

Timber Housing in Indonesia

'A combination of traditional and new techniques'

Presentatie:

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Date:

13 April 2017

Tutors:

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Pieter Stoutjesdijk

Maarten Meijs

P5

powered by innovation

INTECTURE 



MAKE

Indonesia

Problem Statement

INDONESIA

Java



Indonesia

Problem Statement

Population growth
Over 40 years



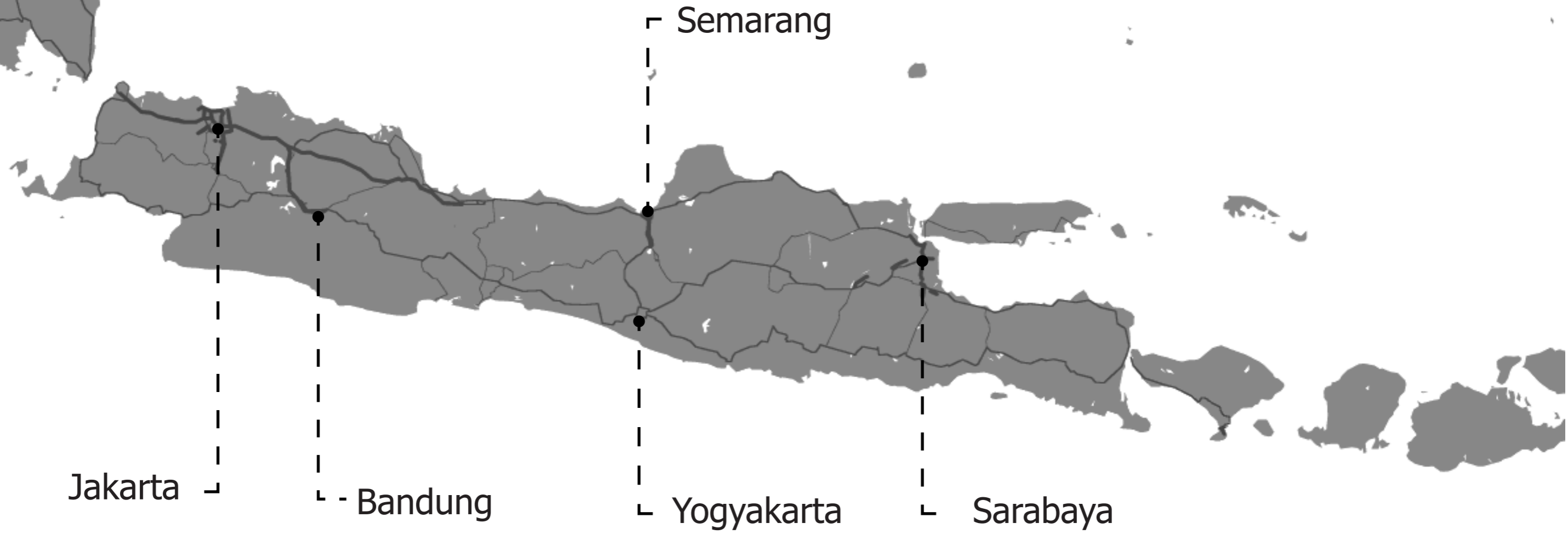
119.000.000



240.000.000

Indonesia

Problem Statement



Indonesia

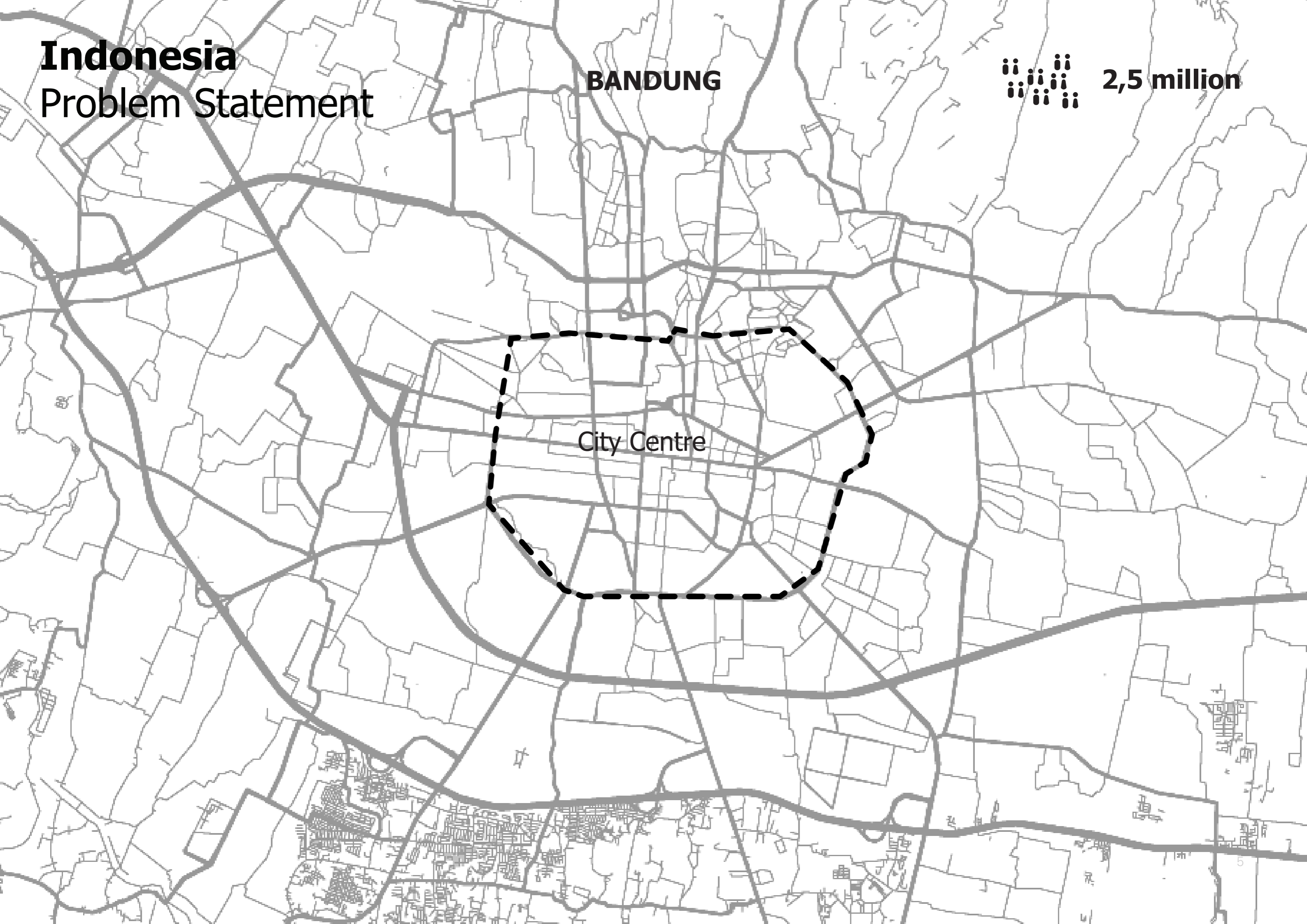
Problem Statement

BANDUNG



2,5 million

City Centre



Indonesia

Problem Statement

BANDUNG

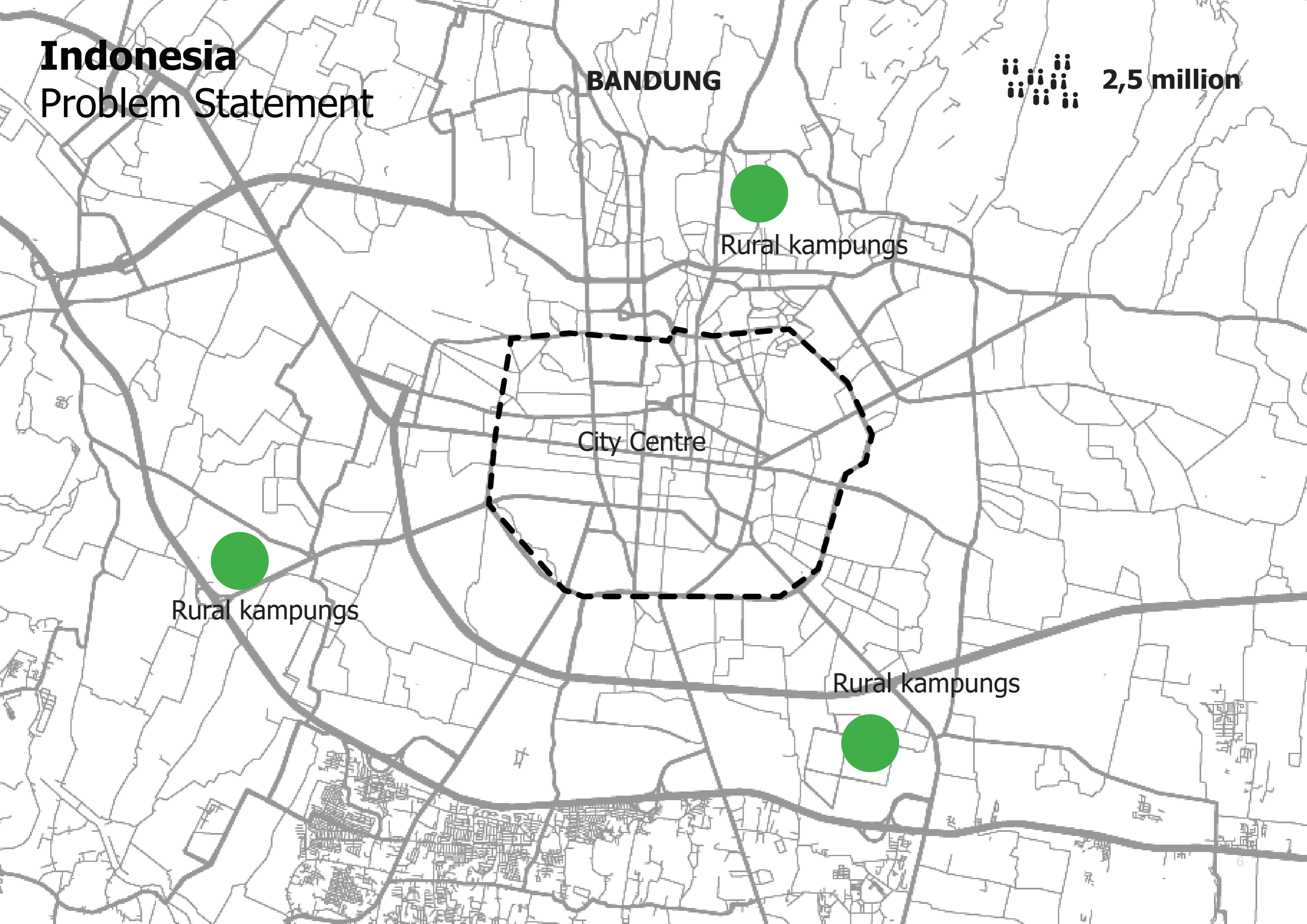
 **2,5 million**


Rural kampungs

City Centre


Rural kampungs

Rural kampungs



Indonesia

Problem Statement

BANDUNG

 **2,5 million**

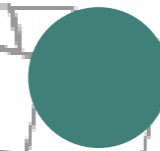


Peri-Urban Kampung

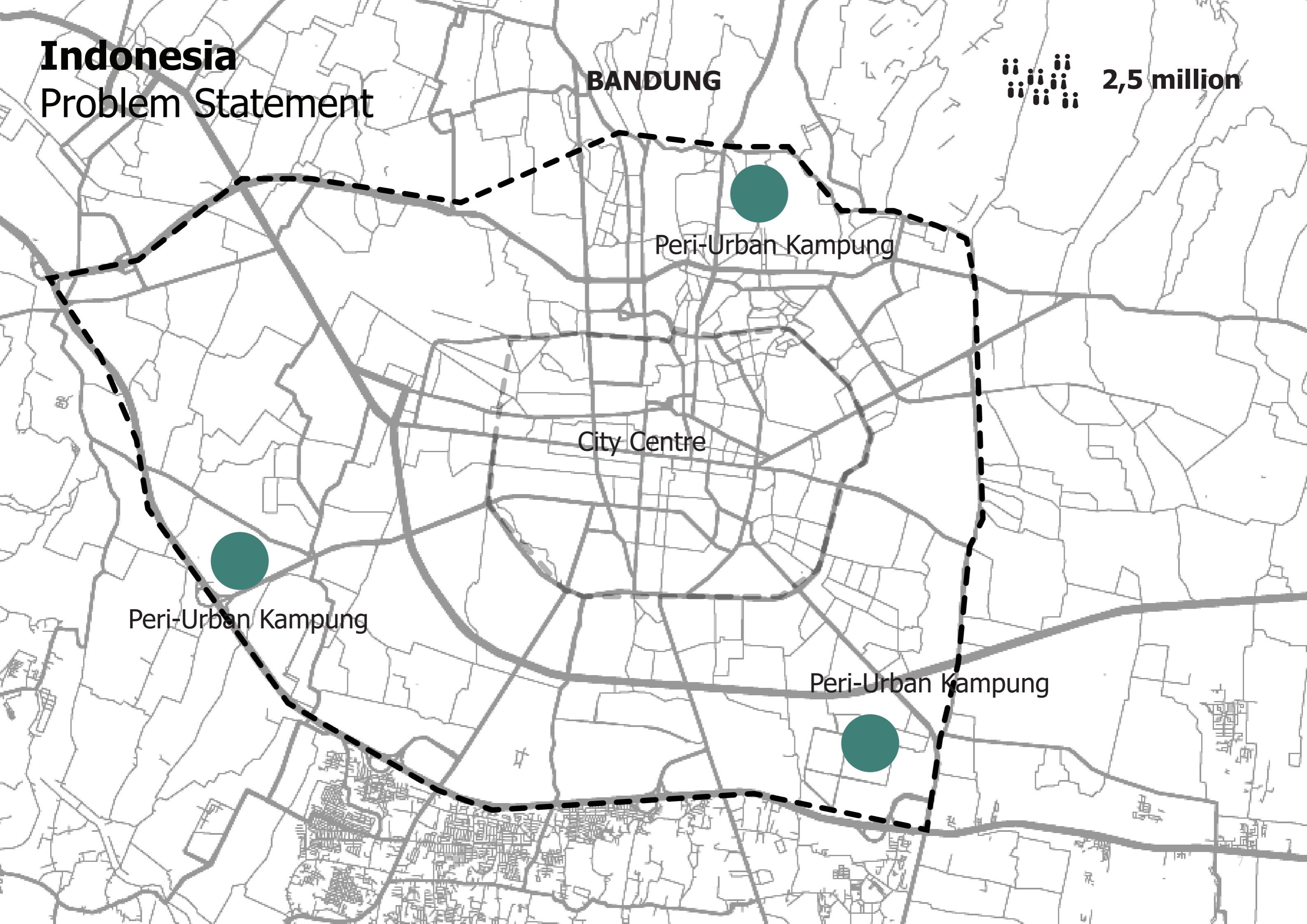
City Centre



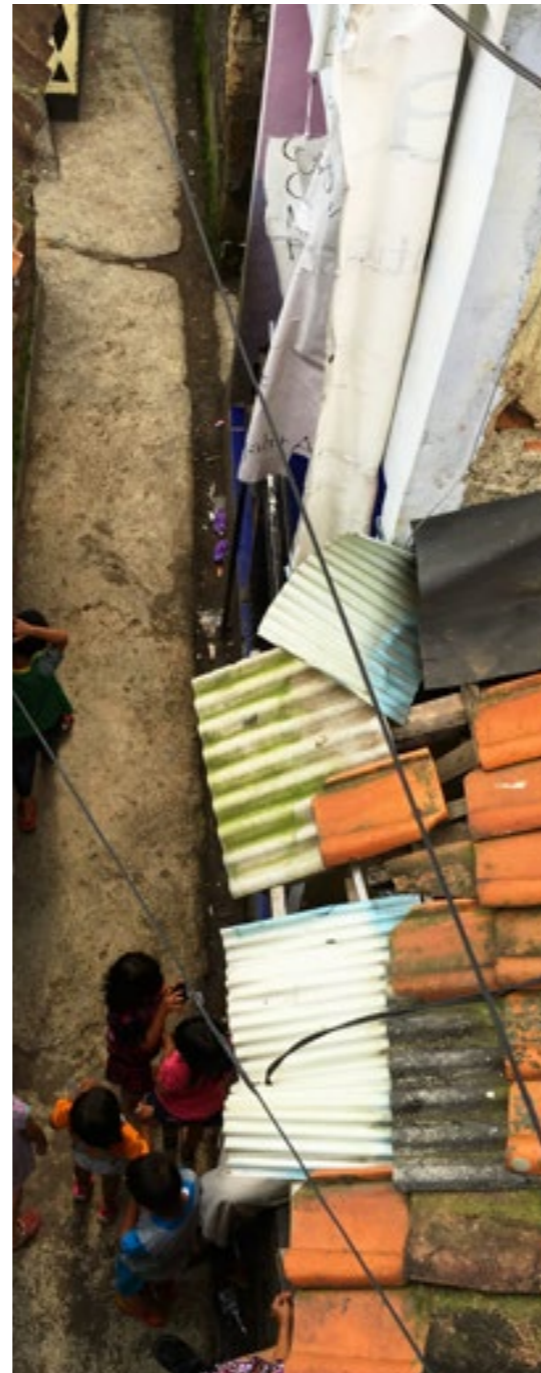
Peri-Urban Kampung



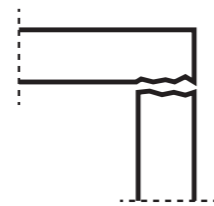
Peri-Urban Kampung



Peri-Urban Kampung - Problem Statement



High Density
(unhealthy)



Bad quality
(unsafe)



Low income

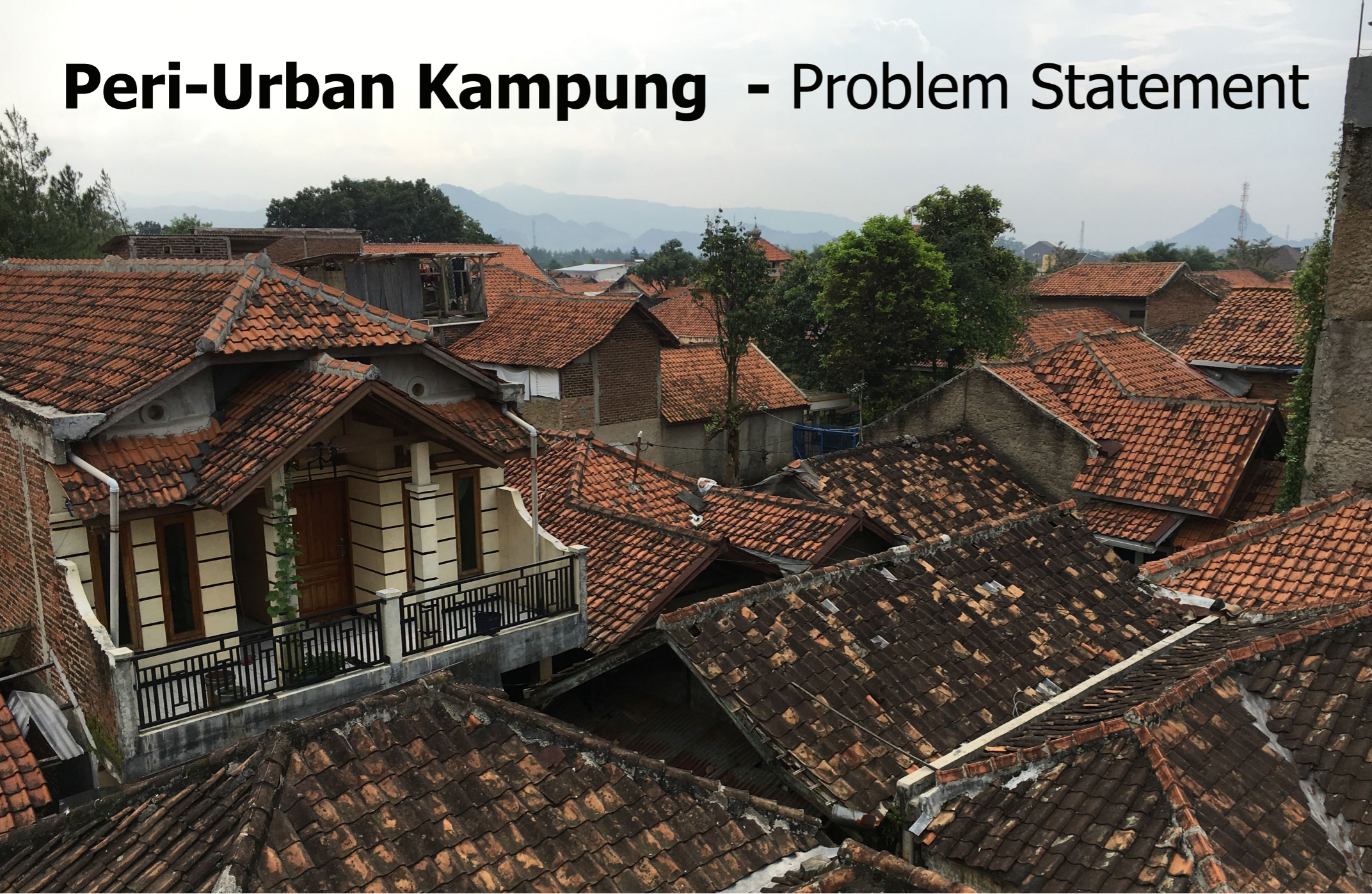


Unsustainable
materials



Assembly
knowledge

Peri-Urban Kampung - Problem Statement



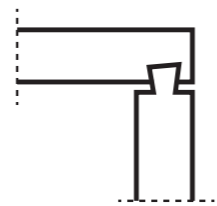
Peri-Urban Kampung - Problem Statement



Traditional Kampung - Opportunities



Low
Density



Quality
structure



re-use

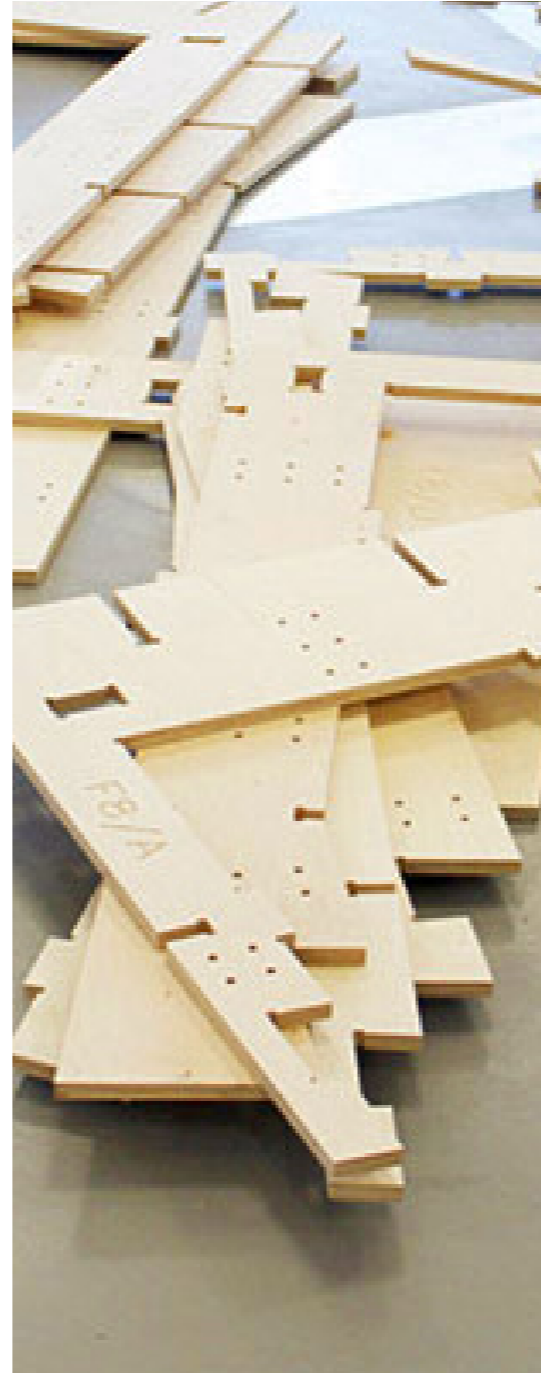


Local
materials

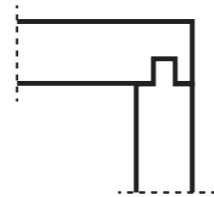


Community
assembly

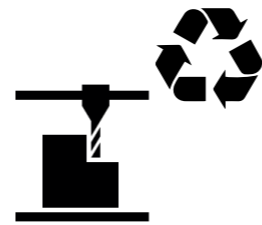
CNC Milling - Solutions



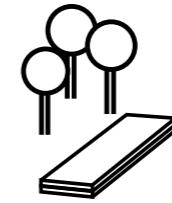
improve height



Quality
structure



re-produce



sustainable
material

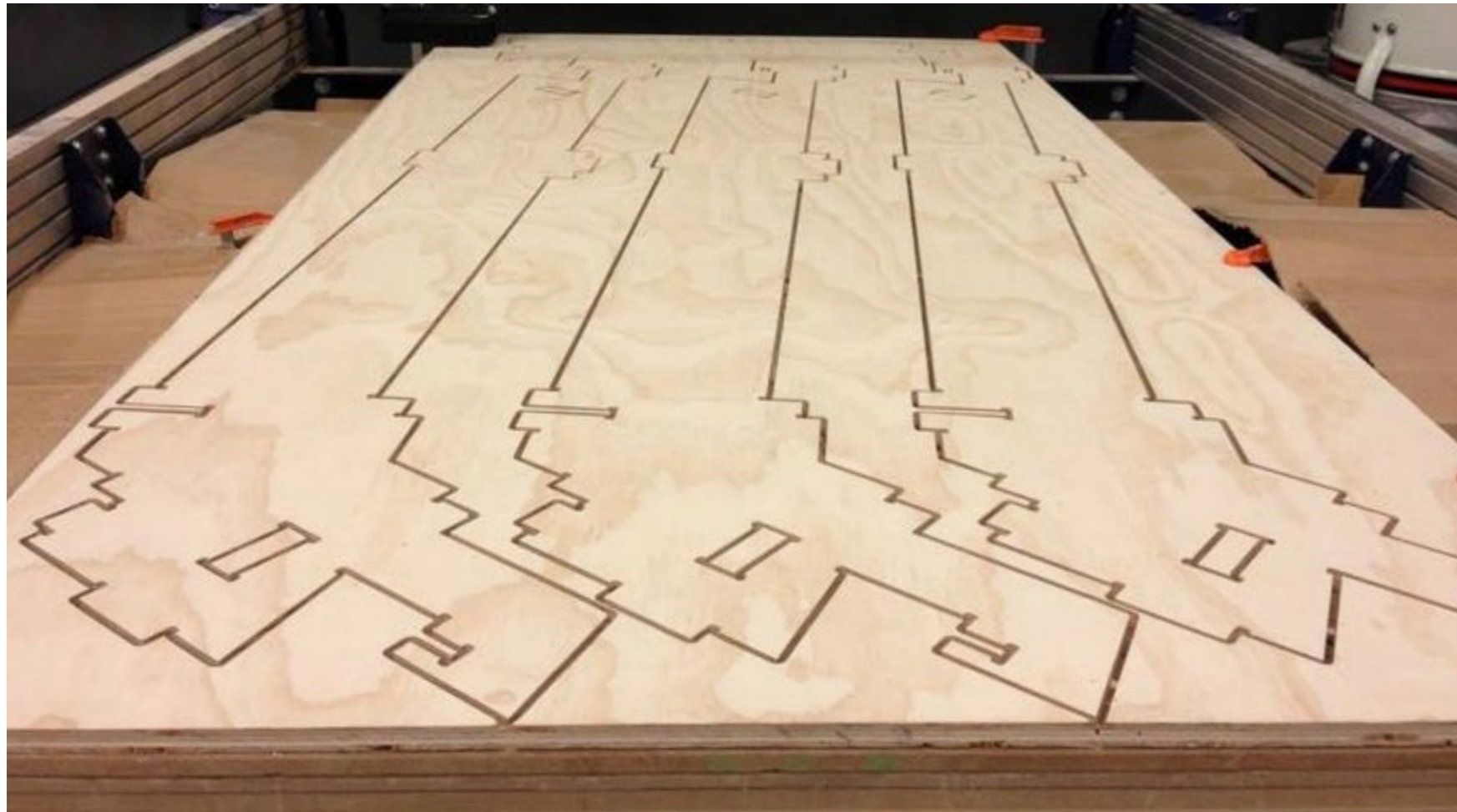
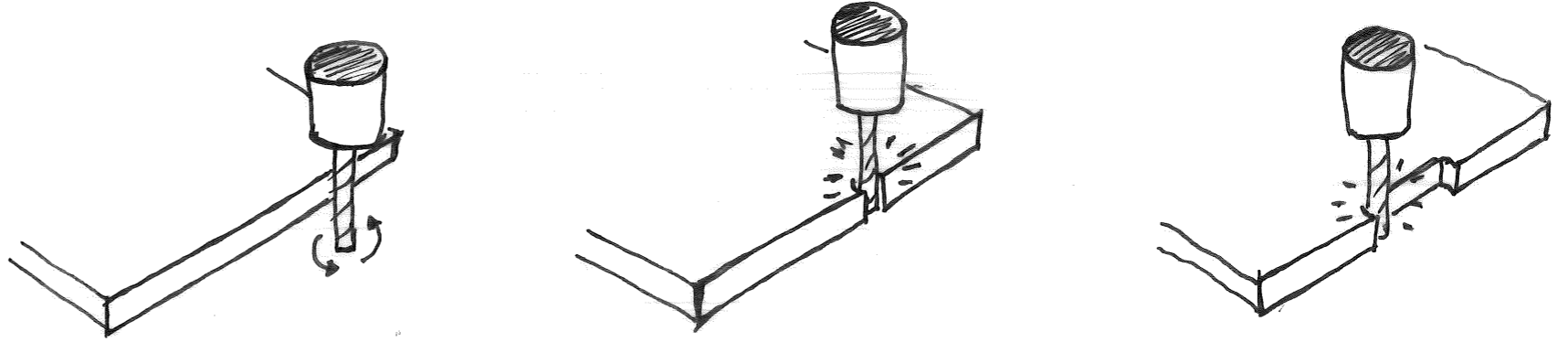


Easy DIY

CNC-Milling

Computer Numerical Control

- High precision
- mass customization
- Easy and fast



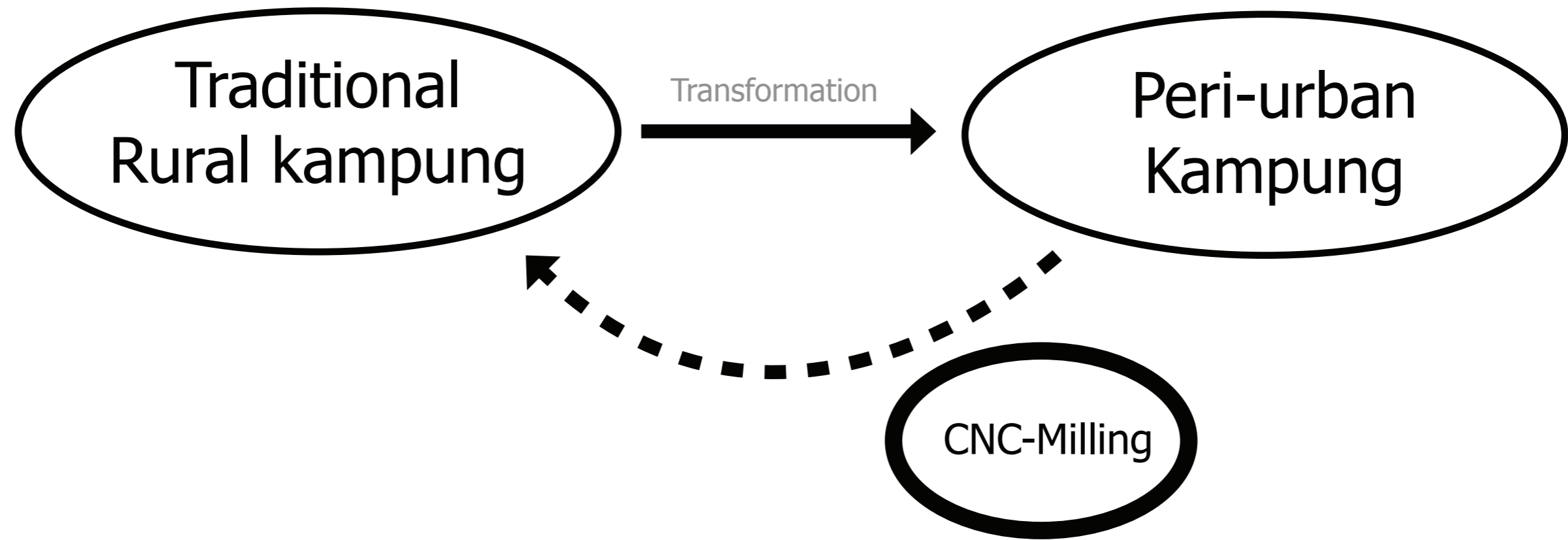
Research question

How to use Traditional and CNC-milling building methods to create sustainable affordable Do it yourself housing in the Peri-urban kampungs of Indonesia






Research question

How to use **Traditional** and **CNC-milling** building methods to create sustainable affordable Do-it-yourself housing in the **Peri-urban kampungs** of Indonesia

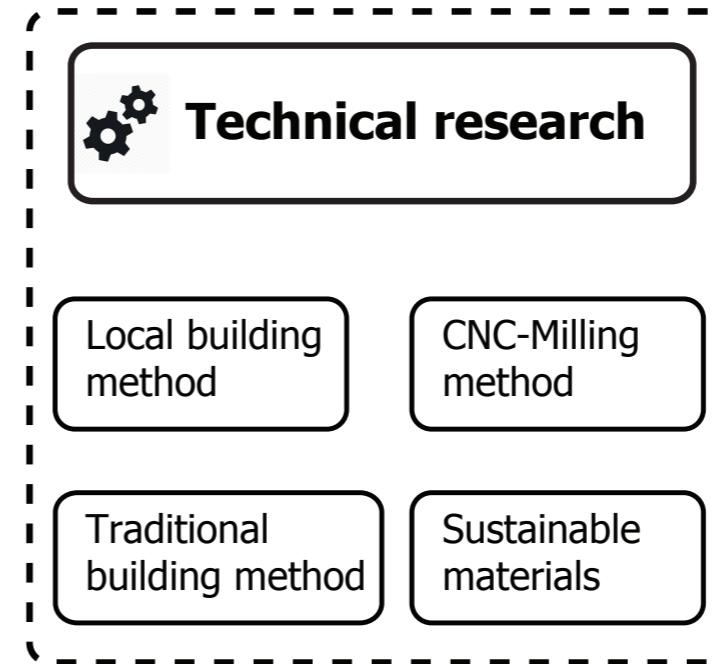
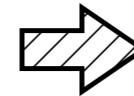
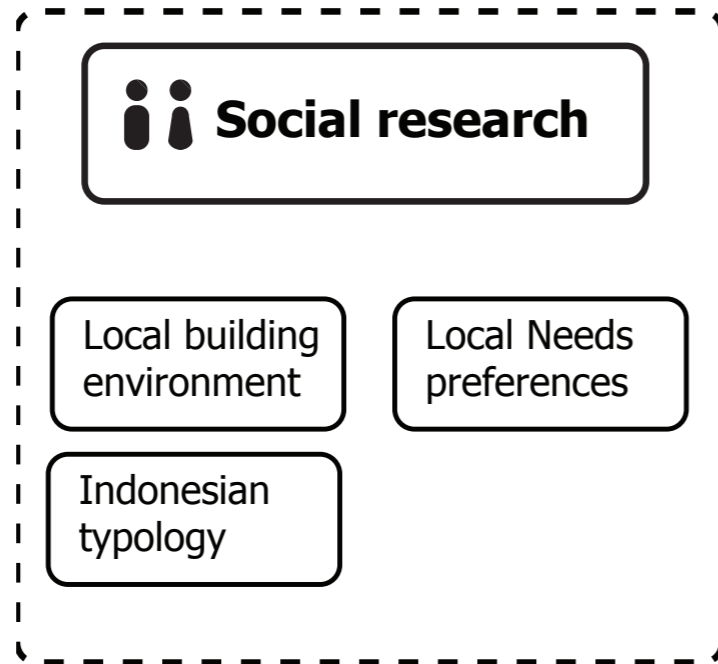
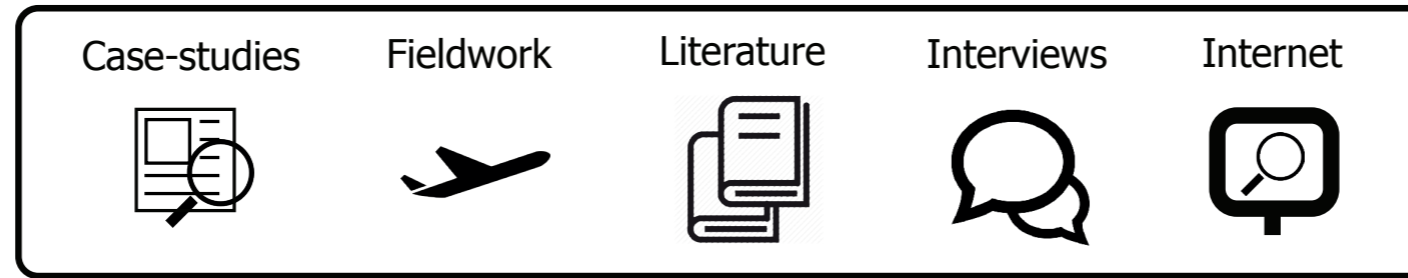
Research question Concept



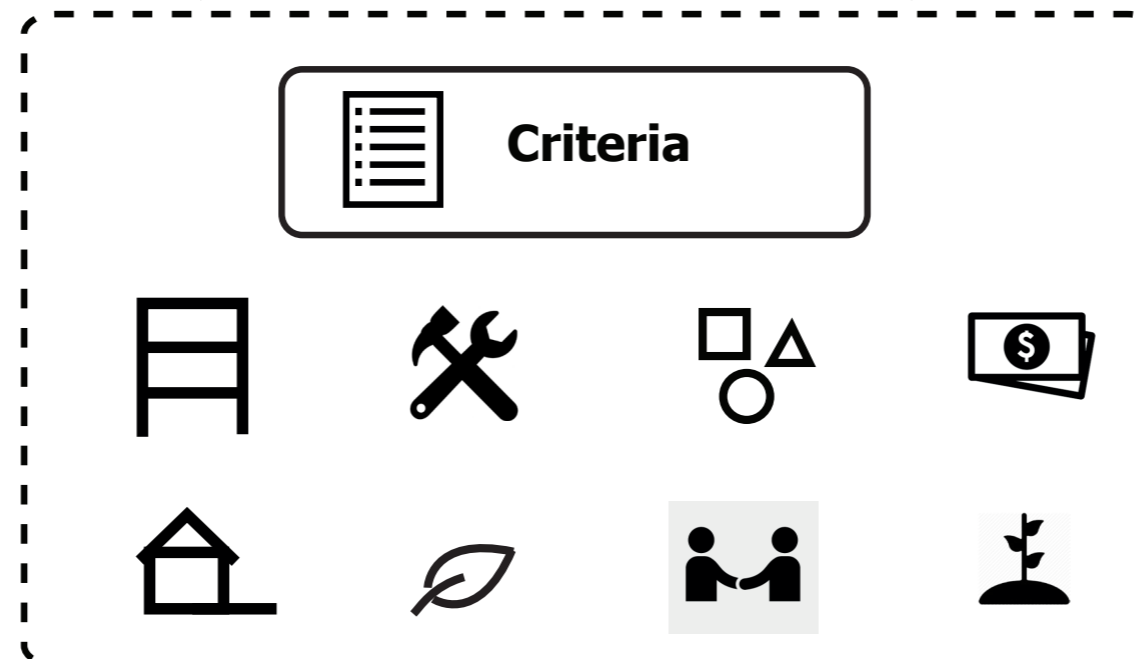
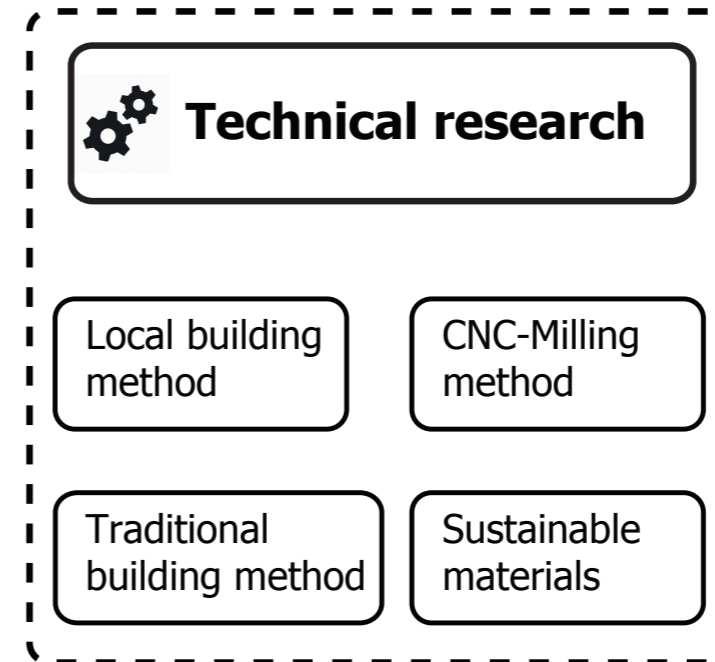
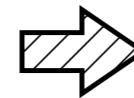
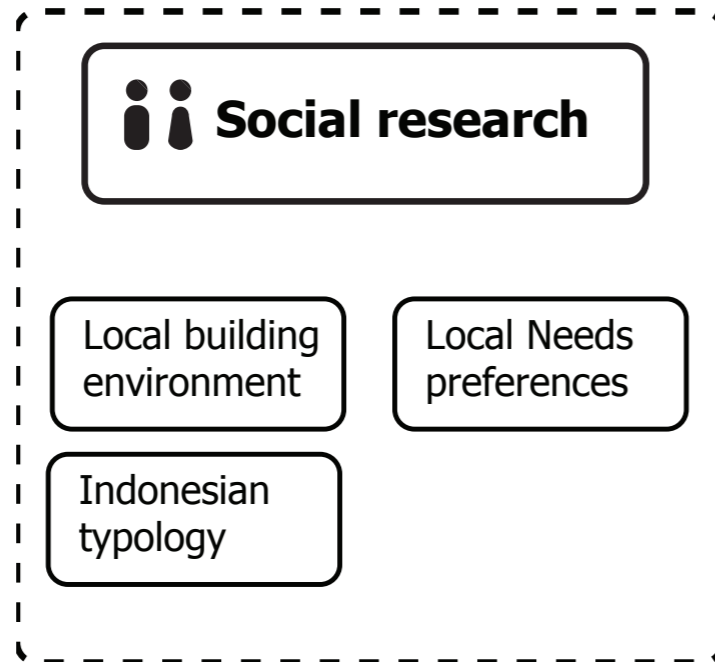
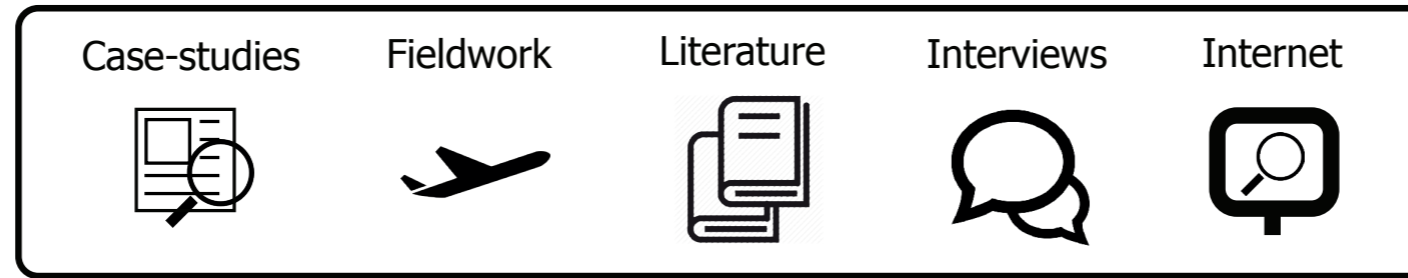
Research Methods

Case-studies	Fieldwork	Literature	Interviews	Internet
				

Research Methods



Research Methods



Research Method



ii Social research
living environment



Research Method



Technical research

Traditional kampung



Research Method

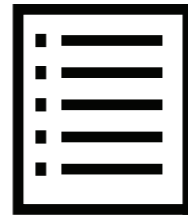


Technical research

CNC-Milling

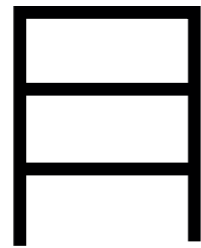


Research



Criteria

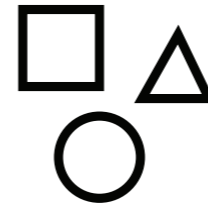
3 storeys high



Easy DIY



Customizable



Low costs



Durable



Sustainable materials



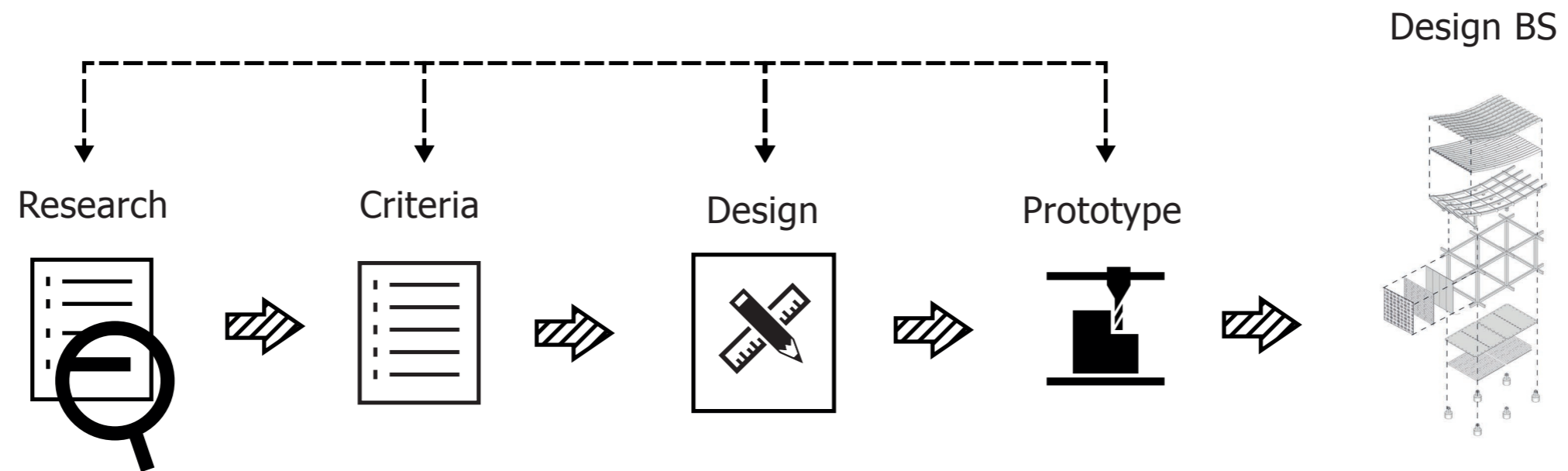
Collective space



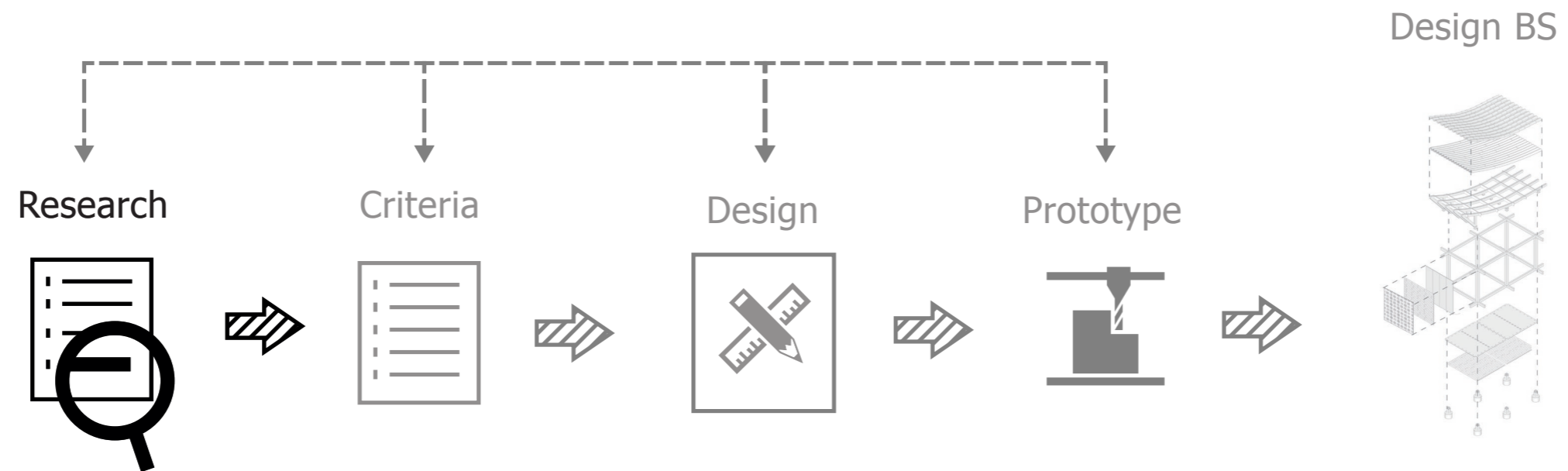
Plantation/green



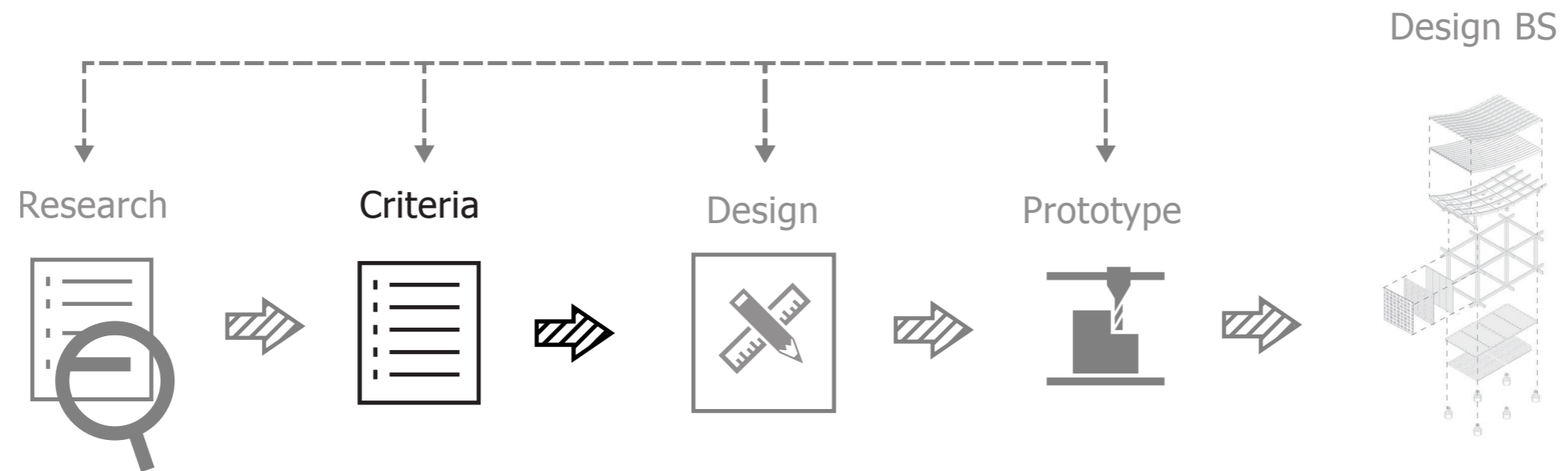
Design Process



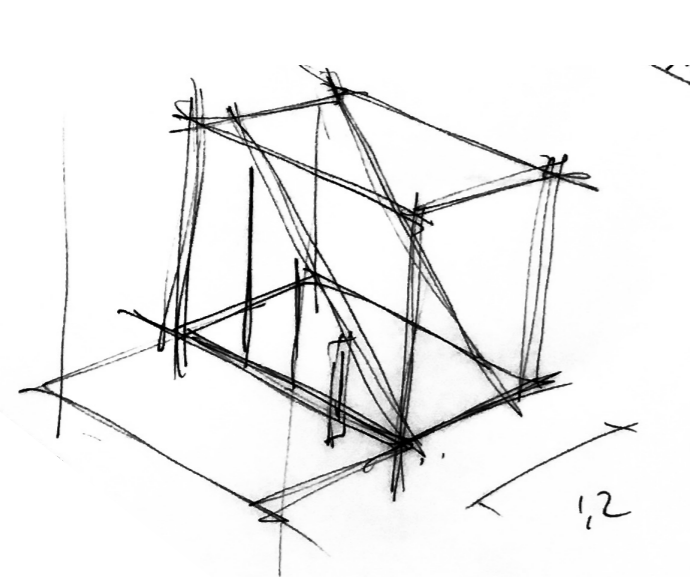
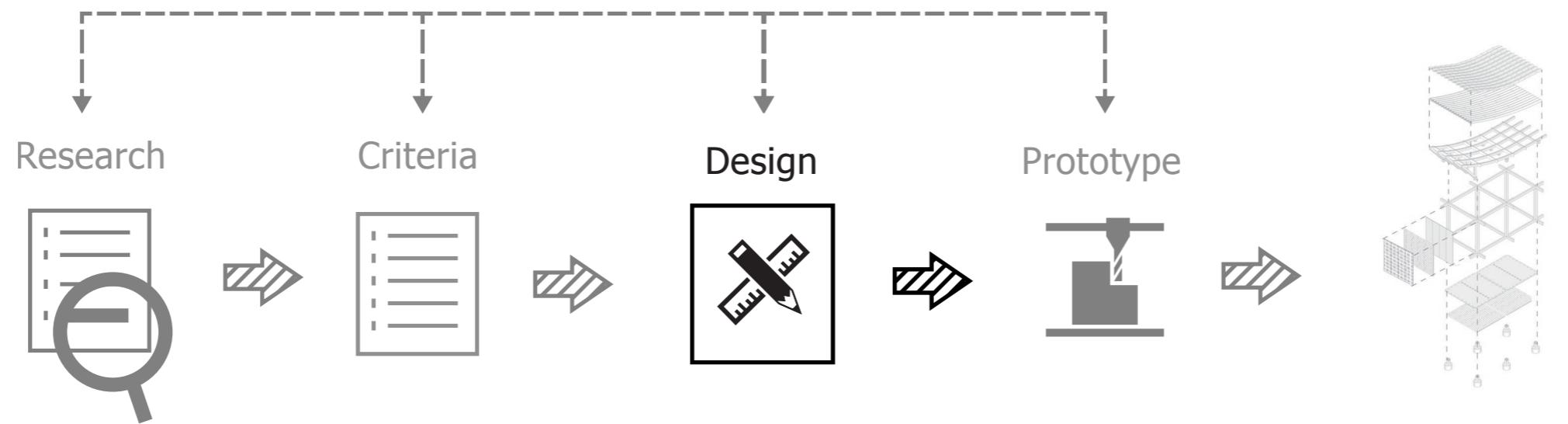
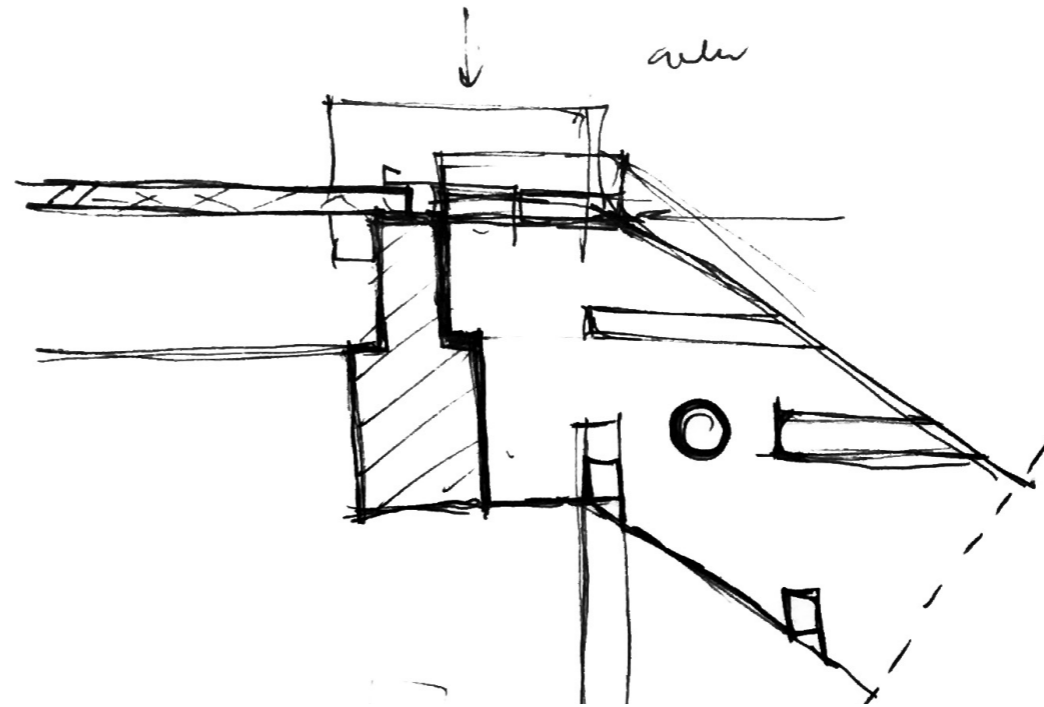
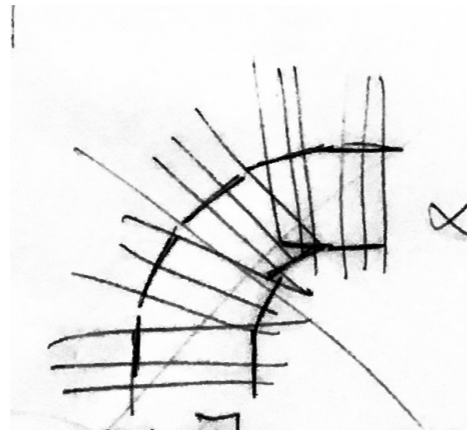
Design Process



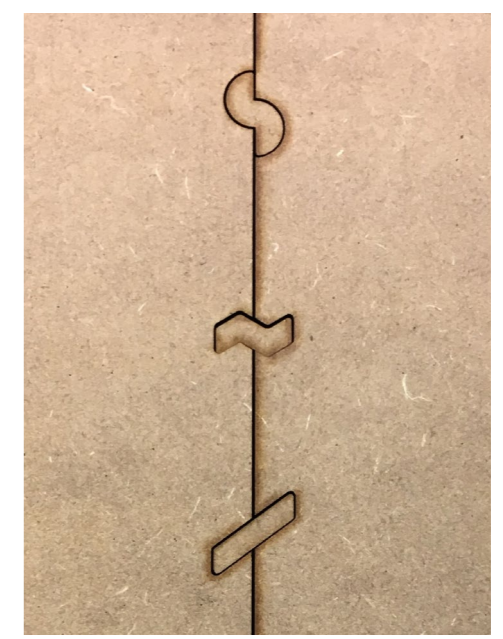
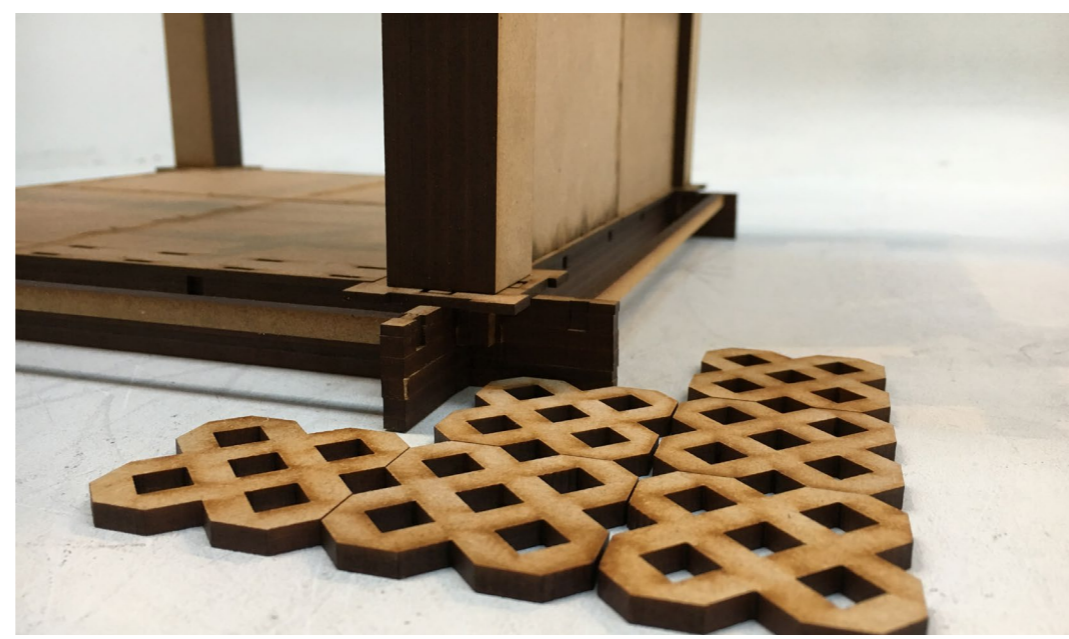
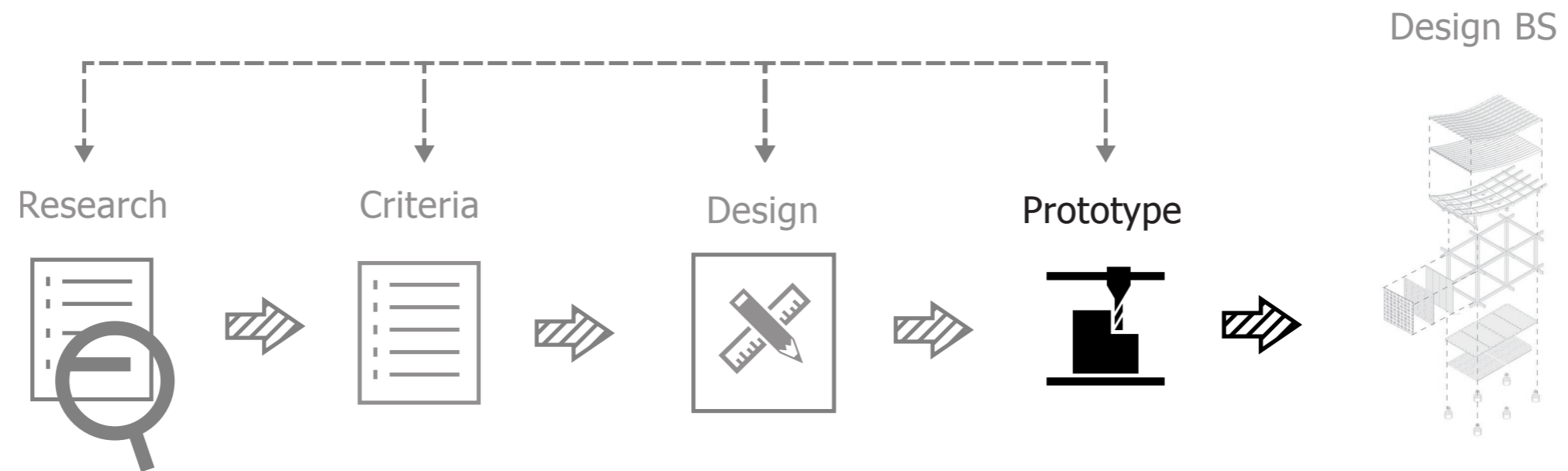
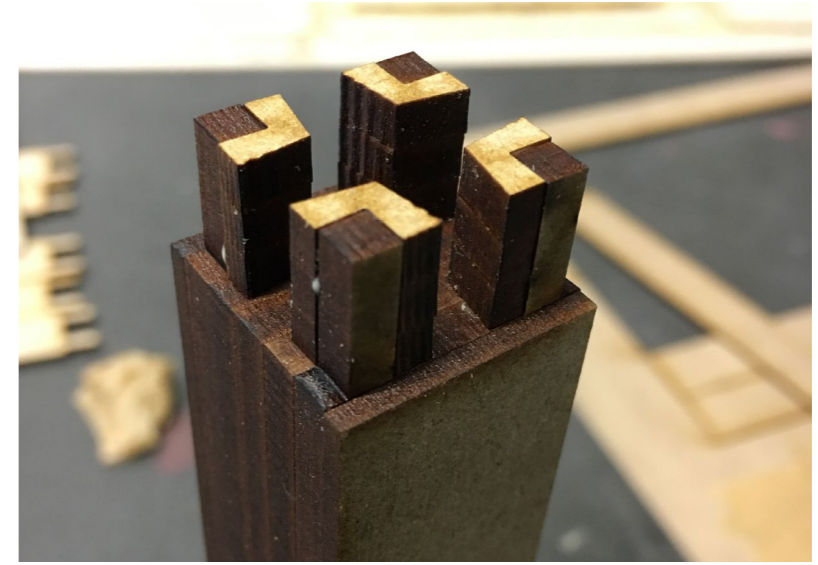
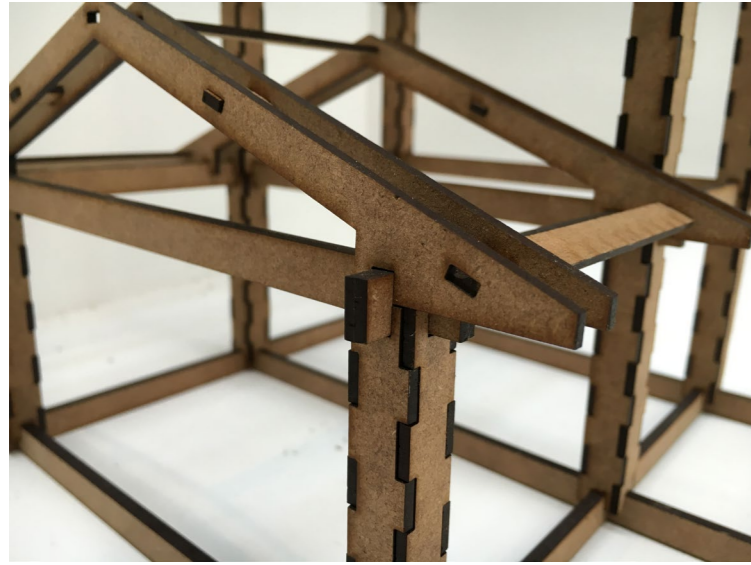
Design Process



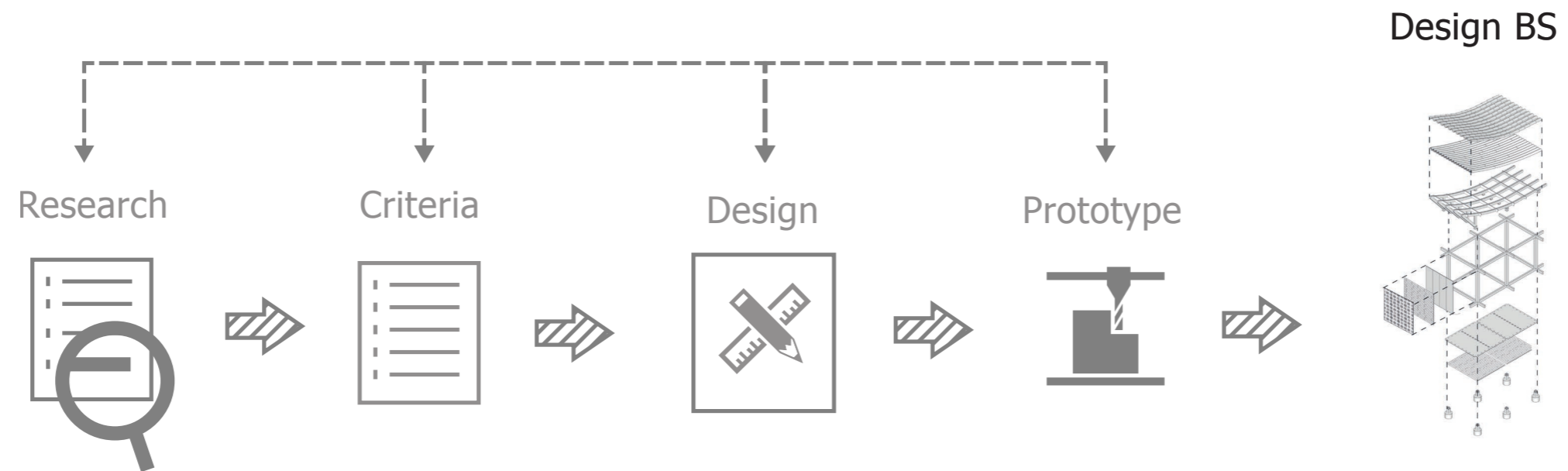
Design Process



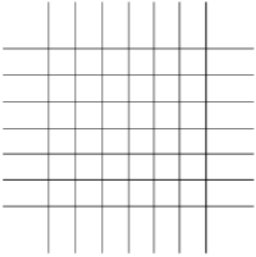
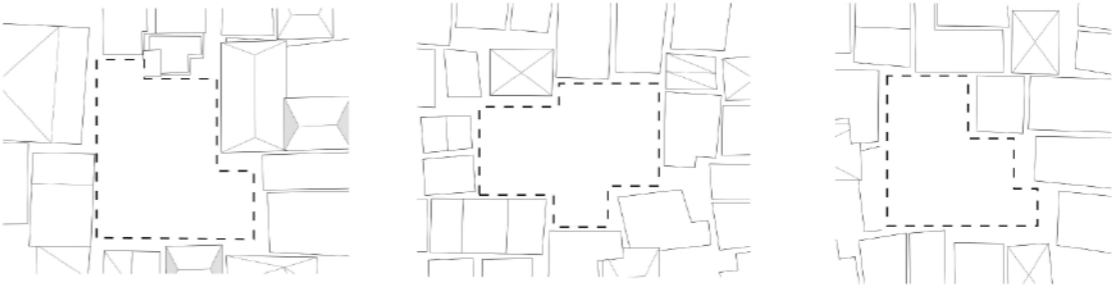
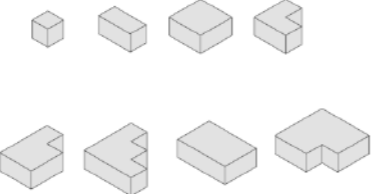
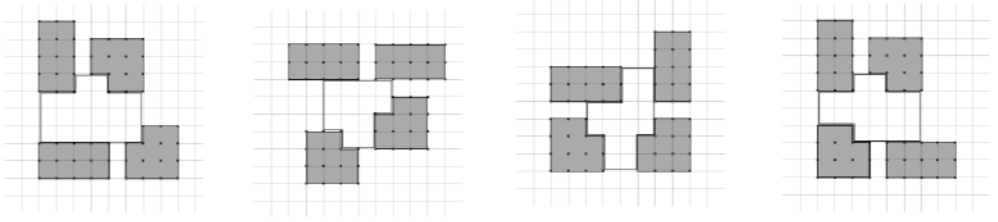
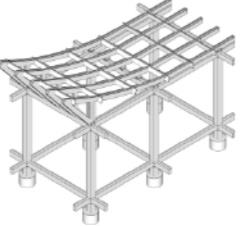

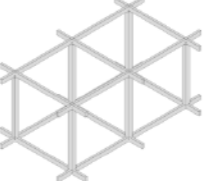

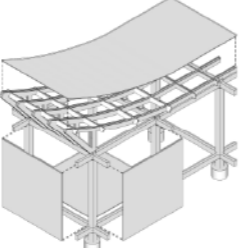
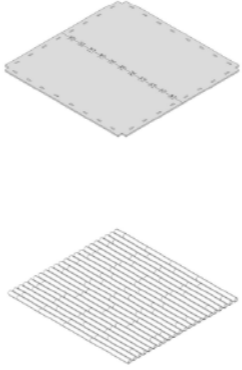
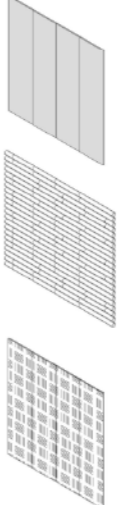
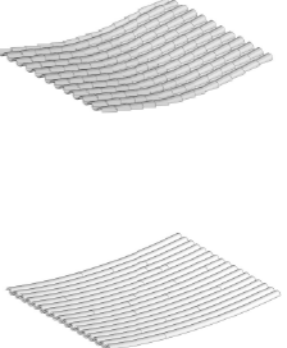
Design Process



Design Process

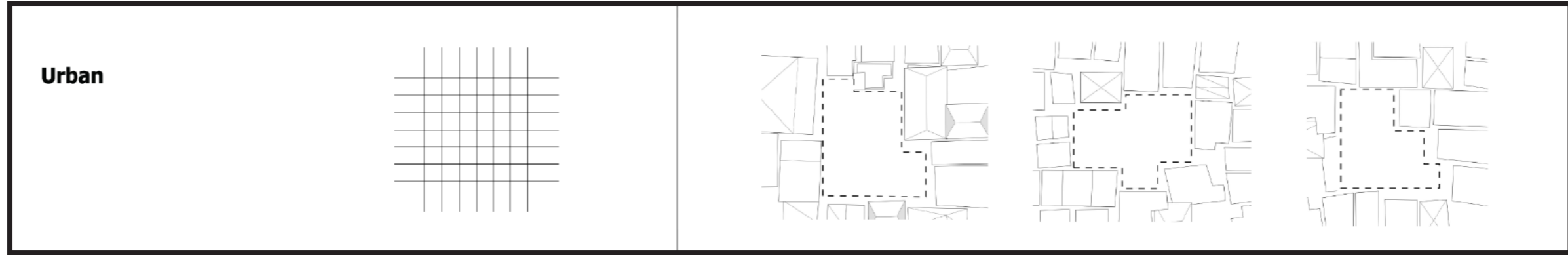


Building system

<p>Urban</p> 			
<p>Dwelling</p> 			
<p>Structure</p> 	<p>Foundation</p> 	<p>Beams/Columns</p> 	<p>Roof</p> 
<p>Envelope</p> 	<p>Flooring</p> 	<p>Facade</p> 	<p>Roof</p> 

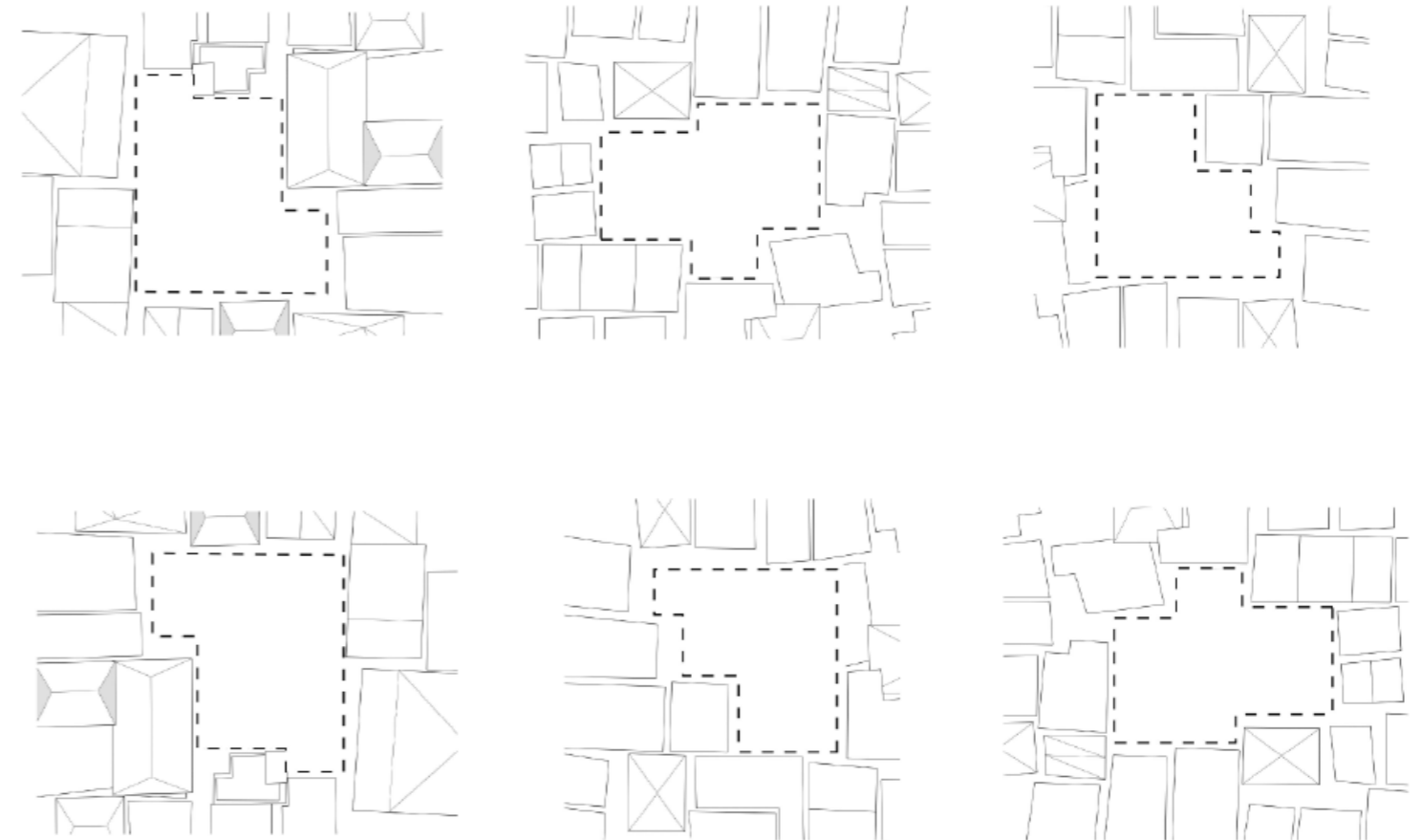
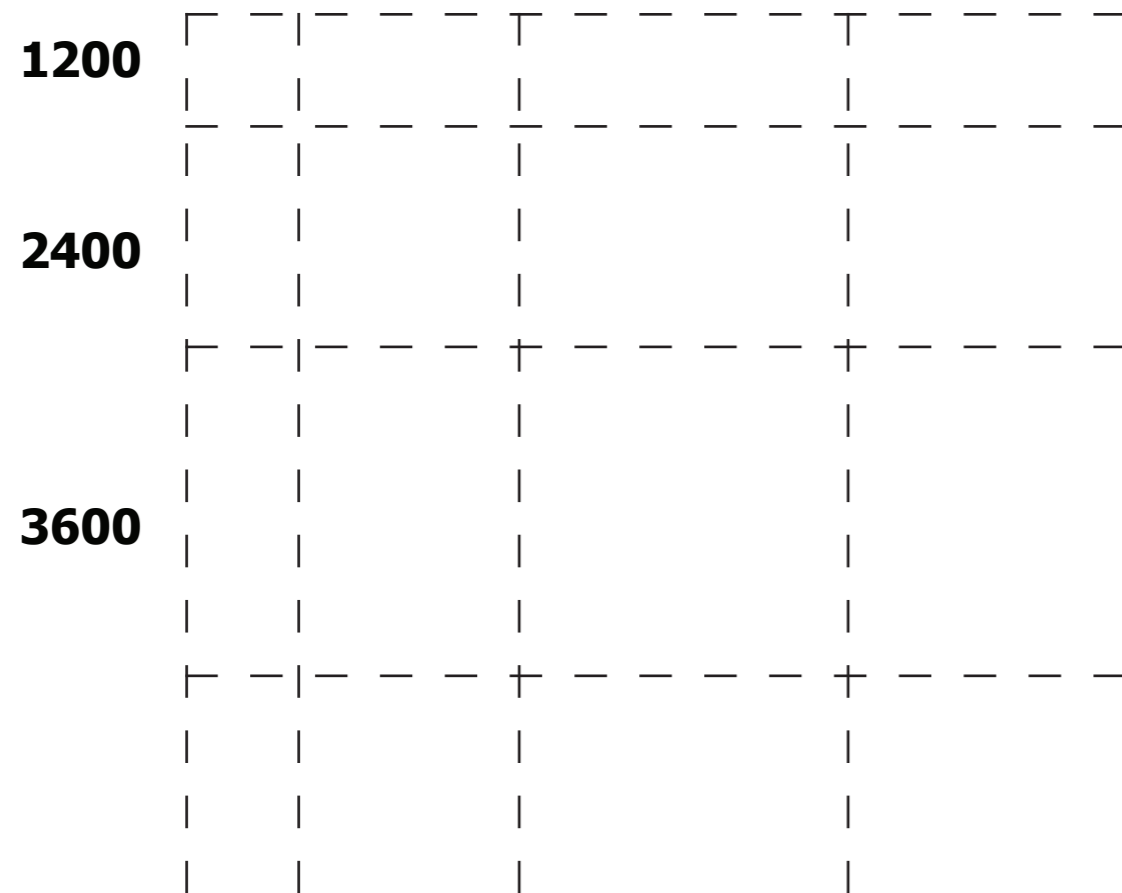
Building system

Urban



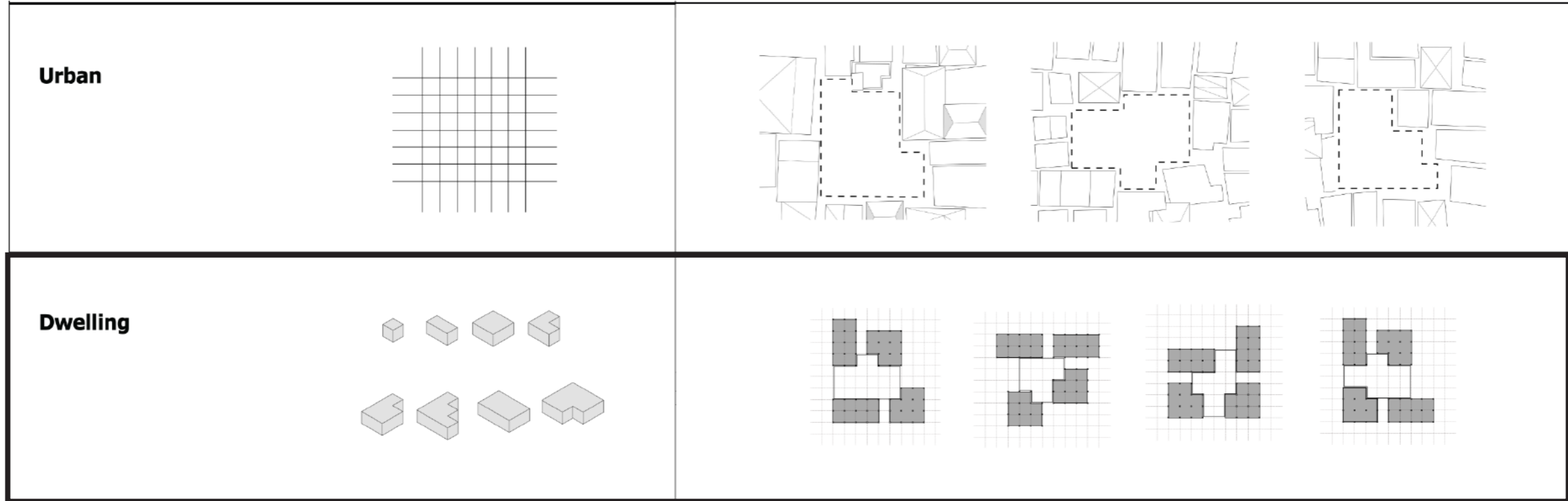
Grid based on 1200 mm

Flexible within urban tissue

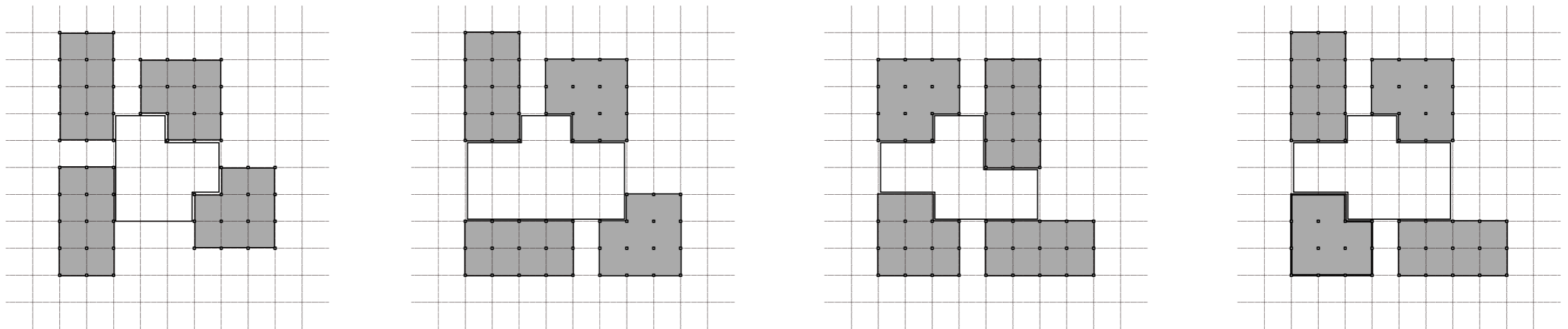


Building system

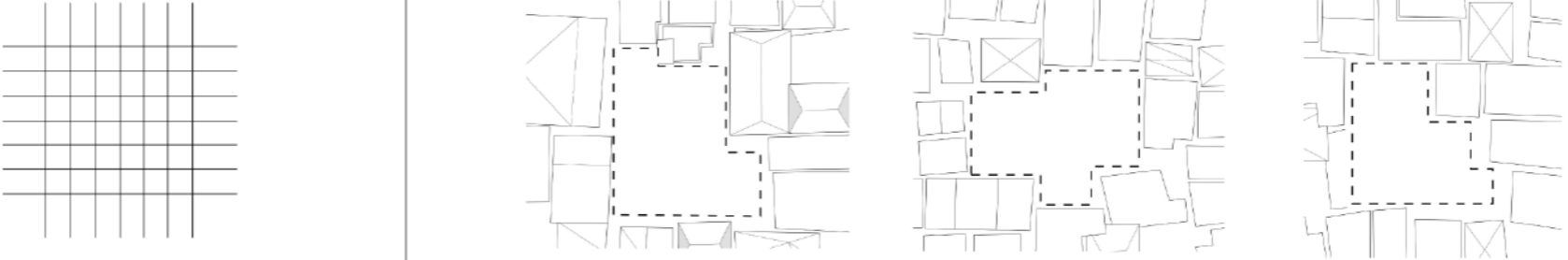
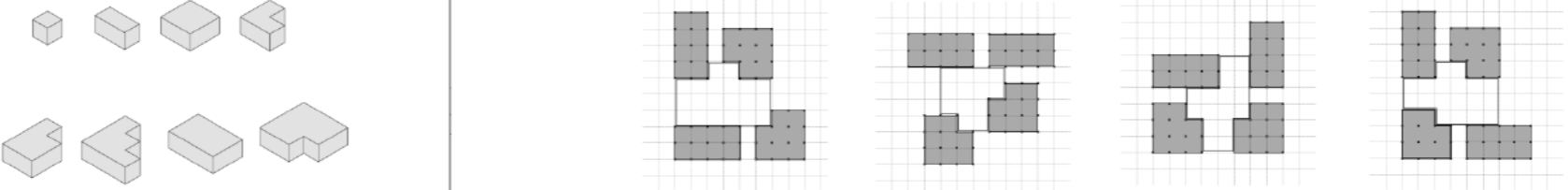

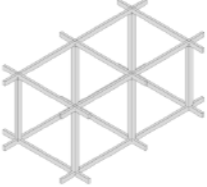


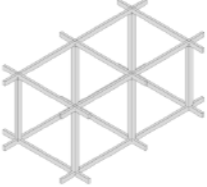


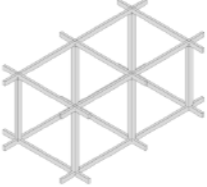

Dwelling



Flexible within grid



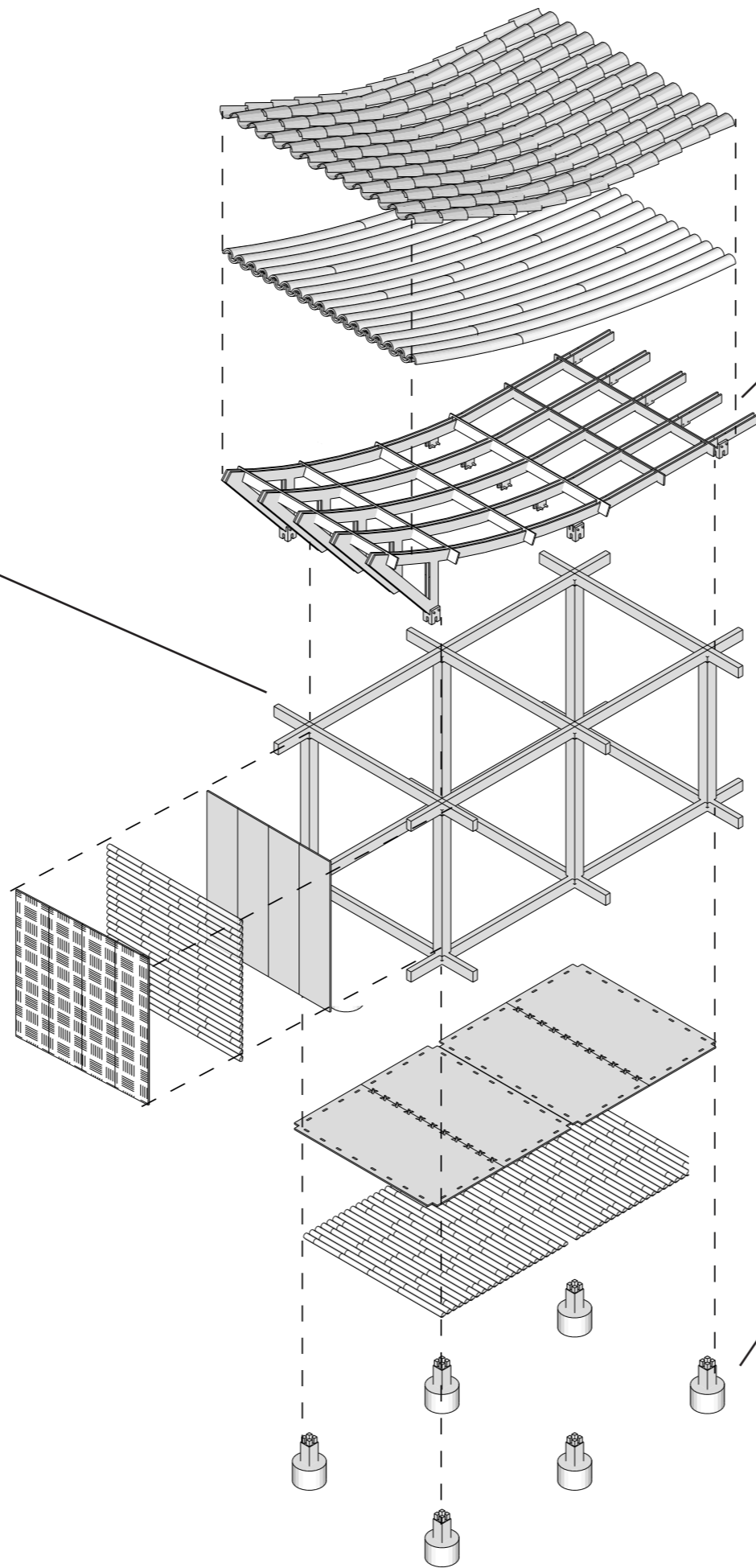
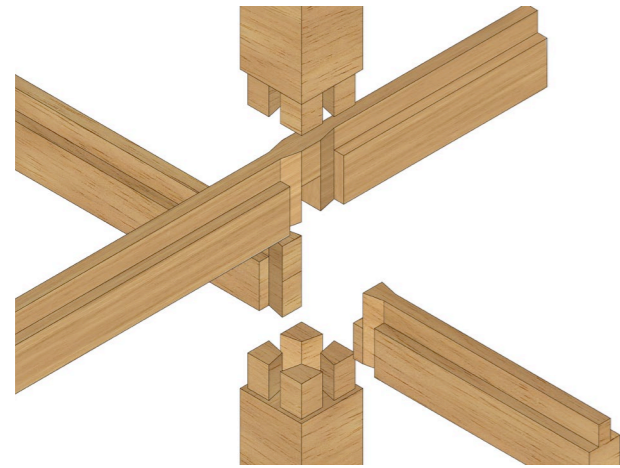
Building system

Urban	 <p>The Urban section contains three diagrams. The first is a simple grid of 10 vertical and 10 horizontal lines. The second and third are more complex line drawings showing building footprints and street layouts within a grid, with dashed lines indicating specific blocks or streets.</p>						
Dwelling	 <p>The Dwelling section contains two rows of diagrams. The top row shows four 3D rectangular blocks of varying sizes and orientations. The bottom row shows four 2D floor plans on a grid, representing different ways to arrange these blocks.</p>						
Structure	<table border="1"><thead><tr><th>Foundation</th><th>Beams/Columns</th><th>Roof</th></tr></thead><tbody><tr><td><p>A diagram showing six small, identical column-like structures arranged in a 2x3 grid.</p></td><td><p>A diagram of a hexagonal truss structure, consisting of interconnected beams forming a series of triangles.</p></td><td><p>A diagram of a curved roof structure, showing a series of parallel beams supported by a central column and other supports, forming a shallow arch.</p></td></tr></tbody></table>	Foundation	Beams/Columns	Roof	 <p>A diagram showing six small, identical column-like structures arranged in a 2x3 grid.</p>	 <p>A diagram of a hexagonal truss structure, consisting of interconnected beams forming a series of triangles.</p>	 <p>A diagram of a curved roof structure, showing a series of parallel beams supported by a central column and other supports, forming a shallow arch.</p>
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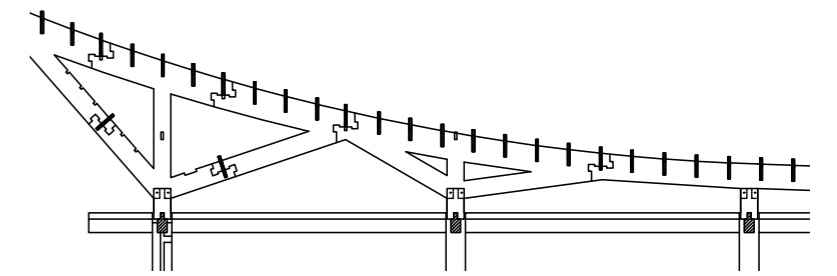
Building system

Structure

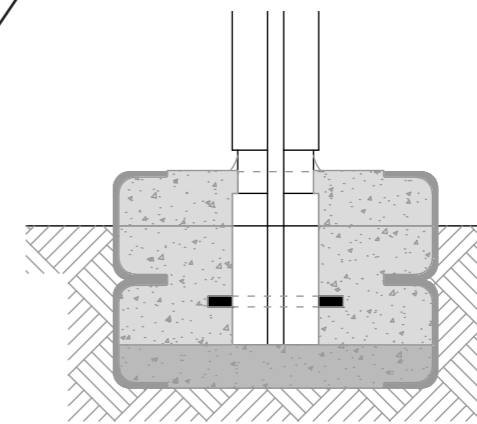
Solid wood structure



Panel wood structure



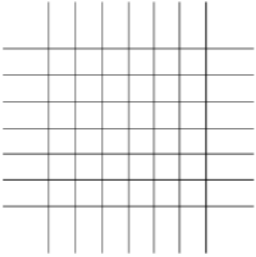
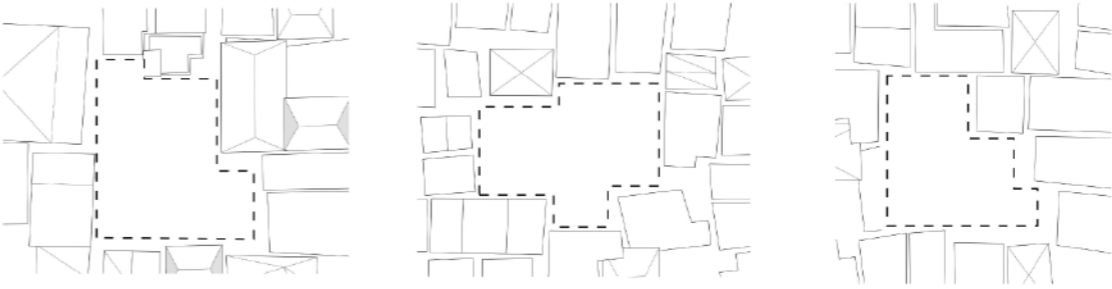
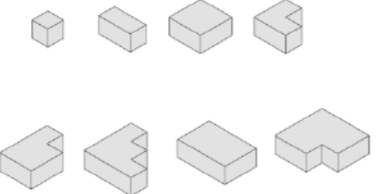
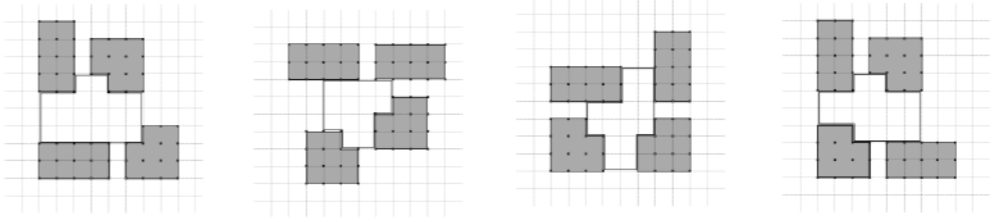
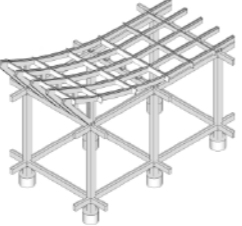

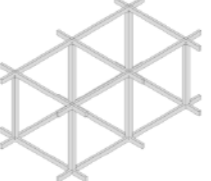

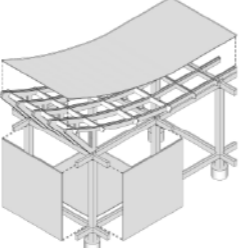
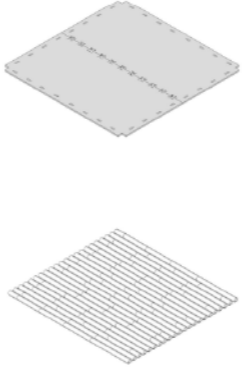
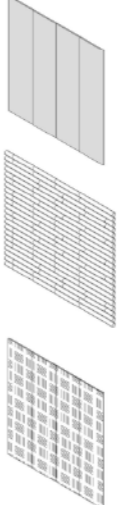
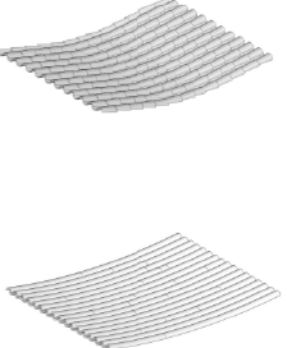
Concrete foundation



Used tyres



Building system

<p>Urban</p> 			
<p>Dwelling</p> 			
<p>Structure</p> 	<p>Foundation</p> 	<p>Beams/Columns</p> 	<p>Roof</p> 
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Building system

Envelope

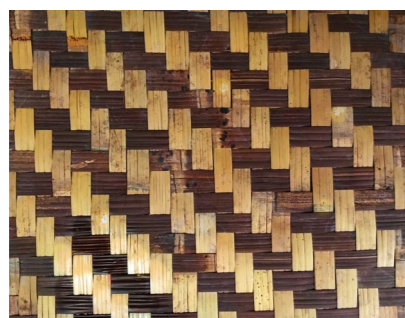
Facade



Board material



Bamboo



Natural panels

Roof



Roof tiles



Bamboo rods

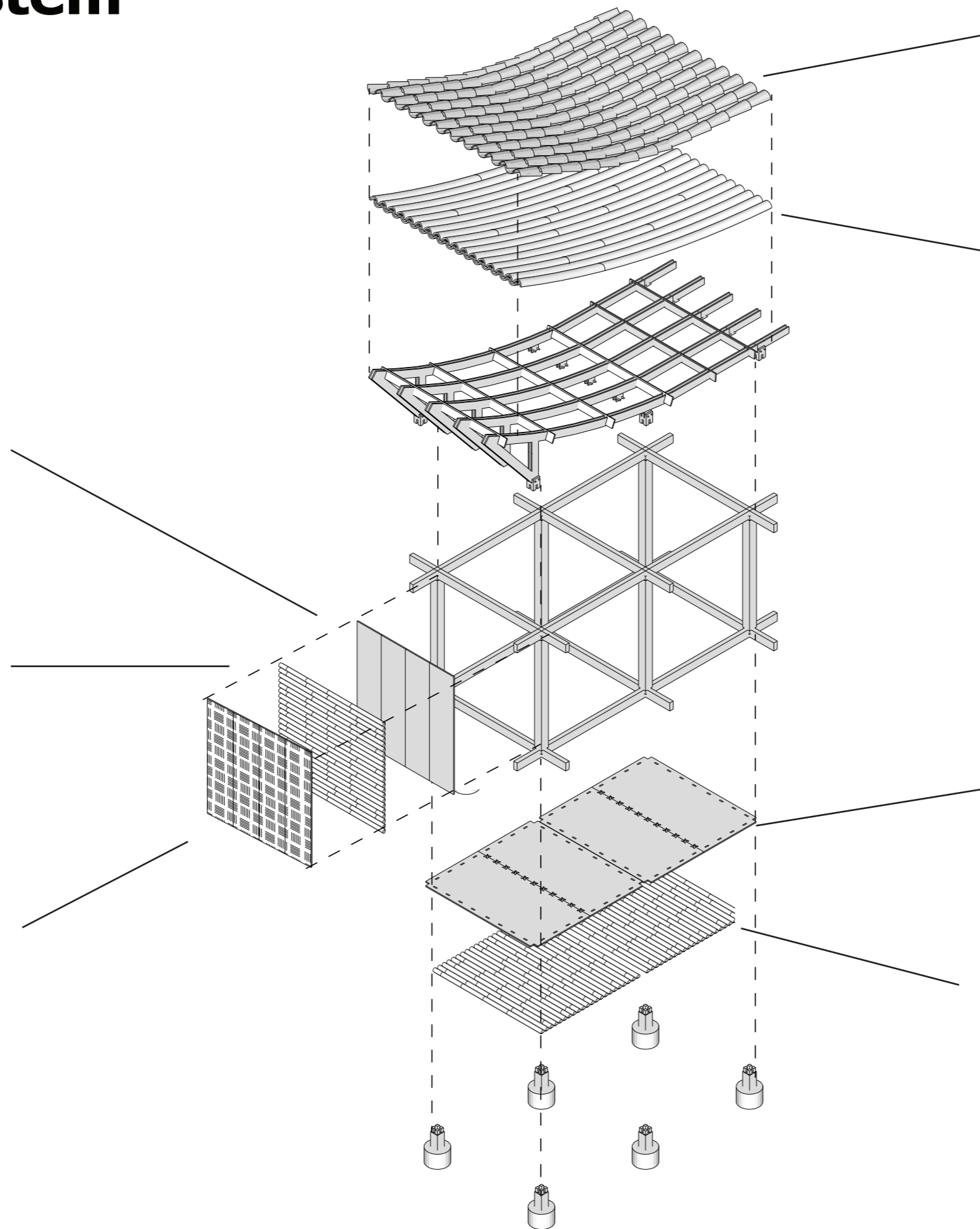
Floor



Board material

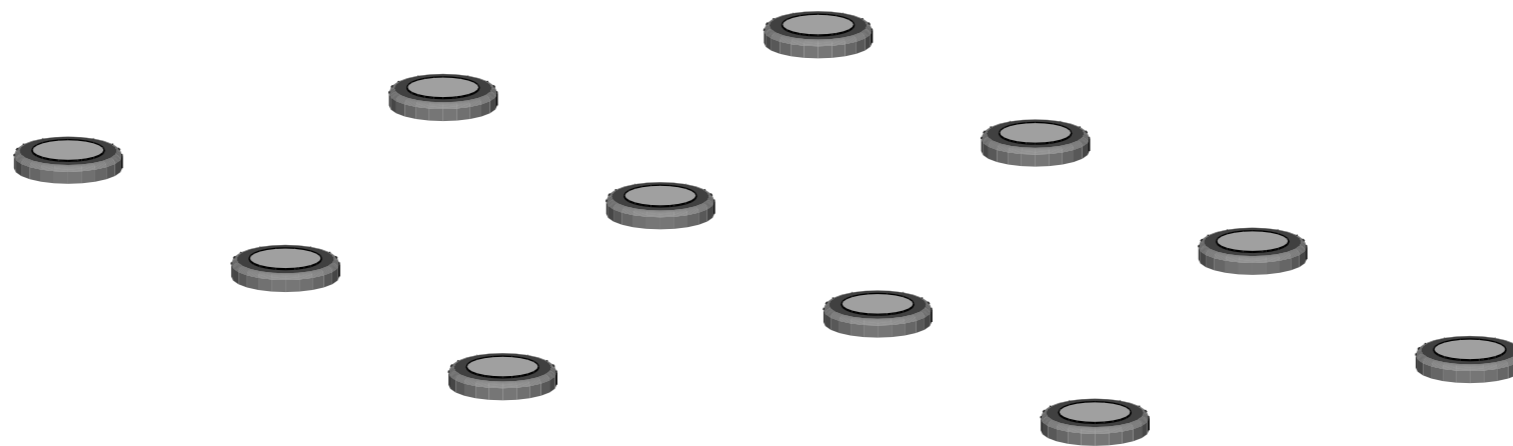


Bamboo rods



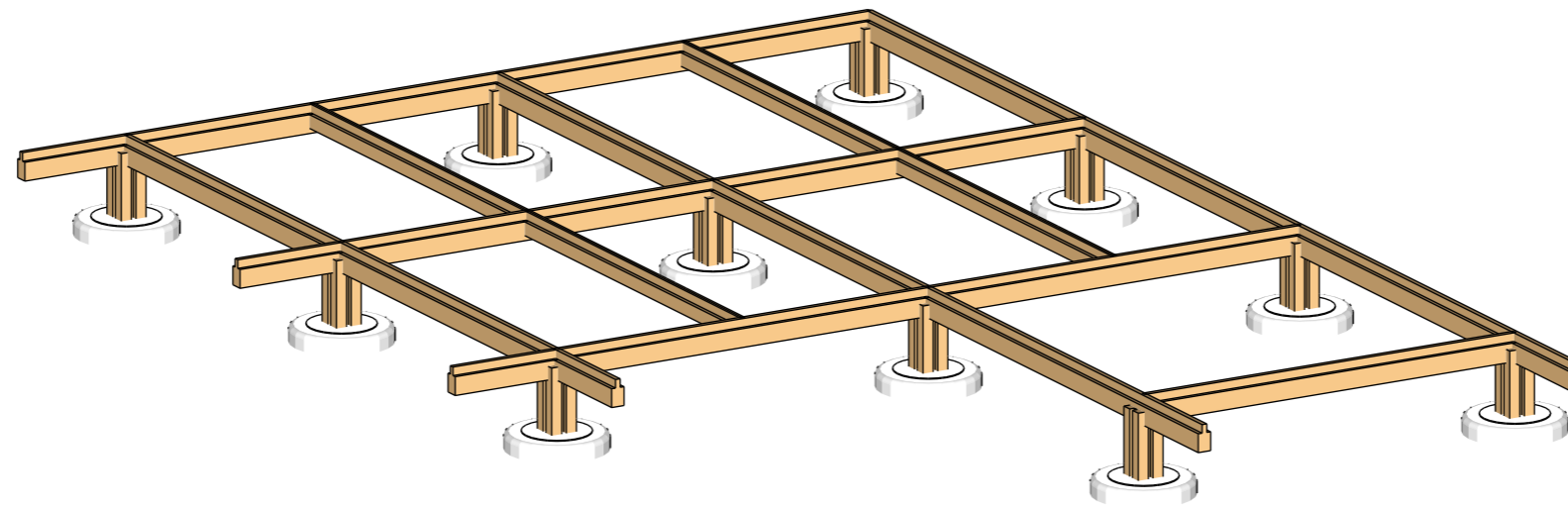
Building system

Assembly



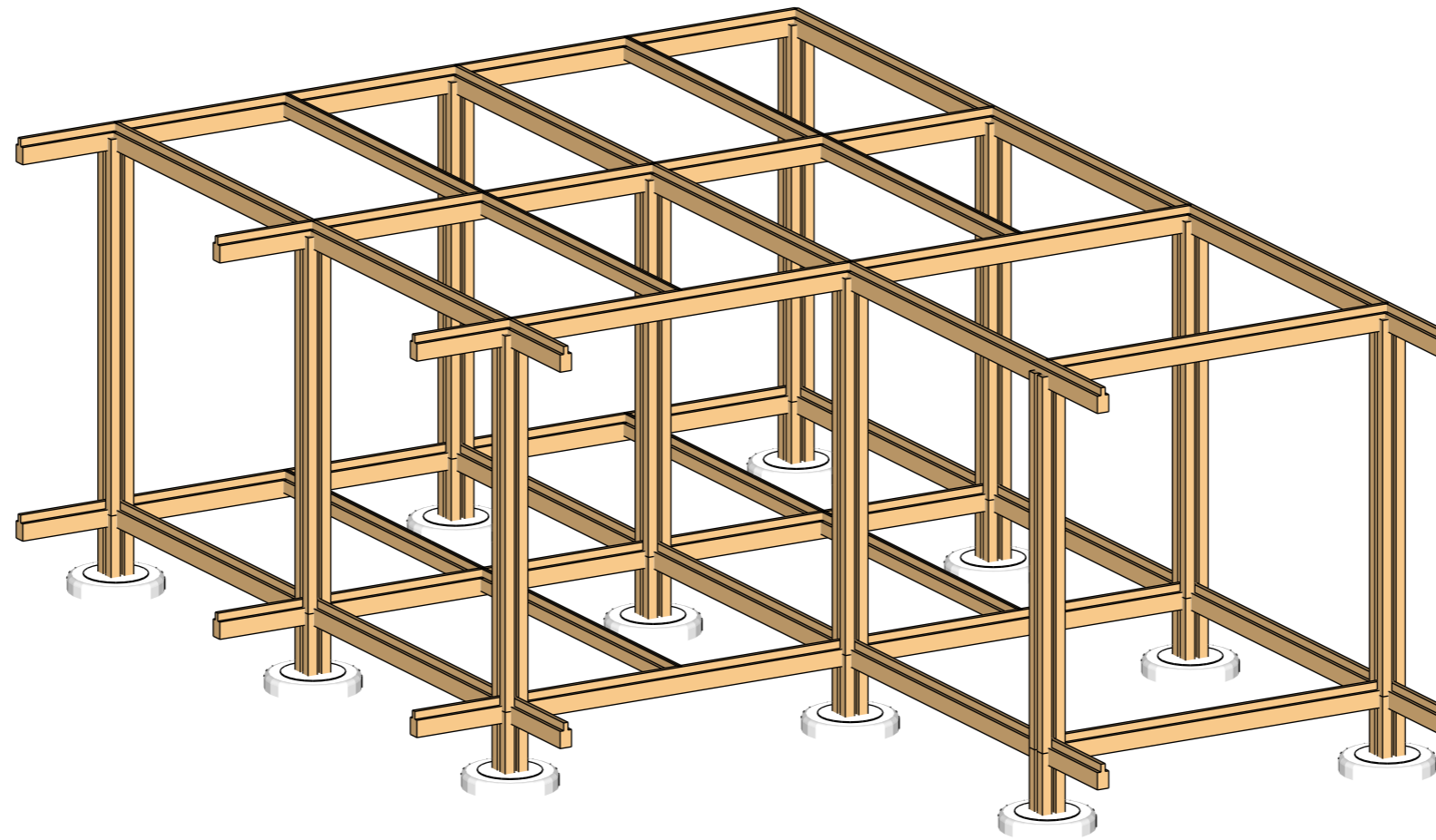
Building system

Assembly



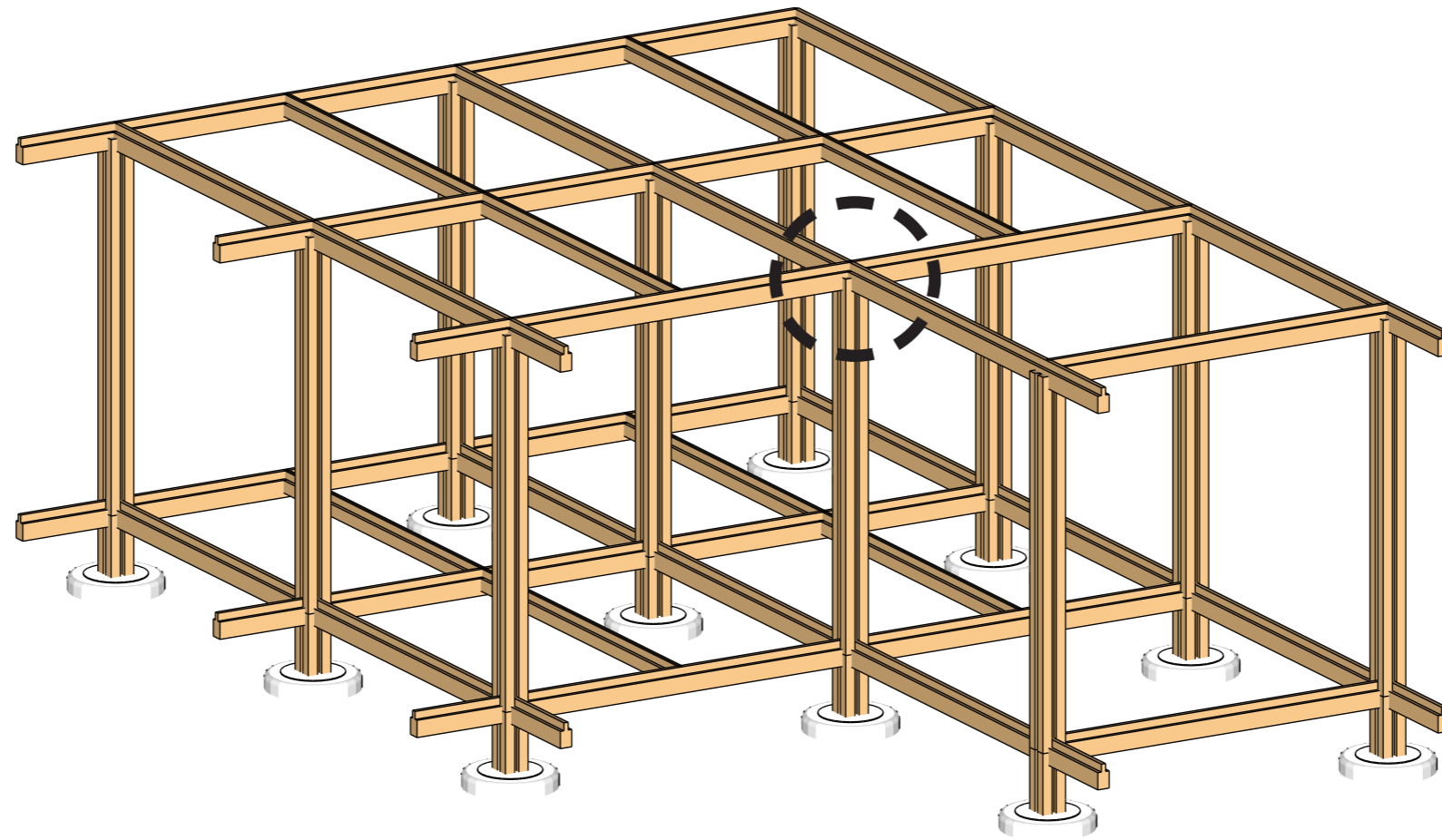
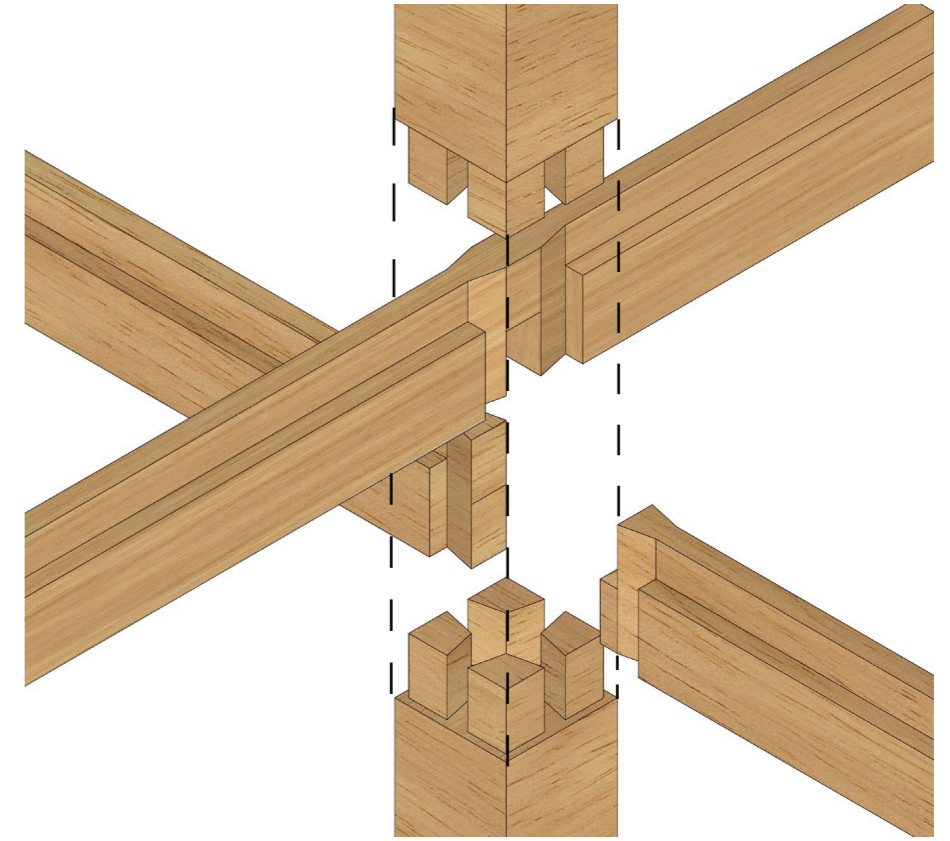
Building system

Assembly



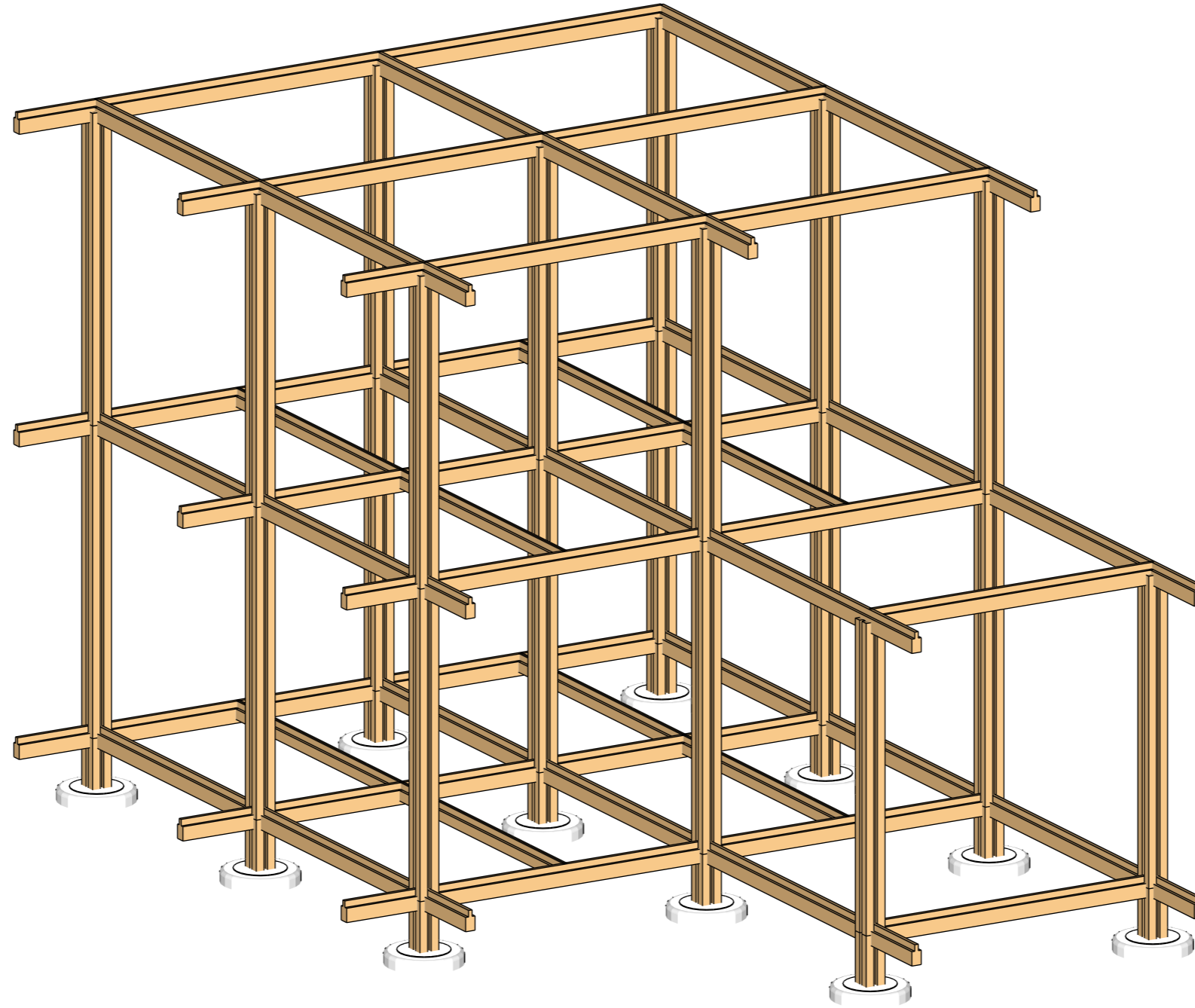
Building system

Assembly



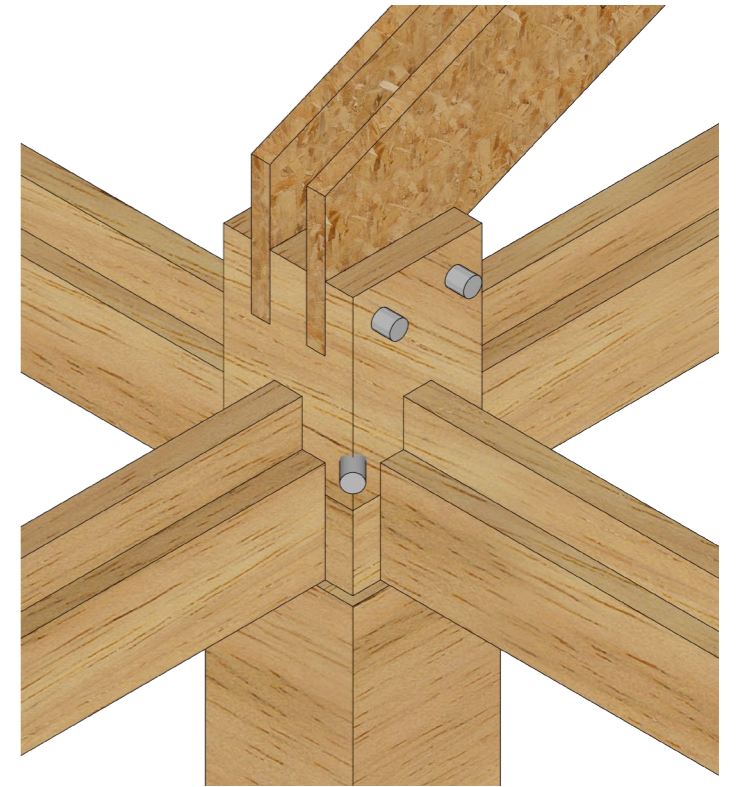
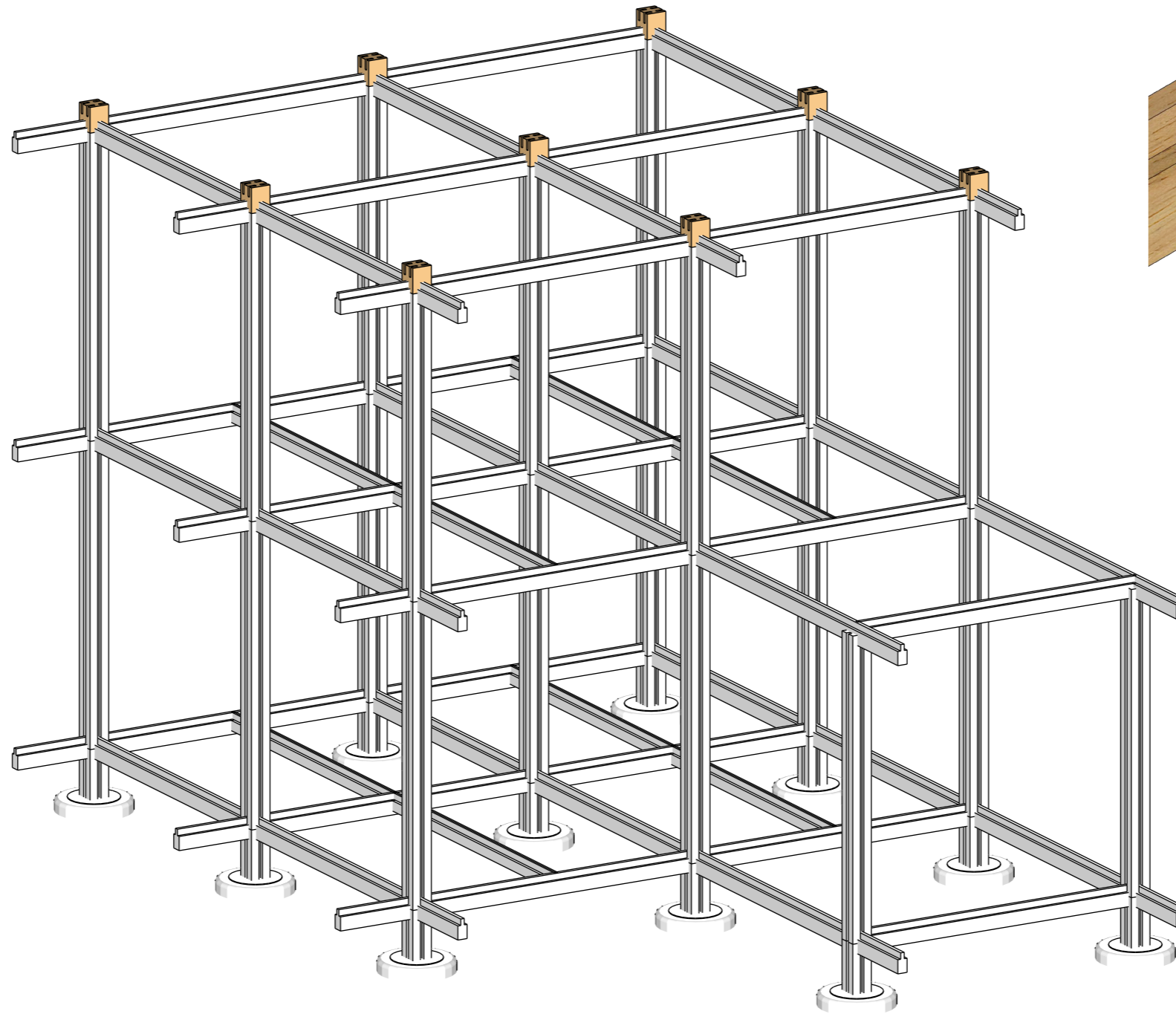
Building system

Assembly



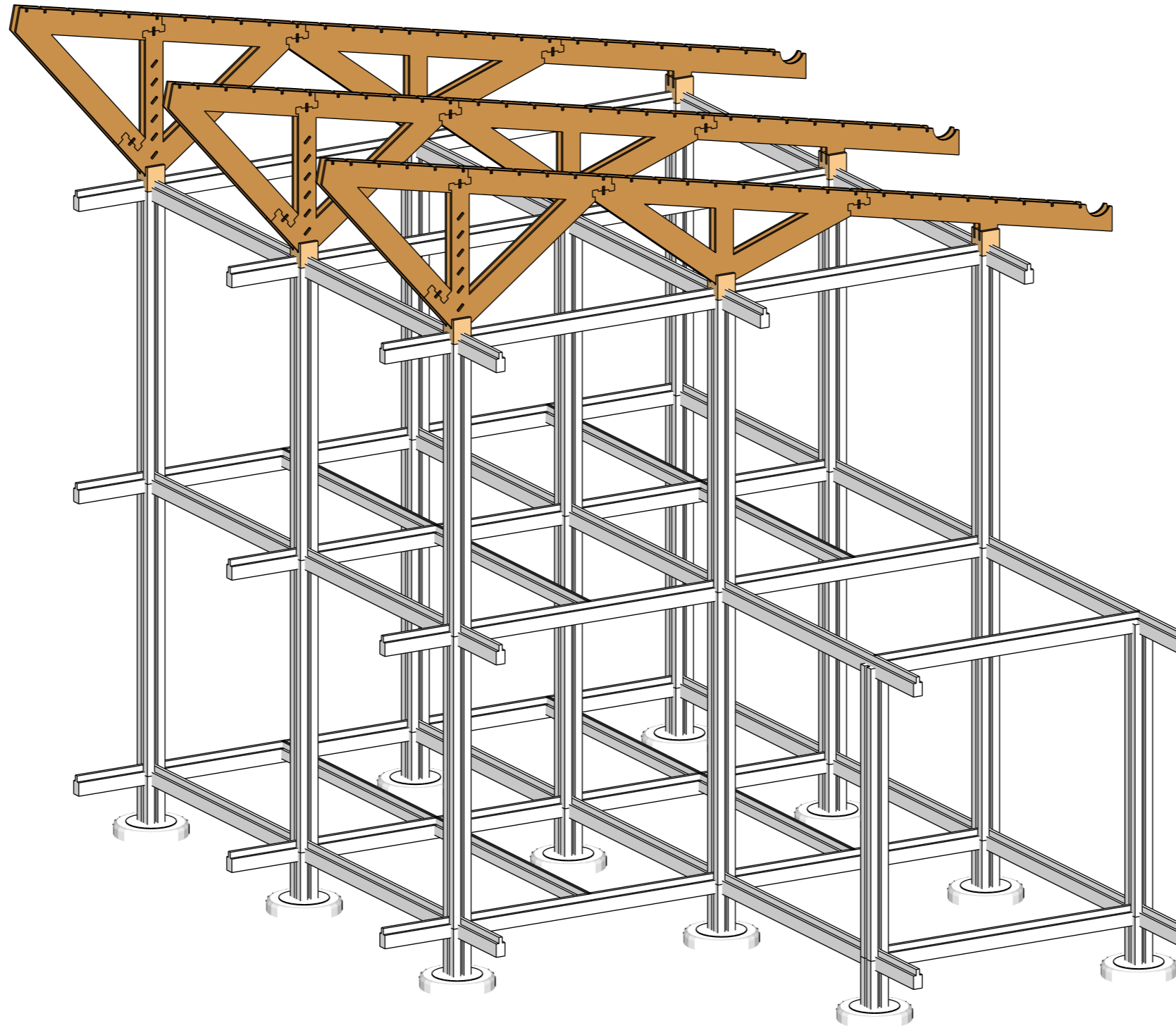
Building system

Assembly



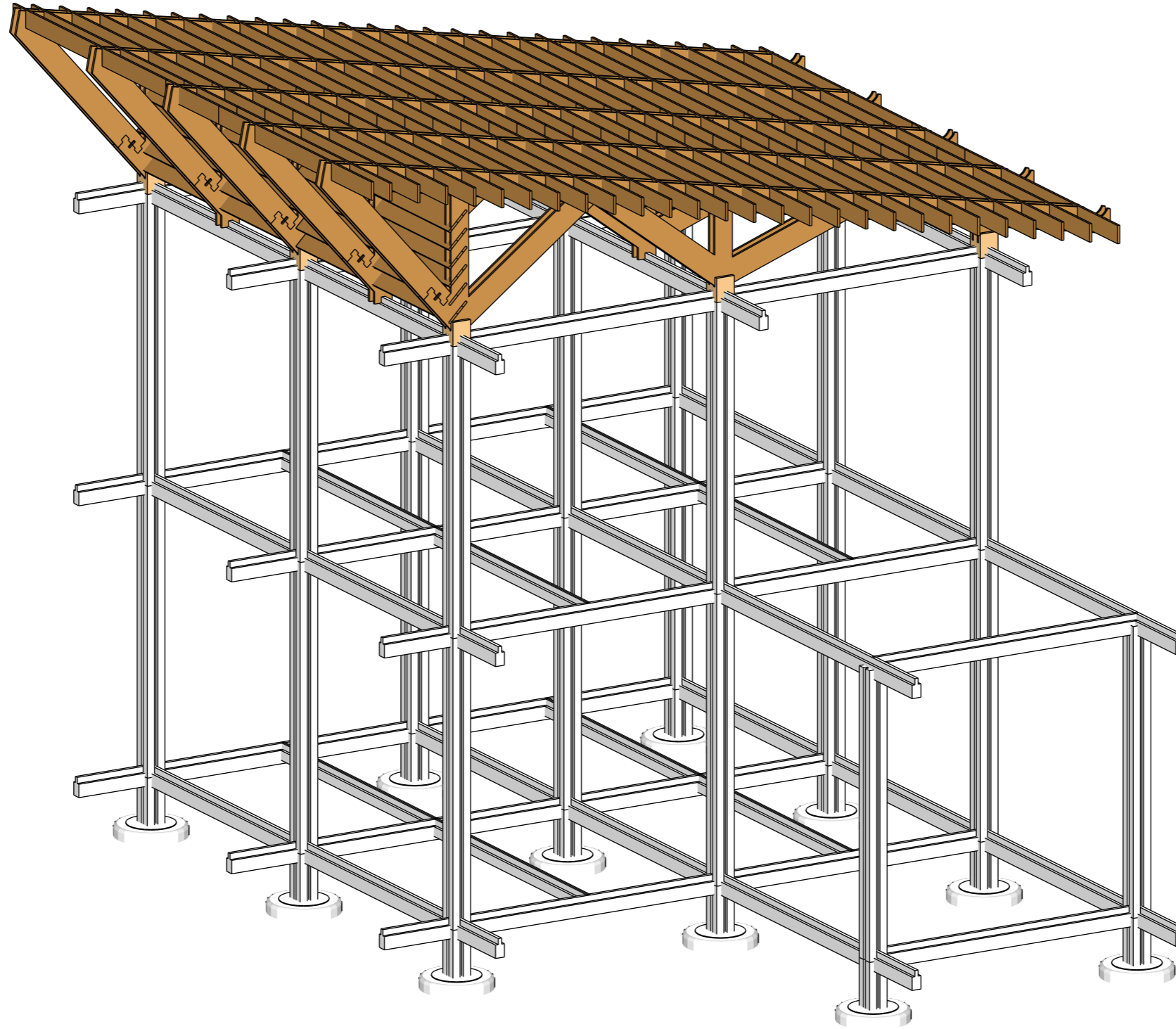
Building system

Assembly



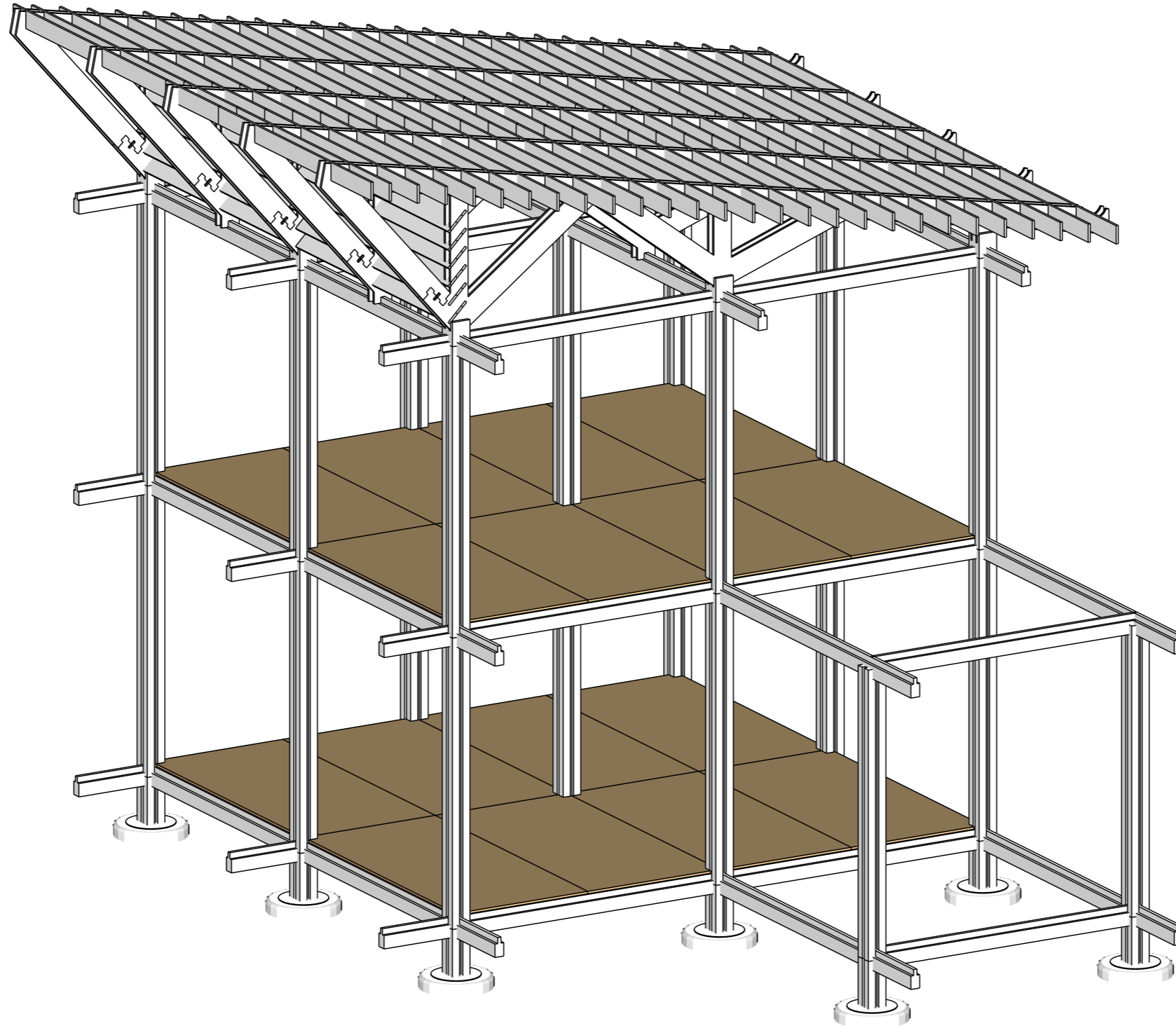
Building system

Assembly



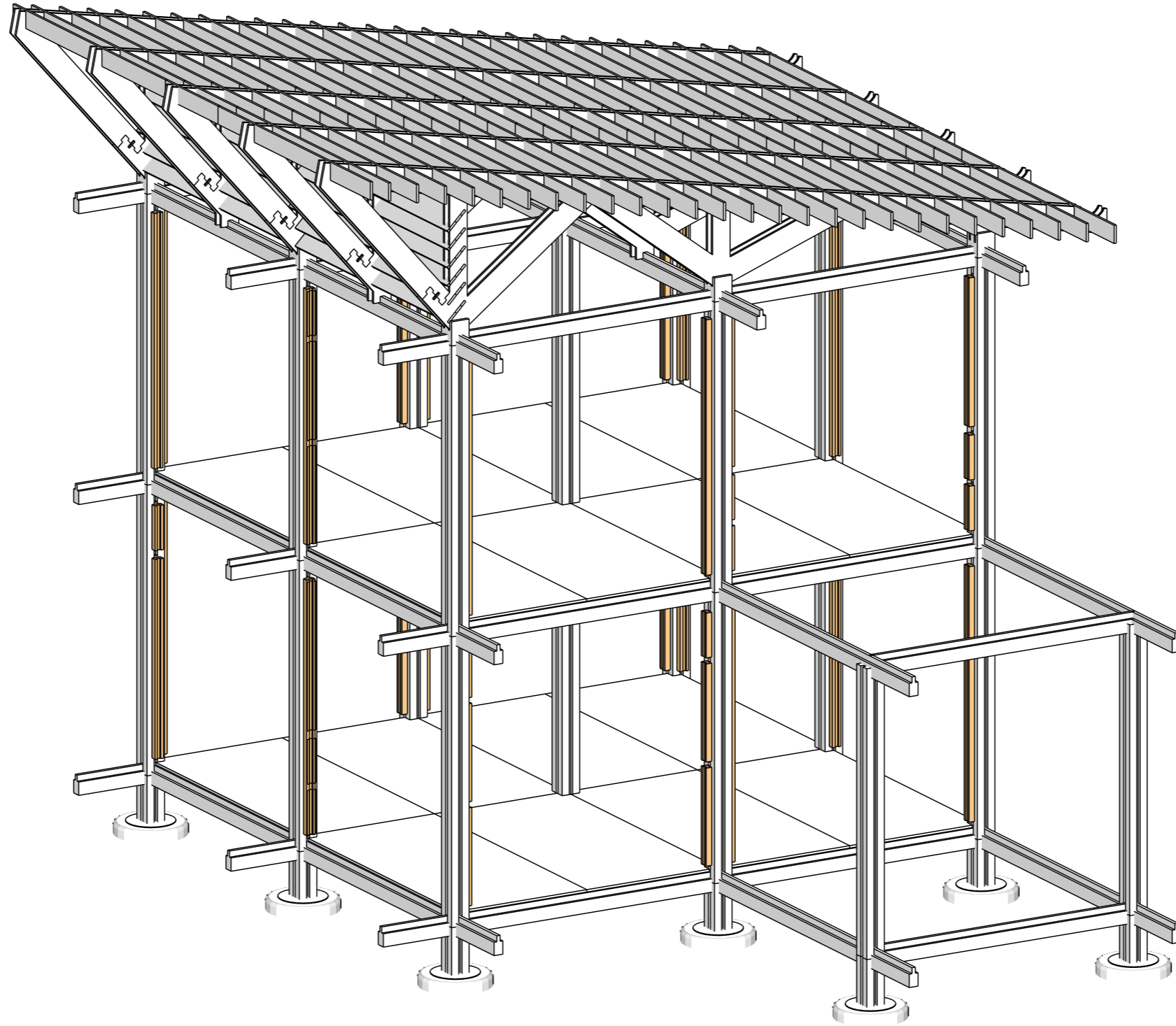
Building system

Assembly



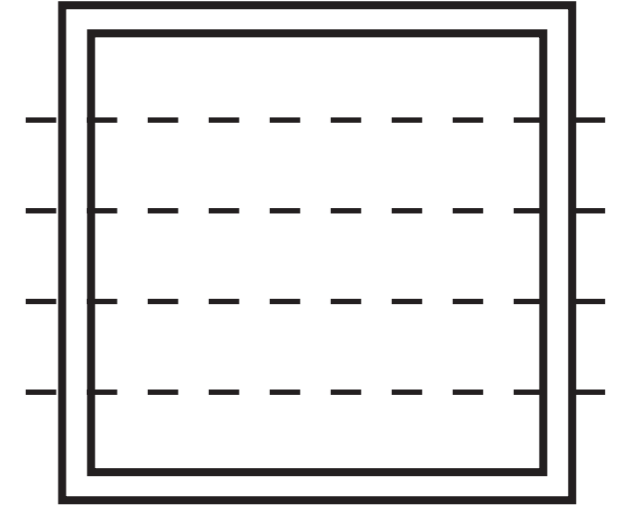
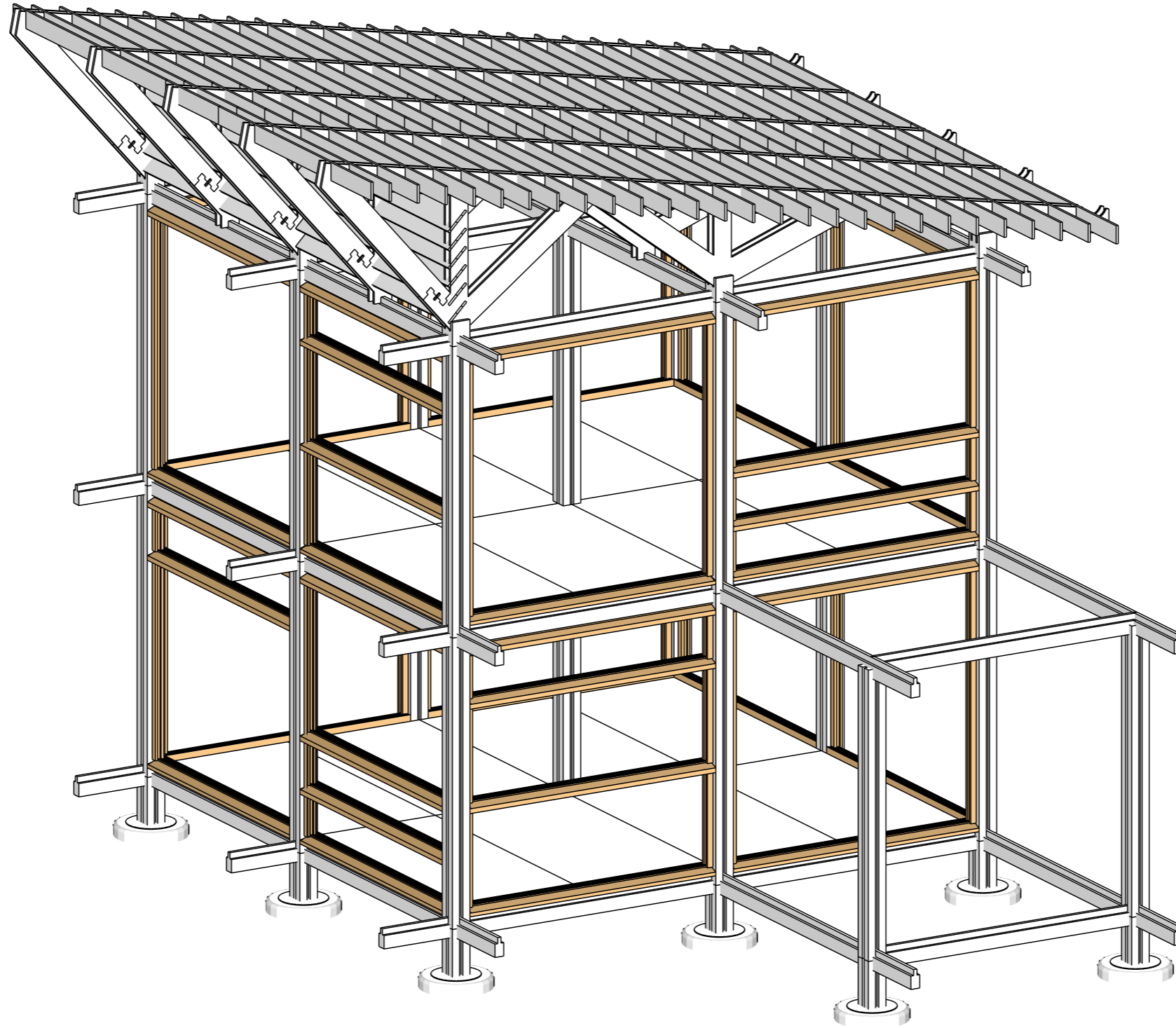
Building system

Assembly



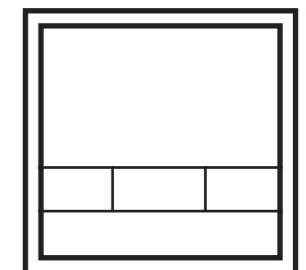
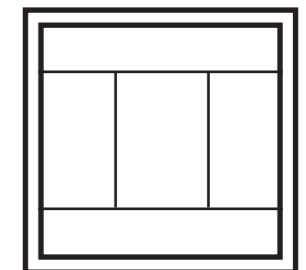
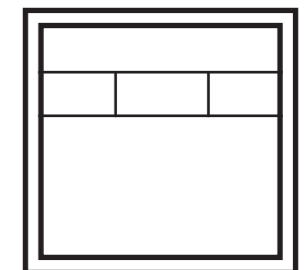
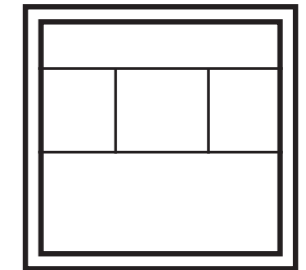
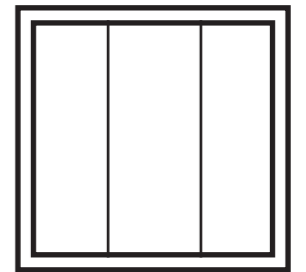
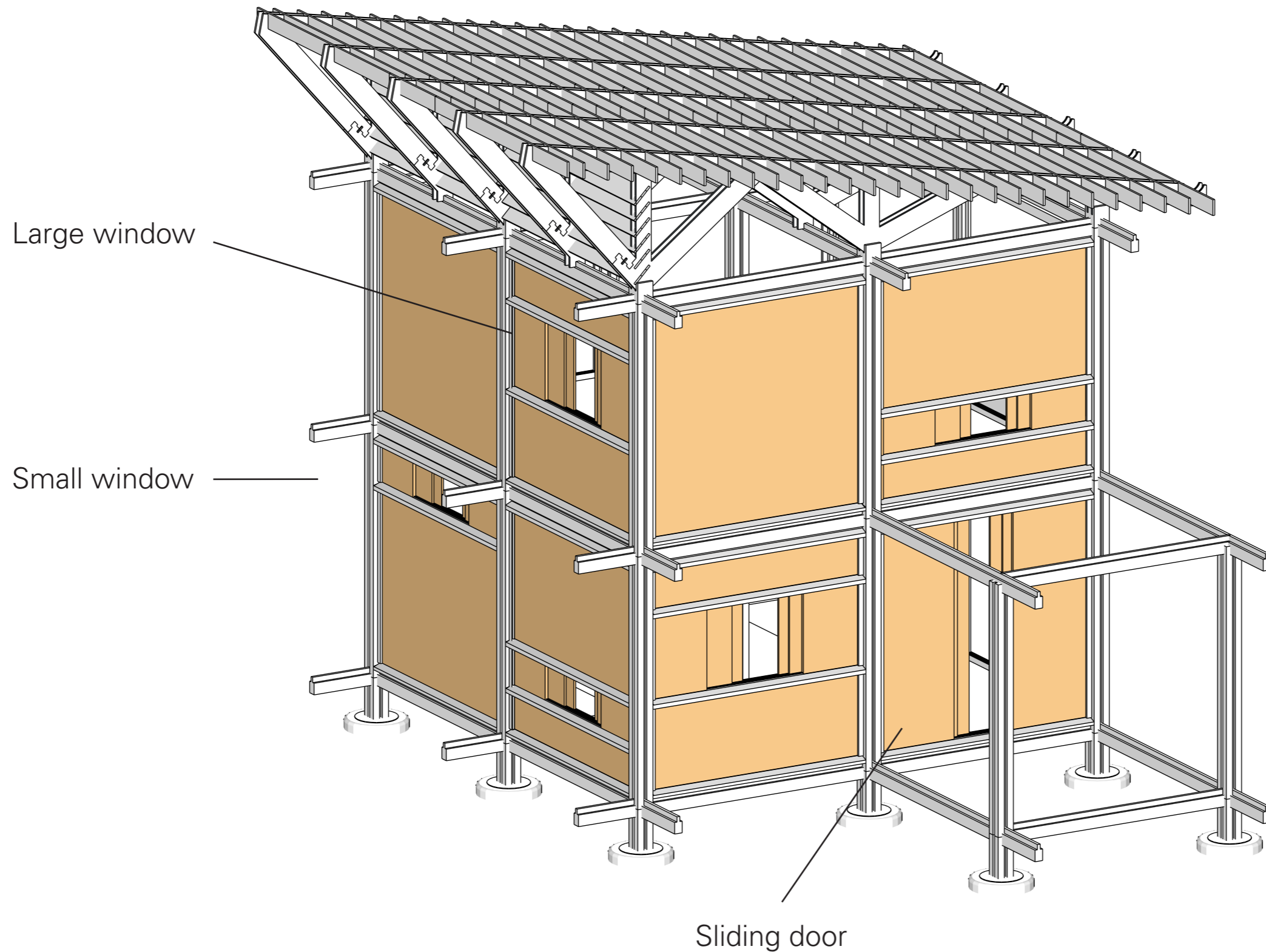
Building system

Assembly



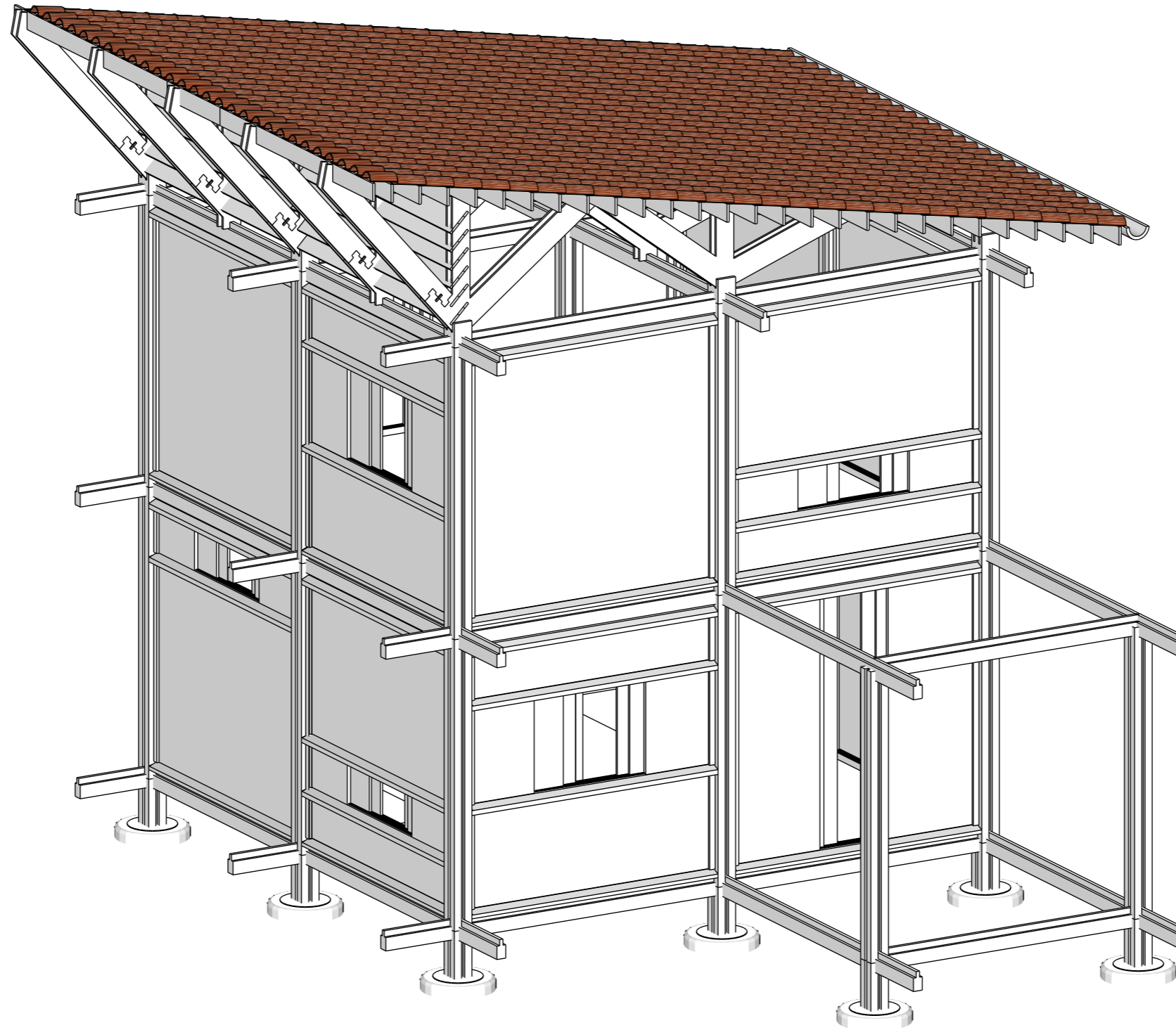
Building system

Assembly



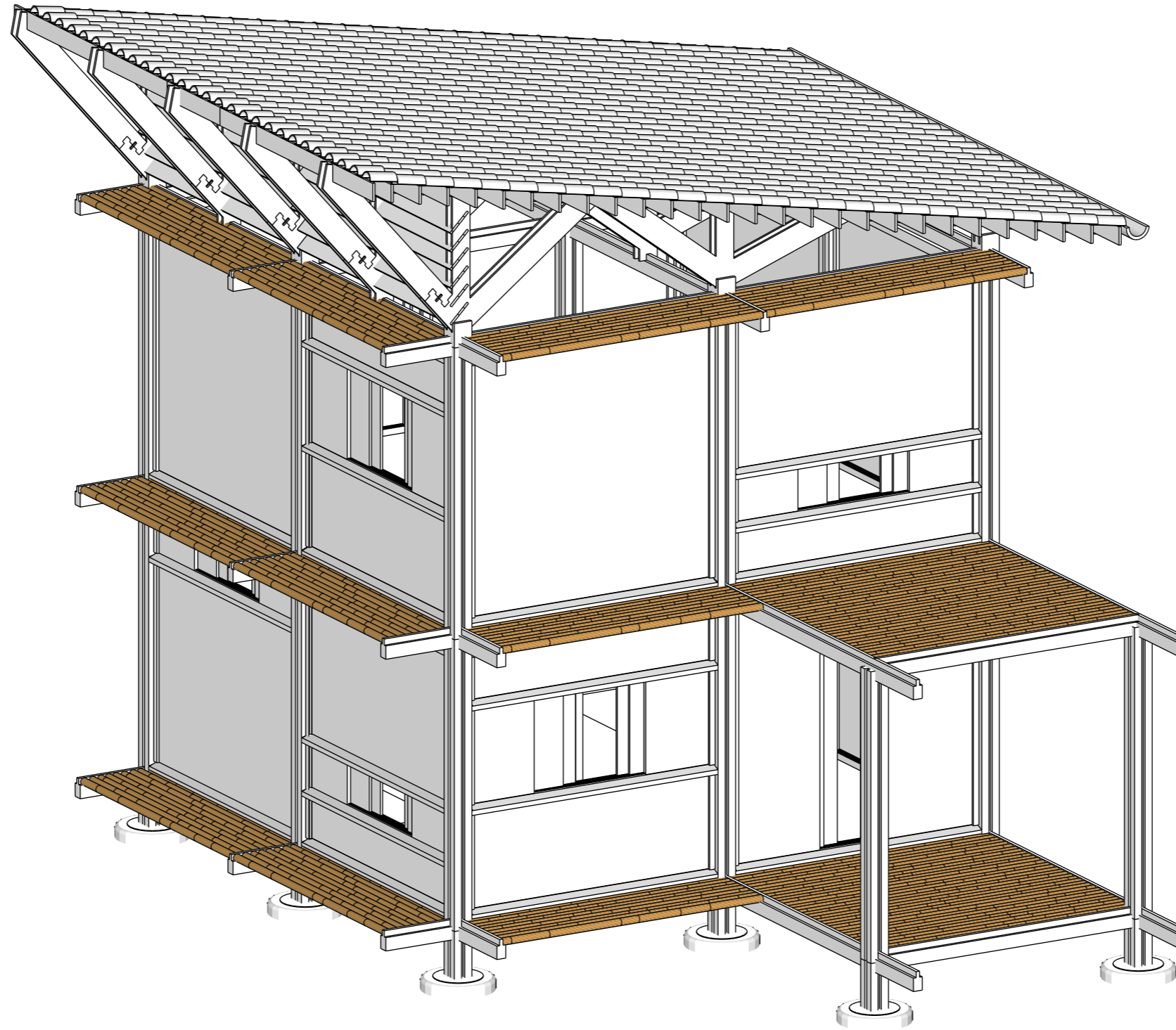
Building system

Assembly



Building system

Assembly

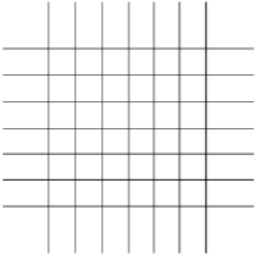
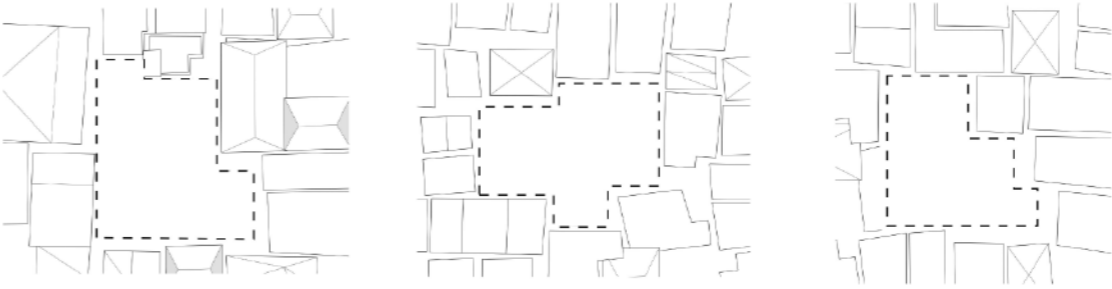
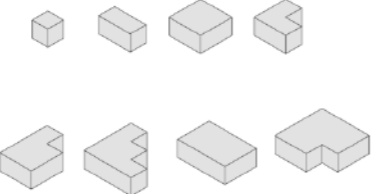
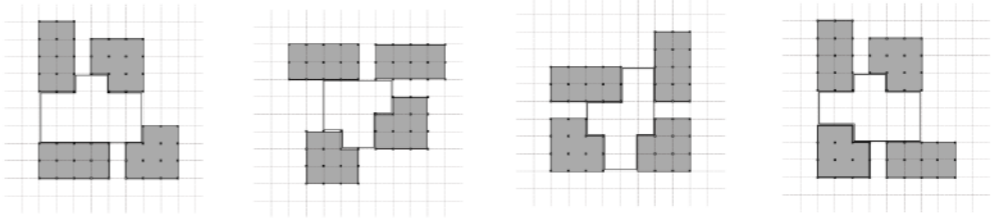
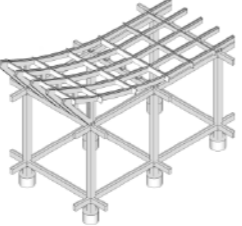

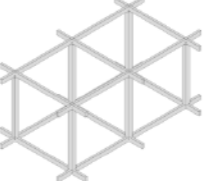

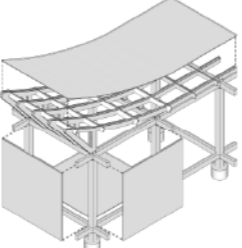
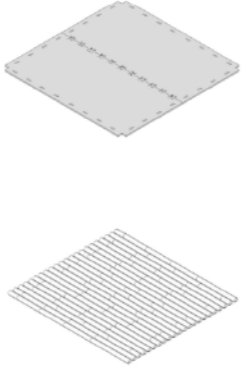
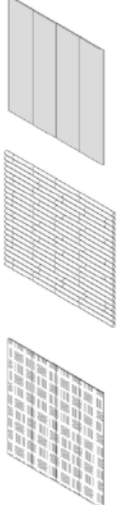
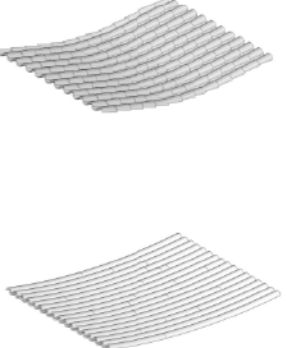


Building system

Assembly



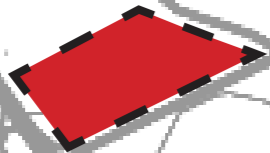
Building system

<p>Urban</p> 			
<p>Dwelling</p> 			
<p>Structure</p> 	<p>Foundation</p> 	<p>Beams/Columns</p> 	<p>Roof</p> 
<p>Envelope</p> 	<p>Flooring</p> 	<p>Facade</p> 	<p>Roof</p> 

Bandung

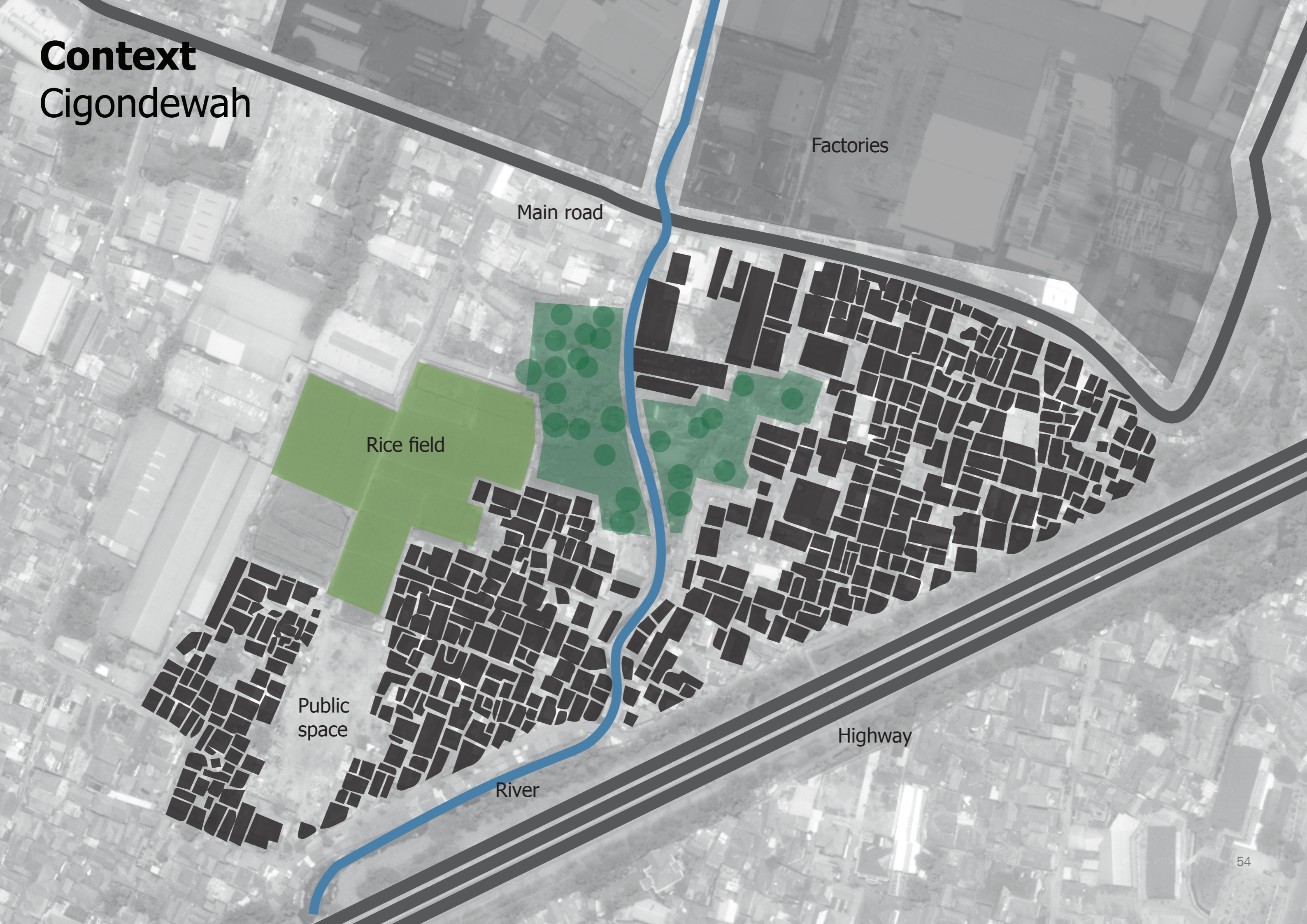
City Centre

Cigondewah



Context

Cigondewah



Factories

Main road

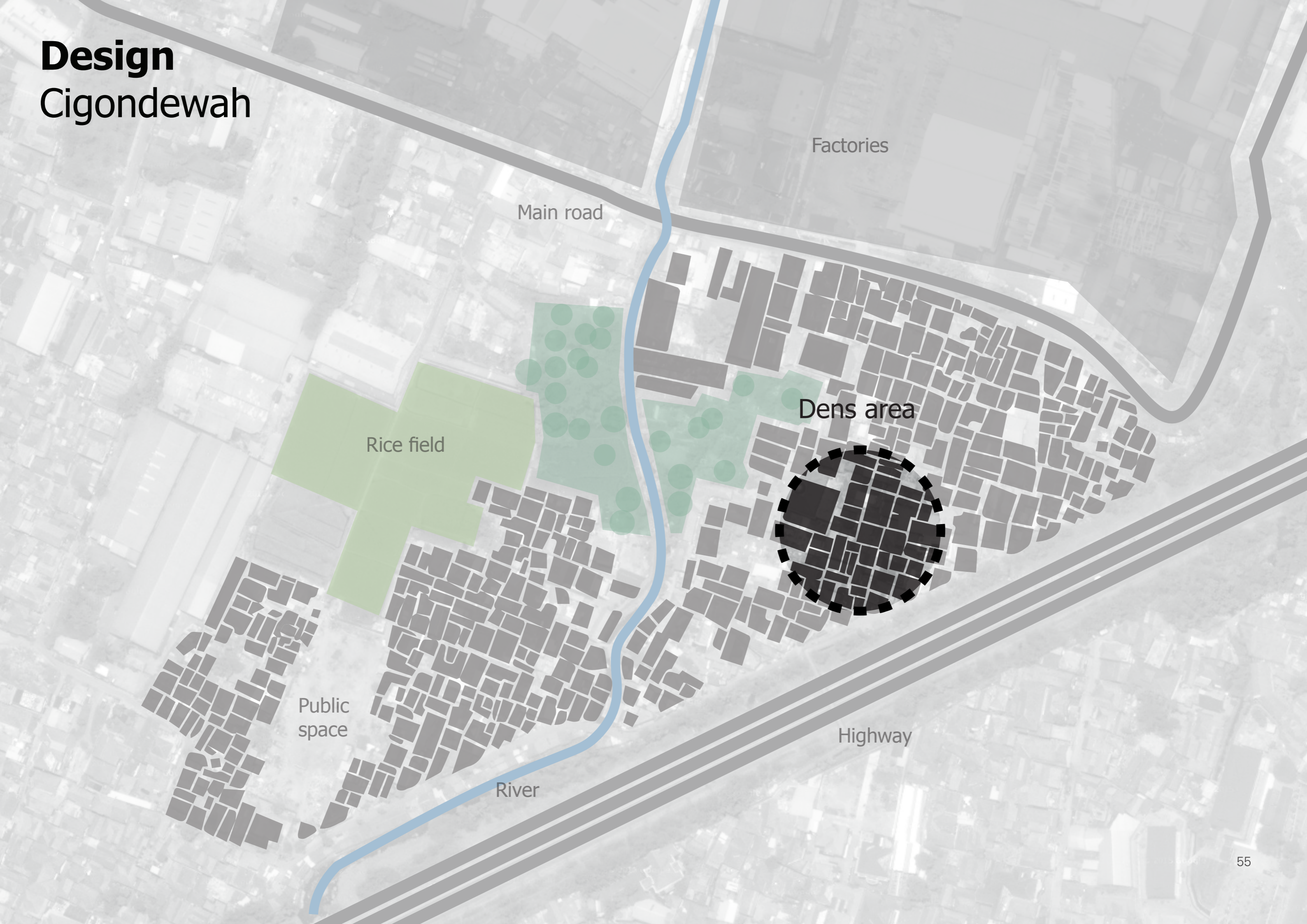
Rice field

Public space

River

Highway

Design Cigondewah



Main road

Factories

Rice field

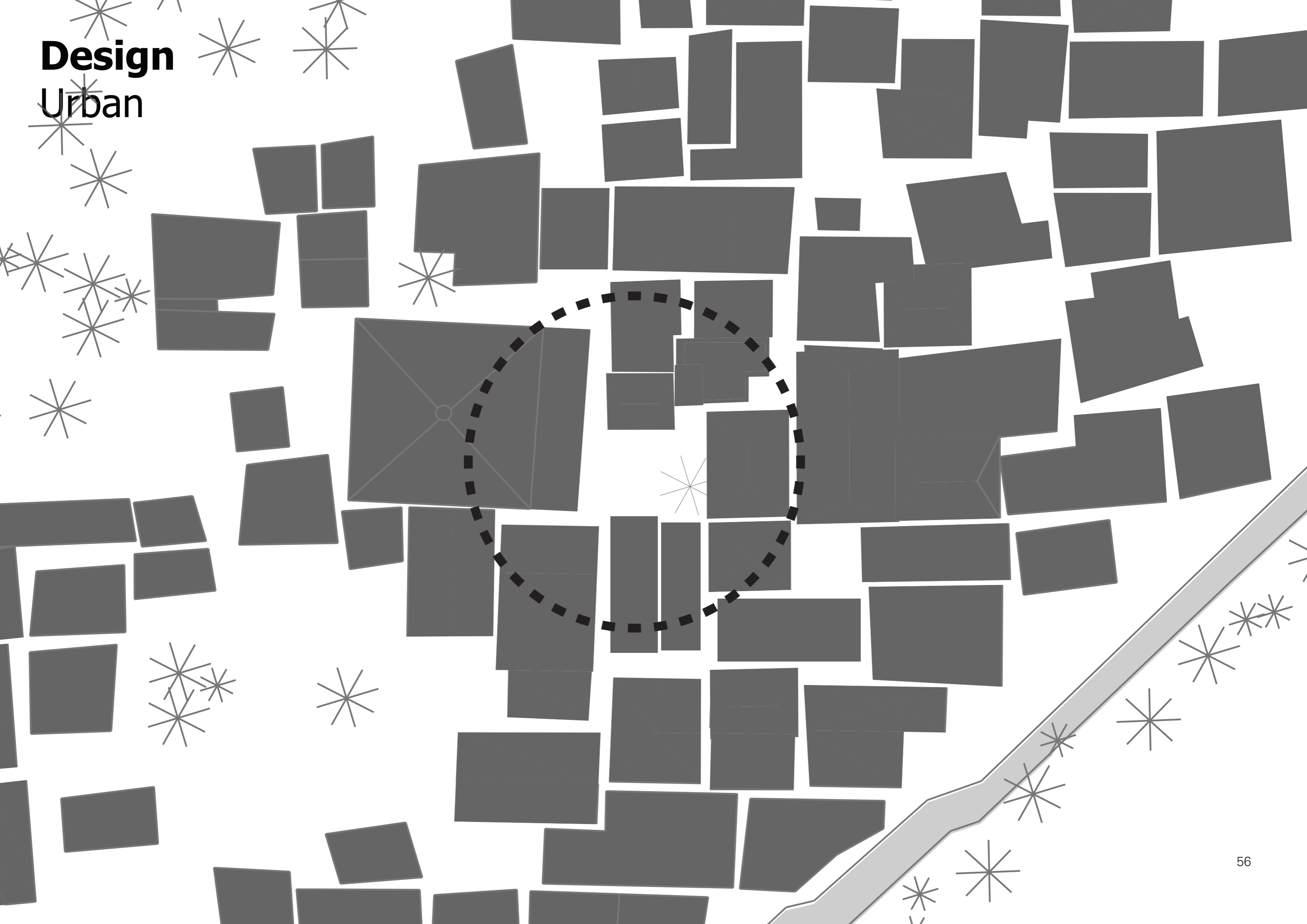
Dens area

Public space

River

Highway

Design Urban

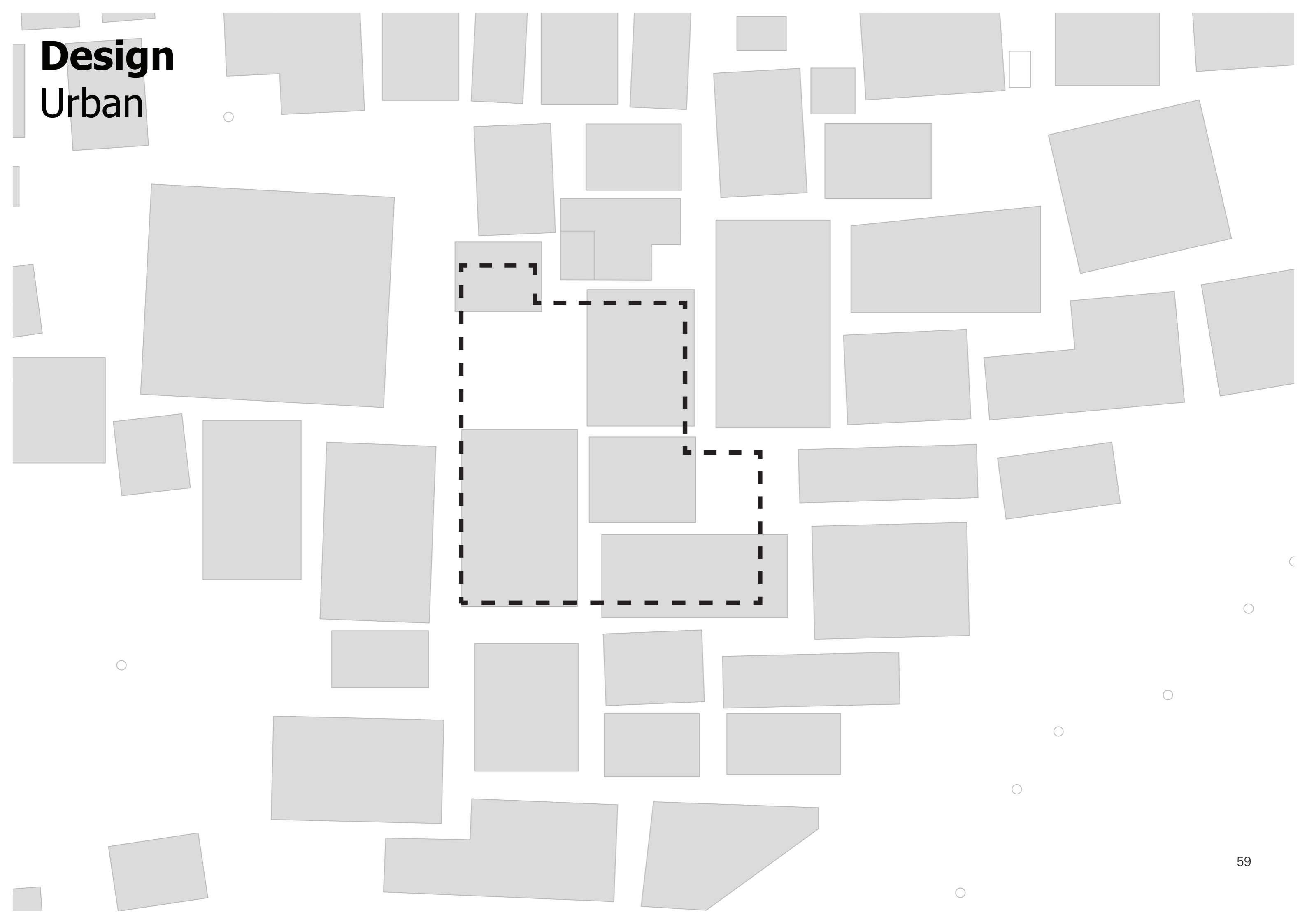


Design Urban

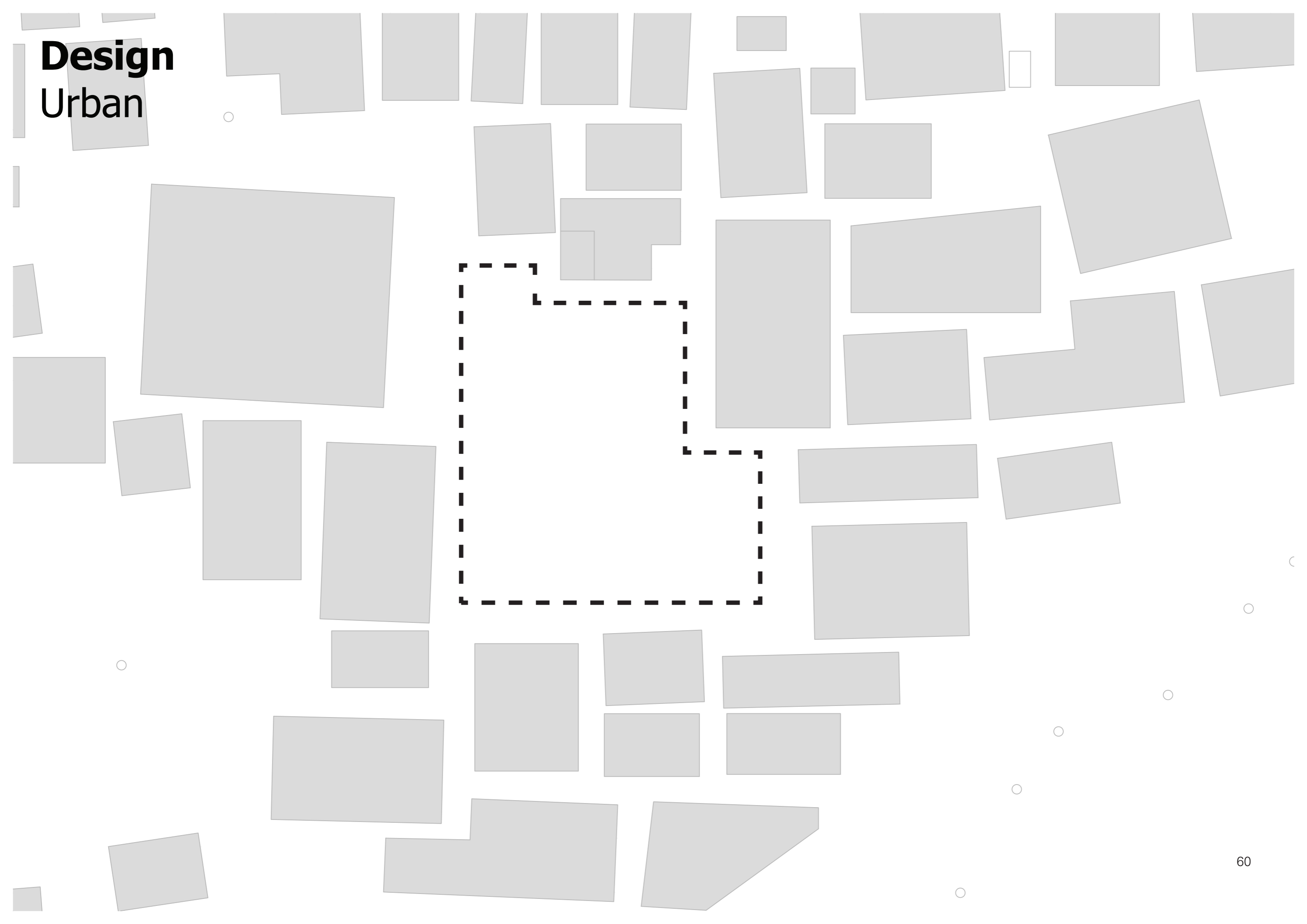




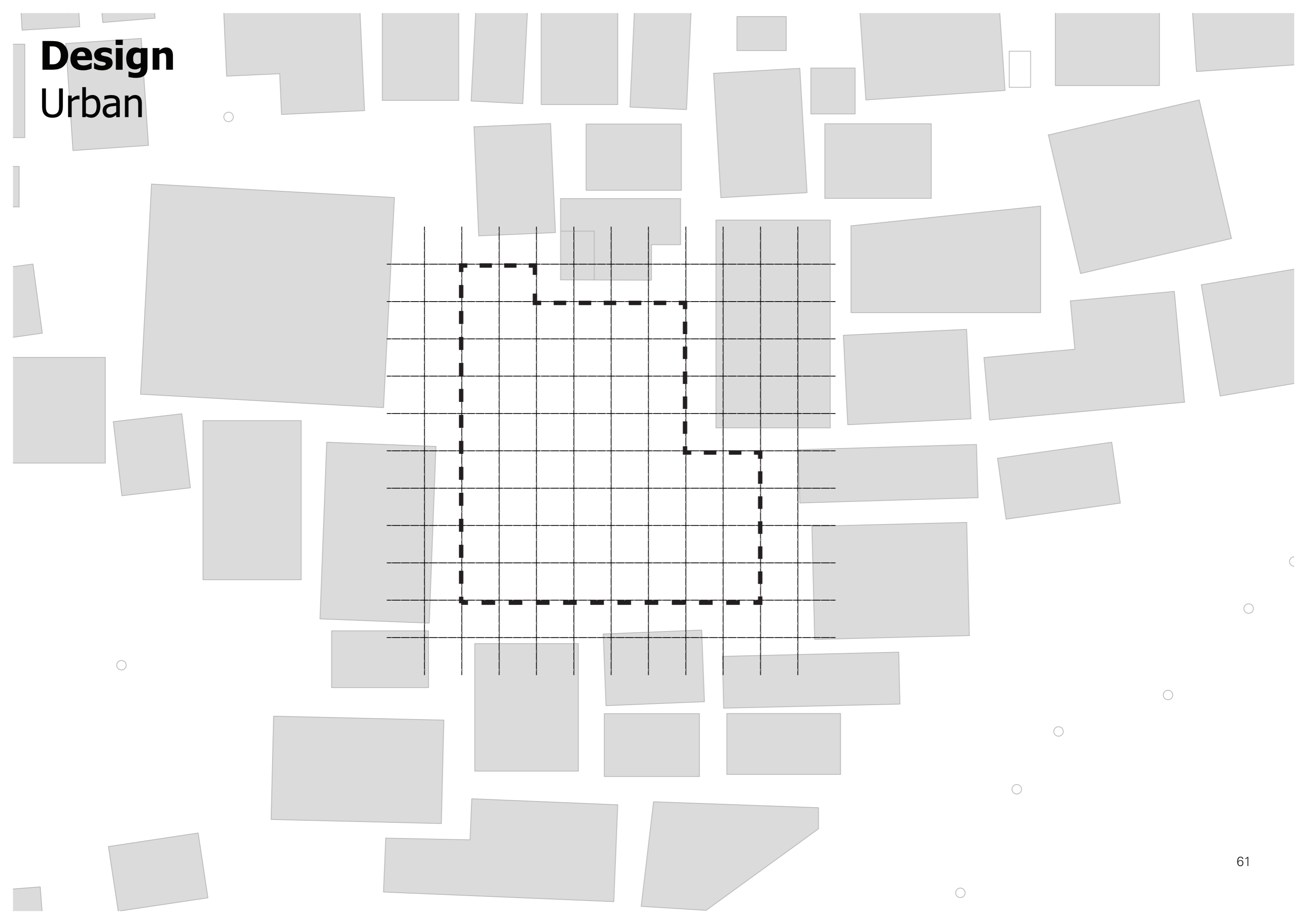
Design Urban



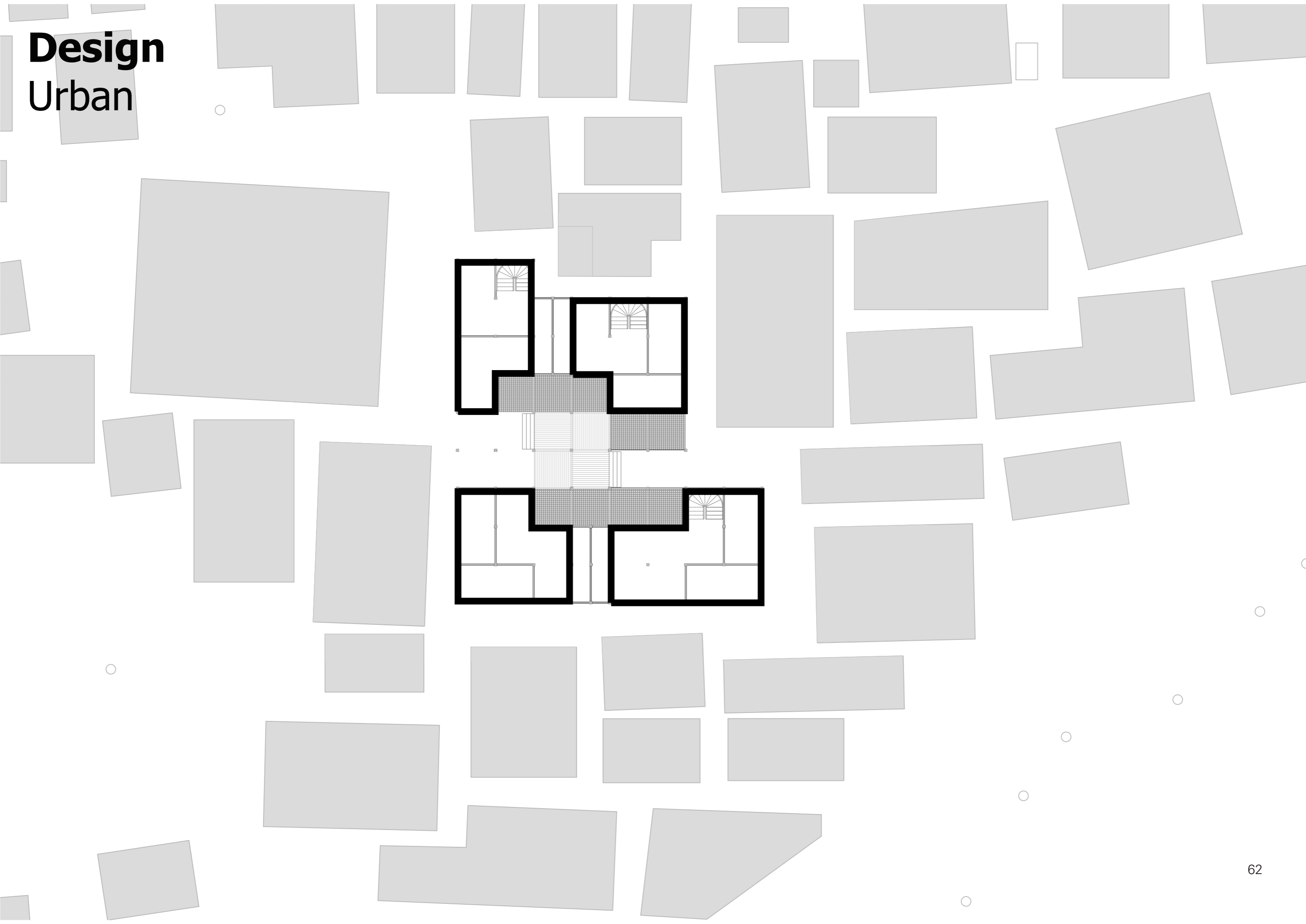
Design Urban



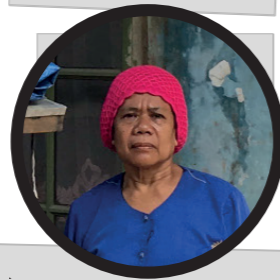
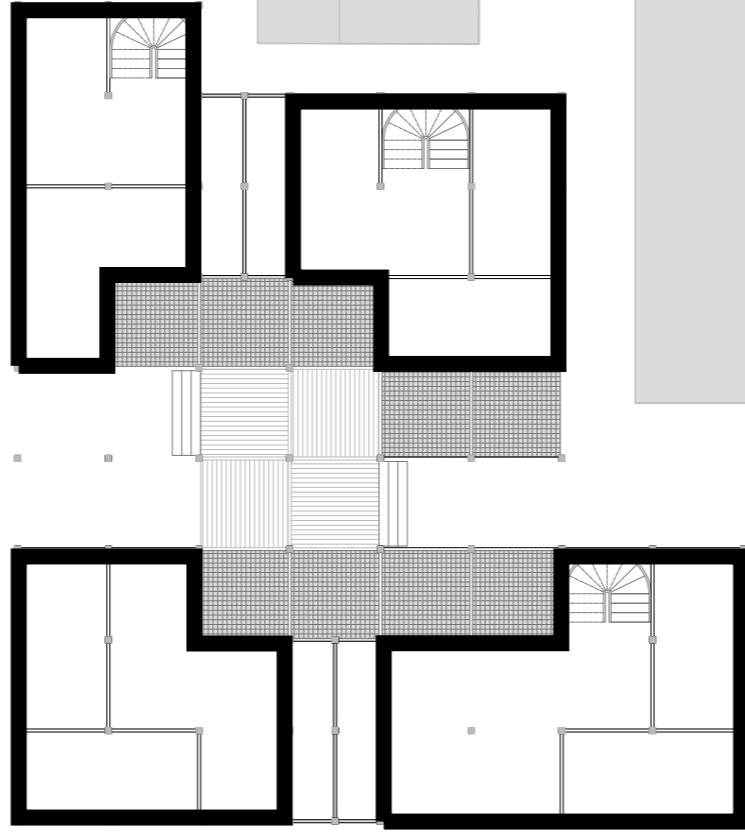
Design Urban



Design Urban



Design Urban



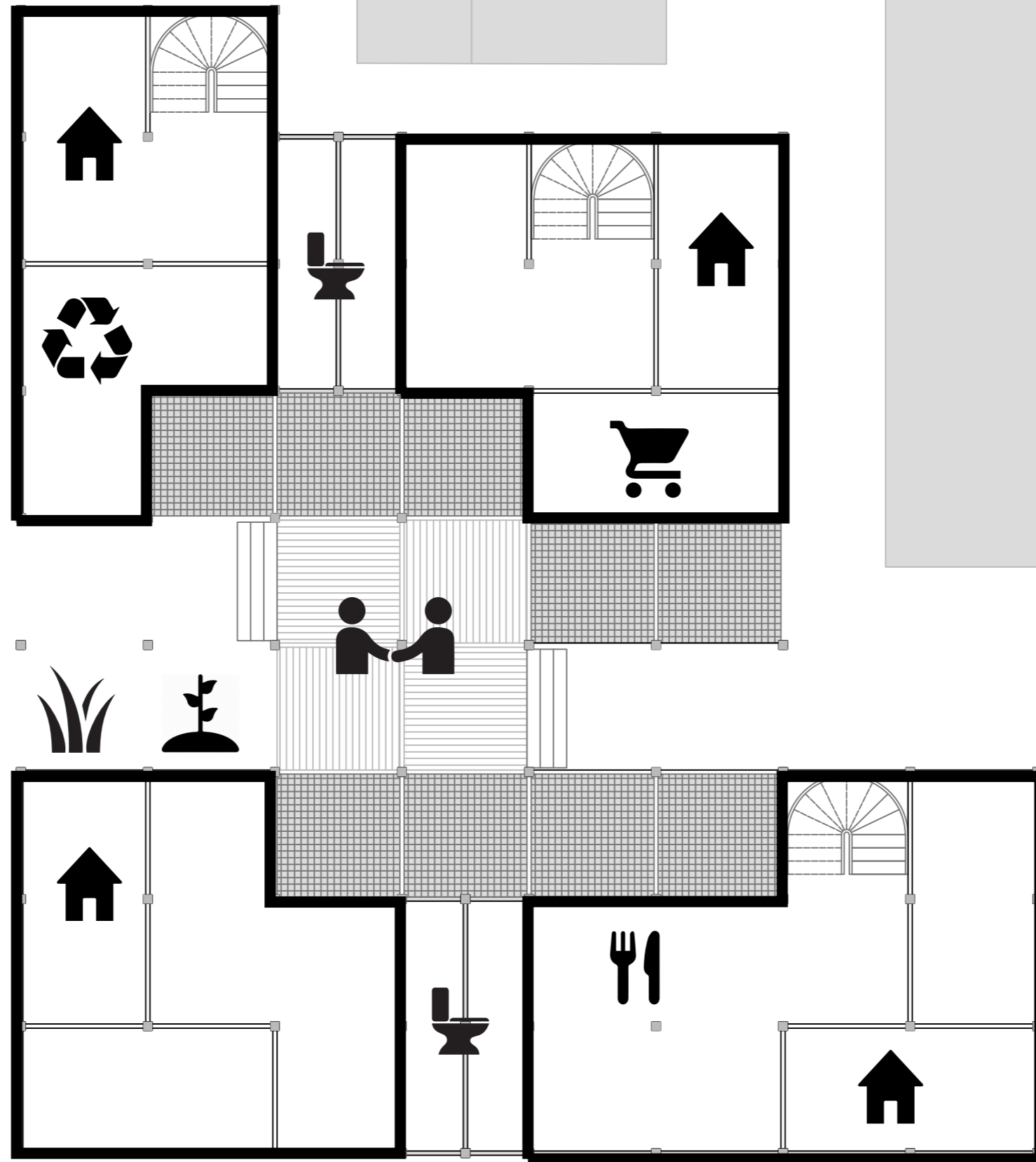
Design
Urban



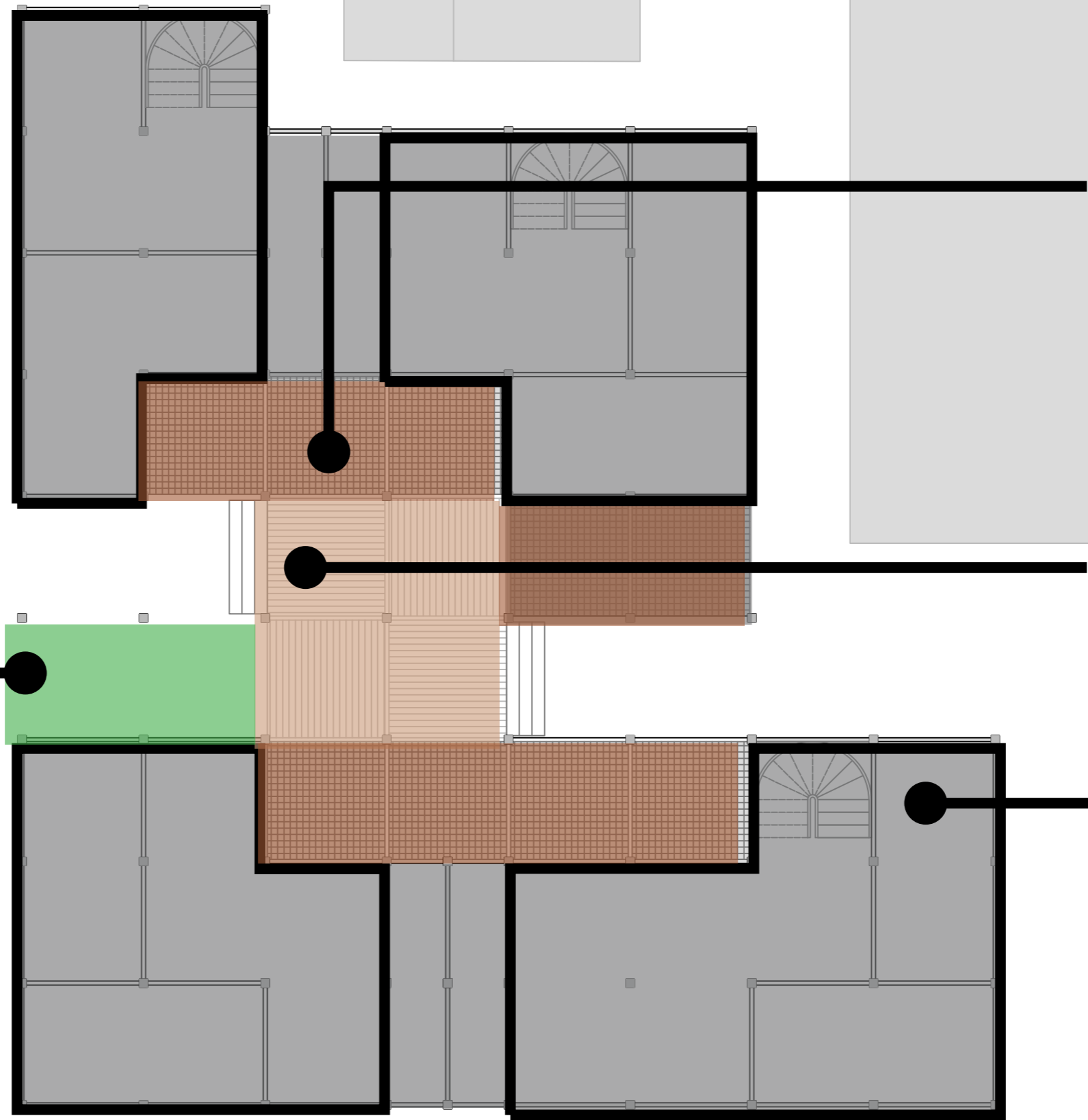
Design Functions



Design Functions



Design
Urban



Porch

Communal
space

Green

Dwellings

Design
Urban

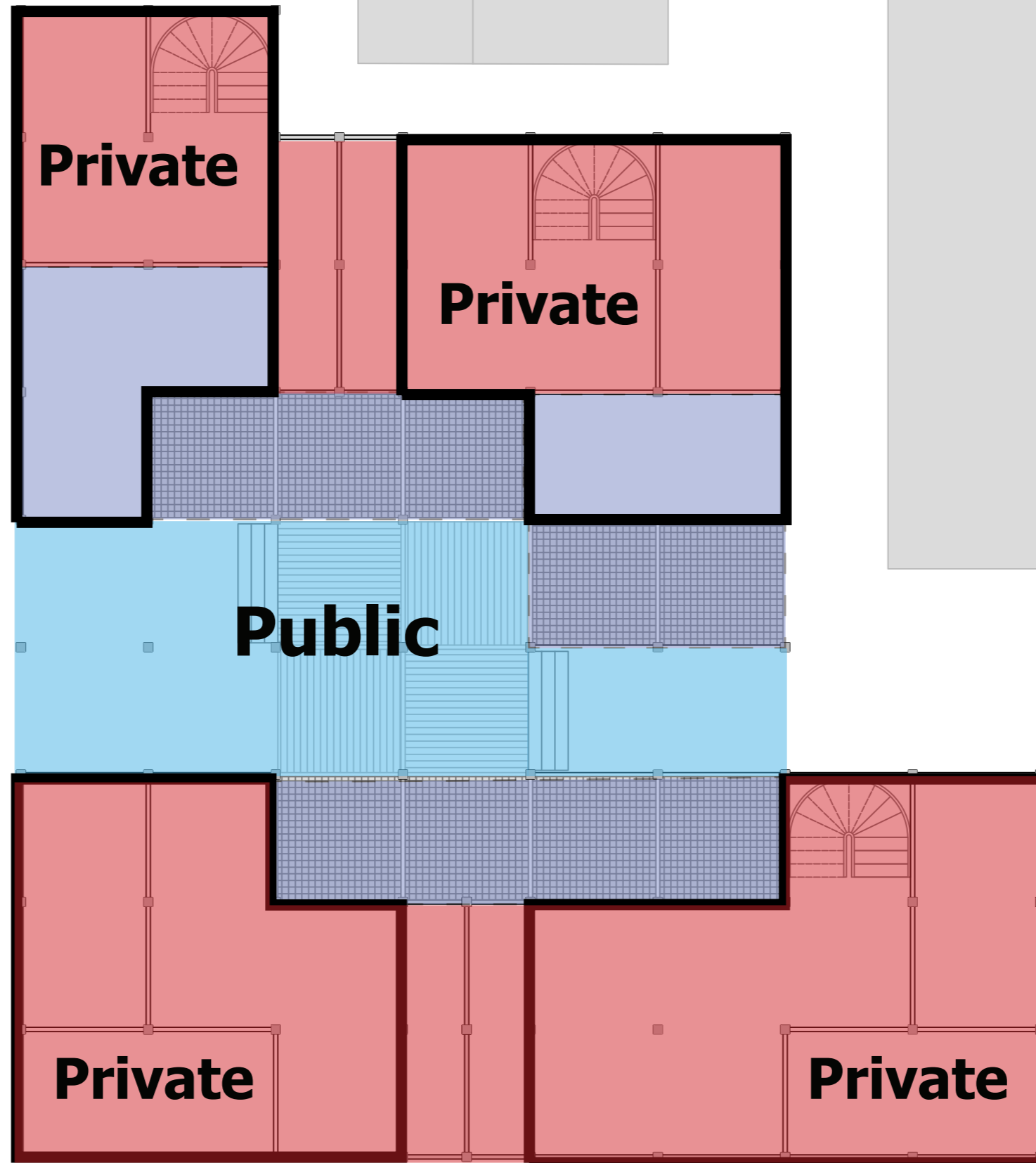


Design Urban



Design

Public vs Private

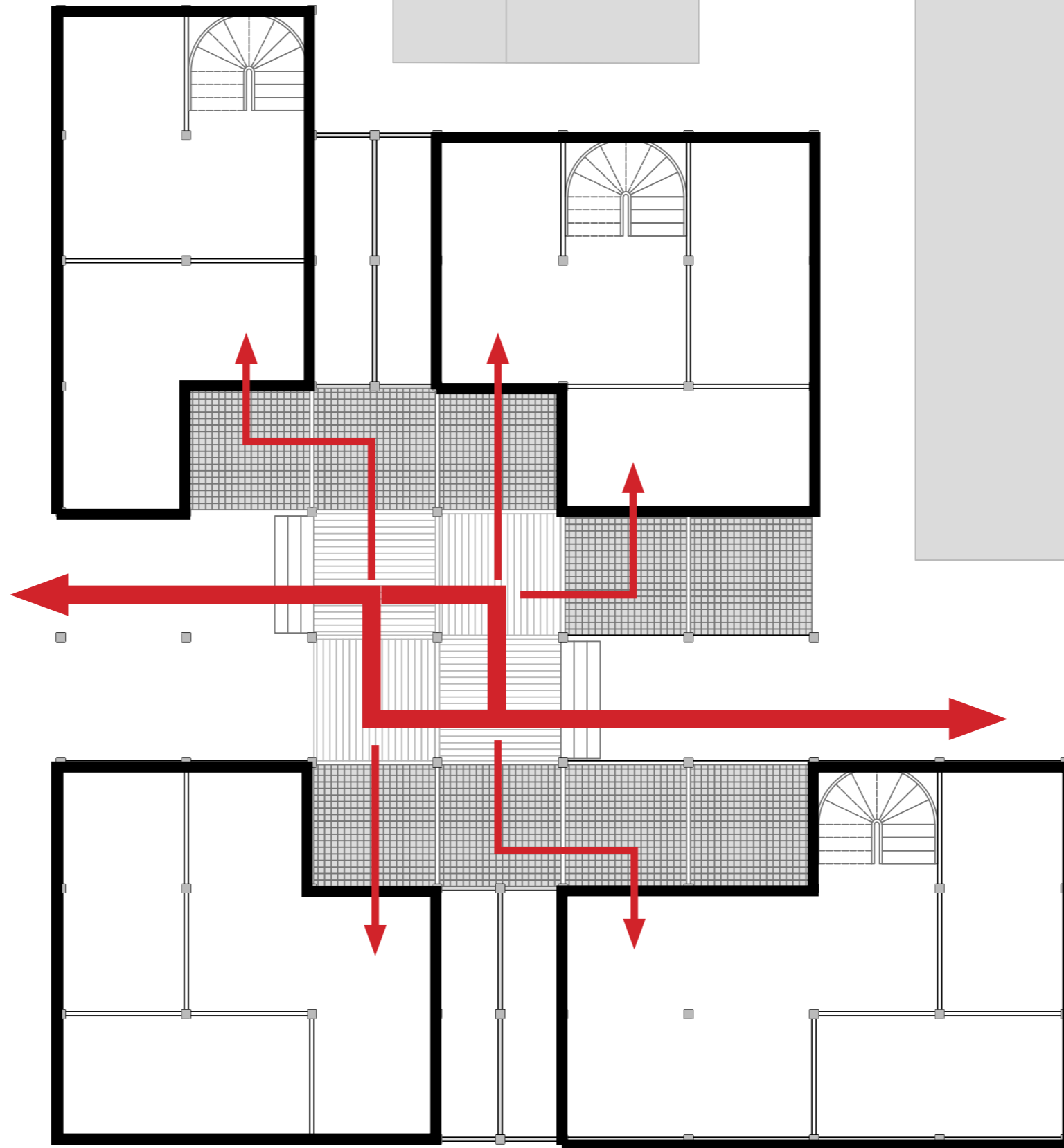


Private

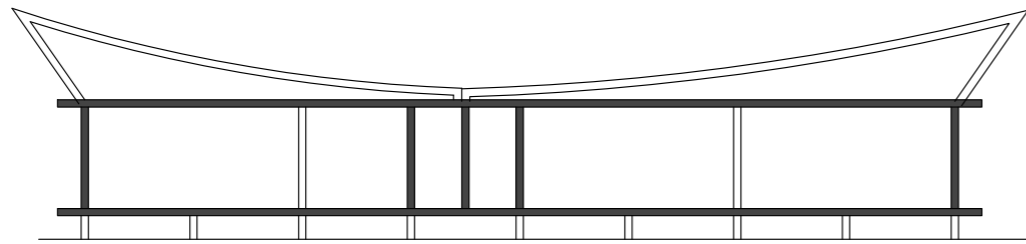
Semi-public

Public

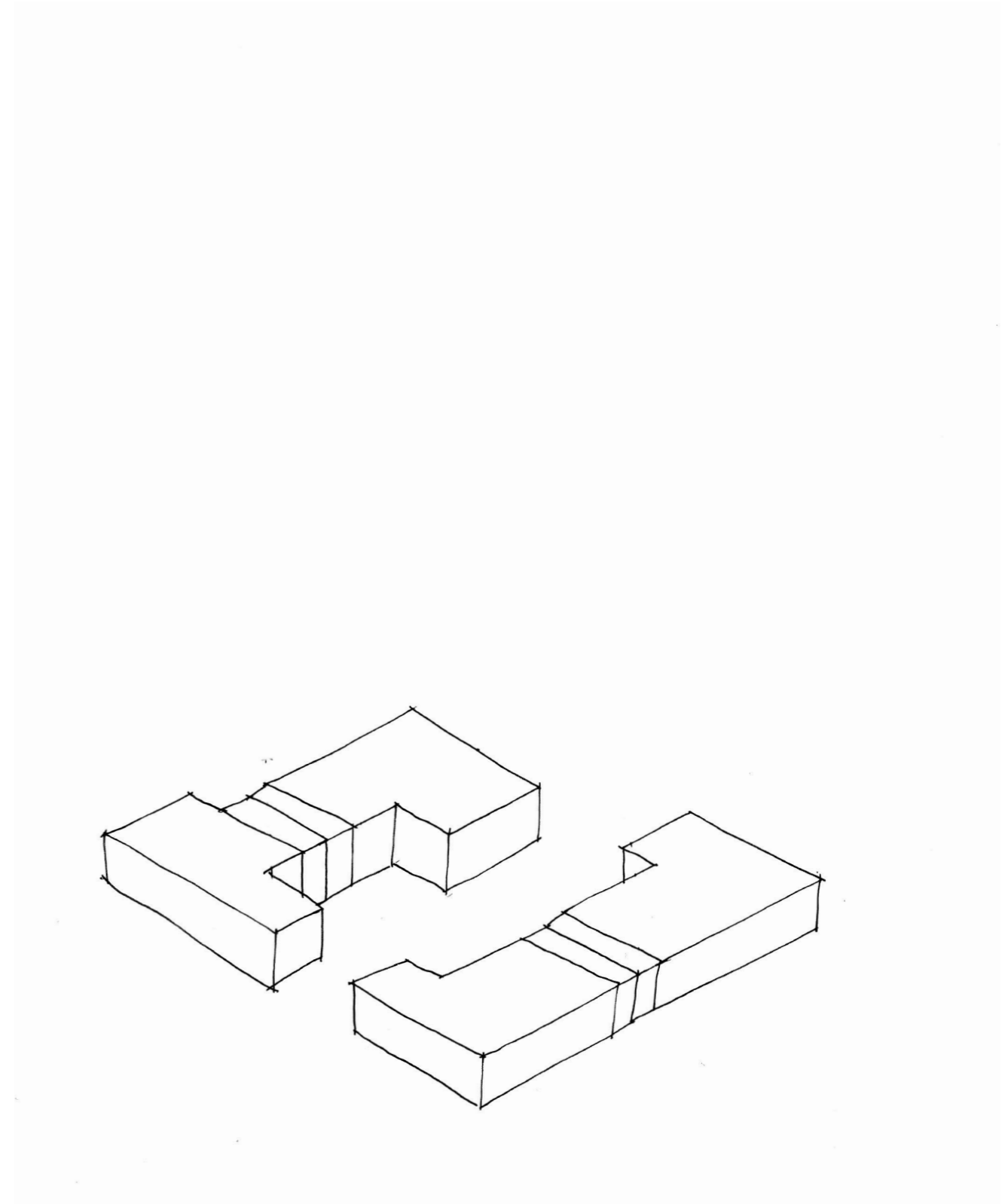
Design Routing



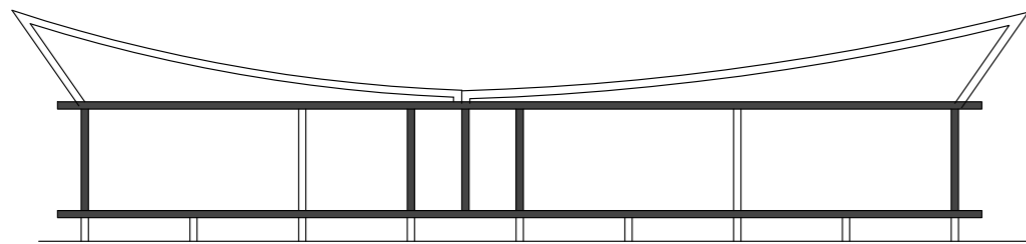
Design incrementality



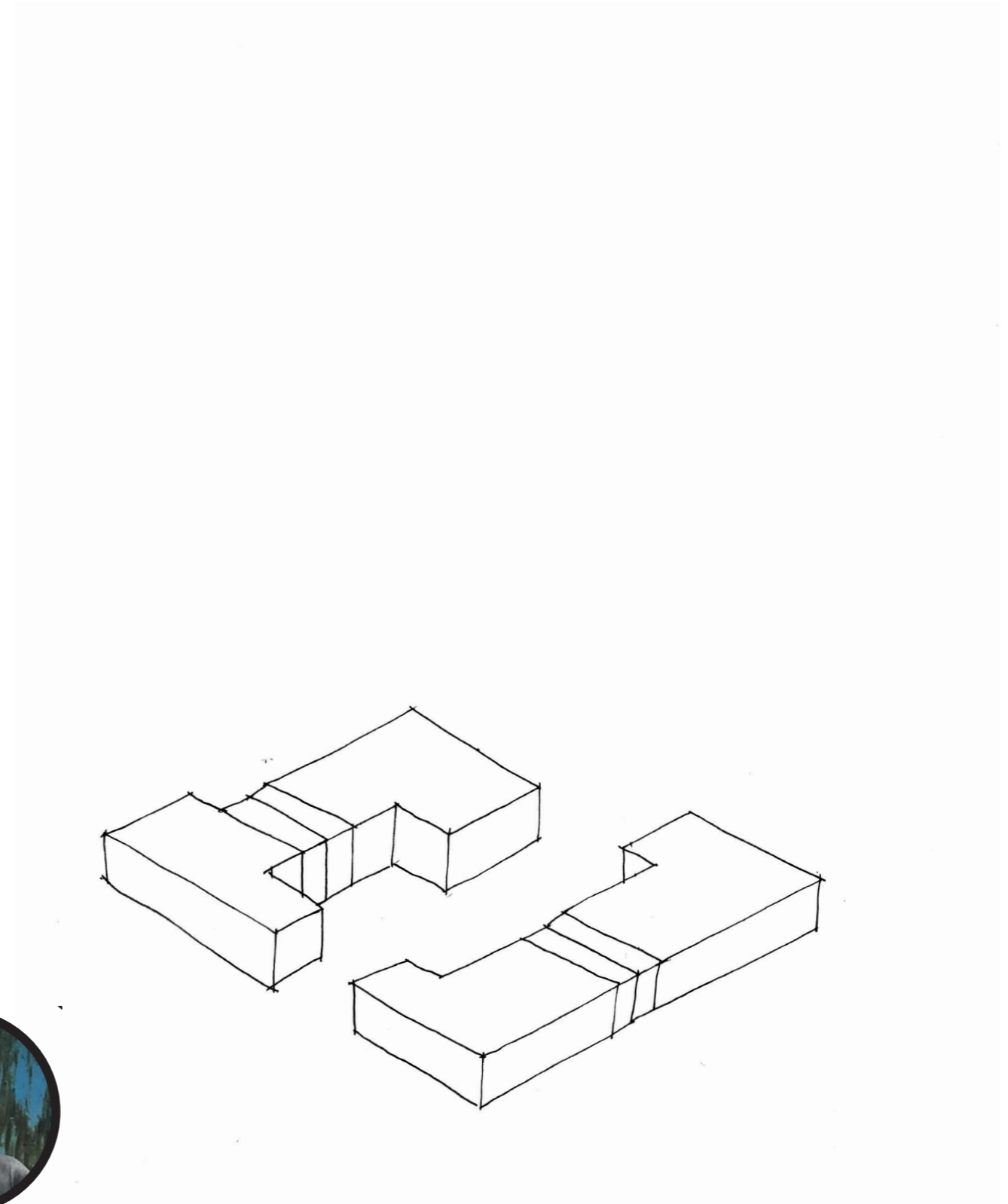
Phase 1



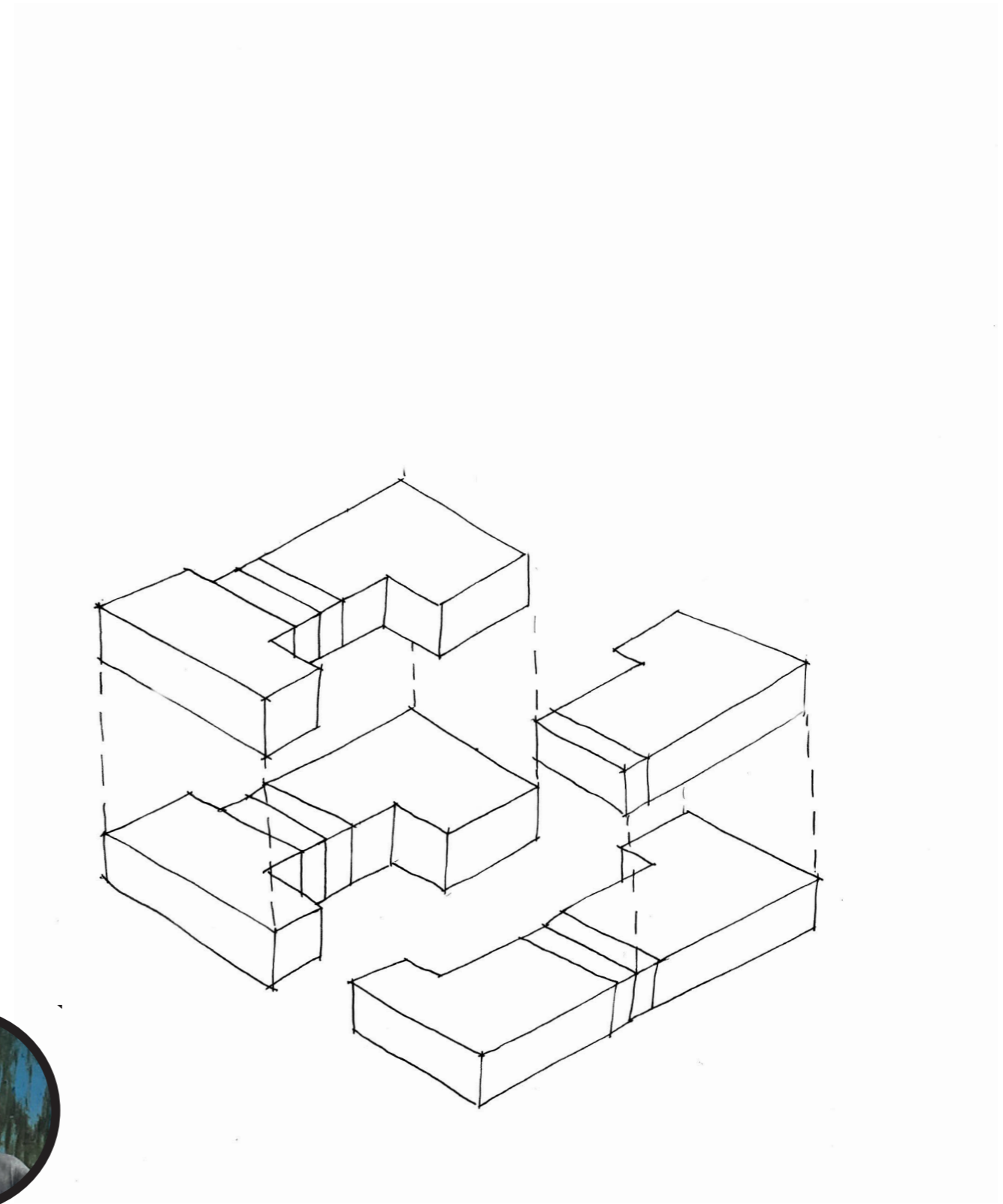
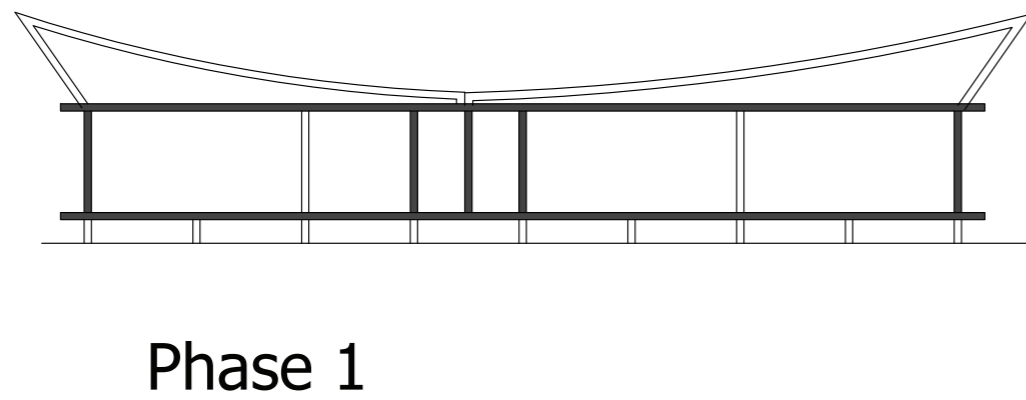
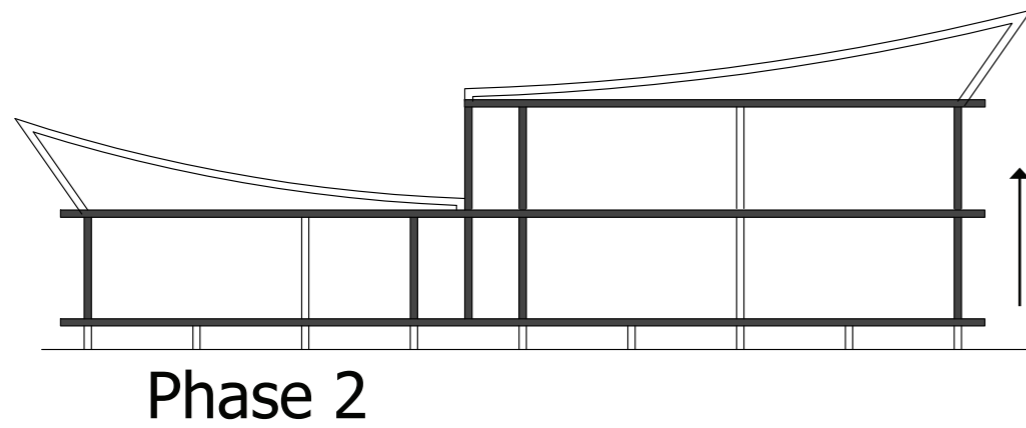
Design incrementality



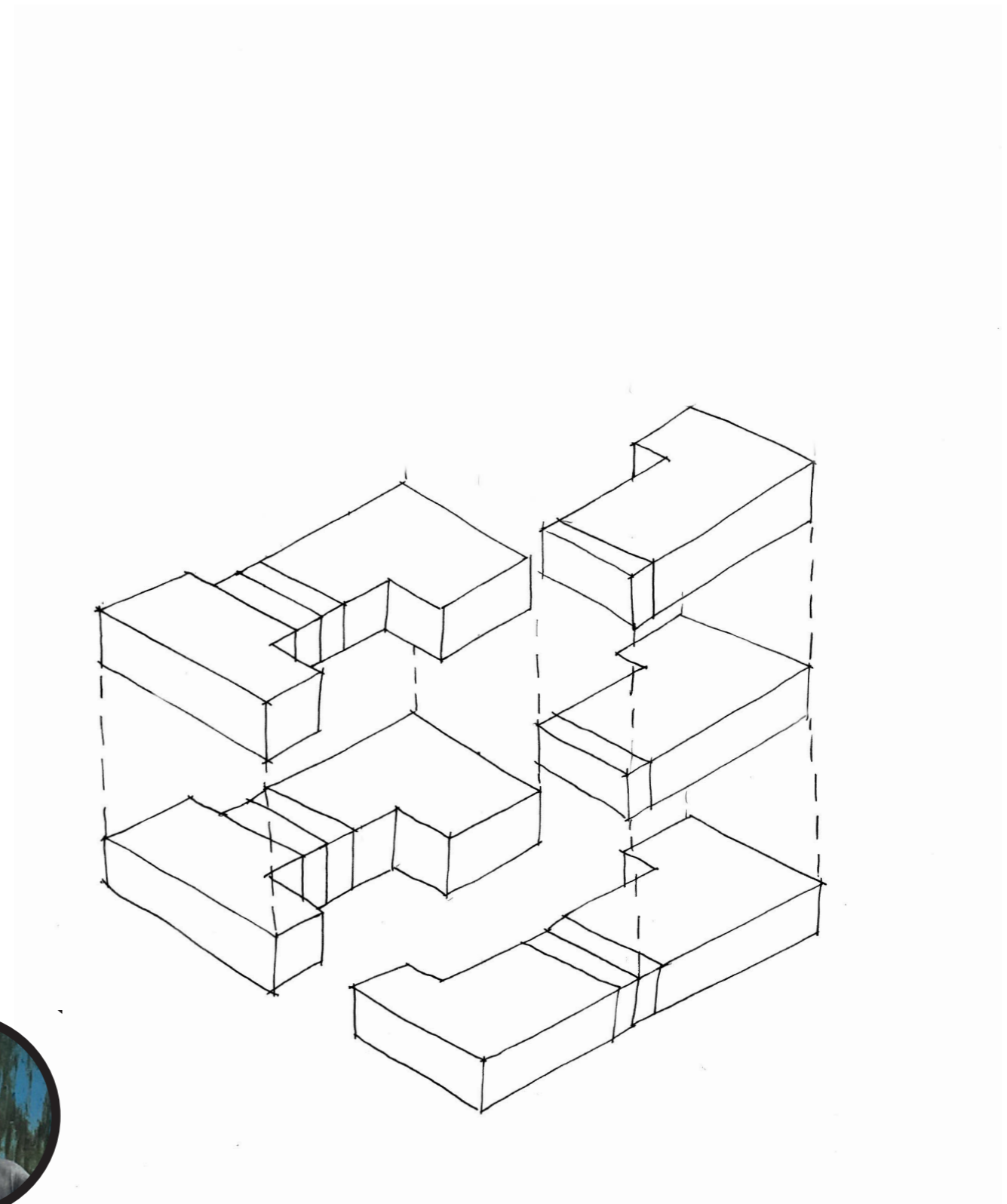
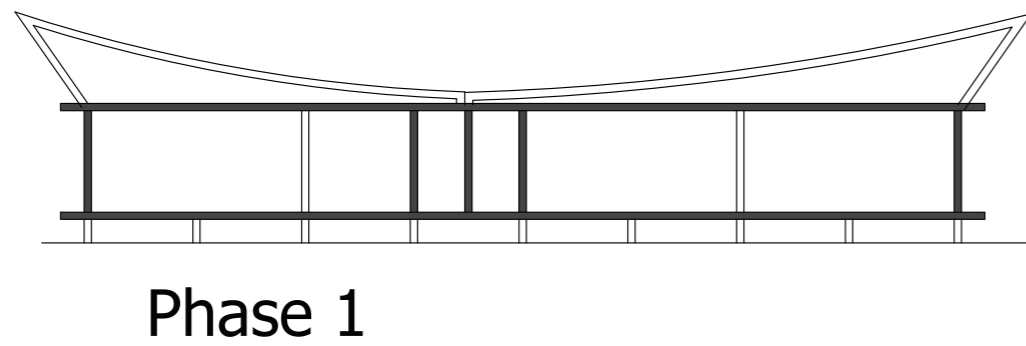
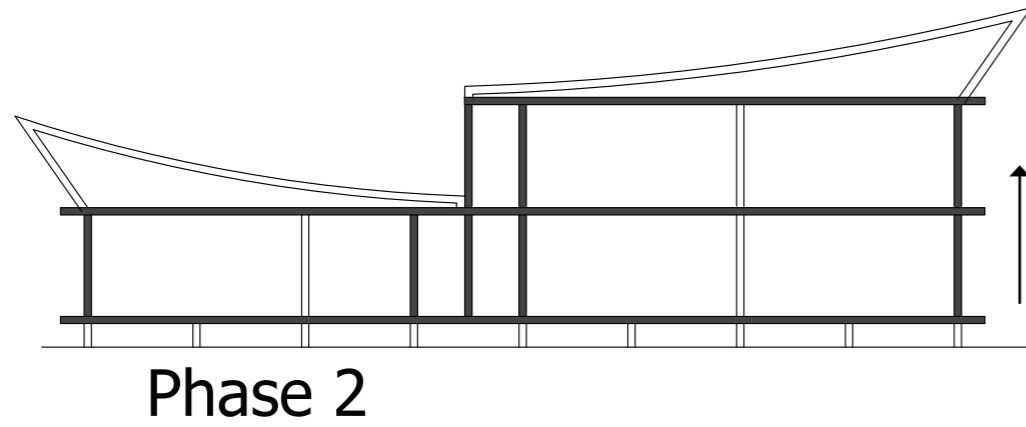
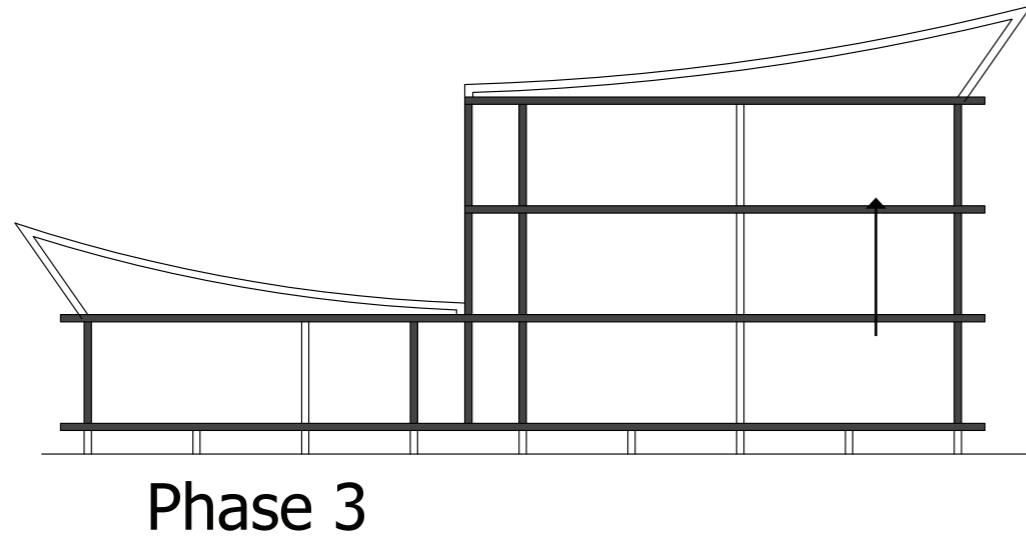
Phase 1



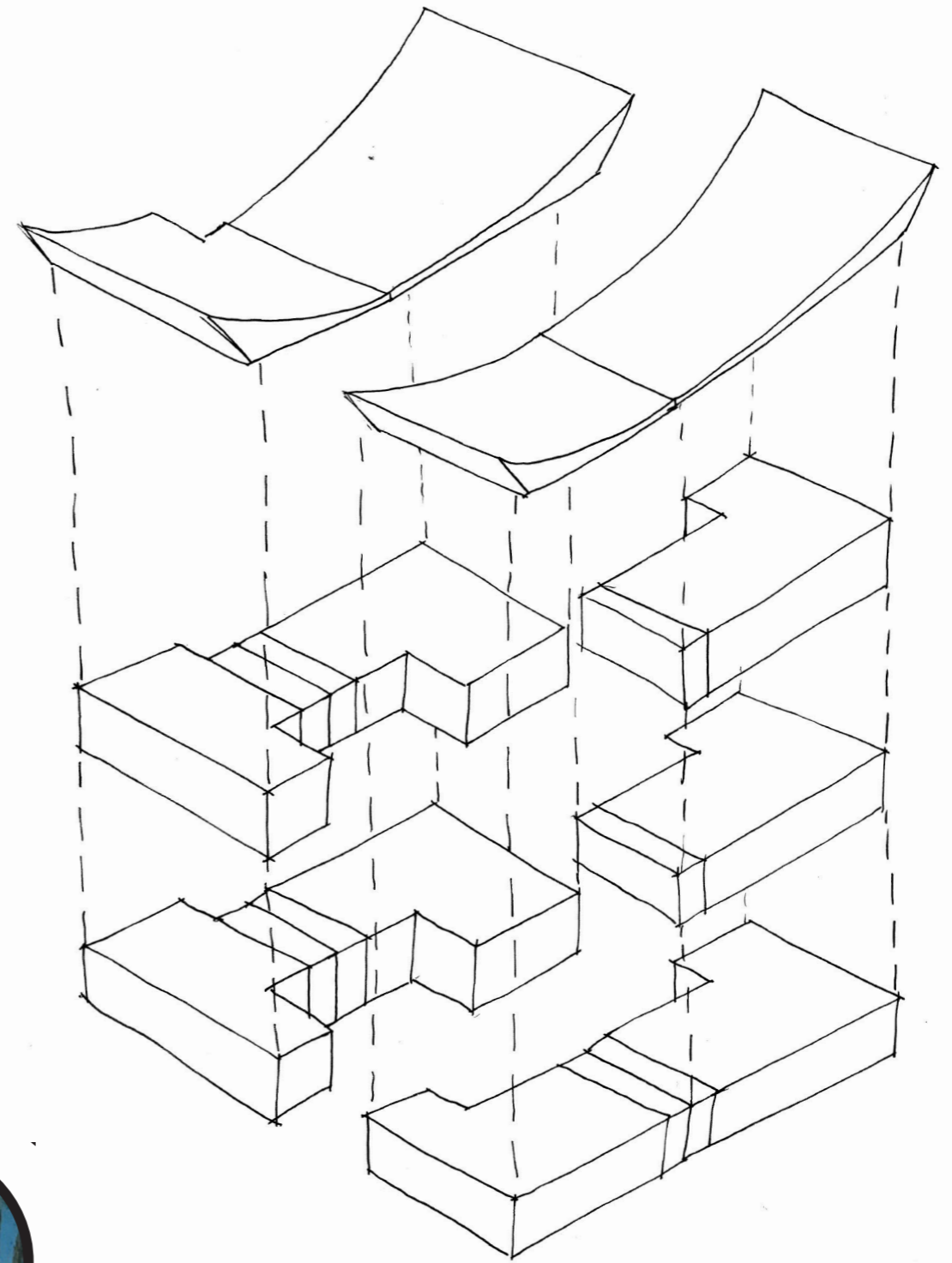
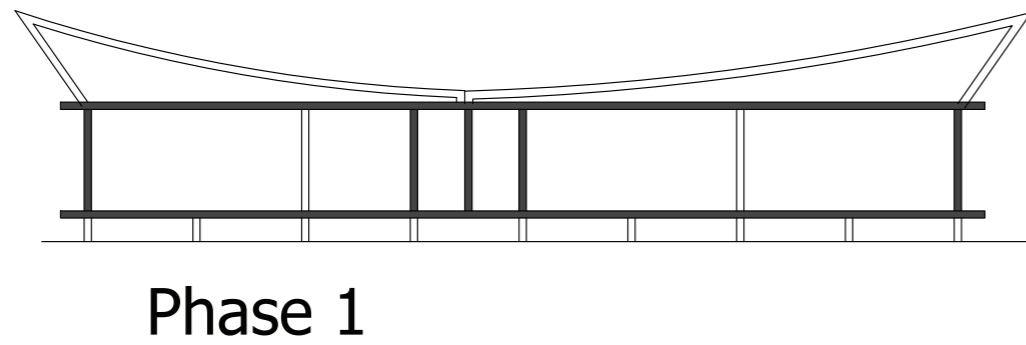
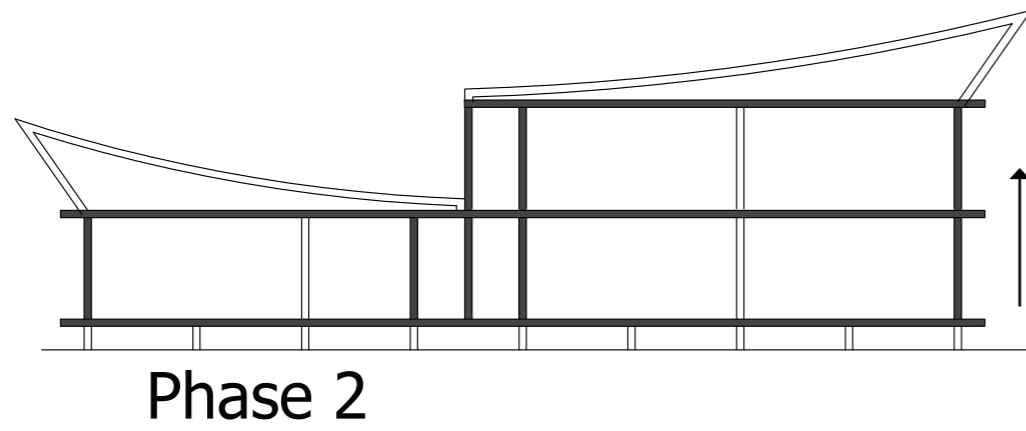
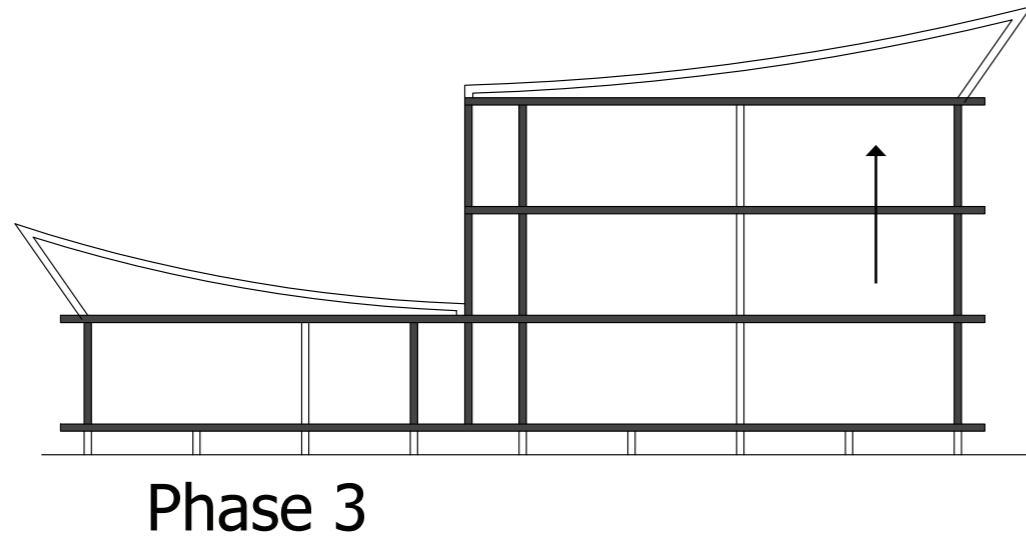
Design incrementality



Design incrementality



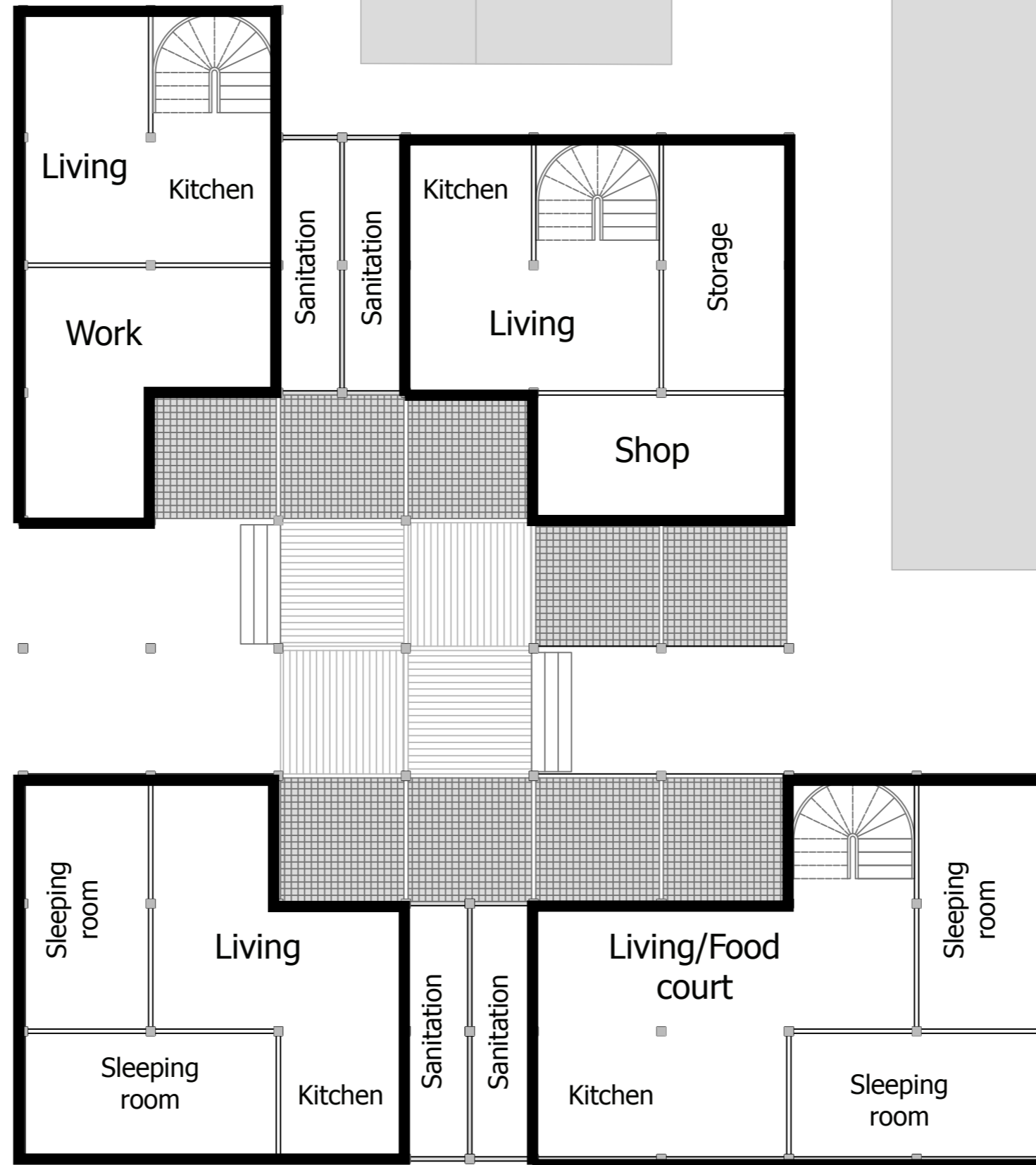
Design incrementality



Design incrementality

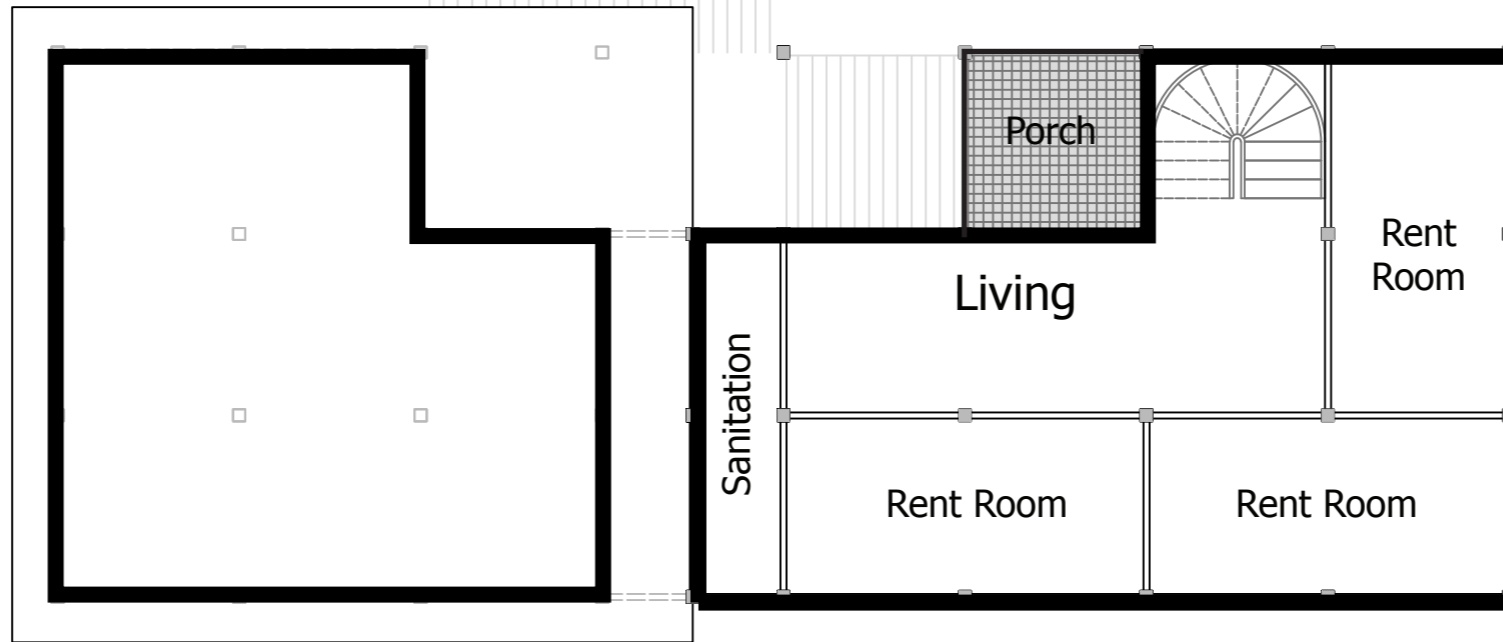
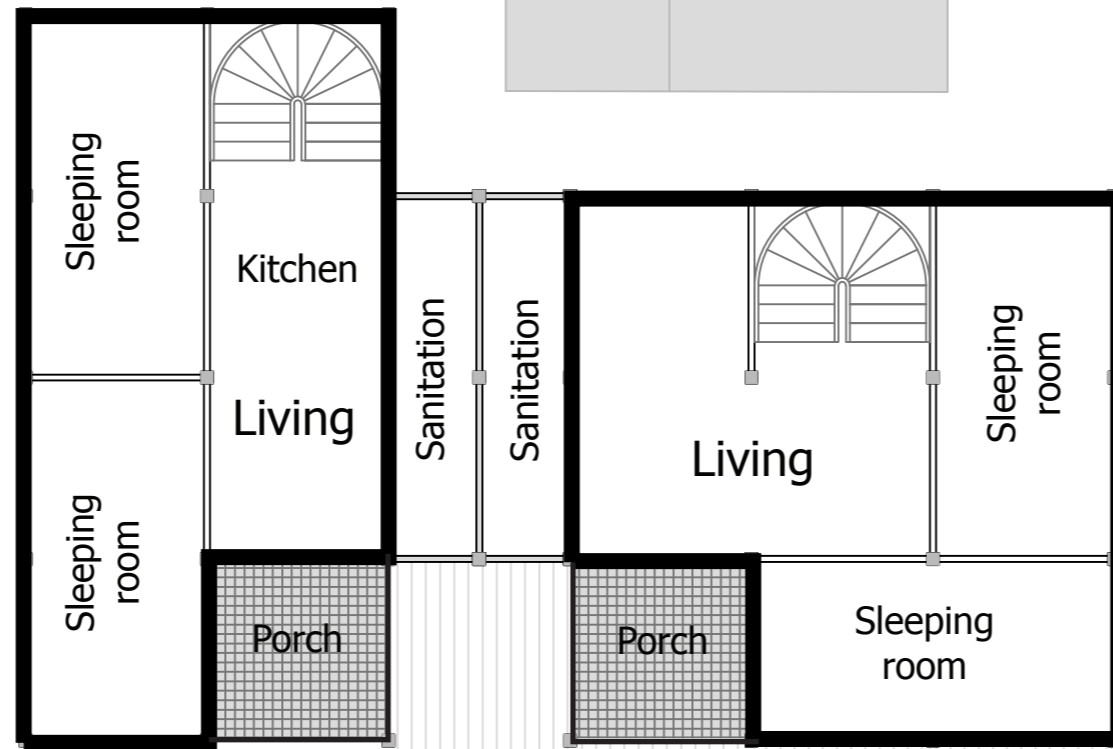


Design Floorplans



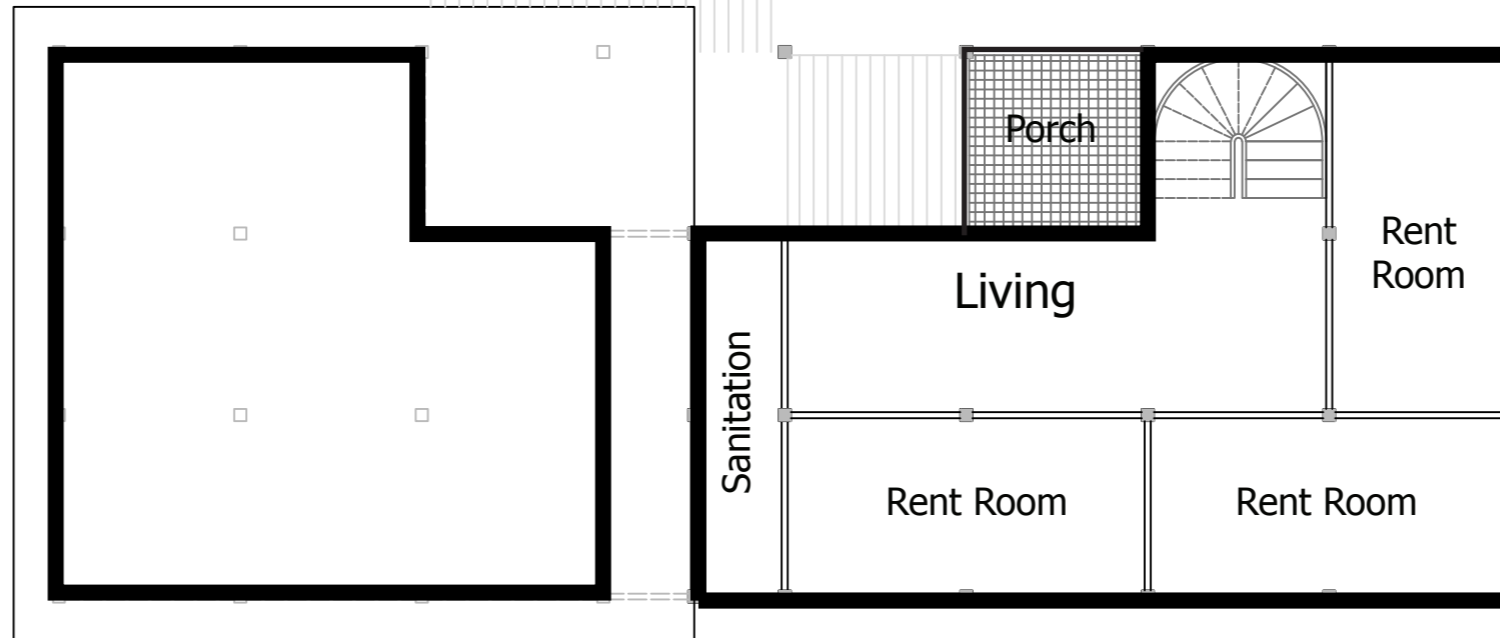
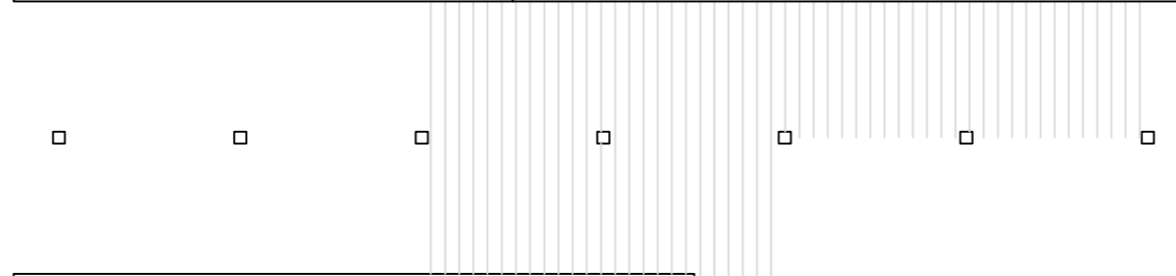
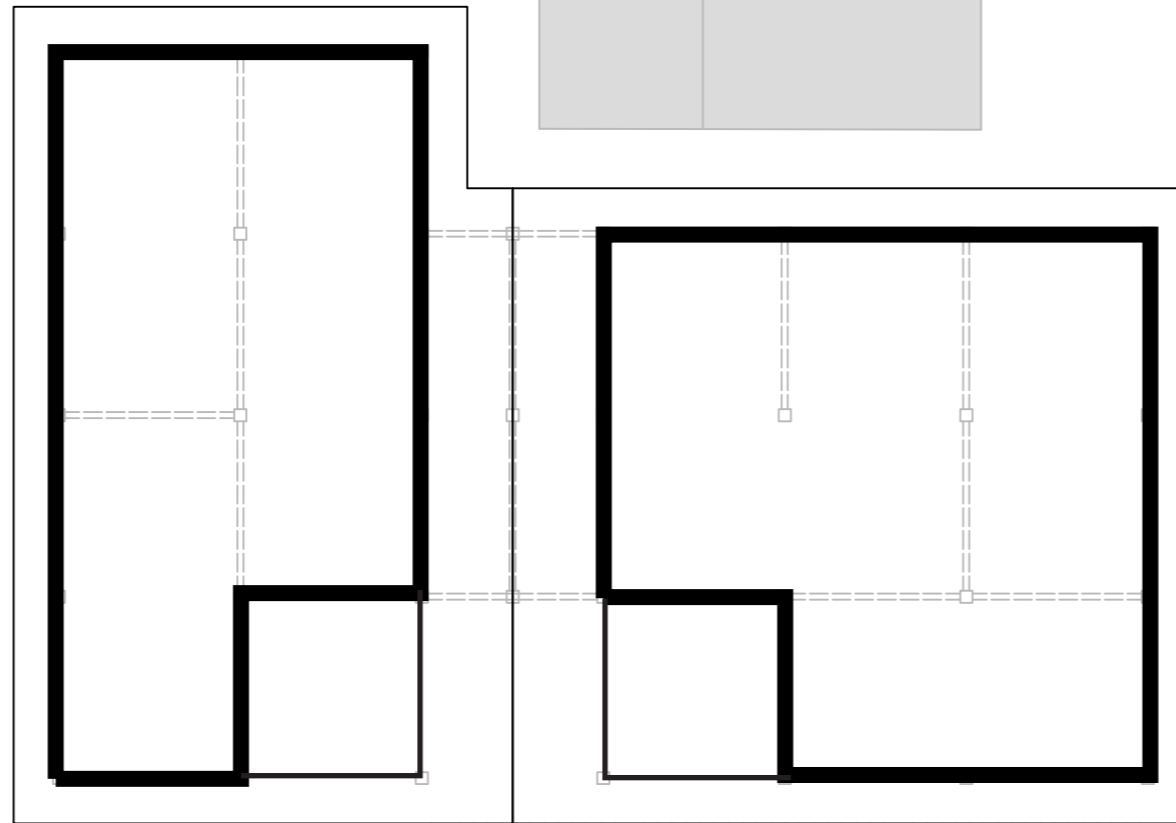
+00
Ground Floor

Design Floorplans



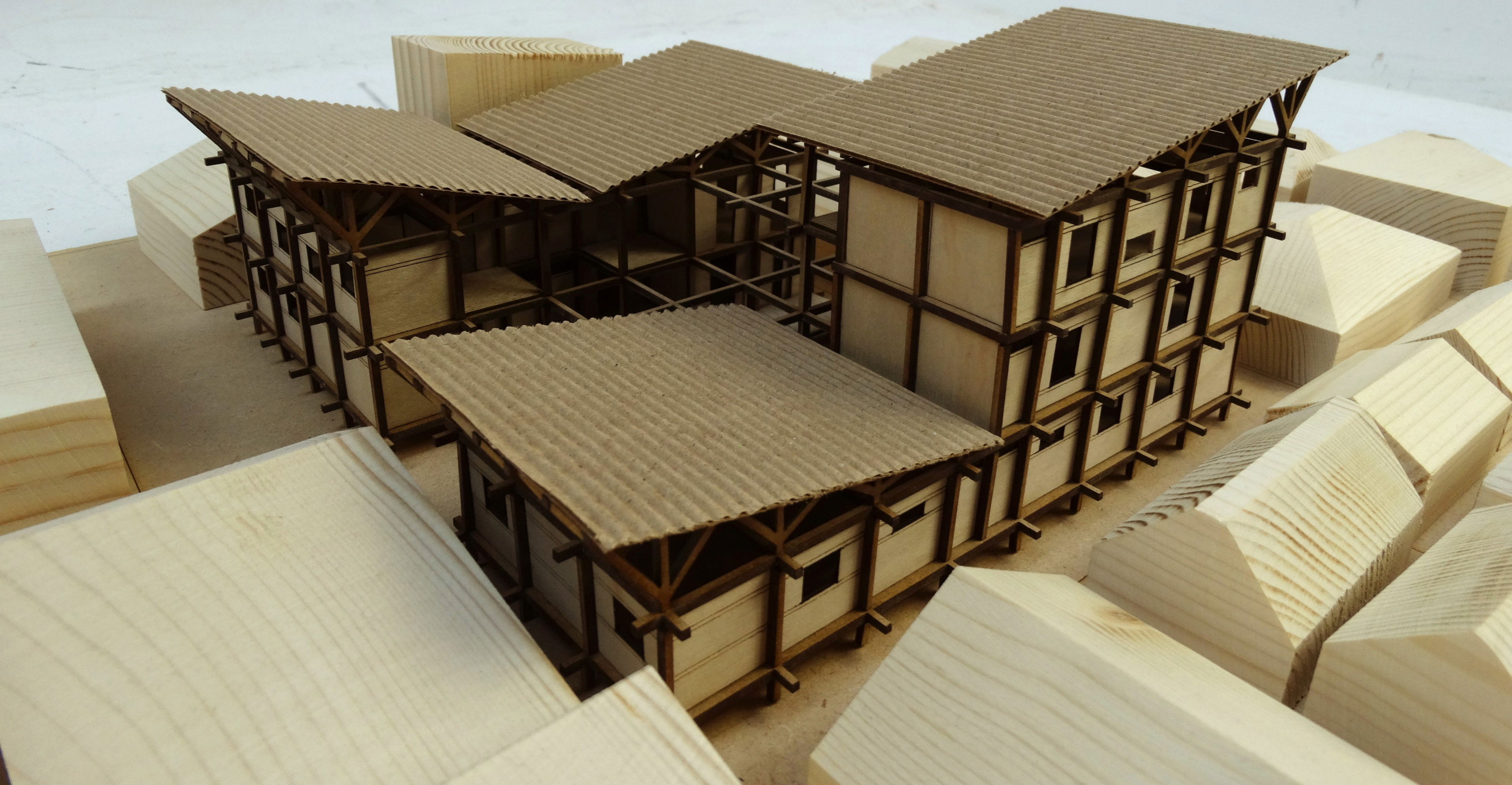
+01
1st Level

Design Floorplans



+02
2nd Level

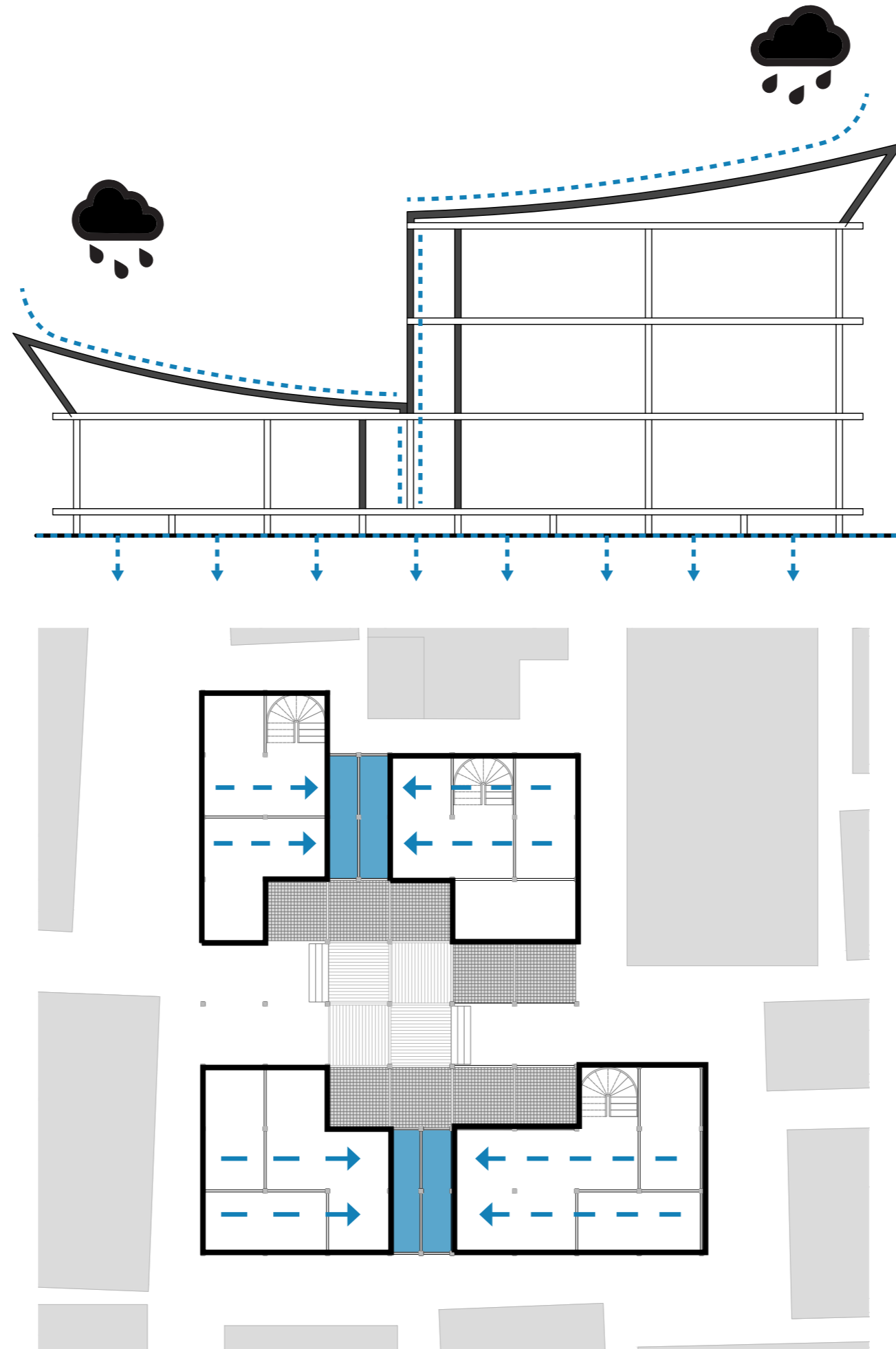
Design Floorplans



Design

Climate design

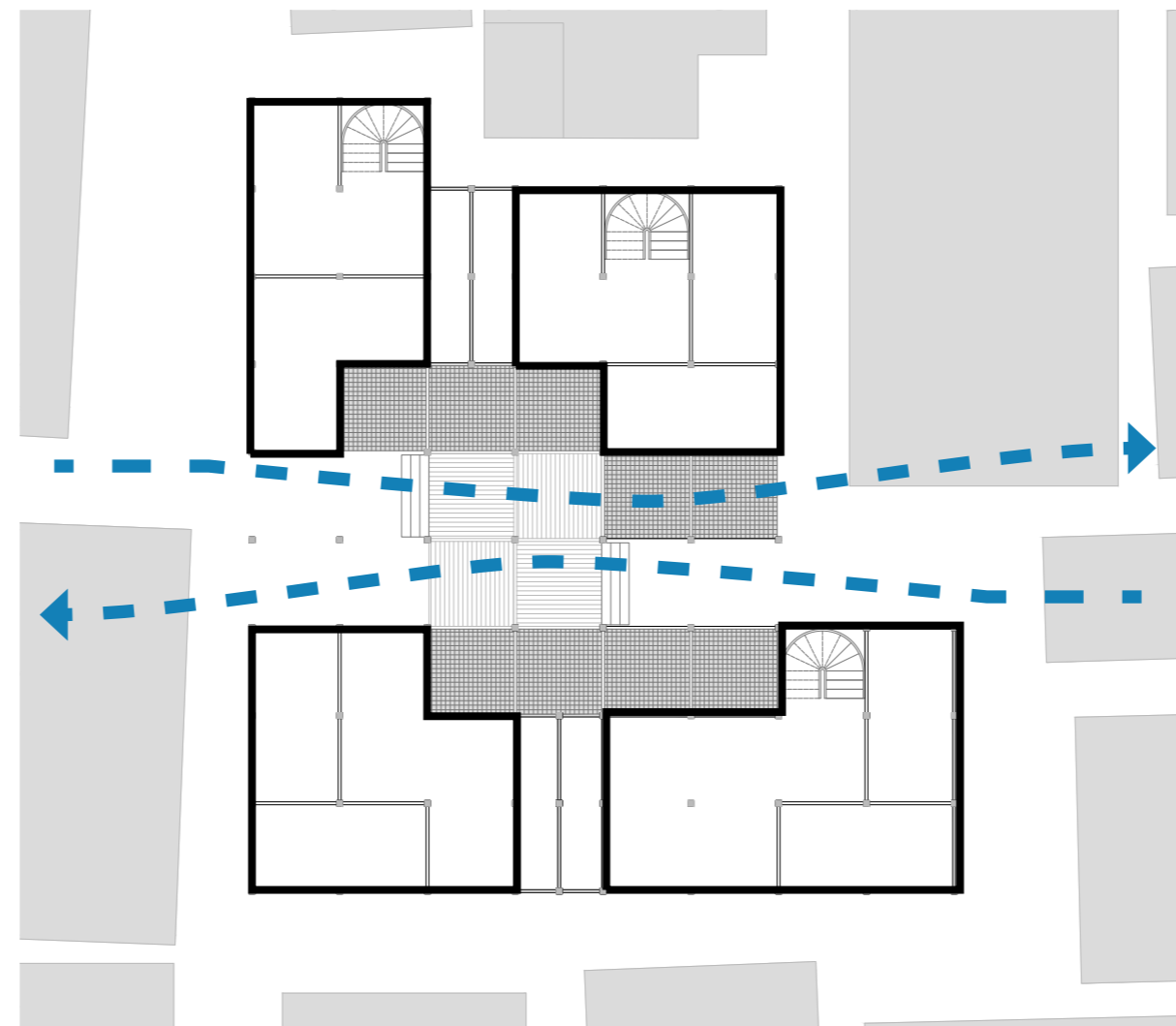
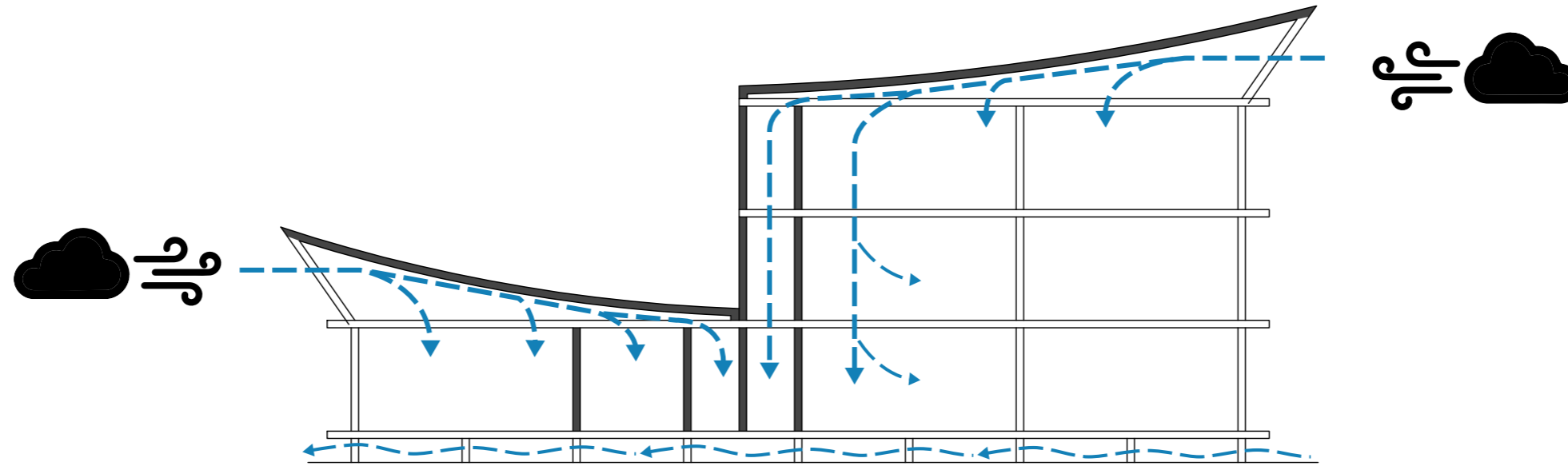
Rain water



Design

Climate design

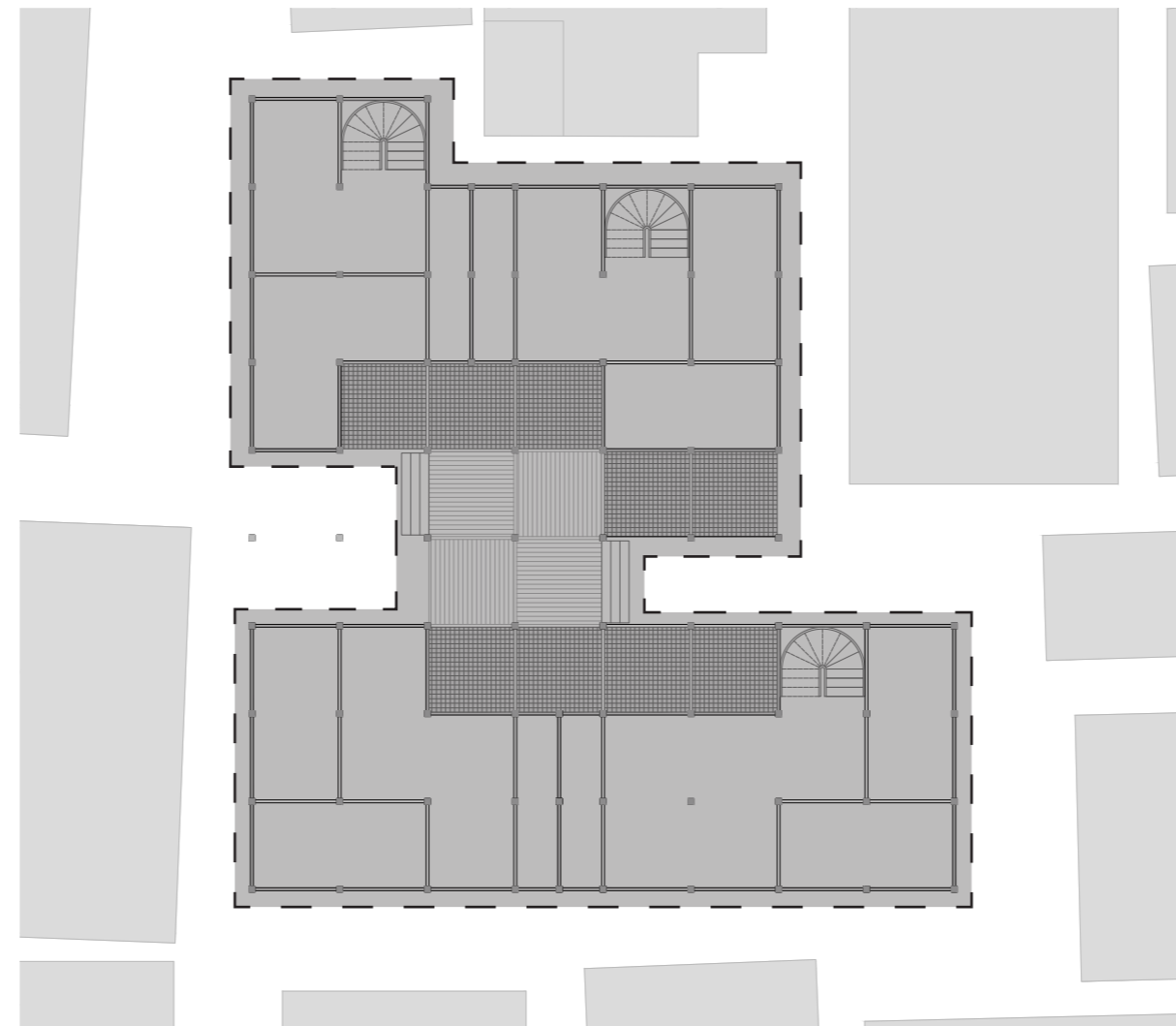
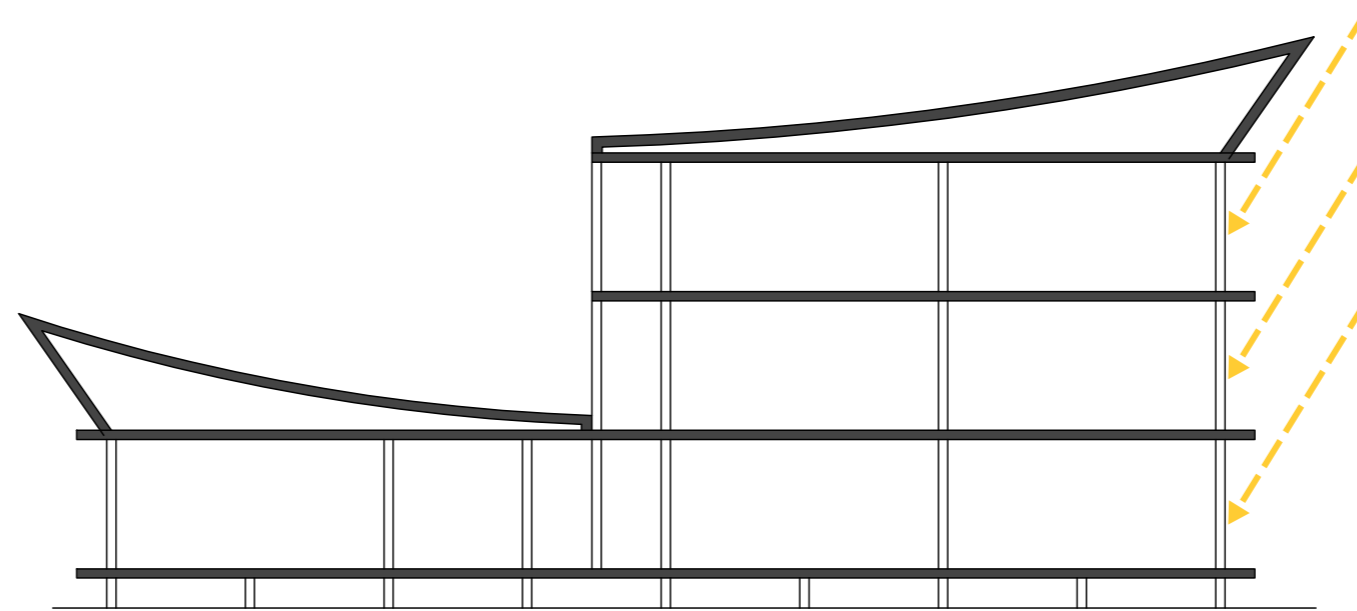
Ventilation



Design

Climate design

Sun Shading



Design Facades



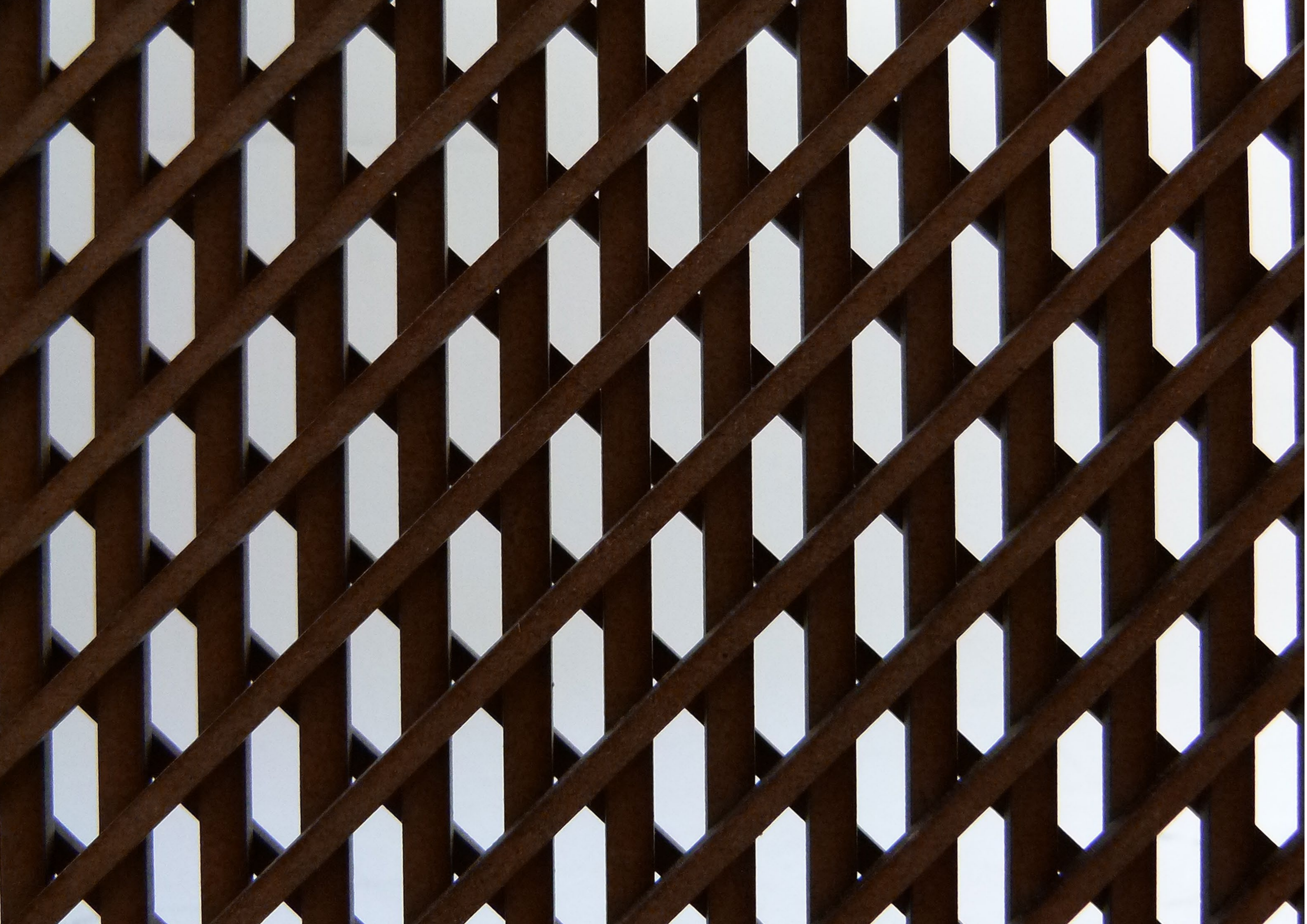
Design Facades



Design Facades







Design Facades



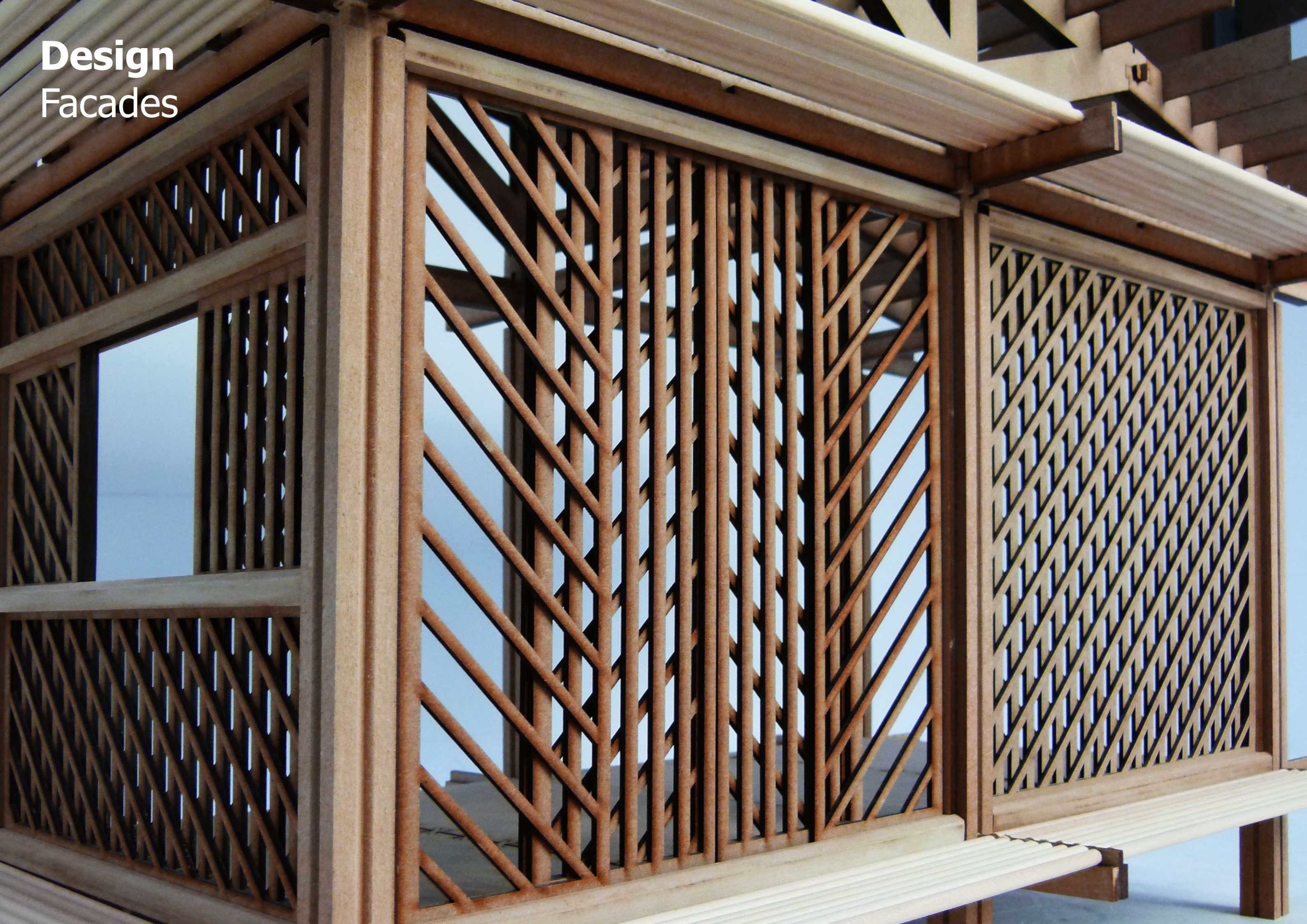
Design Facades



Design Facades



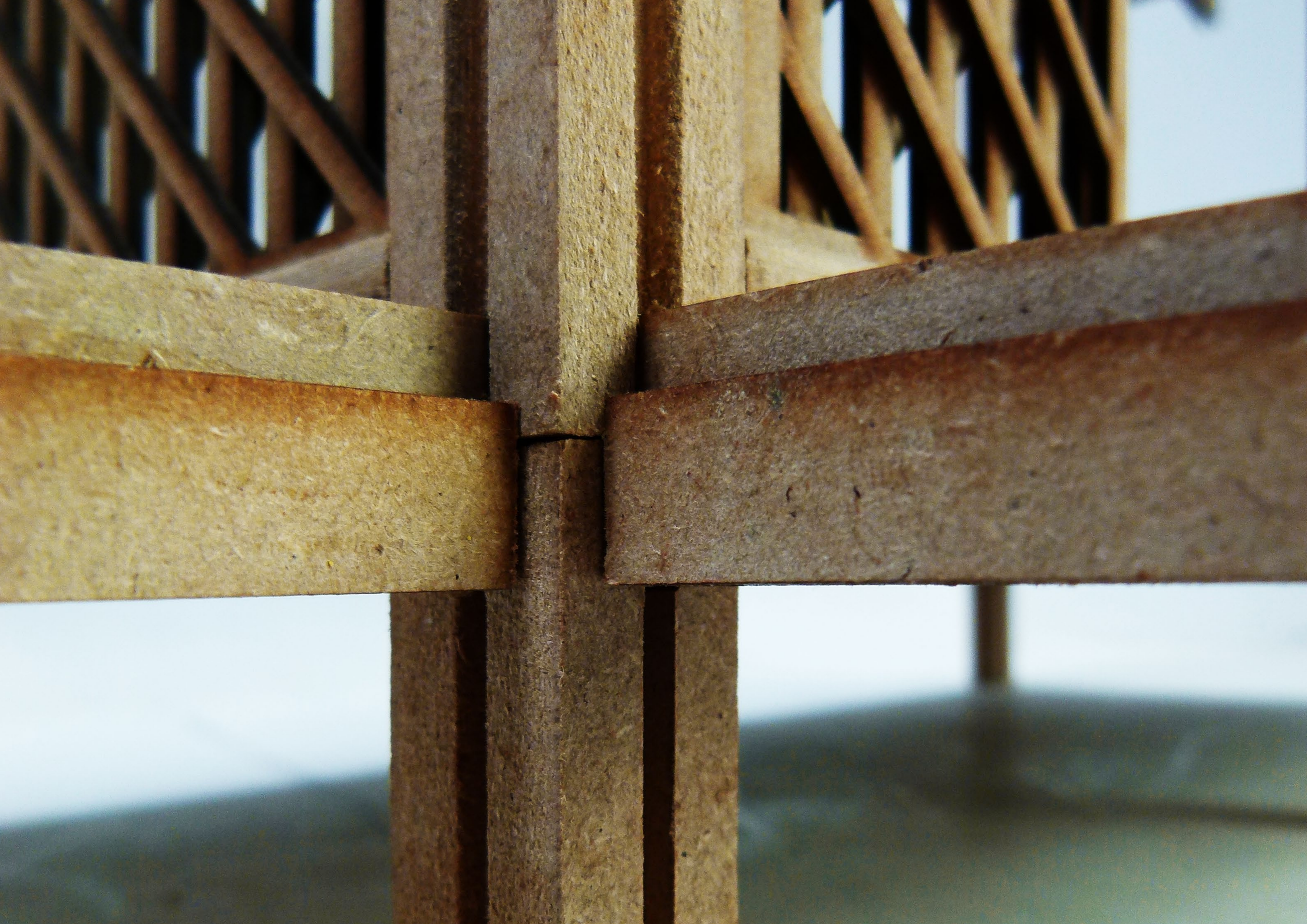
Design Facades









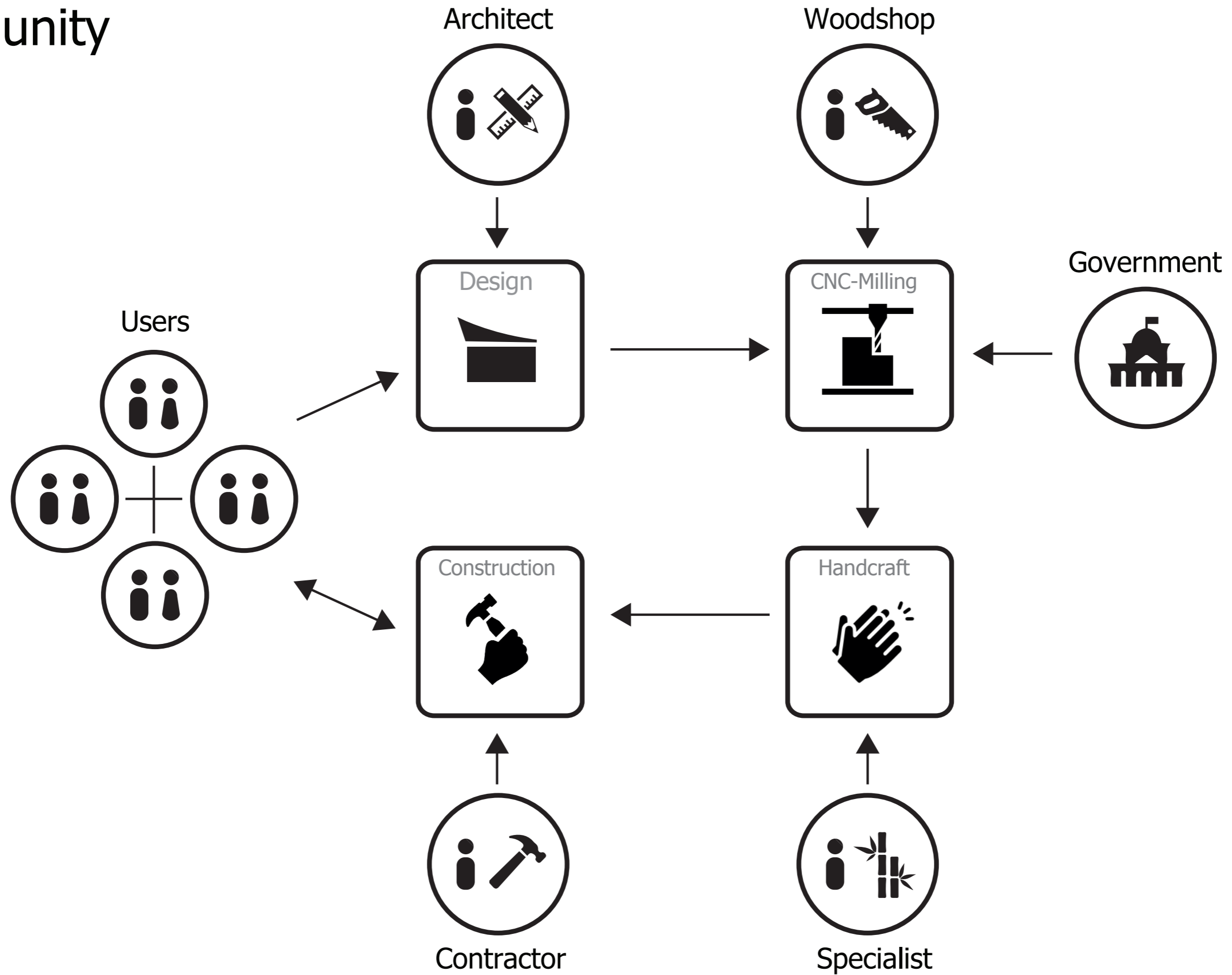




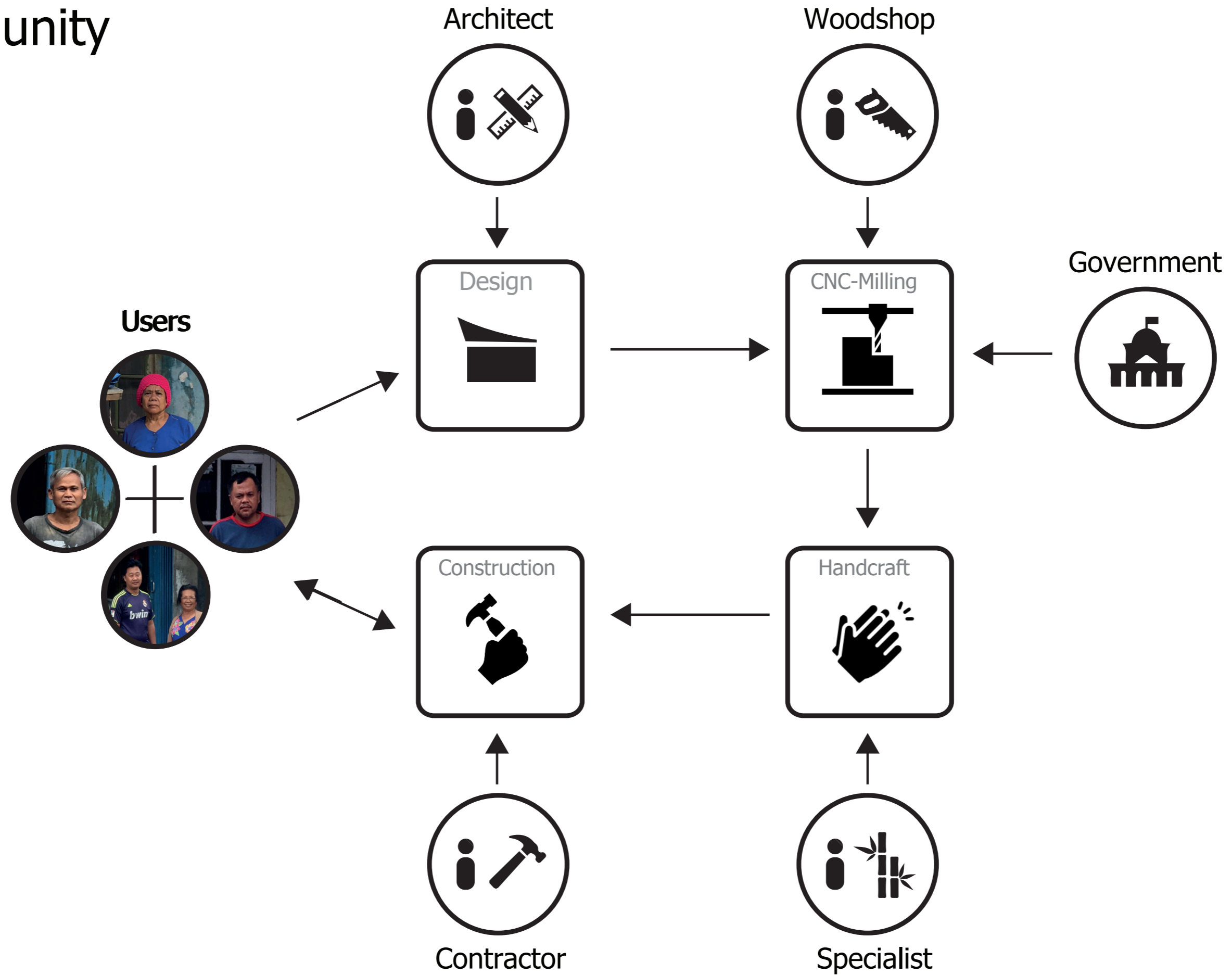




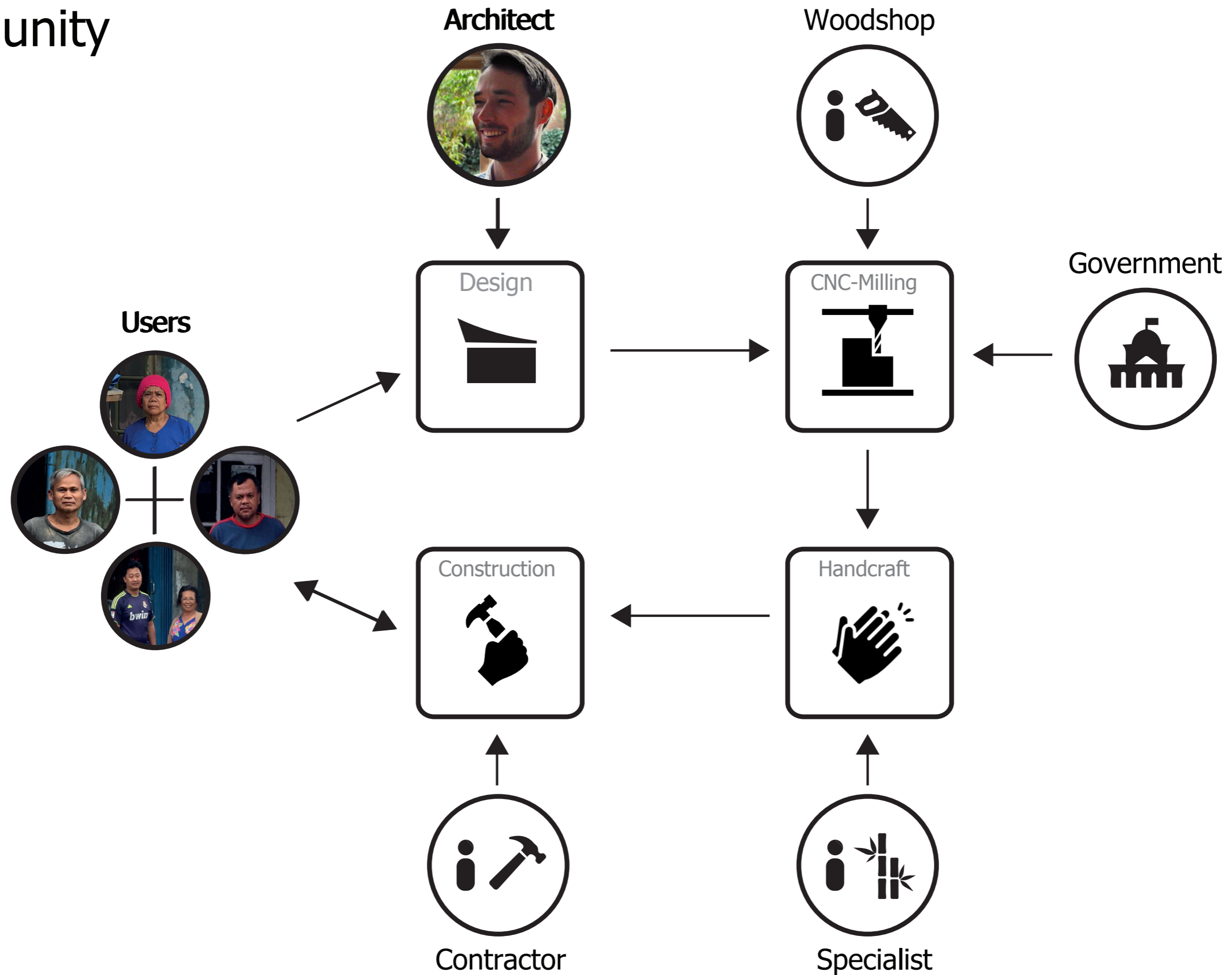
Strategic Application Community



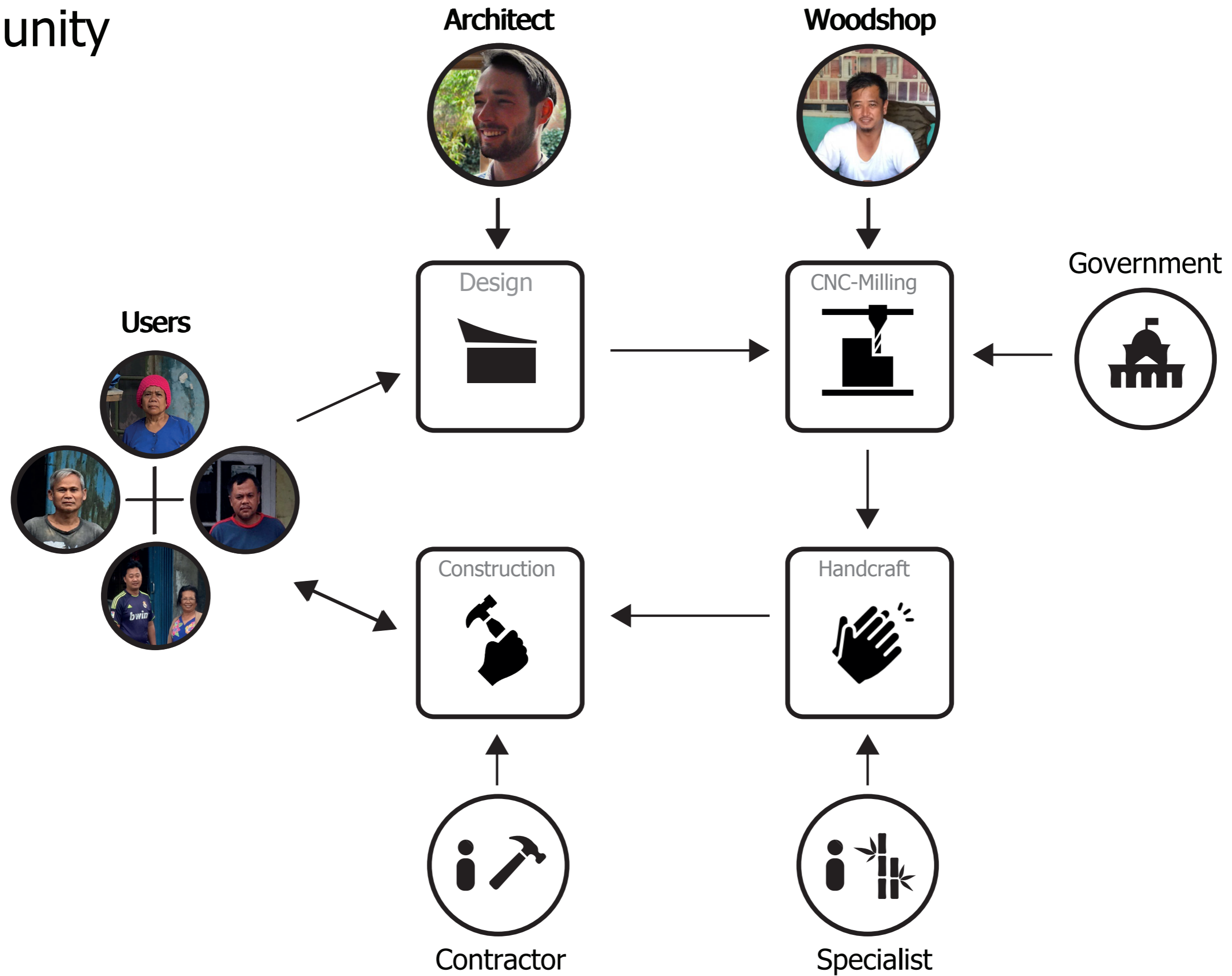
Strategic Application Community



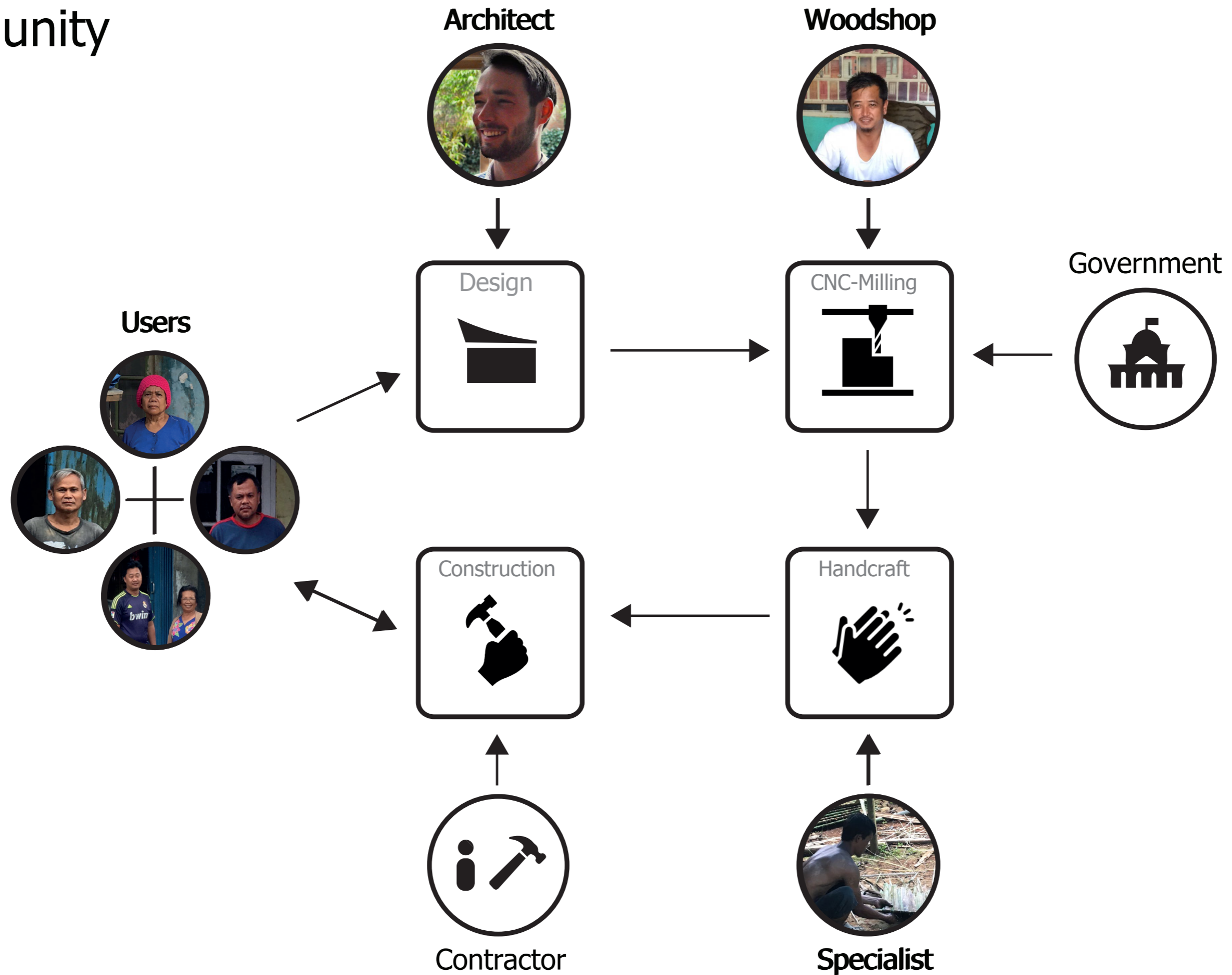
Strategic Application Community



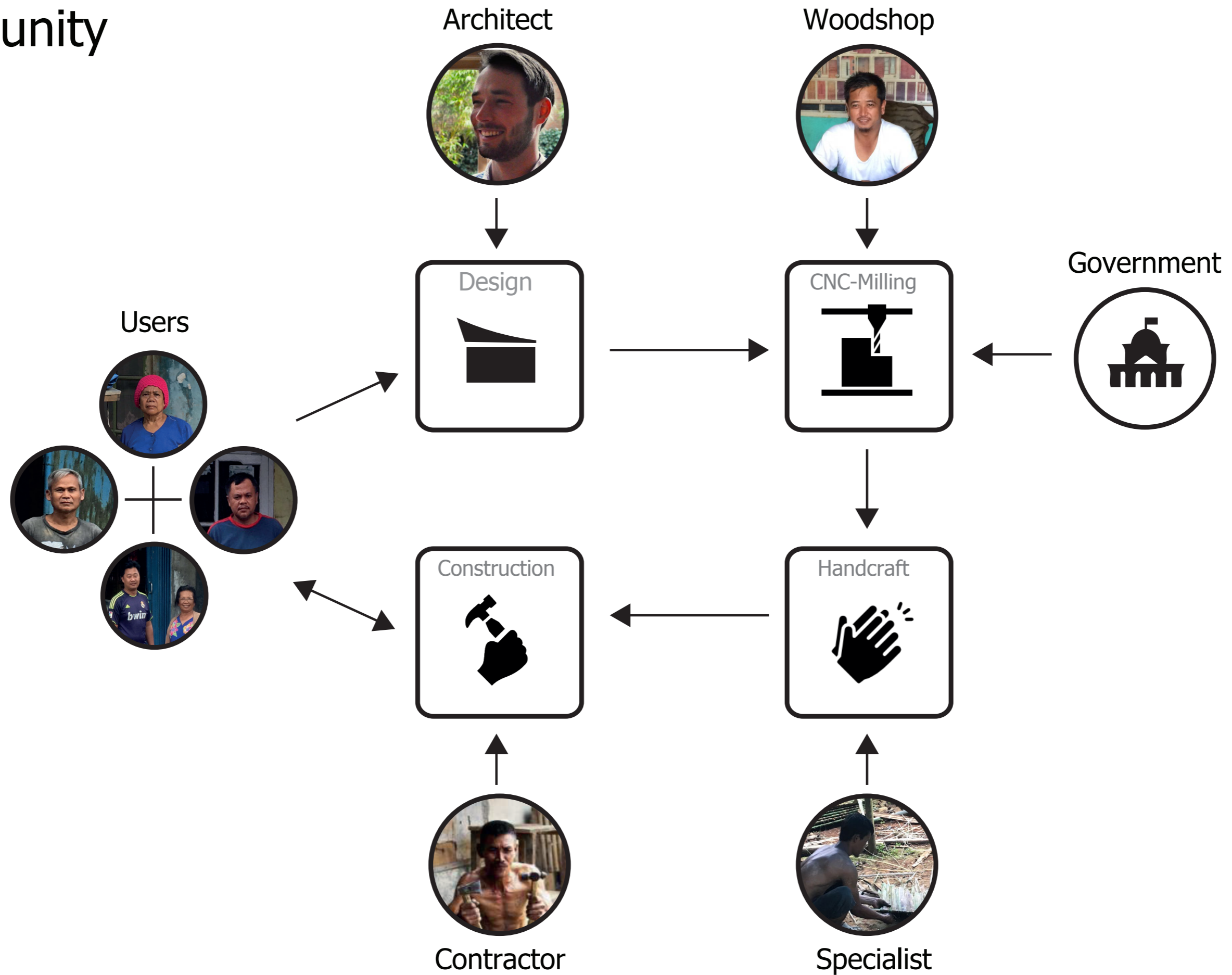
Strategic Application Community



Strategic Application Community



Strategic Application Community



Question recap



Question

recap

How to use **Traditional** and **CNC-milling** building methods to create sustainable affordable Do-it-yourself housing in the **Peri-urban kampungs** of Indonesia

Questions?



Building system

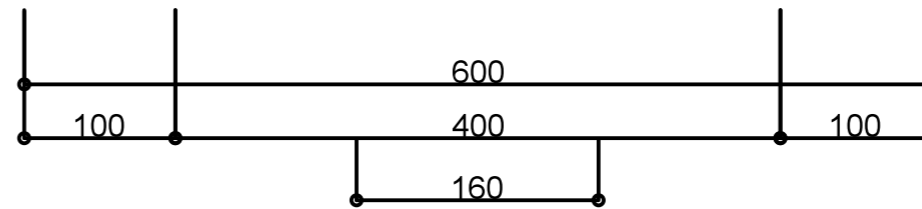
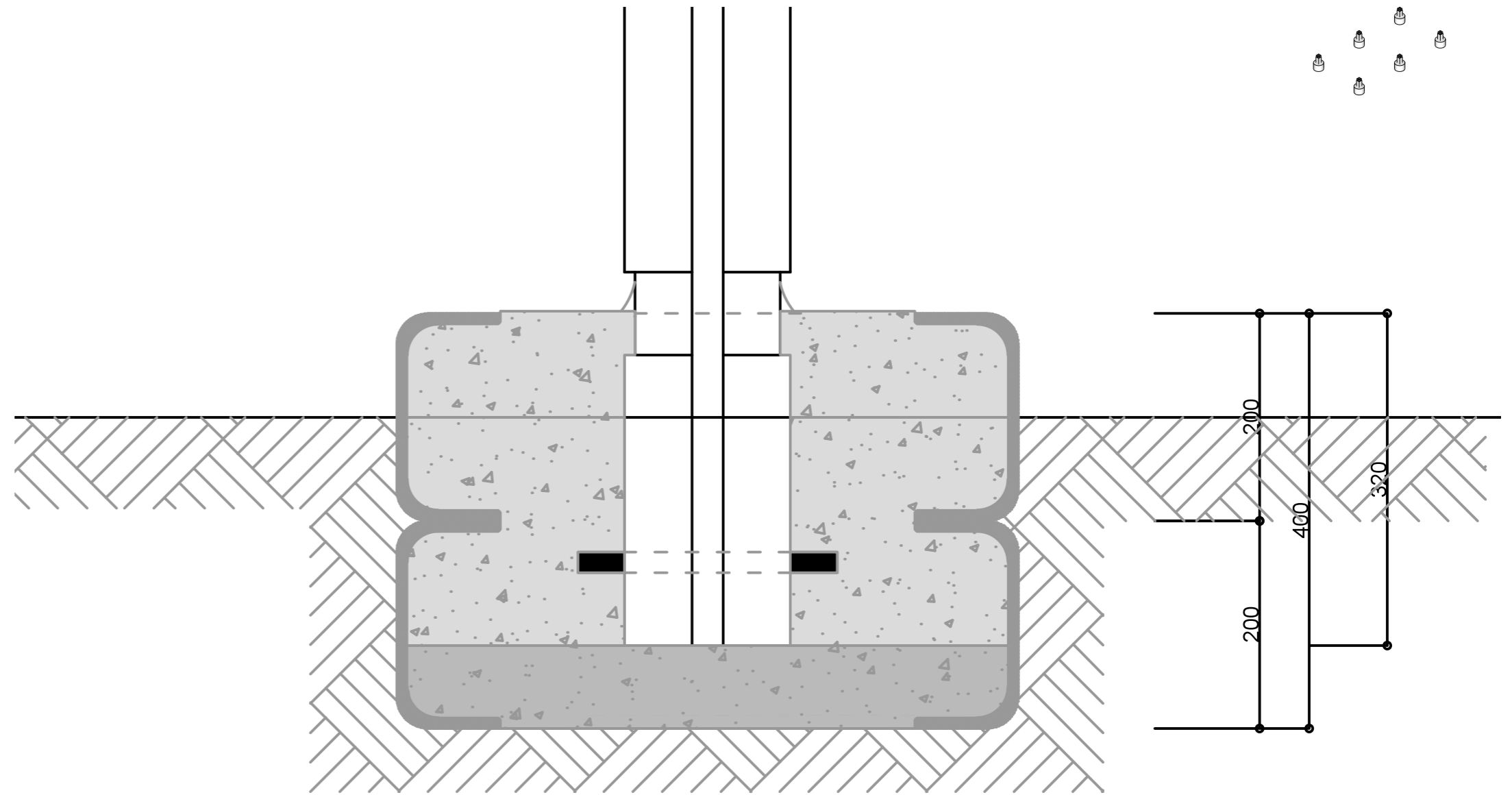
Foundation

Criteria

- Re-use
- Durable
- Water resistance
- Easy assembly (DIY)

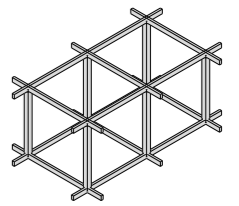
Materials

- Tyres (used)
- Rubberwood
or
- Mahogany wood
- Steel reinforcement



Building system

Beams and Columns

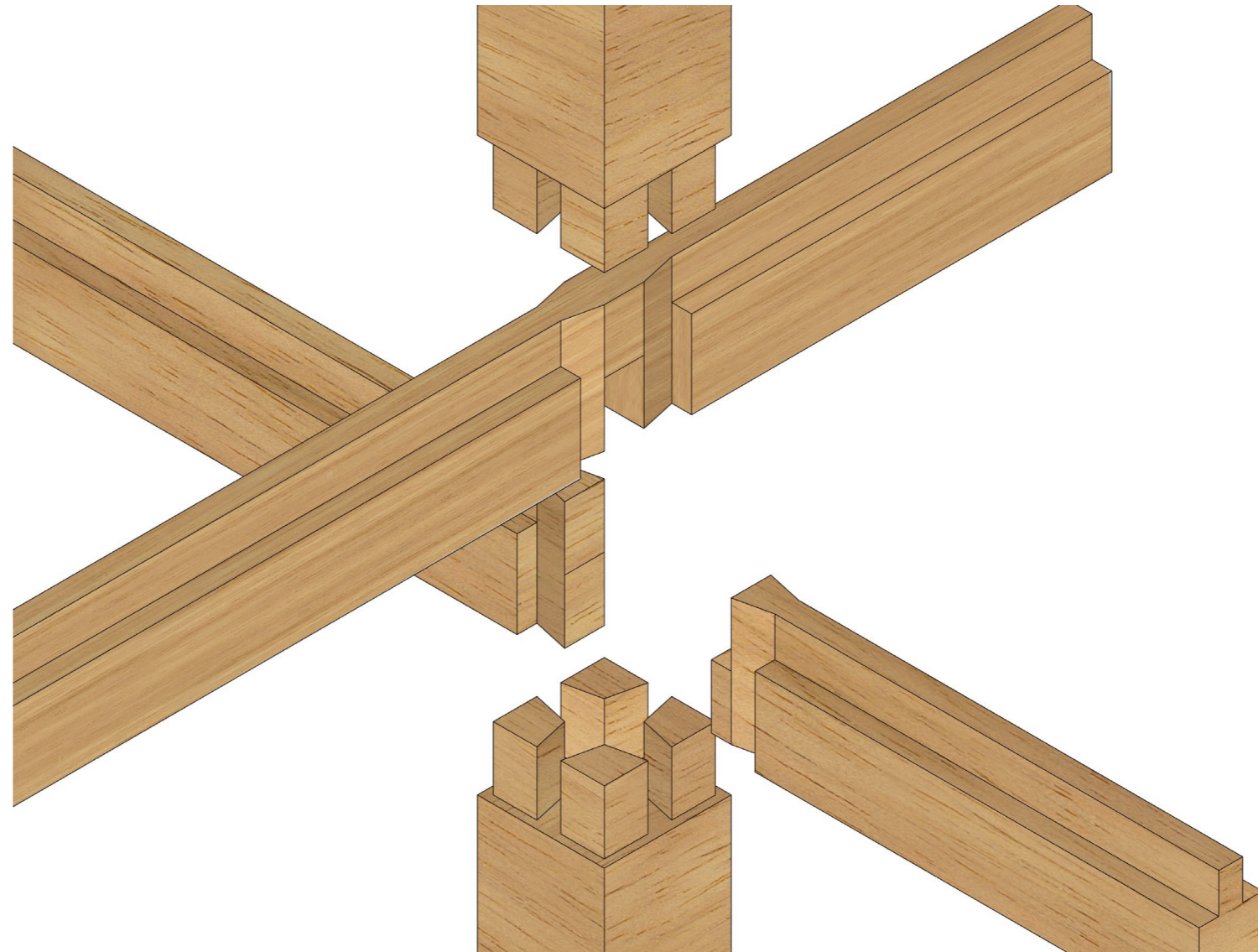


Criteria

- Easy assembly (DIY)
- Incremental
- Durable
- Water resistance

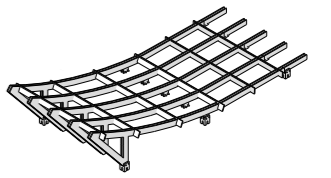
Materials

- Rubberwood
or
- Mahogany wood
- Steel pins



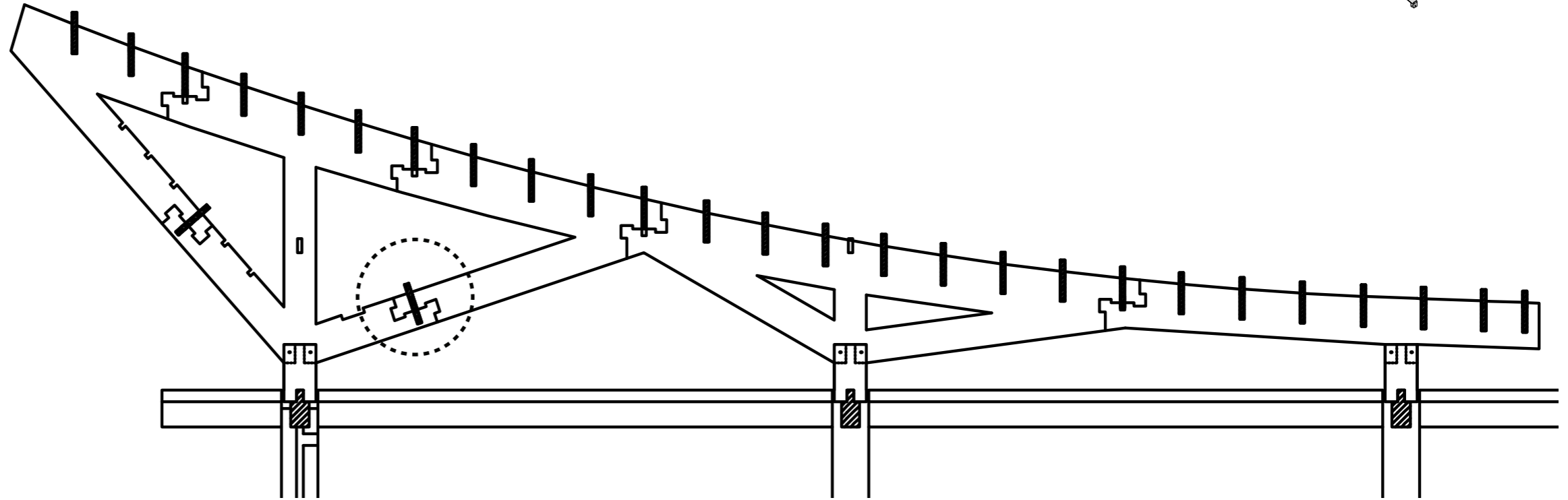
Building system

Roof structure



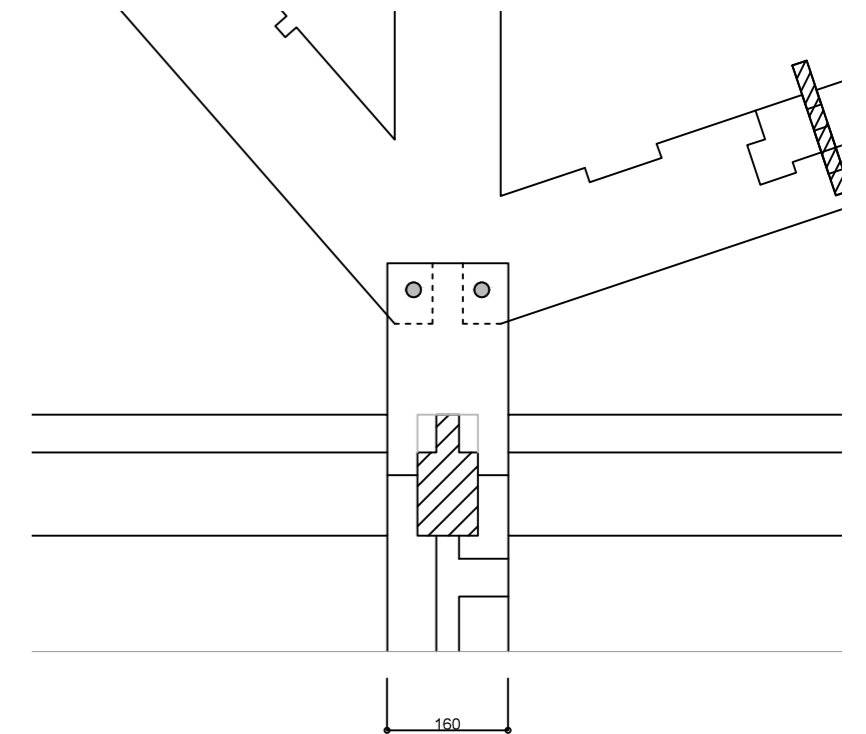
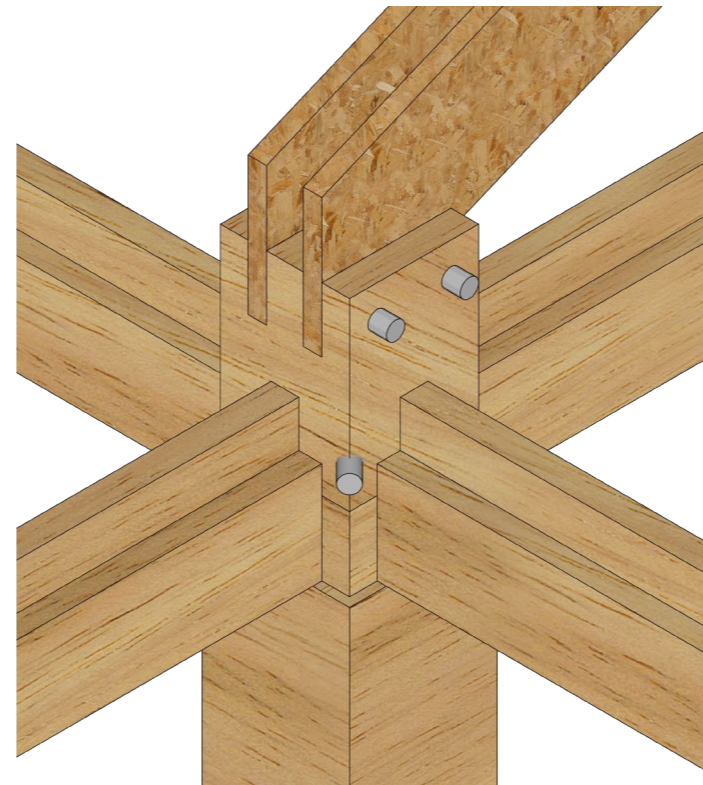
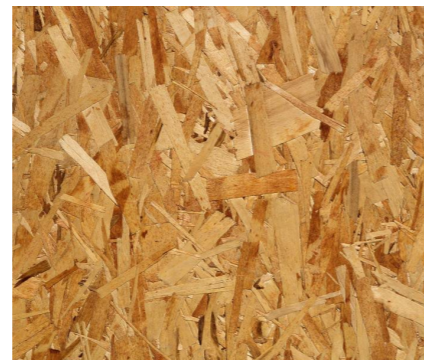
Criteria

- Easy assembly (DIY)
- Light weight
- Dismountable
- Flexible



Materials

- Sengon plywood
or
- OSB (bamboe particles)
- Steel pins



Building system

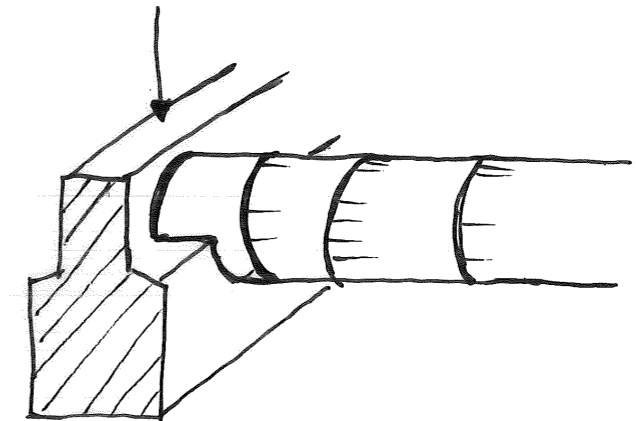
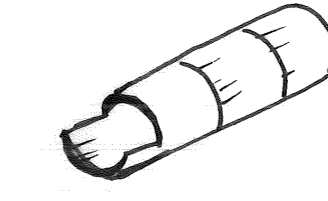
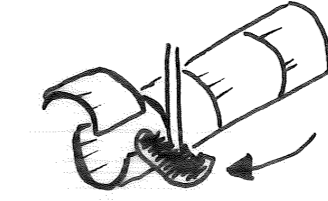
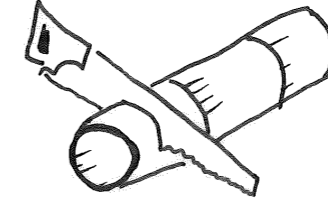
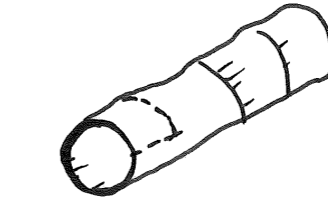
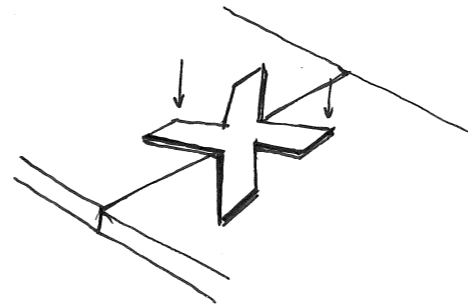
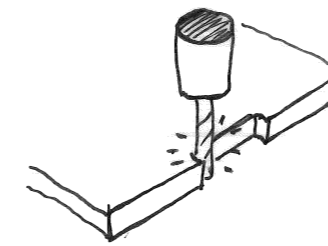
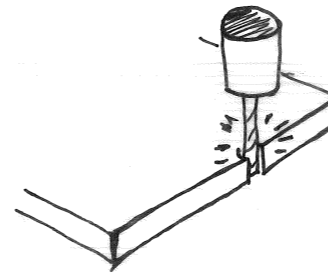
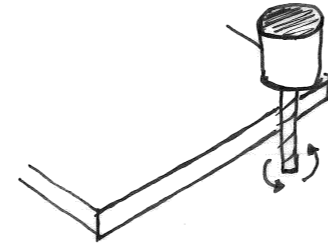
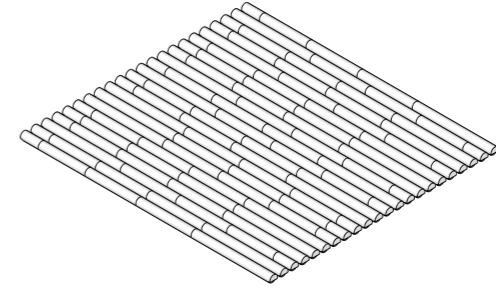
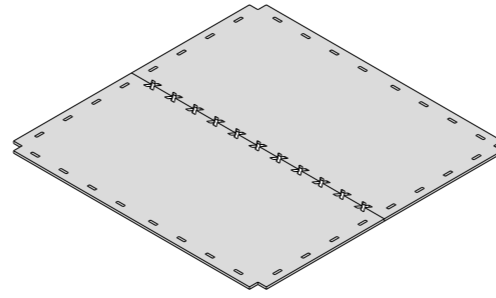
Flooring

Criteria

- Easy assembly (DIY)
- Structural properties
- Low costs
- Customizable
- Sustainable

Materials

- Bamboo rods
or
- Bamboo OSB (cheap)
or
- Bamboo Ply (expensive)
- WPC board (sanitation)



Building system

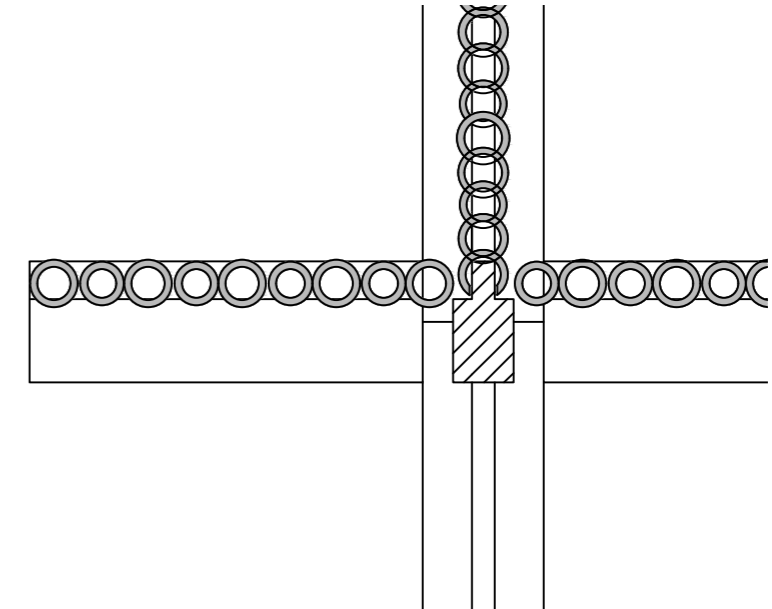
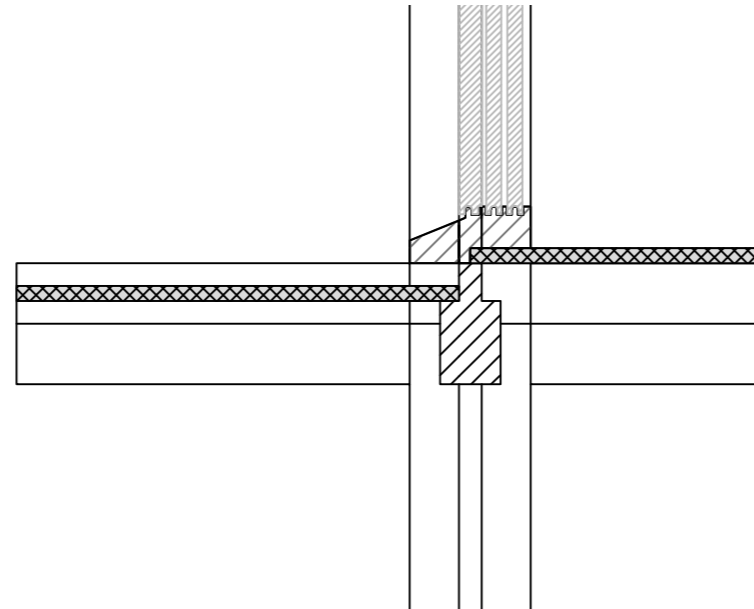
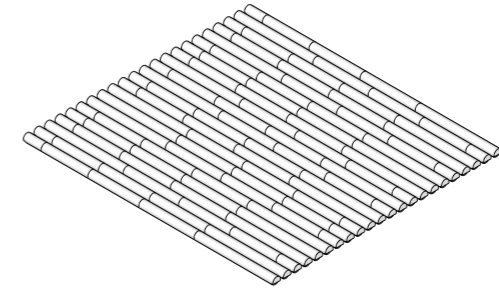
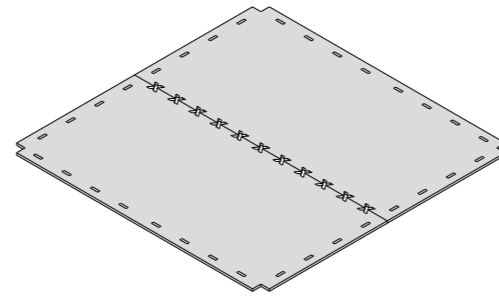
Flooring

Criteria

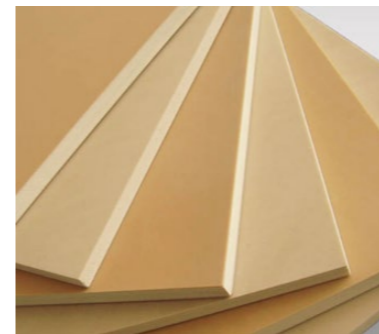
- Easy assembly (DIY)
- Structural properties
- Low costs
- Customizable
- Sustainable

Materials

- Bamboo rods
or
- Bamboo OSB (cheap)
or
- Bamboo Ply (expensive)
- WPC board (sanitation)



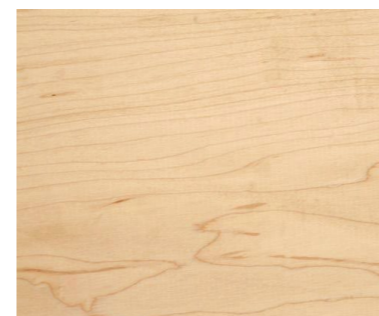
OSB



WPC



Bamboo plywood



Sengon plywood



Bamboo rods

Building system

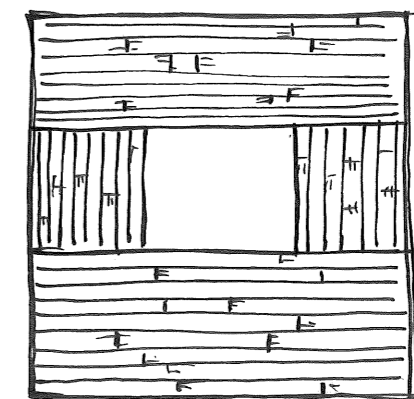
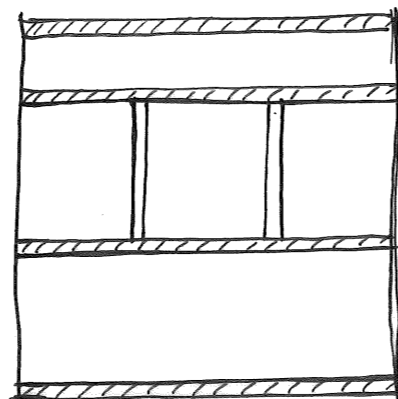
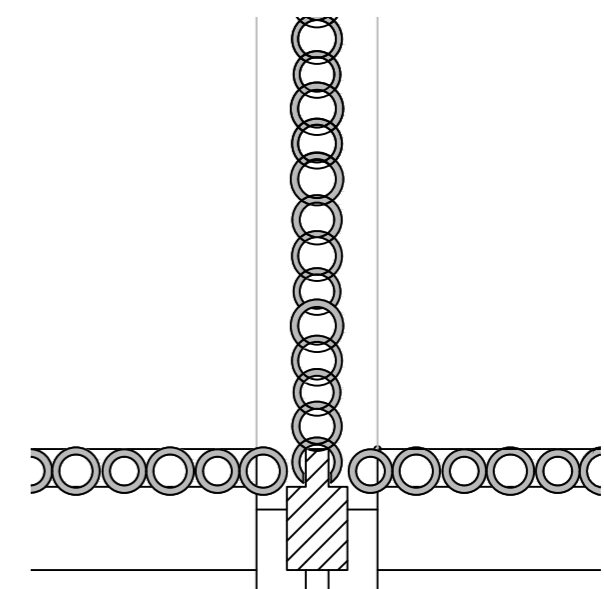
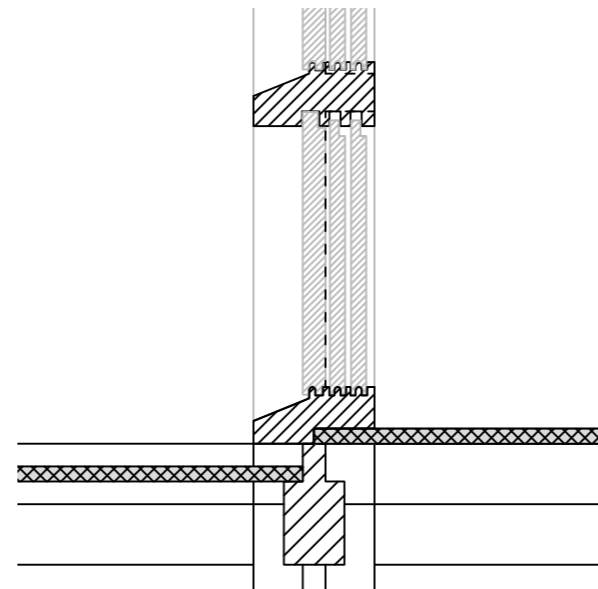
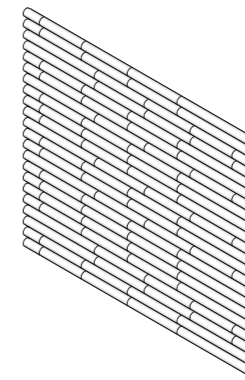
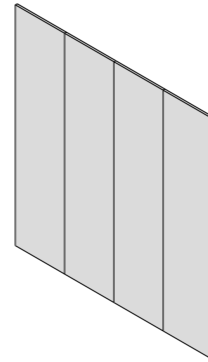
Facade

Criteria

- Easy assembly (DIY)
- Water resistance
- Low costs
- Customizable
- Sustainable
- Flexible

Materials

- Bamboo rods
or
- Bamboo OSB (cheap)
or
- Bamboo Ply (expensive)
- WPC board (sanitation)



Building system

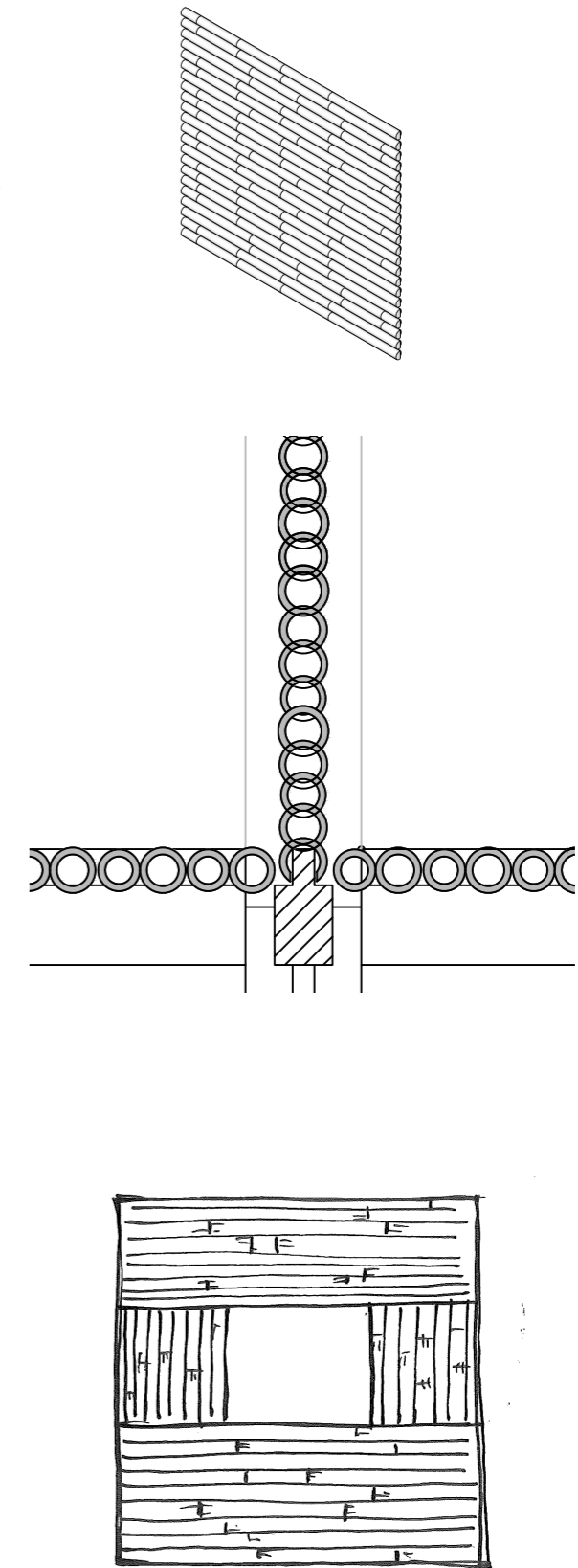
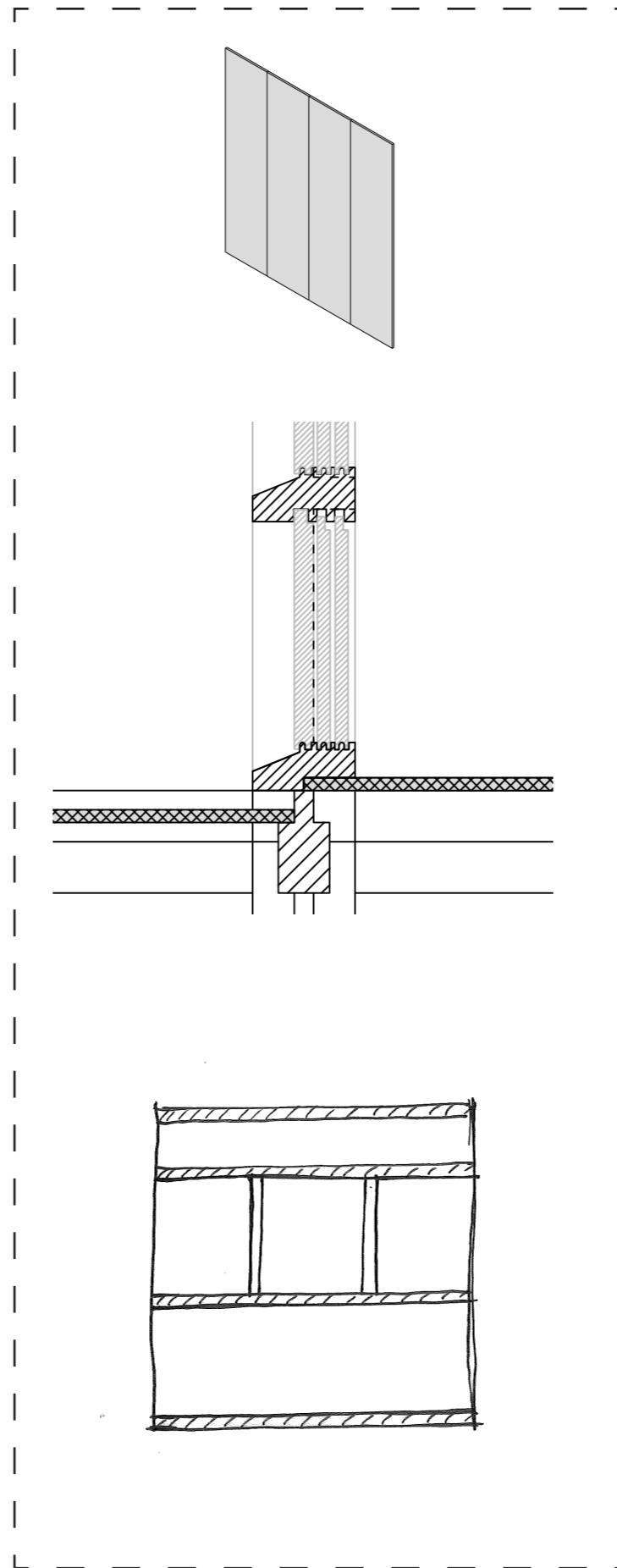
Facade

Criteria

- Easy assembly (DIY)
- Water resistance
- Low costs
- Customizable
- Sustainable
- Flexible

Materials

- Bamboo rods
or
- Bamboo OSB (cheap)
or
- Bamboo Ply (expensive)
- WPC board (sanitation)



Building system

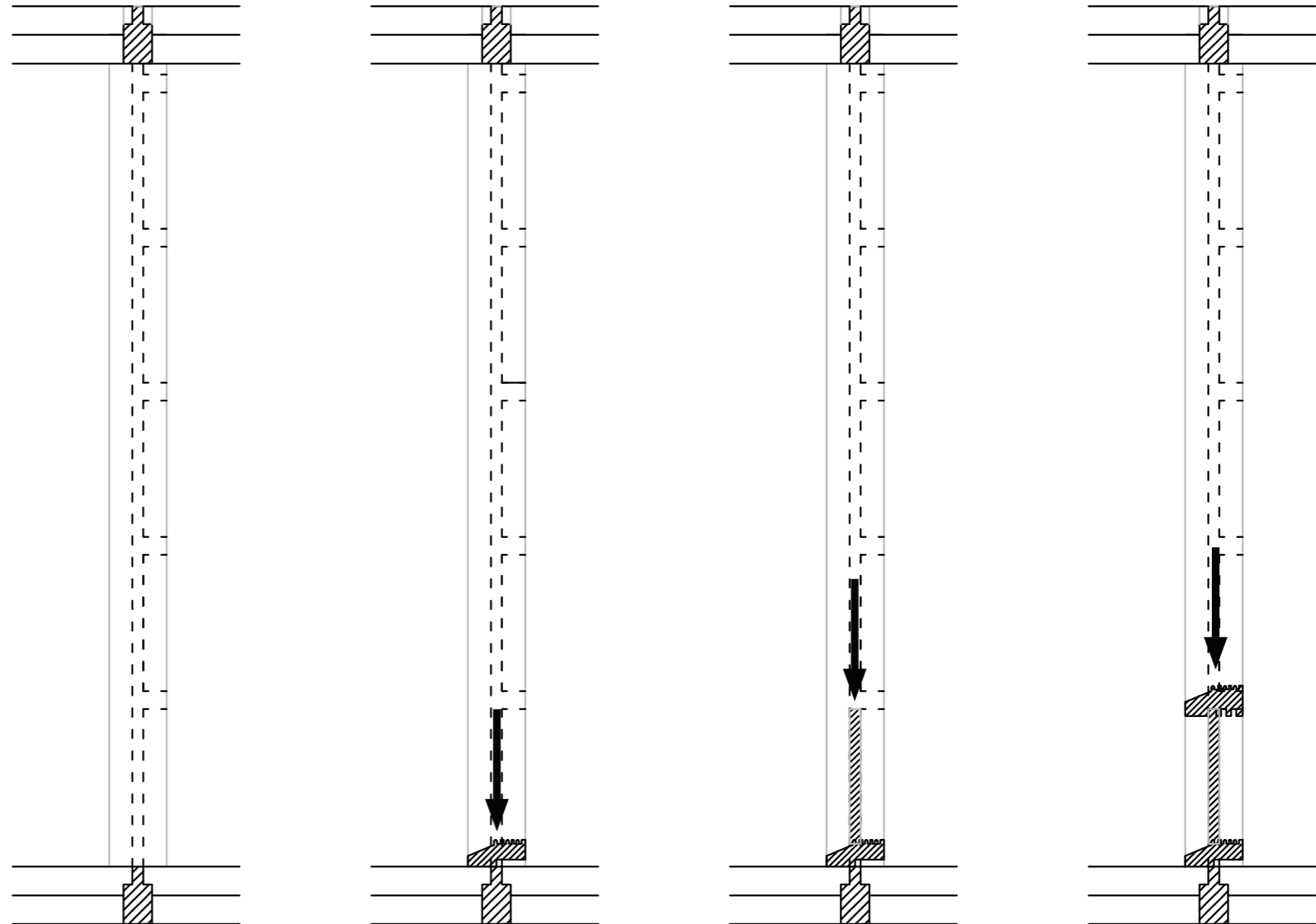
Facade

Criteria

- Easy assembly (DIY)
- Water resistance
- Low costs
- Customizable
- Sustainable
- Flexible

Materials

- Bamboo rods
or
- Bamboo OSB (cheap)
or
- Bamboo Ply (expensive)
- WPC board (sanitation)

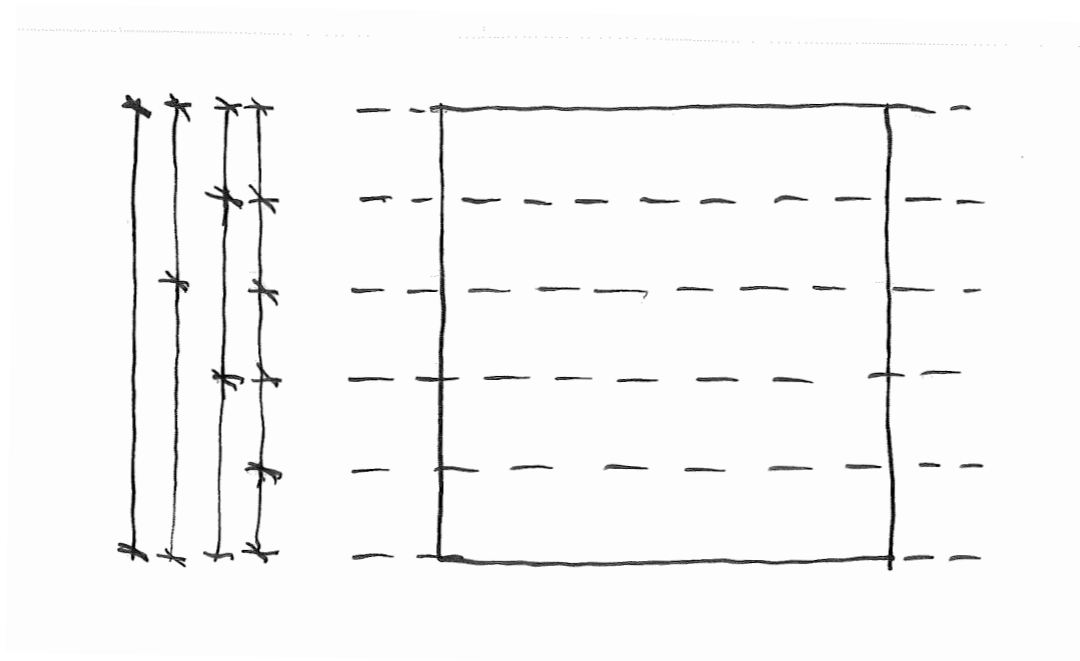


Building system

Facade

Criteria

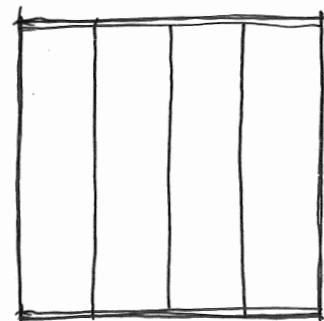
- Easy assembly (DIY)
- Water resistance
- Low costs
- Customizable
- Sustainable
- Flexible



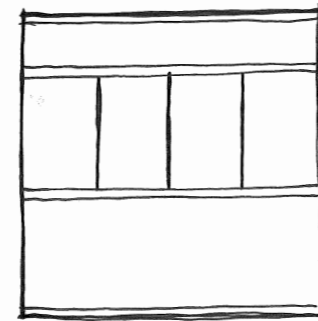
Materials

- Bamboo rods
or
- Bamboo OSB (cheap)
or
- Bamboo Ply (expensive)
- WPC board (sanitation)

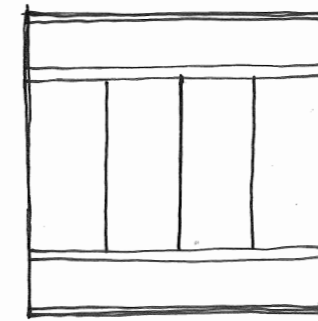
Sliding door



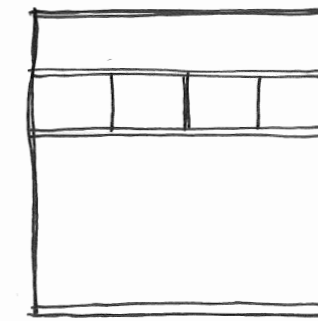
Window



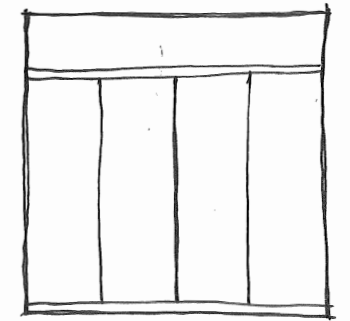
Window large



Window small



Door small



Building system

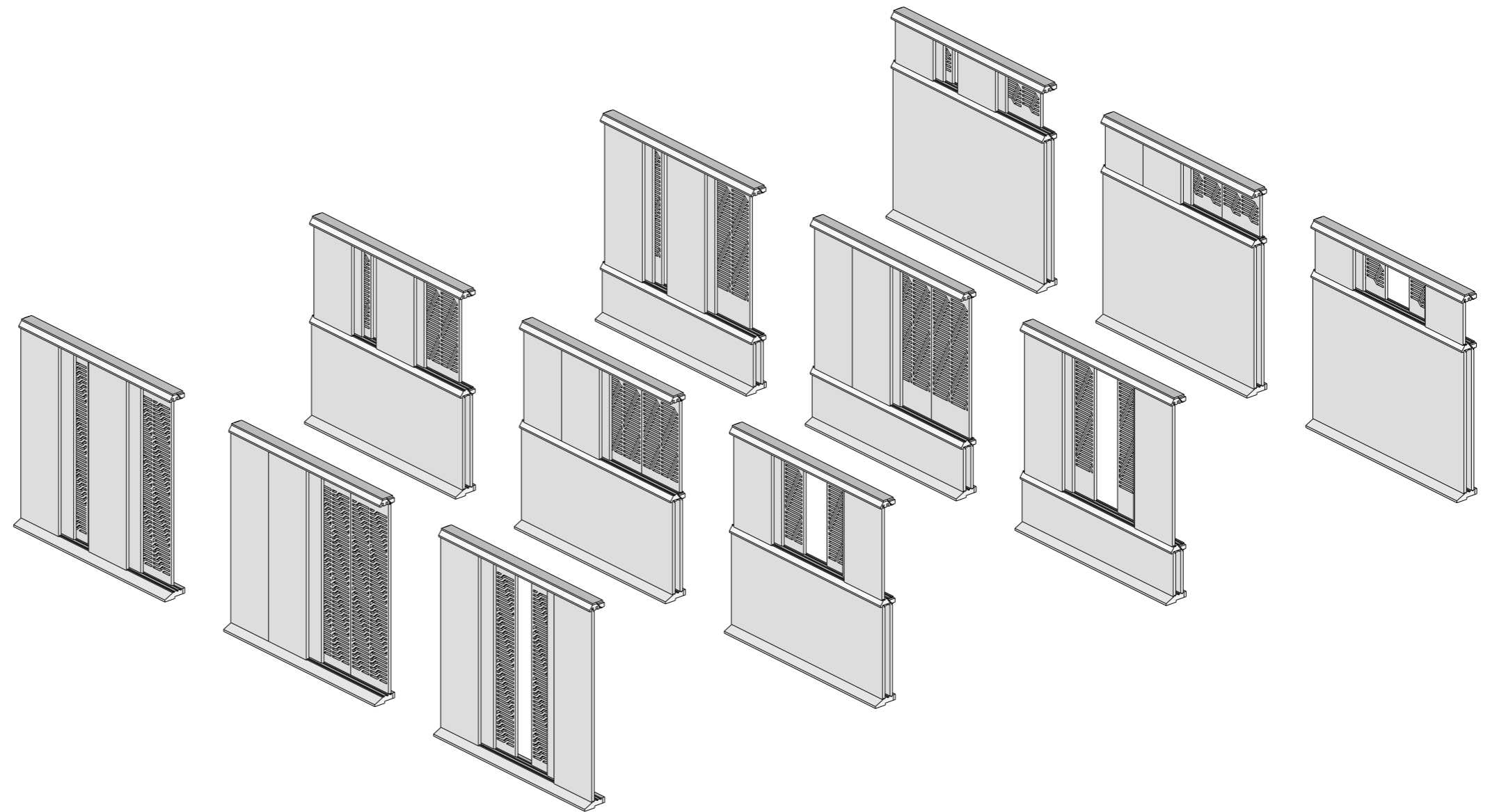
Facade

Criteria

- Easy assembly (DIY)
- Water resistance
- Low costs
- Customizable
- Sustainable
- Flexible

Materials

- Bamboo rods
or
- Bamboo OSB (cheap)
or
- Bamboo Ply (expensive)
- WPC board (sanitation)



Building system

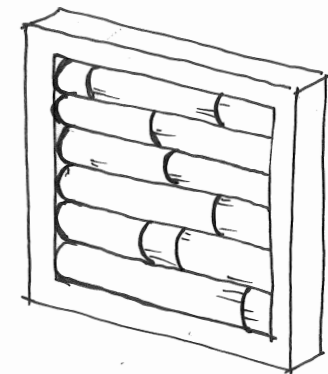
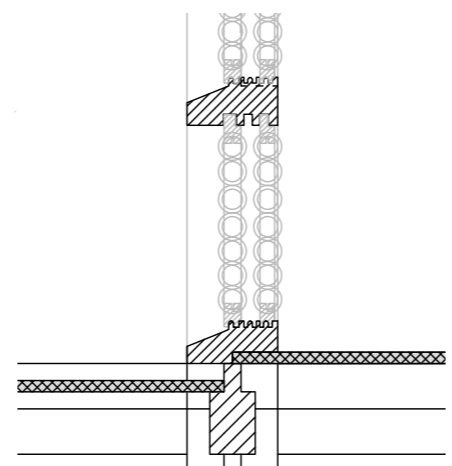
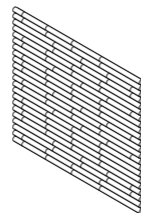
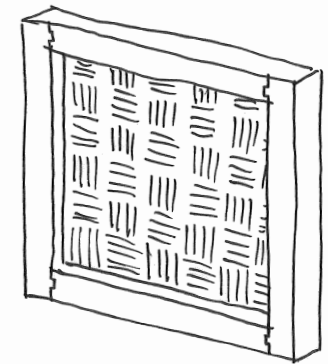
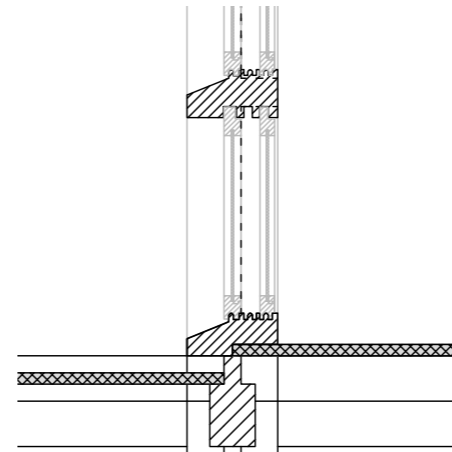
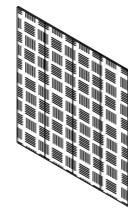
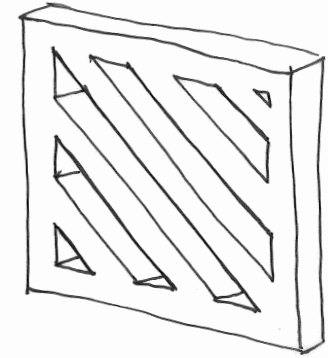
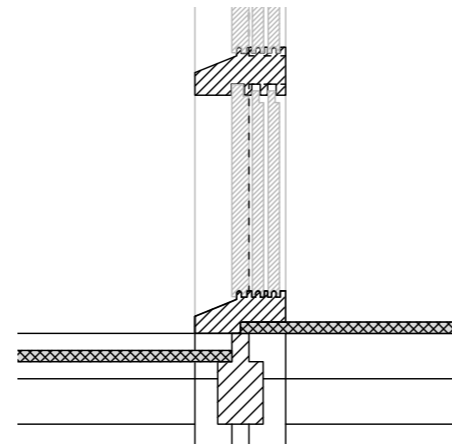
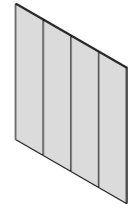
Facade

Criteria

- Easy assembly (DIY)
- Water resistance
- Low costs
- Customizable
- Sustainable
- Flexible

Materials

- Bamboo rods
or
- Bamboo OSB (cheap)
or
- Bamboo Ply (expensive)
- WPC board (sanitation)



Building system

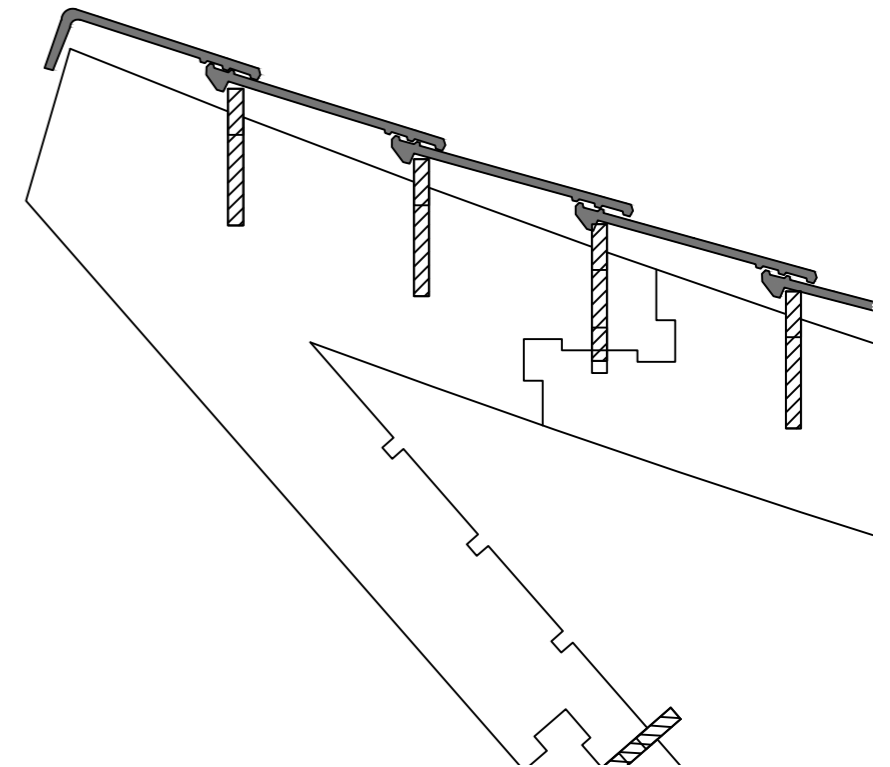
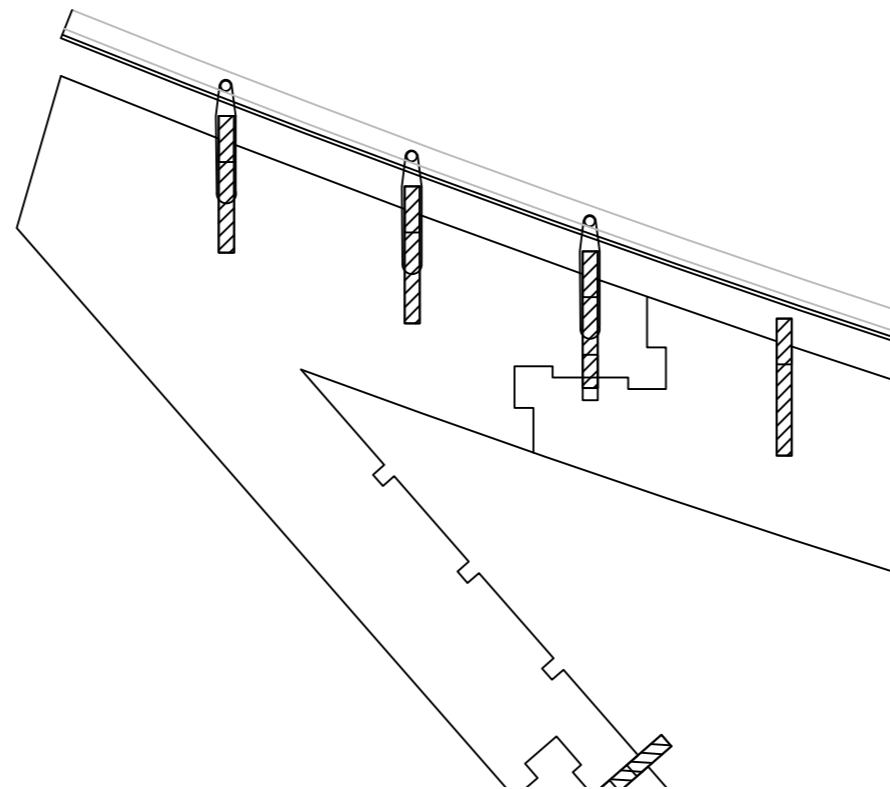
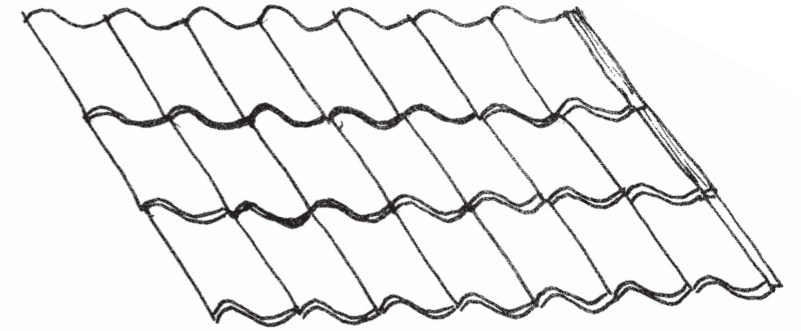
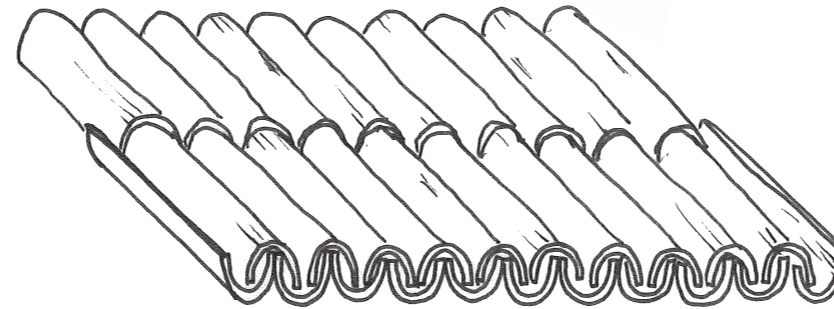
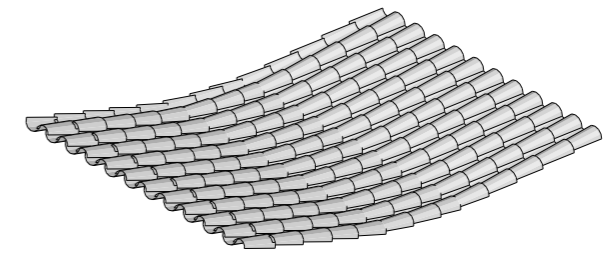
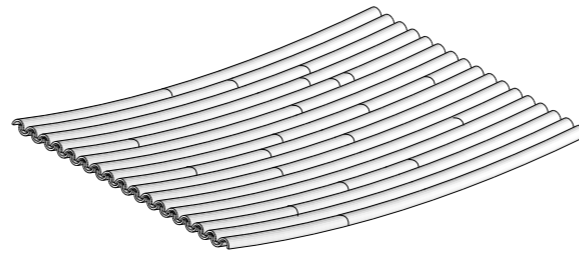
Roof

Criteria

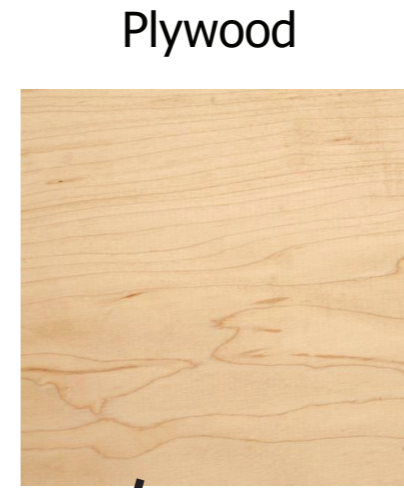
- Easy assembly (DIY)
- Water resistance
- Low costs
- Re-use
- Sustainable
- Flexible

Materials

- Bamboo rods
or
- Roof tiles



Design Facades





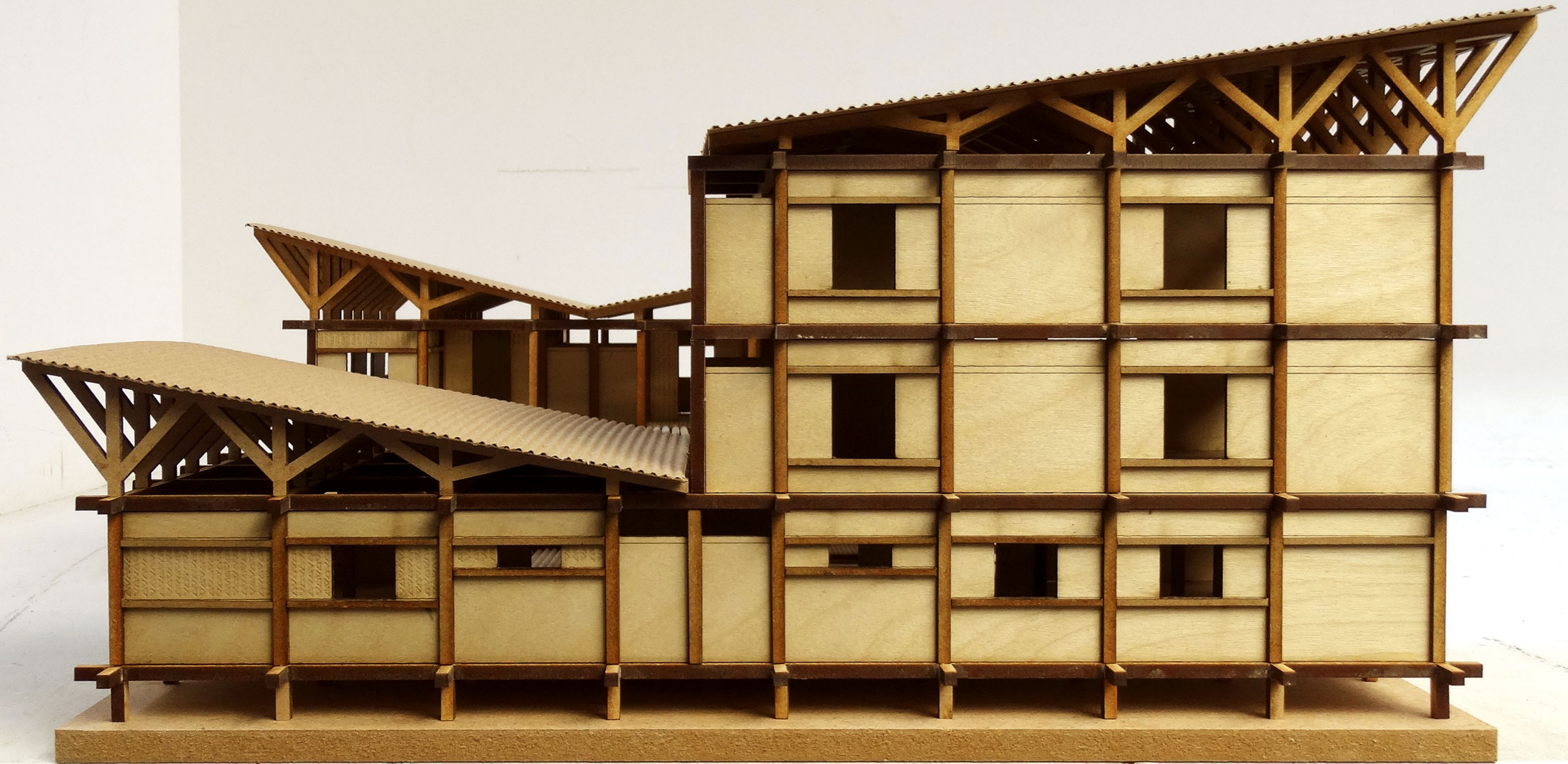








Design Facades



Design Facades



