

An aerial photograph of a densely populated slum area, likely in a developing country. The scene is dominated by a large, muddy, and debris-strewn flood-affected area. In the upper left, there's a cluster of simple houses with corrugated roofs. A prominent feature is a large, multi-story structure with laundry hanging from its roof. To the right, a body of water is visible with a small, narrow boat. In the lower right foreground, several people are standing near a pile of trash and debris. The overall atmosphere is one of poverty and environmental hardship.

LIVING WITH THE MONSOON

how do people live / built in Bangladesh? _____

LIVING WITH THE MONSOON

how do people deal with flooding?

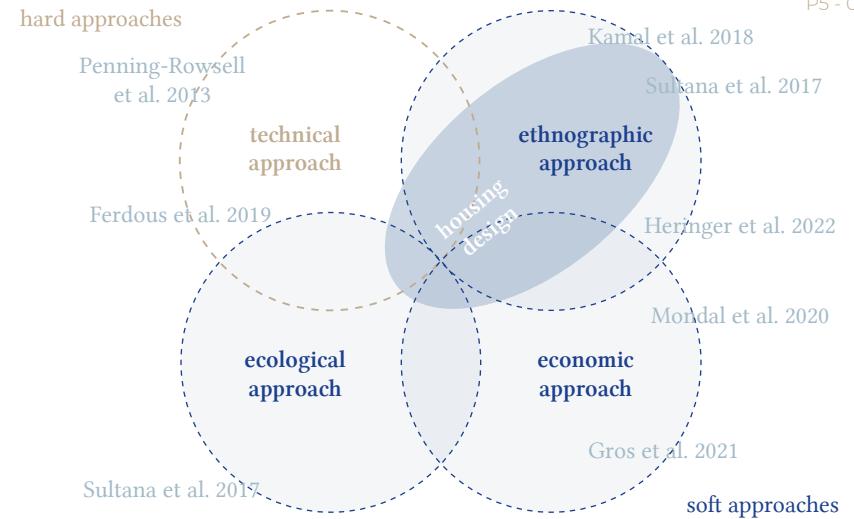
how do people deal with flooding?

How can the **existing resilience strategies** of communities in Bangladesh, developed for coping with monsoon floods, be scaled up to **urban housing** solutions that enhance the ability to withstand more severe floods without compromising livelihoods and **traditional ways of living?**

how to translate this to an urban design?

how do people live / built in Bangladesh?

- 1 **RESEARCH**
- 2 Site
- 3 Material
- 4 Design
 - Units*
 - Cluster*
 - Masterplan*

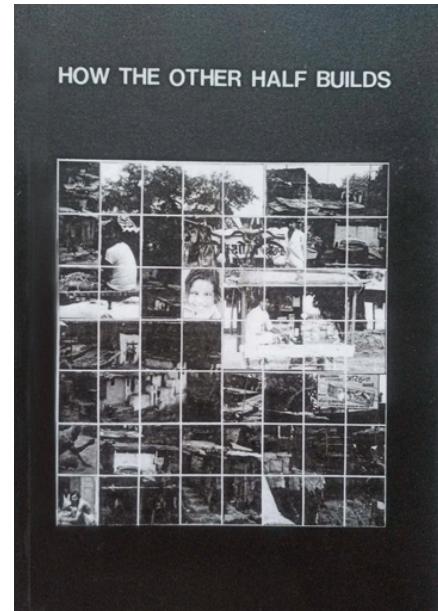


'hard approach' - control the floods
Deltawerken, the Netherlands



'soft approach' - live with the floods
Khudi Bari by Marina Tabassum

How to design in an unfamiliar context,
in a place we have only been a few weeks?



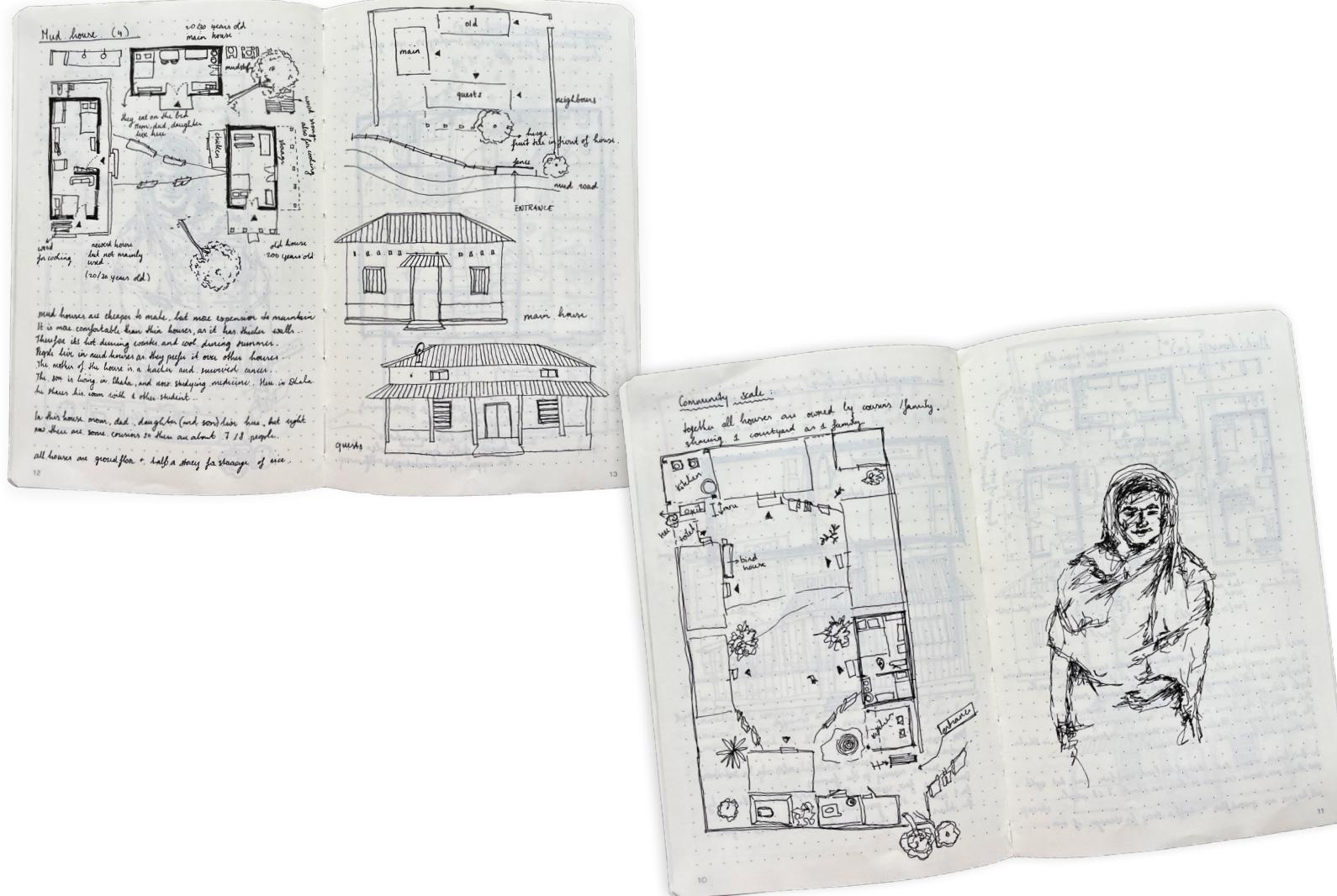
“Learn, before you respond”

‘How the other half builds’
research by Balkrishna Doshi

'Soft approach' // living with the floods

Built upon existing working structures

RESEARCH | learning from



LEARNING FROM | places visited

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P5 - 01.07.2025

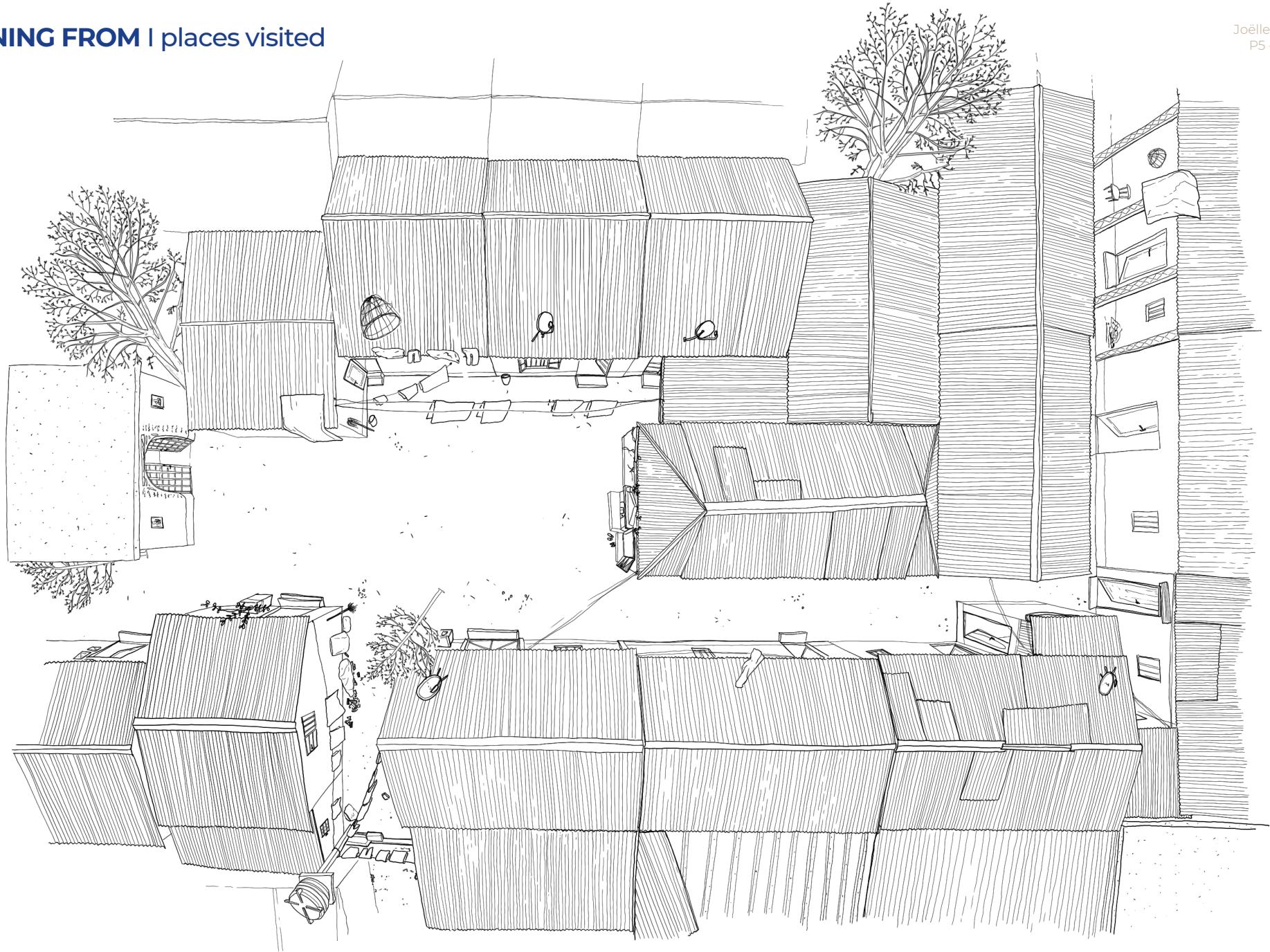


Urban informal settlement along the Surma River,
next to Keane Bridge, Sylhet



LEARNING FROM | places visited

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LEARNING FROM 11 places visited

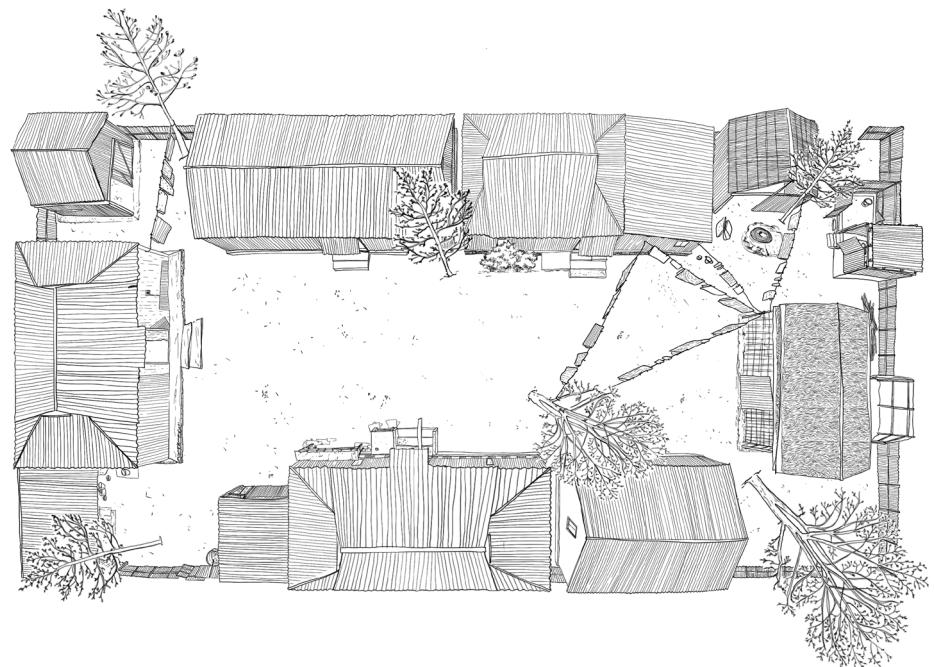
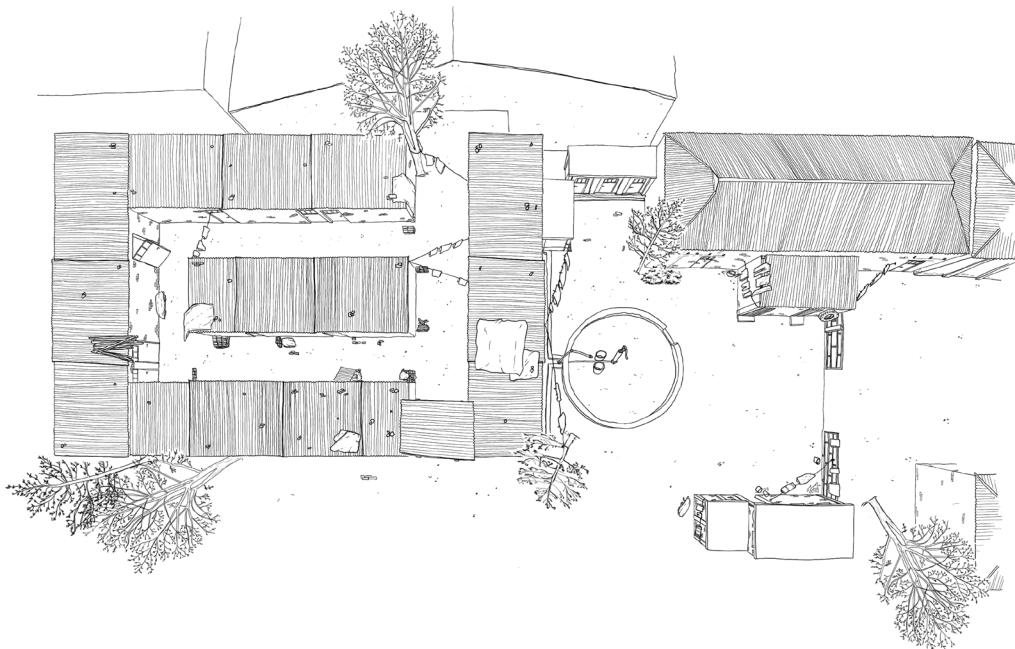
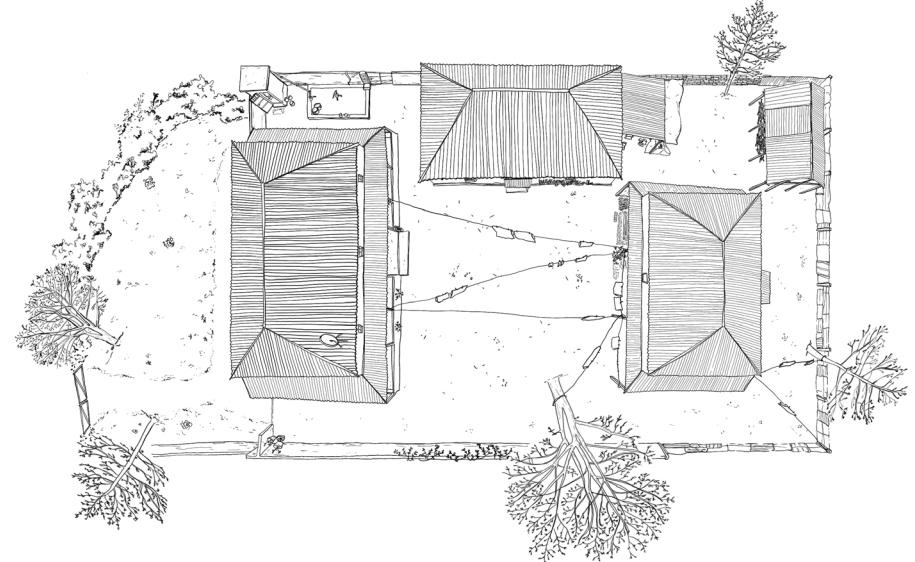
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1 Entrance to hindu community - 2 communal toilet - 3 communal courtyard - 4 community temple - 5 typical hindu dwelling in this community - 6 small temple in front of house - 7 inbetween space, used for water collection - 8 living/bedroom - 9 kitchen - 10 shared back space behind house for sanitary

LEARNING FROM | places visited

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high density building
but not on a human scale

- Dwellings arranged around a courtyard
- Courtyards as a shared outdoor living area
- Small-scale
- Ground access housing
- Small nooks on the façade where you create semi-private spaces connected to a shared area
- Small shops in front of housing
- Rooftop landscape

typology

- Kitchen in a separate space
- Bathroom and kitchen on the façade
- Separated living and dining rooms (to host guests while keeping women/children or private areas separate)

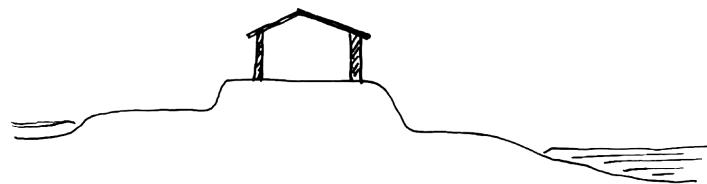
floorplans

- Building in zones, different levels of privacy (public, semi-public, private)

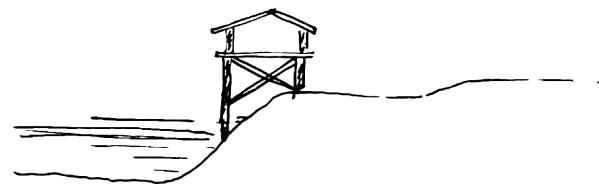
overall

LEARNING FROM | flood resilience

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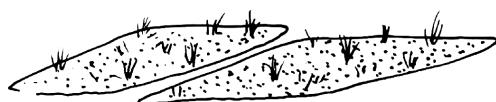
Build on a higher plinth



Built on stilts



Live on the second floor

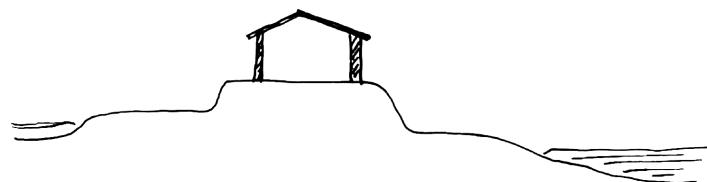


Make room for and use of the monsoon



LEARNING FROM | flood resilience

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Build on a higher plinth



Built on stilts



Live on the second floor

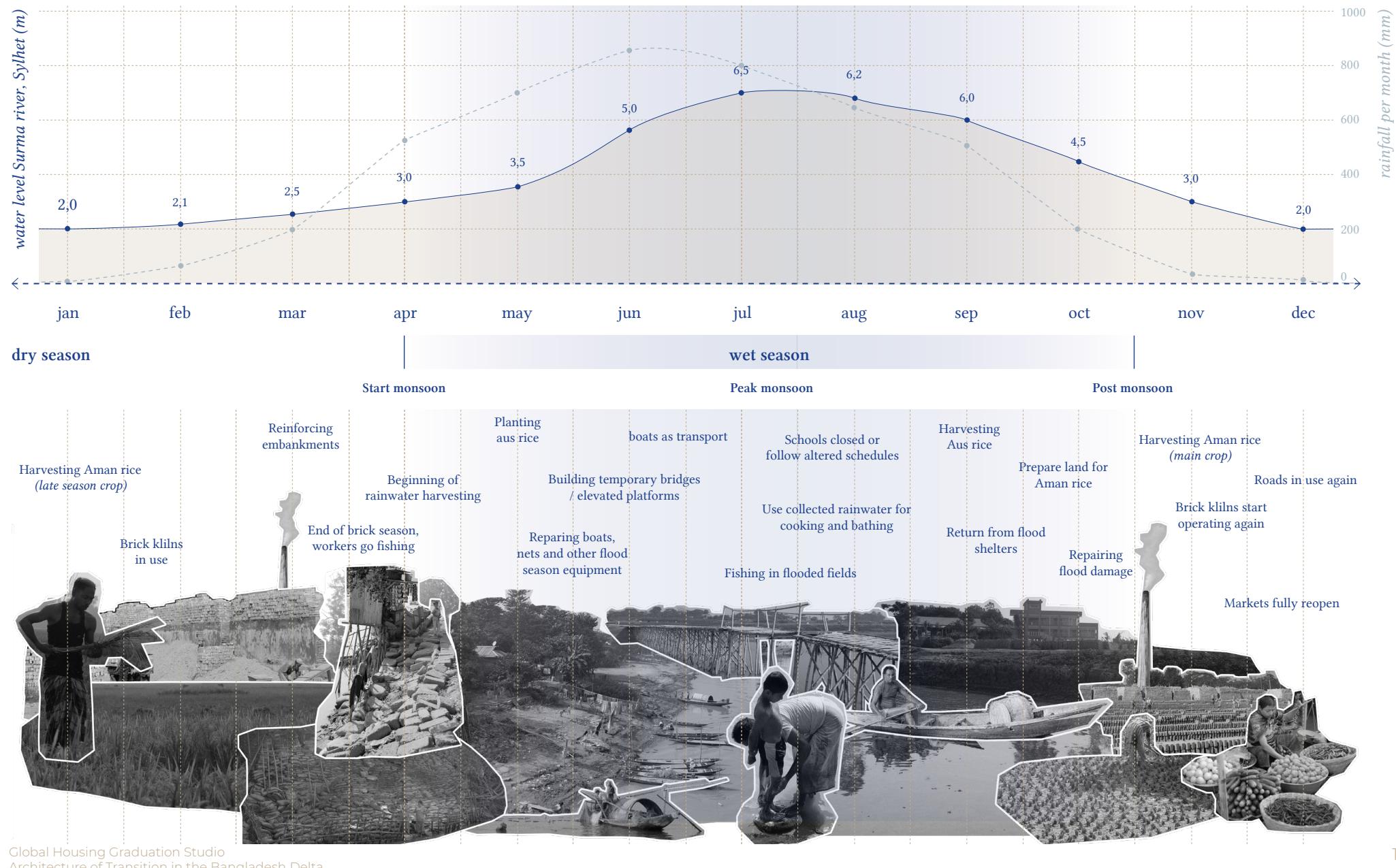


Make room for and use of the monsoon



LEARNING FROM | living with the monsoon

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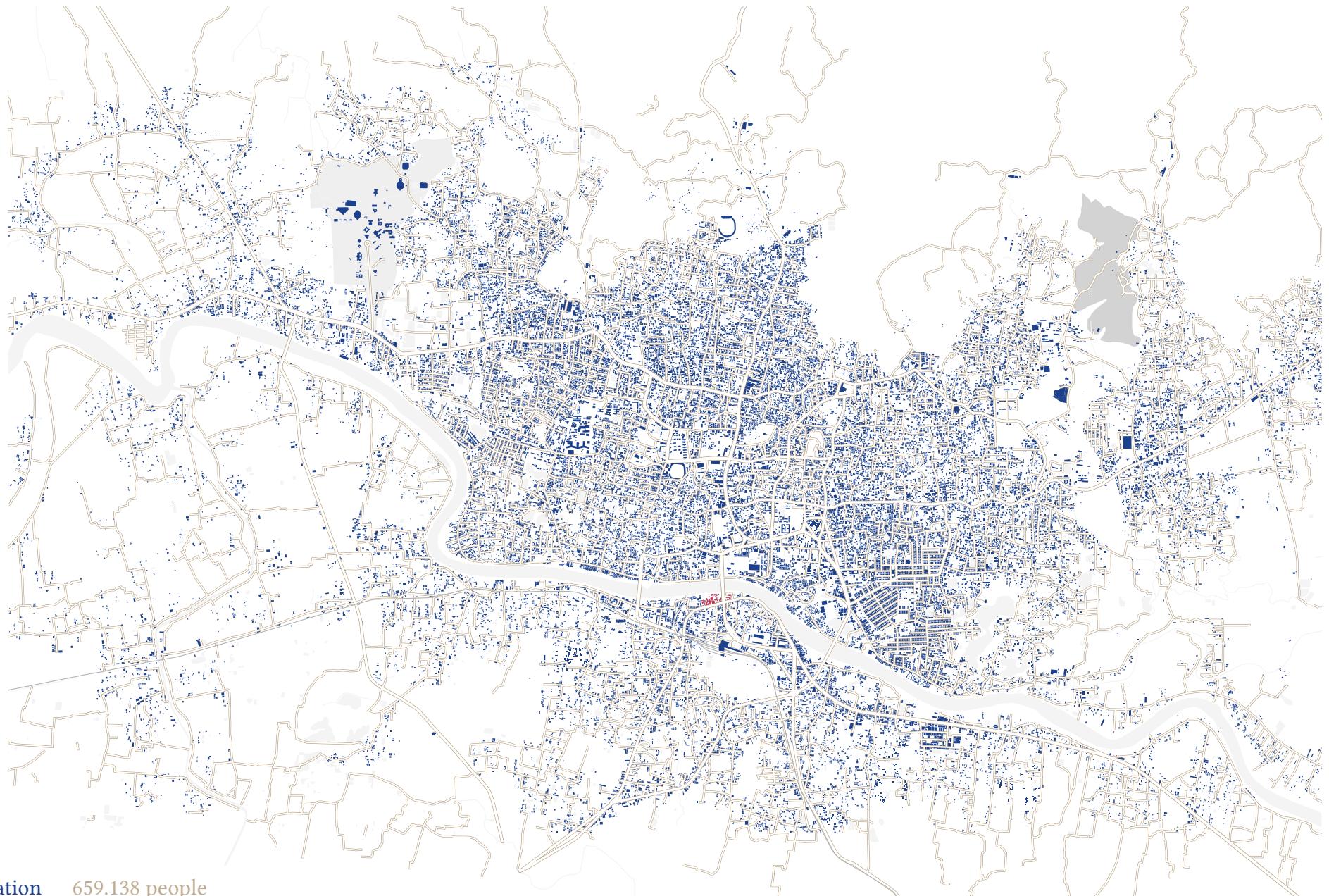
- 1 RESEARCH
- 2 **Site**
- 3 Material
- 4 Design
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 - Cluster*
 - Masterplan*



SITE I Sylhet

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P5 - 01.07.2025

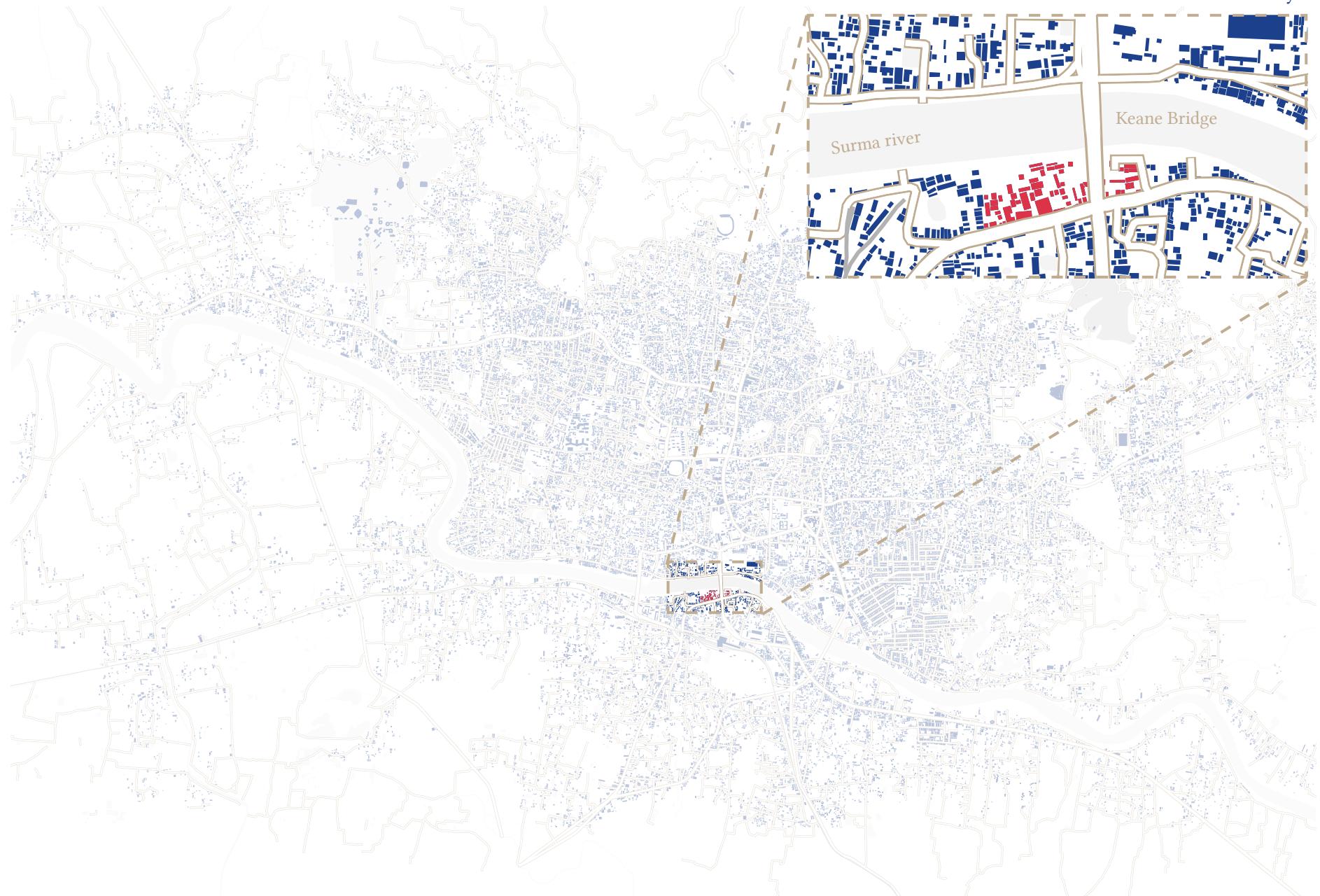




Population 659.138 people
Area 26,50 km²

Global Housing Graduation Studio
Architecture of Transition in the Bangladesh Delta

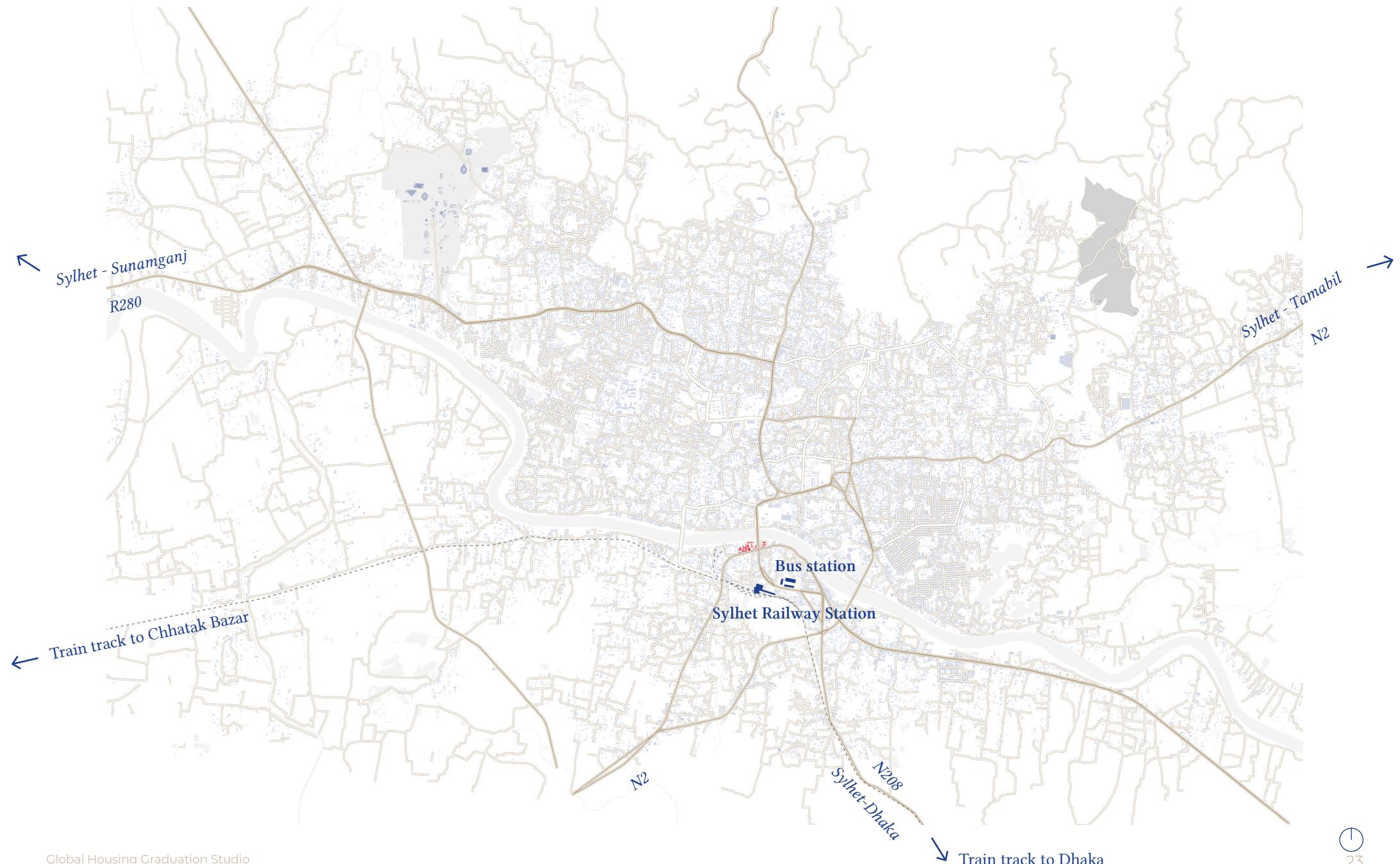
Location in the city



SITE I connectivity

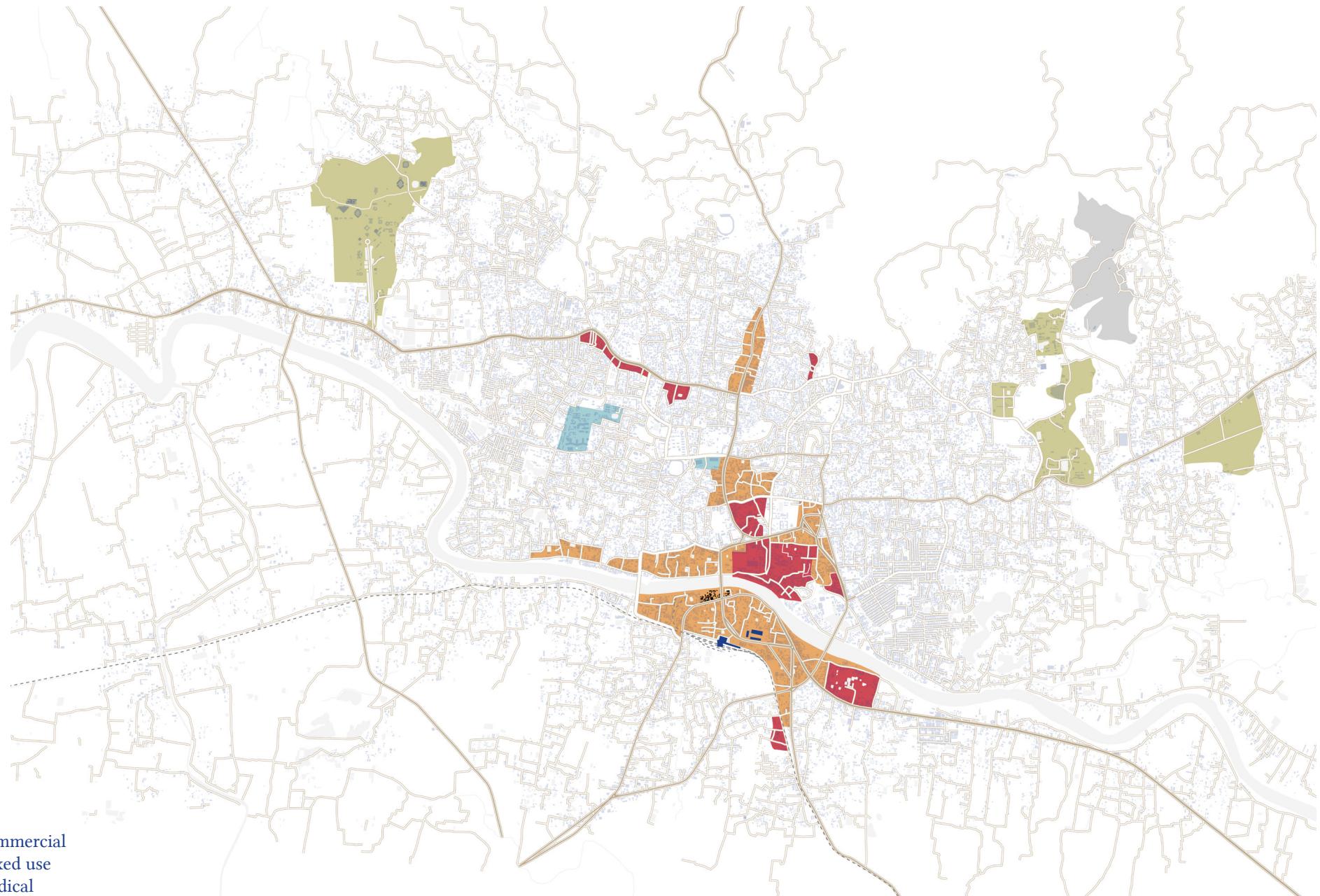
Osmani International Airport

Joëlle Steendam
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SITE I facilities

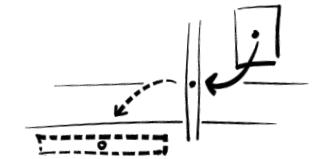
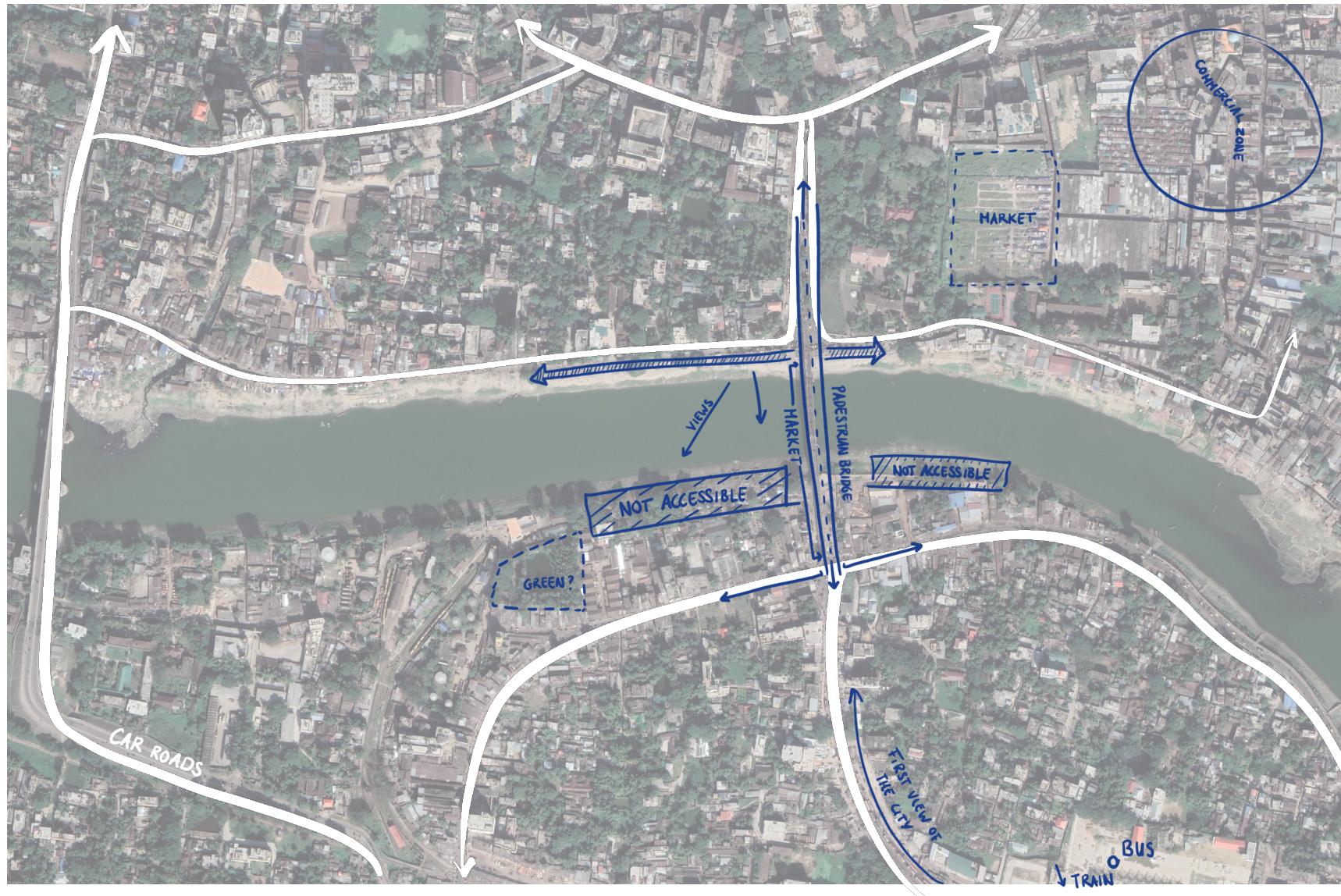
Joëlle Steendam
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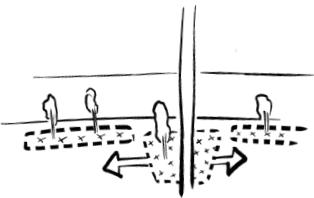
- Commercial
- Mixed use
- Medical
- Education

SITE I relation site to city

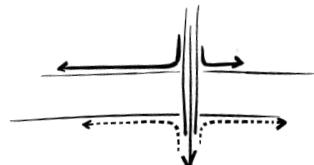
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connect north to south by extending the commercial / market zone



add green and recreational space



continue pedestrian street along river





flooding in Sylhet
Keane Bridge area 2022

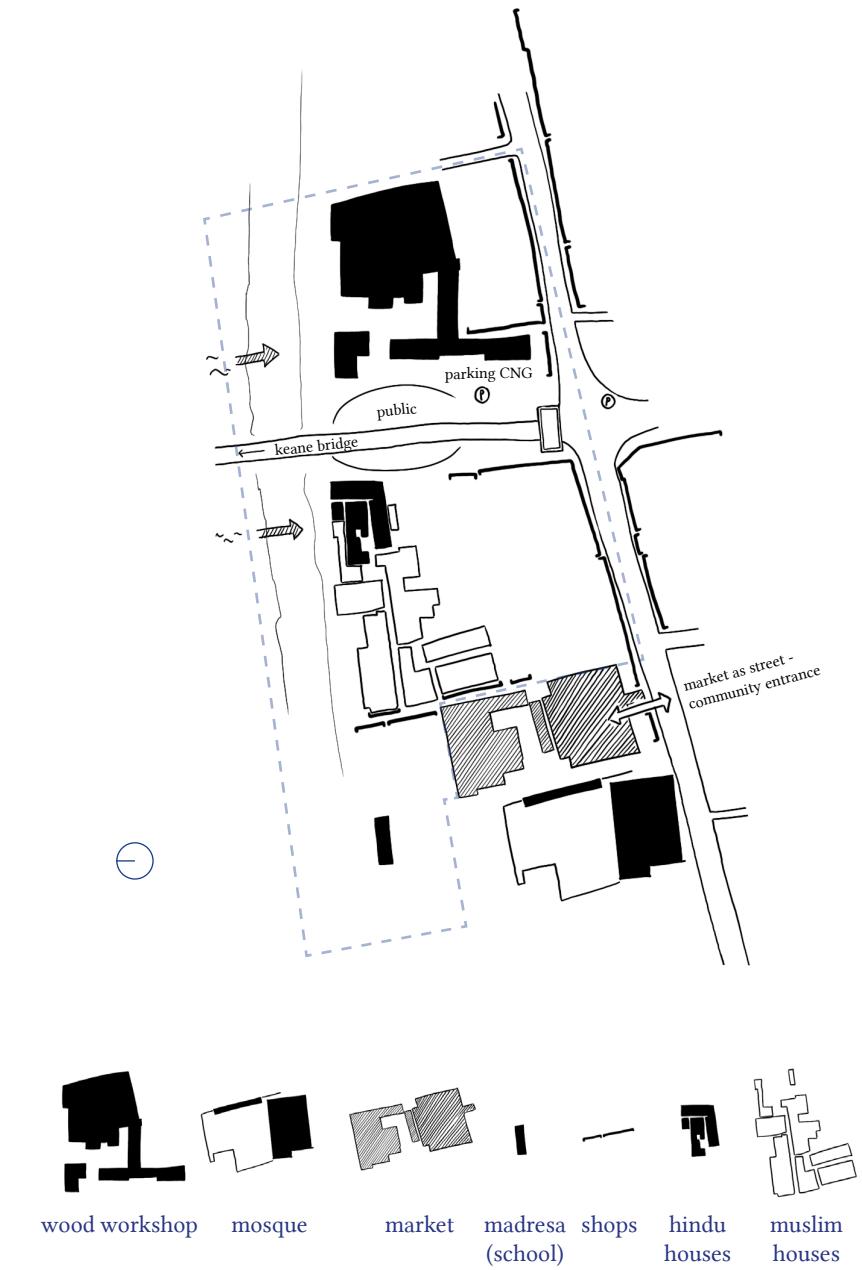


the monsoon as a spectrum of wetness
research by Anuradha Mathur and Dilip da Cunha



SITE I Keane Bridge

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keep



hindu
houses

mosque

Hindu houses
580 m²

Mosque
2440 m² (total of three floors)

demolish



muslim
houses

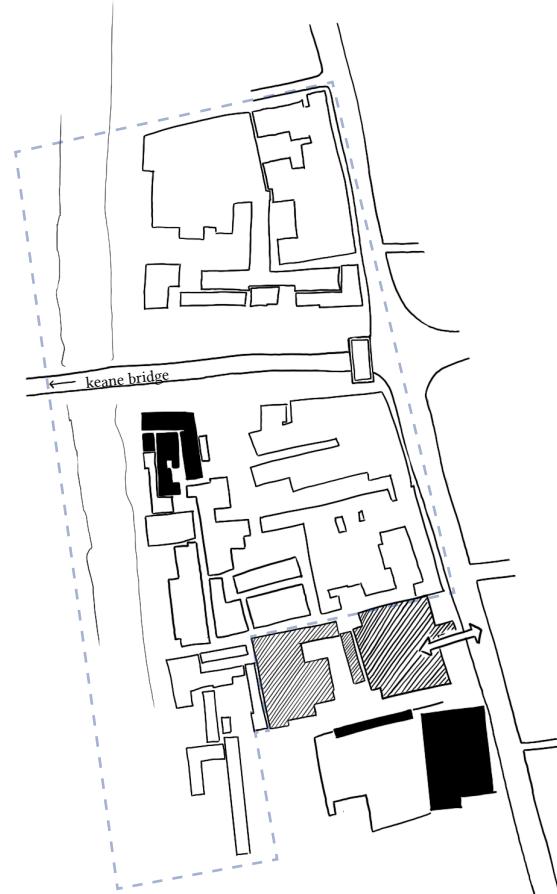
Muslim houses / shops
9880 m²

demolish in later phase



market

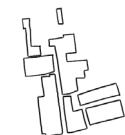
Market
1680 m²



keep



demolish



demolish in later phase



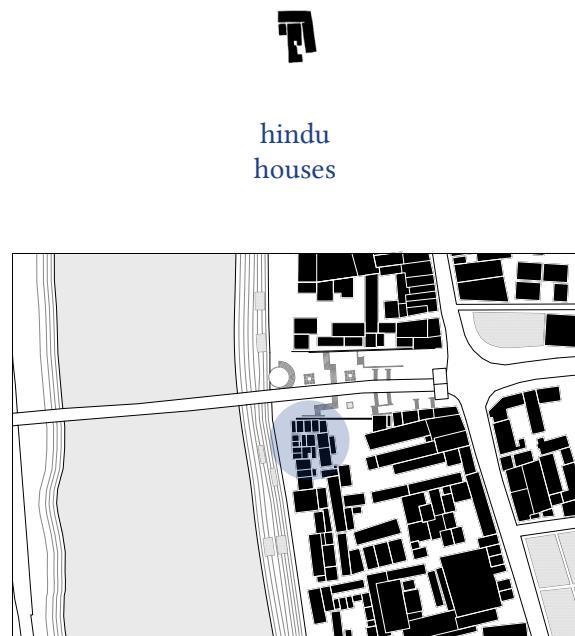
SITE I walk through



Overview of community living next to Keane Bridge, along the river.



SITE I walk through



Housing

The hindu part of the community consists of colourful brick houses, plastered and painted.



SITE I walk through



muslim
houses



Housing

The Muslim houses are in a worse state compared to the Hindu houses. They are mostly built from corrugated sheets.



SITE I walk through

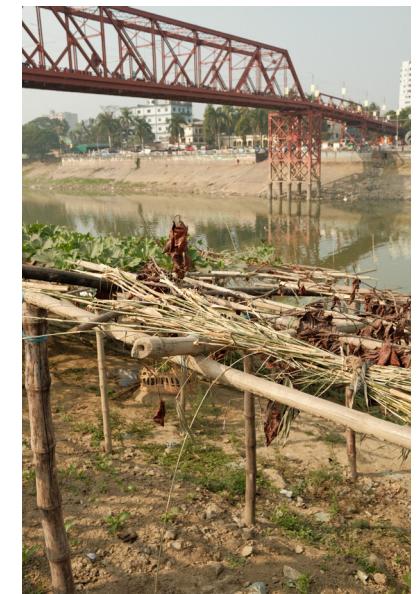
Joëlle Steendam
PS - 01.07.2025



muslim
houses



Small scale agriculture

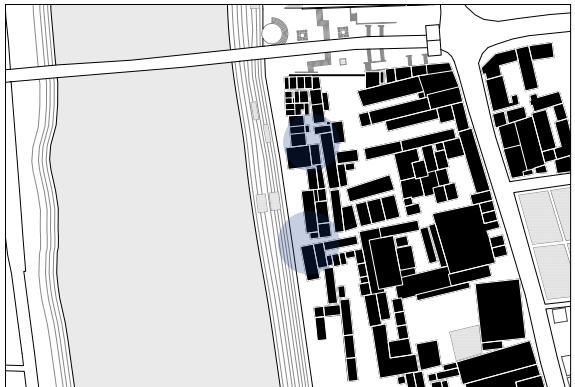


SITE I walk through

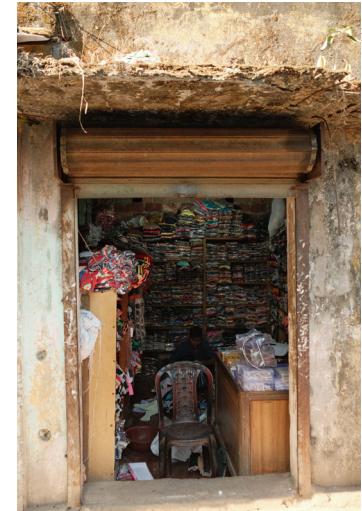
Steendam
01.07.2025



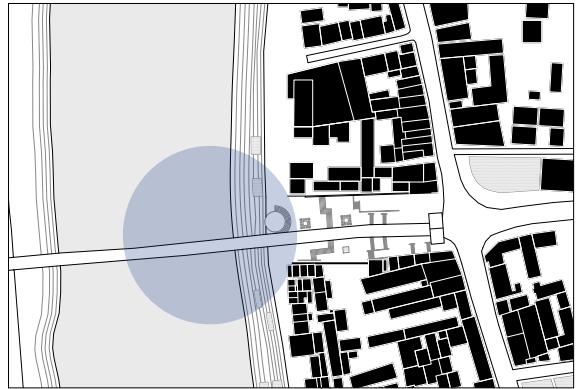
muslim
houses



*Places where people from the community work;
small-shop owner, tea-stall owner, garbage collector*



SITE I walk through



Bridge

The bridge itself is used as an informal market, where people sit without having to pay for their spot



- 1 RESEARCH
- 2 Site
- 3 Material**
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 - Cluster*
 - Masterplan*

MATERIAL | strategy

inspired by
Anna Heringer

“money should go to the people, not to cement.”

Sustainable design is not only about technology, but also social impact

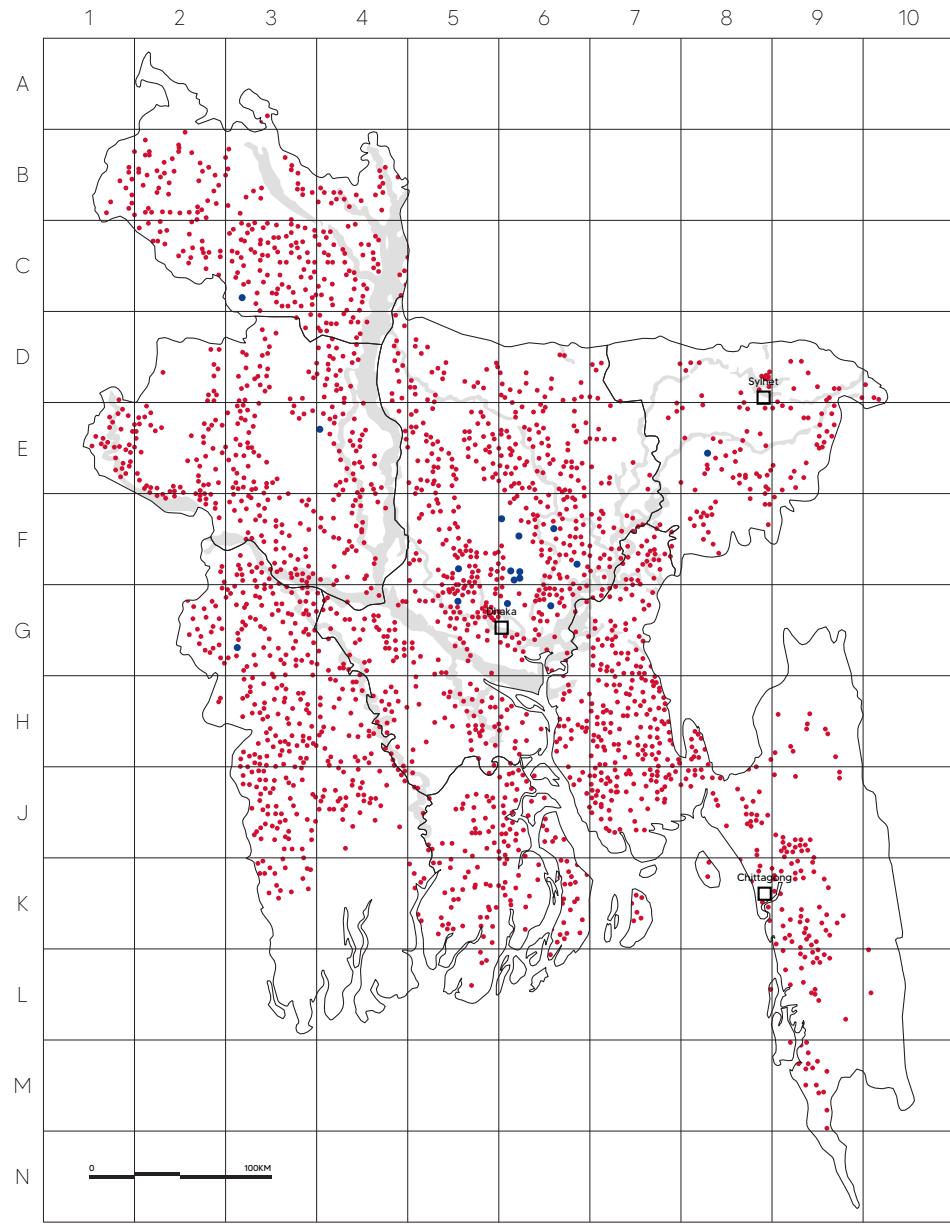


As much local material as possible, so resources go to the people rather than imported material



MATERIAL I brick industry

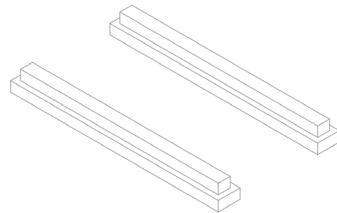
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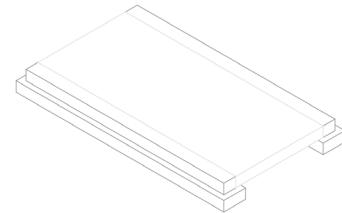
● Fixed chimney / zig-zag kilns
(3rd grade bricks)

● Tunnel kiln
(ceramic bricks)

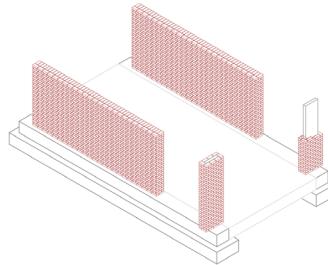
	FIXED CHIMNEY KILN	ZIG ZAG KILN	TUNNEL KILN
OVERVIEW KILN			
PLAN			
AIRFLOW			
NUMBER OF KILNS IN BANGLADESH (2018)	2235	5524	81
BRICK TYPE	Solid	Solid	Solid & Hollow/Perforated
PARTICULATE EMISSION (MG/M3)	1000+	300-800	<50
PRODUCTION CAPACITY (BRICKS/DAY)	20.000 - 50.000	15.000-50.000	80.000-200.000
CLASSIFICATION BRICKS			
CAPITAL COST	20.000 - 50.000	15.000-50.000	80.000-200.000
COST BREAKDOWN	Construction Material 84 % Labour 15% Equipment 1%	Construction Material 75 % Labour 13% Equipment 12%	Fully mechanized
BRICK DIMENSIONS (MM)	230 x 115 x 75	230 x 115 x 75	230 x 115 x 75



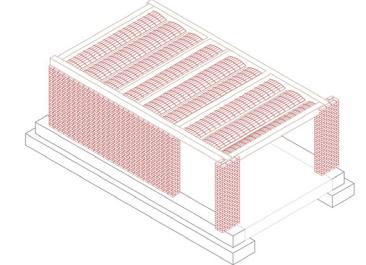
1. Strip foundation



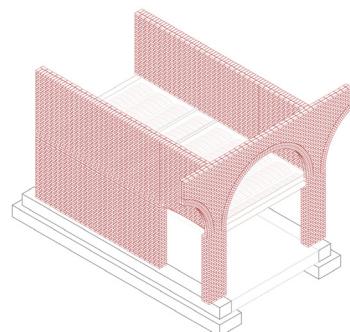
.2. Concrete ground floor



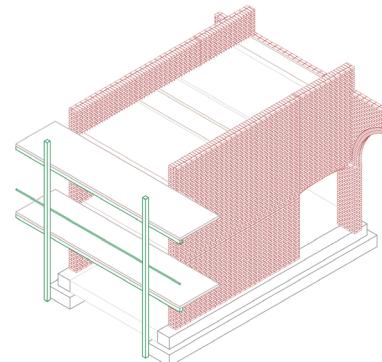
3. Load bearing brick walls



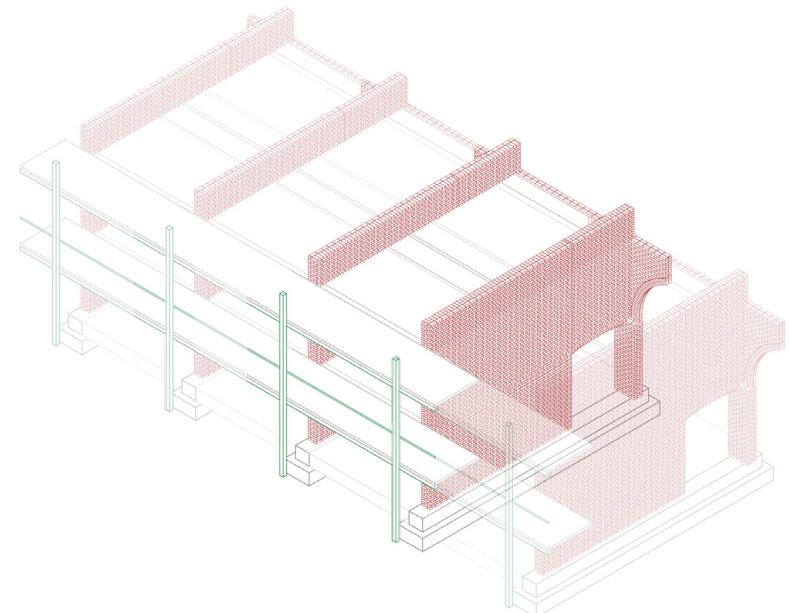
4. Catalan vault floor between concrete beams



5. Brick arches as second facade



6. Steel gallery





Recycled steel

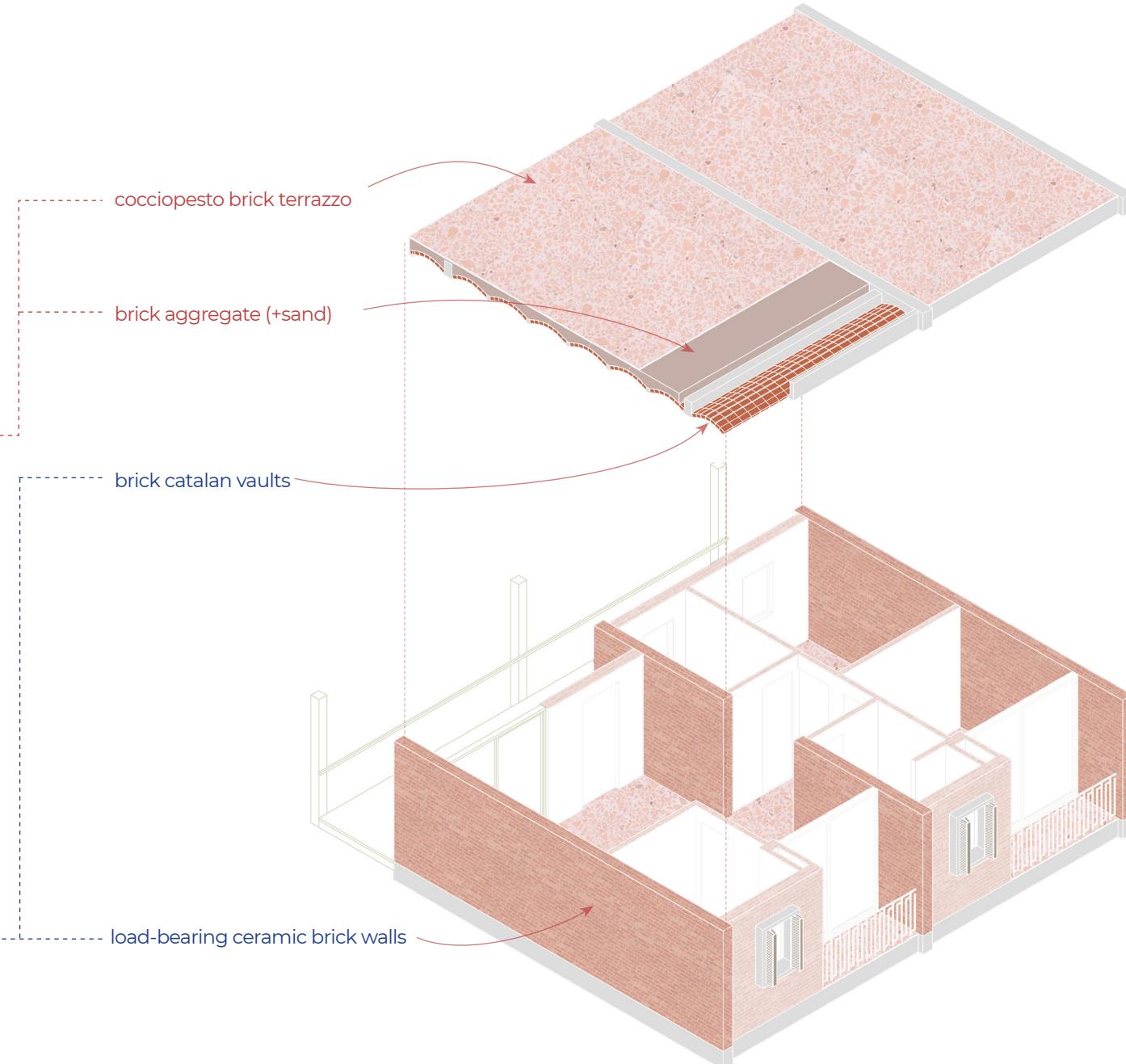
Large ship breaking industry in Chittagong (Bangladesh)



Brick waste
(/ 3rd grade bricks)



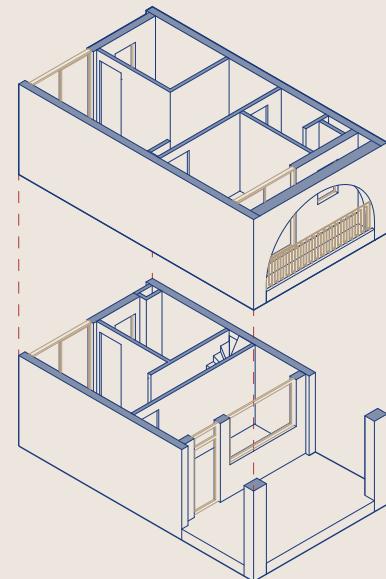
Ceramic bricks

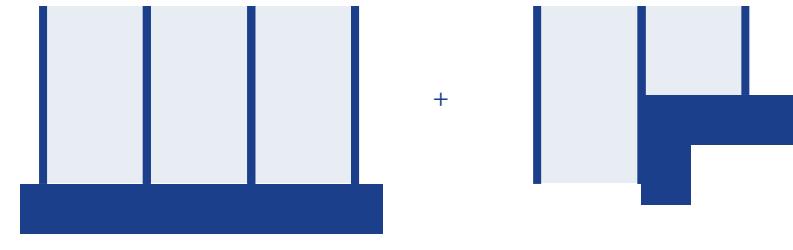
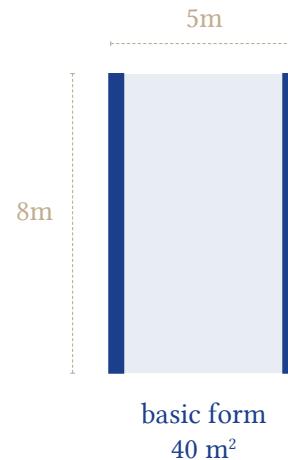


- 1 RESEARCH
- 2 Site
- 3 Material
- 4 Design**
 - Units*
 - Cluster*
 - Masterplan*

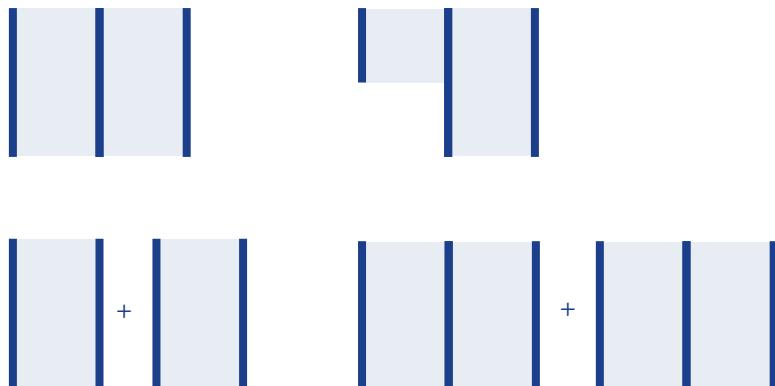
design

UNITS

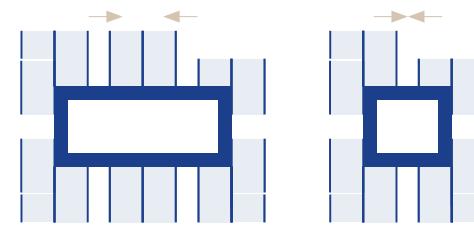
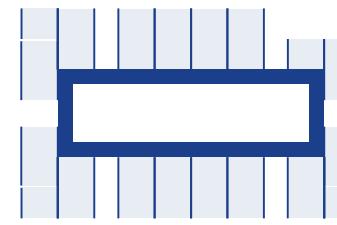




gallery units

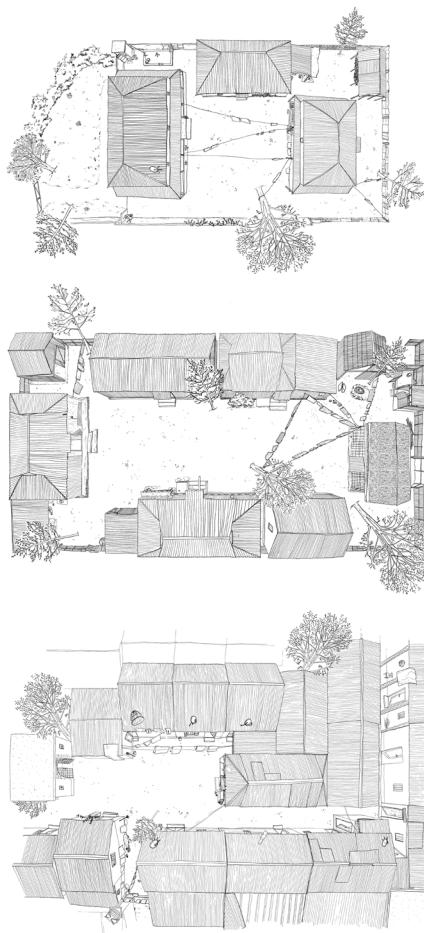


the fixed grid enables flexible variations within the housing blocks

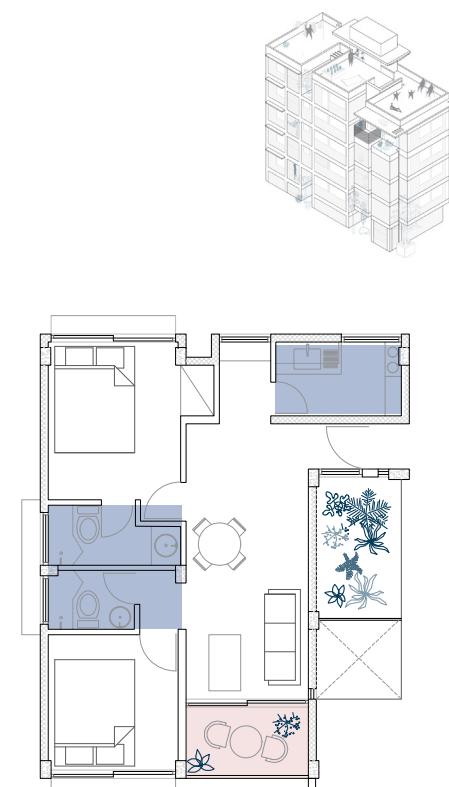


LEARNING FROM | case studies

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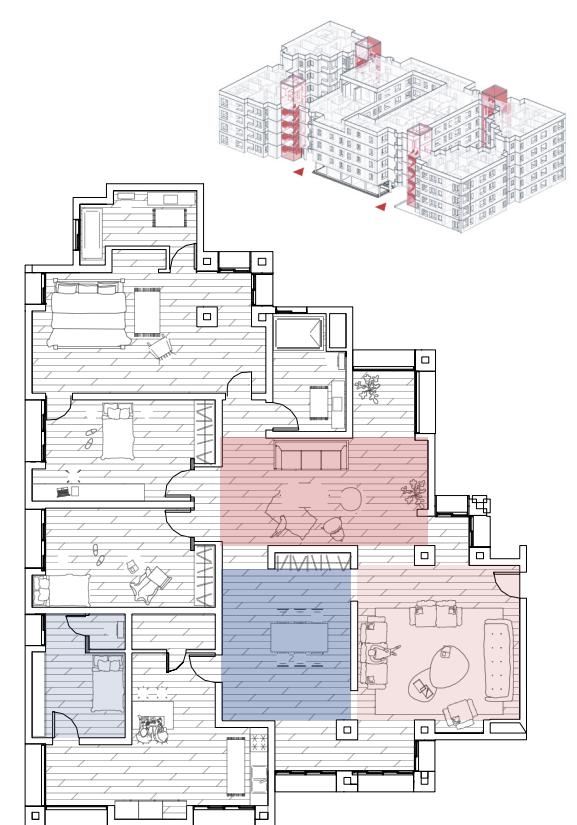


low income



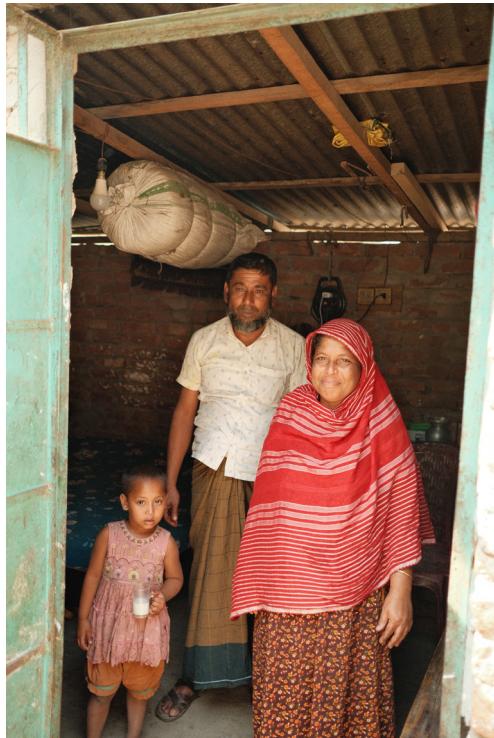
middle income

Kazedewan apartment building
Rafik Azam
Dhaka, Bangladesh



high income

Kalandi housing project
Bashirul Haq & Associates
Dhaka, Bangladesh



low income

+- 10 m² per person



middle income

+- 15 m² per person

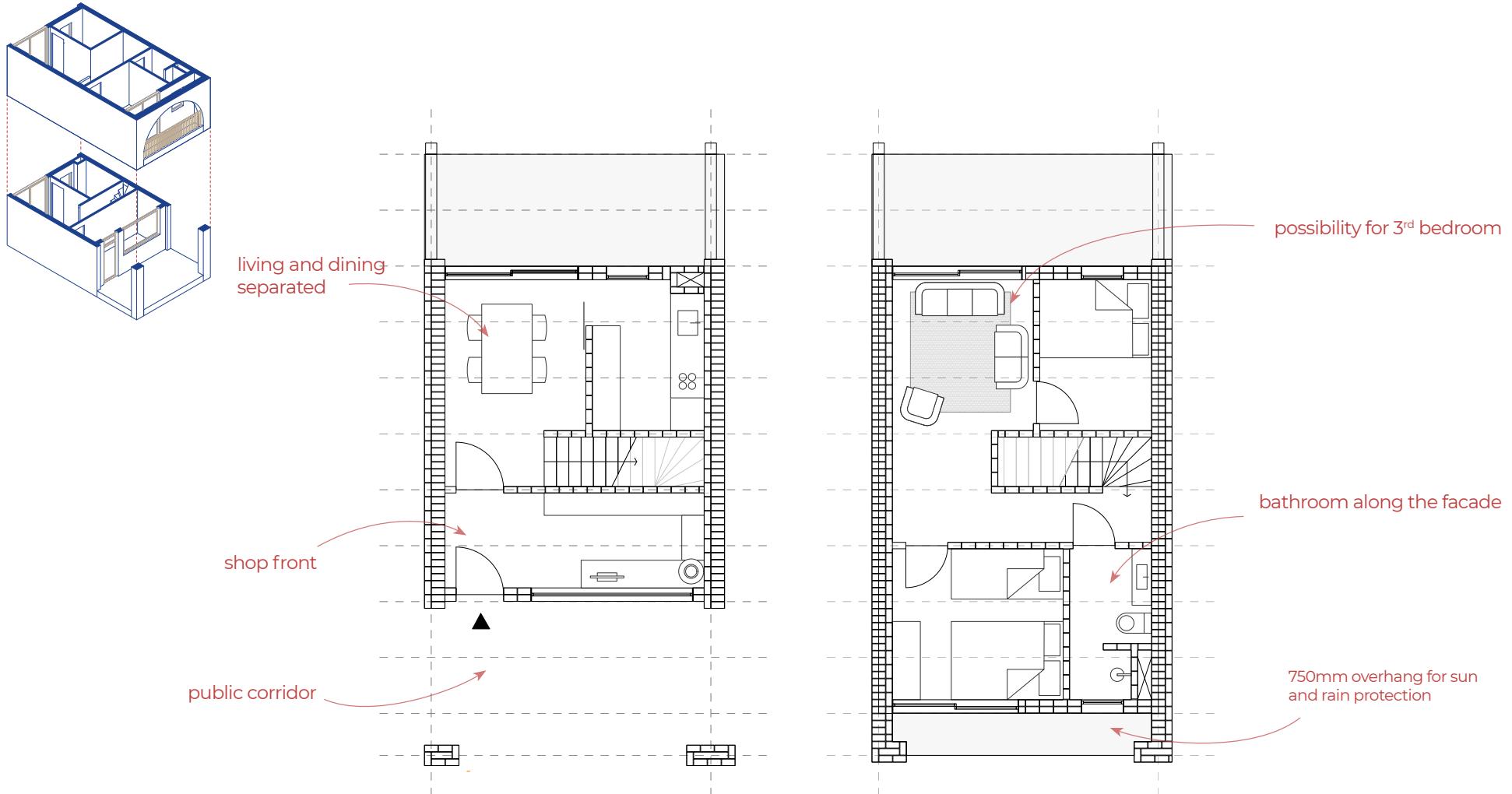


high income

+- 18-23 m² per person

DESIGN I units

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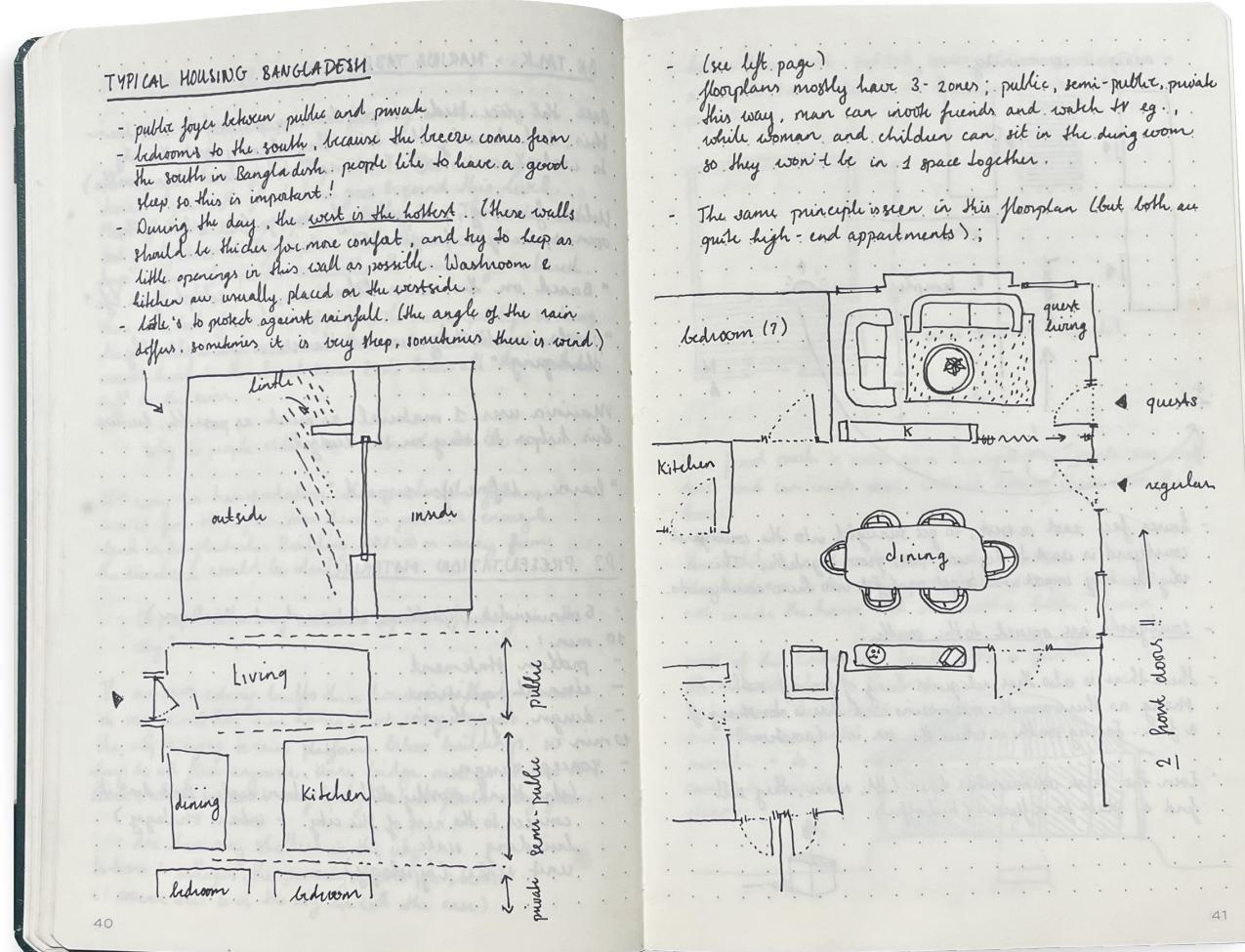


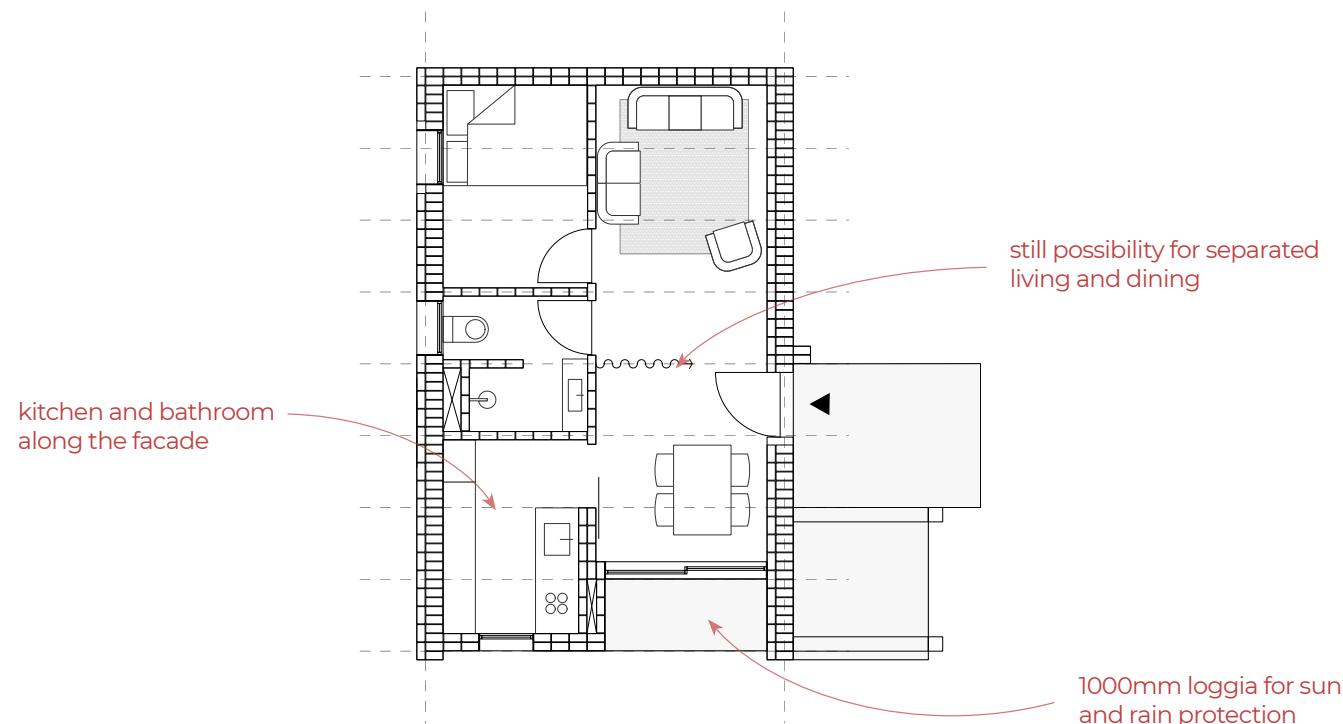
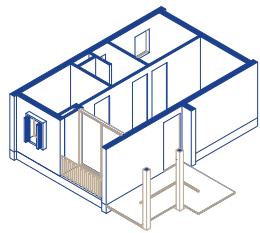
60 m²

+- 5-6 people
10-12 m² per person

shop house

low income





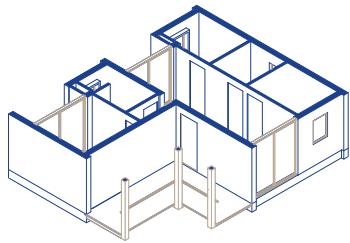
31 m²

+- 2-3 people
10-15 m² per person

1 bedroom apartment

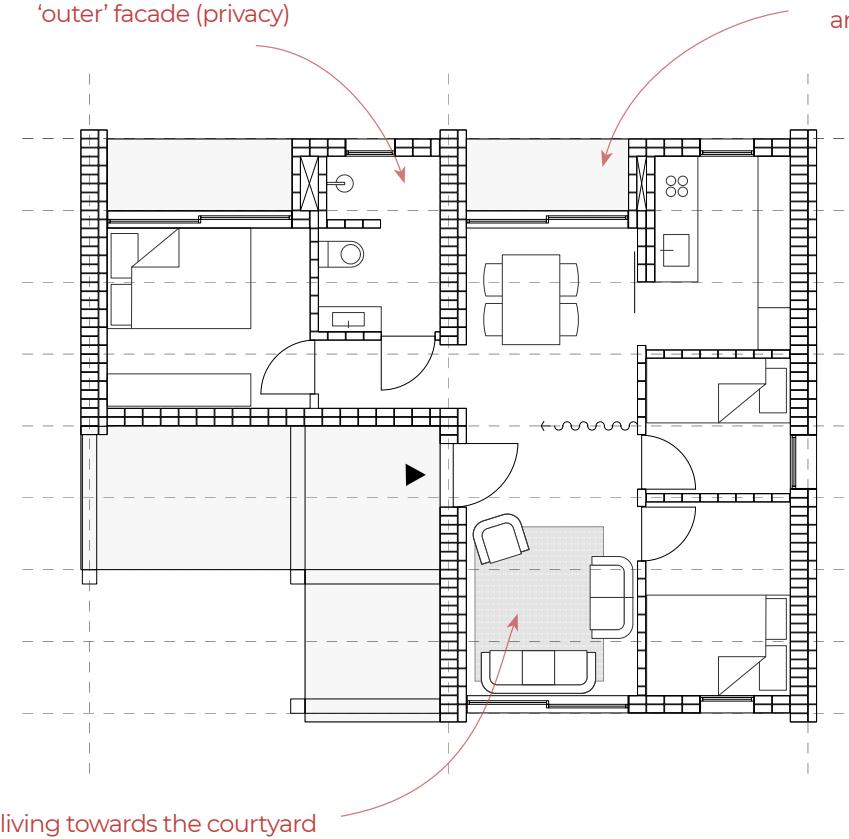
low income

scale 1:100



kitchen and bathroom
'outer' facade (privacy)

1000mm loggia for sun
and rain protection

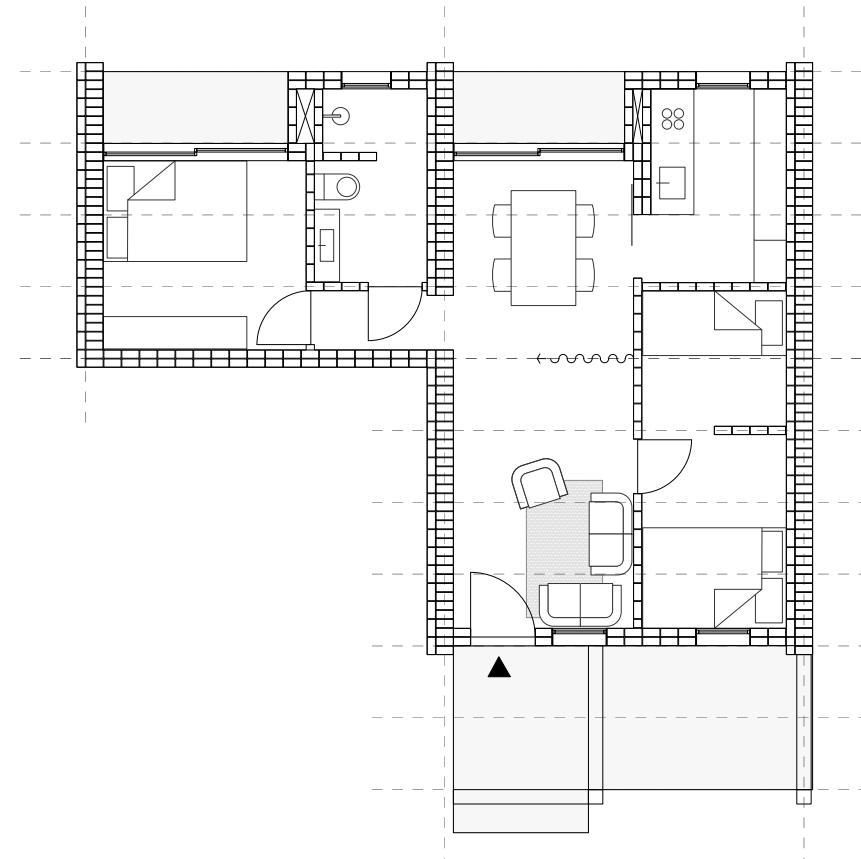
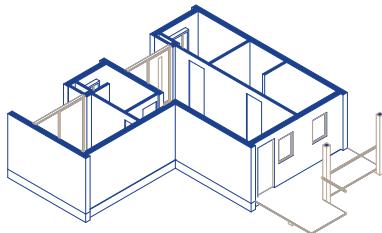


50 m²

+- 5 people
10 m² per person

3 bedroom apartment

low income

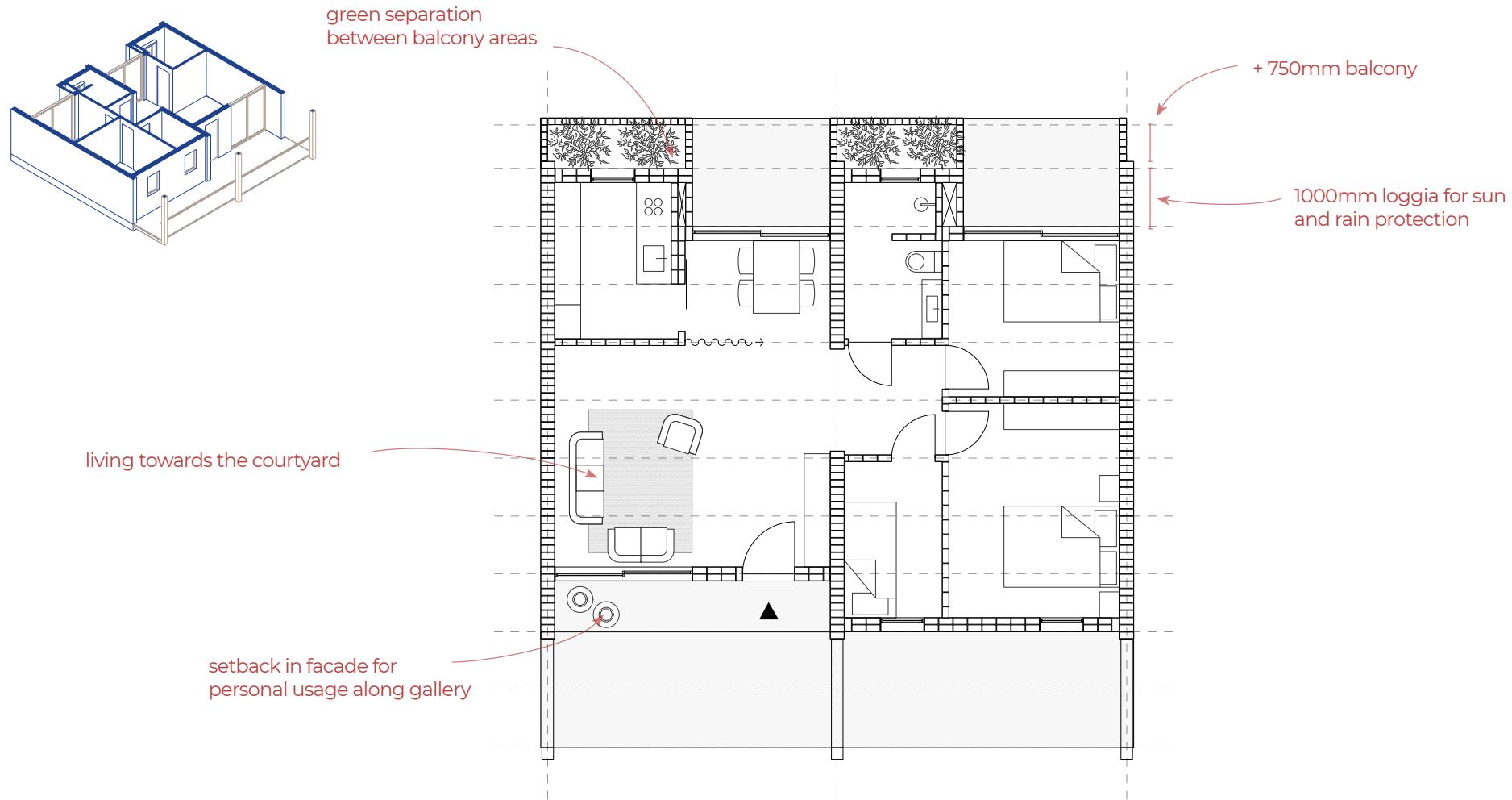


50 m²

+- 5 people
10 m² per person

2 bedroom apartment

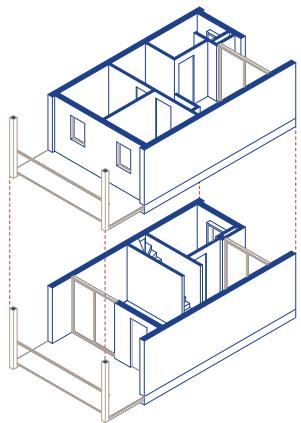
low income





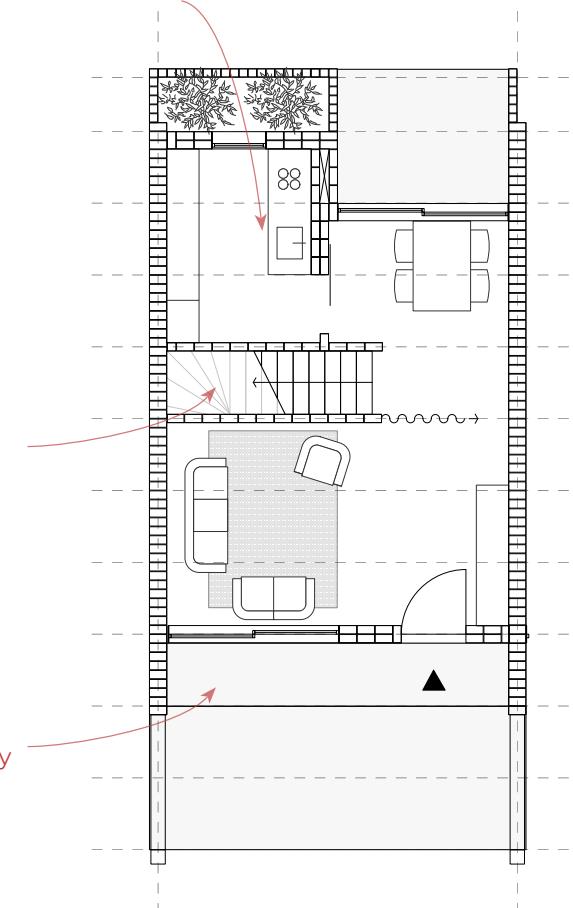
DESIGN I units

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stairs as a separator
between living and dining

kitchen and bathroom
along the 'outer' facade



setback in facade for
personal usage along gallery

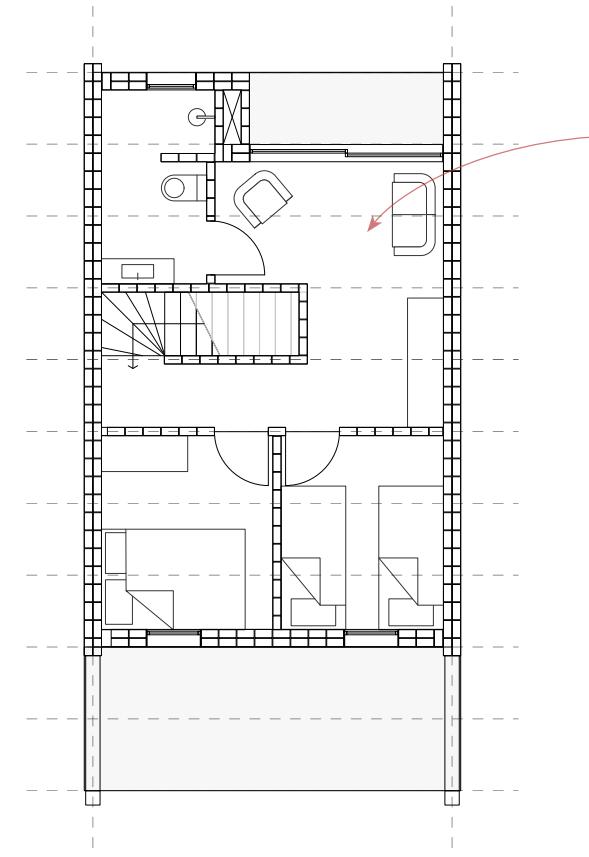
64 m²

± 4 people

16 m² per person

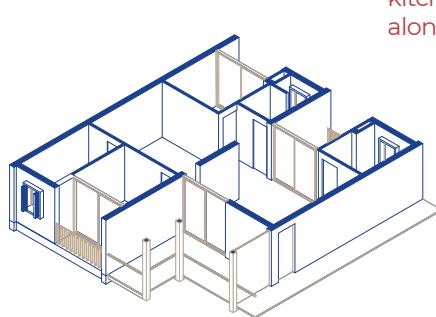
2 bedroom maisonette

middle income

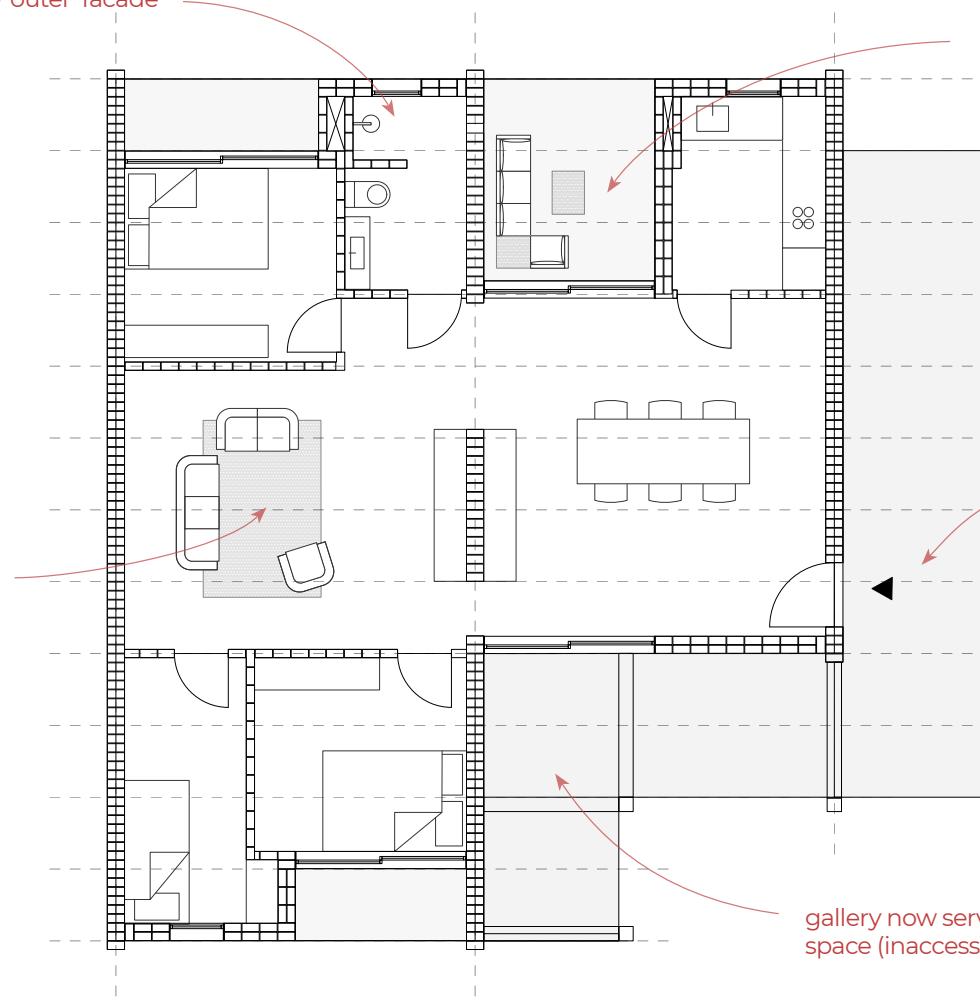


upstairs sitting area

scale 1:100



kitchen and bathroom along the 'outer' facade



living and dining separated

80 m² (+ 25 m² private outdoor space)

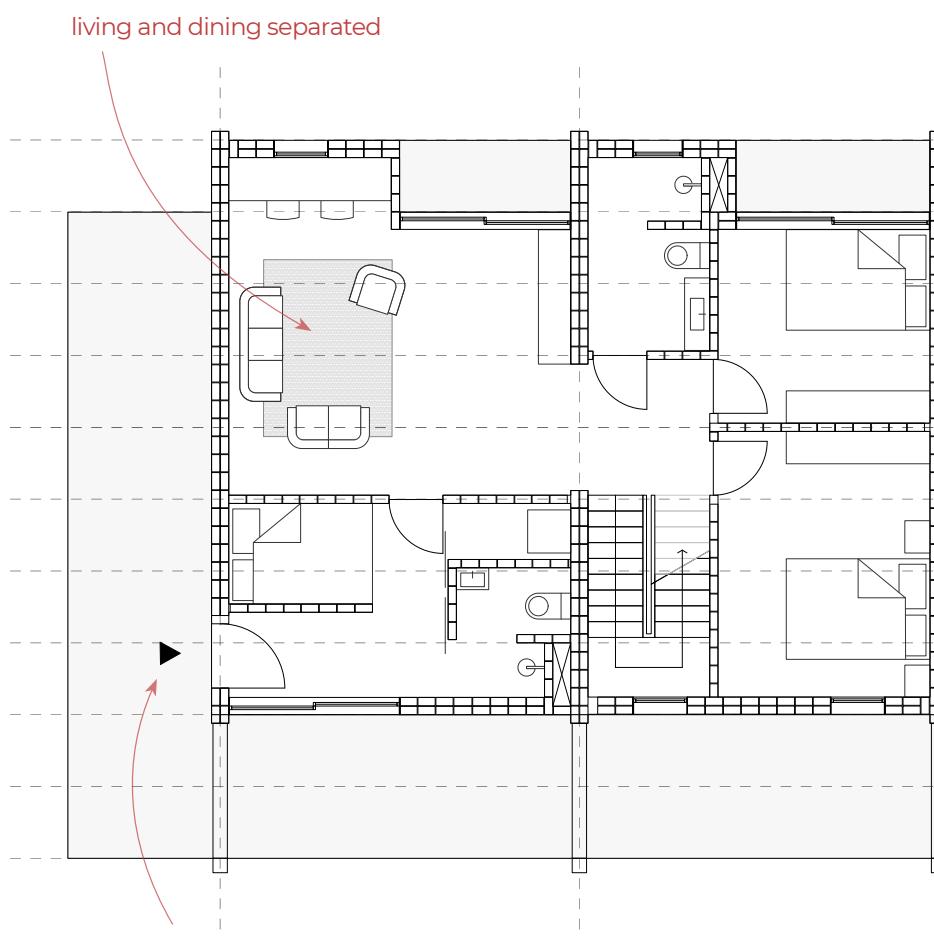
+- 4 people

20 m² per person

3 bedroom apartment

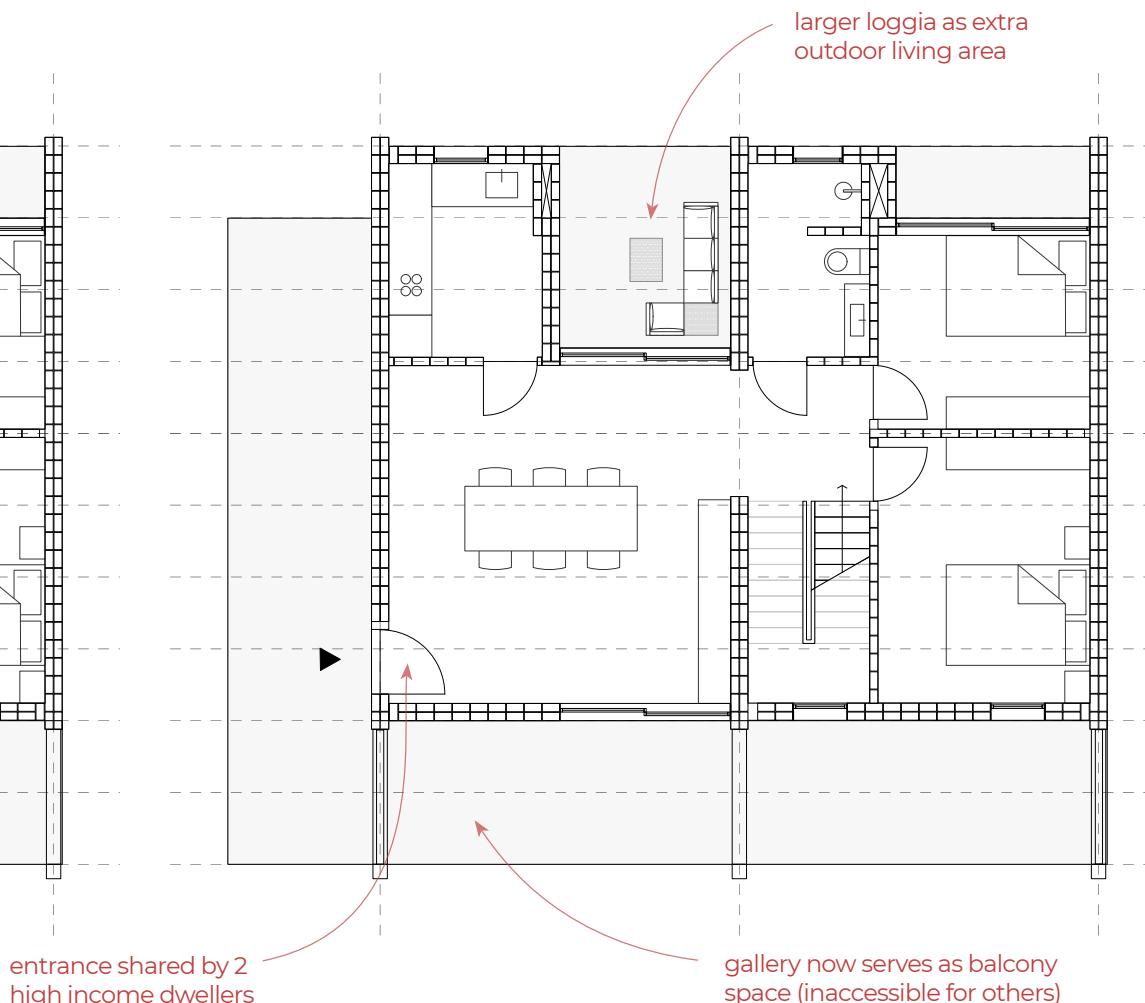
high income

scale 1:100



140 m² (+ 34 m² private outdoor space)

± 6 people
23 m² per person



4 bedroom maisonette

high income



Apartment interior

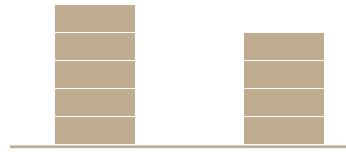
design

CLUSTER





Basic block



Max. 4 / 5 floors,
live on groundfloor



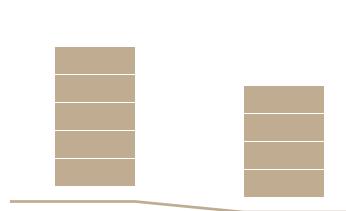
Live around courtyard



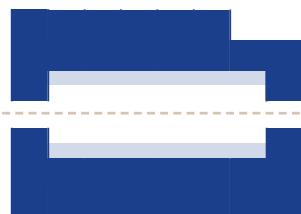
Adjust to existing landscape



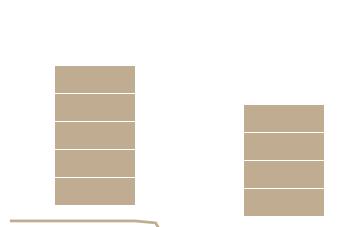
Create public space



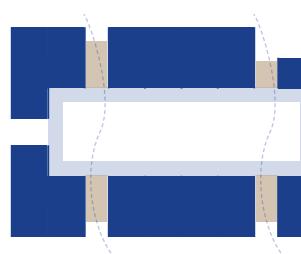
Raise 1,5 meter for parking
and flooding



Connect courtyards



Create room for water



Vertical and horizontal circulation
/ ventilation courtyard

provide living as people live right now

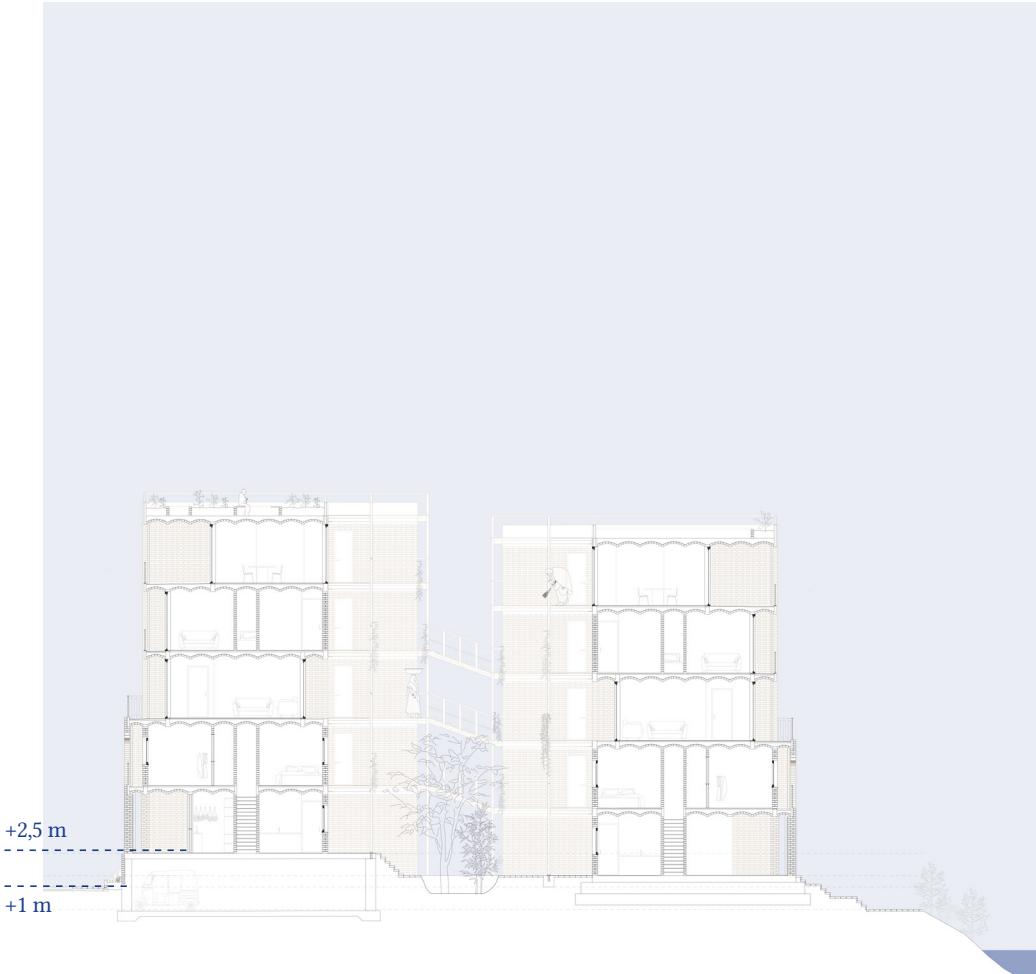
flood proof



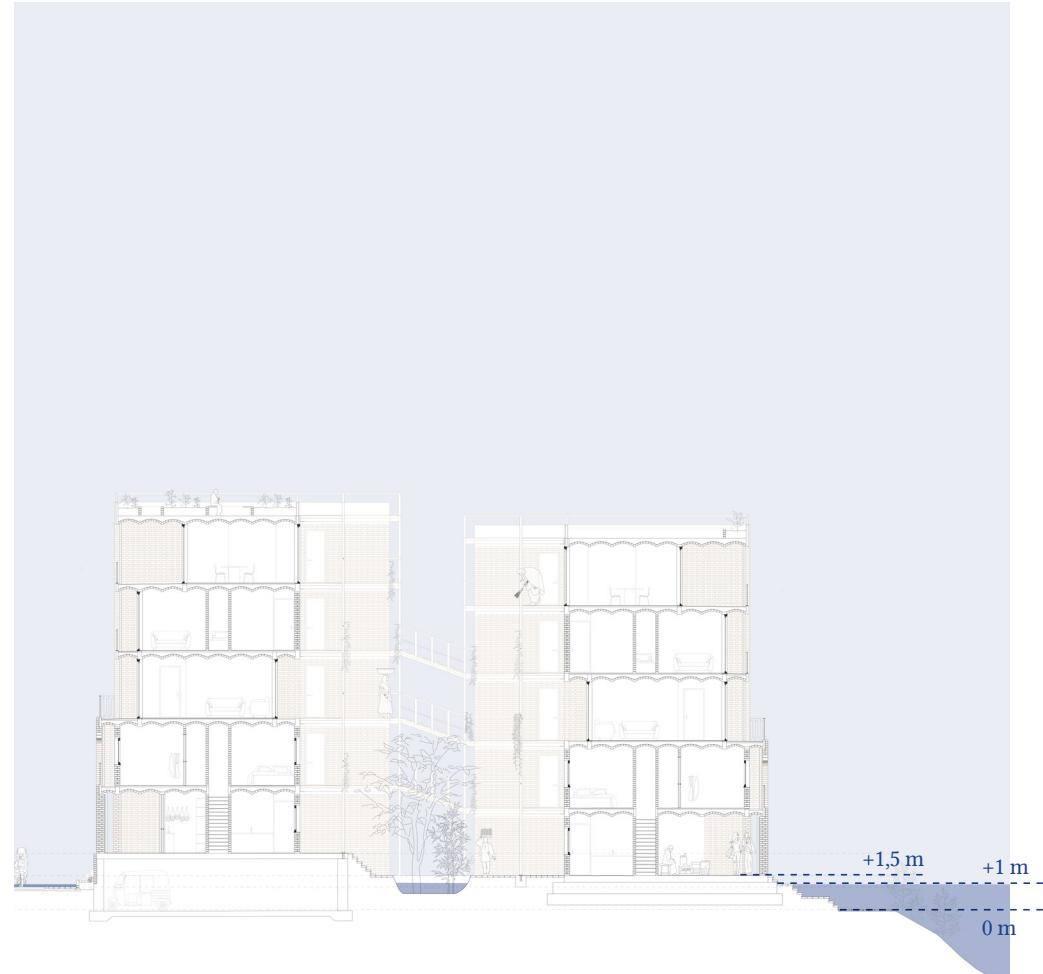
north
river side



east
alley



dry season

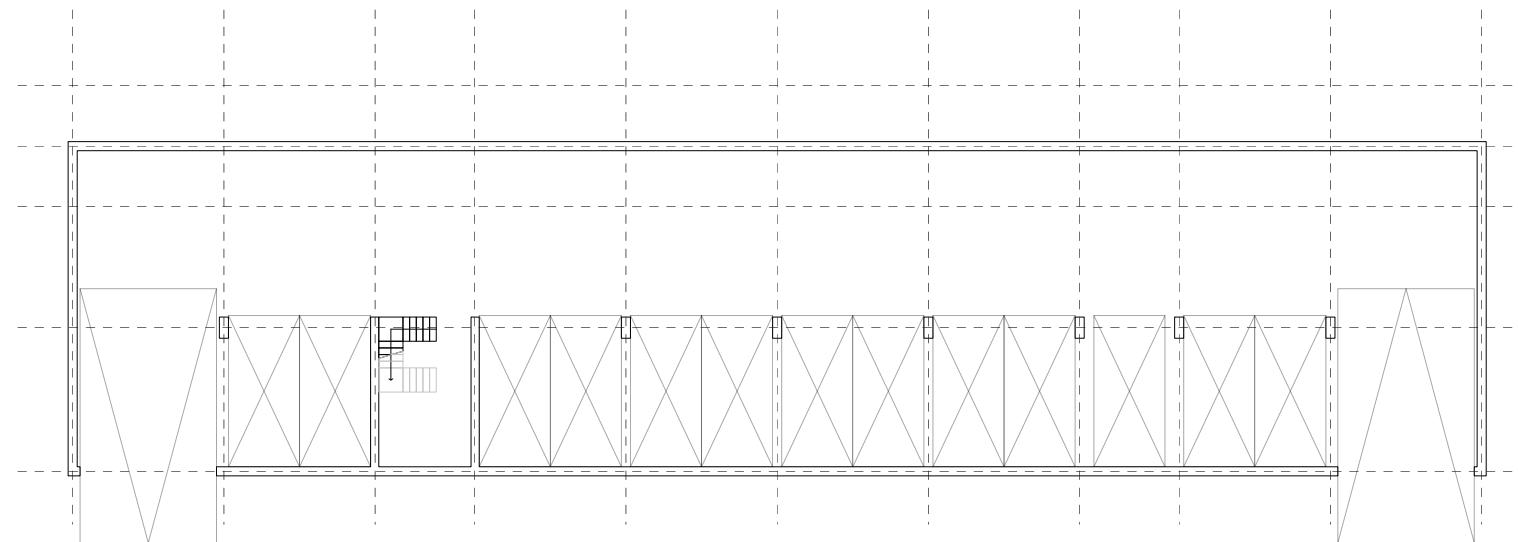


monsoon



south
street side





parking

-1

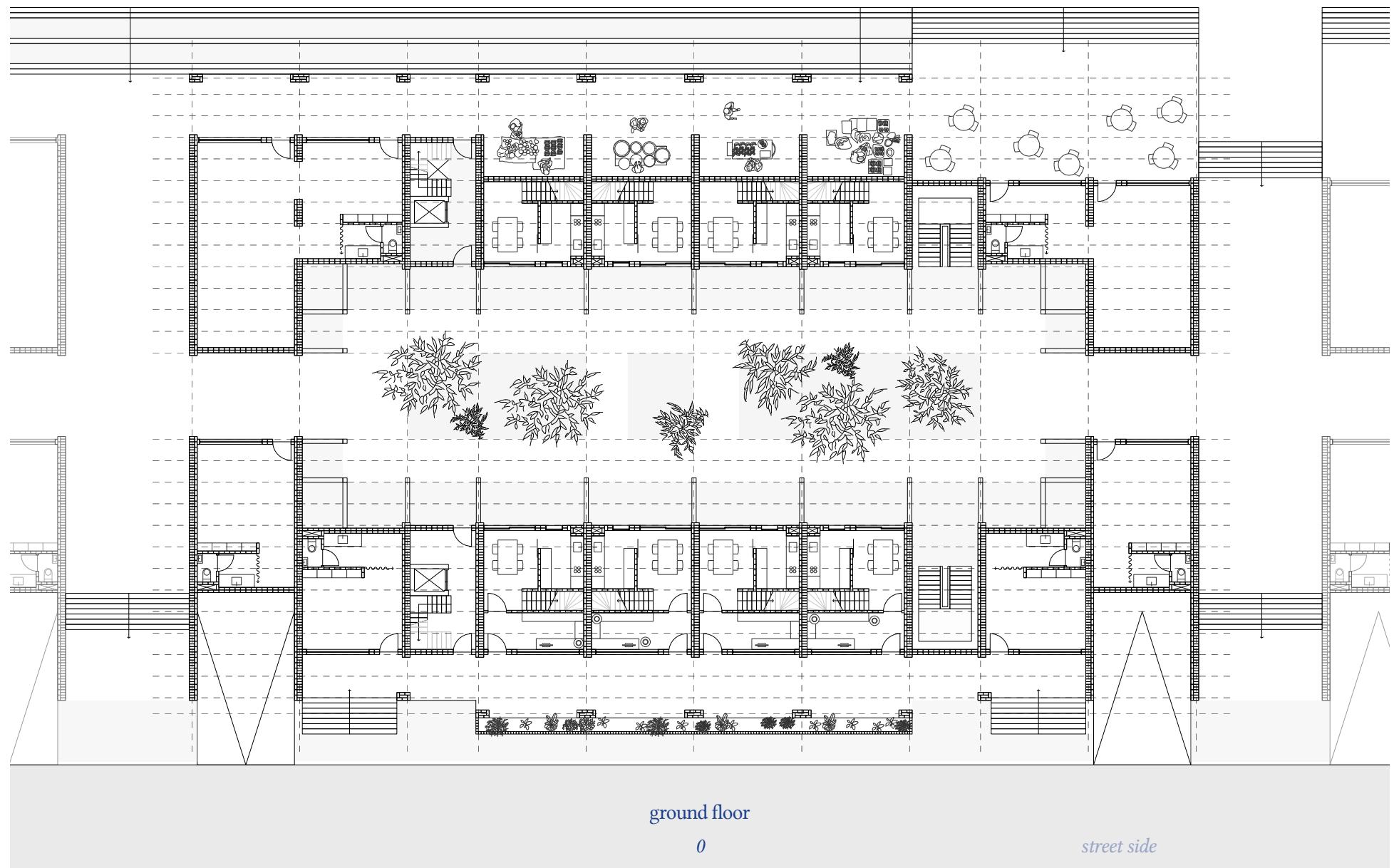
▲

N

DESIGN I floorplans

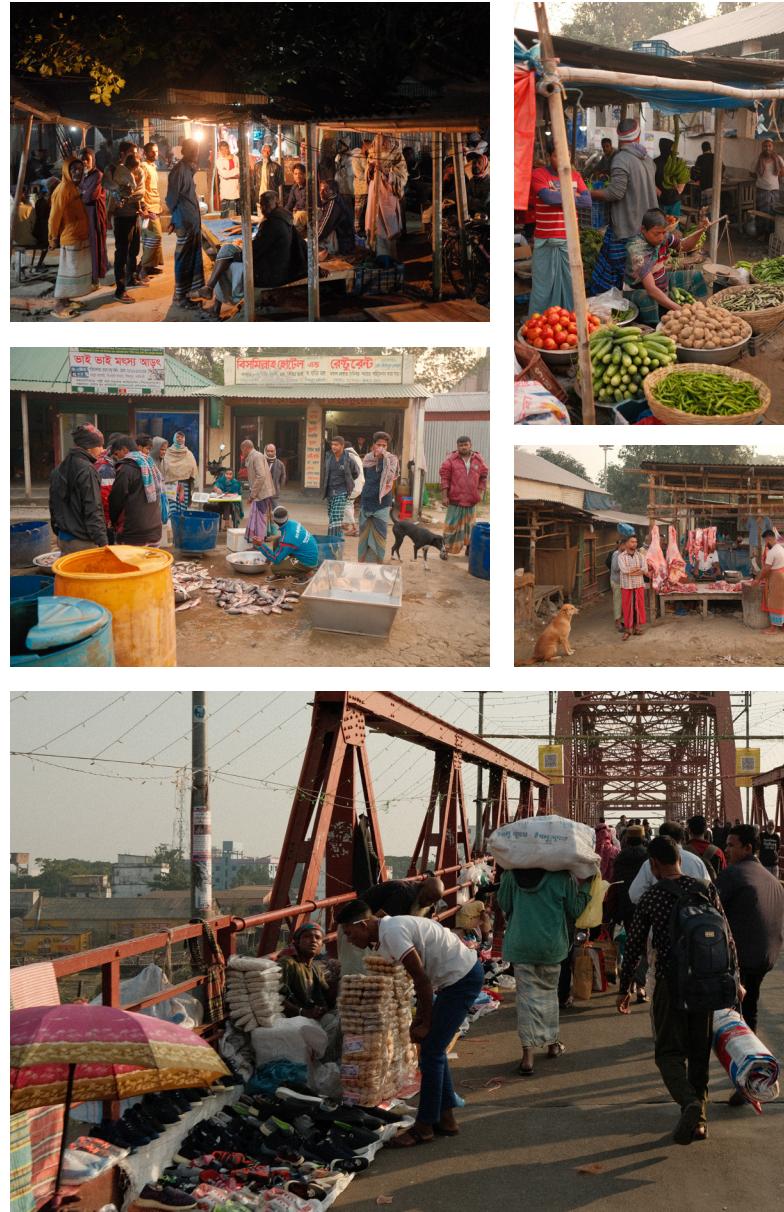
Joëlle Steendam
P5 - 01.07.2025

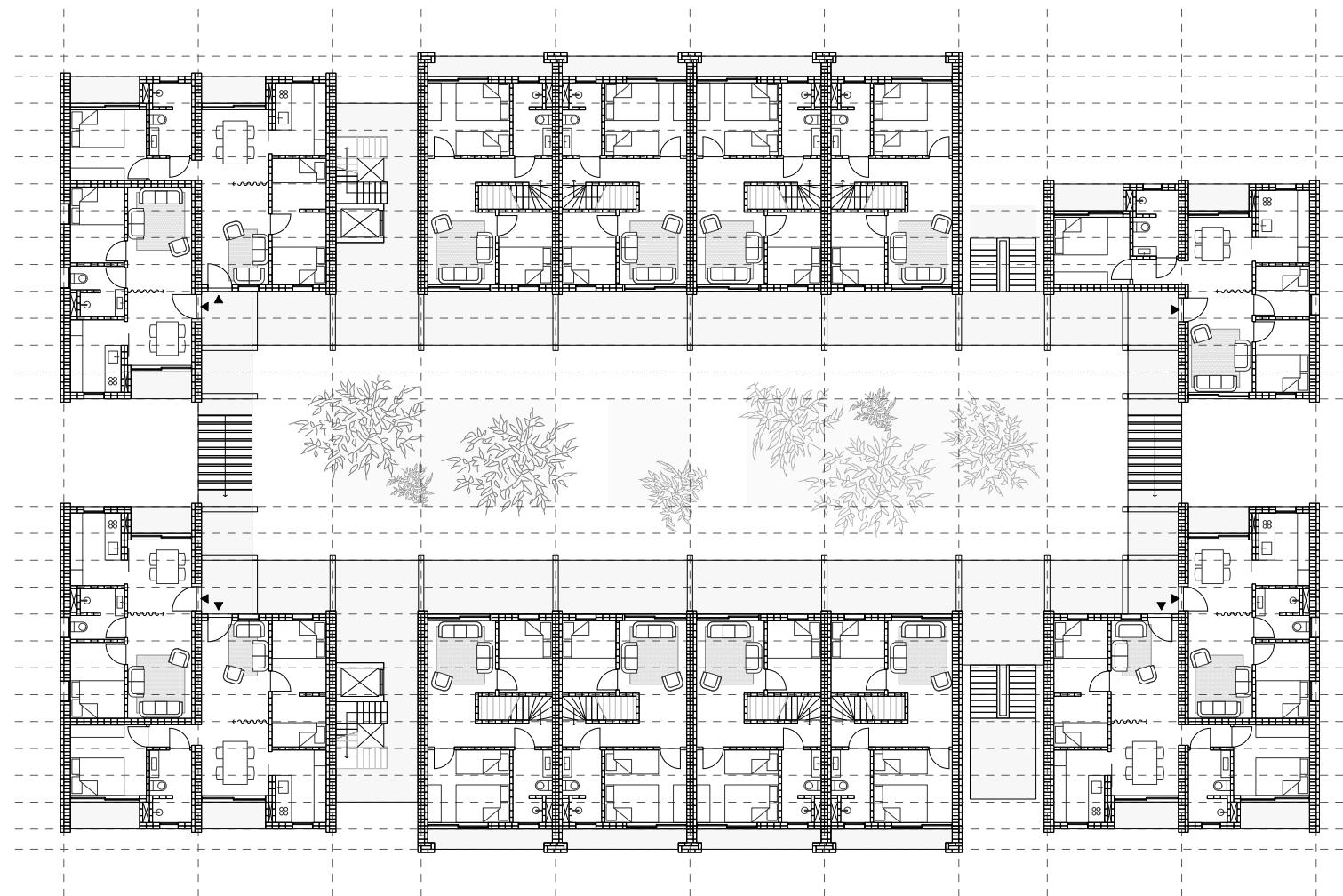
riverside promenade



N
▲





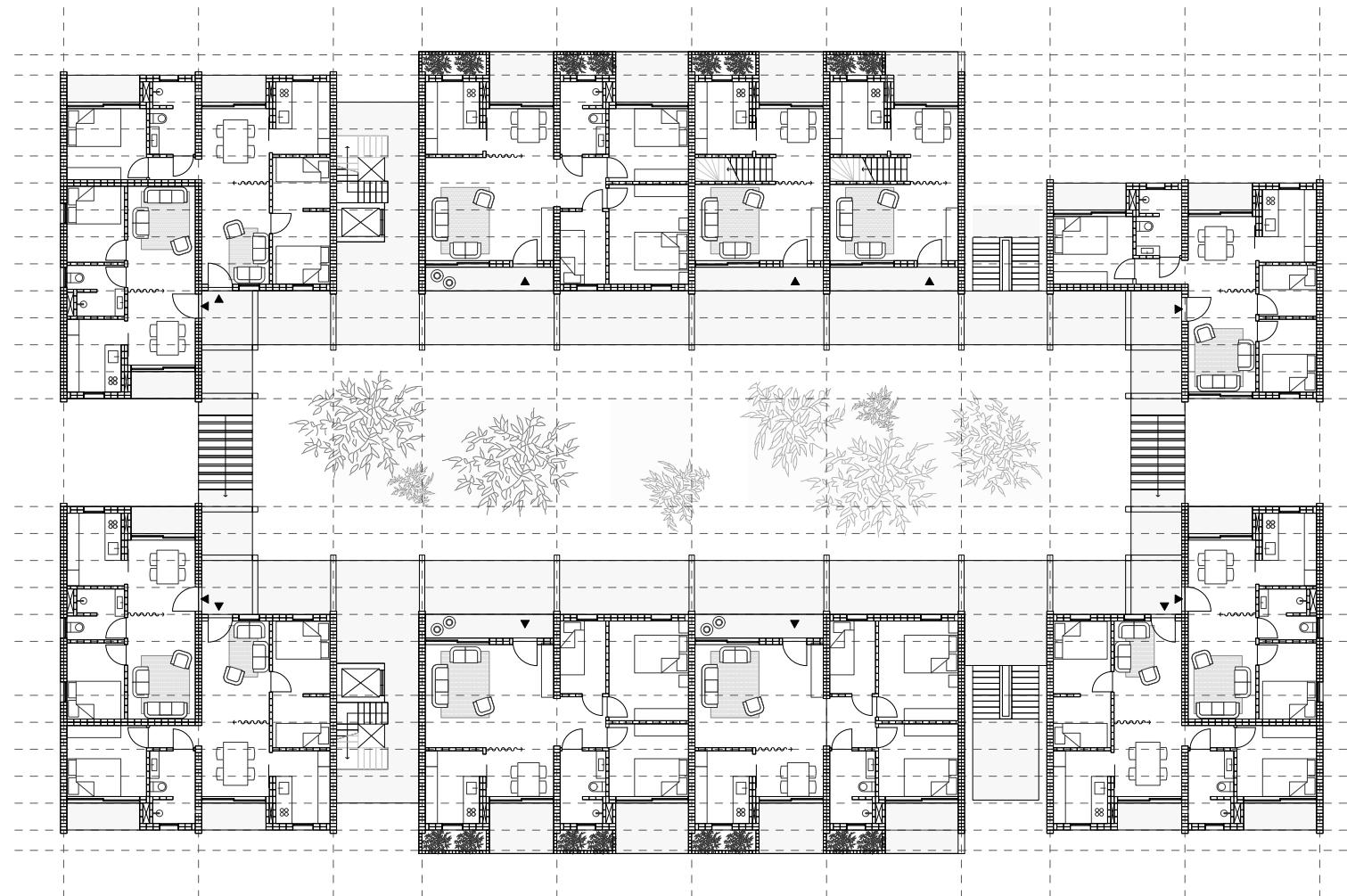


first floor

low income / shop houses

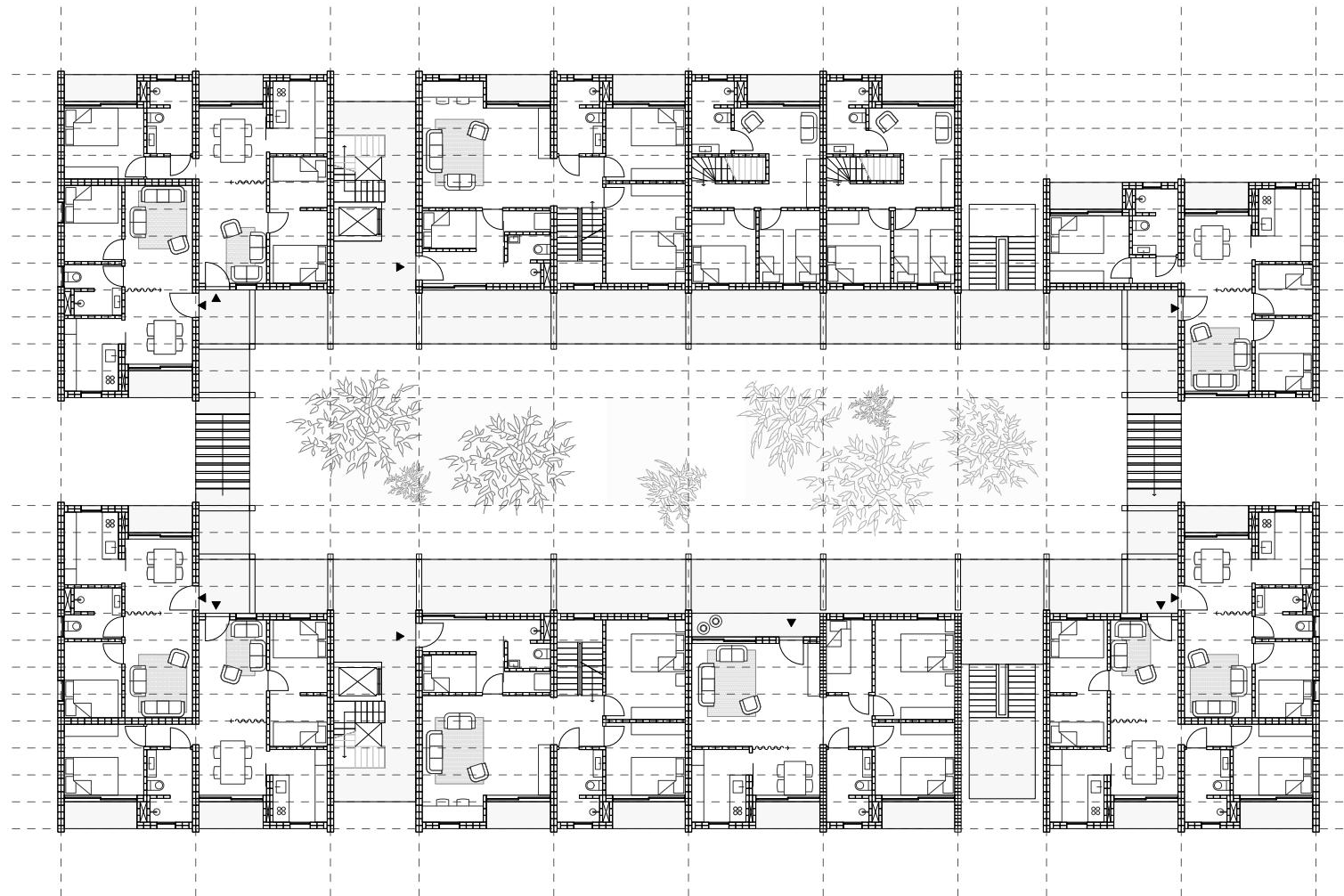
scale 1:200 (scaled 80%)





second floor
middle income

N
▲

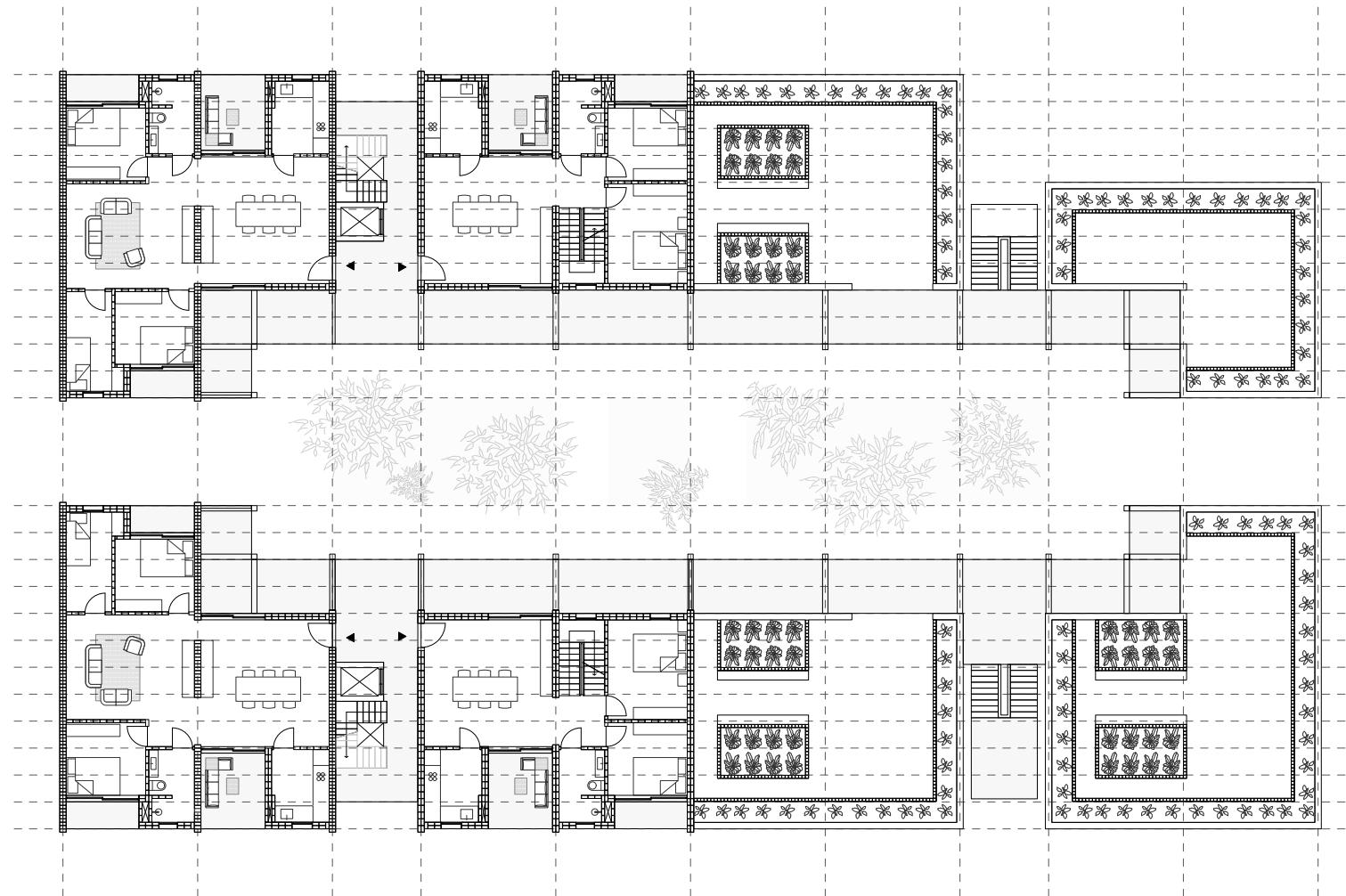


third floor
middle income

▲
N

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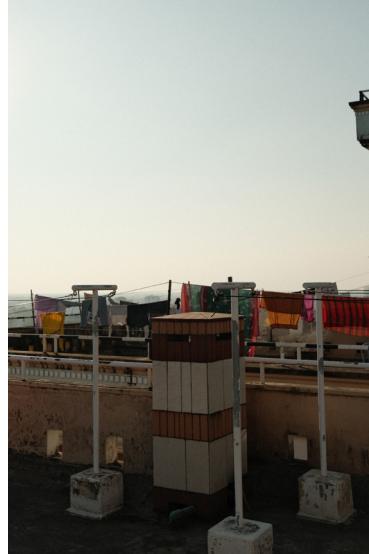
scale 1:200 (scaled 80%)
74



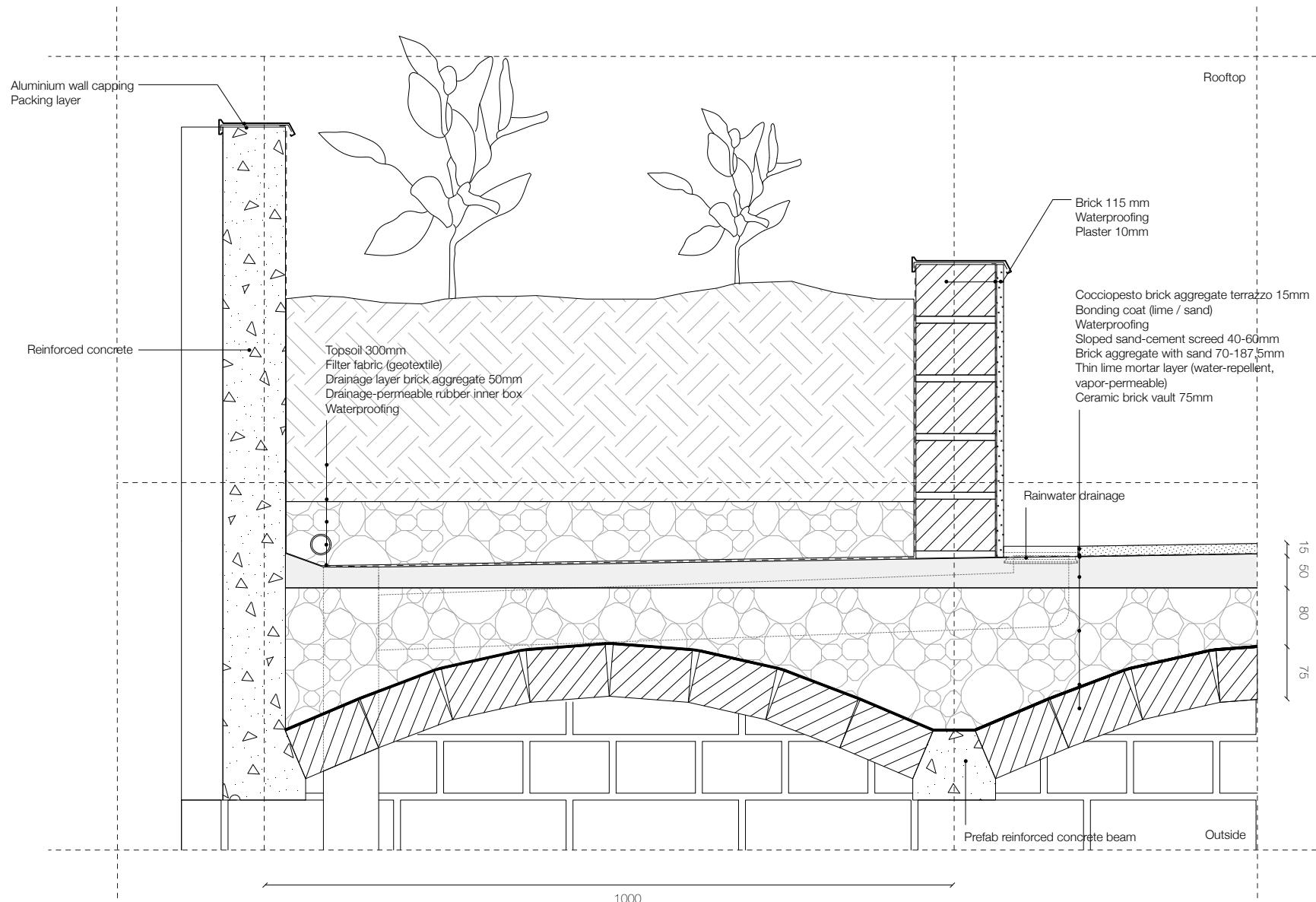
fourth floor

high income / rooftop

▲
N





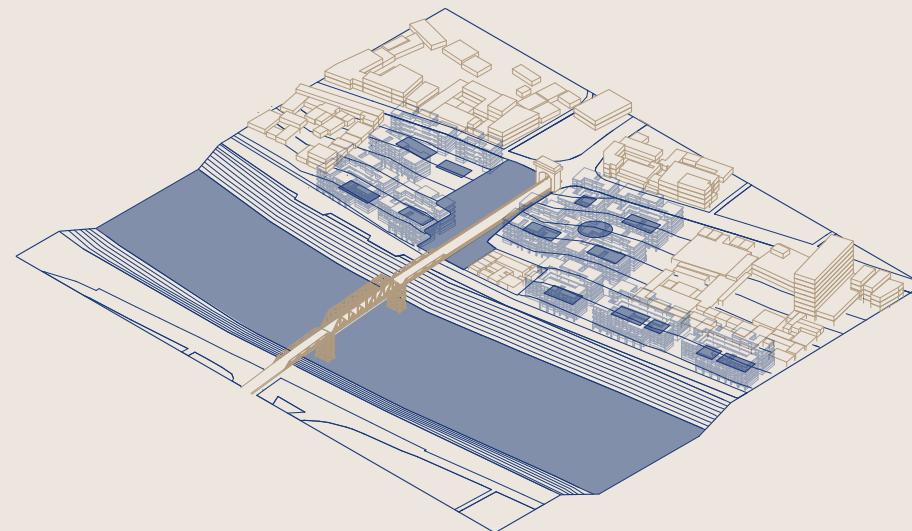


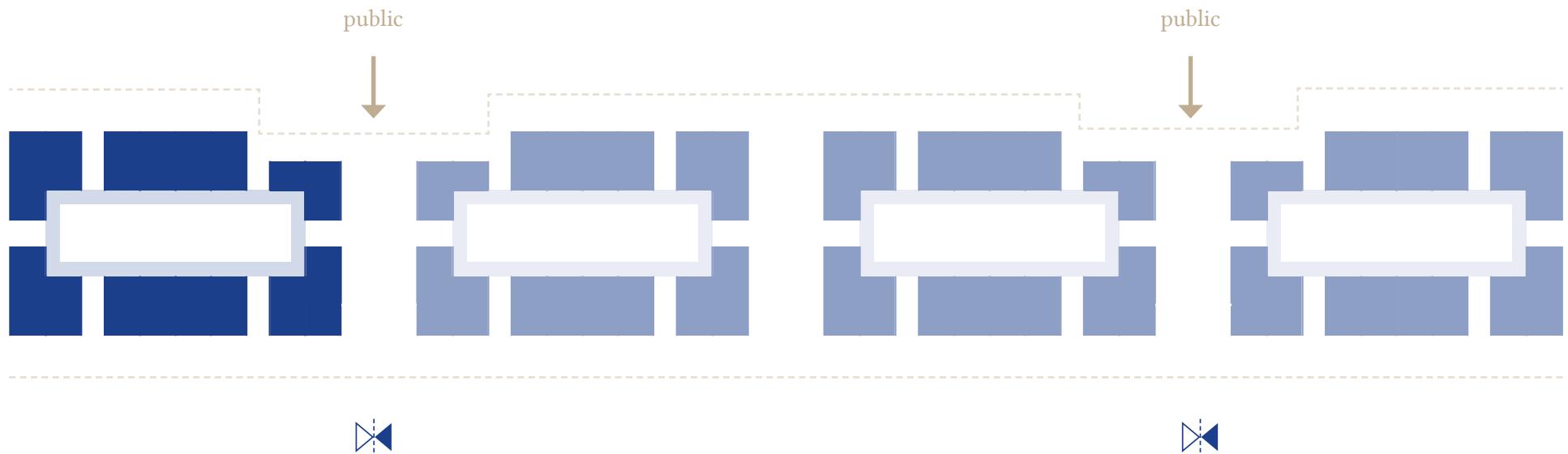
scale 1:5 (scaled 60%)

78

design

MASTERPLAN







N



ground floor plan

▲
N

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scale 1:2000
82



▲
N

Global Housing Graduation Studio
Architecture of Transition in the Bangladesh Delta

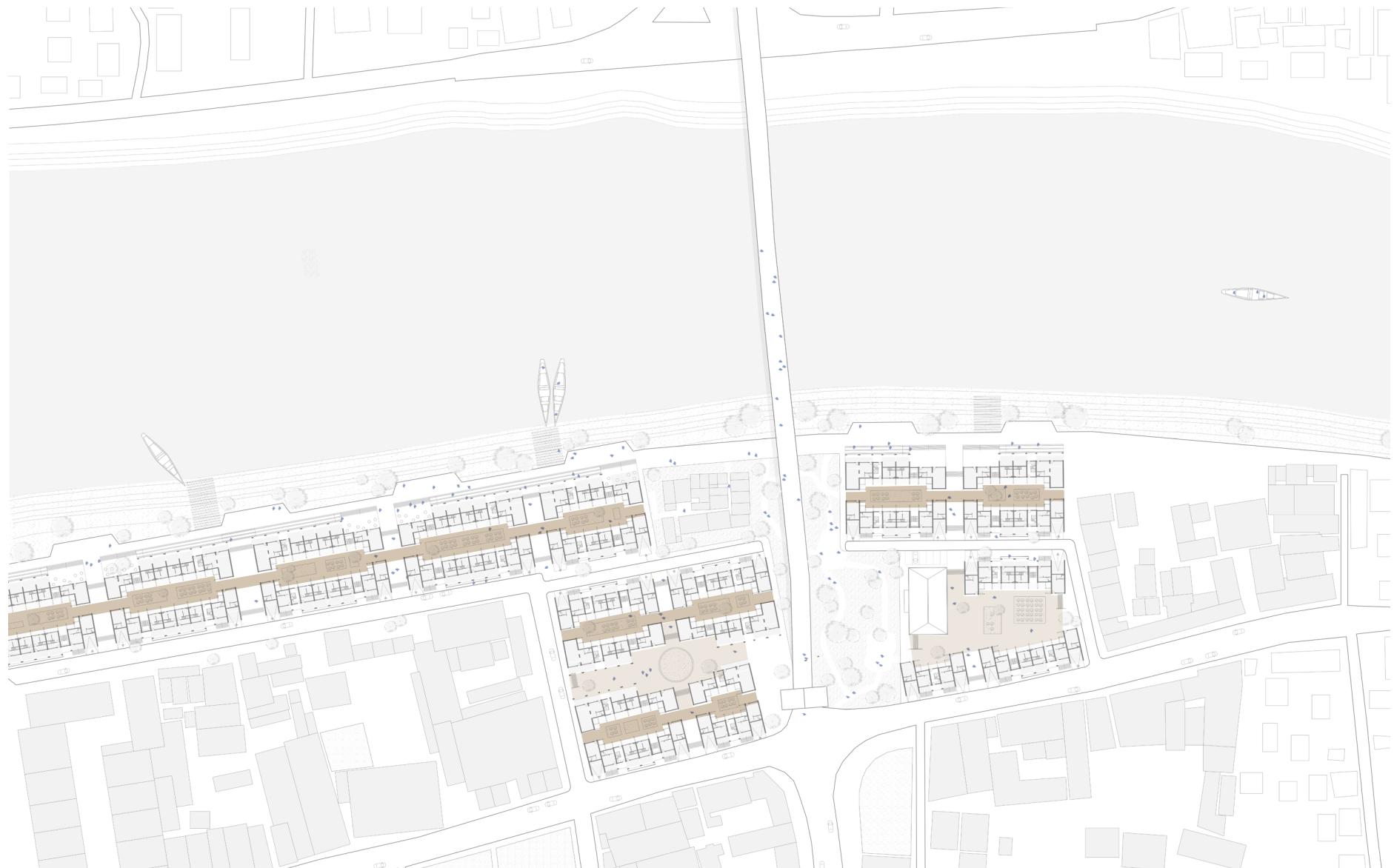
riverside promenade

public

scale 1:2000

83





inner courtyard spine

semi-public

▲
N



inner courtyard spine

semi-public



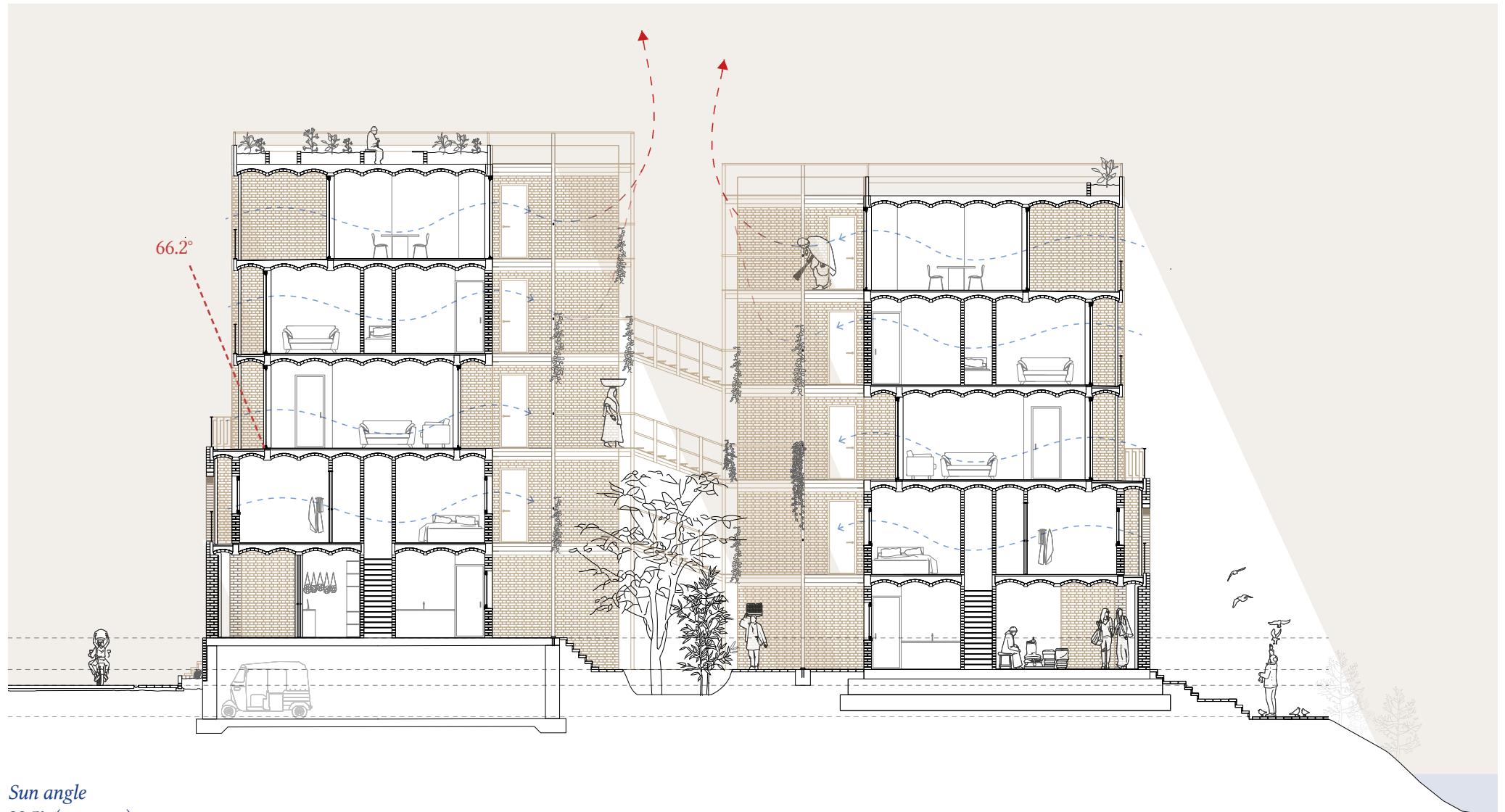
new roads

public

scale 1:2000

87





Sun angle

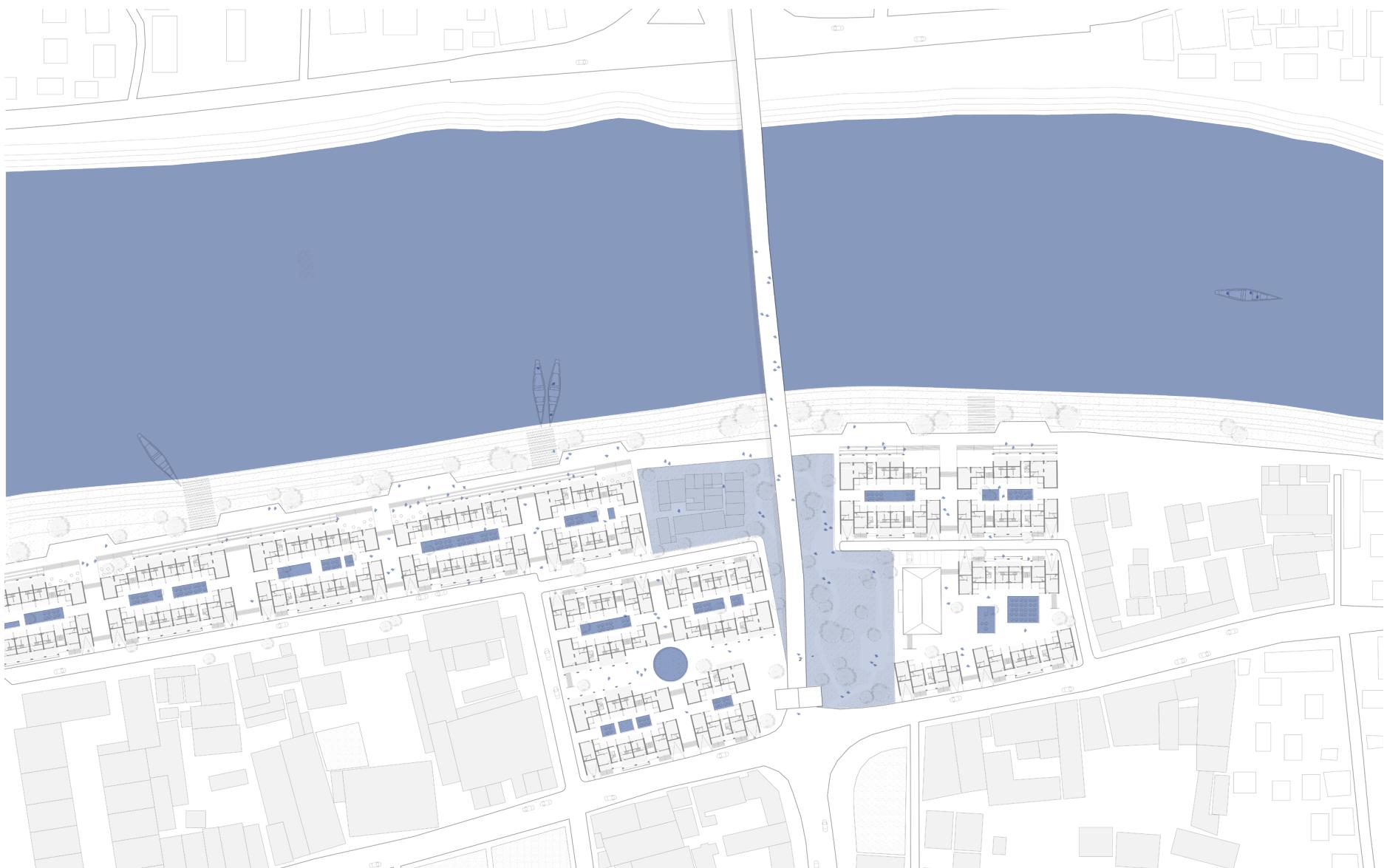
89.5° (summer)

75°-85° (monsoon)

41.2° (winter)

66.2° (spring)

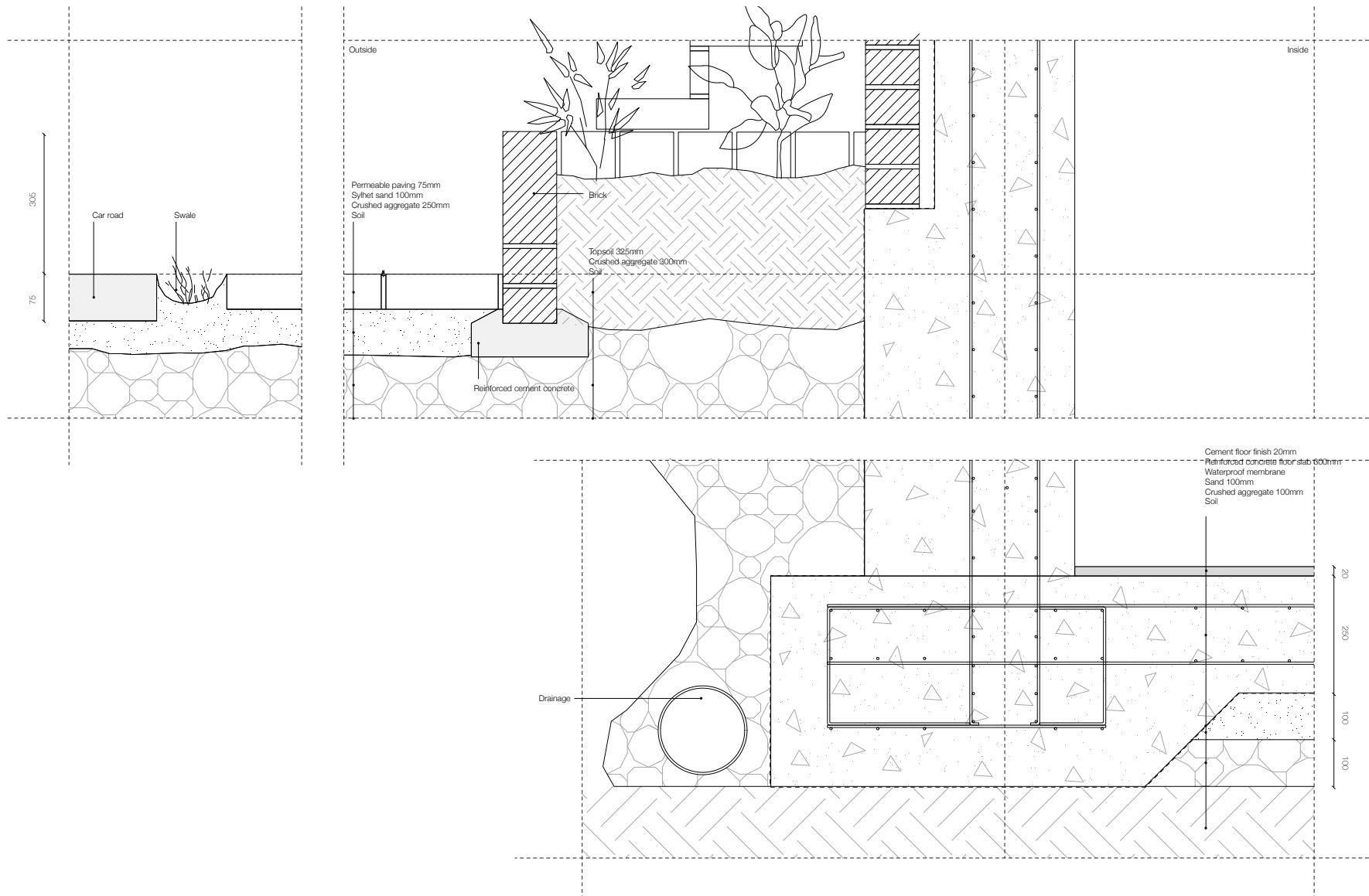
sun / ventilation



water management

lowered green areas as water buffers and infiltration zones

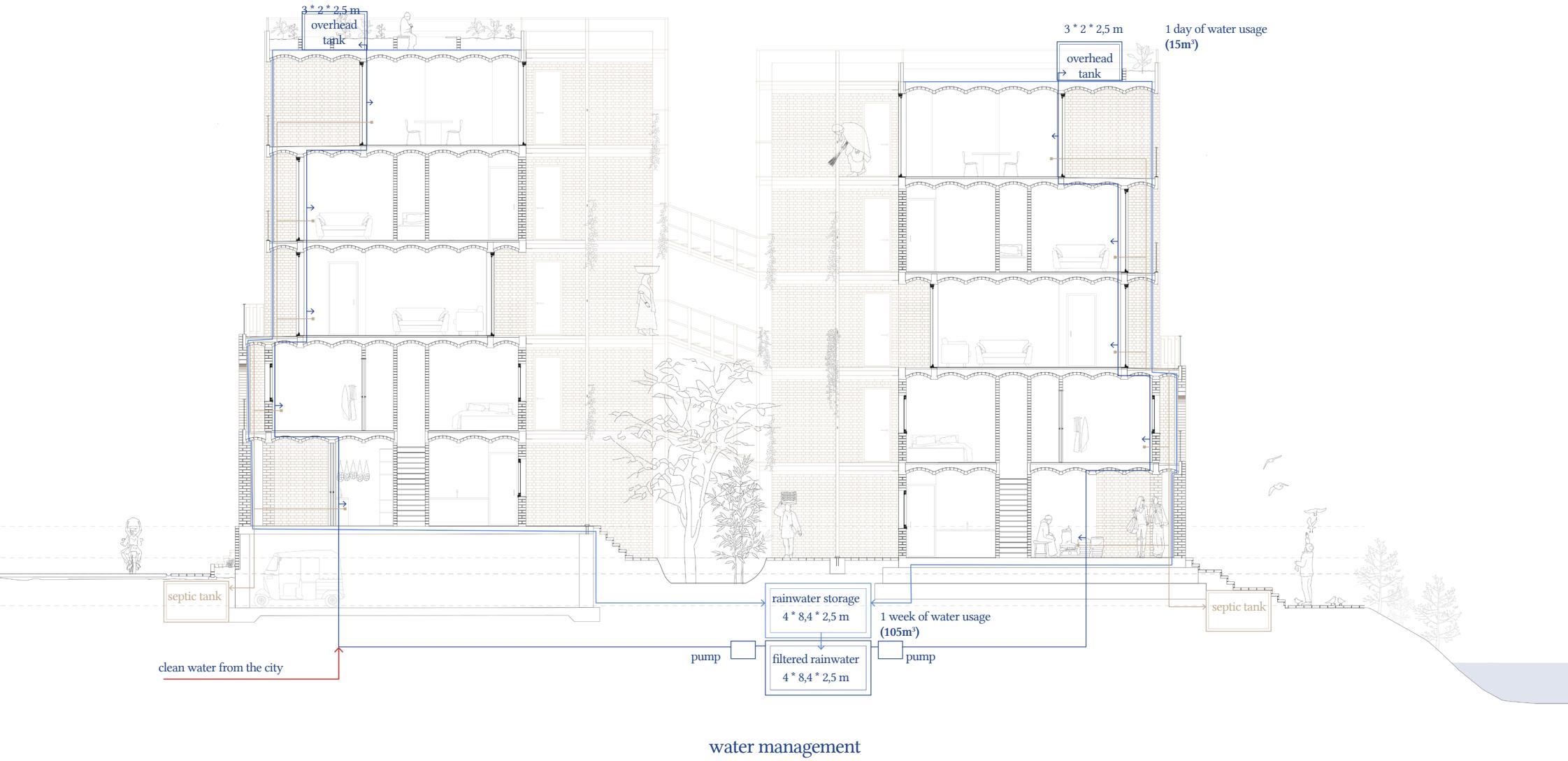
scale 1:2000
90

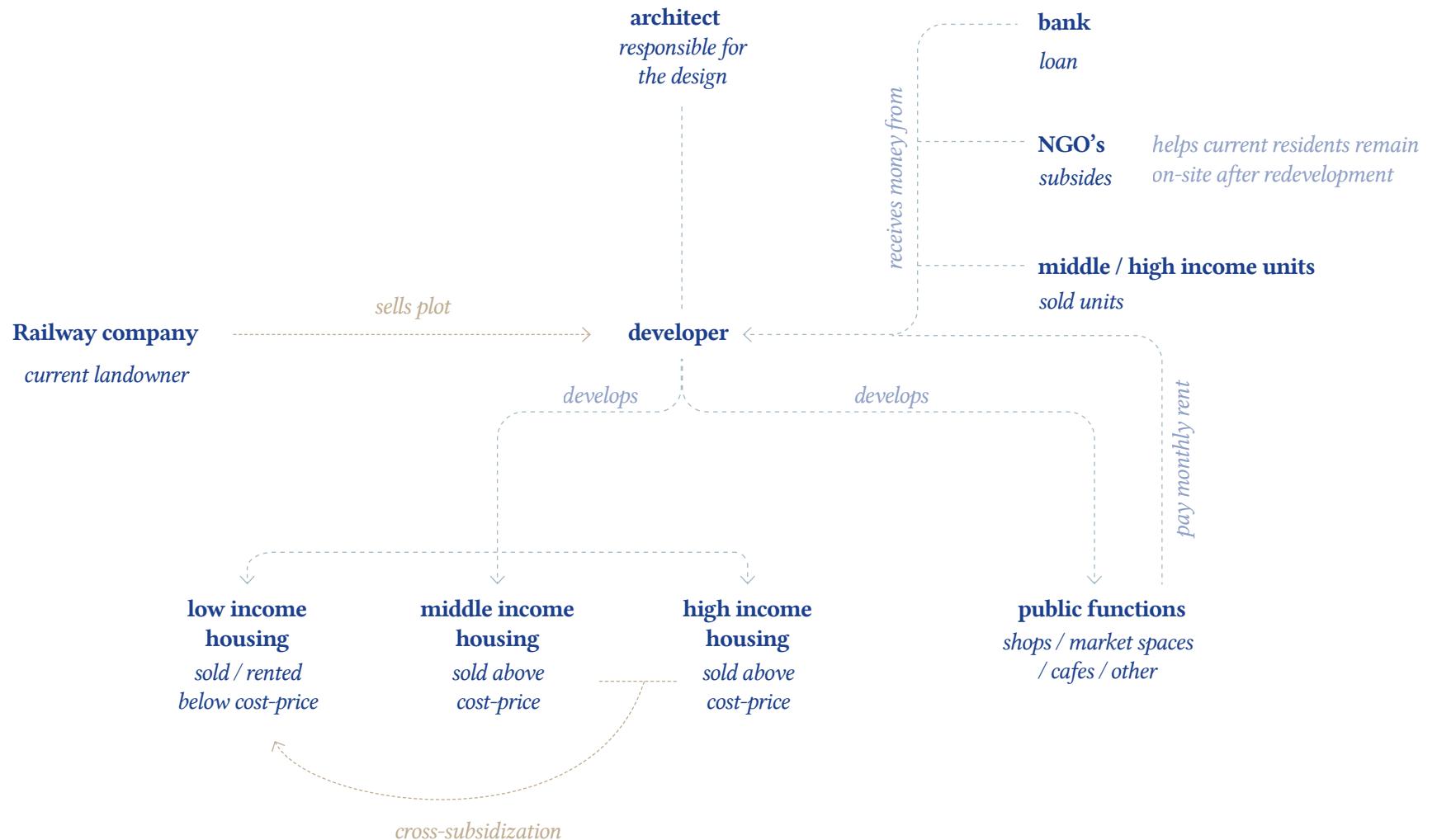


water management

scale 1:5 (scaled 40%)

91







Building in phases

phase 1



Building in phases

phase 2

N



Building in phases

phase 3



Building in phases

▲
N

Global Housing Graduation Studio
Architecture of Transition in the Bangladesh Delta

scale 1:2000

97

Existing

10.460 m² built area on 2,1 Ha

FSI = 0,5.

GSI = 0,5.

Proposal

44.732 m² on a site of 2,1 Ha

FSI = 2,1.

GSI = 0,4.

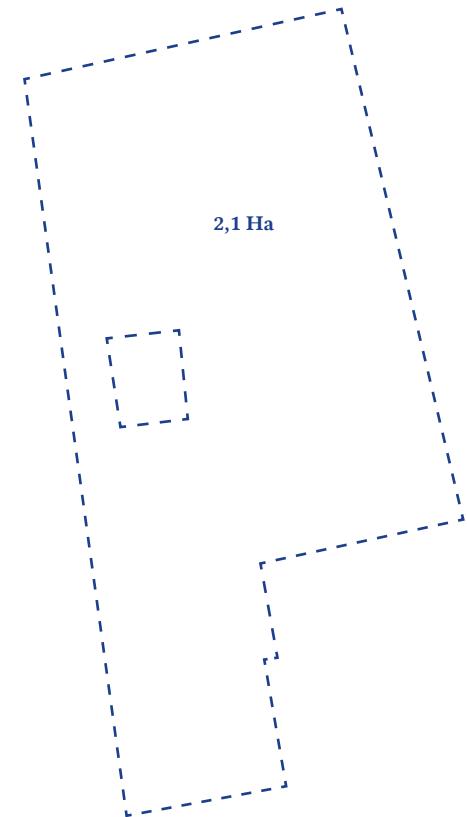
Dwelling / Ha = 170.

Dwelling types per cluster (as shown in the floorplans)

Income group	Unit	Bedrooms	m ²	Amount
Low	Shop house	2	60	4
Low	Maisonette	2	50	4
Low	Apartment	1	30	9
Low	Apartment	3	50	12
Middle	Maisonette	2	65	2
Middle	Apartment	3	65	4
High	Apartment	3	80	2
High	Maisonette	5	140	2

Public functions per cluster

Amenities	m ²	amount
Shop fronts	9	4
Market space	9	4
Shops	26	2
Cafes	52-70	2
Other	28	2
Parking	480	1



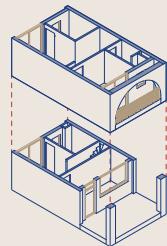
Other public functions

Recreational pedestrian street + sitting spots along river

Park

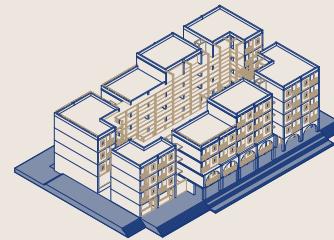
LIVING WITH THE MONSOON

Dwelling



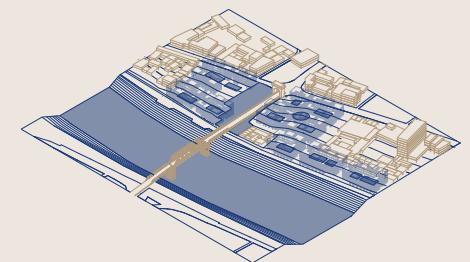
Ground floor functions public
or maisonettes

Cluster



Elevated cluster by 1,5 meters
*(above monsoon flood levels of
0,8 to 1,0 meters)*

Masterplan



Lowered green zones as buffers
and infiltration areas

