



ARCHITECTURE AND DESIGN STUDIO PORTFOLIO  
MICHAELIA KENTI



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## contact

+357 99899289

Michalia Kenti

michaliakenti@gmail.com

7A, Athanasias, Lakatameia,  
Nicosia, Cyprus, 2304

## profile

Bsc Architecture graduate student, looking forward applying for masters, in order to evolve my proficiency as an architect, along with focus and motivation. For the time being, I would like to get into a university in which I will have the chance to experience architecture in a variety of aspects, while giving me strength to work hard and follow my dreams in whatever direction that is.

## languages

Greek - native  
English - secondary

## software skills

AutoCAD SketchUp  
 Photoshop InDesign

## education

### Pascal English School Nicosia | 2010-2016

- Apolytirion | 94 % |
- GCSE's : Art | A |
- Greek | A |
- Maths | B |

### The University of the West of England (UWE) Bristol | 2016-2019 |

- Under-Graduate Certificate

## work experience

### Novo Casa Construction and Development Company (Cyprus)

| September 2019- September 2020

Assistant Architect

### RIBA Student Mentoring Programme | 2018-2019

At Purcell

### GoGreek Bristol | 2018-2019

Responsible for organising events for the Greek and Cypriot Society and also designing the events advertisements.

### Kentis Trading Co. LTD (Cyprus) | Summer Months 2014-2018

(Retail & Wholesale trading of imported goods and DIY goods)

Responsible for:  
- Checking and pricing the stock.  
- Interacting with clients, helping them find the best product according to their needs

### Graphics Designer - Fire Racing | November 2014

(F1 in Schools - World Finals | Abu Dhabi)

Responsible for designing the graphics of the team:

- Uniform, Logo, Pit-Display and the Team's portfolio

## personal skills

### Communication

- Interacting with other people while participating to school exhibitions and events that elevated my writing and speaking skills.
- Organizer at the final year of school of a fundraising event that developed economically the Institute of Neurology and Genetics on behalf of Pascal English School Lefkosa

### Team Working

- Member of a team called Fire Racing that required collaboration, creative thinking, management and respect to the International Competition of F1 in Schools.

## Interests

- Shooting photographs of landscapes
- Experimental abstract drawings
- Travelling, getting to know new places

Master's degree is the stage you realize in what direction you want to drive your future into. By applying for my master's degree, I am setting the next goal for myself which needs to be achieved successfully. I am looking forward to evolving my proficiency as an architect, along with focus, research, motivation and why not getting into RIBA Part 3. After finishing my studies, I am planning to work as a professional architect in different countries, around the globe. This journey will help me and get me to know new traditions and architectural styles. Eventually, I am planning to come back to Cyprus, as an experienced and professional architect with the intent to make changes on this island in which I grew up. I actively rely on my belief that architecture is a platform we can use in order to shape our cities, while our cities are shaping us and our lifestyle. For the time being, I would like to get into a university in which I will have the chance to experience architecture in a variety of aspects, while giving me the strength, motivation and freedom to work hard to follow my dreams in whatever direction that is.

My all time favourite architect is Zaha Hadid! From high school, when I first got a taste of architecture I was always fascinated about her work. Her designs always made me curious about how is possible for a building to be so organic in terms of design, where it is also very much based on tectonics. Her ability to beautifully manipulate the technical details, is something intriguing for me, where I still try to understand and evaluate in my own designs as well.

However, the past few months I have been following several architects based on residential designs. Pitsu Kedem has really got my attention as I found his work interesting. Large openings, emerging the outside environment inside was always one of the main details on my designs. Additionally, large openings also provide the interiors with natural light, where the architect takes the advantage and experiments using cut-out fences, creating playful patterns in the interiors of the design, making it pleasant to the user.

Another great architect for me is Luciano Kruk. A thing that interests me is how efficiently he combines natural materials such as wood and concrete by leaving them exposed. Leaving the materials raw has as an outcome the complete sense of nature to the user, making it more pleasant and relaxing.

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Design resolution and development	

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**DISSERTATION : HOW IS NATURE ABLE TO CHANGE  
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**HOW BIOMIMICRY AFFECTS THE BUILDING INDUSTRY,  
AS WELL AS ITS SURROUNDINGS? (SAMPLE)**  
**(SEPTEMBER 2018 - JANUARY 2019)**

# PROJECT 3.0 - PLACEMENT YEAR (SEPTEMBER 2019 - SEPTEMBER 2020)

## SITE ANALYSIS

### 3.0.1 CLIENT#1 - RESIDENTIAL DESIGN

type of project : residential design

location : Agrokypia, Nicosia, Cyprus



The project is taking place in village the province of Nicosia. Environmentally we are set on top of a hill, surrounded by greenland. The sun is fulfilling the space, where also the air coming from south brings a nice breeze cooling down the site.

From several inspections, the movement around the site is observed as quiet except specific times of the days. for example when people go to work in the morning or come from work, around afternoon. Other times, the neighbourhood is quiet and relaxing



## CLIENT#1 - RESIDENTIAL DESIGN



## DESIGN RESOLUTION AND DEVELOPMENT



KITCHEN AND DINING AREA



LIVING ROOM



BACKYARD

The proposal is an open plan layout for living room, kitchen and dining area with big windows, not only to fulfil the space with pure sunlight, but also to provide the residents a full view toward their backyard enjoying the green area surrounding the residency.

However the proposal illustrates the bedrooms to be more isolated and establish the users with comfort and privacy. The long corridor was used in order to put in place the circulation around the house. The corridor is embellished with window openings to service as spotlights and enlighten the space up.

Due to this pandemic, the project is still on the beginning process.

### FLOOR PLAN 1:200

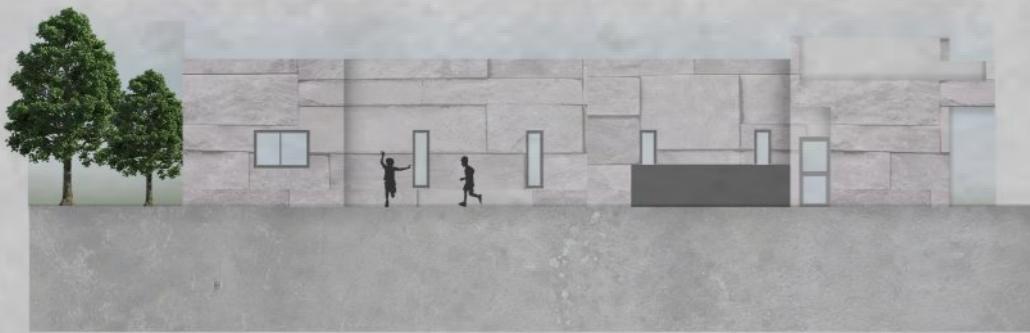
1. kitchen
2. dining table
3. living room
4. guest toilet
5. laundry room
6. bedroom
7. bathroom
8. en-suite (bath/ wardrobe)

## CLIENT#1 - RESIDENTIAL DESIGN

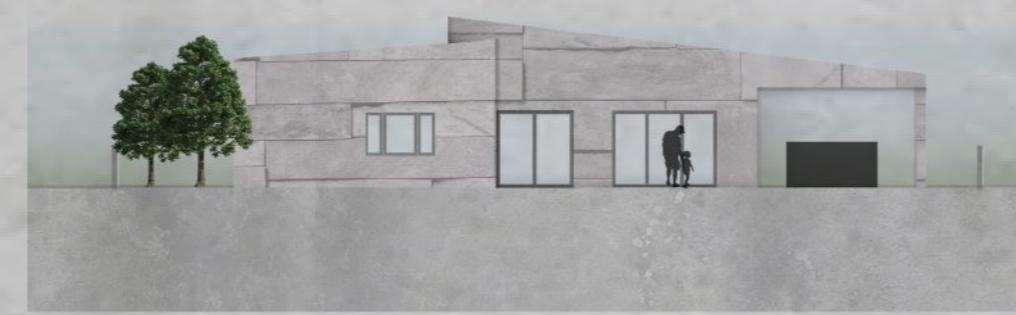
### FORM AND MATERIALITY



SOUTH ELEVATION 1:200



WEST ELEVATION 1:200



NORTH ELEVATION 1:200

At first the proposal was having a straight modern style, which the clients didn't like much. The solution was to manipulate the parapet in order to camouflage the facades and make it look like the roof was pitched.

To complete the contemporary traditional style the clients wanted, the materiality found in the proposed drawings is white- stone, wood, marble and grey matt tile for the floor.



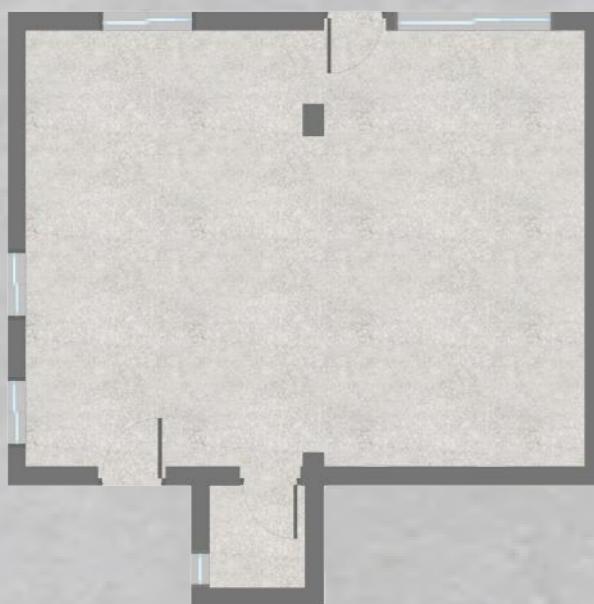
## CLIENT#2 - RENOVATION

proposal

FLOOR PLAN 1:100



existing structure



KITCHEN



LIVING ROOM



BATHROOM

TYPE OF PROJECT : RENOVATION

LOCATION : LAKATAMIA CYPRUS

### DESIGN RESOLUTION AND DEVELOPMENT

This project takes place in Lakatamia, Cyprus. The structure was a dance school and my task was to renovate this space into one bedroom apartment. For this design I also used an open plan layout, in order to make the communal spaces look bigger and establish the interiors with good natural ventilation.

In general the spaces were allocated in the left and right part of the existing structure. This was the most efficient way to design the spaces in order to provide the bedroom and bathroom with enough air and sunlight, as well as privacy. The fact that we had 2 walls where no windows could have been applied was a challenge we needed to overcome.

The materials used in this project were chosen in the preference of the clients. However, the choice of the materiality in the interiors was also based on the option that the apartment will be put on rent afterwards

The project is on hold due to this pandemic however, is on the final stages of its process.

**PROJECT 3.1 - THE POWER OF GIVING (FINAL YEAR PROJECT\_JANUARY 2019 - JUNE 2019)**



### 3.1.1 BUILDING'S PURPOSE AND PROGRAM



### BUILDING'S PROGRAMM

The users will have the chance to participate into a craft making community and practise their favourite skill. Lessons will be provided for the basic information about the skill, and forward, the 'students' will evolve in their own way.

Temporary courses will run into the building for 'pop-up' students, as well as lectures. The lectures will educate people for the courses or the skills they are following and also, some lectures will inform the users ethically.

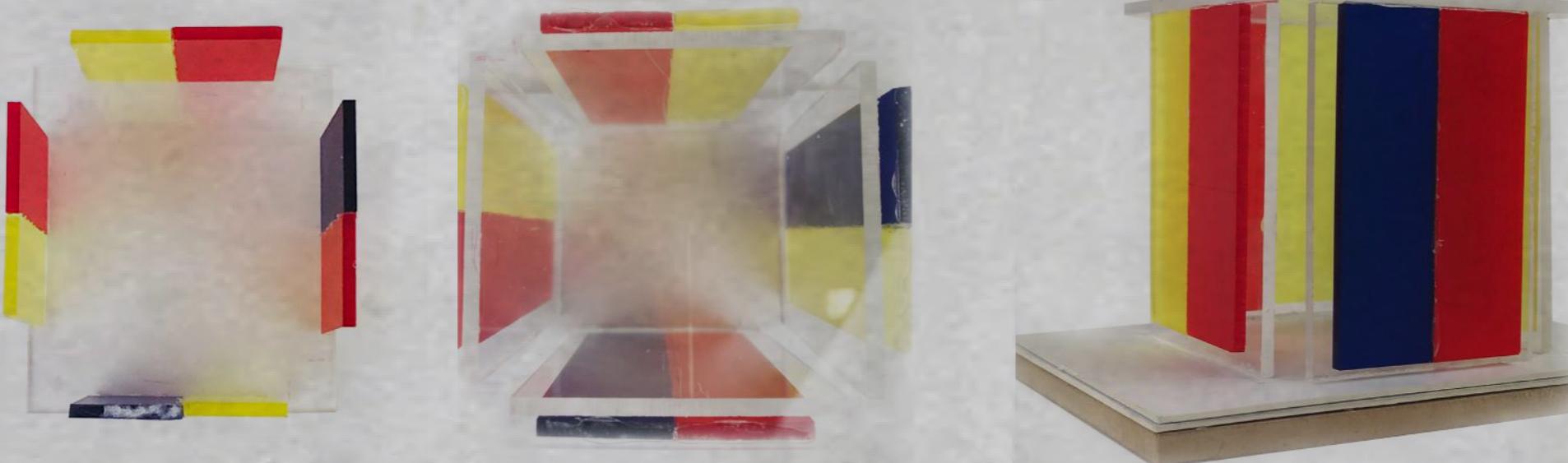
The lessons will be accessible by anyone who is willing to participate and help. People of all ages are welcome to join the craft community. In this community hub, people will not only learn about the skill they have been practising on, but also, they will be selling their creations, aiming to raise money and give them to the charity organisations for homeless. This action, will also help the economy of Bristol.

### 3.1.2 CONCEPTUAL THINKING AND MODELLING



#### MODEL #1 - THE PERSPECTIVE OF GIVING

Giving, has the power to give the sense of happiness and greatness to the giver, as well as the recipient. Taking care of someone, it comes from the heart. Caring for someone by heart is a great value, where not many people have. The model was designed to present the three conceptual phases it confronts. people from the community will have the chance to exercise the craft they are interested in. These creations will be sent into a market, hosted by the specific community hub, where all the profits will be given to charity organisations for homeless.



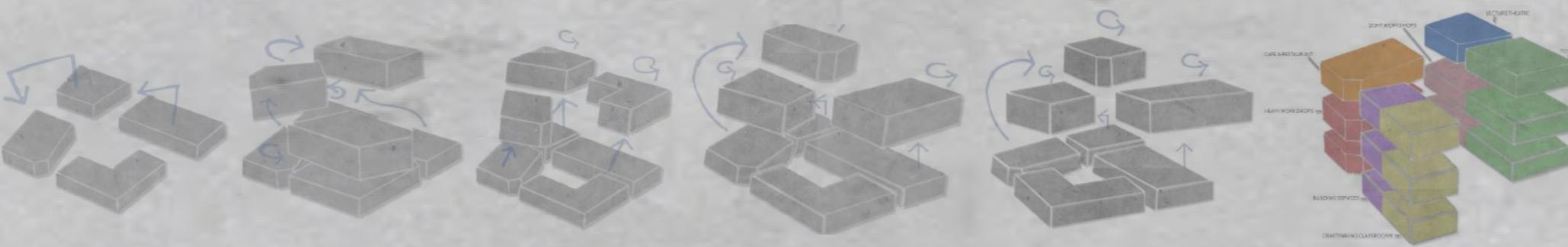
#### MODEL #2 - THE JAR OF LIGHTS

The building have the purpose to provide a feeling of happiness and motivation. To achieve this, the building is designed as a simple concrete structure holding a glass facade, made from dichroic glass. Dichroic glass is manufactured with 6 layers. The two outer glazings, the adhesive layers and the dichroic film.

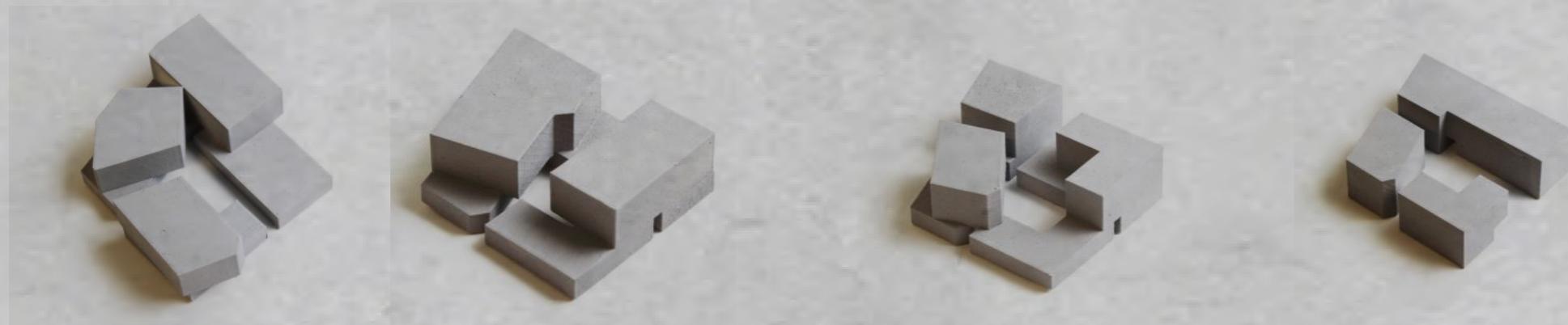
With sunlight, the interior of the building is filled with a variety of colours to provide a sense of happiness towards the inhabitants and provide a motivational environment for them to create.

### 3.1.3 BUILDING'S DESIGN DEVELOPMENT

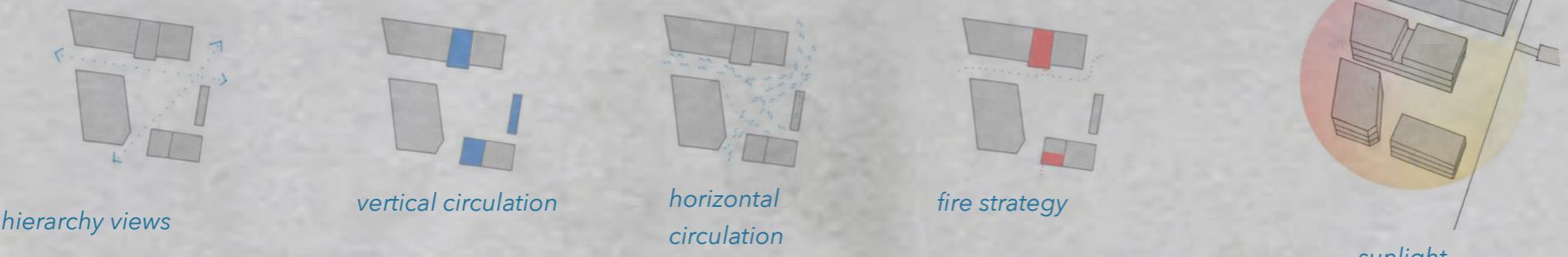
### SPATIAL ORGANISATION



3D print models



ground floor



hierarchy views



vertical circulation

horizontal circulation

fire strategy

sunlight



upper floors



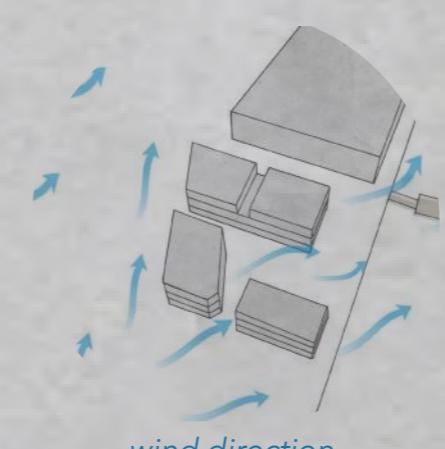
hierarchy views



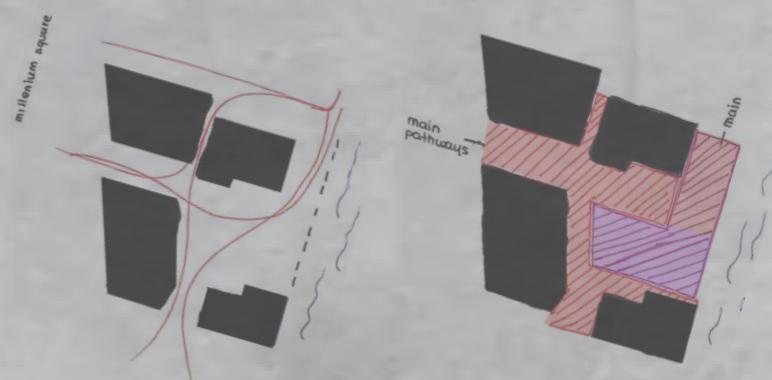
vertical circulation

horizontal circulation

fire strategy



wind direction



Subsequently, the same layout format was preserved on the upper floors not only to integrate clarity and convenience into the entire building, but it also celebrates the central void, emphasising the purpose of the market and highlighting it to visitors.

In this case scenario, the courtyard will play the role of the market, an explicitly socially interactive space for the visitors suitable in expanding their familiarity with the buildings program, craft making.

Following the objectives of an open system, the design of the spaces inhabiting the building was in the form of blocks, to easily outline a pattern of solid and void spaces. The solid components were placed to allow a distance between them, creating open spaces. These spaces followed the pattern of the site's hierarchy routes, to accept and maintain the principal routes of the site, providing the visitors with a smooth and natural transition, inside and outside of the building. By establishing the natural tradition between interior and exterior context, the visitors will easily pass through the building, which lends to be an advantage towards the conceptual scheme, which is to bring the community together

### 3.1.4 PLANS / ELEVATIONS / SECTIONS

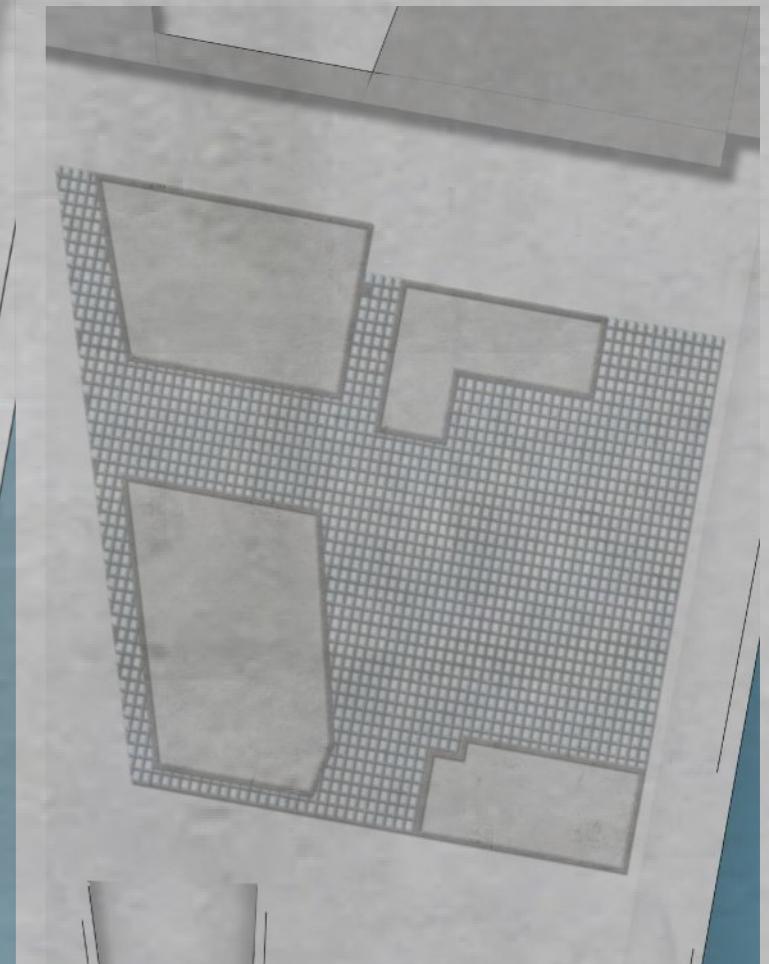


FIRST FLOOR PLAN 1:500

GROUND FLOOR PLAN 1:250

1. toilets
2. vertical circulation cores
3. adult safe workshop
4. younger age safe workshop
5. adult heavy workshop
6. workshop storage
7. sale market area

### 3.1.4 PLANS / ELEVATIONS / SECTIONS

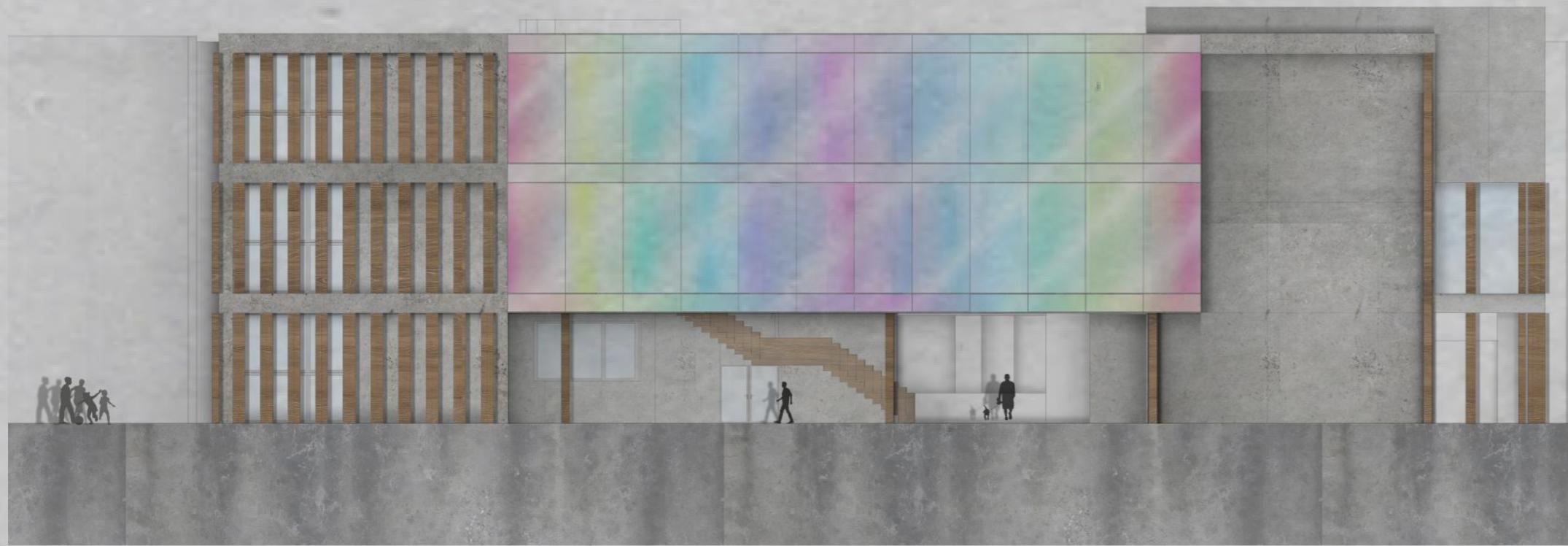


**ROOF PLAN 1:500**

**SECOND FLOOR PLAN 1:250**

1. toilets
2. vertical circulation cores
3. lecture amphitheatre and private rest rooms
4. younger age safe workshop
5. cafe & restaurant
6. cafe & restaurant storage

### 3.1.4 PLANS / ELEVATIONS / SECTIONS

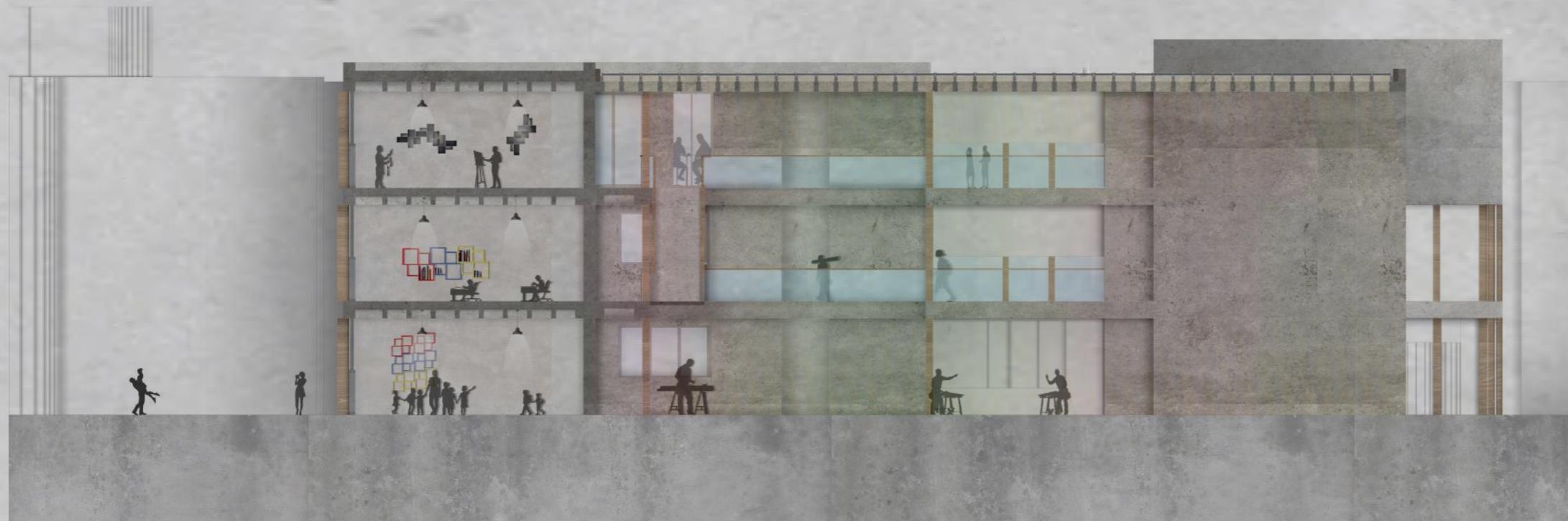


EAST ELEVATION 1:200

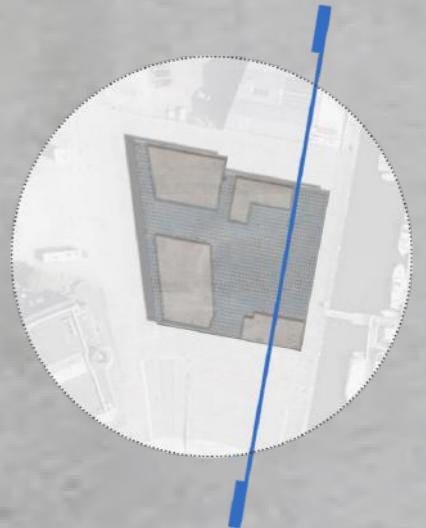


WEST ELEVATION 1:200

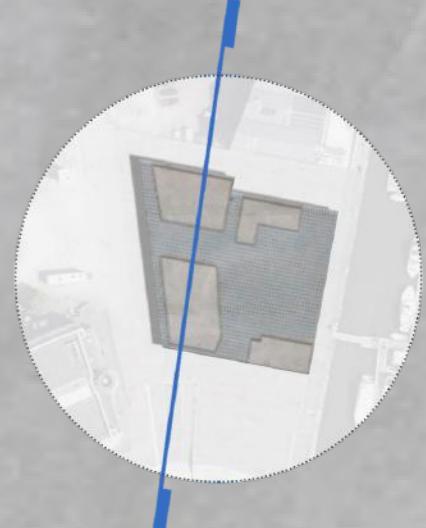
### 3.1.4 PLANS / ELEVATIONS / SECTIONS



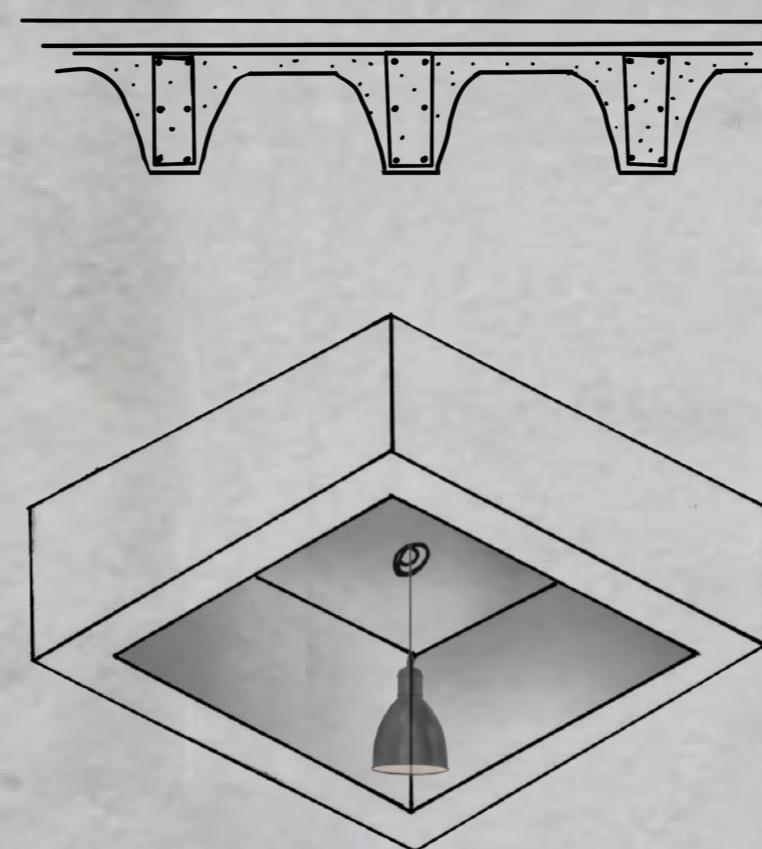
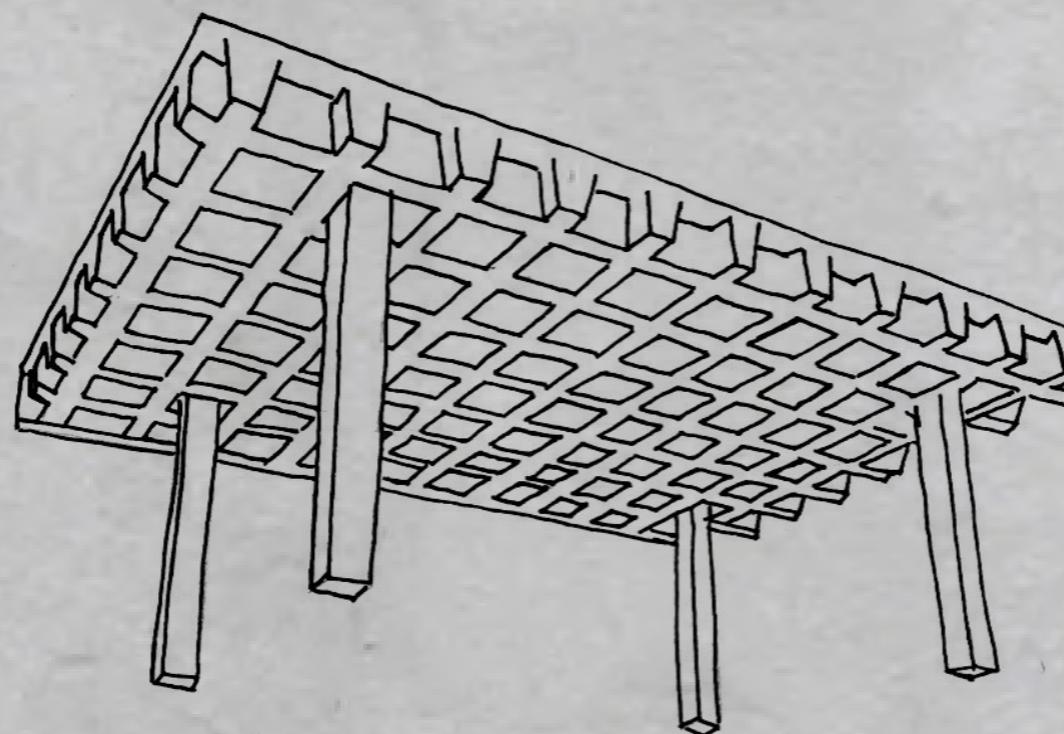
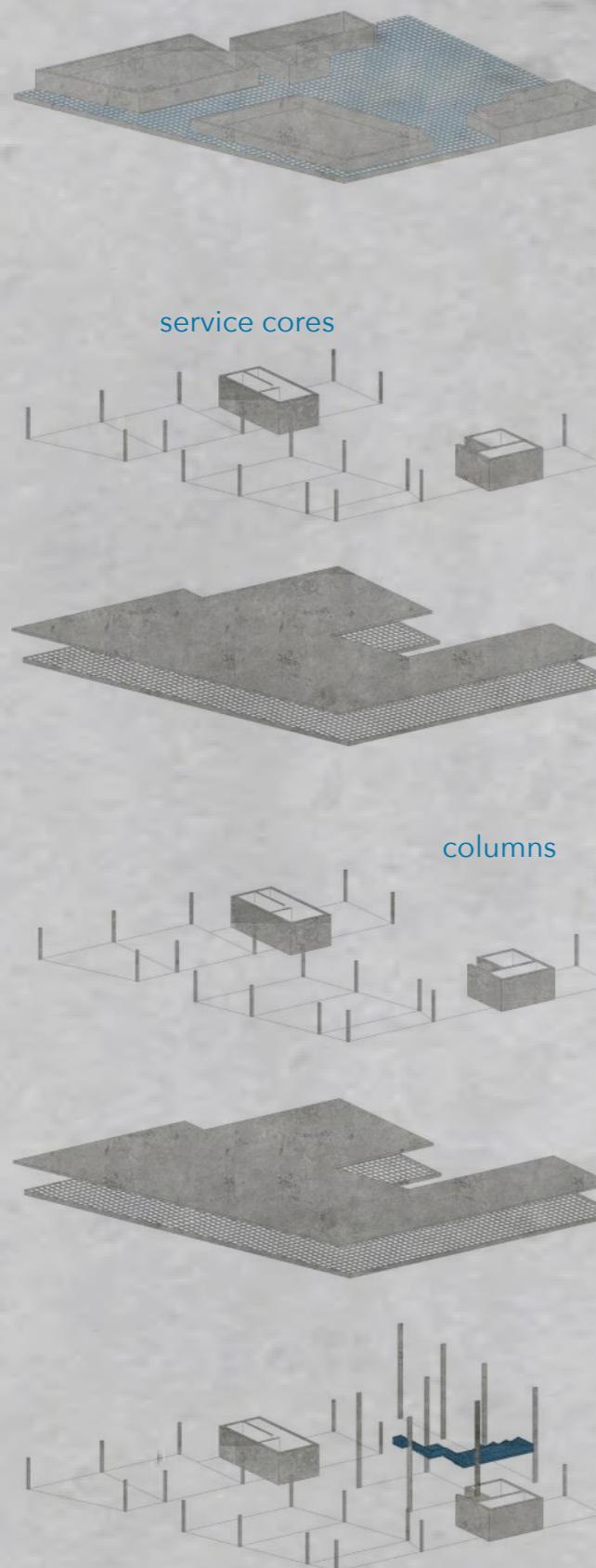
SECTION A-A' 1:200



SECTION B-B' 1:200



### 3.1.5 STRUCTURAL RESOLUTION AND ENVIRONMENT



The structure of the building is assembled from a concrete frame structure supported by two concrete load-bearing walls, where they are also used as service cores

The structure is complete with a waffle slab sitting on the concrete frame structure.

#### WHAT IS A WAFFLE SLAB?

Waffle slabs have regular voids stuck into the soffit and span into two directions, which are usually supported directly by columns

Compared to flat slab, waffle slab uses less concrete, and it has a higher surface area.

#### key advantages:

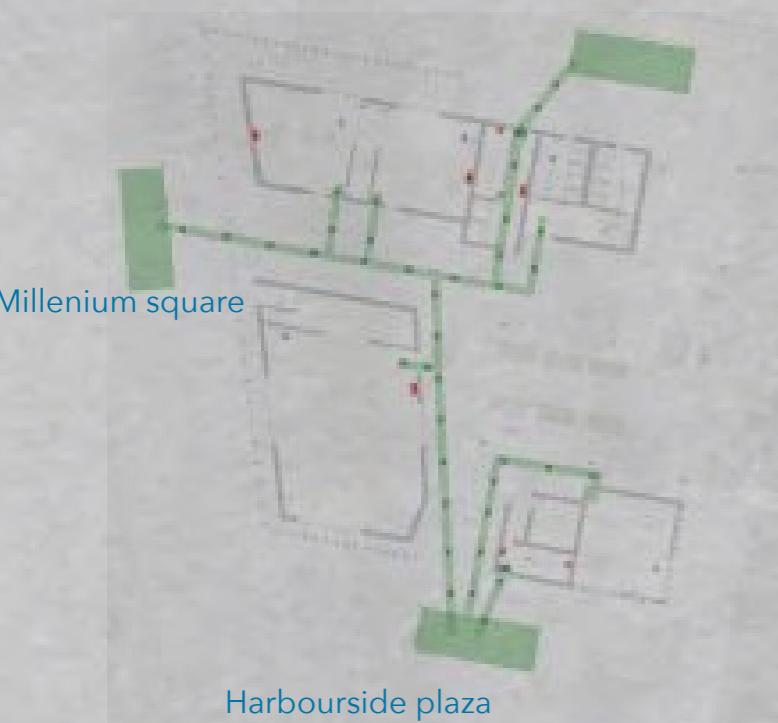
- large surface area
- relatively easy to introduce holes for services
- distinctive profile soffit
- voids reduce the self weight

exposed waffle slab may be used for aesthetic reasons, as it can inhabit different patterns according to the needs of the building

exposed slabs, can also be used to support the services of a building

### 3.1.5 STRUCTURAL RESOLUTION AND ENVIRONMENT

#### FIRE ESCAPE PLAN



**GROUND FLOOR PLAN**



**FIRST FLOOR PLAN**



**SECOND FLOOR PLAN**



**FIRE EXTINGUISHER**



**FIRE ALARM CALL POINT**



**EMERGENCY EXIT**



**YOU ARE HERE**



**FIRE ESCAPE STAIRCASE**



**ESCAPE ROUTE & EVACUATION ASSEMBLY POINTS**

### 3.1.5 STRUCTURAL RESOLUTION AND ENVIRONMENT



*the void spaces created in between the solid volumes, may be seen as tunnels, where the wind passes through.*

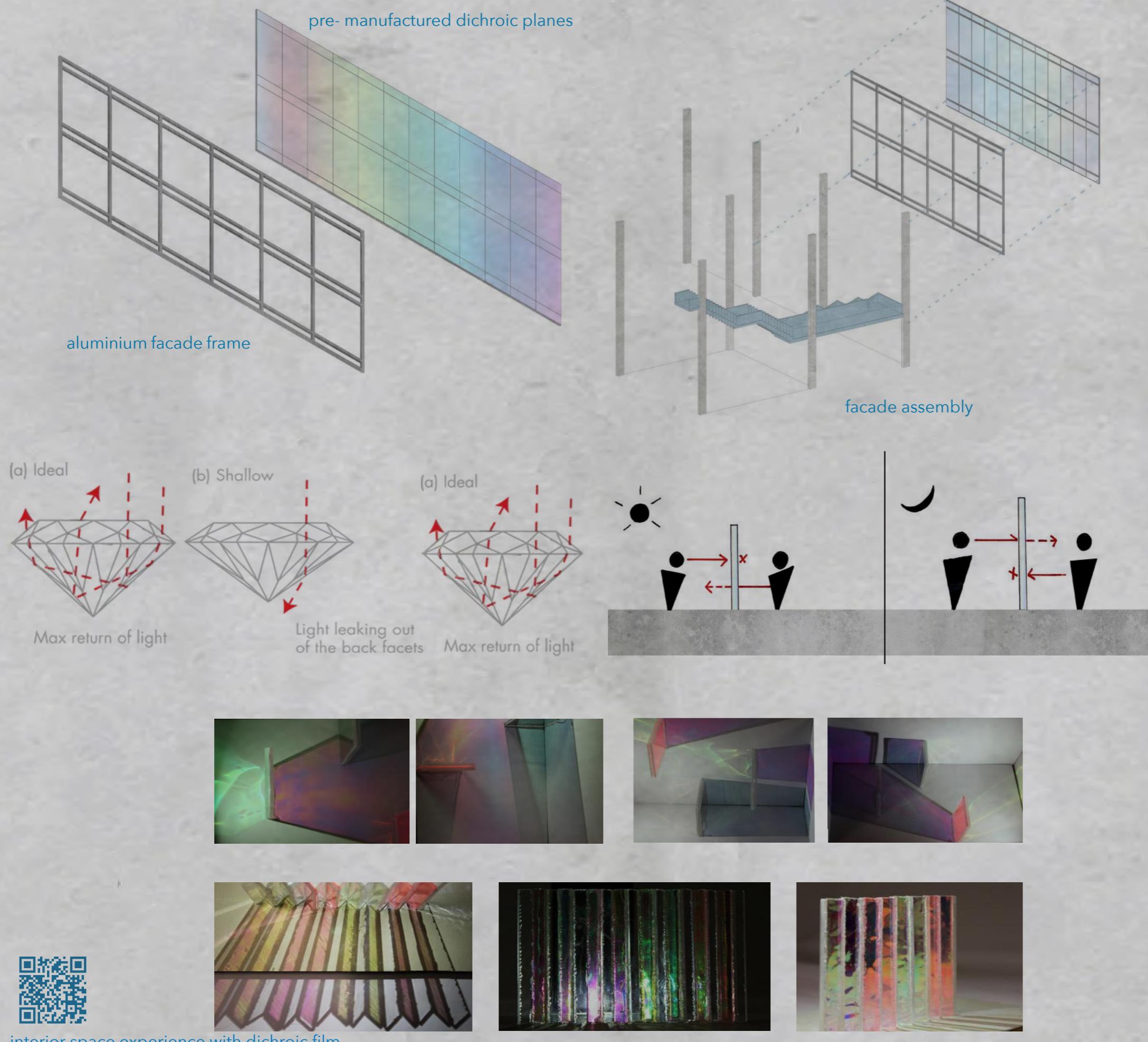
*in this case the building is easily ventilated throughout the day, where also the partially glazed roof, enhances this process, where also, it was designed this way to full fill the building with light.*



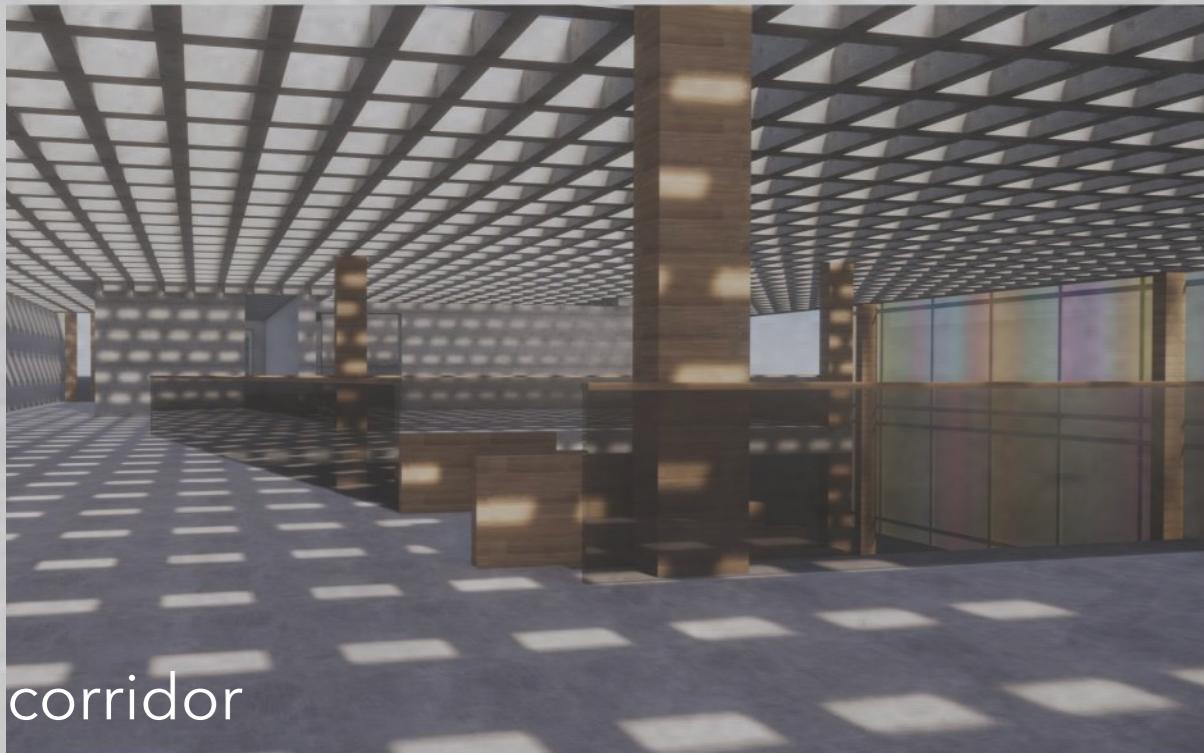
**ENVIRONMENTAL SECTIO A-A'**

1:200

### 3.1.5 STRUCTURAL RESOLUTION AND ENVIRONMENT



### 3.1.5 STRUCTURAL RESOLUTION AND ENVIRONMENT



corridor



heavy workshop



cafe & restaurant



young age workshop



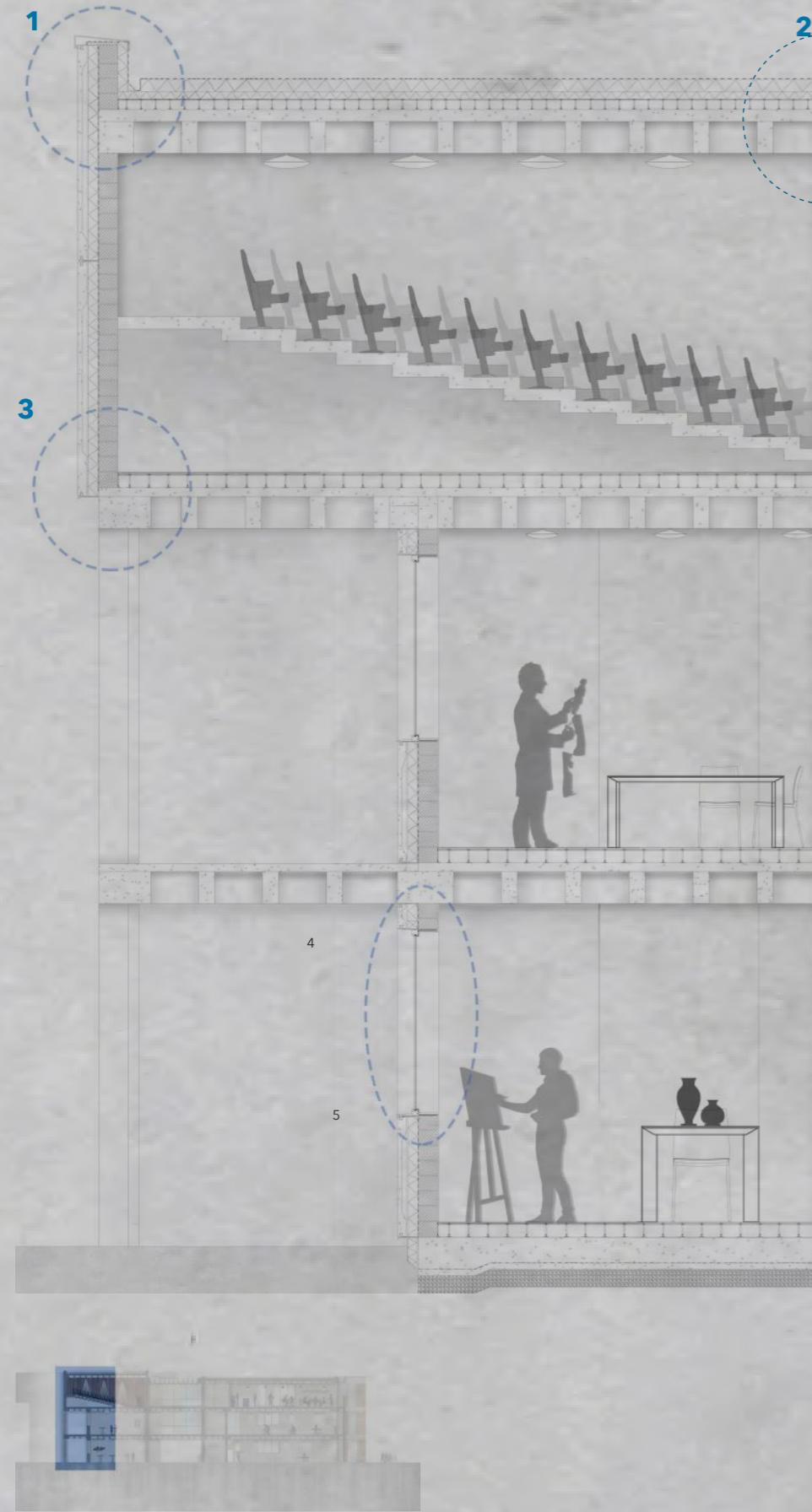
cafe & restaurant



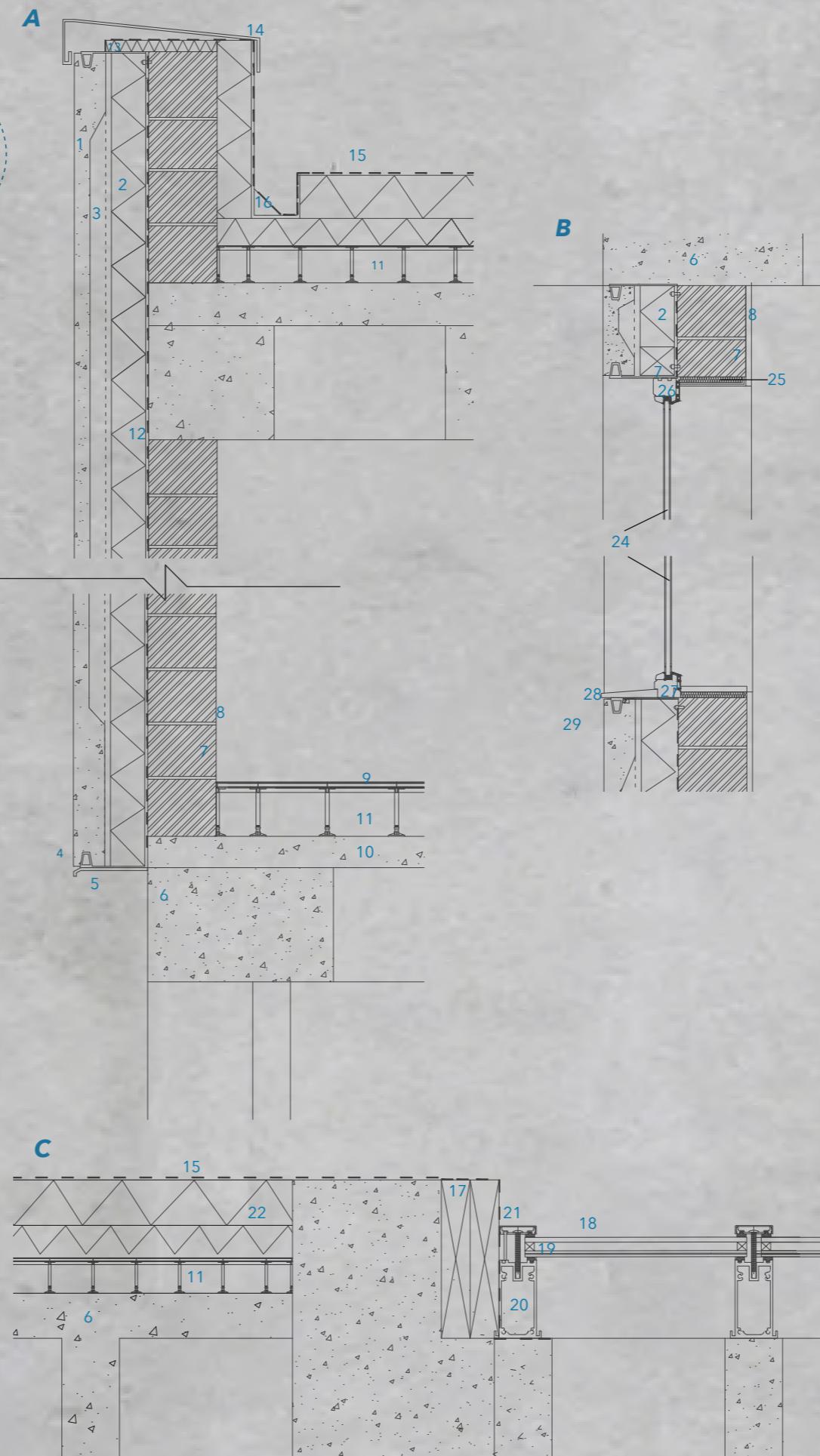
corridor

### 3.1.6 TECTONICS

#### DETAIL SECTION 1:80



JUNCTION DETAIL SECTION 1:20



A. PARAPET JUNCTION DETAIL

B. WINDOW JUNCTION DETAIL

C. GLASS ROOF JUNCTION DETAIL

pre-cast concrete panel

insulation

air cavity

joint sealant with backing rod

damp roof course

pre-cast concrete waffle slab

concrete blockwork

plasterboard

floor finish

in-situ concrete

service gap

Damp proof membrane

insulation strip

metal parapet coping

roof membrane

gutter

wooden block

roof glazing

epdm glazing strips

rafter

beauty cap and pressure cap

rigid insulation

insulation cavity closer

double glazing window

insulated flashing strip

window head

window seal

seal overhang

stainless steel support bracket,  
fixed to substrate

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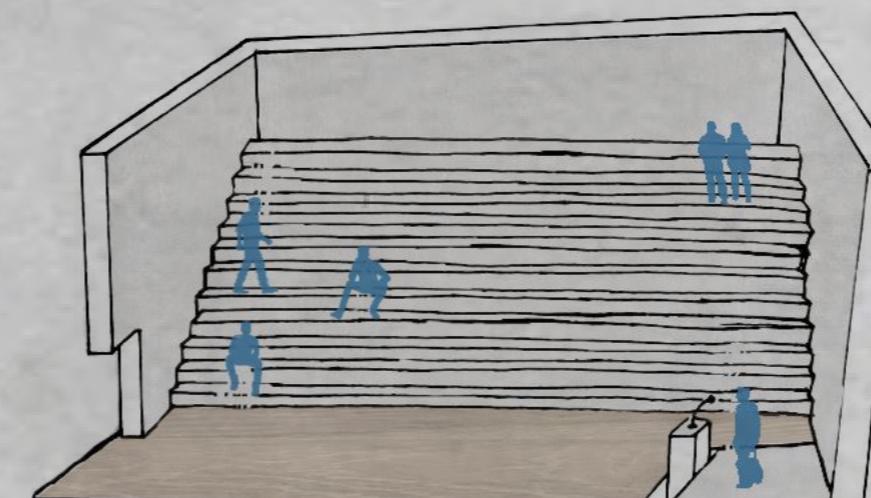
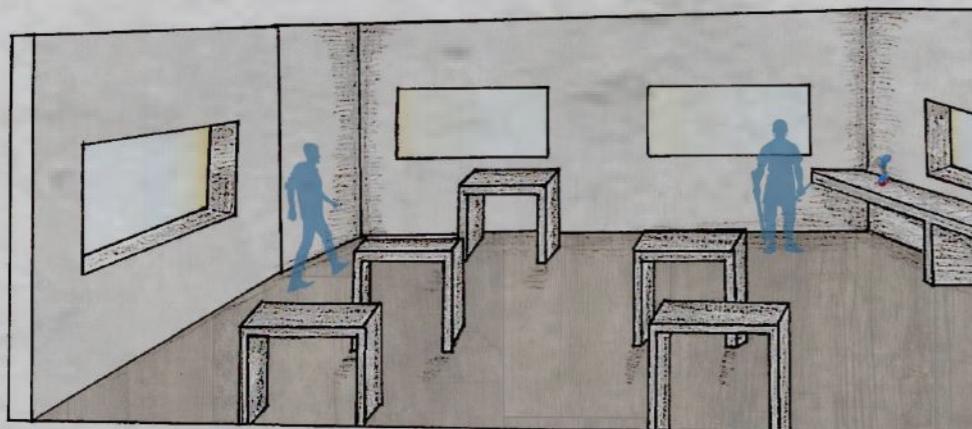
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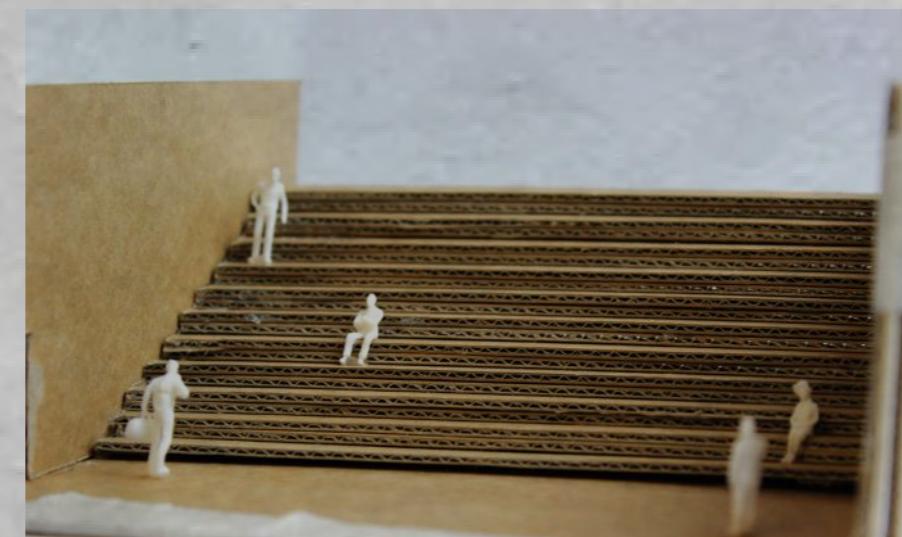
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### 3.1.7 BUILDING EXPERIENCE

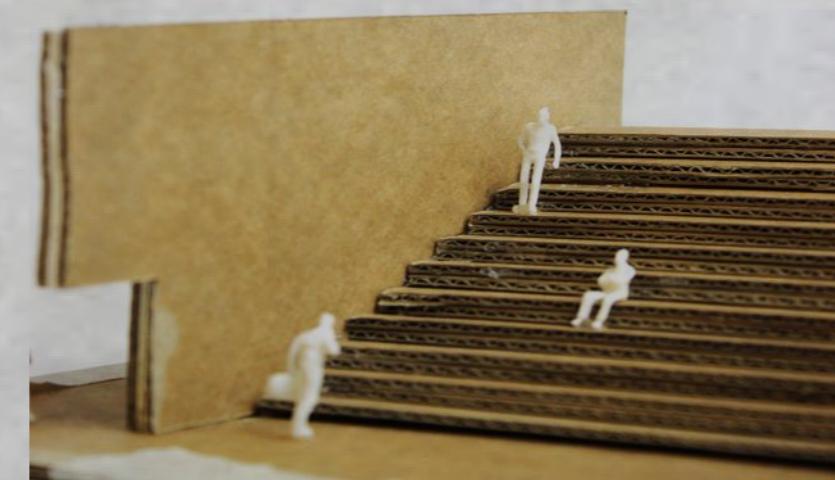


INTERIOR 3D DRAWINGS

the interior as well as the exterior surfaces are rendered with concrete. this is an approach to the celebration of the shadows that will inhabit the building during the day, through the partially glazed roof.

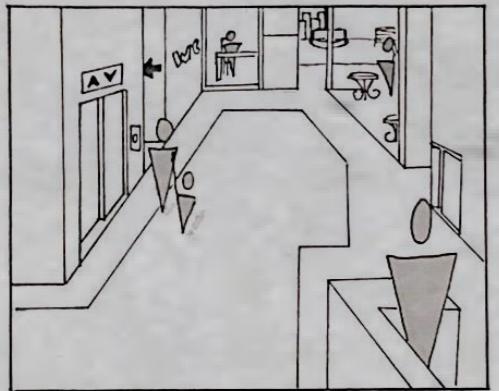


generally most of the interior surfaces are matt, in order to allow the dichroic glass facade create a comfortable environment to the users, and the visitors, while filling the interiors with colourful shards.

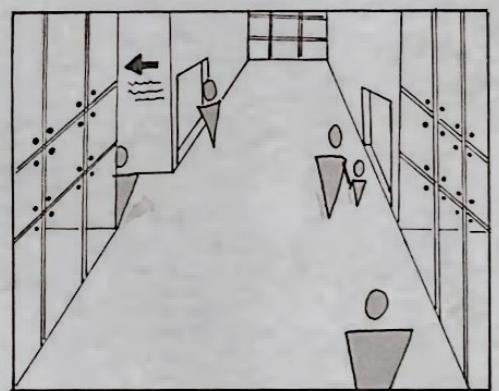


since the building is greatly exposed to sunlight, the windows of the spaces were taken into consideration. the opening dimensions will be limited in order to avoid glare and overheating.

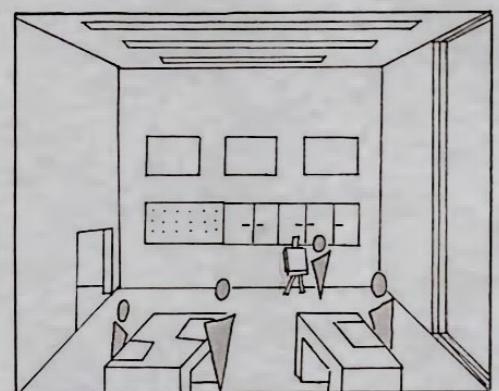
### 3.1.7 BUILDING EXPERIENCE



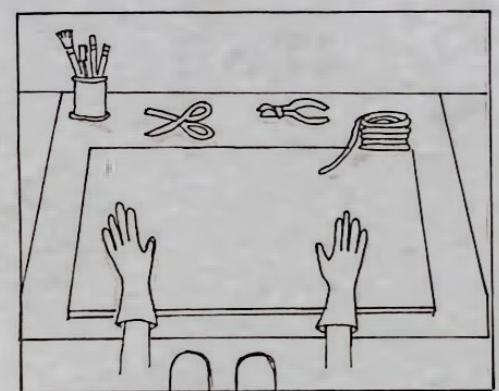
a 23 year old lady coming into the craft-making center, making her way to her arts&crafts class



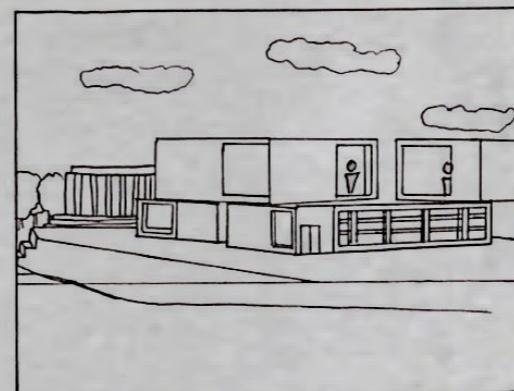
coming into the reception and taking the lift for the upper floors



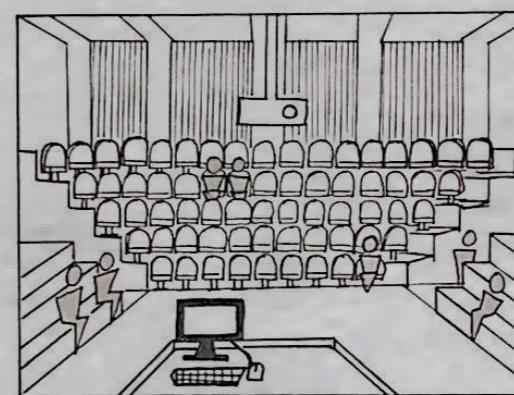
following, she walks down the corridor, which leads to her workshop class



finally, she makes it to her seat and prepares her materials before the instructor begins the lesson



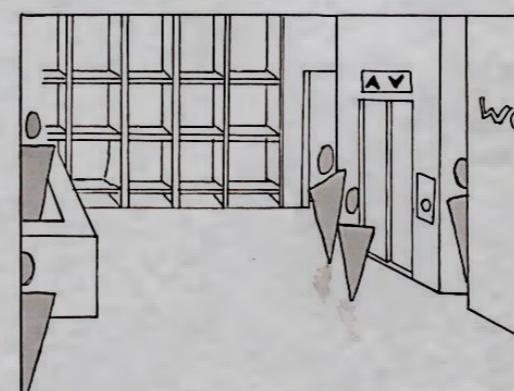
Mr. Panik, the representative of the charity organisations for homeless, comes to Bristol and give a lecture on how we can help the homeless without hurting them



as he enters the building, he comes to the lecture theatre and prepares his speech before everyone arrives.



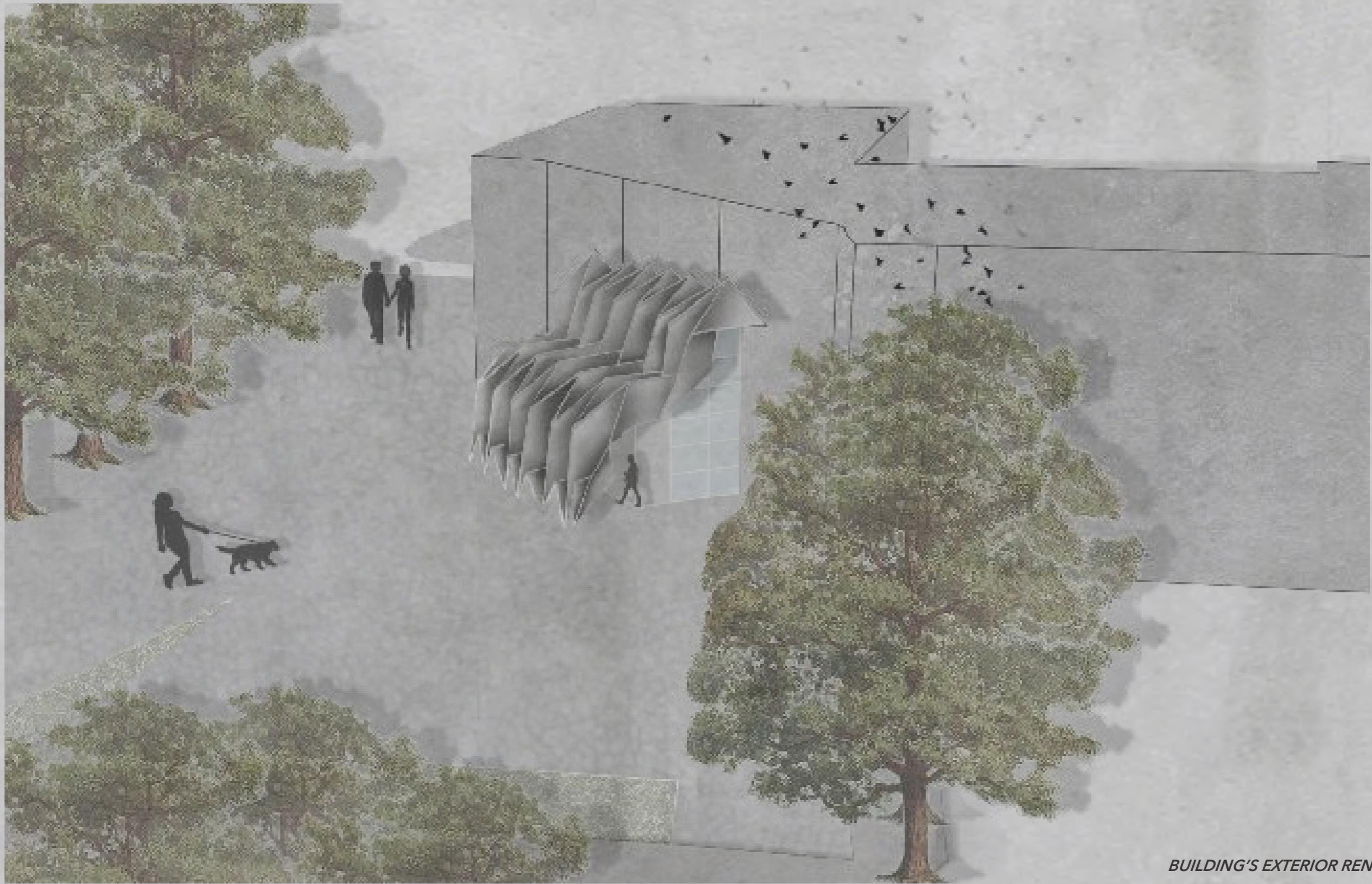
after a successful lecture, Mr. Panik felt hungry, and so he went restaurant next ot the lecture theatre, to get something to eat



after his lunch, he had his afternoon tea and managed to get some rest, by looking the harbourside from above

at last, Mr. Panik after seeing everyones exhibited work on the market, he got very excited about the fact that there is a whole craftmaking center, which is dedicated to save the homeless community

**PROJECT 3.2 - SENTIENT CITY (SEPTEMBER 2018 - DECEMBER 2018)**



*BUILDING'S EXTERIOR RENDER*

### 3.2.1 SPECIFIC RESEARCH ANALYSIS

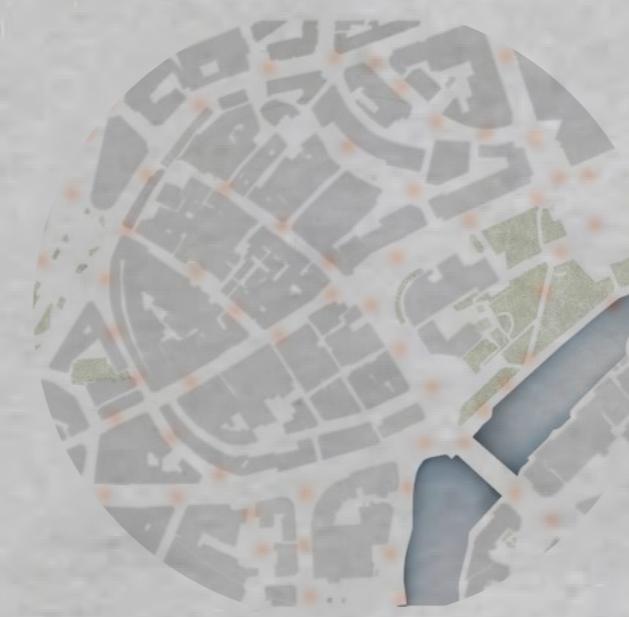
#### SITE ANALYSIS



weather



pedestrians



cycling



noise

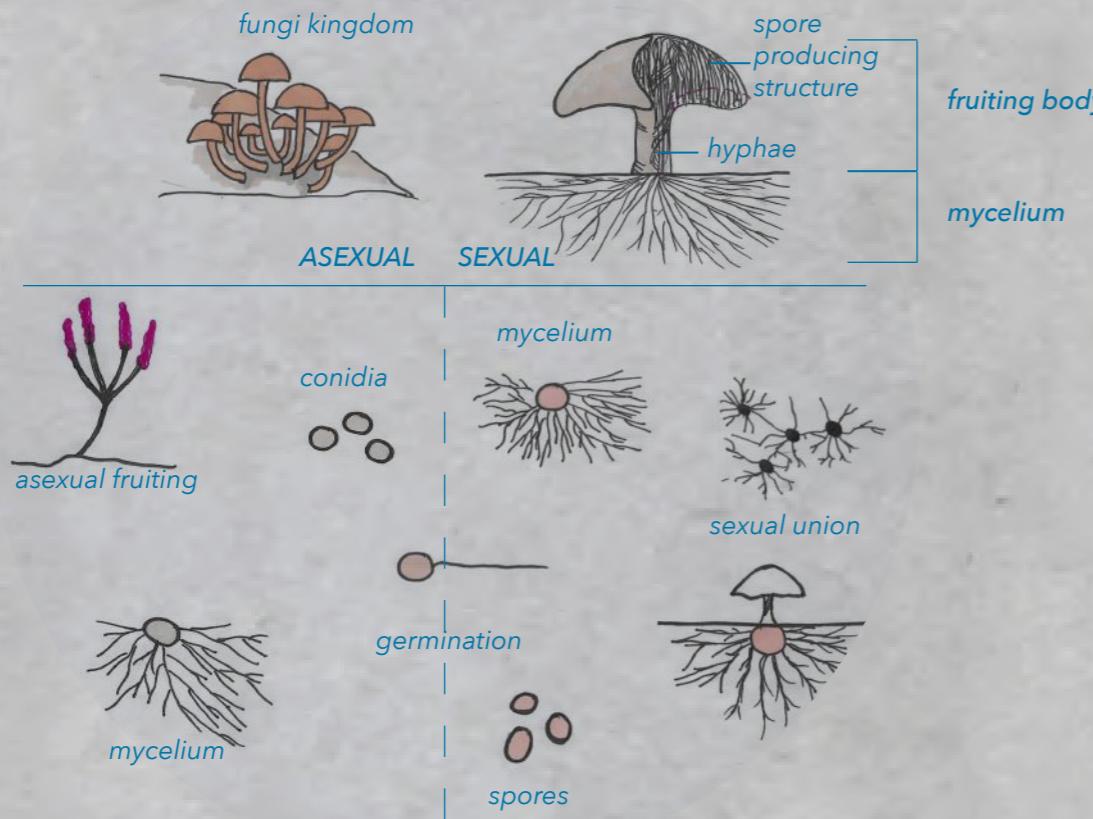


cars

The site is fully exposed to the sun, inhabiting a really warm and comfortable place to relax during the sunny days. It is mostly accessible by pedestrians and cycling people, as it is a nice area to sit and relax, or either cycle. During lunch time, is the time when the surrounding get noisy, since people from the businesses around are taking their lunch break in the area of castle park

### 3.2.1 SPECIFIC RESEARCH ANALYSIS

#### FUNGI LIFECYCLE



LOCATING EDUCATION SPOTS IN AND OUT THE CITY WALLS



COMBINING AND COMPARING THE LOCATIONS OF THE SPOTS TO A FUNGI NETWORK

seperated into: formal and informal education



yellow: civic and religious knowledge  
purple: education: education centers  
orange: cafes/ individual businesses  
green: informal education, people spending their time in castle park

#### STRUCTURE AND FUNCTION OF A MULTICELLULAR FUNGI

The designed proposal has the intention to expand the knowledge of people about Bristol's history, while providing them a space to have a chat, relax or even study. The concept of the design follows the strategy of a multicellular fungi, since it is proposed to be build on a "dead" site and give life to it.

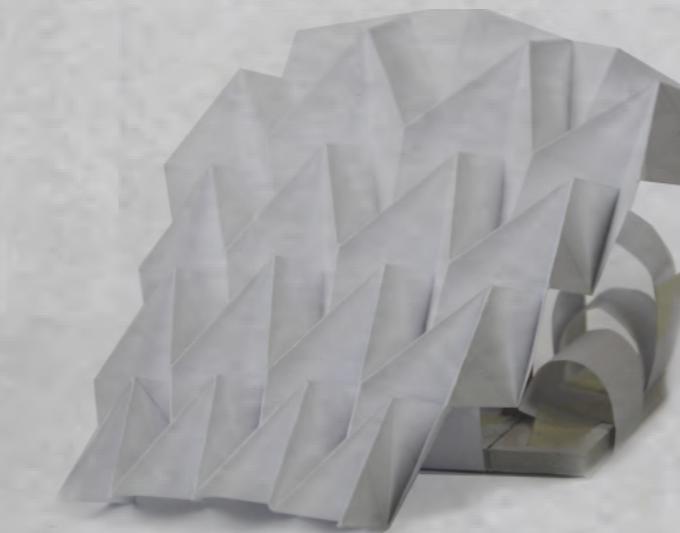
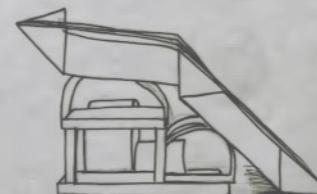
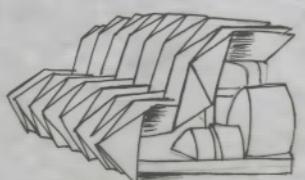
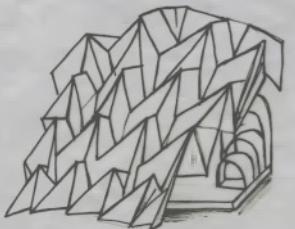
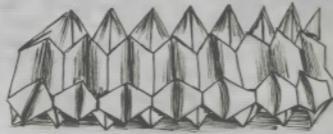
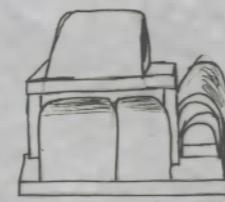
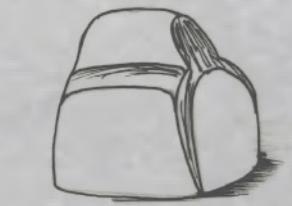
Fungi helps the planet to reproduce and redevelop.

Evolve roots of trees and give rise to the entire forest. They shape our world and keep the key for our future, a kingdom in their own manner.

The web of life is connected through fungi.

this model, demonstrates the different kind of educational spots found in bristol, while the different sizes of the straws, are representing how formal the education is on the specific spot.

### 3.2.2 FORM FINDING AND MASSING PROCESS



#### FORM FINDING

*the overall form of the whole design was based on the form of a fungus*

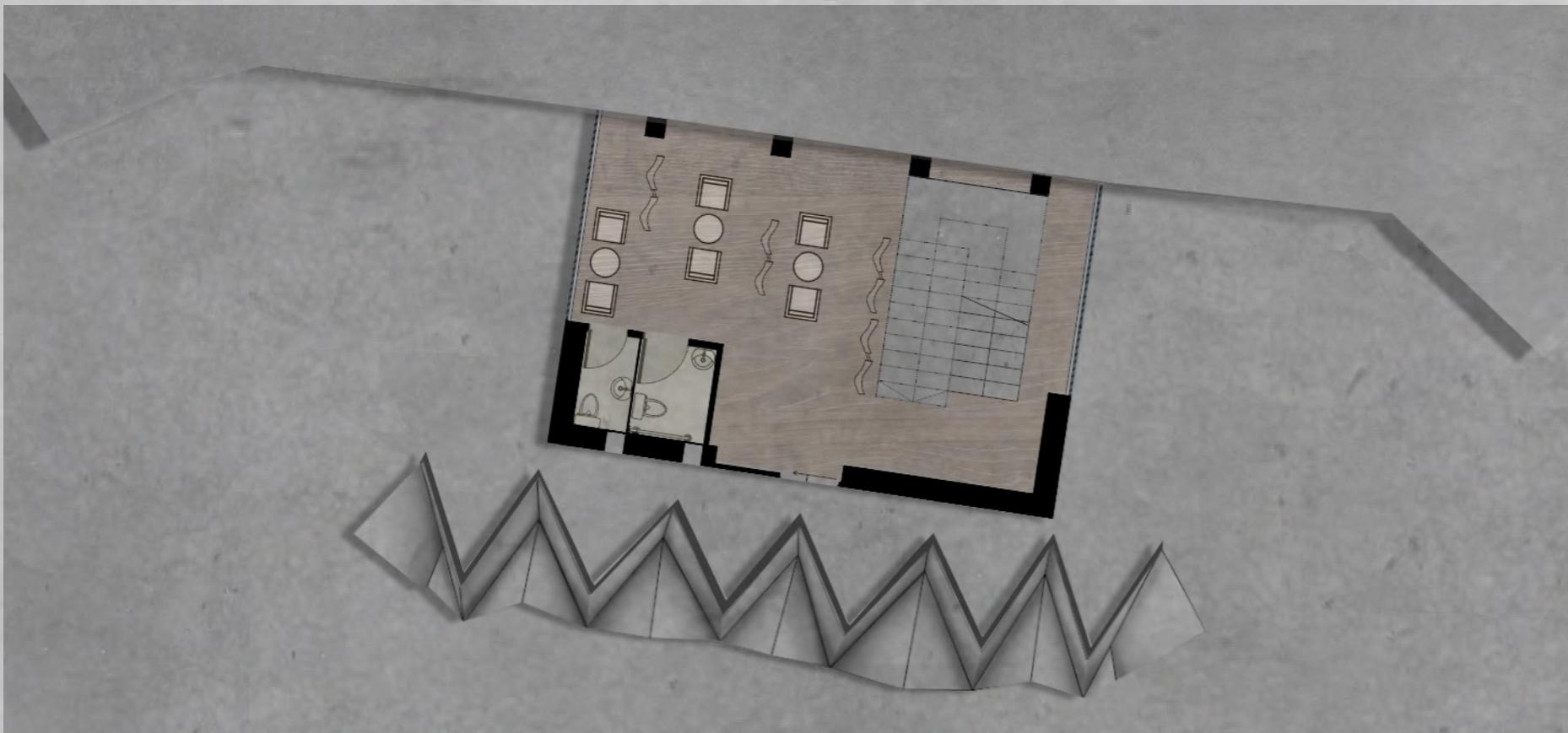
#### ROOF STRUCTURE

*the roof required to either comply with the shape of the design or serve its concept. first, a shallow roof will appropriately inhabit the different heights applied into the building.*

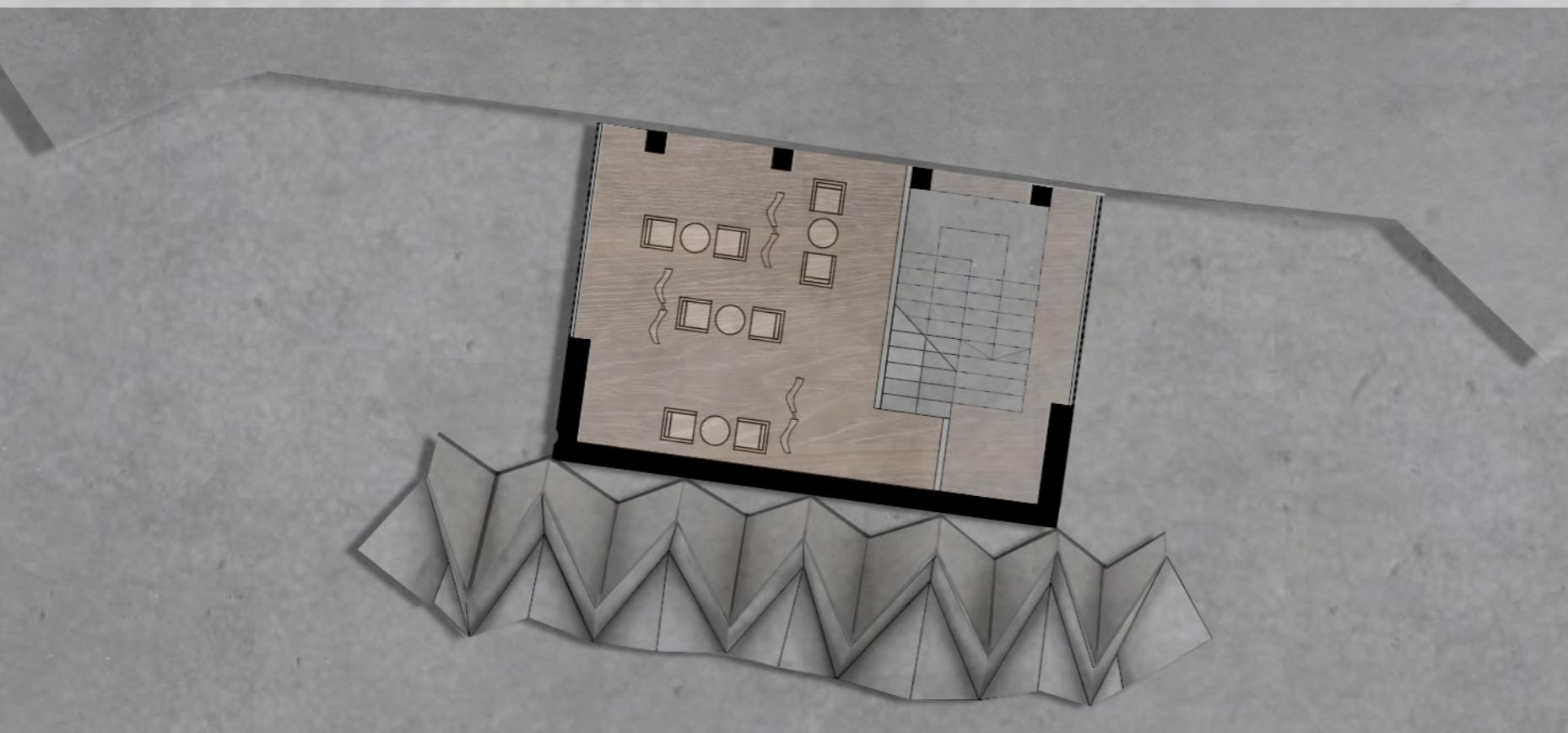
#### ORIGAMI ROOF

*an origami roof will provide the building with a powerfull elevation, appropriately representing how powerfull a fungi kingdom can be.*

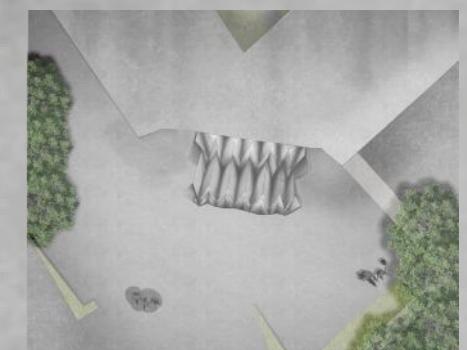
### 3.2.3 PLANS / ELEVATIONS / SECTIONS



GROUND FLOOR PLAN 1:100

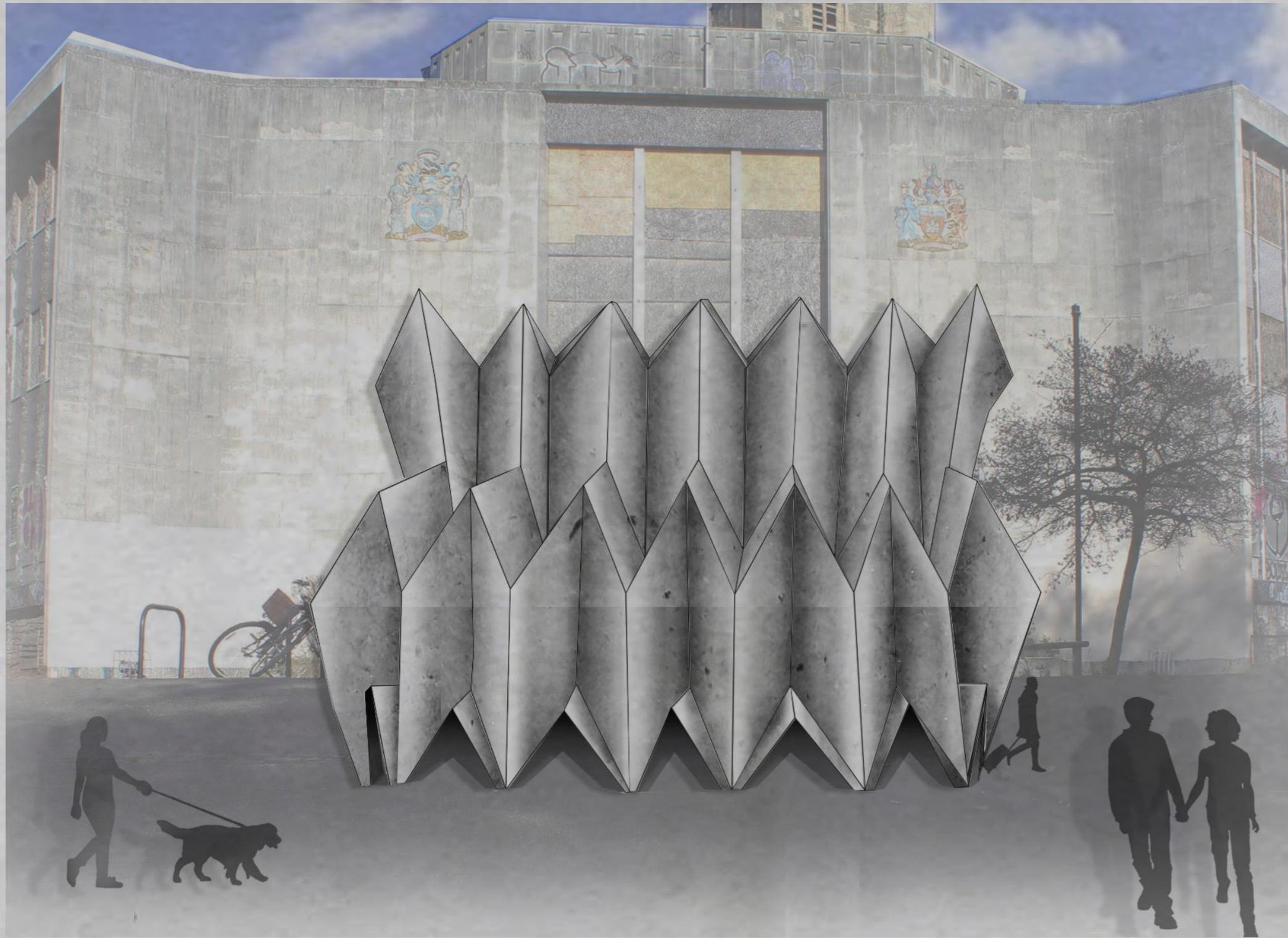


FIRST FLOOR PLAN 1:100



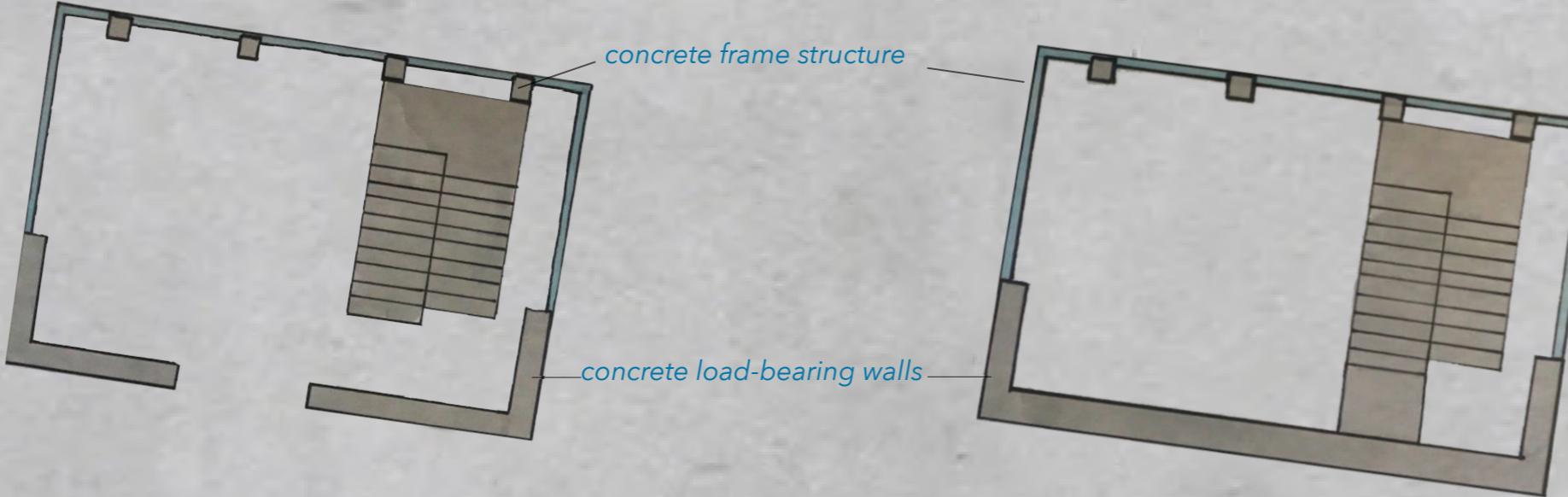
ROOF PLAN

### 3.2.3 PLANS / ELEVATIONS / SECTIONS

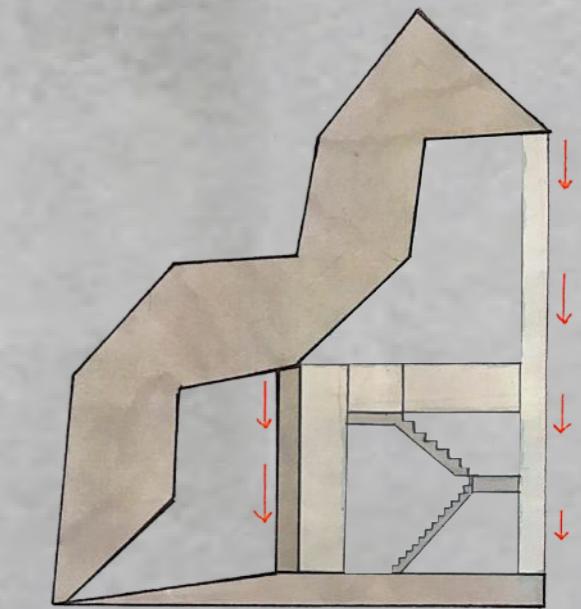


ELEVATION 1:100

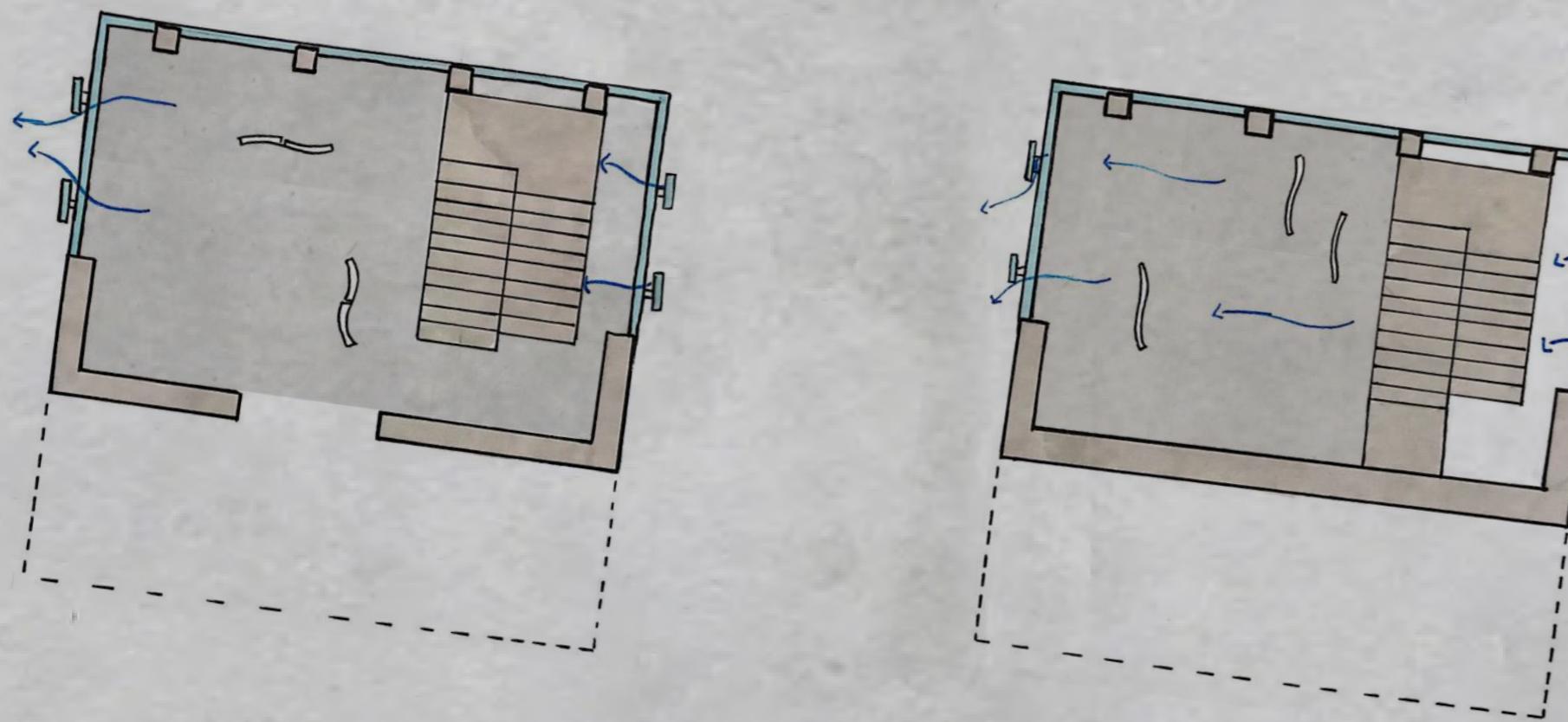
### 3.2.4 STRUCTURAL RESOLUTION AND ENVIRONMENT



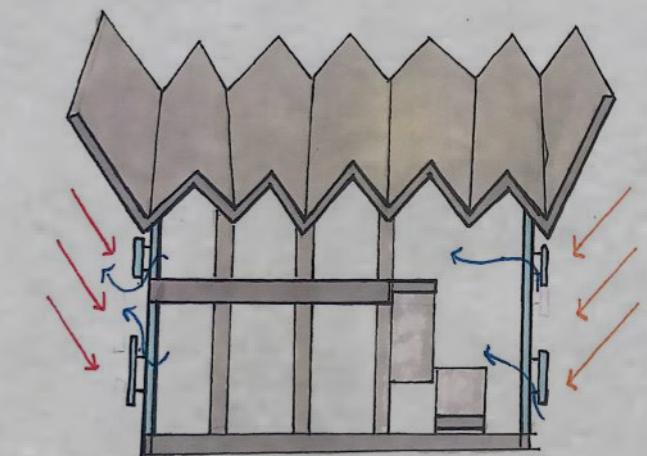
STRUCTURAL LOADS



*the structure of the building is combined by concrete columns and loadbearing walls*



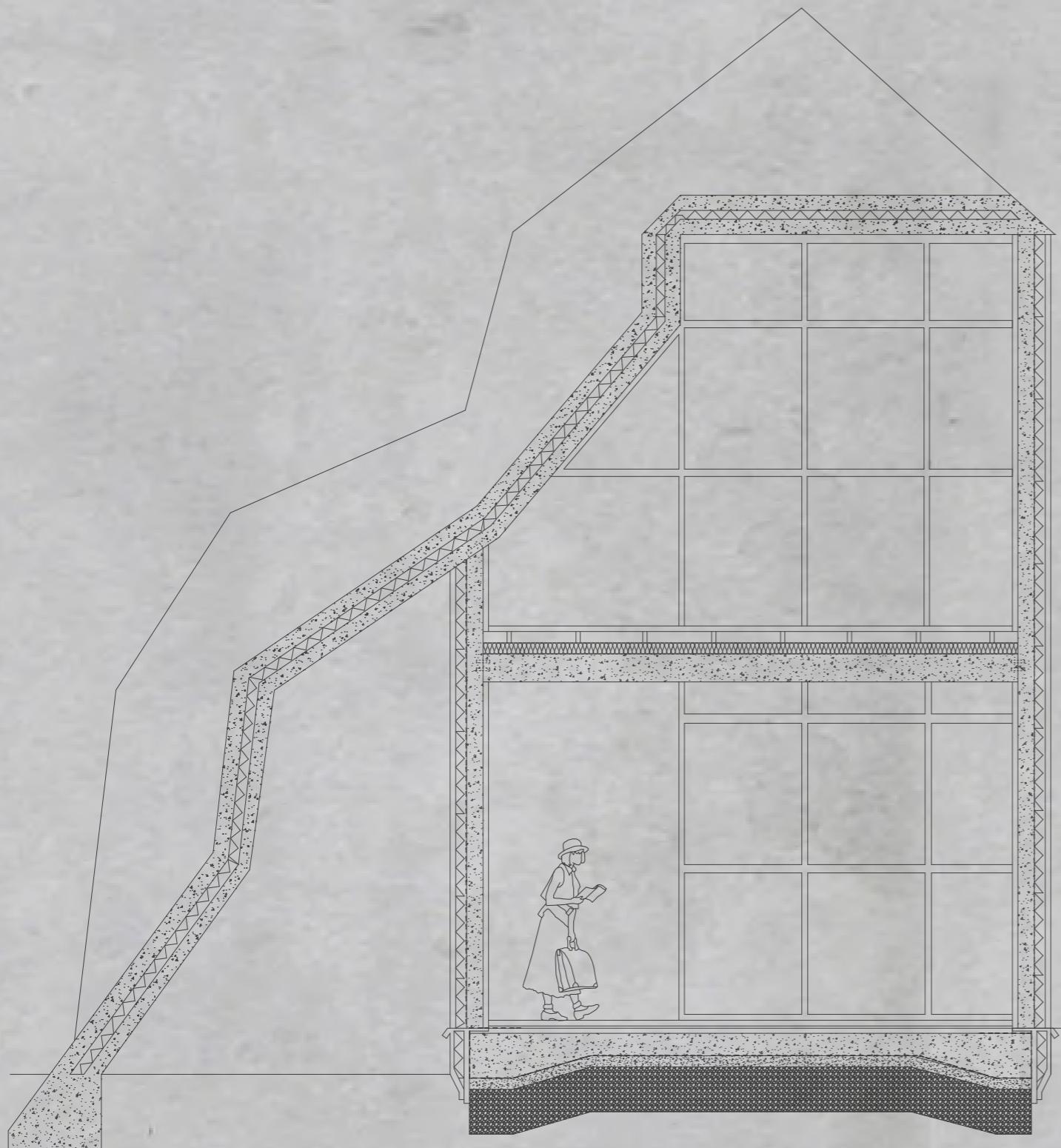
ENVIRONMENTAL STRATEGY



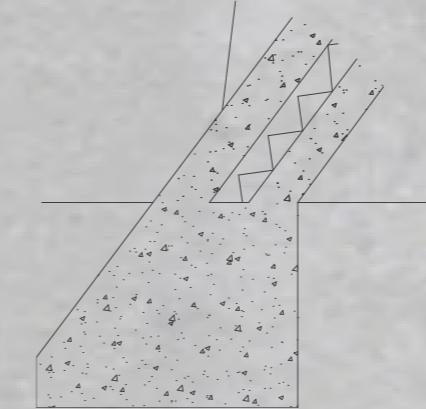
*west sunlight*

*the windows of the building were placed in a way to create cross ventilation, in order for the building to be ventilated more effectively*

### 3.2.5 ROOF STRUCTURE AND TECTONICS

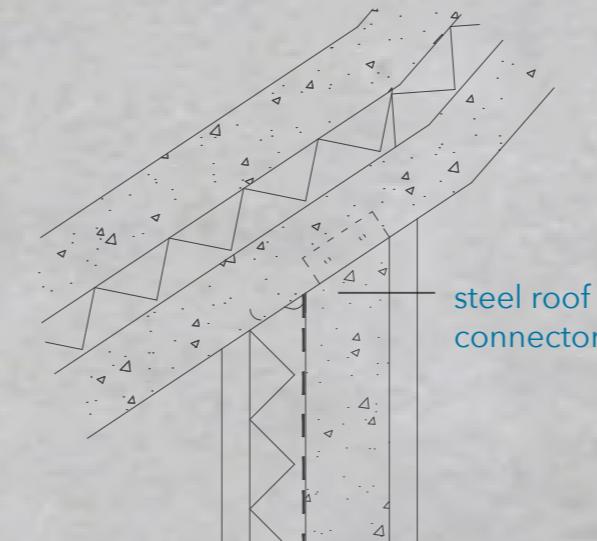


concrete foundation

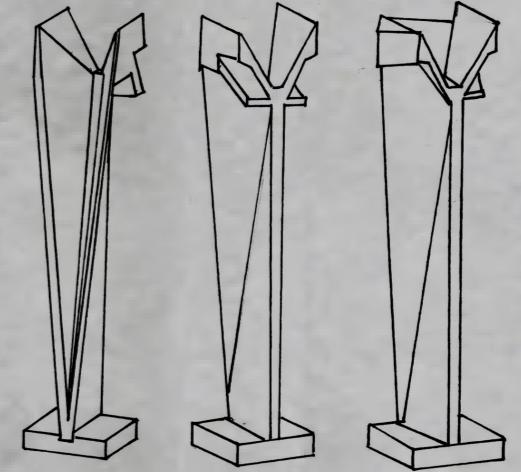


the concrete foundation is part of the origami roof positioned underground, in order to keep the roof more stable

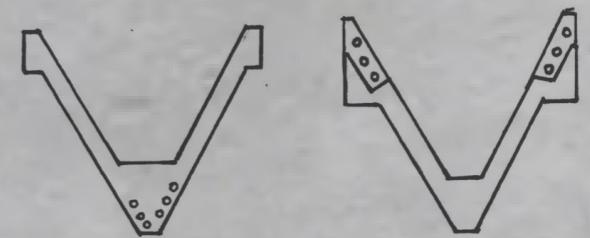
roof / load-bearing wall junction detail



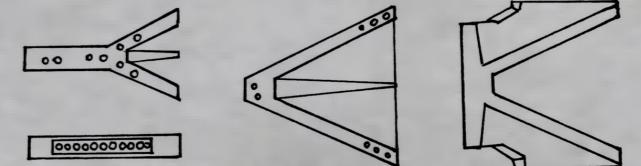
steel roof connector is used to support and secure the roof on the buildings structure



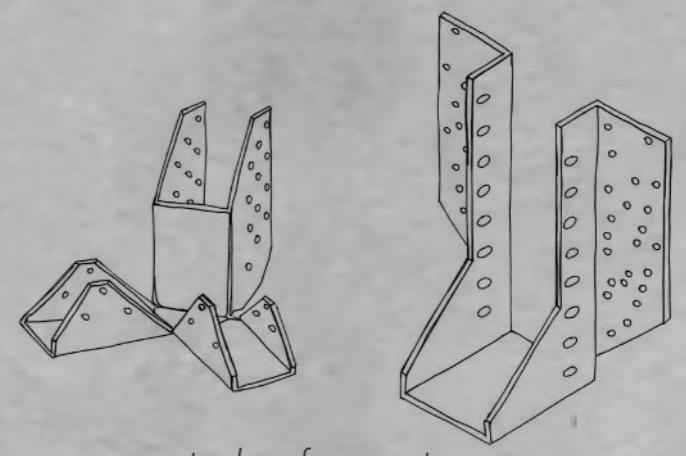
the roof is made from pre-cast concrete and it will be assembled on site



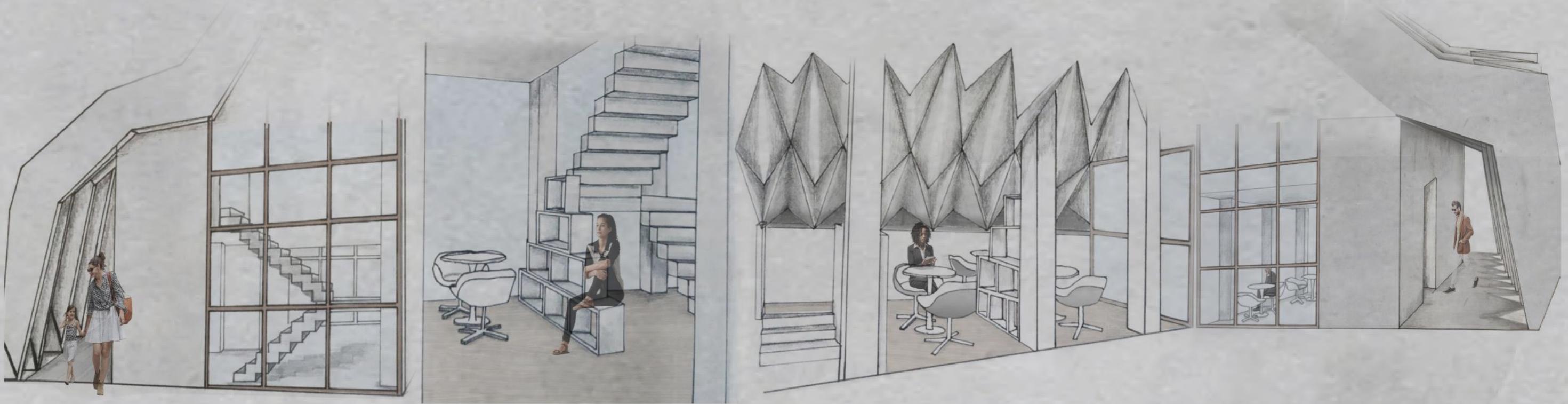
roof pieces before assembly



**PRECEDENT STUDY: MÜLIMATT SPORTS EDUCATION AND TRAINING CENTRE IN WINDISCH, BRUGG**



steel roof connectors



**EXTERIOR AND INTERIOR BUILDING ENVIRONMENT**

# DISSERTATION : HOW IS NATURE ABLE TO CHANGE THE DESIGN PROCESS IN ARCHITECTURE? HOW BIOMIMICRY AFFECTS THE BUILDING INDUSTRY, AS WELL AS ITS SURROUNDINGS?

## CHAPTER01: INTRODUCTION

### 1.1 THE INSTINCTIVE CONNECTION BETWEEN NATURE AND ARCHITECTURE

The building environment has always been involved in the natural environment. From the very early stages of humankind evolution, our progenitors were using nature's essentials to create a shelter. They were using branches, leaves, soil and water to build a shelter and to provide themselves with security and safety from nature's wildlife.

Over time, the development of the building environment has been increased, in order to provide more spaces for people to eat, sleep, work, or even sit and relax. The expansion of the urban landscape has transformed architecture into a possession, where it has, as a result, formed the loss of connection with nature and at the same time, the loss of connection with its inhabitants.

### 1.2 TERMINOLOGY AND BACKGROUND INFORMATION

'Biomimicry', or in another form 'Biomimetics', are complex terms derived from the Ancient Greek Language. 'Bioς' (eng. Bios) which is the Greek word for life, while 'Μίμηση' (eng. Mimesis) is the Greek word which stands for imitation. By connecting them it is easier for us to understand that biomimicry is a combined word describing the imitation of life. The terms were composed by Otto Schmitt, an inventor, engineer and a biophysicist, in 1957. They were coined to define the process of cautious research analysis on nature, and following the techniques, as well as the principles found to innovate the design industry.

Michael Pawlyn, in his book "Biomimicry in Architecture" suggests that nature continues to inspire people in more recent times. Influence from nature continues to be featured in the newer era by the polymaths, Leonardo Da Vinci, and Filippo Brunelleschi. Da Vinci was considered to be one of the first artists who, apart from art, carefully analysed anatomy and physiology to invent new designs and principles into engineering. His early life was spent in nature and this was his motive to investigate the way birds fly and then create the first flight machine, the 'Ornithopter'. This invention made him well known, as the first biomimetic designer. Moreover, Da Vinci elaborated Vitruvius's de Arquitectura text. By considering this text, he "extrapolated and developed" the geometrical ratio found in the human body, in comparison to the geometry of shapes (circle and square). Using his sketches, he was able to explain to people the theory that everything is connected somehow, and conclude to the argument which states that nature's 'relational rules' can be applied into geometry. (Mazzoleni, 2017)



Leonardo Da Vinci's  
Sketches

Filippo Brunelleschi, a goldsmith and clockmaker, was approached to design the dome form of Il Duomo di Firenze in 1420. It is acknowledged as the largest masonry dome designed in the past. The dome has no central support, and everything is based on the concept used for the placement of the bricks. However, it is believed that he was proposing the principles implying on eggshells to have a successful outcome. Following this hypothesis means that nature influenced the design industry further back.

Biomimicry continues and gradually moves forward as seen in 1955 with the publication of the first product inspired by nature. (Pawlyn, 2016). Loops and hooks covering a burr's surface was the motive of the engineer George De Mestral to invent a new fastening system as a substitute of the metallic zippers. After a hiking trip he had, Mestral noticed several burrs caught onto his clothes. From curiosity, he collected them, examined them and finally figured out that the loops and hooks were the reason why the burrs kept clinging on fabrics. The engineer chose to imitate the function of hooks and loops, and after 7 years of investigation he came up with the creation of Velcro. 'Velours' and 'crochet' where the words combined and created the company that has revolutionised the fastening industry. Velcro was a successful invention since it is a very well known to us fastening system used to attach or fasten things we use daily such as shoes, school binders and clothes. (Biography.com Editors, 2014)



Il duomo , Filippo  
Brunelleschi



high view of burdock burr

## CHAPTER02: A WORLD OF BIOMIMETICS, HOW DOES IT WORK?

Biomimicry in architecture is a substantial chapter which also plays a serious role in the design industry. For someone that is not working in a biomimetic world, it is suggested to investigate the chapter actively and follow the appropriate criteria. Janine Benyus, a natural historian, an author and the co-founder of the institute 'Biomimicry 3.8', is one of the most important precedents to follow, concerning the biomimetic world. In her book, ' Biomimicry, Innovation Inspired by Nature', she suggests other ways to see nature, for humans to learn the appropriate data from nature. In a world of Biomimics, the architects and biologists see nature differently. They see nature as a model, measure and mentor. (Benyus, 2002)

### 2.1 NATURE AS MODEL (Benyus, 2002)

It is a new scientific approach towards architecture, which enables architects to deal with issues convoluting the designing process of a project. This new technology helps biologists and architects to look at nature and learn advanced strategies and methods, enabling them to solve their problems in a more solid way, which is also respecting the environment.

## 2.1 NATURE AS MODEL (Benyus, 2002) BIOMIMICRY AS GUIDE TO SHAPE

Considering biomimicry in education can reveal other forms of improvements. An organism can regulate the architecture of a structure considering its shape. These influenced illustrations are more likely to be referenced with the term 'Biomorphism'. The term 'Biomorphism' is also a word derived from Greek words. The word 'Βίος' (eng. Bios) is the Greek word for life, and 'Μορφή' (eng. Morphe), which stands for the meaning of figure. It came in use around the 1930s and it is a description of a design, entirely inspired from biological forms instead of their functions. Michael Pawlyn in his book "Biomimicry in Architecture" refers that "Biomorphism is a formal and aesthetic expression, where biomimicry is more likely to be described as a functional discipline" (Pawlyn, 2016)

Fundamental examples of biomorphic design can be captured in earlier century architects, such as Antoni Gaudi's masterpiece 'Sagrada Familia' and Eero Saarinen's TWA Terminal. Antoni Gaudi began designing the temple of Sagrada Familia in Spain, before the coining of the terms. Even if the designing process started in 1882, it still is one of the ultimate examples of biomorphism. It is representing the sense of nature by considering the sequence found in a forest, to install the columns. The interior of the temple creates the sense of a concrete forest, while the columns are tall and branch near the roof and cover up the windows to the sky. Gaudi enhances the feeling of the natural environment in the structure through the detail of the leaves decorating the columns. These were just the geometries Gaudi found in nature and supported his decision by stating, "To be original, is to return to the origin", where the origin for him, was nature (Dirksen, 2010).

## 2.2 NATURE AS MEASURE (Benyus, 2002) BIOMIMICRY AS GUIDE TO DESIGN

Biomimicry does not only supply the design industry with new methods to figure out the complications that a design team is facing. Nature, after 3.8 billion years of evolution has become an expert on deciding whether something is functional, suitable and most importantly sustainable.

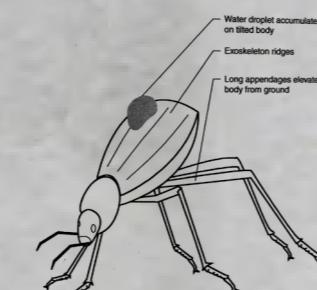
A principal example of a creature harvesting water is the Namibian beetle. The Namibian Beetle is surviving in the Namib Desert, located on the western coast of Africa. The Namib desert has been characterized as one of the hardest deserts in the world, having an intense lack of water, while according to InfoNamibia, in Namibia the possible evaporation is higher than precipitation. In detail, again according to InfoNamibia, the temperature in summer is rising up to 50°C and in winter up to 25°C, while at night the temperature drops below 0°C. The only way to harvest water in such climates is from rain, which is not a usual phenomenon, and from the fog. Namibian beetles are profitably provided with a body structure, that enabled them to develop new technology on gathering water, known as fog-basking (Mazzoleni, 2017).



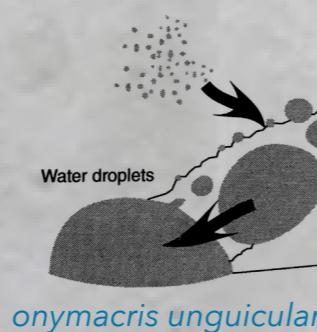
Interior of Sagrada Familia,  
Antoni Gaudi



The TWA terminal, John F.  
Kennedy Airport, New York,  
Eero Saarinen



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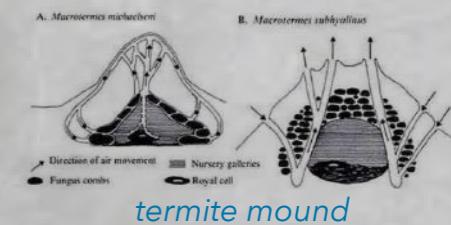
## 2.3 NATURE AS MENTOR (Benyus, 2002) BIOMIMICRY AS A MENTOR

Overall, the procedure is demonstrated through the process of 'Investigate, Imitate, Apply'. Biomimicry is a system allowing biologists to investigate the behaviours of animals, plants and other living organisms. During different periods of their lifetime, biologists observe their performances on specific issues they confront and bring it on the design table (Benyus, 2009). This specific system presents a new perspective on the natural environment and teaches us what we can learn from nature, not what we can extract.

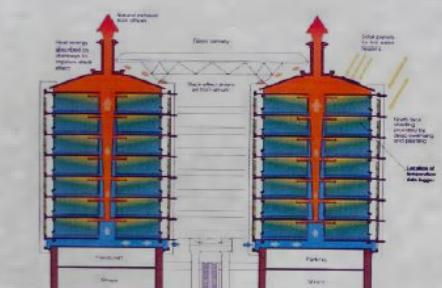
On the behavioural level, biologists are investigating how an organism reacts on certain environments, to overcome any difficulties it confronts, and provide these information to the design table. A precedent to be referenced as a successful behavioural imitation of an organism, is the Eastgate Center, in Zimbabwe (Douglass, 2015). The architect, Mick Pearce was impressed on how the termites are able to manage an exact temperature inside their mounds. First of all, the mounds are created from termites with the aim of harvesting fungi kingdoms, as fungi are their dominant food source. In order for a fungus to grow, the temperature in the environment has to be preserved at 87°F, and termites are responsible for it.

### How do termites regulate an exact temperature of 87°F?

Termites are capable of keeping constant temperatures in their nests, through operating and closing specific holes. The temperature in Africa may fluctuate from 3°C and come up to 42°C, so the termites are changing the sequence of the holes accordingly. Pearce designed the building based on its ventilation system. He illustrated these particular biomimetic principles and he produced an architectural marvel, which uses no conventional air-conditioning or heating. This was made possible because of the small gaps accommodating the bottom of the building and a bigger gap on the roof (chimney), creating natural ventilation in the interior. The vertical corridor, made of glass, is connecting the two parts of the building, enabling all of the interior spaces to be naturally ventilated. Additionally, the use of concrete is an aspect which complements the approach of temperature regulation, as it is an excellent material to perform as an insulator. Therefore, this had as an outcome of saving \$3.5 million on behalf of the air-conditioning system that was not necessary to be installed. (Inhabitat.com, 2012)



termite mound



Section showing how temperature is regulated

## CHAPTER 03: CONCLUSION

### WHY BIOMIMICRY NOW?

Concluding, Marc Kushner said, "Buildings, don't just reflect our society, they shape our society". (Why the buildings of the future will be shaped by ... you | Marc Kushner, 2015). My opinion is that we live in an era, which is able to improve the standard we are living on and evolve it into something exceptional. Yet, before any other development, I suggest to look back into the architectural history and criticise the methodology we used as humanity to become what we are today. By evaluating a feedback on our actions, we are empowering and encouraging ourselves to continue and work more properly, in terms of nature. Considering biomimicry in education, can reveal other forms of improvements.

Biomimicry provides instructions how nature manipulates water, energy and materials. These techniques found are provided by the biologists enrich designers observations regarding nature, enabling them to compose new long-lasting solutions to the design table. The first impression of nature in architecture, it was the forms the nature was inhabiting. Natural forms mark the architectural history from the Corinthian columns in the Ancient Greek temples, to Calatrava's biomorphic designs. Nevertheless, nature influences architecture further than forms. Biomimicry is a platform through which biomimics are examining natures blueprints, approving designers to fit the form of a structure into its function approaching a lifelong design. "None of these are using the organisms. They are really only using the blueprints or the recipes from the organisms" (Benyus, 2009) Through biomimicry, nature allows the architects learn from her, in order to, enrich the building industry with architectural marvels, considering not only the structure of the design, but also the inhabitant experience. By integrating the outdoor environment in the interior of the building, the architect institutes an active and creative environment to its inhabitants. This may be seen as a relatively new manifestation regarding the power of the natural world. Biomimicry is a complex but interesting technique that gives us the chance to get to know the world around us. Exploring nature by examining animals and plants behaviours we will come to the point where "we realise that all our inventions have already appeared in nature, in a more elegant form and at a lot less cost to the planet"(Benyus, 2002). Letting nature educate us in a way that we do not disrupting it, we are establishing a long-lasting environment not only to us, but also to the 3.8 billion lives that created what we live on. As Janine Benyus once said, "A sustainable world already exists, we're just beginning to open our eyes and realise that the answers to the questions we've been asking, how to live here sustainably are all around us."(Benyus, 2011)

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*Benyus, J. (2002). Biomimicry, Innovation Inspired by Nature. 2nd ed. New York: William Morrow.*

*Mazzoleni, I. (2017). Architecture Follows Nature. 1st ed. CRC Press, Taylors and Francis Group, pp.8-9, 26-29, 42, 50-53, 57, 171-172.*

*Pawlyn, M. (2016). Biomimicry in Architecture. 2nd ed. Newcastle: RIBA Publishing.*

**THANK YOU FOR CONSIDERING MY APPLICATION.**