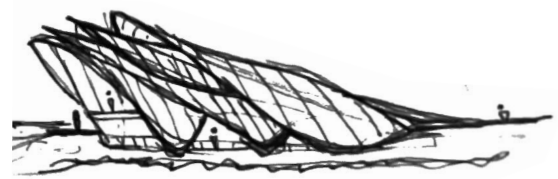




Design Project

Delphine Damiens - Studio 1
MEng Engineering and Architectural Design Year 2
The Bartlett School of Architecture, UCL



This project proposes an intergenerational co-living space for students and elderly residents, anchored by a public café. Set within a park and along the River Lea, the building is designed to be deeply integrated into nature, with framed views, garden access, and open communal spaces that promote wellbeing and connection to the landscape.

The project responds to the often isolating, cramped, and disengaged nature of typical student and elderly housing, offering instead a spatially generous, socially rich alternative. Shared kitchens, lounges, and gardens foster informal exchange, while the café acts as a community hub, hosting events like book clubs and workshops for both residents and local visitors.



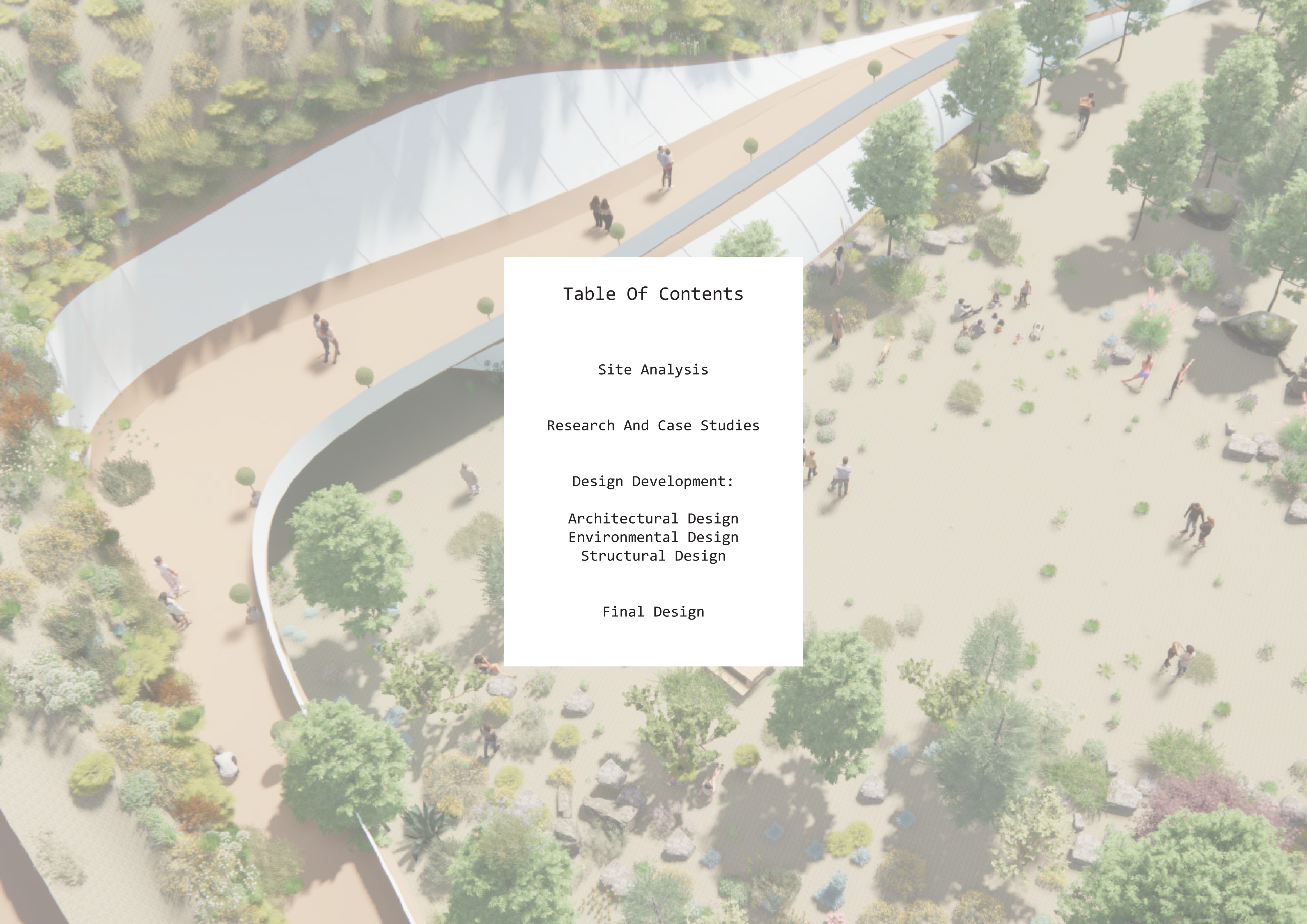
An aerial perspective of a landscaped park. A wide, light-colored path curves through the space, bordered by a low, light-colored wall. The path is populated with several small figures of people walking and standing. To the left of the path is a dense area of green trees and shrubs. To the right is a large, open, sandy area with scattered trees, rocks, and small plants. More people are seen in this open area, some sitting on the ground and others standing. The overall scene is bright and sunny, with shadows cast by the trees and people.

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Site Analysis

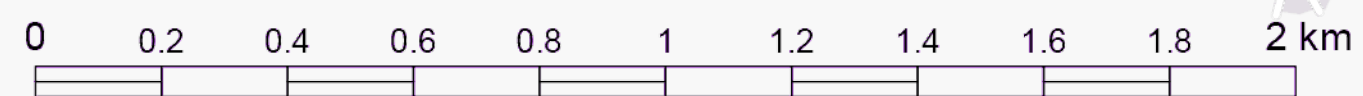
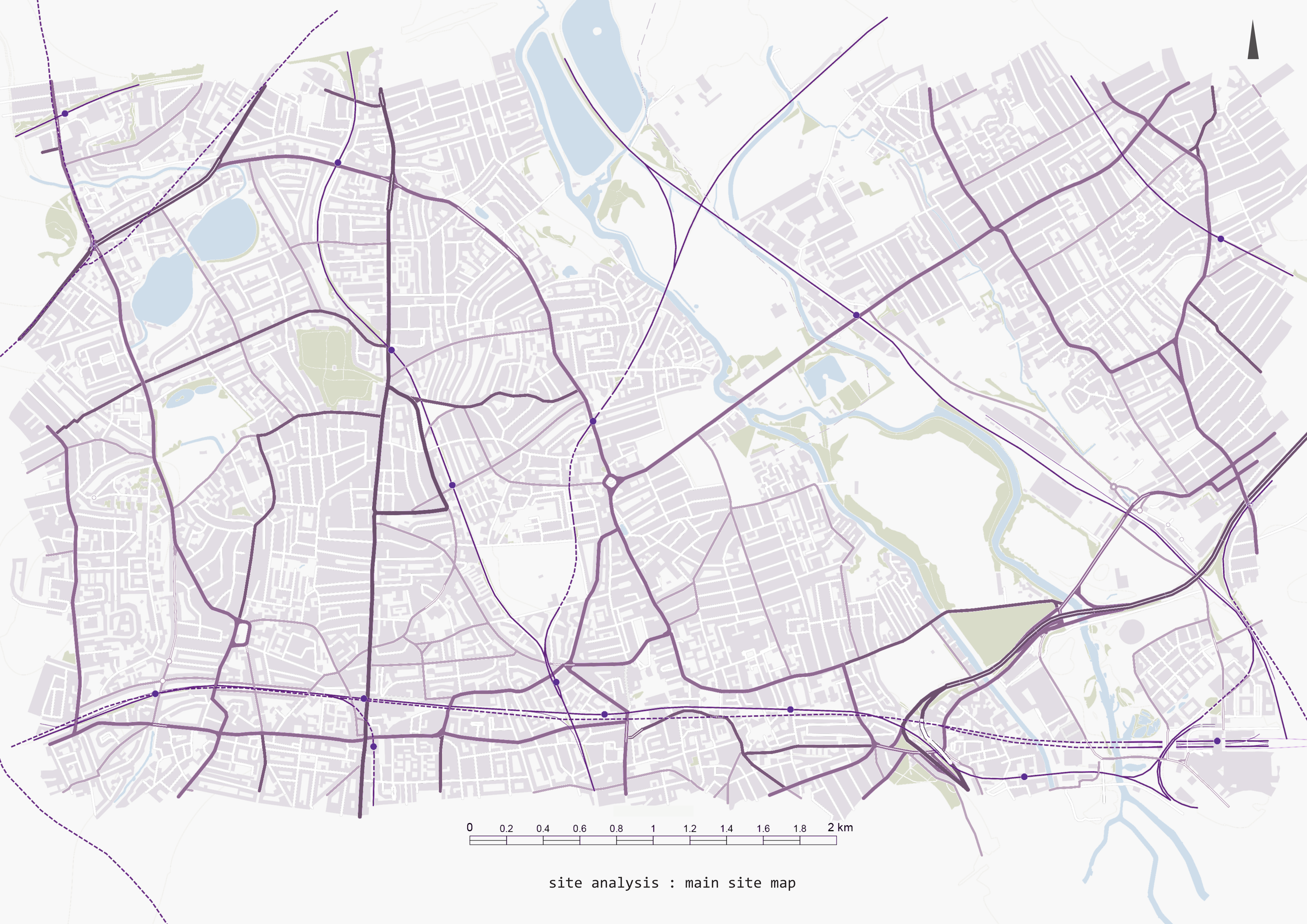
Research And Case Studies

Design Development:

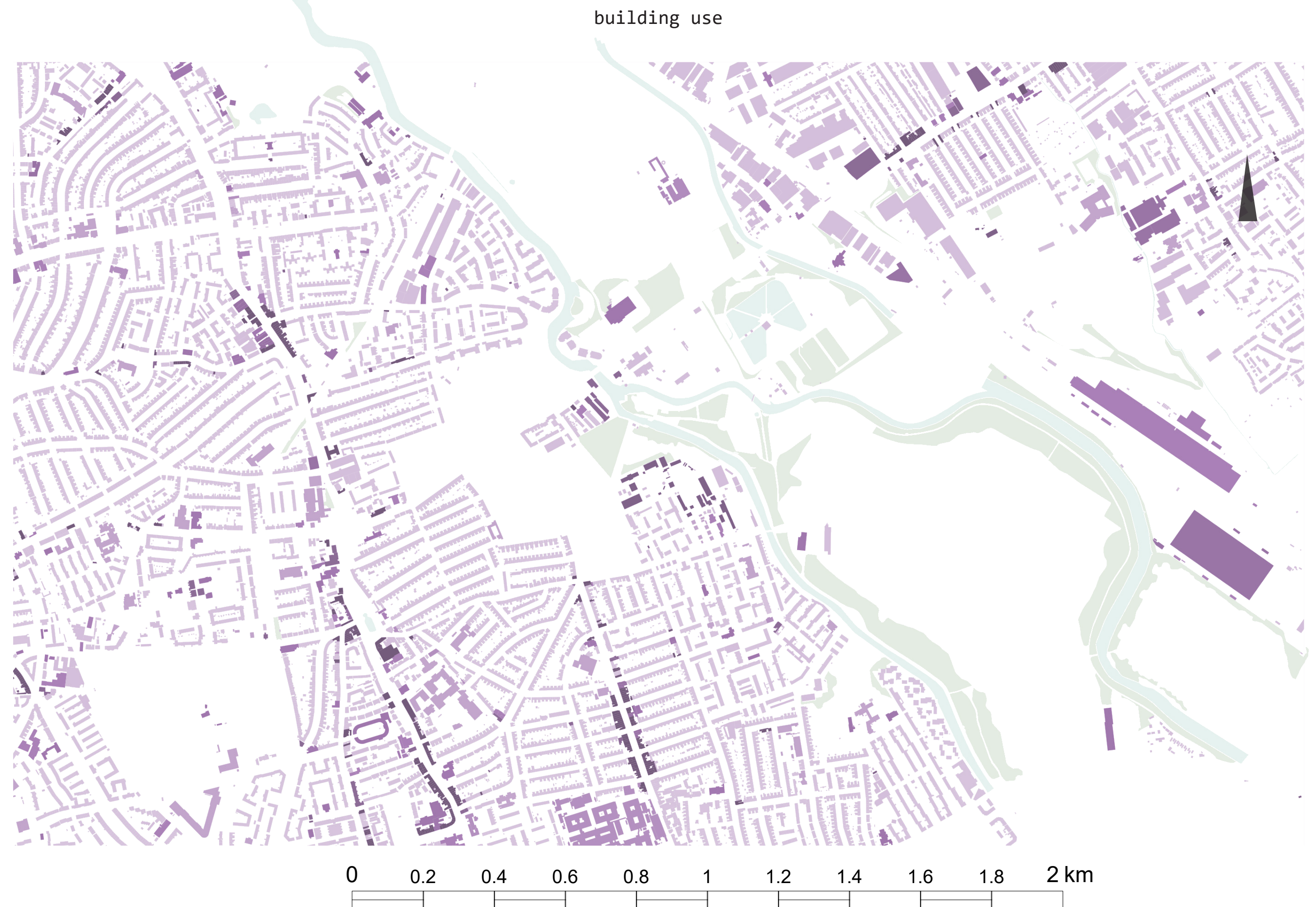
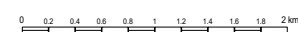
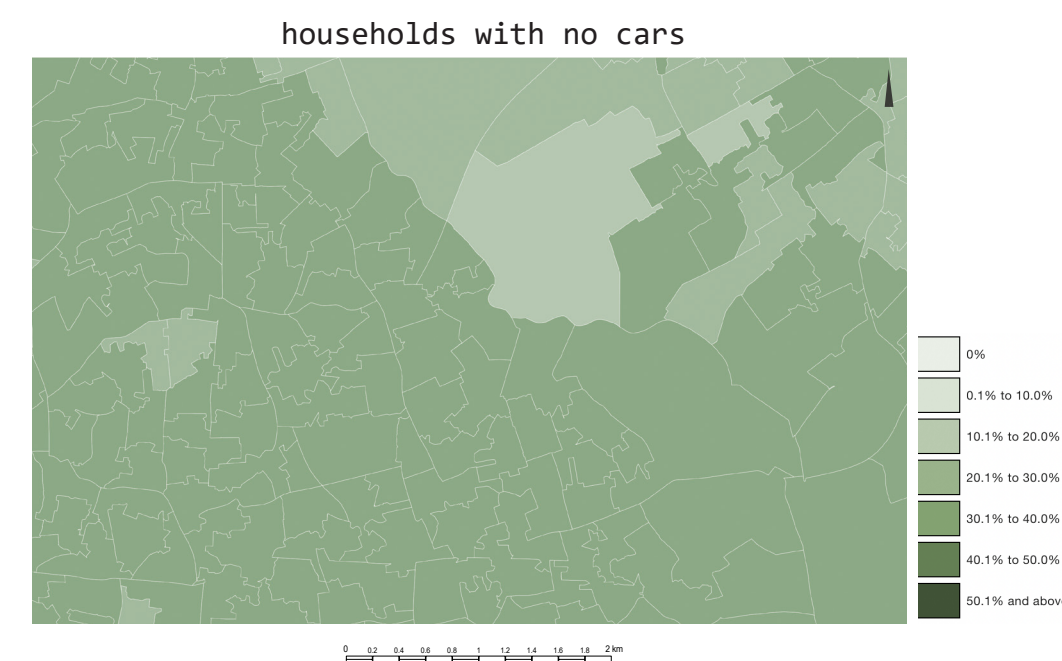
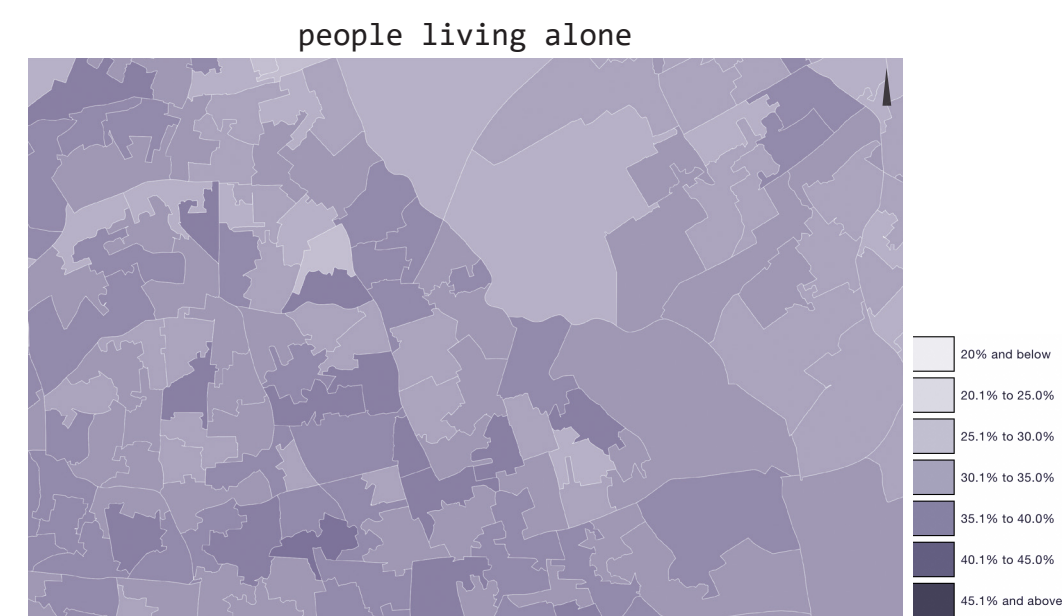
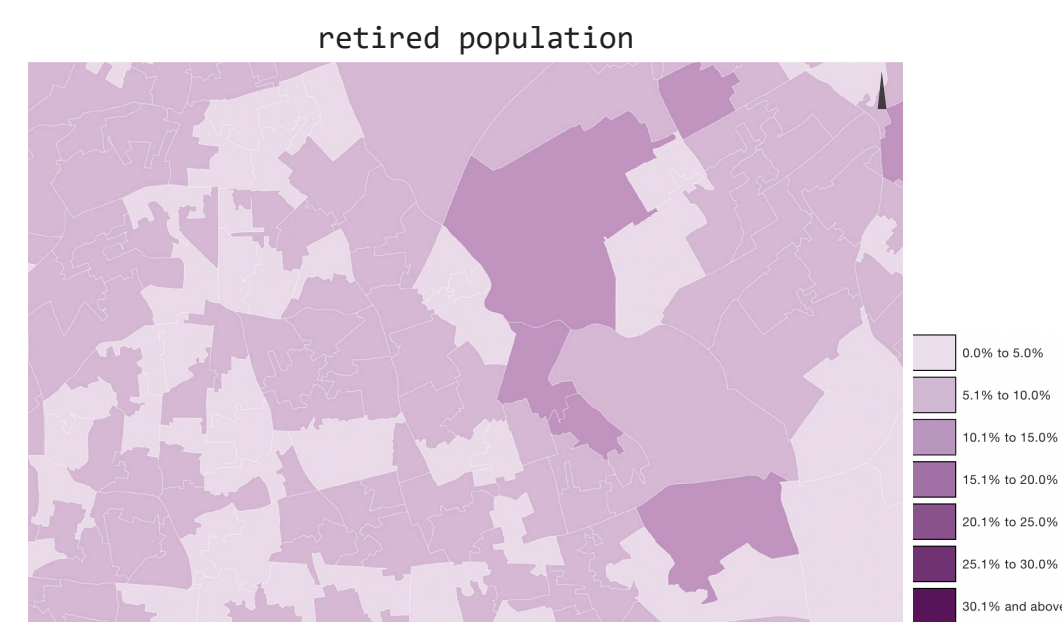
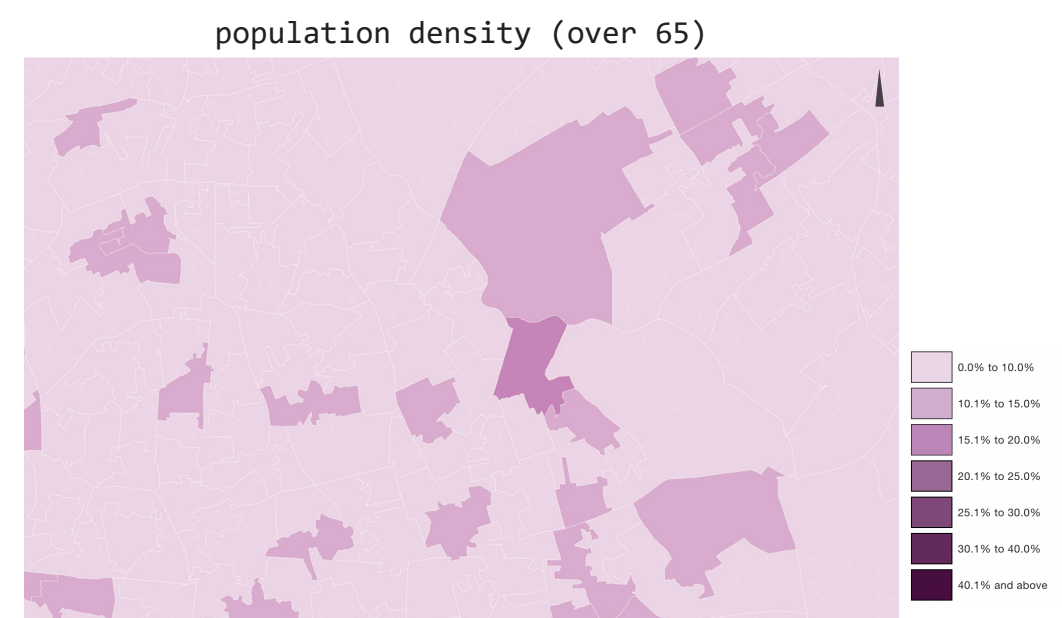
Architectural Design
Environmental Design
Structural Design

Final Design

Site Analysis



site analysis : main site map



site analysis - context

The site is located in a predominantly residential area with many people living alone and a relatively low proportion of elderly residents. This highlighted a social gap, which I aimed to address by bringing communities and generations together.

The surrounding context is mostly housing, with limited communal infrastructure. introducing a public social and welcoming space would create a welcoming area for both residents and locals, a point of exchange and connection, encouraging spontaneous encounters and building a stronger sense of community

site analysis : environmental context

Surrounded by green spaces, the site offers strong potential for nature-based wellbeing. However the nearby fiels lack biodiversity and structured public use, functioning more as a open land than actuve parks. This informed my strategy to create a more engaging and socially activated green space.

tree density map

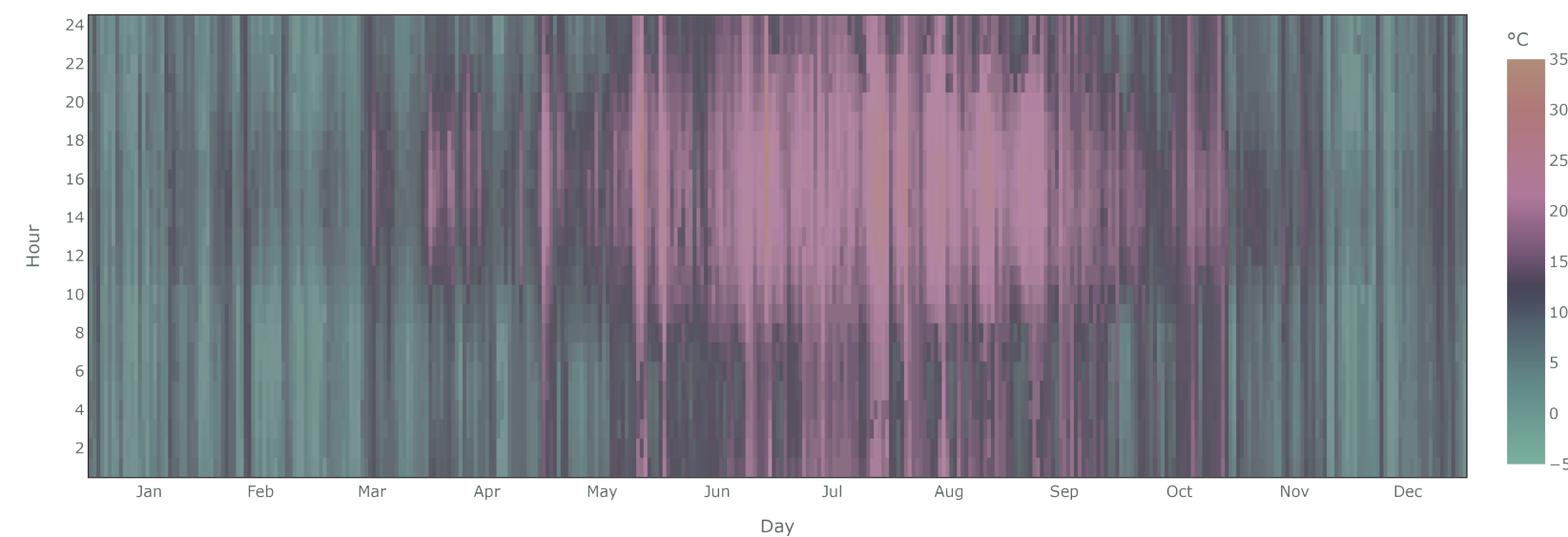
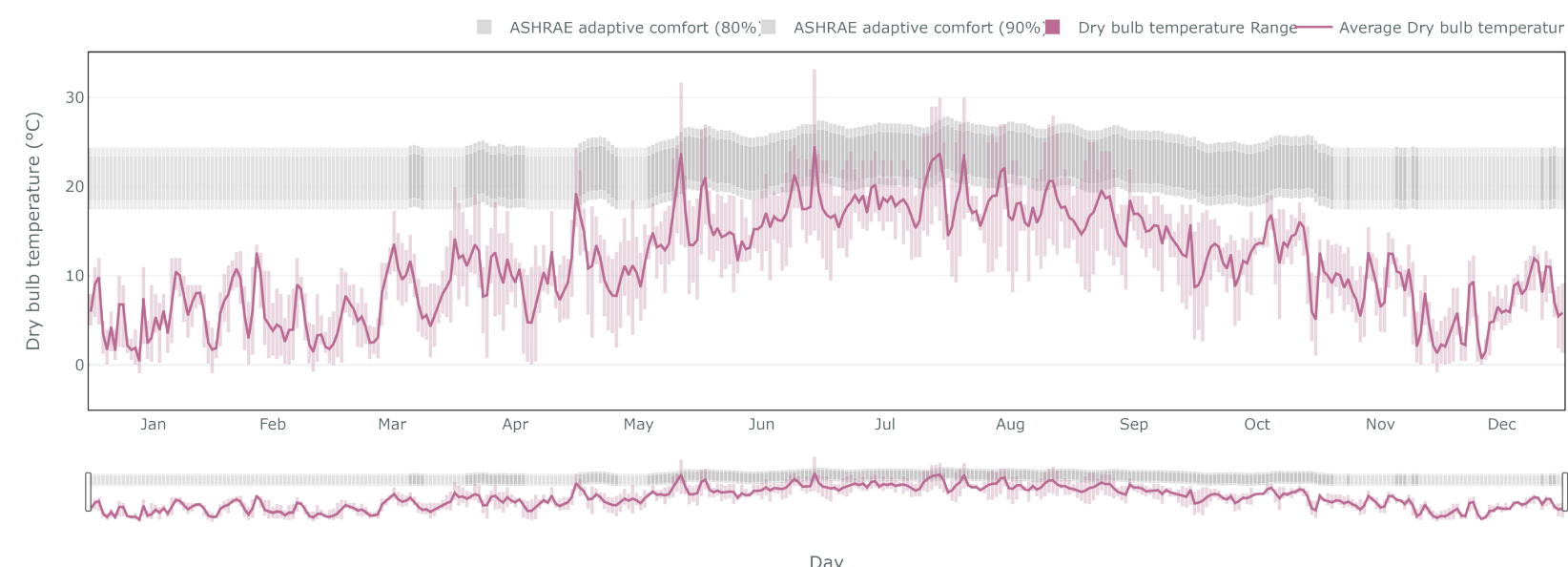
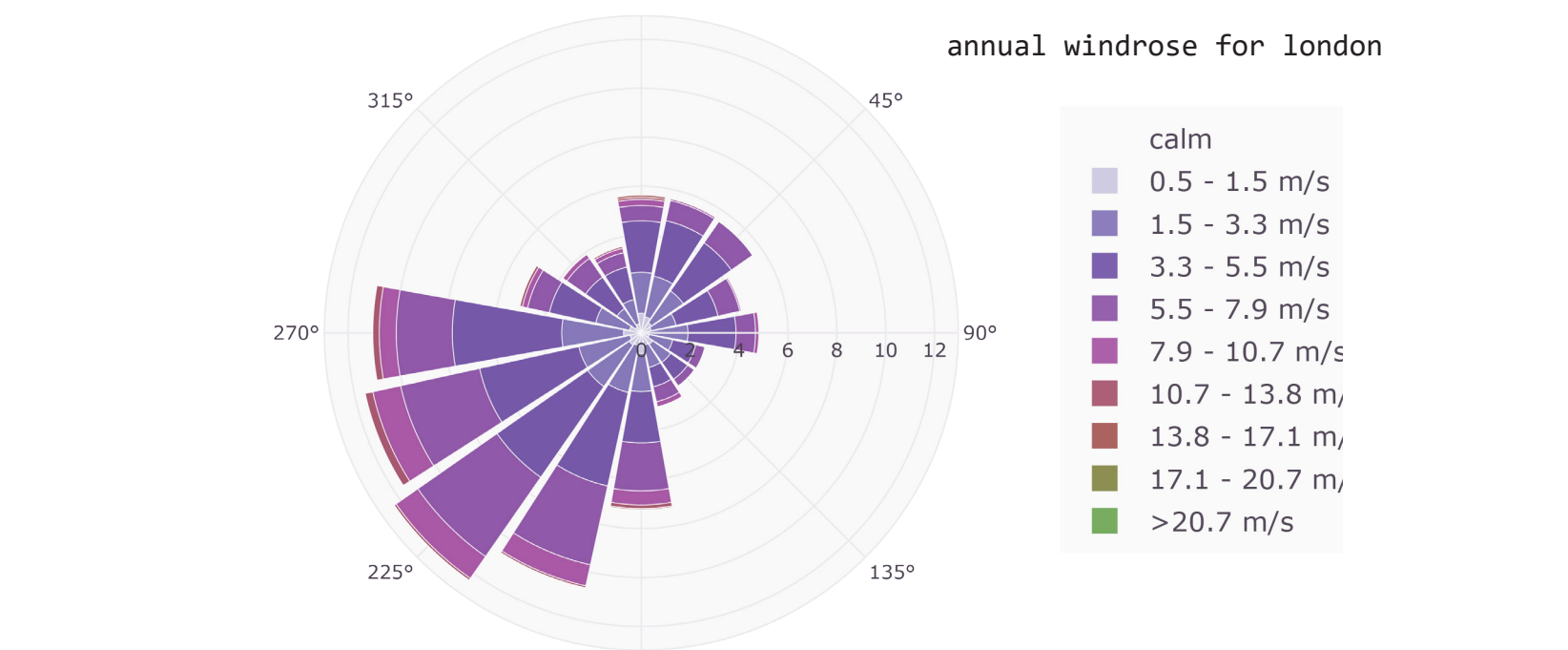


Scale 1:24000
0 0.2 0.4 0.6 0.8 1 1.2 1.4 1.6 1.8 2 km

satellite image of site focused on green areas



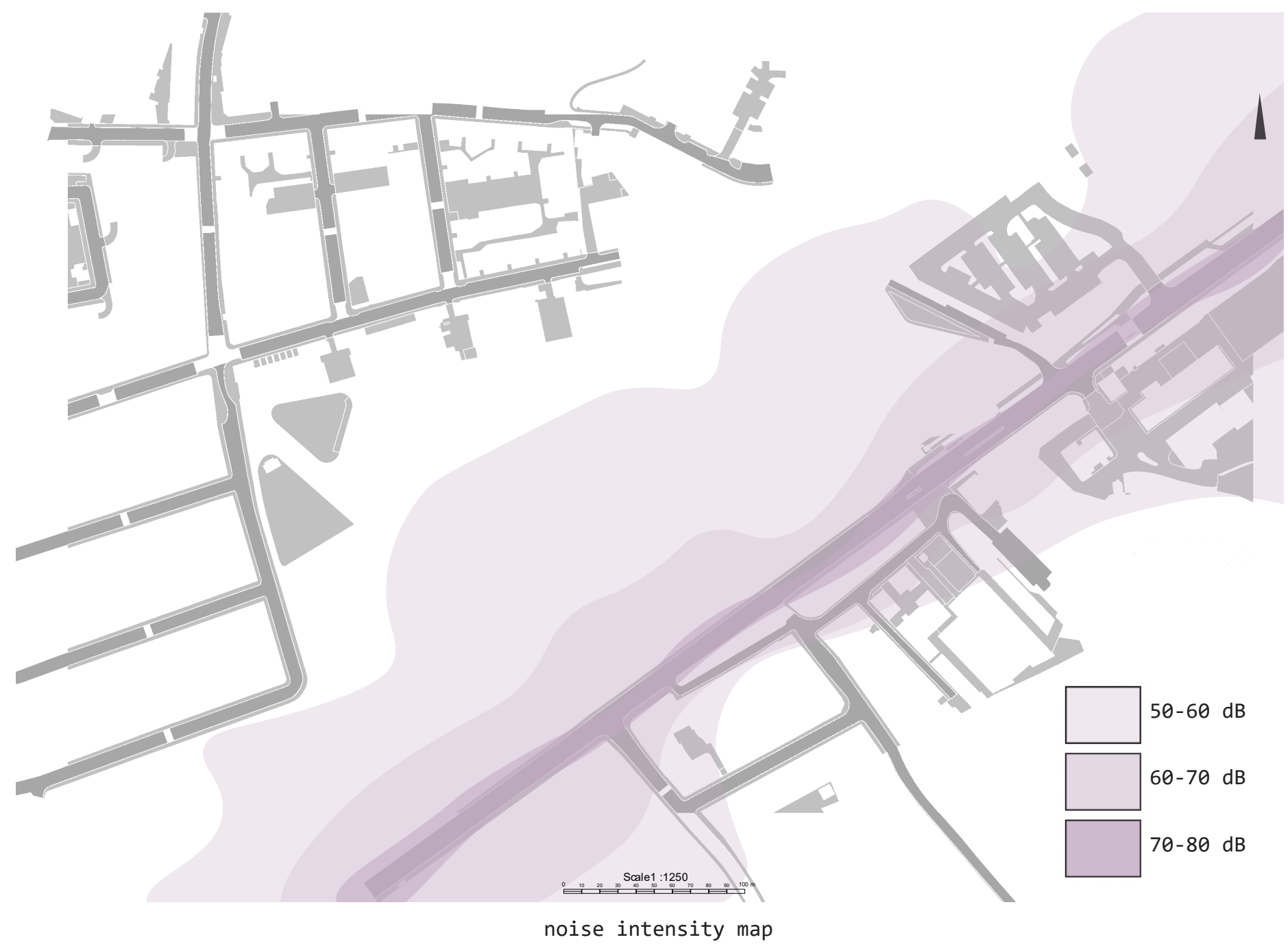
0 0.2 0.4 0.6 0.8 1 1.2 1.4 1.6 1.8 2 km



site analysis : environmental data

The site is located near Lea Bridge Road, a major traffic axis, which resulted in elevated noise levels, especially along the southern edge. This influenced my decisions on facade materials and the careful placement and sizing of apertures to reduce sound pollution in living spaces.

Wind data shows dominant winds from the southwest, which informed the orientation of openings to encourage natural ventilation while avoiding exposure to cold winter gusts. Temperature analysis confirms the need for passive strategies: maximizing winter sun while ensuring summer shading, especially in living spaces.





proposed site map

This site was chosen for its strong balance between accessibility and connection to nature. Located near Lea Bridge Road, it offers easy access by car, which is essential for residents and visitors. At the same time, it is well integrated into the local community, with many residential areas within walking distance. The site is easily reachable by foot, without the need to cross major barriers like bridges, making it ideal for everyday use for visitors and residents of all ages.

Surrounded by open green fields and close to River Lea, the site offers a peaceful, natural atmosphere that contrasts with the busyness of central London. The presence of water and greenery helps create a calming environment, with potential for natural soundscapes, views and outdoor activities, all of which support mental and physical well-being.

Research and Case Studies

There's a quiet kind of healing that happens when generations live side by side. In a city like London, where isolation is rising and space is scarce, rethinking how we live together is no longer optional, it's necessary.

Intergenerational Living



In a time when loneliness affects both young and old, intergenerational living offers a powerful alternative to traditional housing. By bringing students and older adults together, it creates a shared environment built on everyday connection, exchange, and mutual care. It's not just about coexistence—it's about forming a small community where different generations support and learn from one another.

This model encourages a slower, more human way of living, where daily life is enriched by difference rather than divided by age. Older adults stay socially engaged and feel valued, while younger people benefit from presence, wisdom, and emotional grounding. Unlike conventional housing that isolates by default, intergenerational living creates the conditions for spontaneous interaction, empathy, and belonging—making home a place where people are not only housed, but genuinely connected.

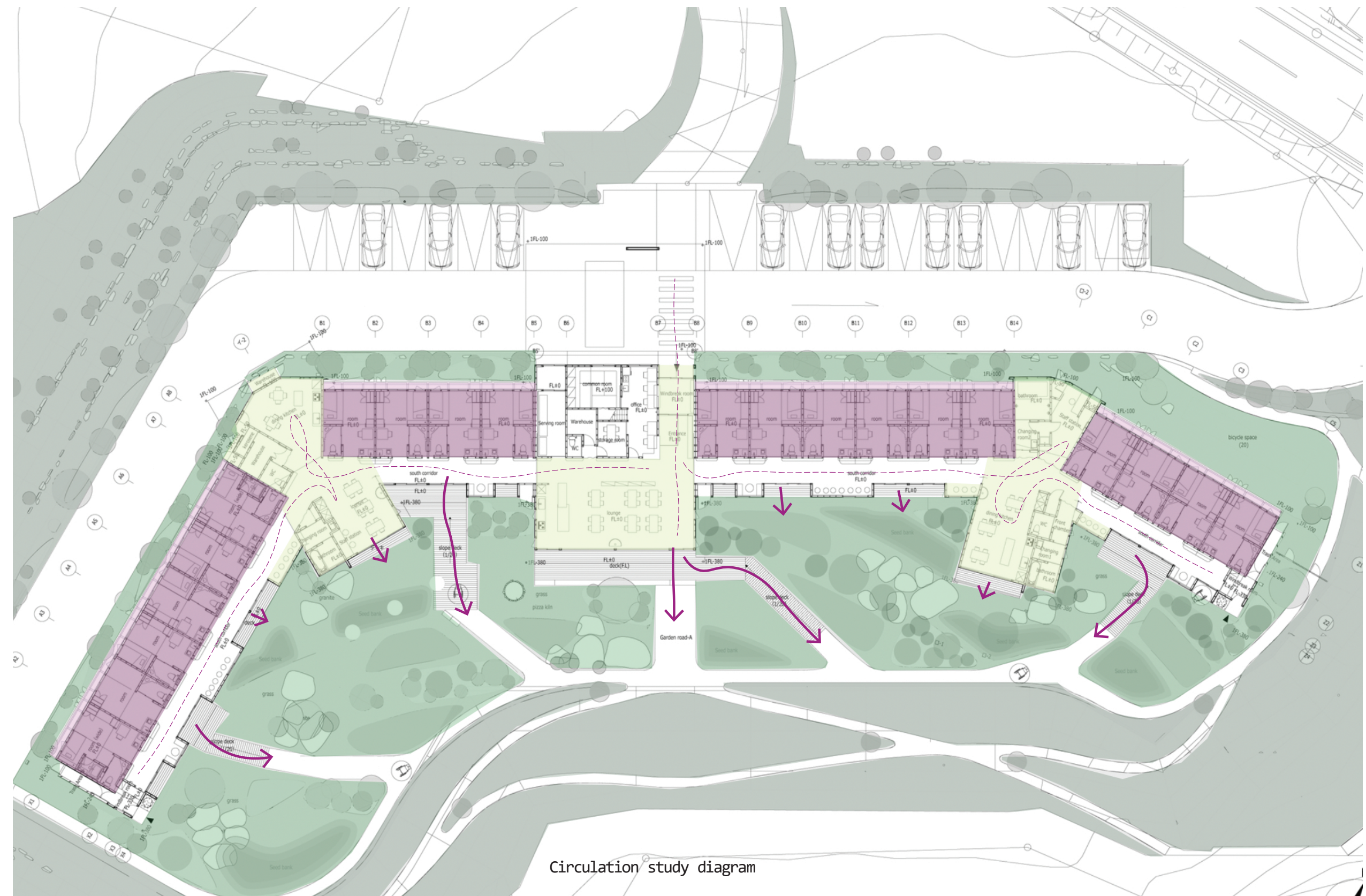
In this area, intergenerational living is rare and often polarized—either large-scale retirement complexes, where real interaction is limited, or one-to-one room exchanges, which can feel risky or too intense. This project proposes a balanced, mid-scale model: structured enough to support community, but intimate enough to allow for meaningful, everyday connection.

Hokkori-Ya

Elderly House in Rikuzentakata, Japan
The University of Tokyo Architectural Planning
& Design Lab + DOG

Hokkori-Ya inspired my intergenerational housing project through its strong connection to nature, elongated layout, and thoughtful use of materials. The building's openings and orientation create constant visual links to the landscape, while private balconies offer outdoor privacy.

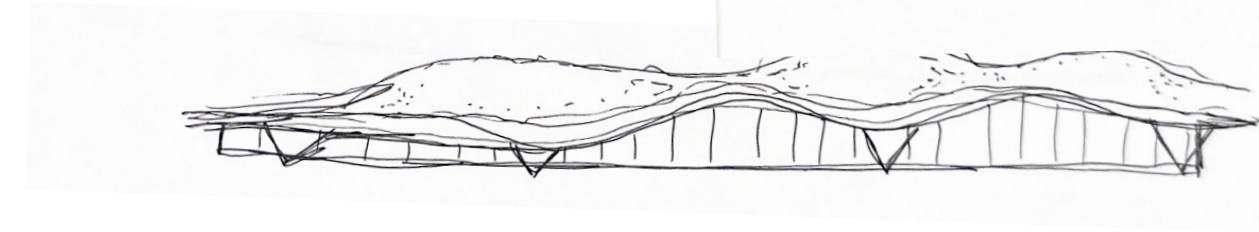
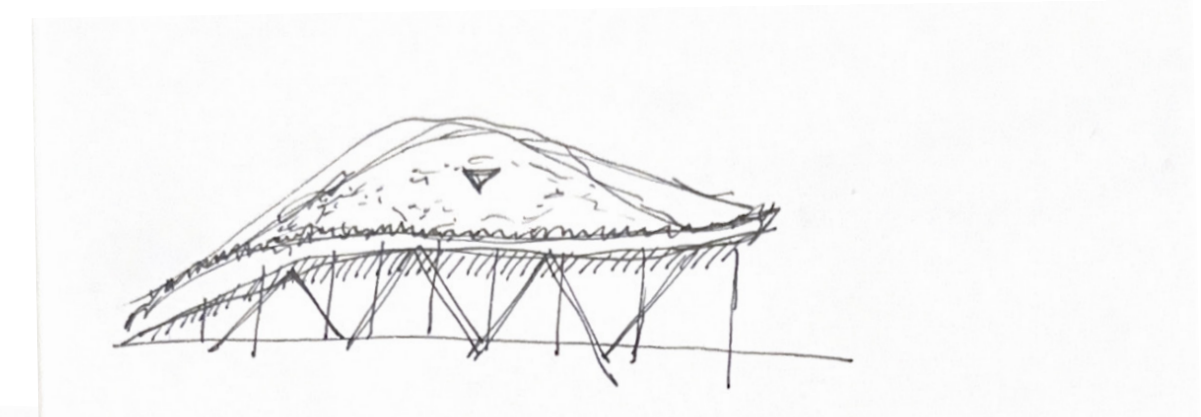
Its accessible, single level design influenced my approach to minimizing level changes and encouraging ease of movement. The warm use of wood creates a comforting, domestic atmosphere, which aligns with the welcoming environment I want to foster. Overall, Hokkori-Ya inspired me in blending privacy, openness and community in a natural setting.



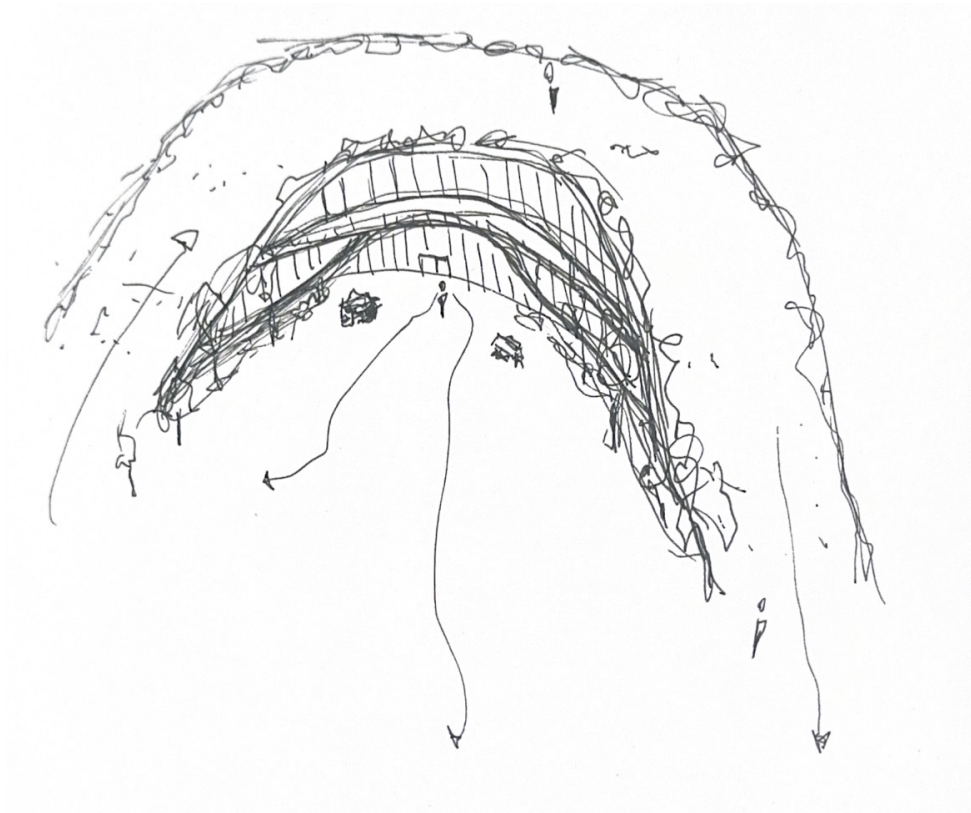
design references: macallan distillery & seed pavilion



macallan distillery
craigellachie, scotland
rogers stirk harbour + partners
2018



the seed pavilion for barilla
emilia-romagna, italy
palette architecture
competition entry 2019



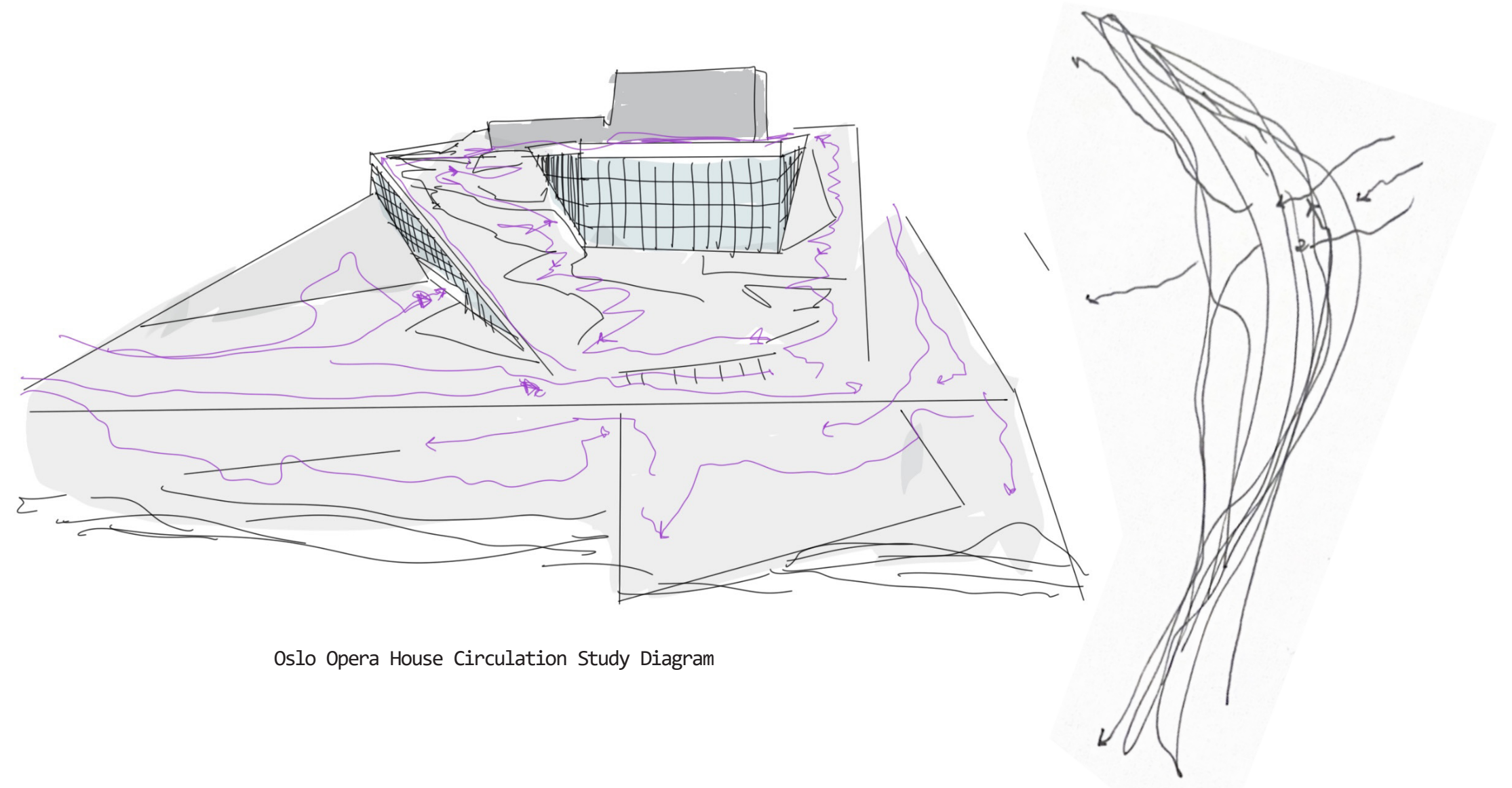
Oslo Opera House

Snøhetta, 2003-2007
Oslo, Norway

The Oslo Opera House served as a key case study for this project, particularly in understanding how ramps and inclined surfaces can shape public movement and interaction.

Its sloping roof and open access allow people to walk over, around, and through the building, blurring the line between architecture and public space. This inspired the use of ramps and gentle inclines in my own design, not only to manage circulation but to create an inviting, playful environment.

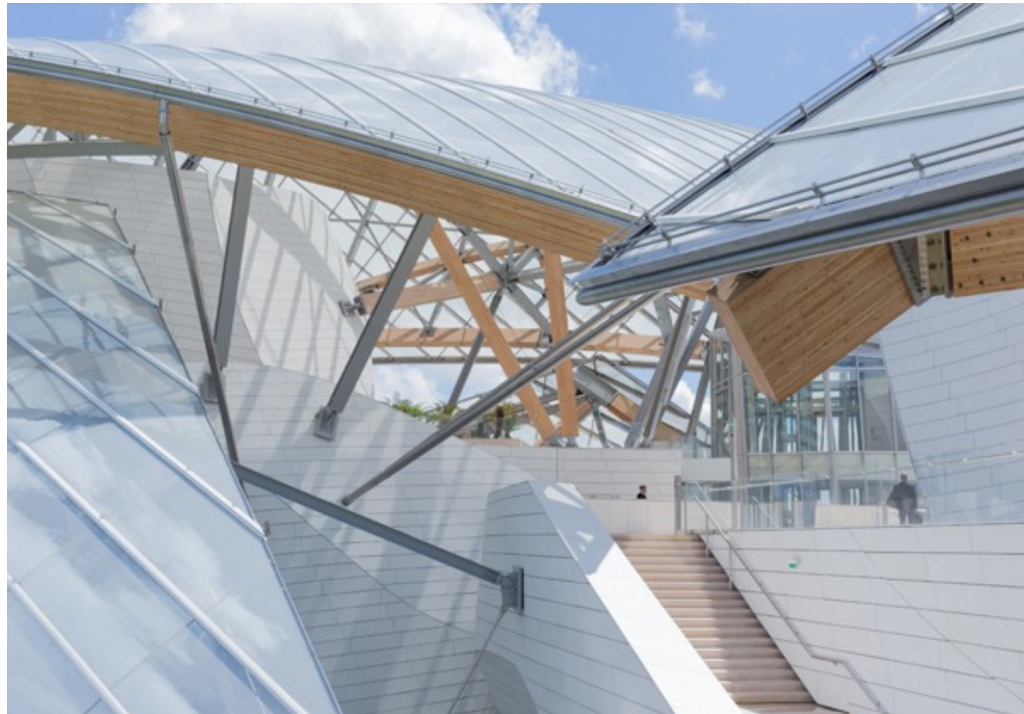
Like in Oslo, the aim was to make the building feel open and accessible—a place that naturally draws in passers-by and encourages exploration.



Oslo Opera House Circulation Study Diagram

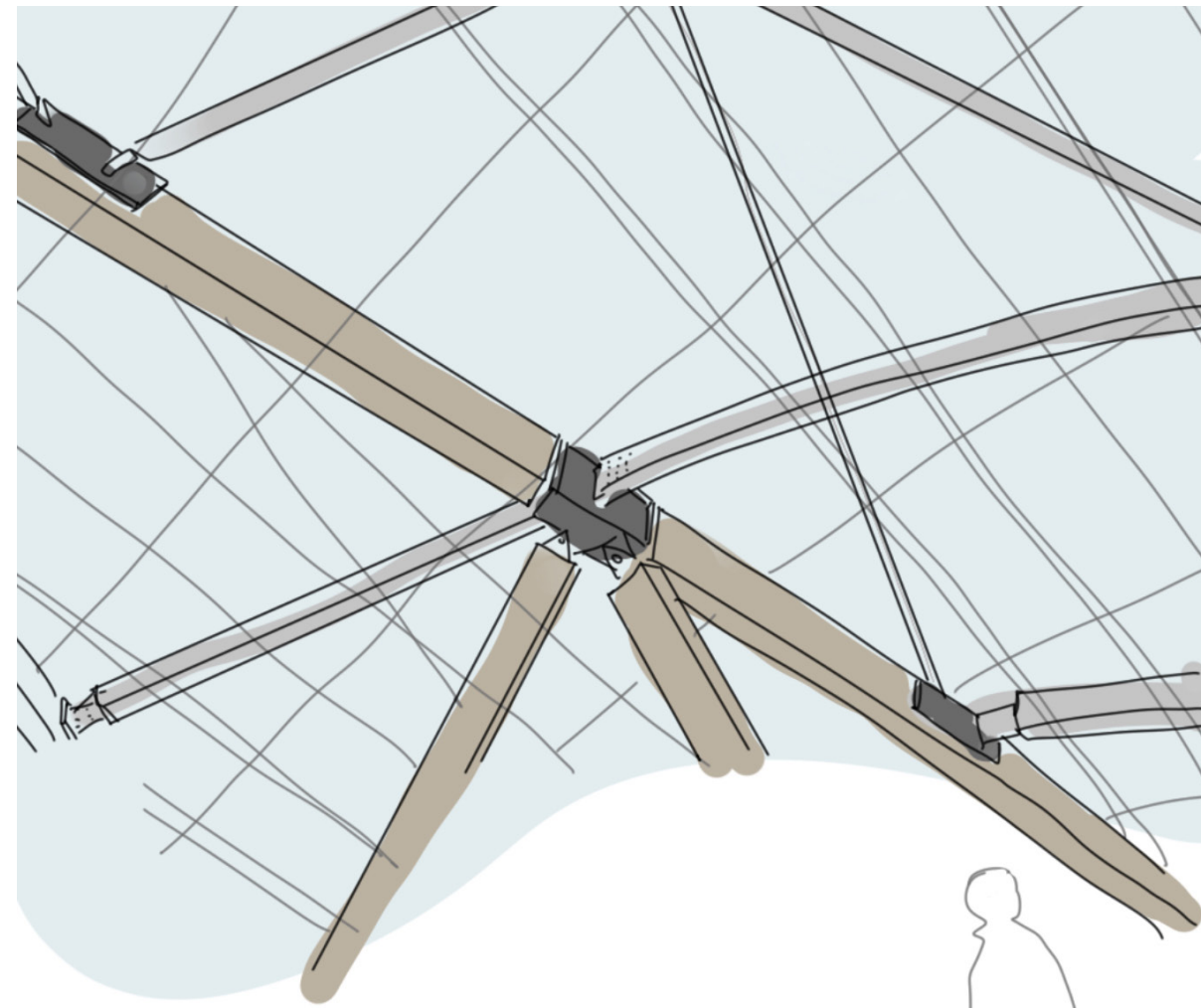
Personal Design Circulation Diagram



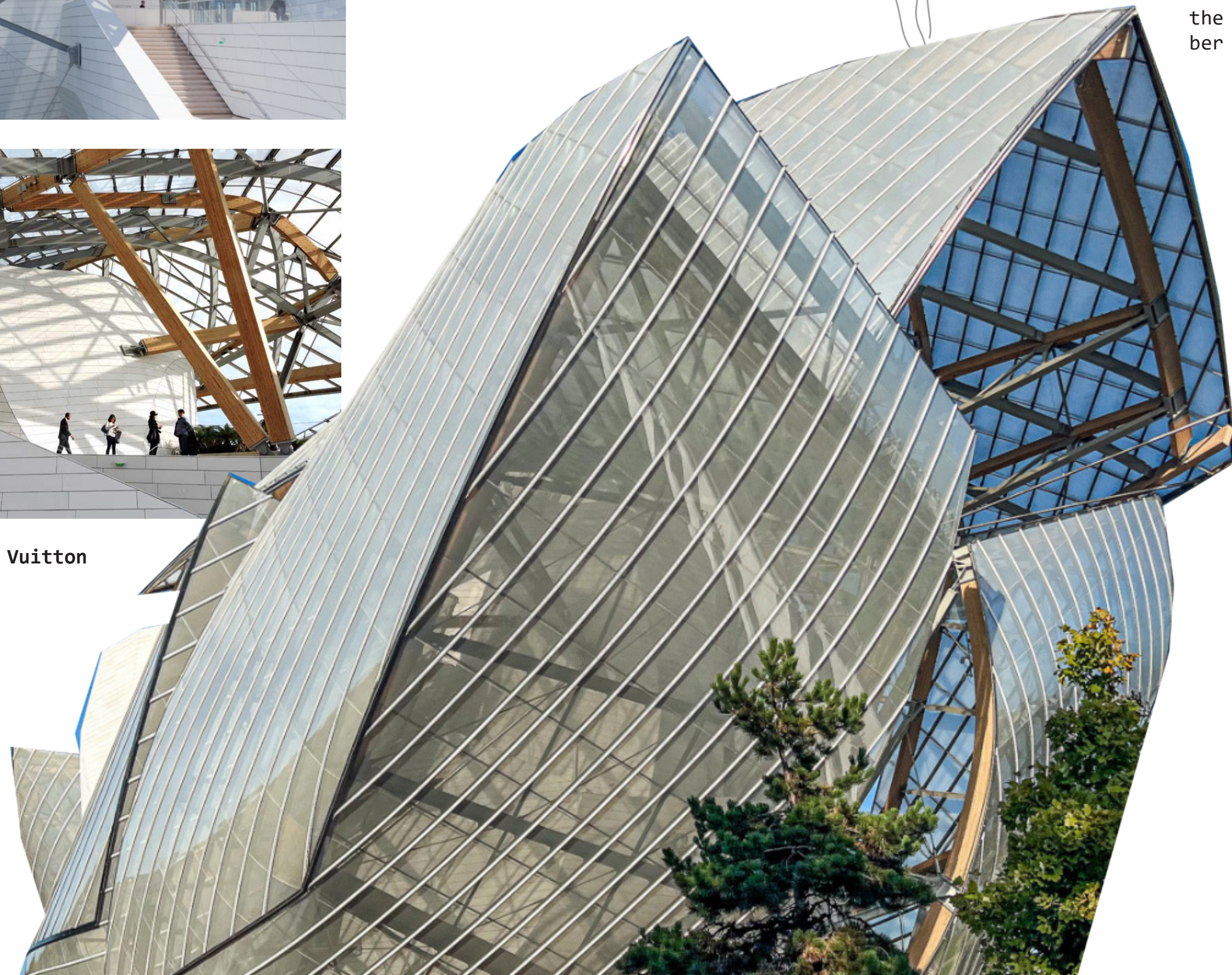


Foundation Louis Vuitton

Frank Gehry,
Paris, France
2014



Structures Study Diagram



Through my analysis of the Fondation Louis Vuitton, I was particularly inspired by its innovative structural system, where timber elements play a central architectural role.

The use of wooden trusses, columns, and beams creates a warm, organic atmosphere while also supporting the complex geometry of the building. I was especially drawn to the integration of skylight panels between these structural elements, which play with transparency and allow natural light to filter through in ever-changing ways.

This interplay of light, structure, and material creates a dynamic and inviting interior, showing how technical systems can contribute to both spatial and emotional impact. Studying this approach deepened my understanding of how structure can shape experience and guided my thinking about the expressive potential of timber and daylight in architecture.

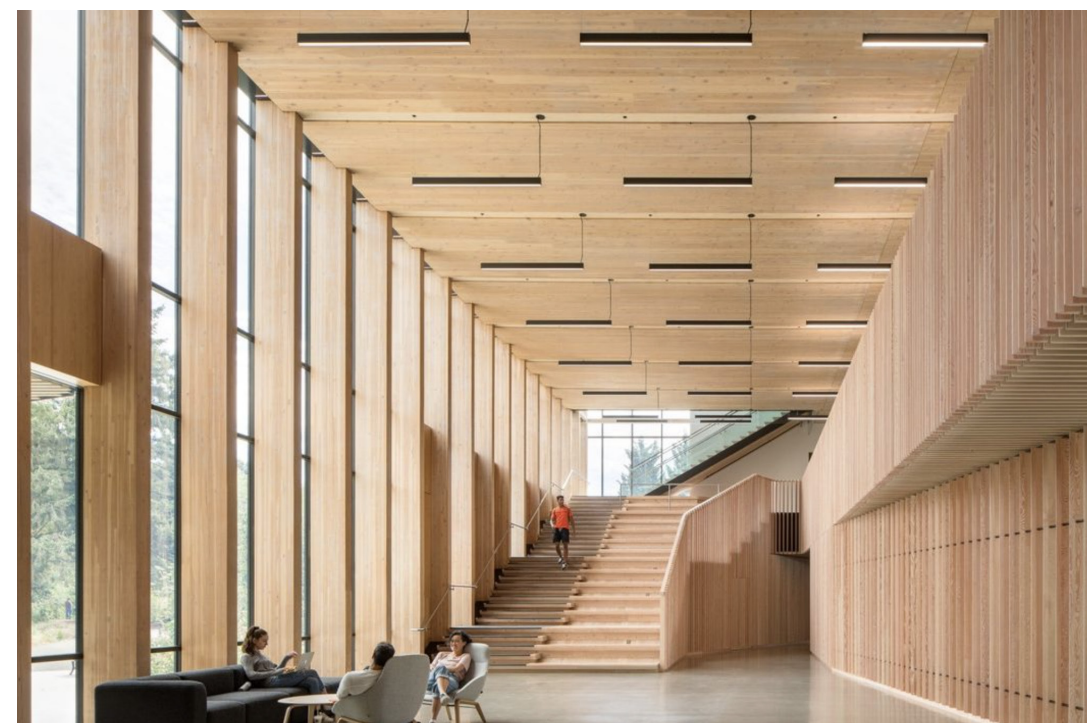
Materiality

The roof was initially designed in concrete for its sculptural flexibility and ability to span long distances, making it ideal for the building's curved form. However, it has since been reconsidered in timber to reduce embodied carbon and align with the project's overall sustainability goals. Timber offers a lighter, renewable alternative while still allowing for modular prefabrication and expressive geometry.

Walls offer two options: CLT for a warm, natural interior in private areas—quick to assemble, low-carbon, and visually rich—or hybrid concrete with timber cladding, extending the roof's materiality and providing thermal mass for high-traffic zones like the café. Concrete floor slabs create a continuous structural system with the roof, offering fire safety, durability, and compatibility with radiant heating.

The mezzanine offers either exposed timber (CLT or glulam) for a light, cozy aesthetic and easy prefab construction, or a slim steel frame with a timber deck—ideal for a café atmosphere with warmth and elegance.

Henning Larsen Architects
World of Volvo,
Gothenburg, Sweden
2024



Michael Green Architecture
College of Forestry at Oregon State University,
Corvallis, USA
2024



dRMM, Maggie's Center,
Oldham, UK
2017



Heatherwick Studio,
Maggie's Center, Leeds,
UK, 2020

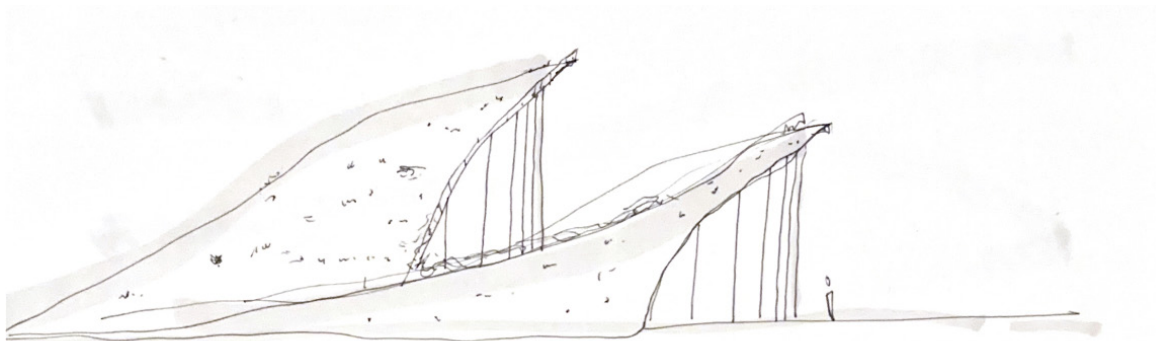
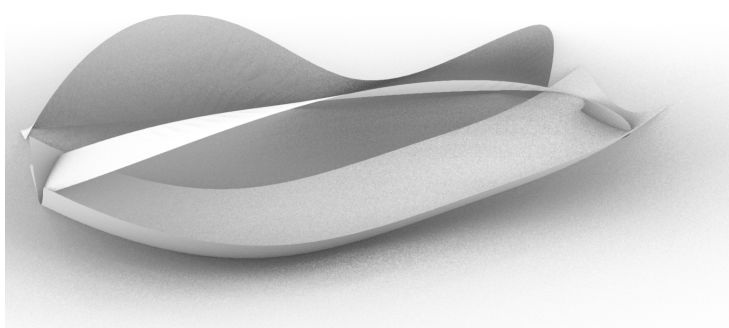
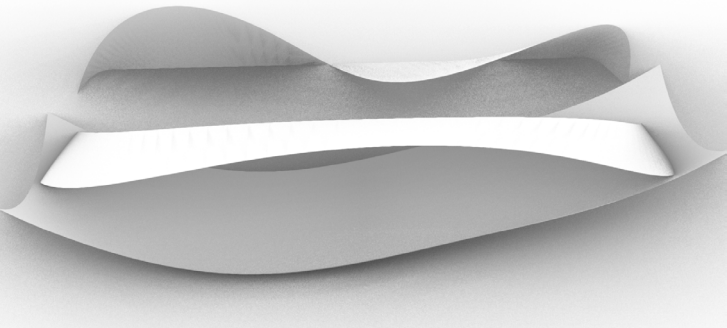
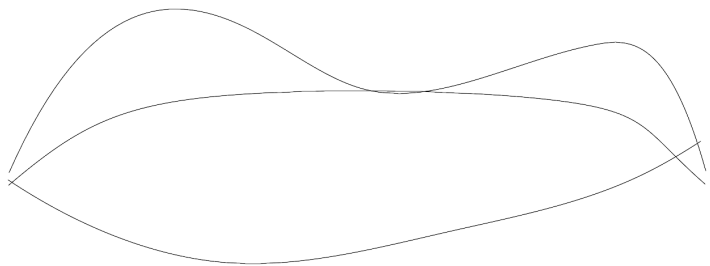
Design Development
Architectural Design

design concept iterations : paper models, 3D modelling and sketches

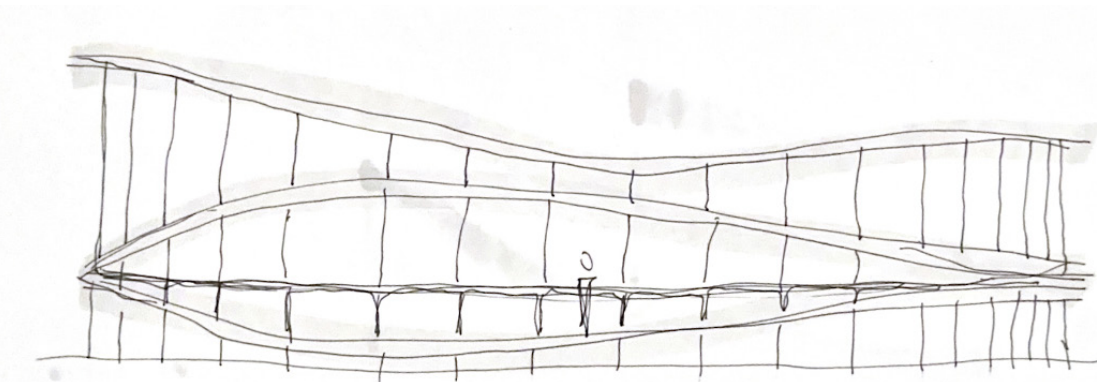
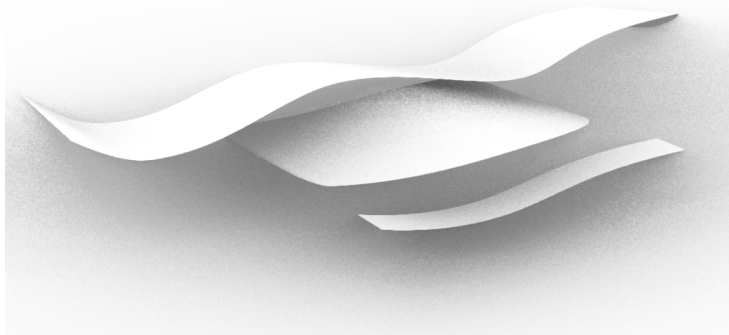
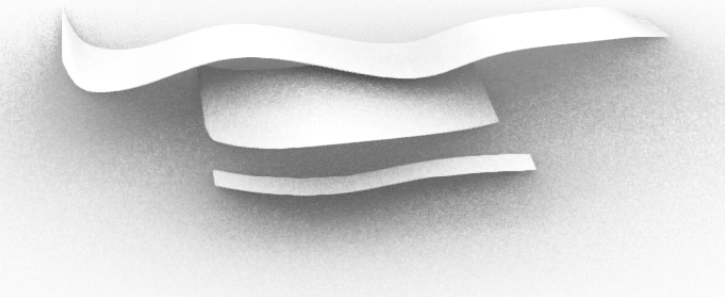
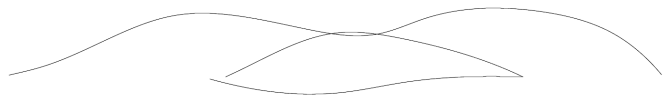
paper modelling - research



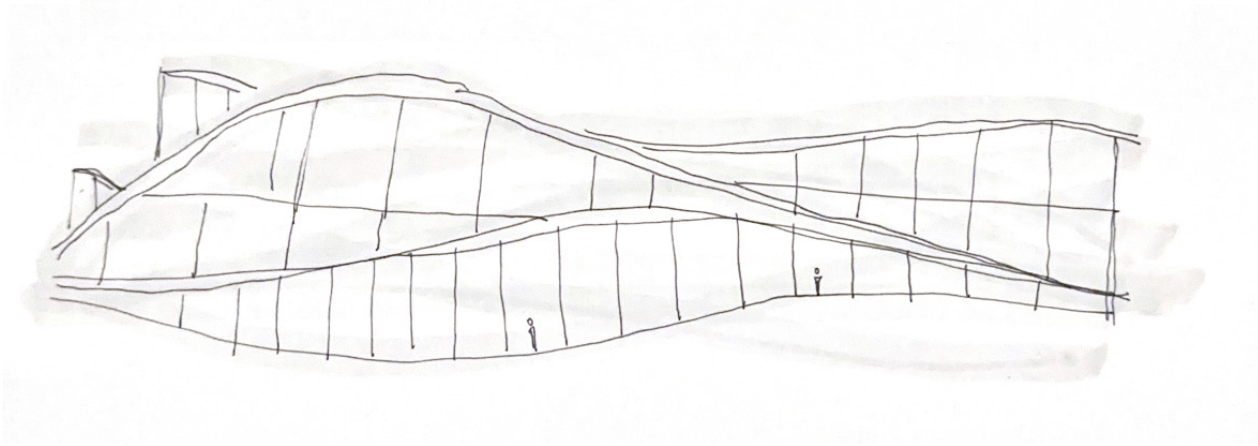
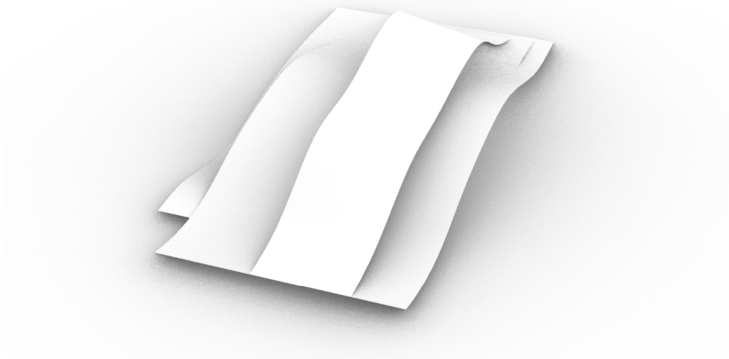
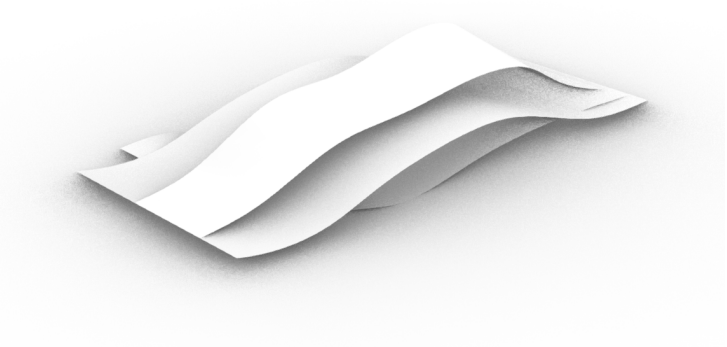
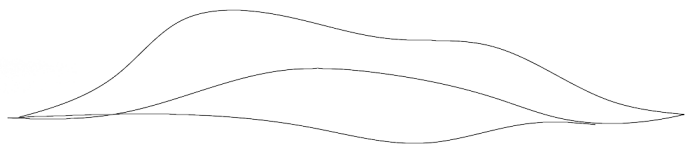
shape 3



shape 2



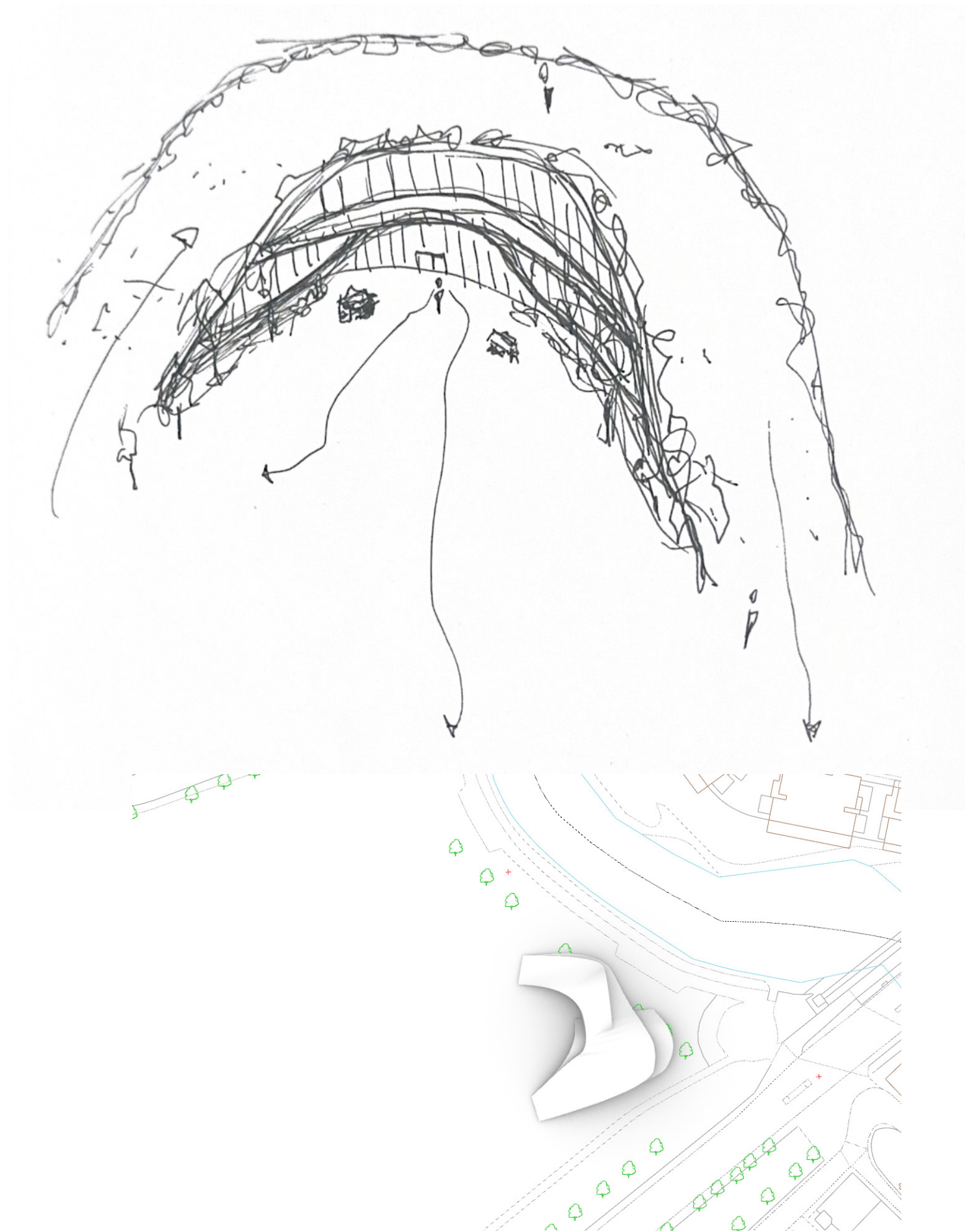
shape 1



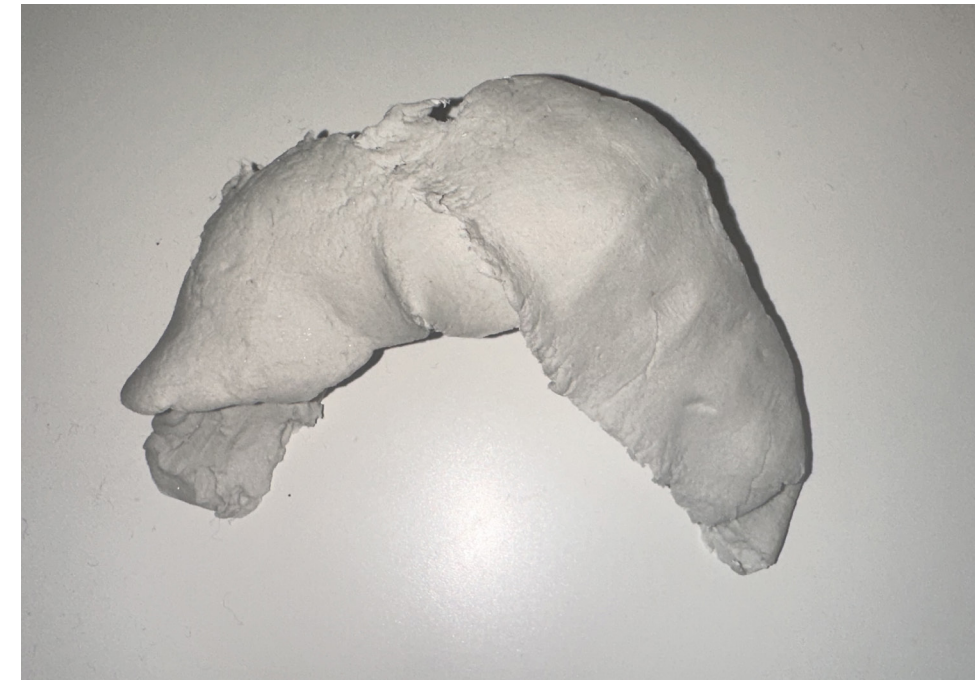
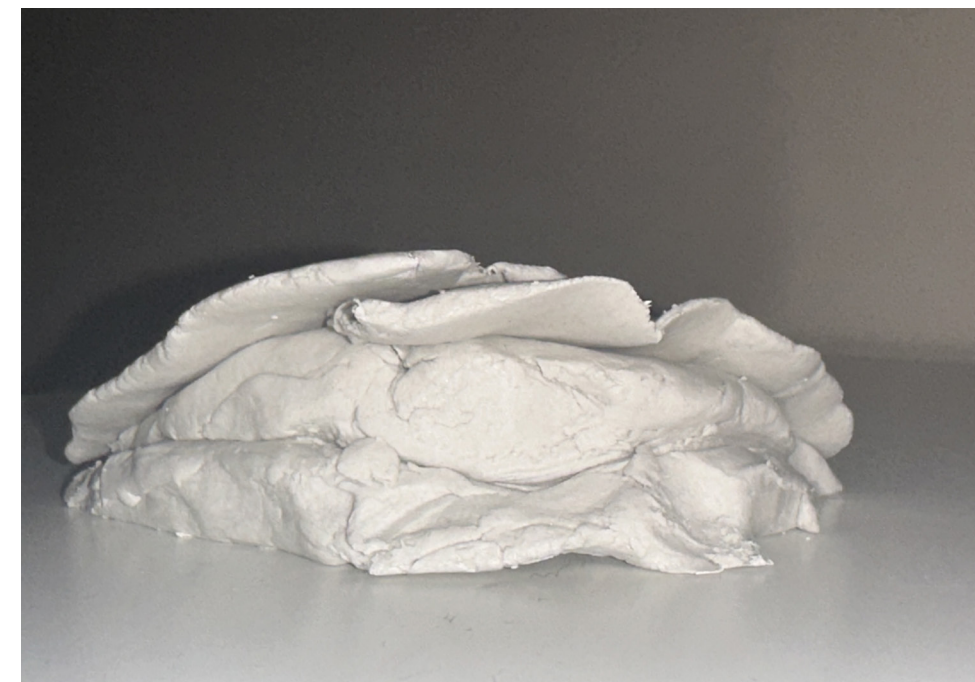
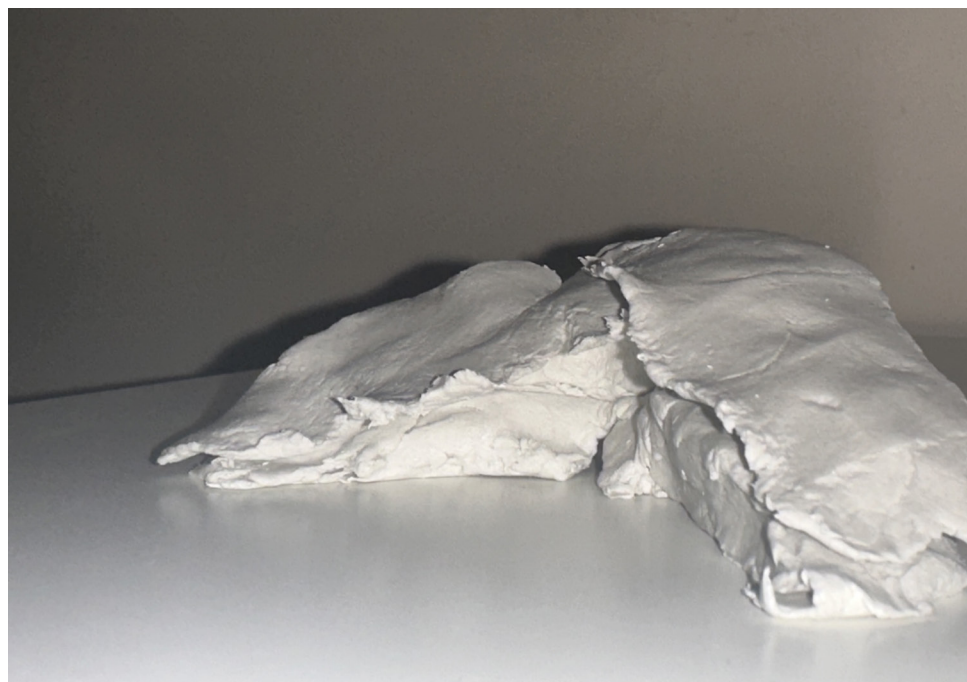
linework

extrusions

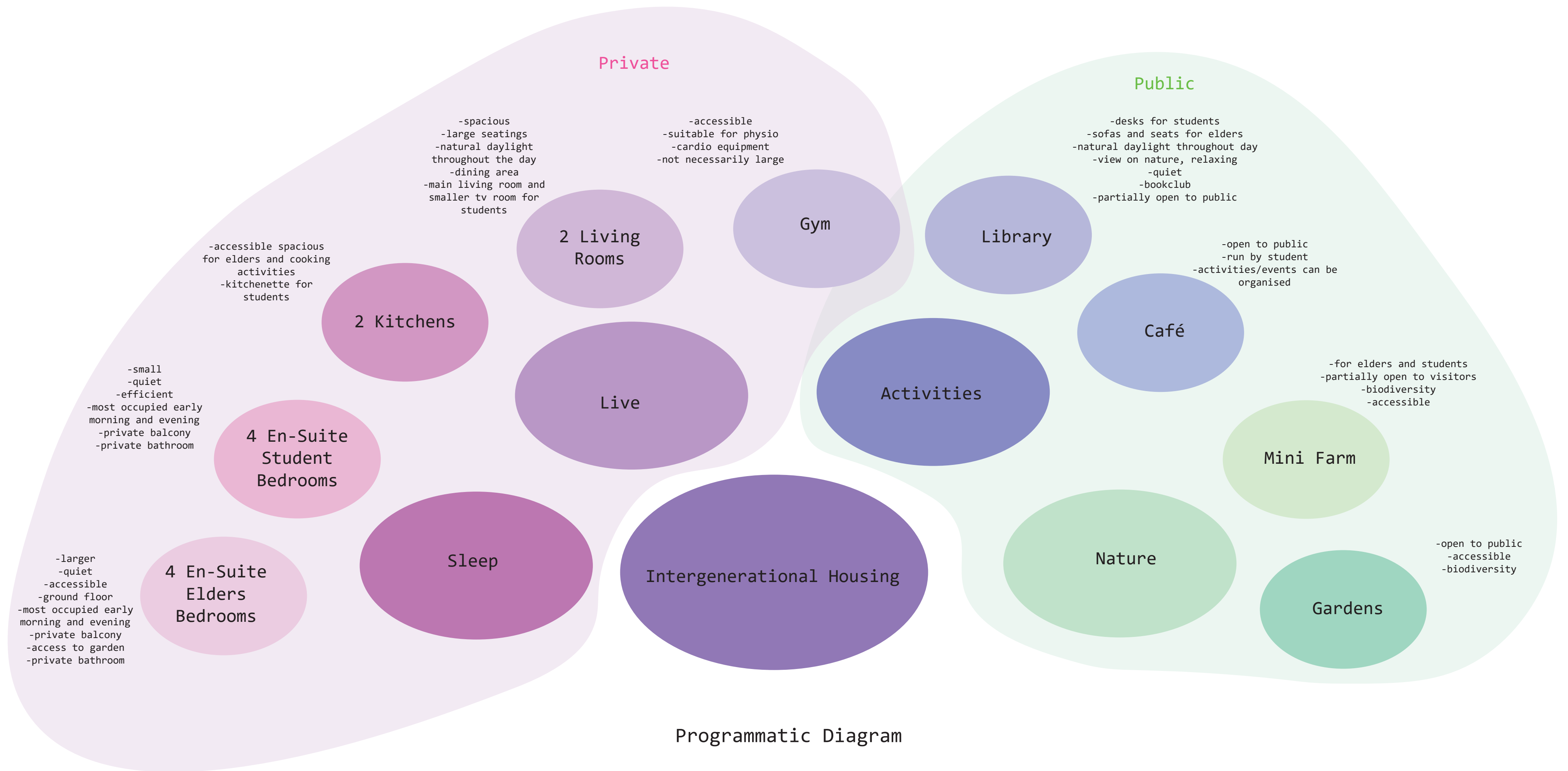
research sketches



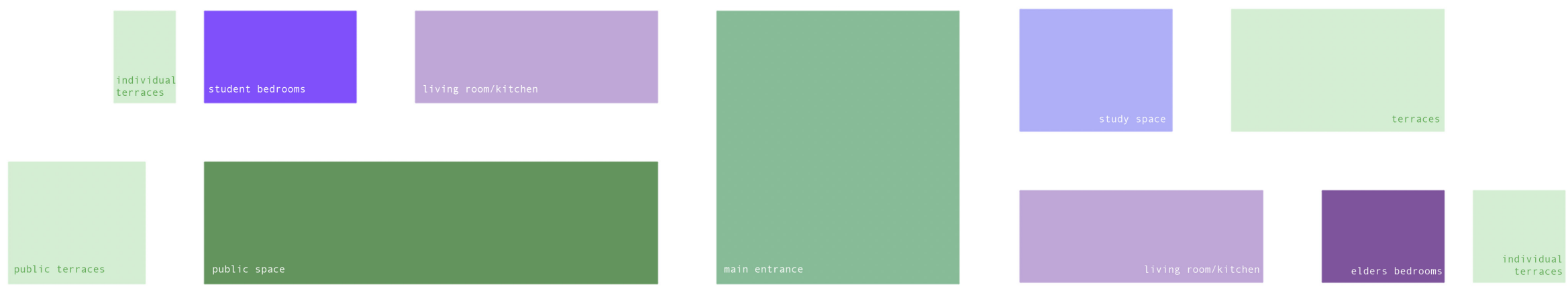
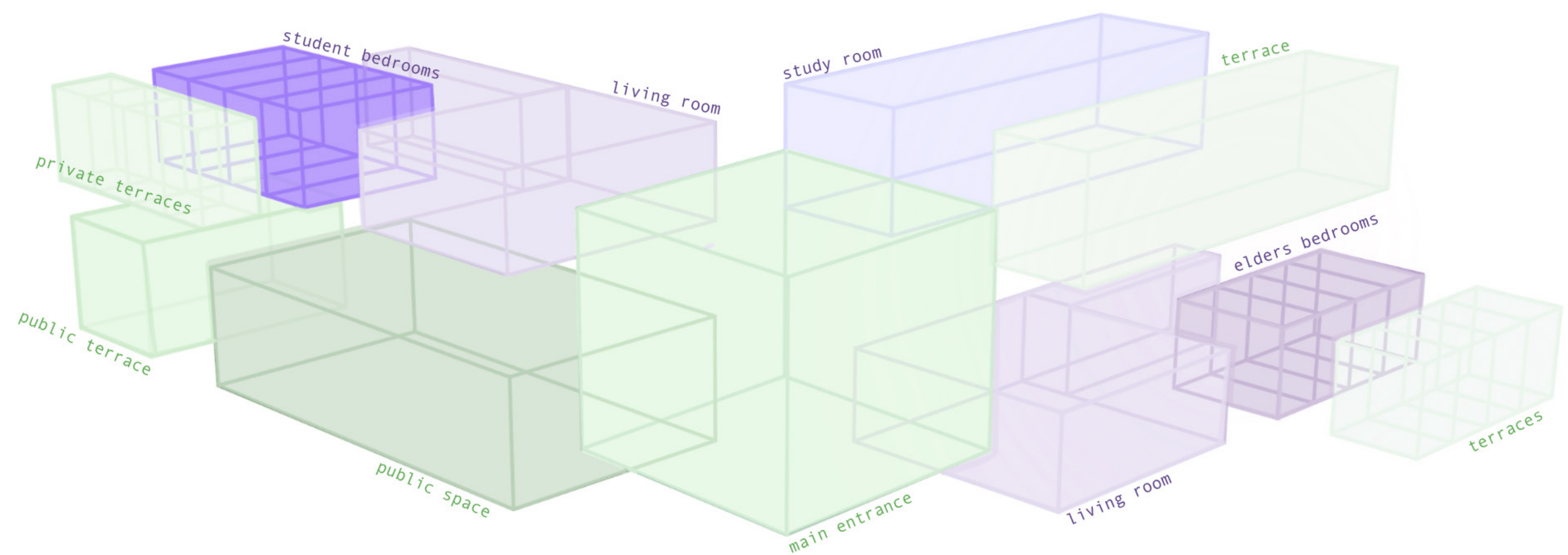
sketches and modelling



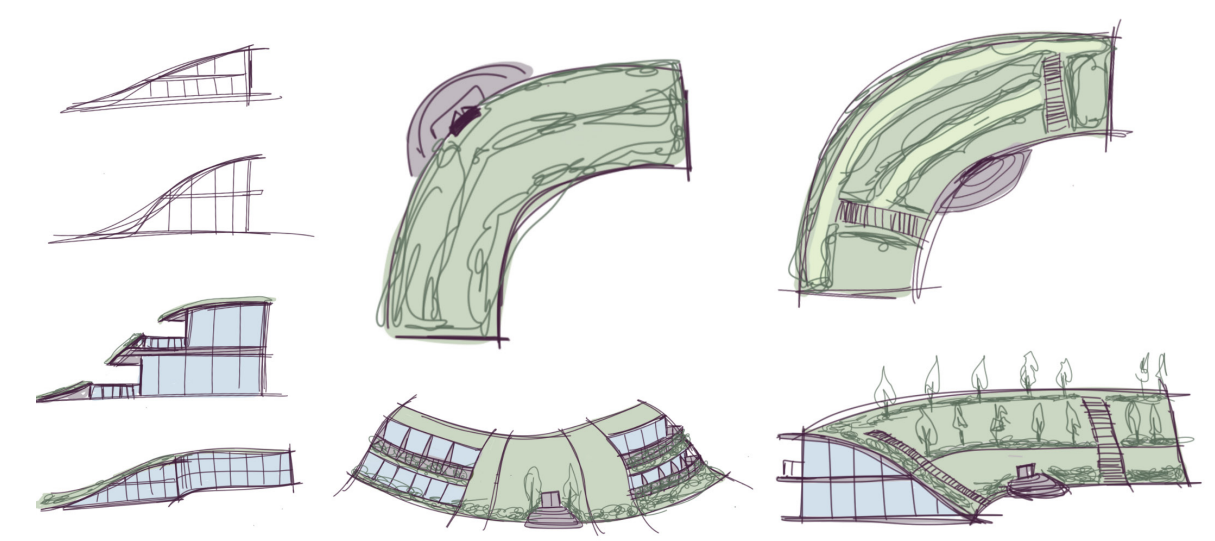
clay concept model



Programmatic Diagram for Iteration 1 : L-Shape Building

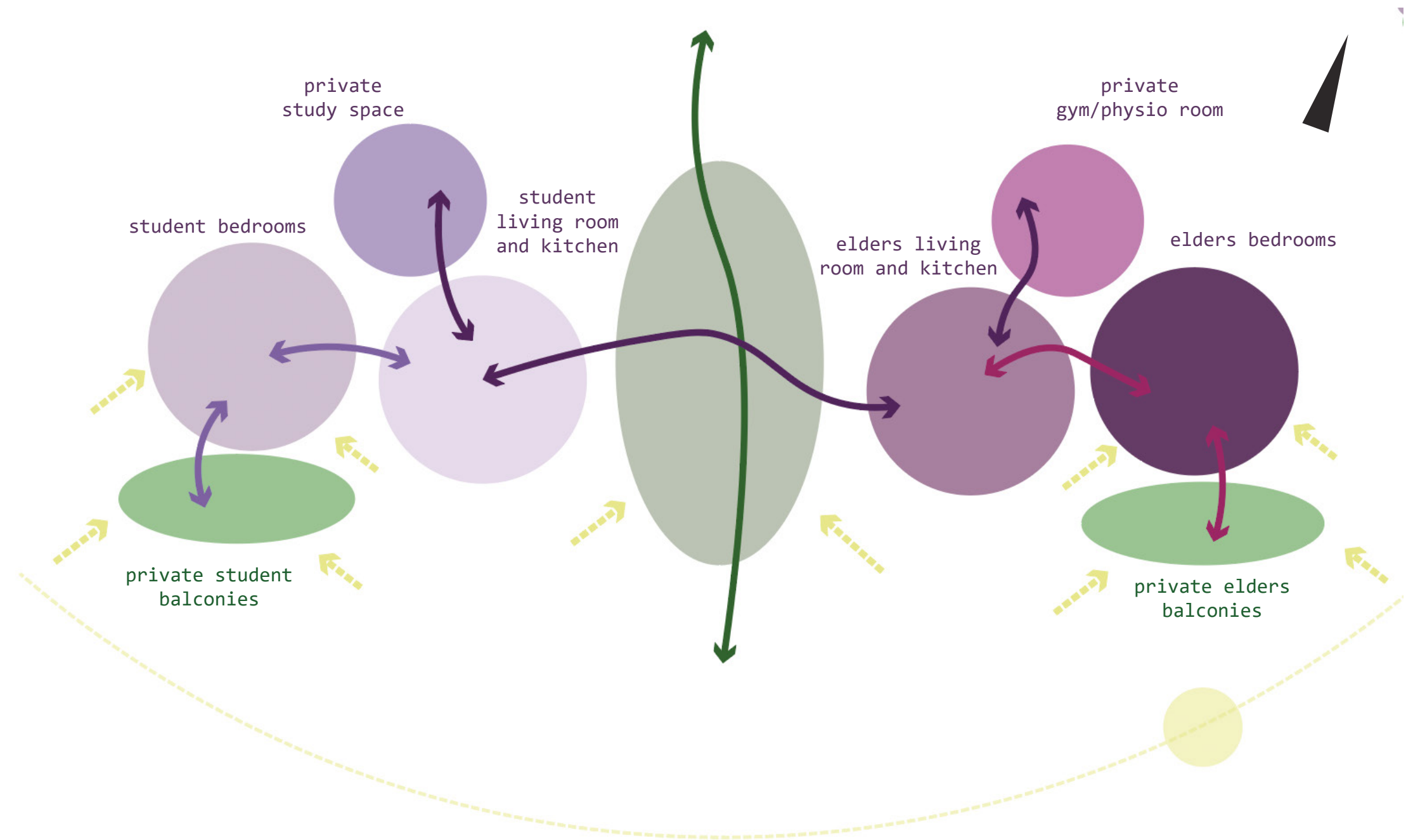
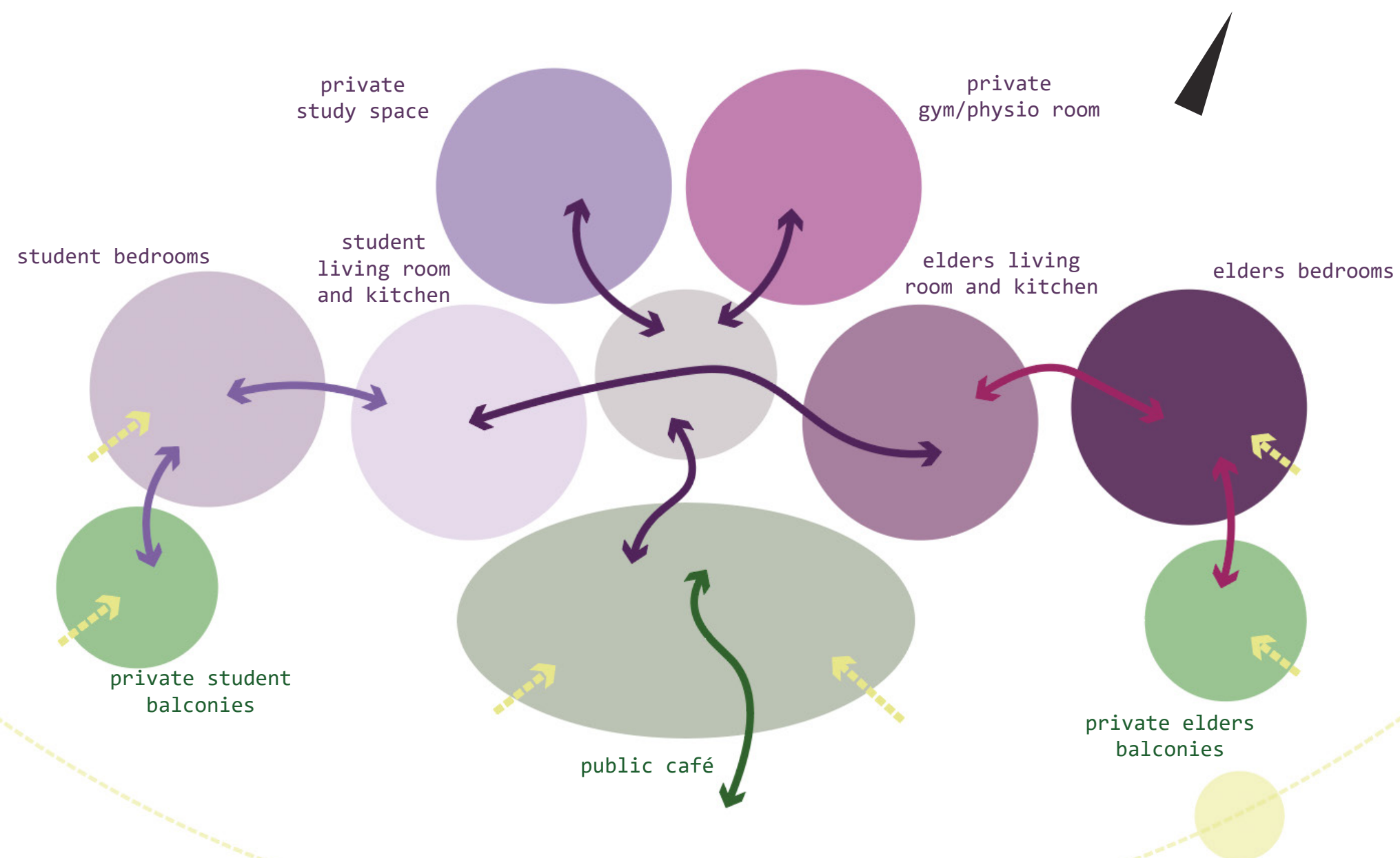


2D programmatic diagram for L-shape

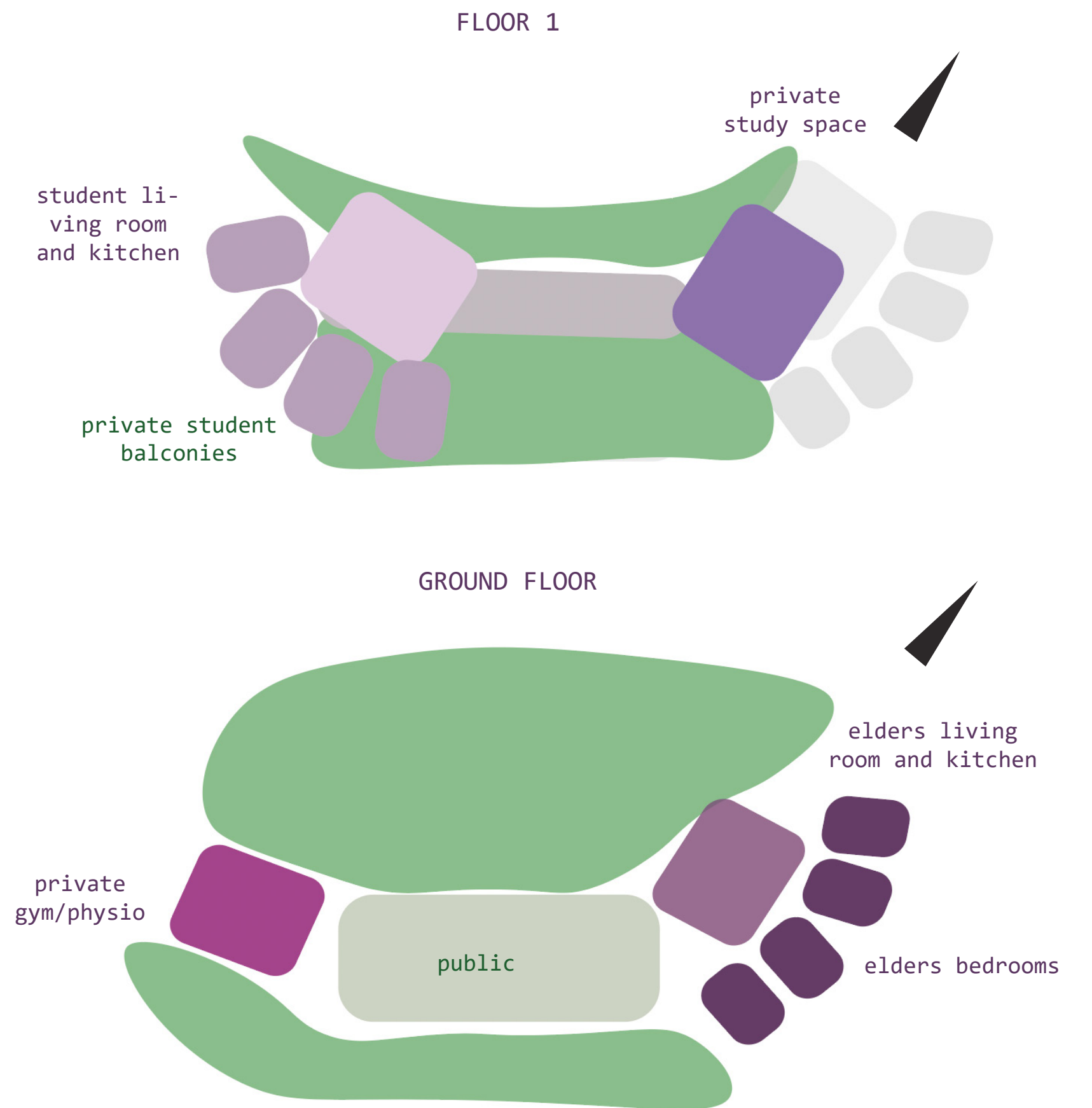
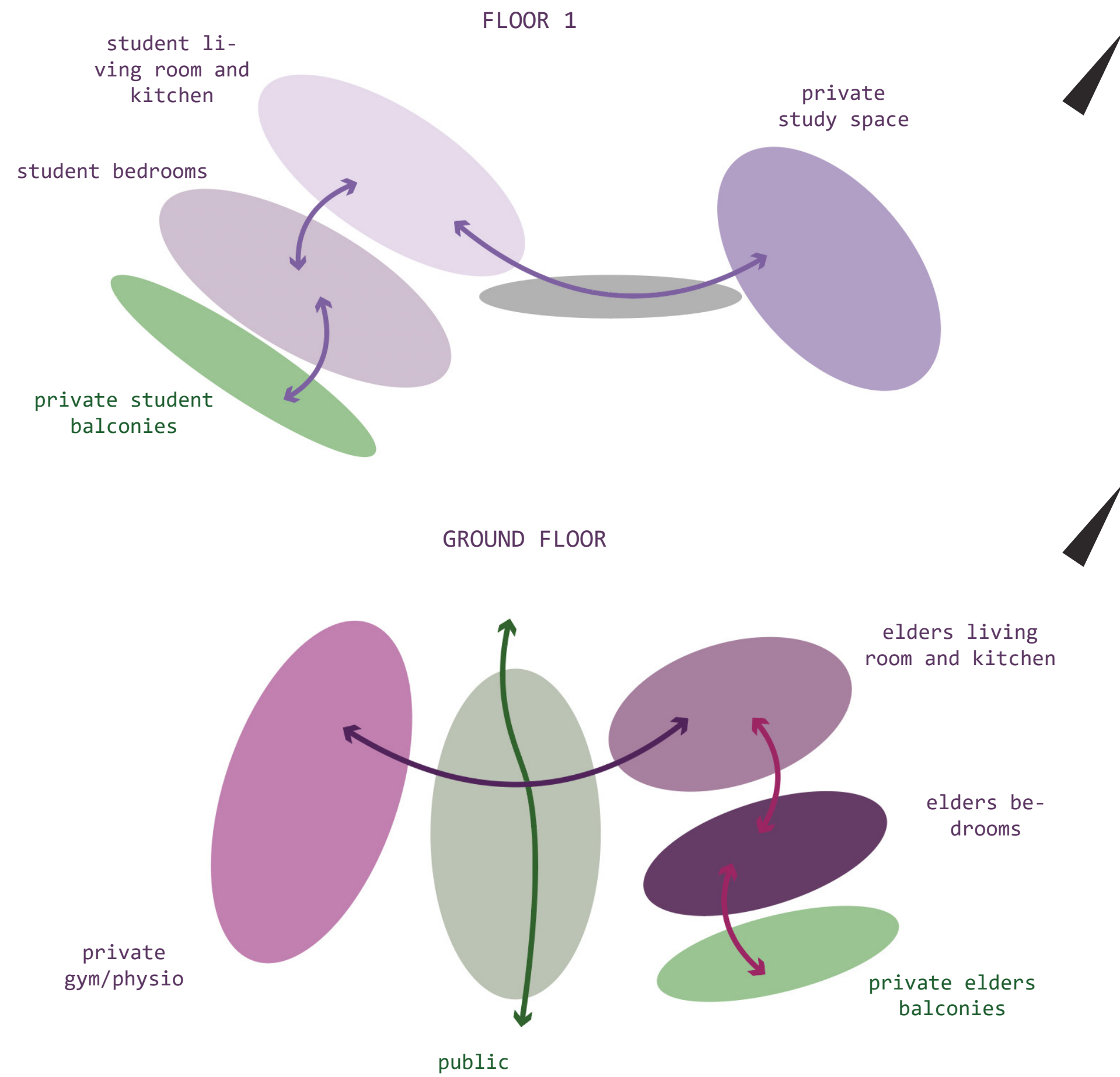


First Iteration : Design concept for
L-shape building

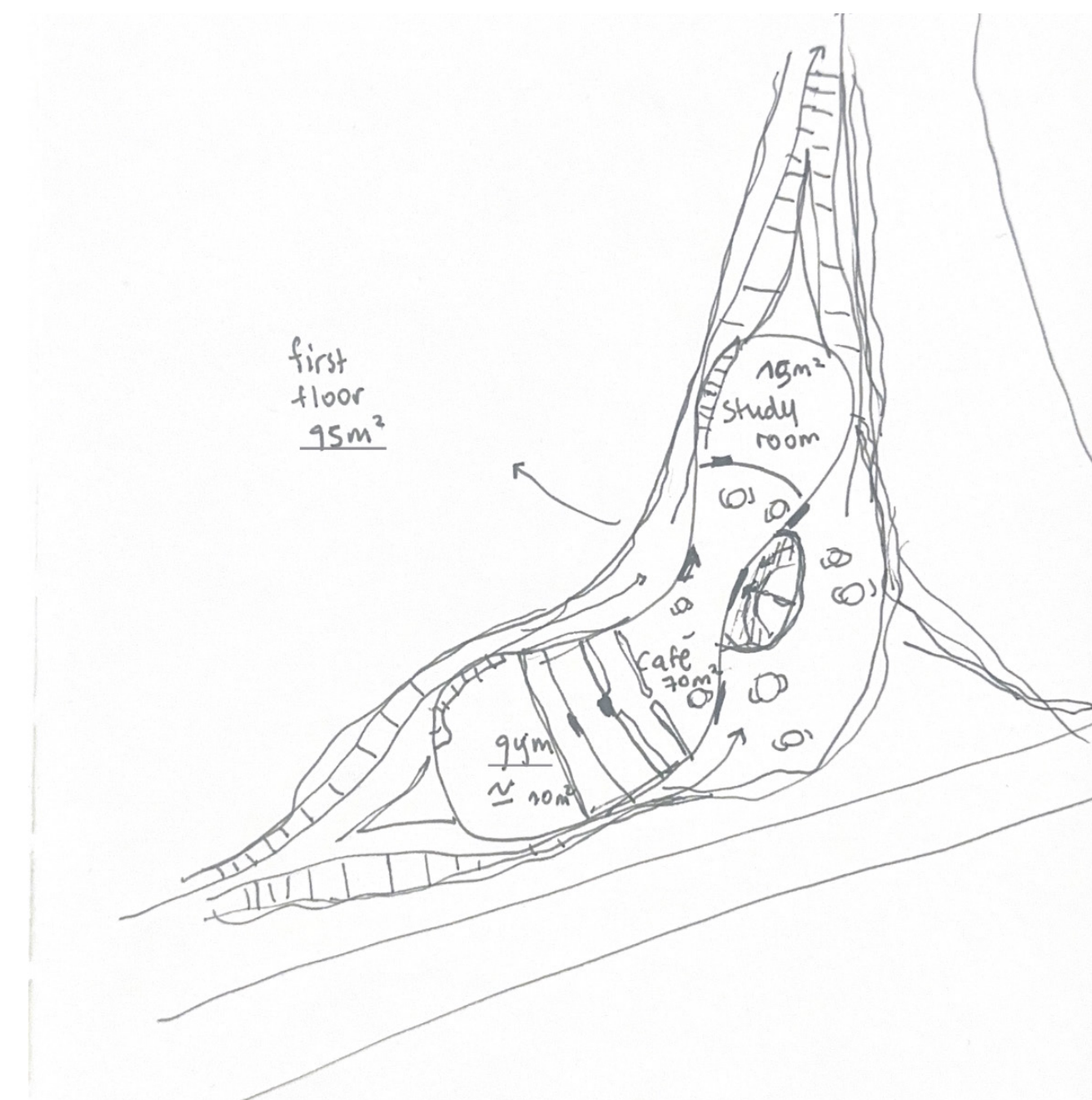
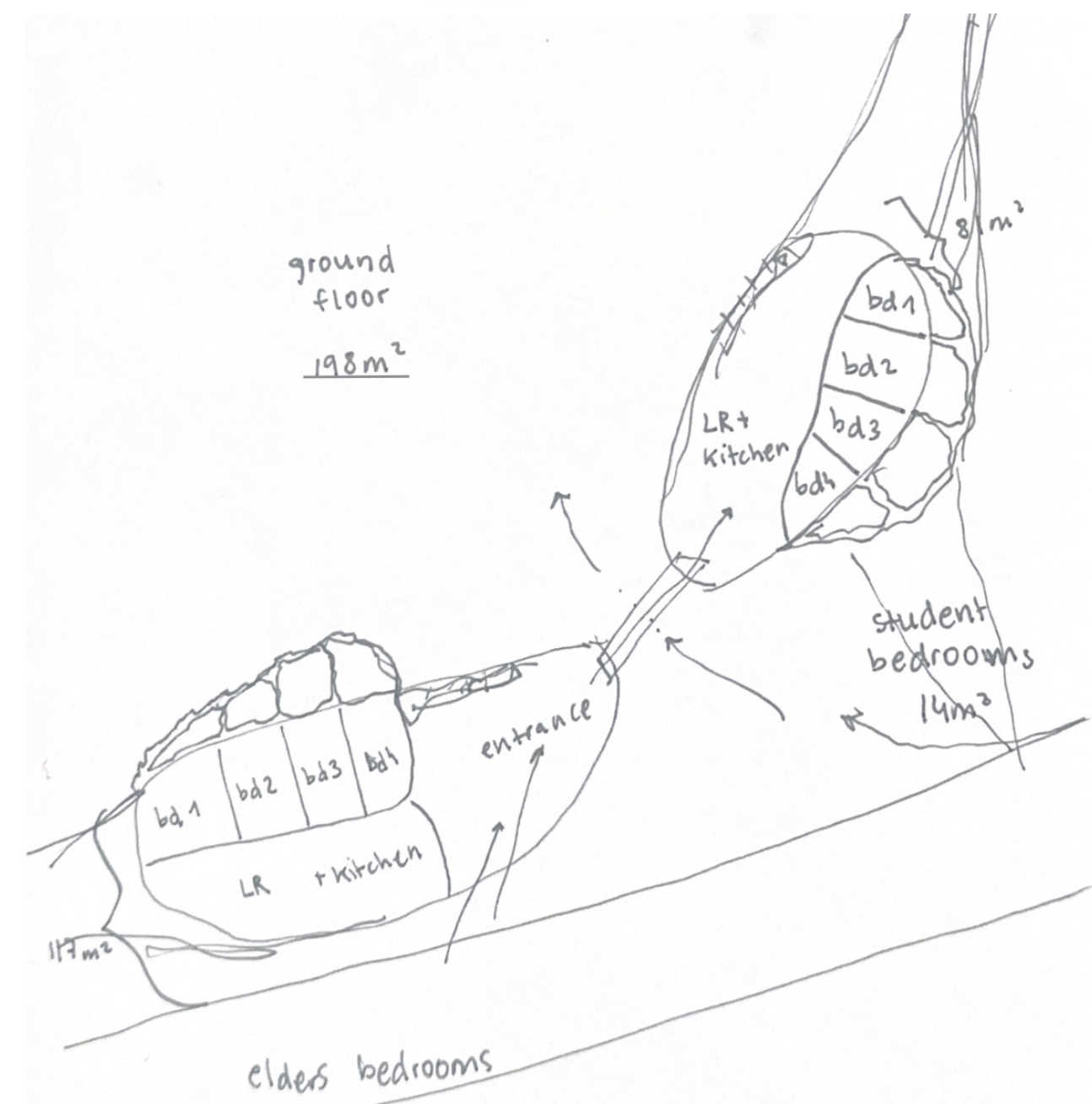
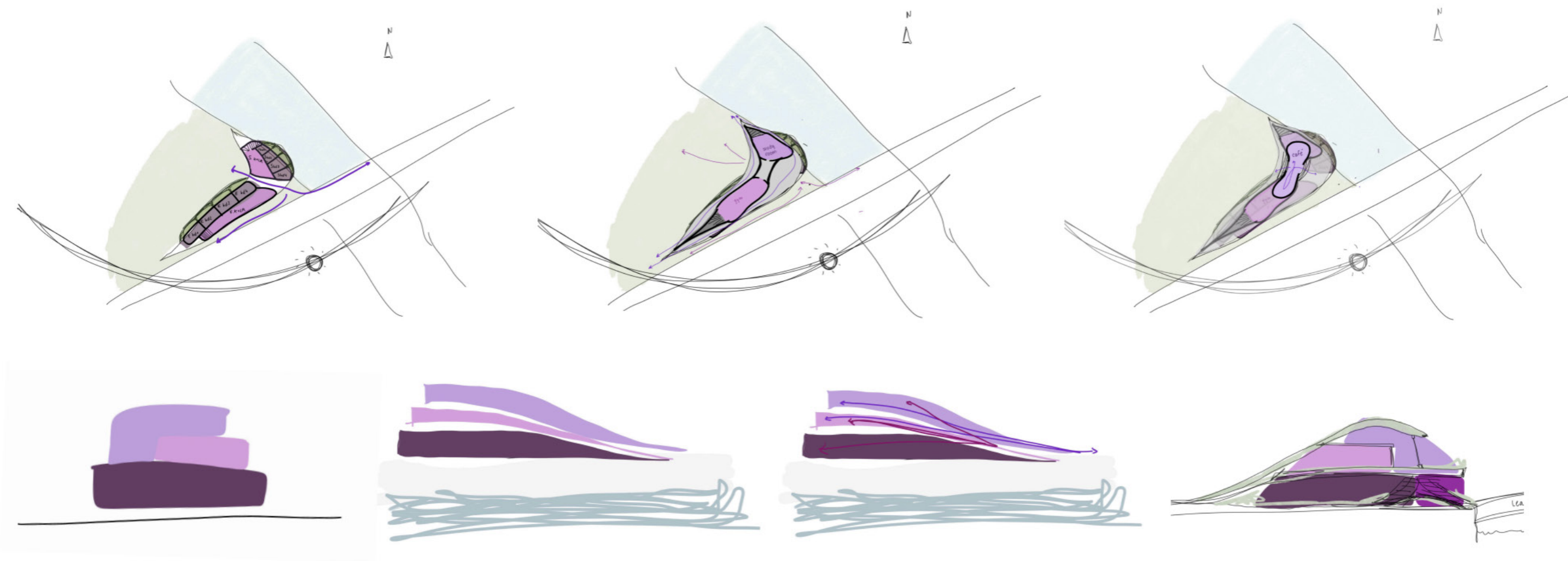
Programmatic Diagrams 2: One Floor Building

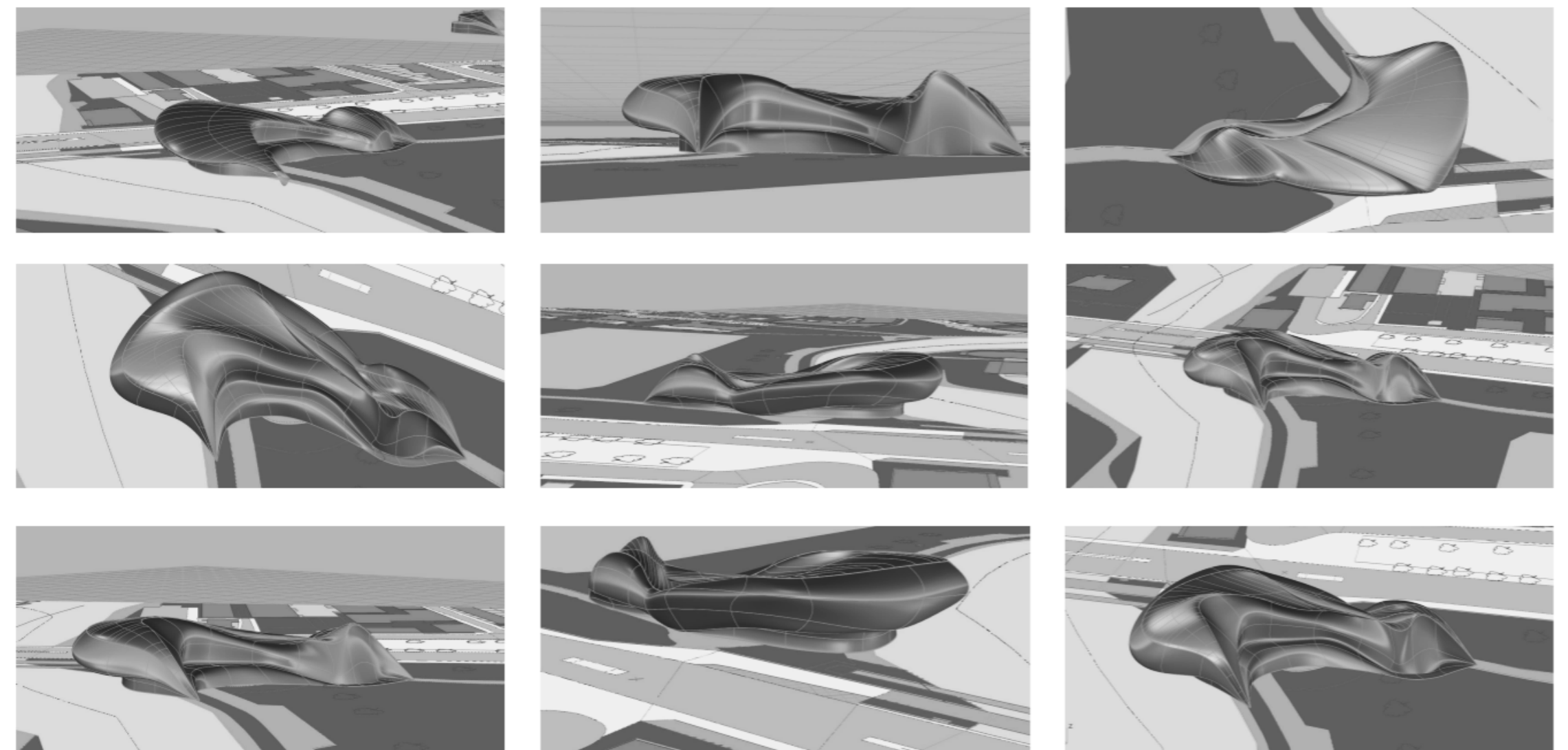


Programmatic Diagrams 3: two-floor building

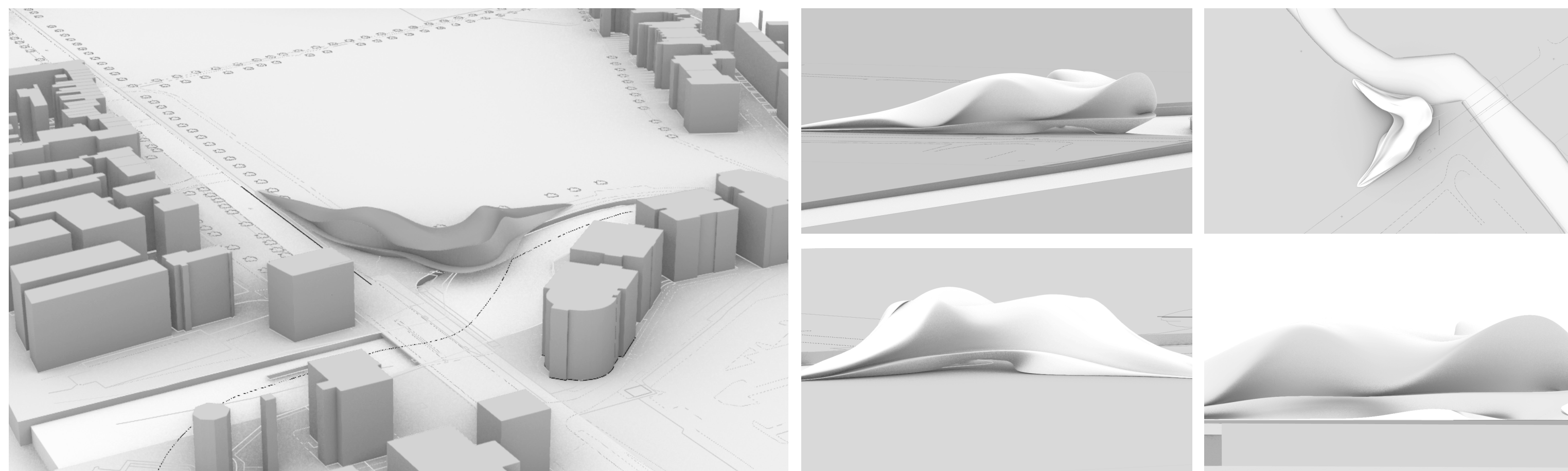


Final Programmatic Sketches, Diagrams & Section Programmatic Diagrams

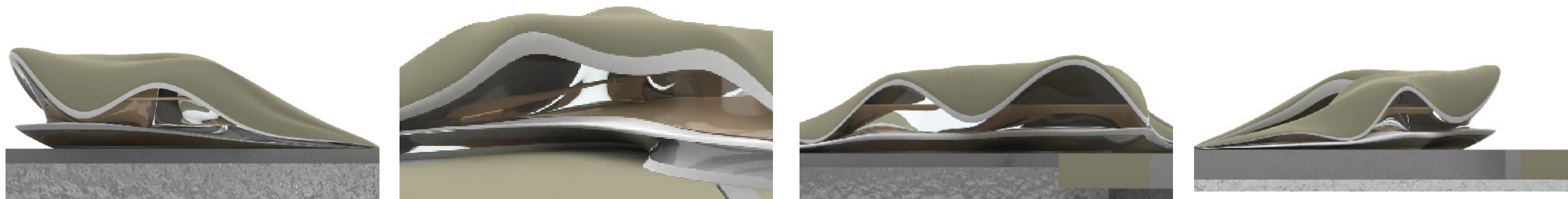




First attempt in modelling organic shape

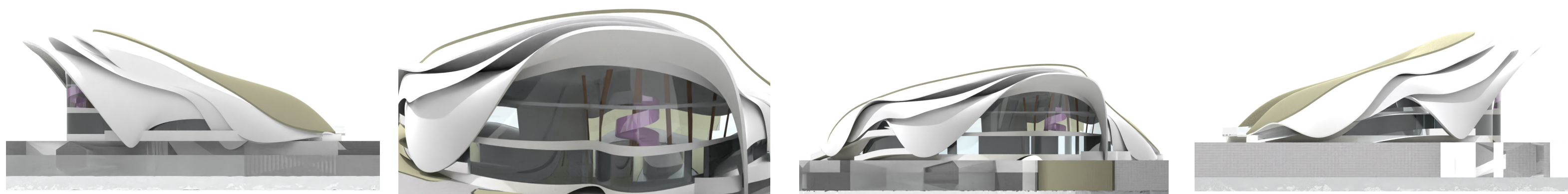


More accurate model based on previous sketches



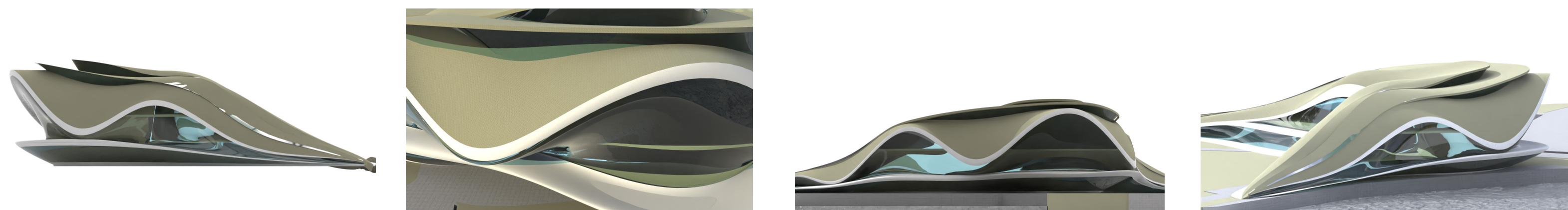
Iteration 1

Green roof



Iteration 2

Layers

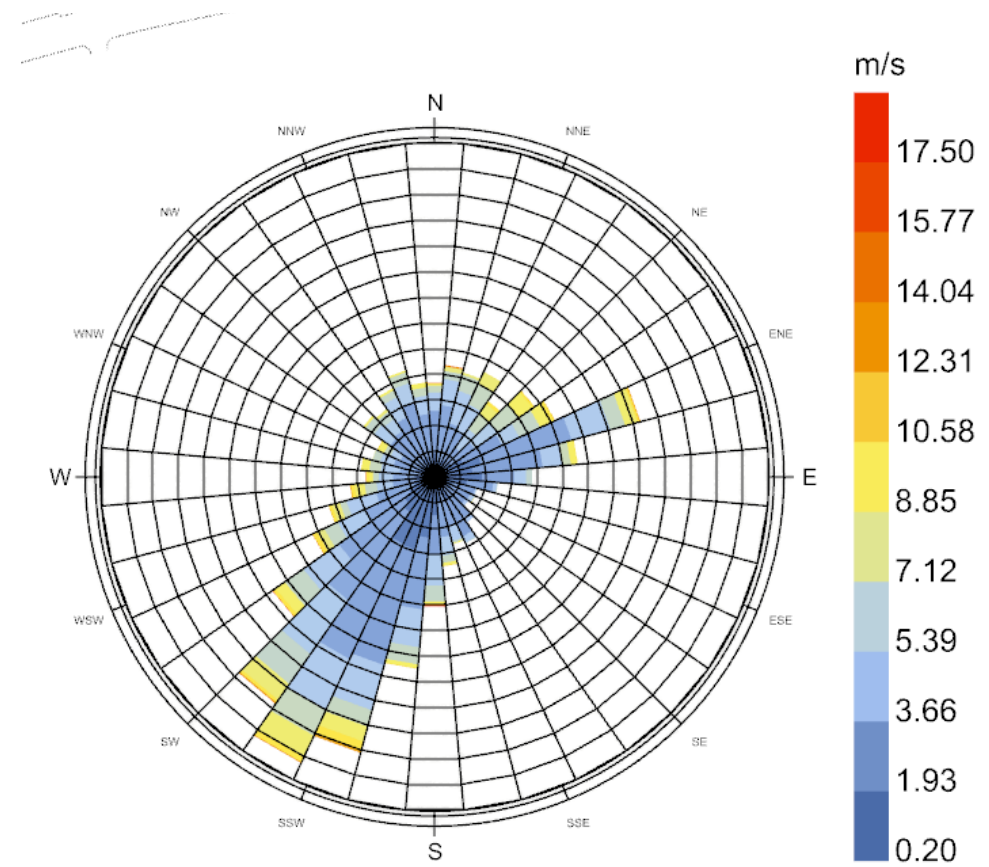
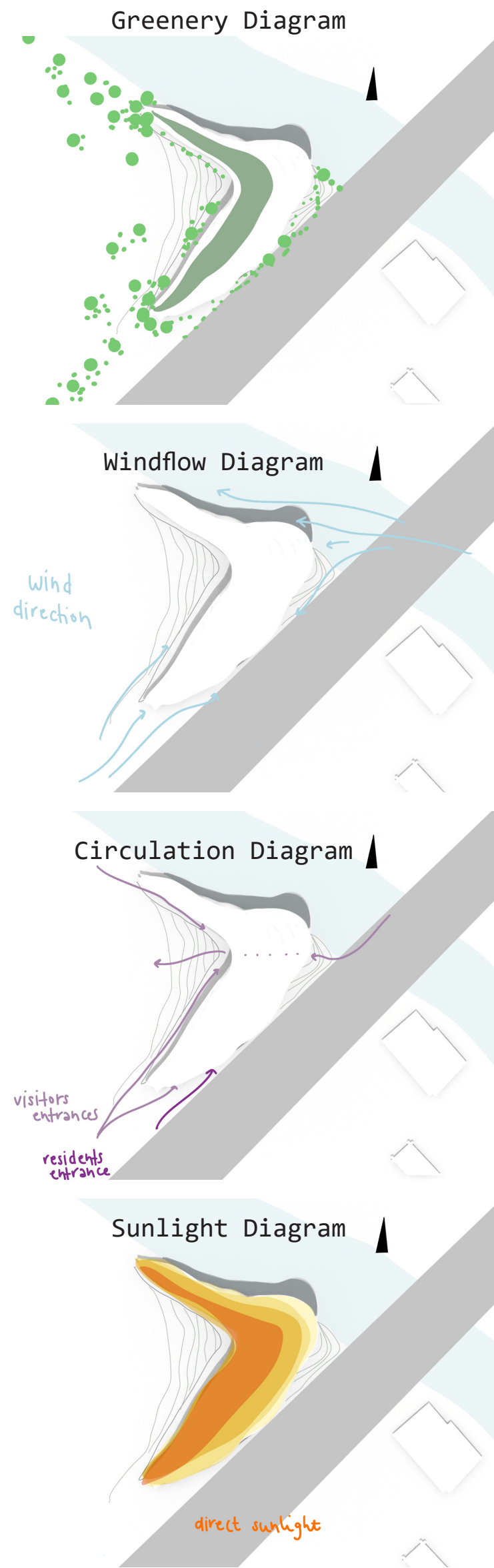


Iteration 3

Taking model from iteration 1 and including 'roof layering' from iteration 2.

Design Development
Environmental Design

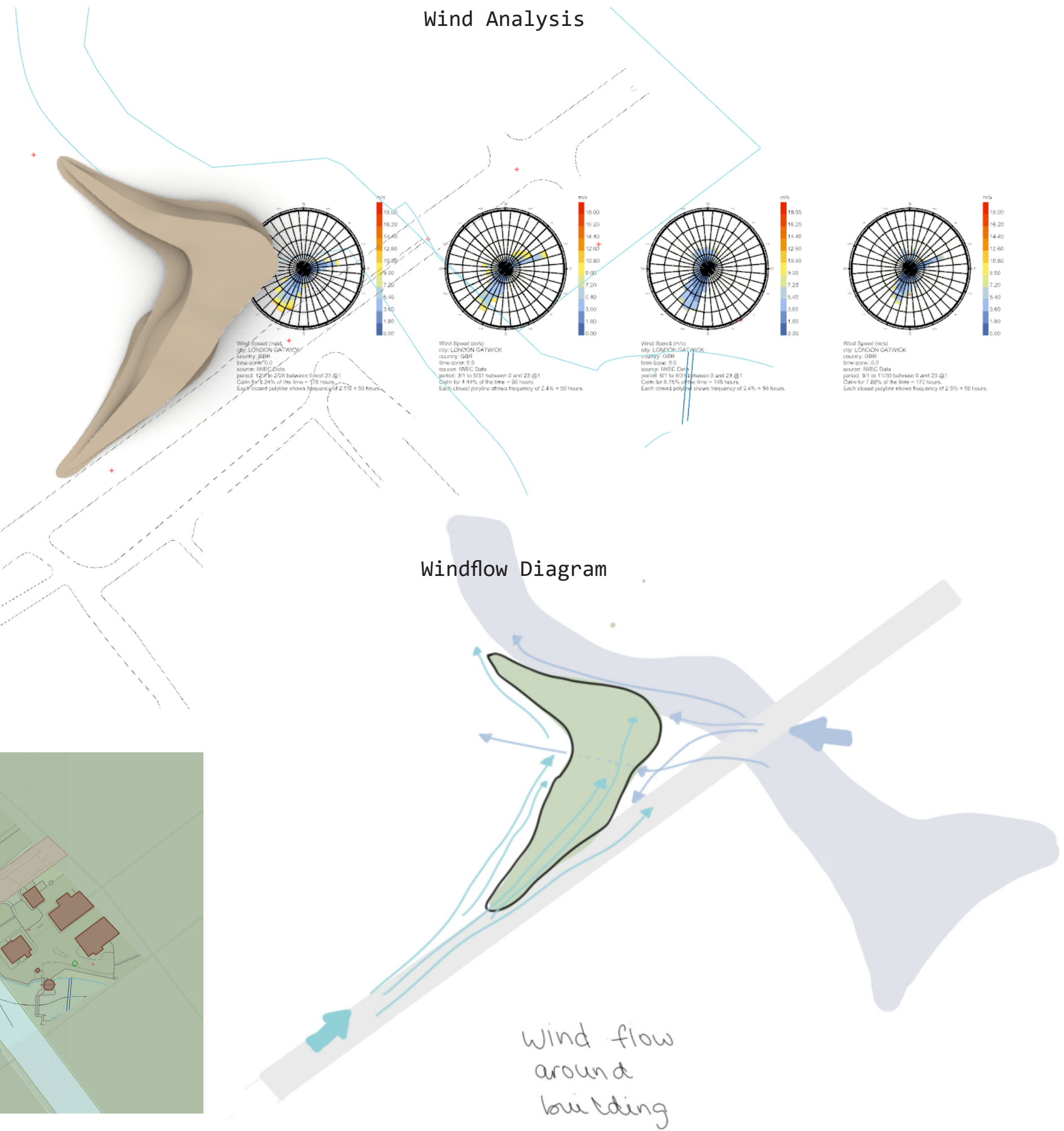
Sun Path, Wind Flow, Circulation Analysis



Wind Speed (m/s)
city: LONDON GATWICK
country: GBR
time-zone: 0.0
source: IWECC Data
period: 1/1 to 12/31 between 0 and 23 @1
Calm for 6.82% of the time = 597 hours.
Each closed polyline shows frequency of 0.6% = 50 hours.

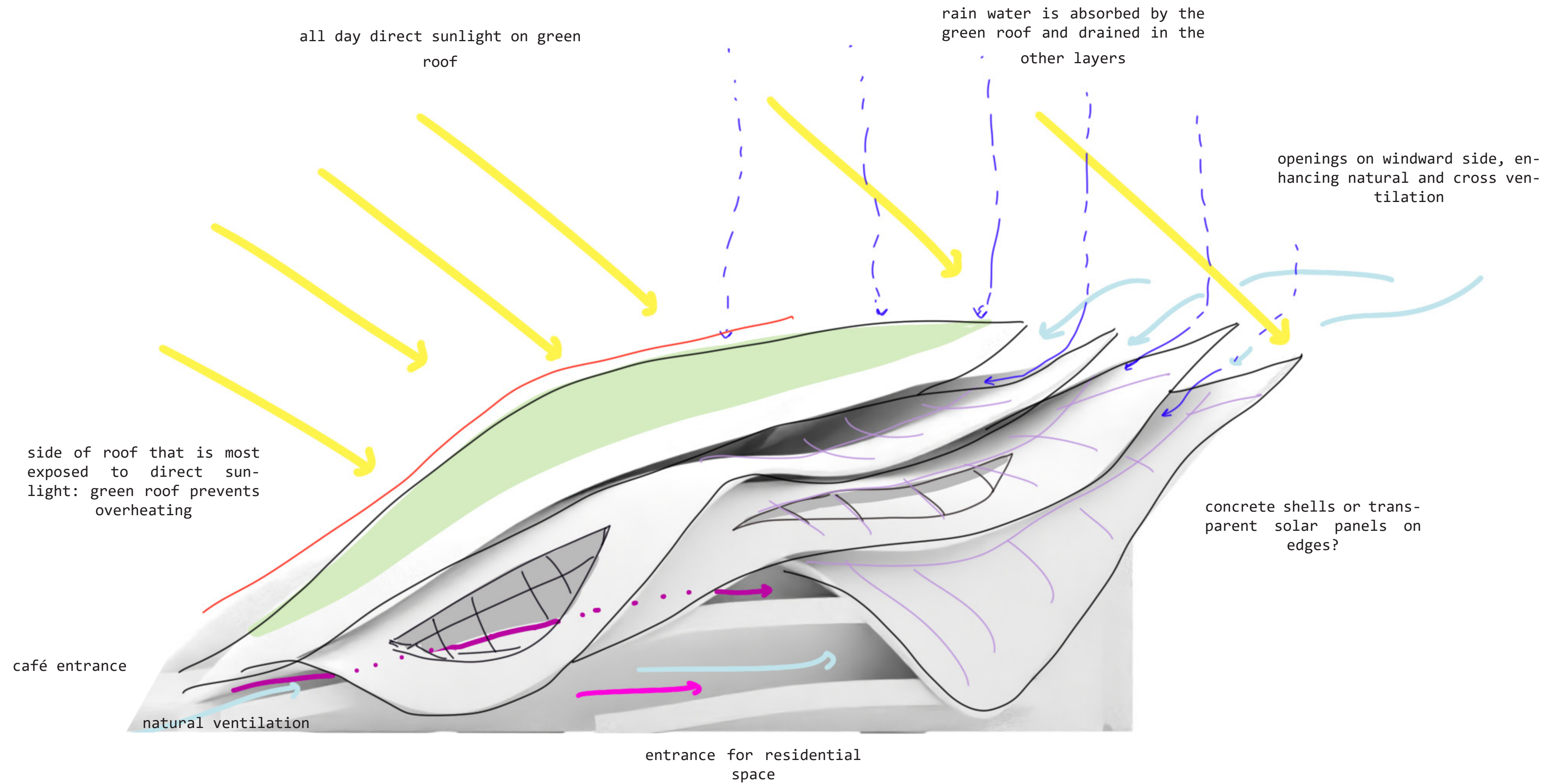


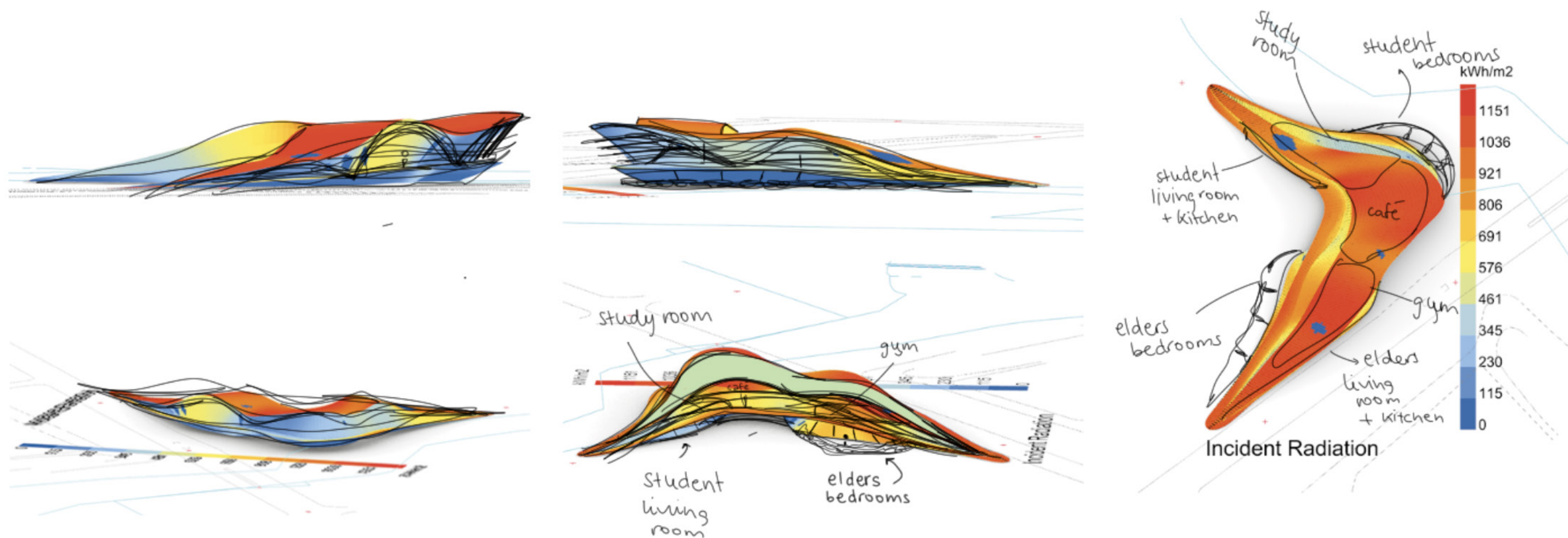
Sunpath Analysis



The green roof is placed on the most sun-exposed part of the building, optimising solar gain. The curved form works with prevailing wind patterns to enable natural cross ventilation, while vegetation and ramp access follow the same logic, guiding movement fluidly through the site. The eastern façade, facing the road, acts as a buffer—protecting from sound, pollution, and traffic. In contrast, the western façade opens to the park, curving inward to embrace visitors and create a sense of calm, as if stepping out of the city and into nature.

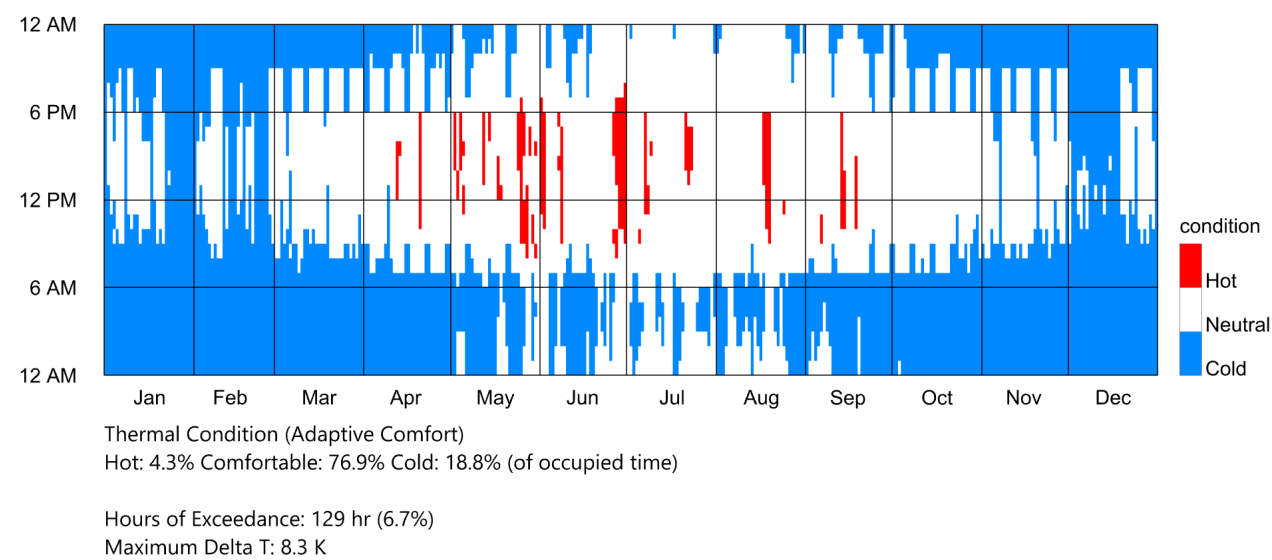
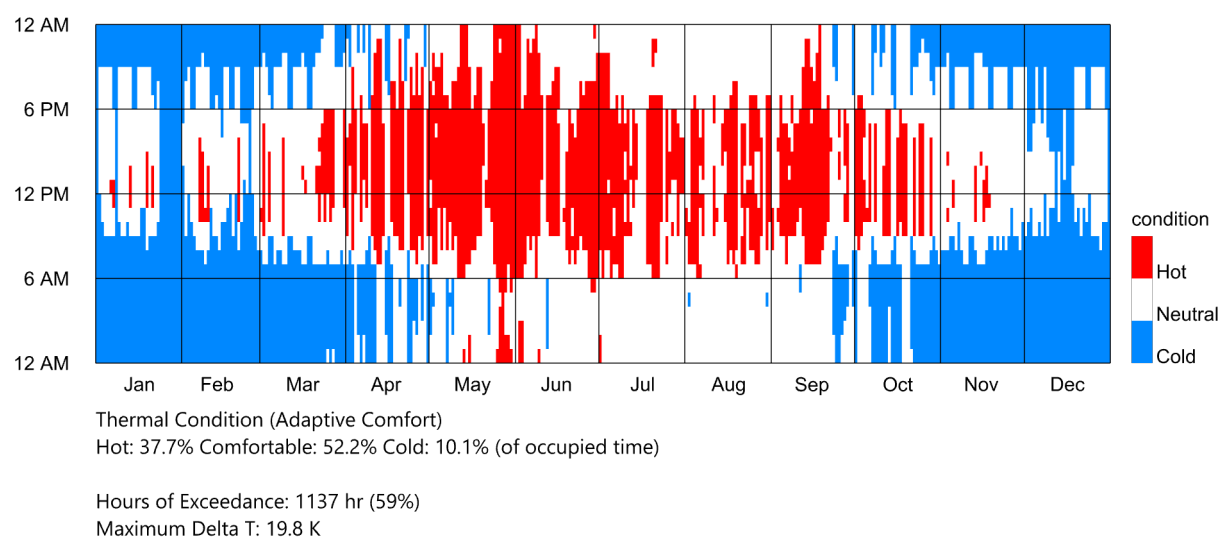
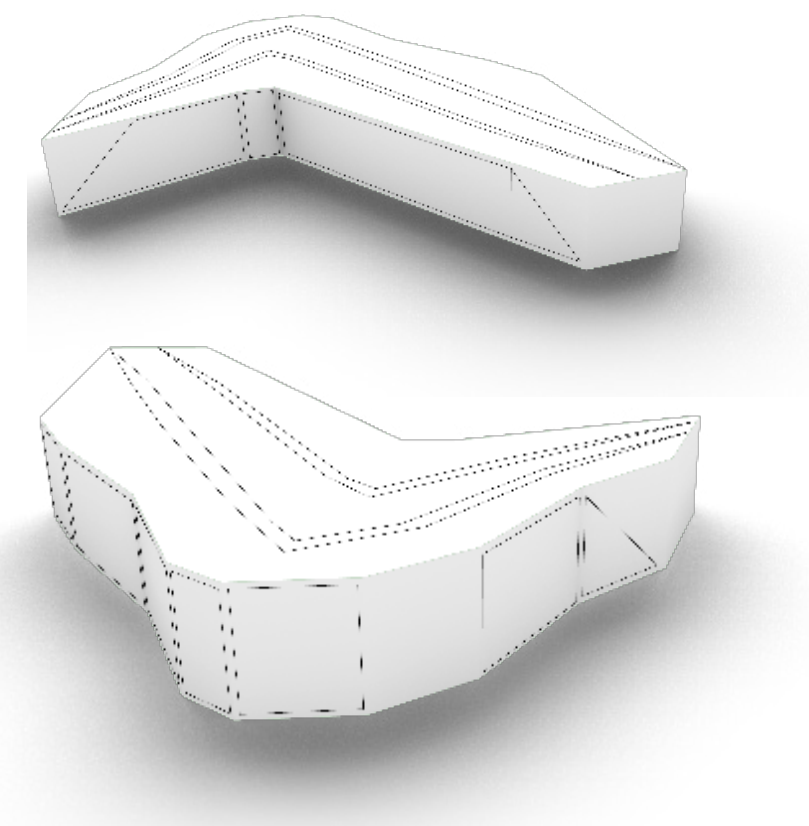
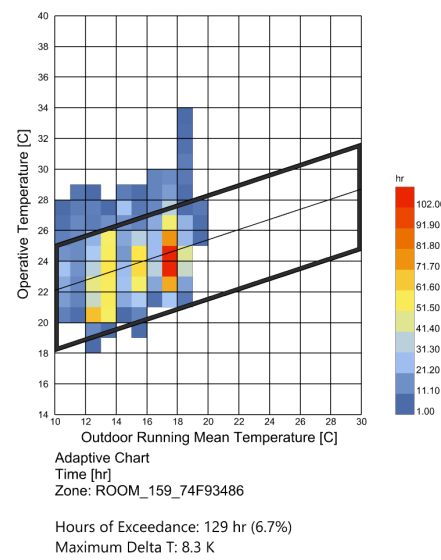
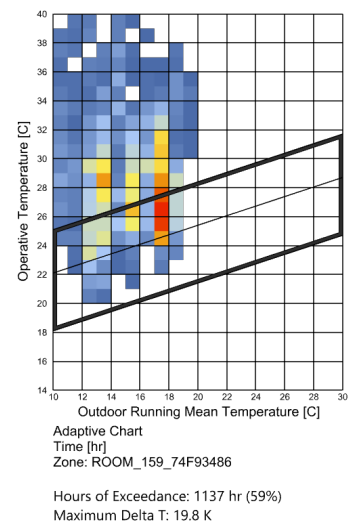
Environmental Strategies Diagram



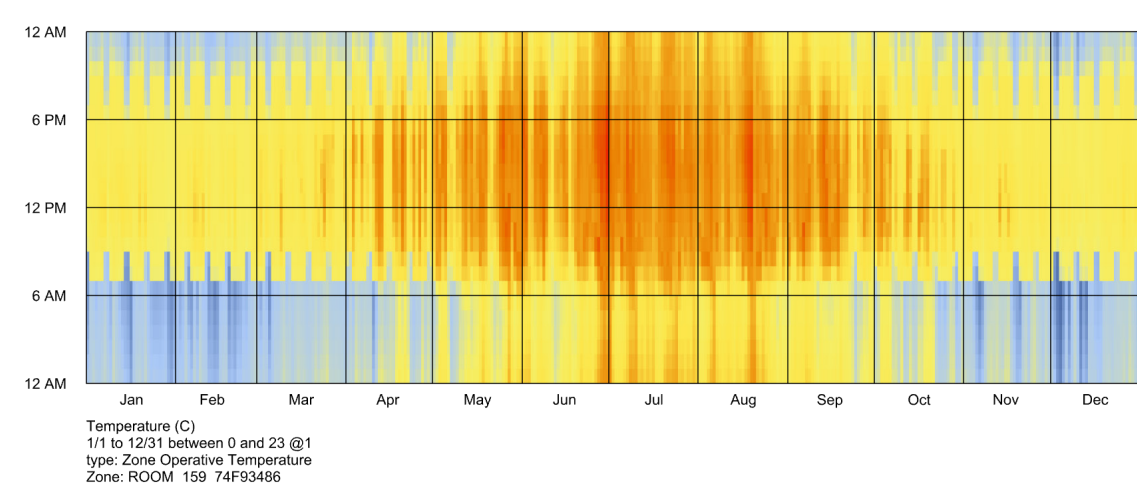
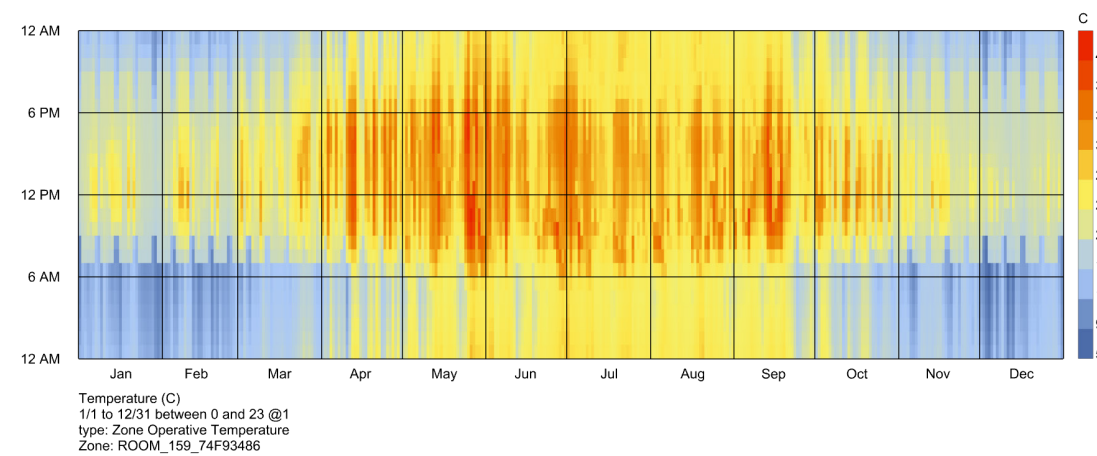


The incident radiation analysis revealed distinct gradients of solar exposure across the building's curving form, which I used as a tool to inform both environmental and social programming.

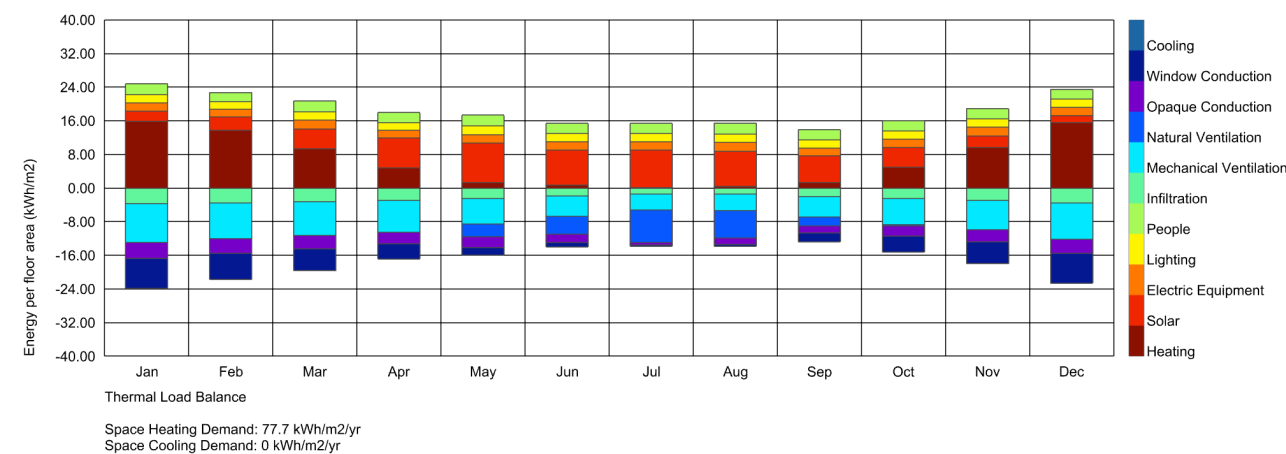
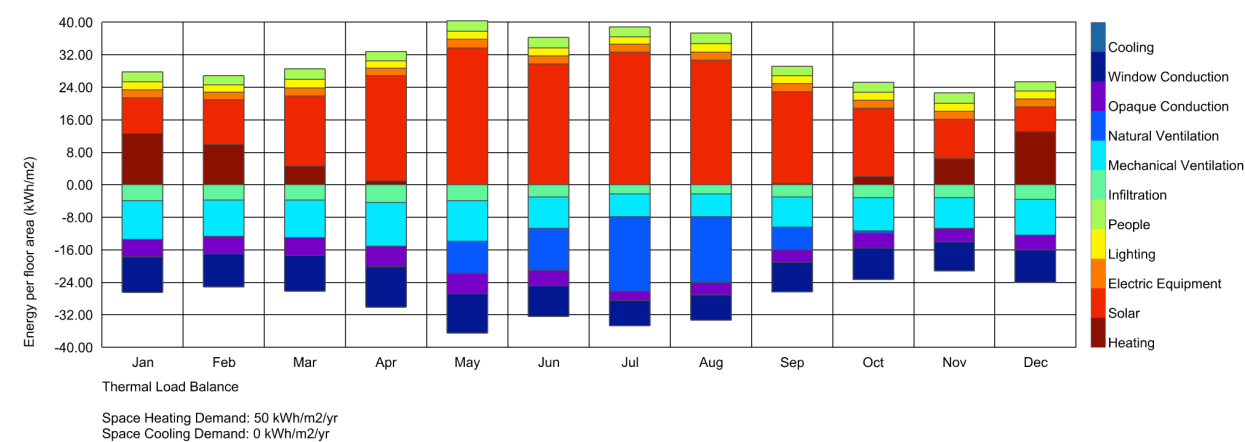
Student bedrooms were intentionally placed in areas of lower solar radiation to discourage prolonged isolation in private spaces and instead encourage movement toward sunlit communal areas. By placing high-radiation zones—such as the café, study room, and shared living spaces—along the building's southern edges, these spaces become naturally attractive due to their warmth and brightness. This subtle spatial tactic promotes informal encounters, cross-generational exchange, and a stronger sense of community. In contrast, elder residents' rooms are situated in moderately lit areas, offering thermal comfort and tranquility. Overall, the solar analysis didn't just inform passive environmental strategies—it directly shaped the building's social dynamics.



This analysis compares the building's performance before and after increasing glazing and insulation thickness from 200 mm to 300 mm.



The improved envelope significantly enhanced thermal comfort, reducing overheating from 37.7% to just 4.3% of occupied time, and increasing comfort from 52.3% to 75.5%.



The maximum indoor temperature variation dropped from 19.8°C to 8.3°C, and energy demand for heating and cooling decreased. This demonstrates how upgrading envelope thickness can drastically improve comfort and reduce reliance on mechanical systems.

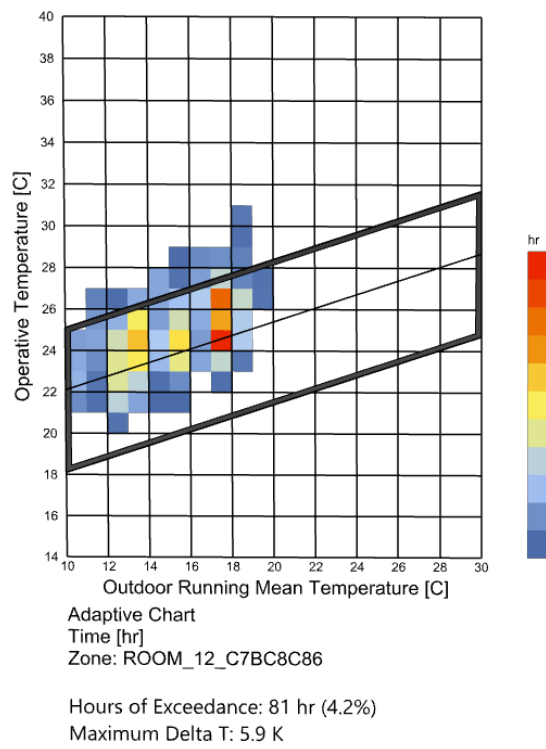
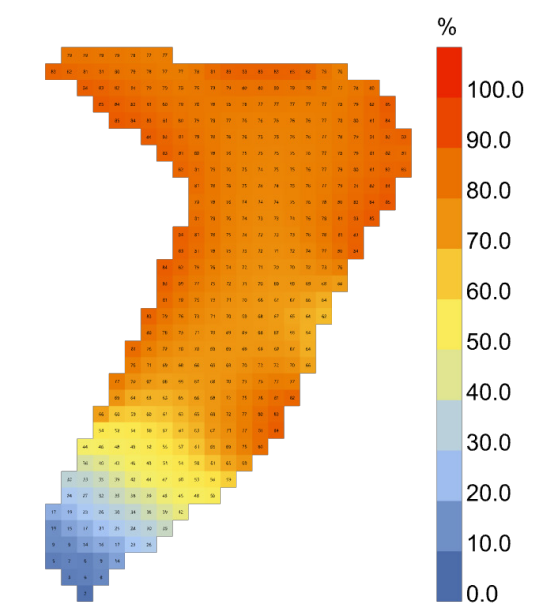
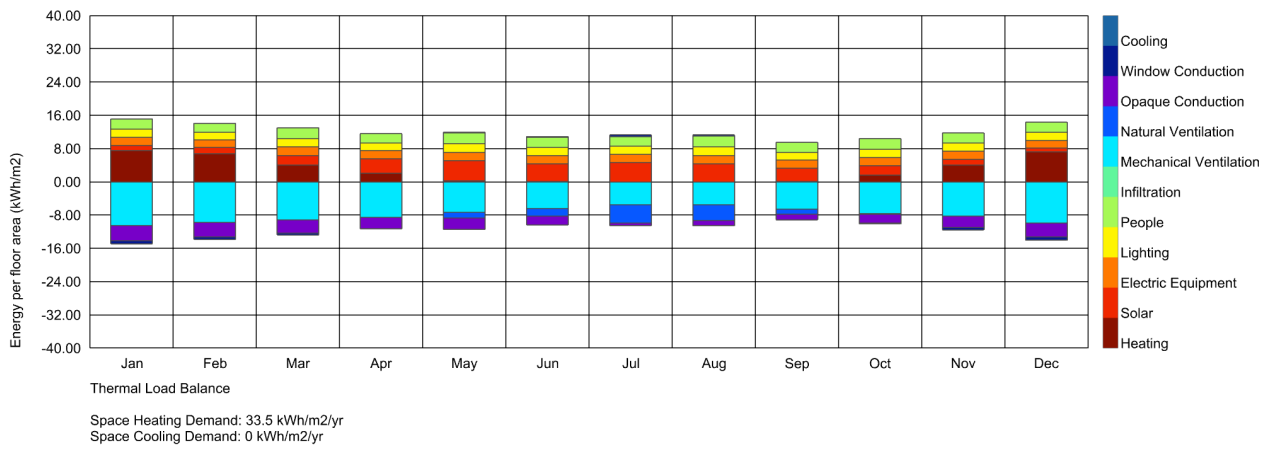
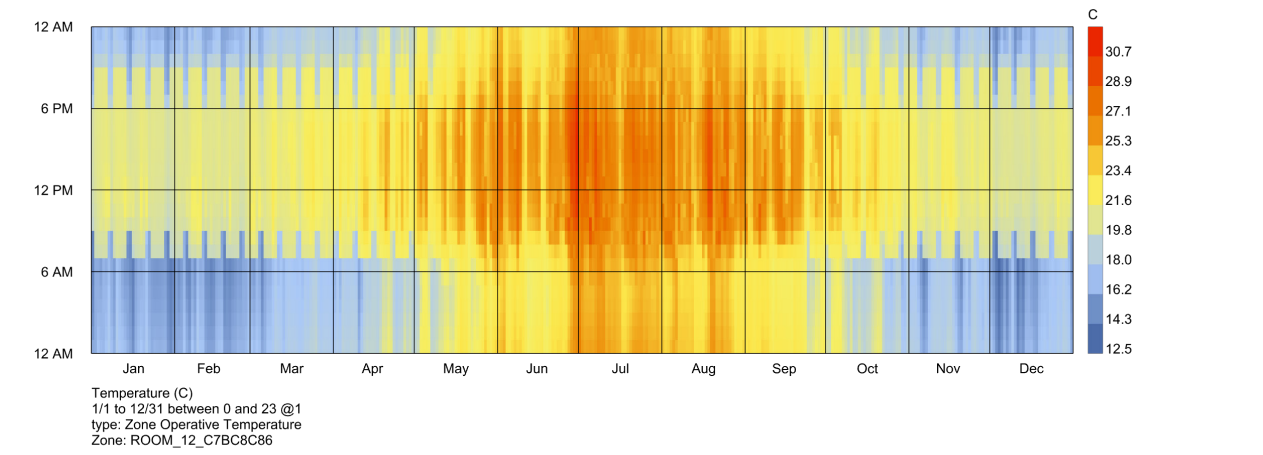
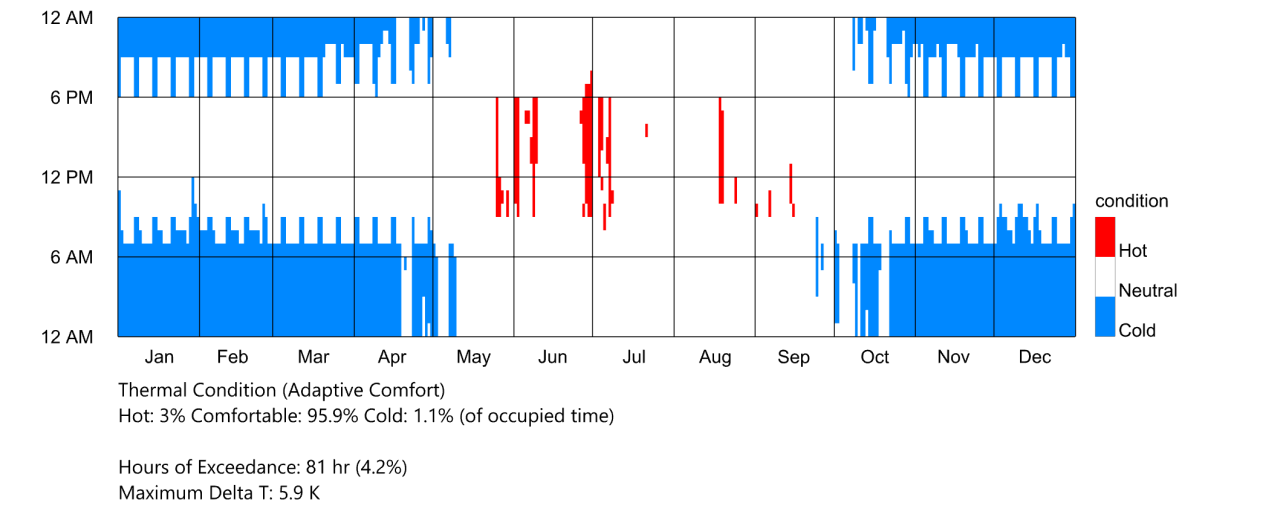
The heating demand remains too high for UK standards and layers need to be reviewed again.

	Roof
Insulation Thickness (mm)	300mm
Timber Thickness (mm)	180mm
U-Value (W/m2K)	0.16

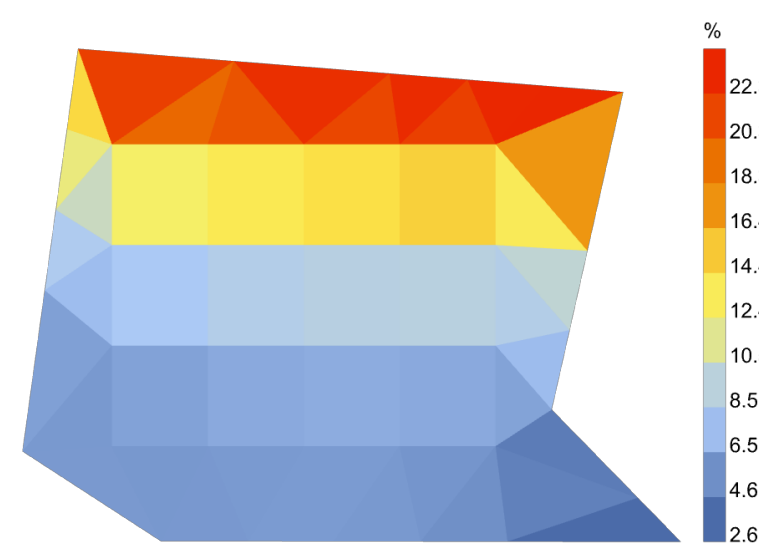
	Walls
Insulation Thickness (mm)	200mm
Timber Thickness (mm)	180mm
U-Value (W/m2K)	0.18

	Floor
Concrete Thickness (mm)	150mm
Insulation Thickness (mm)	200mm
U-Value (W/m2K)	0.18

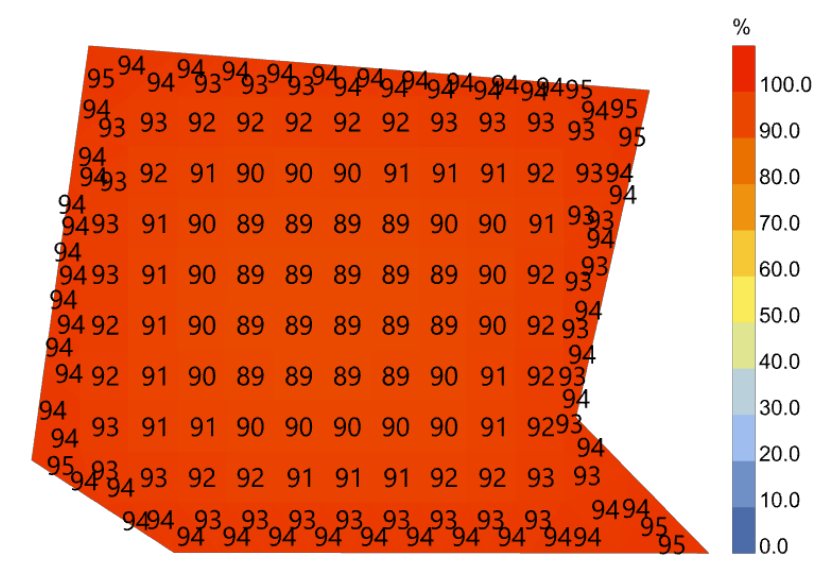
	Glazing
U-value (W/m2K)	0.70
Solar heat gain coefficient	0.52
Visible Transmittance	0.68



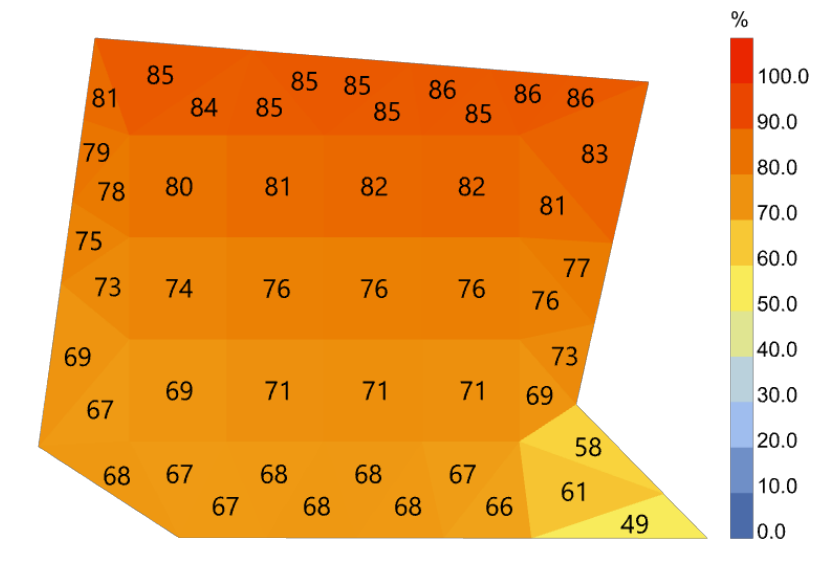
After having reviewed and modified the layers, the café, featuring triple glazing performs well overall with 95.6% thermal comfort hours. However, there is still 3% overheating and notable heating demand in winter, suggesting a need to explore improvements in ventilation strategies or heat recovery. The adaptive comfort chart shows most conditions within acceptable limits, with a maximum delta of 5.9k. Daylight levels are excellent, with 85% of the area achieving over 500 lux, supporting occupant wellbeing and reducing reliance on artificial lighting. Overall, the space offers strong comfort and daylight performance but heating energy use remains high. Further optimization of systems are recommended for alignment with Passivhaus standards.



Daylight Factor



DA: % of daylight hours > 300 lux
Spatial Daylight Autonomy: 100%

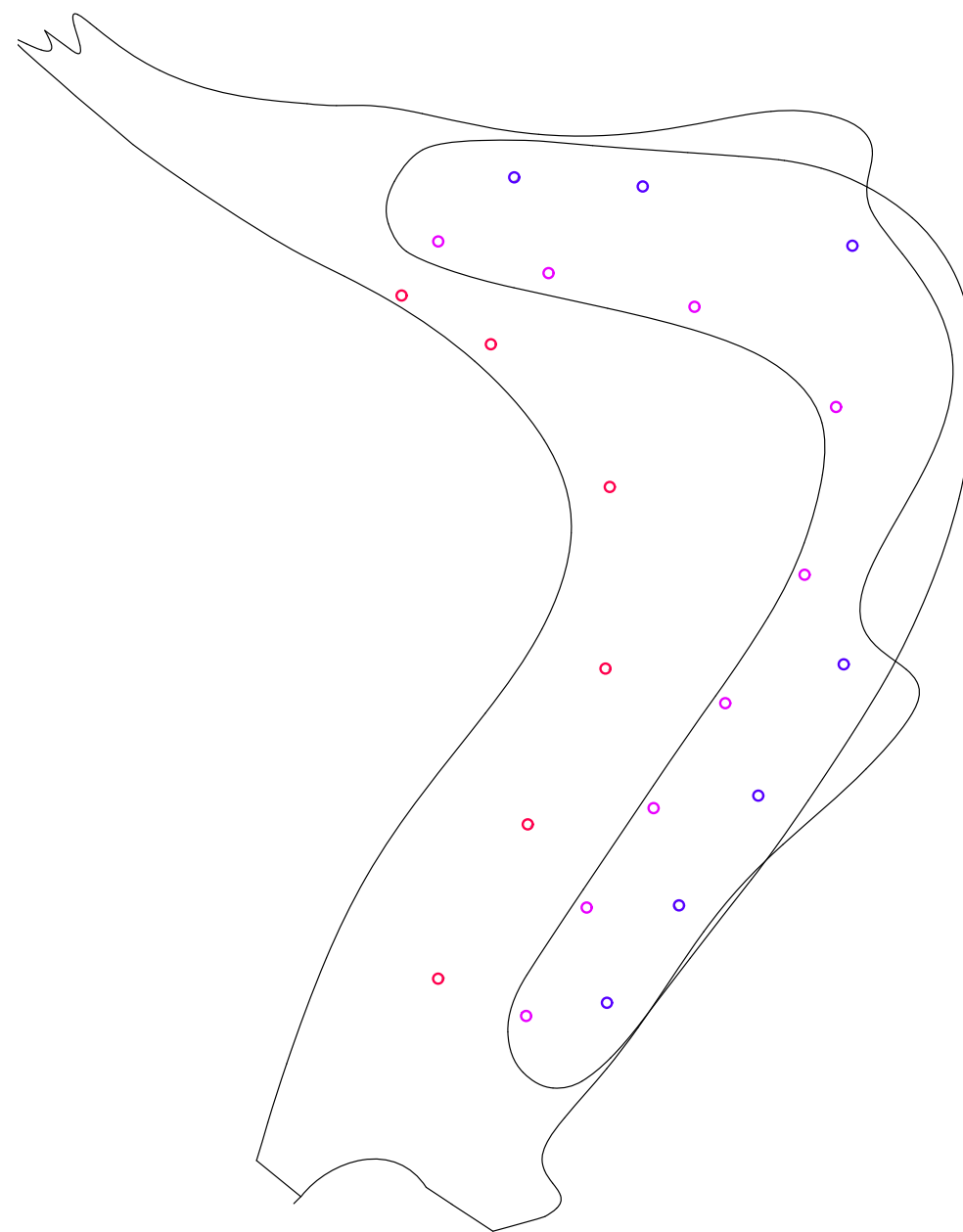
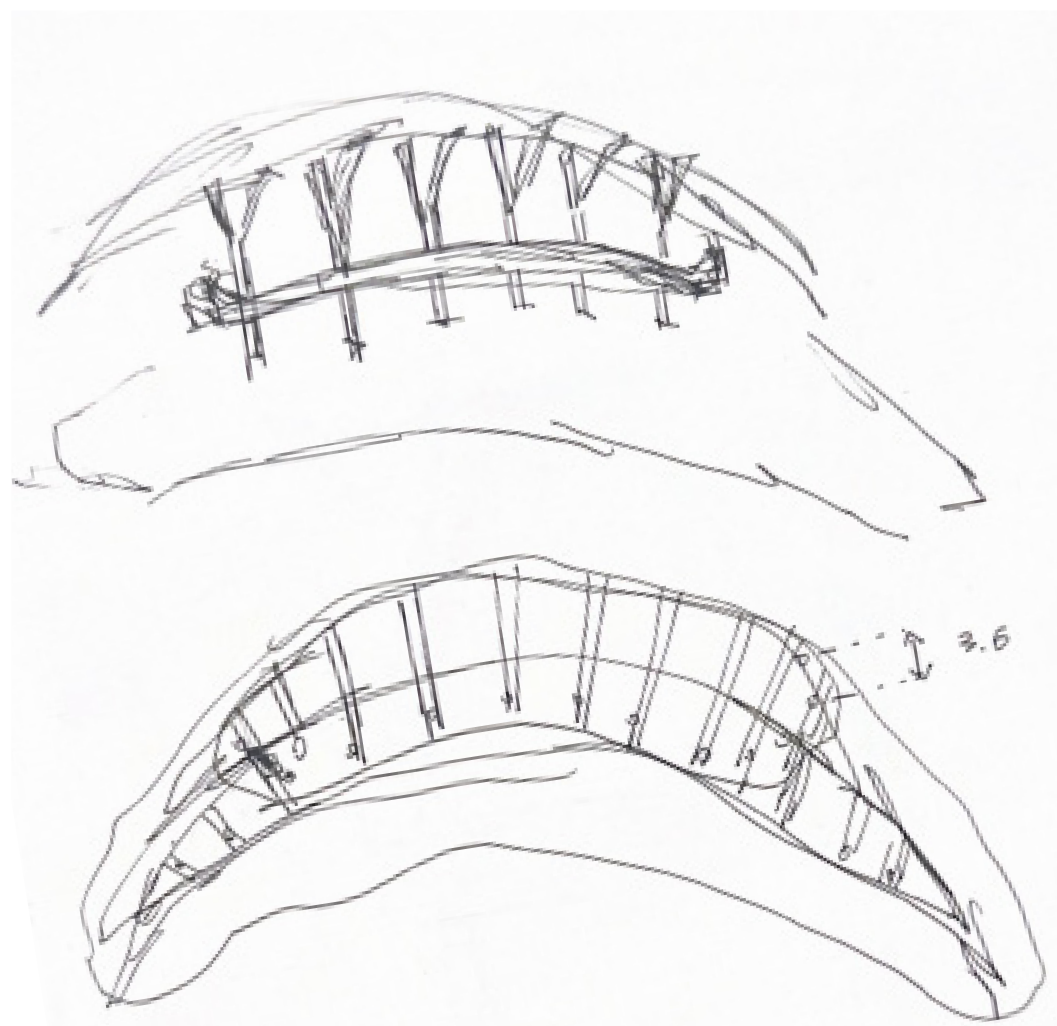
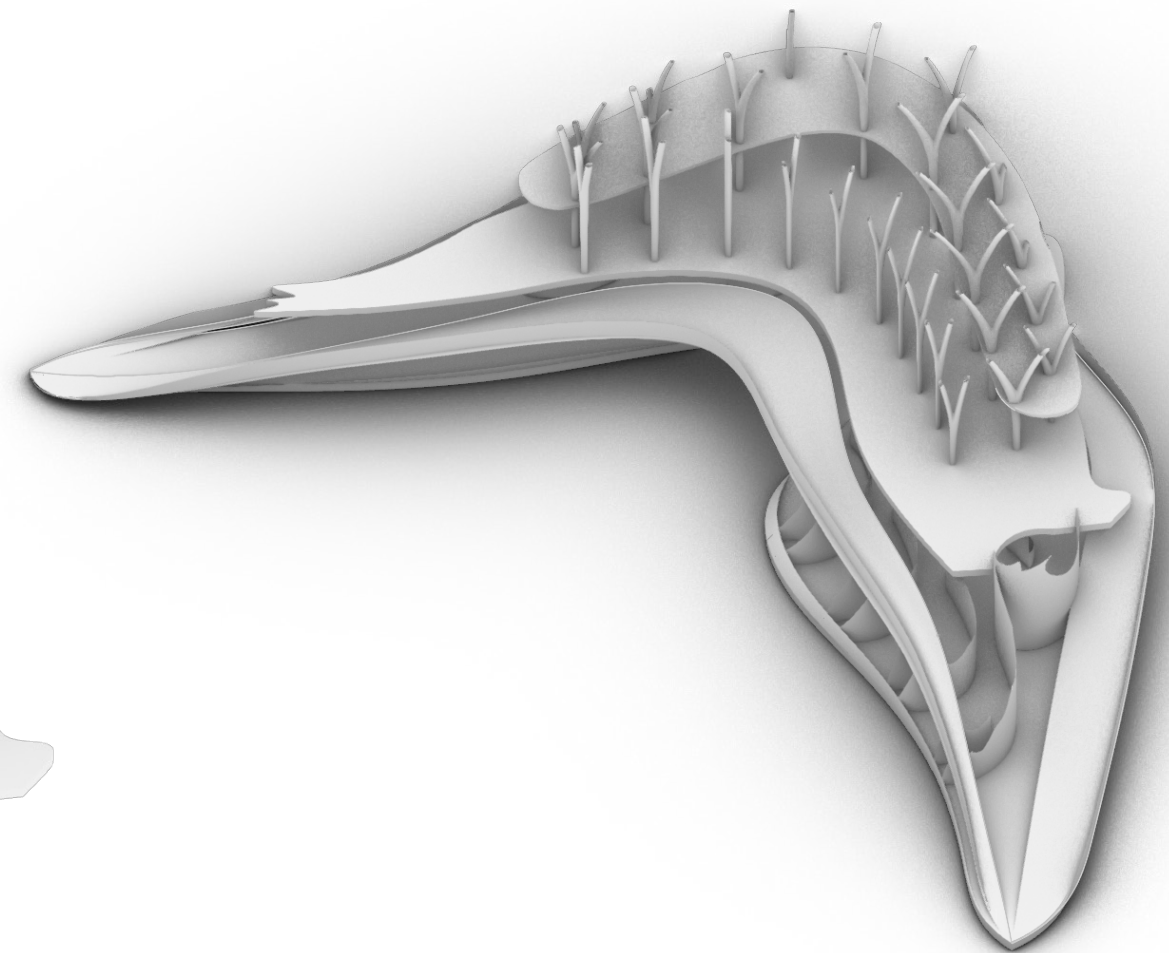
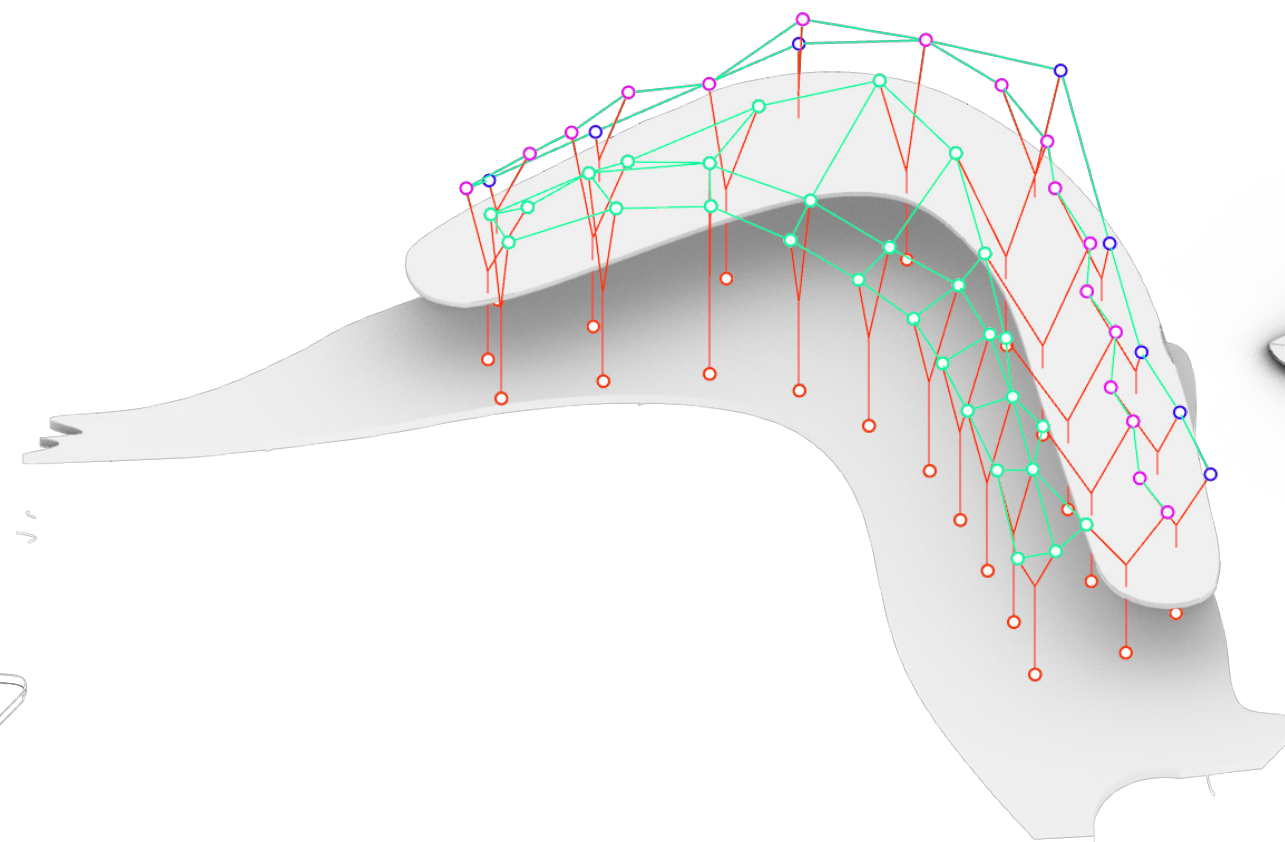


DA: % of daylight hours > 500 lux
Spatial Daylight Autonomy: 98%

The daylight performance of the northeast facing student bedrooms is excellent overall. The Daylight Factor ranges from 2.6% to 22.3%, indicating that the rooms receive ample natural light throughout the day. This is confirmed by the Daylight Autonomy results, with 100% of the space achieving over 300 lux for more than half of daylight hours and 98% achieving over 500 lux, well above most regulatory thresholds.

While this level of daylight contributes positively to student wellbeing, supporting circadian rhythms, mood and productivity, it may also result in overexposures or visual discomfort, particularly in the morning. Given the orientation and function of these rooms as private study and rest spaces, additional shading measures could improve comfort and usability, especially in summer months.

Design Development
Structural Design

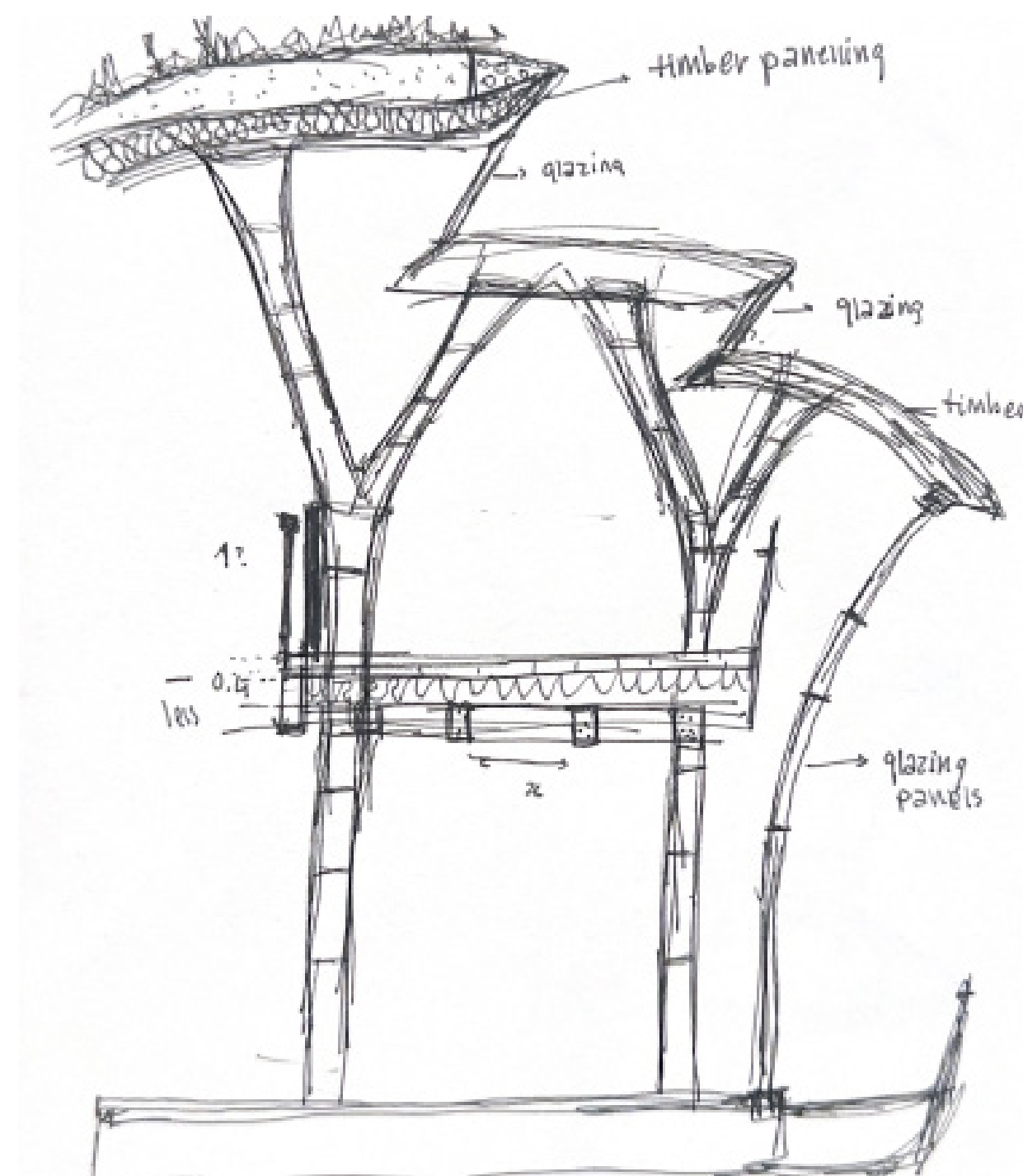
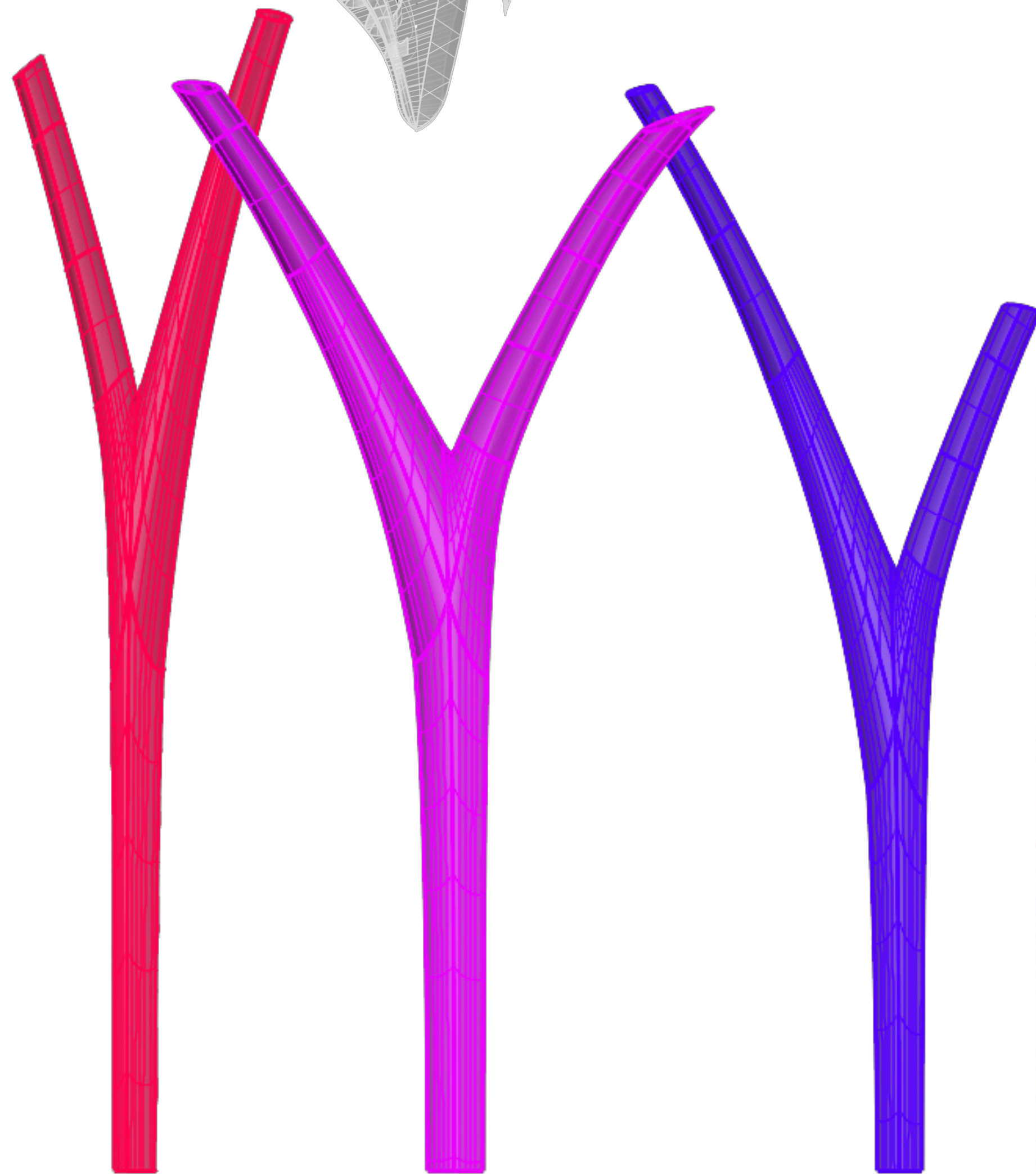
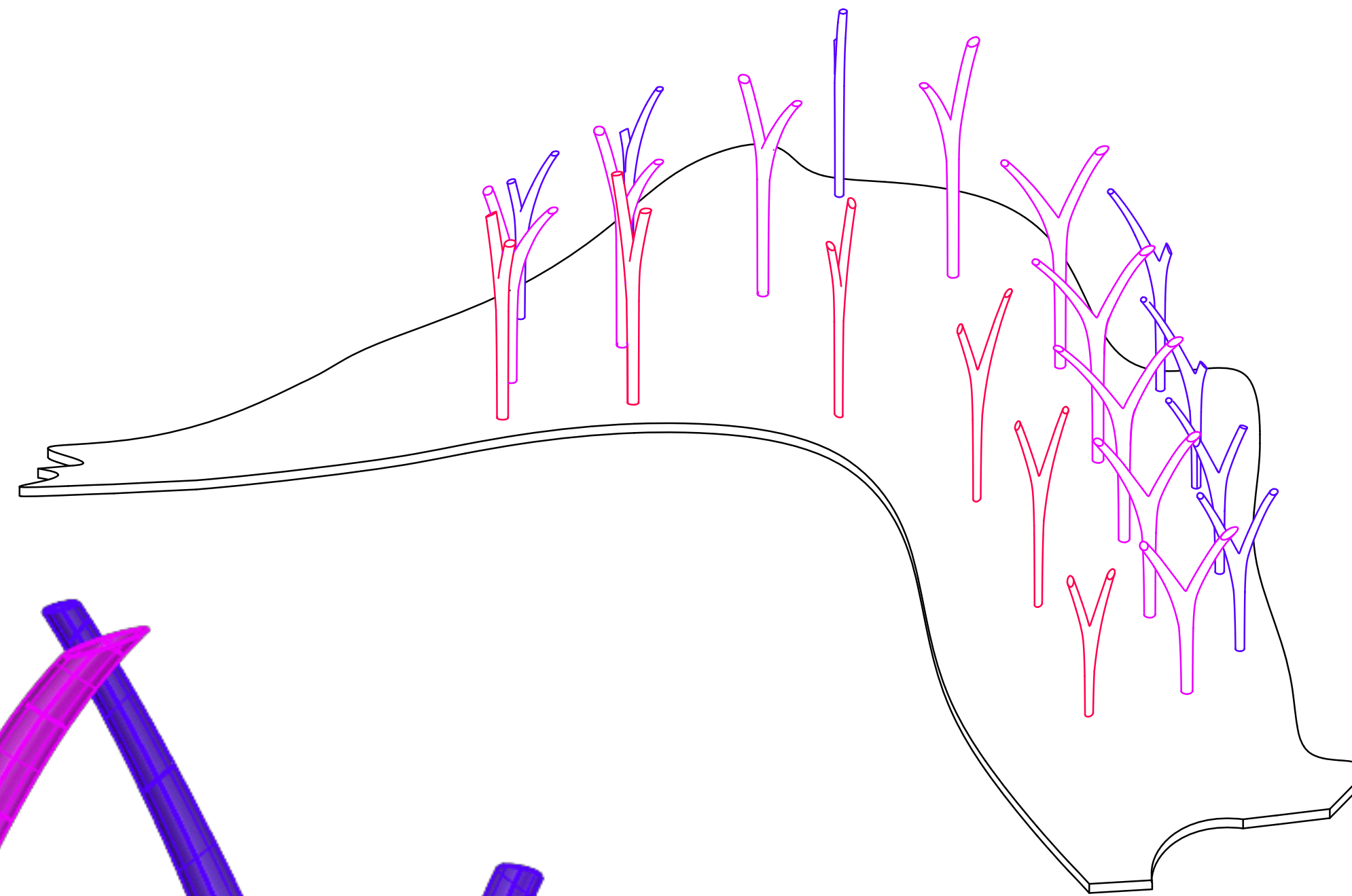
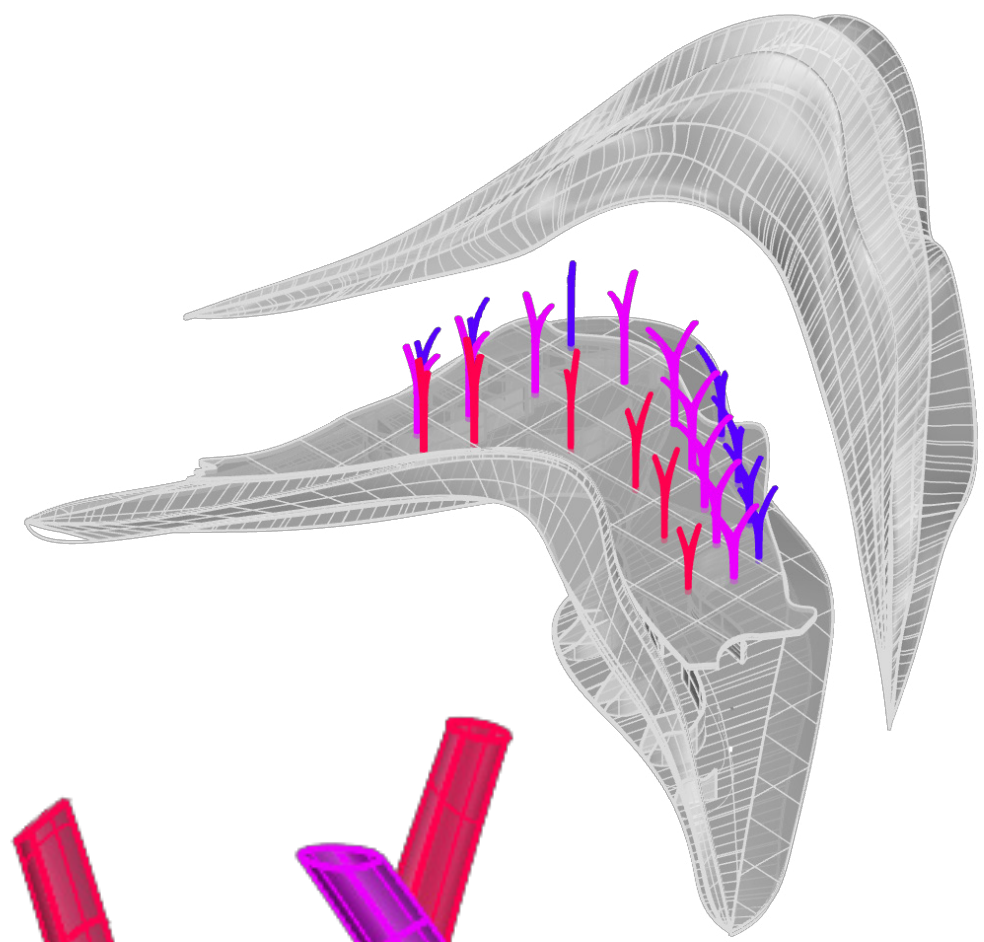


The placement of the columns is adapted to the varying ceiling and roof heights throughout the building.

They are spaced more densely in areas with higher structural demand—particularly under the green roof, which is the largest and thickest roof panel. The other two roof panels are lighter, being timber.

The two left-hand rows of columns also support the mezzanine level. Initially, the columns were evenly spaced at 5 m intervals, but several were removed to avoid redundancy and lighten the design.

Each column is 20 cm thick at the base and made of laminated timber.



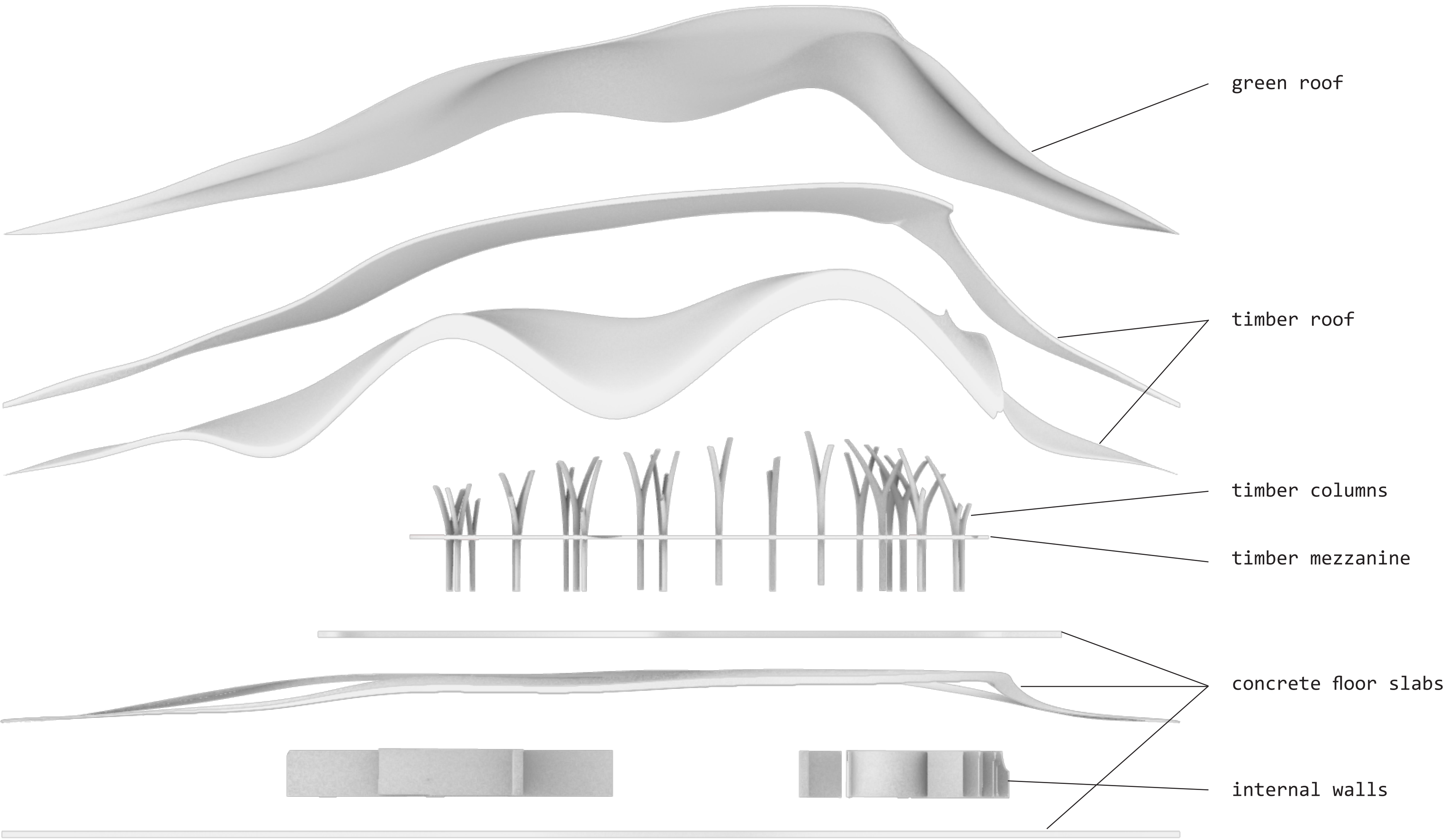
The columns are shown with three different colors (from pink to purple) to represent the three linear groupings.

Their shape, branching at the top like tree trunks, is intentional—reflecting the building's context as a café in a park.

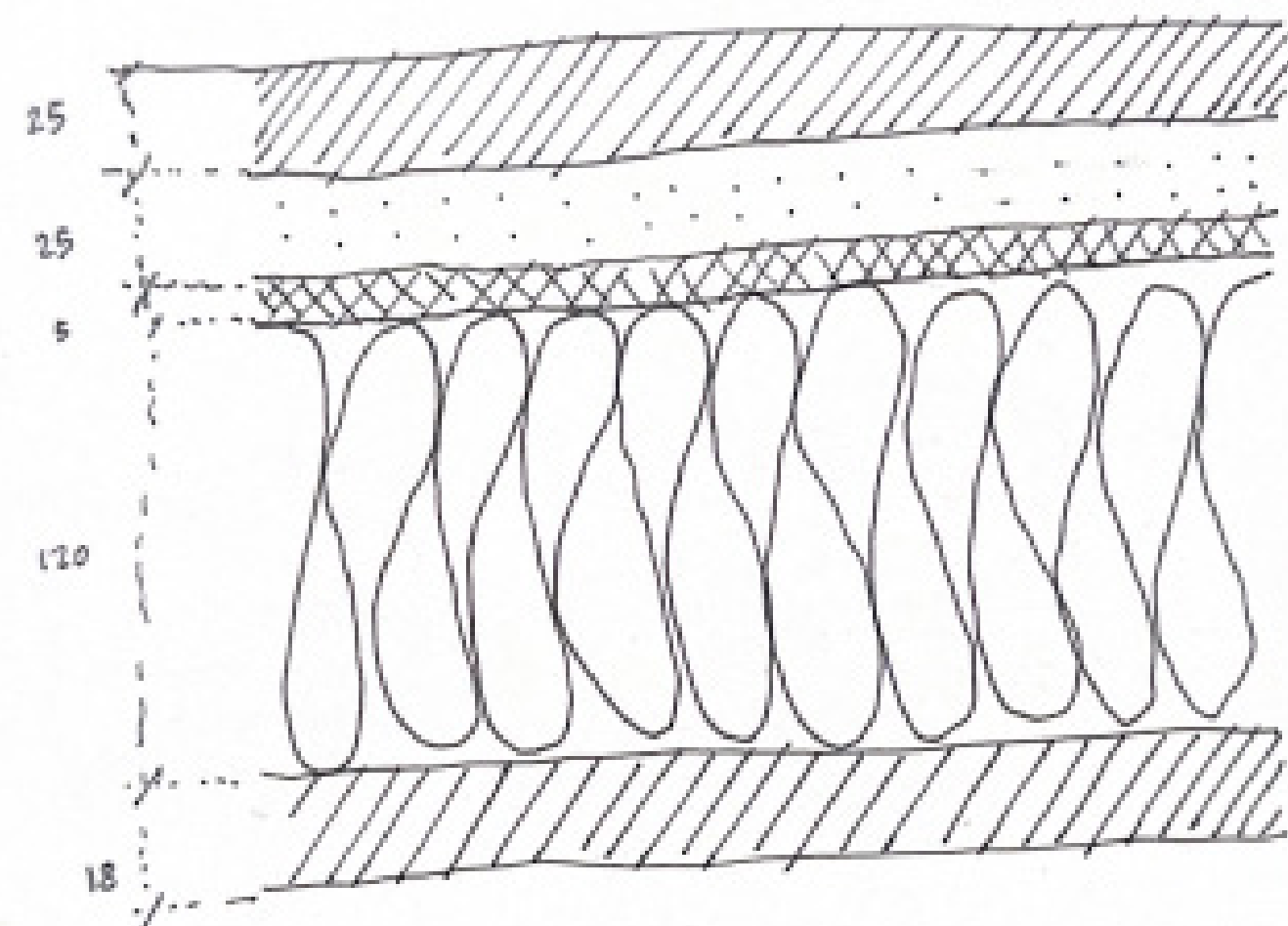
This playful, organic form adds character, making the structure more engaging for children and more integrated into the architectural identity.

Rather than treating columns as purely structural, this approach brings them into the design as interactive, sculptural elements.

Exploded Structural Elements of Building



timber roof / wall



timber panel (extl
cladding / panels

air gap

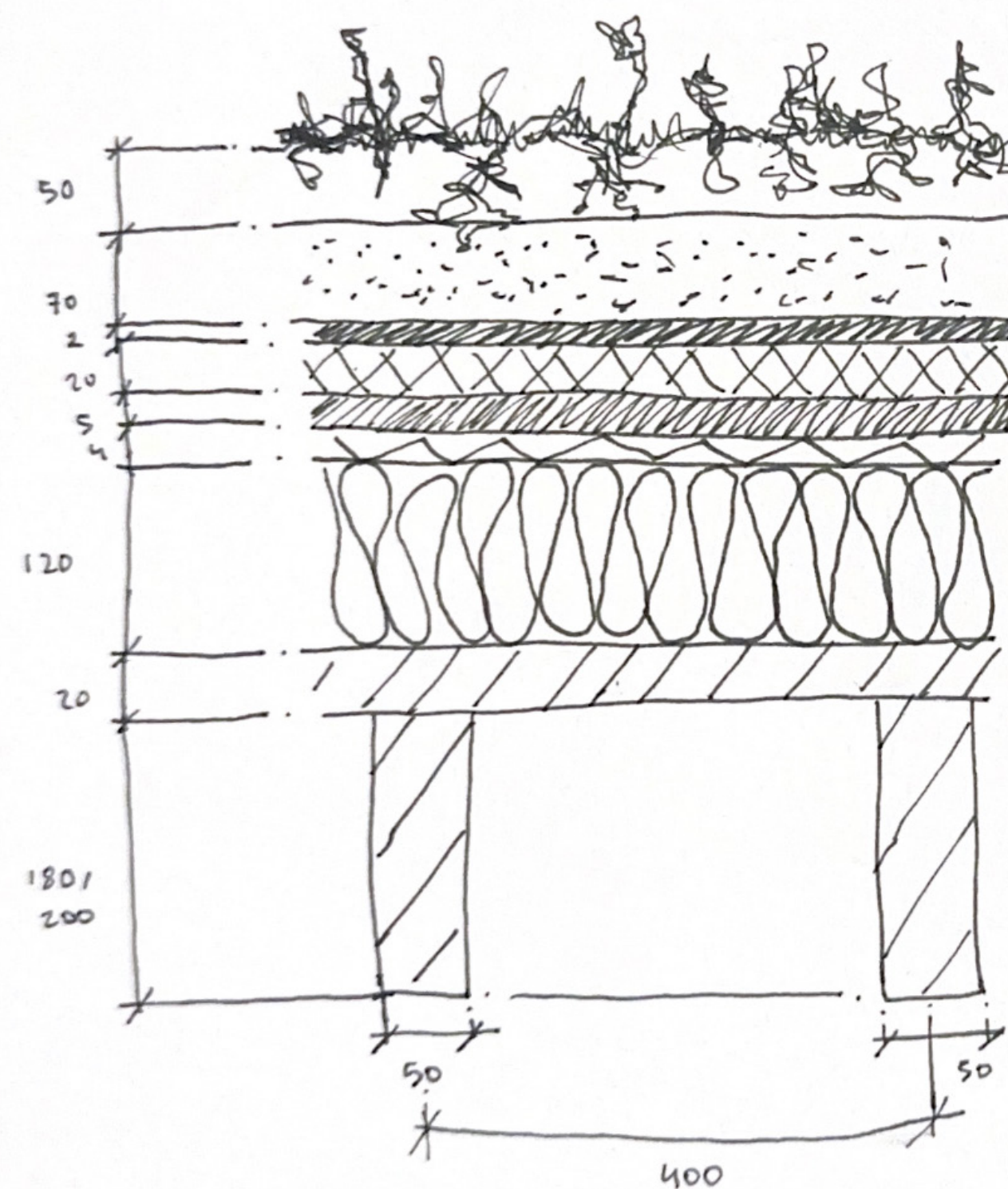
waterproofing membrane

insulation

vapour control layer
timber deck exposed

0.15 W/m²K

green roof cross section · construction details



vegetation

soil

filter fabric

mineral drainage

fiber mat

waterproofing mem

insulation

timber roof d

structural C24
timber joists

Green Roof Cross-Section

vegetation

soil

filter fabric

mineral drainage boards

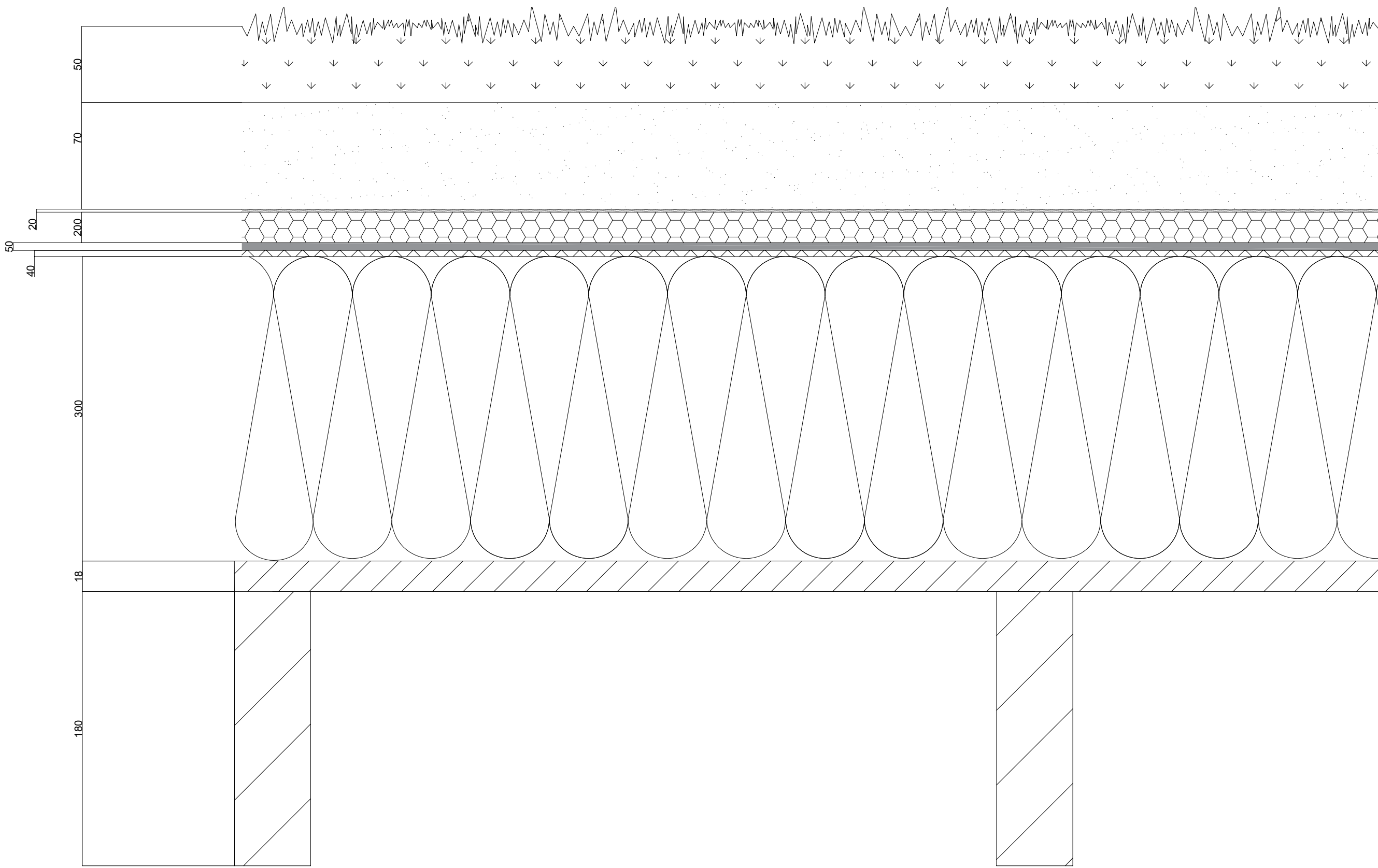
fiber mat

waterproofing membrane

XPS insulation

timber Roof Deck

structural C24 Timber Joists



Foundations

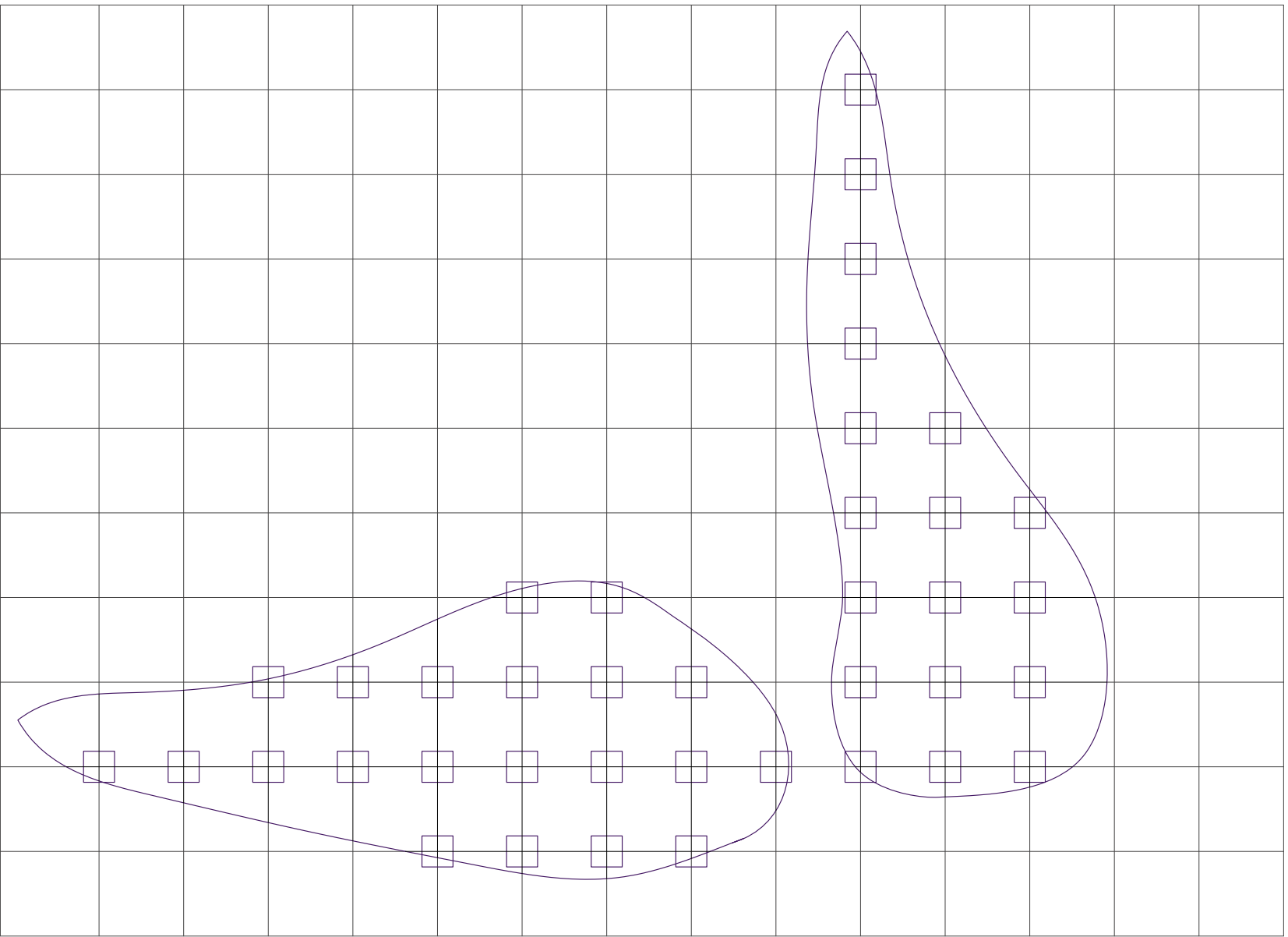
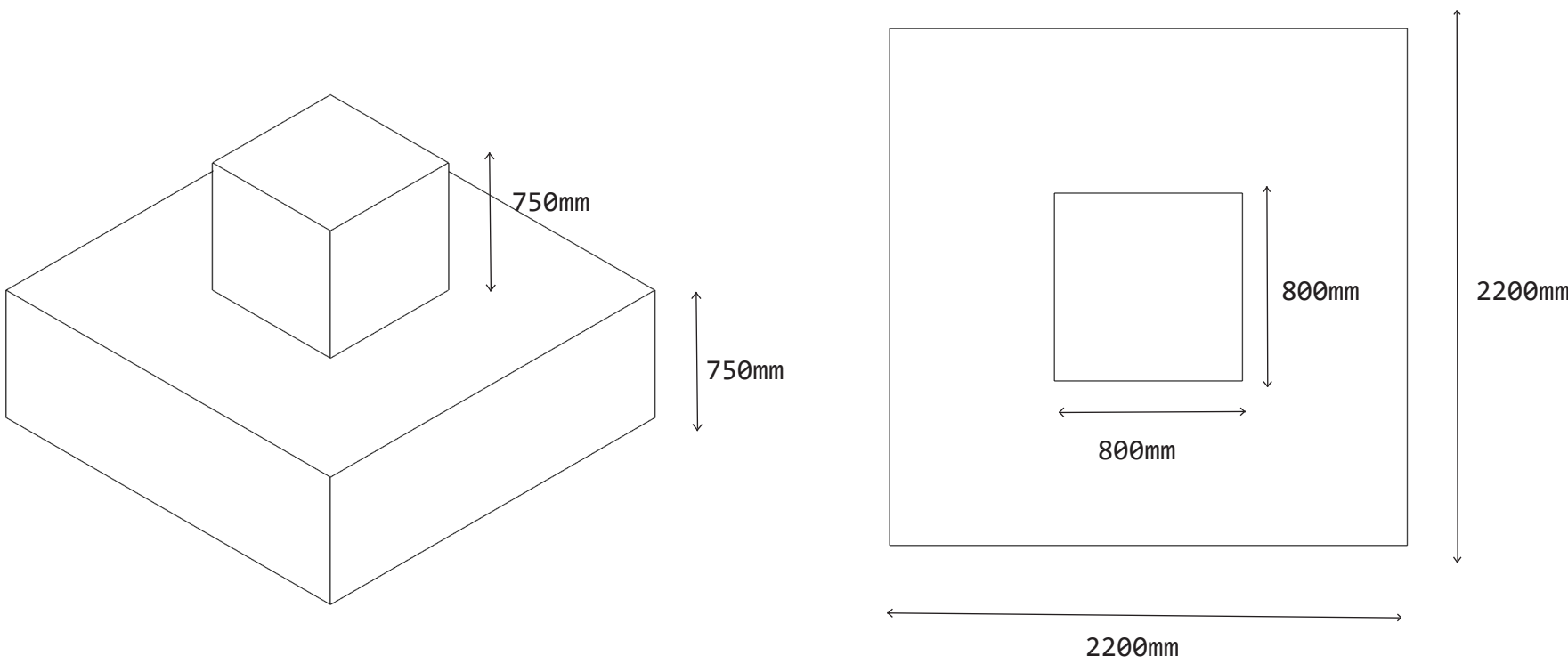
Each pad supports a tributary area of 36 m².

Allowable soil bearing for London clay is 150 kN/m².

The ground floor, a residential flat over 36 m², has a timber structure and finishes estimated at 2.5 kN/m², giving a dead load of 2.5 × 36 = 90 kN.

The first floor and mezzanine (café), covering a combined 72 m², have timber structure and finishes estimated at 3.0 kN/m², resulting in a dead load of 3.0 × 72 = 216 kN.

The green roof adds 1.5 kN/m² over 36 m², or 54 kN.

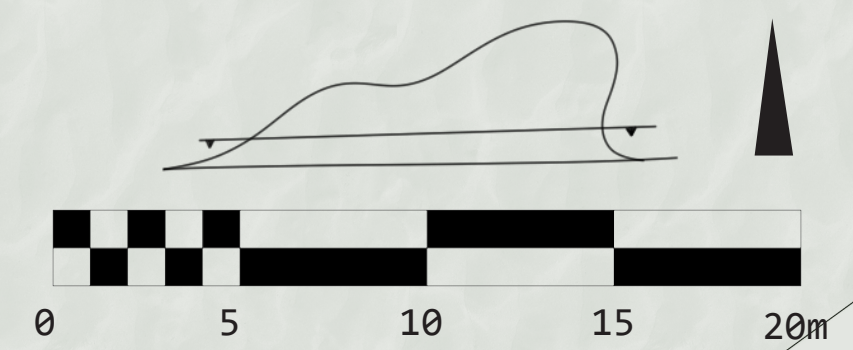
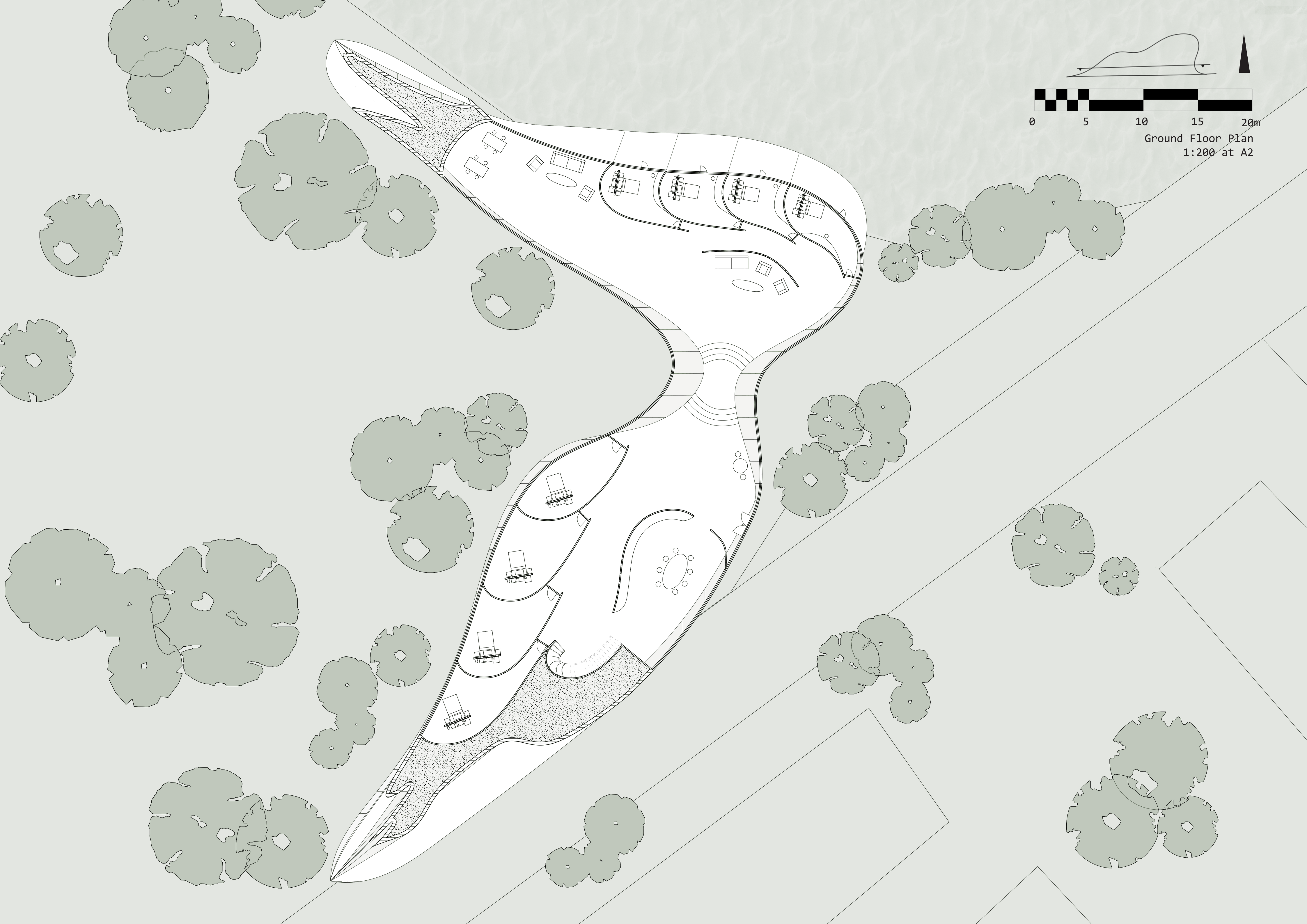


The pad foundation has a volume of 2.2 × 2.2 × 1.5 = 7.26 m³. With concrete at 25 kN/m³, this gives a foundation self-weight of 7.26 × 25 = 181.5 kN.

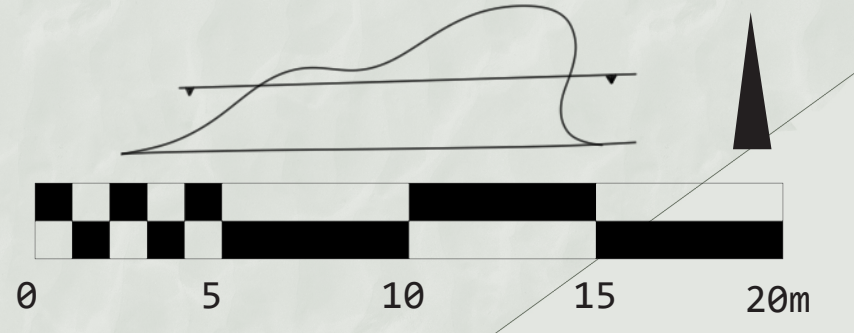
For the ground floor, the total load including a reduced live load (1.0 kN/m²) is (2.5 + 1.0) × 36 = 126 kN. For the café, assuming live loading of 2.5 kN/m², the total load is (3.0 + 2.5) × 72 = 396 kN. Adding the green roof load of 54 kN, the total structural load is 126 + 396 + 54 = 576 kN. Including the foundation self-weight of 181.5 kN, the total load per pad is approximately 758 kN.

The pad area is 2.2 × 2.2 = 4.84 m², giving a bearing pressure of 758 ÷ 4.84 = approximately 157 kN/m². This is slightly above the conservative estimate of 150 kN/m², but remains acceptable for well-consolidated London clay, especially with reduced live loads and typical safety factors already included in soil capacity values. The chosen pad size is therefore considered suitable.

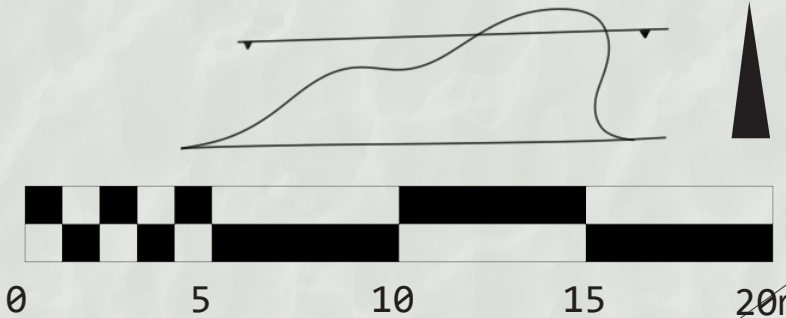
Final Design



Ground Floor Plan
1:200 at A2



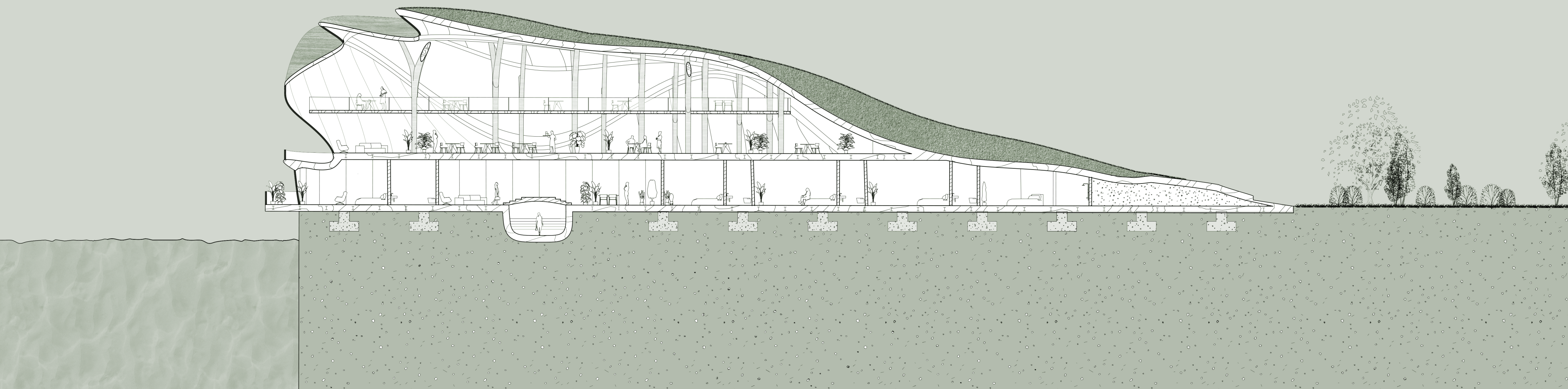
First Floor Plan
1:200 at A2

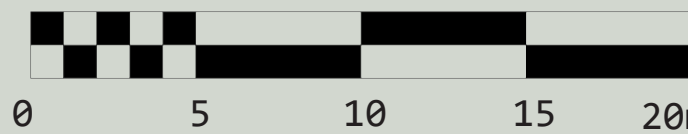


Mezzanine Floor Plan
1:200 at A2

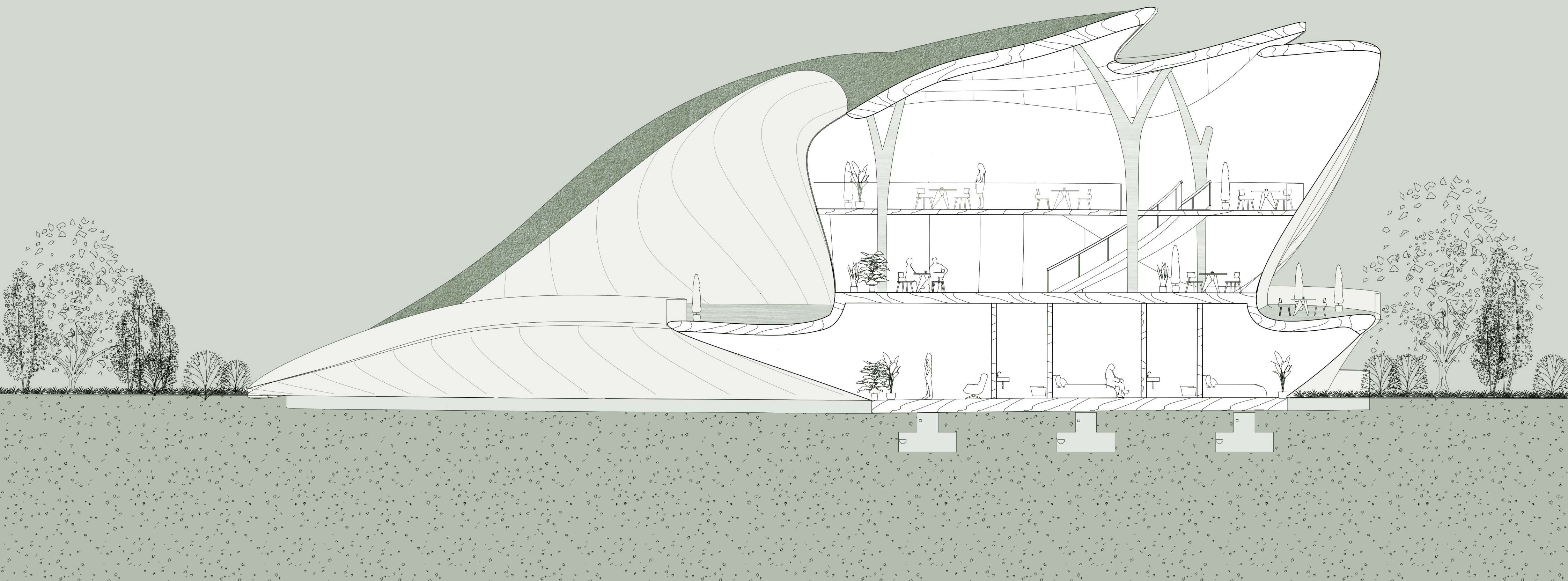


Long Section
1:200 at A2

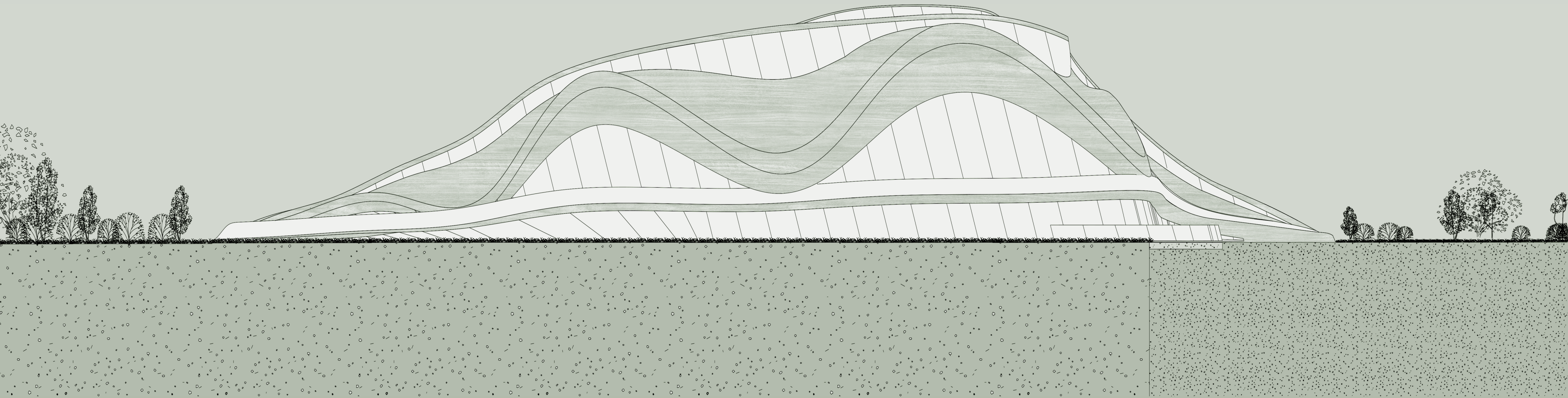
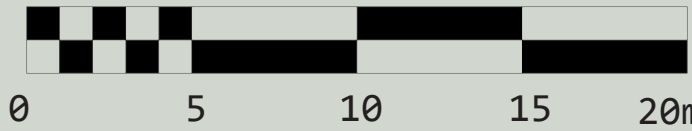


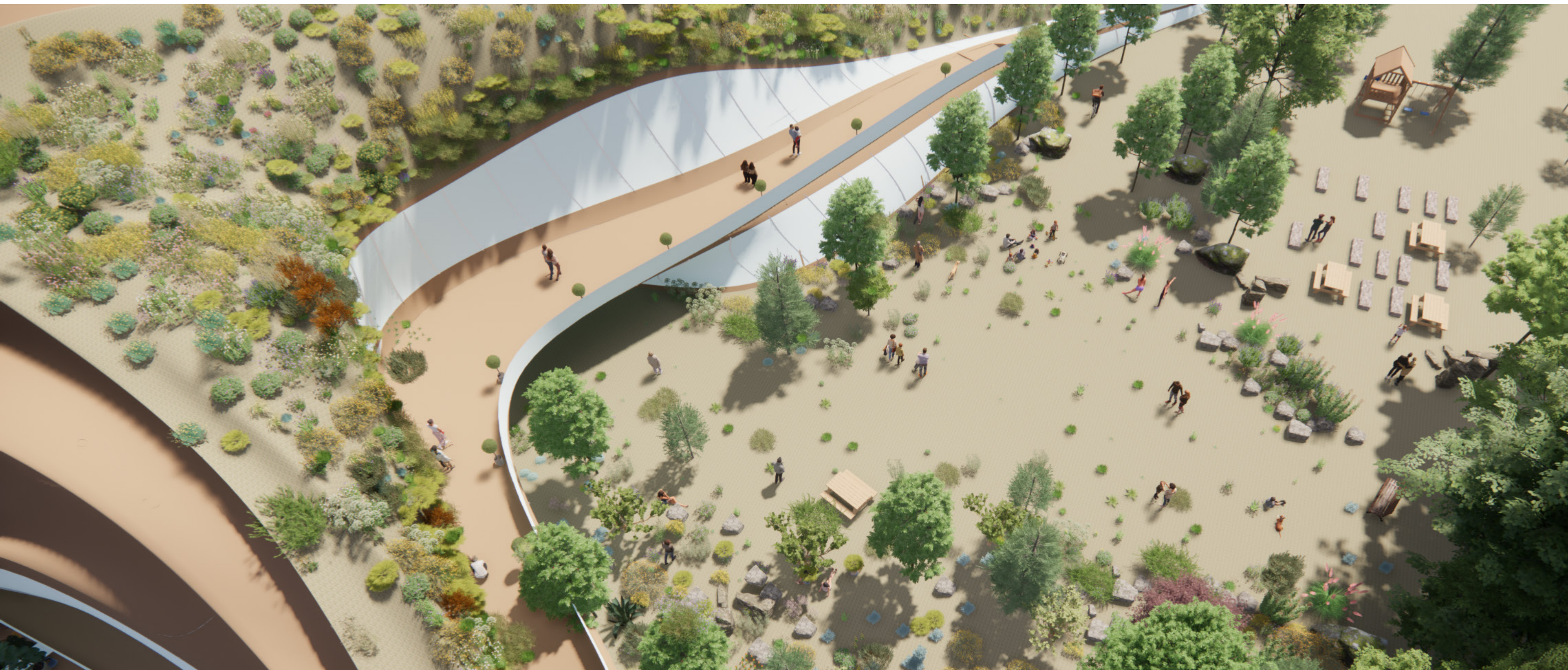


Short Section
1:100 at A2



Front Elevation
1:150 at A2





Renders









