

# MORE THAN A STUDENT ACCOMMODATION

By Mikaela Arroyo

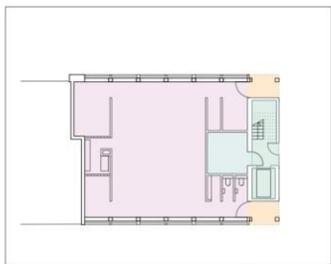


# Precedent Study

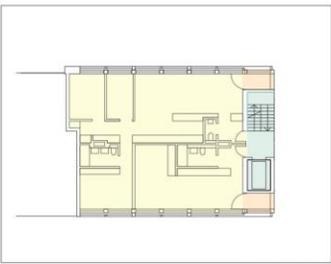
# Housing Rack in Berlin: NEIGHBOURHOOD SCALE

The typology of the building responds to a mixture of live-work environment where the ground floor serves as office space while the remaining 5 floors serve as 10 dwellings with flexible layouts to accommodate different type of residents. The circulation in the building itself, embraces the contact between neighbours as the access to the dwelling is condensed in a set of exposed stairs and an elevator that act as an interaction point between the residents. Moreover, the entrance to the dwellings on the ground floor is completely independent from the entrance to the office.

The dwellings have been designed in a way that the long facades located in the east and west of the building can open entirely thanks to room height sliding doors that offer the possibility of extending the living room towards the exterior in form of loggias. Moreover, every apartment has access to a small balcony adjacent to the staircase and elevator shaft.

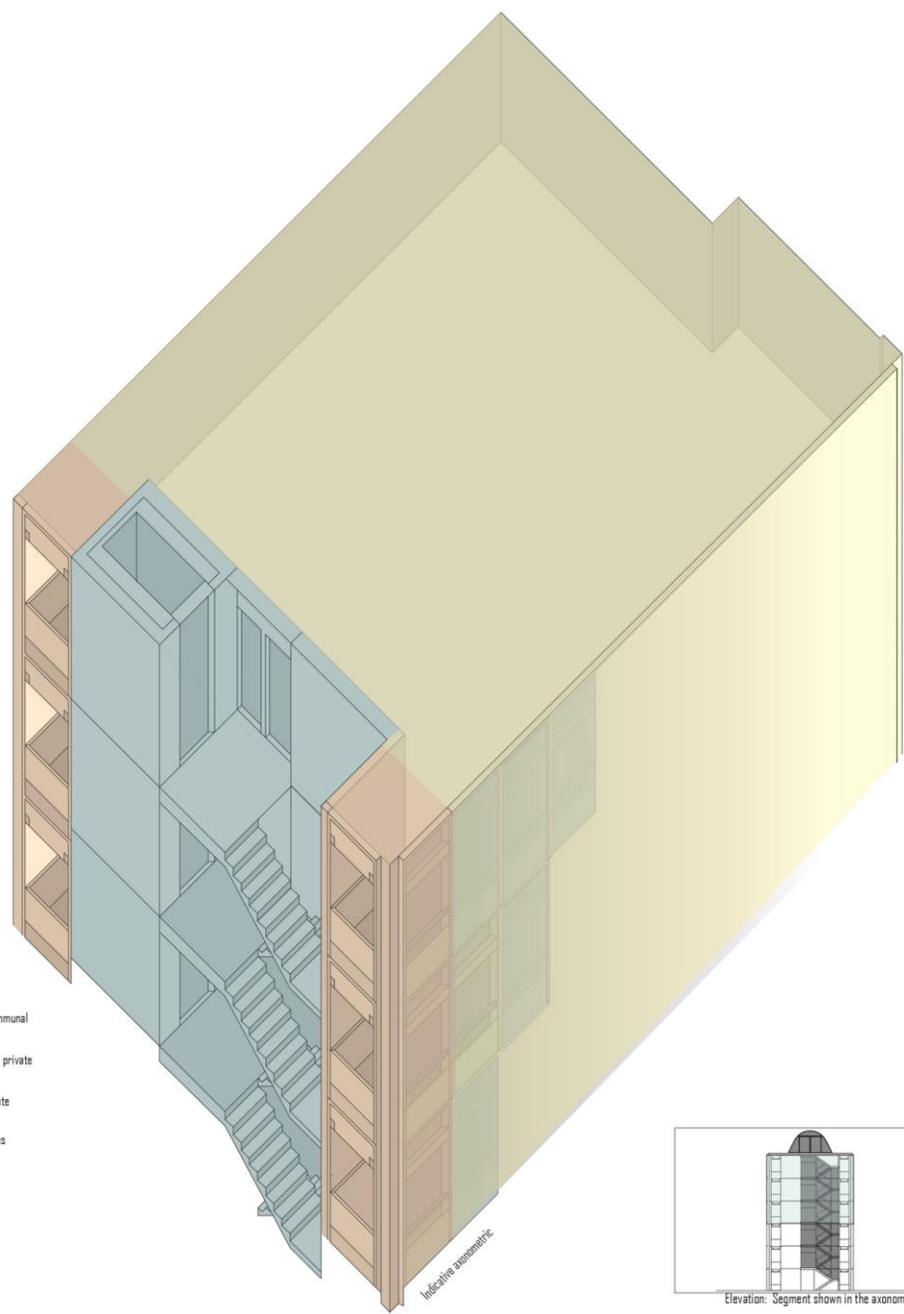


1:200 Groundfloor

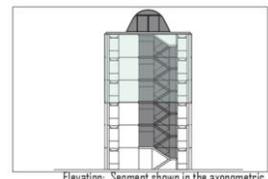


1:200 3rd Floor

- Communal
- Semi private
- Private
- Offices



Indicative axonometric



Elevation: Segment shown in the axonometric



Picture 1: circulation area



Picture 2: Loggias in the livingroom

# T1 Housing: Architecture Of Shared Resources

## T1a: Shared Energy and Waste

This assignment focuses on shared energy and waste. It aims to provide an awareness of design sources, that inform an effective performance of the building's envelope as well as the interior environment and specific components, all this related to sustainability. (LO3)

The Guidelines provided by the *LETI Climate Emergency Design Guide* have been taken in consideration to analyze the operation energy standards of the building in terms of natural daylight penetration. (Pp. 11-12)

This building follows all MINERGIE standards, meaning that's its design has a positive impact in the diminishing of energy usage for heating. Natural light can easily pierce through the building, due its amount and placement of windows and the balconies overhangs and the external staircases serve as shading devices to avoid overheating during summer. The placement of the rooms are also based on the amount of light required in every area of the apartment; this design decision is accountable for 20% of the energy-saving strategy.



*Mehrfamilienhaus in  
Renens*  
by Dreier Frenzel  
Architecture

# FINAL WORK

## SUNPATH DIAGRAM

This diagram shows the sunpath in different seasons throughout the year and how the room positioning relates to it. A key plan of the third floor has been chosen since it is a common room arrangement in the building.

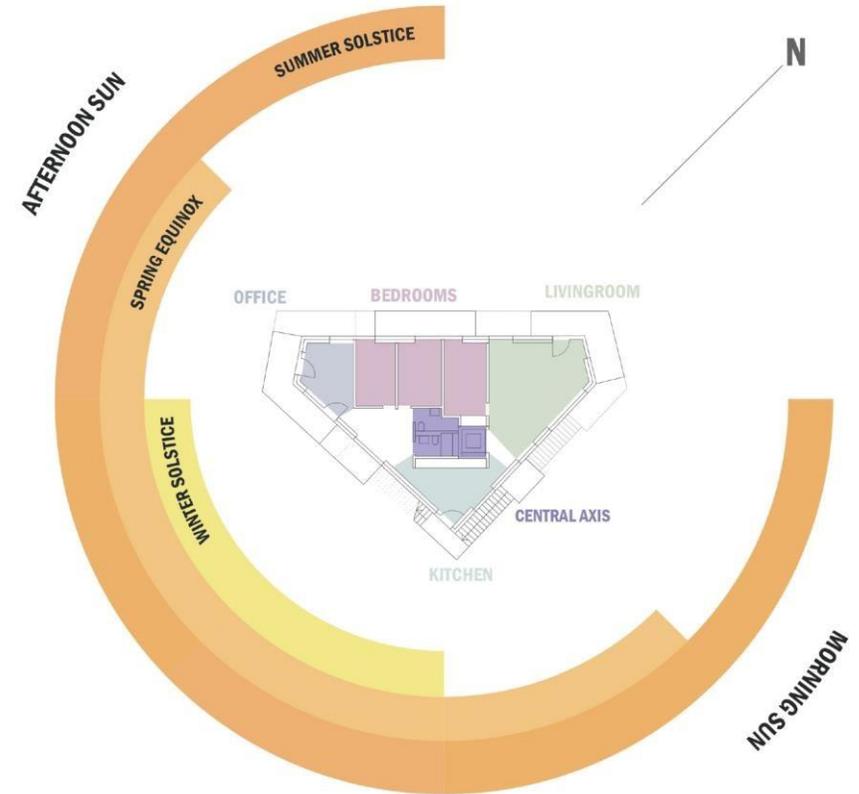
The kitchen and the office have south-oriented façades. In the case of the office this can provide a better work environment with bright natural light and an enjoyable afternoon sun through the west-facing opening in the corner.

The other south-facing room is the kitchen, even though this positioning profits a well-lit room, it can raise concerns of overheating due to the high temperatures produced by cooking.

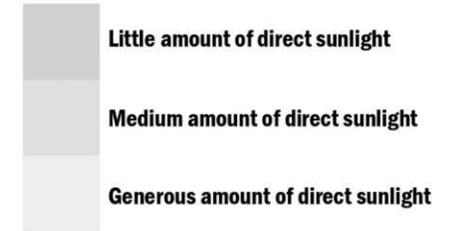
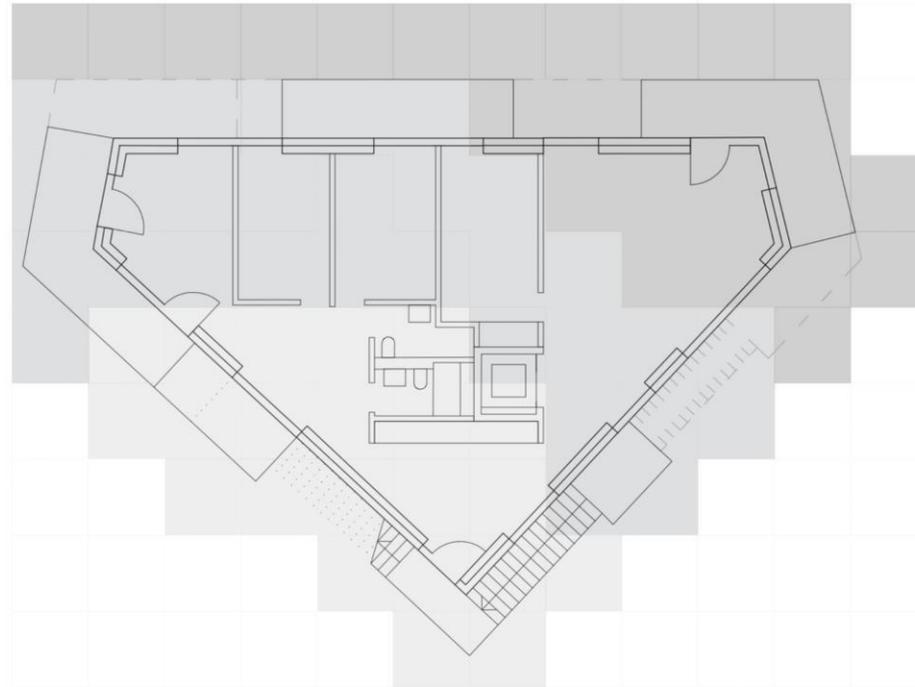
The 3 bedrooms in the apartment are located in the north-western façade. This position only provides little direct afternoon sun during summer days.

The living room receives mostly northern light through its openings, making it the room with the least amount of direct sunlight.

In the middle of the apartment, two bathrooms and an elevator have been accommodated since these rooms do not require direct sunlight of any kind.



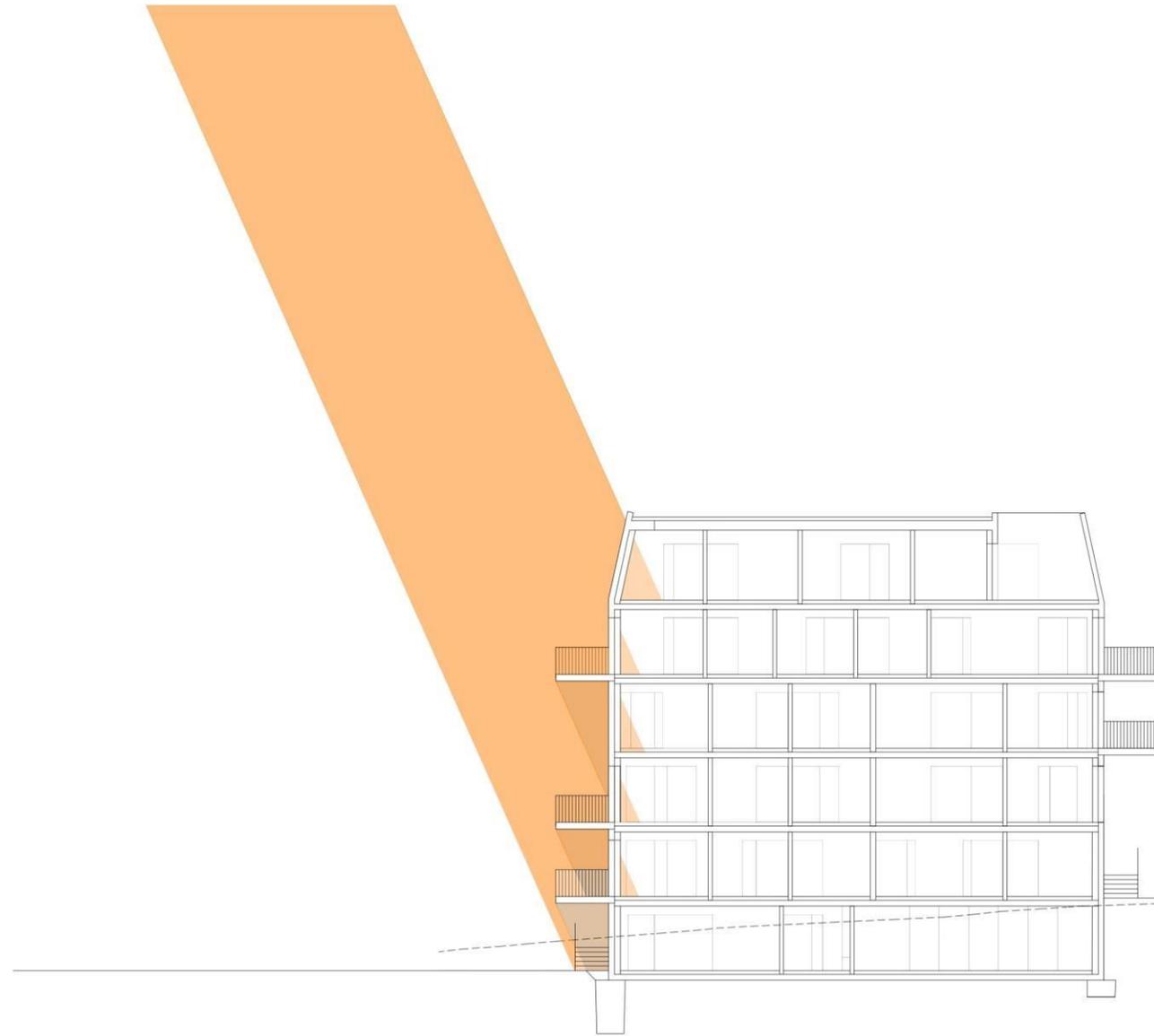
# FINAL WORK



The amount of direct sunlight received by every area of the apartment is represented by this gridded diagram.

**DIRECT SUNLIGHT DIAGRAM**

# FINAL WORK



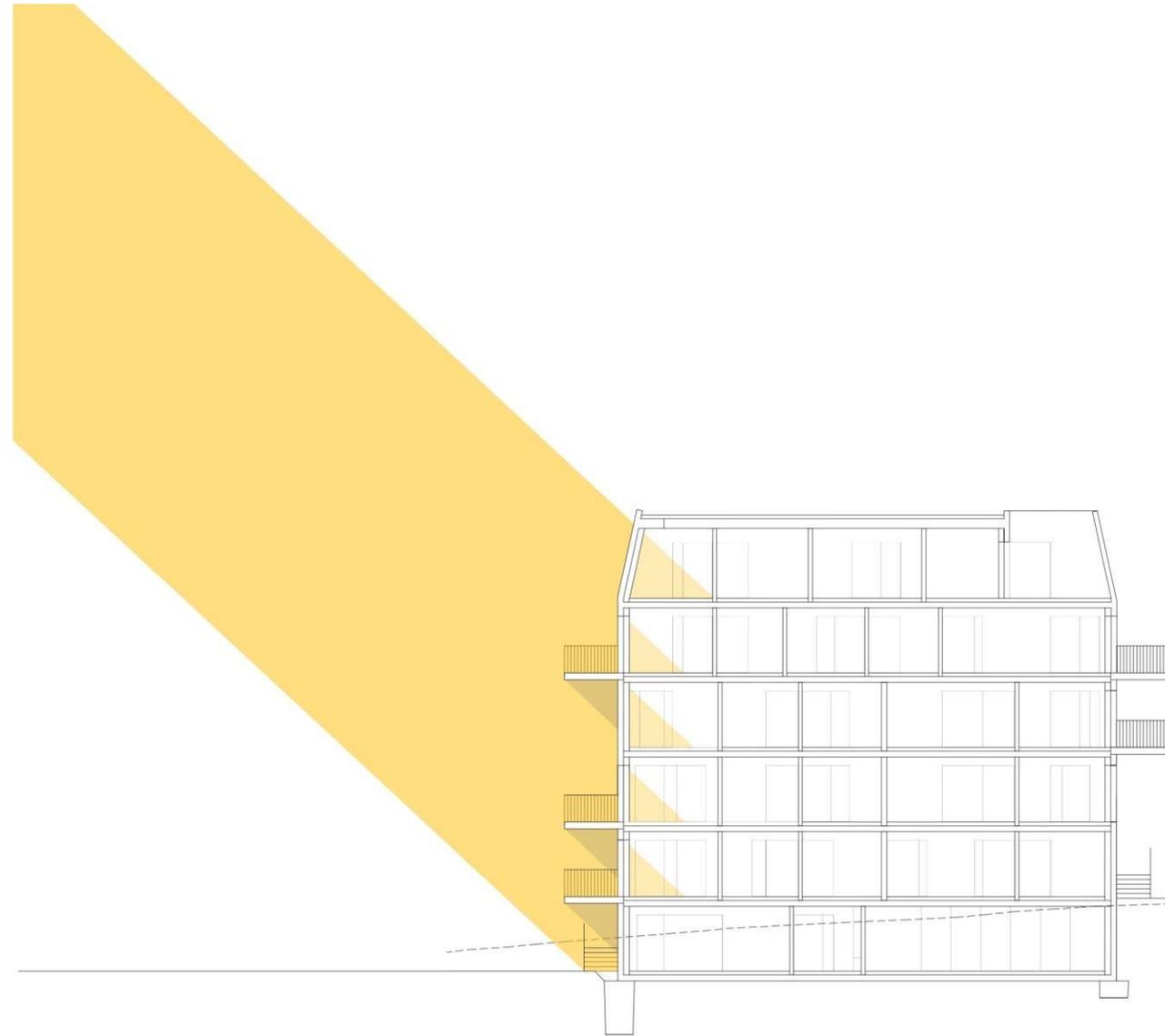
**SUMMER SOLSTICE**  
**21 JUNE 2021**

**66° altitude**

This Diagram represents the influence of the sunlight in the interior of the building and also the shadows created by the balconies. During summer months, the sun is higher in the sky, therefore the sunlight does not pierce too deep in the building but is very intense. Balconies do also serve as shading devices.

**SUNLIGHT STUDY IN SECTION**

**FINAL  
WORK**



**SPRING EQUINOX  
21 MARCH 2021**

**43° altitude**

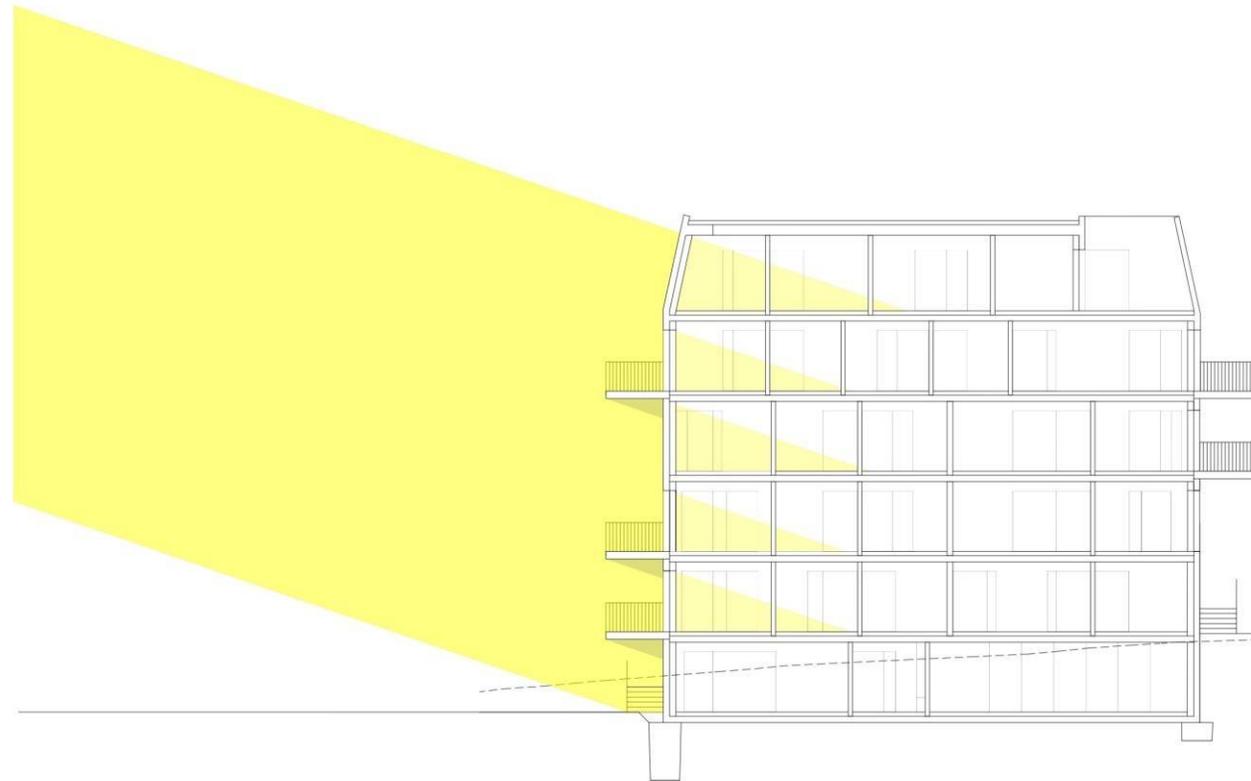
Durning spring months, the intensity of the sunlight deminishes parcialy in comparisson to summer. The light pierces further in the building and the shadows created by the balconies are reduced.

**SUNLIGHT STUDY IN SECTION**

**FINAL  
WORK**

**WINTER SOLSTICE  
21 DECEMBER 2021**

**19° altitude**



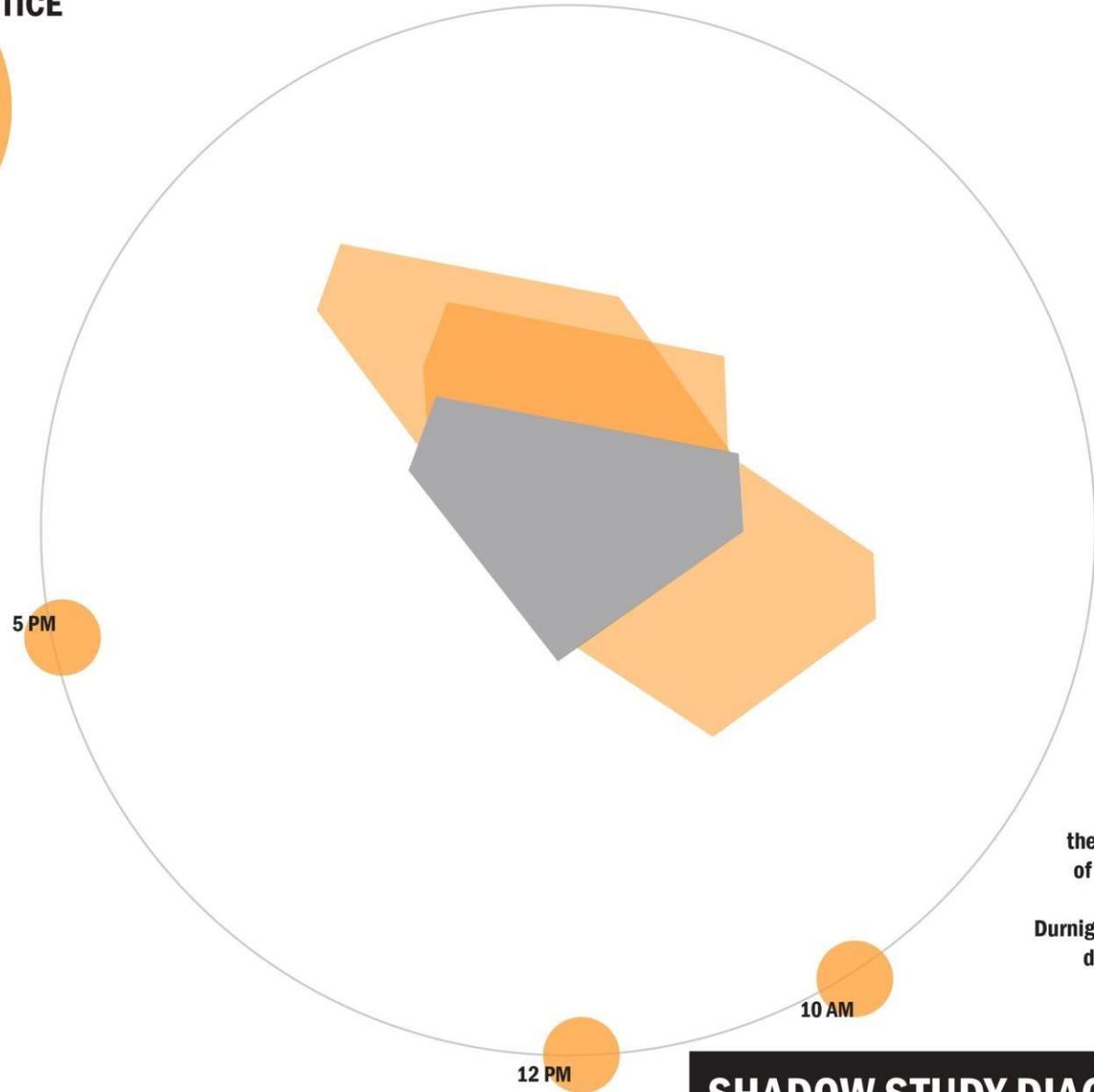
During winter months, the sun reaches its lowest altitude, the light pierces very deep in the building, the shading of the balconies is minimal and the intensity of the light is very low.

**SUNLIGHT STUDY IN SECTION**

# FINAL WORK

**SUMMER SOLSTICE**  
**21 JUNE 2021**

66° altitude



Three times of the day have been chosen in order to study the shadows created by the mass of the building depending on the position of the sun. During summer months, the altitude degree is high and therefore the shadows are smaller.

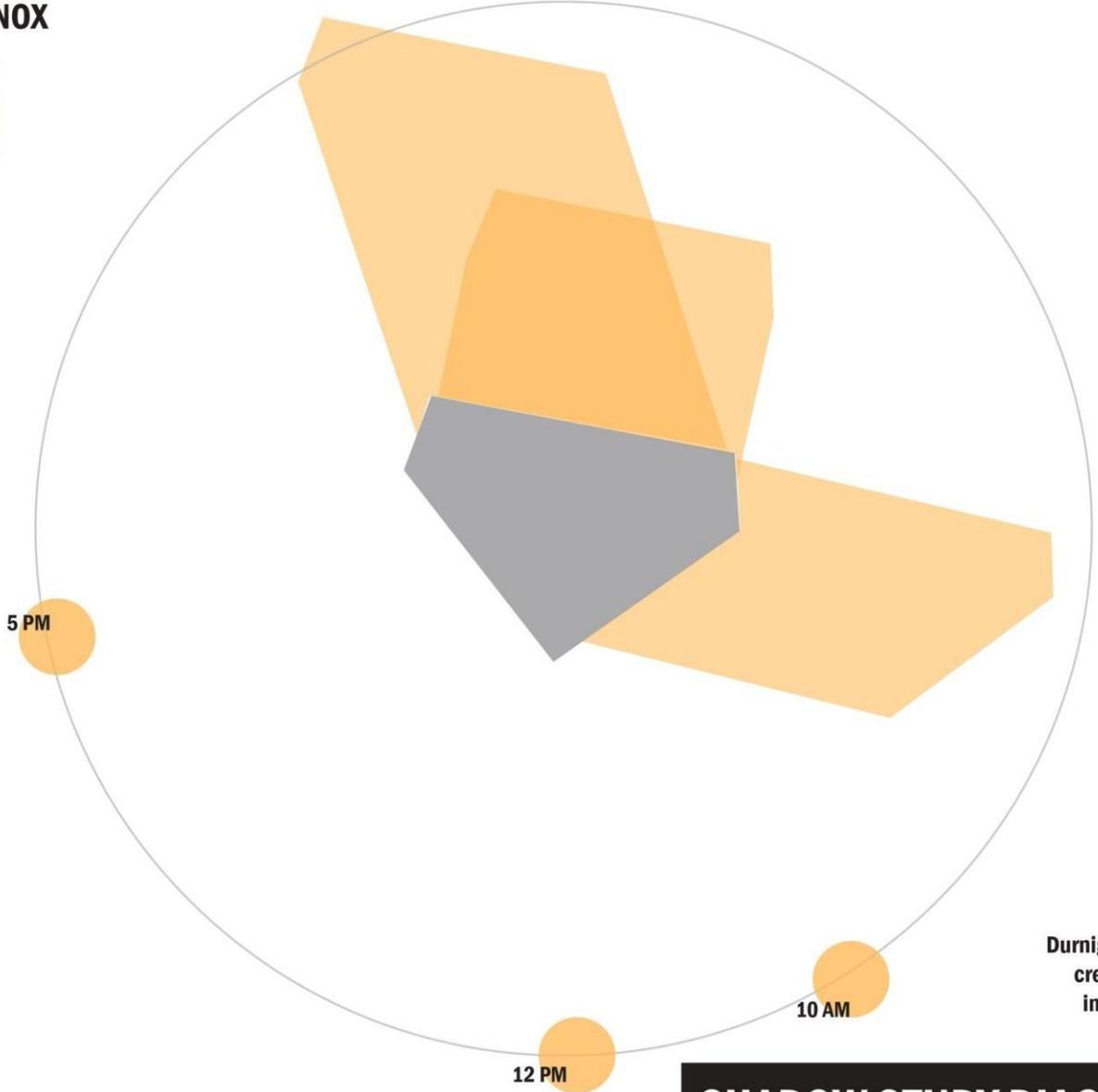
**SHADOW STUDY DIAGRAM**

# FINAL WORK

WORK DONE BY ME

**SPRING EQUINOX  
21 MARCH 2021**

**43° altitude**



Durnig spring months, the shadows created by the building increase in length due to the lower altitude sun angle.

## SHADOW STUDY DIAGRAM

# FINAL WORK

**WINTER SOLSTICE  
21 DECEMBER 2021**

**19° altitude**



**During winter months, the sun is very low and therefore, the building creates significantly longer shadows.**

**SHADOW STUDY DIAGRAM**

# FINAL WORK

In order to meet the operation energy standards of a medium and large-scale housing given by the LETI, the window area should be as following:

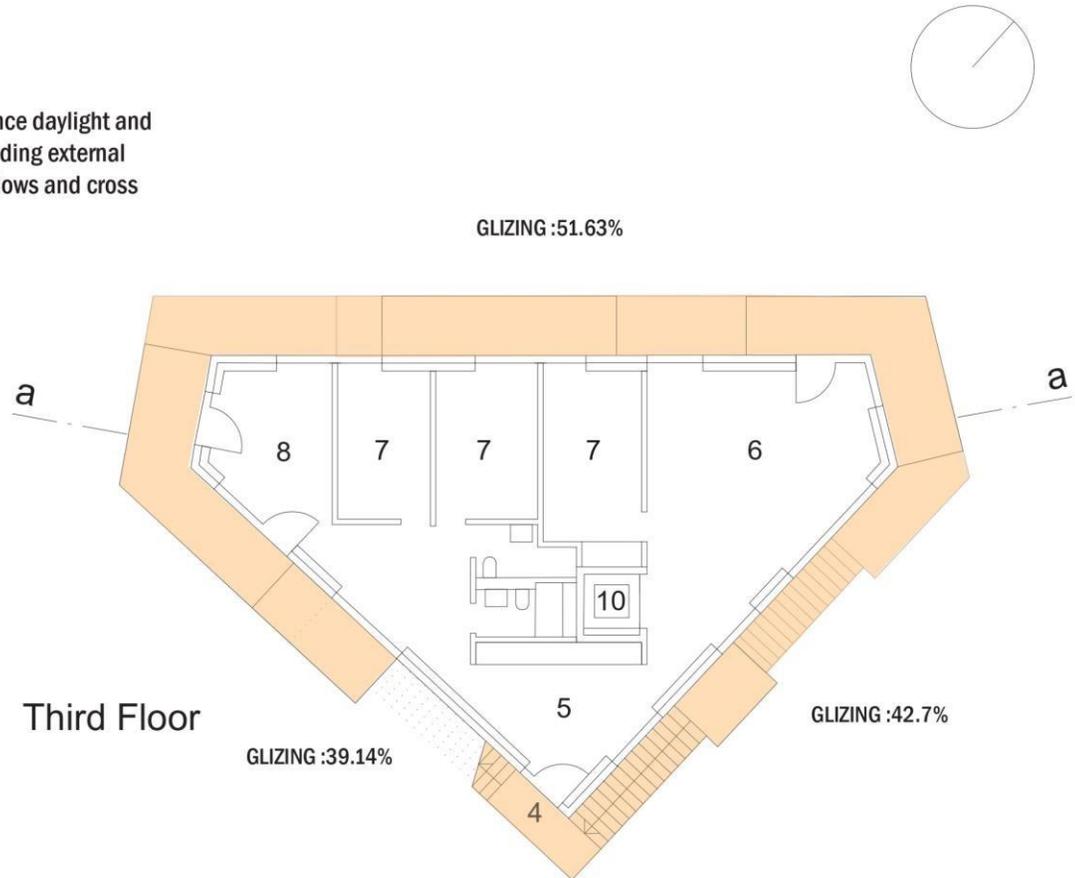
North: 10-20%

East: 10-15%

South: 20-25%

West: 10-15%

Additionally, it should balance daylight and overheating as well as including external shading and openable windows and cross ventilation.



- 1 Store
- 2 Laundry / Utilities
- 3 Bicycle storage
- 4 Entrance
- 5 Kitchen
- 6 Living room
- 7 Room
- 8 Office
- 9 Terrace
- 10 Elevator

This south-facing building has only one opening facing directly towards the north, The west façade, where the bedrooms and the office are located, has a total of 40,63 sqm while the area of the openings is of approximately 20.98 sqm (51.63% of the wall area). The glazing on the east facing façade represents an estimate of 42.7% and the glazing on the south facing side is of 39.14%.

The building counts with balconies, external staircases and landings that shade the other apartments underneath and also has sun screen awnings that can be regulated by the residents.

All apartments have openable windows, allowing proper ventilation.

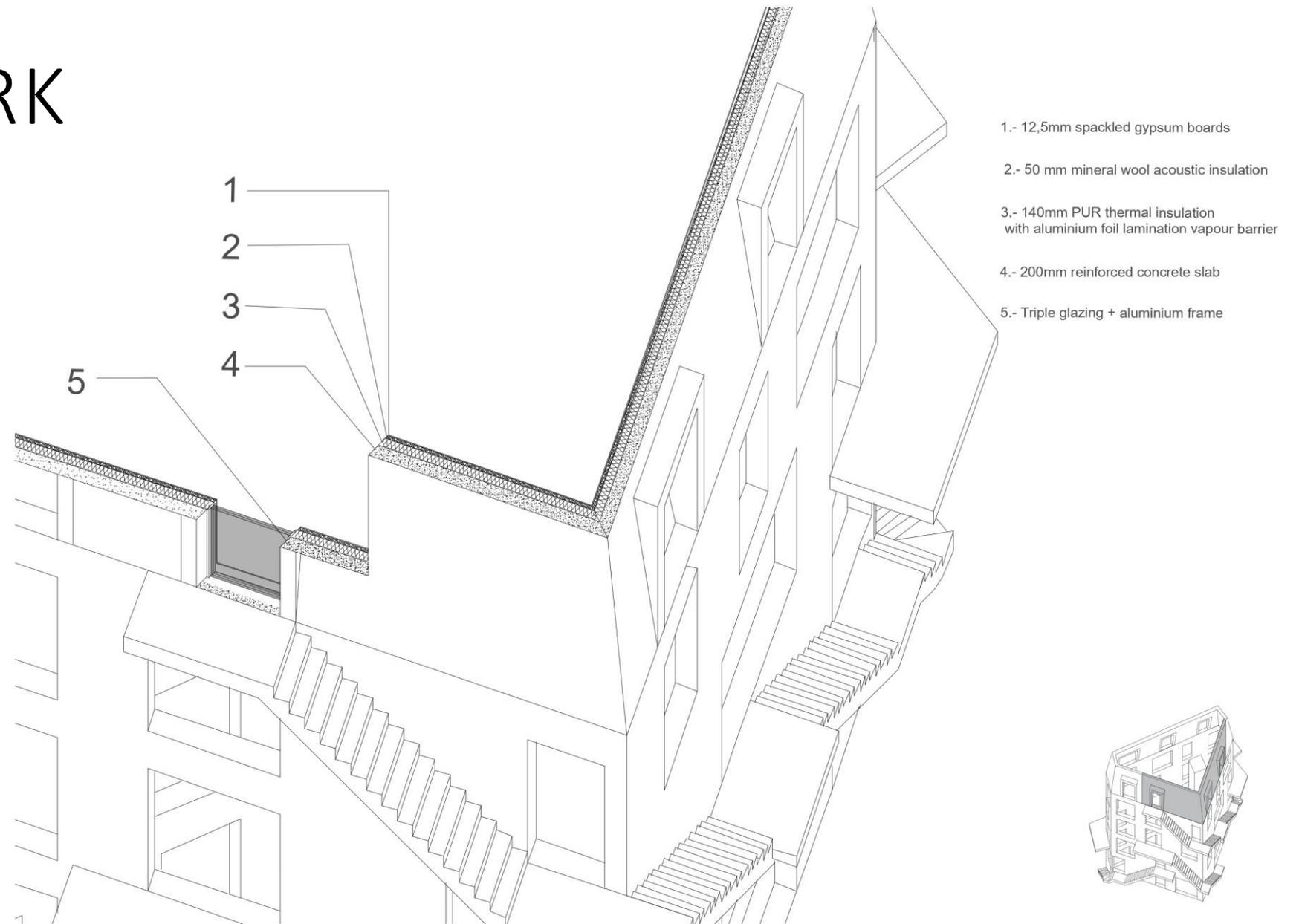
## LETI REGULATIONS COMPLIANCE

# FINAL WORK

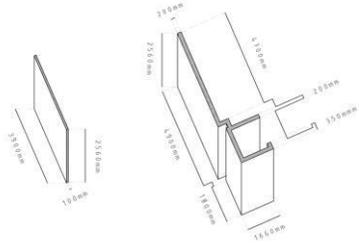
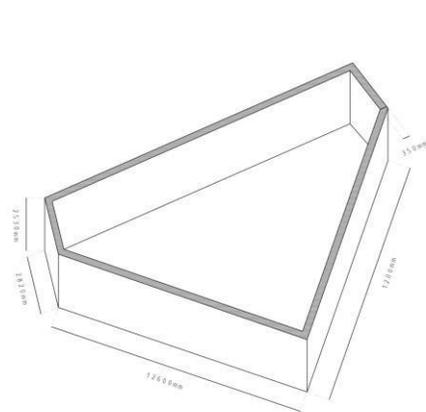


ADF expresses the illumination on an internal surface as a percentage of external illumination. Roughly, a well lit room has an ADF of 5% or more, while a gloomy room has an ADF of 2% or less. All the values in the building (3% being the lowest and 6.9% the highest) can be considered adequate in terms of daylight illumination, meaning that the amount of artificial lightning is reduced and so is the amount of energy used for artificially lightning the apartment.

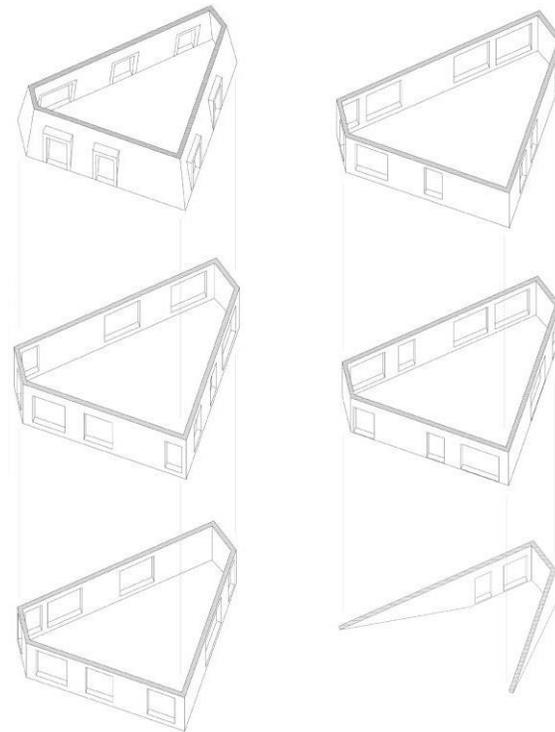
# FINAL WORK



# FINAL WORK

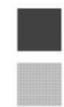
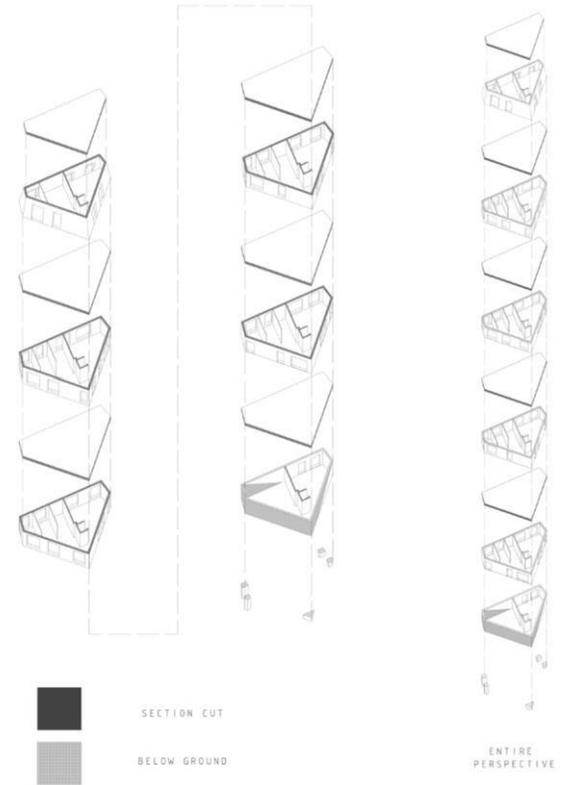


WALL DIMENSIONS



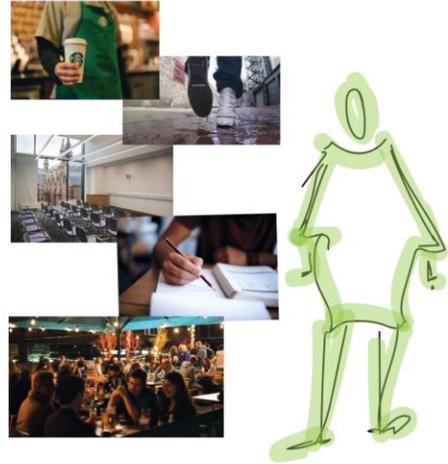
EXPLODED STRUCTURAL AXONOMETRIC  
CONCRETE SLAB STRUCTURE

AXONOMETRIC - CONCRETE STRUCTURE



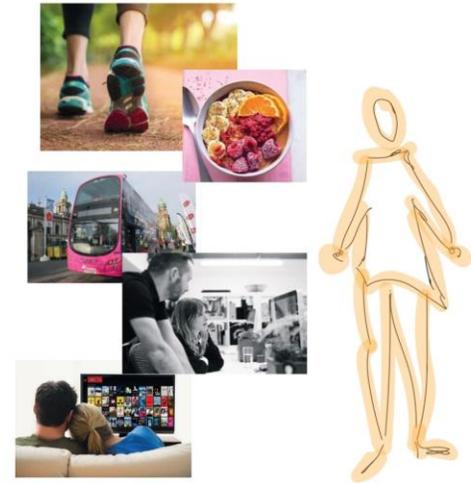
SECTION CUT  
BELOW GROUND

ENTIRE  
PERSPECTIVE



MARIO- 21

- Male
- Single
- Brazil
- Full time mechanical engineering student
- Needs a quiet space to study
- Likes to meet new people but sometimes struggles with the language and accents



LILY-23

- Female
- In a relationship
- From Finland but lives in NI since she was 10
- Is doing an internship in a design studio and works from 8am to 6pm
- Enjoys outdoors exercise and movie nights
- Shy at first but likes to make new friends



ROBIN-26

- Non binary
- Single
- Wales
- Started a new job as a kindergarten teacher
- A good book and a cup of coffee are a must to after an exhausting day at work
- Goes to the gym every afternoon
- Trying to make new friends in Belfast

# Imagining the potential user

As the designer of a housing project, I aim to create spaces that promote an atmosphere of community among the residents as well as **comfortable and efficient individual dwellings** and pursuing a smooth integration of the intervention in the exterior city scale. To achieve this, I will approach the **circulation as a dual space**, where stairs and hallways are carefully designed and scaled so they invite people to stay and socialize with their neighbours. Moreover, the shared facilities such as kitchens and living rooms perform as **interaction points among flatmates**. **Greenery and opened air spaces** are also to be incorporated as they can accommodate larger gatherings and recreational activities can take place. Regarding the building's connection to the city, I imagine an **'open air gym'** that can be used by the residents as well as other citizens. The design targets residents from pluricultural background, around their early twenties that are looking for a rich social environment with comfortable dwellings in a very convenient location.



# FINAL WORK WEEK 13



GROUND FLOOR plan in site  
1:200  
Mikaela Arroyo

# FINAL WORK WEEK 13



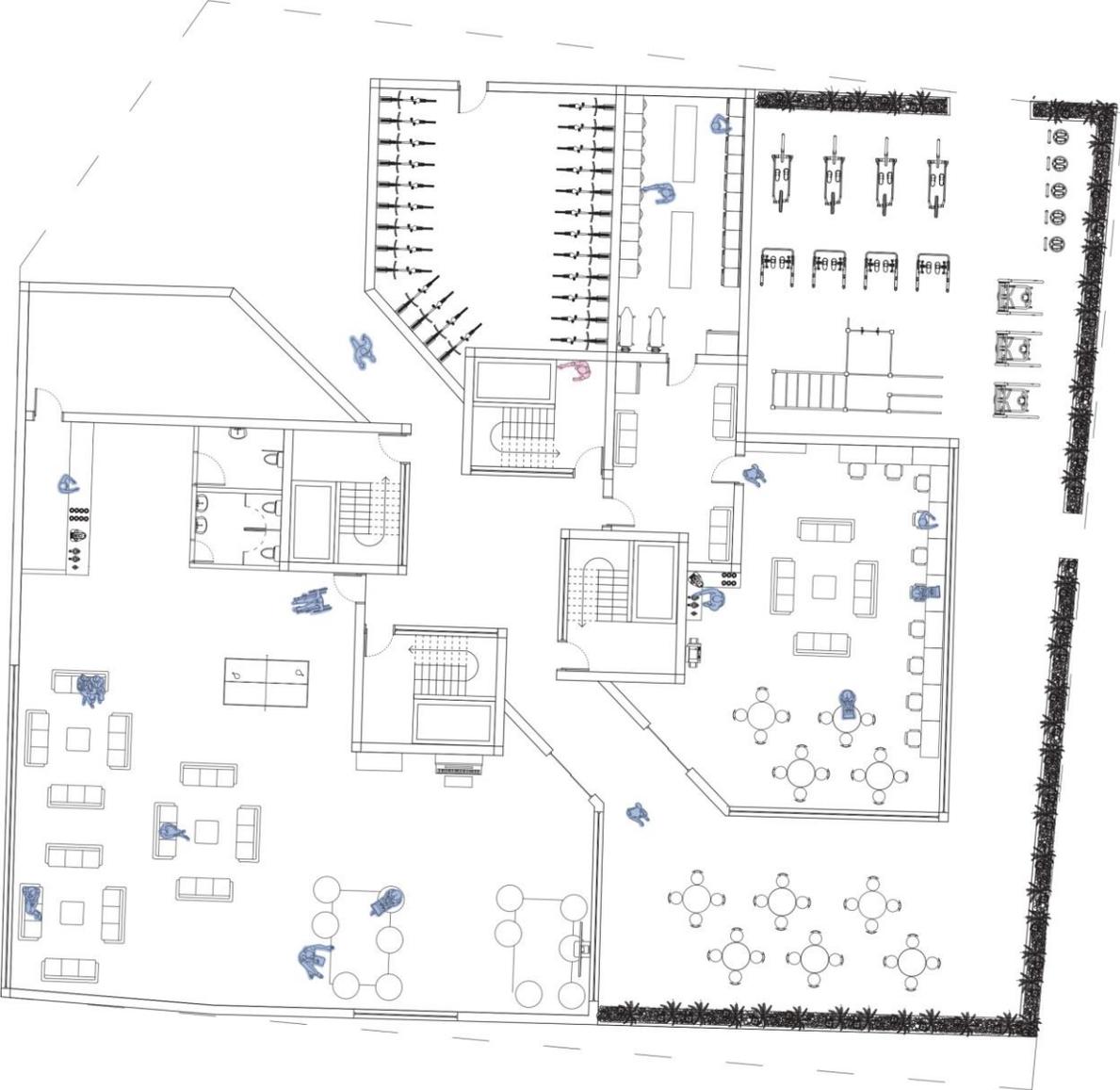
TYPICAL plan in site  
1:200  
Mikaela Arroyo

# FINAL WORK WEEK 13



ROOFTOP plan in site  
1:200  
Mikaela Arroyo

# FINAL WORK WEEK 13



GROUND FLOOR plan  
1:100  
Mikaela Arroyo



# FINAL WORK WEEK 13



TYPICAL DWELLINGS plan  
1:100  
Mikaela Arroyo



# FINAL WORK WEEK 13

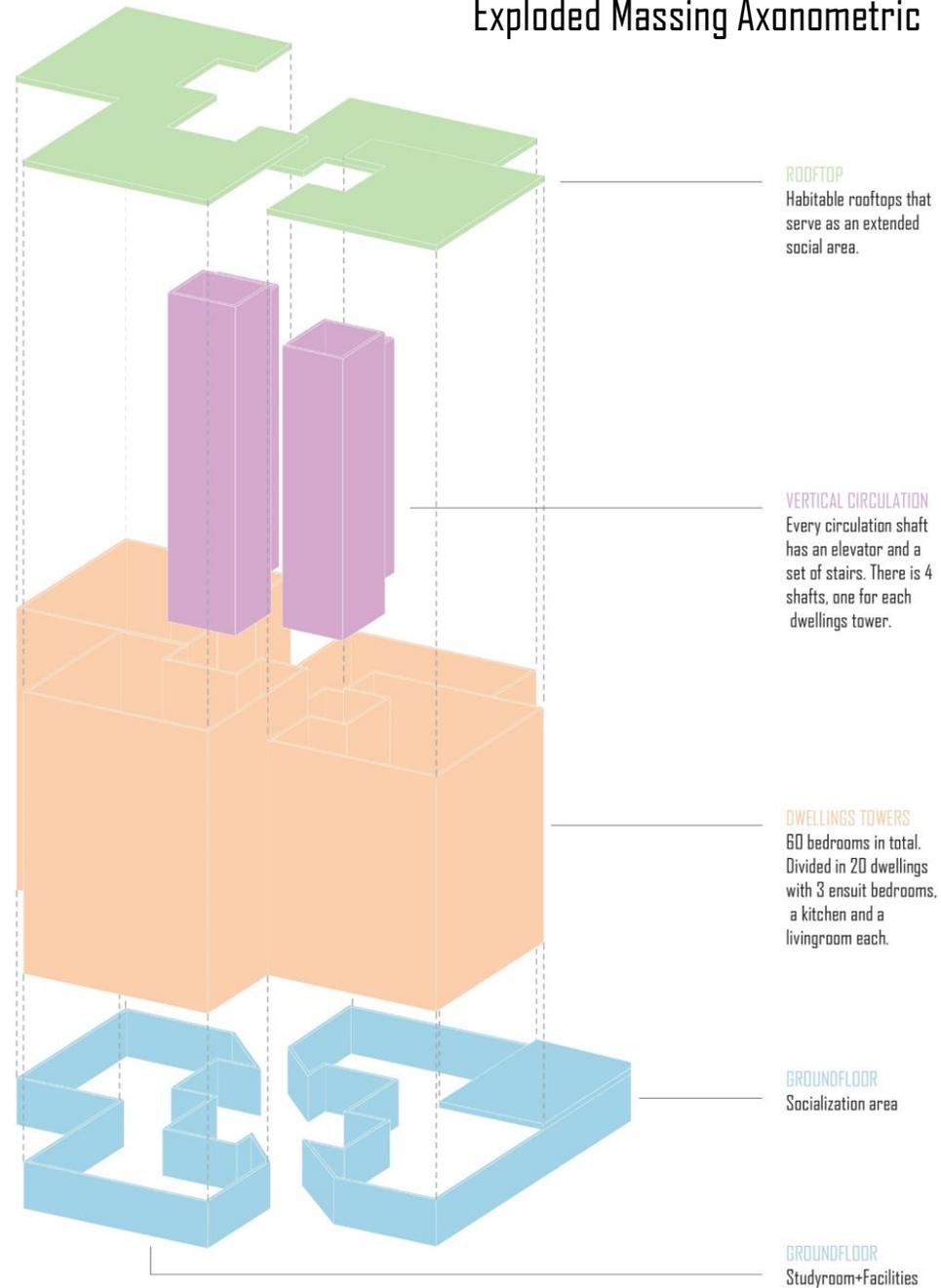


ROOFTOP plan  
1:100  
Mikaela Arroyo



# FINAL WORK WEEK 13

## Exploded Massing Axonometric



# FINAL WORK WEEK 13



ELEVATION Botanic Avenue  
1200  
Mikaelo Arroyo

# FINAL WORK WEEK 13



SECTION Botanic Avenue  
1.200  
Mikaela Arroyo



# FINAL WORK WEEK 13



# FINAL WORK WEEK 13



SECTION Donegall Pass  
1/200  
Mikaela Arroyo



# FINAL WORK

WEEK 13



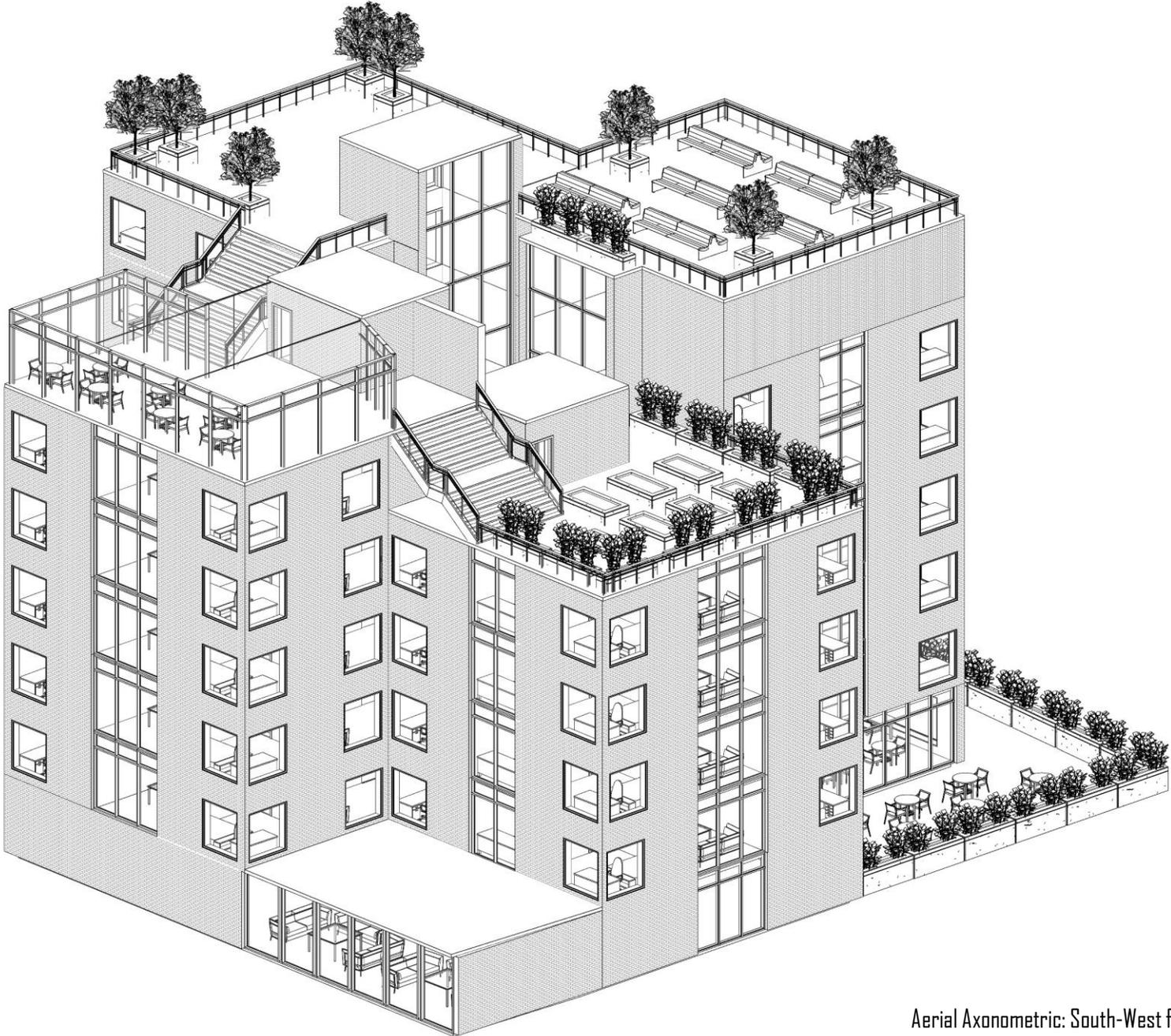
Aerial View Including The Surroundings

# FINAL WORK WEEK 13



Street View

# FINAL WORK WEEK 13



Aerial Axonometric: South-West facade

# FINAL WORK

WEEK 13



Aerial Axonometric: West-North

# FINAL WORK WEEK 13



Axonometric: Main entrance approach

# USAGE OF OUTDOORS COMMUNAL SPACE AND SUSTAINABILITY

## FINAL WORK WEEK 13

ROOFTOP GARDEN



This does not only maximise the usage of the building's footprint by creating communal outdoors space, but the trees and planting can help to convert CO2 emissions and produce oxygen. Decreasing greenhouse emissions in urban areas and improving the air quality. Moreover, the creation of communal urban crops, can potentially lead to a sustainable source of vegetables and herbs.

OUTDOORS GYM



This space is destined for an outdoors gym that aims to reinforce the interaction of the building with the public realm, allowing people who are not residents of the building to make use of the space as well. Moreover, there is no energy required to function the machines, since they are designed to be powered by the body weight of the user.

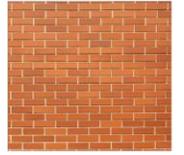


CONCRETE POTS



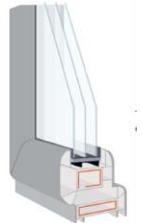
the residue of the concrete floors, can be used to create the pots.

RED BRICK AND MORTAR



This material's choice responds to the surroundings, so the building can better blend in the site and transmit a sense of belonging but with a contemporary twist. Additionally, it can be locally sourced and the CO2 emission due transport, is significantly reduced.

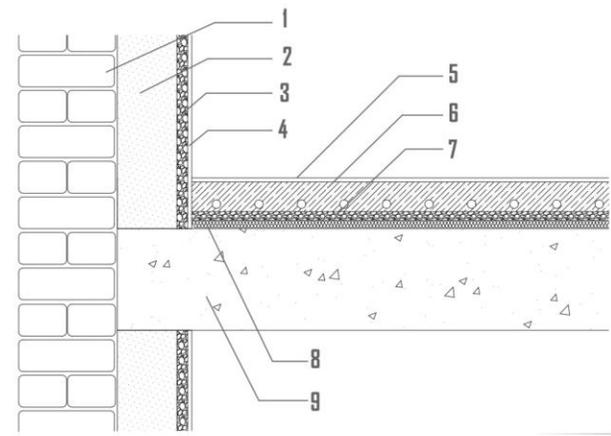
TRIPLE GLAZED WINDOWS WITH ALUMINIUM FRAME



Due to the location of the site (Botanic Avenue and Donegall Pass) the noise levels reach 80 dB per minute around mid day, which is a potential hazard. Triple glazing can deliver a reduction factor of up to 54dB, providing a more comfortable and a healthy living environment.

In terms of insulation and energy efficiency, triple glazing offers a heat loss U-value of 0.8, which is a significant reduction in comparison to double or single glazed windows, increasing the energy savings by a 15%.

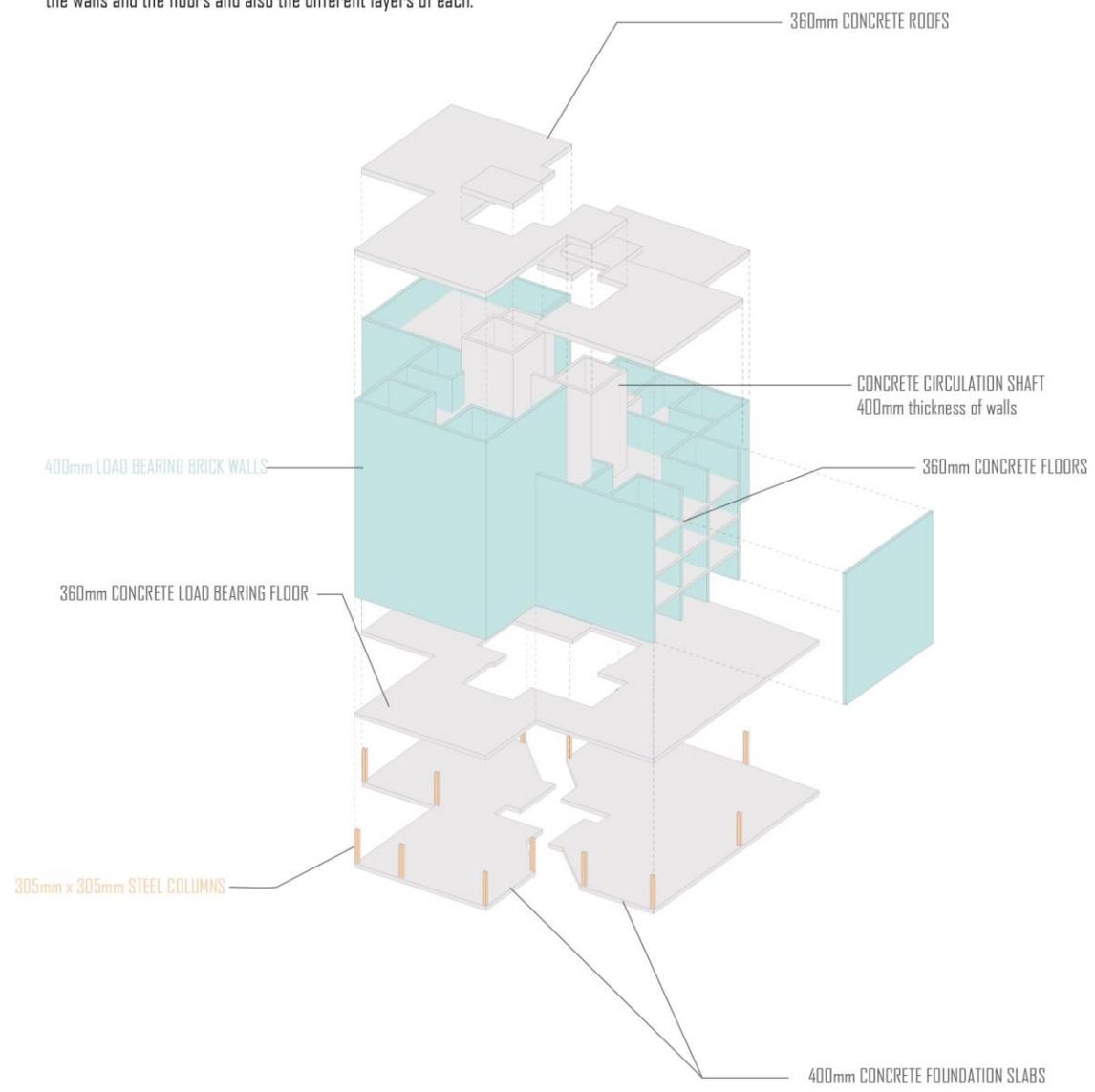
# STRUCTURAL STABILITY



Detail Drawing of how the floor and the walls join

- KEY:
- 1.- Loadbearing red brick ( Dimensions: 225mm x 112.5mm x 75mm)
  - 2.- PUR thermal insulation with aluminium foil lamination vapour barrier (140mm)
  - 3.- Mineral wool acoustic insulation (25mm)
  - 4.- Gypsum finishing board (10mm)
  - 5.- Floor finishing (10mm)
  - 6.- Underfloor heating (70mm)
  - 7.- Mineral wool acoustic insulation (20mm)
  - 8.- PUR thermal insulation (20mm)
  - 9.- 240mm reinforced concrete slab

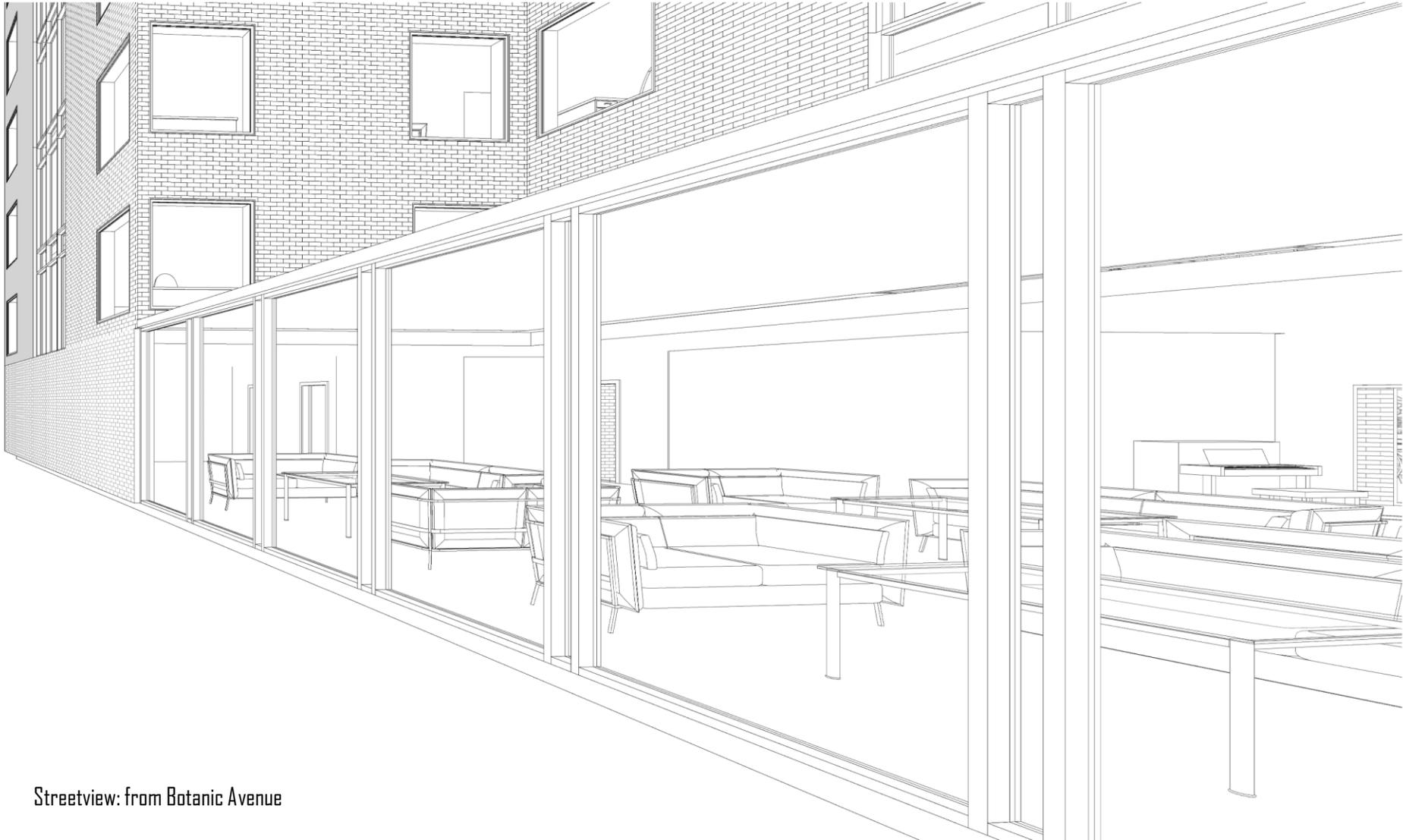
This exploded axonometric drawing aims to represent the different elements of the primary structure of the design proposal. Additionally, a detailed drawing has been created to show the interaction between the walls and the floors and also the different layers of each.



# FINAL WORK WEEK 13

# FINAL WORK

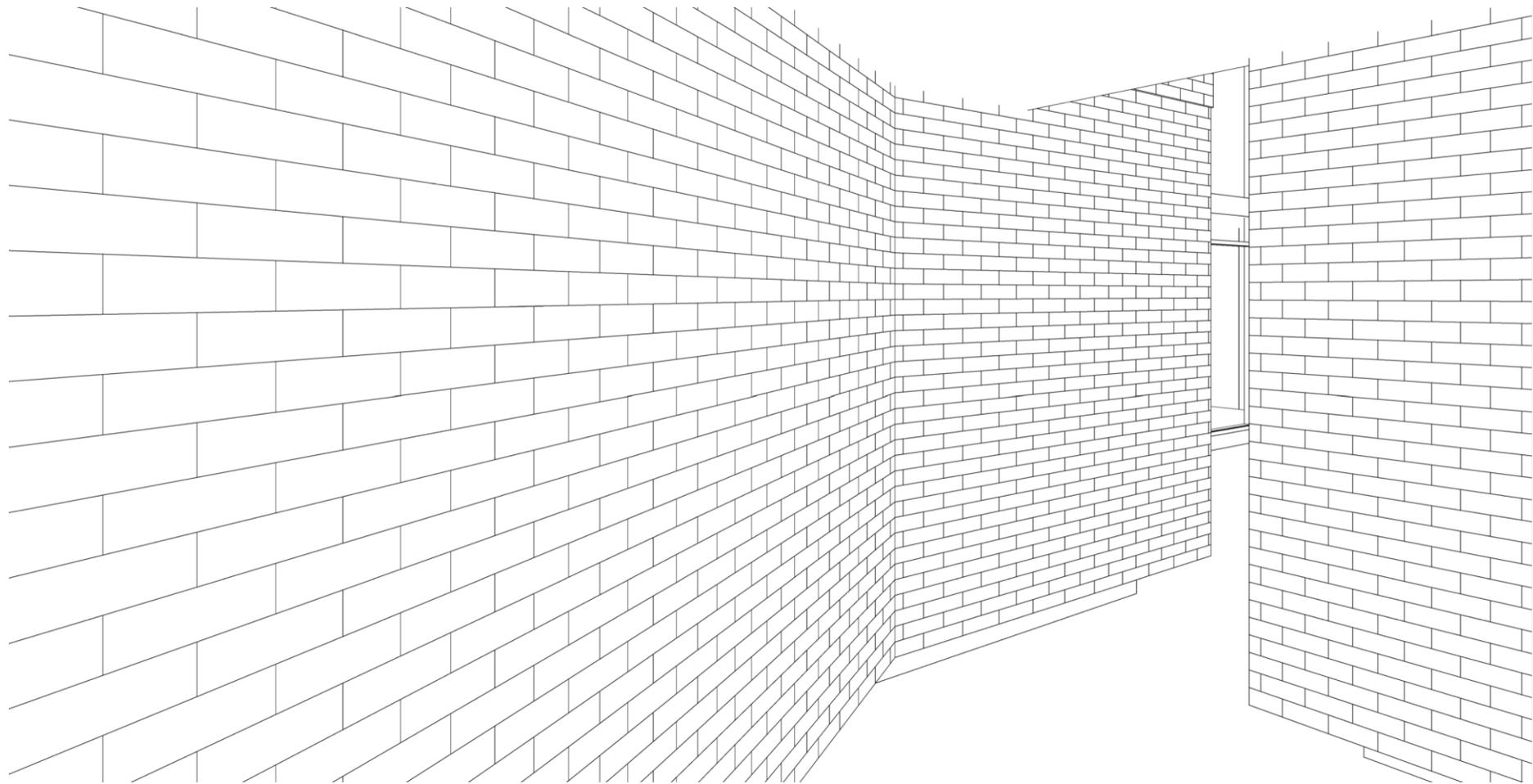
WEEK 13



Streetview: from Botanic Avenue

# FINAL WORK

WEEK 13



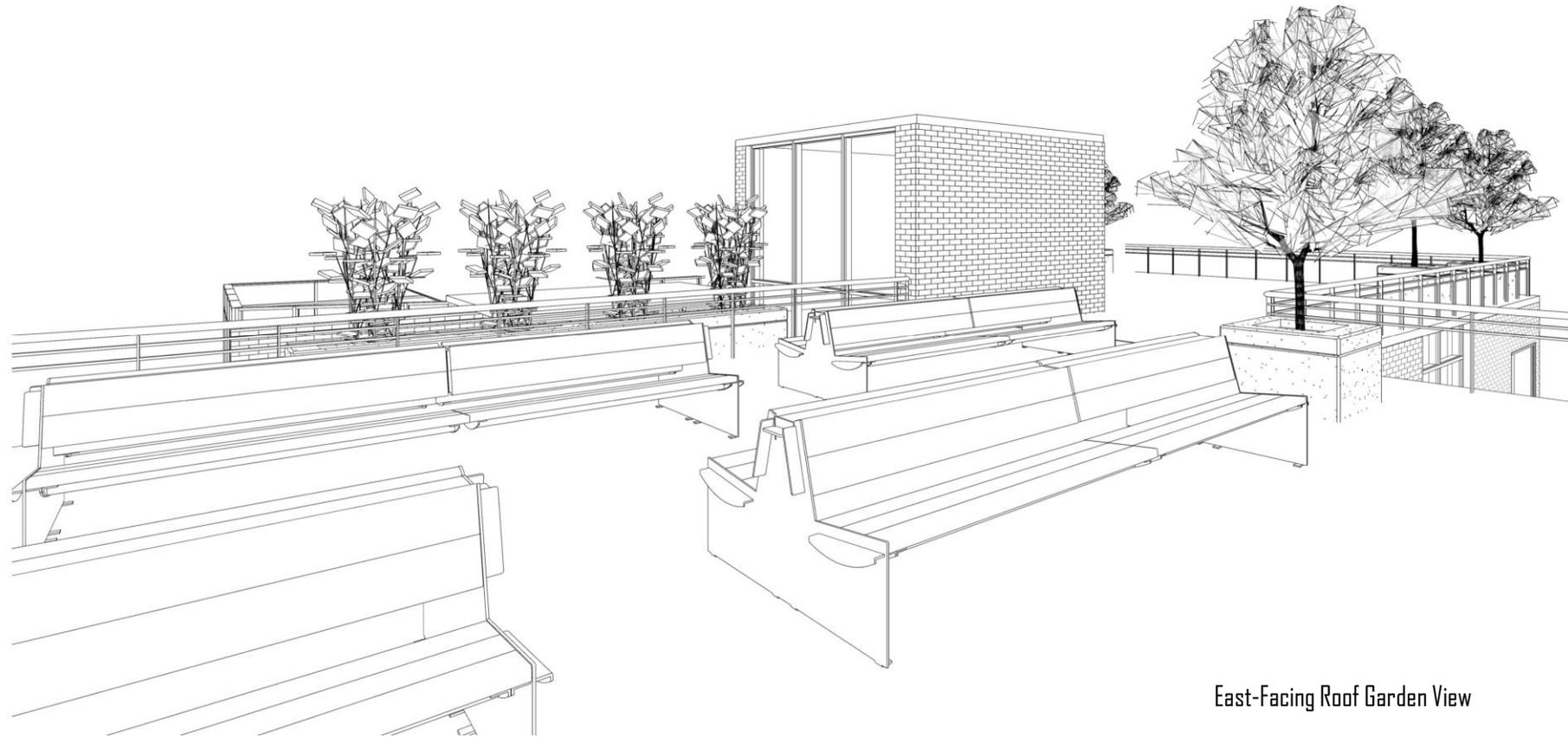
Main Entrance View

# FINAL WORK WEEK 13



South-facing Sitting Area View

# FINAL WORK WEEK 13

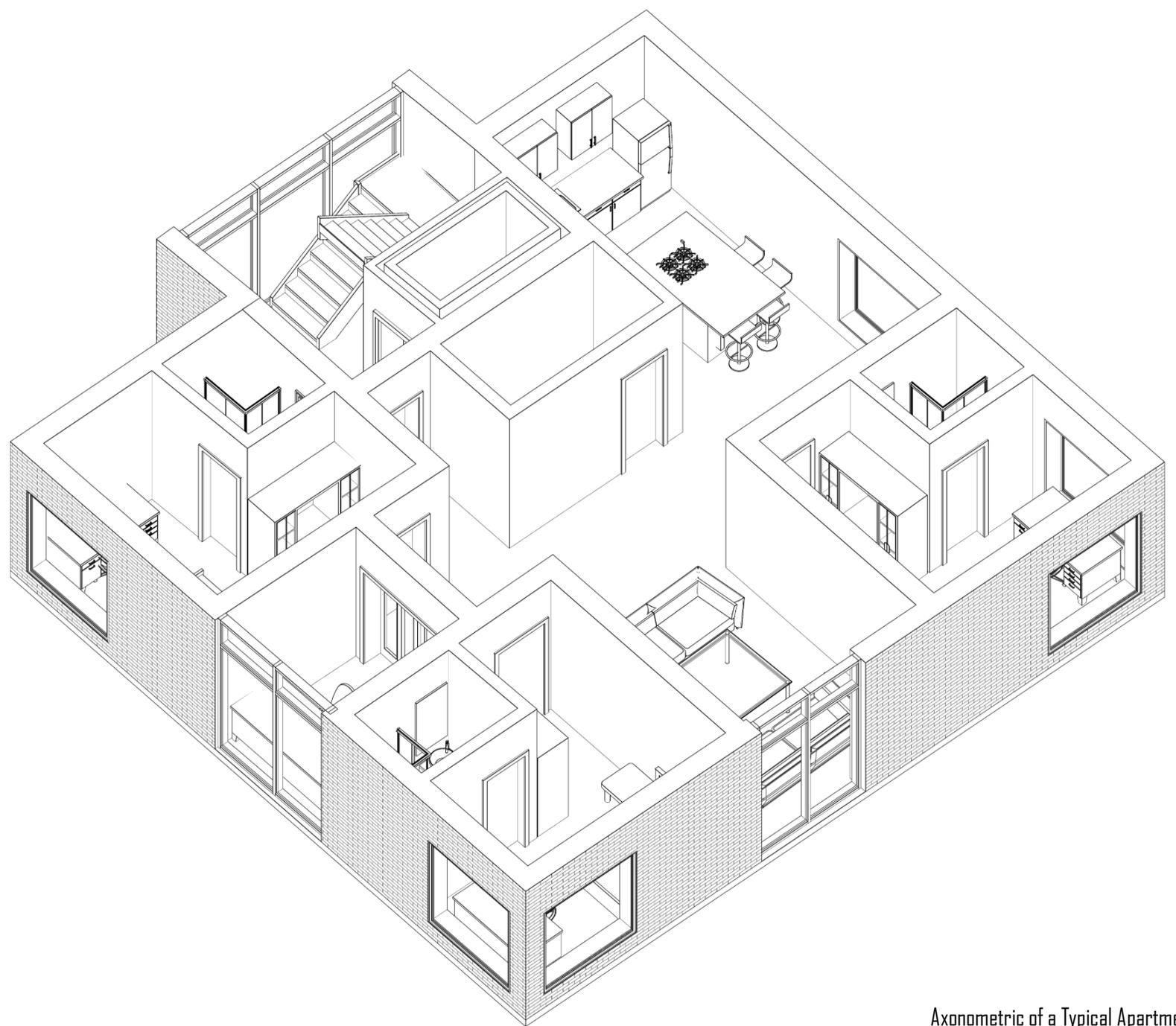


East-Facing Roof Garden View

# FINAL WORK WEEK 13

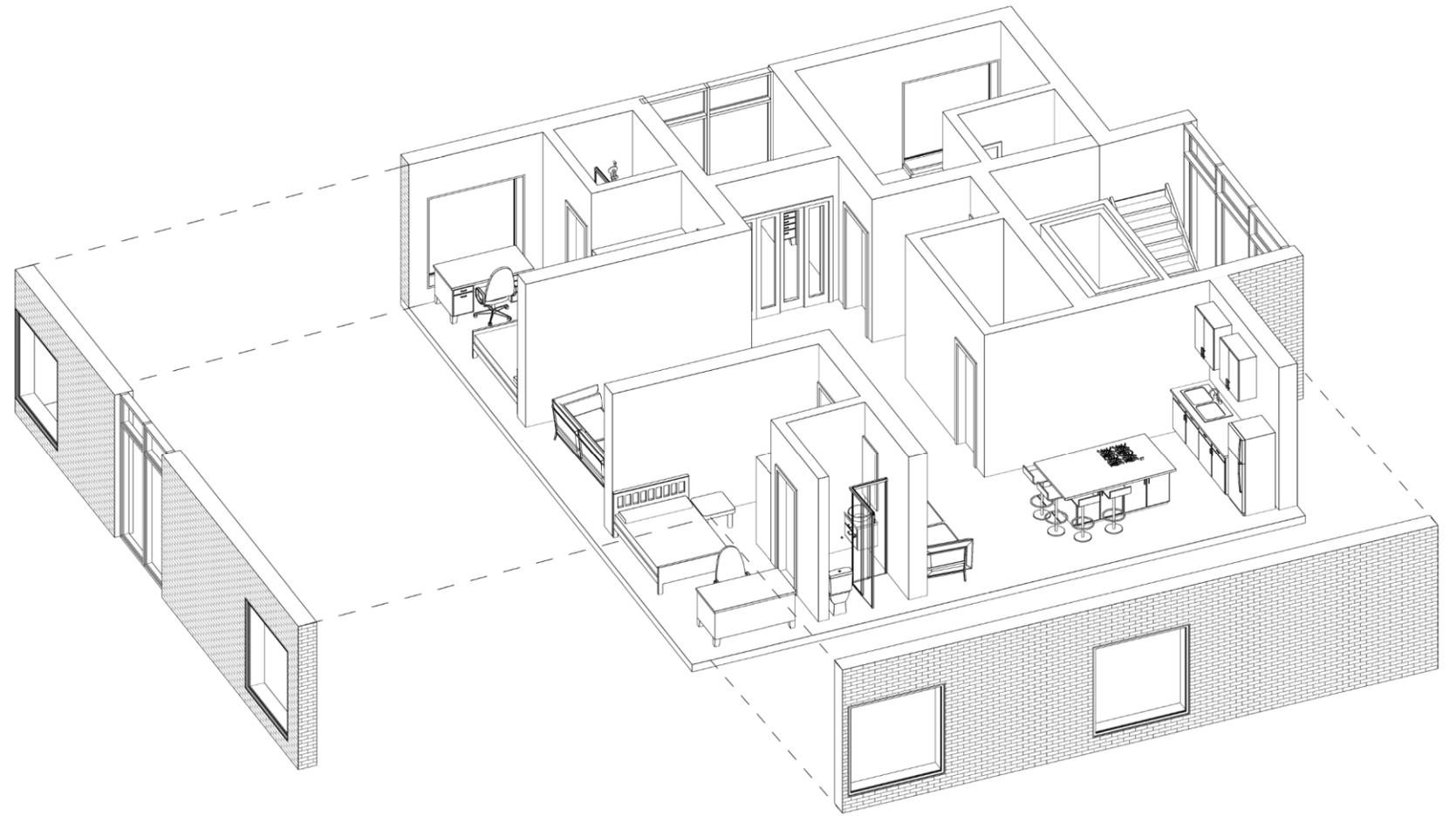


# FINAL WORK WEEK 13



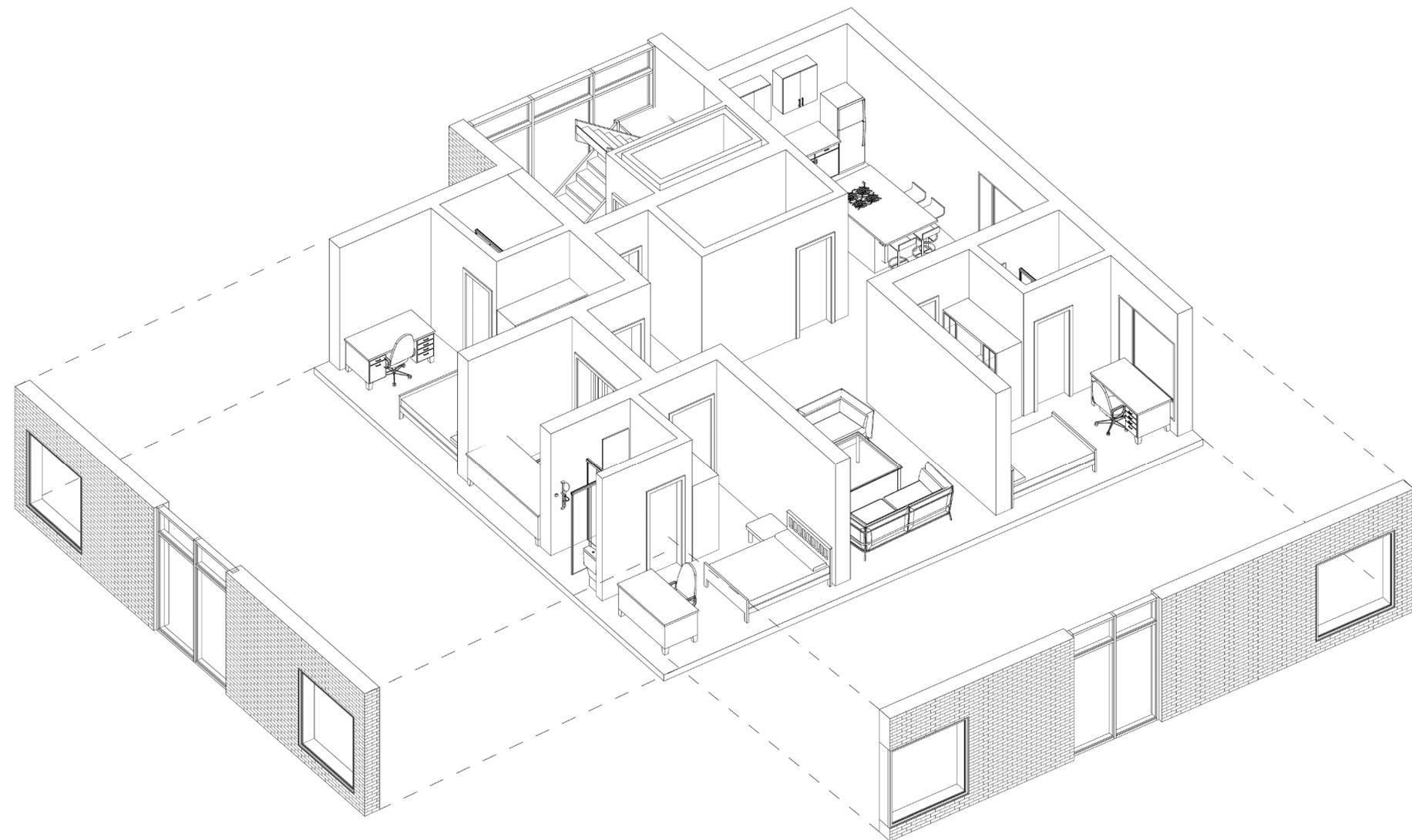
Axonometric of a Typical Apartment

# FINAL WORK WEEK 13



Exploded Axonometric of a Typical Apartment:

# FINAL WORK WEEK 13



Exploded Axonometric of a Typical Apartment:

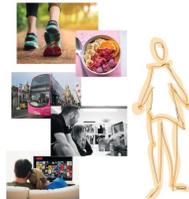
# WEEKLY PROGRESS

# WORK IN PROGRESS



MARIO- 21

- Male
- Single
- Broad
- Full time mechanical engineering student
- Needs a quiet space to study
- Likes to meet new people but sometimes struggles with the language and accents



LILY-23

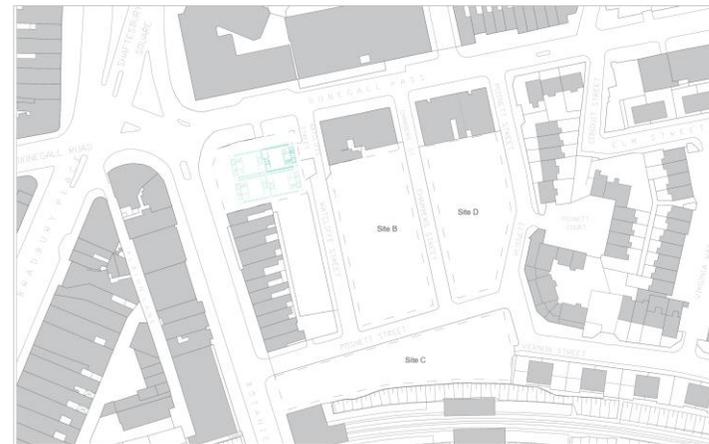
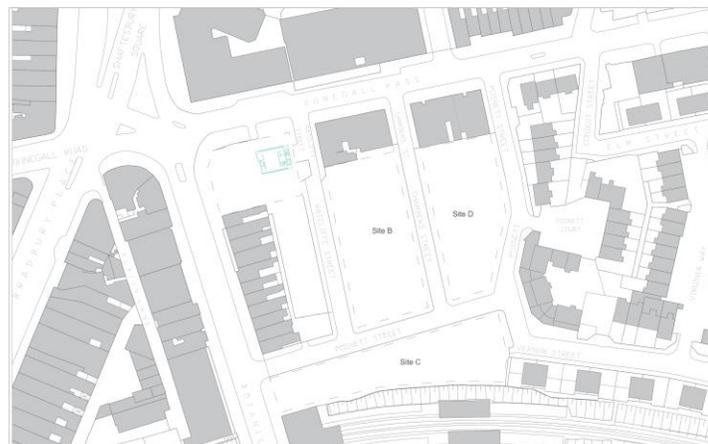
- Female
- In a relationship
- From Finland but lives in NI since she was 10
- Is doing an internship in a design studio and works from 9am to 6pm
- Enjoys outdoors exercise and movie nights
- Shy at first but likes to make new friends



ROBIN-26

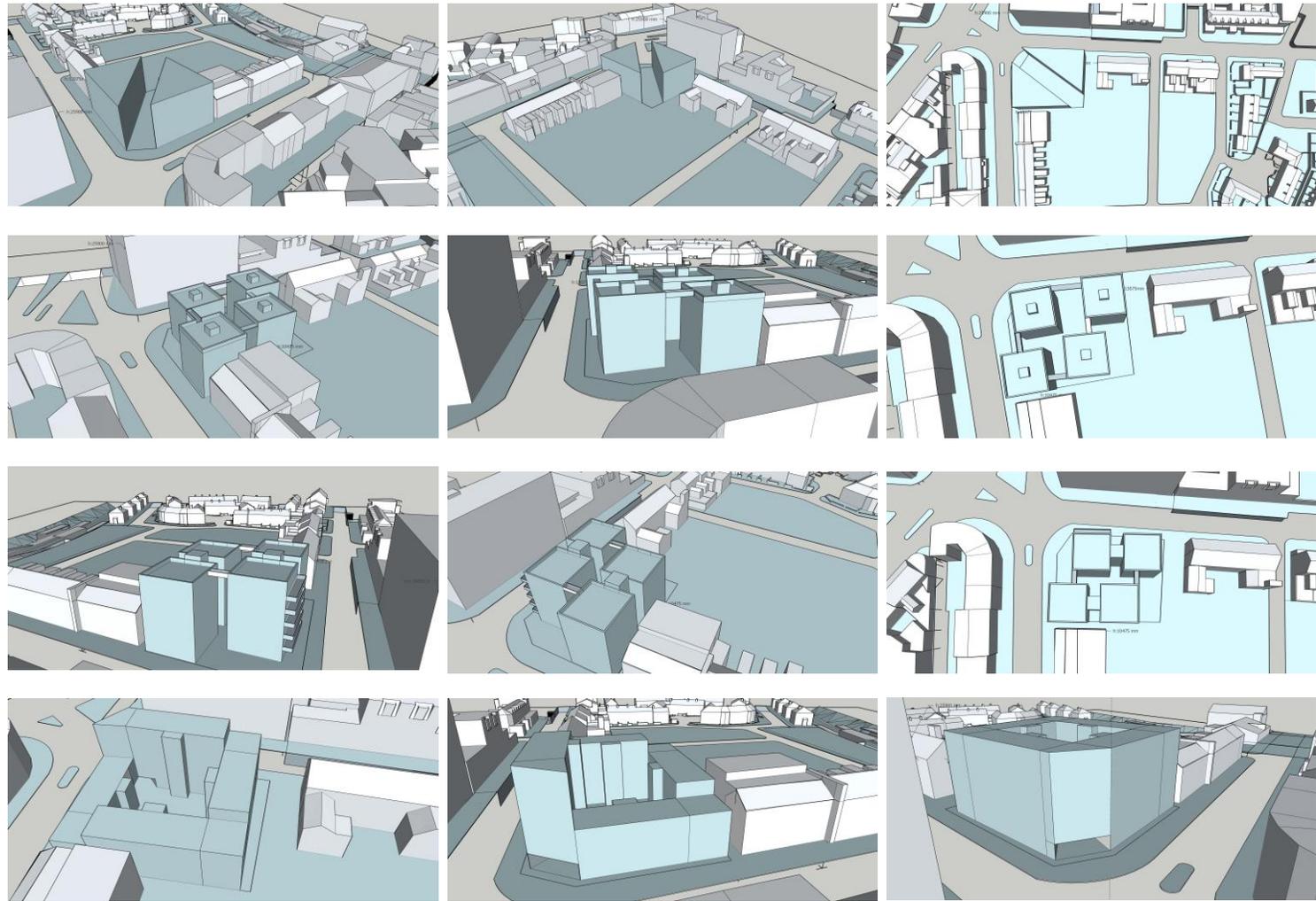
- Non binary
- Single
- Wides
- Started a new job as a kindergarten teacher
- A good book and a cup of coffee are a must to after an exhausting day at work
- Goes to the gym every afternoon
- Trying to make new friends in Belfast

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# WEEK 5

# WORK IN PROGRESS



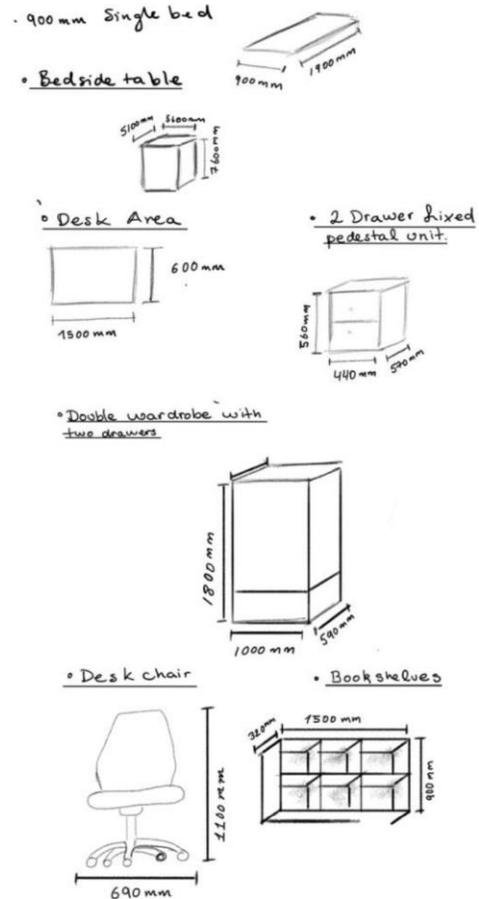
**Handwritten notes and diagrams:**

- Top diagram:** A site plan showing building footprints and courtyards. Annotations include "Courtyard (existing)", "New building", and "Existing building".
- Second diagram:** A floor plan with annotations: "Aerial view", "Existing building", "New building", "Courtyard", "Ramp", "Staircase", "Elevator", "Mechanical room", "Storage room", "Bicycle parking", "Garage", "Office", "Retail", "Residential", "Public space", "Green space", "Water feature", "Furniture", "Lighting", "Security", "Accessibility", "Sustainability", "Energy efficiency", "Water conservation", "Air quality", "Acoustic", "Thermal", "Lighting", "Ventilation", "Humidity", "Temperature", "Sound", "Vibration", "Electromagnetic interference", "Radio frequency interference", "Power quality", "Surge protection", "Grounding", "Lightning protection", "Fire protection", "Security", "Access control", "Monitoring", "Maintenance", "Operations", "Management", "Governance", "Compliance", "Risk management", "Insurance", "Liability", "Disaster recovery", "Business continuity", "Information security", "Data protection", "Privacy", "Ethics", "Social responsibility", "Environmental impact", "Community engagement", "Stakeholder management", "Communication", "Marketing", "Sales", "Customer service", "Employee relations", "Labor relations", "Union relations", "Government relations", "Media relations", "Investor relations", "Analyst relations", "Rating agencies", "Credit rating", "Debt rating", "Equity rating", "ESG rating", "Sustainability rating", "Green building certification", "LEED certification", "BREEAM certification", "Green Star certification", "Green Mark certification", "Green Building Index certification", "Green Building Council certification", "Green Building Institute certification", "Green Building Research Institute certification", "Green Building Research Institute of Australia certification", "Green Building Research Institute of Canada certification", "Green Building Research Institute of China certification", "Green Building Research Institute of India certification", "Green Building Research Institute of Japan certification", "Green Building Research Institute of Korea certification", "Green Building Research Institute of Mexico certification", "Green Building Research Institute of Middle East certification", "Green Building Research Institute of North America certification", "Green Building Research Institute of Oceania certification", "Green Building Research Institute of South America certification", "Green Building Research Institute of Europe certification", "Green Building Research Institute of Africa certification", "Green Building Research Institute of Asia certification", "Green Building Research Institute of Australia certification", "Green Building Research Institute of Canada certification", "Green Building Research Institute of China certification", "Green Building Research Institute of India certification", "Green Building Research Institute of Japan certification", "Green Building Research Institute of Korea certification", "Green Building Research Institute of Mexico certification", "Green Building Research Institute of Middle East certification", "Green Building Research Institute of North America certification", "Green Building Research Institute of Oceania certification", "Green Building Research Institute of South America certification", "Green Building Research Institute of Europe certification", "Green Building Research Institute of Africa certification", "Green Building Research Institute of Asia certification".
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# WEEK 6

# WORK IN PROGRESS

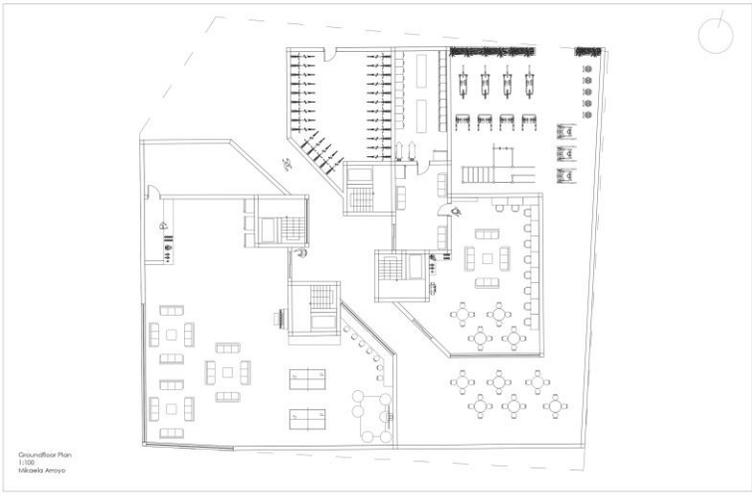
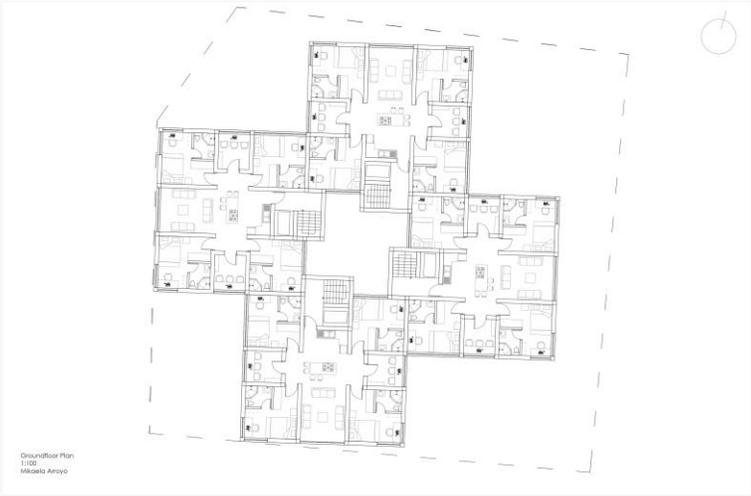
Study of precedent student accommodation arrangements and massing of elements.



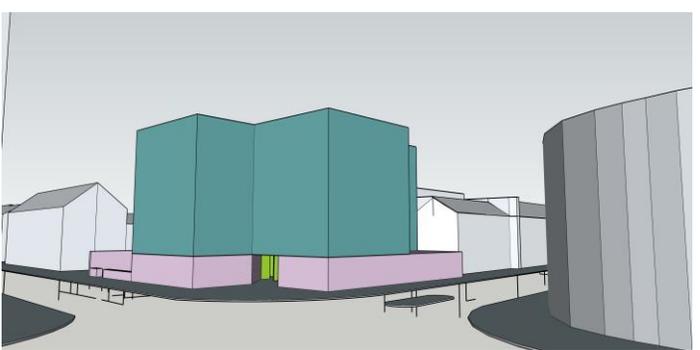
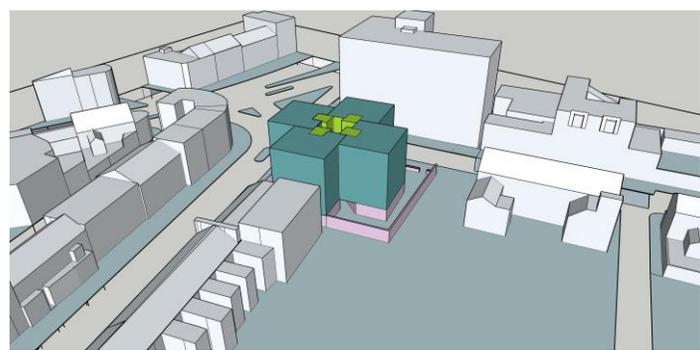
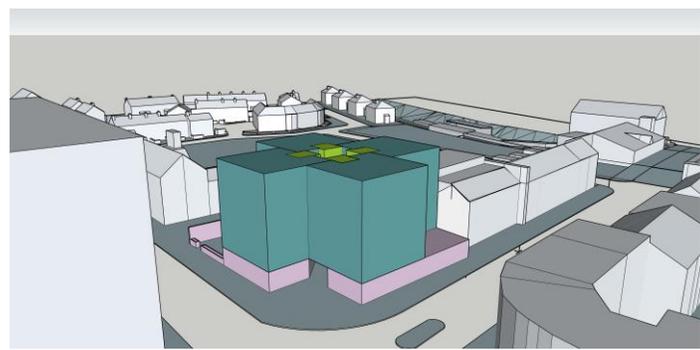
Staircase layout – Balliol College Oxford, MJP Architects



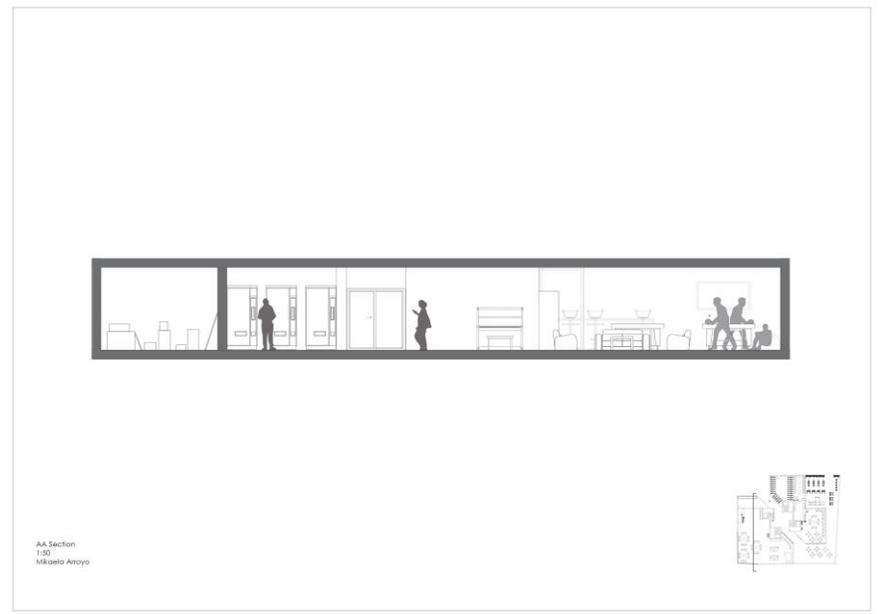
# WORK IN PROGRESS



# WORK IN PROGRESS

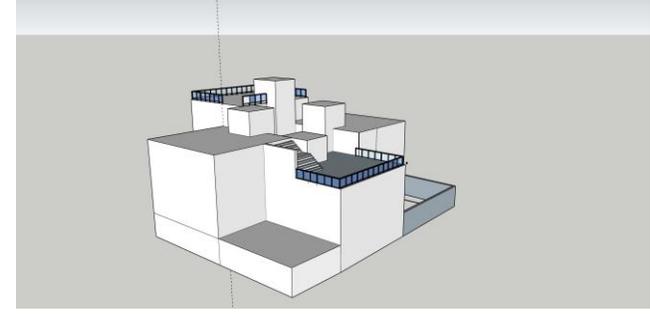
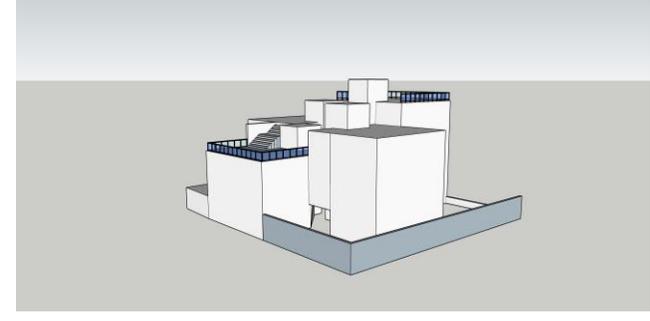
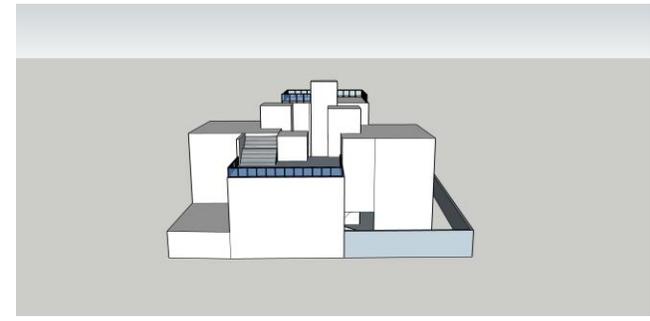
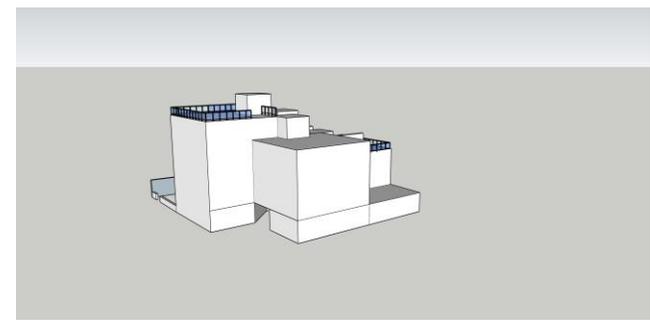


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Mikaela Arroyo

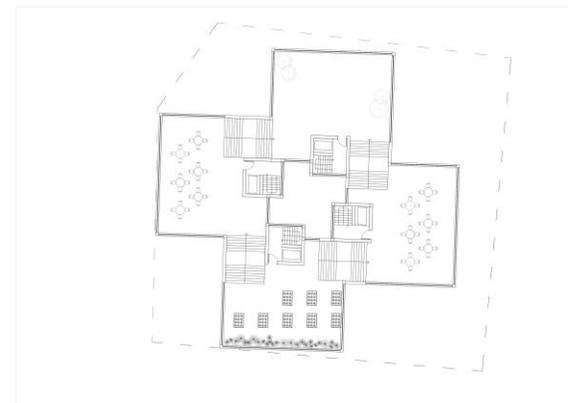
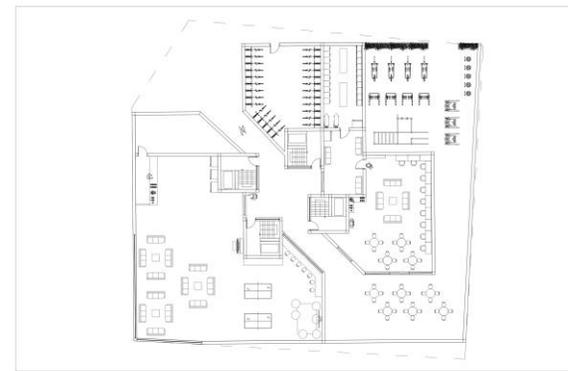
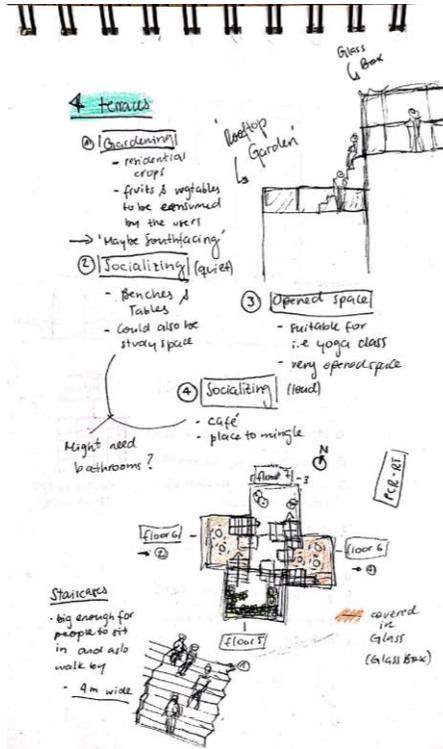


AA Section  
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Mikaela Arroyo

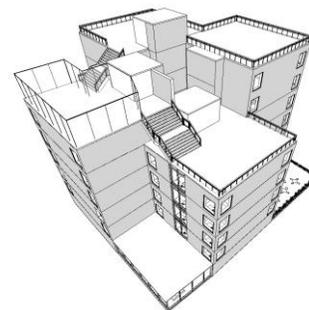
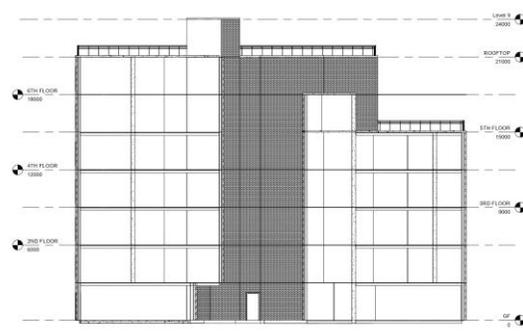
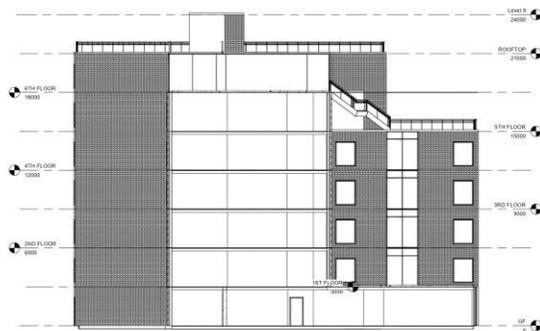
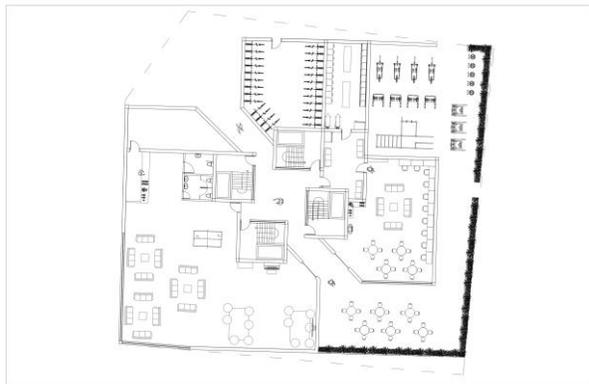
WORK IN PROGRESS



WEEK 9



# WORK IN PROGRESS



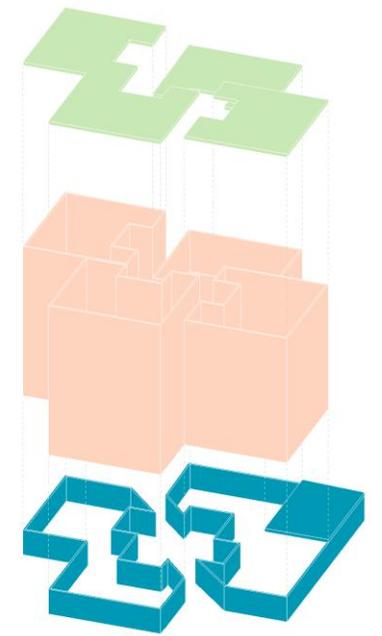
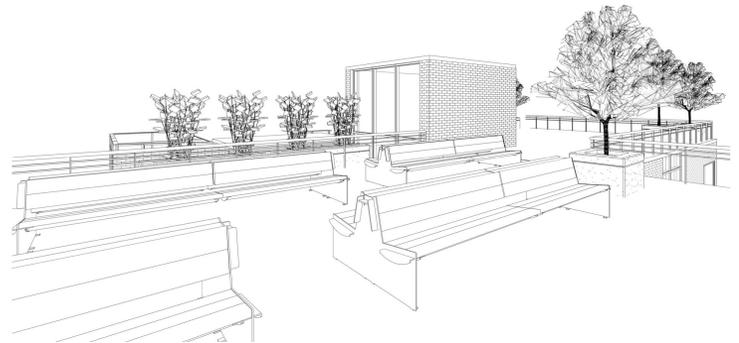
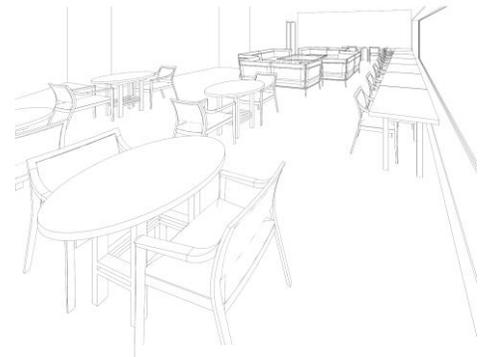
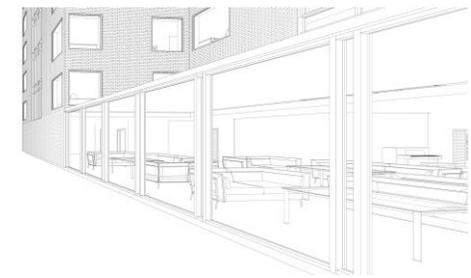
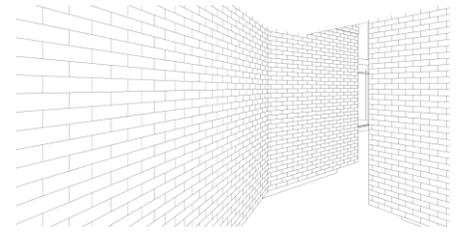
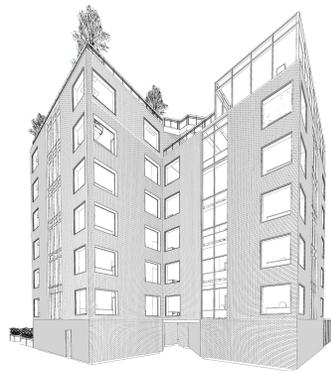
# WEEK 10

# WORK IN PROGRESS

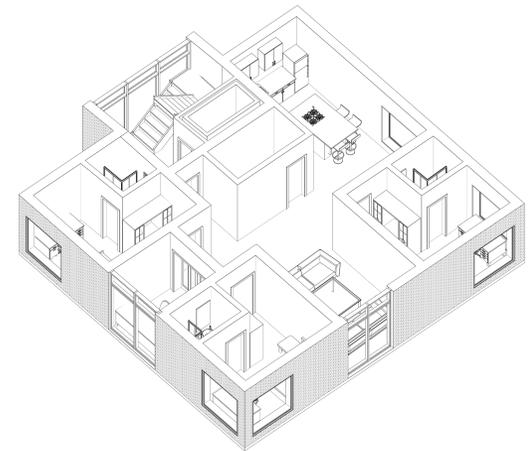
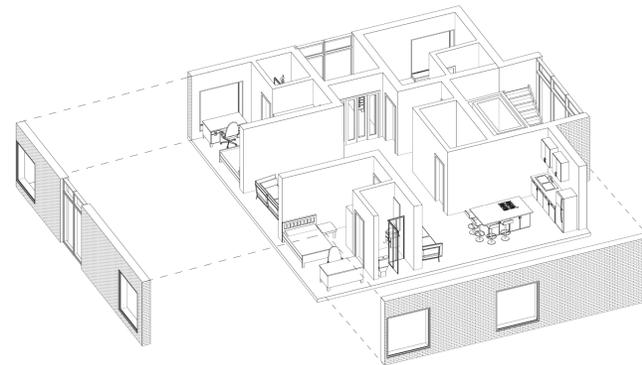
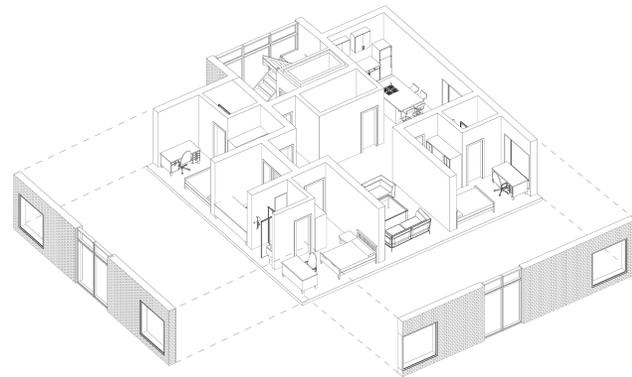


# WEEK 11 FINAL REVIEW

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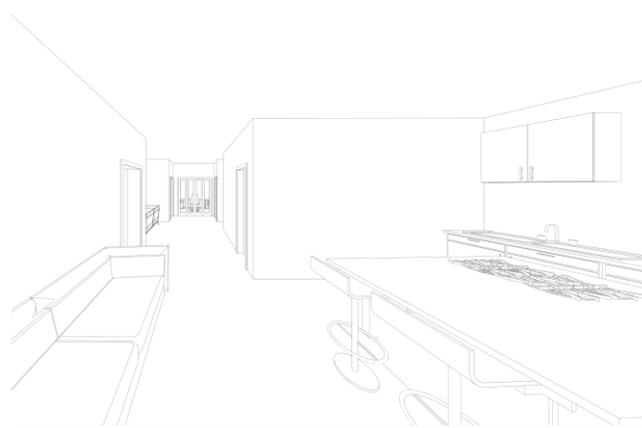


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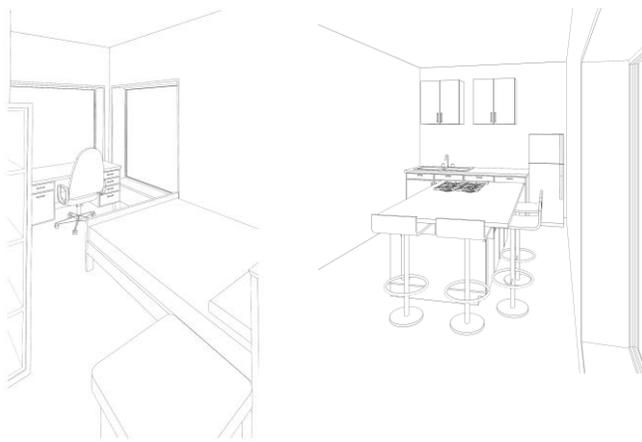
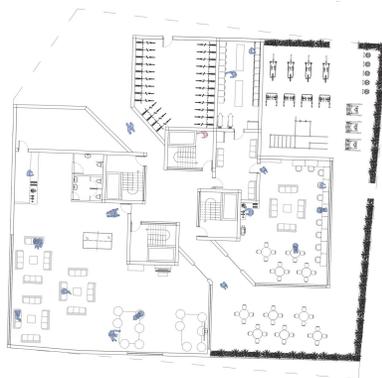


WEEK 12

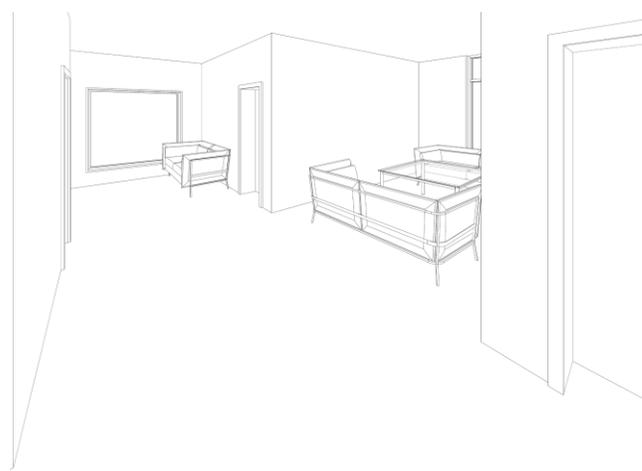
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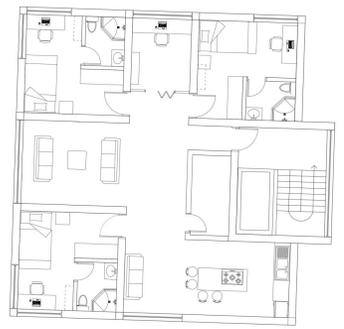
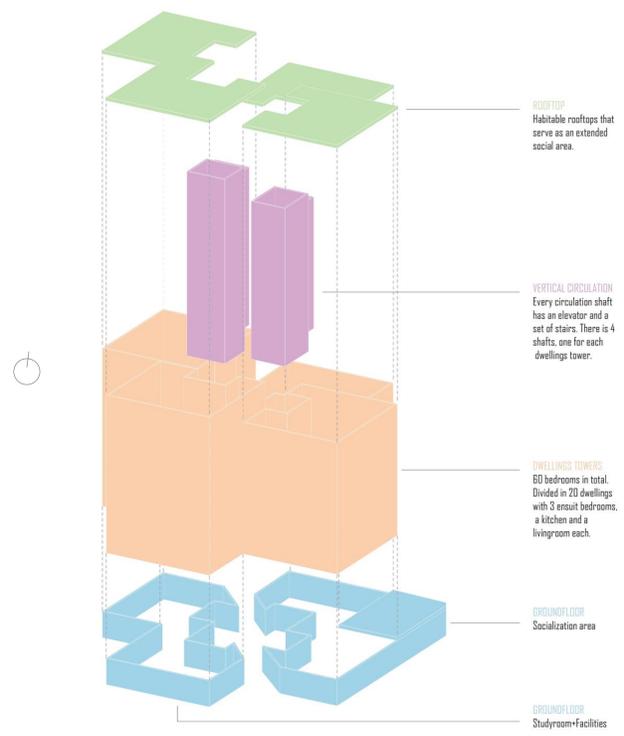
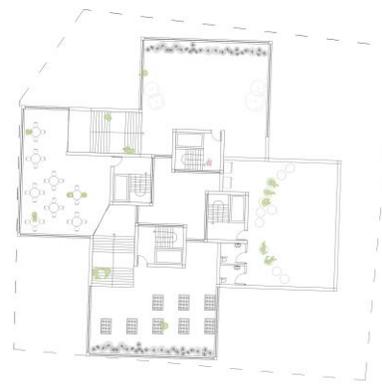
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Marta Araya



SECOND FLOOR  
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Marta Araya



SECOND FLOOR  
1:50  
Marta Araya



# WEEK 12

# SKETCHES, LECTURE NOTES AND ROUGH WORK

P3

04

INDIVIDUAL WORK

A recompilation of sketches that sum up my design process, lecture notes that shaped my project and rough work that synthesizes the ideas that were brought forward in the final designs.



*P3 Final Work*

# P3

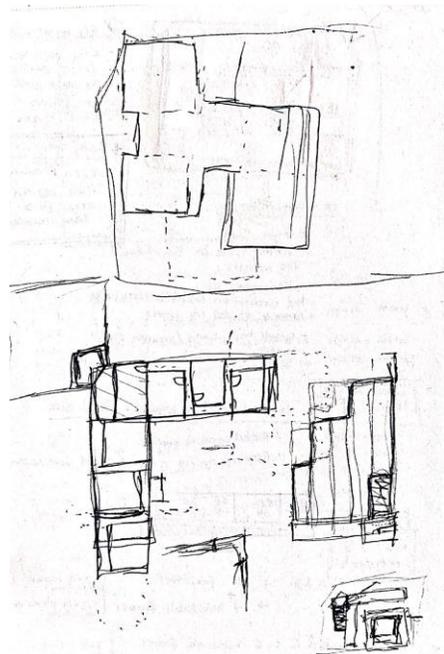
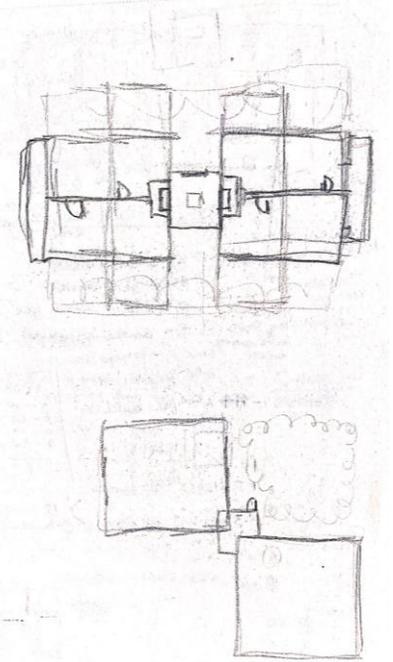
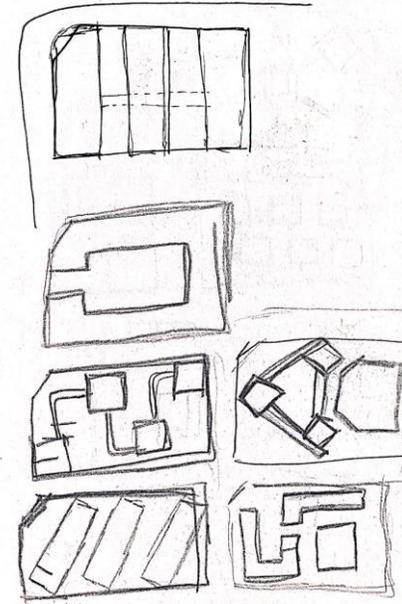
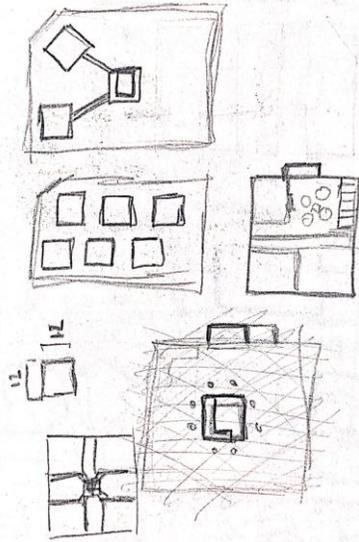
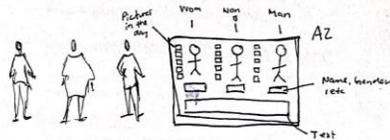
## P3 - TEXT

### 1. Housing Interest

- security / privacy
- communal areas (mum)
- communal areas (3-4)
- shared areas:
  - kitchen
  - living room
  - energy storage
  - roof
- private areas: bathroom/shower (?)
- study space
- activity - recreation space
- bike storage

### PRINCIPLES

- comfort
- affordable
- pluricultural and inclusivity
- safety & security
- interaction
- sustainability



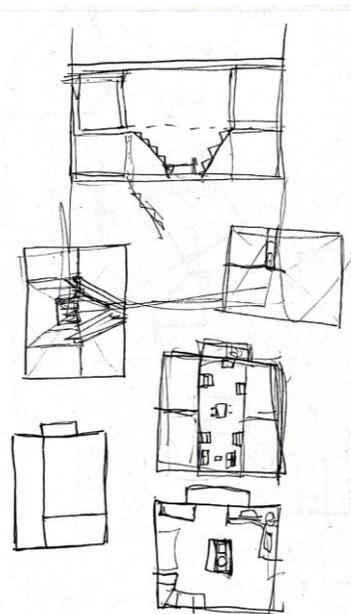
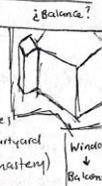
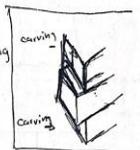
## → TUTORIALS ←

\* Anthony's sketches

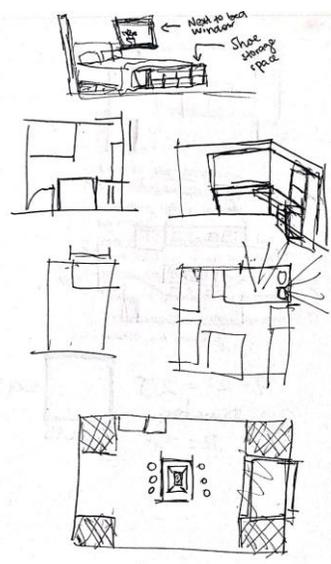
(note: approx 32x32)

WEEK 6

- Colour diagrams showing different scales
- Thresholds
- Views of the building from the street (drawing)
- Impactful corner!
- Groundfloor is very important
- Chamfered corners (Barcelona)
- Courtyard in different shapes
- Combine Rooftop-bar + courtyard
- Be careful with sizes (monastery)
- Sunlight (Gauguin Dublin flats)
- Further development of the ideas
- 3D view to show how big your buildings look like
- Circulation Diagrams → courtyards
- City - semi public
- semi public - unit
- unit - room
- Distribution of apartments



P3



2025: VERTICAL CIRCULATION Week 8

combination of poetic and pragmatic

1 THE STAIRS

Private: pitch not exceed 72°  
 Rise min: 25  
 Rise max: 220  
 Going min: 220

Building regulations: R.H.H  
 Residential: Rise min: 25  
 Rise max: 170  
 Going: 250

Stairs play a vital role in:  
 - Spatial Volume  
 - Prominence  
 - Recreational Experience

Architecture is a game of spatial sequence

- Flights wider than 1.800 must have a middle handrail
- 1.500mm minimum (1.400 per handrail)
- Min length of a landing is the width of the stair
- Handrail 850-1050mm from the floor

LIFTS

provide full access

- disabled use
- must have a lift & set of stairs
- should follow the language of the building
- manoeuvring space in front of a lift → no less than 1500mm preferably 1700mm
- passenger lift shaft: 1800 x 1800mm shaft size
- bank depth: 1.1 x 2.2m space + manoeuvring

