Profundo	C mm	110
Distancia entre conexiones	D mm	900
Conexiones (en la pieza de conexión)	G	3/4"
Ángulo de inclinación		15° - 90°
Absorción de energía**	%	79,4
Coeficiente de transmisión de calor k1 **	W/(m² K²)	3,494
Coeficiente de transmisión de calor k2 **	W/(m² K²)	0,015
Temperatura de parada máx. (en seco)	°C	198
Eficacia visual (factor de conversión) K50° **	%	95,4
Capacidad térmica efectiva C **	kJ/(m² K)	8,073
Presión de régimen admisible	bar	10
Superficie del captador	m²	2,3
Superficie útil	m²	2,0
Capacidad	Ltr.	1,9
Peso (vacío)	kg	41
Caudal admisible	Ltr./h	45 - 90
Fluido calorportante		ANRO
Certificado Solar-Keymark		011-7S592F
Certificado homologación		NPS-11209

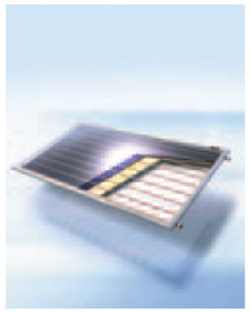
** Valores según EN 12975
* Reservado el derecho de moficaciones técnicas



Datos Técnicos*

Modelo BSP		800	1000
Capacidad	Litros	785	915
Capacidad	Litros	785	915
Retorno solar	A mm	230	230
Sonda solar	B mm	490	550
Impulsión solar	C mm	910	1.030
Altura sin envolvente	D mm	1.755	2.040
Altura con envolvente	E mm	1.825	2.110
Conexión	F mm	260	310
Conexión	G mm	630	745
Conexión	H mm	1.030	1.250
Sonda	I mm	1.230	1.300
Conexión (sólo para BSP-W 1000)	J mm	–	1.430
Sonda	K mm	1.350	1.510
Conexión	L mm	1.430	1.710
Diámetro con envolvente	M mm	1.000	1.000
Diámetro sin envolvente	N mm	790	790
Altura máxima inclinada sin envolvente	mm	1.788	2.068
Impulsión/Retorno solar	G	1"	1"
Conexión (8 Unidades)	Rp	1 1/2"	1 1/2"
Sonda (4 uds.) diámetro interior	mm	15	15
Superficie intercambiador solar	m2	2,5	3
Contenido intercambiador solar	Ltr.	16,5	19,8
Presión máxima de trabajo acumulador	bar	3	3
Presión máxima de trabajo intercambiador	bar	10	10
Temperatura máxima de trabajo acumulador	°C	95	95
Peso	kg	160	180
Módulo de producción a.c.s.			
Producción a.c.s. (60/15, 10/47)	Ltr/min	30	30
Presión máxima de trabajo calefacción	bar	3	3
Presión máxima de trabajo a.c.s.	bar	10	10
Temperatura máxima de trabajo	°C	95	95
Potencia eléctrica	W	95	95
Conexión eléctrica		230V/50Hz	230V/50Hz
Peso	kg	16	16

* Reservado el derecho de moficaciones técnicas



Captador solar
TopSon F3-Q
De alto rendimiento con todo tipo de accesorios de fácil montaje y perfecta integración en tejados.

Instalación en vertical y horizontal.

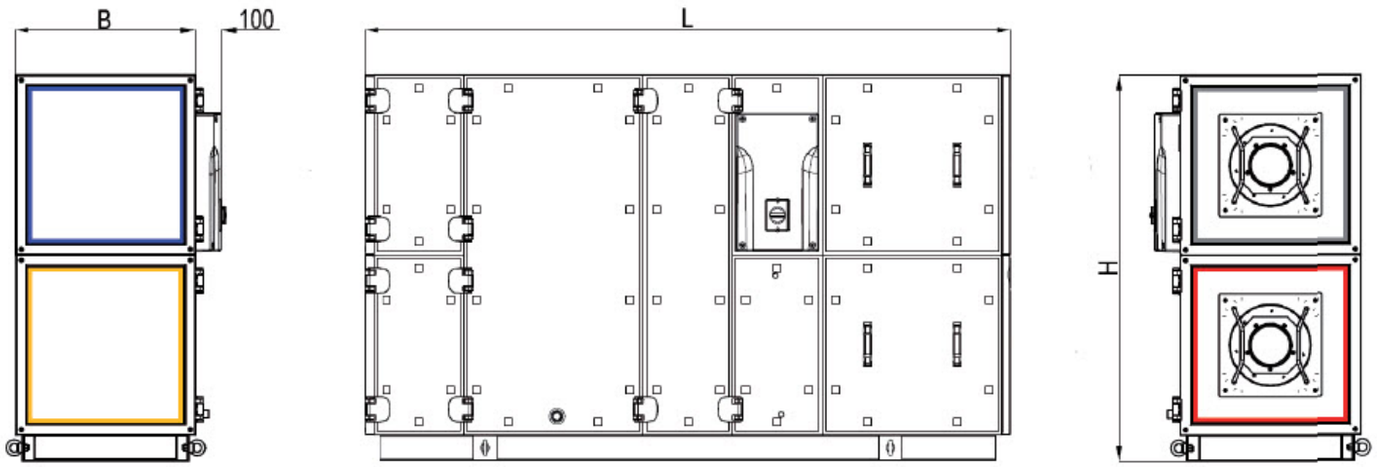
Sección TopSon F3-Q

Características del acumulador dinámico solar BSP:

- Optimización de espacio BSP 800 y 1.000 litros
- Componentes hidráulicos para producción de a.c.s., circuito solar y dos circuitos de mezcla, aptos para montar en acumulador o pared
- Las guías estabilizan las temperaturas en el acumulador y aprovechan considerablemente mejor la energía del sol
- Producción de a.c.s. altamente higiénica con gran producción 30 l/min
- Apto para montaje de kit de recirculación
- Combinación idónea Solar y Biomasa
- Mínimas pérdidas mediante sistema de un sólo acumulador
- Solución económica para apoyo a calefacción
- 5 años de garantía en cuerpo de acumulador

5. Abmessung & Gewicht

5.1 Innenaufstellung



Die Abmessungen beziehen sich auf obengenanntes Standardgerät, Ausführung mit Zellenfilter (PF).
Bei diesen Abmessungen ist die Verwendung eines Nacherhitzers (POH) standardmäßig möglich.

Typ	L [mm]	B [mm]	H [mm]	Luftanschluss [mm]	Gewicht [kg]
ComfoAir XL 800	1750	700	1168	525 x 395	235-275
ComfoAir XL 1500	1750	1050	1168	875 x 395	310-340
ComfoAir XL 2200	2514	700	1500	612 x 612	450-600
ComfoAir XL 3300	2514	1050	1500	962 x 612	600-750
ComfoAir XL 4400	2514	1400	1500	1312 x 612	750-900
ComfoAir XL 6000	2514	1750	1500	1662 x 612	900-1050

Folgende Abmessungen geben die Zusatzlänge der optionalen Komponenten wieder.

Option	Zusätzliche Länge [mm]
Taschenfilter (BF) oder Vorwärmer (PRH)* oder leerer Abschnitt	350
Kühler (CL) oder leerer Abschnitt	350

* Beim ComfoAir XL 800 und ComfoAir XL 1500 ist keine Zusatzlänge erforderlich, hier passt ein Vorwärmer (PRH) serienmäßig.

VENTILATION SYSTEM

The ventilation system is required to keep the quality of the inner air avoiding heat losses by opening the windows.

The system is based on a central machine which makes the air and heat exchange with the outside air and filters the new air to keep particules and pollen out of the building. Then, a system of isolated tubes will distribute the air into the diferent rooms with two different nets; the first one brings the clean air to every room and the second one takes the exhaust air from every room.

This process is possible due to small openings in the ceilings and in the upper part of functional walls covered by a grille at the end of each distribution tube.

Based on the RITE (Reglamento de las instalaciones térmicas de los edificios = Regulation of thermal installations in buildings) the quality of the air must be class IDA 1, which is the optimal quality (highest), because of the use of the building: kindergarten.

We will consider a minimum flow to keep this air quality in 8dm^3/s per person. Which equals to 28,8m^3/h per person.

Assuming 135 people, the required air flow will be 3800m^3/h.

The central station choosen for providing this amount of new air is the model ConfoAir XL 3300, with a heat recovery tax of 87%. This machine will be placed in the services room, in the kitchen box in a dedicate space accessible for reparations or changes.

The distribution tubes will be a flexible oval flat tubes which allow a great distribution capacity in a short high, they will be placed on the ceiling.

In the plan you can appreciate the tubes distribution and the position of the supply and extract grilles in every room.

BUILDING'S FACILITIES

The building, even though it is not a residential building, has the same necessities when talking about facilities.

Thus, there will be a rain water recovery system, a plumbing system for hot and cold sanitary water, a sewerage system as well as a fire security analysis, and an illumination project.

All this items have been designed according to the CTE (Código técnico de la edificación= Technical code for edification), in this concrete case acording to the DB-HS (Documento básico de salubridad = Basic document for healthy conditions) and the DB-SI (Documento básico de seguridad en caso de incendio = Basic document for fire security).
(As seen before, also the RITE and EHE-08 have been consulted)

SEWERAGE SYSTEM

The rainwater evacuation system is needed to avoid water to enter into the building but mainly to avoid overloads because of water acumulation in the roof.

In this case, there are several floor sinks in each box roof wich bring water through the ceiling to every drainpipe, and then to the manhole system under the floor deck.

It is seen in the drawing how every roof has been divided into sloped parts with similar areas, and calculated de diameter of every tube under the roof, using the board DB-HS 4.9. In this case all the tubes are 90mm because they get similar quantity of water.

In the next drawing, you can see the distribution of the tubes of residual water, as well as the position and diameter of the drainpipes and also the diametres of tubes between sanitaries and the drainpipes.

The tube of each sanitary has been calculated according the board 4.1 using their UDD (dewatering units), as shown next:

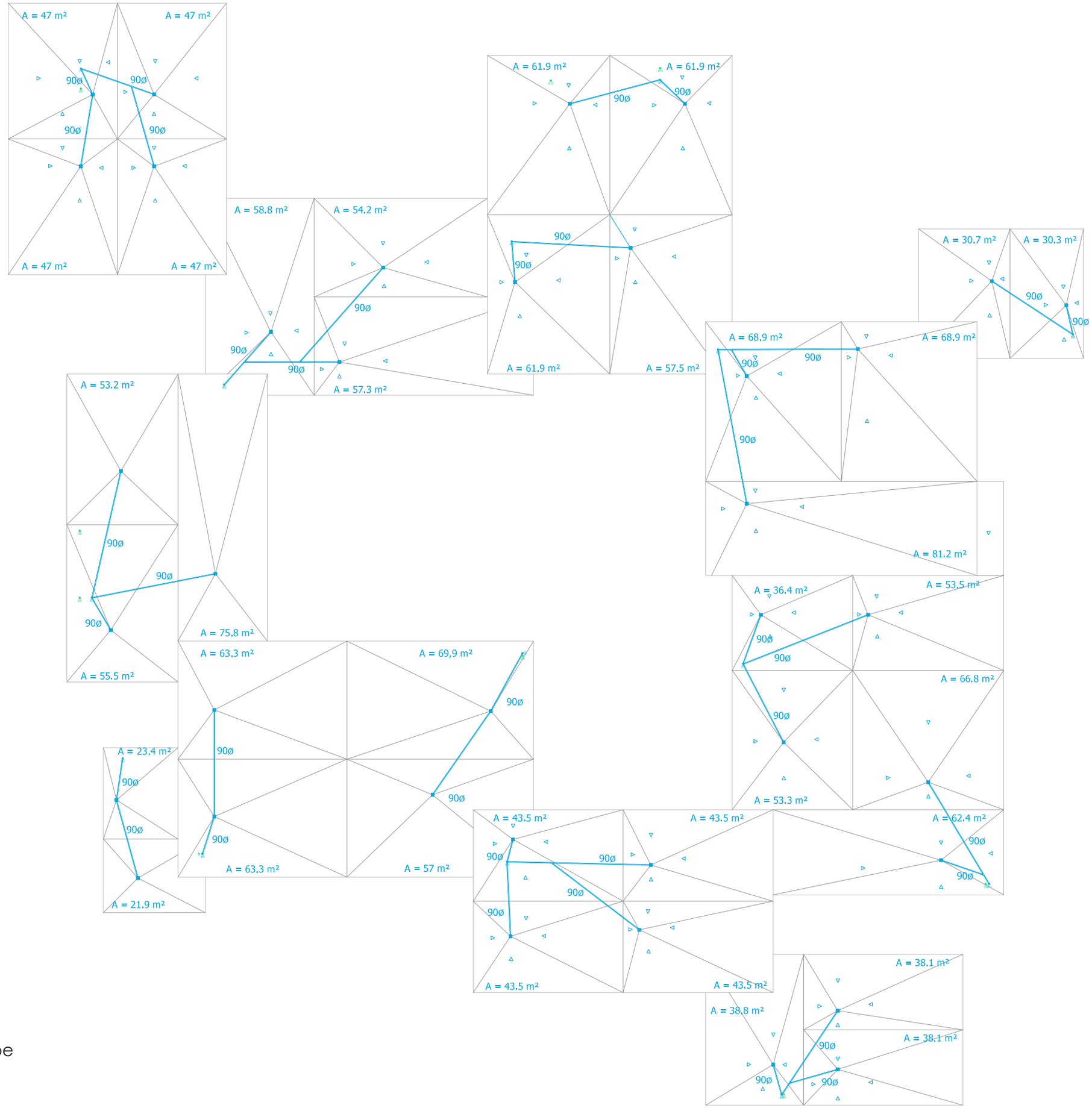
	UDD	minimum diameter
Sink:	2	40mm.
Small sink:	2	40mm.
Toilet:	5	100mm.
Shower:	3	50mm.
Baby bath:	4	50mm.
Kitchen sink:	6	50mm.
Dishwasher:	6	50mm.
Washing machine:	6	50mm.

The tubes between sanitaries and drainpipes with the board 4.3, and then the drainpipes diameter has been calculated using the board 4.4 by the UDD which get the drainpipe and the number of floors in the building (1).

Once the drainpipes get the floor, there is a manhole and through them all residual water is connected to get out of the building by the main drainage tubes.
Every drainpipe will get the roof to expulse the exhaust air.

The diameter of those drainage tubes has been calculated using board 4.5 and the size of the PVC manholes is 50 x 50 cm.

In the plan, the blue lines mean rainwater and green lines are residual water.



Floor sink

90ø Pipe diameter

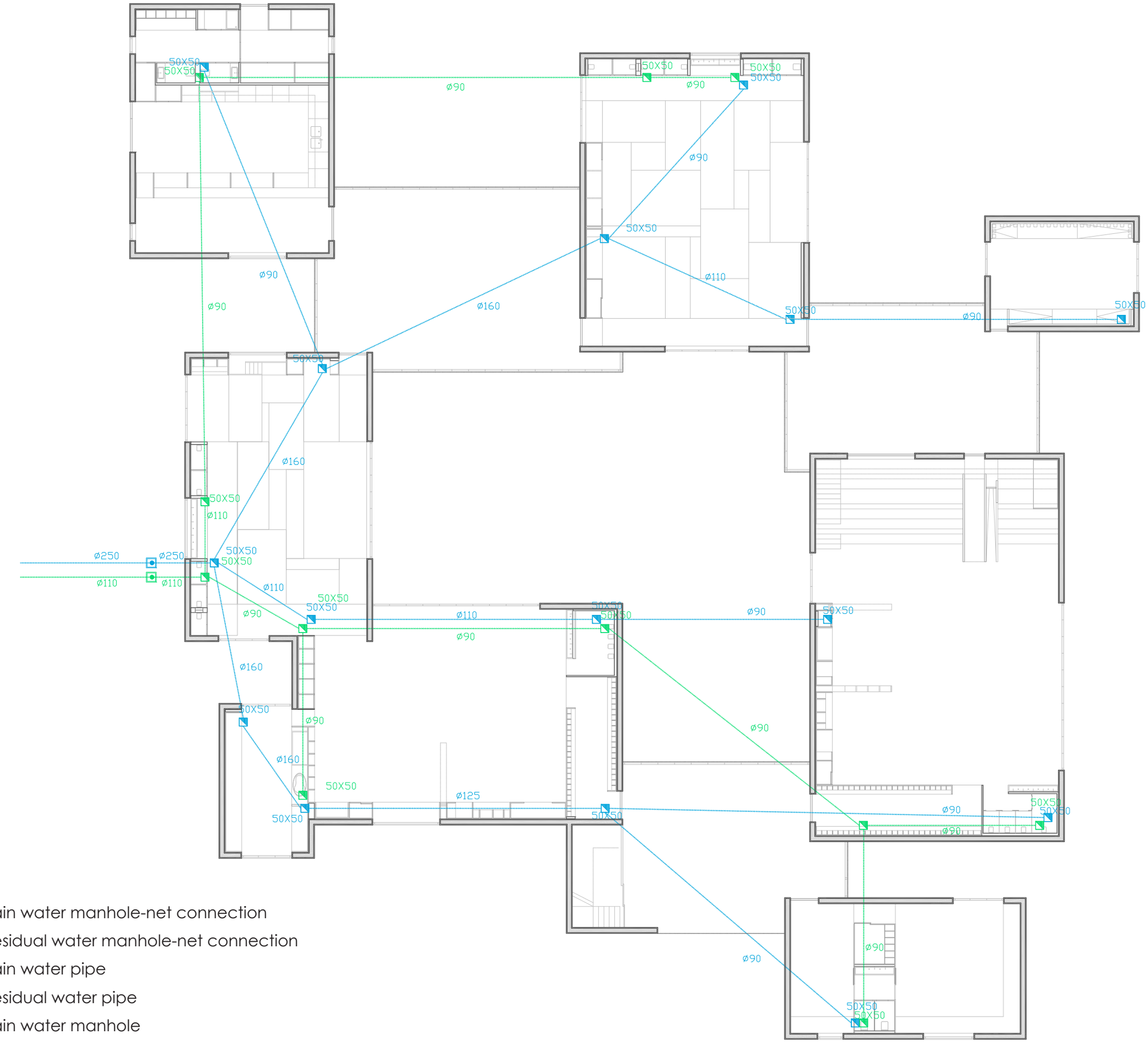
Rain water pipe

Ø50 Drainpipe

PLUMBING AND SEWERAGE: DB-HS

1_250

SPIELKINDERGARTEN



- Rain water manhole-net connection
- Residual water manhole-net connection
- ø250 Rain water pipe
- ø110 Residual water pipe
- 50X50 Rain water manhole
- 50X50 Residual water manhole

PLUMBING AND SEWERAGE: DB-HS

1_250

SPIELKINDERGARTEN

PLUMBING SYSTEM

The plumbing system will distribute hot and cold water to every sanitary in the kindergarten.
The diameter of the pipes has been calculated attending to the water flow and its maximum velocity.

To calculate the necessary amount of water in the whole kindergarten, the water flow of each device needs to be known. Acording to the board 2.1 and the model of every element:

	minimum flow	number
Sink	0,05 dm^3/s	5
Small sink:	0,1 dm^3/s	19
Toilet	0,1 dm^3/s	23
Shower	0,2 dm^3/s	2
Baby bath:	0,3 dm^3/s	1
Kitchen sink:	0,3 dm^3/s	1
Drinking fountain:	0,2 dm^3/s	4
Dishwasher:	0,25 dm^3/s	1
Washing machine:	0,20 dm^3/s	1

Acording to the number of elements and its flow, the peak flow for the building is 3,69l/s.

In the pictures you can see the models of every sanitary device, if they have hot and cold water supply or only cold, and the diameter of the residual water tubes.

The models are:

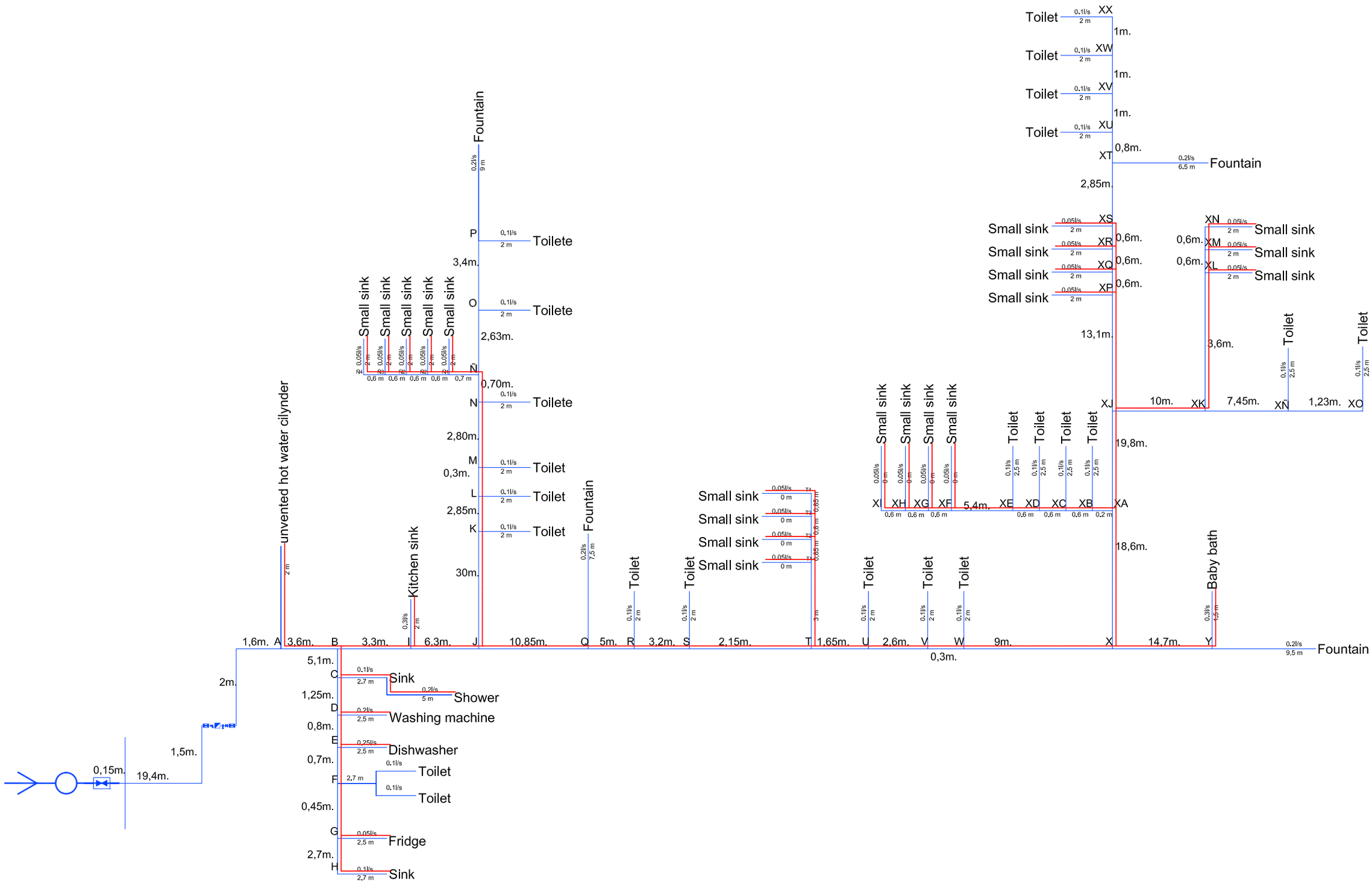
For children:

Sinks: 4Bambini, by Keramag children.
Toilets: Owe, by Jacobdelafont

For adults:

Sinks: Element, by Roca
Toilets: Element, by Roca
Shower: Blues XL, by Roca

- City net connection
- Non-return valve
- Shut-off valve
- Filter
- Drainig valve
- Water meter
- Hot-cold water distribution pipes
- Hot-cold water vertical pipes
- Hot-cold water tap



PLUMBING AND SEWERAGE: DB-HS

SPIELKINDERGARTEN

PLUMBING SYSTEM

In the diagram you can see conceptually the distribution of the pipes, the distances between them and the name of each pipe so you can see what kind of pipe and its diameter in the board below.

Even though all the pipes have been calculated, only the most most adeverse part has been shown, to avoid a huge board.

The water supply connection is done in polietilene, the standpipe on galvanised steel, and all distribution pipes are multilayer composite pipes.

Nombre tramo	Material	Diameter (mm)	Inner diameter (mm)
RGD			
Acometida	**PE 100 PN10**	**90**	**79,2**
Tubo Alimentacion	**Acero Galvanizado**	**80**	**80,9**
Filtro			
Contador General		**80**	**80,9**
Valvula de retencion general		**80**	**80,9**
Válvula-Entrada	**Multicapa**	**110**	**90**
Access-A	**Multicapa**	110	90
A-B	**Multicapa**	110	90
B-I	**Multicapa**	110	90
I-J	**Multicapa**	110	90
J-Q	**Multicapa**	90	73
Q-R	**Multicapa**	90	73
R-S	**Multicapa**	90	73
S-T	**Multicapa**	90	73
T-U	**Multicapa**	90	73
U-V	**Multicapa**	90	73
V-W	**Multicapa**	90	73
W-X	**Multicapa**	90	73
X-XA	**Multicapa**	75	60
XA-XJ	**Multicapa**	63	51
XJ-XP	**Multicapa**	50	41
XP-XQ	**Multicapa**	50	41
XQ-XR	**Multicapa**	50	41
XR-XS	**Multicapa**	50	41
XS-XT	**Multicapa**	40	32
XT-XU	**Multicapa**	40	32
XU-XV	**Multicapa**	32	26
XV-XW	**Multicapa**	32	26
XW-Toilet	**Multicapa**	20	15,5

FIRE SECURITY

For the acomplishments of the regulations in case of fire, the applicable document is the DB-SI.

There are 4 points in the regulations:

-Inner propagation
_Outside propagation
_Evacuation
_Protection facilities

INNER PROPAGATION

The relulations set that the building will be only one risk sector when:

_90% of the are is in one floor
_The exits of the building comunicate with outside space
_>75% of the perimeter is facade
_There is no residential area avobe it
_There is no limit area for a minimum risk area

For schoolarship buildings:

If only 1 floor: only one sector
If more than one floor: one sector ever 4000m^2

Thus, all the building will be one risk sector.

Fire resistence:

_Perimeter elements (walls):EI60
_Functional walls: C-s2
_Floor:E_{FL}

OUTSIDE PROPAGATION:

_There are no windows facing other windows nearer that 3m.
_There are no windows placed perpendicular to other nearer that 2m.

EVACUATION:

According to board 2.1, the maximum occupancy for kindergarten is 10m^2/person. With 1764m^2 usable, it would mean 176 people.

However, the kindergarten has been designed for 120 children, so the maximum occupancy should be 150 people. This way, the evacuation conditions will be:

_Distance to floor exit <35m.
_Distance to exit in open air <75m.
_Distance to point where two alternative evacuation ways exist < 35m.

Elements dimensioning for evacuation:
(Based on the occupancy 176 people)

	minimum	size
_Doors:	>0,88m.	1-1,65-2 m.
_Corridors:	>1m.	1-1,65 m.
_Non protected stairs	>1,1 m.	1,5 m.

FIRE PROTECTION FACILITIES

As the built area is 2300m^2, the required facilities in case of fire are:

_Extinguisher at <15m. from evacuation origin.
_Fire alarm system
_Fully equipped fireplug network (BIE-25)

Exit of the plot

Exit of the building

Fire alarm system

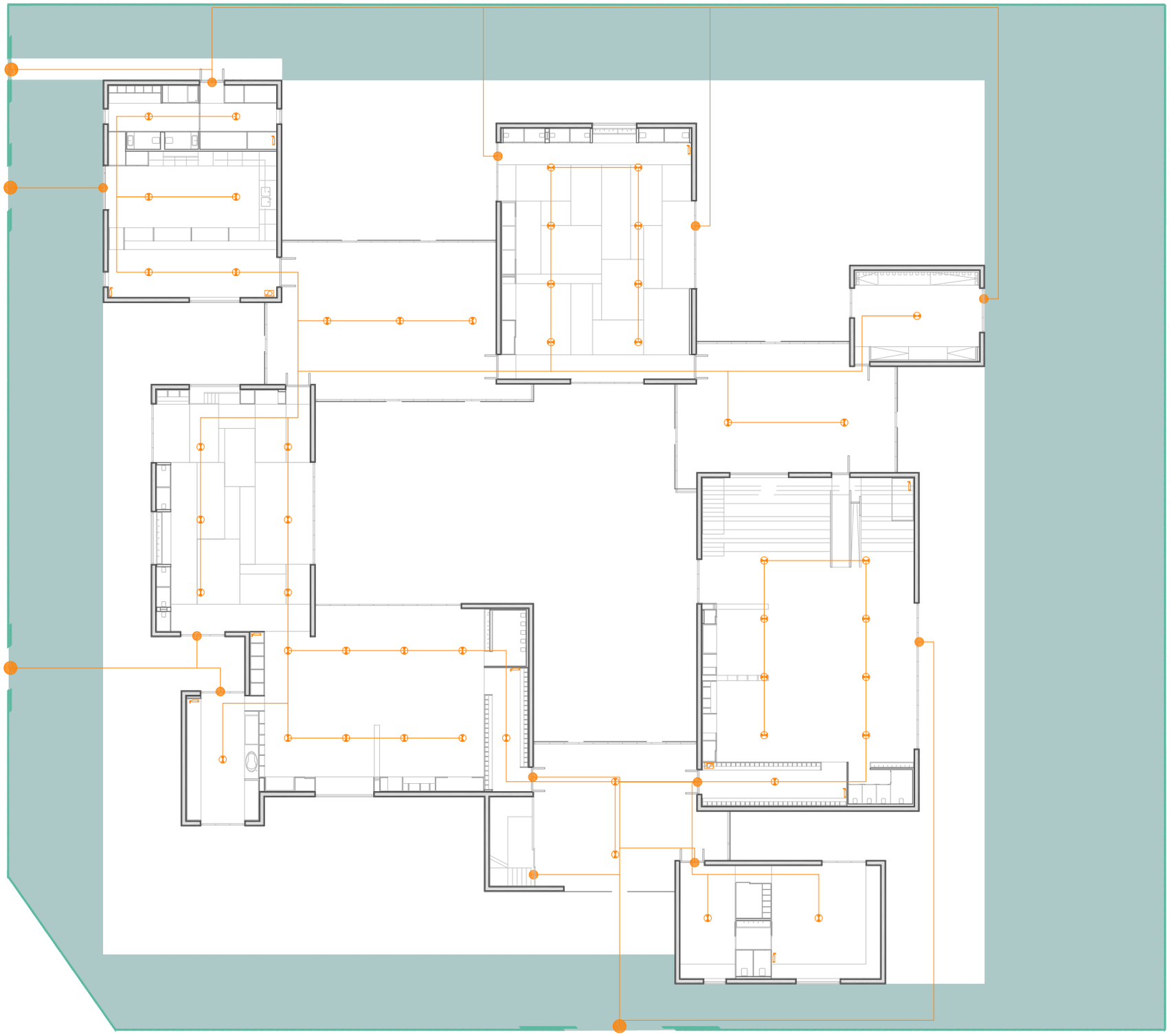
Fully equipped fireplug networks

Extinguishers

FIRE SECURITY: DB-SI

1_300

SPIELKINDERGARTEN



ILLUMINATION PROJECT

LED ADJUSTABLE MULTIPLE SIZES

IK10 IP67 850°C

CE 03 A+ A A+ A++ A++

	Lámpara + casquillo	W	Lm	K	Óptica	Dimensiones
 Light Up walk inox	LED	3	267	4200	SS 6°	ø145x175
	LED	3	232	3200	SS 6°	ø145x175
 iN 60 empotrada	LED	11	1230	3000	G	612x60x101
	LED	22	2460	3000	G	1210x60x101
	LED	45	4920	3000	G	2397x60x101
	LED	67	7380	3000	G	3594x60x101
	LED	67	7380	3000	G	3594x60x101
 Linealuce compact empotrable	LED	6	620	4000	WW	601x101x117
	LED	6	580	3000	WW	601x101x117
	LED	13	1240	4000	WW	1129x101x117
	LED	13	1160	3000	WW	1129x101x117
	LED	20	1860	4000	WW	1658x101x117
	LED	20	1740	3000	WW	1658x101x117
	LED	18	1500	4000	WW	601x101x117
	LED	18	1400	3000	WW	601x101x117
	LED	35	2990	4000	WW	1129x101x117
	LED	35	2800	3000	WW	1129x101x117

For the illumination, 3 models of lamp have been choosen.
The main one, iN60, from iGuzzini, is a lineal lamp without frame which will be recessed in the ceiling to simulate a continuous line of light.
For outside spaces where there is no ceiling, a similar lamp, Linealuce Compact will be place on the floor.
For the playing sets, small dotted lights will be placed stuck in the ground, so they will not be appreciate when lights are off.

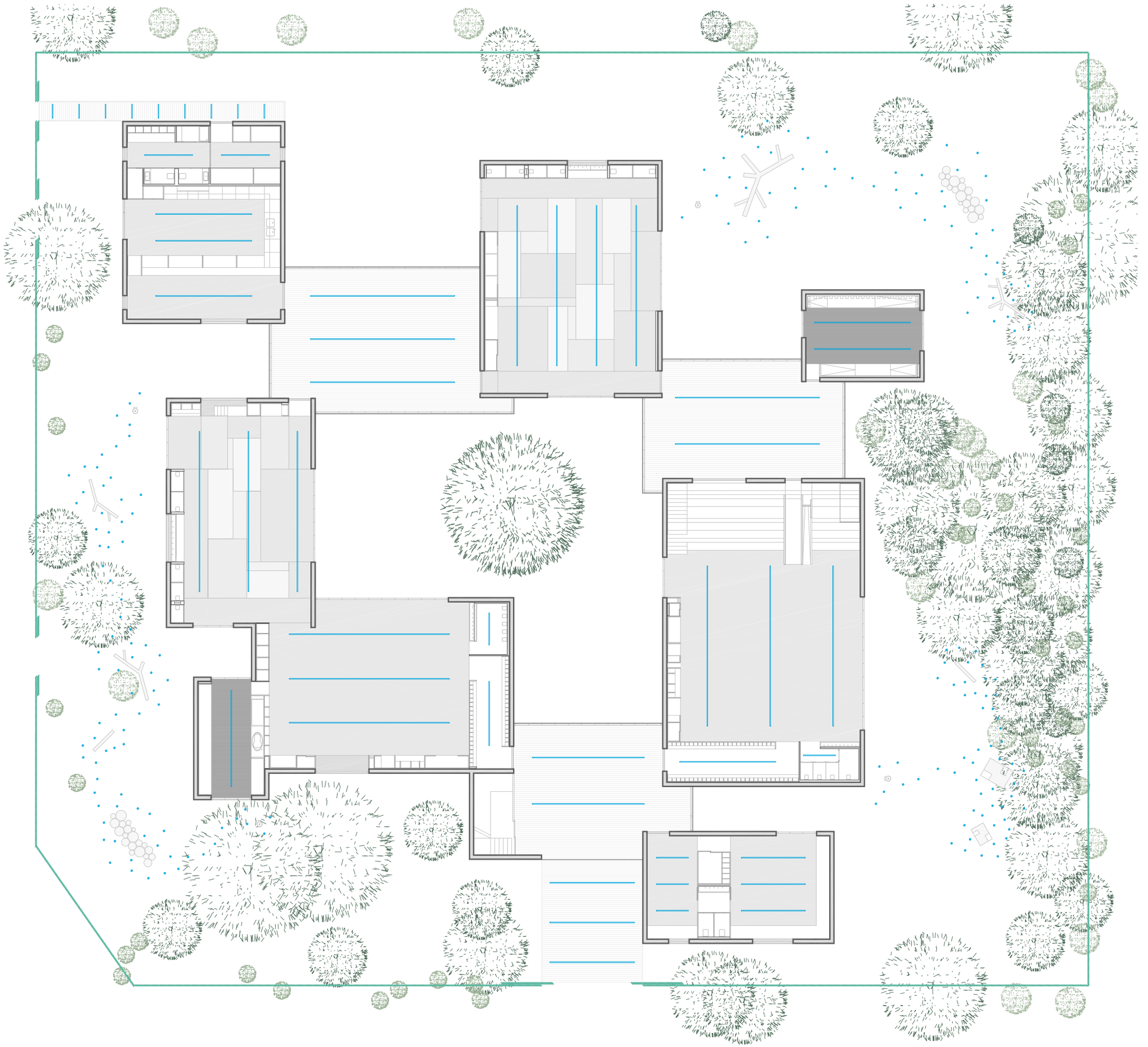
In the plan it is possible to see the position and length of every line and the organic disposition of the outside dotted lights.

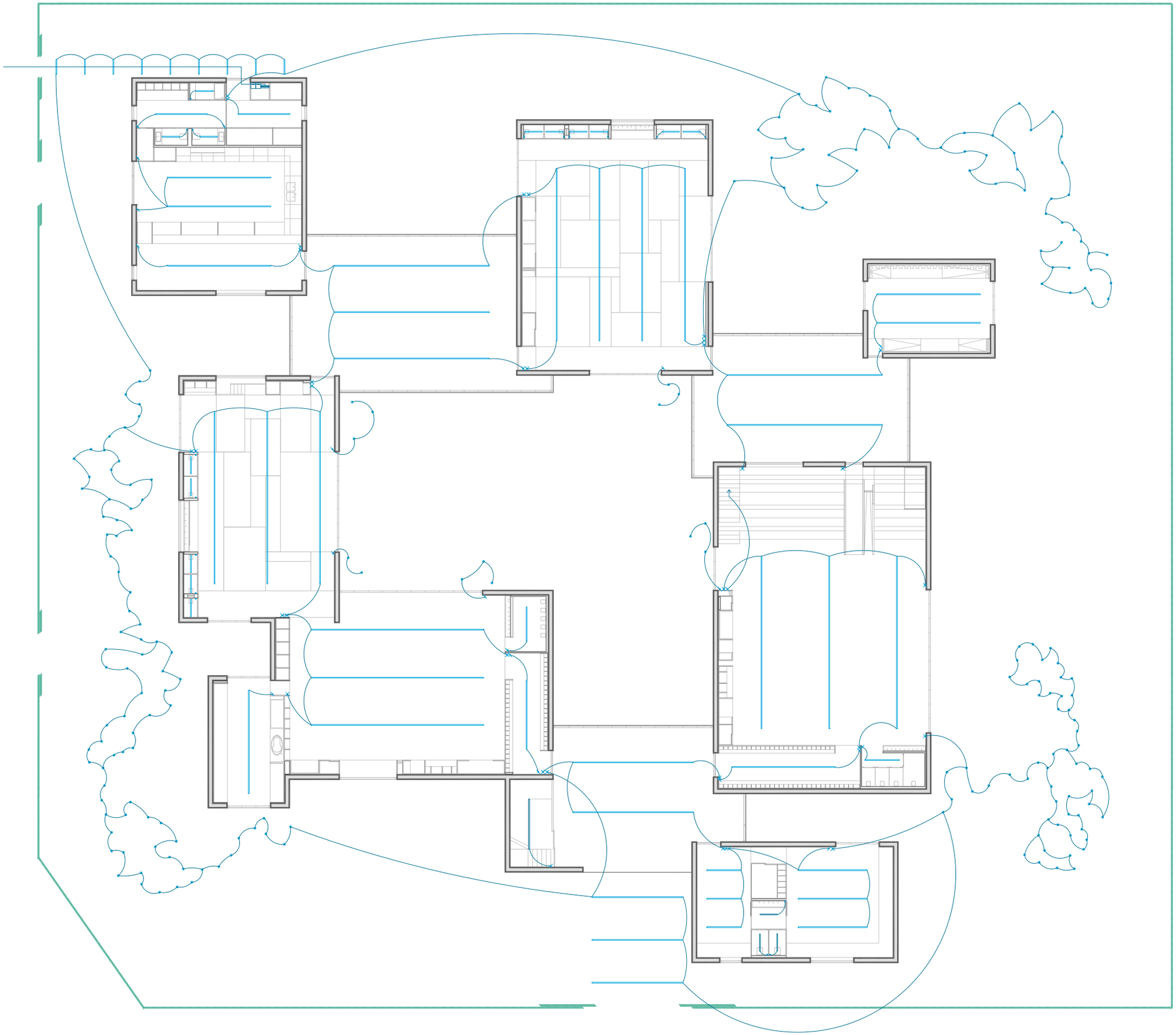
All the lights have different possibilities of power so they can be adjusted to the necessities of each room, that way in every room the achievable levels of illuminance at floor level will be:

Common rooms:	300 lux
Play room:	300 lux
Level rooms:	300 lux
Baby room:	150 lux
Buffer spaces:	200 lux
Parent's room:	150 lux
Administration:	500 lux
Cloakrooms:	200 lux
Toilets:	200 lux
Kitchen:	300 lux

All the lamps have A++ energetic certificate.

- Change-over switch
- Simple switch
- Automatic detection switch
- Light up walk inox
- iN60 or Linealuce compact





ELECTRCITY AND ILUMINATION

1_300

SPIELKINDERGARTEN

ILLUMINATION PROJECT

In the electricity plan it is possible to follow the electric net, and how it is distributed along the ceilings. It is also possible to appreciate how many and where are the switches for each light.

All the switches in children spaces will be placed at 70cm from the floor so children and adults could get them easily. Differently, the ones placed on kitchen, parent's room, administration and teacher's room will be at 90cm from the floor.