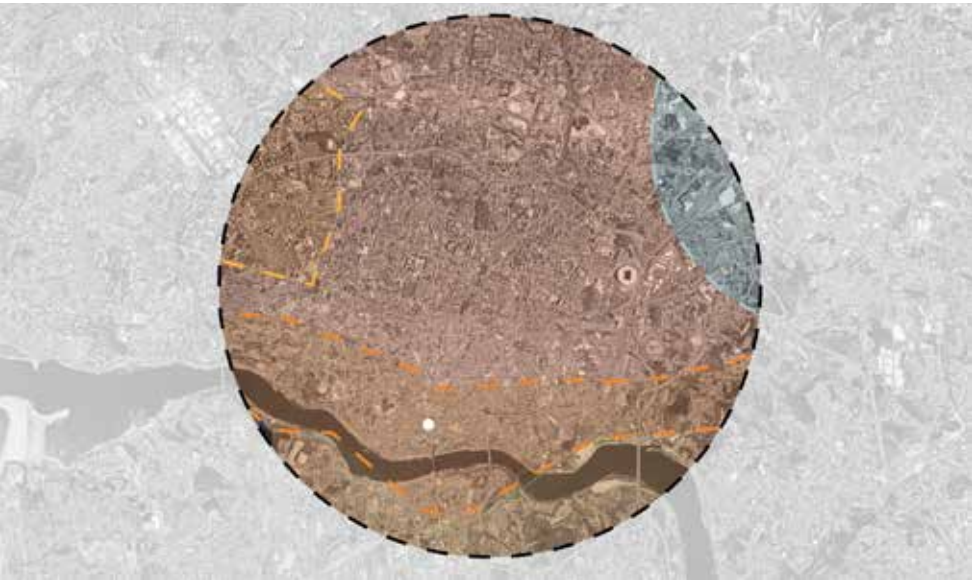
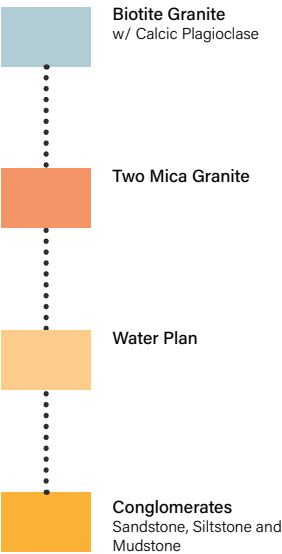


Geology In Porto



Colour Meanings



Most Used Materials In Porto

Red Granite

There is mutple granite pockets underground Porto making it an ideal choice for buildings

Azulejo Tiles

Depict stories from history, religion, due to this reason they are important.

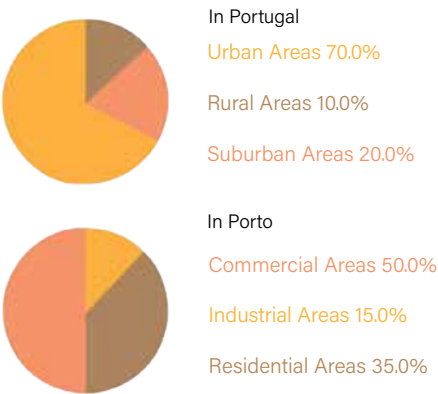
Marble

Porto has a rich tradition of using stone, such as marble, for tiles, pavers

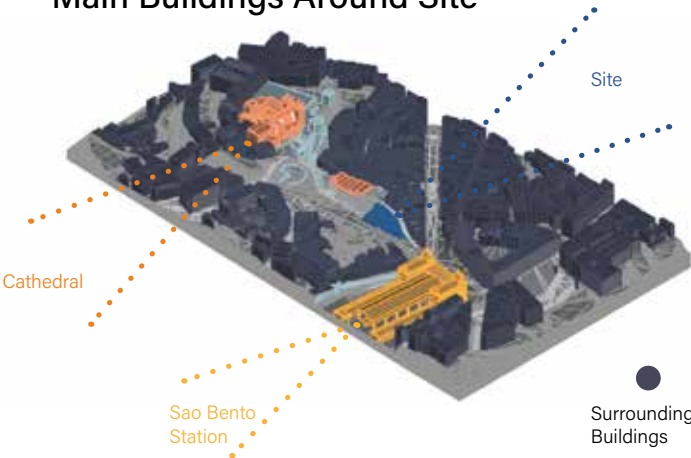
Glazed Brick

Porto has a deep rooted tradition with using ceramics which align with the tiles

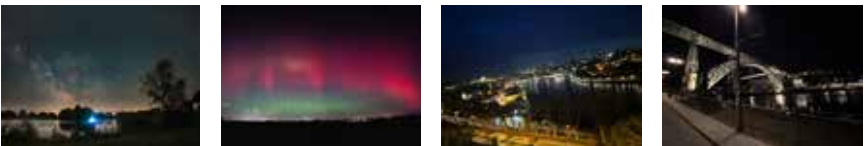
Light Pollution Statistics in Porto



Main Buildings Around Site



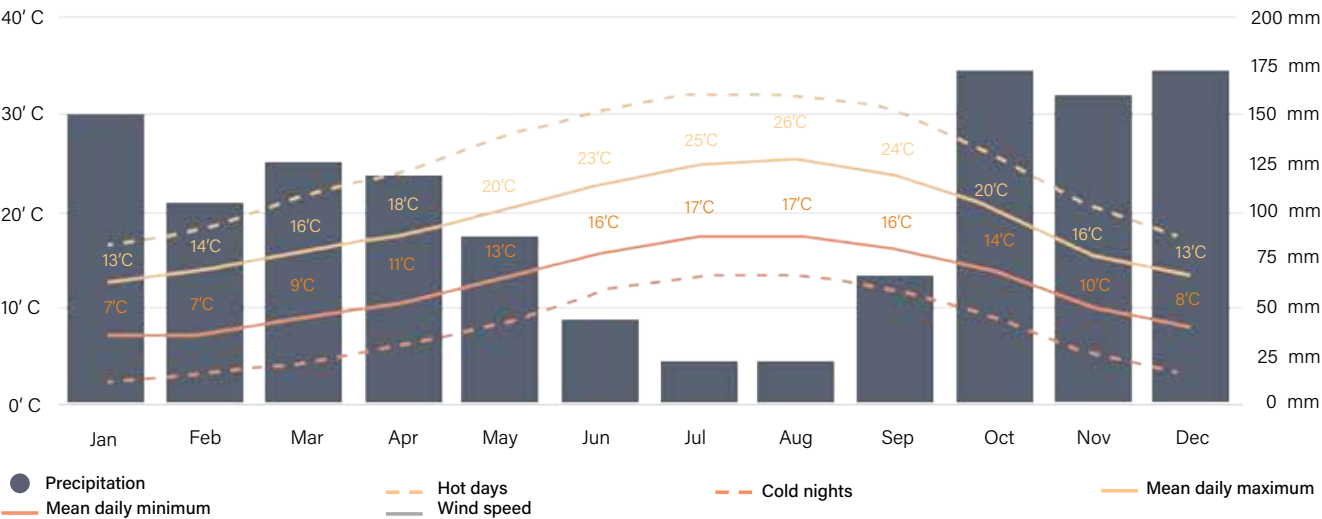
Light Pollution In The Uk Vs Porto



Site Analysis 01

Porto (Portugal)

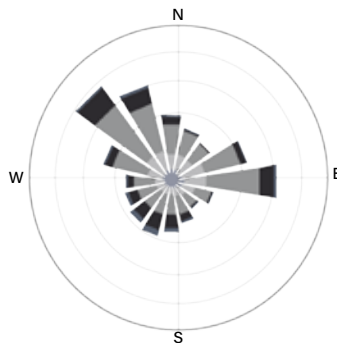
Average Temperatures and Precipitation In Porto



Summer Solstice



Winter Solstice



10-15 mph 5-10 mph 3-5 mph 1-3 mph

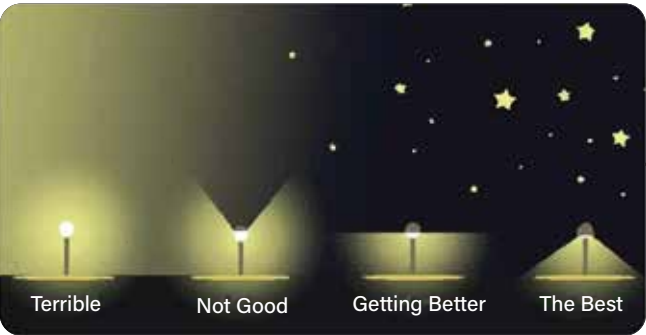


Noise Pollution

Most To Least Places Filled With Light Pollution



Streetlight Designs that cause high to low light pollution



Effects of light fixtures

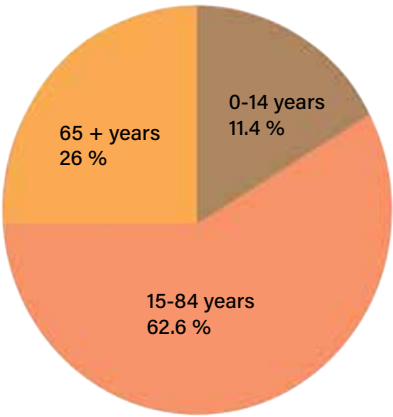


Planterium In Porto



Feels unwelcoming to the general public as it primarily caters to schools, limiting access for casual visitors. Its rigid, academic approach lacks interactive and immersive experiences, making it feel outdated compared to modern planetariums.

Observatory In Porto



Age population In Porto

Site Analysis 02 Porto (Portugal)

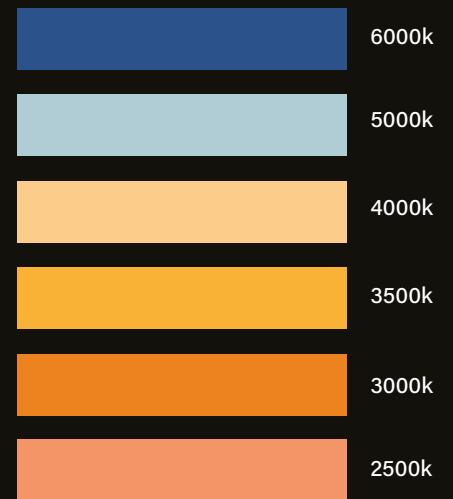


Map Of Porto



blue to white light scatters easily in the atmosphere, reducing visibility of stars and disrupting ecosystems. Mid range temperatures around 4000K and 3500K are slightly better but still contribute to urban light pollution. The best choices for minimizing light pollution are warm colored lights at 3000K

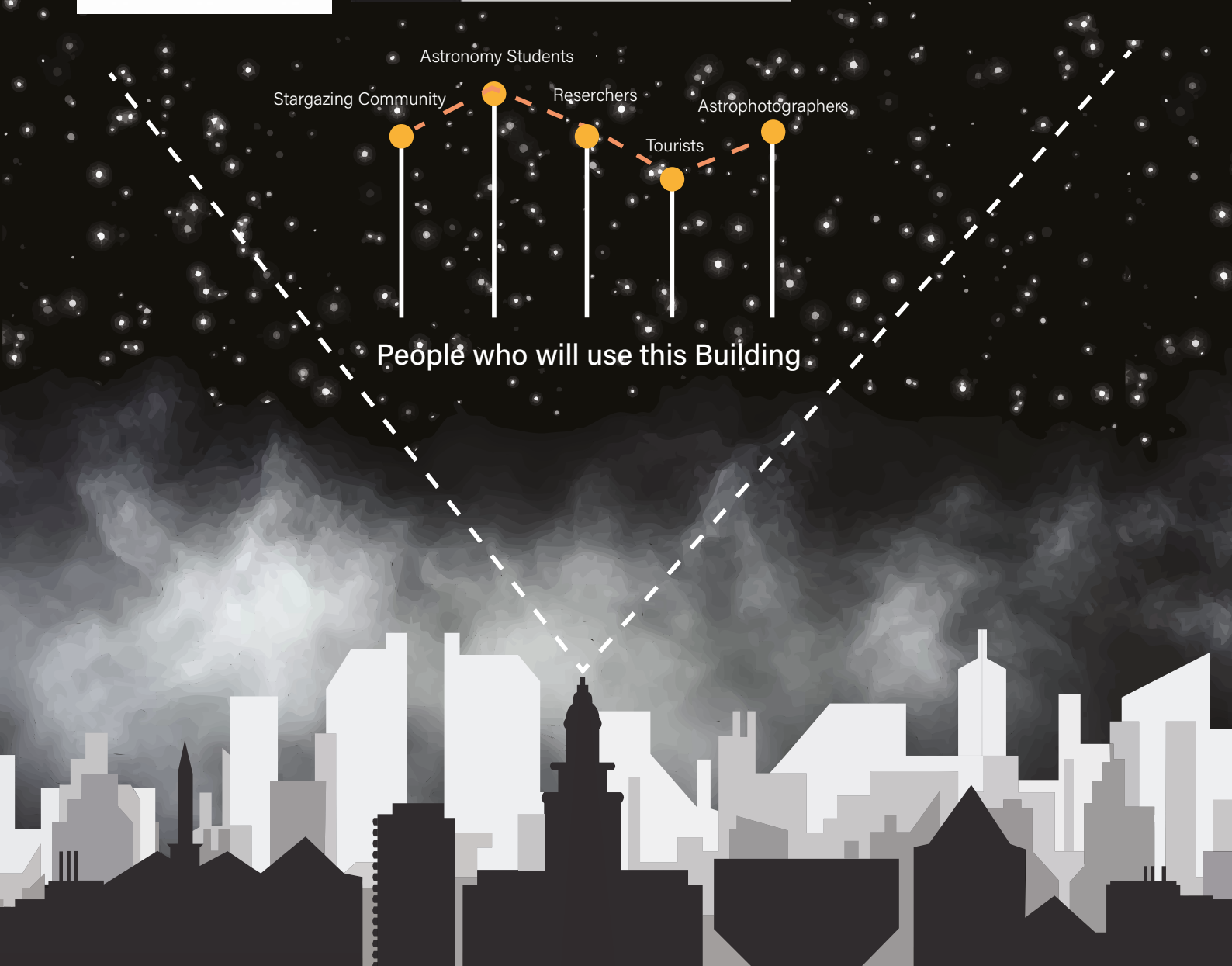
Worst to Best Light Temperatures



Possible Clients and Funders



Portugal Space focuses on satellite technology, Earth observation, space exploration, and fostering collaboration between academia, industry

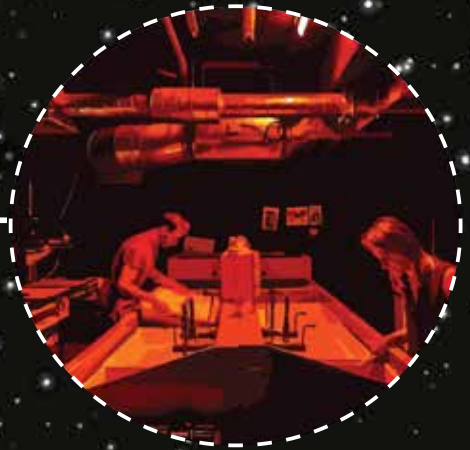




Stargazing Room

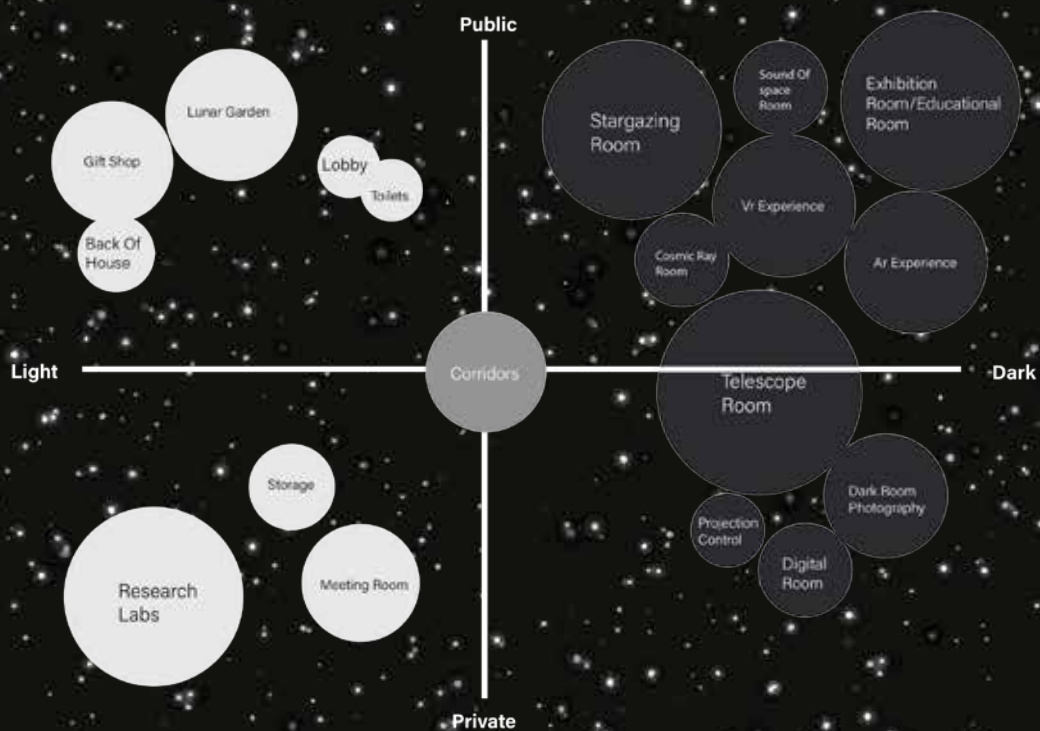


Telescope Room



Dark Photography

Room Adjacency Programs



Exhibition Room



Lunar Garden



AR Room

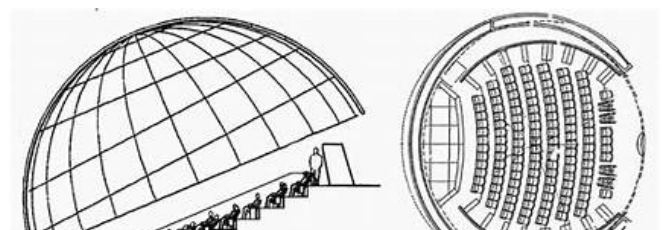
Brief Area
Collages and Diagrams

Shanghai Astronomy Museum



The world's largest astronomy museum, opened in 2021 and was designed by Ennead Architects. What makes it unique is its futuristic, flowing architecture, which avoids straight lines and right angles, mimicking celestial motion. The museum features an Oculus that tracks the sun, an Inverted Dome offering a direct sky view, and an Observatory with a 35-cm telescope.

Constructivist Moscow Planetarium



Built in 1929 in the Constructivist style, is Russia's oldest and one of Europe's largest planetariums. Its unique design emphasizes functionality and geometric simplicity, featuring a 25-meter dome, the Universarium M9 star projector, and an observatory with Moscow's largest public telescope.

Brief Precedents Porto (Portugal)

All The Dark Rooms



Stargazing, Projection and cosmic ray rooms



Ar and Vr Rooms



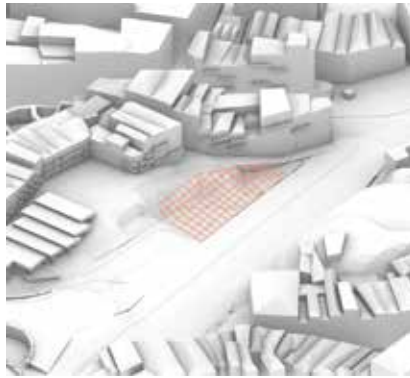
Celestial bodies, and Sound in space rooms



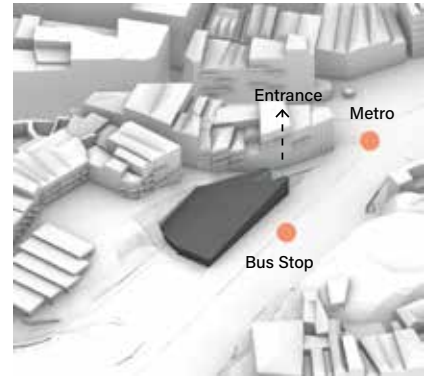
Dark photography, with digital print room



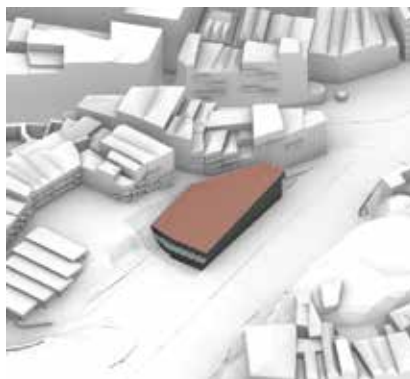
Telescope room



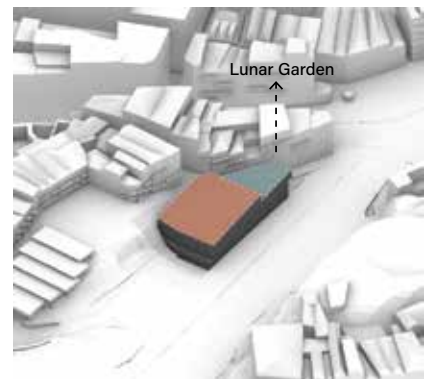
Achieving the shape, ready to be extruded.



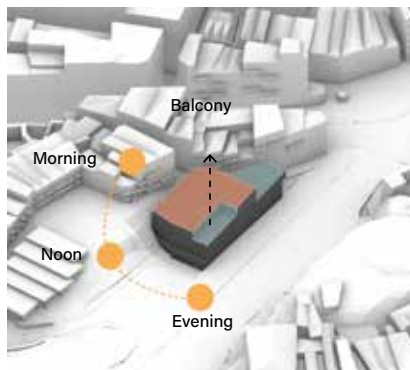
Ground floor being extruded, with entrance near metro for easy access



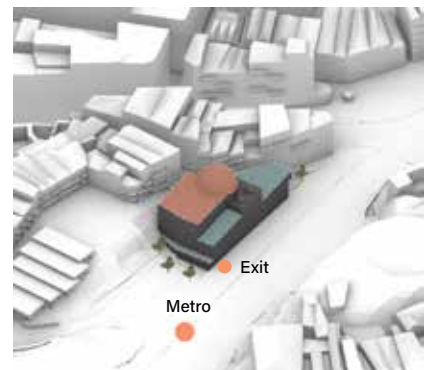
First floor added, with mass being added to the building



Lunar garden added to the north site, for plants that bloom better during the night



Third story being added, mass has been taken away for a balcony



Last story added, with telescope dome added.



As you go up the floors mass has been removed

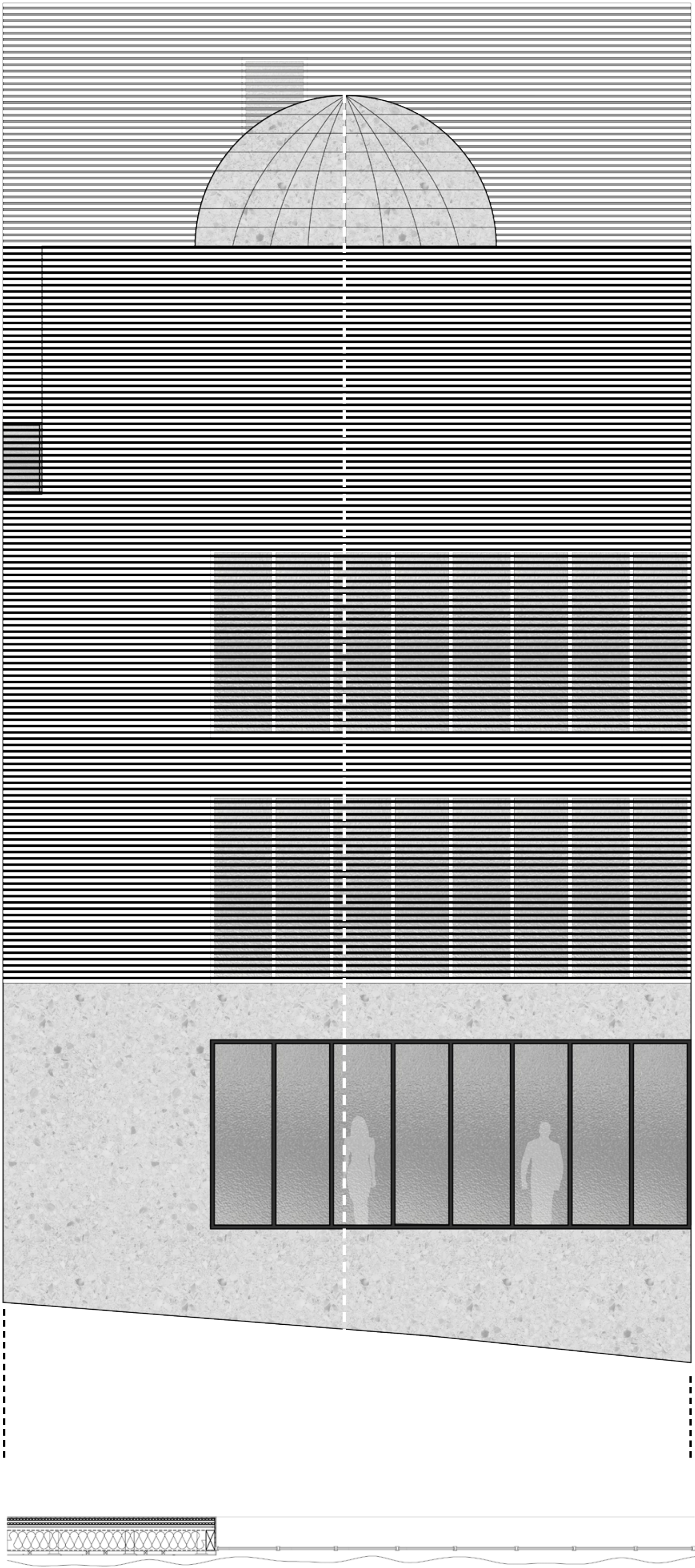
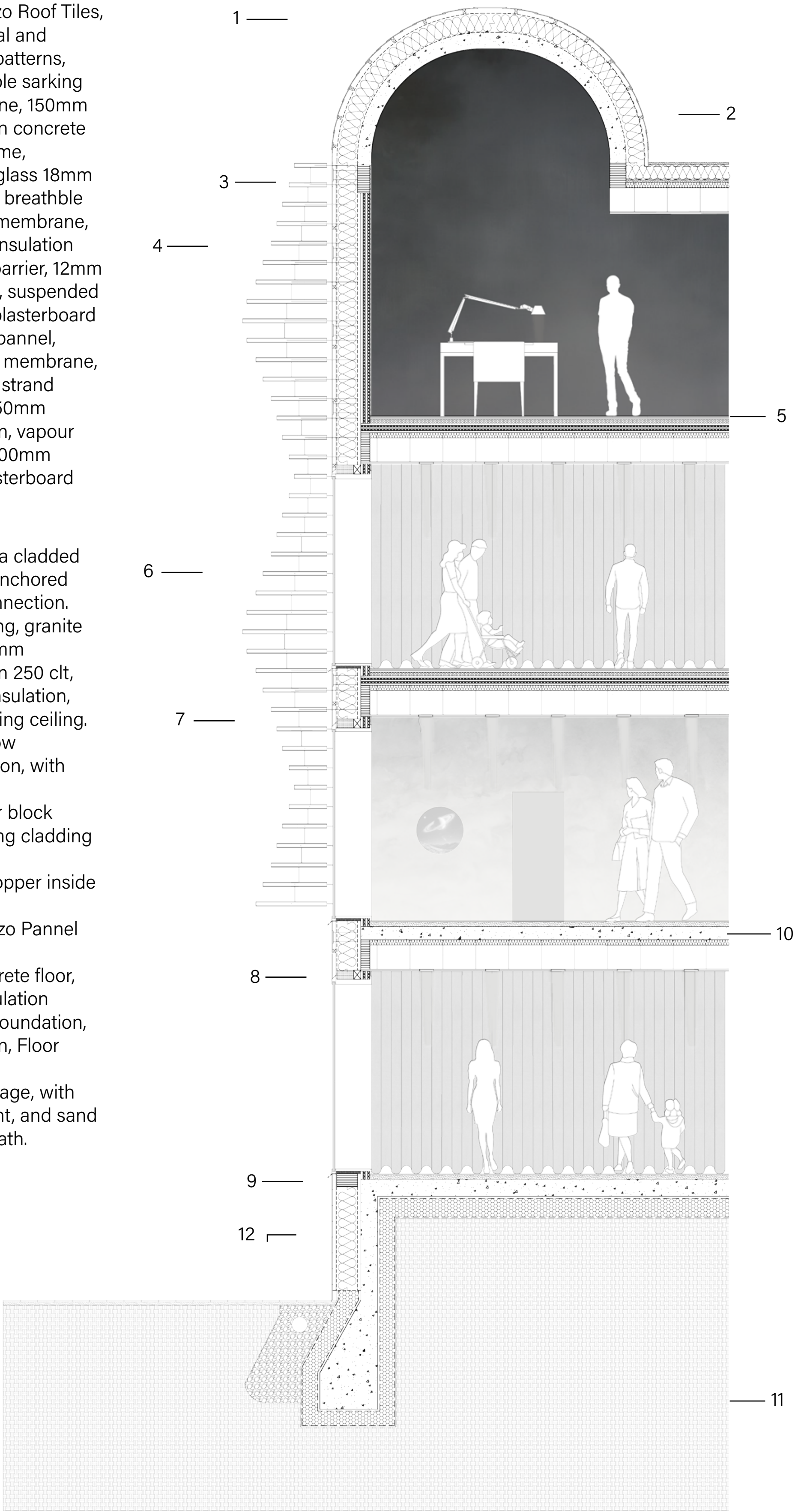
All Floors

Design Development Porto (Portugal)



1. Terrazzo Roof Tiles, horizontal and vertical batterns, breatheble sarking membrane, 150mm insulation concrete Shell dome,
2. Fibreglass 18mm plywood breatheble sarking membrane, 150mm insulation vapour barrier, 12mm plywood, suspended ceiling, plasterboard
3. Viroc pannel, breather membrane, oriented strand board, 150mm insulation, vapour barrier, 100mm CLT, Plasterboard

4. Accoya cladded waves, anchored steel connection.
5. Flooring, granite tiles, 60mm insulation 250 clt, 80mm insulation, suspending ceiling.
6. Window connection, with lintel.
7. Timber block seperating cladding change.
8.Fire stopper inside wall
9. Terrazzo Pannel plinth.
10. Concrete floor, with insulation
11. Strip foundation, insulation, Floor finish
12. Drainage, with pavement, and sand underneath.



Material Palette

Plan Build Up



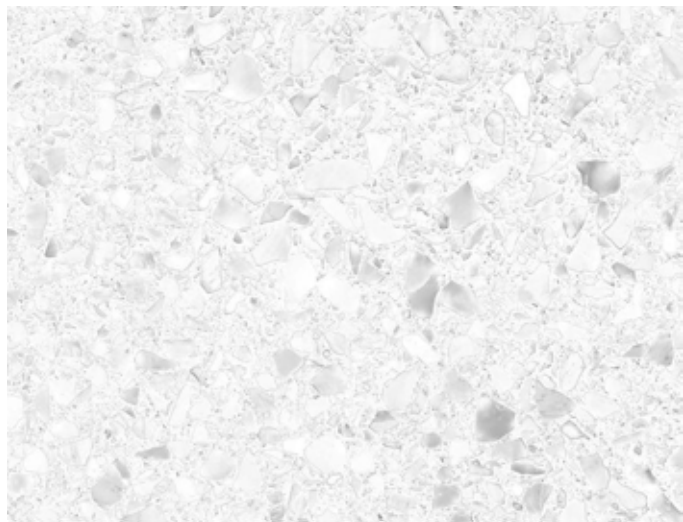
Accoya Cladding



Cross laminated Timber



Gluelam Structure



Terrazzo Panels



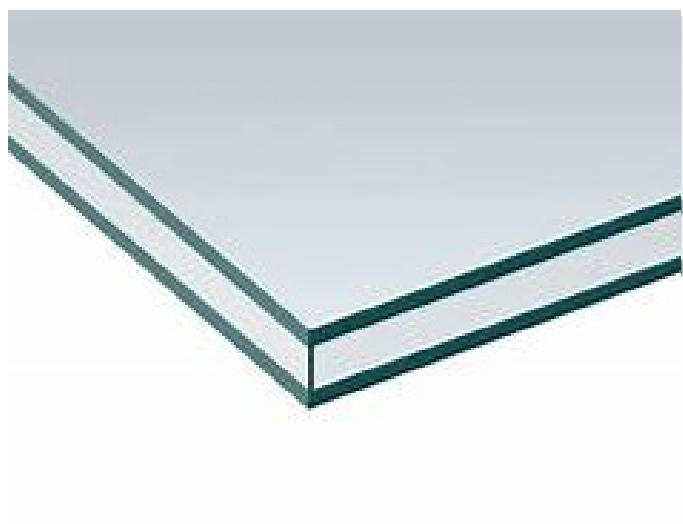
Terrazzo Tiles



Concrete



Viroc



Reflective Glass

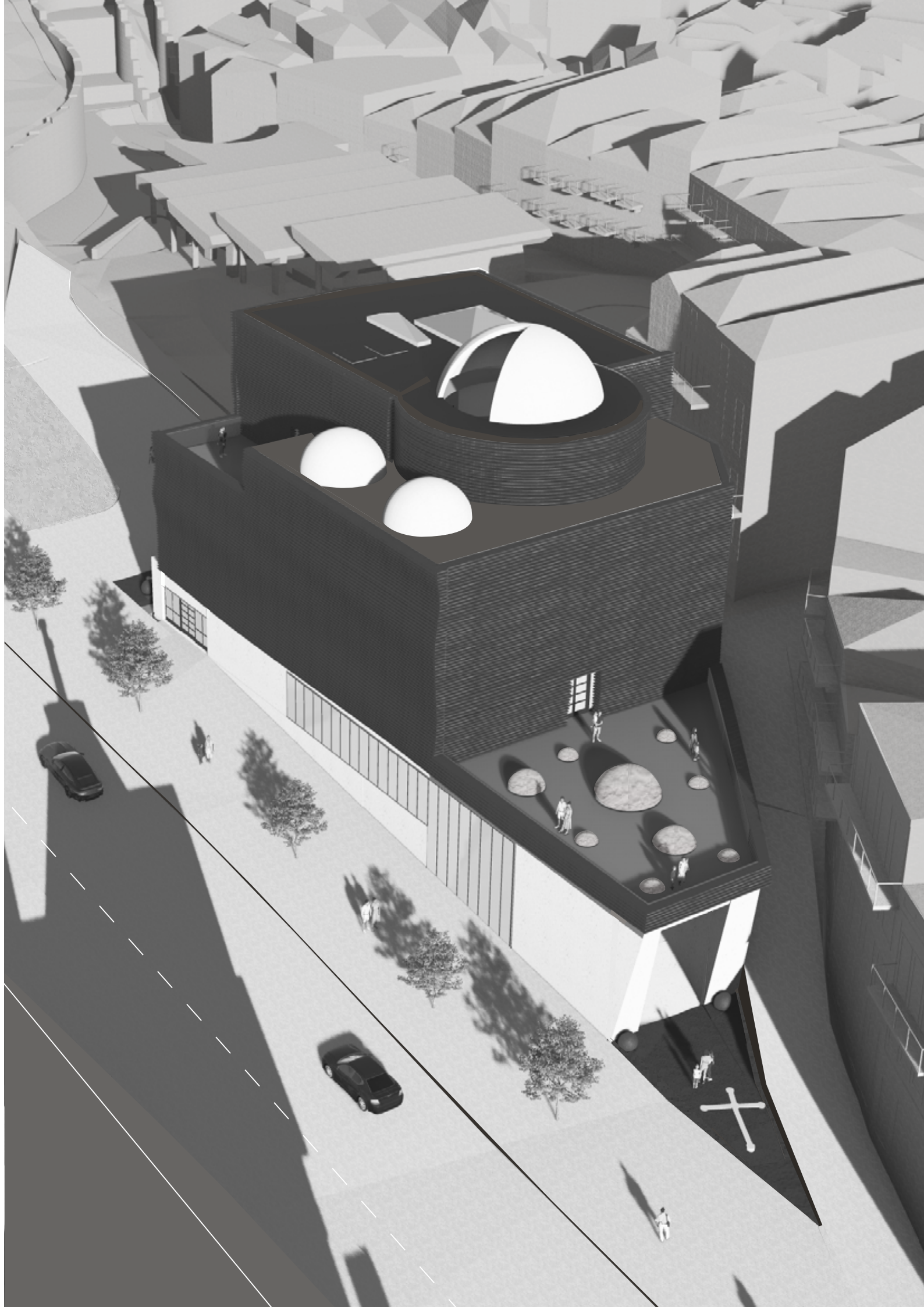


Plasterboard

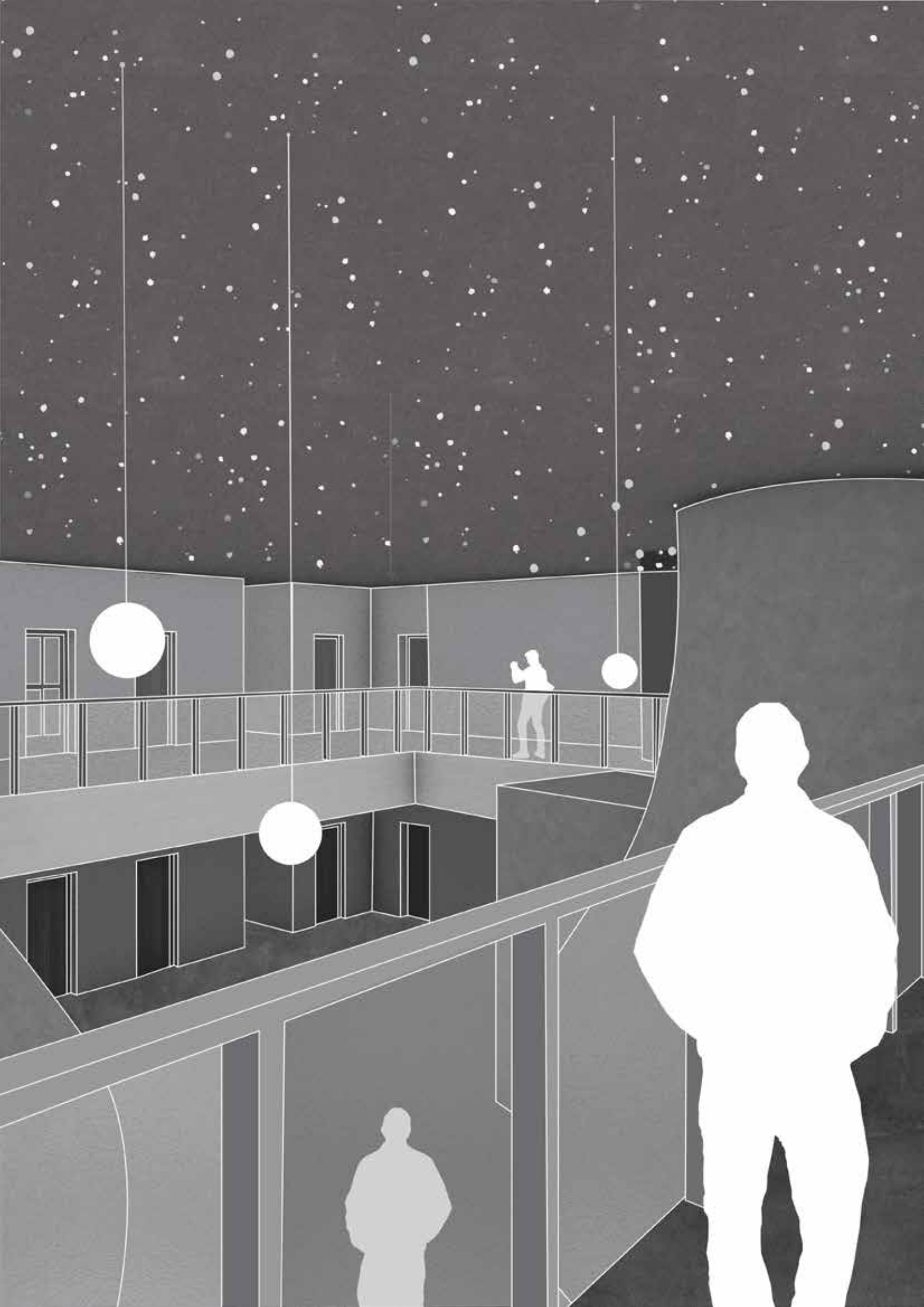


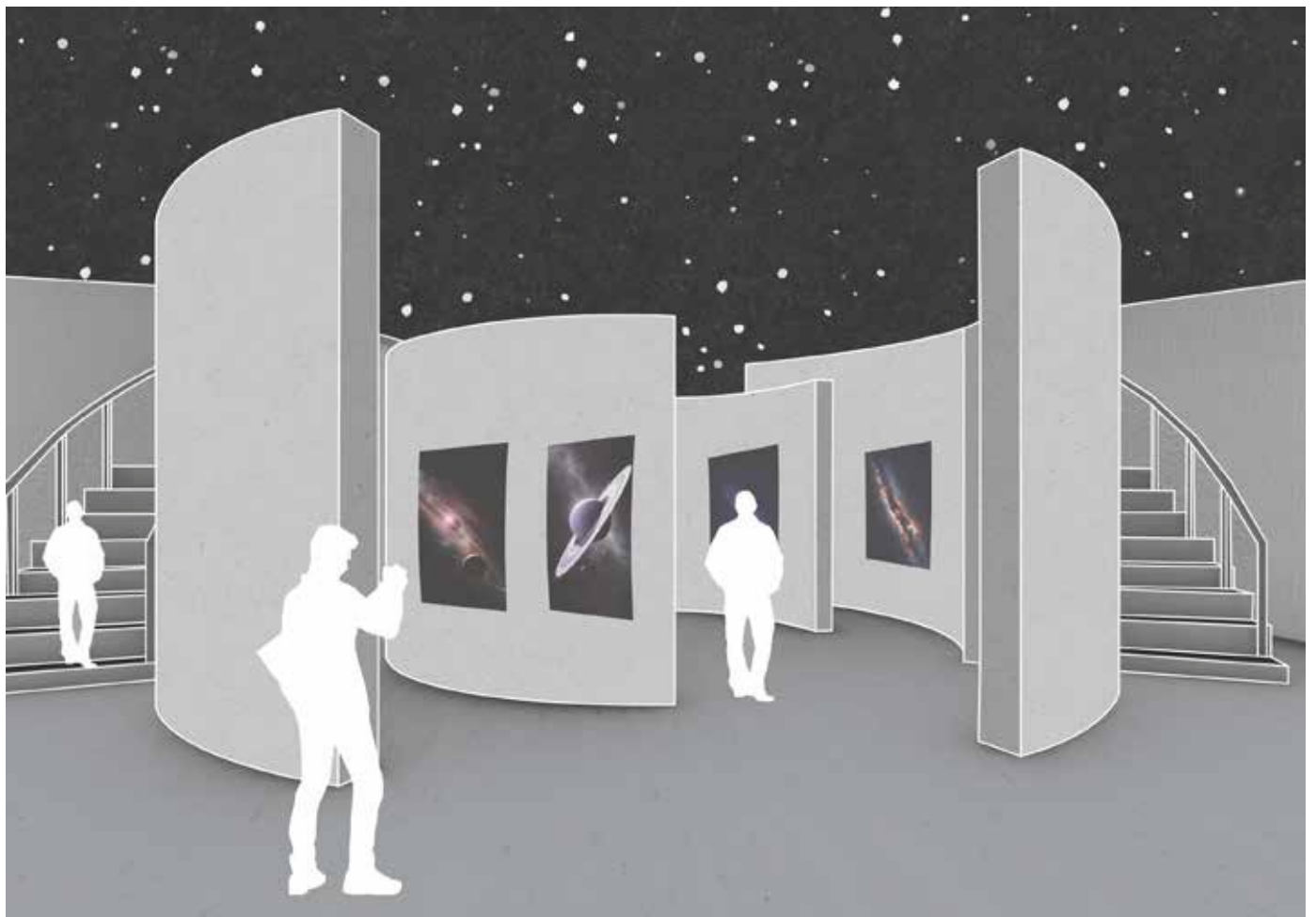
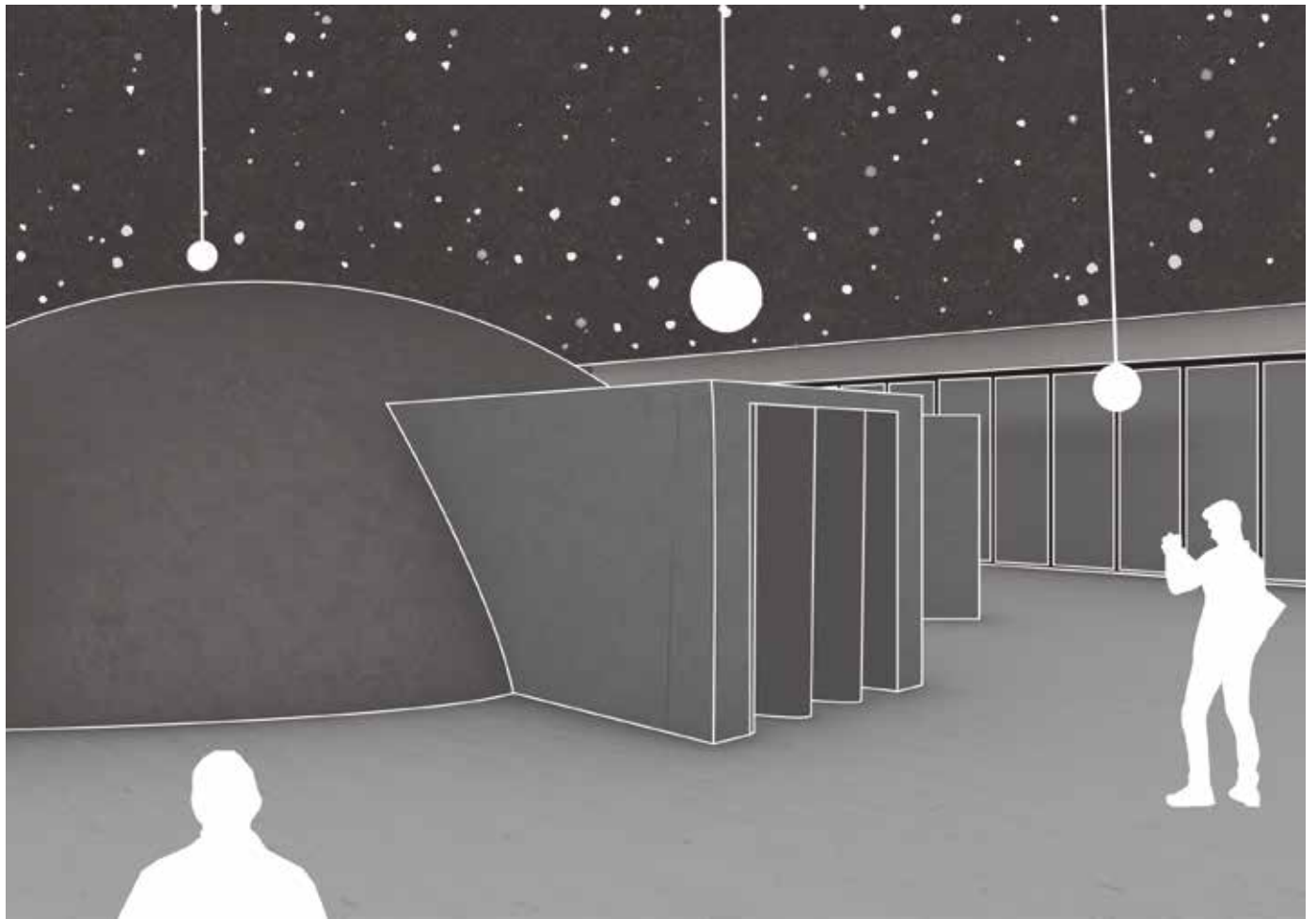
Helping Hand Bracket



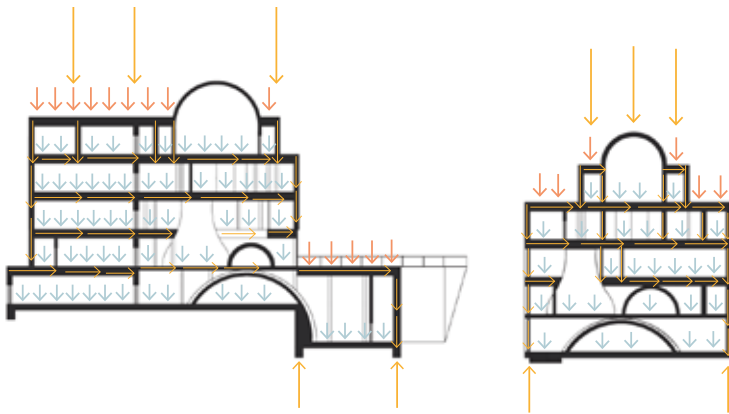




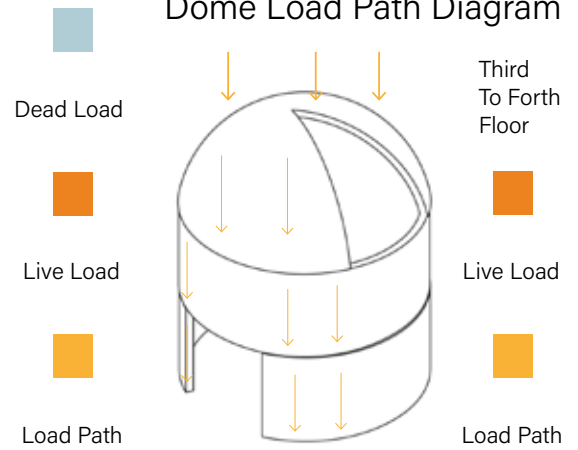




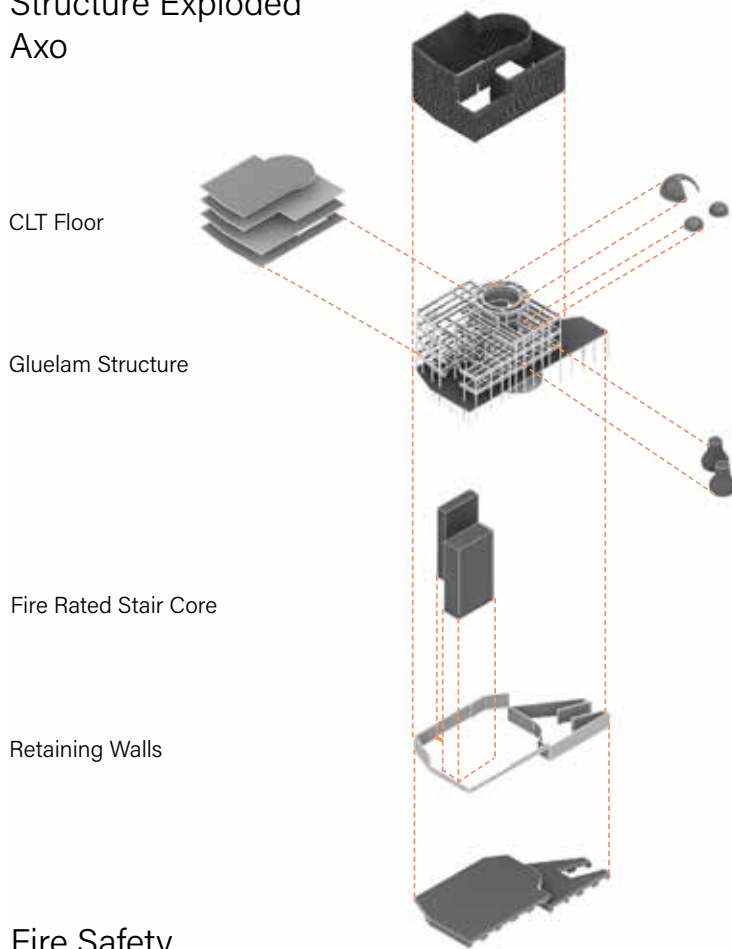
Load Path Diagram



Dome Load Path Diagram



Structure Exploded Axo



Accoya Waves Cladding

Concrete Shell Domes

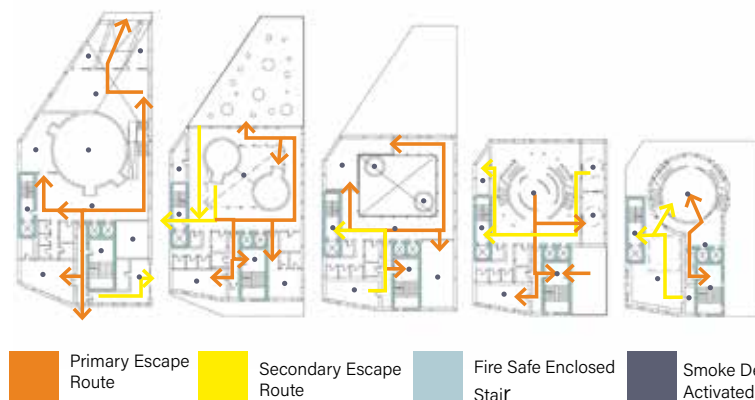
Concrete Shell Funnels

Raft Foundations

● Private Access
● Public Access

Fire Safety

Ground Floor First Floor Second Third Floor Forth Floor



Access and Circulation

The structure uses CLT floor plates supported by a Glulam frame, with a concrete slab at first floor level for load distribution. Concrete shell domes and funnels form the roof structure, clad in durable Accoya wave panels. The system sits on raft foundations with retaining walls.

A protected fire-rated stair core ensures vertical circulation and safe egress. Fire safety includes primary and secondary escape routes, a fire-safe enclosed stair, and a network of smoke detectors with heat-activated sprinklers for early detection and response.

Structural Strategy

Loads Paths / Access

Light and Ventilation



Concrete for retaining walls, ground floor and concrete shells for domes and funnels

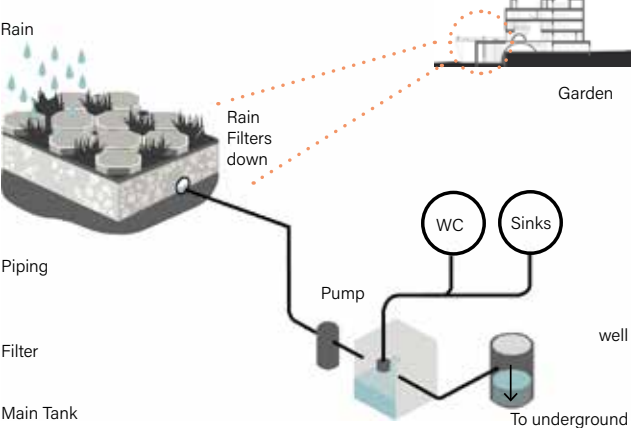


CLT For flooring, with a glulam structure

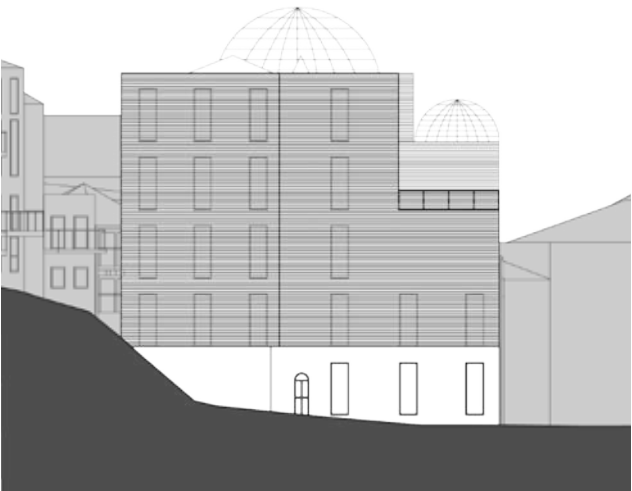
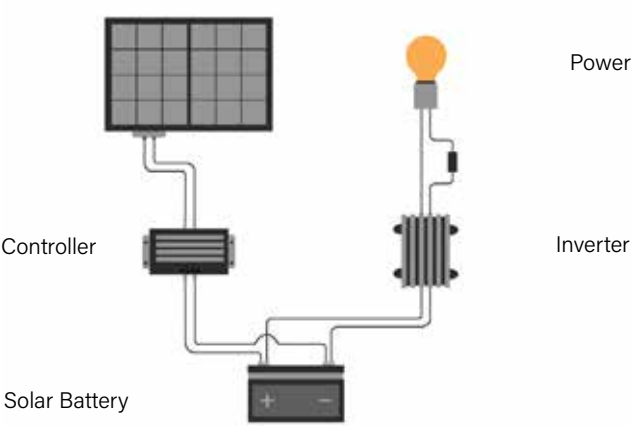


Glass for my curtain wall, doors and windows

Rain Water Harvesting



How Solar Panel Are Used



Stained Accoya Waves



Terrazzo Plinth



Terrazzo Tiles For Domes



Viroc Cladding



Glass for the windows

Viroc cladding sits above the plinth with the accoya so that way the waves don't get damaged or too wet.

Embodied Carbon

Structure	Total (kgCo2e)	Cladding	Concrete Equivalent
Raft Foundation	411,792	Terrazzo	1,964,733
Concrete Walls	690,000	Accoya	Emodied Carbon Intensity
Concrete Shells	185,619.2	Viroc	242.5 kgCo2e/m2
CLT With Sequestration	-43,468.34	Total	RIBA 2030 Target 625kg CO2e/m2
Glulam	152,994	423 kgCO2e	Current composition
			1,397,363 kgCO2e

Environmental strategy
Materials / Carbon

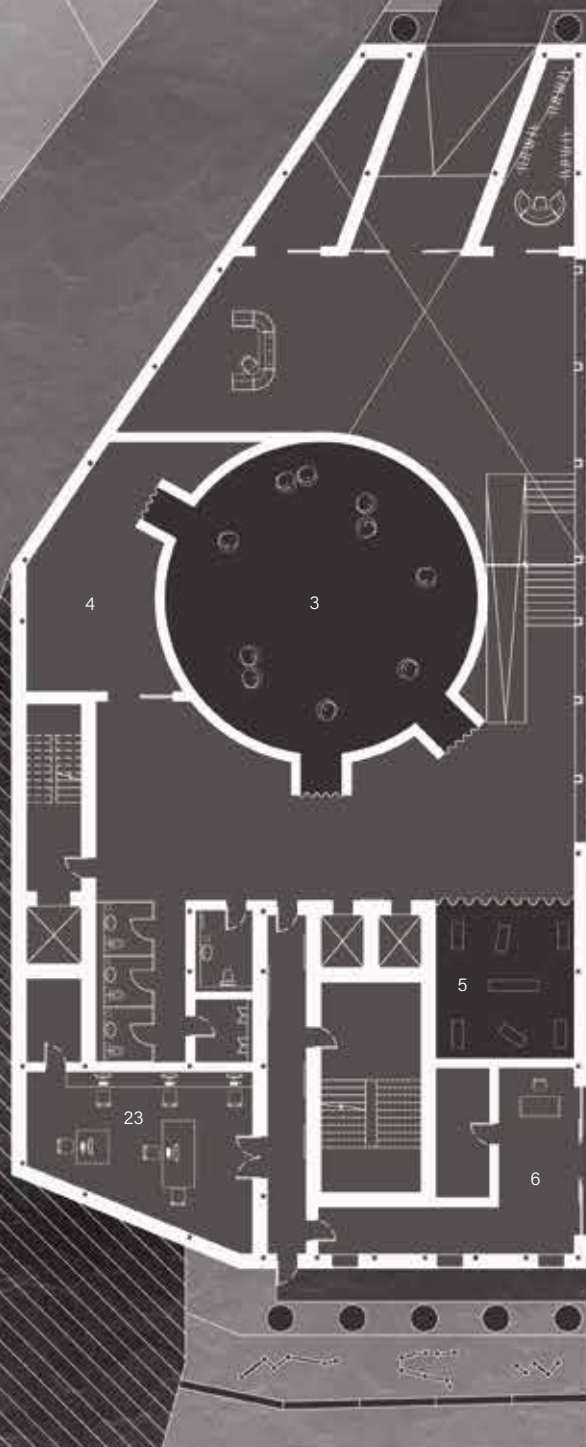
1. Lobby + Info
2. Cloak Rooms
3. Stargazing Space
4. Projection Room
5. Cosmic Ray Room
6. Gift Shop
7. AR Room
8. VR Room
9. Storage
10. Exhibition Space
11. Lunar Garden
12. Astronomy Lab
13. Changing Room
14. Celestial Body Room
15. Sound In Space
16. Photograph Space
17. Dark Photography
18. Digital Print Room
19. Telescope Room
20. Research Lab
21. Martian Garden
22. Server and Repairs
23. Research Room



Lower Ground

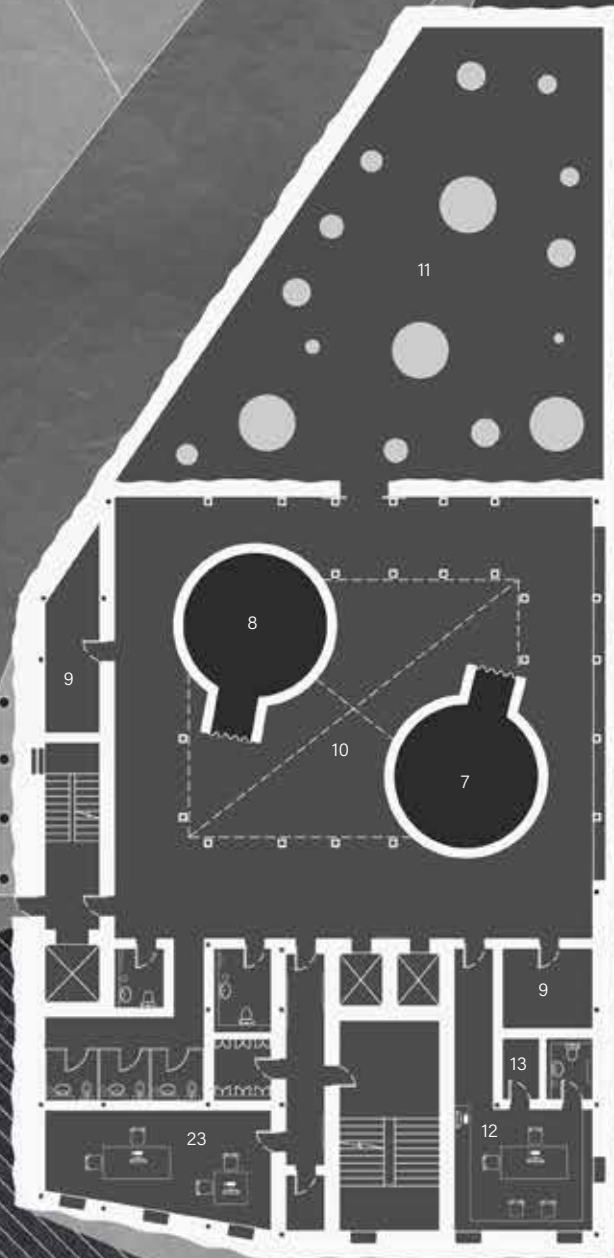
1:200

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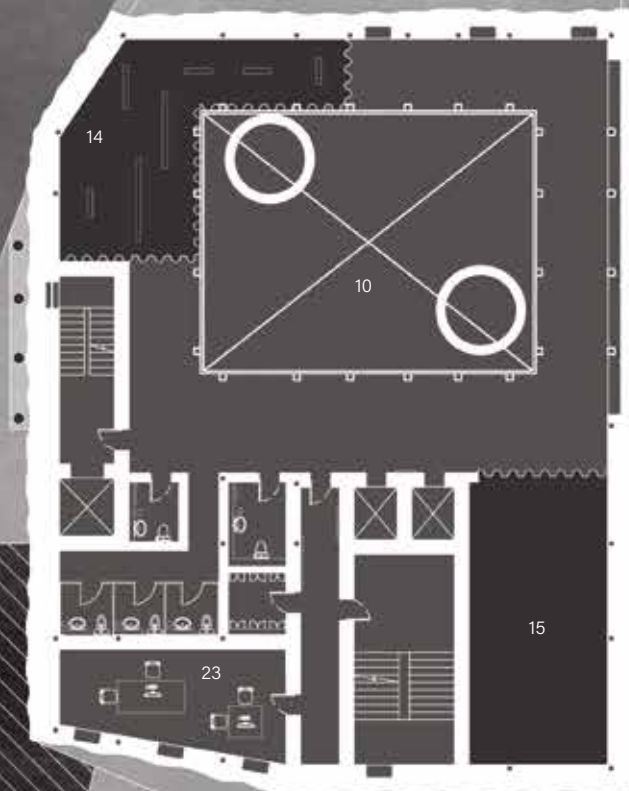
Upper Ground
1:200

1. Lobby + Info
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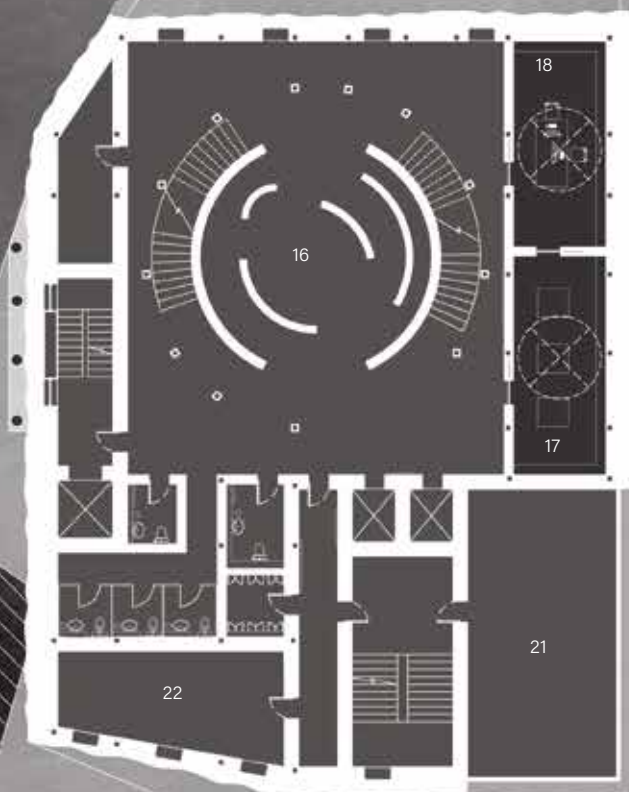
First Floor
1:200

1. Lobby + Info
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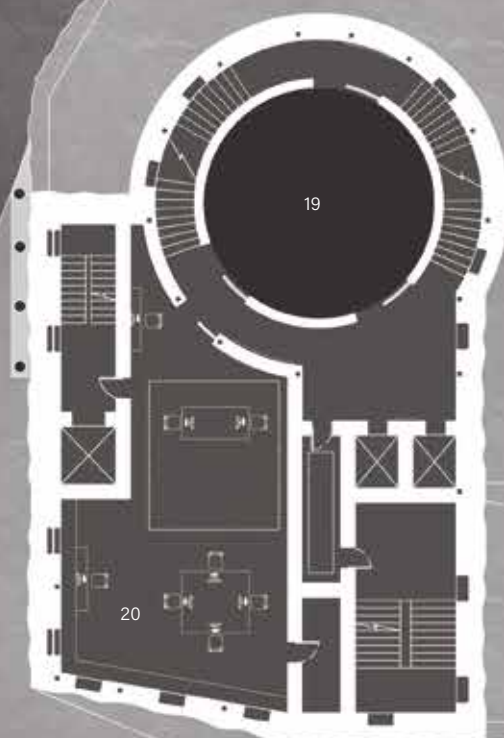
Second Floor
1:200

1. Lobby + Info
2. Cloak Rooms
3. Stargazing Space
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7. AR Room
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Third Floor
1:200

1. Lobby + Info
2. Cloak Rooms
3. Stargazing Space
4. Projection Room
5. Cosmic Ray Room
6. Gift Shop
7. AR Room
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Forth Floor
1:200

1. Lobby + Info
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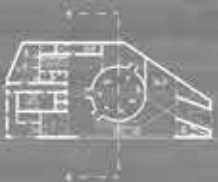
Roof Plan

1:200



Long Section

1:200



Short Section

1:200



East Elevation

1:200



North Elevation

1:200



South Elevation

1:200



West Elevation

1:200

