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WORK-LIFE NEXUS

Exploring a new housing system that combines local housing and industries based on haor condition in Tahirpur, Sylhet.

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Tahirpur, Sylhet, Bangladesh

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RESEARCH

Background, Problem, Research Question

Tahirpur, Sylhet, Bangladesh

— urban scenario —

Figure 1. Mass housing in old Dhaka.
Author own photograph

Figure 2. Mass housing in old Dhaka.
Author own photograph

Figure 3. Mass housing in old Dhaka.
Author own photograph

Background

Internal migration

Multiple forces from the economic, environmental, cultural, and political domains weave an intricate web of migration, which means that a mix of these elements frequently influences the decision of people to migrate from one place to another. Within Bangladesh, a developing country grappling with the obstacles of its socio-economic condition, internal migration is largely viewed as a calculated reaction to concerns about one's means of subsistence. Chowdhury et al. (2012) state that the desire for more job possibilities and a reduction in the weight of poverty is one of the primary reasons why individuals migrate from rural areas to city centers. This implies that workers from outlying regions are coming to cities in pursuit of employment. Within this intricate dynamic, the allure of urban area is the chance of gainful employment and higher earnings—a self-generated coping mechanism given the scarcity of job opportunities in peripheral areas.

Problem Statment

Between urabn and rural area

Housing, in the words of Bhan (2020), is a collection of places, services, and employment opportunities that must meet the criteria of being adequate, affordable and viable. Also, in many Asian countries, including Bangladesh, housing is not only used for residential purposes, but also as a workplace where important economic activities take place (Chen and Sinha, 2016). In other words, housing must consider the needs of its occupants in both their working and living conditions. This involves the distance between housing and work and the convenience of nearby transportation, as well as the material adequacy of being a suitable size, reasonable cost, and secure ownership. This idea helps to explain, at least in part, Bangladesh's internal migration patterns, where people from rural areas go to the metropolis in pursuit of jobs that will improve their income at the expense of their standard of living. During this process, housing becomes more accessible to work while losing some of its material adequacy. This phenomenon also implies that it is challenging to meet both criteria of housing at the same time and that achieving one frequently comes at the expense of achieving the other.

Based on information from the Labour Force Survey (LFS), BBS (2010) and ADB (2012) report that 75.9% of all jobs in cities are informally held by people. This makes up the majority of the employment sector. Street vending, rickshaw pulling, and domestic work are examples of informal jobs in urban Bangladesh. Some informal workers may also reside in urban slums where they must deal with subpar housing, poor sanitary conditions, and cramped living arrangements. According to Urbz (2017), private mass housing, which is close to work centers, small and medium-sized businesses, and affluent residential areas but has little space and subpar living conditions, is common in Bangladeshi cities. This suggests that rather than prioritizing accommodation quality, people from peripheral areas move to urban centers primarily in order to increase their income and find job opportunities. In other words, people have to choose between having more comfortable living spaces and being close to possible places of employment (Correa, 1989). This phenomenon draws attention to the difficulties and economic realities that peripheral area residents usually face. People living in rural areas of Bangladesh are often forced to migrate to cities in search of work. This results in them having to choose between overcrowded dwellings and higher incomes. Enhancing industrial development in rural areas and creating more employment opportunities could alleviate this problem to some extent, and the income and quality of life of rural residents could be improved.

As the data from BBS (2010) and ADB (2012), a mere 22.9% of Bangladesh's workforce is engaged in urban employment, while a substantial 77.1% are employed in rural sectors. This demonstrates the continued need to give rural residents more attention. The living and working conditions of the whole workforce will not be considerably improved by concentrating just on the needs of urban workers. The lack of funding and job prospects in rural areas is a significant issue for people there. People relocating to cities in pursuit of jobs has resulted in a considerable fall in living standards, and there is a complicated conflict between these two problems. One possible solution is to invest in improving rural economic life and opportunities, enhancing living and working circumstances nearby and generating employment prospects in the suburbs, which lessens the need for people to relocate to metropolitan areas in search of employment. Stated differently, the expectation is that a new system that combines housing and local industries can be designed in this area, which is able to reduce the mismatch between job opportunities and housing quality. At the same time, the vitality of rural regions will be increased. There will be a growth and development in both the economy and living quality for the residents.

Excessive rural-to-urban migration

Seeking Job Opportunities

Overcrowded urban living conditions

Housing needs to ensure proximity to the workplace

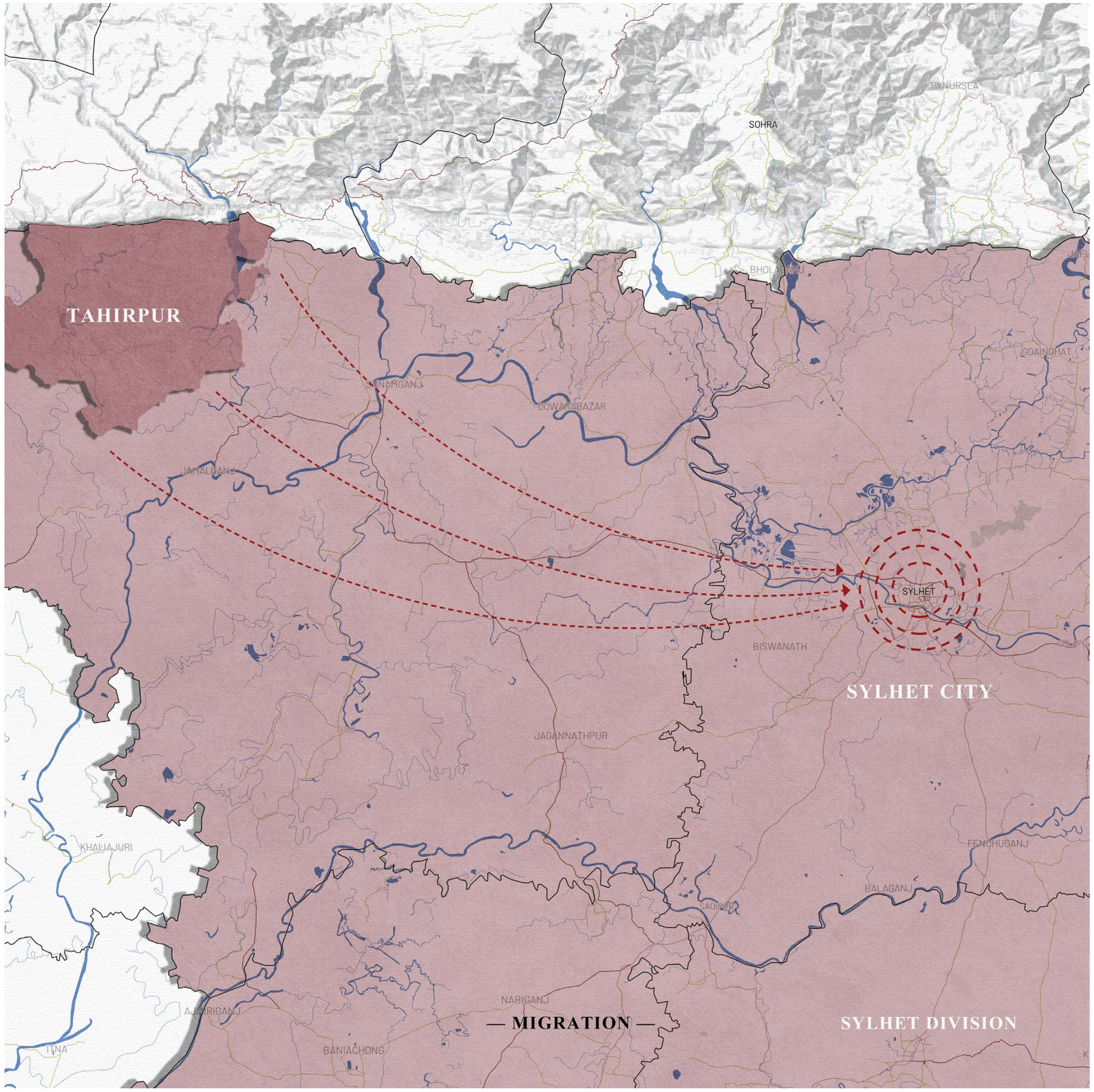

Figure 4. Migration from rural to urban area.
Author own drawing

— rural scenario —

Figure 5. Housing in rural area of Sylhet.
Author own photograph

Figure 6. Housing in rural area of Sylhet.
Author own photograph

Figure 7. Housing in haor in Tahirpur.
Author own photograph

Local Industry Analysis

Between living and working

In Bangladesh, land is categorized according to the depth and duration of its inundation (Uddin, 2019), which means that people are encouraged to grow different crops based on different land types. Meanwhile, the hills and water bodies of Sylhet form a fascinating and unique topography with a unique diversity of fish species and a well-developed fishing industry (Alam, 2001). Furthermore, the fishing sector's correlation with the rainy season significantly impacts the productivity of the industry, which means that the extent of land inundation plays a significant role in determining the fishery's output. That is to say, varying seasons offer the local inhabitants opportunities to work in different local industries, including crop cultivation, fisheries, and livestock rearing. In addition, since the degree of inundation of the land changes according to the weather, the housing of the inhabitants will need to meet the demand for dismantling and relocation, and at the same time, the changing industries will require that the inhabitants' dwellings show a kind of resilience, diversity and adjustability.

Industry specific analysis in Tahirpur:

The research focuses on the Tahirpur region of Sylhet, which is rich in wetlands that known as haor in Bangladesh. Haor is a seasonal wetland that is primarily characterised by the formation of water bodies during the monsoon season, which dry up in the winter and return to a land. In Tahirpur, the primary local industries are crop farming, fisheries, and animal husbandry, but many people only work in one of them, and there is little collaboration or integration between these industries. Before the monsoon season, farmers harvest the paddy and store it in their rooms; after the monsoon season, fisherman may not work or may fish in smaller rivers or ponds. Farmers then depart for the city in quest of employment. For the Tahirpur region, there is a relative separation between industrial activities, and a lack of a system that would integrate local industries and housing. A new system is required to increase individual productivity and provide more job opportunities, while at the same time mitigating the negative impacts of housing displacement due to inundation of the land.

Develop local industries in rural areas and reduce internal migration

Balancing rural and urban population distribution

Create work-life nexus

A system that integrates living and livelihoods

— research question —

Based on the current situation in the rural area, how can industrial upgrading be promoted in this rural area and adaptable housing be constructed to improve the working and living conditions of the people and to alleviate the problem of over-migration to urban centres?

How to better integrate the existing industries and introduce new industries to the rural area to help upgrade local industries and improve economic efficiency, so as to alleviate the problem of excessive migration to urban centres?

Based on the living patterns of the inhabitants of the rural area, how can housing be designed to fulfil both living and livelihood needs?

How can flexible and adaptable housing be built to cope with the seasonal industrial changes in the Sylhet rural area in order to provide comfortable living conditions?

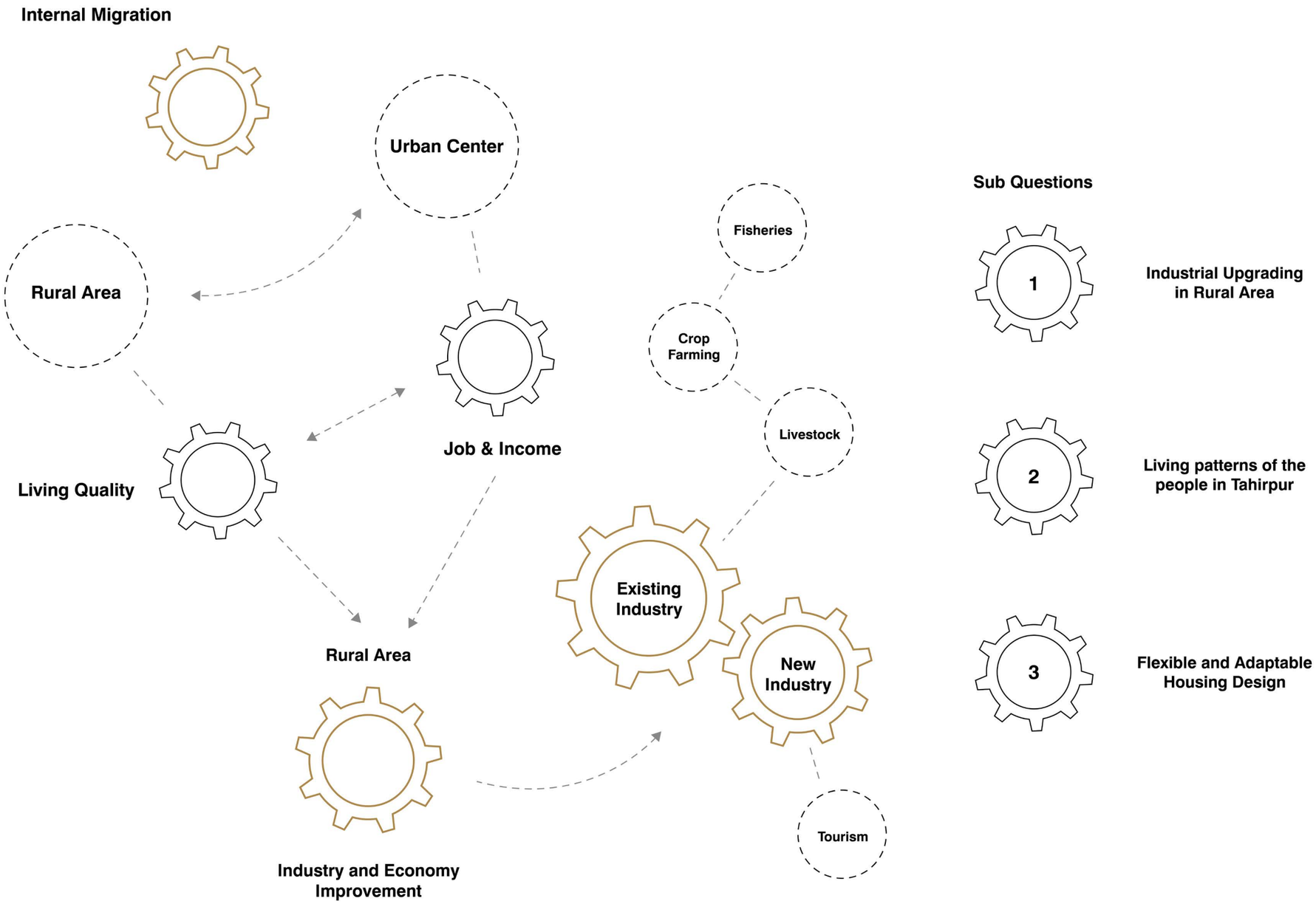

Figure 8. Research diagram.
Author own drawing

— methodology —

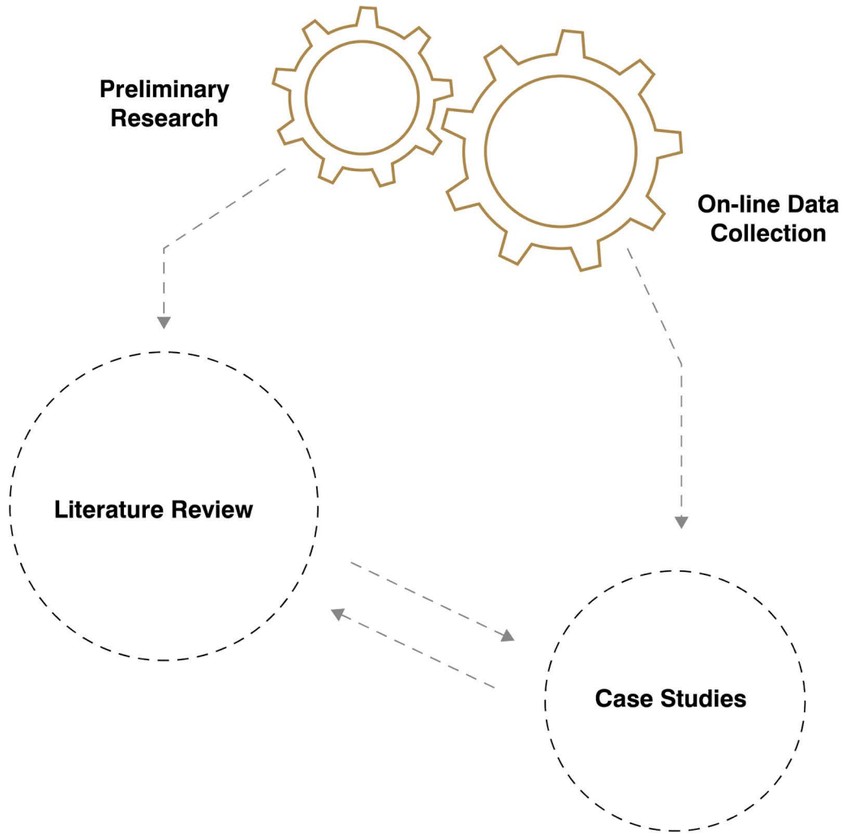

Figure 9. On-line data collection.
Author own drawing

Methodology

Multiple methods

Literature Review

The literature review was primarily used to establish a contextual basis for the overall study, providing basic information about local housing and industry in Sylhet and helping to understand the current state of local housing and the main industries. At this initial stage of the research, a review of the existing literature on the topic was required to understand the historical and theoretical framework of the integration of housing and local industries in Sylhet. The literature review helped to understand the existing knowledge, theories and findings related to the housing and industry in the wetland areas of Sylhet and helped to conduct the subsequent study.

Case Studies

On the one hand, the study will focus on case studies of similar regions that have successfully integrated housing with local industry, which are essential for analysing the feasibility of such a strategy of integrating housing and industry. At the same time, the research will pay attention to global cases of adaptable and adjustable housing, such as demountable and prefabricated building structures. By analysing these cases in detail, the aim is to summarise feasible approaches that are appropriate to the realities of the Tahirpur region. Case studies will allow us to draw valuable lessons from experiences in other regions and adapt them to the specific needs of Tahirpur.

According to Saha, Sobhan and Alam (2013), the architecture in Sylhet has been developed using different building forms and techniques to fulfil the requirements of sustainability. A series of cases can be used to understand the historical forms of local buildings and provide historical information on sustainability for subsequent designs.

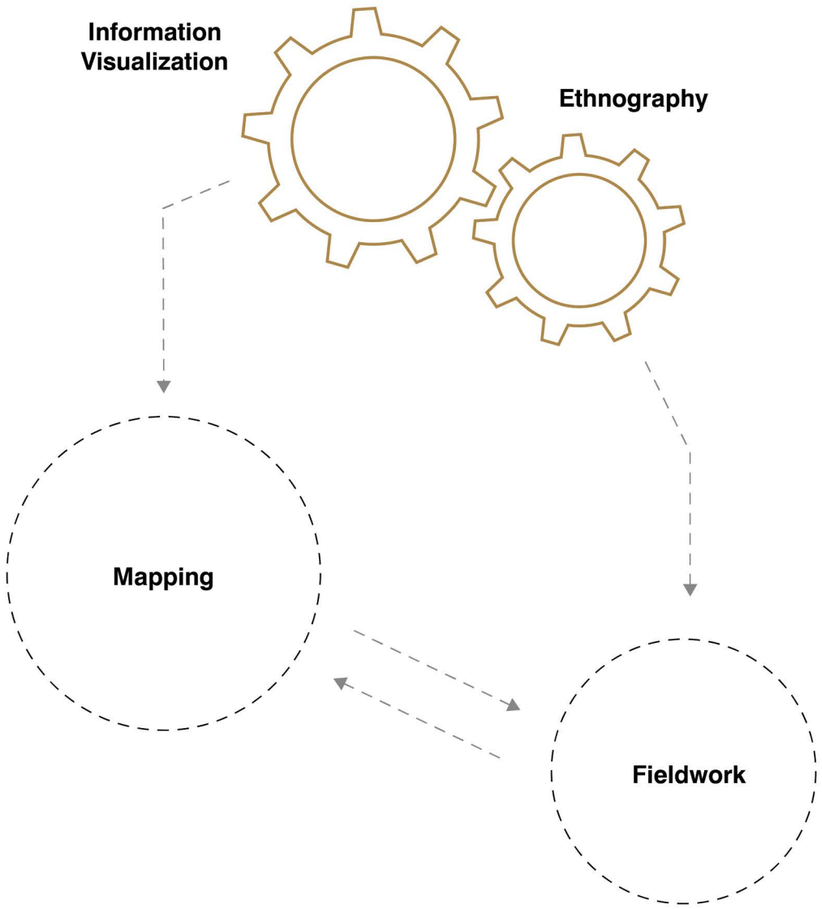

Figure 10. Information visualization.
Author own drawing

Mapping

This research focuses on the land use of the haor area in Sylhet, the jobs performed by the local people and the changes in local industries. These aspects of data need to be visualised relying on mapping to help us better organise the information that collected. Due to the changing natural conditions, the local people work differently during the dry and monsoon seasons. By creating maps of the different seasons, we can understand the different conditions of local natural resources, housing and industries.

Fieldwork and Ethnography

Fieldwork and ethnography can help us to get first-hand information, gain a close-up experience of the daily lives of the people living in the haor areas of Sylhet, and interact face-to-face with the locals. There are many haors in the Tahirpur area and we will choose several of them that are more distinctive to visit. This will be a great opportunity and we will be able to get a lot of detailed information about the haor from our interaction with the locals. In addition, after leaving Sylhet, we will still be able to keep reviewing the local area through videos, photos and sketches.

In conclusion, this study will use a variety of methods, from online data collection to offline site visits to information processing, to analyse the form of housing, people's living patterns and local industries in the haor area of Sylhet.

— framework —

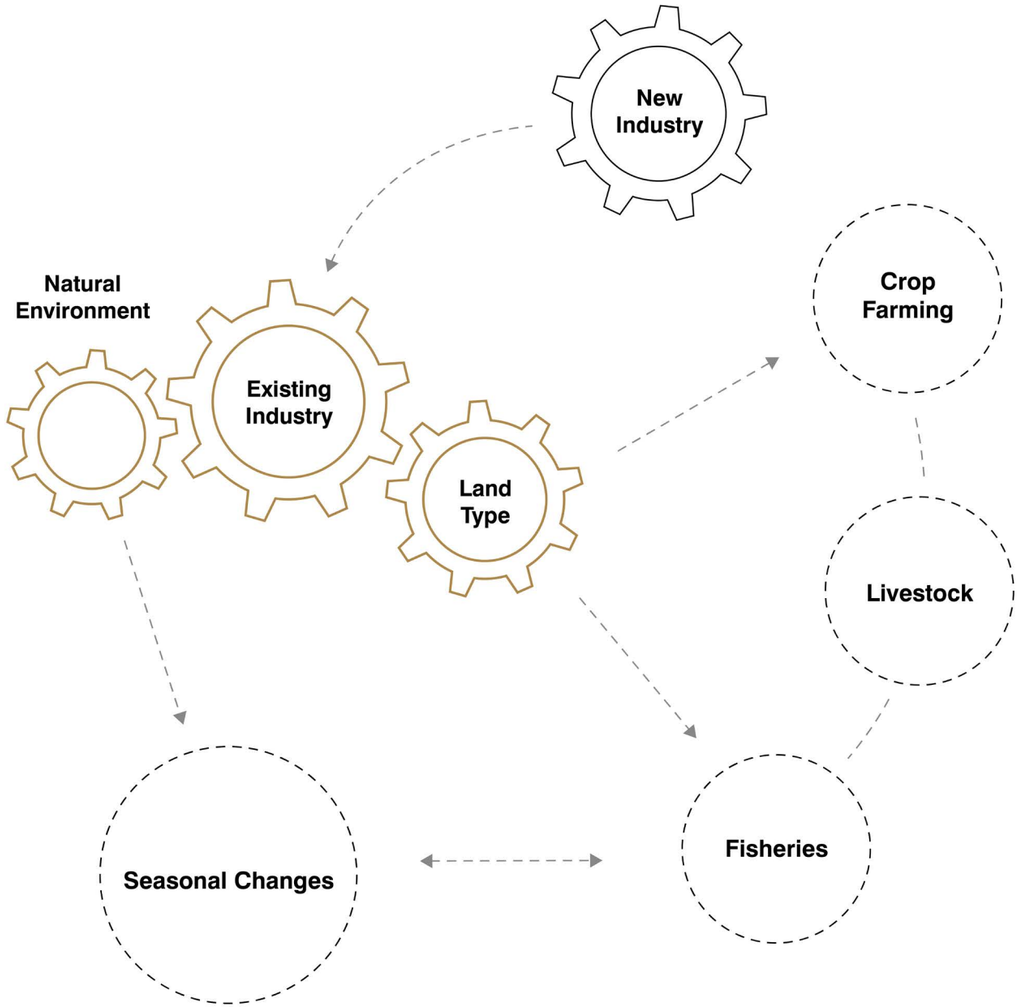

Figure 11. Existing industry and new industry with potential.
Author own drawing

Theoretical Framework

Housing and local industry

Sylhet's agricultural industries, such as crop cultivation, fisheries and livestock, are heavily dependent on natural resources and are subject to seasonal variations (World Bank Group, 2016). During the monsoon season, parts of the land are submerged and cultivation is restricted while fisheries are developed. In other words, the availability of land directly affects the viability and scale of multiple industries in the haor area, which in turn affects people's jobs and incomes. Different industries will have their peaks at different times of the year. This seasonal change in industries presents challenges as well as unique opportunities for each industry, meaning that the haor area has a wealth of economic potential (Uddin et al., 2019).

In addition, there is a lack of co-operation and upgrading between these existing industries, as well as a lack of more new industries being added to this region. By combining existing industries and adding new ones, it can help expand the diversity of industries and improve the economic efficiency of the entire region. This diversified industrial situation can create more job opportunities and help alleviate the employment pressure on the local residents (World Bank Group, 2019).

This research focuses on the relationship between local industries and residents' lives. It is hoped that a new system can be created that combines housing and people's livelihood to improve their working and living conditions. In other words, local residents will be able to use their housing as a centre for a wider variety of more financially rewarding jobs around them. The necessity for people to travel to city centres in search of work will be greatly reduced.

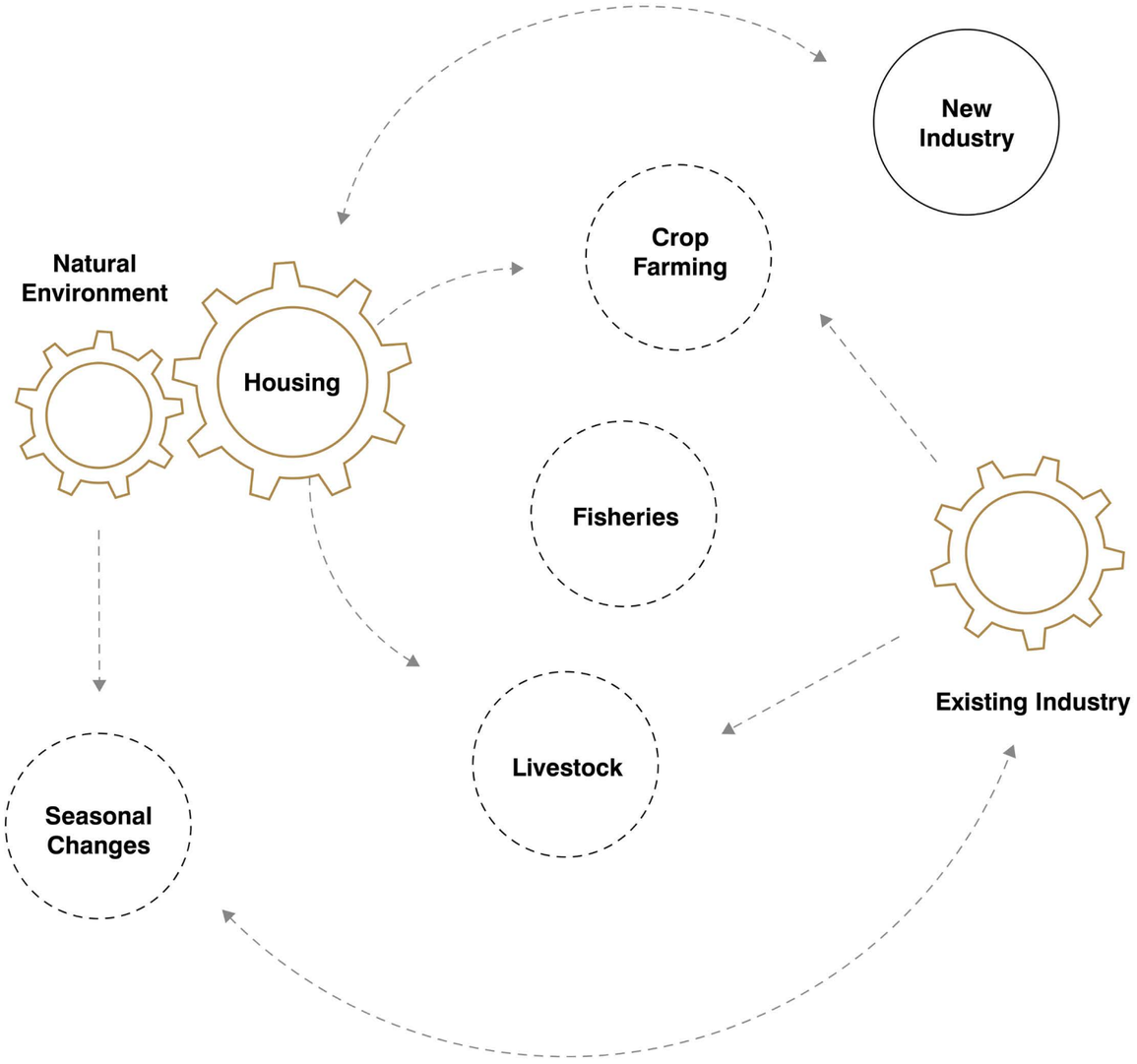

Figure 12. Local housing considering local industry changes.
Author own drawing

Housing design needs to be based on people's daily lives to help solve the problems they encounter in their daily lives (Anderson, 2016). We should recognise that the environment, local industry and housing are interconnected rather than independent of each other. In the Sylhet haor area, there are seasonal changes in the weather such as monsoon and dry seasons, which can cause the amount of land available to change with the seasons and affect the work that people do. People's daily lives, including working, affect the overall architectural form of the dwelling.

In other words, the design of the house must also take into account the local industry, not just the house itself. In the haor area of sylhet, there are mainly crop cultivation, fishing and animal husbandry, and these industries will change in different seasons. Some industries will disappear in a certain season. This seasonal change will also be reflected in housing. That is to say, housing needs to be relatively adjustable and adaptable, able to face possible changes in local industries in a flexible way.

In addition, with its beautiful natural environment, the haor region has the potential to develop tourism (Hasan, 2022). At the same time, other new industries may be introduced to the haor region. The addition of these new industries will not only affect the layout of local industries, but also the pattern of local housing, as people's lives will be changed. Therefore, the sustainability and adaptability of buildings becomes particularly important. Housing needs to be able to continually adjust to changes in local industries to meet the needs of people's lives and livelihoods.

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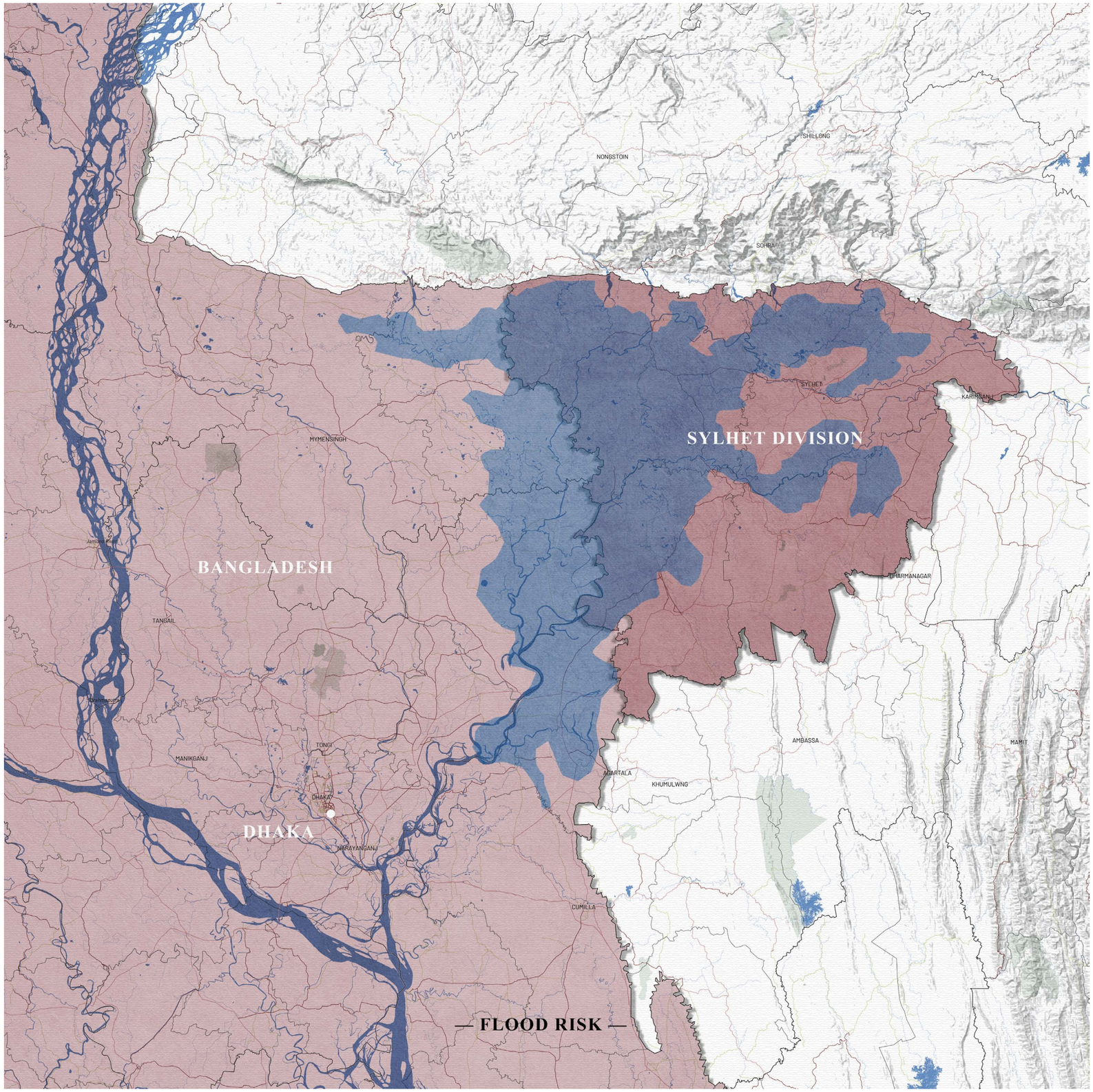
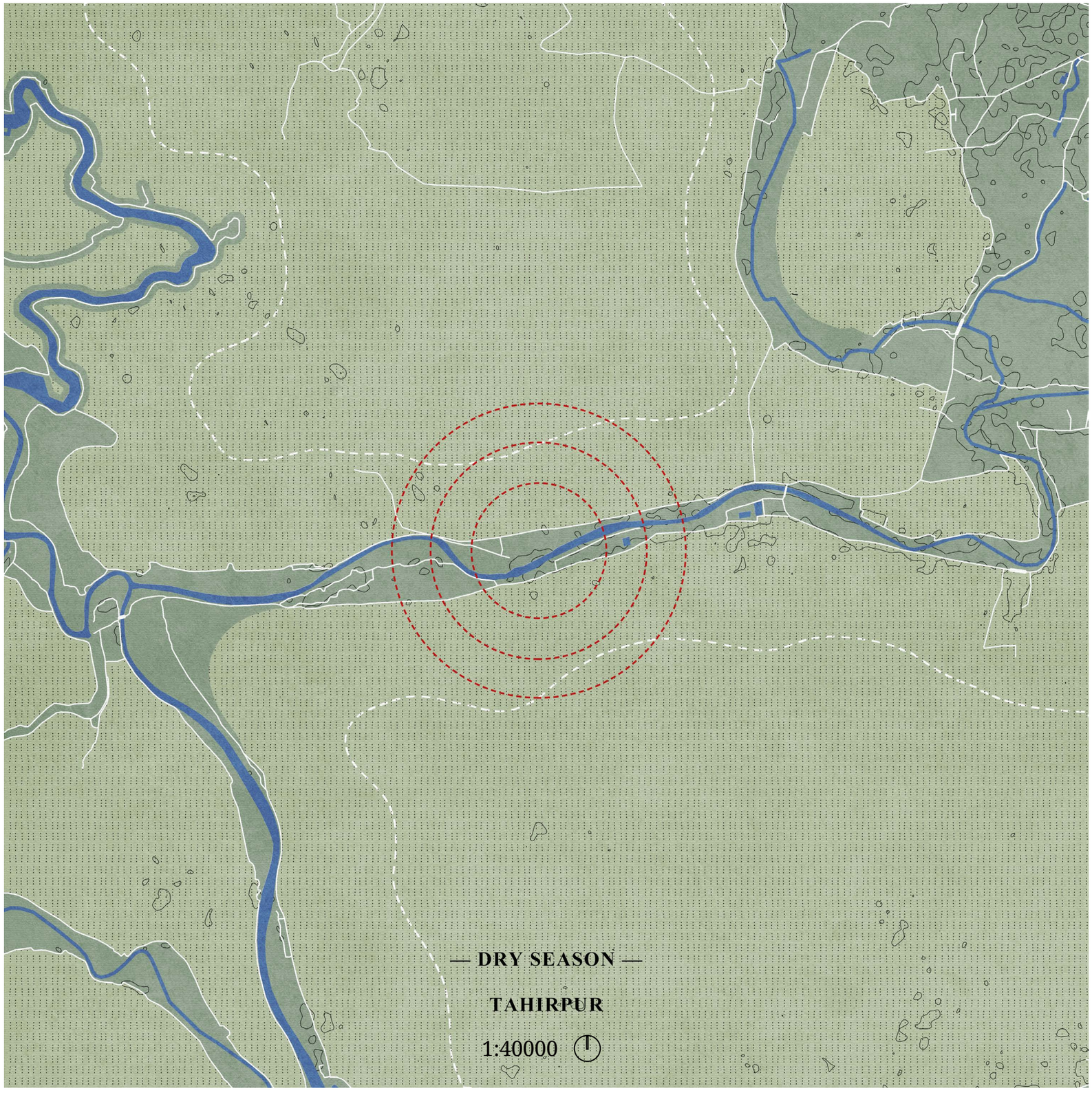
SITE

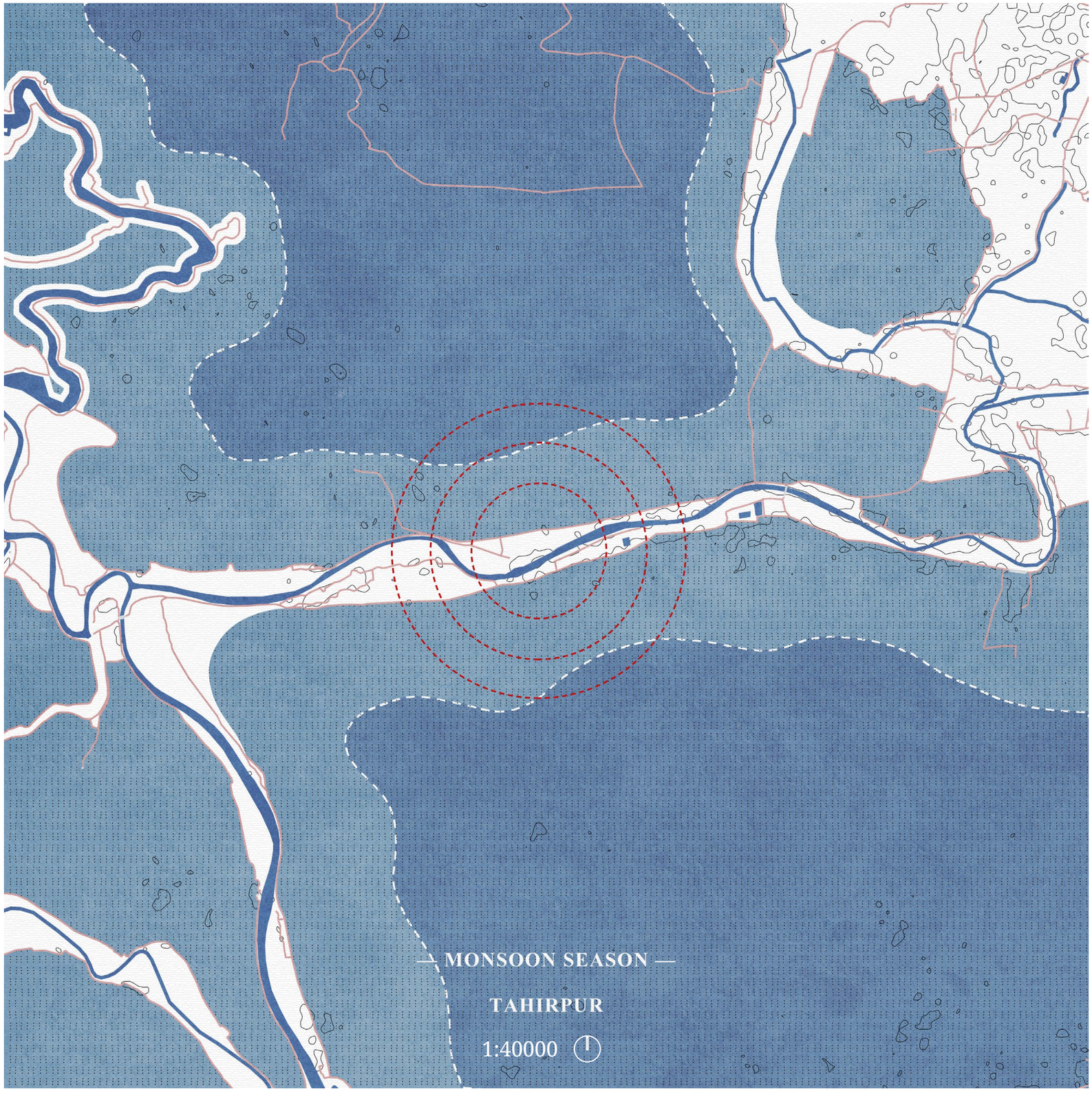
Site Condition, Site Strategy

Tahirpur, Sylhet, Bangladesh

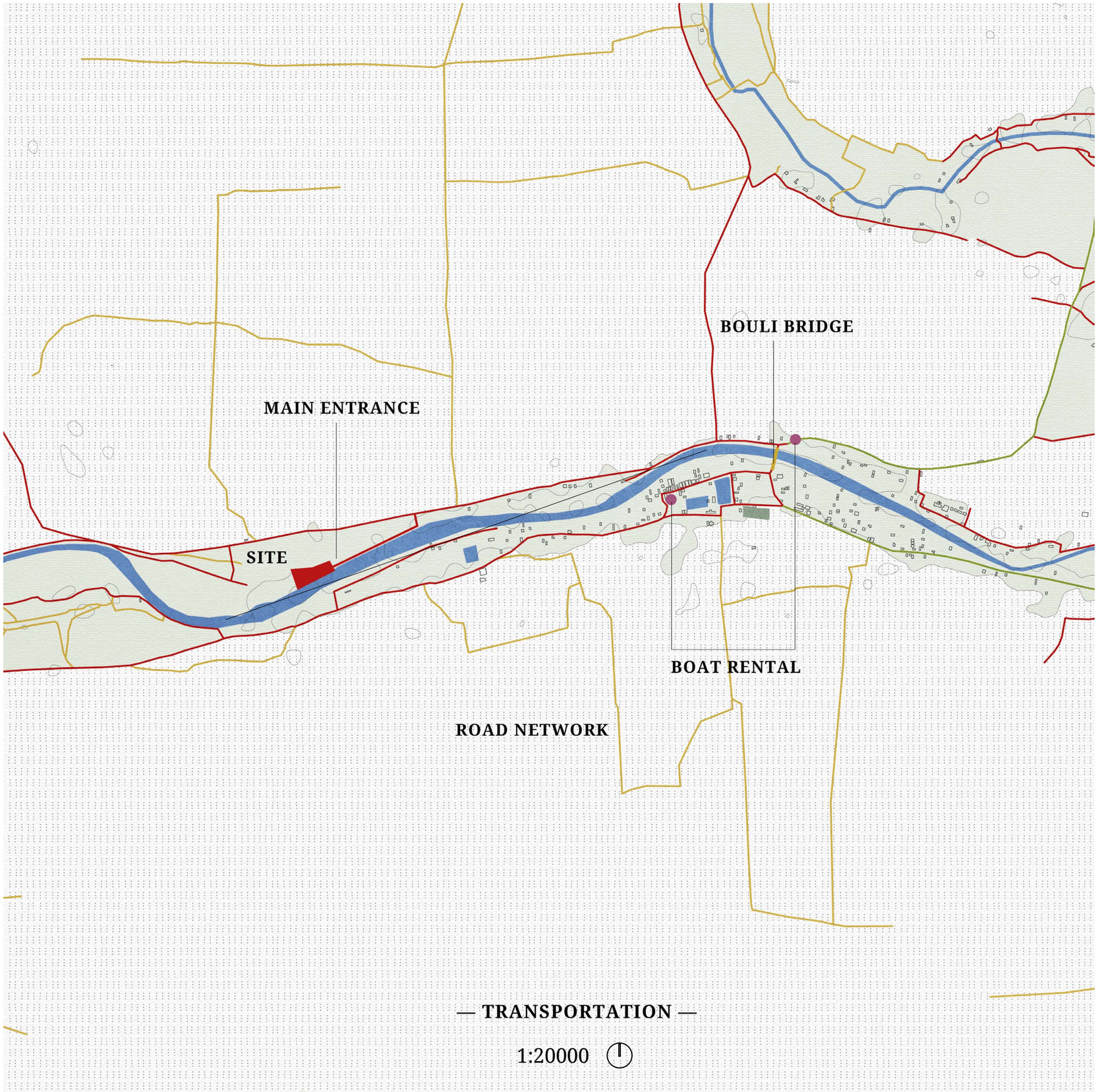
— flood mapping —

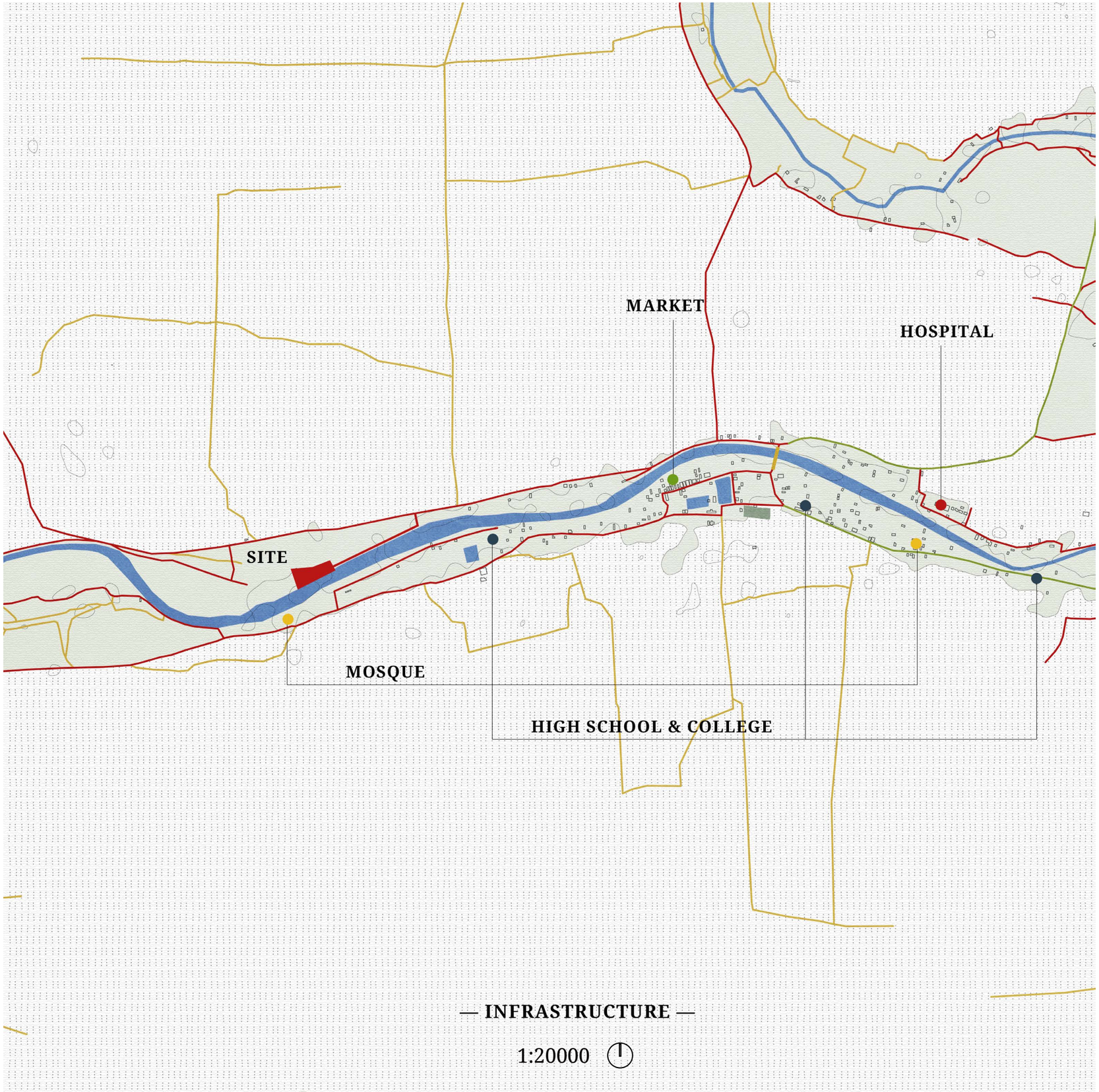

SHILLONG
NONGSTOIN
SOHRA
SYLHET
KARIMGANJ
SYLHET DIVISION
MYMENSINGH
BANGLADESH
DHARMANAGAR
TANGAIL
AMBASSA
MAMIT
TONGI
MANIKGANJ
AGARTALA
KHUMULWNG
DHAKA
DHAKA
NARAYANGANJ
CUMILLA
— FLOOD RISK —


— DRY SEASON —
TAHIRPUR
1:40000


— MONSOON SEASON —
TAHIRPUR
1:40000

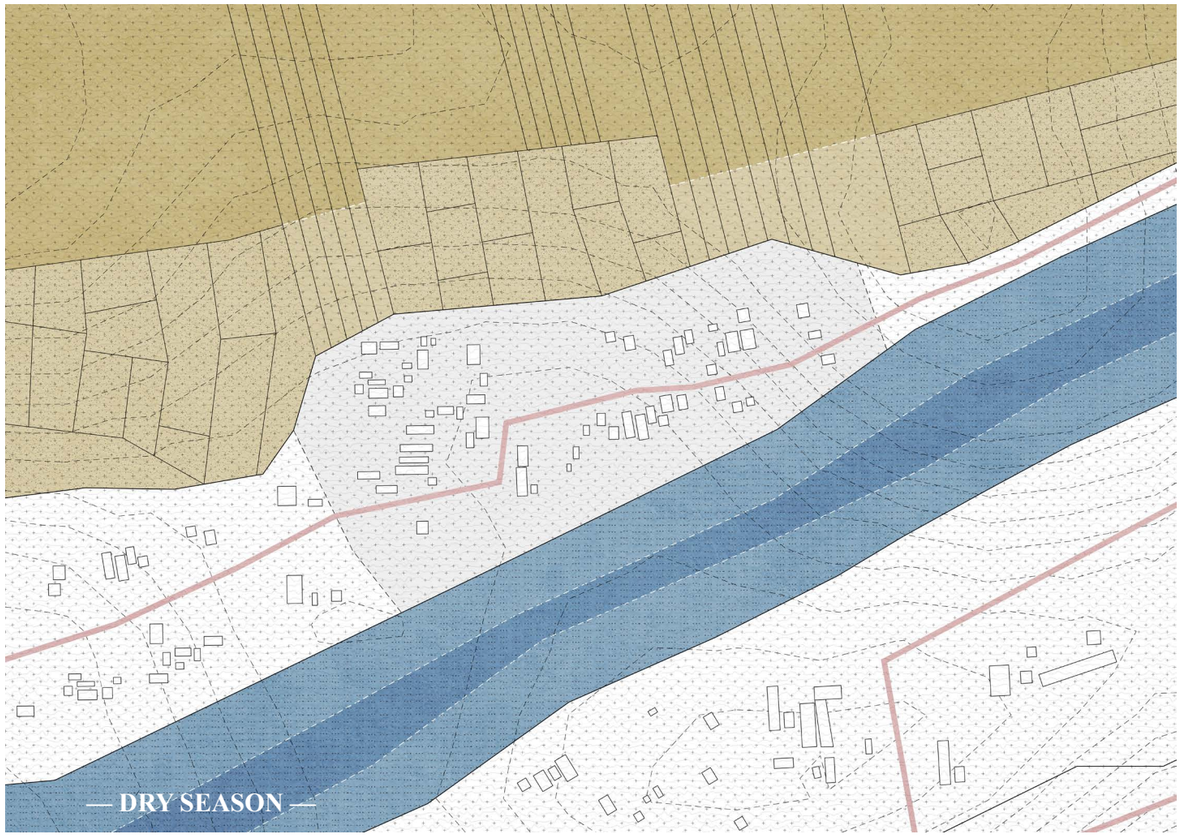
— transportation and infrastructure —


BOULI BRIDGE
MAIN ENTRANCE
SITE
BOAT RENTAL
ROAD NETWORK
— TRANSPORTATION —
1:20000



— INFRASTRUCTURE —

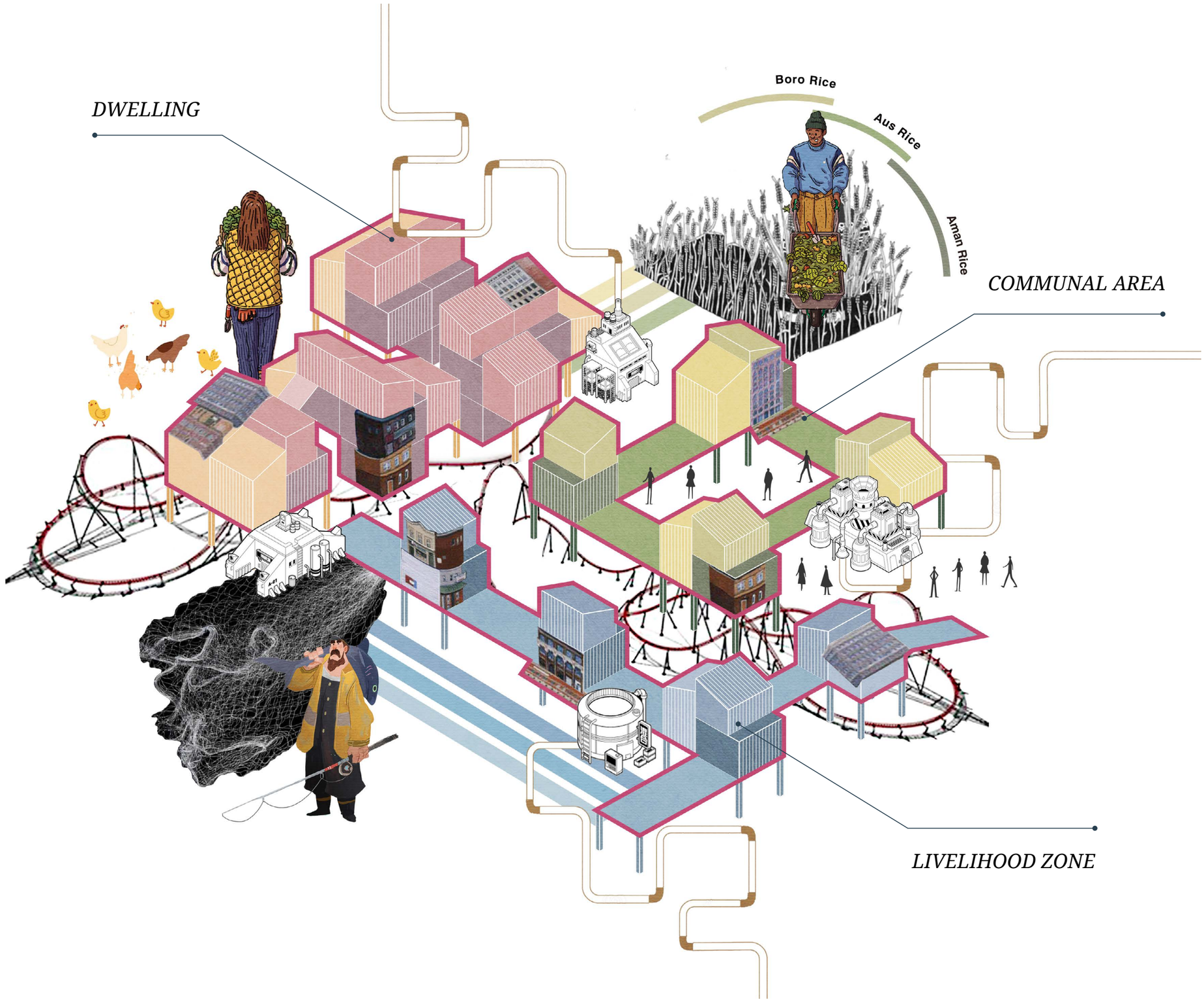
1:20000

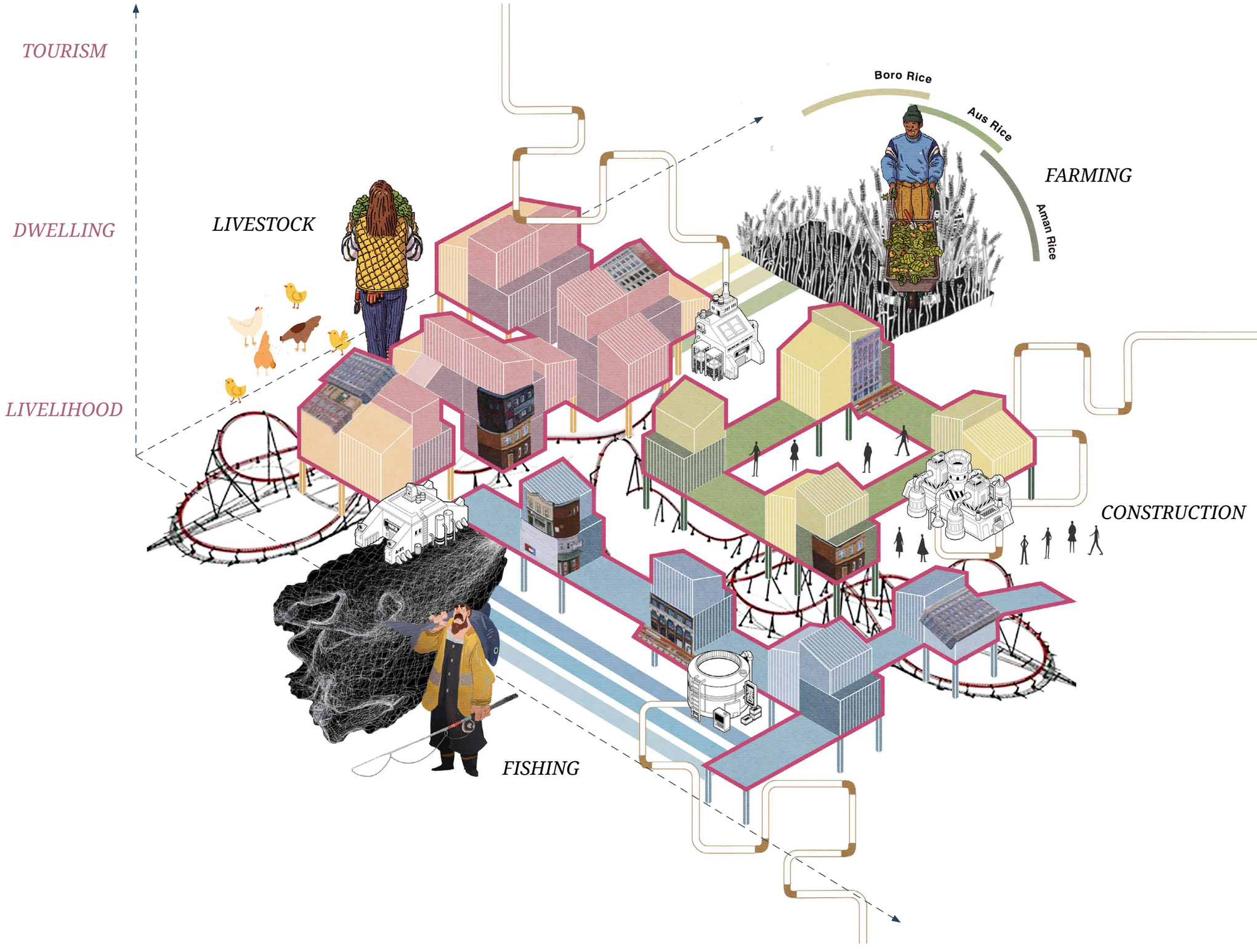


— DRY AND MONSOON SEASON CONDITIONS OF THE SITE —

1:2000

— main concept —


DWELLING
Boro Rice
Aus Rice
Aman Rice
COMMUNAL AREA
LIVELIHOOD ZONE


TOURISM
DWELLING
LIVELIHOOD
LIVESTOCK
Boro Rice
Aus Rice
Aman Rice
FARMING
CONSTRUCTION
FISHING

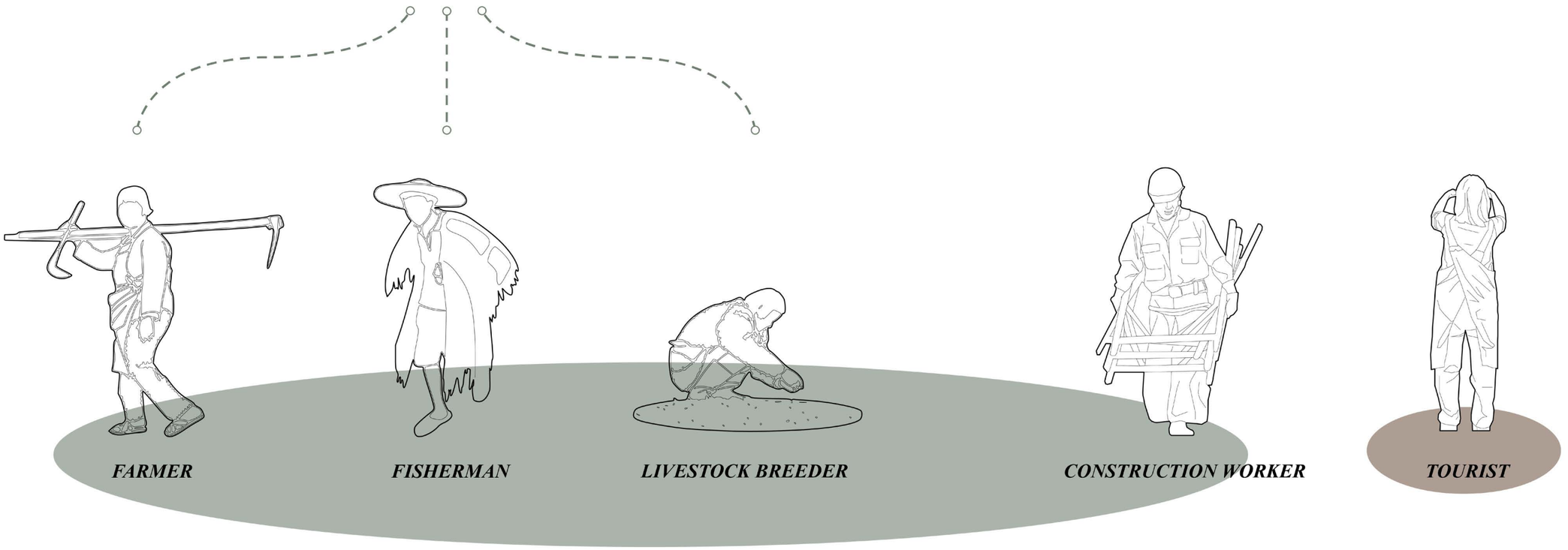
— inhabitant groups —

LOCAL RESIDENTS

OUTSIDERS

BEFORE

LOW INCOME



LOW-MIDDLE INCOME → **AFTER**

— site strategy —

— DRY SEASON —

1:1000

— MONSOON SEASON —

1:1000

— SITE INFORMATION —

Site area: 16,000 m^2

Residents: originally 500, currently 800

Density: 500 residents/ha

Fsi: 0.86

Gsi: 0.32

— SITE PLAN —

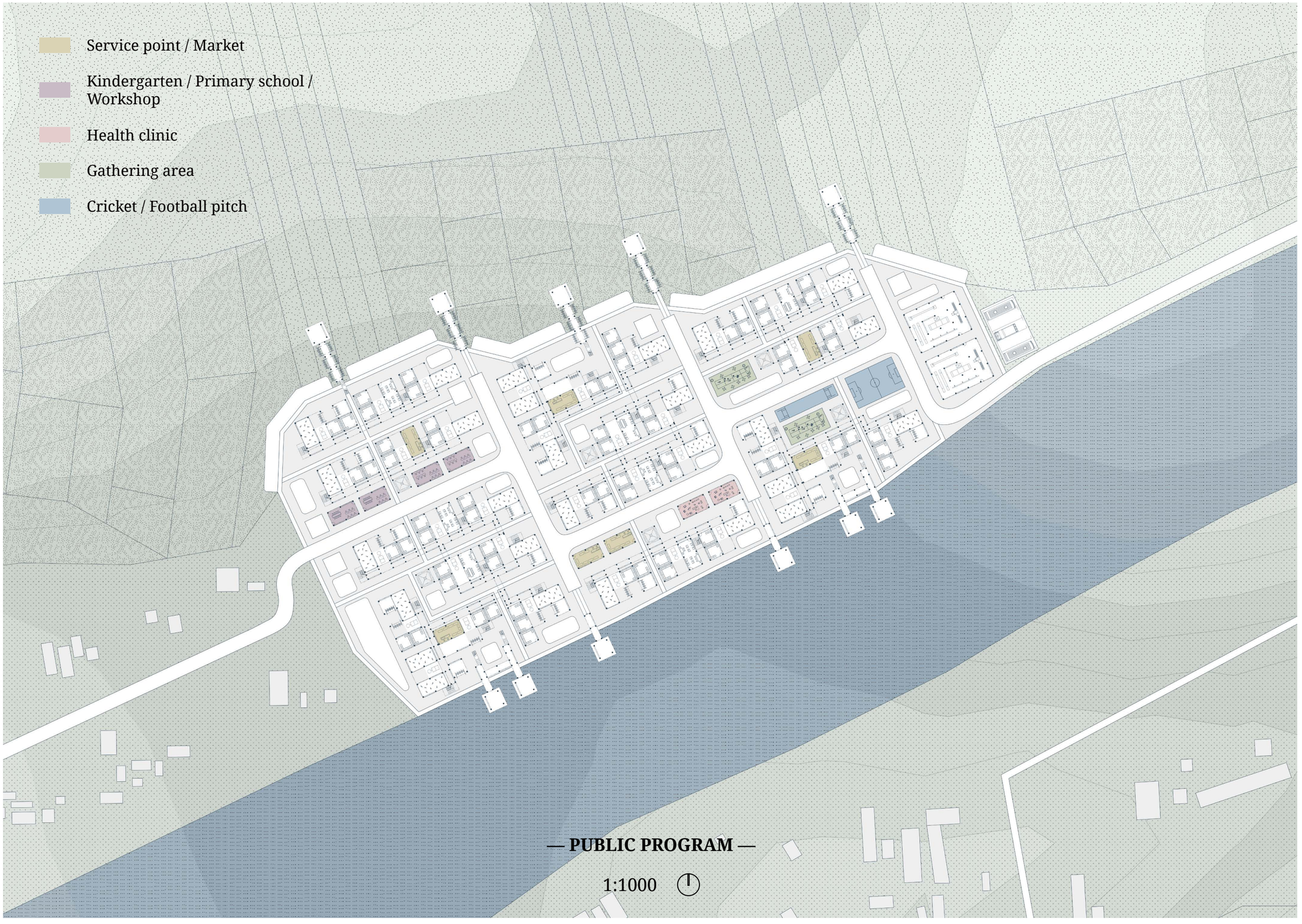
1:1000

— TRANSPORTATION —

1:1000

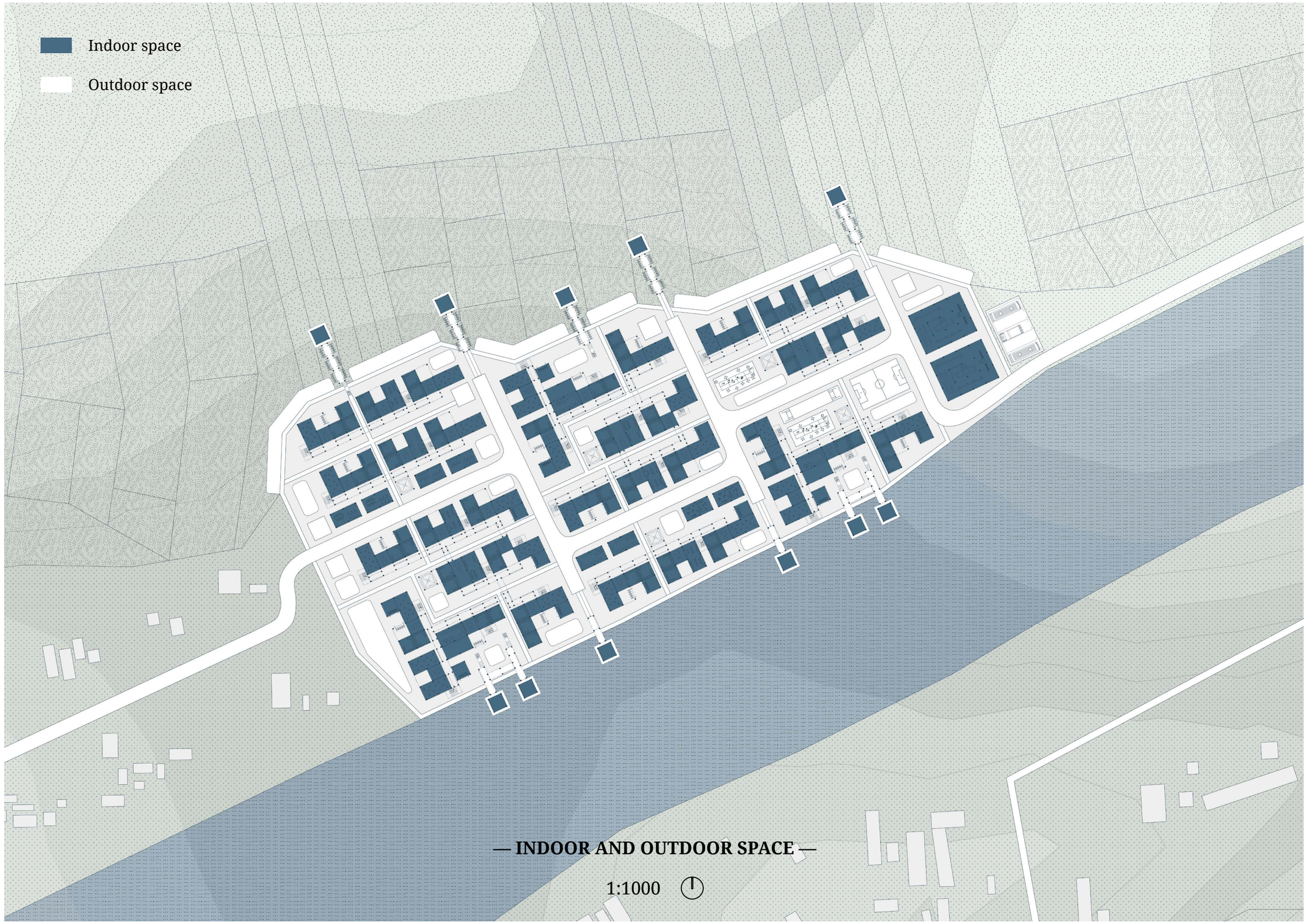
— LOCAL INDUSTRIES —

1:1000



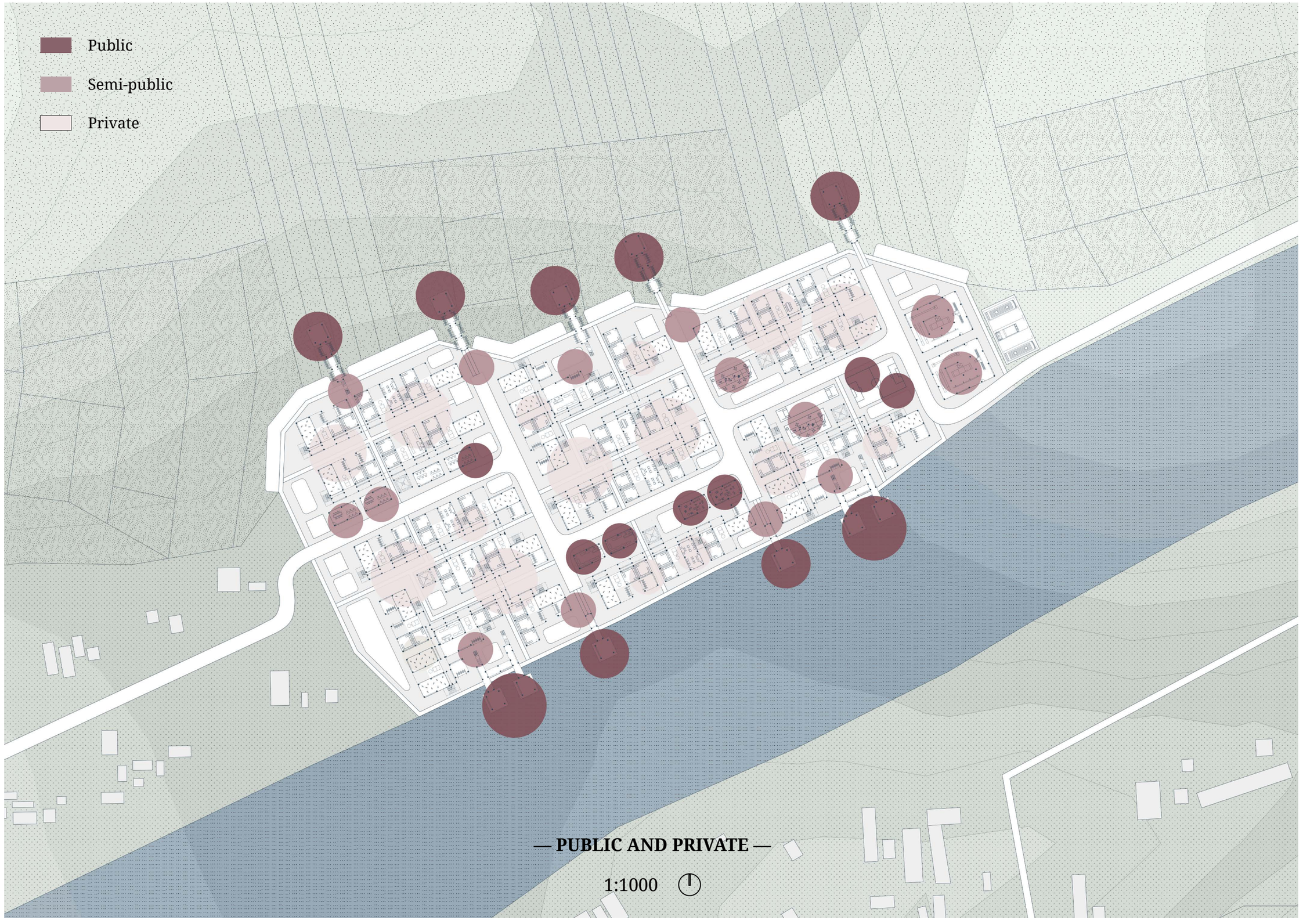
— PUBLIC PROGRAM —

1:1000



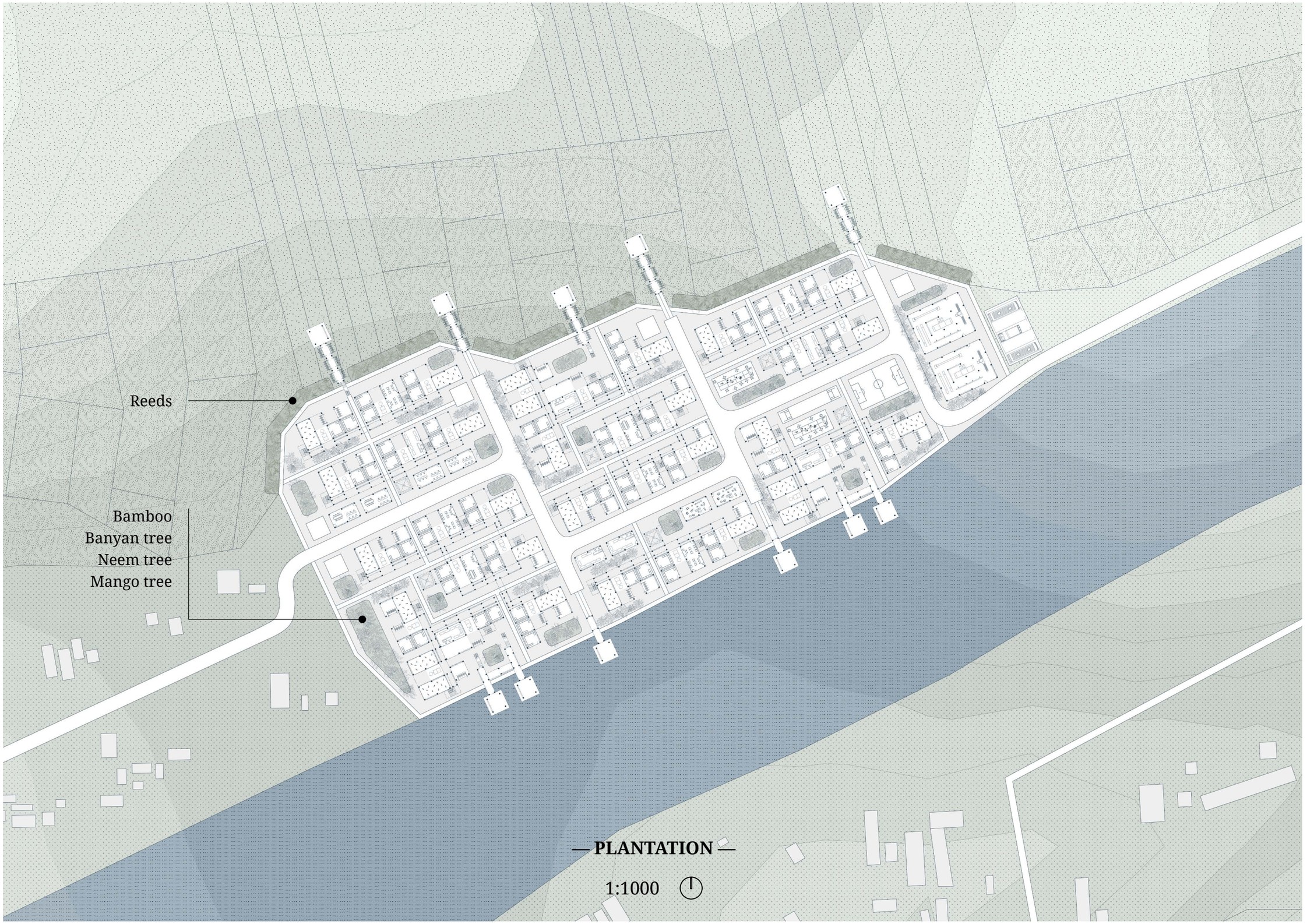
— INDOOR AND OUTDOOR SPACE —

1:1000



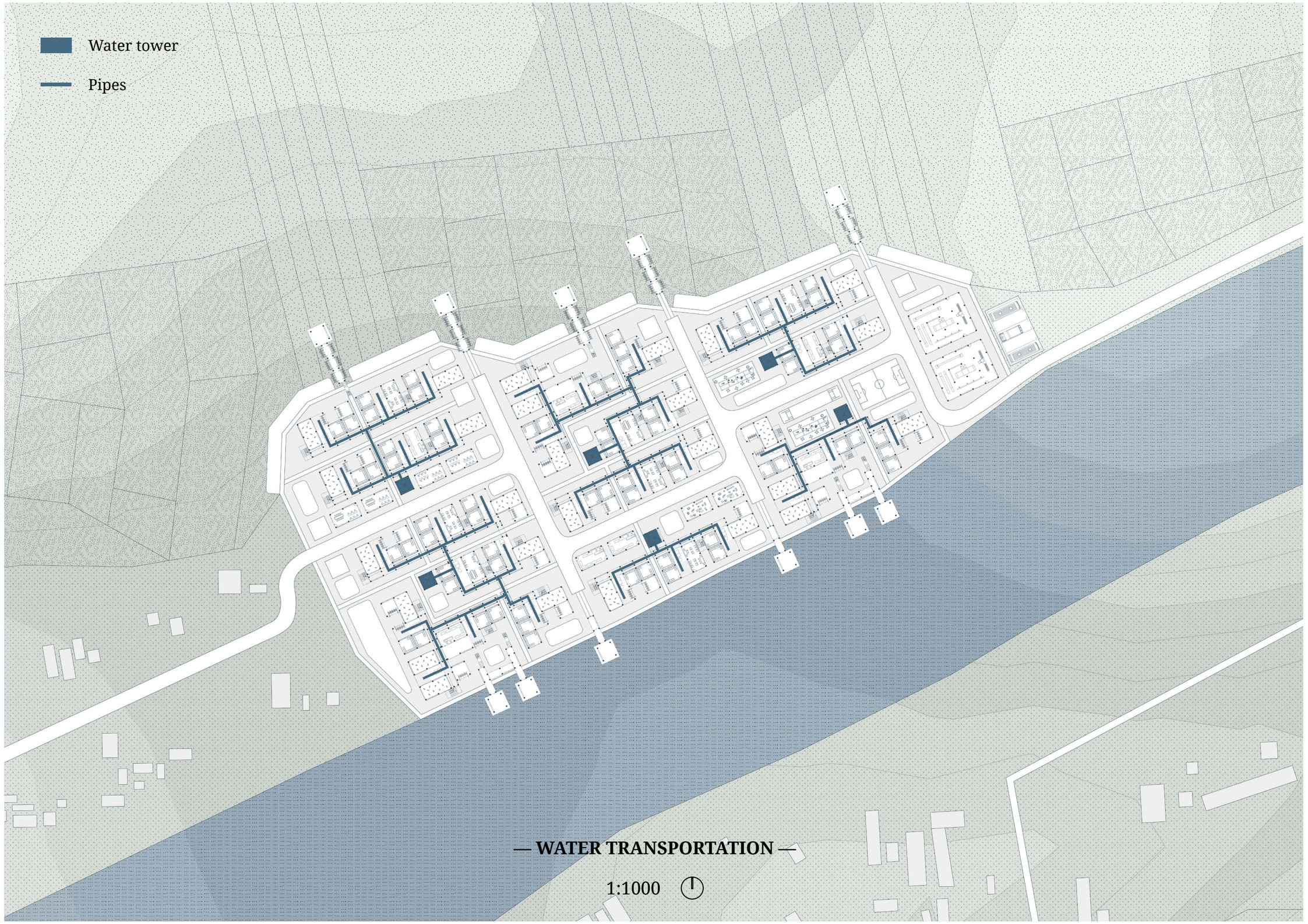
— PUBLIC AND PRIVATE —

1:1000



— PLANTATION —

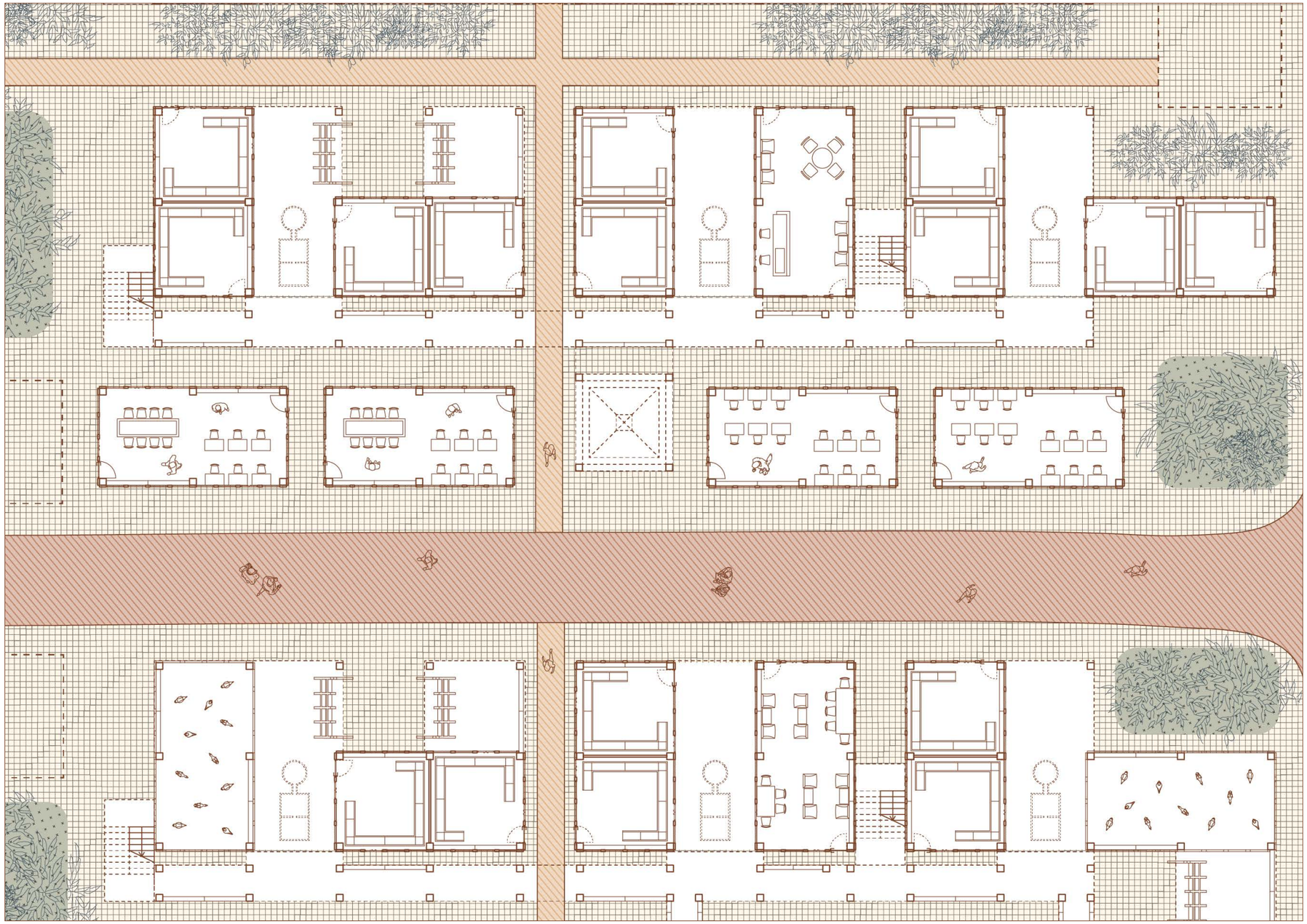
1:1000



— WATER TRANSPORTATION —

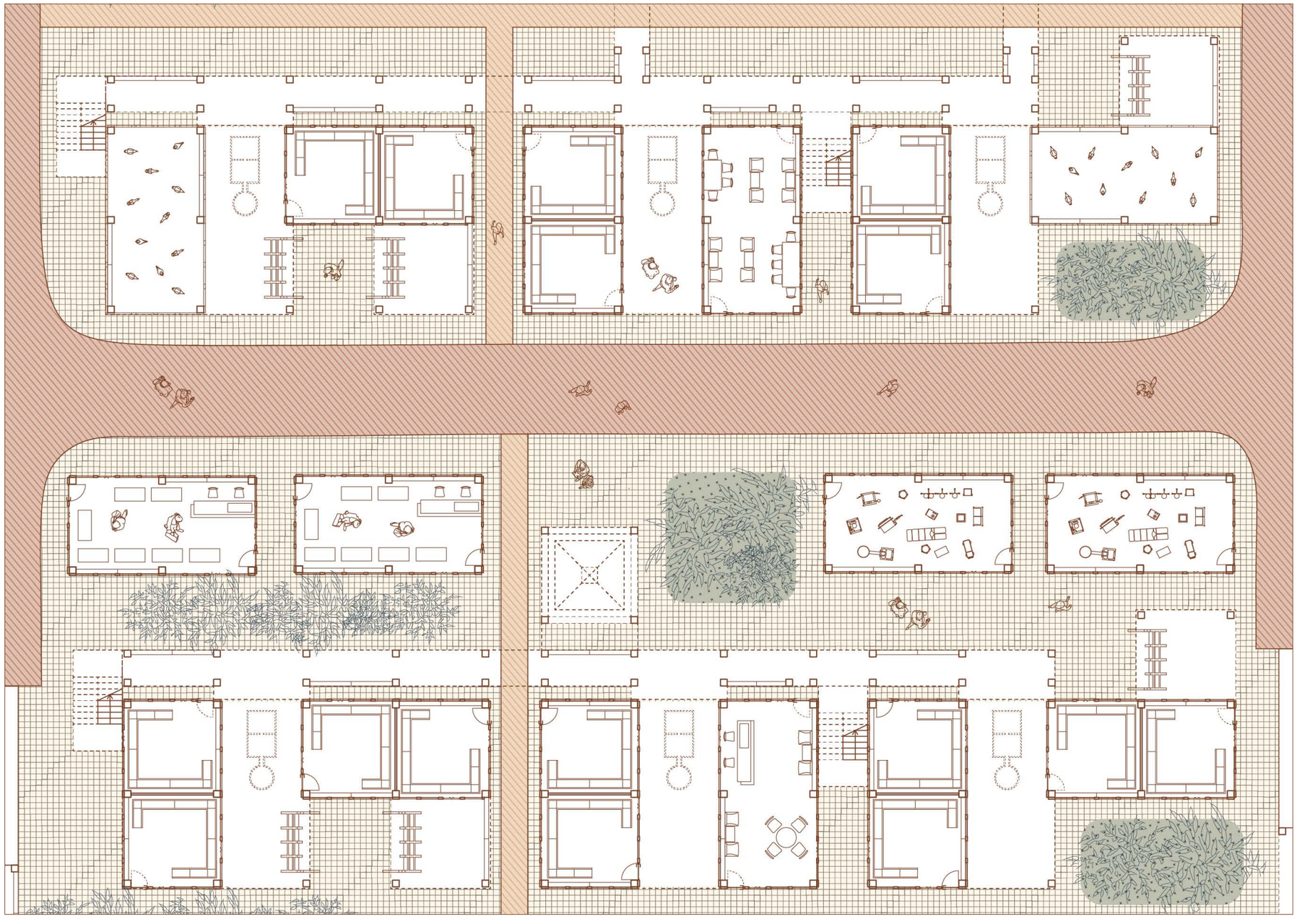
1:1000

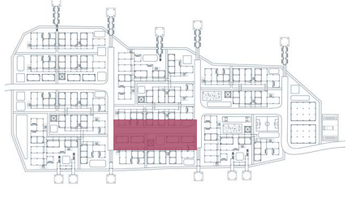
— community public area —



— KINDERGARTEN / PRIMARY SCHOOL / WORKSHOP —

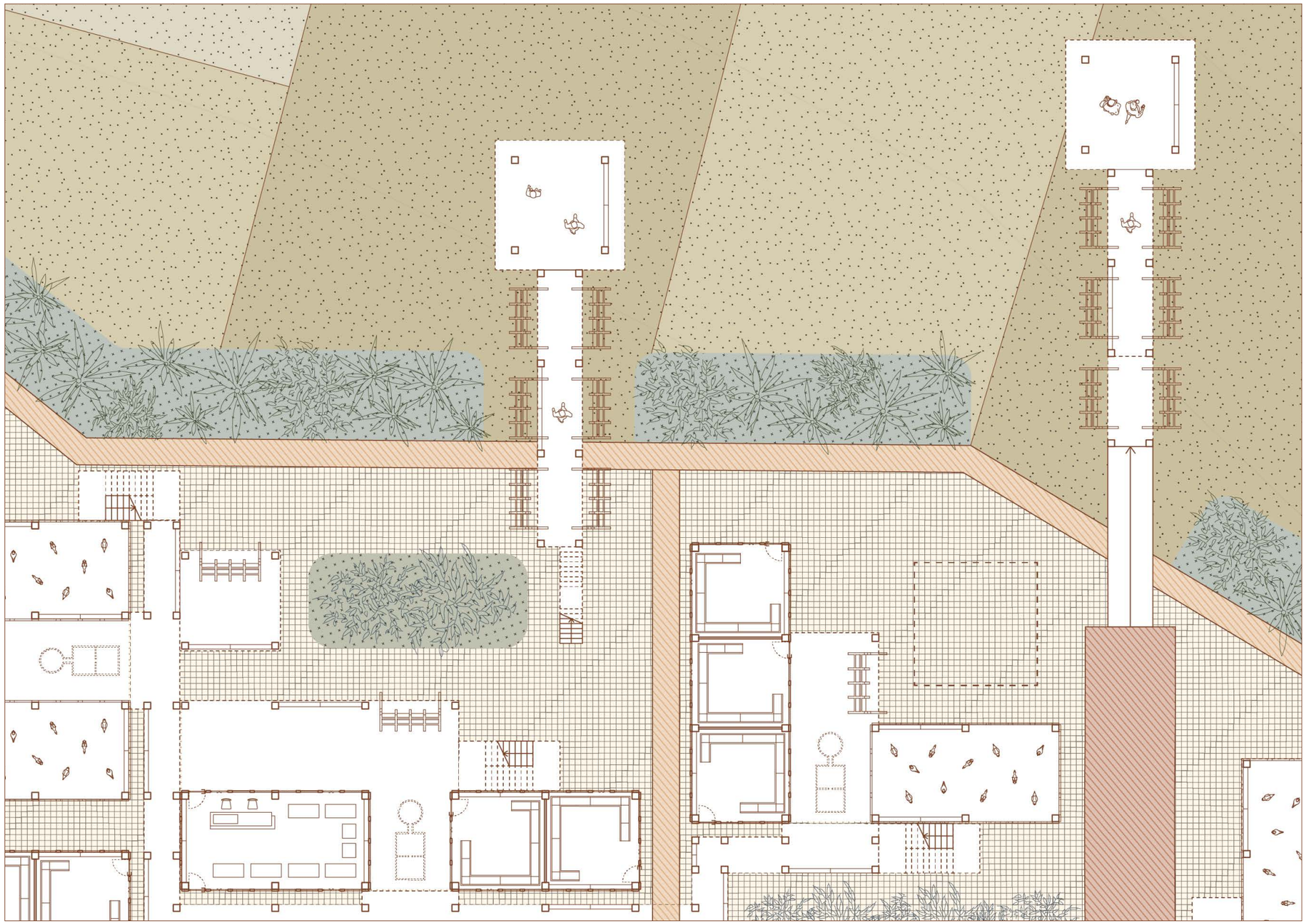
1:200





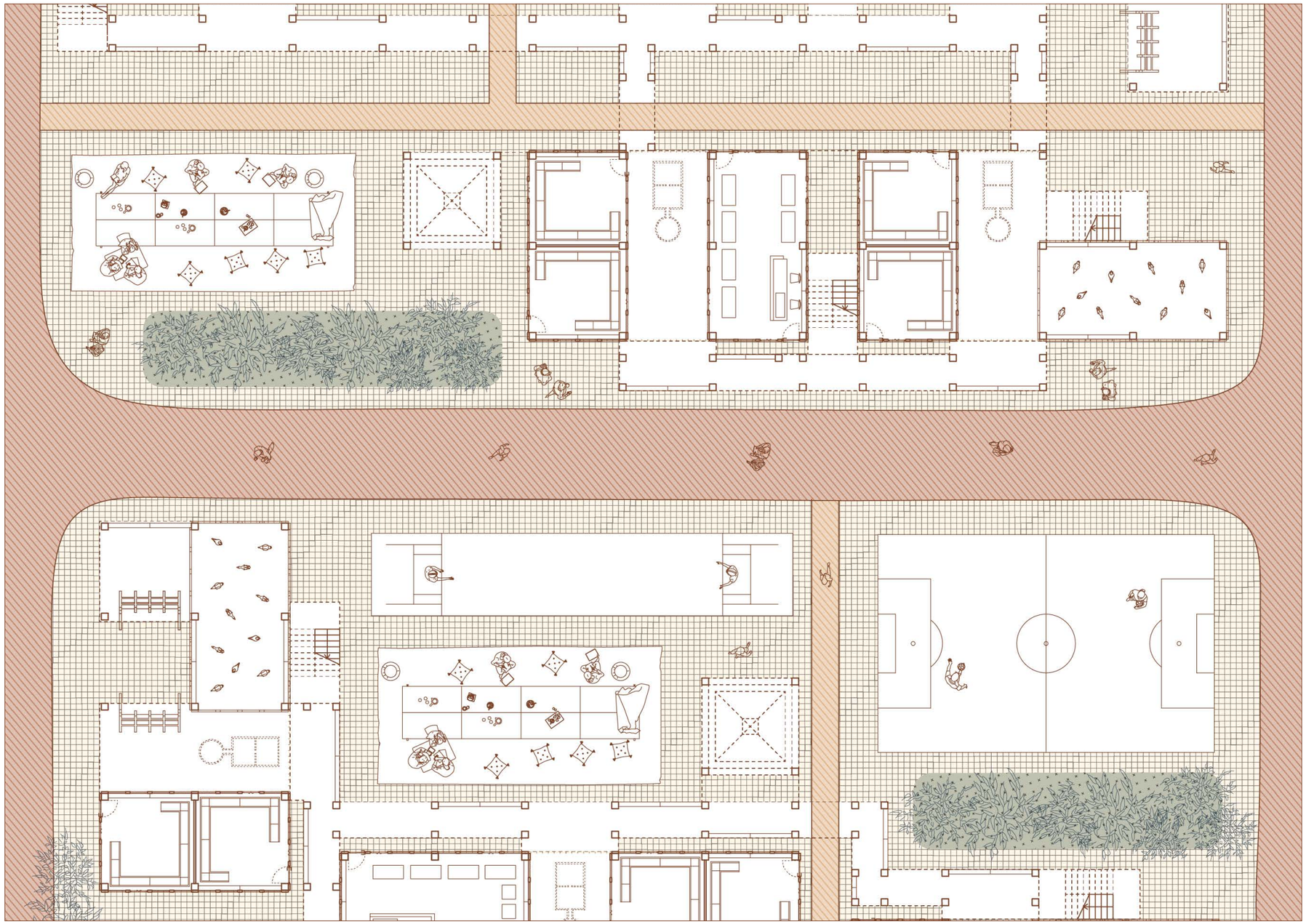
— SERVICE POINT / MARKET / HEALTH CLINIC —

1:200



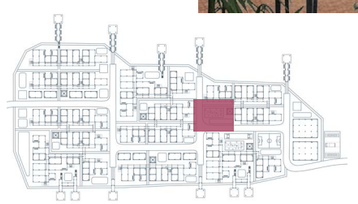
— FARMING —

1:200

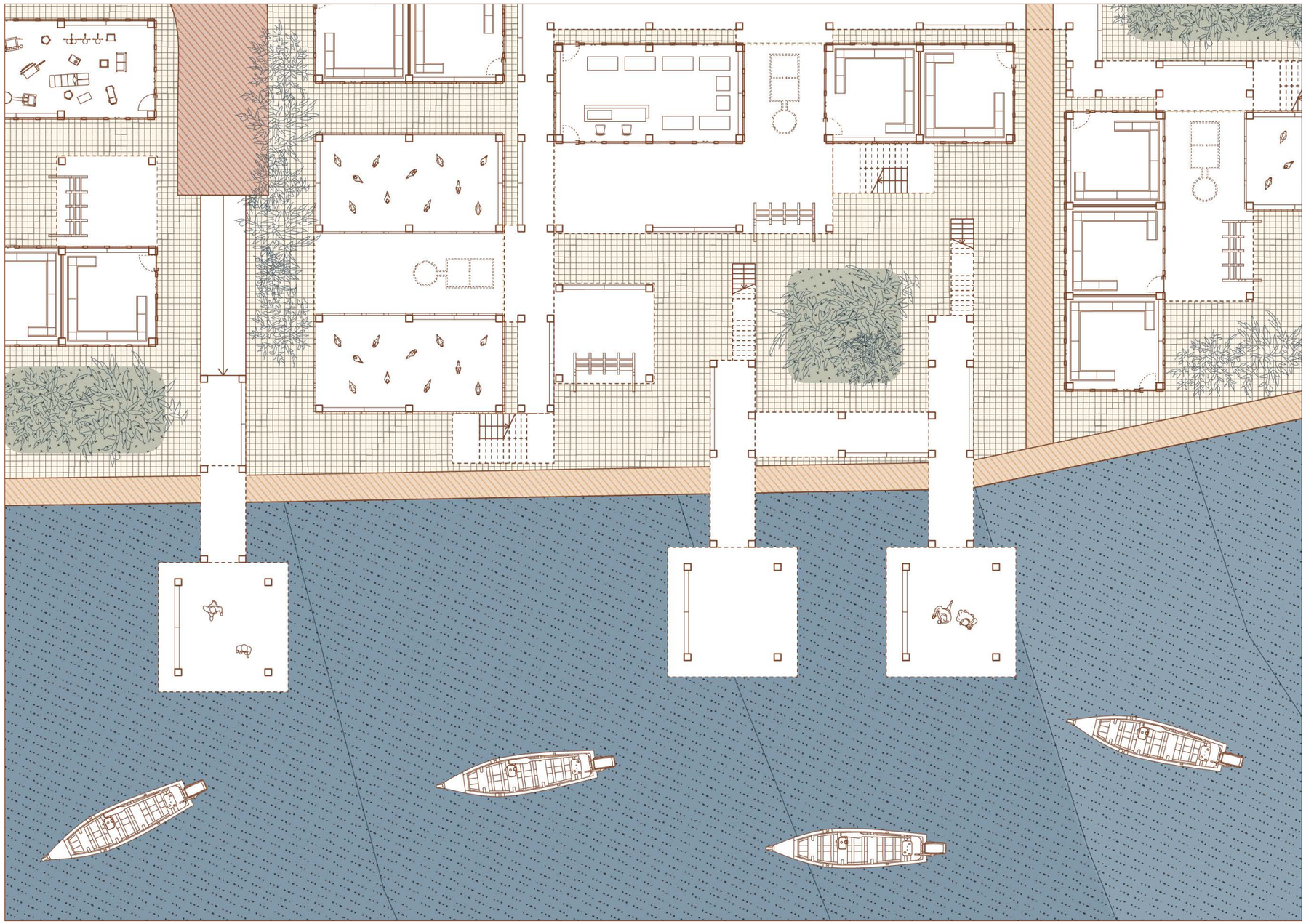


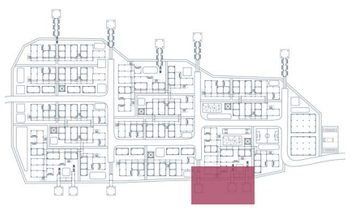
— GATHERING AREA / CRICKET / FOOTBALL PITCH —

1:200



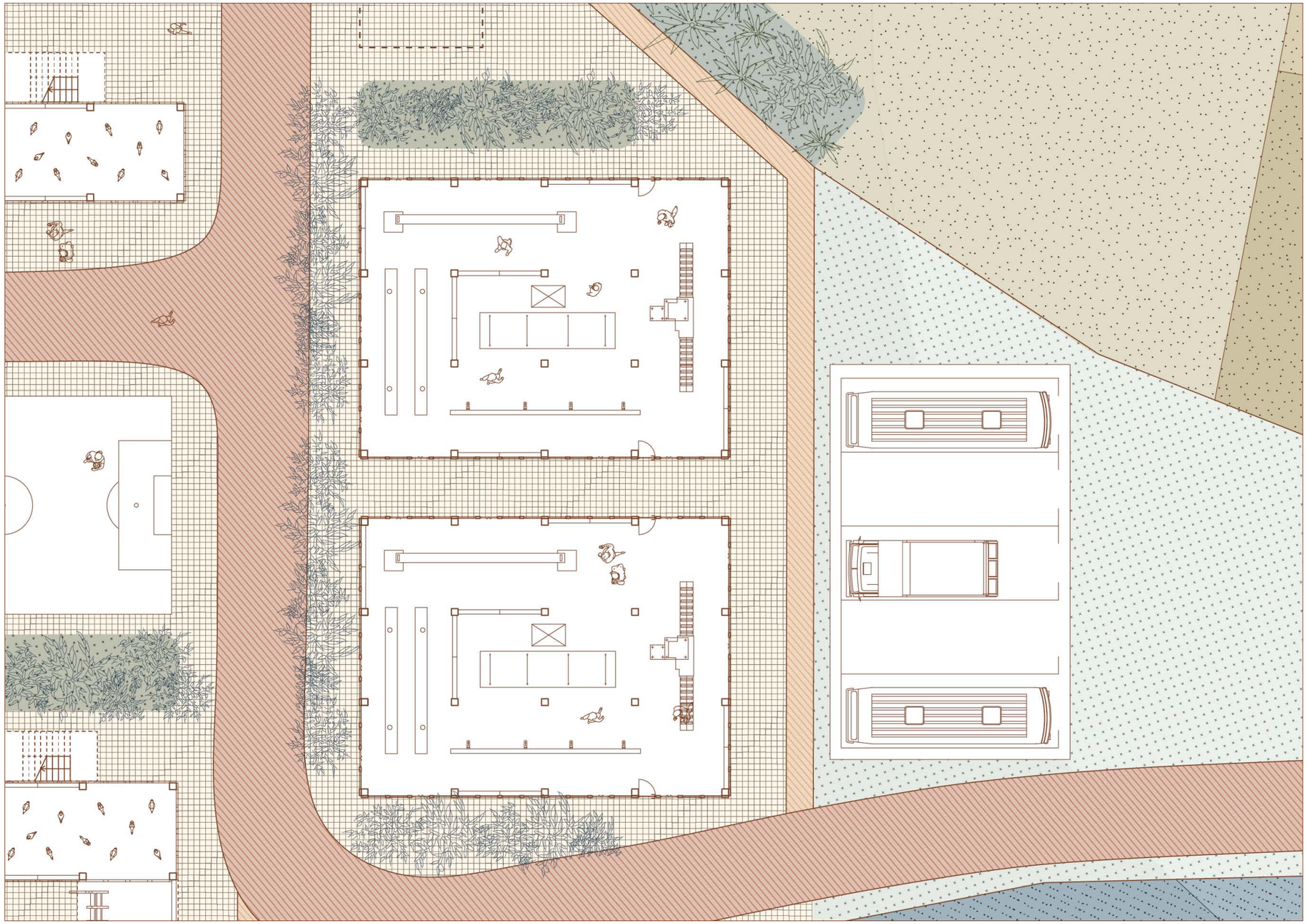
— COURTYARD VIEW —

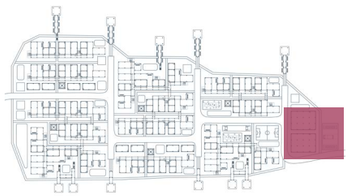




— FISHING / BOAT LANDING —

1:200





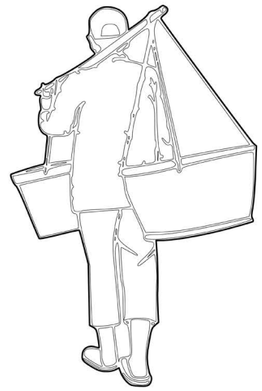
— CONSTRUCTION INDUSTRY / MAIN ENTRANCE / VEHICLE-PARKING / VAN CONNECTION NOD —

1:200

CLUSTER

New Housing System, Layout, Program

Tahirpur, Sylhet, Bangladesh



FISHING TOOLS

AGRICULTURAL TOOLS

FEED

STORAGE

DWELLING

• PRIVATE

FISH / CROP / CHICKEN / DUCK

PRODUCT

MARKET

PUBLIC AREA

DWELLING

TOURISM

• SEMI-PUBLIC

DRYING

LIVESTOCK

FISHING

FARMING

CONSTRUCTION

FEEDING

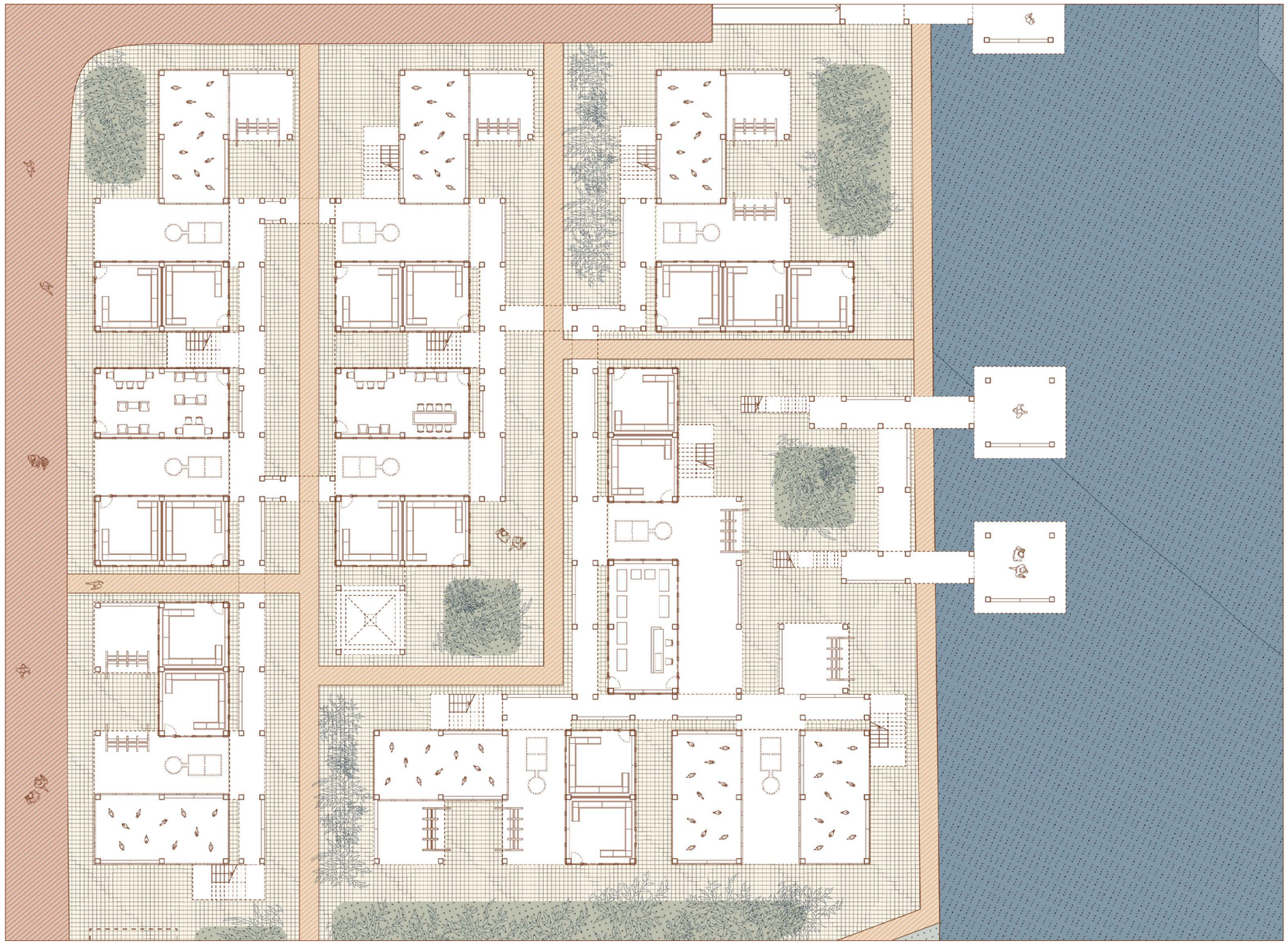
WATERING
WEEDING

• PUBLIC

CIRCULATION OF PEOPLE

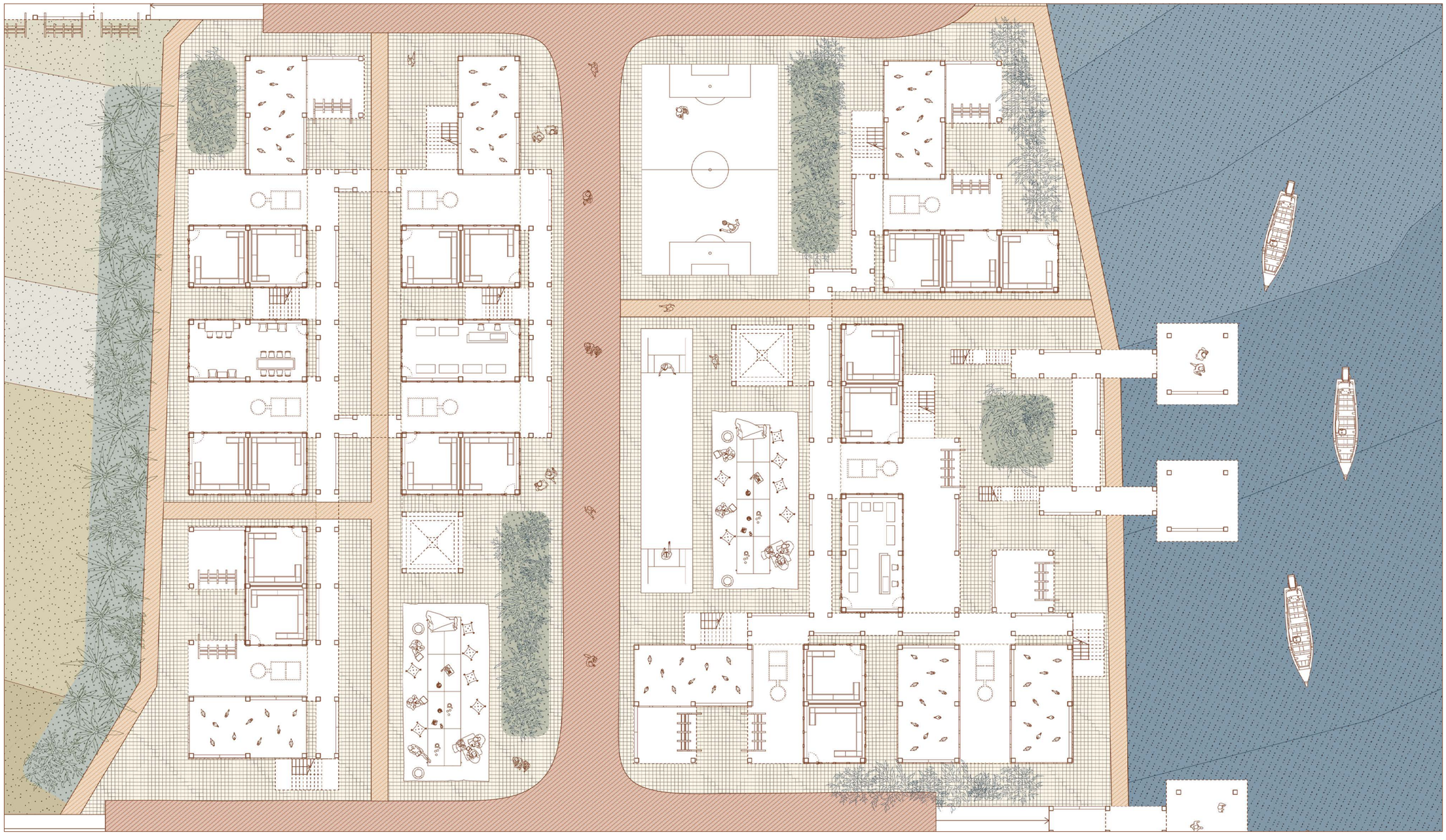
CIRCULATION OF PRODUCT

— local-resident dominated complex —



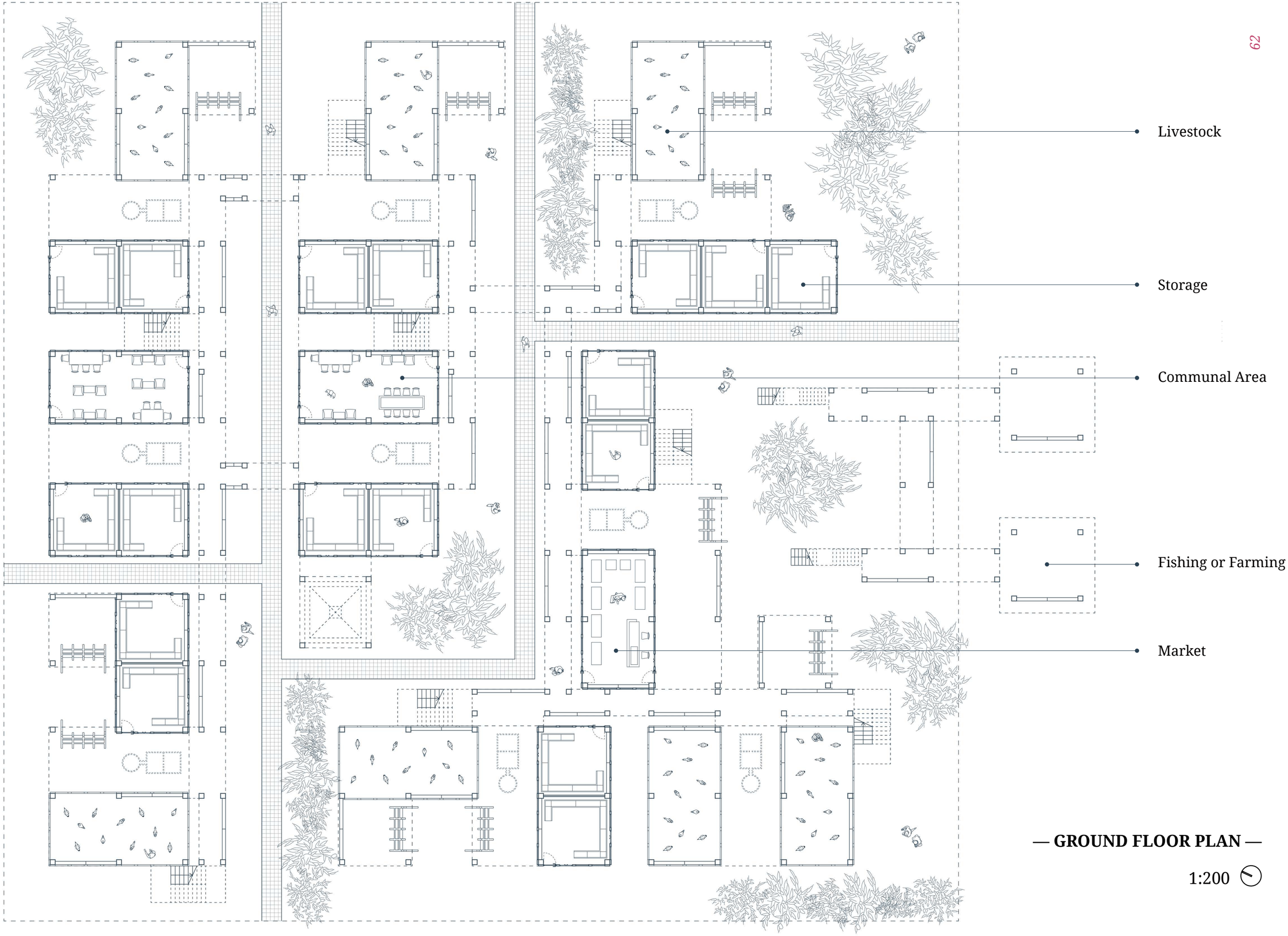
— LOCAL-RESIDENT DOMINATED COMPLEX —

1:300



— LAYOUT OF CLUSTER VARIES ACCORDING TO SITE —

1:300

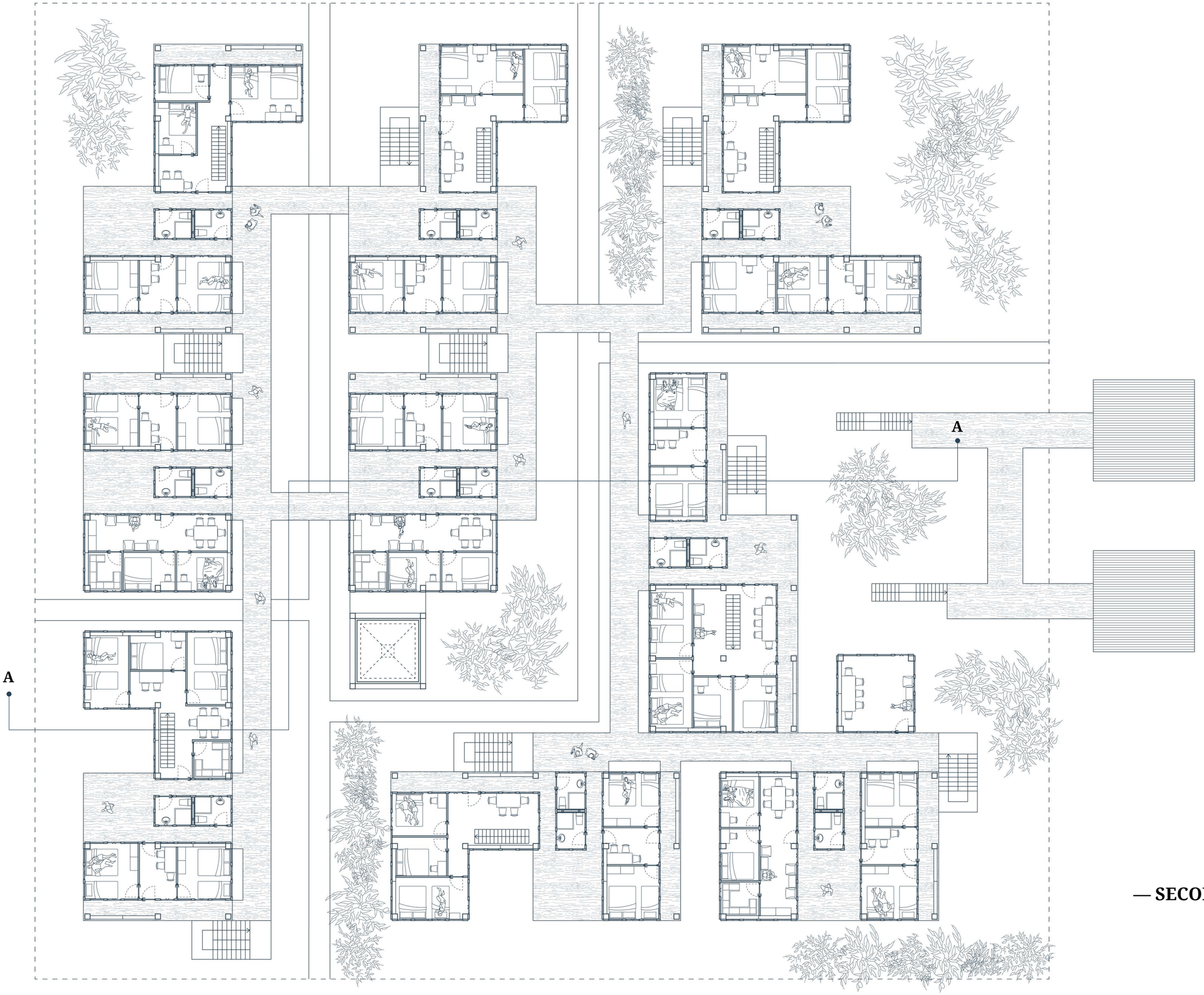


— GROUND FLOOR PLAN —

1:200

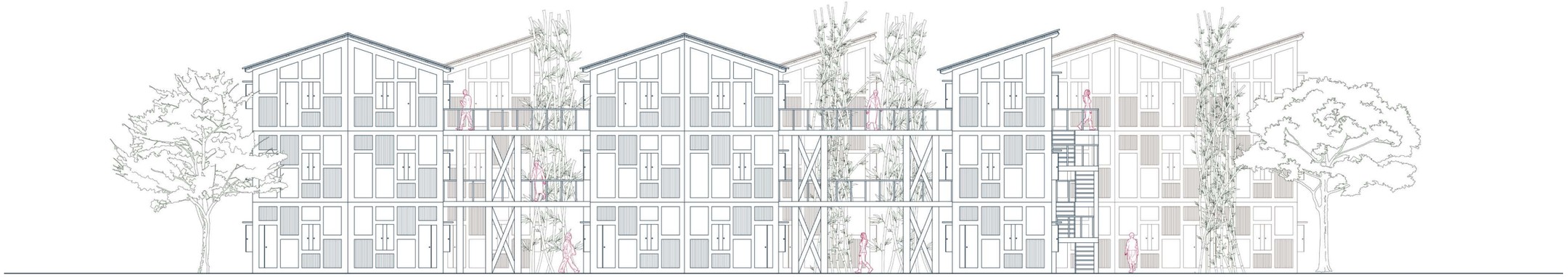
— FIRST FLOOR PLAN —

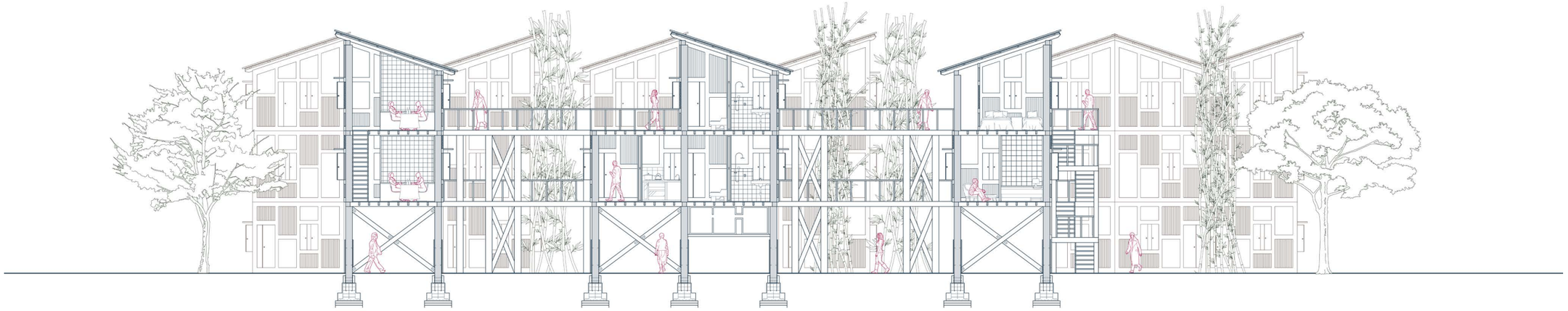
1:200



— SECOND FLOOR PLAN —

1:200



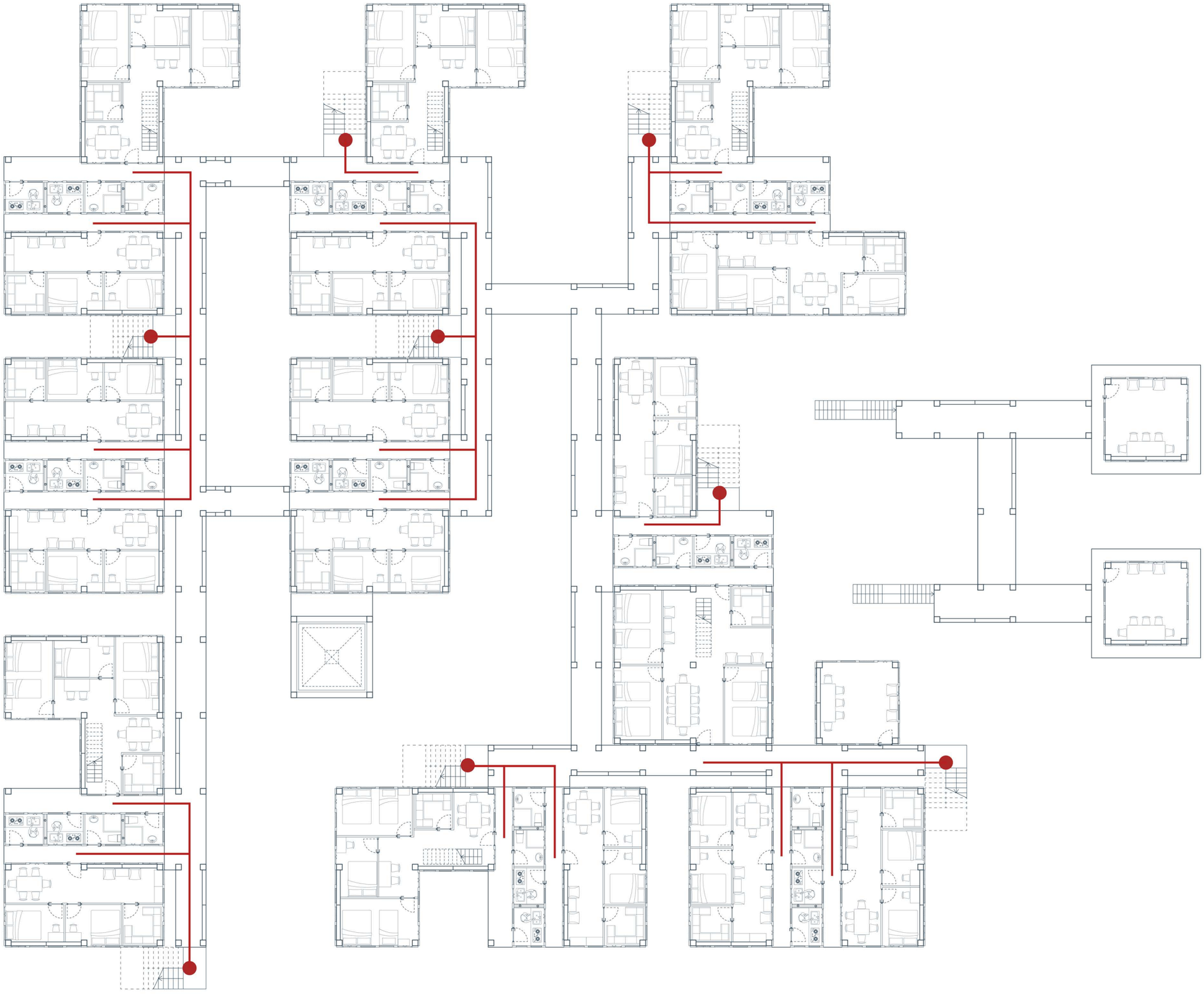


— WEST ELEVATION & SECTION A-A —

1:200

— WEST ELEVATION & SECTION A’-A‘ —

1:200



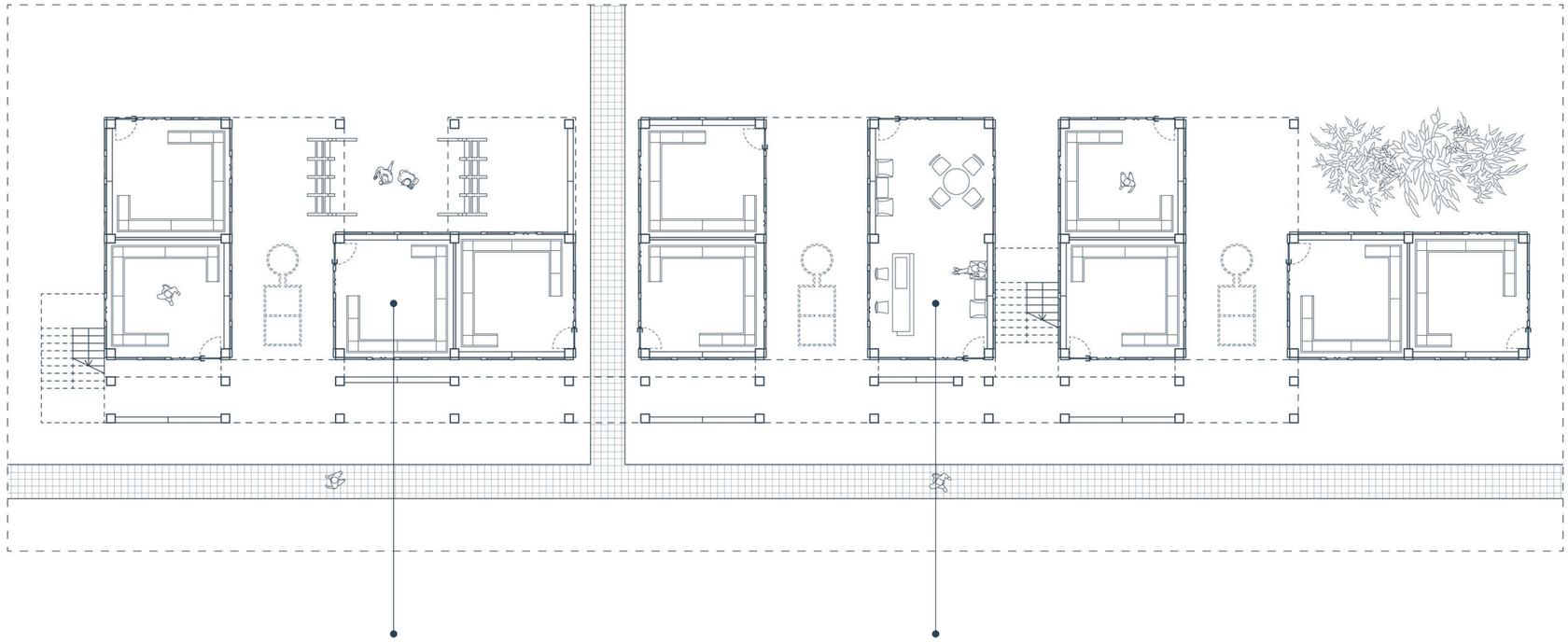
— FIRE ESCAPE —

1:200

— tourist-exclusive complex —

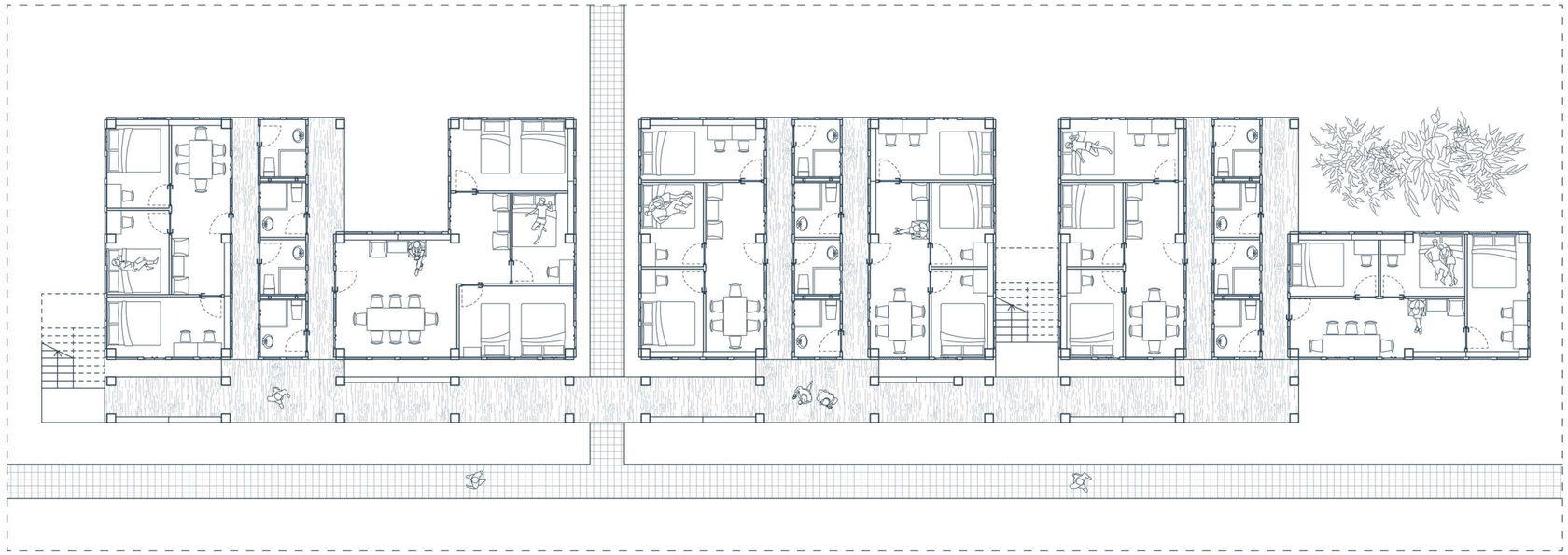
— TOURIST-EXCLUSIVE COMPLEX —

1:300



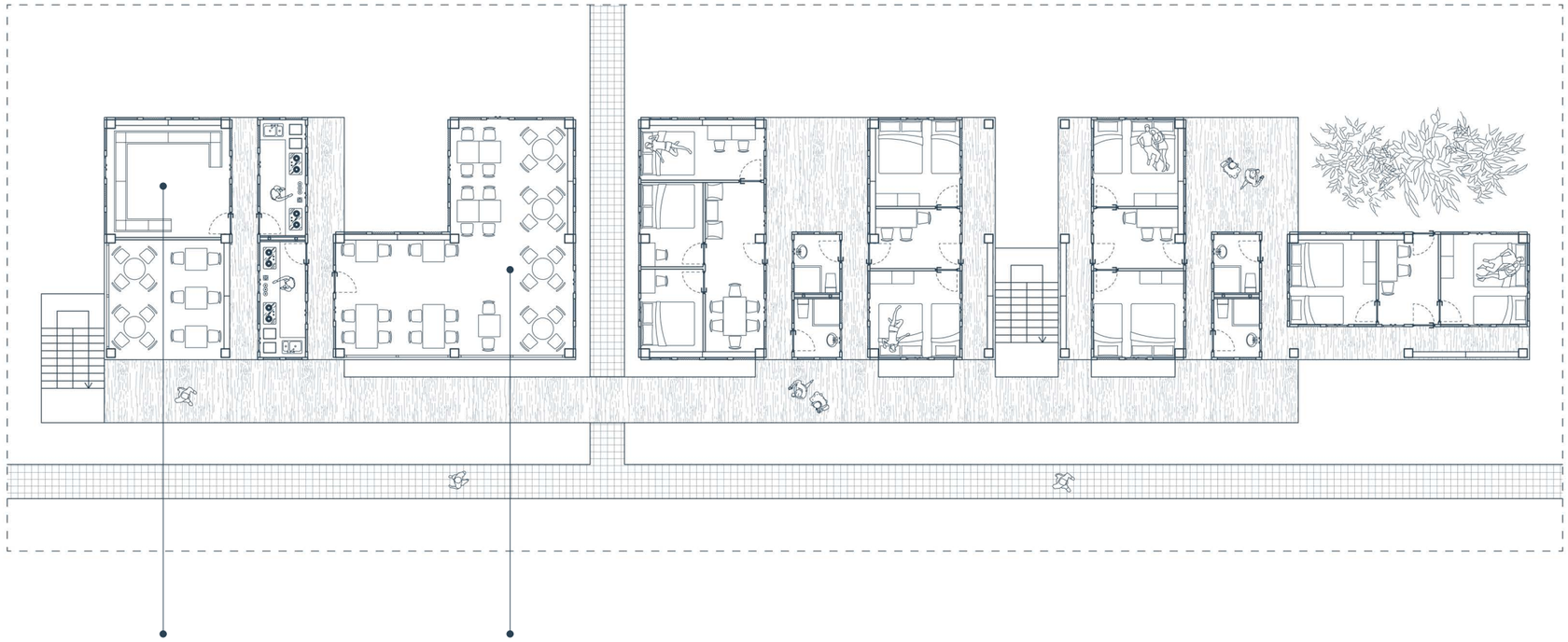
— GROUND FLOOR PLAN —

1:200



— FIRST FLOOR PLAN —

1:200



— SECOND FLOOR PLAN —

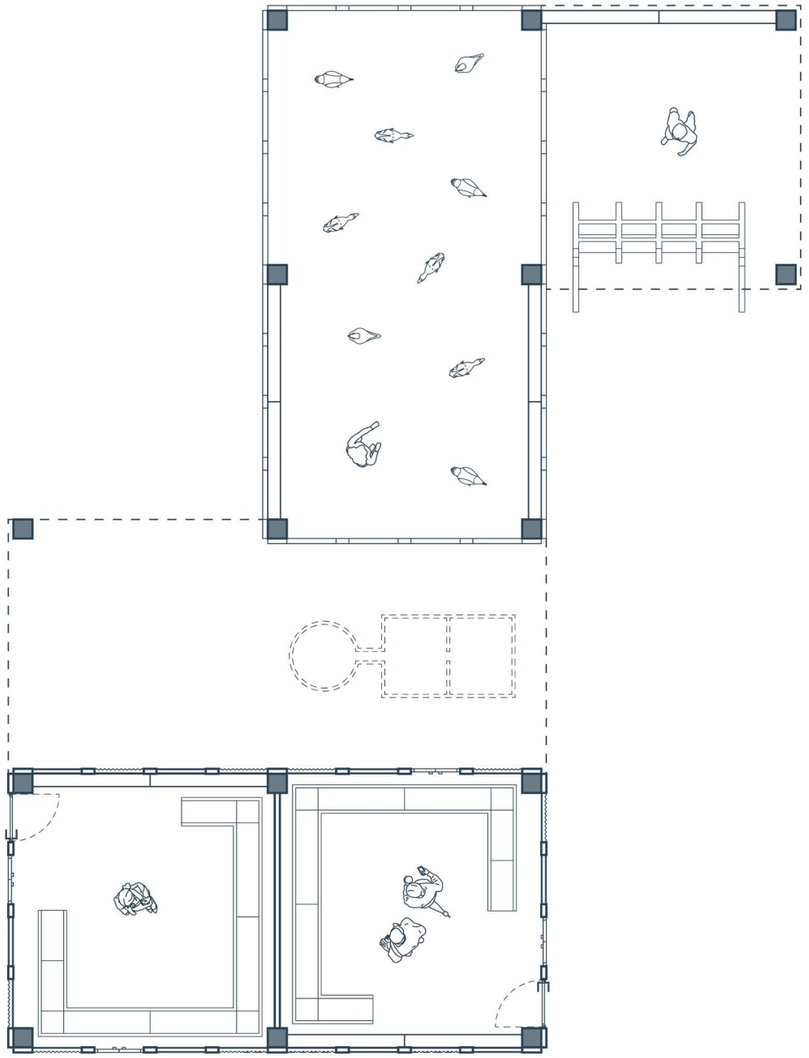
1:200

UNIT

Dwelling Unit Types, Livelihood Unit Types

Tahirpur, Sylhet, Bangladesh

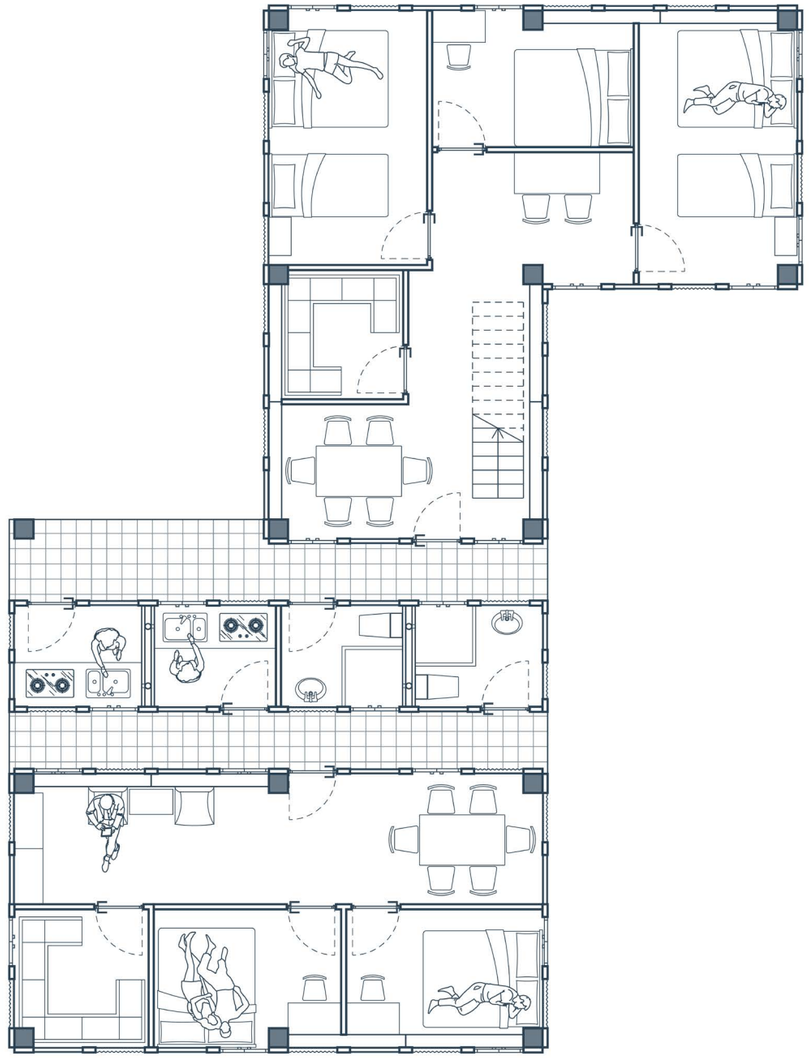
— dwelling unit 1 —



— GROUND FLOOR —

STORAGE / LIVESTOCK

124 m^2

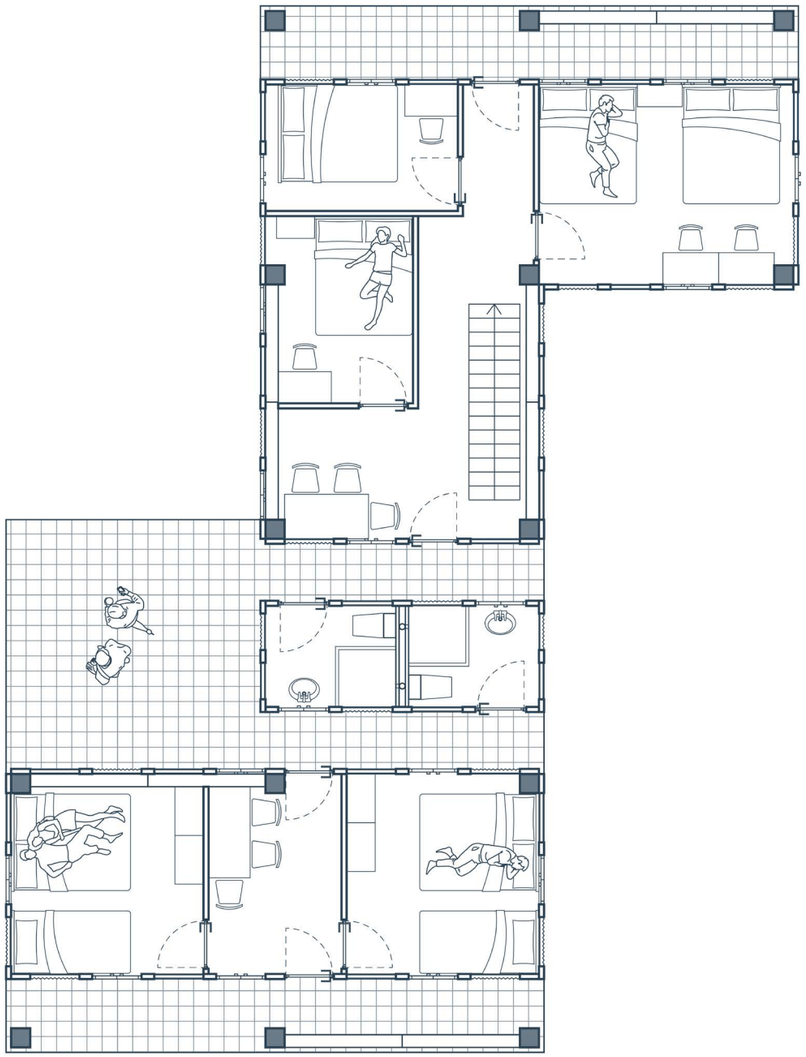


— FIRST FLOOR —

3 BEDROOMS — 2 BEDROOMS

LOCAL RESIDENTS

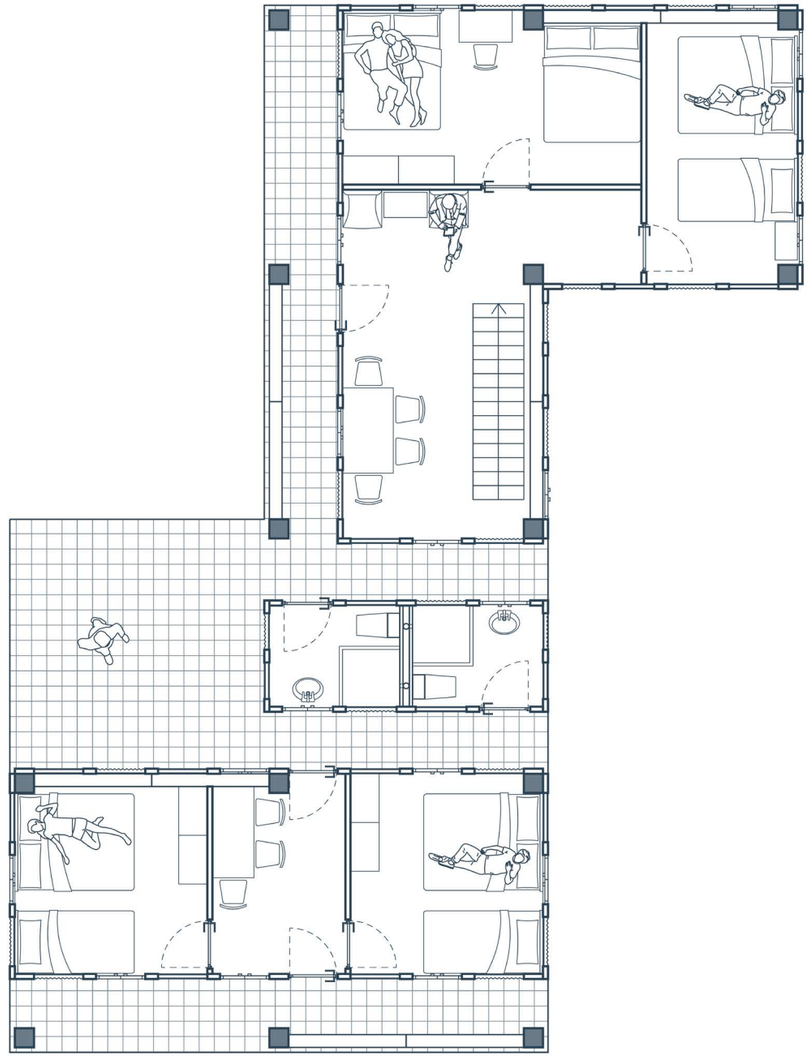
— scale: 1:50 —



— SECOND FLOOR —

3 BEDROOMS — MIXED RESIDENCE

2 BEDROOMS — TOURISTS



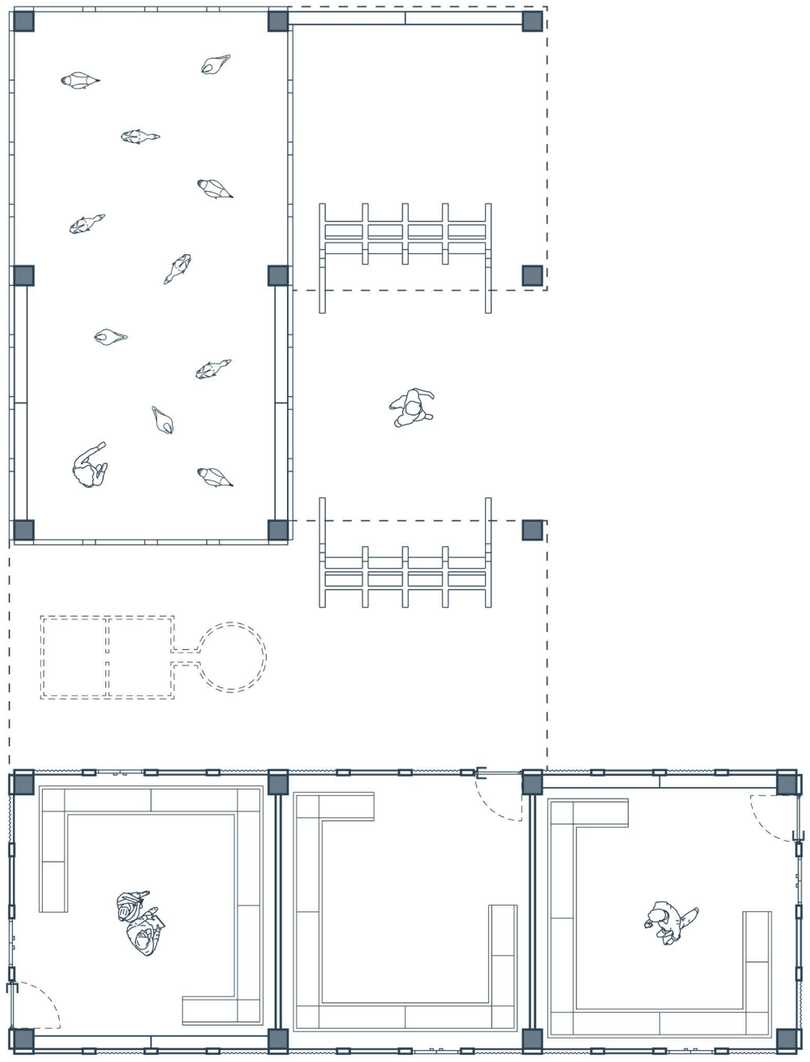
— SECOND FLOOR —

2 BEDROOMS — MIXED RESIDENCE

2 BEDROOMS — TOURISTS

— scale: 1:50 —

— dwelling unit 2 —

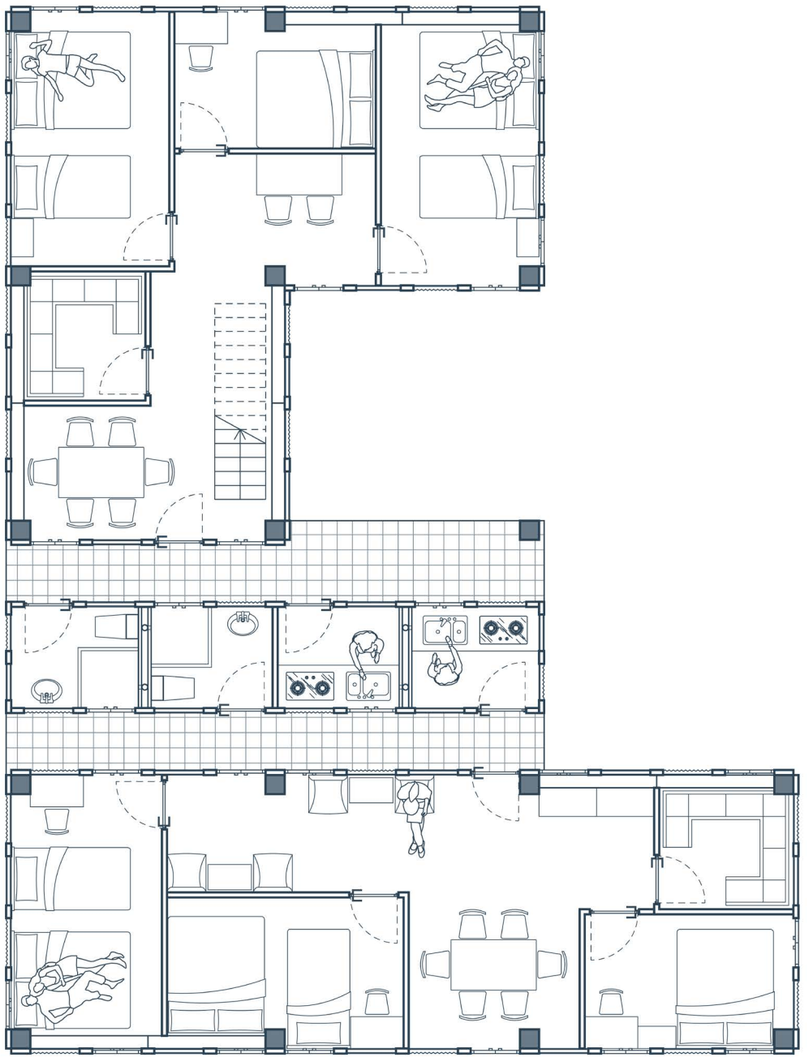


— GROUND FLOOR —

STORAGE / LIVESTOCK

140 m^2

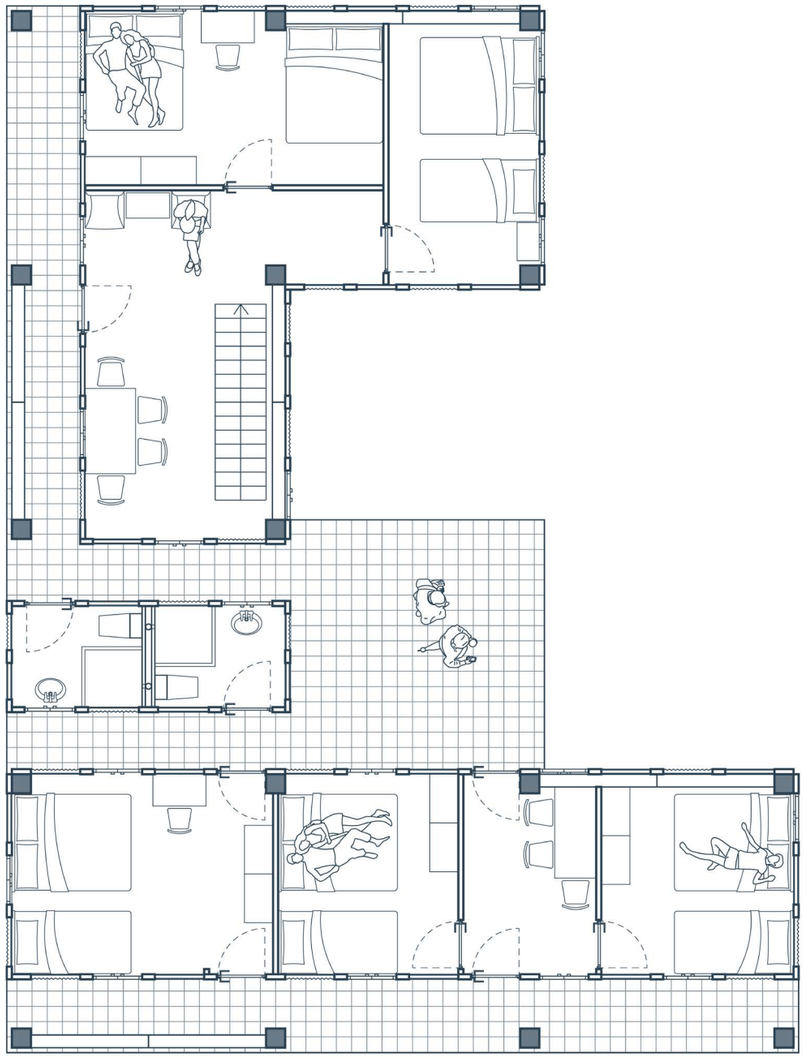
— scale: 1:50 —



— FIRST FLOOR —

3 BEDROOMS — 3 BEDROOMS

LOCAL RESIDENTS



— SECOND FLOOR —

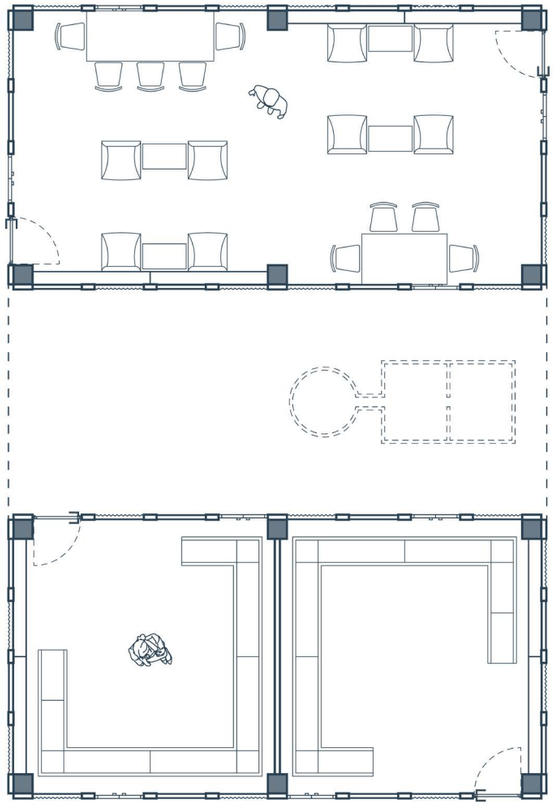
2 BEDROOMS — MIXED RESIDENCE

3 BEDROOMS — TOURISTS

— scale: 1:50 —

— LIVING AREA —

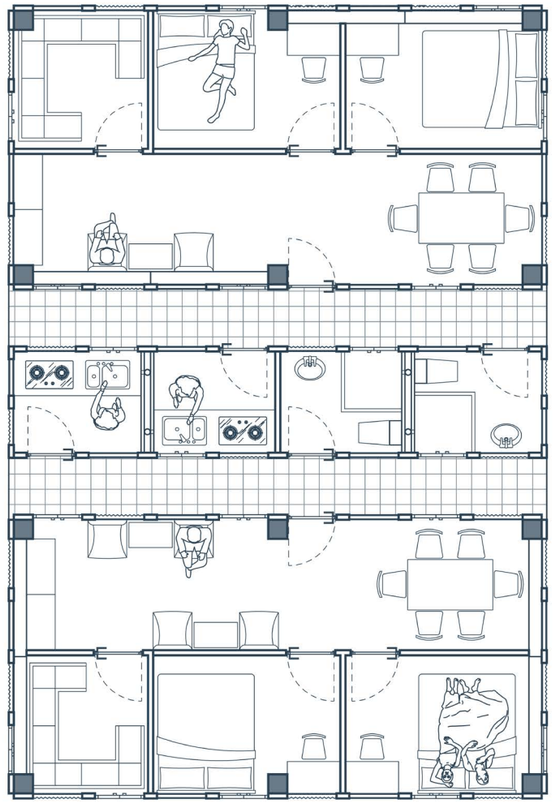
— dwelling unit 3 —



— GROUND FLOOR —

STORAGE / COMMUNAL AREA

104 m^2

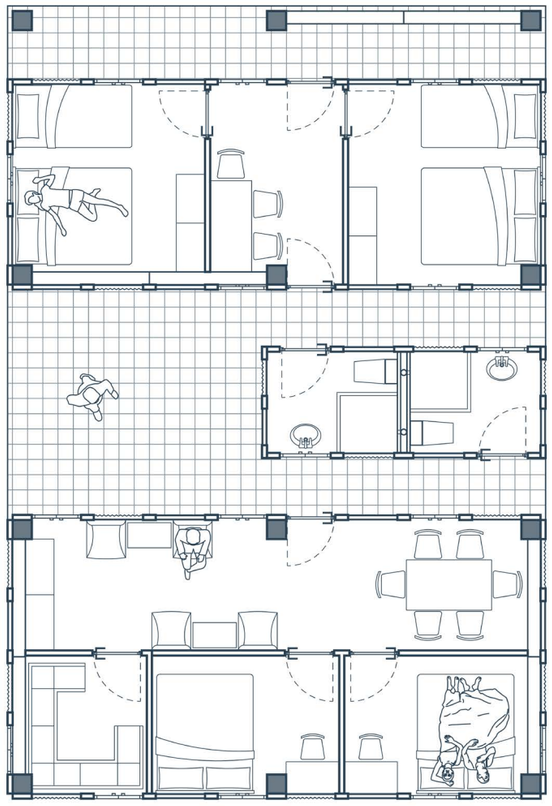


— FIRST FLOOR —

2 BEDROOMS — 2 BEDROOMS

LOCAL RESIDENTS

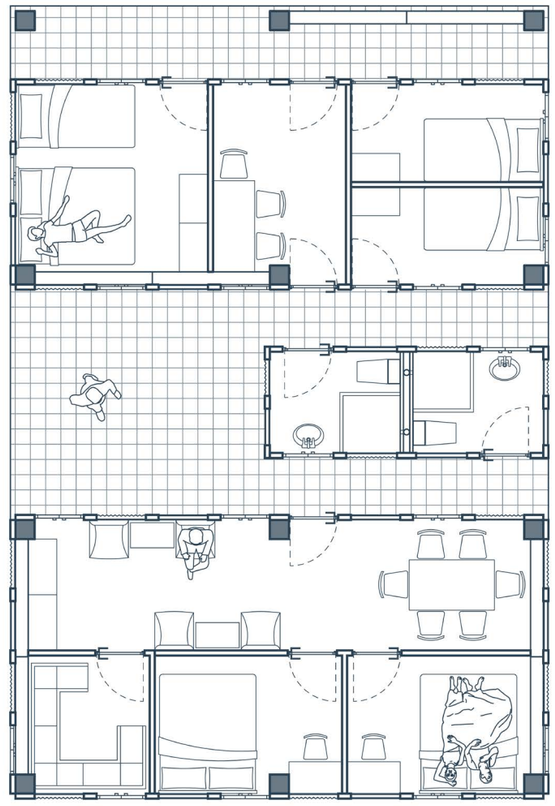
— scale: 1:50 —



— SECOND FLOOR —

2 BEDROOMS — TOURISTS

2 BEDROOMS — TOURISTS



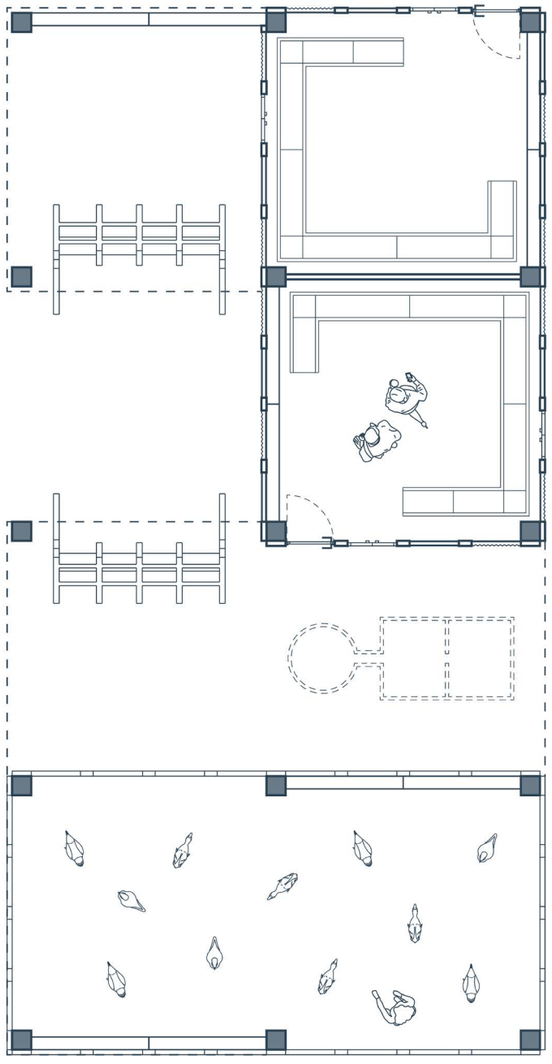
— SECOND FLOOR —

3 BEDROOMS — TOURISTS

2 BEDROOMS — TOURISTS

— scale: 1:50 —

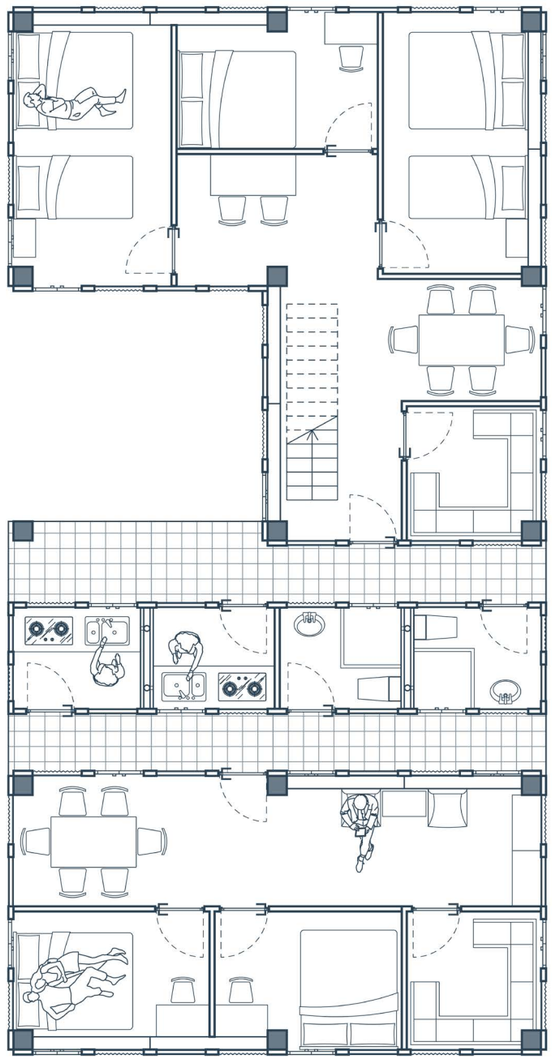
— dwelling unit 4 —



— GROUND FLOOR —

STORAGE / LIVESTOCK

124 m^2

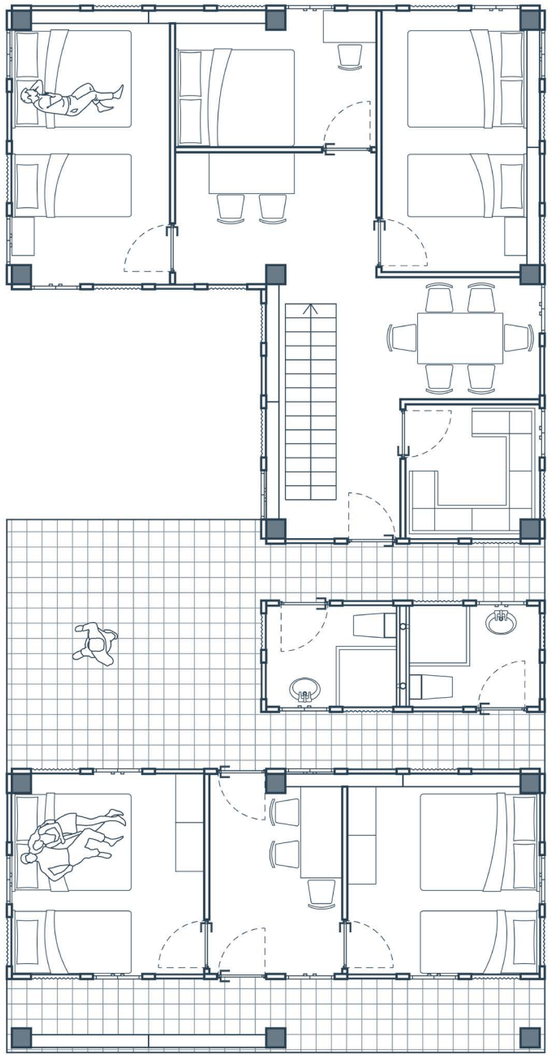


— FIRST FLOOR —

3 BEDROOMS — 2 BEDROOMS

LOCAL RESIDENTS

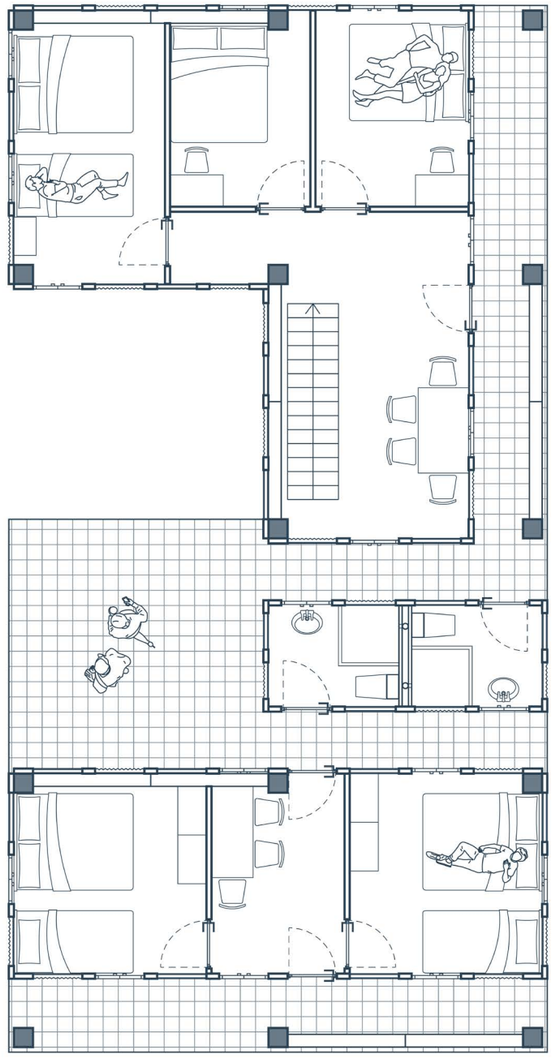
— scale: 1:50 —



— SECOND FLOOR —

3 BEDROOMS — MIXED RESIDENCE

2 BEDROOMS — TOURISTS

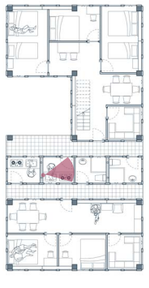


— SECOND FLOOR —

3 BEDROOMS — MIXED RESIDENCE

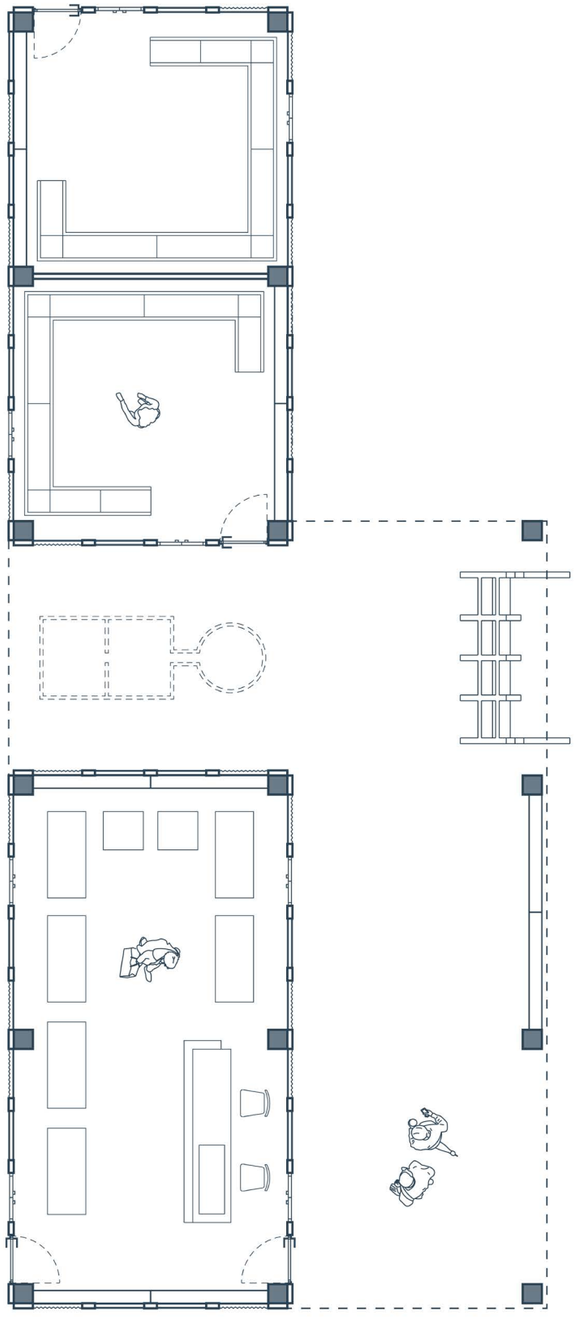
2 BEDROOMS — TOURISTS

— scale: 1:50 —



— KITCHEN —

— dwelling unit 5 —

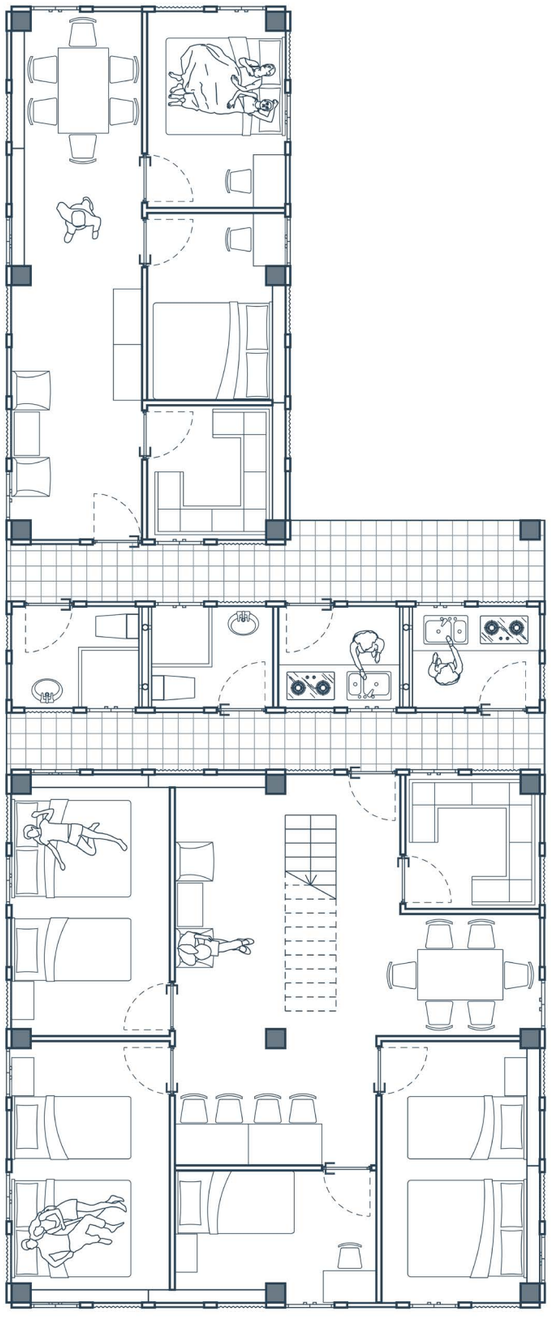


— GROUND FLOOR —

STORAGE / MARKET

140 m^2

— scale: 1:50 —

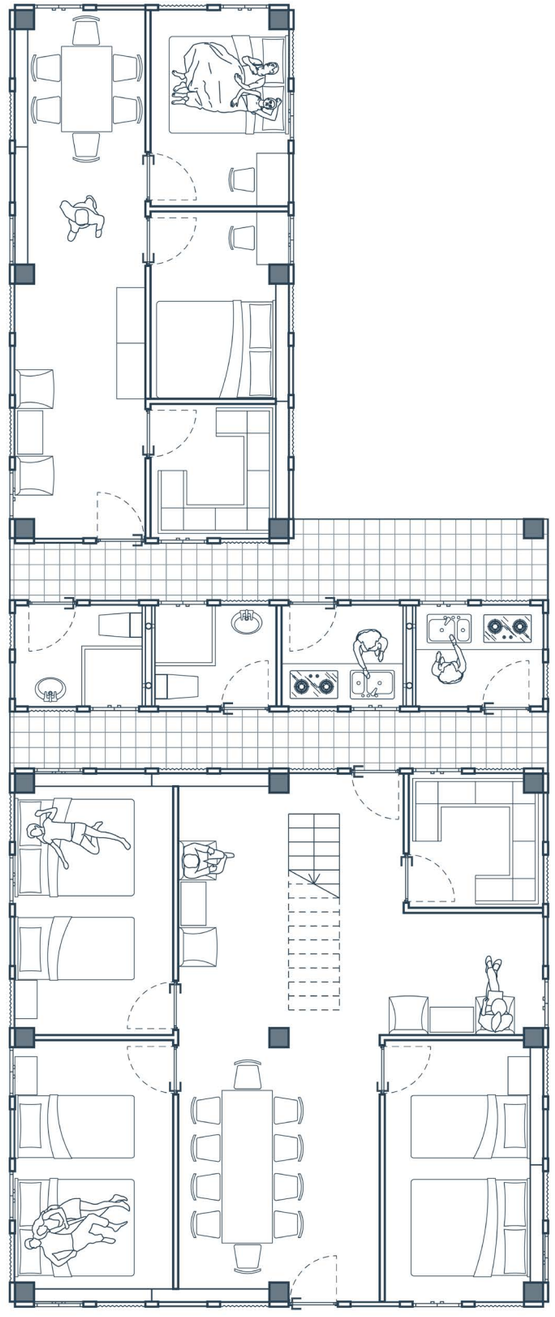


— FIRST FLOOR —

2 BEDROOMS — 4 BEDROOMS

LOCAL RESIDENTS

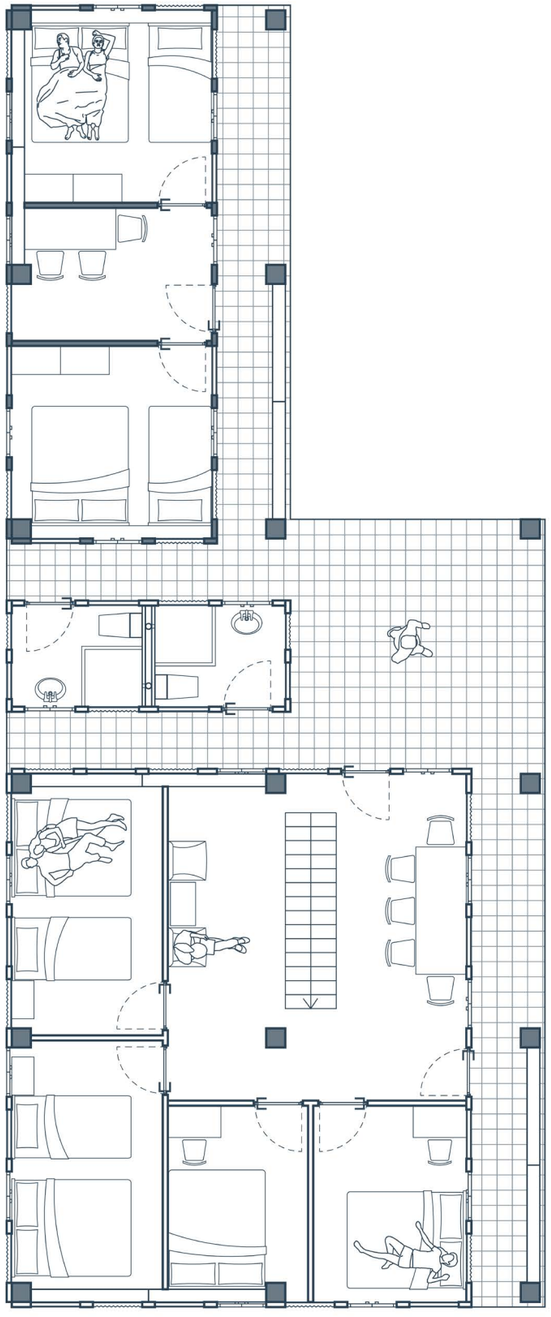
— scale: 1:50 —



— FIRST FLOOR —

2 BEDROOMS — 3 BEDROOMS

LOCAL RESIDENTS

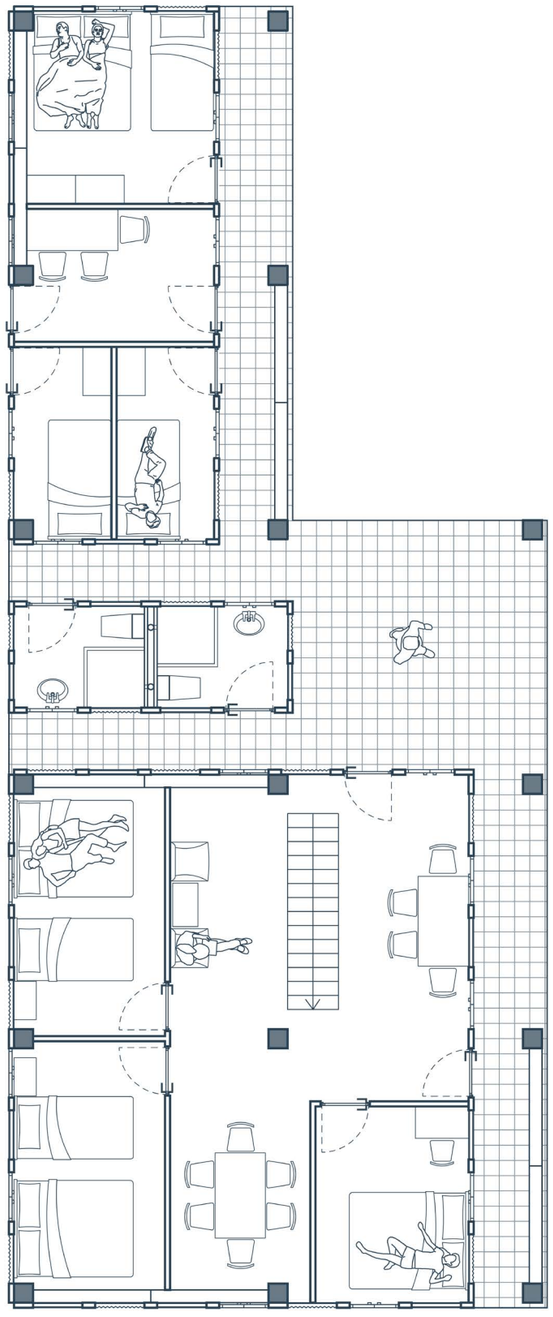


— SECOND FLOOR —

2 BEDROOMS — TOURISTS

4 BEDROOMS — MIXED RESIDENCE

— scale: 1:50 —

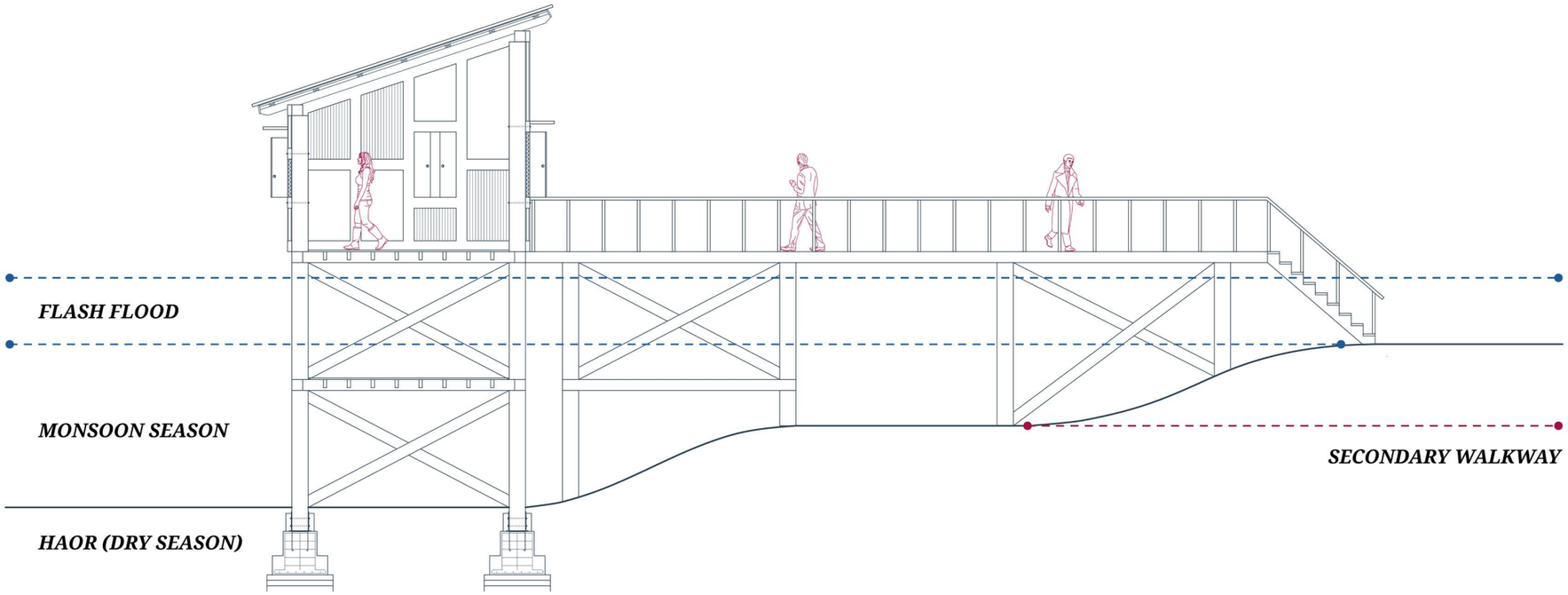


— SECOND FLOOR —

3 BEDROOMS — TOURISTS

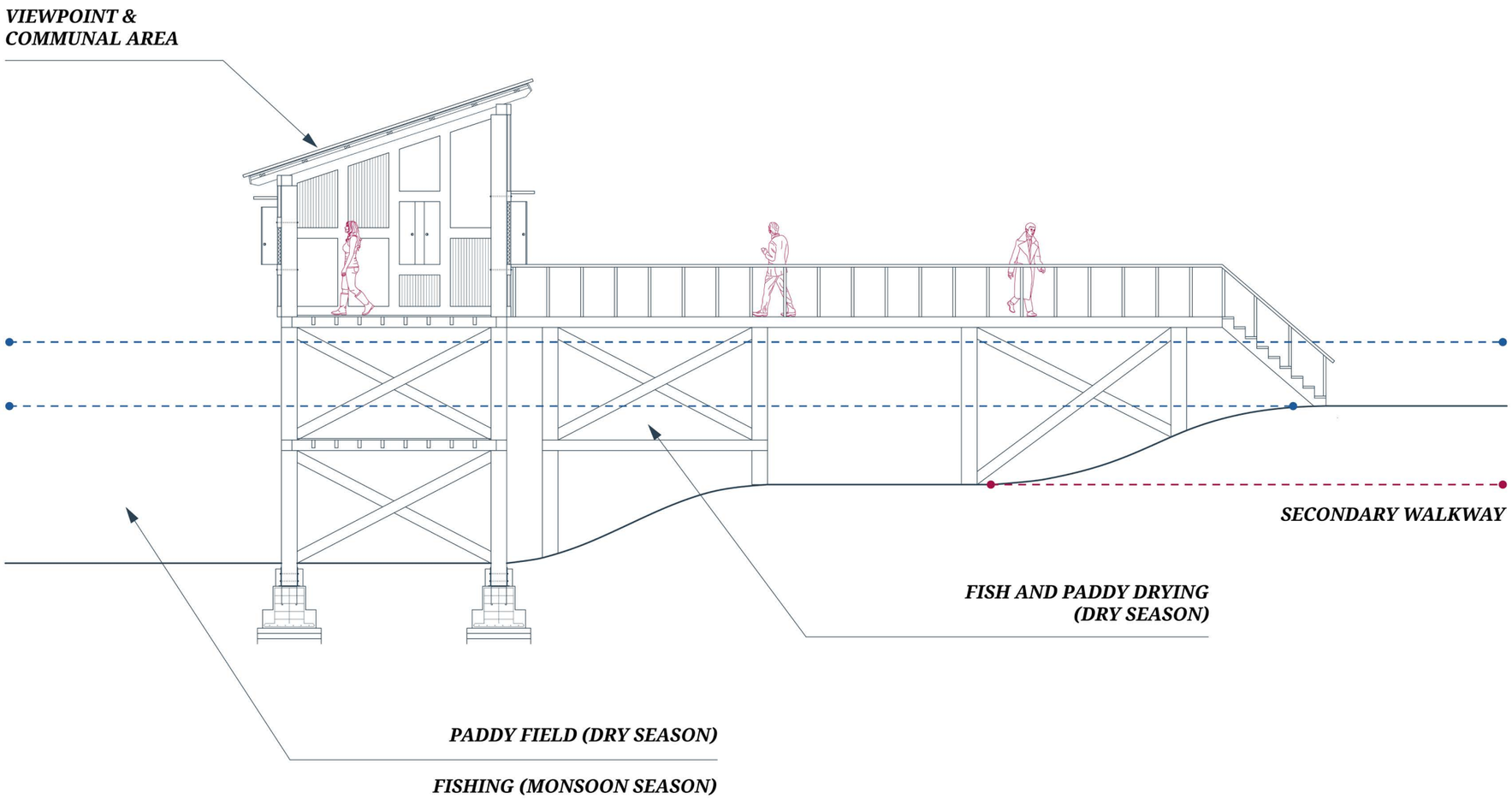
3 BEDROOMS — MIXED RESIDENCE

— livelihood unit 1 —



— HAOR AREA WATER LEVEL —

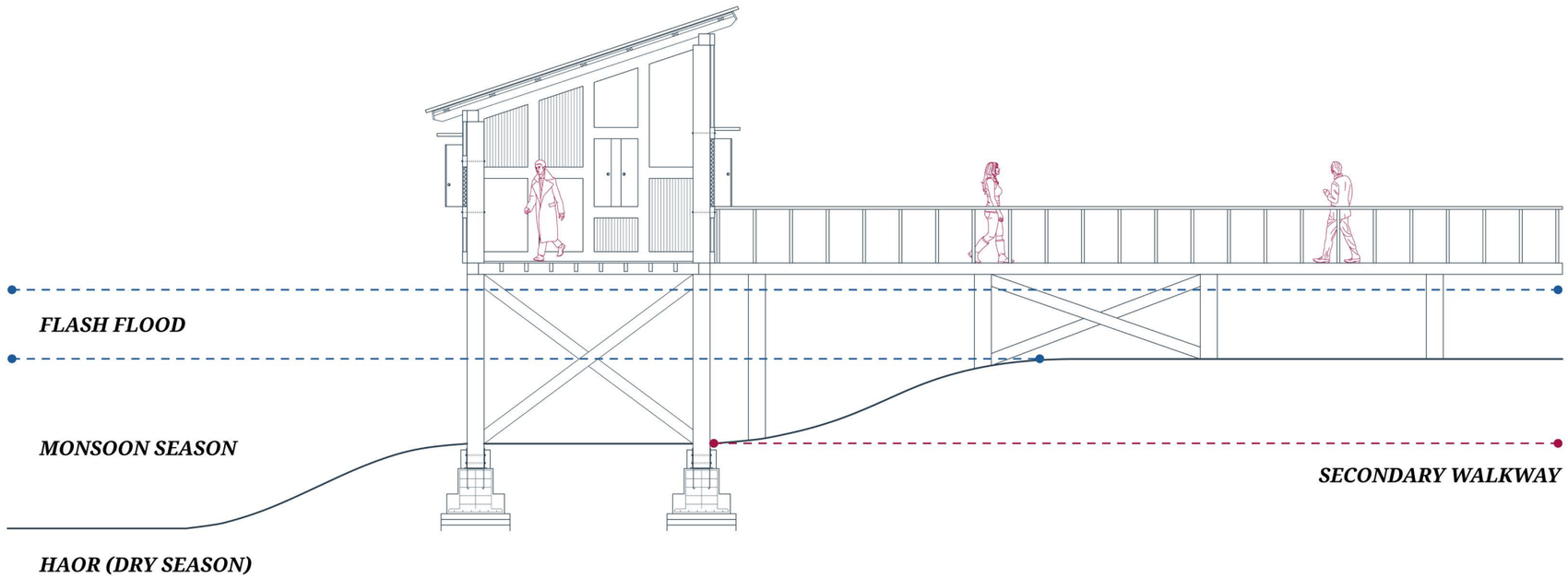
1:100



— HAOR AREA PROGRAM —

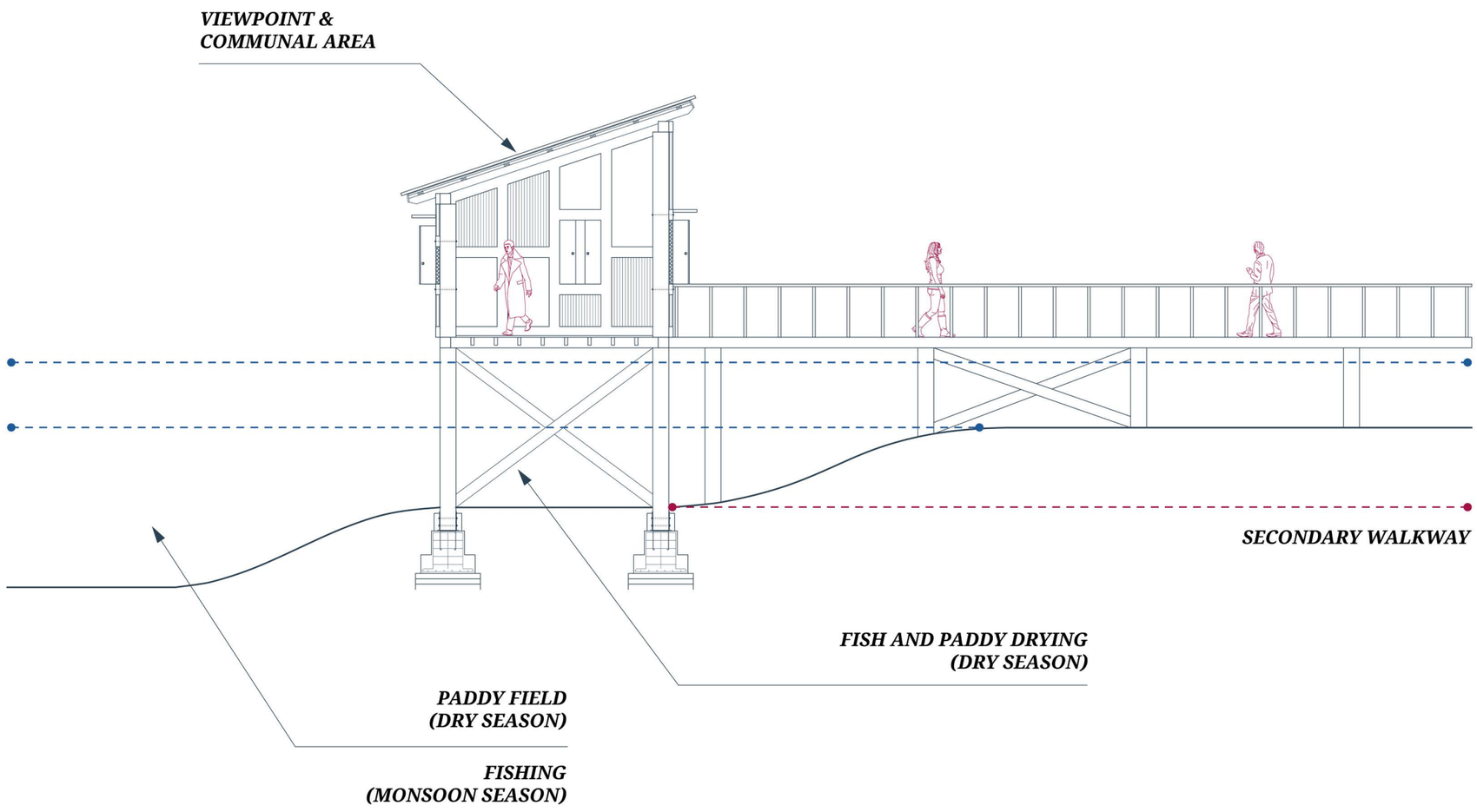
1:100

— livelihood unit 2 —



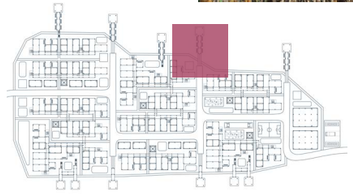
— HAOR AREA WATER LEVEL —

1:100



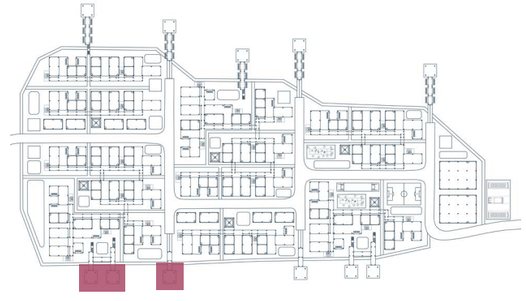
— HAOR AREA PROGRAM —

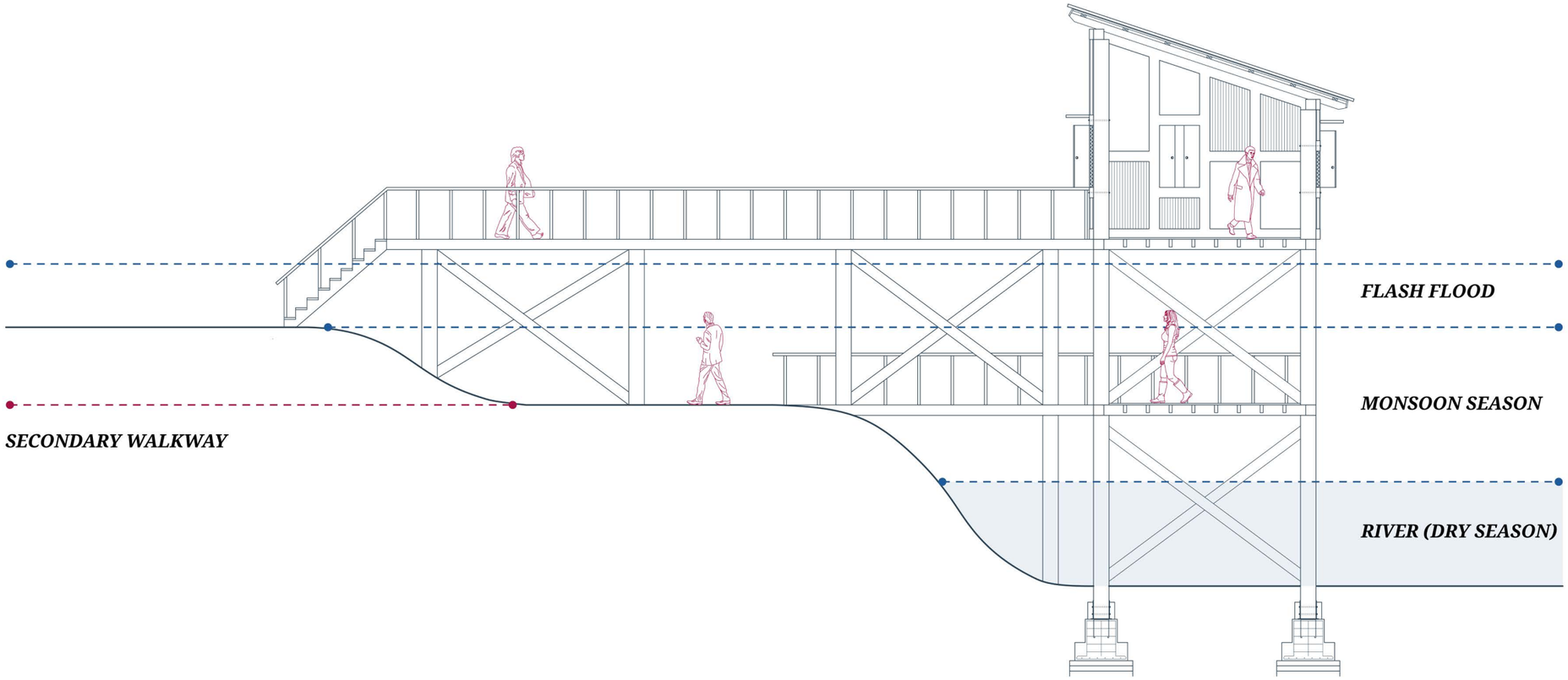
1:100



— HAOR AREA —

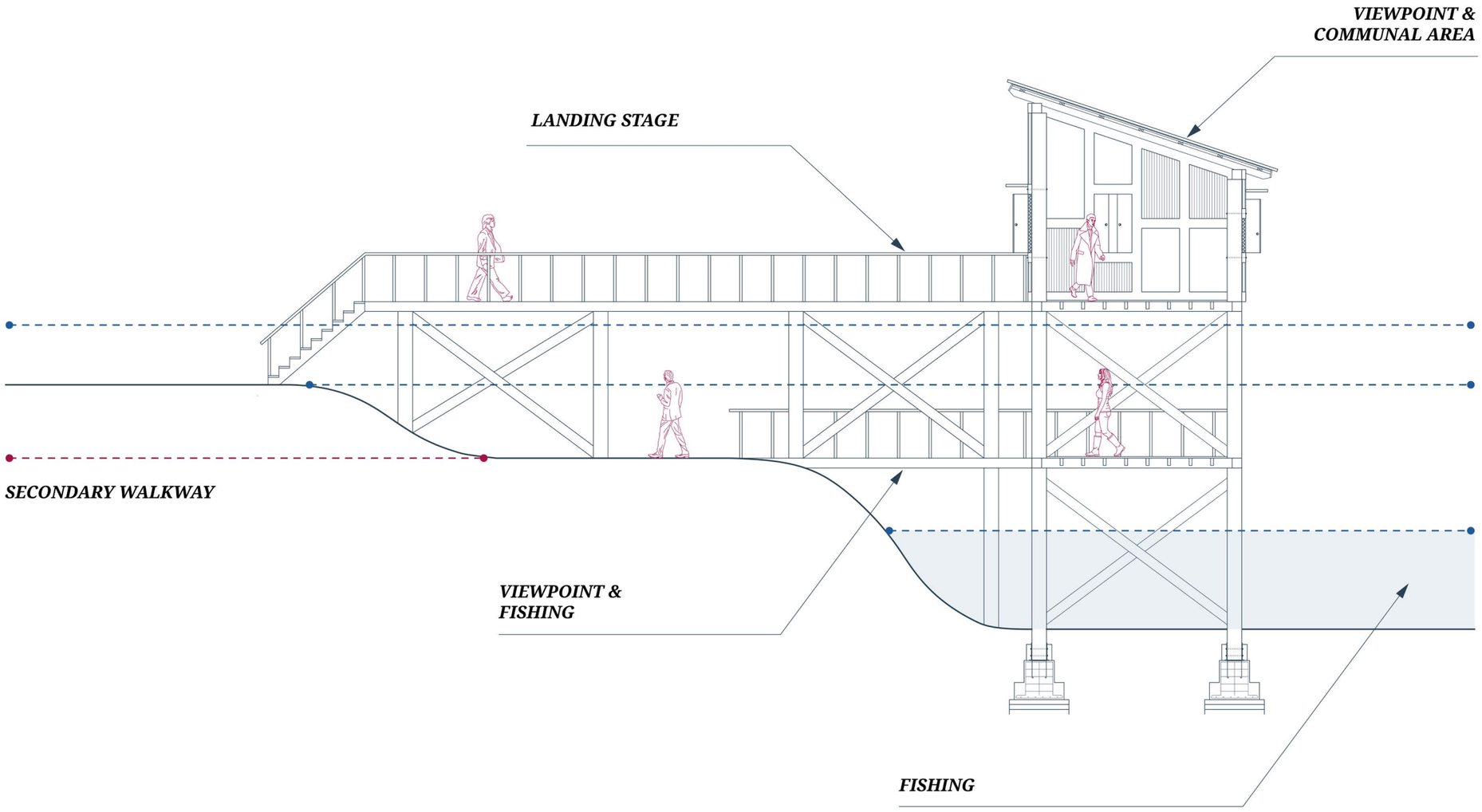
— livelihood unit 3 —





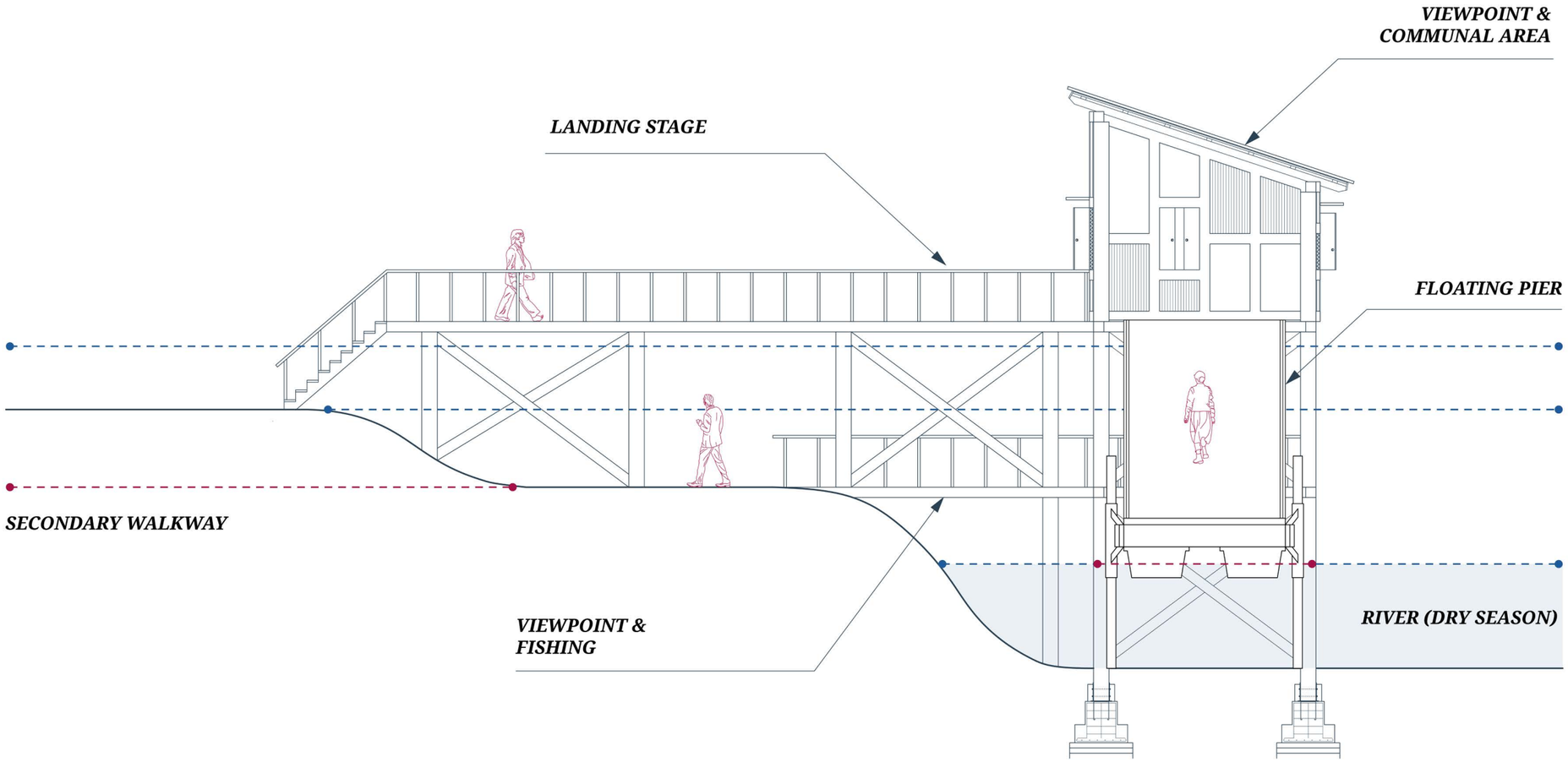
— RIVER SIDE WATER LEVEL —

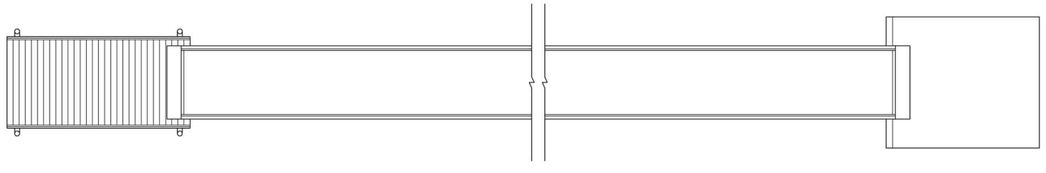
1:100



— RIVER SIDE PROGRAM —

1:100



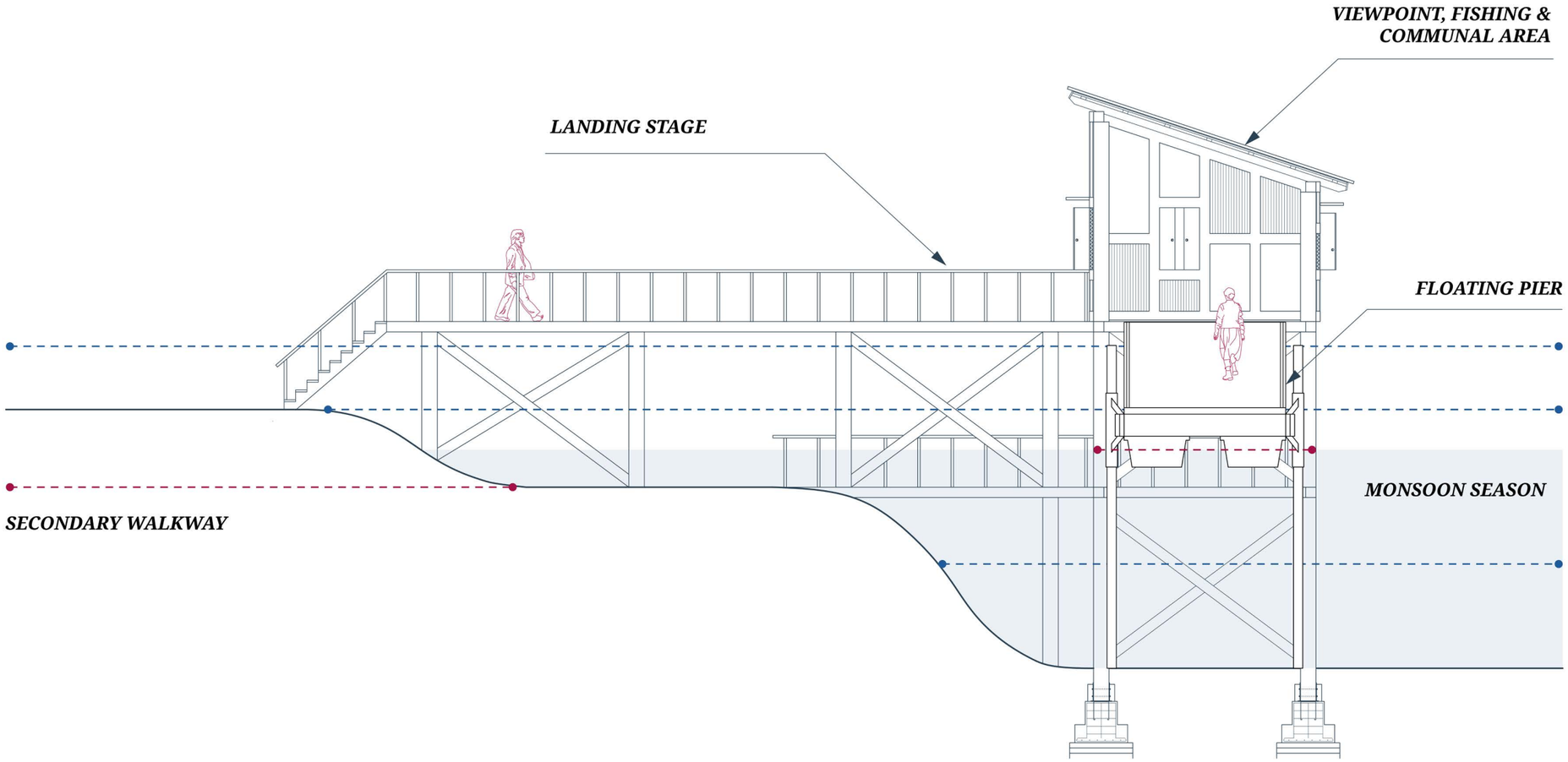


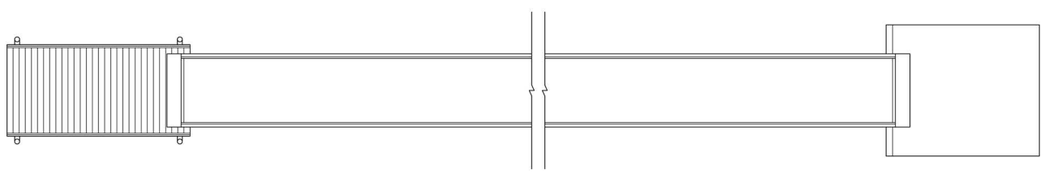
FLOATING PIER TOP VIEW

scale: 1:200

— RIVER SIDE FLOATING PIER (DRY SEASON) —

1:100





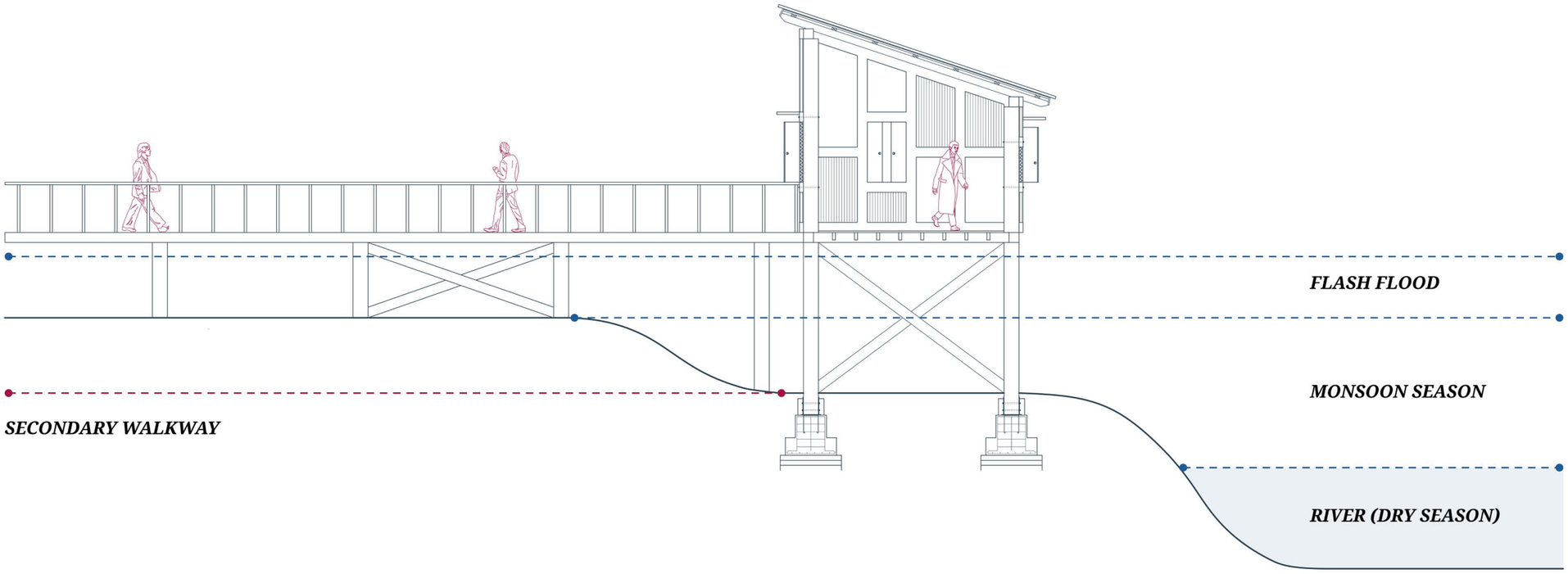
FLOATING PIER TOP VIEW

scale: 1:200

— RIVER SIDE FLOATING PIER (MONSOON SEASON) —

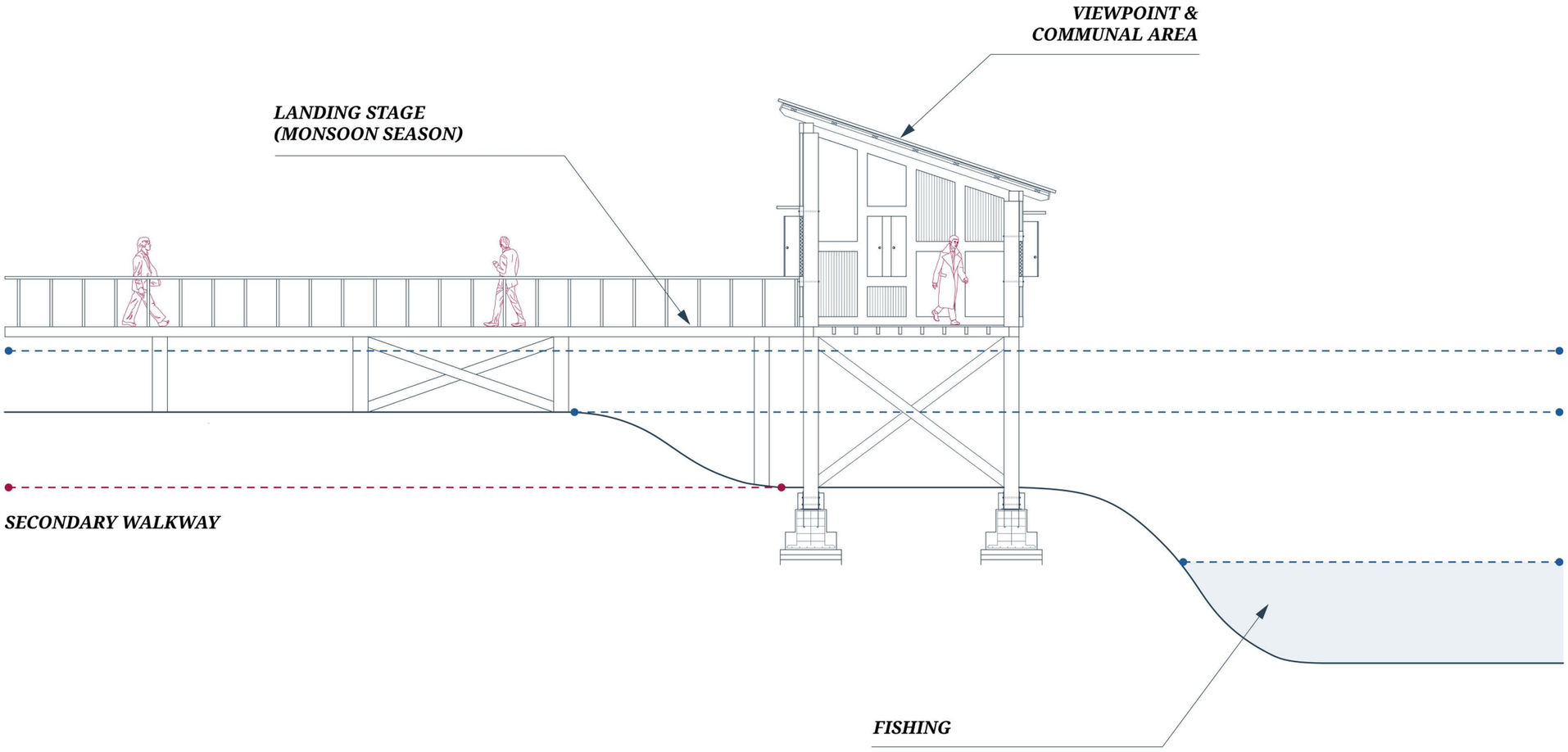
1:100

— livelihood unit 4 —



— RIVER SIDE WATER LEVEL —

1:100



— RIVER SIDE PROGRAM —

1:100

BUILDING TECHNOLOGY

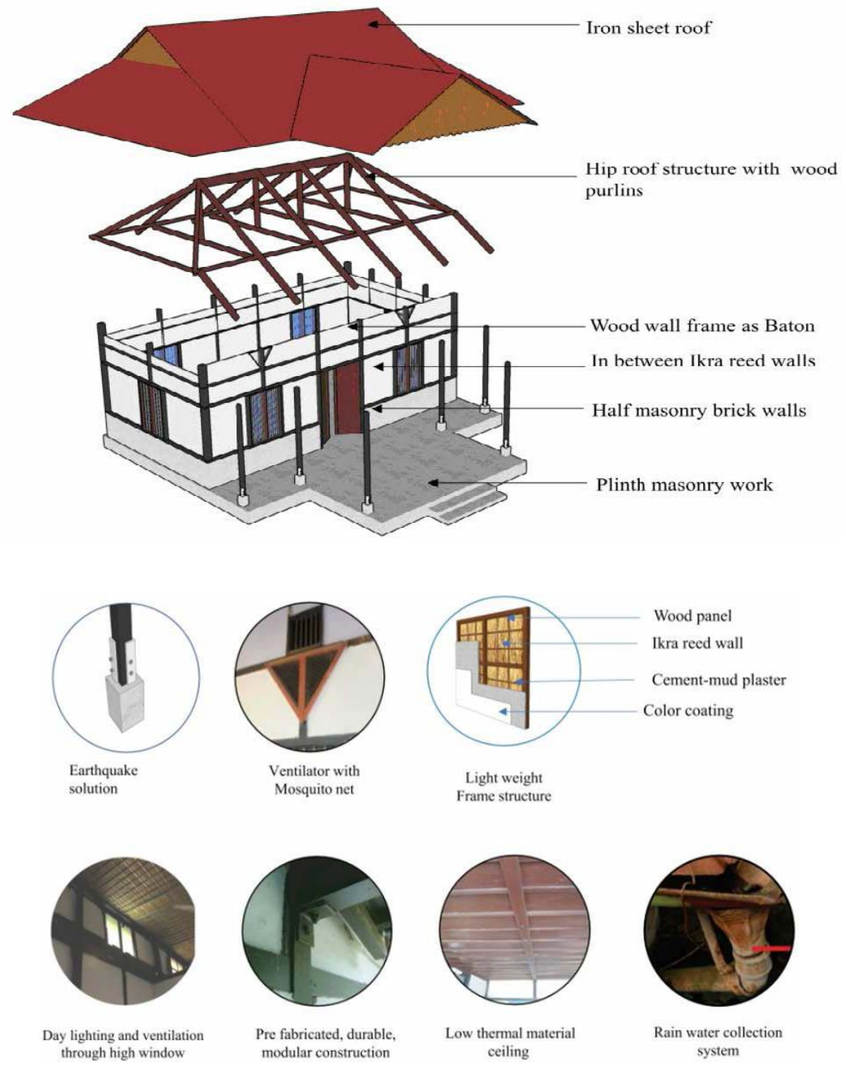
Material, Structure, Details

Tahirpur, Sylhet, Bangladesh

— material —

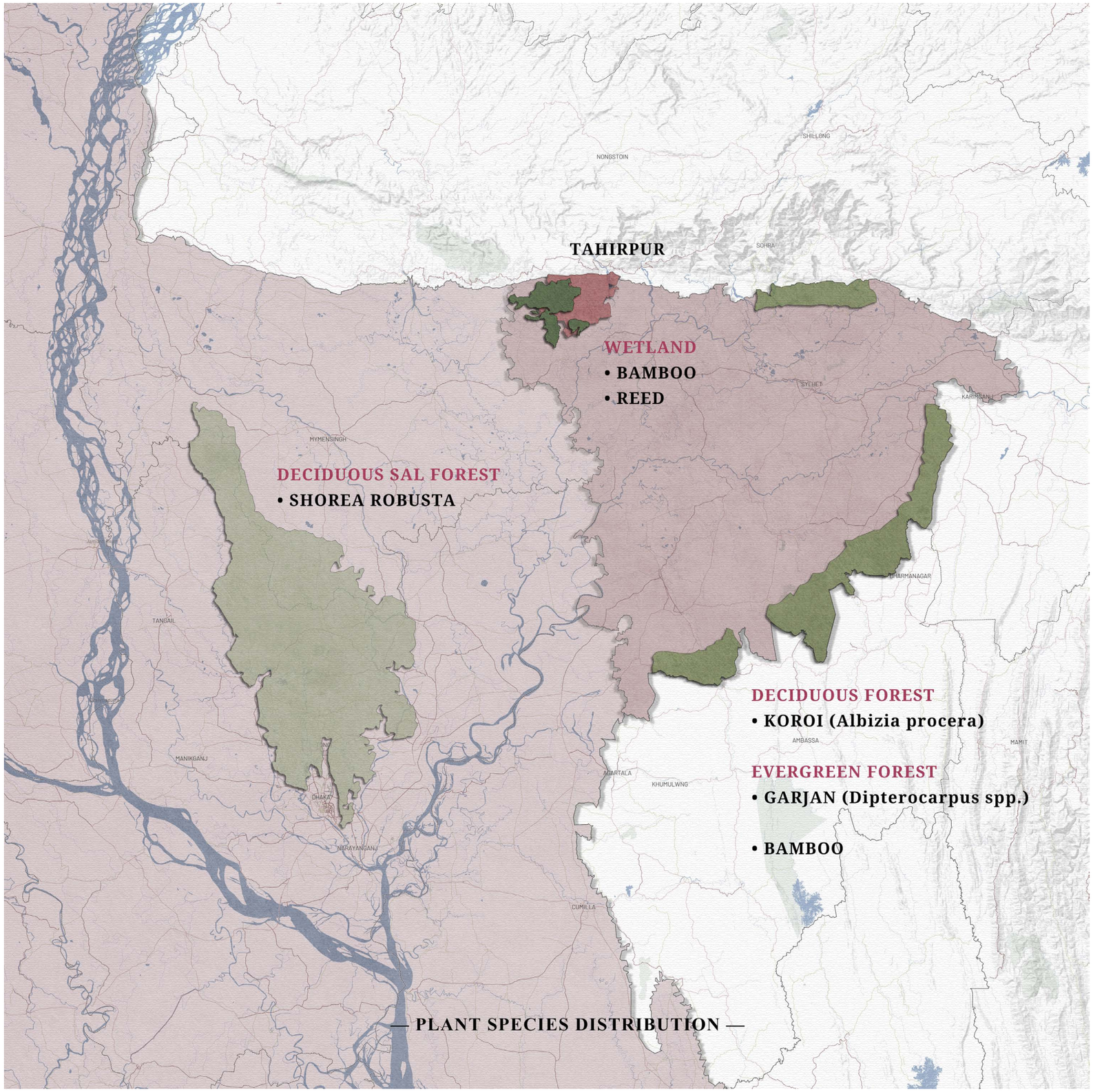
Bangla Baton - Vernacular archetype in Sylhet

Modular Construction



Inheriting Wetness.
https://marinatabassumarchitects.com/inheriting-wetness/#

SAHA, K. et al. (2021) Vernacular architecture as cultural heritage: An interpretation of urban vernacular ‘bangla baton’ houses of Sylhet City, Bangladesh. Journal of Settlements and Spatial Planning. 12 (1), 35–49.


SHILLONG
NONGSTOIN
TAHIRPUR
SOHRA
WETLAND
• BAMBOO
• REED
SYLHET
KARIMGANJ
MYMENSINGH
DECIDUOUS SAL FOREST
• SHOREA ROBUSTA
BHARMANAGAR
TANGAIL
DECIDUOUS FOREST
• KOROI (Albizia procera)
AMBASSA
MAMIT
MANIKGANJ
AGARTALA
KHUMULWNG
DHAKA
EVERGREEN FOREST
• GARJAN (Dipterocarpus spp.)
• BAMBOO
NARAYANGANJ
CUMILLA
— PLANT SPECIES DISTRIBUTION —

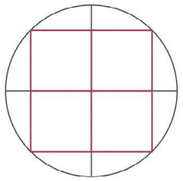
• **SHOREA ROBUSTA**

BEAM

COLUMN

BRACING

Load bearing structure

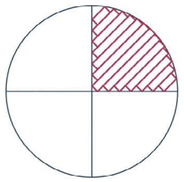


• *Quarter sawn*

• **GARJAN**
(DIPTEROCARPUS SPP.)

FLOORING

PLYWOOD

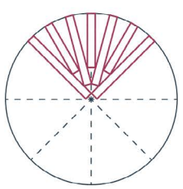


• *Quarter sawn*

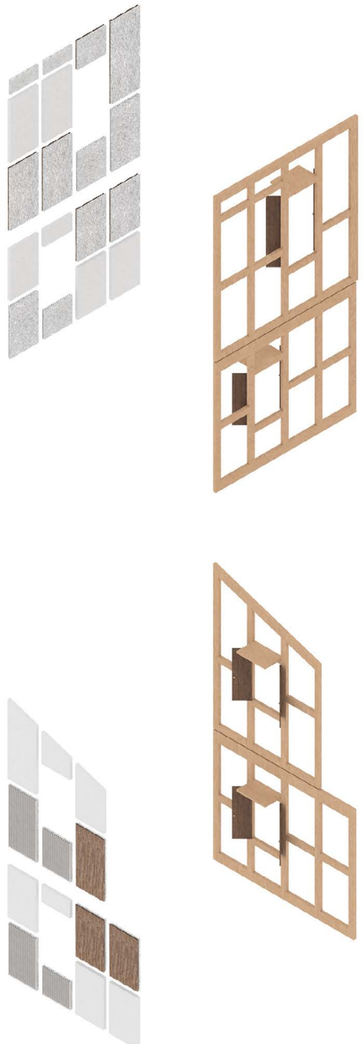
• **KOROI**
(ALBIZIA PROCERA)

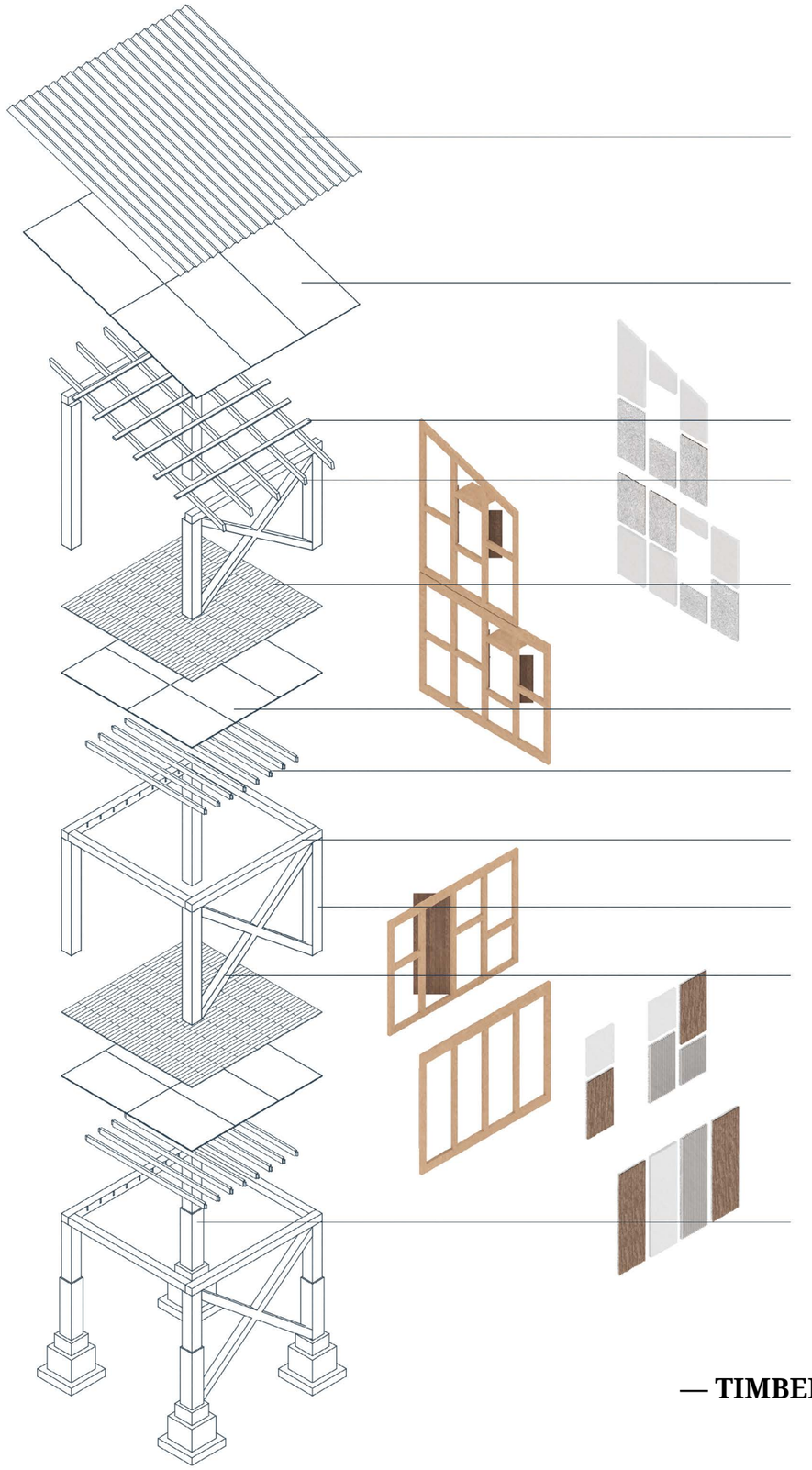
FACADE

Lightweight structure



• *Rift Sawn*





CORRUGATED IRON SHEET
Waterproof membrane underneath

TIMBER PANEL

ROOF BATTEN

ROOF RAFTER

TIMBER FLOORING
Waterproof membrane underneath

SUBFLOOR

FLOOR JOIST

BEAM

COLUMN

BRACING

TIMBER PANEL WITH STEEL CONNECTORS

— TIMBER TYPES AND STRUCTURES —

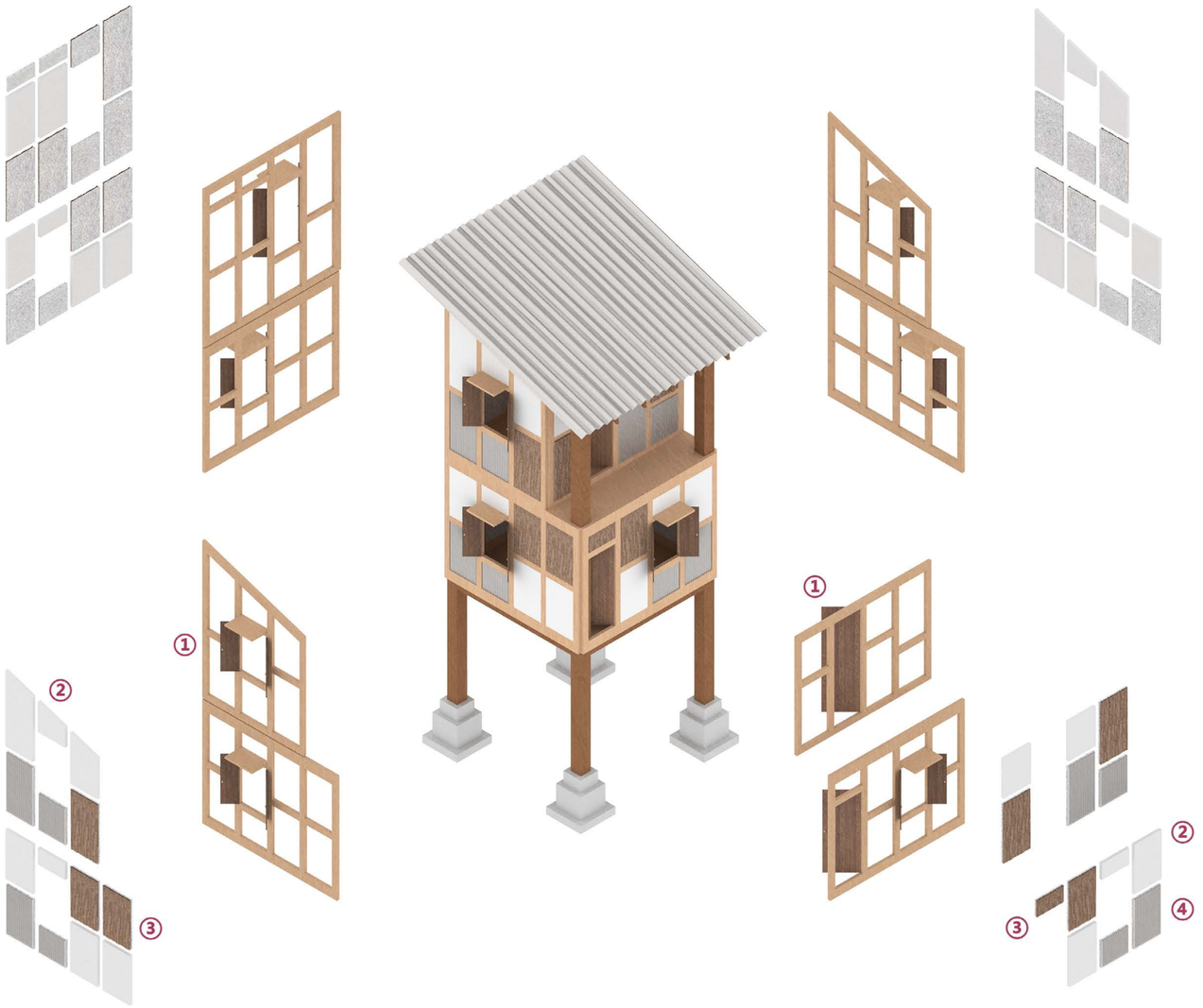
1:150

① *Timber panel*

② *Ikra reed panel with plasterboard*

③ *Bamboo cladding with plasterboard*

④ *Corrugated iron sheet with plasterboard*



— FACADE MATERIAL (STRATEGY 1)—

1:150

①

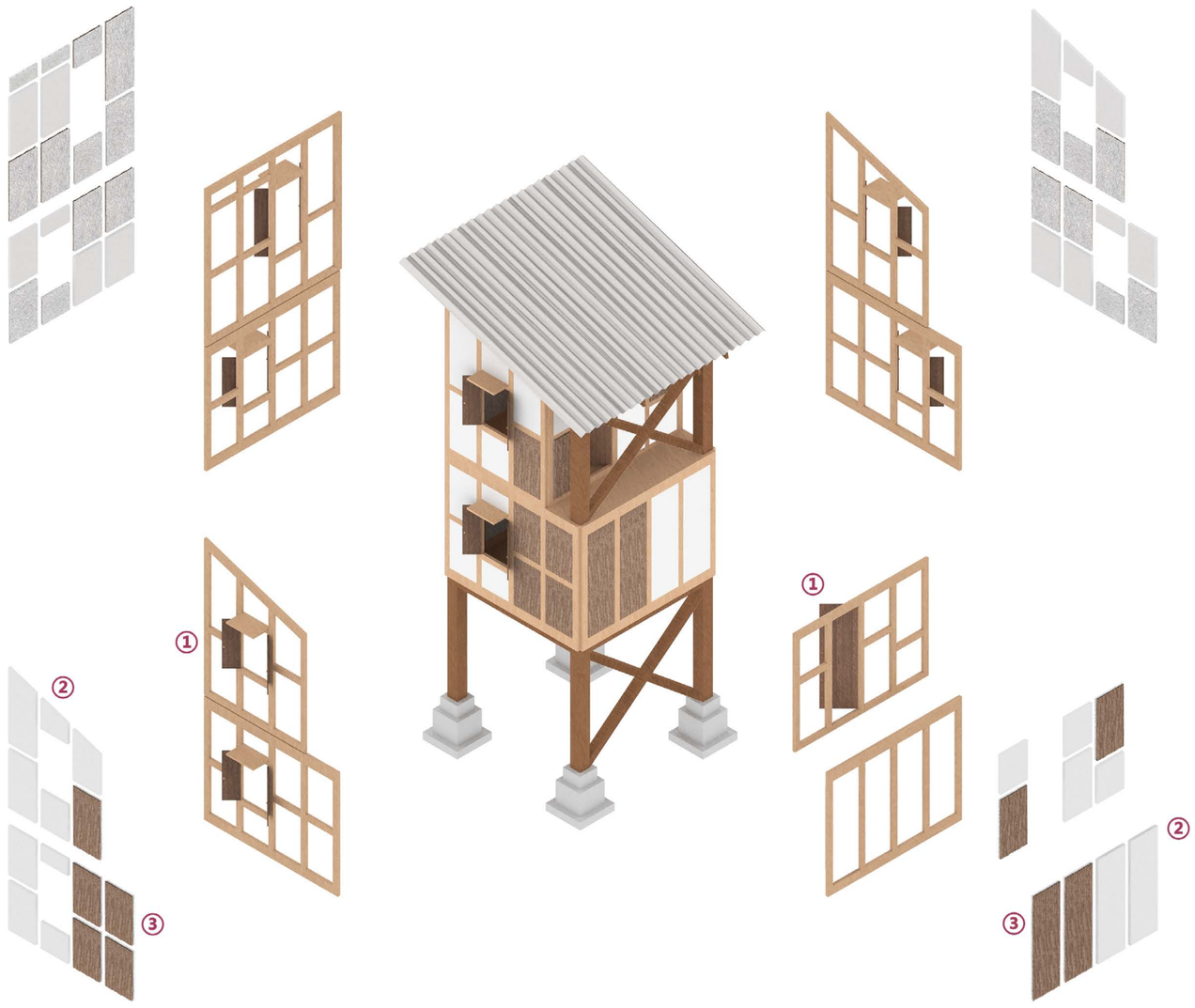
Timber panel

②

Ikra reed panel
with plasterboard

③

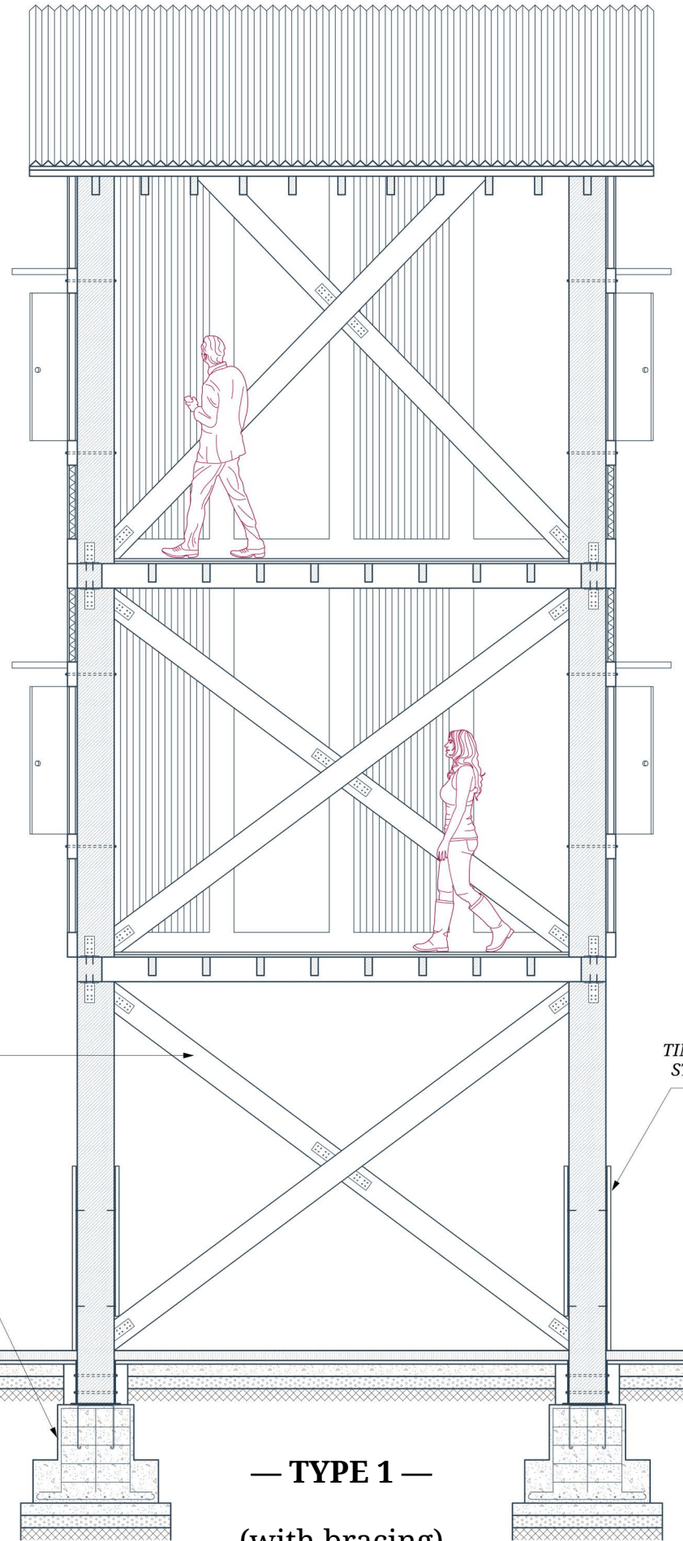
Bamboo cladding
with plasterboard



— FACADE MATERIAL (STRATEGY 2)—

1:150

— structure —

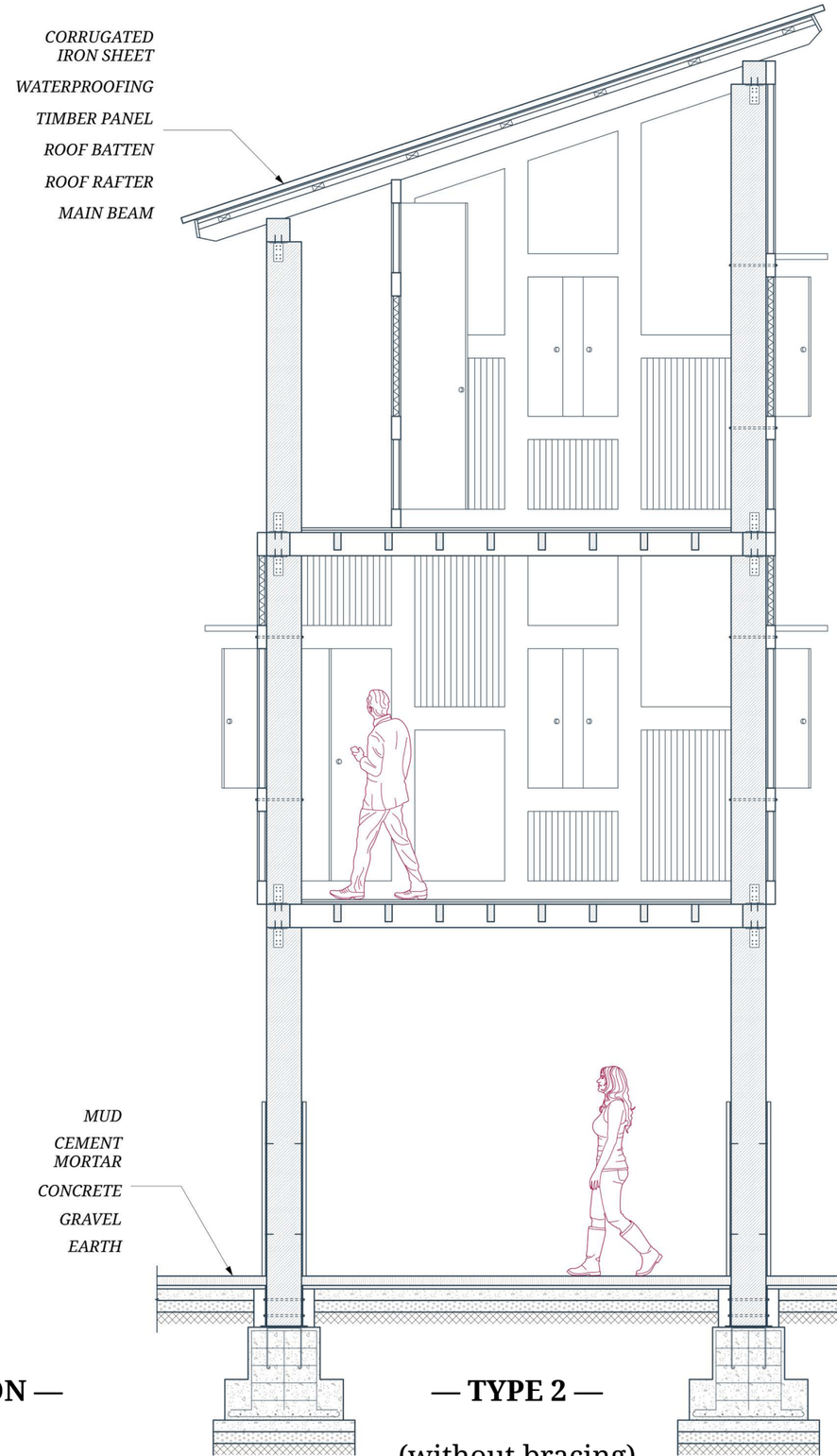


— TYPE 1 —

(with bracing)

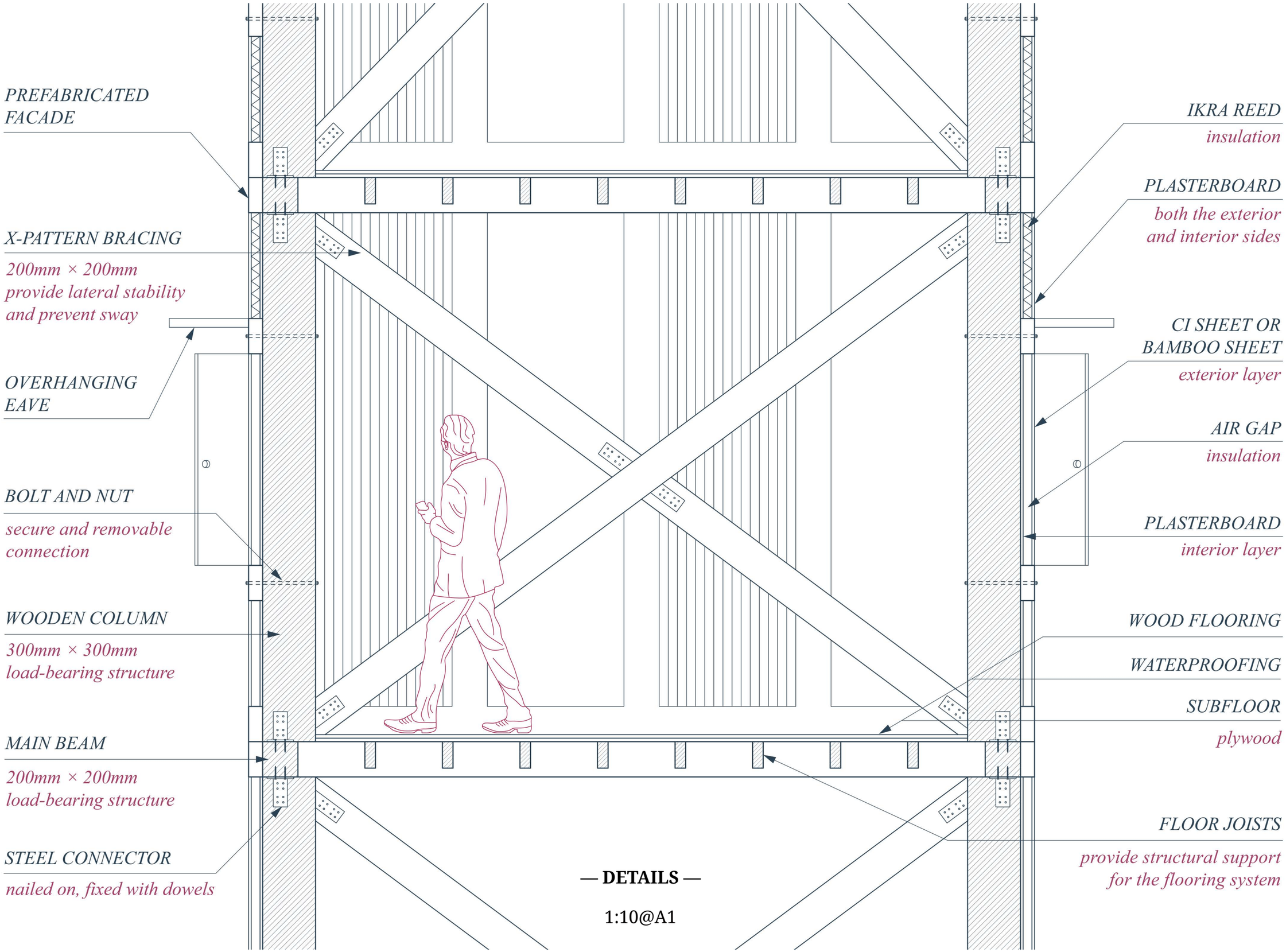
— PART SECTION —

1:50



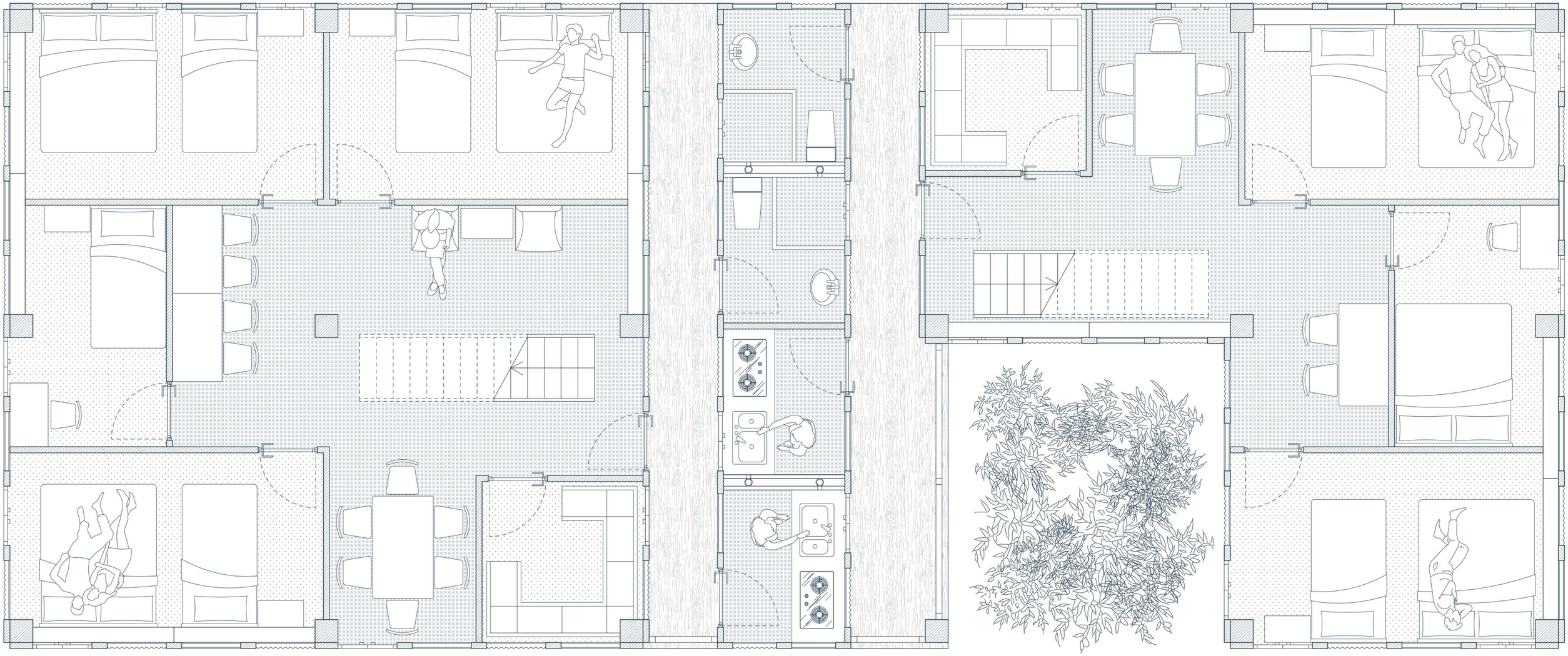
— TYPE 2 —

(without bracing)



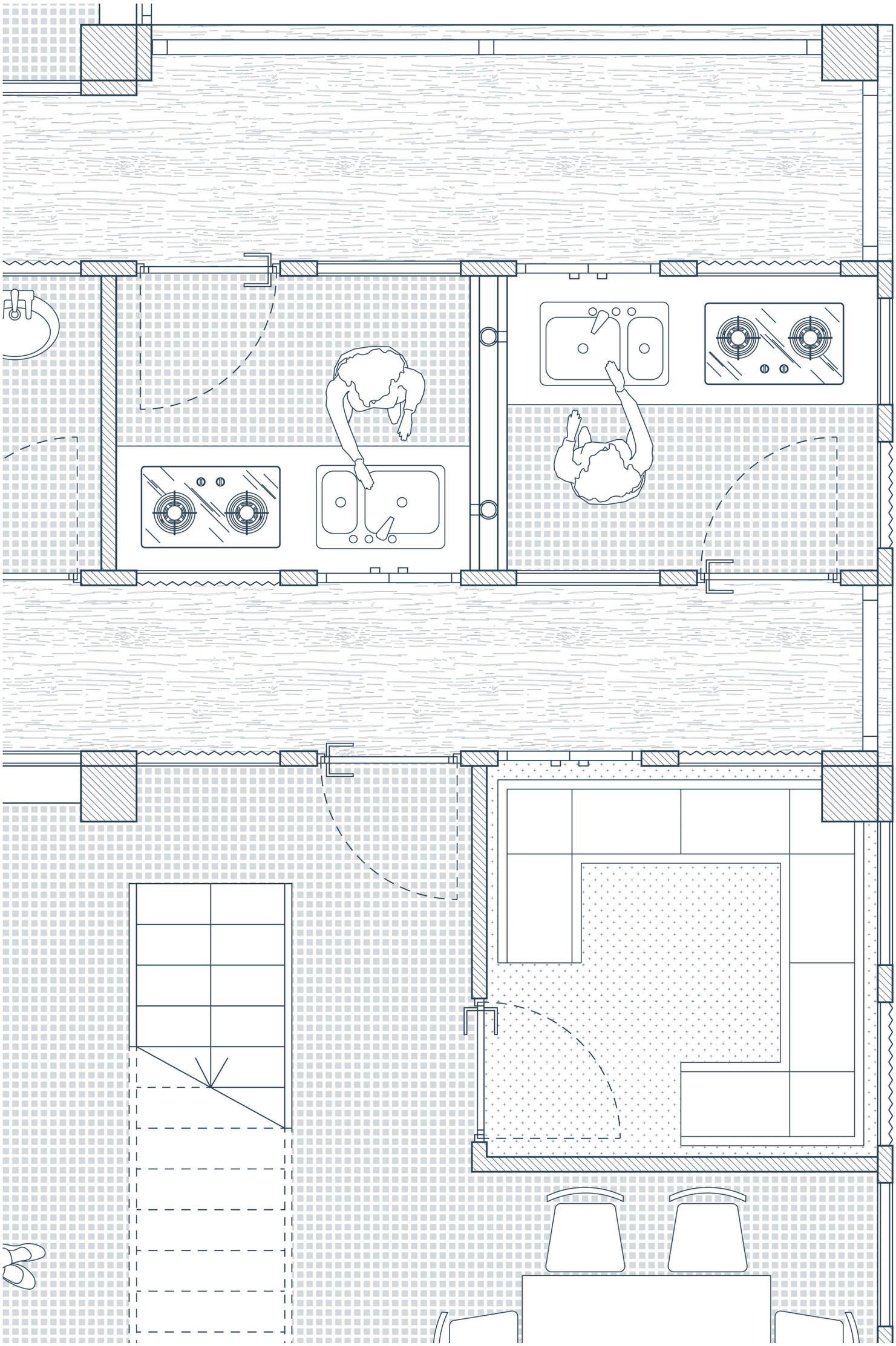
— DETAILS —

1:10@A1

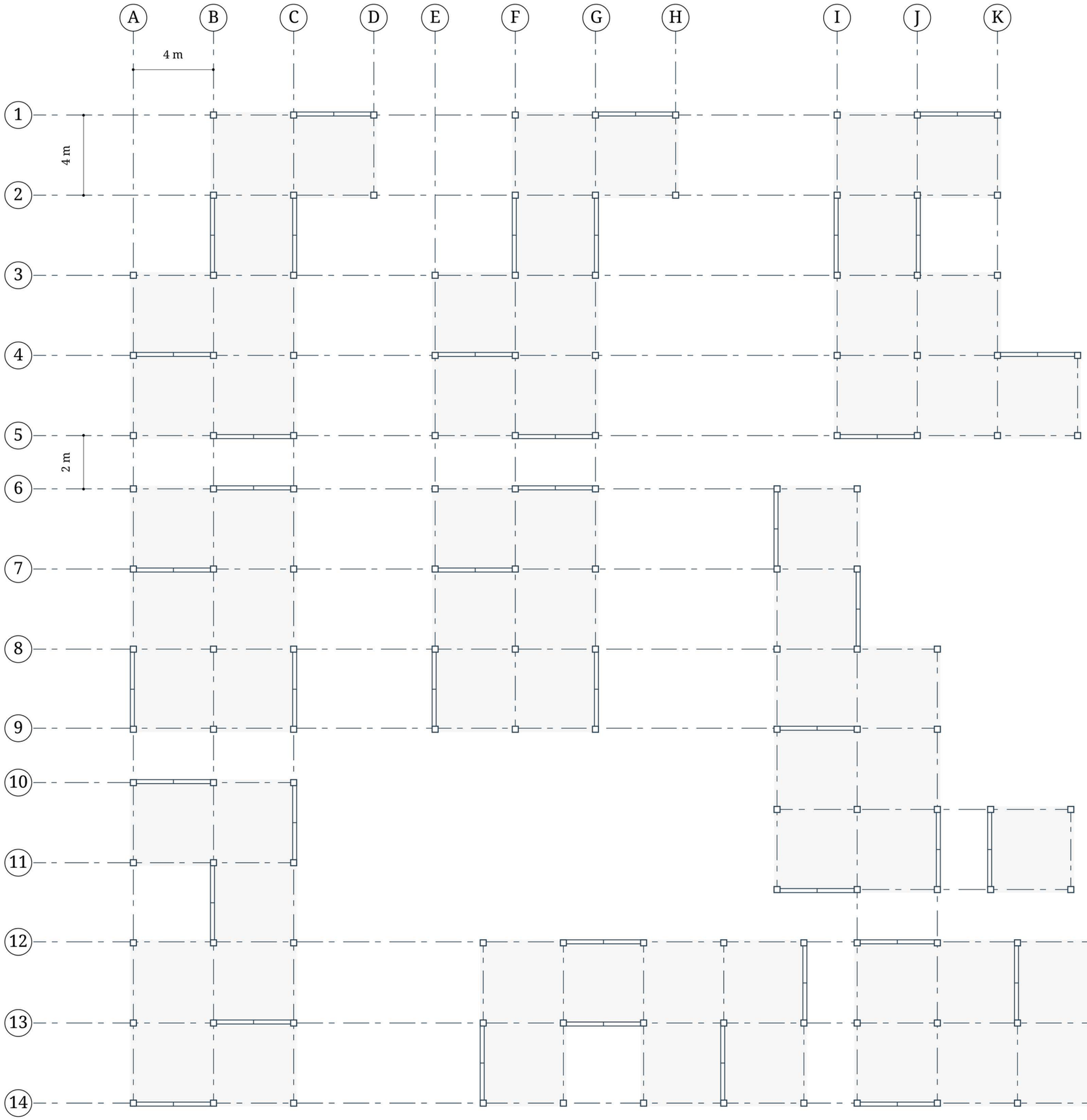


— PART FIRST FLOOR PLAN —

1:50

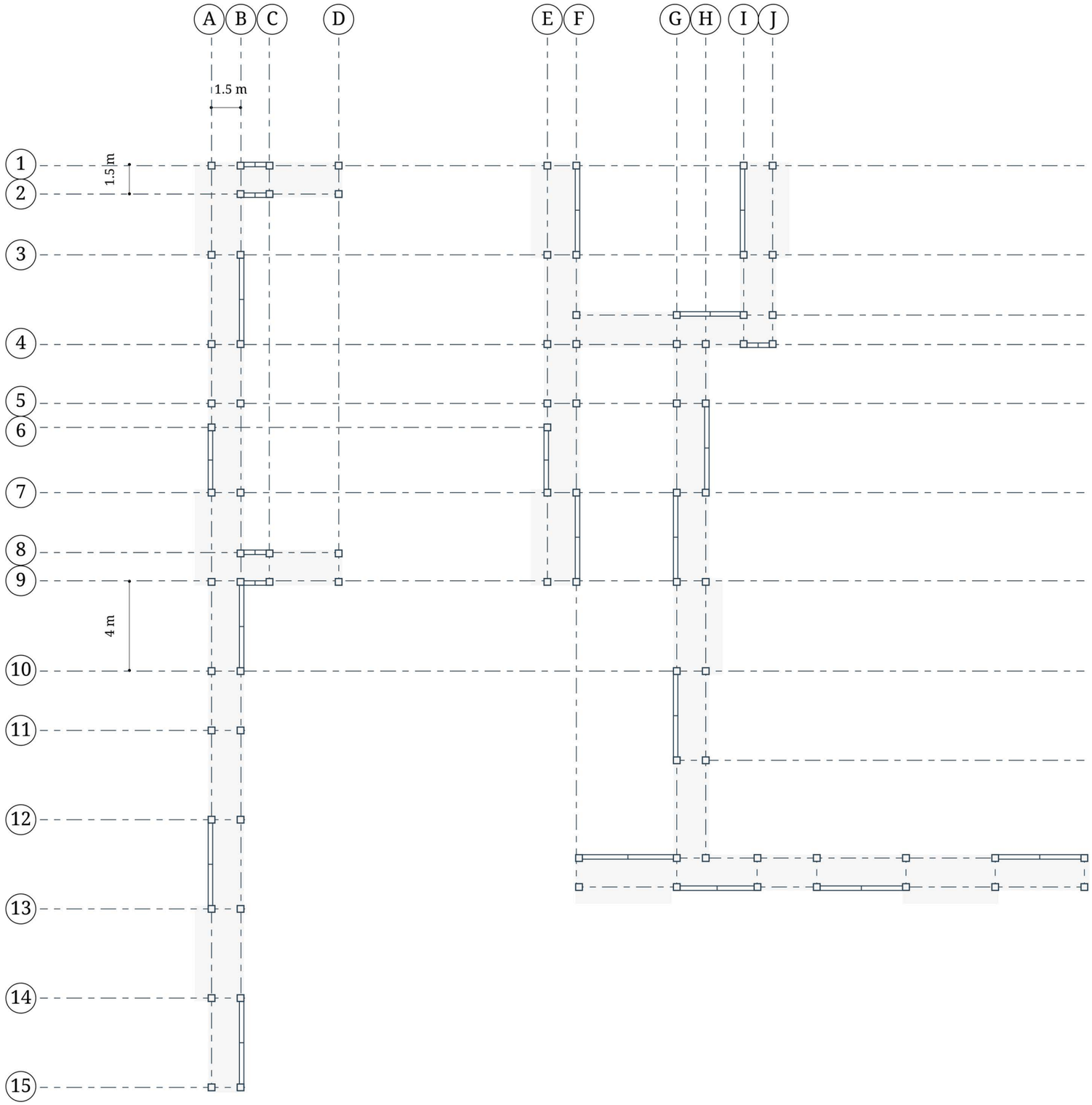


— DETAILS —
1:10@A1



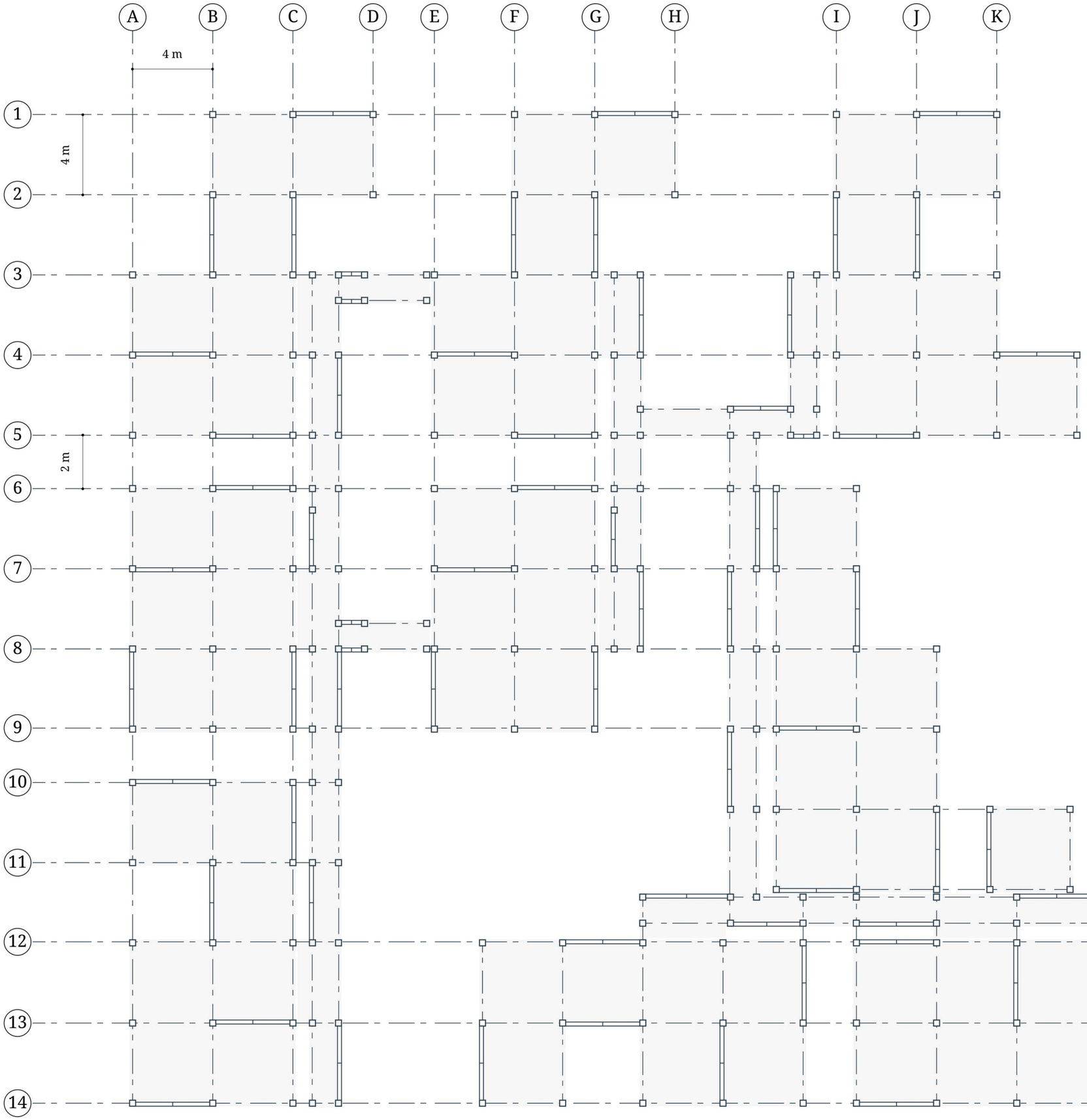
STRUCTURE GRID OF
— COLUMN AND BRACING —
(DWELLING UNIT)

1:200



STRUCTURE GRID OF
— COLUMN AND BRACING —
(PLATFORM)

1:200



STRUCTURE GRID OF
— COLUMN AND BRACING —
(COMBINATION)

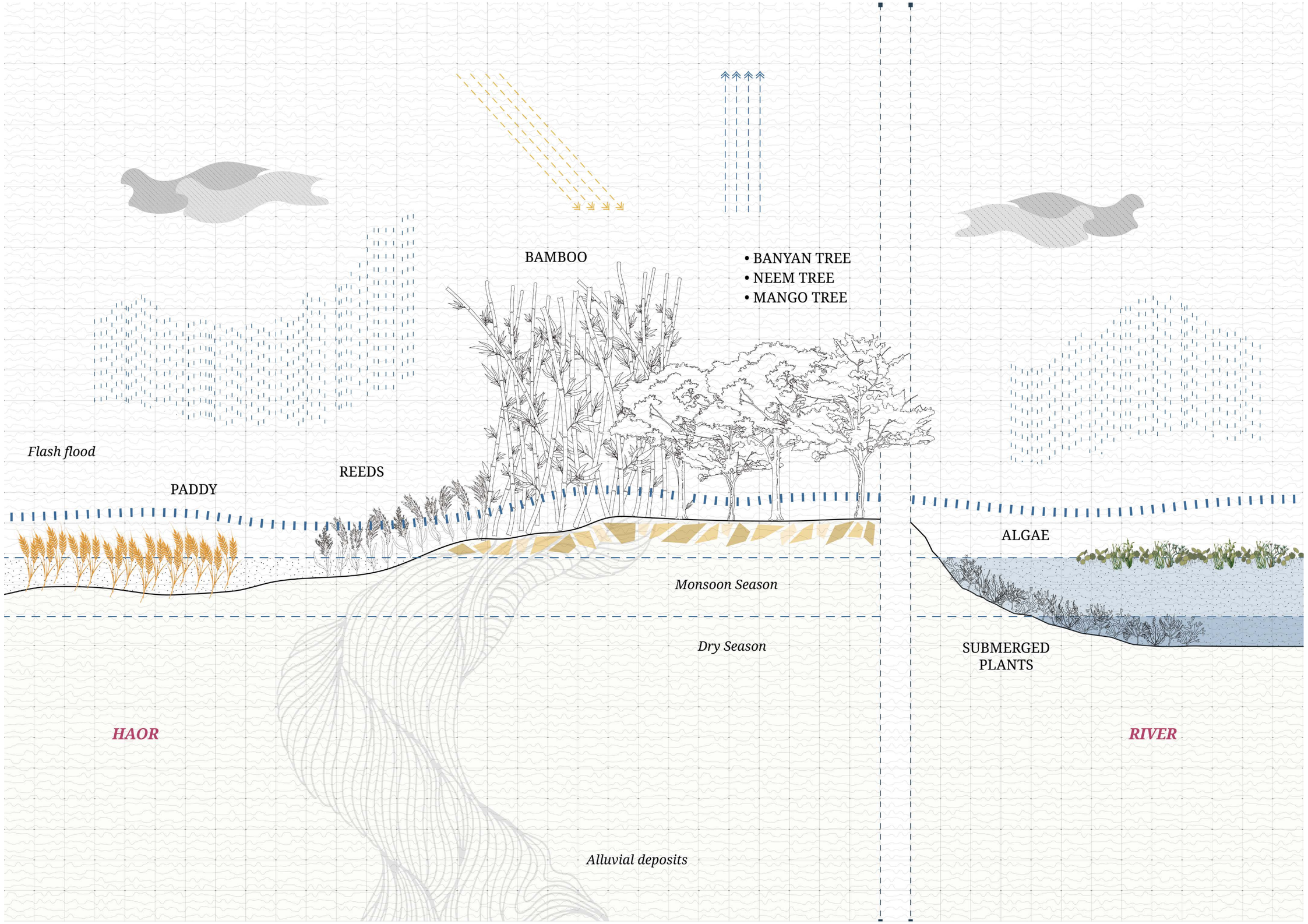
1:200

ENVIRONMENTAL SUSTAINABILITY

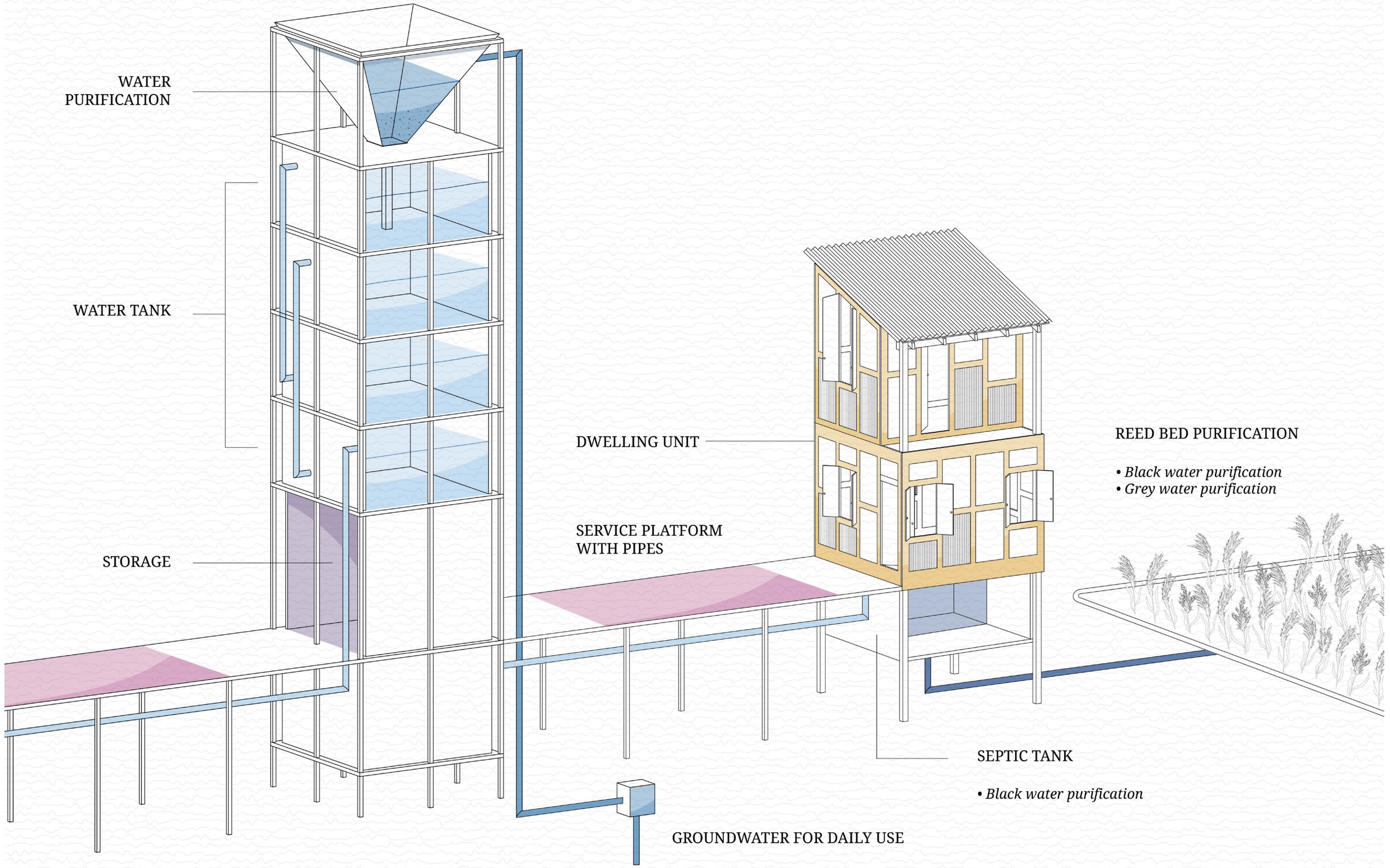
Landscape, Climate Design, Water Treatment, Product Circulation

Tahirpur, Sylhet, Bangladesh

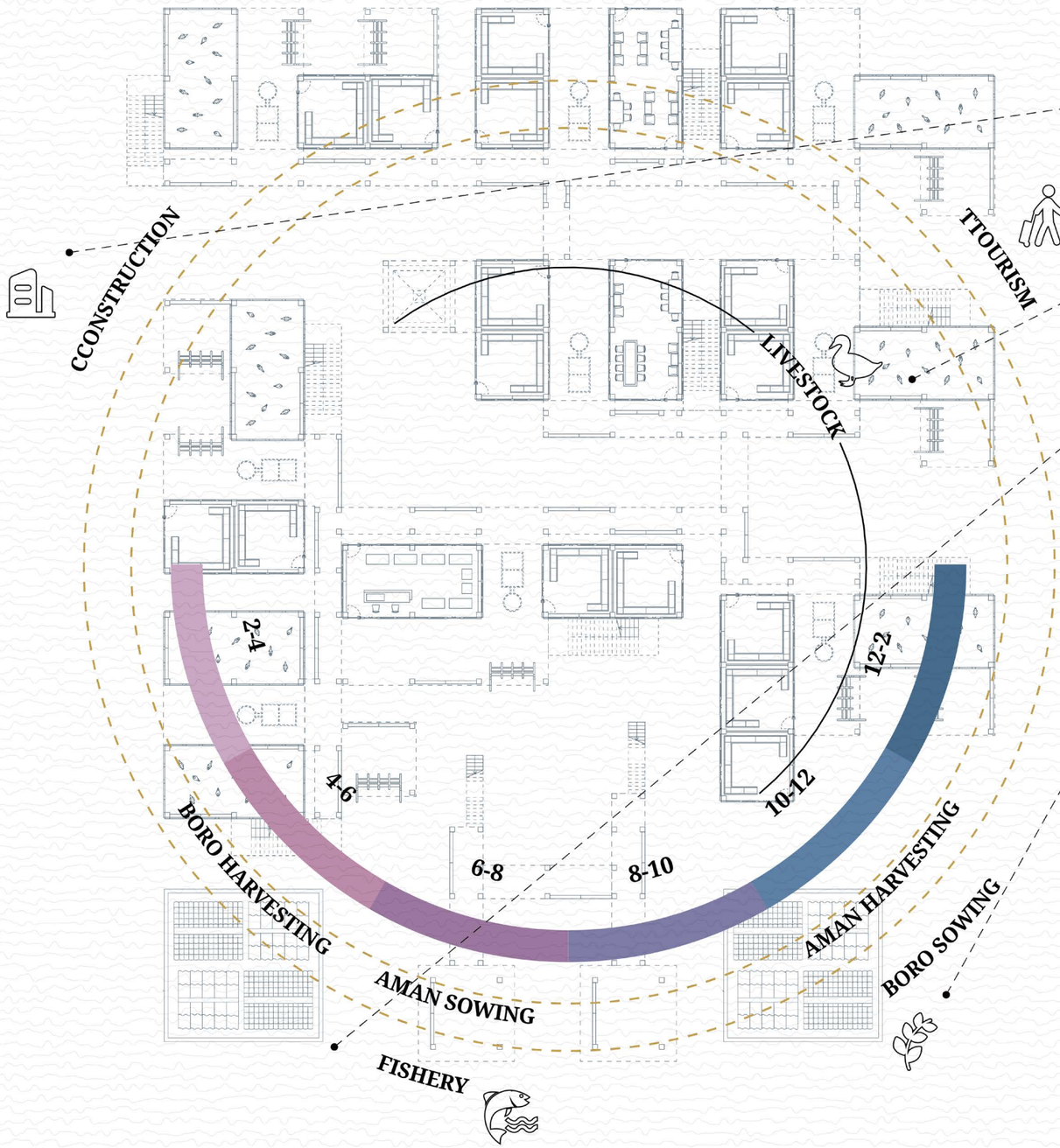
— landscape —


BAMBOO
• BANYAN TREE
• NEEM TREE
• MANGO TREE
Flash flood
REEDS
PADDY
Monsoon Season
Dry Season
ALGAE
SUBMERGED PLANTS
HAOR
RIVER
Alluvial deposits

— water treatment —

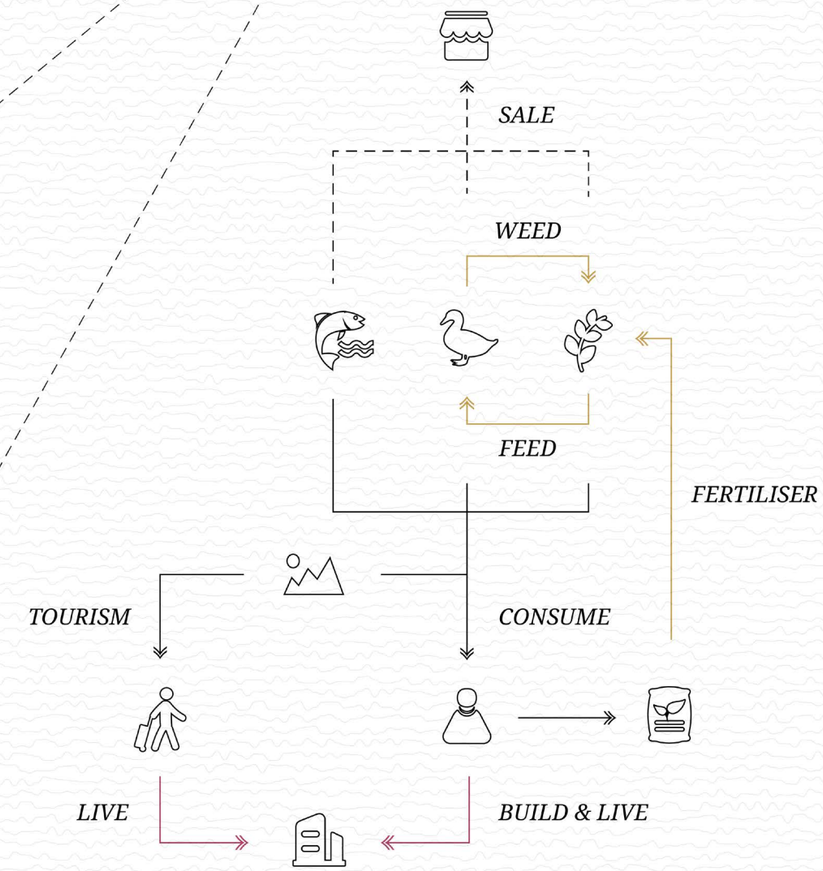

WATER PURIFICATION
WATER TANK
STORAGE
DWELLING UNIT
SERVICE PLATFORM WITH PIPES
GROUNDWATER FOR DAILY USE
SEPTIC TANK
• Black water purification
REED BED PURIFICATION
• Black water purification
• Grey water purification

— product circulation —



INDUSTRY CONVERGENCE

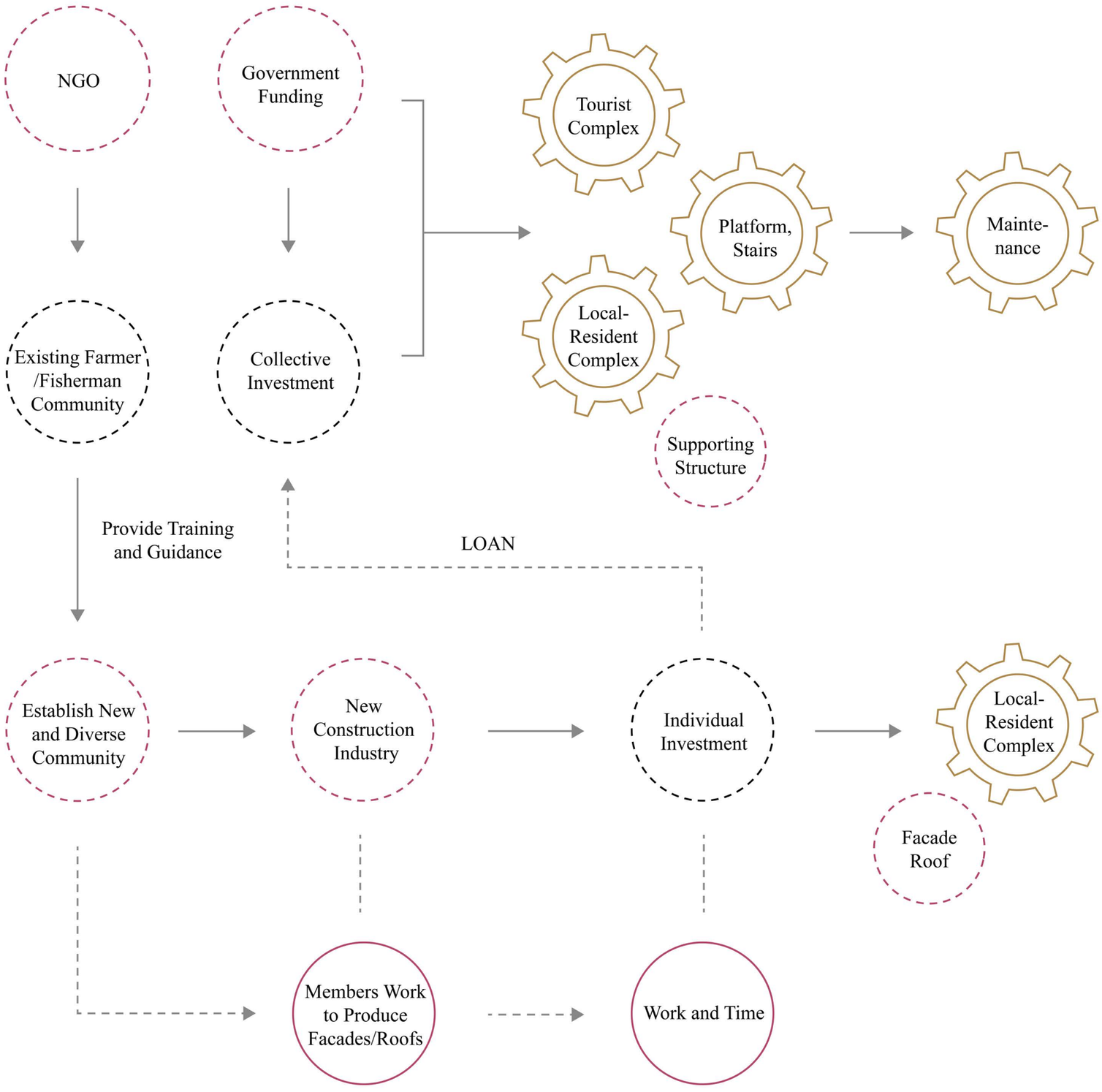
1. *CONSTRUCTION*
2. *TOURISM*
3. *LIVESTOCK*
4. *FISHERY*
5. *AGRICULTURE*

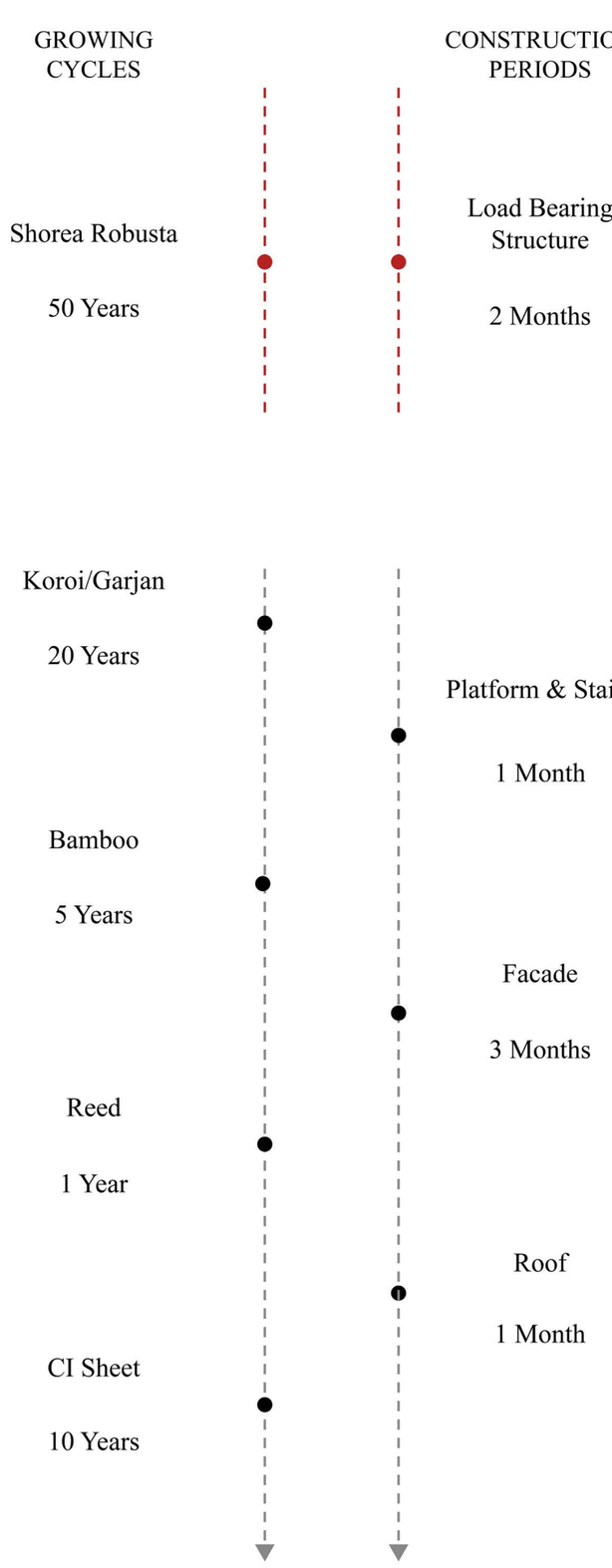


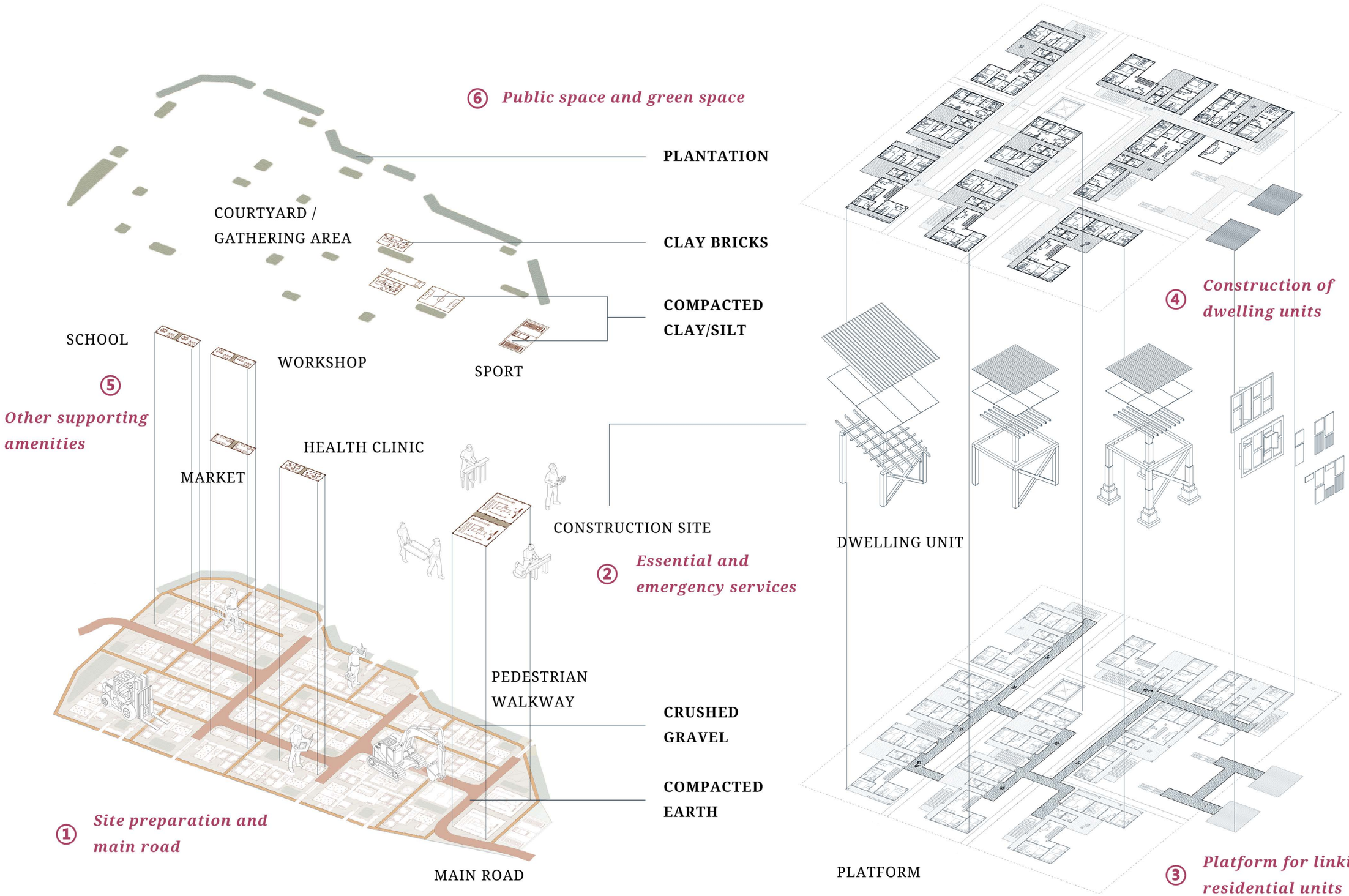
SOCIAL SUSTAINABILITY

Managerial Strategy

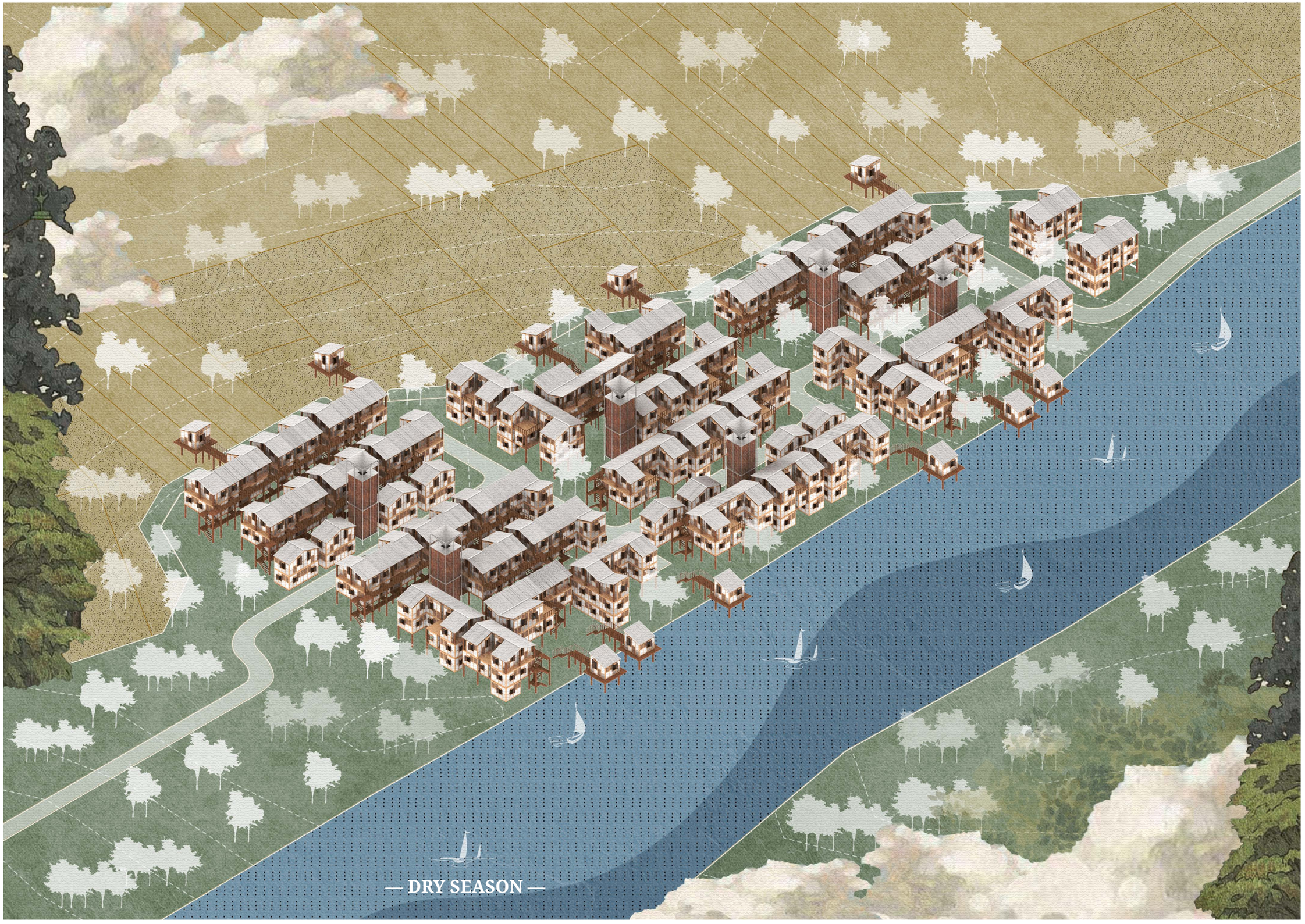
Tahirpur, Sylhet, Bangladesh


NGO
Government Funding
Existing Farmer /Fisherman Community
Collective Investment
Provide Training and Guidance
LOAN
Tourist Complex
Platform, Stairs
Local-Resident Complex
Supporting Structure
Maintenance
Establish New and Diverse Community
New Construction Industry
Individual Investment
Members Work to Produce Facades/Roofs
Work and Time
Local-Resident Complex
Facade
Roof


GROWING CYCLES
CONSTRUCTION PERIODS
Shorea Robusta
50 Years
Load Bearing Structure
2 Months
Koroi/Garjan
20 Years
Platform & Stairs
1 Month
Bamboo
5 Years
Facade
3 Months
Reed
1 Year
Roof
1 Month
CI Sheet
10 Years


⑥ Public space and green space
PLANTATION
COURTYARD /
GATHERING AREA
CLAY BRICKS
COMPACTED
CLAY/SILT
SCHOOL
WORKSHOP
SPORT
⑤
Other supporting
amenities
HEALTH CLINIC
MARKET
CONSTRUCTION SITE
② Essential and
emergency services
PEDESTRIAN
WALKWAY
CRUSHED
GRAVEL
COMPACTED
EARTH
① Site preparation and
main road
MAIN ROAD
④ Construction of
dwelling units
DWELLING UNIT
PLATFORM
③ Platform for linking
residential units

— isometric view —


— DRY SEASON —


— MONSOON SEASON —

REFLECTION

The Process of the Project

Tahirpur, Sylhet, Bangladesh

Background

There is a gradual increase in internal migration in Bangladesh, people migrate from rural areas to the cities in search of jobs and better incomes. This can lead to an unbalanced distribution of the population and a decline in the quality of housing for urban residents. Overpopulation is concentrated in limited areas and in order to be close to areas with a high concentration of jobs, people are forced to compromise on overcrowded and unhygienic dwellings. This phenomenon suggests that housing should not only have the attribute of providing safe and hygienic shelter, but also the attribute of meeting the work-related needs of the inhabitants. This points to the need for housing to be close to the workplace, i.e. to provide shorter commuting distances, without sacrificing quality of living and sanitation. However, this tension between commuting distance and quality of housing is to some extent inevitable and difficult to reconcile, as both the density of jobs and the increase in internal migration lead to an over-densification of the city, which affects the size of the housing stock in terms of usable area, open space and surrounding infrastructure. Unlike some other studies that focus on how to improve the utilization of urban space, my research and project looks at the housing situation in rural areas in order to create a new housing system adapted to rural areas to mitigate the problem of mass migration from rural to urban areas and thus improve the living conditions of both urban and rural residents.

Research and Design Process

P1 Phase

During the P1 phase, the theme of my project is identified, which is to create a new housing system that is integrated with local industries and adapted to the different water levels of the dry and monsoon seasons, based on the research and analysis of rural areas in Sylhet. The new housing system not only combines the three seasonal industries of farming, livestock raising and fishing, but also integrated with tourism and construction industries. It allows local people to get more jobs without having to leave their original living environment. At the same time, the site is located in a wetland area where the available land area increases or decreases in different seasons depending on the water level, so the new housing system also takes into account the different ways of coping with the dry season, the monsoon season, and the period of flooding, so the disadvantage of the rise in the water level can be transformed into a unique feature of the local area.

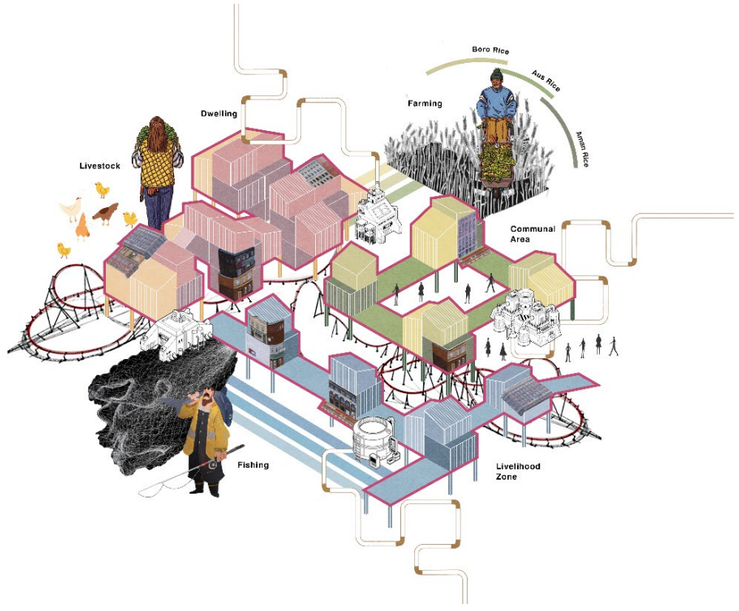


Figure1: Project concept collage.

P2 Phase

During P2, based on tutors' feedback, I further develop the theme of the project and work on the design of the main building, defining the various types of functional spaces and floor plan layouts.

1. Industry

After mapping the wetland areas of Sylhet, I found that the usable land area of the wetland areas varies a lot between monsoon season and dry season. Even in some extreme cases, there are instances where floods cover all the usable land. As a result, the new housing system raised the building, moved living areas such as bedrooms to the first and second floors, and used the ground floor as communal space, shops, storage rooms, space for the local industry and for residents to work. This approach makes the most of the ground floor while addressing the flooding crisis faced by the housing system, not losing the utilization of the ground floor space, but instead enhancing the connectivity between the homes and the local industry. This means that the new housing system can truly achieve more than merely improving the standard of living for residents, but also helping to develop local industries, increasing job opportunities and bringing homes and workplaces closer together.

Through field research and interviews with locals in site, I found that the existing local industries are mainly farming, fishing and livestock breeding. Cultivation and fishing peak during the dry and monsoon seasons respectively, while livestock farming is a year-round activity, but the linkages between the three industries are weak, with people choosing to work in different industries. The new housing system provides a template for combining these industries, in which people can switch between them according to the seasons, and the relationship between the different industries is no longer antagonistic but complementary. At the same time, the new housing system introduces two new industries, construction and tourism. The construction industry not only provides some of the components for the construction of the housing units, but also creates new jobs for the local population. Tourism increases the flexibility of the housing units by generating income from renting out rooms that are left vacant during the monsoon season when some of the residents travel to look for work elsewhere. At the same time, the arrival of tourists drives consumption and boosts the local economy. The new housing system provides different spaces for various types of industries, with livestock breeding, farming and fisheries lined up in a cascade on the ground floor, from the land to the river, with the second floor being the living space for tourists. The construction industry, is located slightly away from the living space, separated by bamboo and other plants. In addition, a platform system is introduced into the project, which not only raises the building to cope with flood risk, but the space underneath the platform can be used for drying paddy and fish during the dry season.

2. Layout

In the layout of the plan, the main consideration is to separate the service spaces from the housing units. The service space consists of toilets and kitchens, and since it is located in an area that is subject to flooding, it is necessary to have separate kitchens and toilets in order to reduce the risk of damage to the house caused by flooding. At the same time, because wooden buildings are less soundproof, having separate service spaces also helps to reduce noise, and the centralization of kitchens and toilets facilitates water treatment. Specifically, the service space is placed in the middle of the two housing units to improve space utilization while ensuring that each housing unit has its own private toilet and kitchen. In addition, the waterfront cabins and platforms are originally connected to the main building, but given the differences in height of the terrain and the requirements of the construction techniques, the waterfront cabins and platforms are designed as separate parts that can be flexibly positioned according to the differences in terrain.

P3 and P4 Phase

During P3 and P4, based on tutors' feedback, I increase the density of the residential units and adjust the functional arrangement of some spaces. I analyze the local vernacular architecture and indigenous materials, choose the structures and materials to be used in my project. Also based on the study of the local climate, environment and society, I propose a solution for the water treatment and landscaping of the site, and provide a managerial strategy for my project.

1. Material

During the field research in the wetland area of Sylhet, I found that most of the local residents belong to the low-income group, and most of the original houses are built by using bamboo as the supporting structure and corrugated iron sheet as the skin. This is because of the abundance of bamboo and the cheap price of corrugated iron sheet, which makes it easy and cheap to build a house. Also, because the structure is simple and the corrugated iron sheet is easy to be replaced, this kind of replaceable house is easier to be moved in case of floods. However, there are also disadvantages when using bamboo and corrugated iron sheet. Bamboo is a local material, may not widely distributed, which means bamboo buildings may not be able to be used in other areas, and corrugated iron sheet performs poorly in terms of thermal insulation and will reduce the thermal comfort level of the housing.

Based on this situation, the new housing system considers the introducing of a new material: timber, as the main supporting and framing material of the building, in order to increase the feasibility of the new housing system to be replicated in other areas. At the same time, the use of bamboo, corrugated iron sheet, and reeds, which are common in the area, as skin materials, can reduce the construction cost by using local natural resources. And by combining a variety of materials, rather than using only corrugated iron sheet, the richness and insulation of the façade will be enhanced. The new housing units are constructed with reference to Bangla Baton, a vernacular building in Bangladesh. For the case study, I researched Marina Tabassum's project "Inheriting Wetness" and other Bangla Baton types of buildings, and summarized the construction methods and materials used in these buildings. The Bangla Baton is supported by wooden beams and columns, and the façade is attached to the main structure by means of wooden frames filled with reeds or covered with corrugated iron sheet. The facade is not load-bearing and can be taken down or replaced at any time. The new housing units follow this traditional pattern, but with innovative facade infill materials. The facades of the new housing units are not only made

of both reeds and corrugated iron sheet, but the new bamboo sheet has also been introduced as a skin material. The proportion of these three materials on the façade can be changed continuously to achieve a variety of the façade expressions. In addition, since the façade is not load-bearing and can be dismantled, the façade on the ground floor of the building can be removed in case of flooding and can be easily replaced after a certain period of time if the façade is damaged.

2. Climate Design

Firstly, in this housing system, there are a lot of courtyard spaces, and the size of these courtyards is designed according to the number of housing units in the surrounding area, which not only ensures that the residents have suitable space to move around, but also provides enough natural ventilation and natural lighting for the rooms. Secondly, the wetland area of Sylhet is originally planted with bamboo, so the choice of planting bamboo in the site not only makes use of a natural resource to provide material for the facade of the house while stabilizing the soil in the wetland area for the construction of the house, but also shades the courtyard spaces and improves thermal comfort. In addition, reeds are also common plants in the area and therefore are planted close to the agricultural land, so that when the agricultural land is flooded, reeds are still able to grow, and during the dry season, grey water from the housing is discharged into the reed field for water purification, and then is discharged into the agricultural land for agricultural water use.

3. Managerial Strategy

After analyzing the incomes of the local people, I found that although the new housing units, in the form of Bangla Baton, would be familiar to the local people and thus easy to be accepted, the use of wood as the main building material could create the problem of high construction costs for the low-income people in the wetland area, which would discourage them from adopting this option. The solution to this problem, apart from reducing construction costs, could be to increase the income level of the local people. The construction industry has therefore been introduced into the new housing system to serve both the construction of new housing units and the raising of incomes to improve the quality of life of the residents. The government provides the upfront investment, and residents invest in their own housing through loans. At the same time, residents can repay their loans by investing time and work in the construction industry. The components produced in the construction industry can be used to build housing units in the local area or sold in other areas to generate income while promoting the new housing system. In other words, the new housing system can be seen as part of the local government's plan to promote economic development in rural areas and to alleviate excessive internal migration by combining existing local industries with new ones to increase job opportunities and provide better living conditions for local residents.

Besides the housing units subscribed by the residents individually, there are other amenities in the housing system and the platform system that serves as the back bone of the project, and their construction and maintenance are financed by collective investment, which clarifies the attribution of public use and responsibility for these areas. It also means that the local infrastructure can be built first, creating favorable conditions for the subsequent construction of the housing units. In addition, these public facilities will gradually help to form a cohesive community as they are used by the local residents and contribute to the promotion of the architectural and humanistic aspects of the community.

Relation with the Academic and Societal Value, Scope, Implication and Transferability

From a social point of view, my research and project provide a new solution for combining housing and industry in wetland areas affected by seasonal flooding, turning the disadvantage of a rural area being far from urban centers into an advantage of having abundant land, natural and industrial resources. Seasonal industries are integrated, new industries are added to re-build the local industrial structure, and the arrival of tourists activates local business development. Along with the improvement of the industrial structure, people's income and economic conditions have improved, as well as the living environment and the quality of housing, and the space for public activities and infrastructure have been gradually increased and improved. People in rural areas are no longer displaced by floods and have access to jobs very close to their homes and no longer need to migrate from the countryside to the cities to endure cramped housing and poor sanitation. This proposal has had a positive impact on both urban and rural dwellers by reducing the high population density in urban centers, while at the same time rationalizing the use of natural resources in rural areas and developing them into better quality living and working areas.

In the field of architecture, my research and project focus on timber-framed dwellings, with timber beams and posts as the main load-bearing components, and lightweight timber for removable and replaceable facades. This form is not only an inheritance of the local vernacular architecture, but also provides a solution to cope with flood risk. In the event of a flash flood, the bolted ground floor façade can be removed and people will live mainly on the first and second floors without having to move elsewhere for shelter.

In terms of transferability, the project can be applied in rural areas with flood risks of other countries and regions similar to the Sylhet wetland area in Bangladesh. And local temperatures need to be relatively high throughout the year. My project mainly uses timber as the building material, which is widely distributed and therefore suitable for the replication of the houses in other areas. At the same time, the façade of the building is prefabricated, which can be seen as a modular design, which can also increase the feasibility of replicating the project in other areas. In addition, the infill material of the façade can be changed with local materials and need not be limited to bamboo and reeds that are abundant in the Sylhet wetland area, which provides more choices for other areas and helps other areas to use their local natural resources and reduce construction costs.

Relation with Master Track Architecture and Programme (MSc AUBS)

My project is to build a new housing system in the rural area of Sylhet, Bangladesh to improve the living conditions of the local residents and to increase job opportunities. The housing system has been designed in terms of spatial planning, such as separating the service space from the living space. At the same time, the project provides a new possibility for the development of rural area, and eases migration from rural area to city centers, which is closely linked to urbanization. In addition, the project explores aspects such as building materials and construction techniques to help adapt this new housing system to the natural conditions of seasonal wetlands and to meet the needs of sustainability. The project is therefore relevant to architecture, urbanism and building sciences.

The Final Part of the Graduation Period

The final part of the graduation period will be used to further explore the flexibility and adaptability of this new housing system. The system consists of a combination of housing units, which can be freely combined with each other, so that a variety of combinations of these units in different scenarios can be explored. Also, the housing units can be vertically adapted and varied according to differences in terrain height. By exploring the diversity of the housing system, it can be shown that it can be adapted to the topography and planning situations of different regions. In addition, the spatial arrangement within the housing units has a wide range of possibilities and should also be further investigated. Under different economic and cultural conditions, inhabitants spontaneously regulate their internal space, and the new housing system encourages and supports this regulation.

APPENDICES

Details

Tahirpur, Sylhet, Bangladesh

PREFABRICATED FACADE

X-PATTERN BRACING

200mm × 200mm
provide lateral stability and prevent sway

OVERHANGING EAVE

BOLT AND NUT

secure and removable connection

WOODEN COLUMN

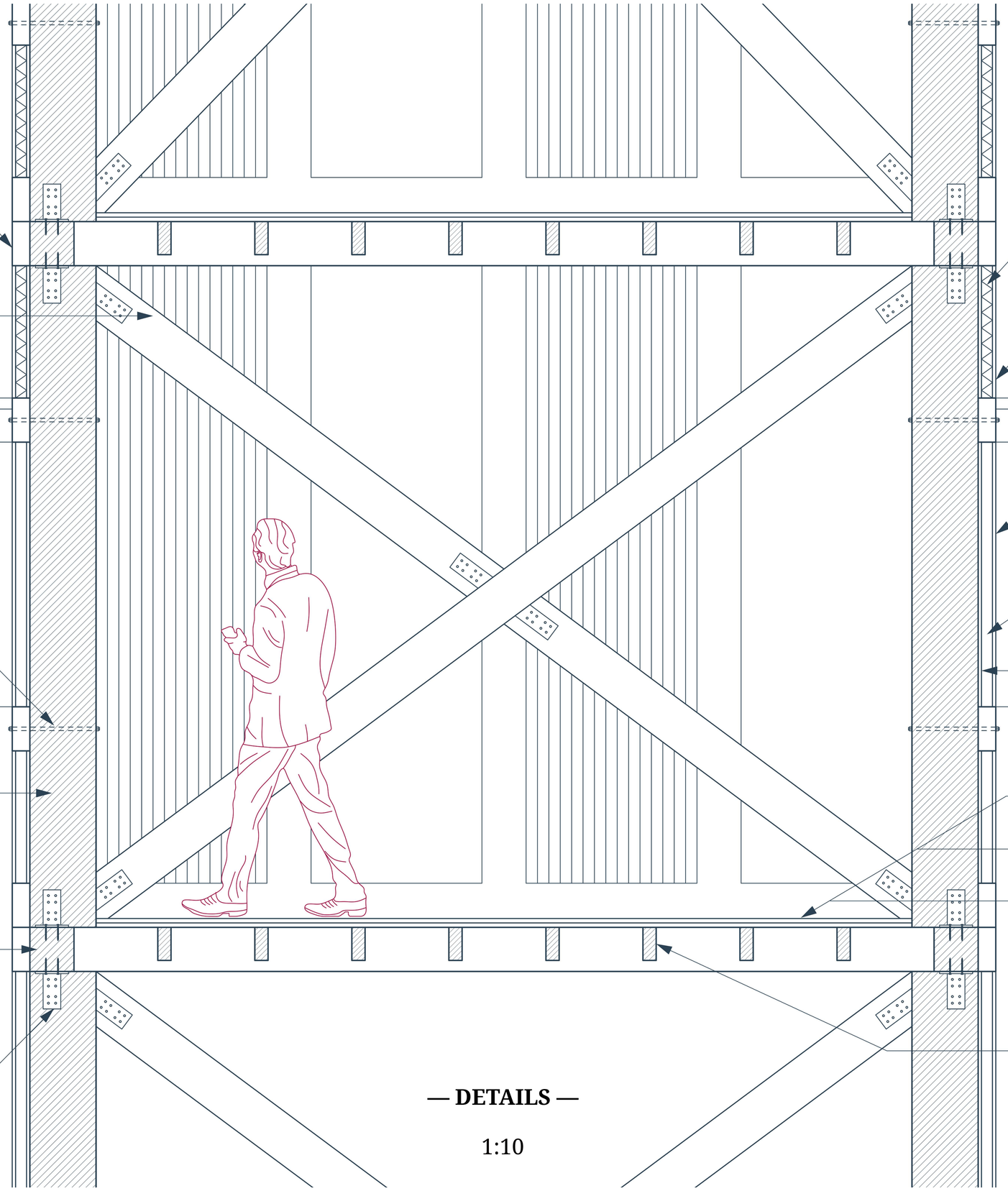
300mm × 300mm
load-bearing structure

MAIN BEAM

200mm × 200mm
load-bearing structure

STEEL CONNECTOR

nailed on, fixed with dowels



IKRA REED

insulation

PLASTERBOARD

both the exterior and interior sides

CI SHEET OR BAMBOO SHEET

exterior layer

AIR GAP

insulation

PLASTERBOARD

interior layer

WOOD FLOORING

WATERPROOFING

SUBFLOOR

plywood

FLOOR JOISTS

provide structural support for the flooring system

— DETAILS —

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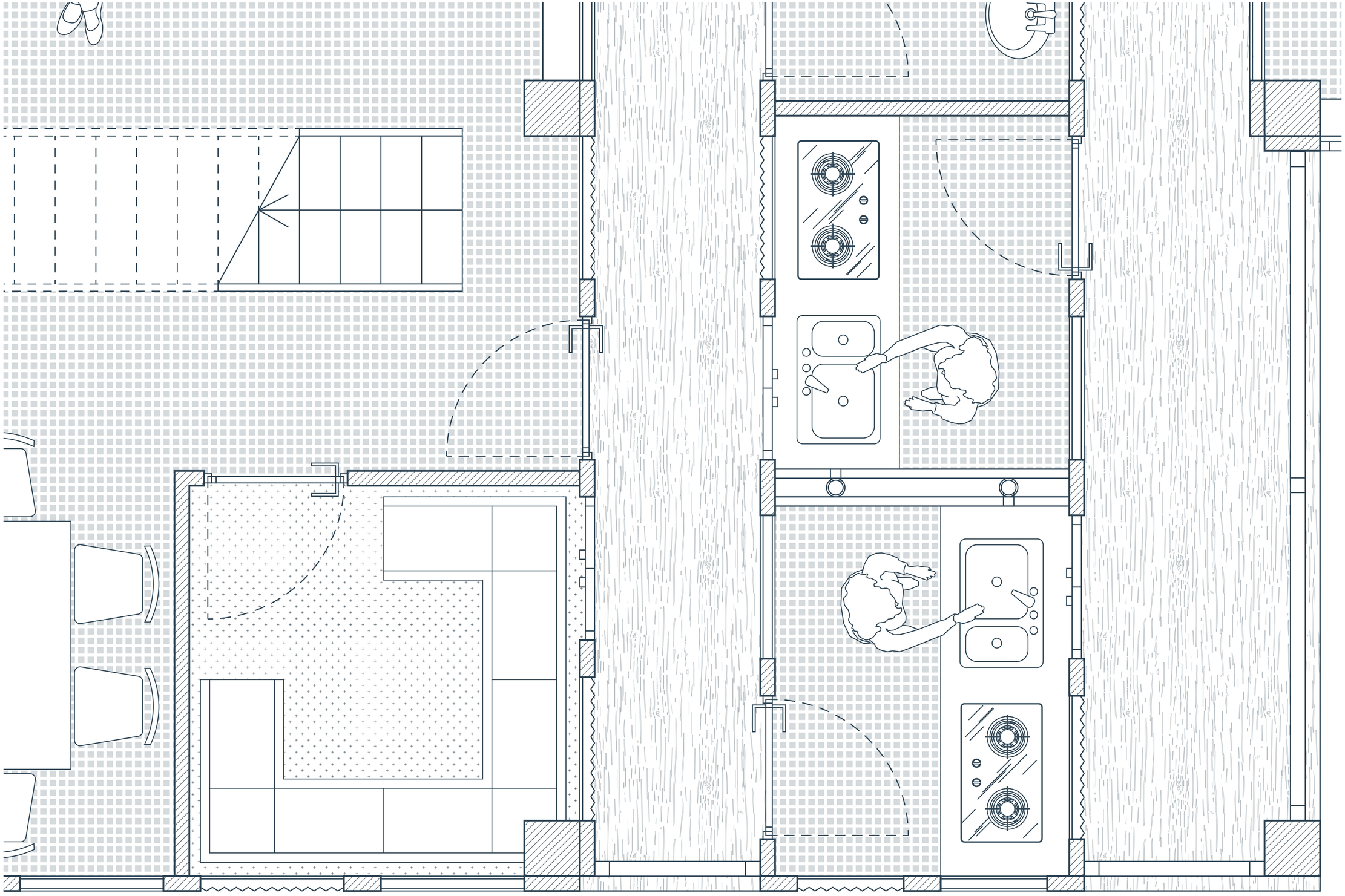

— DETAILS —

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