

# Comfortably Rising:

A Modular Multi-Floor Residential Units Applying  
Passive Climate Strategies in Kampung  
Cigondewah, Bandung

P4 Presentation

AE Graduation Studio 2016-2017  
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Research Tutor: Carolin Bellstedt

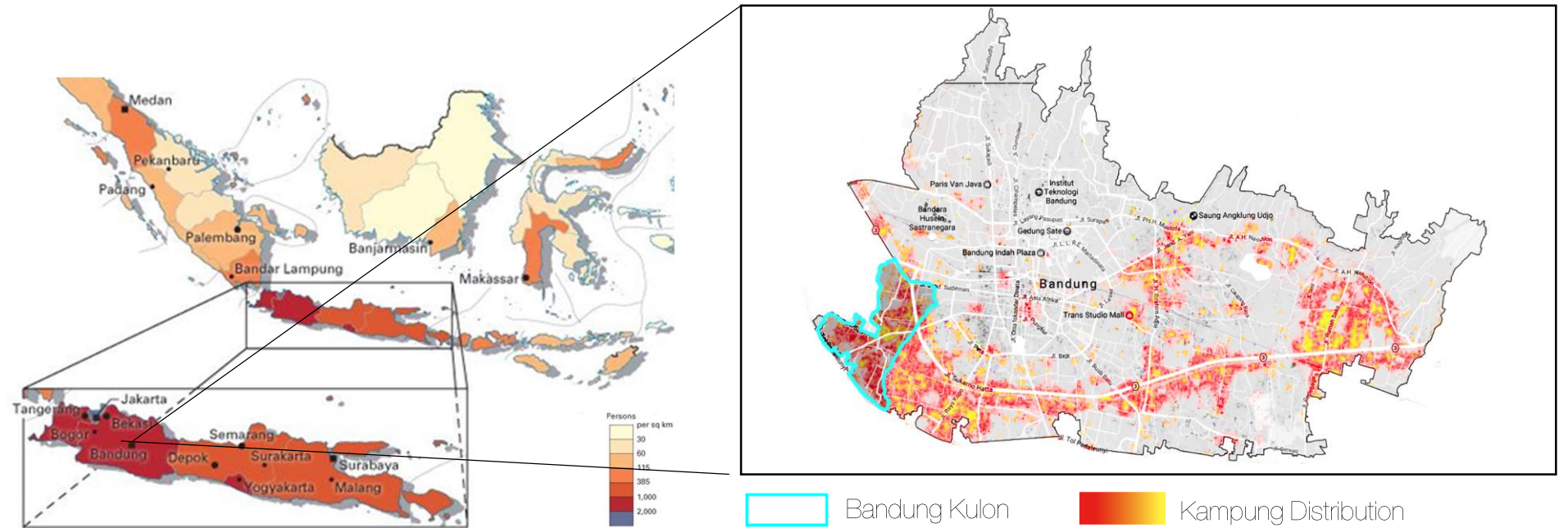


# Problem Statements and Solution

# 1. Growing Density of Population and the Built Environment



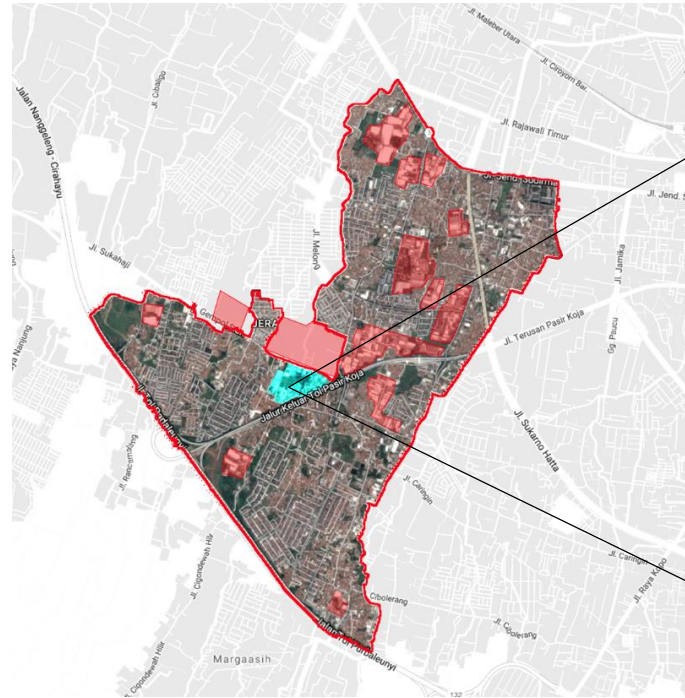
# Density of Population and the built environment



Indonesia population density distribution

Urban Kampung distribution in Bandung and Bandung Kulon (own drawing)

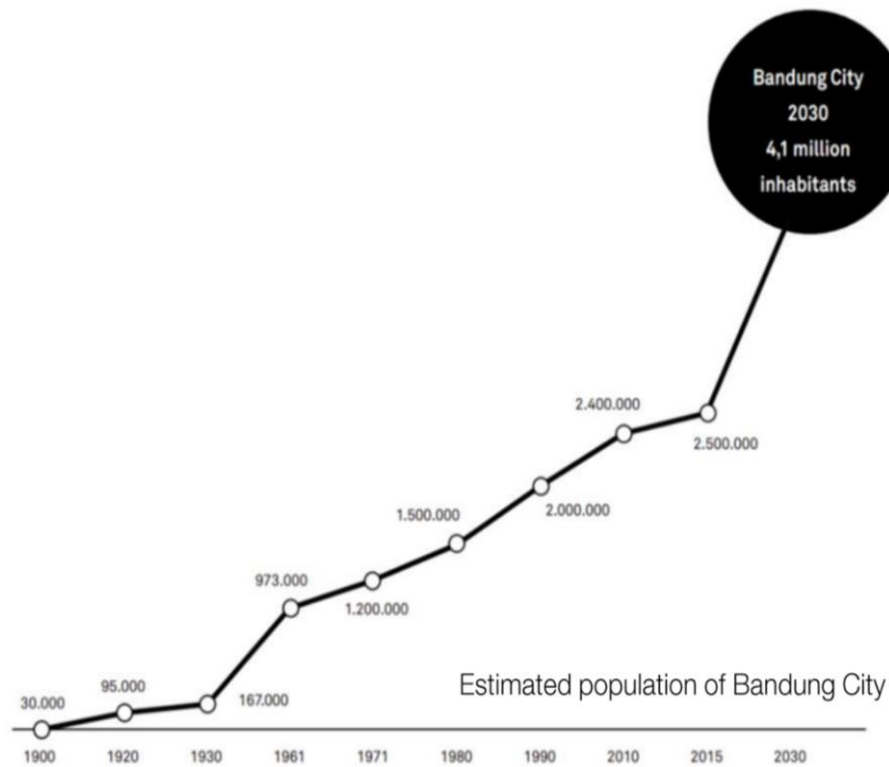
15,173 pp/ km<sup>2</sup>



 Cigondewah  Factories

Bandung Kulon And its(own drawing)

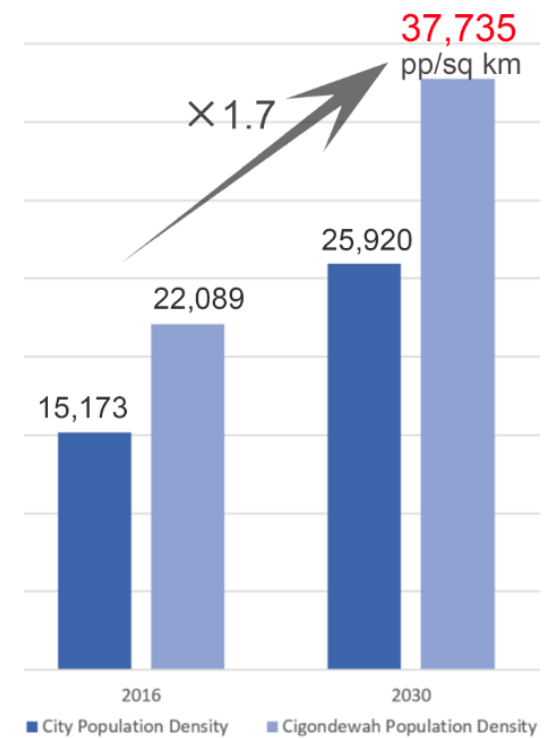
22,089 pp/ km<sup>2</sup>



+70%

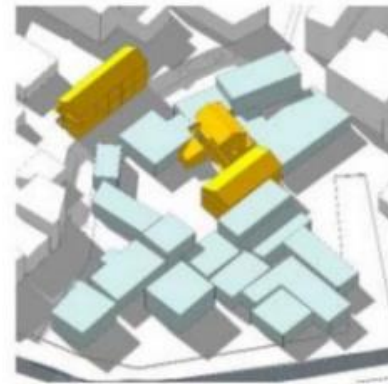


Population Density in the future





## Solution 1: Vertical development: Multi-floor Collective Housing



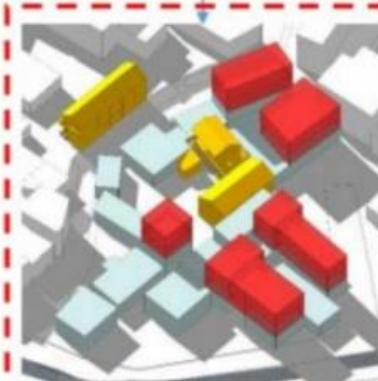
Current Situation 2016

Total Area:  
**1141.55 m<sup>2</sup>**



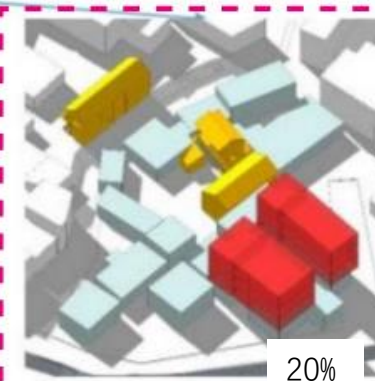
70% building areas  
rising 1 floor

**800 m<sup>2</sup>**



35% buildings areas  
rising 2 floors

**400 m<sup>2</sup>**



35% buildings areas  
rising 3 floors

**266 m<sup>2</sup>**

20%

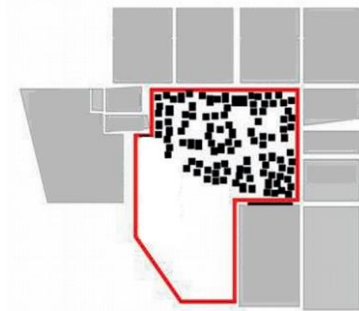
## 2. Uncontrolled Development of informal settlements



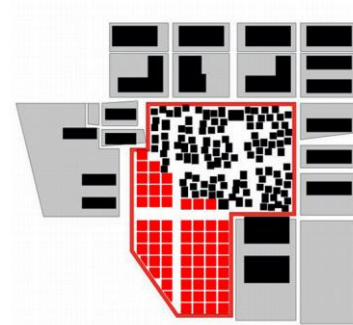




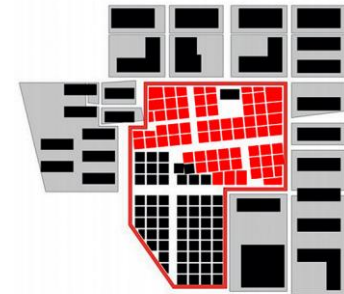
1980s



1990s



2000s



Densify process of Shenzhen Urban villages  
(Own drawings, 2016)

### 3. Poor Interior Living Condition



## Solution 2: Application of Passive Climate Strategies



Solar

### Challenge

High Solar Radiant with High Solar Altitude during the day



Temperature & Humidity

Moderate Temperature, yet with High Humidity



Wind

Low wind speed; Prevalent Wind Direction inconsistent with Best Solar shading Direction;



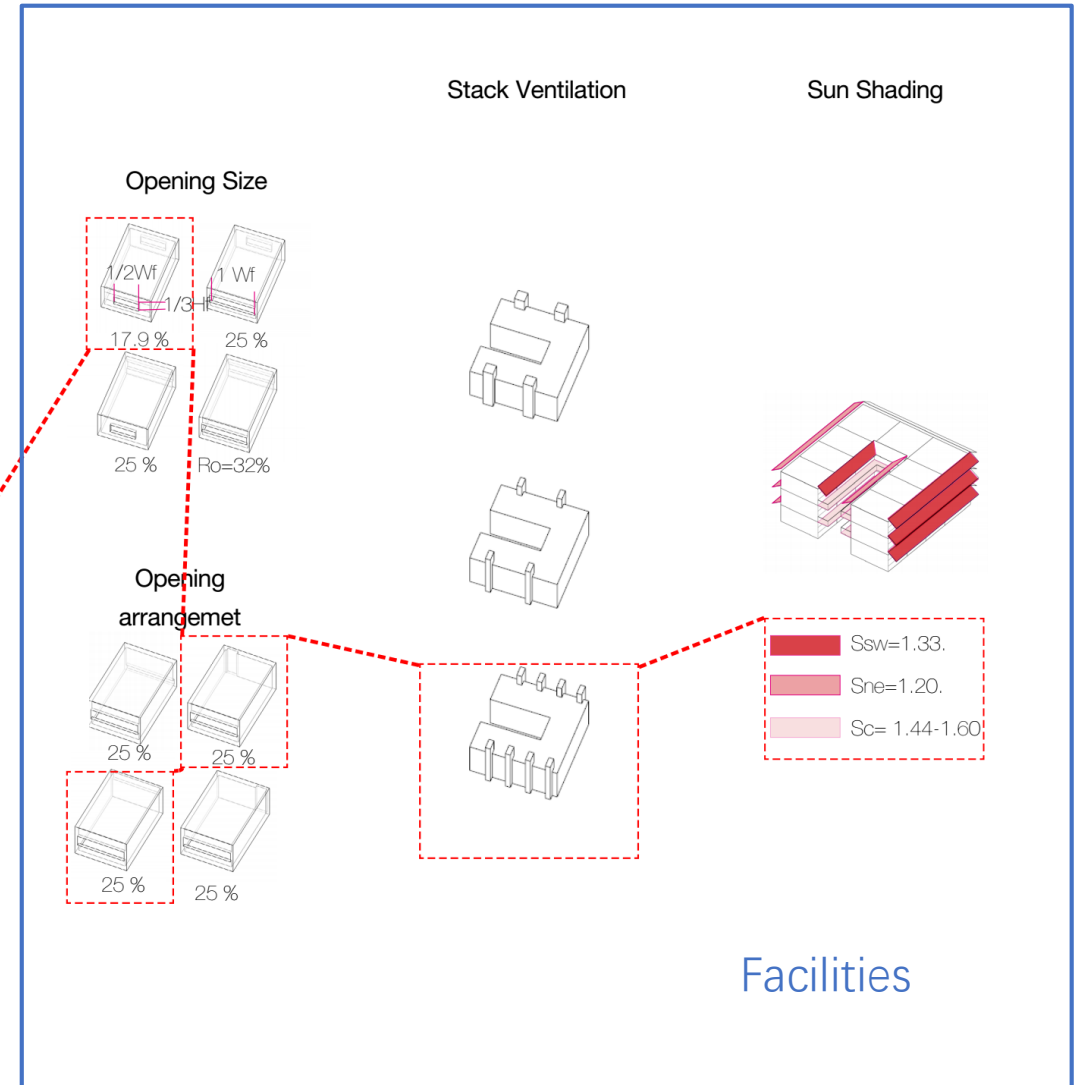
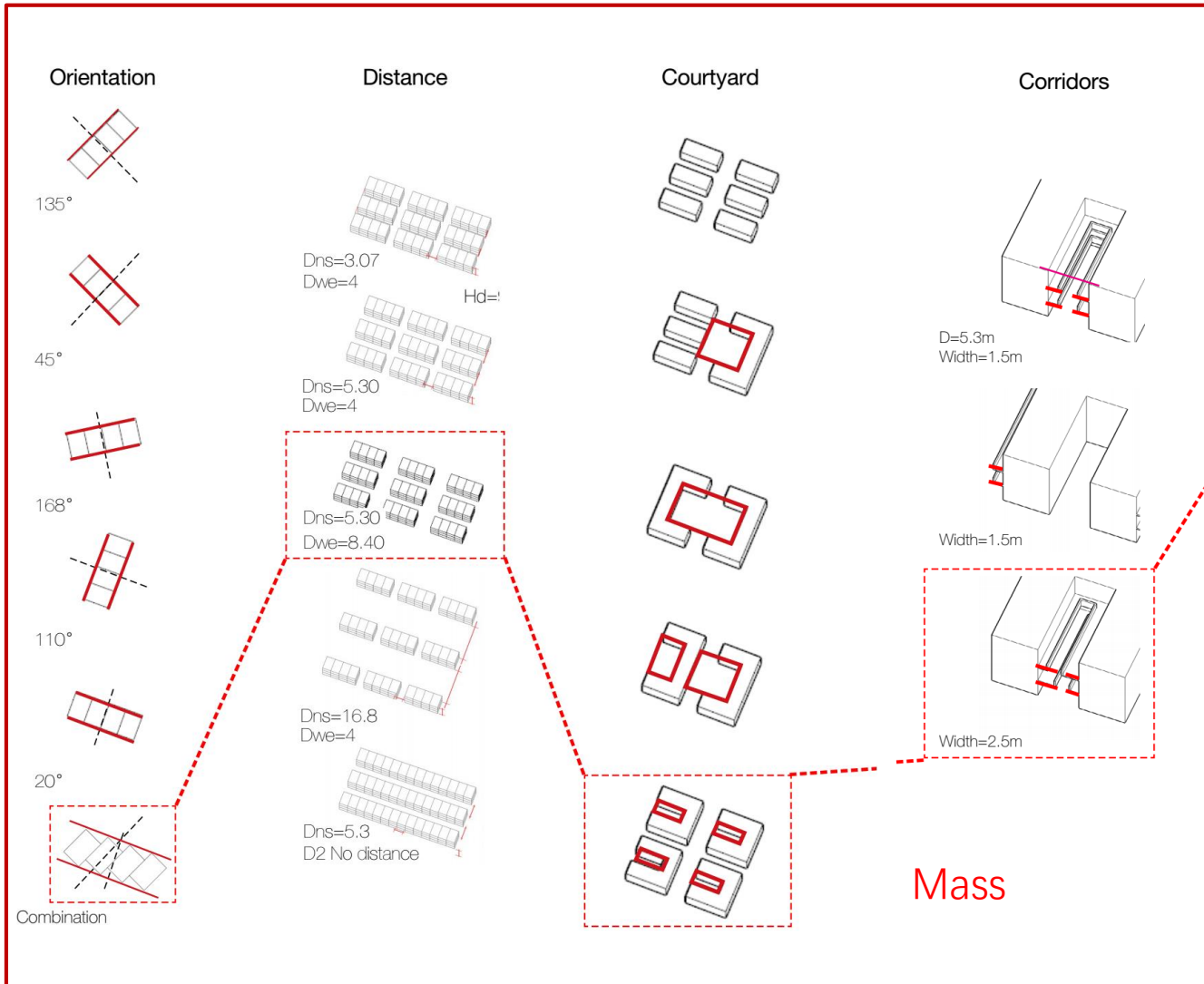
Shading

+



Ventilation

# Climate Solution – Control Mass and Facilities



## 4. Kumpung Communal Space and Daily Life

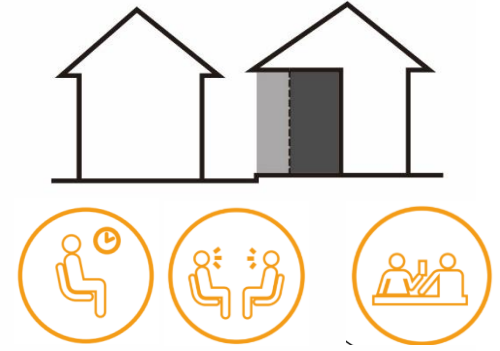




1. Under the Eave



3. Mixture with Interior



2. Mixture with lanes

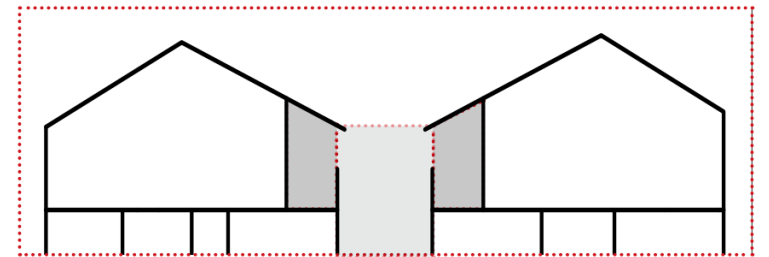


4. On the edge of large open space



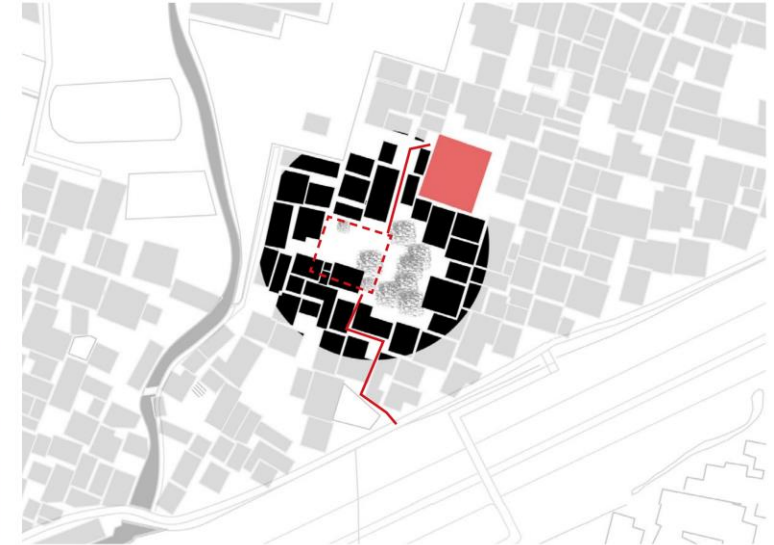


**Solution 3:** Project the kampung communal space into the new housing structure





**Solution 4:** Insert a **Public Space** within the Kumpung tissue for Market and Communication;





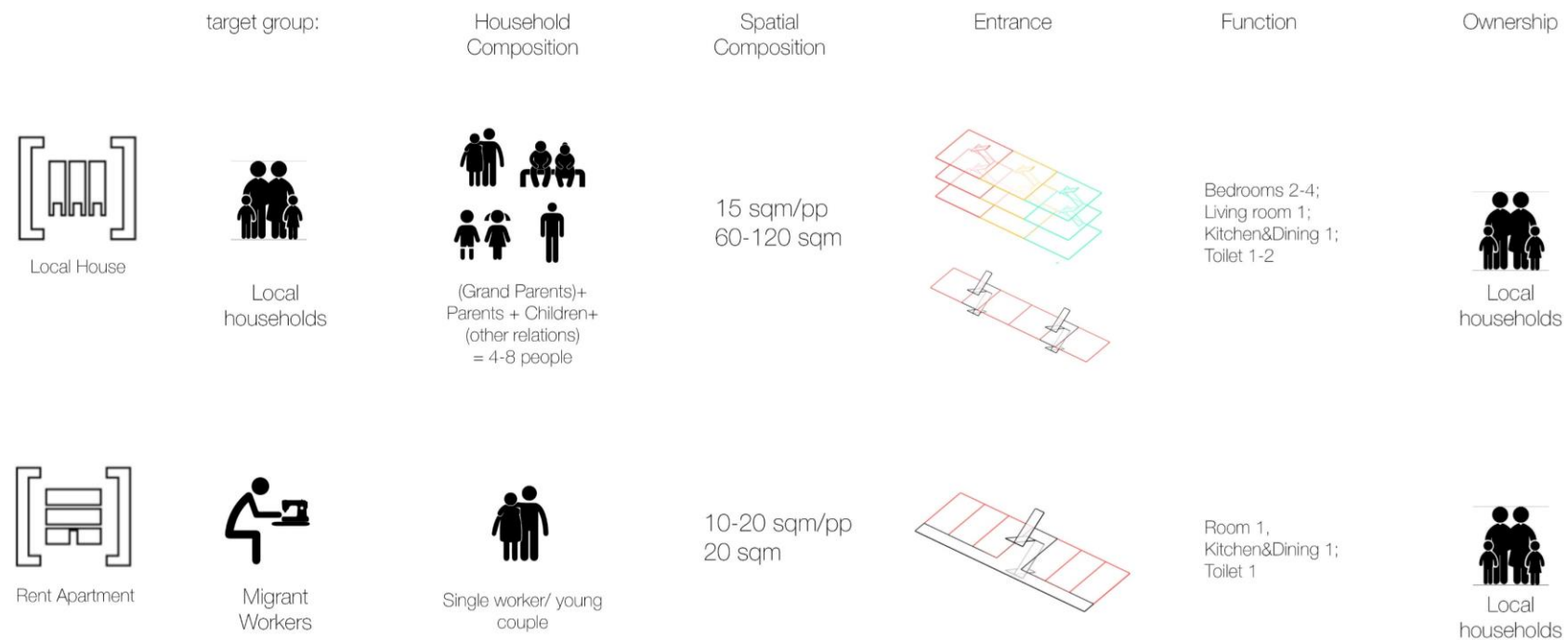


**5. Different Demands:  
Local Residents and Migrant Workers**

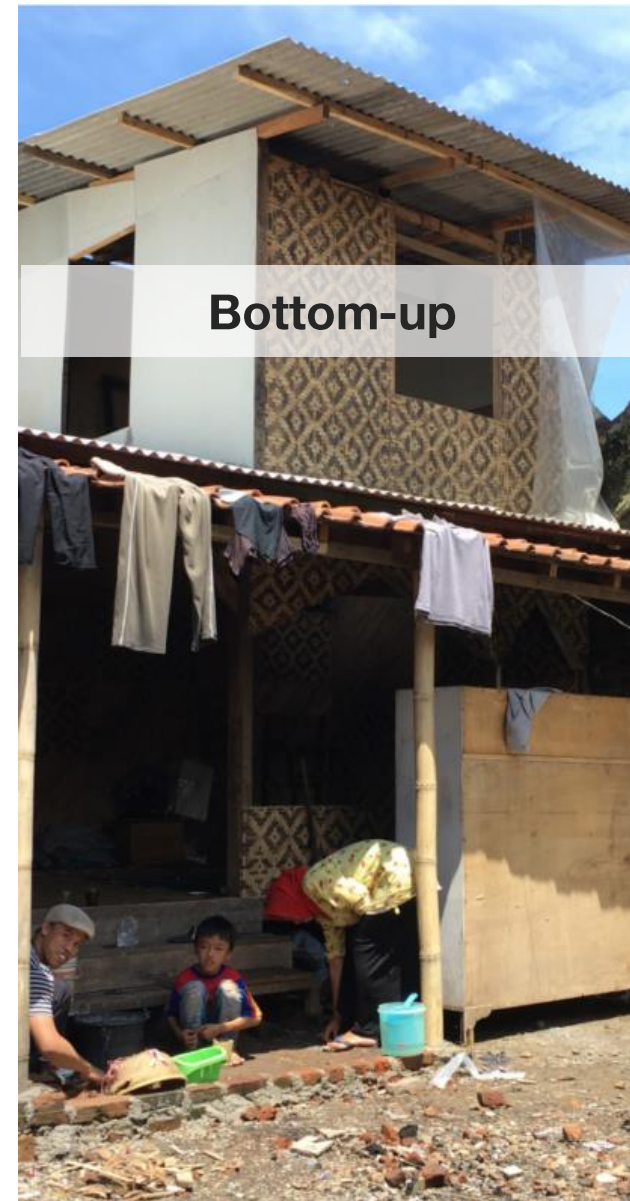
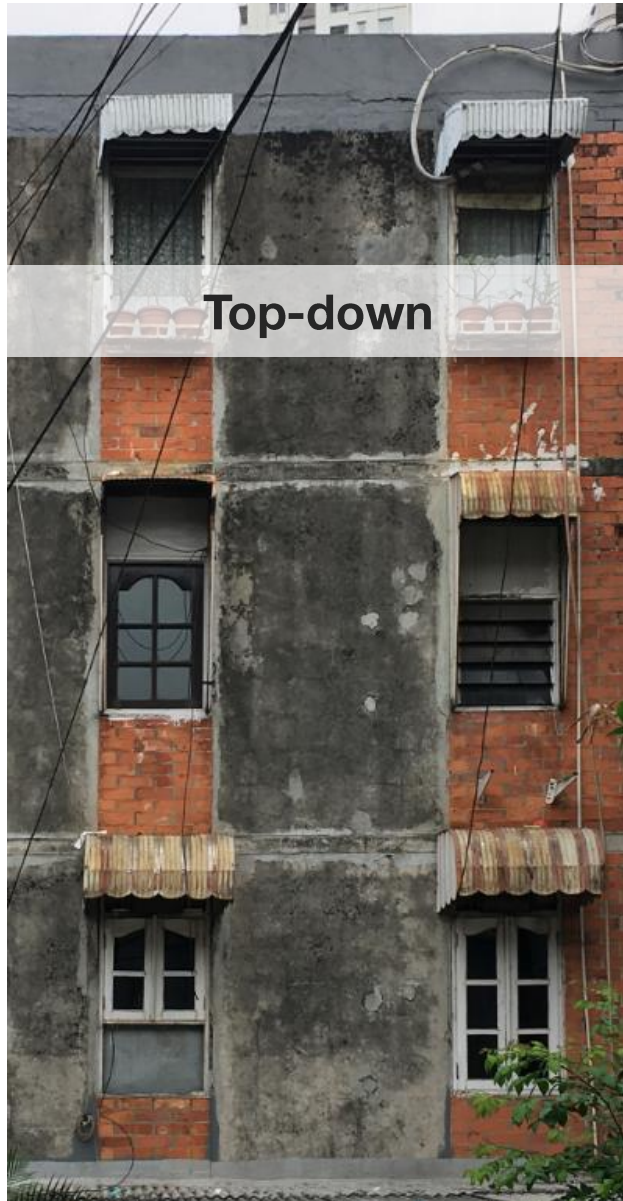




## Solution 5: Different Housing type for Different Target group

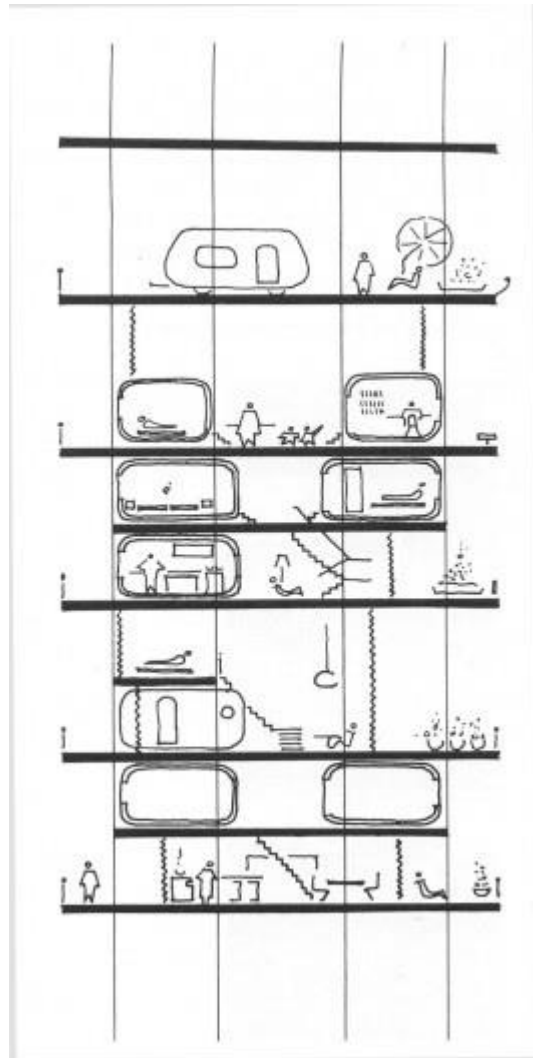


## 6. Balance between Top-down and Bottom-up approaches





## Solution 6: Open architecture: the support-infill system



Support- Infill system  
by J. Habraken



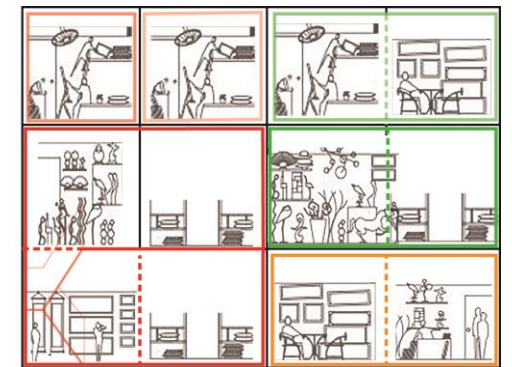
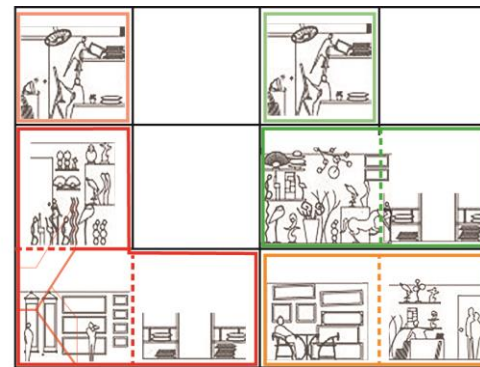
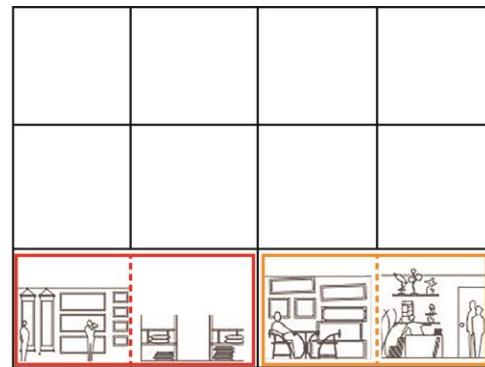
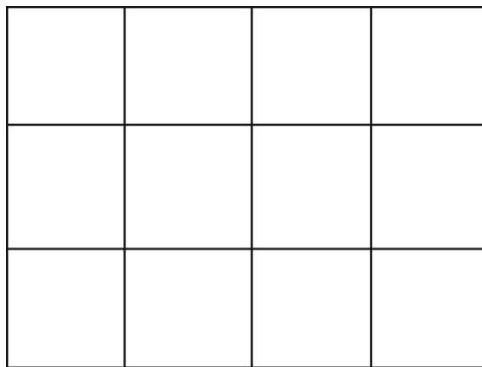
Open architecture in Japan

# Concept of The Mold

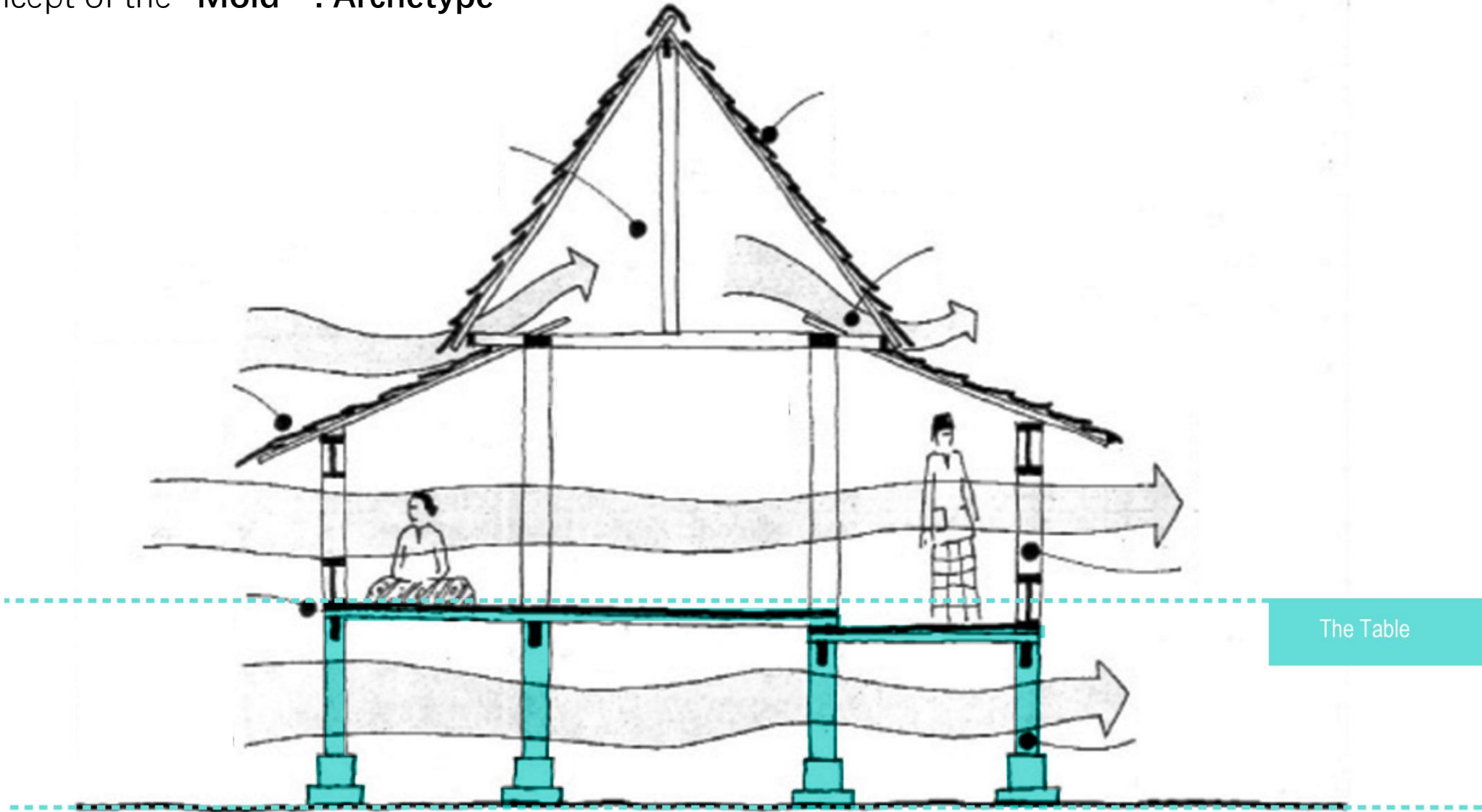


## The concept of the "Mold"

1. Incrementality: growing within the frame
2. Limitation: give the maximum scale for the whole
3. Modularity: Achieve Support-infill system

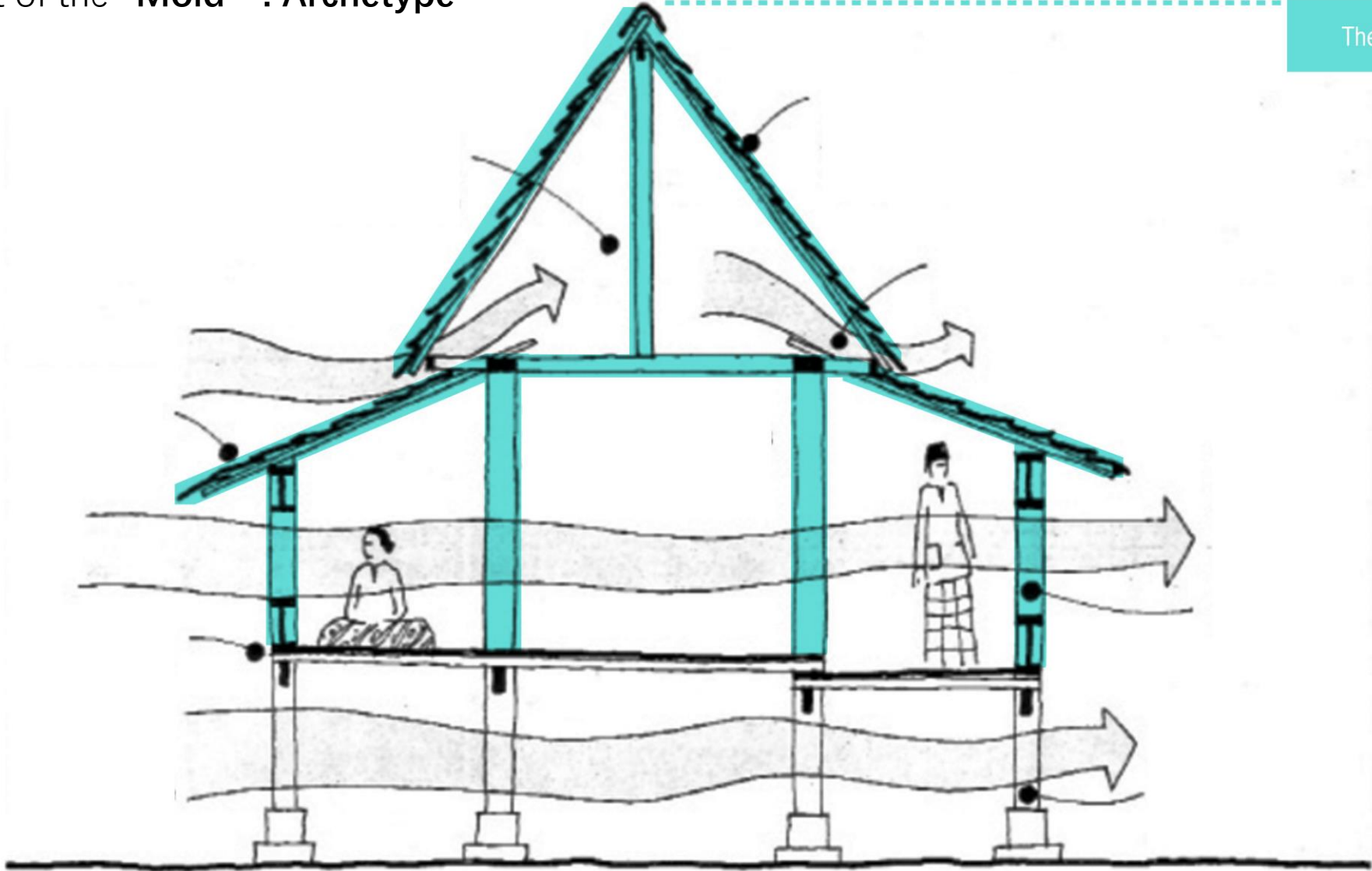


# The concept of the "Mold ": Archetype



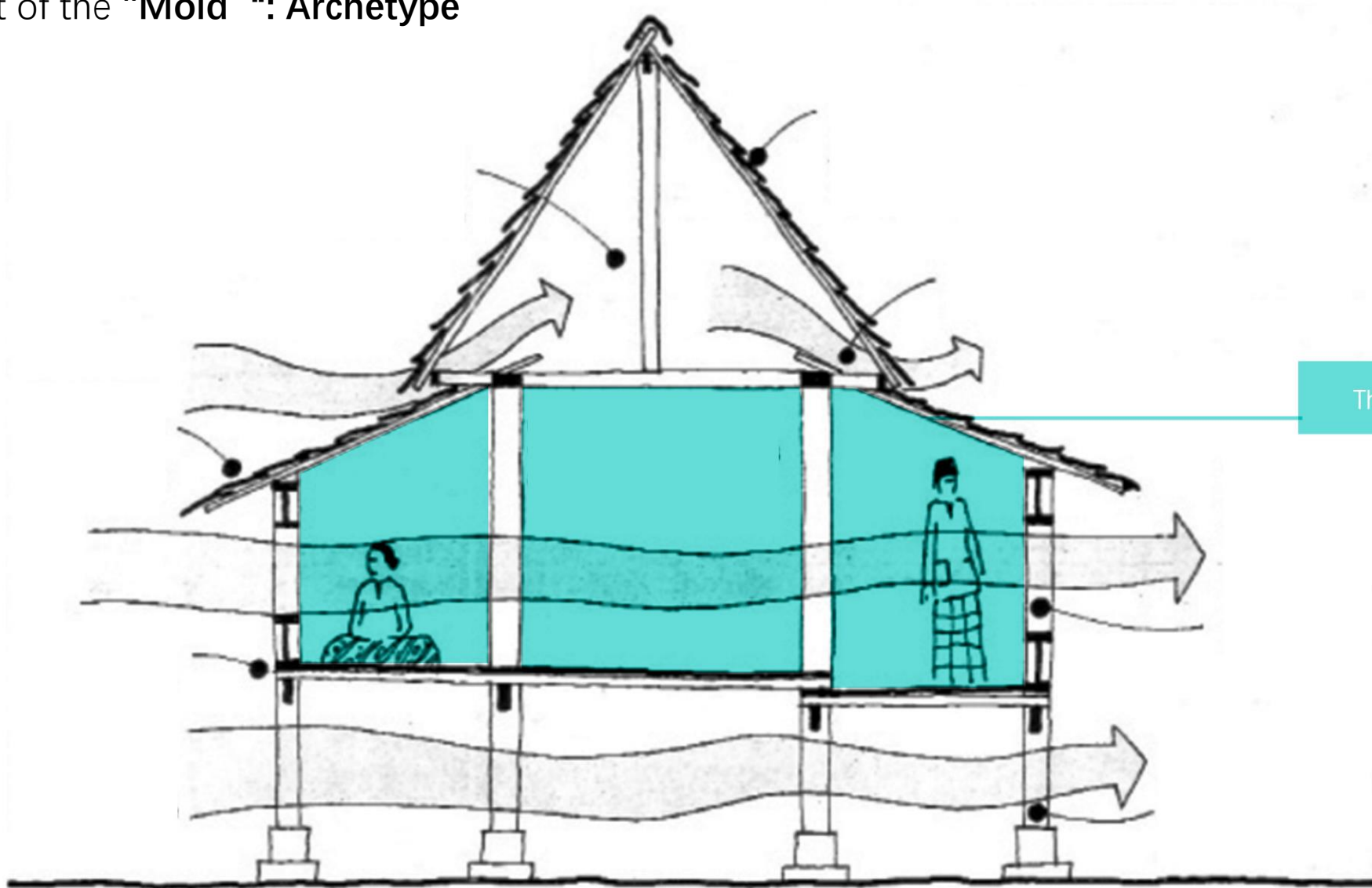
# The concept of the "Mold ": Archetype

The Frame

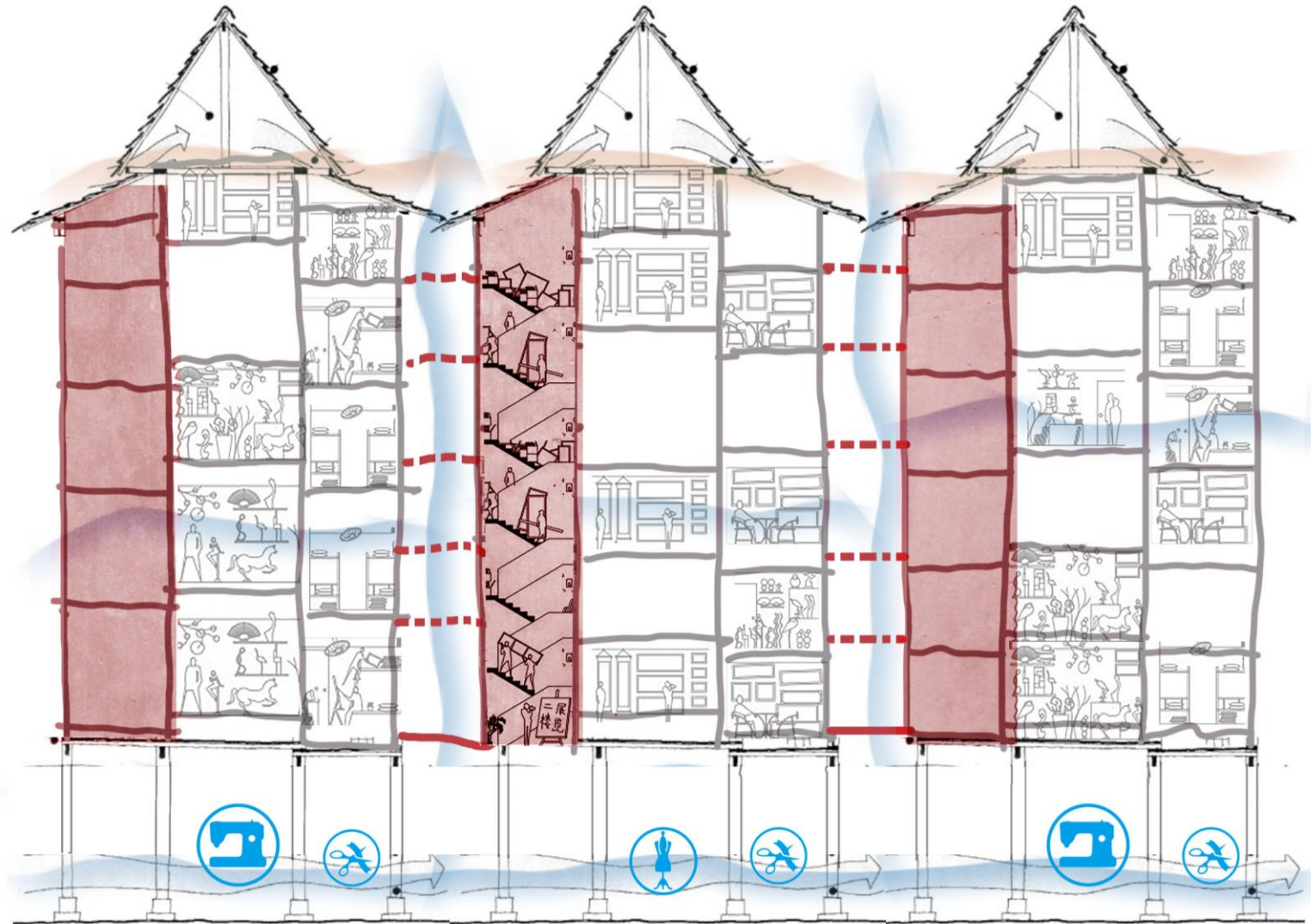




# The concept of the "Mold ": Archetype



# The concept of the "Mold": Archetype



## Passive Climate Strategies



Shading

+

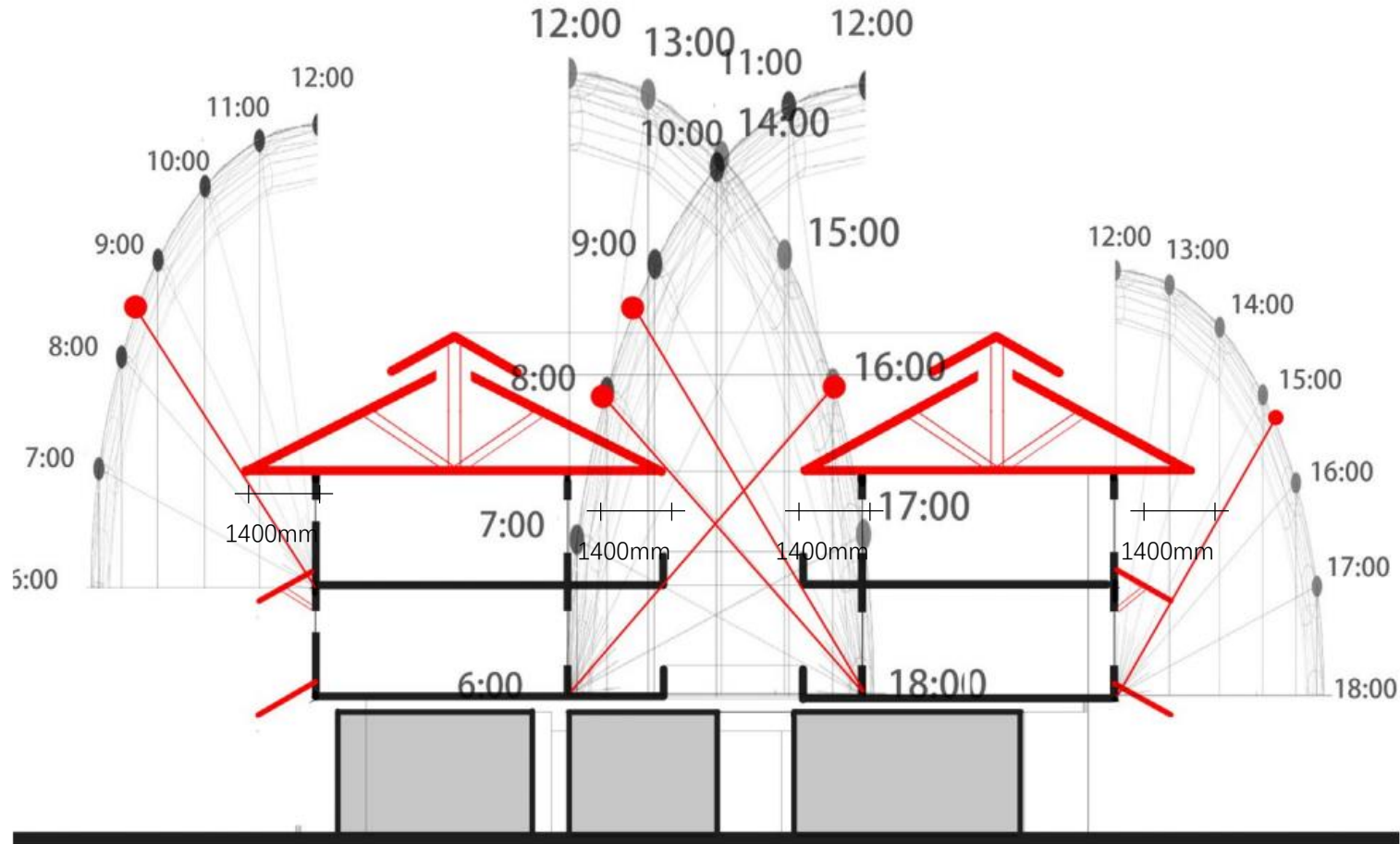


Ventilation

# Climate Solution

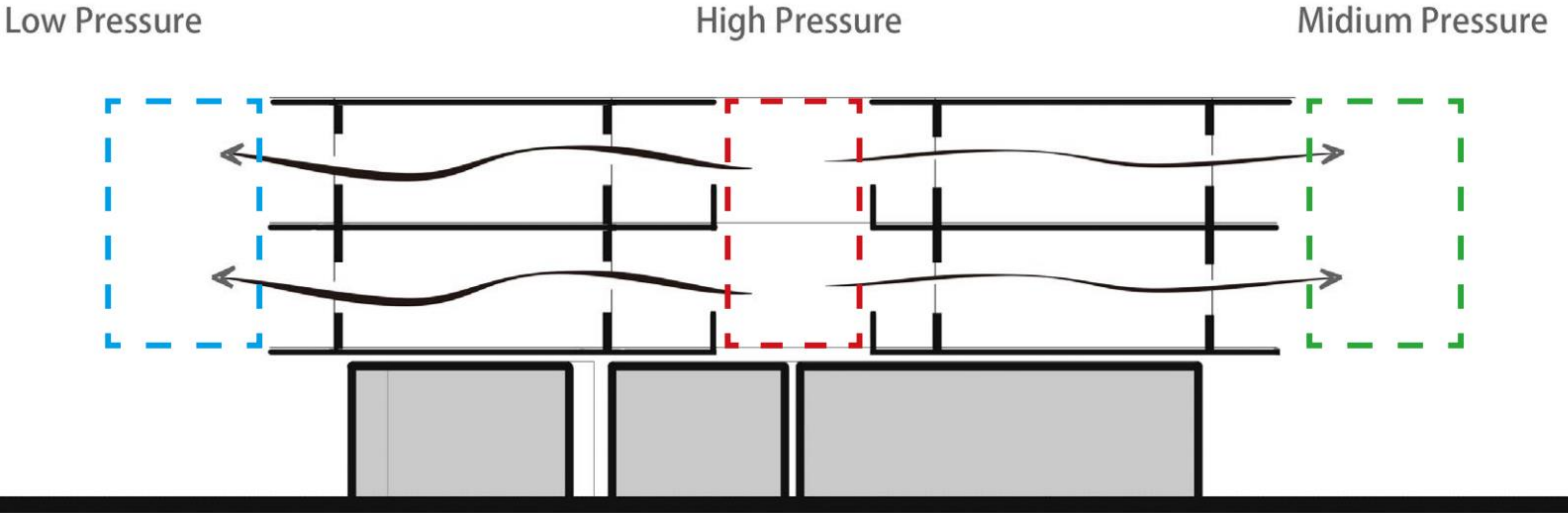
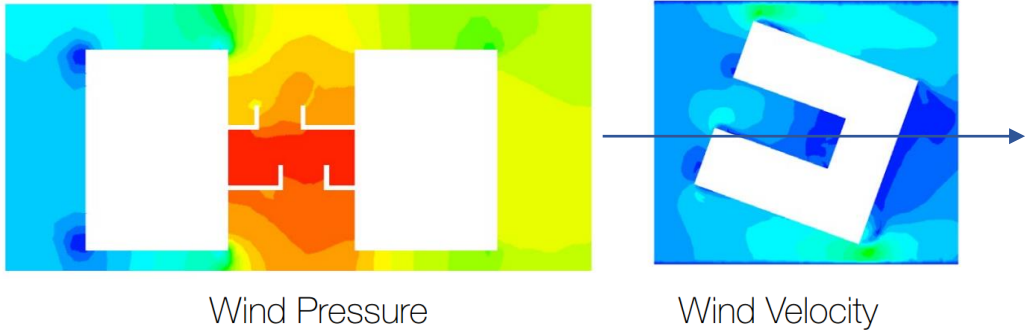


Shading



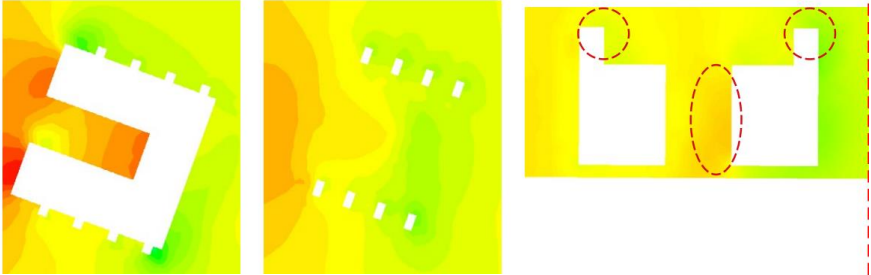
1. Orientation and Horizontal Shading Components

Climate Solution



2. Open Courtyard

# Climate Solution



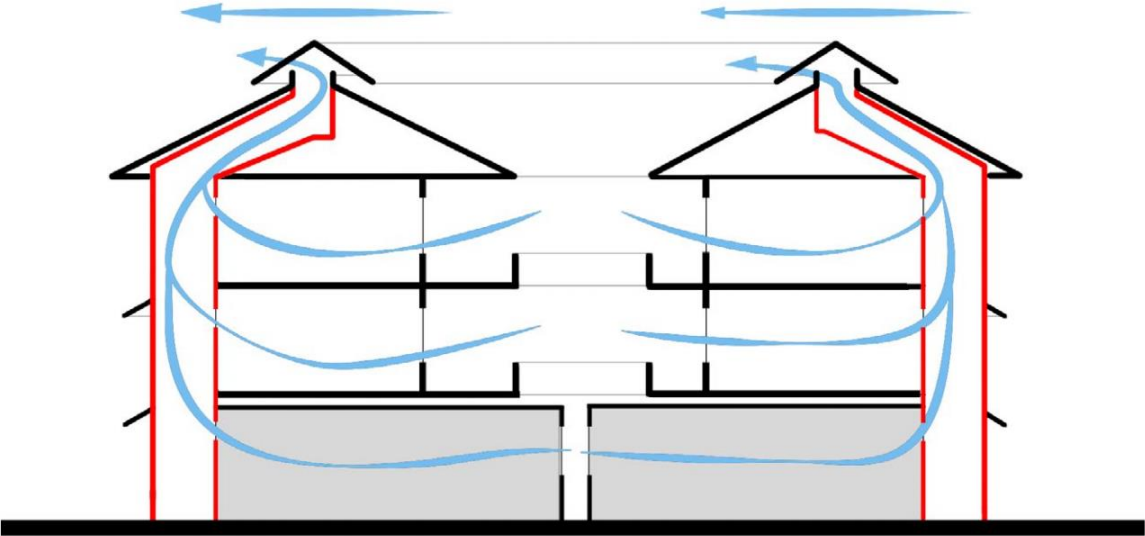
Wind pressure  
1.5m

Wind pressure  
11m

Wind pressure  
Section



Stack Ventilation



3. Stack- ventilation Chimney

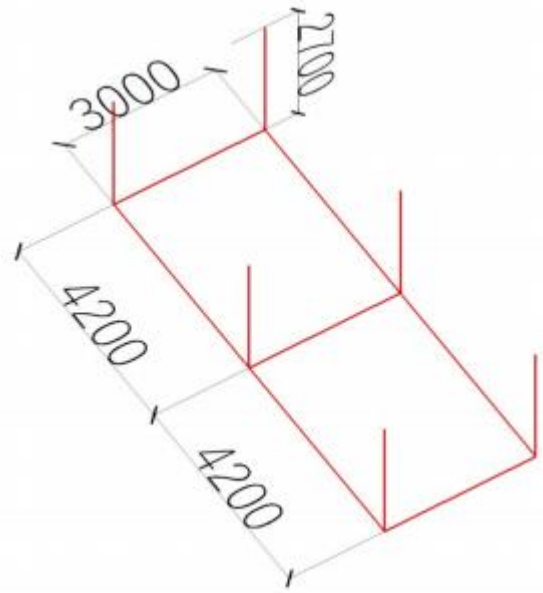
Modularity



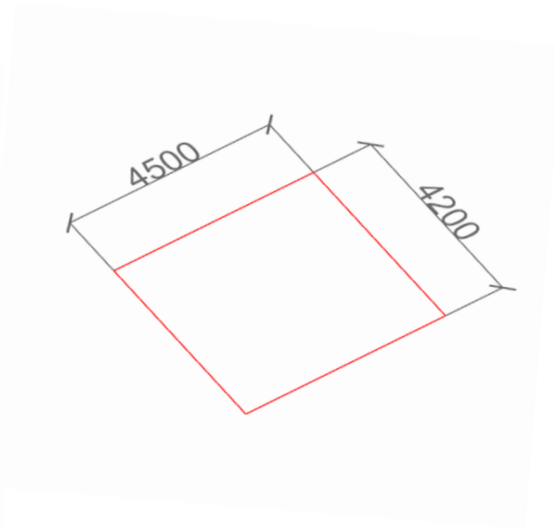




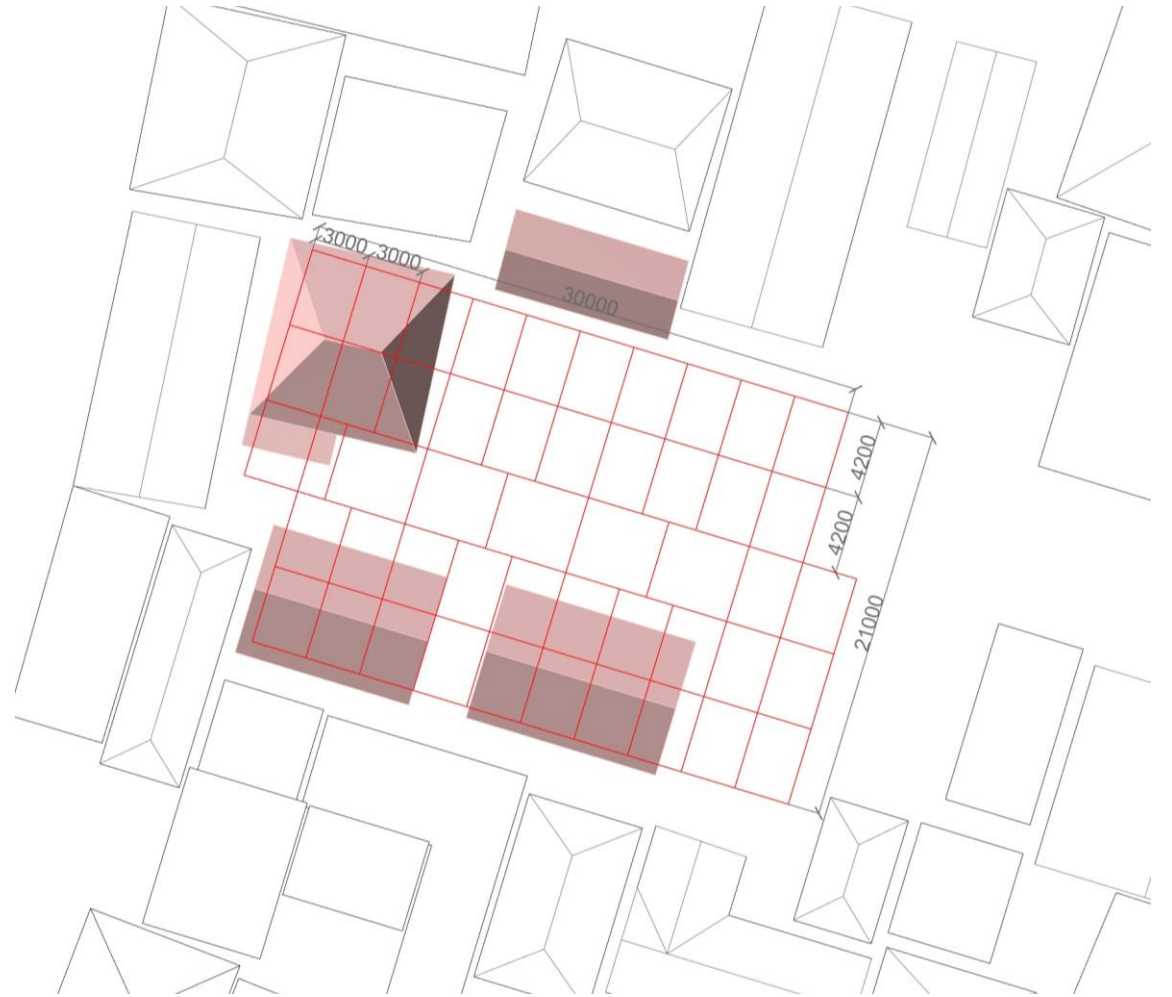
# Modular system and its measurement

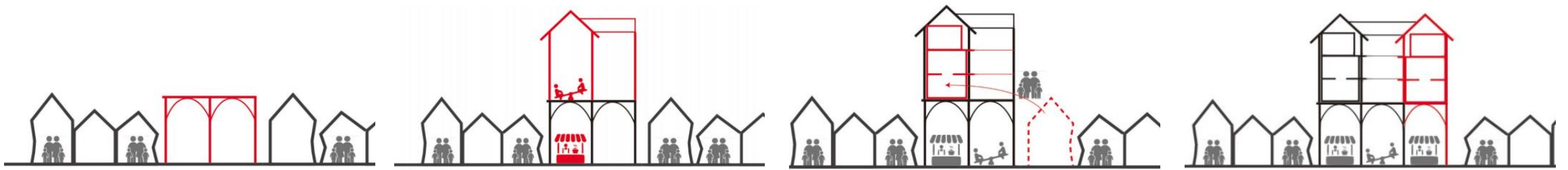


Measurement of the Main Structure



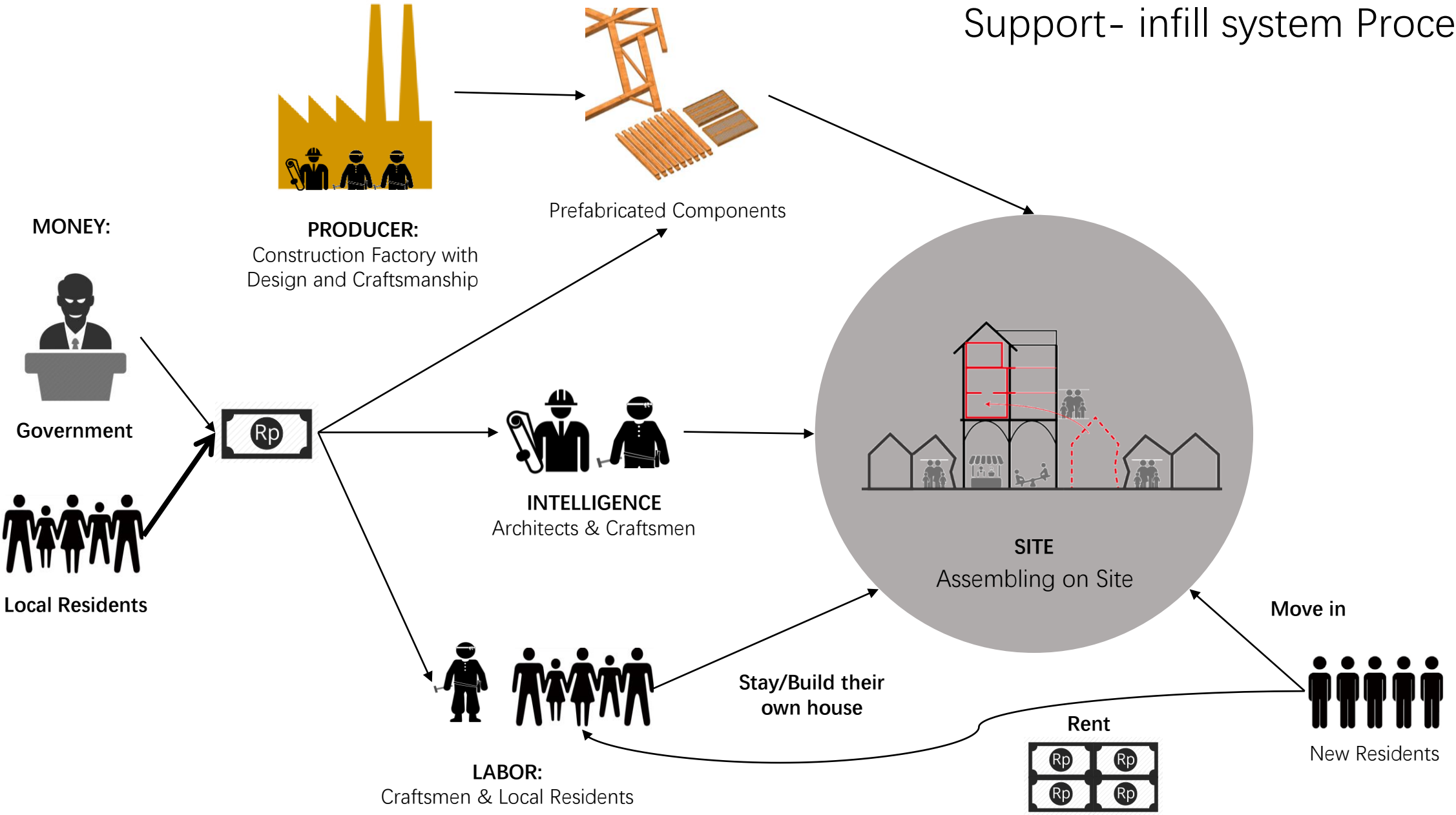
Measurement of the Staircase



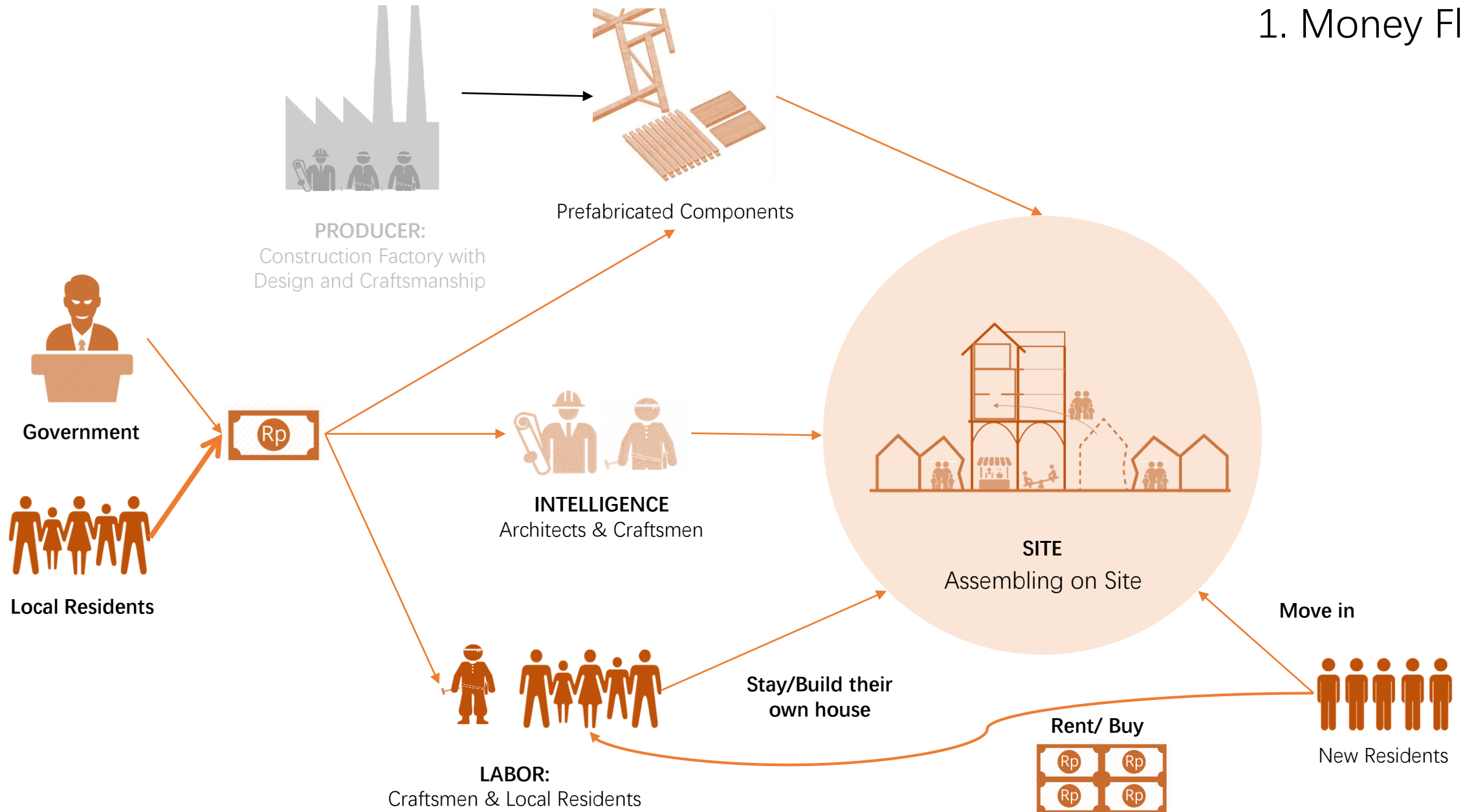


1. Refurbish the residential area piece by piece

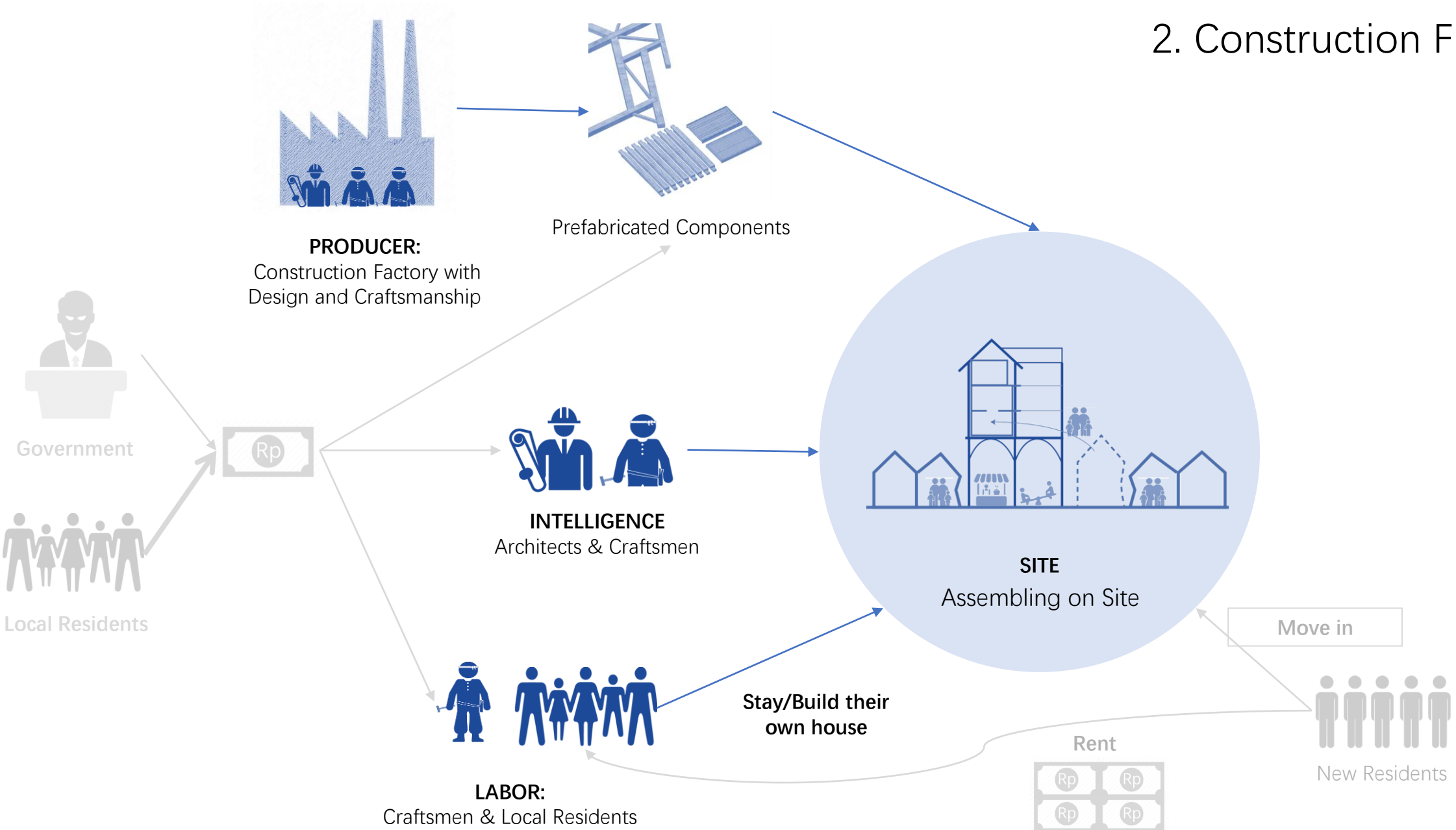
# Support- infill system Process



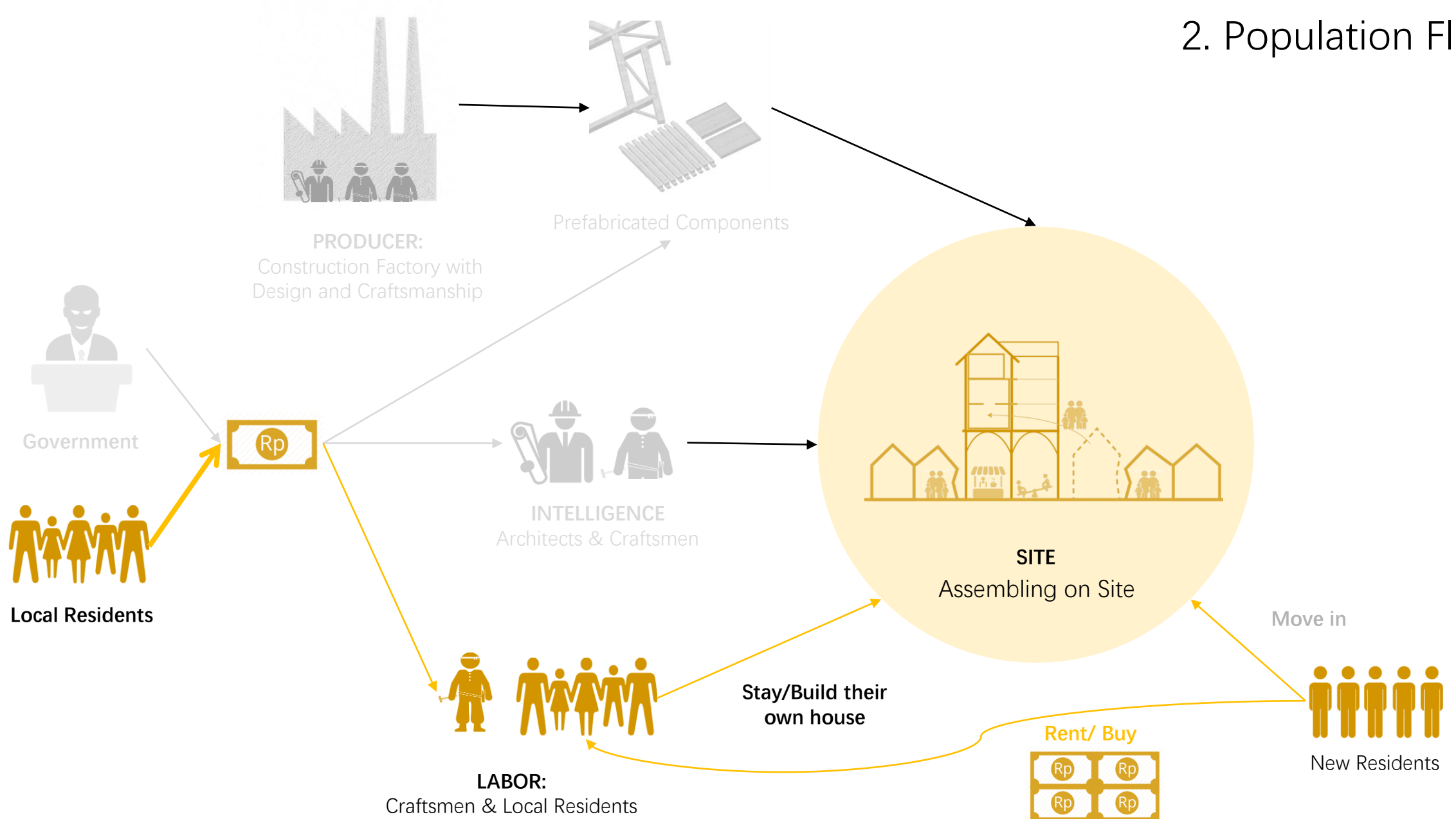
# 1. Money Flow

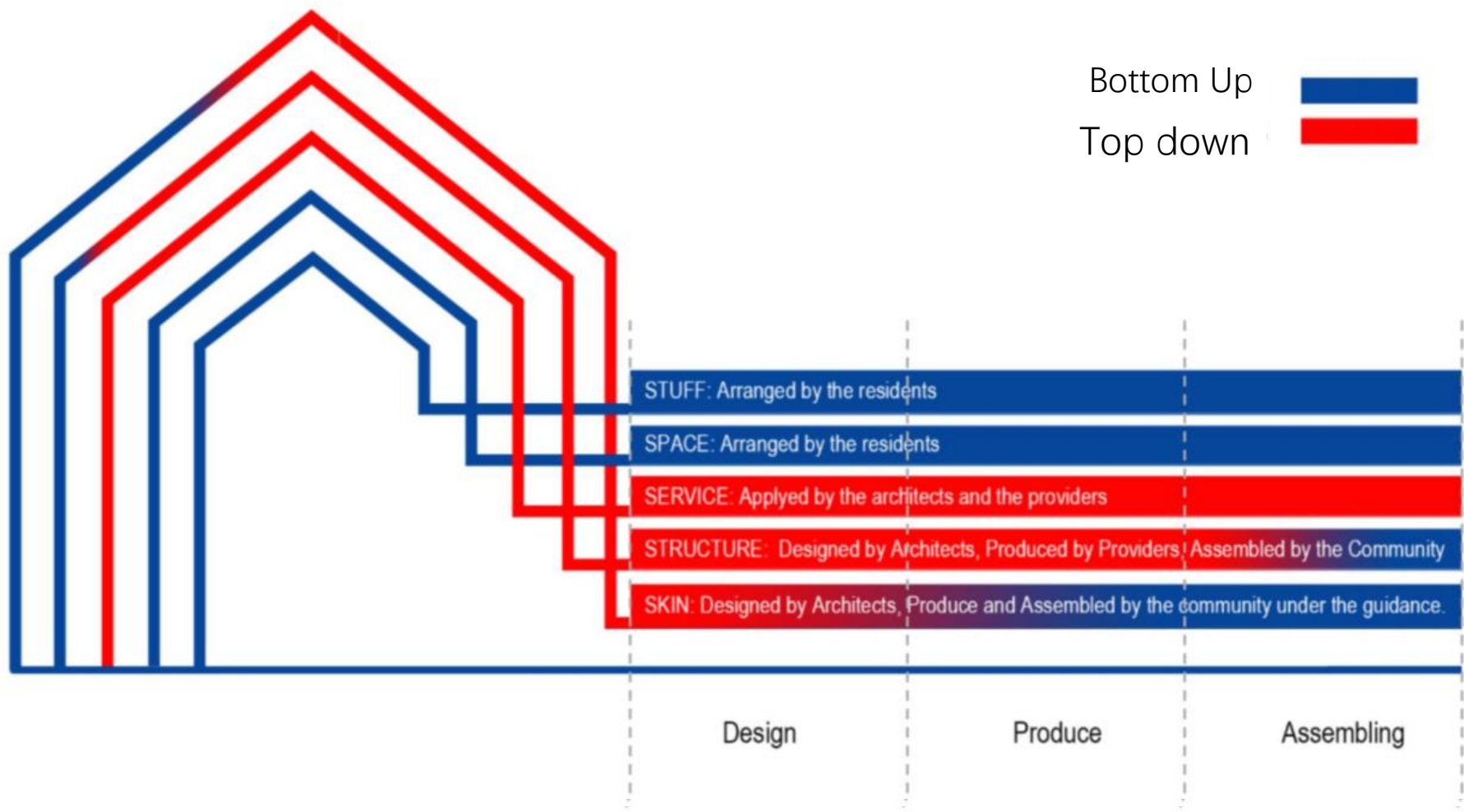


# 2. Construction Flow



## 2. Population Flow





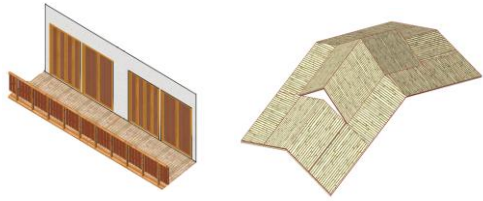
Money

Producer

Labor

Intelligence

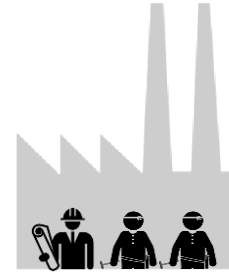
SKIN



STRUCTURE



Residents &  
Government



Factory  
collaborated with  
Designer/Craftsmen



Residents &  
Craftsmen

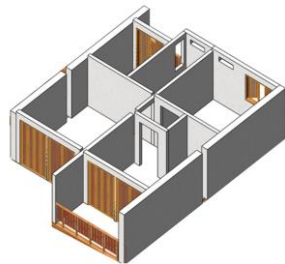


Architect &  
Craftsmen

SERVICE



SPACE



Residents



Construction  
Market



Residents &  
Craftsmen



Residents

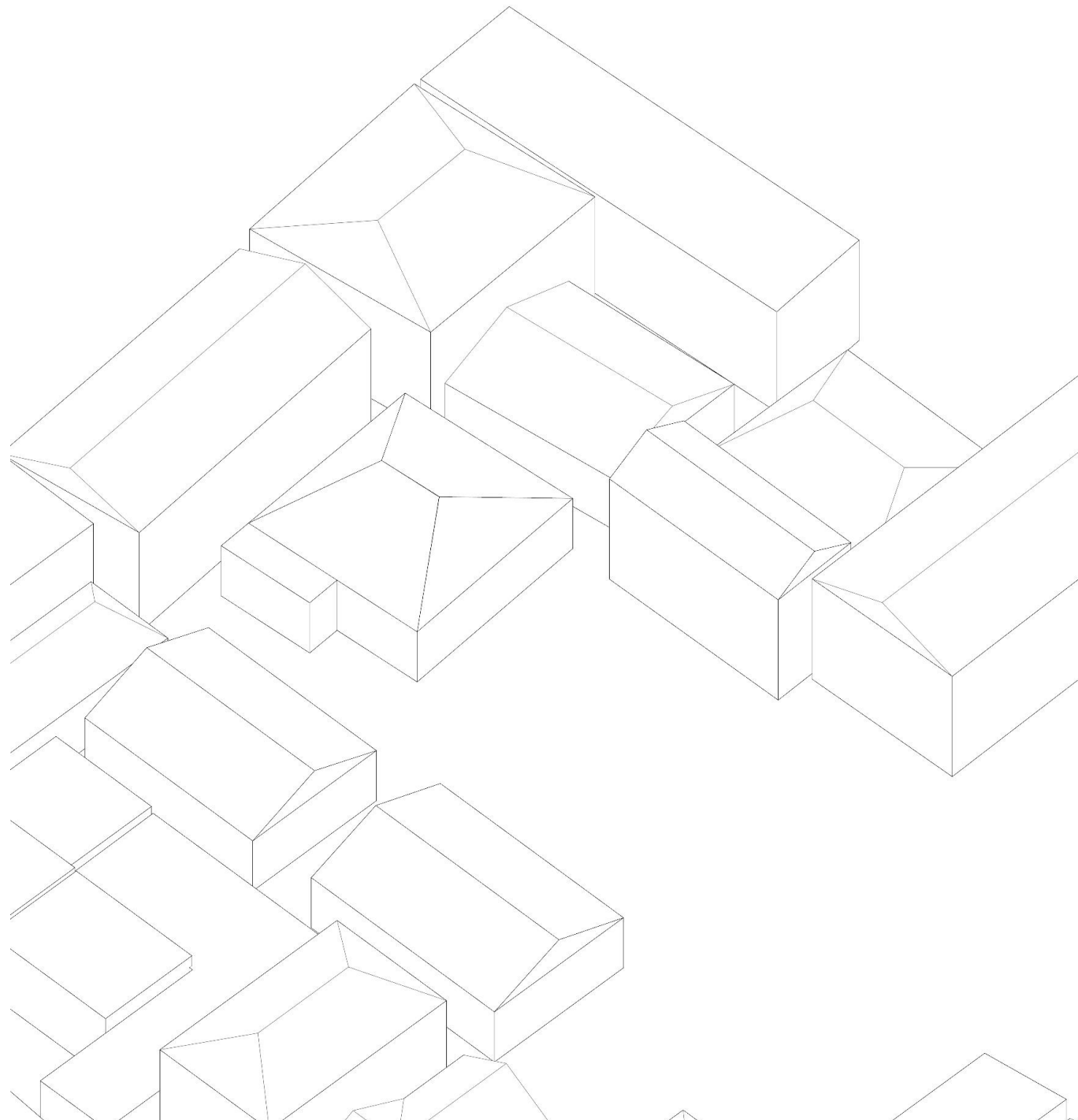
STUFF



## Renewal Process

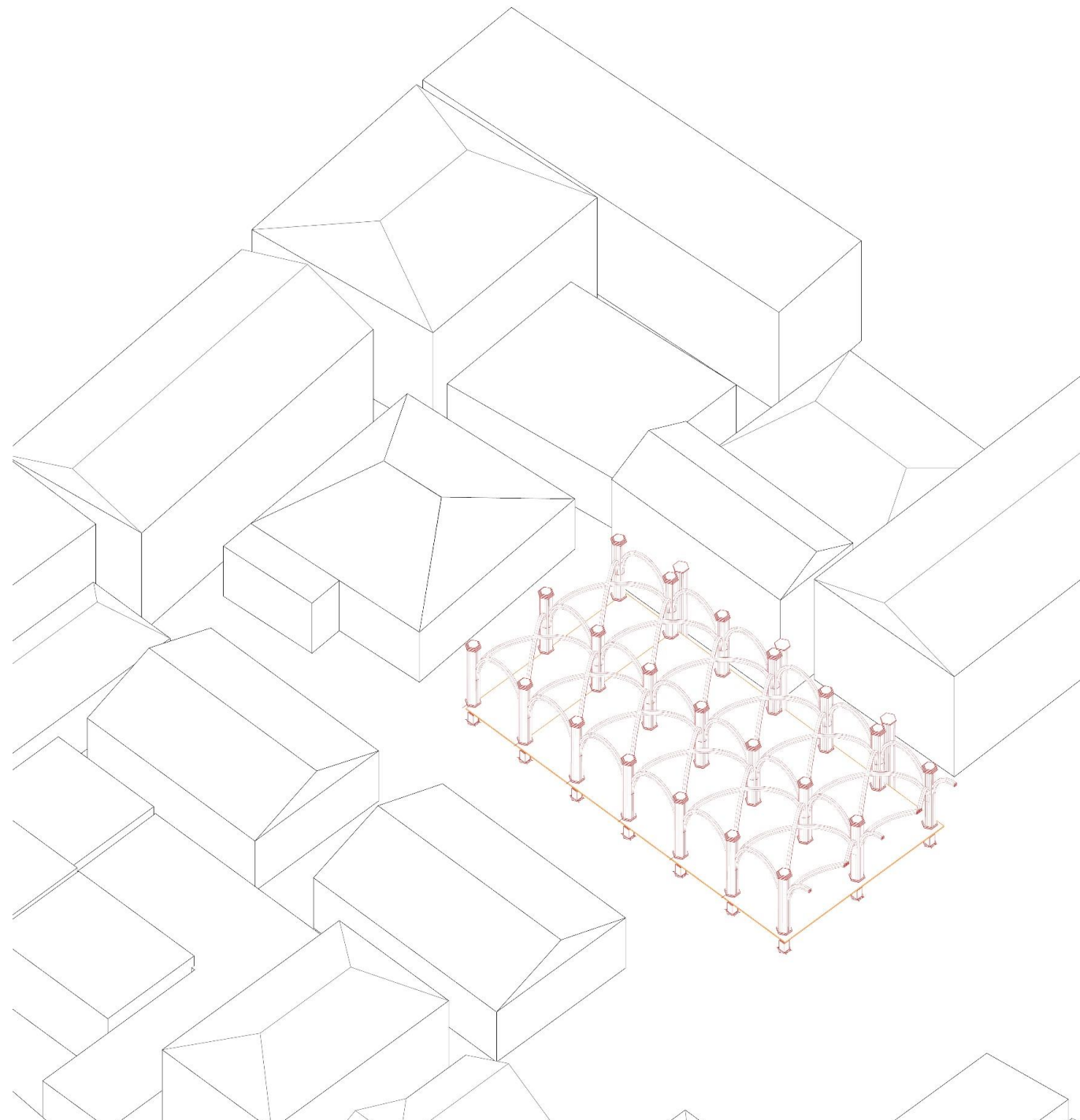


0. Choose the site



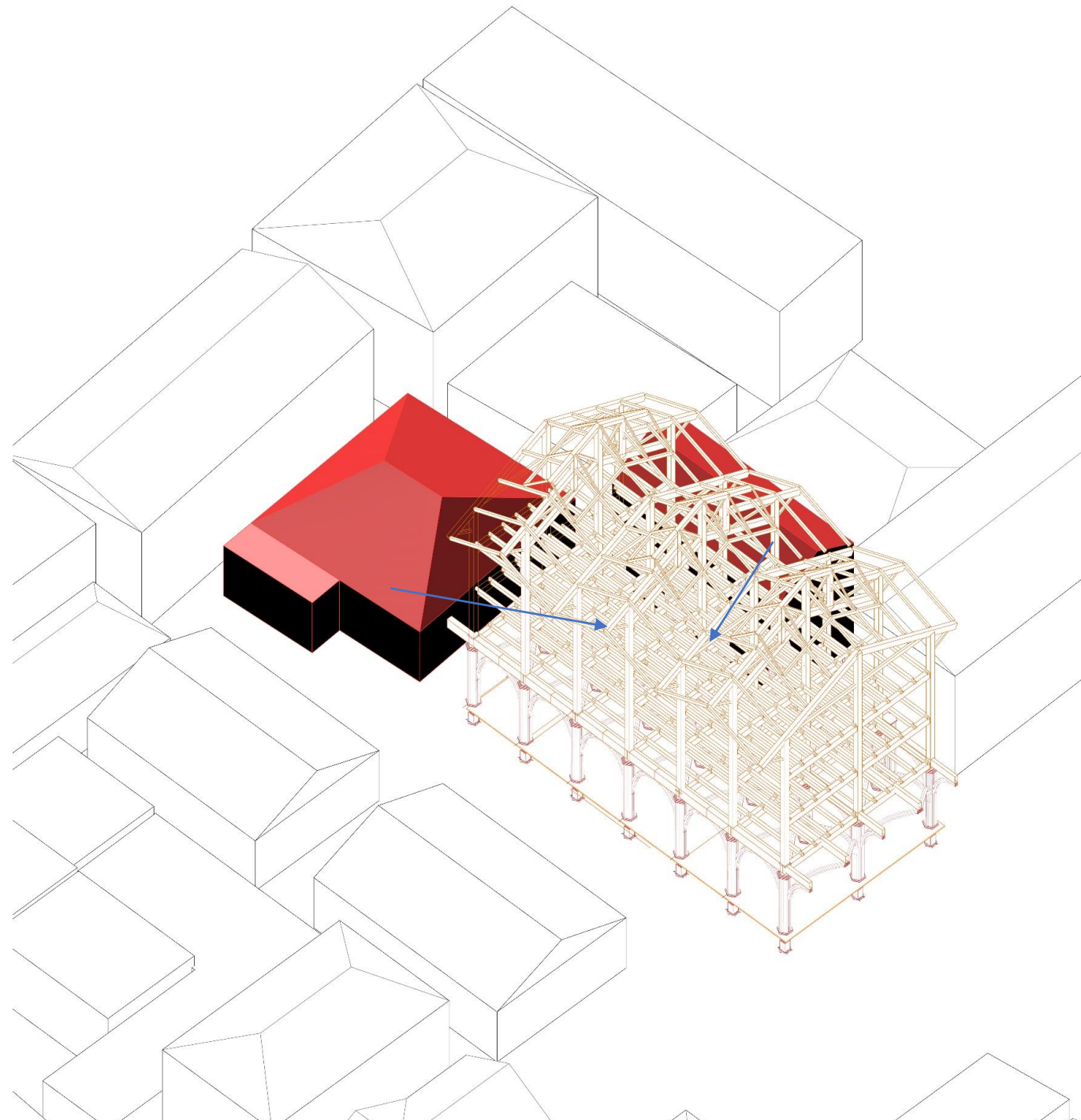
# Organic Renewal Process

## 1. The Table of the First Piece



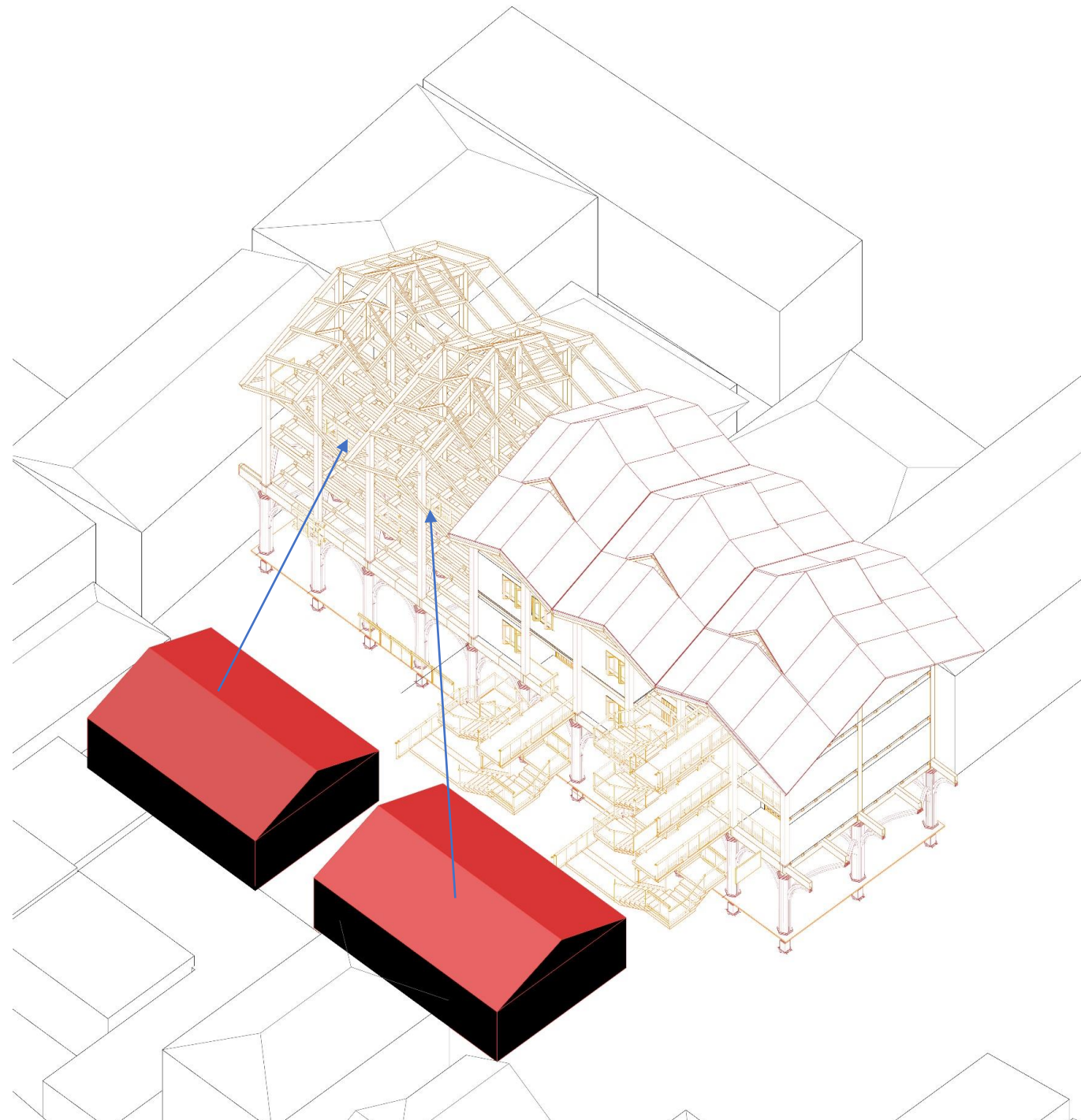
# Organic Renewal Process

## 2. Framing, Demolishing, Moving

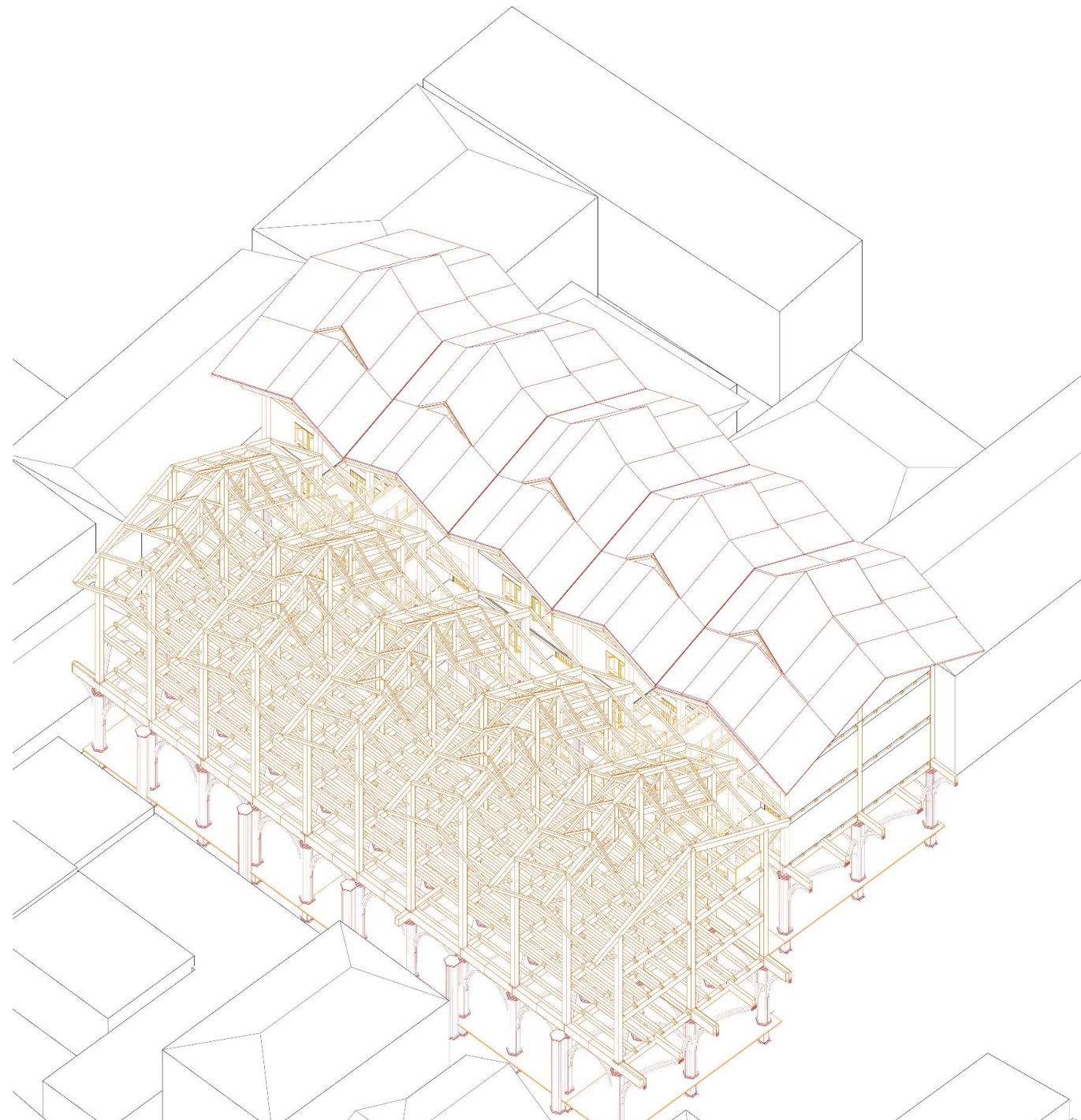


# Organic Renewal Process

## 3. Framing, Infilling, Demolishing, Moving



#### 4. New pieces



# Organic Renewal Process

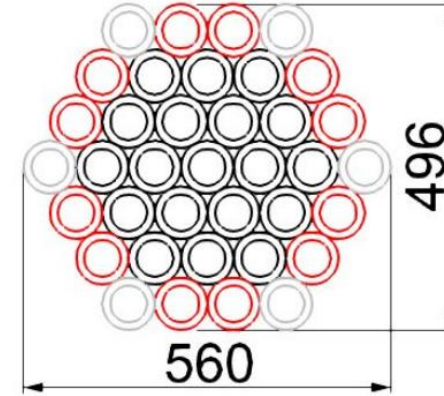
## 5. Final Result





The Table  
& The Public Space on  
the ground floor

## Structure Materialization



### 1. Bambu Betung

**Compressive Strength:** 70Mpa (8% MC)

**Dimension:** 200cm / 8-12cm

**Specific Gravity:** 0.74

Hexagon Column  
Effective section area:0.048m<sup>2</sup>  
Fire prove: one layer



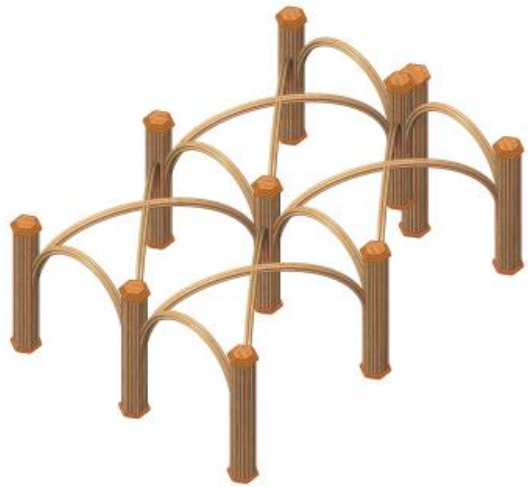


Ground Floor



Mercato Rialto, Venezia

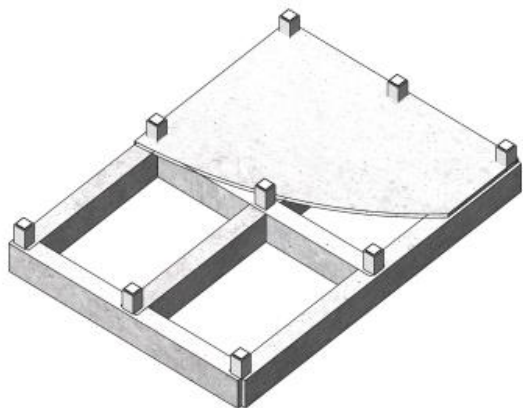




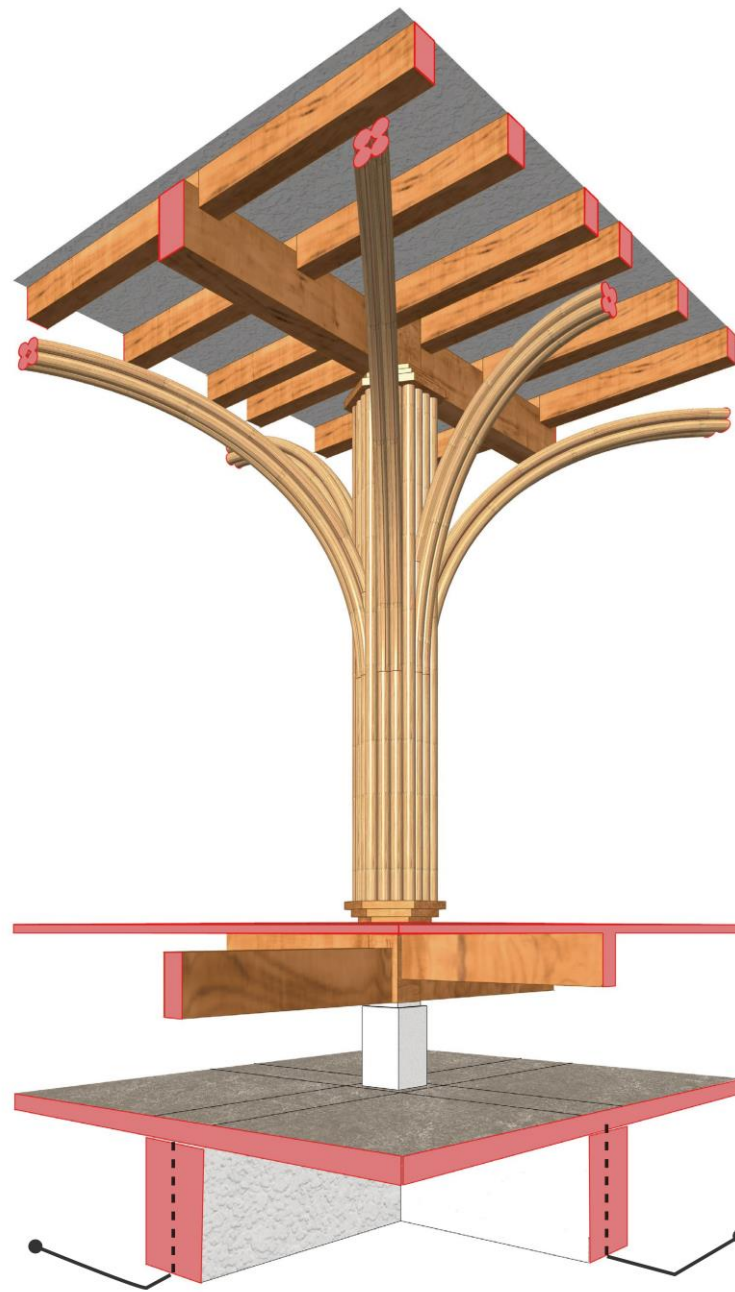
Bamboo Beam



Ground floor beam & floor finishing

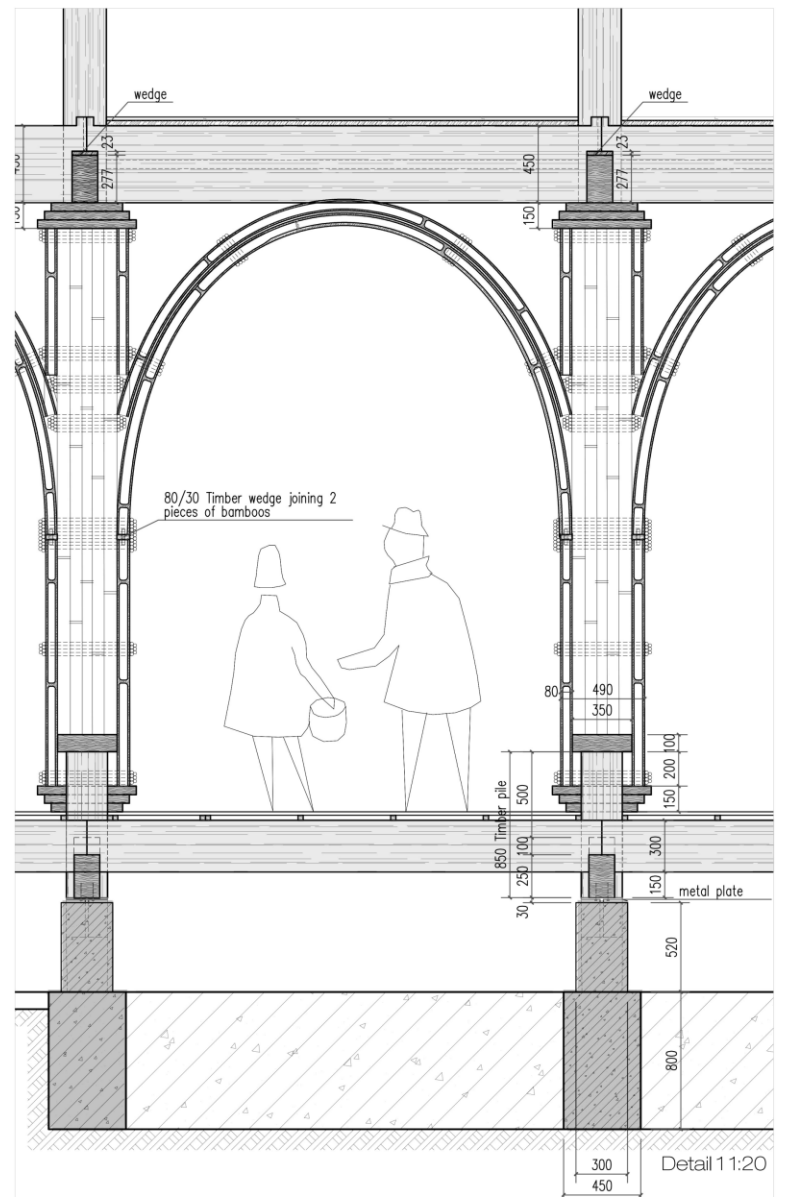
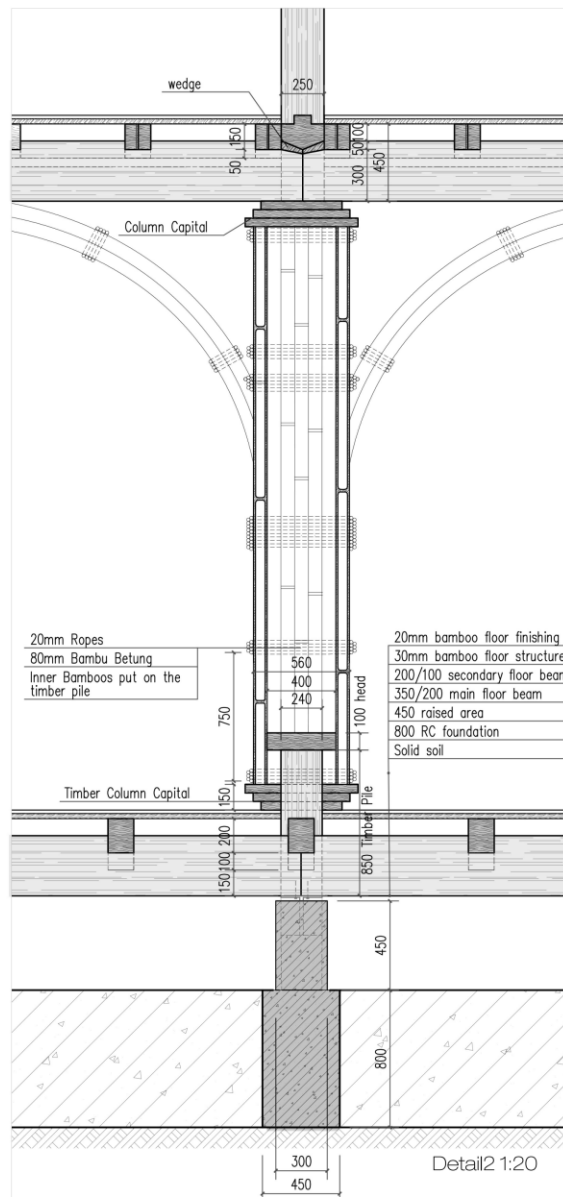


Concrete Foundation (Step Strip) and the solid soil ground



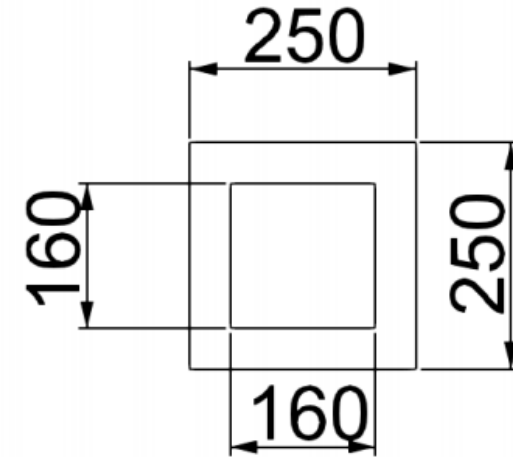
Detail2

Detail1





## Structure Materialization



## Timber Bangkirai

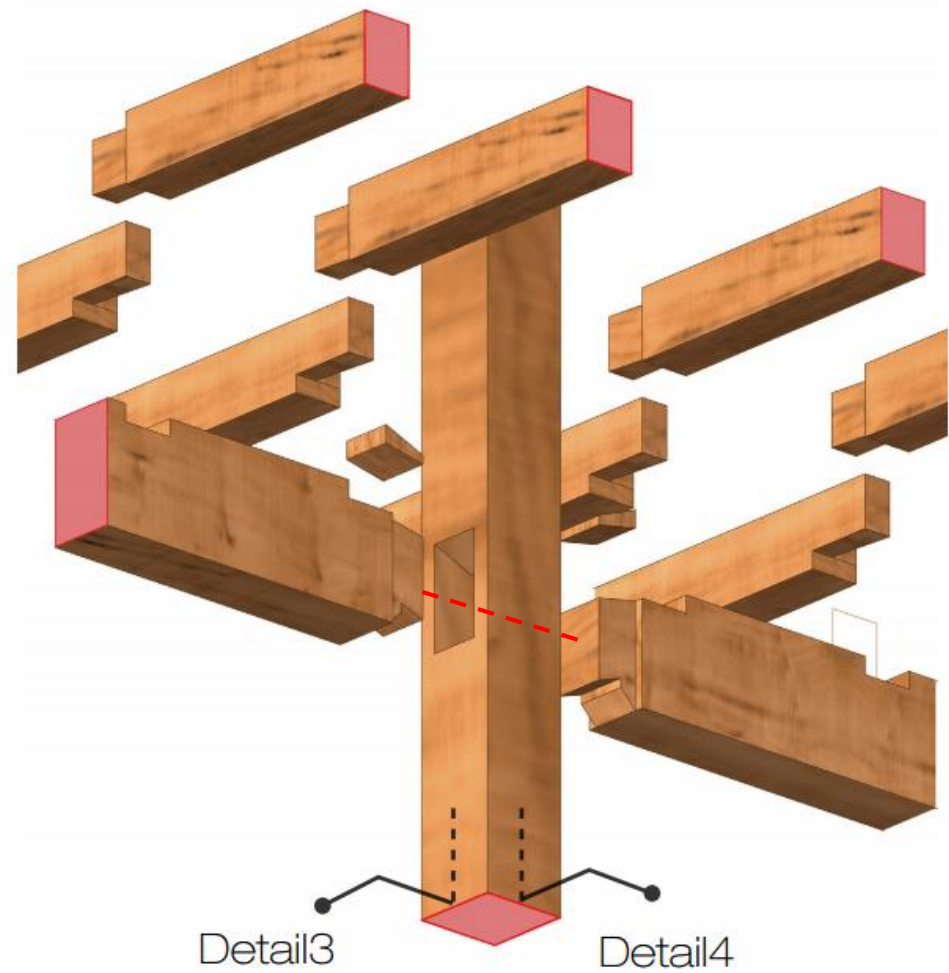
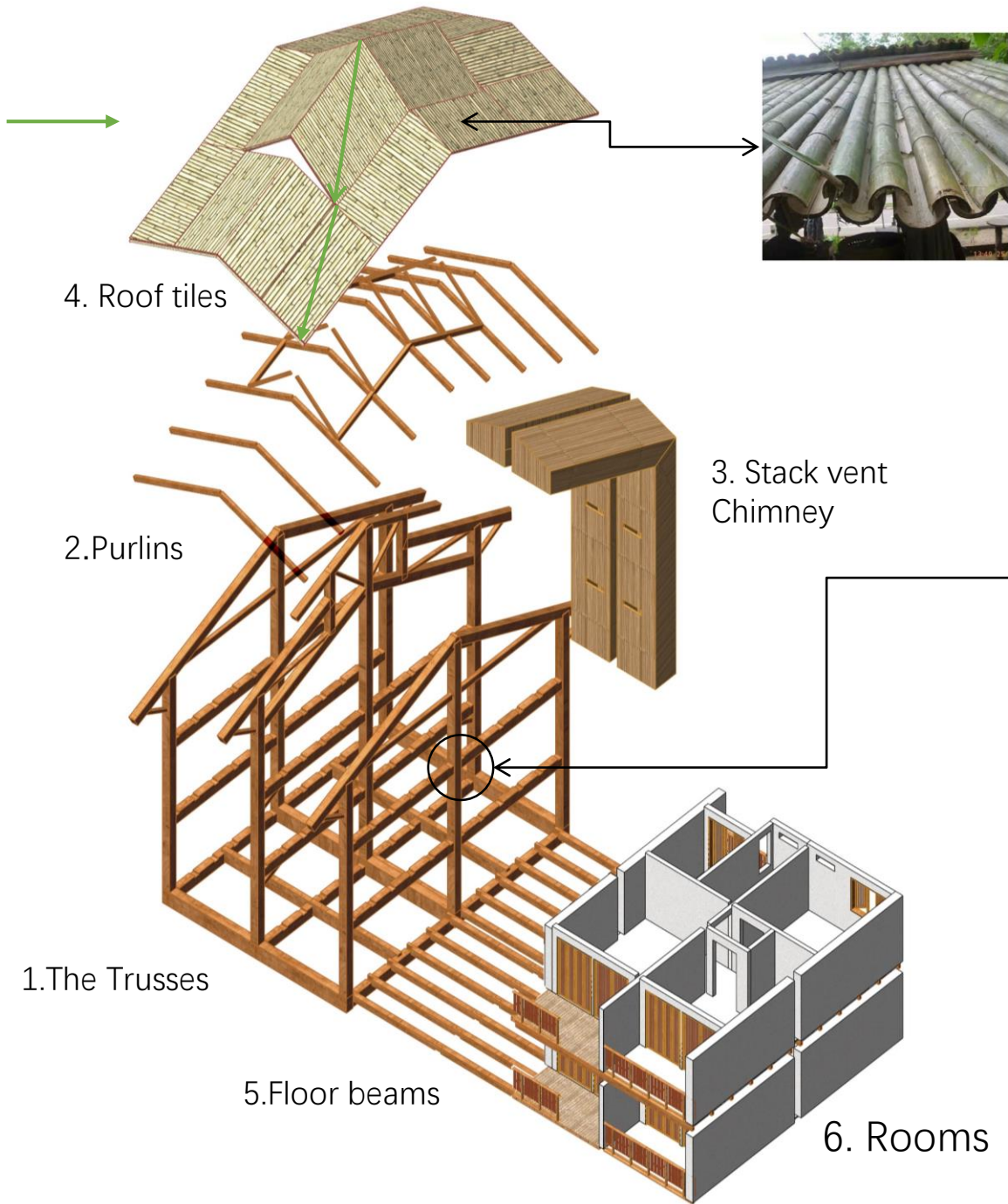
**Compressive Strength:** 85Mpa (8% MC)

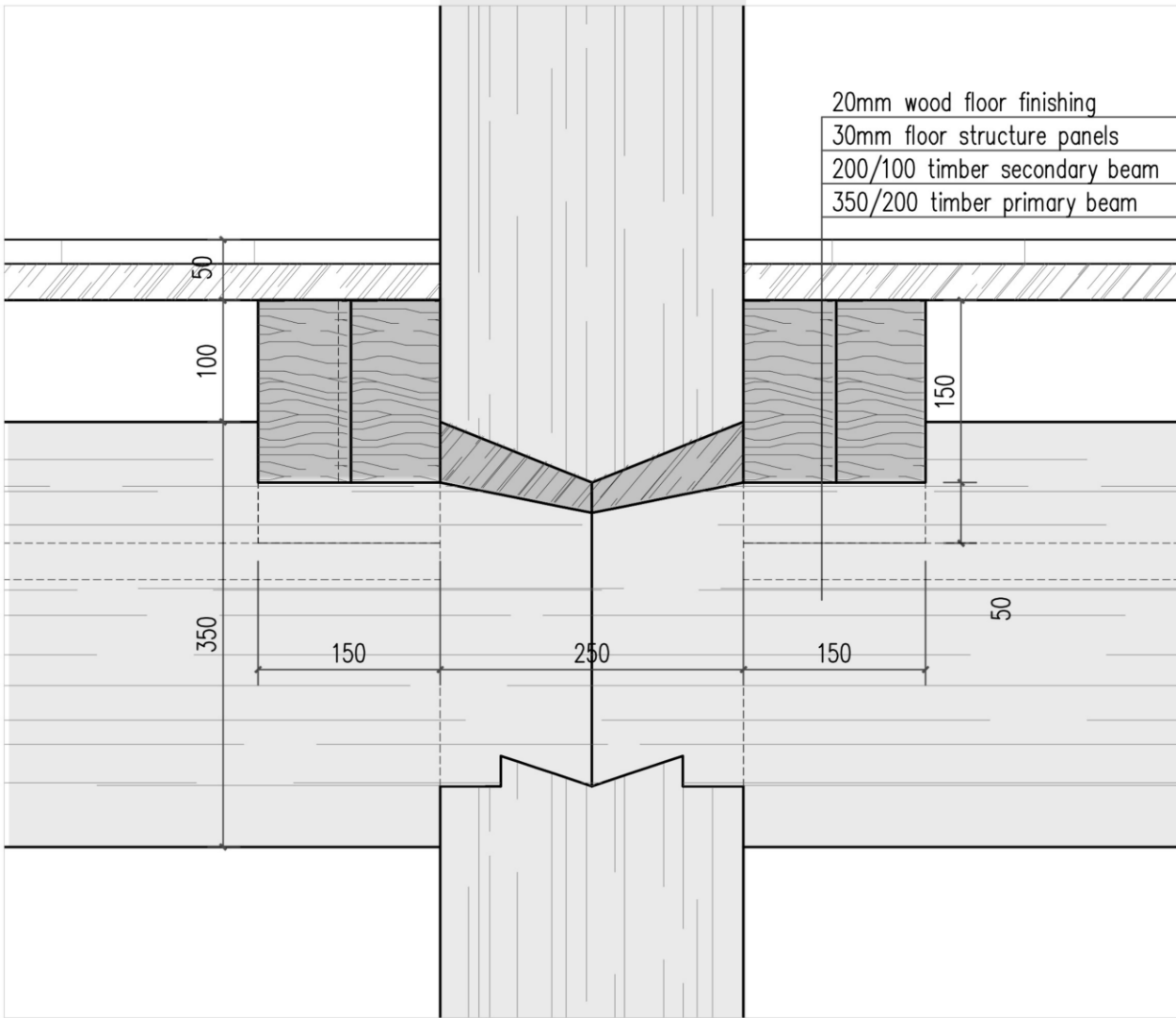
**Dimension:** 70-90cm

**Specific Gravity:** 0.91

Option 1

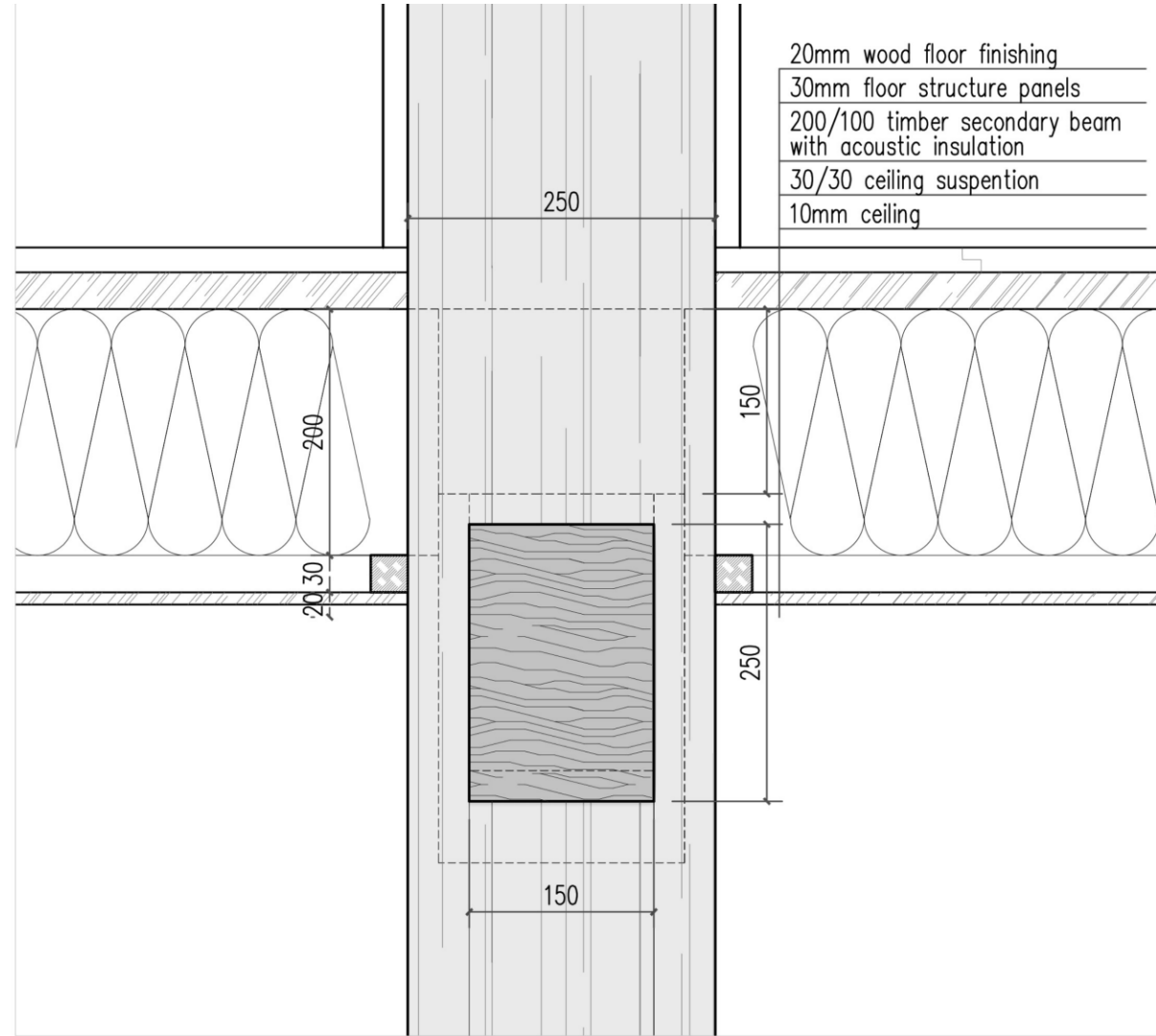
160/160 structural core;  
45mm fire proof layer





- 20mm wood floor finishing
- 30mm floor structure panels
- 200/100 timber secondary beam
- 350/200 timber primary beam

Detail3 1:5



- 20mm wood floor finishing
- 30mm floor structure panels
- 200/100 timber secondary beam with acoustic insulation
- 30/30 ceiling suspension
- 10mm ceiling

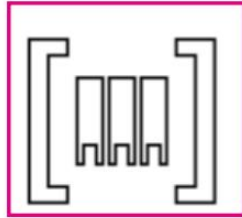
Detail 4 1:5



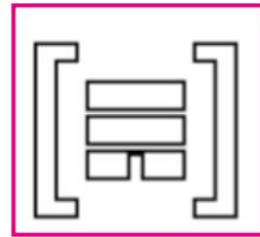
# The Rooms



## Housing Typology



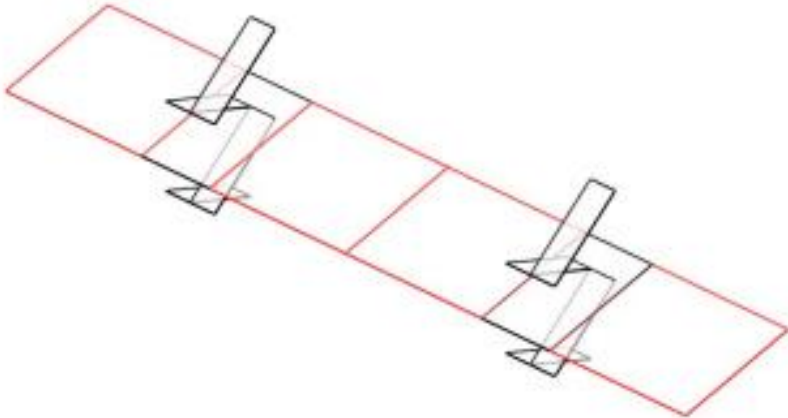
Row house: All units have a separate entrance on the ground floor; predominately multistory units/maisonettes.



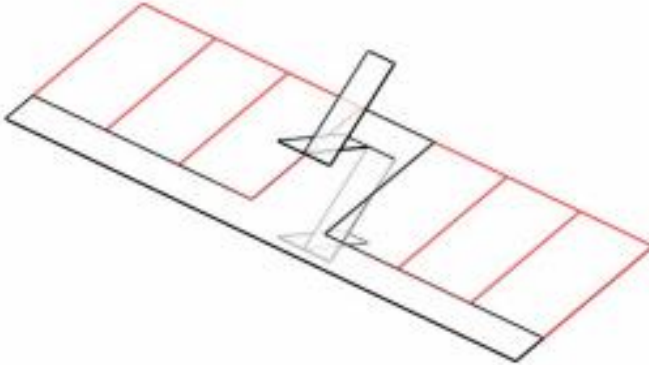
Multistory apartment building: Common entrance, including as a rule a shared central stairwell.

(Future living: Collective housing in Japan)

Transport Typology



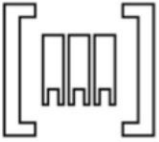
Walk-Up



Gallery

# Target Groups

## Row House



Local House

target group:



Local households

Household Composition

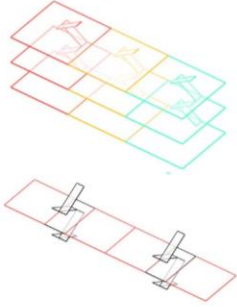


(Grand Parents)+  
Parents + Children+  
(other relations)  
= 4-8 people

Spatial Composition

15 sqm/pp  
60-120 sqm

Entrance



Function

Bedrooms 2-4;  
Living room 1;  
Kitchen&Dining 1;  
Toilet 1-2

Ownership



Local households

## Multi-floor apartment



Rent Apartment

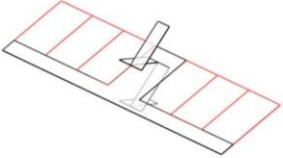


Migrant Workers



Single worker/ young couple

10-20 sqm/pp  
20 sqm

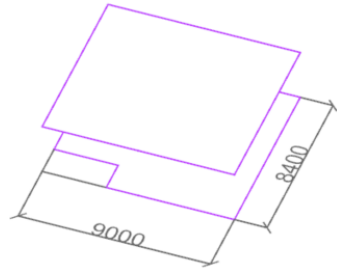


Room 1,  
Kitchen&Dining 1;  
Toilet 1

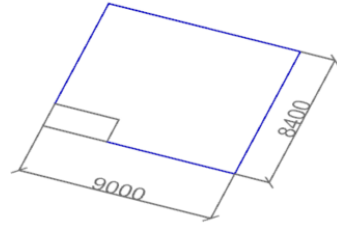


Local households

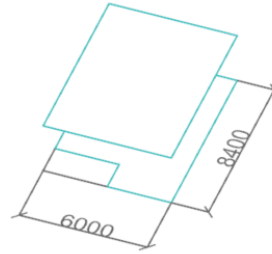
# Unit Types



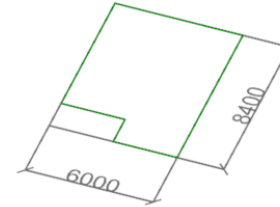
146.6 sq.m



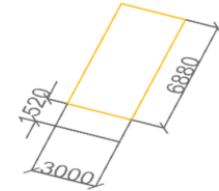
71.04 sq.m



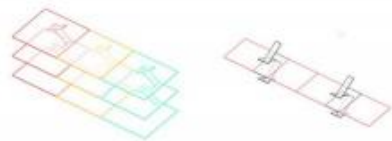
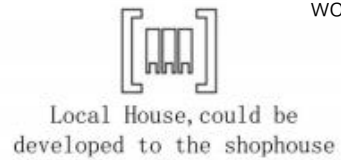
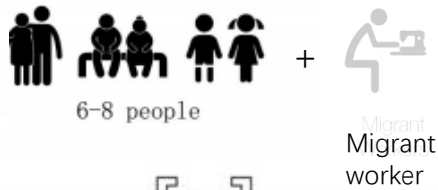
96.2 sq.m



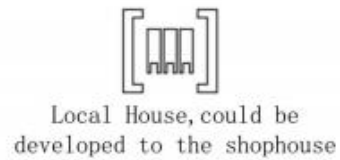
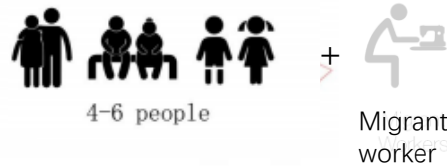
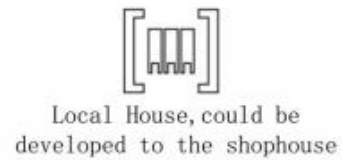
45.8 sq.m



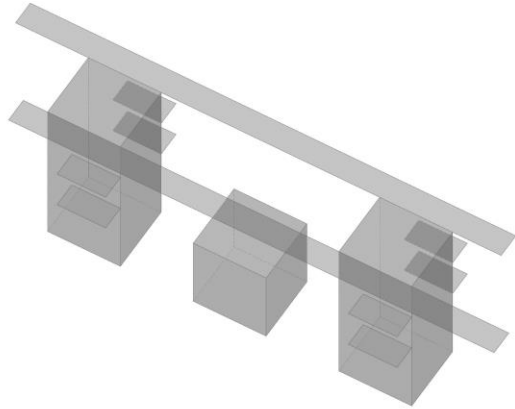
20.6 sq.m



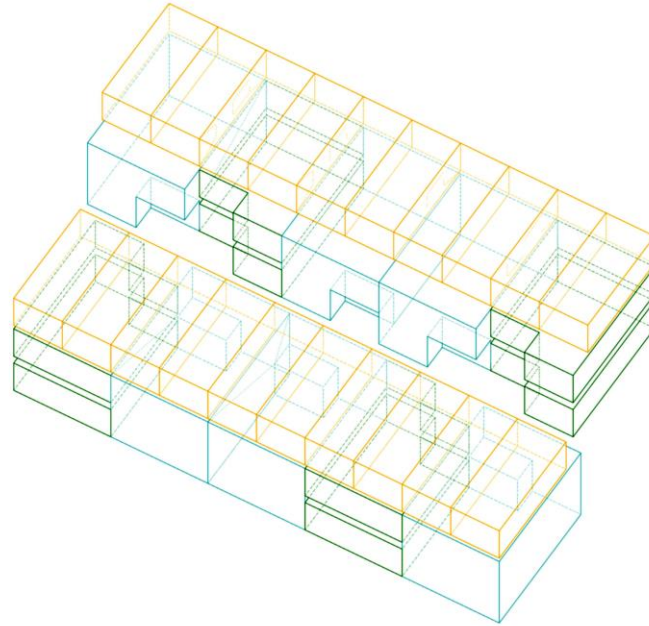
Entrance/transport type



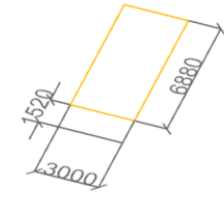
# An exemplary Programming



**Transport space**

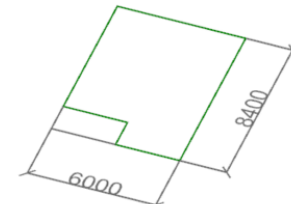


**Room Configuration**



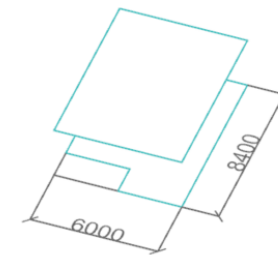
Rent Unit

\*18



Single Floor

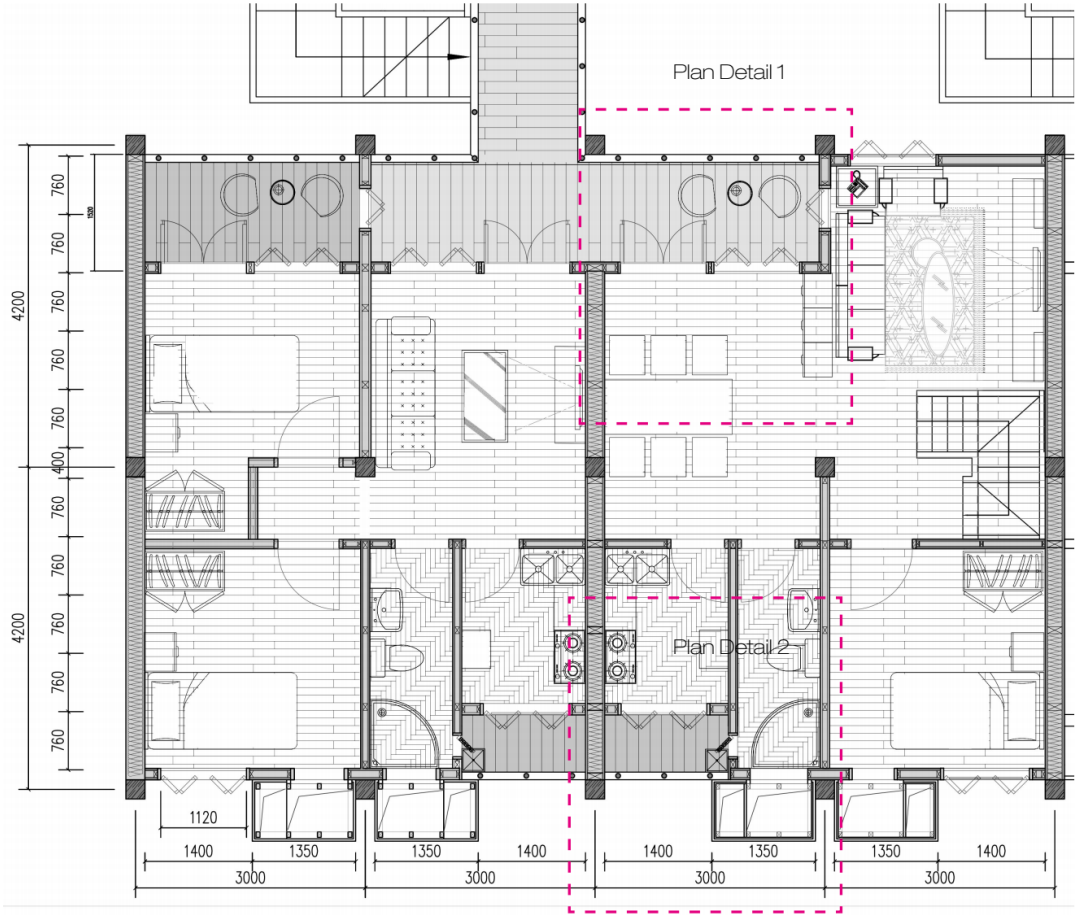
\*8



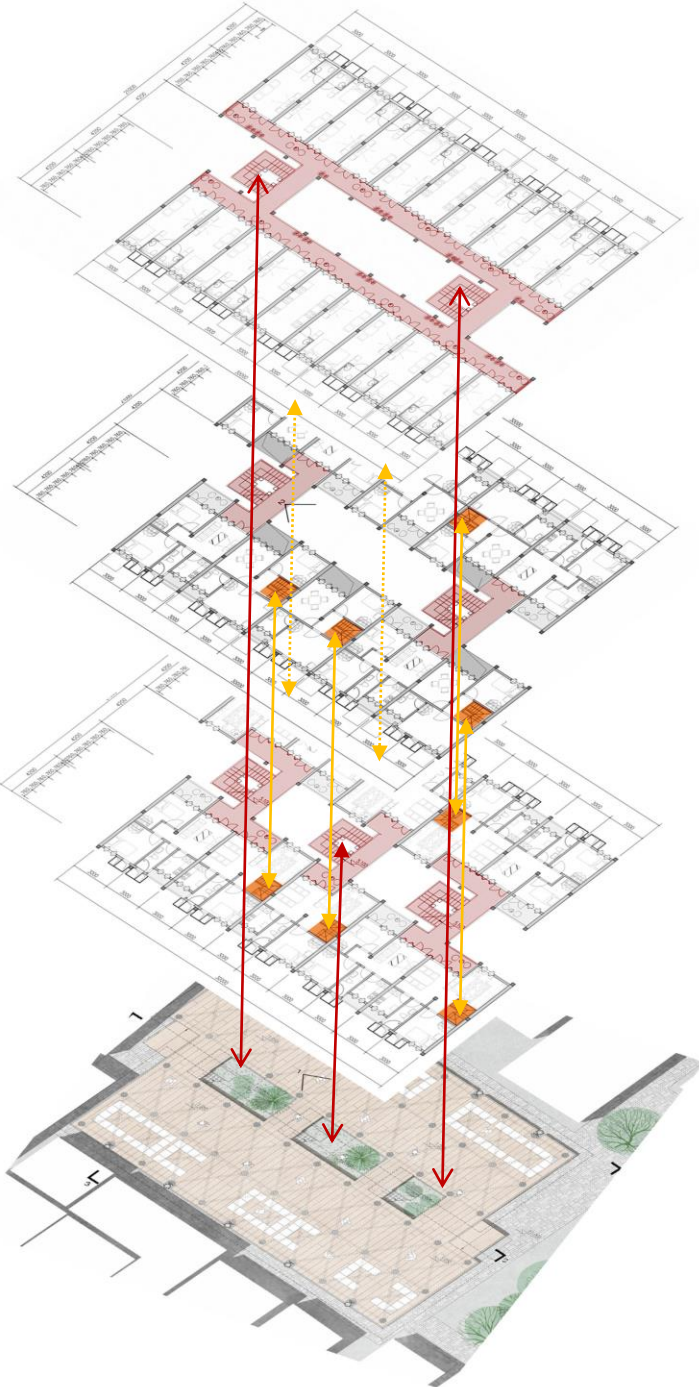
Double Floor

\*6

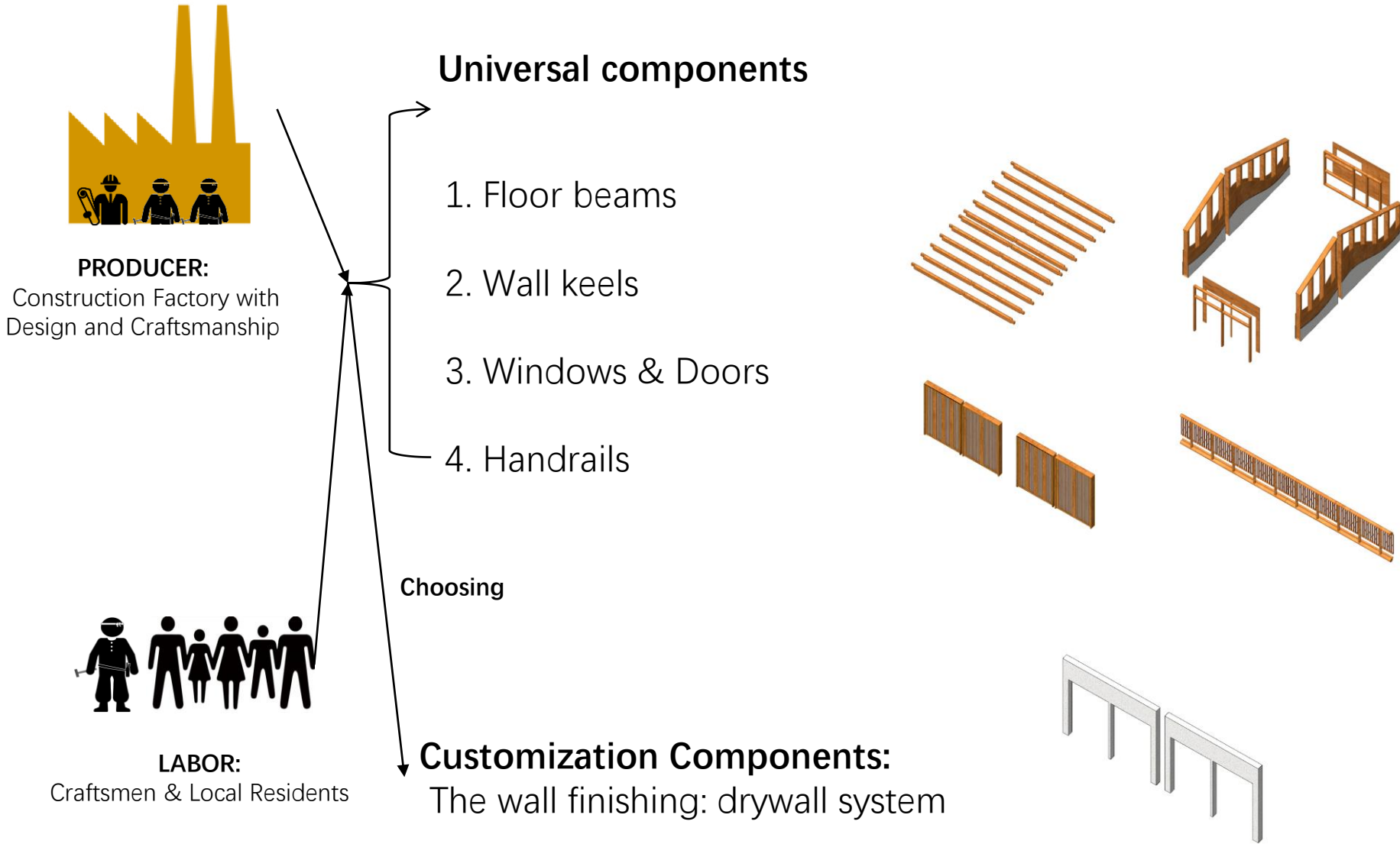
# Plans



Unit Plan First floor 1-50



# Prefabrication and Customization





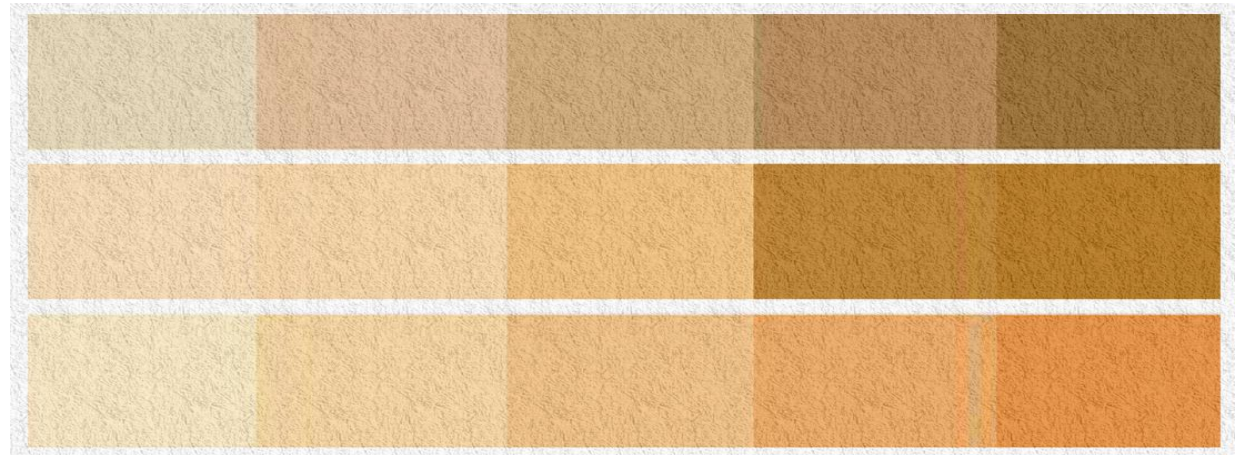
Wall finishing:  
Drywall System



Material:  
Mud Plaster



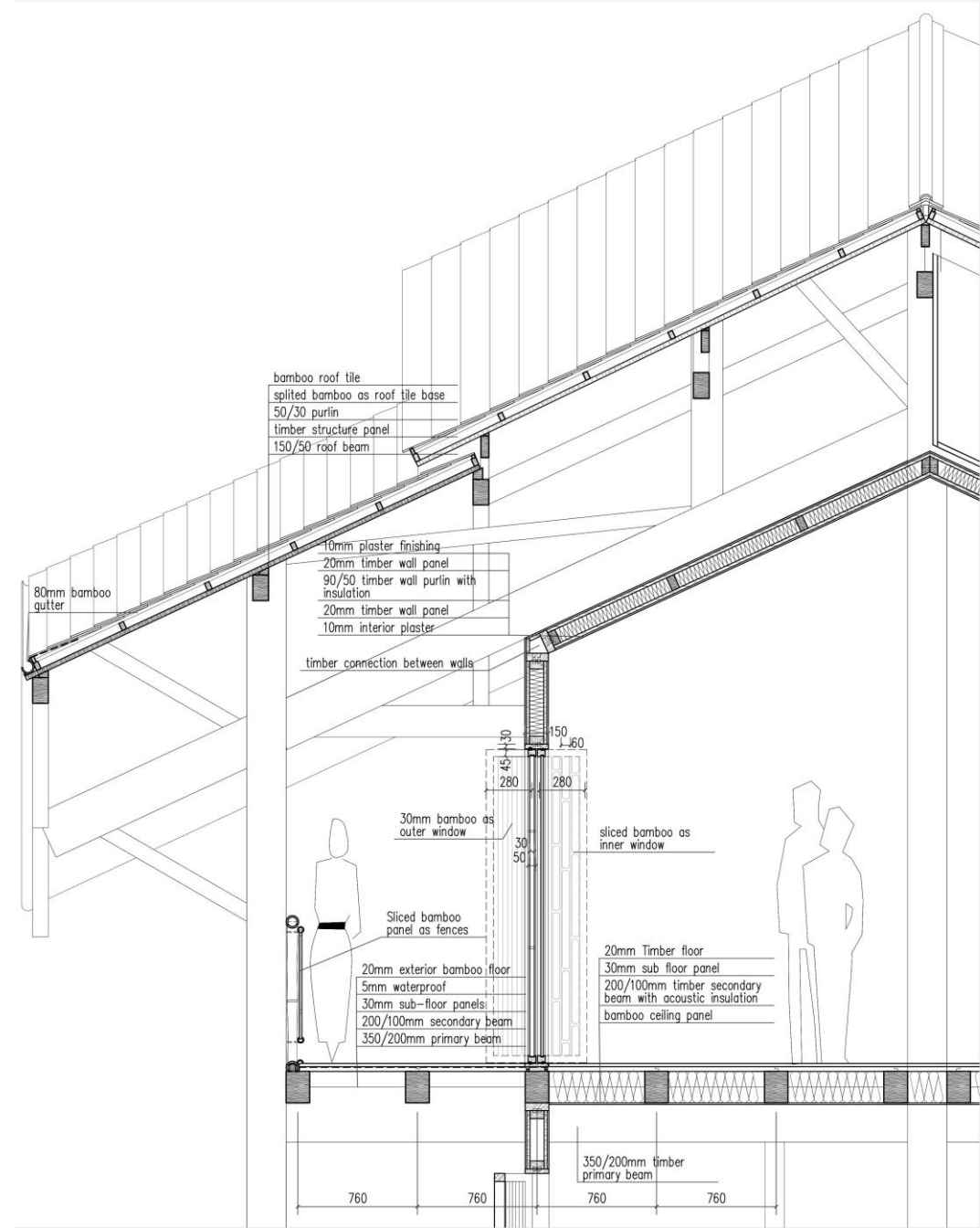
Color Range:  
Earthy tone



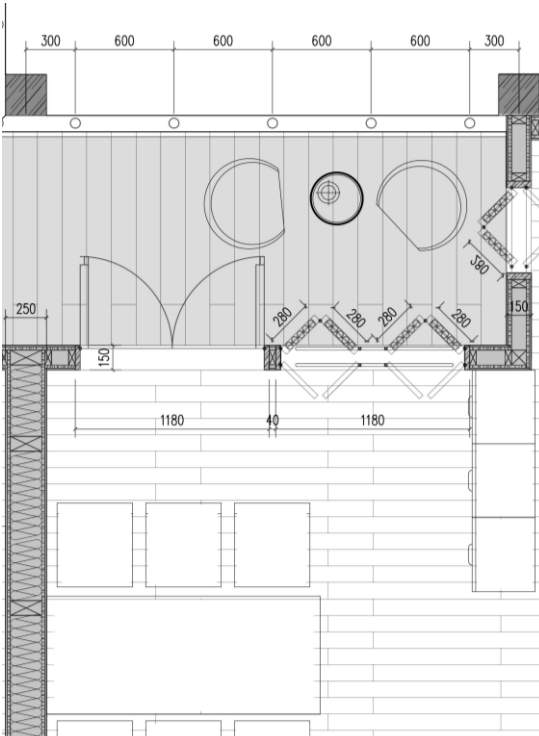
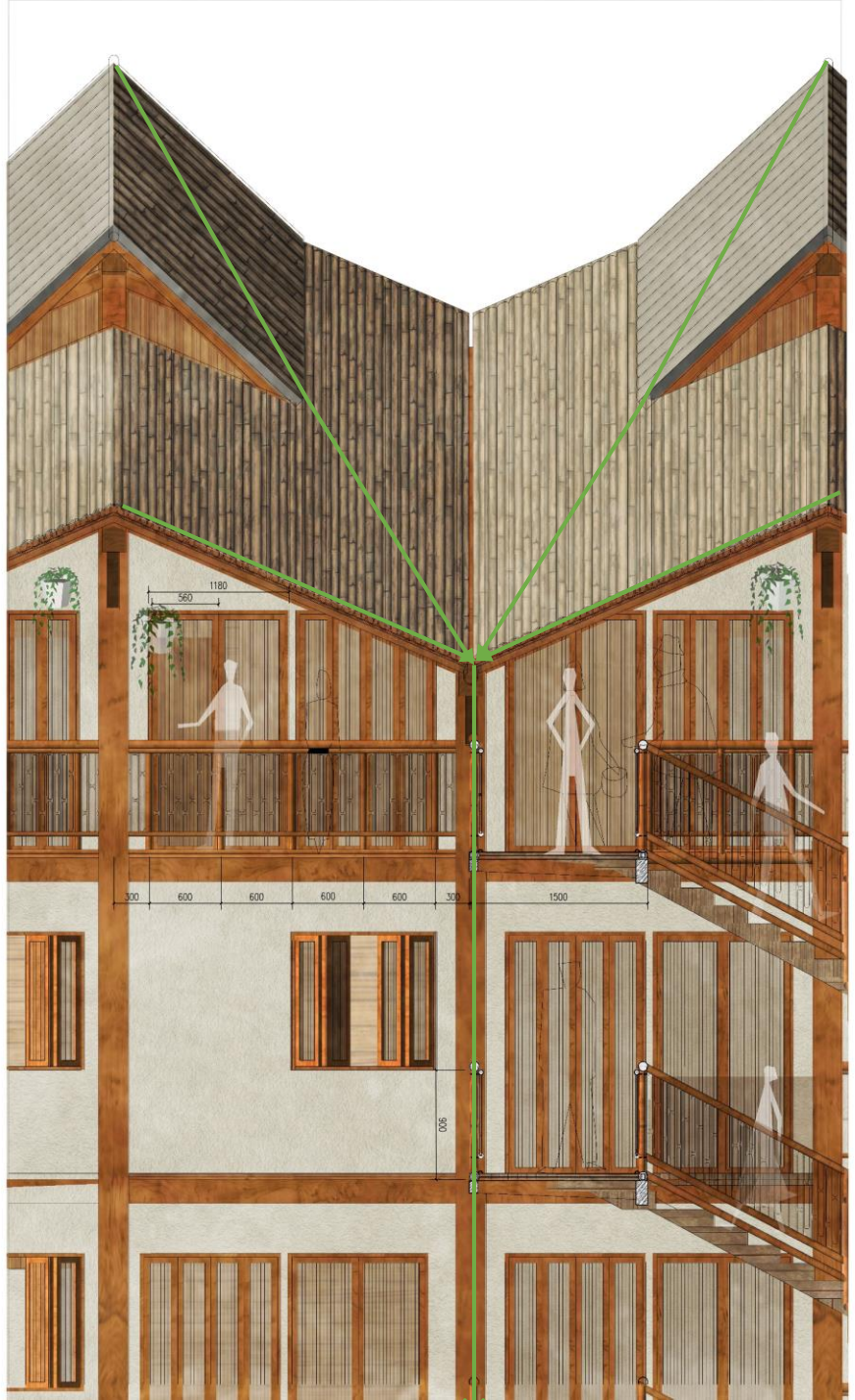
Pattern:  
Bamboo Weaving



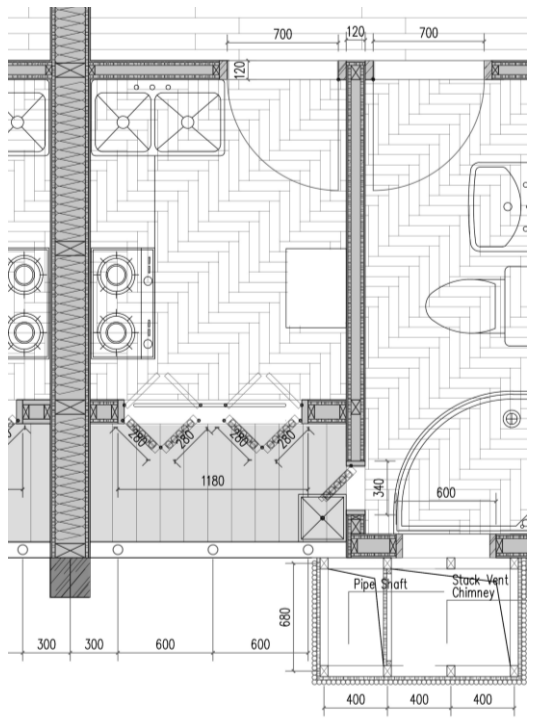




Detail of the Roof and the Facade



Plan detail 11-20



Facade detail 21-20









● Drainage  
→ Ventilation

1400 1400 1400 1400 1400 1400 1400 1400

16.600

14.400

12.500

10.500

7.800

5.100

0.050

±0.000

760 760 760 760 760 400 760 760 760 760 770

2100 2100 2100 2100 2100 2100 2100 2100

1400 4200 4200 4200 4200 4200 4200

