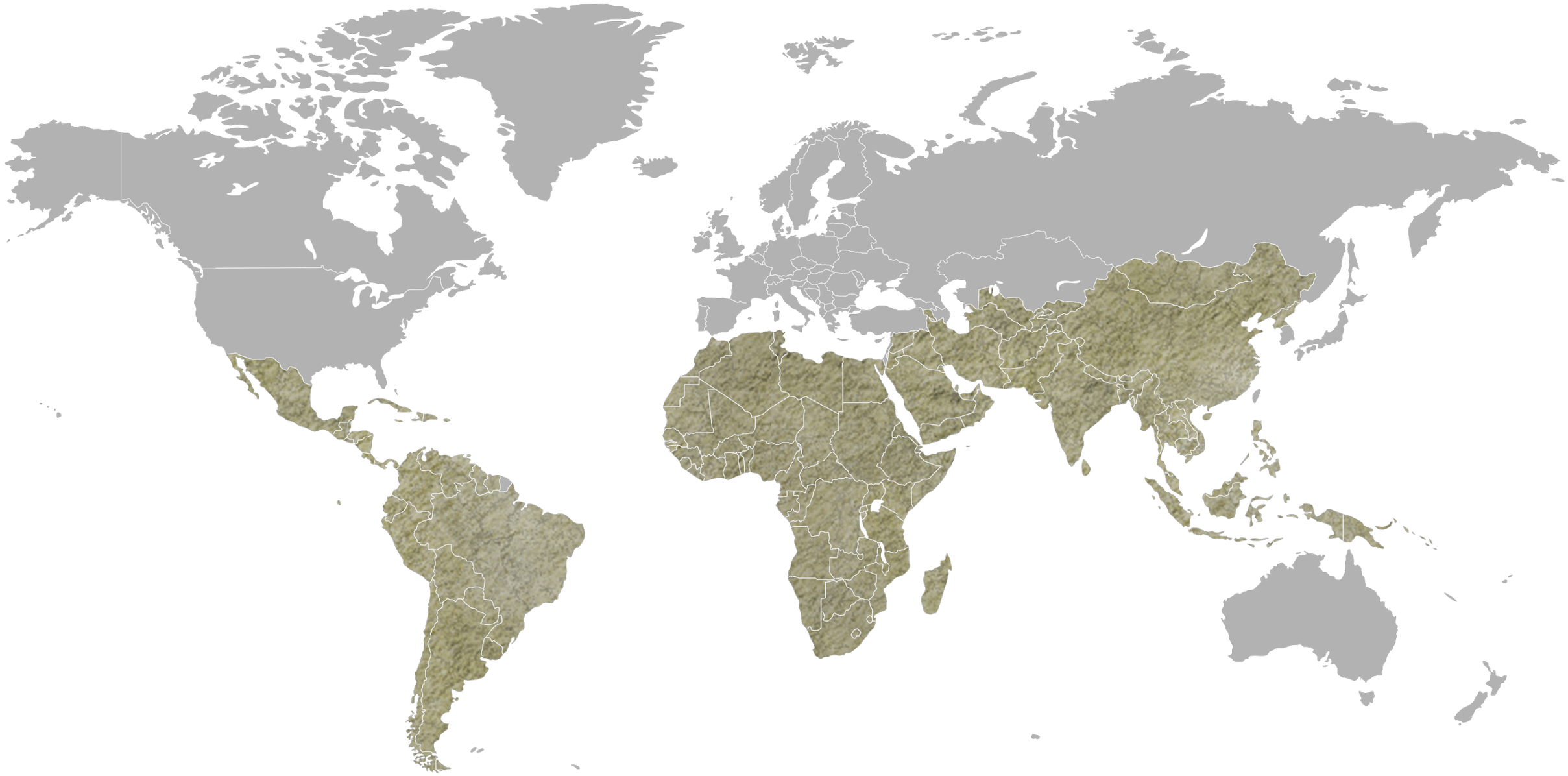
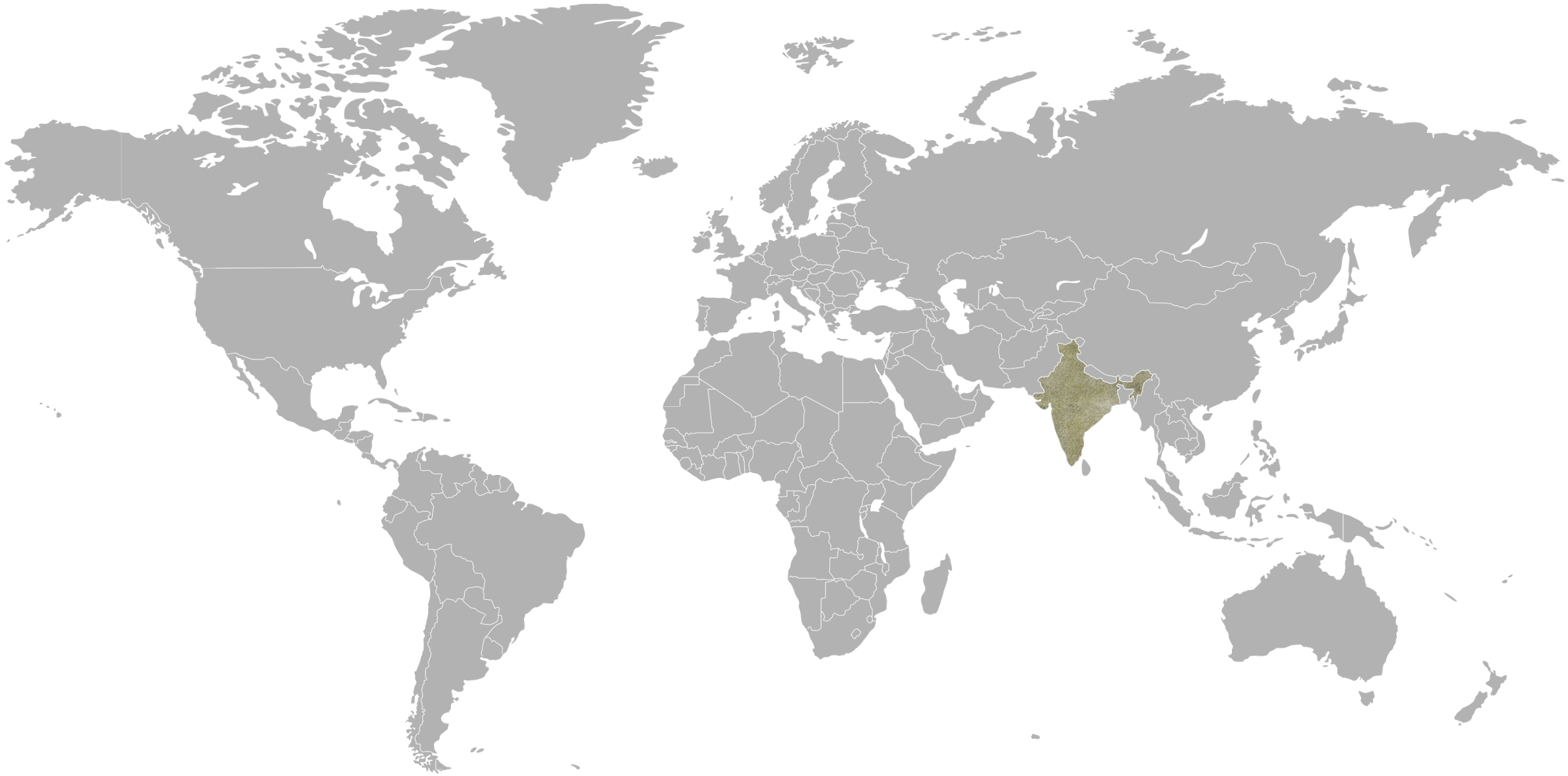
TOWARDS A SUSTAINABLE DENSITY

Global Housing Mixing Mumbai
Affordable Housing for Inclusive Development

Fleur Anne Melchers | 4275098 | 01 - 07 - 2019

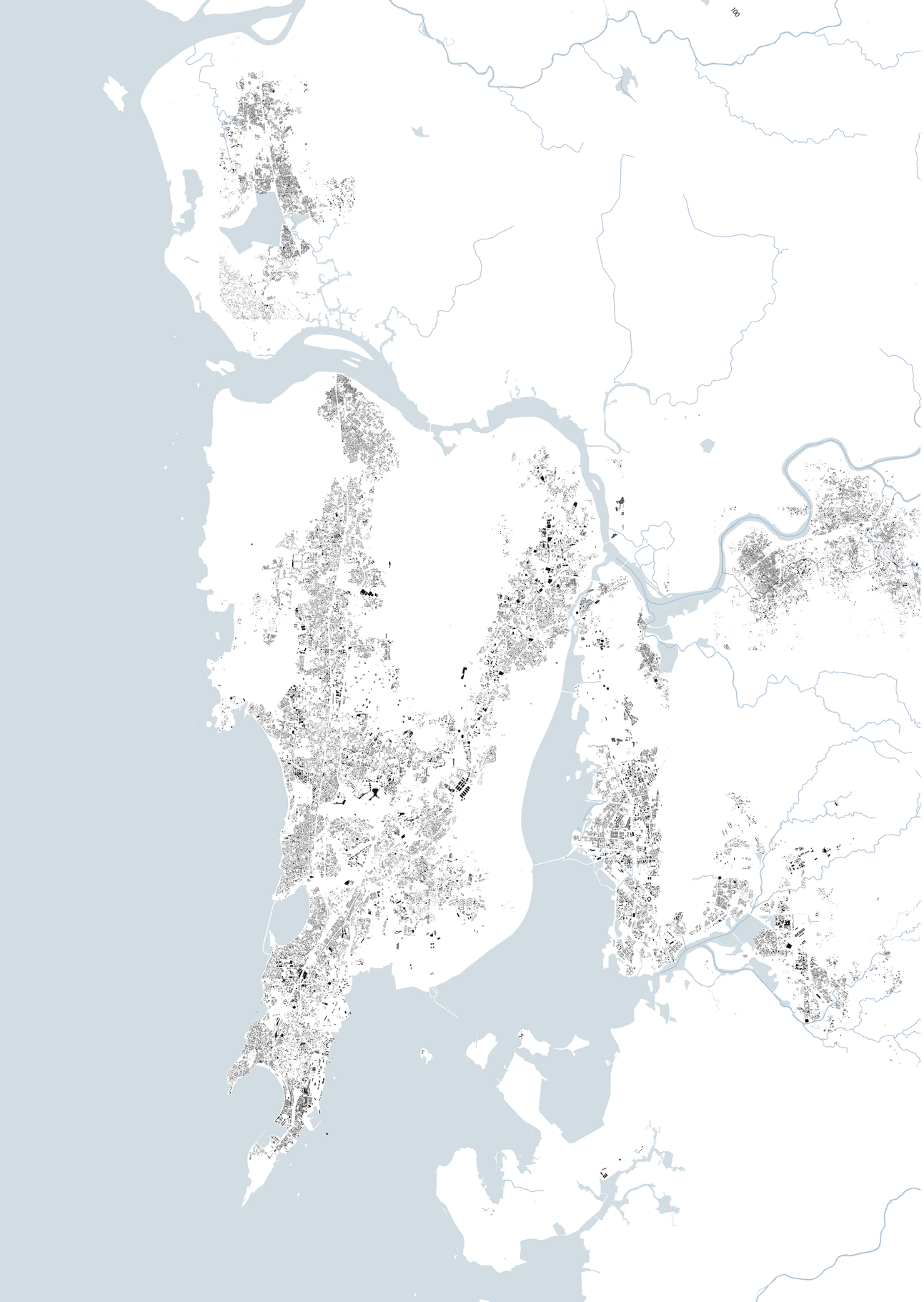
introduction



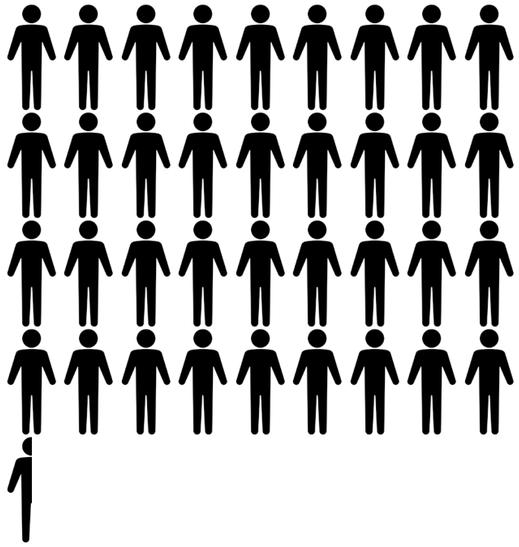


21.000 people / km²

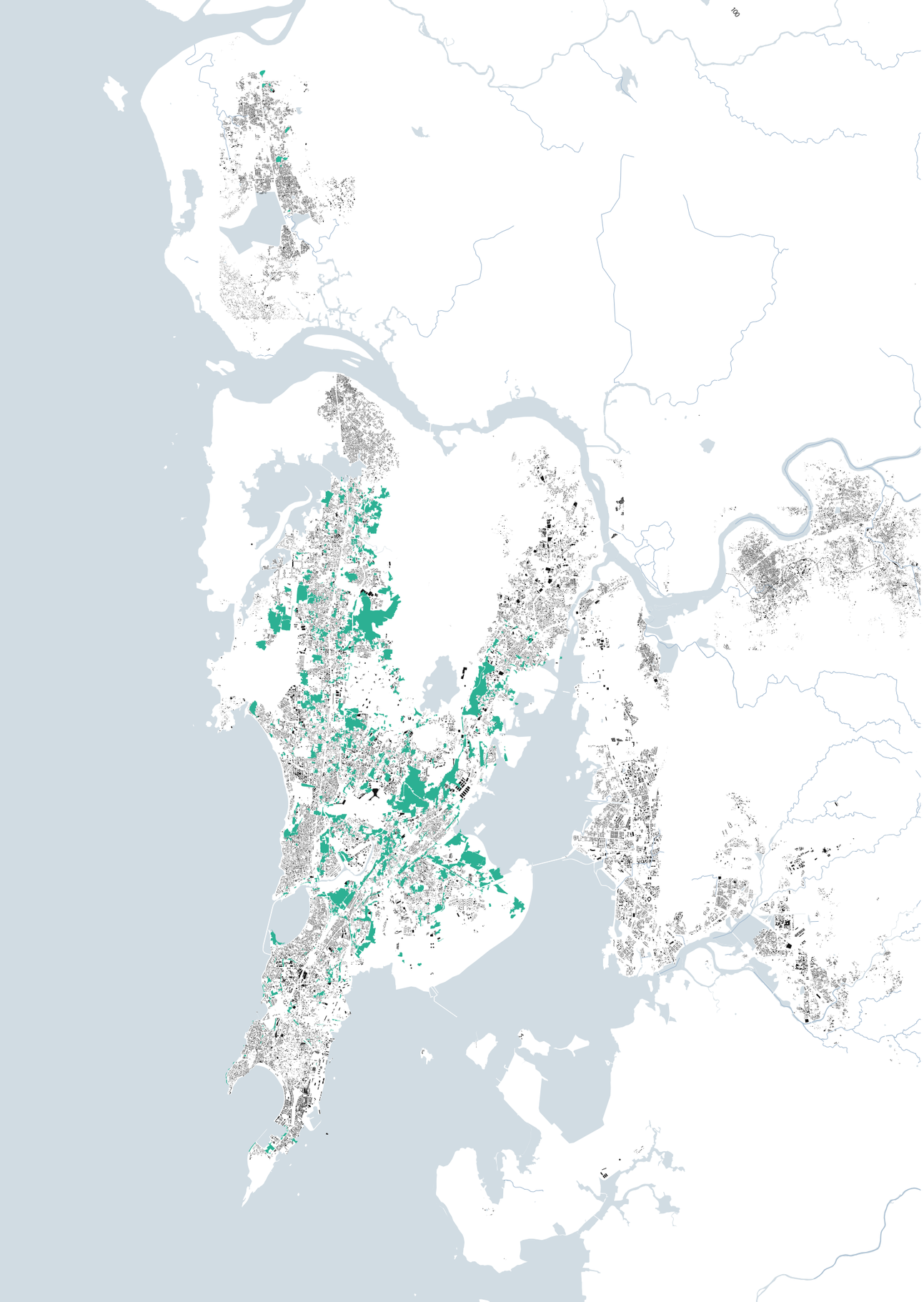
1812 | 1,8 million



2010 | 18,4 million

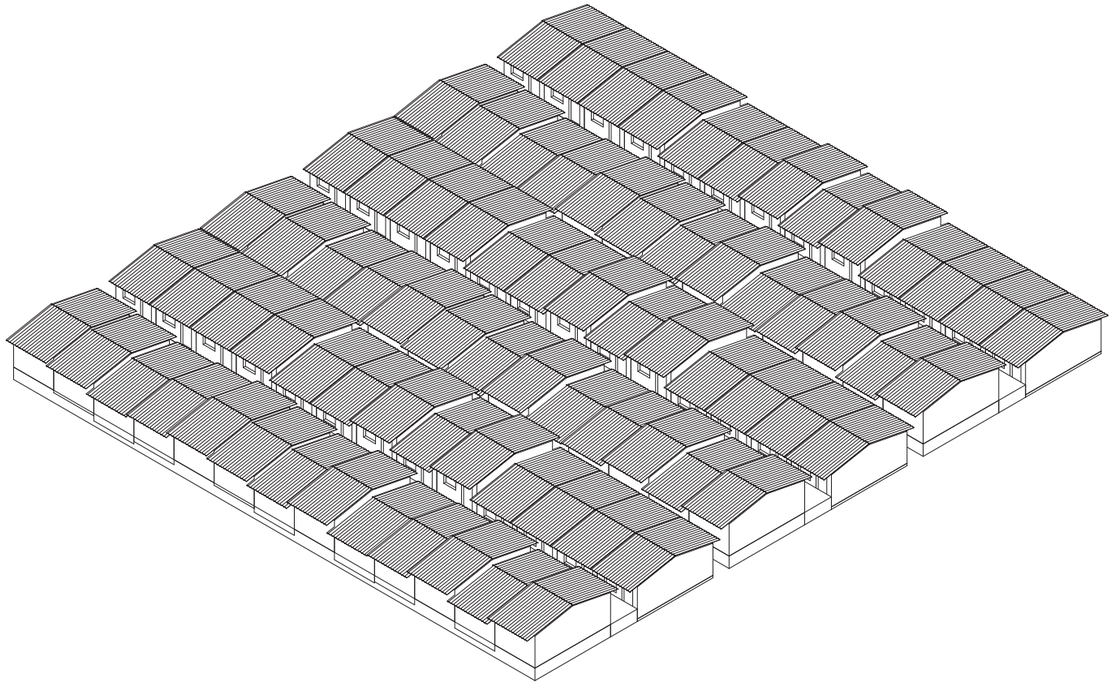


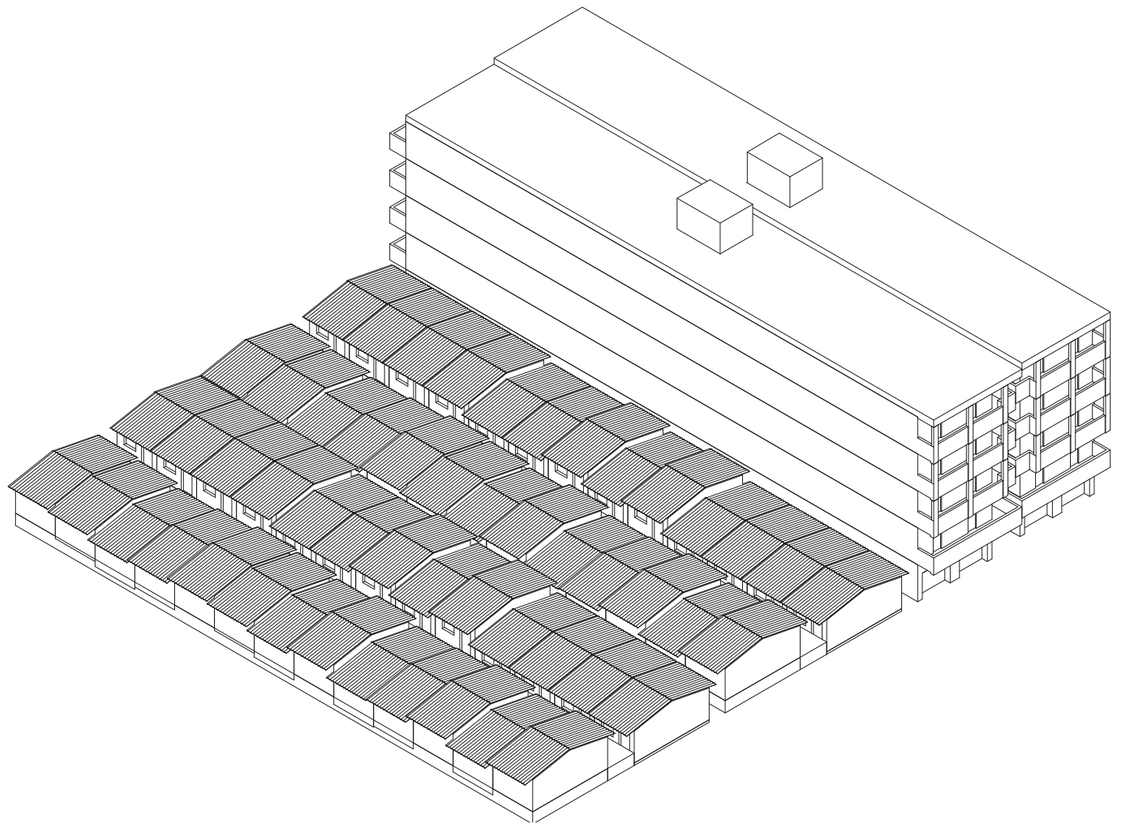
Only 5 % of the population can afford a house in Mumbai.



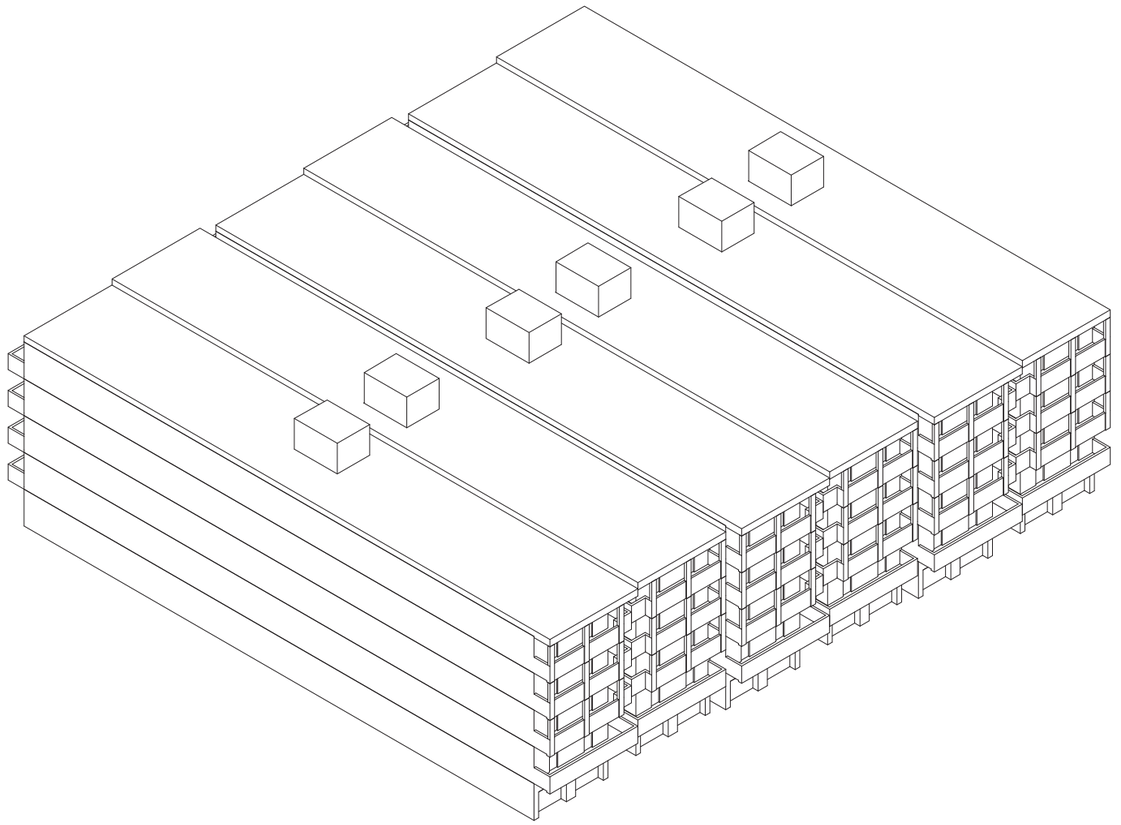
Half of its population lives in informal settlements, covering only 6 % of the city's land.

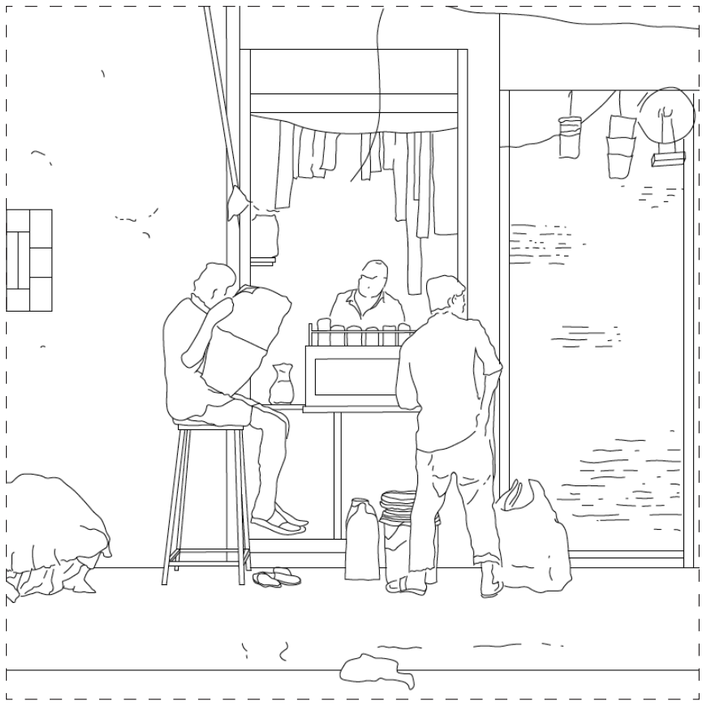
The housing shortage is expected to reach 34.1 million units by 2022





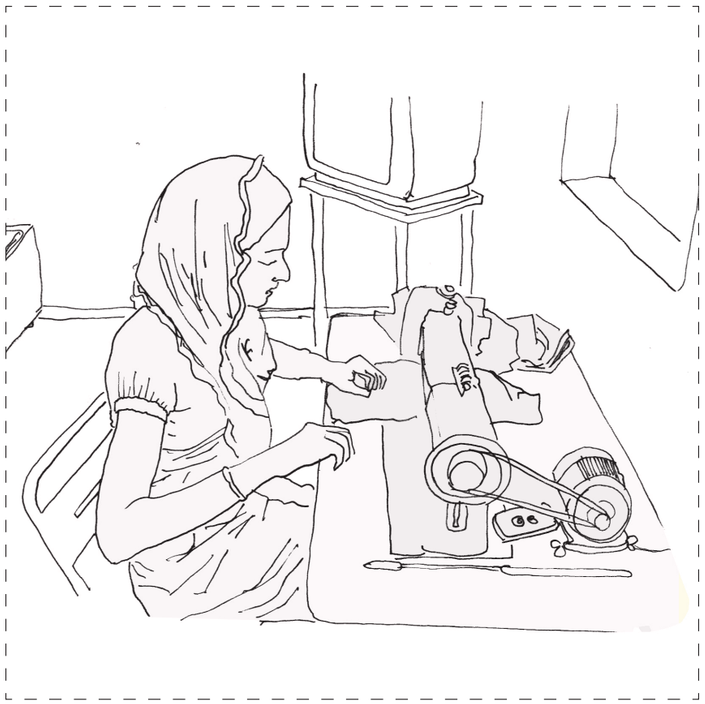
Nilkamal





window chat

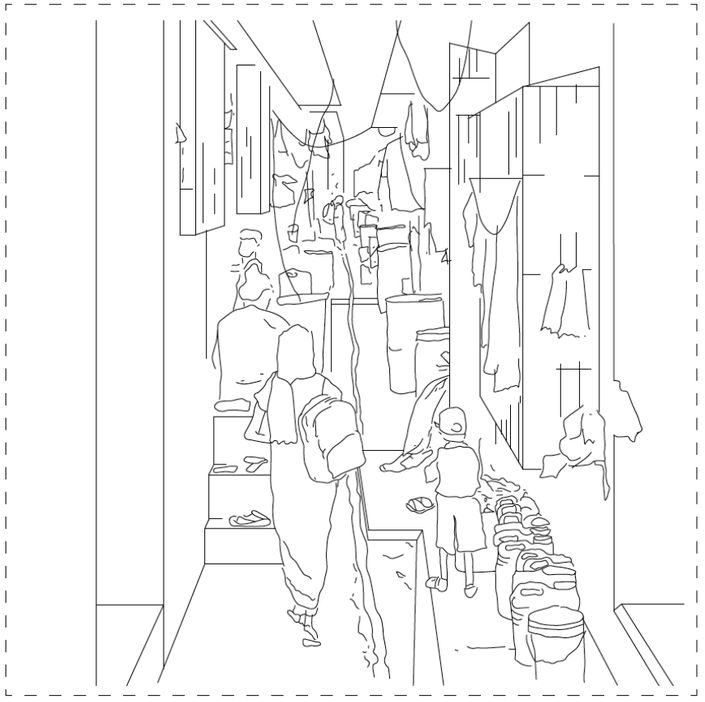
waiting plinth



homework

food preparation

water pump



intimacy alley

research

How does an increasing residential density influences social sustainability?

"Social sustainability is a combination of traditional social principles, including initial basic needs (housing and health) employment, education, equality and social justice and new concepts that are also less measured such as identity, sense of place, happiness and quality of life"

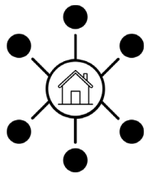
Colantonio

"Social sustainability embodies the principles of futurity, equity, participation empowerment, accessibility, cultural identity and institutional stability"

Seema Dave

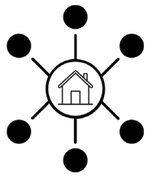
access to basic needs

access to basic needs

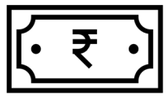


access to local facilities

access to basic needs

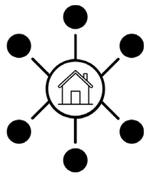


access to local facilities

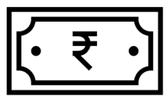


opportunities for income generation

access to basic needs



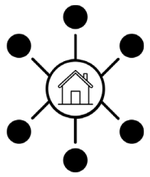
access to local facilities



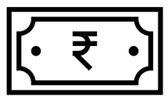
opportunities for income generation

social interaction

access to basic needs



access to local facilities

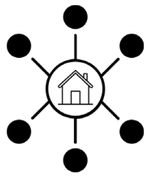


opportunities for income generation

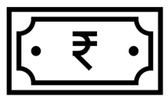
social interaction

community spirit

access to basic needs



access to local facilities



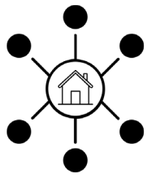
opportunities for income generation

social interaction

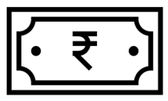
community spirit

sense of safety

access to basic needs



access to local facilities



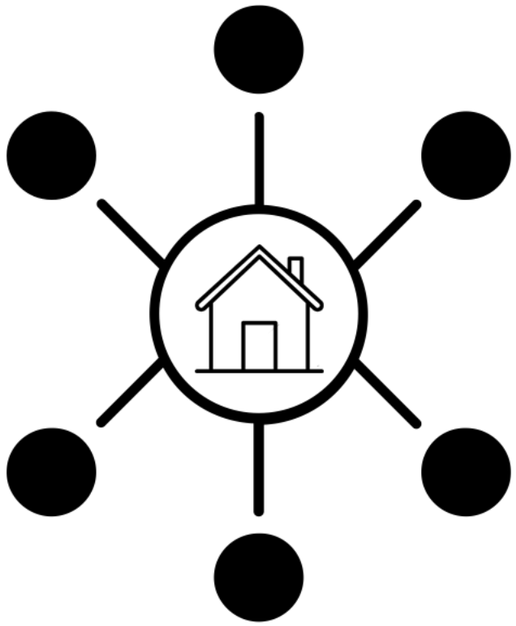
opportunities for income generation

social interaction

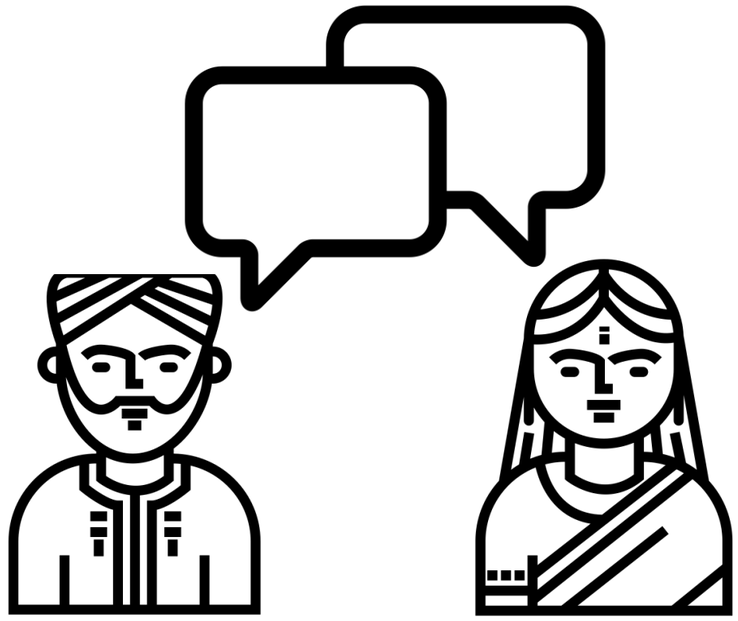
community spirit

sense of safety

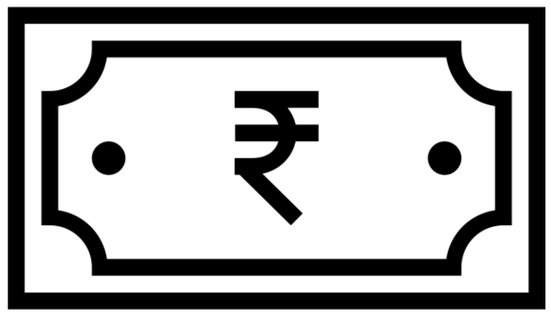
health of the inhabitants



High densities make access to services and facilities easier.



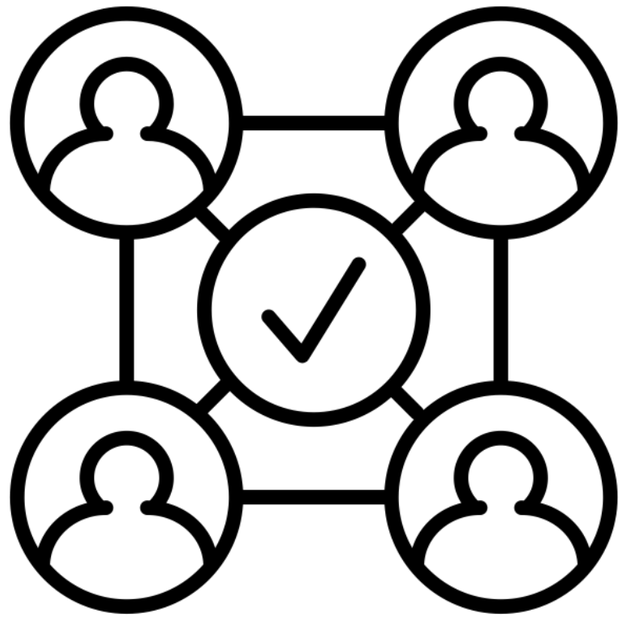
High densities can contribute positively to social equity, social interaction and vitality



High densities have positive impacts on employment opportunities

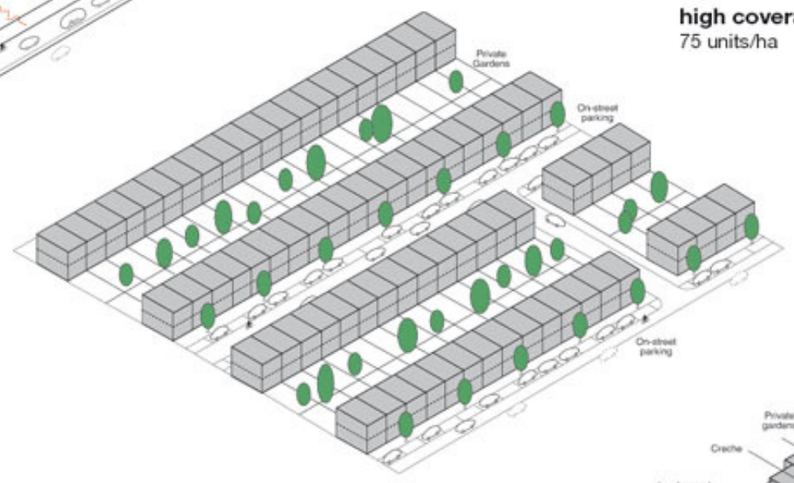
High densities may cause a decline of community and weakening of social ties

High densities have a negative influence on the health of the inhabitants, particularly stress-related health

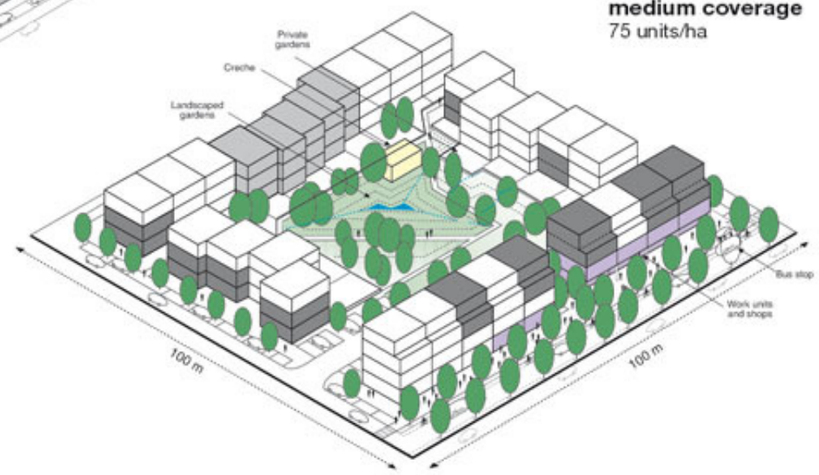


High densities are likely to have an overall negative impact on satisfaction within the neighborhood

High rise –
low coverage
75 units/ha



Low rise –
high coverage
75 units/ha



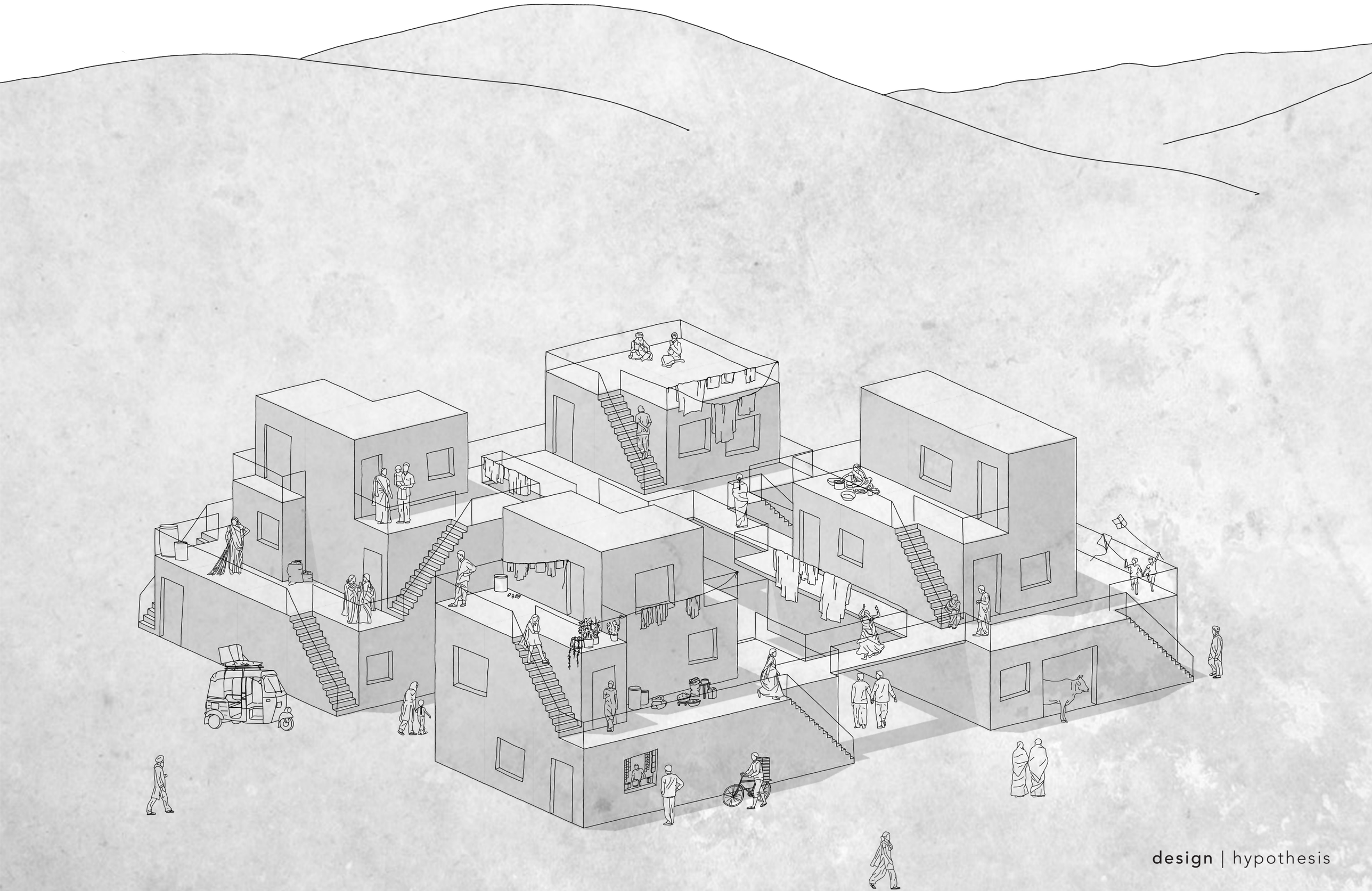
Medium rise –
medium coverage
75 units/ha

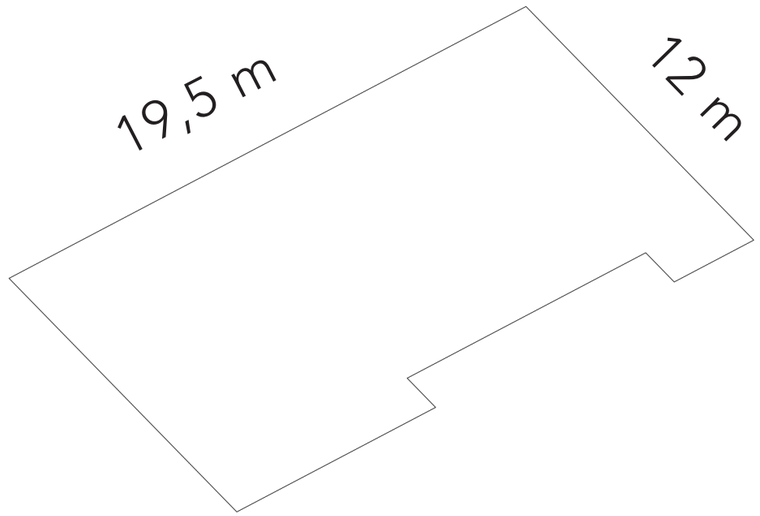
Key
Target a mix of activities
Include a variety of house types

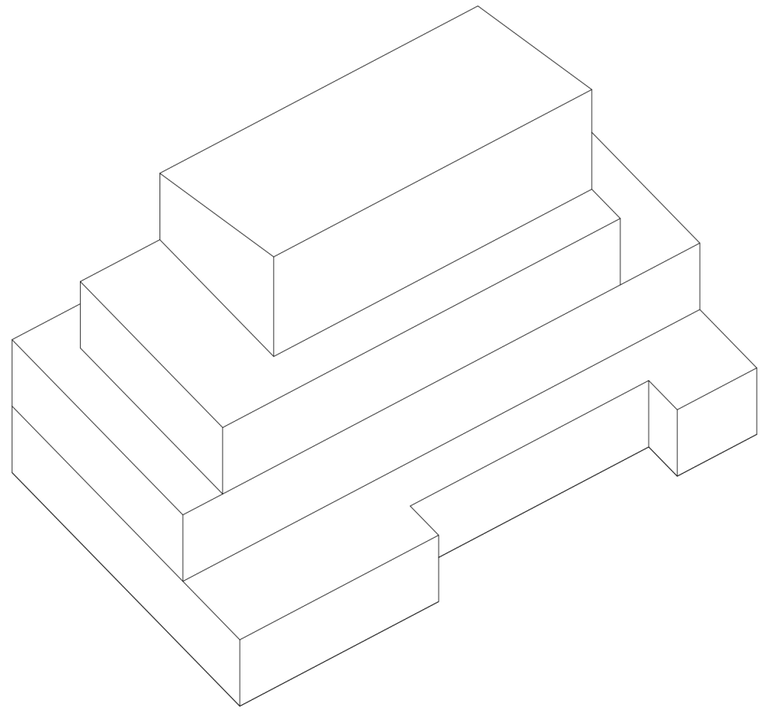
- Community facilities
- Shops and workspaces
- Maisonettes
- Houses
- Apartments

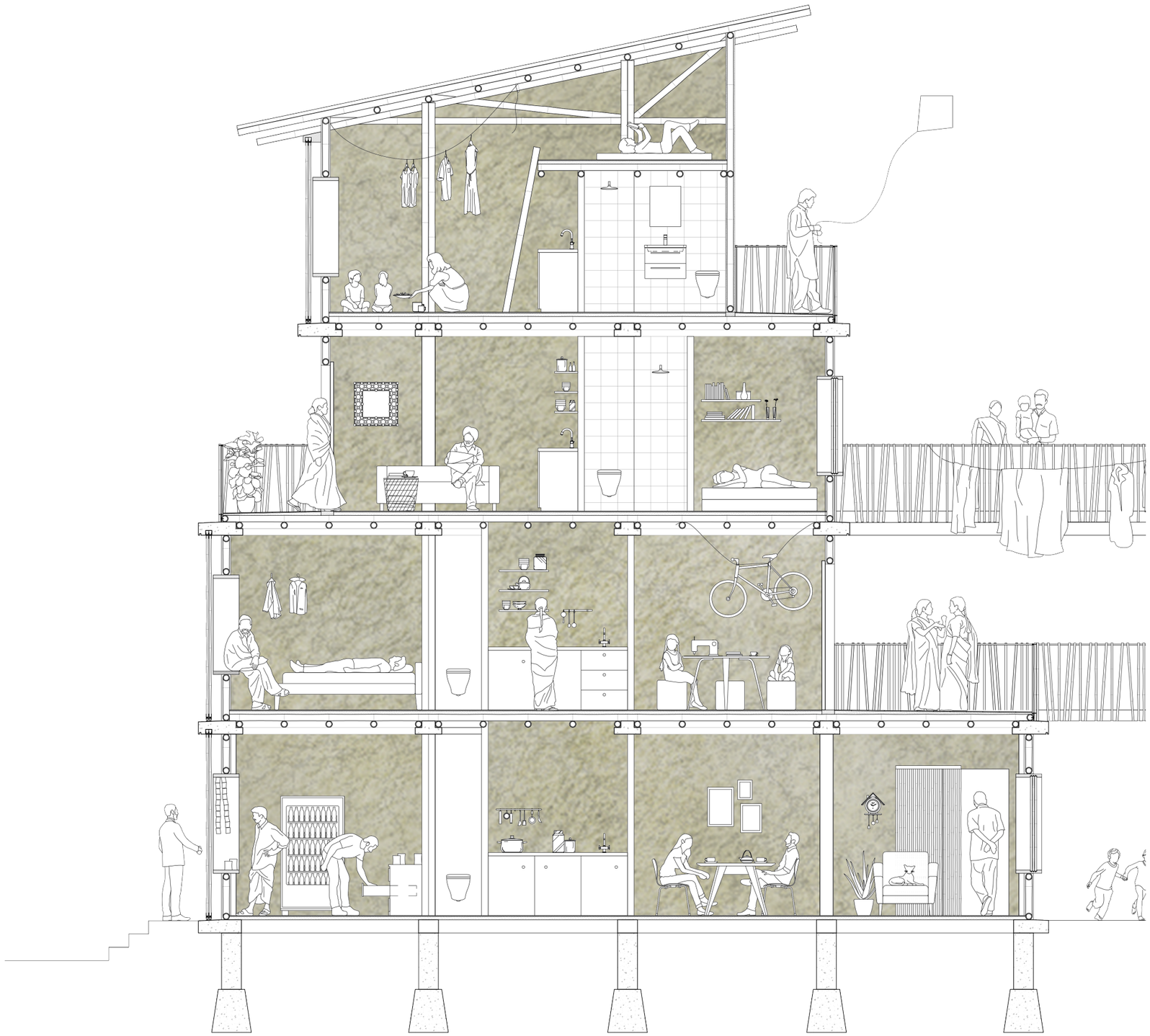
"How density is perceived by residents or users (crowding of buildings or people) may have significant impacts on social interaction, community cohesion, satisfaction with the built environment, the reputation of an area, and on preferences for moving in or out of an area in the city."

design




19,5 m
12 m



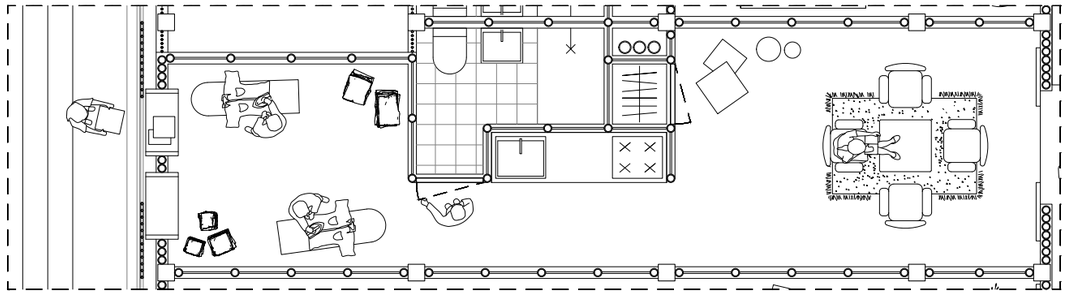


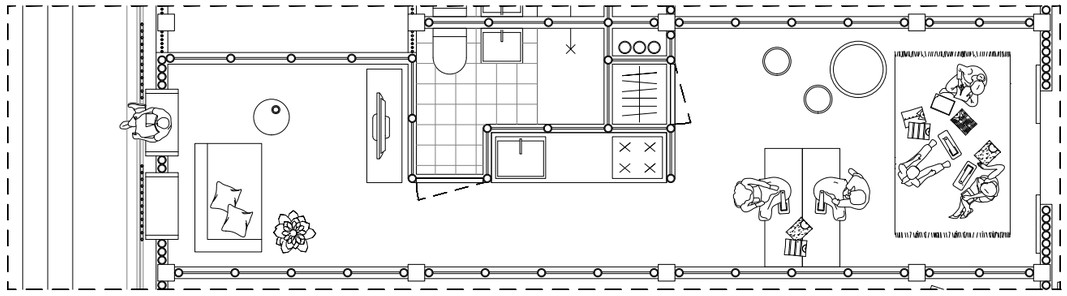
working
wet area
living

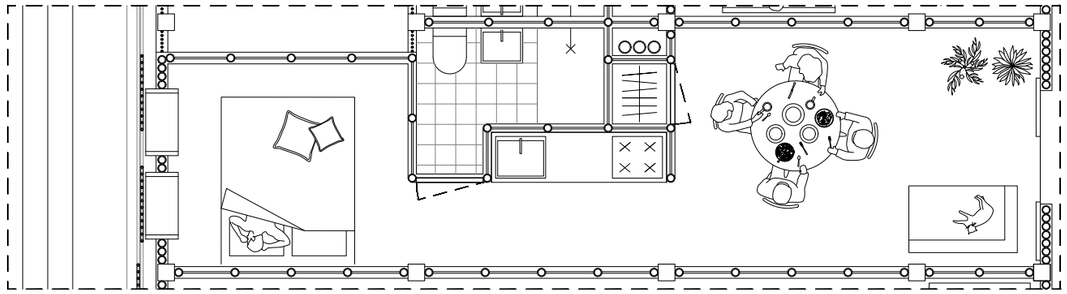
sleeping
wet area
living

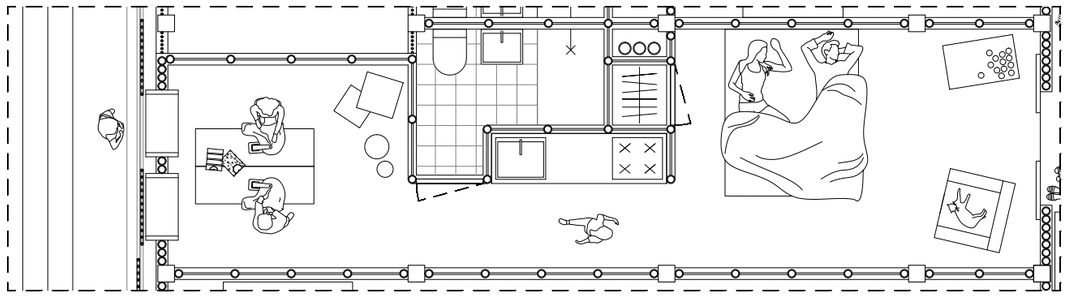
living
wet area
sleeping

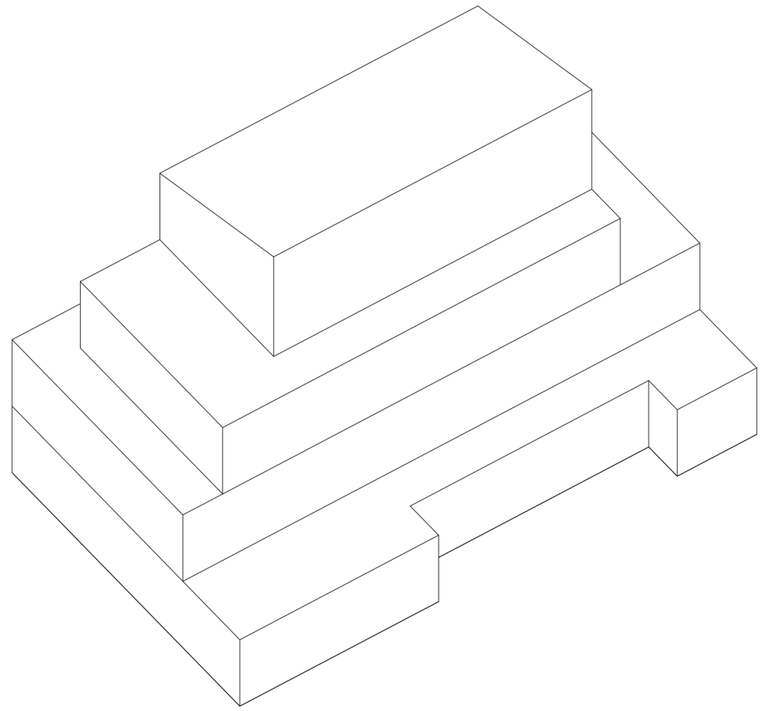
living
wet area
working

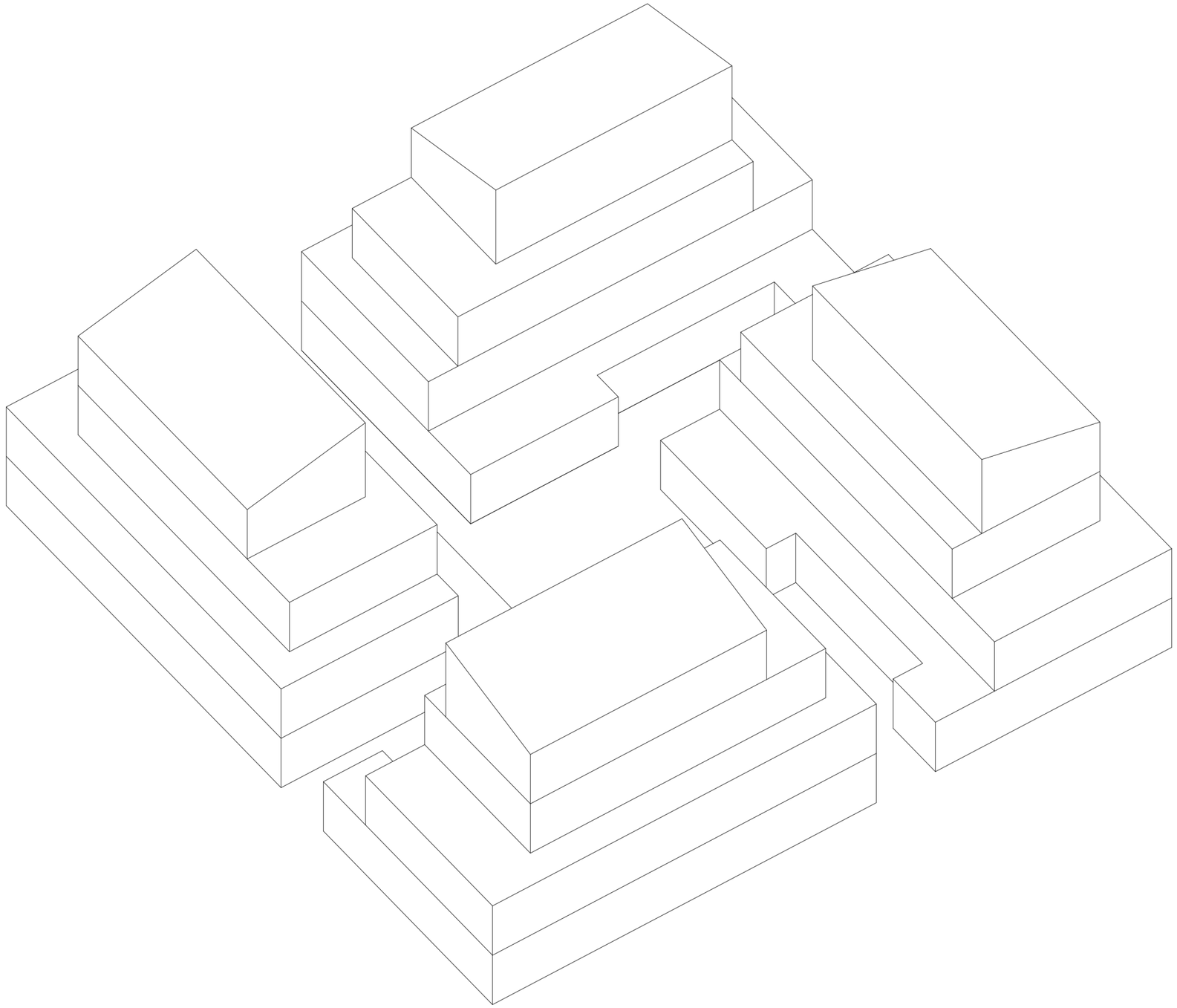


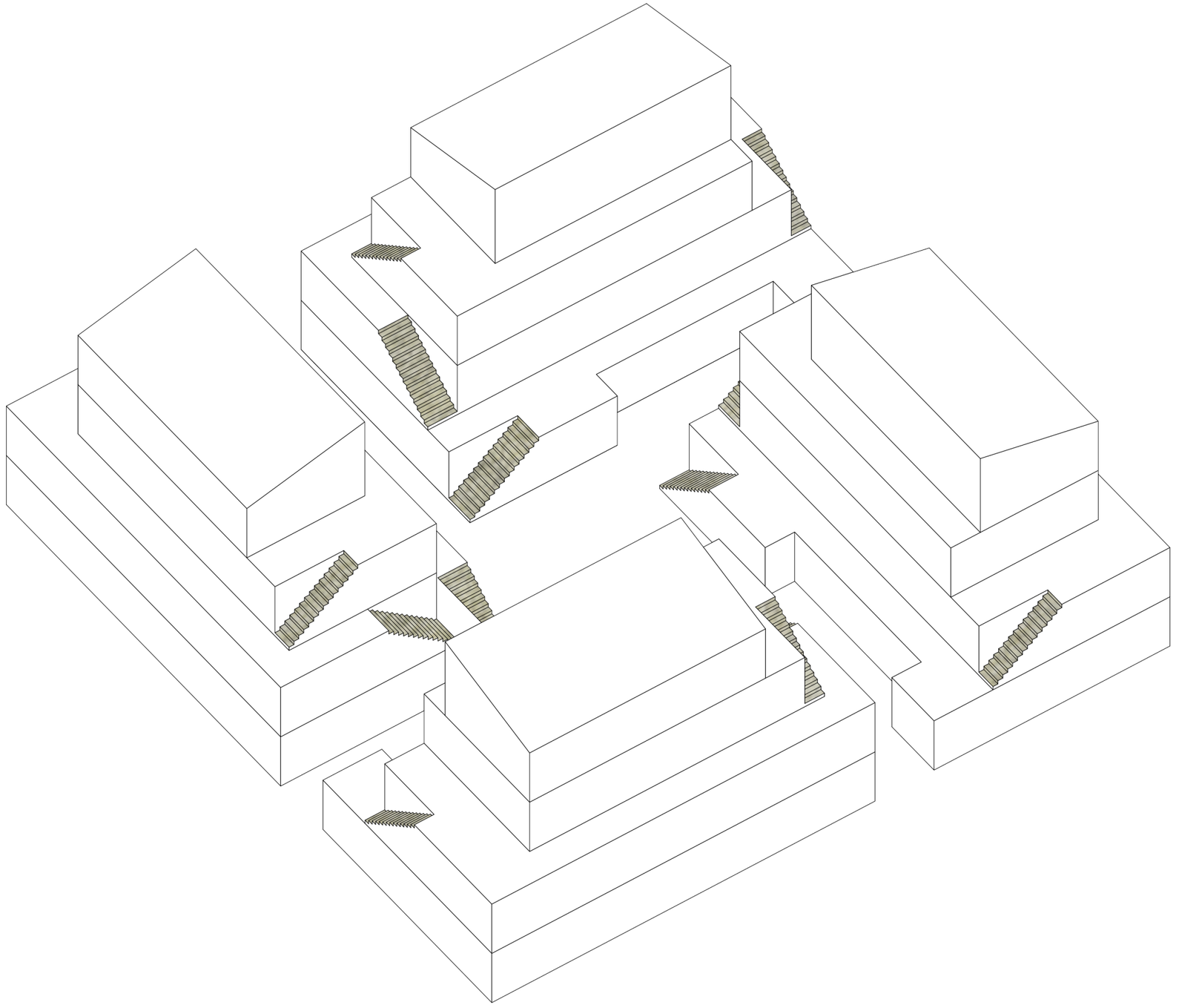


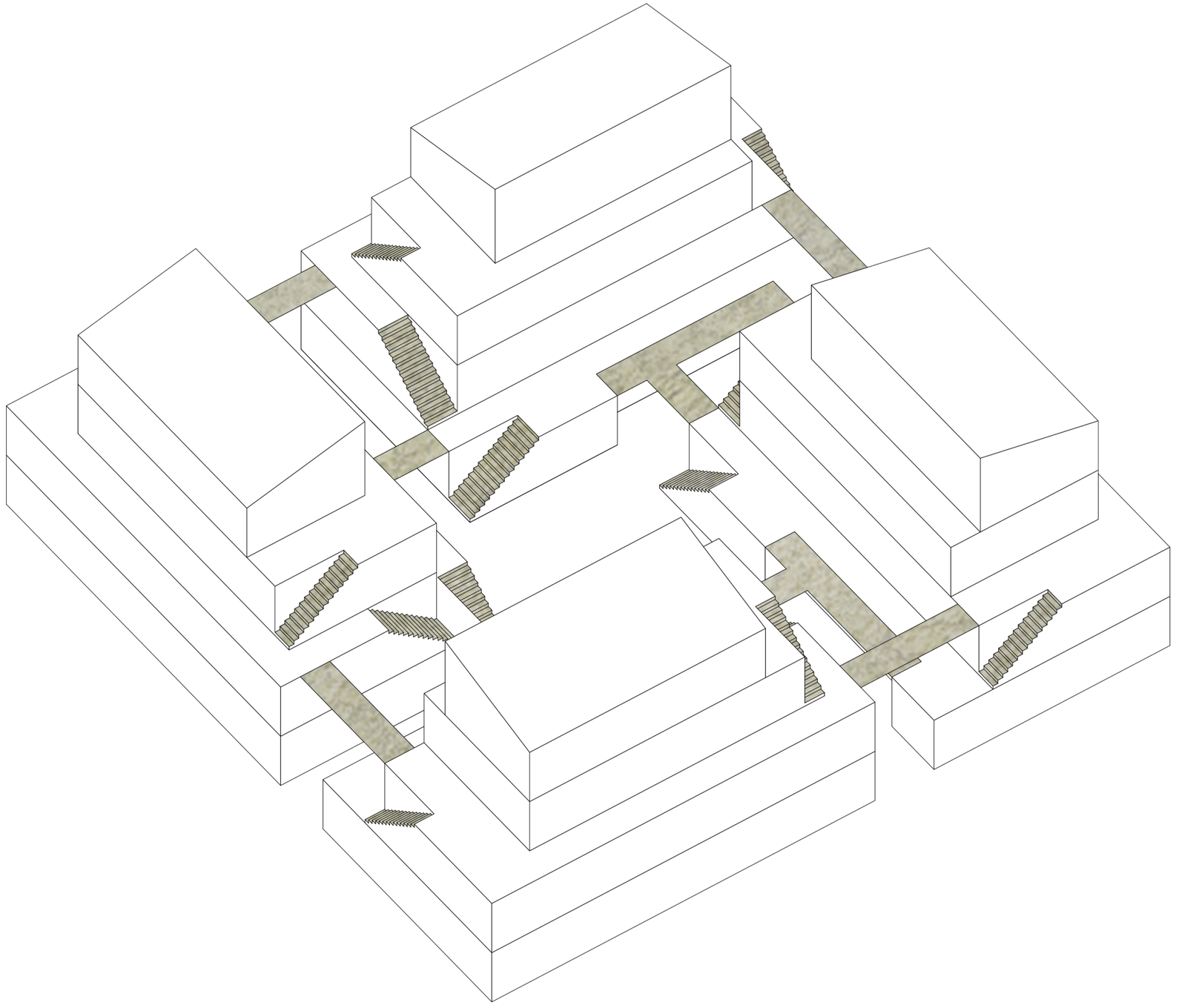


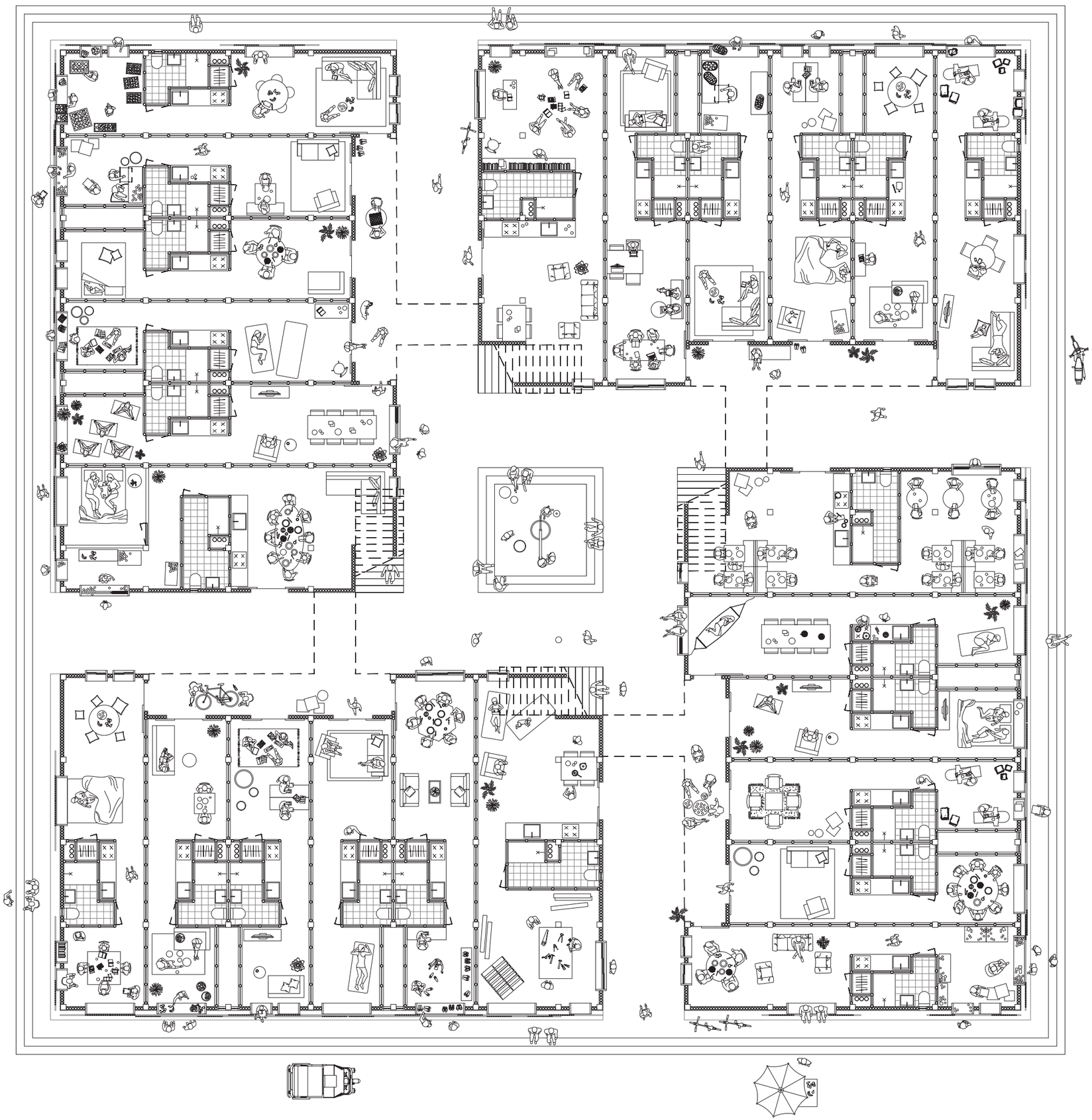


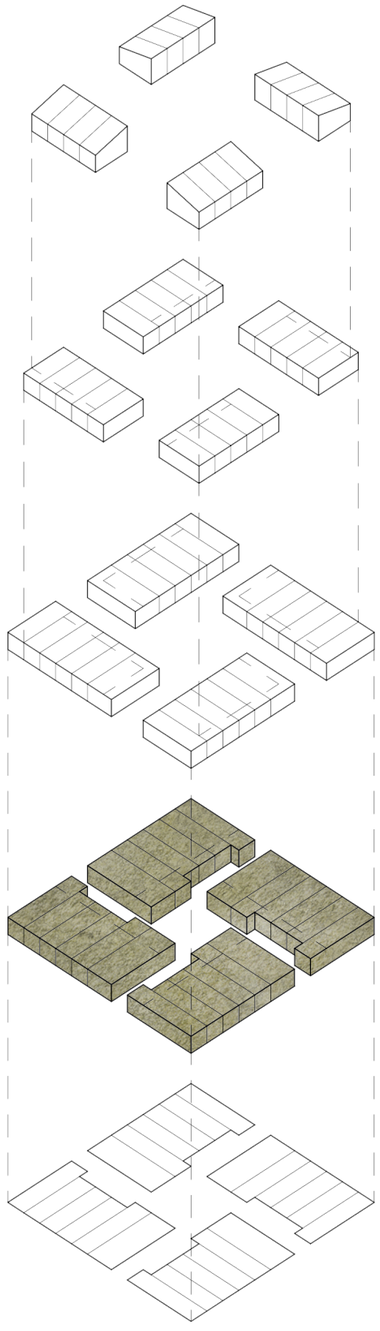


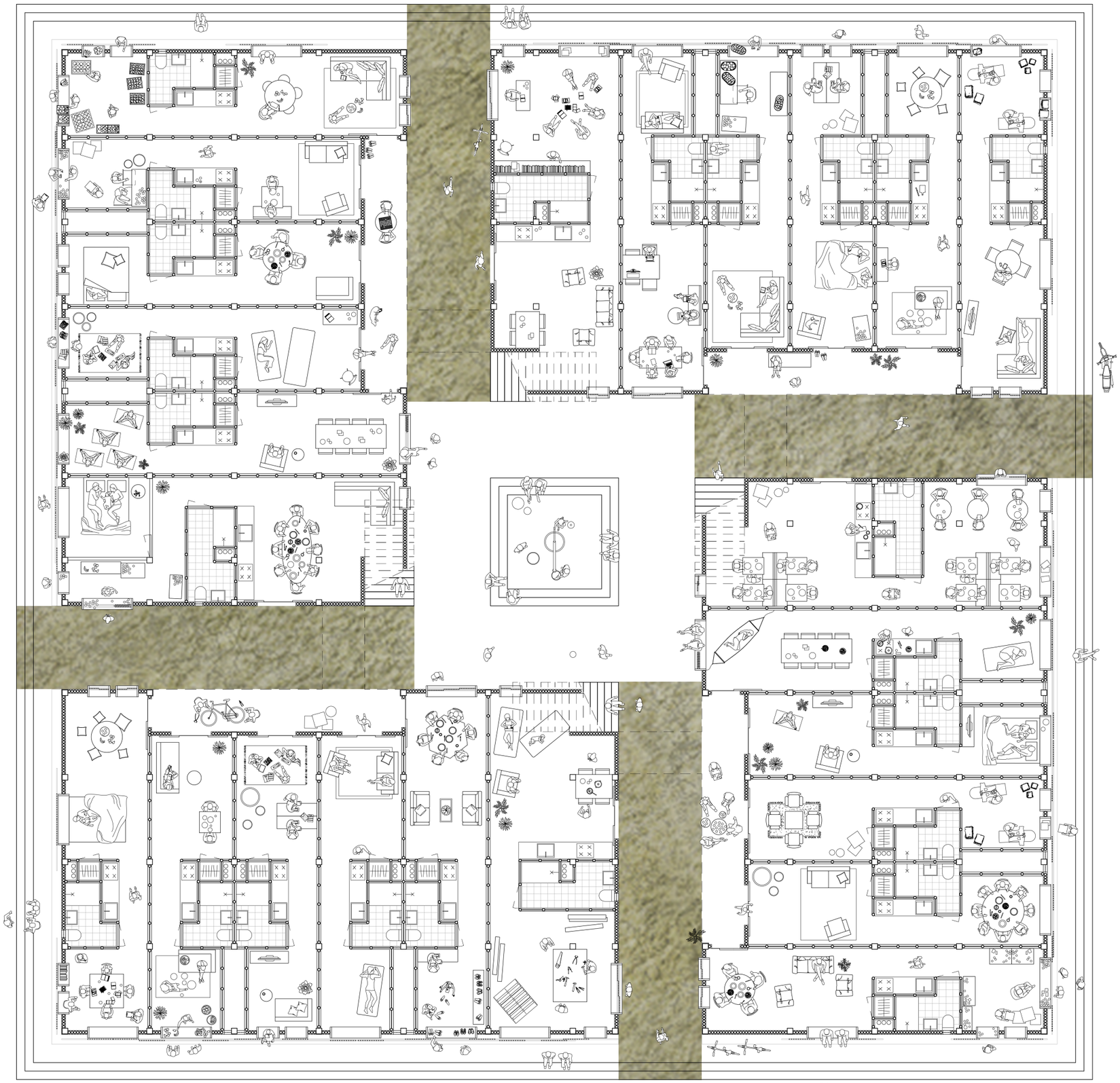


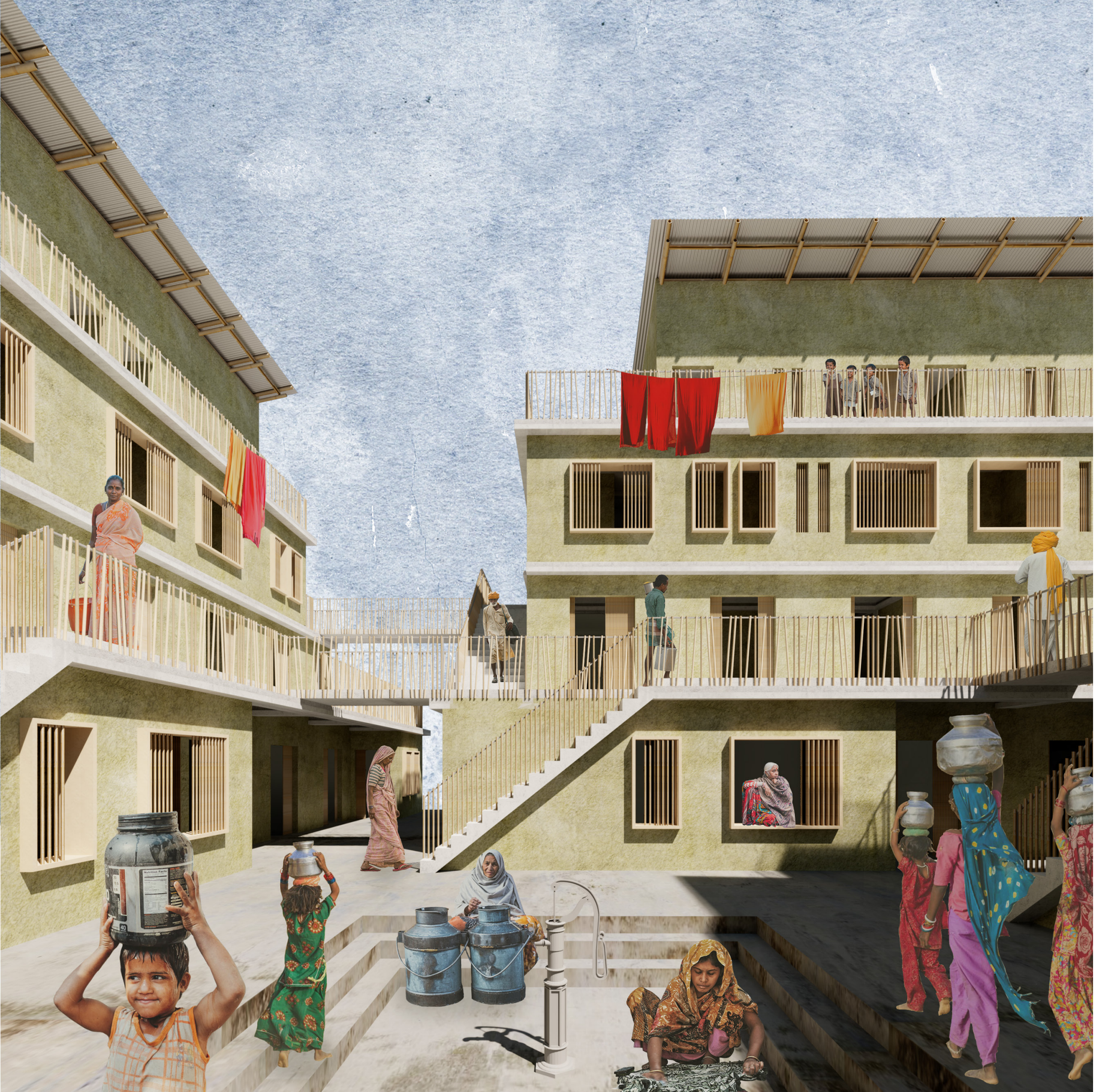


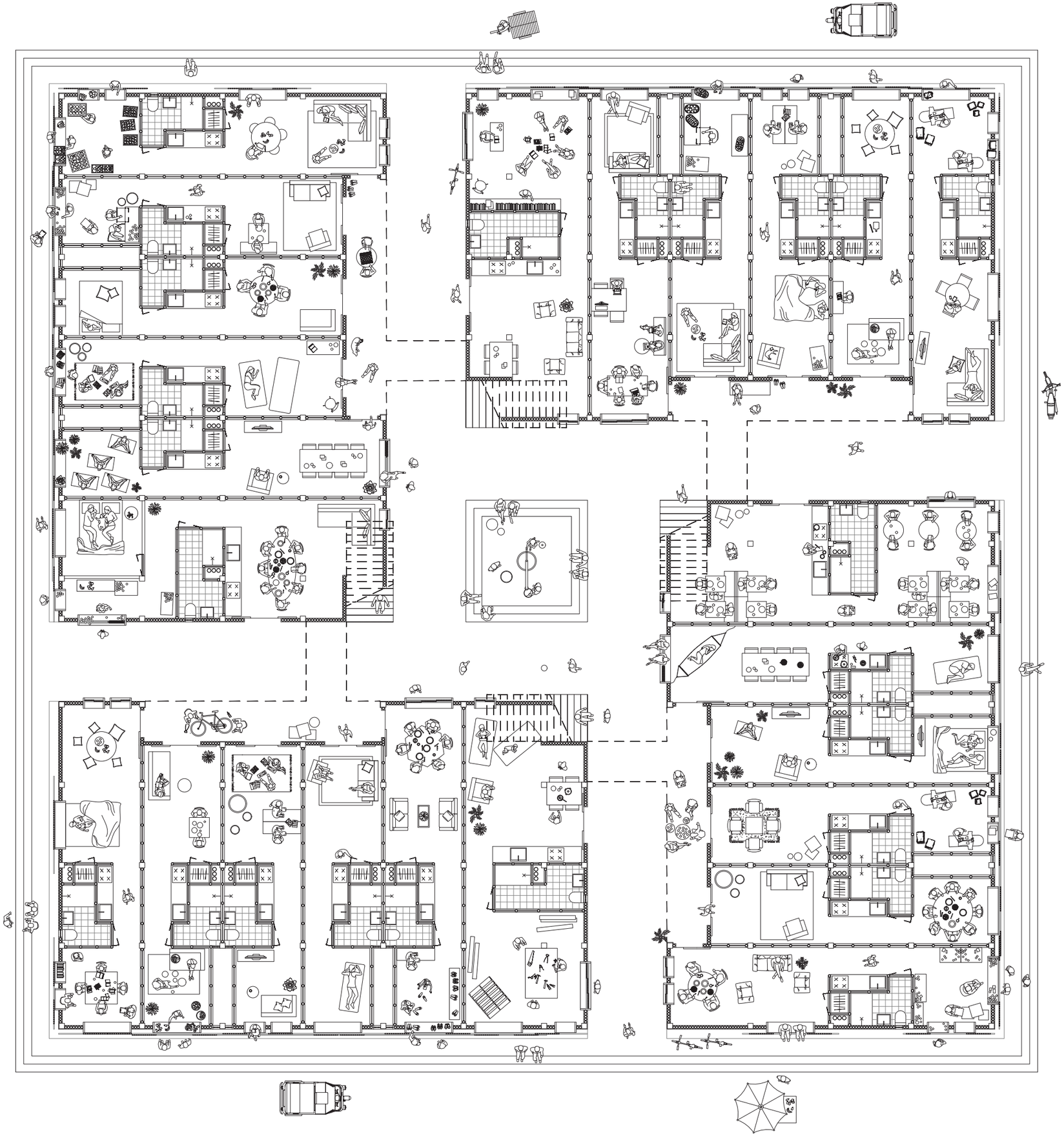


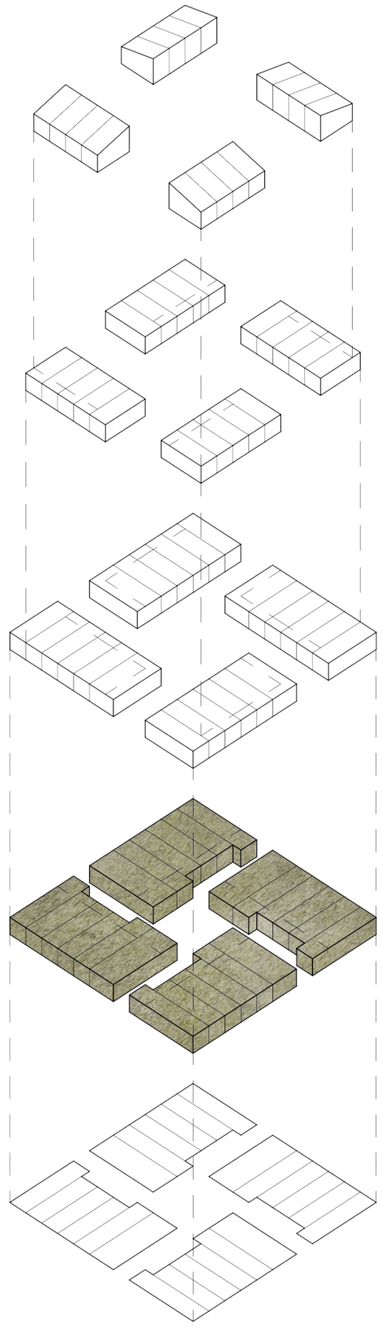








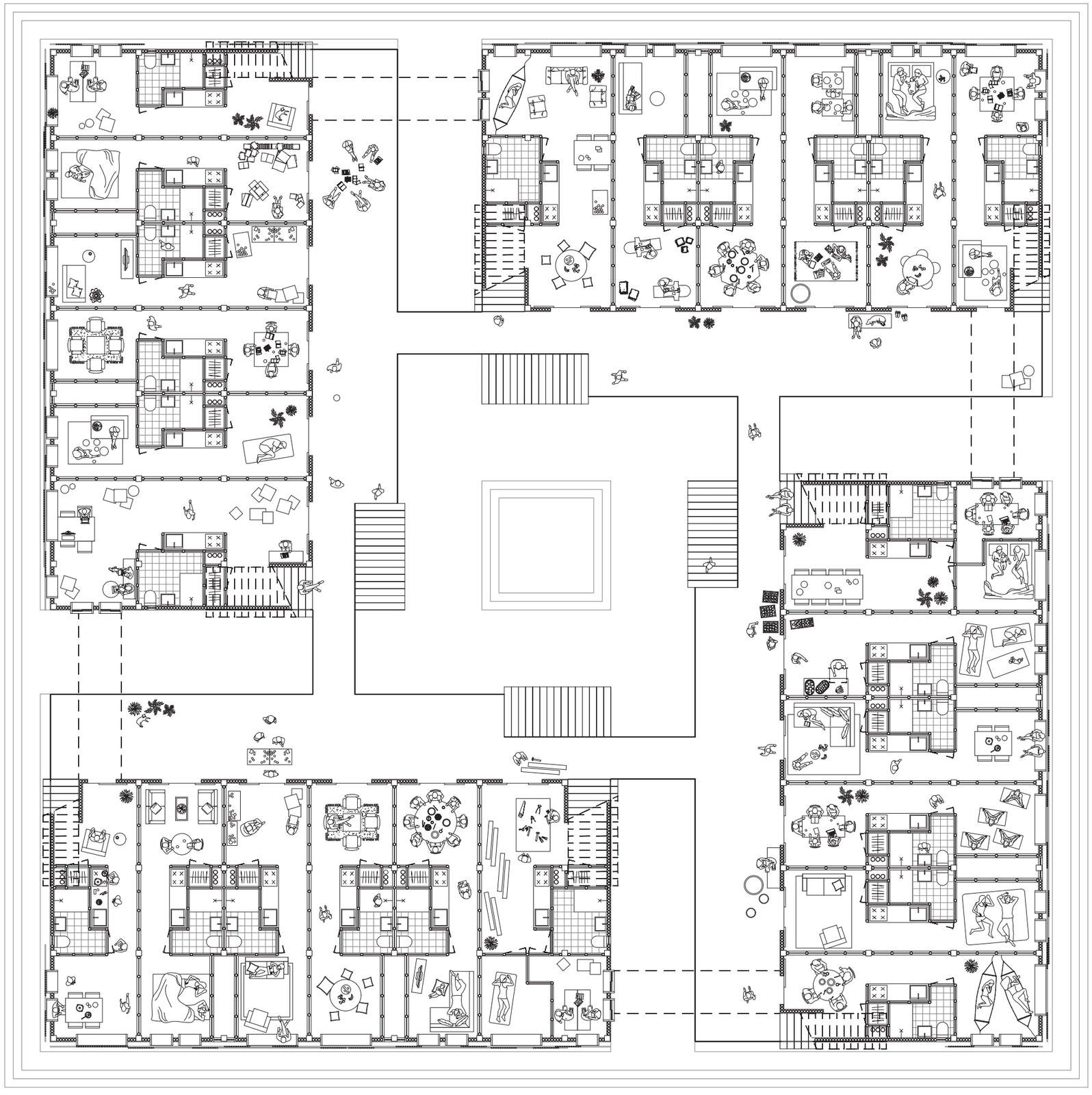


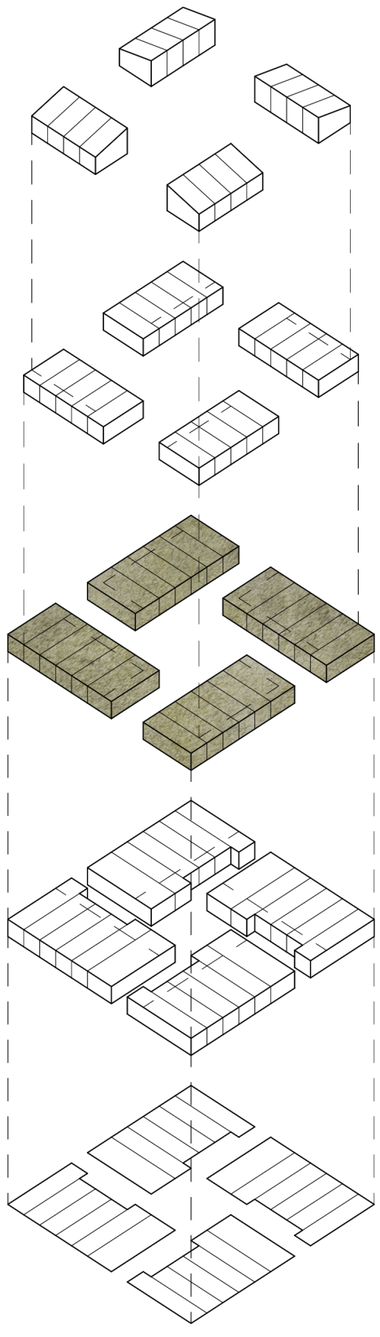


size	10,5 x 3 m
area	31,5 m^2
m^2 dwelling / person	6,3 m^2
dwellings / cluster	12
situation	ground floor
type	EWS

size	12 x 3 m
area	36 m^2
m^2 dwelling / person	7,2 m^2
dwellings / cluster	8
situation	ground floor
type	LIG

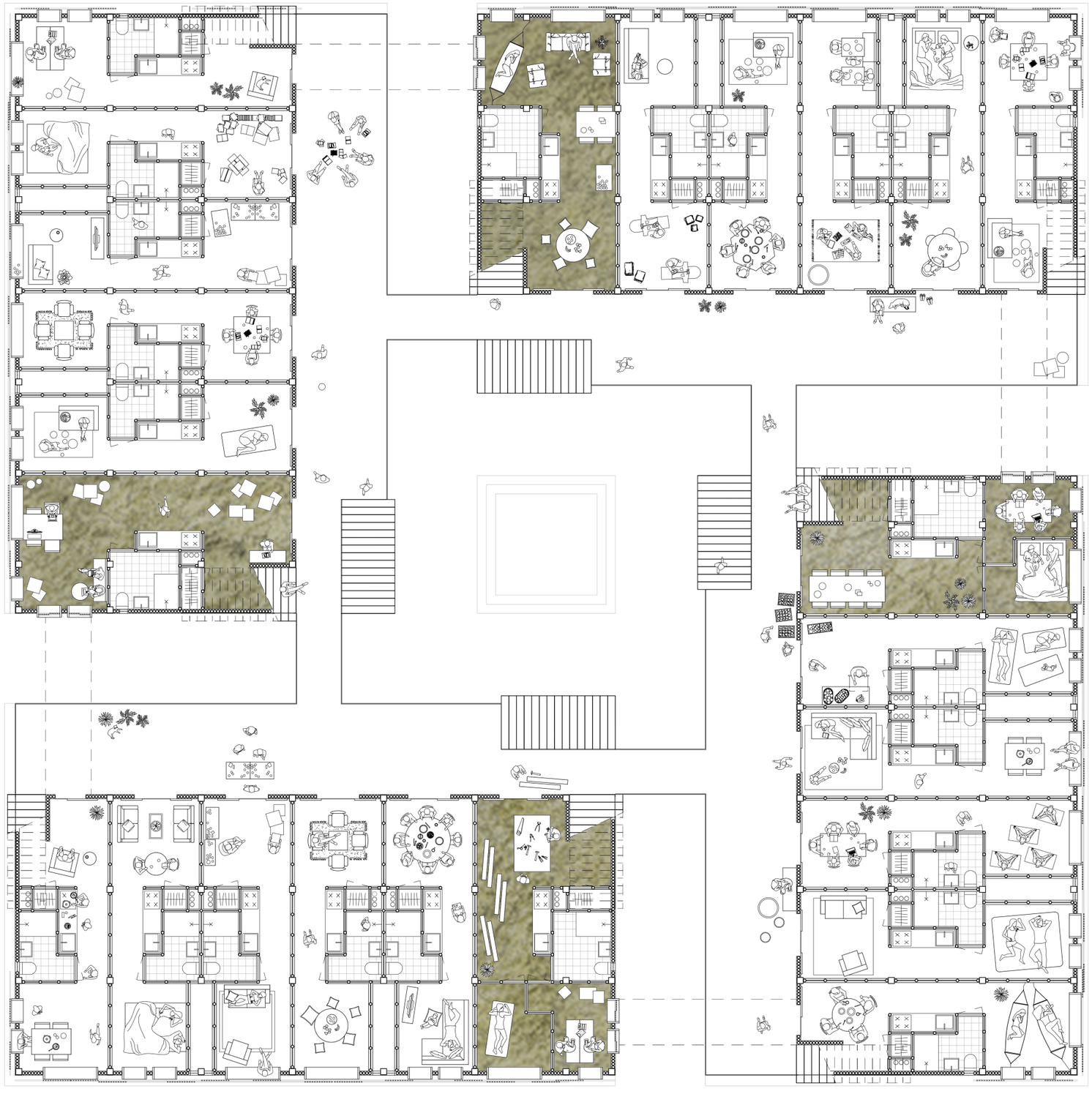
size	12 x 4,5 m
area	54 m^2
m^2 dwelling / person	10,8 m^2
dwellings / cluster	4
situation	ground floor
type	LIG



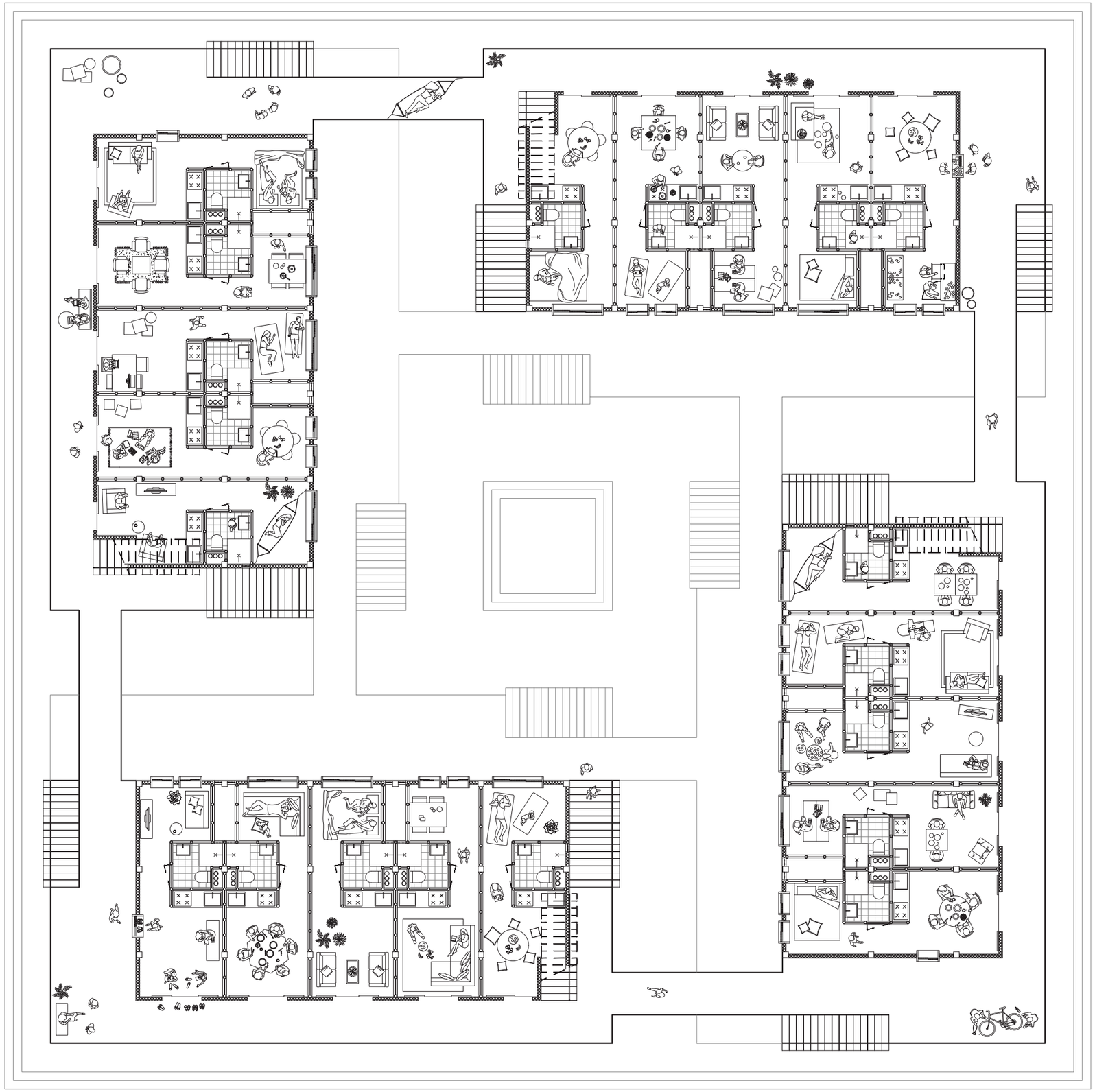


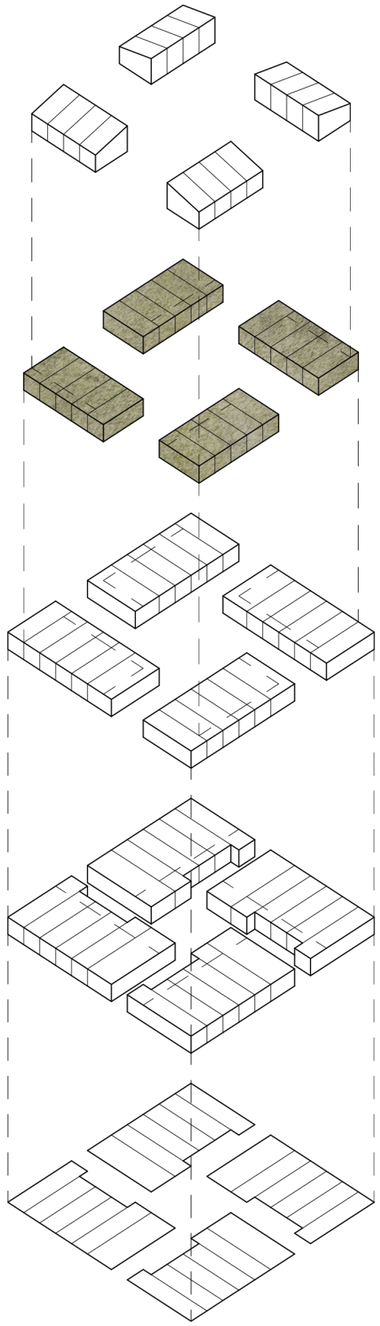
Ultimate
India

size	9 x 3 m
area	27 m^2
m^2 dwelling / person	5,4 m^2
dwellings / cluster	20
situation	first floor
type	EWS

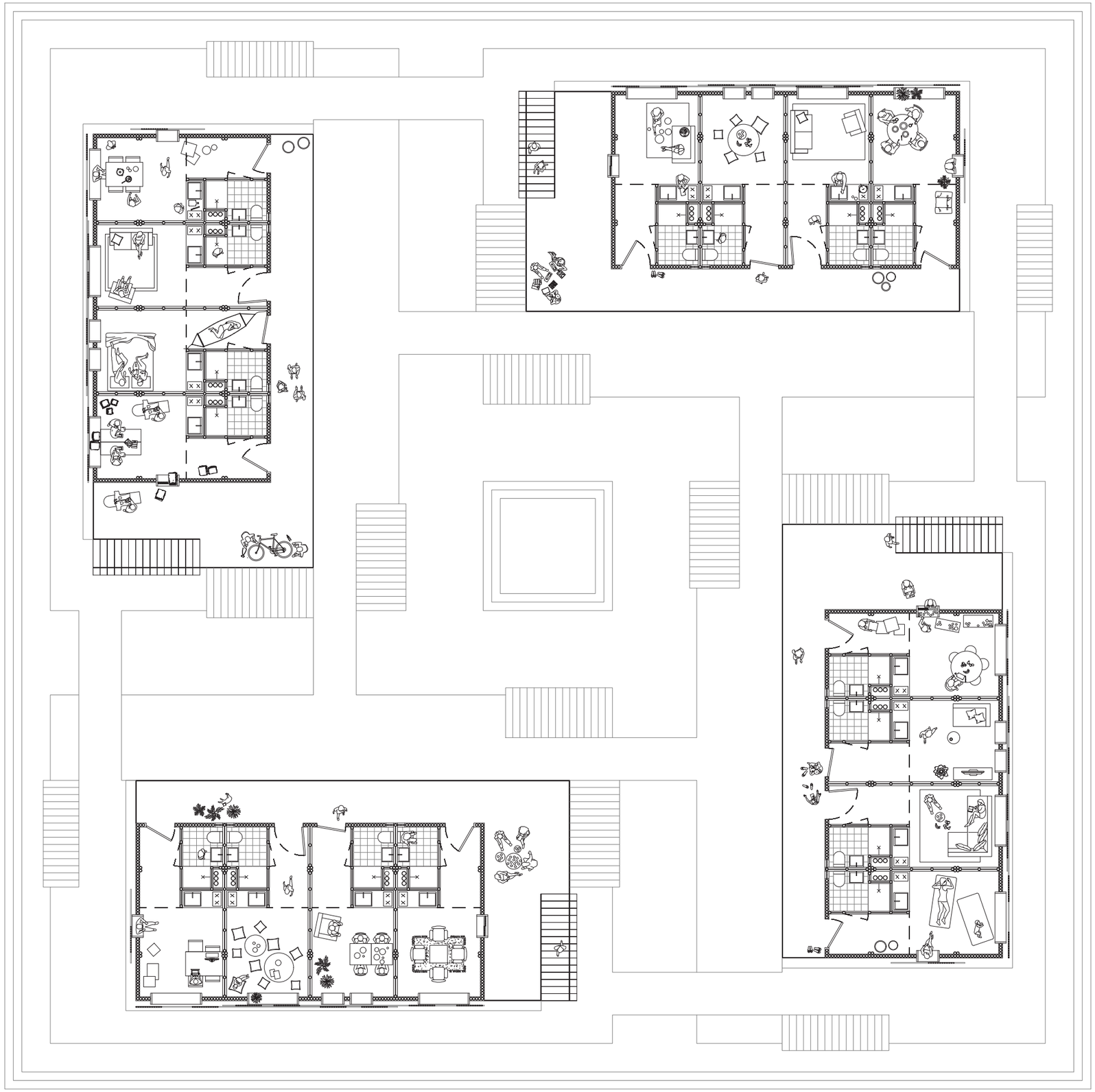


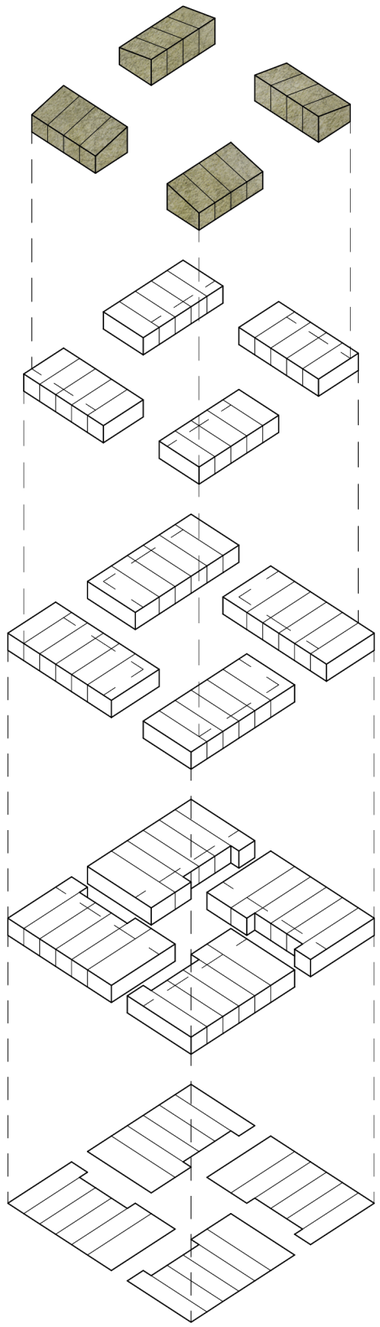
size	9 x 4,5 m
area	40,5 m^2
m^2 dwelling / person	8,1 m^2
dwellings / cluster	4
situation	first floor
type	LIG



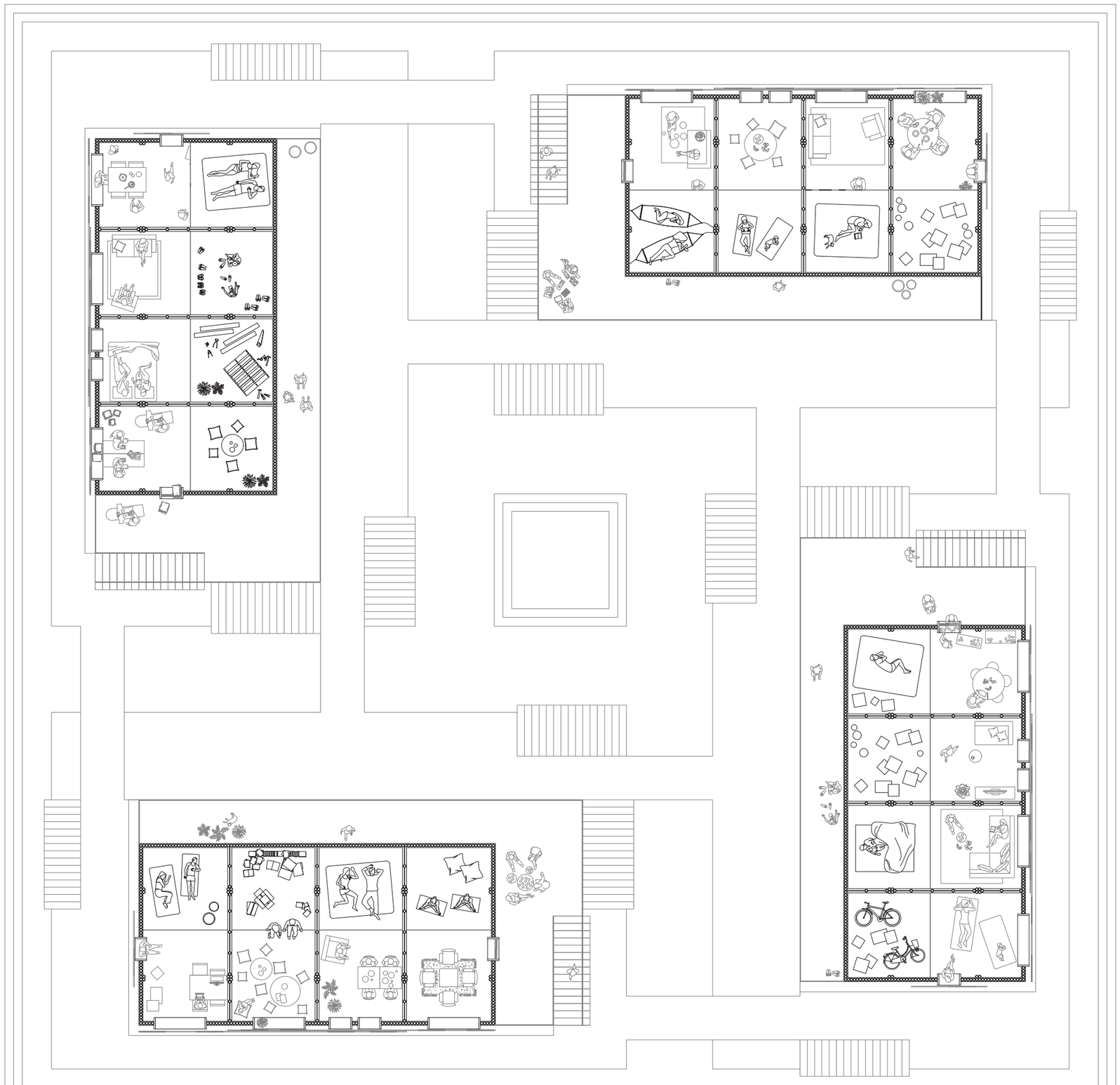


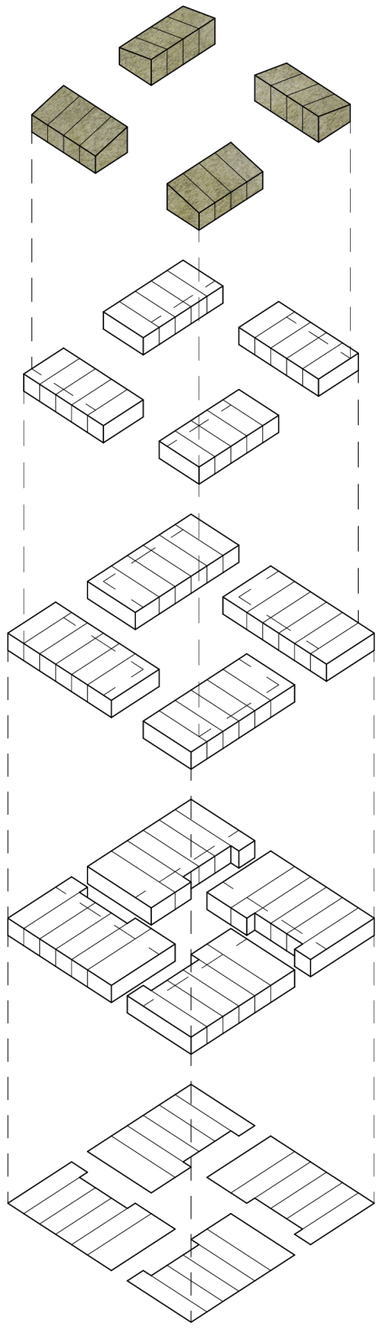
size	7,5 x 3 m
area	22,5 m^2
m^2 dwelling / person	4,5 m^2
dwellings / cluster	20
situation	second floor
type	EWS



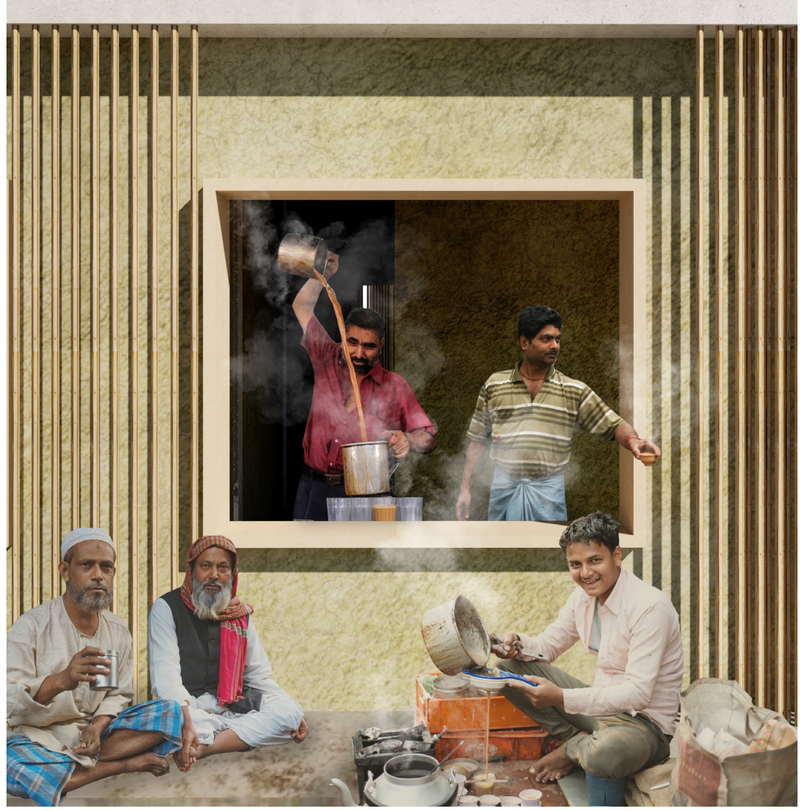


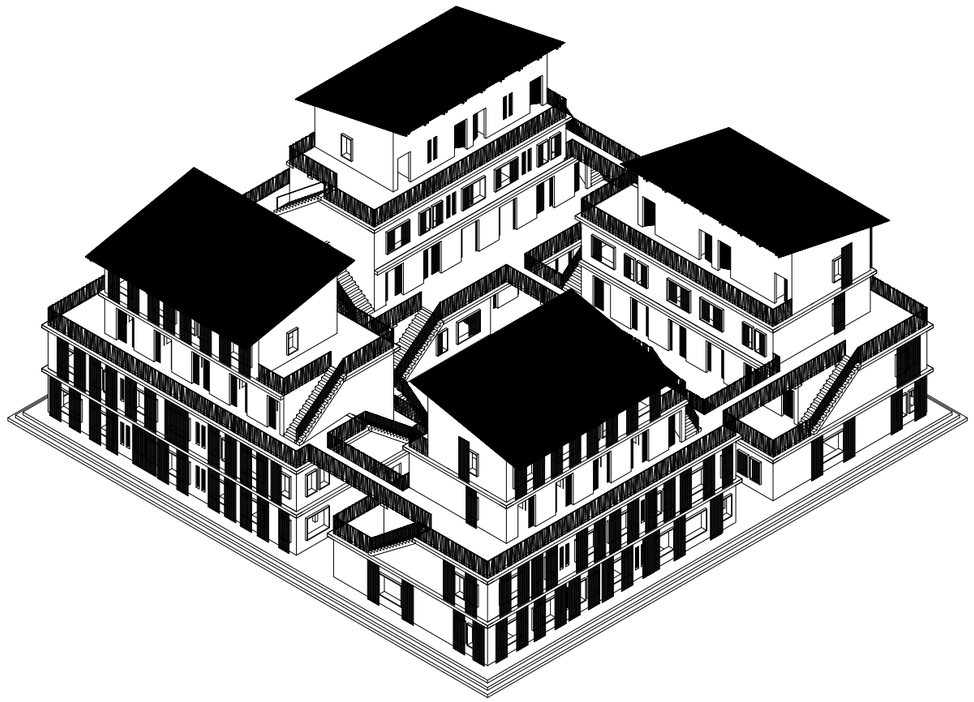
size	6 x 3 m + 3 x 3 m
area	27 m^2
m^2 dwelling / person	5,4 m^2
dwellings / cluster	16
situation	third / fourth floor
type	EWS





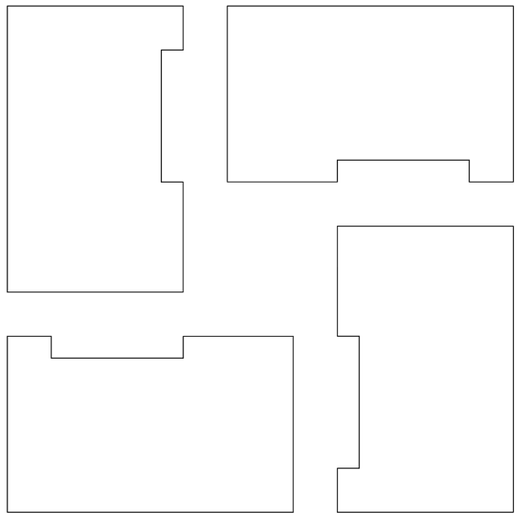
size	6 x 3 m + 3 x 3 m
area	27 m^2
m^2 dwelling / person	5,4 m^2
dwellings / cluster	16
situation	third / fourth floor
type	EWS

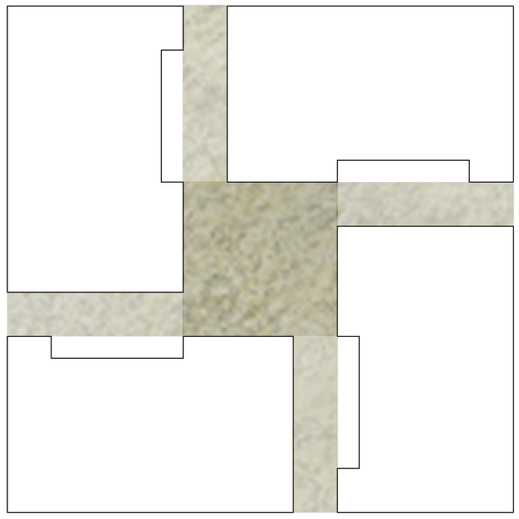


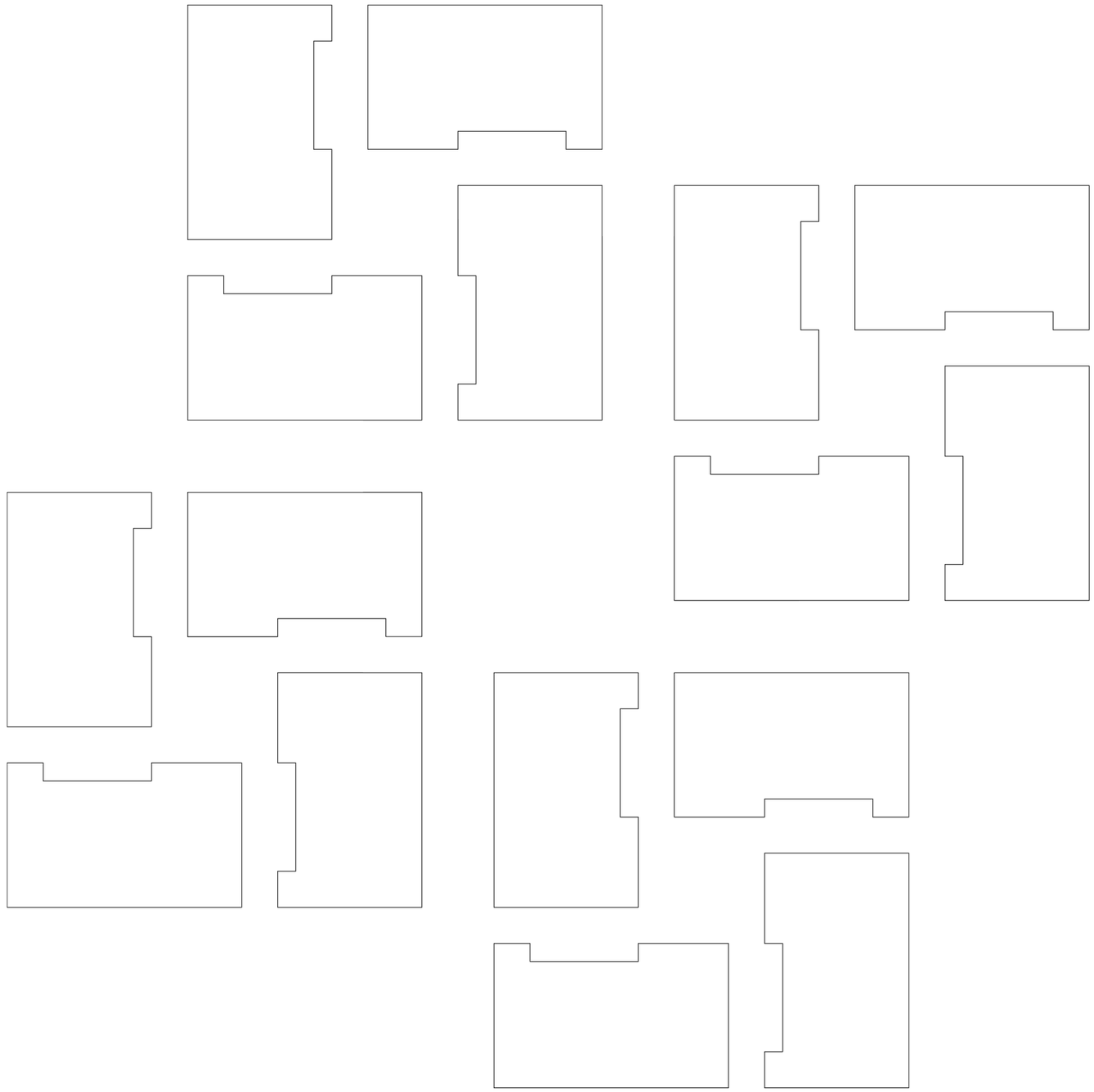


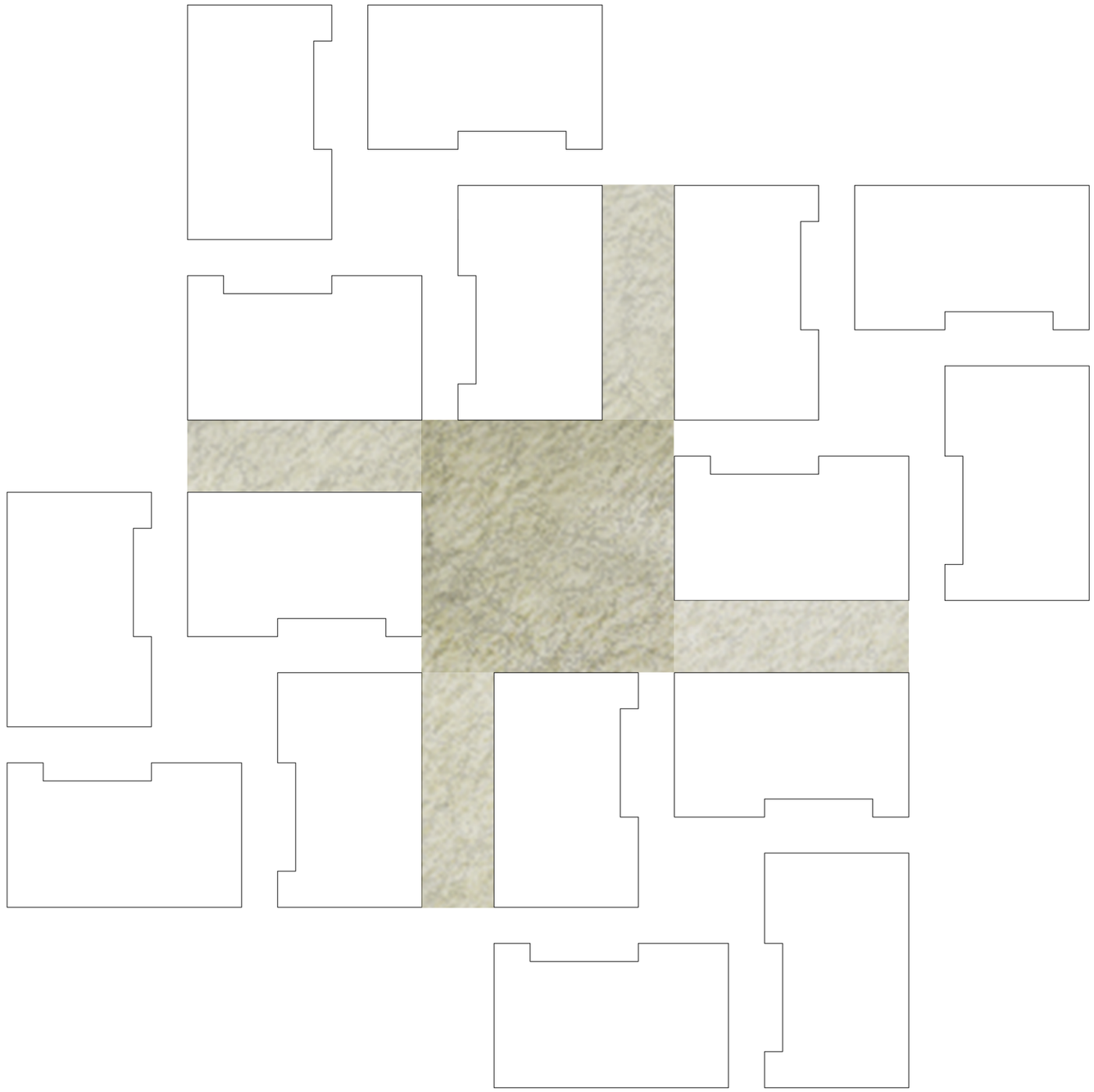
plot size	34,5 x 34,5 m = 1190,25 m^2						
built footprint	882 m^2						
total floor area	2466 m^2						
open space	940,25 m^2						
size of dwellings	54	40,5	36	31,5	27	22,5	27
number of dwellings	4	4	8	12	20	20	12
dwellings / cluster	84						
average family size	5						
persons / cluster	420						
m^2 dwelling / person	5,9 m^2						
m^2 open space / person	2,3 m^2						
m^2 open space / dwelling	11,2 m^2						
FSI cluster	2,1						
OSR cluster	2,6						

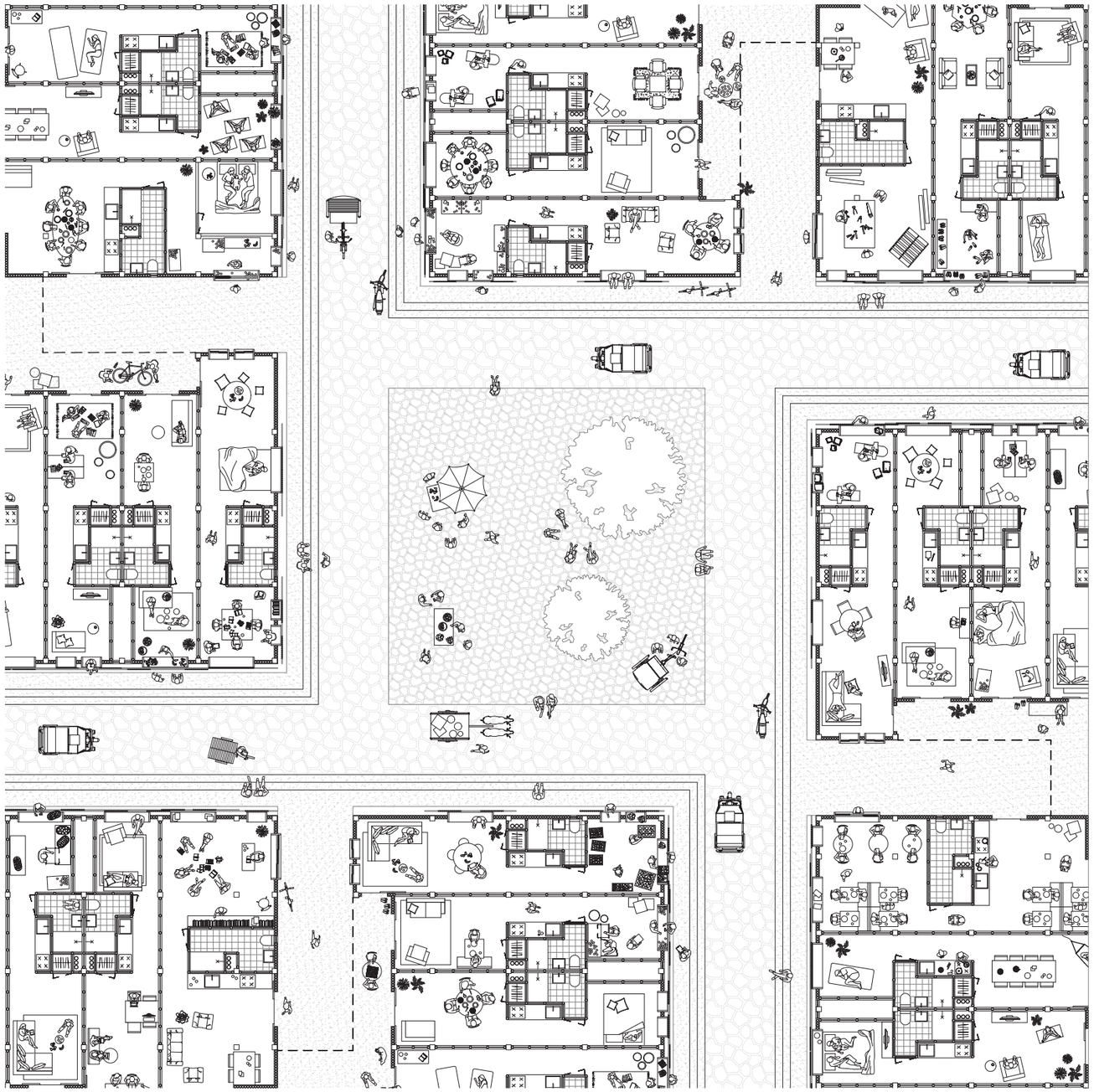
urban design

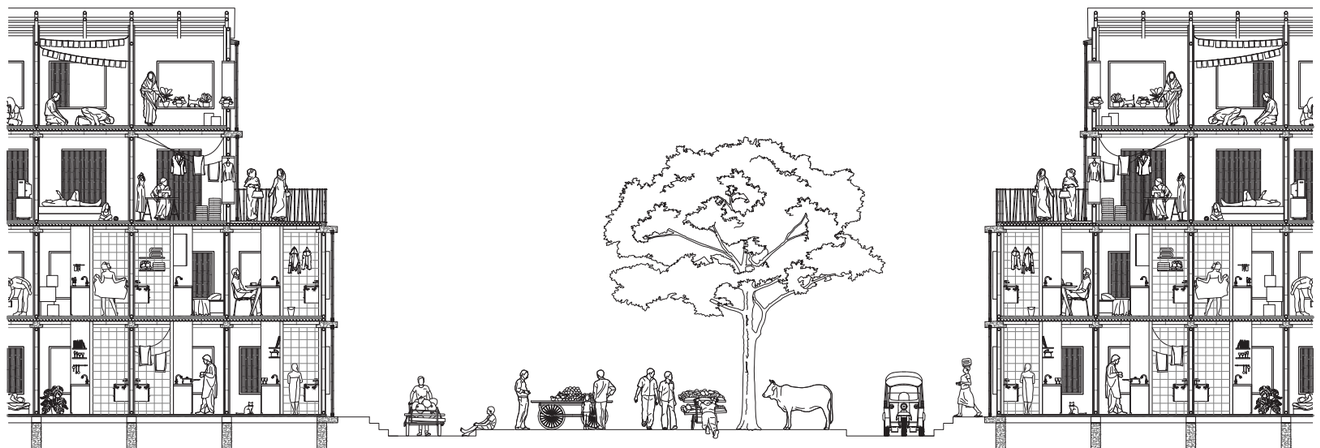












+ - +/-
phase 0 0 0 0

	+	-	+/-
phase 0	0	0	0
phase 1	+ 336	- 0	336

	+	-	+/-
phase 0	0	0	0
phase 1	+ 336	- 0	336
phase 2.1	+ 0	- 54	282

	+	-	+/-
phase 0	0	0	0
phase 1	+ 336	- 0	336
phase 2.1	+ 0	- 54	282
phase 2.2	+ 168	- 0	450

	+	-	+/-
phase 0	0	0	0
phase 1	+ 336	- 0	336
phase 2.1	+ 0	- 54	282
phase 2.2	+ 168	- 0	450
phase 3.1	+ 0	- 110	340

	+	-	+/-
phase 0	0	0	0
phase 1	+ 336	- 0	336
phase 2.1	+ 0	- 54	282
phase 2.2	+ 168	- 0	450
phase 3.1	+ 0	- 110	340
phase 3.2	+ 252	- 0	592

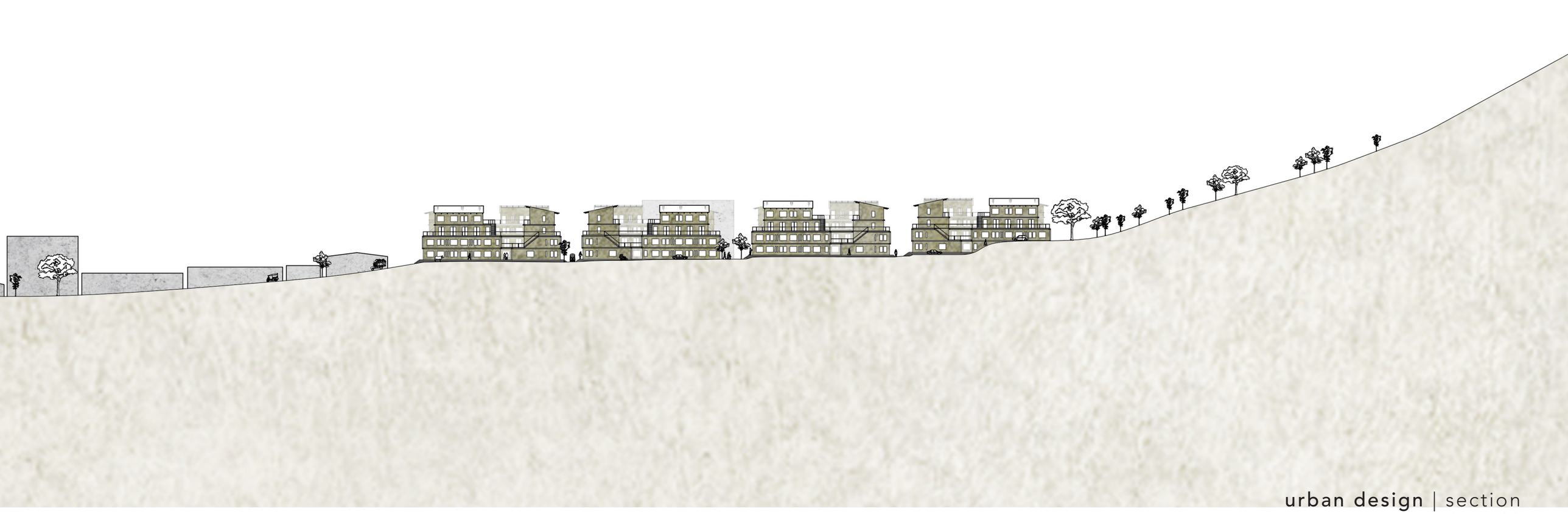
	+	-	+/-
phase 0	0	0	0
phase 1	+ 336	- 0	336
phase 2.1	+ 0	- 54	282
phase 2.2	+ 168	- 0	450
phase 3.1	+ 0	- 110	340
phase 3.2	+ 252	- 0	592
phase 4.1	+ 0	- 264	328

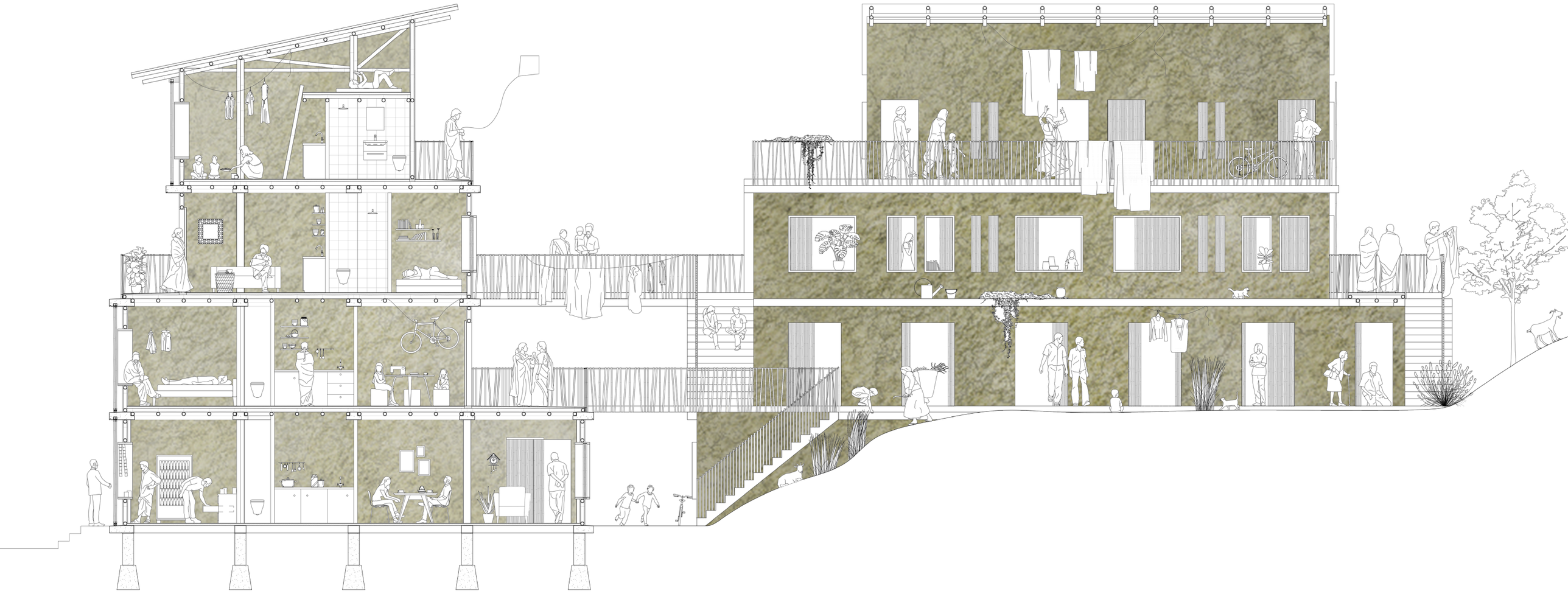
	+	-	+/-
phase 0	0	0	0
phase 1	+ 336	- 0	336
phase 2.1	+ 0	- 54	282
phase 2.2	+ 168	- 0	450
phase 3.1	+ 0	- 110	340
phase 3.2	+ 252	- 0	592
phase 4.1	+ 0	- 264	328
phase 4.2	+ 378	- 0	706

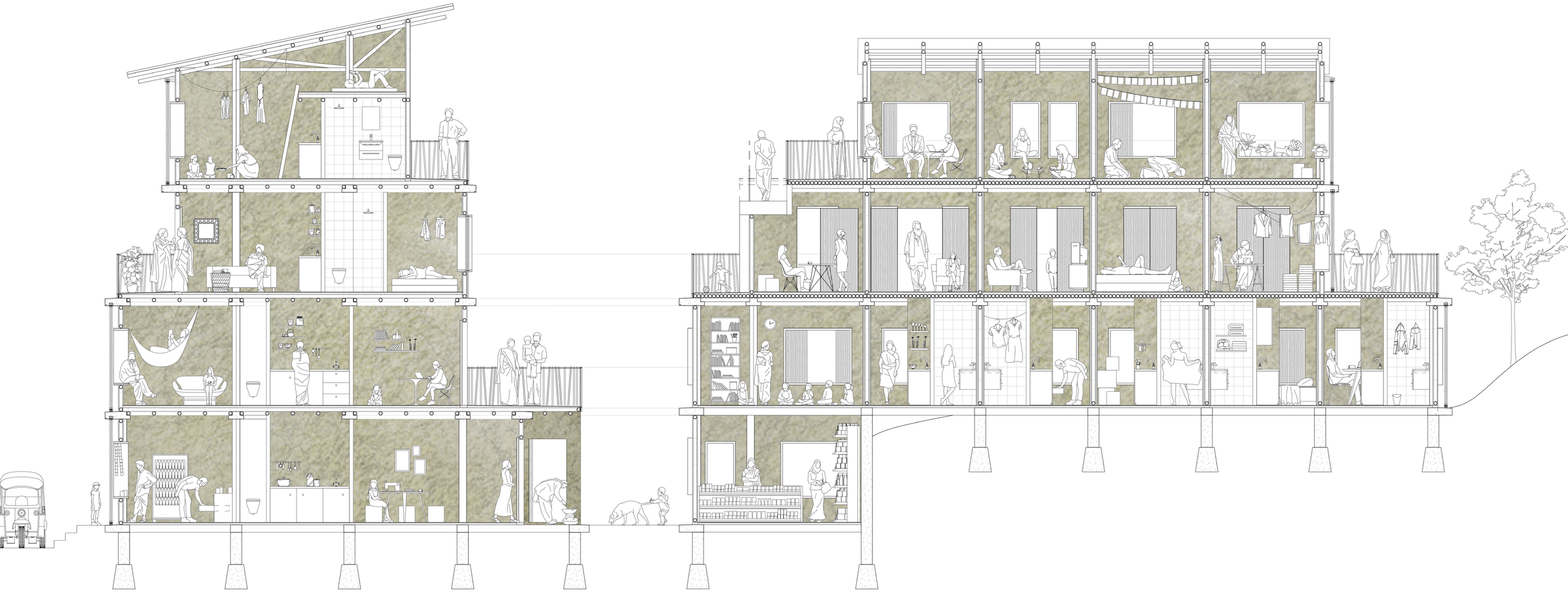
	+	-	+/-
phase 0	0	0	0
phase 1	+ 336	- 0	336
phase 2.1	+ 0	- 54	282
phase 2.2	+ 168	- 0	450
phase 3.1	+ 0	- 110	340
phase 3.2	+ 252	- 0	592
phase 4.1	+ 0	- 264	328
phase 4.2	+ 378	- 0	706
phase 5.1	+ 0	- 246	460

	+	-	+/-
phase 0	0	0	0
phase 1	+ 336	- 0	336
phase 2.1	+ 0	- 54	282
phase 2.2	+ 168	- 0	450
phase 3.1	+ 0	- 110	340
phase 3.2	+ 252	- 0	592
phase 4.1	+ 0	- 264	328
phase 4.2	+ 378	- 0	706
phase 5.1	+ 0	- 246	460
phase 5.2	+ 336	- 0	796
total	1470	674	796

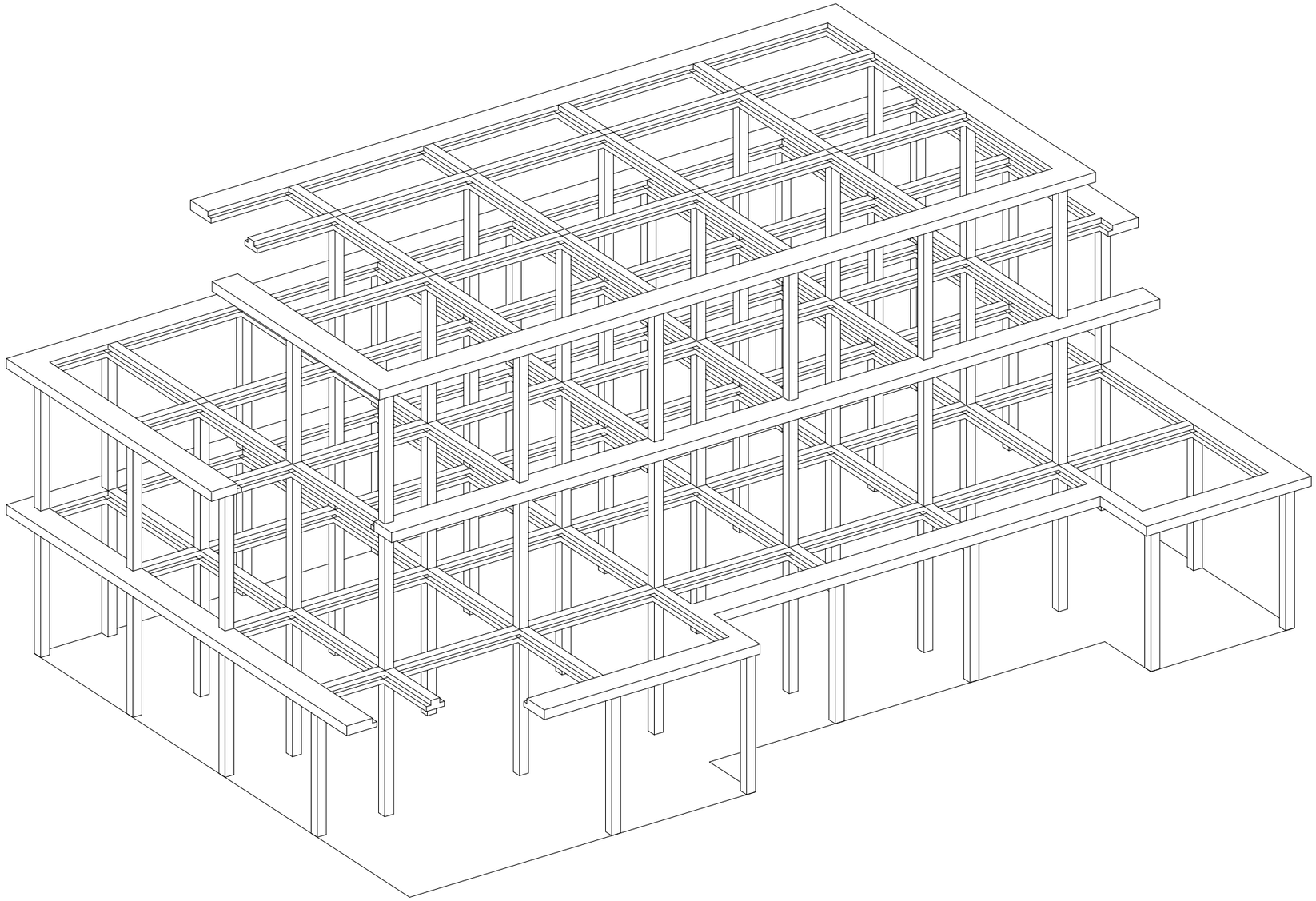
	old	new
area	3 ha	3 ha
number of dwellings	675	1470
total floor area	12000 m^2	43155 m^2
dwellings / hectare	225	490
people / hectare	1125	2450
FSI	0,4	1,4

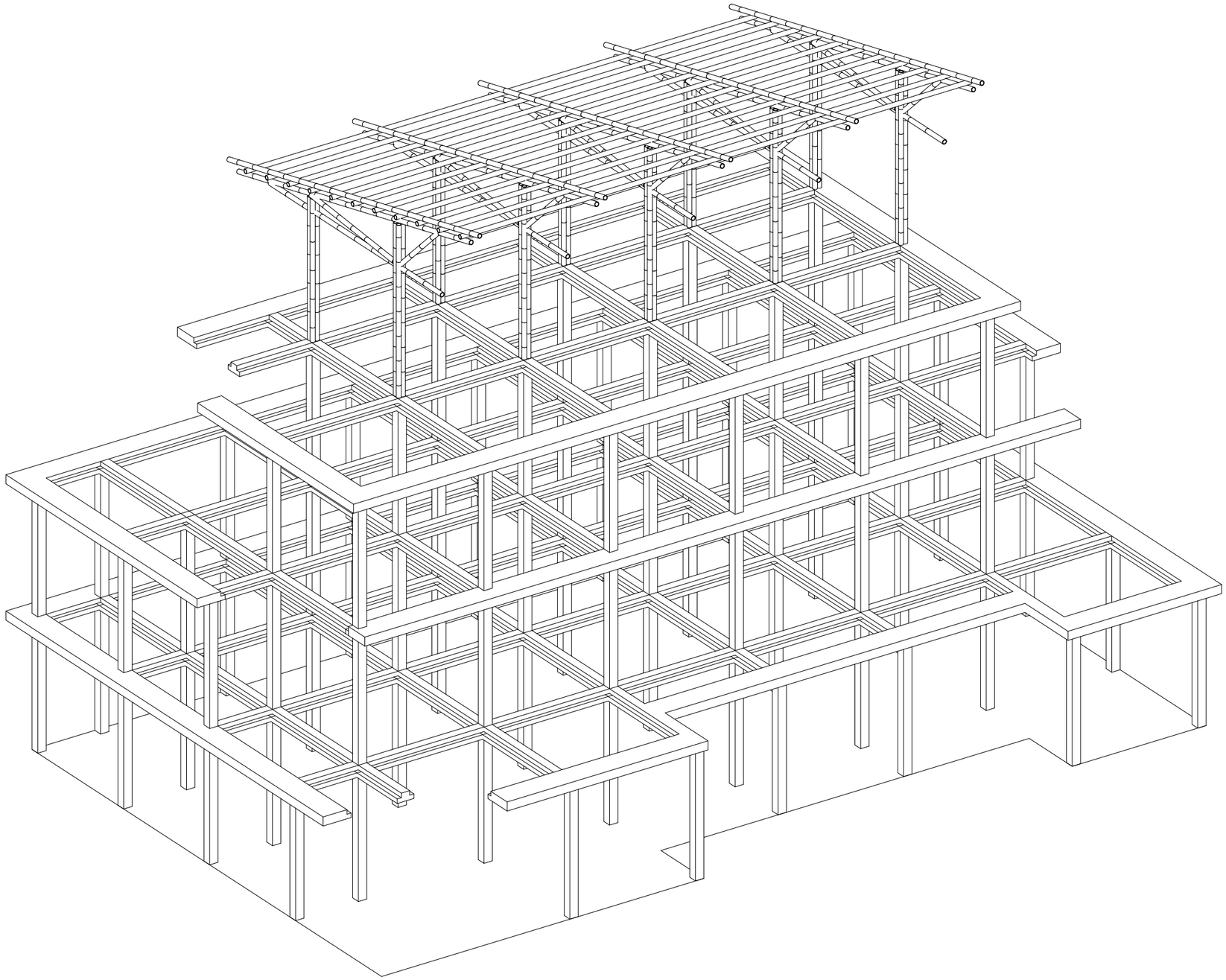






building technology





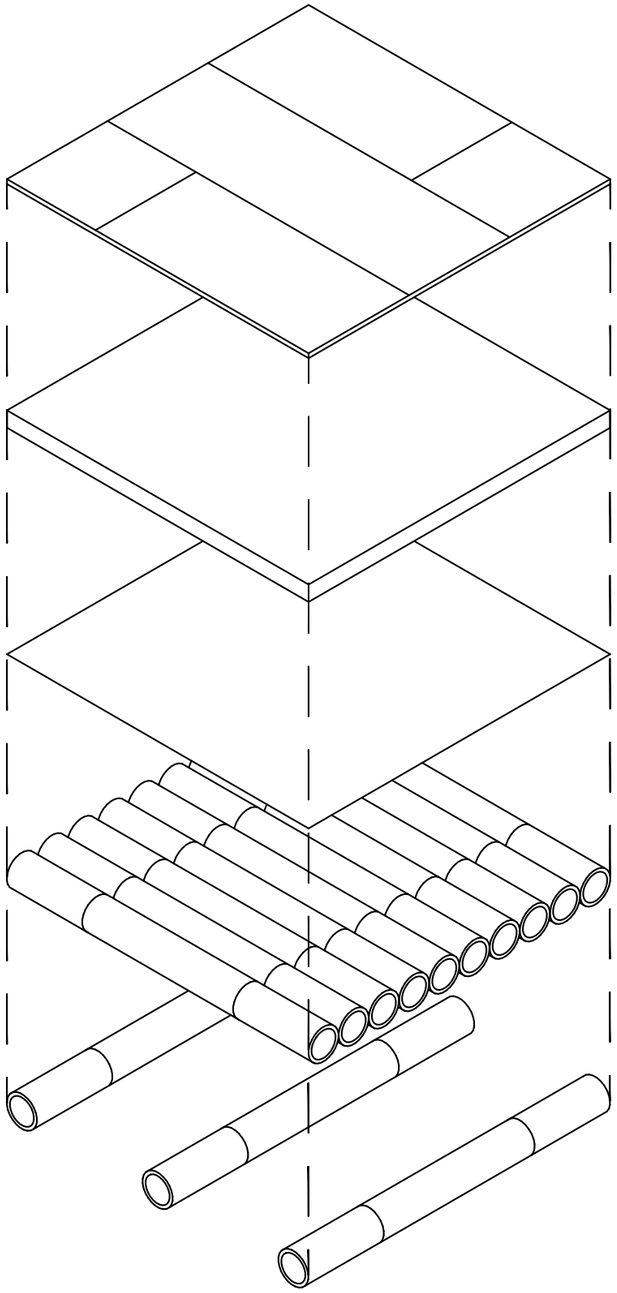
India is the second largest producer of bamboo in the world, after China.

Bamboo bearing area

India	156.866 km²
Maharashtra	15.927 km²

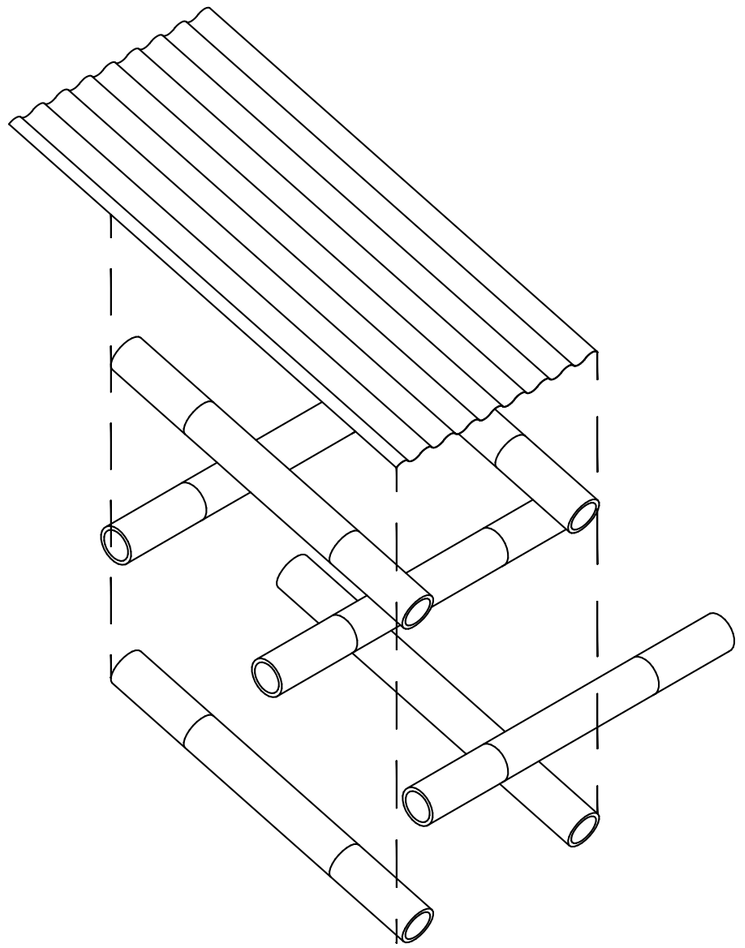
Amount of culms

India	28.103 million
Maharashtra	1.816 million



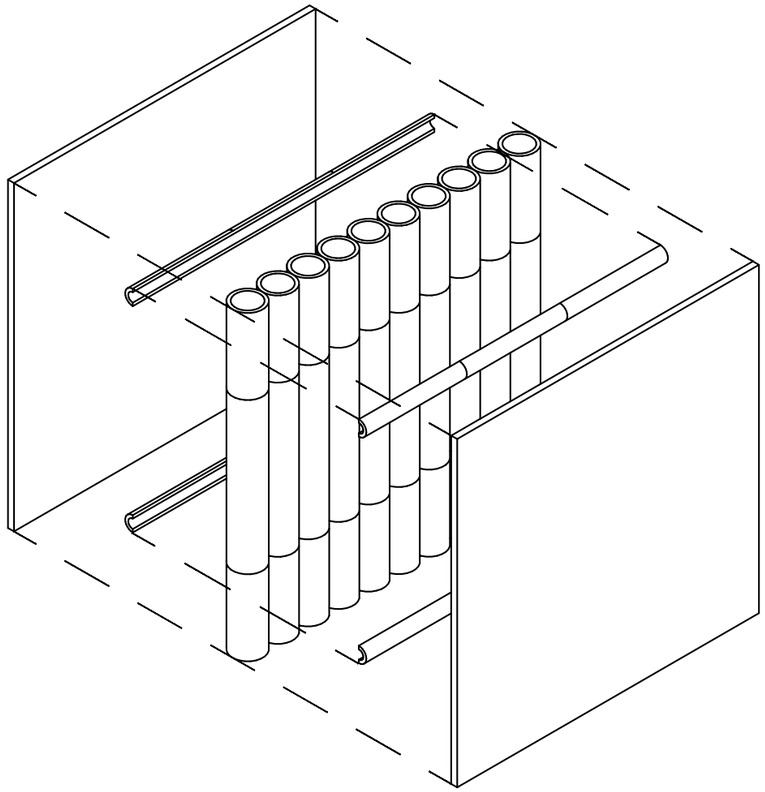
floor

14	crushed bamboo panels
50	structural earth base
	waterproof membrane
100	bamboo culms floor
100	bamboo joists



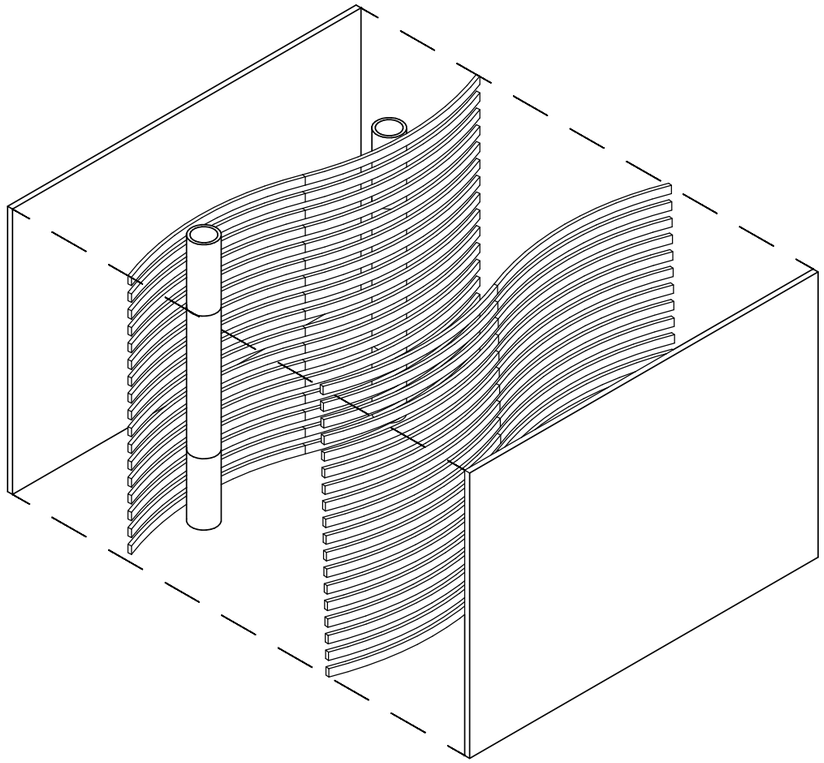
roof

25	corrugated steel
100	bamboo beam
100	bamboo beam
100	bamboo beam



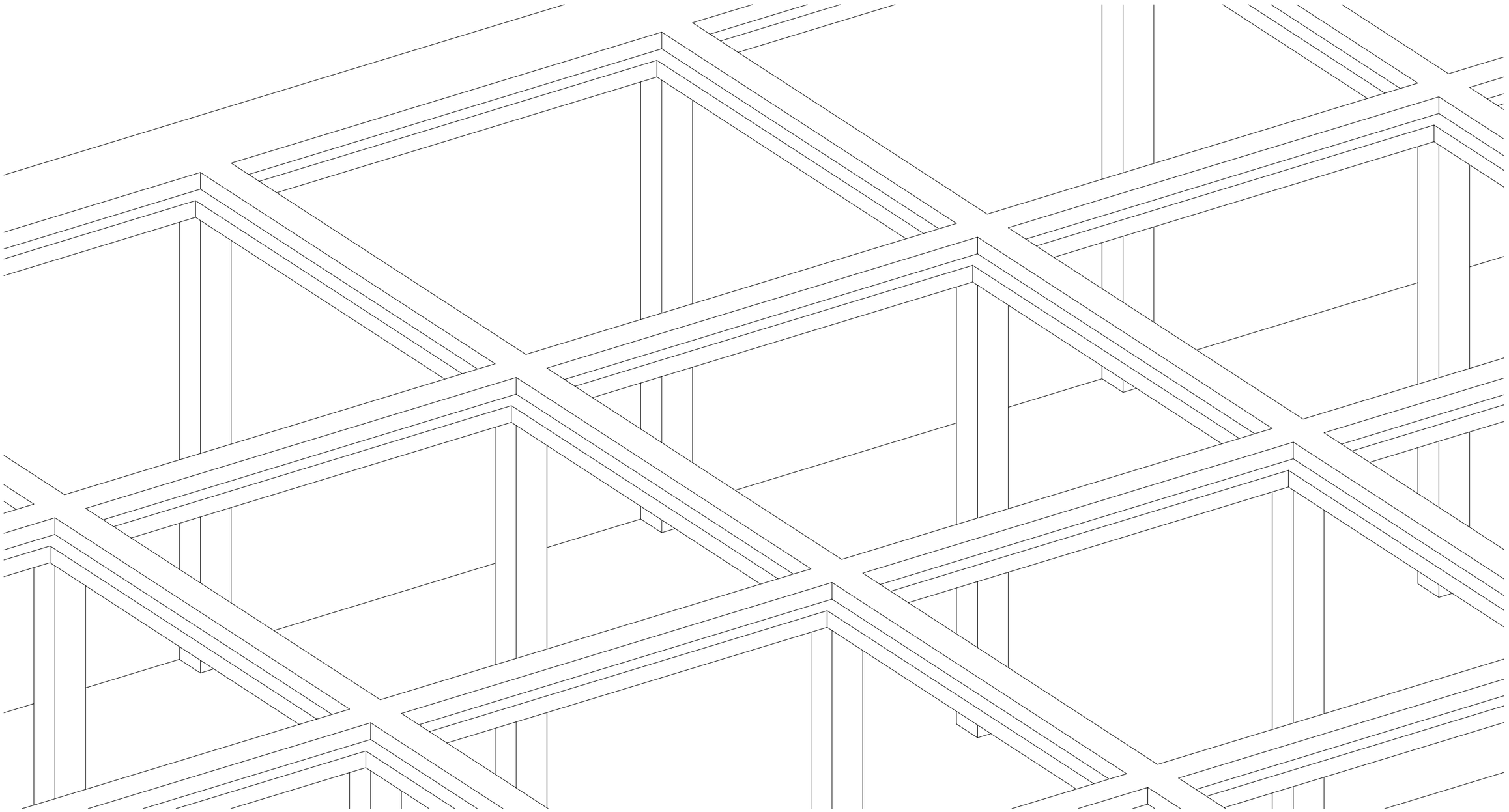
facade

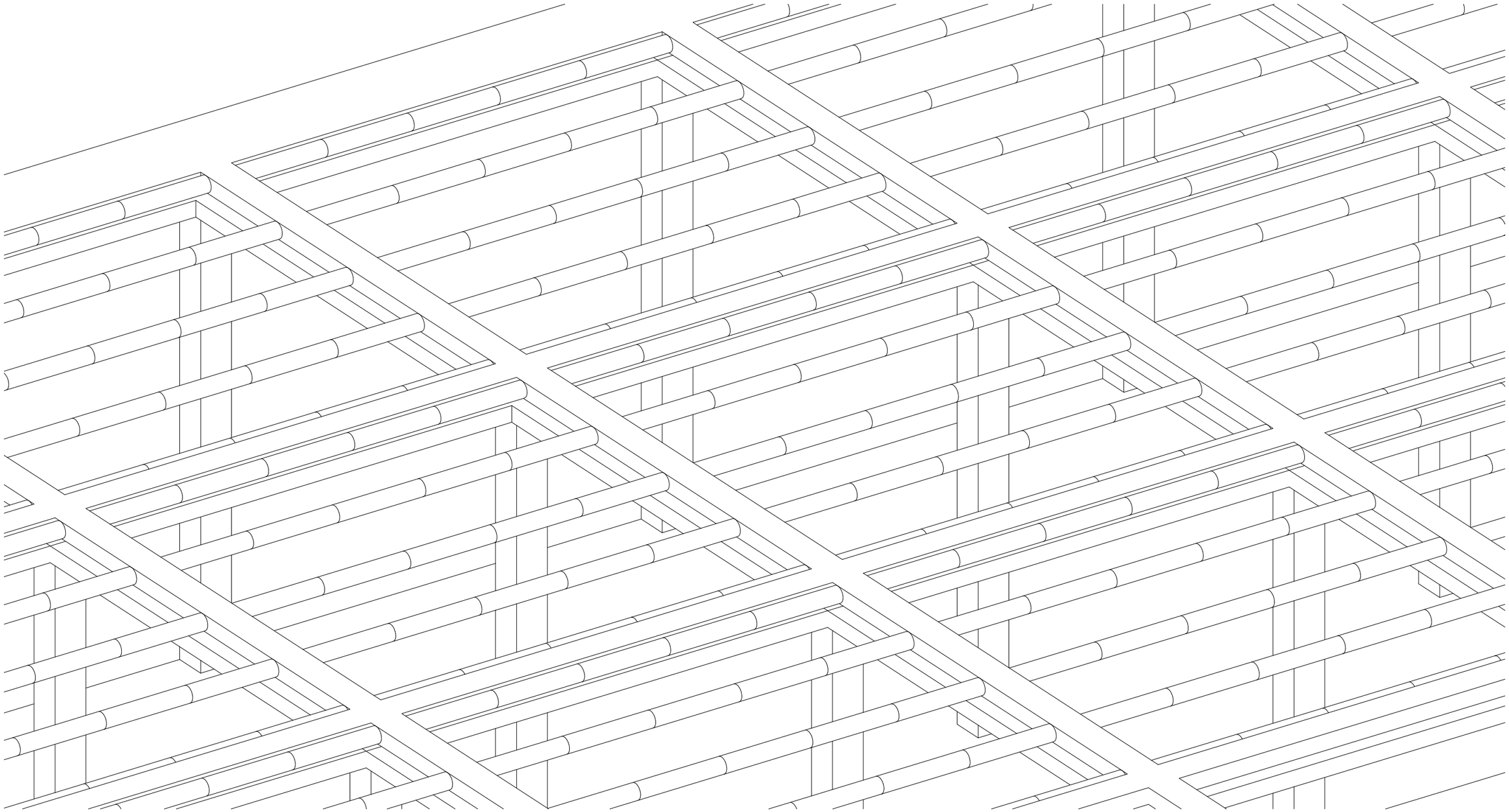
20	clay plaster
15	halved bamboo culms
100	bamboo culms
15	halved bamboo culms
20	clay plaster

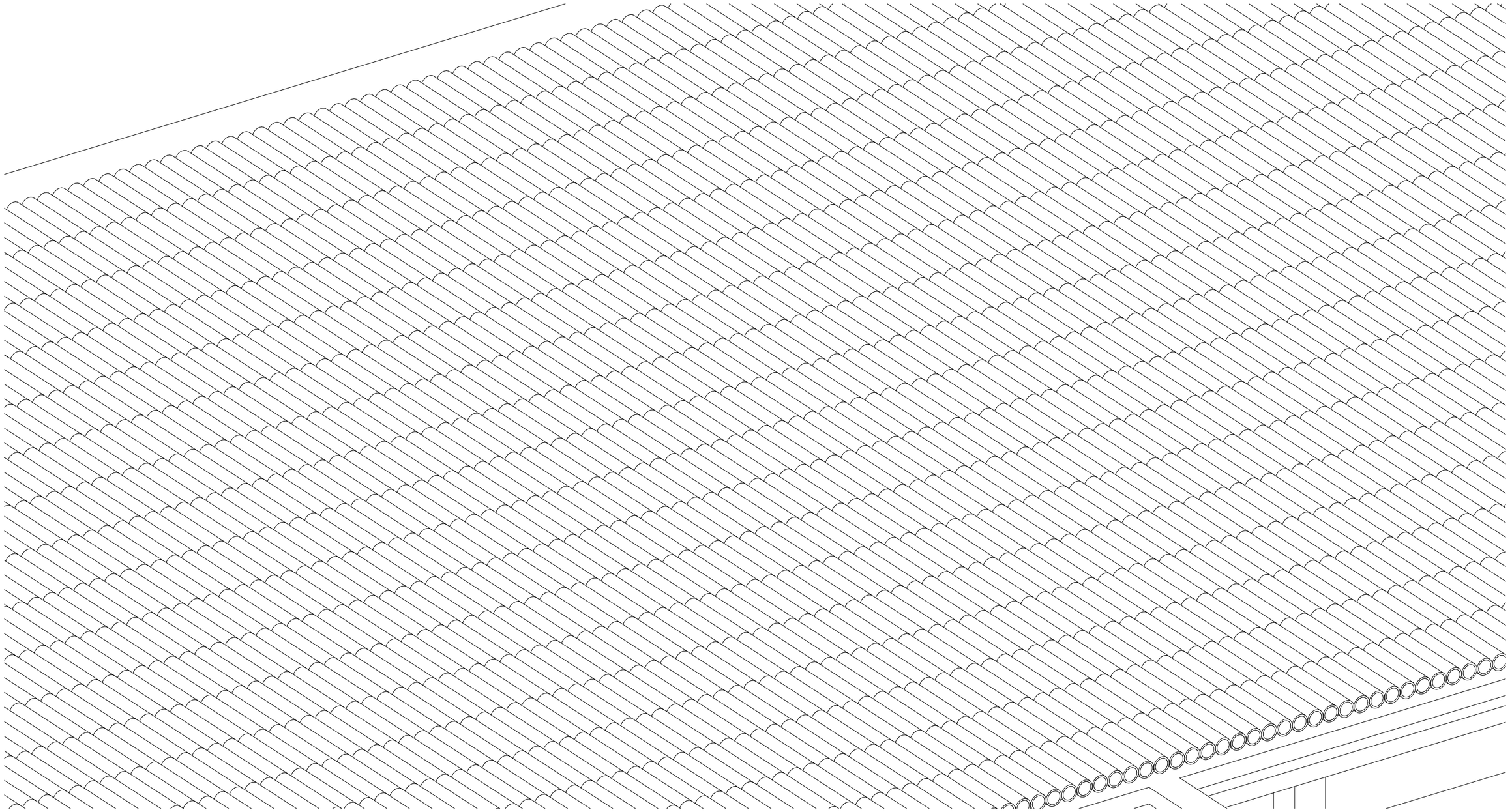


partition wall

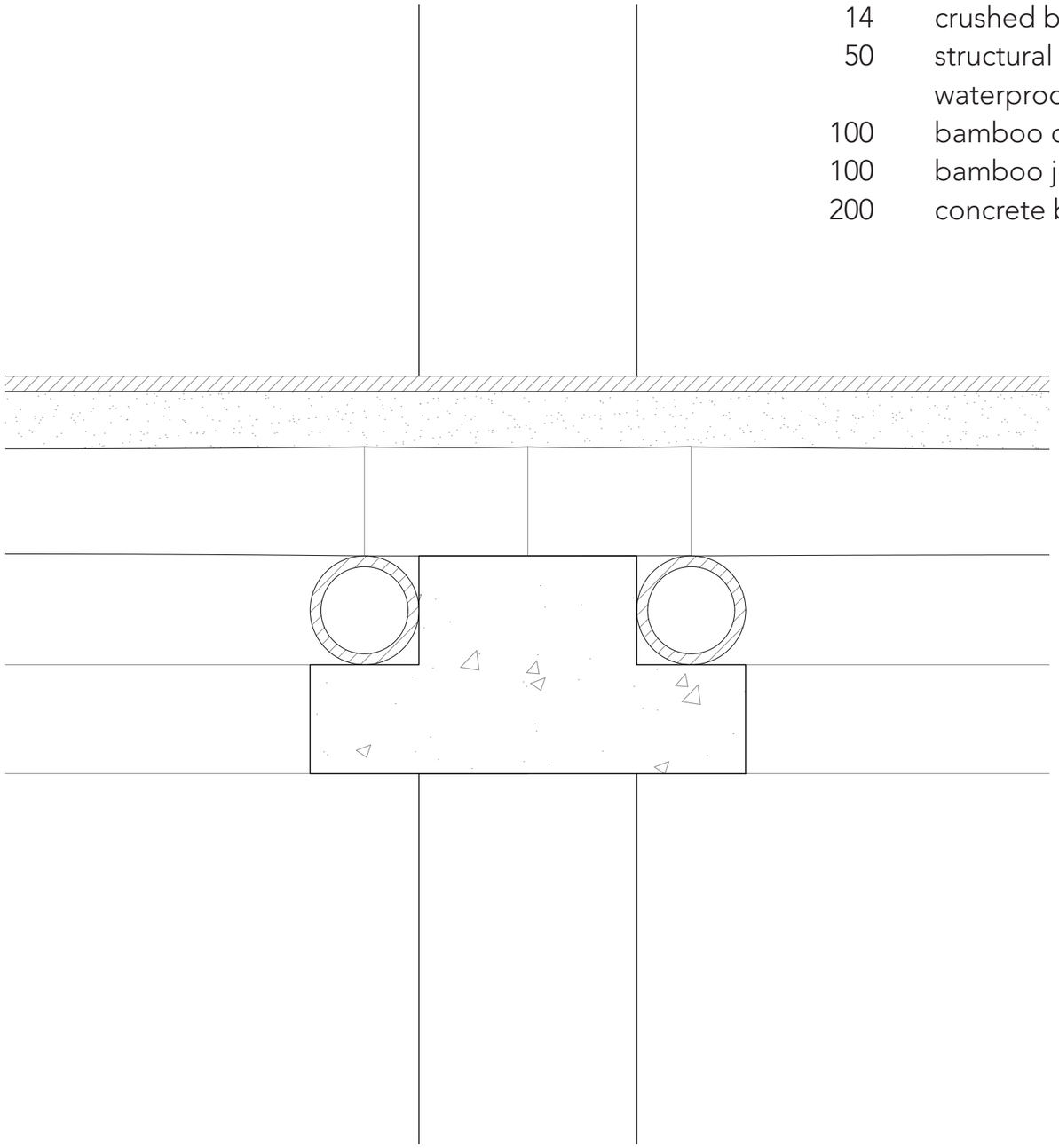
20	clay plaster
20	bamboo woven mat
100	bamboo culm
20	clay plaster

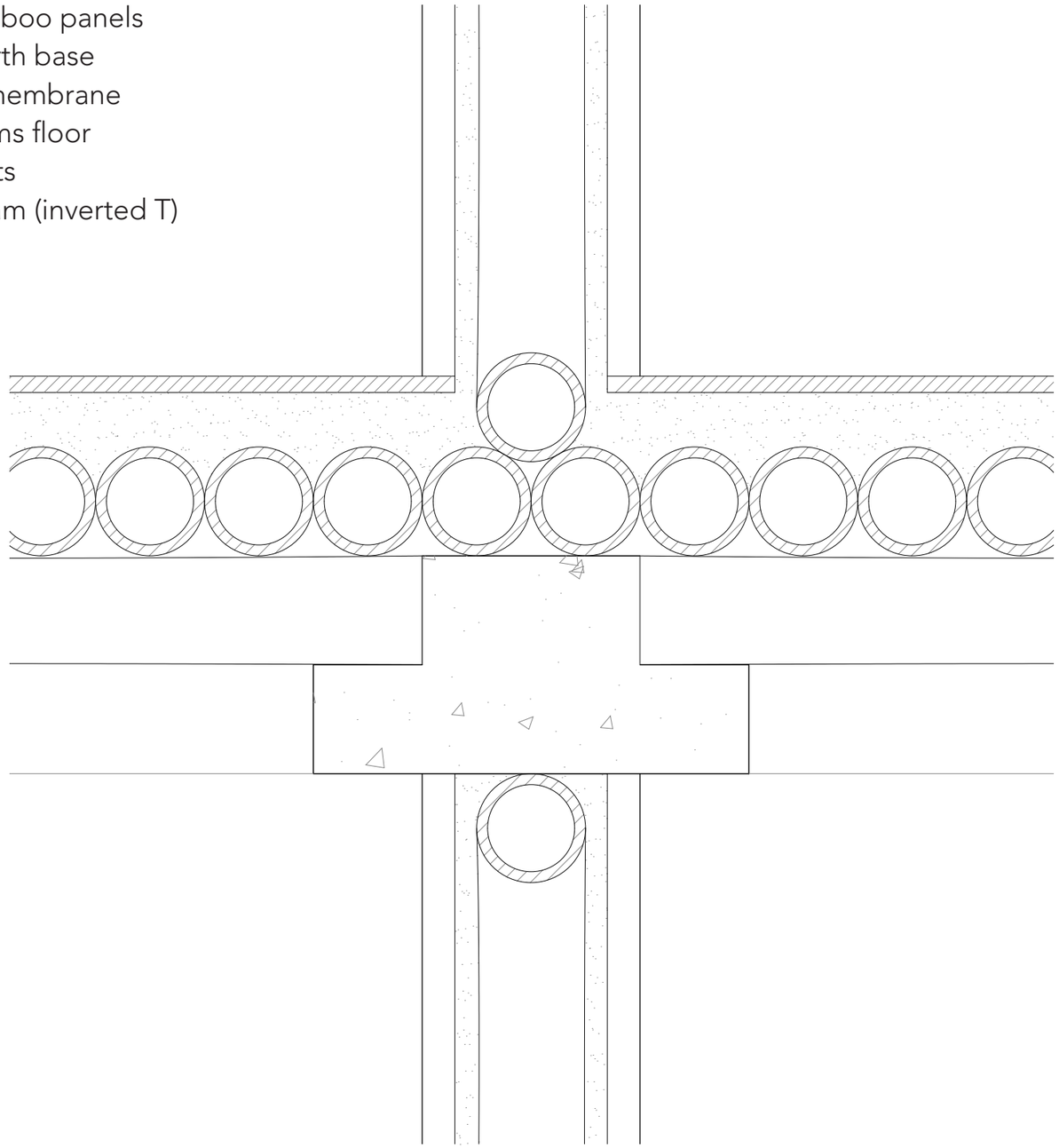


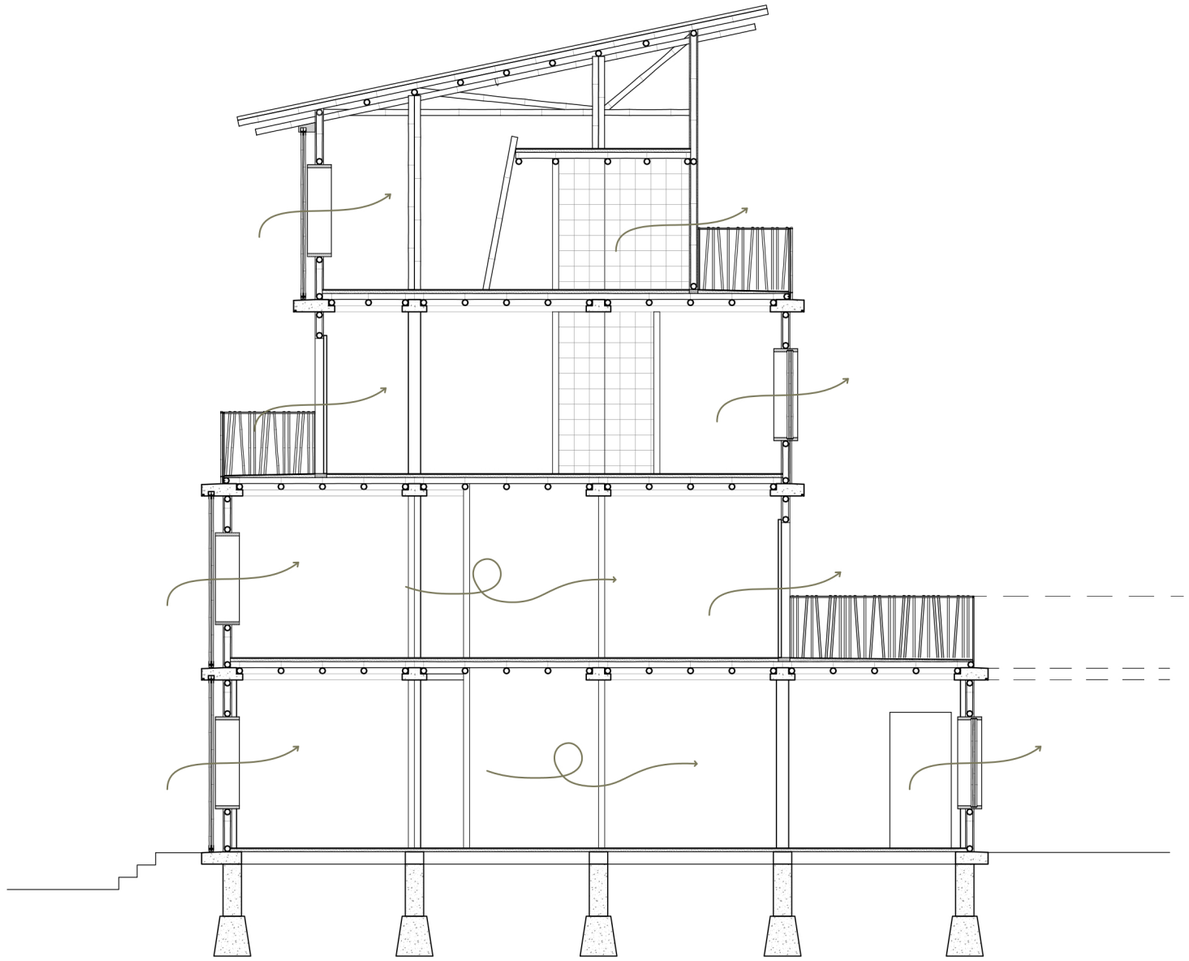


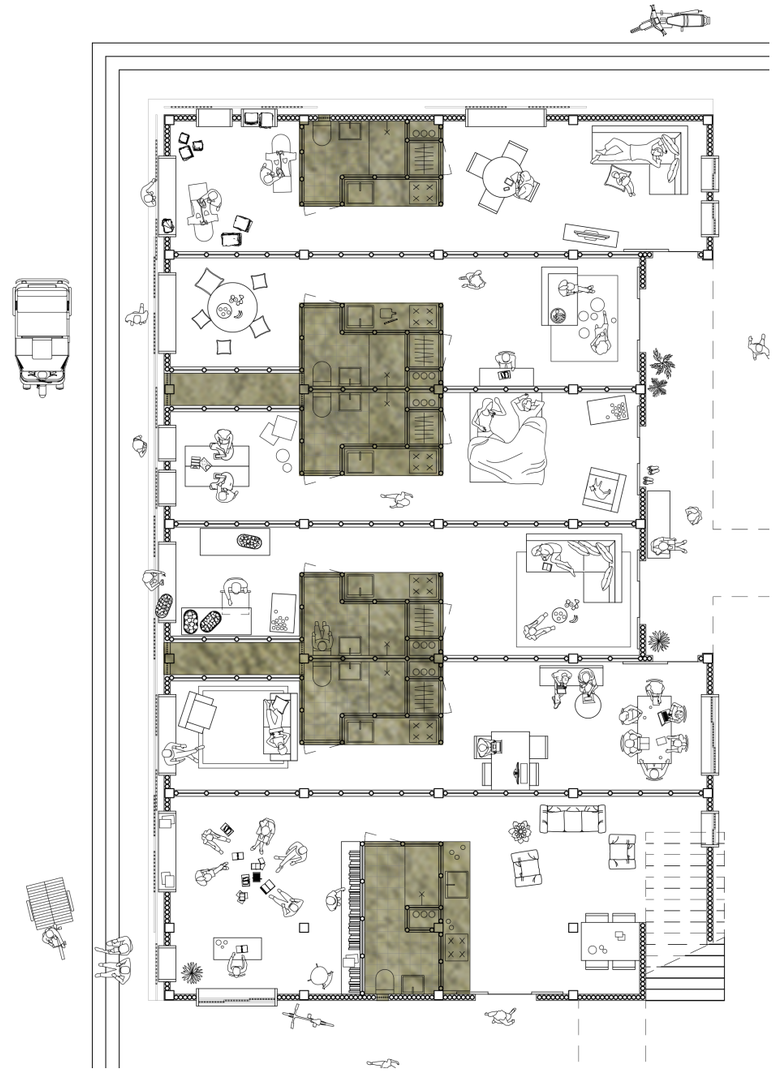


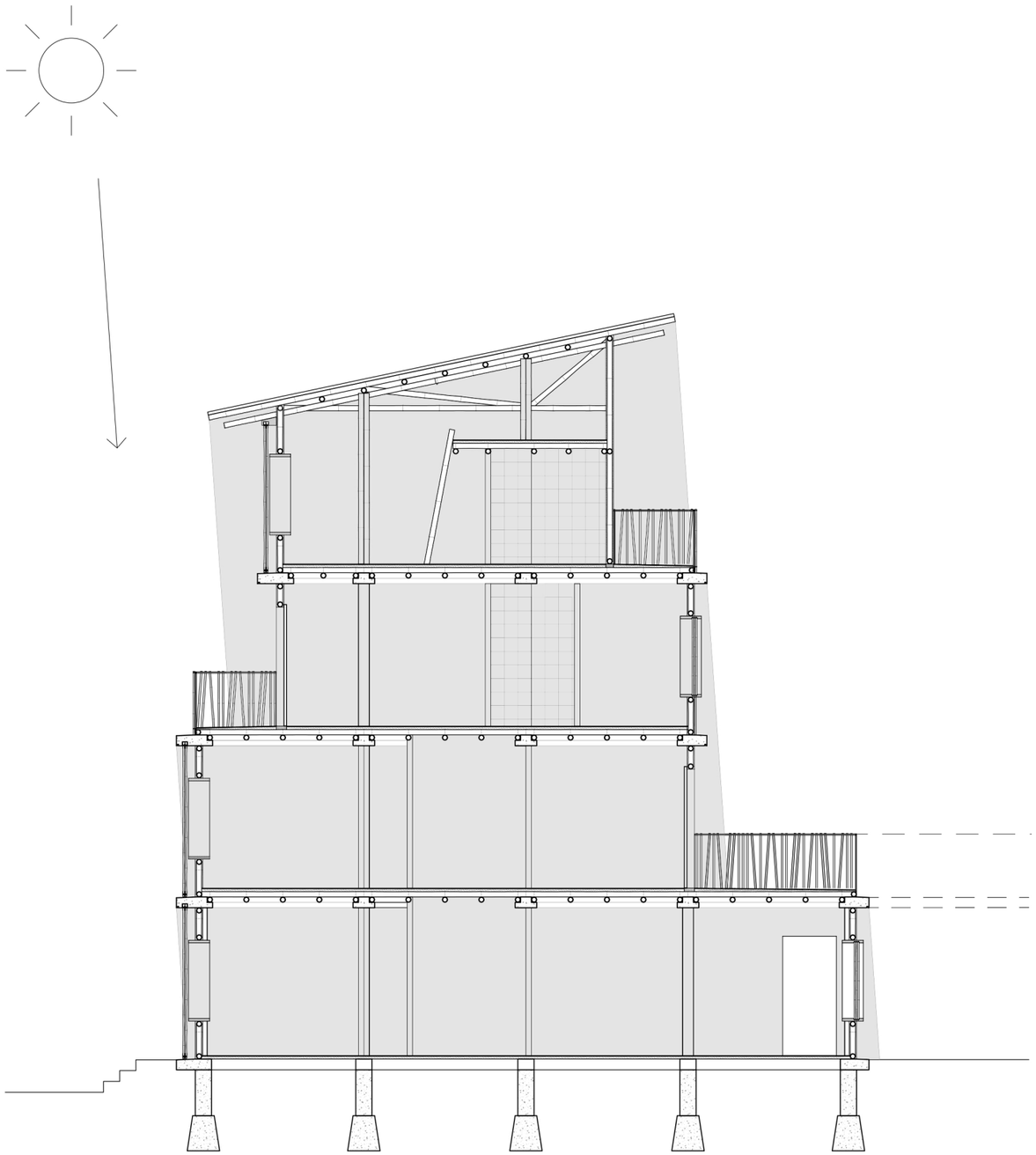
14	crushed bamboo panels
50	structural earth base
	waterproof membrane
100	bamboo culms floor
100	bamboo joists
200	concrete beam (inverted T)



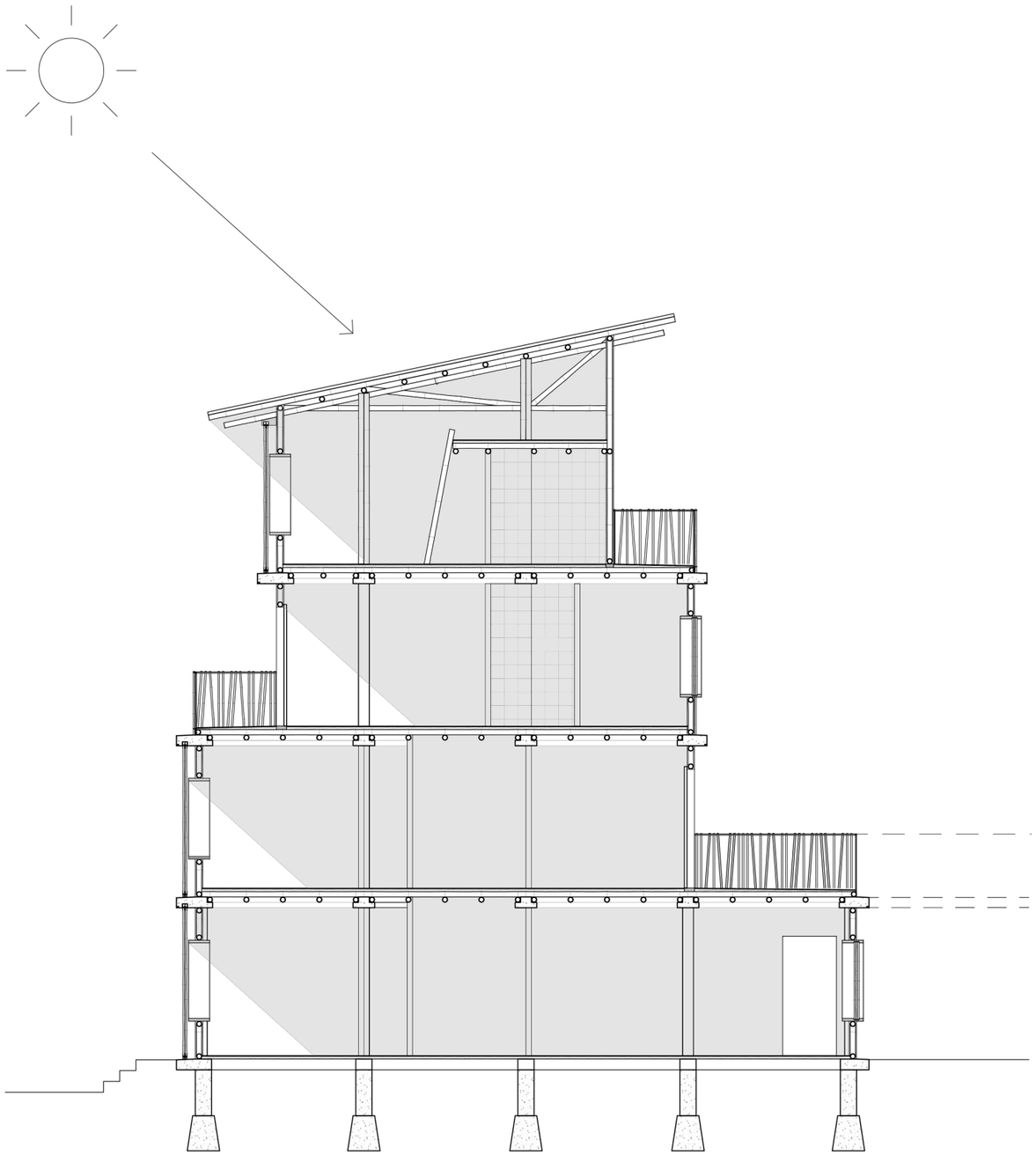








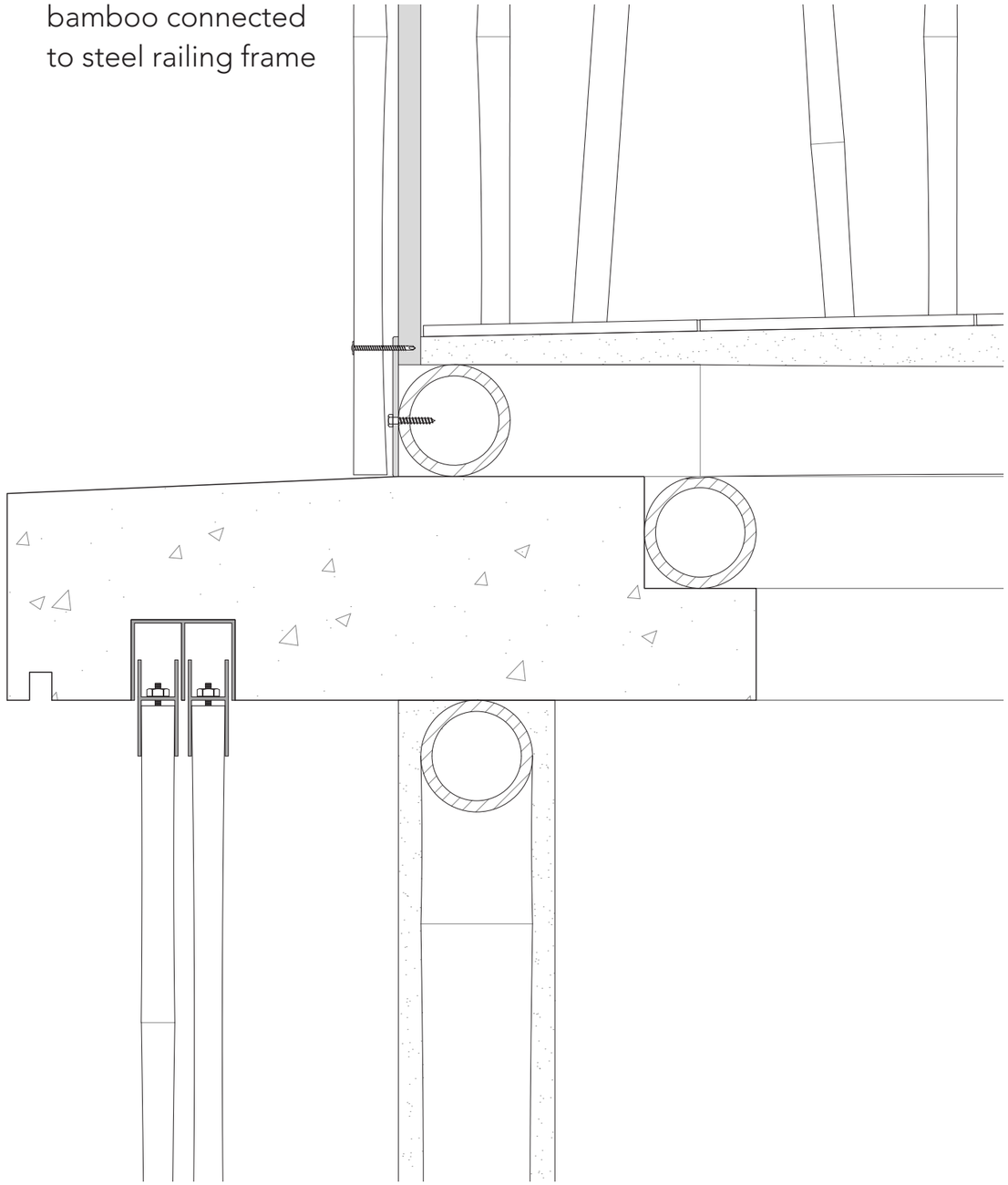
Summer



Winter

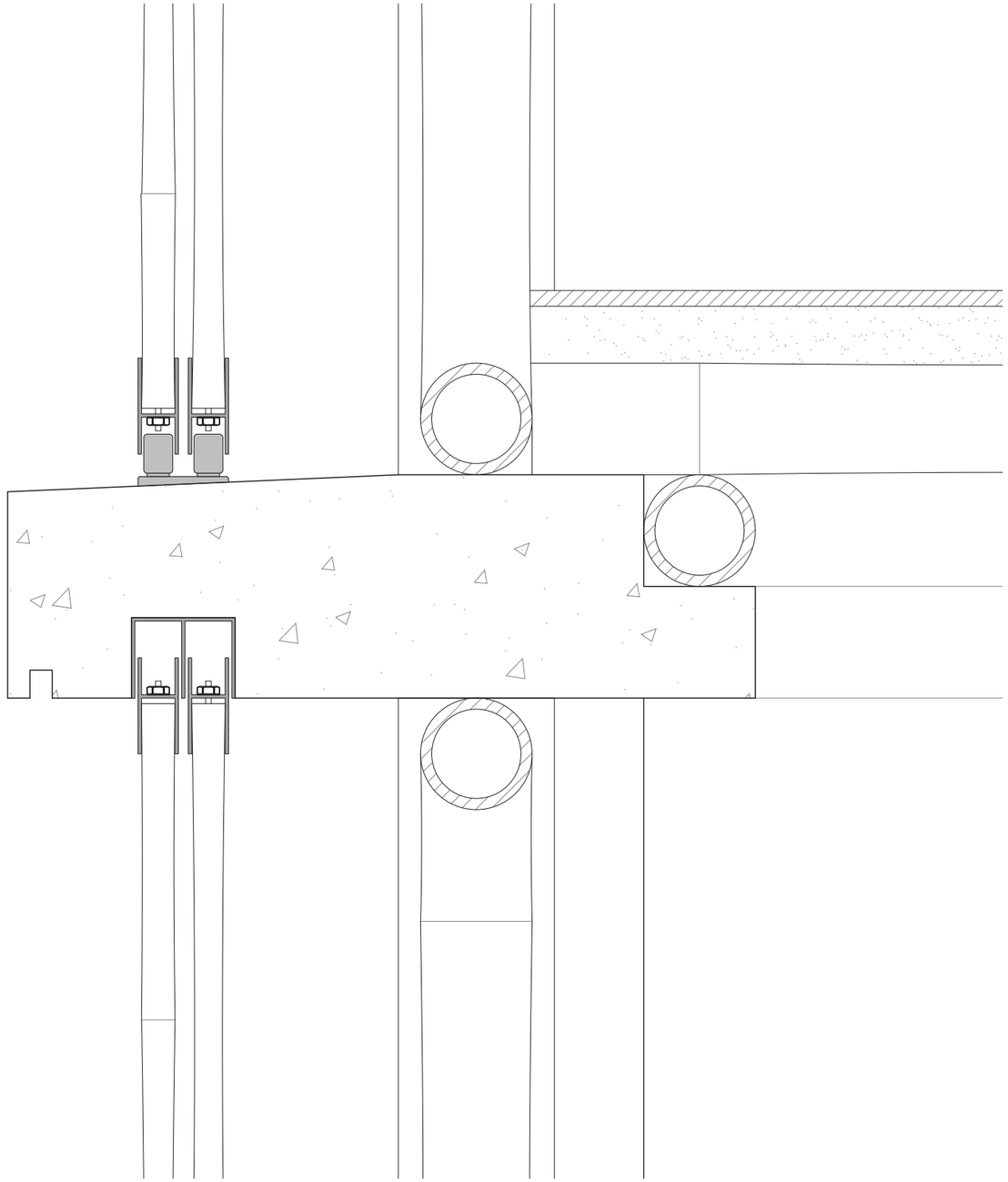
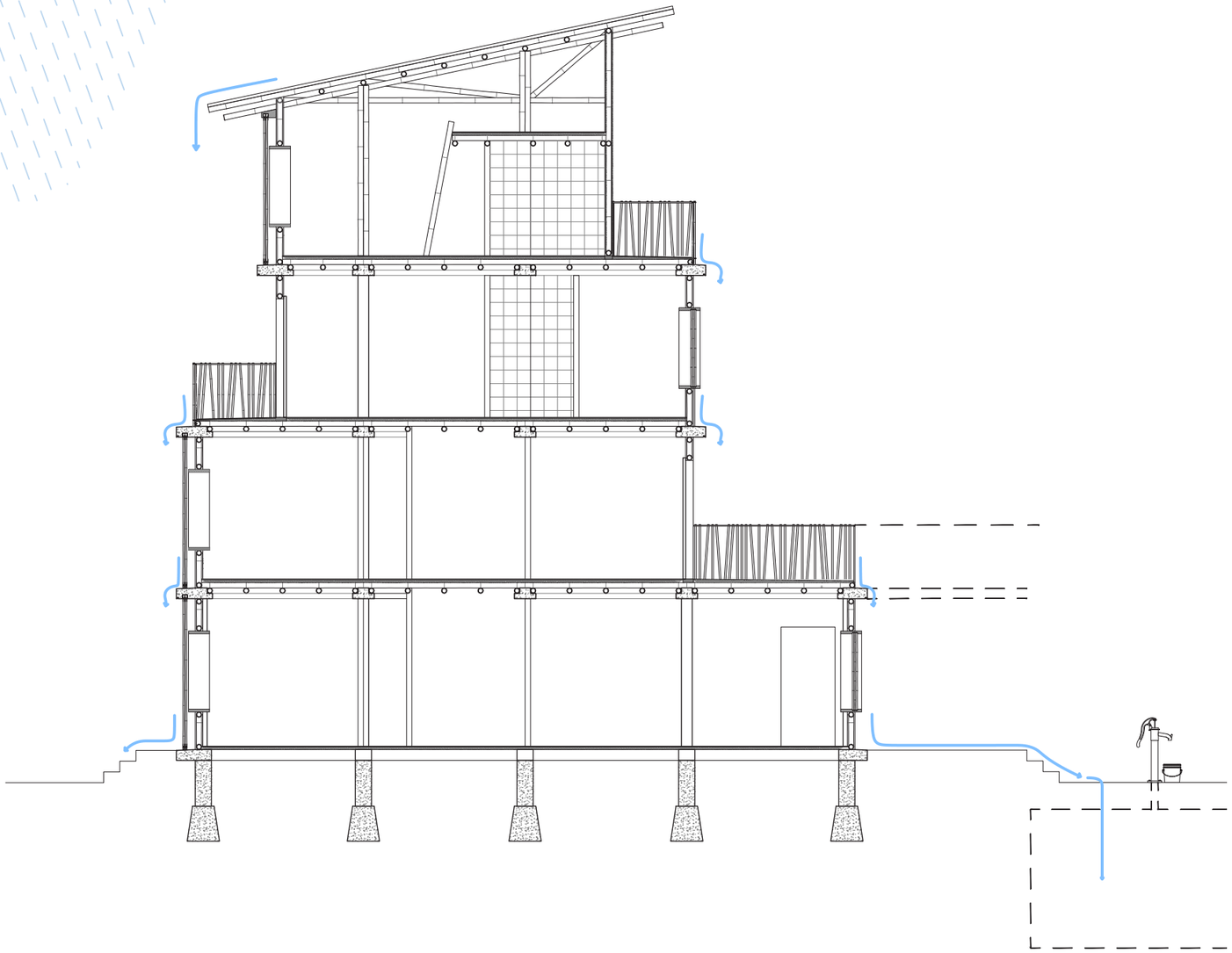
10	tile finishing (slope 20 mm/m)
50	structural earth base
	waterproof membrane
100	bamboo culms floor
100	bamboo joists
200	concrete beam (inverted T)

bamboo connected
to steel railing frame



20	clay plaster
100	bamboo culm
20	clay plaster

14	crushed bamboo panels
50	structural earth base
	waterproof membrane
100	bamboo culms floor
100	bamboo joists
200	concrete beam (inverted T)



aluminum profiles
with bamboo
shutters