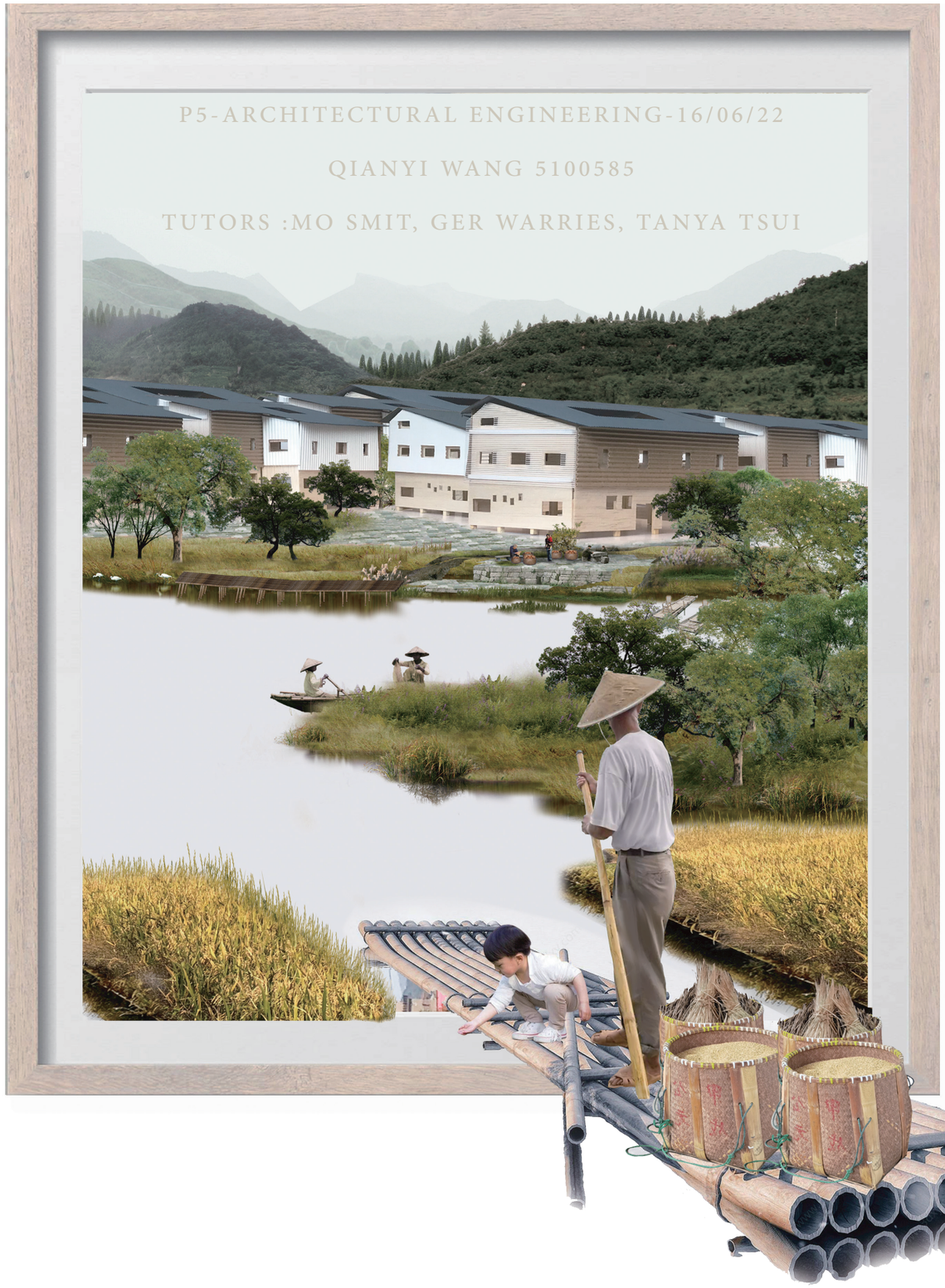
The R Village



Architectural Engineering
The graduation studio
Cees Dekkers Collaboration with Landscape Architecture

***Harvest*, 2021 to 2022**

Rice Landscape
Purchased no code
Gallery in the Basis, in the world

The question how circular design strategies and principles can contribute to valuable landscapes, villages or urban neighbourhoods is central to the Harvest assignment. Student's work on nature-inclusive architectural design solutions, using the energy transition as a leverage for a renewed and healthy living environment. In combination with the spatial potential of the intervention area itself, we work on design solutions that strengthen the social activity, economy and its spatial identity.

CONTENT

- problems and opportunities

  waste and pollution/homogenity(countryside)
  lessons from vernacular architecture

- design

  plans/layout/pavement
  facade design and its logic
  facade fragments and detail
  climate solutions
  materiality

- future ambition

  village plan
  tourism
  job opportunities

rice field

site

village/town

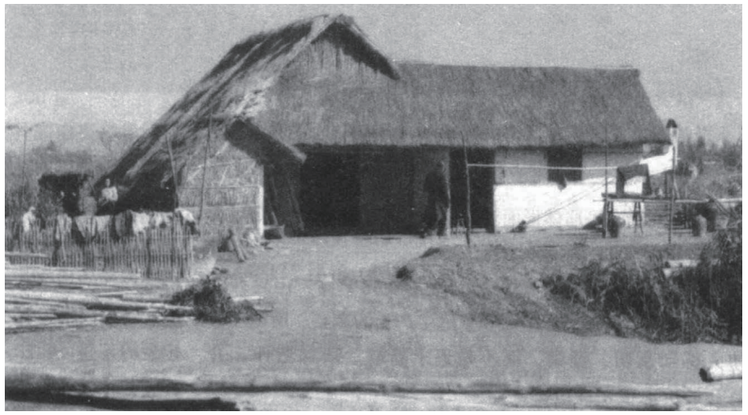
0

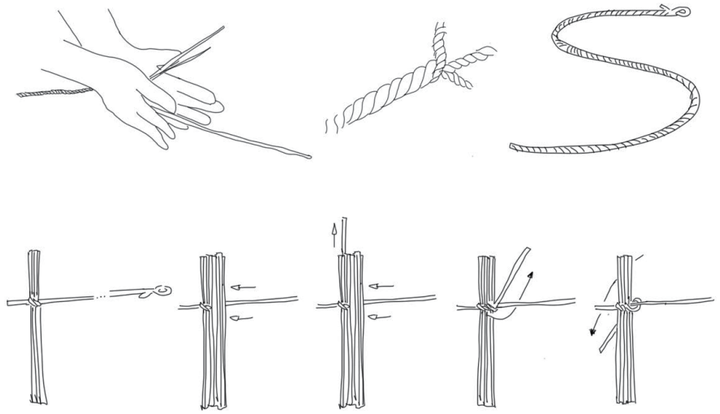
400m

LOCALLY HARVESTED RESIDUE

Process	Type	Origin
Harvesting	Straw	Field
Shelling	Husk	Factory
Milling	Bran	Factory
Milling	Germ	Factory
Milling	Brewer	Factory

CONSTRUCTION METHODS





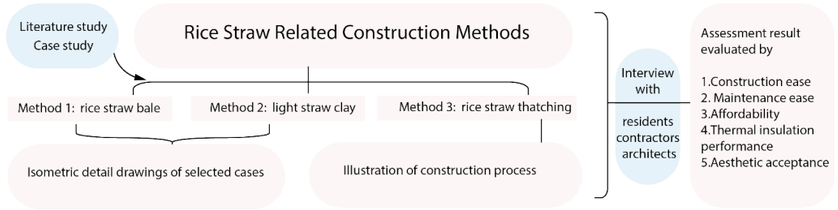


Table 1. The amount of rice straw used for different construction methods

Construction methods	**Amount of rice straw needed per square meter/per cubic meter**
Rice straw bale	non-load bearing wall: 70-110 kg/m³ load-bearing wall: >130 kg/m³
Light clay	from 1 kg/m³ to 50 kg/m³ (depend on the clay content)
Rice straw thatching	from 1.5 kg/m² to 3 kg/m²

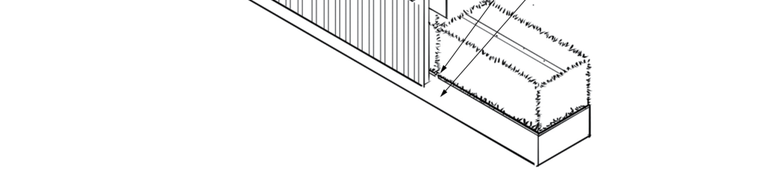
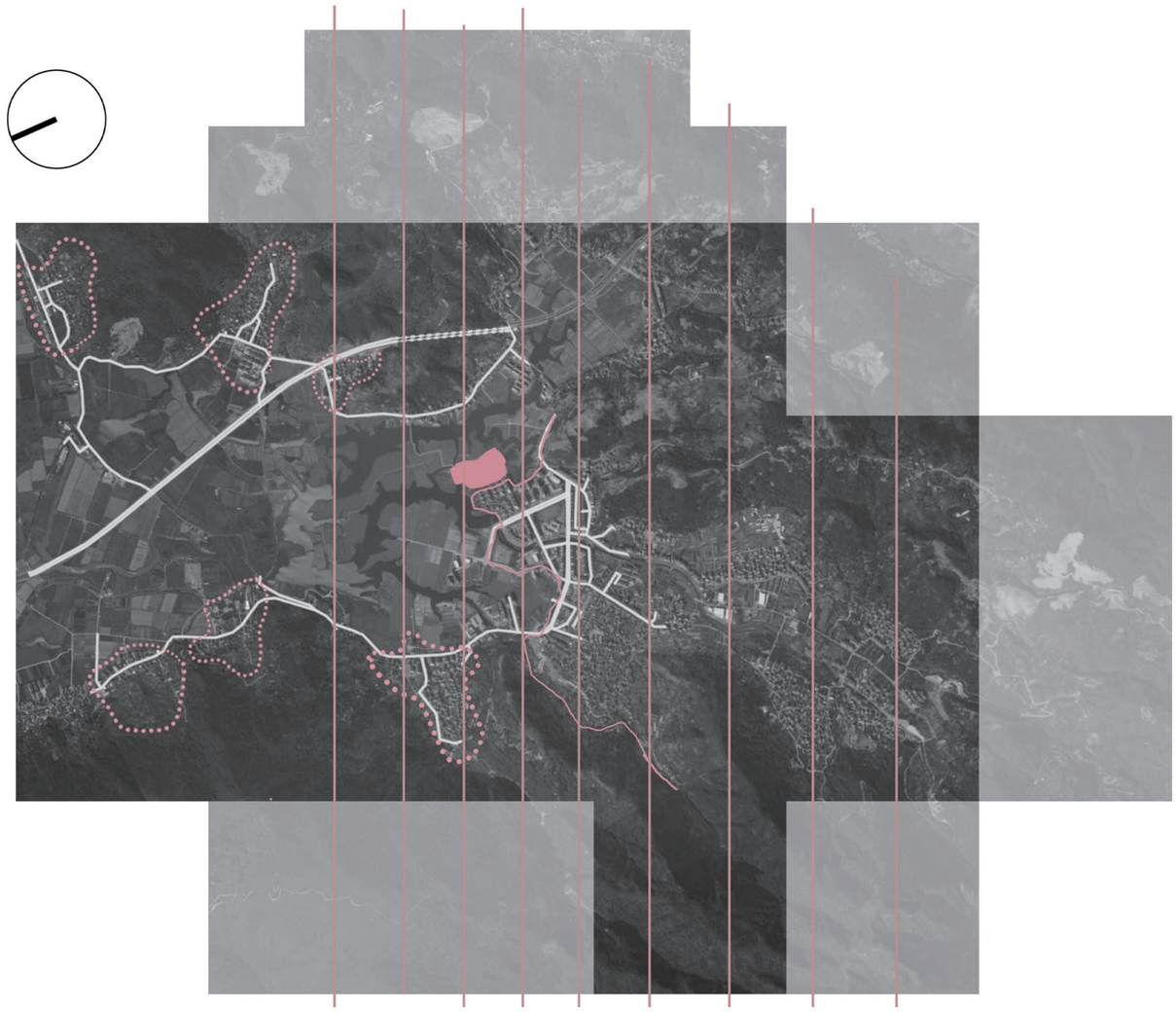
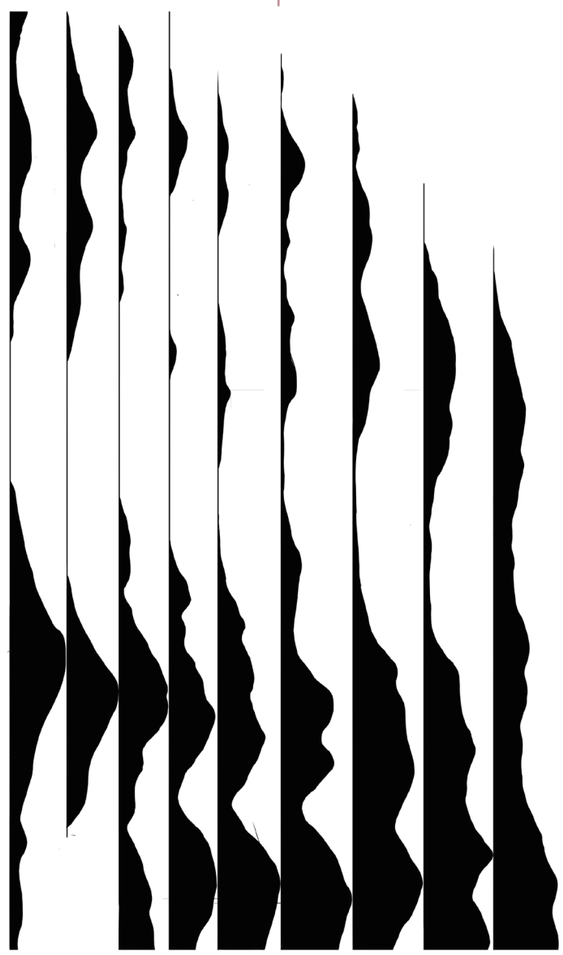


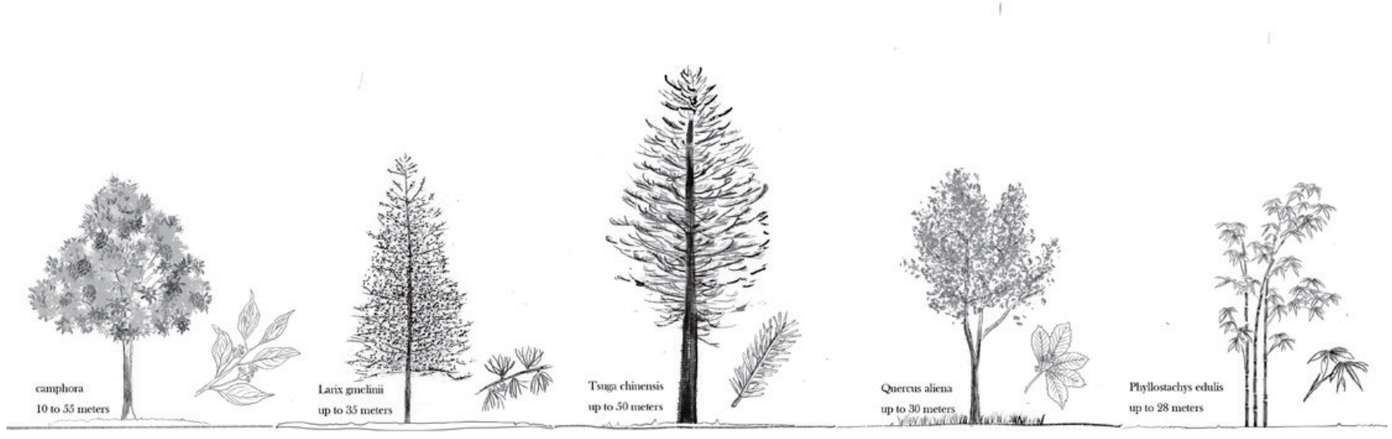
Table 2. Performance of the three construction methods

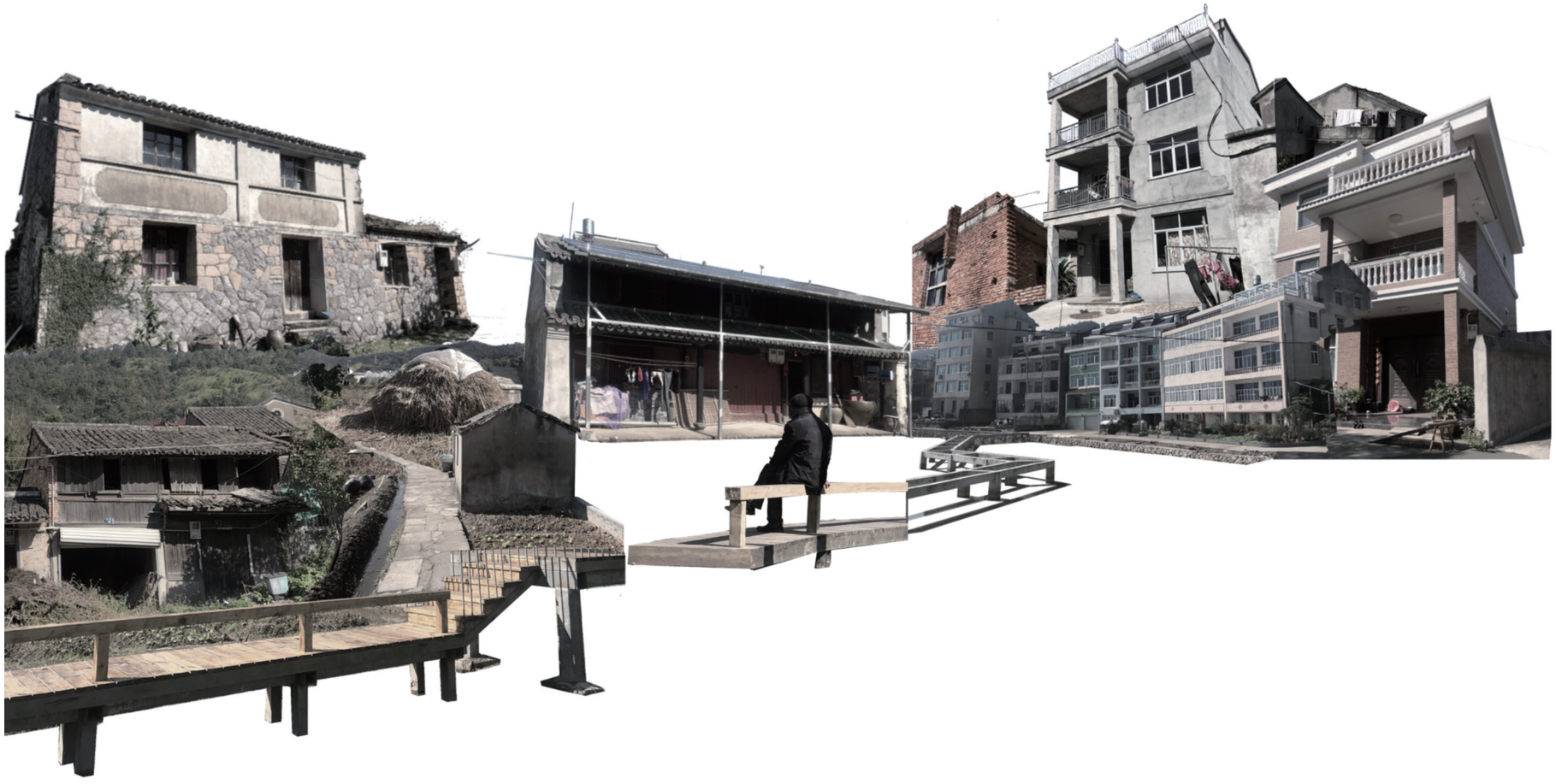
Method	**construction ease**	**maintenance ease**	**Affordability**	**Thermal performance**	**Aesthetic acceptance**
Rice straw bale	Easy when rice straw are baled before, unskilled worker can finish. Difficult when the baling process should be done by workers.	easy when extra protection added (rain screen/coating layer)	Affordable as local rice straw is cheap (20 euros for 500 kg rice straw) 1 m³ wall cost 22.4 ¥ to 41.6 ¥ (2.8 € to 5.2 €)	u-value between 0.1 to 0.2 U = 0.167 [W/m^{2}K] (external clay plaster 0.07 m, straw bale 0.45 m, internal clay plaster 0.04 m)	Acceptable (As the straw bale must need coverage such as rain screen or plastering therefore it is not exposed)
Light clay	Between easy and difficult. Ordinary construction workers can complete.	Feasible when skilled workers are hired.	Ditto. Besides, mud/clay is also a residue (from basement digging) 1 m³ wall cost 0.32 ¥ to 16 ¥ (0.04 € to 2 €)	u-value = 0.19 [W/m2K] (exterior clay plaster 0.03 m, light clay 0.5 m, interior clay plaster 0.03 m) thermal conductivity 0.067 W/mK	Acceptable (As the light clay wall need coverage therefore it is not exposed)
Thatching	Quite difficult as there is a prone of leakage when the construction is not carefully done. Skilled workers needed.	Feasible when replacement is applied (every 1-3 years depending on the quality)	Ditto. 1 m² roof cost 0.48 ¥ to 0.96 ¥ (0.06 € to 0.12 €) Affordable but skill requirement is higher and the wage of skilled worker would be therefore higher	thermal conductivity 0.07 and a resistivity of 14.3 u-value = 0.2 [W/m2K] (0.35m of straw)	For most residents not acceptable as the rice straws are exposed. For some it can be a point to attract tourists.



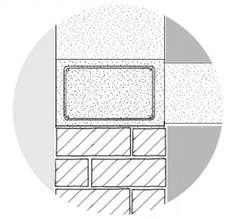


LOCALLY HARVESTED MATERIAL



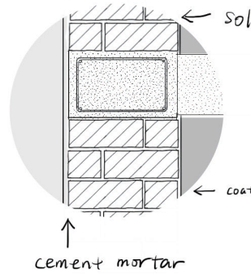


brick and concrete building (84.6%)



external wall 240mm / 370mm

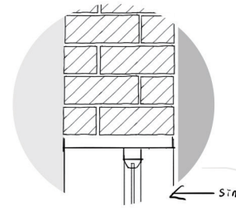
internal wall 240mm / 120mm



← solid clay brick (84.63%)

← coating material

↑ cement mortar

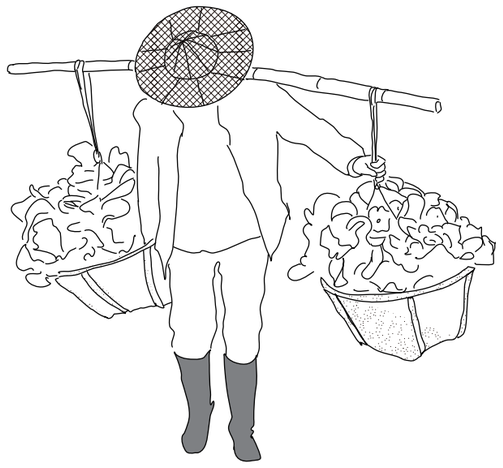


← single layered aluminum window

Target group

job opportunities

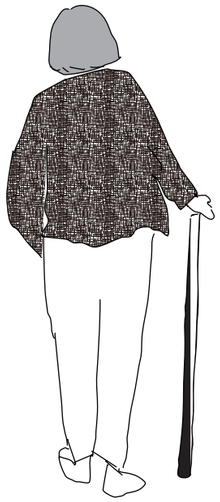
worker



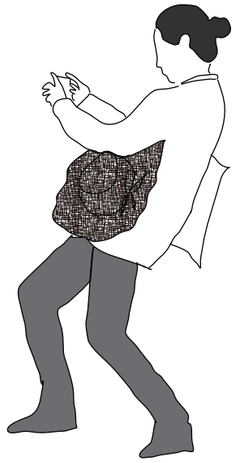
farmer

added value
of rice industry

comfortable environment
(interior/exterior)

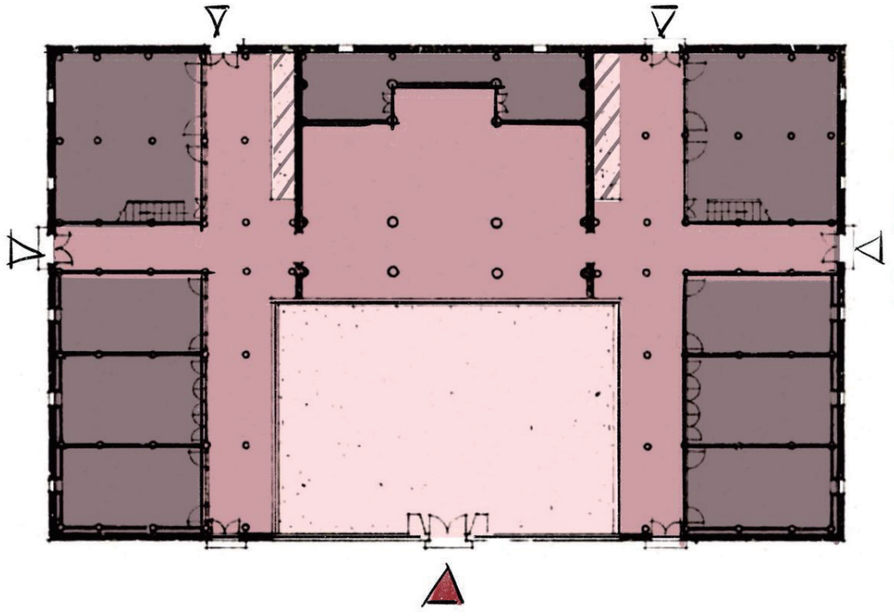


local villagers



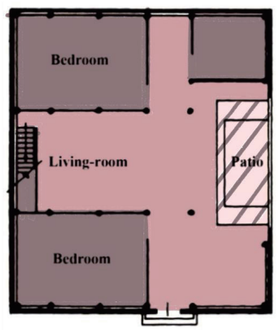
visitors

experience

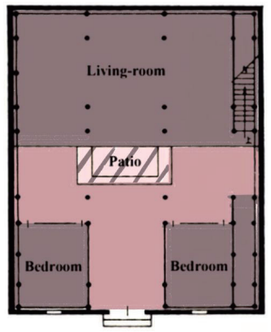


Enhance natural ventilation

Narrow alley to prevent direct solar gain



Three-wings Building Plan View

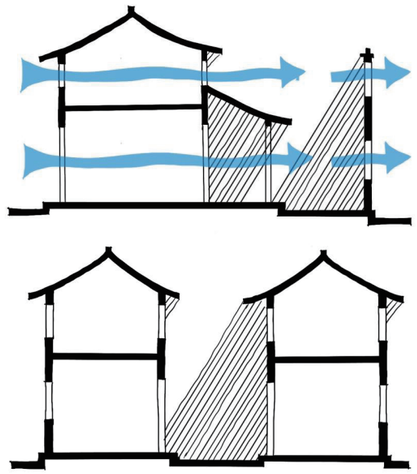


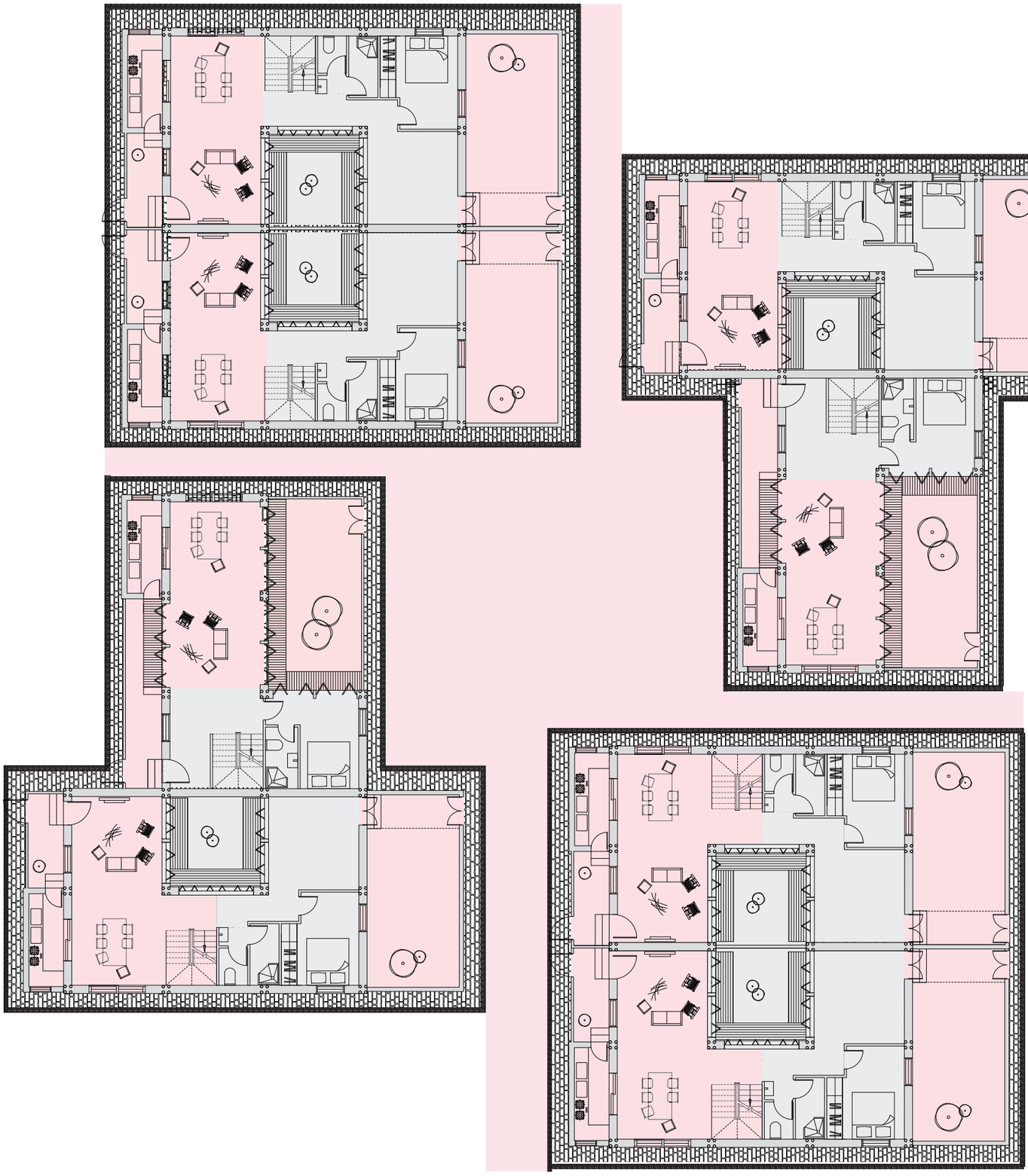
Folio Shape Building Plan View

Flexible plan to enhance ventilation

Use of skywell and courtyard

Gardens for different seasons*



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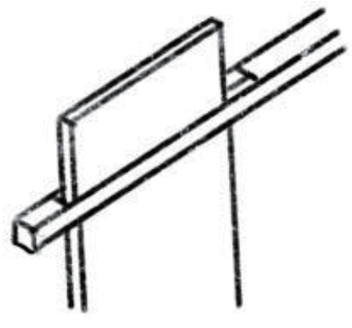
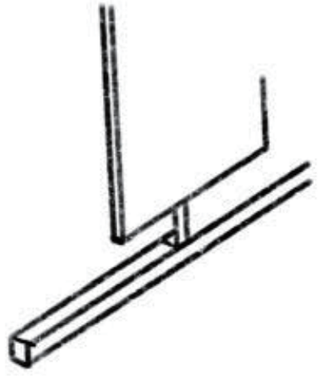
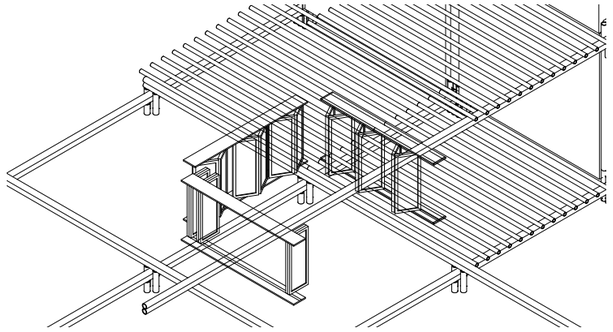
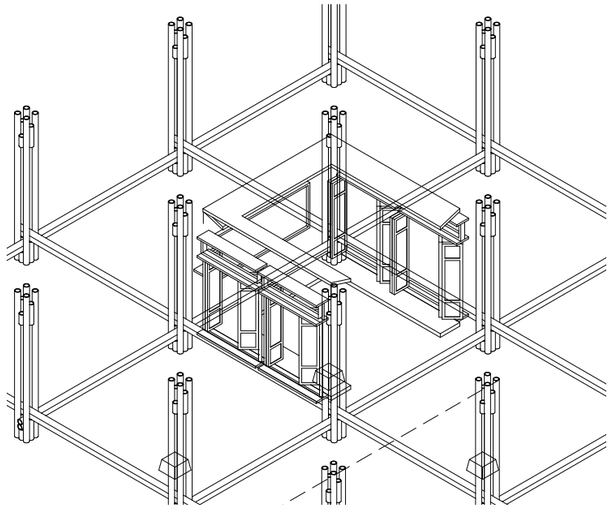
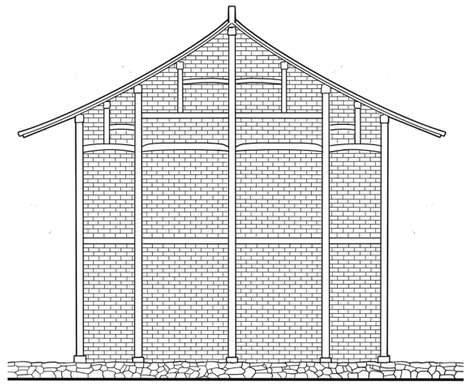
四海逢春千门都慶
普天同庆万户皆福

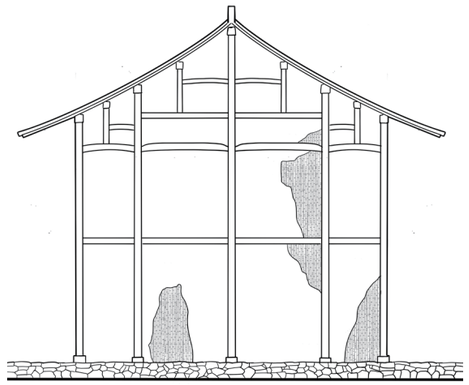


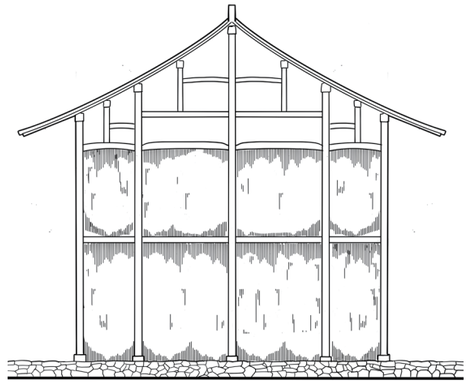


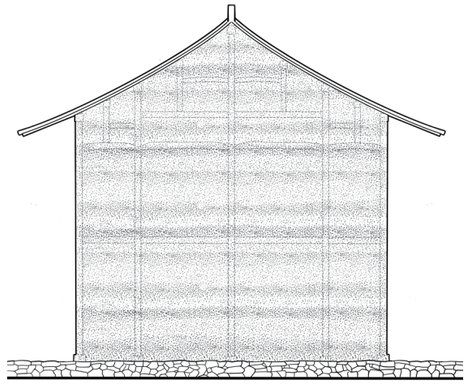


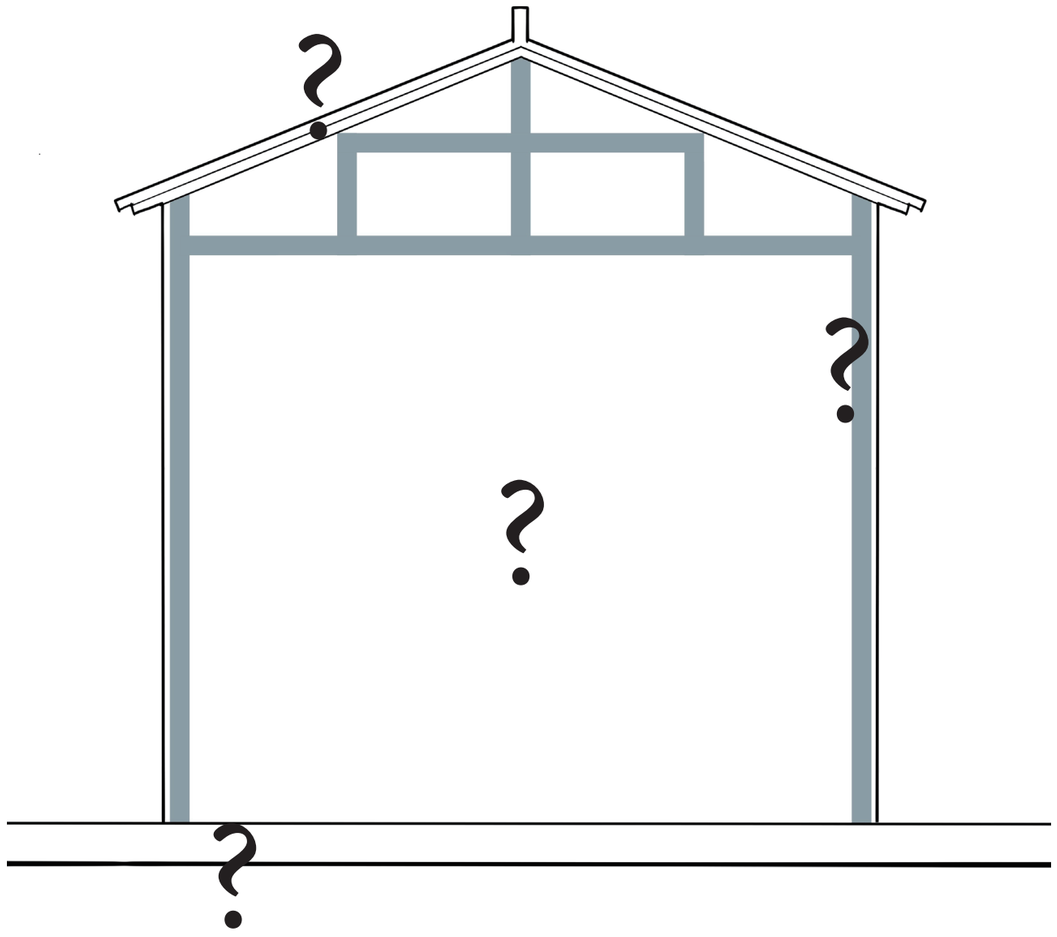




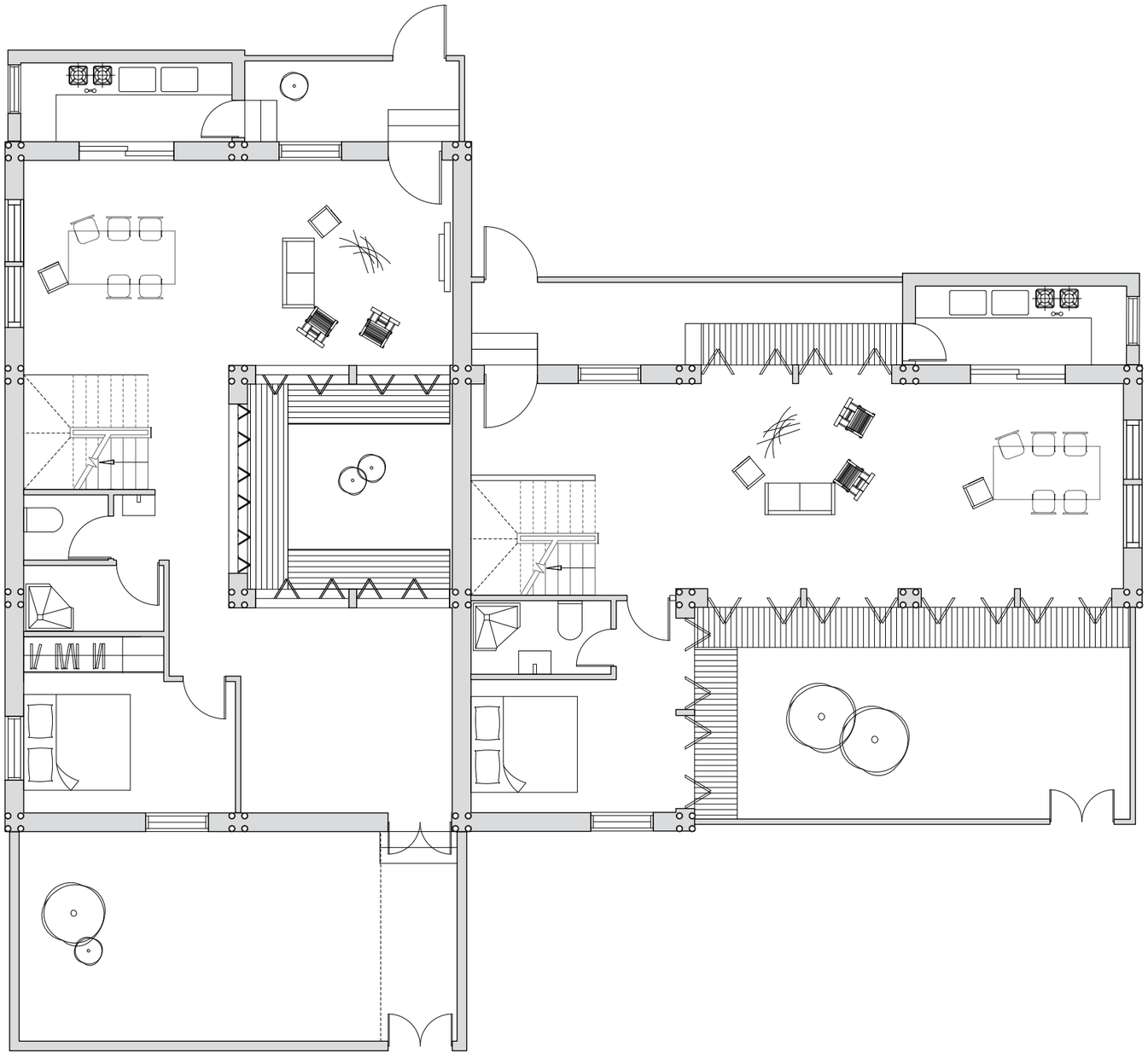




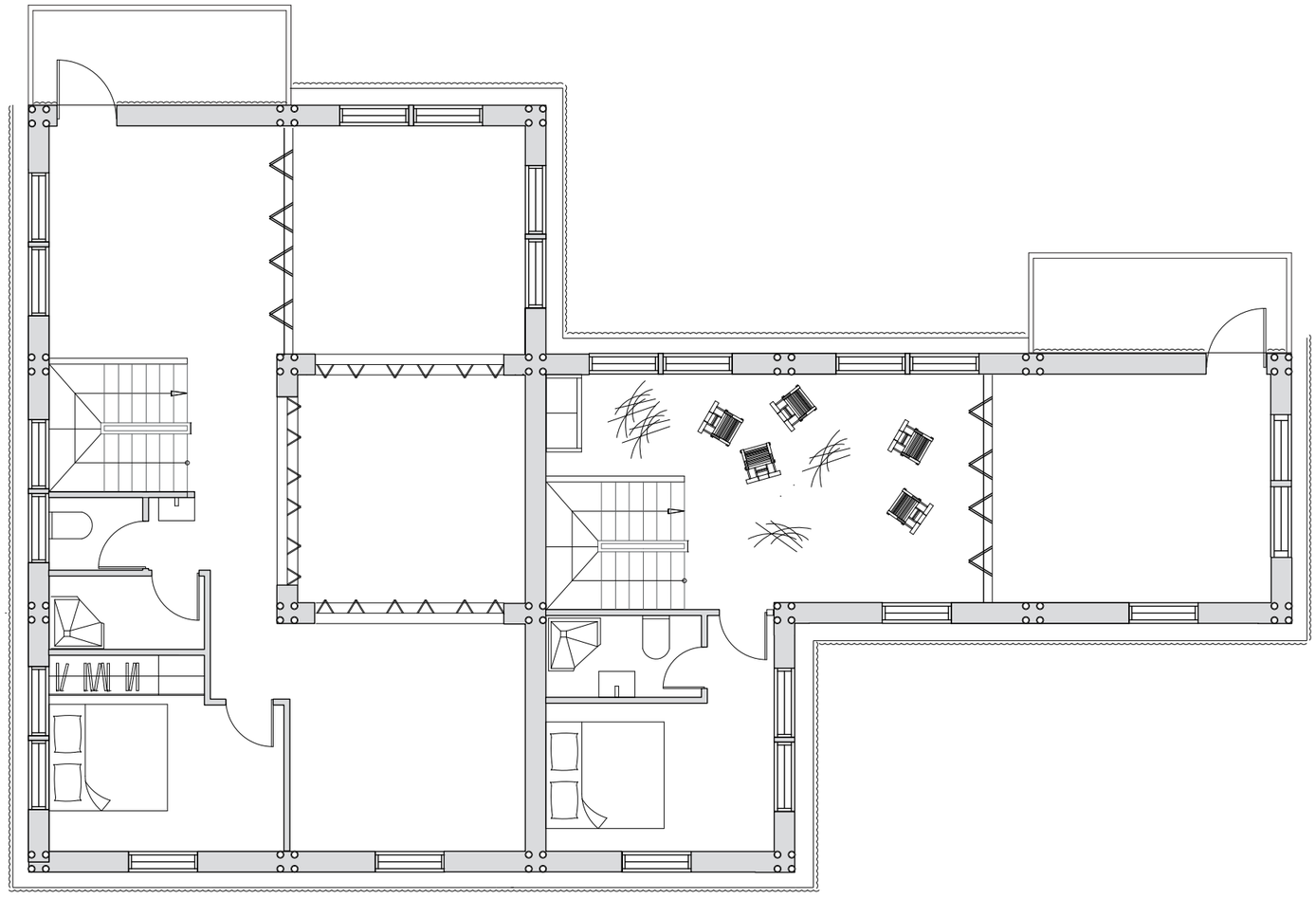




Plan ground floor(L+U)



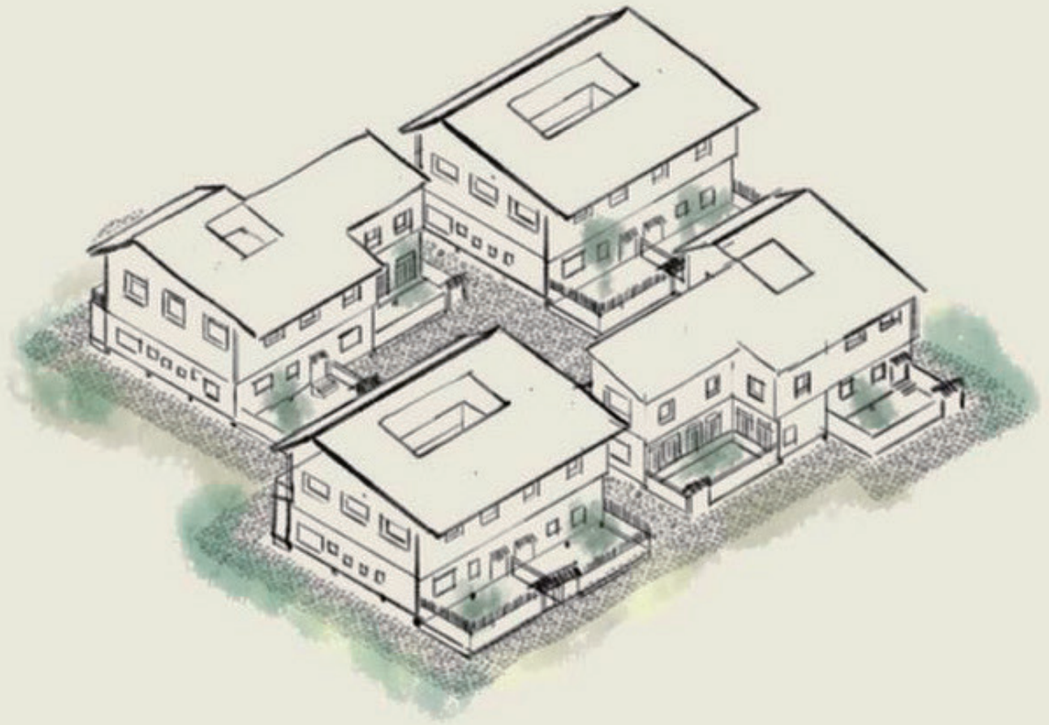
Plan first floor(L+U)



Plan ground level

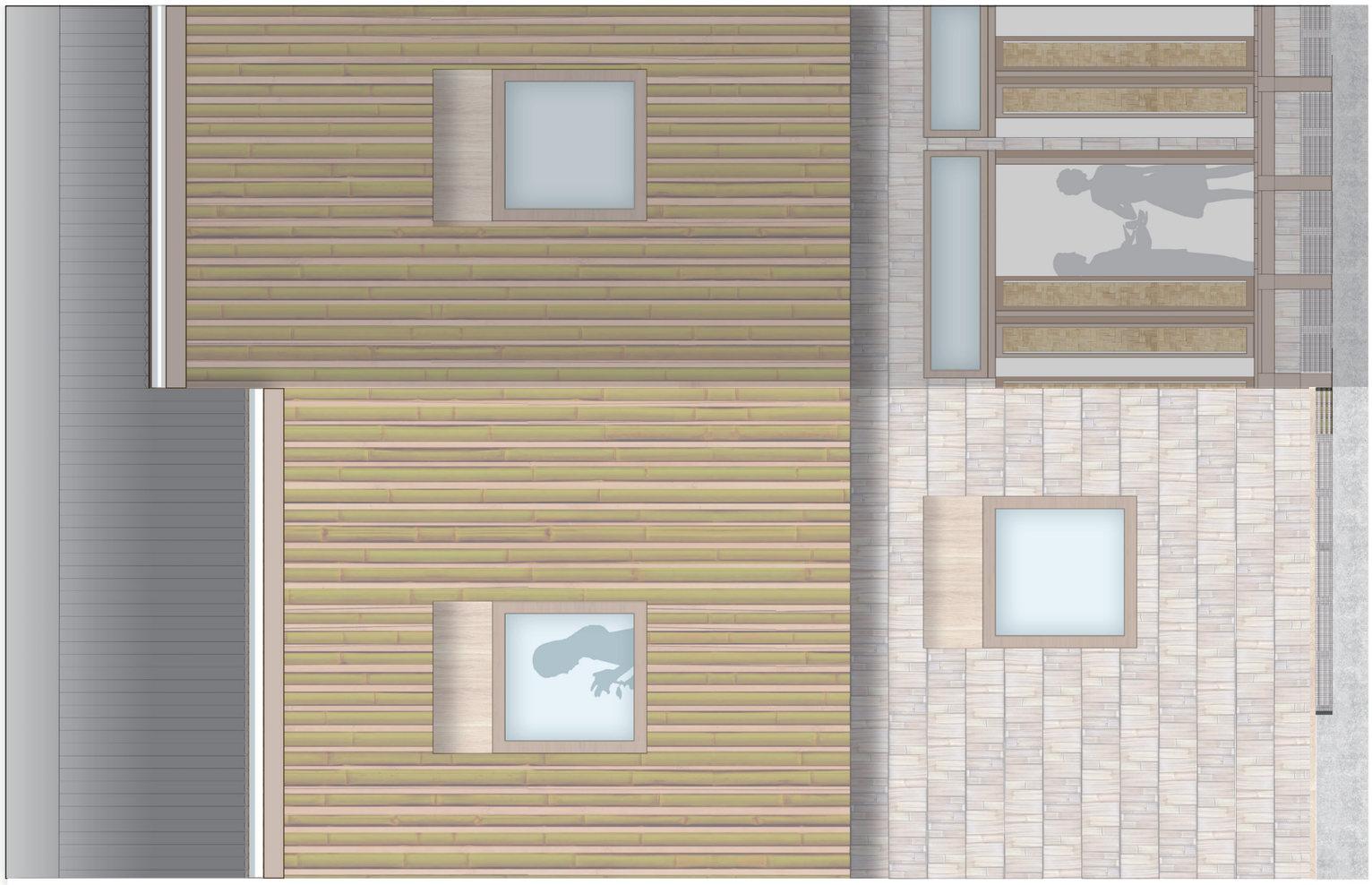
north elevation

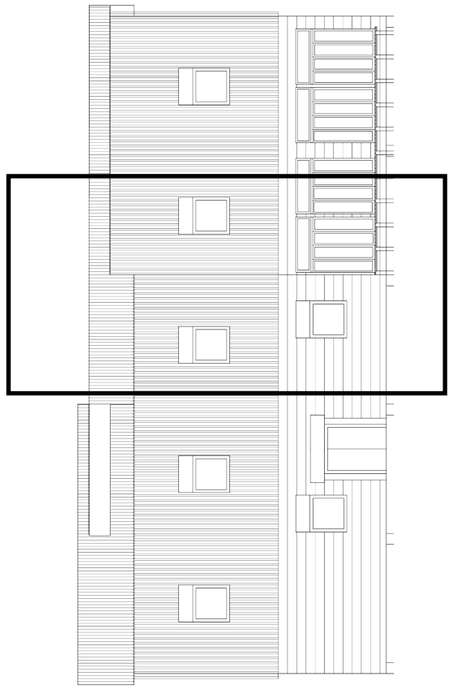
west elevation

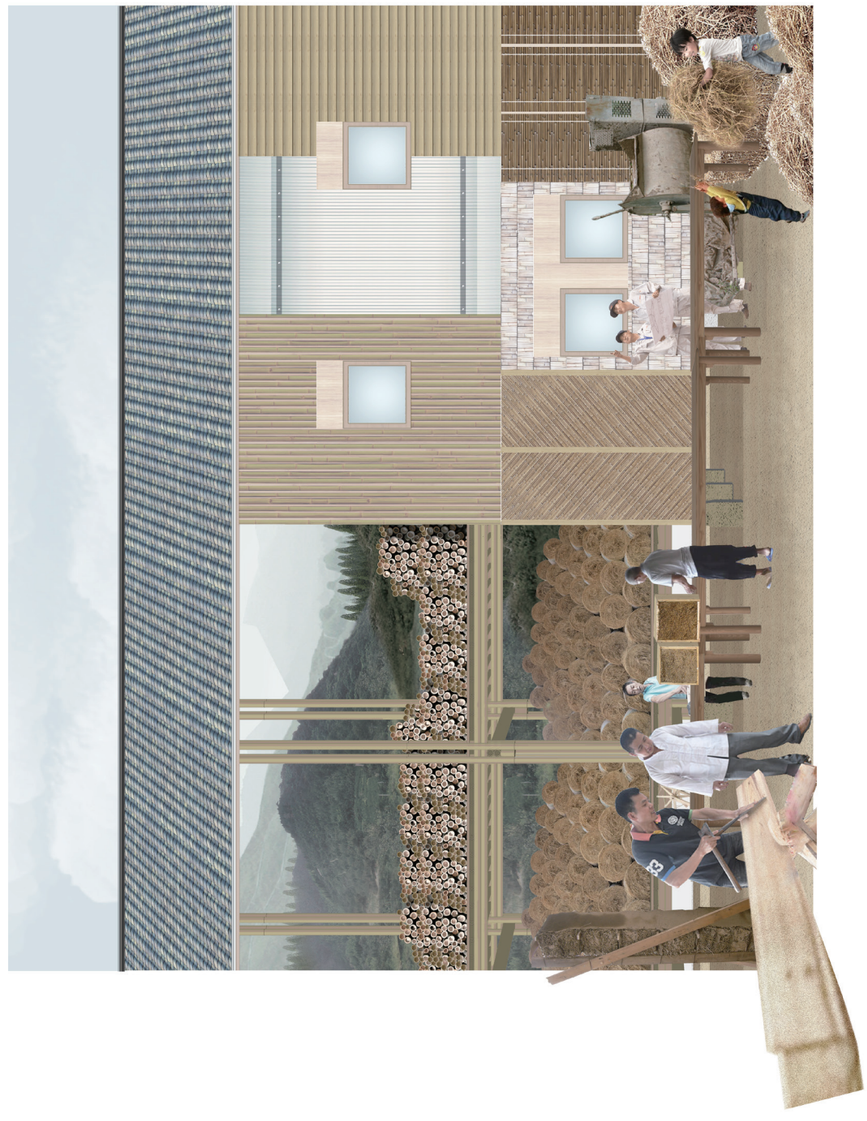


east elevation

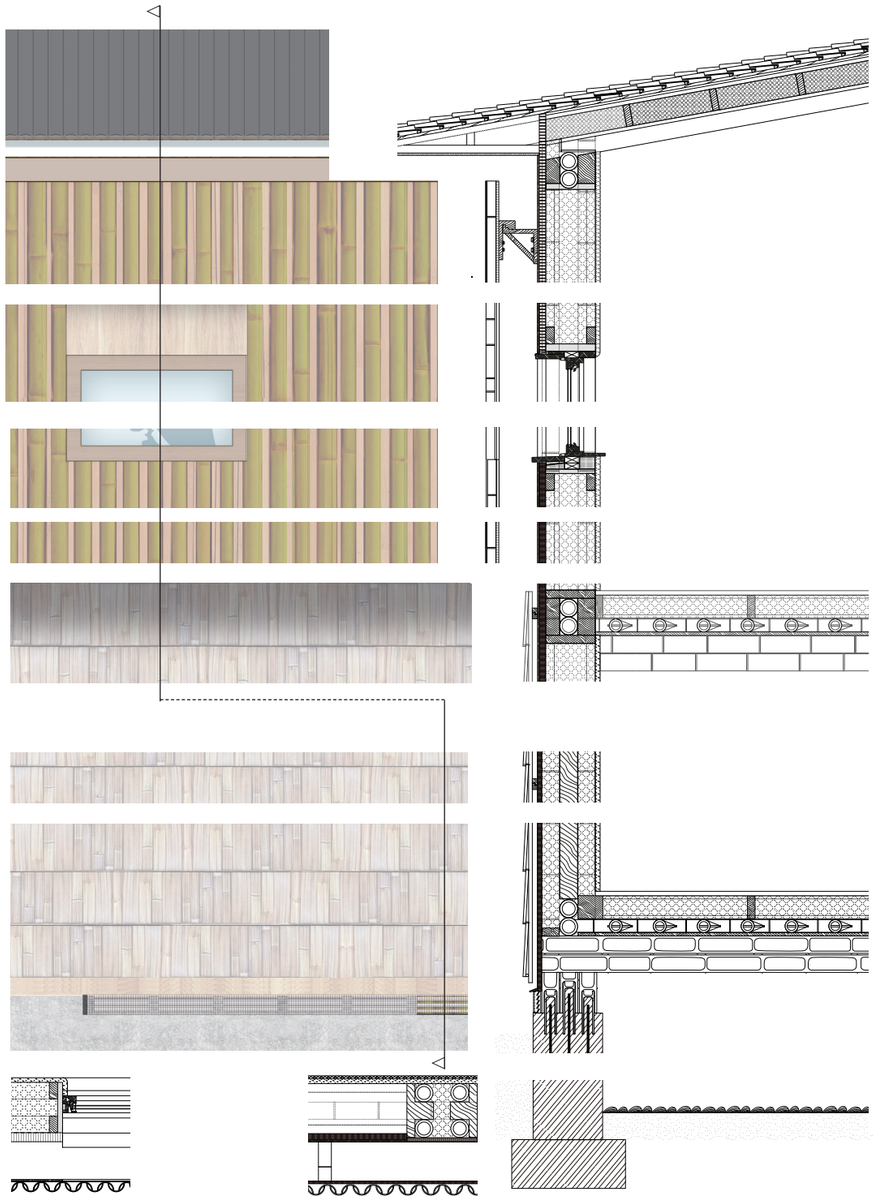
south elevation

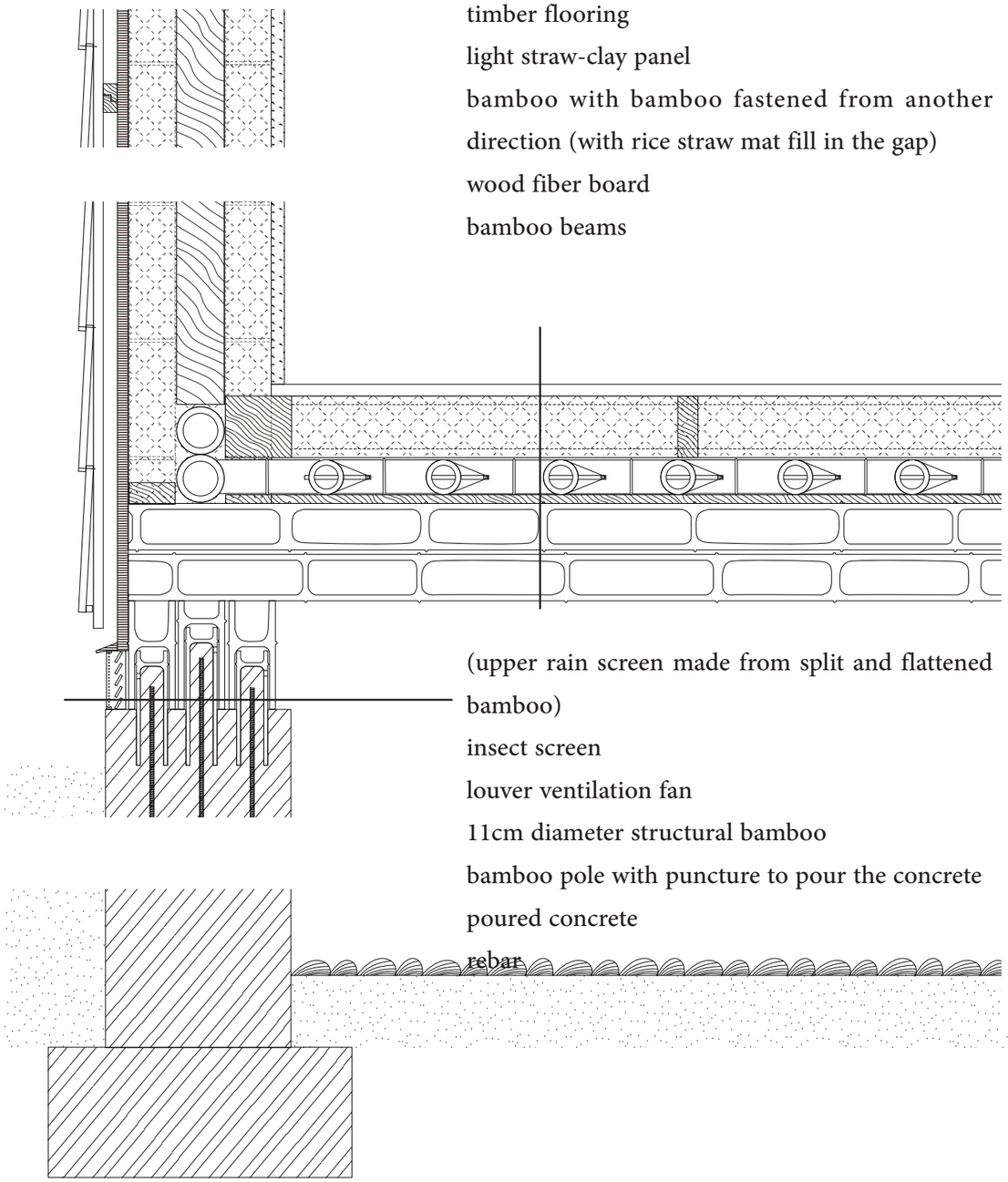






column/window section

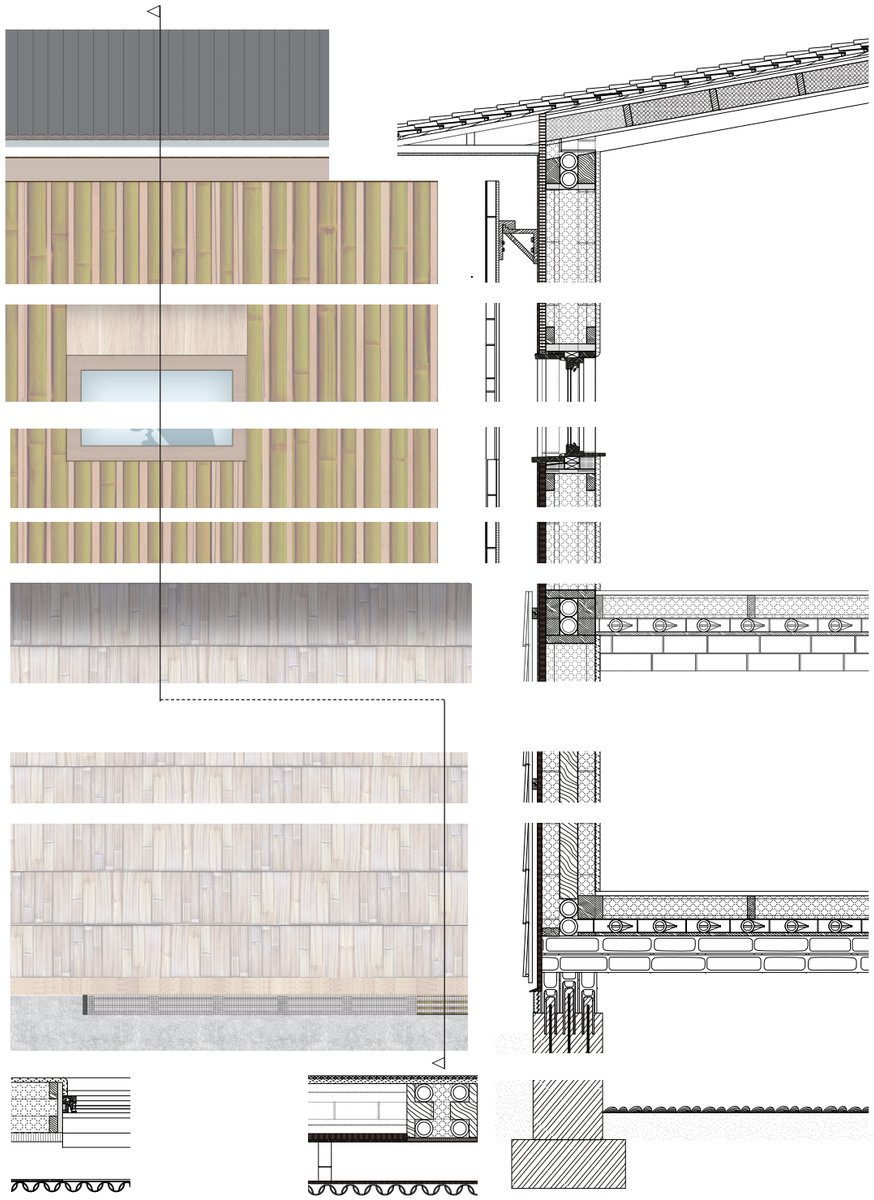


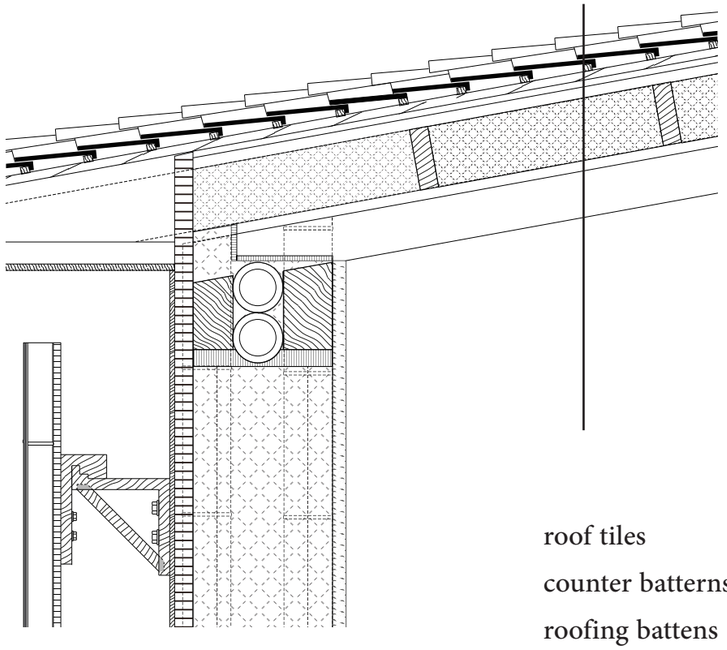


timber flooring
light straw-clay panel
bamboo with bamboo fastened from another direction (with rice straw mat fill in the gap)
wood fiber board
bamboo beams

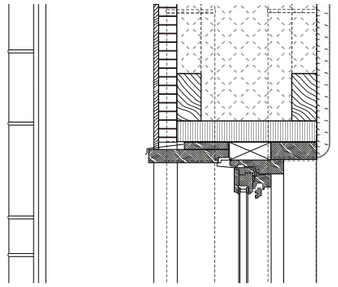
(upper rain screen made from split and flattened bamboo)
insect screen
louver ventilation fan
11cm diameter structural bamboo
bamboo pole with puncture to pour the concrete
poured concrete
rebar

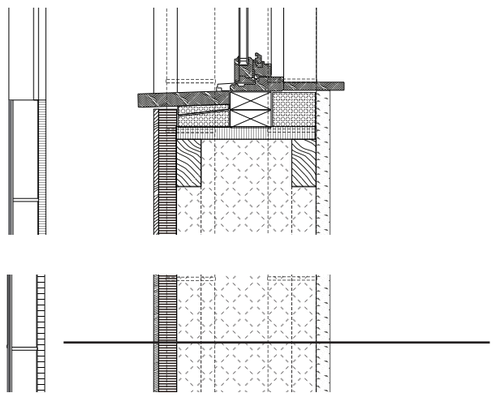
column/window section



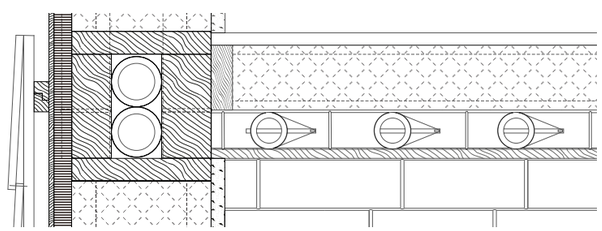


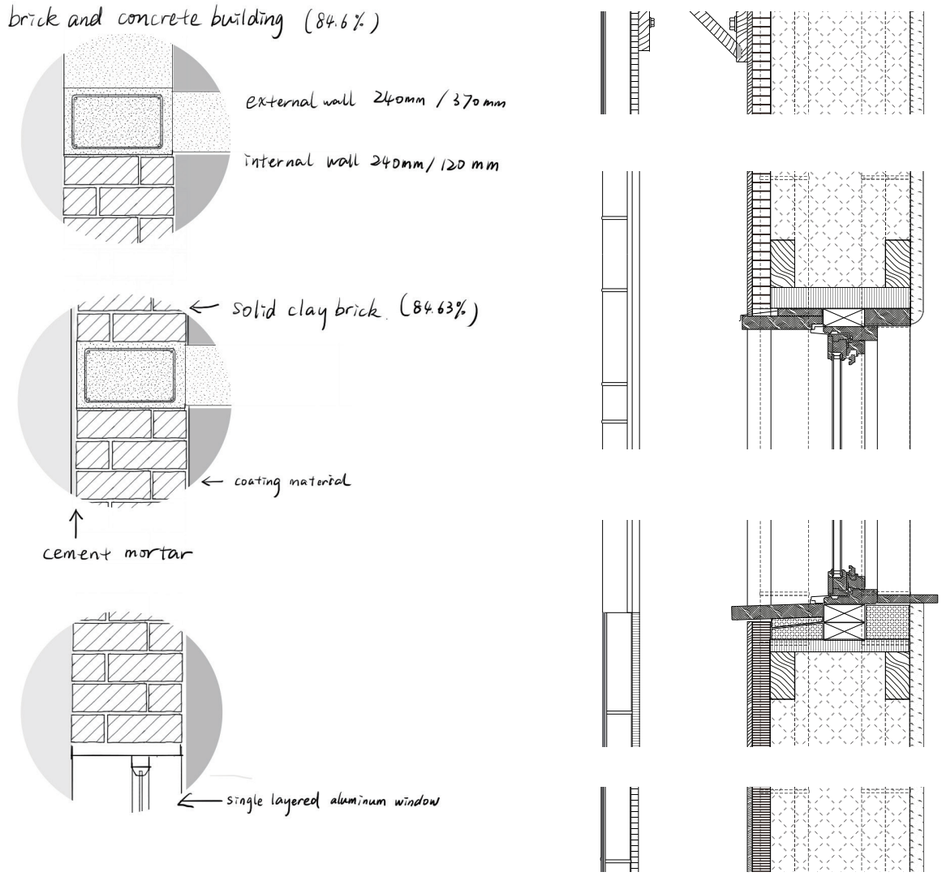
roof tiles
counter batterns
roofing battens
wood fiberboard
chopped rice straw blown-in insulation
rafter





rain screen made of half cut
bamboo
wood fiber board
timber frame with light straw-clay
mixtures
clay plaster





Rsi Value (Internal Surface) m2k/w
0.12
Rso Value (External Surface) m2k/w
0.06

typical wall in rural zhejiang:

240mm brick wall lambda value (W/MK):0.7	Rvalue 0.34m2k/w	
7mm cement mortar	1.73	0
15mm ceramic tiles	1.06	0.01

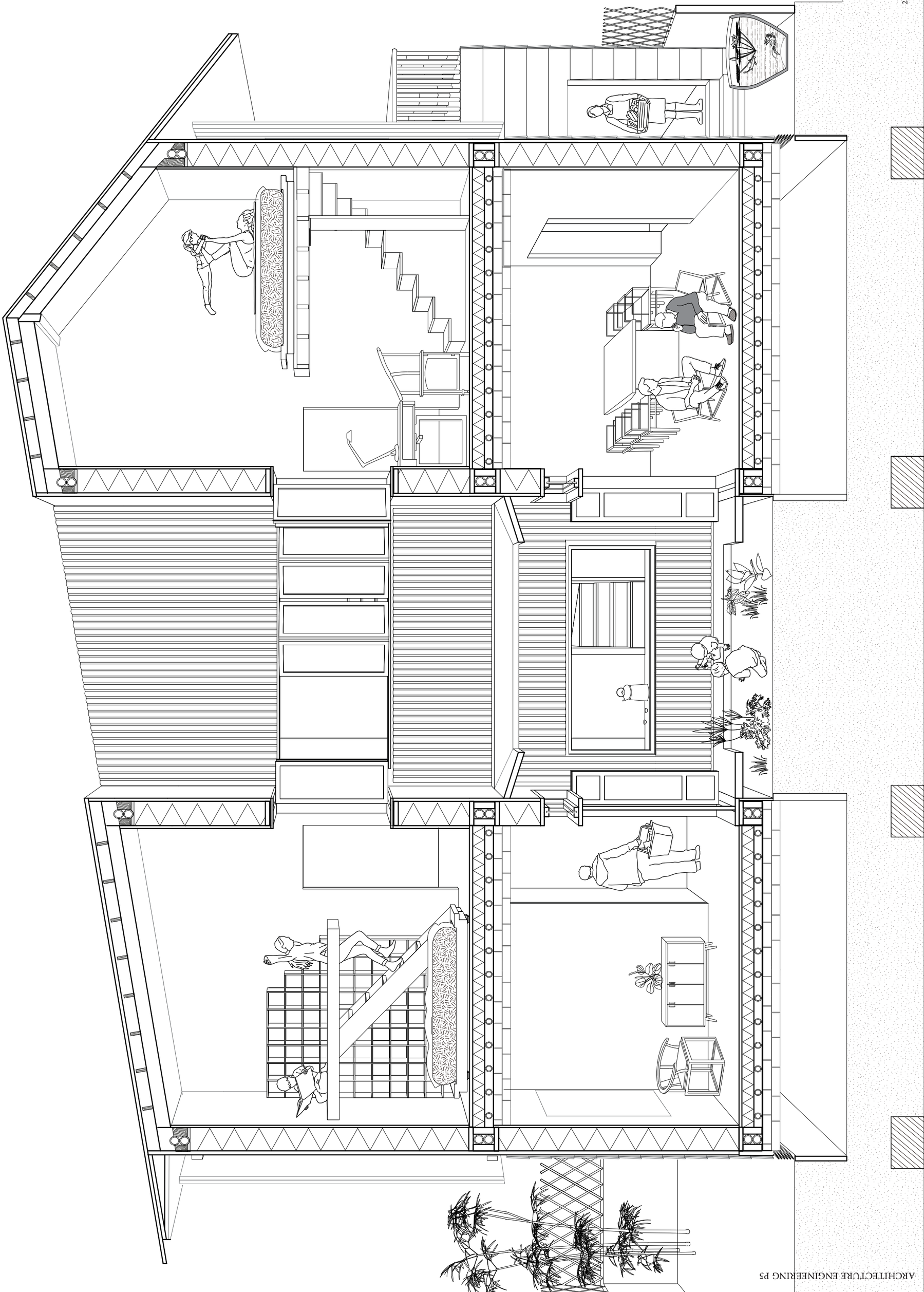
total u-value 1.887m2K/W

Rsi Value (Internal Surface) m2k/w
0.12
Rso Value (External Surface) m2k/w
0.06

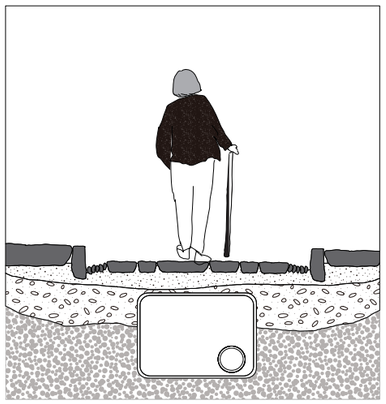
NEW wall in rural zhejiang:

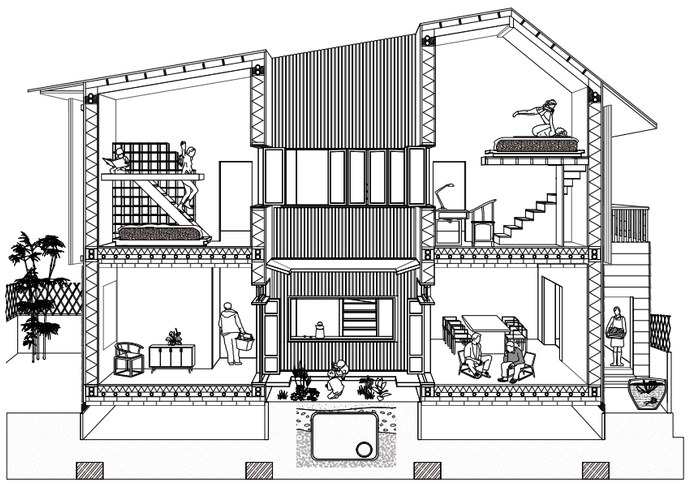
310mm rice straw light clay panel lambda value (W/MK):0.1	Rvalue 3.1m2k/w	
28mm fiber board	0.2	0.14
50mm clay plaster	0.2	0.25

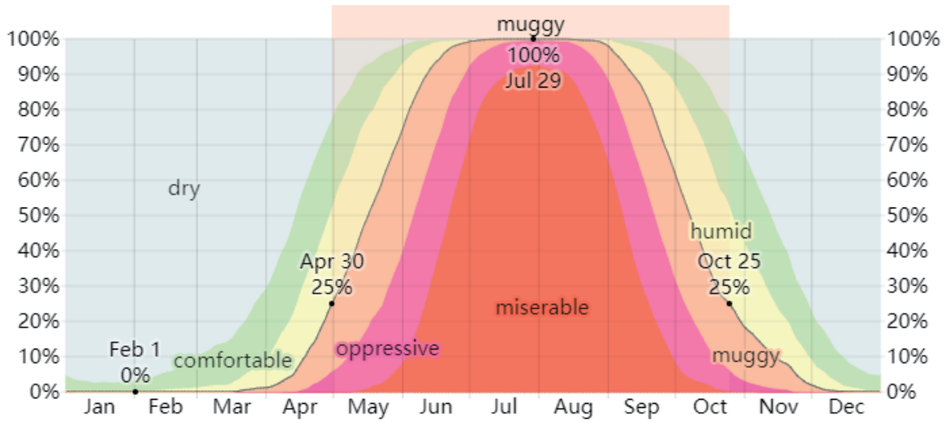
total u-value 0.272m2K/W

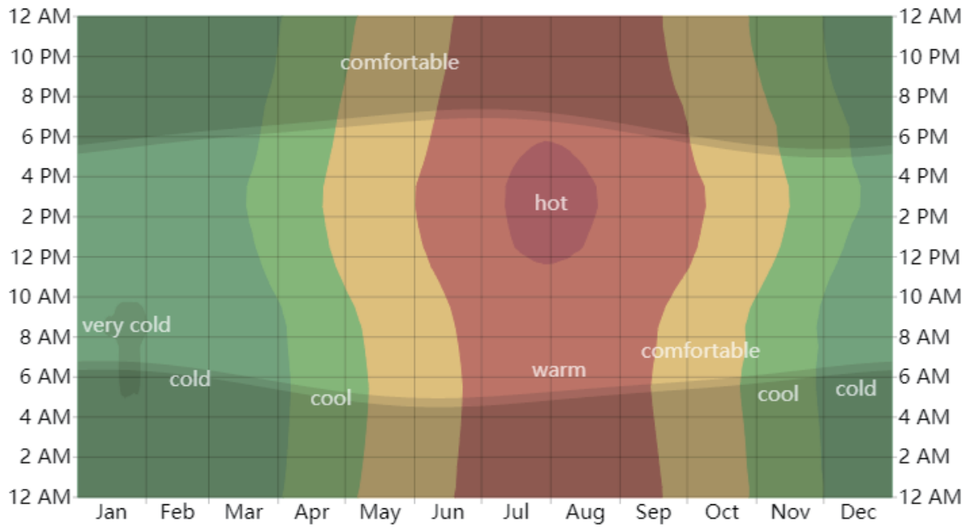


Water purification

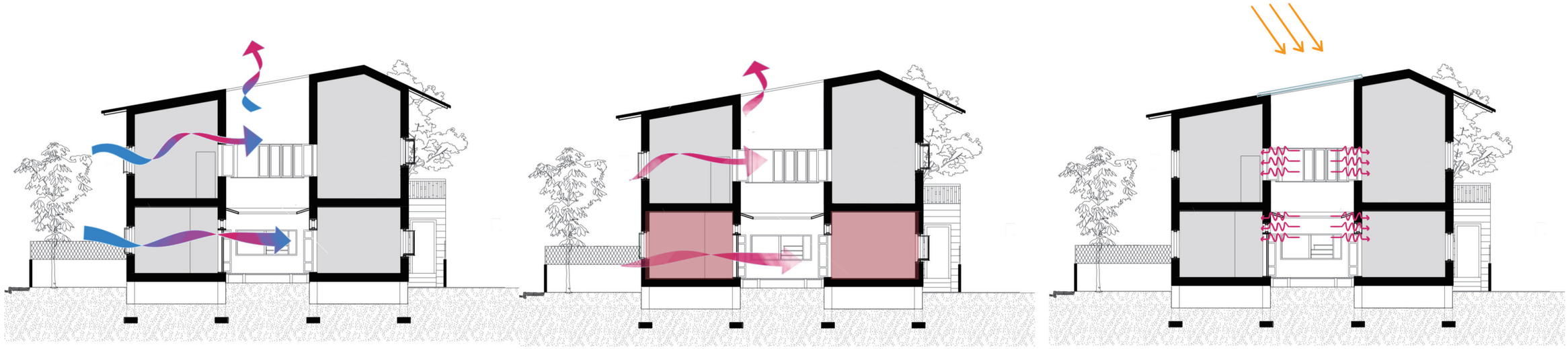





muggy
100%
Jul 29
dry
humid
Oct 25
25%
Apr 30
25%
miserable
Feb 1
0%
comfortable
oppressive
muggy
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


comfortable
hot
very cold
cold
cool
warm
comfortable
cool
cold
12 AM
10 PM
8 PM
6 PM
4 PM
2 PM
12 PM
10 AM
8 AM
6 AM
4 AM
2 AM
12 AM
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

Climate strategies

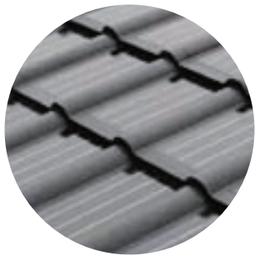


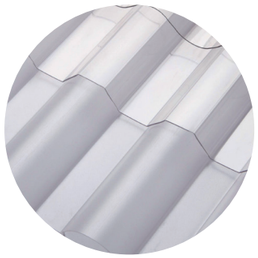
spring/autumn

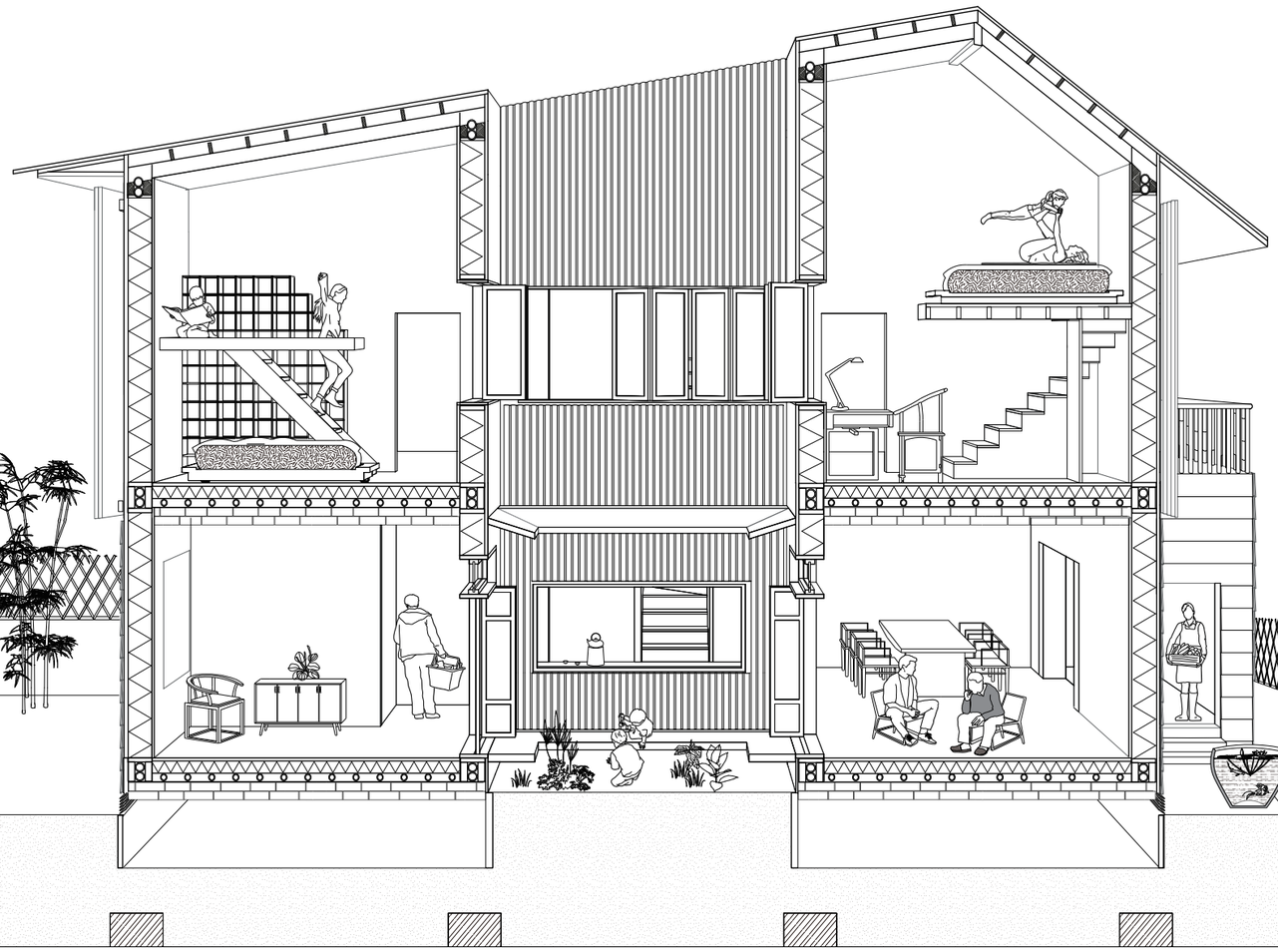
summer

winter

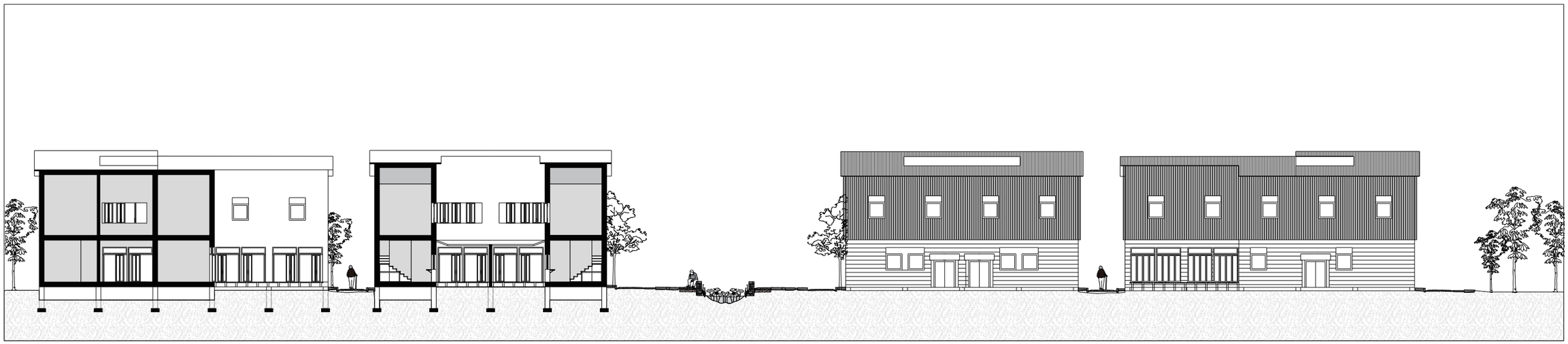
Material choice





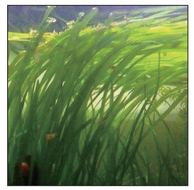


Sections and elevations



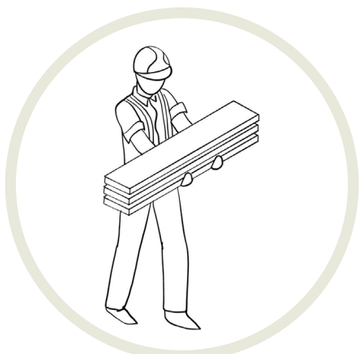
Plantaion and the introduced water

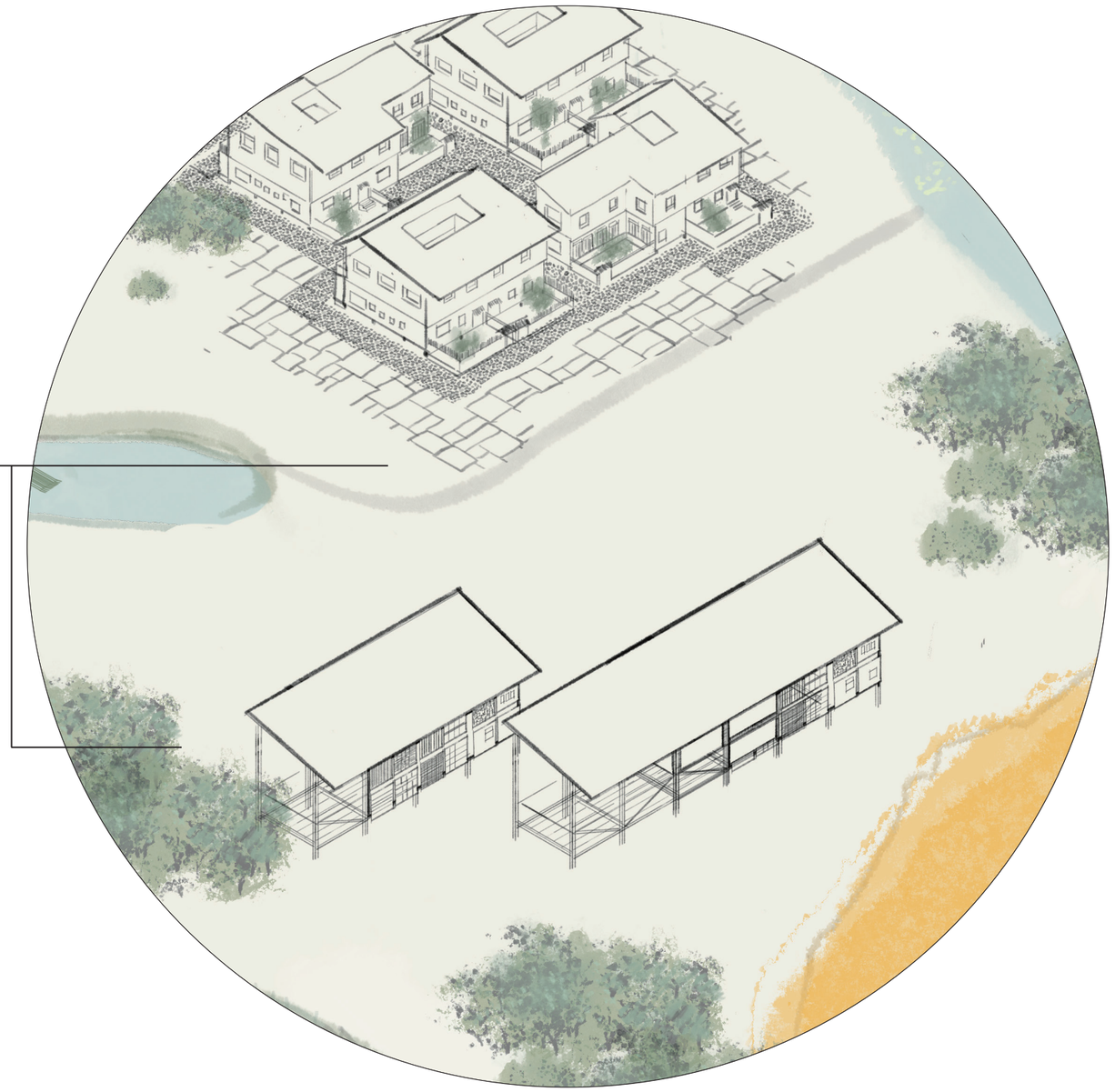
submergent plant

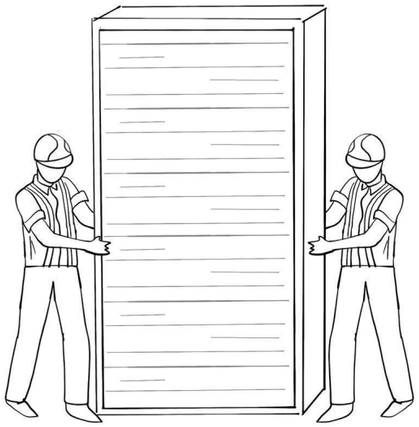


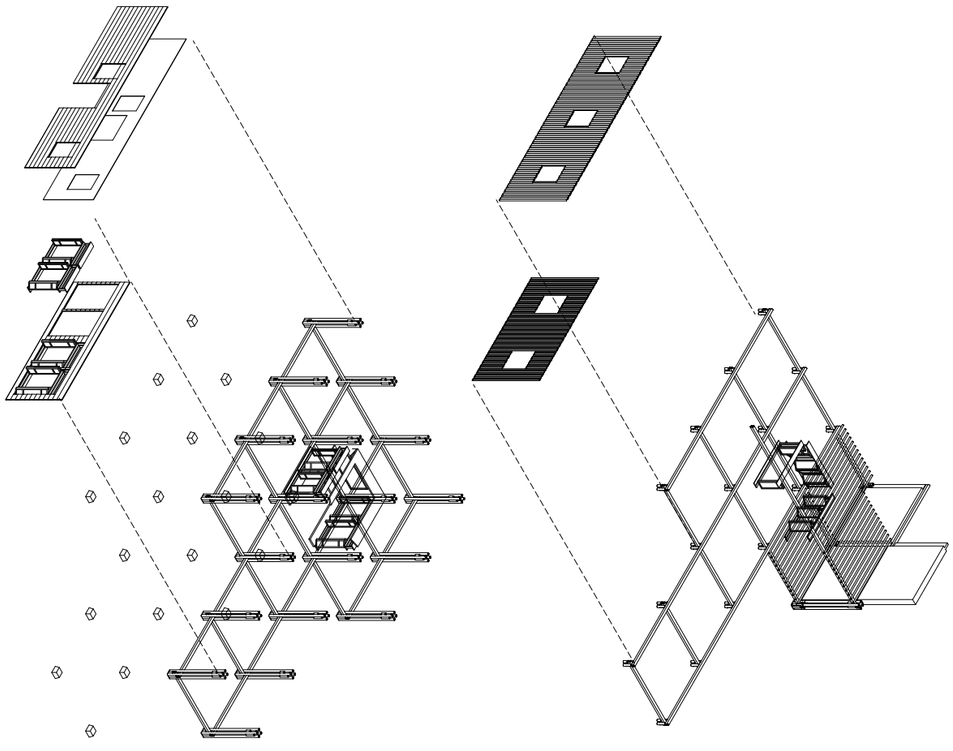
emerged plant

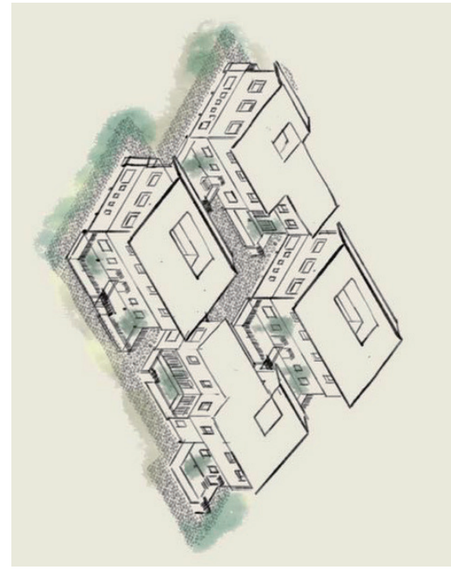
floating leaf formation

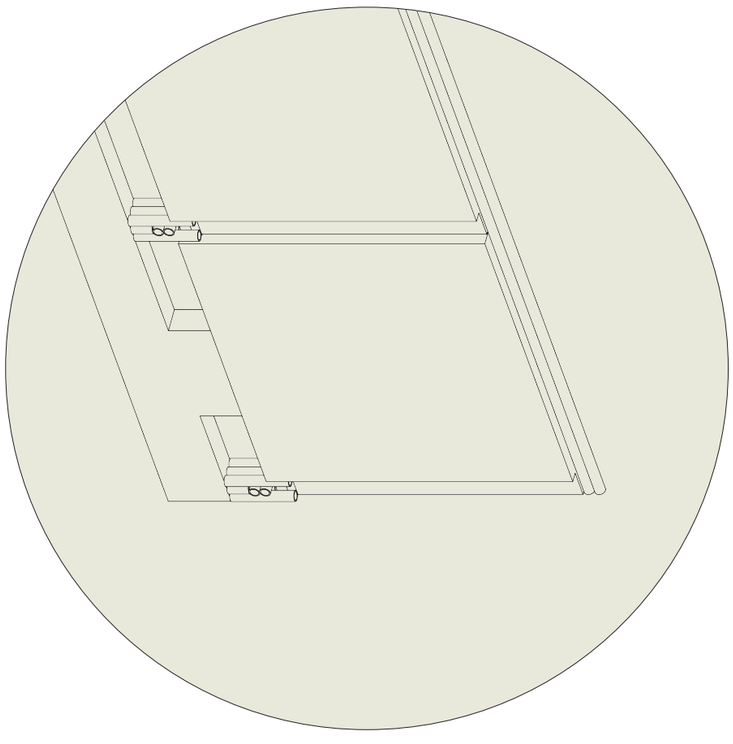


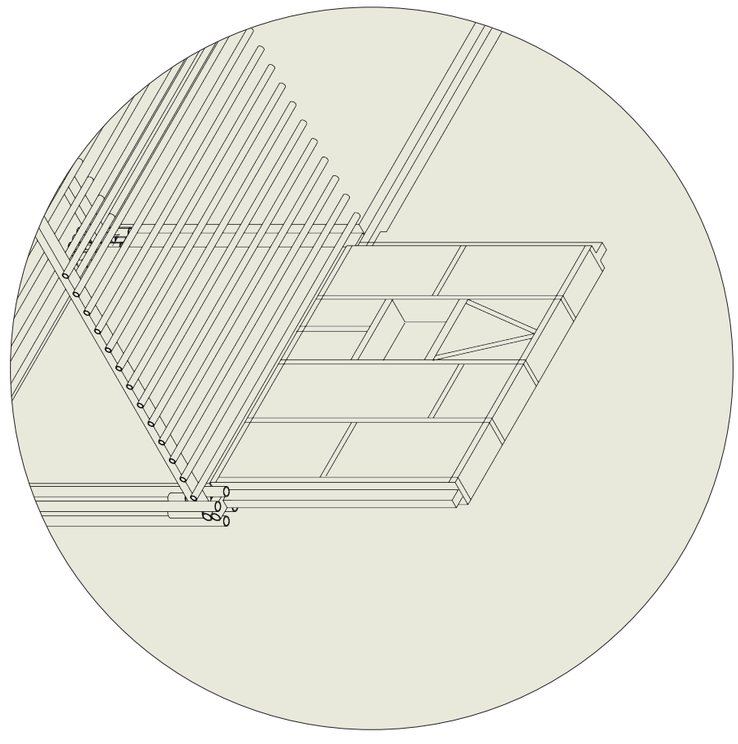


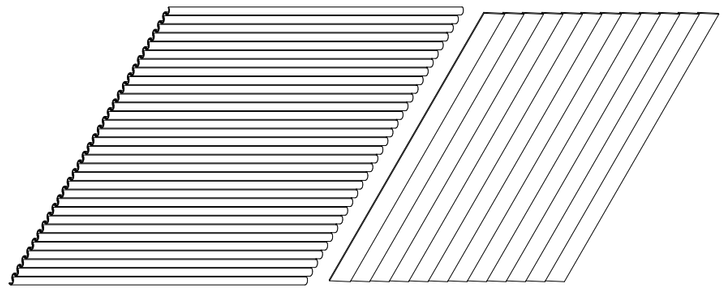


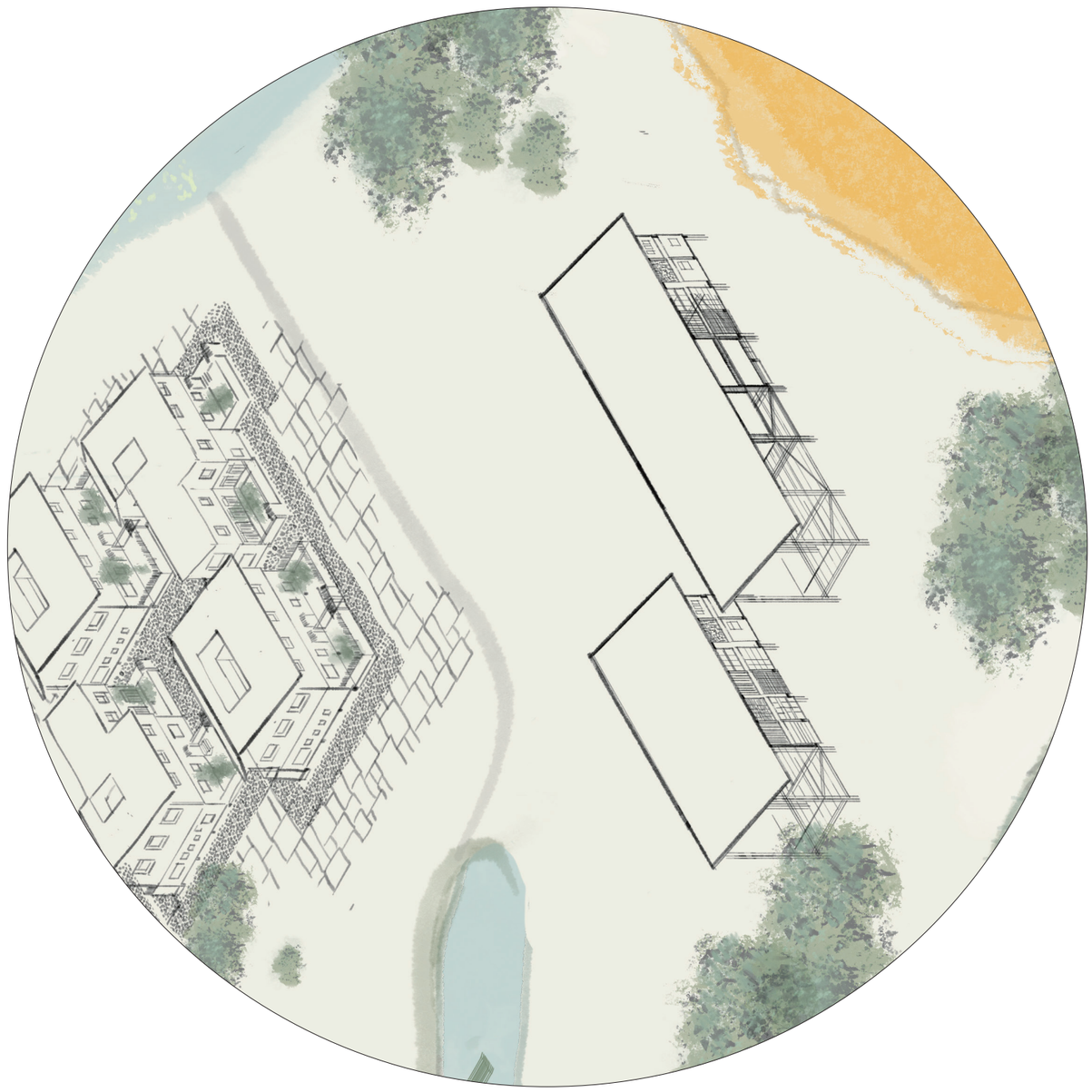












Sightseeing

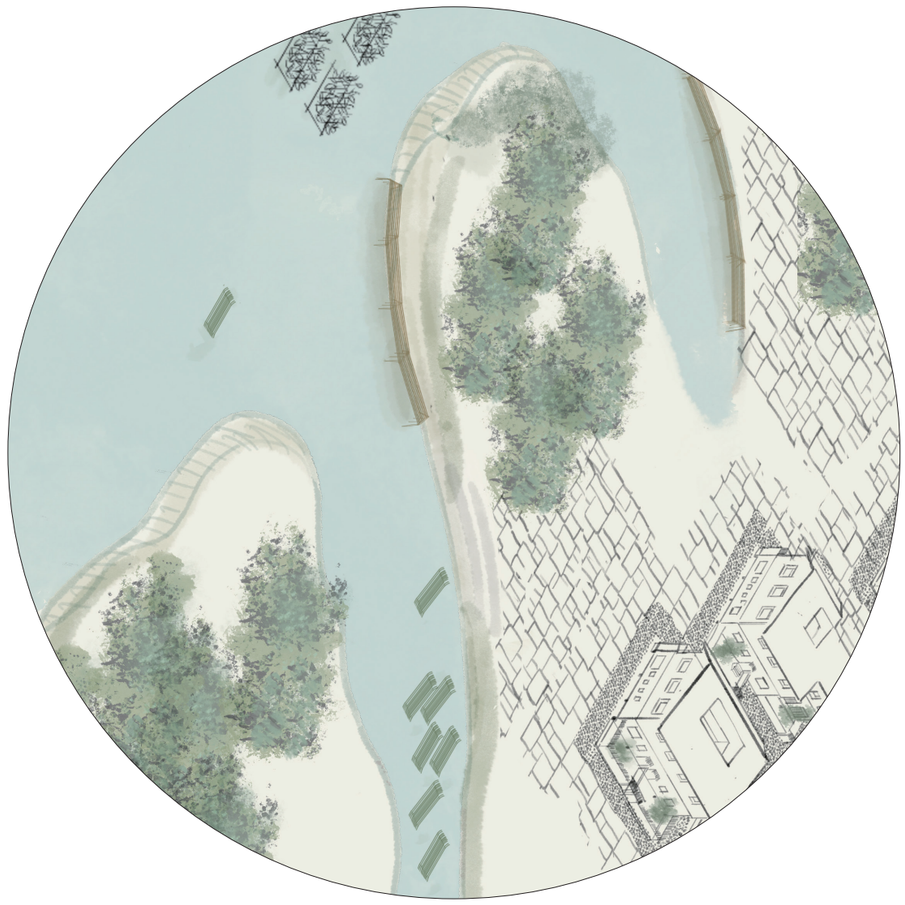
Bed and Breakfast

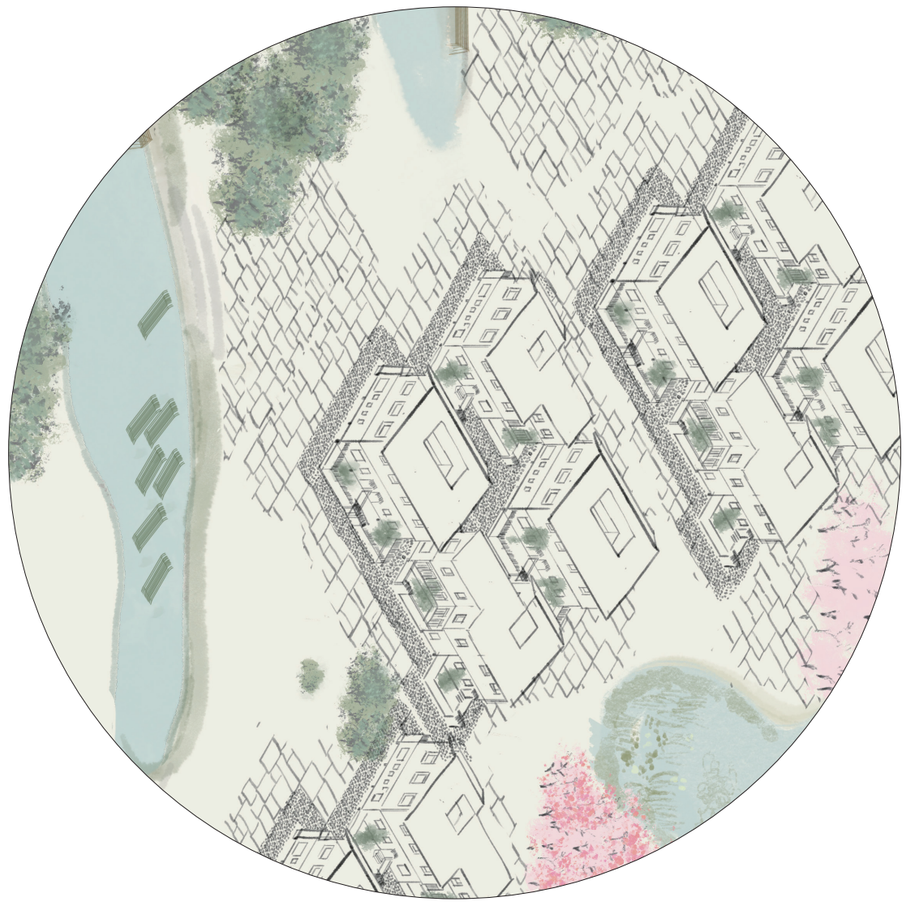
"Experirence"

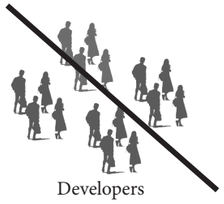
Sightseeing {normal development}

Bed and Breakfast {popular}

"Experirence"

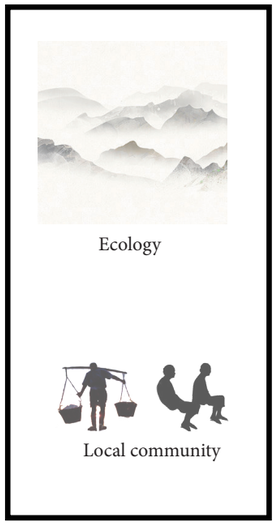






Developers

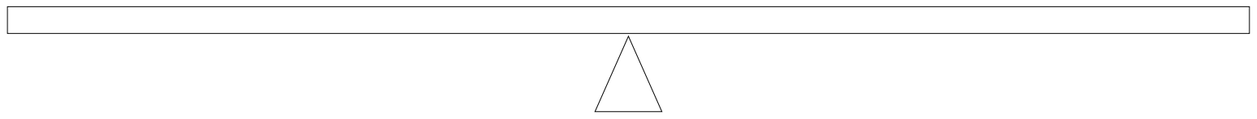
Tourists

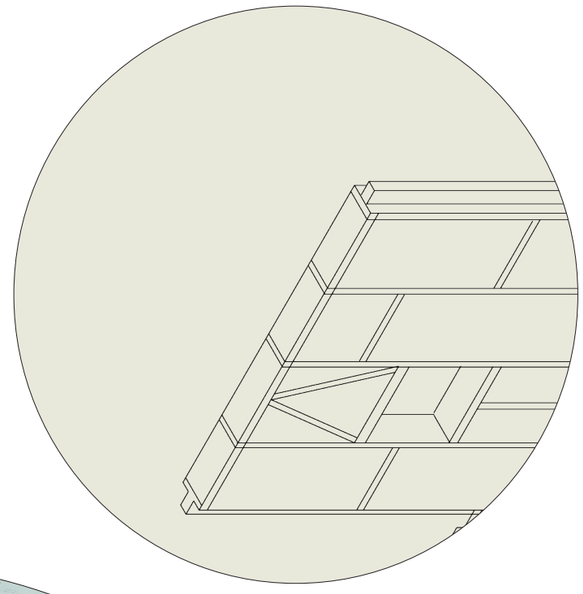


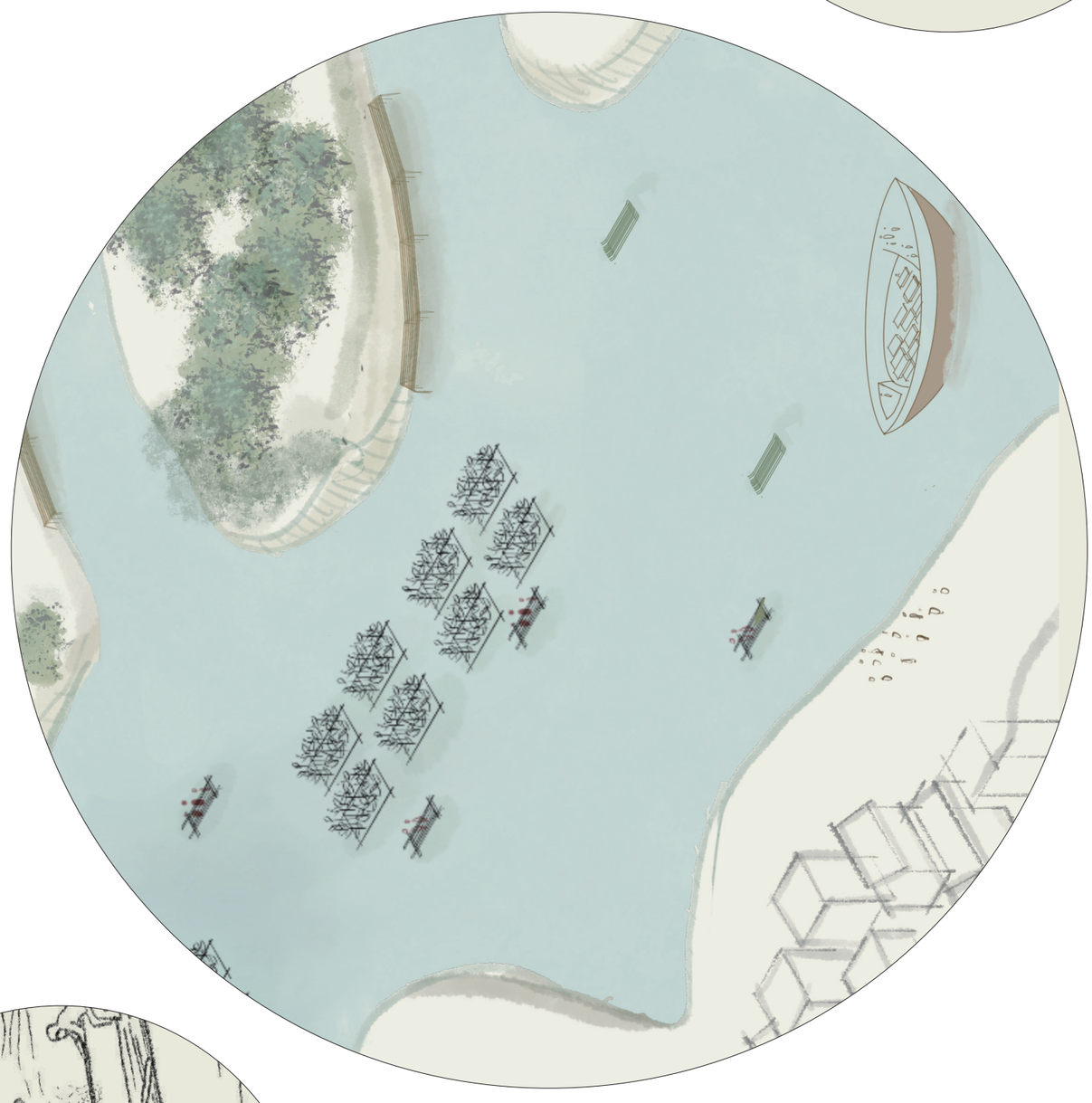
Ecology

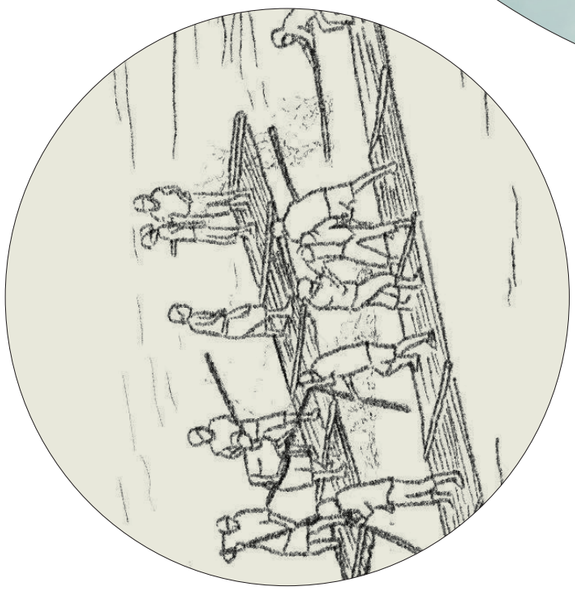
Local community

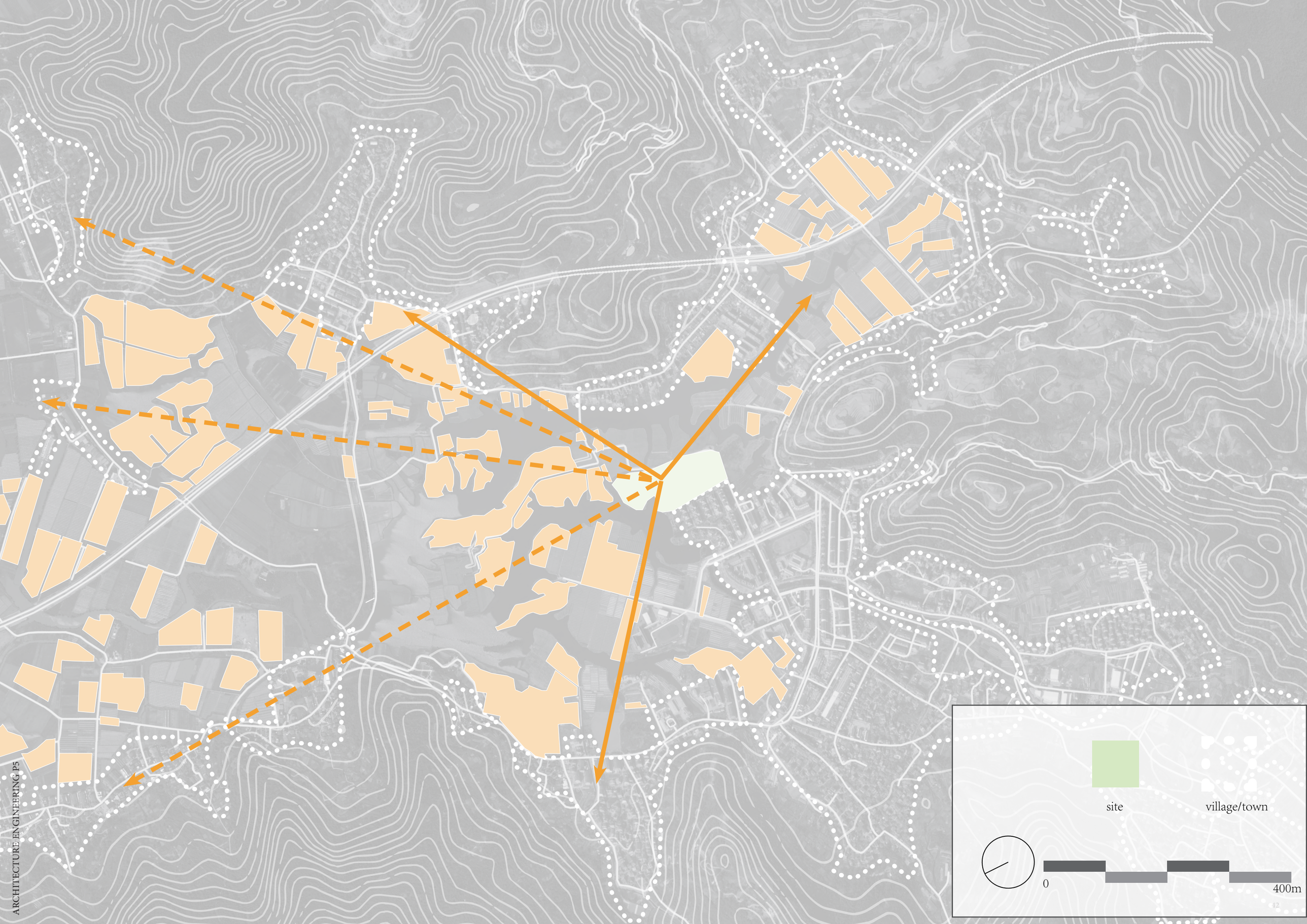
Tourists










site
village/town
0
400m

Architectural Engineering
The graduation studio
Cross-Domain Collaboration with Landscape Architecture

***Harvest*, 2021 to 2022**

Real Landscape
Purchased no date
Gallery in the fileds, in the world

The question how circular design strategies and principles can contribute to valuable landscapes, villages or urban neighbourhoods is central to the Harvest assignment. Students work on nature-inclusive architectural design solutions, using the energy transition as a leverage for a renewed and healthy living environment. In combination with the spatial potential of the intervention area itself, we work on design solutions that strengthen the social activity, economy and its spatial identity.

The R Village

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