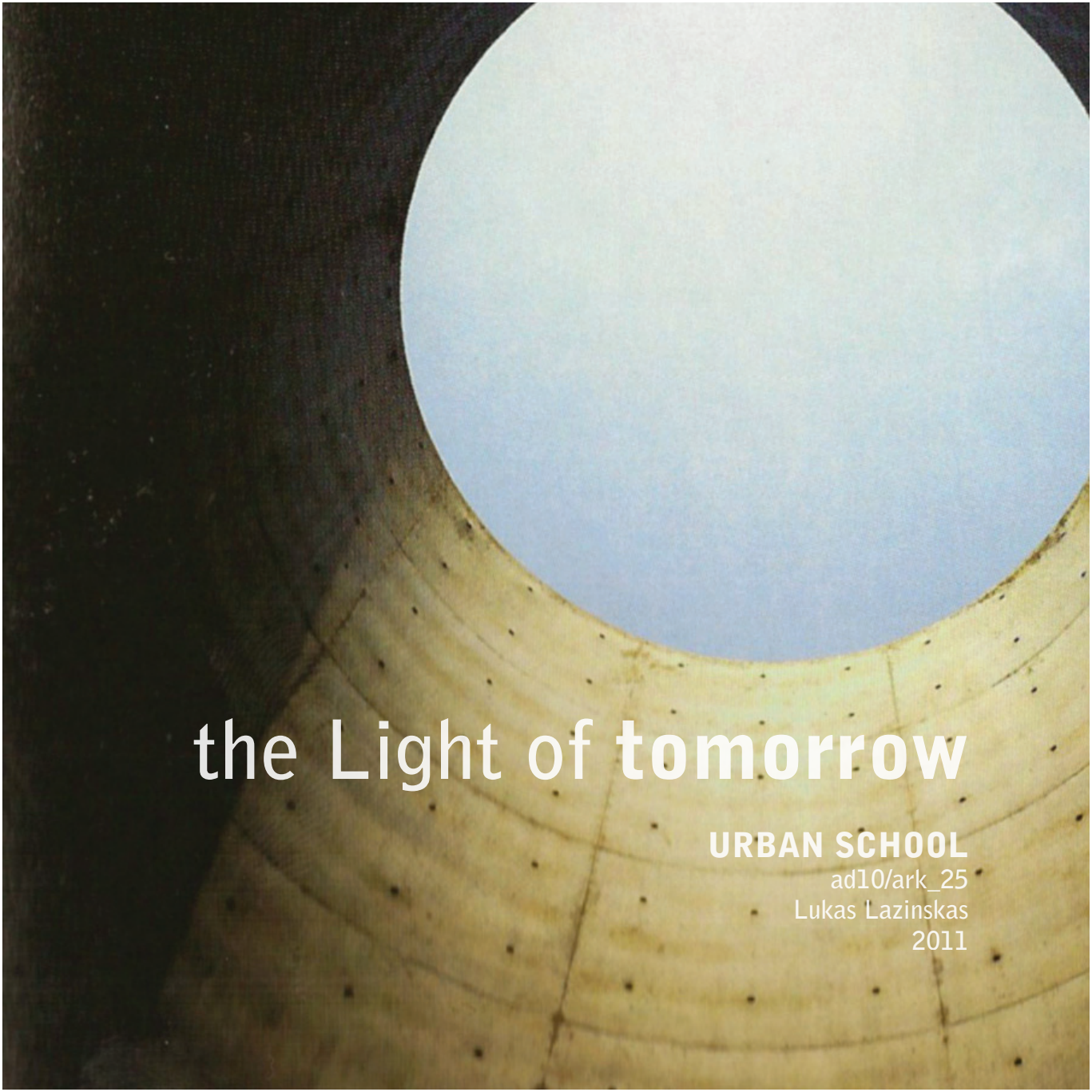

the Light of **tomorrow**

URBAN SCHOOL

ad10/ark_25
Lukas Lazinskas
2011

Title:	The light of tomorrow, urban school
Theme:	Master thesis, urban school
Project period:	1st Feb 2011- 31st May 2011
Project group:	ad10-ark25
Project group:	ad10-ark25
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..... Lukas Lazinskas.....>

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PROGRAM:

WORK PROCESS:

PRESENTATION:

MOTIVATION:

Modern cities are main driving forces behind todays populations develop-met. It is a place where residents, buisneses, industry and culture cooperate to benefit from each other. The city is a place where different people carry out their activities very close to each other so it becomes a dense structure composed of many particles linked together.

Cities consist of dense urban fabric. And this urban fabric is getting densier and densier. The populations increase, people move to cities to look for a better life, olso dense living is uses less energy resouces and is more sustainable. The architectural output of this factor are areas filled with buildings packed closely to each other, the gaps between are for communication and for minimal daylight input.

The space usage is maximized because land is very expensive. Buildings not just lie close to ech other but also sterch in height to house more presious square meters.

So the future cities will require buildings that can function in this dense enviroment without compromising the living standarts of the users. These demands require architects to develop the designs that deal with daylight shortage, multistory layouts, compacting the functios, solving passage solutions and above that providing users with spaces that stands XXI century living stadarts. The buildings that are not just the mashines to live in, but buildings that worth spending time in, are memorable, inspiering.

The challenge is for this master project is to design a school a dense urban enviroment. A school that is incorporated in buisy city limits but offer pupils and theachers high level spaces and a quality frame learning and growth.

A standart solution for a school placement is in green suburb a free standing school building that is surounded by park like context protecting it from active and buisy enviroment. But doesn't a residents of inner city deserve a school close by and offering same learning environment???

SITE LOCATION:

The building site for the urban school is located in Denmark, Copenhagen which has urban population of 1,181,239 (2010) and is the largest city in Scandinavia. The population density of Copenhagen city is 6016 persons per square kilometer.

City center area:

urban block of
the school site:

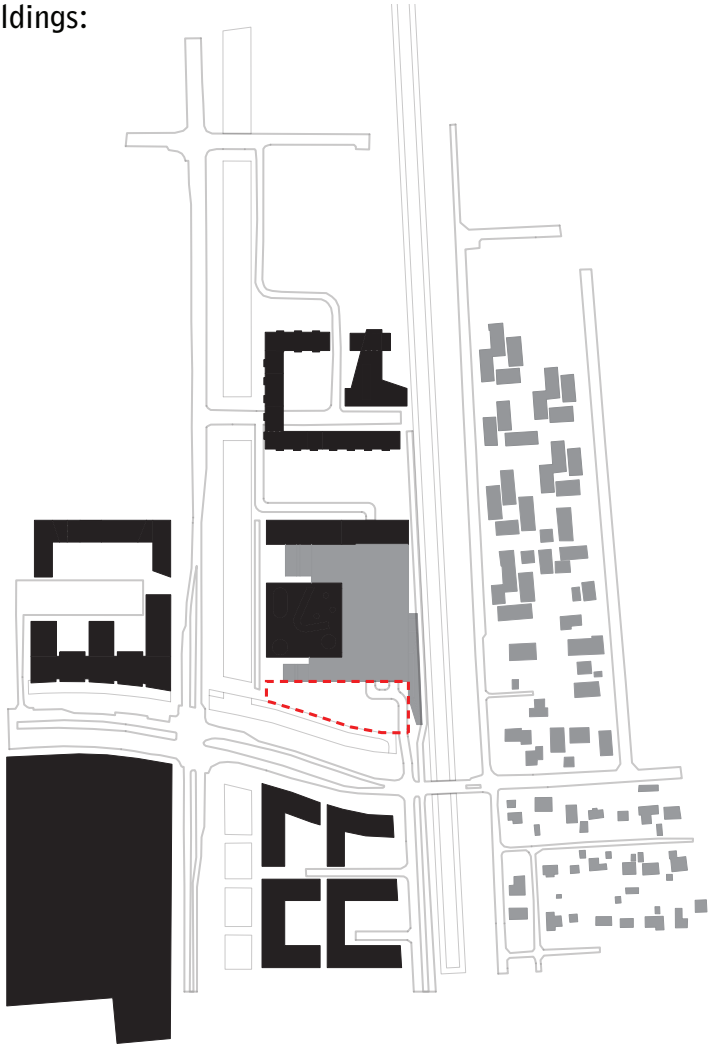
Orestad development:
area of high density
build up

undeveloped
land

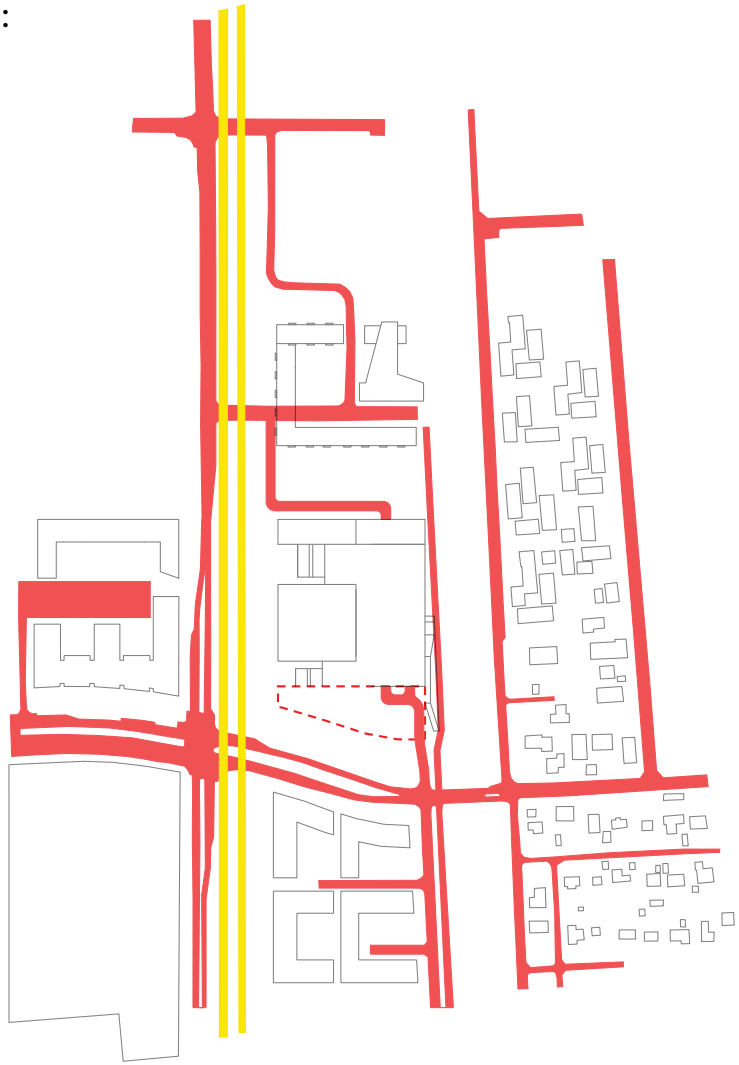
suburbian area:

SITE CONTEXT:

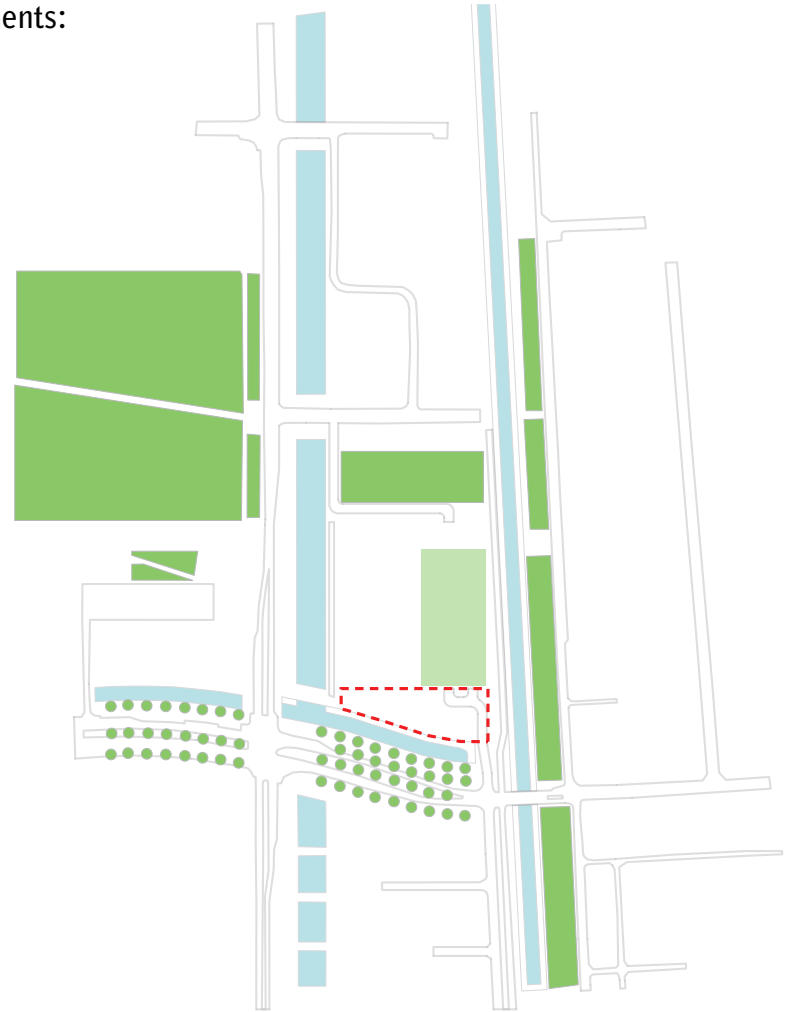
Neighboring buildings:



Trafic analyses:



Natural elements:

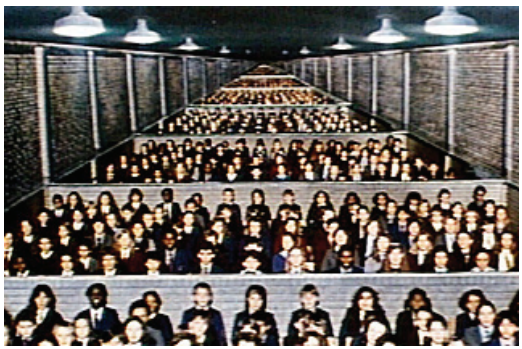


SCHOOL ARCHITECTURE:

This chapter will discuss the particular education approach that will be applied in school design. To explain the education apprach the simple comparison of "clasical" and "contemporary" approach will be carried out.

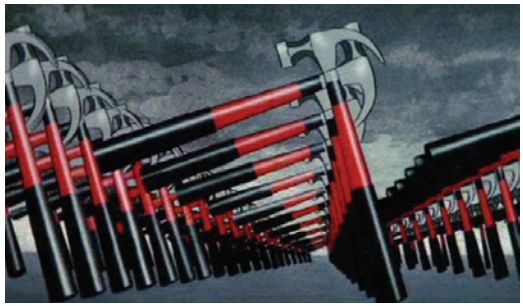
"Clasical" vs. "Contemporary"

Scene from "Pink Floyd the Wall" movie and interior of open space at Ørestad gymnasium.



The “clasical” school

The “clasical”school is the one where learning activities are organized only in the classrooms. The teaching consists of lessons that lasts fixed amount of time usually 45min. and brakes between them usually 10min. Pupils are expected to sit hole learning time in the classroom to optimize concentration. Special classes take place in specialy build classrooms like phisics, chemistry, phisical activity and others. The regular layout of the school is made from classrooms for usually have 15-25 pupils connected by coridors. This kind of school provides unified conditions to all students because this approach is based on approach that everybody learns the same way and the bigest challenge for children to learn is distraction.



Marching hammers from the movie “Pink Floy the Wall”. Symbol of unified education and mindset.

The “contemporary ” school

The contemporary school is a visionary school that seeks best performance in children education. School where all children learn more and they learn to learn. School, where children experience in their whole day through education and recreation. It should strengthen their children’s academic, social and personal skills and enable them to do well throughout life.

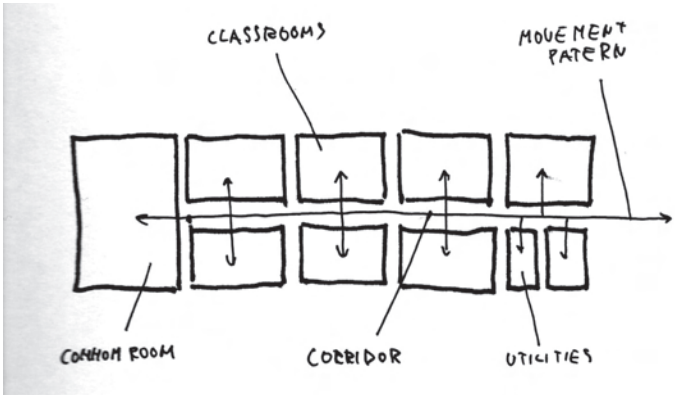
This approach was spearheaded in 1998 by Gentofte Kommune in Copenhagen which lounched a project SKUB to renovate the schools . As scientific ground for a new way of managing school came from dr. Steen Larsen (Danish University of Education)

According to his research, children learn best when they are emotionally engaged, active and challenged at the level they are. This means that the learning situation is rewarding when their emotions are in play when they are active and influential in the regular game, and when it is neither too easy or too difficult. It goes without saying that it is individually when there is such a learning situation for the individual child.

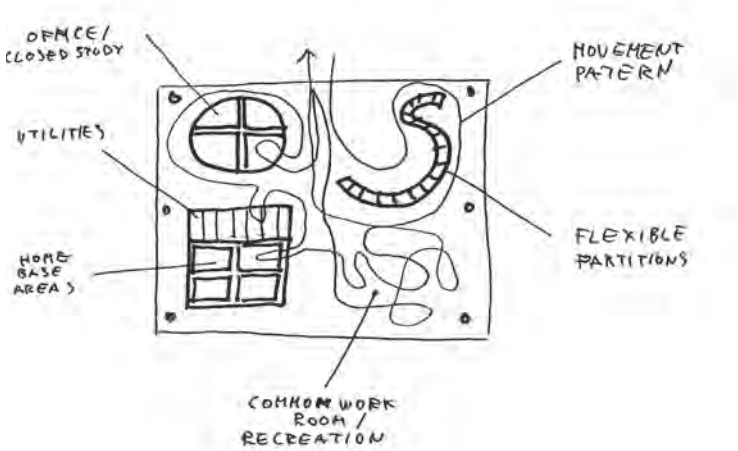
A school that takes diversity seriously, must always organize learning and teaching based on the children. There is a need for flexible schools with diverse learning environments and opportunities. In this way it may be a good school for all.

Each child has his unique way of learning and expressing themselves. Some need a routine and stable environment, others need variety and challenge. For some language plays a big role for other persons, and some are visual impression it best just to mention a few examples. When children go to school, it is therefore natural that they have the opportunity to learn in many ways.

Classical school plan layout:



Contemporary school plan layout:



Case study, Heelerup school

Address: Dessaus Boulevard, Tuborg Syd, DK-2820 Gentofte
Size: 8,200 m² - three streams, 750 students
Construction: 2002
Architect: Arkitema

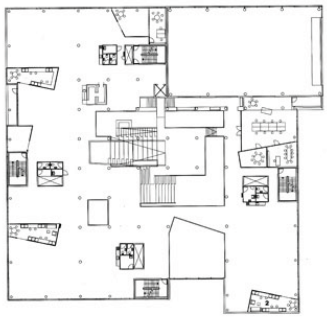
As soon as you step into Hellerup School, you notice its very special atmosphere. Just inside the entrance lie lots of shoes – because both students and teachers change into indoor shoes when they arrive. This means that students can romp about on the floor for both play and learning.
The floor areas are not merely flat surfaces, but a modelled landscape with staircases, plateaux, balconies and bridges, where the children can sit, jump about, stand, move around.

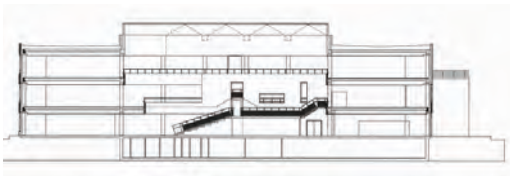
The heart of the building is the large stairway area, which is much more than just a stairwell leading from one floor to another. A wealth of different activities take place here: traffic to and fro, chatting, teaching, group work, presentations.

The stairway form is used at many points in the school's physical structure; besides the central atrium, they are also used in all home areas and in connection with the roof terraces and outdoor spaces.

Simple and clear communications routes lead in all directions from the central stairway area.

The central functions are associated with the staircase or atrium, while teaching takes place in the students' home areas, which are located in the more peaceful corners. The home area is the children's base in their daily routine, and provides them with a sense of security. With the help of mobile units – cupboards, shelving and screen walls – the home areas can be sub-divided into smaller spaces. The design of the homes areas also matches the pupils' ages, and classes can also customise their home areas to a very large degree.





CONCLUSION:

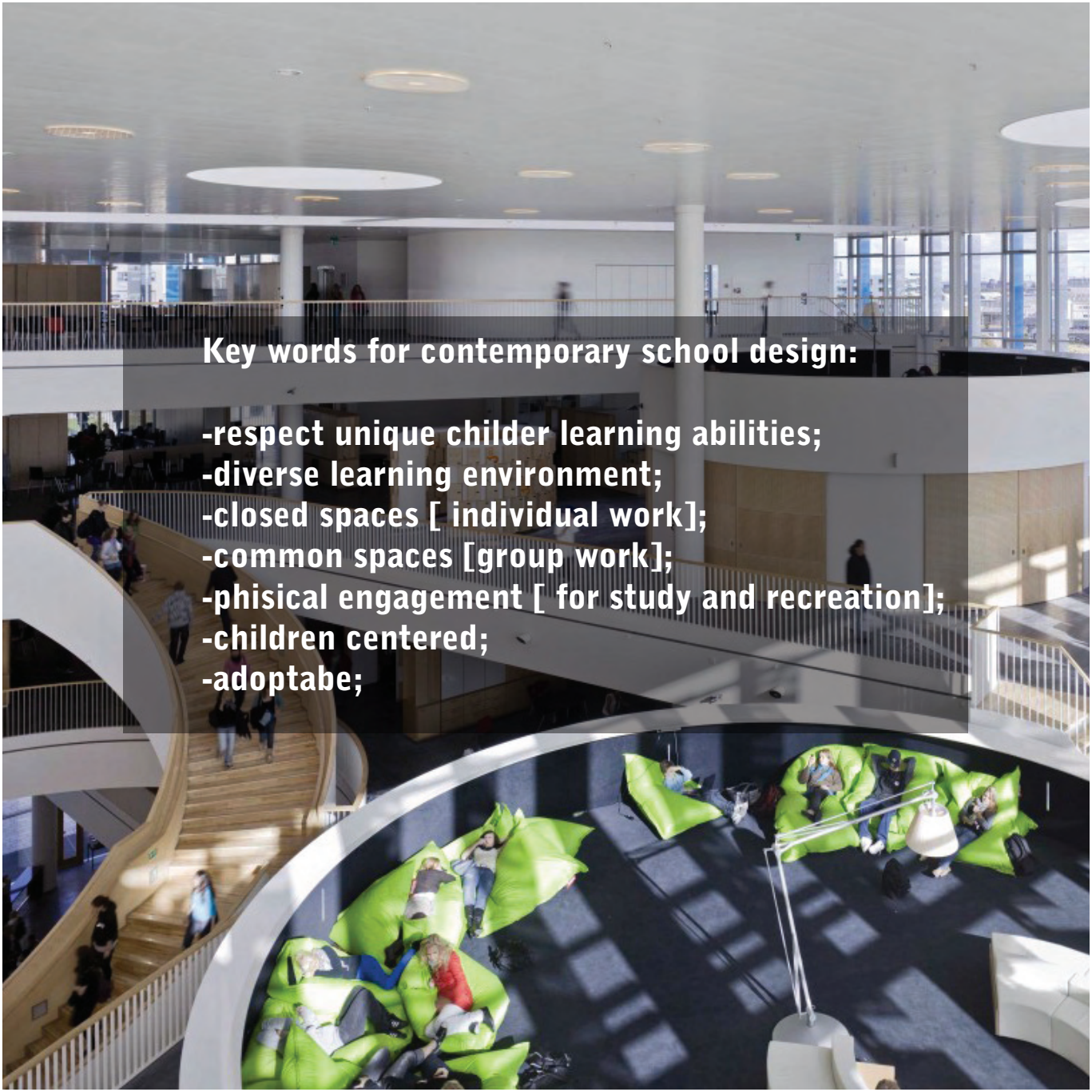
The traditional school offers too narrow possibilities to allow all children benefit from it. Some learn very differently from the ways the school teaches, and others have the potential to learn far more if they have more leeway.

Secondly, the school should reflect the society it is a part of. Former school reflected the industrial society. It was evident in the school's structure: Fixed low times, learning rate, pause rate, solves all the same tasks at the same time, the tasks provided by the teacher, very little impact on student content and methodology.

Today our society is different. Many adults work both independently and in teams, both creative and results-oriented. Many have influence on their working day . It also means changes in the ways that children need to learn to work - and thus changes in the school's work.

In addition, most of the children create their adulthood in a society where we do not know what characterizes it by then. It is therefore important that the school is considering future and is constantly in development.

"THE SCHOOL SHOULD REFLECT THE SOCIETY IT IS A PART OF"

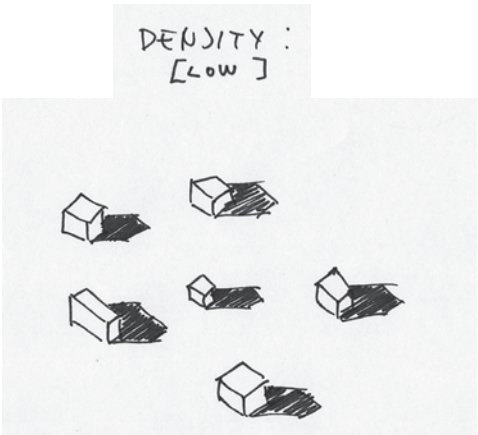

Key words for contemporary school design:
-respect unique childer learning abilities;
-diverse learning environment;
-closed spaces [individual work];
-common spaces [group work];
-phisical engagement [for study and recreation];
-children centered;
-adoptabe;

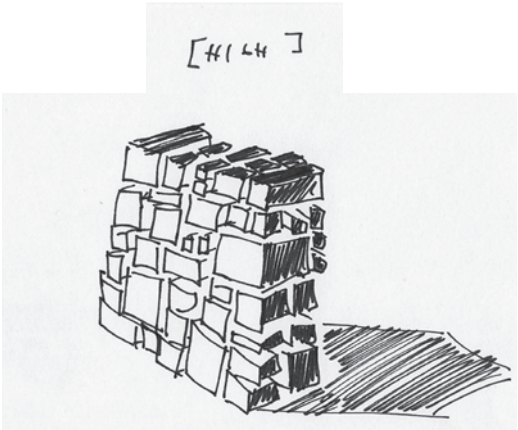
DESIGN PARAMETERS:

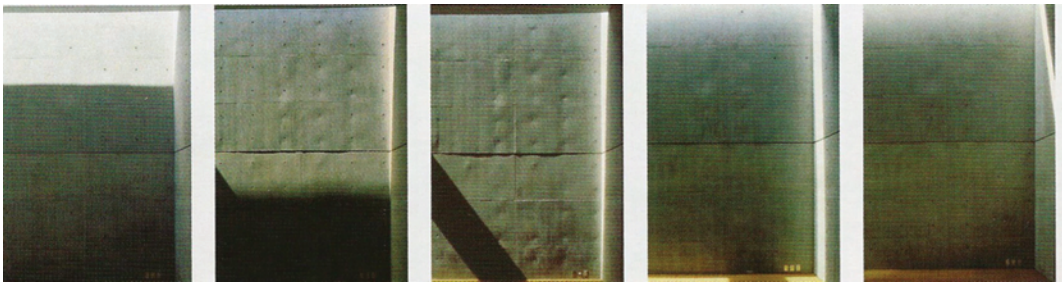
Selected design parameters represent main design focus points that variation of them would mainly influence the project outcome:

-Density in architecture

[Manipulates building to compress its spaces to contract to very optimal volume]



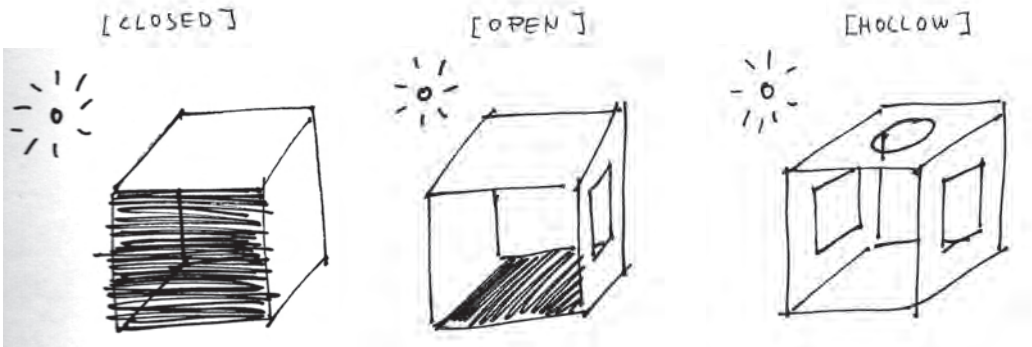




-Natural daylight

[Manipulates openings in the buildings to create more open or closed structure. More daylight is better for humen experience and vision. Less light creates more intimate atmosphere.]

[Natural daylight is also selected as projects technical parameter. To investigate daylight factor with ECOTEC software. Precise output data will help to achieve better design solutions in intergrated desing principles.



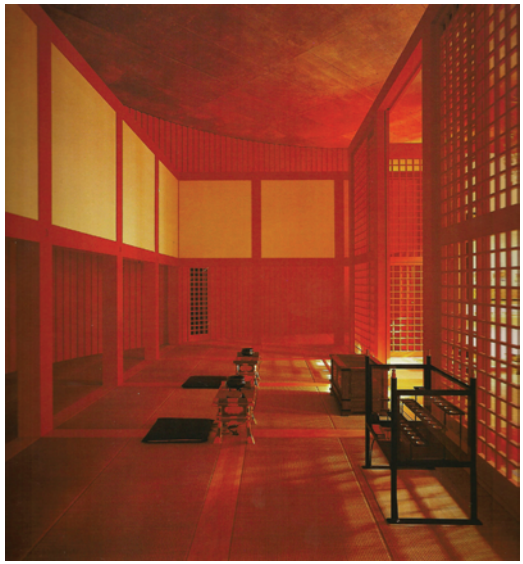
- Natural light

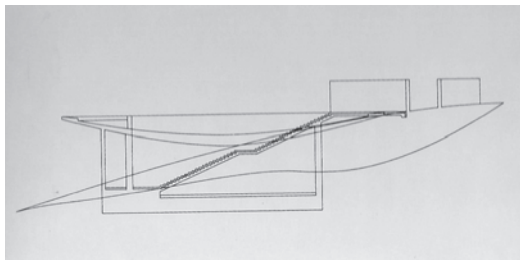
"The beholding of the light is itself a more exellent and a fairer thing then all the uses of it." *Francis Bacon*

In order to overview the the spectrum of posibilities working with natural light in architecture the group selected a book by Henry Plummer "The architecture of natural light" that analyses diferent qualities of natural light in the buildings. The book contains comprehensive survey categorized in seven major chapters that reveal different uses of light. The survey is based on observation and personal interpretation so it is made more from phenomenological point of view and not objective and technical. The group decided to study the extracted principles to familiarize with main design principles in this field. The goal is to learn from existing architectural examples that deal with natural light issue and later use these design tools in project design phase.

-EVANESENCE

"Orchestration of light to mutate through time"

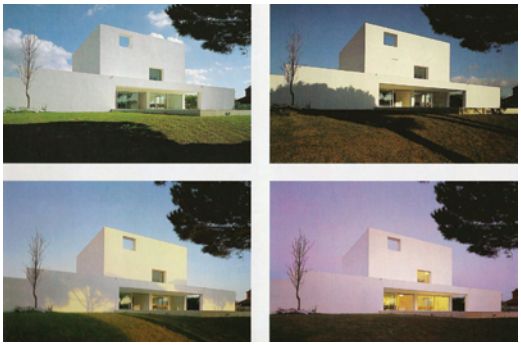


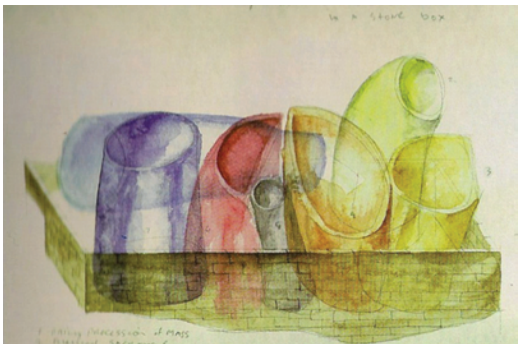


The sun is traveling through sky over time providing light to the earth. At different times the light is perceived differently due to different angle it's beams reach the surface. The affect to us is that we see objects and our suroundings lighten from one side and a usualy a shadow from the other. This "effect" cought the eye of builders from the begining of humanity. The best example is Stonehenge in England. The monumental stones are placed in the gruond to to capture the movement of the sun and therefore incorporate the sky and look to the heavens, to satisfy human need for orientation and perspective.

Sun traveling in the sky emits it's light beams that fall on the objects that people live around. Light falls on materials thus at different time reveal-

ing it's variant properties: colour, deph, roughfness, composition and so on. This phenomena is often used by architects to reveal the duration of time in their buidings. It is also used to remind us about constantly changing and cyclic world that becomes evident to us by observing the moving shadows on the walls. This is a poetic tool to combine natural dinamic in still spaces and to connect closed building with their universal environment.





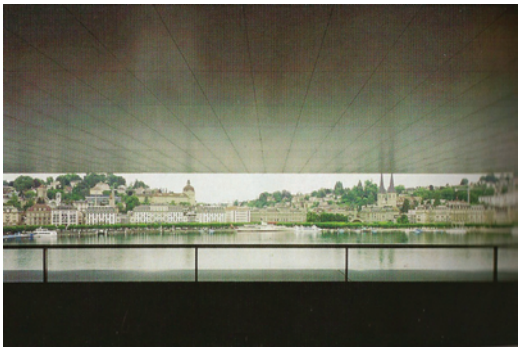
-PROCESSION

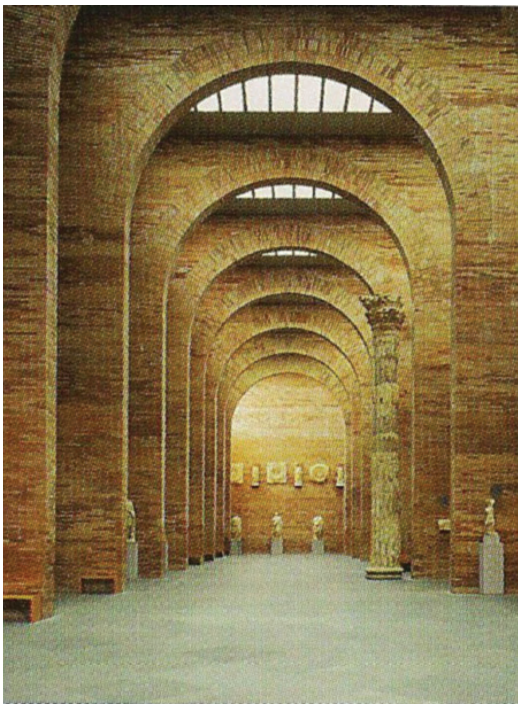
"Choreography of light for the moving eye"

People perceive space not only how they see it in one still moment but also by moving in space and observing the changes. The greatest change emotionaly is the transition from darkness to light. The so caled " light at the end of the tunnel" effect. Light effects people buy seducing and attracting them. So the rithm of light and shadow spaces is what affects how peaple perceive and remember places they visit.

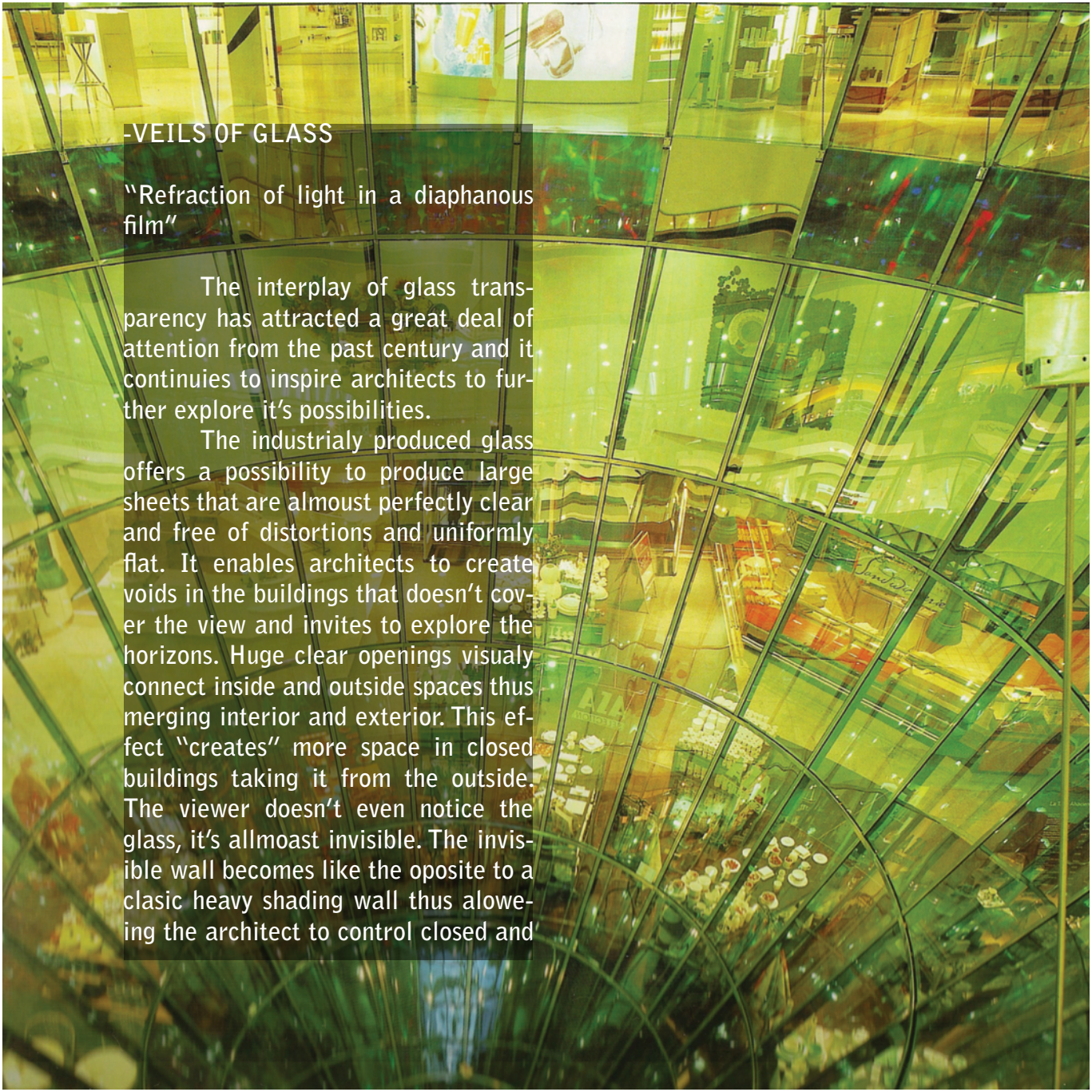
Space filled with light invokes a feeling of relief and openess and expanshion. Dark spaces close people down, slows the motion, promotes a look inwards and blures the vision. The effect on people for light and dark can not be discussed seperatly because in order to have the light you have to have darkness to fill it.

The orchestrated secuence of light and shadow is often what archi-





tect s call a scenario of the building. Visitors use the building , move around and visit the spaces simillar like puting beads on the necklace. If architect creates a scenario which reveals the "truth" about the building as Peter Zumthor would put it, then it becomes a sucsessfull and memorable and likeble. It becomes like a necklace that is so naturaly beautifull that you don't want to put away.



-VEILS OF GLASS

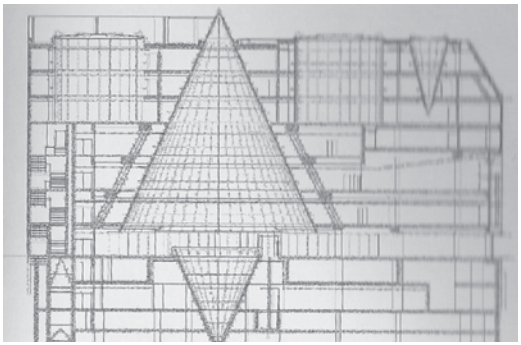
"Refraction of light in a diaphanous film"

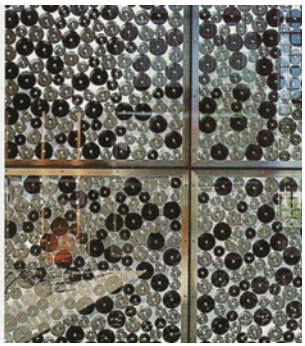
The interplay of glass transparency has attracted a great deal of attention from the past century and it continuies to inspire architects to further explore it's possibilities.

The industrialy produced glass offers a possibility to produce large sheets that are almoust perfectly clear and free of distortions and uniformly flat. It enables architects to create voids in the buildings that doesn't cover the view and invites to explore the horizons. Huge clear openings visualy connect inside and outside spaces thus merging interior and exterior. This effect "creates" more space in closed buildings taking it from the outside. The viewer doesn't even notice the glass, it's allmoast invisible. The invisible wall becomes like the oposite to a clasic heavy shading wall thus alowe-ing the architect to control closed and

open spaces in the building.

The opposite phenomena of a clear glass is to transform the view. Differently processed glass distorts the view in many unexpected ways. The rays of light bent and the human eye catches an image that is a abstract representation of outside reality. This irational feature inspires to create abstracted and blury views, where people can't concentrate on the objects as sharp as they used to. It puts a dreamers glasses on. It offers a multilayered image of distorted glass with all it's effects like reflections, colour, luminosity and others in the front and an abstract glims with blury contours of real world behind it.



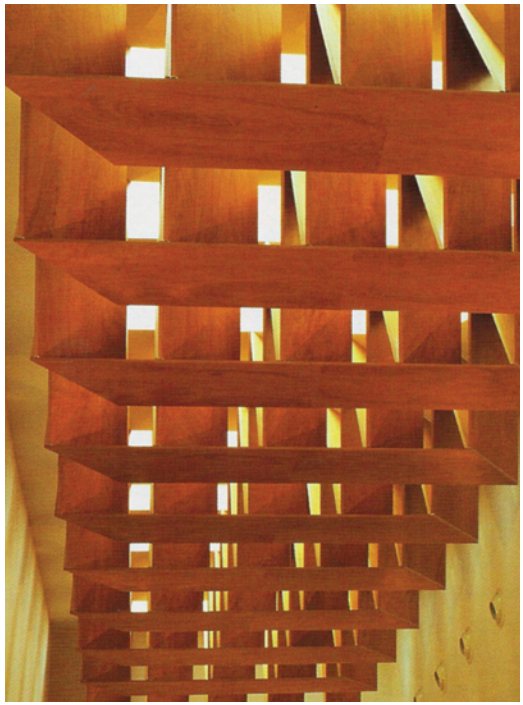


-ATOMIZATION

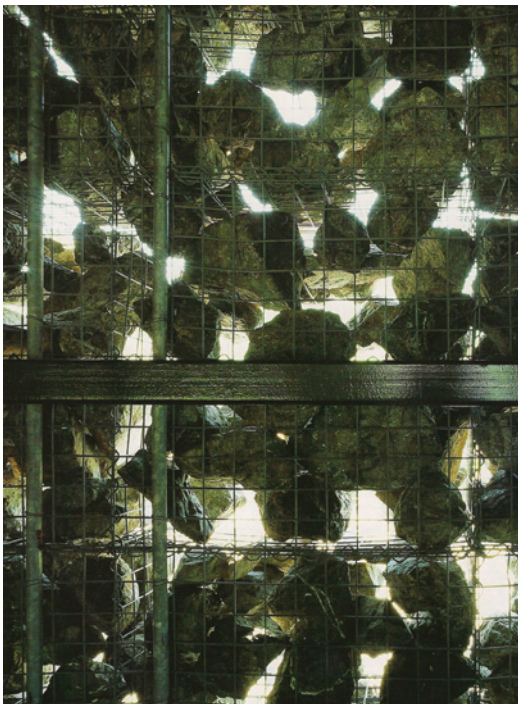
"Sifting of light through a porous screen"

The porious walls were used for many years specialy in vernacular architecture, loosly woven reeds in tropical huts or pierced stone heavy walls in India. The main purpose for such solutions were very practical, to protect from heat or glear and minimize visual exposure. Porious walls restrict light beams penetrating their surface thus abstracting the view but still provide natural airflow connection thus creating a feeling of connection to the "outside".

Contemporary fasination with porous surfaces extends not just for practical reasons but also for a special image that these semi transparent surfaces create. By controling the size of the small openings one can achieve a mistical view of the surface. The eyes sight doesn't halt on the surface it penetrates deeper and disapear. The simi-



lar view can be seen in a misty morning where buildings standing closer to you appear solid and real and the ones standing in more far away start sinking in to the fog until they totaly disapear. There are many ways to achieve this effect. One common approach is to applly flat thin sheets like steel or similar with particular small holes that filter the light. The sizes of the holes control the opelness of the view. Another aproach is to go one step ahead in scale and use repetetive larger objects like natural stone pieces that placed freely on each other form more massive porous mass that pass through beams of light . The resulting shading patern replikcate the natural shape of the objects creating the constantly changing mosaic of light and shadow.



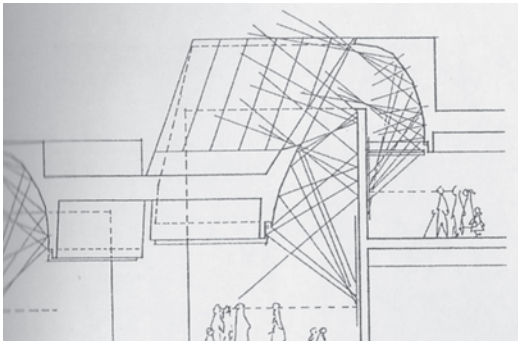
-CANALIZATION

"Channelling of light through a hollow mass"

The attemts of modern architecture to fill buildings with day light and benefit from nature started new explorations in cutting holles in the buildings to channel the light deep inside.

Contemporary efforts to pass the light inside the building produced a new generation of hollow structures. The buidings become like a porous sponge not filled by darknes but rather glowing natural light. The cavities are perceived as optical tools to distribute light. The approach not only increases the well beying of people spending their time inside but also offer rich poetic atmospheres.

Guiding the light obvously is very sucsesfull working with openings in the roof and introduceing voids that reach lowest levels of the building. Many different vishual effects can be



achieved by manipulating the direction of light that reaches the desired surface. More dirrect for stronger light or indirect and reflected for more diffused light.

Voids can be sculpted through all directions of the building thus appreciating different lighting condition offered by changing angle of sun. Warm yellowish tones of light would fall on the building in the evening and sharp bright allmost white light would fall during the midday thus creating strong contrasty short shadow paterns.

-ATMOSPHERIC SILENCE

"Suffucion of light with unified mood"

For centuries architects tried to grasp the ability of natural light to create it's own mood. It is when beams of light fill the room reflecting from varous surfaces and elevating the feeling of materials from surfaces in to the air. It is the atmosphere when you can actualy "see" the air in the room and feel it as a material thing. When light and the space becomes one thing. Only then this atmospher arise when the materials of suroundings are quieted down and the tones matched together leting the light to play the first role in the scene. The forms clarify themsesves and the feeling of whole arise.

This special atmoshere is not something that can be controled precisely. It is highy poetic tool that can't be strictly programed. It requires certain desigh aproach from architect to reveal the esential emptynes in space.

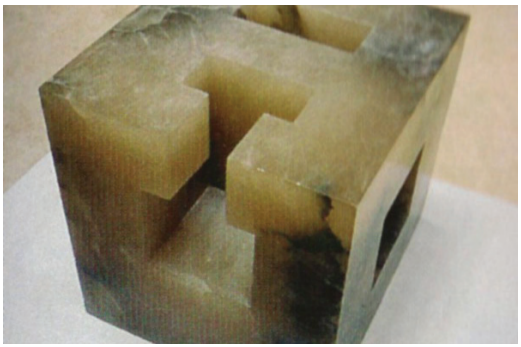
The simplicity of suroundings envokes more sensetive seeing and hearing. Only then if the natural light is right the room is filled luminous atmosphere. It starts to become more evident when building elements are simplified and purified. The unnesesary visual noises quite down intvitign the visitor to quite as well. This intimate atmoshper is often desired in spititual buildings where people tend to relax, concentrate and take a look inside themselves. Movement is not encoruaged. The light source is usually not evident thus not encoruaging to seek the way but rather to move on at ones own natural speed.

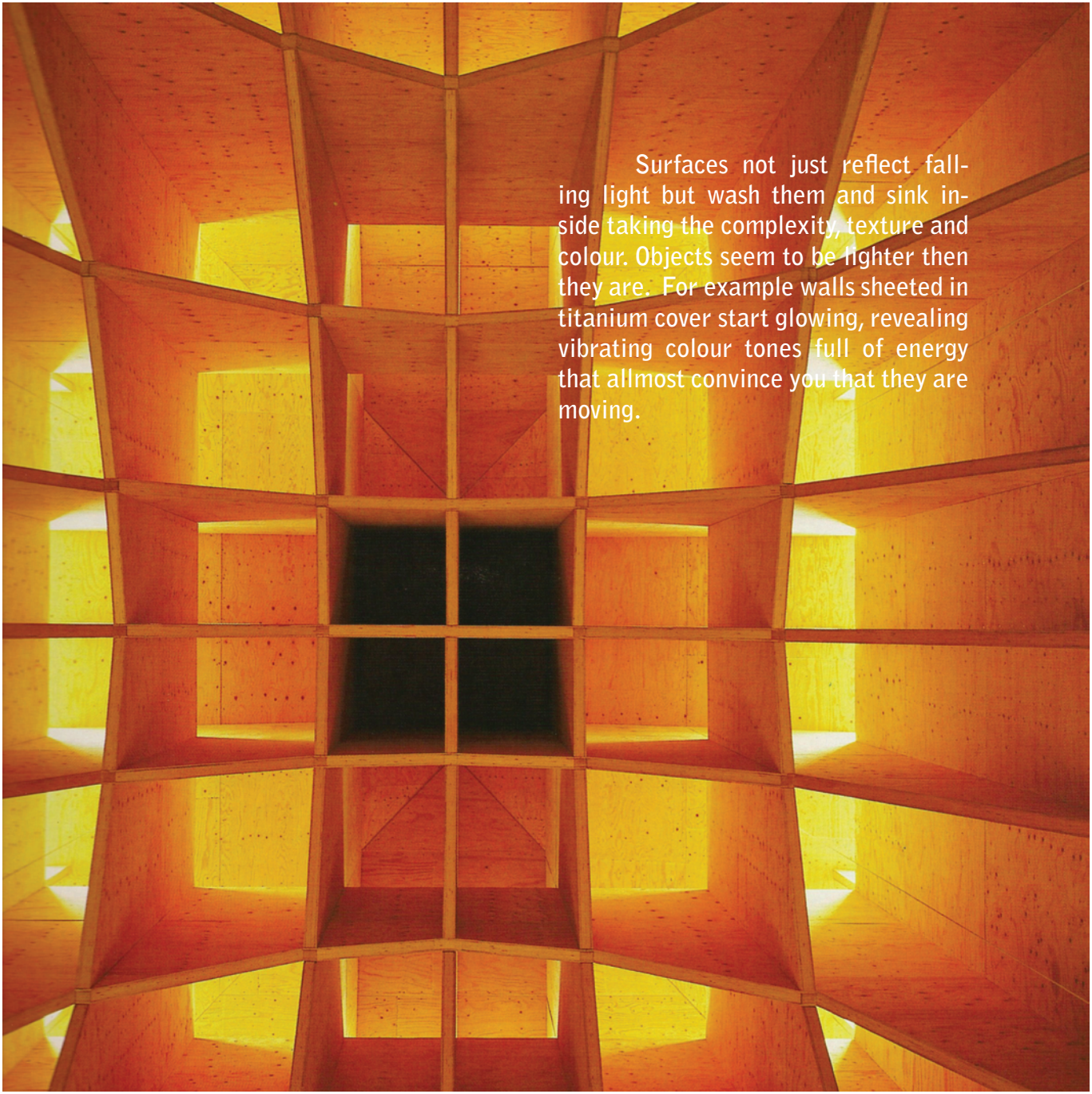
-LUMINESCENCE

"Materialization of light in a physical matter"

The light has the ability to penetrate matter and produce an inner glow. The object looks like the light source itself. The light is locked in the object thus creating a feeling that it is realy a material thing. The objects like natural stone pieces cut in thin sheets begin to glow and show their inner structure when enough natural light is falling on them. The traditional coloured glass mosaics begin to glow and become alive coming to their true purpose to capture and then release the light.

The contemporary building methods also offer many possibility of capturing light in the materials. Stone, wood, coloured glass, metal sheeting plaster begin to glow if they are processed to absorb light. Usualy still and solid objects awaken and show their subtile qualities and hidden anatomy.





Surfaces not just reflect falling light but wash them and sink inside taking the complexity, texture and colour. Objects seem to be lighter then they are. For example walls sheeted in titanium cover start glowing, revealing vibrating colour tones full of energy that allmost convince you that they are moving.

- Desity in architecture

The mathematical expresion of what density is in architecture can be described by floor area ratio. "The Floor Area Ratio (FAR) is the ratio of the total floor area of buildings on a certain location to the size of the land of that location, or the limit imposed on such a ratio" [Wikipedia] This relation shows how dense the area is built.

Low density areas are ussualy country side or suburban city areas. The is the consiquence of big amounts of land available for development, low prise and people preference of owning their own house with private garden.

In low density context the building is placed in free standing space with no restrictions. The design of these kind of buildings is flexible and not limited by neighboring objects, like buildings or traffic.

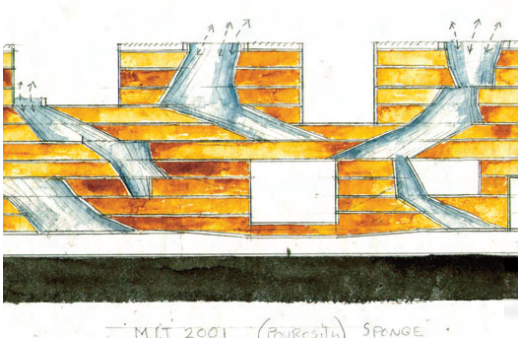
High density ares are typical in city centers, highly urbanized areas or where there building area is limited by natural obstacles like mountain slopes.

It is ussual that concentration of various activities like commerce, transportation, living and others determine that are is getting denser, starts "growing". The concentration of activities is whatmakes urban areas effective which results high land value.

Building design in dense context requires to work out a solution that would match many diverse issues . In inevitable future of densification the architect will have to work dense and compact programs.

The density can be desribed in urban context where "one element" of design is a building or block structure. In smaller scale density is concentration of different functional elements that have to be modeled together in one integrated mass stucture.

Steven Holl, Simons Holl building, a dormitory for 350 students is a good example of design that is dealing with compressed program. The Day light inside is provided by deep light shafts thus making a building like prious sponge.



PROJECT VISION:

Imagine a city of tommorow that is dense, highly populated and still expanding in all directions simultaniousley, underground, higher to the sky and in with. What is a suitable school for this kind of city?

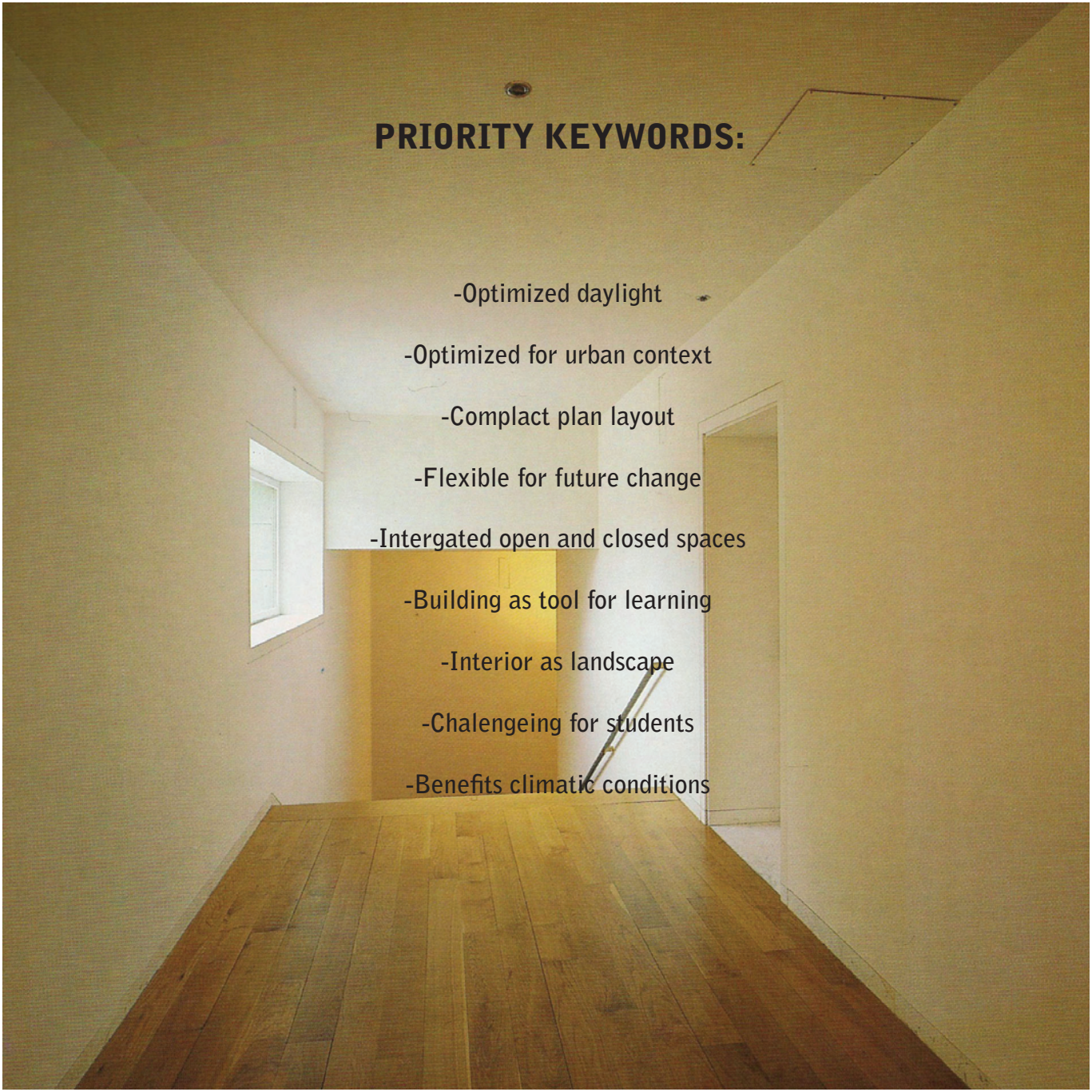
A school that is integrated inside dense city block. It has a small site so it has to use it very effectively. None of regular school functions has to be excluded. The school is a hight multistory building that is more intraverted than looking outside because of restricted views. But the openings available have to provide maximum natural daylight. Daylight has to penetrate deep inside and the benefits of natural light has to reach the farest corners.

It is an open school with combination of open and closed spaces. Every student is an individual and school has to provide deferent needs for the student and teachers. Closed and open spaces are integrated together.

The interior of the school is man maid landscape wich challenge the students to explore and use their bodies to get around. Walk, run, climb, sit, lie and influence the school itself. It is dynamic and complex like many pupils that atend it.

The exterior comunicates to the outerworld that it is a school building. It is a building of growth and cooperation. It is memorable, mistyrous and inviting to explore.

The school works as a tool for learning itself. It reveals the lows of nature like climate, forces of phisics, aesthetics, human body, and cooperation between individuals. As compact city of knowledge in a city.



PRIORITY KEYWORDS:

-Optimized daylight

-Optimized for urban context

-Complact plan layout

-Flexible for future change

-Intergated open and closed spaces

-Building as tool for learning

-Interior as landscape

-Chalengeing for students

-Benefits climatic conditions

PROBLEM STATEMENT:

The standart school design solution is a building standing in the free space and enjoying benefits surounding greenery and low density build up context. This way school design is fexible to take many shapes on offer different plan solutions.

This scenario is not possible when the school is placed in dense urban area where neighboring buildings restrict desing solutions and only limited site is available.

school ???

DELIMITATION:

As stated in project vision the project will concentrate on:

-Contemporary school design
[work with visonary education in schools]
-Density in architecture
[work with coplex plan layout in urban contex]
-Natural daylight
[daylight as aesthetic and technical parameter]

and solve other issues of the project in very general manner:

-Structural system
-Engineering systems like ventilation,sewer and so on.
-Construction details
-Budget

SPACE PROGRAM:

SCHOOL CHARACTERISTICS:

Typology:	Urban school
Type:	Highschool
Grades:	0-9
Pupils:	~840
Personel:	~45
Building area:	9400m2

CLASSES:

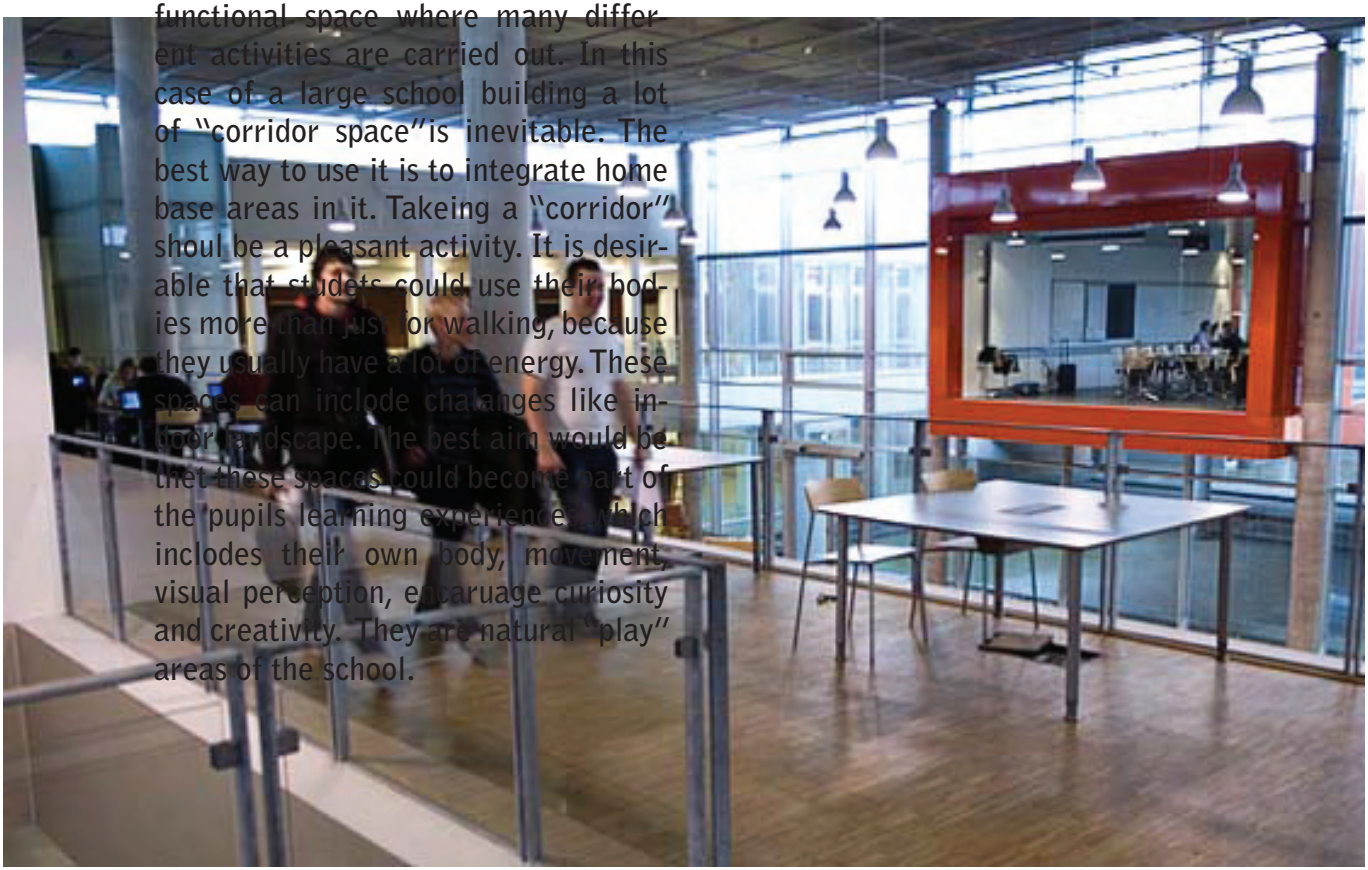
Classrooms are main spaces where clasical learning is carried out. Reading, writing, listening, discussing. The maximum amount of pupils can be 30 but 25 is the desired number. The classrooms schould be around 60m2 giving 2.4m2 per pupil. The designed space can be closed to provide privacy, protection, sound insulation and better concentration. Classroom space can as well be open and tranformable to adopt with changeing school demands like increased number of students. It is enough to have one wall with opening faceing east, west, north. With south and west orientation aditional atention should be payed to control daylight and indoor climate.

HOME BASE AREAS:

These are the areas where pupils have their lockers for wardrobe and space to spend time between classes. It is preferably equiped with furniture that engages pupils phisicaly and encoruages them to use their body. It is important in order to achieve more balance between active and passive being in the school. The furniture and equipment could be transformable and also used for smoller group work discusions in process of learning. The groups could be devided in 4, 8 or 12 work groups. The home bases should be common for one track like all 3rd graders have one big home base that is divided in smaller areas by each class. This is done in order to have some separation between different ages groups of the pupils that range from 0-9th grade. Home bases are usualy well integrated in circulation spaces and merge together.

CORRIDORS:

Corridors are conecting ares of the school but single function "classical" long corridors shoud be avoided, because they do not use space efectively and don't create a dynamic and atractive environment. The connecting spaces coud serve as open multifunctional space where many different activities are carried out. In this case of a large school building a lot of "corridor space"is inevitable. The best way to use it is to integrate home base areas in it. Takeing a "corridor" shoul be a pleasant activity. It is desirable that studets could use their bodies more than just for walking, because they usually have a lot of energy. These spaces can inclode chalanges like indoor landscape. The best aim would be thet these spaces could become part of the pupils learning experience, which includes their own body, movement, visual perception, encaruage curiosity and creativity. They are natural "play" areas of the school.

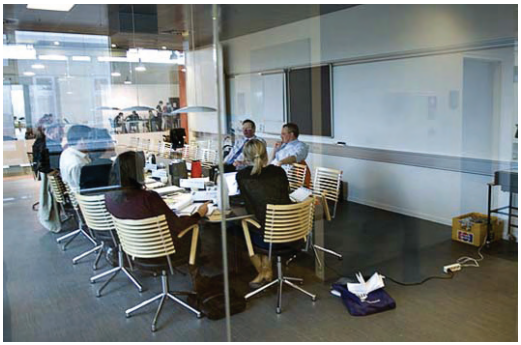


SPECIAL CLASSES:

Special clasrooms in the school are designated for single purpose teaching. These inclode science classrooms like: chemistry/phisics, nature studies, biology. Art classes also have special classrooms for: music, visual art workshop, handwork workshop, wood workshop.
The main criteria for all these classrooms are that they should be adopted for thier purpose which is; providing necesary equipement like increased ventilation, sinks for hand wash, adecwate space for moving and working/stydying, sound insulation, storage space in the classroom and others particular for that class. Special classes require a lot of depot space inside and also ouside classroom to keep necesary metodical tools and instruments.

MANAGEMENT:

Spaces for teachers, principal and other school personel. This is basicaly office spaces for personal teachers work. Also includs common discusion place. The good orientation is to the east, north or west.



KANTEEN:

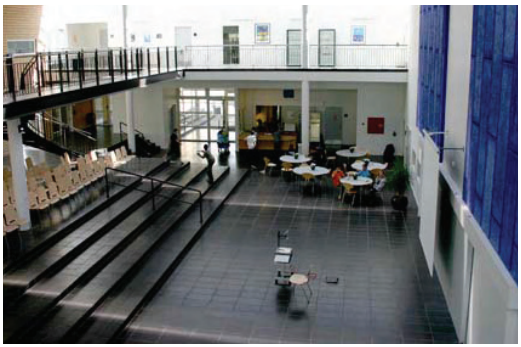
Kanteen is dinnig area of the school for pupils and staff. It consists of kitchen for food preparation of staff around 10 personel and kanteen where food is served and space for tables to have the meal. The meal serving concept is based on self service. Since the large amount of student in the school the kanteen could offer space for 200-300 pupils. The meal would be served at different times in relation to effectiveness and diferent age grups. The kanteen can be partly opened and intergated in school open spaces. It is desirable that the place could be used for other purposes like for student to hang out, rest, or do homework when the meal is not served.

COMMON SPACE/HOLL:

School building should include at least one bigger common space which could be considered as a "public" space for pupils and teachers. It should serve representation and gathering purposes. This space is for students to socialize, arrange exebitions, events. This should be an integrated space in school building, open, multifunctional and well connected with the rest of the school.

SPORTS HOLL:

The main area where student carry out their physical training indoors. The demands are that this could serve as a transformable space and be used not only for sport activities but to other common events like common lectures and presentations. Aditional equipement includes foldable spectator seats, trasformable scene. Good access from the rest of the school i very important because outside visitors like parents could also come to event in the sports holl.



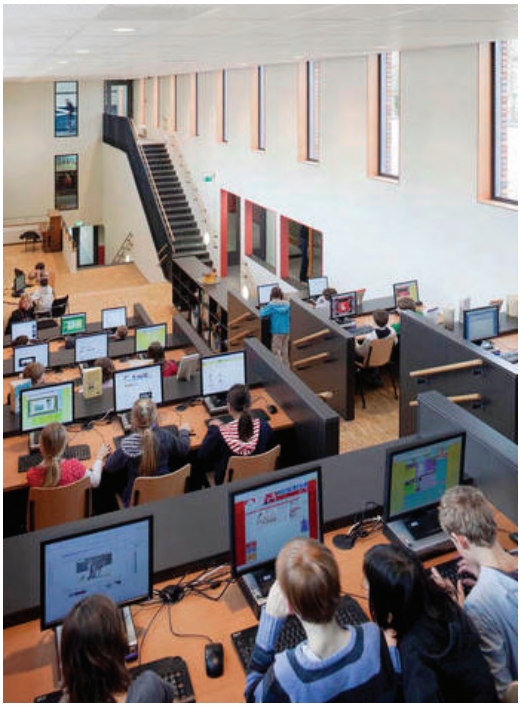
DRAMA HOLL:

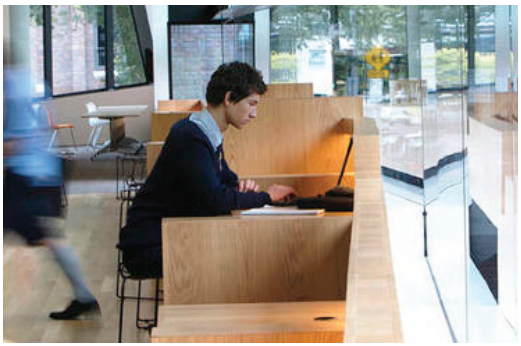
Drama holl is where main performances of the school are practised. It includes music, dancing, theater, lectures and presentations. It is a trasfomable space with one level floor with foldable spectator seats and a lifted scene. Drama holl requires depot space, a small foye and clear entrance from outside of the school. Activities in

drama holl sometimes have to be open to other visitors of the school like parents. This space doesn't require particular orientation , but sound quality is very important. The ceiling hight is 6 meter minimum.

LIBRARY:

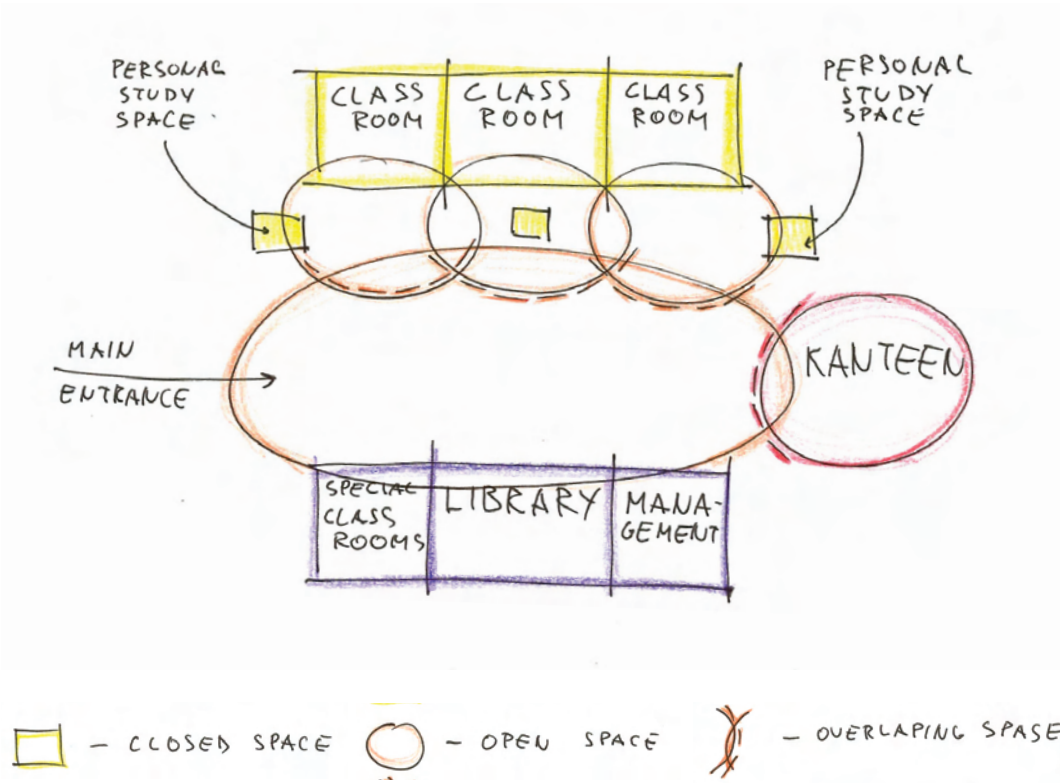
Library is the knowledge center of the school. It holds books and space for reading as a clasical library. In addition it incudes digital equipment and access to internet making it media library as well. It is provided with personal work places- workstations. It has to be a quite and calm area where student who require silence and concentration can find their place. It has to be isolated in terms of sound, but be well connected to main school pathways. Library needs good natural light conditions for healhty reading and good atmosphere. The library should encaruage pupils to be curious and and deepen their are of interest.





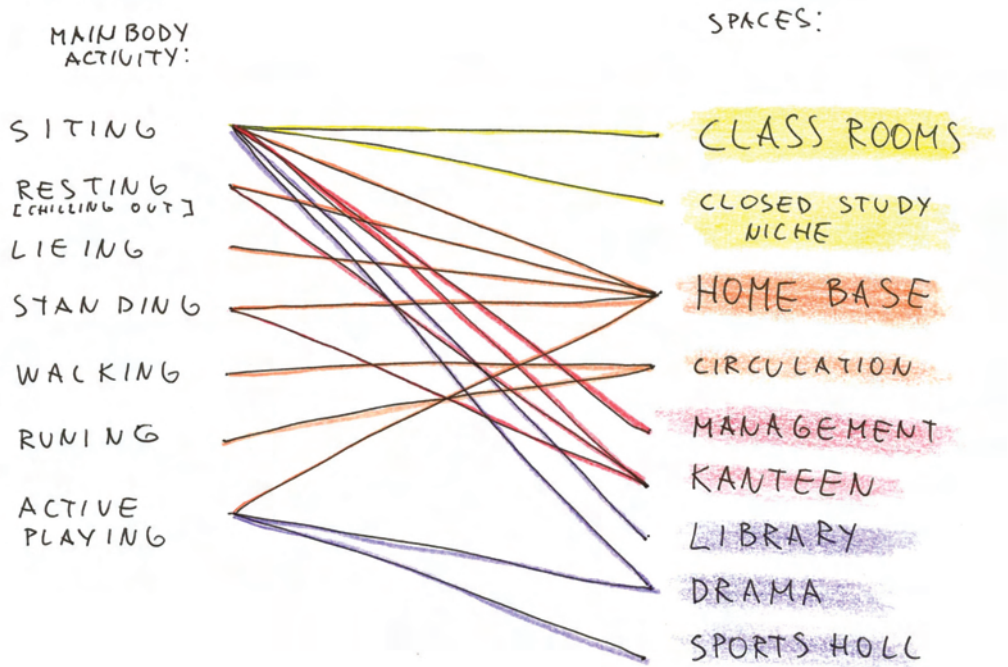
FUNCTIONAL DIAGRAM:

Diagram shows the relationship between different spaces in the school and the properties of particular spaces. It reviels the main pupil "flow" from main entrance through circulation areas to home bases and to the classrooms.



BODY ACTIVITY IN THE ROOMS:

Diagram investigates the pupils body positions in different school spaces. From the diagram it becomes evident that home base areas and circulation areas are the most active parts of the schools. The passive areas are monofunction spaces like classrooms or library. This could sugest different aprouches regarding furniture layout in those rooms.

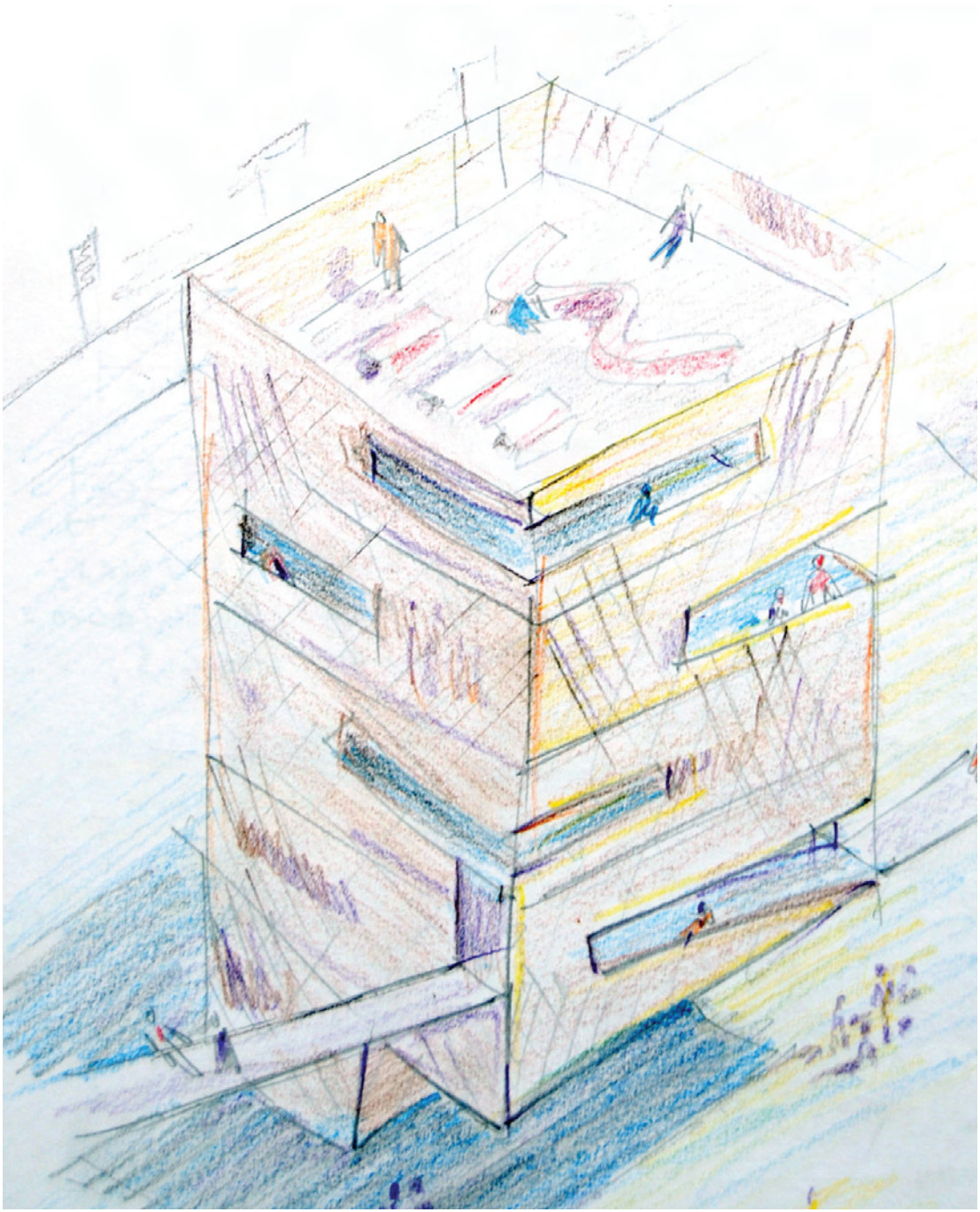


ROOM:	Amou nt:	Main activity:	Person capasity per unit:	Area per unit [m2] :	Phisical activity level:	Space require-ments:
Class room	30	teaching	25	60	low	closed spase
Play area	10	playing, relaxing, group work	75	130	medium, high	open, semi open
Wardrobe for pupils	10	Personal storage	75	12	medium, high	semi closed, closed
WC for pupils	10	wc	4	12	low	closed
Nature science class	1	teaching	25	75	low	closed
Physics/chem-istry class	1	teaching	25	75	low	closed
Biology class	1	teaching	25	75	low	closed
Depot for science classes	1	storage		25	very low	closed
Music class	1	teaching	25-50	130	low, medium	closed, transformable

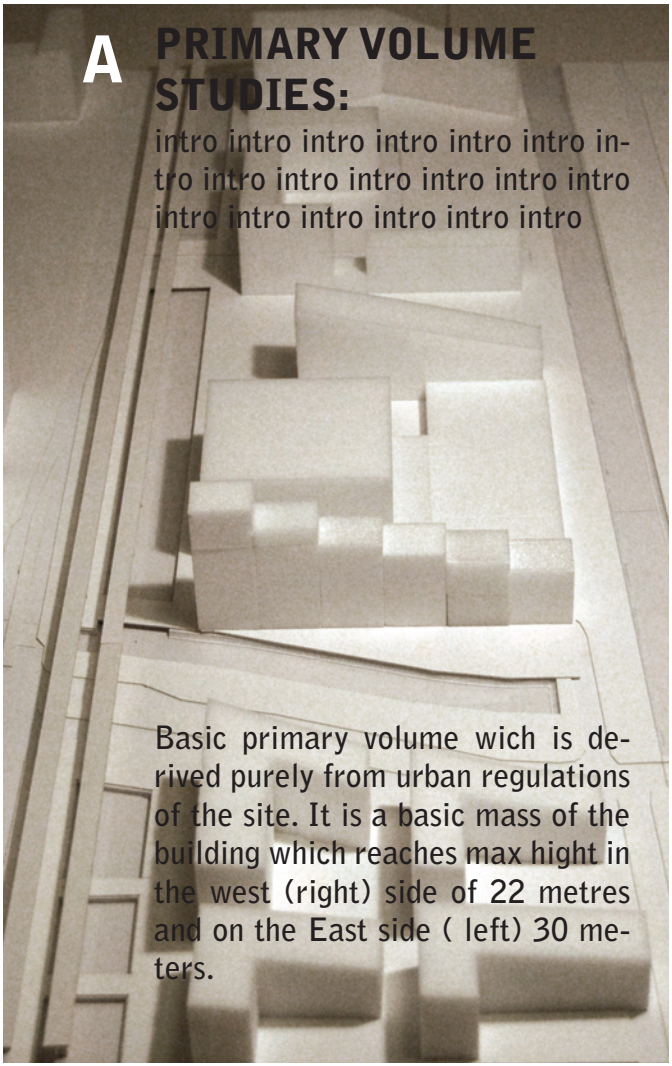
ROOM:	Amou nt:	Main activity:	Person capasity per unit:	Area per unit [m2] :	Phisical activity level:	Space require-ments:
Depot for music class	1	storage		45	very low	closed
Visual art workshop	1	workshop	25	75	low, medium	closed
Handwork workshop	1	workshop	25	90	low, medium	closed
Wood and art workshop	1	workshop	50	280	low, medium	closed
Depot for workshops	1	storage		50	verylow	closed
Management	8	Office work	1-12	18	low	closed, transformable

Comon holl	1	entrance, presentation space	125	250	medium, high	open, tranformable
Kitchen	1	food preparation	8	370	medium, high	closed
Tech. room for kitchen	1	technical equipment	2	8	very low	closed
Kanteen	1	food serving, dining	200	300	medium	semi closed, open
Library	1	book storage, reading, workstations	30	100	low	semi closed, closed
Sport holl	1	Sport activi-ties, school gatherings	250	600	high, very high	closed, transforable, high-7m
Wardrobe,wc for sports	2	changing room	50	40	high, very high	closed
Depot for sports	1	storage		30	very low	closed
Tech. room for kitchen	1	technical equipment	2	8	very low	closed
Drama	1	performanc-es, presenta-tions, school gatherings	120	450	medium, high	closed, high-7m
Depot for drama	1	storage		30	very low	closed

ROOM:	Amou nt:	Main activity:	Person capasity per unit:	Area per unit [m2] :	Phisical activity level:	Space require-ments:
Depot for kitchen	1	storage	2	20	very low	closed
Changing room for ser-vice personel	2	changing-room, wc, showers	8	40	low	closed
washing facili-ties	1	loundry	2	25	medium	closed, 10pieces
extra wc	4	wc, shover	1	15	low	closed
Server room	1	IT equipment	2	20	very low	closed
Workshop for maintenance	1	workshop	6	60	low, medium	closed
Depot	4	storage		50	very low	closed
Technical room for school	3	tchnical equipment	3	50	very low	closed



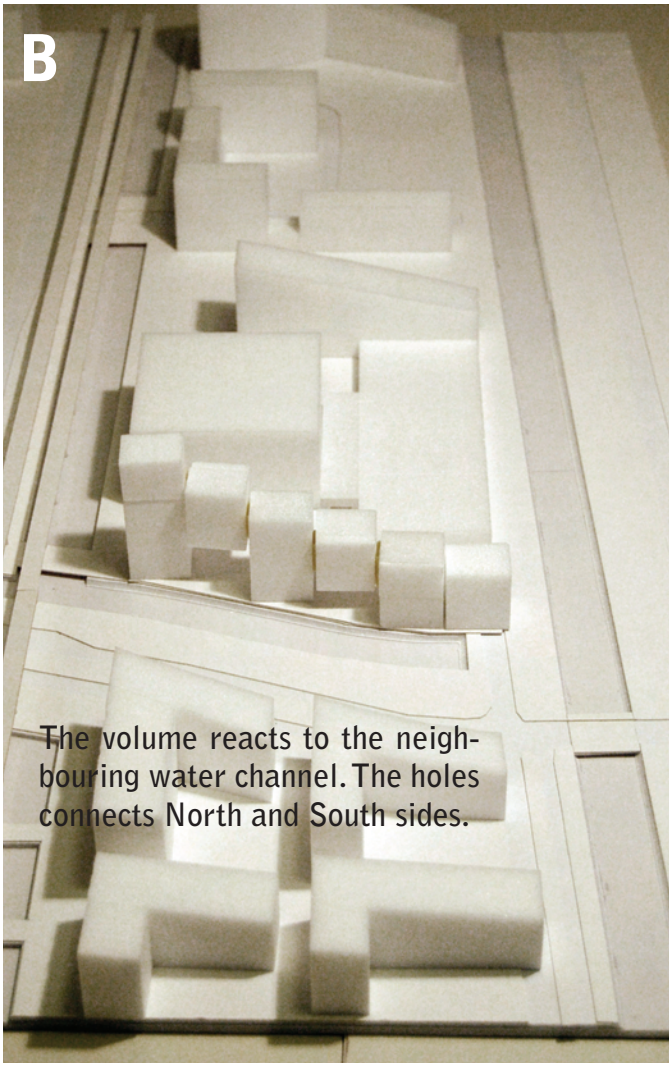
WORK PROCESS:



A PRIMARY VOLUME STUDIES:

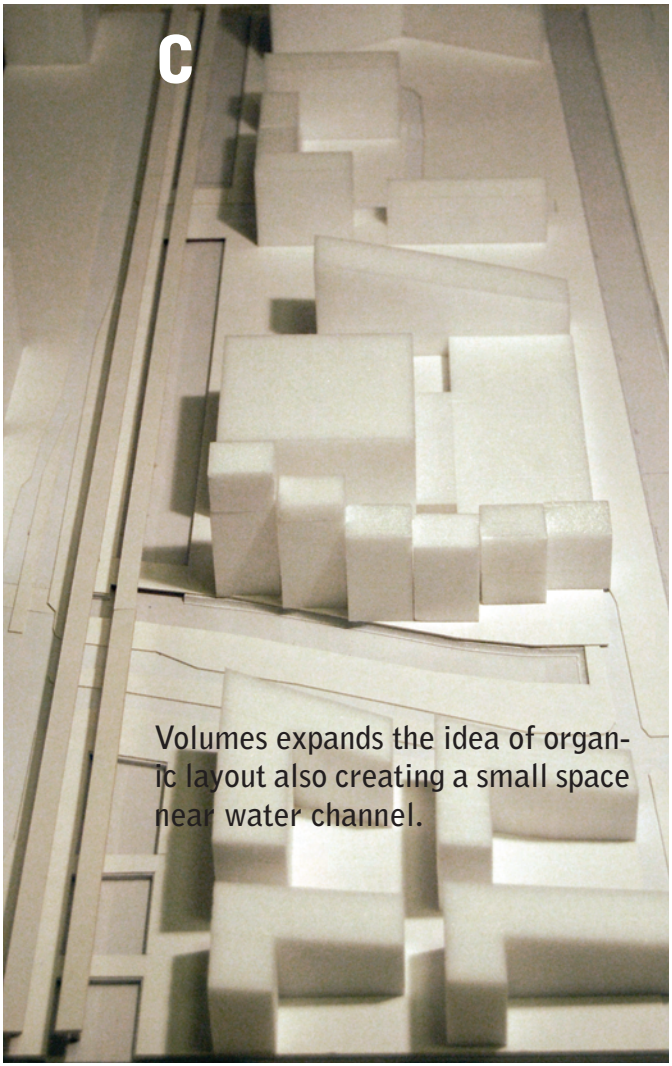
intro intro intro intro intro intro intro intro intro intro intro intro intro intro intro intro intro intro

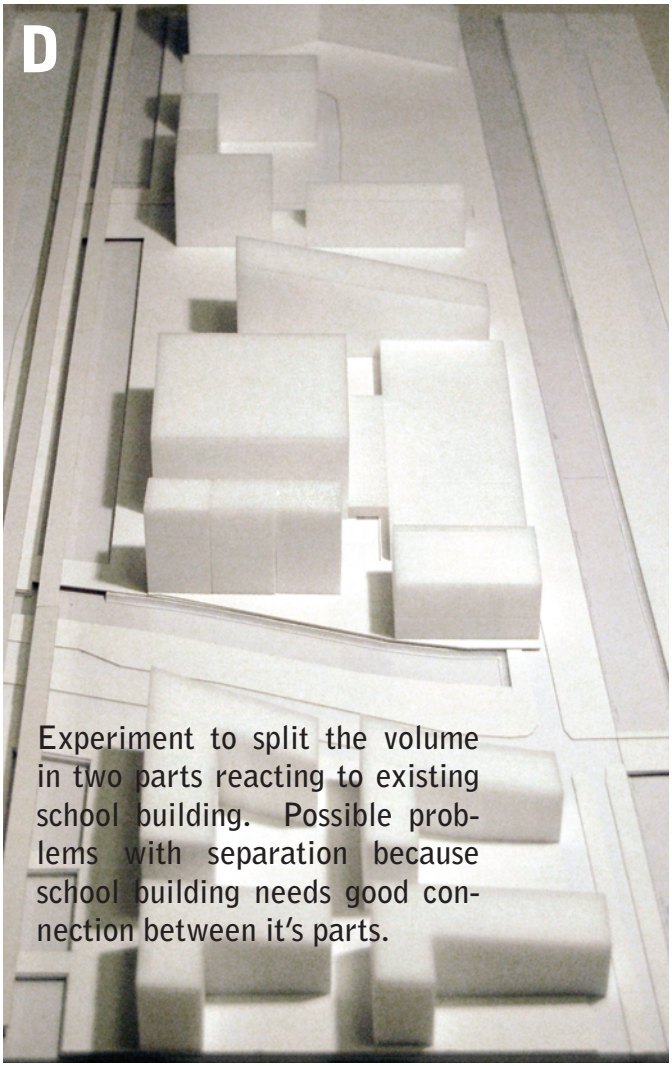
Basic primary volume wich is derived purely from urban regulations of the site. It is a basic mass of the building which reaches max hight in the west (right) side of 22 metres and on the East side (left) 30 meters.

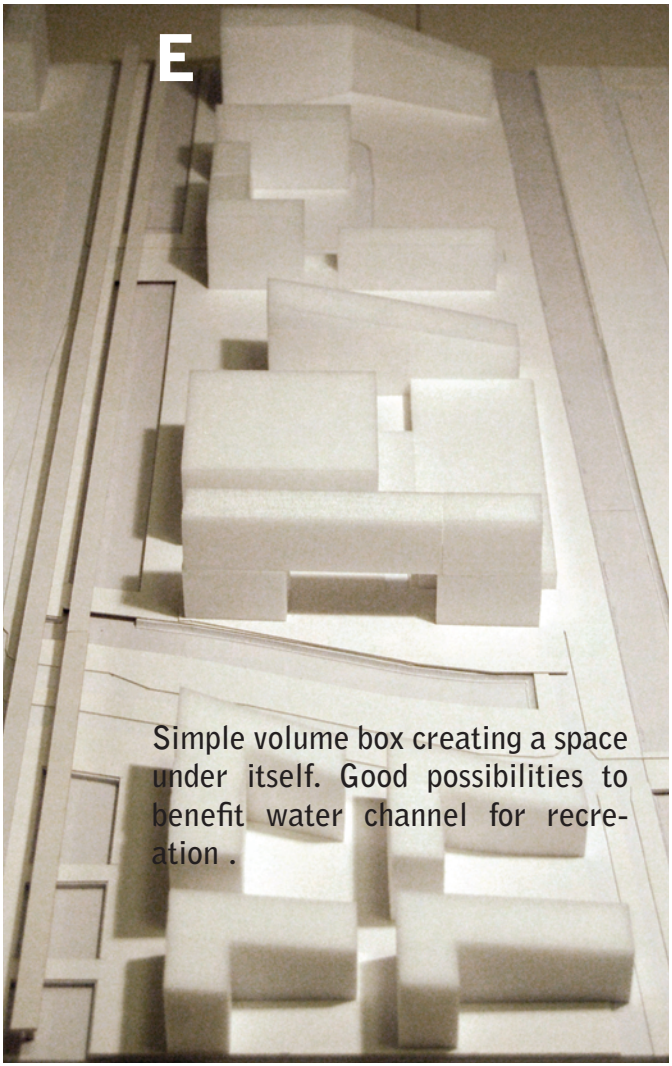


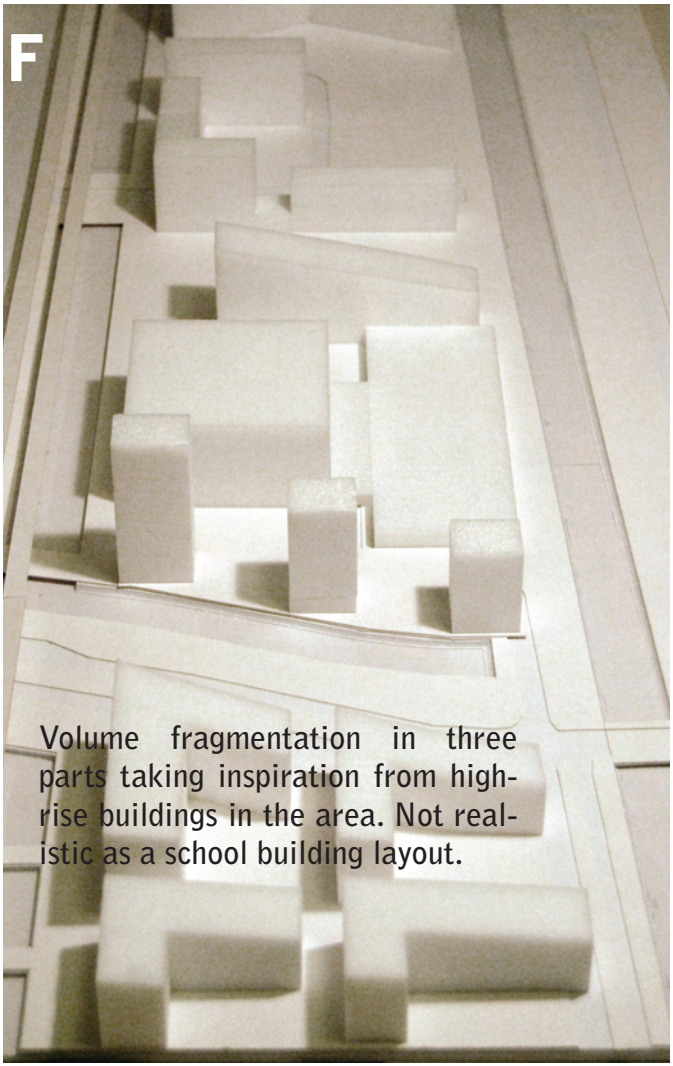
B

The volume reacts to the neighbouring water channel. The holes connects North and South sides.

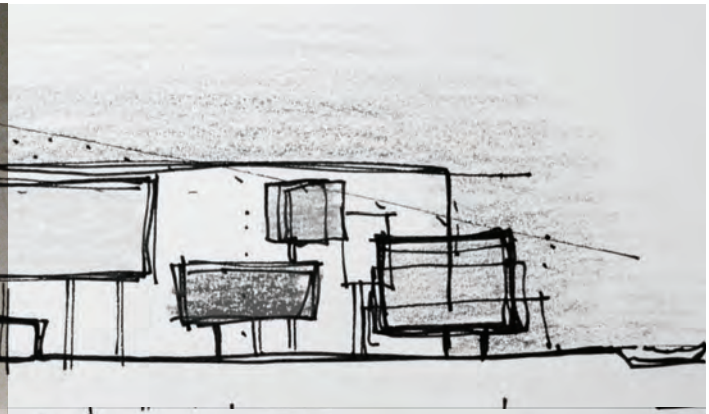

C
Volumes expands the idea of organic layout also creating a small space near water channel.

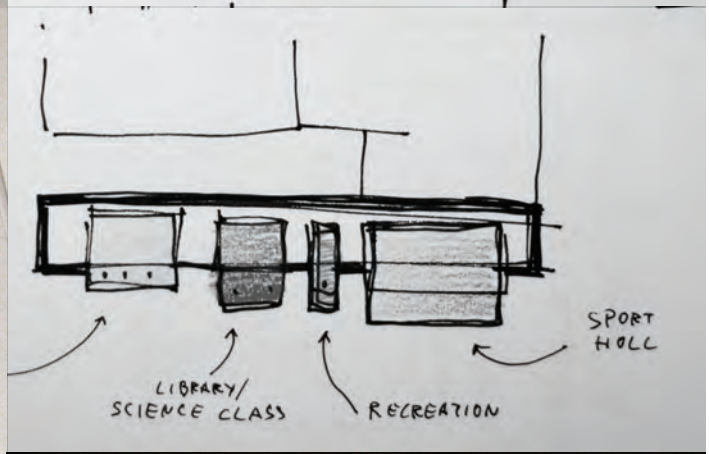

D
Experiment to split the volume in two parts reacting to existing school building. Possible problems with separation because school building needs good connection between it's parts.

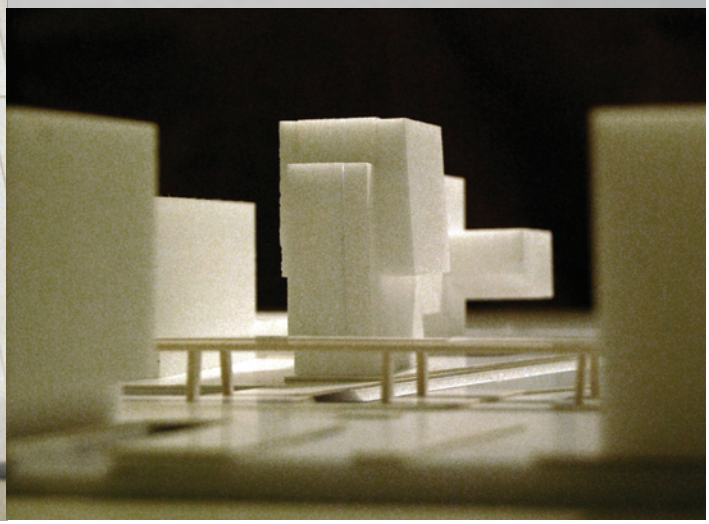




G !!!

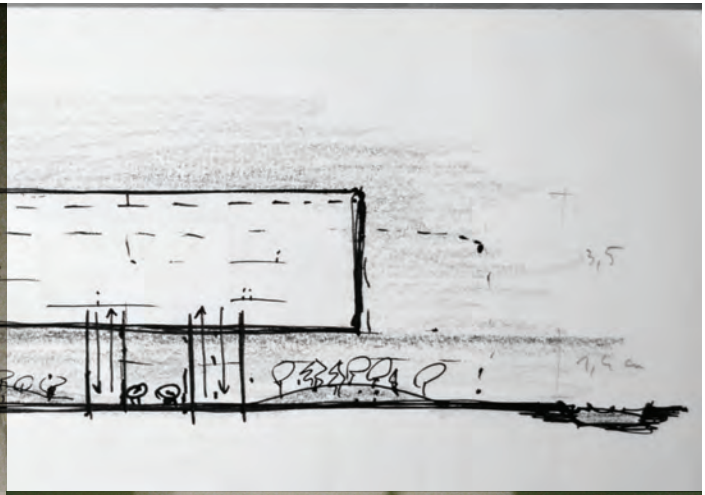


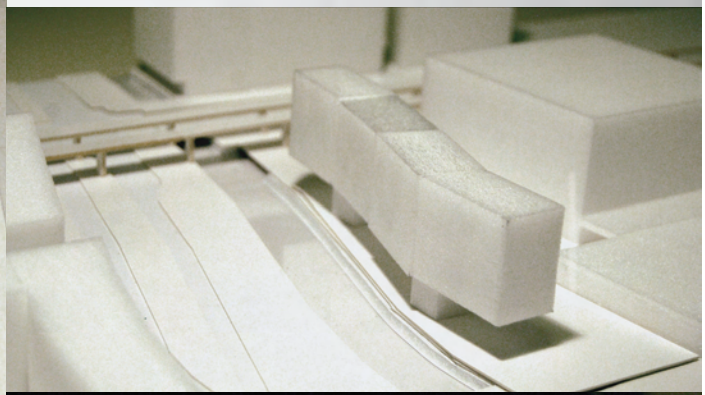


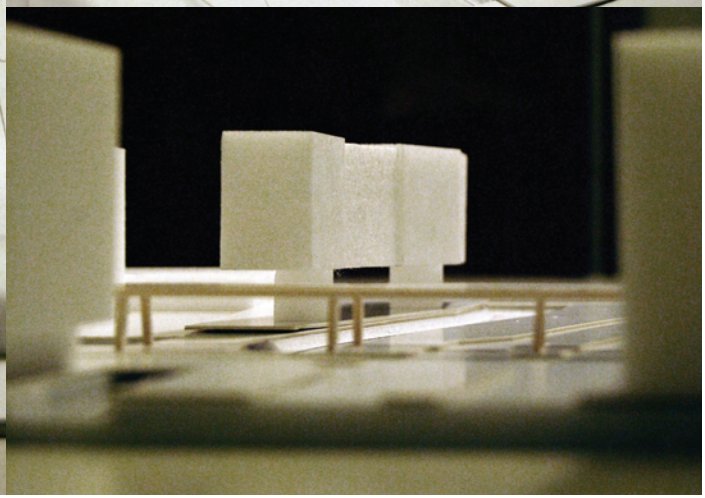


Volume made from a "wall" and "boxes" stacked to it. The boxes represent diferent programatic function in the building like Auditorium, kanteen, library, sports holl. Promising concept worth further investigation.

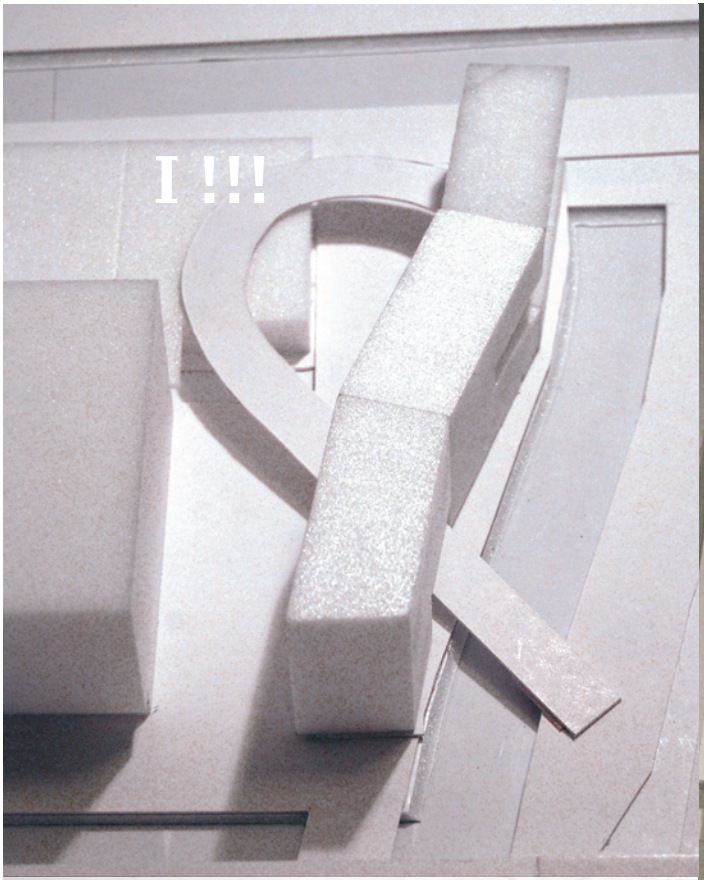
H !!!

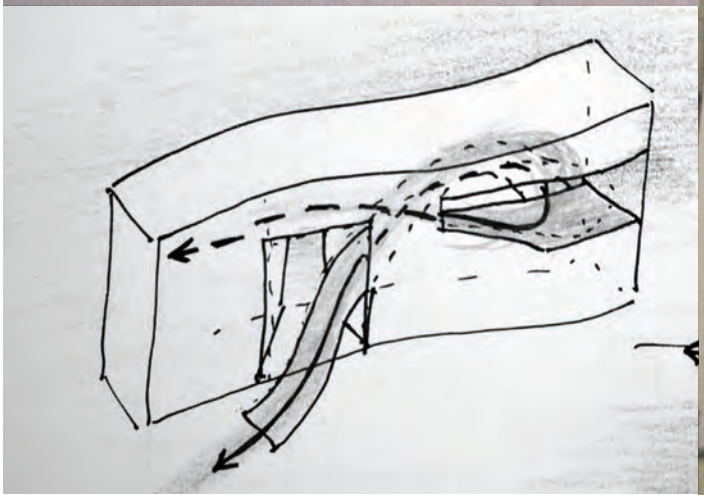


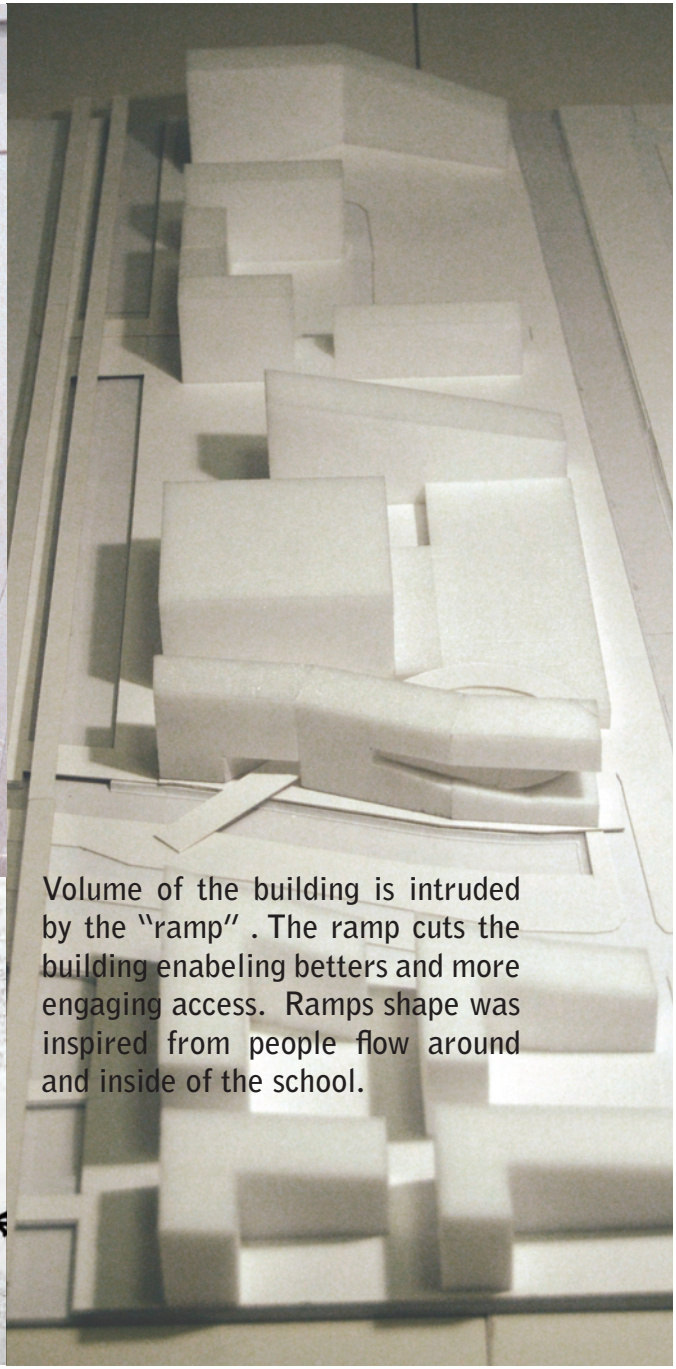




Organic volume reacting to the water channel with it's shape. It is being elevated in order to create a bigger open space on the ground level. It could be used as a courtyard for the school since the there is no more space on the site.







Volume of the building is intruded by the "ramp" . The ramp cuts the building enabeling betters and more engaging access. Ramps shape was inspired from people flow around and inside of the school.

CONCLUSION from primary model studies:

After making primary volume studies several ideas prooved to be more promising for further exploration. The main inspiration was taken from concepts...

concept -G [posibilities of interesting spaces in the building working with clear volumes representing different rooms, like gymanasium, lybrary, drama. clear orientation in the building.]

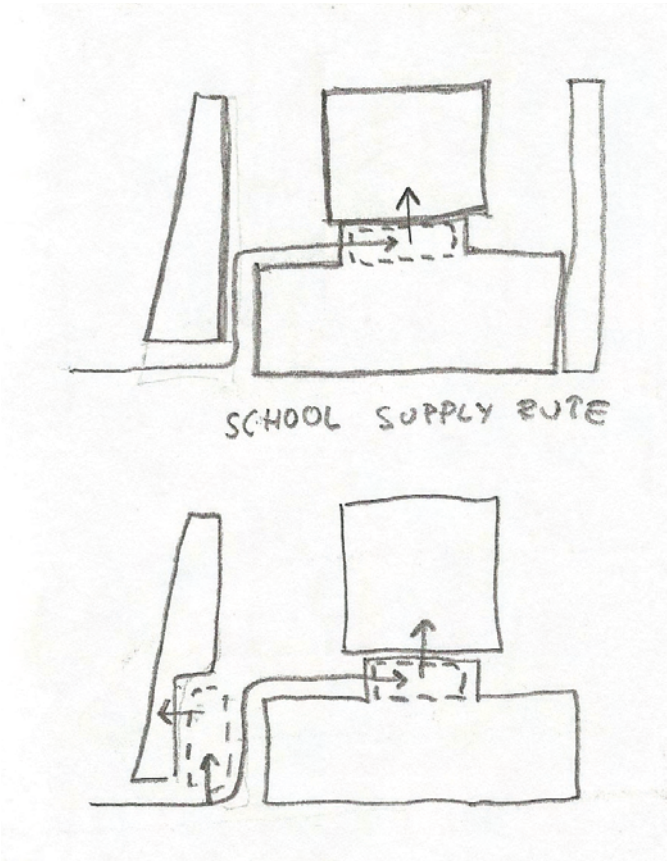
concept- H [interesting concepts to elevate the volume second level, to have better connection to school terrace and to separate it from busy, noisy environment on ground level.]

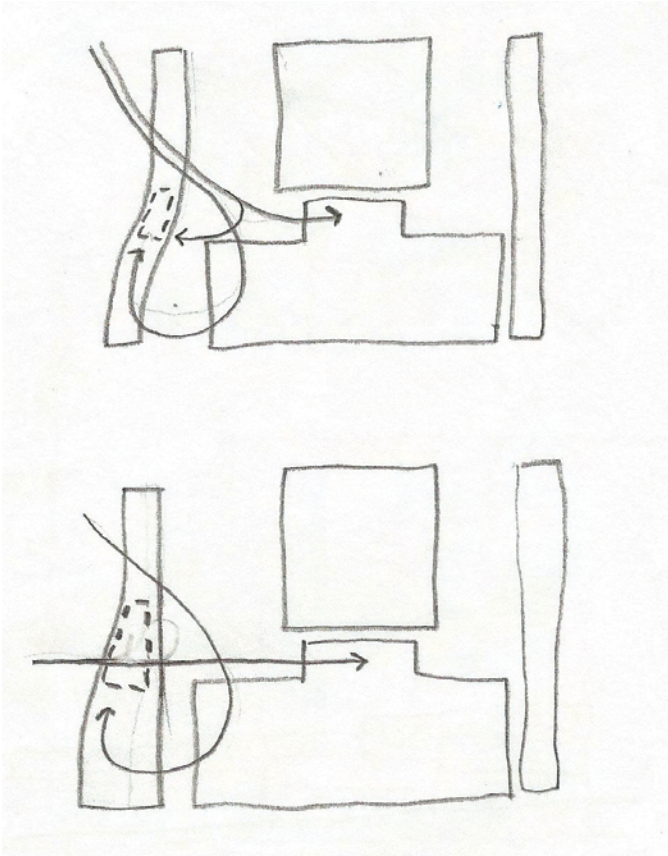
concept- I [an unexpectd discovery of ramp runing trough the building is an inspiaring fact. It can benefit school building very much by connecting it better with it's environment and creating dynamic atmosphere inside. Ramps is like continuity of the street takeing the flow from outside to inside and intergrating diferent parts of the school. Good tool for orientation.]

RAMP STUDIES:

A series of diagrams investigating the school suply route and pedestrion flow.

Supply rutes for trafic bring the supplies to the kithchen and school. Also there has to be possibility for cars to reach parking behind existing gymnasium.





RAMP DIAGRAMS:

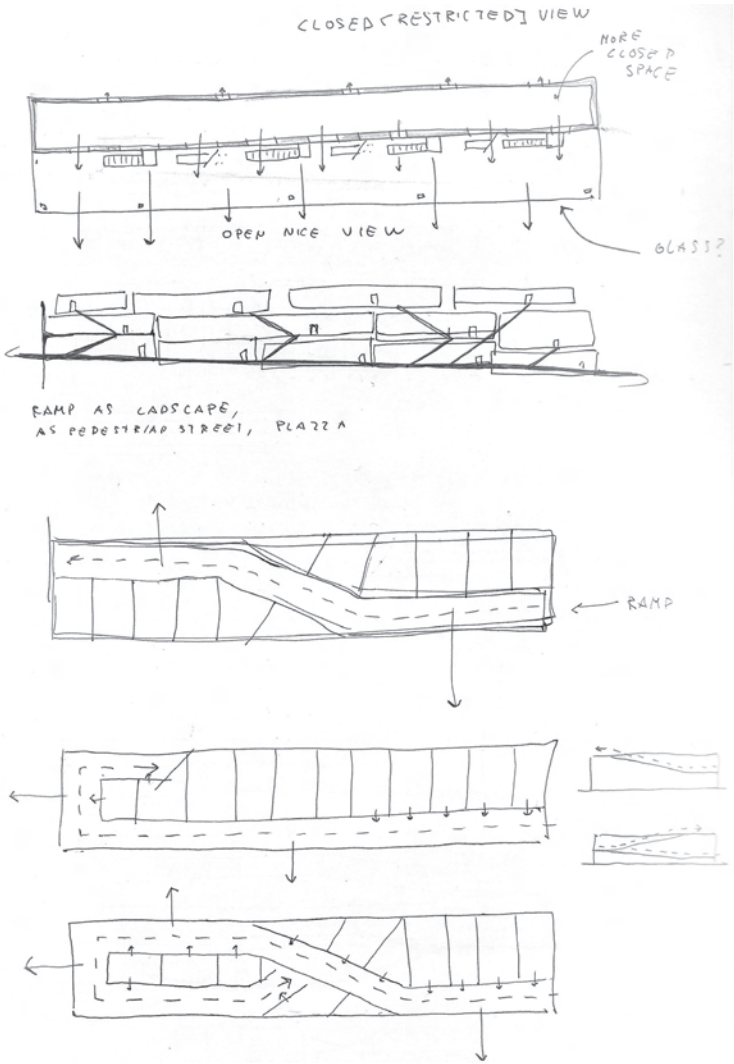
Different ramps possibilities in the building volume. Ramp inside building or going out and then in.

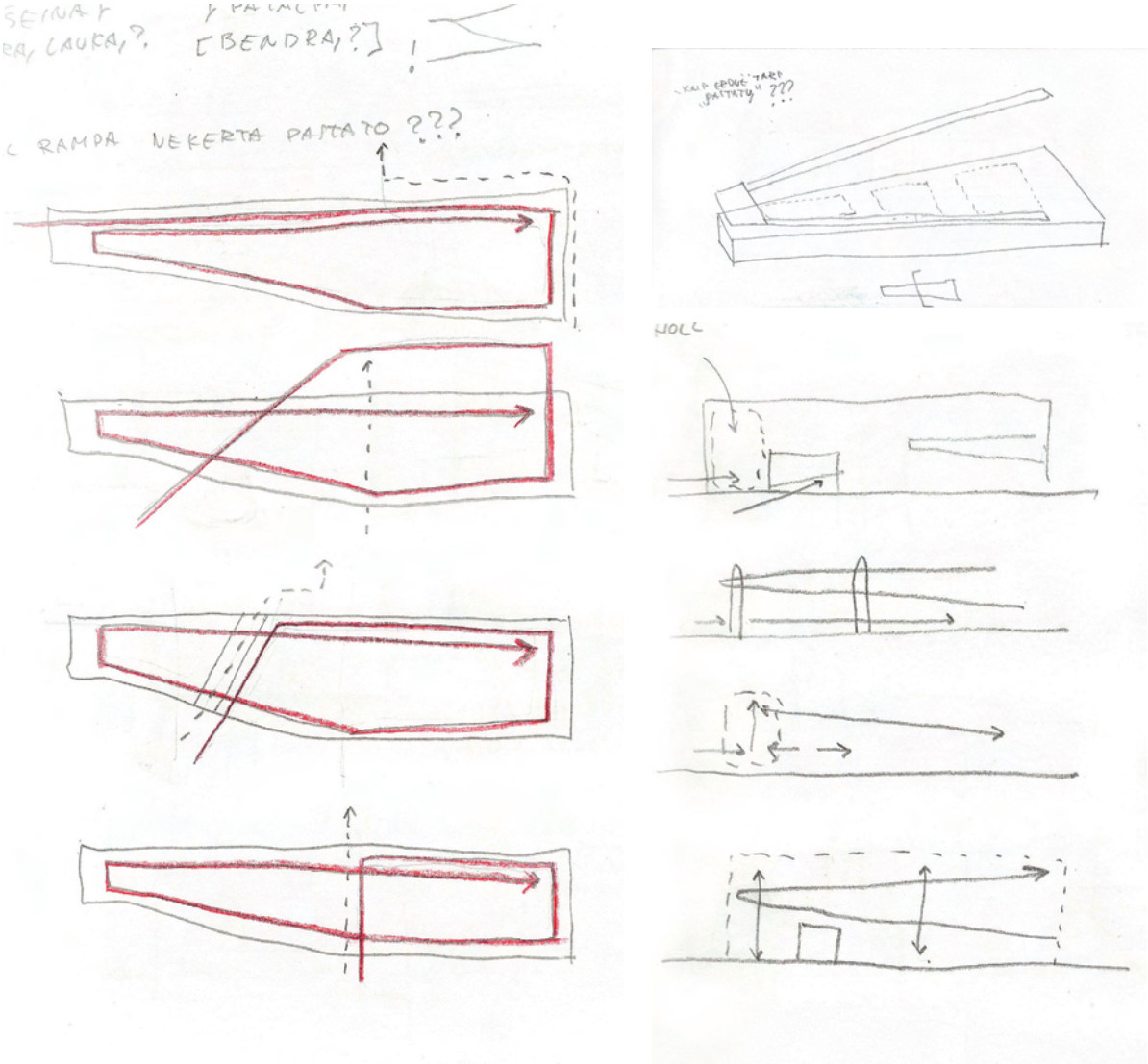
How can run inside the building and "feed" the rooms instead of corridor???

If ramp could be wide enough (6m?) it could serve as a play or home base area

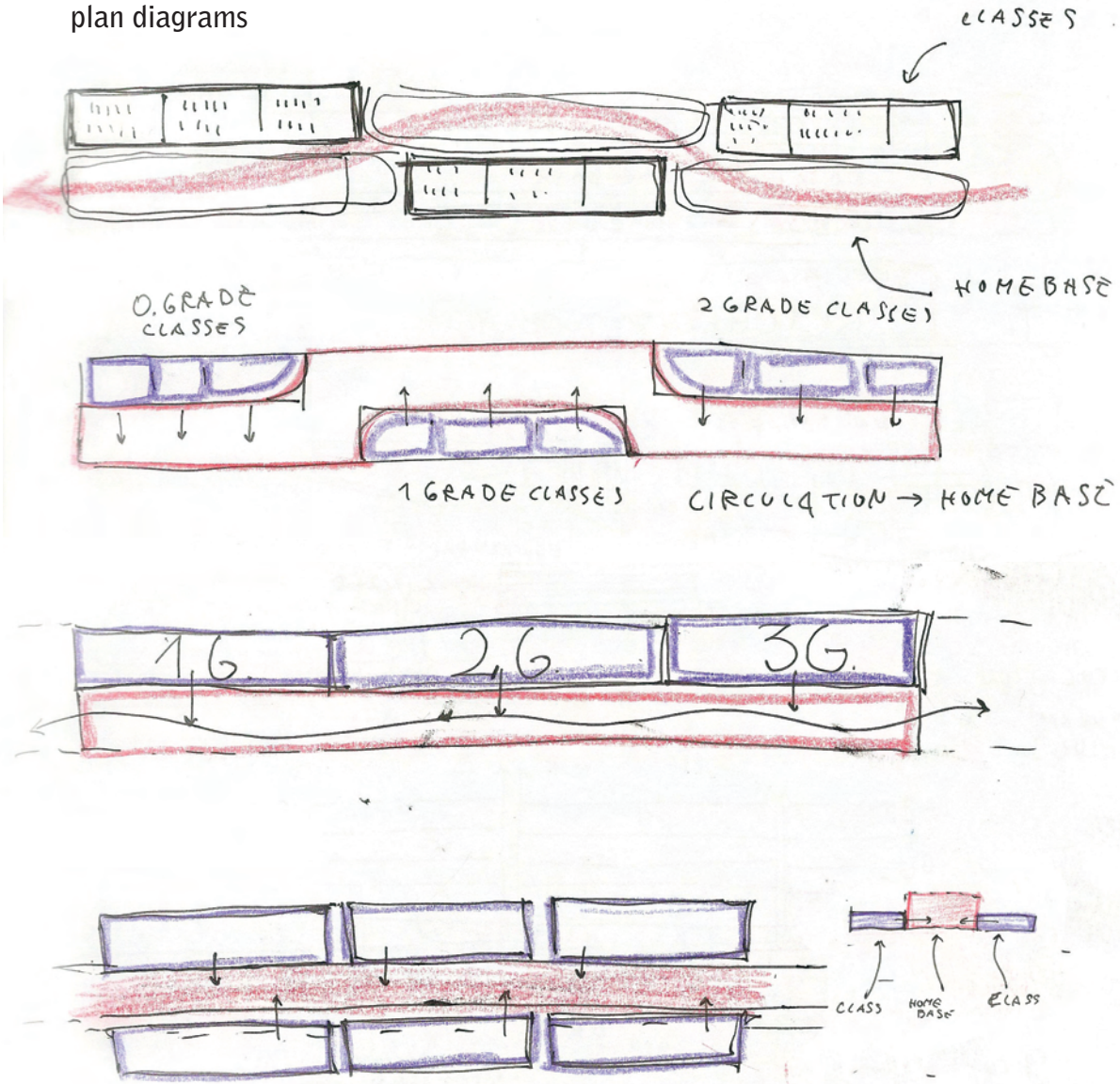
Classroom distribution in inclination? walking a school like landscape. Engageing the body.

each class has it's own stairs?

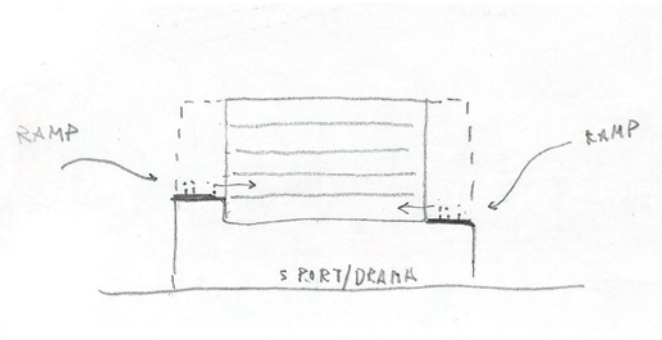



SEINA ?
EA, LAUKA, ?.
[BEANDRA, ?]
RAMPA NEKERTA PAITATO ???
HOLC

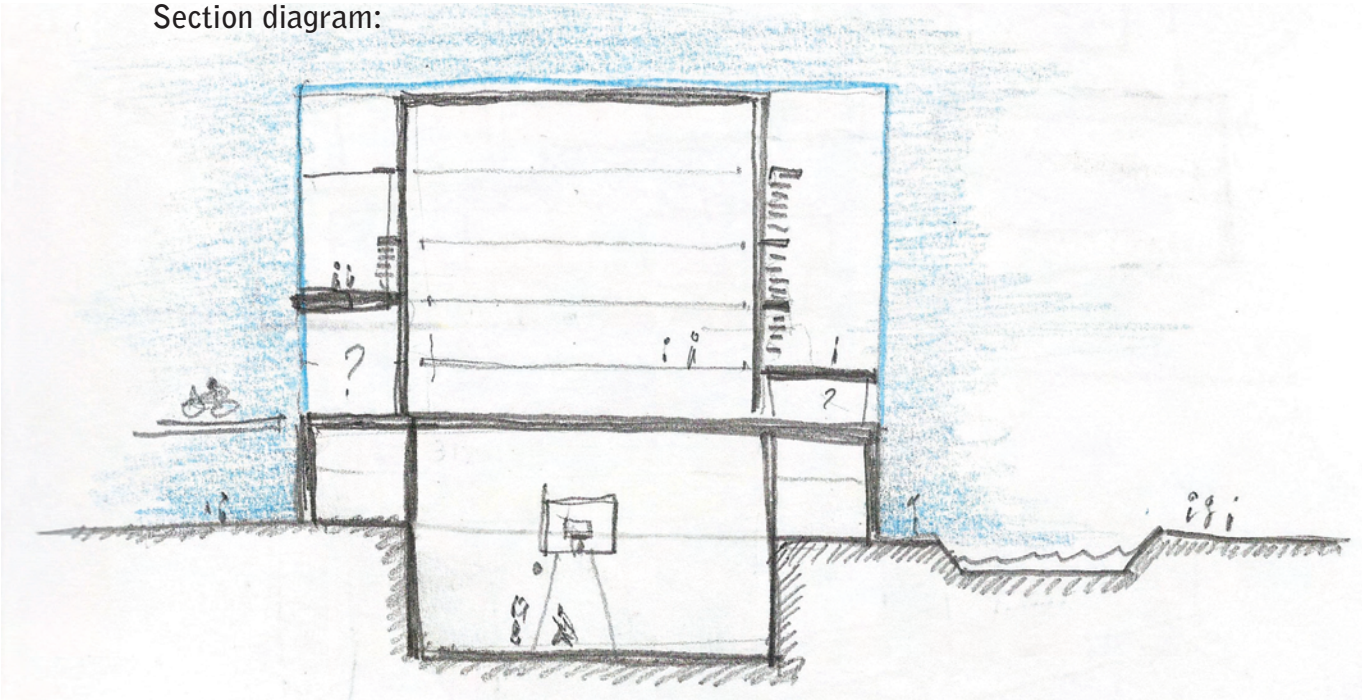
plan diagrams



Ramps instead of corridor. Ramp as horizontal connection but regural staircases with elevators penetrate the building to provide shortcuts. What hapens below the ramps?

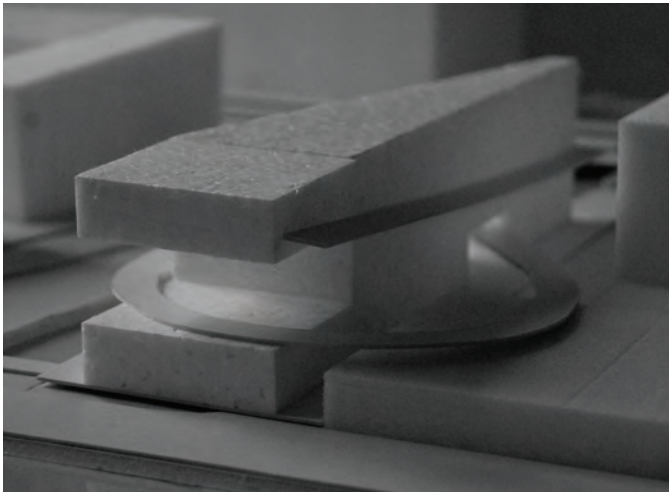


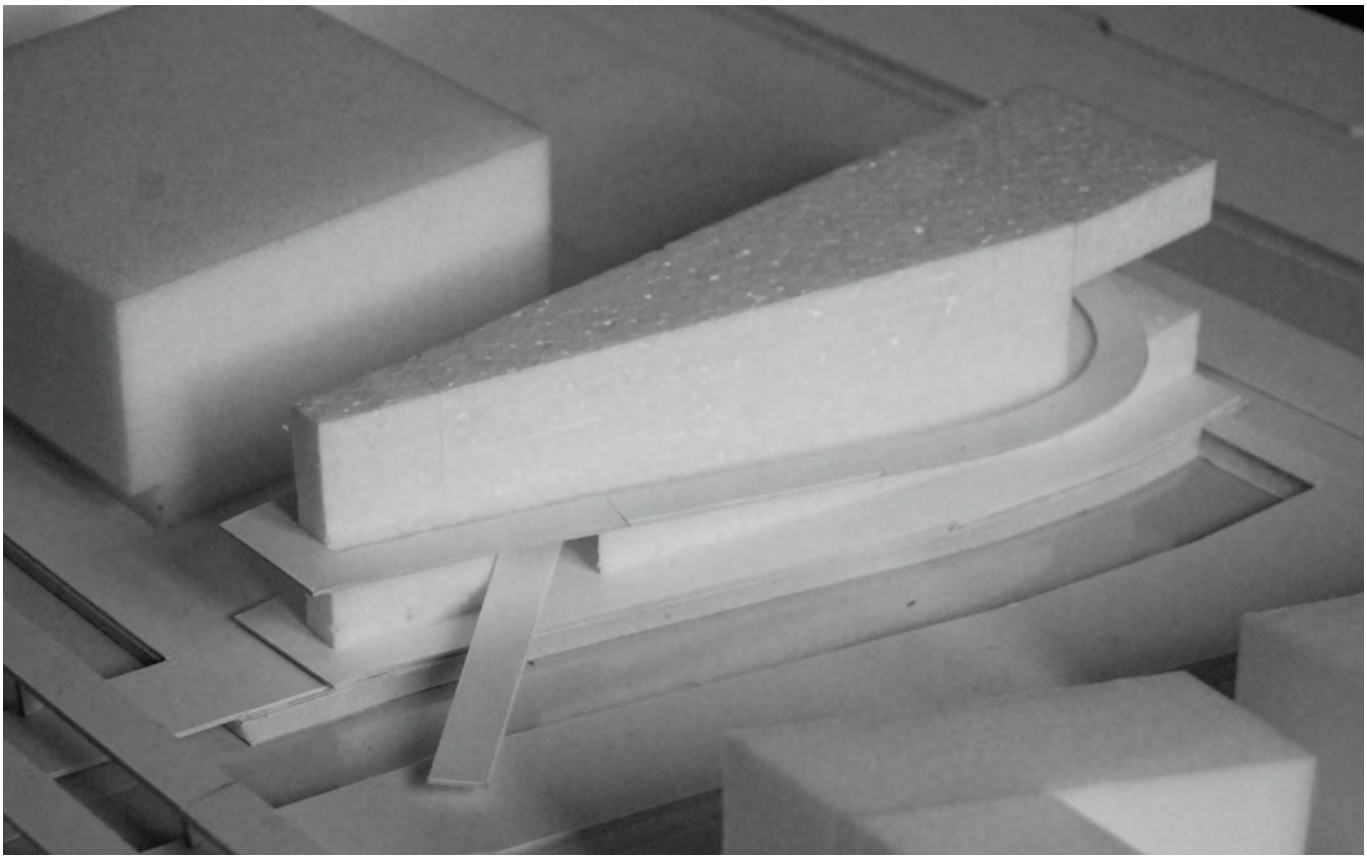
Section diagram:



RAMP STUDIES, MODEL

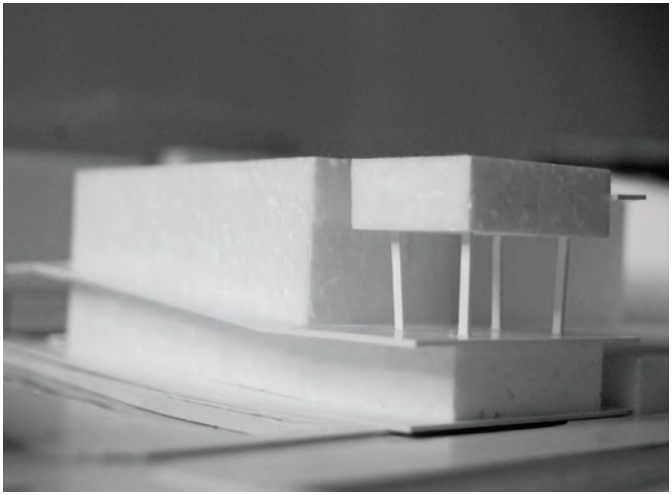
Ramp extends to the parking roof enters the school and reach to top floors. Extra entrance from the bridge.

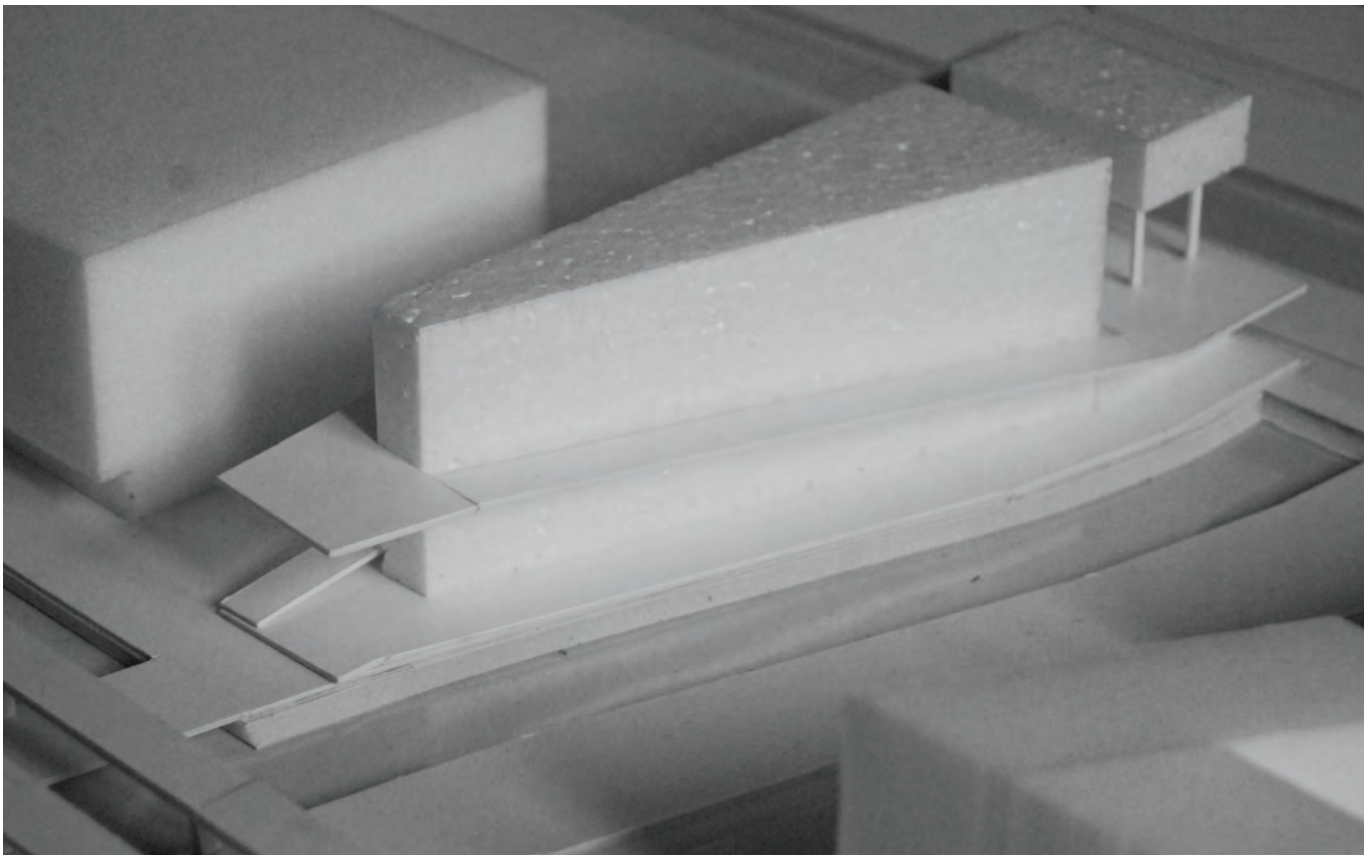




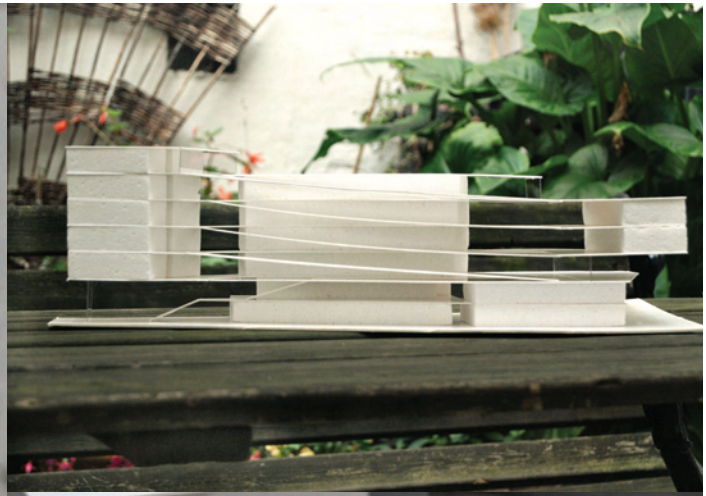
RAMP STUDIES, MODEL

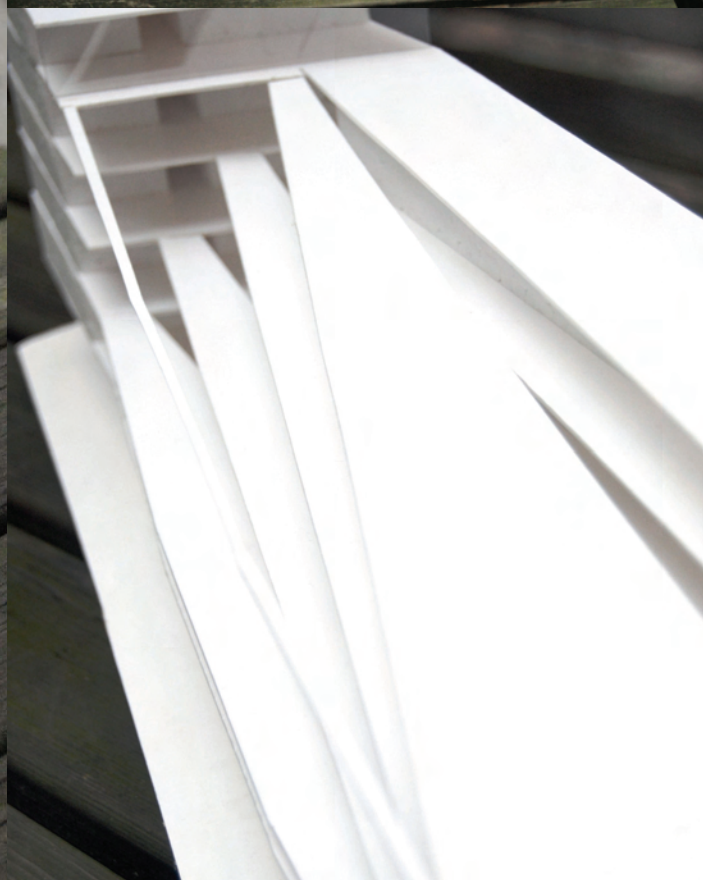
Ramp starts from front of the building and goes to parking roof. Small hanging element (drama holl) above. Ramp doesn't go outside of building envelope. No bridge or hole.






RAMP STUDIES, MODEL
Ramps as a landscape in the school... learning with your body.

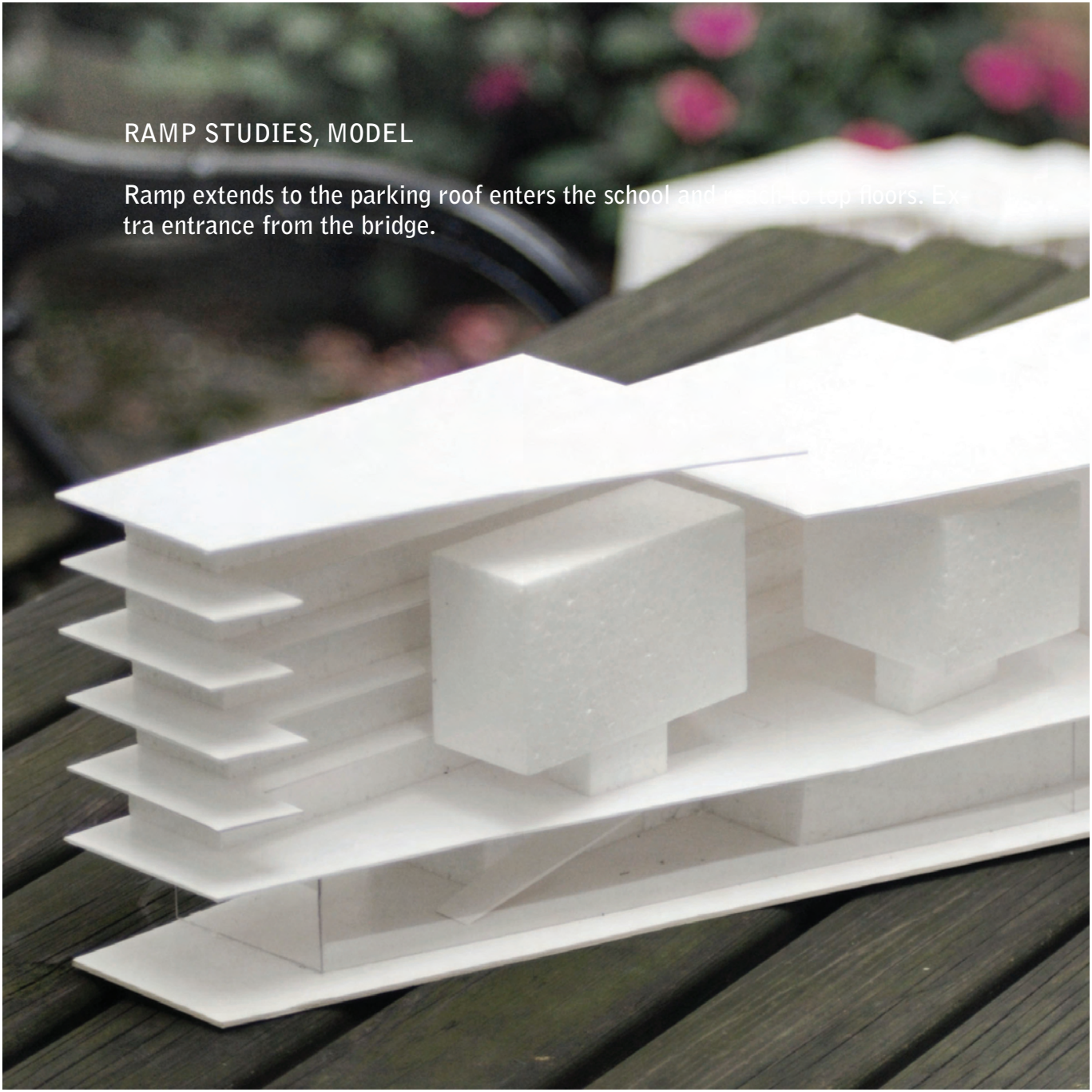




RAMP STUDIES, MODEL

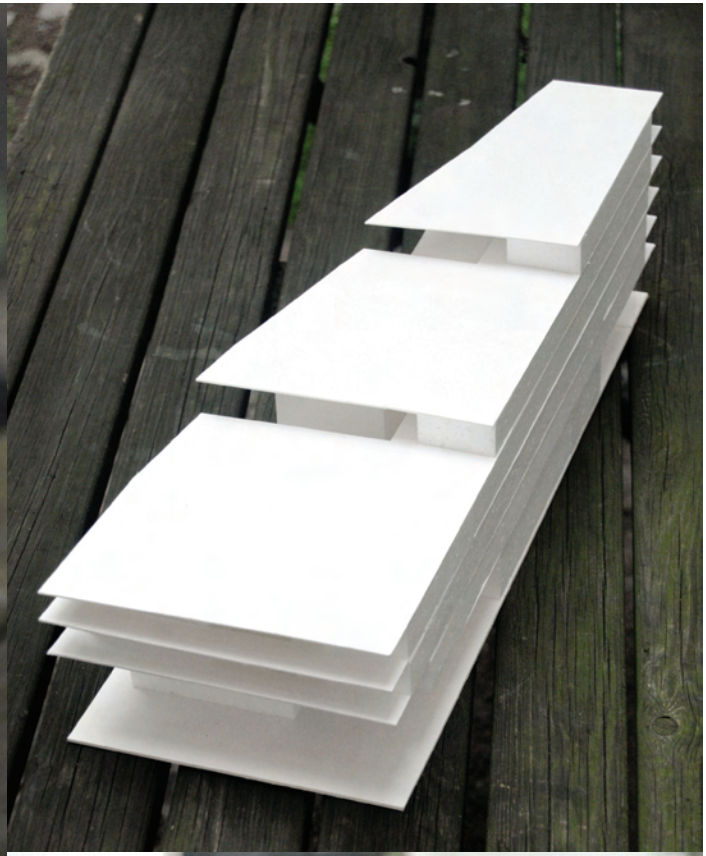
Ramp extends to the parking roof enters th
tra entrance from the bridge.

e school and reach to top floors. Ex-



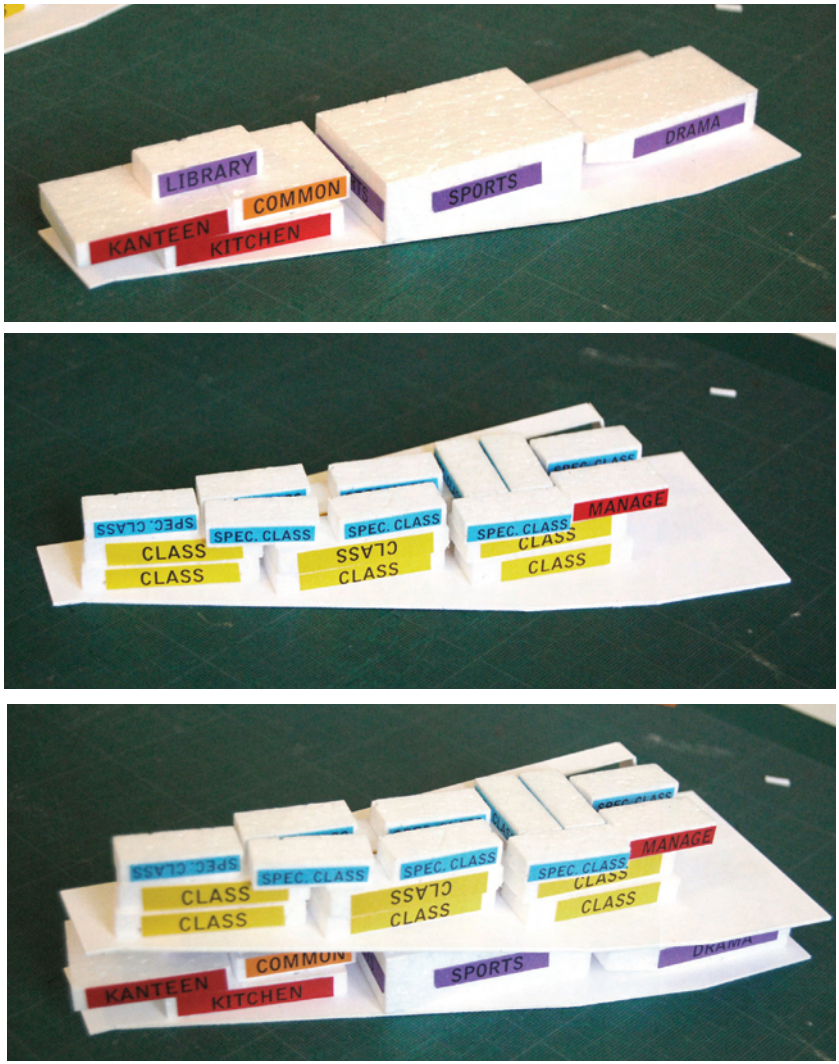
RAMP STUDIES, MODEL

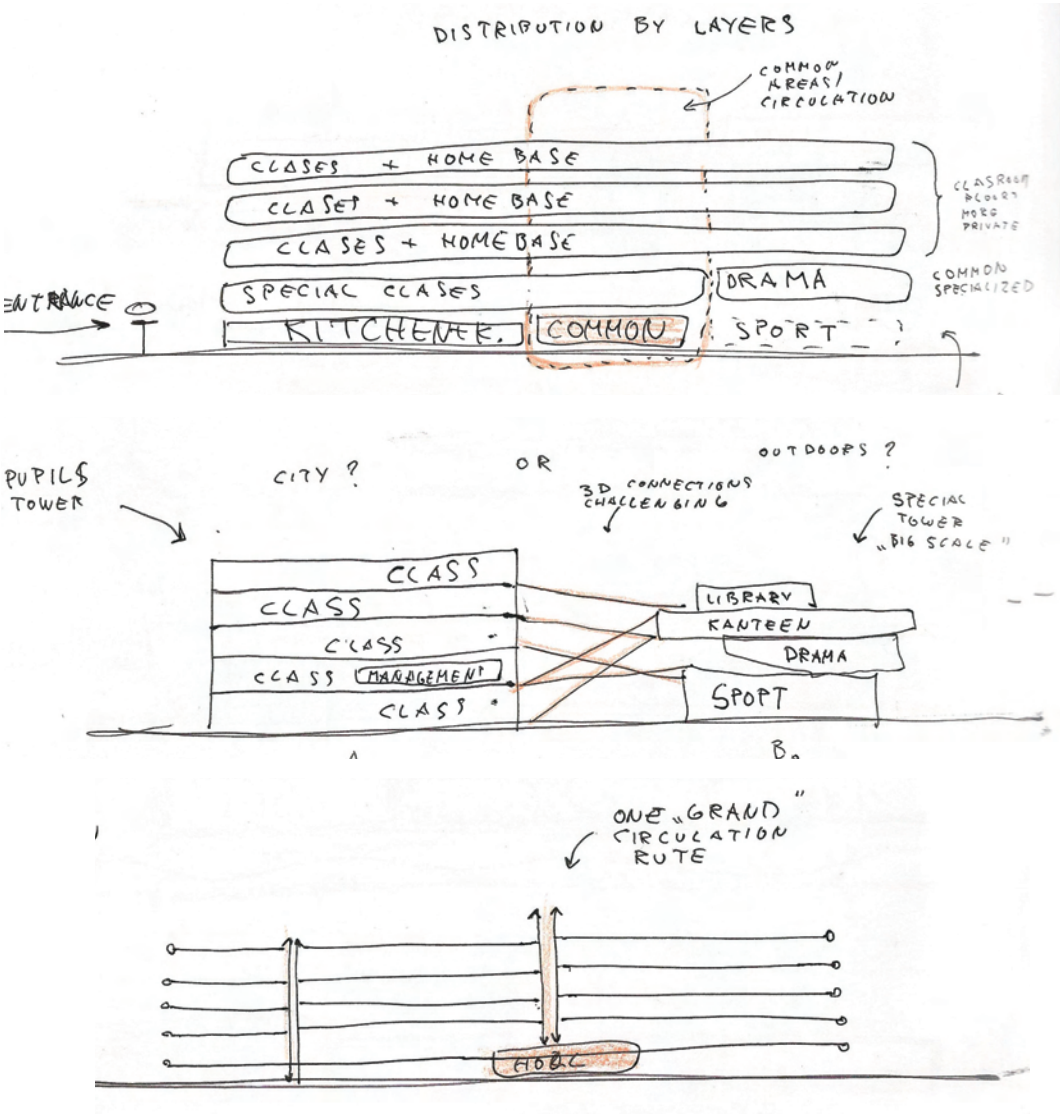
Ramp extends to the parking roof enters the school and reaches top floors. Extra entrance from the bridge.

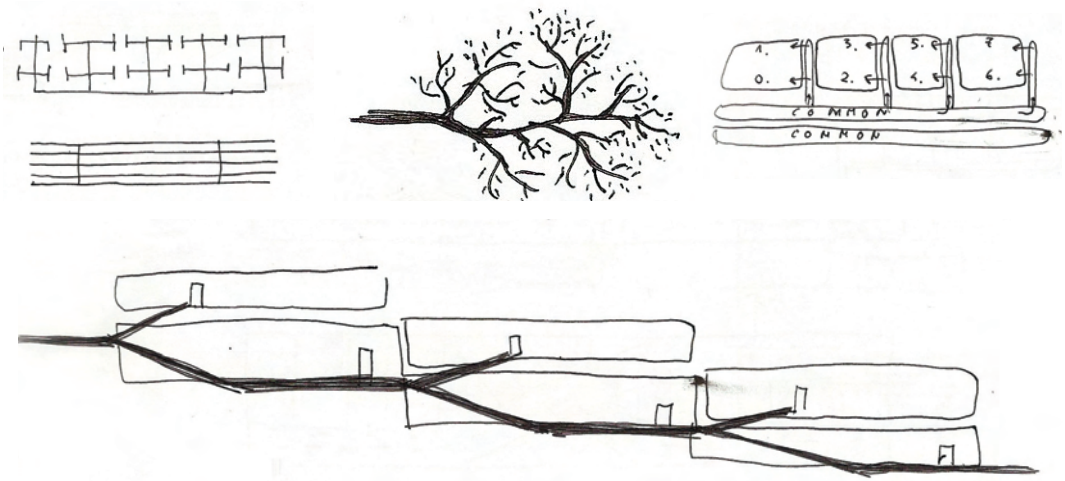


STACKING ARCHITECTURE:

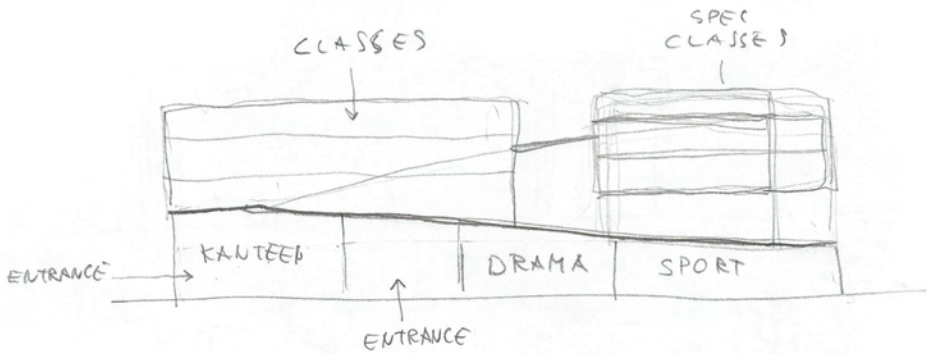
This chapter cover the work process working with room program in the school building. It shows how design process was influenced by diferent concepts and how the final building layput emerged.

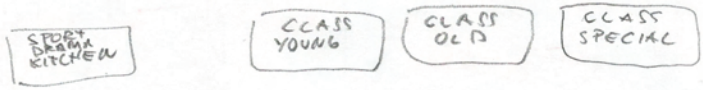


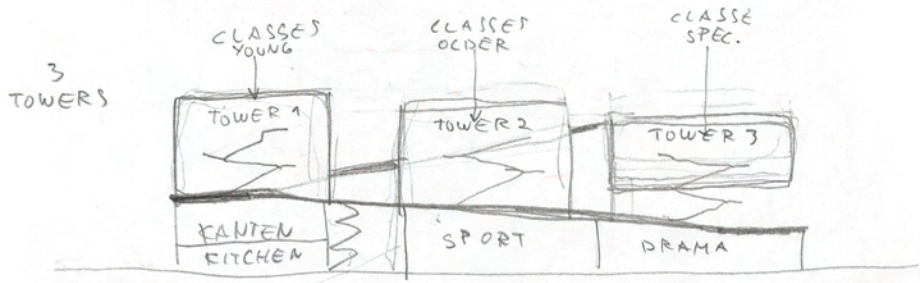

DISTRIBUTION BY LAYERS
COMMON AREAS / CIRCULATION
CLASES + HOME BASE
CLASES + HOME BASE
CLASES + HOME BASE
CLASSROOM FLOORS MORE PRIVATE
SPECIAL CLASES
DRAMA
COMMON SPECIALIZED
ENTRANCE
KITCHENER.
COMMON
SPORT
PUPILS TOWER
CITY ?
OR
OUTDOORS ?
3D CONNECTIONS CHALLENGING
SPECIAL TOWER „BIG SCALE"
CLASS
CLASS
CLASS
CLASS
MANAGEMENT
CLASS
LIBRARY
KANTEEN
DRAMA
SPORT
A
B.
ONE „GRAND" CIRCULATION RUTE
HALL

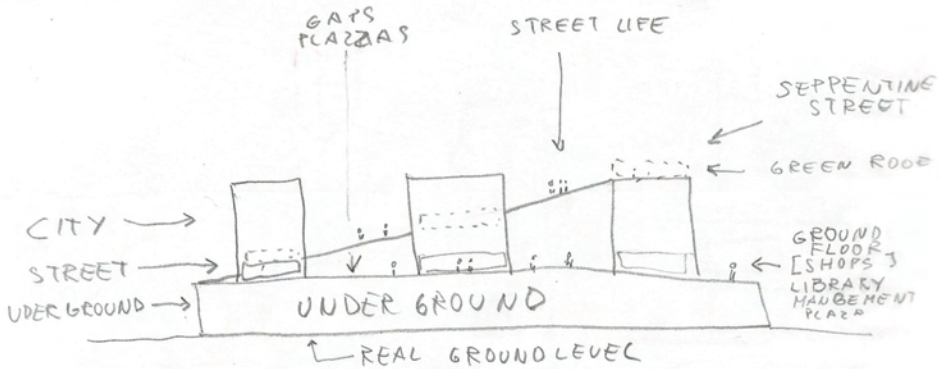

0.
1.
2.
3.
4.
5.
6.
COMMON
COMMON


SPEC. CLASS
SPEC. CLASS
SPEC. CLASS
MANAGE
LIBRARY
CLASS
CLASS
CLASS
CLASS
CLASS
CLASS


CLASSES
SPEC CLASSES
ENTRANCE
KANTEEN
DRAMA
SPORT
ENTRANCE

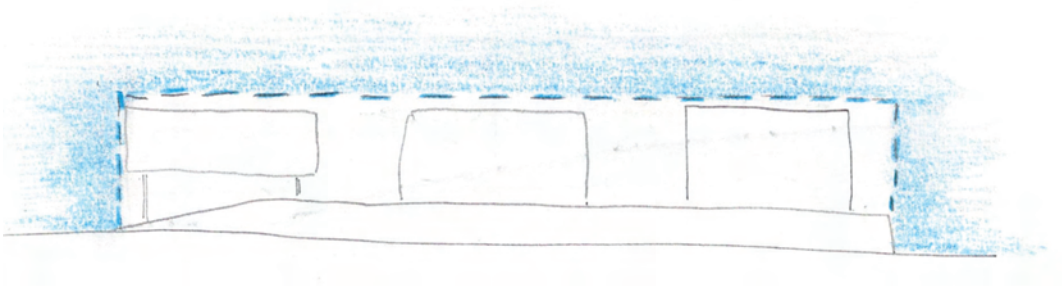

SPORT DRAMA KITCHEN
CLASS YOUNG
CLASS OLD
CLASS SPECIAL

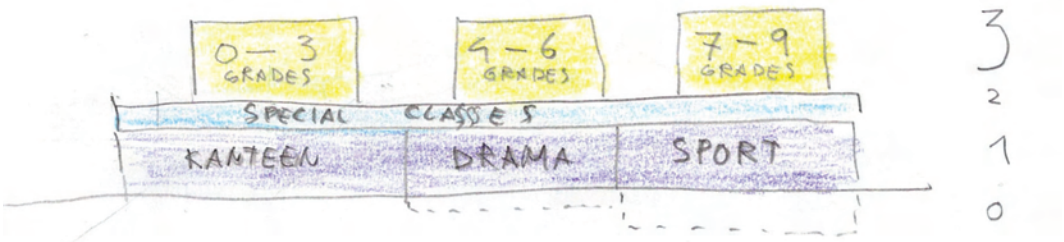

3 TOWERS
CLASSES YOUNG
CLASSES OLDER
CLASSE SPEC.
TOWER 1
TOWER 2
TOWER 3
KANTEEN KITCHEN
SPORT
DRAMA

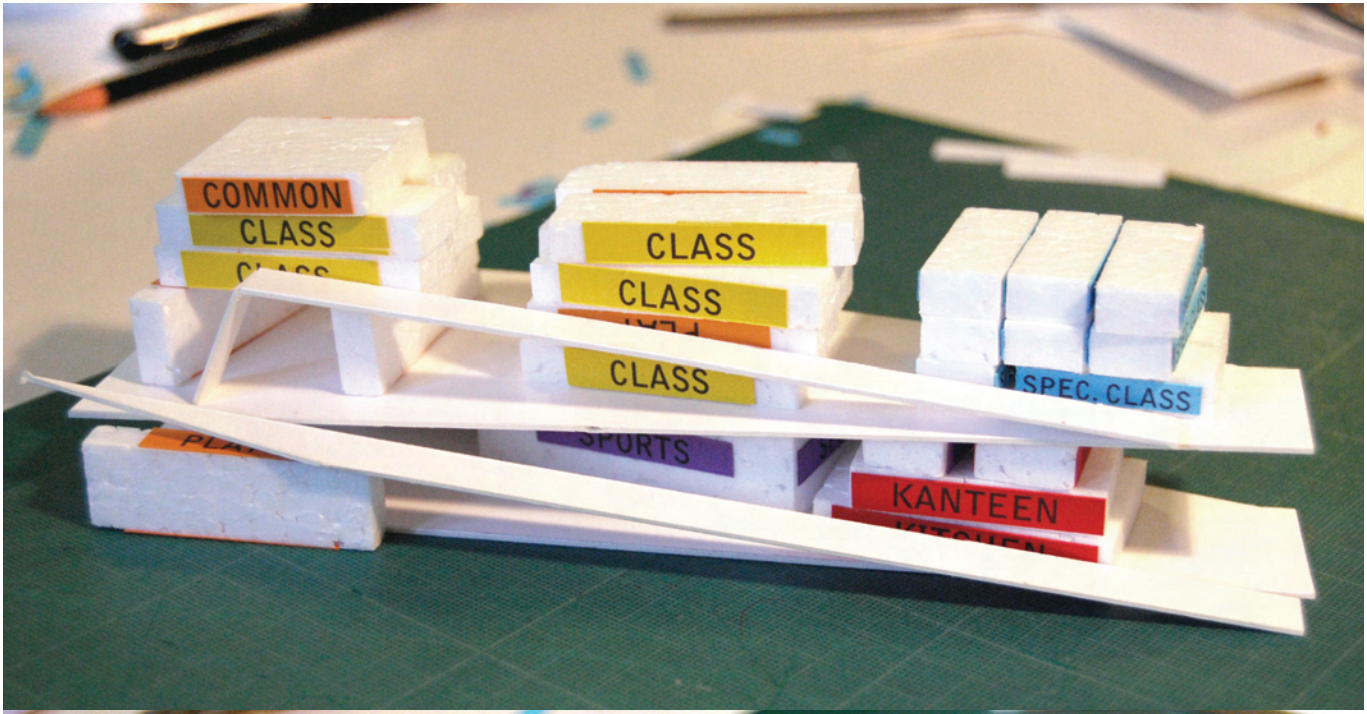

GAPS PLAZAS
STREET LIFE
SEPPENTINE STREET
GREEN ROOF
CITY
STREET
UDER GROUND
GROUND FLOOR [SHOPS]
LIBRARY
MANAGEMENT
PLAZA
UNDER GROUND
REAL GROUND LEVEL

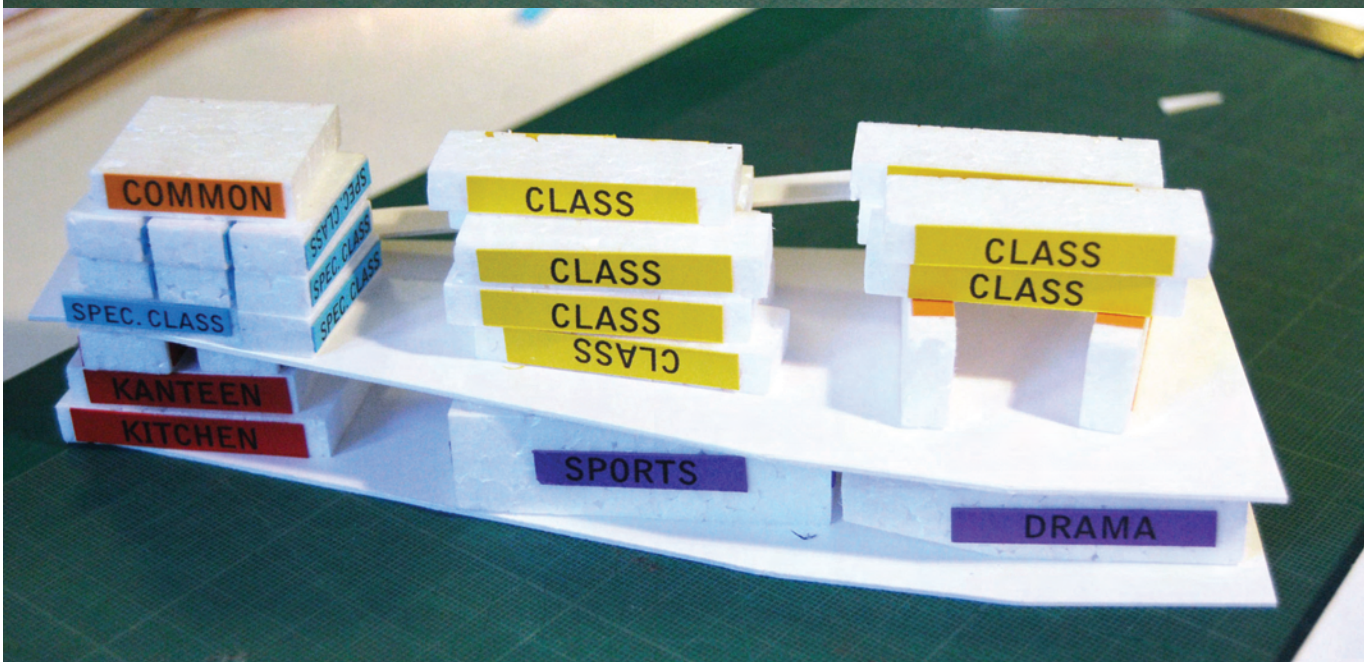
STACKING ARCHITECTURE:

Working in section. Putting room program on each otehr to find a place for school building elements like classes, common spaces, place for differetn age groups. Ramp connects the boxes as inside street. How to orientate yoursef in the building in a clear way. Site is very small so the only possibility is to work upwords. To layer the building.



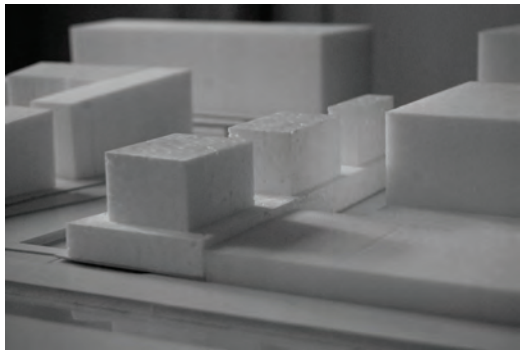


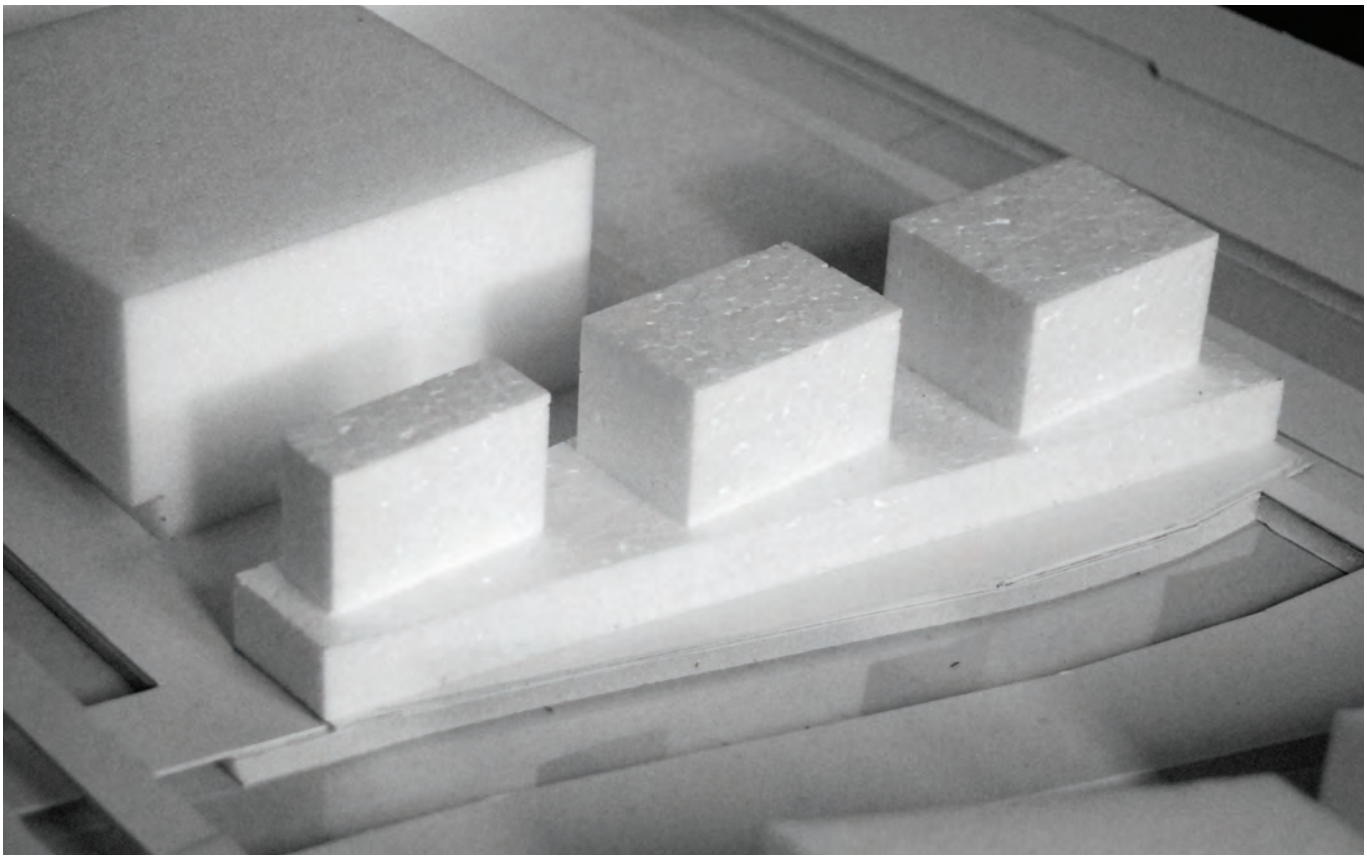

COMMON
CLASS
CLASS
CLASS
CLASS
SPEC. CLASS
KANTEEN

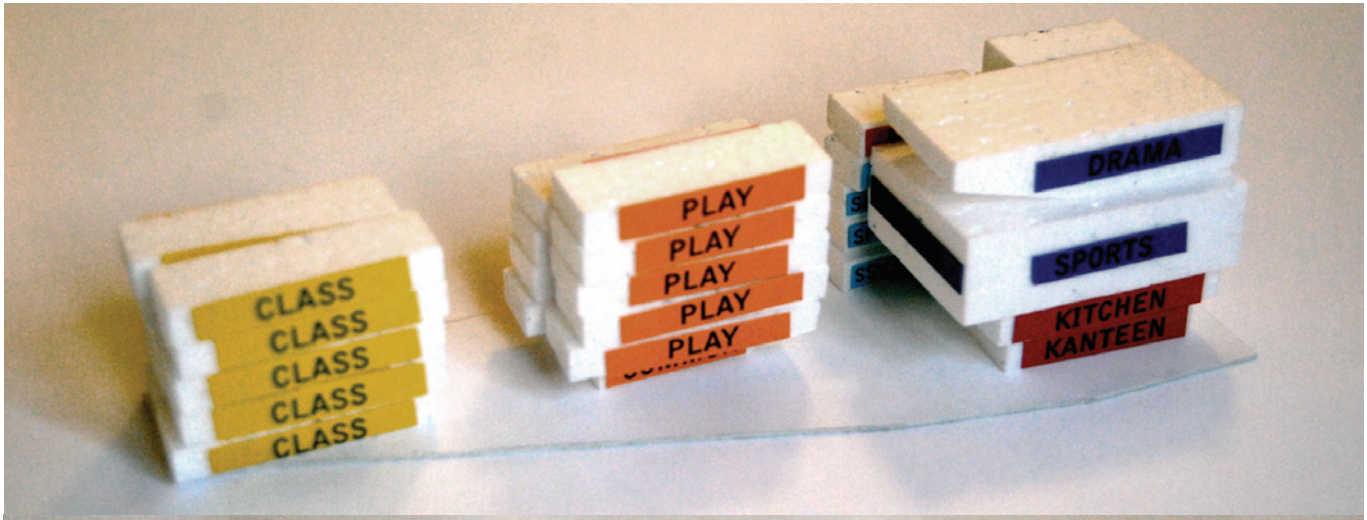

COMMON
SPEC. CLASS
SPEC. CLASS
SPEC. CLASS
SPEC. CLASS
CLASS
CLASS
CLASS
CLASS
CLASS
CLASS
KANTEEN
KITCHEN
SPORTS
DRAMA

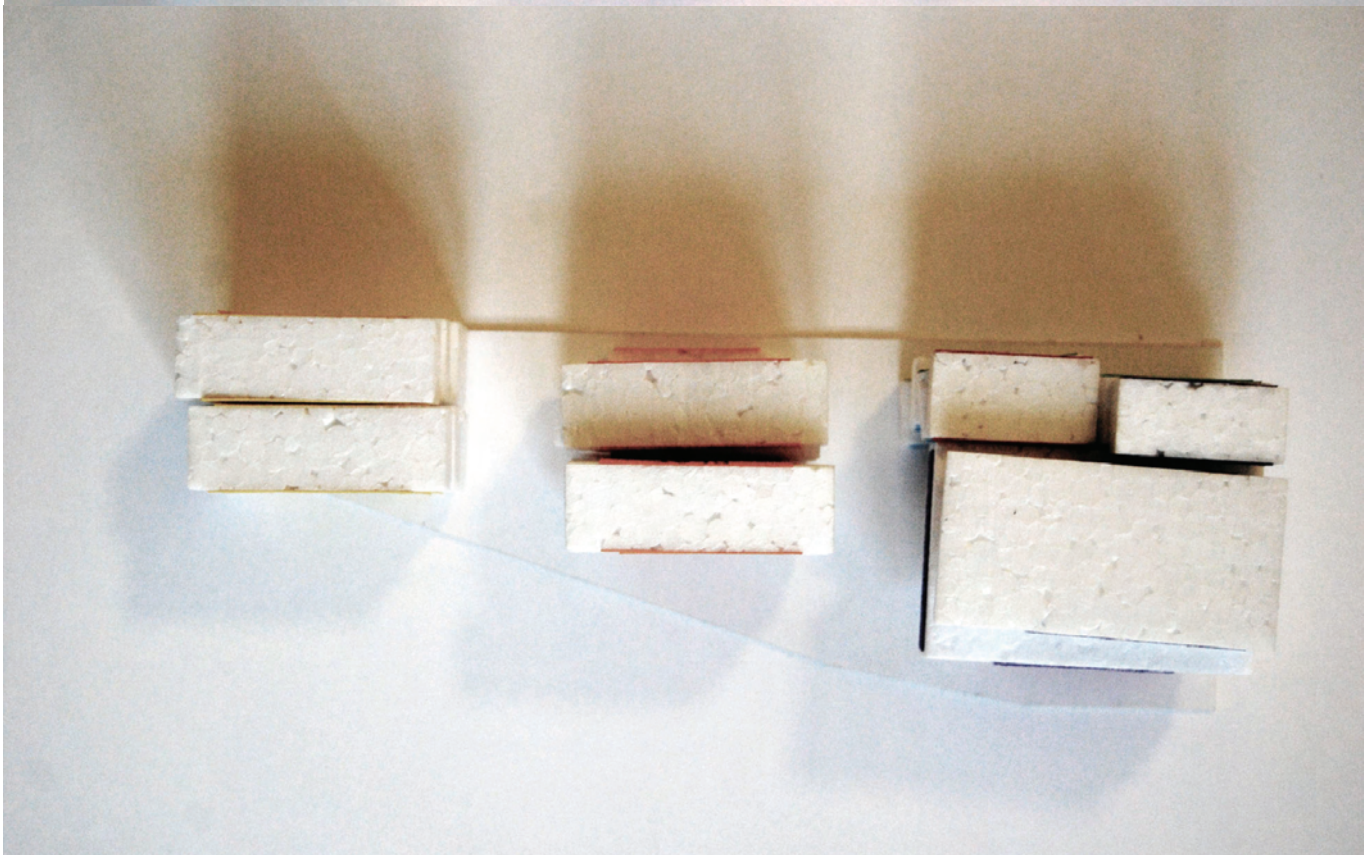
STACKING ARCHITECTURE:

En experiment working with platform and three volume "boxes" on top. The "box" volumes can tree represent diferent parts in the building: classes, homebase ares and big common rooms like sports holl, kanteen, drama.






CLASS
CLASS
CLASS
CLASS
CLASS
PLAY
PLAY
PLAY
PLAY
PLAY
DRAMA
SPORTS
KITCHEN
KANTEEN



CONCENTRATION AND INTERACTION

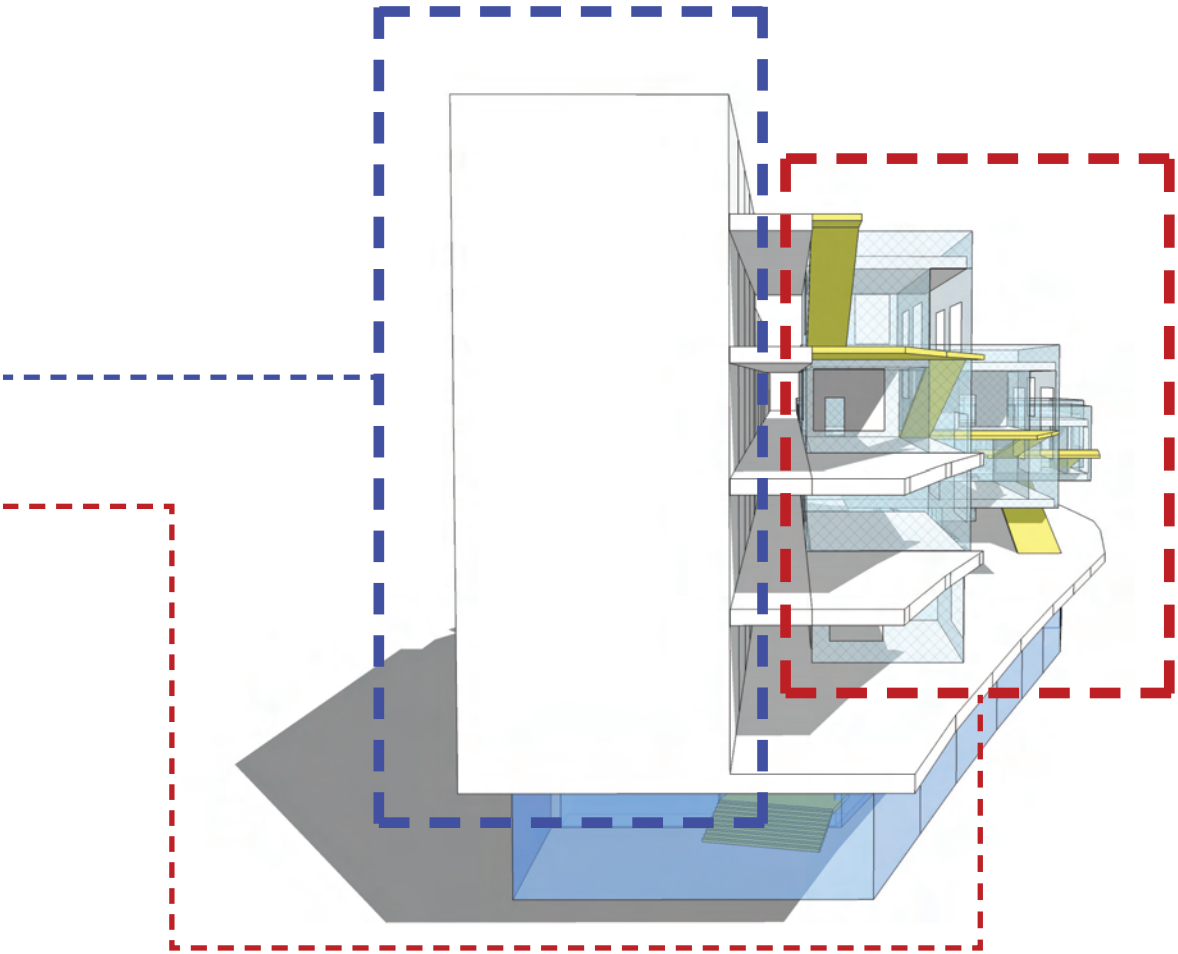
Working in section. Putting room program on each otehr to find a place for school building elements like classes, common spaces, place for differetn age groups. Ramp connects the boxes as inside street. How to orientate yoursef in the building in a clear way. Site is very small so the only possibility is to work upwords. To layer the building.

CONCENTRATION

INTERACTION

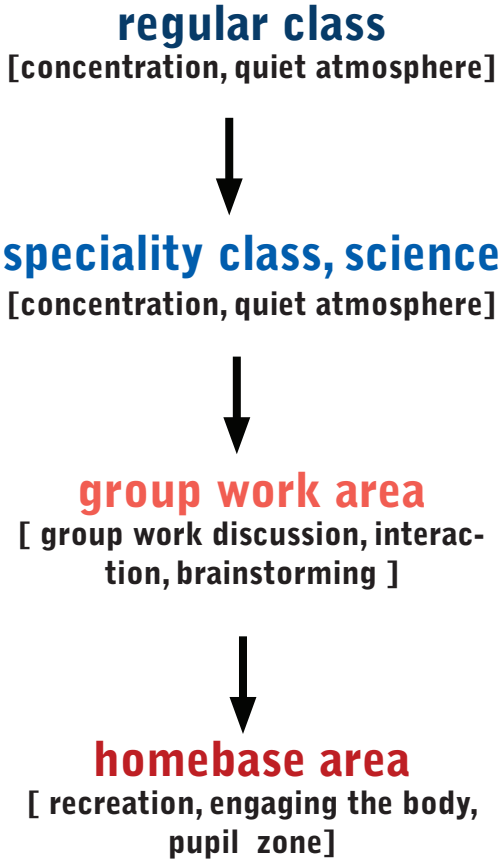
NORTH SIDE

SOUTH SIDE

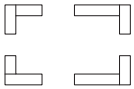


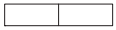
CLASS CLUSTERS:

The school building is designed according contemporary school examples (Heelerup) which uses open plan concept. The teaching is organized that way that every class has a class room, a home base area and a group room. Science, art and other special activities ar held in special classrooms which have special equipment. This way pupils are givven opurtunity to study accordint to individual needs. Regular classes are place to work where concentrattion and quiet is needed, it is better for individual work. Group room areas are more buisy where pupils talk and have discussions, there is less constrain on phisical position. Home base areas are "safe place" for pupils to rest or play, use their bodies more, stand, sit lay down or run around. This way the balance between active movement and still concentration is provided which is very suitable for learno for children from 6- 16 years old.

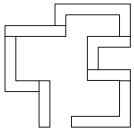


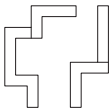
Play area
[homebase]



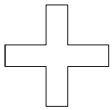


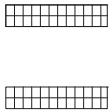
Play area
[homebase]

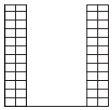




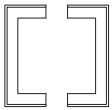
lockers,
wardrobe



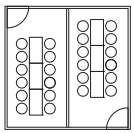




discussion
cluster



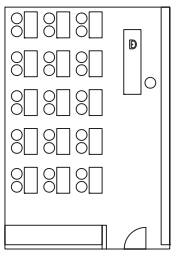
24

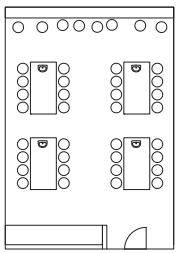


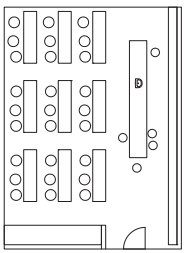
2 x 12

8

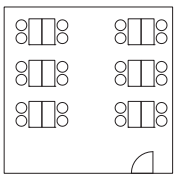
science
class

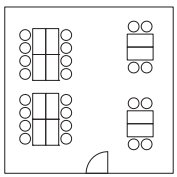


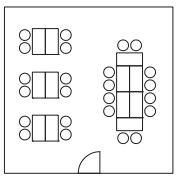




regular
class





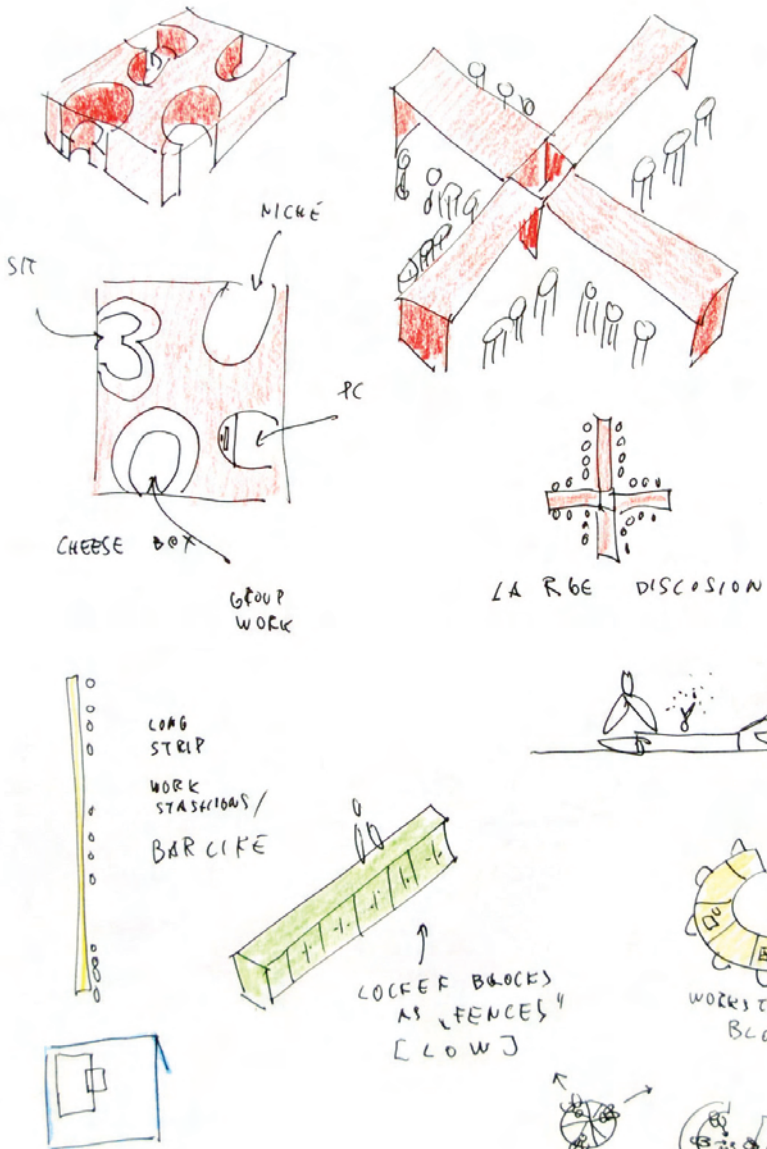


CLASS CLUSTERS:

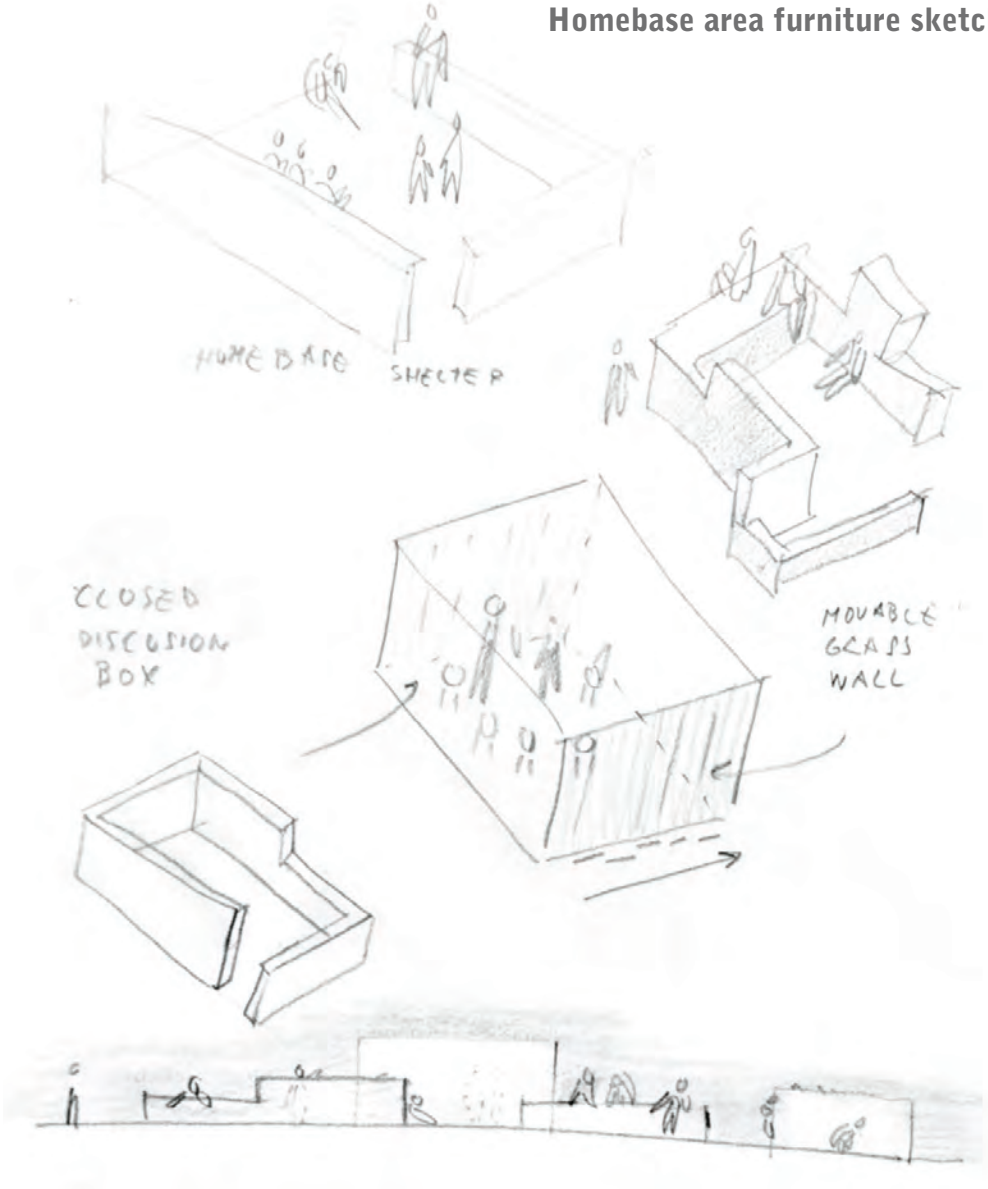
In a contemporary schools very important area is a homebase area for pupils. Each class has a designated area where pupils play or rest. If regular classes are more formal areas then hamebase is more informal. Common solution is to work with furniture design that enables pupils to make best use of this space. Area shuold be encouraging to explore and inspire. It is often an improvised furniture that pupils can sit on, lay down, bend over and so on. It is a litle bit protective place that separtes from common school open space. Here pupils can find their own way to read, prepare for class or just play. Good lighting conditions are very important. Natural light is a must, bet from East-South-West sides, because it is a cozy active place where children should feel welcome.

Another important element of conteporary school is a place for group work. These areas are designed in three different sizes according to group sizes; 24pupils -12pupils -6pupils. 24 pupils is the full number of the regular class. This place also has privacy but is not so formal as regular class to encourage students to interact and brainstorm. Good lighting condition are important but sun light is not necesary. Sometimes light but not too bright place creates atmosphere of intimacy which can help concentrate on the moment which is very important in pupil discussions. Group work areas has to be flexible and allow modificationsns in partition or furniture layout. Walls work as exposition place for poster or other material that pupils want to display.

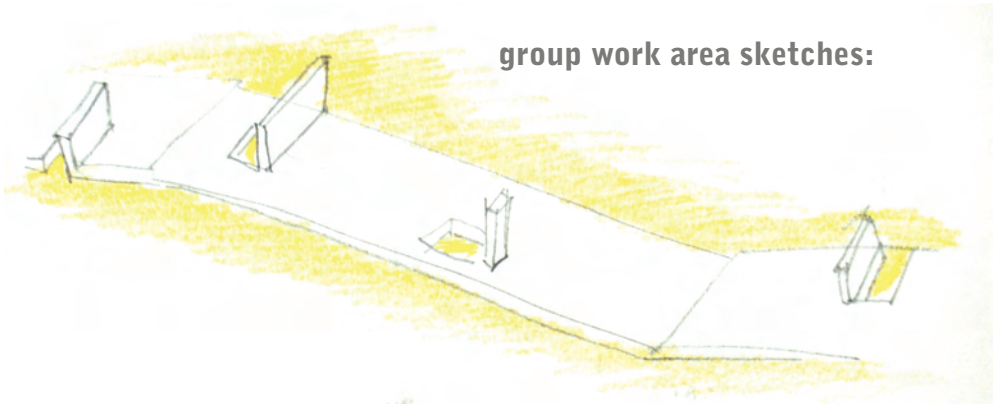
Homebase area furniture sketches->

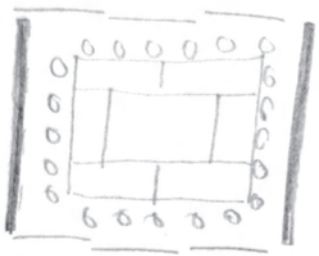

NICHE
SIT
PC
CHEESE BOX
GROUP WORK
LARGE DISCUSION
LONG STRIP
WORK STASHIONS / BAR CIKE
COFFEE BLOCKS AS „FENCES"
[LOW]
WORKS TASHION BLOCK
INDIVIDUAL SUPERVISION

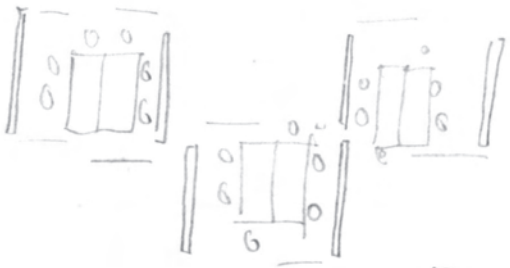
Homebase area furniture sketches :

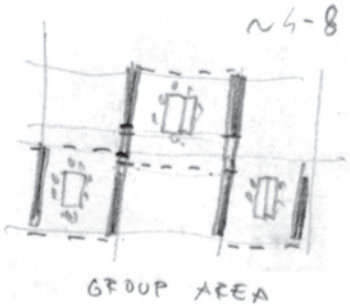


group work area sketches:







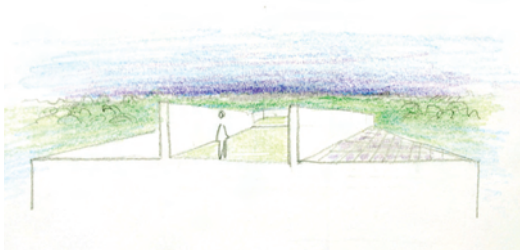


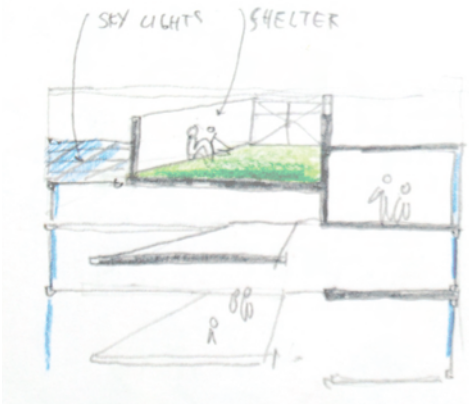
SCHOOL COURTYARD:

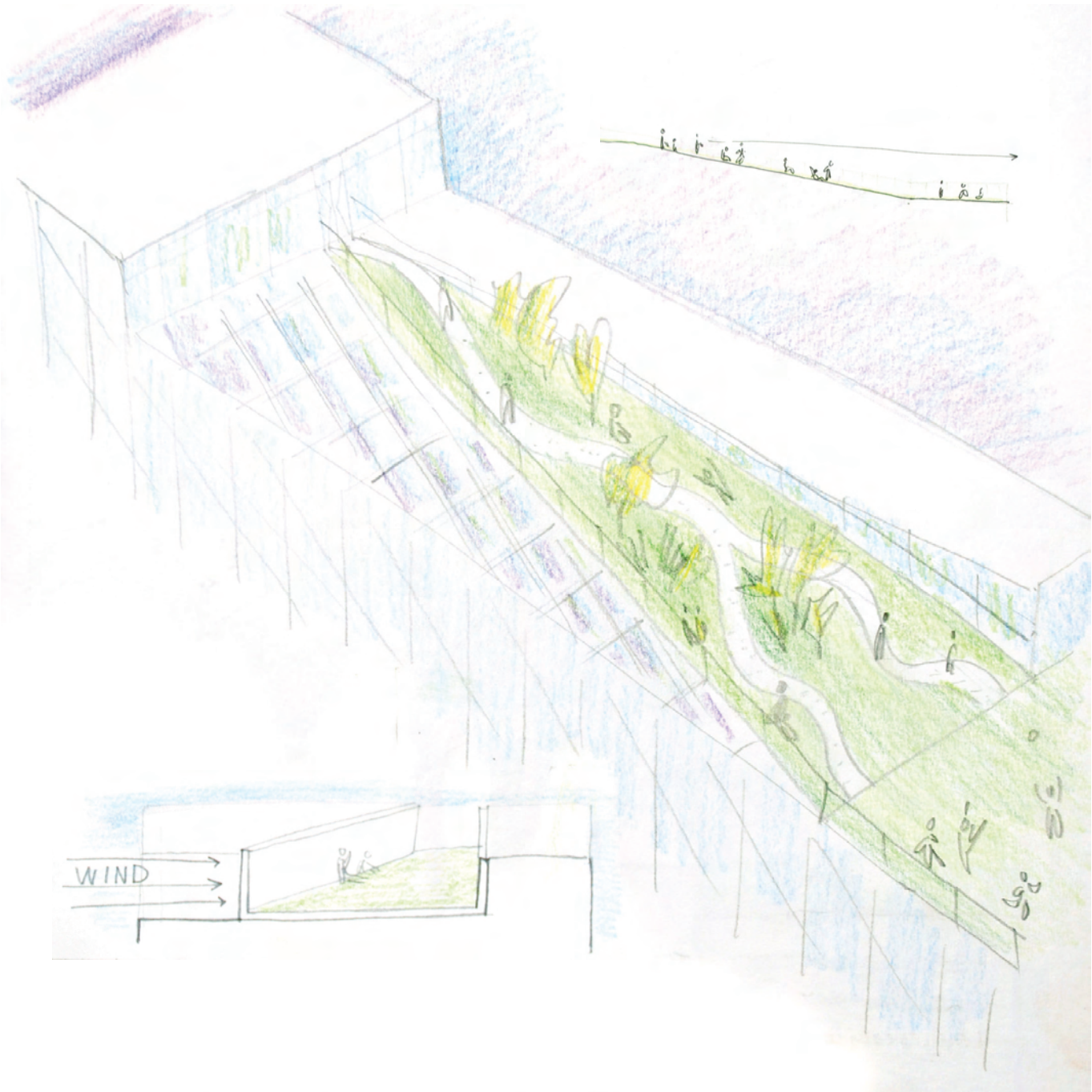
The proble of the this particular school is that it's site is too small to have a school building and a courtyard. Courtyard is very important place in the school of pupils from age 5 to14 years old. It is a place where they do there outside sport activities, recreate, play and have open air classes. The solution in this school is to accomodate these functions else where. Sports holl is designed in the basement and outside recreational areas on the roof of the building. Building roof has terraced shape so it is divided in three different level so that pupils if different age groups would have there spaces and do not mix too much.

Terraced roof works as a continuation of inside ramps of the building thurther expanding the concept of landscape in the building. It is an interpretation of natural and urban landscape whre pupils can spend their free time or during the class activities outside. It is a good place to teach children about surounding world elements like climate, nature or even urban life becous so much is visible from the roof.

sketching of the roof layout:

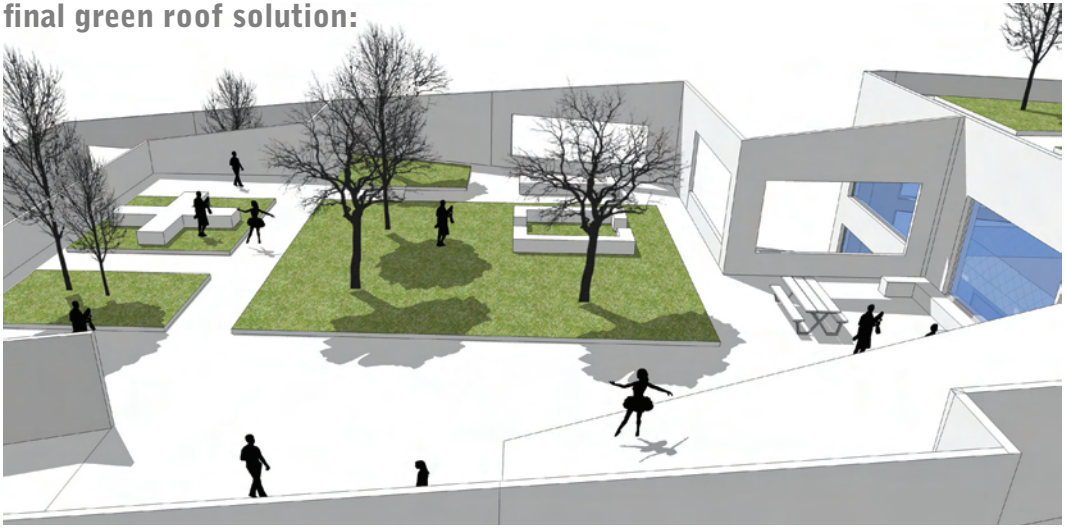





WIND

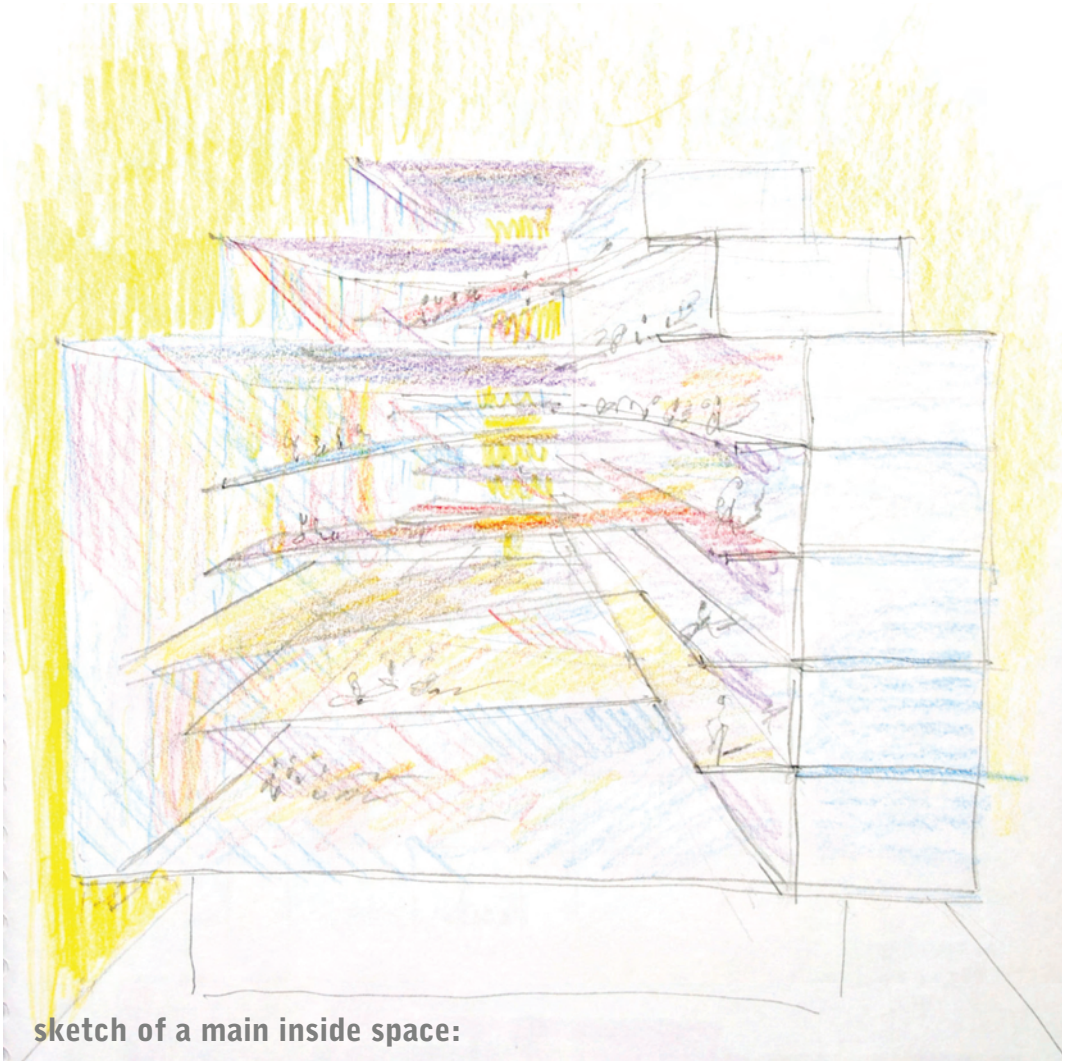
final green roof solution:

final green roof solution:

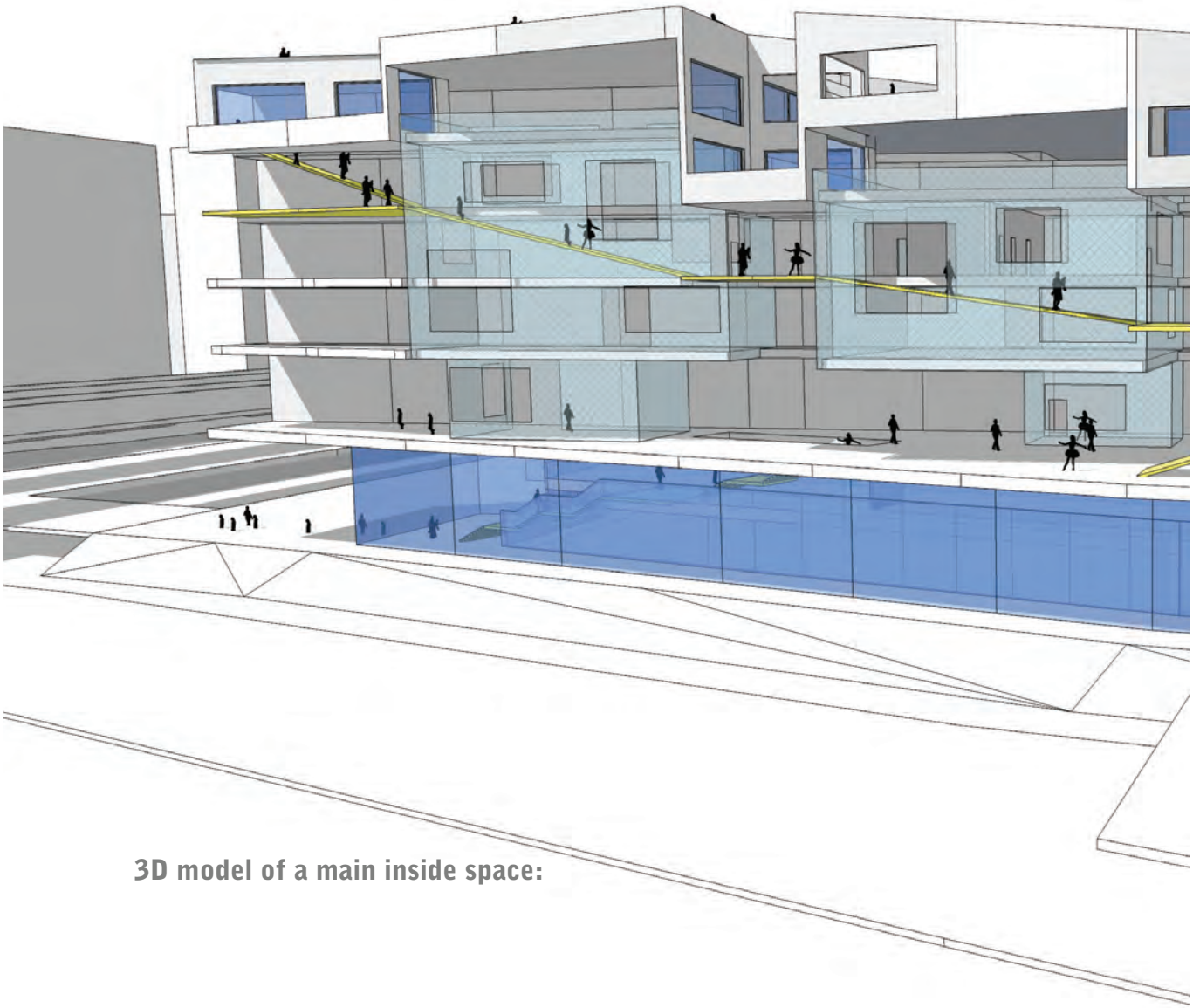


SCHOOL INSIDE SPACE:

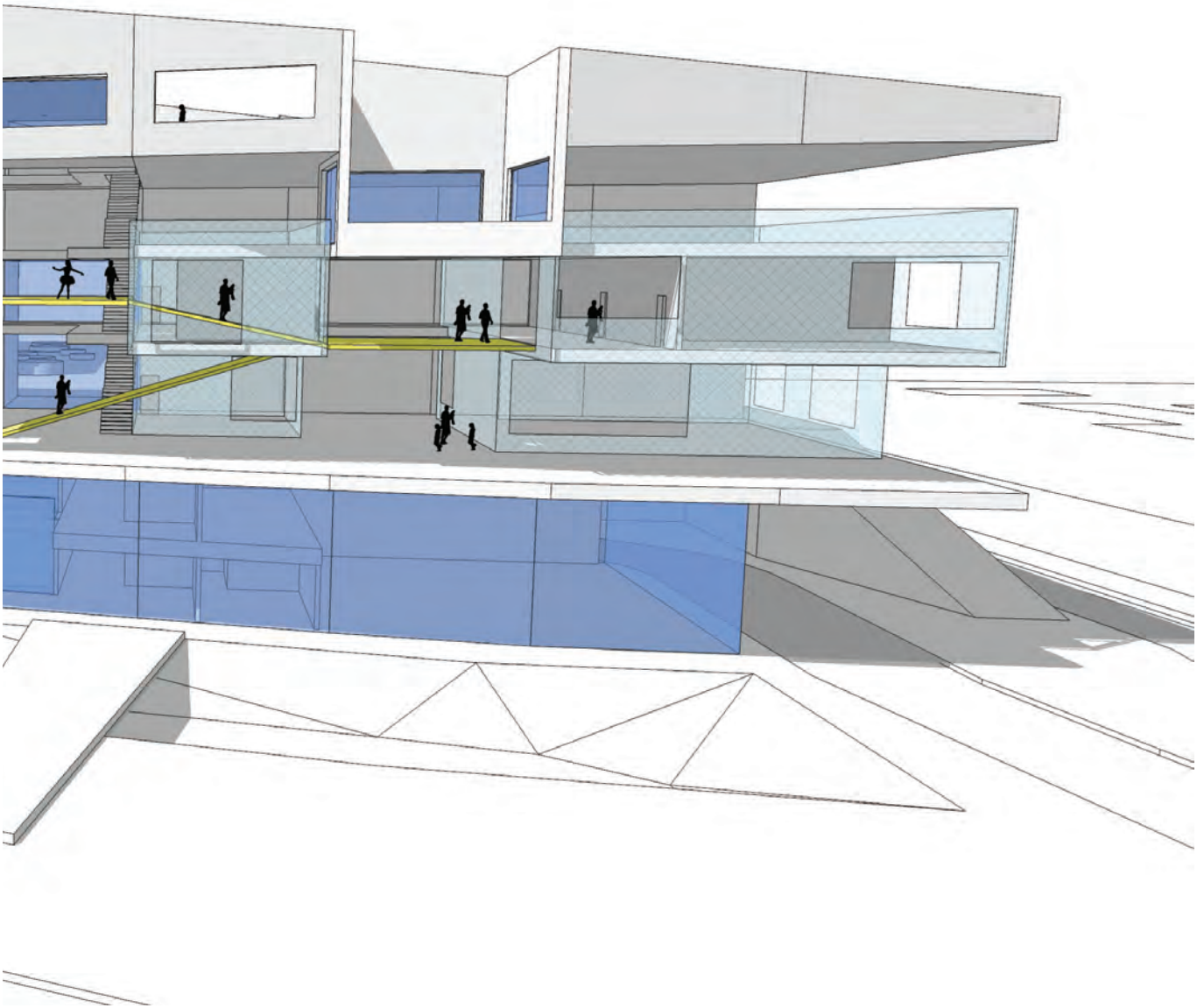
The school size of 7000 m2 and that has 840 pupils is a big school. It starts to be so big that it reminds a small town or at least a small urban block. It has a lot of rooms of different sizes and functions, it has corridors and pedestrian paths that work like streets, it has work, recreational and dinning areas. Teachers and pupils of different ages ar inhabitants of this big school building. But in this small academic comunity where do pupils meet, where can they gather together and feel the common spirit of the school. In clasical Antiquity towns citizens met in Agora a central place or square to discuss and hear the news. This school also has a common space which serve for representation, gaterings, and orientation in the building. It is located on the second floor of the school and oriented toward he South. It is a big open space with good connections to outside and inside. It has the hight of four floors to create a feeling of space and light. In this space stands fours free standing volumes simular like standing buildings in the city. They are all interconnected with one ramp running from ground floor to the top floor. In these four " buildings" are located special classes like science and woodworking and also home base areas for the pupils. These structures and an open space around them create a place of creativity and exploaration. It is place where student spent a lot of their school time. It is informal and inviting to explore. It is illuminated by the stream of Southern light which makes it more active and dynamic. This places stands in opposition to a regular grid class structure on the Northern side of the building where. concentration silence is prefered.

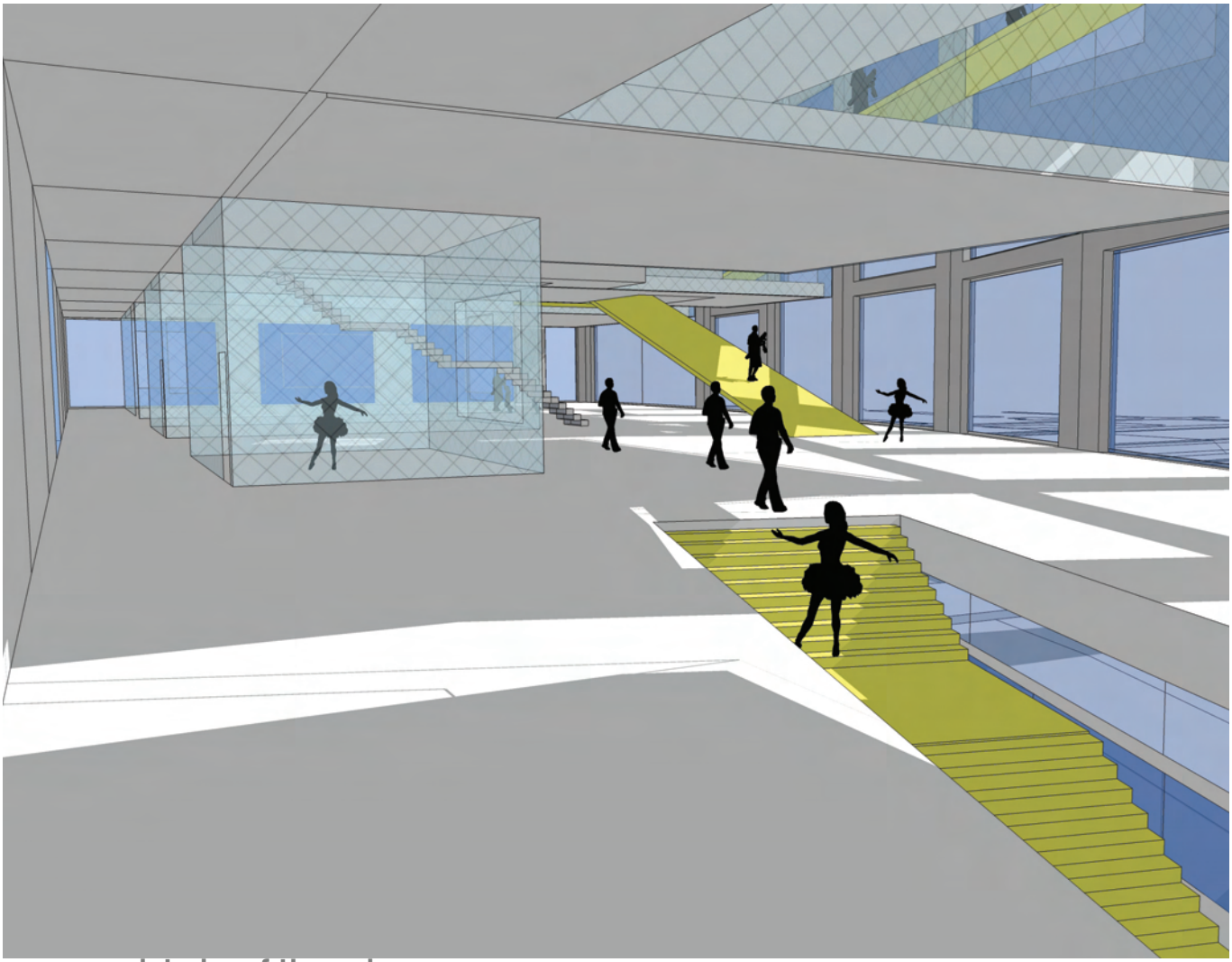


sketch of a main inside space:

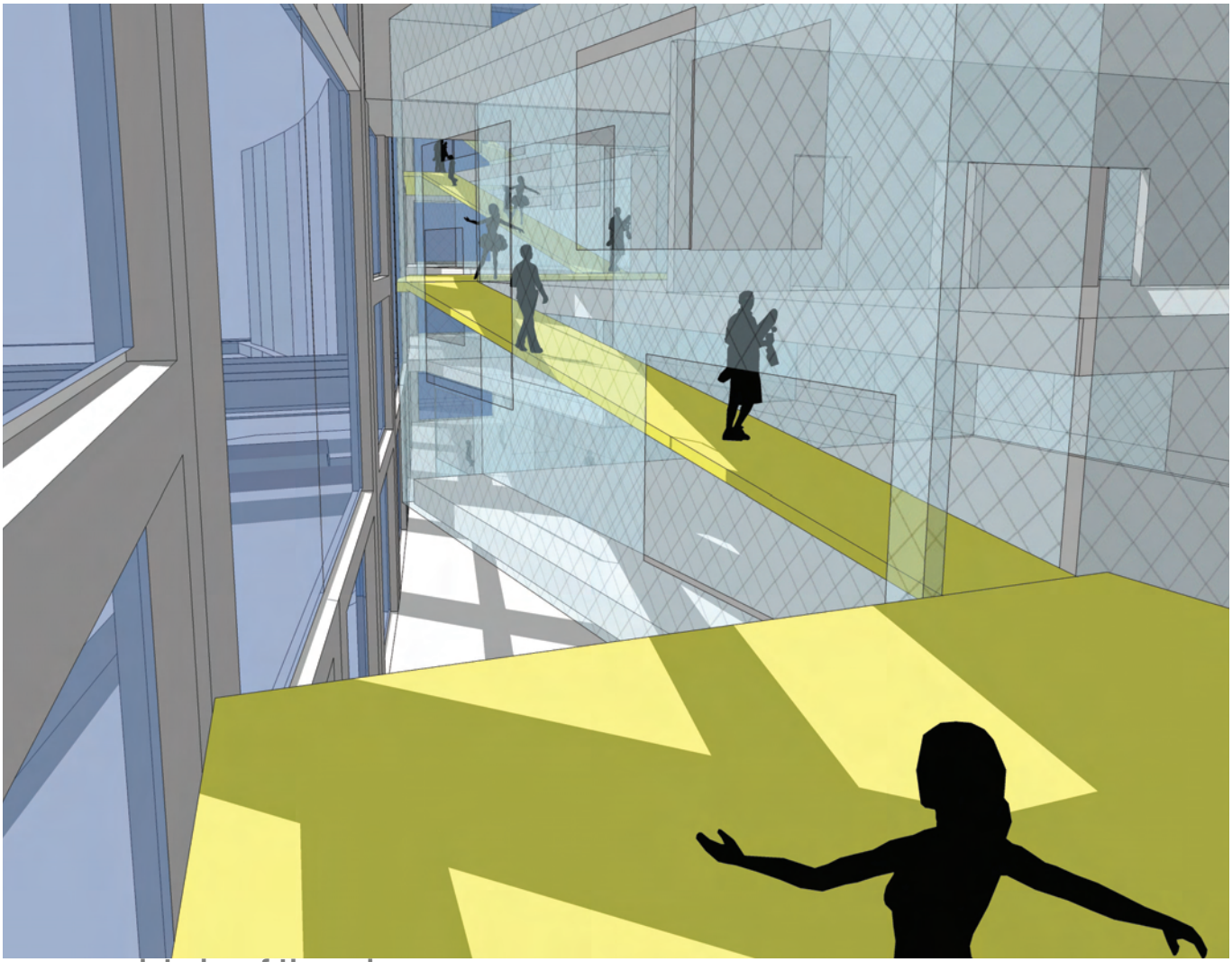


3D model of a main inside space:





interior of the main space:

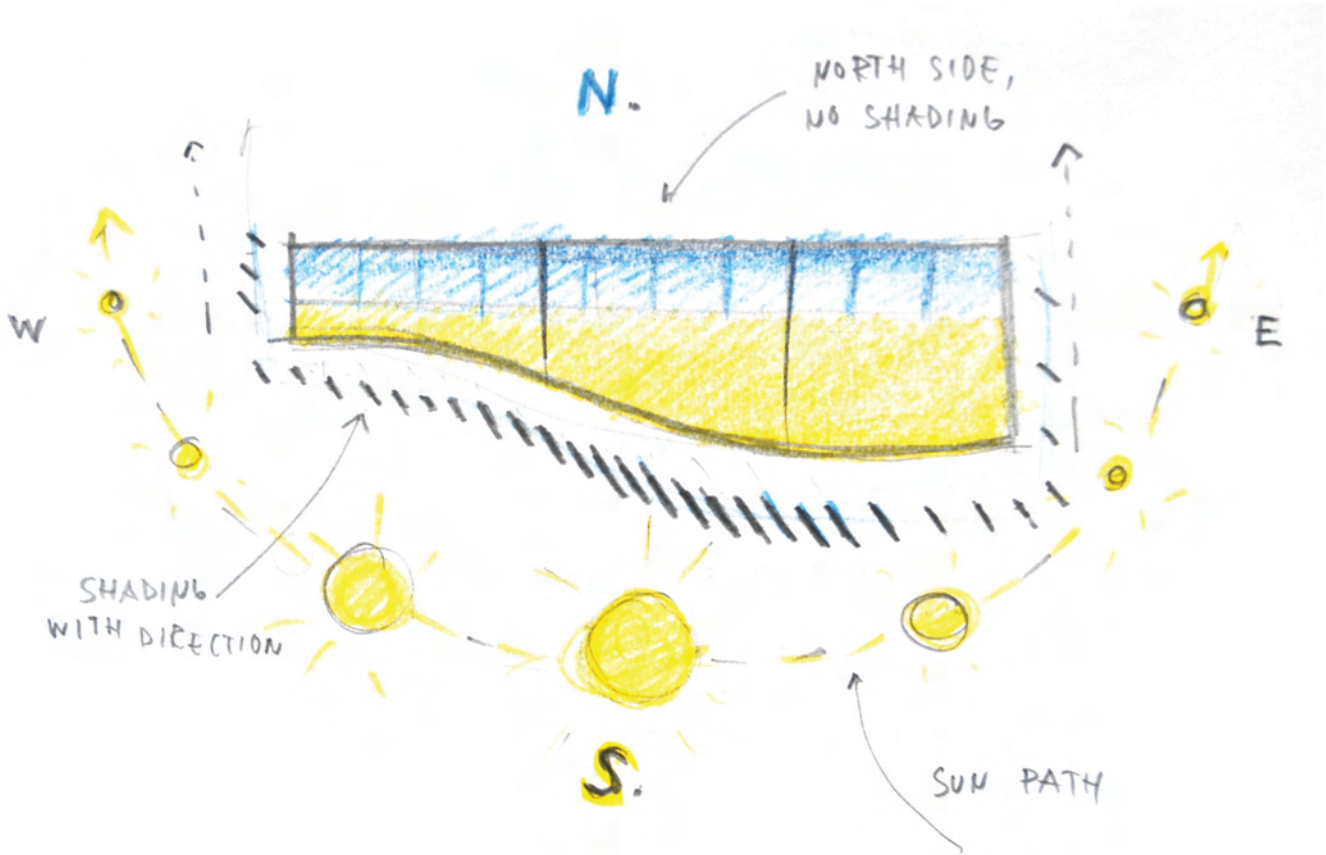


interior of the main space:

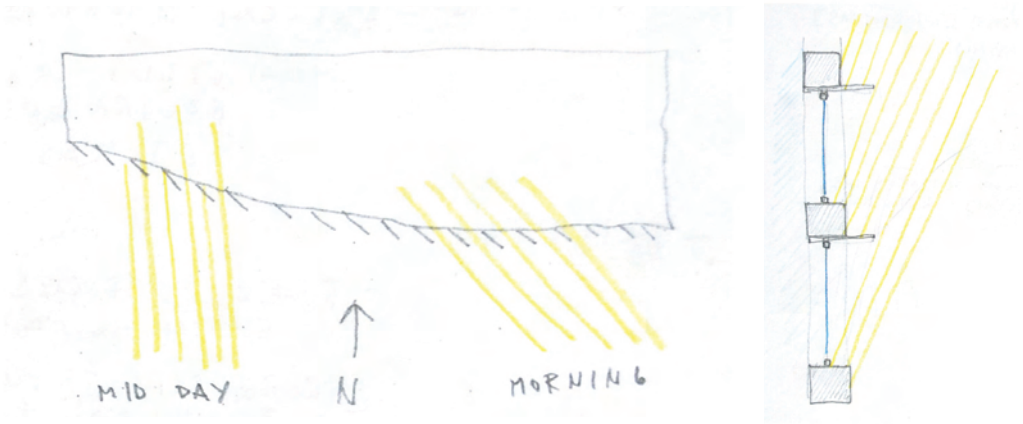
DAY LIGHT:

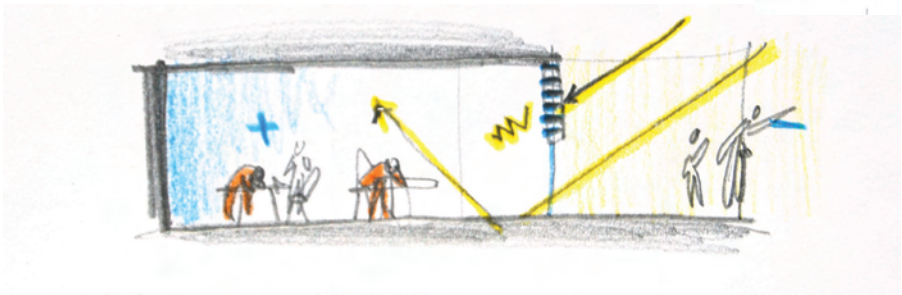
Optimized daylight was the top priority in the design of this school when the priorities were set. This project reflects my own opinion what an optimized daylight conditions for the school are. My aim was to benefit from the presence of light and also from it's absence. The result is explained in the chapter about "concentration and interaction". In this chapter I would like to explain my work with daylight in the main common space of the school. As explained before this space is located in the Soutern part of the building. There stands " free standing volumes" with science classes and ramps between them. It is a dynamic and active space for interaction and exploration very much realted with pupils bodies.

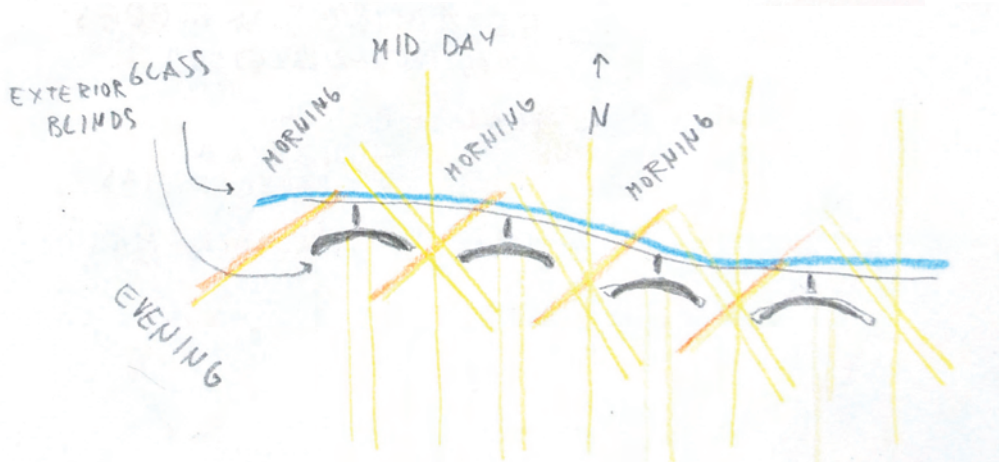
It is very natural that this kind of dynamic space would be illuminated by a heavy stream of sun light. The challenge here is to achieve a ballance of light and shading. Buiklding faces 2300 m2 of facade surface toward South. The facade is designed from concrete grid framing huge glass windows in the size of 20 m2. So most part of the facade is constructed from glass, this was necesary to achieve good visibility and aestetic properties of the building. On the other hand this amount of glass in hte South facade creates big problems with overheating and possible glare especialy in the warm season of the year. Desidion was made to solve these problems by providing shading solution.



sketch of the daylight investigation:


MID DAY
N
MORNING




EXTERIOR GLASS
BLINDS
MID DAY
N
MORNING
MORNING
MORNING
EVENING

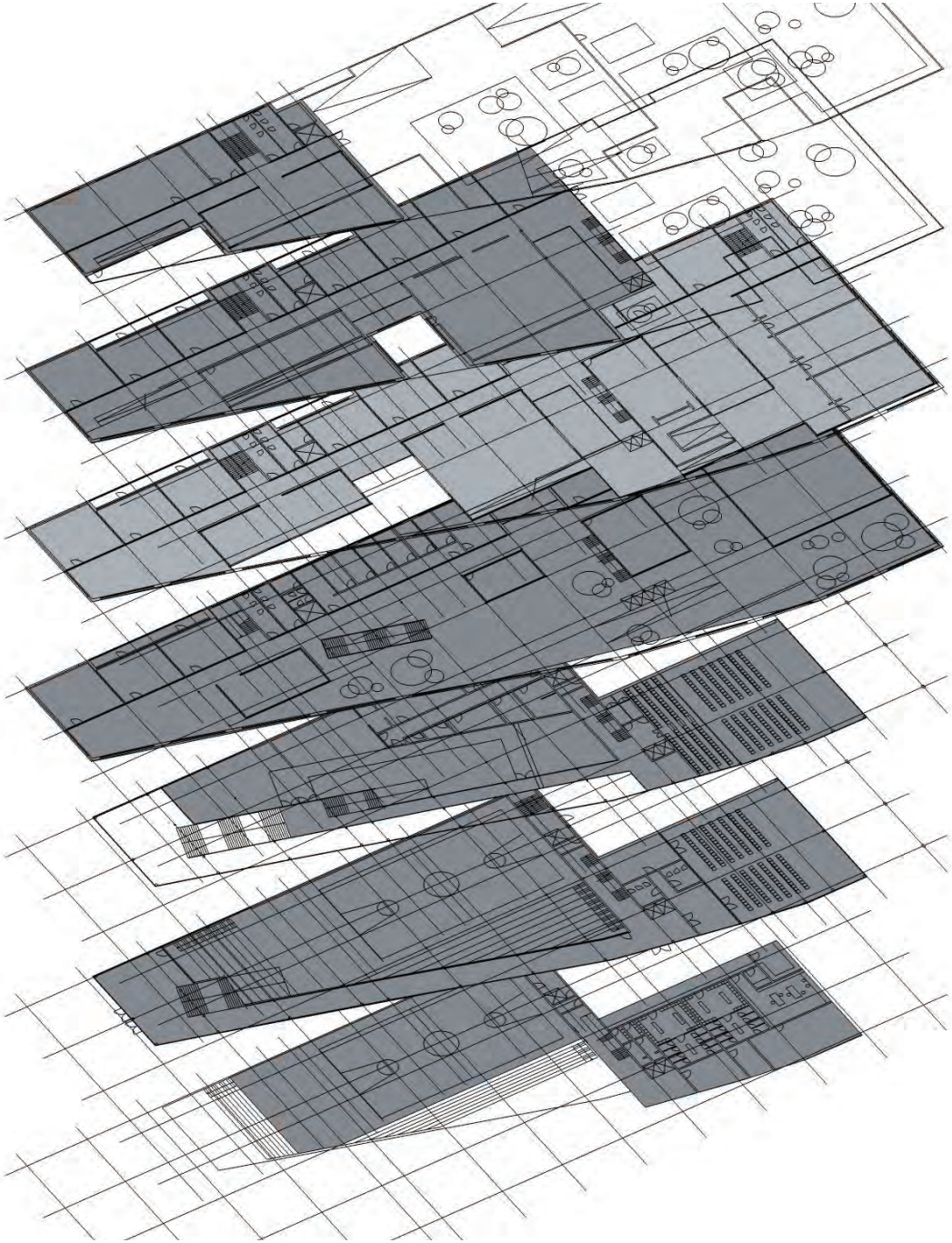
different shading solutions:

STRUCTURE SYSTEM:

School building construction system is based on a simple concrete column grid which is the size of 8x8 meters. It is an optimal grid for this kind of a school because grid 8x8 gives opurtunity to place one classrooom in one grid element wich is 64 m2. Sampe column grid runs from the basement to the roof of the seventh floor supporting concrete slabs. Naturely there are few exeptions in the grid in the places where longer distances needs to be covered. between the supports. These places are: sports holl, drama room and kanteen. In these special areas column grid is not si dense but instead they are reinforced to be able to support a increased load. The "box" structures inside the building are also in the same system of 8x8 grid. Their outside walls are not load bearing and made from transparent steel mesh so that the light could penetrate the rooms inside them and that they would carry less weight. The facades are wraped in concrete grid that carry the weight of an outside building shell. Big rectangular windows fill the grid to allow enough daylight in deeper in the school building.

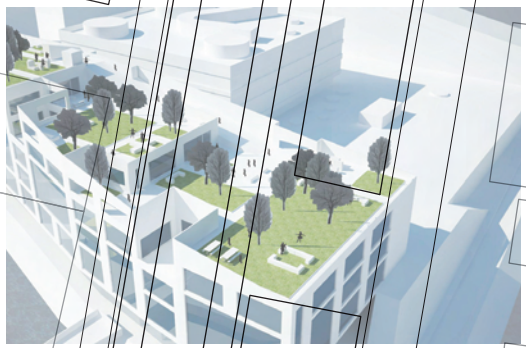
The construction solutions in this project were worked through only in a basic principal level becouse to investigate building system is not the main focus of this project. The main focus of the project is to investigate building in a dense urban environment. Please see chapter about project vision and problem statement for further information.

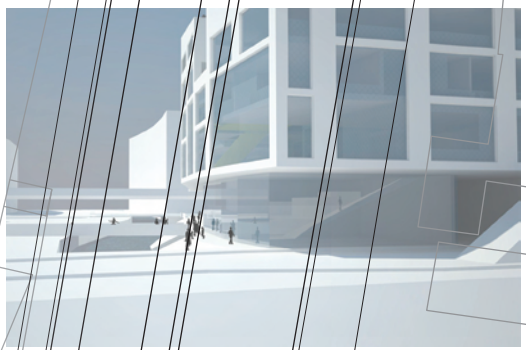
Building floors with column grid->

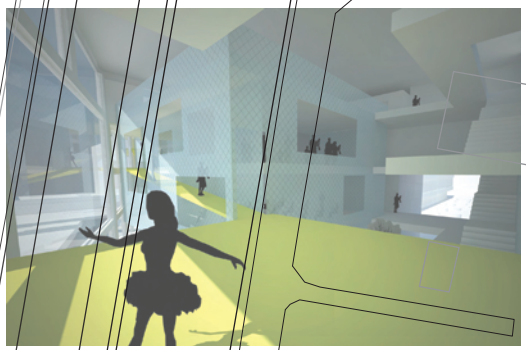


PRESENTATION:

As a project name implies this is an urban school project design in a dense city area in Copenhagen, Orestad. It is designed for 800 pupils in the age ofro 5 to 14. It takes 700 m2 and is seven floors hight. It is a visionary school fo the children of tomorrow. It means that contemporary teachig methods wll be applied which has special requirements for the school building. Since the school is place in a dense urban area where of the site is very limited it benefits it's environment in another way by stacking school rooms on top of each other. The interior organisation plays the most important part. The daylight illumination problem in this long [90m] and deep [20- 40m] building is solved by creating a big common space in the South side to transmit dayligh to the classrooms which are deeper in th school. The experience here is active and dynamic specialy in a common Southern space where a lot of pupil activities take place. The school itself is inviting to investigate it's surroundings and explore. Ths is achieved byhaving continiuos "landscape" in the building which is made as a ramps running from the ground floor to the top floor and even connecting the green roof. Ramps are aditional connection in the building together with elevators and staircases but ramps in particular invite pupils to use thei bodies, like for running, laying down, active playing,. This way the balance between active body use and stillnessi achived which increases pupils ability to learn and makes learning more personal. It is true that all children are different and according to contemporary education researchers they need different learning environments. So this visionary school offers opportunities for children who are more sporty, more still and others to reveal themselves in their own particurlar and personal way.







SITE PLAN:

[scale 1/1000]

Master plan layout is limited by the site size. The building is basicaly the offset of the site so the solution is very compact. Because water channels and existing school with two stories car parking are neighbouring it. Main pedesrian access is from he West through an existing bridge. Second accsess is from the South side where the new bridge is designed The bridge works as a small meeting point before the school because this enrance is also public. General public has opportunity to use this accsess when the school offers open events at their drama or sports holl. Building is well connected to it's urban environment by taking existing pedestrian paths and extending it inside. It has truck supply access from the West side and additional pupil access to a roof terrace on top of the parking in the Northen side.

EXPLODED DIAGRAMS:

The urban school building is made from four major parts which together ar stacked on each other like architectural pie. So the best way to explain the building is to exlode it in primary elements. Starting from the ground level there is first layer which represents two building floors and a basement. Bigest school spacee are lieing there: sports hool, drama and kanteen. In special school events these spaces can become public. Second level is regular classrooms situated in the North side. They are connected with corridors. Third level are the"box" volumes freestanding on the lower level. It consists of special and creative classrooms and pupil homebase areas. These "boxes" area made in concrete frame and wraped in transparent steel mesh which becomes inside skin in the building. The top level is the outer skin of the building they are facades and terraced roof.

4- THE SKIN

[roof, facades]

3- " BOX" VOLUMES

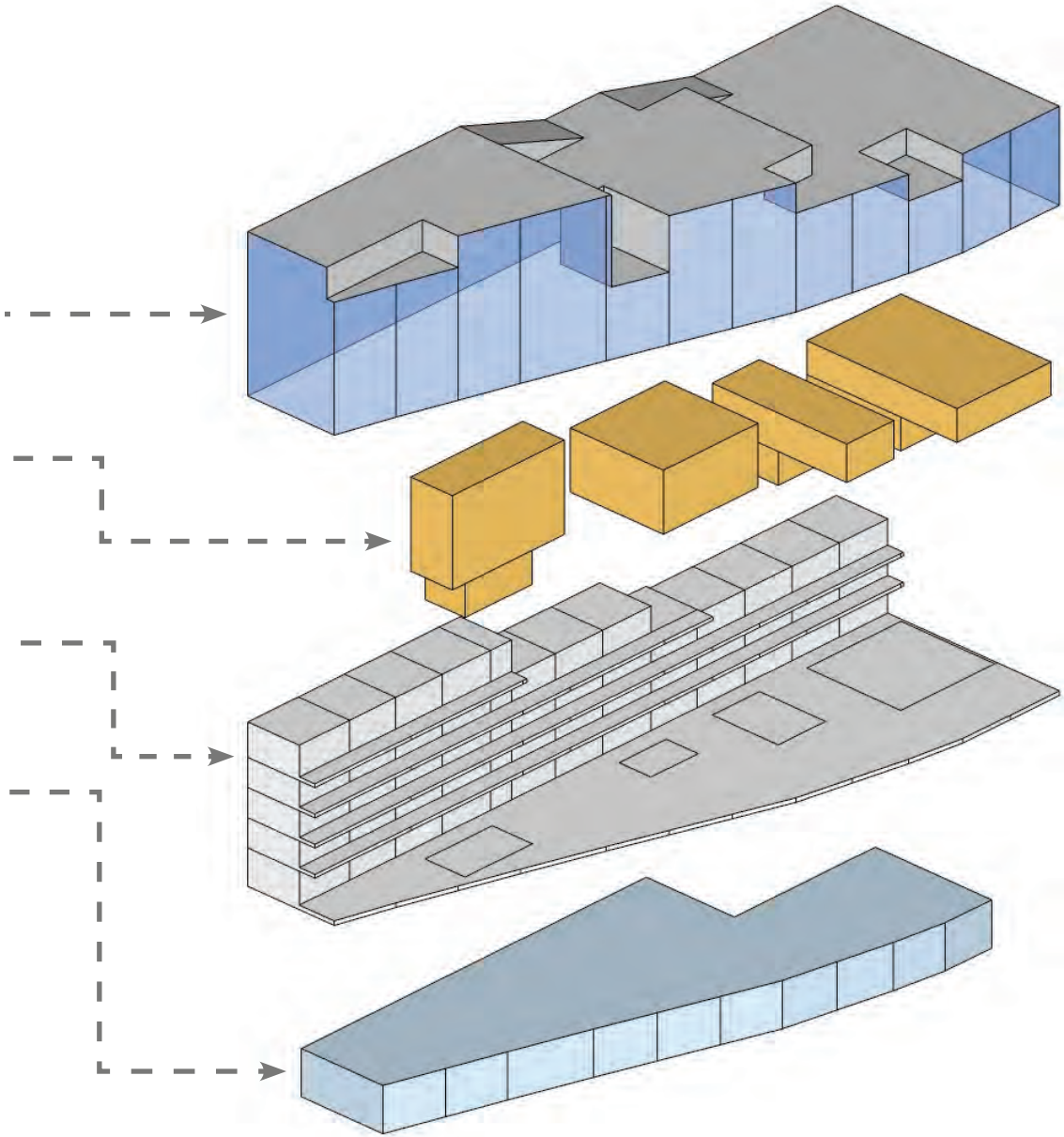
[creative, interactive,]

2- GRID WALL

[regular classes 8x8m]

1- THE BASE

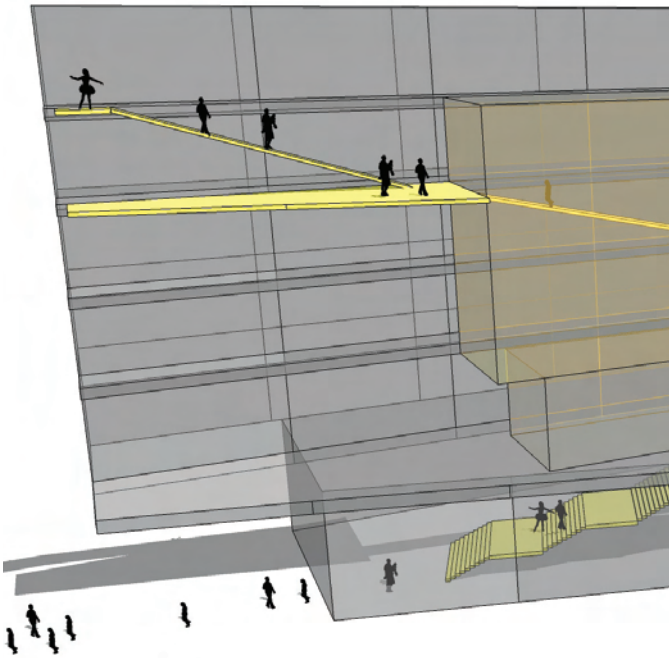
[sports, drama, kanteen]

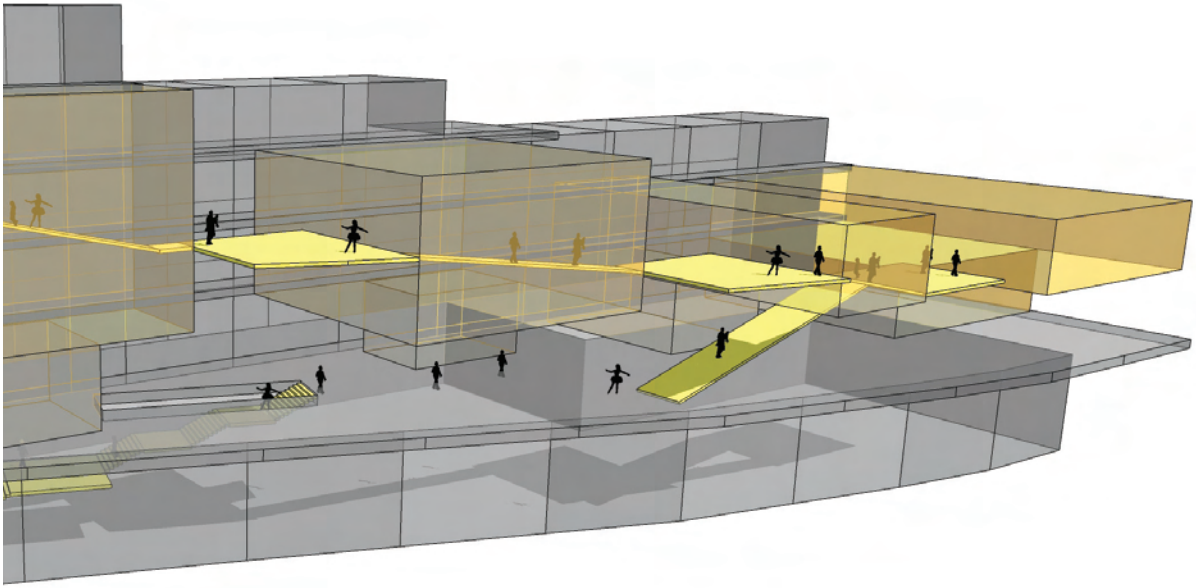


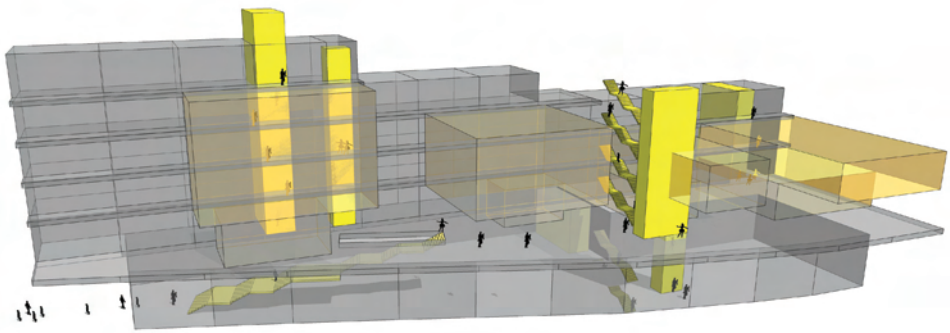
INSIDE LANDSCAPE :

The concept about waving landscape in the building came from persona experience of big school buildings which very flat, monotonous, confusing and boring. The wish was to connect all seven floors of the building in an interesting and clear way. Pupils engage ramps with their bodies, play, relax, then they can concentrate better in onther subjects where more concentration is needed. Ramps connect all floors of the building in a contitues flow they serve not only as walking rute bt also as an unexpected place for pupil activities. They link "box" volumes where artistic classes and ome base areas are situated. They are the alternative root for corridor system which is simple monotonous and clear.

To diagrams show Ramps route through the building and a regular corridor-staircase-elevator system in the school. They complement each other.



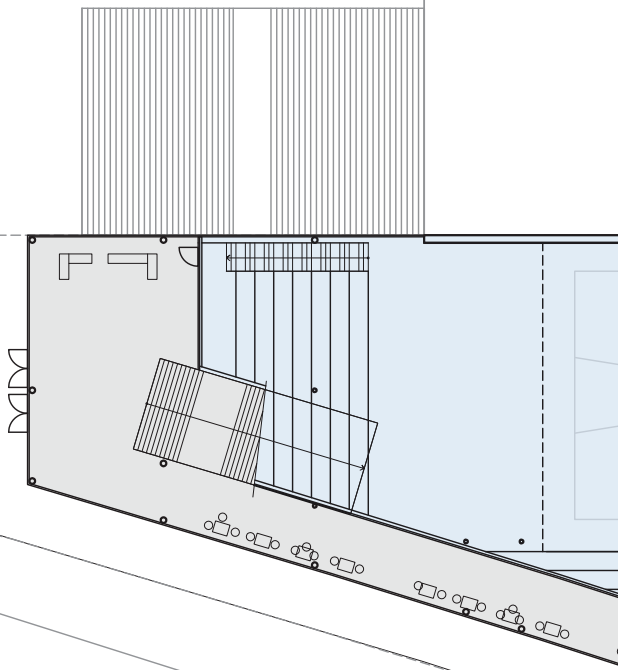


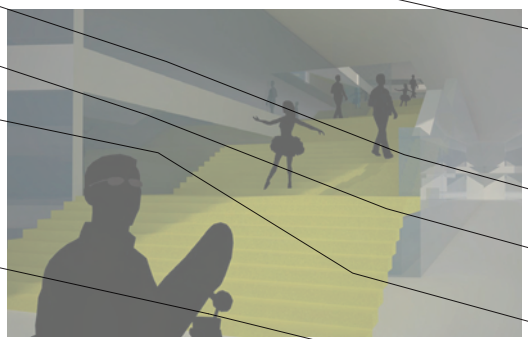


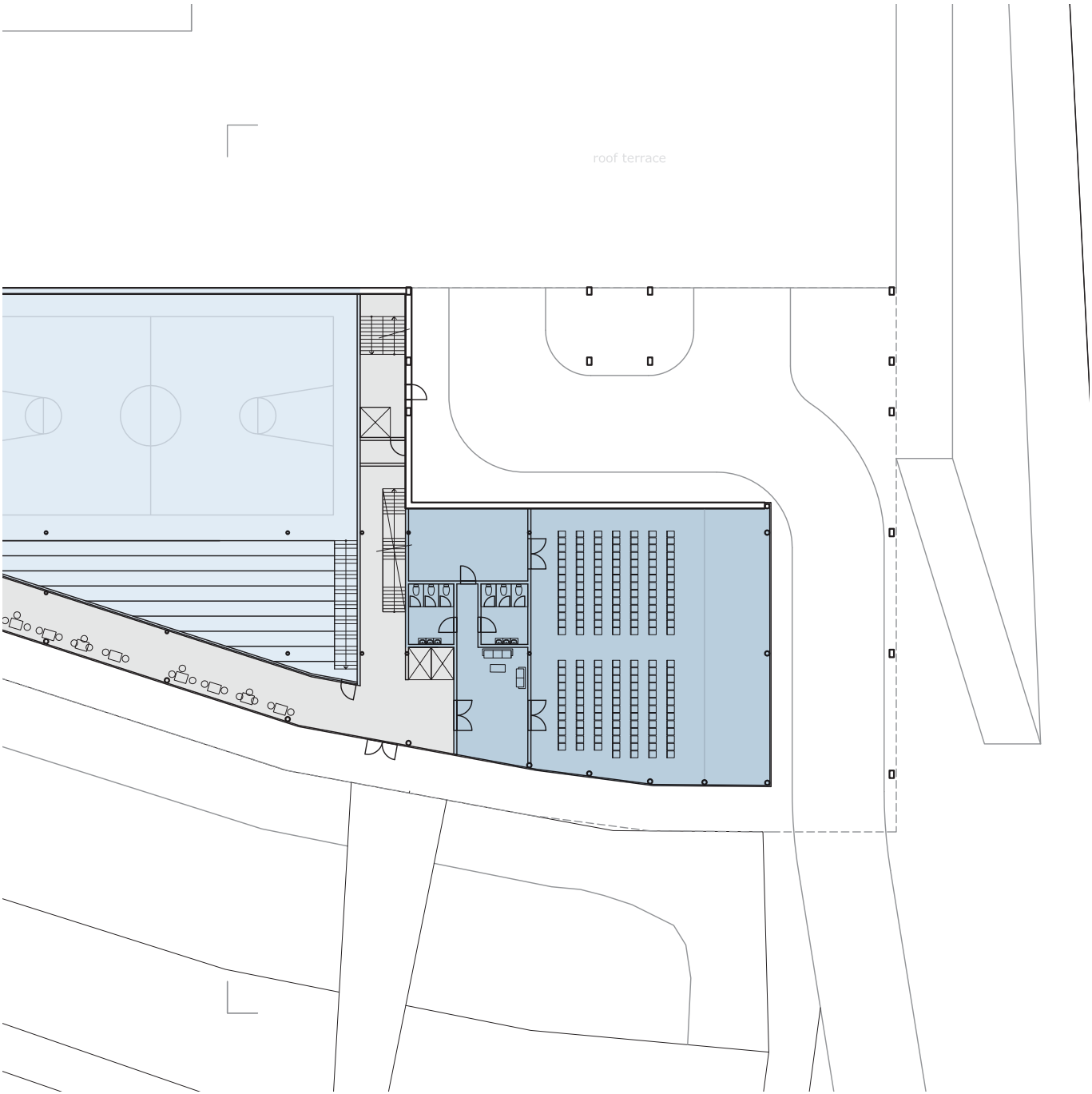

Building in the context:

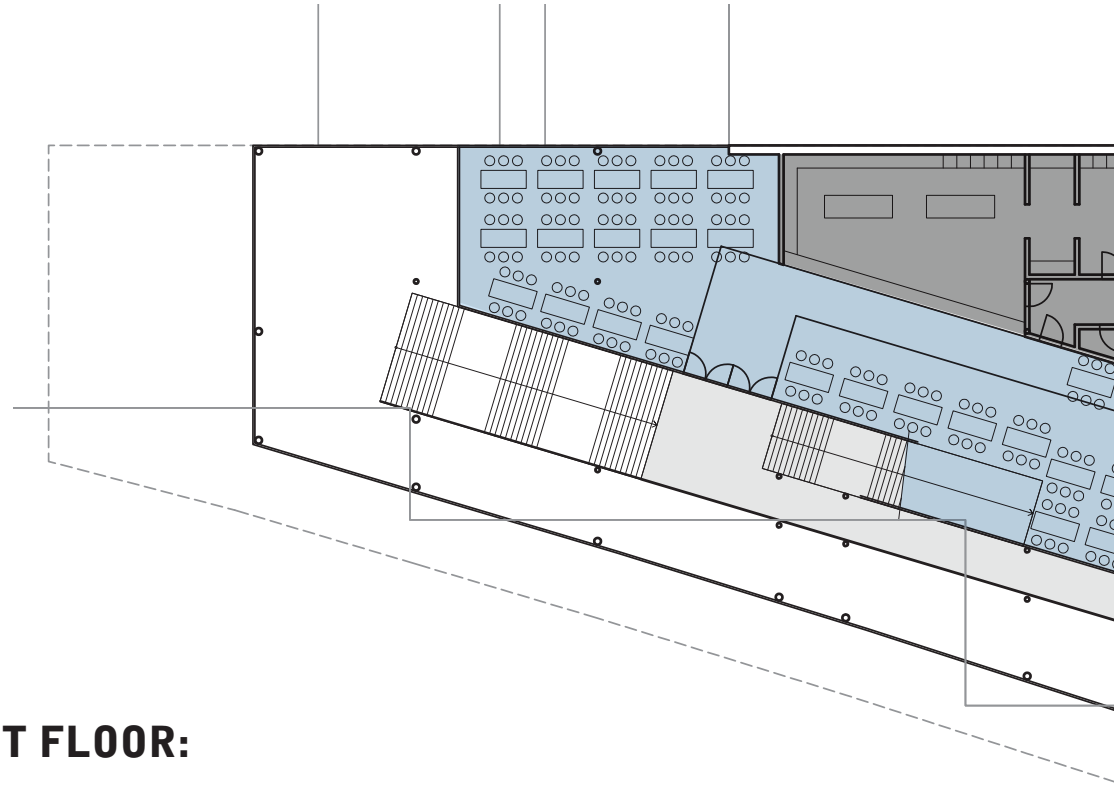
GROUND FLOOR:

Ground floor is offested from the site build u in order to create more welcome space tothe West entrance and to benefit from channel waterfront The floor contains drama and sports holl which starts ant the basement. It has good daylight conditions and visibility because be taking a stroll you can observe spots activities in the basement. Grand staircase start the ramp flow to the upper floors.



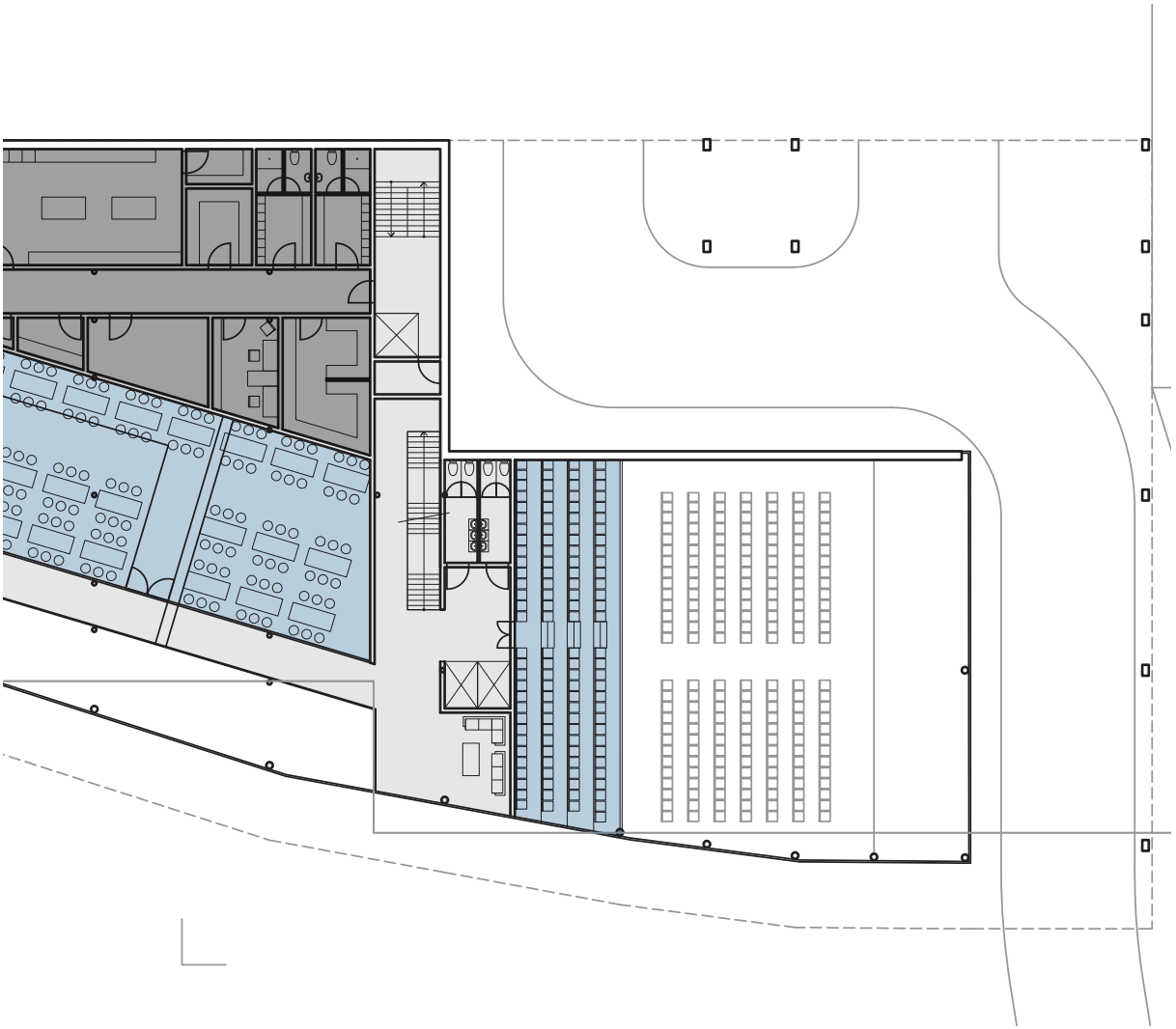


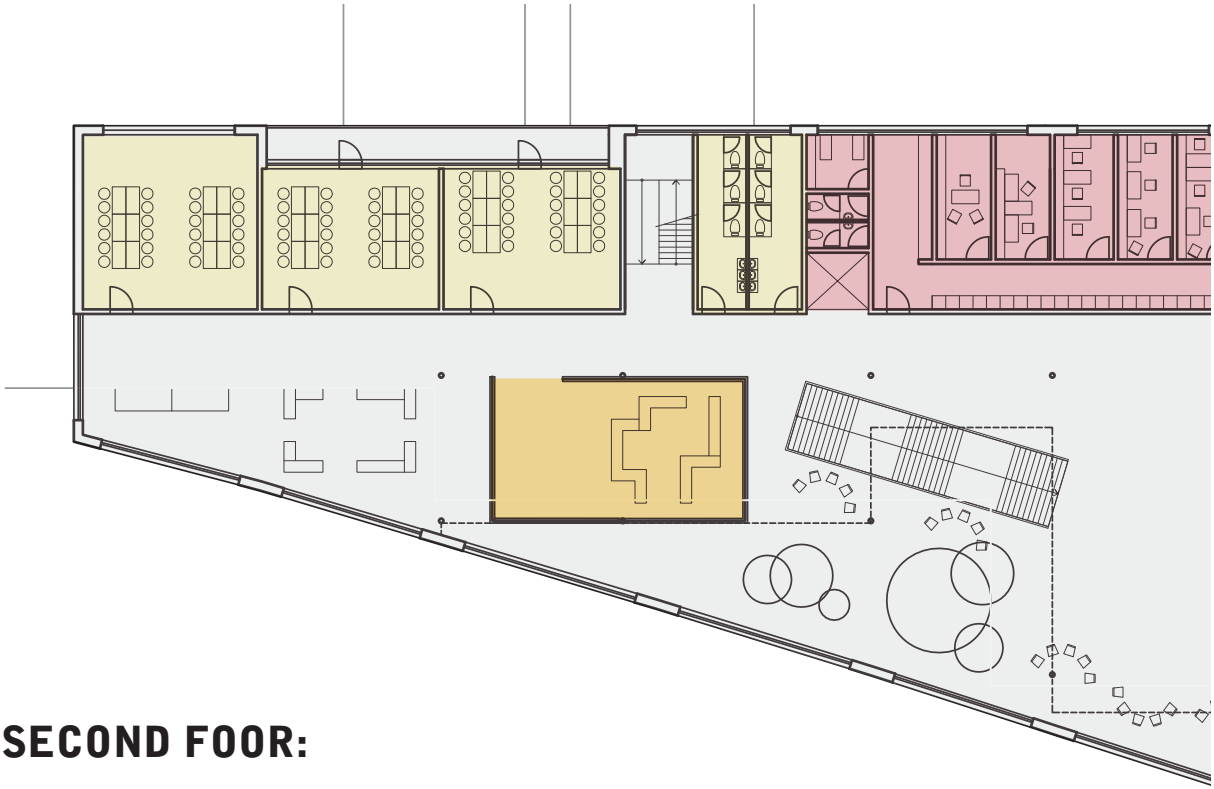




FIRST FLOOR:

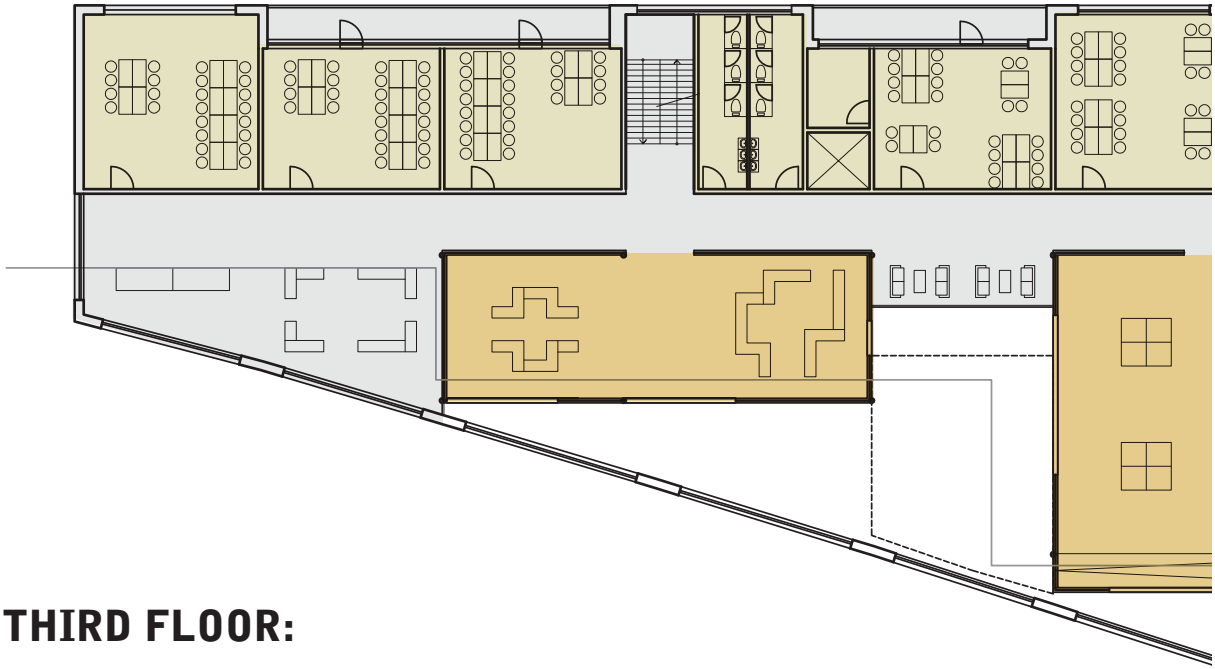
First floor contains kanteen and balconies for the dram holl. Grand starcase continous to the main floor.





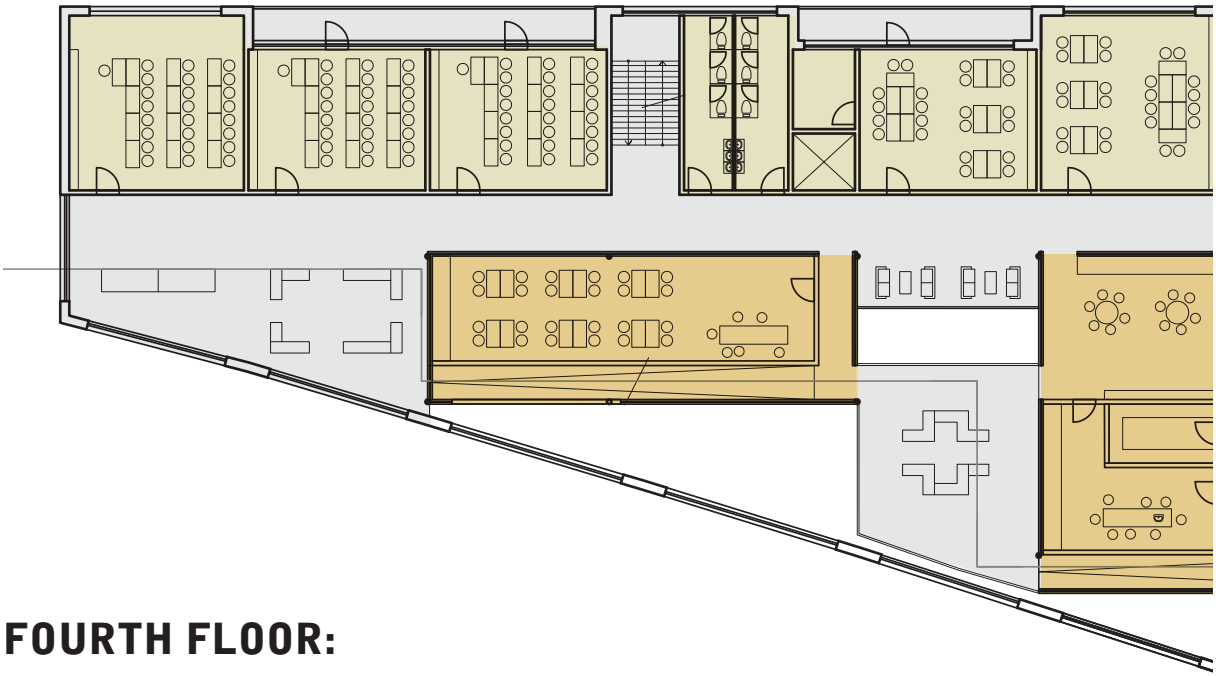
SECOND FOOR:

It is he main level of the school where most action is going on. I s like elevated ground level. It contains youngest children classes and management offices. The opem space is like small town piazza, a common school social space



THIRD FLOOR:

Third floor contains classrooms for 2-3-4 graade pupils. "Box" volumes contain science and art classes and homebase areas for the children.

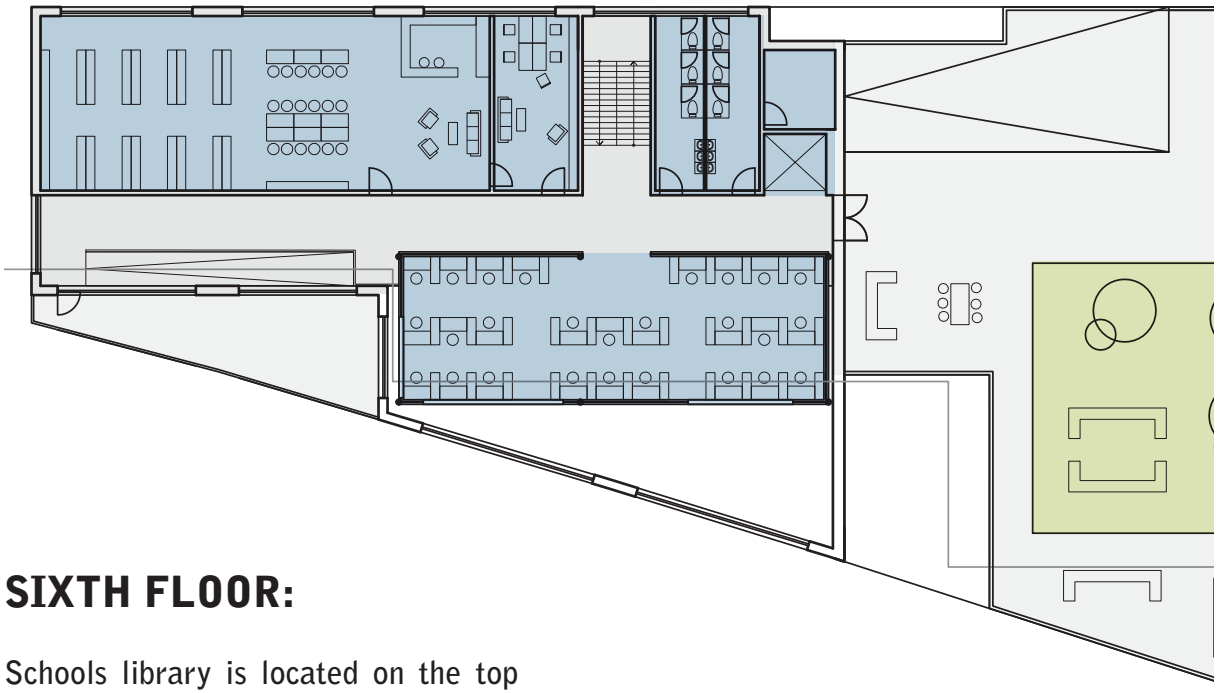


FOURTH FLOOR:

"box" volumes on the Southern part contain wood workshops, homebase areas, group work clusters and children wardrobe. Ramp connects the "boxes"

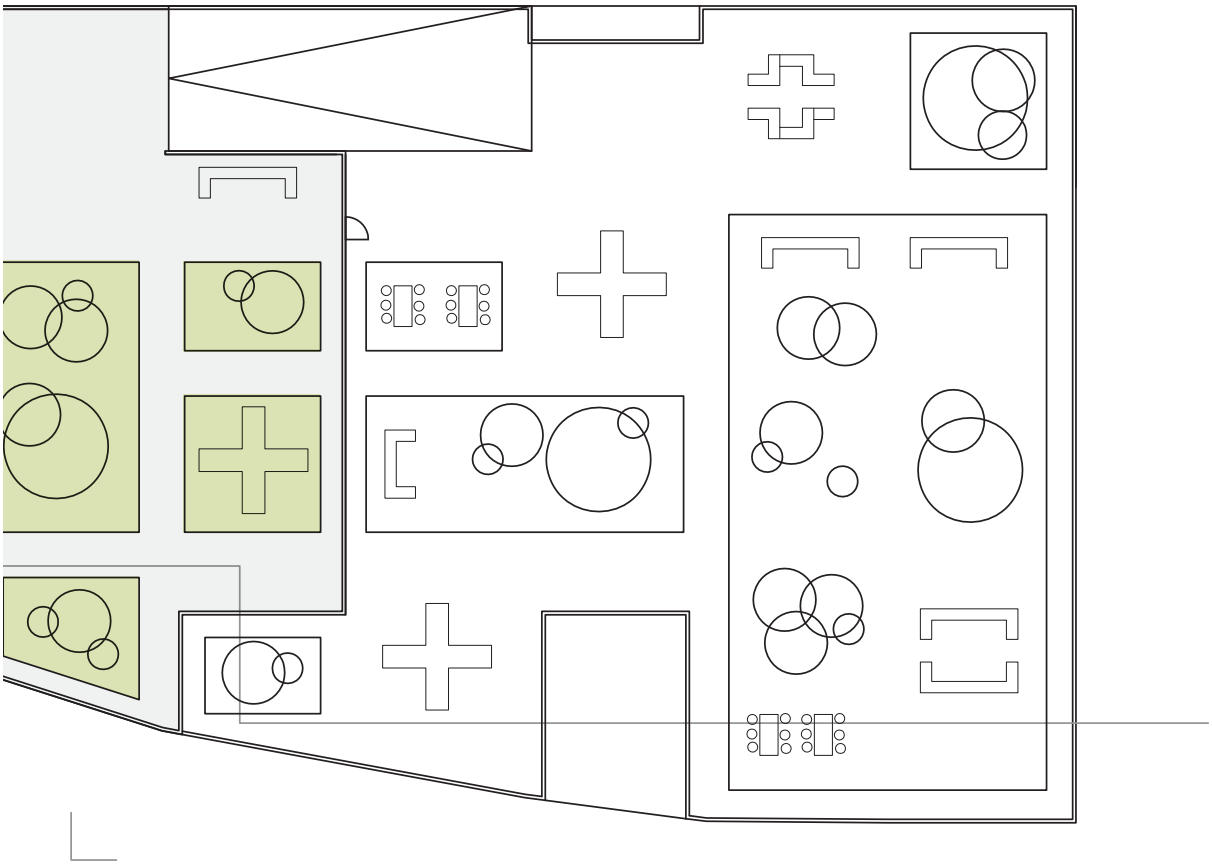
FIFTH FLOOR:

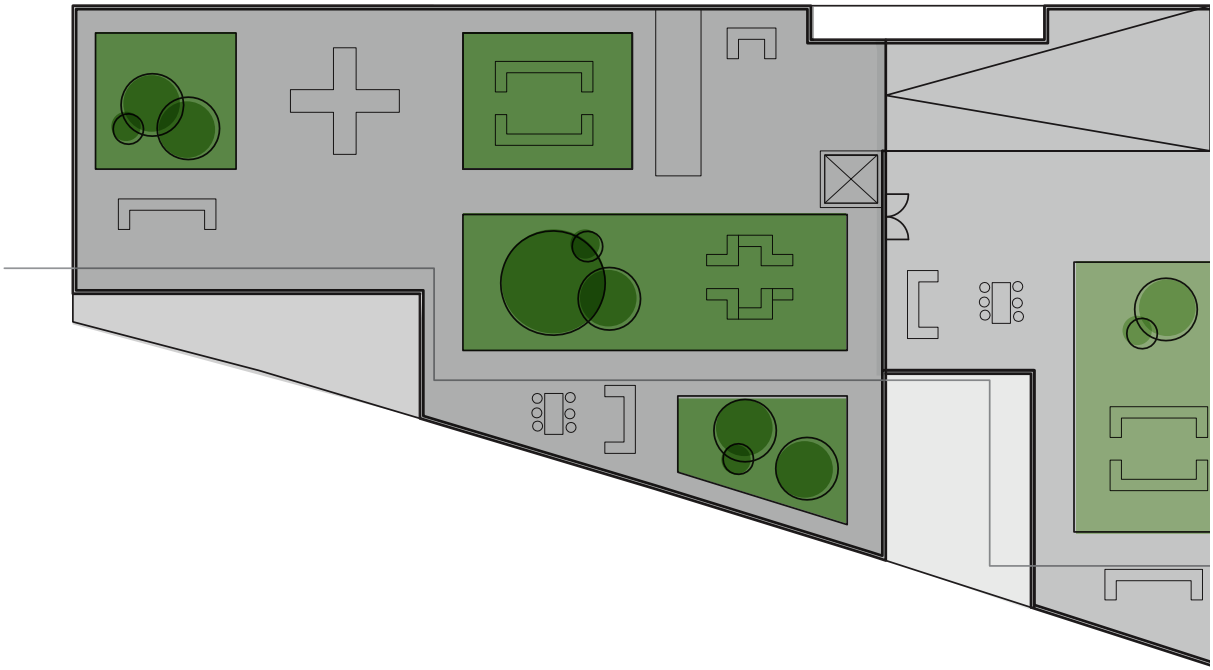
Fifth floor has access to the green roof. Regular square classes in the grid of 8x8 meters on the North side are for pupils from 8 to 9 grade. "Bexes" contain their homebase areas. The concept was to pu older kids to higher floor starting from the bottom.



SIXTH FLOOR:

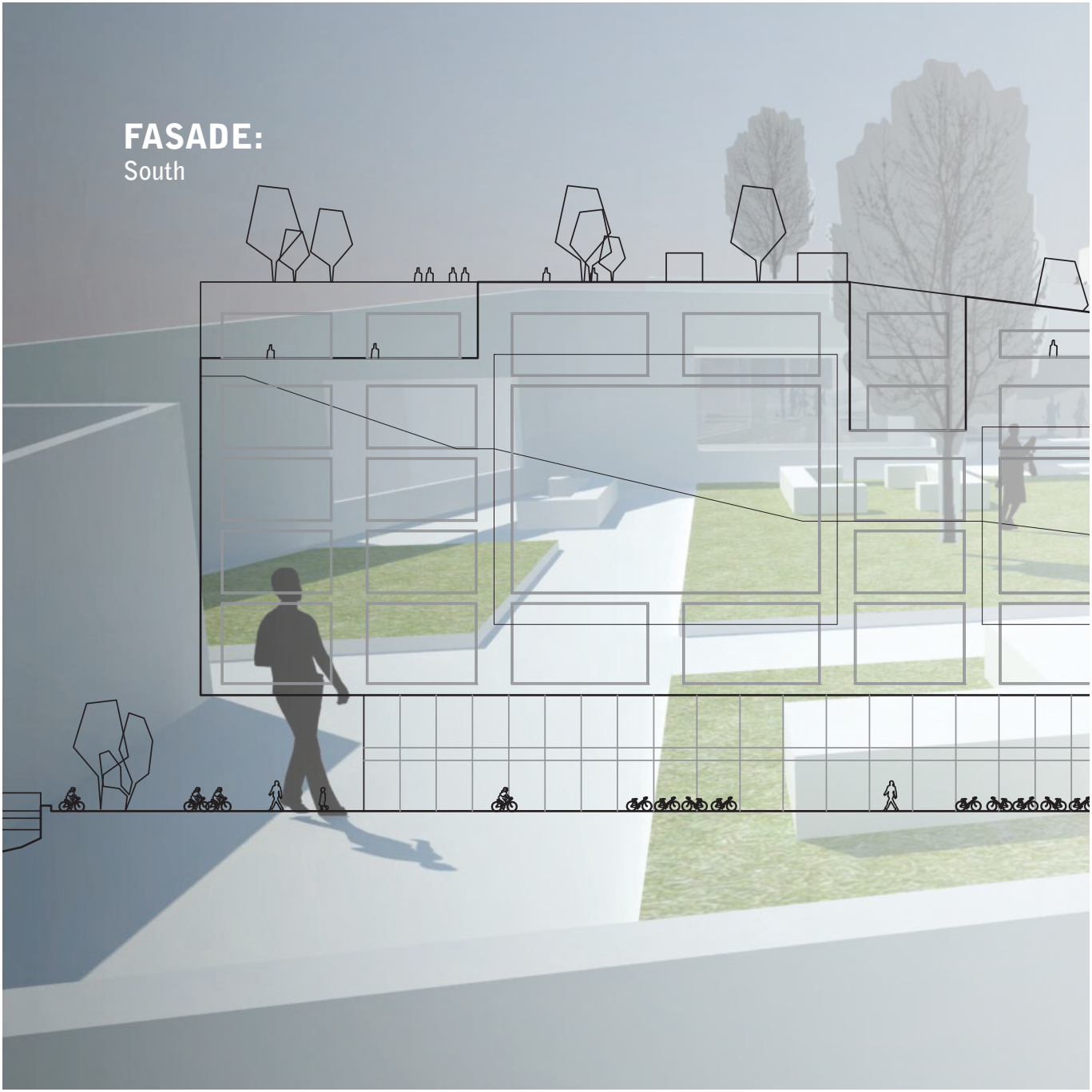
Schools library is located on the top floor and a computer workstations at the "box" volume so that everybody could enjoy exellent views around.

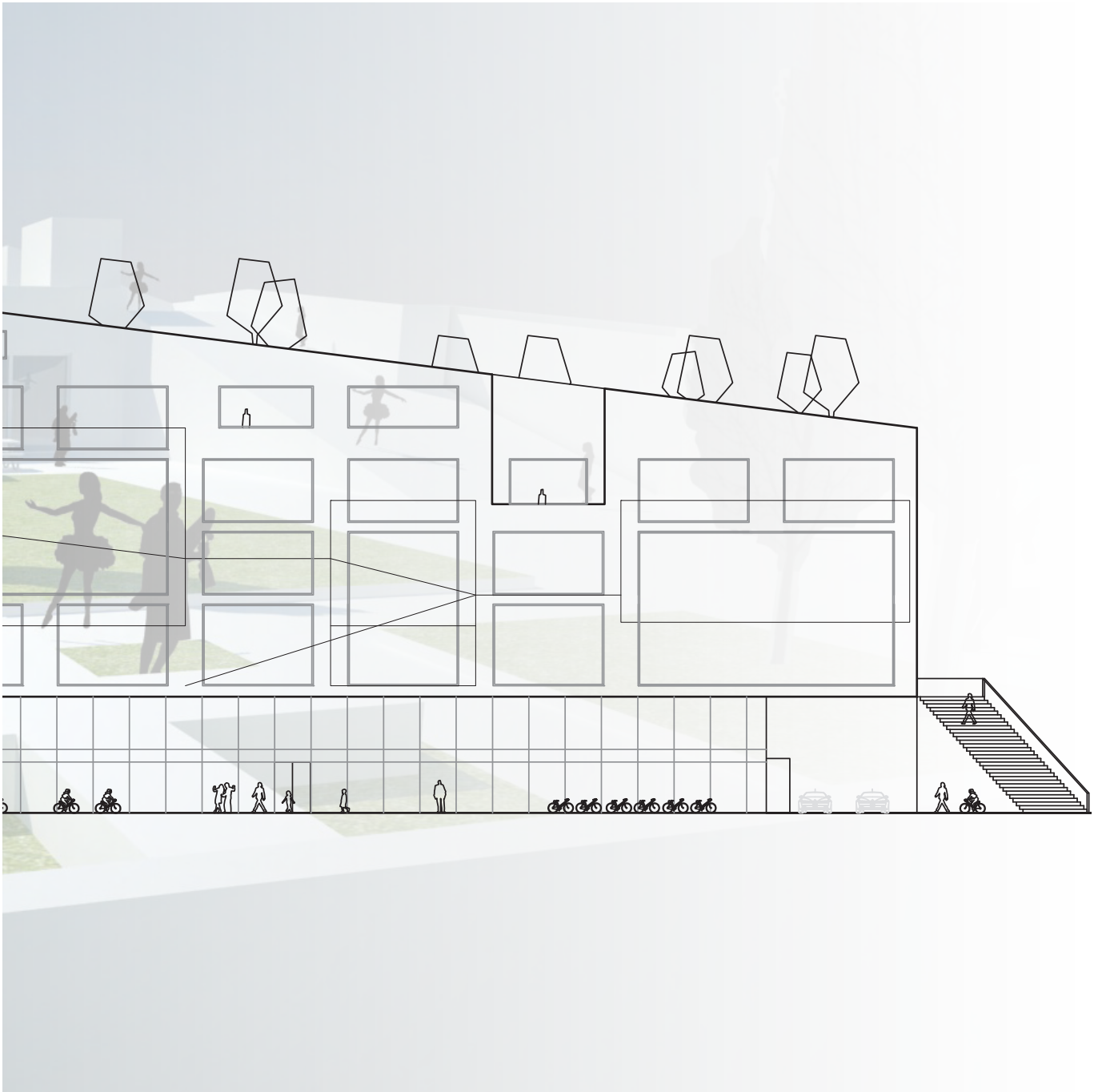




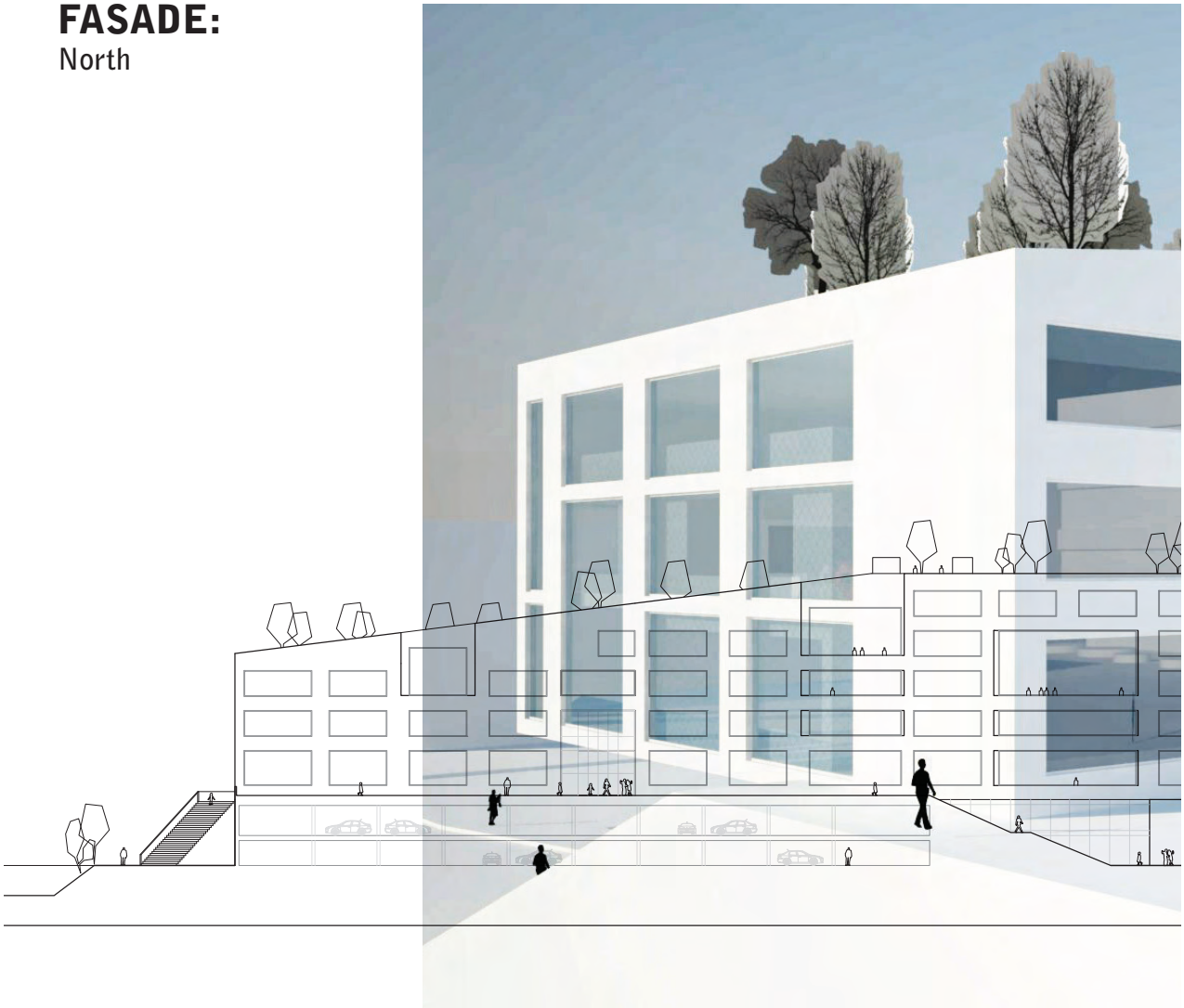
ROOF PLAN:

FASADE:
South

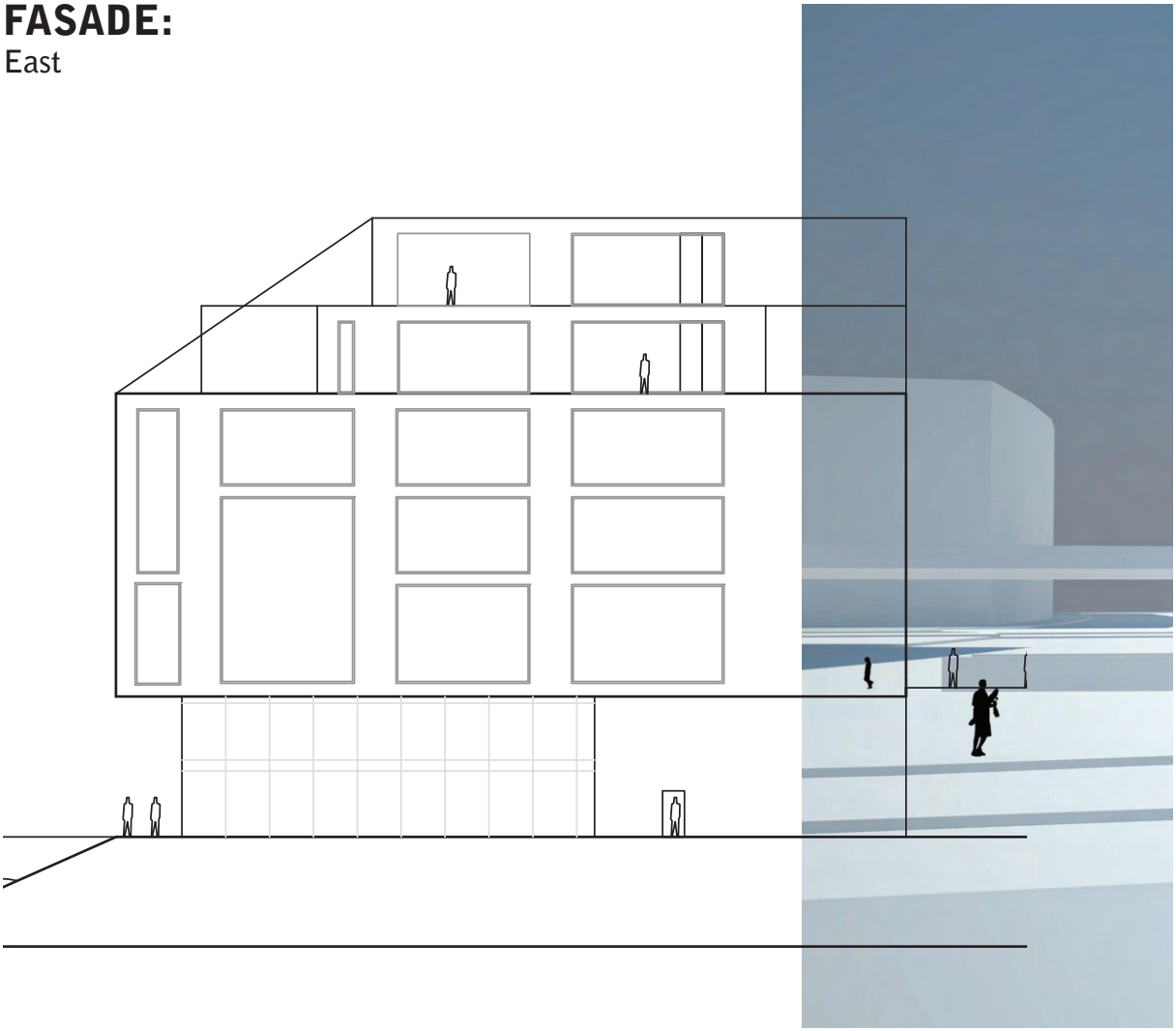




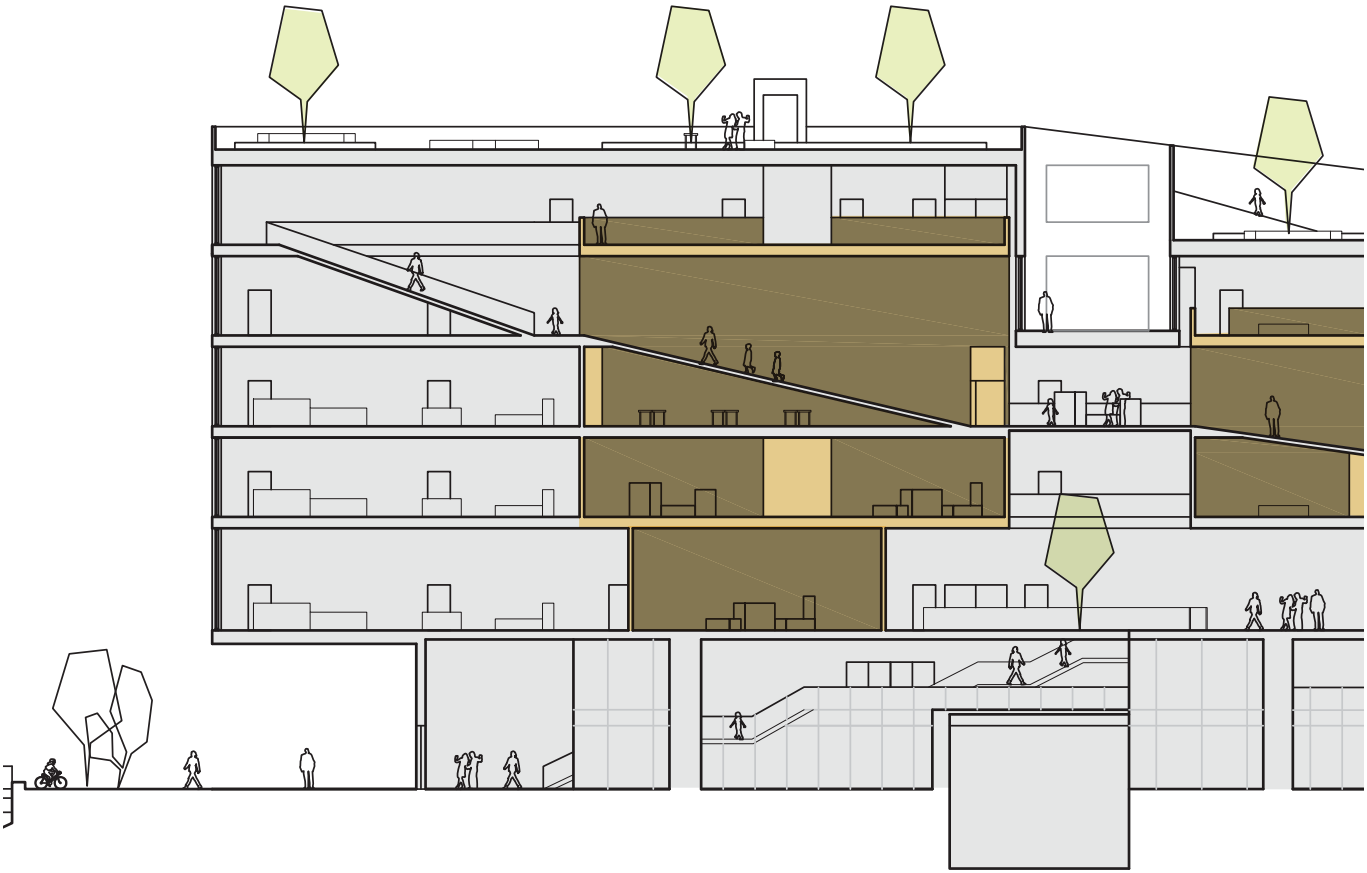
FASADE:
North

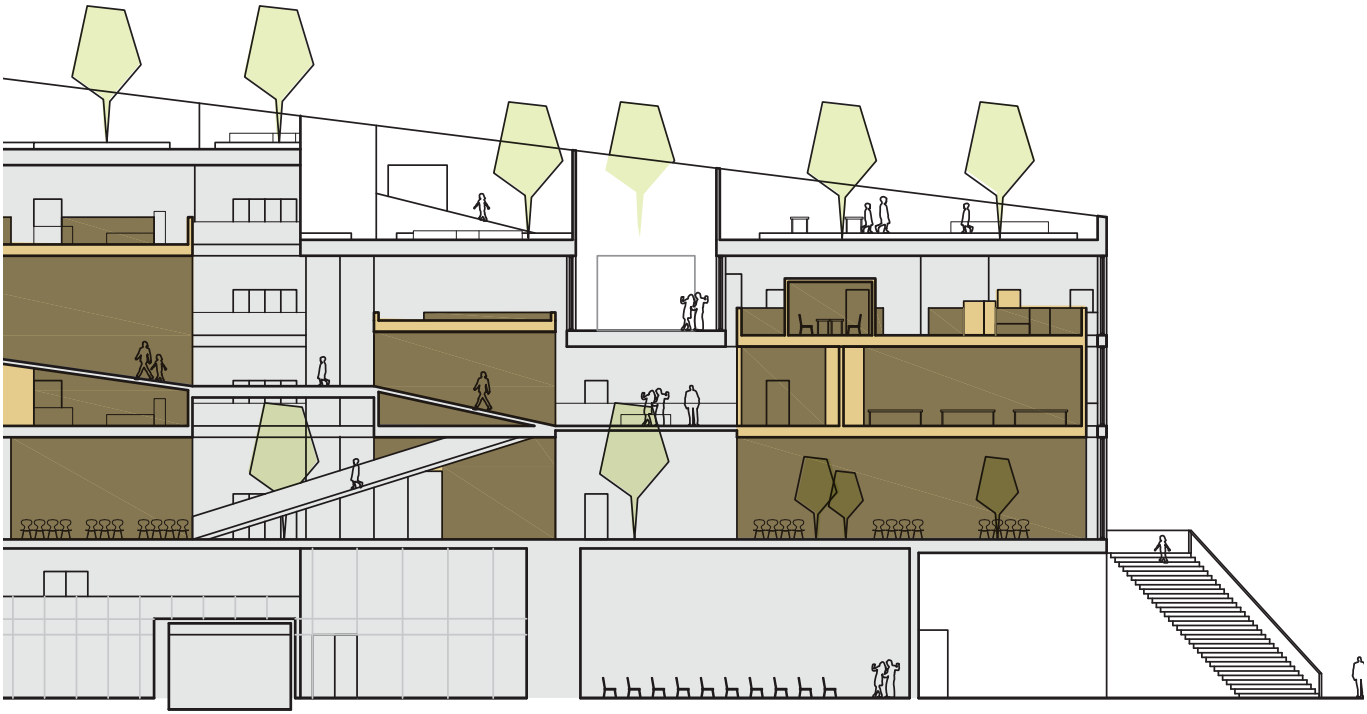


FASADE:
East

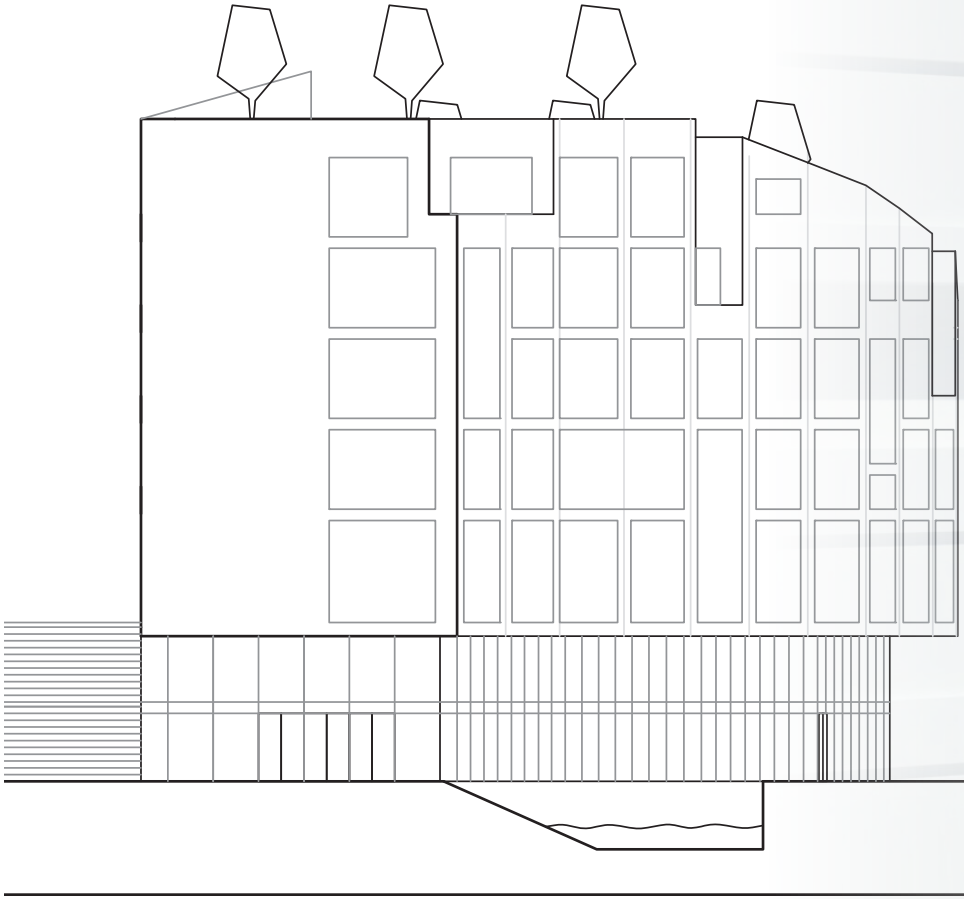


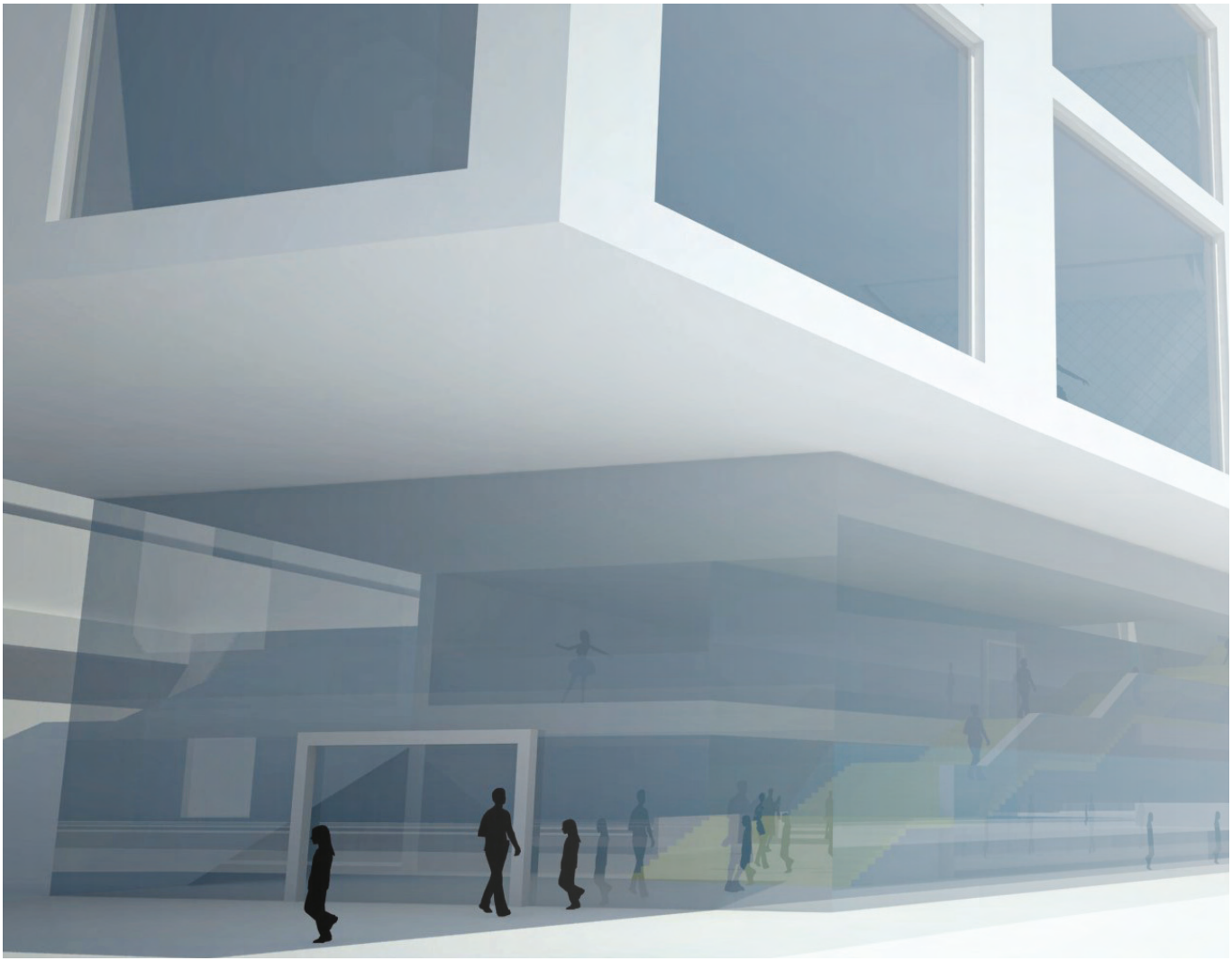
SECTION A-A:

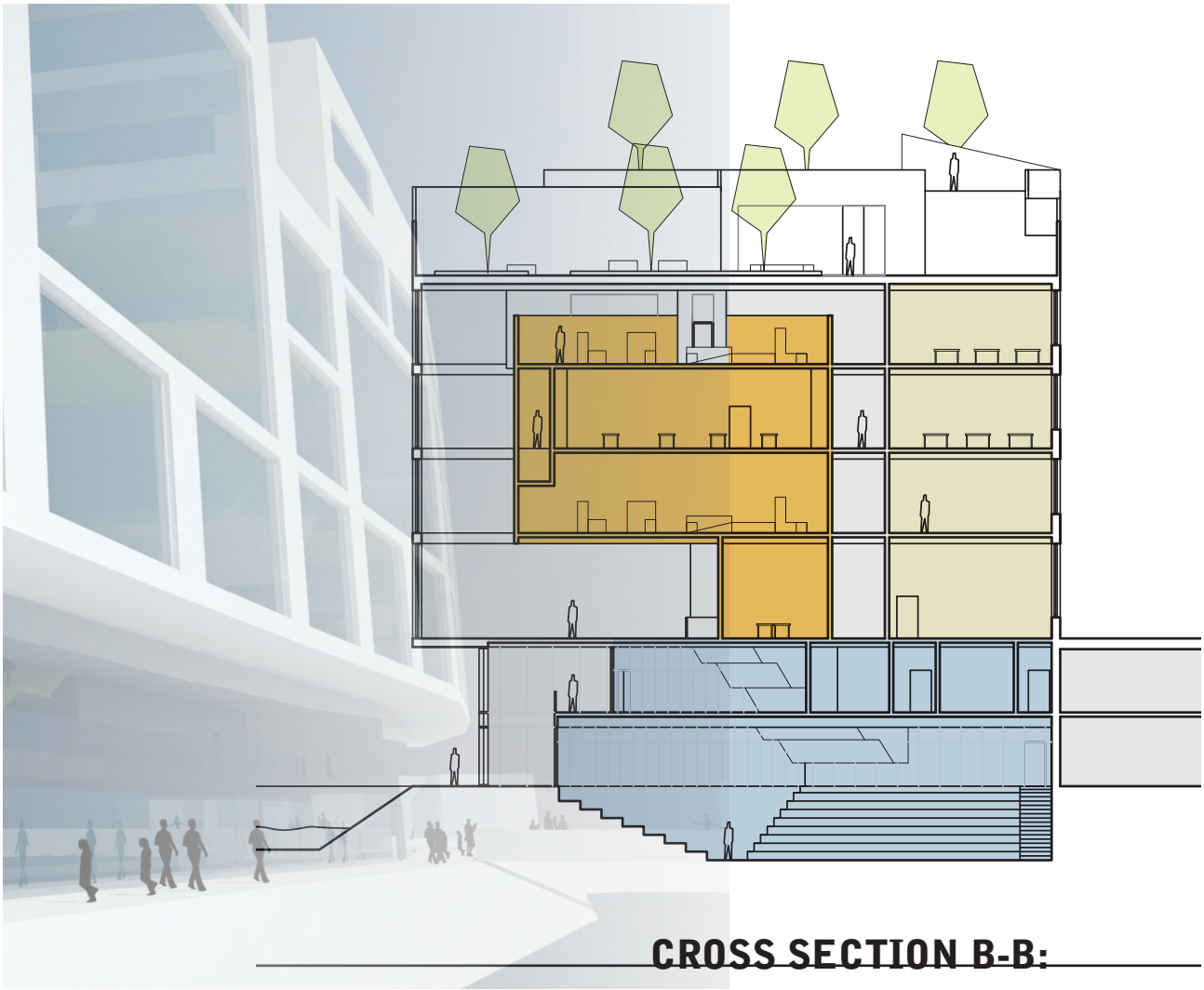




FACADE:
West

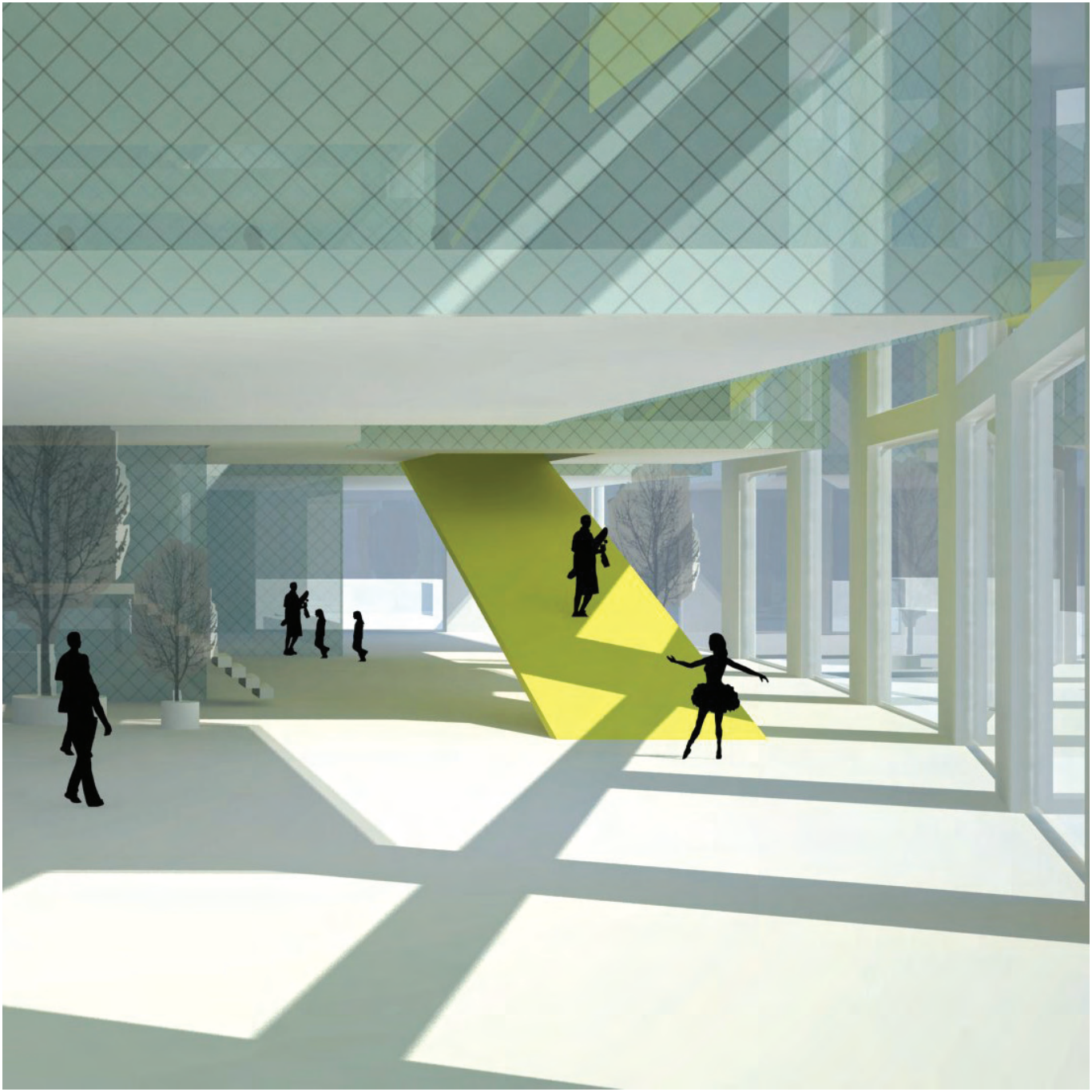






CROSS SECTION B-B:

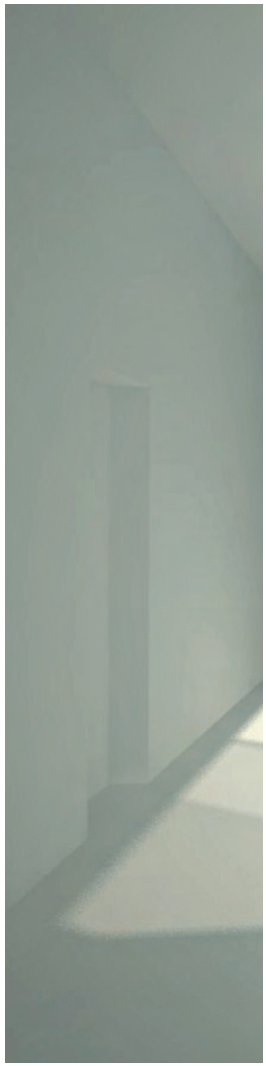
SECOND FLOOR VIEW:




VIEW FROM the RAMP:


RAMP VIEW:


RAMP VIEW:



FOURTH FLOOR CORRIDOR:


CLASSROOM in the "BOX" VOLUME