

HYOSIK KIM

Nest for the Future

Exploring housing design to improve the living conditions of impoverished children in flood-prone area of Sylhet city, Bangladesh

P5 Presentation of
*MSc 4 - Global Housing Architecture of
Transition in the Bangladesh Delta*

**GLOBAL
HOUSING**

**Around the world, children are more likely to live in poverty than adults.
They are also more vulnerable to its effects (UNICEF)**



**Child
Malnutrition**



**Unsafe
Environment**



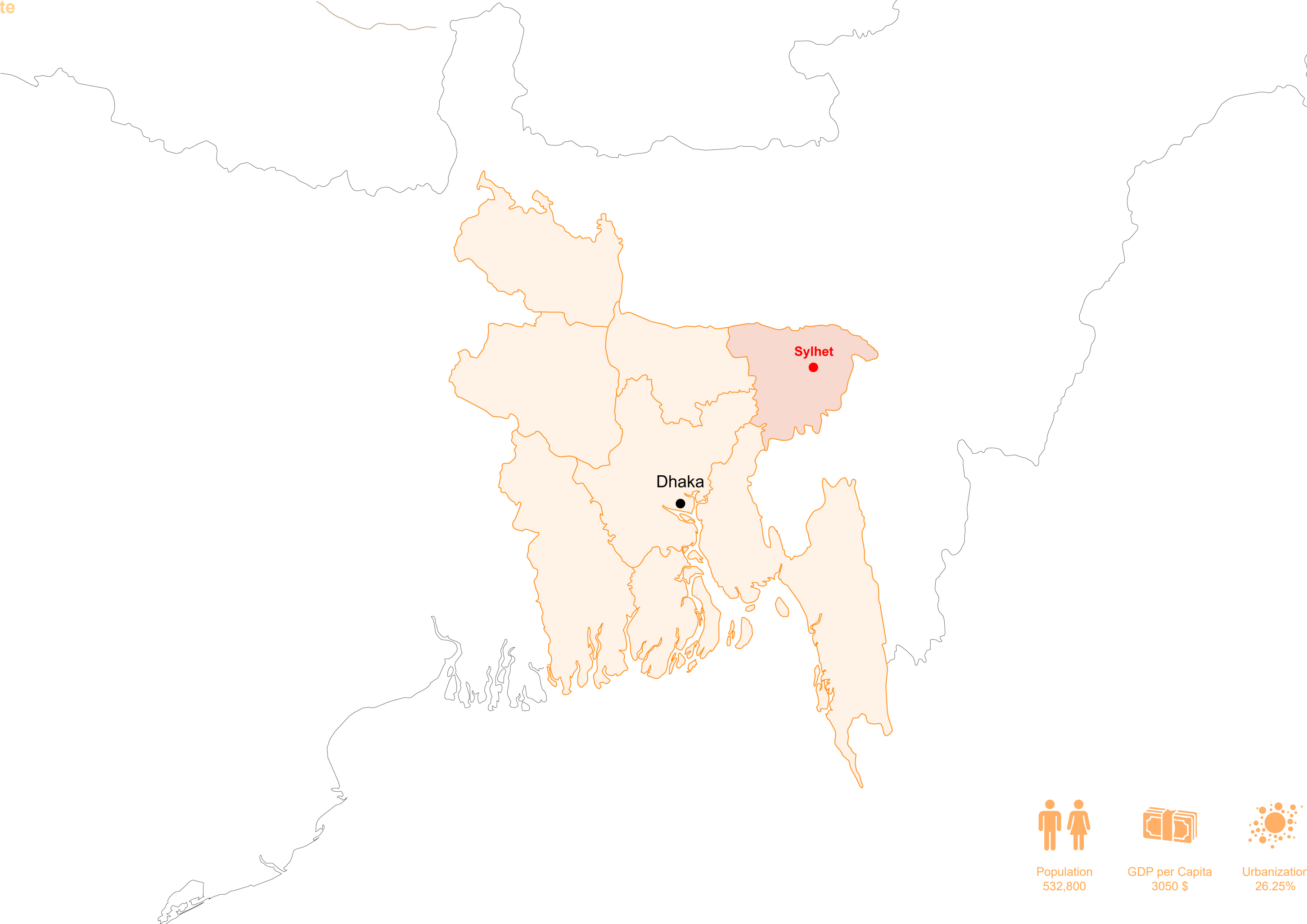
**Low-Quality
Living**



**Vulnerability to
Flood**

“How can housing design improve the living conditions of impoverished children in flood-prone areas of Sylhet city?”

Site



Population
532,800

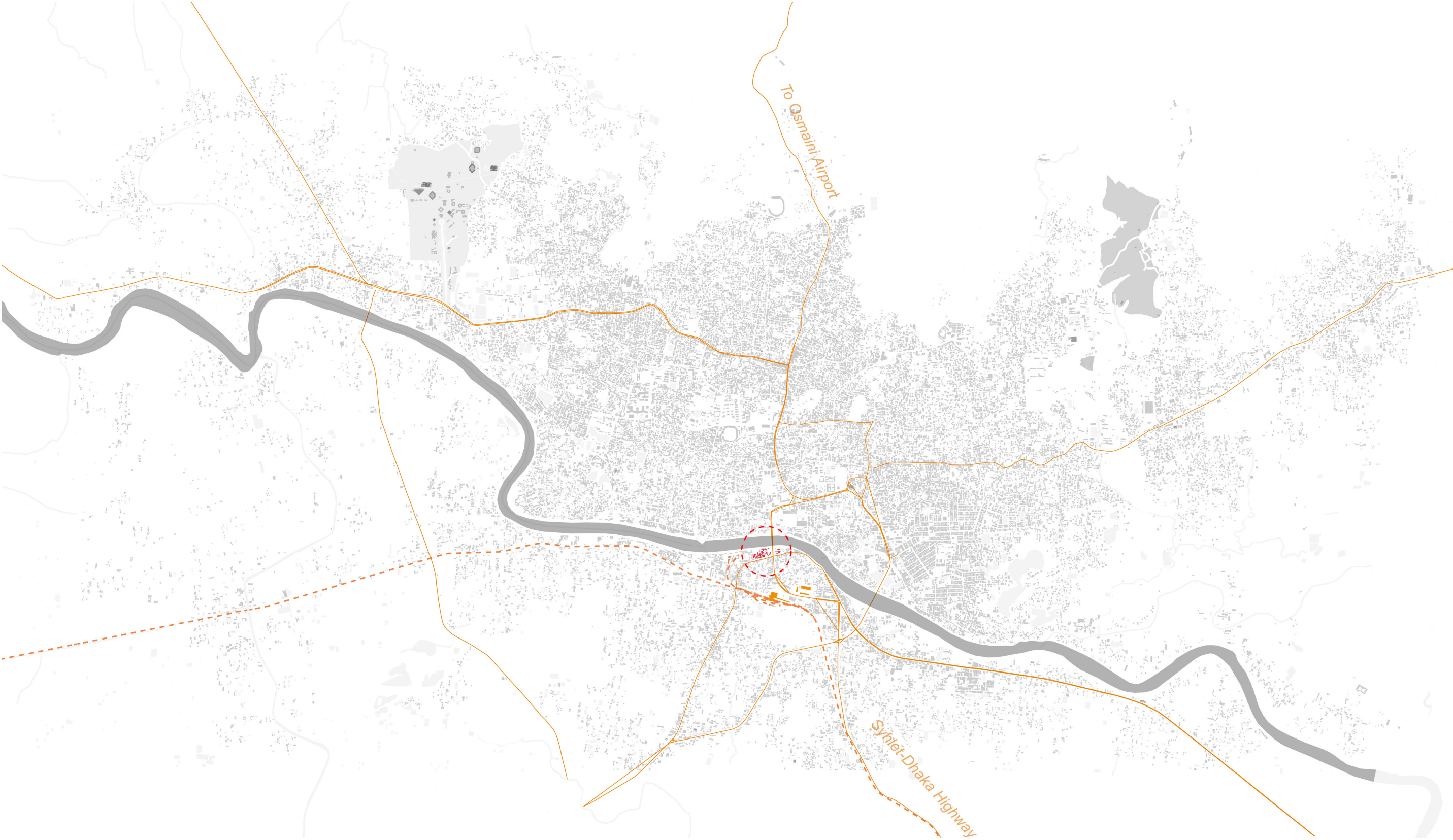


GDP per Capita
3050 \$



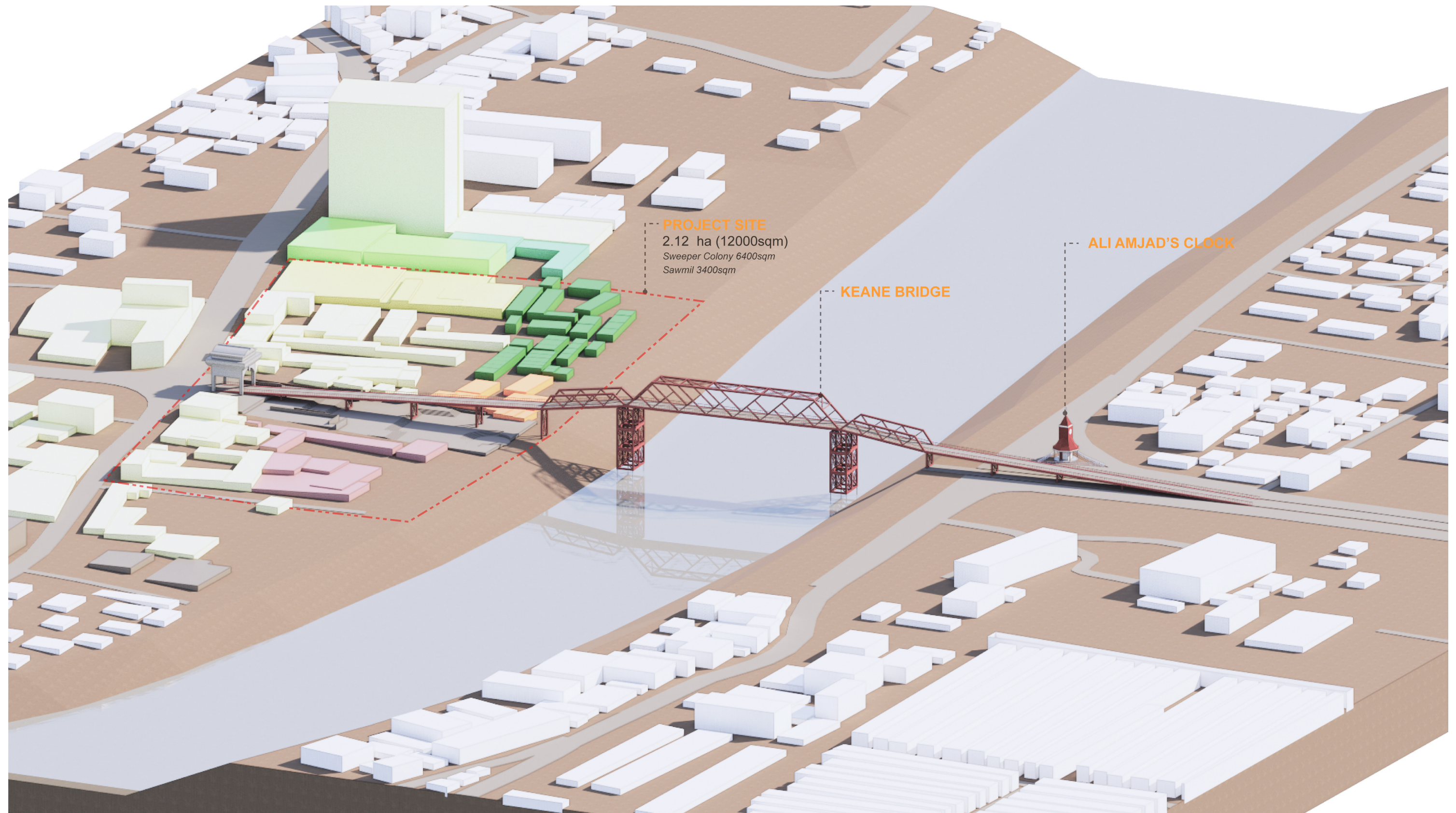
Urbanization
26.25%

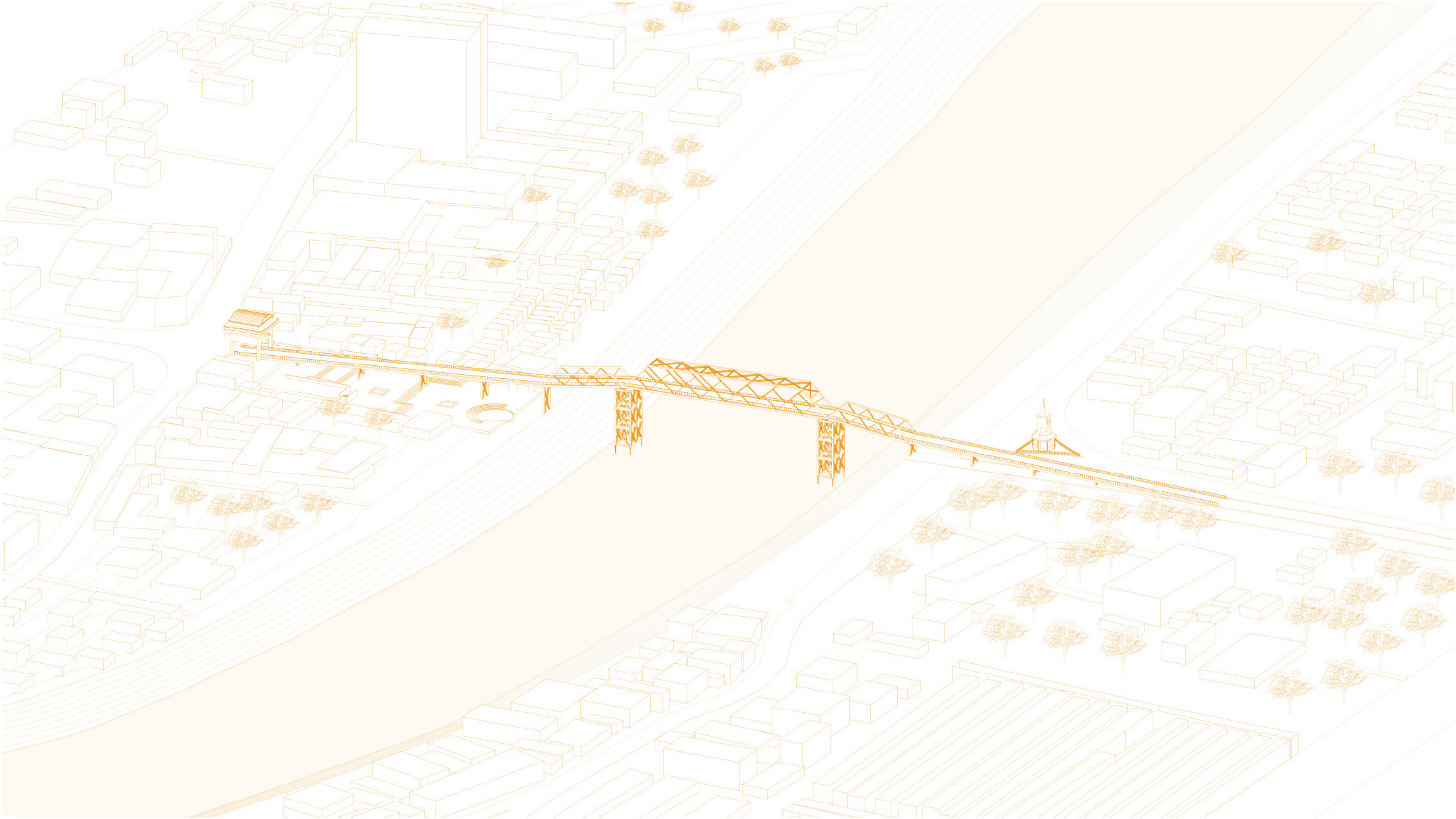
Site





Site

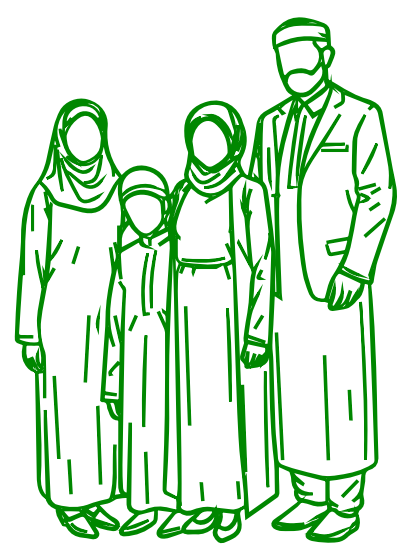




Site

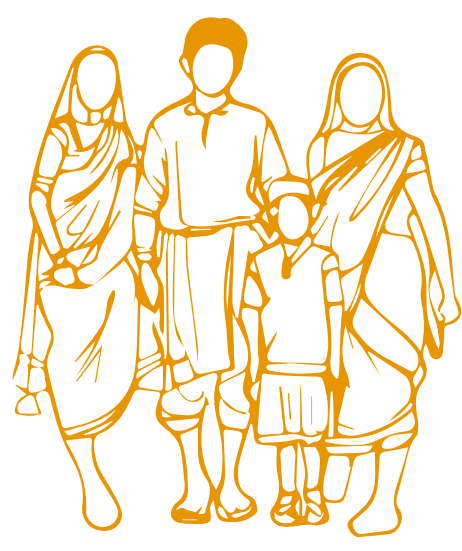


No ownership
Sanitation problem
Limited access to infrastructure



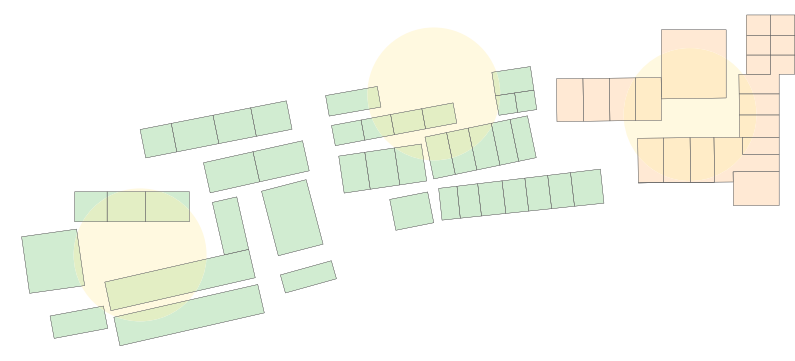
Muslim Community

Number of Households: 40 Families
Total number: 240 people (120 Children)
Job: Merchant, Business

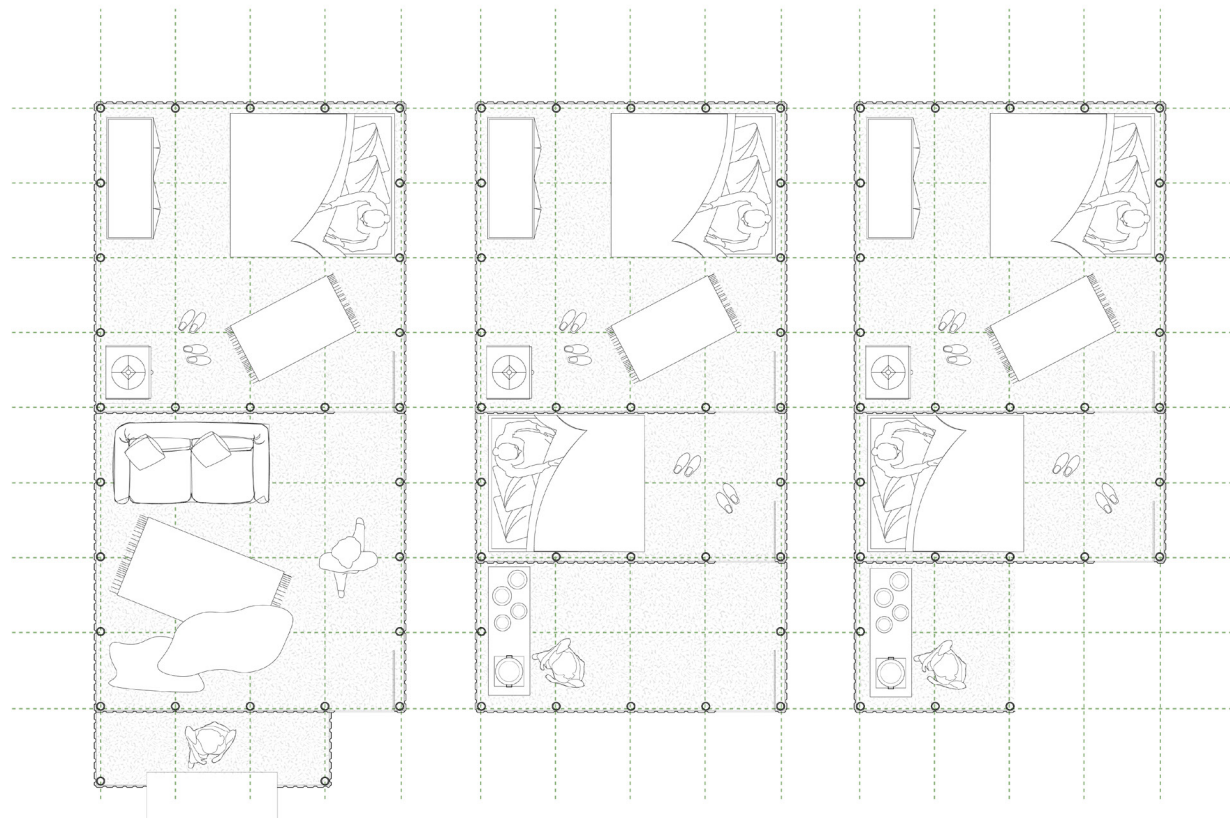


Hindu Community

Number of Households: : 20 Families
Total Number: 120 people (60 Children)
Job: Sweeper

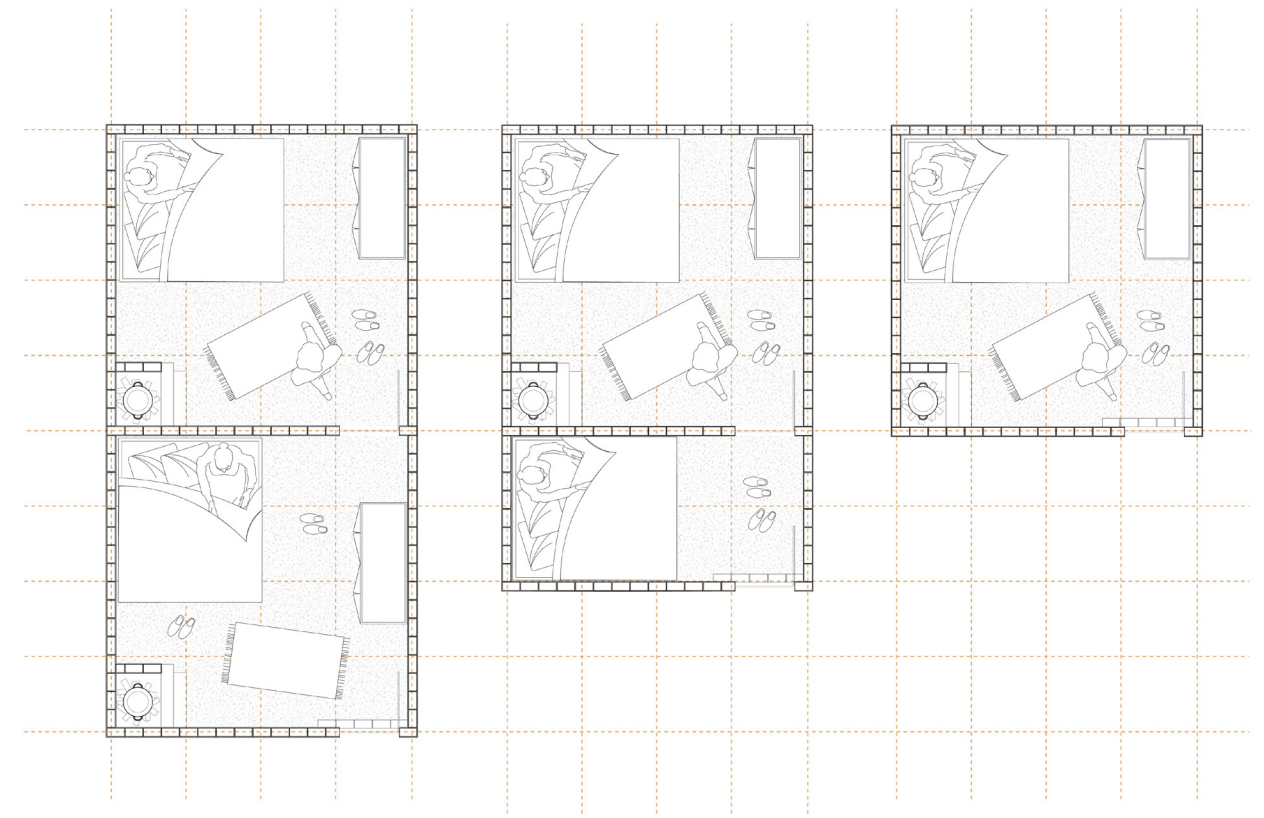


Living in overcrowded housing conditions



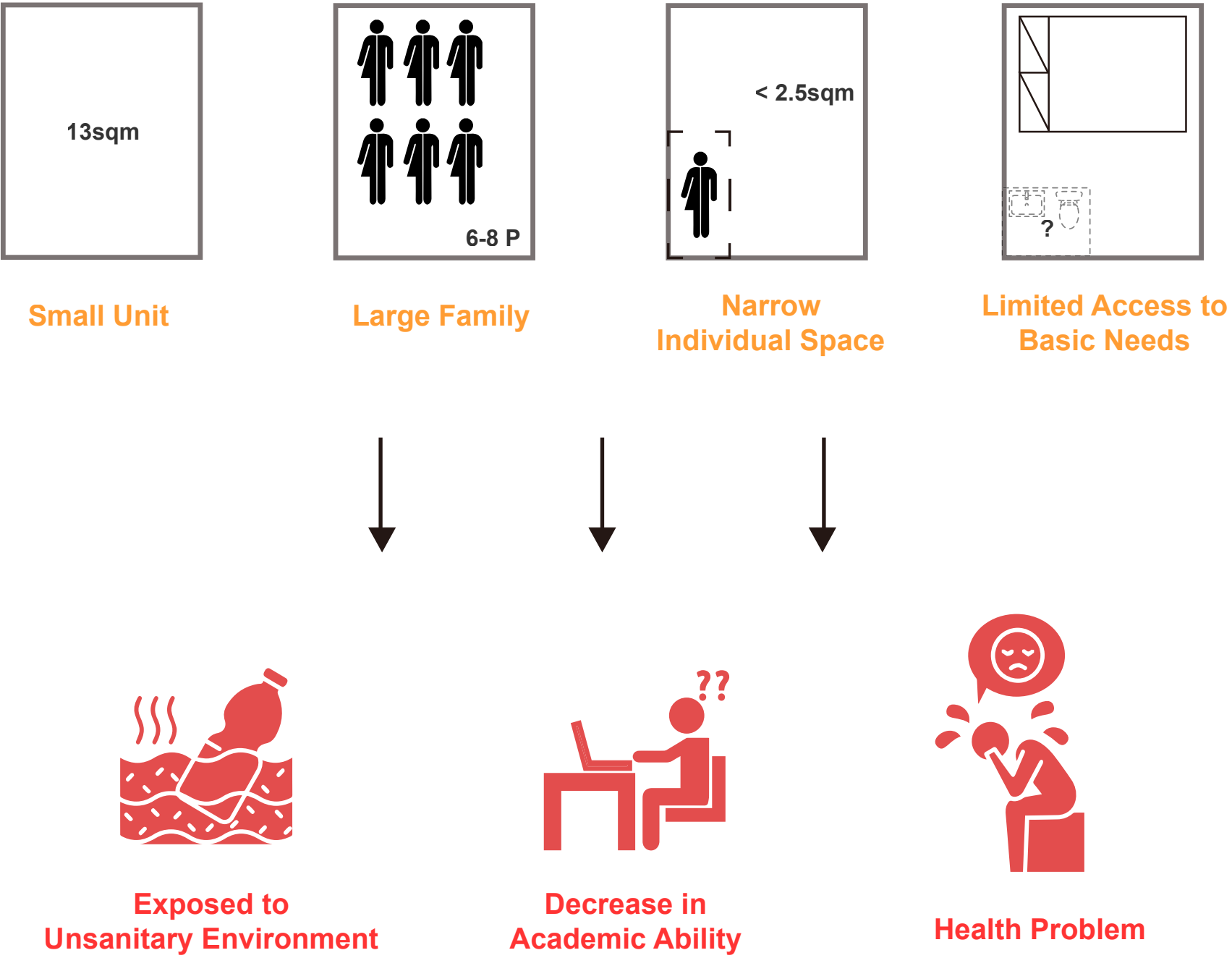
Muslim Community

The housing of Muslim communities is often built with corrugated metal sheets and bamboo, making it highly vulnerable to flooding. In addition, the densely packed living conditions negatively affect children.



Hindu Community

The houses in Hindu communities are built with brick and plaster. They often live in extremely crowded conditions, with up to ten people in one or two rooms, and without access to proper sanitation or a kitchen.



Site



Courtyard Culture



Children



Ritual Tree



Lack of Space



Unclean Environment



Flooding (700mm)

What do the people of Sweeper Colony want?



- 1. Better future for their children**
- 2. Maintaining bonded community**
- 3. Flood-resisting house**



How can I design Children Centric Housing?

Case Studies

Thamesmead



Tara Housing

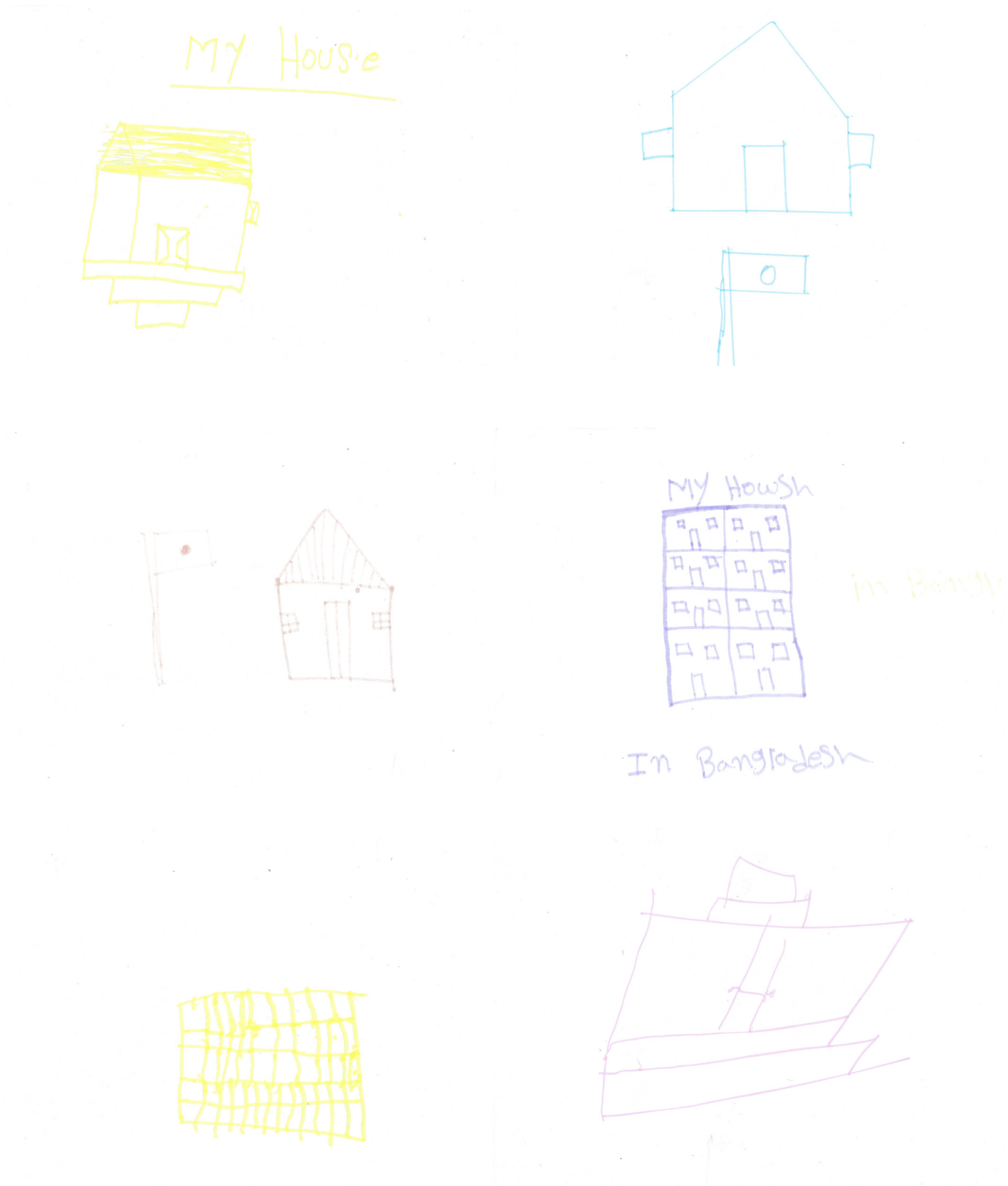


Barbican



SOS Children's Village - Dhaka





1. Space for the Children
2. Safe environment for Children
3. Green & Walkable street



Age Group



AGE 1-3



86cm 90cm

Average Heigh of 3 year-old

Circle of proximity
(in immediate proximity)

Attachment to their mothers
Safe indoor space



AGE 3-6



116cm 116cm

Average Heigh of 6 year-old

The exploration space
(within sight or earshot)

Relation with peers & skill development
Larger indoor space



AGE 6-12



149cm 149cm

Average Heigh of 12 year-old

The exploration space
(Within sight or shouting distance)

Advanced skill developement
Outdoor playground



AGE 13+

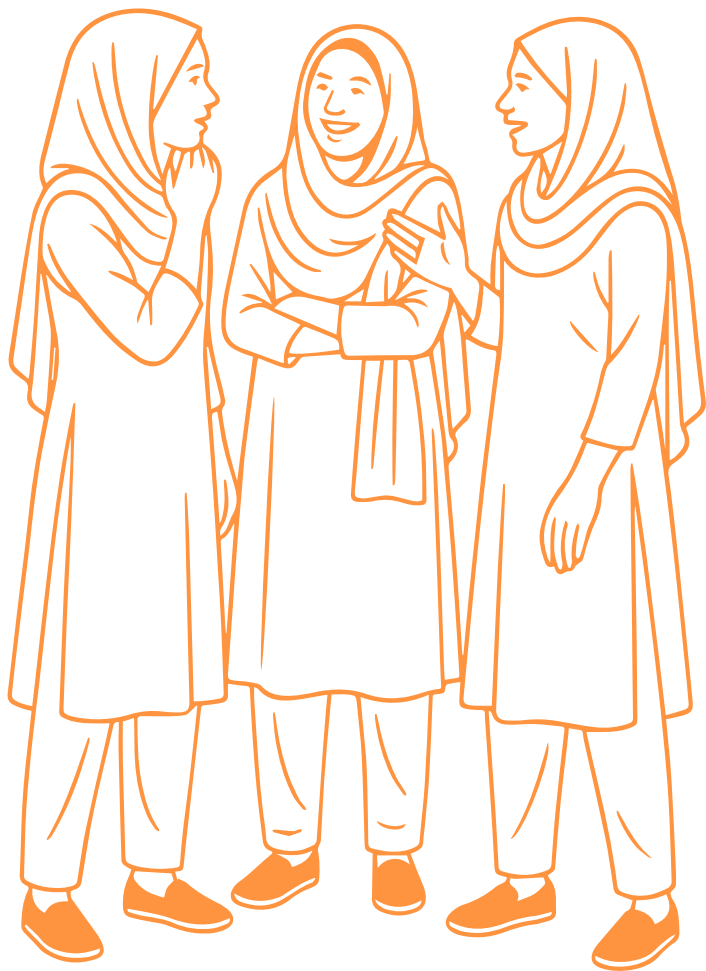


165cm 151cm

Average Heigh of 15 year-old

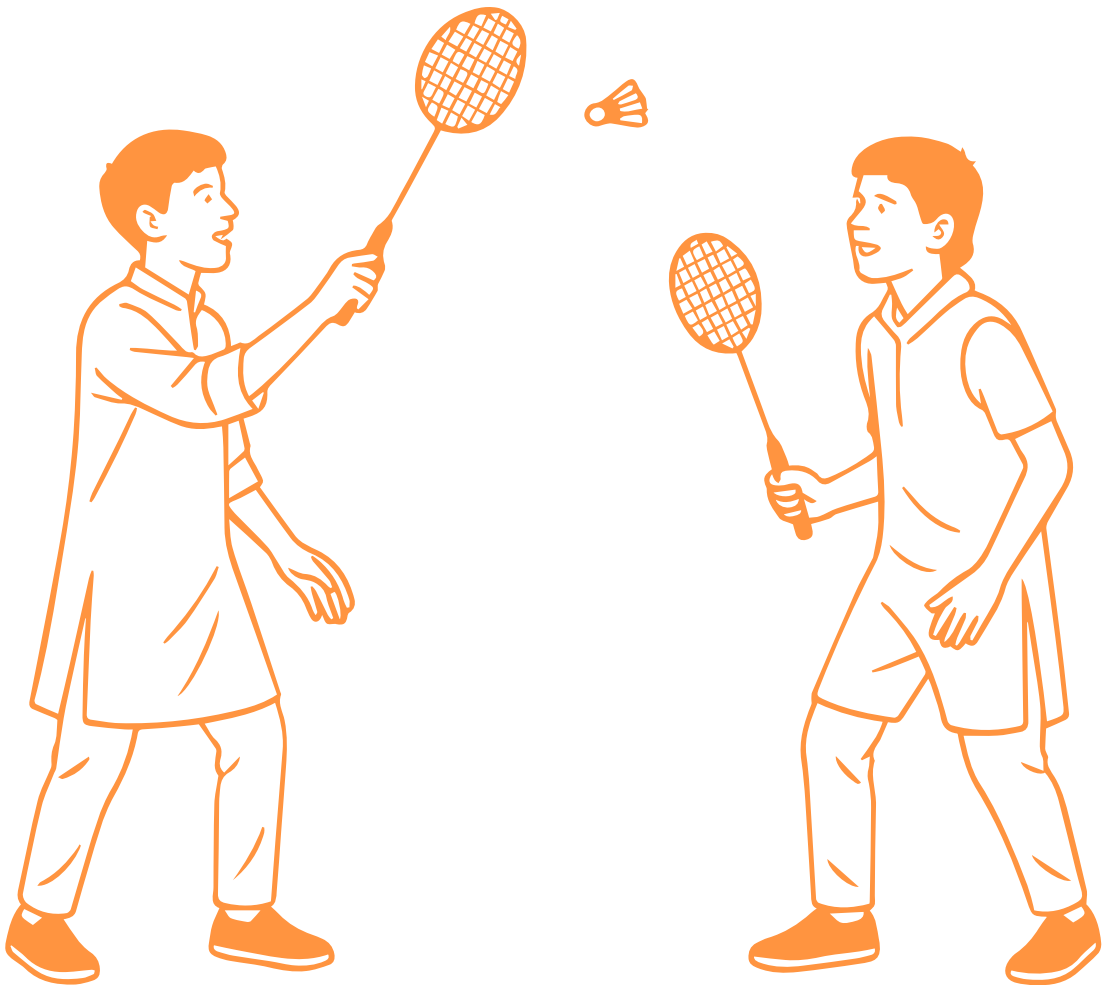
Independent space
(Within Neighborhood)

Private & Independennt
outdoor spacce for peer group
outdoor spacce for Sport



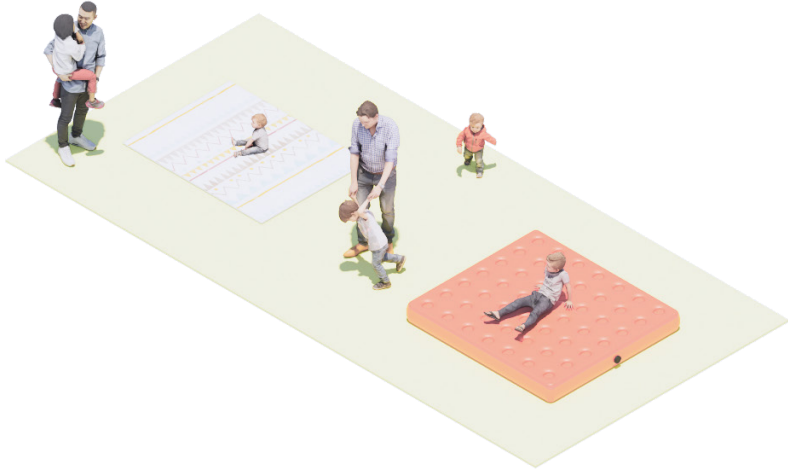
Girls

Less Activity (Near by home)
Chatting / Gathering



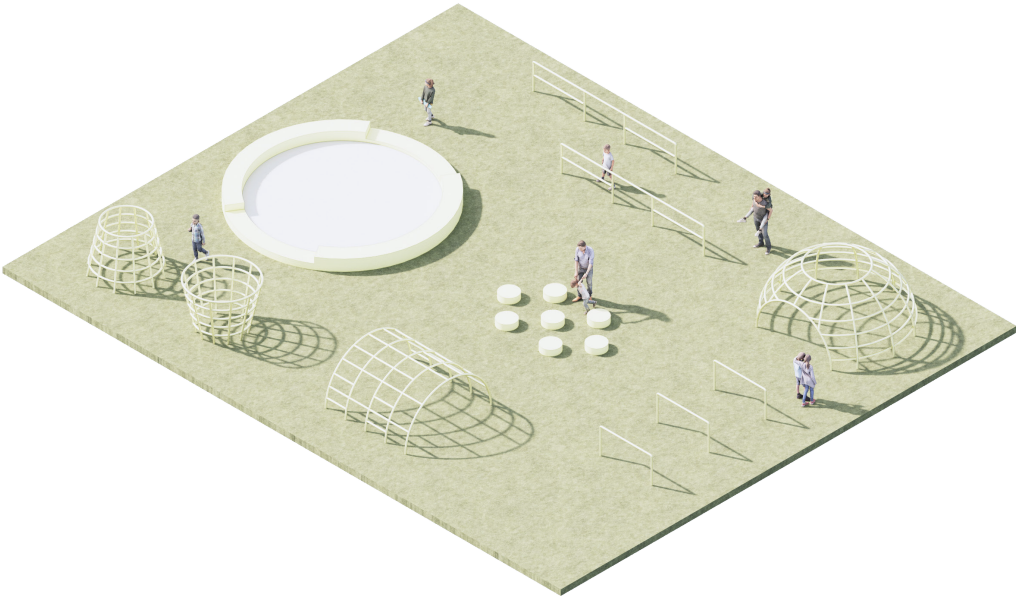
Boys

Active (Outdoor)
Sports, Adventure, Games



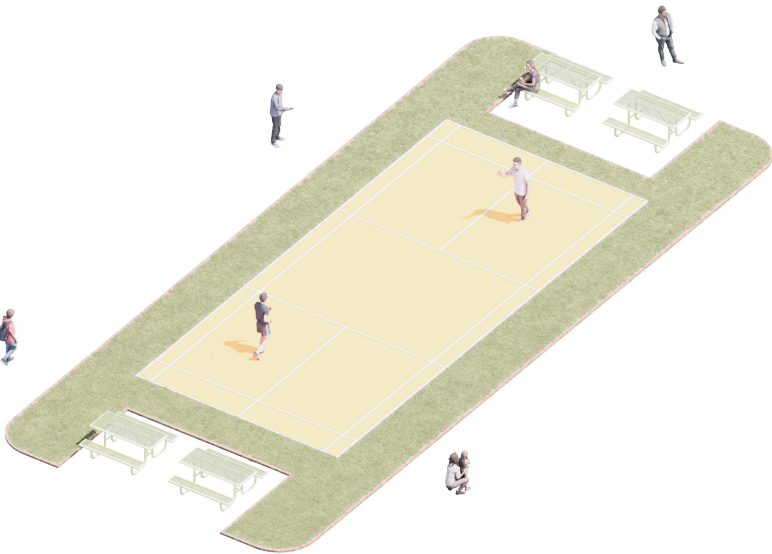
Pocket Play Space

Age 1-6
Sight distance



Courtyard Playground

Age 6-12
Shouting distance



Badminton Court

Age +13
Neighborhood



Swing Chair

Age +13
Neighborhood



LEARNING

Children from low-income families often struggle with reading and academic performance. Therefore, it is important to provide them with a reading room to ensure they have equal access to educational opportunities.



CARING

When parents go out to work, children are often left in the care of their siblings. To improve this situation, a day care room is necessary.



GATHERING

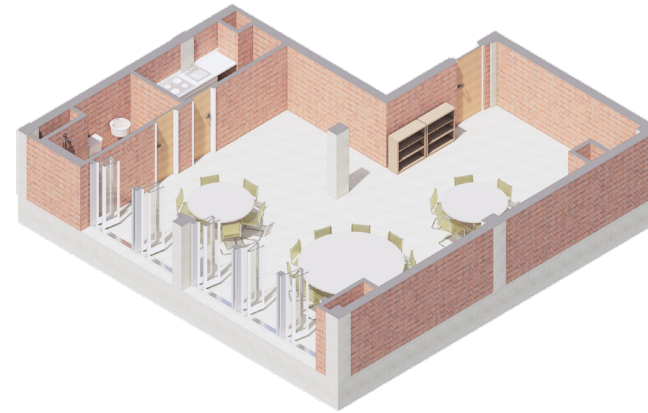
To raise children effectively, information sharing among parents and collaboration within the local community are essential. Therefore, a gathering room should be designed to support these interactions.

Community space



Daycare Space

The daycare space is a place where children can receive care while their parents are away at work.



Gathering Space

The gathering space is a flexible area where various child-related activities take place and parents can interact and exchange information.

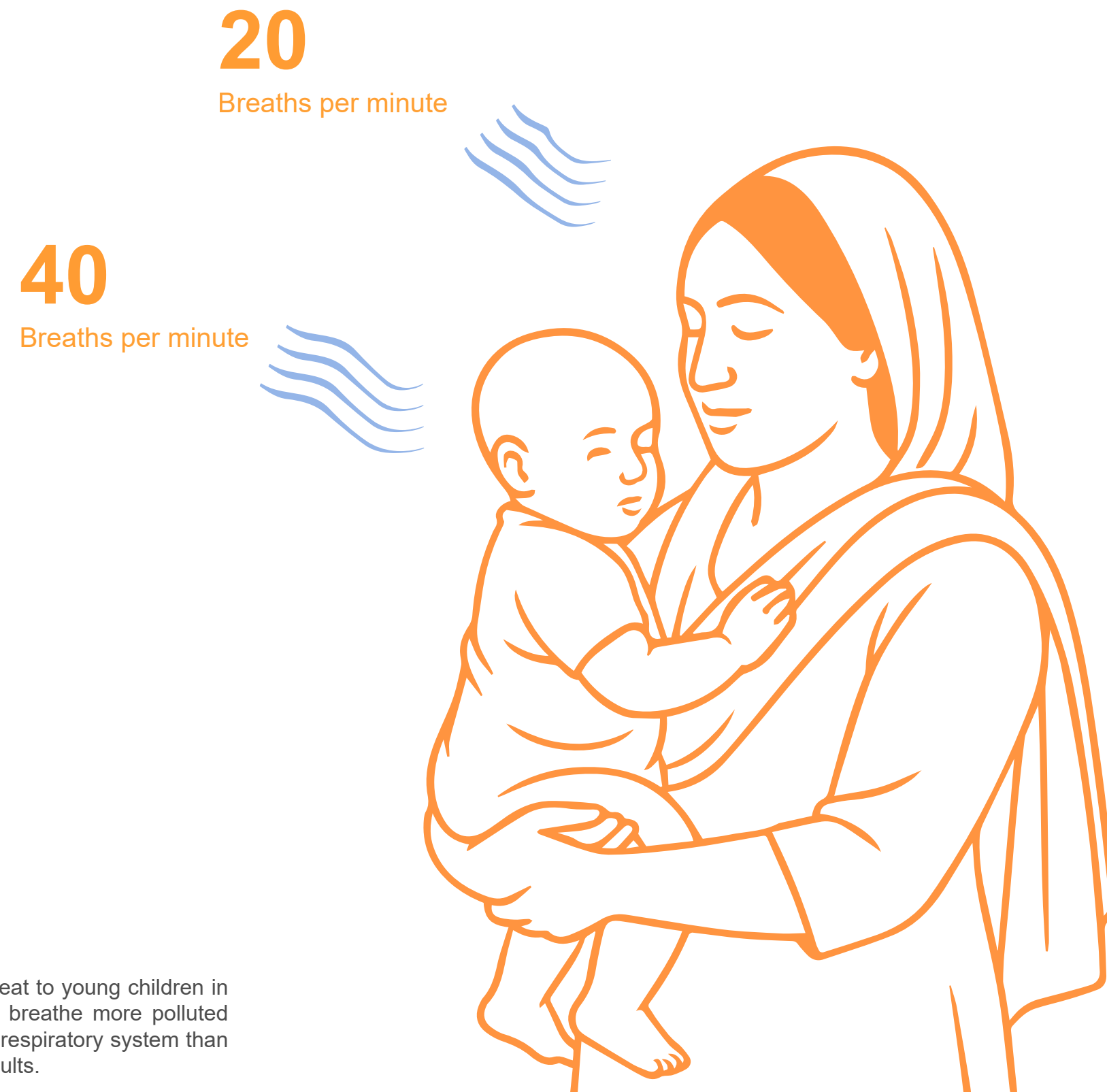


Reading Space

The reading space is a place where children can learn how to read and engage with a variety of books, fostering their academic development.

From Eyes on the Street

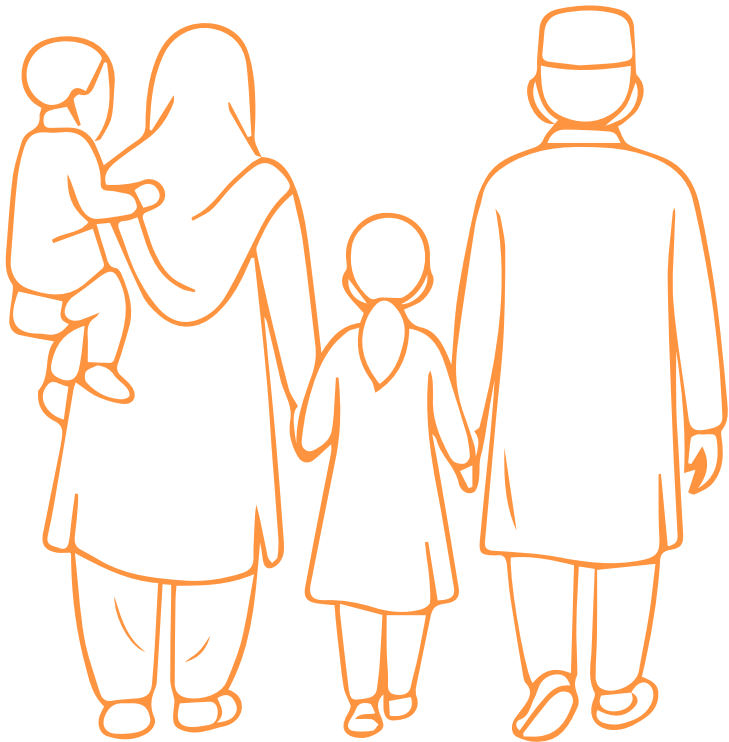




Air pollution poses a threat to young children in particular because they breathe more polluted air into their developing respiratory system than do older children and adults.

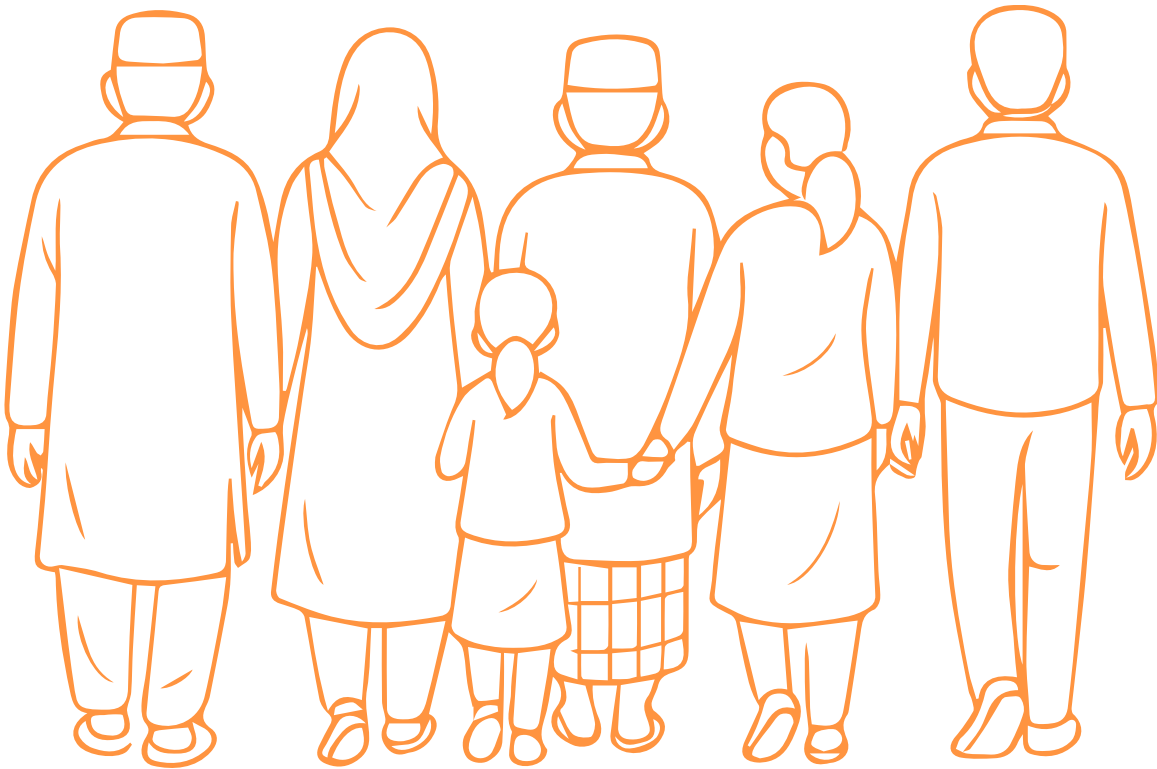
Scale of the street

Required sidewalk width for a family to walk together



2.4 M (8ft)

Required sidewalk width for a family to walk together

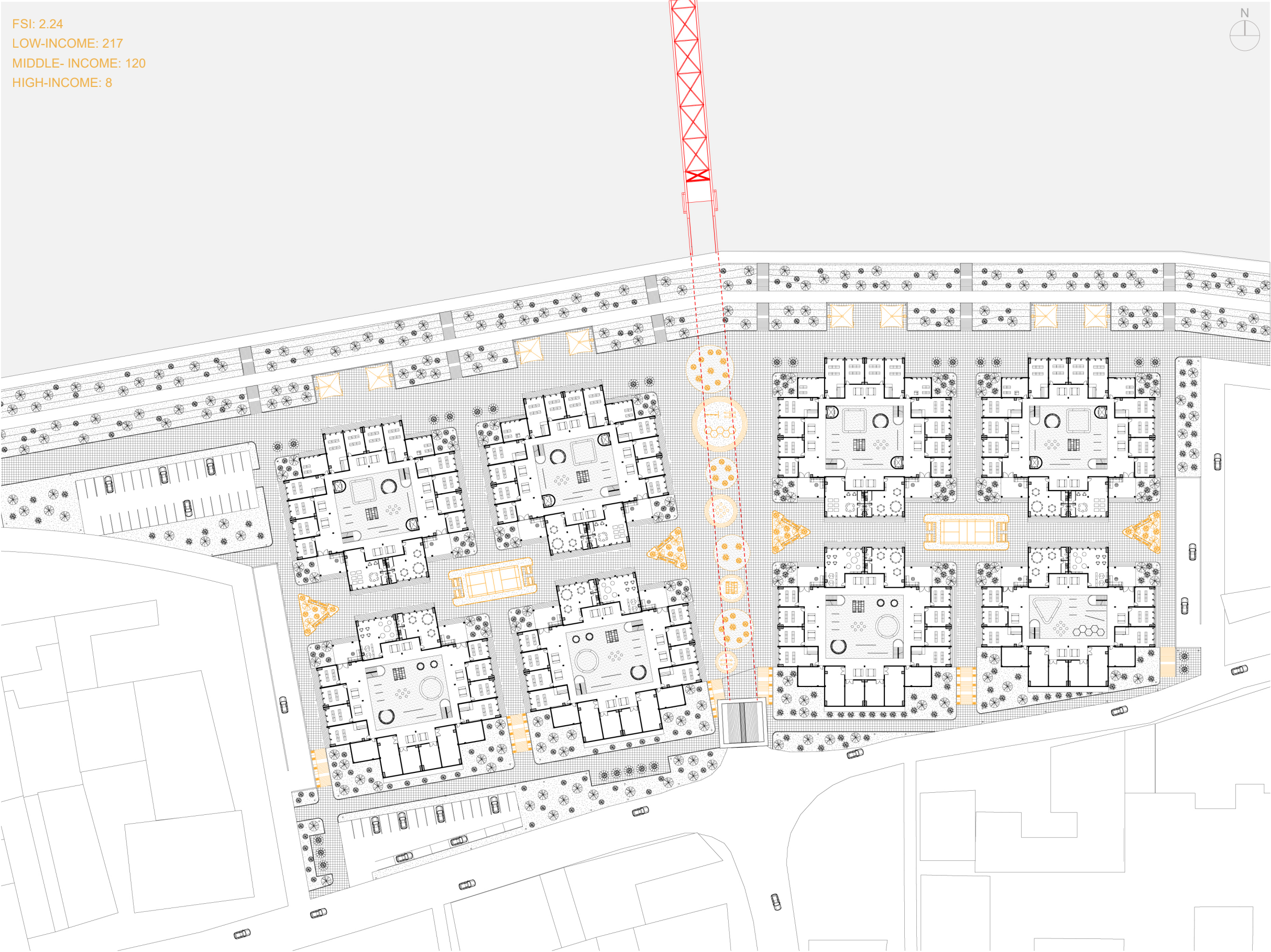


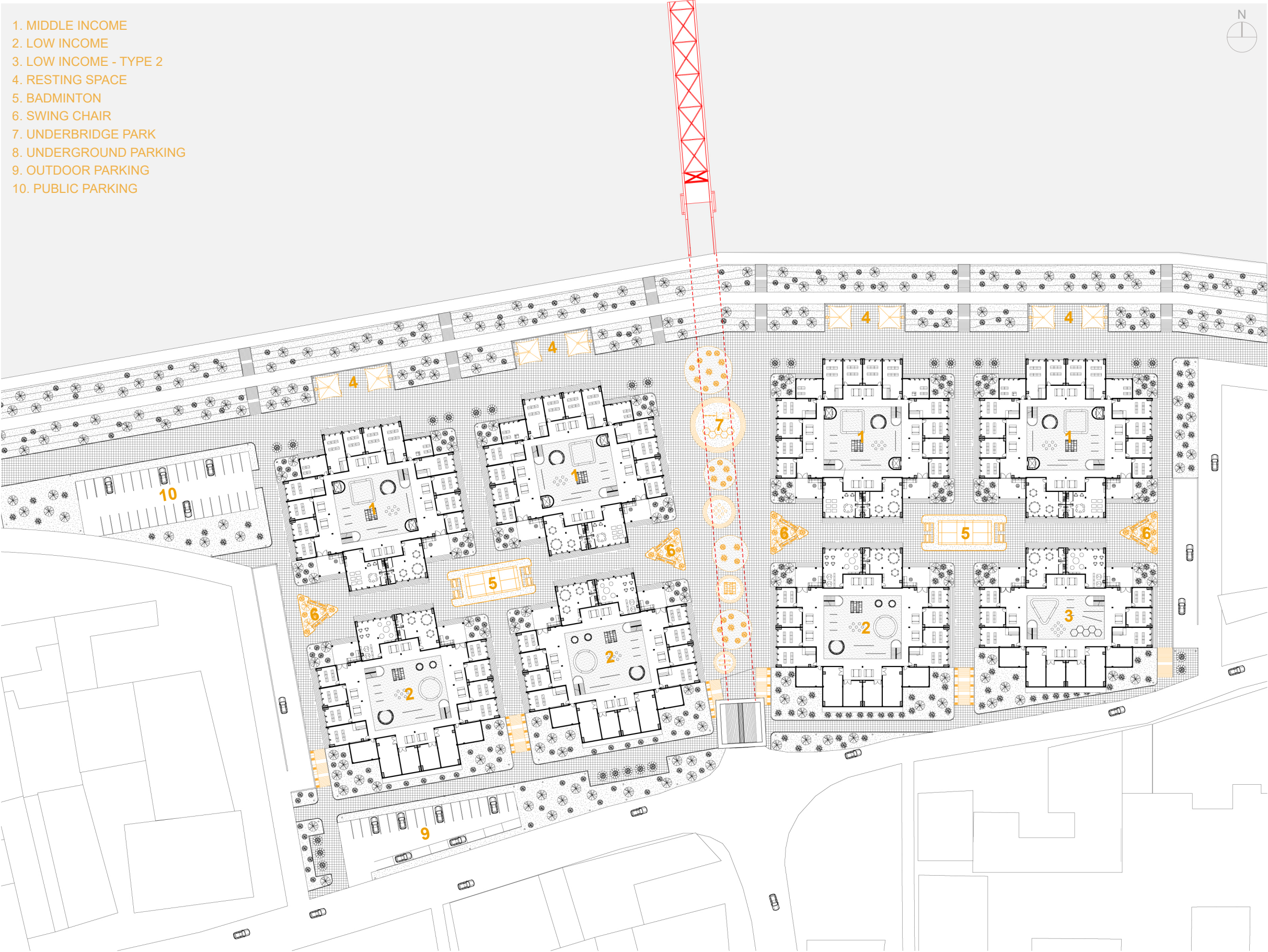
4.8 M (16ft)



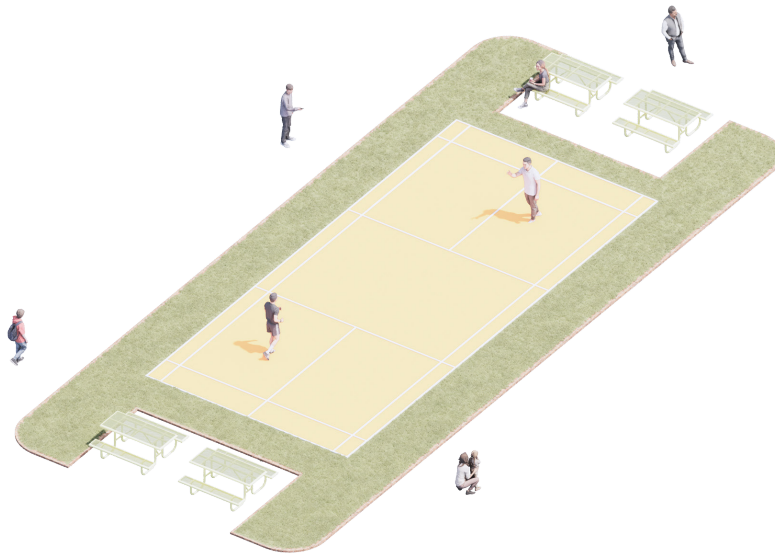
View from the Keane Bridge







Diverse Playspace



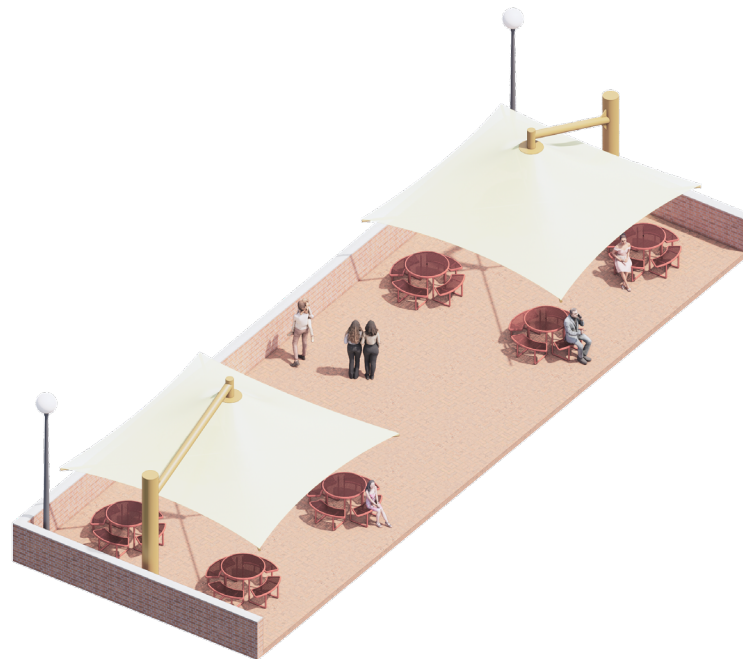
Badminton Court

Age +13
Neighborhood



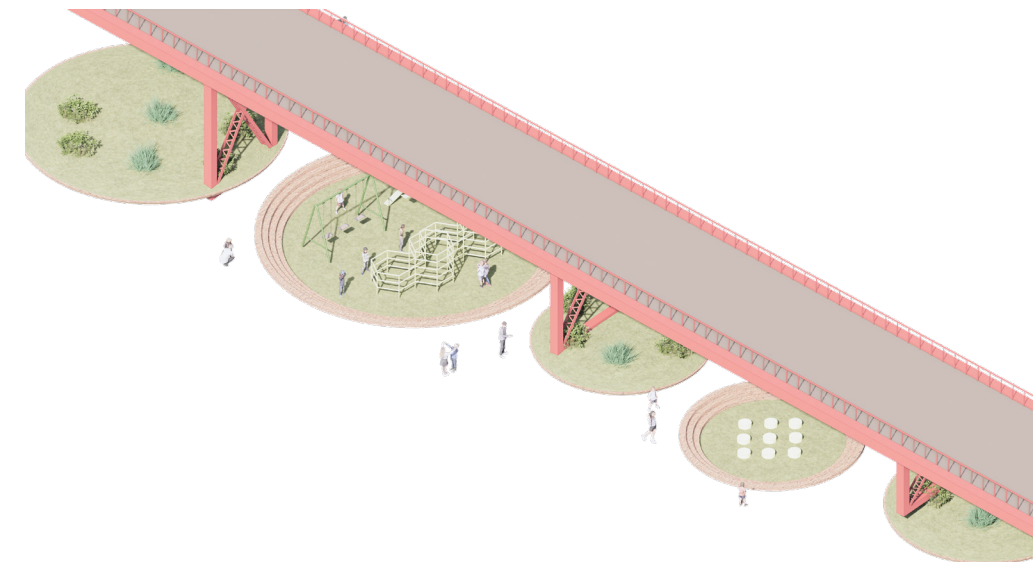
Swing Chair

Age +13
Neighborhood



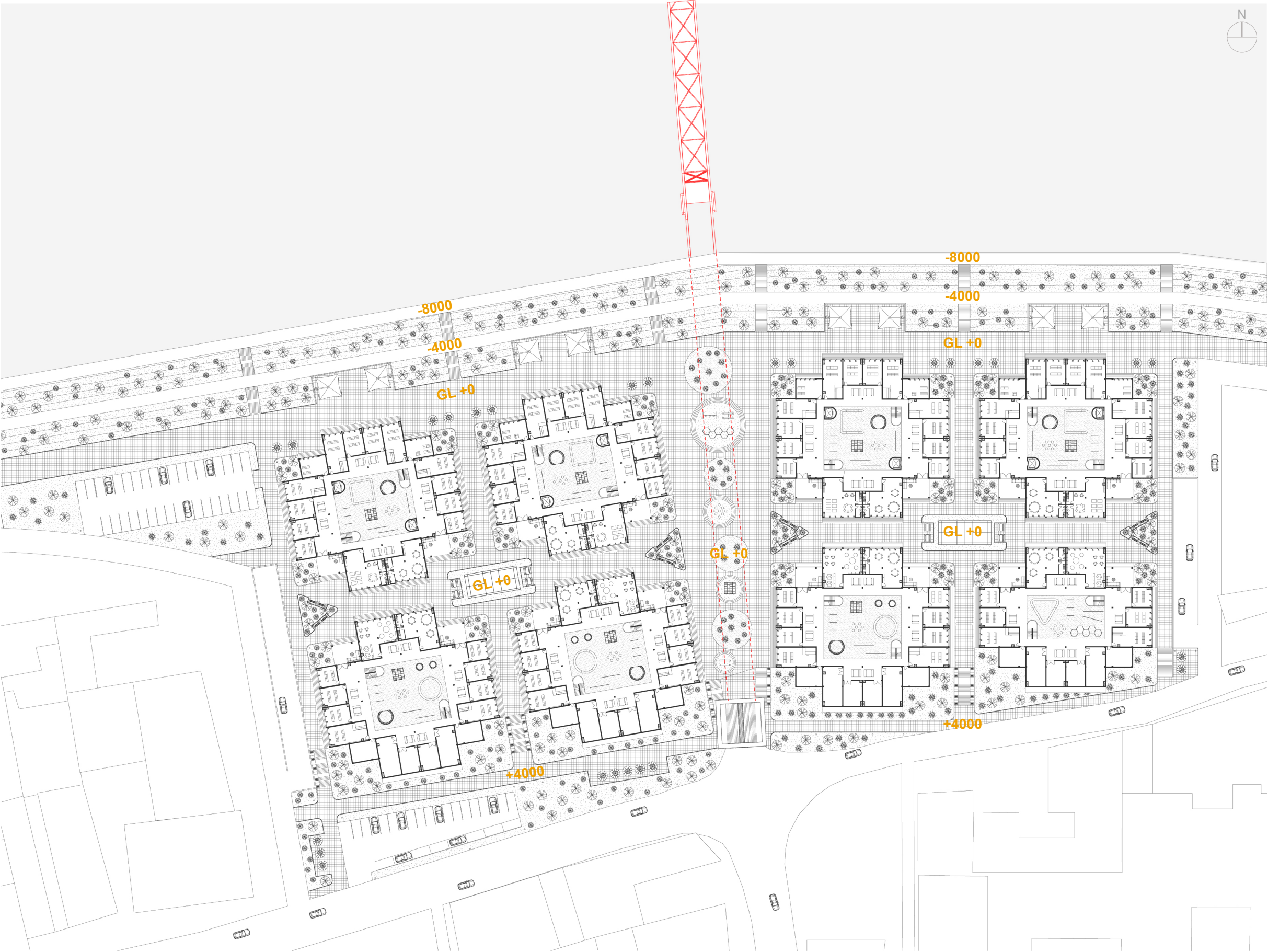
Riverbank openspace

Age +13



Playground under bridge

Age 6-12, Age +13



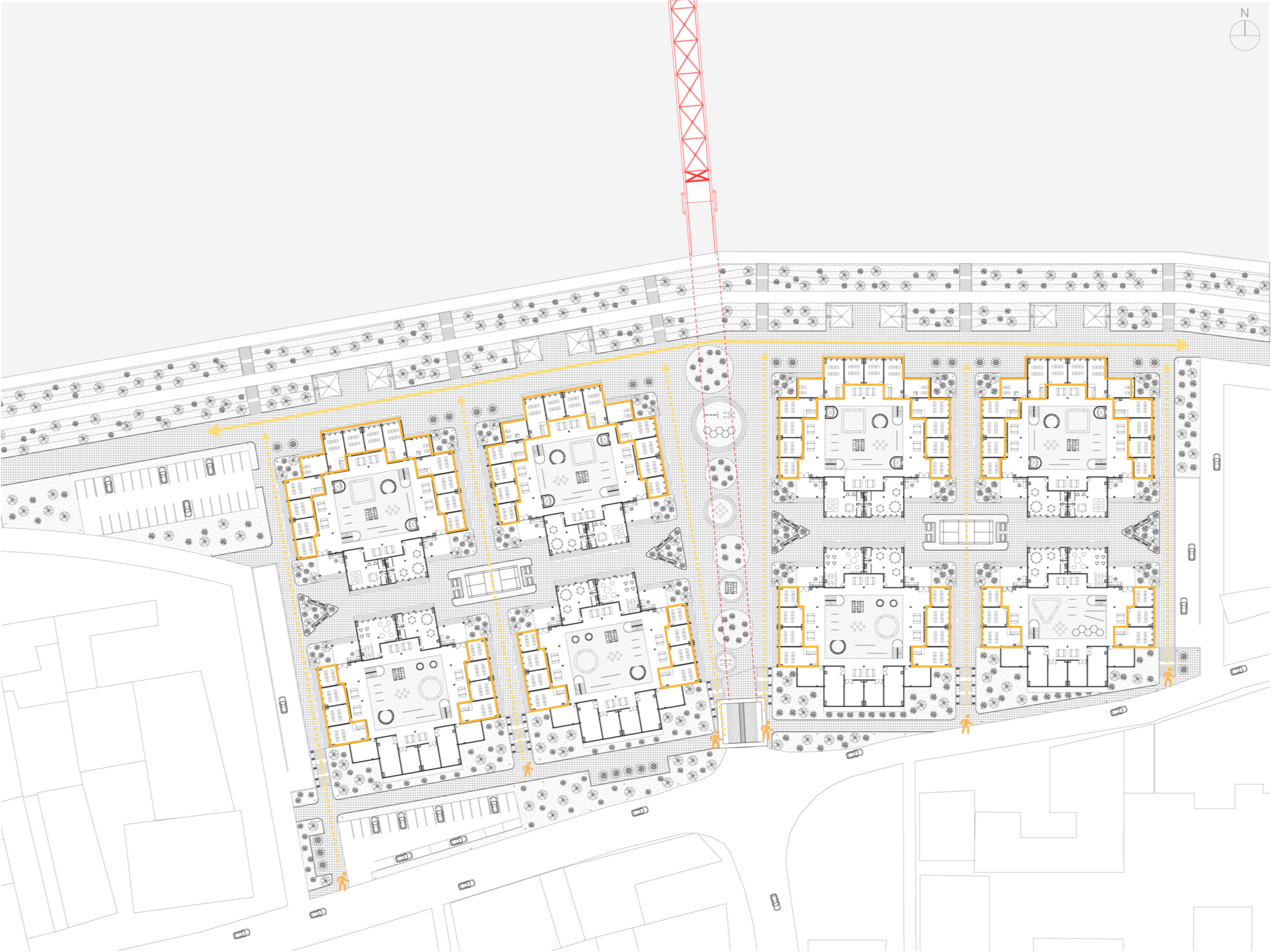
Site Section



There is a 4-meter level difference between the main road and the riverside at the project site. This required a design that responds to the site's topography.

To prepare for the typical flood level of 700mm, the plinth level was set at 750mm, and the residential units were arranged starting from the first floor to prevent flood damage.





Entrance View

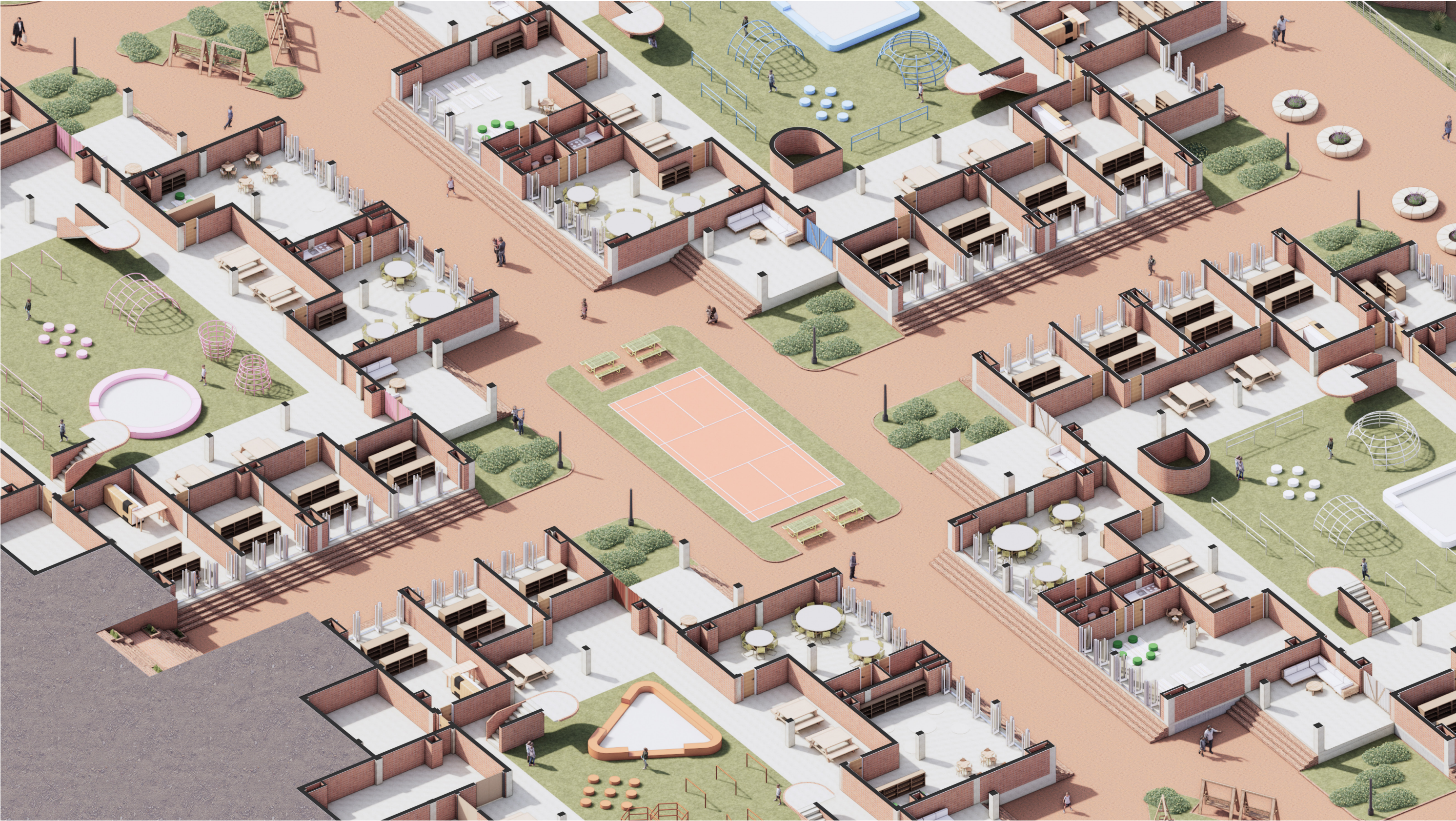


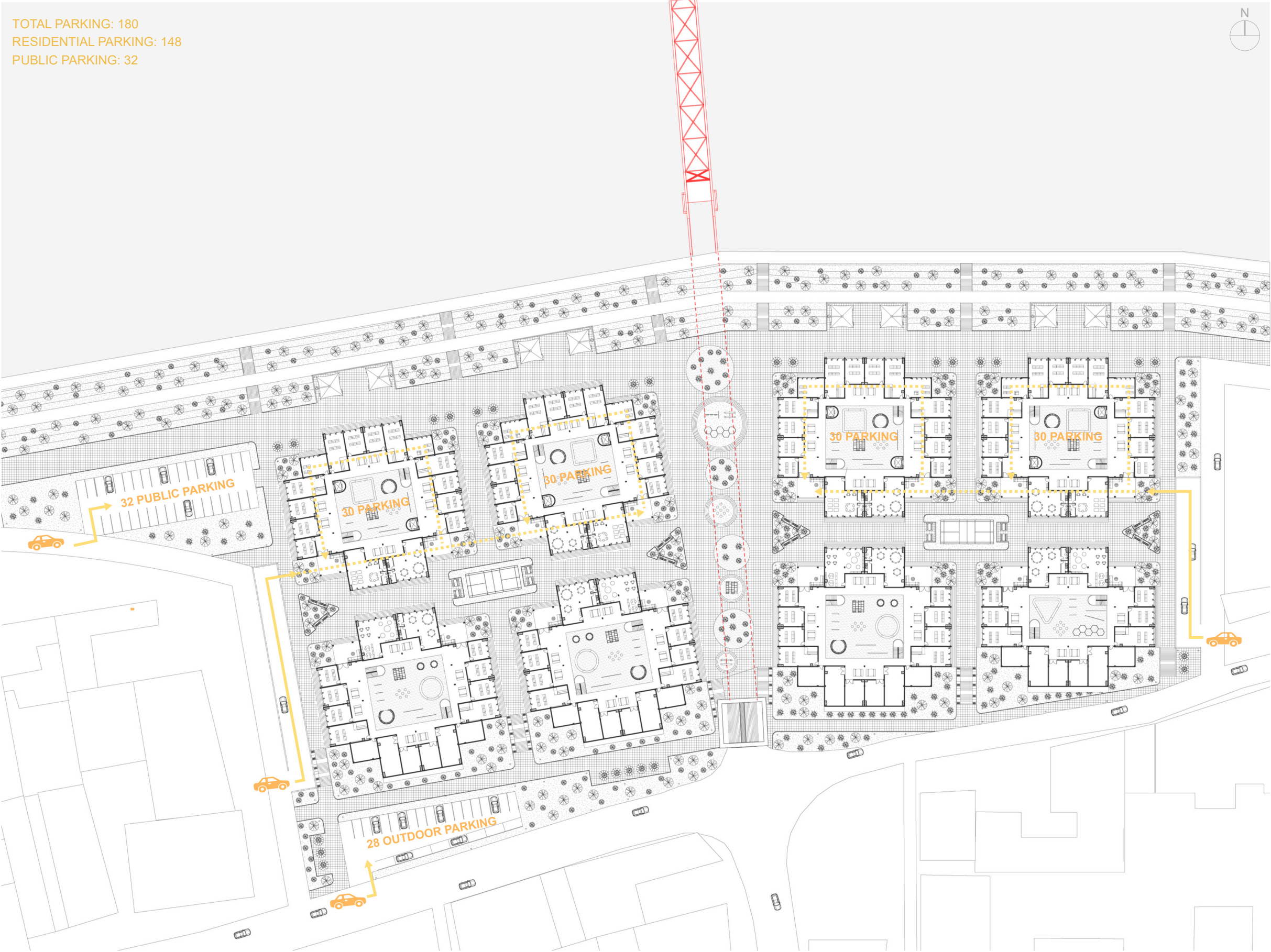
View of the Public Space





Community Spine

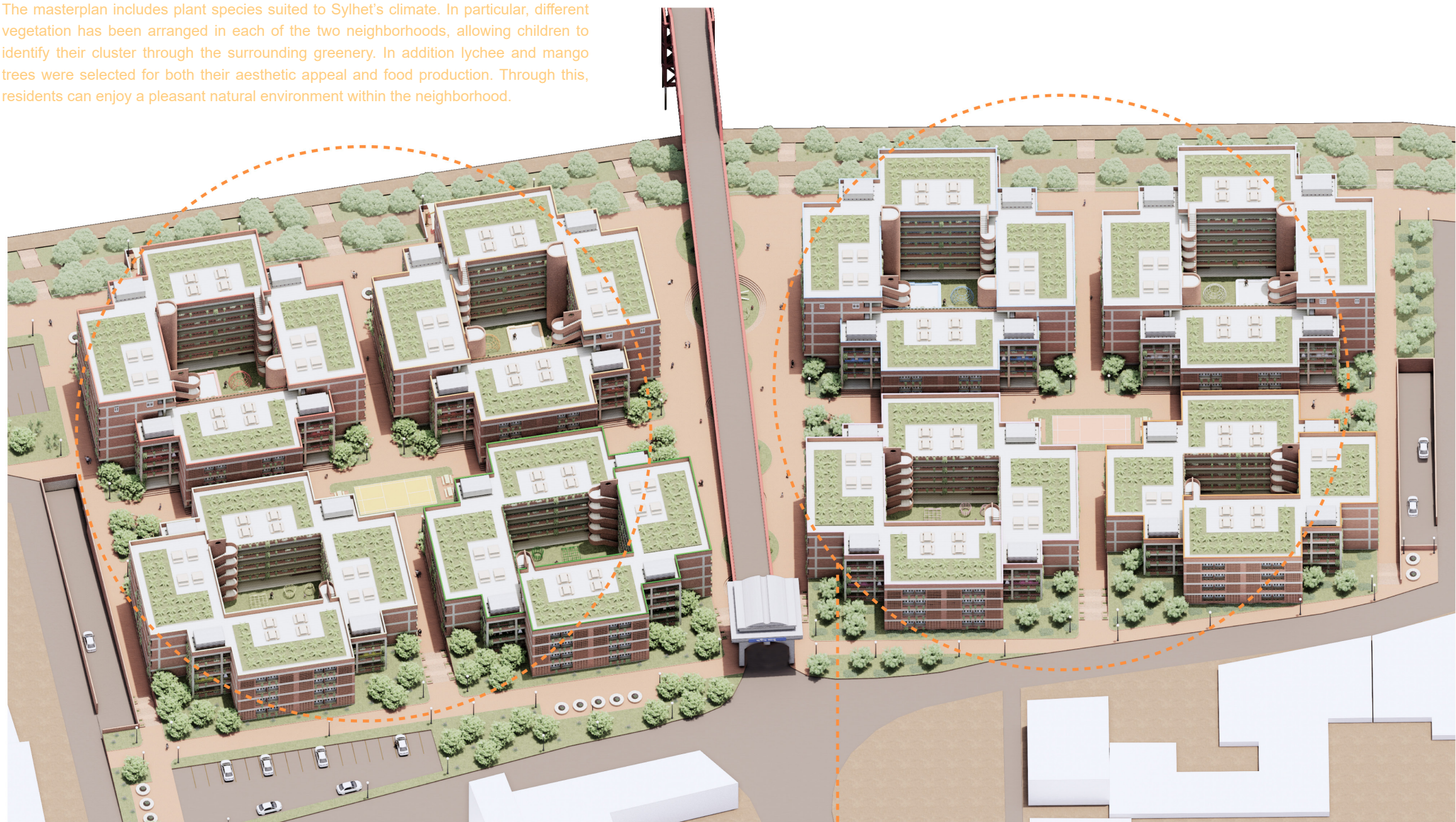






Green Space

The masterplan includes plant species suited to Sylhet's climate. In particular, different vegetation has been arranged in each of the two neighborhoods, allowing children to identify their cluster through the surrounding greenery. In addition lychee and mango trees were selected for both their aesthetic appeal and food production. Through this, residents can enjoy a pleasant natural environment within the neighborhood.



Lychee Tree
(4-8M)



Chaste Tree
(0-4M)



Mango Tree
(4-8M)



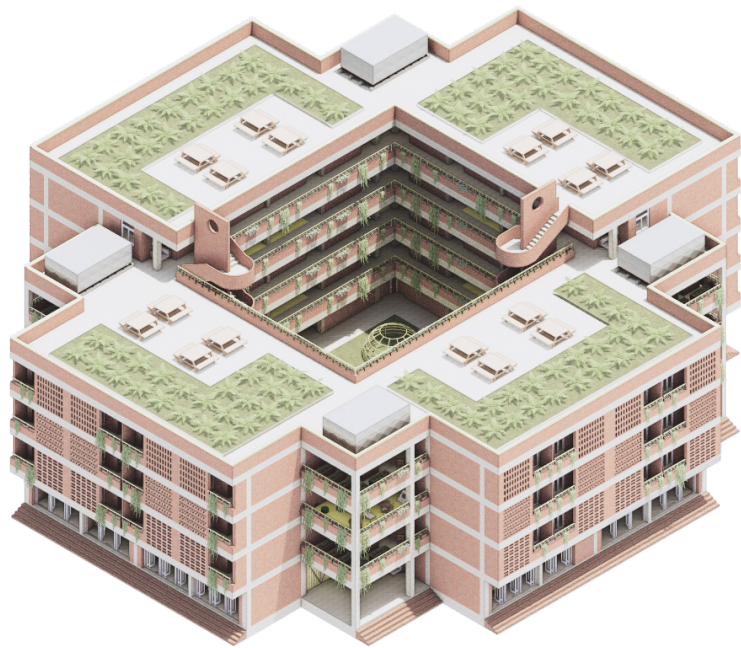
Primrose Willow
(0-2M)

Lighting Plan

One of the most essential aspects of a children-centric neighborhood design is safety. Children are especially vulnerable to safety issues on the streets at dusk. To address this, 400W halogen streetlights were installed at intervals of less than 20 meters to enhance street safety.

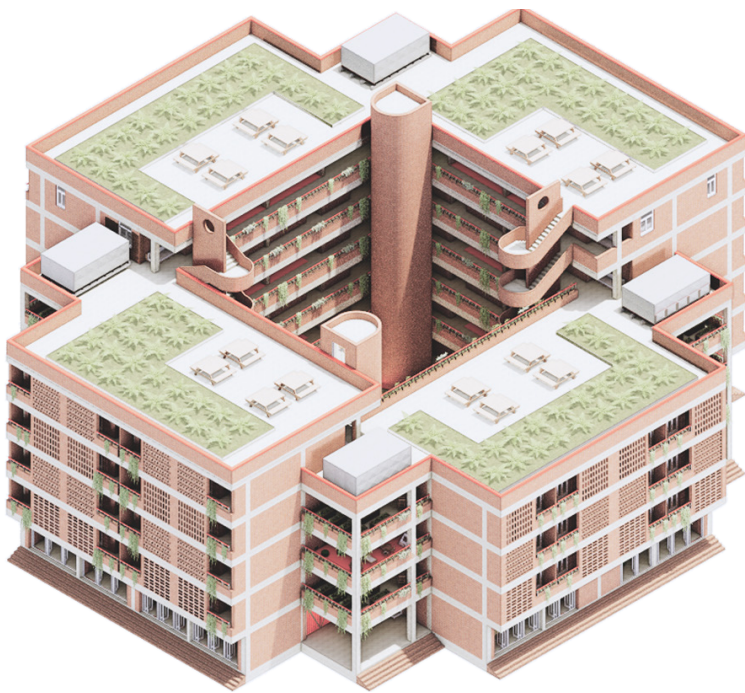


CLUSTER DESIGN



LOW - INCOME CLUSTER (GL+4)

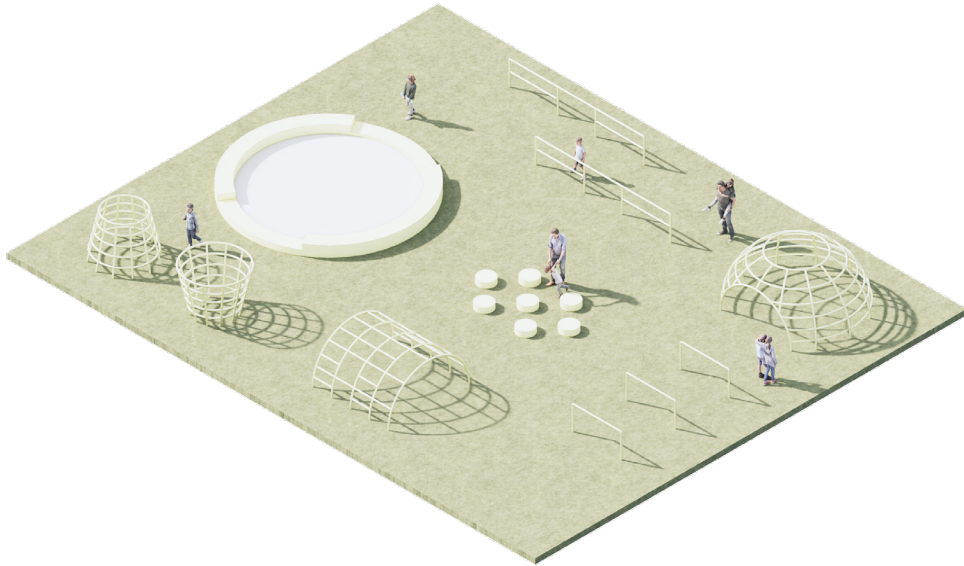
- 1. 35 sqm studio unit - 28
- 2. 50 sqm one-bed room unit - 28
- 3. Pocket play space
- 4. Playground
- 5. Shops
- 6. Community Ammenities
- 7. Storage



MIDDLE - INCOME CLUSTER (GL+5)

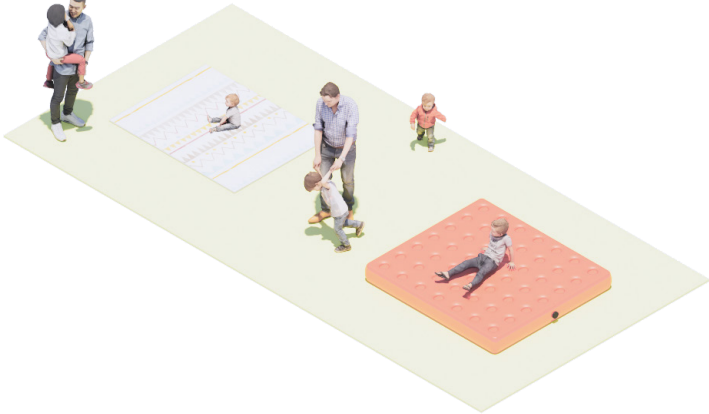
- 1. 85 sqm three-bed unit - 30
- 2. 120 sqm three-bed room unit - 2
- 3. Pocket play space
- 4. Playground
- 5. Shops
- 6. Community Ammenities
- 7. Underground Parking

Play Space in Cluster



Courtyard Playground

Age 6-12
shouting distance



Pocket Play Space

Age 1-6
Sight distance



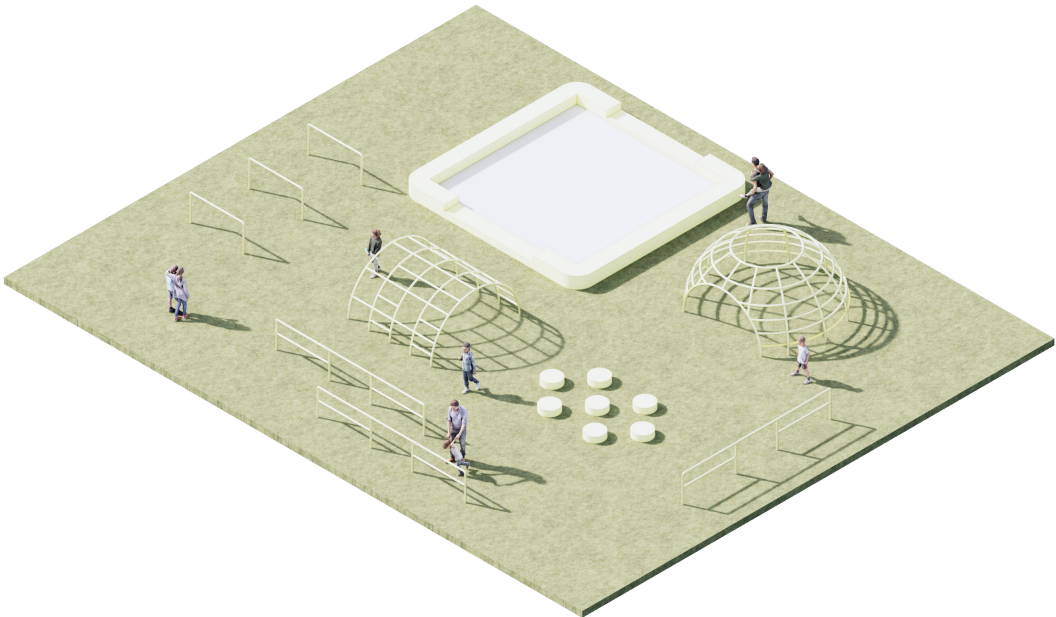
Pocket Play Space

Age 1-6
Sight distance

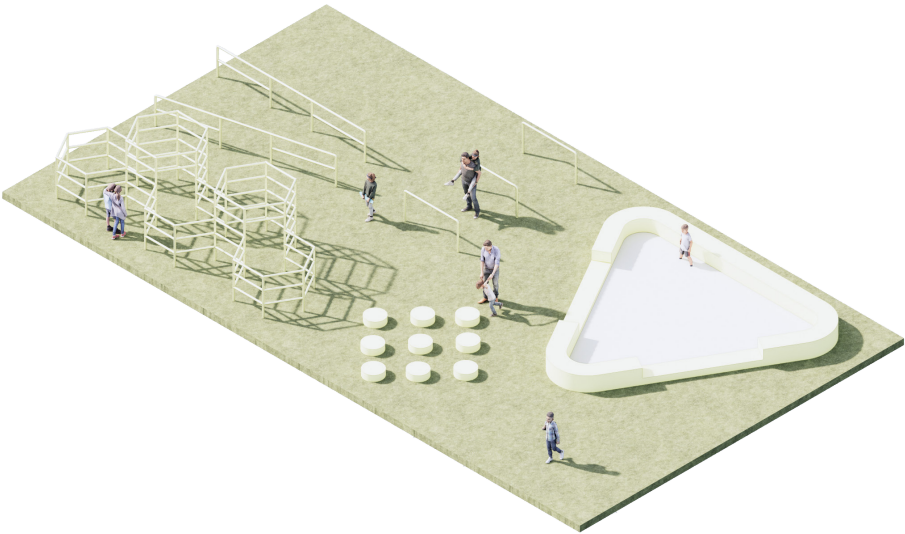
Play Space in Cluster



Playground Type A



Playground Type B



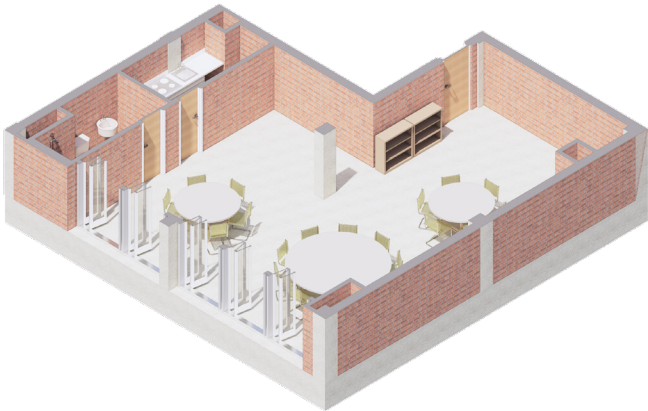
Playground Type C

Community Space in Cluster



Daycare Space

The daycare space is a place where children can receive care while their parents are away at work.



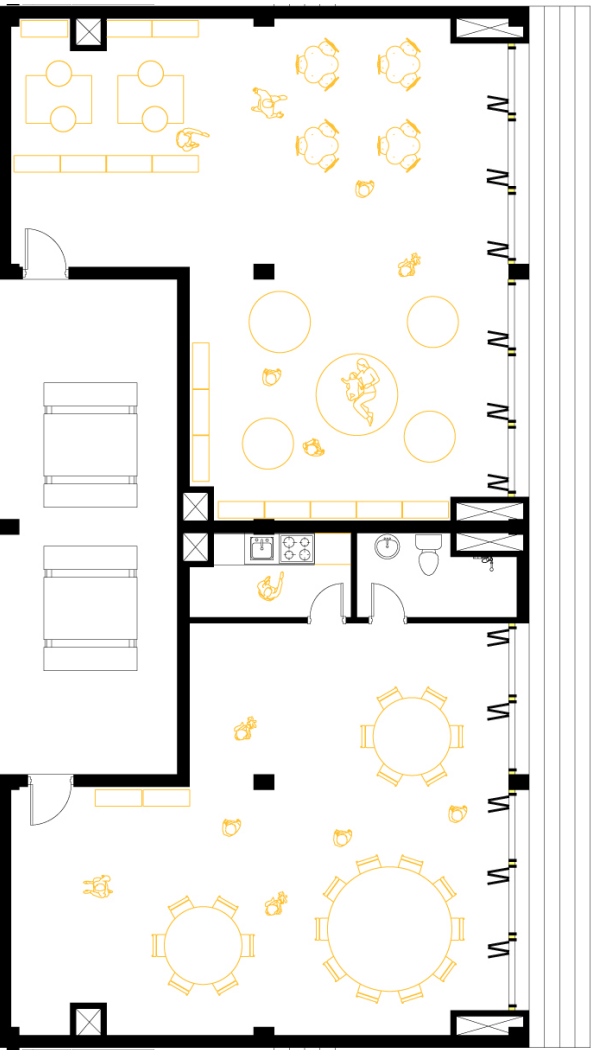
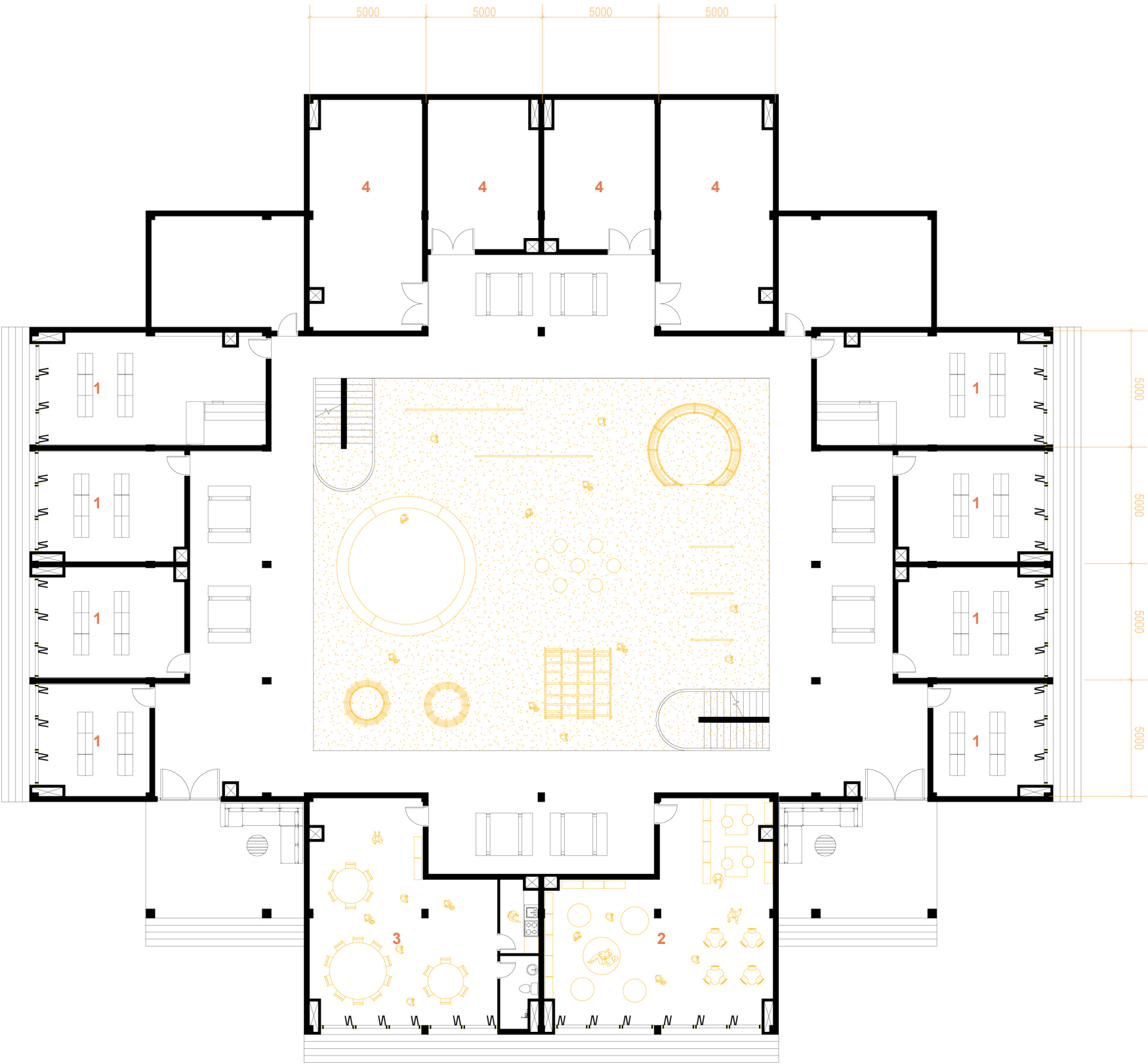
Gathering Space

The gathering space is a flexible area where various child-related activities take place and parents can interact and exchange information.



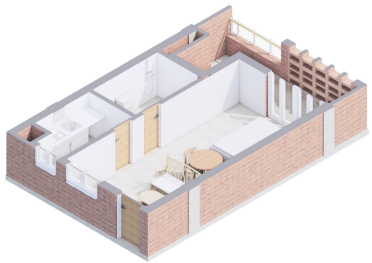
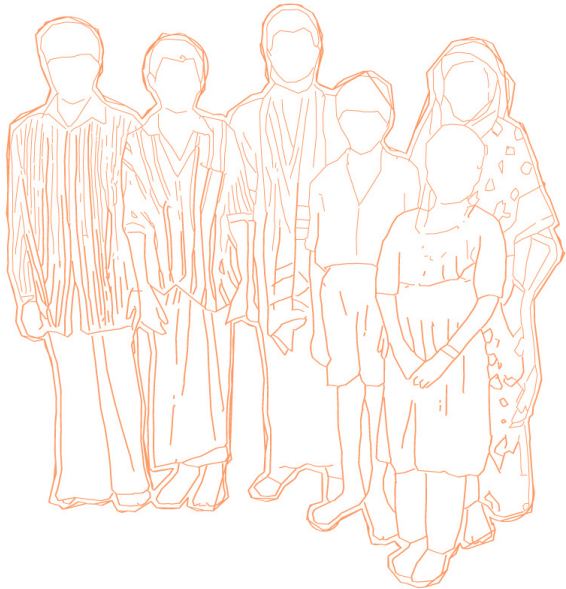
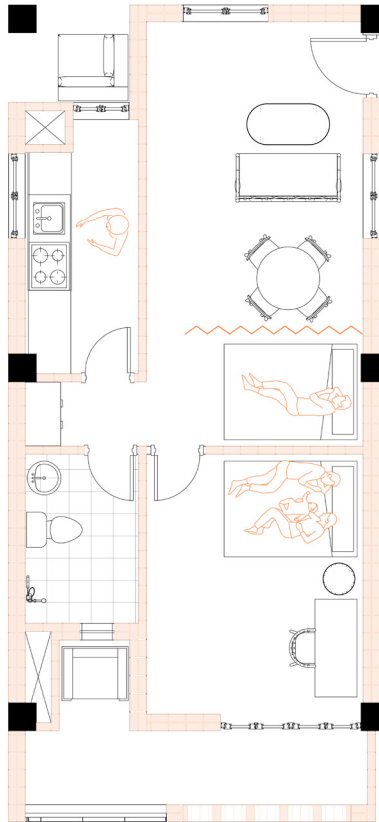
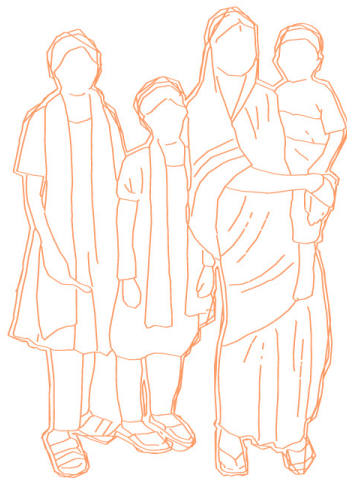
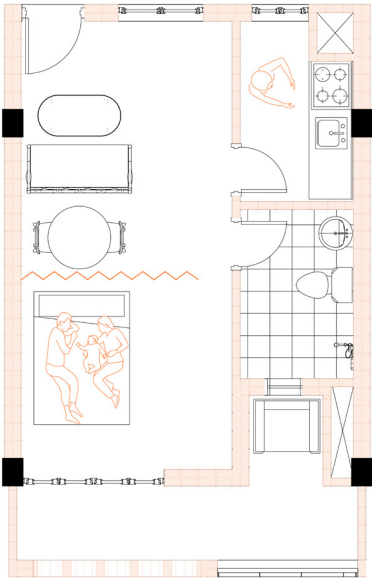
Reading Space

The reading space is a place where children can learn how to read and engage with a variety of books, fostering their academic development.



Low income cluster GL

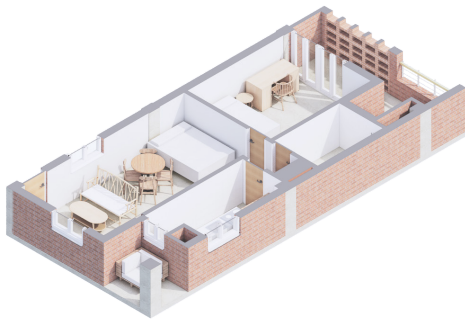
- 1. Shops
- 2. Library
- 3. Gathering space
- 4. Storage



Low income unit - 35 sqm

For 2-4 people

- Living space (bedroom at night)
- Dining table
- Bed
- Kitchen
- Toilet
- Balcony (1.2m)



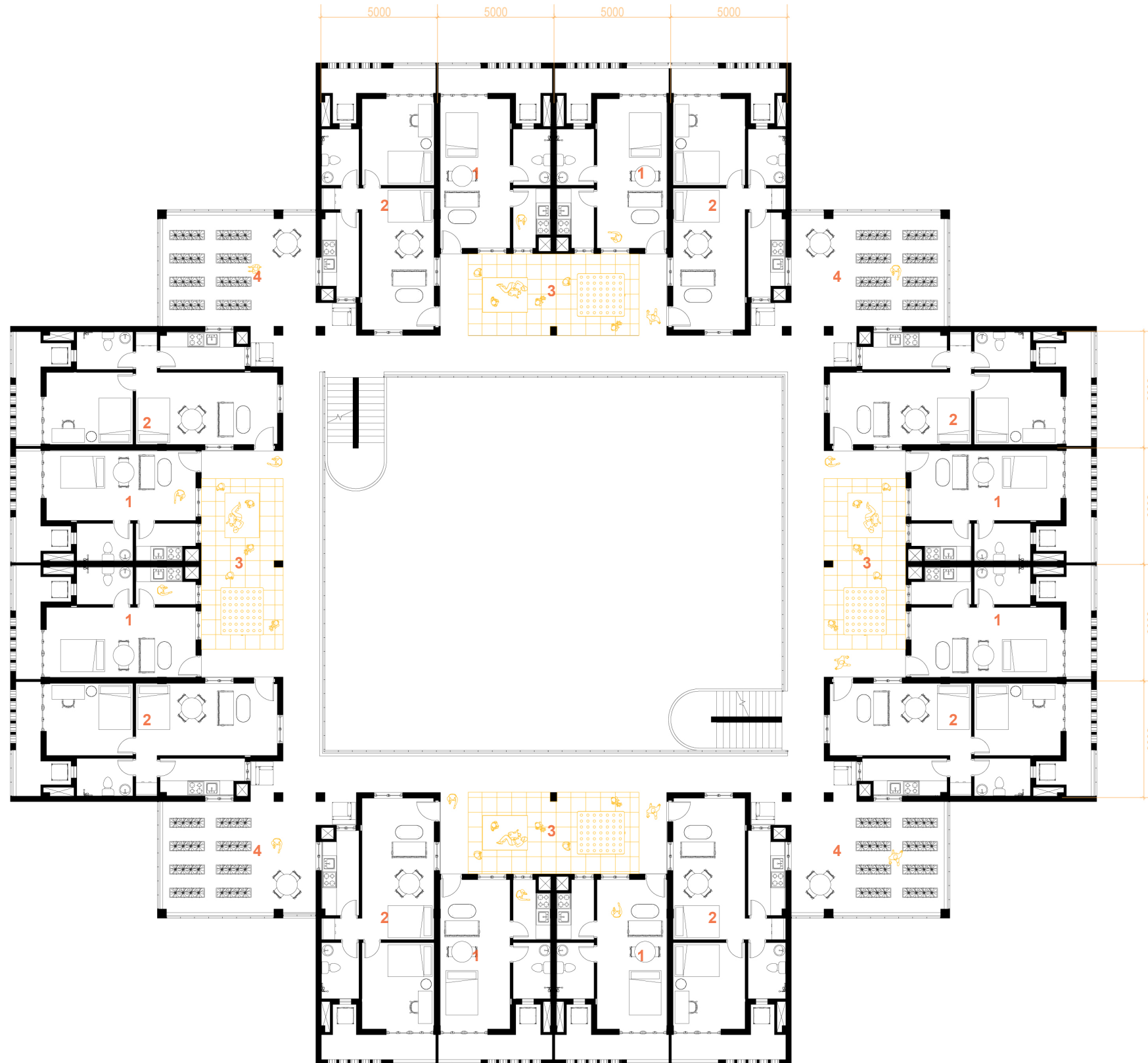
Low income unit - 50sqm

For 4-6 people

- Living space (bedroom at night)
- Dining table
- Bed room
- Kitchen
- Toilet
- Balcony (1.2m)



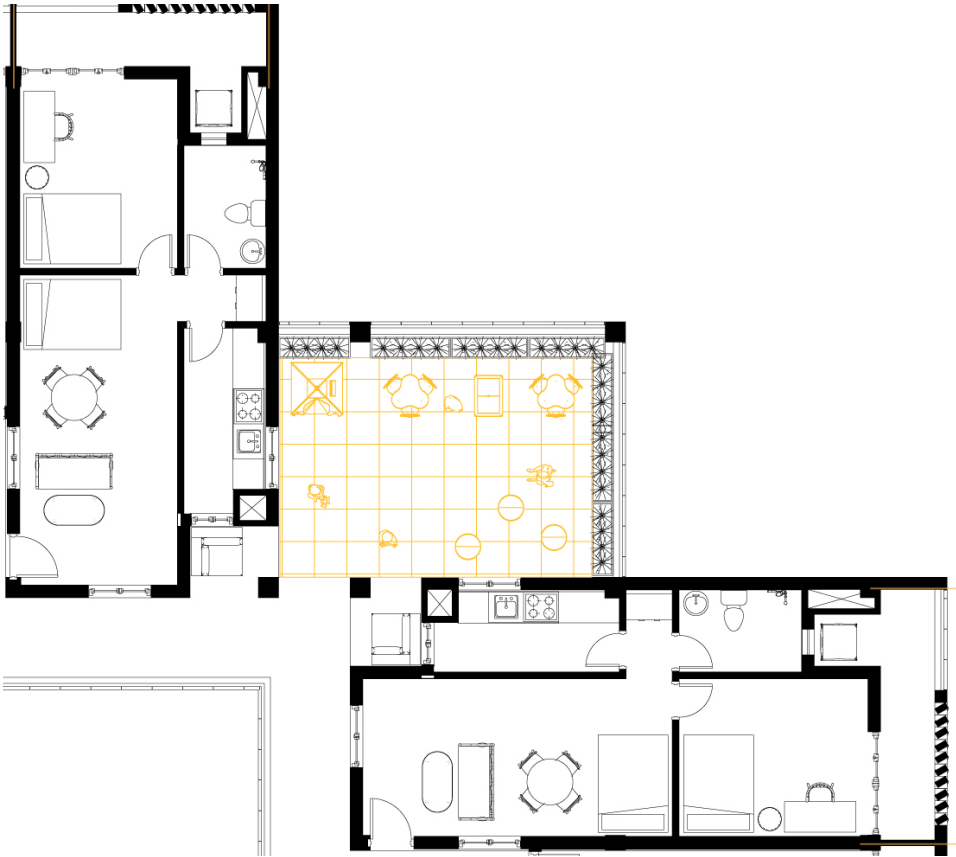
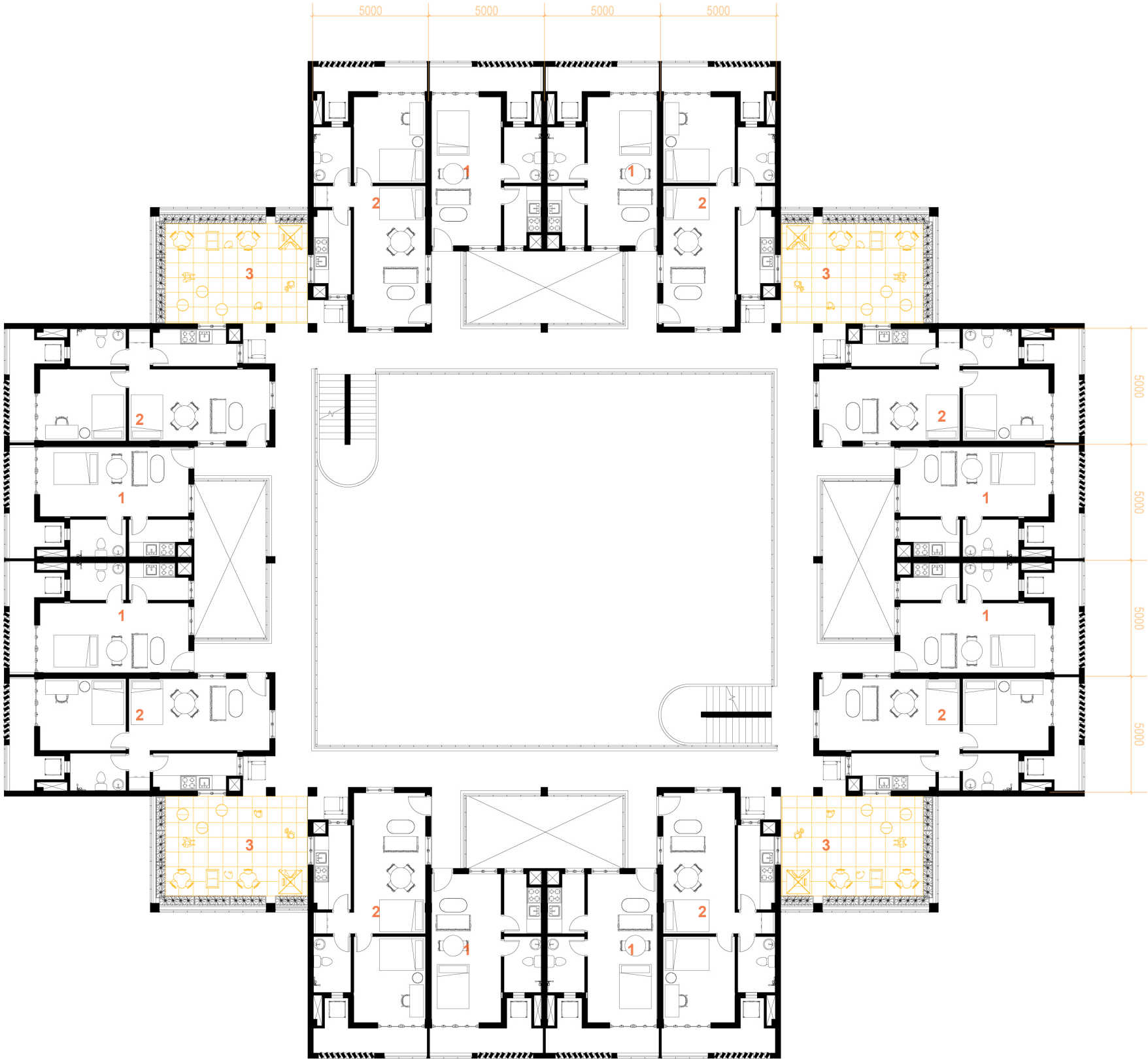
Cluster Plans



Low income cluster 1st floor

- 1. 35 sqm studio unit (2-4 person) - 8
- 2. 50 sqm one-bed room unit (4-6 person) - 8
- 3. Pocket play space
- 4. Farming balcony

Cluster Plans



Low income cluster 2nd floor

- 1. 35 sqm studio unit (2-4 person) - 8
- 2. 50 sqm one-bed room unit (4-6 person) - 8
- 3. Pocket play space

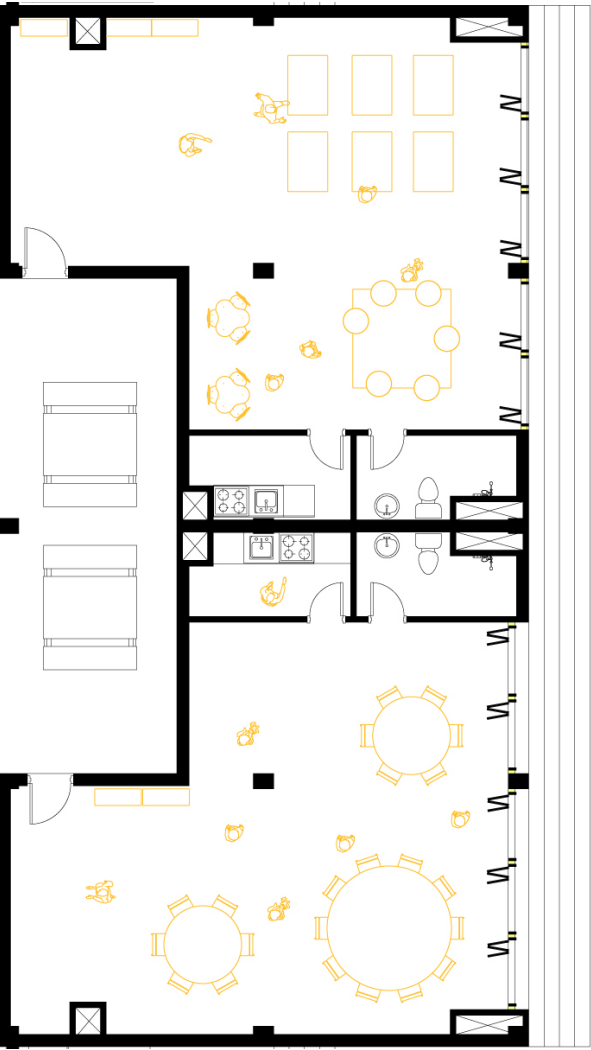
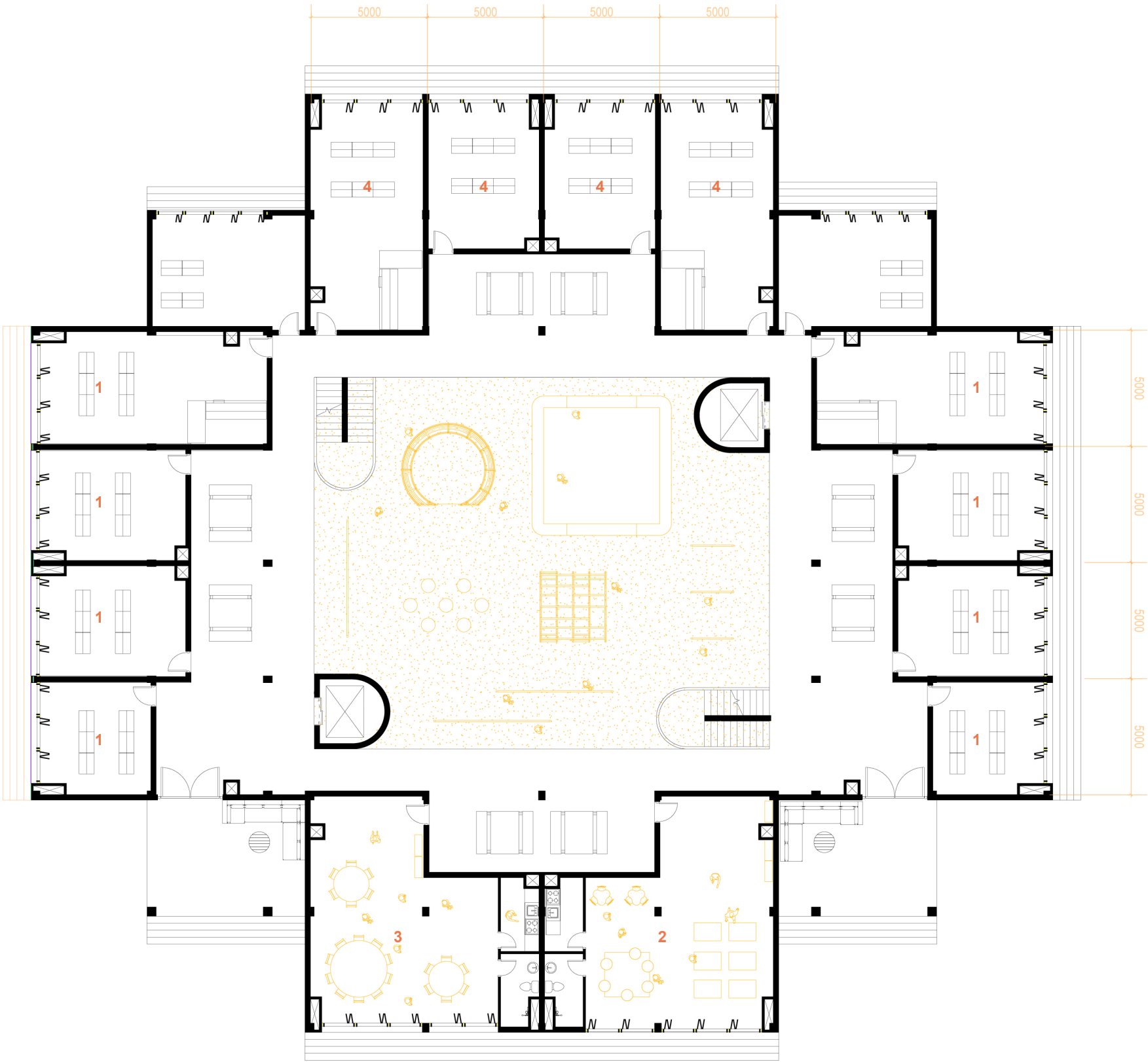
Section View



View of the Corridor

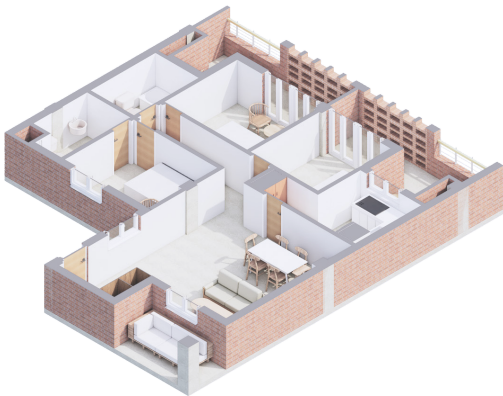
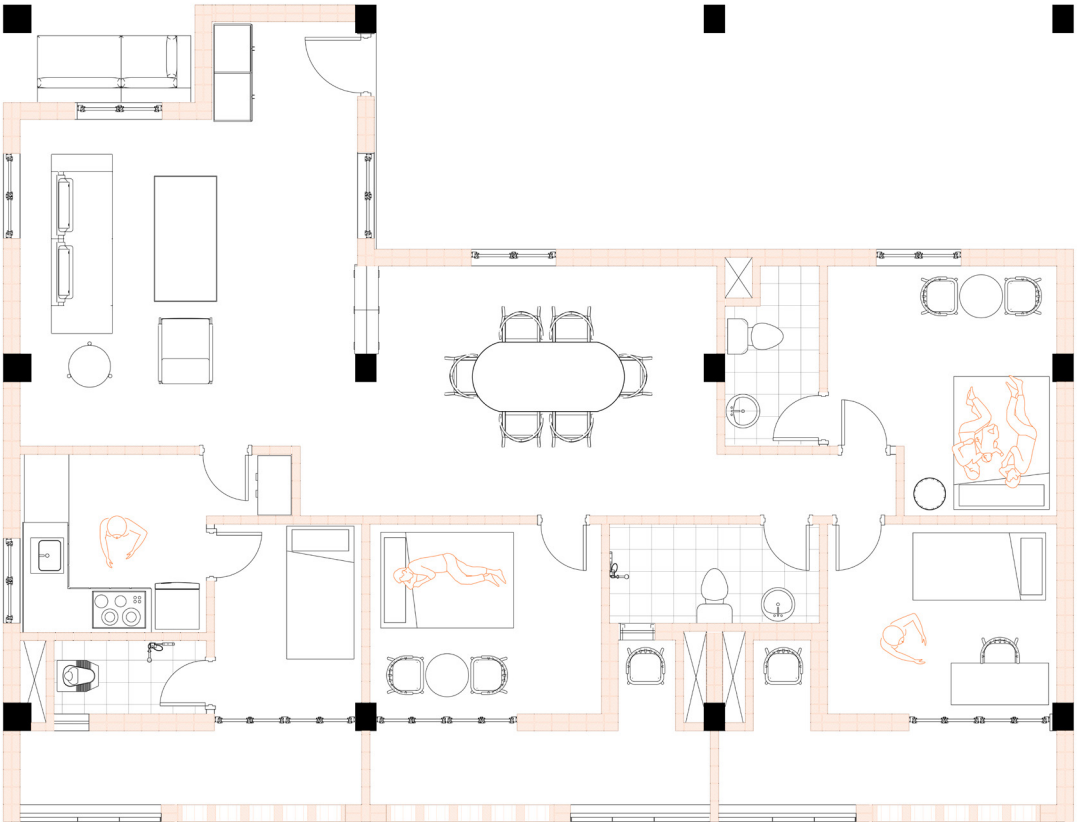
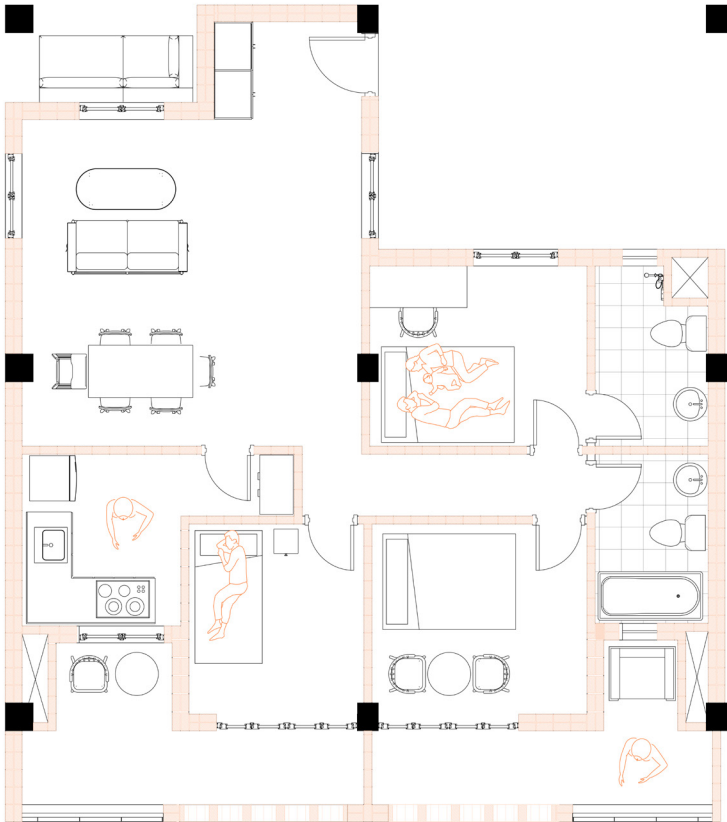






Middle income cluster GL

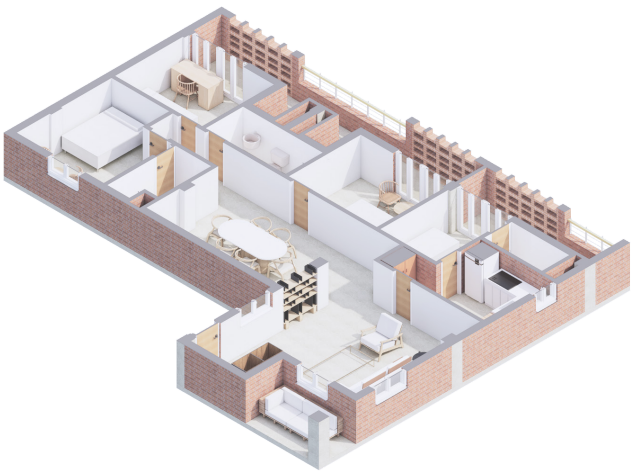
- 1. Shops
- 2. Day care center
- 3. Gathering space
- 4. Storage



Middle income unit - 85sqm

For 4-6 people

- Living space
- Dining
- 3 bedrooms
- Kitchen
- 2 toilet
- Balcony (1.2m)

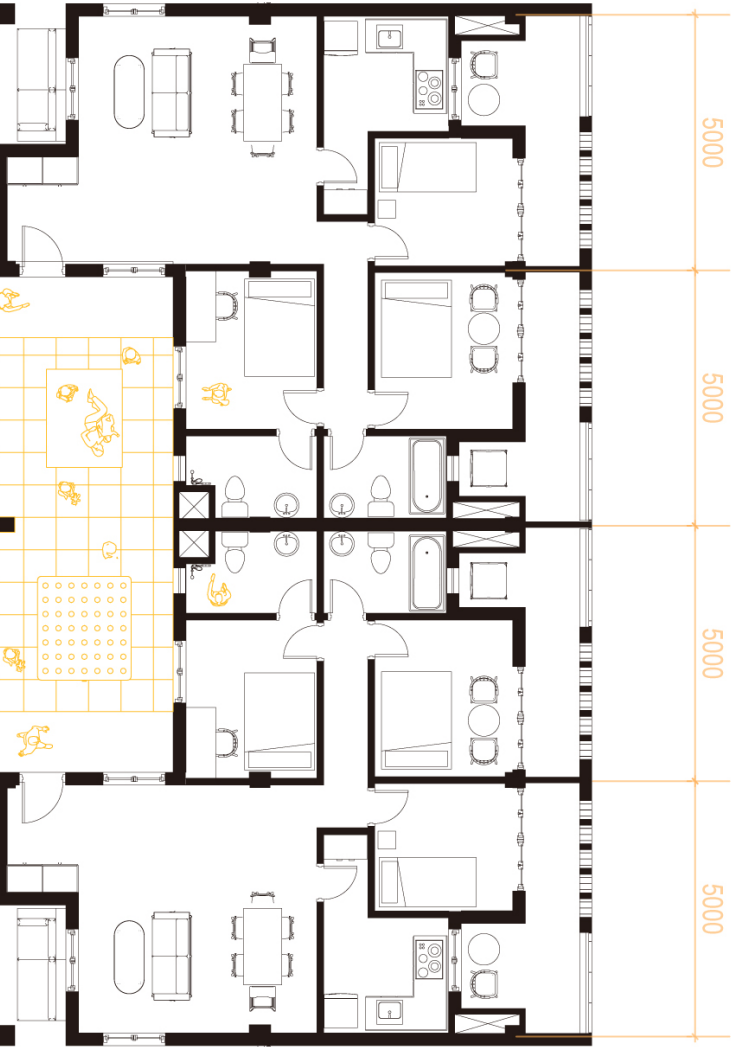
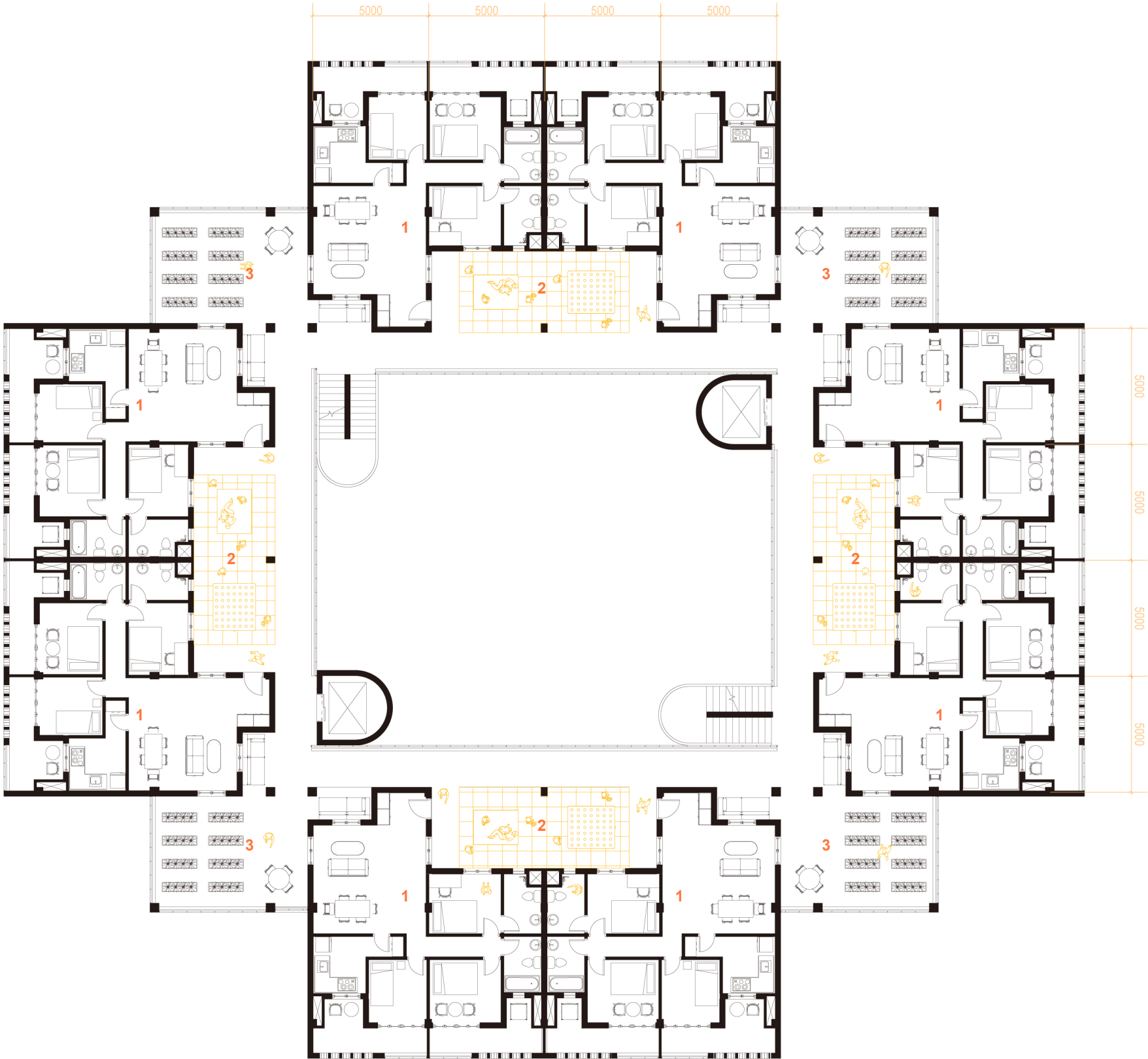


High income unit - 120sqm

For 4-6 people

- Living space
- Dining
- 3 large bedrooms
- Kitchen
- ervant room
- 2 toilet
- Balcony (1.2m)

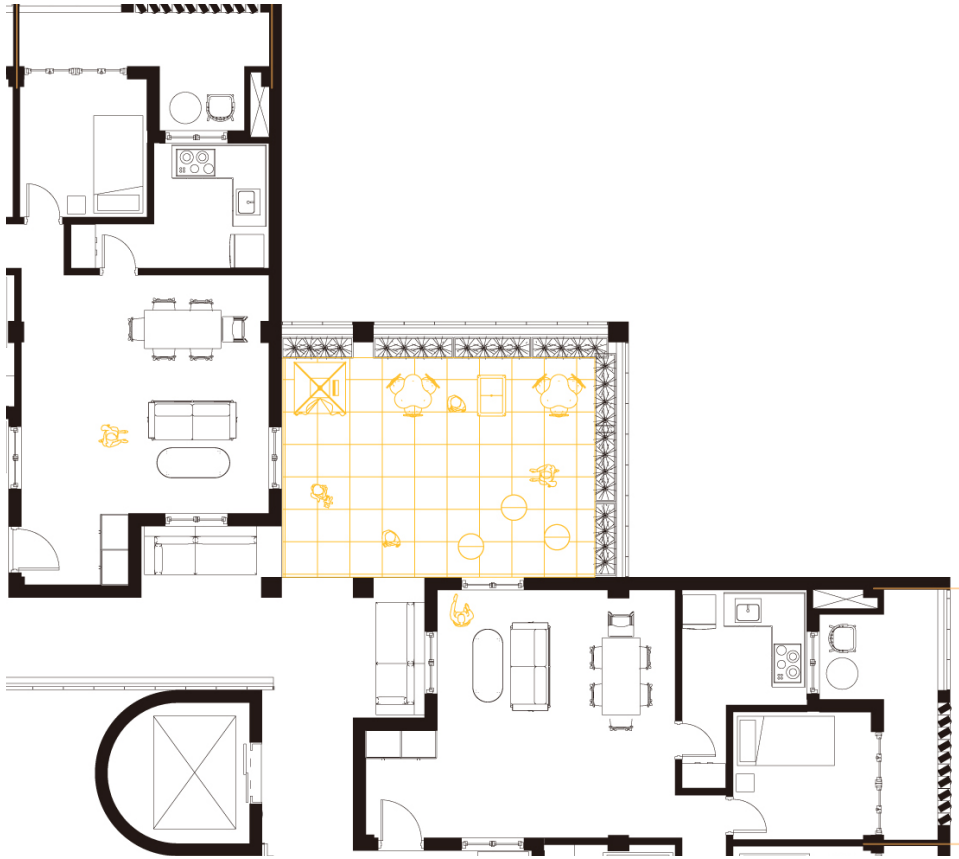
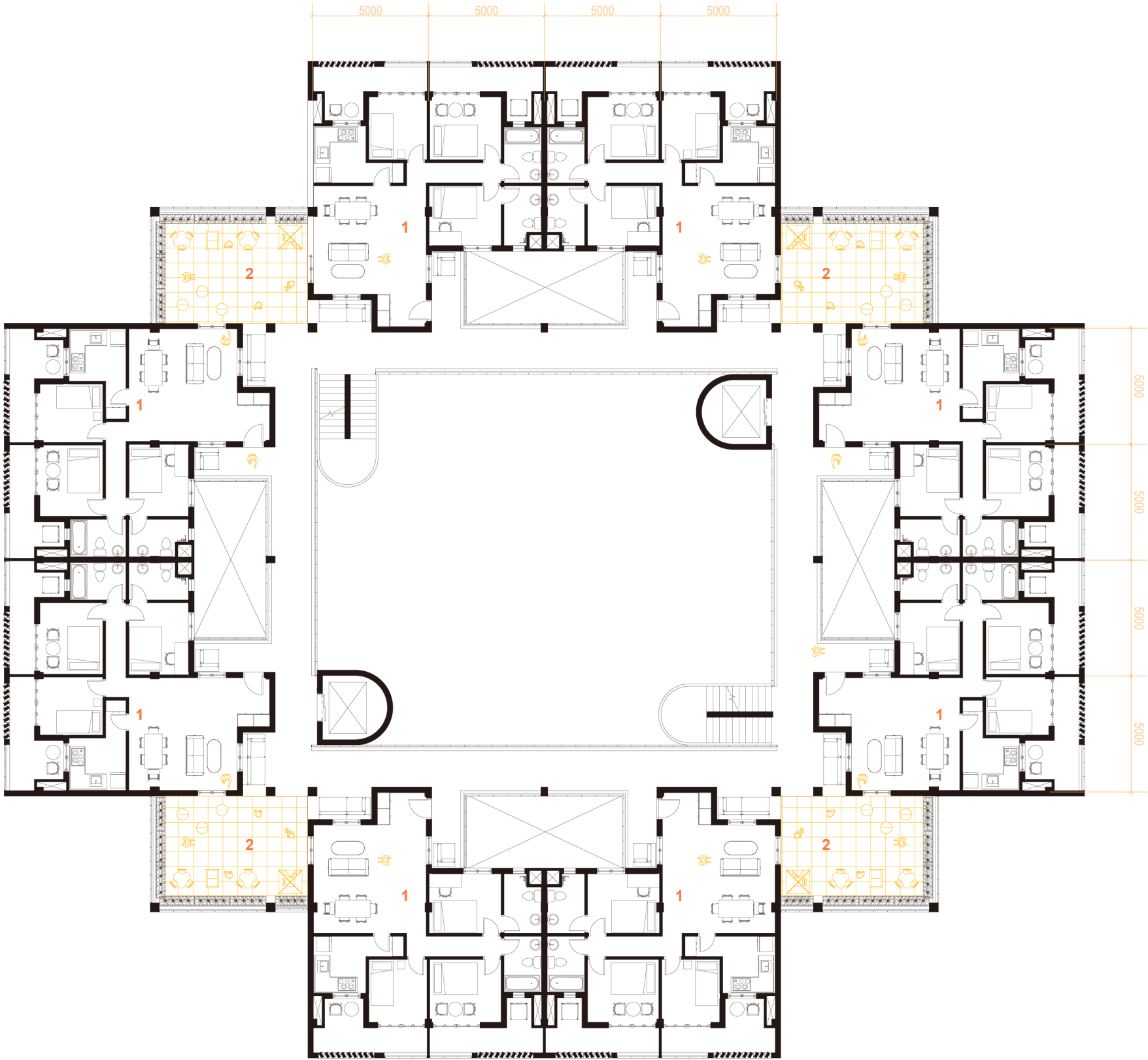
Cluster Plans



Middle income cluster 1st floor

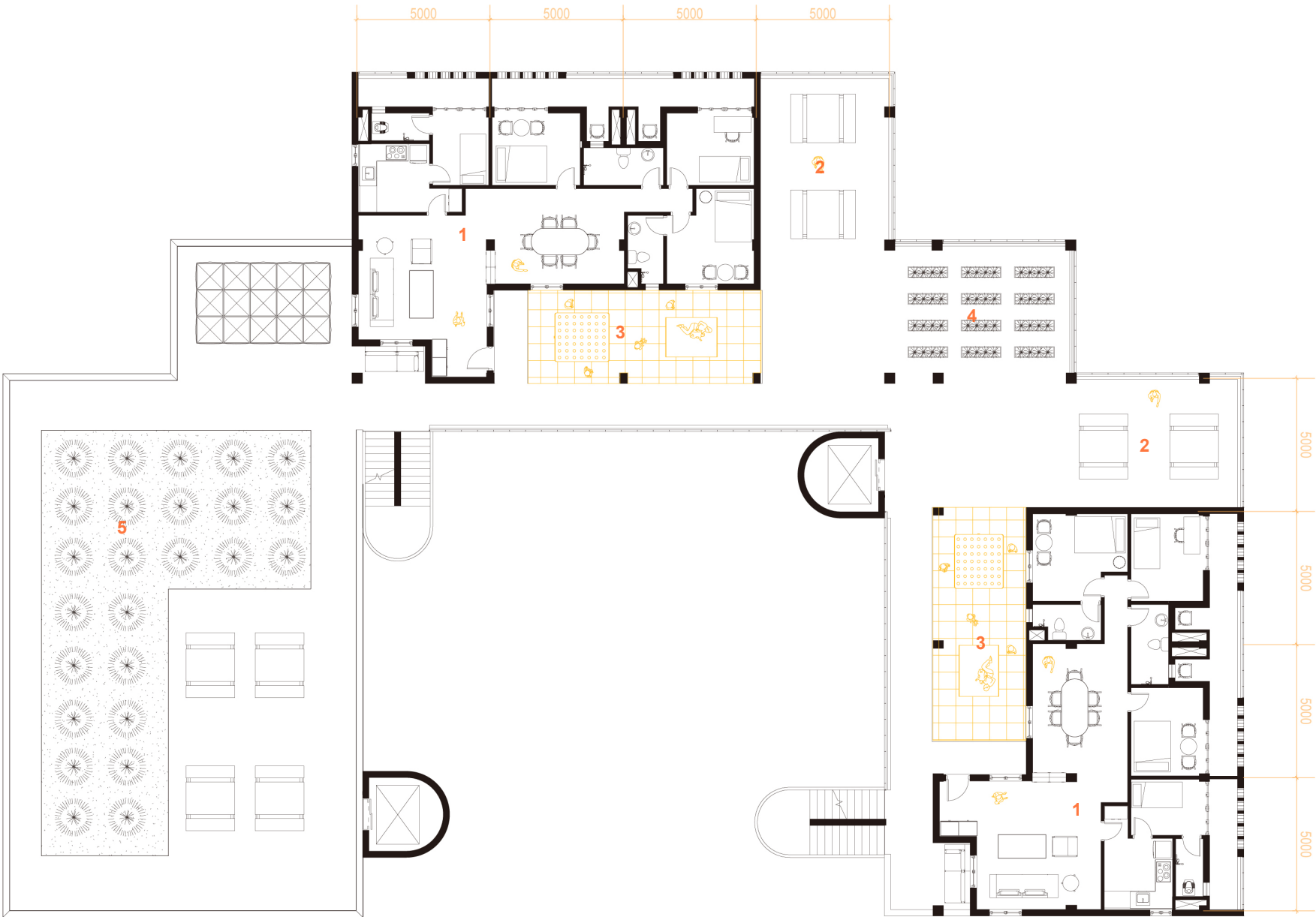
- 1. 85 sqm three-bed unit (4-6 person)
- 2. Pocket play space
- 3. Farming balcony

Cluster Plans



Middle income cluster 2nd floor

- 1. 85 sqm three-bed unit (4-6 person)
- 2. Pocket play space



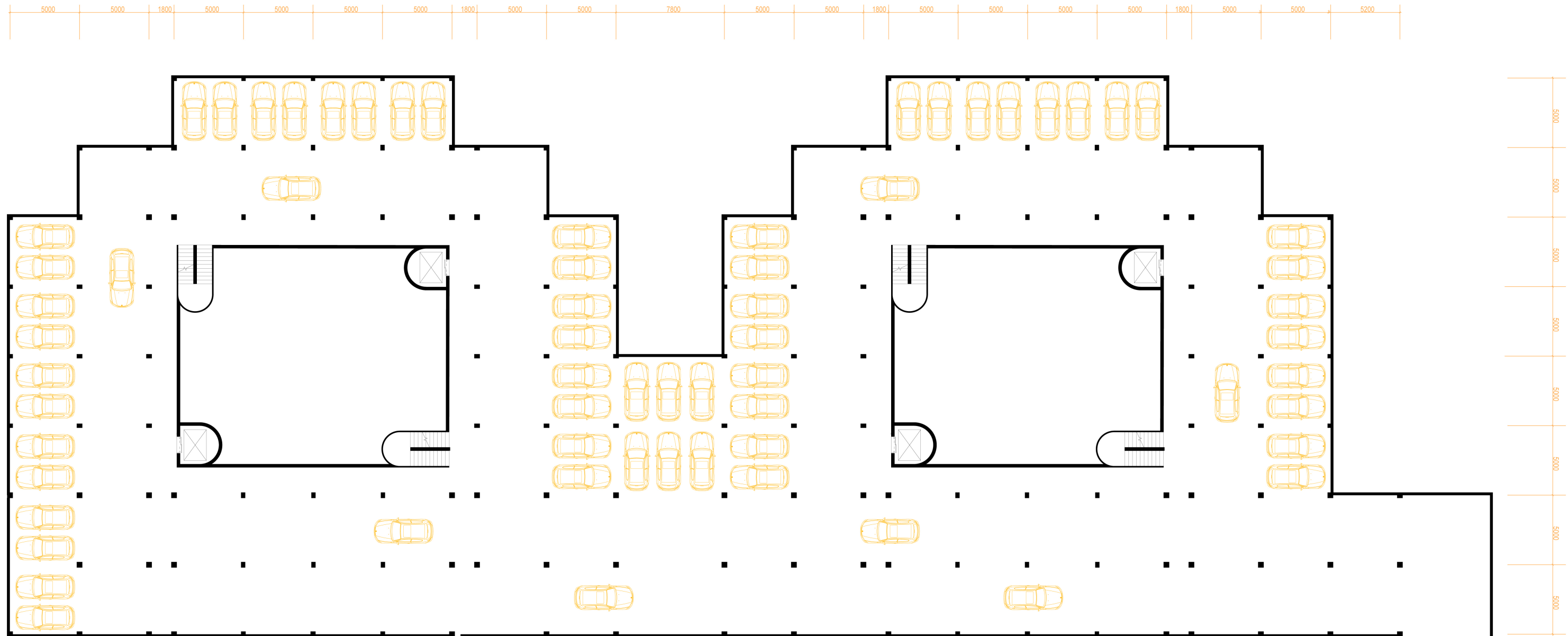
High income Floor

- 1. 120 sqm three-bed unit (4-6 person)
- 2. Exterior Balcony
- 3. Pocket play space
- 4. Farming balcony
- 5. Roof top Farming

View of the Playground



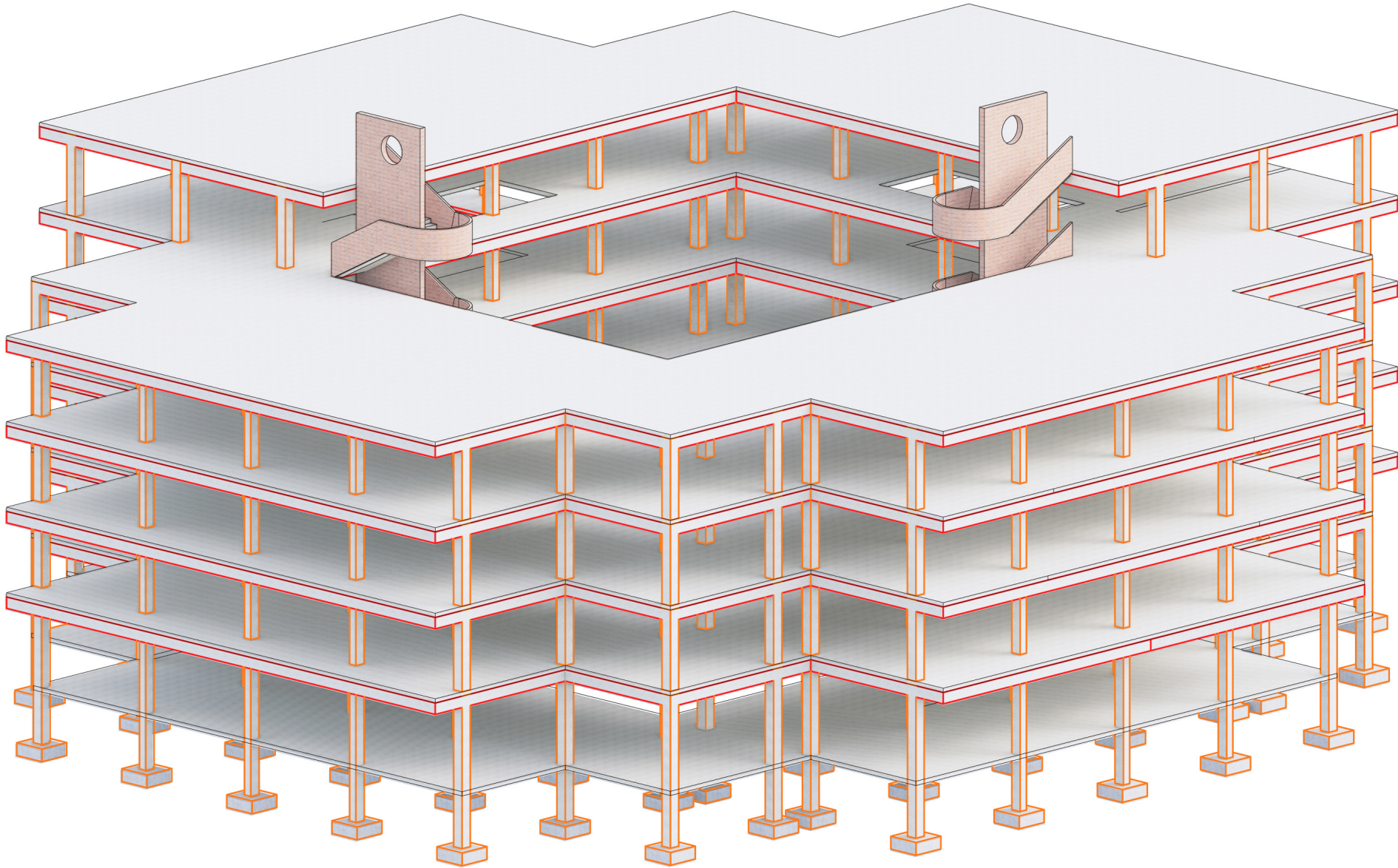
Cluster Plans



Parking Lot

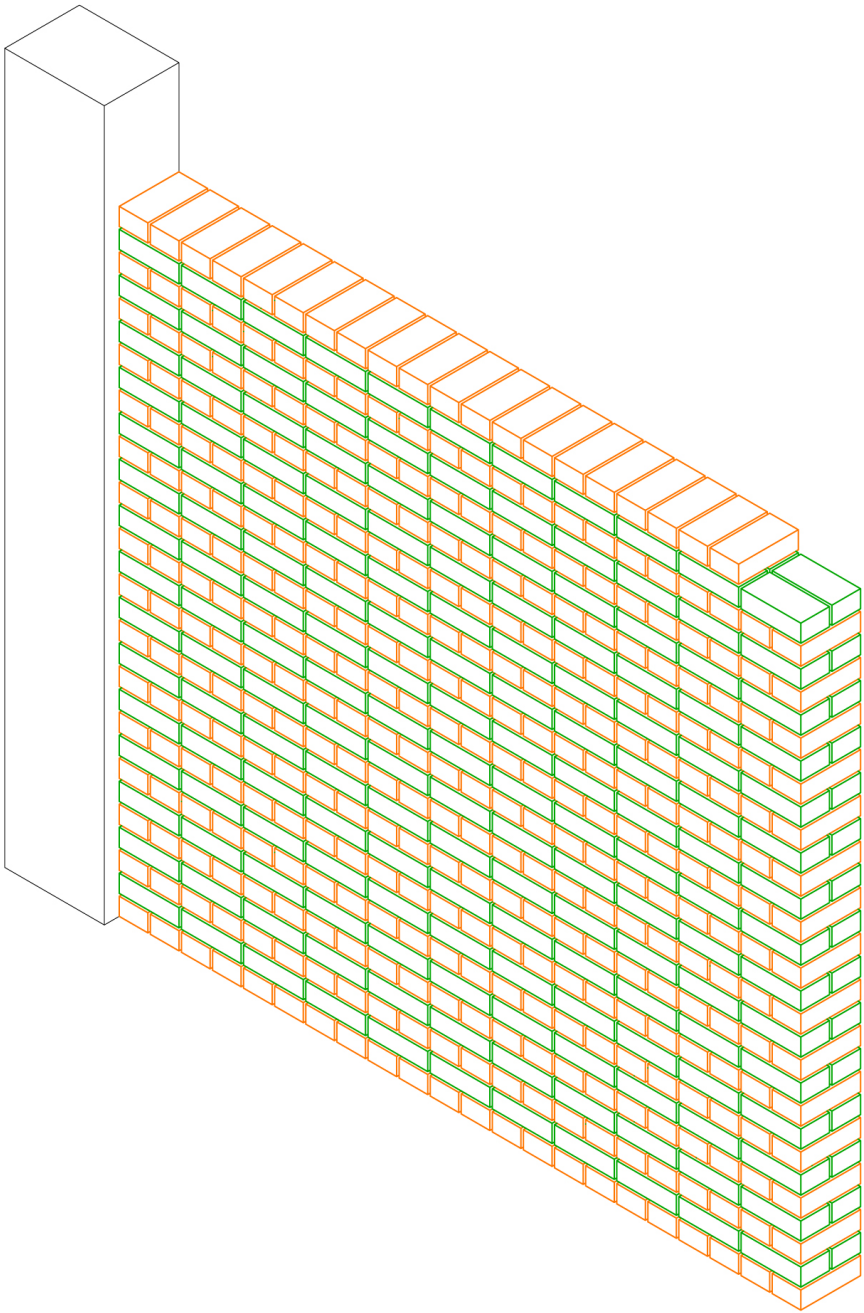
1. 60 parking space

BUILDING TECHNOLOGY



LOAD BEARING STRUCTURE

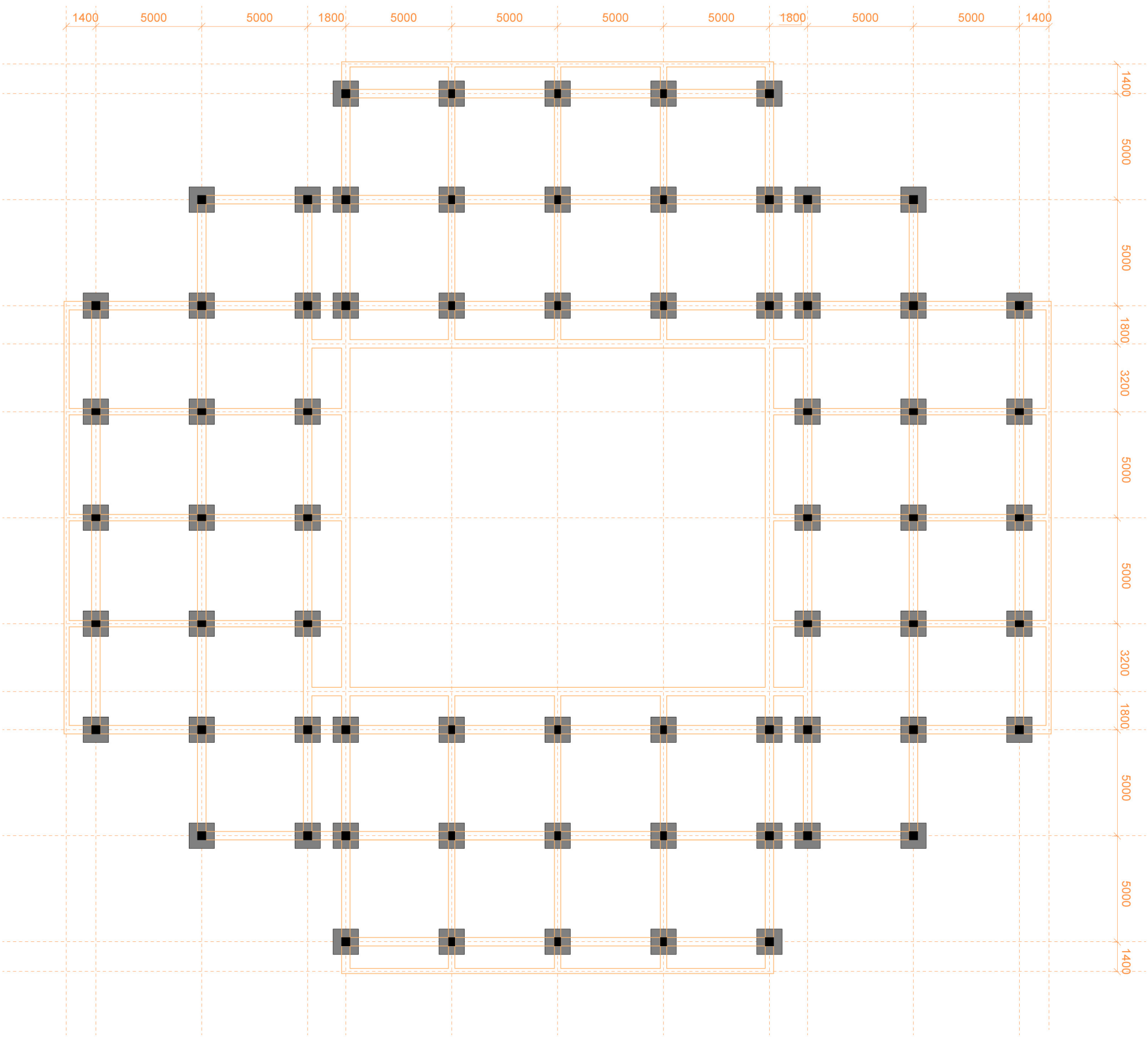
- 1. Concrete Column (400x400, 300x400)
- 1. Concrete Beam (400x400, 240x400)

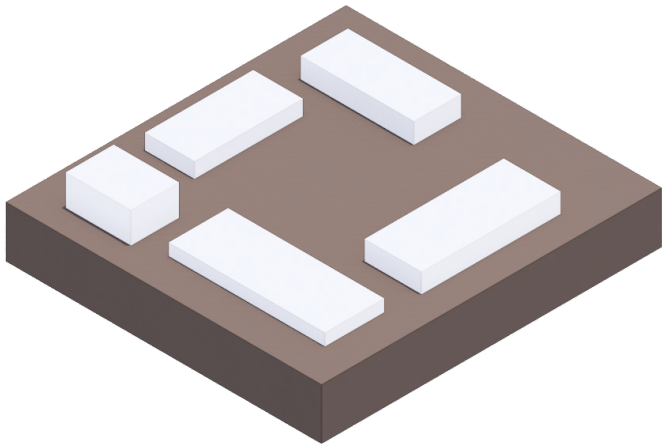


Brick Infill (English Bond)

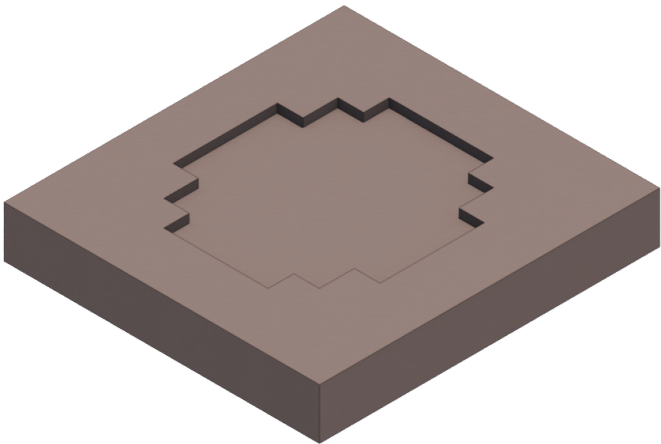
- 1. Fire Brick (240x115x70)

The application of the English brick bond resulted in a dense wall structure, effectively mitigating noise made by children.

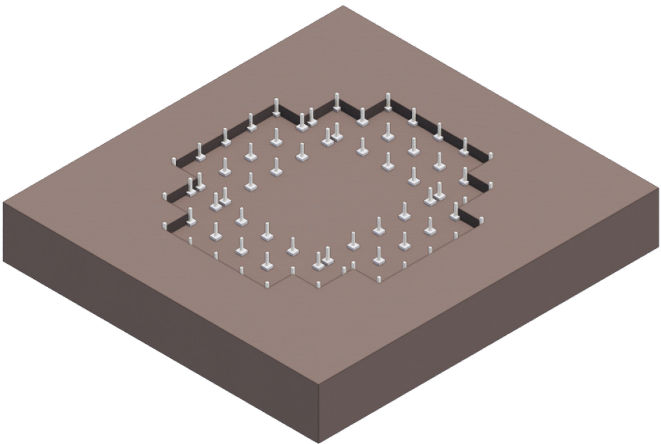




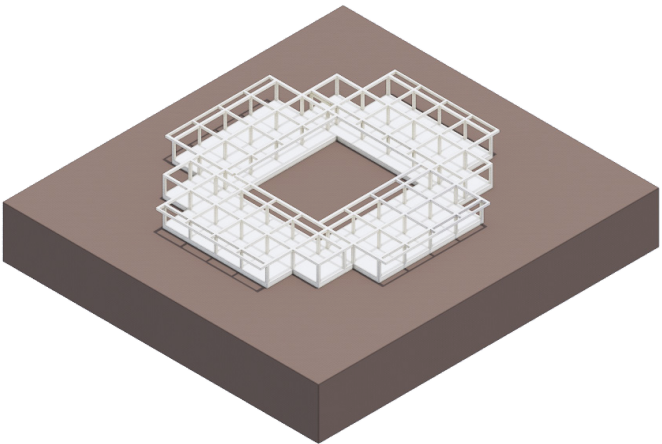
1. SITE PREPARATION



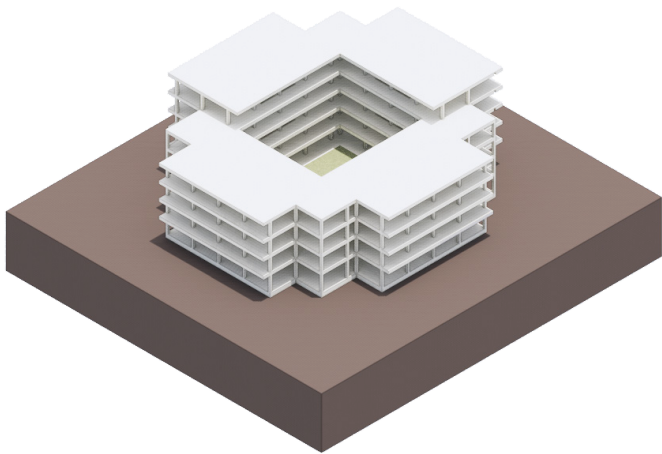
2. EXCAVATION



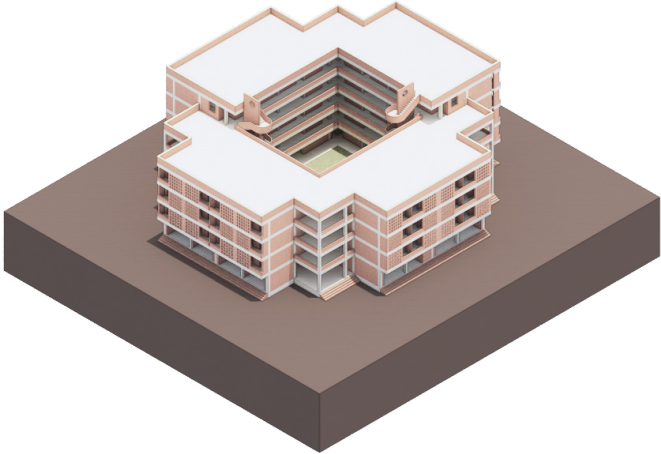
3. FOUNDATION



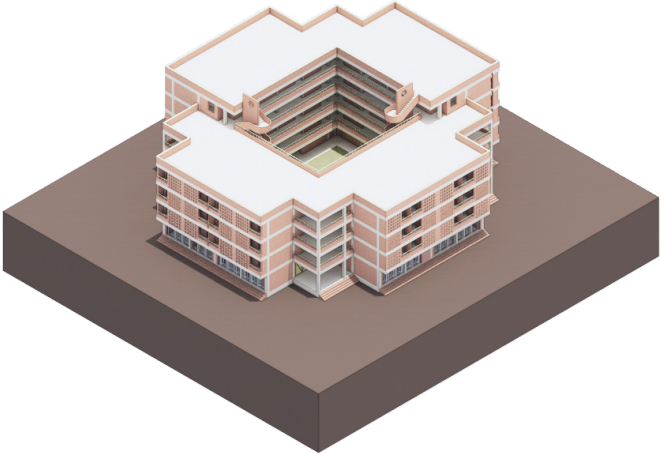
4. GROUND FLOOR



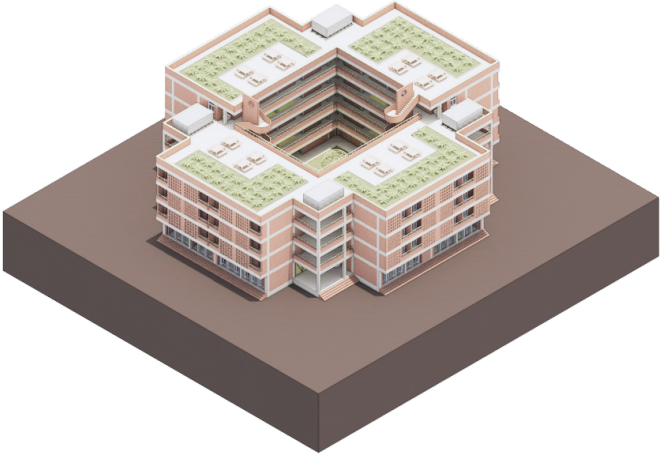
5. REPEATITION



6. BRICK INFILL



7. WINDOW AND DOOR



8. FINISH

Facade

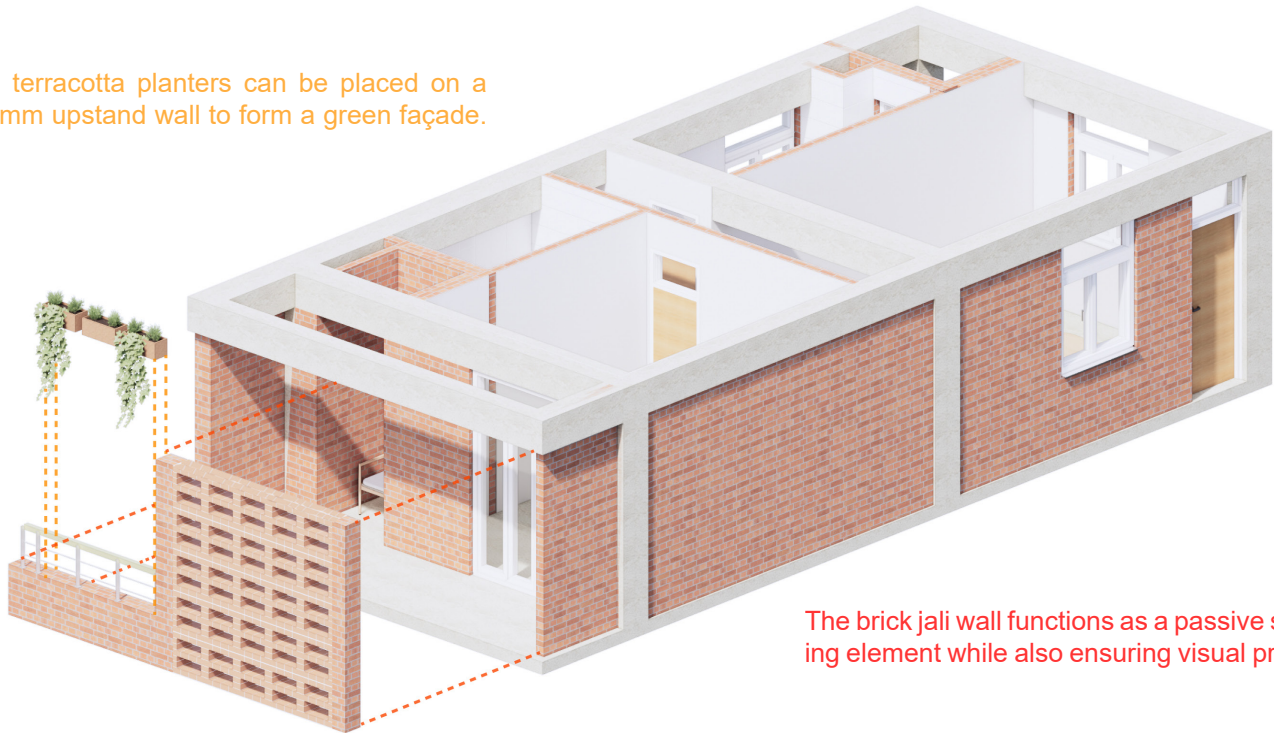


SOUTH ELVEVATION



EAST ELEVATION

The terracotta planters can be placed on a 600mm upstand wall to form a green façade.



The brick jali wall functions as a passive shading element while also ensuring visual privacy



FIRE BRICK

Affordability
Recyclable



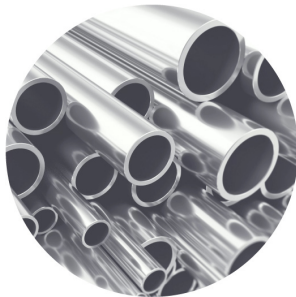
CONCRETE

Durability



UPVC

Affordability
Easy to maintenance



Metal

Aesthetics

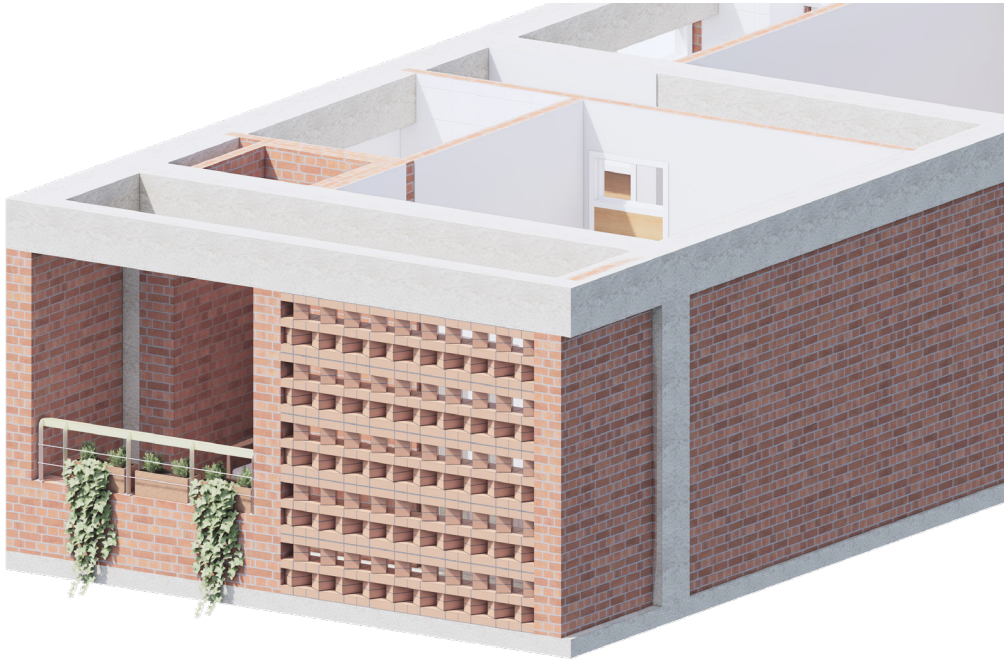
Brick Jali Wall



Horizontal Brick Jali Wall



Vertical Brick Jali Wall



Crossed Brick Jali Wall

Various types of brick jali walls add diversity to the façade, enhance the residents' privacy, and simultaneously provide shading to block excessive sunlight.

South Shading



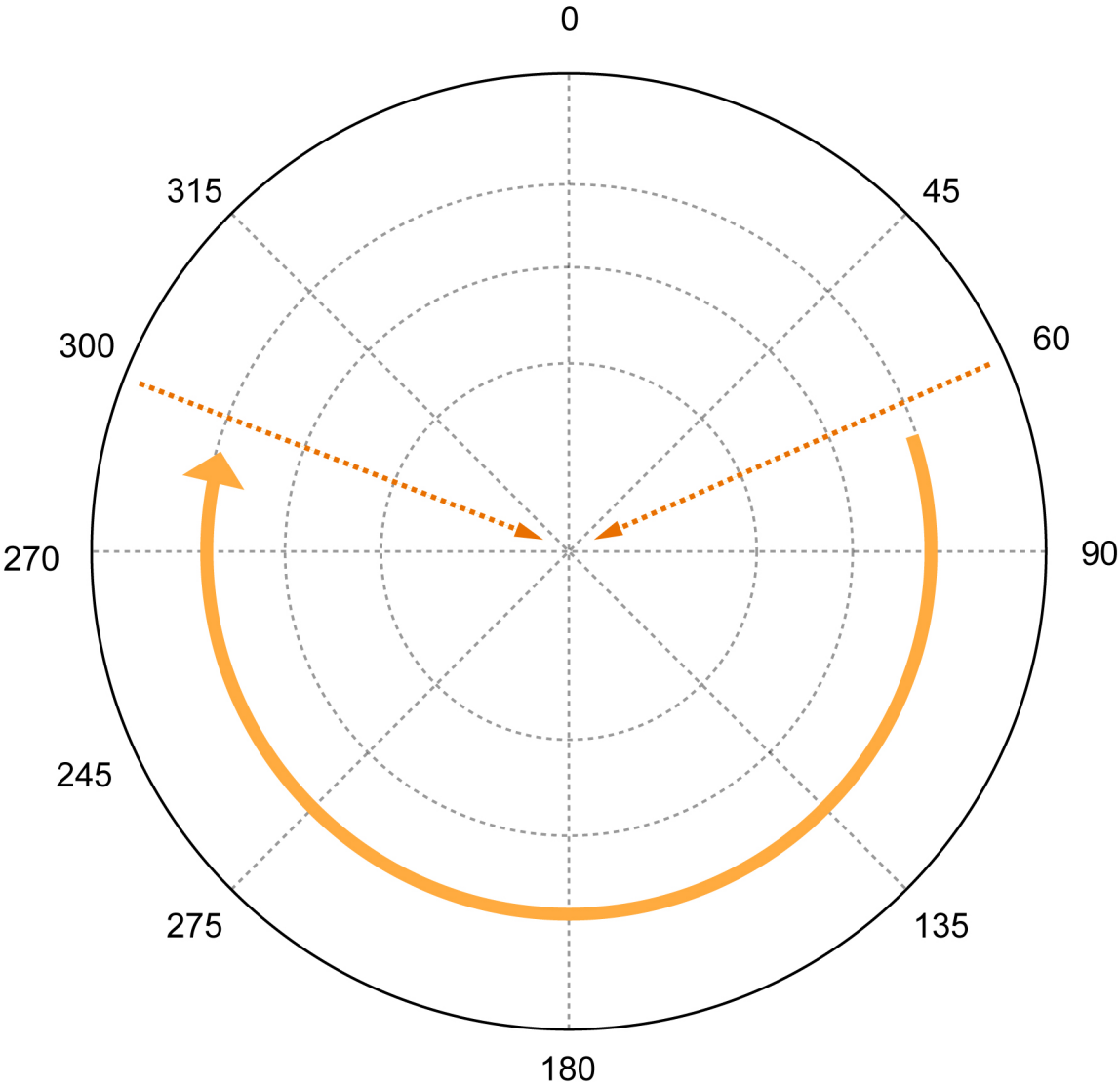
To shade the southern sunlight, a minimum 0.7-meter shading space is required. To make use of this shading area, a 1.4m balcony was created, transforming it into a meaningful and functional space.



Latitude: 24°
 Sun Angle (meridian altitude) = $90^\circ - 24^\circ + 23.5^\circ = 89.5^\circ$ (SUMMER)
 $90^\circ - 24^\circ = 66^\circ$ (March)
 $90^\circ - 24^\circ - 23.5^\circ = 42.5^\circ$ (Winter)
 $\tan 24^\circ (0.45) * 1.5\text{M} = 0.7\text{M}$

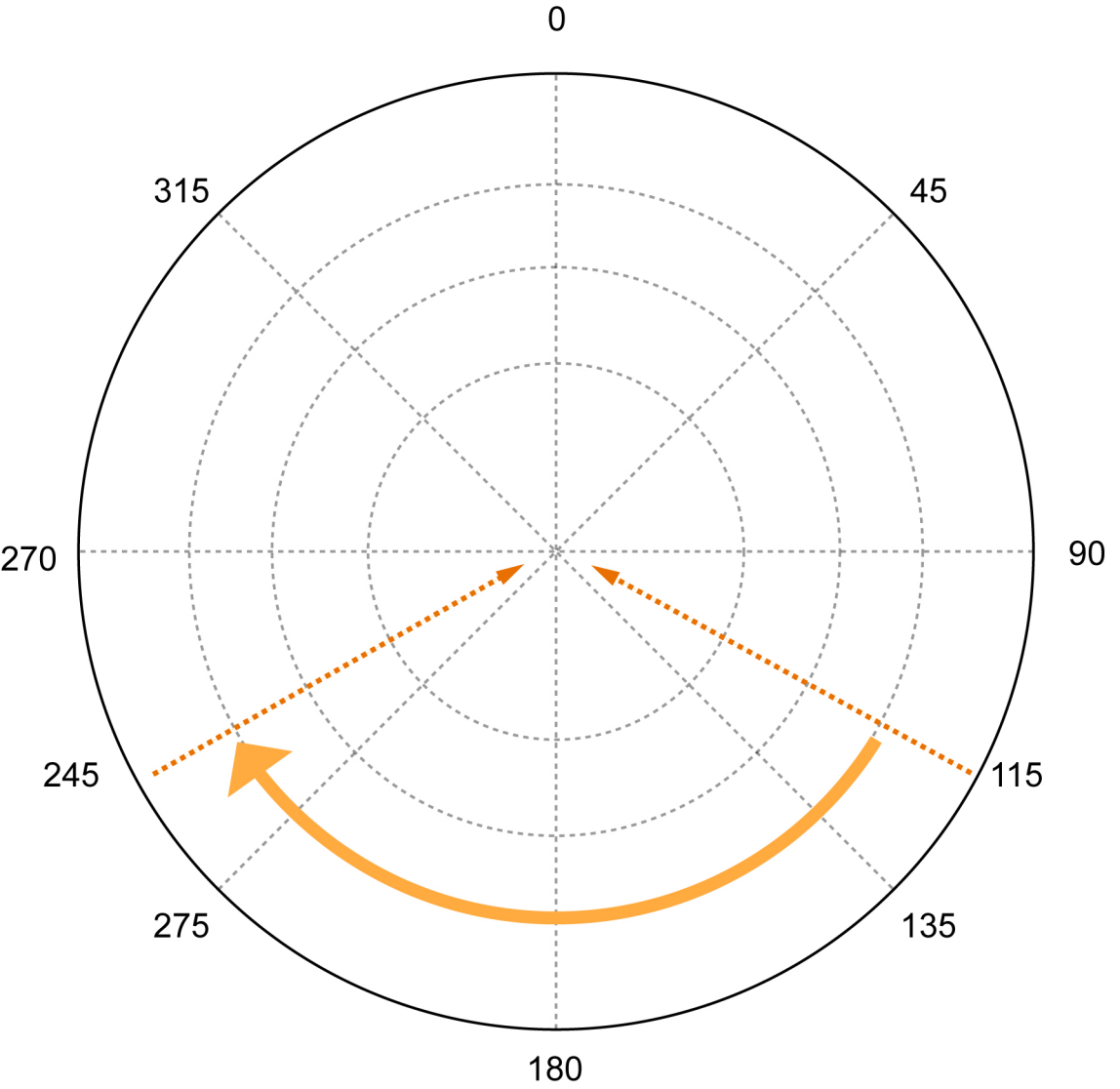
East-West Shading

Sun path Azimuth in Sylhet (Summer)



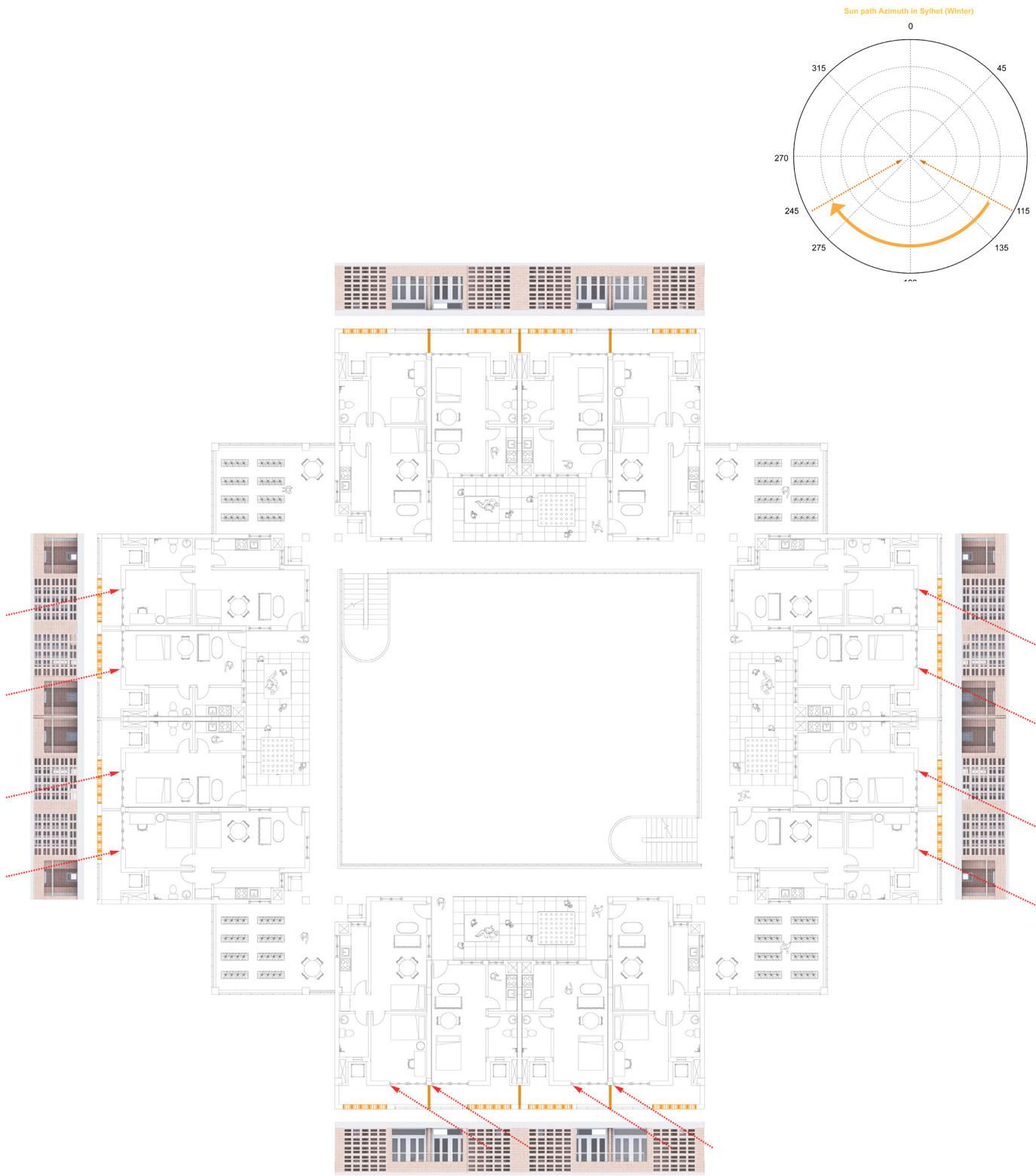
In summer, the sun rises in the northeast and sets in the northwest.

Sun path Azimuth in Sylhet (Winter)

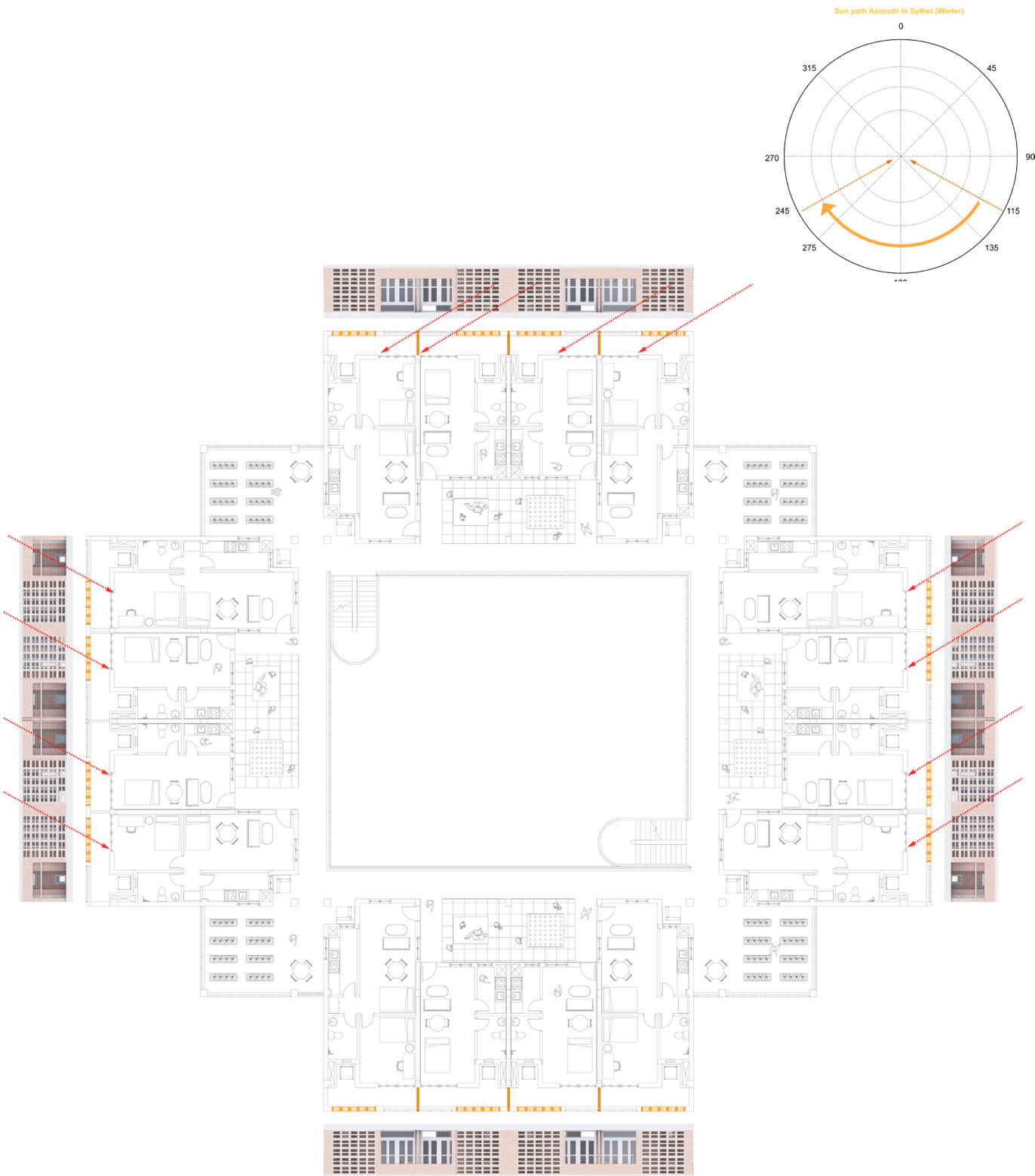


In winter, the sun rises in the southeast and sets in the southwest.

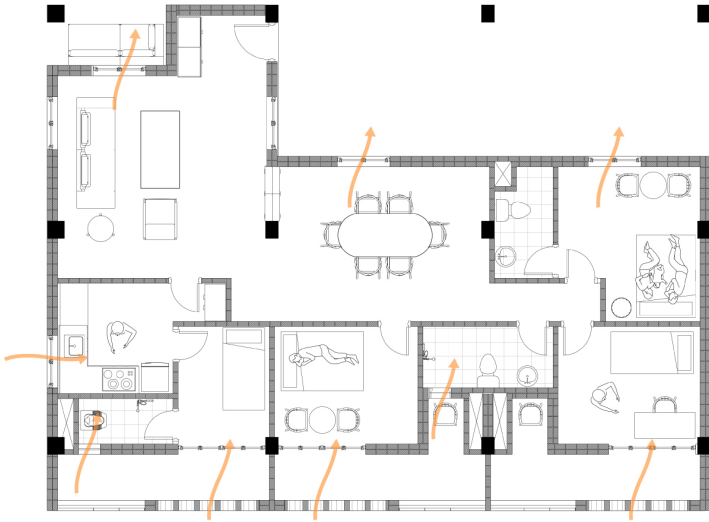
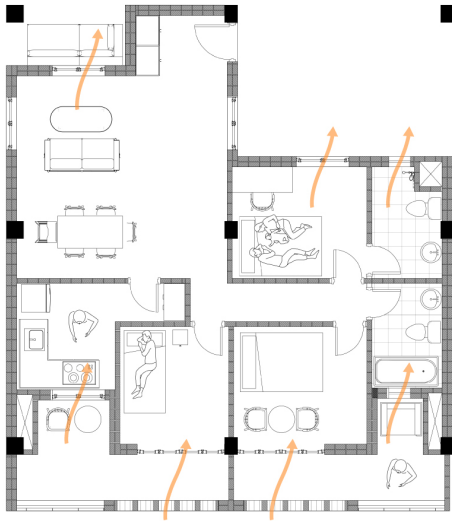
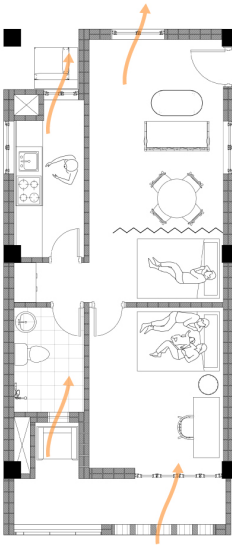
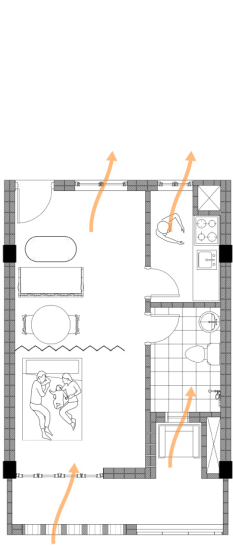
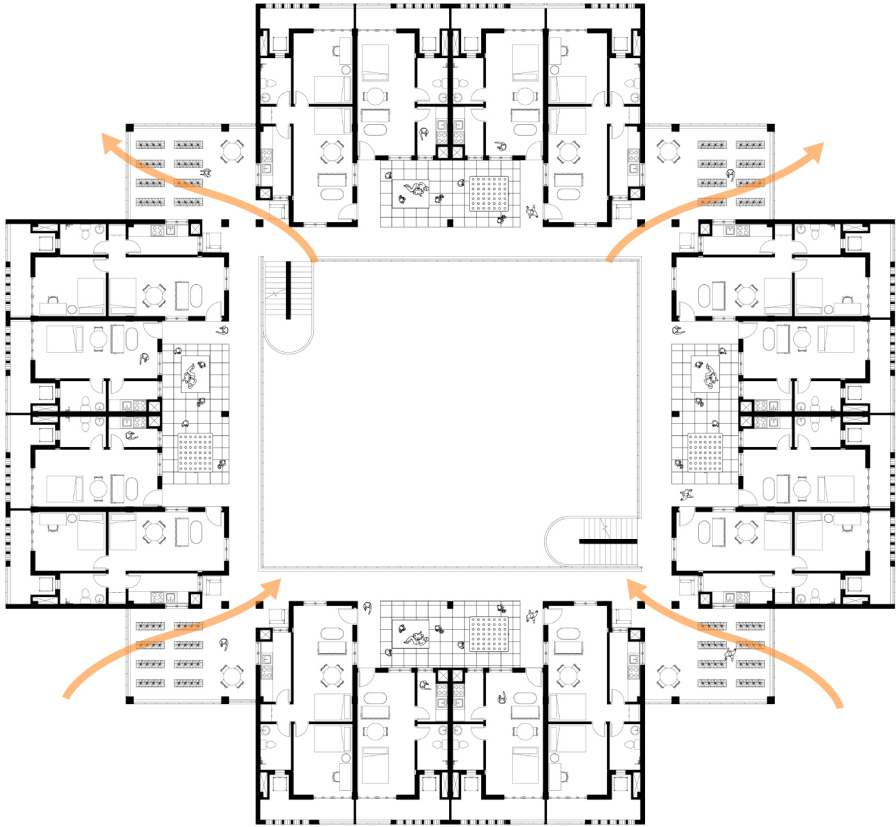
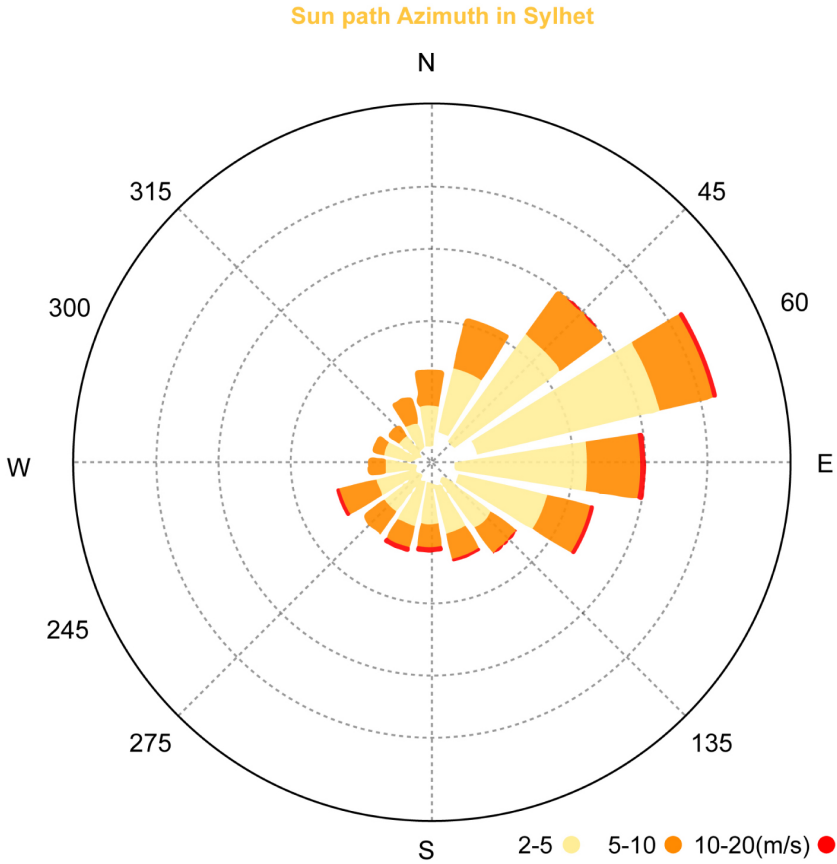
Winter & Summer Shading



In summer, temperatures in Sylhet can rise up to 34°C, making east- and west-facing shading essential. The brick jali wall and partition wall shade the façade, effectively preventing overheating.

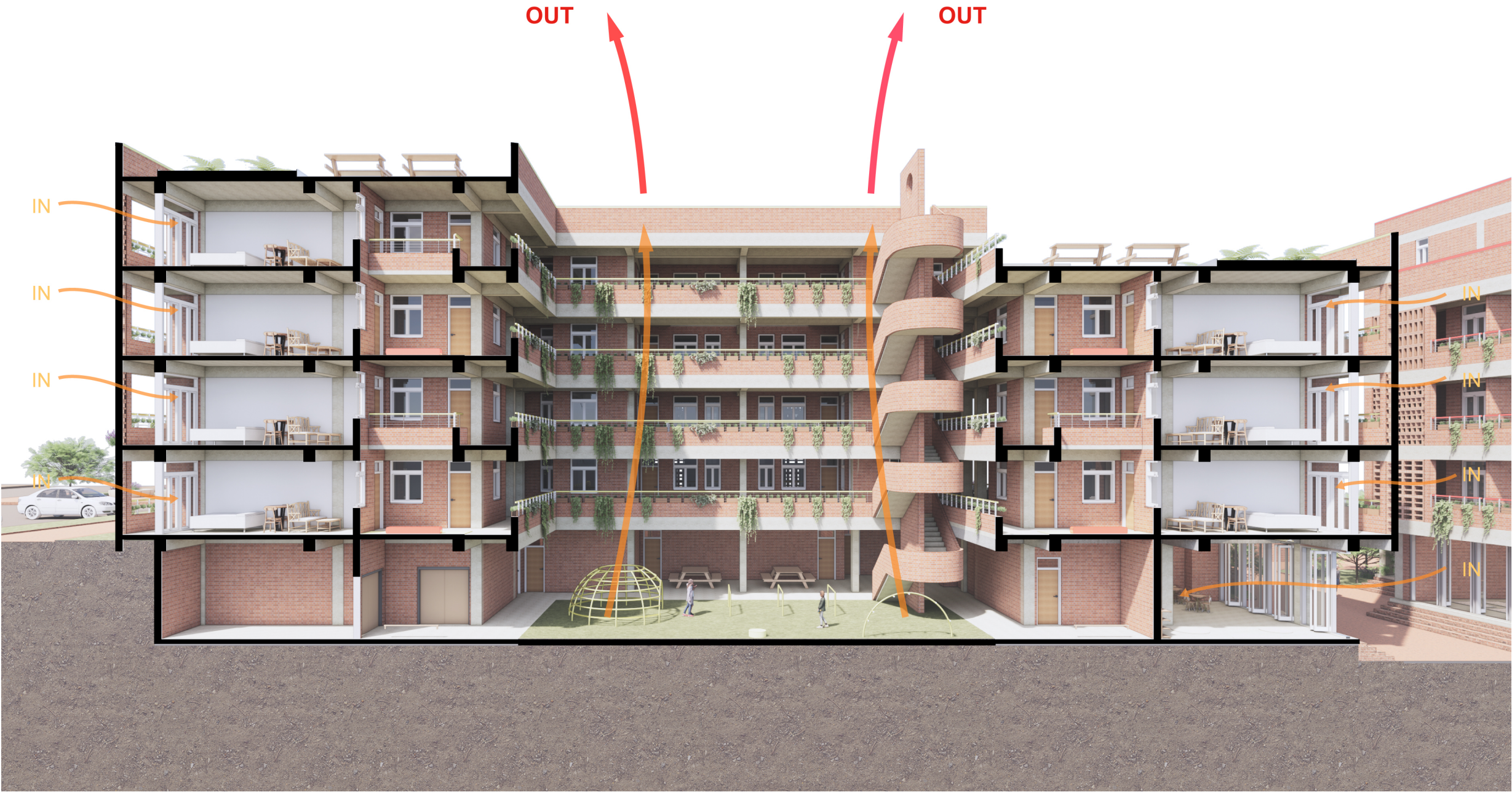


In winter, temperatures in Sylhet can reach up to 28.3°C, making east- and west-facing shading necessary even during the cooler months. The brick jali wall and partition wall provide shading for the façade, helping to prevent overheating.



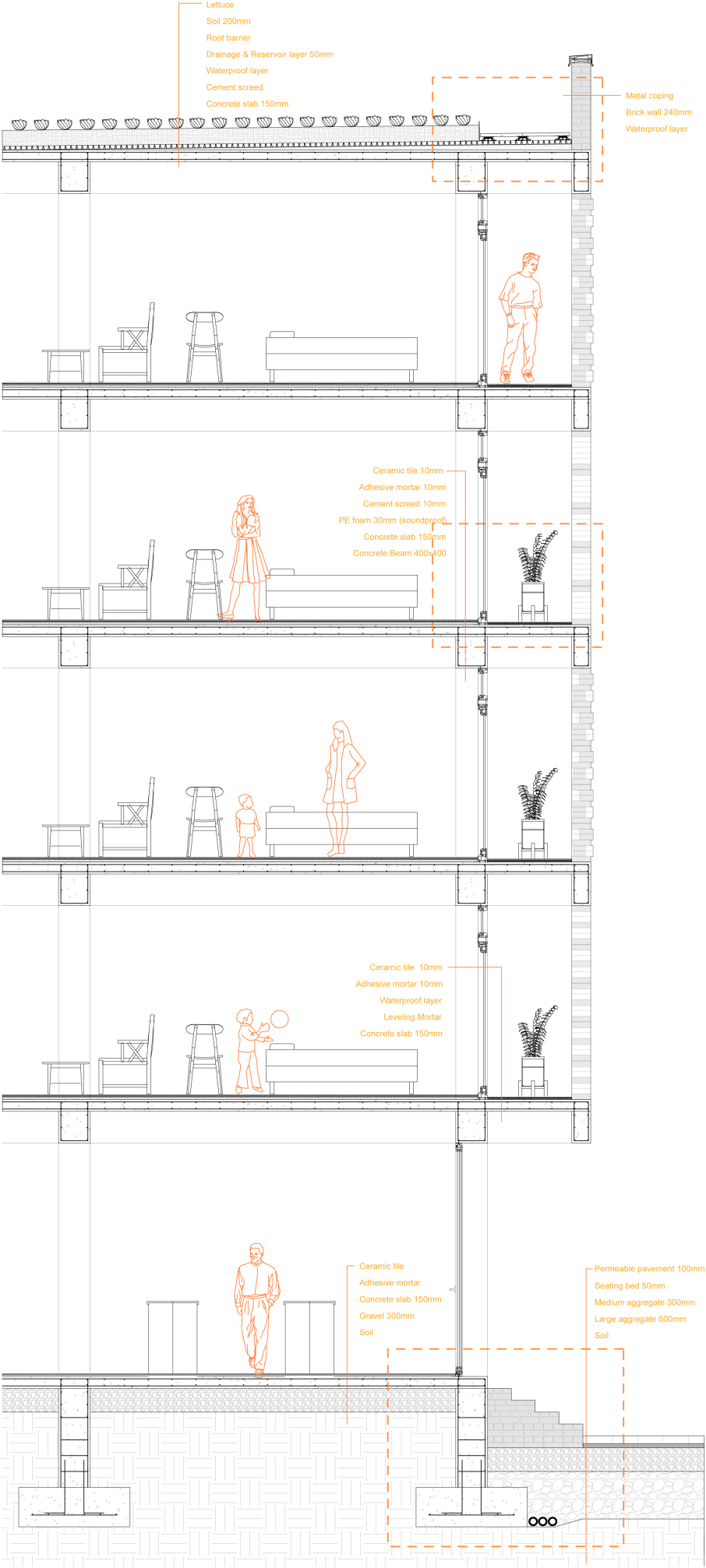
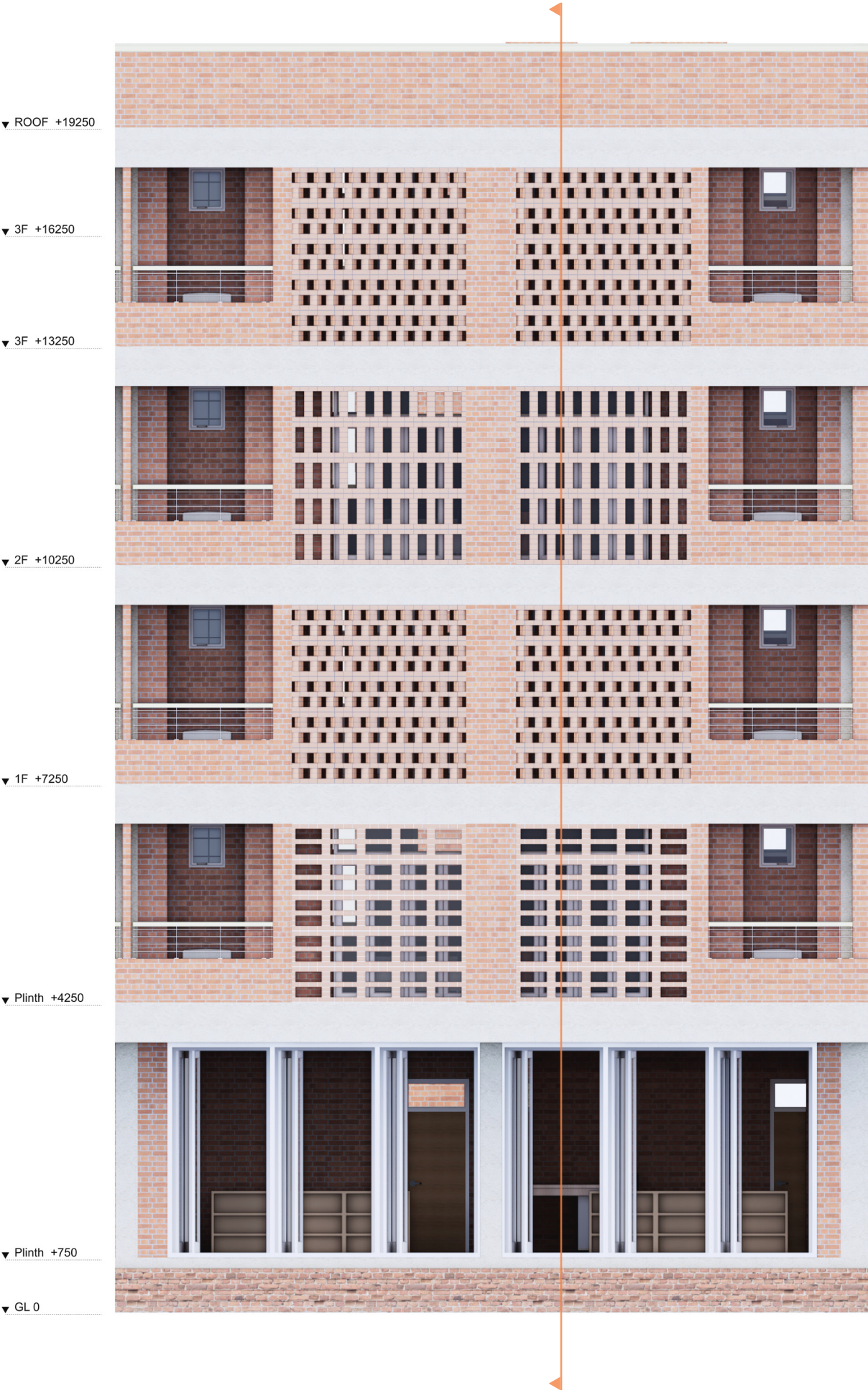
All units are designed to allow for effective cross ventilation.

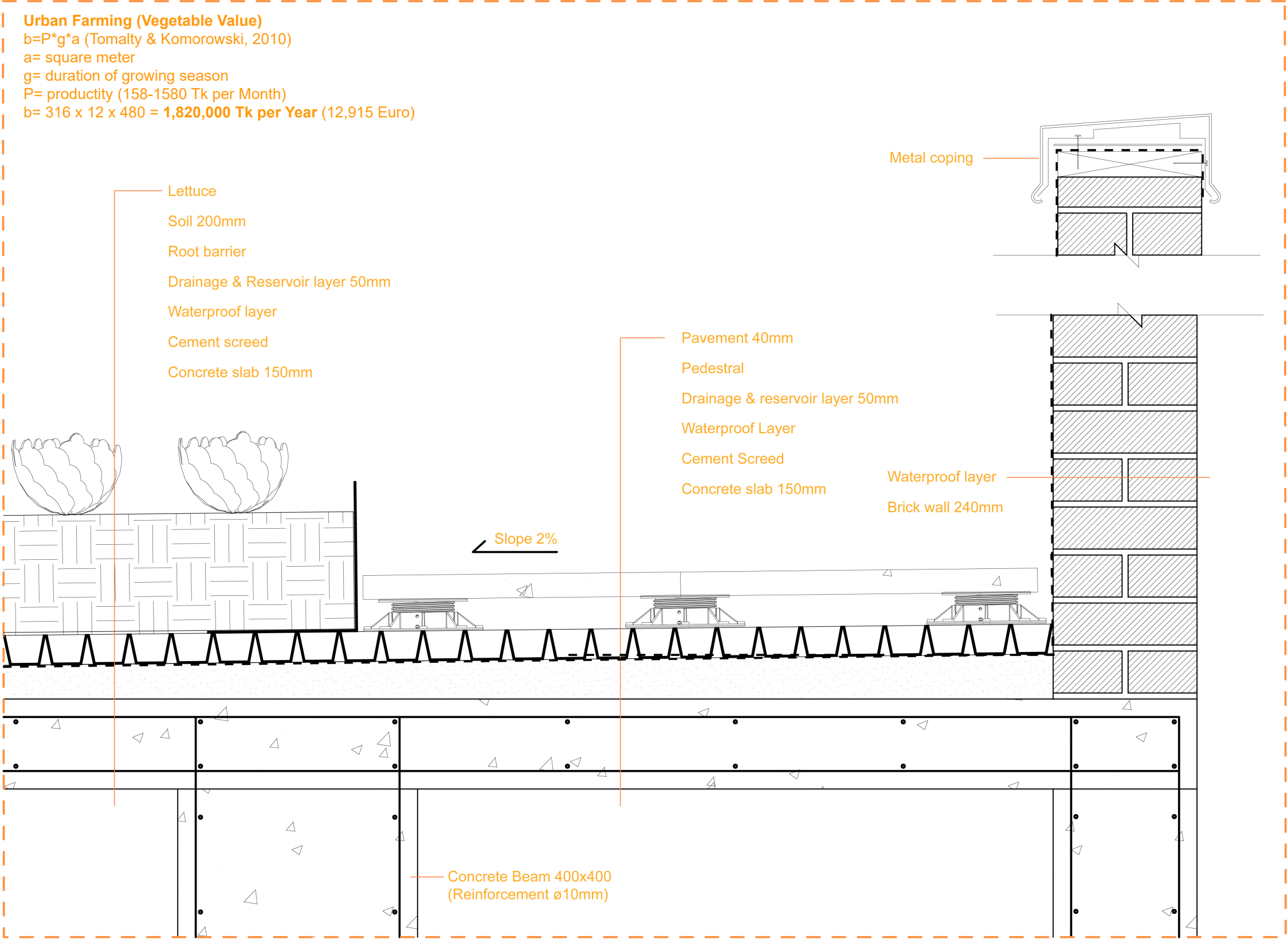
Stack Ventilation



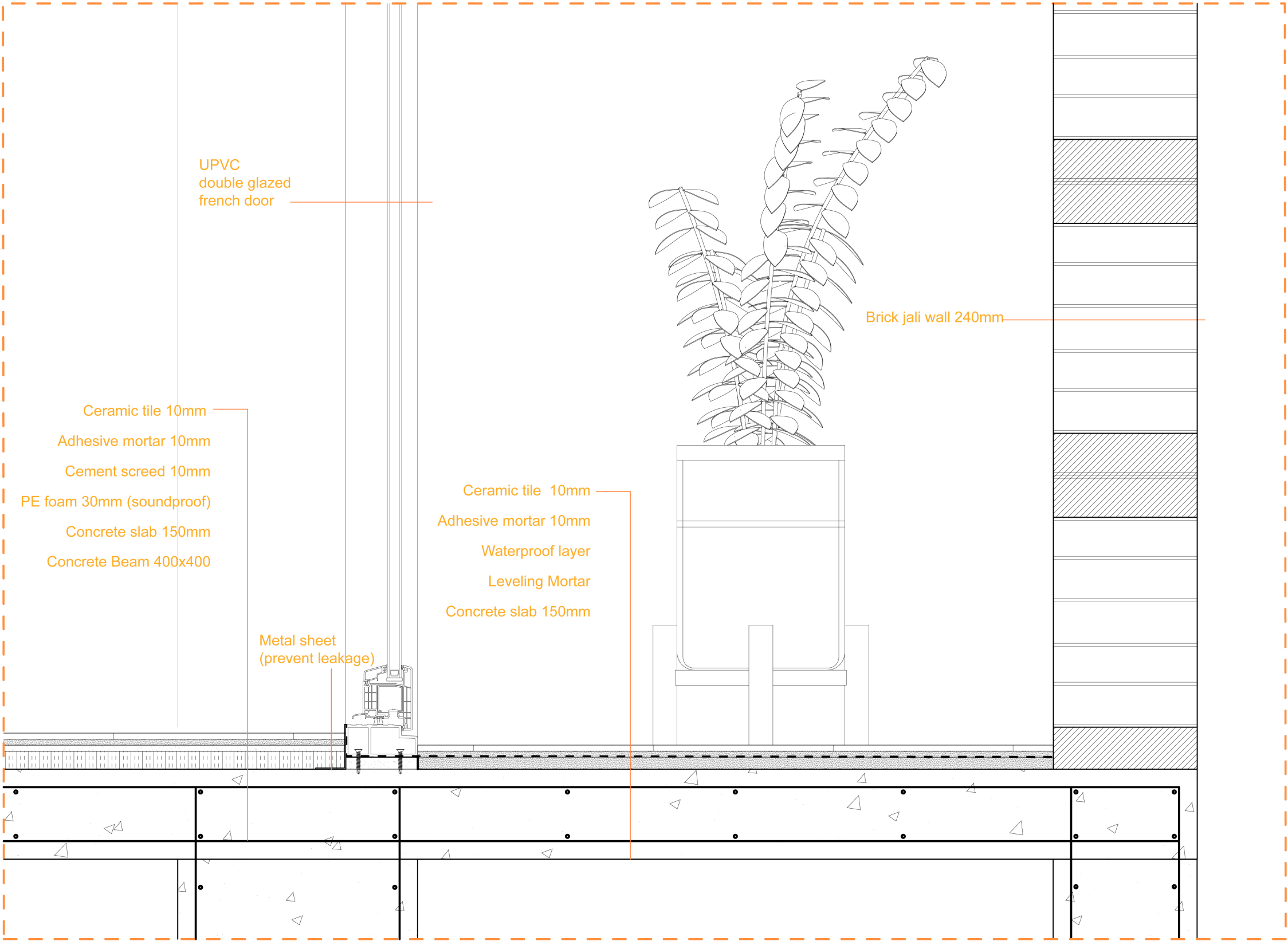
The courtyard, featuring a central green area, promotes stack ventilation across the cluster by encouraging vertical airflow through temperature differentials.

Vertical Section



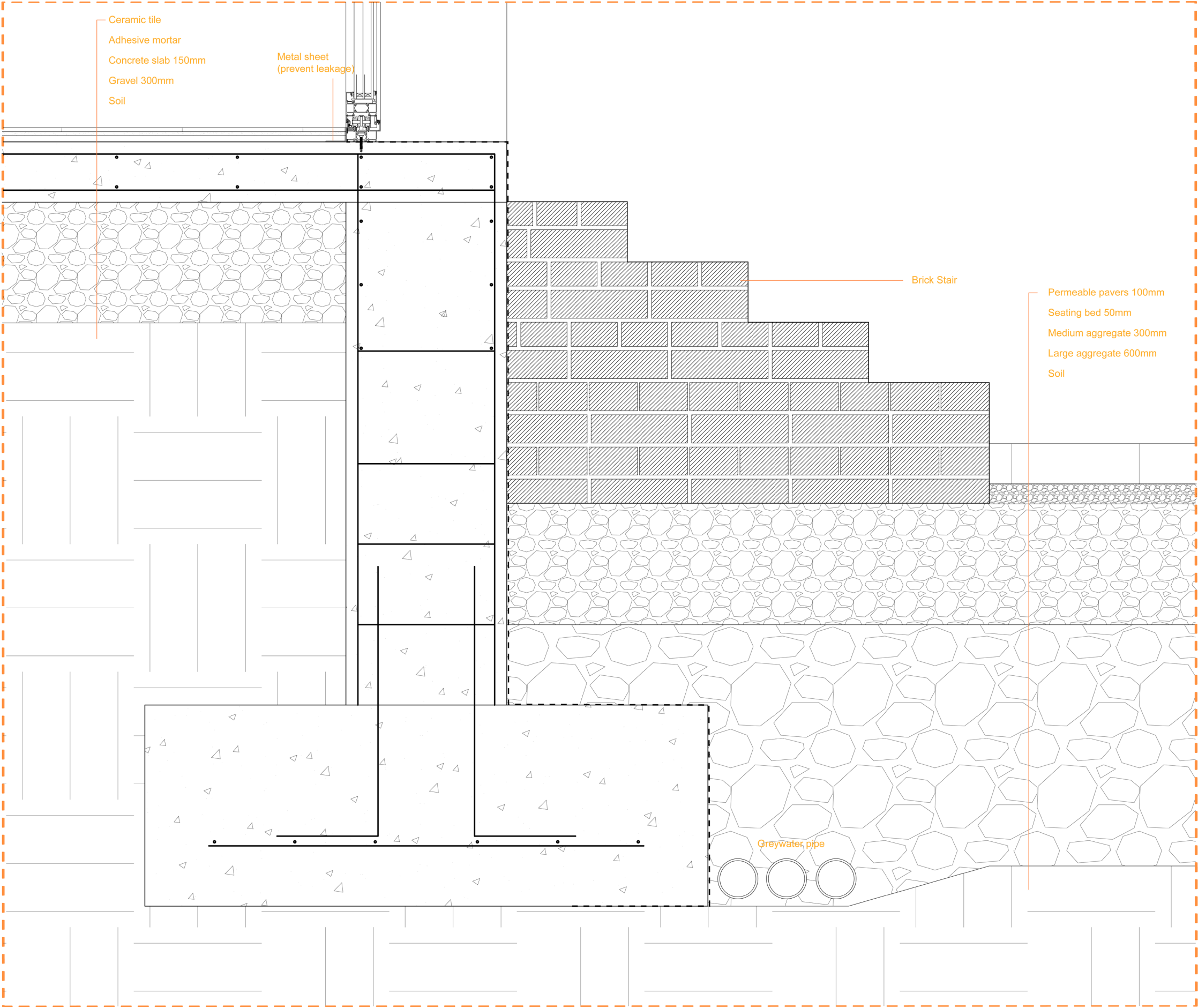


The 480 sqm extensive rooftop garden produces food worth 1,820,000 Tk per year (approximately 12,915 euros), supporting food self-sufficiency for children from low-income families.



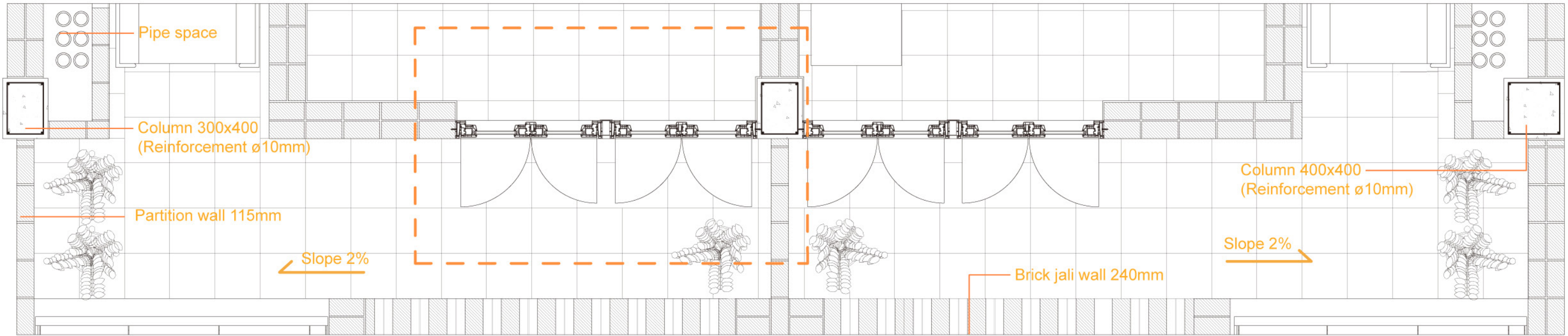
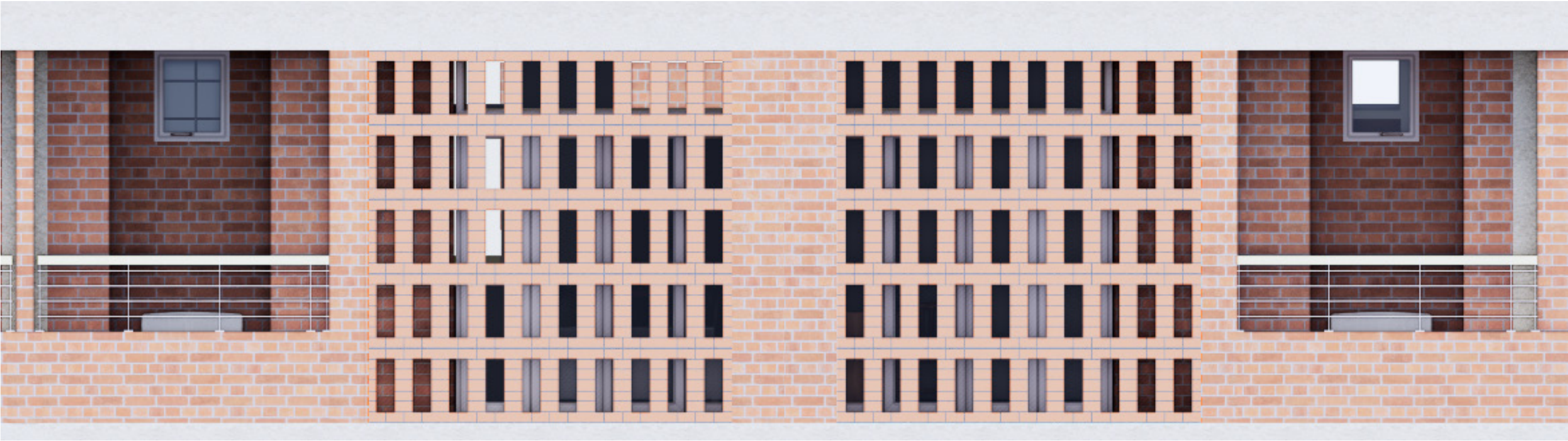
PE foam, a material that is readily available in Bangladesh, is applied to the flooring to absorb impact and reduce noise transmission between floors caused by children's activities.

Fragment - 3

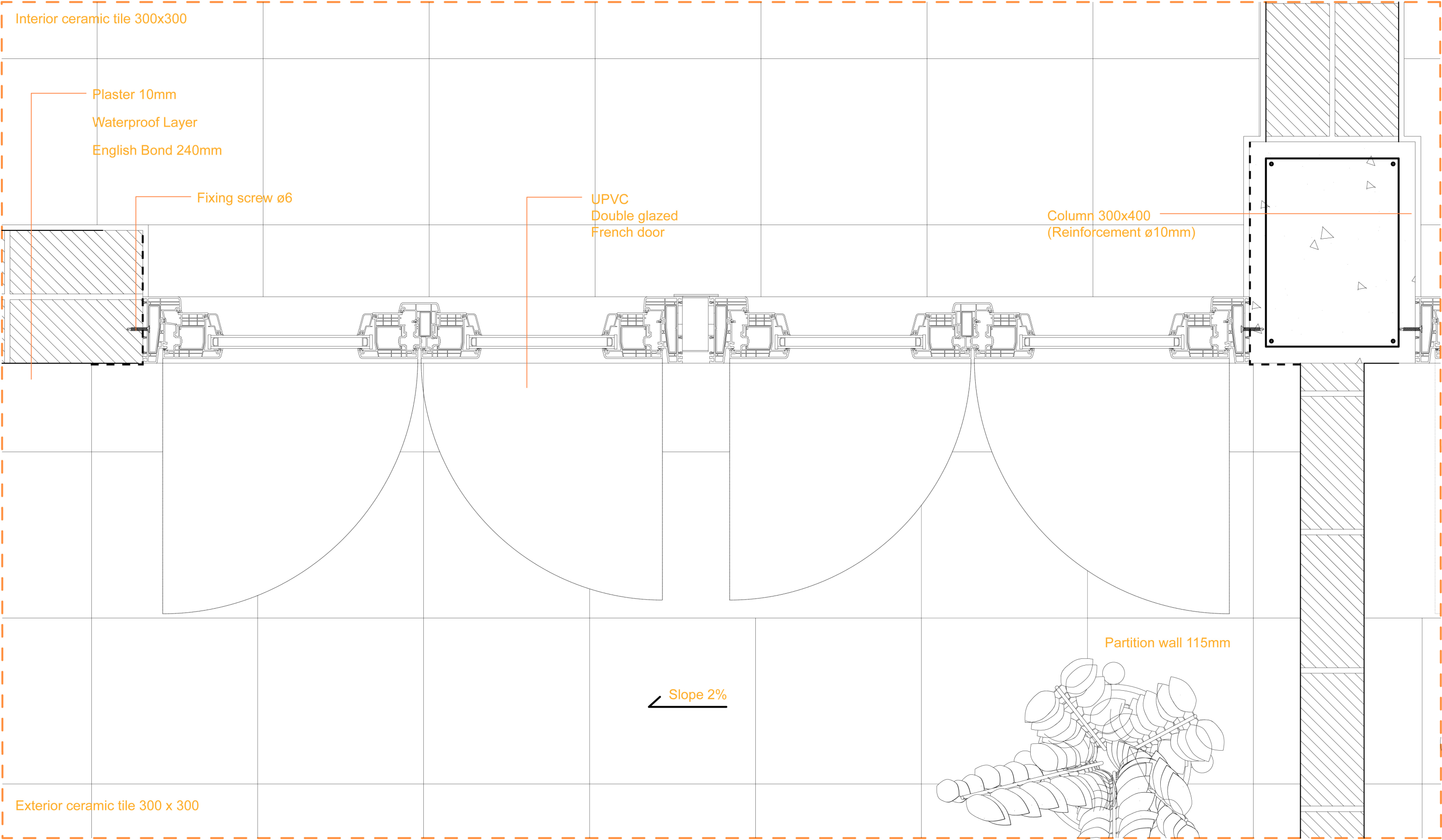


A greywater pipe installed beneath the permeable pavement absorbs rainwater and facilitates its reuse, thereby reducing the consumption of potable water.

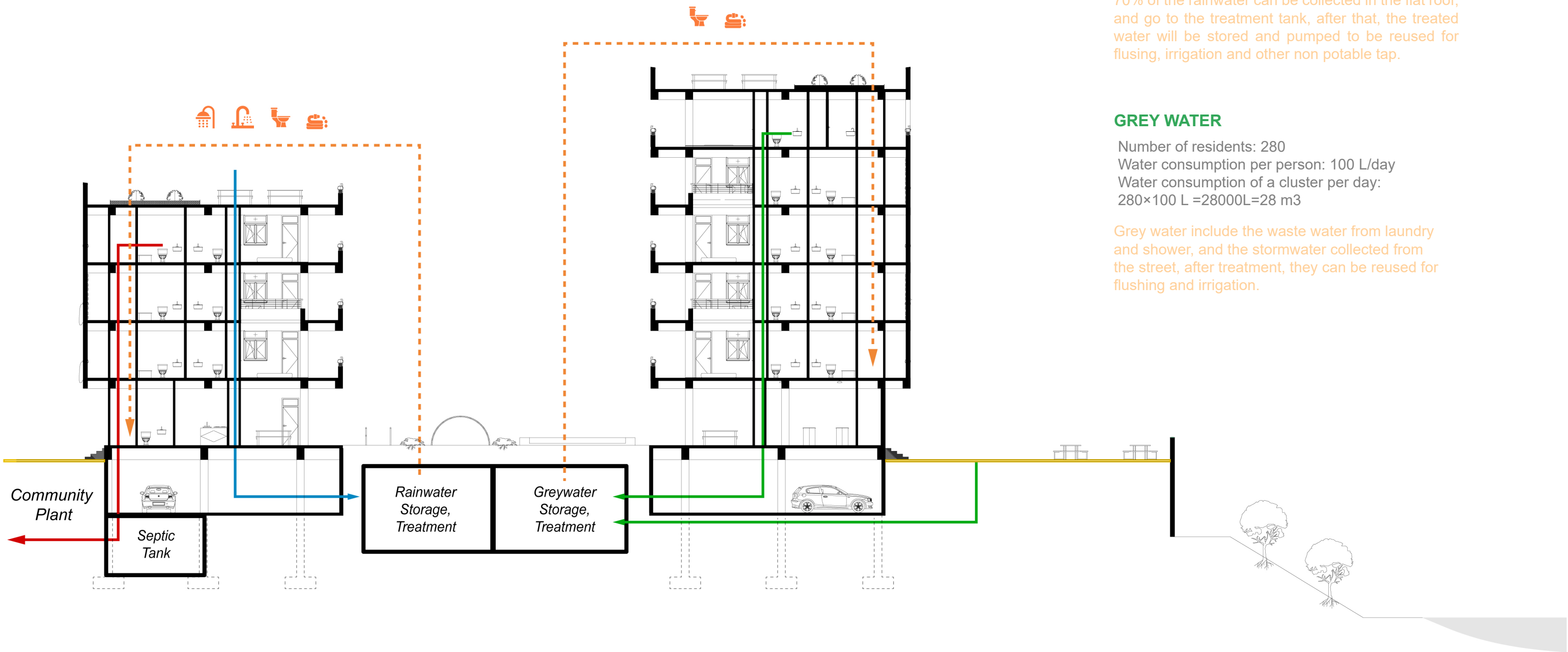
Horizontal Section



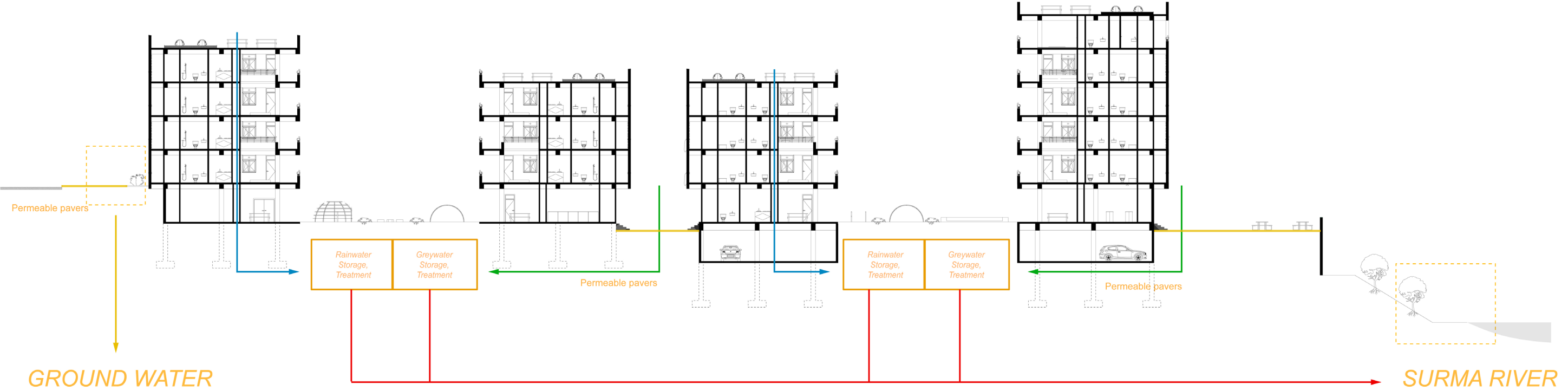
Fragment - 4



Water Mangement

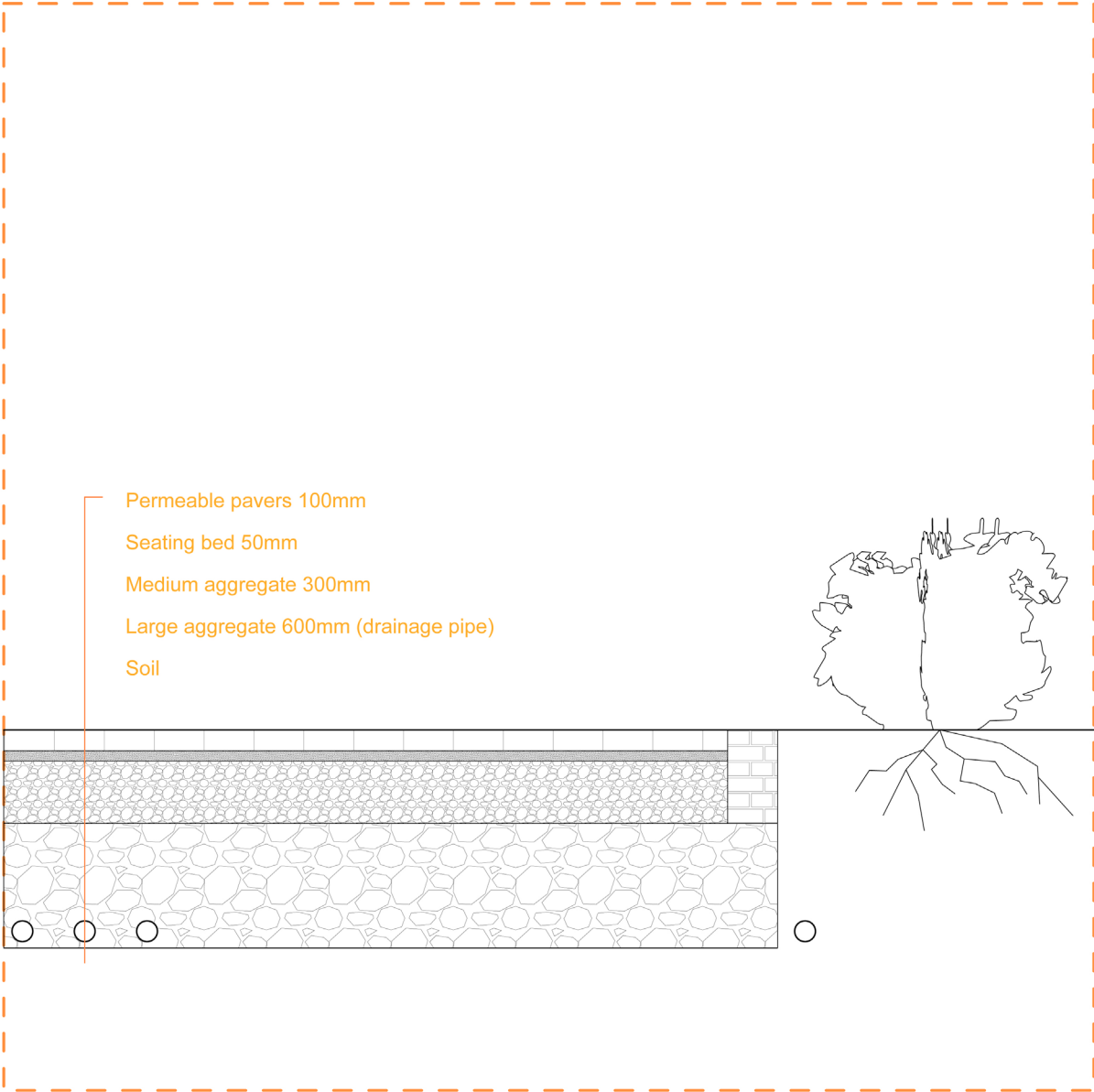


Water Mangement

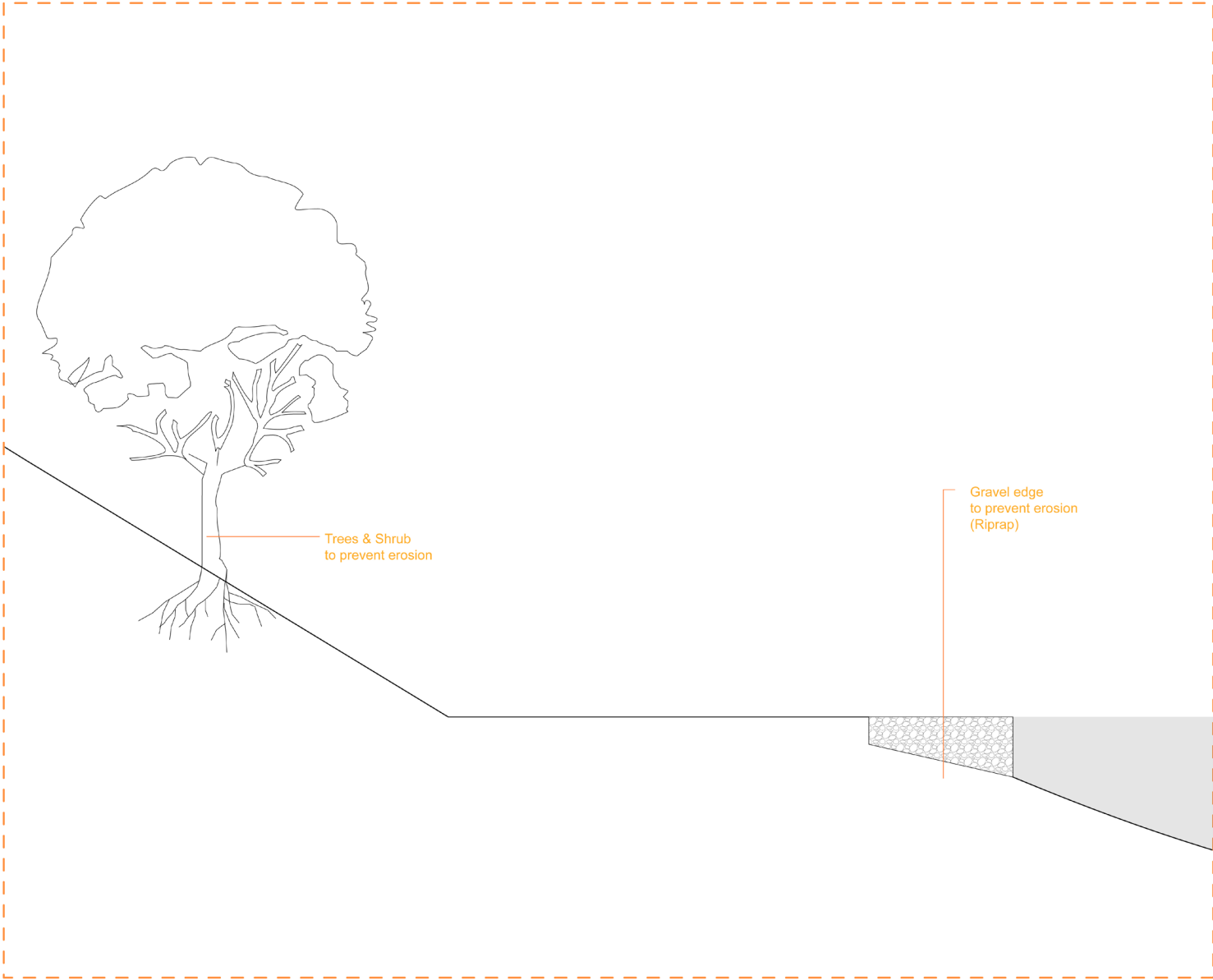


Rainwater is either collected in a water tank within the cluster or absorbed into the ground through permeable pavers. The harvested rainwater is then reused for irrigation and toilet flushing. However, during periods of excessive rainfall, the overflow is discharged into the Surma River through a pipe system, ensuring efficient water management.

Green Infrastructure



A greywater pipe installed beneath the permeable pavement absorbs rainwater and facilitates its reuse, thereby reducing the consumption of potable water.



Trees planted along the riverbank slope help prevent soil erosion, while riprap made of gravel is installed at the edge of the river to further protect against erosion caused by the water flow.



MANAGERIAL STRATEGIES

Construction Phase



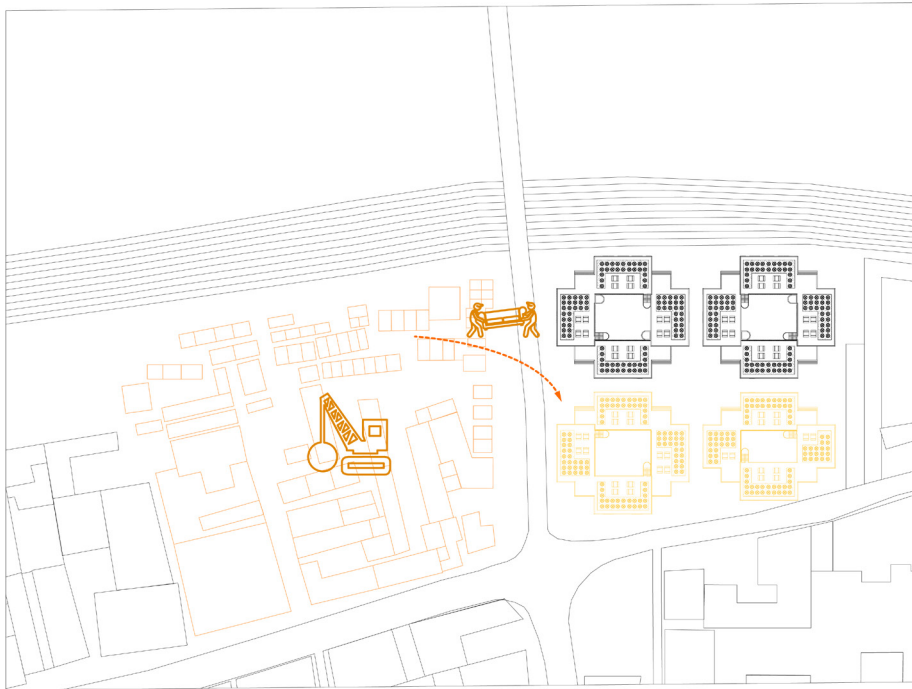
1. Demolition (Sawmil Area)



2. Infrastructure installation (Sawmil Area)



3. Cluster Construction (Sawmil Area)



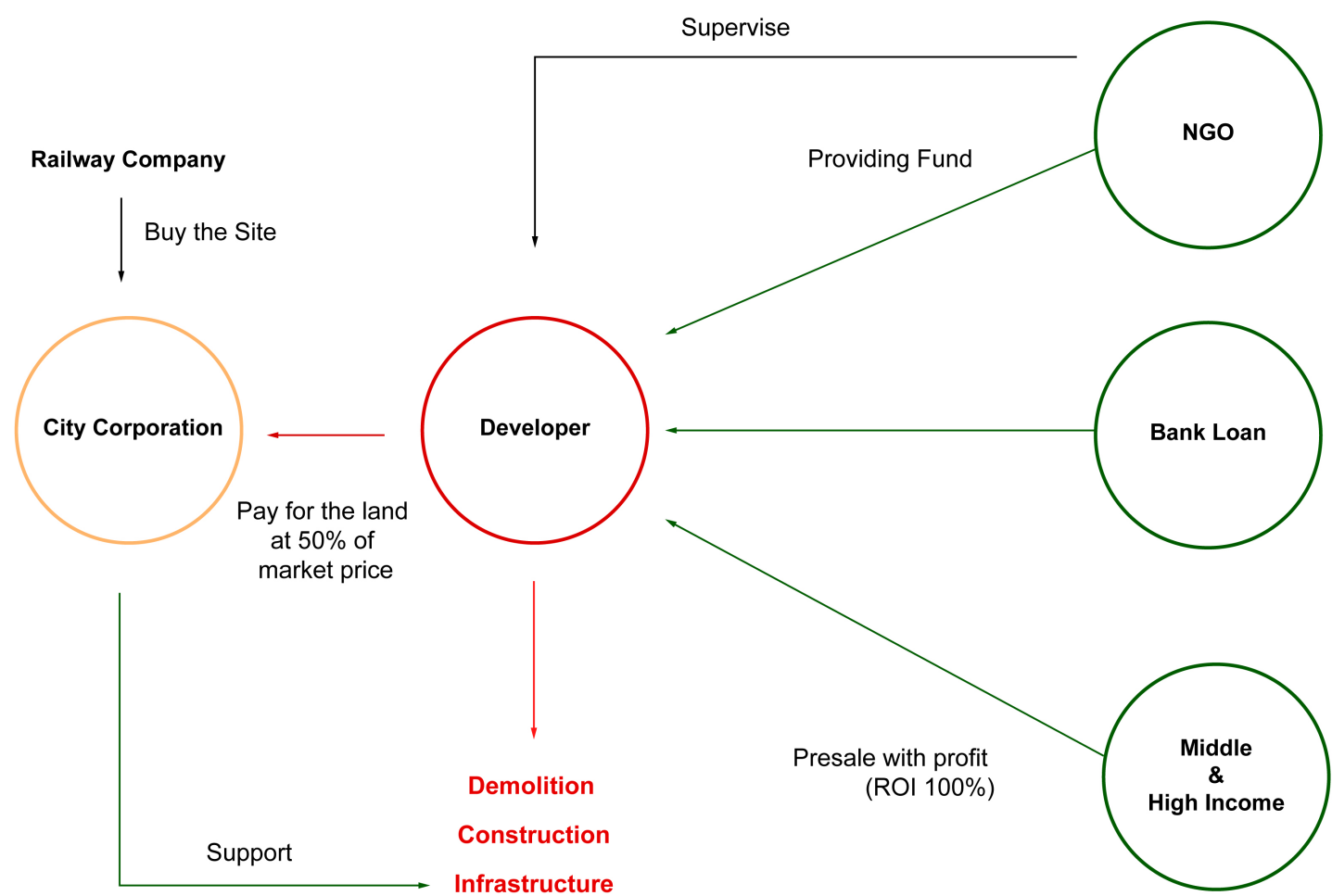
4. Demolition (Sweeper Colony)



5. Infrastructure installation (Sweeper Colony)



6. Finished Construction



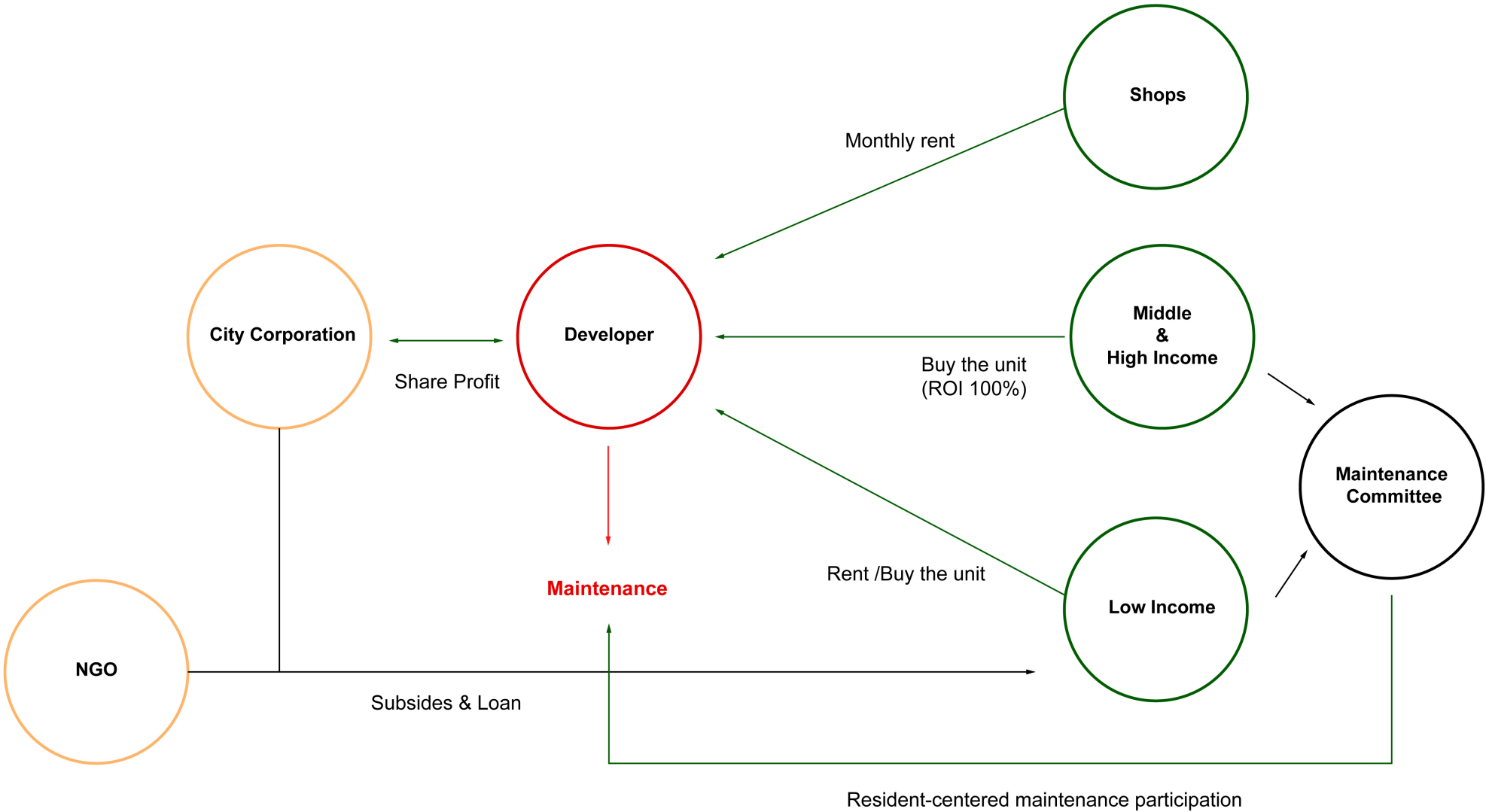
Construction

The Keane Bridge area is currently owned by the railway company. The City Corporation purchases the land and sells it to the developer at 50% of the market price, under the condition that no profit is made from constructing the low-income cluster. The developer then finances the project through a combination of NGO support, bank loans, and presales. Infrastructure installation is supported by the City Corporation during construction.

Through this construction model, developers can carry out the project at a lower cost, while low-income families gain access to affordable housing. As a result, the development of the Keane Bridge area becomes an attractive option for developers.

	Previous situation	New Development	Main Function List	
Area	2.12 ha	2.12 ha	Low income unit	217 (21200 sqm)
FSI	0.35	2.3	35 sqm unit	120
GSI	0.28	0.45	50 sqm unit	8
Unit / ha		162	Construction cost 636,000,000 Tk	
Low Income	60	217		
Middle Income		120	Middle & High unit	120 (21600 sqm)
High Income		8	85 sqm unit	120
			120 sqm unit	8
			Construction cost 708,000,000 Tk	
			Selling cost 1,416,000,000 Tk	
			ROI 100%	

A cost analysis shows that apartments in central Sylhet are valued at approximately 60,000 Tk per square meter, while the average construction cost is around 30,000 Tk per square meter. This results in a 100% profit through the development of middle- and high-income housing. Given this financial advantage, the project presents an attractive opportunity for potential developers.



Operation

The developer generates revenue through the sale of middle- and high-income housing units (with a 100% ROI), rental income from commercial shops, and the sale of low-income units. A portion of this revenue is shared with the City Corporation, while another portion is allocated for maintenance. In addition, residents form a maintenance committee to help manage and sustain the housing complex.

Low-income residents initially rent their houses with the support of loans and subsidies from the City Corporation and NGOs. Over time, they can purchase the homes using the income they earn.

OVERVIEW







