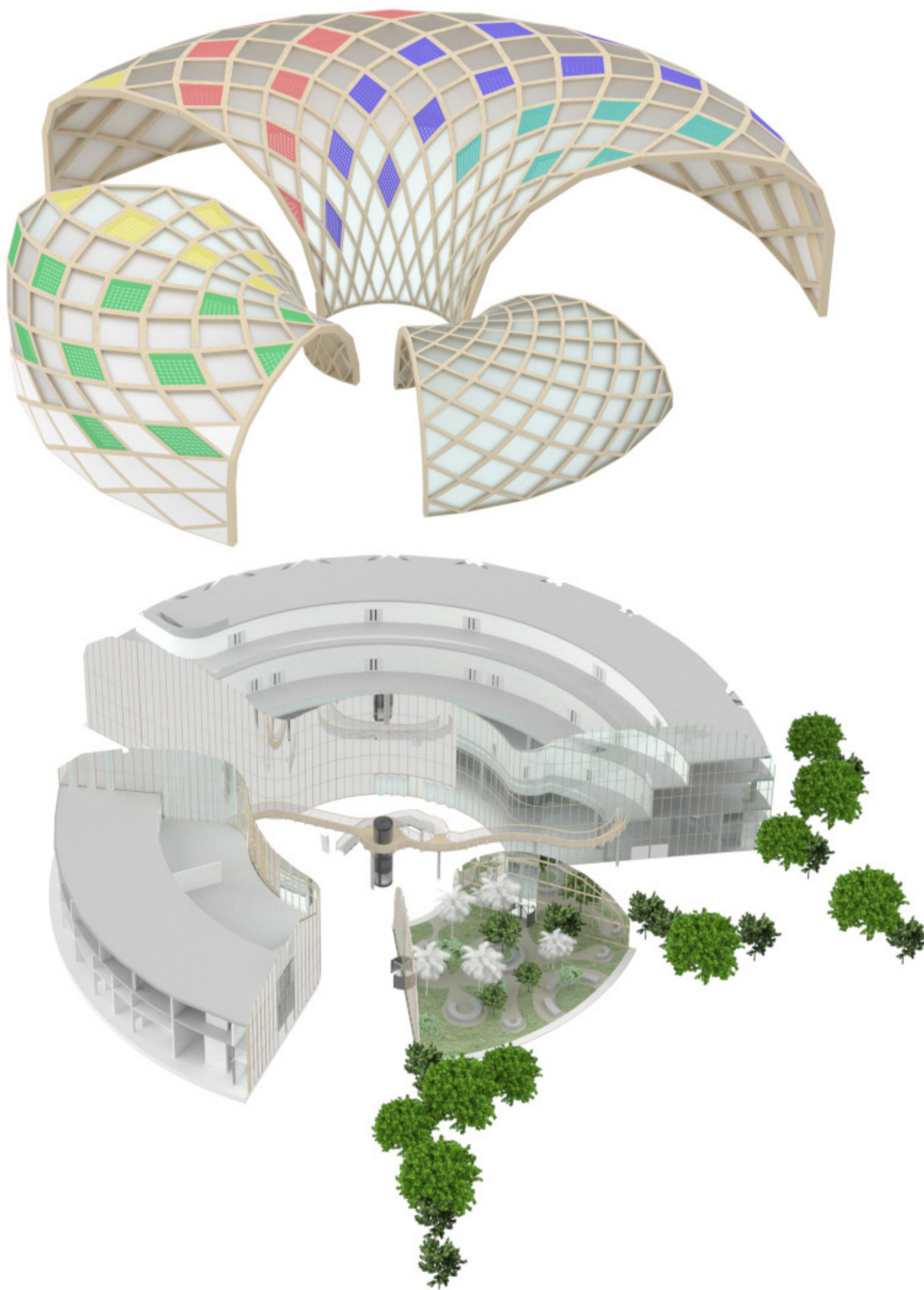


TECHNOLOGY RESEARCH TO INFORM DESIGN STUDIO 6 : FRESH FOOD MUNICIPAL MARKET, GARDEN, AND CULINARY EDUCATIONAL FACILITY | EL POBLENOU, BARCELONA



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CENTRE POMPIDOU-METZ

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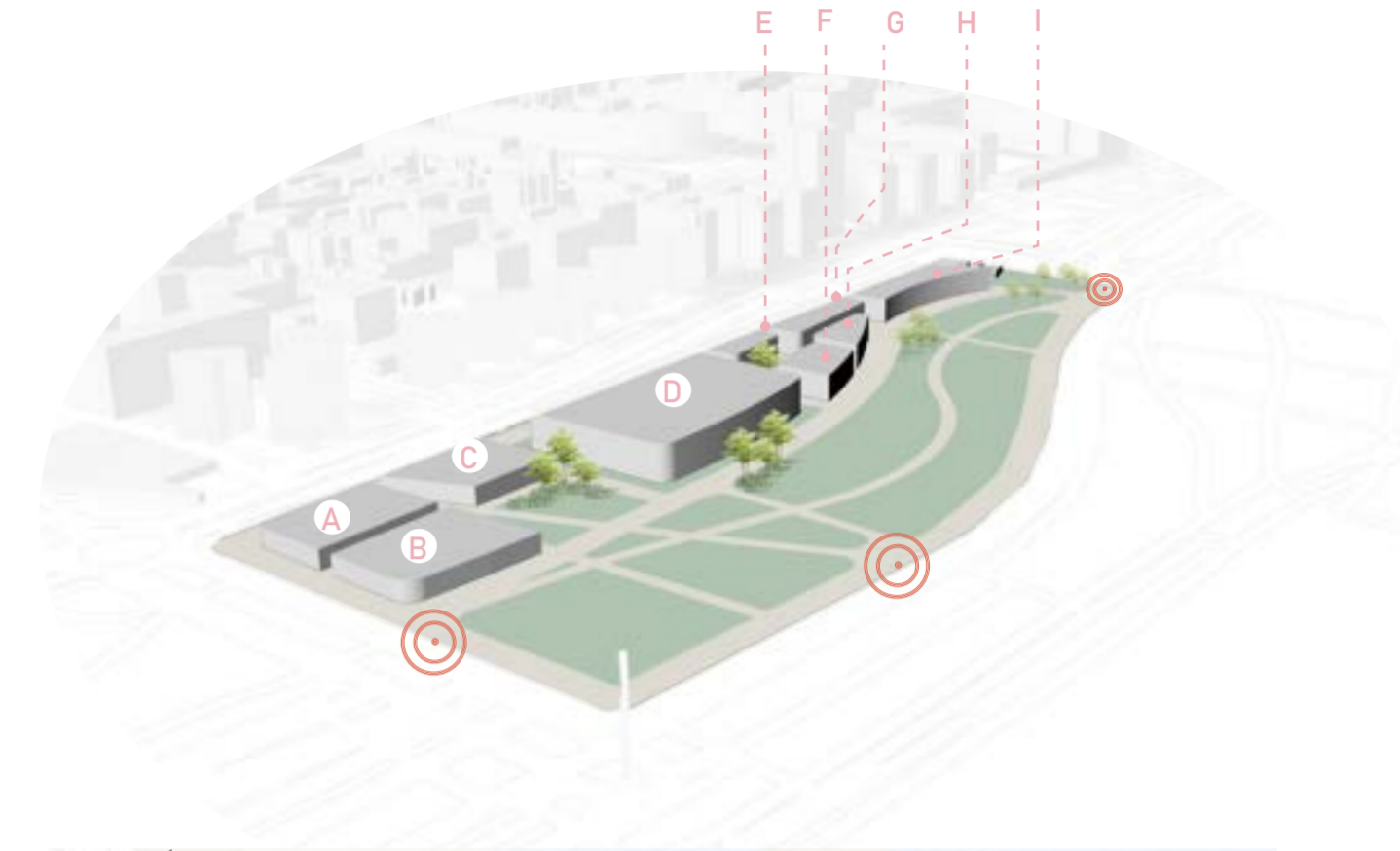
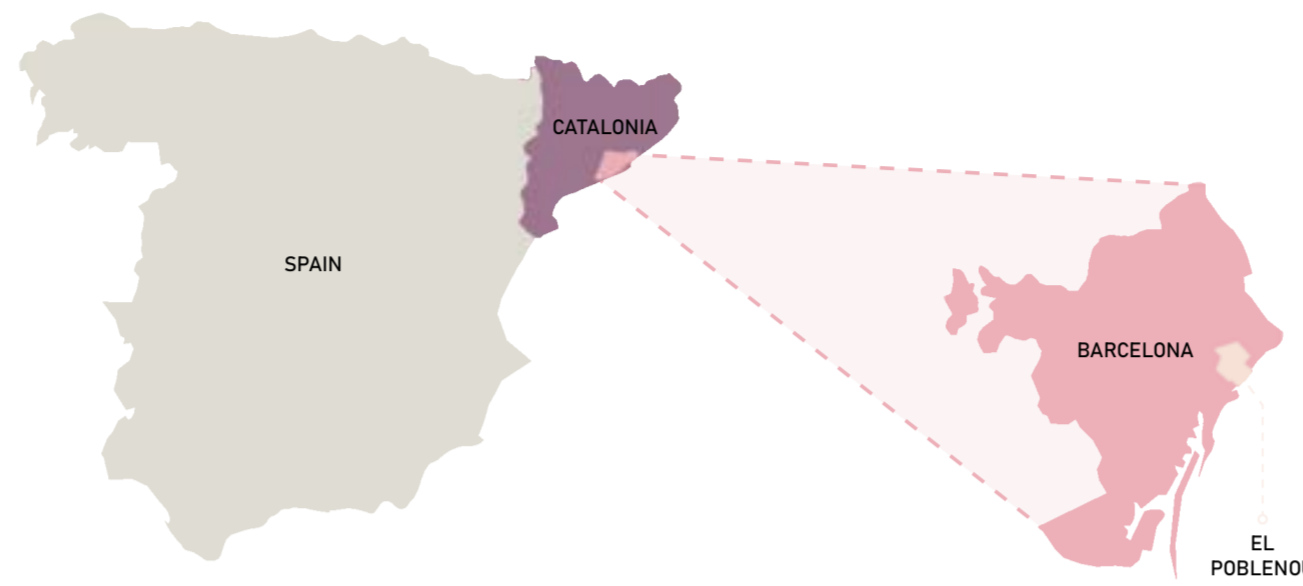
32-33

EL POBLENOU COASTAL COMMUNITY EXTENSION: MASTER PLAN

The El Poblenou masterplan, situated in the city of Barcelona, seeks to expand community-centric amenities towards its coastal promenade, fostering greater community engagement and connectivity. Currently, the coastal front primarily features coastal-related sports facilities and two seafood restaurants located beachside, with a notable emphasis on seasonal activities. The main focus of the master plan was to show how the community can better connect El Poblenou's community with their coastline.

The decision to situate the masterplan on the edge of the Parc del Poblenou was driven by two key factors. Firstly, the park's vegetation was facing challenges due to climate change and escalating droughts. By selecting this location, there was an opportunity to not only enhance the park's entrance but also implement innovative rainwater recycling systems to support irrigation during hot seasons, thereby addressing environmental concerns. Secondly, the site's strategic positioning along El Poblenou's vital pedestrian routes, particularly the La Rambla Del Poblenou intersecting with the coastal promenade axis, renders it a crucial connector within the community. The masterplan prioritizes the development and improvement of gateway connectors within the site to enhance connectivity, while also emphasizing the harmonious relationship between proposed buildings and the surrounding vegetation.

LOCATION IDENTIFICATION



TRANSPORT NETWORK



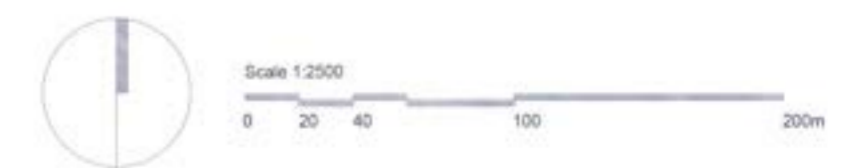
PROPOSED MASTERPLAN



Plots	m2	ft2
A	1187	12776.76
B	1386	14918.78
C	1041	11205.23
D	5618	60471.65
E	568	6113.9
F	570	6135.43
G	1068	11495.86
H	436	4693.06
I	1339	14412.88

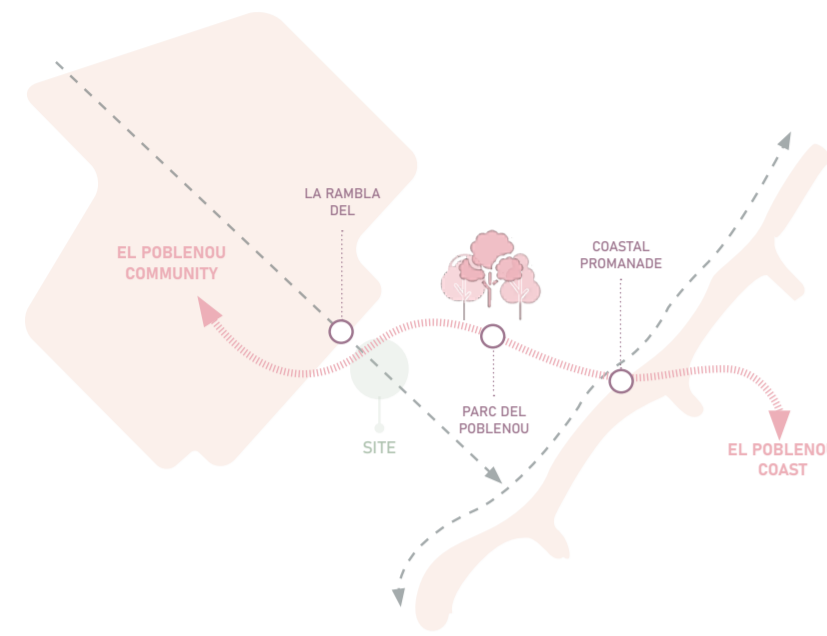
MASTER PLAN KEY

- Site Gateways
- Key Public spaces
- Pedestrian/ Cycle routes
- Parc Del Poblenou

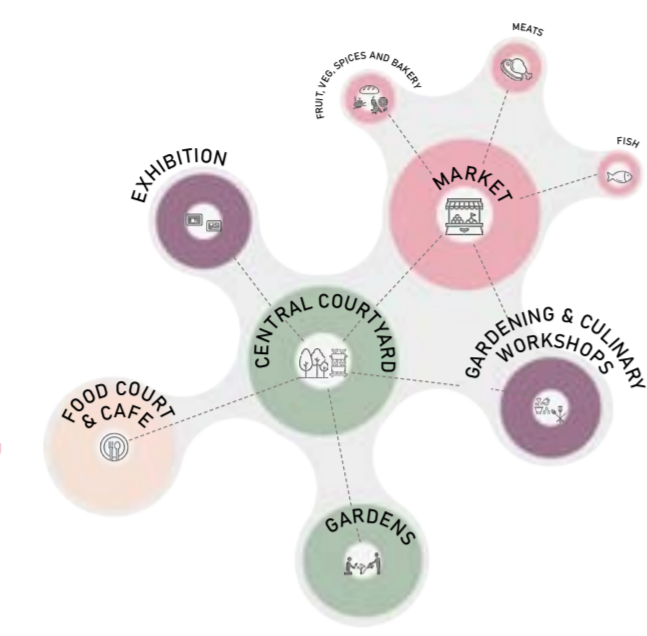


FRESH FOOD MUNICIPAL MARKET, GARDENS, AND CULINARY EDUCATIONAL FACILITY

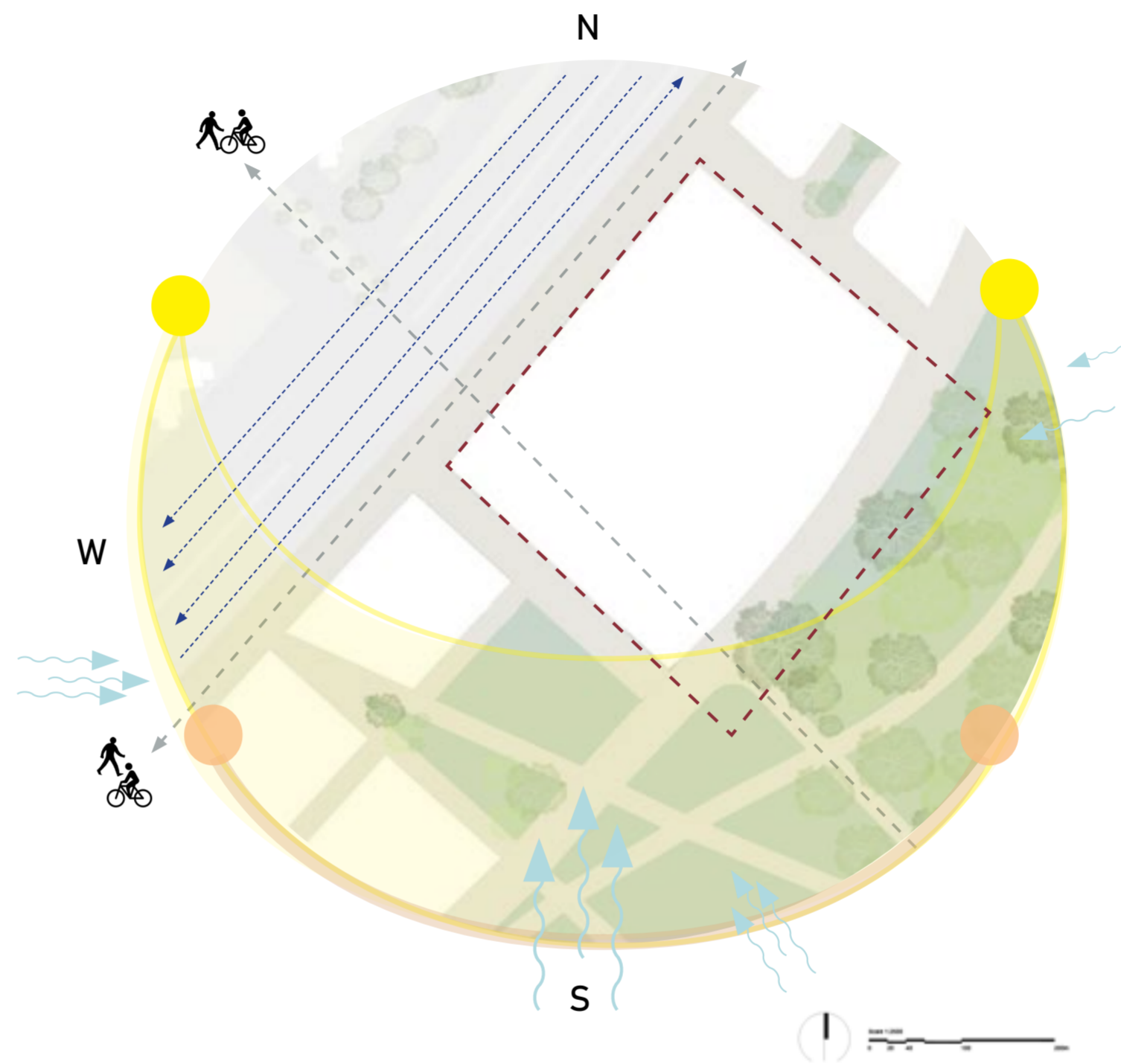
THE GATEWAY CONNECTOR



SCHEDULE OF ACCOMMODATION

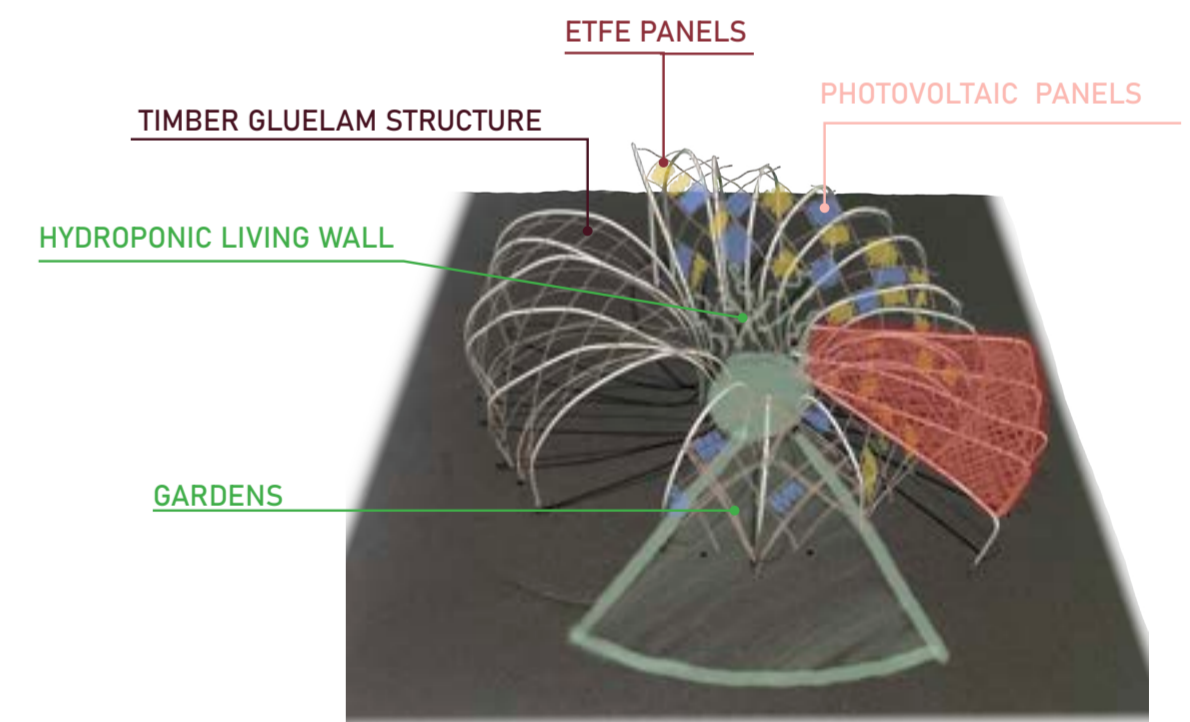
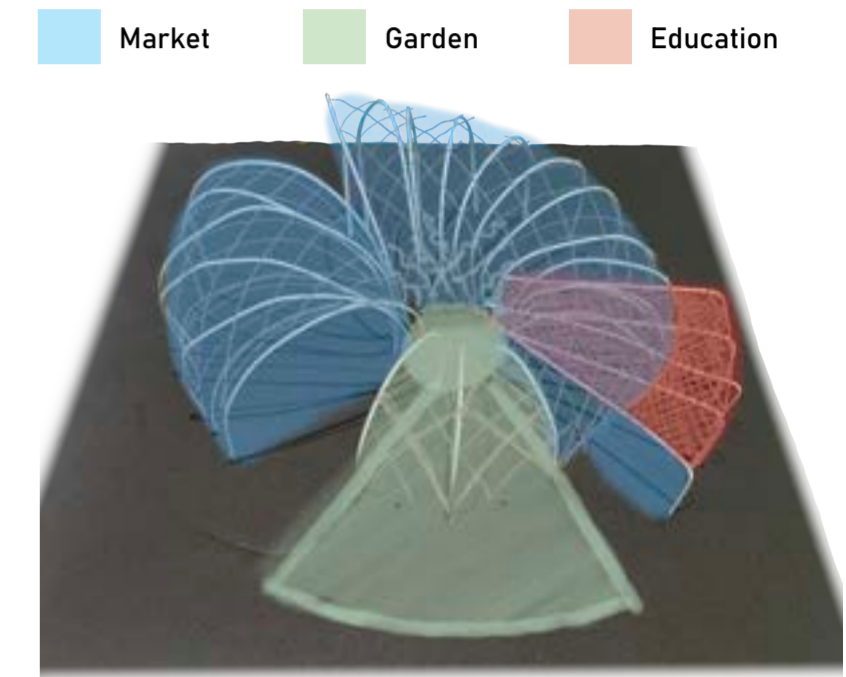


SITE ANALYSIS



- Site Boundary - - - - -
- Pedestrian & Cycle Routes - - - - -
- Vehicle Routes - - - - -
- Summer Solstice - - - - -
- Winter Solstice - - - - -
- Prevailing Wind - - - - -

INITIAL DEVELOPMENT

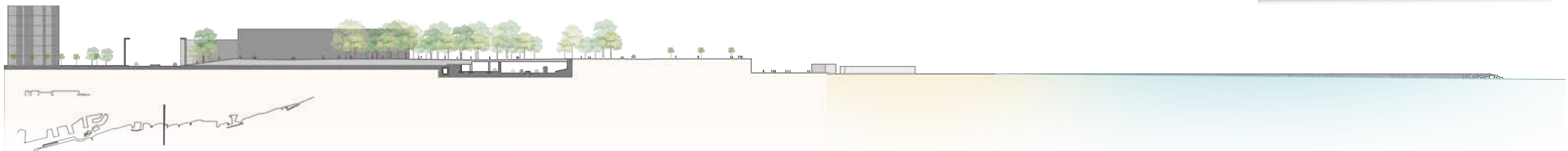


PROJECT INTRODUCTION

The Fresh Food Municipal Market, Garden, and Culinary Educational Facility will be situated in Plot D, strategically positioned as a gateway plot aimed at enhancing the journey to El Poblenou beach, while also improving the entry into the Parc Del Poblenou. This multifunctional facility hub is enveloped by an array of community-centric amenities including cafes, restaurants, shops, and more as part of the masterplan.

The intervention is designed to advocate food sustainability through a multifaceted approach. Hosting educational workshops, engaging exhibitions, and captivating demonstrations to advocate for sustainable food practices. Additionally, the facility will showcase locally sourced produce and feature a diverse array of community gardens. By seamlessly integrating growth, trade, and education under one roof, the aspiration is to create a dynamic facility that not only enriches the journey to the coastal promenade but also expands the community's culinary landscape captivating a deeper understanding and appreciation for sustainable food systems.

The design is guided by two overarching concepts: one centered around technological innovation, while the other drives the development of the design. At its core, the design revolves around essential elements such as food and the critical connections between people and nutrition, encompassing energy, water, and micro-nutrients. These elements are translated into architectural solutions that prioritize energy efficiency, innovative water recycling methods, and the integration of functional spaces with nature to enhance overall health and well-being. Additionally, the design is driven by the concept of the gateway connector, accentuating the interplay of spaces in between. It enriches pathways throughout the design, enhancing the journey between the El Poblenou community and the coastal promenade, while also improving access to Parc Del Poblenou.



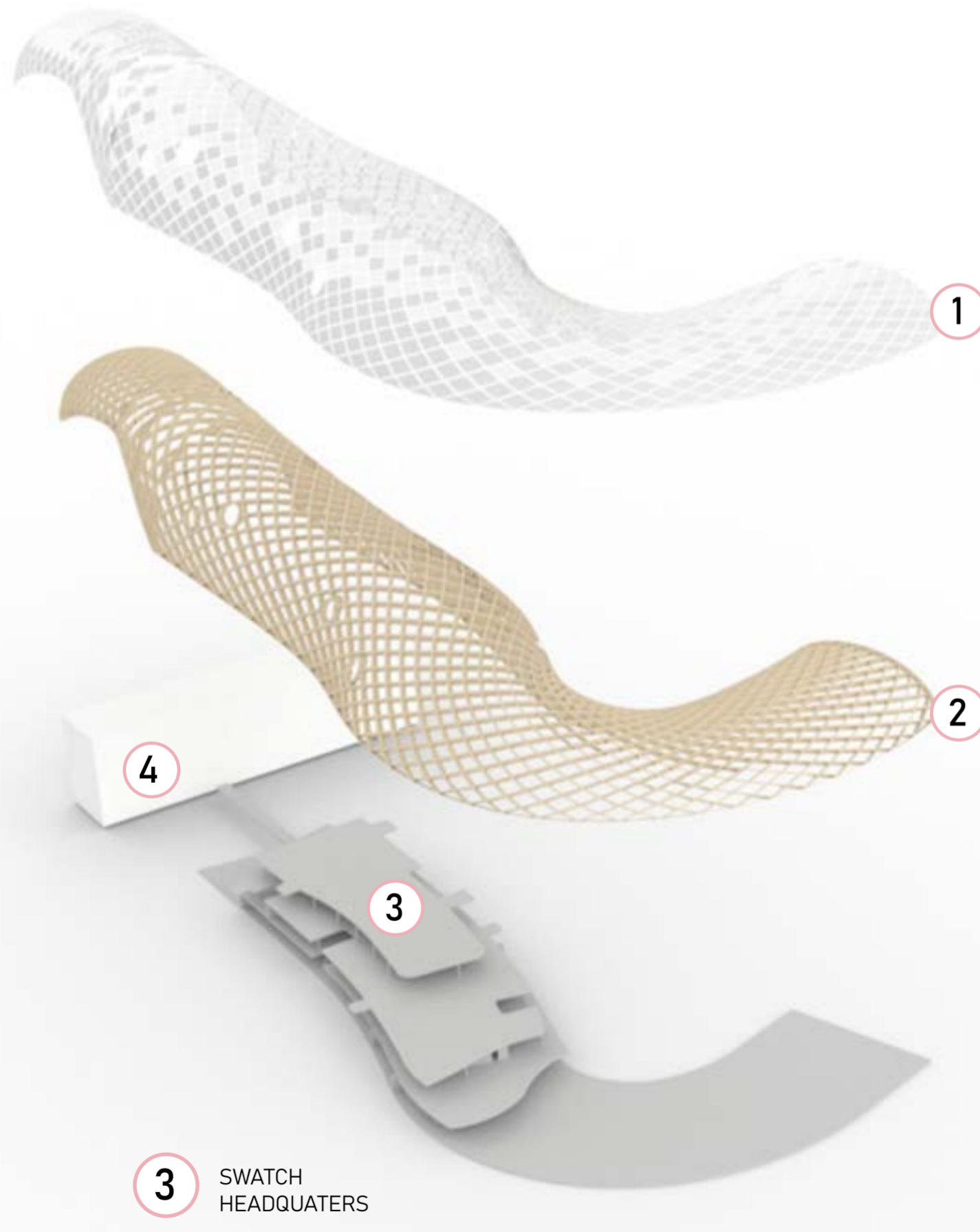
CASE STUDY RESEARCH 1 : MASS TIMBER CONSTRUCTION - SWATCH OMEGA HEADQUARTERS, BIENNE, SWITZERLAND



Client: Swatch AG
 Completion: 2019
 GFA: 465,539 ft² / 43,250 m²
 Architects: Shigeru Ban,
 Itten+Brechtbühl AG



IDENTIFYING THE DIFFERENT ELEMENTS



- 1 FACADE
- 2 MASS TIMBER CONSTRUCTION
- 3 SWATCH HEADQUARTERS
- 4 OMEGA MUSEUM

MASS TIMBER CONSTRUCTION:

SPRUCE GLUELAM -
 220x845mm

SOLID PANEL:
 FPO Membrane
 Wood-Fibre Insulating Board
 3-Layer Board

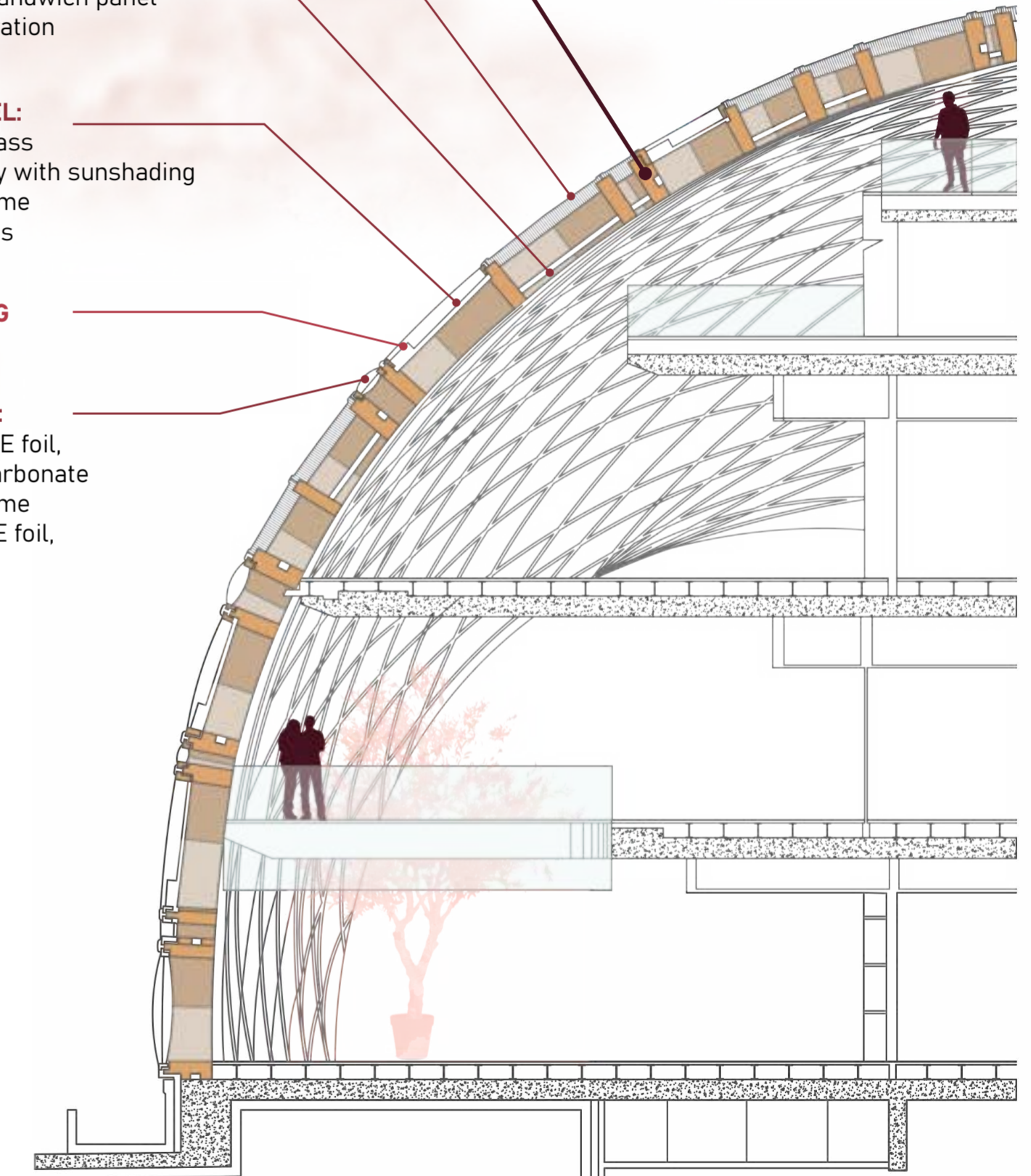
COOLING PANEL:
 Aluminium sandwich panel
 Micro-perforation

GLASS PANEL:
 Cold Bent Glass
 Closed Cavity with sunshading
 Plywood Frame
 3-Layer Glass

SUNSHADING

ETFE PANEL:
 External ETFE foil,
 fritted polycarbonate
 Plywood Frame
 Internal ETFE foil,
 Transparent

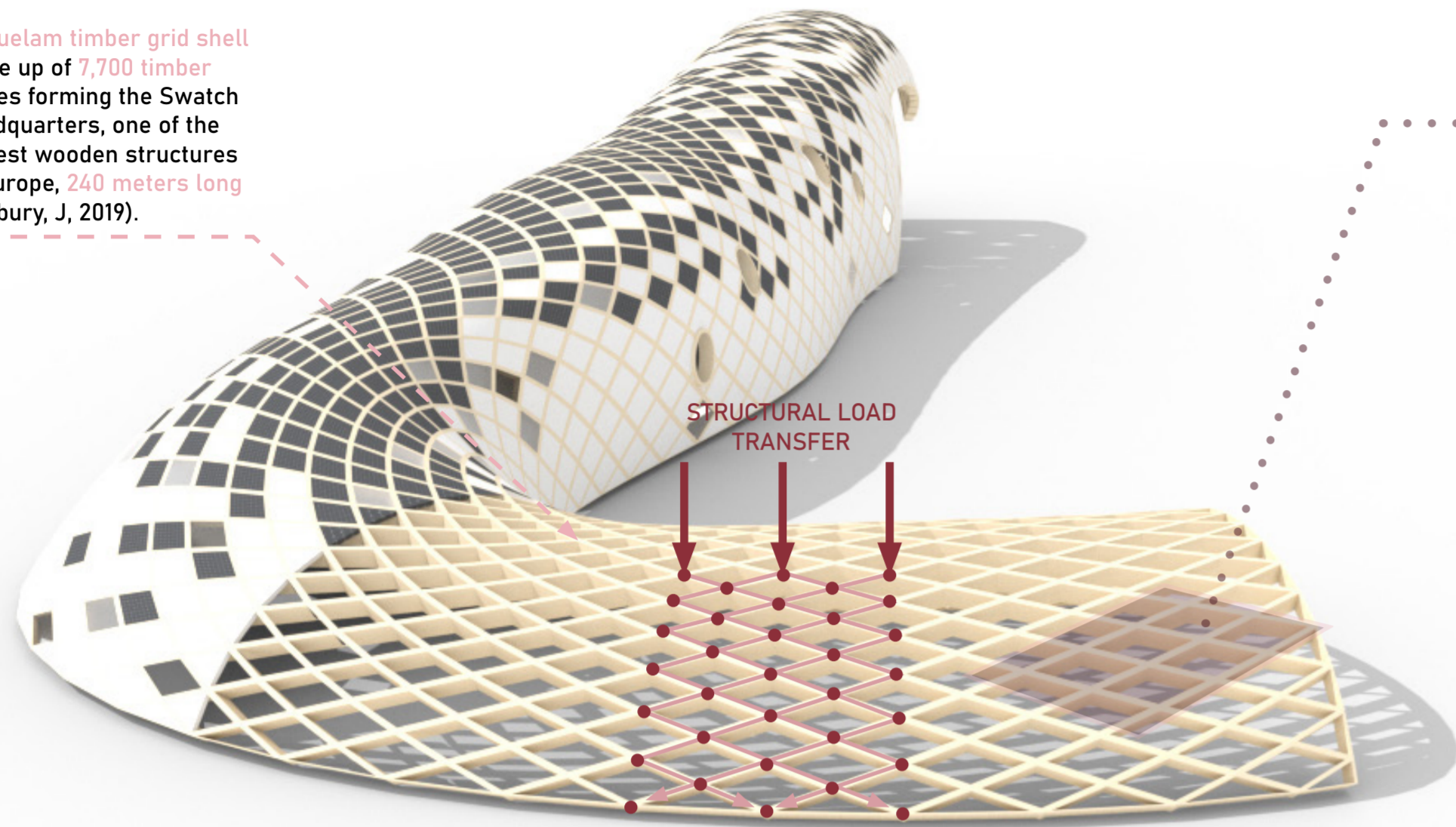
4th Floor 2450
 3rd Floor
 4100
 2nd Floor
 4100
 1st Floor
 4100
 Ground Floor



Scale 1:100
 0 1000 2000 4000 8000mm

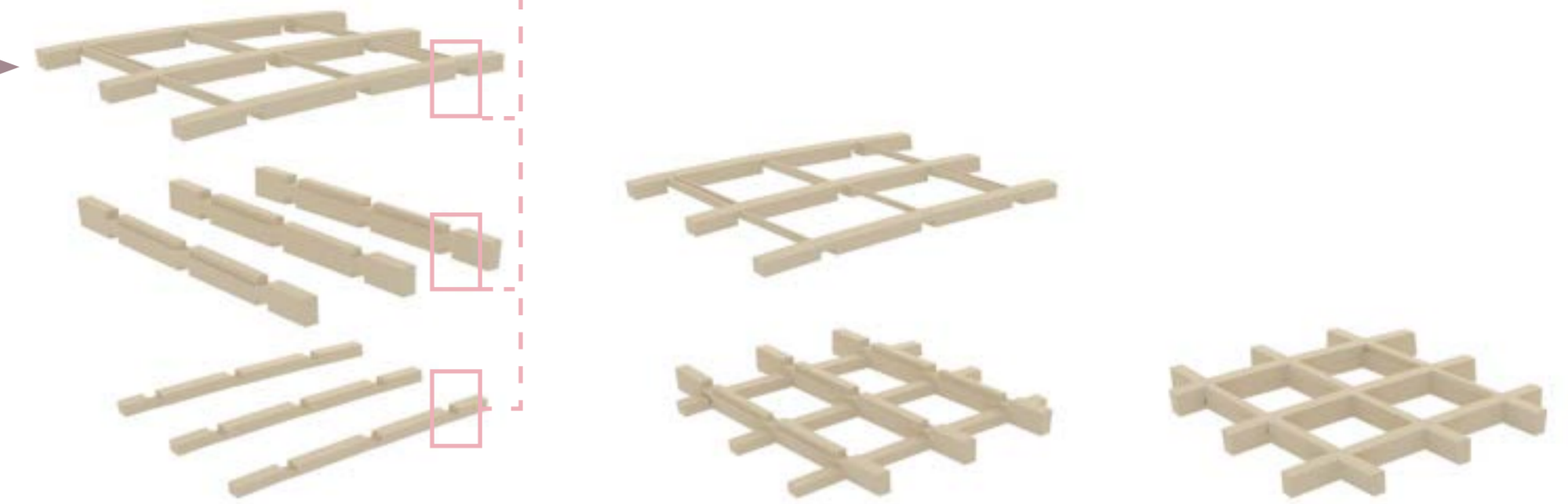
MASS TIMBER CONSTRUCTION

A Gluelam timber grid shell made up of 7,700 timber pieces forming the Swatch Headquarters, one of the largest wooden structures in Europe, 240 meters long (Astbury, J, 2019).



MASS TIMBER CONNECTION

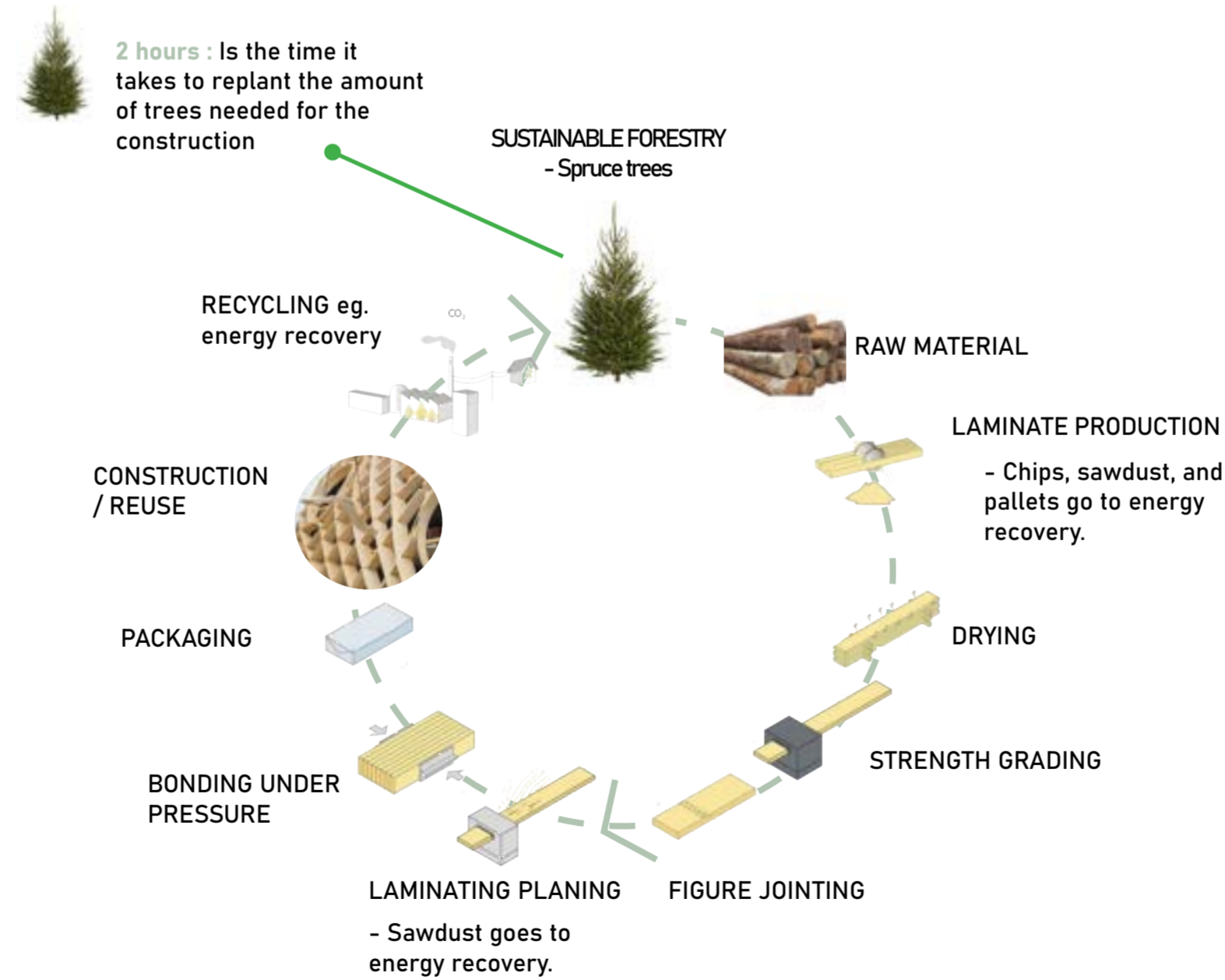
CROSS HALF LAP JOINT



ENVIRONMENTAL CONSIDERATIONS

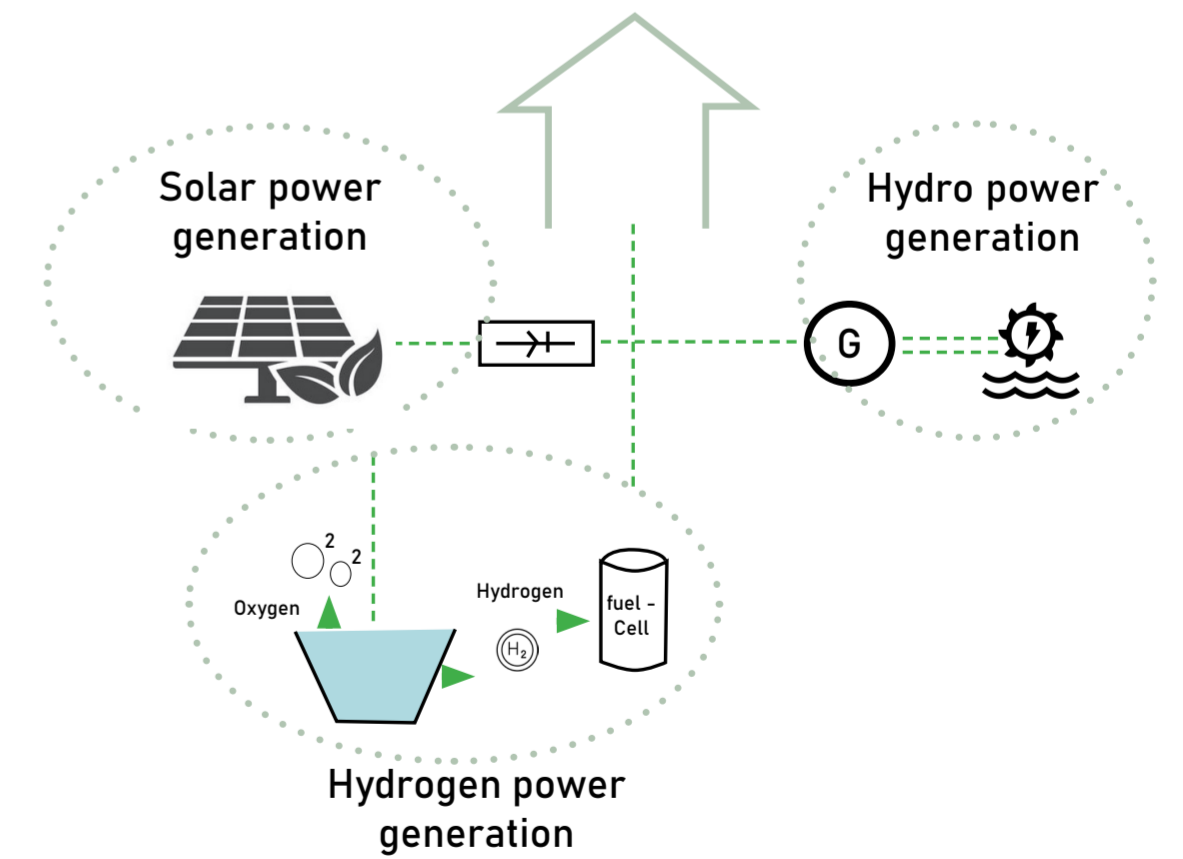
MASS TIMBER CONNECTION - Environmental

- Glulam is known to have no negative environmental effects
- Gluelam is repairable, and can be replaced if necessary
- Once the glulam product has reached the end of its life, it makes an excellent biofuel.



PV PANELS - SOLAR, WATER RESOURCING AND THERMAL BALANCE

The radiative heating and cooling, ventilation, and primary lighting of all three buildings function autonomously.

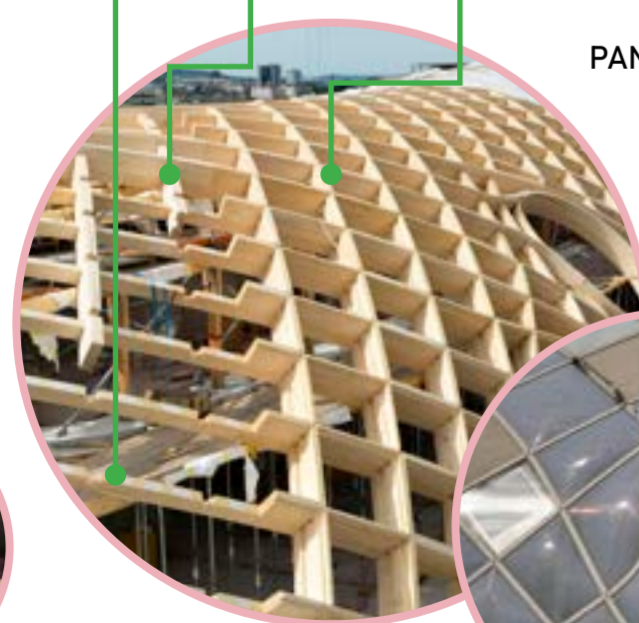


CONSTRUCTION IMAGES

APPLICATION USING CROSS HALF LAP JOINTS

LAYER 1 LAYER 2 LAYER 3

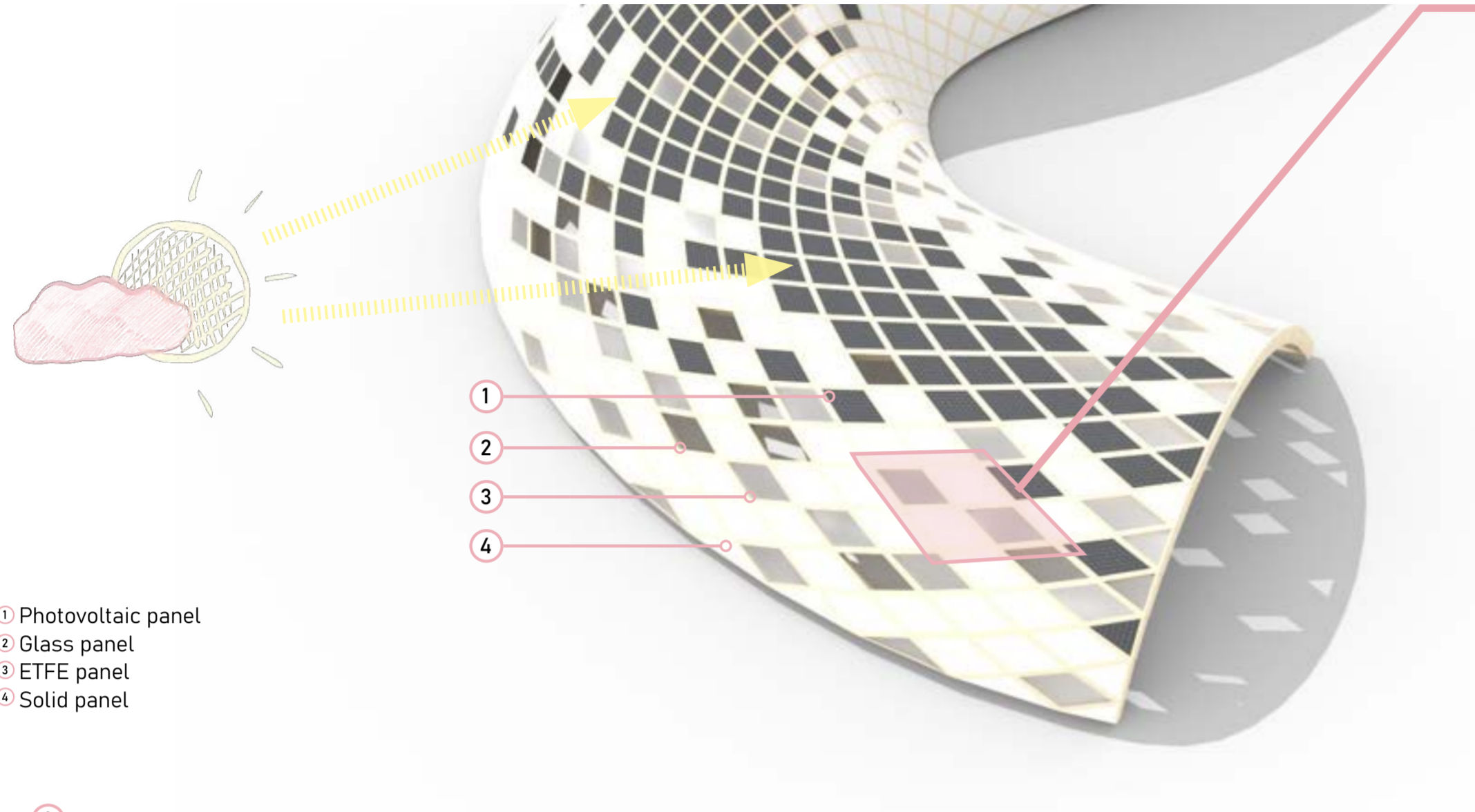
PANEL APPLICATION



CASE STUDY RESEARCH 1 : FACADE PANELS

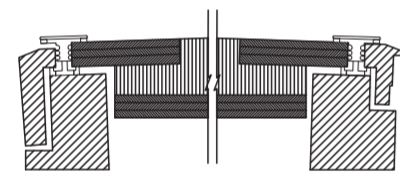
SWATCH OMEGA HEADQUARTERS, BIENNE, SWITZERLAND

EXPLODED VIEW OF TIMBER FRAME AND FACADE DETAIL

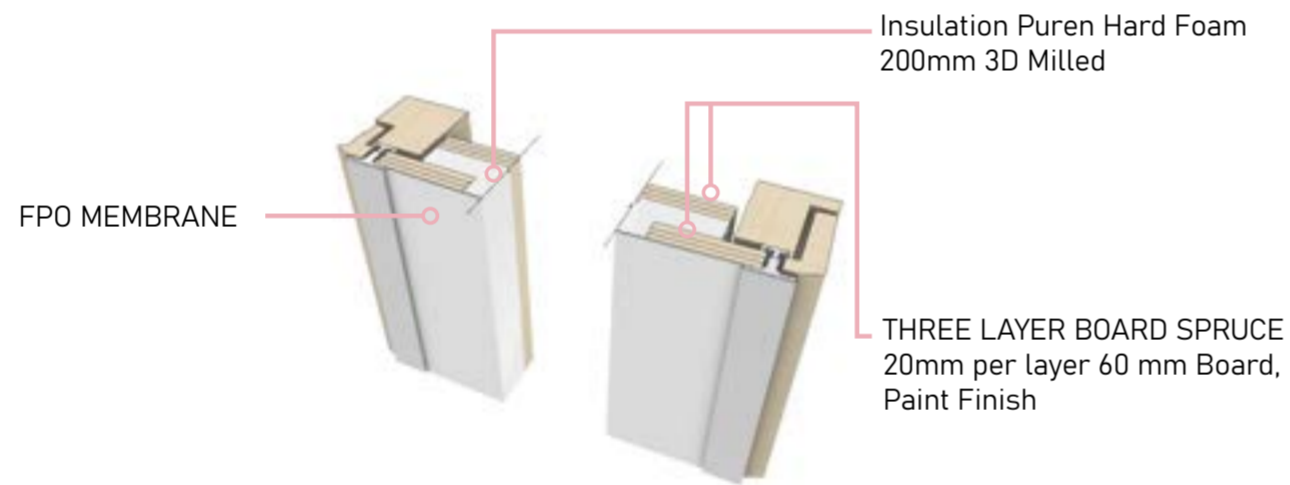


- ① Photovoltaic panel
- ② Glass panel
- ③ ETFE panel
- ④ Solid panel

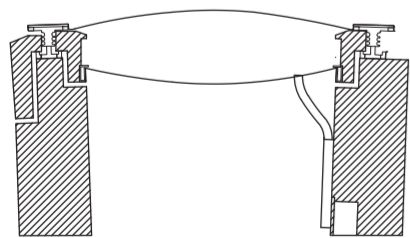
① SOLID PANEL



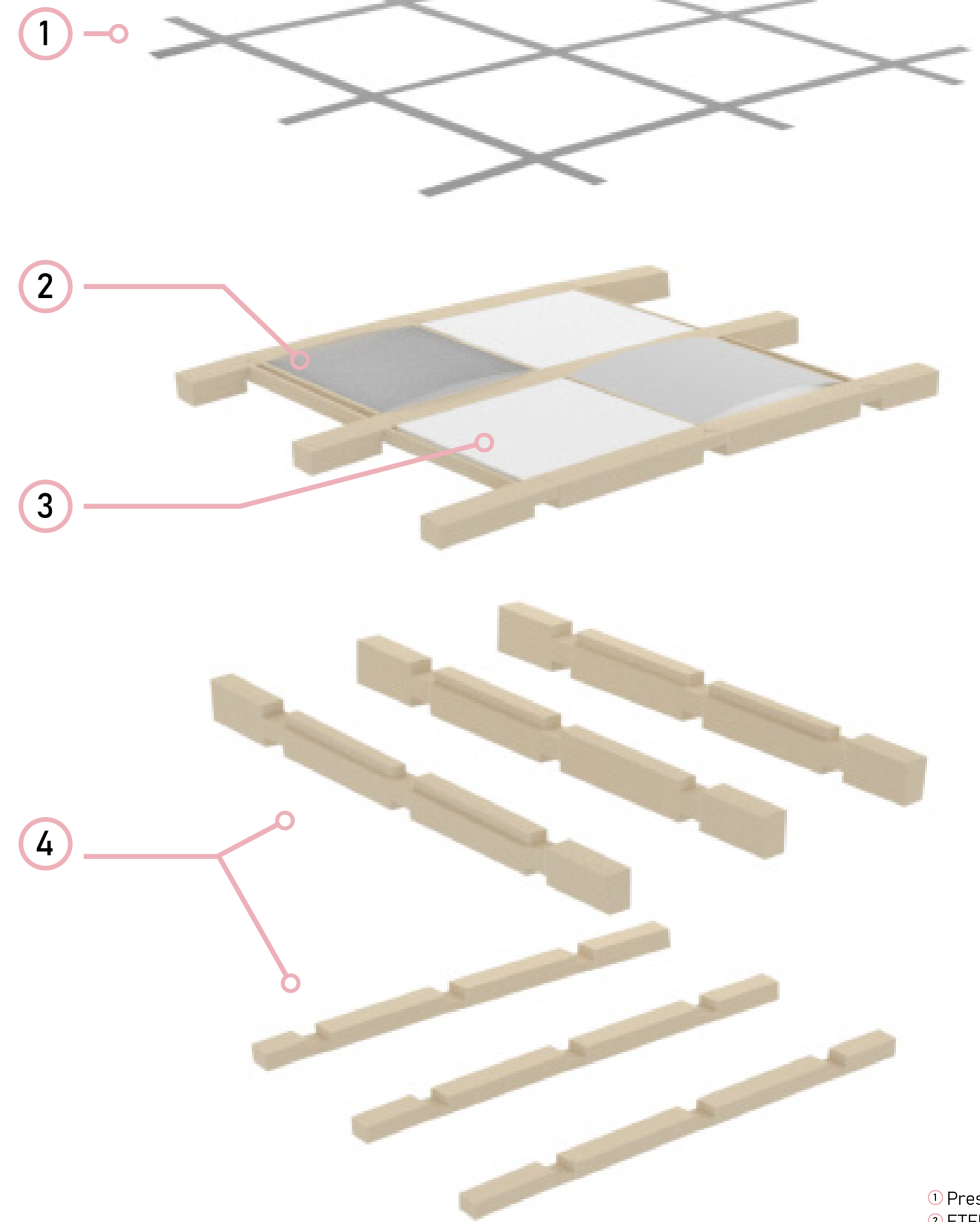
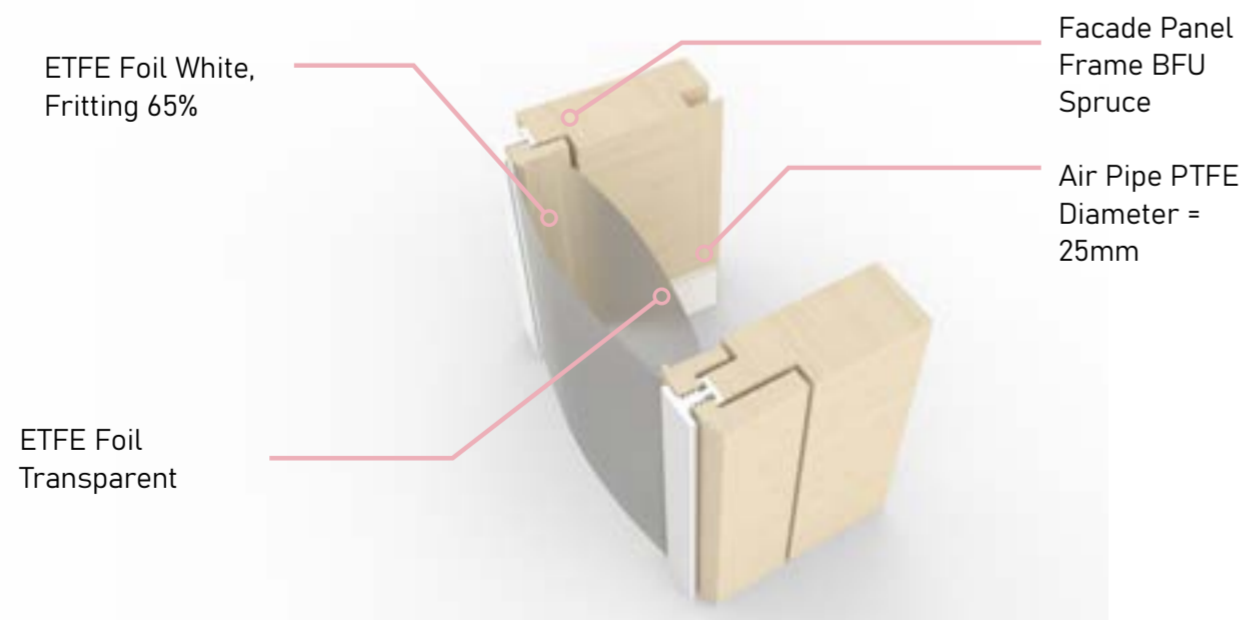
Scale 1:20
0 200 500 1000 1500mm



② ETFE PANEL



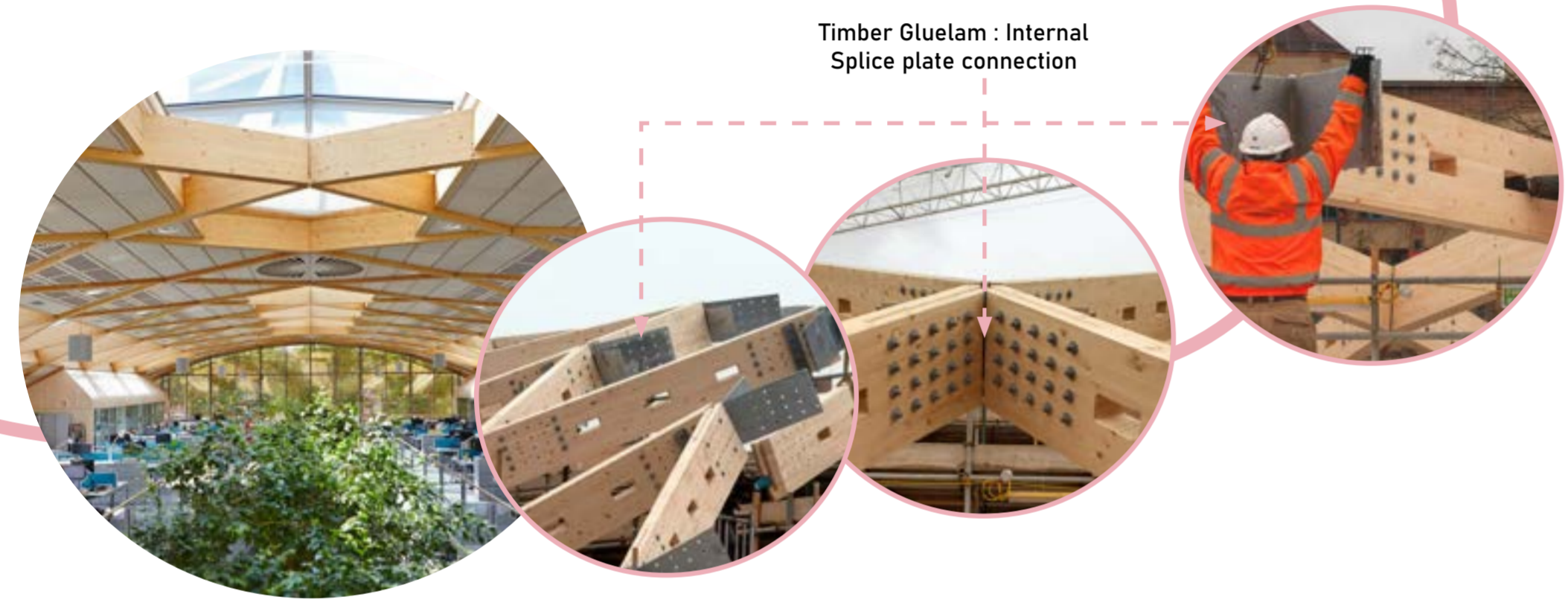
Scale 1:20
0 200 500 1000 1500mm



- ① Pressure plate
- ② ETFE Panel
- ③ Solid Panel
- ④ Mass timber structure

CASE STUDY 2 RESEARCH : MASS TIMBER CONSTRUCTION - WWF-UK'S LIVING PLANET CENTRE

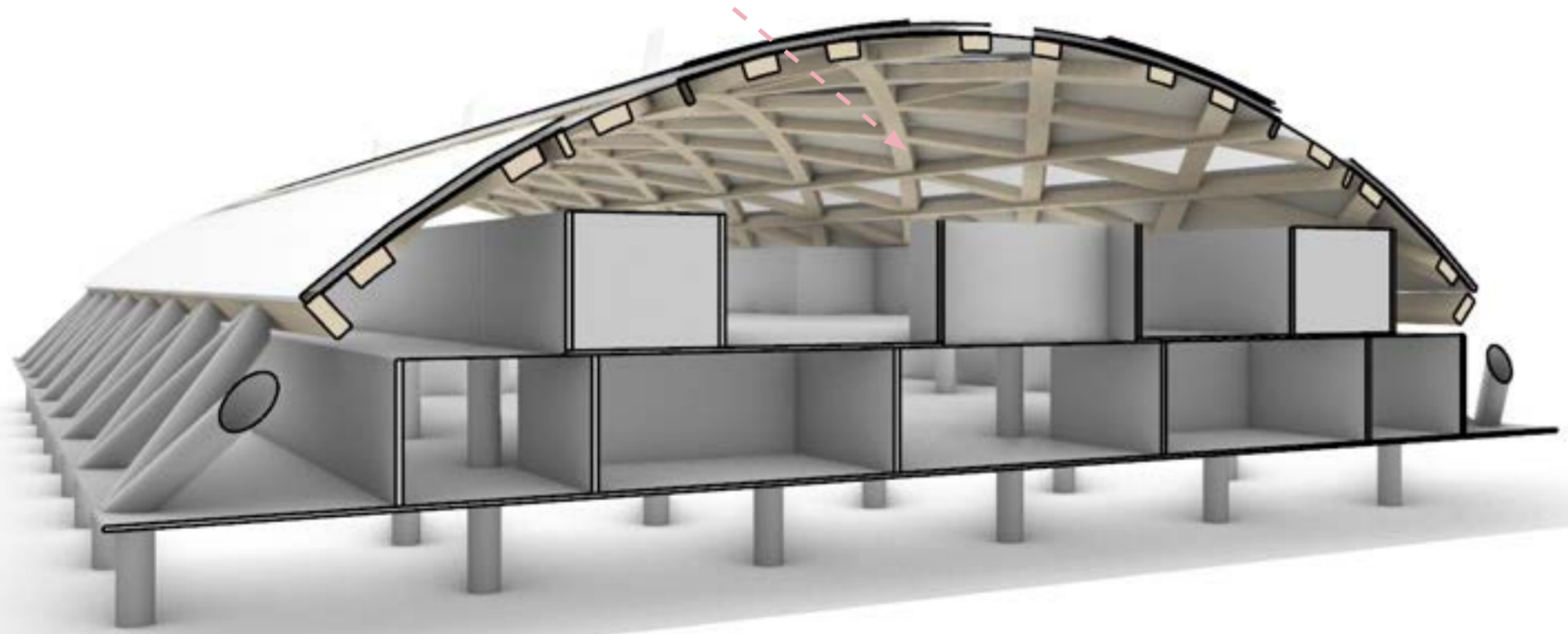
Client: WWF UK, Woking
 Completion: 2013
 Architects: Hopkins Architects, London



Timber Gluelam : Internal Splice plate connection

3D SECTION

MASS TIMBER CONSTRUCTION



Wind cowl
 PV modules on carrier frame

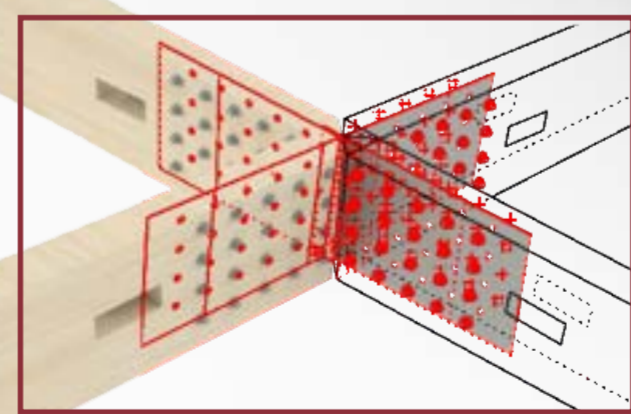
Roof lights:
 Double glazing in aluminium frame

Diagrid timber roof:
 Structural glulam beam,
 175 x 585 mm

V-struts, painted steel,
 Diameter : 323 mm

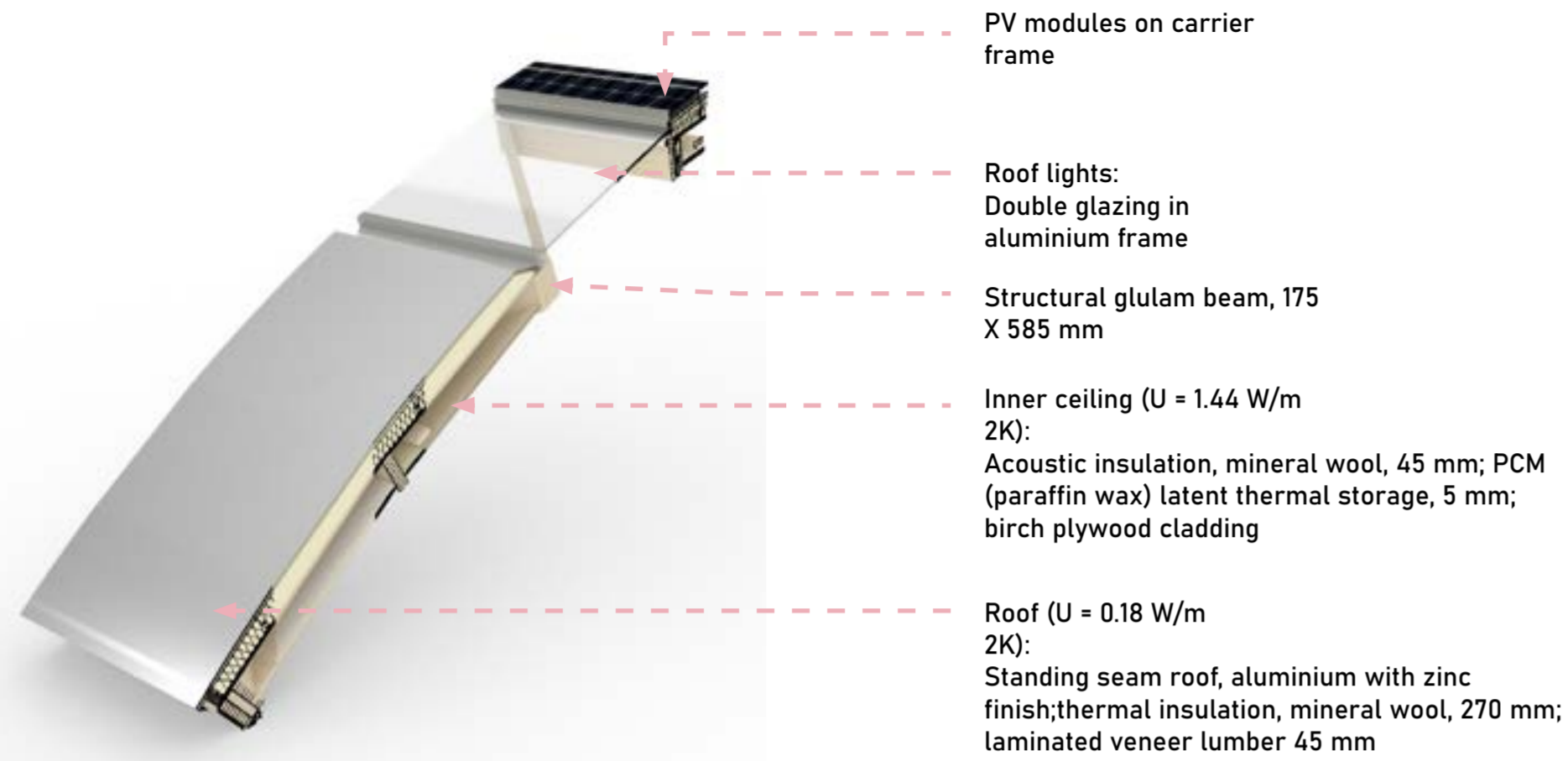
Inner ceiling - birch plywood cladding

Concrete with recycled aggregate and GGBS

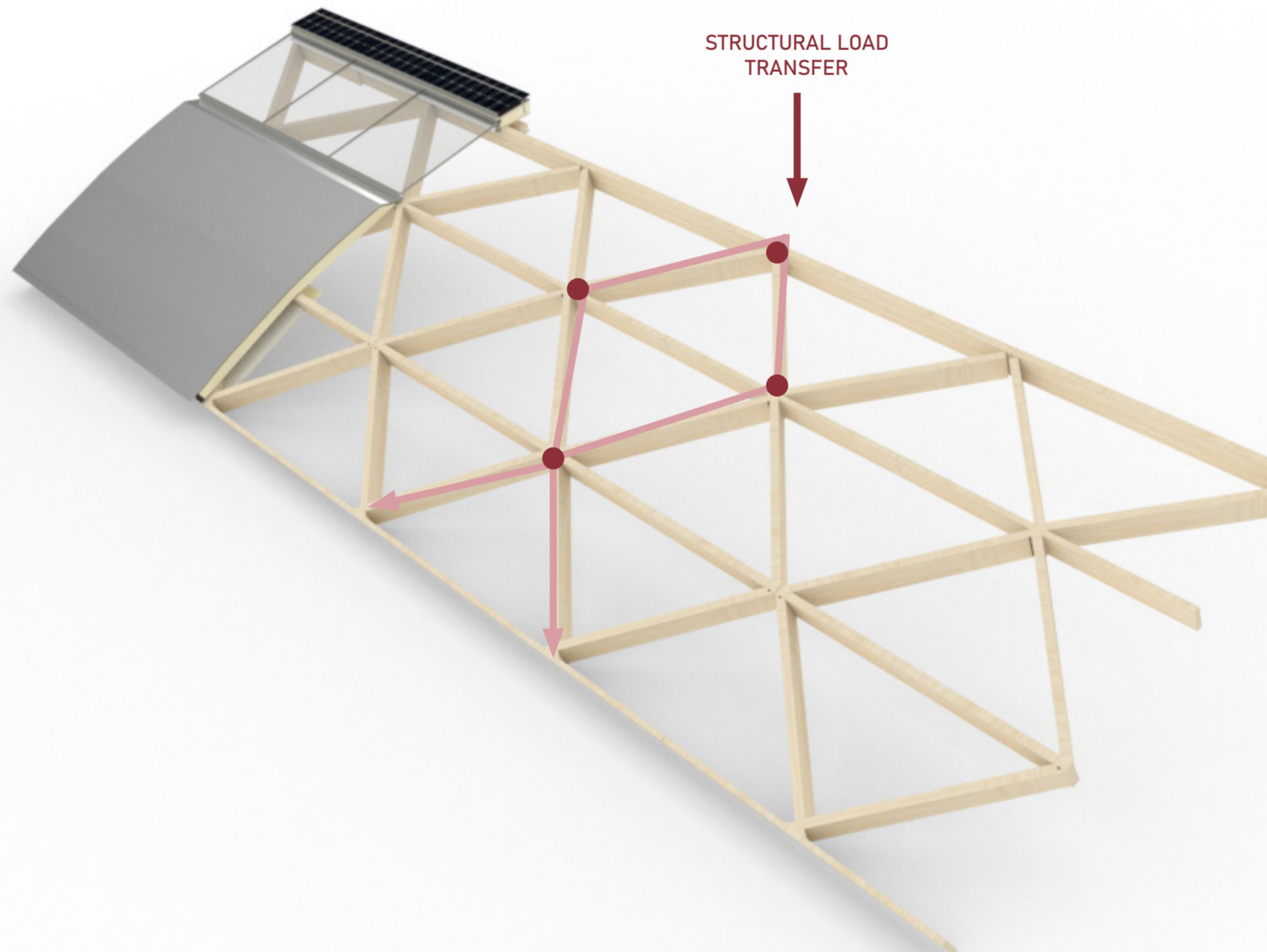


TIMBER FRAME CONNECTION : INTERNAL SPLICE PLATE CONNECTION

FACADE CONNECTION



STRUCTURAL LOAD TRANSFER



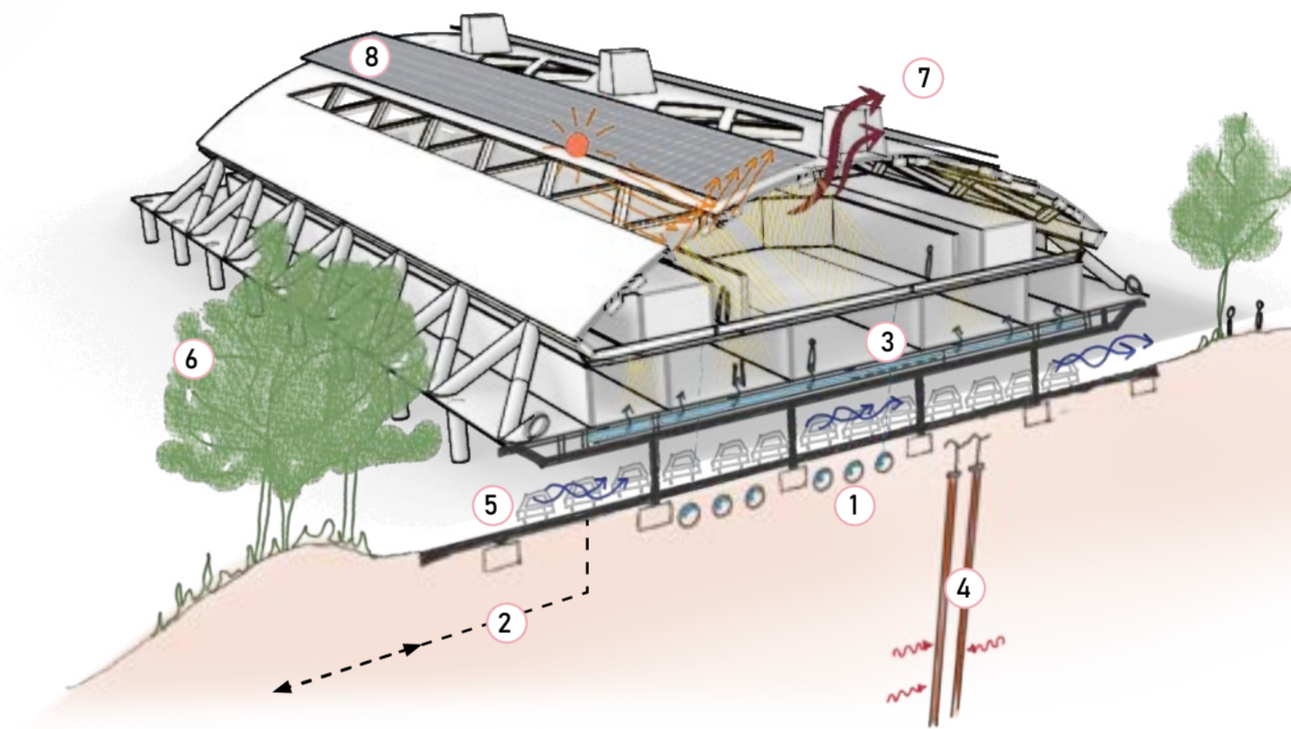
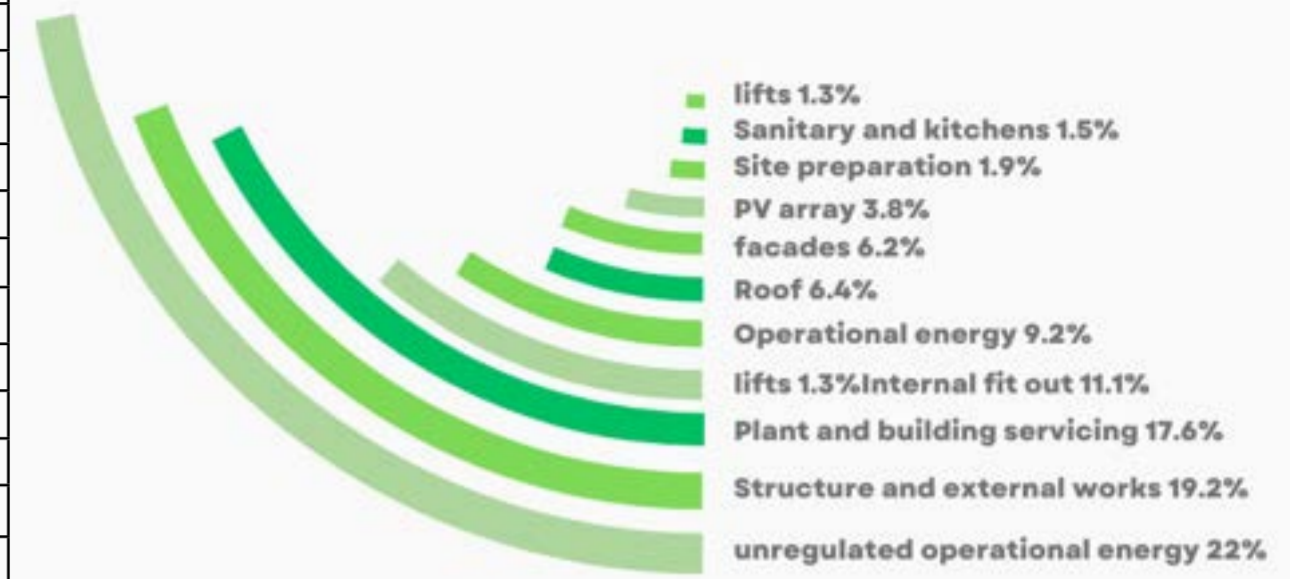
ENVIRONMENTAL CONSIDERATIONS

Results of BREEAM Final Assessment

CATEGORY	SCORE
Management	100%
Health and Wellbeing	87%
Energy	88%
Transport	93%
Water	88%
Materials	73%
Waste	86%
Land Use and Ecology	90%
Pollution	67%
Innovation	50%
TOTAL SCORE	90,6%

RESULTS: BREEAM OUTSTANDING
(Pass:30%, Good:55%, Excellent: 70% outstanding:85%)

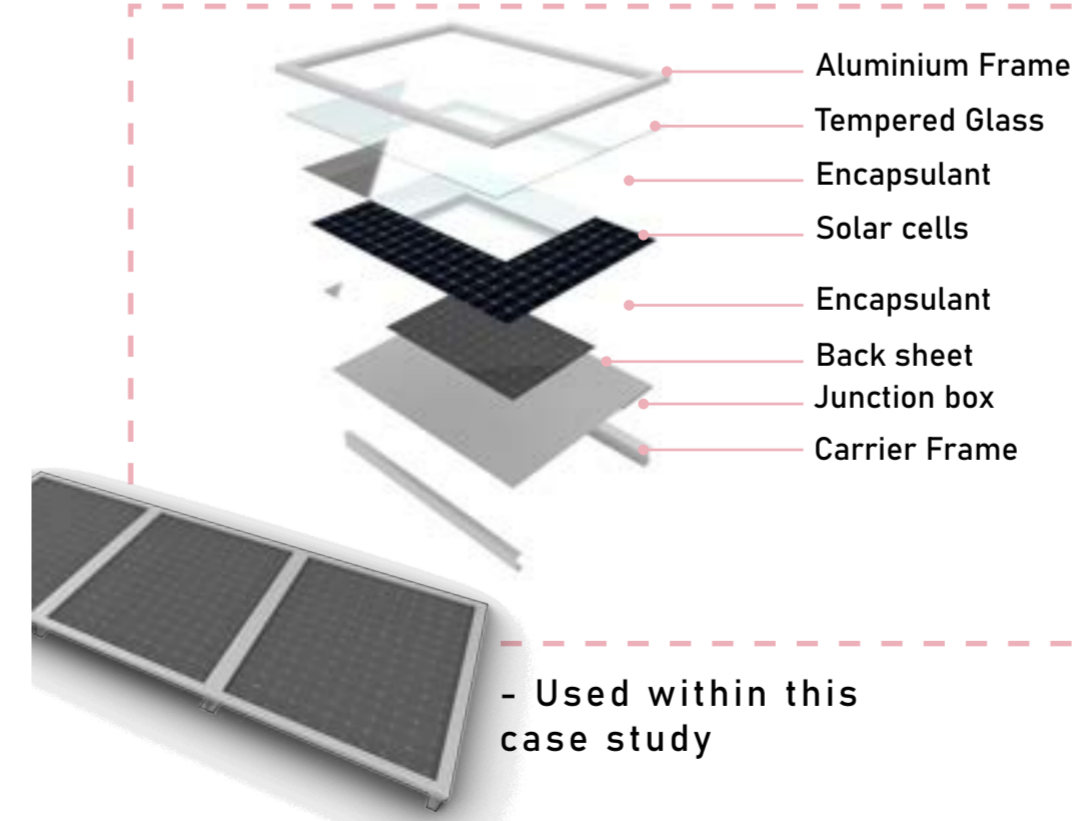
TOTAL EMISSIONS (60 years)



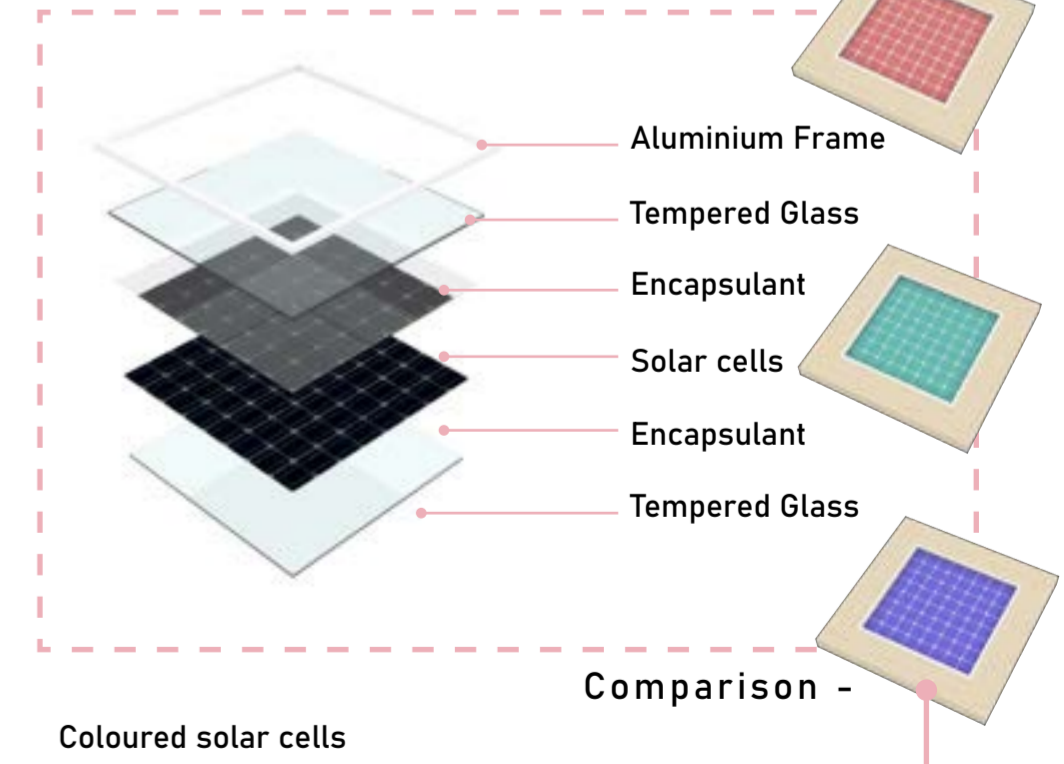
1. Earth ducts (100m length, minimum)
2. District heating from the working district energy system
3. Displacement ventilation
4. Borehole for ground-source heat pump
5. Car Park natural ventilation
6. Deciduous trees for solar shading
7. Crawl for exhaust air (closed in winter)
8. photovoltaic cells

COMPARISON PV PANELS: BUILT - IN VOLTAIC PANELS

PV PANEL ON A CARRIER FRAME



BUILT - IN VOLTAIC PANEL



CASE STUDY RESEARCH : MASS TIMBER CONSTRUCTION - CENTRE POMPIDOU-METZ

Completion: 2010
GFA: 11330 m²
Architects: Shigeru Ban
Architects Europe, Paris



EXPLODED VIEW HIGHLIGHTING MASS TIMBER FRAME



TEFLON-COATED GLASS-FIBRE MESH MEMBRANE



2 ≈ 140/440 MM LAMINATED SOFTWOOD DOUBLE COLUMN WITH LARCH FOOT

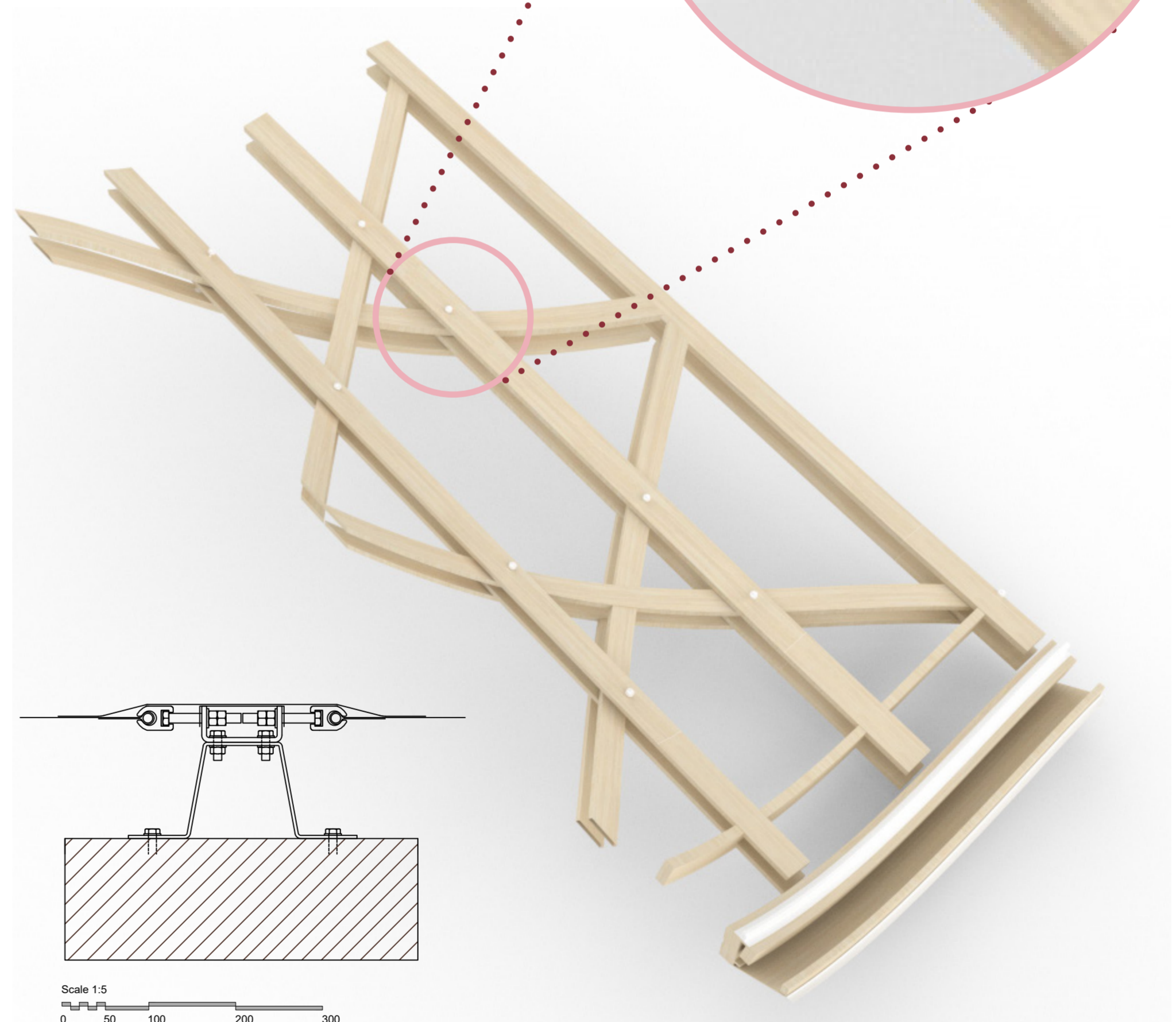
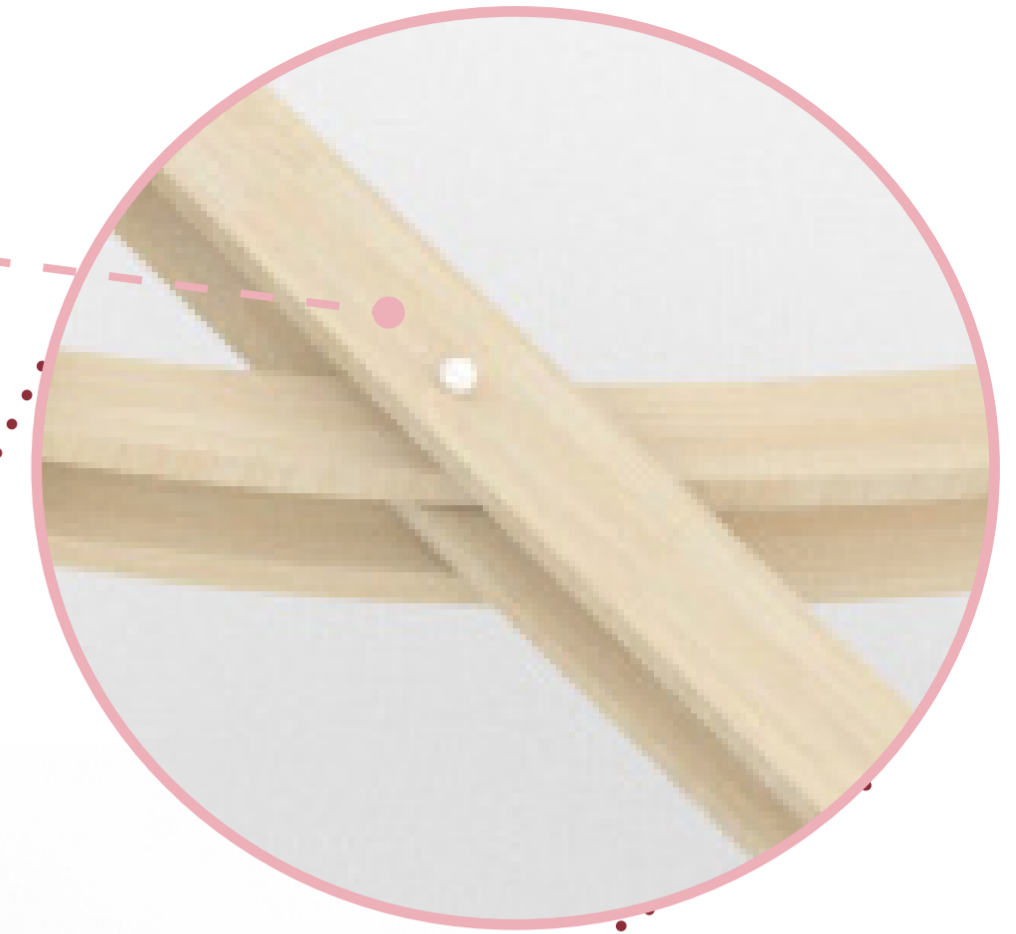


CENTRE POMPIDOU-METZ

CLOSER 3D MODEL OF THE TIMBER FRAME CONNECTIONS

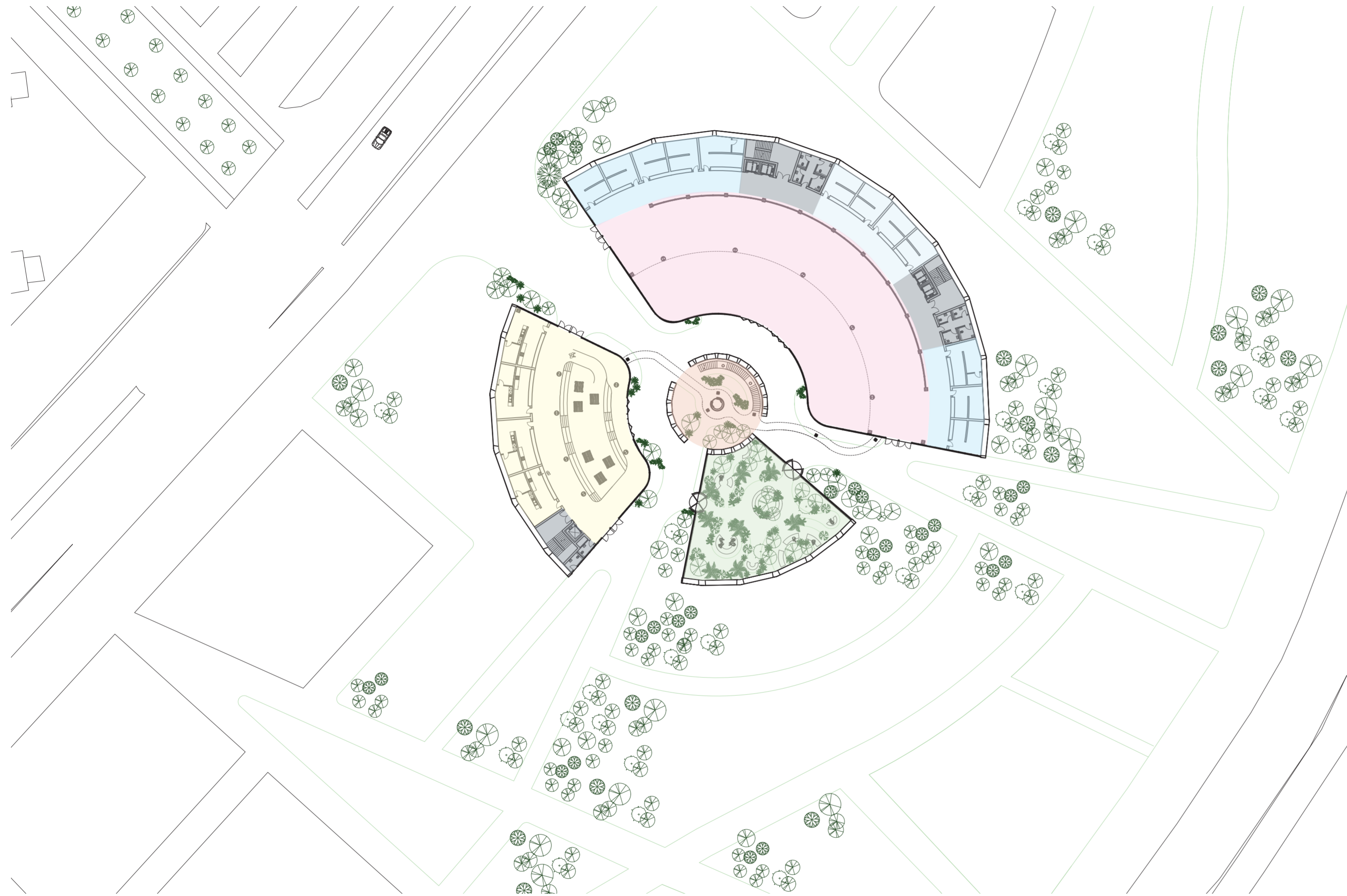
PINNED CONNECTION

4 LAYERS OF TIMBER CONSTRUCTION

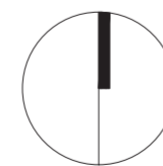


FRESH FOOD MUNICIPAL MARKET, GARDENS, AND CULINARY EDUCATIONAL FACILITY

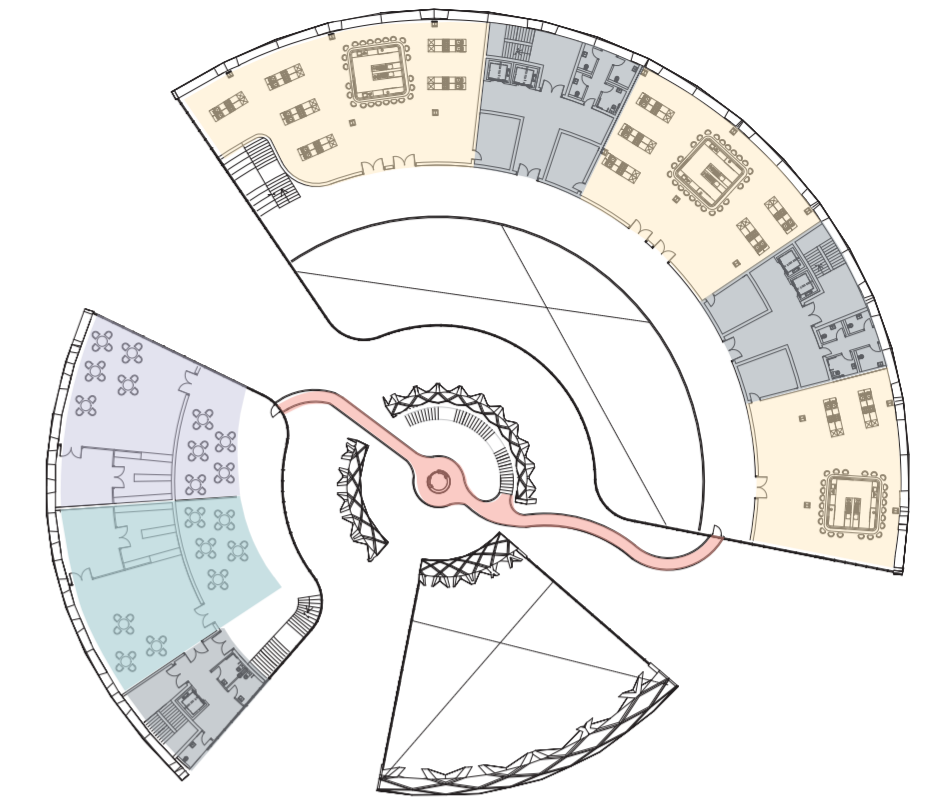
GROUND FLOOR PLAN



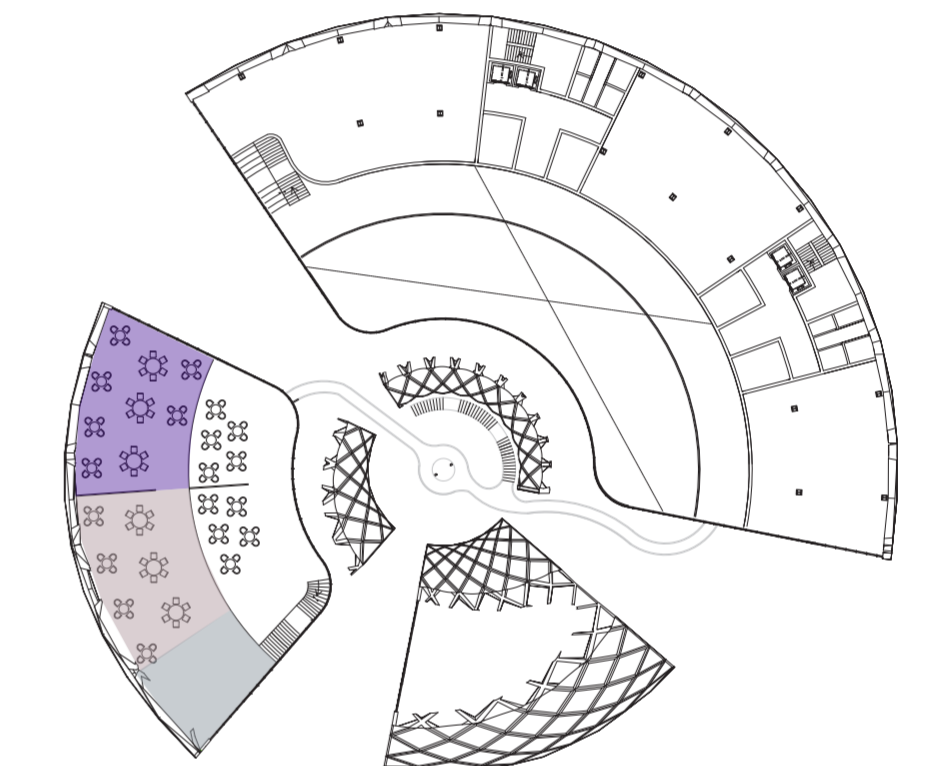
- | | | |
|---|---|--|
| ■ Fixed market stalls - Fish and Meat | ■ Small restaurant 1 | ■ Gardening workshop spaces with hydroponic racks |
| ■ Flexible market stall space | ■ Small restaurant 2 | ■ Bridge |
| ■ Food court - with flexible event space | ■ Culinary educational space | ■ Utilities - Toilets, storage and fire exits |
| ■ Central courtyard with bridge access | ■ Extra seating for small restaurant 1 | |
| ■ Indoor garden | ■ Extra seating for small restaurant 2 | |



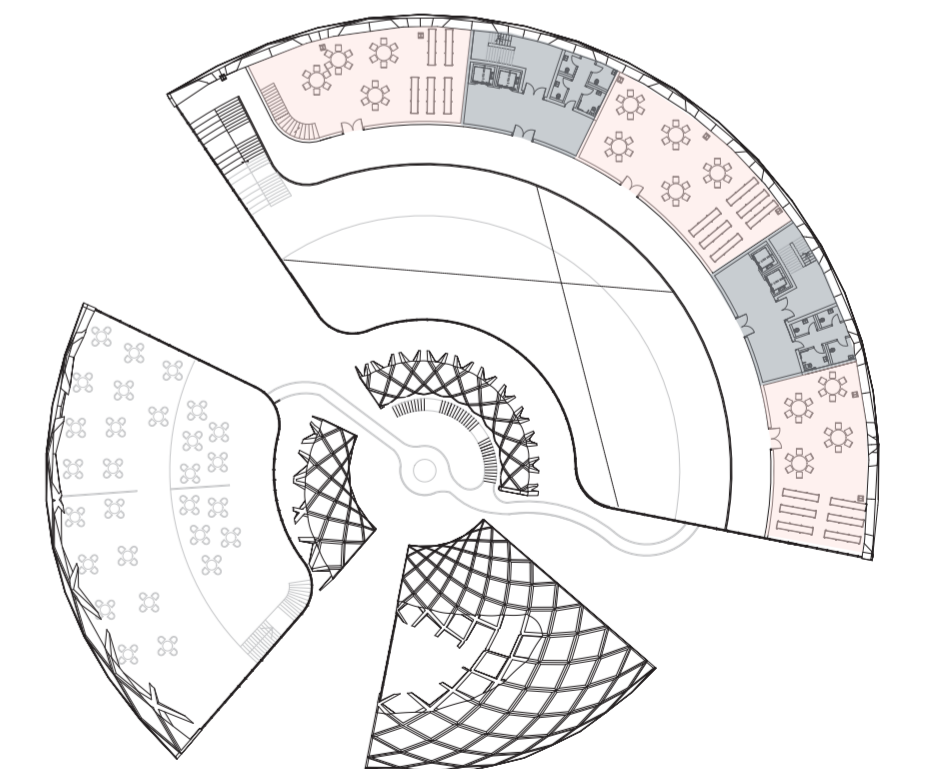
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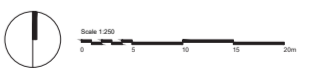
1ST FLOOR PLAN



2ND FLOOR PLAN



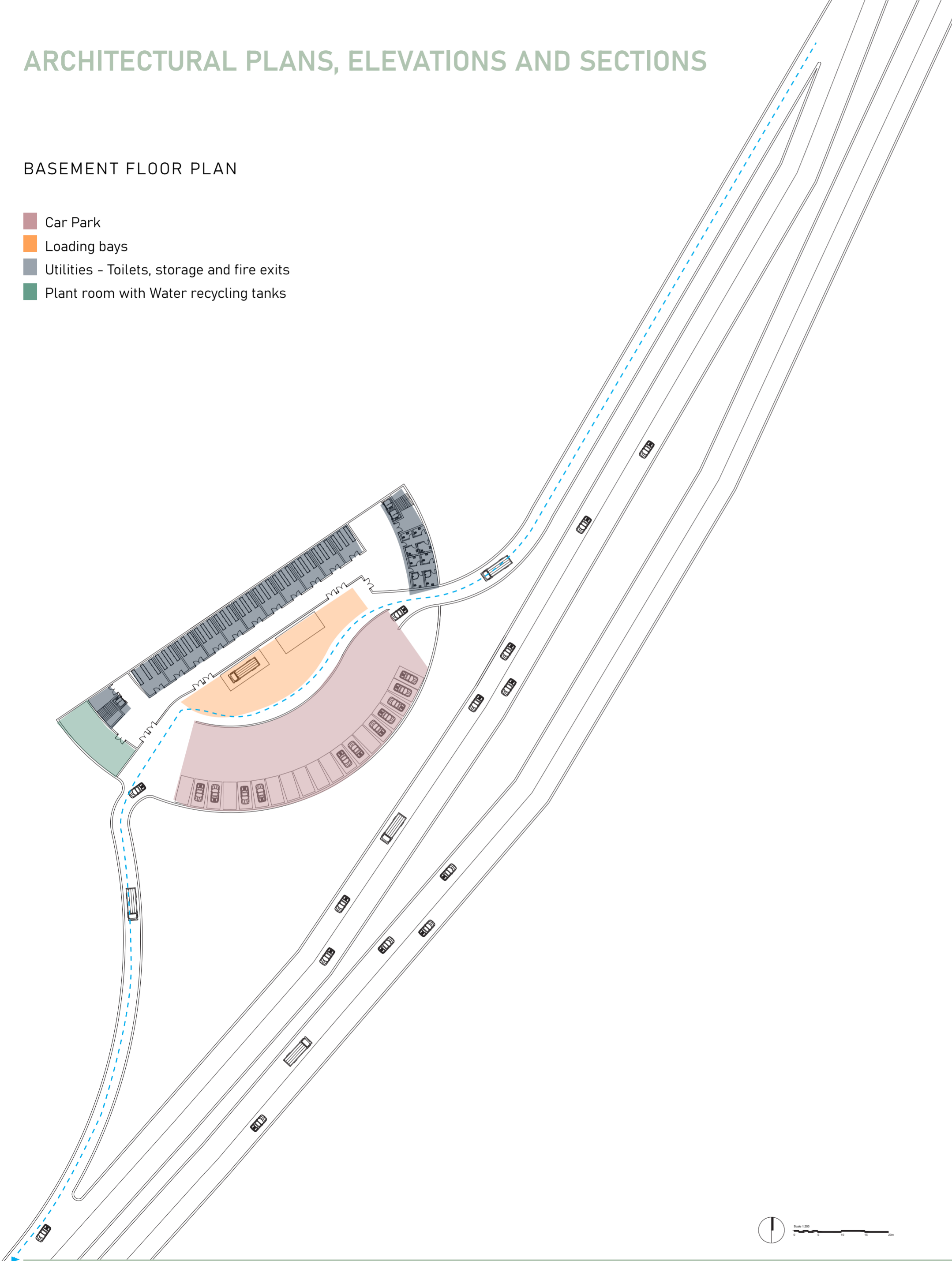
3RD FLOOR PLAN



ARCHITECTURAL PLANS, ELEVATIONS AND SECTIONS

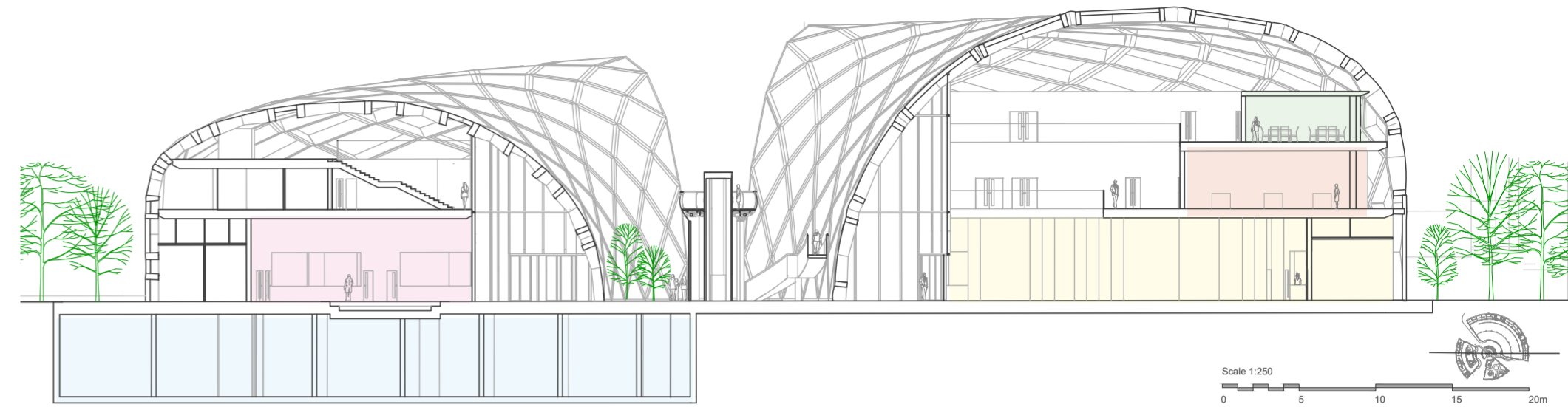
BASEMENT FLOOR PLAN

- Car Park
- Loading bays
- Utilities - Toilets, storage and fire exits
- Plant room with Water recycling tanks

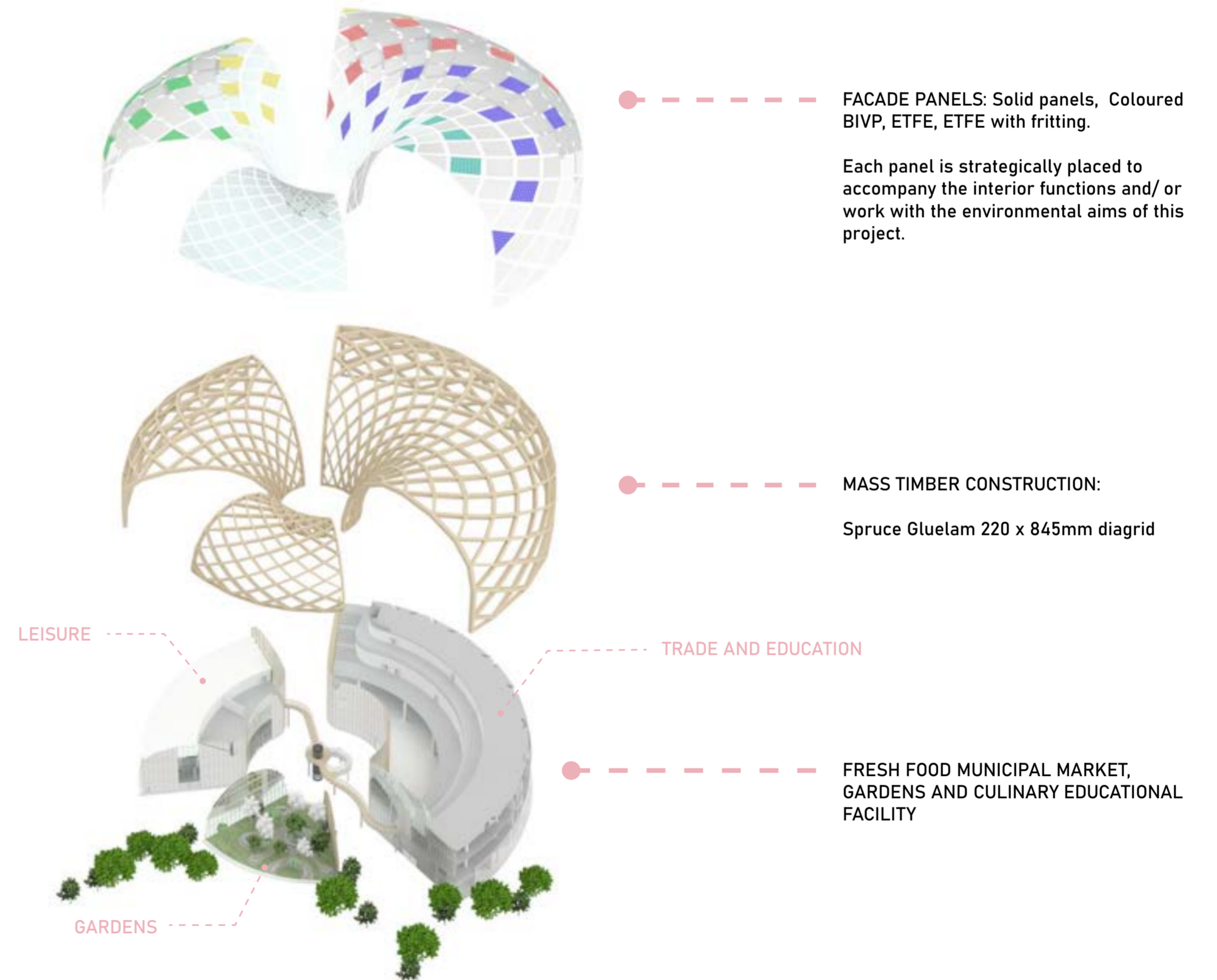


SECTIONS

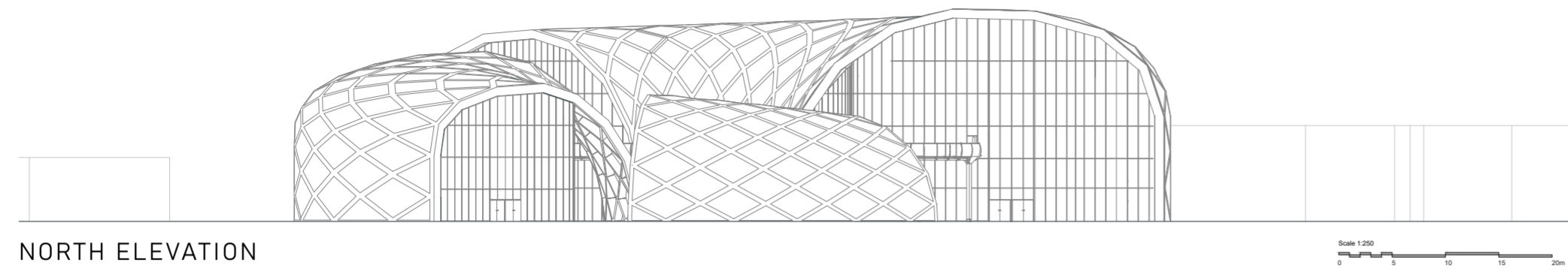
- Storage space
- Food court
- Market
- Culinary workshop
- Gardening workshop with hydroponic growing racks



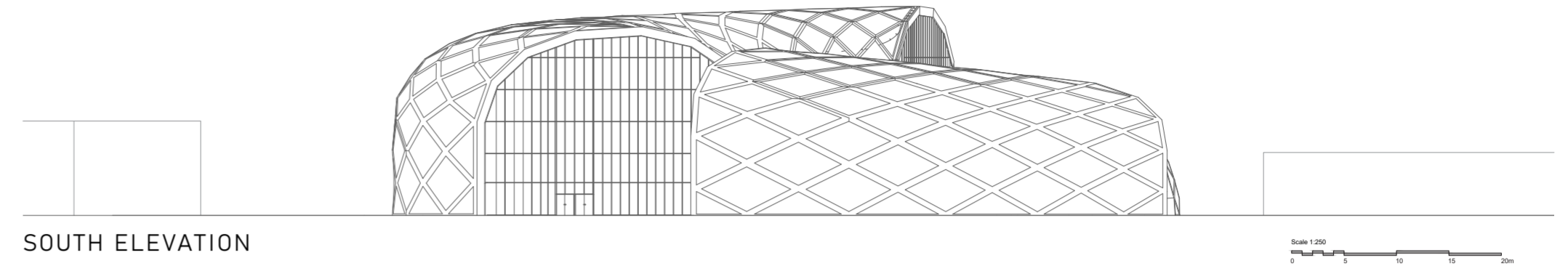
IDENTIFYING THE ELEMENTS



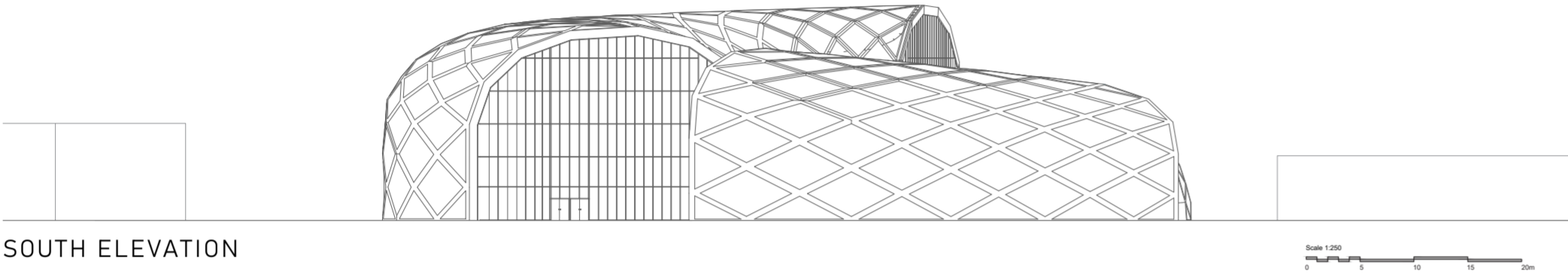
ELEVATIONS



NORTH ELEVATION

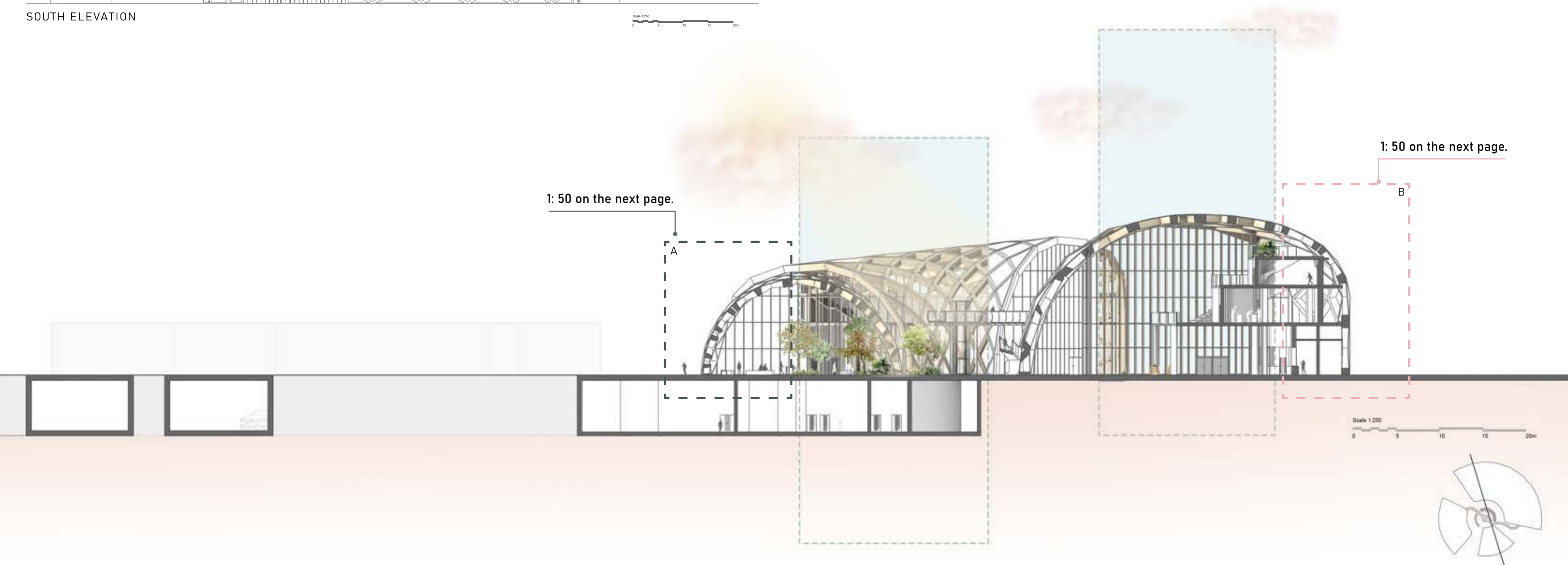


SOUTH ELEVATION



SOUTH ELEVATION

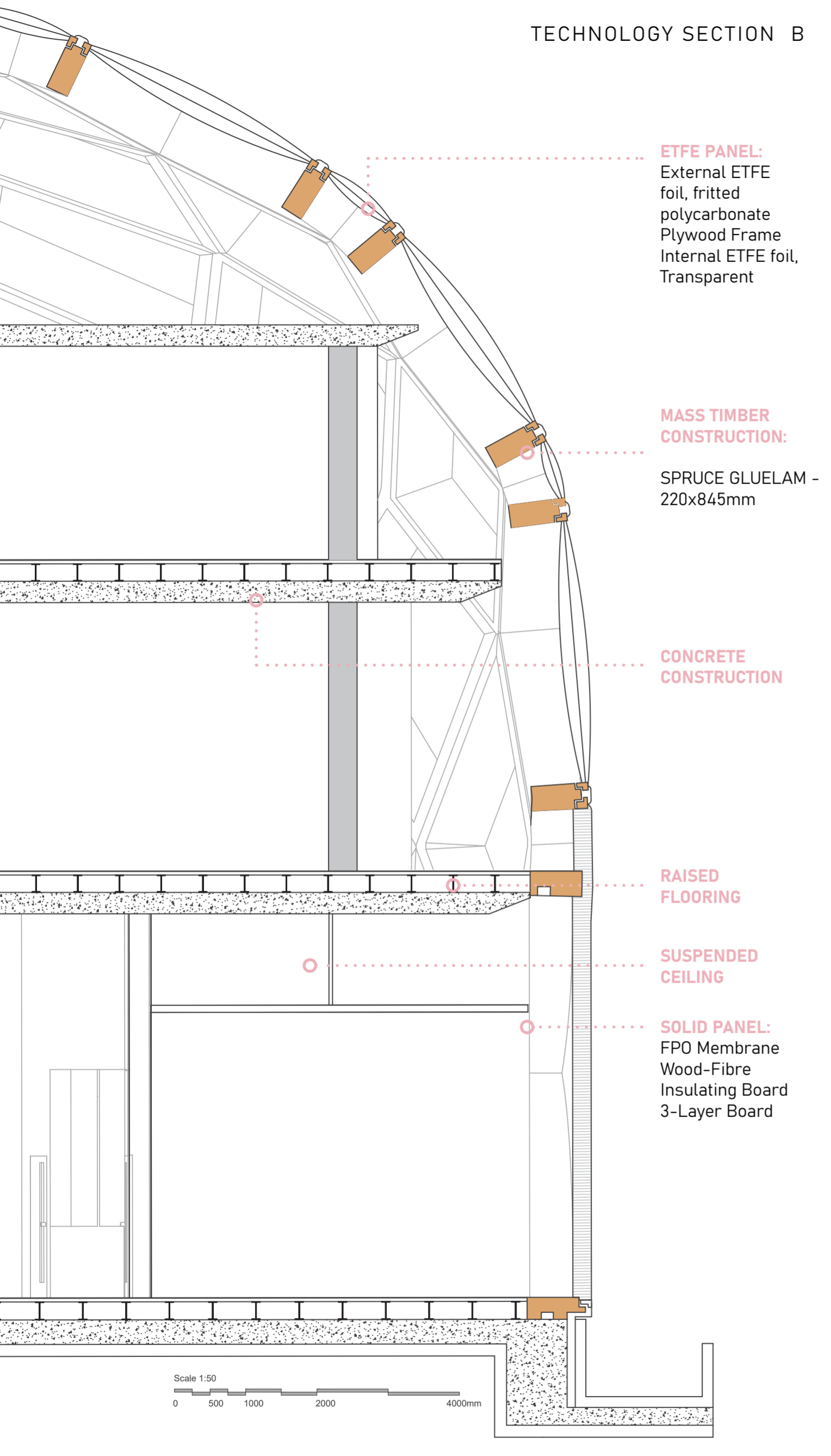
SECTION



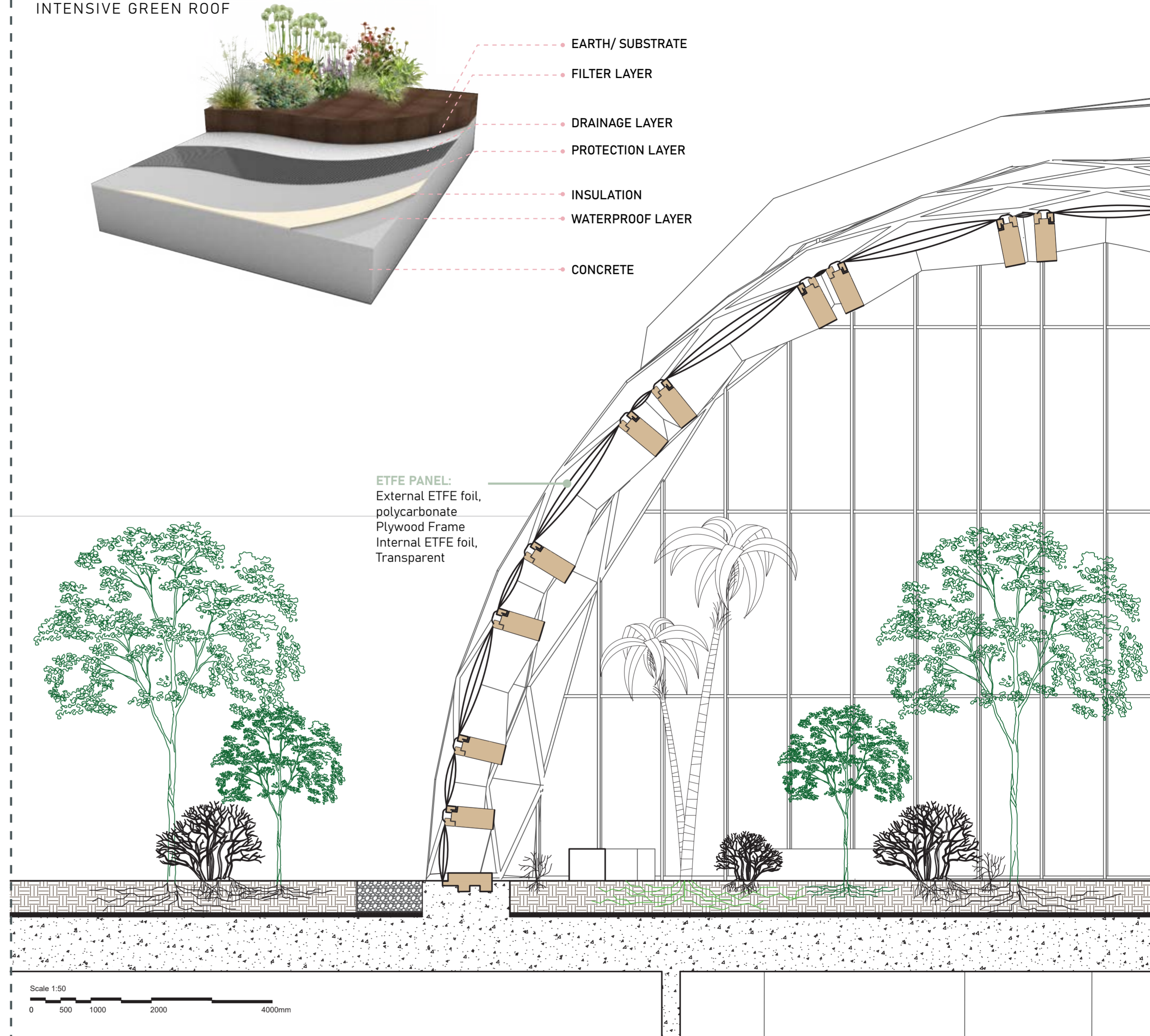
1: 50 on the next page.

1: 50 on the next page.

TECHNOLOGY SECTION B

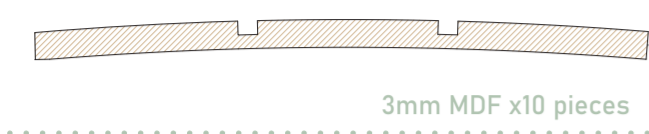


TECHNOLOGY SECTION A
 INTENSIVE GREEN ROOF

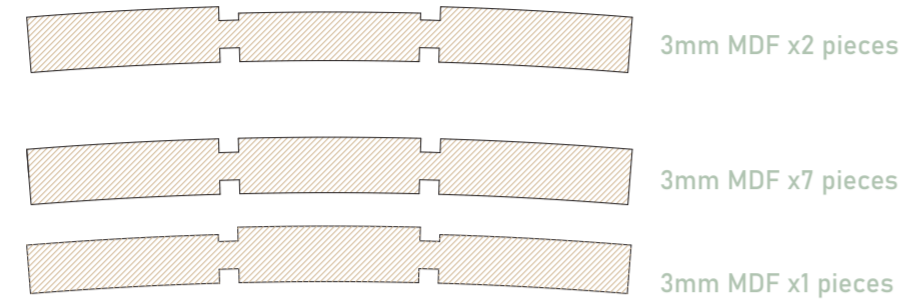


PHYSICAL MODEL DEVELOPMENT

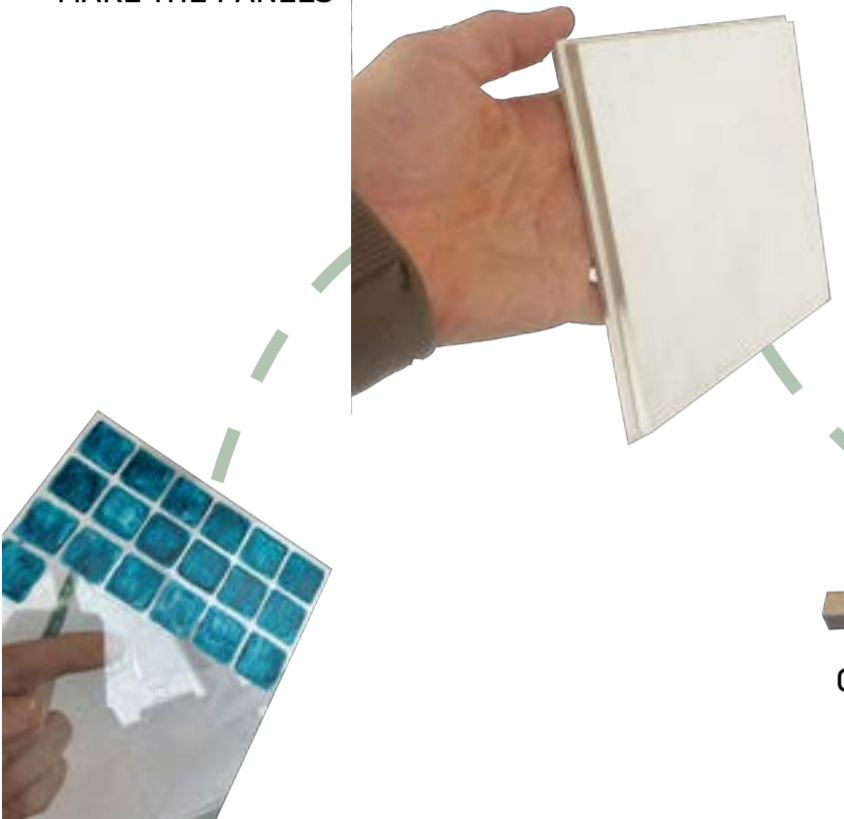
BOTTOM PIECES



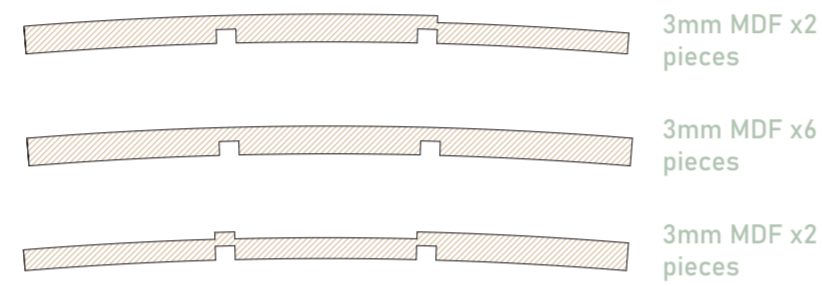
MIDDLE PIECES , Each piece is slightly different dependant on what panel its holding.



MAKE THE PANELS



TOP PIECES , Each piece is slightly different dependant on what panel its holding.



GLUE TOGETHER



1 : 20 PHYSICAL MODEL



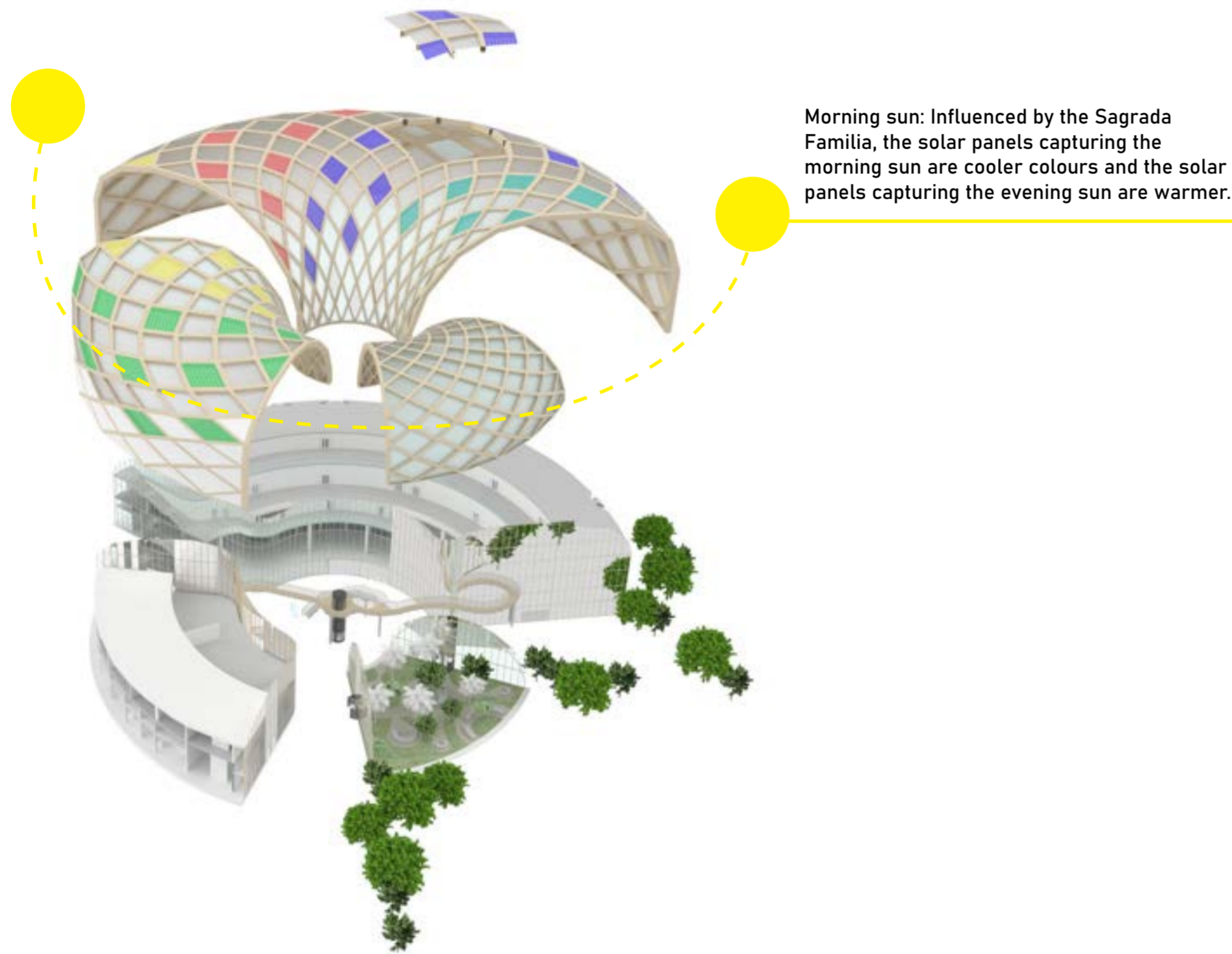
This model aims to show the construction of the gluelam timber beams and the application of a few of the range of panels that are integrated into the design.

ETFE PANEL

SOLID PANEL

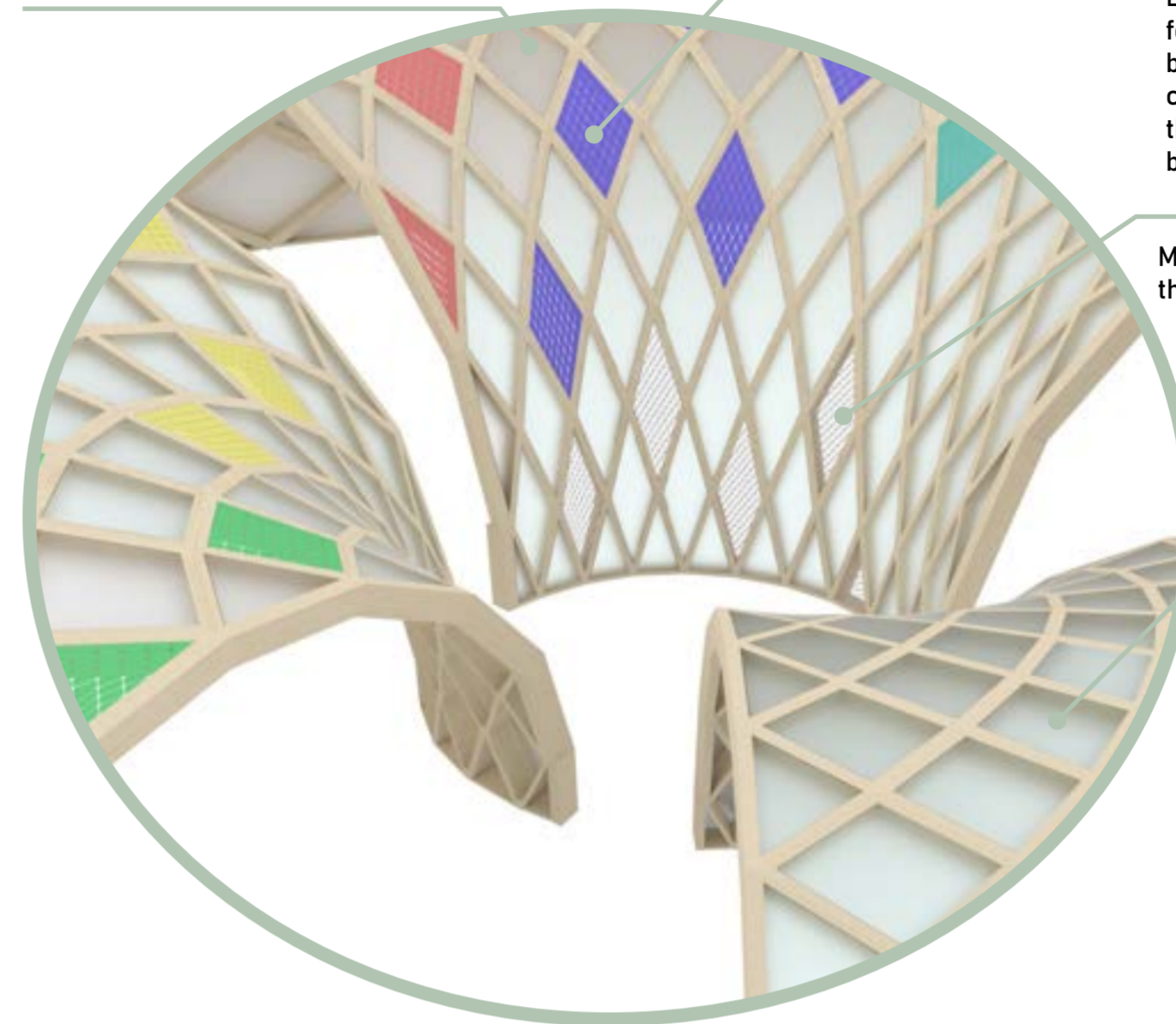


ENVIRONMENTAL CONSIDERATIONS



Morning sun: Influenced by the Sagrada Familia, the solar panels capturing the morning sun are cooler colours and the solar panels capturing the evening sun are warmer.

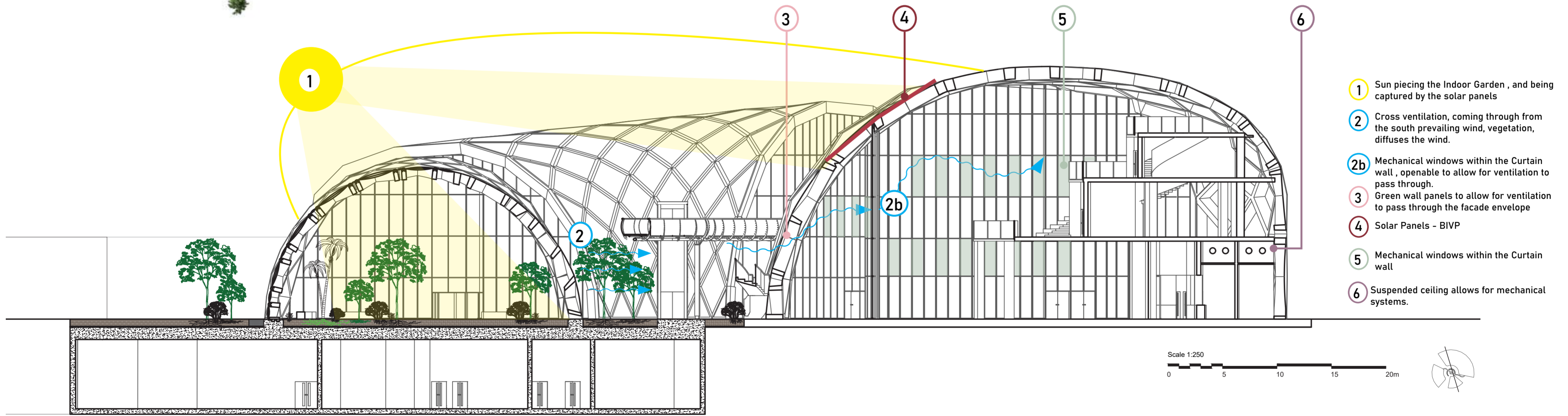
ETFE Panels with Fritting, controlling UV transmission



BIPV - The technology concept for this design focuses on energy, with the aim of the design being to achieve : The radiative heating and cooling, ventilation, and primary lighting of all three buildings function autonomously, inspired by case study 1.

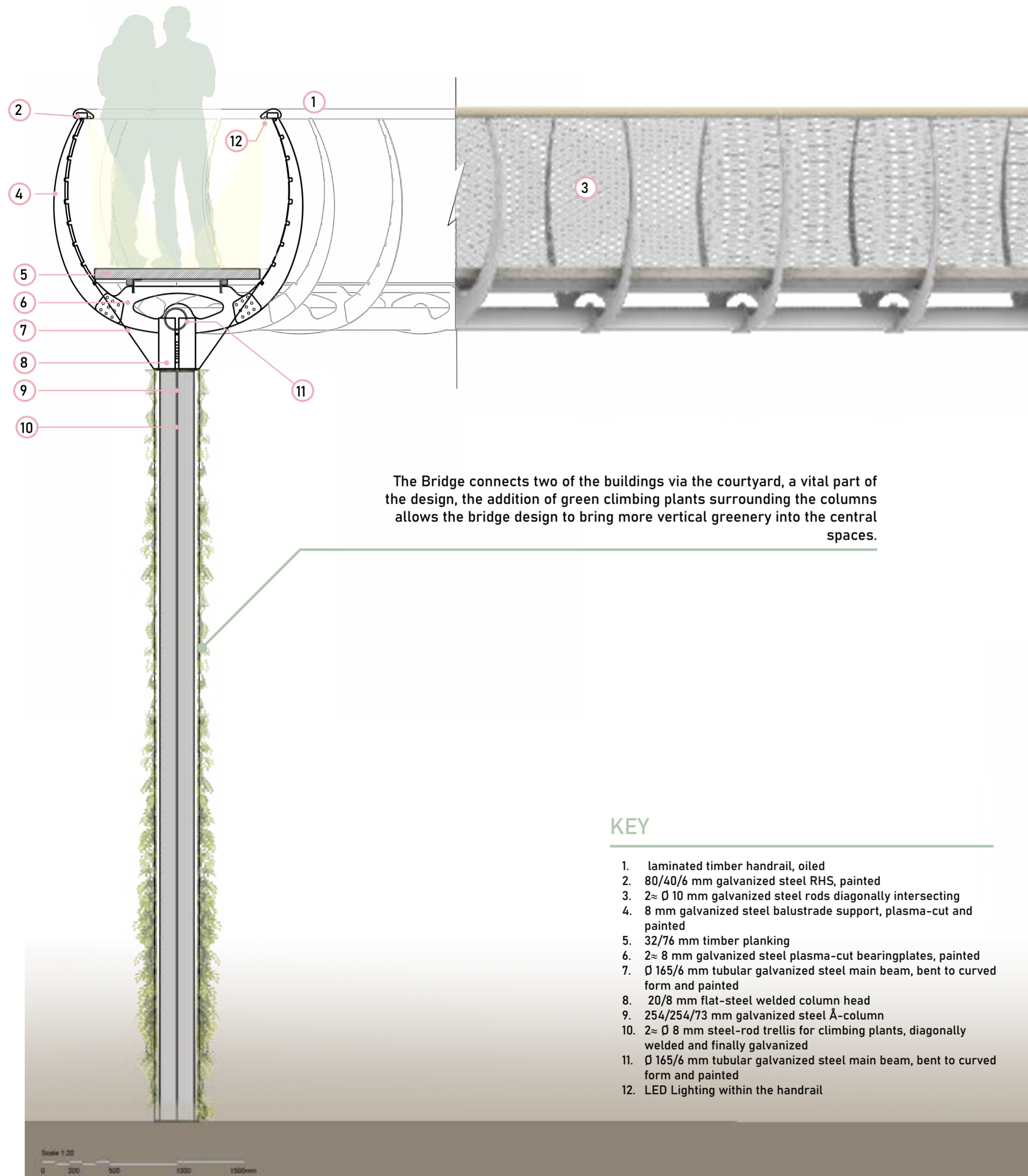
Mesh Green panels, allowing ventilation to pass through.

ETFE Panels covering the Garden.



- 1 Sun peicing the Indoor Garden , and being captured by the solar panels
- 2 Cross ventilation, coming through from the south prevailing wind, vegetation, diffuses the wind.
- 2b Mechanical windows within the Curtain wall , openable to allow for ventilation to pass through.
- 3 Green wall panels to allow for ventilation to pass through the facade envelope
- 4 Solar Panels - BIPV
- 5 Mechanical windows within the Curtain wall
- 6 Suspended ceiling allows for mechanical systems.

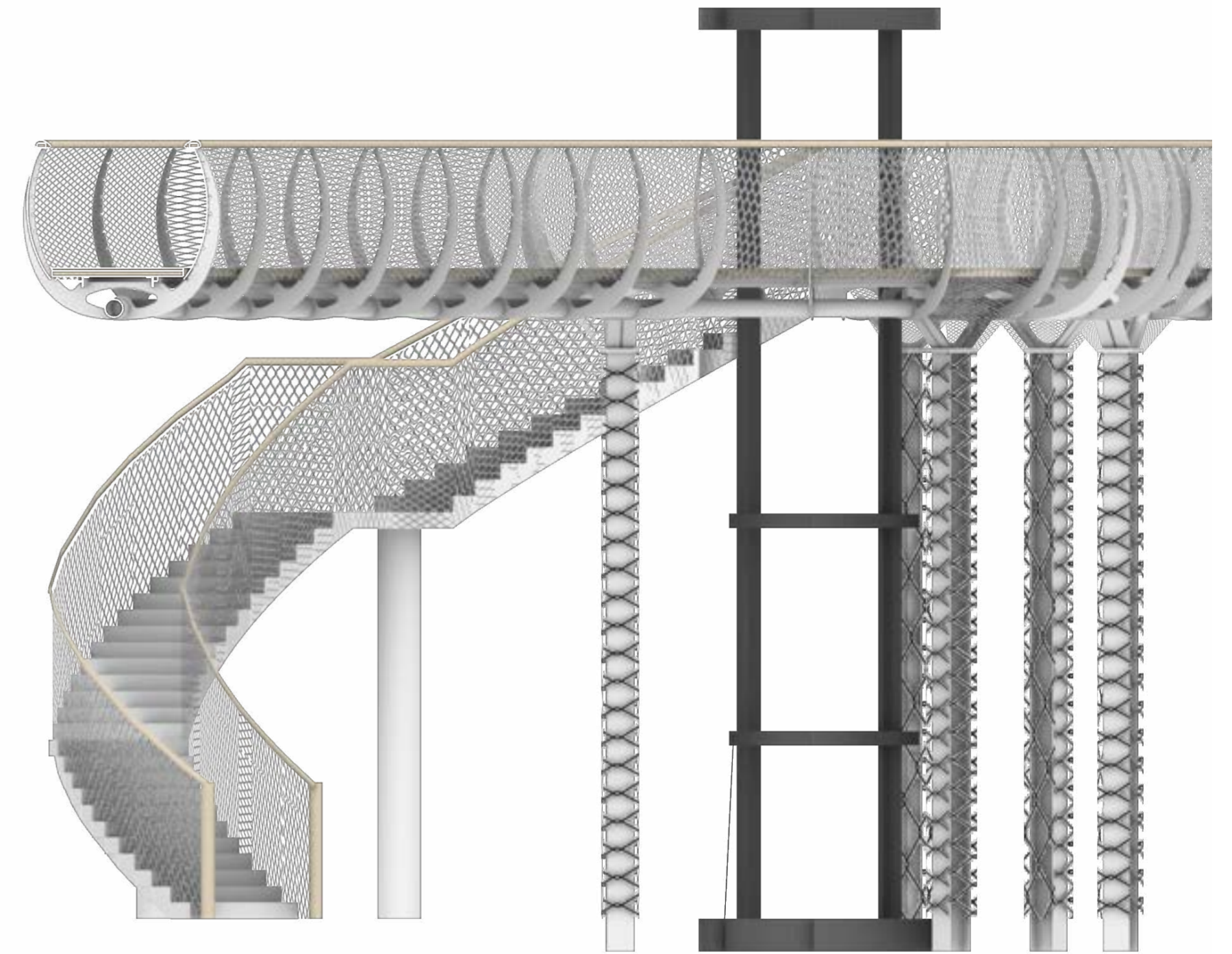
BRIDGE DETAILS



KEY

1. laminated timber handrail, oiled
2. 80/40/6 mm galvanized steel RHS, painted
3. 2≈ Ø 10 mm galvanized steel rods diagonally intersecting
4. 8 mm galvanized steel balustrade support, plasma-cut and painted
5. 32/76 mm timber planking
6. 2≈ 8 mm galvanized steel plasma-cut bearingplates, painted
7. Ø 165/6 mm tubular galvanized steel main beam, bent to curved form and painted
8. 20/8 mm flat-steel welded column head
9. 254/254/73 mm galvanized steel Å-column
10. 2≈ Ø 8 mm steel-rod trellis for climbing plants, diagonally welded and finally galvanized
11. Ø 165/6 mm tubular galvanized steel main beam, bent to curved form and painted
12. LED Lighting within the handrail

A central glass circular lift, allows for accessibility, so everyone can enjoy the walkway above the courtyard.



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