

# Mind the gap | aE

P5 - Presentation

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## **Introduction**

problem statement  
overall question  
proposal  
research question

## **Research**

existing fabric  
lightweight concepts  
case studies  
analysis  
conclusions

## **Design**

structural concept  
implementation

## **Conclusions**

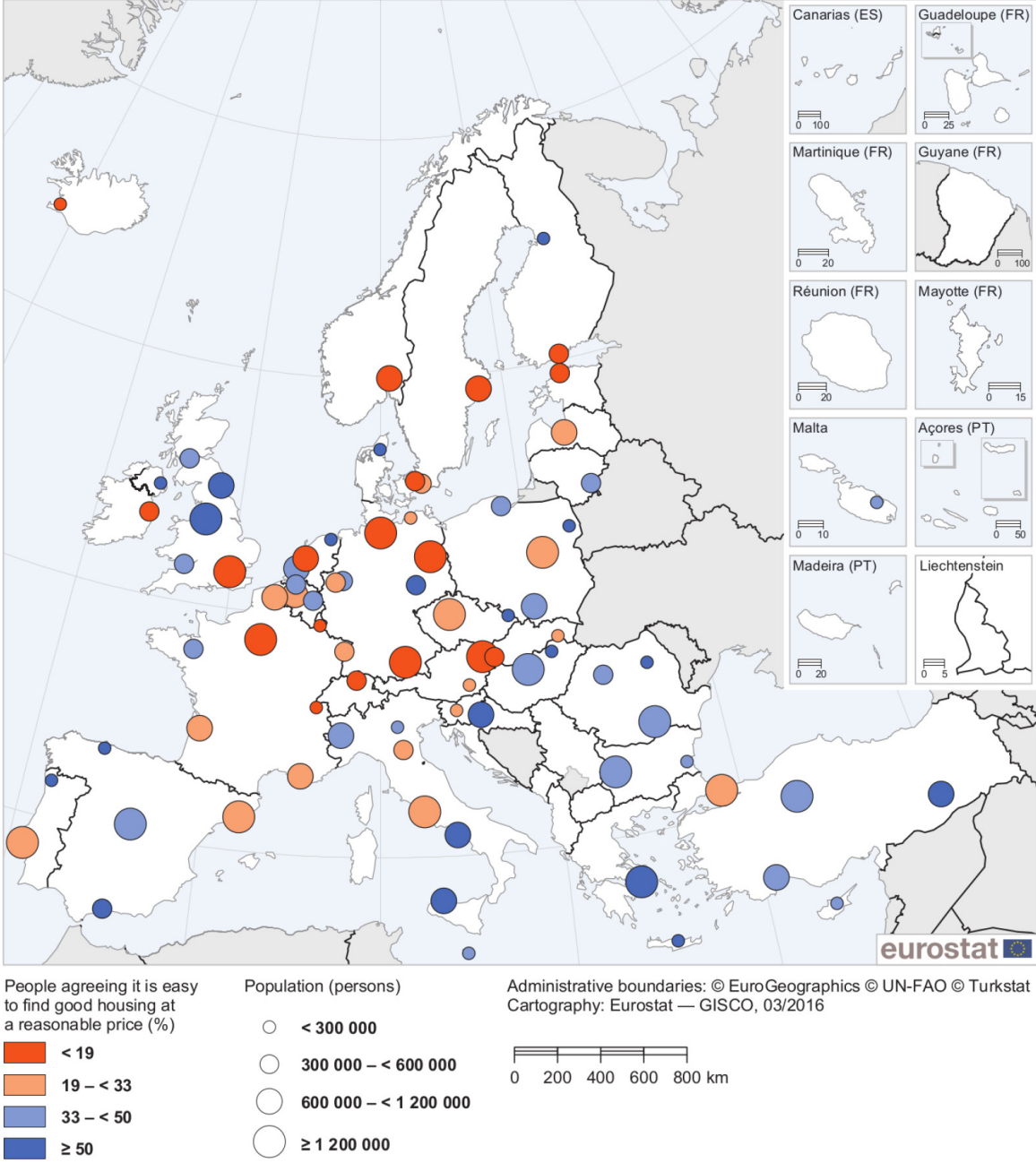


**- problem statement -**

With the remarkable population **growth** combined with the **shift** of dwelling habits over the past decades, the **demand** for housing is increasing and its **shortage** becomes an alarming issue

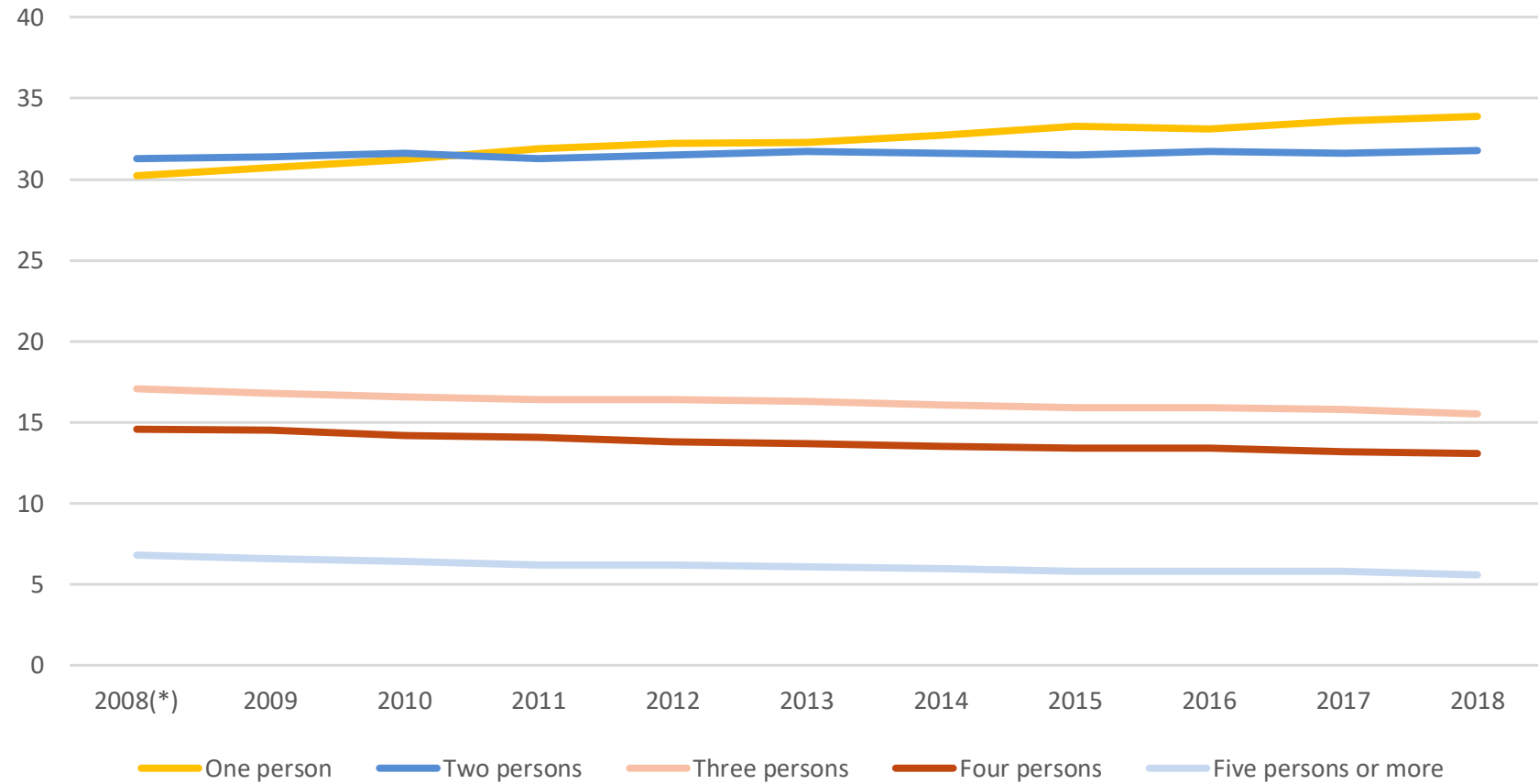
Proportion of people who agree that it is easy to find good housing at a reasonable price in their city, 2015 (\*)  
(%)

In major cities, less than 19% of people find affordable housing easily



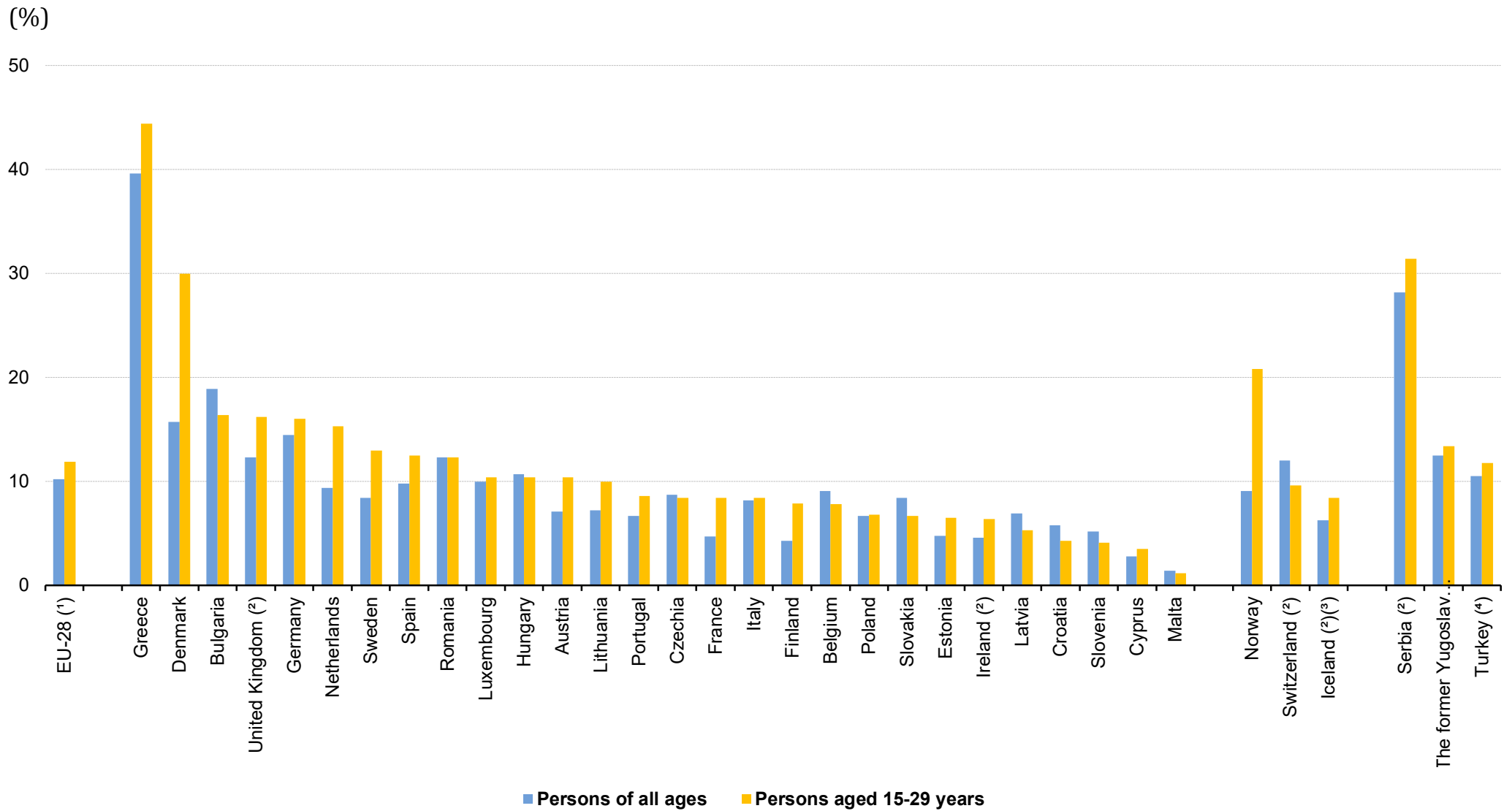
## Distribution of households by size, EU-28, 2008-18

(% of all households)



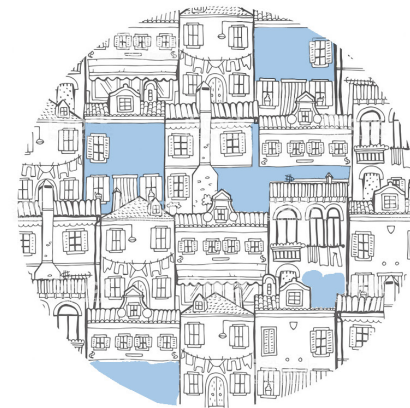
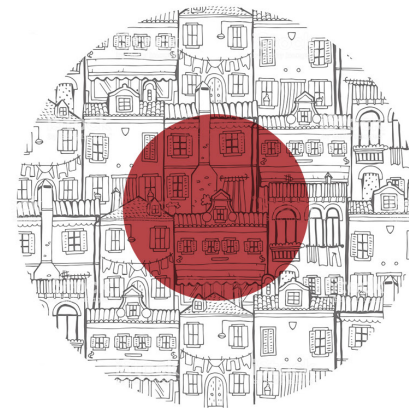
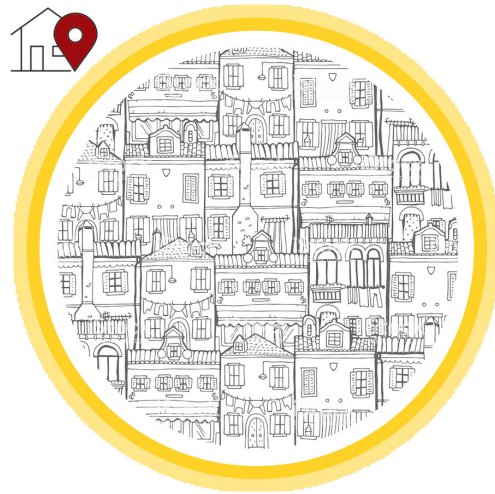
There is an increased demand on single occupant housing  
**More housing units need to be produced**

# Housing cost overburden rate, 2017



**young people** are the ones less able to afford a house

# - problem statement -



- population growth
- shift of dwelling habits

- increasing demand
- land shortage

- housing in suburbs
- concentration of activities in the centres

- unused urban voids in central locations

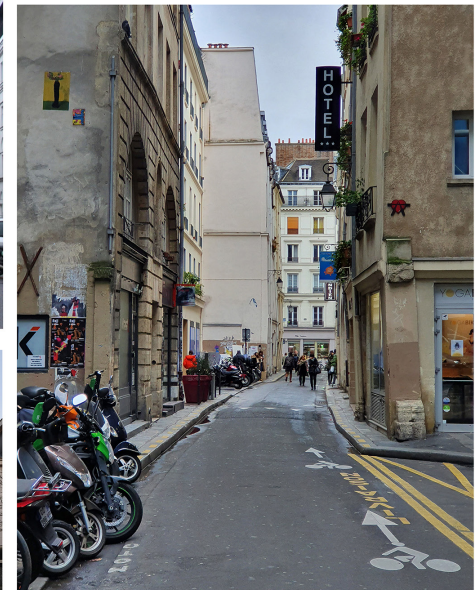
---> increasing demand for housing vs. housing shortage

---> lack of affordable housing in the city centres

---> increased commute time, decreased social interaction

---> opportunity?





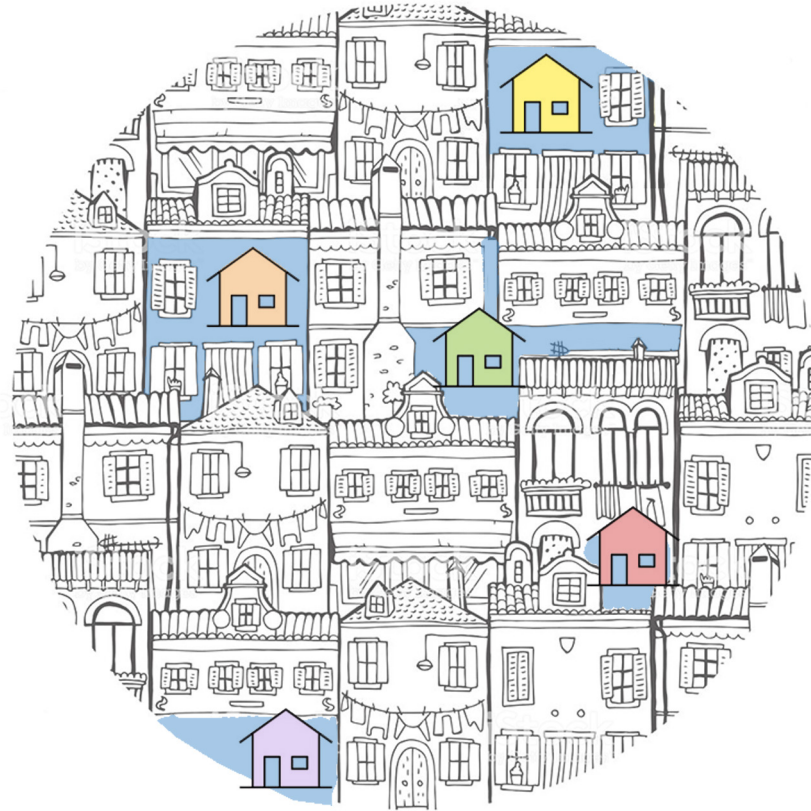
## - design question -

How to design affordable single-occupant housing for young people using the left over space in city centers?

Subquestions |

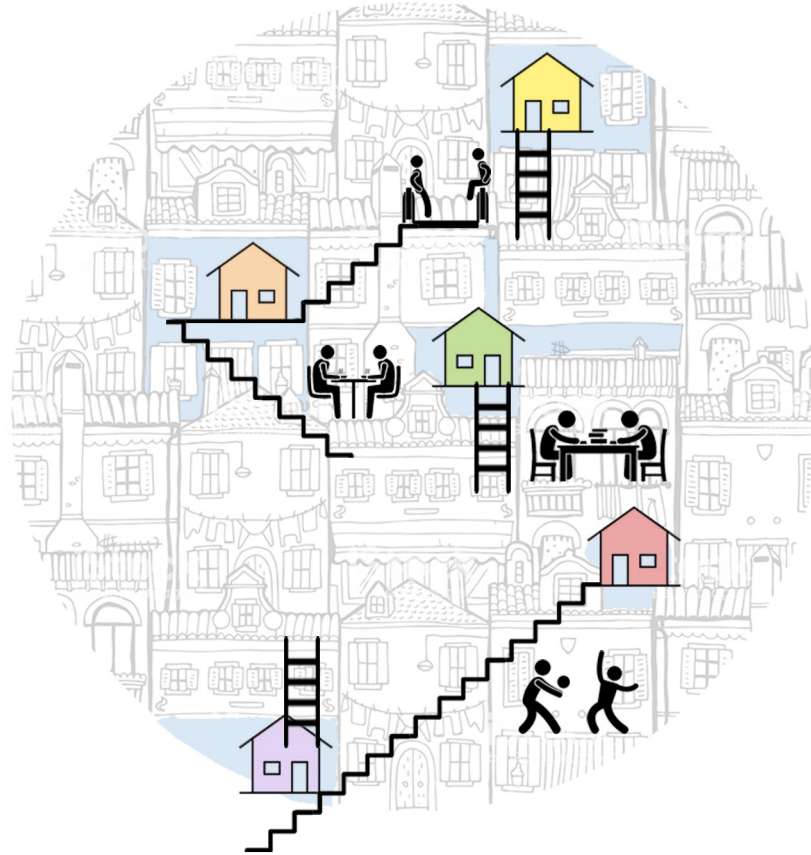
- How to create a system that could adapt to different cities?
- What are the different modes of infills on the site?
- Which existing amenities can be used ?
- Could it improve the host building?
- What is the influence on the neighborhood?
- How to respond to climate?
- How to minimize area?
- What is public, shared, private?
- How to convince/promote a new way of living? reduced costs + sustainable awareness
- How to minimize costs?
- Is it permanent?

## - proposal -



- Densify the **city centers** by occupying **unused space** with **lightweight** single housing **units** for **young people**

## - proposal -



- These units would be **minimal** in their rental area not only due to space constraints, but also for **sharing** amenities with the public, thus engaging with and giving back to the **neighborhood**

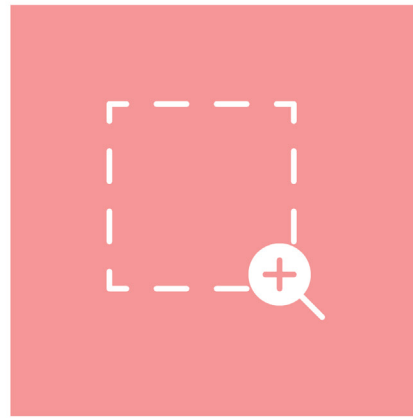


- proposal -

What can it give back to the host neighborhood?



provides young people  
with affordable housing  
in the center



**public spaces:**  
common rooms  
gardens



**revenue:**  
rent or lease money  
shared expenses



**physical improvements:**  
renovations  
greenery

- proposal -

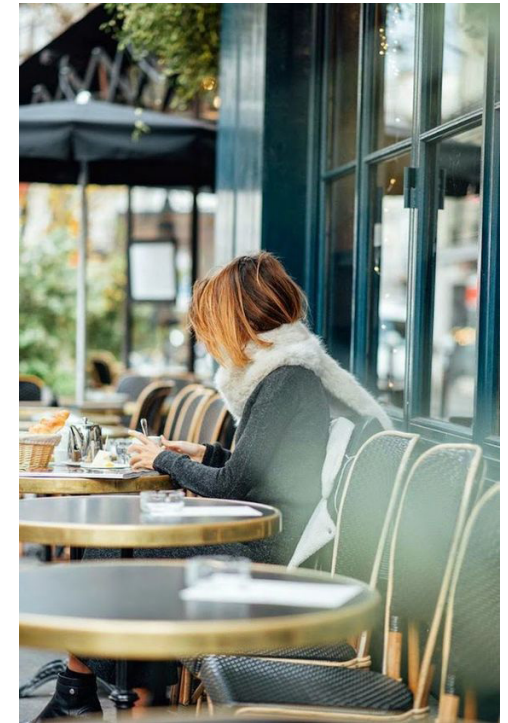
What can it take from the city center?



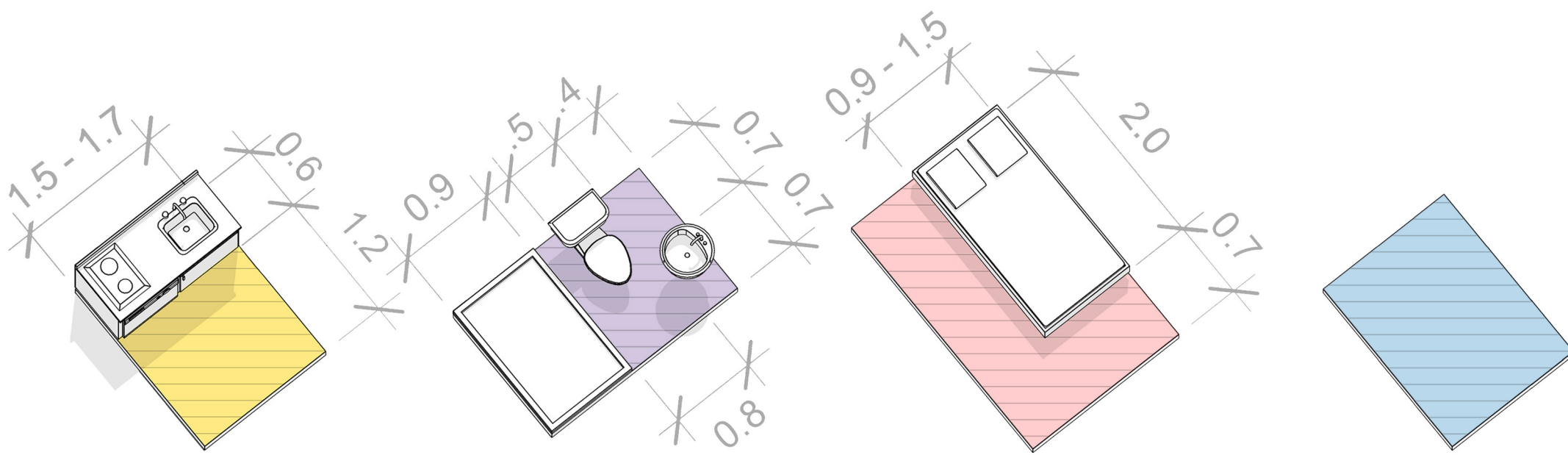
- socializing -



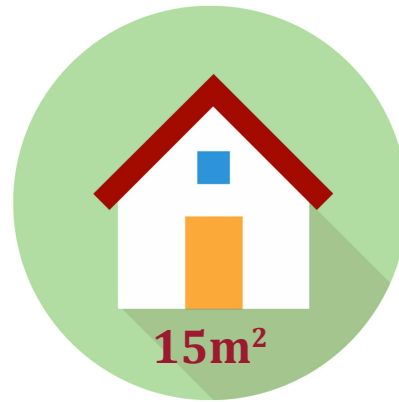
- working -



- eating -

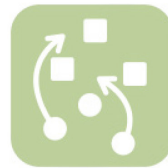


- minimum required areas per function -  
**total 8-10 m2 plus flexible area**



**lightweight:**

less materials



**flexible:**

adaptable  
easily transported



**affordable:**

less rental area



**user friendly:**

social interaction  
privacy



**neighborhood  
friendly:**

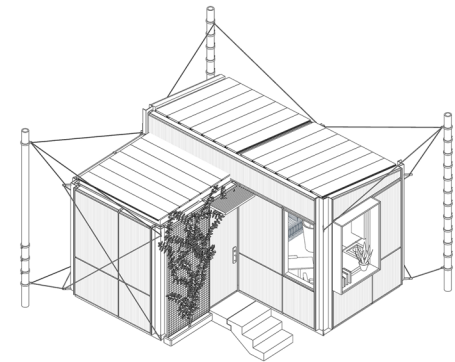
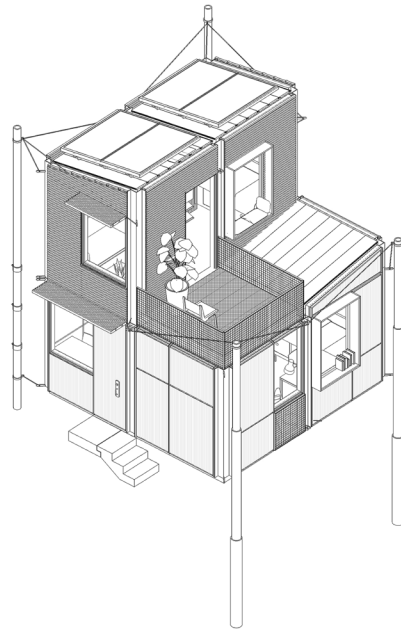
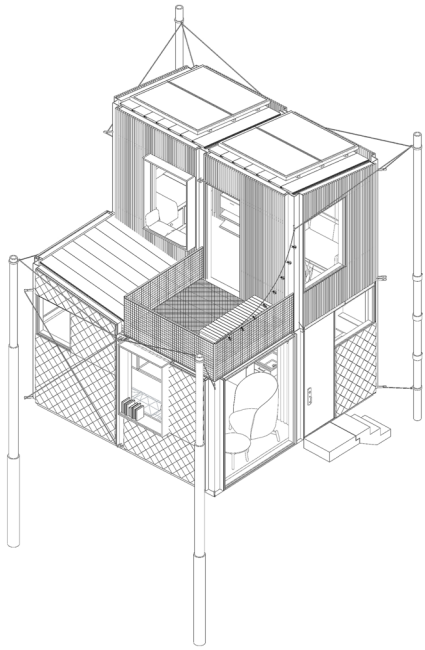
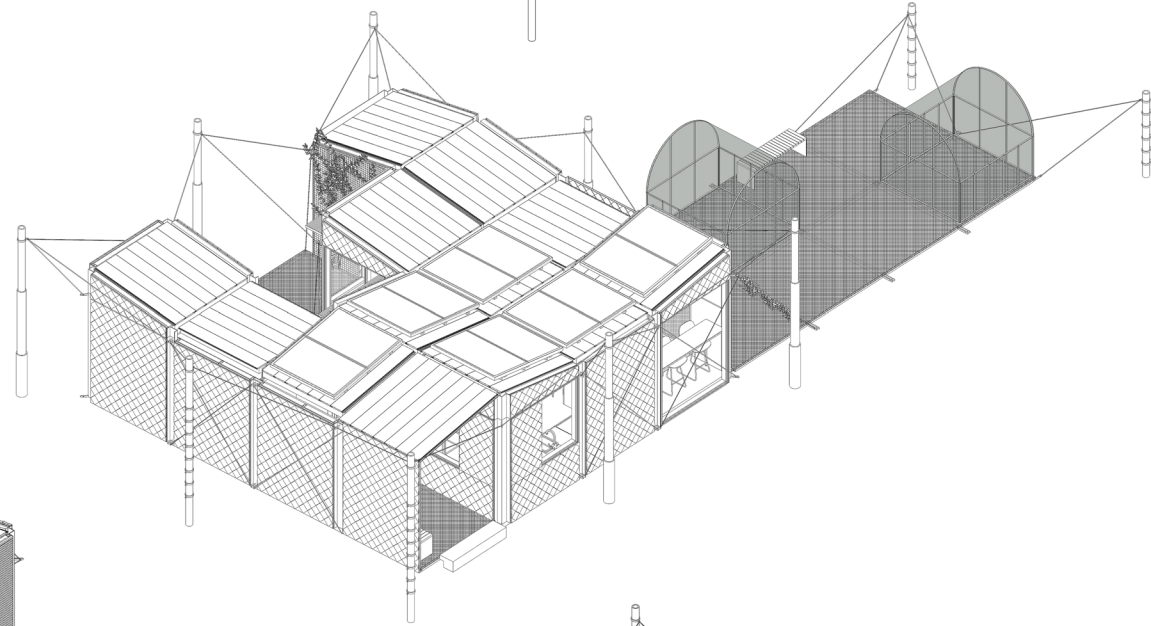
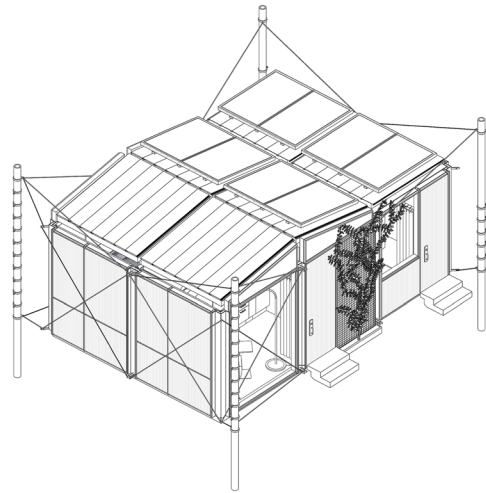
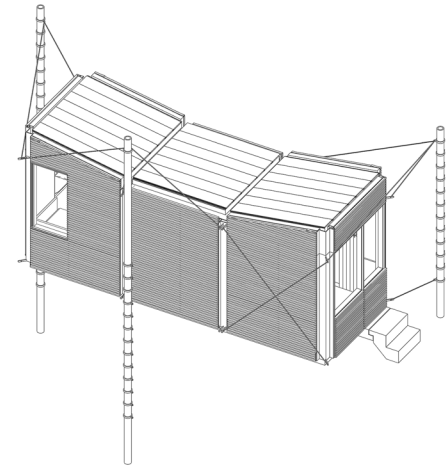
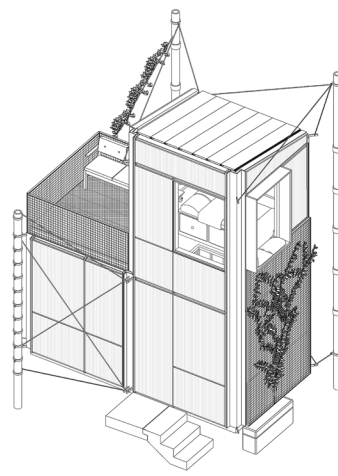
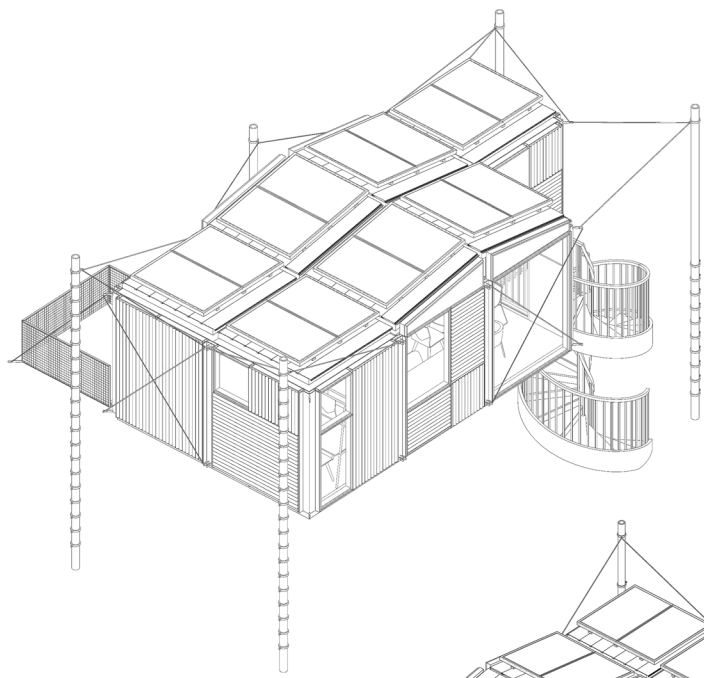
common spaces  
engagement

**- research question -**

What are the design guidelines for lightweight single-occupant housing, for students and starters, that attaches to the existing fabric of crowded European city centers?

Subquestions |

- How to achieve diversity?
- How to respond to different site aspects (host buildings, climate)?
- How to benefit the host buildings?
- Which innovations could be applied? (from different fields)
- What materials to use? (lightweight, sustainable)





# Research

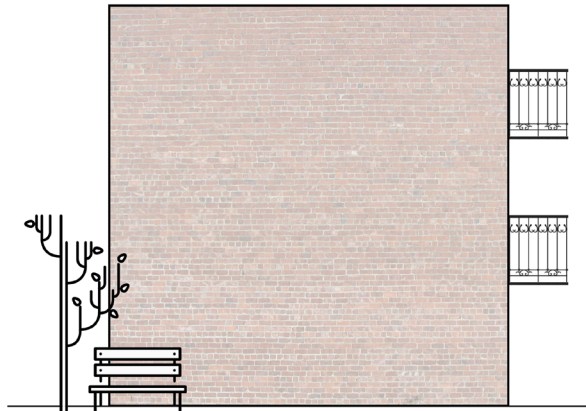
existing fabric  
lightweight concepts  
case studies  
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EXISTING FABRIC



**In-between |**



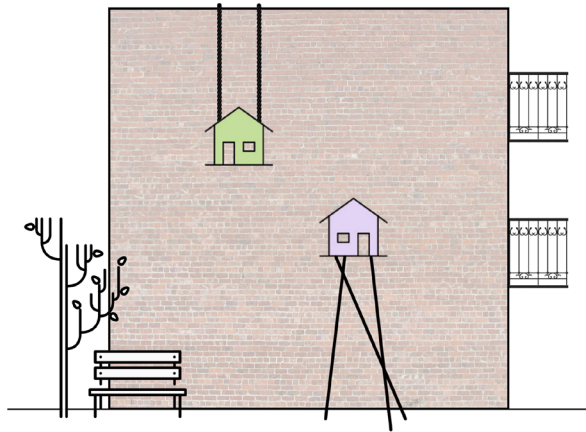
**Blind-walls |**



**Roof-tops |**



**In-between | compressed**



**Blind-walls | hanging, free-standing**



**Roof-tops | resting, attached**

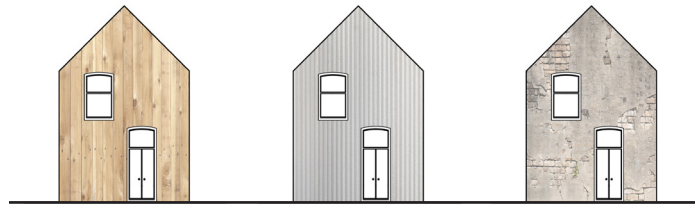


**lateral forces:** minimal

**compressive forces:** acceptable

**attachment method:** hanging from the roof structural members, in-between (aligned to beams)

*\*notes: forces applied to the wall should be distributed along a wide surface area*

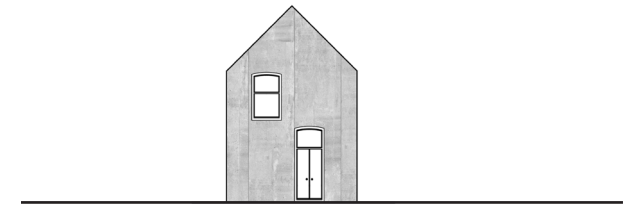


**lateral forces:** on structural members

**compressive forces:** on structural members

**attachment method:** hanging from, in-between (along structural elements), attached to structural elements

*\*notes: in case of in-between connection alignment of structural elements of both buildings should be resolved*

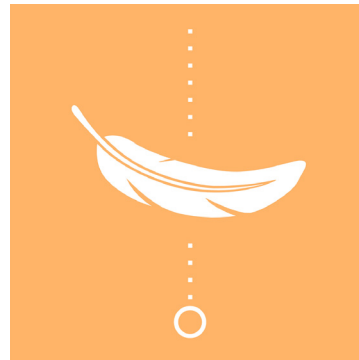


**lateral forces:** acceptable

**compressive forces:** acceptable (preferable)

**attachment method:** hanging from, in-between, attached to

*\*notes: enough distance from openings, no other restrictions on attachment location*

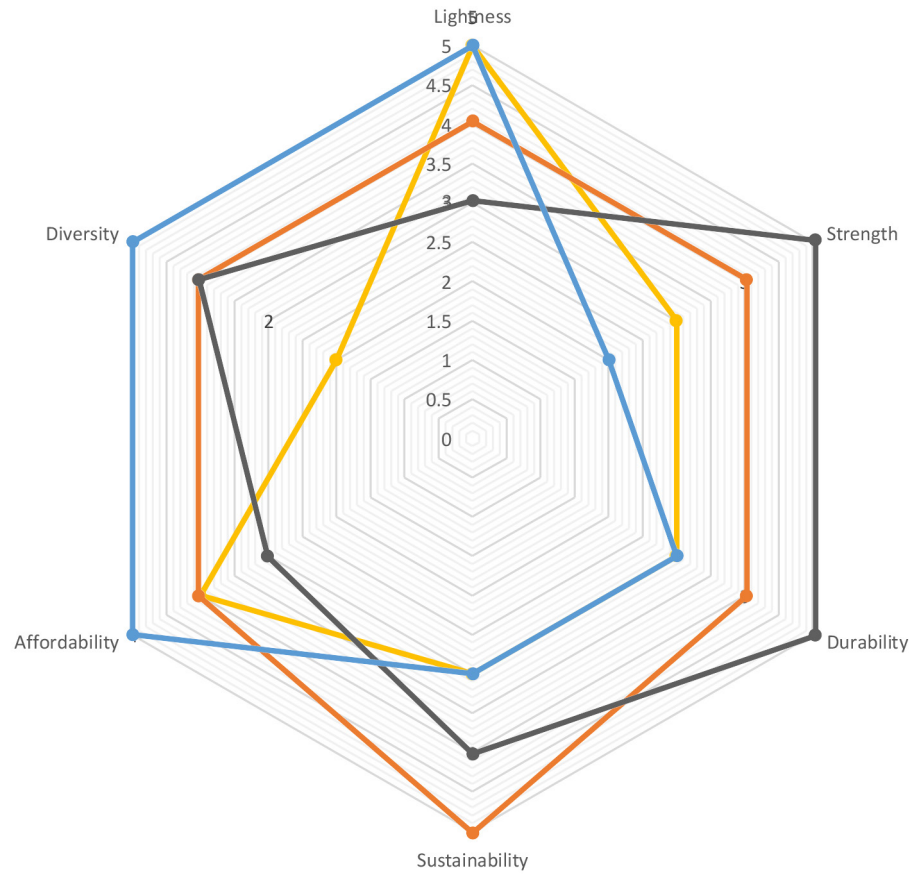


LIGHTWEIGHT

To **reduce impact** on the host building and ensure **structural stability**, the constructed units must be **lightweight**.  
Using **less materials** also makes the units more **affordable**.

# MATEIALS

- *Wood*
- *Metal*
- *Plastics*
- *Fabrics*

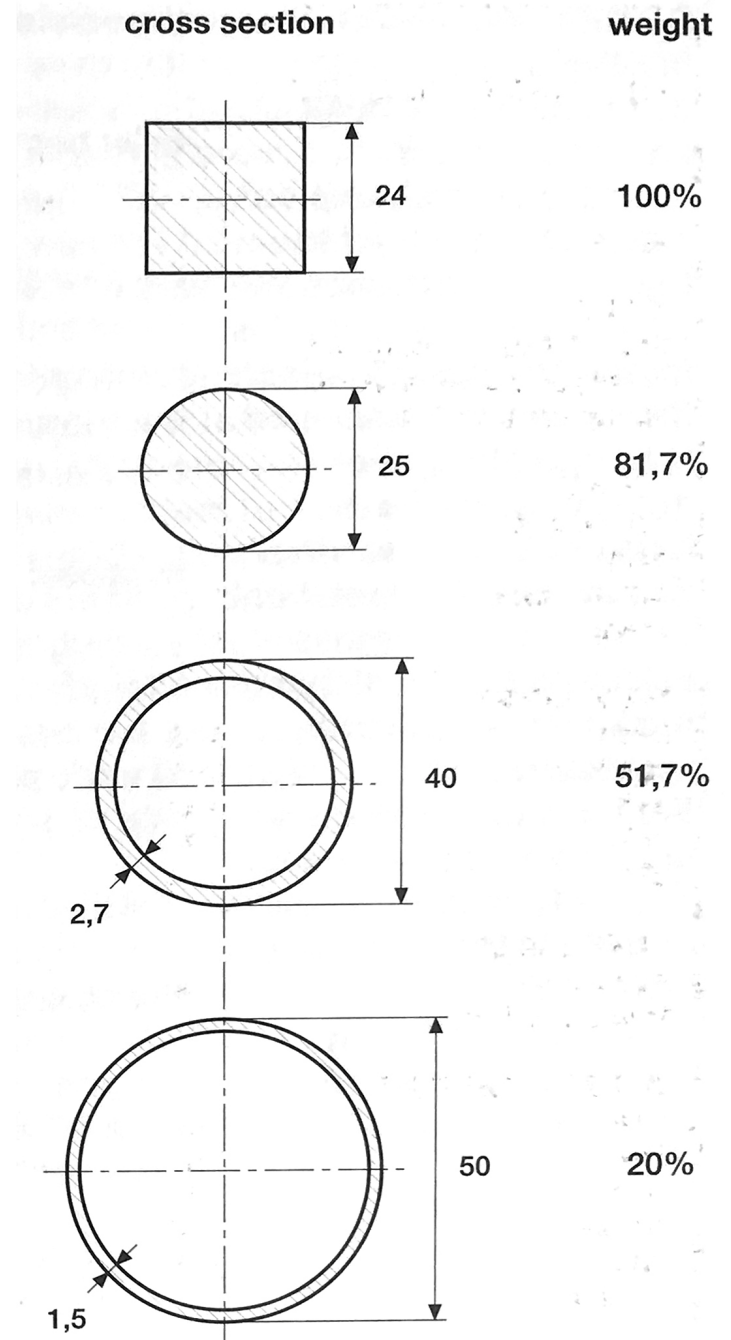


	lightness	strength	durability	sustainability	affordability	diversity
wood	4	4	4	5	4	4
metal	3	5	5	4	3	4
plastics	5	2	3	3	5	5
fabrics	5	3	3	3	4	2

## CONCEPTS

*" The lightness of an object is not limited to the choice of lightweight materials only. It highly depends on the shape they are given and the function that these materials would perform." - Ed van Hinte*

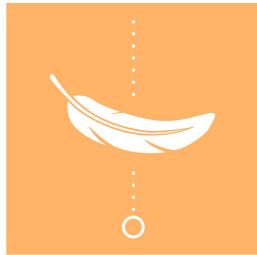
Tension should always be favored for lightweight construction as compression requires mass.





CASE STUDIES

To gain **further understanding** of these concepts and more



MATERIALS COMPRESSION

TENSION



CABLES+ANCHORS

ANCHORS

ADJUSTABLE LEGS

POLES

FOUNDATIONS

FRAMES



FABRICATION

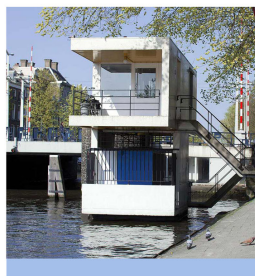
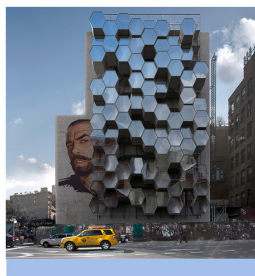
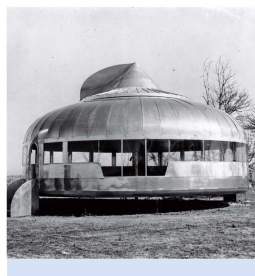
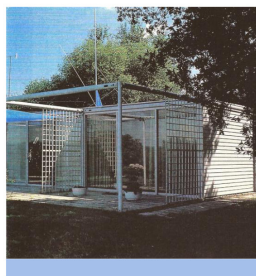
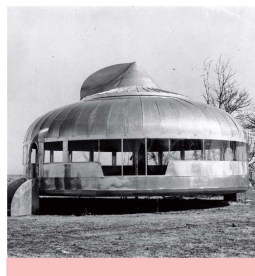
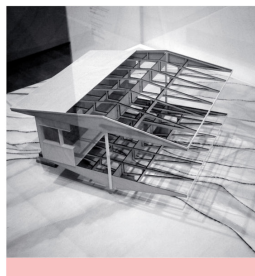
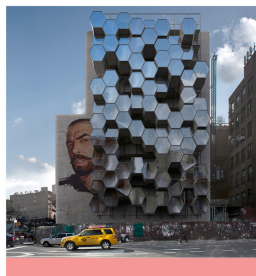
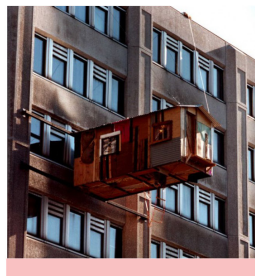
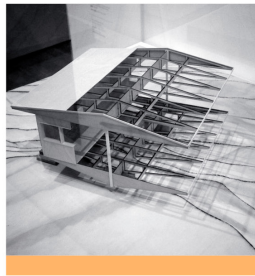
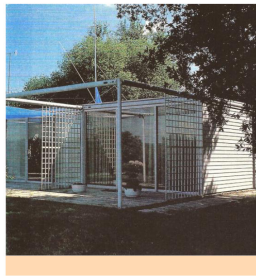
JOINTS

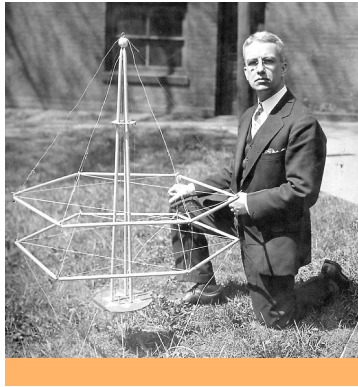
STRUCTURE

COST

ENERGY

SPACE

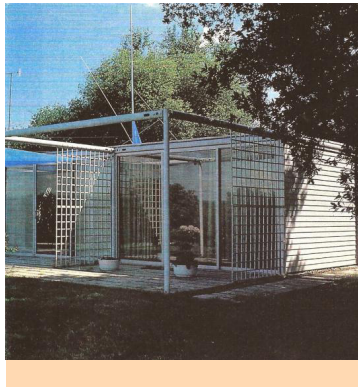




## Dymaxion House | Buckminster Fuller

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- **Suspension** of roof, floors, and walls, from a single mast
- Steel struts triangulated to give structural **rigidity**
- **Stairs** further stabilize the house



## Yacht House | Richard Horden, Frank Newby

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- **Aluminum** alloy for compression members and stainless **steel** as tension members
- Innovative **joint system** for efficient nodes and fast assembly
- **Modular design** and standard components for flexibility and ease of connection

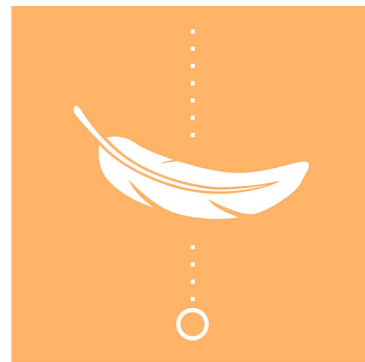


## Micro Compact Home | Horden Cherry Lee Architects

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- **Off-site** assembly
- **Detached sub-frame** and services prepared on-site in parallel with the factory process
- **Vacuum** roof insulation
- 2 options for **structural frame**: wood and aluminum *~weight, cost, and sustainability differences*

- structural concept -



LIGHTNESS



ATTACHMENT

**lightness**

minimizing number of structural elements' number and size by favoring tension over compression  
using materials of high strength to weight ratio

**adaptability to different attachment types**

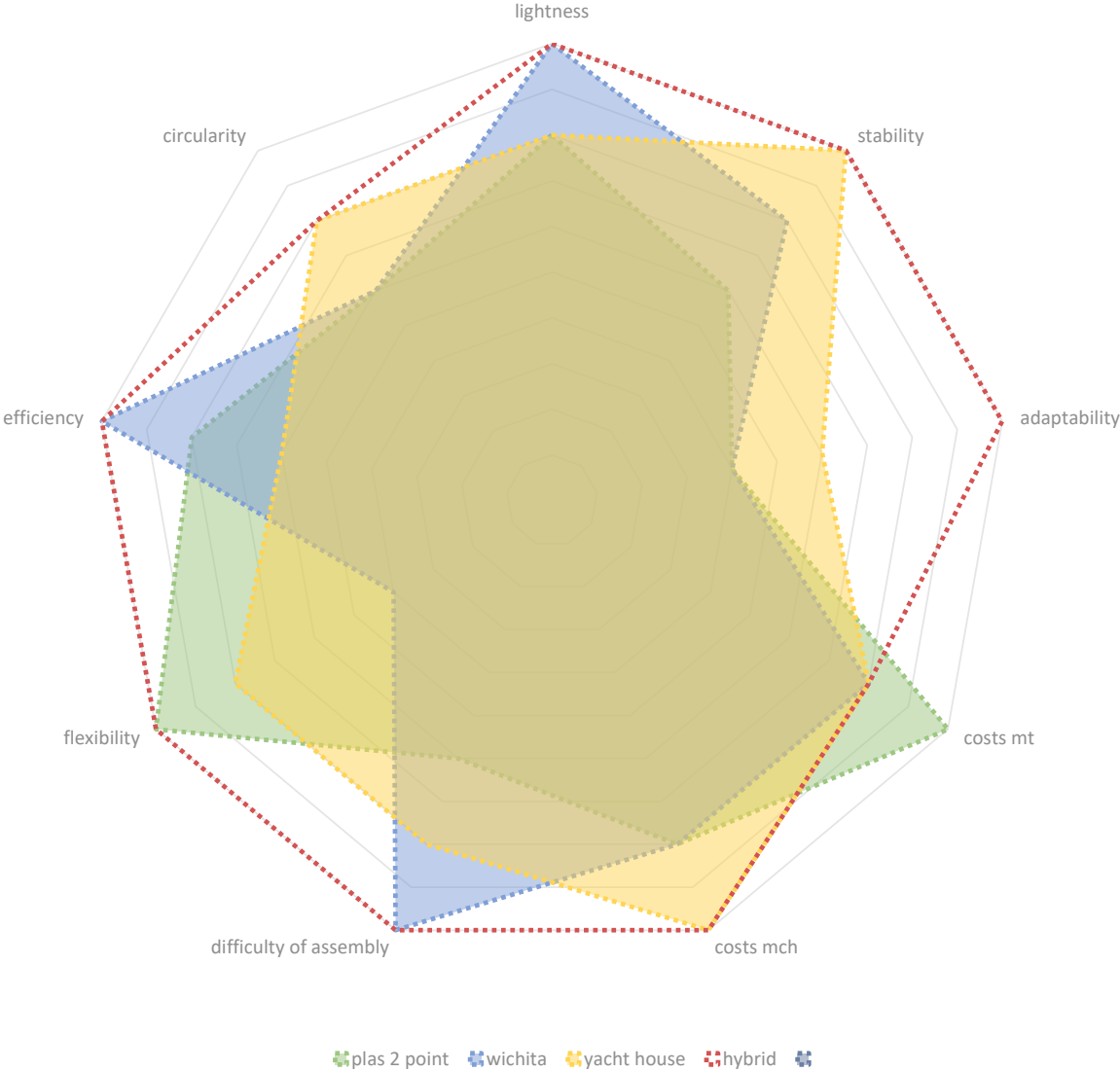
detaching the house unit from the support allows for various flexible combinations



CONCLUSIONS



- the hybrid system -



# 1.

## Project Settings

### 1.1. Location

which are the potential cities where units would make a difference?

- Criteria for choosing the location
- 1. urgency of the housing issue:**
  - cities where single-occupancy units are in high demand
  - cities where it is uneconomical to build new units
  - cities where the percentage of housing stock is high
  - \* which implies housing overburden
  - a high percentage of students
- 2. initiatives:**
  - governmental/municipal efforts
  - modifying planning regulations
  - simplifying building procedures
  - offering funding
  - carrying out surveys
- NGOs and housing/social organizations
  - conducting surveys on usage
  - forming statistics on city density
  - raising public awareness
  - promoting sharing, exhibition
  - translating public needs into design
  - finding funding solutions
- 3. city character:**
  - acceptance of experimental architecture
  - a need/willingness to characterize the city
  - positive responses to previous projects
  - samples of innovative/conceptual design
  - sense of community
  - availability of "gaps" in the urban fabric
  - \* there should be a balance between public and private spaces
- List of potential cities: **Copenhagen, Vienna, Stockholm, Zurich, Amsterdam**

### 1.2. Target group

who are the future users of the project?

- Housing overburden is most acute in the city center
- Young generations are willing to share
- Choice of one of the categories:
  - the percentage of each in the target group
  - successful housing initiatives already enough to provide for the target group
  - \* it is important to understand the needs of the target group

# 2.

## Regulations and Laws

### 2.1. Building regulations

how to find relevant laws? what to look for?

- Existing relevant laws:
  - Air rights, NYC - *unused space rights*
  - La Loi Alur, Paris - *lot acquisition*
- Municipal archives and government
  - laws on land acquisition/rent
  - laws on co-owned housing
  - laws on house extensions/additions
  - laws on temporary construction
  - laws on roof additions and modifications
  - laws on balcony and 2nd facade
  - laws on public and green space

### 2.2. Responding to laws

how to react to these regulations?

- Follow the laws - *abide by existing building permits rules*
  - case study: - *the 3Box, Paris*
  - *Didden Village, Rotterdam*
- Find loopholes - *use existing rules to tweak the design to meet the regulations*
  - case study: - *the H-VAC, London*
- Break rules - *through provocation*
  - case study: - *Manifest destiny, Seattle*

### 2.3. Fundings

who could fund the construction of the project?

- Student housing organization
- Governmental subsidies
- Neighborhood tenants - *public housing*
- \* consider: *land/ownership issues, but public areas vs. rentable areas*

# 3.

## Resources Study

### 3.1. Unused spaces

what can be considered as "unused space"?

- Types of unused space:
  - in-between buildings*
  - blind walls*
- Main considerations:
  - minimum dimensions / area
  - enough outer diameter for connection
  - accessibility
  - availability of potential adjacent spaces
  - proximity of available gaps
- Further considerations:
  - not compromising the building structure**
    - not blocking daylight/sunlight
    - not blocking views
    - not interfering with adjacent spaces
    - not compromising functions

### 3.2. Attachment style

how could the units be attached to the building?

- Possible attachment types:
  - compressed*
  - hanging, free-standing*
- Considerations:
  - type of unused space
  - structural capacity of the host building
  - attach to the strongest part
  - choose simplest/most accessible
  - divide the load when possible

### 3.3. Existing fabric - commonly used materials

	structure	ex. walls	
brick	timber	brick, structural	*2 an
stone	timber and/or metal	stone, structural (front facade)	*2 ro
timber	timber	wood infill, non-structural	*4 co
metal	metal	framed panels, load-bearing	*4 v
concrete	concrete	CMU infill, non-structural	*6 ter
concrete+metal	concrete	precast concrete units	*5 wt

# 4.

## Design Strategies

### 4.1. Solutions

what are the design strategies derived from the study that offer solutions for attaching the units?

- lightness**
  - suspending loads from a mast with compression frame
  - minimizing number of structural elements
  - favoring tension over compression
  - using materials of high strength to weight ratio (e.g. steel, wood)
- structural stability**
  - a light frame must be braced for rigidity
  - triangulated tension cables provide a lightweight solution
  - extra elements could be used to further stabilize the structure as an external staircase
- adaptability to different attachment conditions**
  - detaching the house unit from the main building structure
  - modified scaffolding with firm joints is a common solution
  - creating a kit of part system that can be adapted to different conditions
  - adjustable legs
- affordability**
  - lightweight construction minimizes the cost
  - modularity of elements reduces production costs
  - using available resources and minimizing waste
- difficulty of assembly**
  - minimum number of foundation elements
  - efficient joints that combine to several functions
  - reversible joints between unit and frame
- impact on host building**
  - lightweight addition
  - attachment system must distribute the load on the bearing structure
  - light triangular bases and scaffolding in order to build lightly
  - cables are a flexible and light solution for connecting the units
  - carrying the loads to the street or roof
- façade flexibility**
  - structural frame with infill wall construction
  - modularity of façade units enables integration with existing building
  - wall panels suspended from central girder act as tension members only and thus can be eliminated when not needed
  - introducing columns reduces the need for a central girder

# 5.

## Neighborhood Analysis

### 5.1. Program

which functions are available/needed in the neighborhood?

- study the existing program
- categorize the existing functions
- define public areas present
- conclude which functions are needed

### 5.2. Character

what characterizes the chosen neighborhood?

- Privacy levels:**
  - windows: *size, curtains, glass color*
  - entrances: *elevation, exposure*
  - connections to streets: *gradual*
  - thresholds between public and private spaces: *sidewalks, plants*
  - shared spaces: *purpose, availability*
- Tenants' demographics**
  - meetings
  - organizations
  - shared properties/projects
  - people's interaction
- Community sense:**
  - public awareness
  - willingness to change
  - shared spaces operation
  - experimental buildings on site
- Acceptance level:**
  - public awareness
  - willingness to change
  - shared spaces operation
  - experimental buildings on site
- Physical conditions:**
  - available amenities
  - required renovation works

### 5.3. Intervention

what are the further considerations for the intervention?

- Considerations:**
  - climate and orientation
  - aesthetic impression - *standing*
  - parasitic level - *degree of reliance*
  - privacy level - *openness vs. enclosure*
  - unit accessibility - *location, orientation*
  - inducing interaction - *case study: Moriya house, Tokyo; Cub*

# 6.

## Personalization

### 6.1. Space use

how to personalize the unit according to users' daily space usage patterns?

- analyze users' needs - *questionnaires*
- determine required private functions
- specify the areas of chosen functions
- define their relation/configuration - *mapping*

\* sample studies: *praxeology, Frankfurt kitchen studies, "Die Neue Wohnung" - Taut*

### 6.2. Flexibility

which aspects could require flexibility in the units?

- innovation*
- partitions*
- functions*
- furniture*
- privacy*

\* flexibility in these aspects can be provided by smart changeable elements applied in both private and shared spaces in accordance with users'/neighborhood needs

### 6.3. Shared (public) space

what would be shared and to what extent?

- choosing which functions to share - *in accordance with recent surveys of future target group*
  - sample study: *ONE SHARED HOUSE 2030 surveys*
- considering neighborhood needs - *gardens, kitchens, event spaces, study halls; renovation works, profit*
- choosing extend of sharing - *facility operation hours, facility management, opening to tenants vs. to public*
- Goals:**
  - creating/activating a neighborhood
  - encouraging a new way of dwelling - *through sharing, indoor and outdoor relation, and neighborhood engagement*
  - offering cheaper housing - *smaller private rented area vs. larger communal spaces*

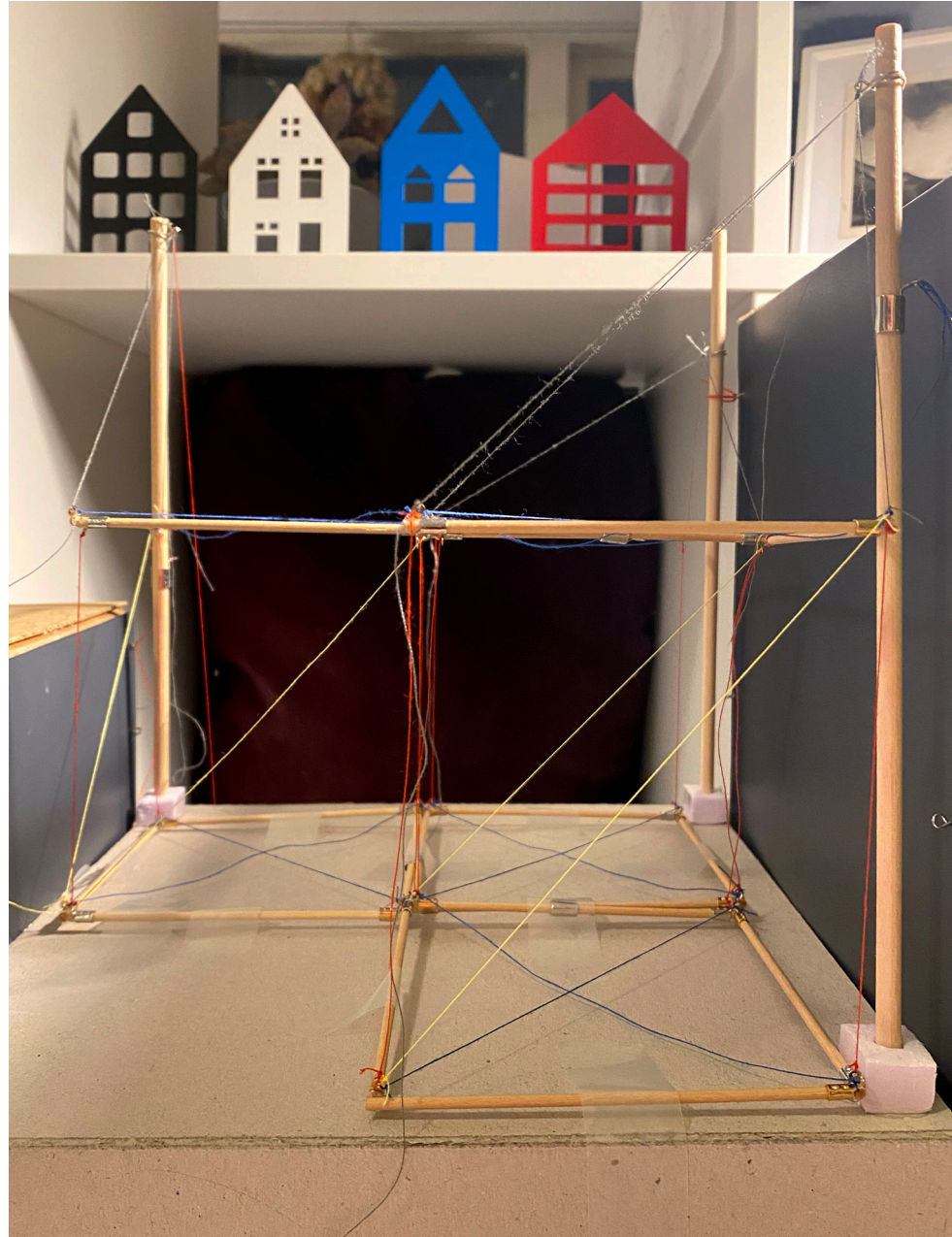
### 6.4. Diversity

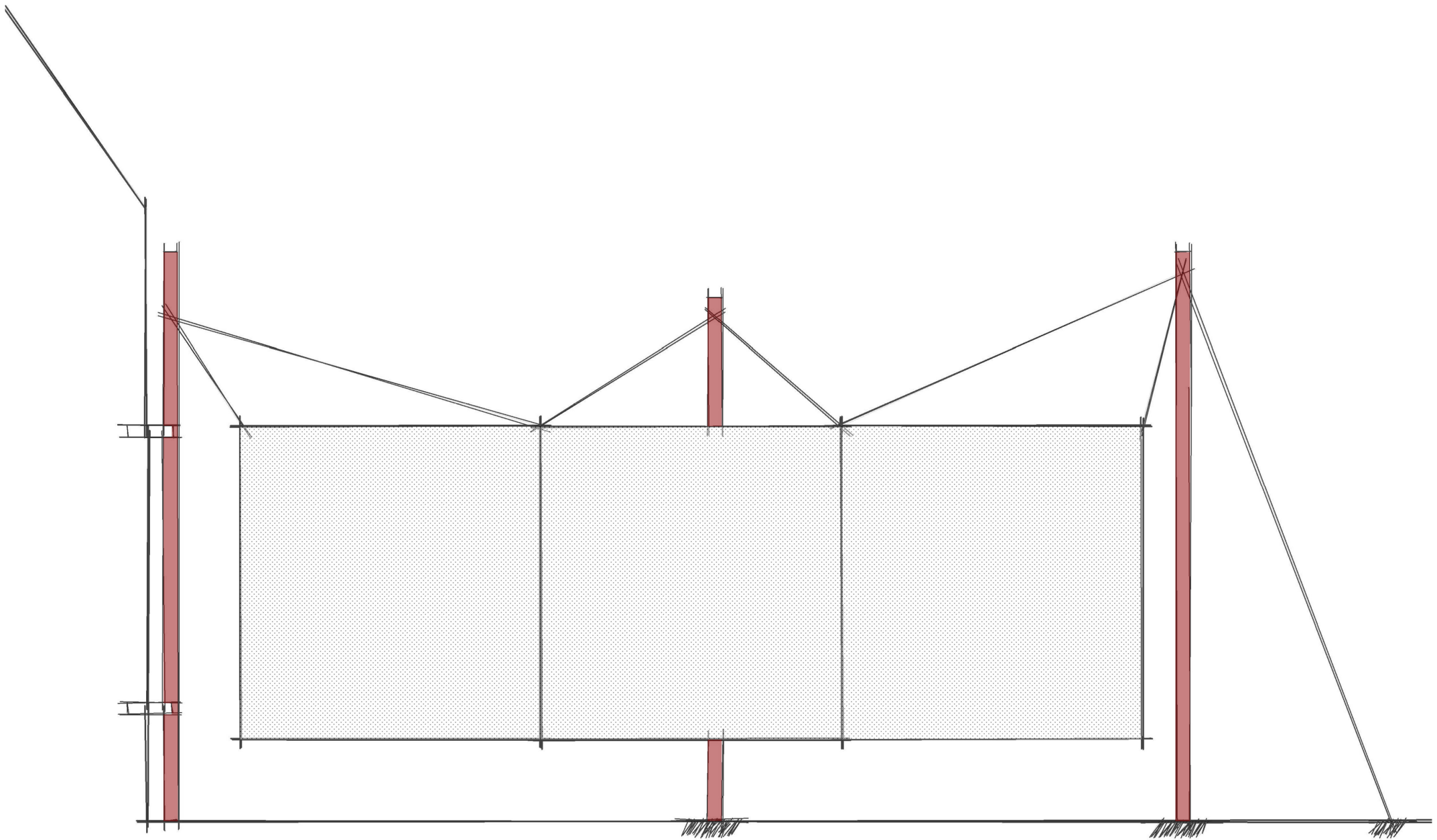
how to achieve the desired level of diversity?

- Diversity elements:**
  - floor plan*
  - functions*
  - geometry*
  - façade*
  - privacy*
- Considerations:**
  - desired aesthetic impression - *considering existing buildings*
  - outer vs. inner diversity
  - needed level of diversity - *according to target group*

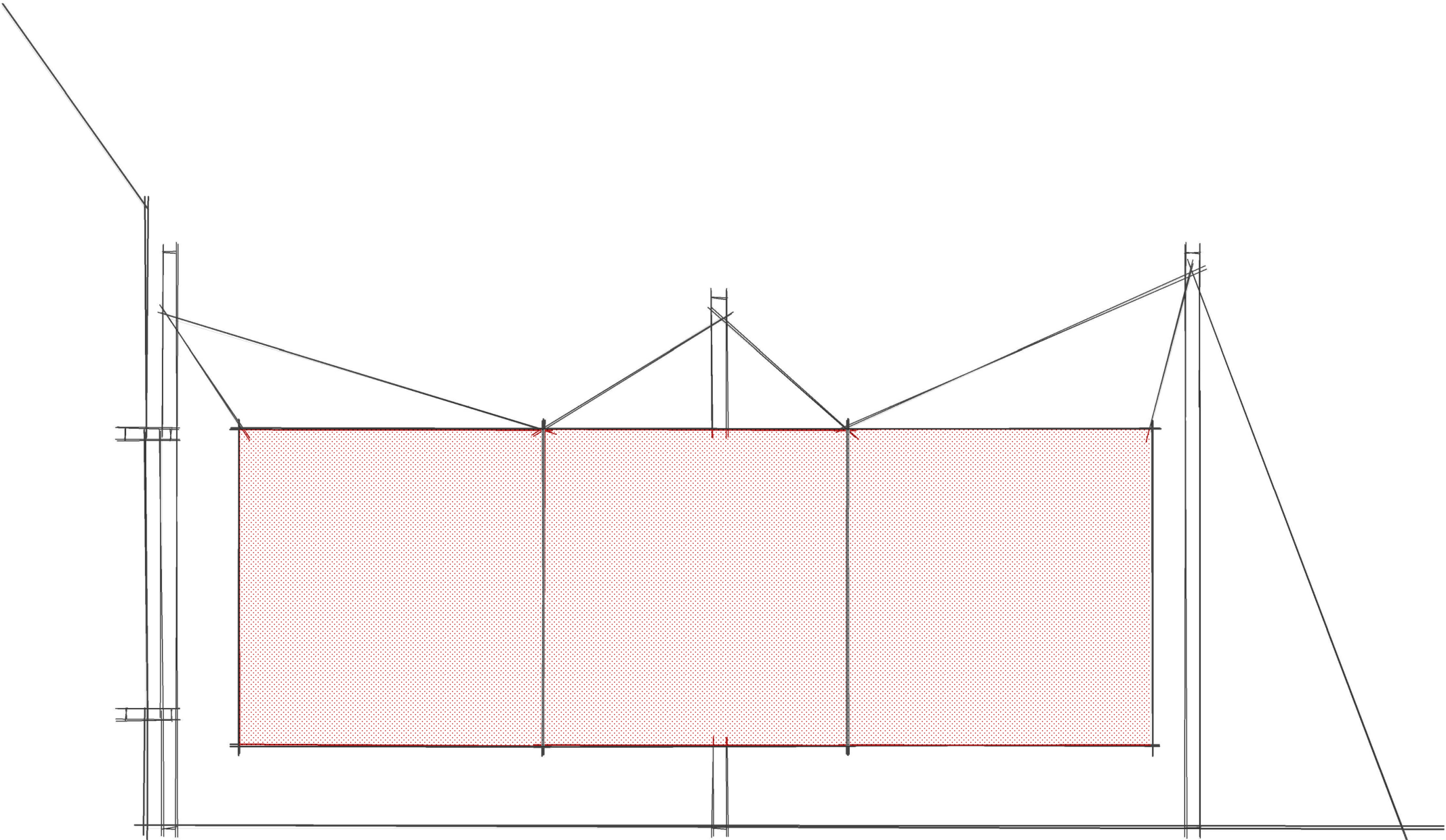




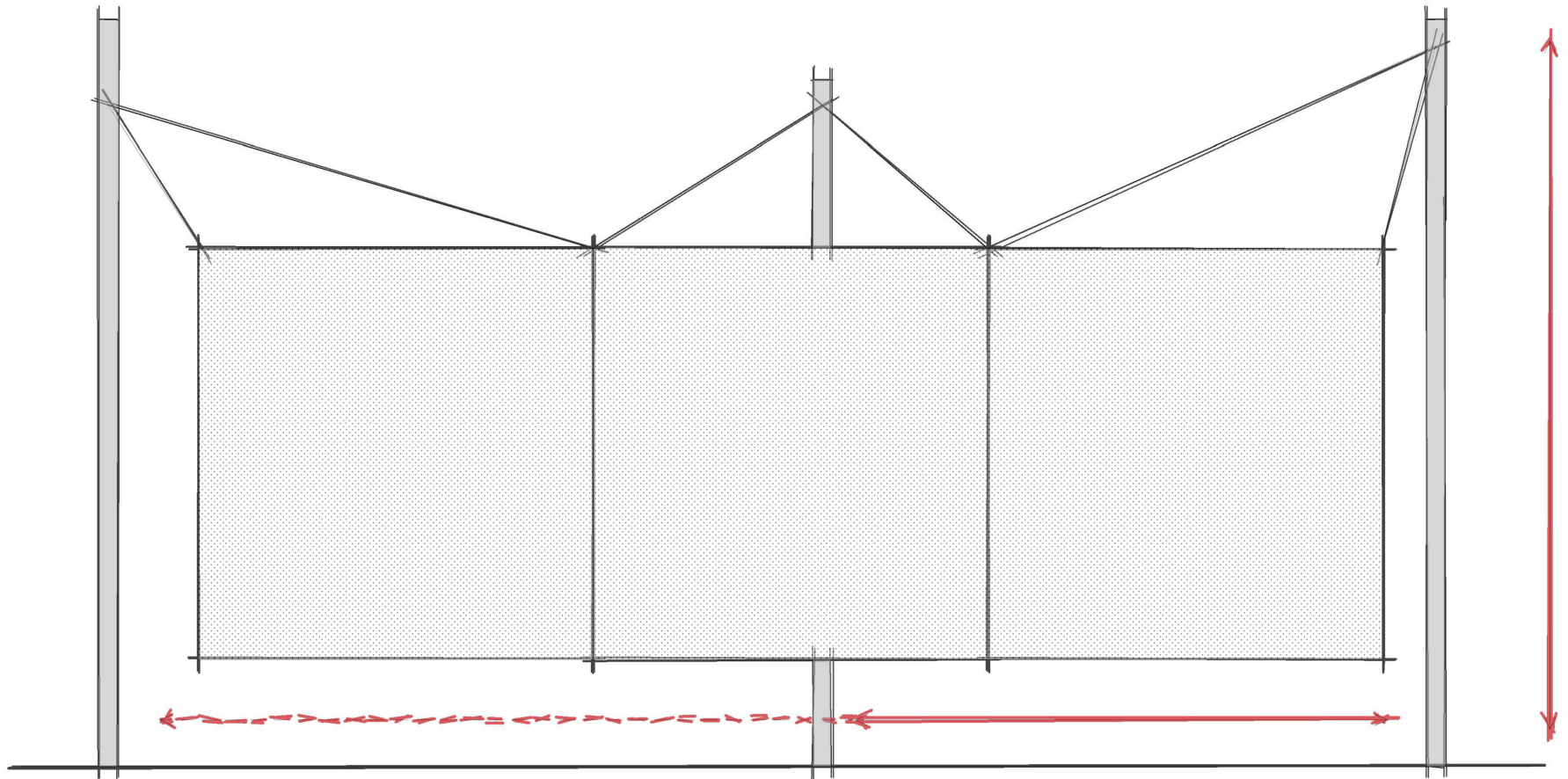




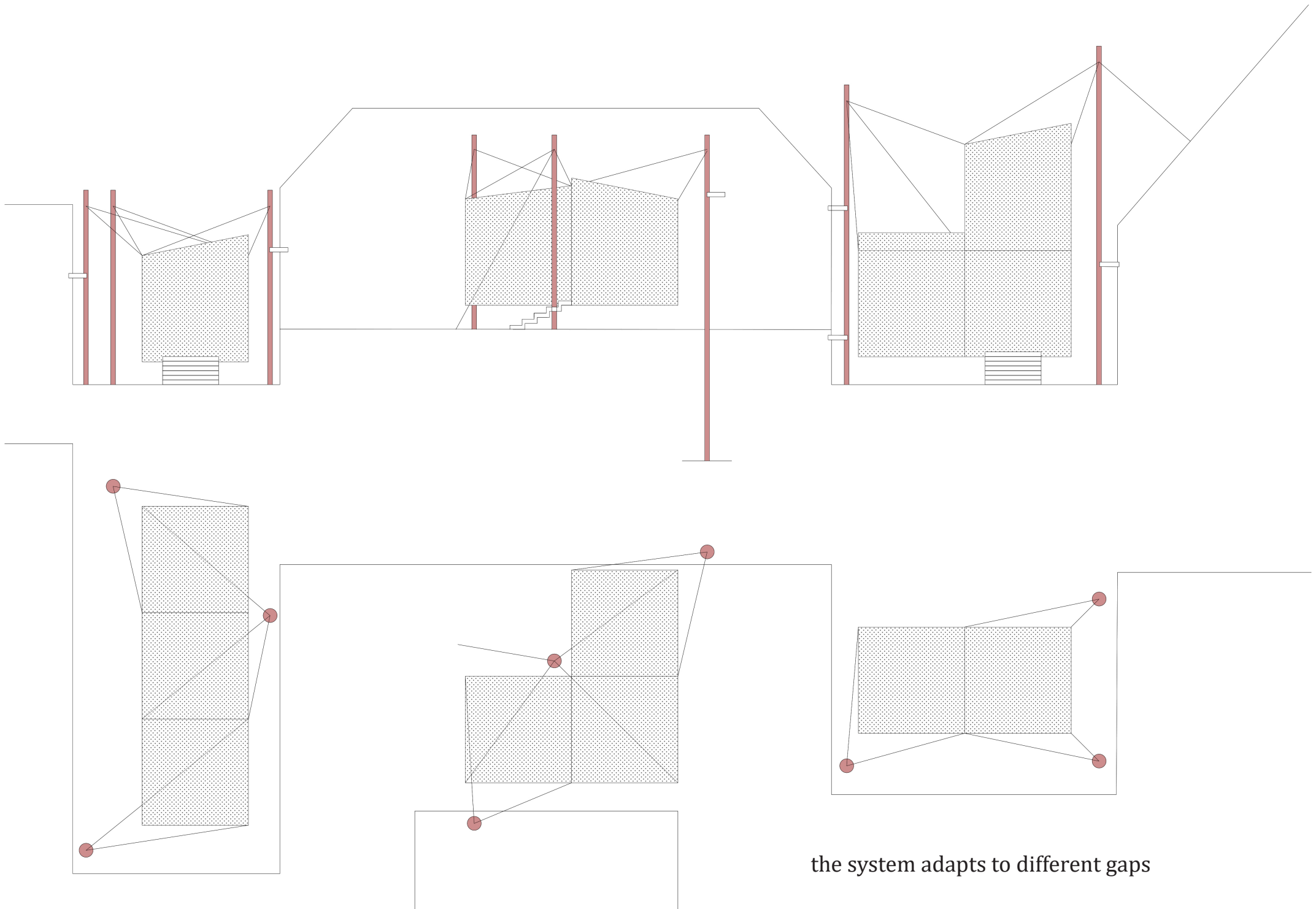
the house is suspended from 3 rods



a house is formed of 3 units, 5m<sup>2</sup> each

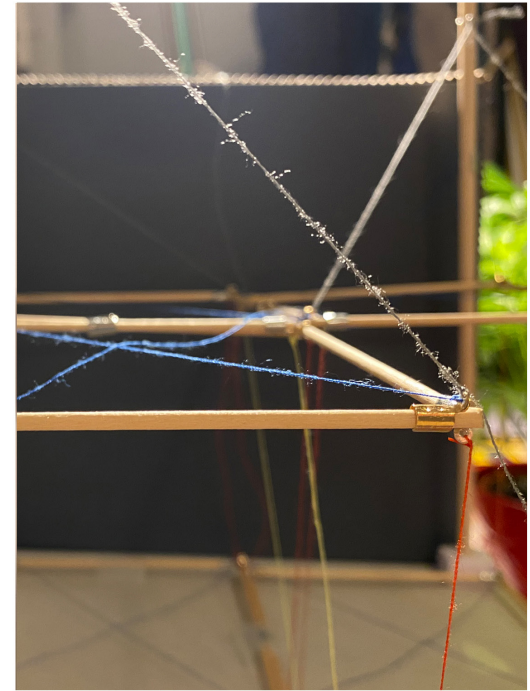
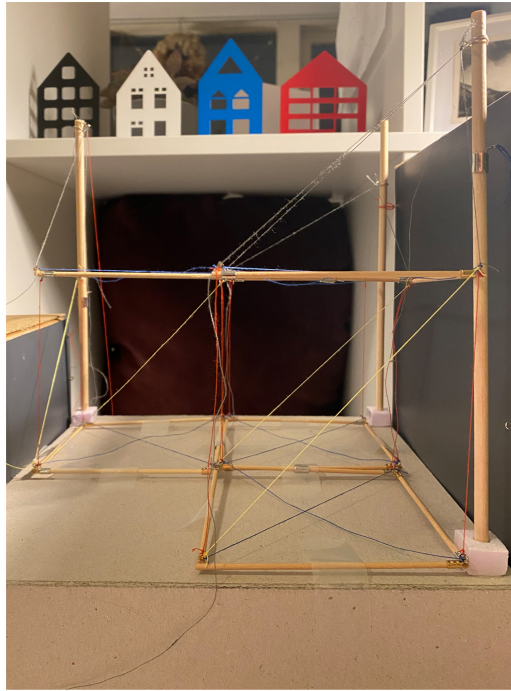


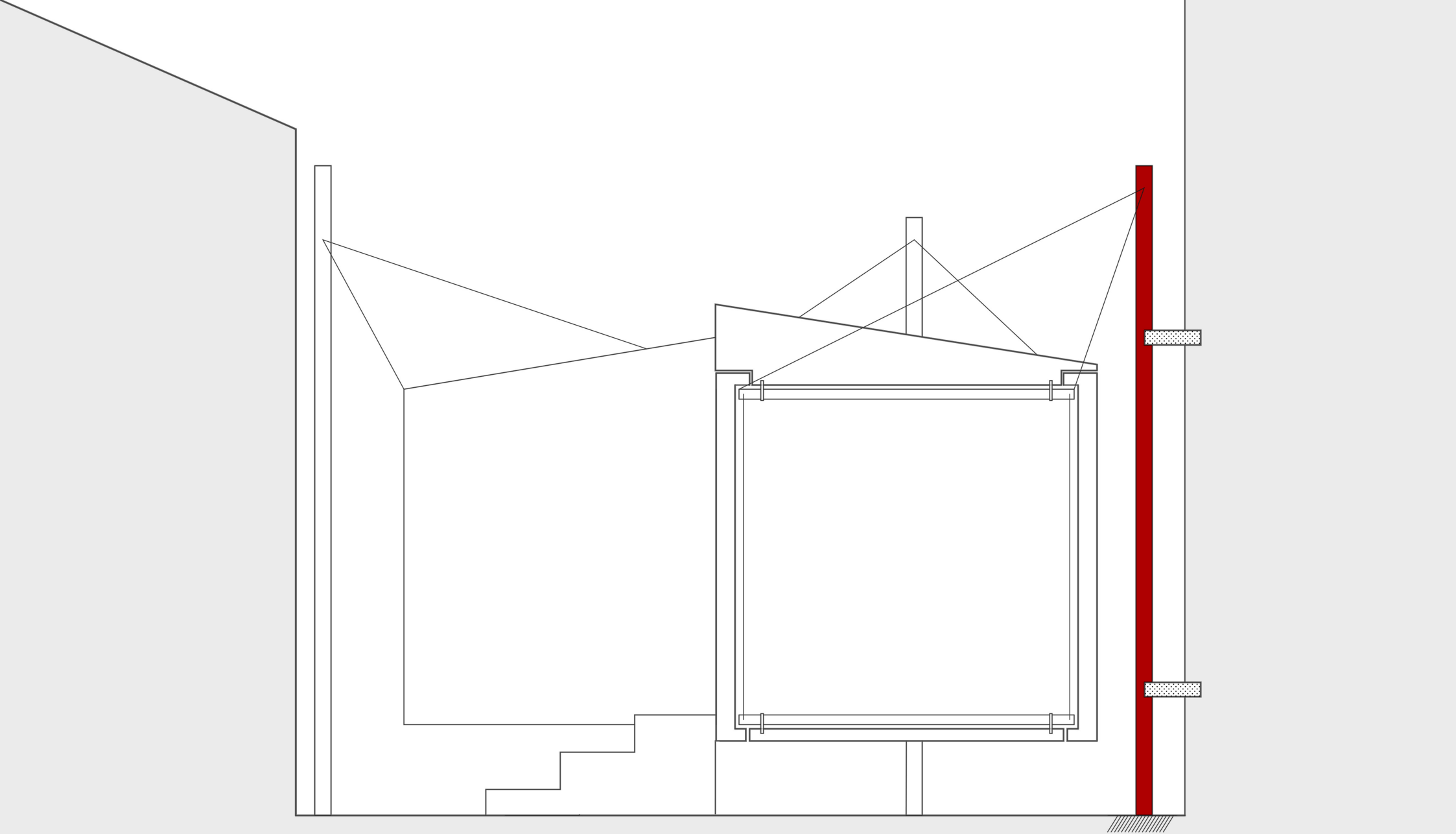
vertical and horizontal dimensions are flexible



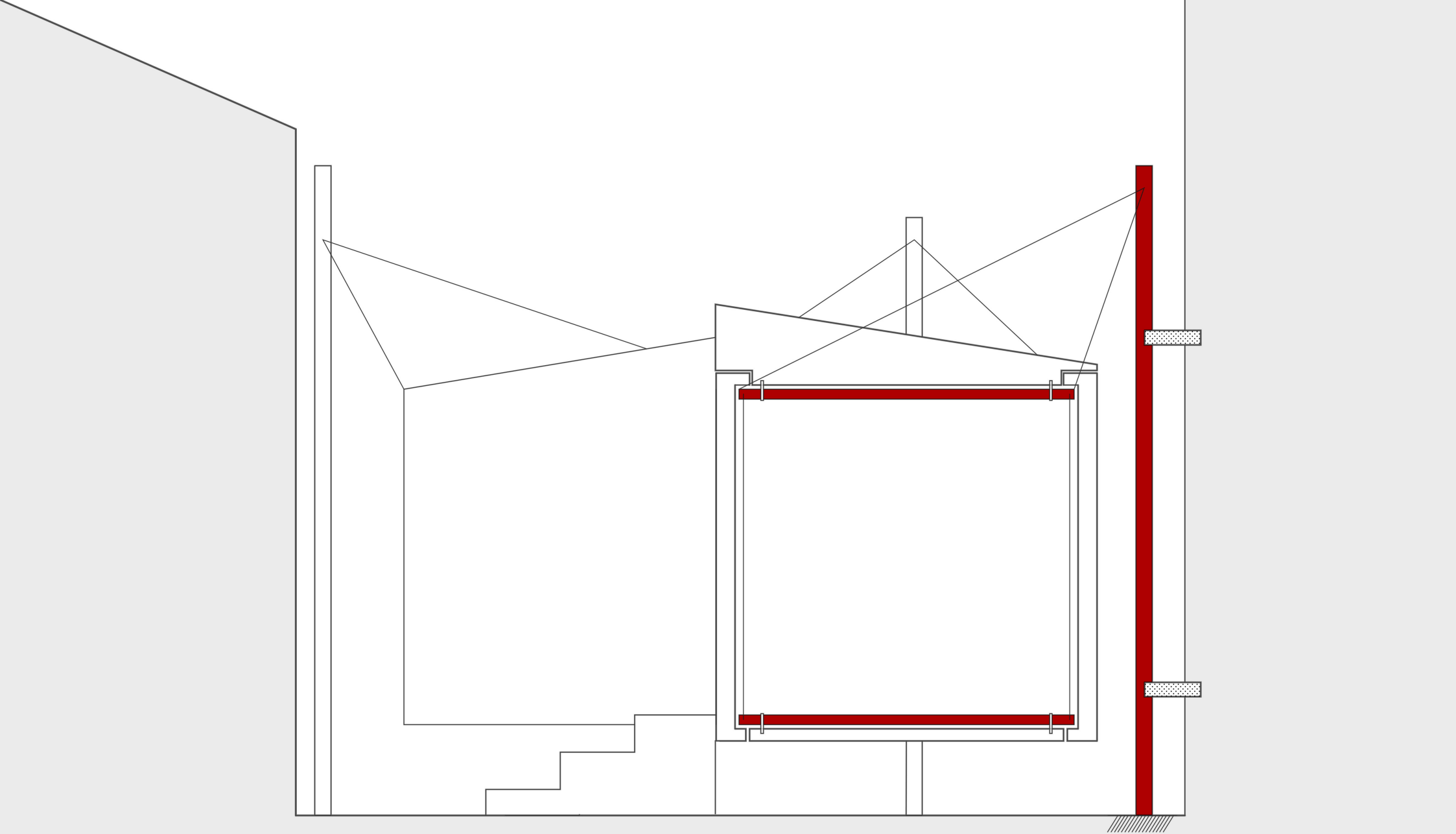
the system adapts to different gaps

- study models -

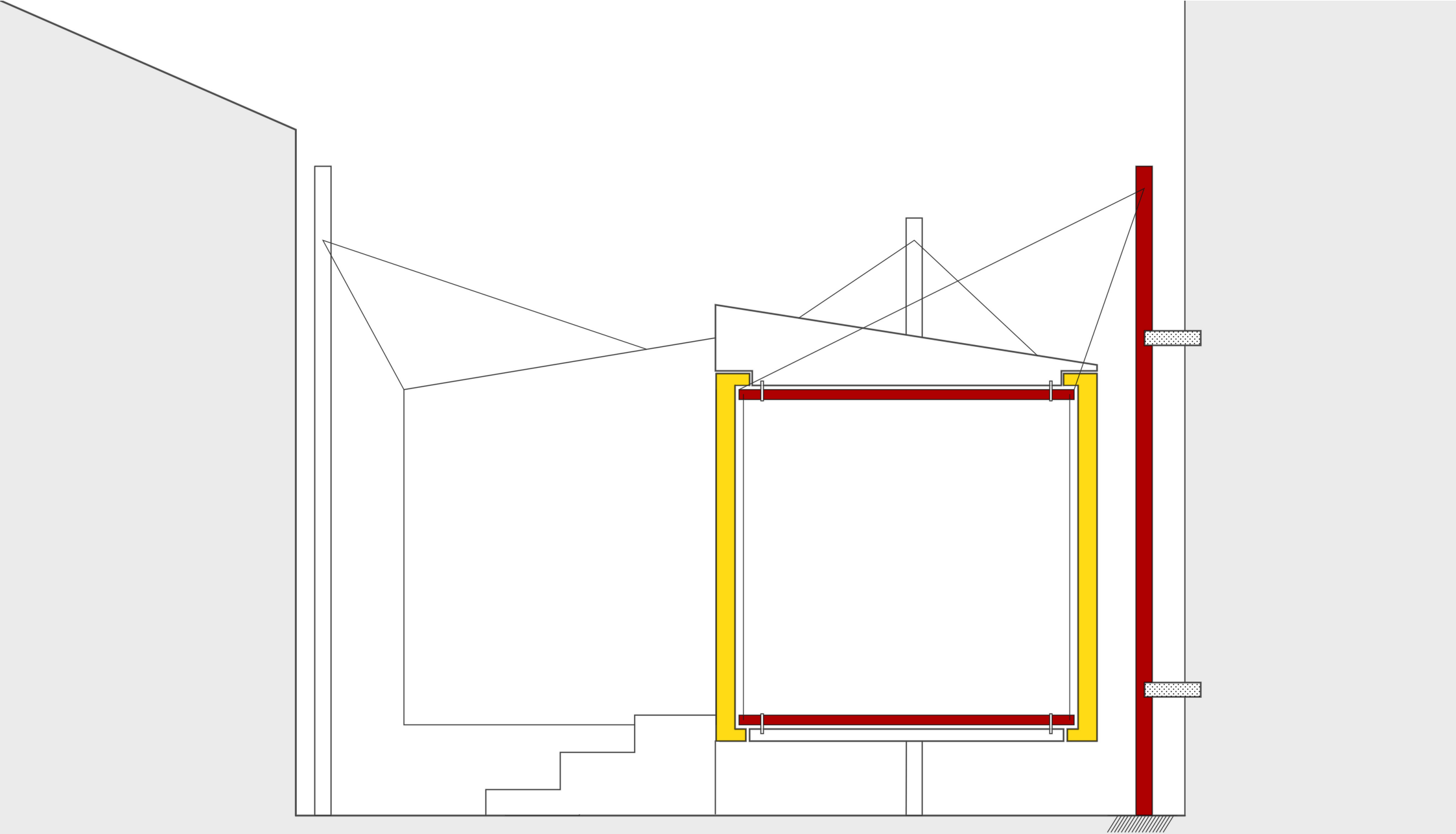




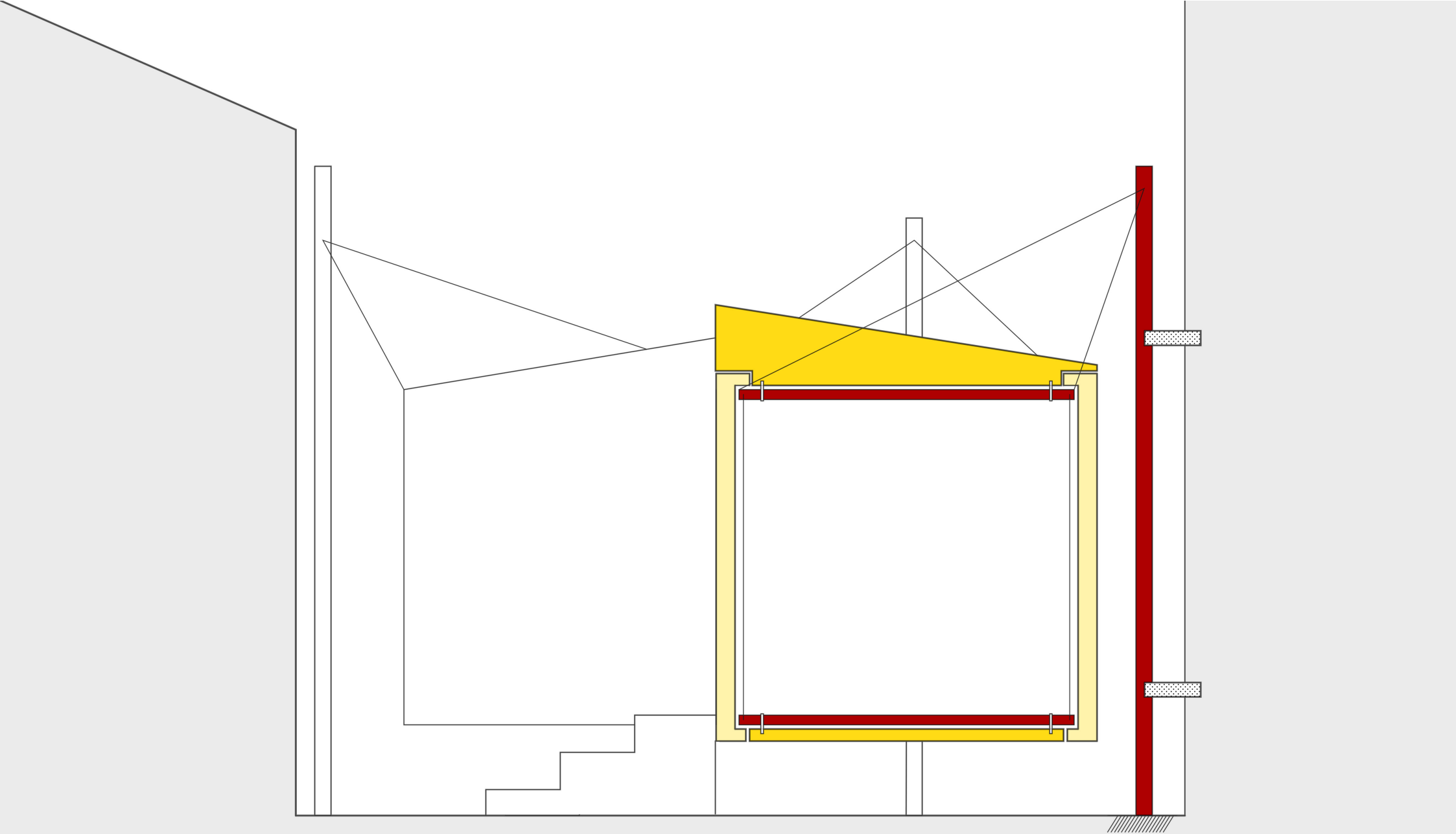
the hollow circular steel rod is anchored to the host building



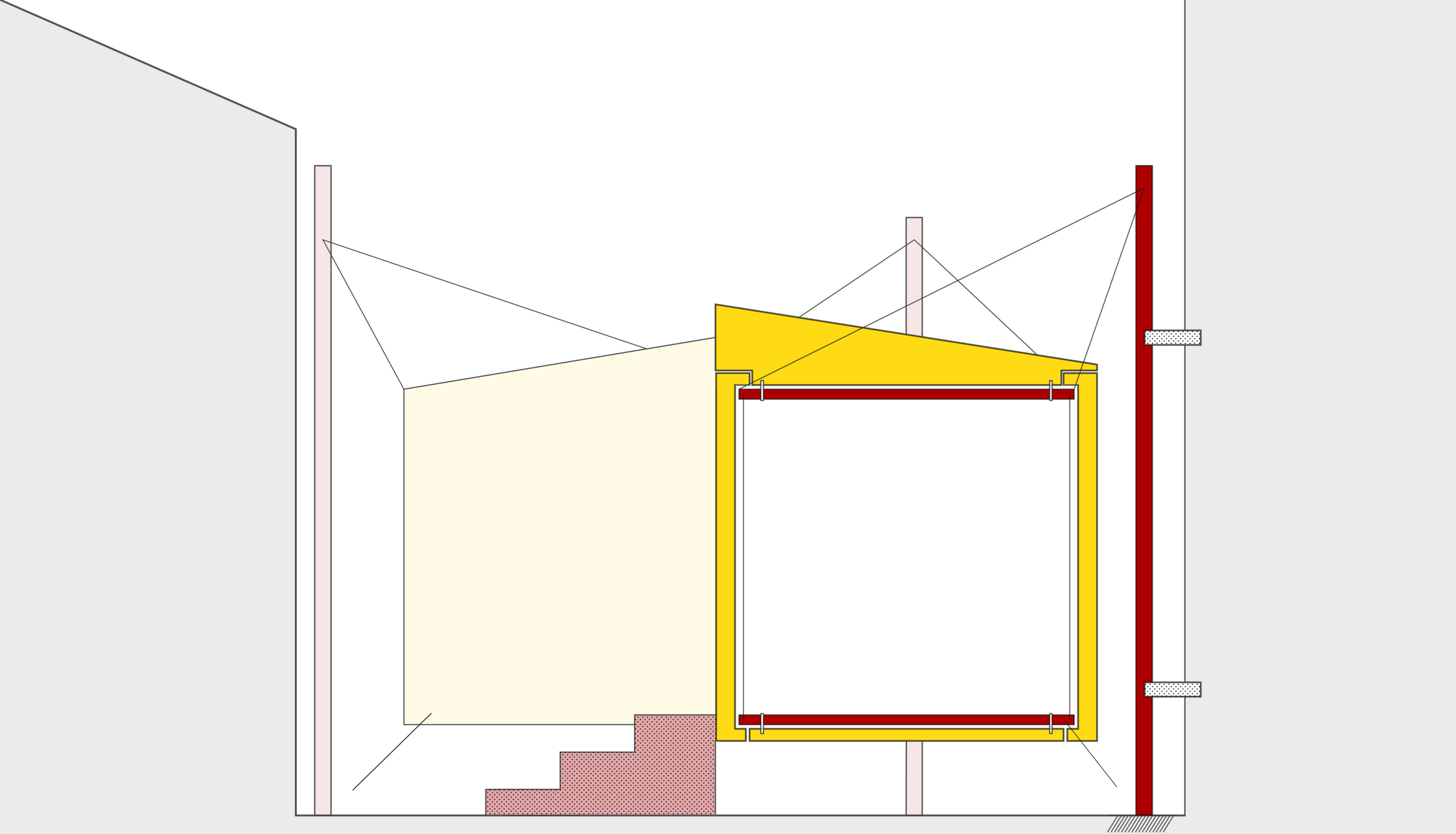
2 aluminum frames are held by tension cables to the rod  
cables are used instead of columns between the 2 frames



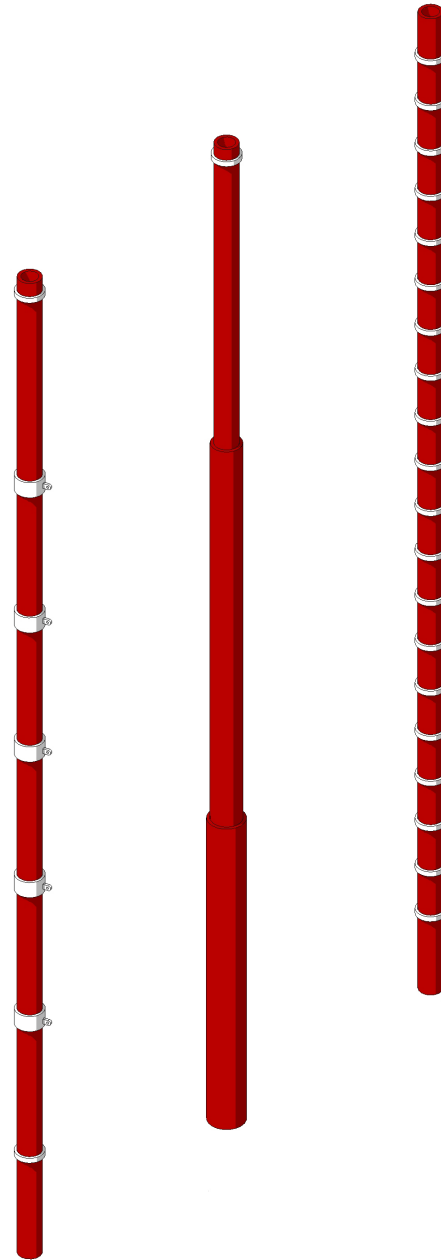
facades are held by frames 1 and 2



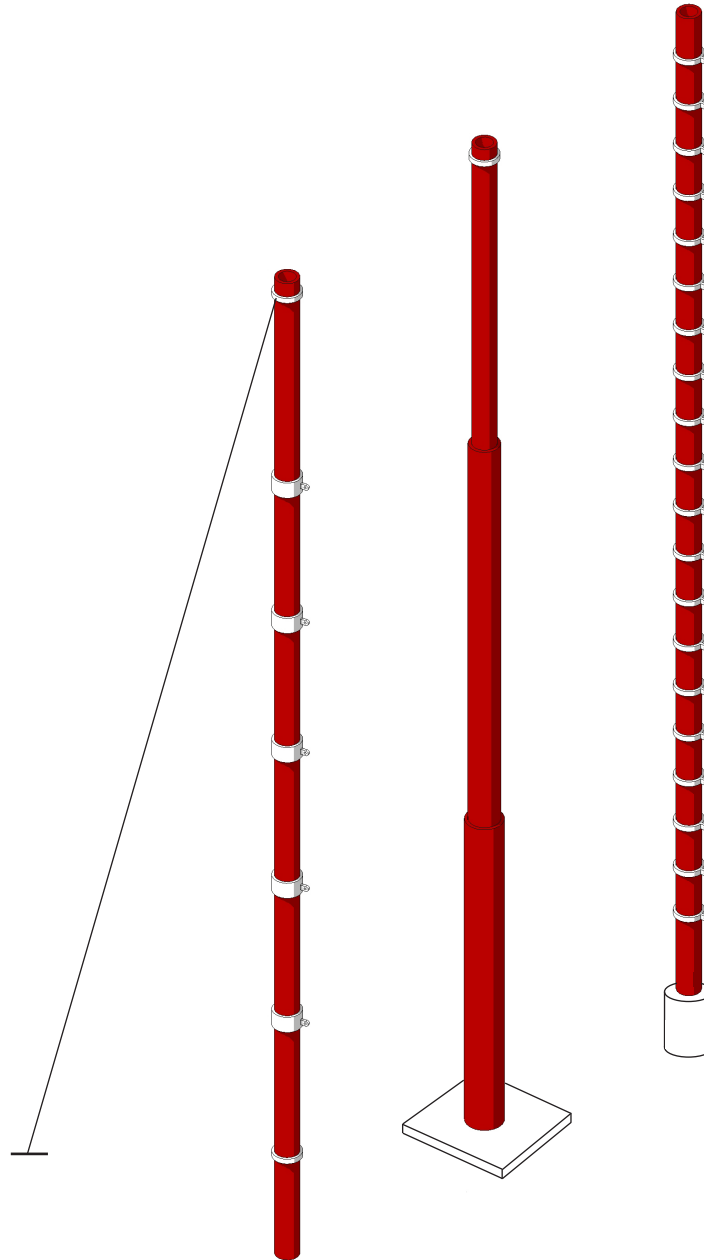
roof is held by frame 1, floor is held by frame 2  
forces from frame 2 are transferred to frame 1 via the internal tension cables



horizontal stability is achieved by the staircase and tensioning back to the rods

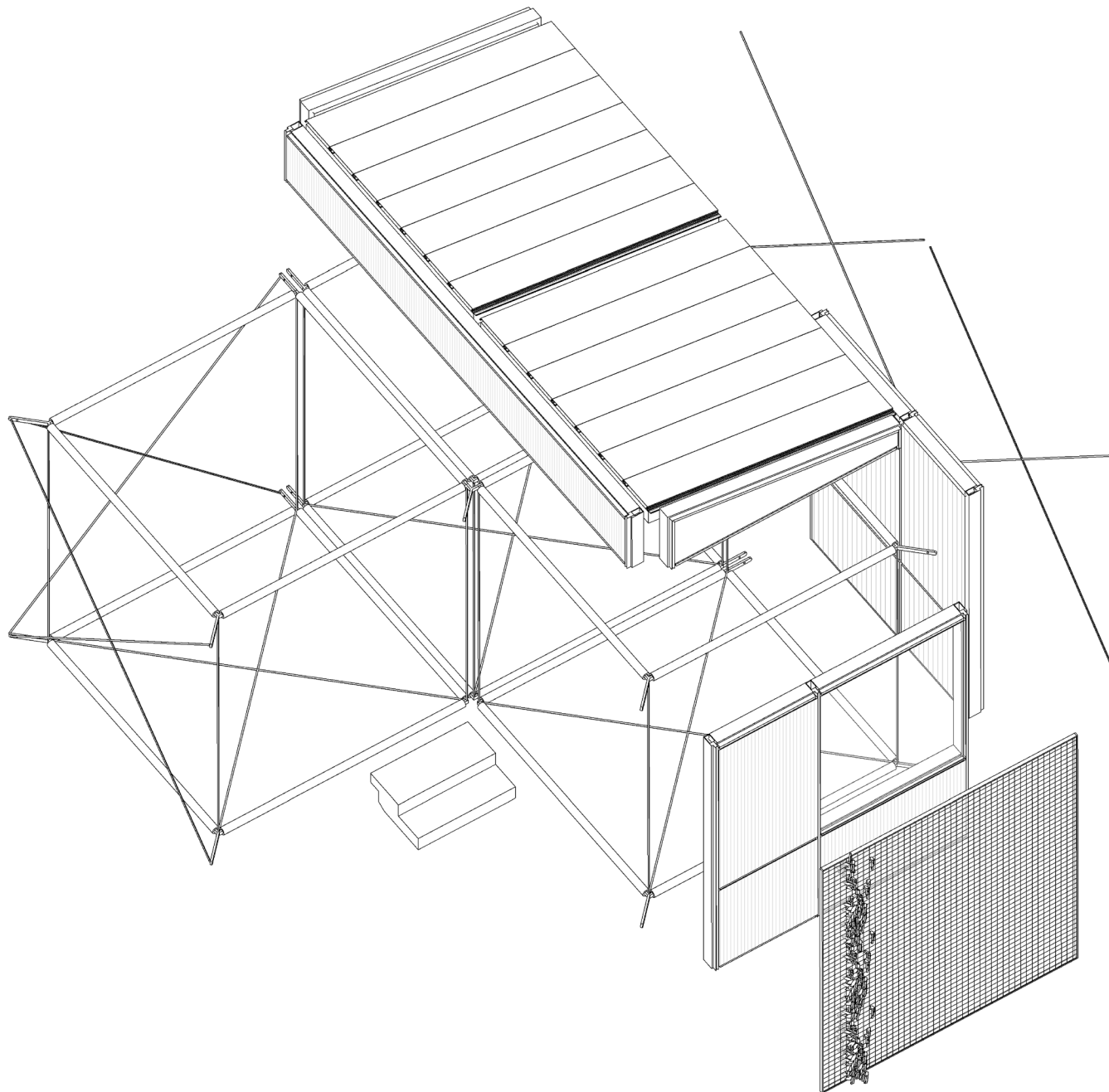


different rod and anchor designs are used according to application (location and host building type)

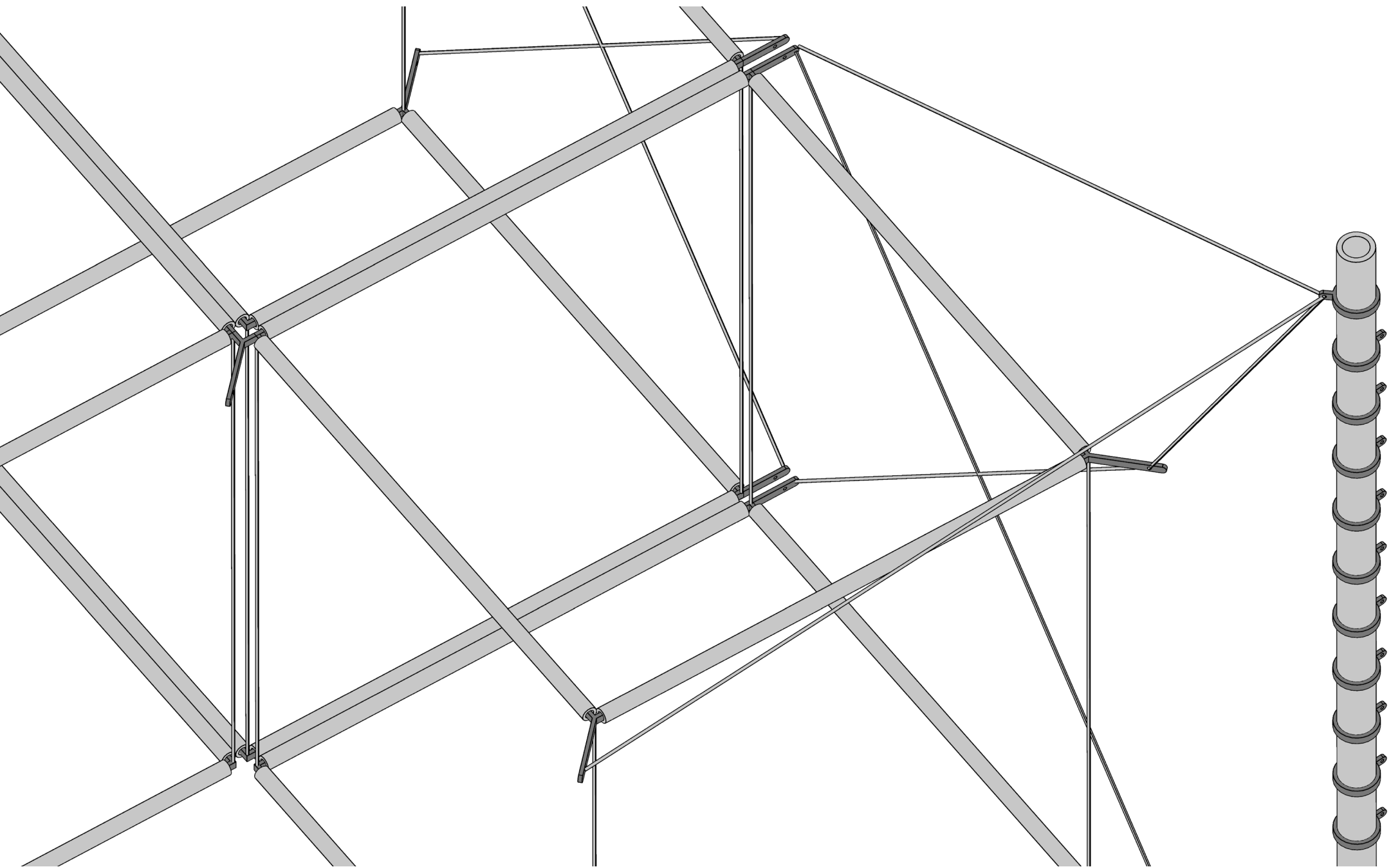


rods could be further stabilized by tension cables, base plates, and cylinders

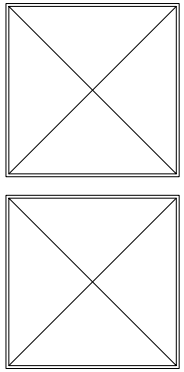
- exploded view -



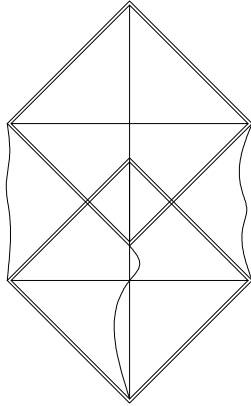
- structure -



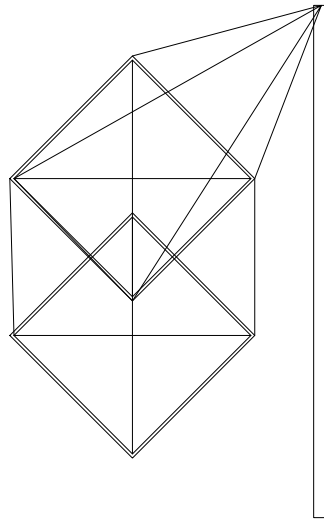
- structure assembly -



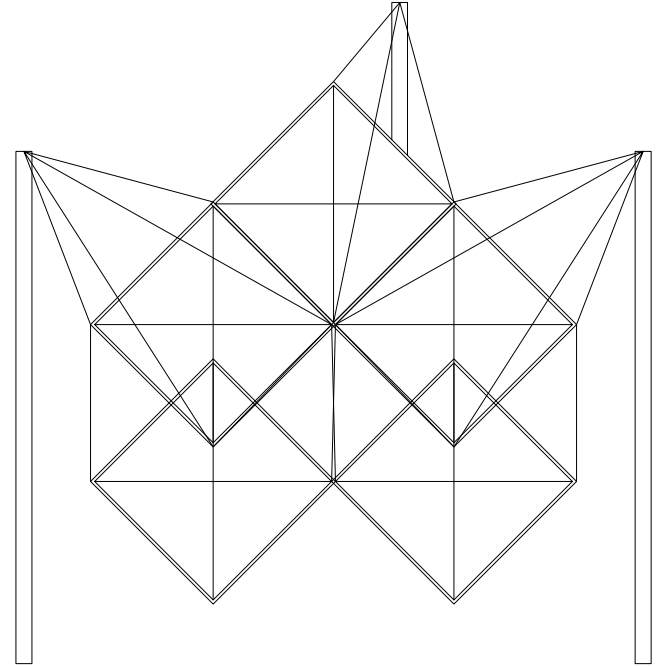
- a -



- b -

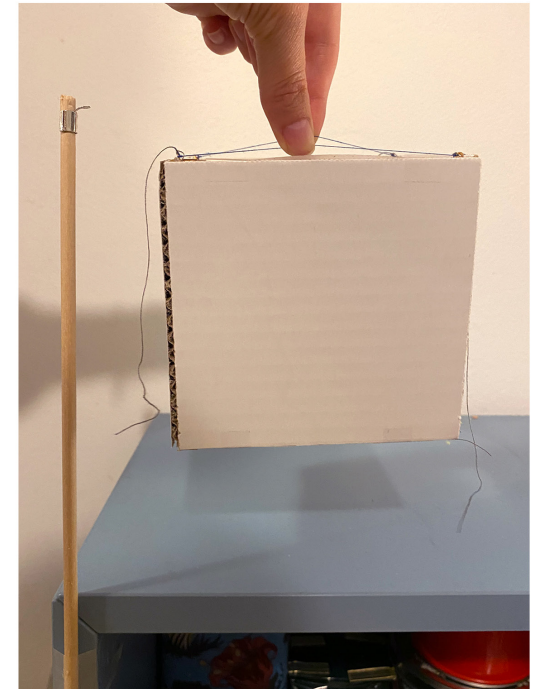
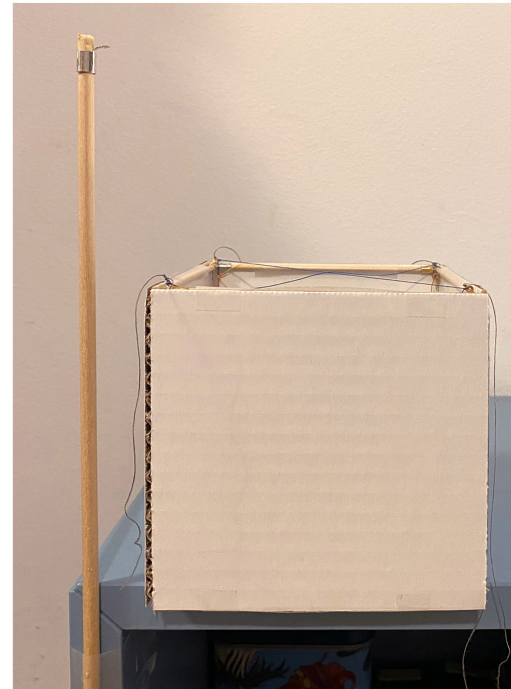
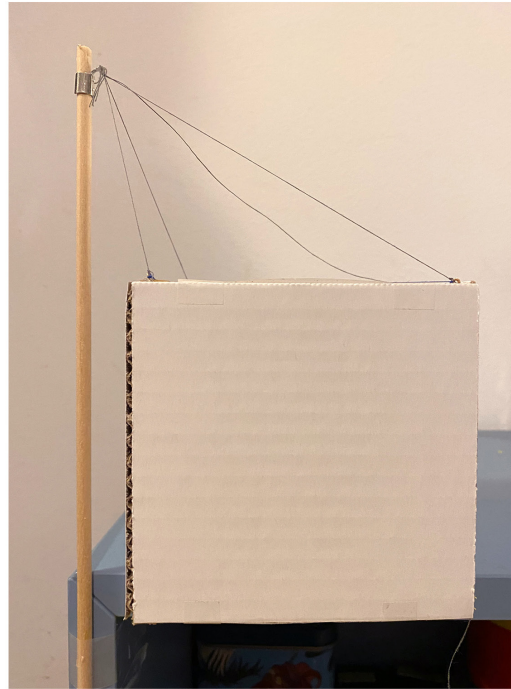
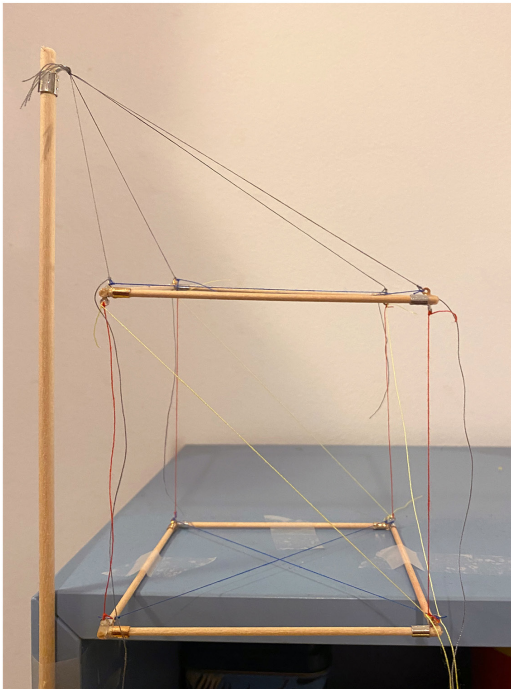


- c -



- d -

- transportation -



facades give sufficient rigidity for transportation to site

DESIGN

FABRICATION + CONSTRUCTION

TRANSPORTATION

ROD CONNECTION

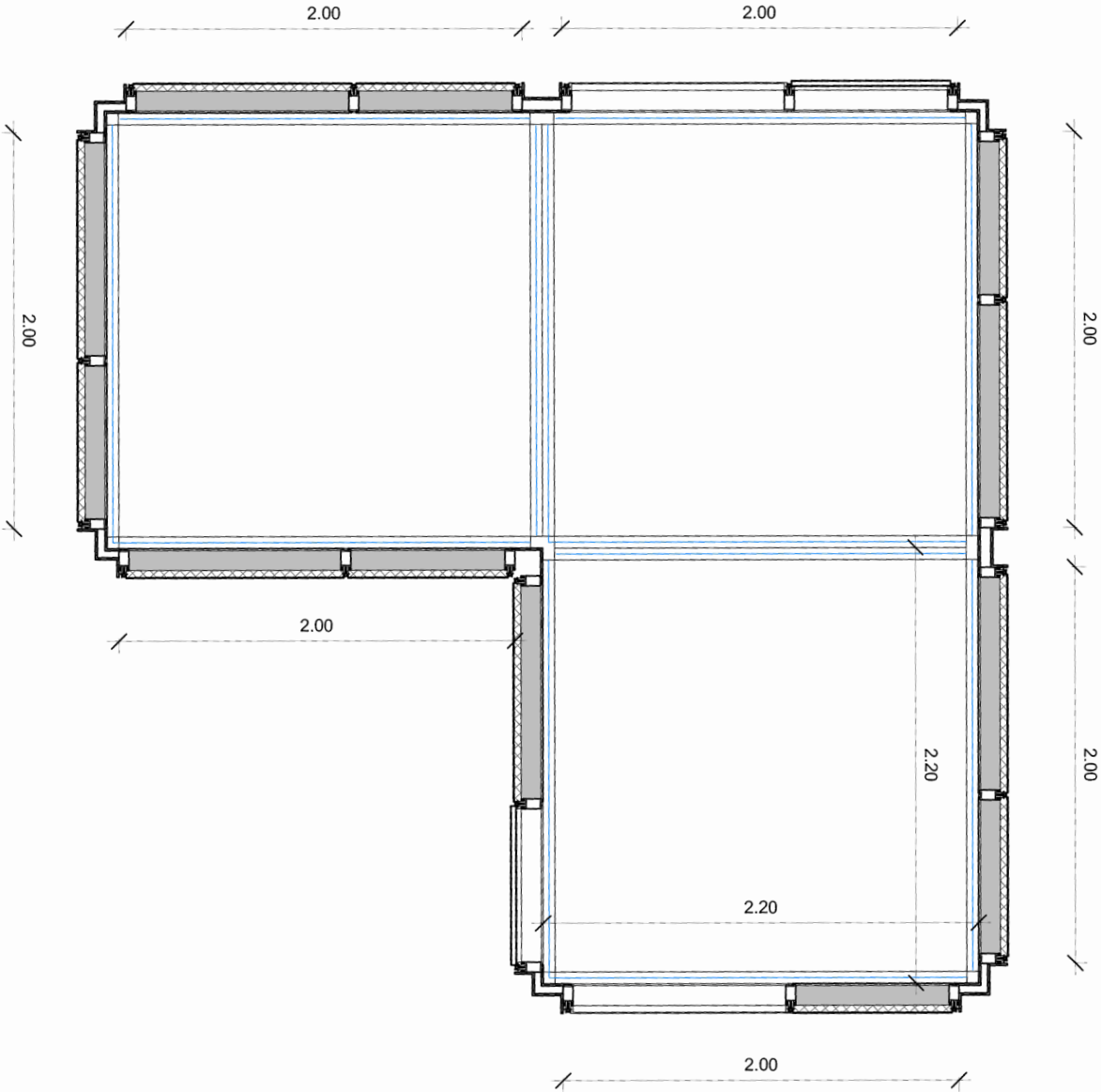
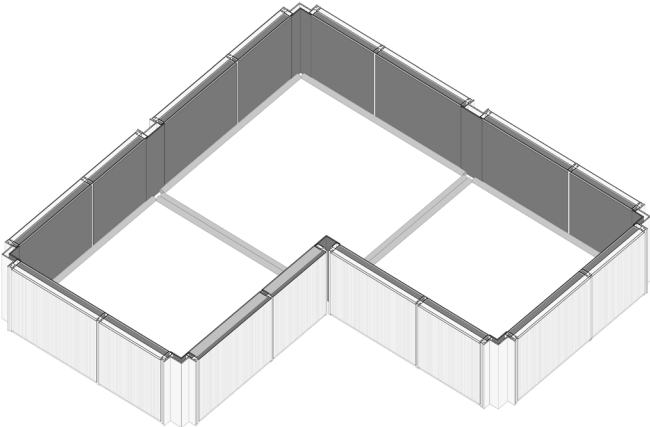
CONNECTING SERVICES

PERSONALIZATION

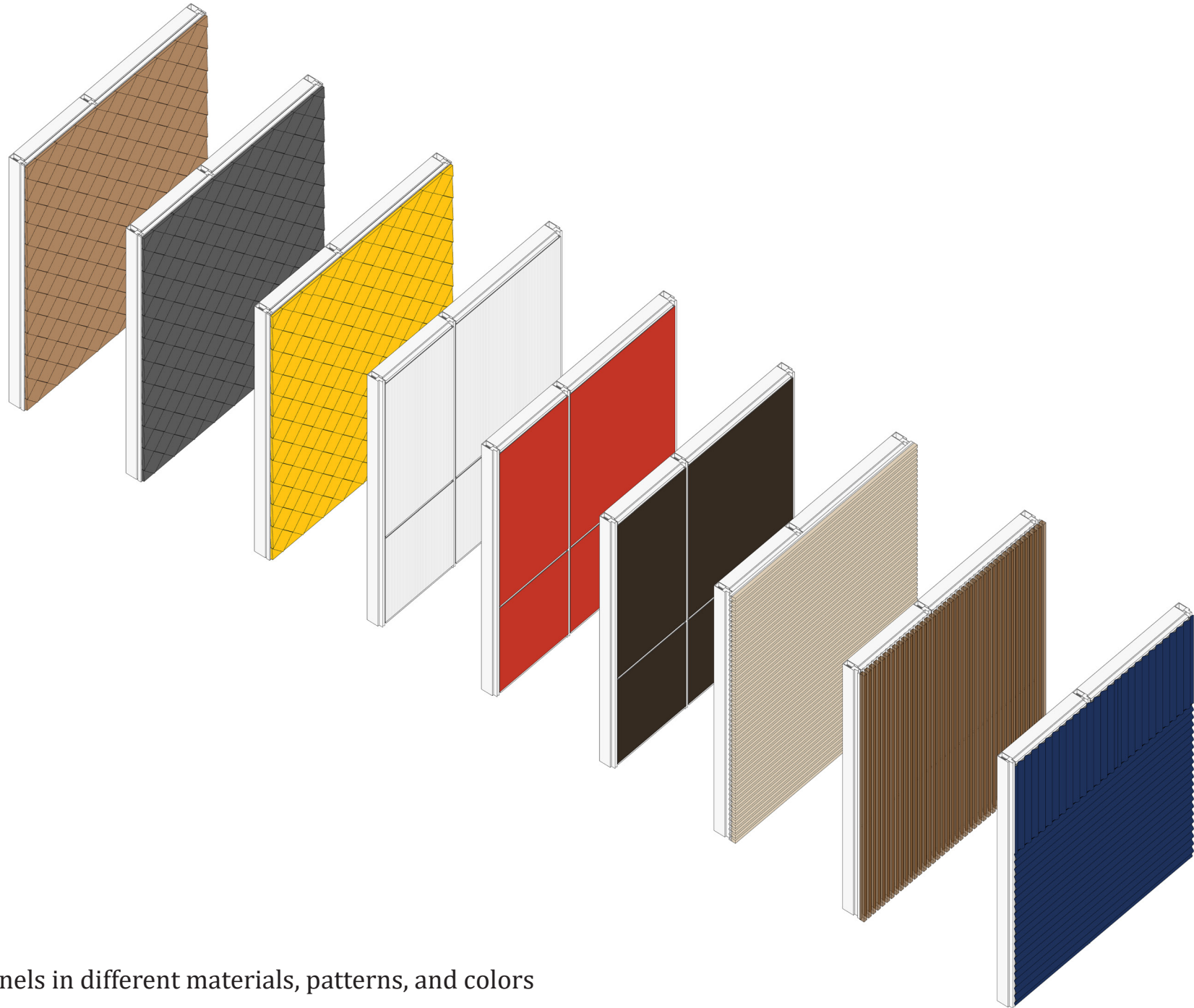
*off-site*  
*on-site*



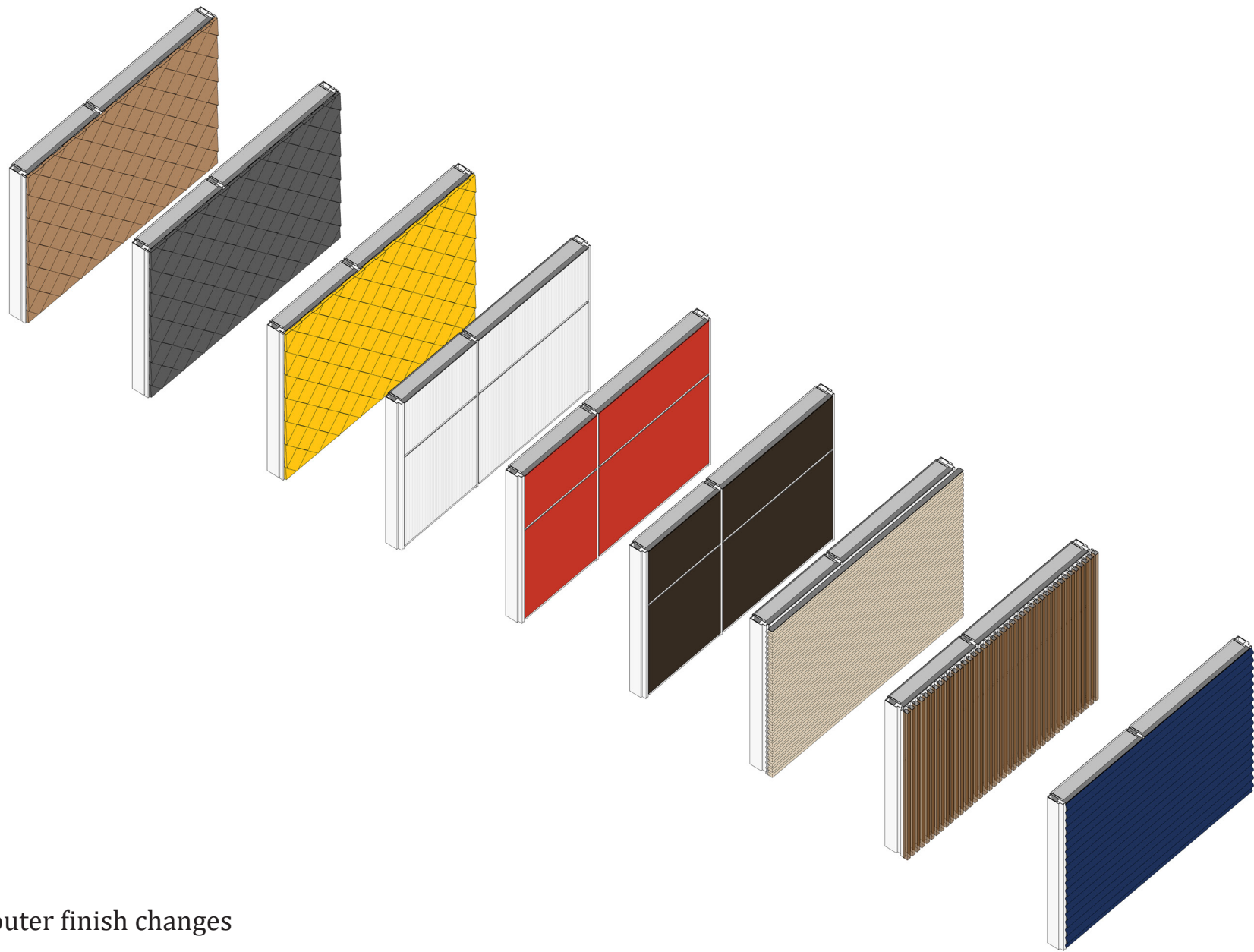
- facade panels -



- all facade panels are 2 meters in width
- corner elements are used for adjustments

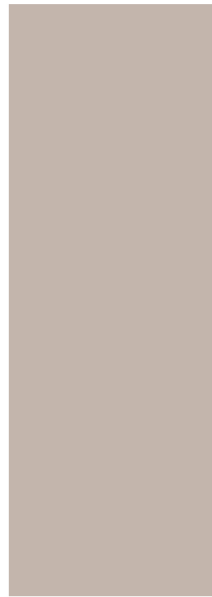


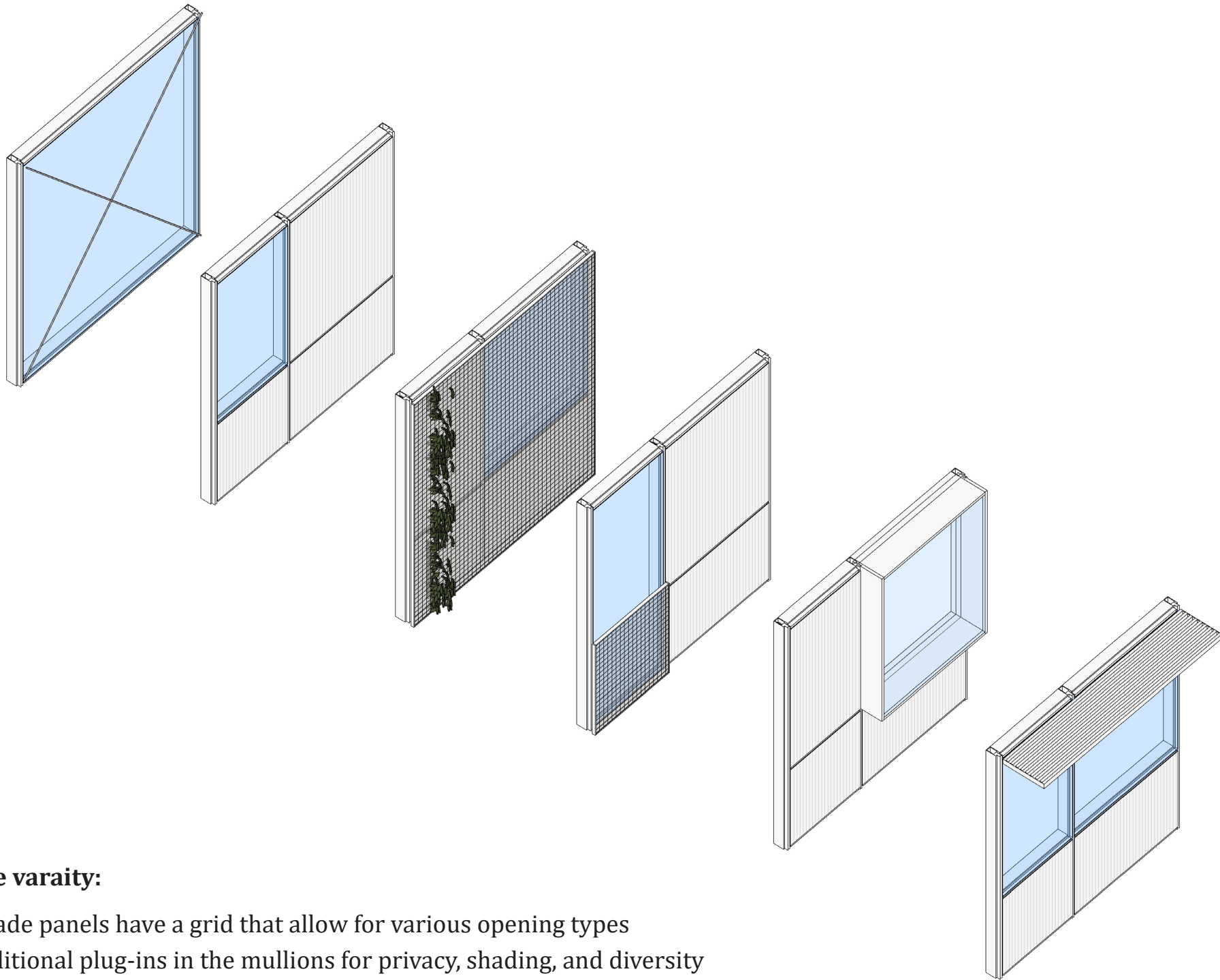
facade panels in different materials, patterns, and colors



only the outer finish changes

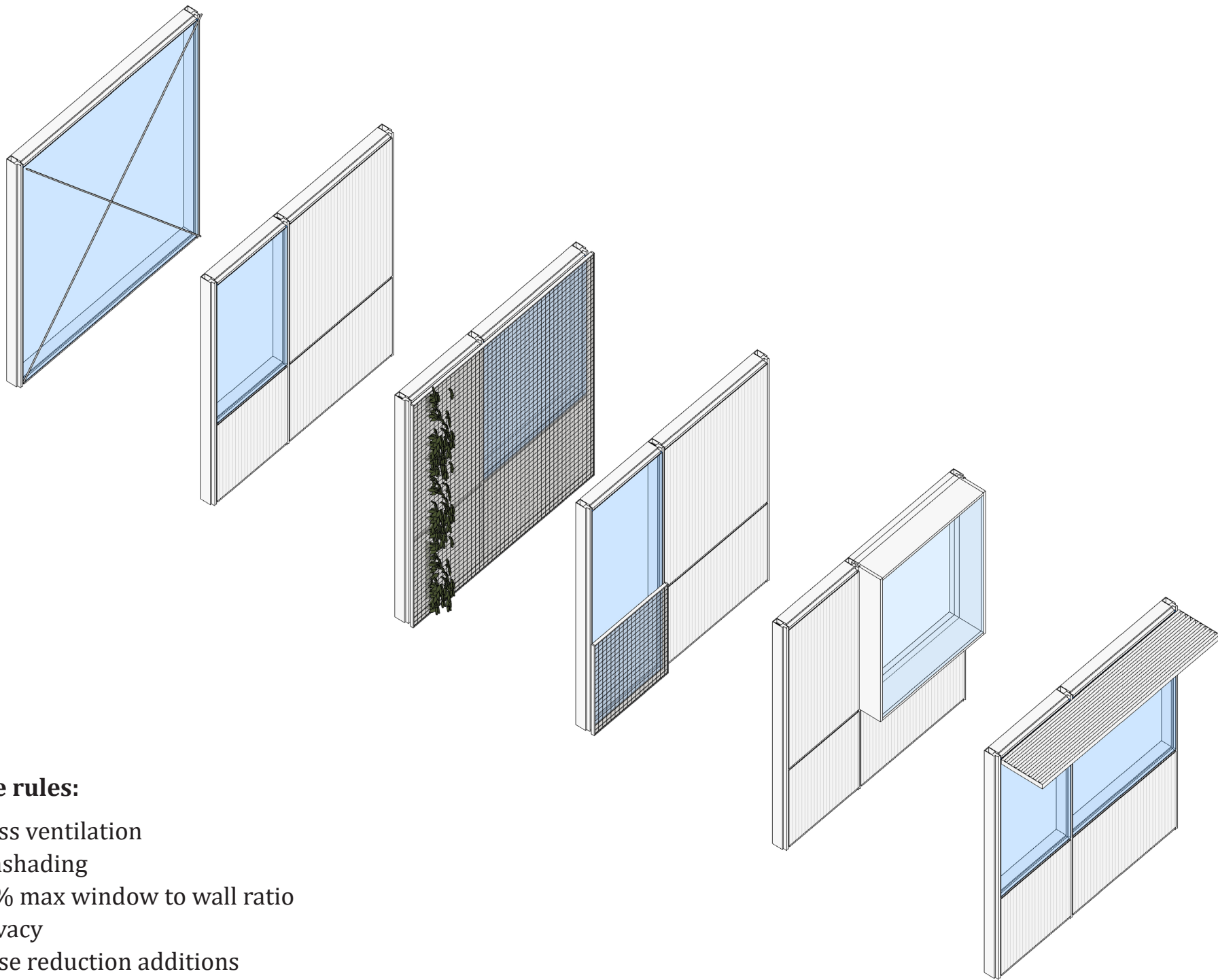
- color palette -





**facade variety:**

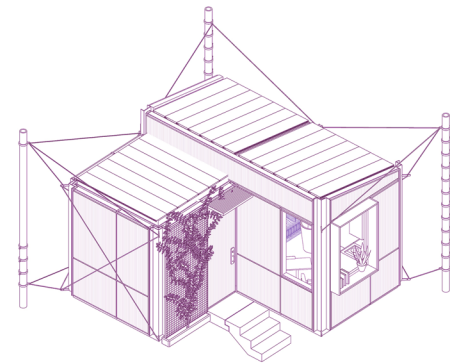
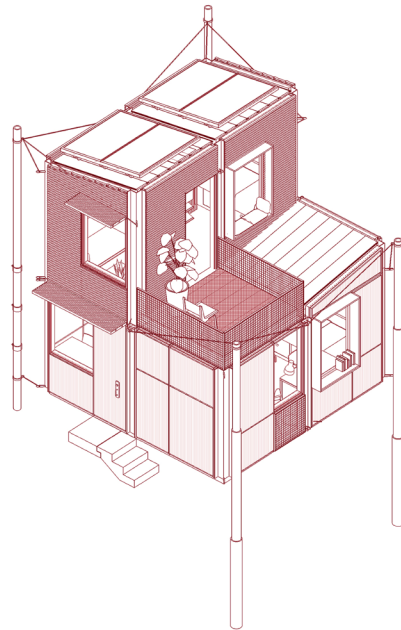
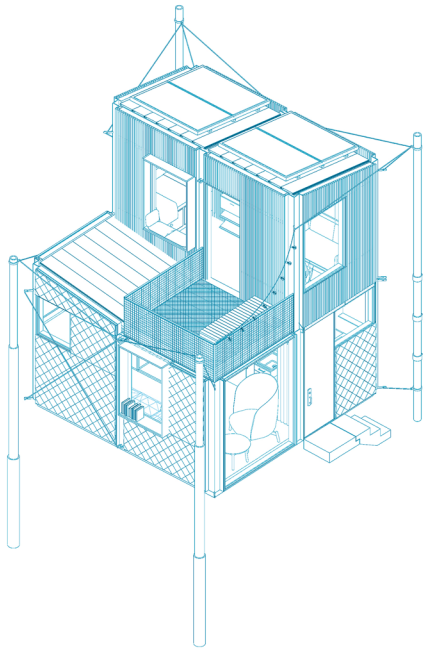
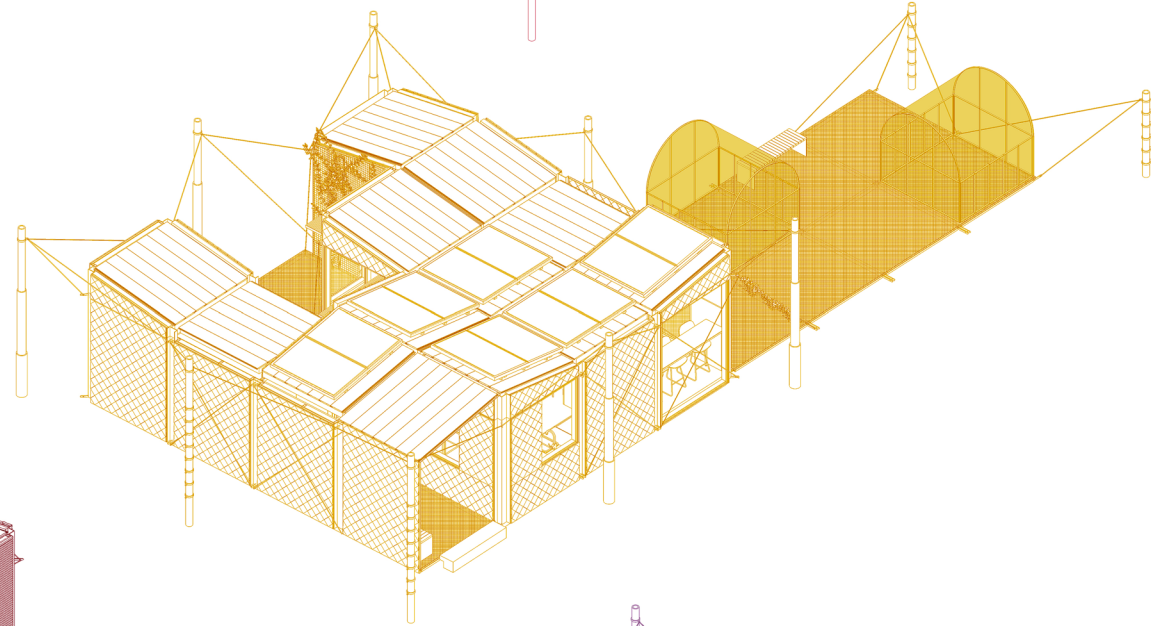
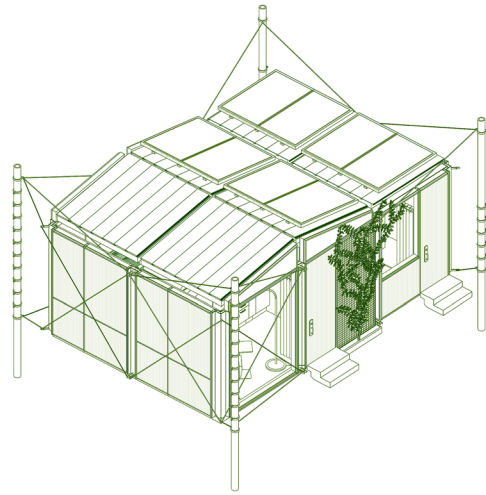
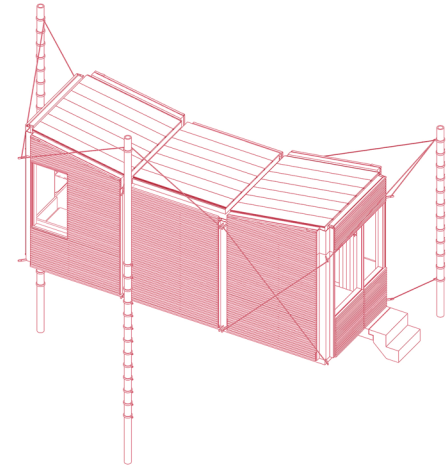
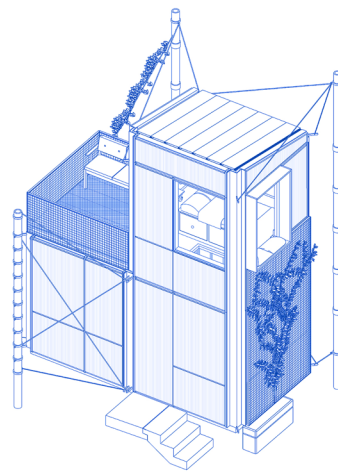
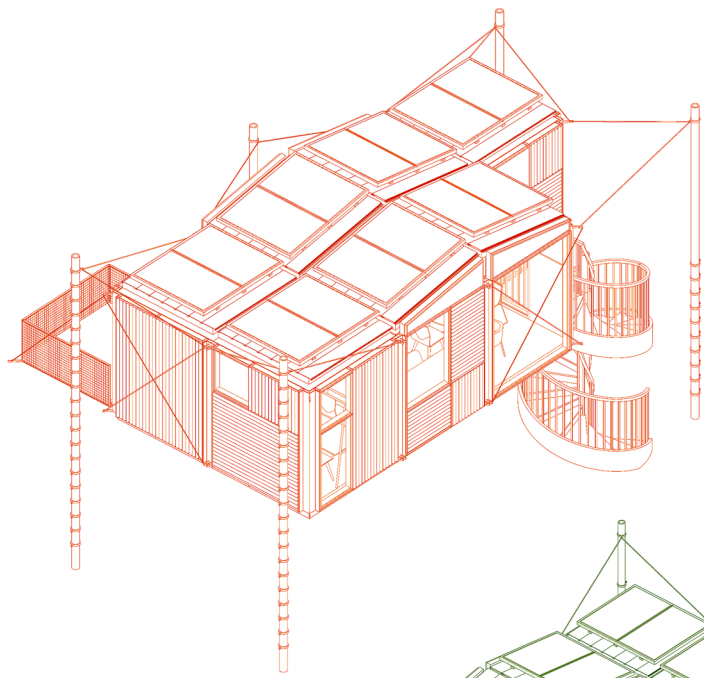
- facade panels have a grid that allow for various opening types
- additional plug-ins in the mullions for privacy, shading, and diversity



**facade rules:**

- cross ventilation
- sunshading
- 40% max window to wall ratio
- privacy
- noise reduction additions

- combined together these elements give various possibilities -





# interactive

## program:

- neighborhood integration
- shared space
- small area
- inbetween spaces
- outdoor space

# attached

## thematic research:

- light
- stable
- least impact
- fast
- removable
- affordable

location

# diverse

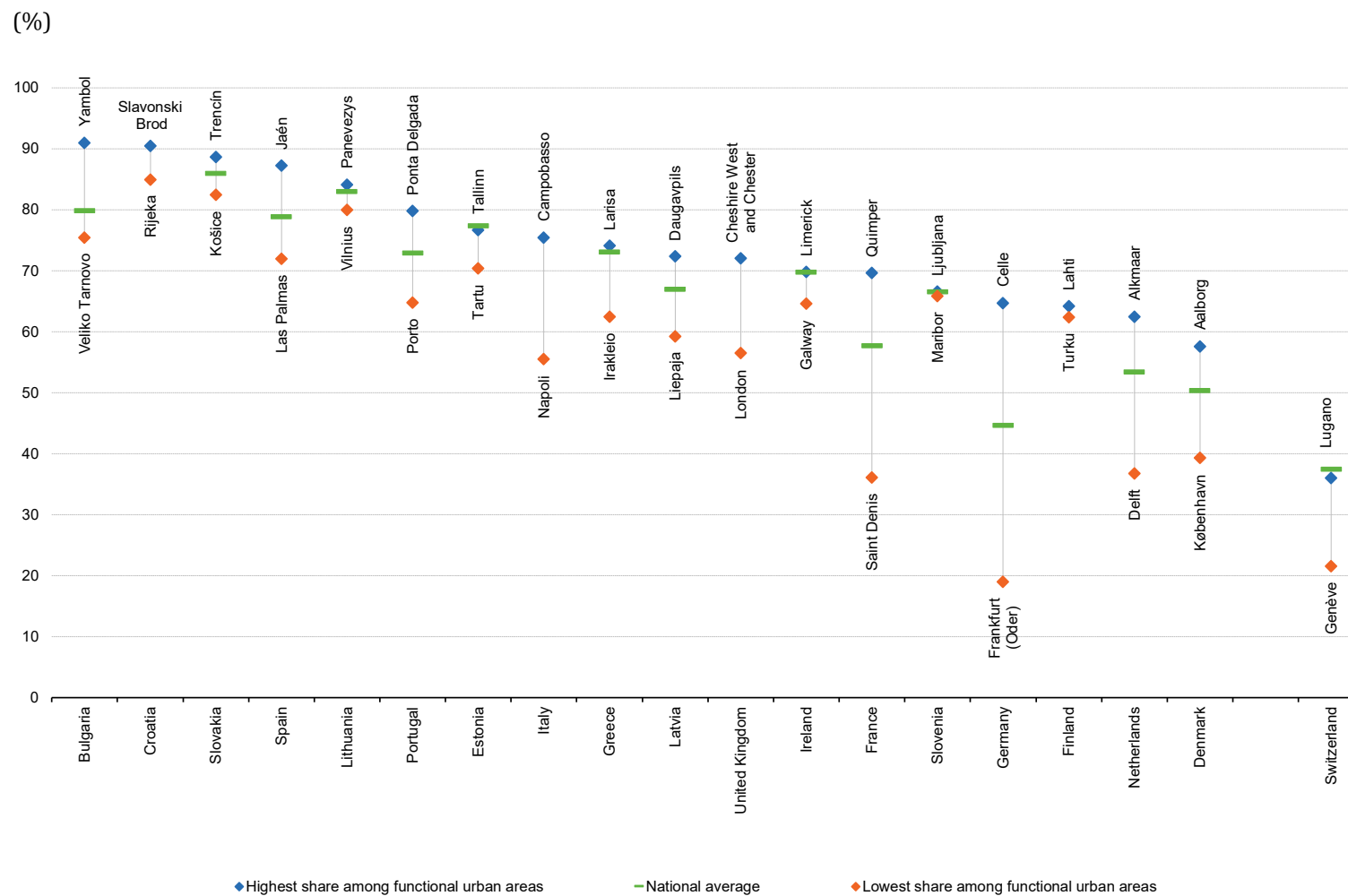
## architecture:

- layout
- modularity
- flexibility
- geometry
- facade
- privacy

- the site -



## Functional urban areas with the lowest and highest proportion of households that own their accommodation, 2011





1 in 10 of the residents is a TUDelft student



Image NASA

Google Earth

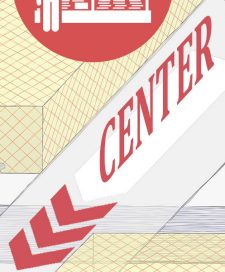
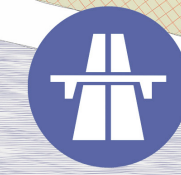
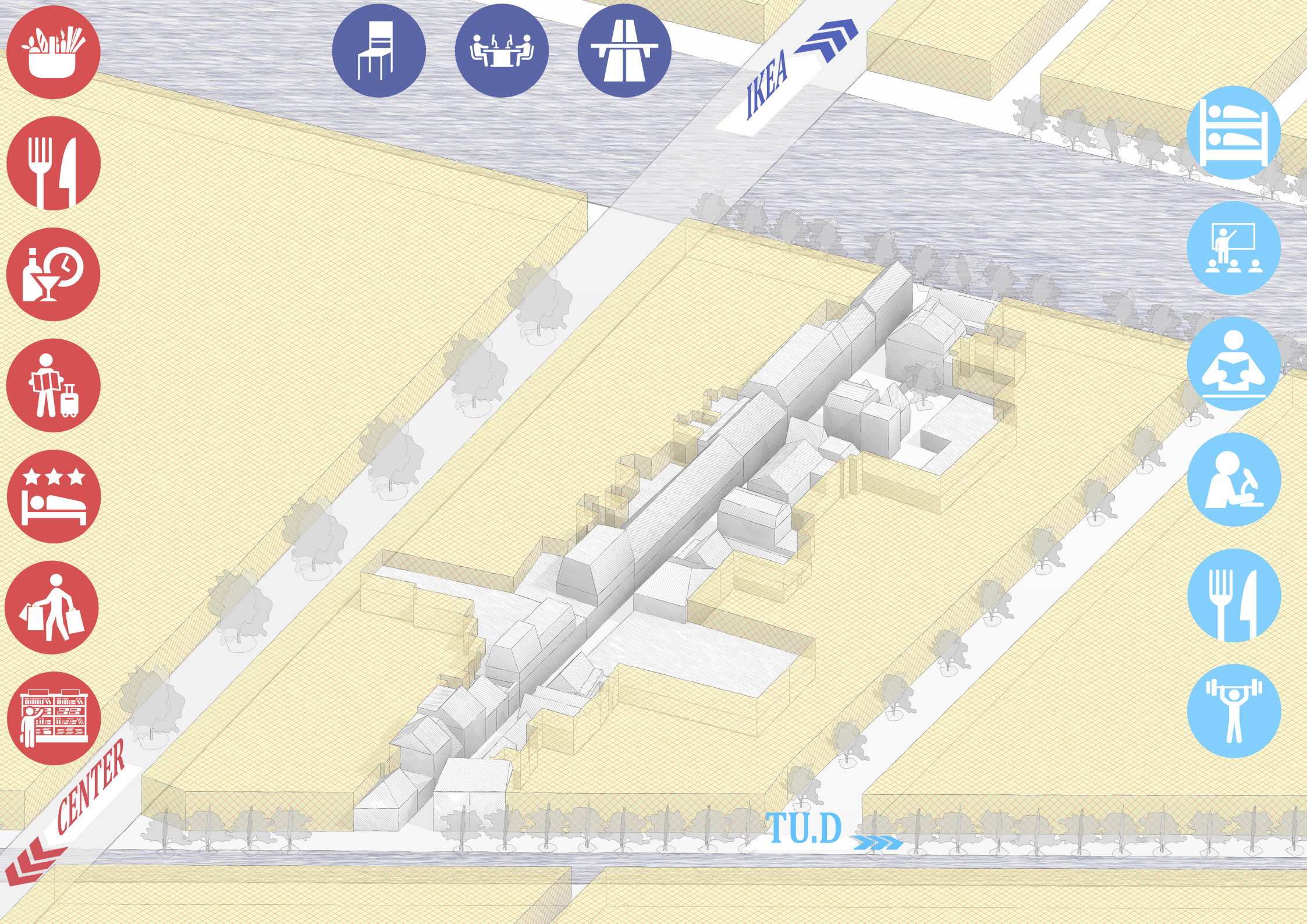
52°00'41.59" N 4°21'44.55" E elev 20 m eye alt 522 m



Image NASA

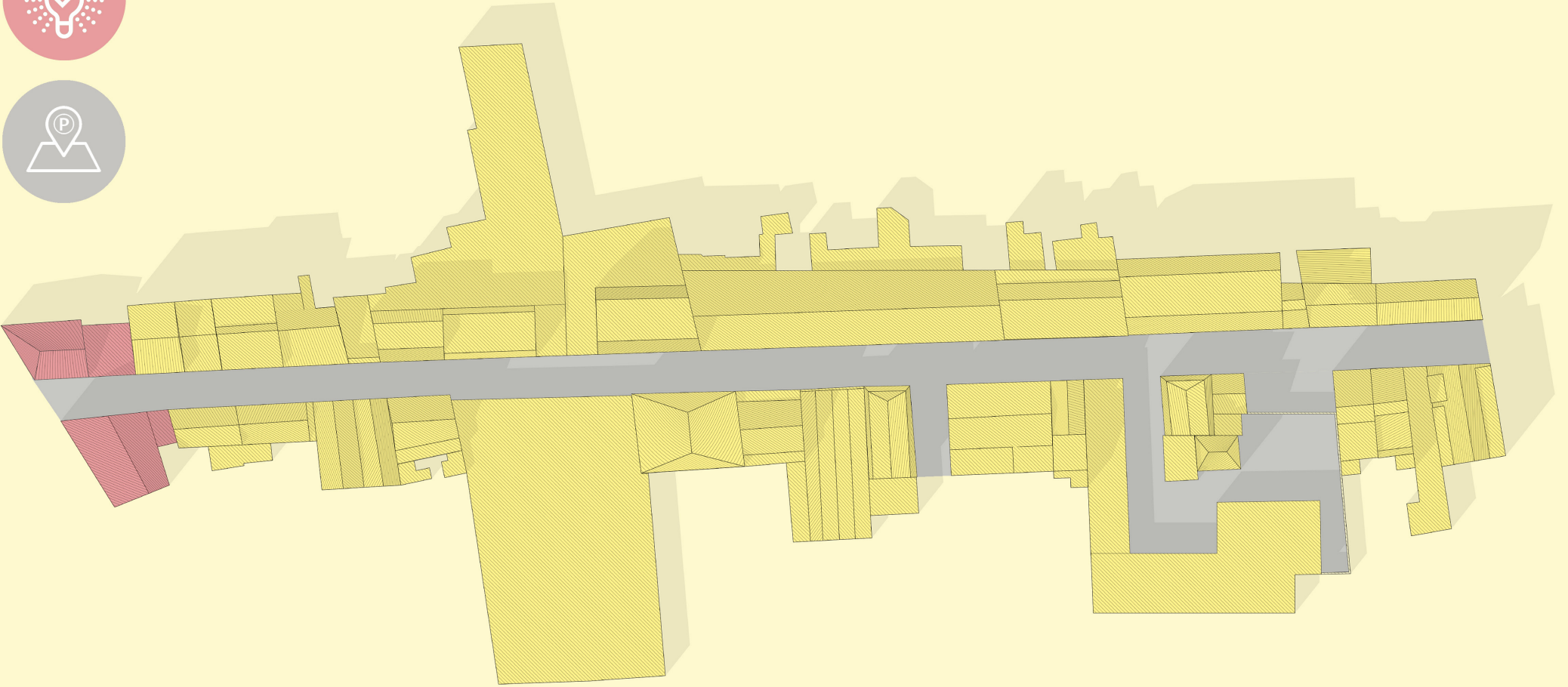
Google Earth

52°00'41.59" N 4°21'44.55" E elev 20 m eye alt 522 m

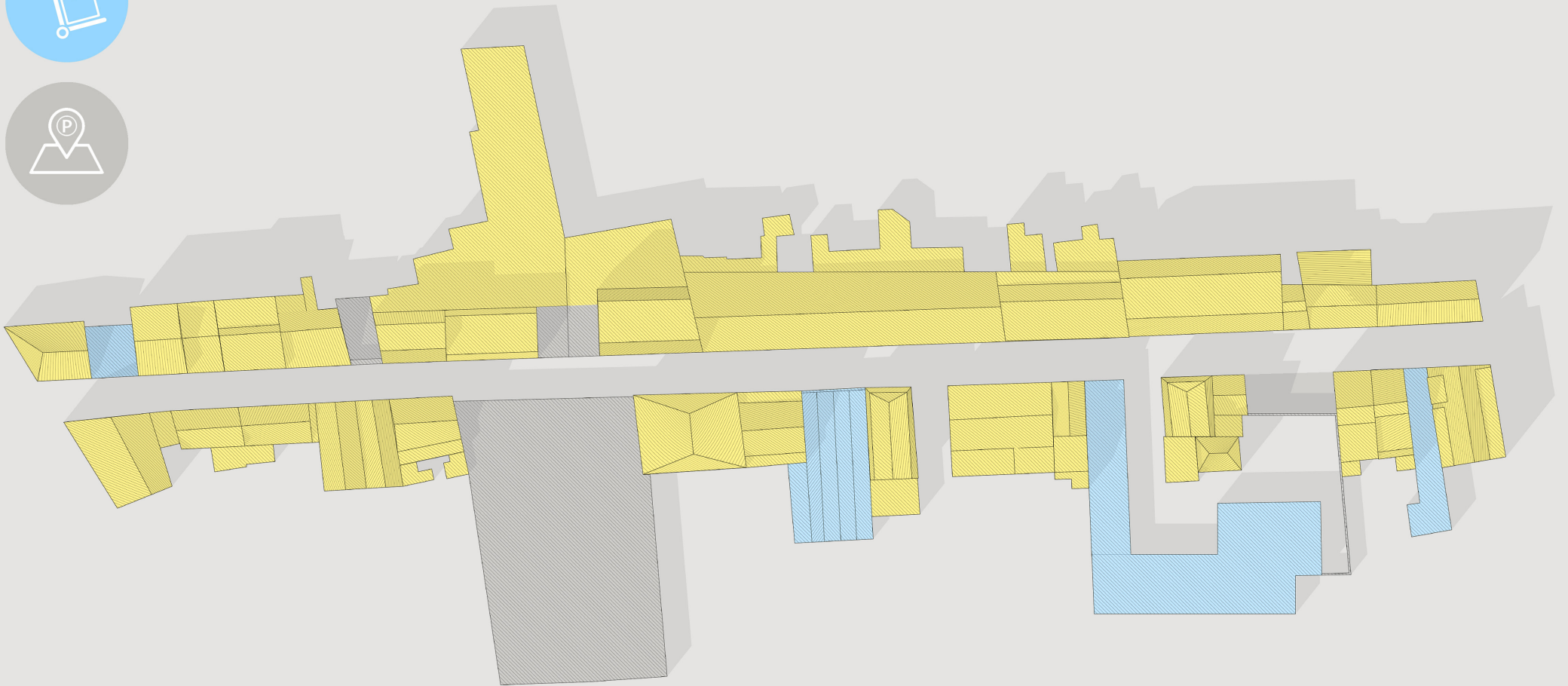


*Delft, Donkerstraat*

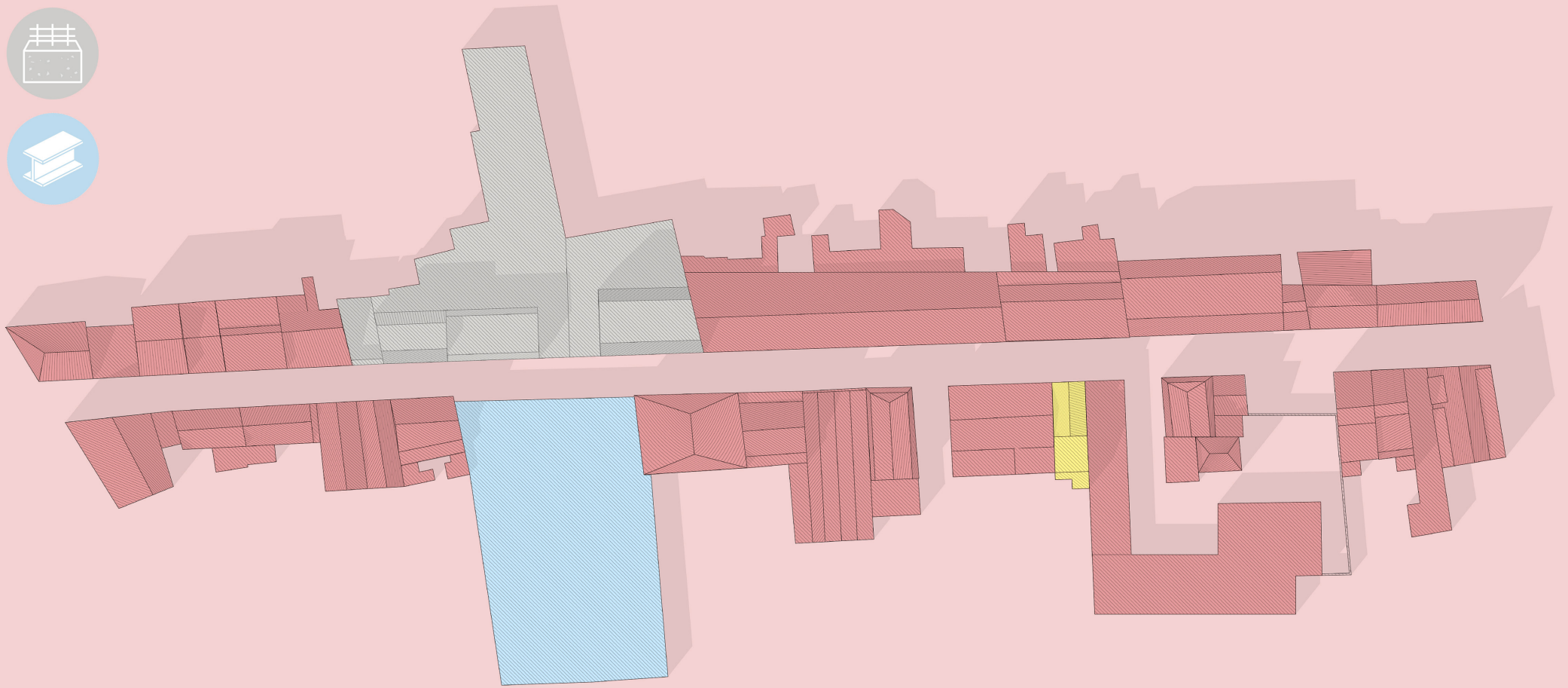




- the regulations -

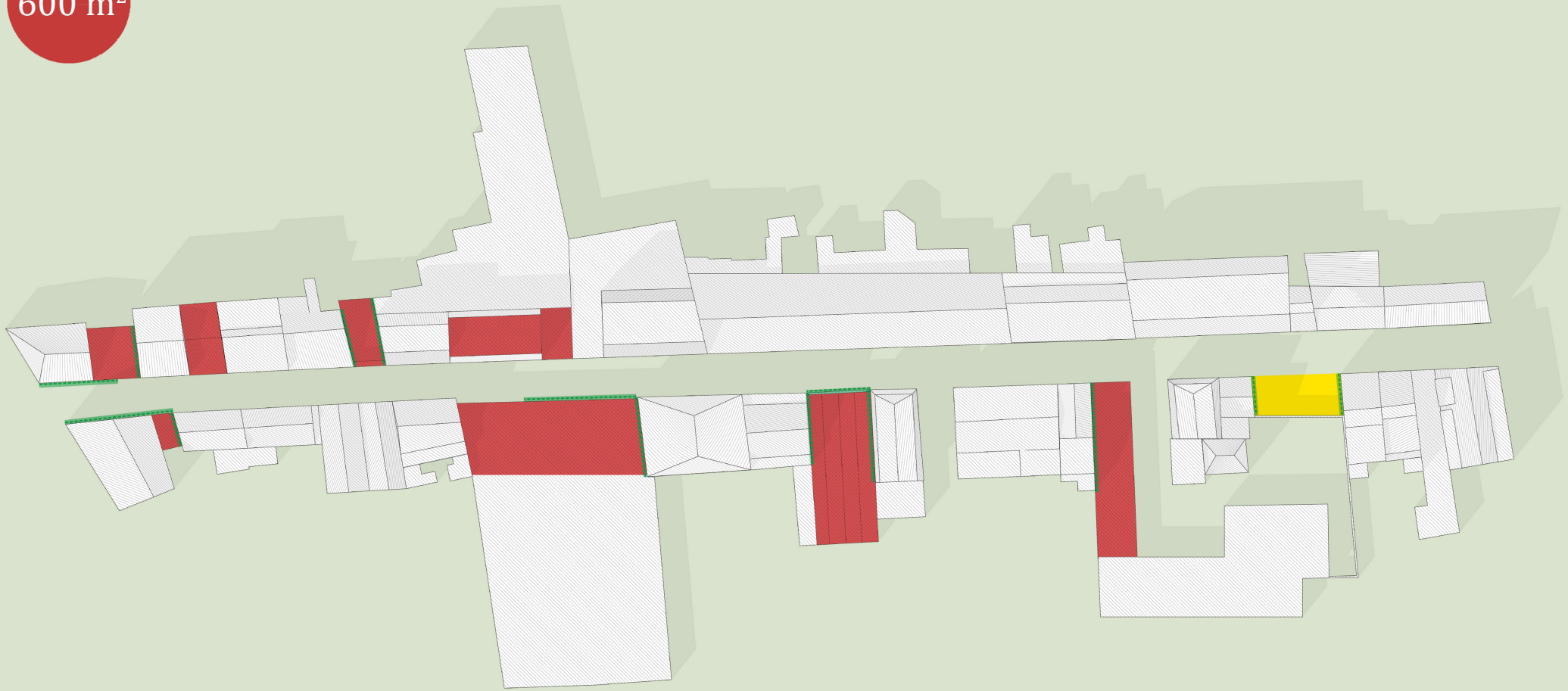


- the usage -



- the construction types -

600 m<sup>2</sup>

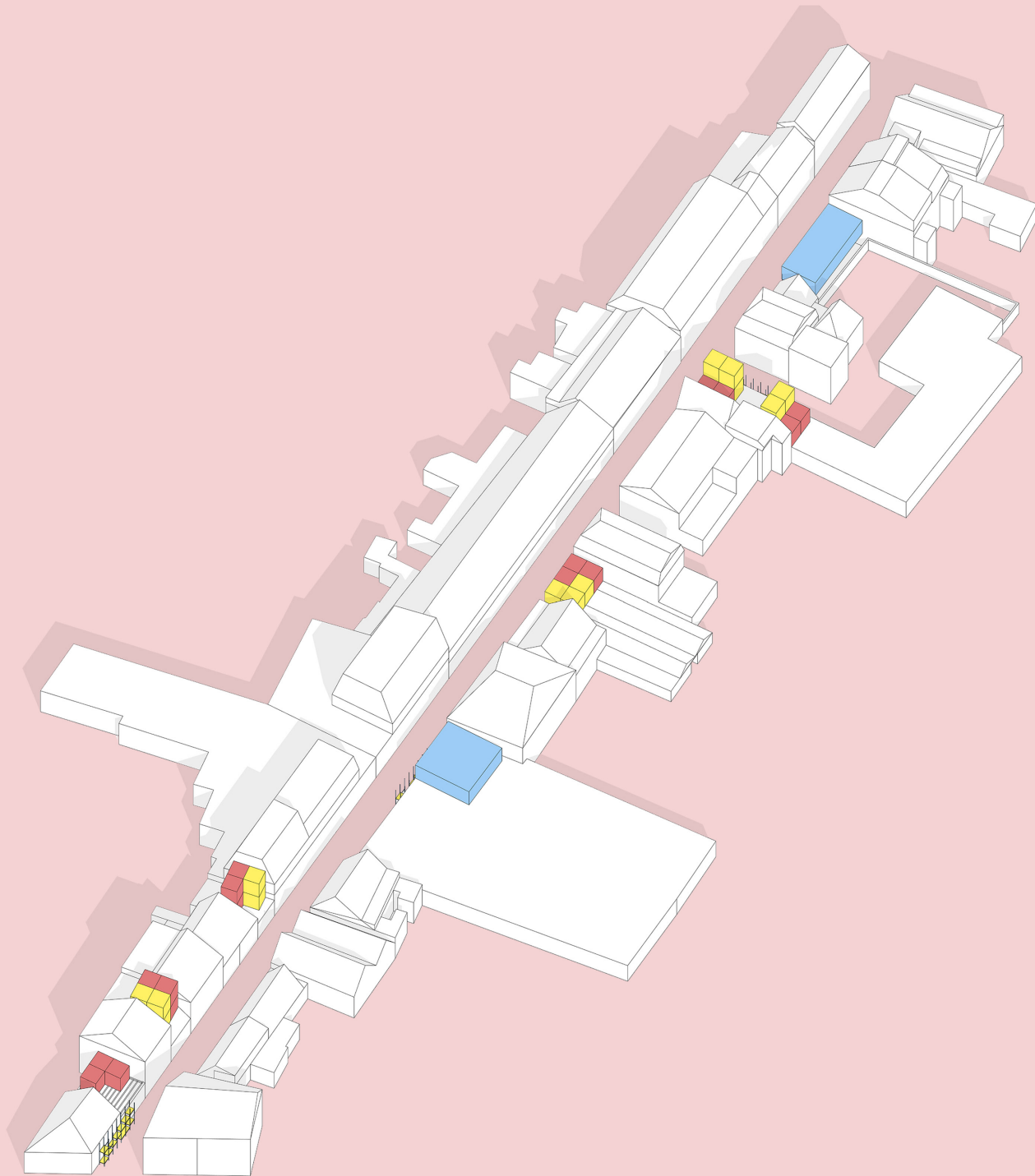


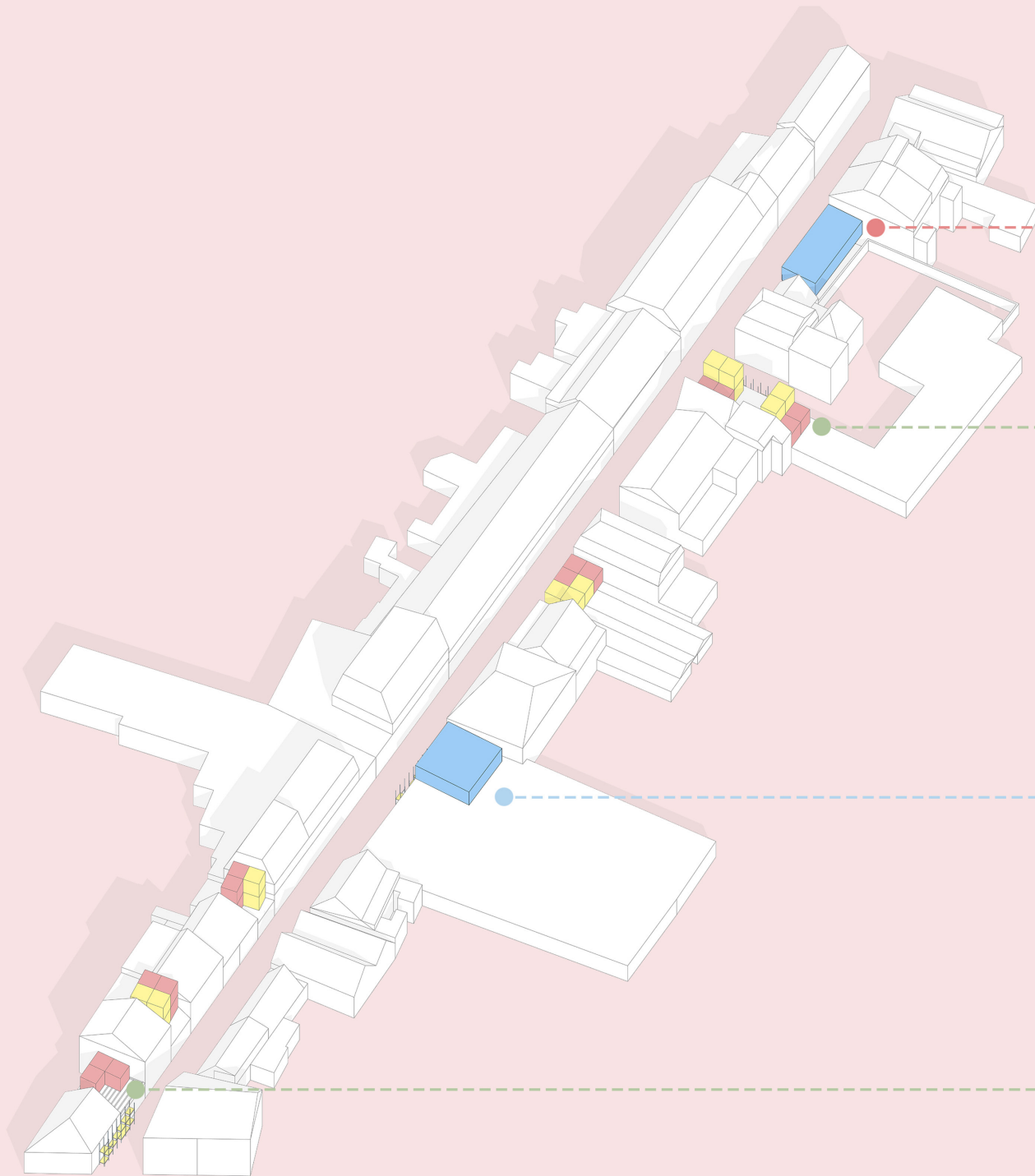
- total selected space -

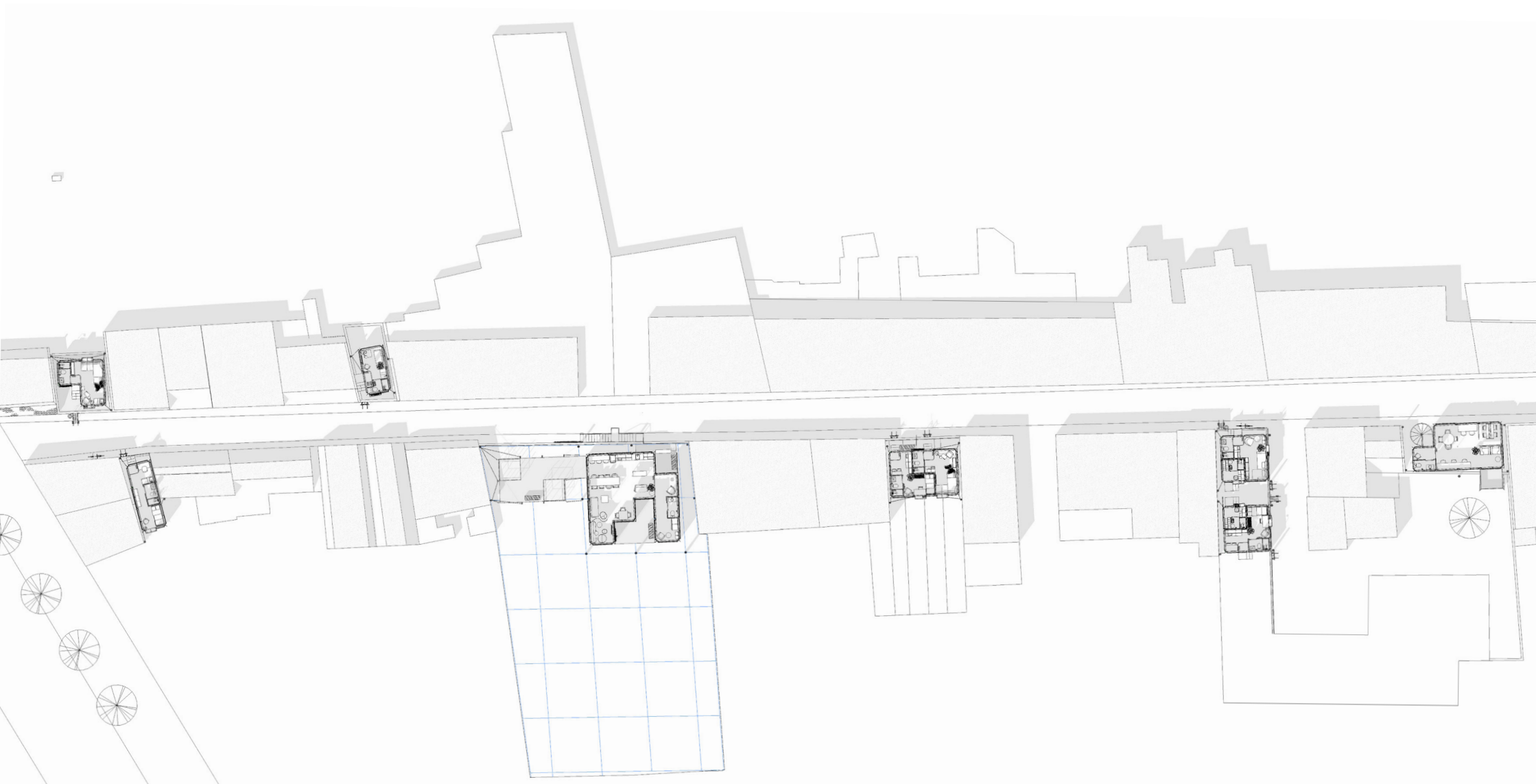
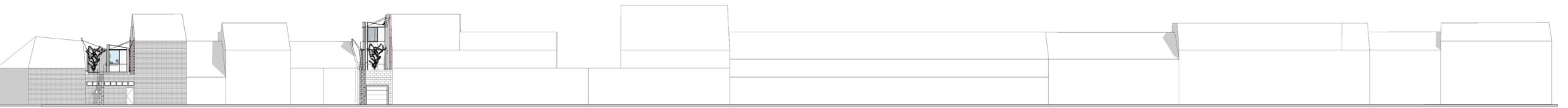
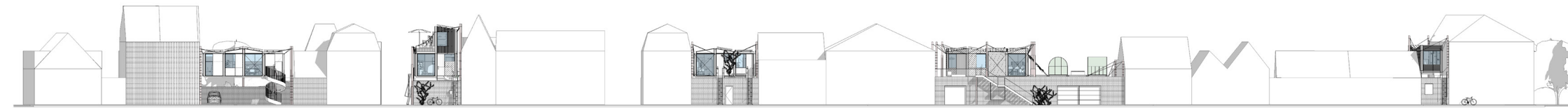
**- the concept -**

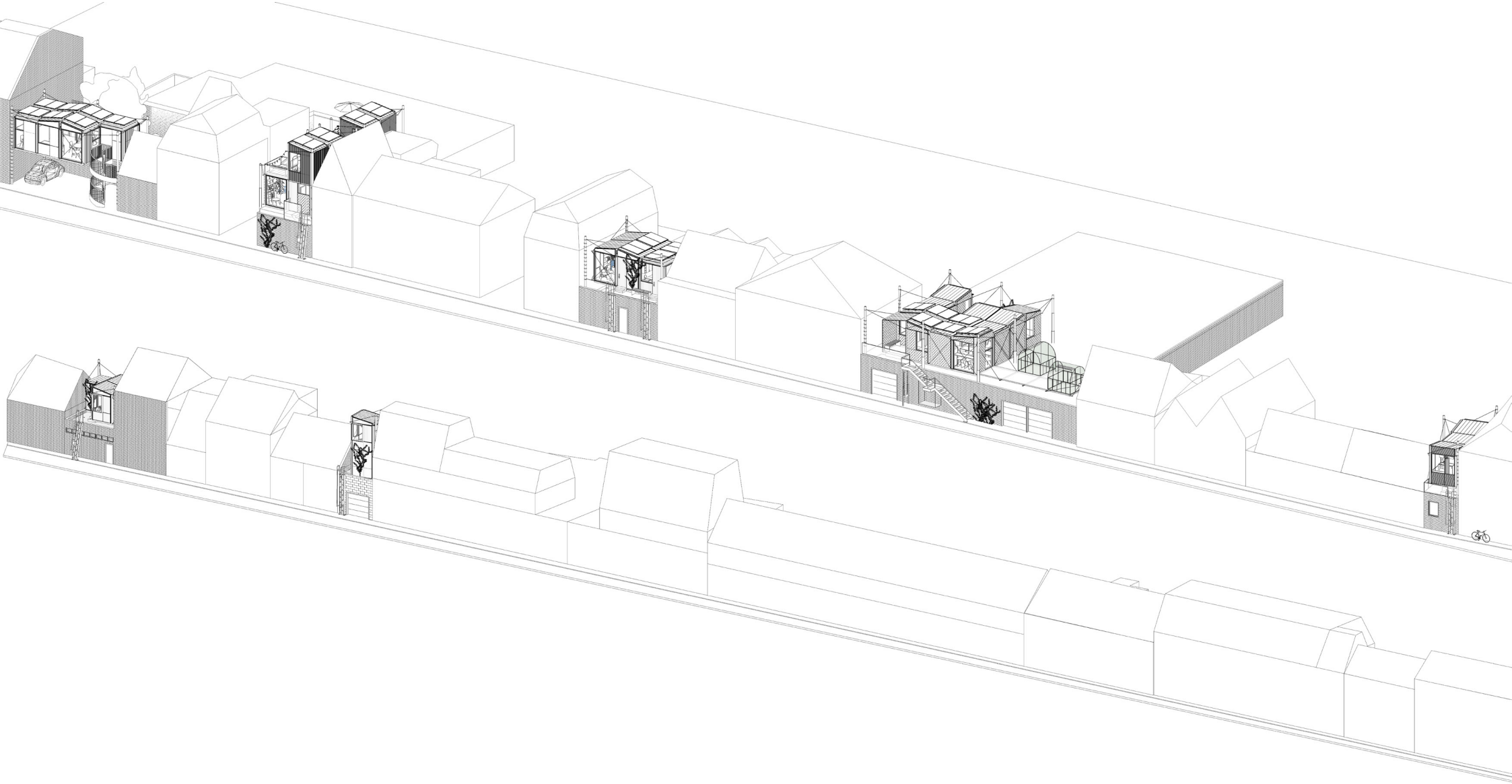


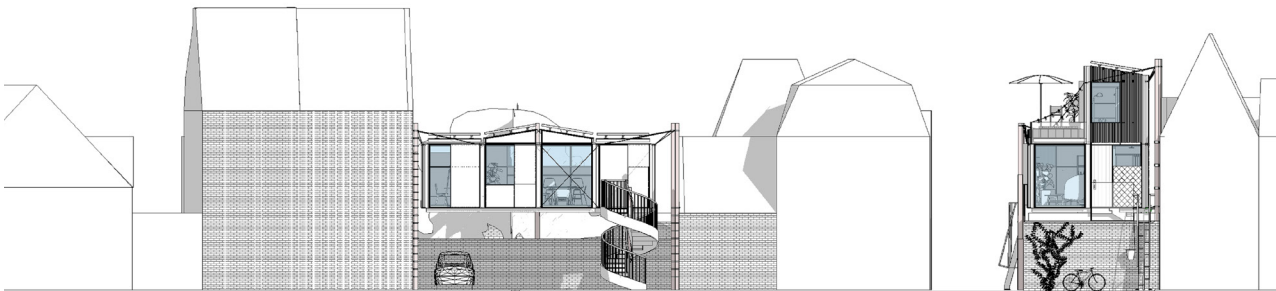
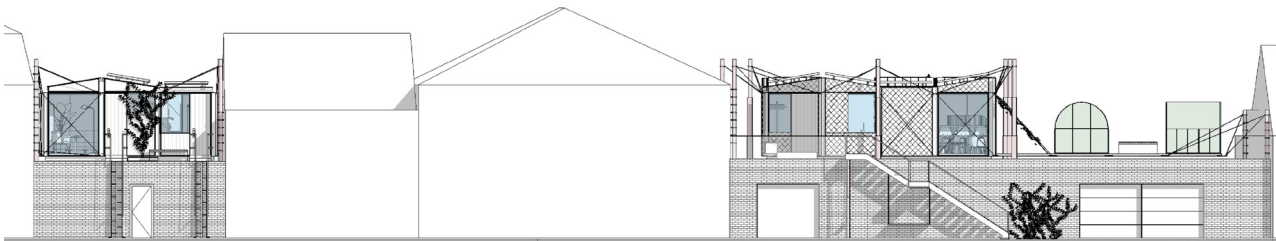
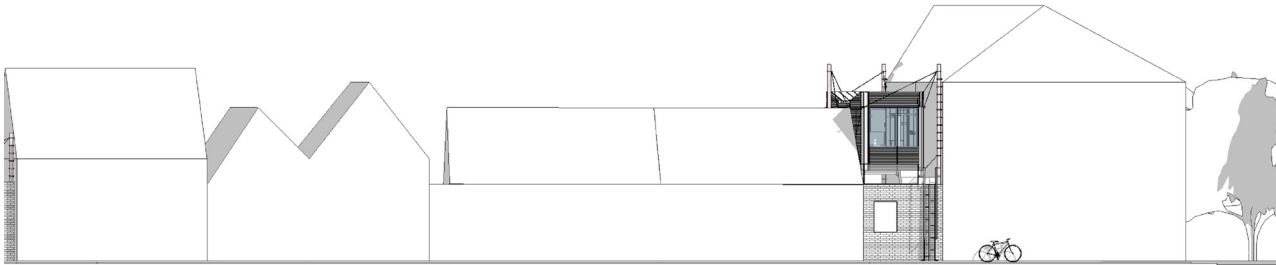
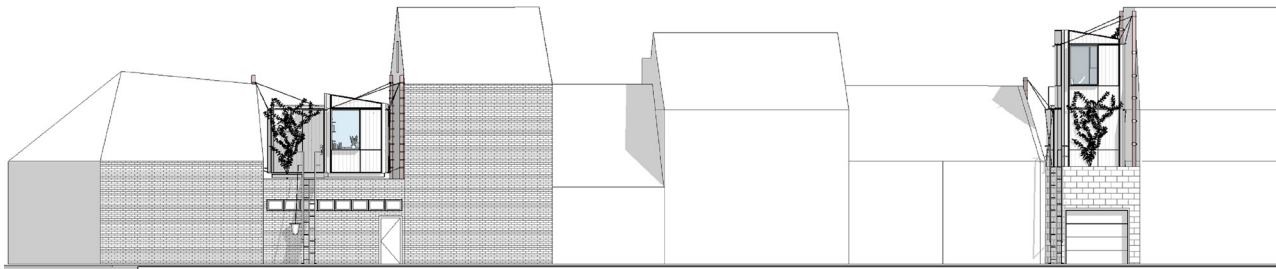
- Home 
- Bathroom 
- Bedroom 
- Entrance 
- Living room 
- Kitchen 

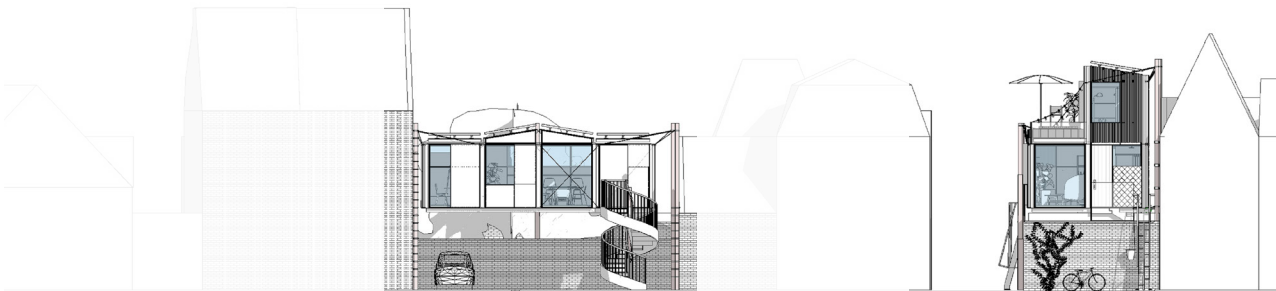
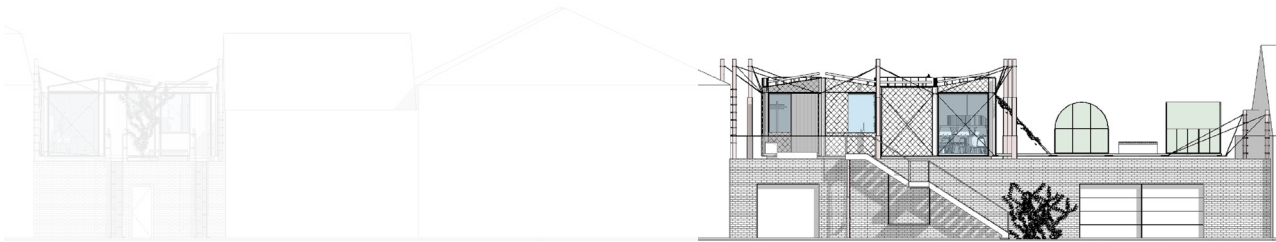
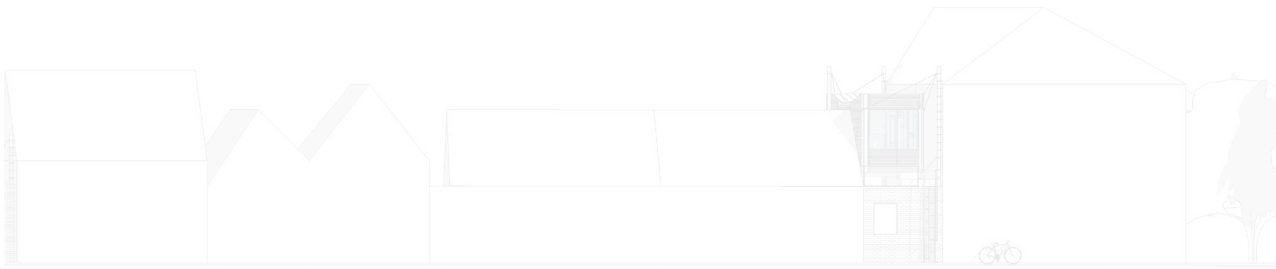






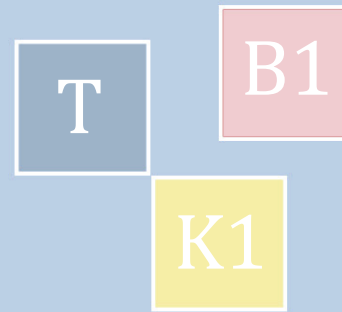
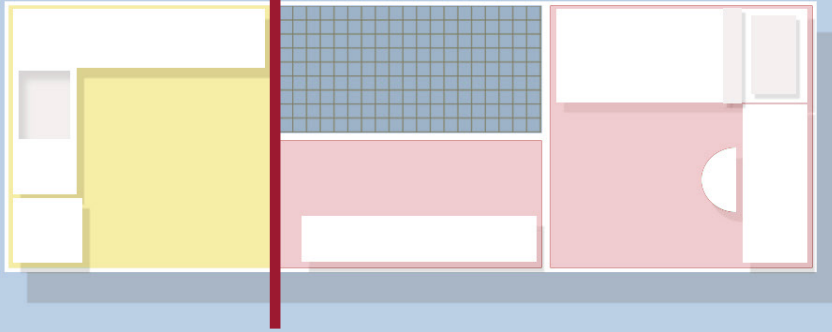






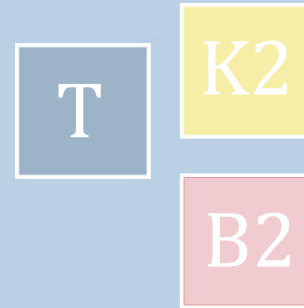
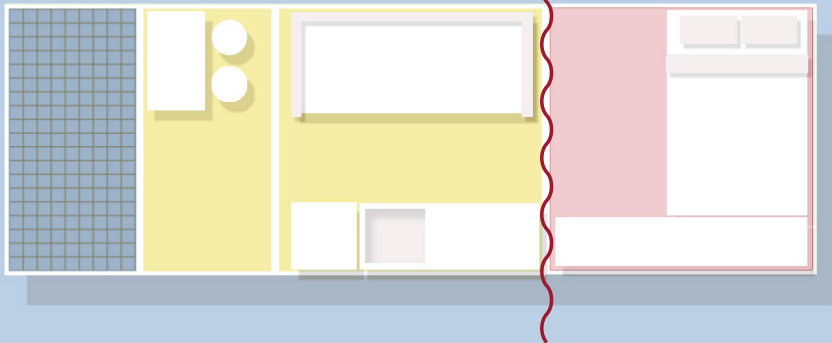
**- the house -**

TYPE 1: Introvert



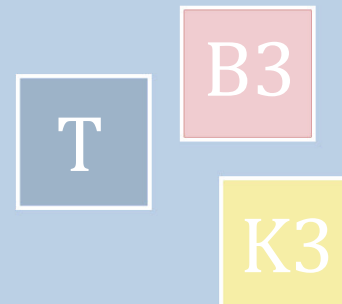
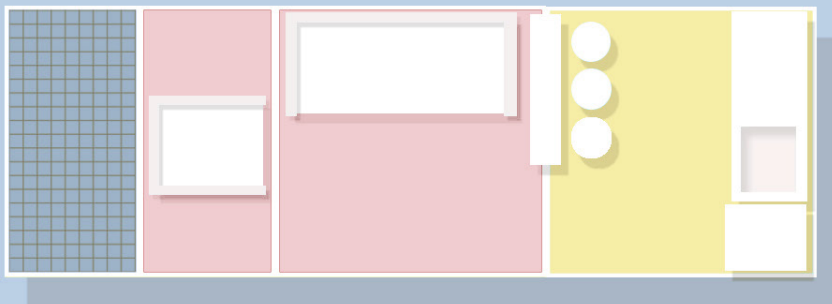
- **Kitchen** - storage
- Toilet** - closet
- Bedroom** - study

TYPE 2: Average

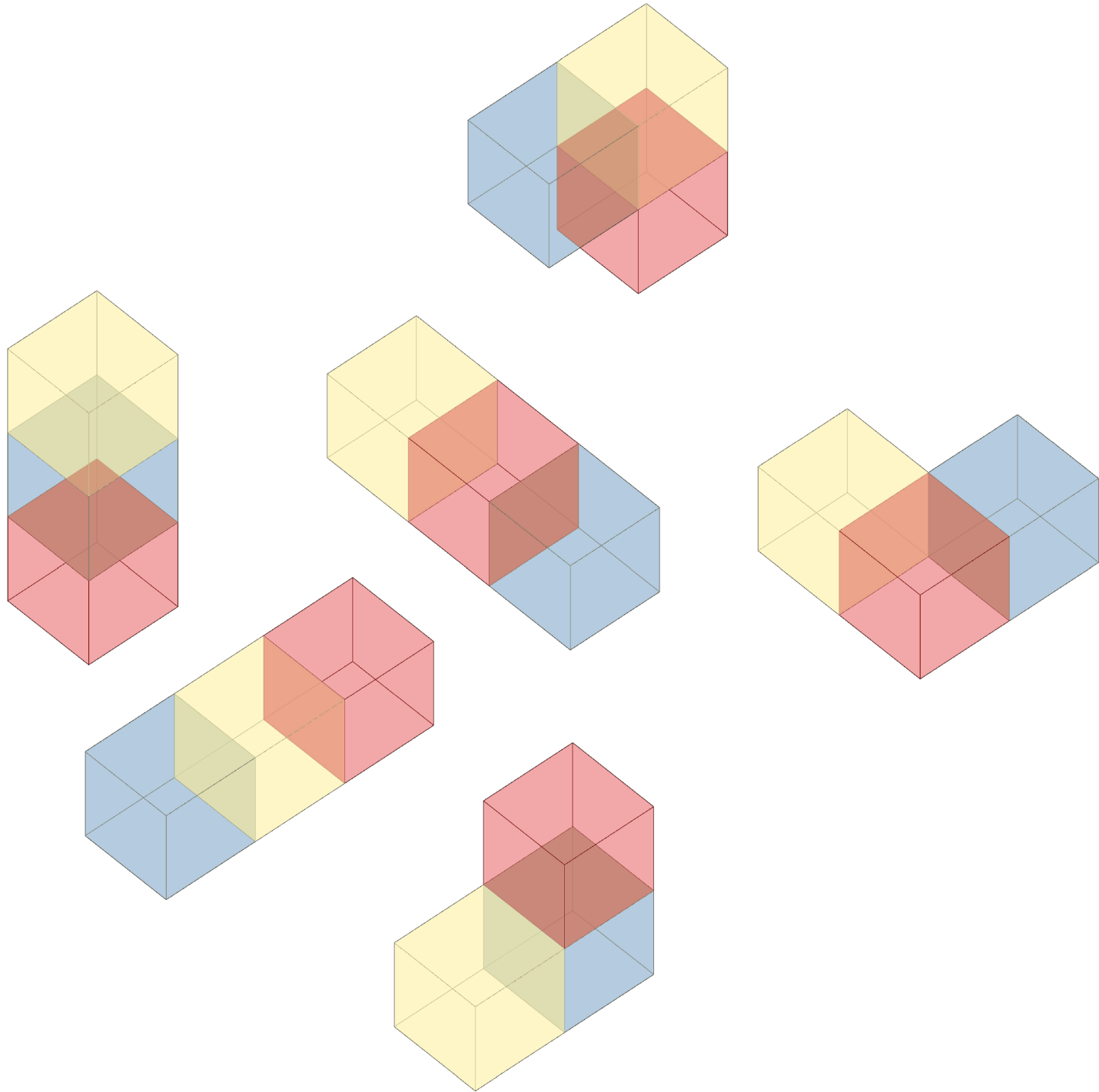


- **Toilet** - study/dining
- Kitchen** - living
- Bedroom** - storage

TYPE 3: Extrovert



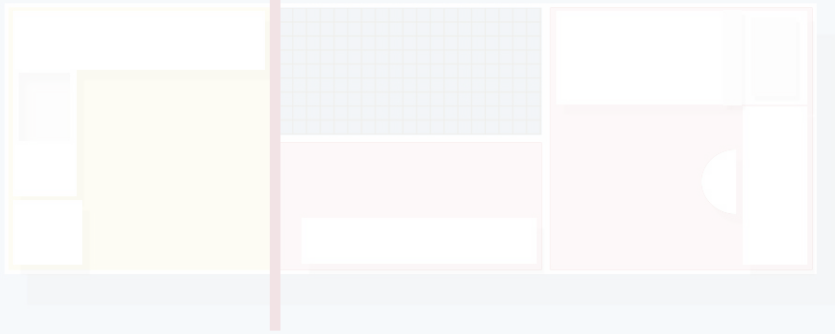
- Toilet** - living
- bedroom - **Living**
- Kitchen** - storage



**- unit 1-**

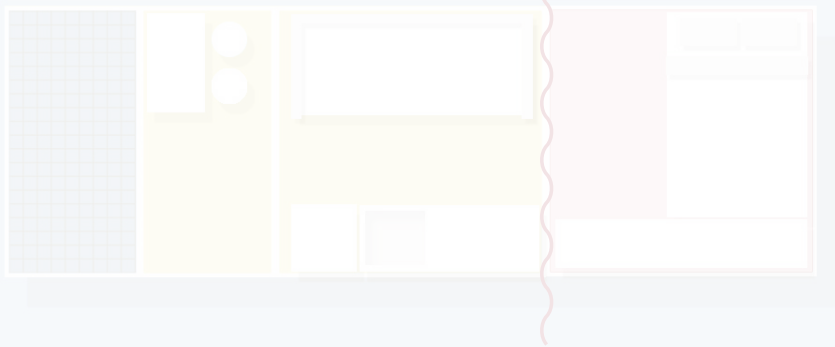


TYPE 1: Introvert



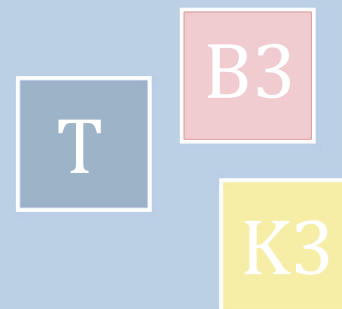
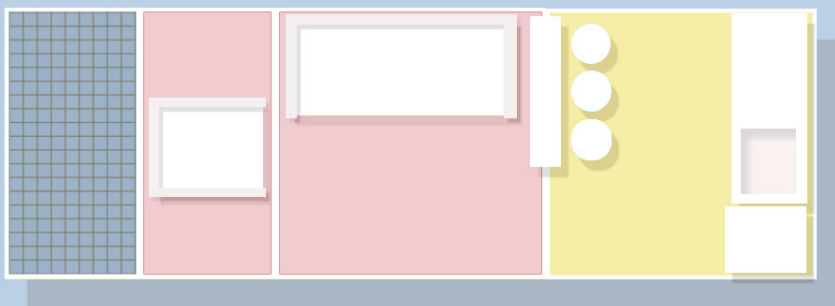
- **Kitchen** - storage
- Toilet** - closet
- Bedroom** - study

TYPE 2: Average

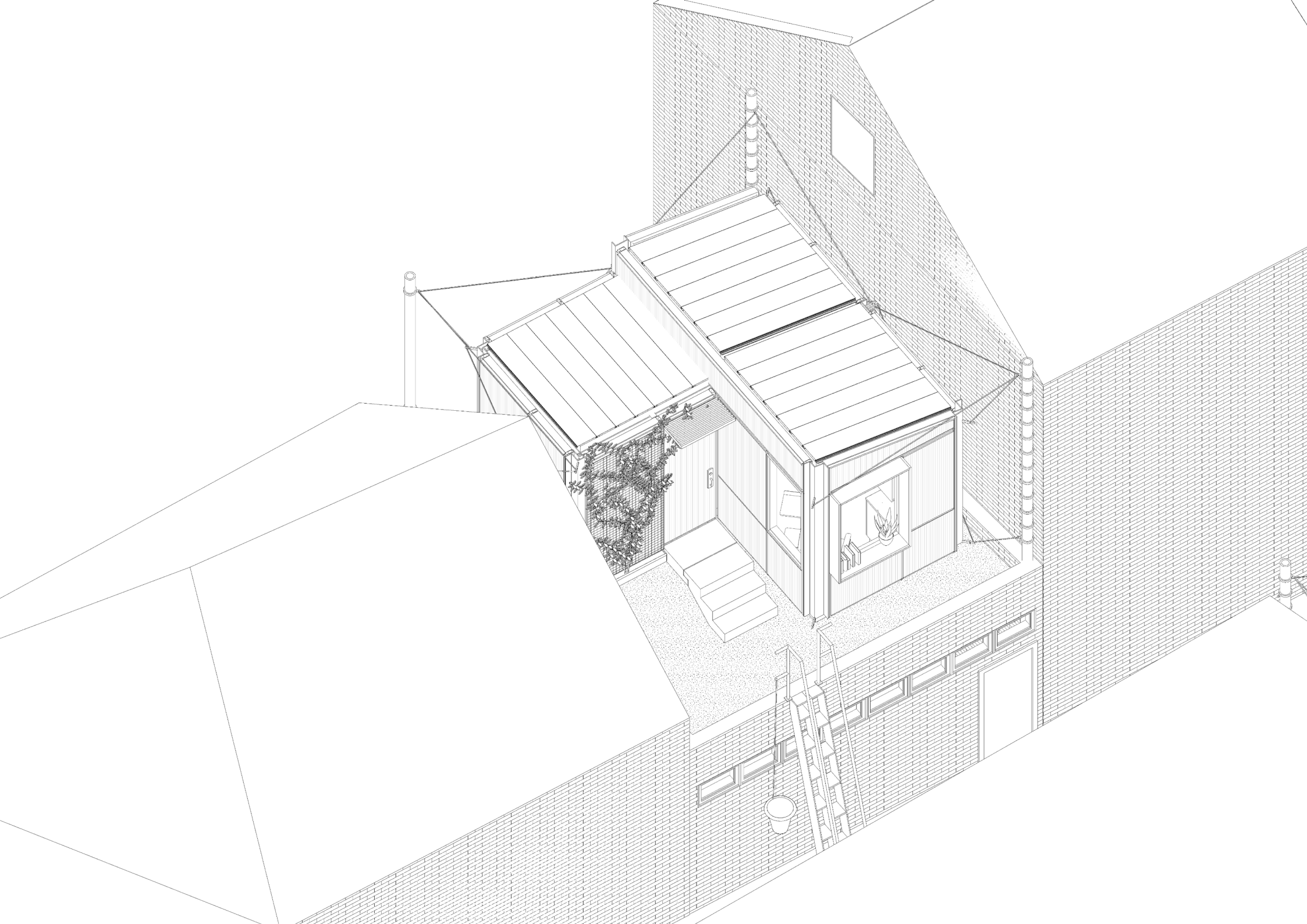


- **Toilet** - study/dining
- Kitchen** - living
- Bedroom** - storage

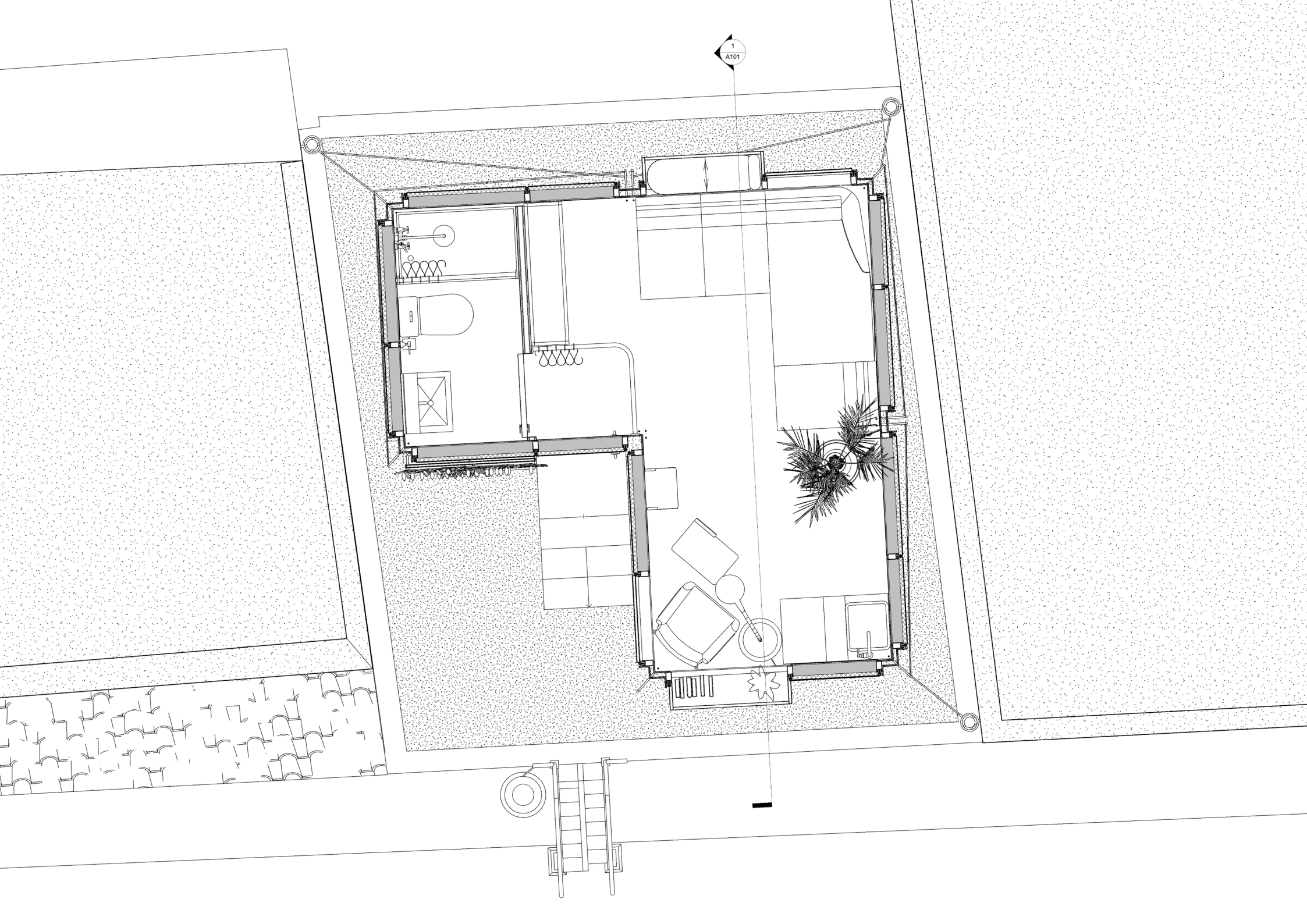
TYPE 3: Extrovert

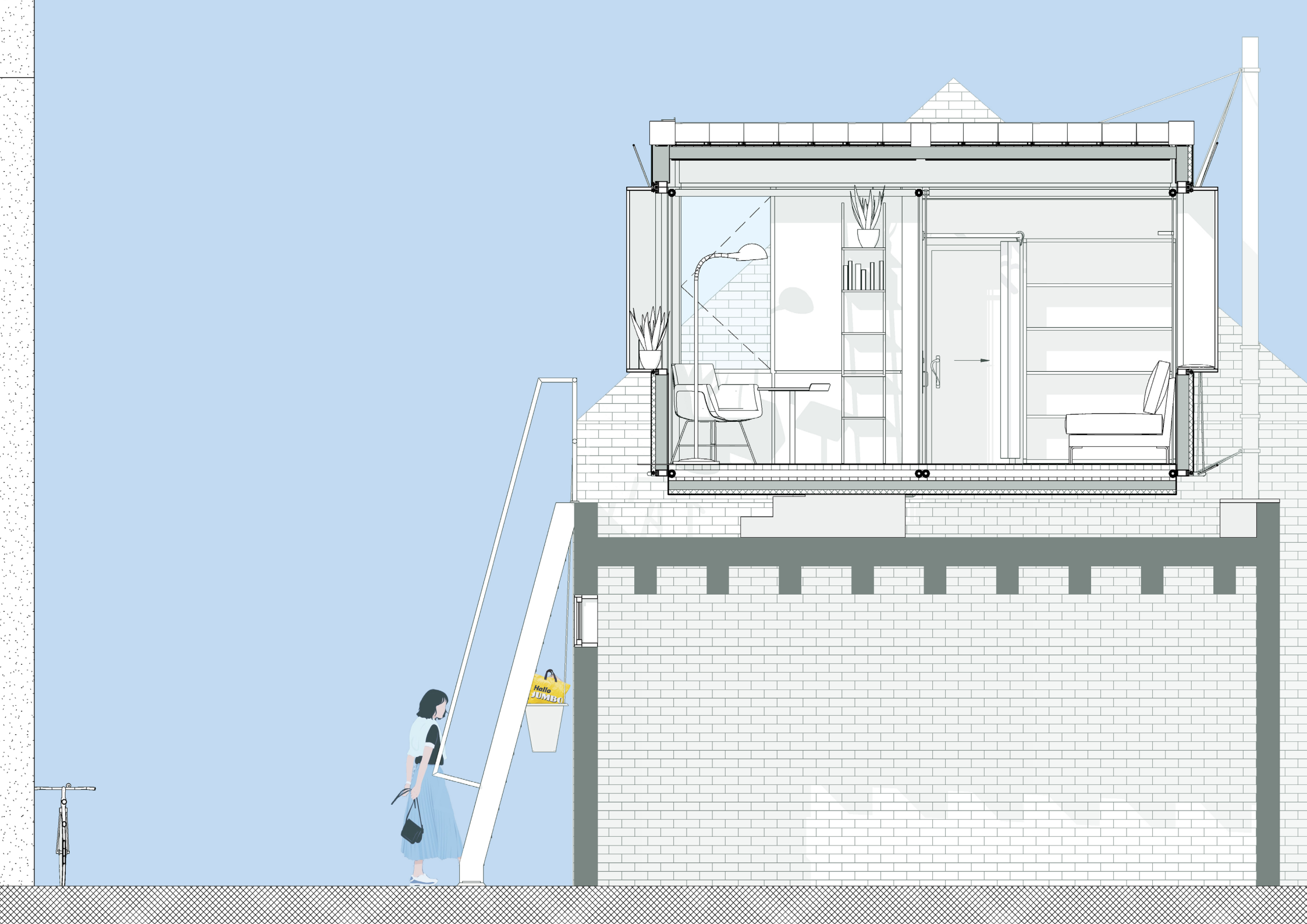


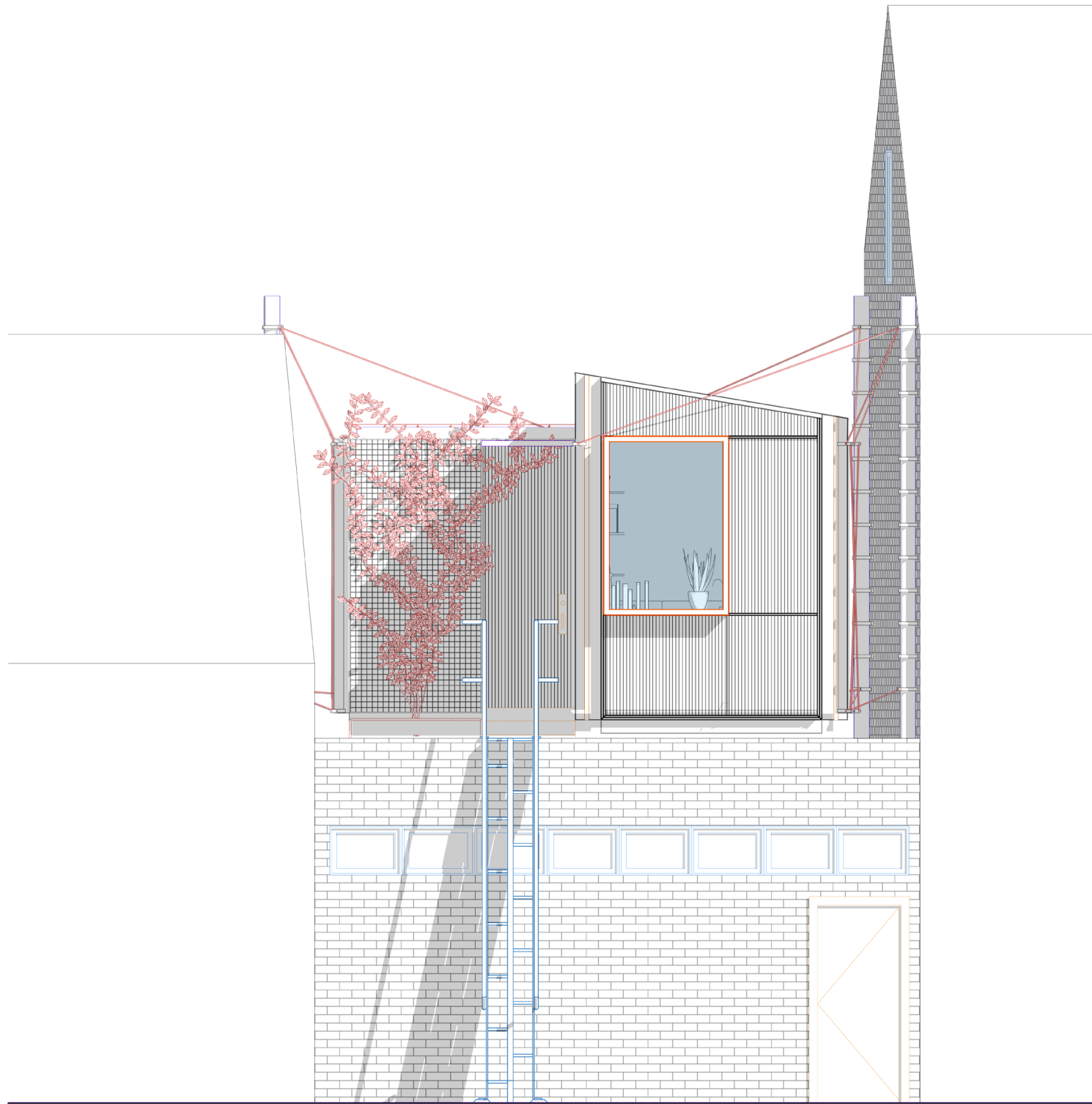
- Toilet** - living
- bedroom - **Living**
- Kitchen** - storage

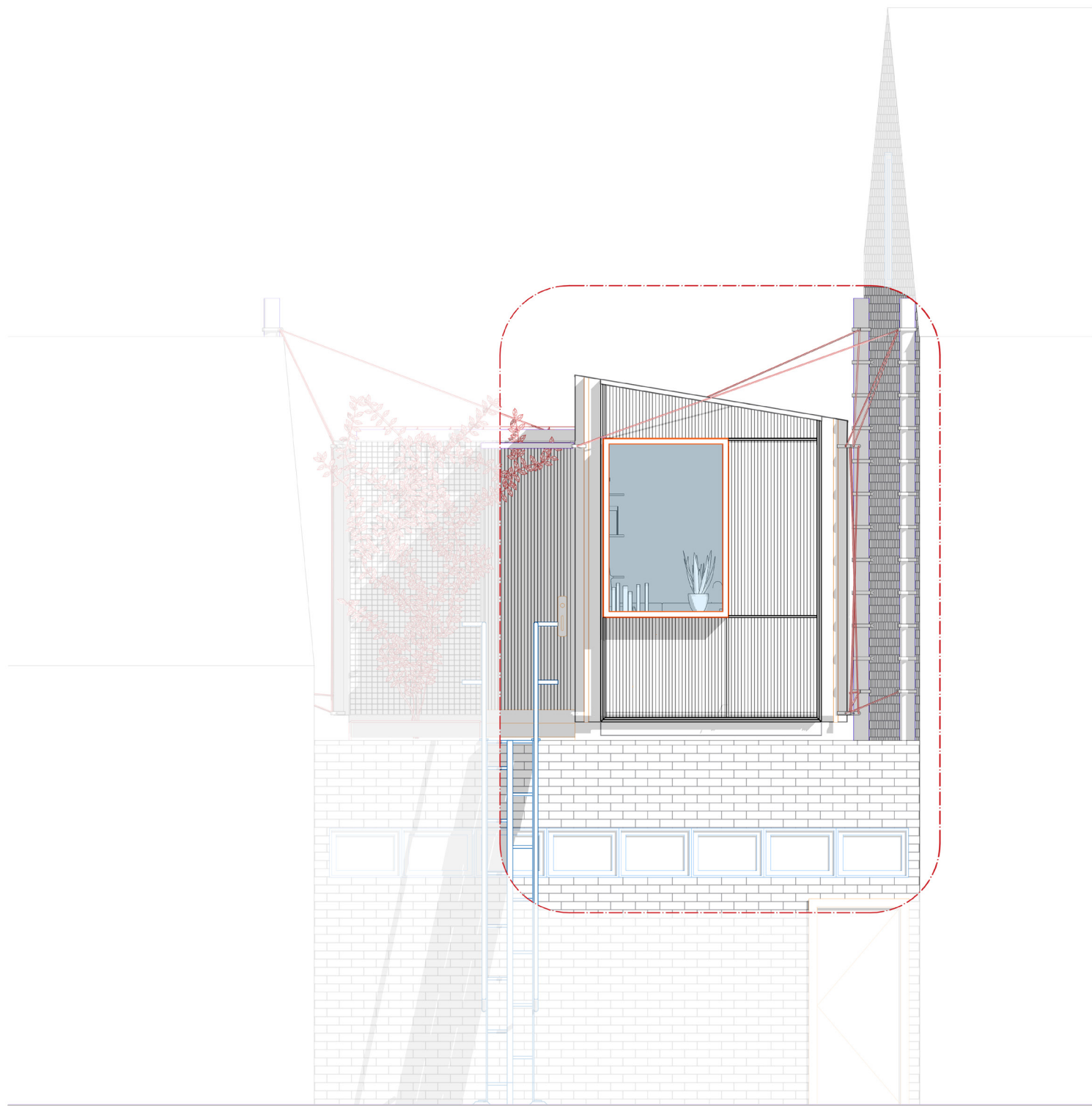


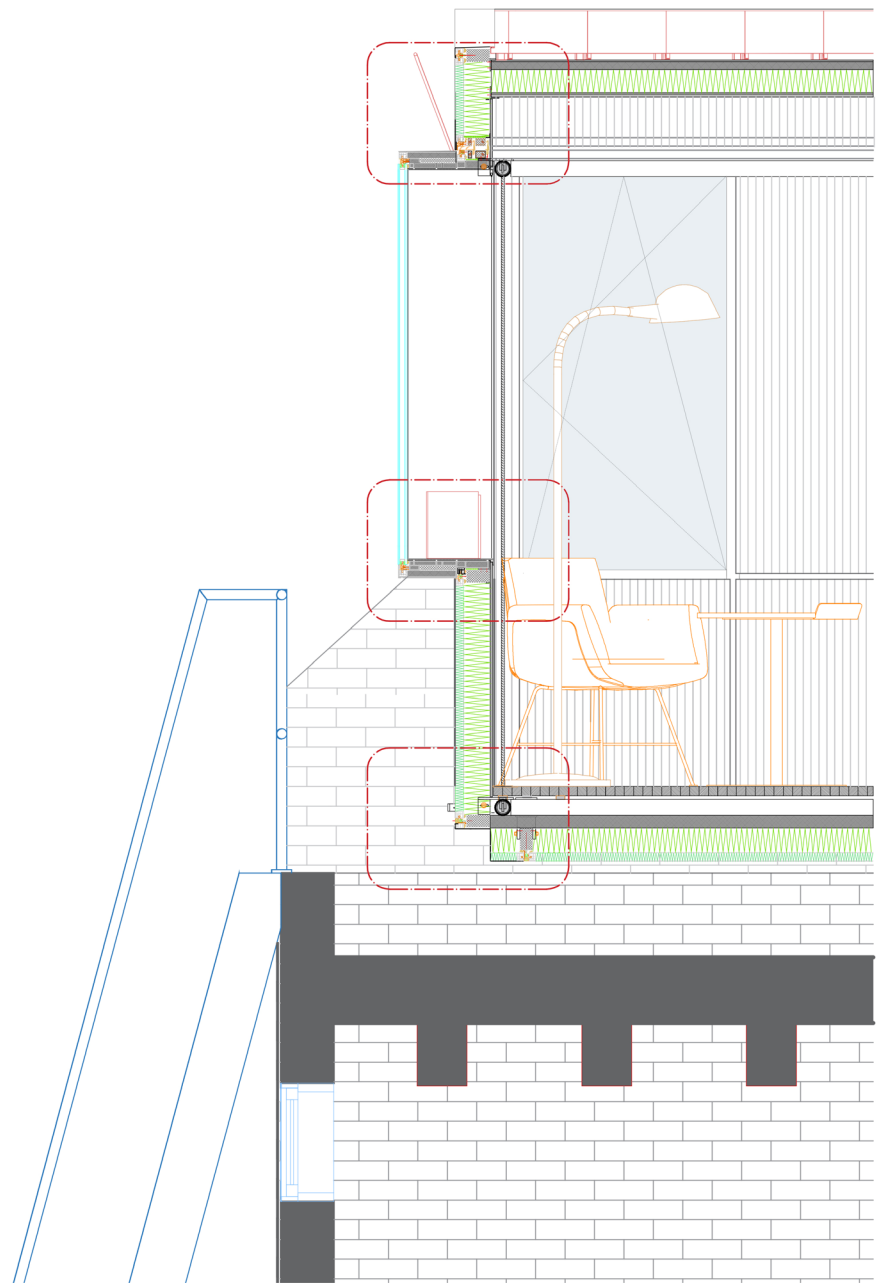
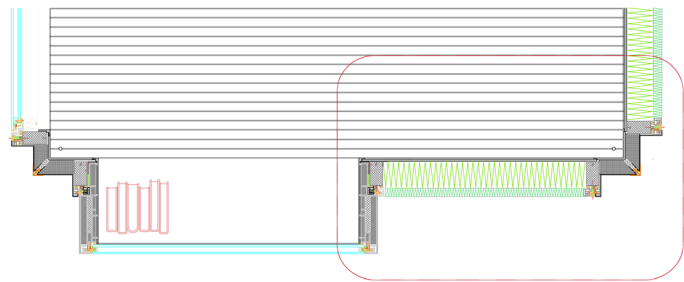
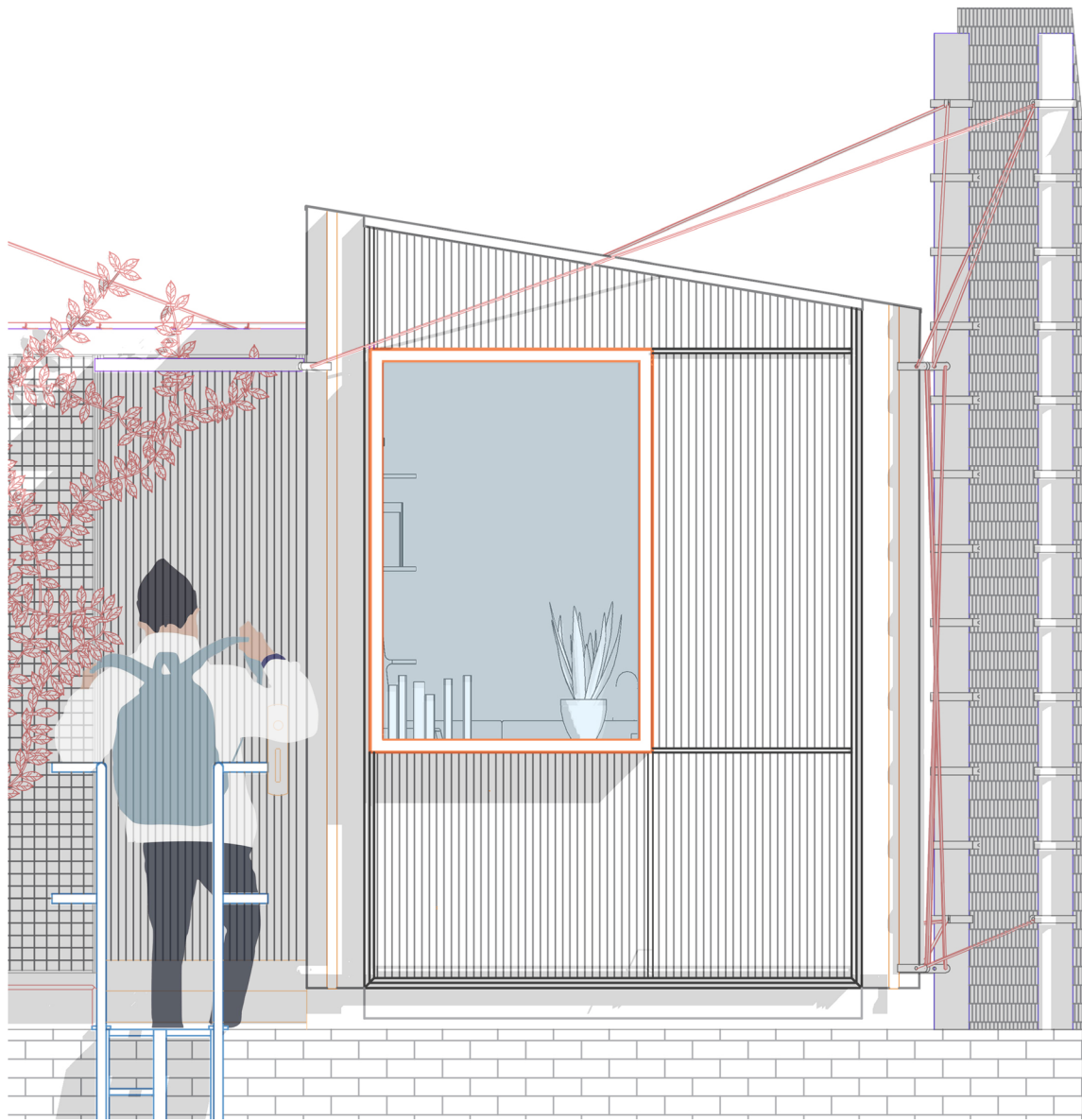
1  
A101

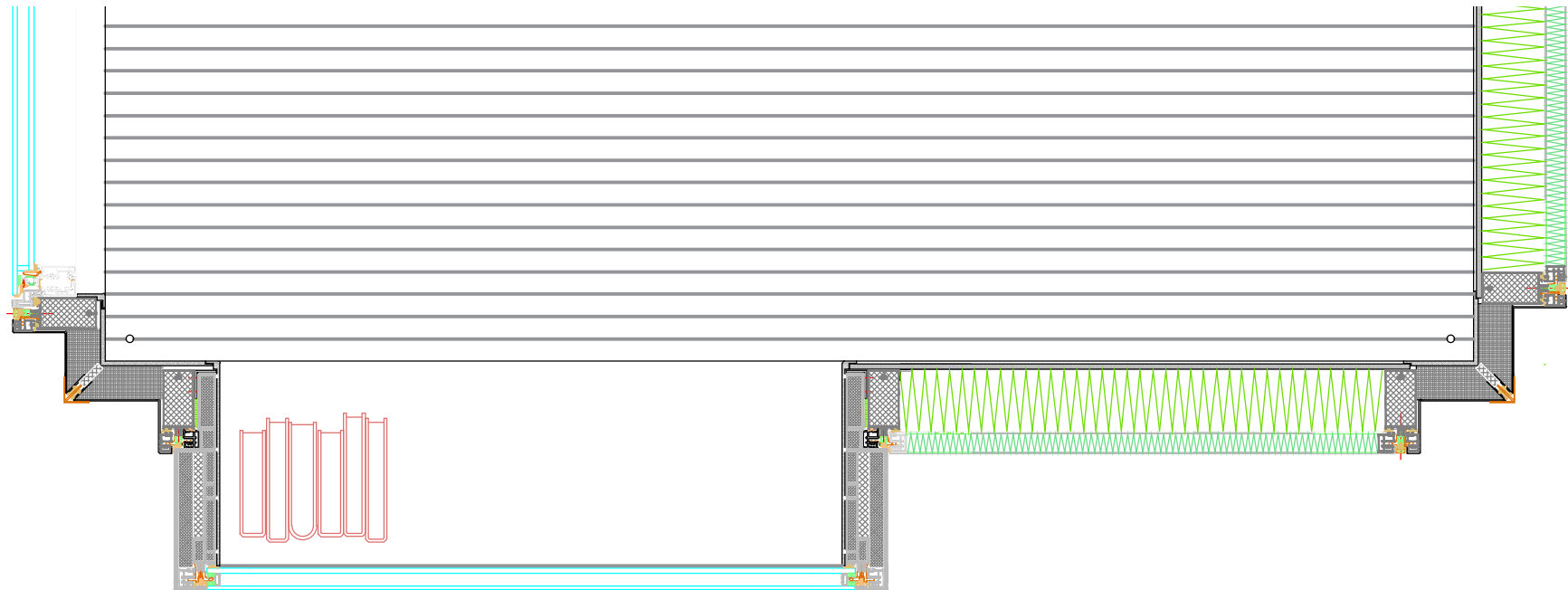




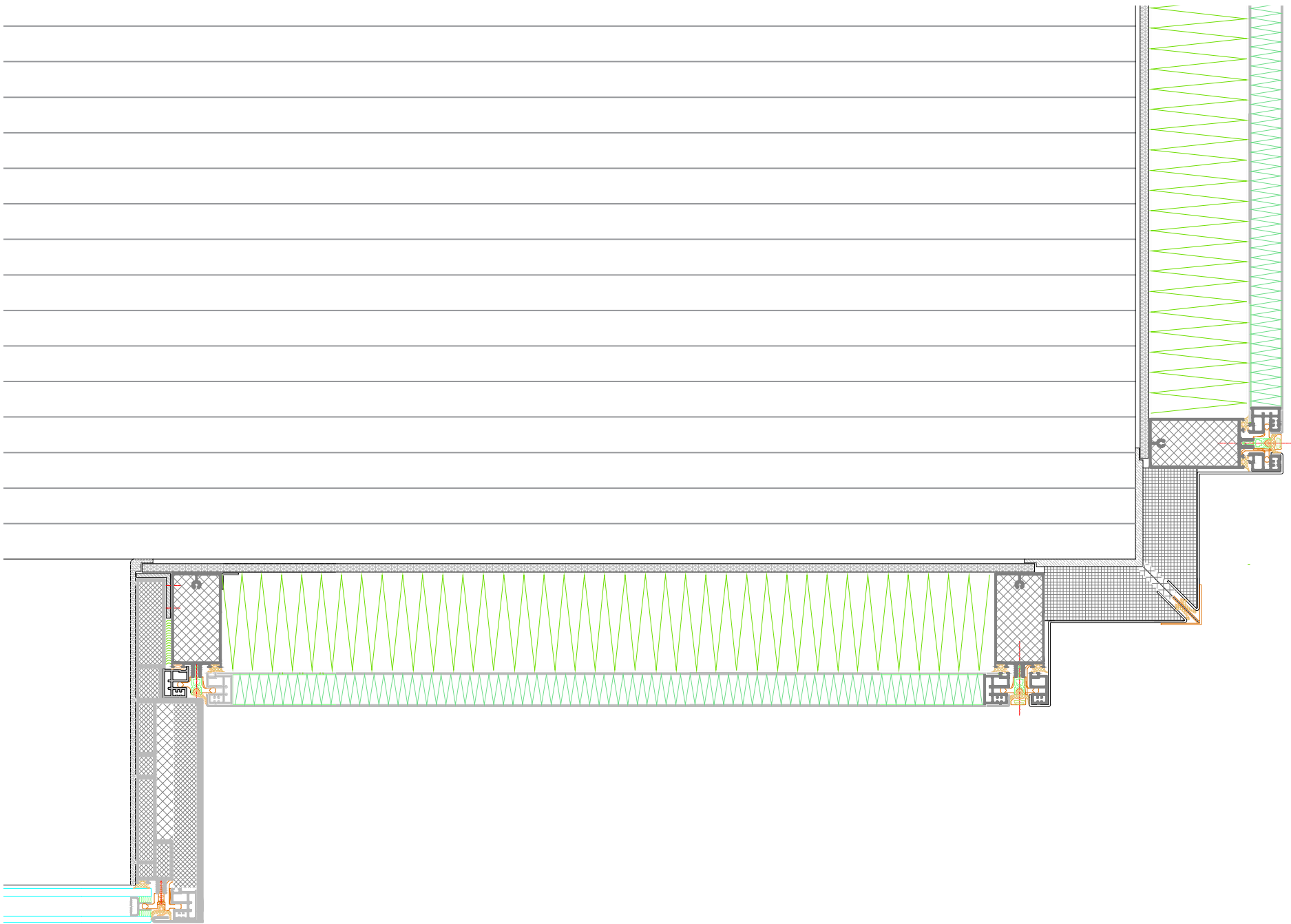




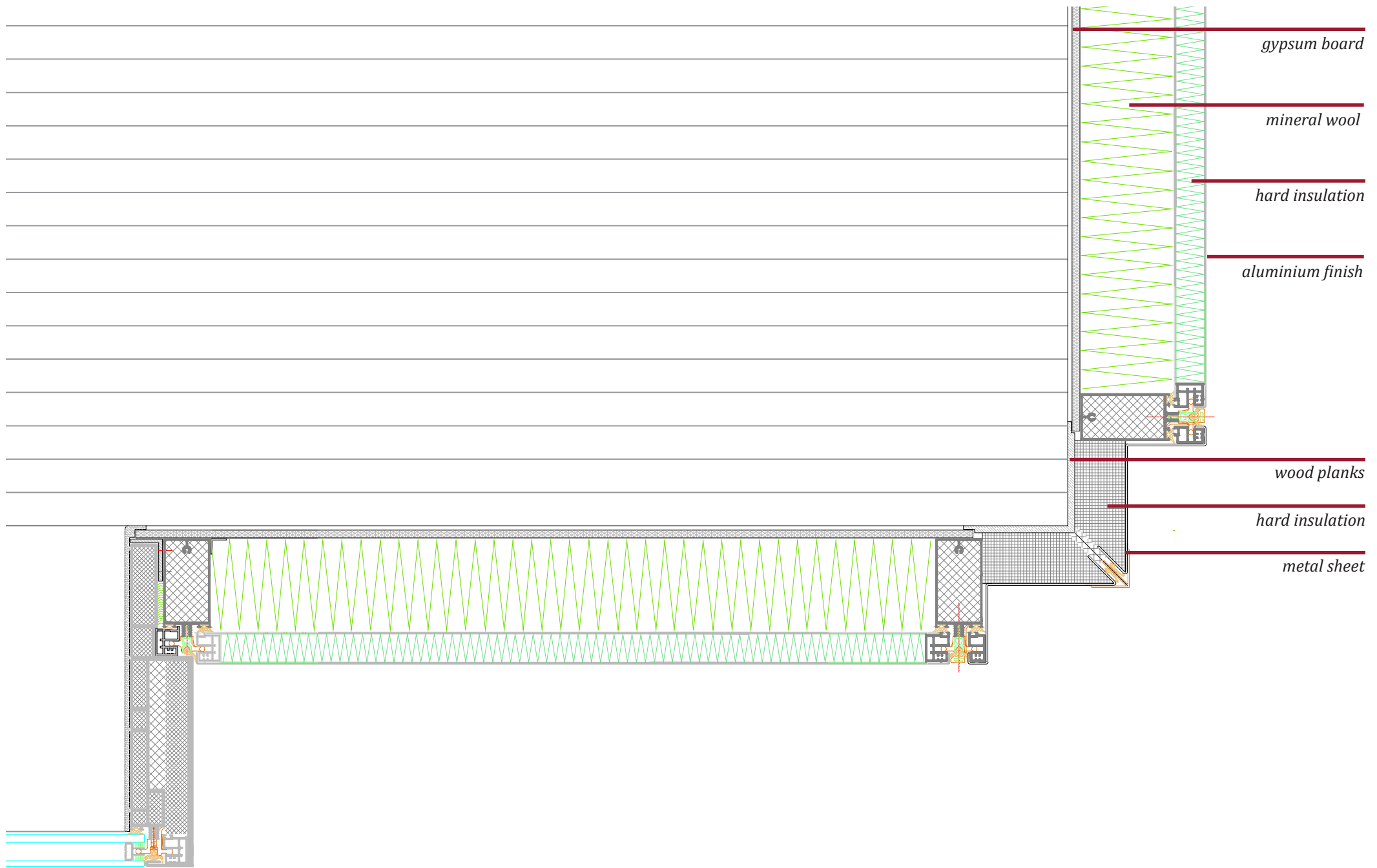




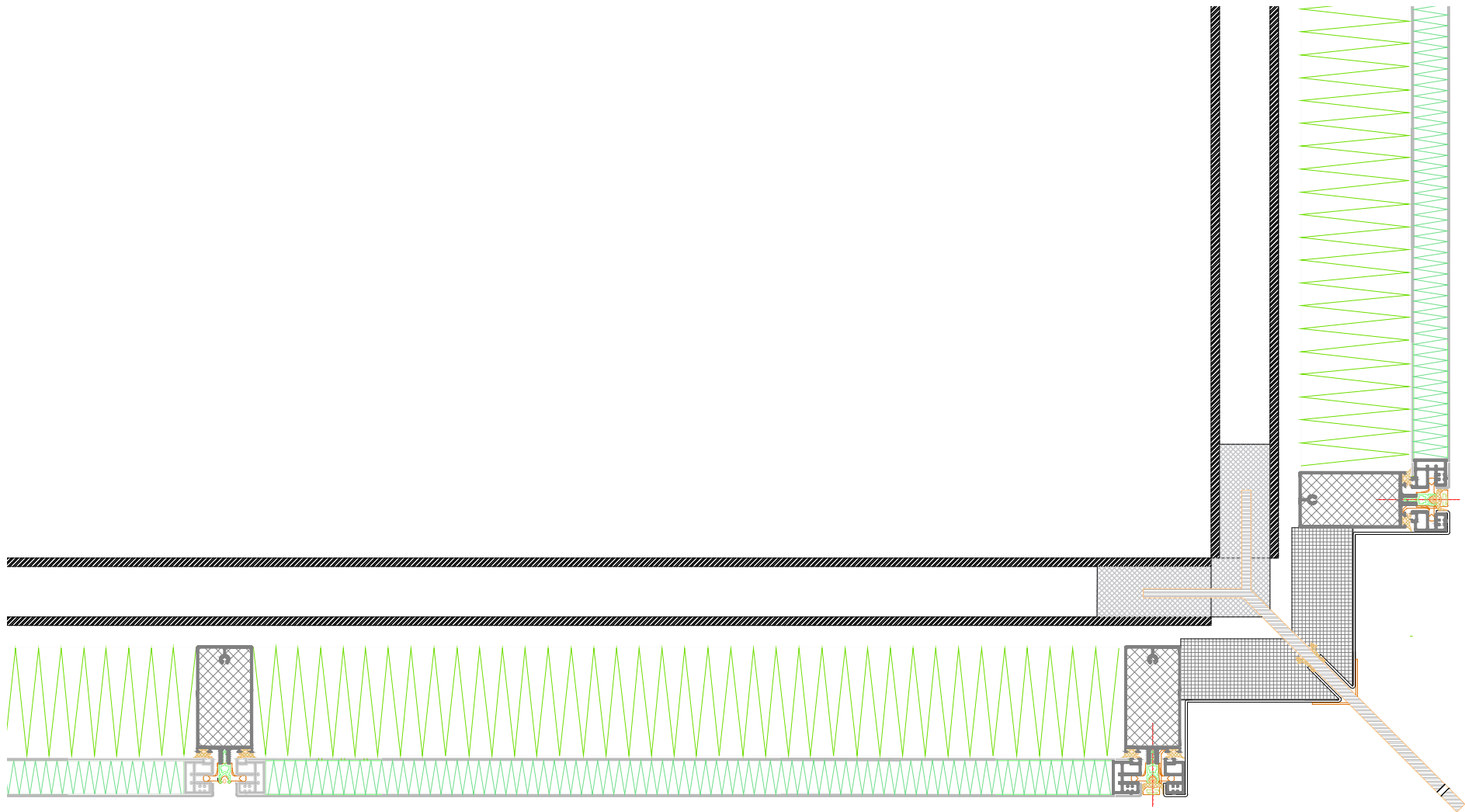
- bay window provides extra usable space -



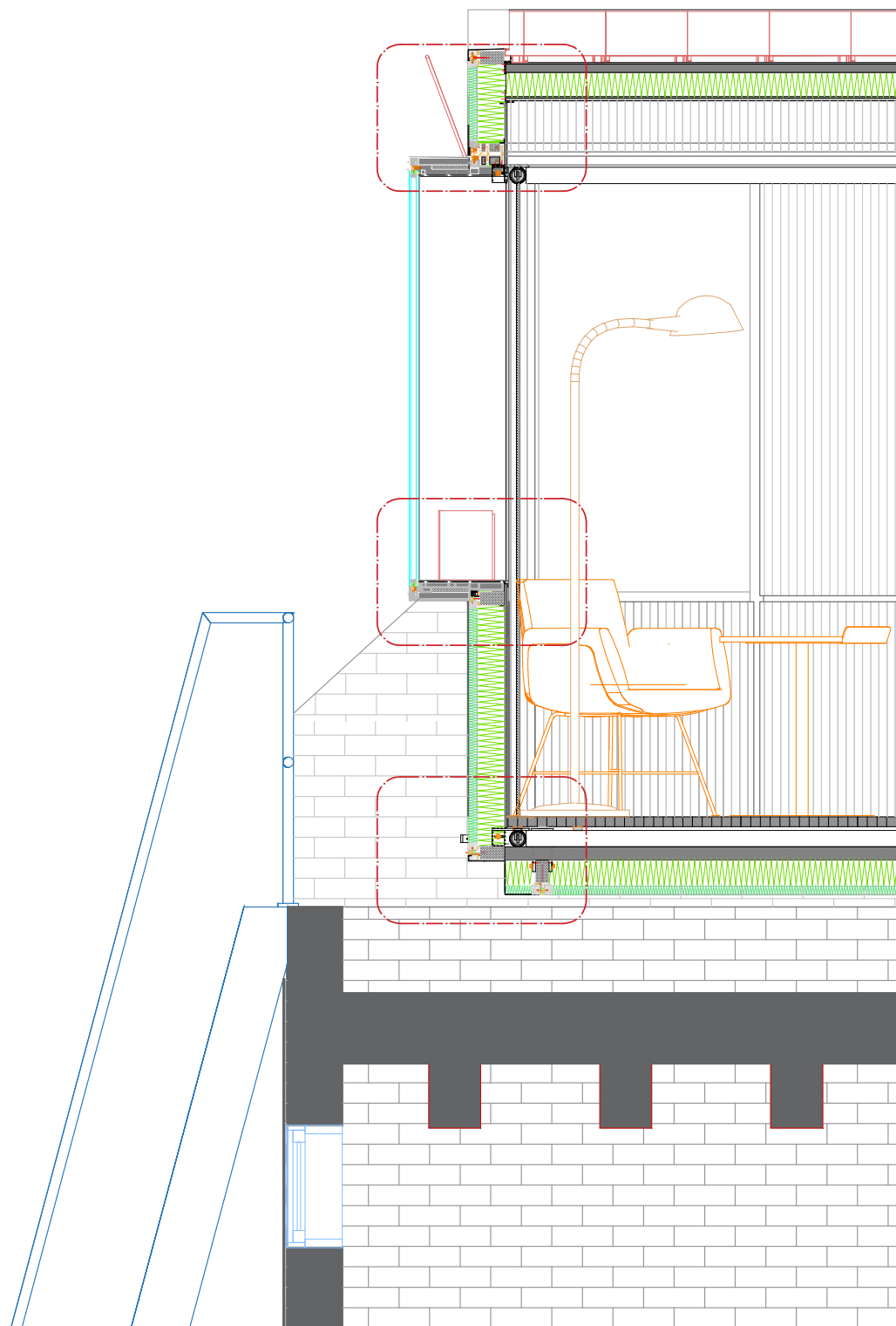
- corners emphasize the modularity of the system -

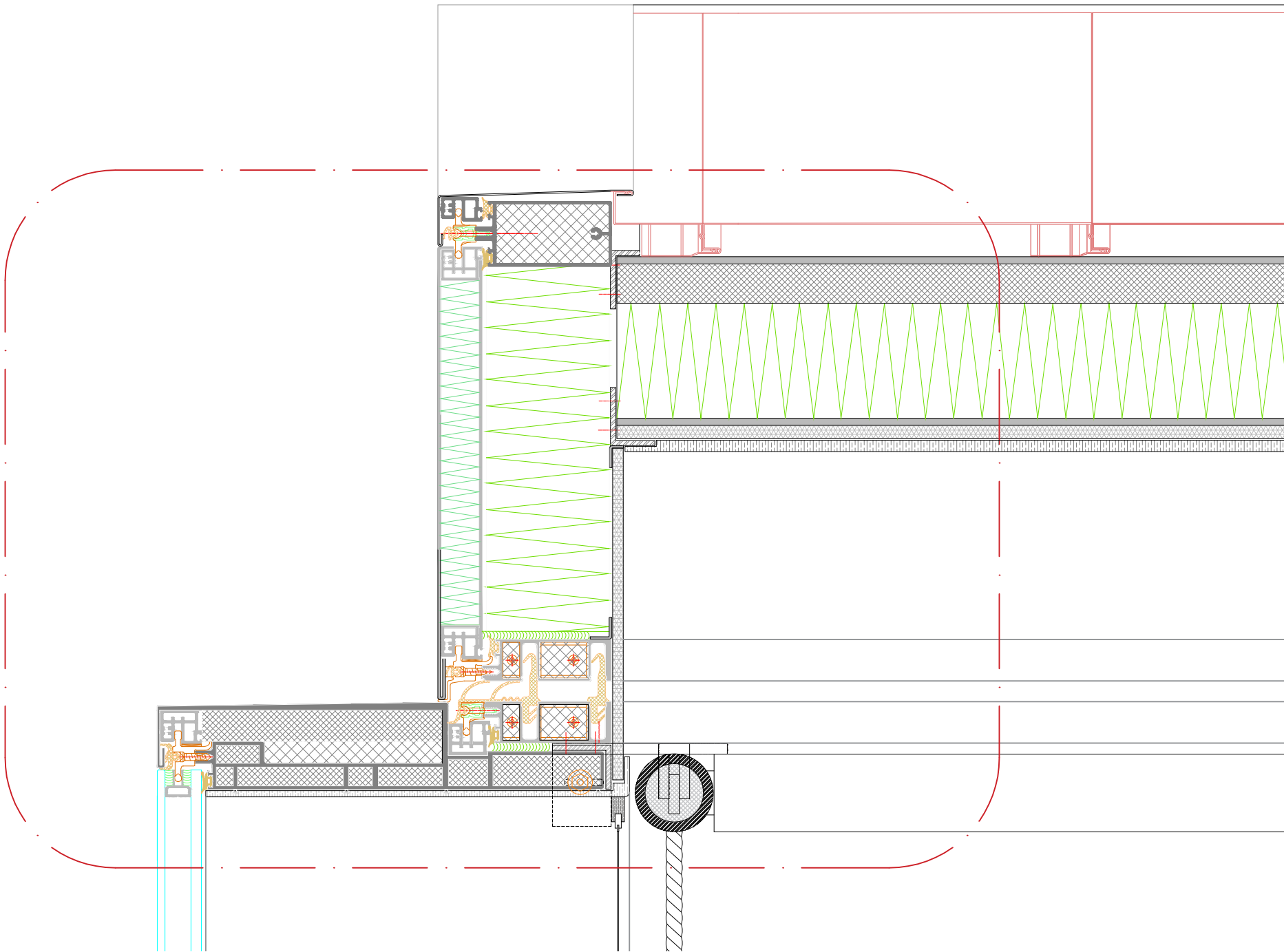


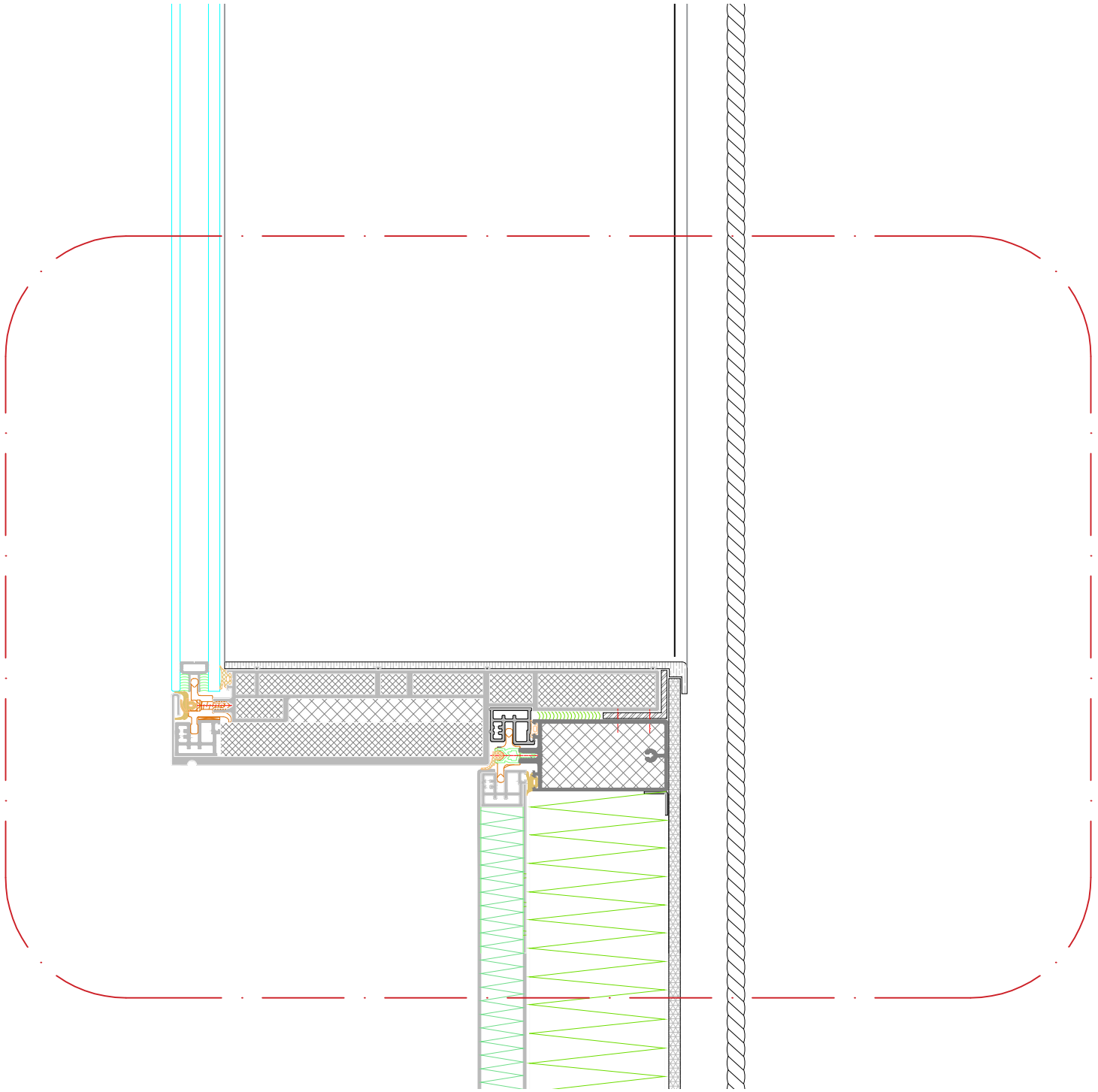
- acoustic and thermal performance -

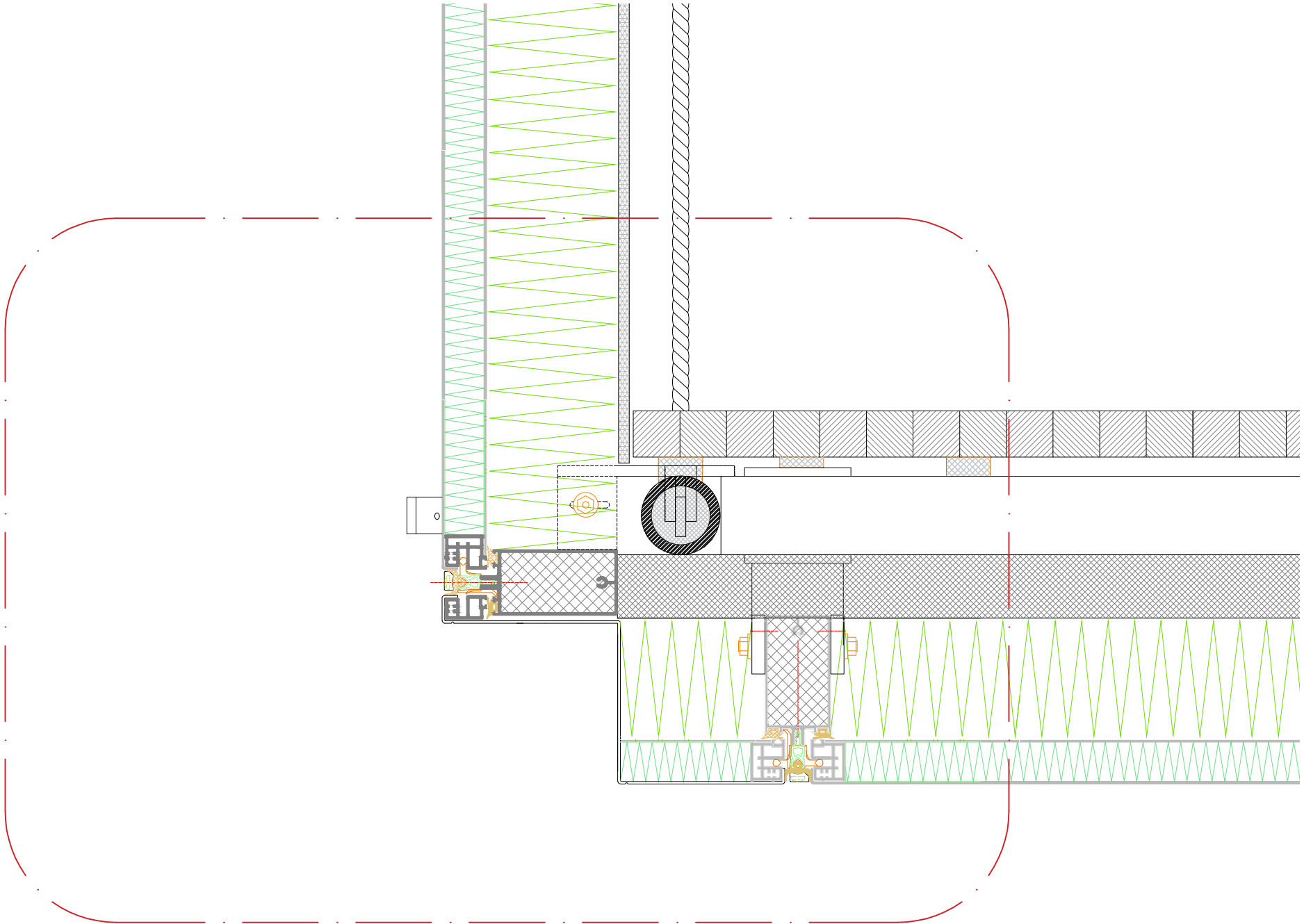


- corner solution for cable connection -



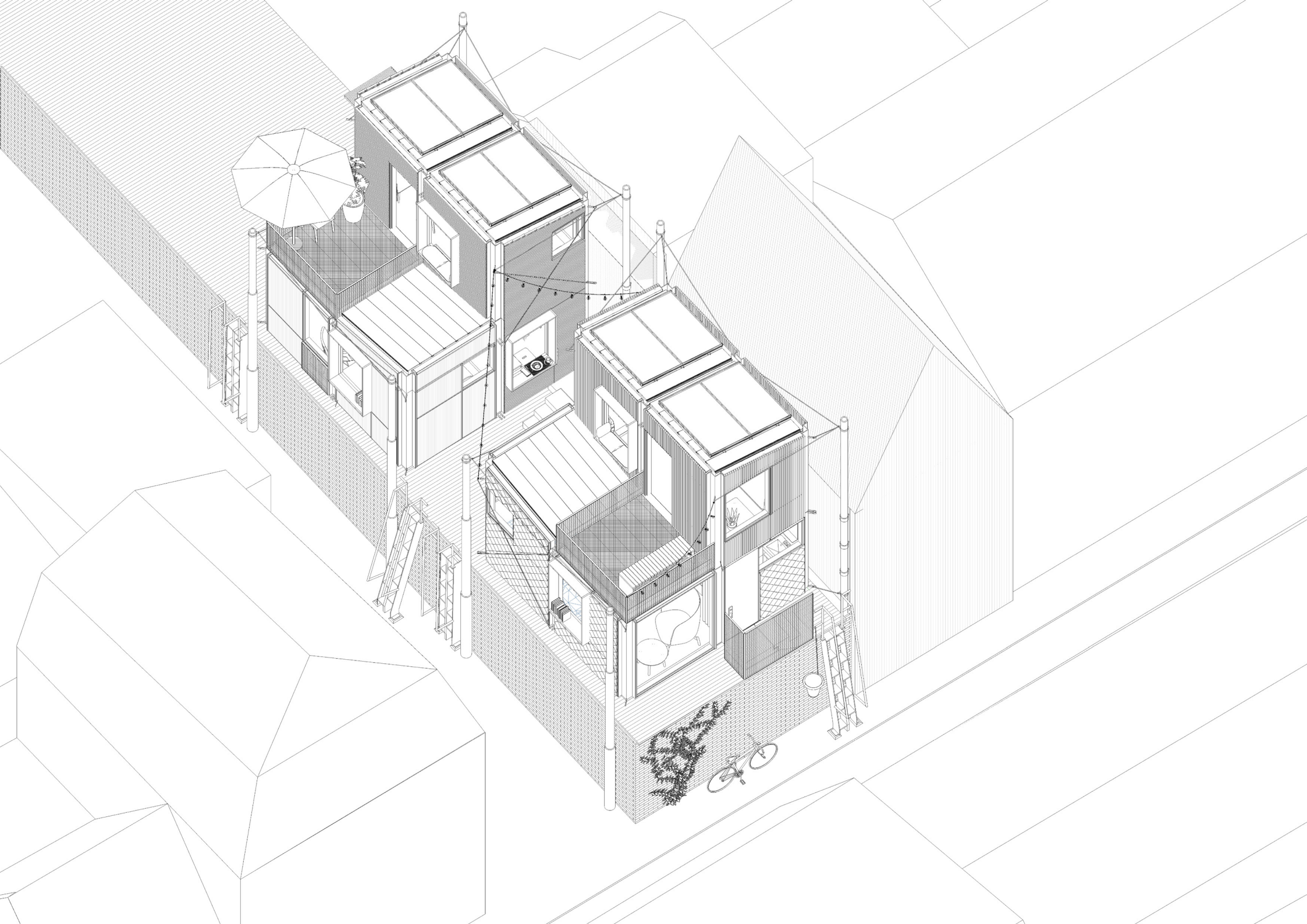


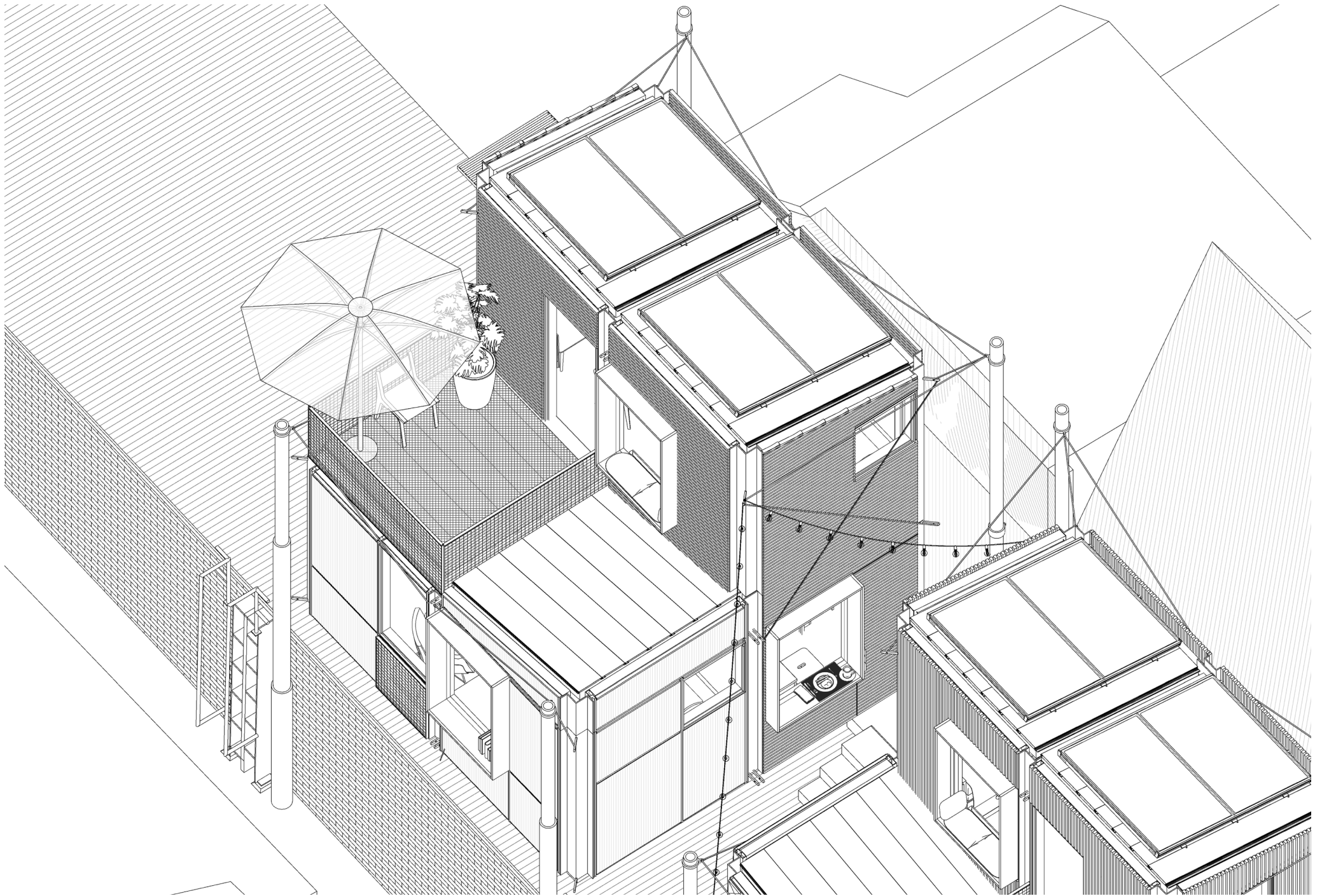




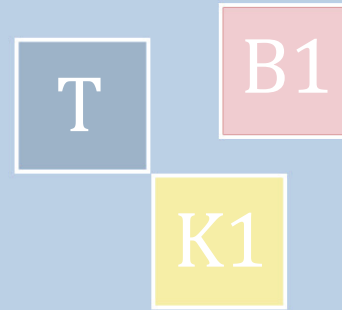
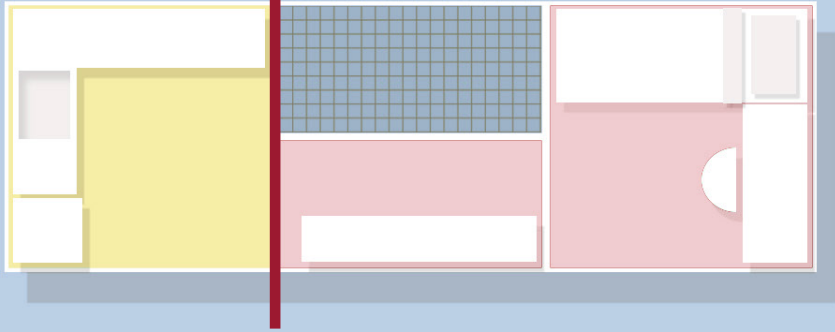


**- unit 2 -**



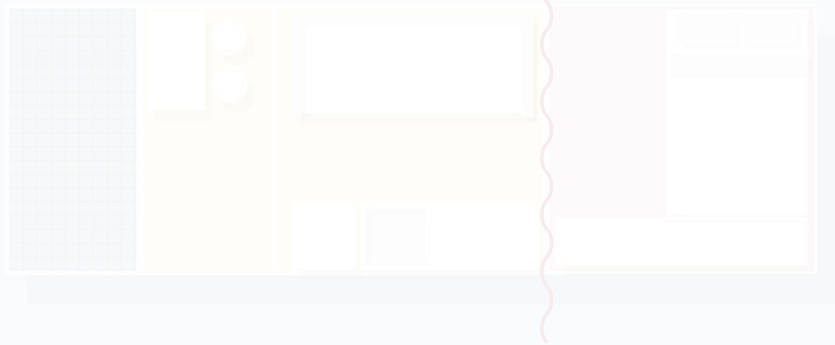


TYPE 1: Introvert



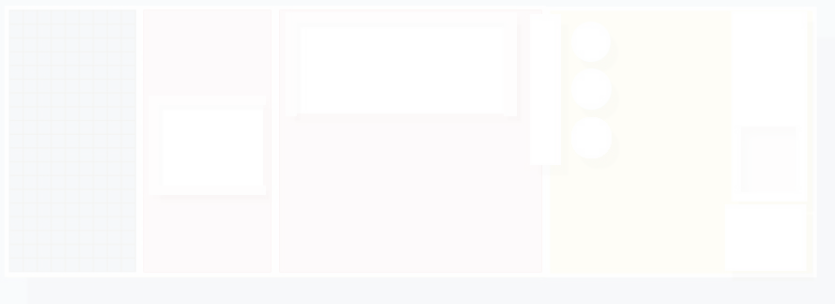
- **Kitchen** - storage
- Toilet** - closet
- Bedroom** - study

TYPE 2: Average



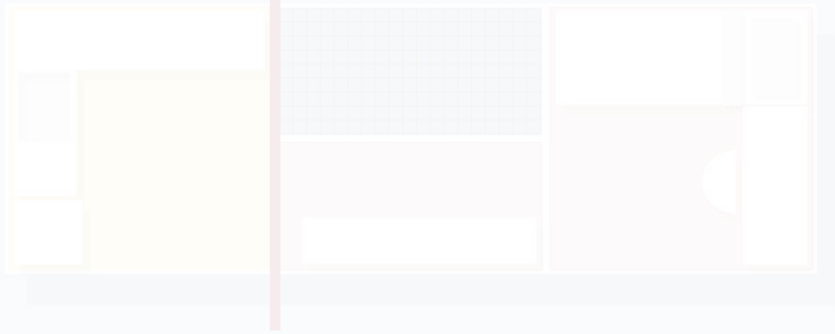
- **Toilet** - study/dining
- Kitchen** - living
- Bedroom** - storage

TYPE 3: Extrovert



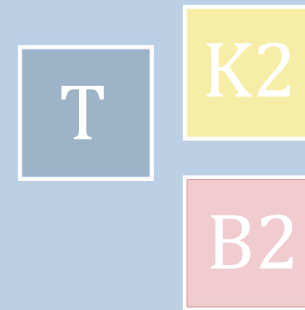
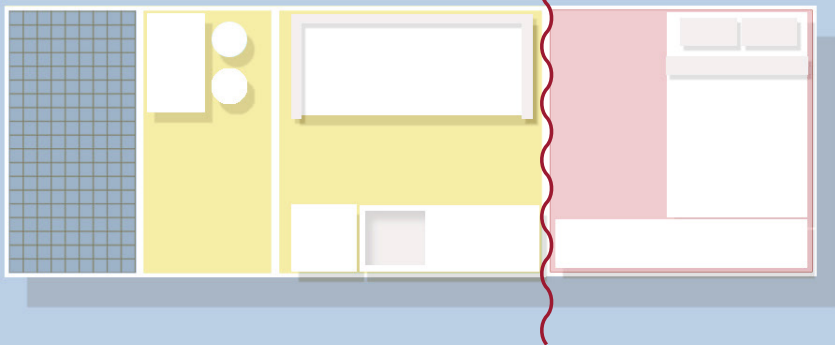
- Toilet** - living
- **bedroom** - Living
- Kitchen** - storage

TYPE 1: Introvert



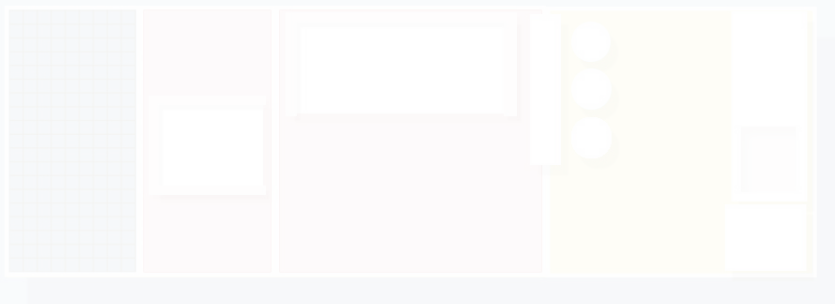
- Kitchen - storage
- Toilet - closet
- Bedroom - study

TYPE 2: Average



- Toilet - study/dining
- Kitchen - living
- Bedroom - storage

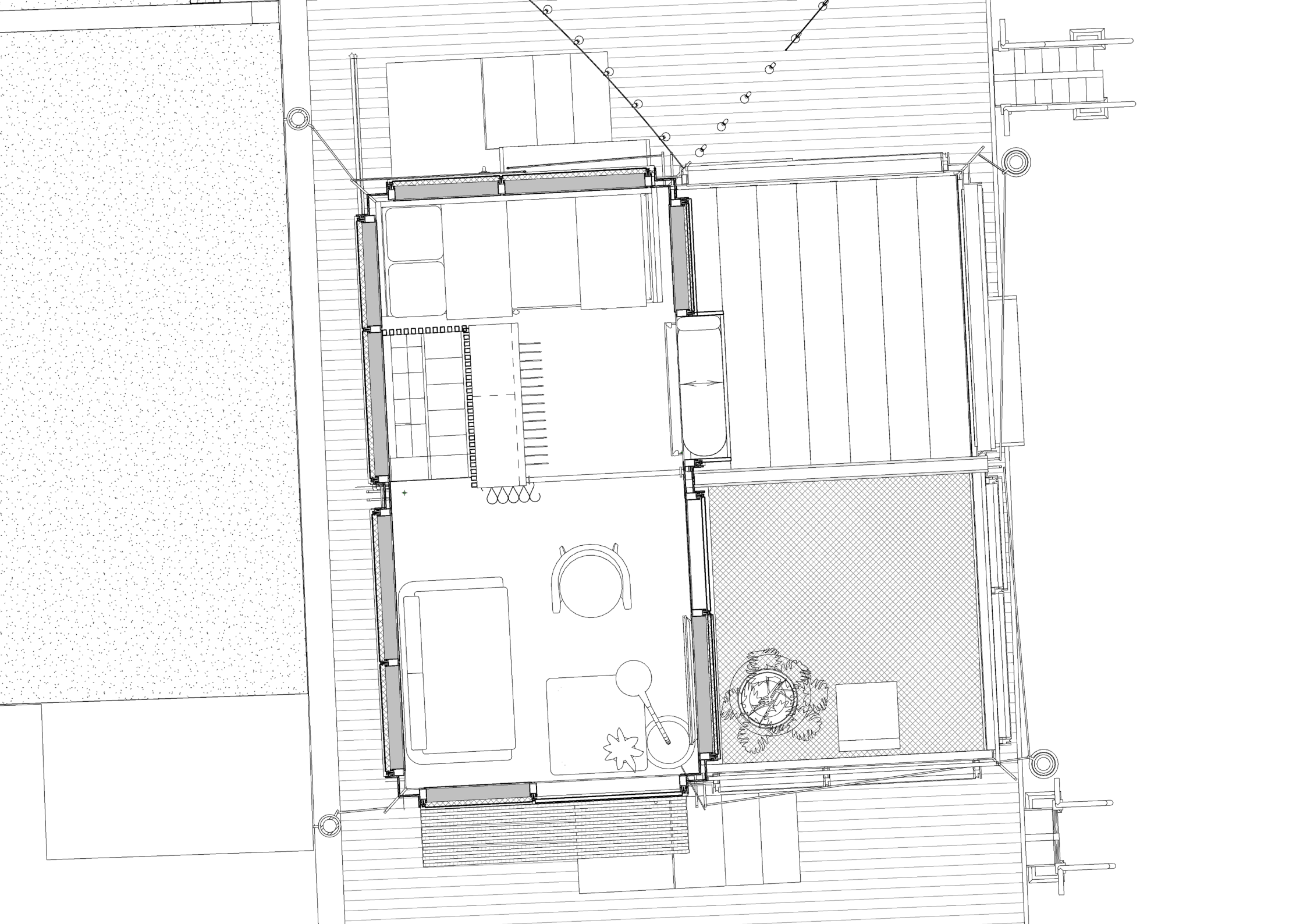
TYPE 3: Extrovert

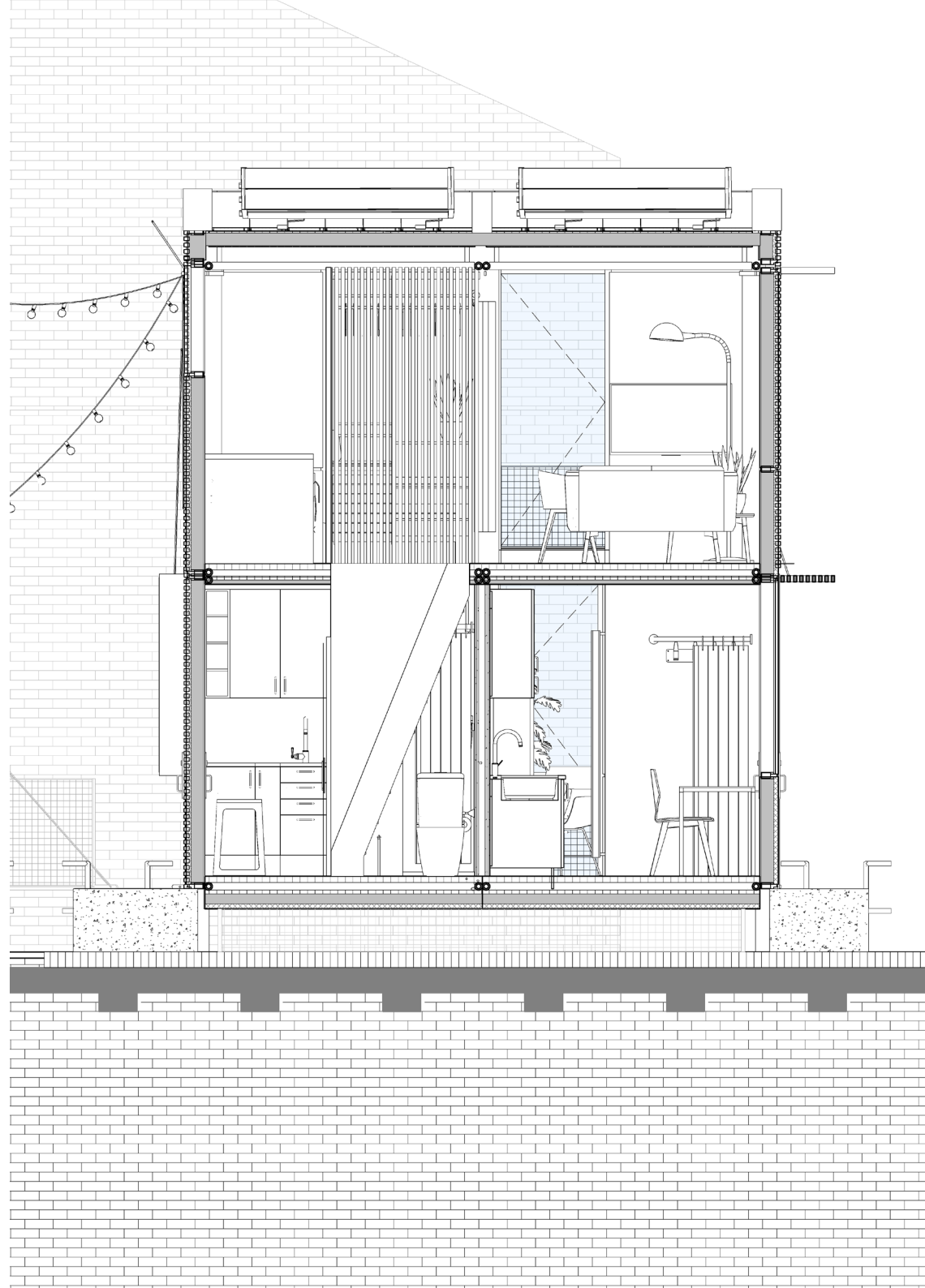


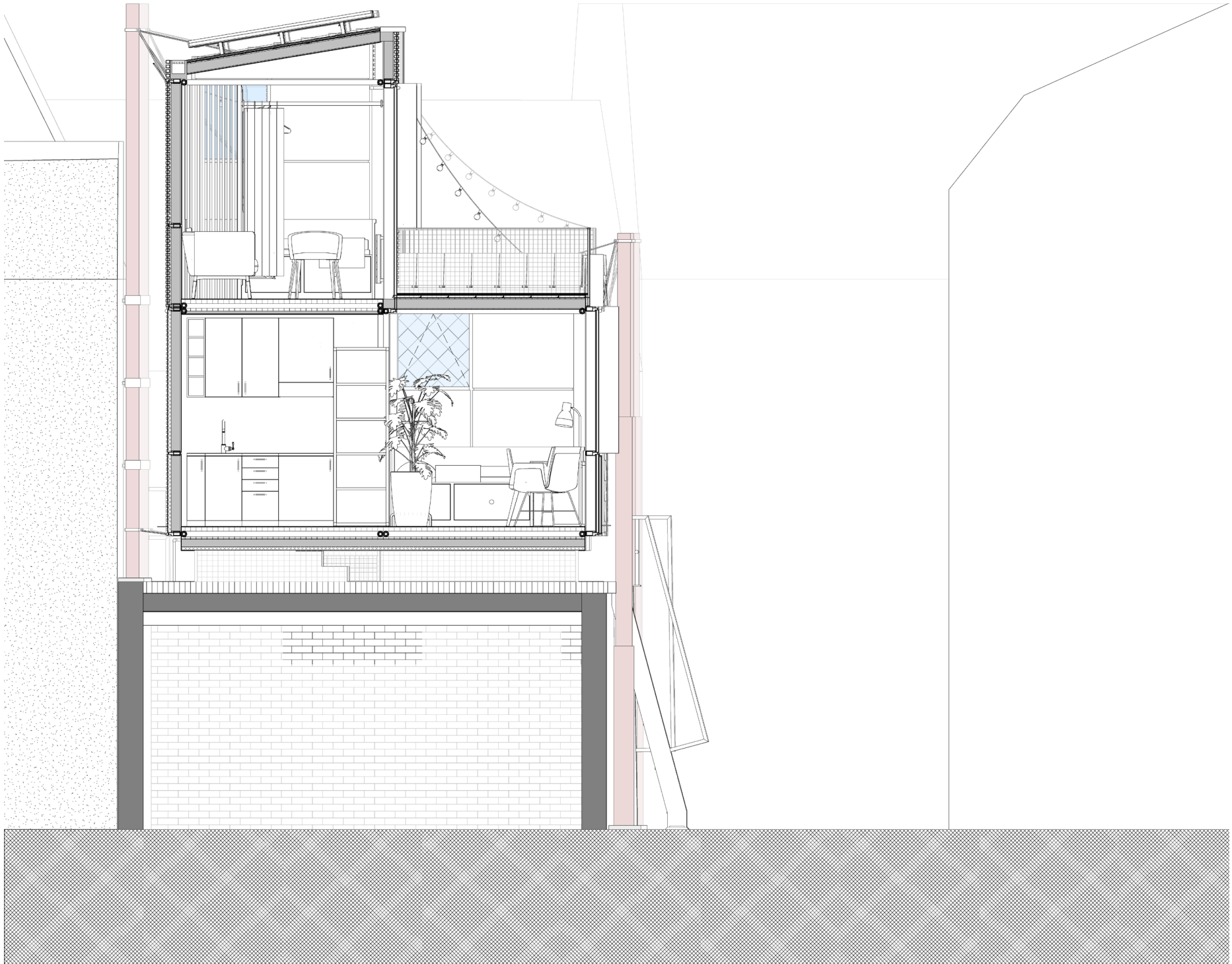
- Toilet - living
- bedroom - Living
- Kitchen - storage





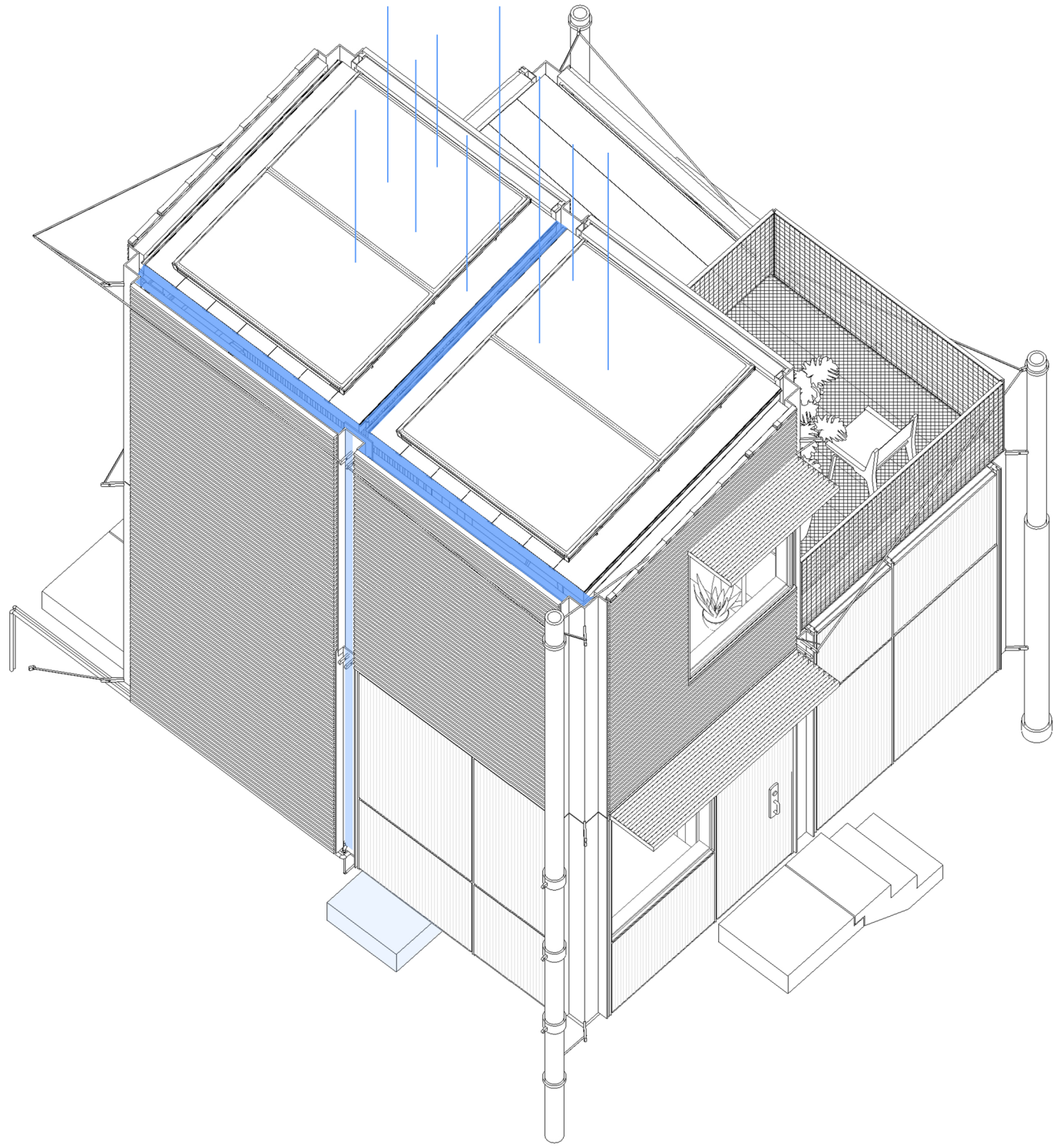


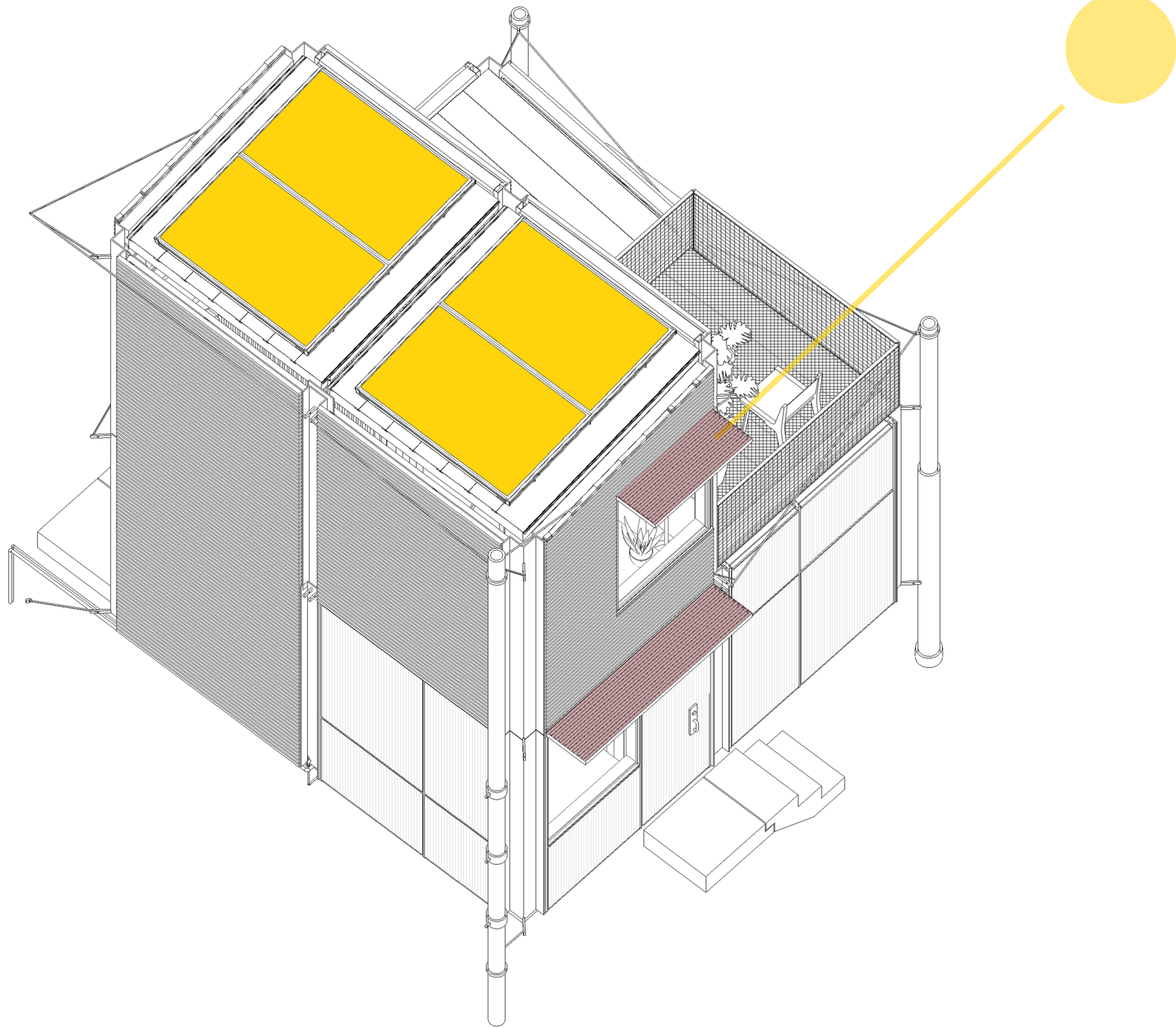


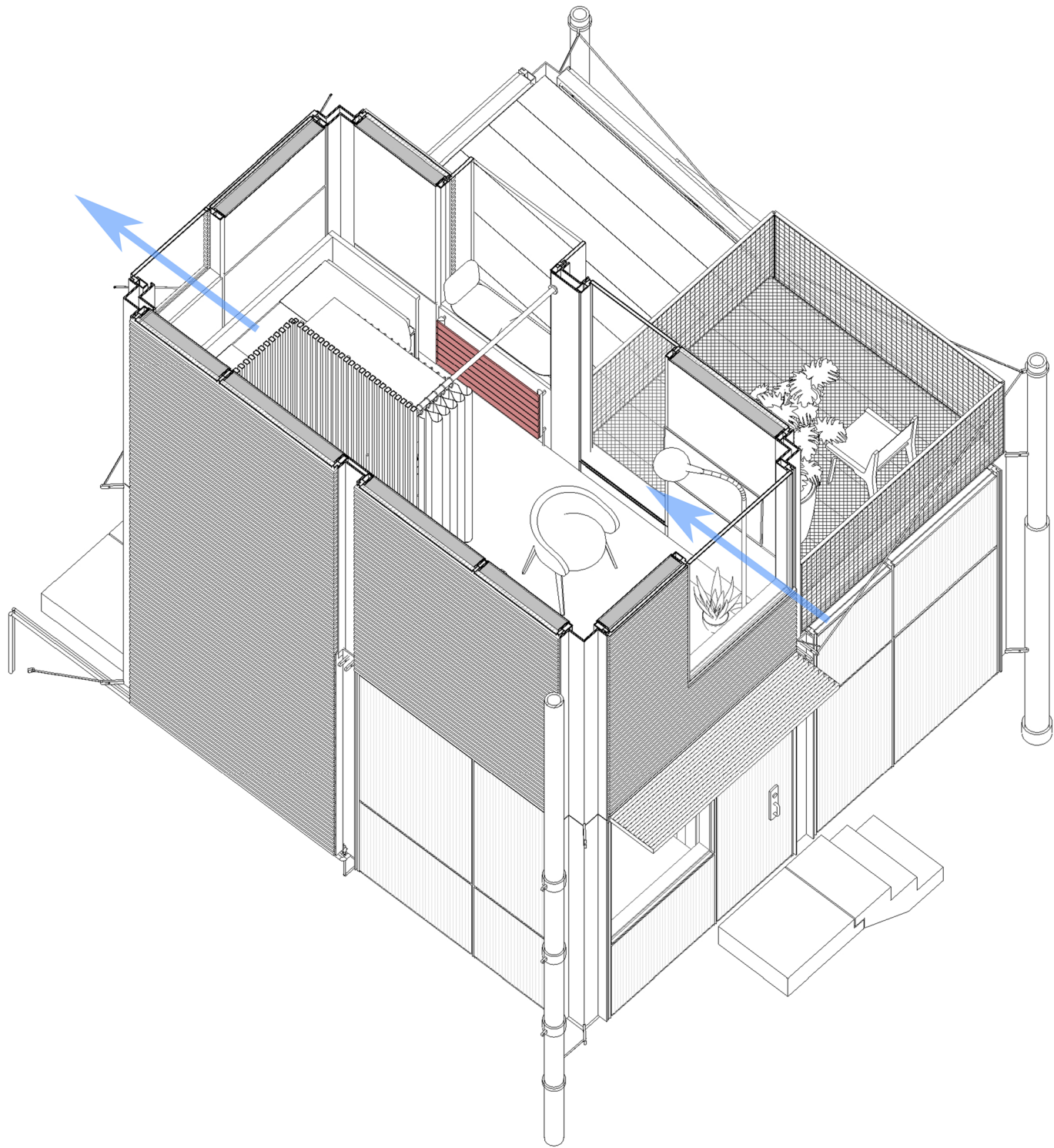


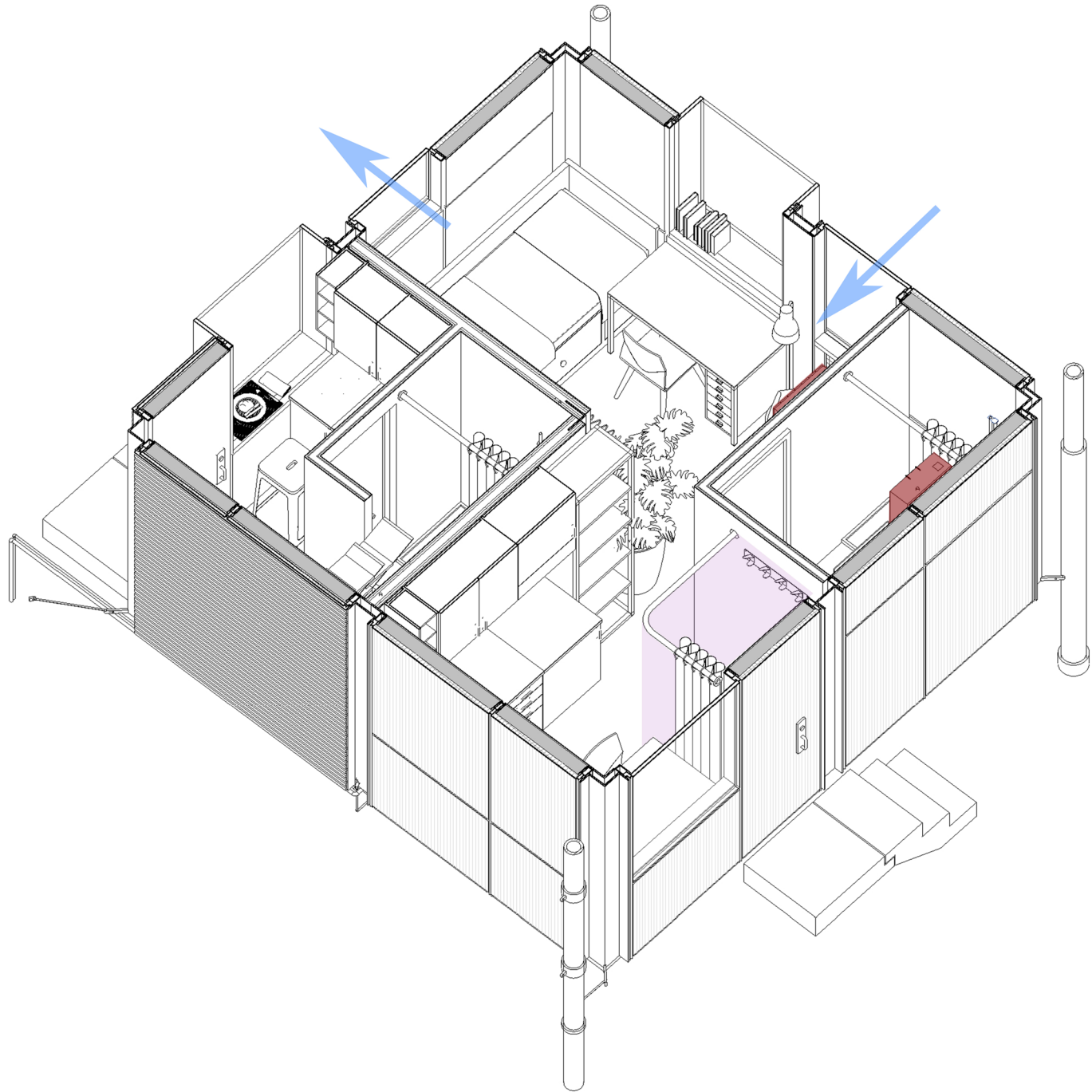


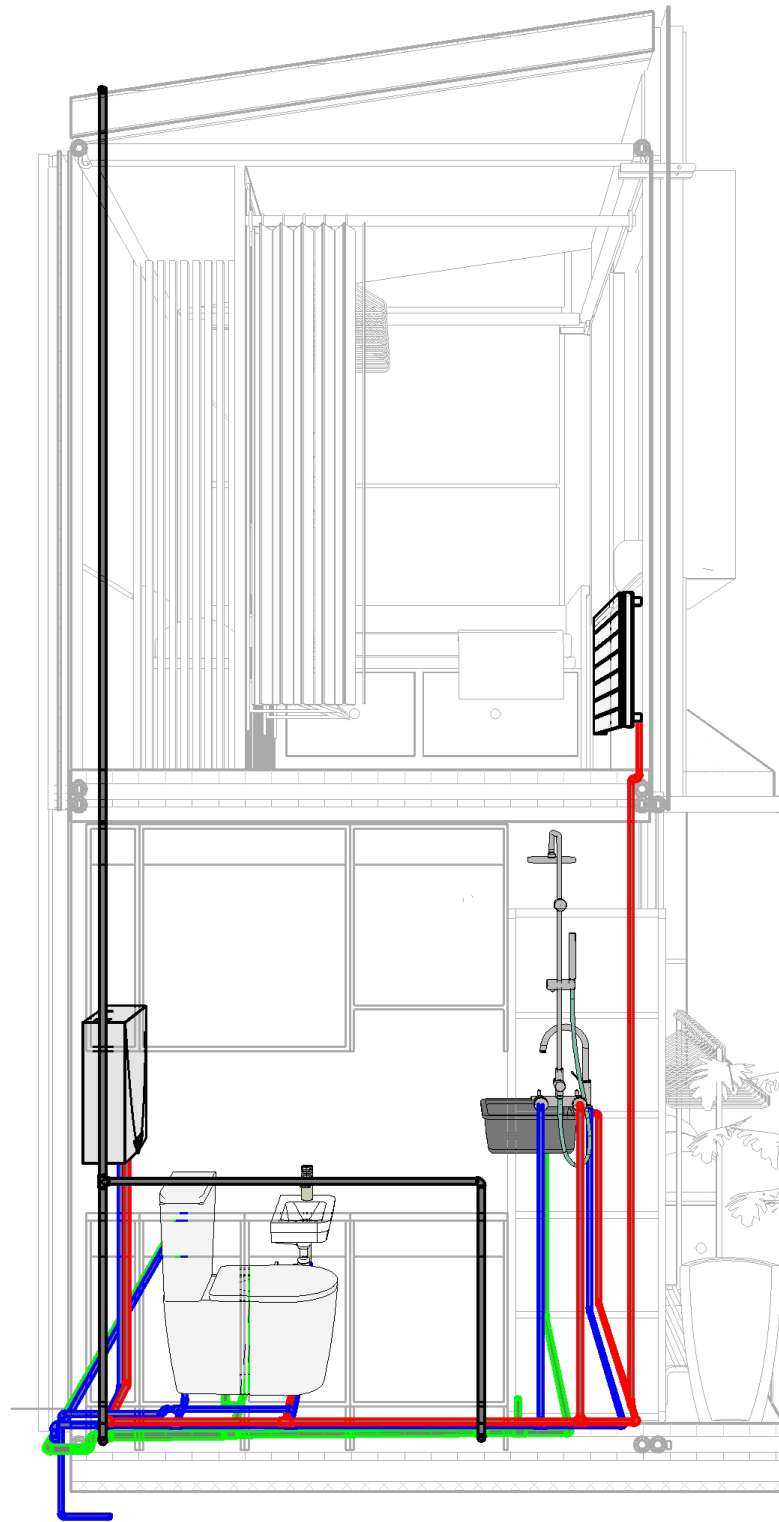
**- climate systems -**









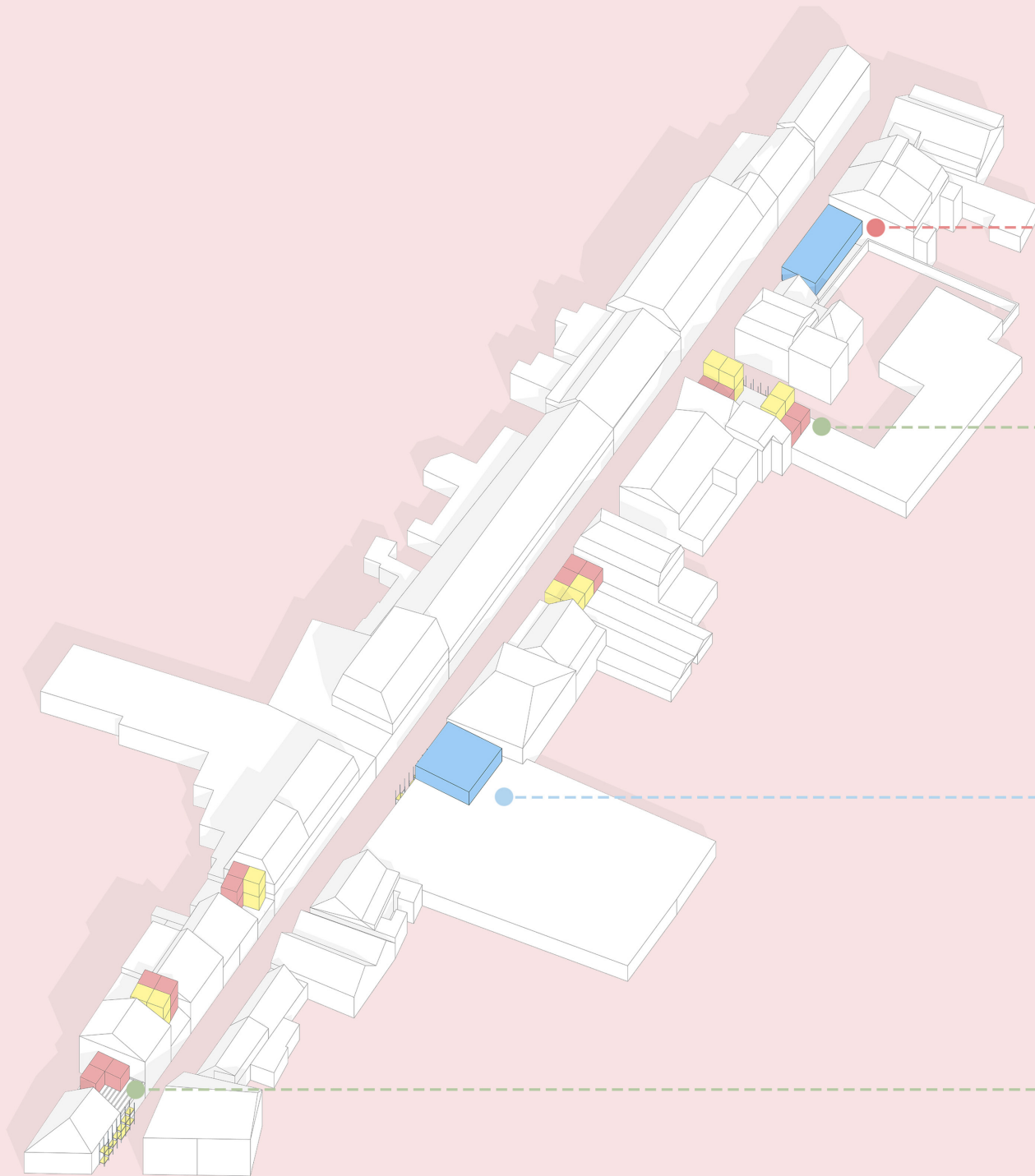


**- the common spaces -**



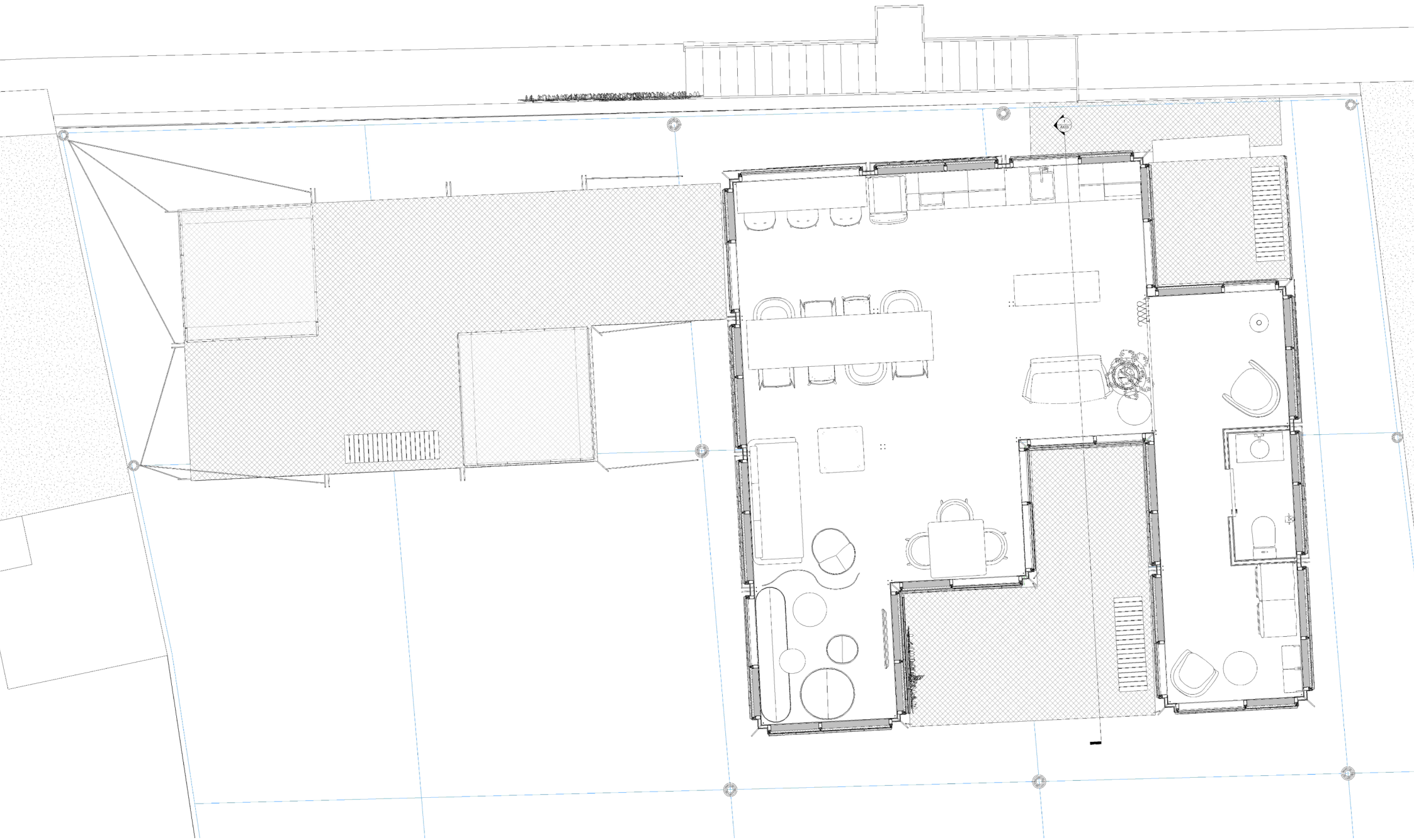
## Common spaces

- determined according to neighborhood and users
- same parts as the single units
- resting on attachment preferable
- ease of access constraint

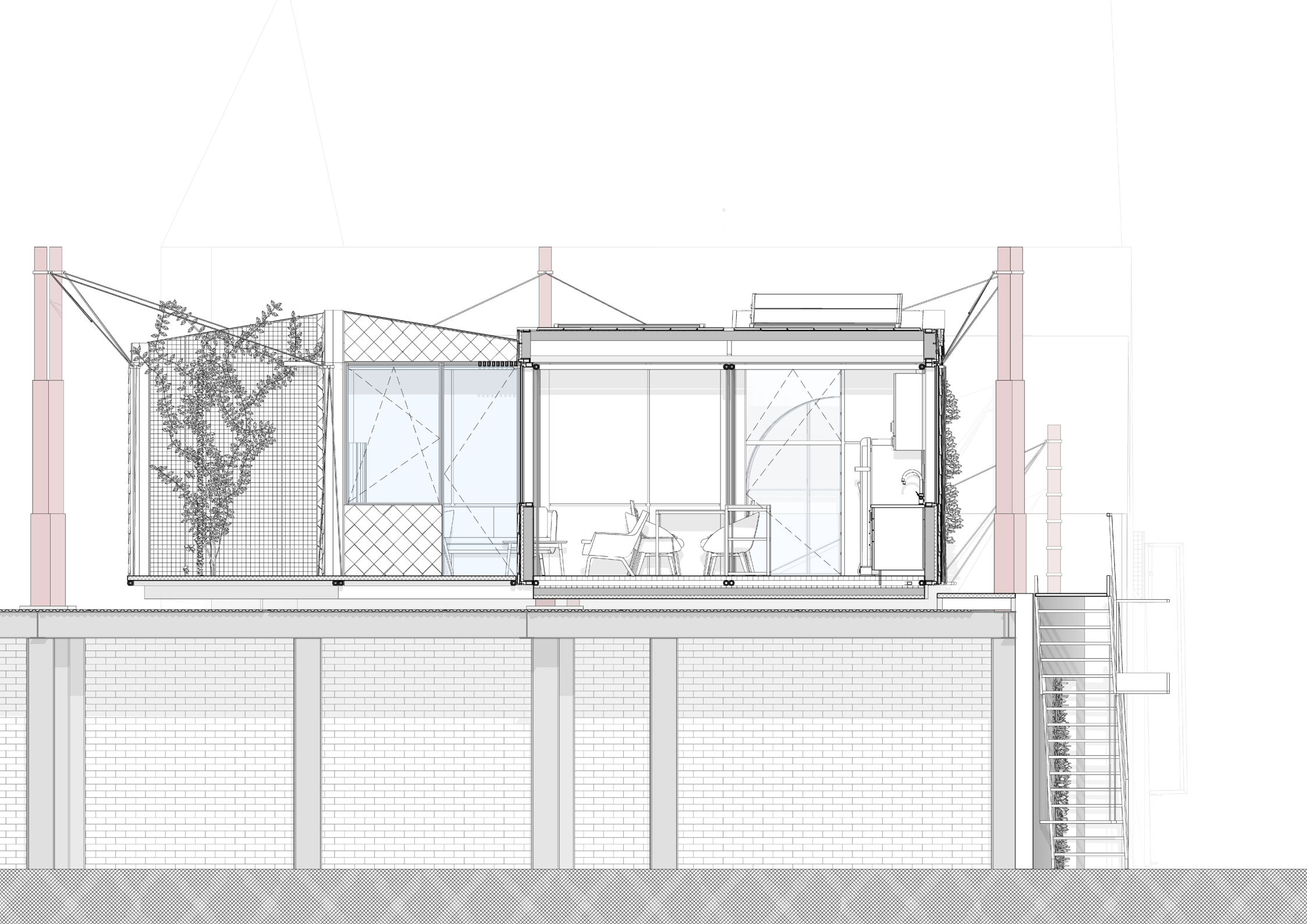


**- kitchen and living space -**



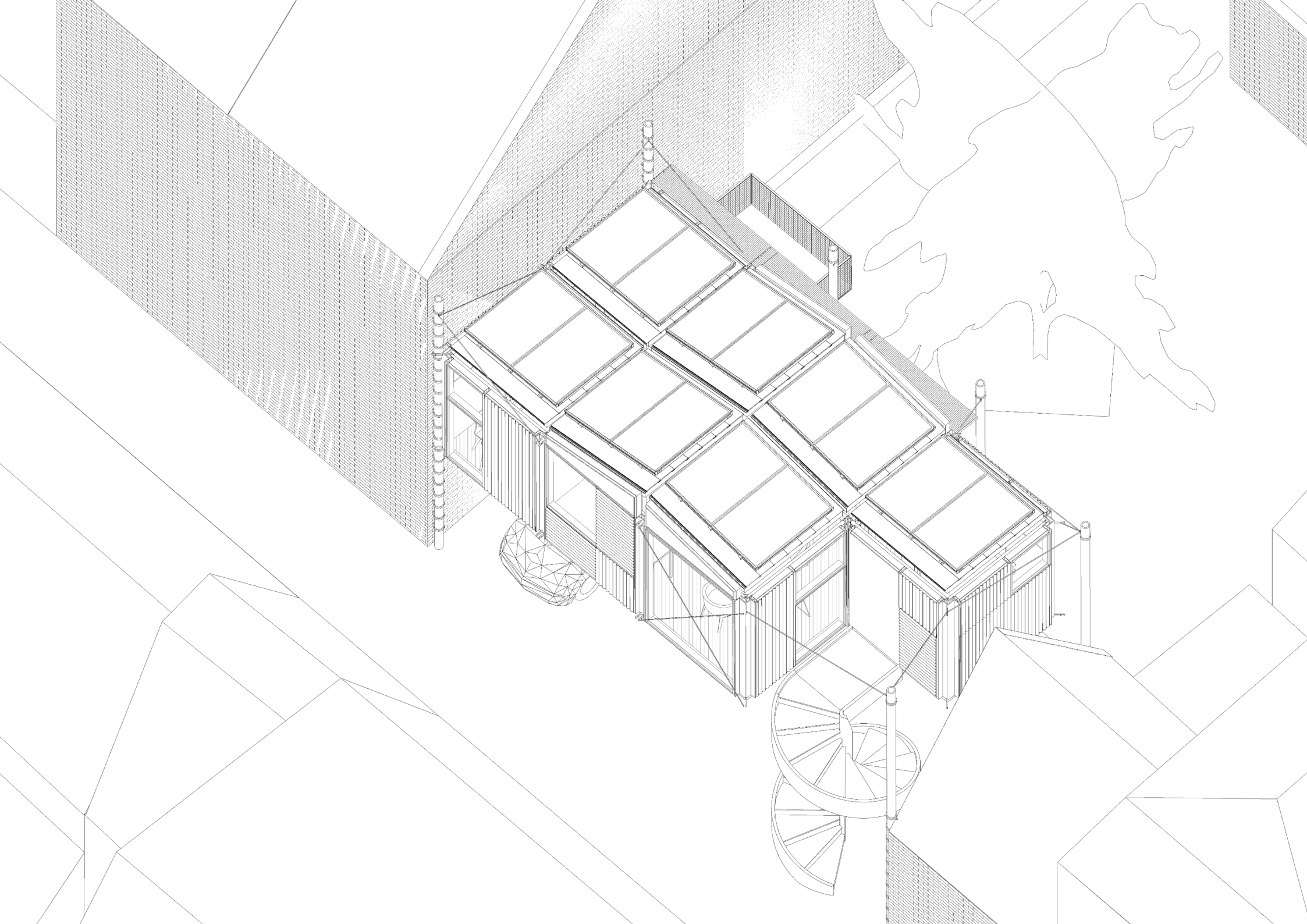




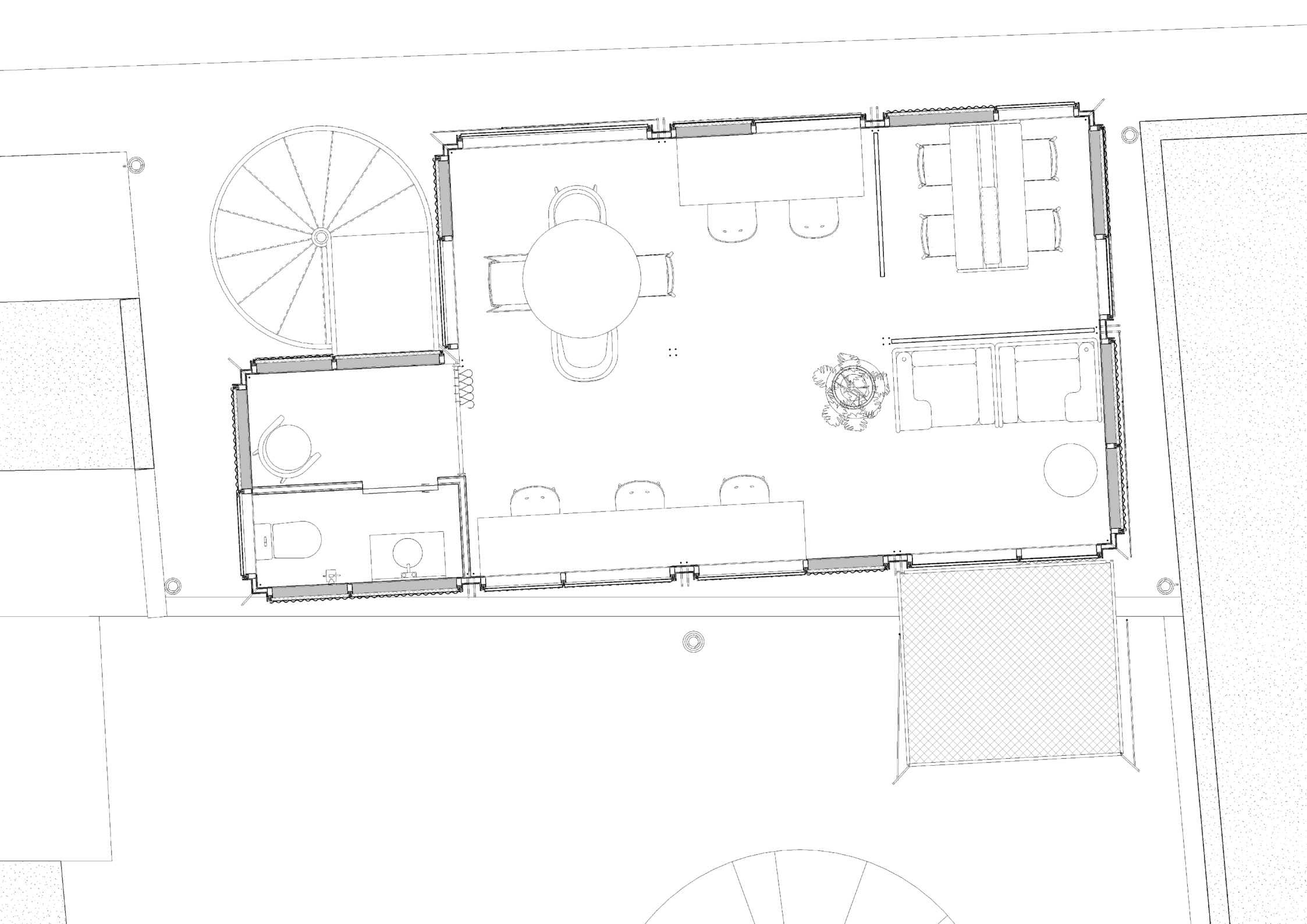




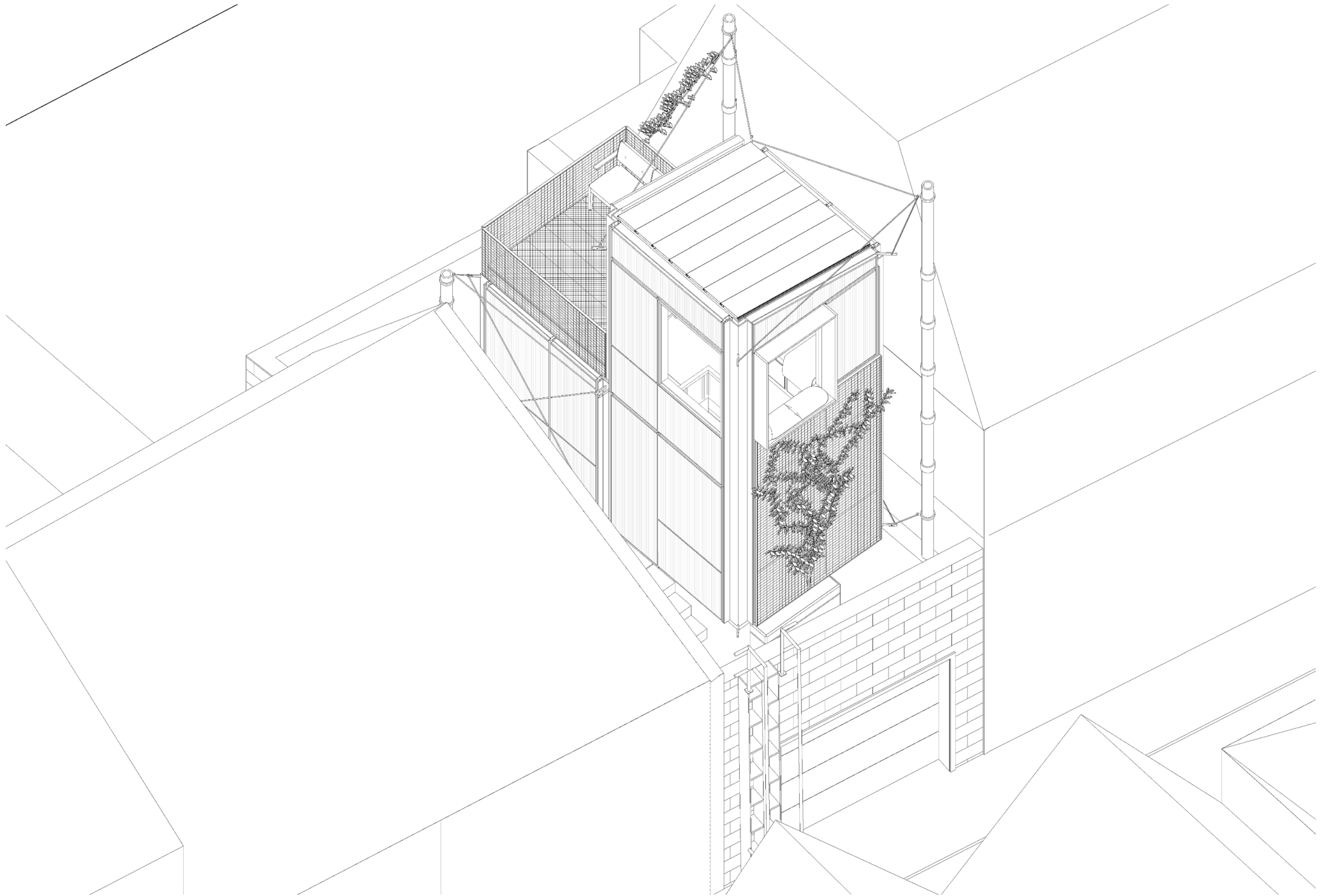
**- study space -**

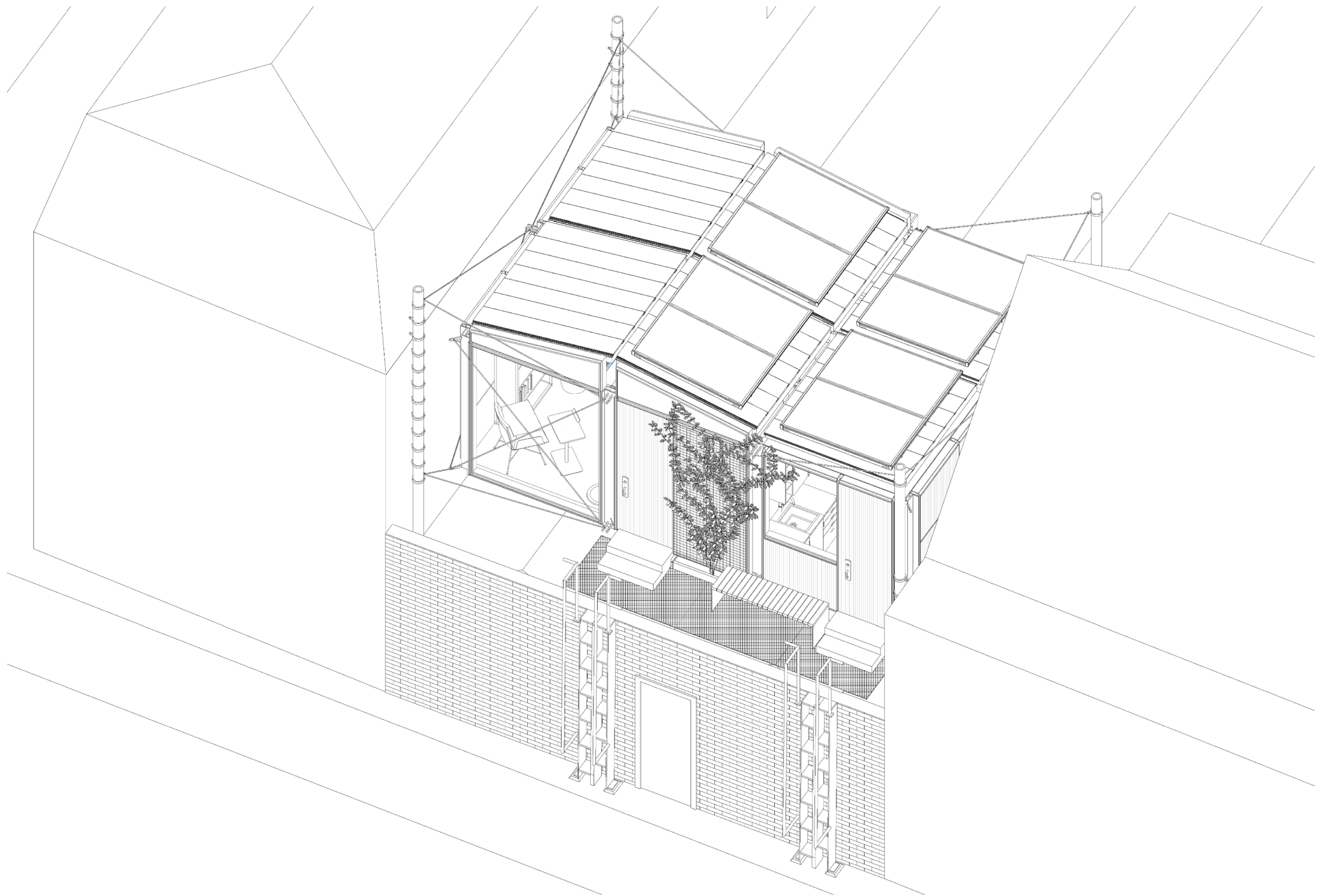


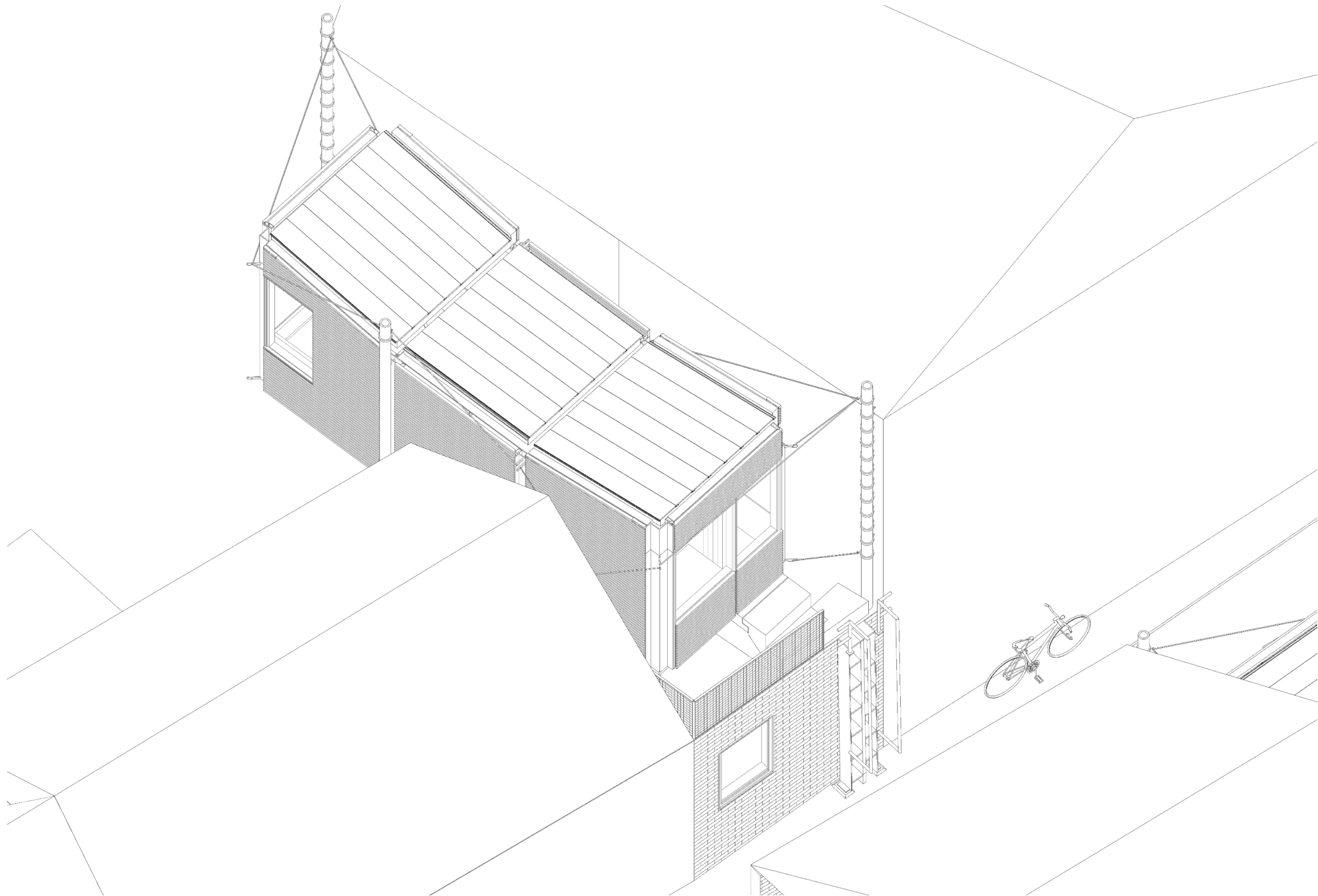


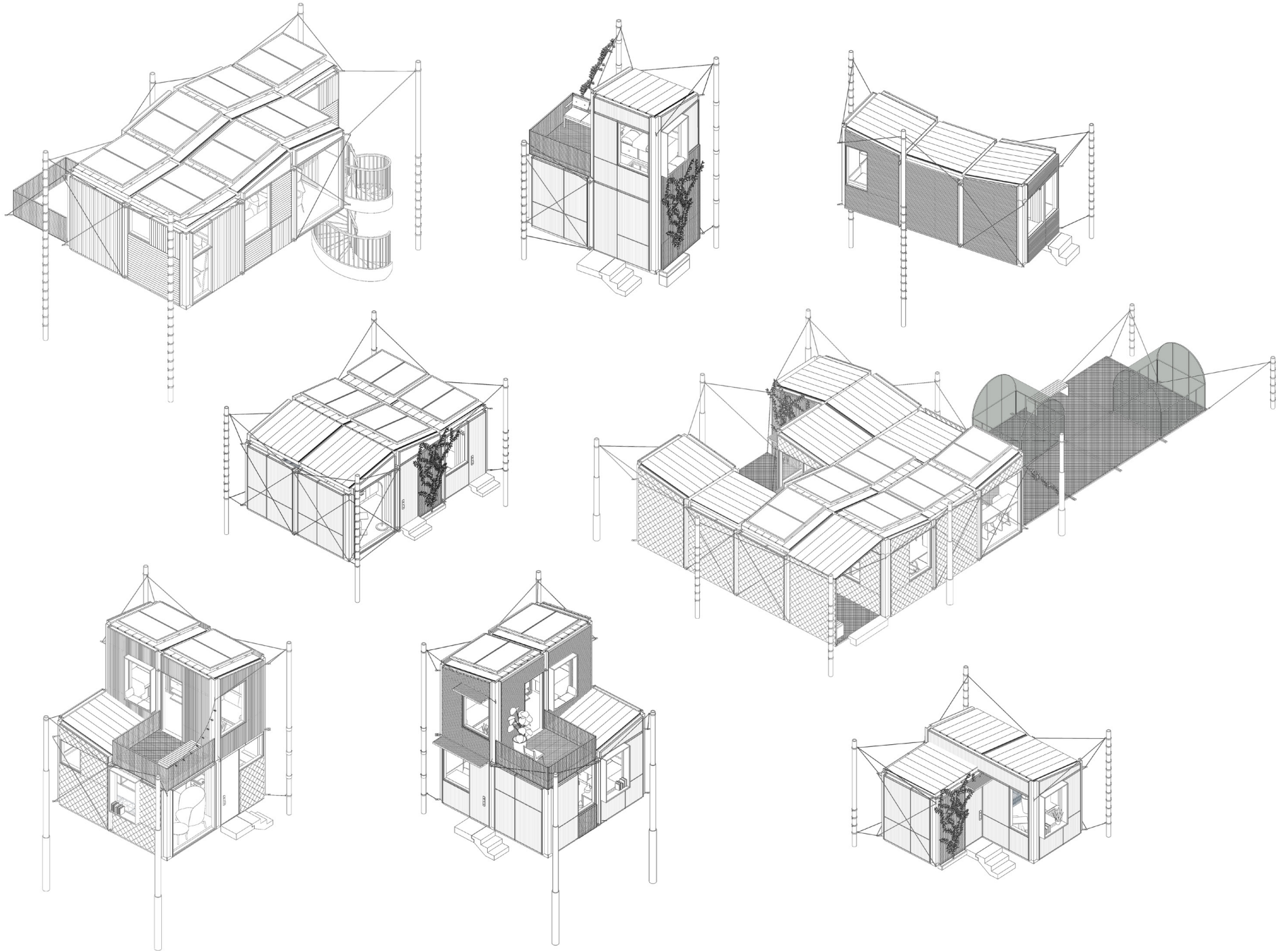


**- other units -**



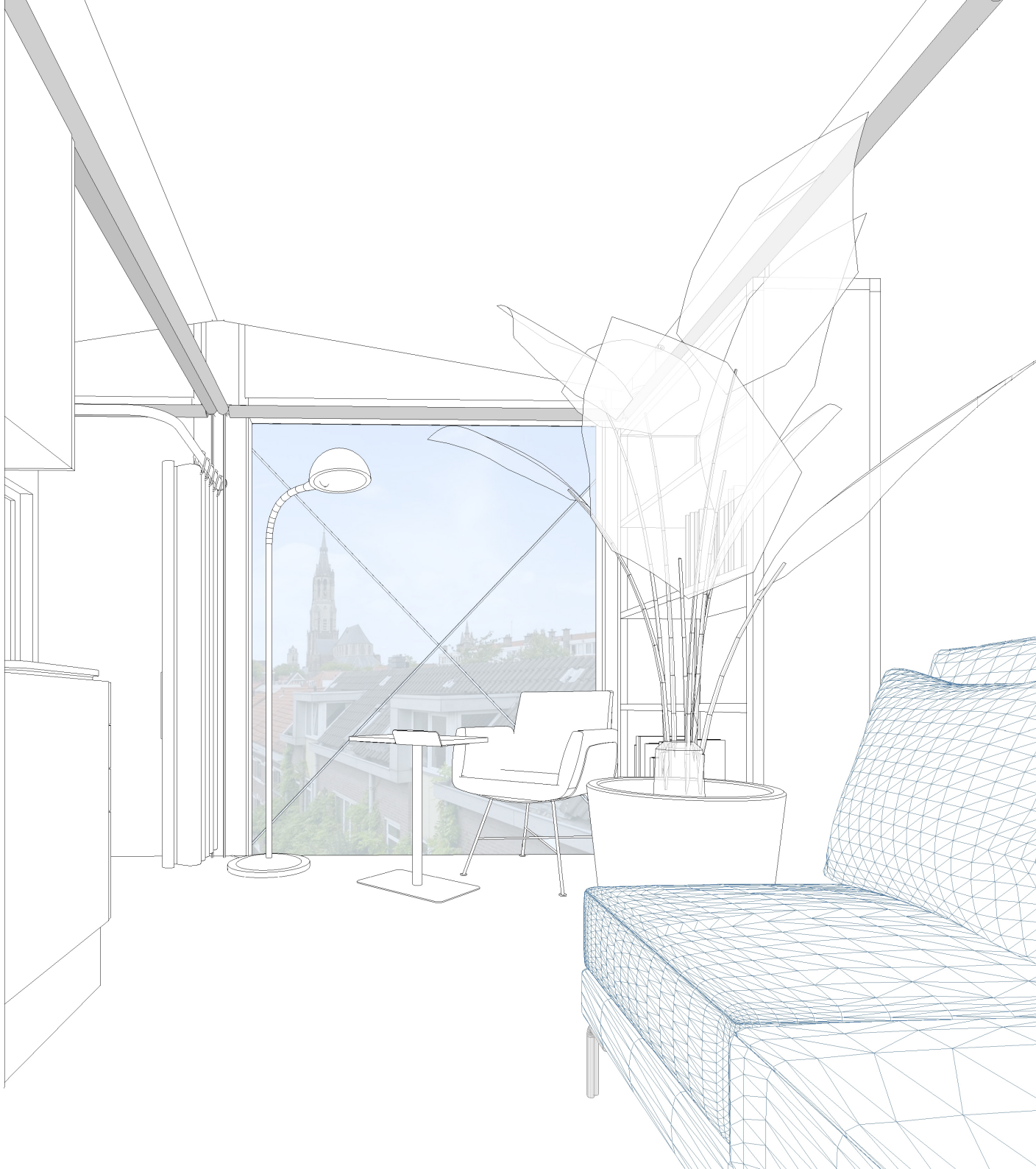


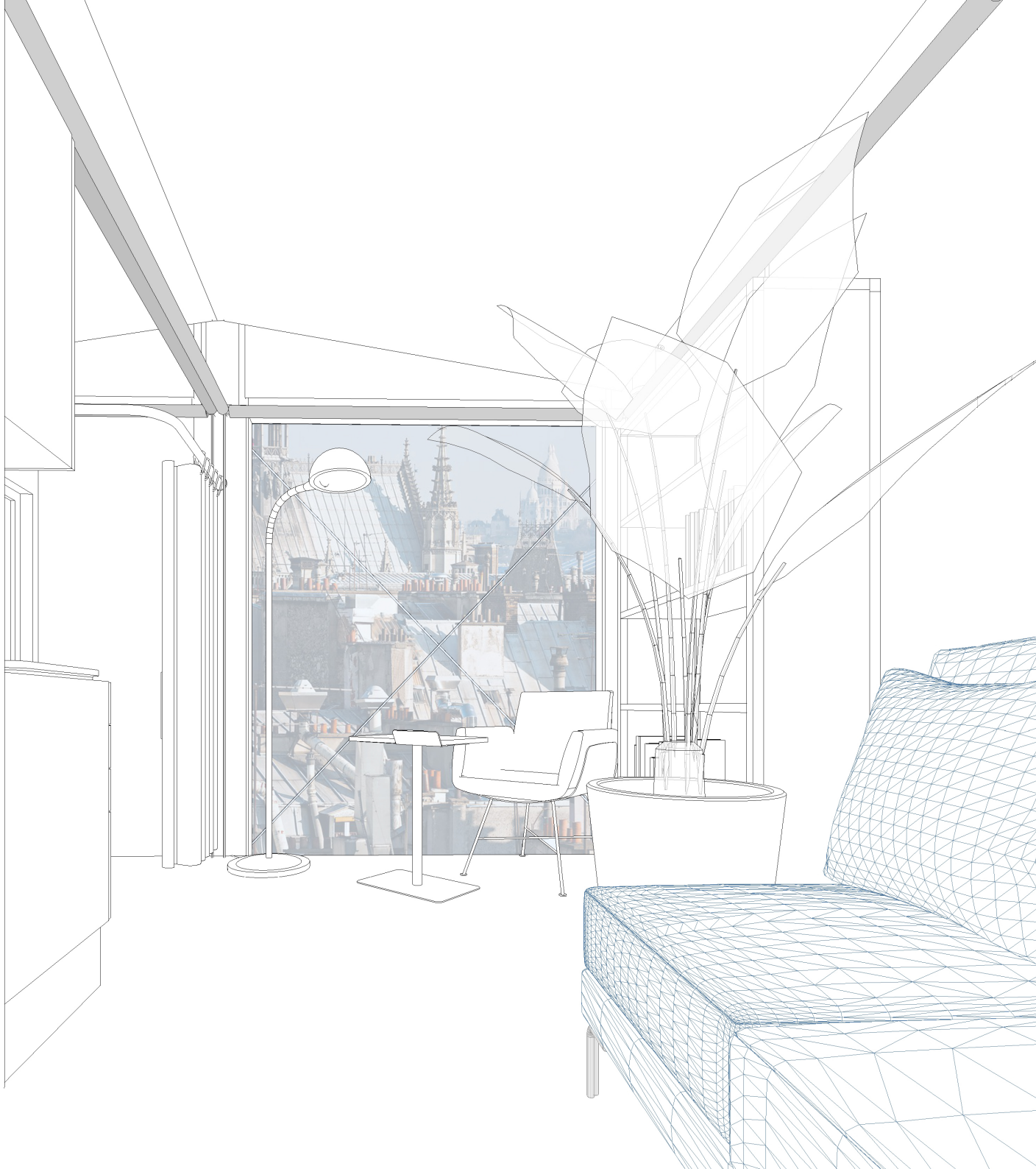


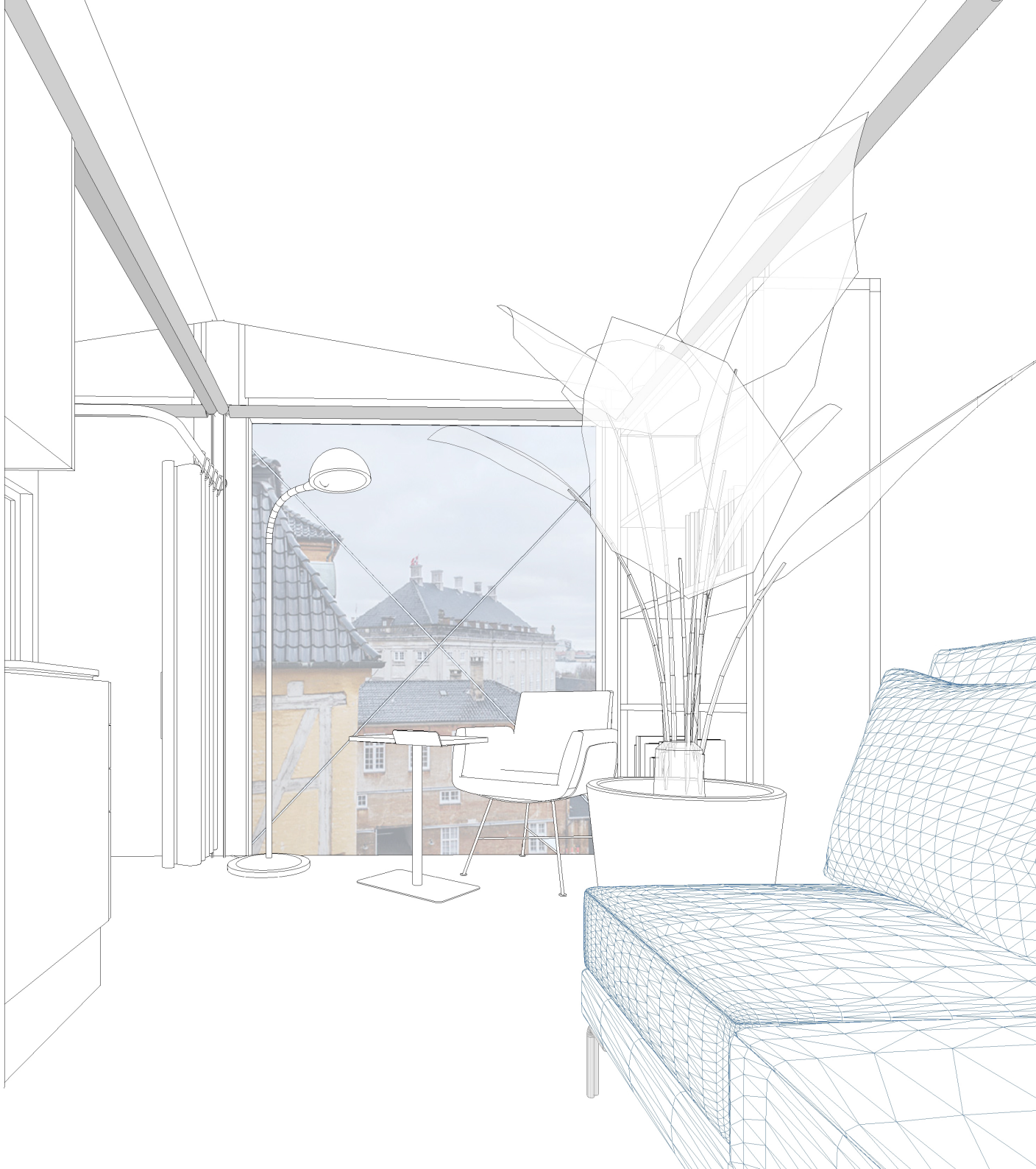




**- vision-**







## - ownership scenario -

**Agencies** : leasing the urban voids for a 10 year period

**Tenants** : 1 to 5 years rental contracts

**"Land" owners** : an extra income for the lease period  
with possibility of extension

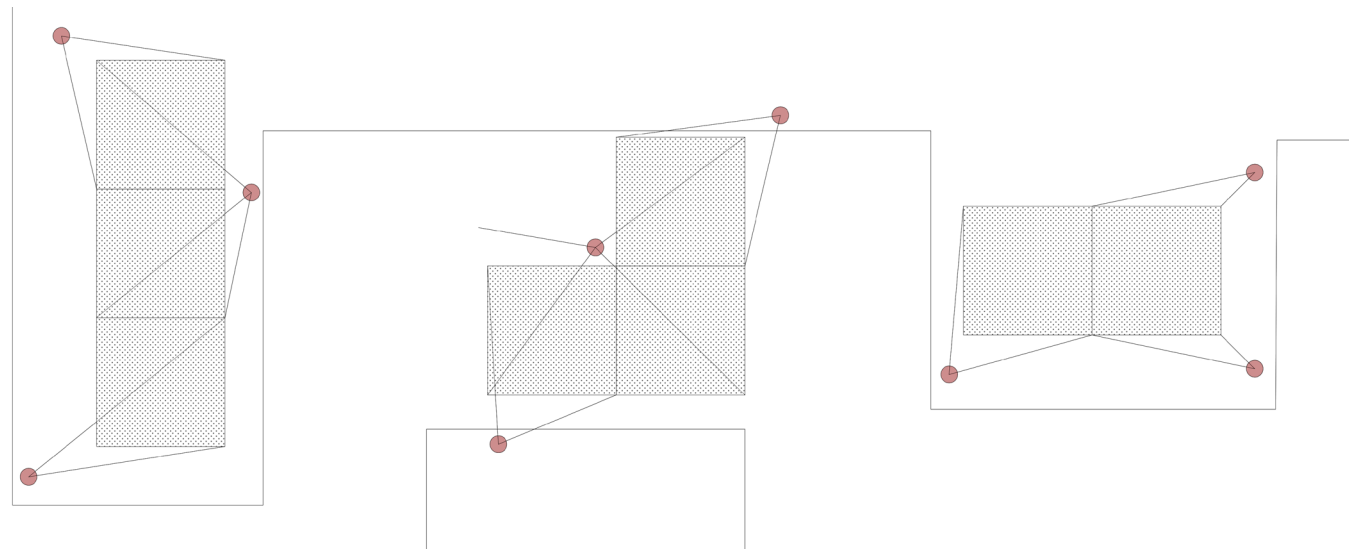
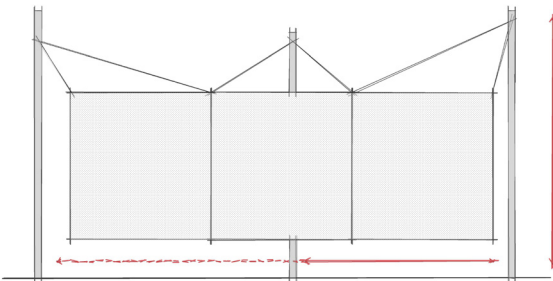


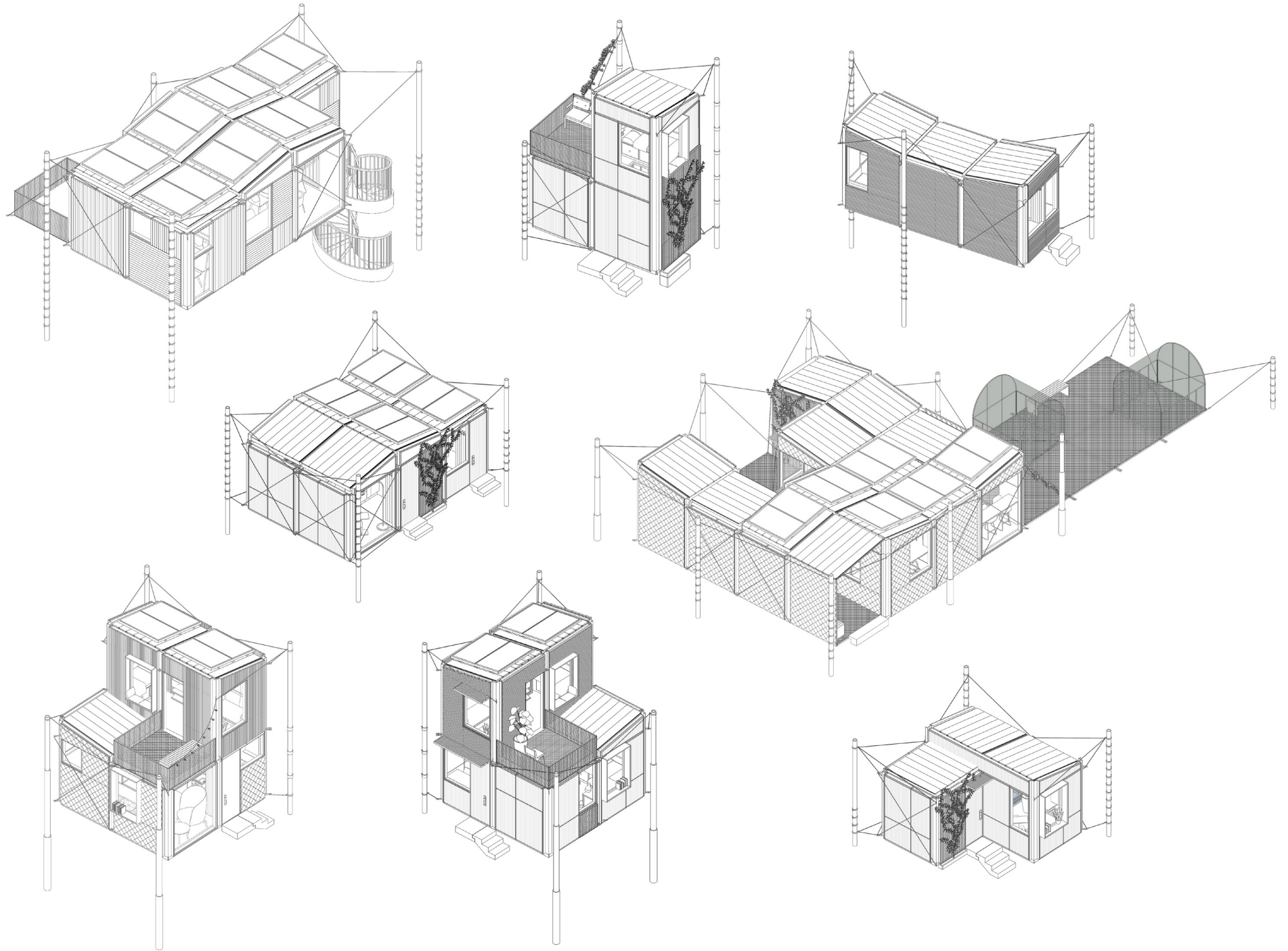
**THE STUDENT HOTEL**



## - lifecycle scenarios -

- the unit can be remounted in a different location
- the components can be reused to form other arrangements
- the components can be dismantled and materials reused





## - conclusions -

- were the initial goals achieved? -

**taking unseen opportunities**

**least impact on host :** lightweight, removable

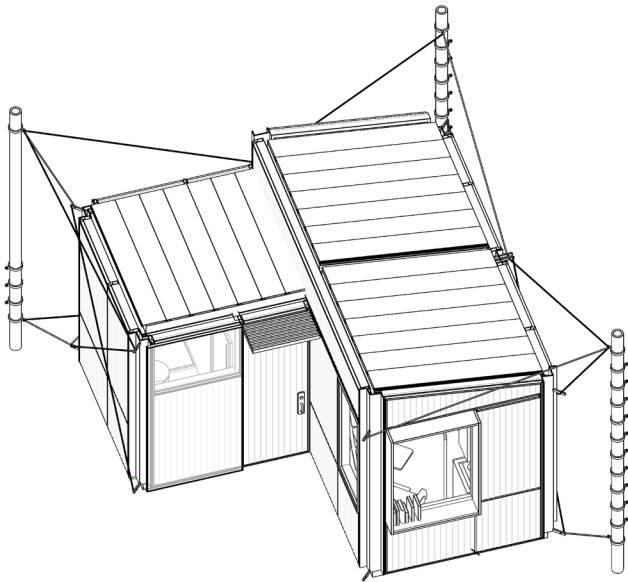
**affordable:** no land acquisition, minimal area, less energy usage

**socially engaging:** shared spaces, city experience

**diverse:** various typologies and facades

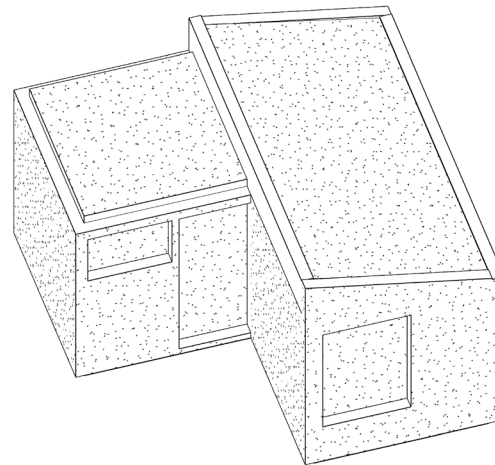
**benefit for neighborhood:** outdoor areas, shared spaces, lease

**- conclusions -**



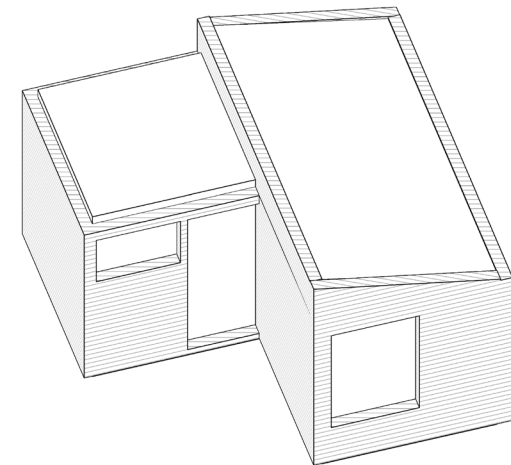
**- proposed system -**

2.7 tons



**- concrete construction-**

17-24 tons



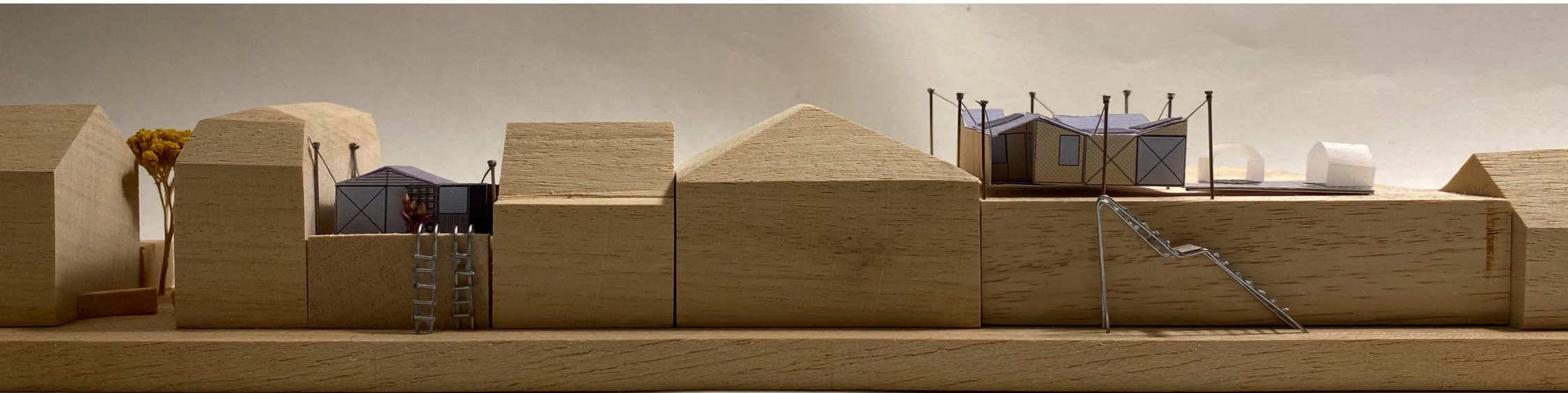
**- wood construction -**

5 tons

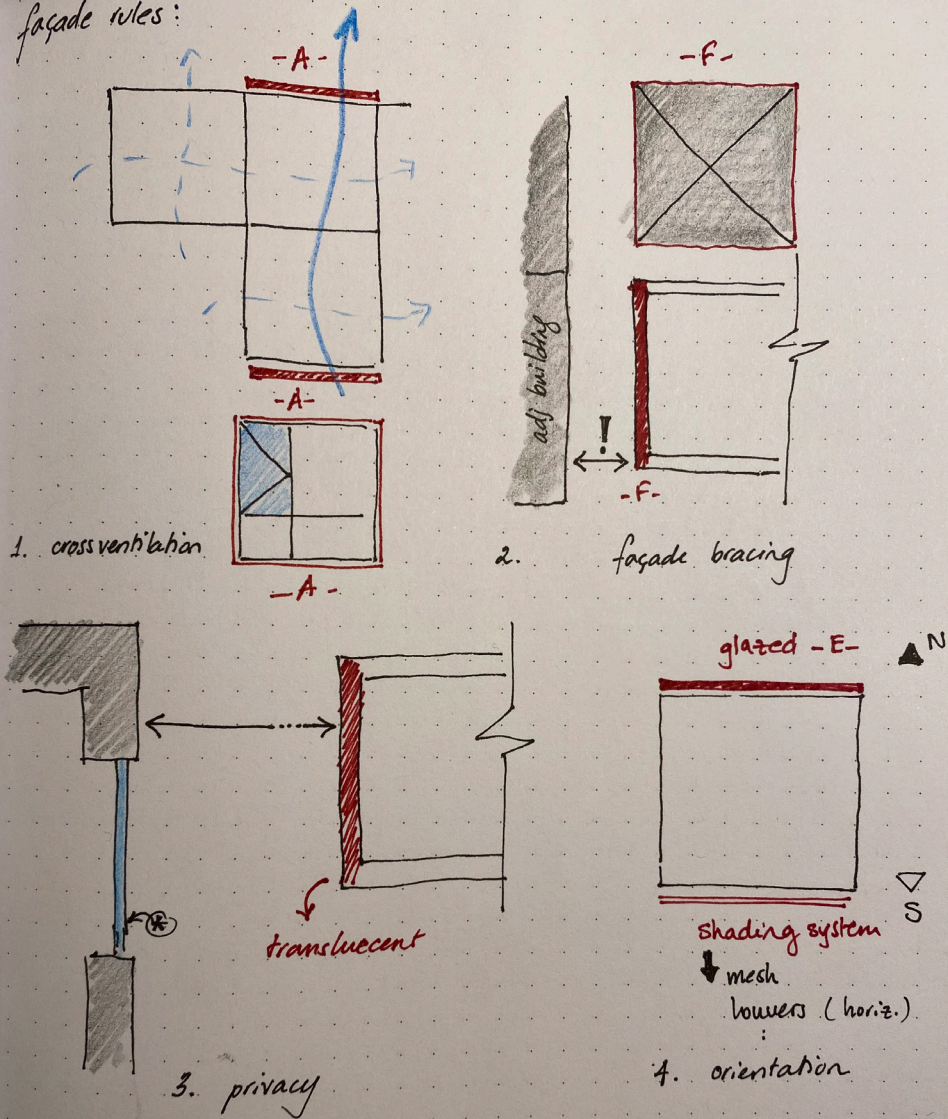
**- Thank you! -**



**- appendix-**



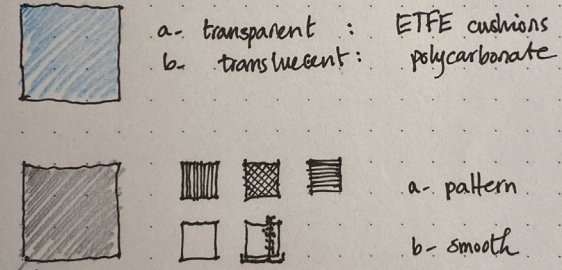
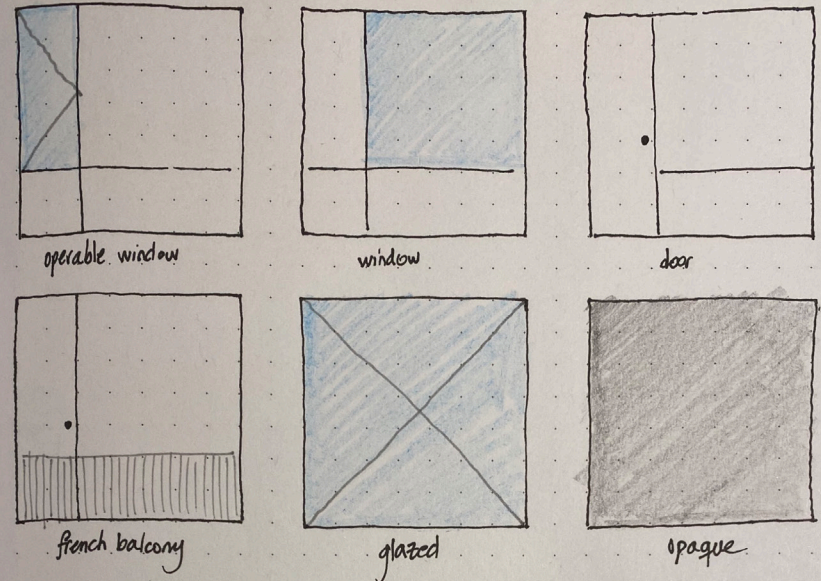
façade rules:



→ façades are flat panels for:

- affordability
- modularity
- simplicity

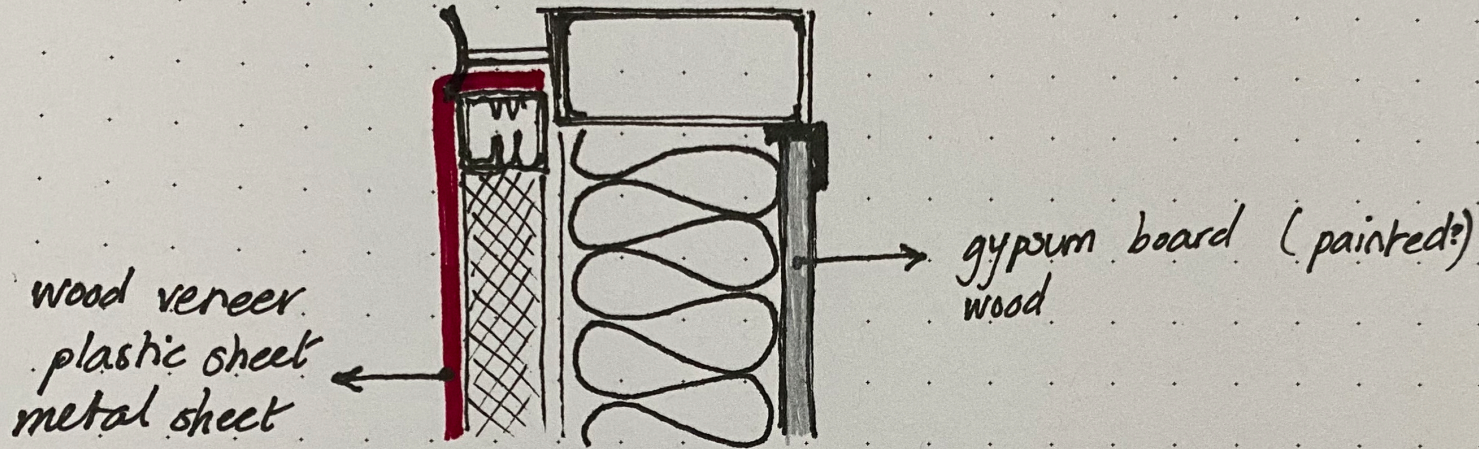
façade families:



materials:

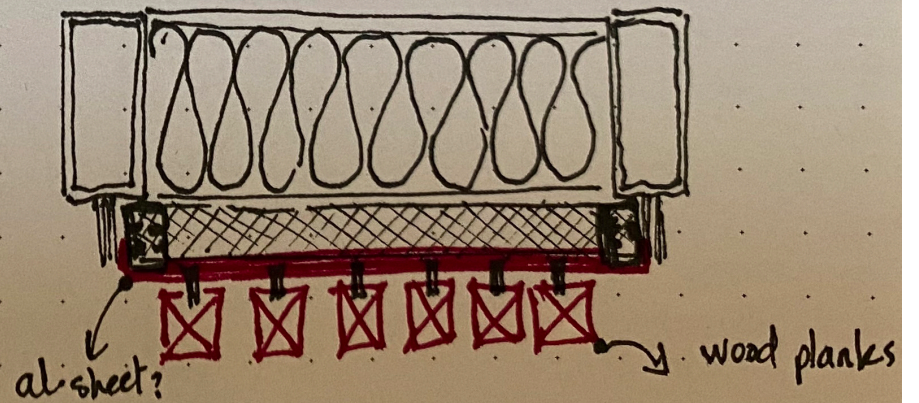
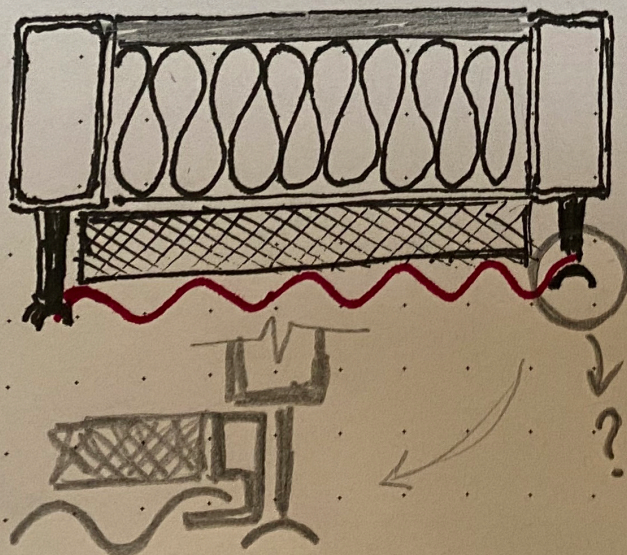
- plastics: recycled of various colors → bright → red, yellow, blue  
→ blacks, grays
- metals: aluminium: corrugated, smooth, brushed  
corten steel: smooth, perforated
- wood: cedar, woods, engineered woods

1. smooth

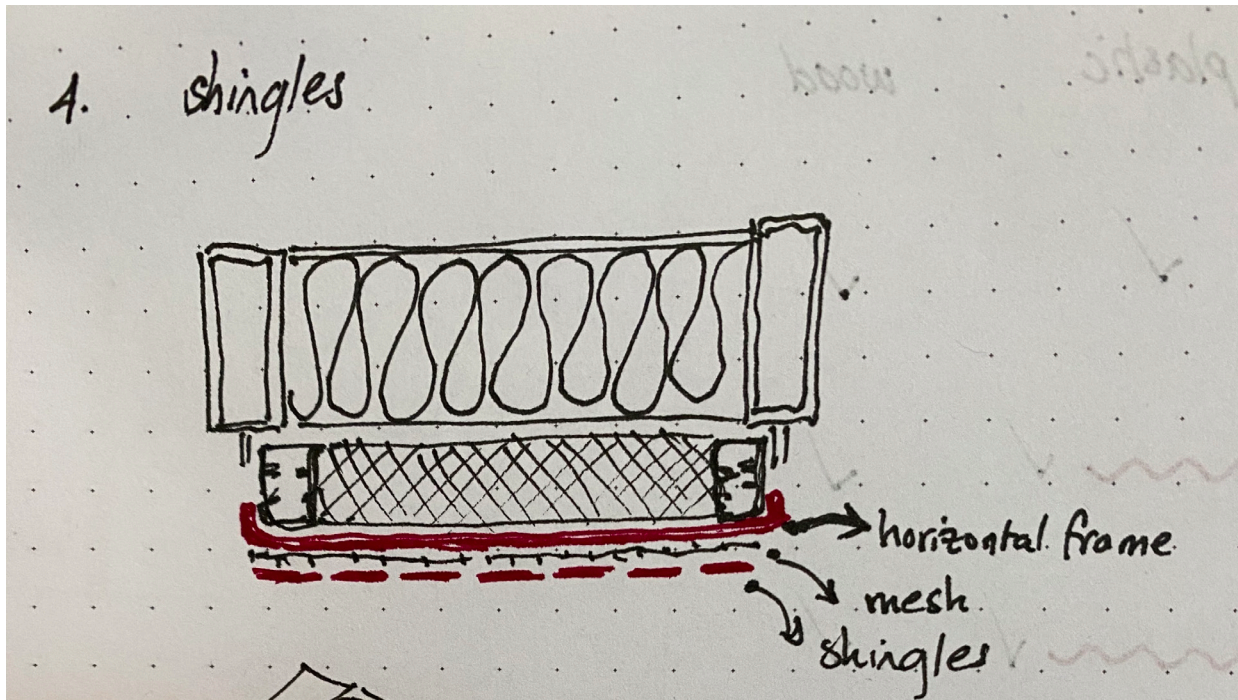


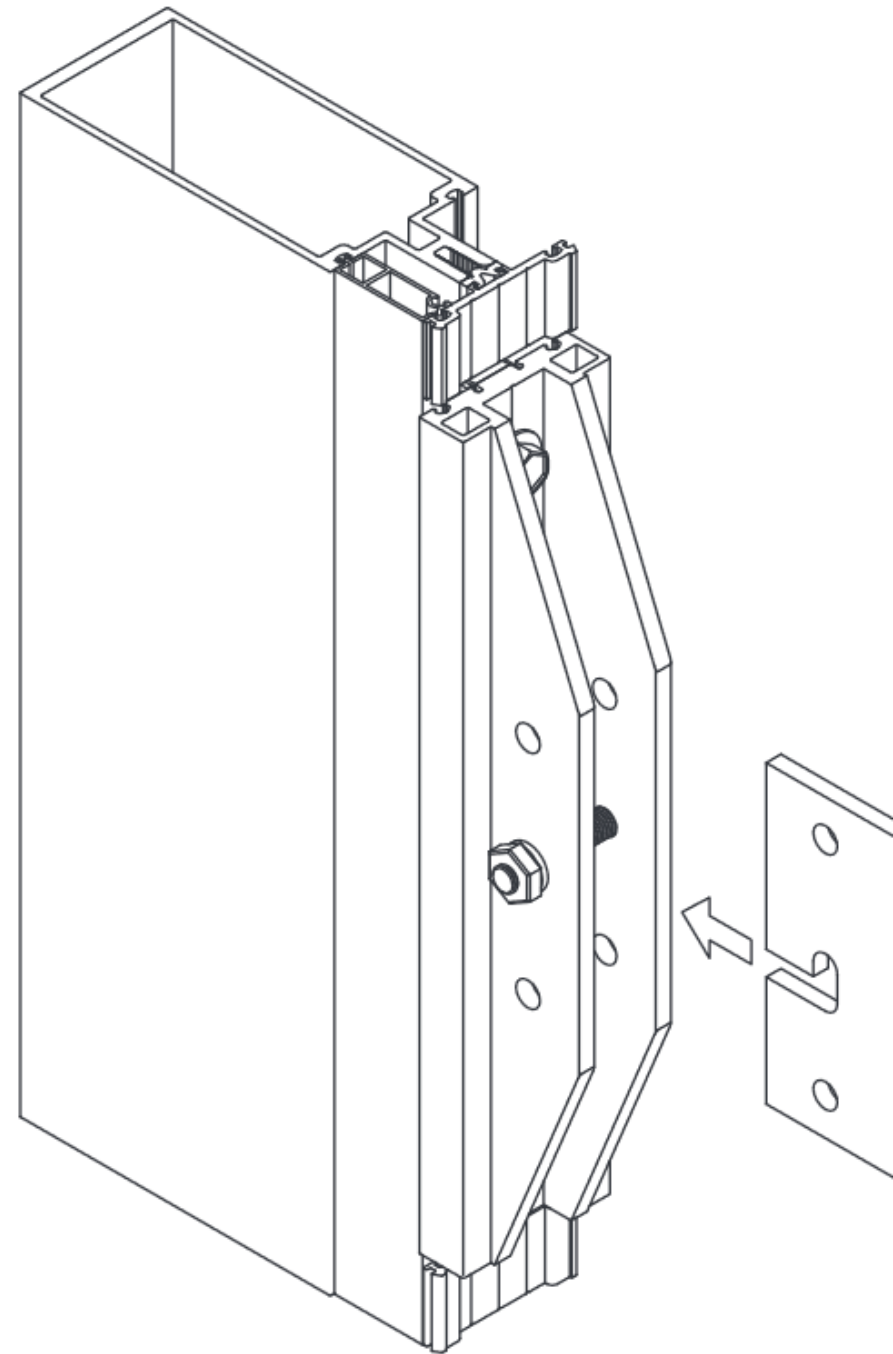
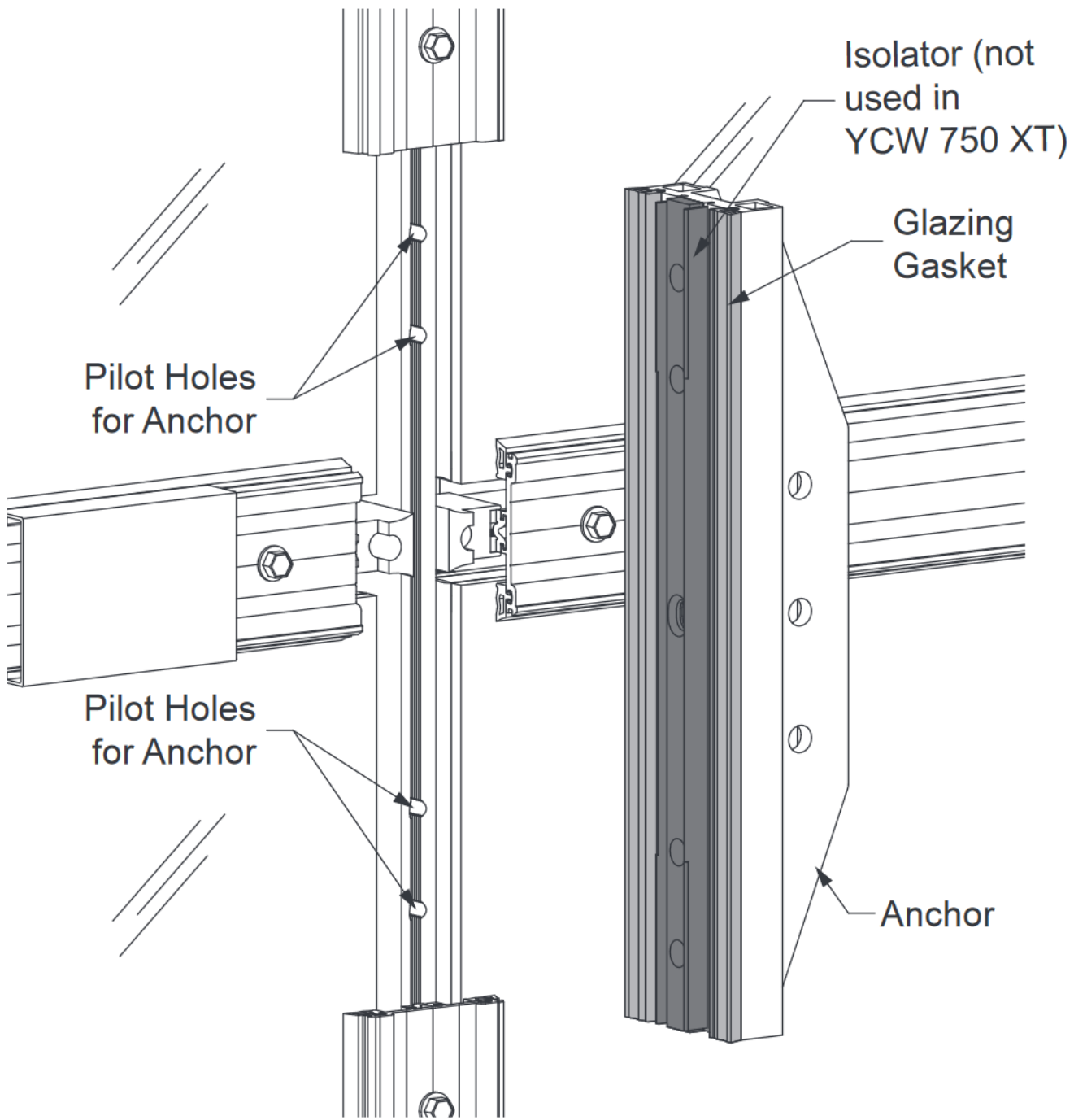
2. vertical (metal or plastic)

(wood)

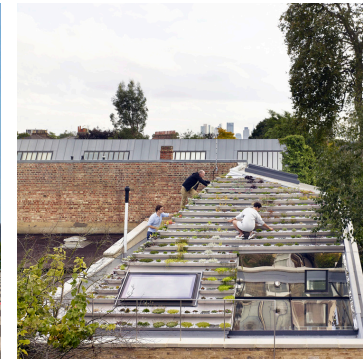


SEK



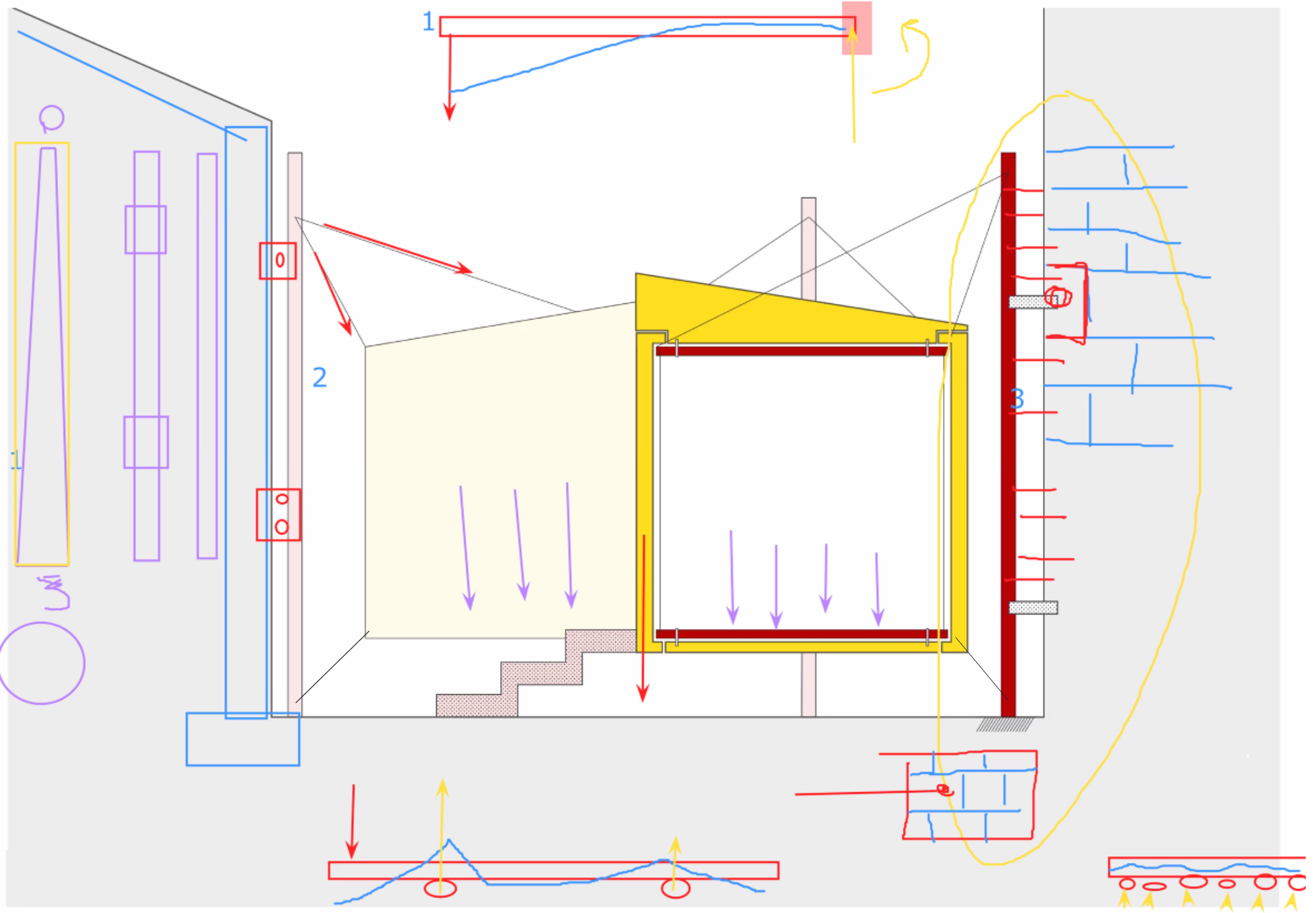


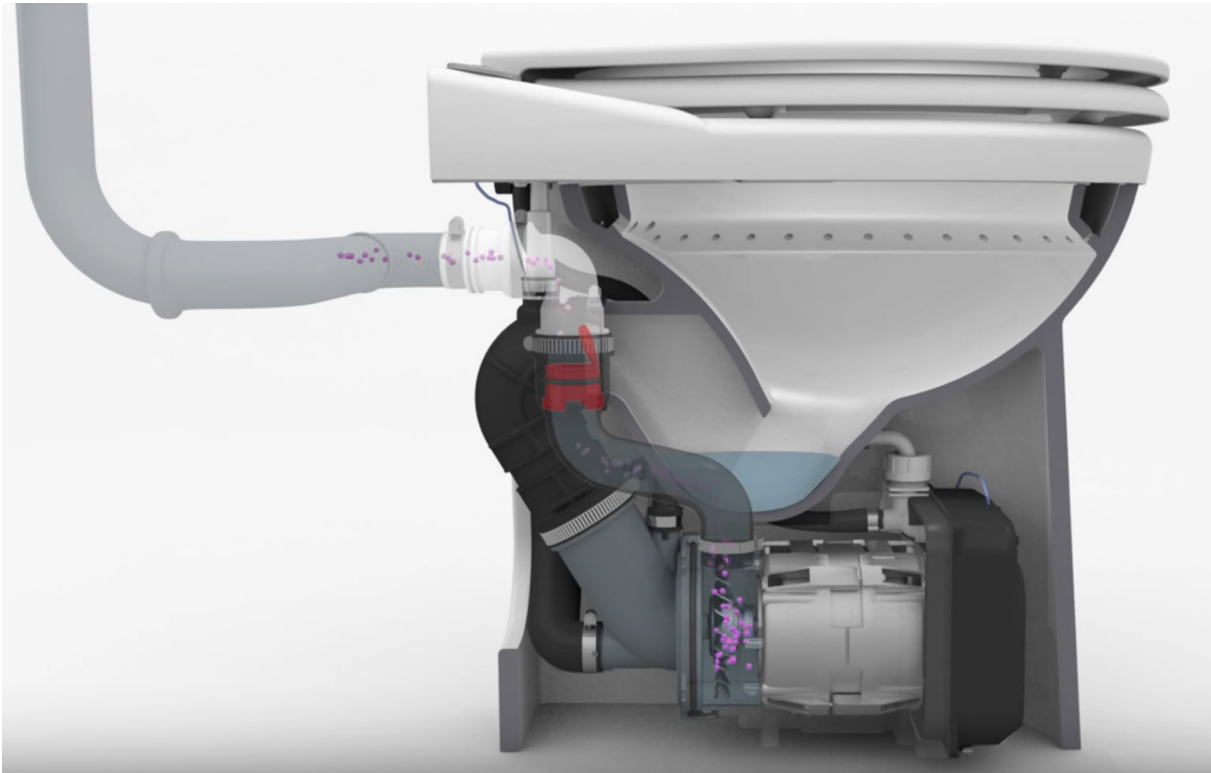
- facade ideas -





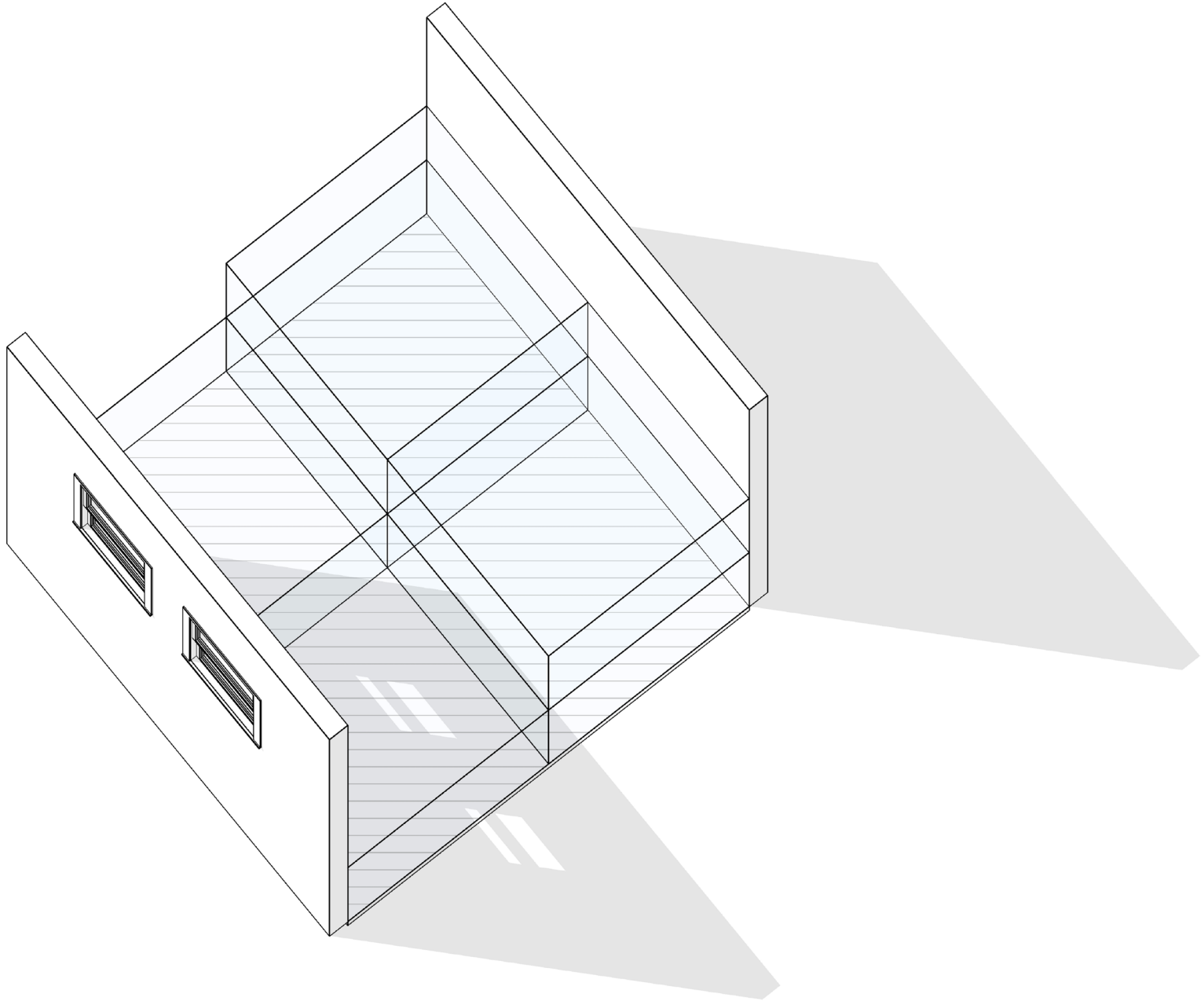
	metal	plastic	wood
smooth	✓	✓	✓
vertical	✓	✓	✓
horizontal	✓	✓	✓
shingles	✓	✓	✓

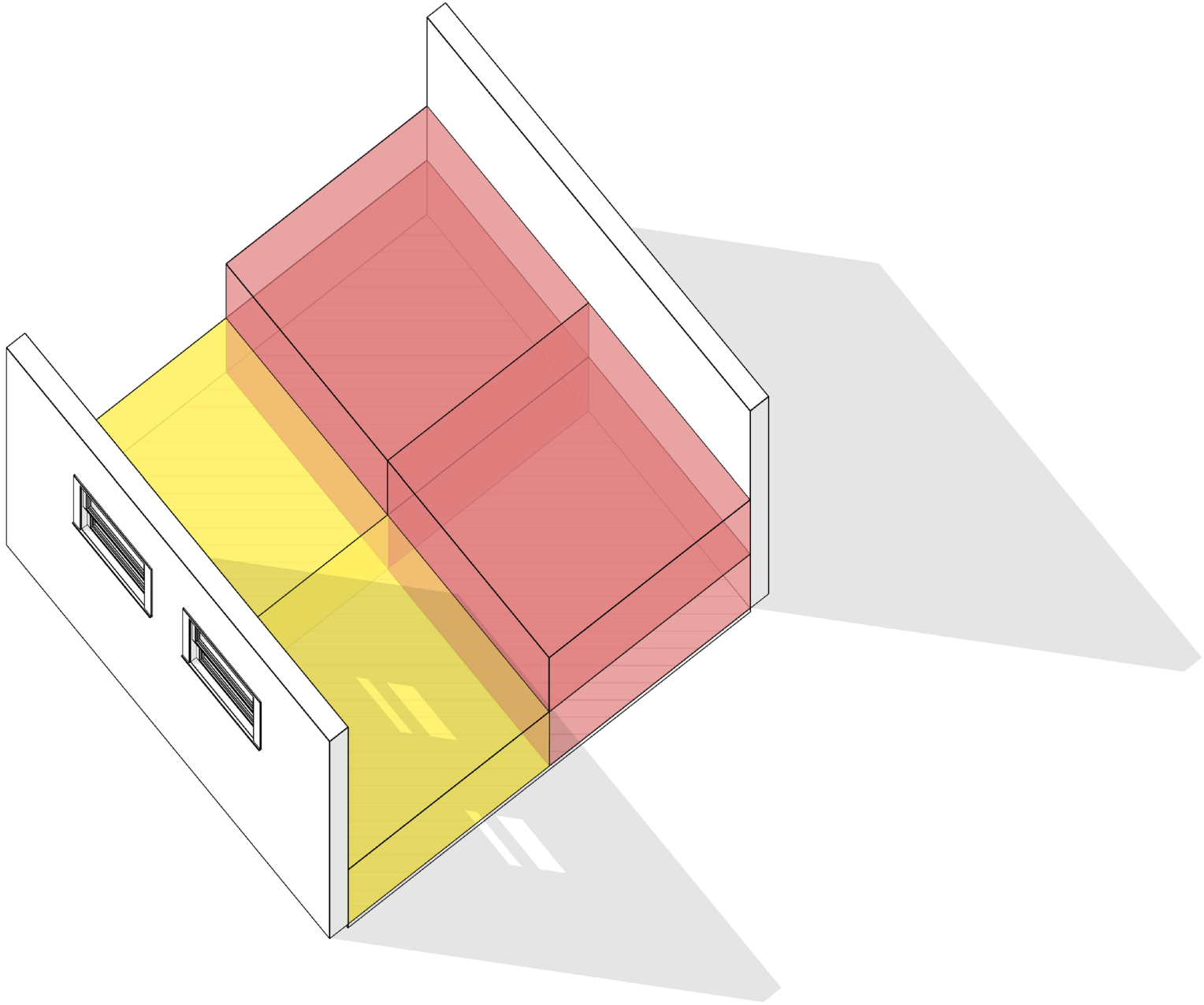


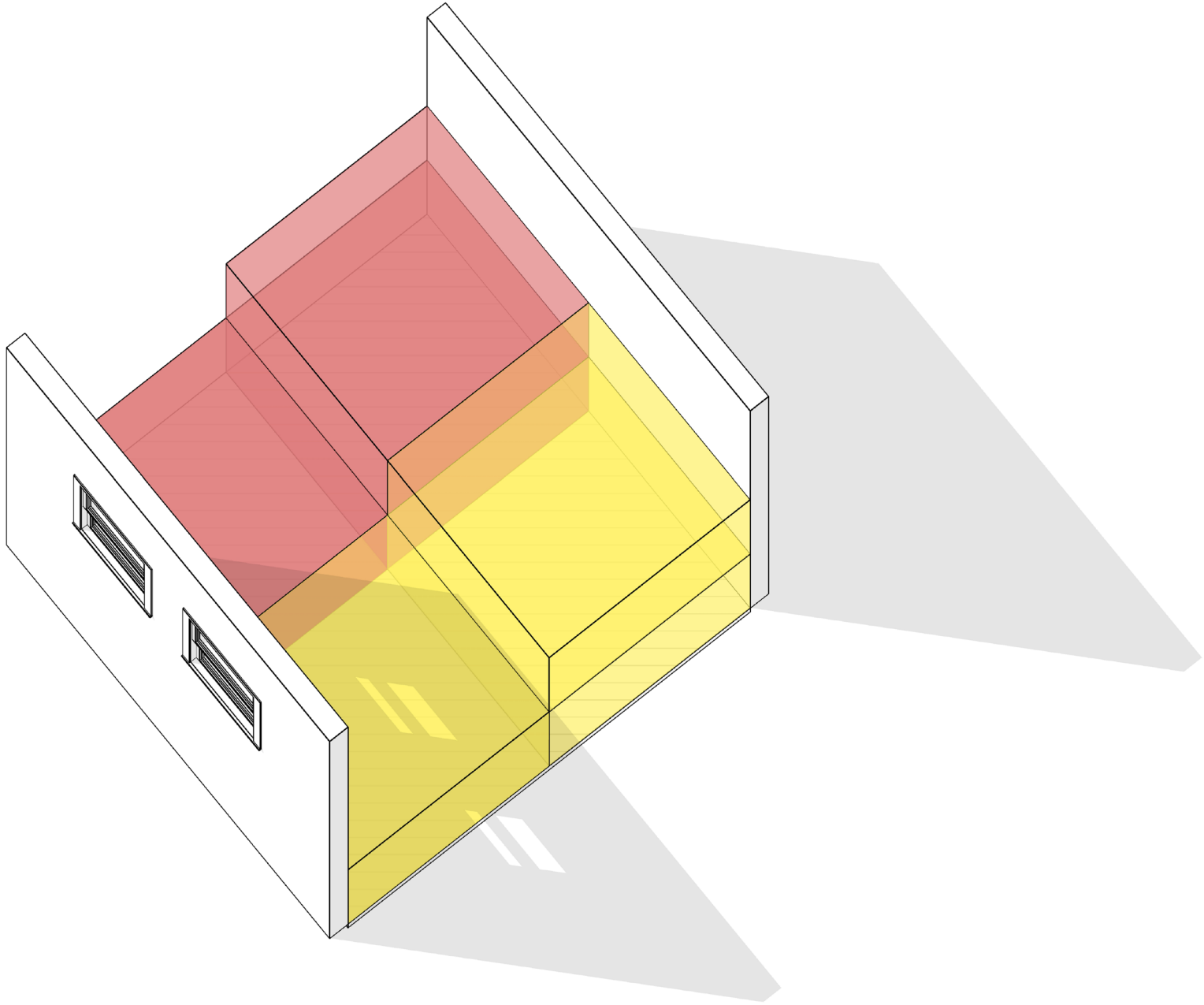


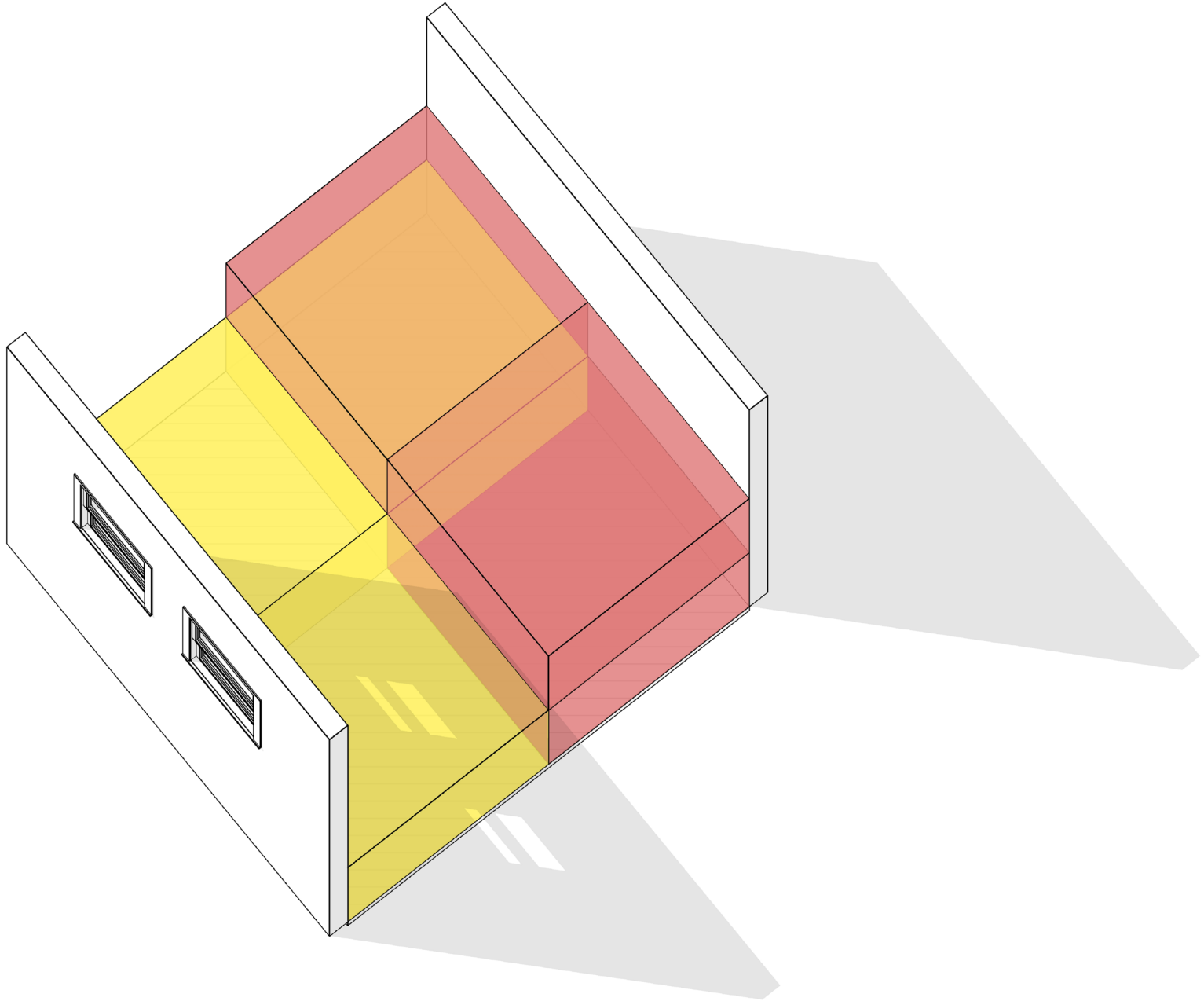
## **Macerating toilet**

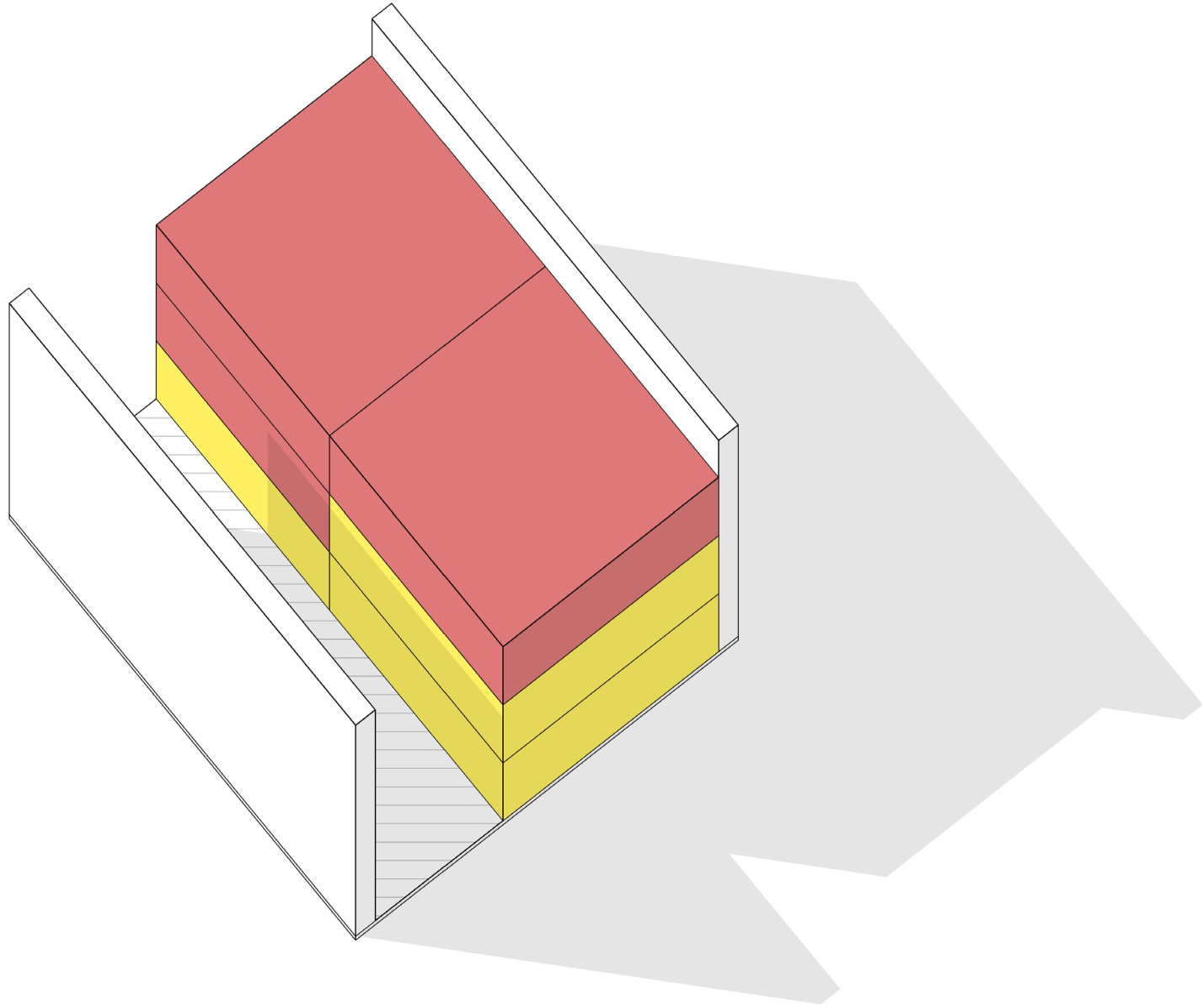
- uses water and electricity
- mechanical operation
- discharges waste immediately in a 2.5cm pipe
- saves up to 70% of water
- sink connection possible (combination)

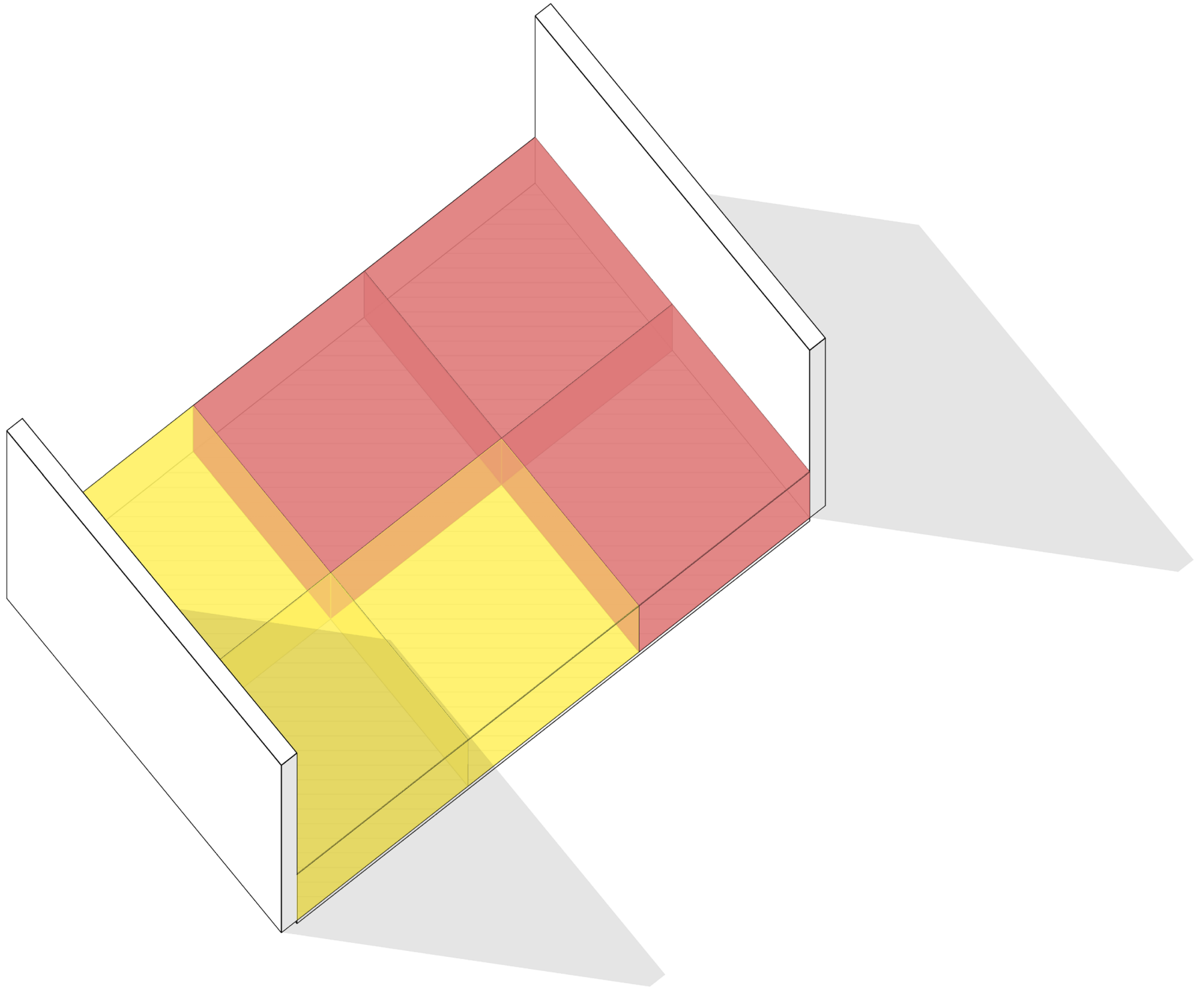


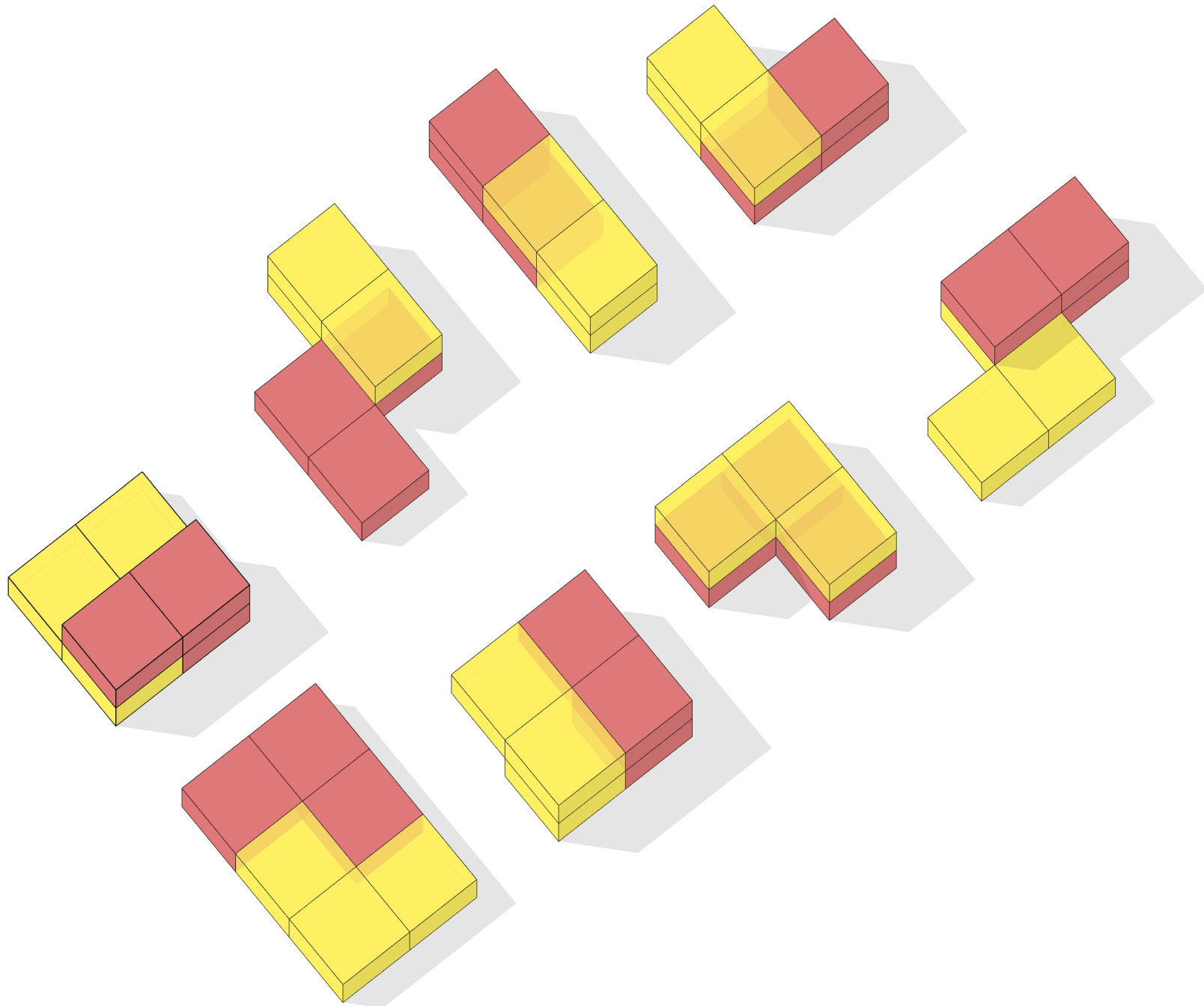


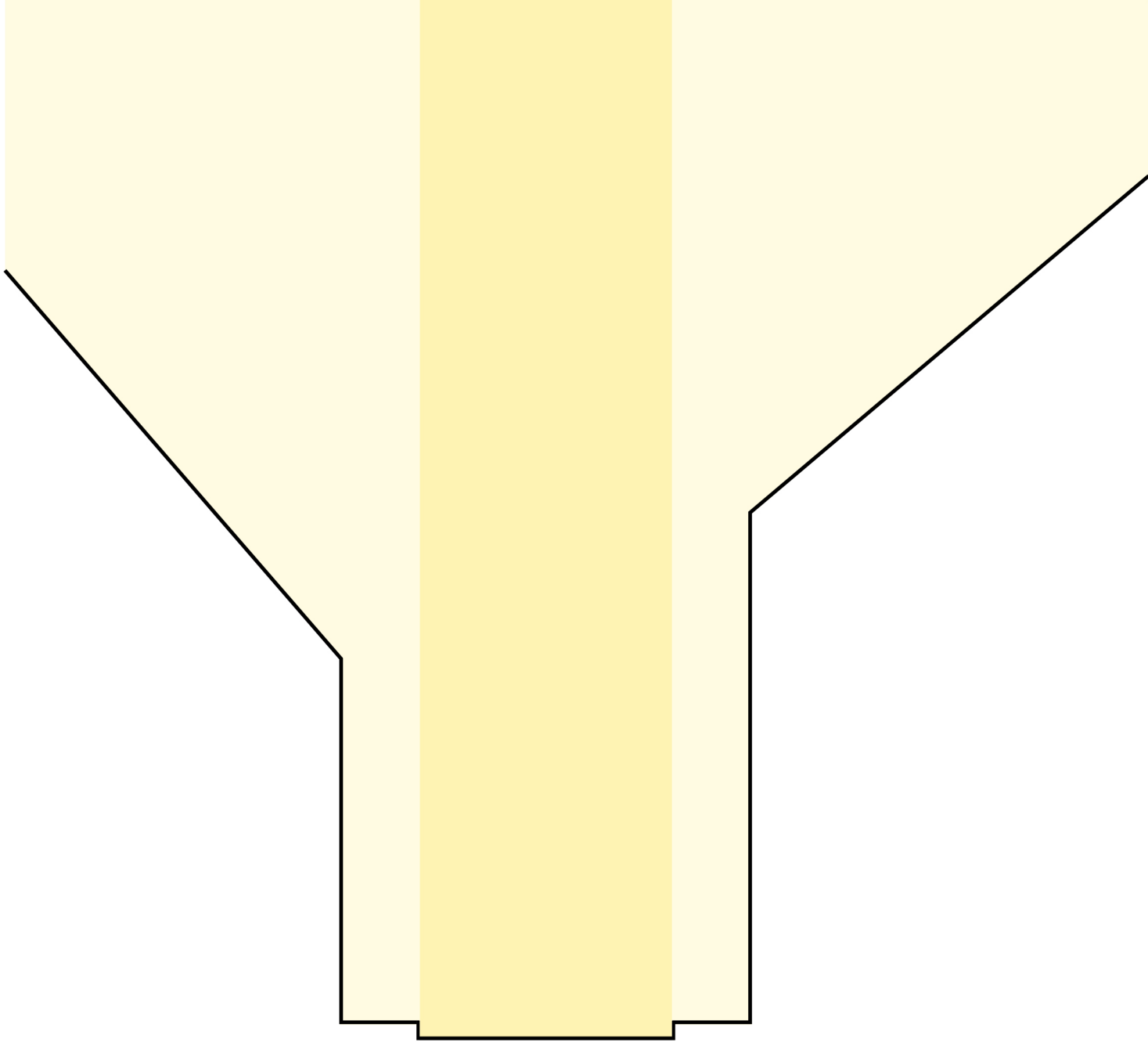


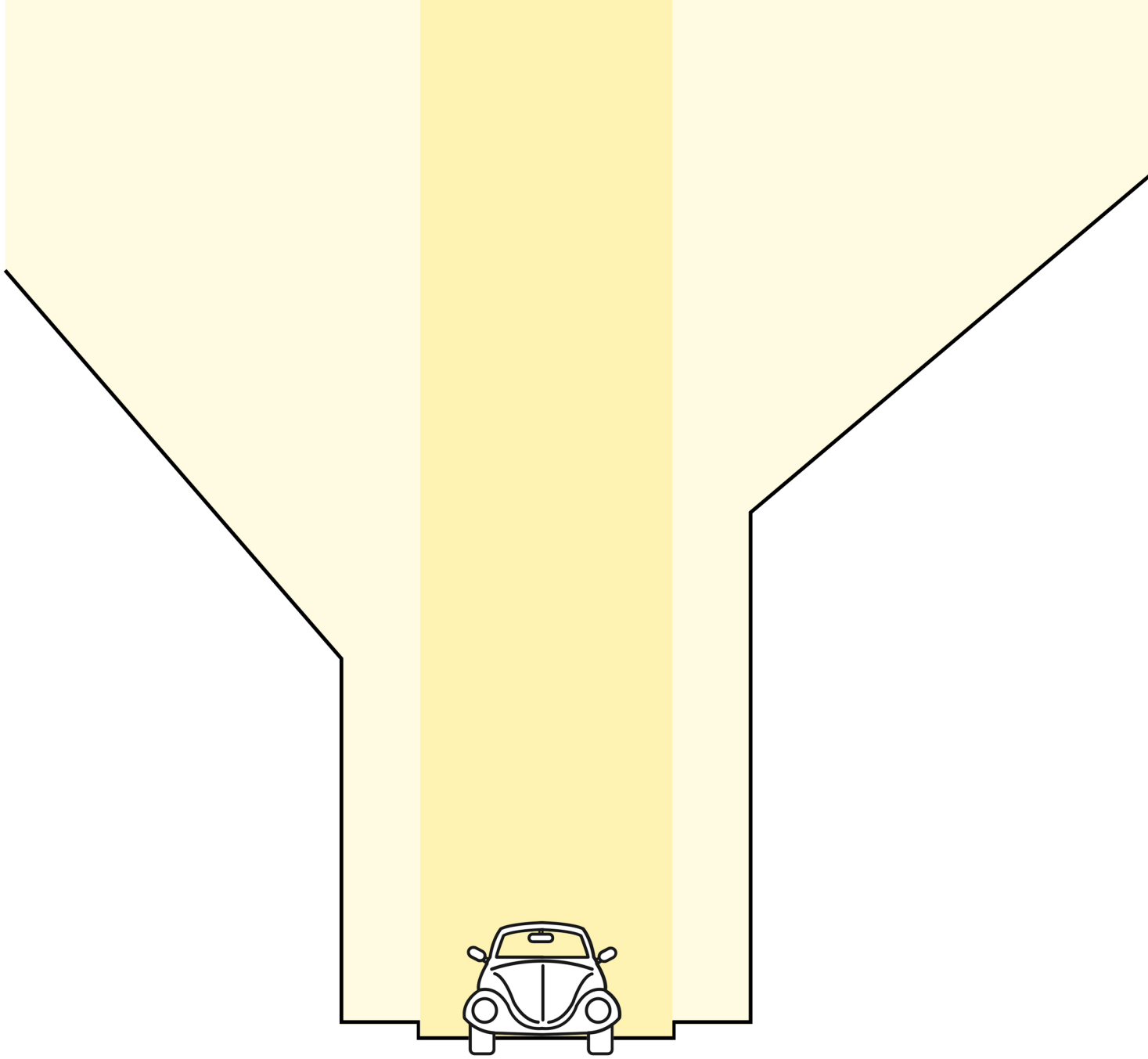


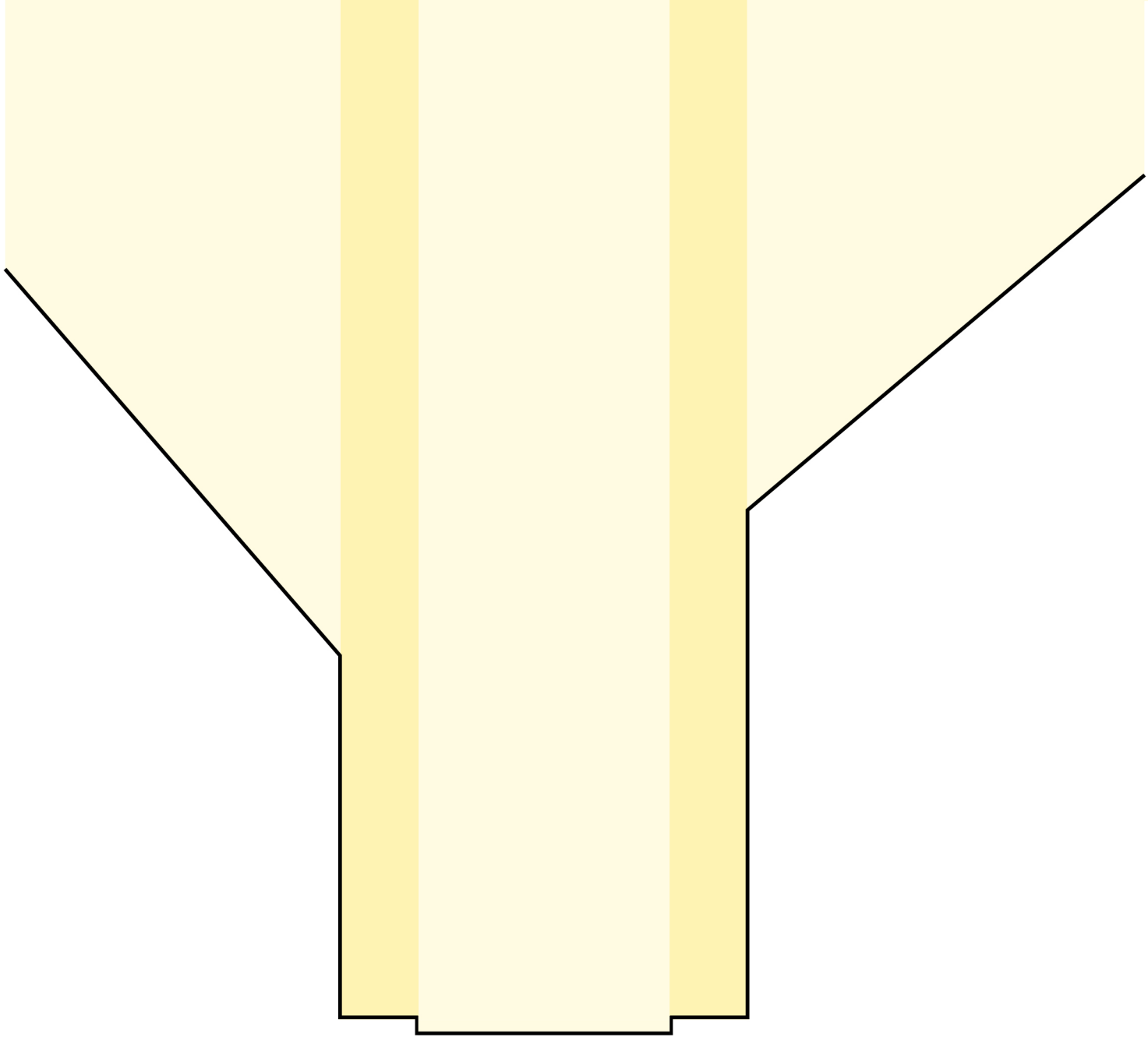


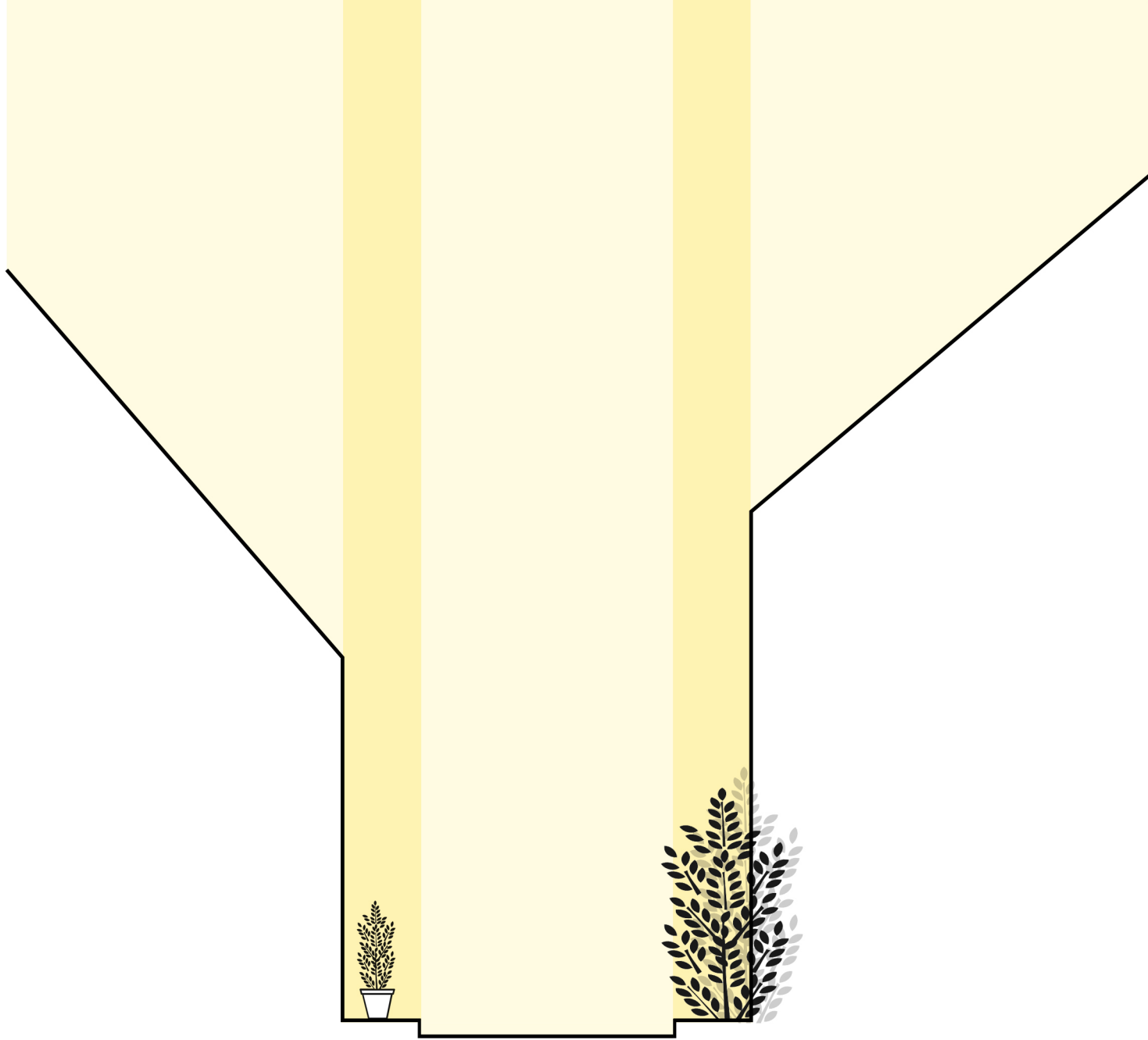


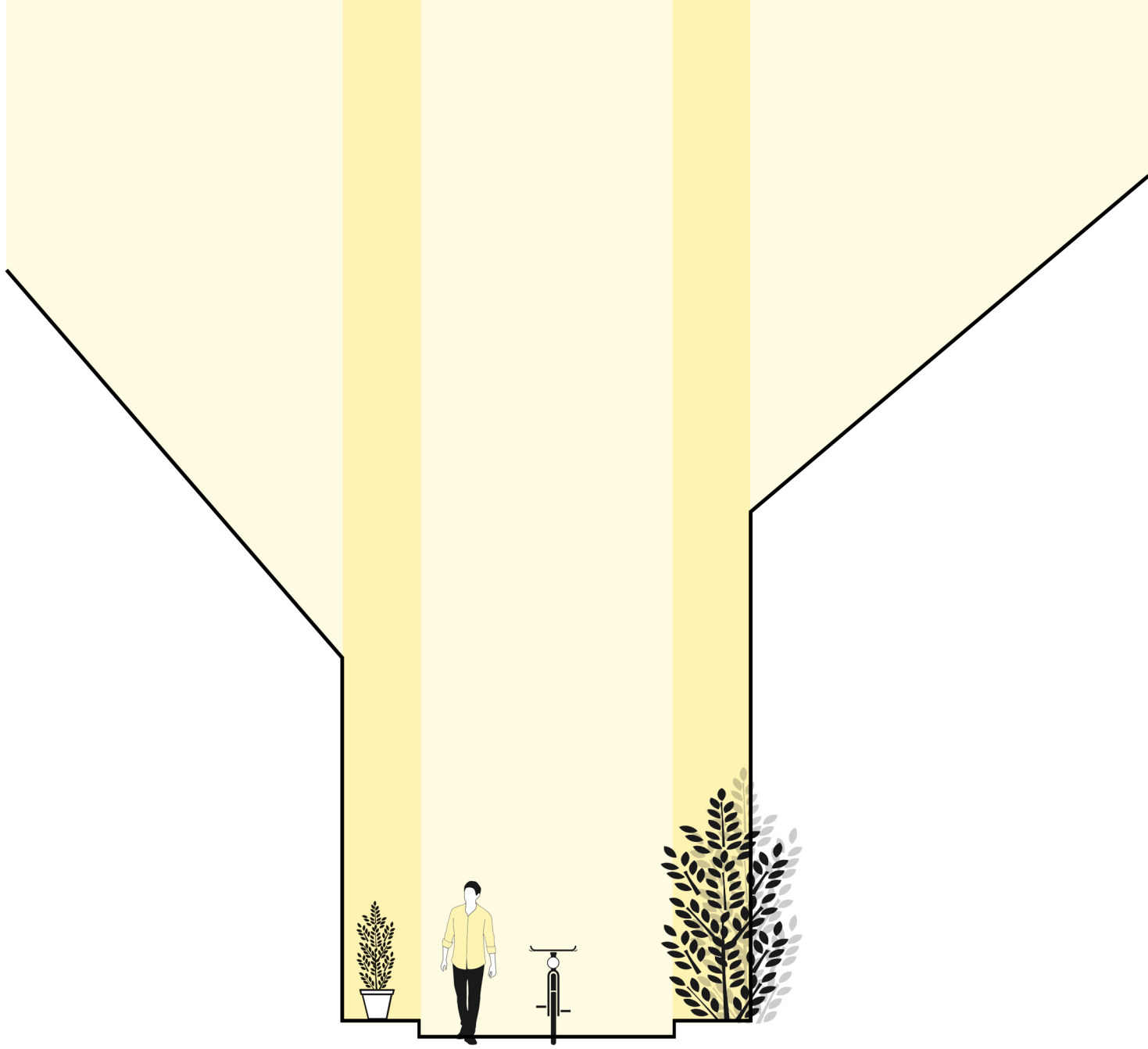


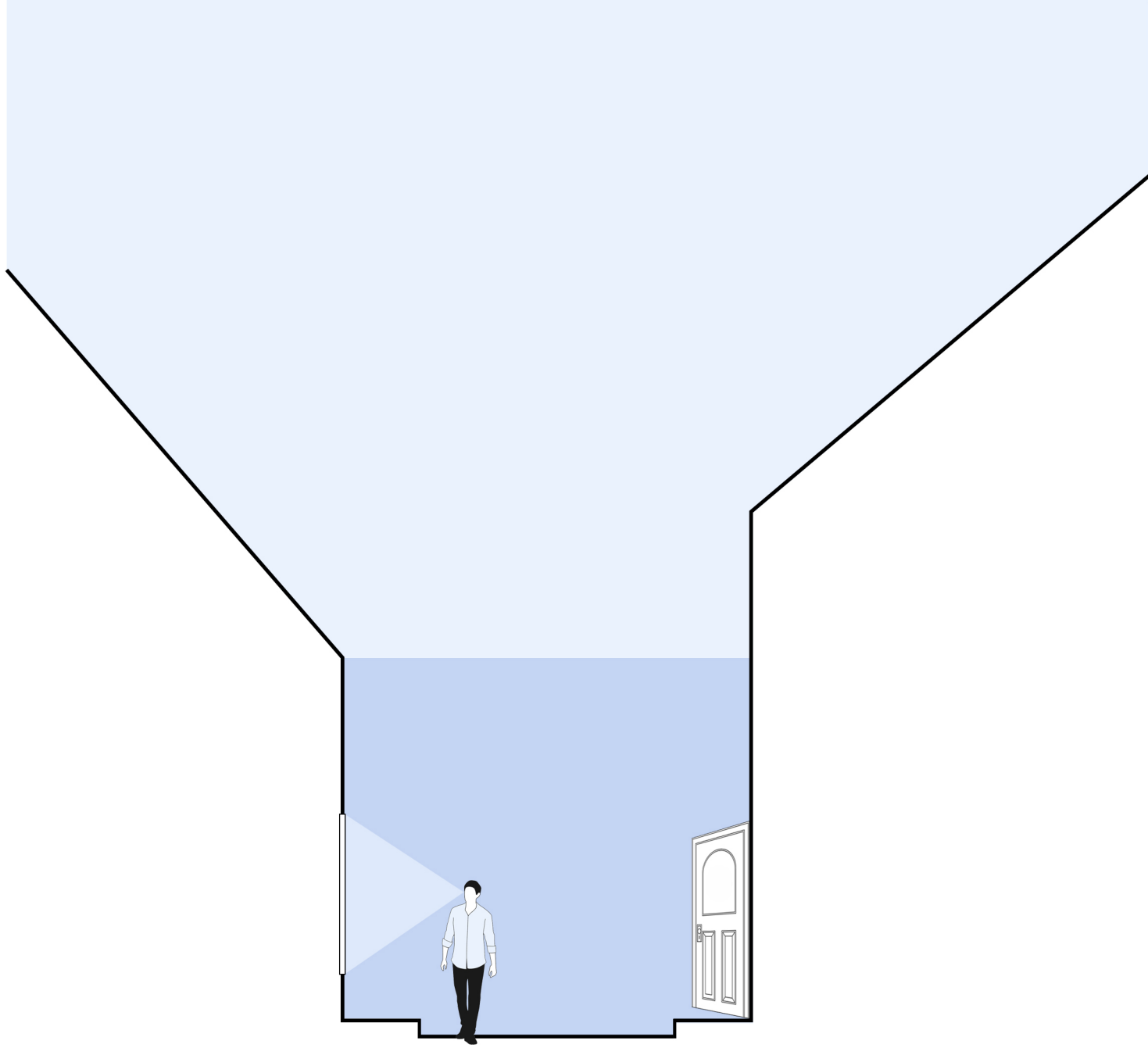


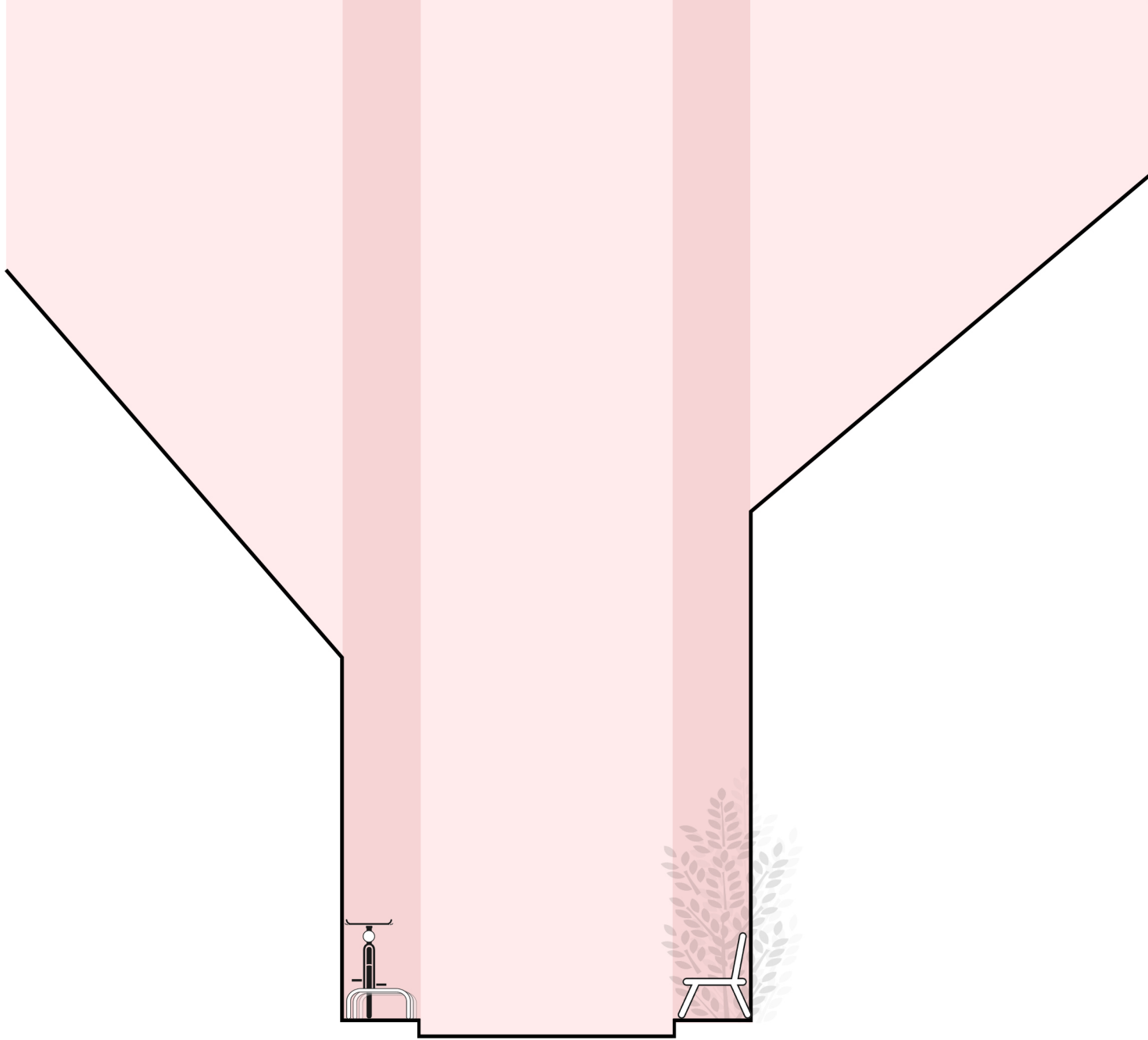












# 3.0

## 2<sup>nd</sup> Site

*Copenhagen, Denmark*

### Main issues |

**problem:** lack of affordable housing

**opportunity:** initiatives, experimentality

**target group:** students and starters



# 3.0

## 2<sup>nd</sup> Site

*Vienna, Austria*

### Main issues |

**problem:** lack of housing and public space

**opportunity:** roof culture

**target group:** students and starters



TOLERANCE

## which of these items are you comfortable sharing in your home, long-term?

utilities	9%
common room	9%
workspaces	9%
household appliances	8%
kitchen	8%
cleaning responsibilities	8%
self-driving car	8%
child care	6%
daily dinners	6%
groceries	4%
shower & toilet	3%

CHOOSE NEW TOPIC

submit












**people** who are  
**25 – 29**, and are  
**single**,  
from **netherlands**,  
on average:

reset filters

ONE SHARED  
HOUSE 2030

SURVEY ABOUT  
RESULTS RESOURCES

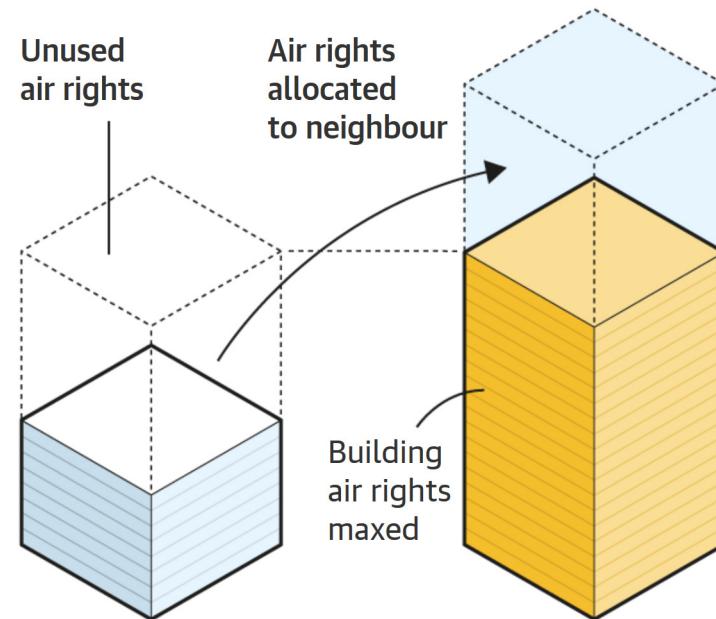
-  would prefer single women, couples and single men in their community
-  are happier with access to multiple homes they could easily move between
-  prefer to live in the city
-  think people with an architectural background would be the best at designing a co-living community
-  think it's important that the people who design their community have experienced co-living themselves
-  prefer members to share equal ownership of the house
-  would pay extra for a service layer to manage all house related items
-  only want the common areas to come furnished and furnish their own space themselves
-  want house-members from different walks of life

<b>City</b>	<b>Percentage agreeing</b>	<b>Population 2014</b>
München	3	1,407,836
Genève	5	191,557
Hamburg	6	1,746,342
Paris (greater city)	7	6,707,750
Stockholm	7	864,324
Zürich	7	384,786
København	8	559,440
Helsinki	8	595,384
Berlin	10	3,421,829
Amsterdam	10	799,278
London (greater city)	11	8,477,600
Dublin	12	516,255
Luxembourg	13	89,836
Bratislava	14	417,389
Oslo	14	623,966
Tallinn	17	406,059
Wien	18	1,741,246
Reykjavik	18	120,339
Bruxelles / Brussel	19	1,183,841
Roma	19	2,863,322
Istanbul	19	9,897,599

Proportion of people who agree that it is easy to find good housing at a reasonable price in their city, 2015 <sup>(1)</sup>

### Transferable development rights, NYC | “air rights”

Allows landowners to buy unused air space from neighbouring buildings and reallocate it to their own so that they can build higher



### la Loi Alur, Paris |

Building does not require any lot acquisition as the rights to build is obtained in exchange for the existing building's renovation

**the 3BOX |**

**location:** Paris

**year:** 2016

**architect:** Malka architecture



**the H-VAC |**

**location:** Greater London, UK

**year:** 2017

**architect:** PUP architects

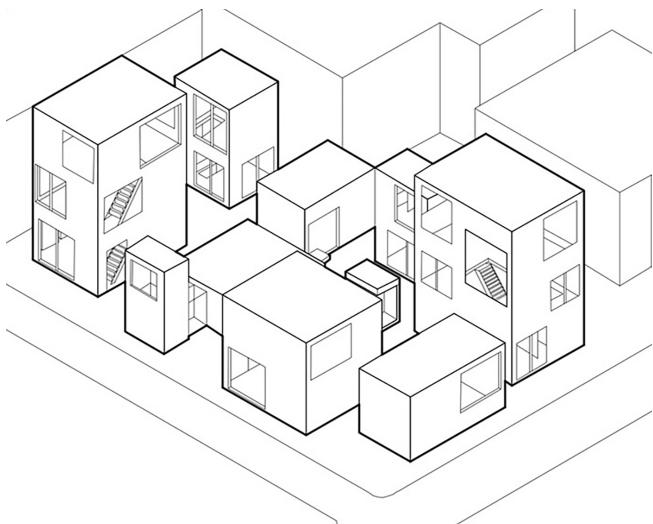


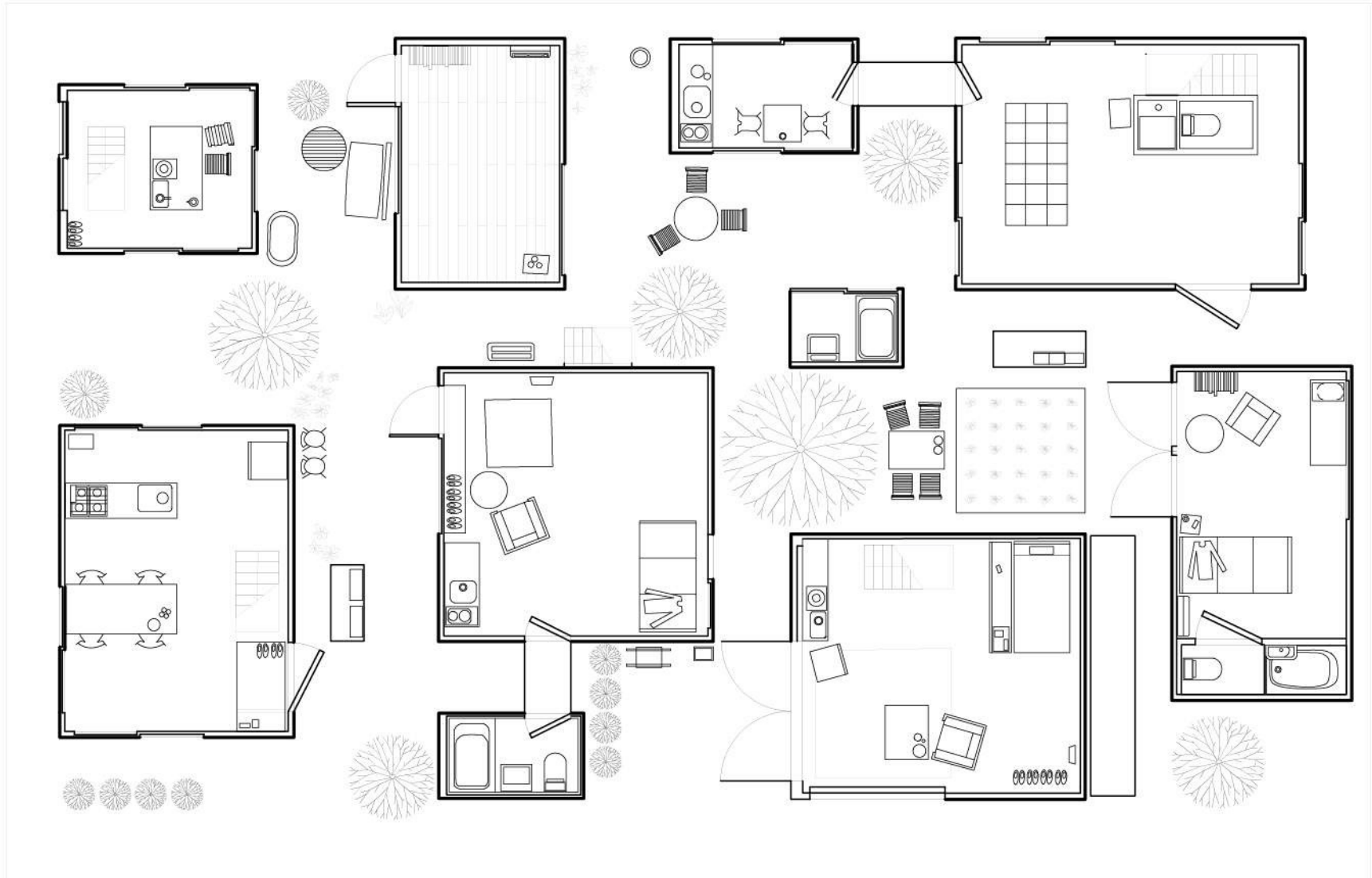
## Moriyama House |

**location:** Tokyo, Japan

**year:** 2005

**architect:** Ryue Nishizawa, SANAA





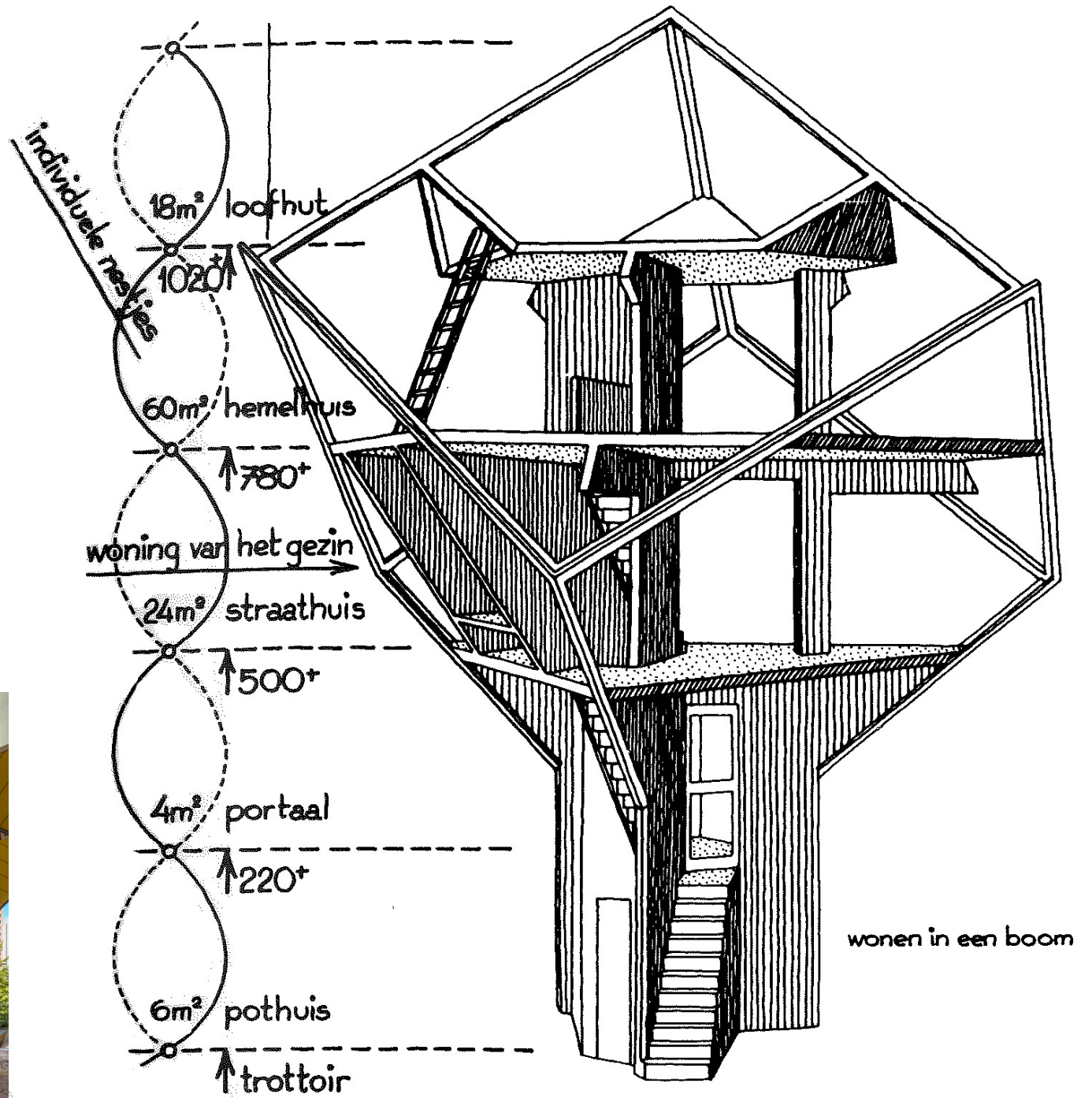


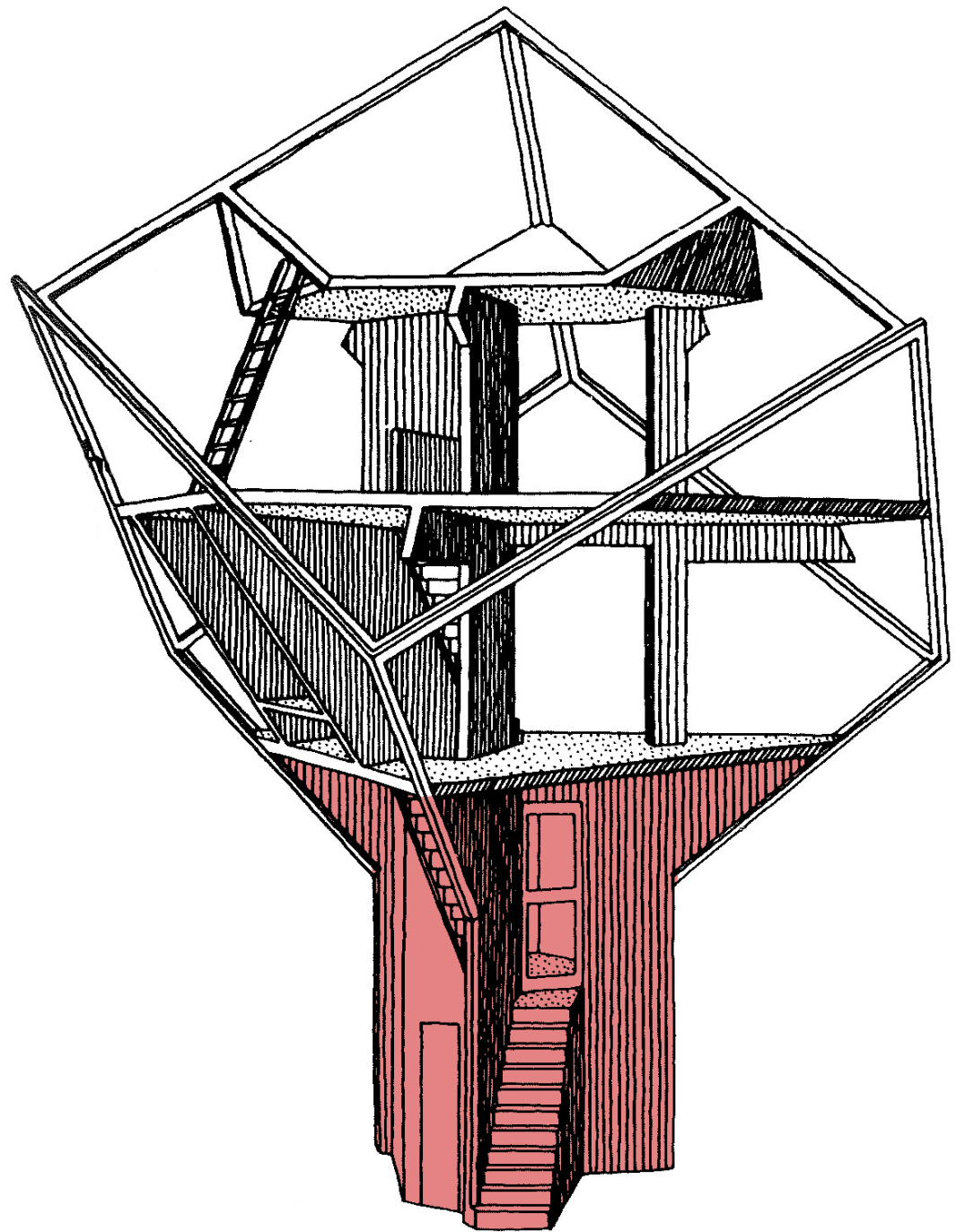
# Cube Houses |

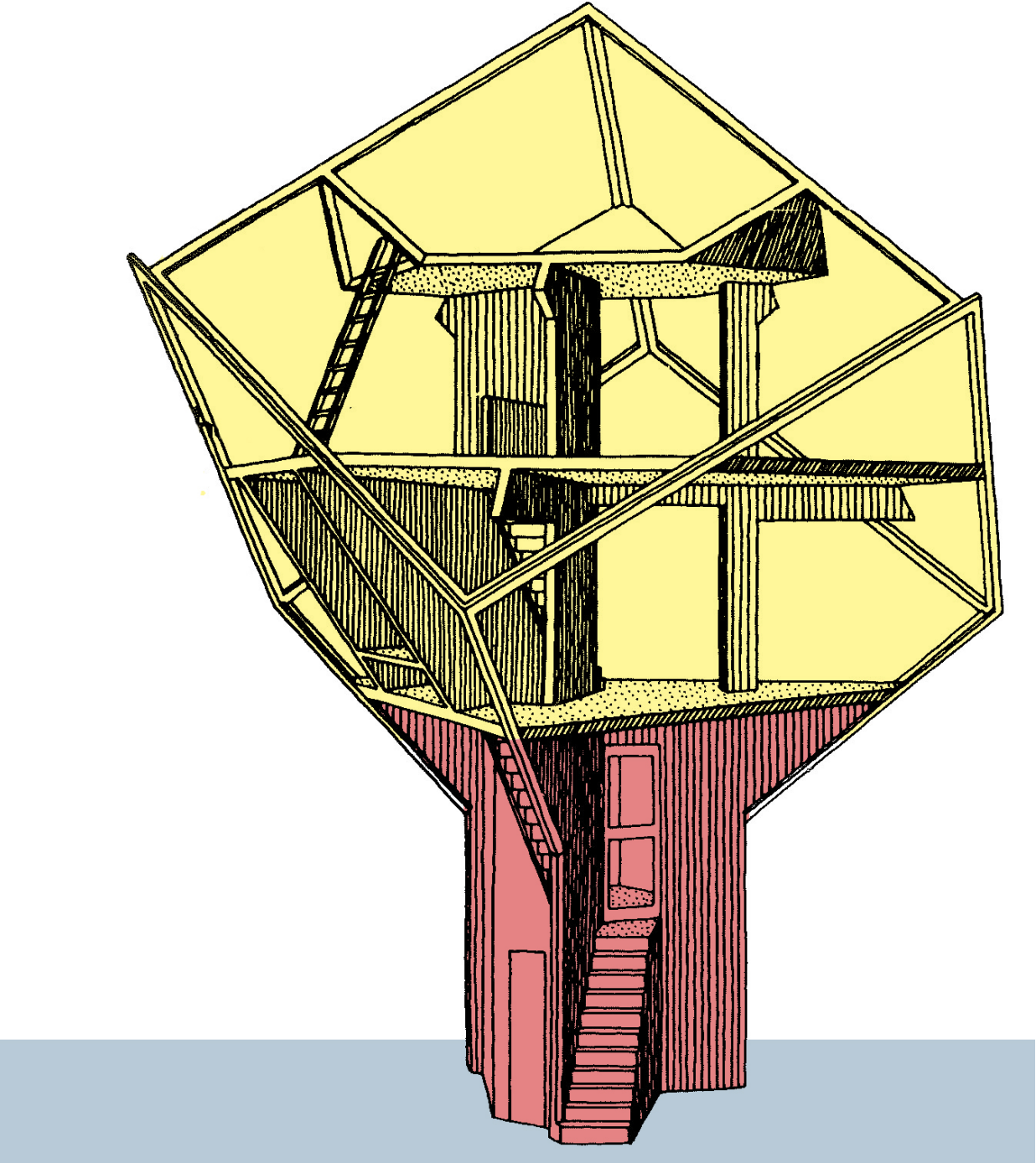
location: Rotterdam, the Netherlands

year: 1997

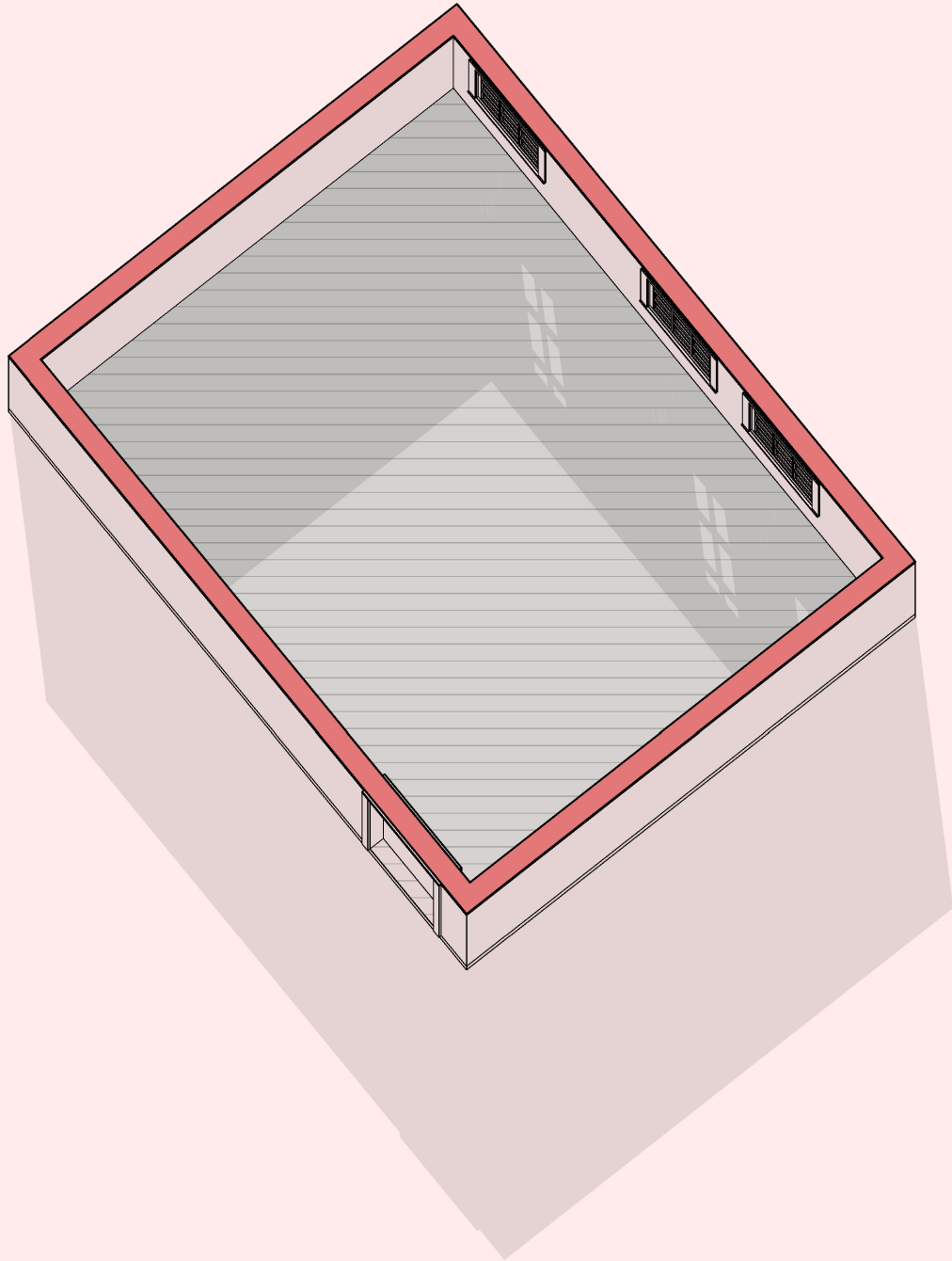
architect: Piet Blom

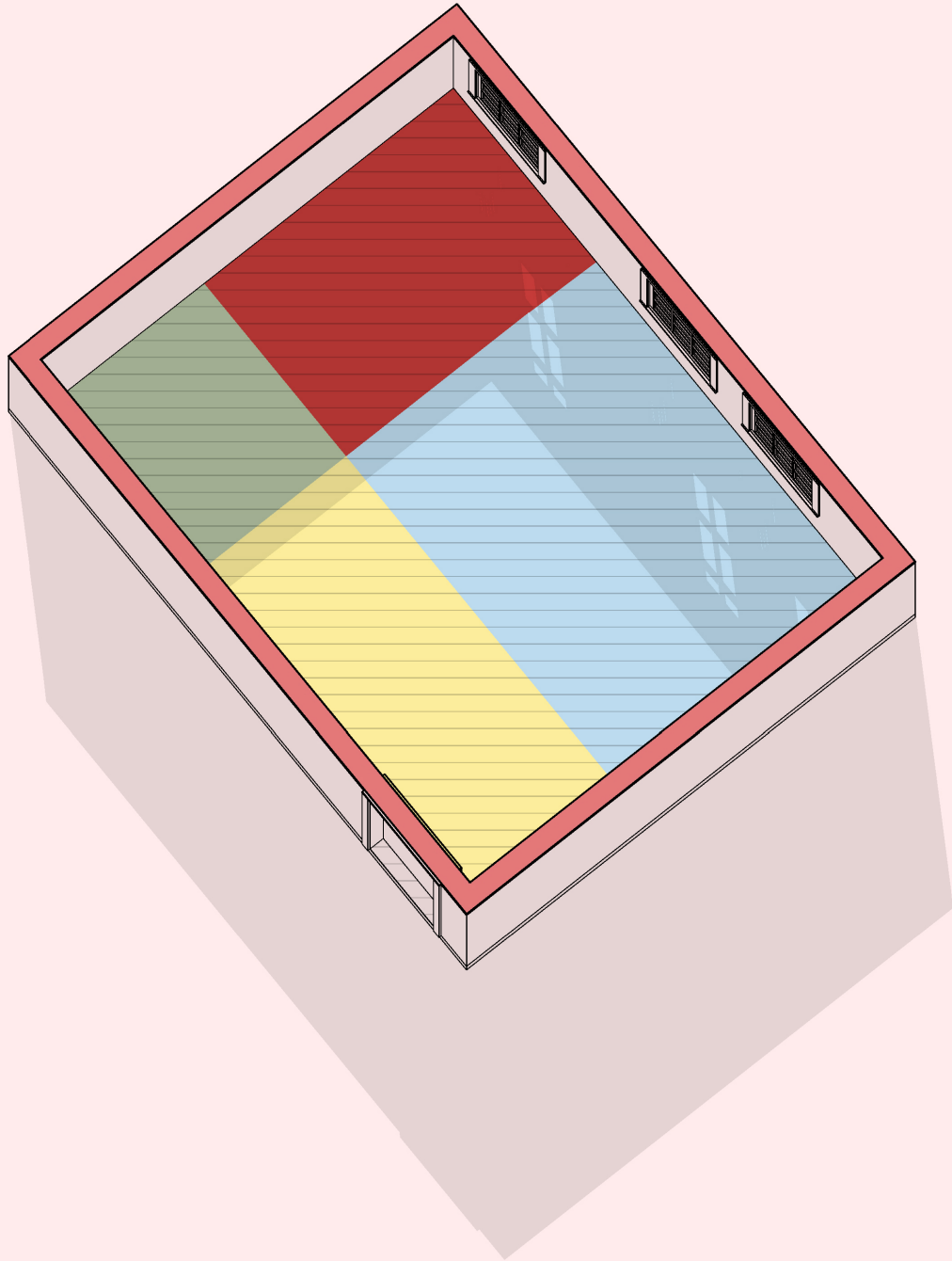


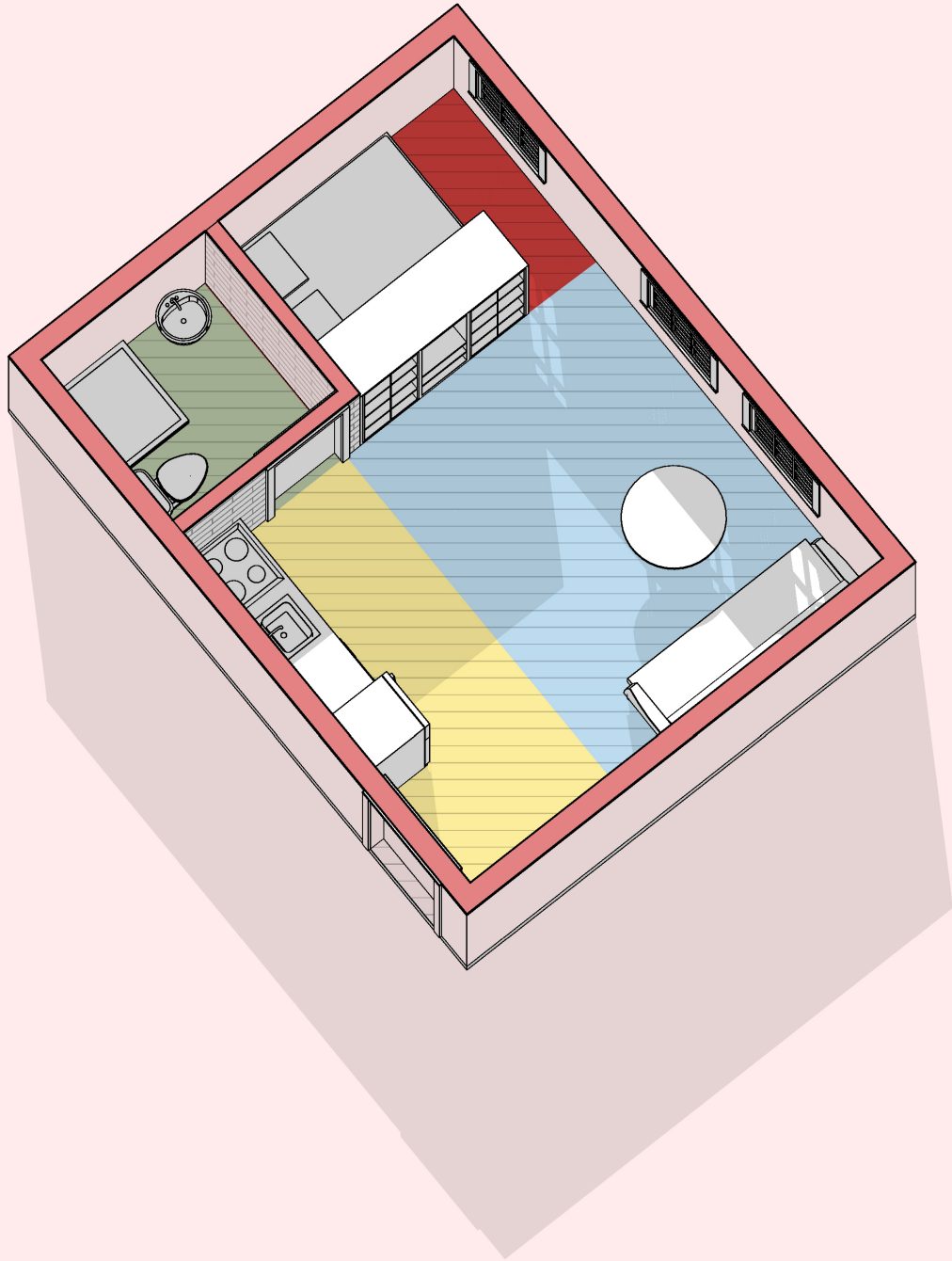


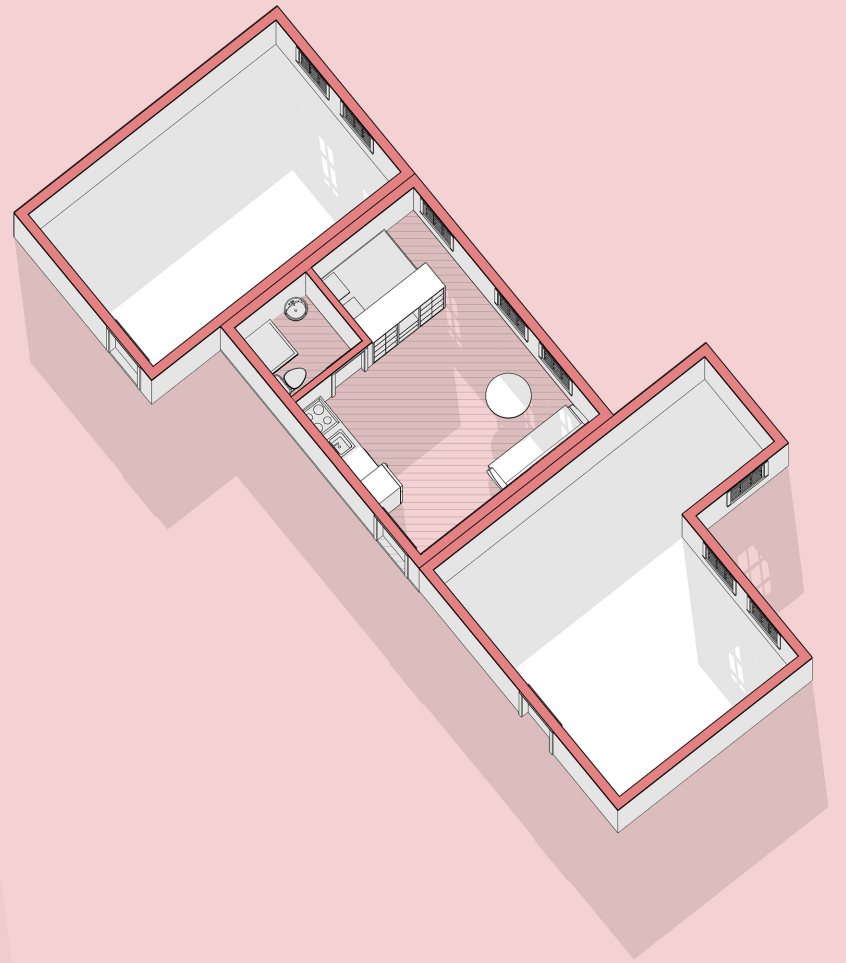
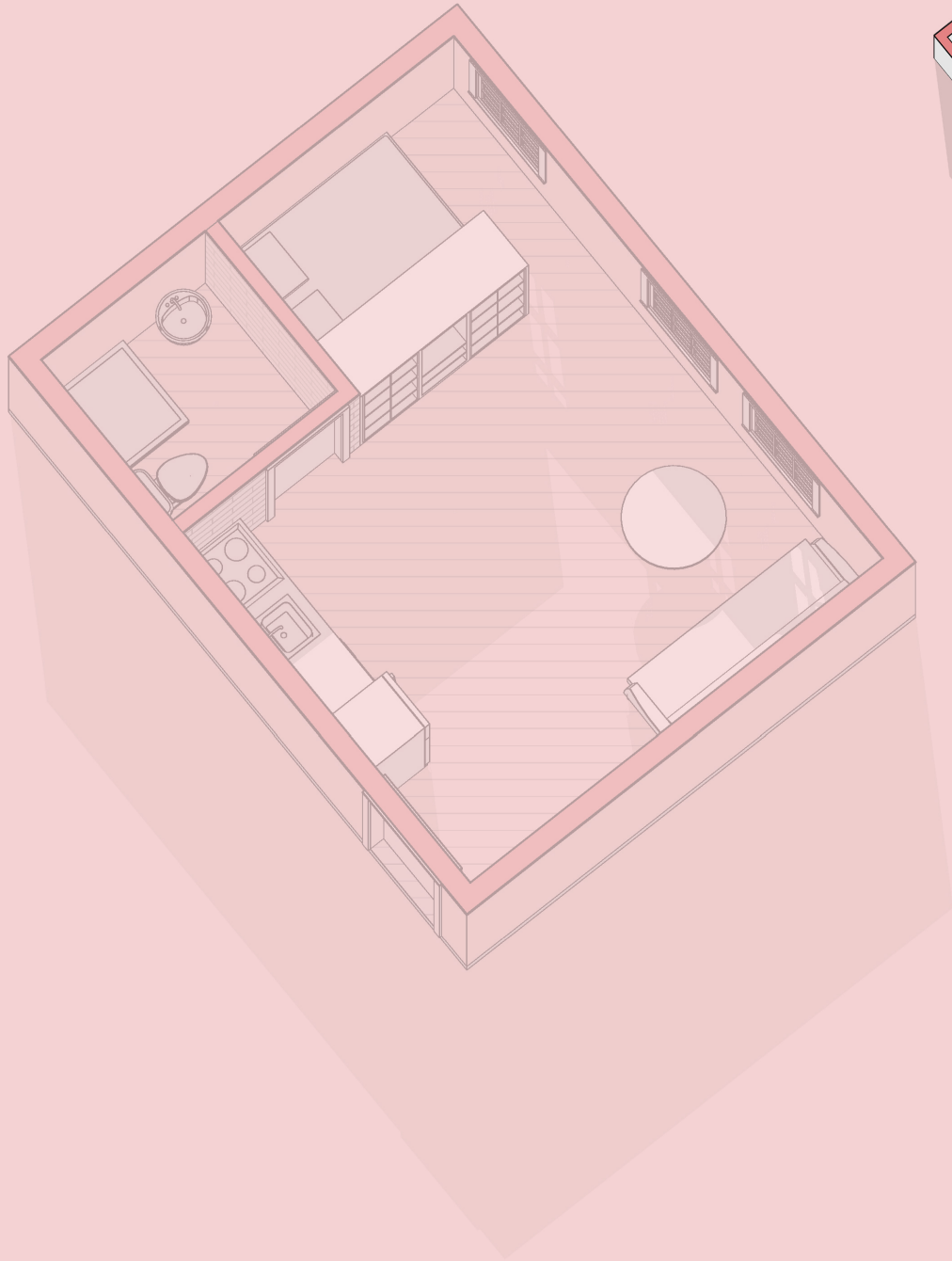


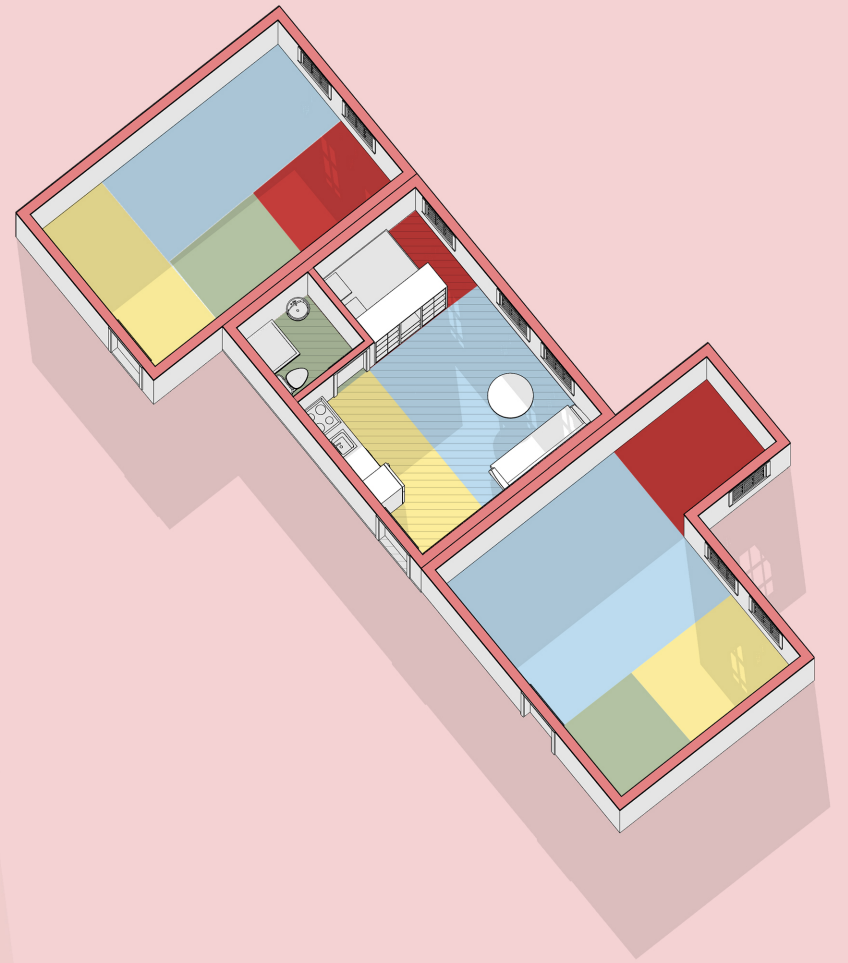
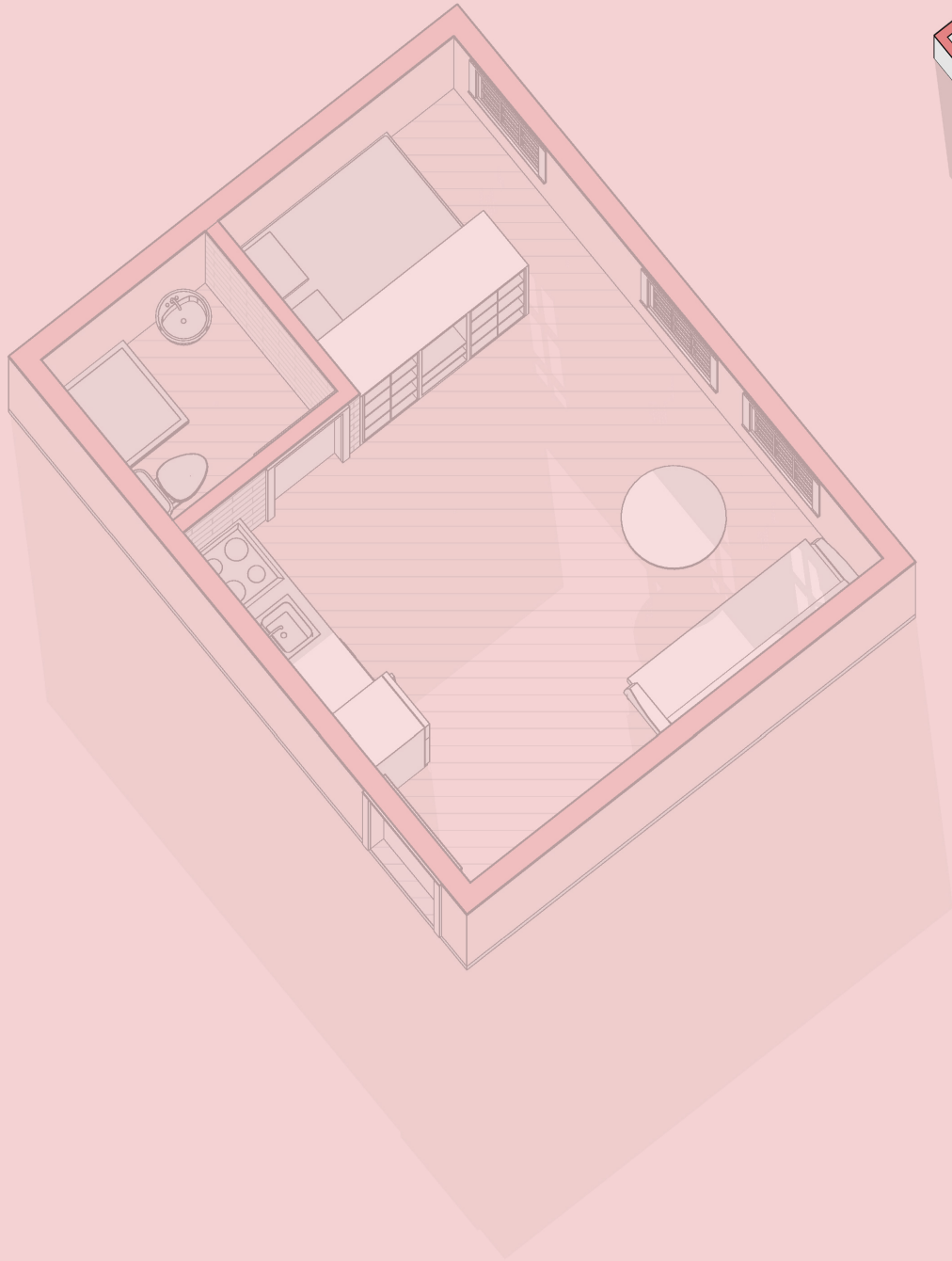


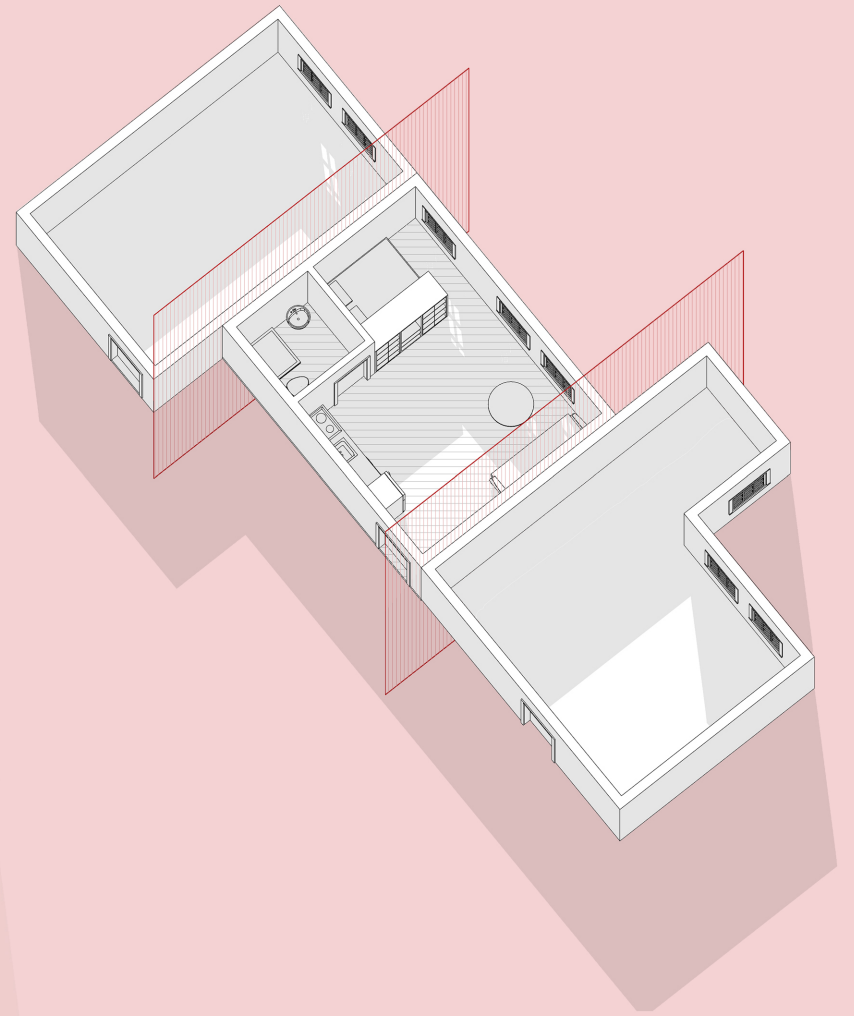
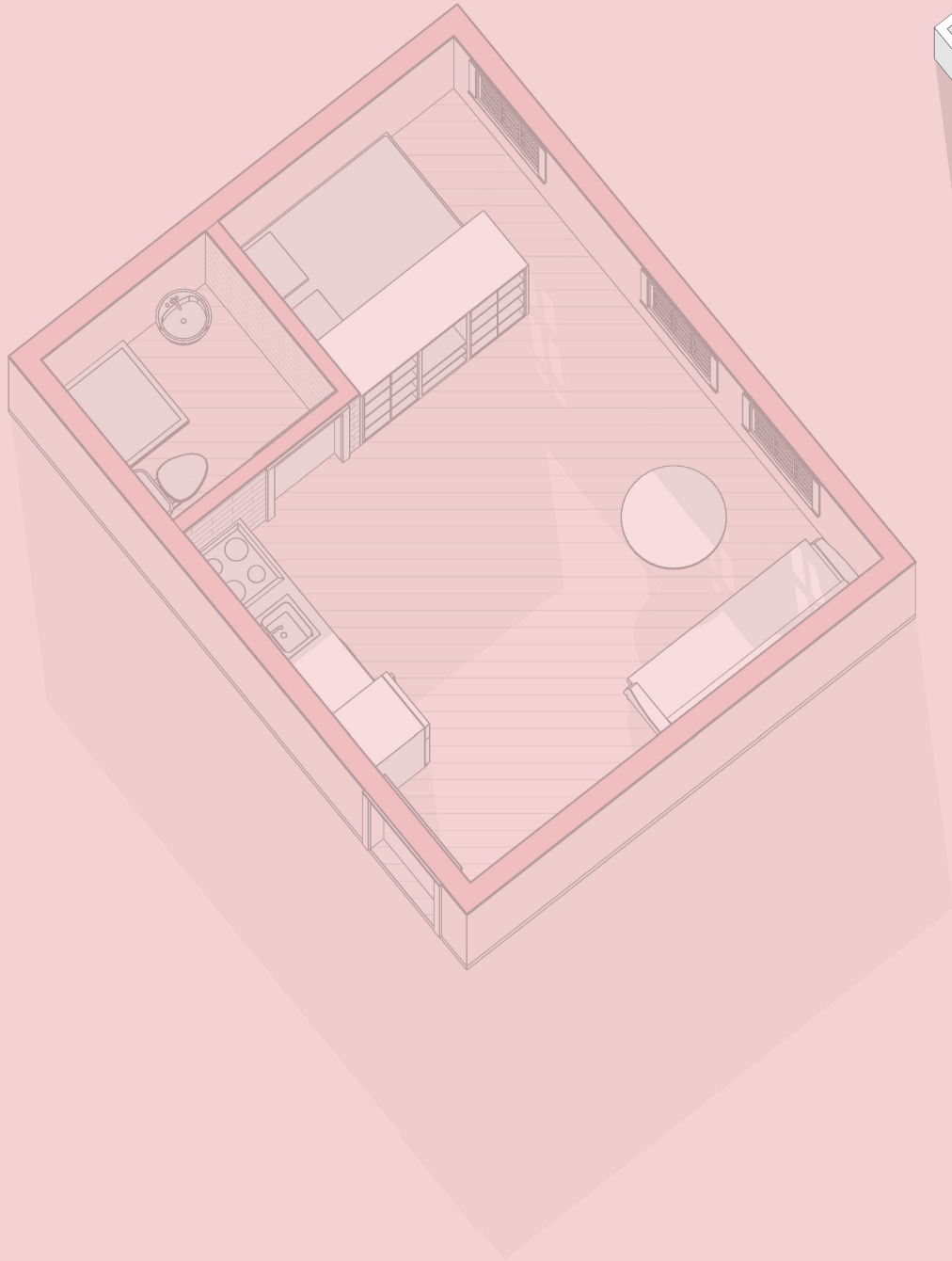


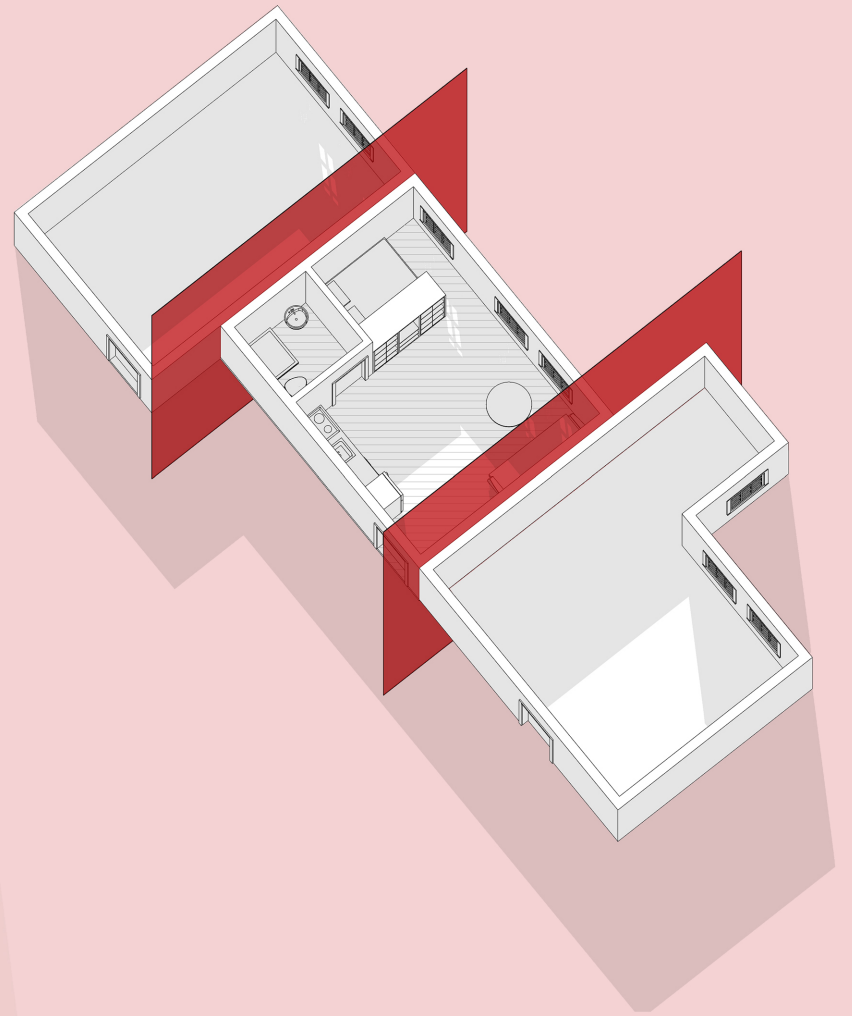
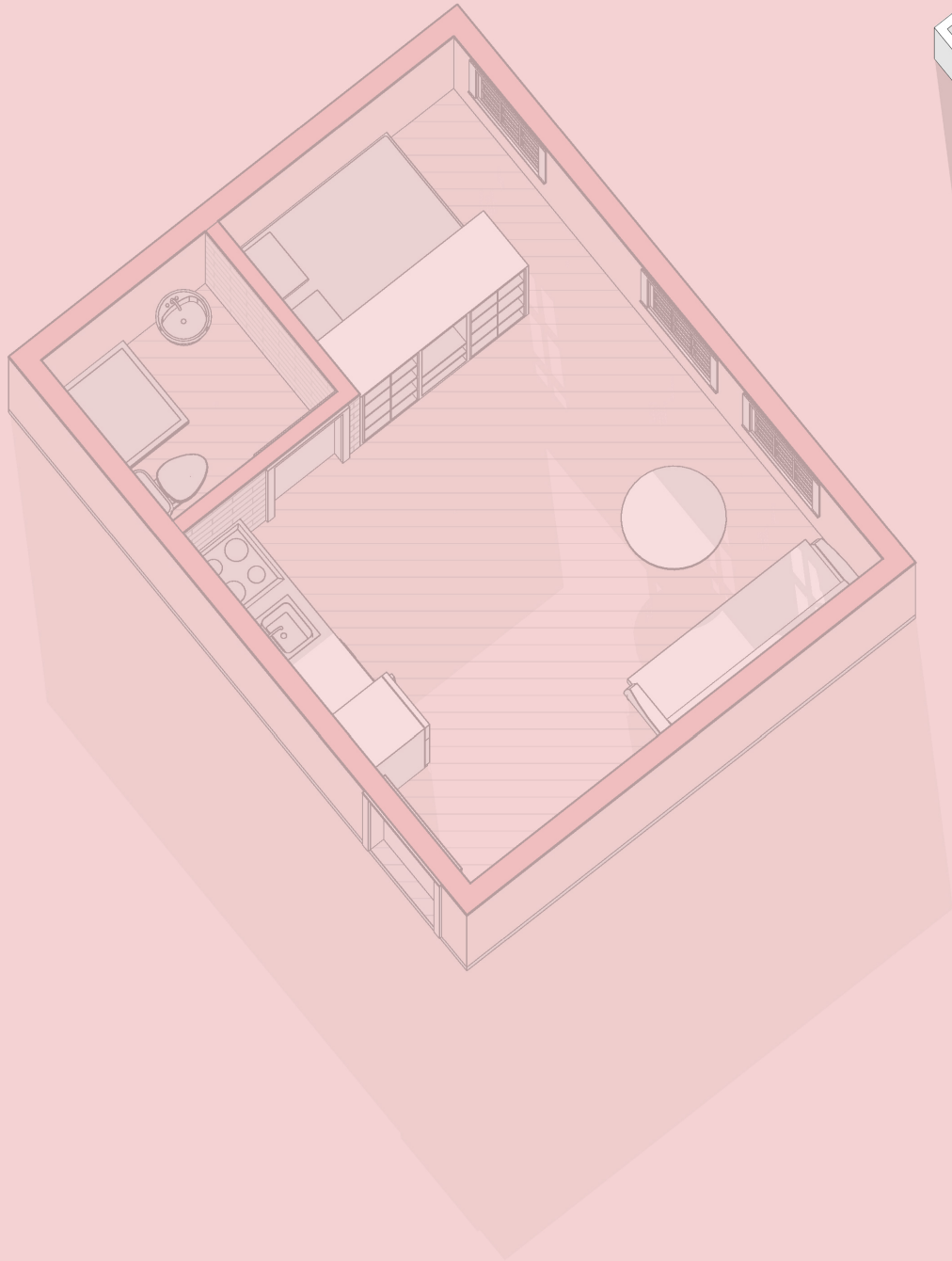




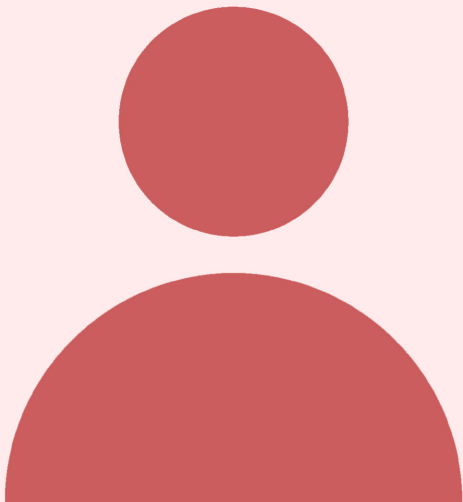








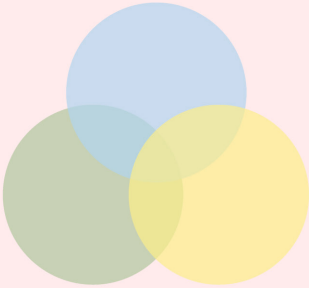
*" I like my space, I could **furnish** it the way I want. It wasn't very easy to find something affordable though. It could have been **smaller** and **cheaper**. I don't think it was really designed for 1 person, 2 could easily live in here. I also barely see my **neighbors**. "*



**Diversity**

**Flexibility**

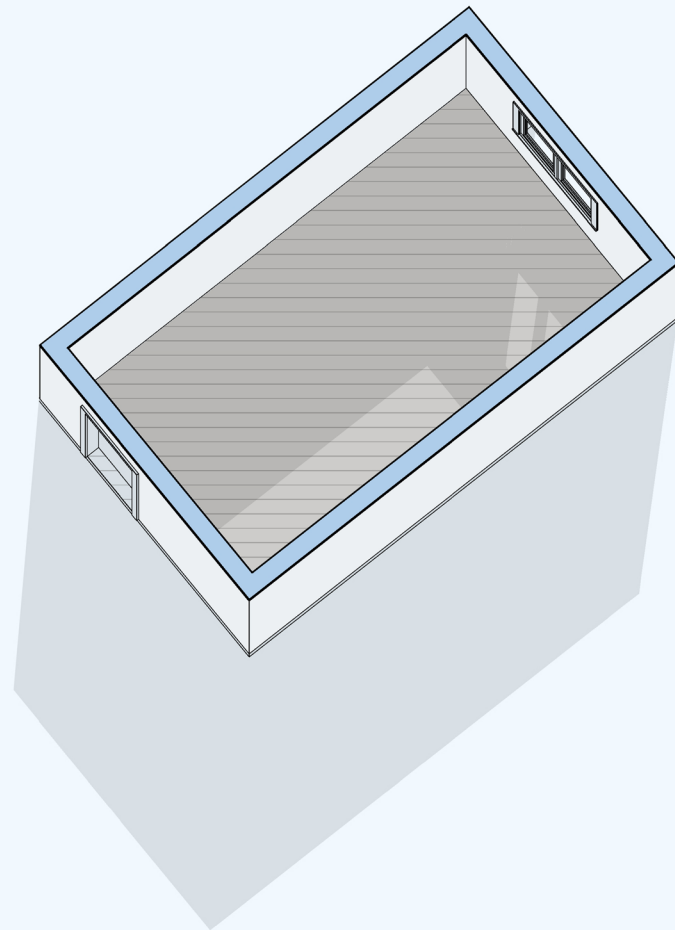
**Location**

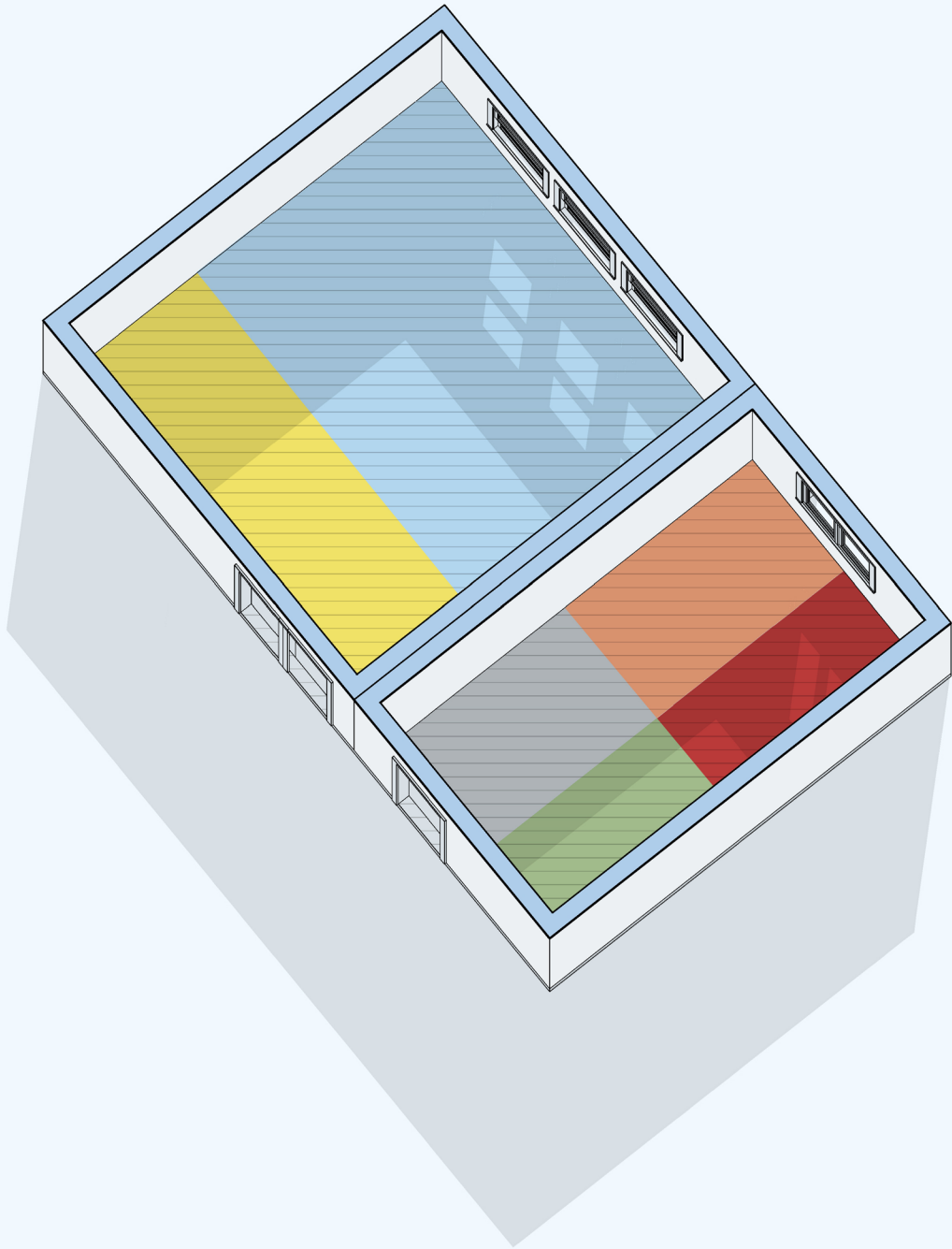


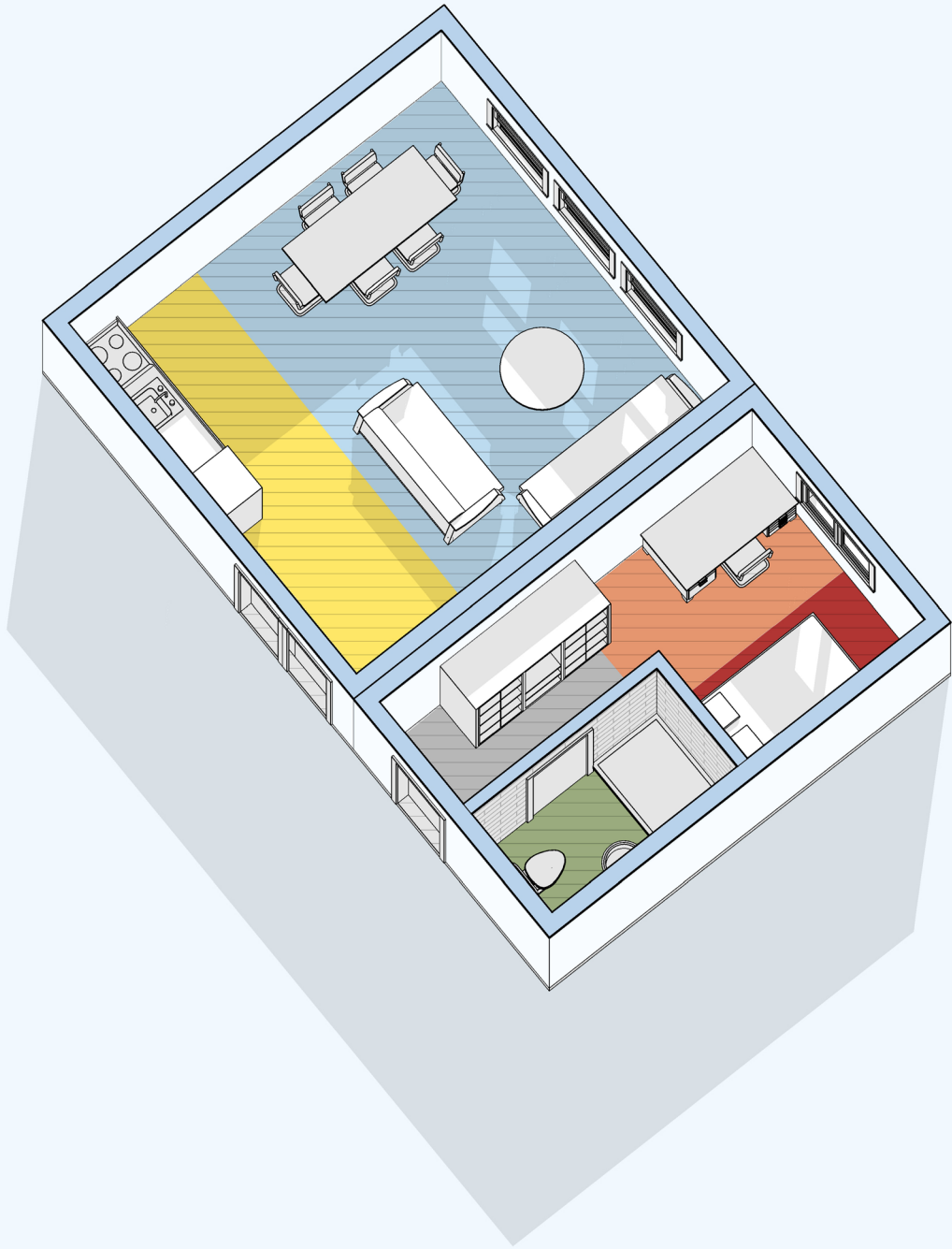
**Seclusion**

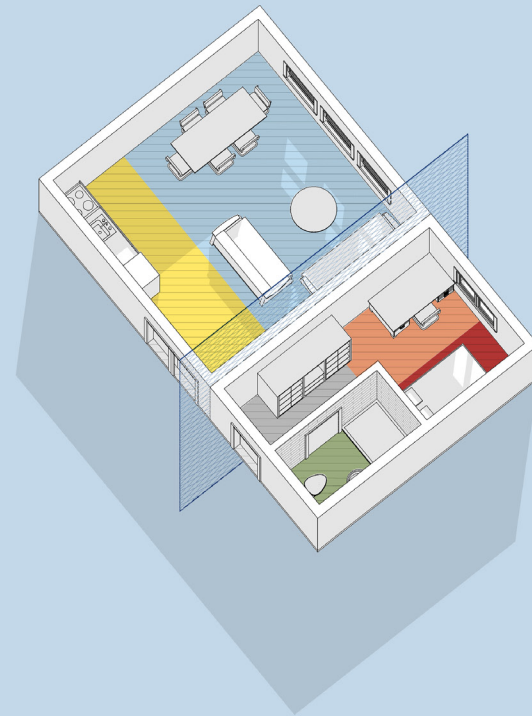
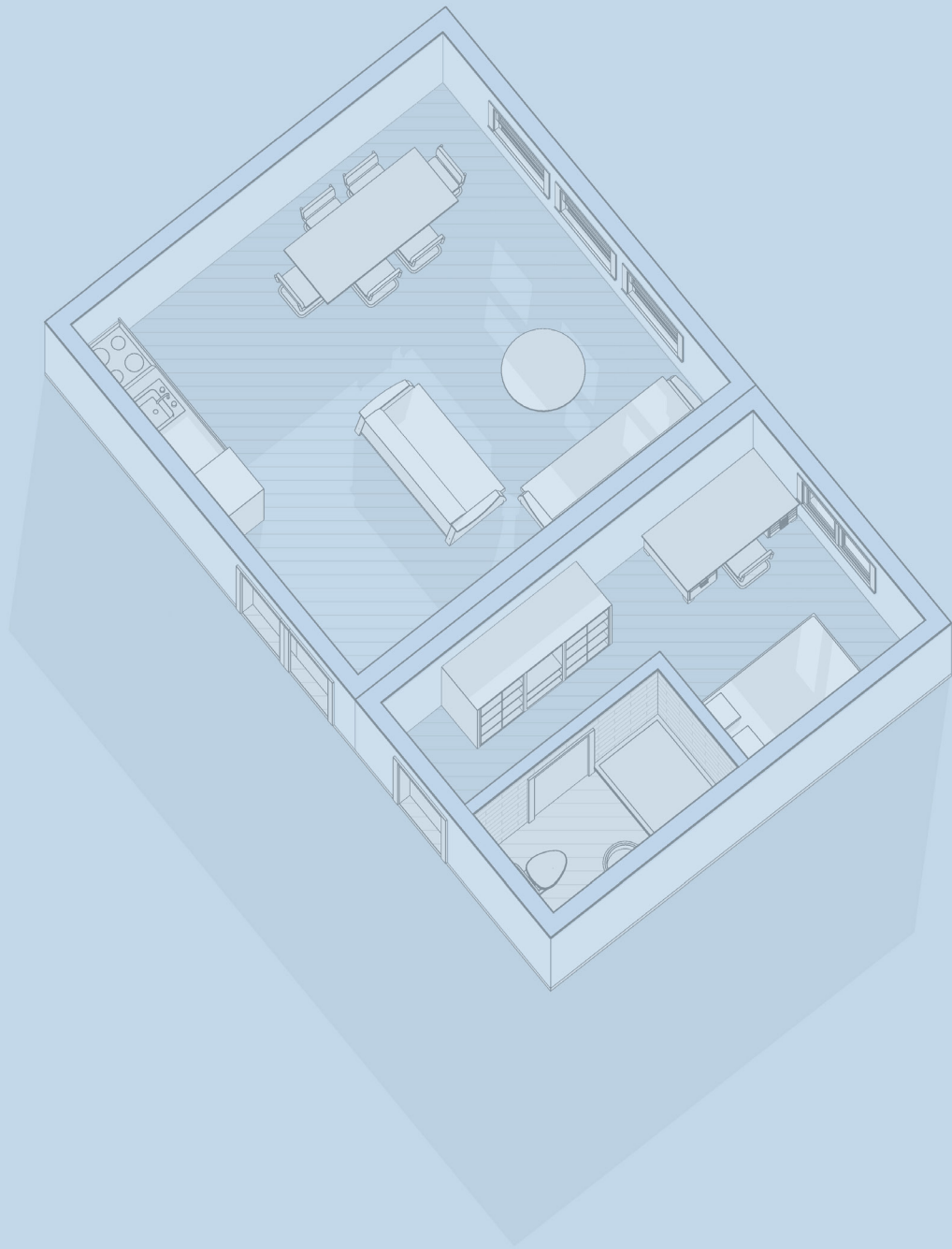
~~**Efficiency**~~

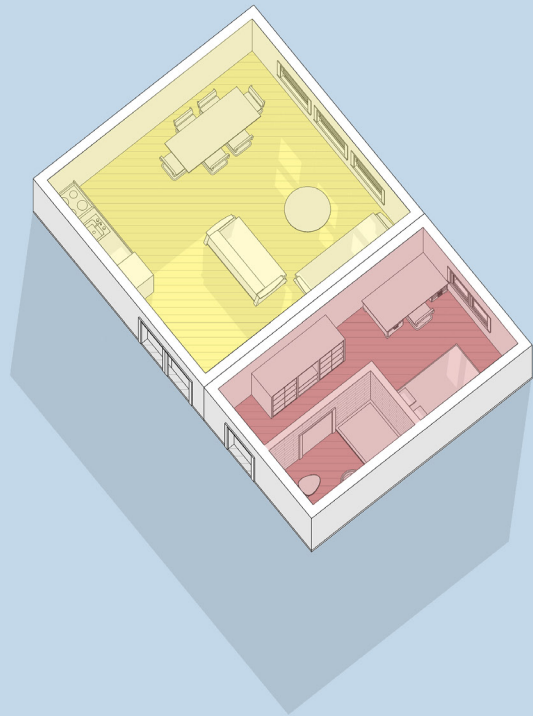
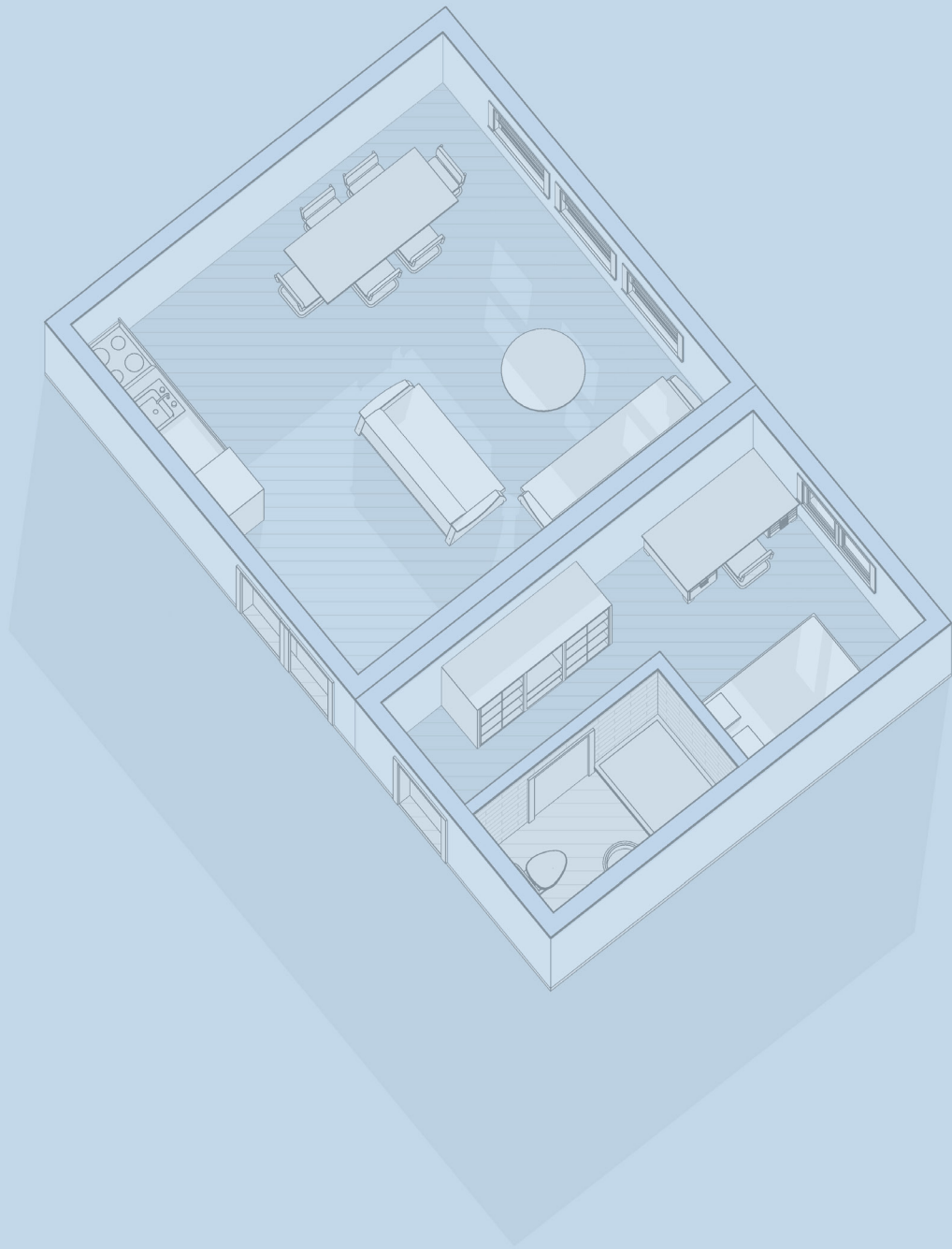
~~**Affordability**~~

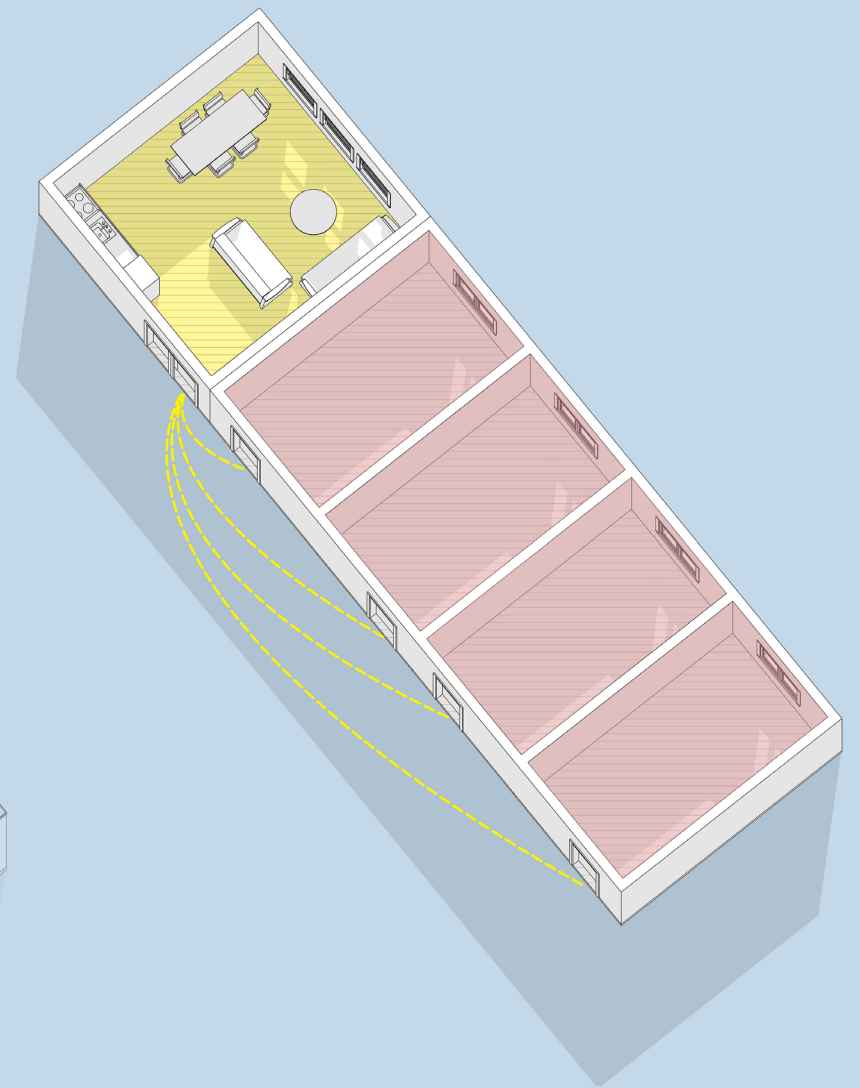
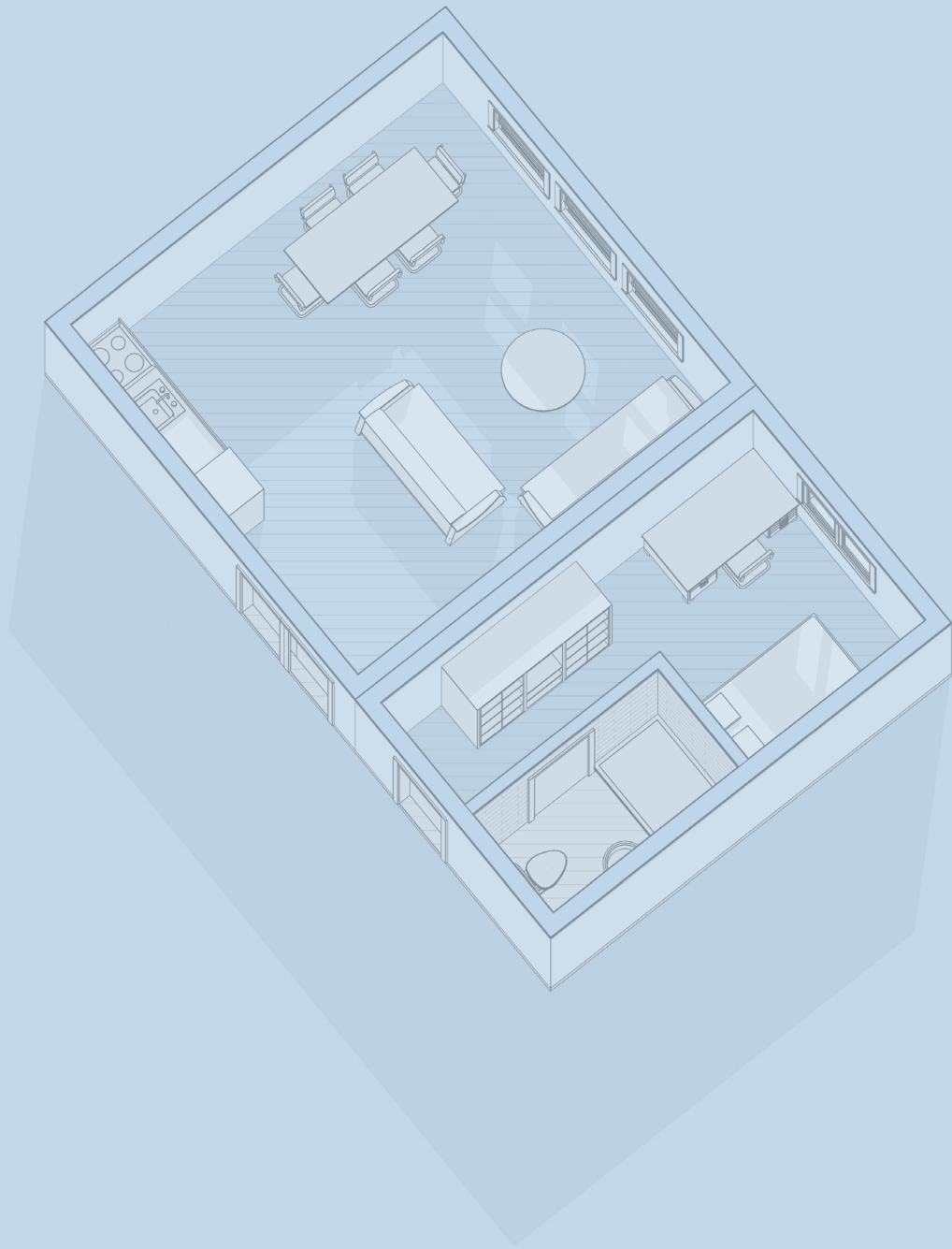


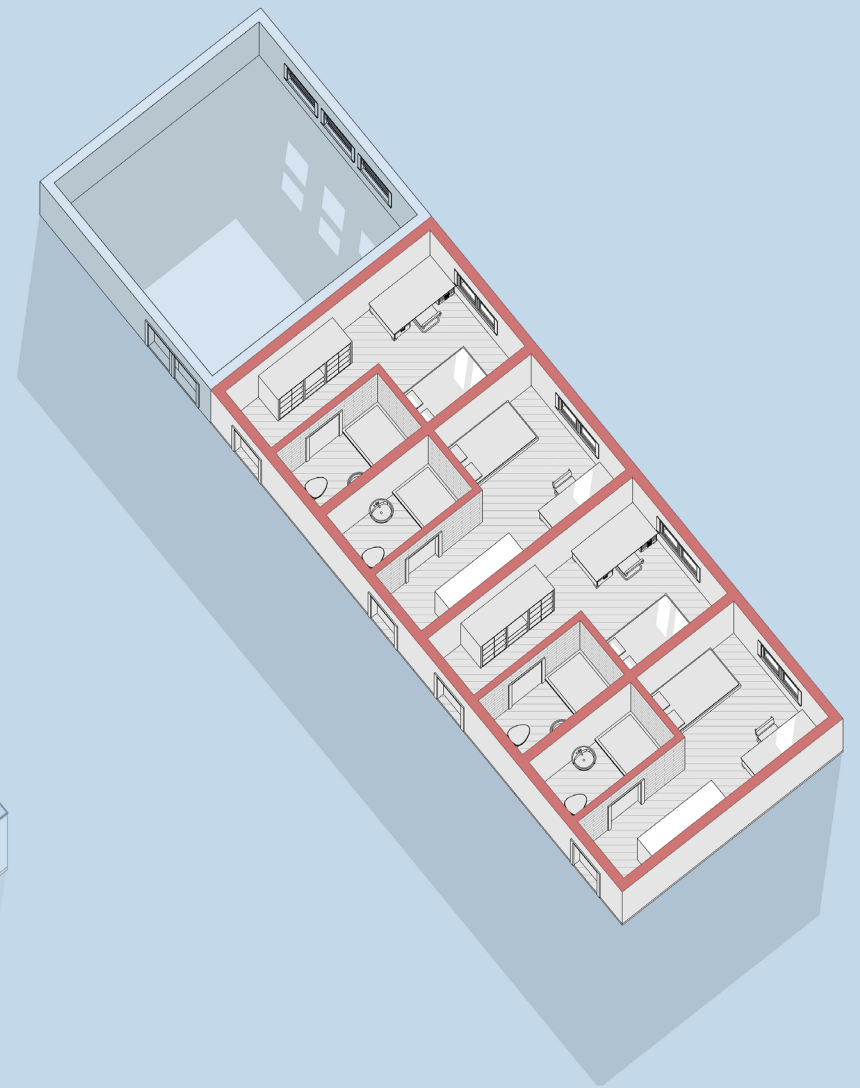
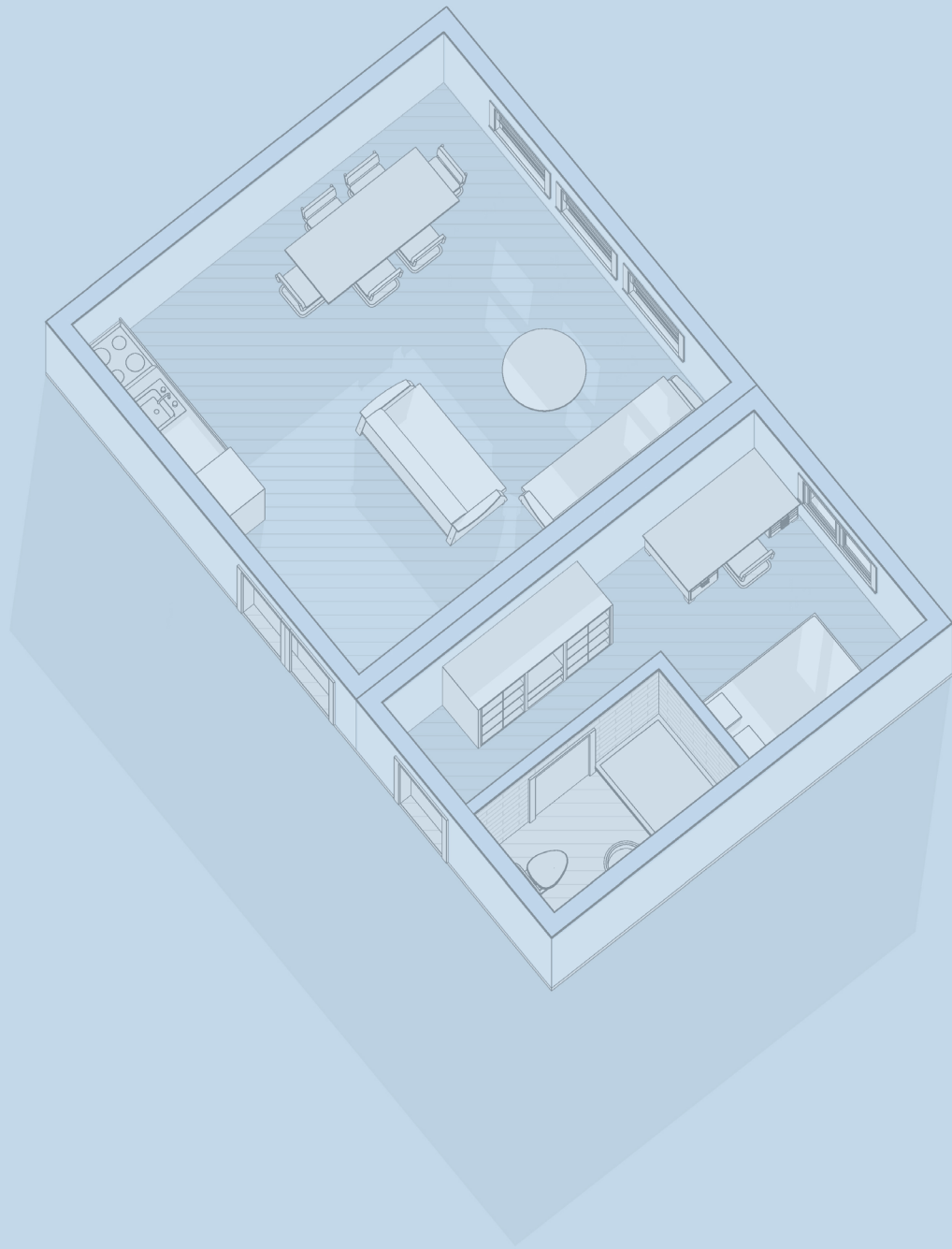




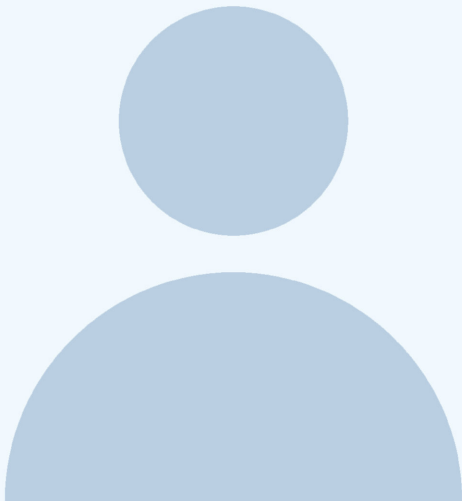








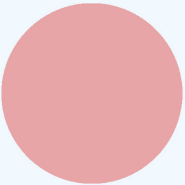
*" I had the chance to choose my room, but they were all the **same**. I met a lot of people and we had good times in the **common room**. I eventually became good **friends** with some. Yet I didn't like having the common room so close to mine, it got **noisy** sometimes."*



**Interaction**

**Efficiency**

**Affordability**



**Monotony**

**Flexibility**

**Location**

**Privacy**

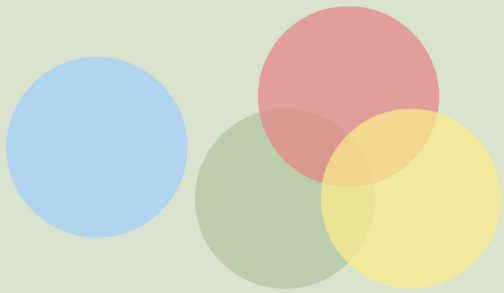
**Diversity**

**Flexibility**

**Interaction**

**Efficiency**

**Affordability**



~~**Privacy**~~

~~**Location**~~

**Scale**

~~**Integration**~~

**Location**

**Affordability**

**Interaction**

**Diversity**

**Efficiency**

**Flexibility**

**Integration**

