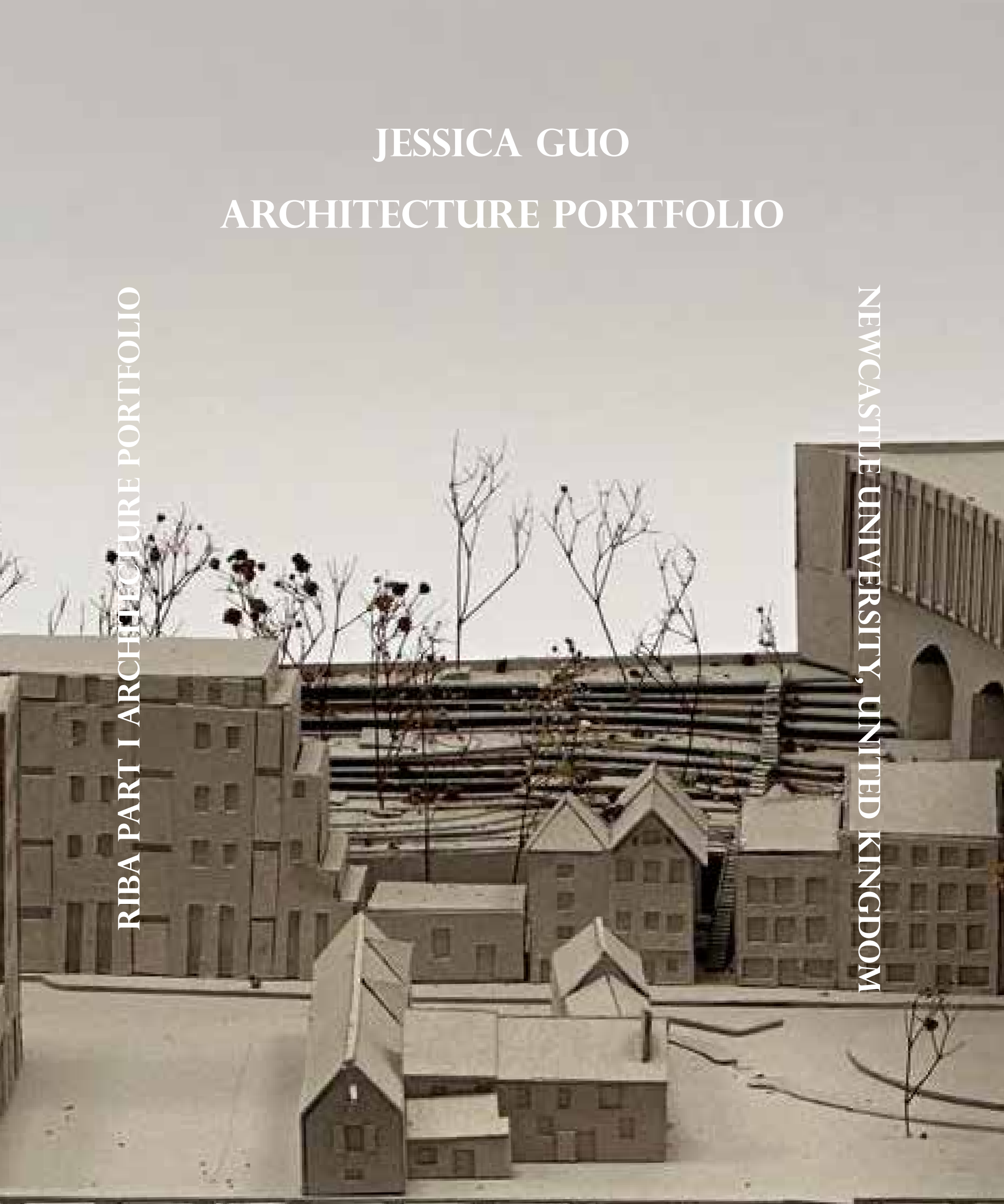
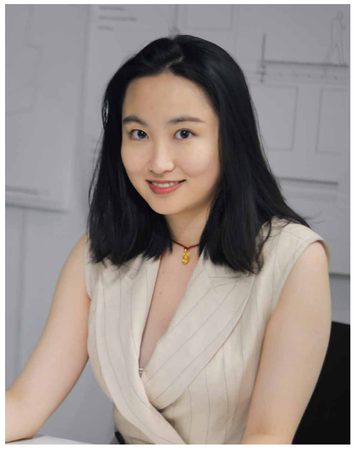
JESSICA GUO

ARCHITECTURE PORTFOLIO

RIBA PART I ARCHITECTURE PORTFOLIO

NEWCASTLE UNIVERSITY, UNITED KINGDOM





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references

Stella Mygdali
Lecturer in Architecture at Newcastle University
stella.mygdali@ncl.ac.uk

Jack Mutton
Lecturer in Architecture at Newcastle University
jack.mutton@newcastle.ac.uk

Experience

Nov 2024
Venue Manager Volunteer
Volunteered with Nova Scotia Music Week for three days straight, working as venue manager and social media.
Collaborated with staffs to oversee the success exhibition of performance, and supervising 4 other volunteers.

Jun - Jul 2024
Freelance Photographer
I marketed myself on Chinese social me dia as photographer to take pictures for newly graduated Chinese international students at Newcastle University.

Apr - Jul 2024
Online Mandarin Tutor Internship
Helped Chinese tutors with homework correction and course preparation, colla borated with colleagues to oversee the teaching

Dec 2022 - Mar 2023
RIBA Student Mentoring Scheme
I was under the mentorship of Elliott Architects, based in Hexham. Along with two other stage 2 architecture students from Newcastle, we visited the office at Hexham twice and had a meeting with the director, Ben Elliott, and a practicing architect there, Dan Finney. We also vis

Education

Sep 2022 - Jun 2024 *Newcastle University*
Bachelor of Architecture

- Royal Institute of British Architects (RIBA) [Part I equiva lent] and Architects Registration Board (ARB) accredited course.
- Modules taken: Architectural Design, Architectural Tech nology, Architectural History, Architectural Dissertation
- Participated in Intramural sports in badminton and squash
- Societies: investment society, entrepreneurial society
- Volunteering with Confucius Institute at Newcastle Univer sity

Jan 2022 - Jul 2022 *INTO Newcastle University*
International Year One in Architecture

- Courses taken: Design, Architecture History, Technology
- Progressed into stage 2 of the bachelor's degree in architec ture at Newcastle University
- taken a 3-month extra-curricular course on sketching with marker for architecture and landscape

Sep 2019 - Jan 2022 *University of Ottawa*
Bachelor of Arts in Linguistics

- Relevant skills: cross-cultural communication, sociolinguistics, research
- Received Merit Scholarship (2021)

Skills

Proficient in Microsoft Office: Words, Powerpoint, Excel.
Proficient in AutoCAD, SketchUp, Revit, and Rhino
Proficient in Photoshop, InDesign, Illustrator, Lightroom

Languages

Native in English and Mandarin Chinese.
Intermediate in French and Thai
Beginner in Korean and Arabic.

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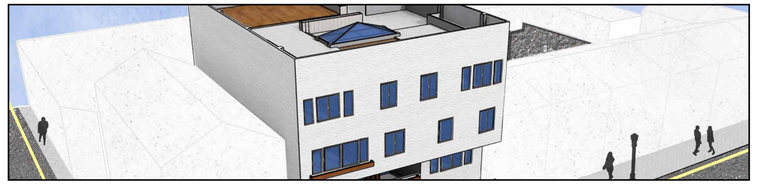
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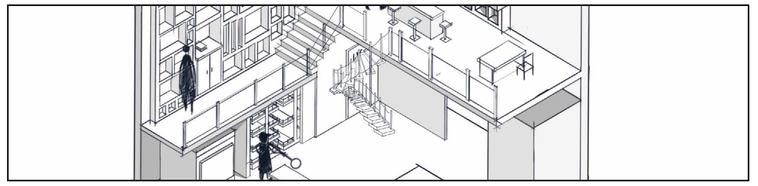
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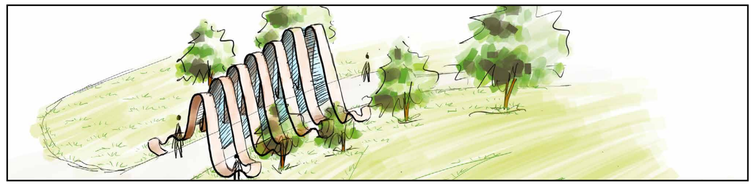
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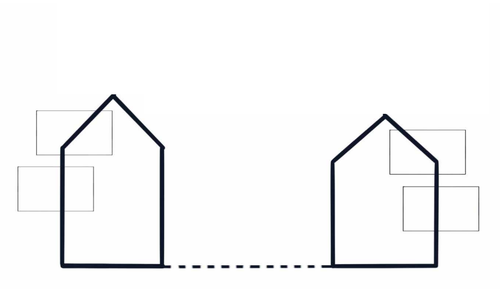
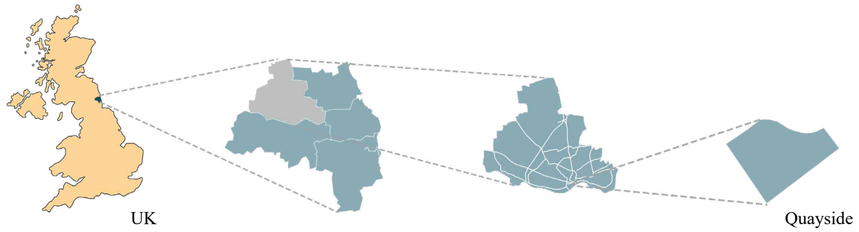
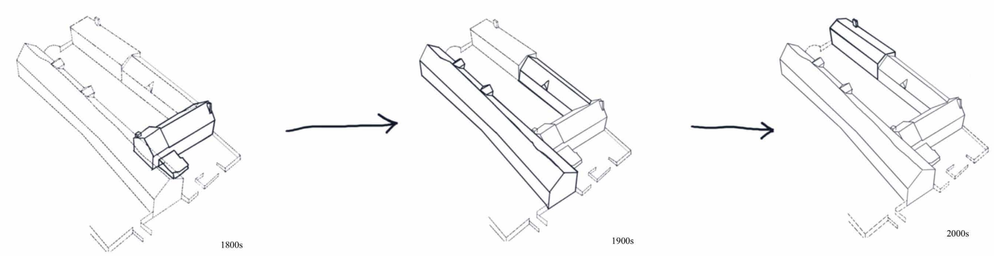


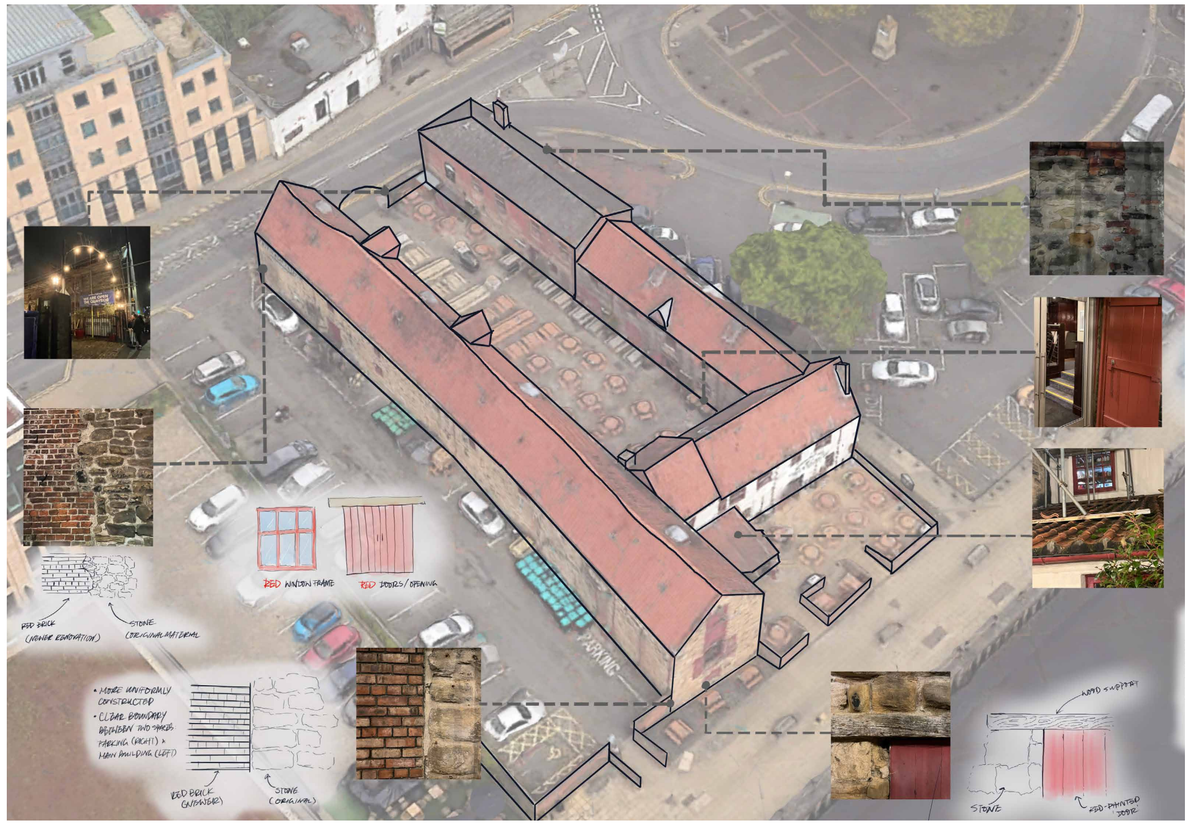
01 Quayside Secondary School

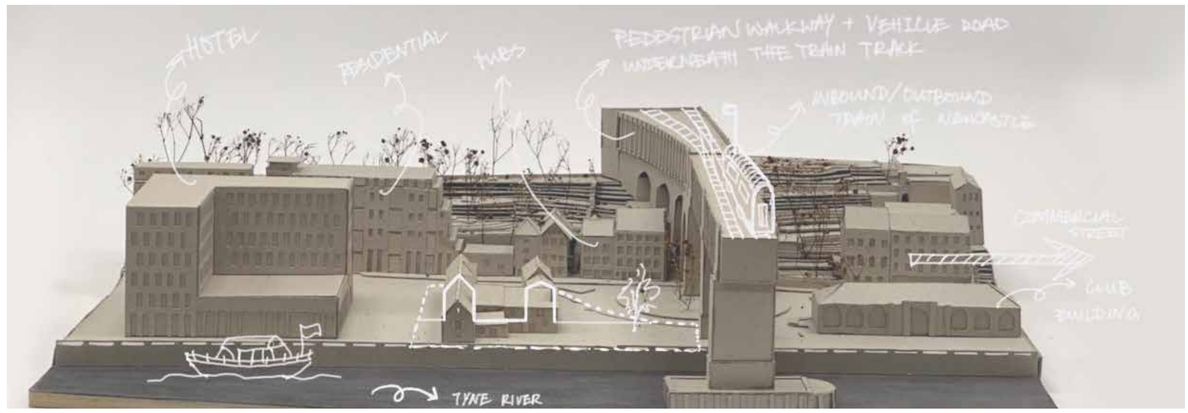
Location: Quayside, Newcastle upon Tyne
Date: Sep 2023 - May 2024
Theme: City Assemblage
Size: Large
Guidline: Individual work under school curriculum and supervision and Newcastle City Council strategy outline.
Instructor: Jack Mutton & Shaun Young



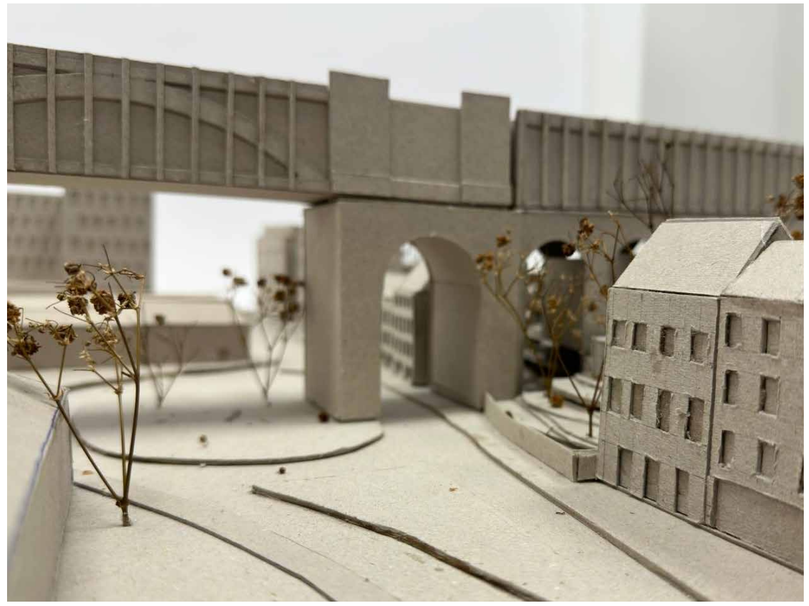
SITE ANALYSIS

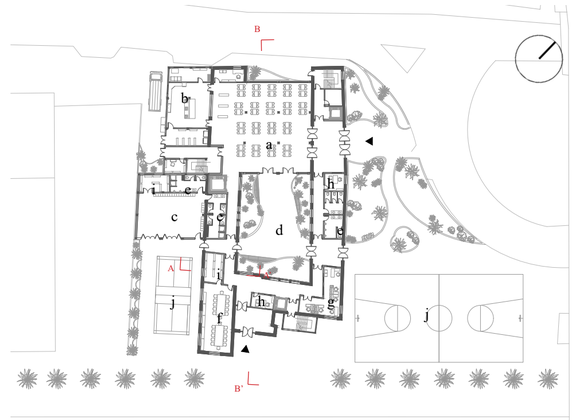


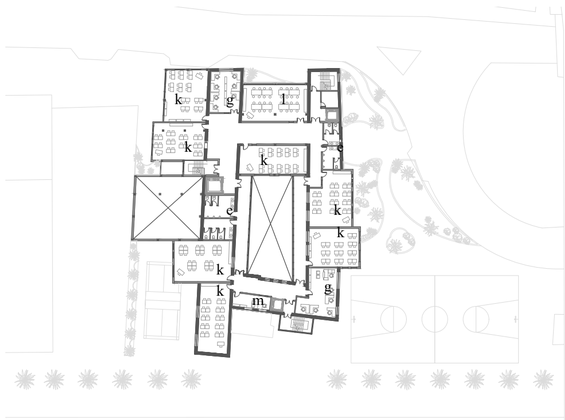


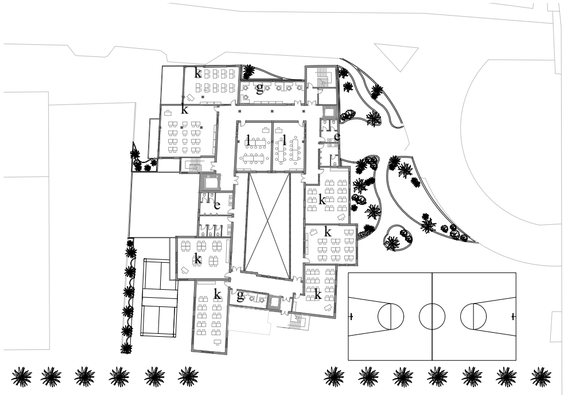


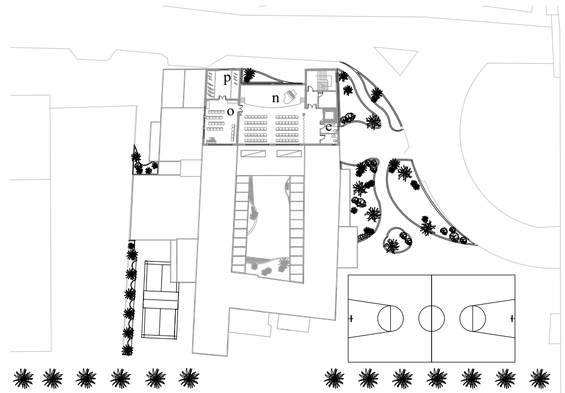
Site Model 1:50











0 5m 10m

Legend

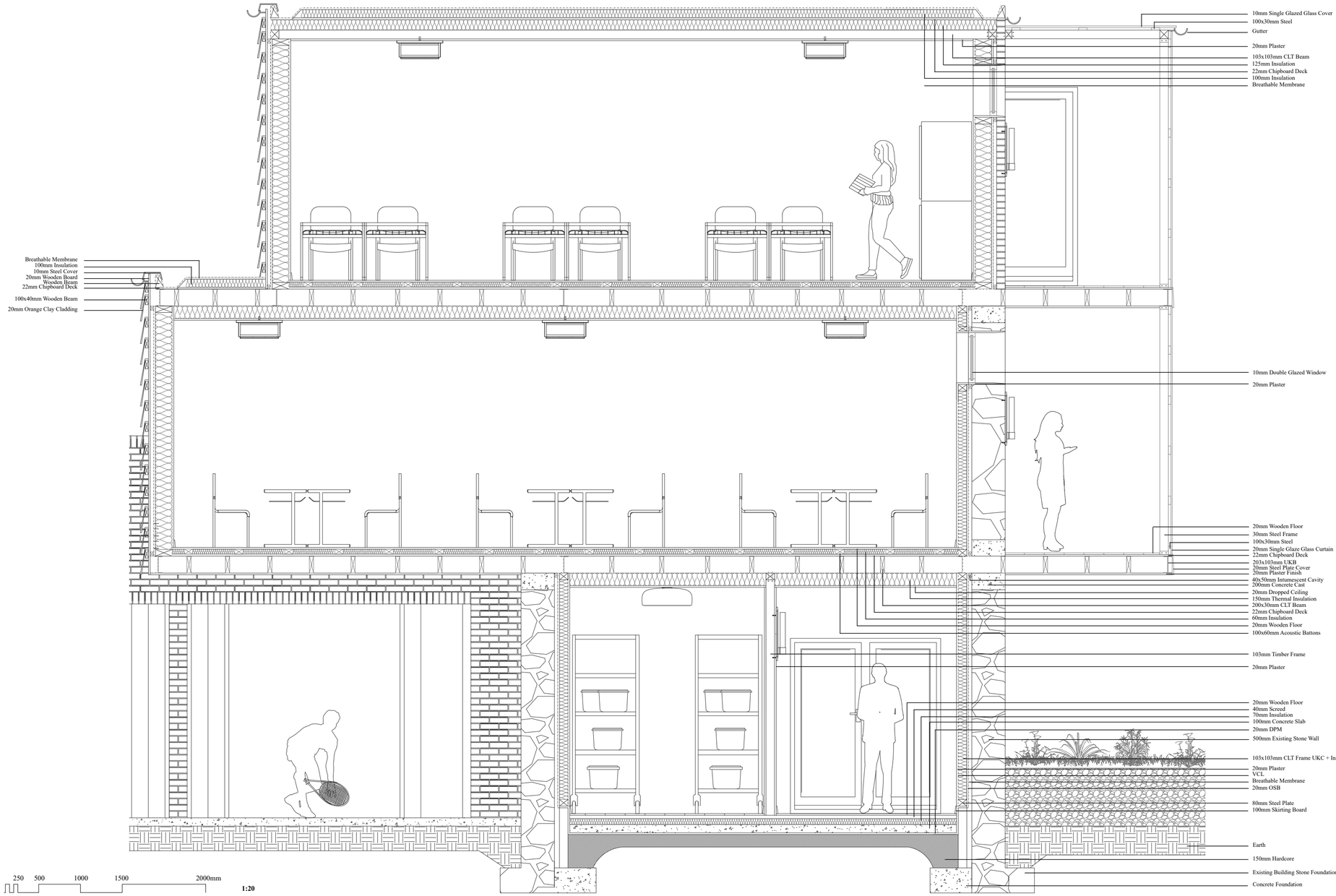
Ground Floor Plan
a Cafeteria
b Kitchen
c Indoor gym
d Inner Courtyard
e Toilet
f Workshop
g Teachers' Office
h Receptionist Office
i Storage
j Outside Playground

First Floor Plan
e Toilet
g Teachers' Office
k Classrooms
l Lab
m Principle's Office

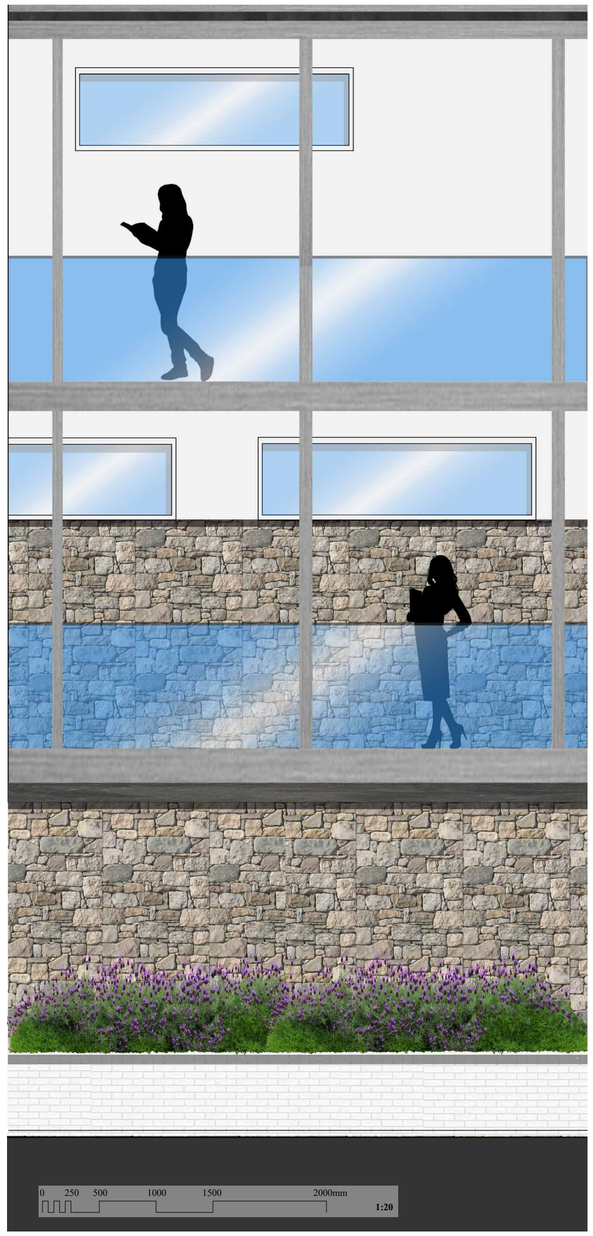
Second Floor Plan
e Toilet
g Teachers' Office
k Classrooms
l Lab

Third Floor Plan
e Toilet
n Performance Stage
o Practice room
p Musical Instrument Storage

Key Section A-A' 1:20 @A1



Elevation Section



Perspective Section B-B'

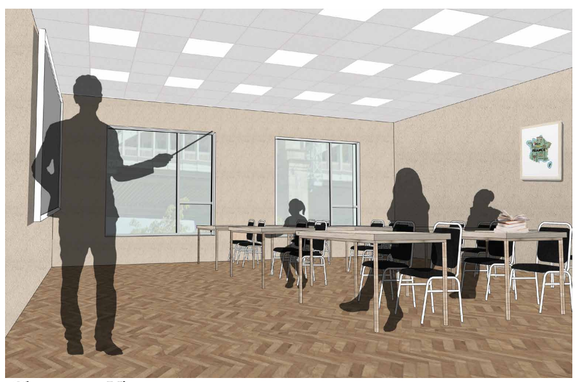
1. Roof removal

2. Foundation building &
Main glulam columns

3. Major glulam beams building

4. Secondary steel frame
building

Isonometric Collage Render



Classroom View

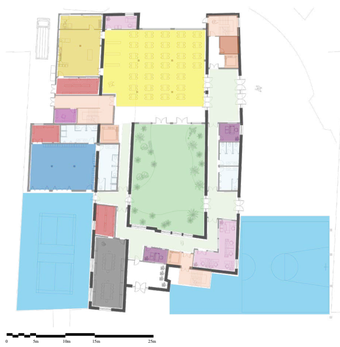
Music Hall

Inner Courtyard

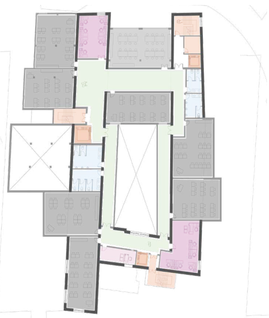
Exterior Entrance Perspective

Floor Plan Functions

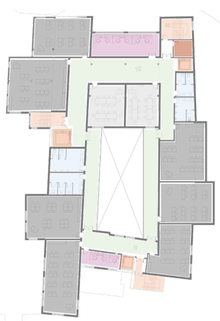
Ground Floor Plan



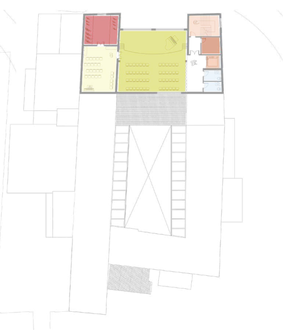
1st Floor Plan



2nd Floor Plan



3rd Floor Plan



FLOOR	FUNCTION	AREA(m2)	VOLUME(m3)
GROUND FLOOR			
	Service plant room	9.1	34.125
	Fire protected stairway	18.39	68.96
	Fire protected stairway	18.84	70.64
	Fire protected stairway	34.165	128.12
	Elevator	1.95	
	Elevator	1.95	
	Elevator	3.65	
	WC	25.888	97.08
	WC	42.358	158.84
	Circulation		
	central courtyard	200.197	
	Reception	9.014	33.75
	Reception	10.207	38.25
	Teachers' Office	25.177	94.41
	Teachers' Office	11.278	42.29
	Janitor room + storage	8.88	33.3
	Cafeteria	183.81	689.28
	Kitchen	76.024	285.09
	indoor gym	84.63	317.36
	outdoor playground	468.23	1755.86
	storage	16.199	60.75
	storage	14.29	53.58
	storage	21.42	80.32
	workshop	61.56	230.85

FLOOR	FUNCTION	AREA(m2)	VOLUME(m3)
FIRST FLOOR	Service plant room	9.1	25.03
	Fire protected stairway	18.39	50.57
	Fire protected stairway	18.84	51.81
	Fire protected stairway	14.56	40.04
	Elevator	1.95	
	Elevator	1.95	
	Elevator	3.65	
	Circulation		
	WC	37.59	103.37
	WC	42.46	116.77
	Principal's office	15.56	42.79
	Teachers' Office	32.22	88.605
	Teachers' Office	50.22	138.105
	Lab classroom	71.23	195.88
	Classroom	65.86	181.115
	Classroom	58.42	160.655
	Classroom	72.35	198.96
	Classroom	62.12	170.83
	Classroom	59.12	162.58
	Classroom	66.12	181.83
	Classroom	58.81	161.72

FLOOR	FUNCTION	AREA(m2)	VOLUME(m3)
SECOND FLOOR	Service plant room	9.1	25.03
	Fire protected stairway	18.39	50.57
	Fire protected stairway	18.84	51.81
	Fire protected stairway	14.56	40.04
	Elevator 1	1.95	
	Elevator 2	1.95	
	Elevator 3	3.65	
	Circulation		
	WC	37.59	104.36
	WC	42.46	116.76
	Teachers' Office	43	118.25
	Lab classroom 1	49.16	135.19
	Lab classroom 2	45.58	125.34
	Classroom 1	61.84	170.06
	Classroom 2	85.64	235.51
	Classroom 3	66.99	184.22
	Classroom 4	70.82	194.75
	Classroom 5	50.22	138.105
	Classroom 6	60.47	166.29
	Classroom 7	66.12	181.83

FLOOR	FUNCTION	AREA(m2)	VOLUME(m3)
THIRD FLOOR	Service plant room	9.1	36.4
	Fire protected stairway	18.39	73.56
	Elevator	1.95	
	WC	10.73	42.92
	Canteen	28.43	113.68
	Practice classroom	43	172
	Performance space	115.8	463.2

DRY STONE MATERIAL RESEARCH

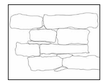
LINE OF ENQUIRY: How can the principles of dry stone construction be applied to retrofit a Grade II listed building, preserving its historical integrity while enhancing its structural environmental performance?

The use of dry stone as an architectural material represents a sustainable and low-carbon approach, making it a compelling subject for contemporary research. Dry stone construction, characterized by the stacking of stones without mortar, boasts minimal embodied energy due to the lack of processing and use of local materials. This ancient technique aligns with modern sustainability goals, emphasizing durability, reusability, and integration with natural landscapes. As buildings must balance heritage preservation with modern performance, exploring dry stone's application in retrofitting existing structures offers insights into sustainable architecture practices that respect cultural and environmental contexts.

To evaluate the efficiency and capability of dry stone as a building material, the criteria chart to the bottom right is employed. This chart assesses various factors such as embodied carbon, health benefits, cost-effectiveness, and adaptability. Each criterion helps determine the material's overall sustainability and its alignment with cradle-to-cradle principles, focusing on reusability and biodegradability.

In conjunction with the criteria chart, the RICS Whole Life Carbon Assessment framework provides a comprehensive method for assessing the carbon impact of using dry stone throughout a building's lifecycle. By evaluating stages from material sourcing to end-of-life, this assessment ensures that the use of dry stone not only meets current sustainability standards but also contributes to long-term ecological benefits.

Characteristics of Dry Stone



Natural Sourced Stones

often irregular shaped, locally sourced.

Load-bearing Capacity

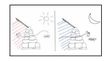
capable of supporting significant weight due to the interlocking nature and mass of the stones.

Durability

highly resistance to weathering and erosion, providing longevity.

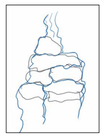
Biodiversity

gaps between stones can provide habitats for flora and fauna.



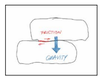
Regulate Temperature

storing heat during the day and releasing it at night.



Permeability

allows water to pass through, reducing runoff and erosion.



Mortar-free Construction

stones stacked without mortar, relying on gravity and friction. Interlocking stones fit together precisely, creating stable structures that can lex and move slightly, beneficial in seismic areas.

Element	Criteria	Colour	Comments
	Will they lower the building's embodied carbon?		
	Do they benefit the user's health?		
	Are they cost effective?		
	Are they time efficient?		
	Do they have good fire resistance?		
	Do they require transport far way to be processed (increasing cradle-to-gate carbon?)		
	Cradle to cradle will they create a circular economy/closed loop? Reusable, break downable, biodegrable, create novel ecology		
	Is the material dry jointed / easily deconstructable?		
	Is the element adaptable for future changes in use?		
	Is the element designed with maintenance in mind?		
	What is the materials lifetime?		
	Is the material organic / can it be left to biodegrade by itself?		

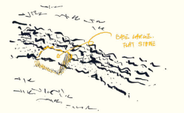
Dry Stack Construction Process

Source: How to build a dry stone wall. [3]

Step 1: mark the area for the wall with chalk or strings. Then sort stones into large, medium and small sizes.

Step 2: dig a trench with one foot deep that will be used to hold the base of the stone wall.

Step 3: Lay a large and flat stone in the trench to use as the base for the wall. Pack any gaps with small stones.



Step 4: Build the wall to form an A shape. Each layer will be slightly narrower than the layer below it. Make sure the stones touch and covering joins in the layer below.

Through Stone: the longer stones that are placed to extend through the entire width of the wall, binding both sides together.
Topping Stone: the layer of flat, large stones that's put on top of the wall, which help protect the wall from weather and erosion.

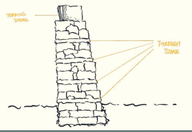


Figure 44: illustration of dry stack construction process

Fire Strategy

Table 0.1 Classification of purpose groups

Volume 1 purpose groups		
Title	Group	Purpose for which the building or compartment of a building is intended to be used
Residential (dwellings)	1(a)[3]	Flat.
	1(b)[3]	Dwellinghouse that contains a habitable storey with a floor level a minimum of 4.5m above ground level up to a maximum of 18m.[4]
	1(c)[3][6]	Dwellinghouse that does not contain a habitable storey with a floor level a minimum of 4.5m above ground level.
Volume 2 purpose groups		
Residential (institutional)	2(a)	Hospital, home, school or other similar establishment, where people sleep on the premises. The building may be either of the following: • Living accommodation for, or accommodation for the treatment, care or maintenance of, either: – disabled people with a range of impairments including physical, sensory and cognitive impairments, or mental health conditions – people under the age of 5 years. • A place of lawful detention.
Residential (other)	2(b)	Hotel, boarding house, residential college, hall of residence, hostel or any other residential purpose not described above.

Table 2.1 Limitations on travel distance

Purpose group	Use of the premises or part of the premises		Maximum travel distance[2] where travel is possible in: One direction only (m)	More than one direction (m)
2(a)	Residential (institutional)		9	18
2(b)	Residential (other):			
	a. in bedrooms[3]		9	18
	b. in bedroom corridors		9	35
	c. elsewhere		18	35
3	Office		18	45
4	Shop and commercial		18	45
5	Assembly and recreation:			
	a. buildings primarily for disabled people		9	18
	b. areas with seating in rows		15	32
	c. elsewhere		18	45
6	Industrial[5]	Normal hazard	25	45
		Higher hazard	12	25
7	Storage and other non-residential[5]	Normal hazard	25	45
		Higher hazard	12	25
2–7	Place of special fire hazard[6]		9[1]	18[1]
2–7	Plant room or roof-top plant:			
	a. distance within the room		9	35
	b. escape route not in open air (overall travel distance)		18	45
	c. escape route in open air (overall travel distance)		60	100

Table 2.2 Minimum number of escape routes and exits from a room, tier or storey

Maximum number of people	Minimum number of escape routes/exits
60	1
600	2
More than 600	3

Table 2.3 Widths of escape routes and exits

Maximum number of people	Minimum width (mm)[1][2][3][5]
60	750[4]
110	850
220	1050
More than 220	5 per person[5]

NOTES
1. See Appendix D for methods of measurement.
2. Widths may need to be increased to meet guidance in Approved Document M.
3. Widths less than 1050mm should not be interpolated.
4. May be reduced to 530mm for gangways between fixed storage racking, other than in public areas of 'shop and commercial' (purpose group 4) buildings.
5. 5mm/person does not apply to an opening serving fewer than 220 people.

Figure 37: Extract from Approved Document B Fire Safety Volume 2

Exit Capacity Calculation

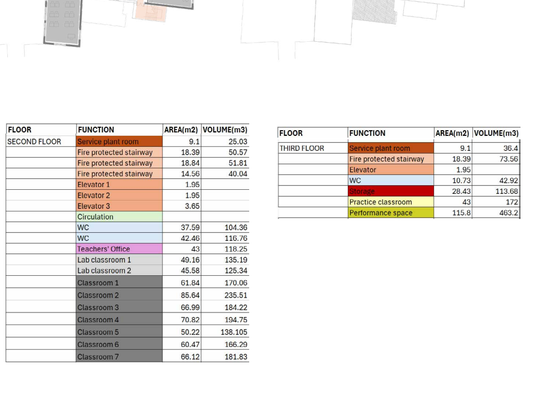
W = ((N/2.5) + (60S))/80
Ground floor storey exit serving 240 people that share a common final exit with a 1.2m wide stair.
This required final exit width
= ((240/2.5) + (1.2x60))/80 = 2.1m

The minimum number of escape route per room is 1, as all spaces will have maximum 69 people (Fire Safety Approved Document B, 2010). The cafeteria on the ground floor will have two means of escape, because its occupancy will be above 60. Floor plan analysis to the left highlights travel distances to escape routes with consideration of additional external fire escapes and refuge zones to comply with building regulations.

The project comprises a mixed use occupancy with classrooms, cafeteria, teacher's offices, gym, music hall, and plant rooms. Therefore, escape routes vary depend on different types of occupants and spatial dimensions. The ground floor has 12 escape routes in total which lead to assembly zones outside the building.

Figure 38: Ground Floor Fire Escape Distance

Enclosed fire exit staircase located exterior of the building



Assembly Zone
Fire Staircase
Protected Corridor

Dry Stone under RICS Whole Life Carbon Assessment framework

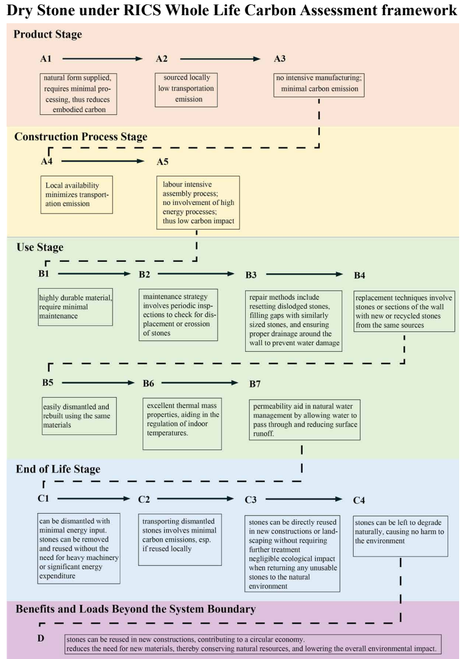
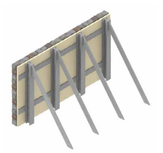


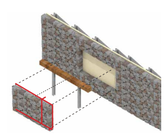
Figure 47: dry stone material under RICS whole life carbon assessment framework diagram

Construction Modification of Dry Stone Wall

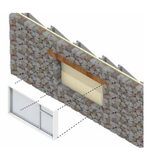
Inserting Window Openings



Step 1: create support on the interior for the existing wall with steel bars



Step 2: remove the planned opening area (in red), and install a lintel that supports the dry stones on top for it to not collapse, and two steel columns to support the opening temporarily.



Step 3: insert the window frame into the opening with the supporting lintel on top.

FIgure 48: SketchUp diagrams of construction modification on dry stone wall

Construction Sequencing: Steel Frame Structure Details

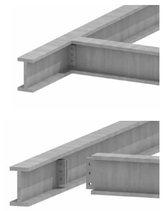
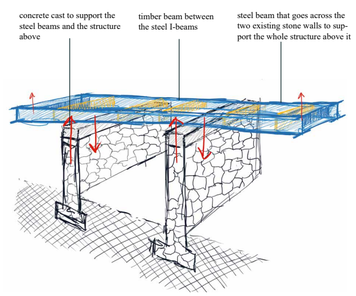
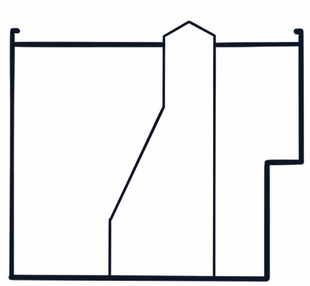


Figure 34. steel I-beam joint detail



Structure of steel beam and on existing stone wall, for second floor floor and first floor ceiling.

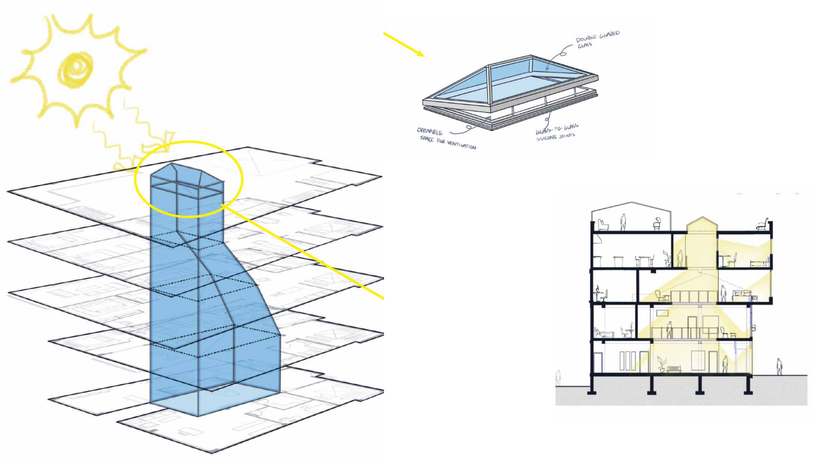
Figure 35. sketch of steel frame structure on existing structure



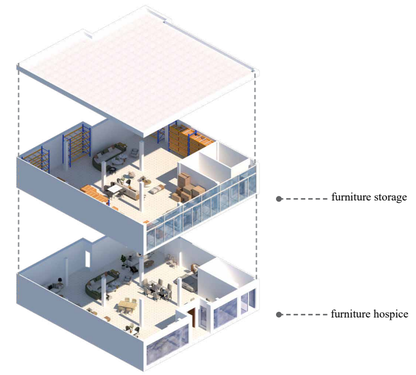
02 Byker Co-Housing

Location: Byker, Newcastle upon Tyne
Date: Sep - Dec 2022
Theme: Threshold + Co-Housing
Size: Medium
Guidline: Individual work under school curriculum and supervision and Newcastle City Council strategy outline.
Instructor: Eleanor Gair

As a part of the strategy by Newcastle City Council to revive the wider Byker community, we were asked to propose a co-housing plan on Shields Road, Newcastle upon Tyne. The theme for this project explores the threshold between private and public space.

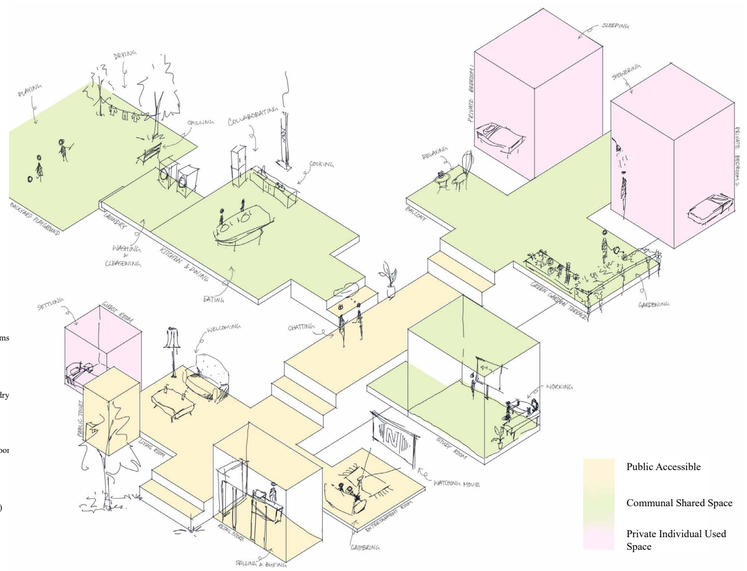


Original Building on Site, Explode Diagram

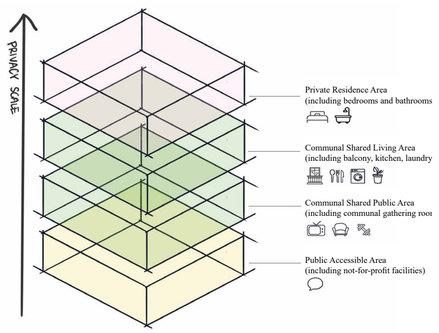


There are two parts to my design: one is the choice of not-for-profit facilities in the building, which most likely would be on the ground floor, open to the wider community, and the other concerns the levels above, which would mainly designated for the residents of the co-housing community. Exploring the concept of threshold from public accessible to private individual space is illustrated in the Preliminary Conceptual Diagram, distinguished through the rainbow color scheme from yellow to green to pink.

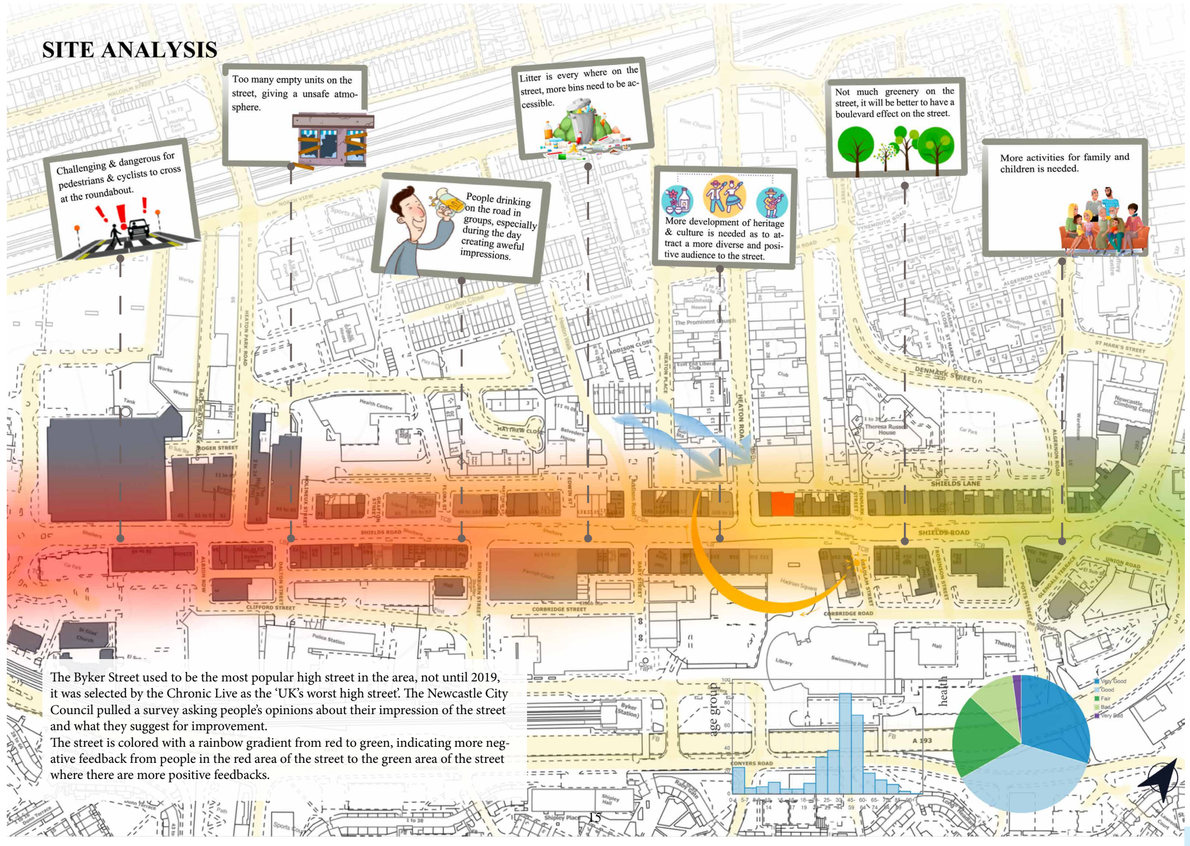
Preliminary Conceptual Diagram



Conceptual Diagram

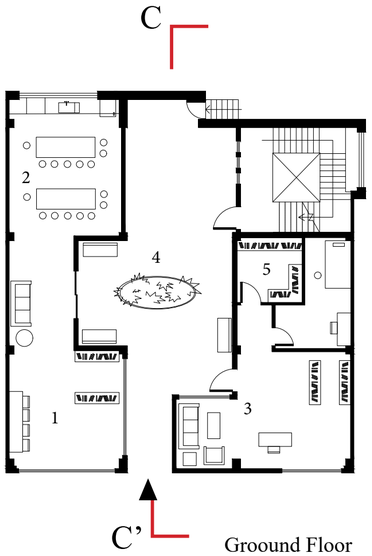


SITE ANALYSIS

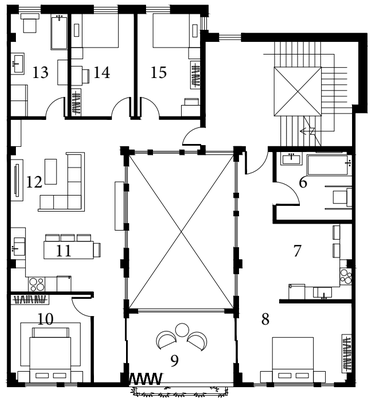


The Byker Street used to be the most popular high street in the area, not until 2019, it was selected by the Chronic Live as the 'UK's worst high street'. The Newcastle City Council pulled a survey asking people's opinions about their impression of the street and what they suggest for improvement.
The street is colored with a rainbow gradient from red to green, indicating more negative feedback from people in the red area of the street to the green area of the street where there are more positive feedbacks.

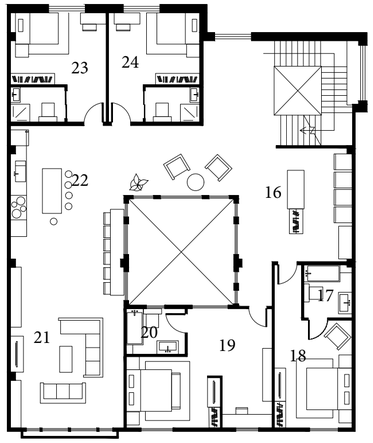
Floor Plans



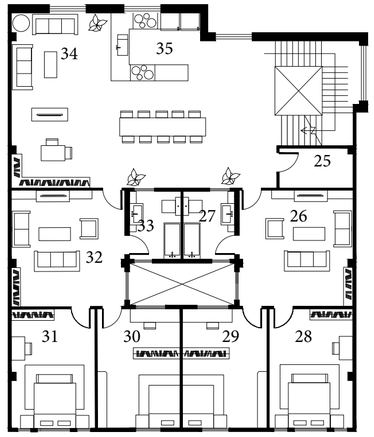
Grooound Floor



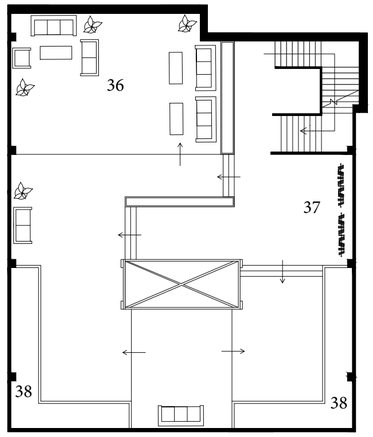
First Floor



Second Floor



Third Floor



Rooftop

Legend

Ground Floor
1 Community Child Care
2 Community Shared Kitchen
3 Community Clinic
4 Inner Courtyard
5 Storage

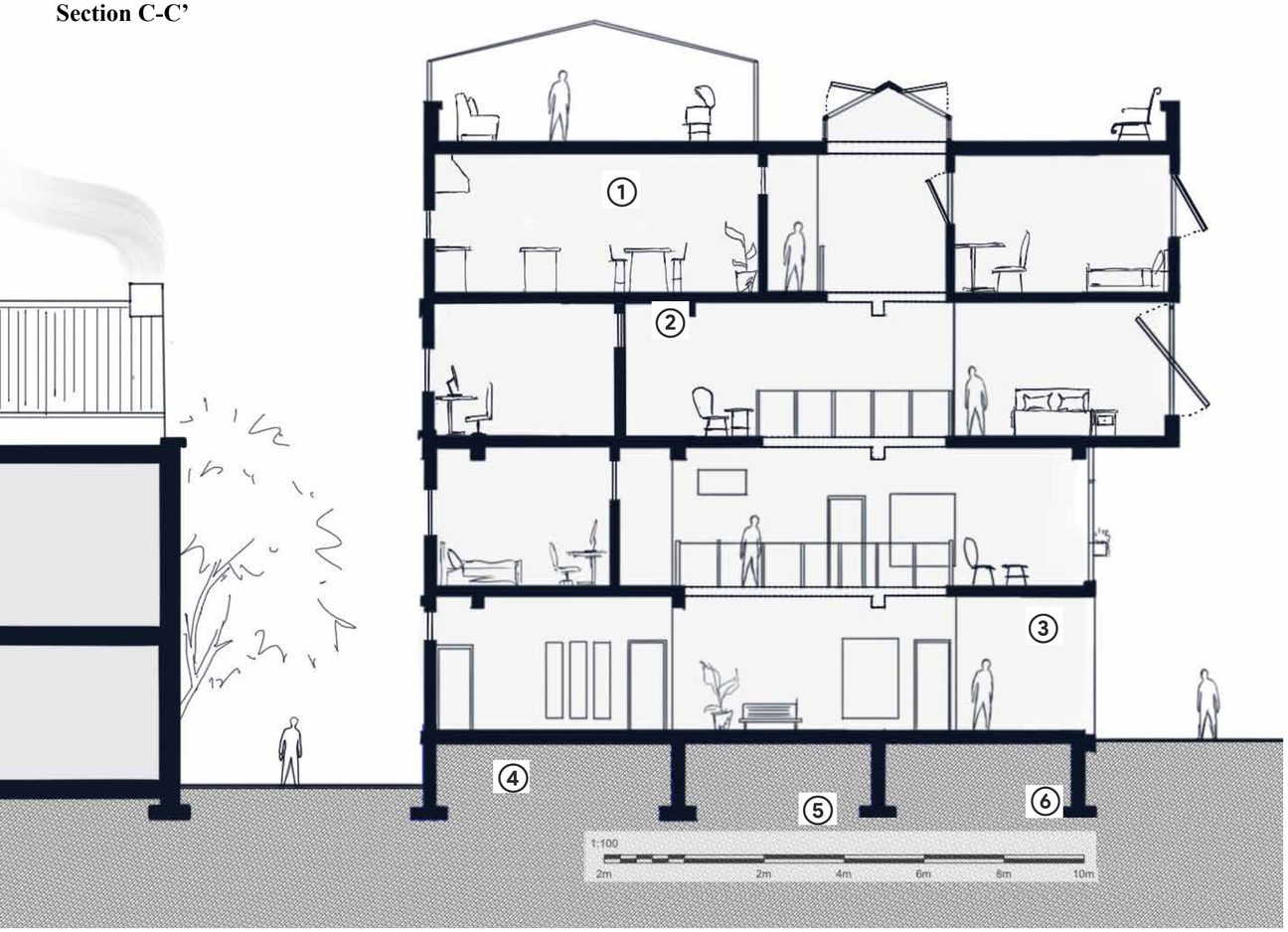
First Floor
6 Toilet-Accessible
7 Kitchen-Accessible
8 Bedroom-Accessible
9 Shared Balcony
10 Master Bedroom
11 Kitchen
12 Living Room
13 Bathroom
14 Bedroom-1
15 Bedroom-2

Second Floor
16 Shared Laundry
17 Bathroom-1
18 Bedroom-1
19 Bedroom-2
20 Bathroom-2
21 Shared Living Room
22 Shared Kitchen-2
23 Bedroom-3
24 Bedroom-4

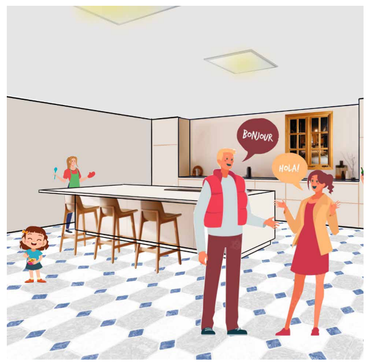
Third Floor
25 Storage
26 Family Room-1
27 Bathroom-1
28 Bedroom-1
29 Bedroom-2
30 Bedroom-3
31 Bedroom-4
32 Family Room-2
33 Bathroom-2
34 Shared Living Room
35 Shared Kitchen

Rooftop
36 Shared Terrace
37 Laundry
38 Planting Area

Section C-C'

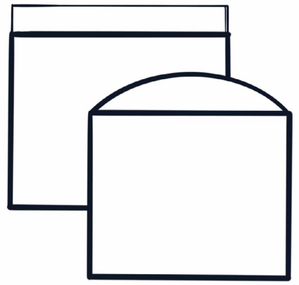


1: Building Entrance Corridor



2: Public Shared Kitchen

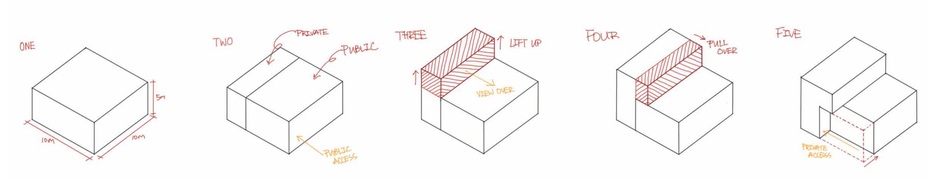
Perspective Isonometric Drawing



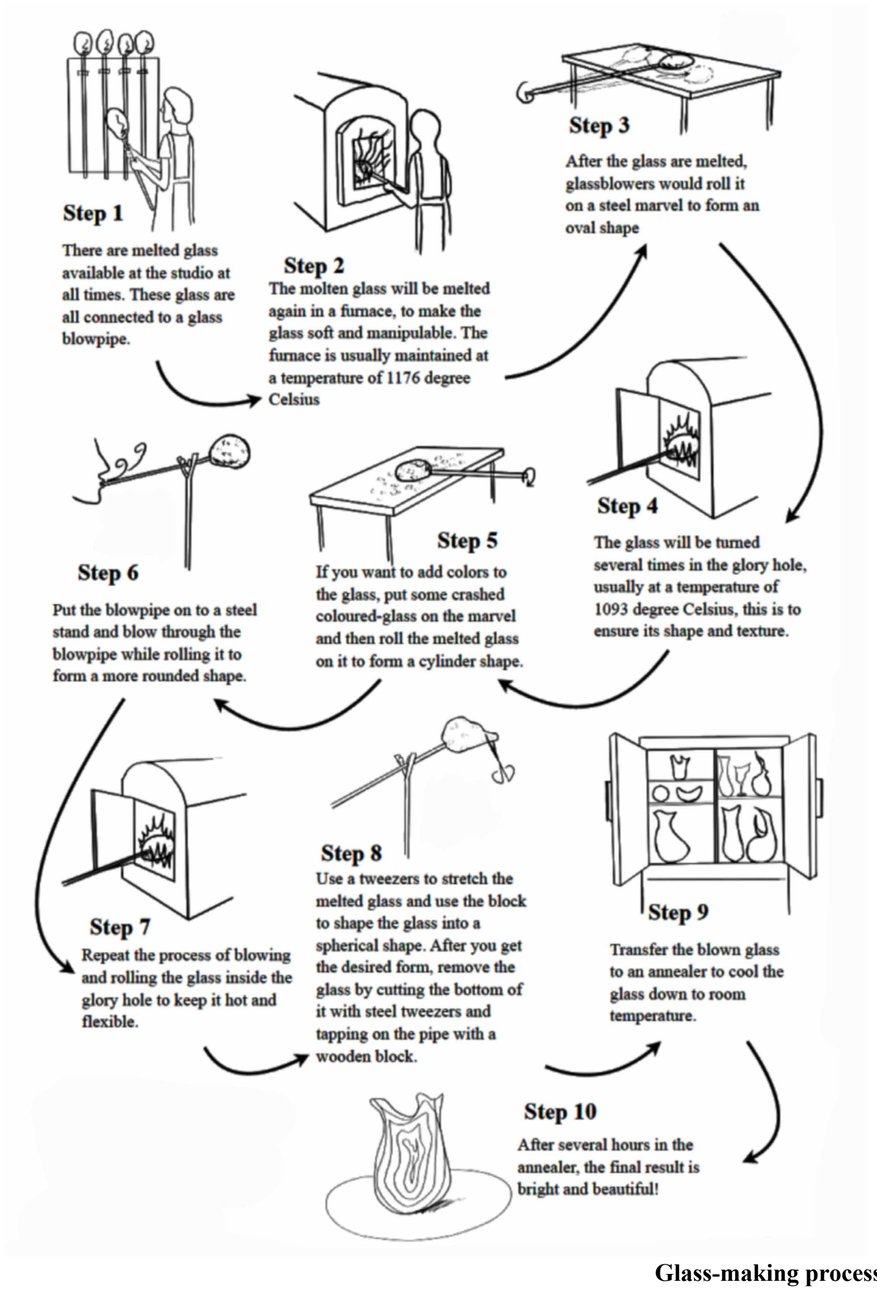
03 Glass-Making Artist Residential

Location: Ouseburn, Newcastle upon Tyne
Date: Mar - Jun 2022
Theme: Residential
Size: Small
Guideline: Individual work under School Curriculum and Supervision
Instructor: Emily Scullion

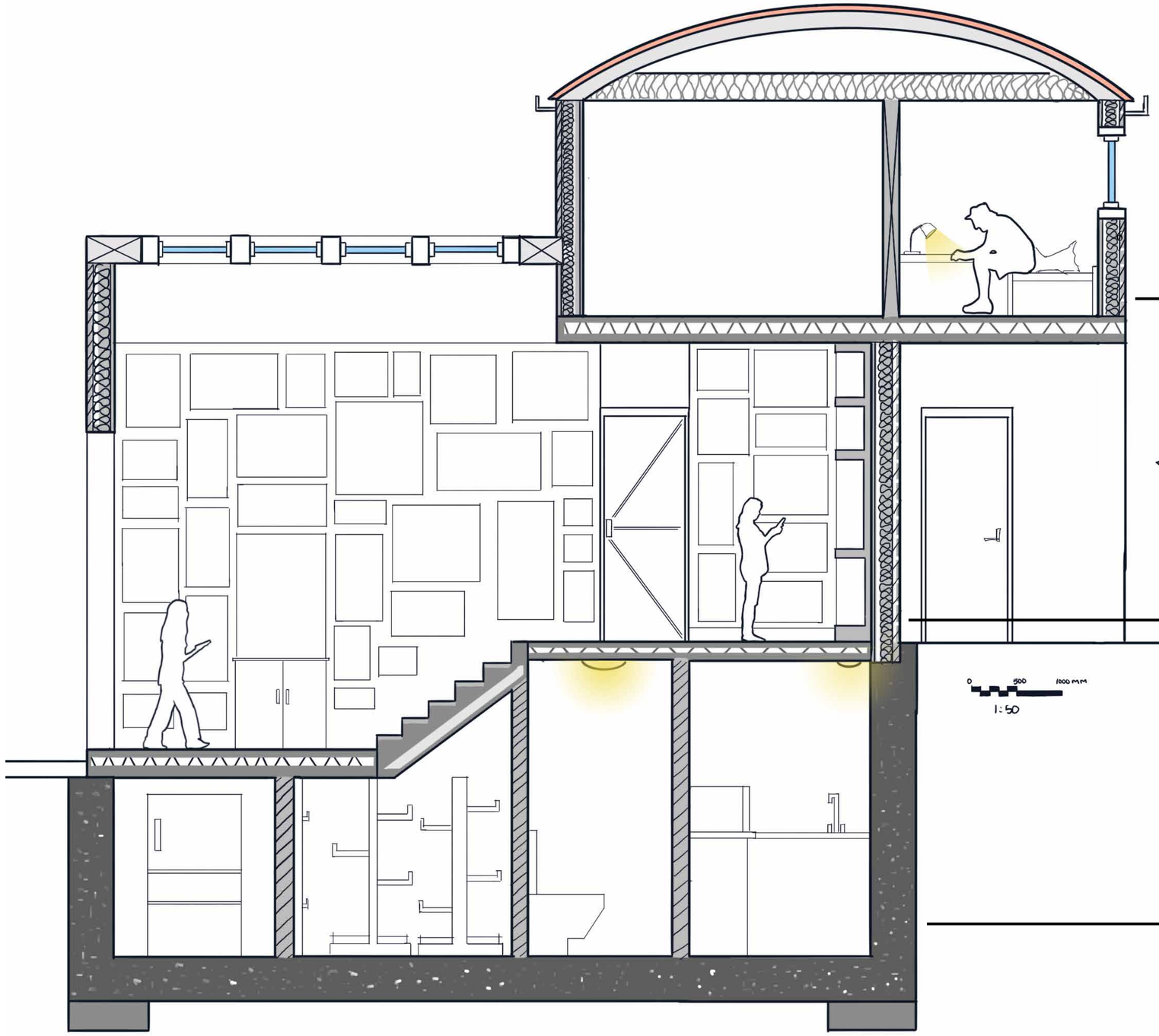
The Ouseburn Valley, although now undergoing regeneration and reshaping into Newcastle's creative quarter, it was once known as the cradle of industrial revolution in the Northeast. The glassmaking industry was the first known industry established in the valley with three glasshouses established by 1619 at the mouth of Ouseburn.It has grown to such an extent that it was responsible for almost half of all the glass and glassware produced in England, from bottle glass and "crown glass" for windows, to plate and mirror glass and the finest of decorative table wares.



Proposal Iteration Development

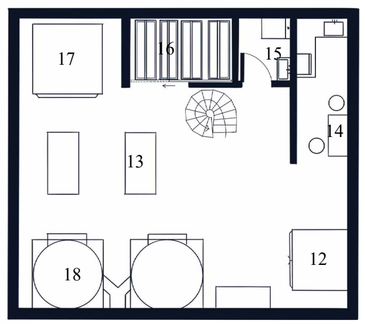


Glass-making process



Second Floor

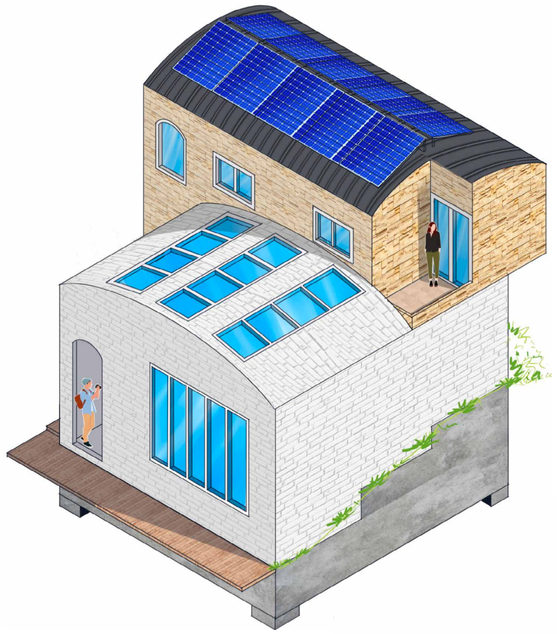
First Floor

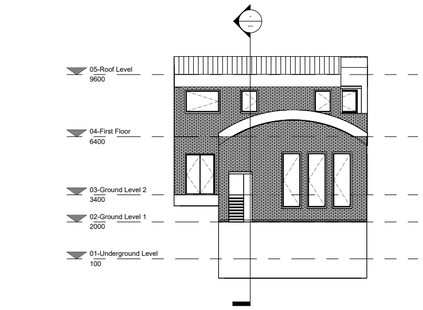


Ground Floor

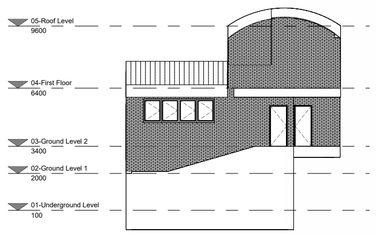
0 5 10m

Legend
1 balcony
2 shared kitchen
3 shared bathroom
4 bedroom 1
5 bedroom 2
6 bedroom 3
7 emergency exit
8 receptionist
9 sitting area
10 living room
11 emergency exit 2
12 annealer
13 work table
14 rest space
15 bathroom
16 storage
17 marver
18 glory hole



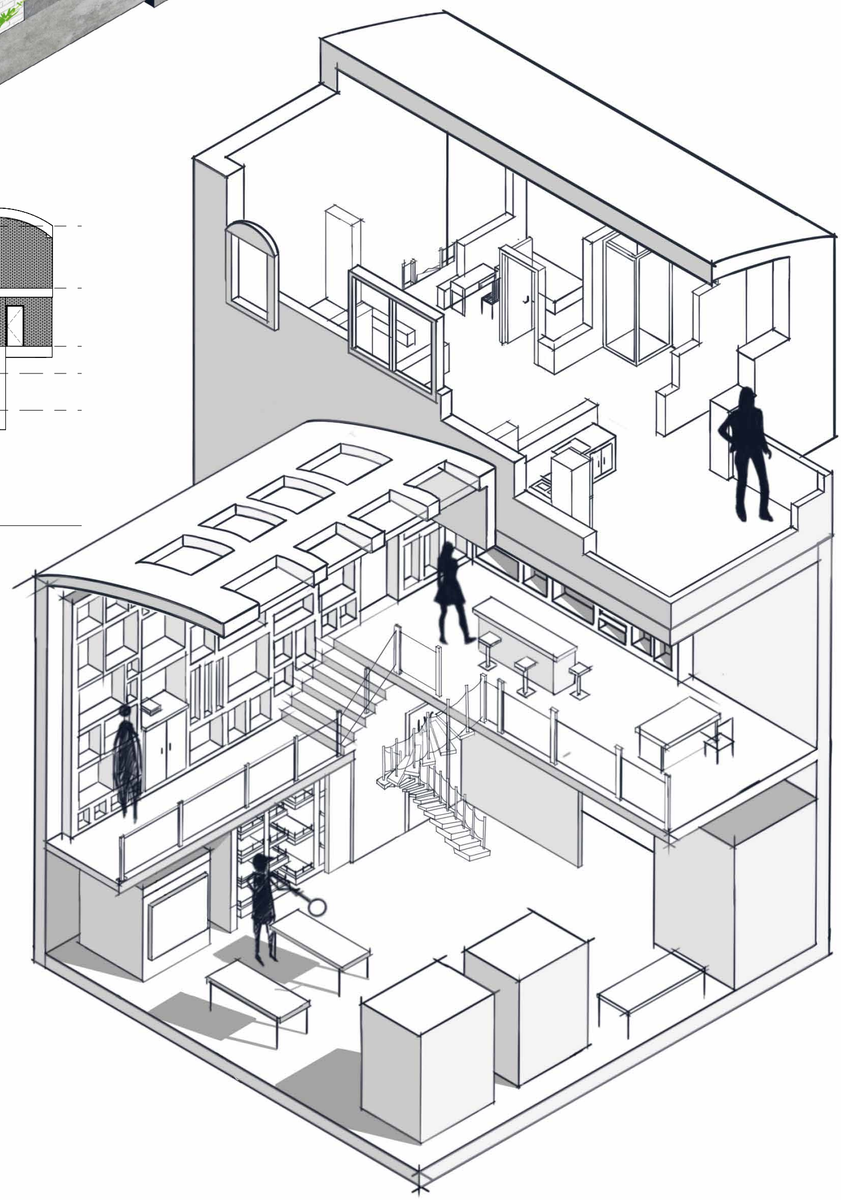


3 **South**
1 : 100



1 **East**
1 : 100

0 1 2 3 4 5



The final drawings proposed a living and business area for glass-blowing artists. The residents can live upstairs while opening their business downstairs. Each unit can accommodate three people. All facilities are on board, from balcony to toilet and kitchen, and a small living room.

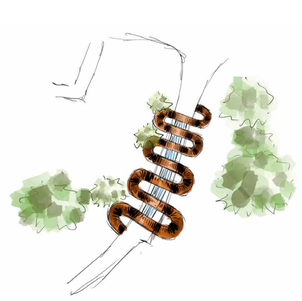
04 Civic Center Garden Pavillon

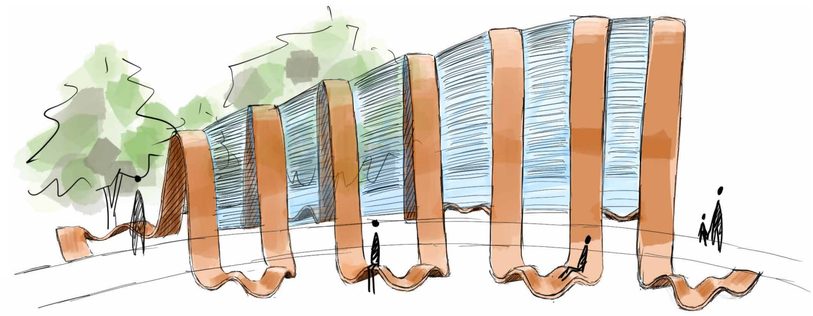
Location: Percy Street, Newcastle upon Tyne
Date: Feb - Mar 2022
Theme: Installation + Pavillon
Size: Small
Guideline: Individual work under School Curriculum and Supervision
Instructor: Emily Scullion

The site is a natural garden in front of the civic center that's open to the public. It is situated at the city centre, where the visitor flow is high. It would be great to maximize sun exposure and have covers from rain and prevailing winds. Although the area is somewhat noisy and polluted since one of the large street in Newcastle runs in front of it.

The inspiration for this pavillion was from water droplet. I wanted to mimic the form of the water drop when it is immersing with the other water. This brings to a shape of ups and downs. The higher arch can be a pavillon located right above the walking path, while the shorter arch can be seats for pedestrians and play site for children.

Above is an aerial view of the final proposed design. It is divided into two function areas: the public and walk pass or get cover from the rain in the middle, while others can sit and chat on the part located on the grass.



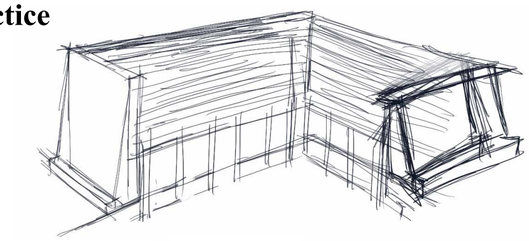


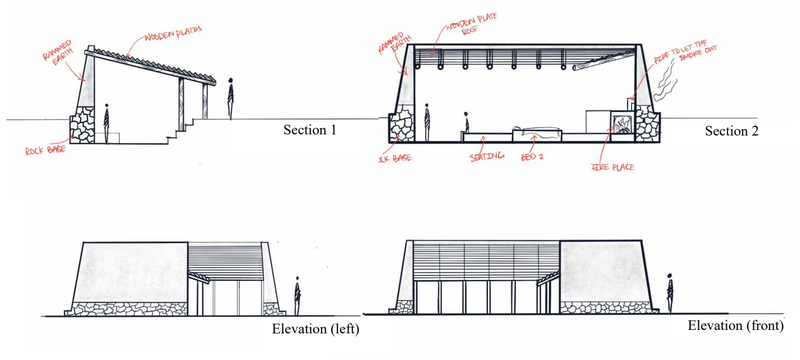
05 Other Small Projects

vernacular architecture inspirational design practice

Inspirational design for a small house from a previous study of Chinese vernacular architecture, Tu Lou.

Sketched with Procreate.
Apr 2022



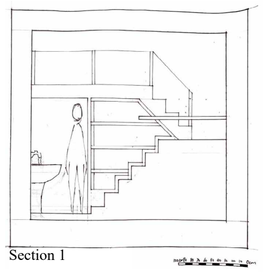


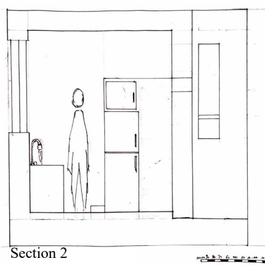
Small House design practice

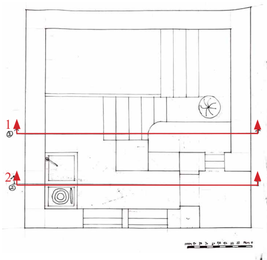
A design practice of designing a small house of 3m x 3m x 3m that accompanies one person living there.

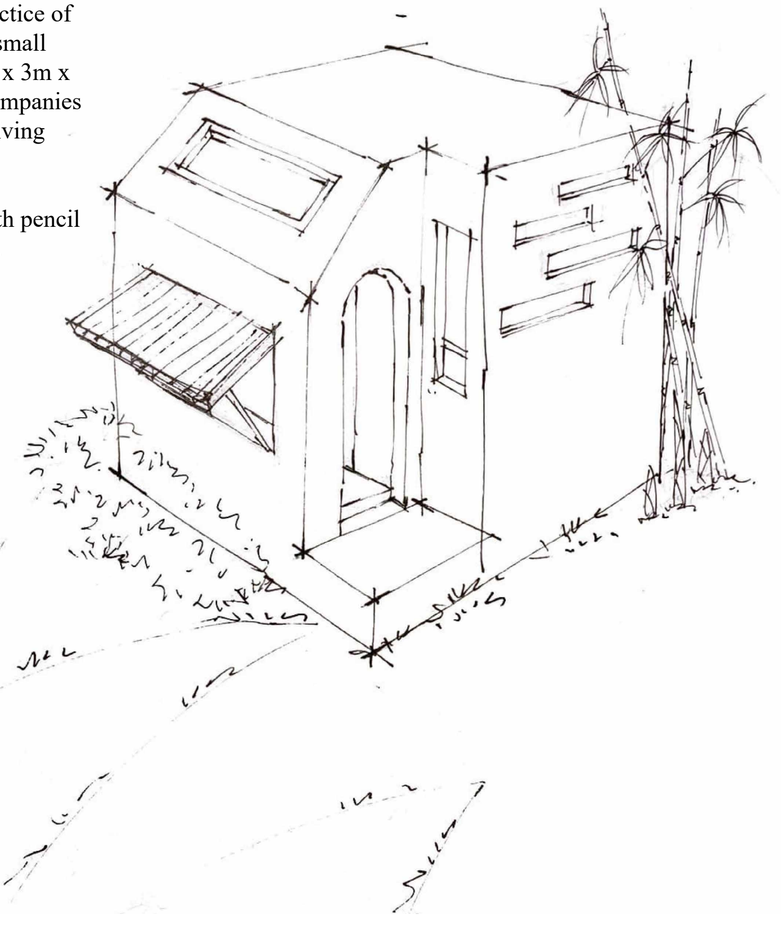
Sketched with pencil and scanned.

Feb 2022

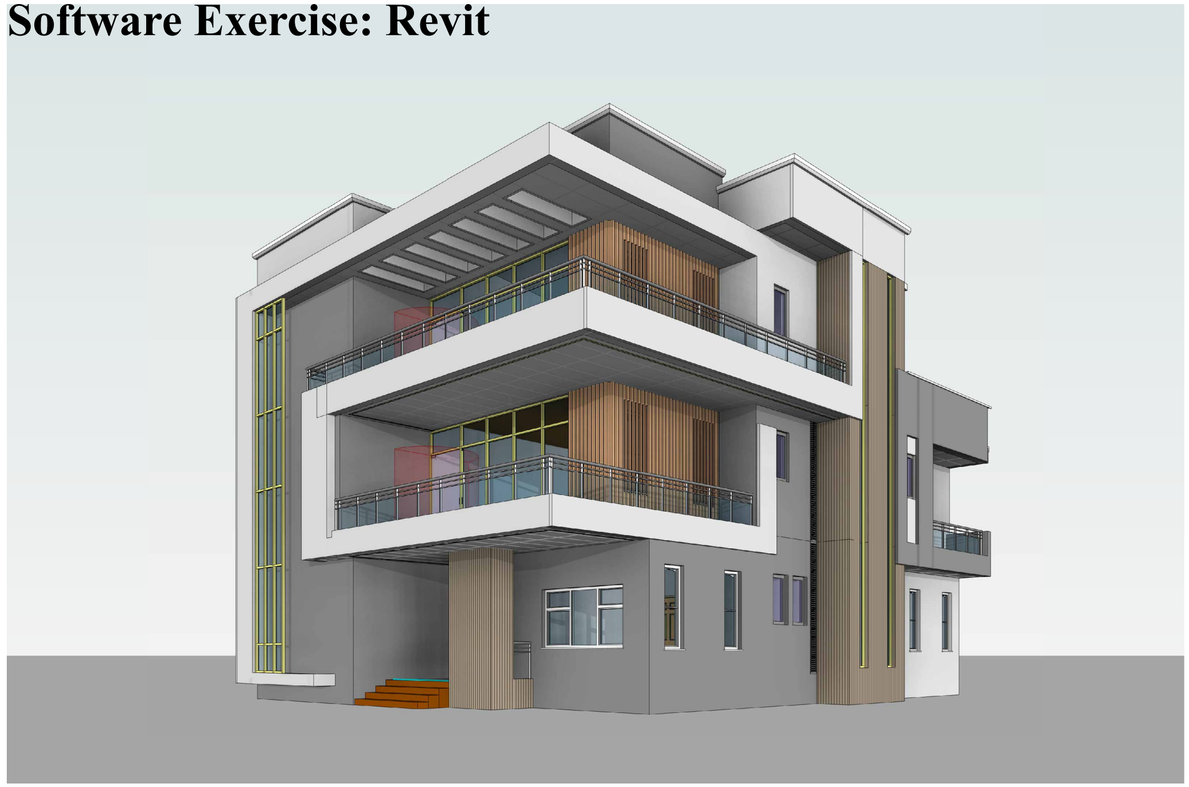


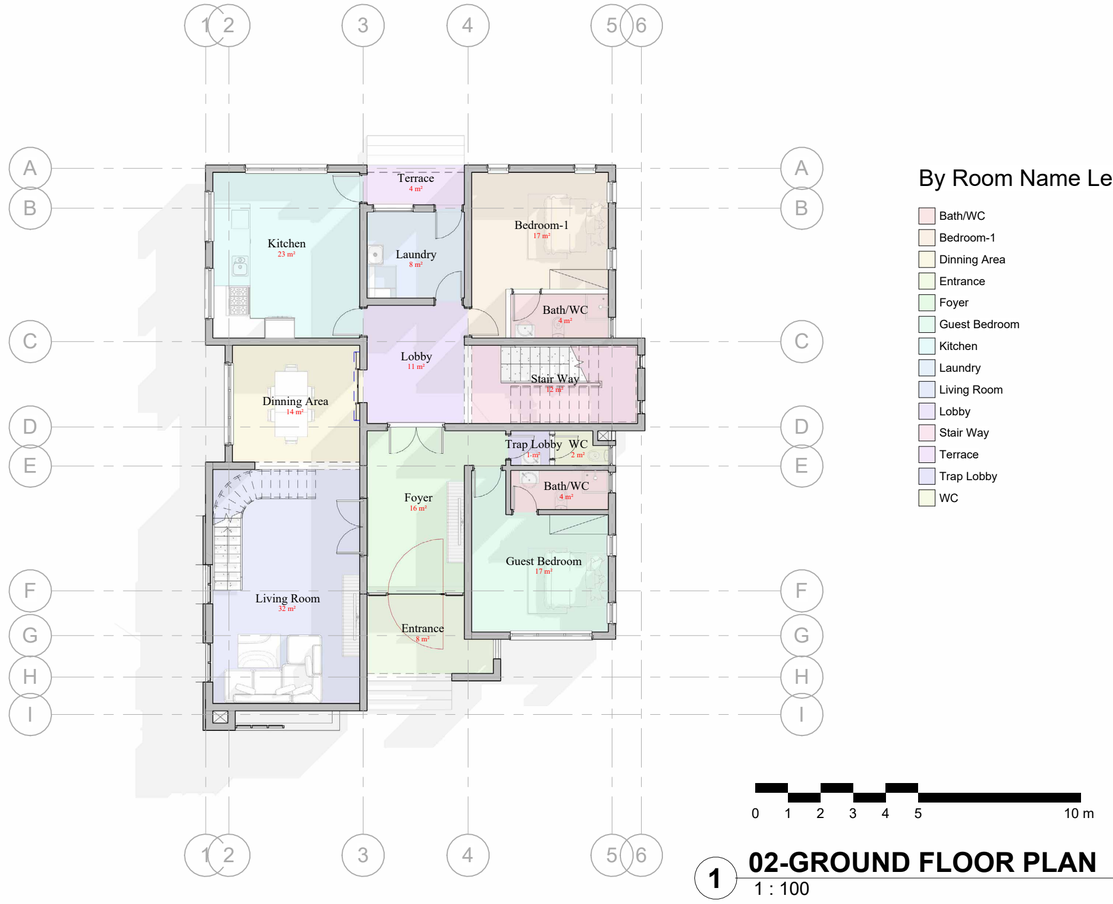






Software Exercise: Revit





1 **02-GROUND FLOOR PLAN**
1 : 100

Thank You for Reviewing!

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