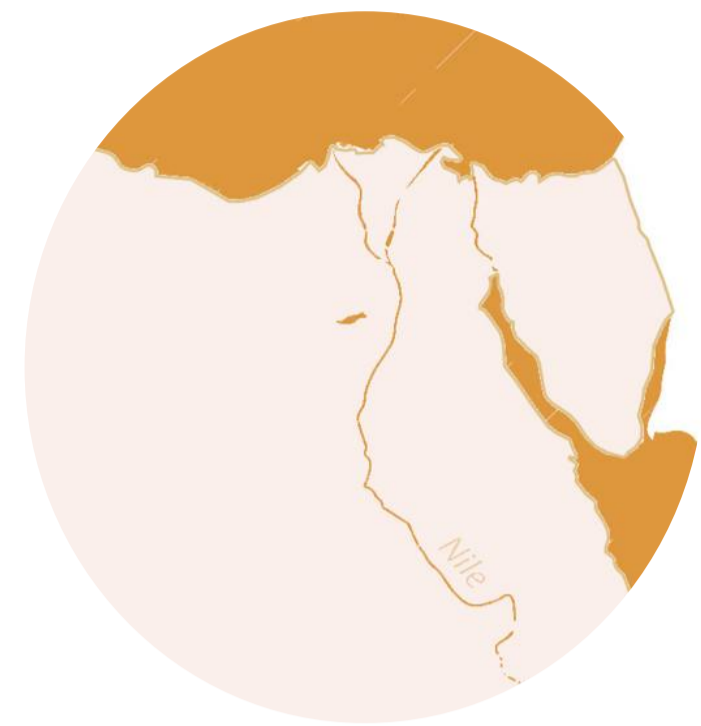


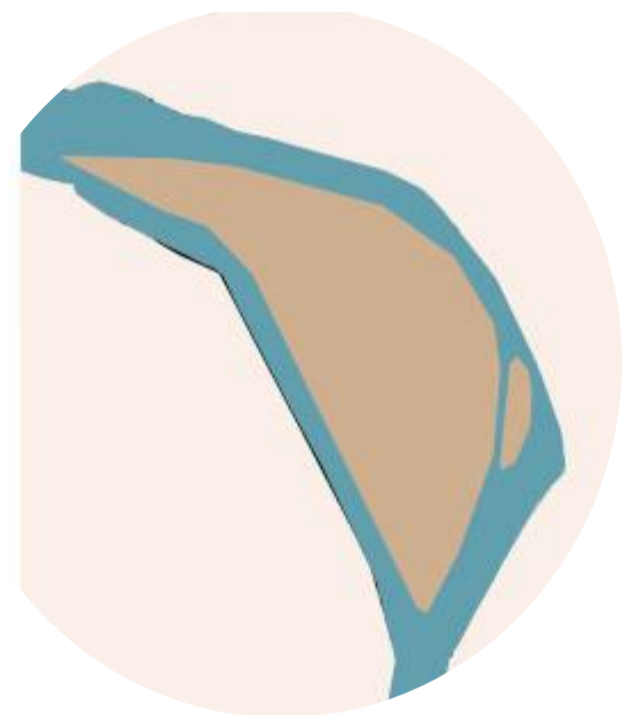
## Project Location



Egypt



Greater Cairo Region (GCR)



Warraq Island



Region selected according to the status-quo

## Problem

### 1. Loss of Agricultural-& Ecological values, unplanned settlements

Warraq Island has been dramatically reshaped by informal urban expansion. What was once primarily agricultural land has been overtaken by unplanned housing without proper infrastructure, resulting in the absence for green areas and congestion.



### 3. Socio-cultural isolation

Although located in the heart of Cairo's metropolitan fabric, Warraq Island remains culturally and socially disconnected. This isolation has deepened inequalities, as residents are excluded from the opportunities of a potentially rich cultural asset connected to the Nile.

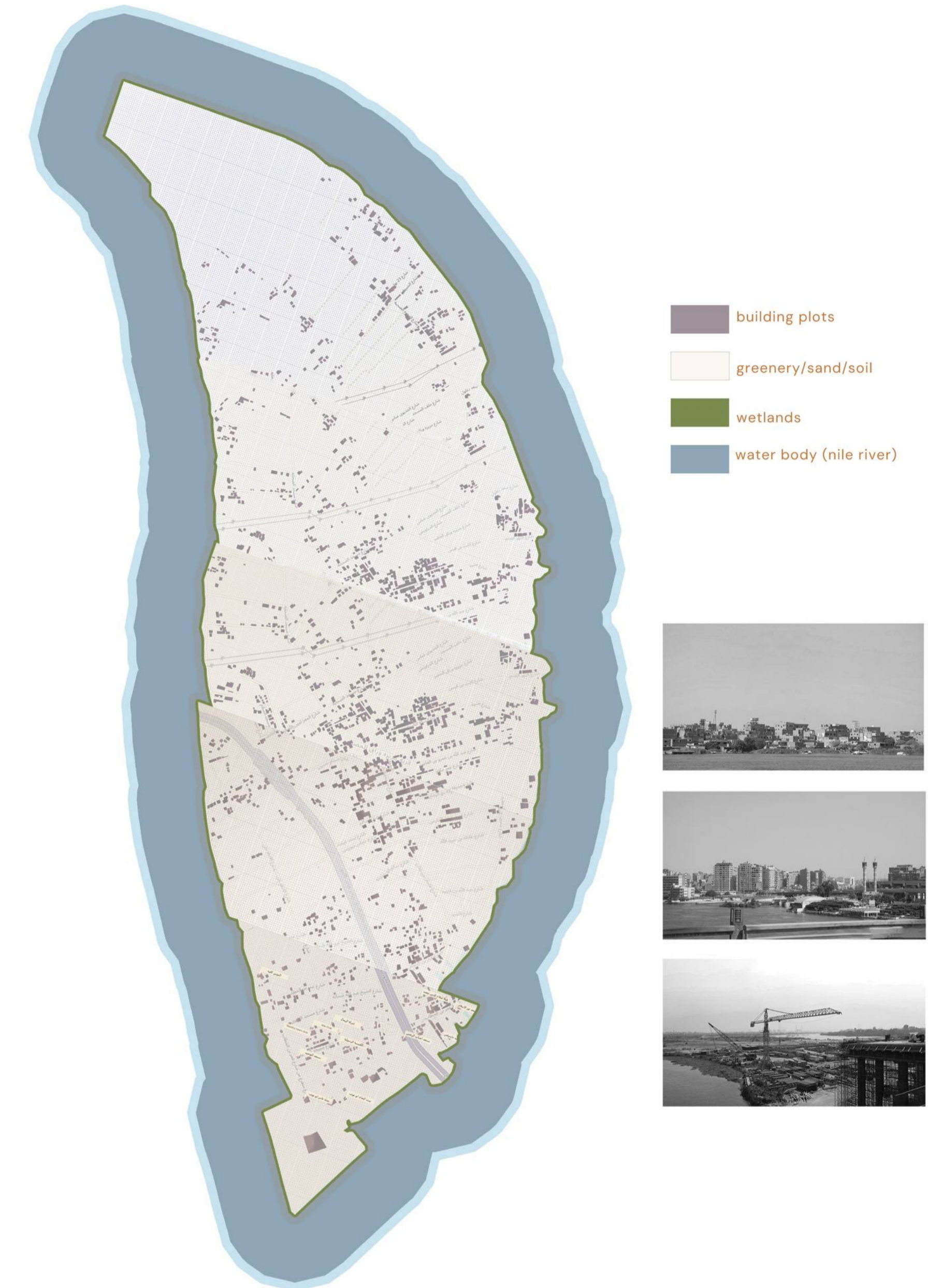
### 2. Displacement of Warraq Island's residents

Much of the Nilefront today is seen as an opportunity for real-estate profit, not for community-design perception. The people who lived close to the island have become spectators to their former identity as citizens in Warraq Island.

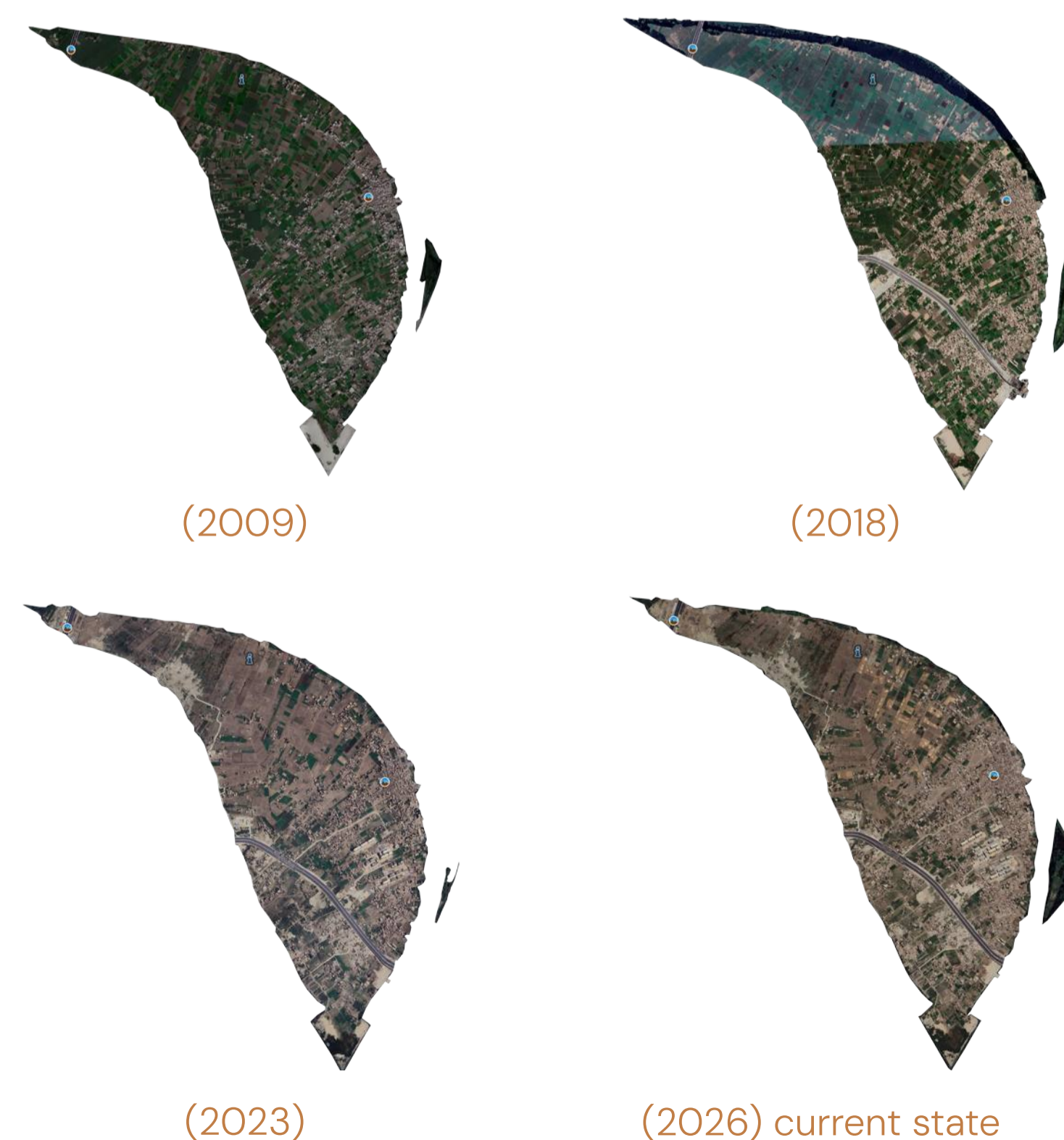
### 4. Uncontrolled urban sprawl, landscape fragmentation

Warraq Island, with its shrinking greenery and lack of resilient infrastructure, is exposed to flooding risks, poor air quality, and urban heat island effect, as a result from dense construction and uncoordinated planning.

## Warraq Island Status quo



## Warraq Island historical timeline (2009-current)

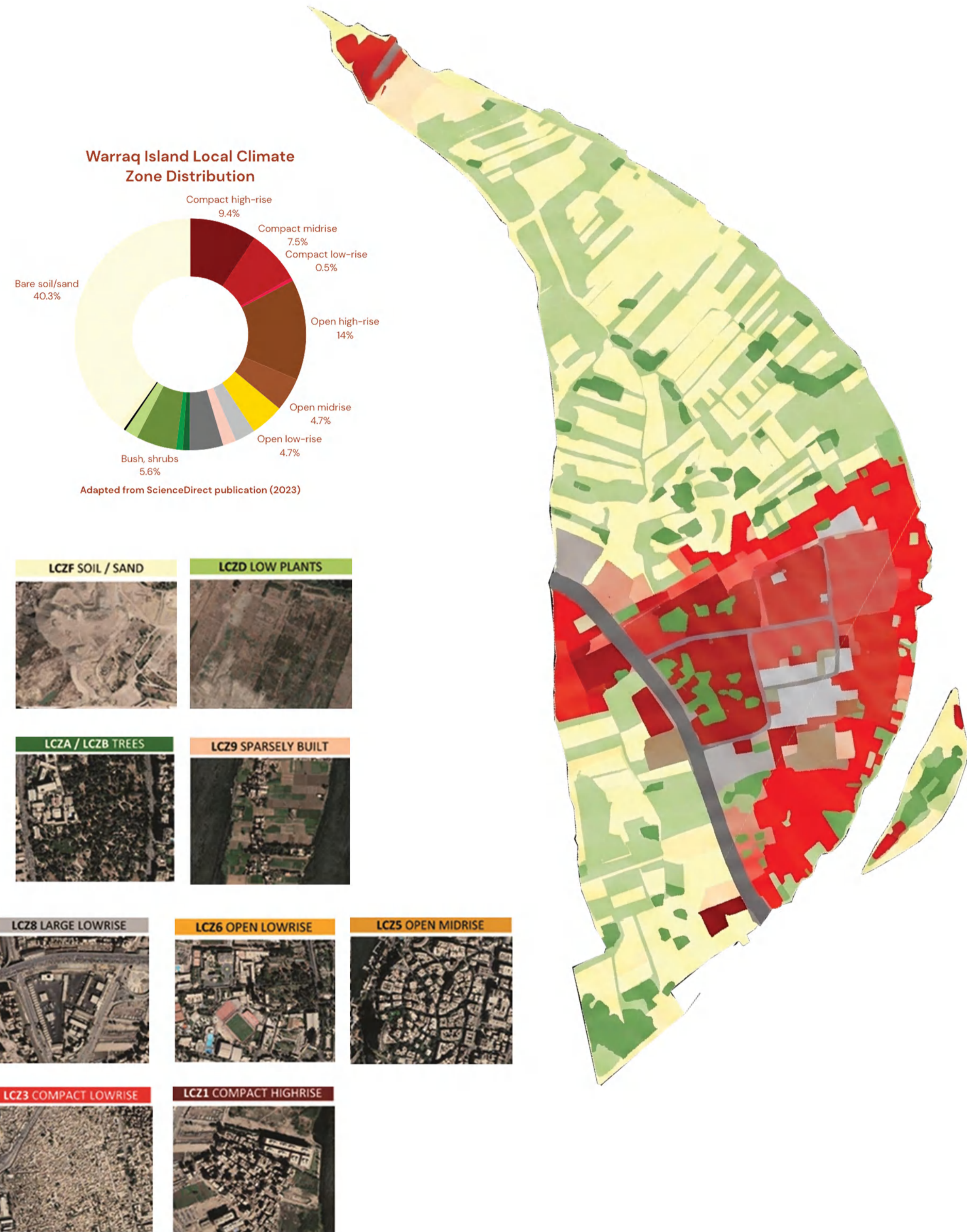


Urban Egypt and its Delta have been dependent on the Nile River since the early Egyptian civilization, and it is frequently referred to as the "gift of the Nile" for both the fertile farmland required for long-lasting urban populations and the Nile's gradual accumulation of soil. However, due to the restrictions on the urban land (Warraq Island), the area became inaccessible and under-used as an "ecological" factor that could benefit its people.

Warraq Island mainly consists of fragmented landscapes along with the scattered building plots and informal, unplanned settlements. One of their main transportation was by boats and ships that are also used for their activities (fishing, agriculture).

## Problem's Objective

How can a Nilefront development be re-imagined as a regenerative system where ecological processes and community life exist symbiotically?



## Problem background and solution

**1** Fragmented Warraq Island, land losing its meaning.

**2** Inaccessible roads to the island, limited to bridges.

**3** Government-led vision for Warraq Island 2030-2050

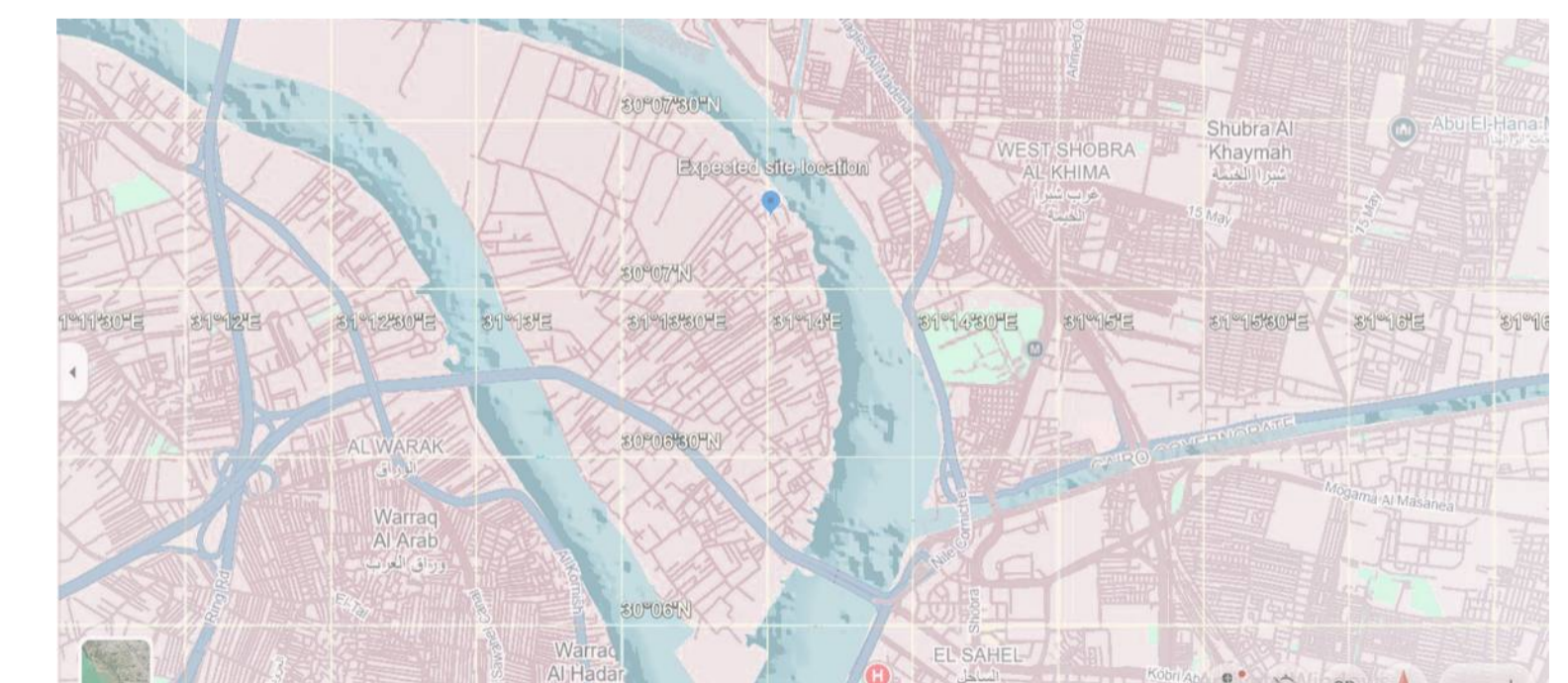
**5** Ecospace: Ecological Civic and Accessible Hub

**4** Design Process: Building an Ecological Civic Hub

The plan is to develop the island into a **mixed-use urban** area featuring public amenities along the Nilefront, residential skyscrapers and towers, and ecological parks. Egypt has 2 roles in the process: firstly, as the **'primary regulator'** of landuse and investor, and secondly, as the **political authority** responsible for balancing long-term urban benefits with the potential displacement of residents. The government positions itself as a leading force in converting unused and informal lands into well-organized, sustainable urban spaces.



Warraq Island's Topography map



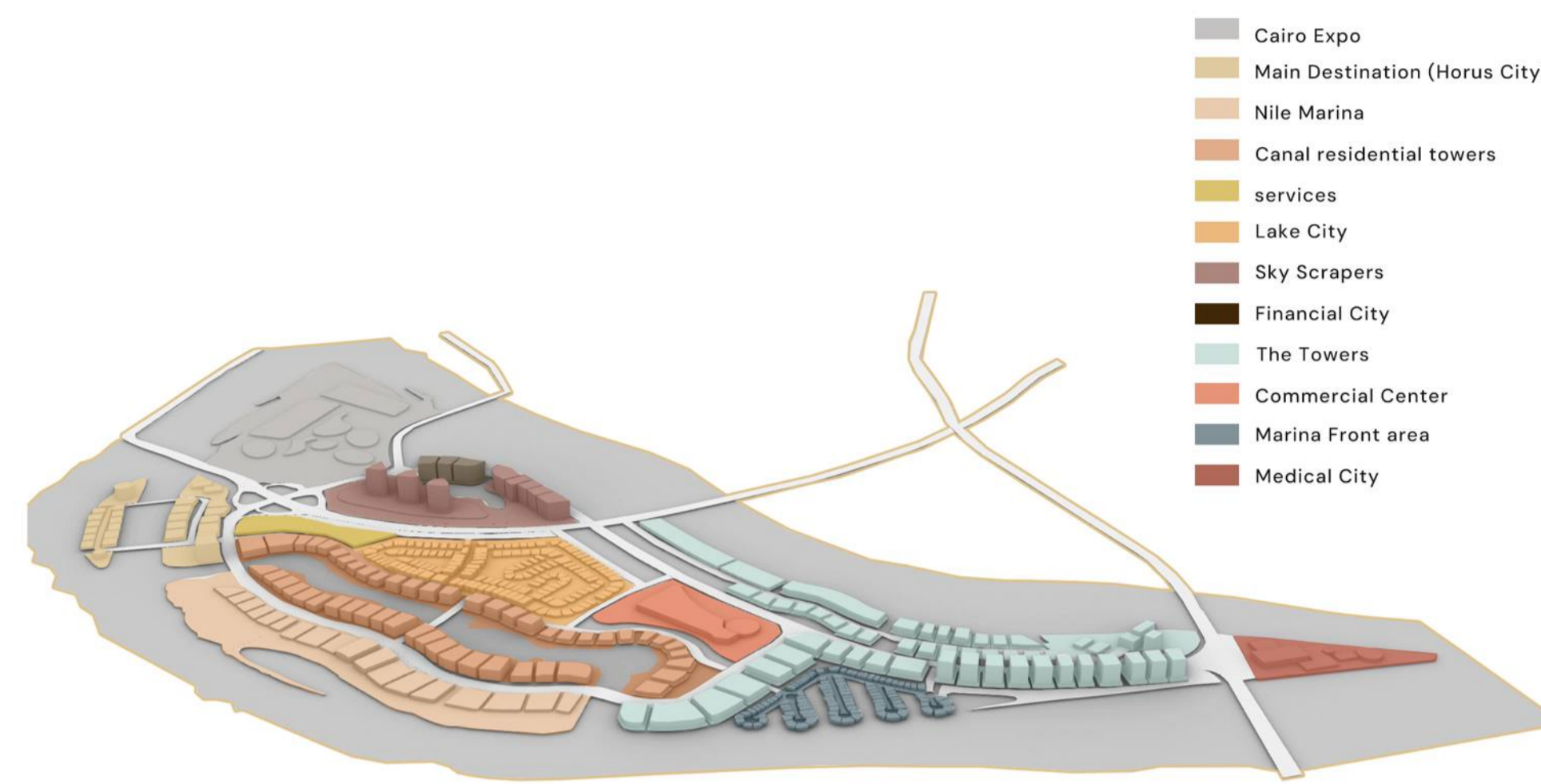
Warraq Island's geographical coordination map

Warraq Island's Topographical classification

# Warrag Island Government-led Vision (Horus City)

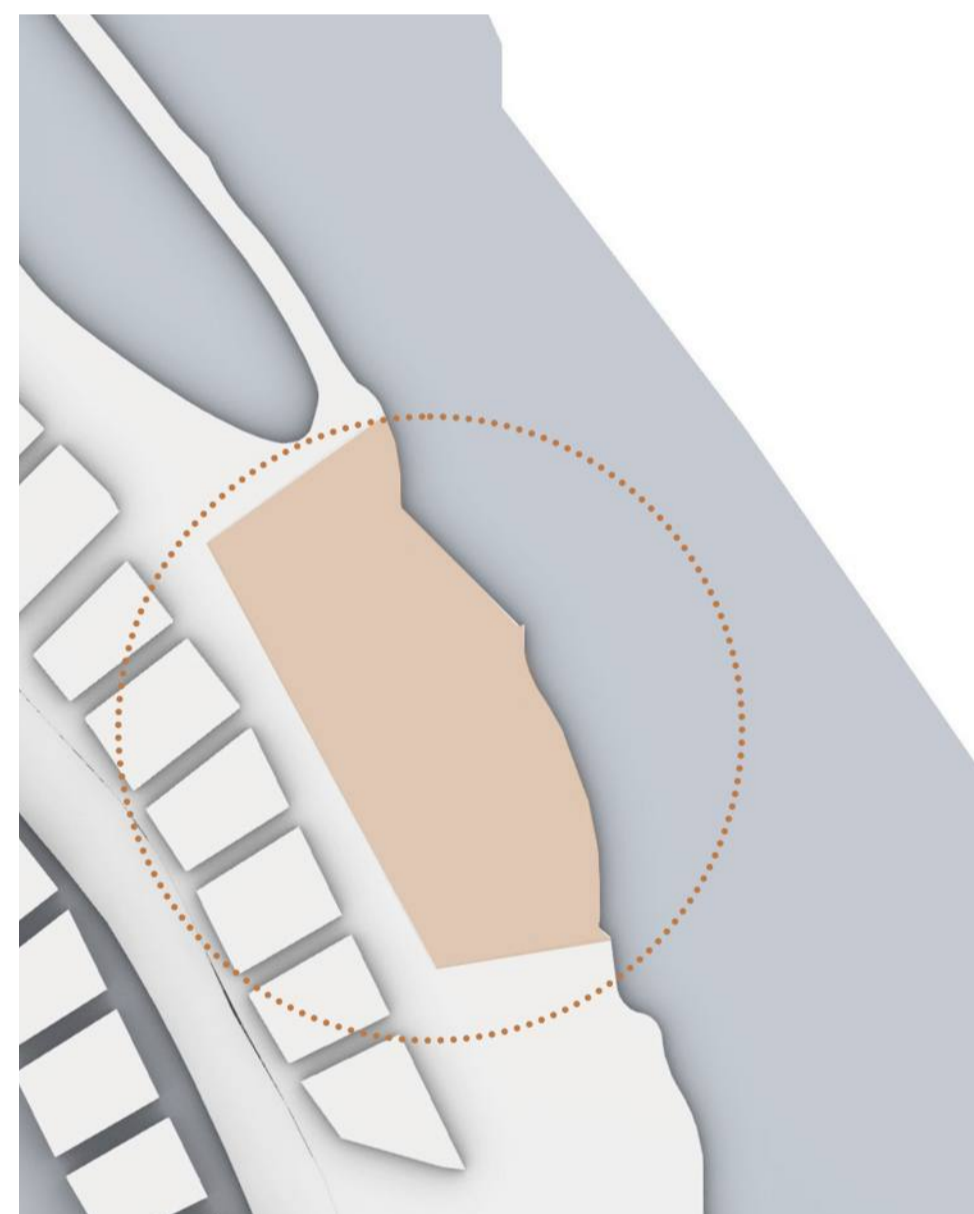


Upcoming Horus City

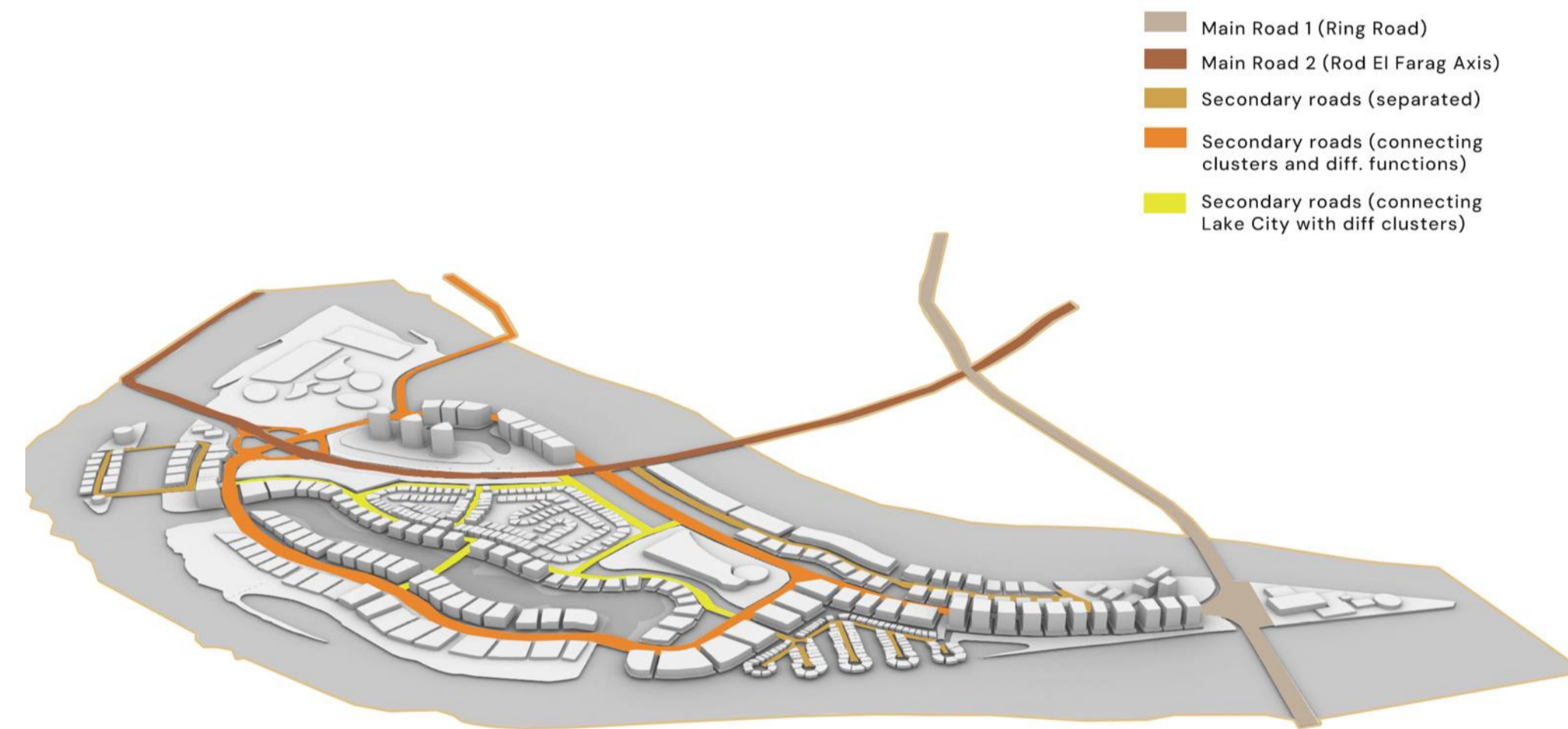


Horus City landuse for 2050

- Cairo Expo
- Main Destination (Horus City)
- Nile Marina
- Canal residential towers
- services
- Lake City
- Sky Scrapers
- Financial City
- The Towers
- Commercial Center
- Marina Front area
- Medical City



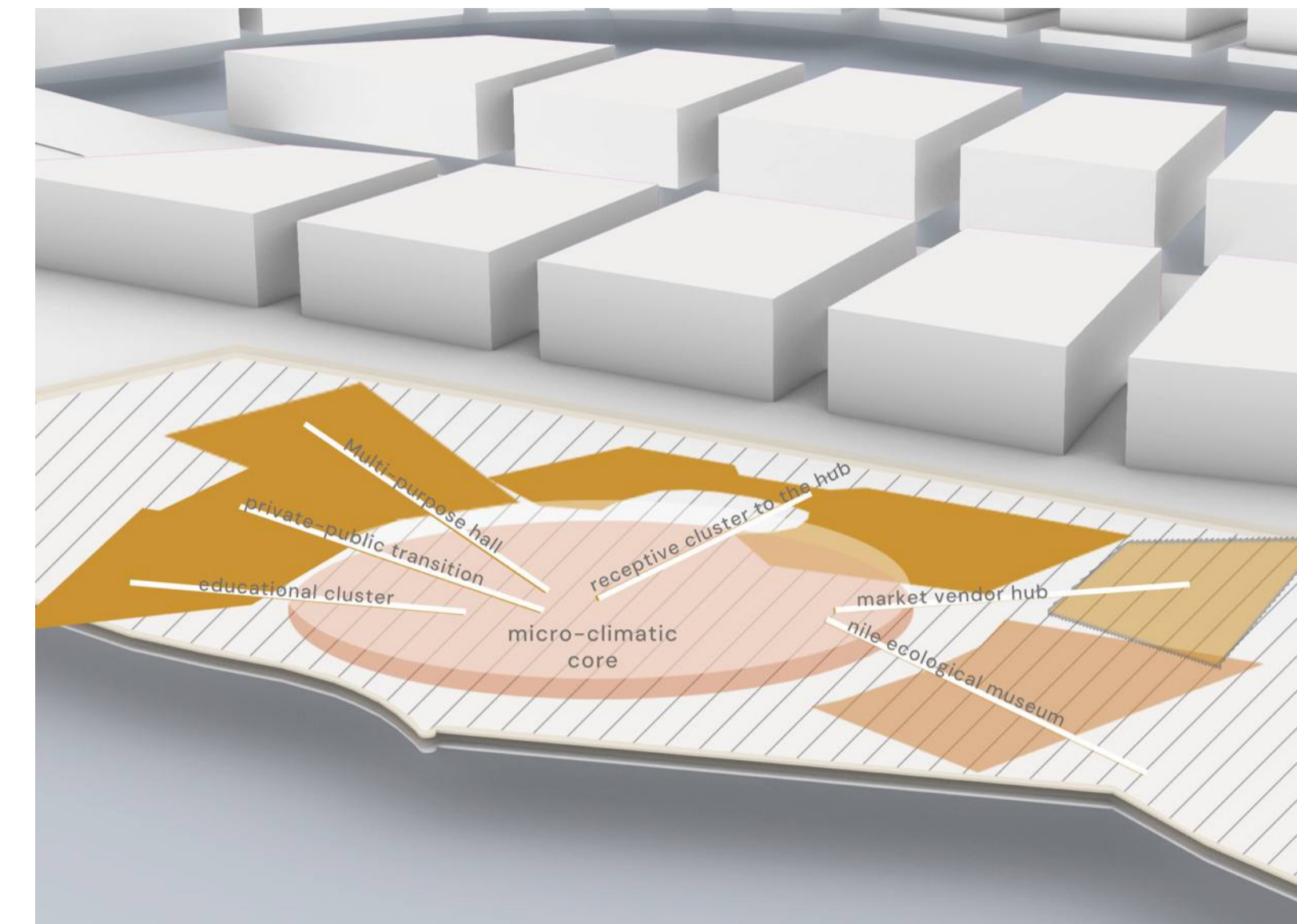
Project's Site location at the city's front



Horus City accessibility for 2050

- Main Road 1 (Ring Road)
- Main Road 2 (Rod El Farag Axis)
- Secondary roads (separated)
- Secondary roads (connecting clusters and diff. functions)
- Secondary roads (connecting Lake City with diff clusters)

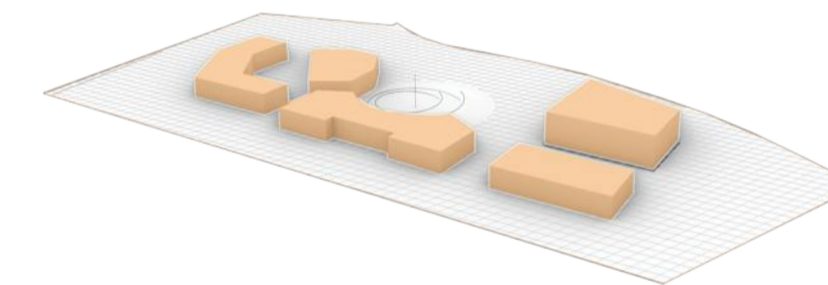
# Design Approach



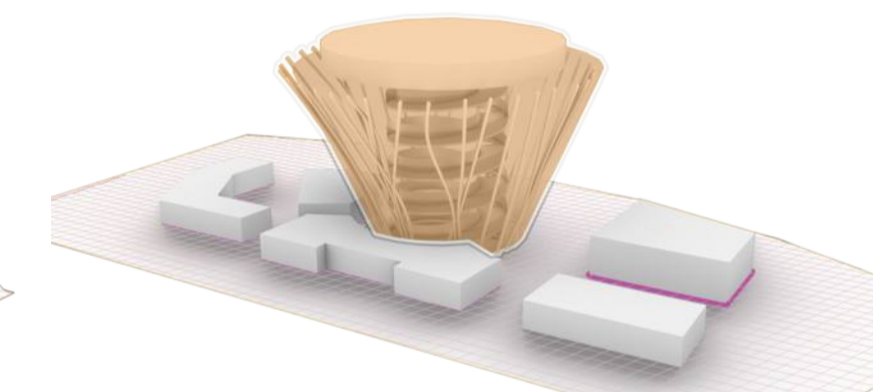
The design approach focuses on co-existing ecological processes, community life in Warrag Island, and cultural and sociological aspects, where an **Ecological Civic Hub** acts as a mediator between Warrag Island's significance for the island's residents and the vision led by the government for **Horus City**. The building consists of 5 amenities/clusters connected by a micro-climatic mediator as the core element and circulation.

# Form Finding/Generation Stages

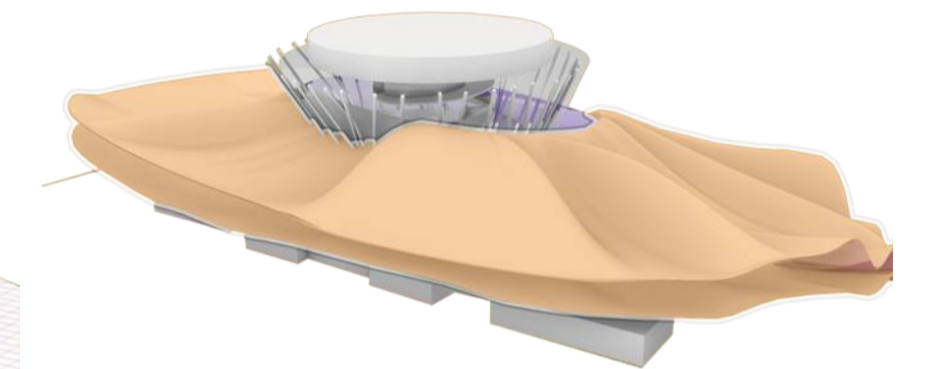
## Stage 1



structuring the 5 main clusters according to the design approach.

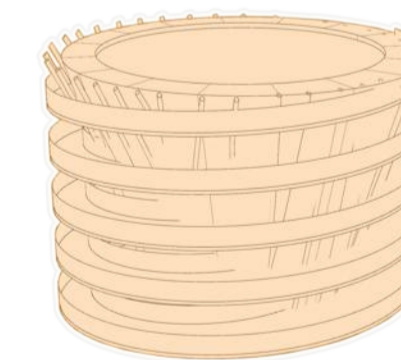


Designing the micro-climatic core as a glazed funnel atrium with rippled structure, indoor ramp and ring beam on the roof.

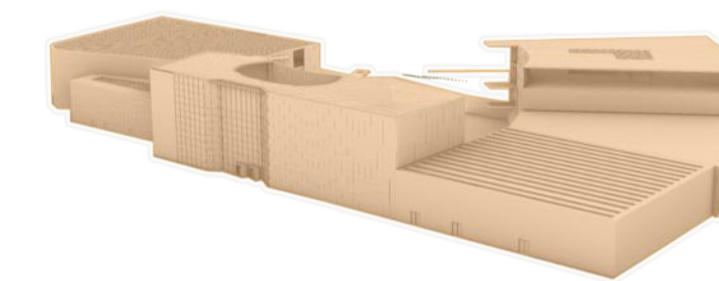


Adding organic roof as a trial for shading the building.

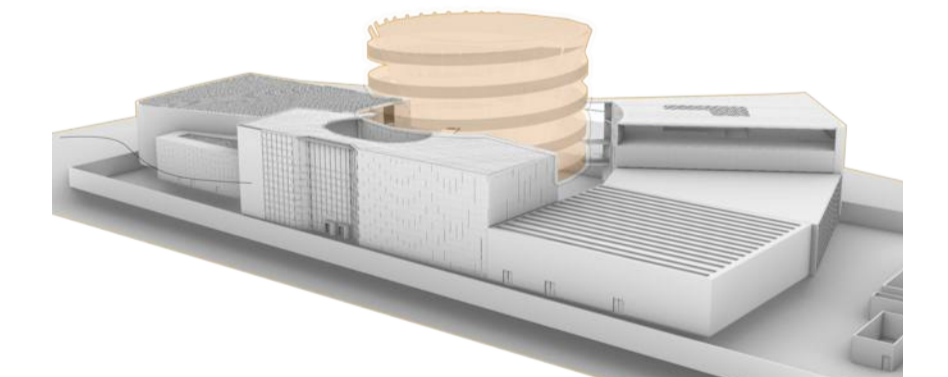
## Stage 2



Re-designing the core into a structured funnel atrium with outdoor ramp for experience.

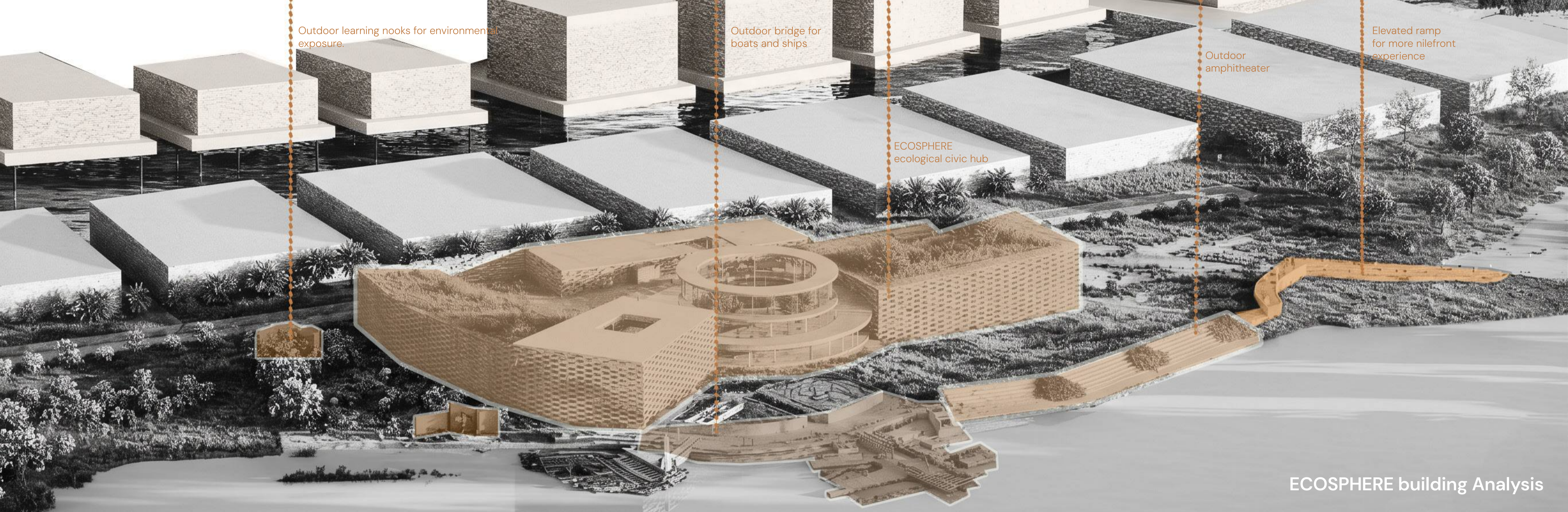


Connecting and re-designing the 5 amenities into one connected building.

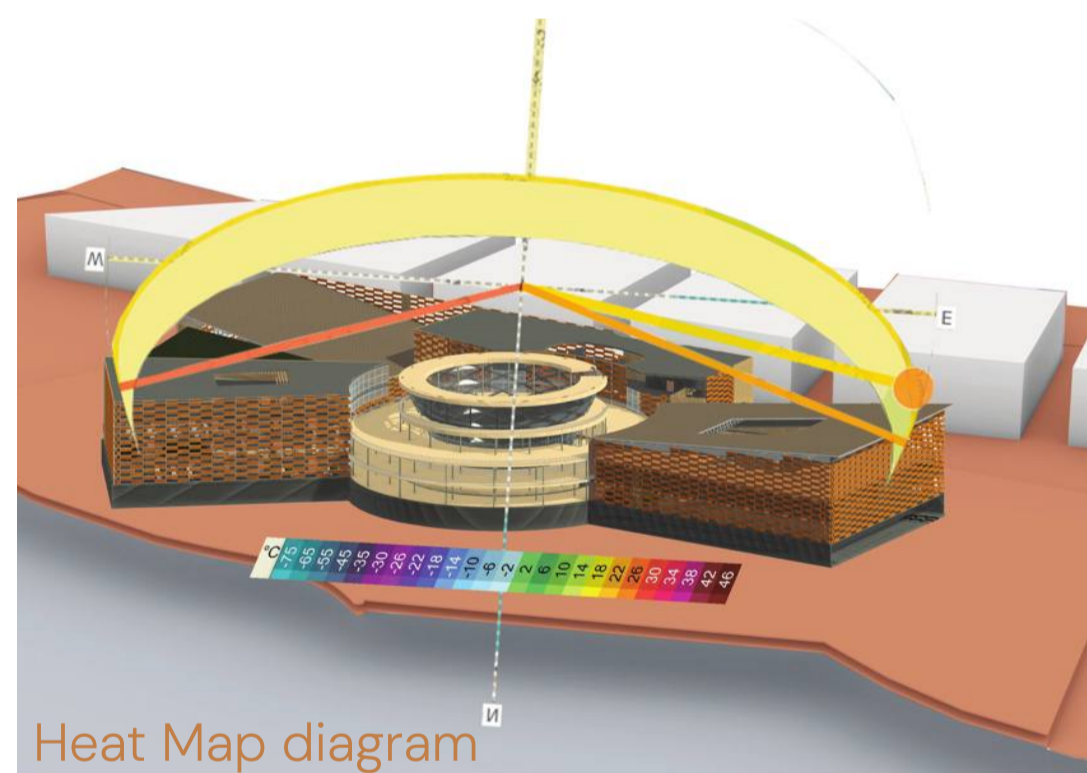


Integrating the core and building to form the ecological civic hub.

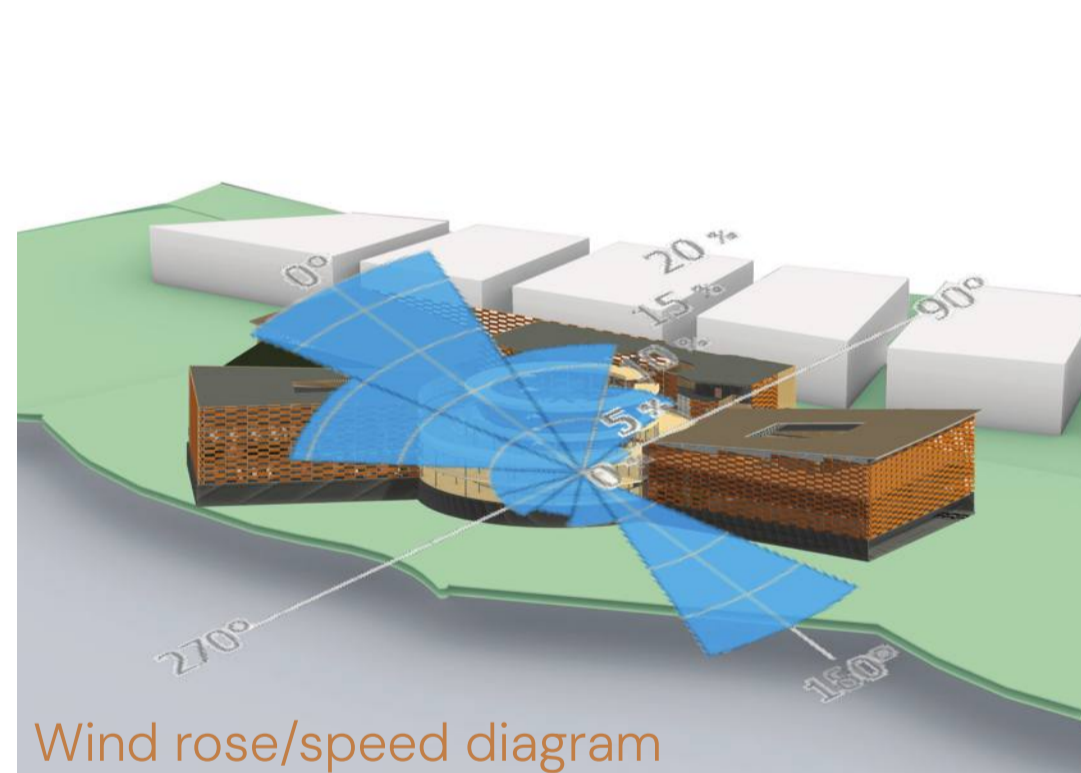




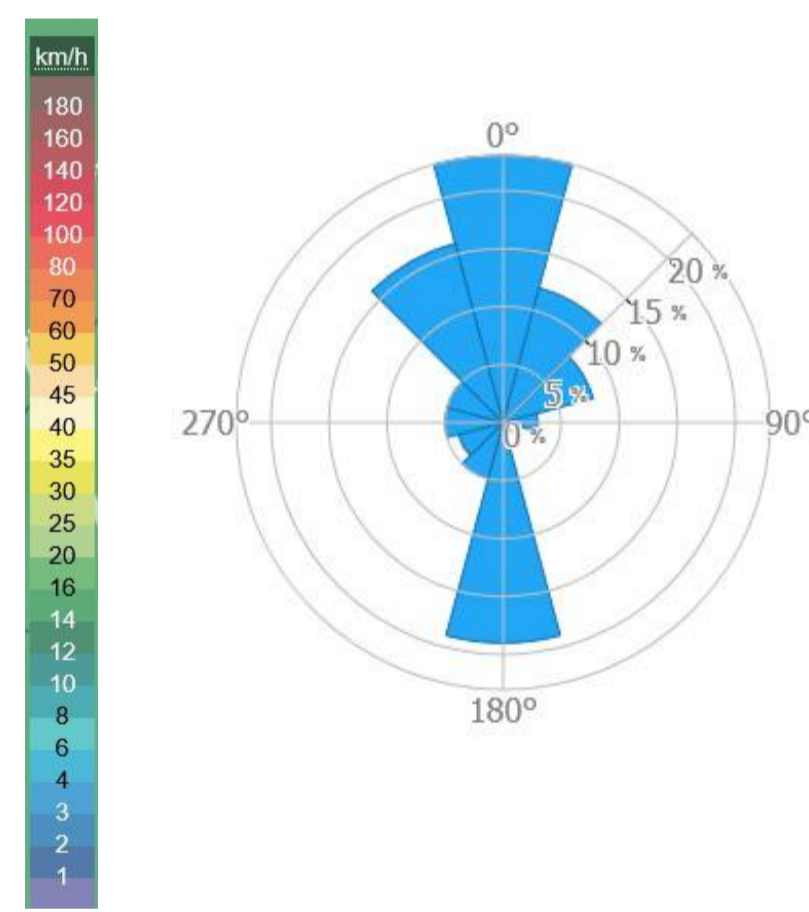
## Environmental Studies



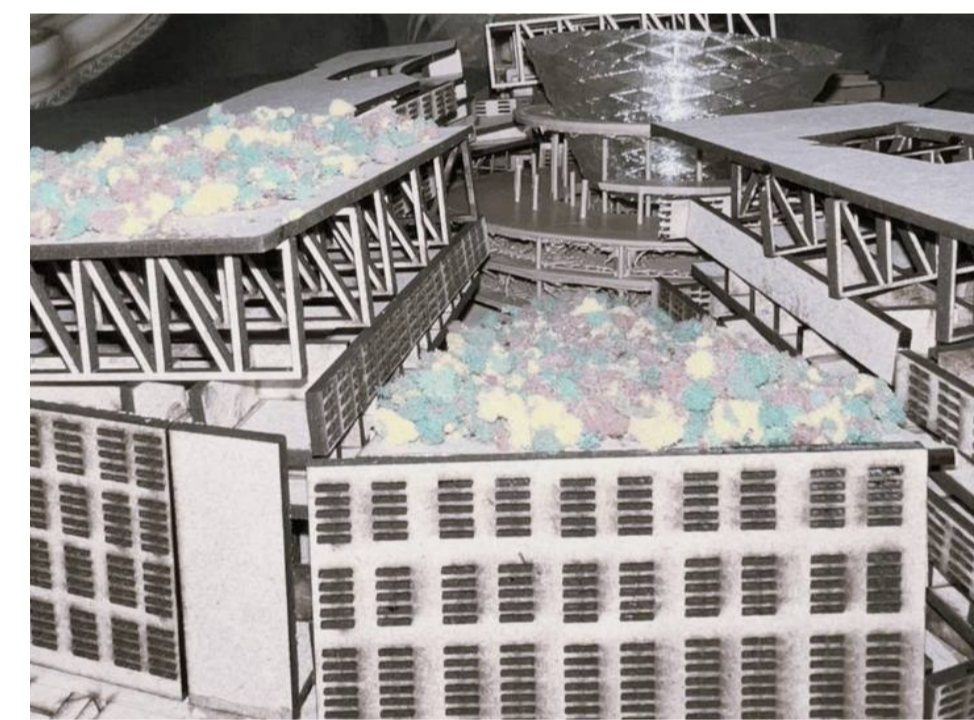
The heat map indicates that the average temperature in Warraq Island during summer ranges from 30-36 celsius degrees.



The windrose indicates that the average wind speed in Warraq Island ranges from 20-25 kilometer/hour.

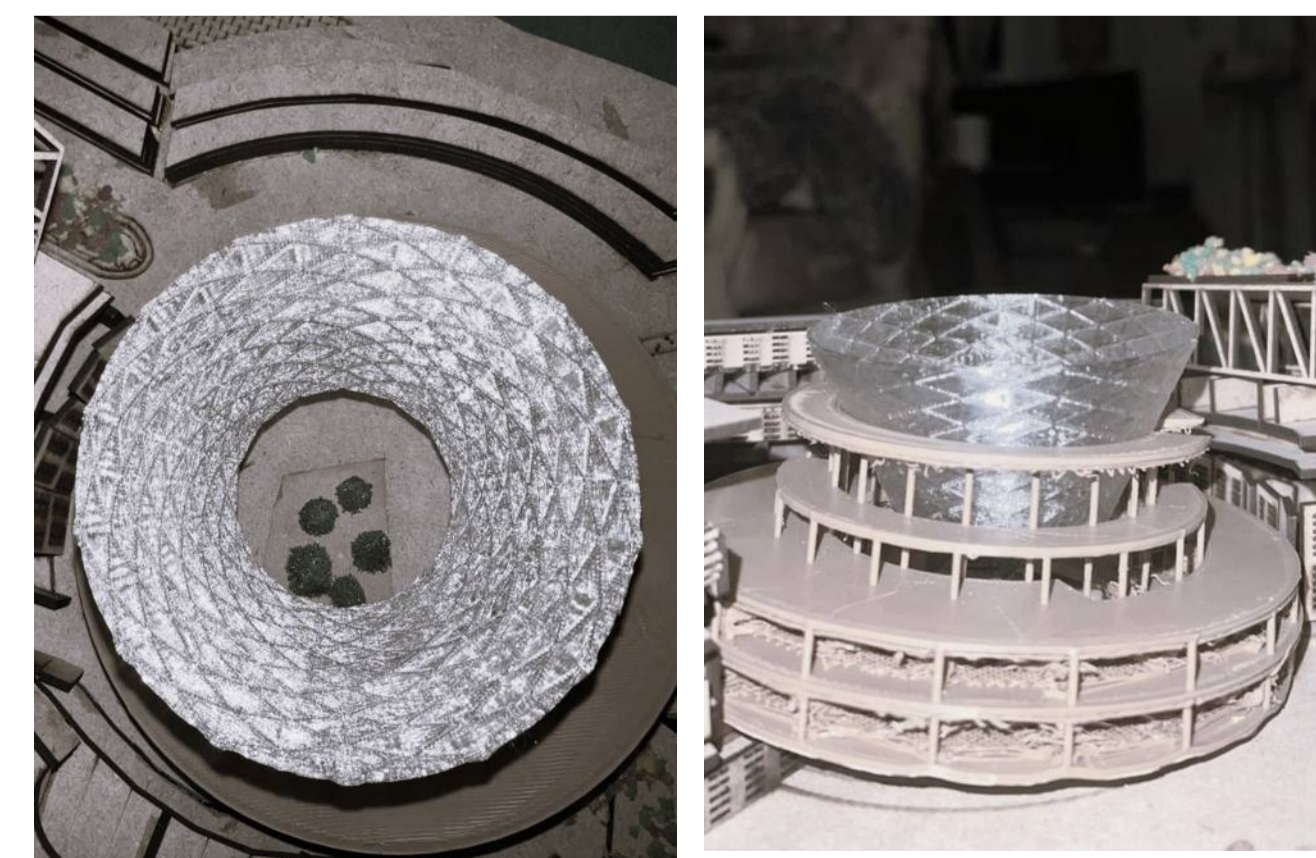
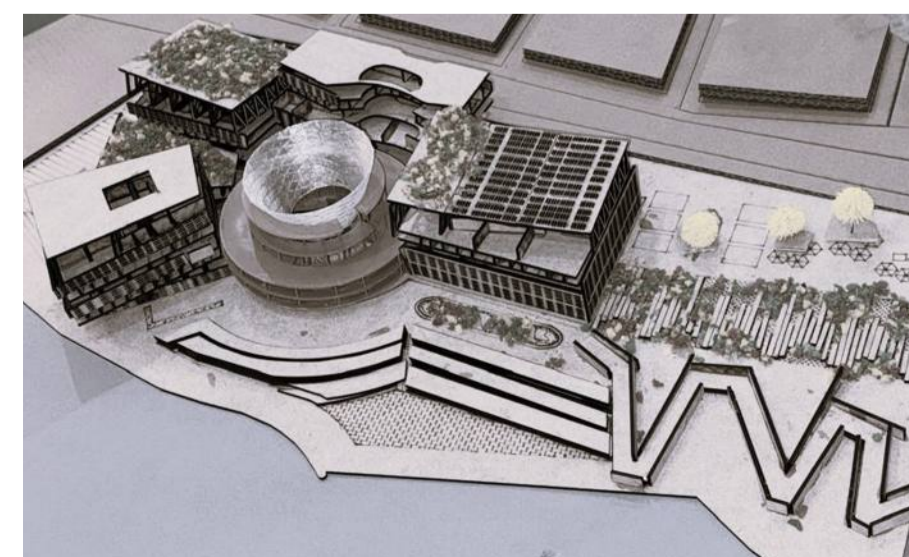
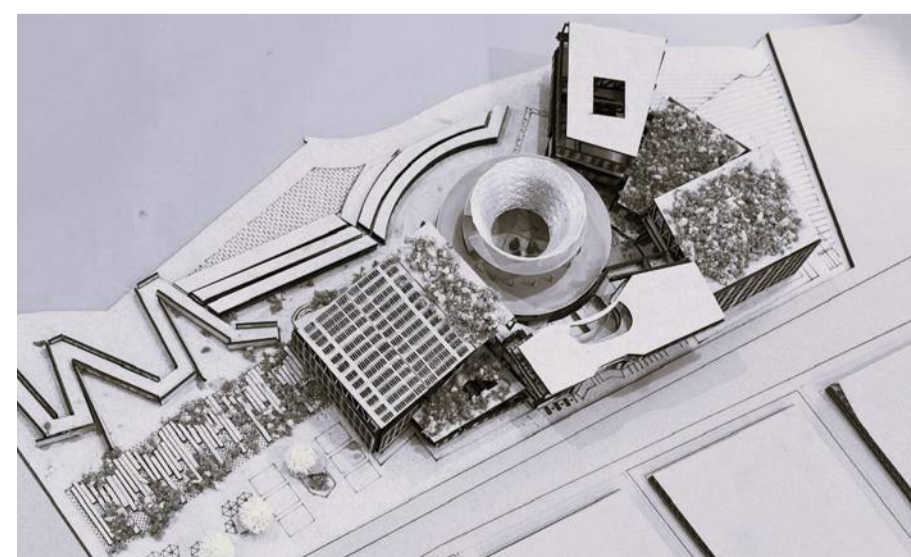
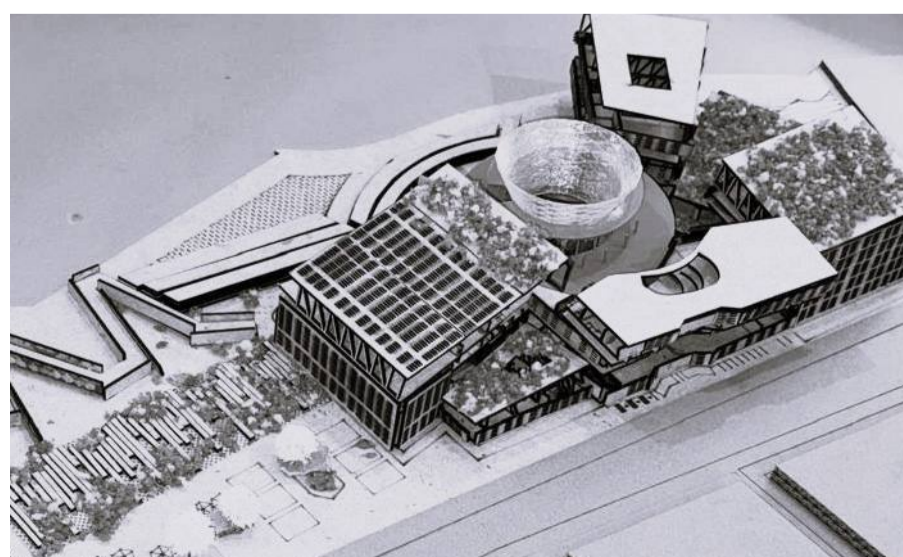


## Physical Model Details



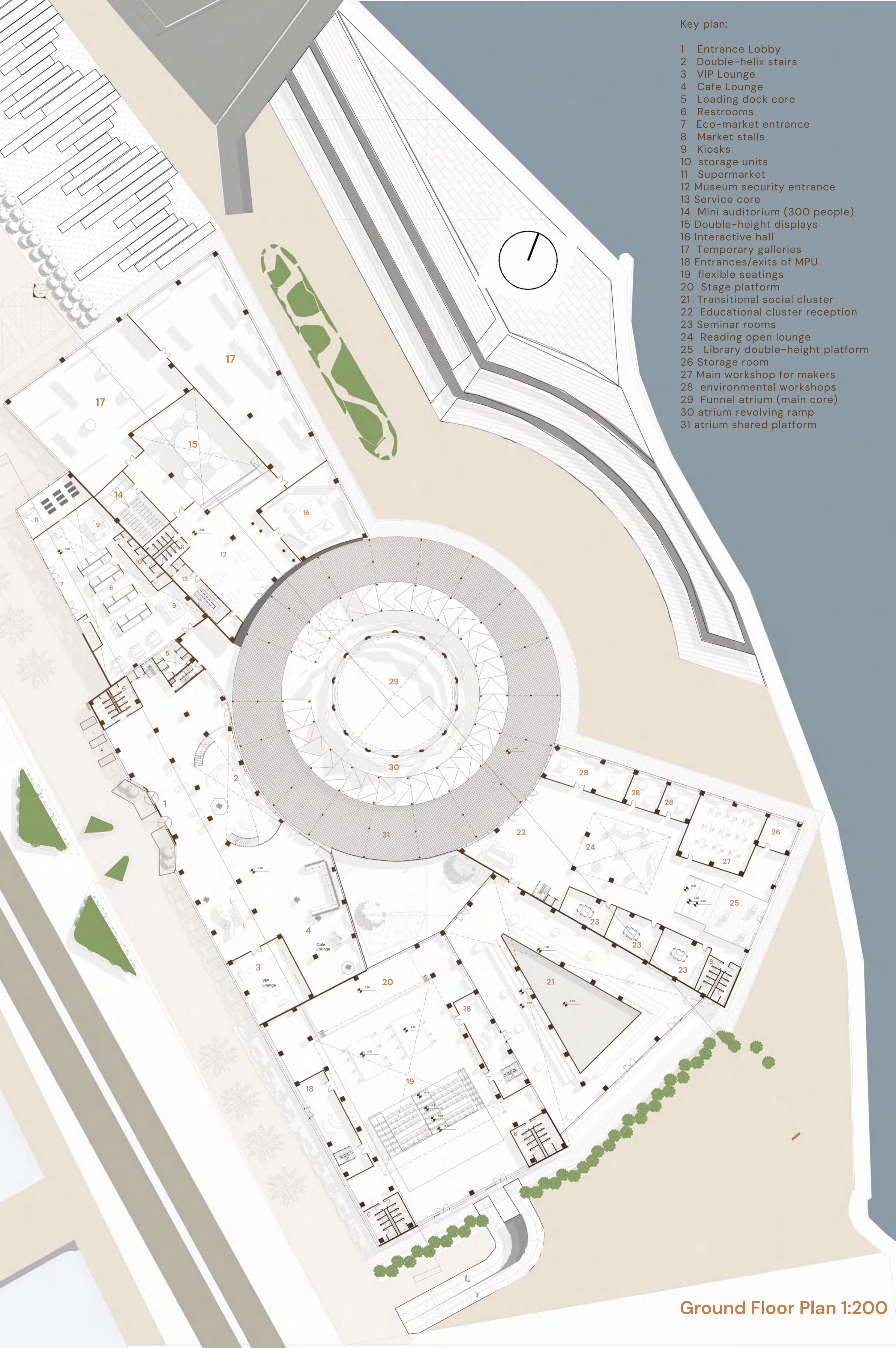
Pratt truss system and green roof system integrated within the roof's structure.

## Physical Model



Funnel atrium with ramp platforms details

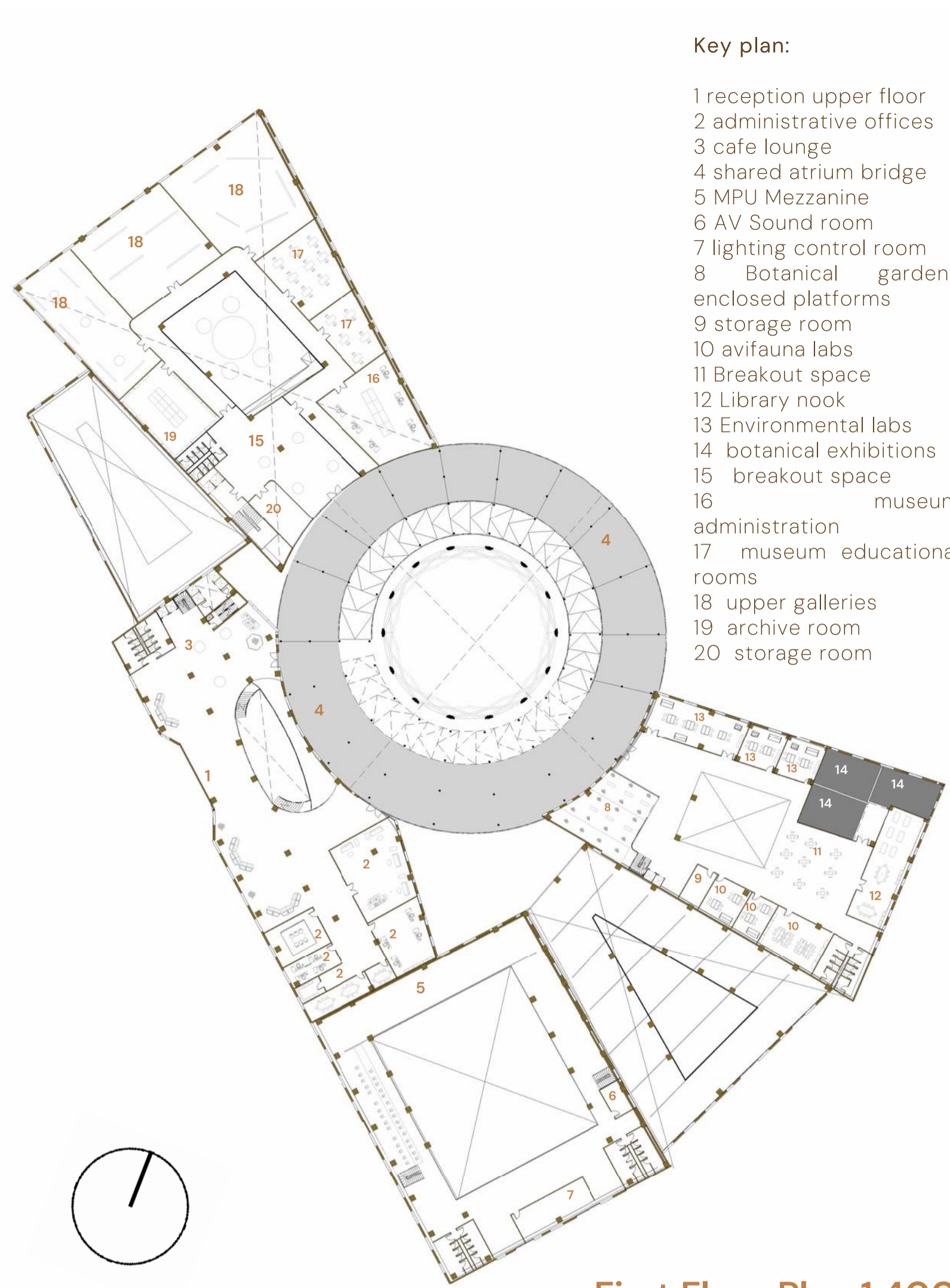




Key plan:

- 1 Entrance Lobby
- 2 Double-helix stairs
- 3 VIP Lounge
- 4 Cafe Lounge
- 5 Loading dock core
- 6 Restrooms
- 7 Eco-market entrance
- 8 Market stalls
- 9 Kiosks
- 10 storage units
- 11 Supermarket
- 12 Museum security entrance
- 13 Service core
- 14 Mini auditorium (300 people)
- 15 Double-height displays
- 16 Interactive hall
- 17 Temporary galleries
- 18 Entrances/exits of MPU
- 19 flexible seatings
- 20 Stage platform
- 21 Transitional social cluster
- 22 Educational cluster reception
- 23 Seminar rooms
- 24 Reading open lounge
- 25 Library double-height platform
- 26 Storage room
- 27 Main workshop for makers
- 28 environmental workshops
- 29 Funnel atrium (main core)
- 30 atrium revolving ramp
- 31 atrium shared platform

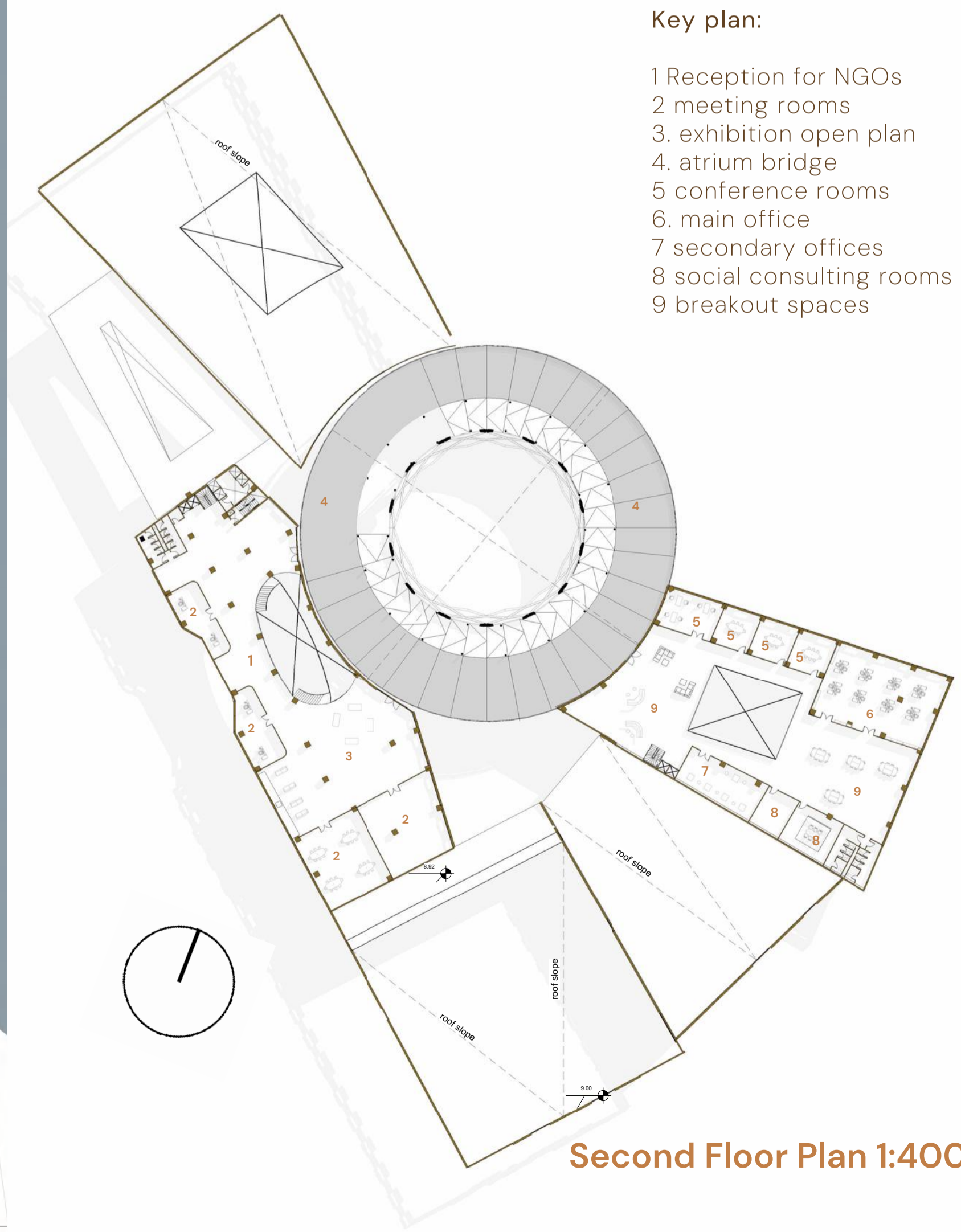
Ground Floor Plan 1:200



Key plan:

- 1 reception upper floor
- 2 administrative offices
- 3 cafe lounge
- 4 shared atrium bridge
- 5 MPU Mezzanine
- 6 AV Sound room
- 7 lighting control room
- 8 Botanical gardens enclosed platforms
- 9 storage room
- 10 avifauna labs
- 11 Breakout space
- 12 Library nook
- 13 Environmental labs
- 14 botanical exhibitions
- 15 breakout space
- 16 administration museum
- 17 museum educational rooms
- 18 upper galleries
- 19 archive room
- 20 storage room

First Floor Plan 1:400

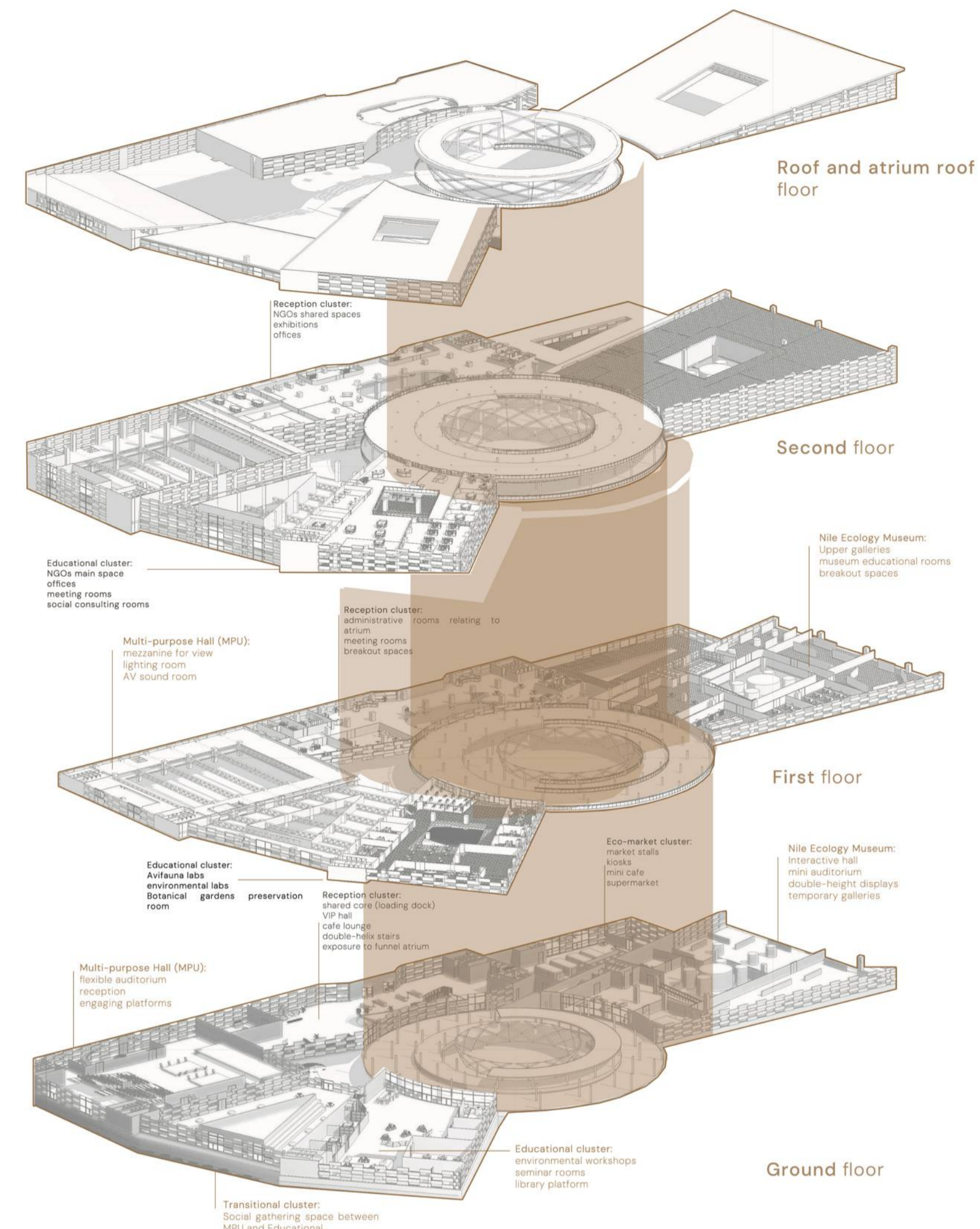


Key plan:

- 1 Reception for NGOs
- 2 meeting rooms
3. exhibition open plan
4. atrium bridge
- 5 conference rooms
6. main office
- 7 secondary offices
- 8 social consulting rooms
- 9 breakout spaces

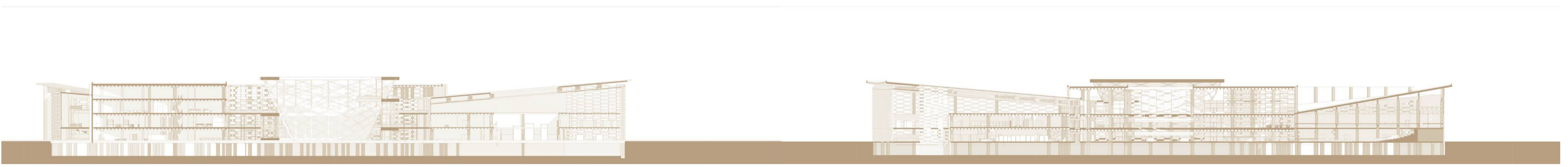
Second Floor Plan 1:400





Nilefront Elevation 1:200

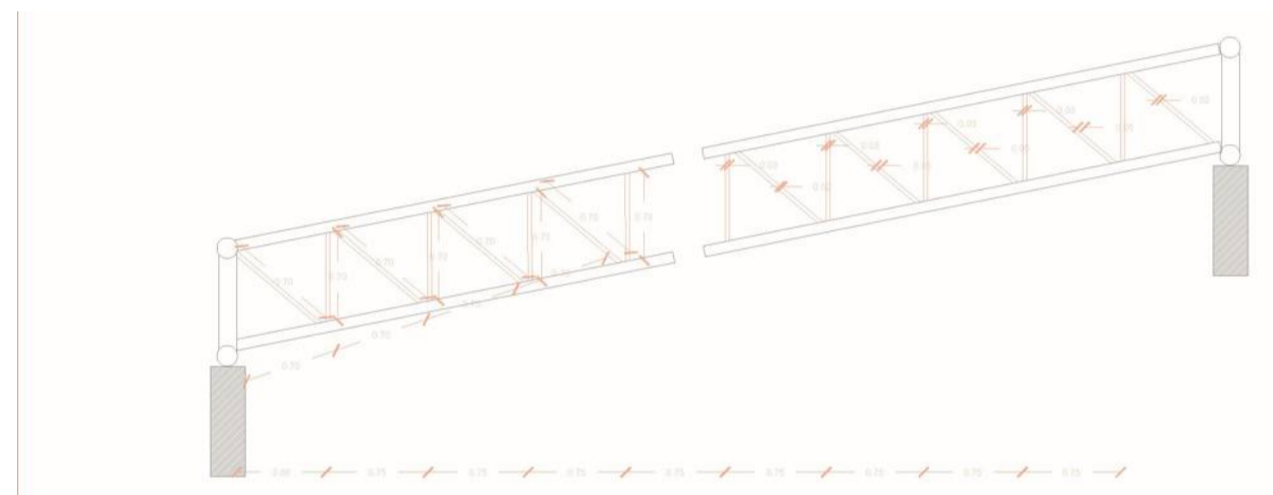
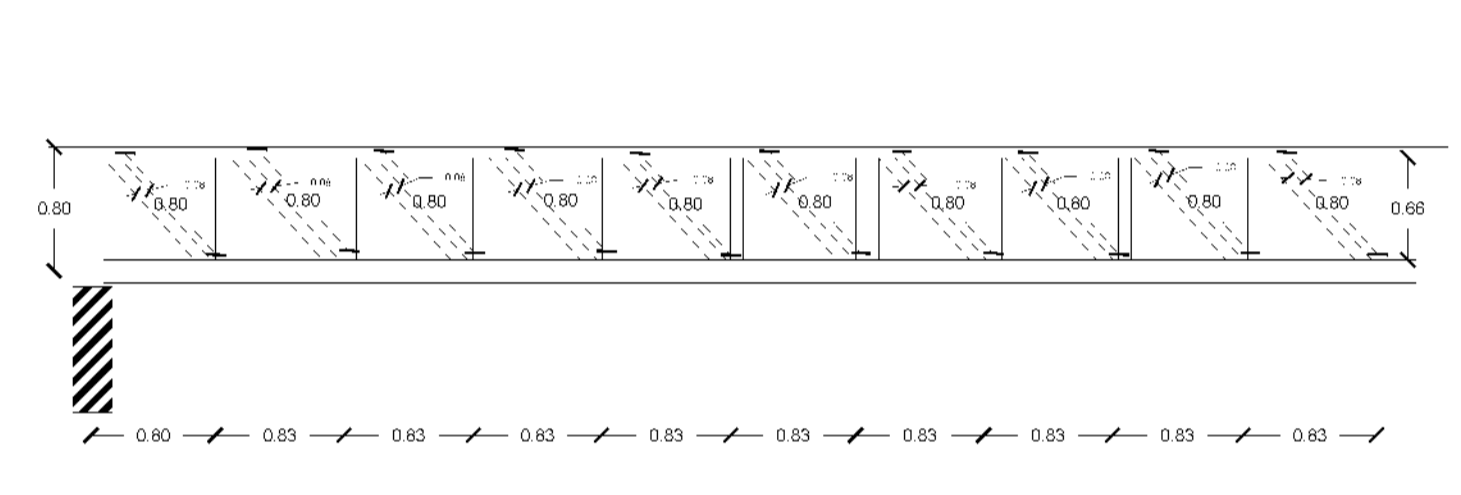
Street Elevation 1:200



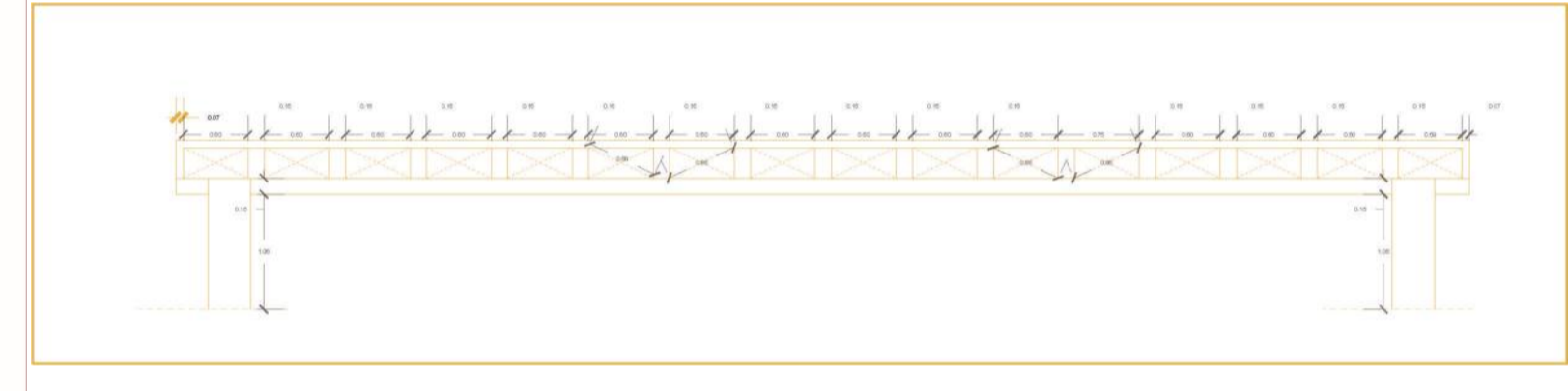
Section A-A 1:200

Section B-B 1:200

Structural Details

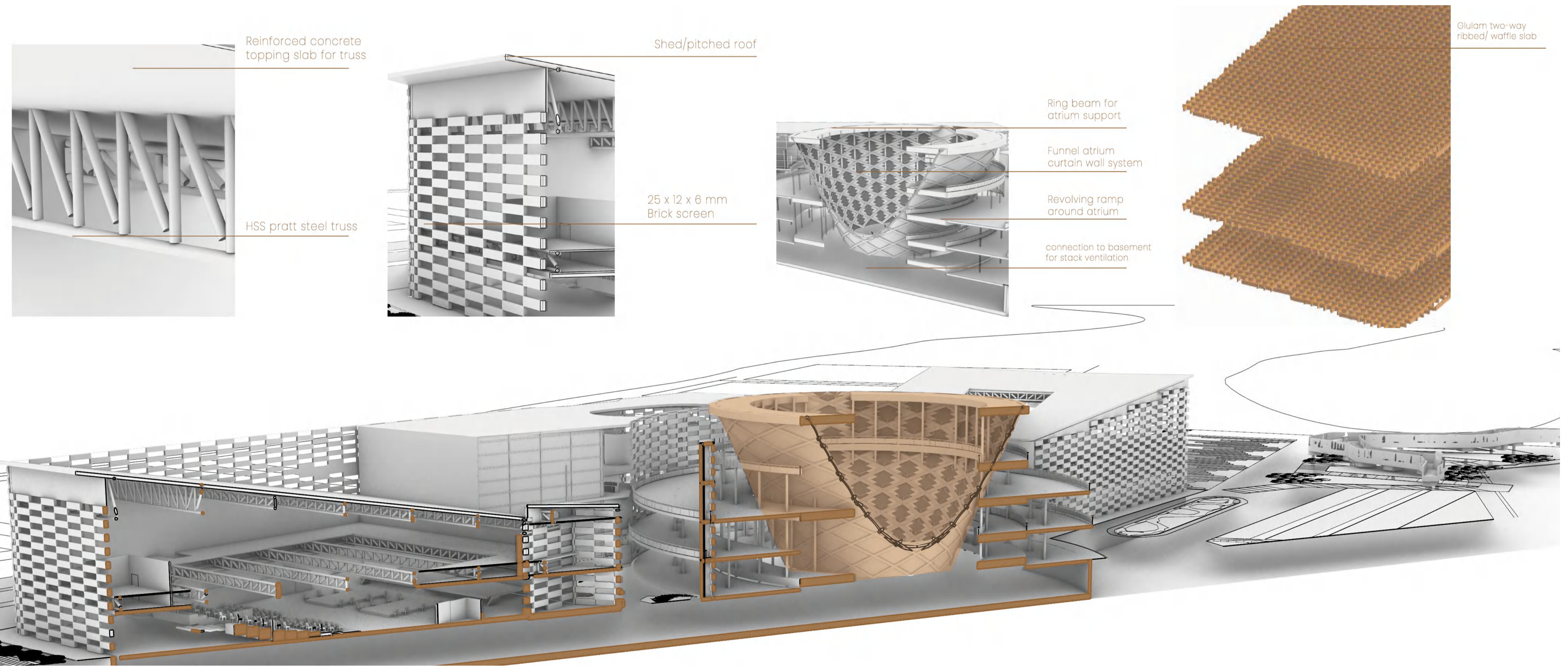


Pratt Truss Details

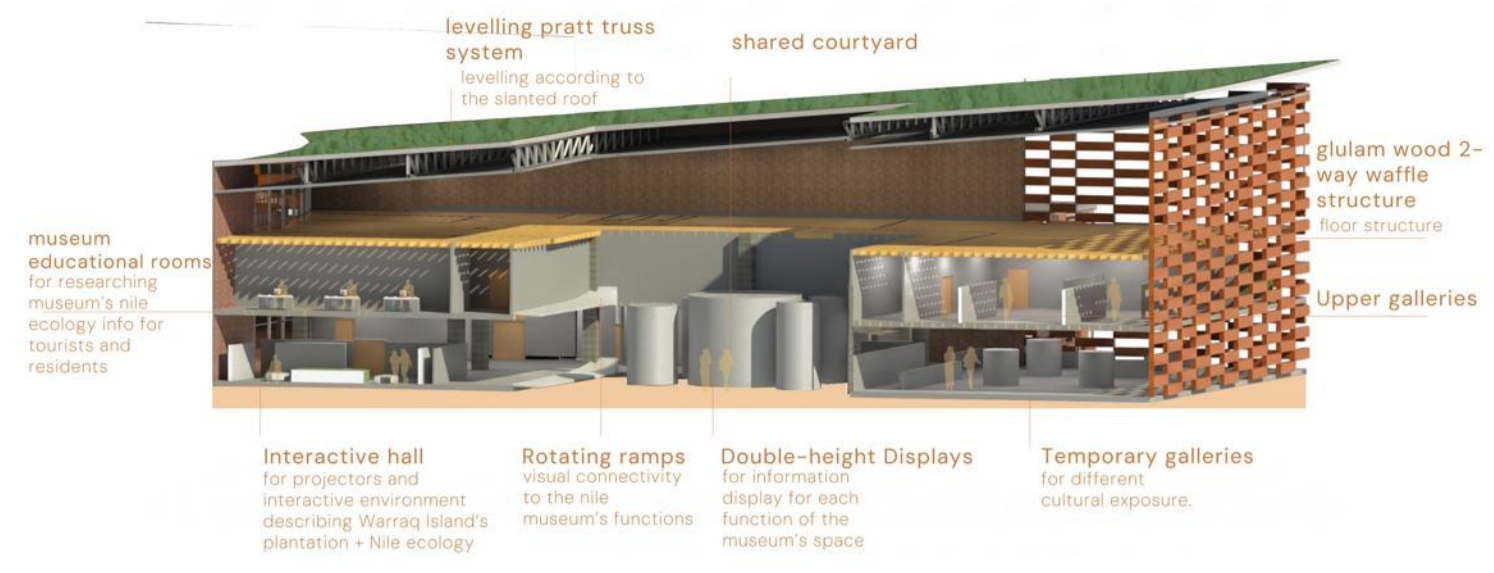


Two-way Waffle (ribbed) Slab Details

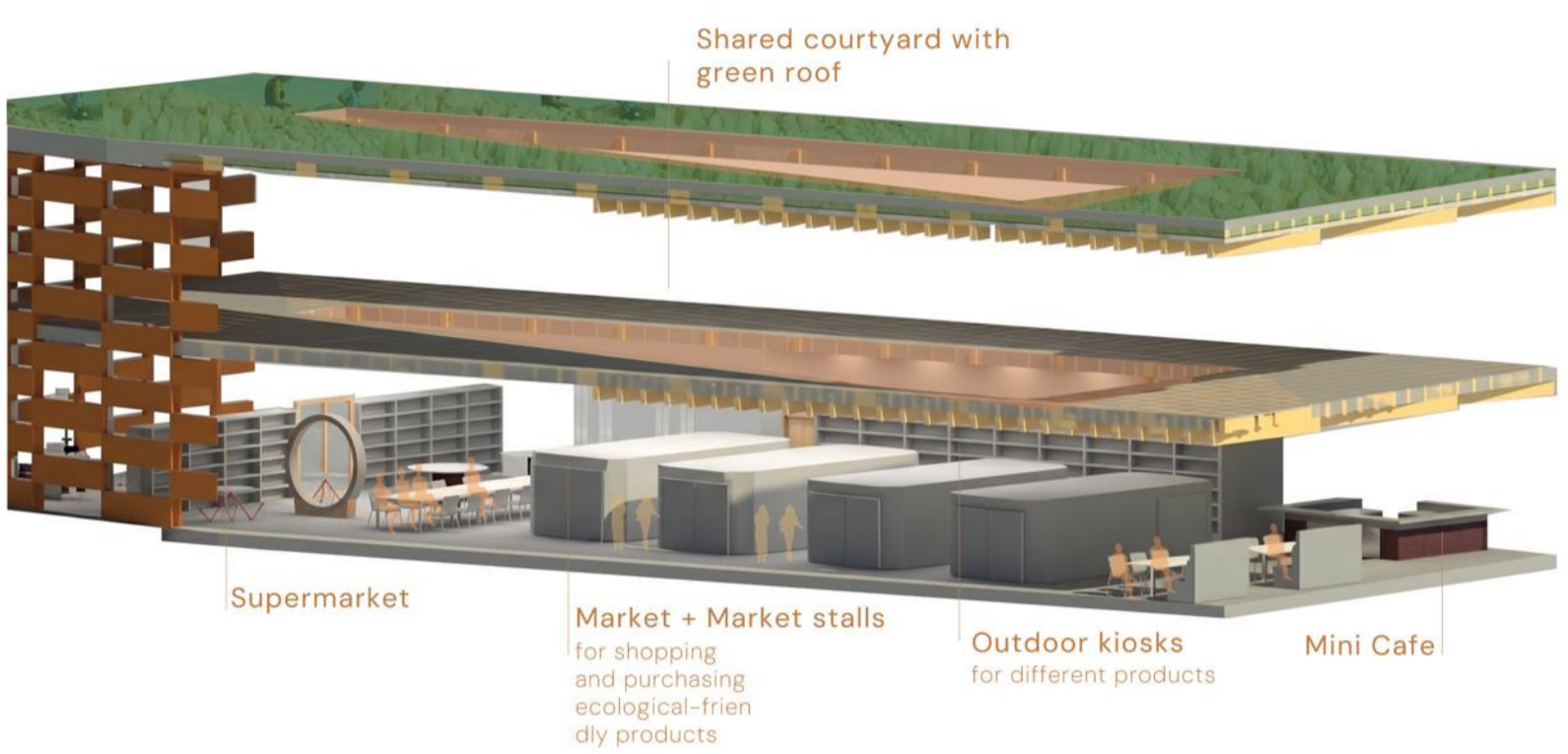
Zoning exploded axonometric



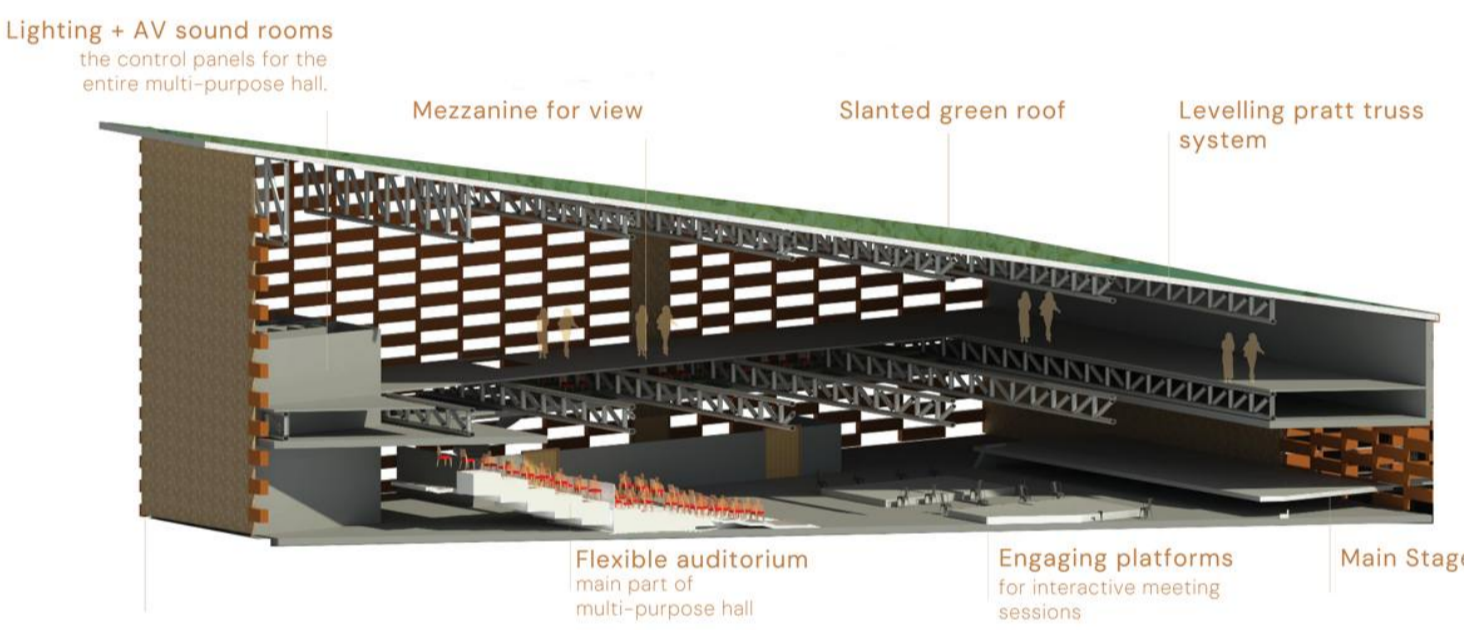
3D section facade



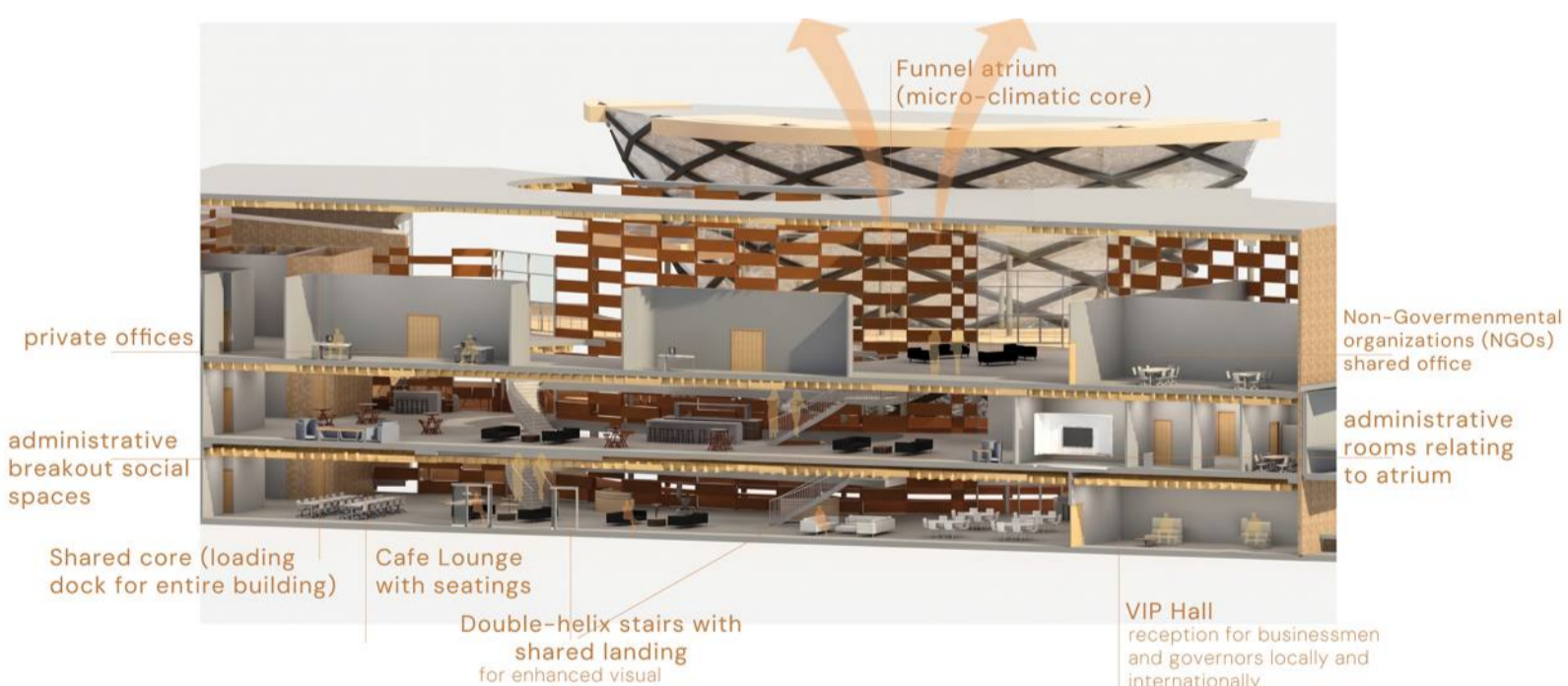
**Ecological Nile Museum details**



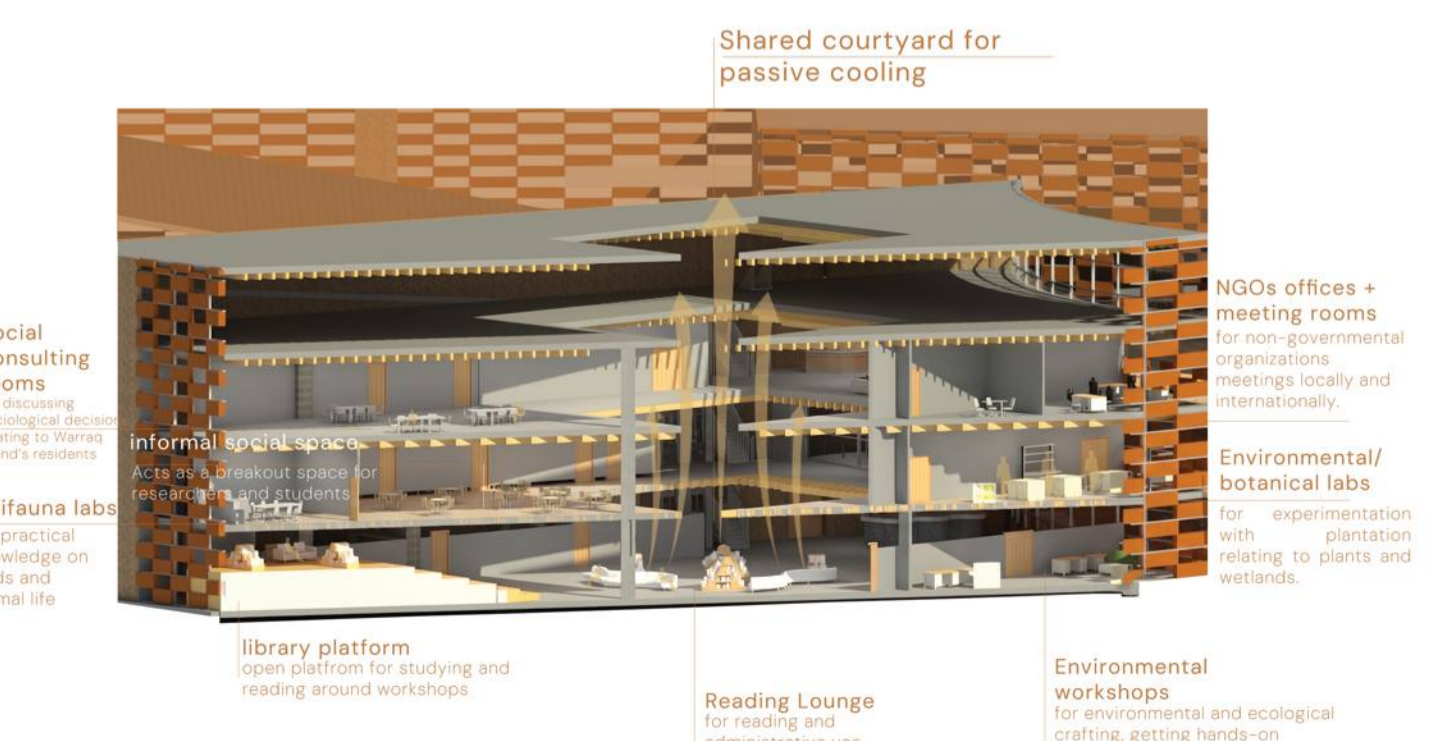
**Ecological Market details**



**Multi-purpose Hall details**

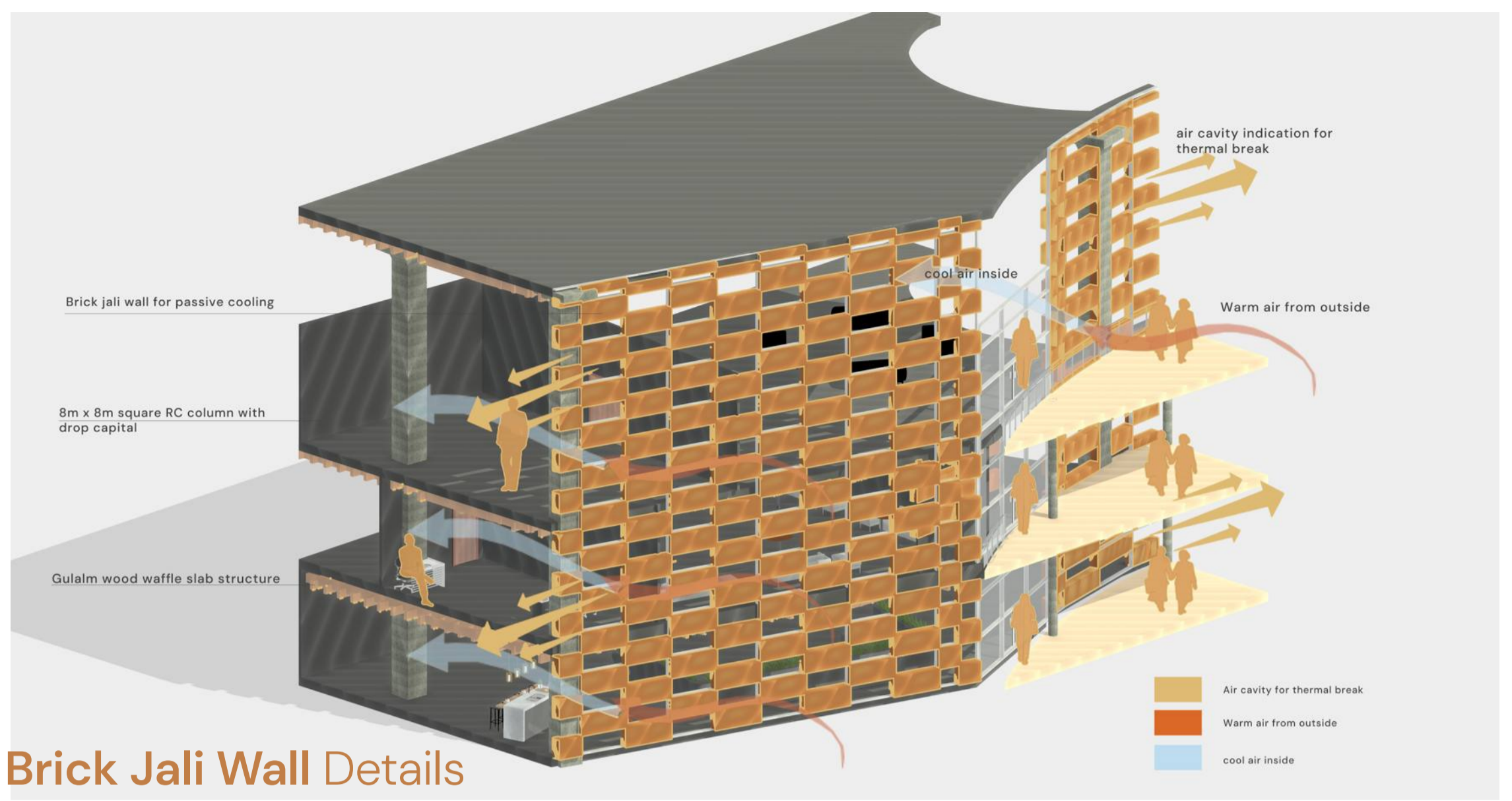


**Reception cluster details**



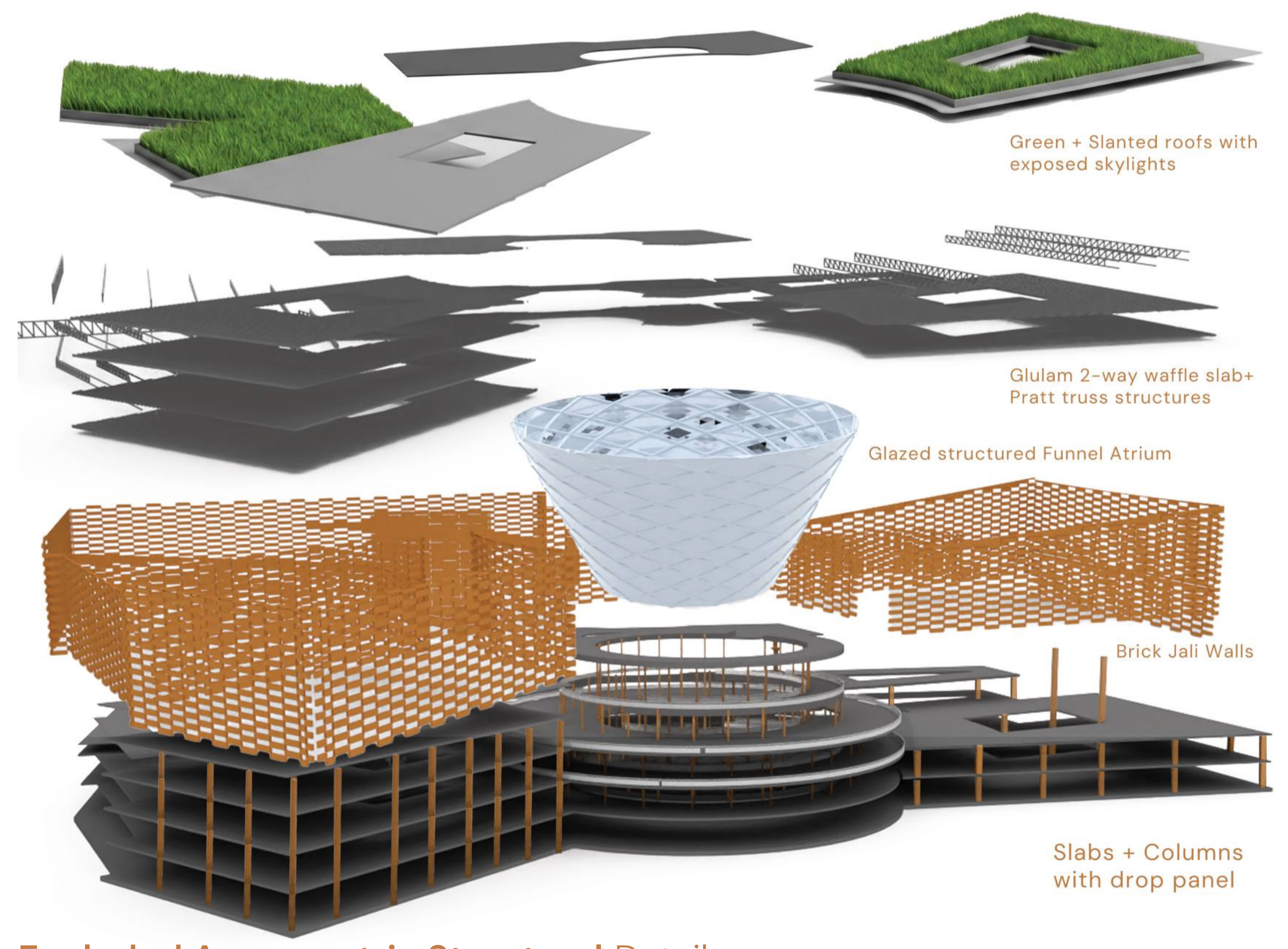
**Educational and NGOs cluster details**

**3D Structural Details**



**Brick Jali Wall Details**

The brick jali wall serves as a passive cooling element by reducing direct solar heat gain while allowing continuous natural airflow through its perforated structure. Acting as a breathable environmental filter, it enhances cross-ventilation, supports air circulation within the atrium, and contributes to lower indoor temperatures without mechanical intervention. The filtered daylight and improved airflow create a comfortable microclimate, reducing cooling loads and improving thermal comfort while maintaining visual connectivity and cultural identity.

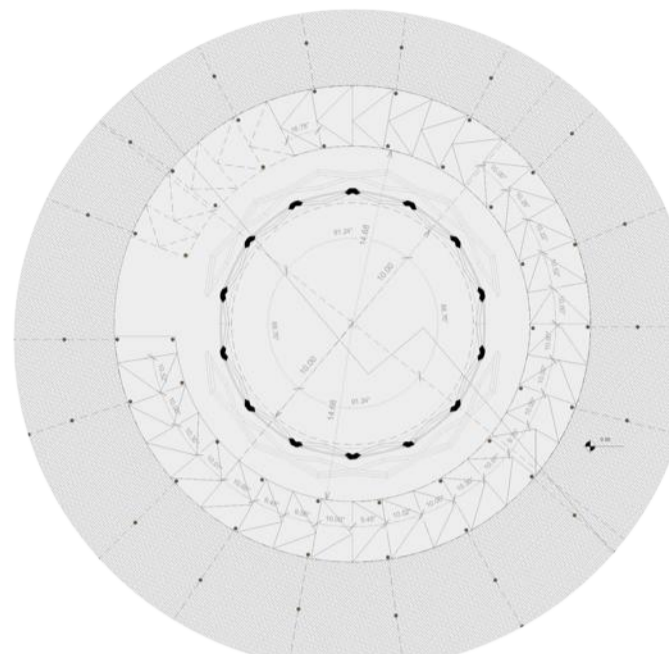


**Exploded Axonometric Structural Details**

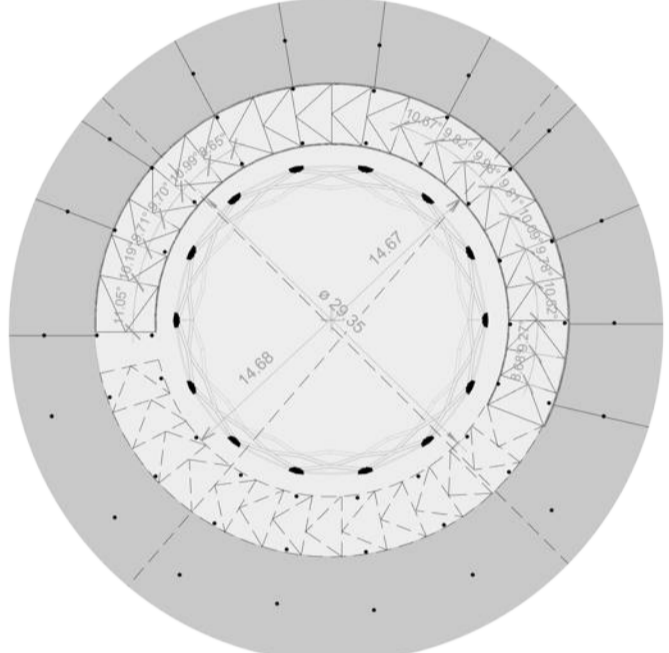


# Funnel Atrium details

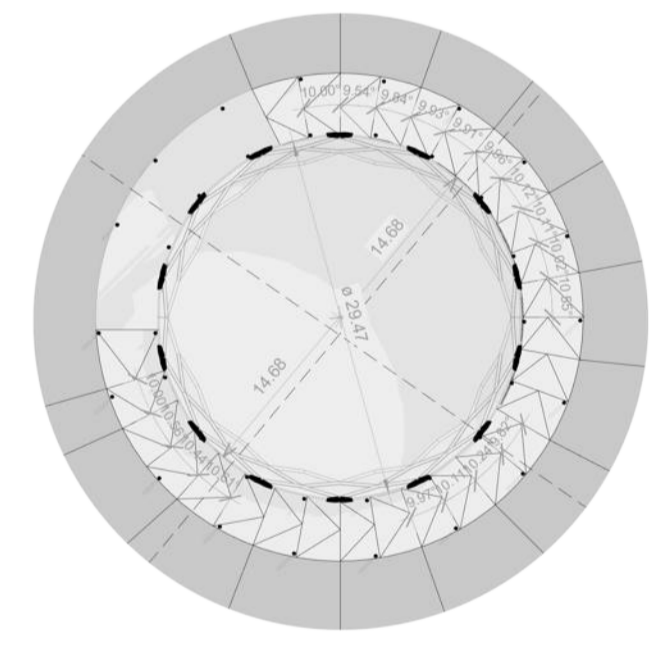
The configuration of a funnel atrium's top diameter, bottom diameter, and flare width dictates its efficiency as a **micro-climatic stack ventilation element** by balancing aerodynamic wind-capture with buoyancy-driven thermal exhaust. The outlet opening size (top diameter) is the **"most influential parameter"** affecting both indoor thermal conditions and ventilation behaviors, as it determines the building's ability to exhaust stagnant, warmed air.



Funnel Atrium (Ground Floor plan)

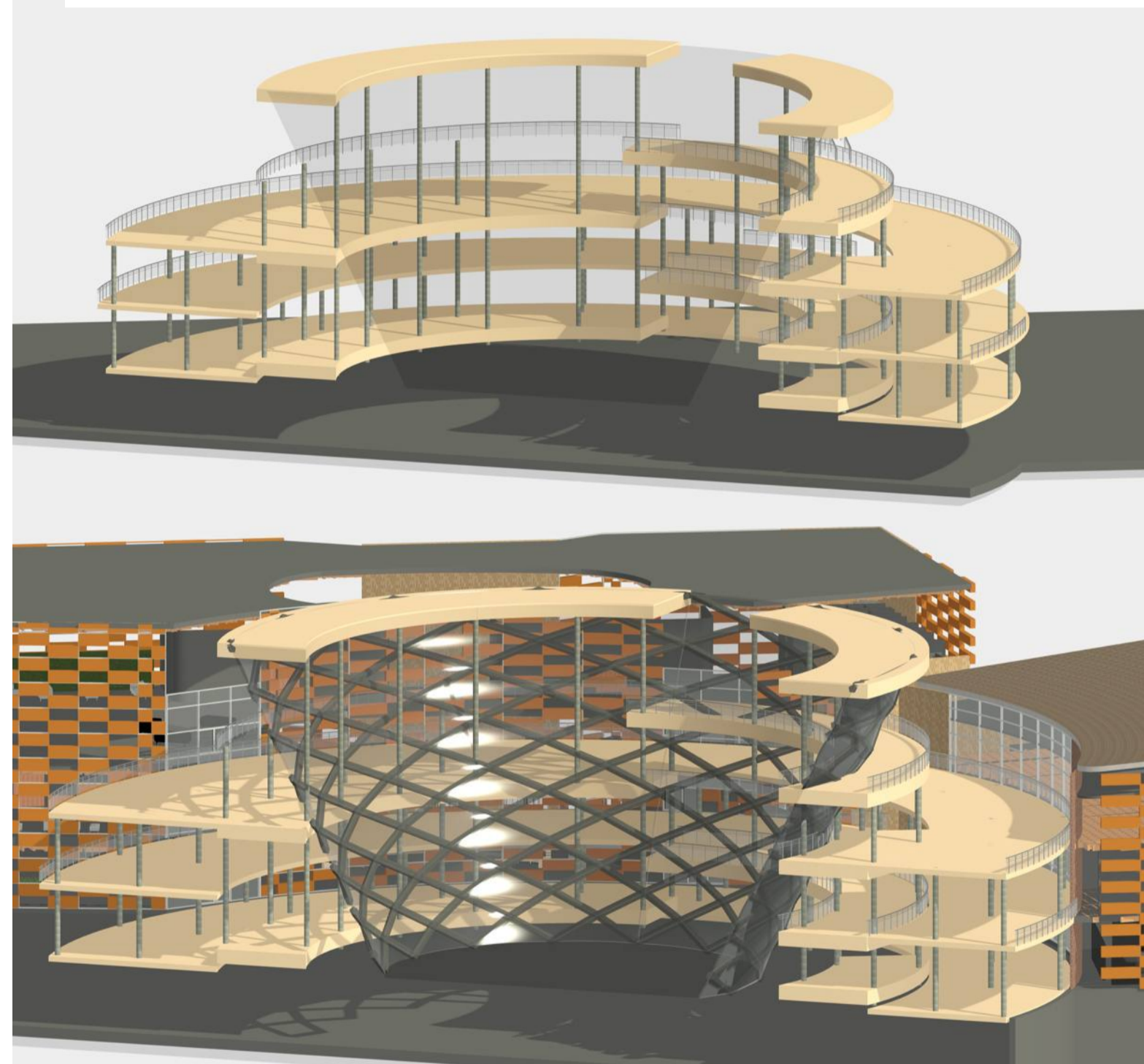


Funnel Atrium (First Floor plan)

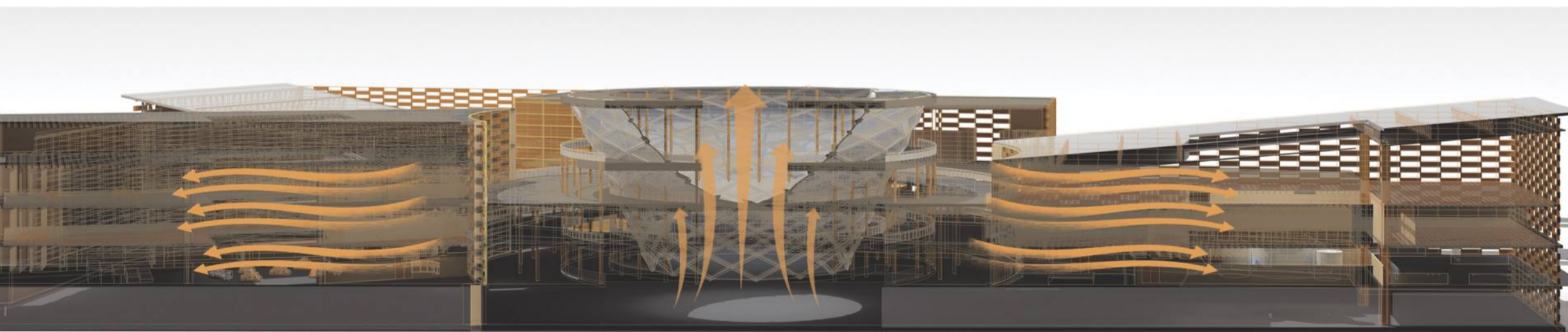


Funnel Atrium (Second Floor plan)

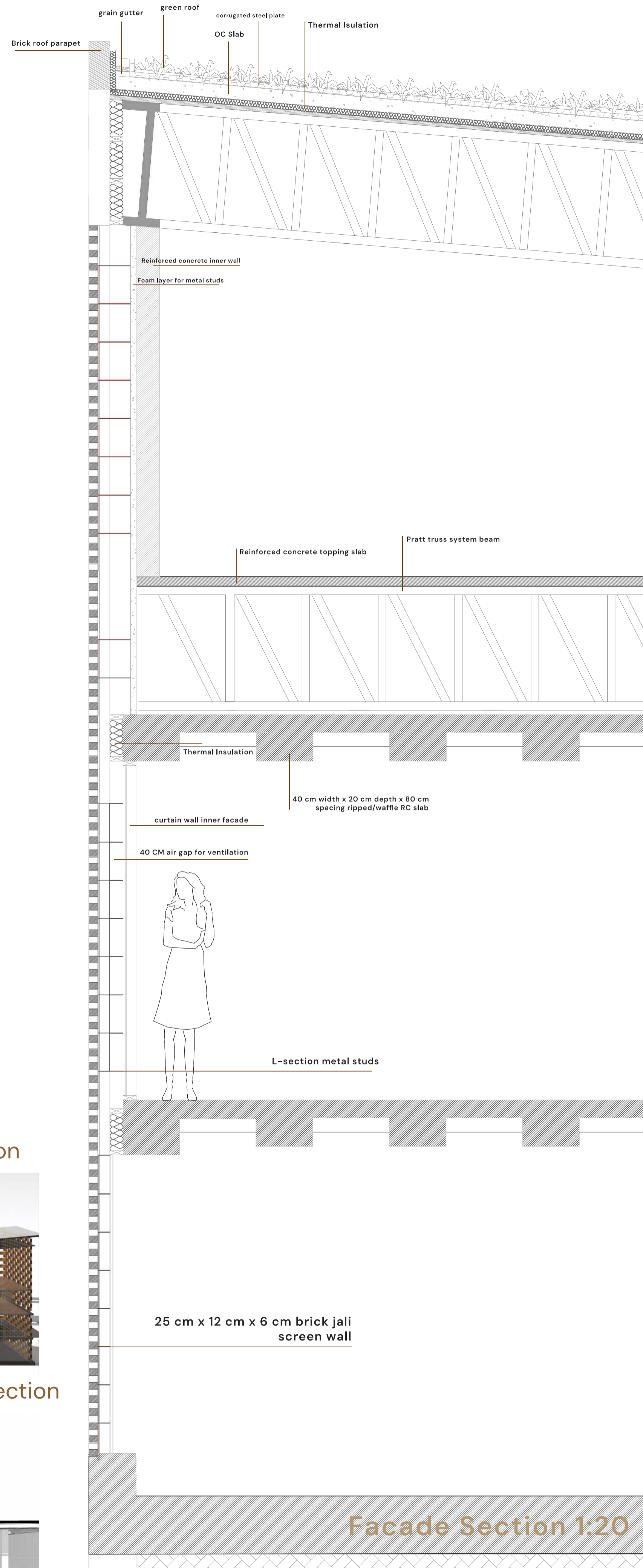
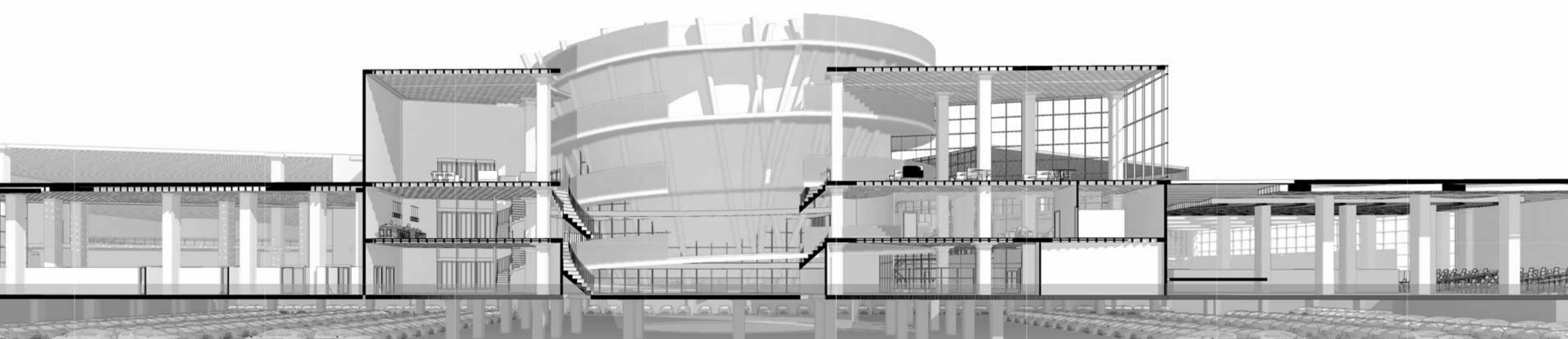
Dimension	Recommendation	Source Basis
Height	18.0 m	User Constraint
Bottom Diameter	14.0 m	Assadi et al. (via Moosavi 1) optimal diameter for naturally ventilated institutional buildings.
Top Diameter	16.4 m	Varela-Boydo et al. 4 optimal aerodynamic expansion ratio (1.375x).
Flare Expansion	+37.5% Area	Varela-Boydo et al. 3 max efficiency finding.



Funnel Atrium development 3D section



Stack Ventilation Airflow perspective section



Facade Section 1:20

Section Facade 1:20



Outdoor Brick Jali wall view













