

A neighbourhood for a better sense of home

Adaptable dwellings & social cohesion in Amsterdam Nieuw-West

Jelle Grunstra

P5, 6th of July 2017

Architectural Engineering [aE]

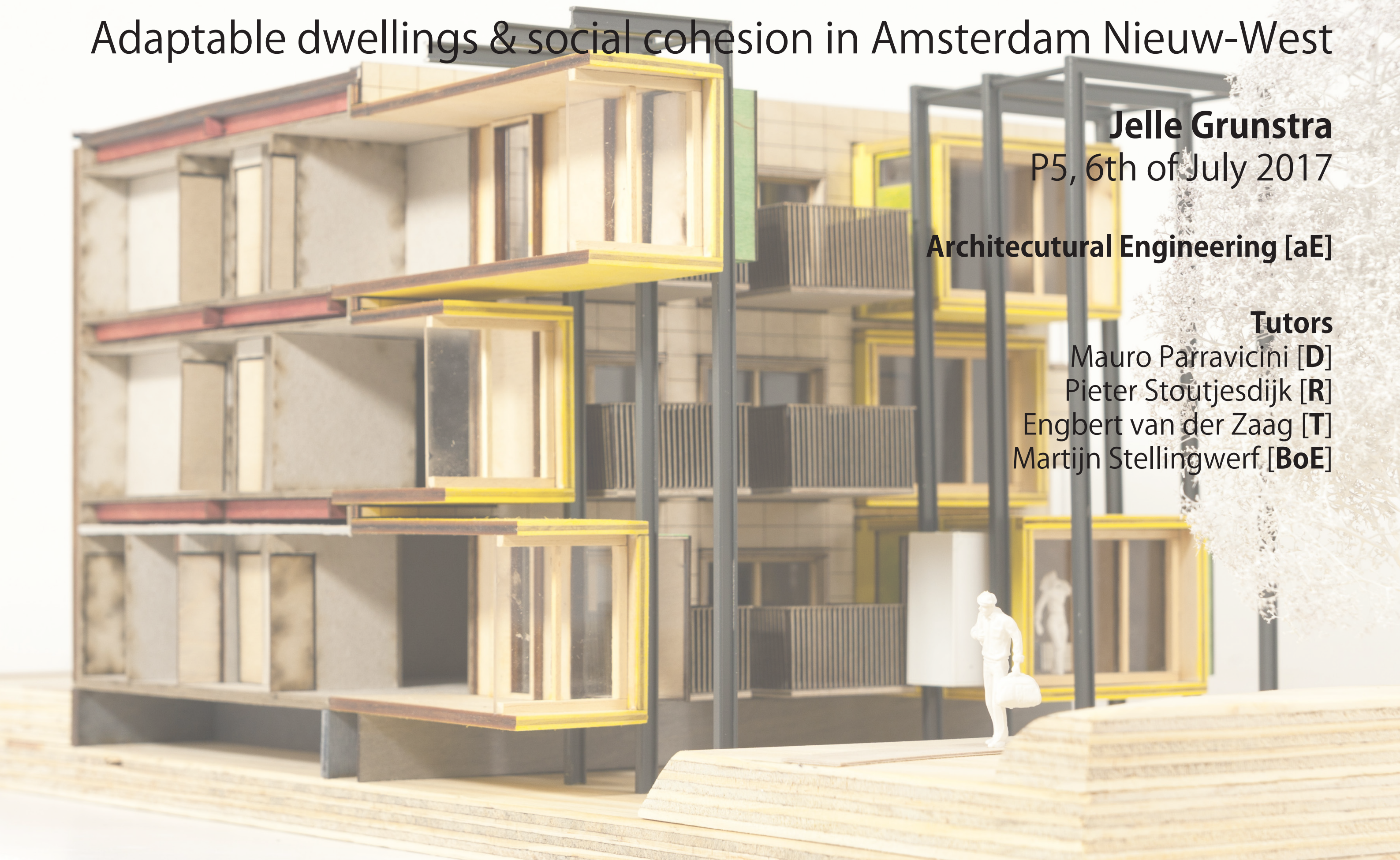
Tutors

Mauro Parravicini [D]

Pieter Stoutjesdijk [R]

Engbert van der Zaag [T]

Martijn Stellingwerf [BoE]



PROBLEM STATEMENT

CONTEXT

DESIGN & RESEARCH

CONCLUSION



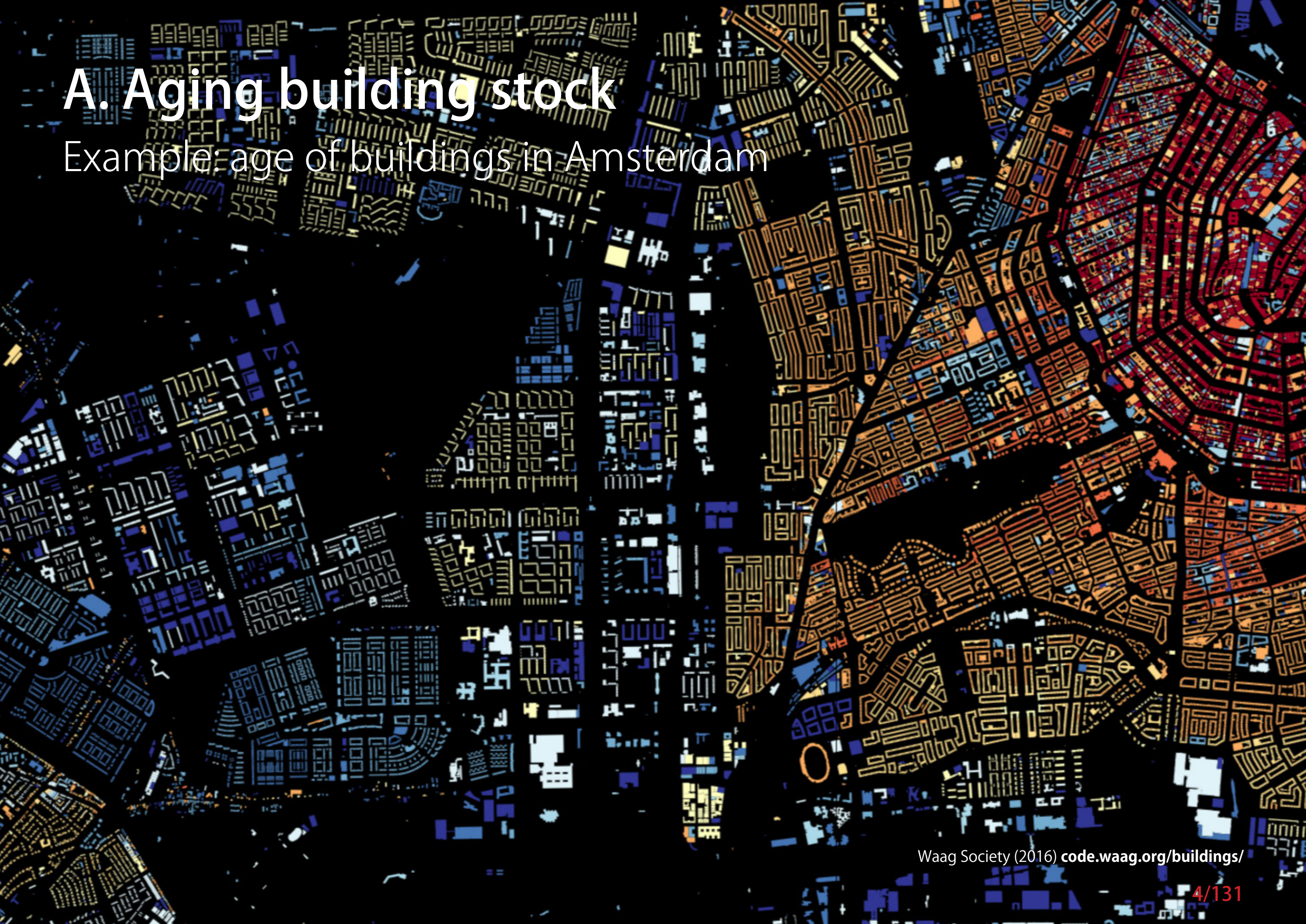
PROBLEM STATEMENT

A. Aging building stock

B. Emerging prosumer

A. Aging building stock

Example: age of buildings in Amsterdam

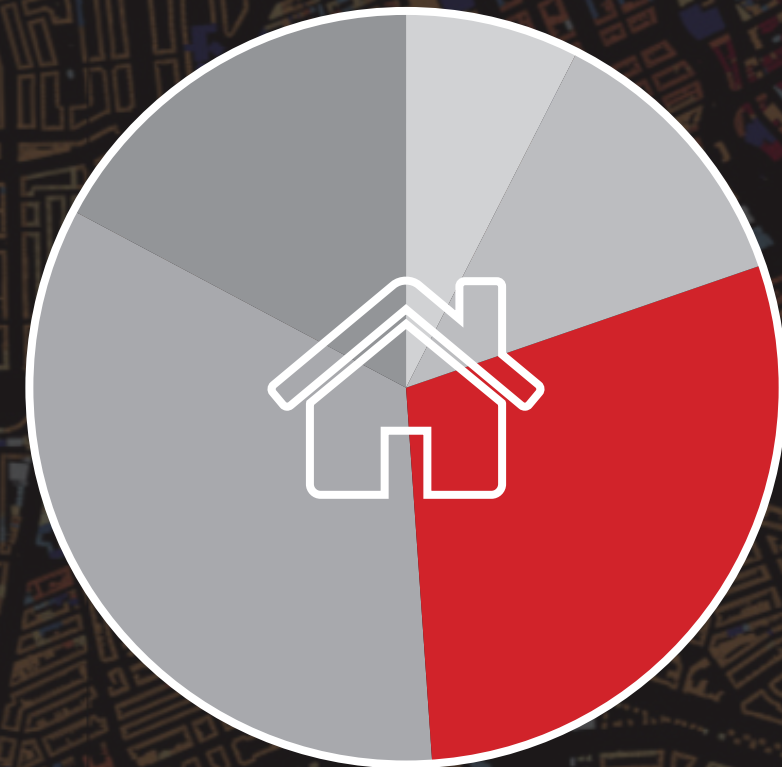


A. Aging building stock

Dutch building stock

1/3 built post World War II: **1945-1970**

Regulations have increased
User demands have risen



Frits Meijer, Laure Itard & Minna Sunikka-Blank (2009): **Comparing European residential building stocks: performance, renovation and policy opportunities**, Building Research & Information

A. Aging building stock

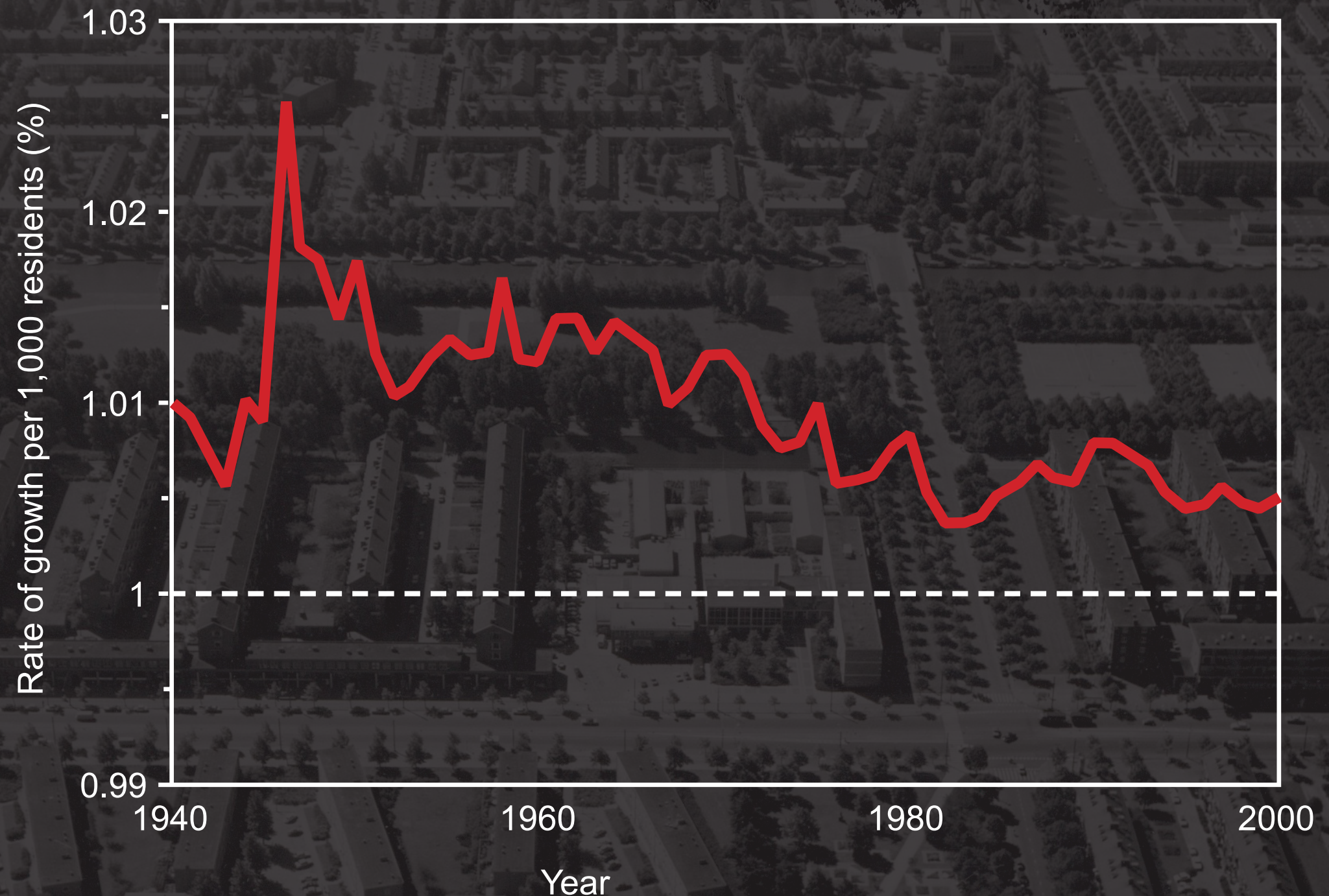
To demolish, or not to demolish

Disadvantages

- Destroy existing **communities**
- **Financial** value of existing stock
- A lot of **invested energy**
- A lot of **wasterd material**
- **Heritable values**

A. Aging building stock

1945-1970: Rapid population growth



A. Aging building stock

Mass housing

Large production volume

Cheap dwellings

Repetition necessary

Low quality housing

A. Aging building stock

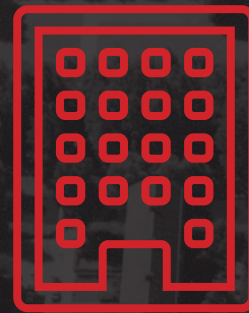
Mass housing

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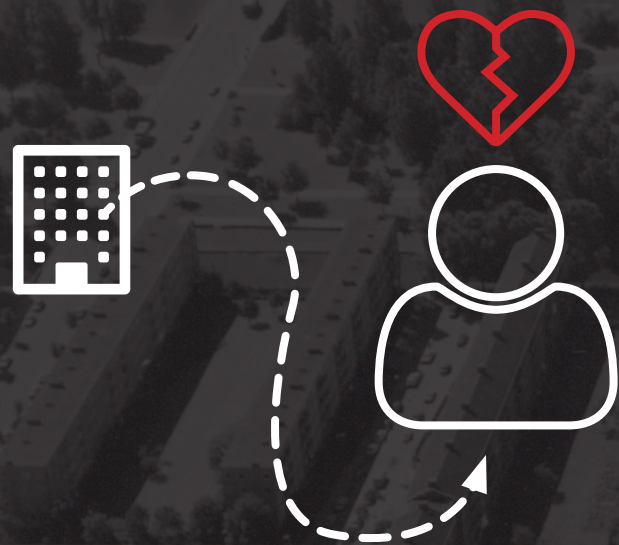


MASS HOUSING

Large volume of low quality,
repetitive housing

A. Aging building stock

Effects of low quality mass housing



Low quality housing can lead to, for example: **boredom, fatigue, depression and anxiety.**

B. Emerging prosumer

Products matching needs better

Not only **choosing from options**

Market of one: personal production

Mesh Lingerie (2015) Custom made 3D printed bra

B. Emerging prosumer

User involvement in built environment: **new build**



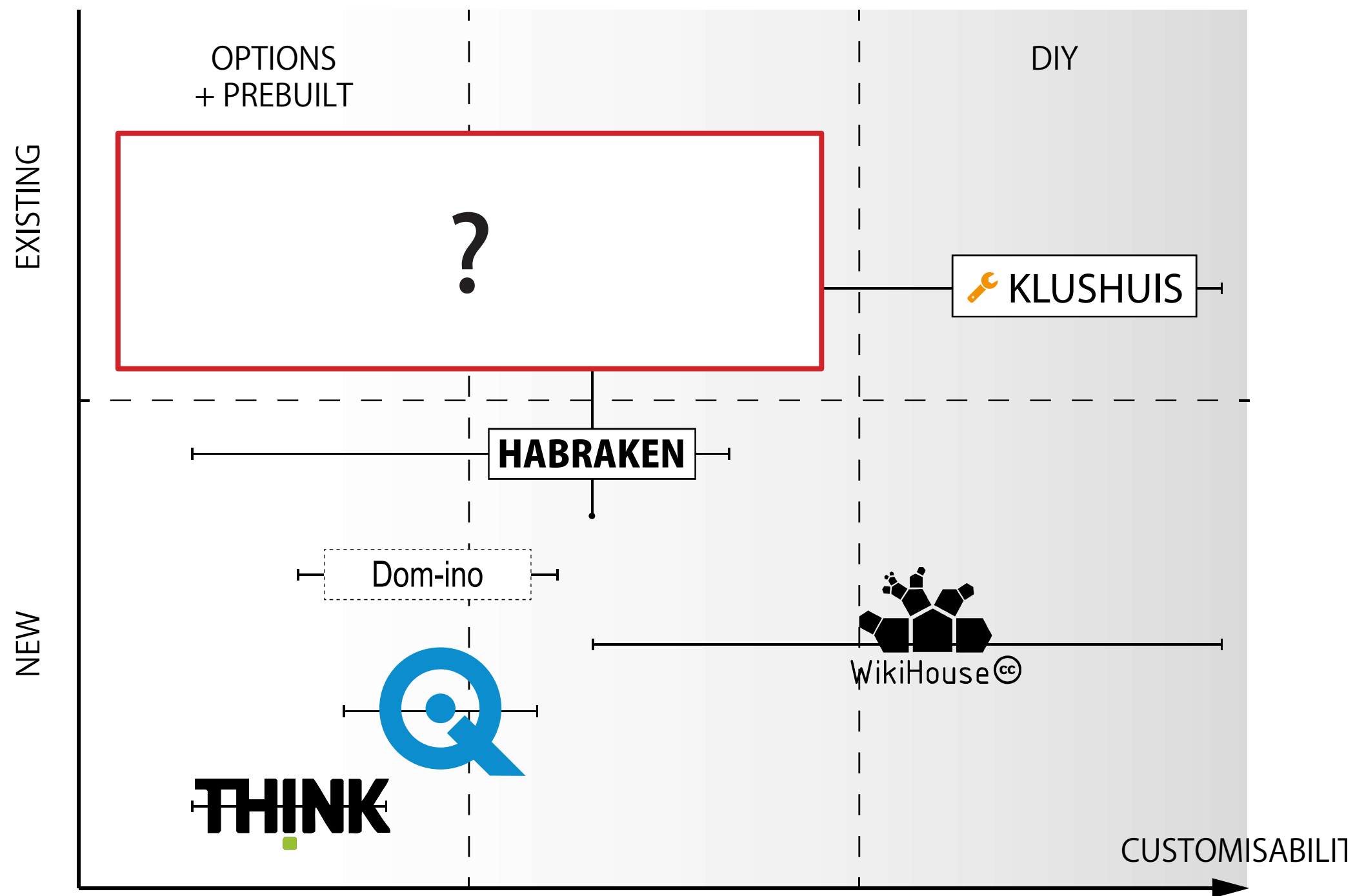
B. Emerging prosumer

User involvement in built environment: **DIY**



B. Emerging prosumer

User involvement in built environment



C. Summary

A. Aging building stock: **don't demolish » revitalise**

- Communities remain
- Less wasted material & energy
- Heritable values

B. Emerging prosumer: **consumer wants more influence**

- Have a personal fitting product

Customisation in dwellings: **not satisfactory**

- Only with **new built customisation possible**
- DIY is for almost anyone **not suitable**
- **How about renovation of buildings?**

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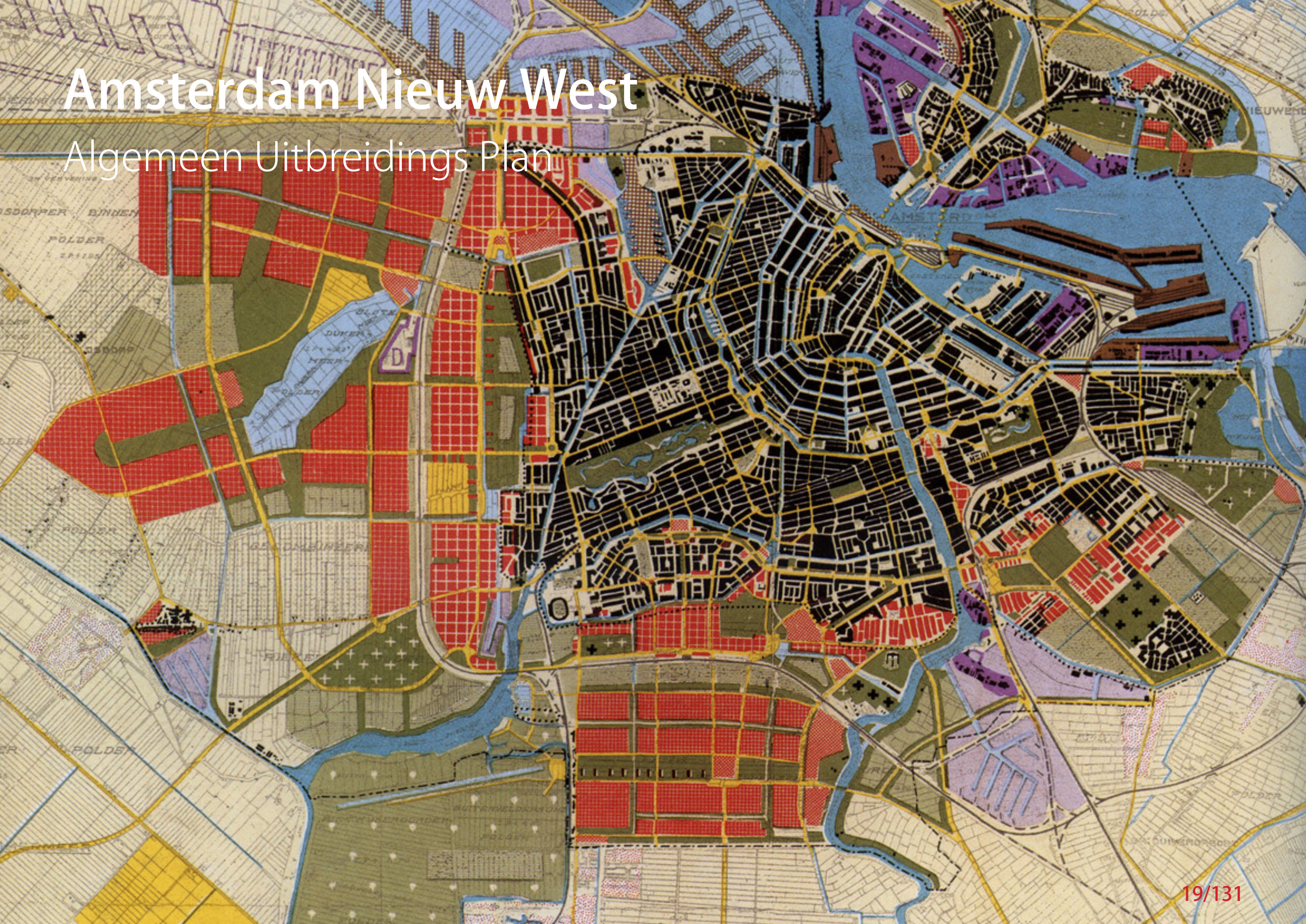
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- DIY is for almost anyone **not suitable**
- **How about renovation of buildings?**



CONTEXT

Amsterdam Nieuw West

Algemeen Uitbreidings Plan



Amsterdam Nieuw West

Algemeen Uitbreidings Plan



Plan designed by **Van Eesteren**
Garden city: **light, air & space**

Amsterdam Nieuw West

Nemavo-Airey blocks

13 building blocks

2 block types

255 dwellings

Amsterdam Nieuw West

Nemavo-Airey blocks



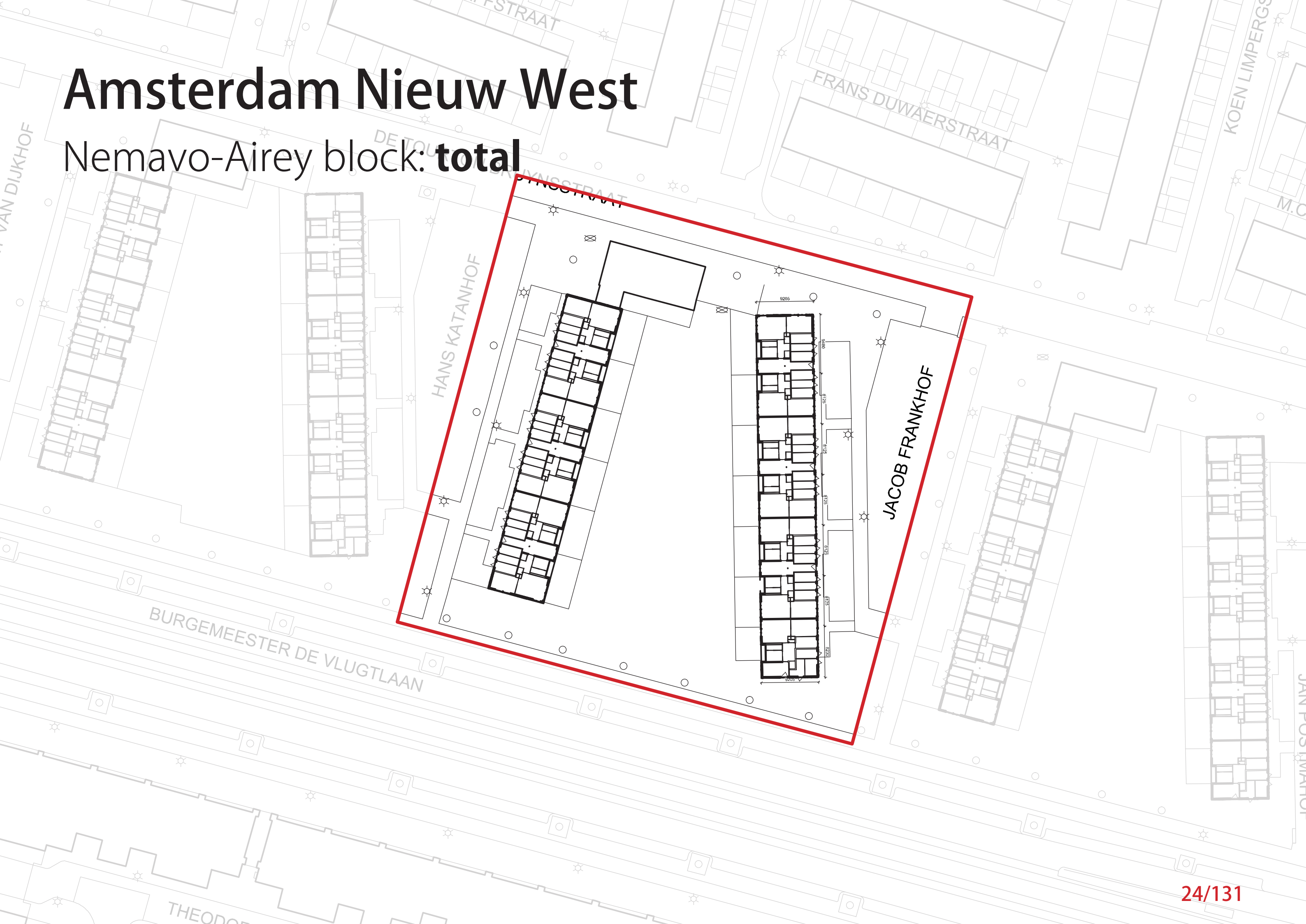
Nemavo-Airey blocks

Streetview



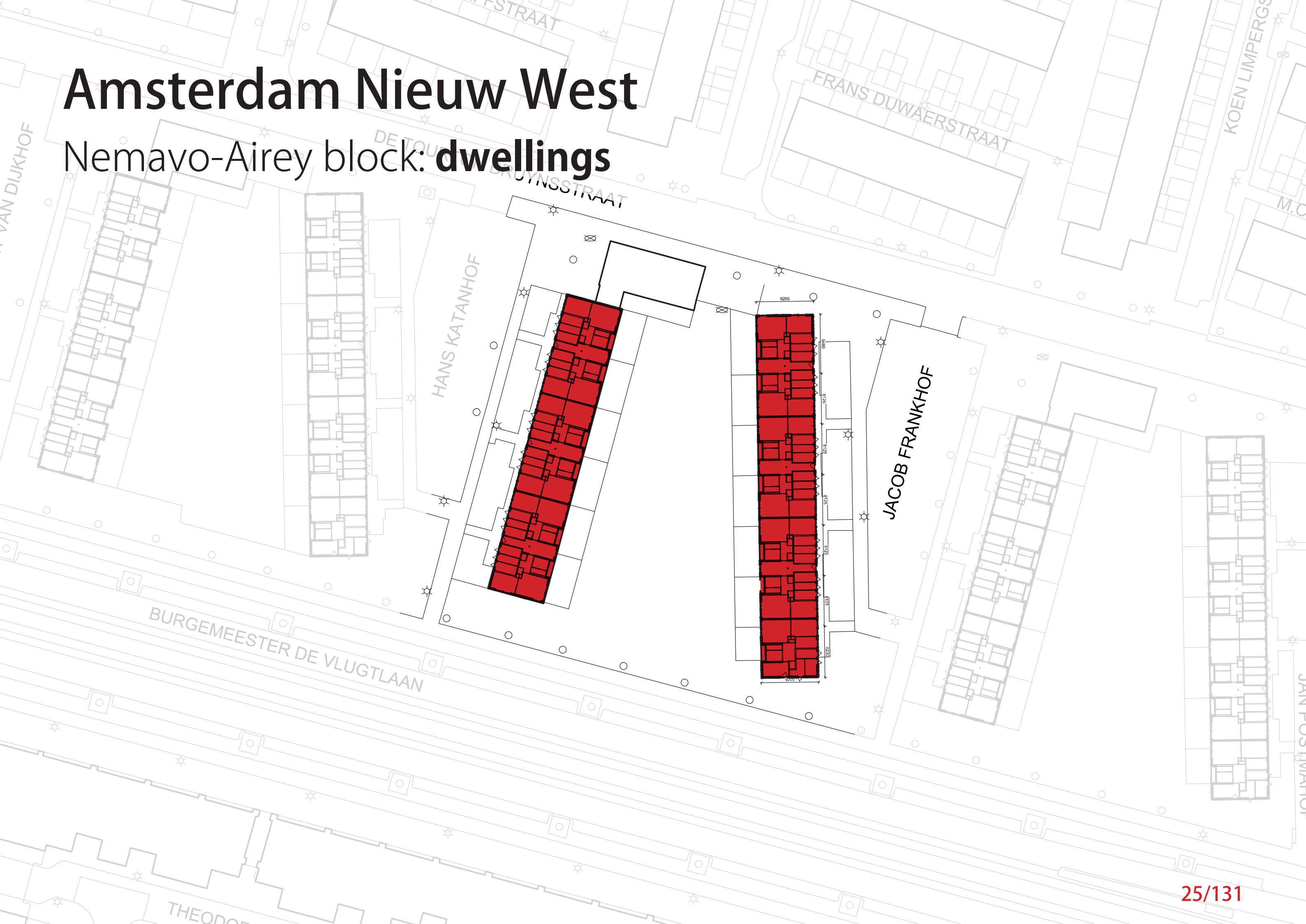
Amsterdam Nieuw West

Nemavo-Airey block: **total**



Amsterdam Nieuw West

Nemavo-Airey block: **dwelling**s

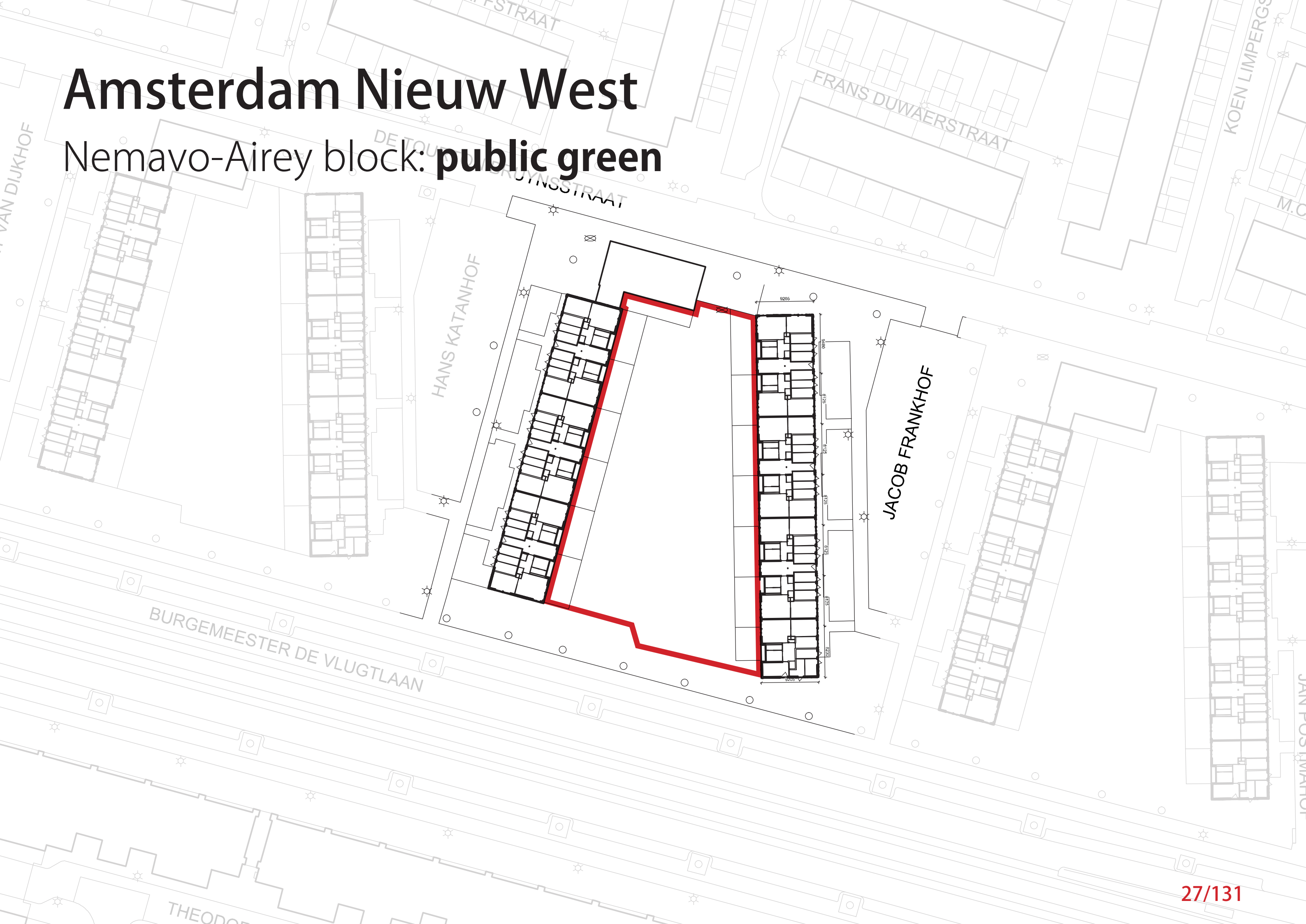


Amsterdam Nieuw West

Nemavo-Airey block: **shop**



Nemavo-Airey block: **public green**



Amsterdam Nieuw West

Nemavo-Airey block: **dwelling types**

A.0 42 m²

A.1 62 m²

A.2 62 m²

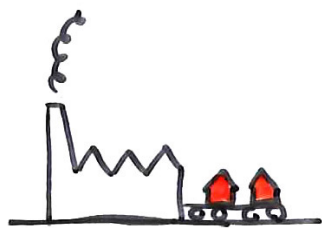
B.0 57 m²

B.1 72 m²

B.2 72 m²

Nemavo-Airey blocks

Rebuild period post World War II



MASS PRODUCED



PREFABRICATED



LIGHTWEIGHT



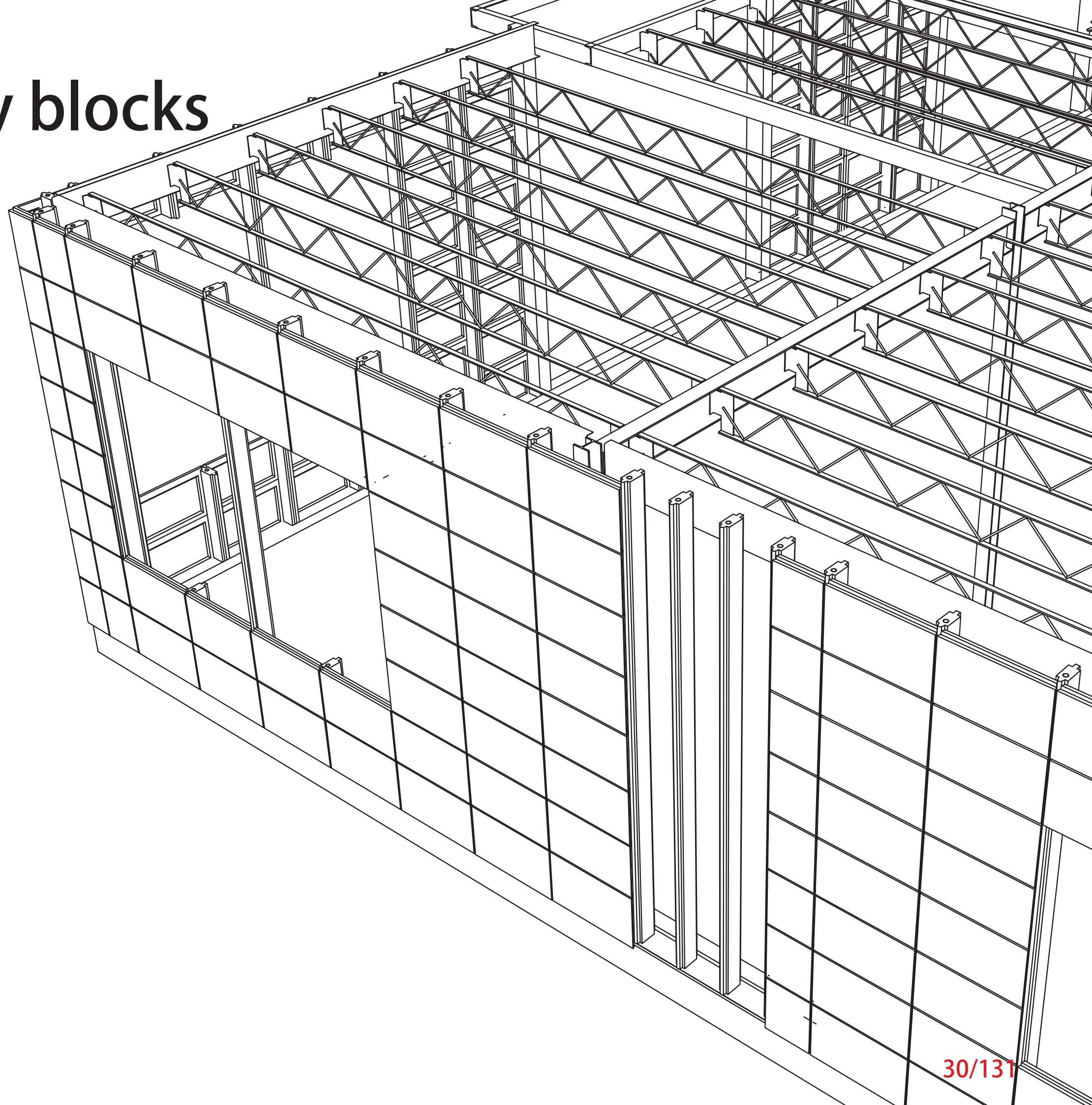
SMALL & MODULAR
PARTS



EASY INSTALL

Nemavo-Airey blocks

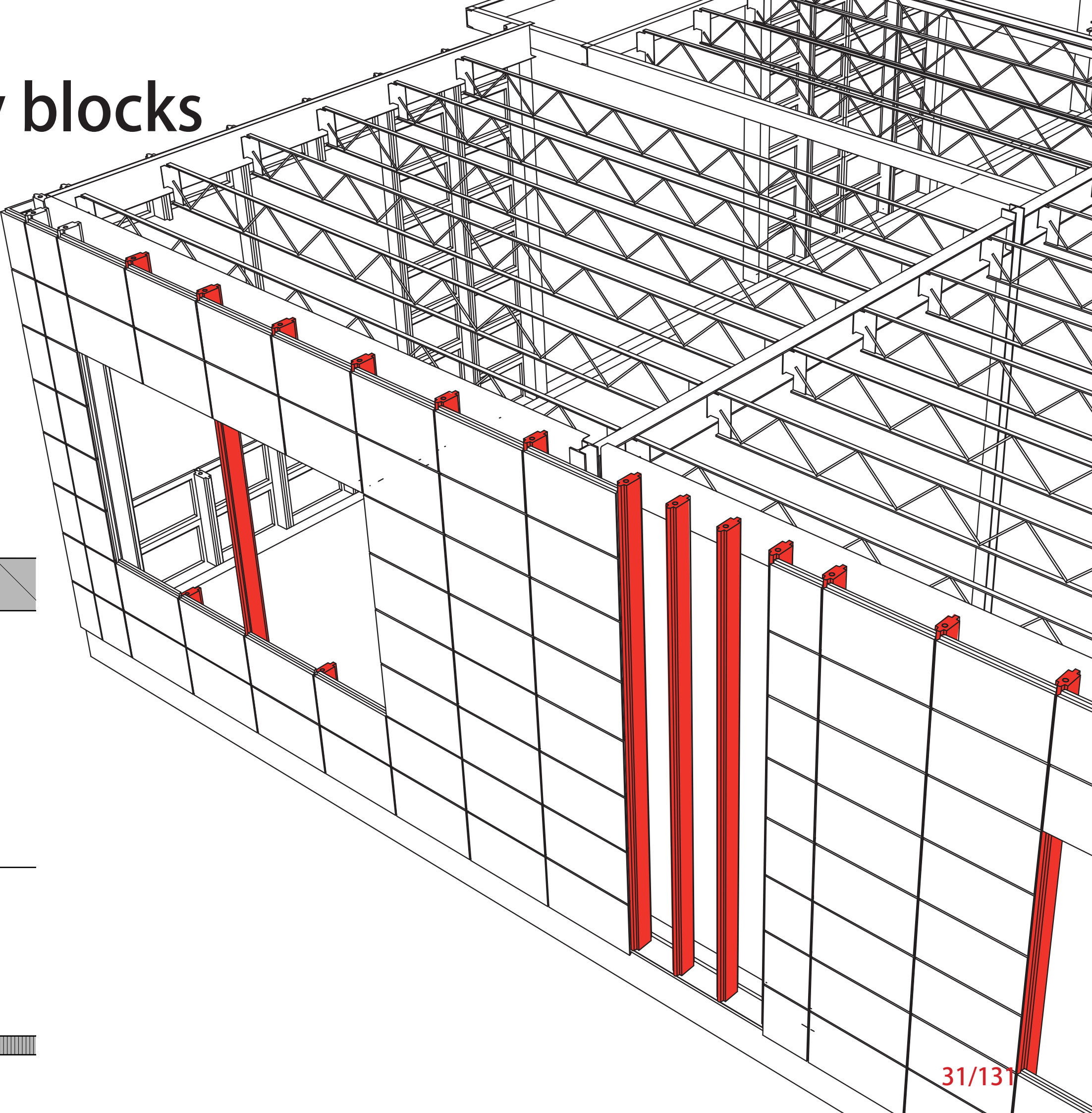
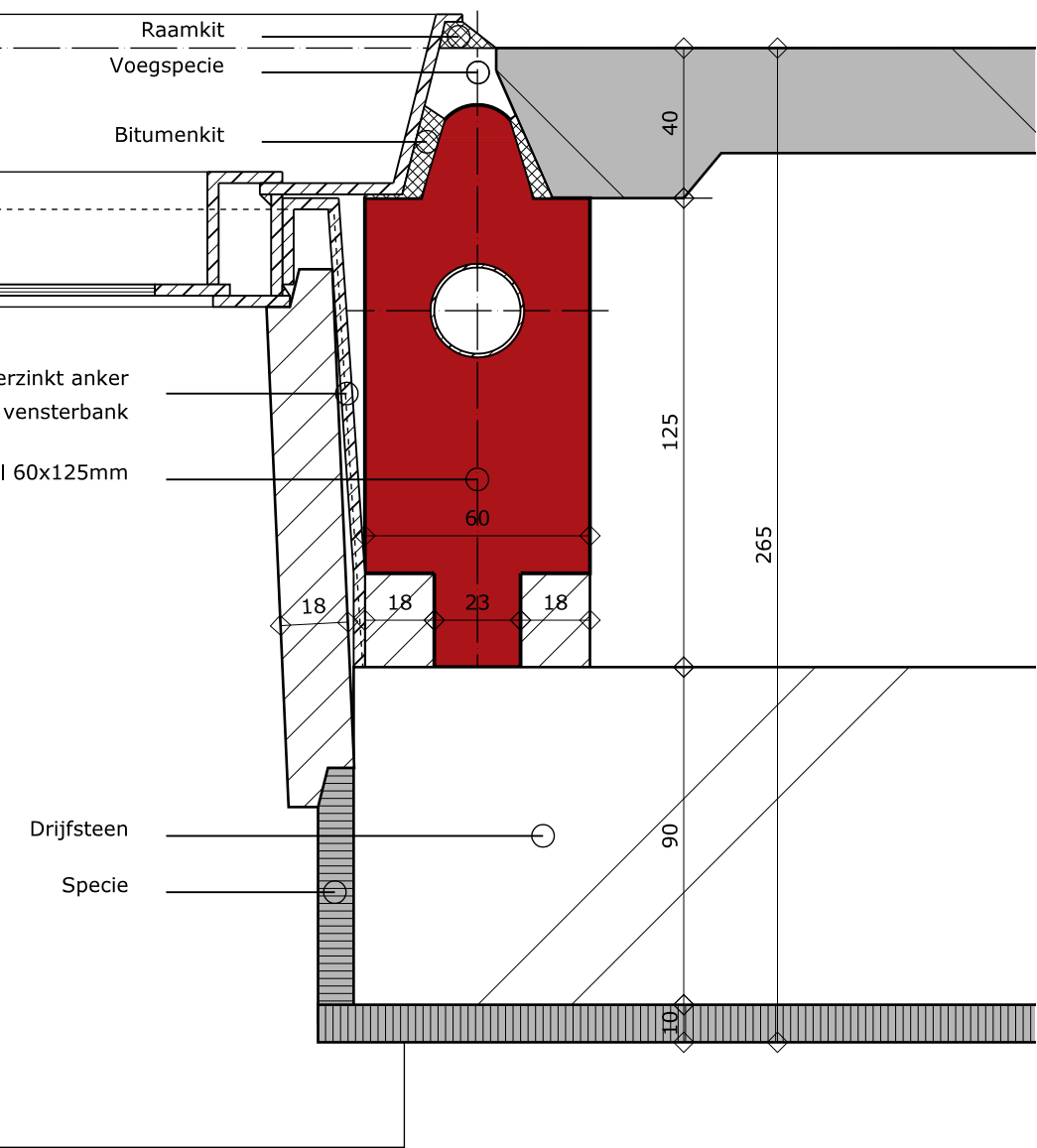
Building system



Nemavo-Airey blocks

Building system

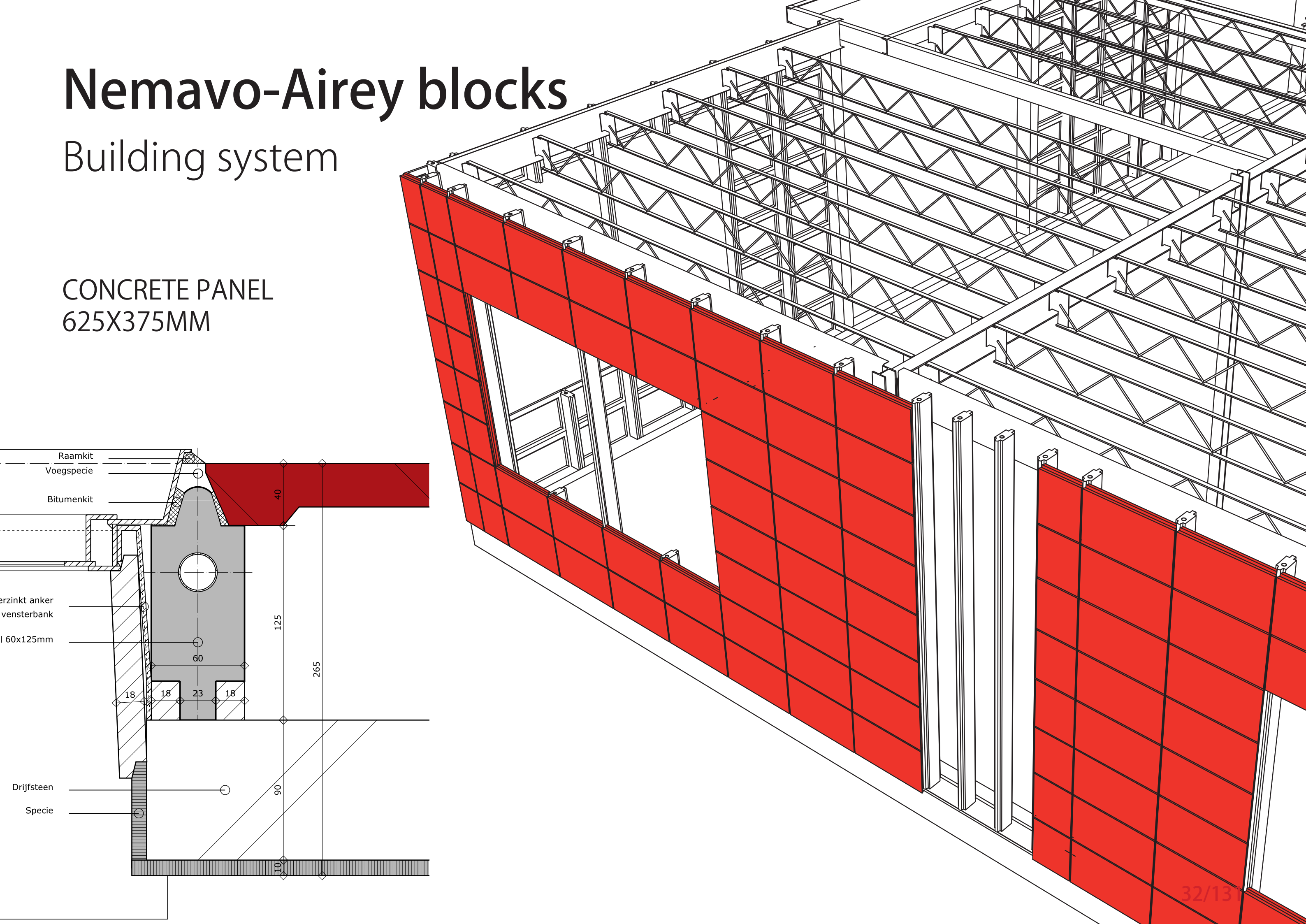
COLUMN
60X125MM
625MM SPACING



Nemavo-Airey blocks

Building system

CONCRETE PANEL
625X375MM

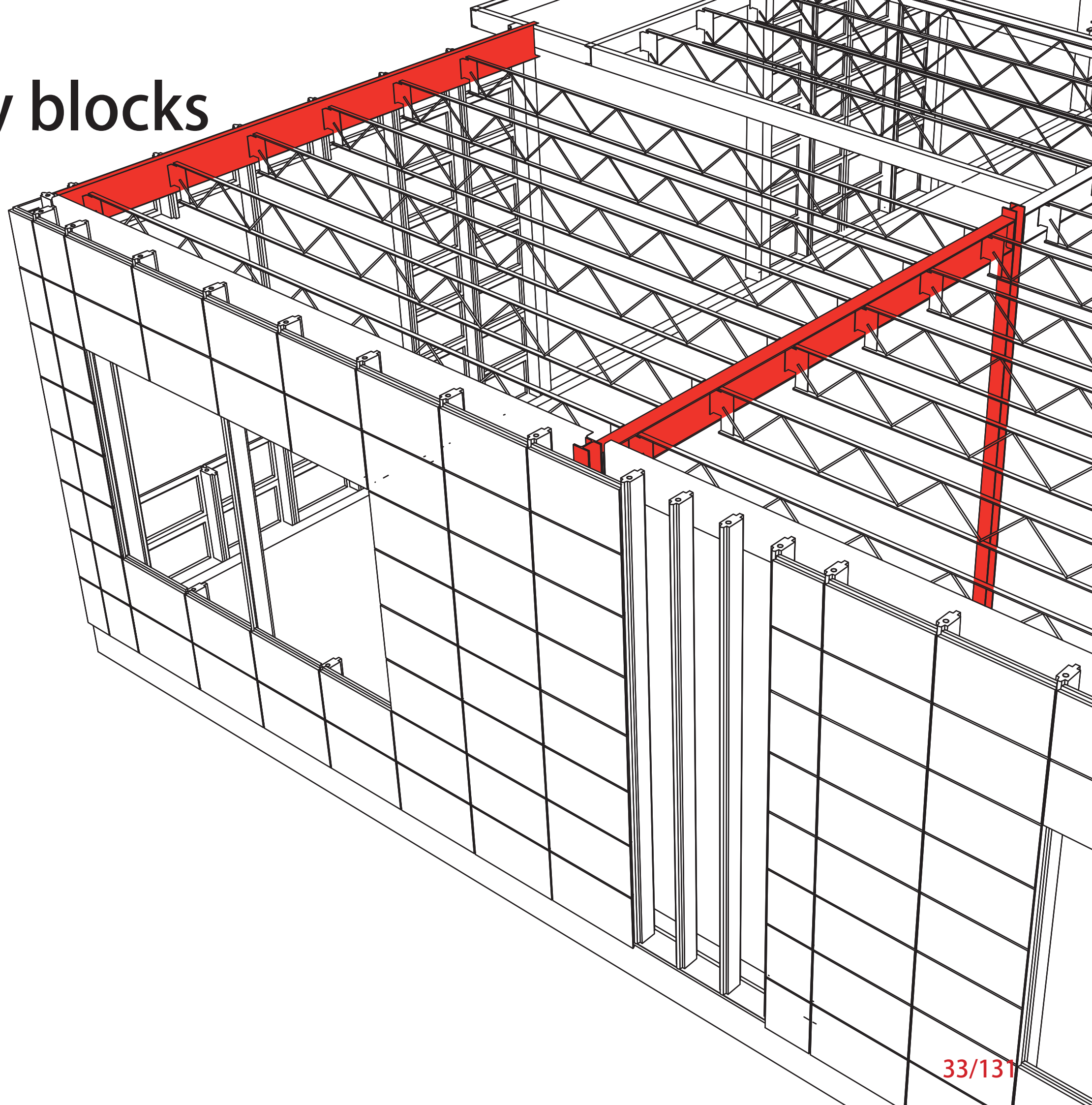


Nemavo-Airey blocks

Building system

HEA 140 COLUMNS

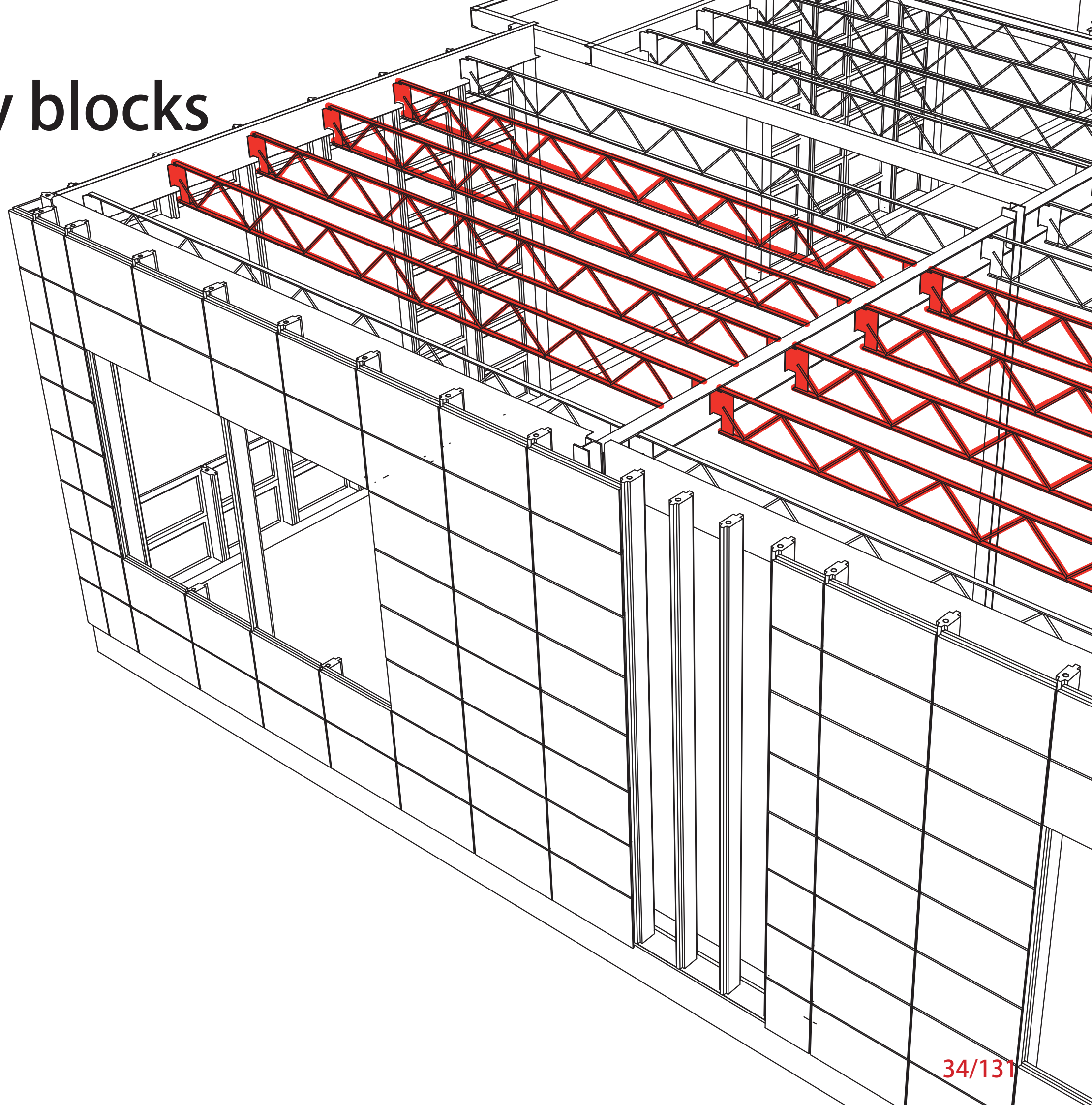
BEAMS
IPE 200
UNP 200



Nemavo-Airey blocks

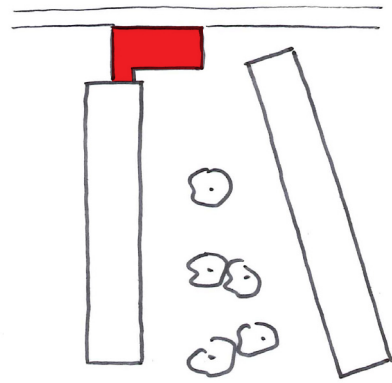
Building system

CUSTOM BEAMS
250MM HIGH

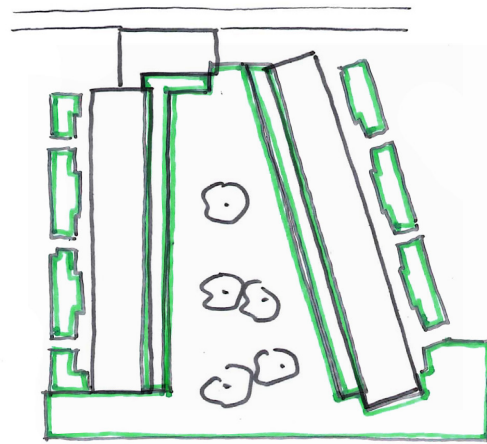


Nemavo-Airey blocks

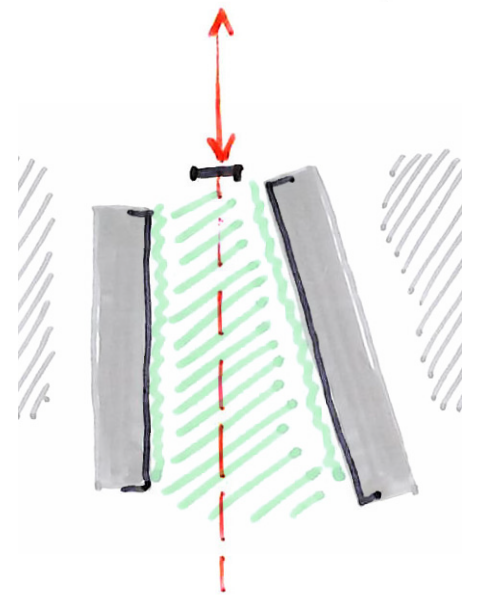
Urban problems



Empty shops



Poor state of greenery



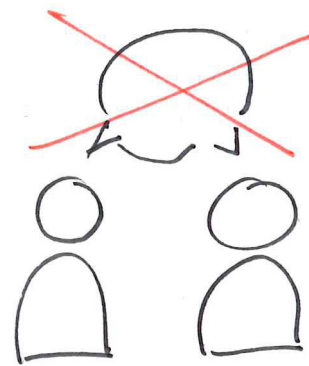
Illogical urban plan

Nemavo-Airey blocks

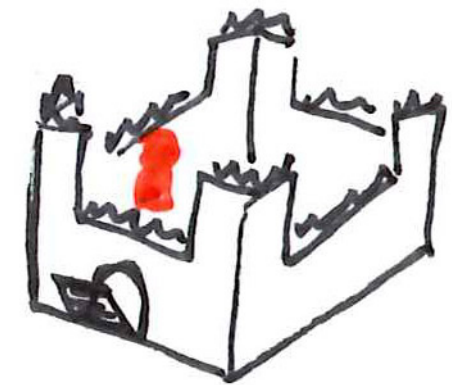
Social problems



Above average
serious loneliness



Little contact with
neighbours



Unpersonal
neighbourhood

Nemavo-Airey blocks

Functional/technical problems



Small dwellings



Low insulation



Sound nuisance



DESIGN

Overview

Starting points

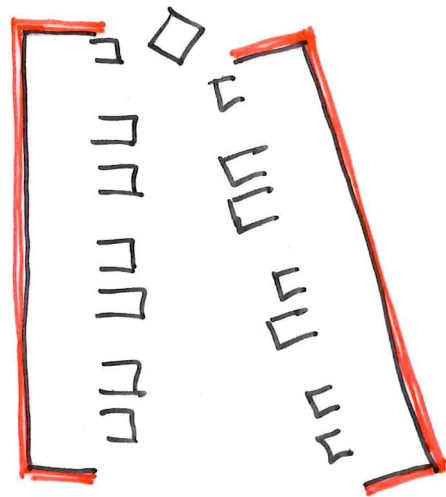
User participation

Modules

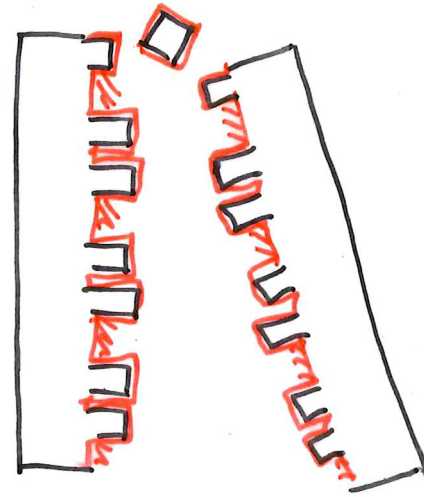
Technical

Design

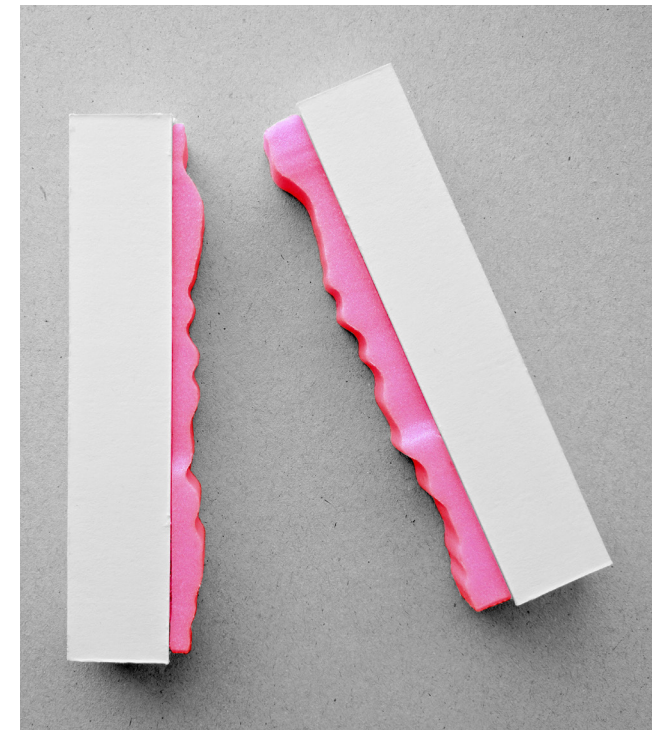
Starting points



CLOSED
REPETITION
FIXED
CLOSED OUT-
SIDE

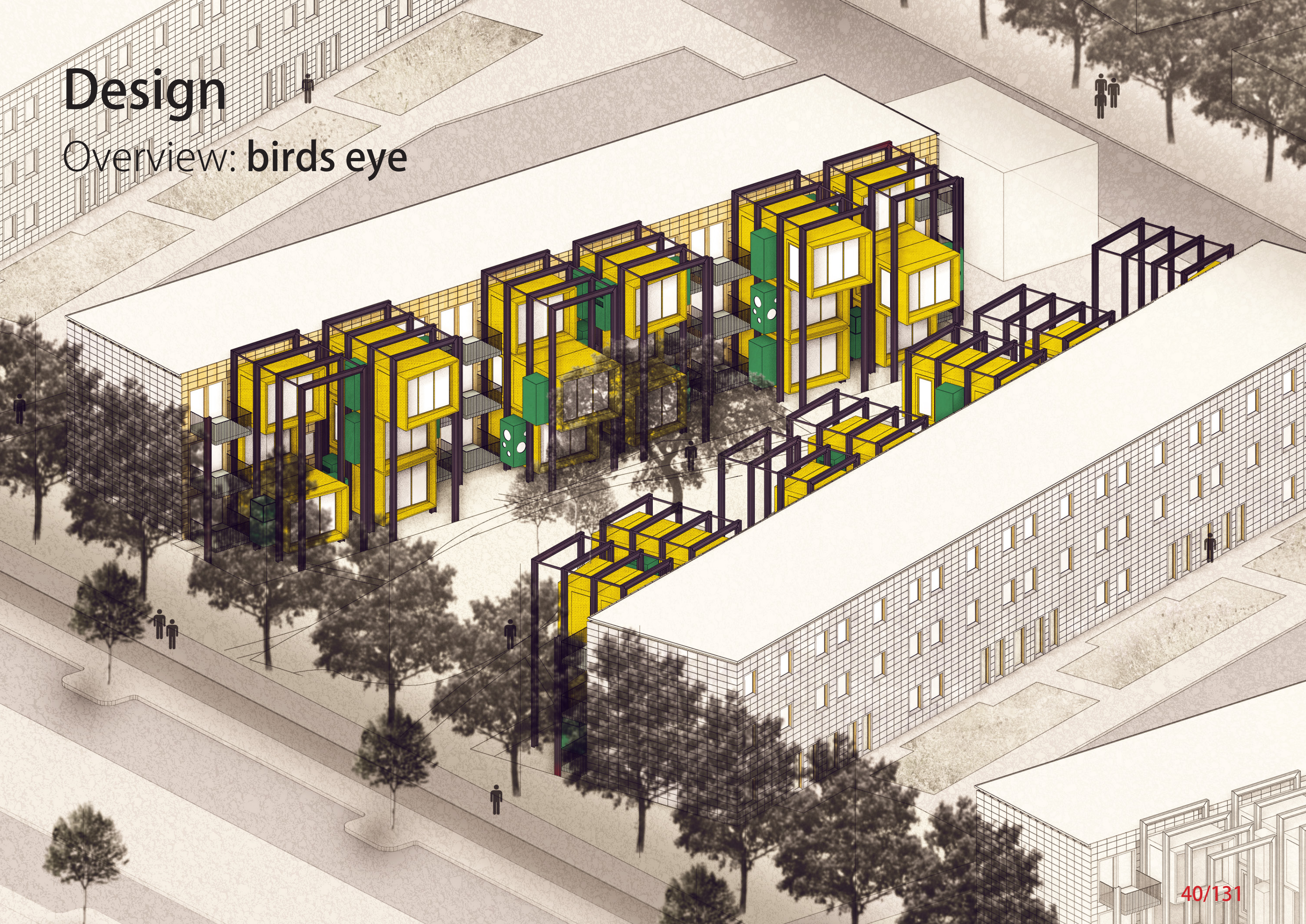


OPEN
VARIETY
FLEXIBLE
SEE INSIDE



Design

Overview: birds eye



Design

Overview: approach



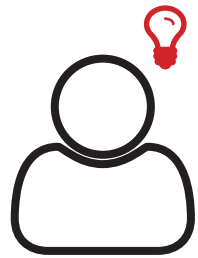
Design

Overview: inner garden



Starting points

General



1. Enable user participation

Make user 'master of their home again'



2. Sense of home

Prevent negative impact of mass housing



3. Improve state of dwellings

Resolve technical & social problems

User participation

Research outcomes: **hypothesis**

Reflecting on architectural history and using modern technology, it is now possible to implement the user in the building process.

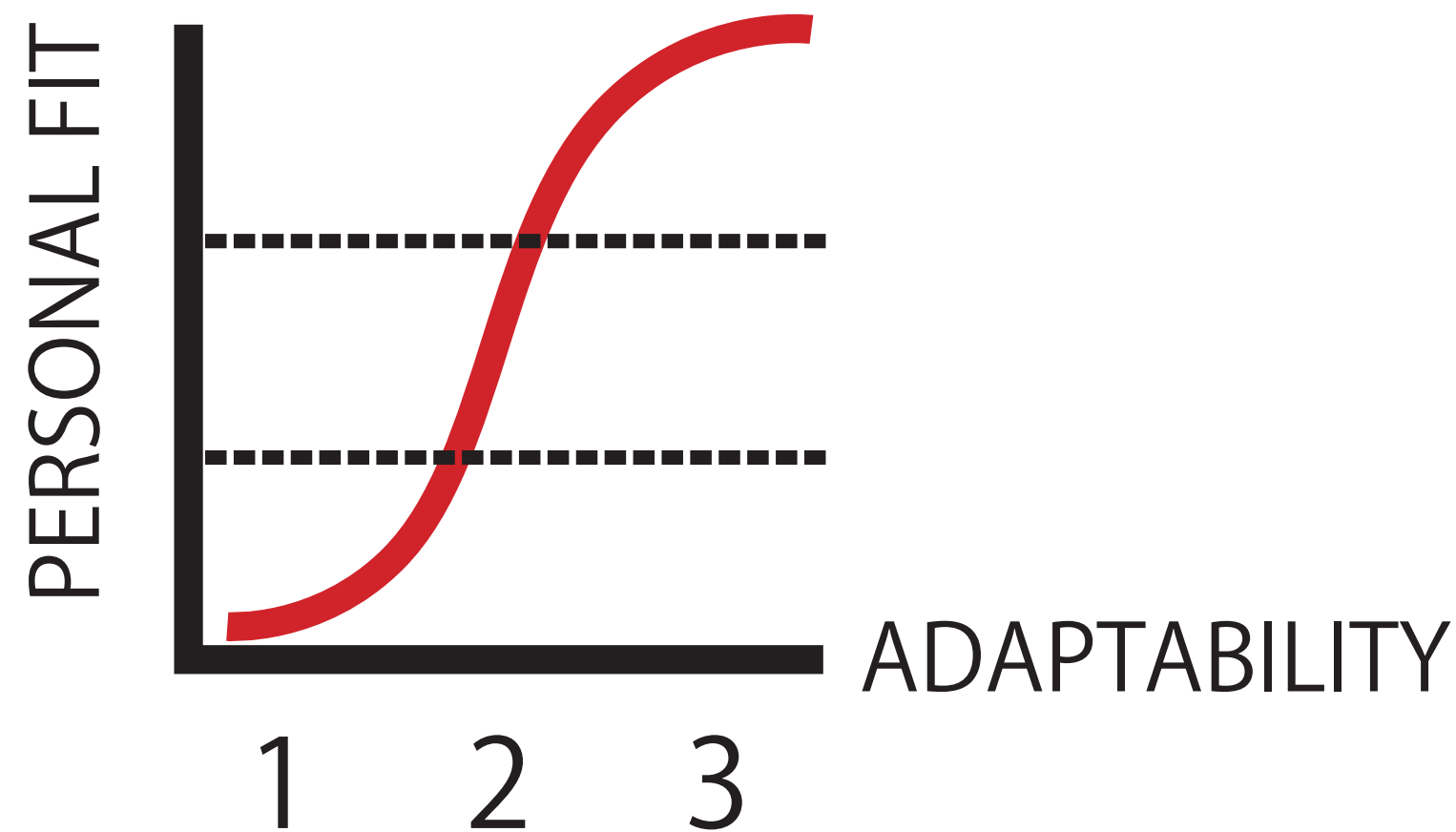
YES

**On demand production
Enhanced user interaction
Users wants to participate**

User participation

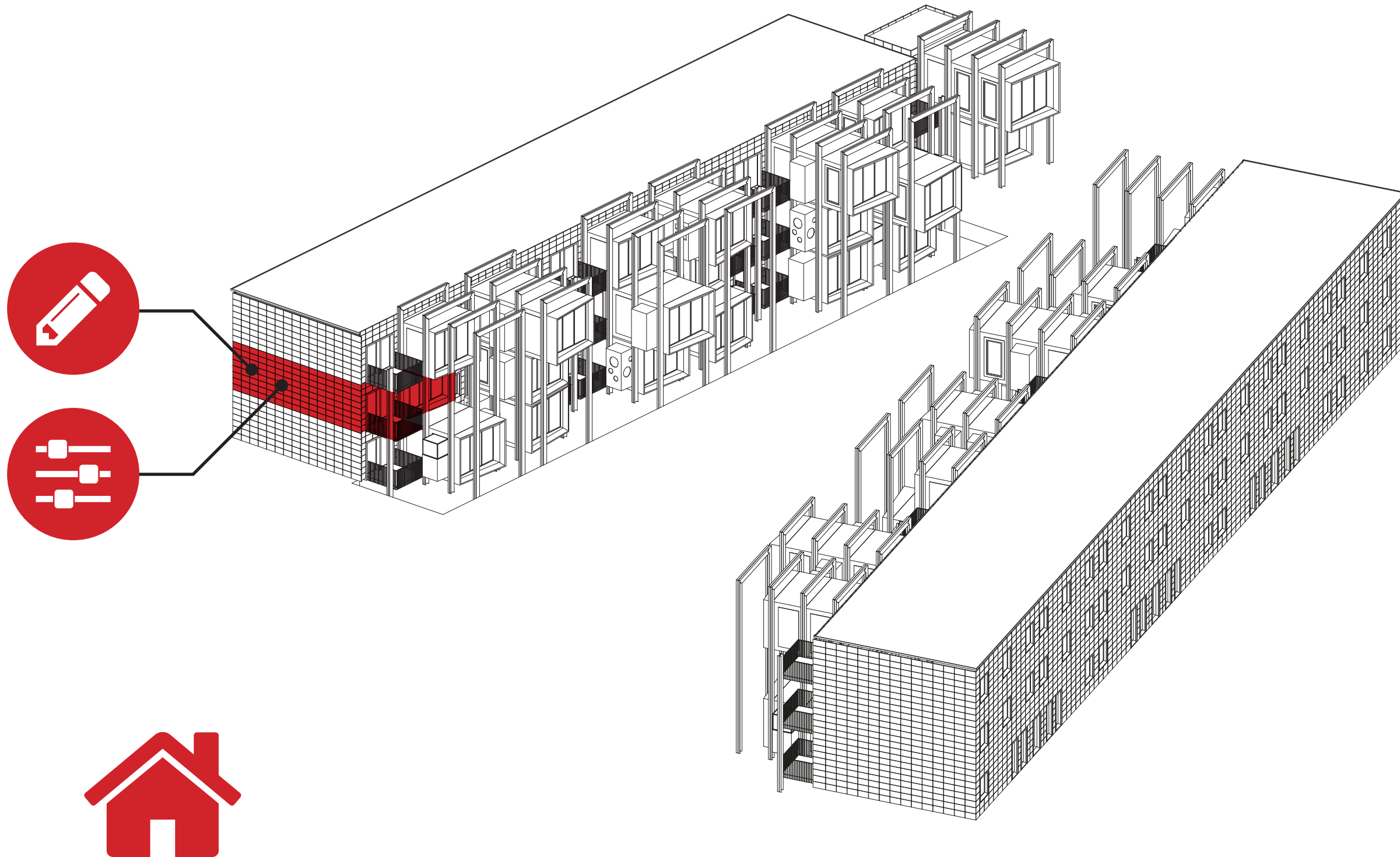
Research outcomes: **industrial paradigms**

- | | |
|------------------------|-------------------------------------|
| 1 Mass Production | All the same |
| 2 Mass Customisation | Choose from range of options |
| 3 Mass Personalisation | Unique, personalised product |



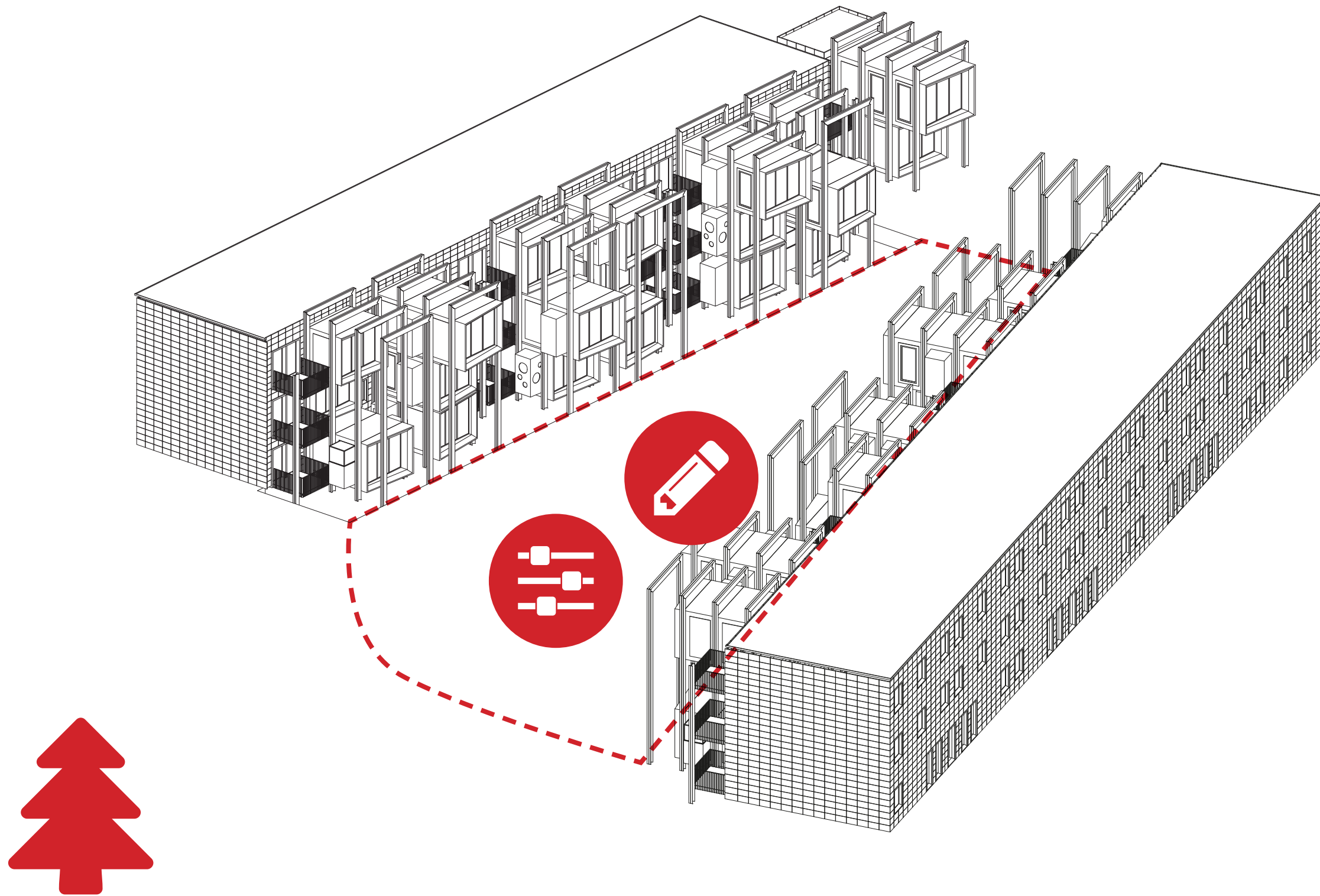
User participation

Make own dwelling



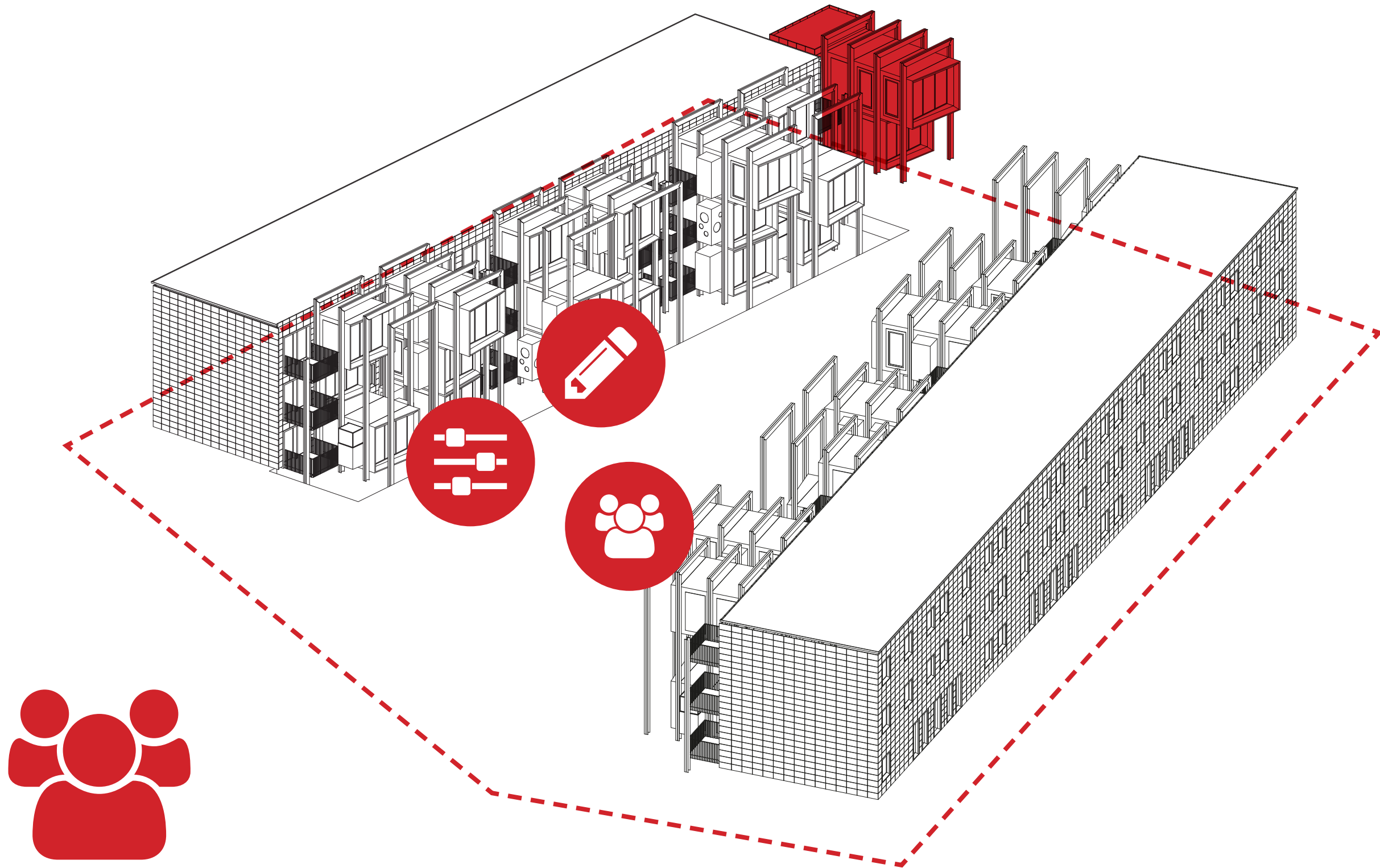
User participation

Adapt communal garden



User participation

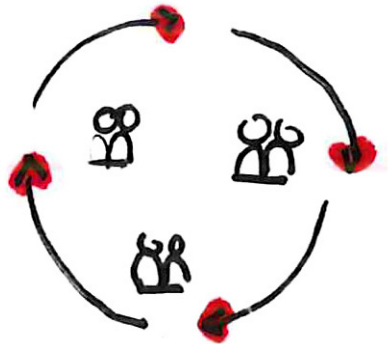
Share a community



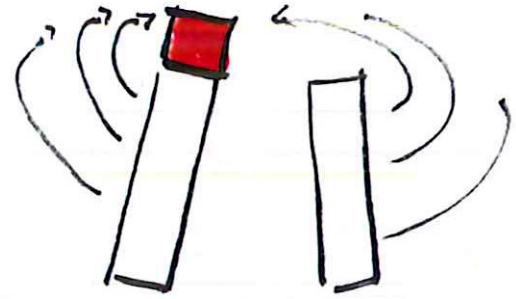


Community

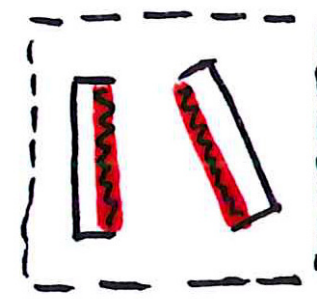
Starting points



Create **community**



Community **center**



Shared **communal**
space

Community

Search for dwelling?

Search for a suitable dwelling, **adapt to neighbourhood**

Community

Search for community!

~~Search for a suitable dwelling, adapt to neighbourhood~~

Search for a suitable community, adapt dwelling as necessary

Community

Search for community!

~~Search for a suitable dwelling, adapt to neighbourhood~~

Search for a suitable community, **adapt dwelling as necessary**

Community

Community centre

Defined by community

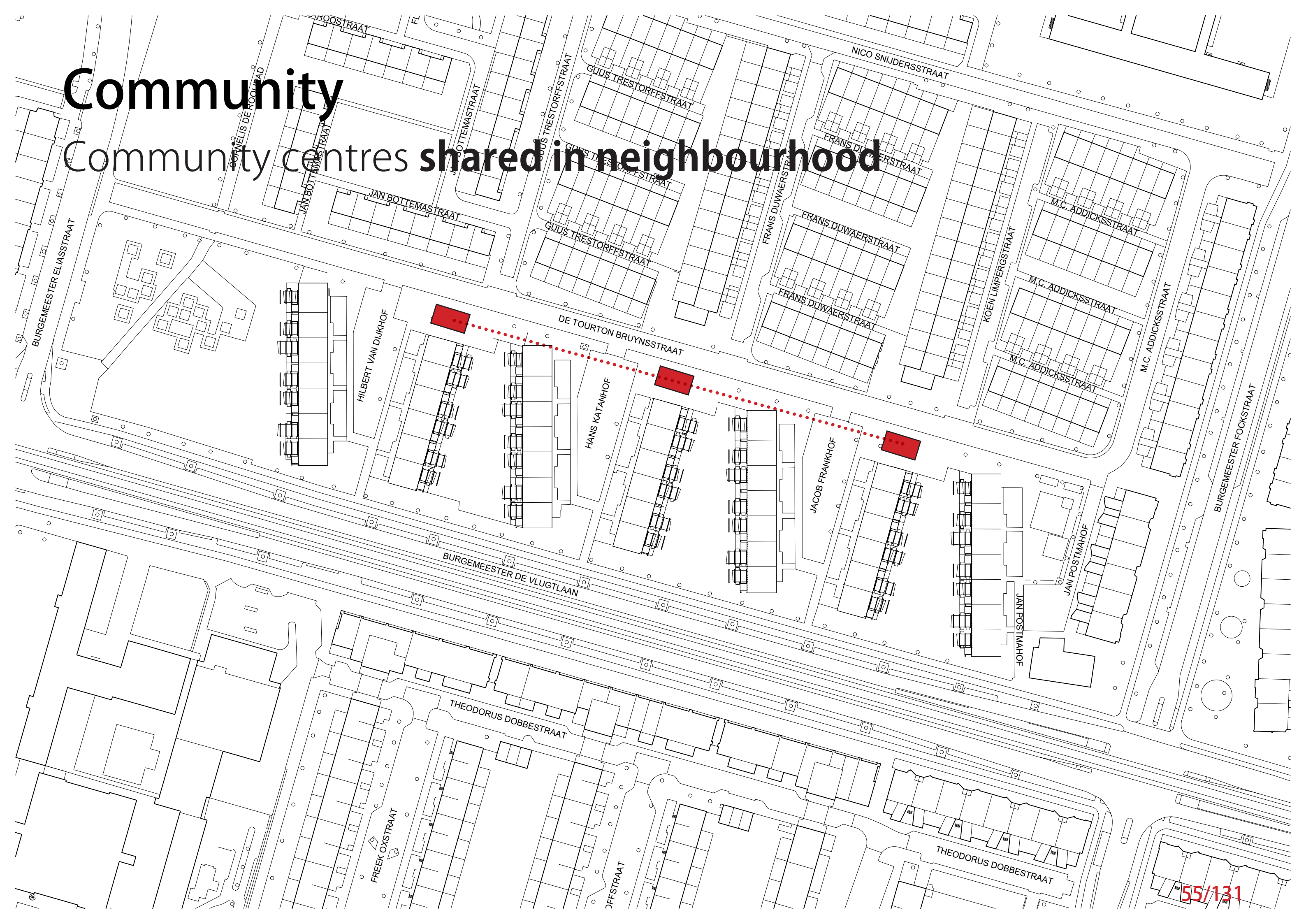
Use for **communal activities**

For example: **urban farming, activity centre, work area**

Adaptable building to suit different needs

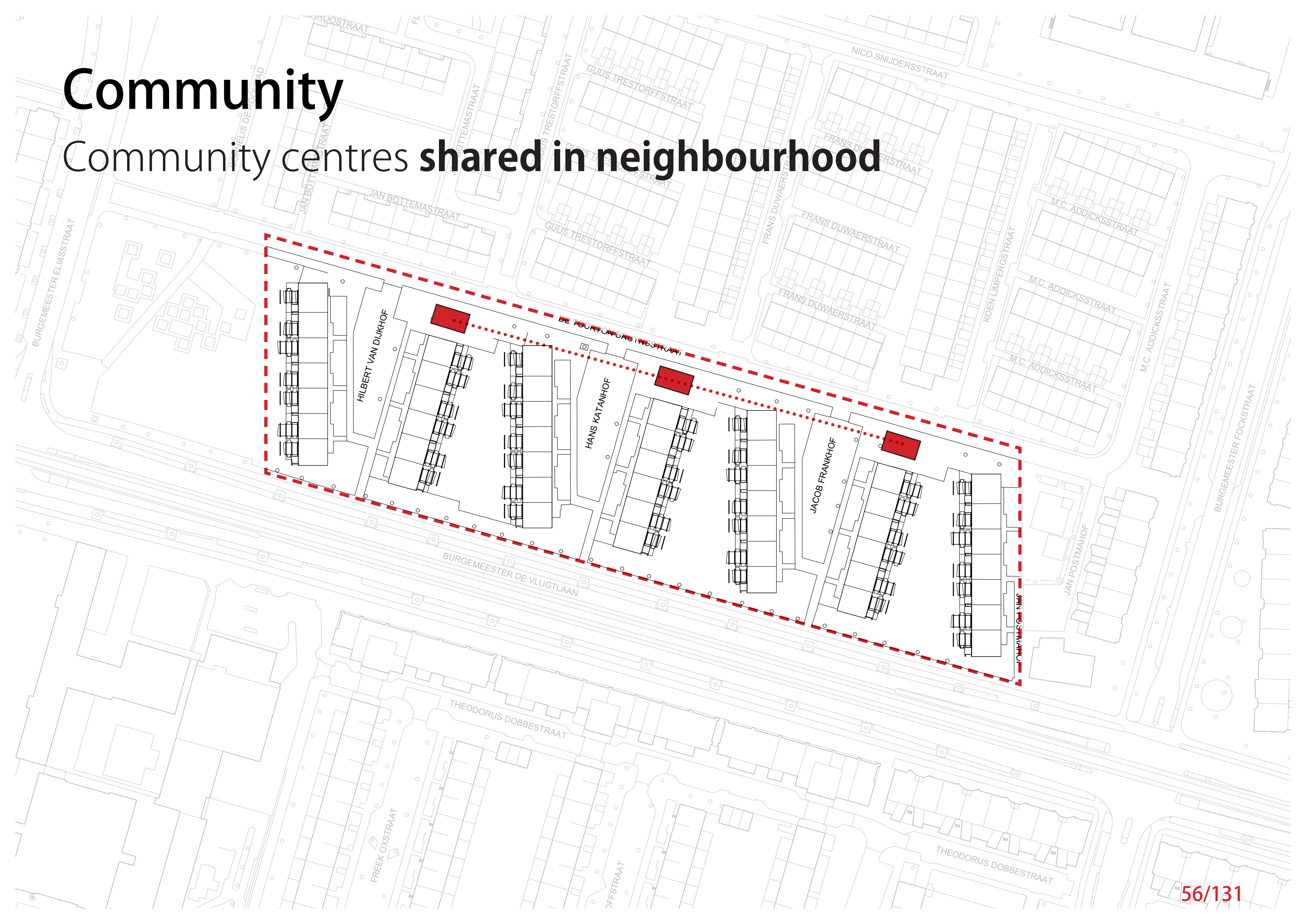
Community

Community centres shared in neighbourhood



Community

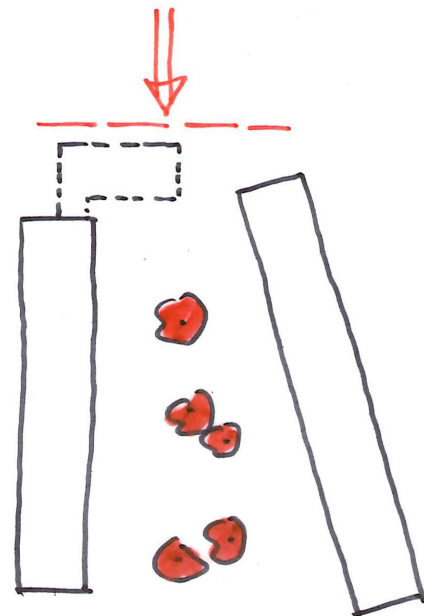
Community centres **shared in neighbourhood**



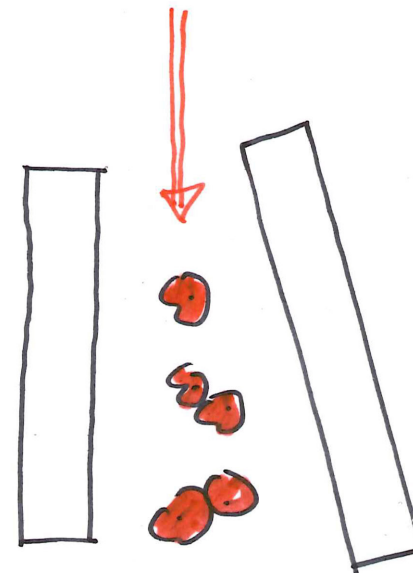


Urban

Starting points



REMOVE SHOPS



ENABLE COLLECTIVE USE OF GREENERY

Shared garden

Overview

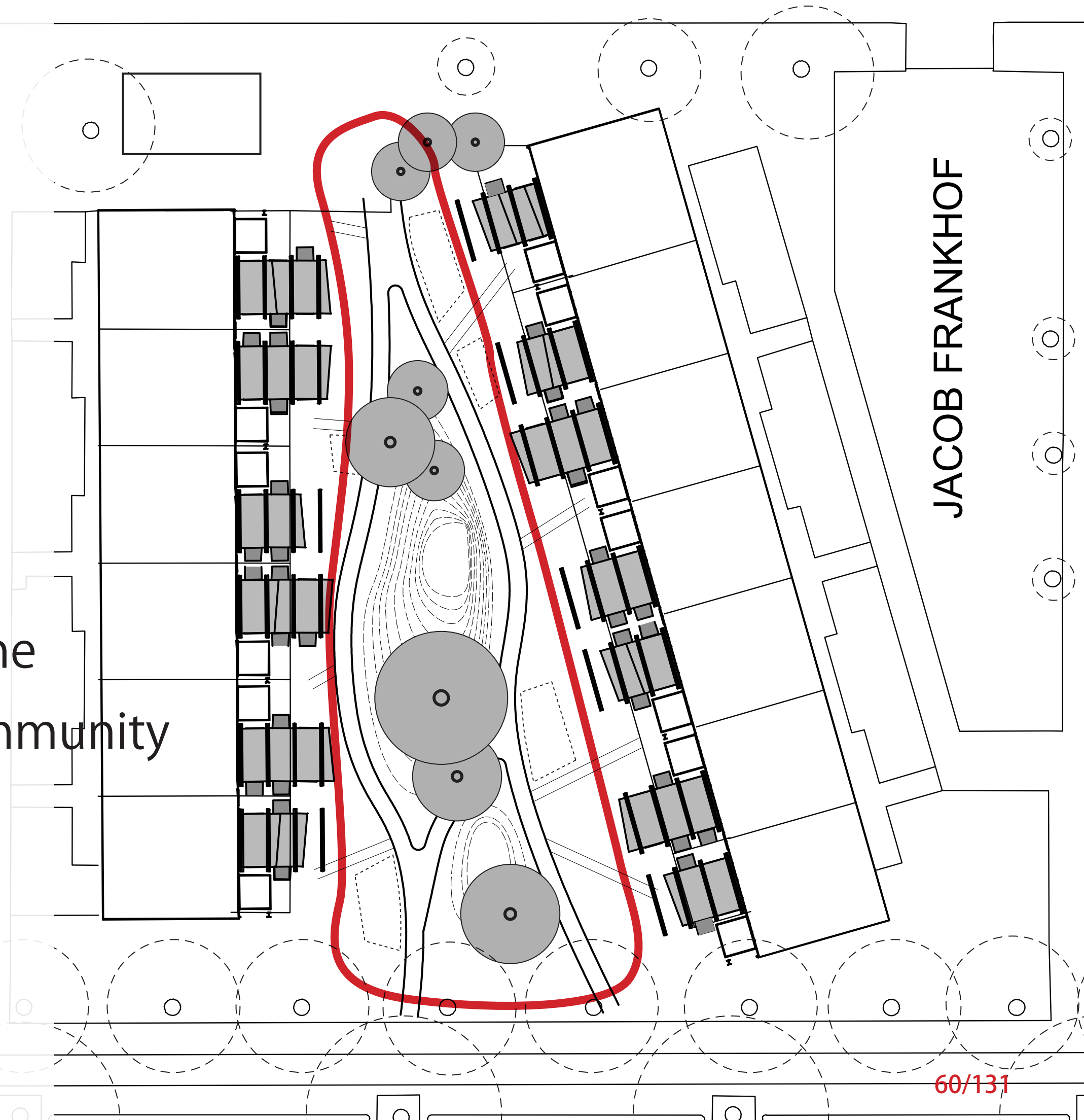


Shared garden

Public: **area**



Shared with everyone
Parts filled in by community



Shared garden

Public: **pathways**



Gravel pathways

Main and sub paths



Shared garden

Public: **adaptable areas**



Defined by community

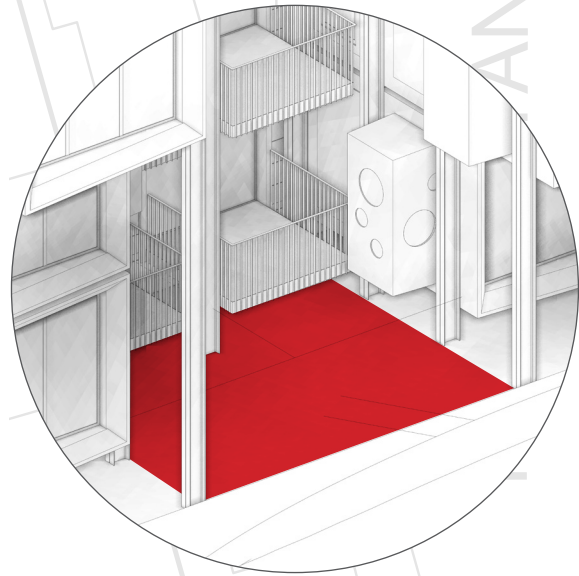
Large **freedom** to experiment

For **example**: urban farming,
rose nursery, apple trees



Shared garden

Semi-private: **in front of balconies**



Shared space
In front of dwelling



Shared garden

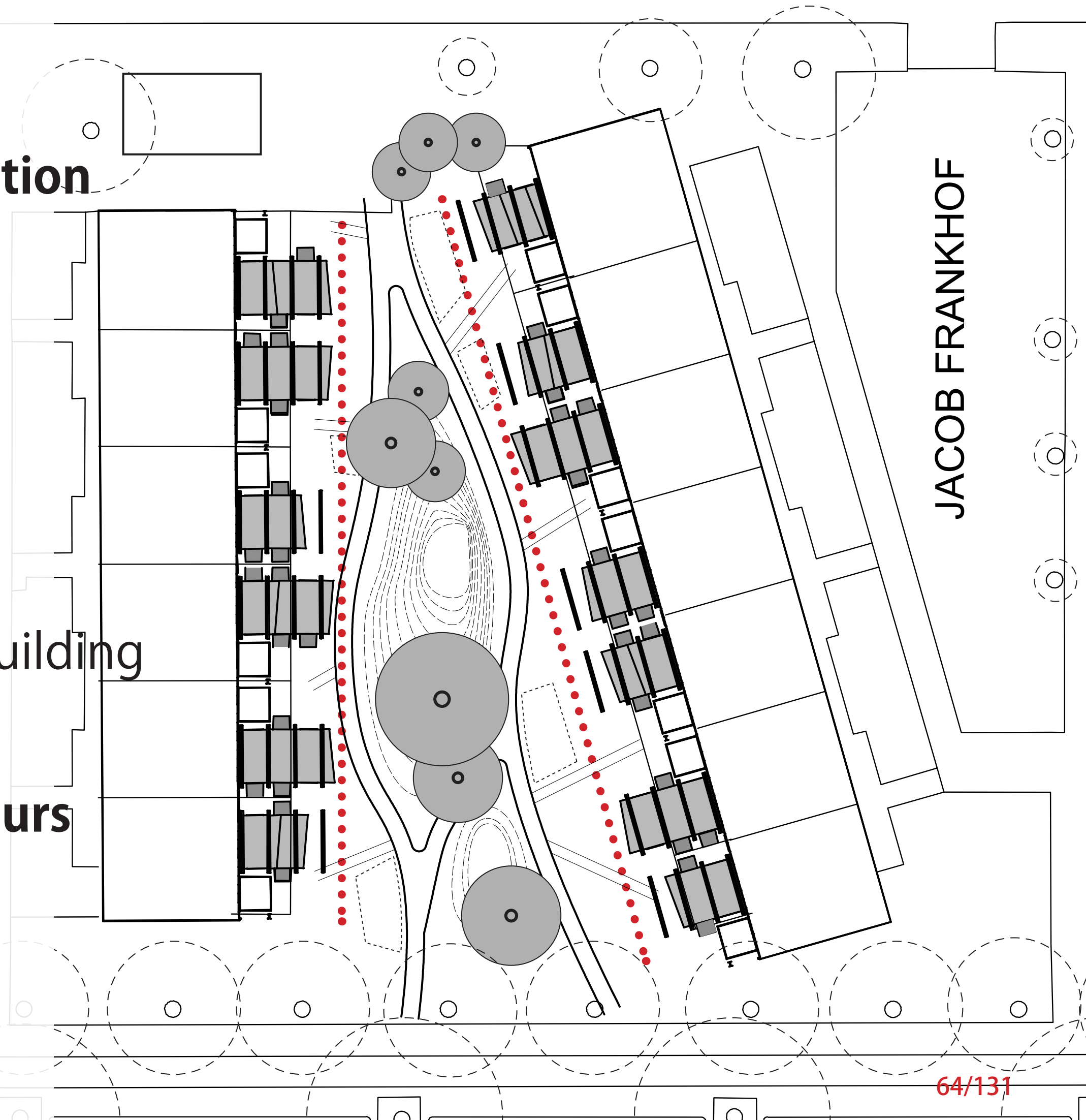
Semi-private: **separation**



Vegetation **versus** building

High & lower plants

Unity in **several colours**





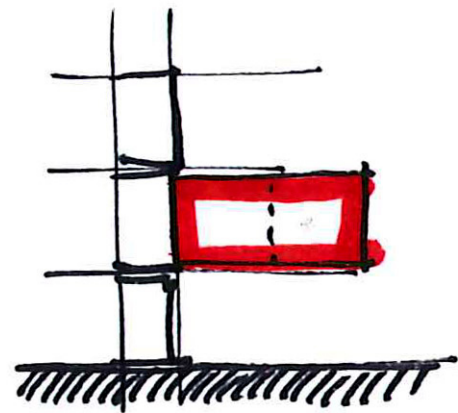




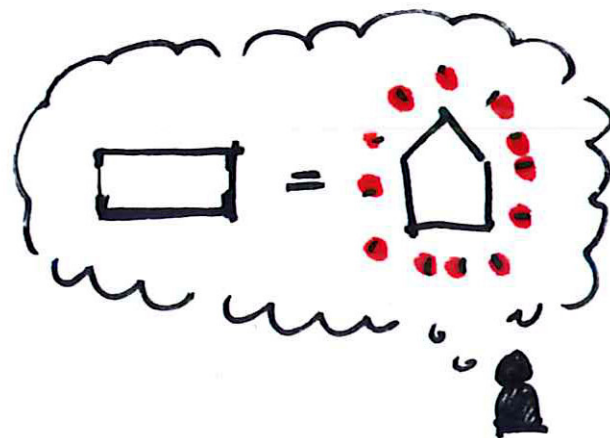


Dwelling

Modules: **adaptability**



Extend
floorspace



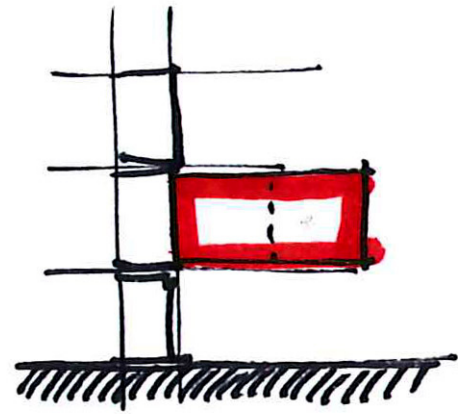
Personalised
dwelling



Unity through
chaos

Dwelling

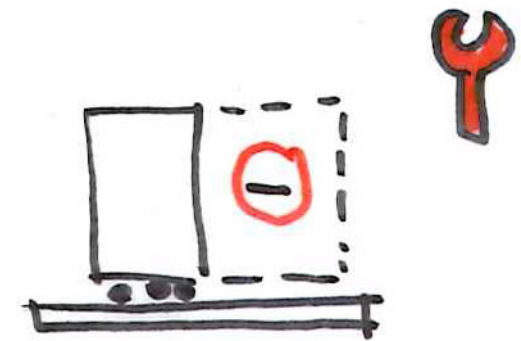
Modules: **technical rules**



Independent
extensions



Professional
installation



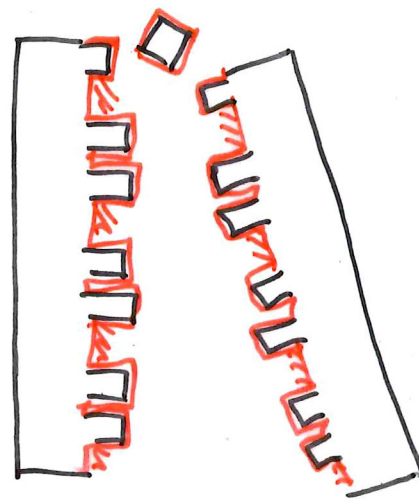
Demountable
modules

Dwelling

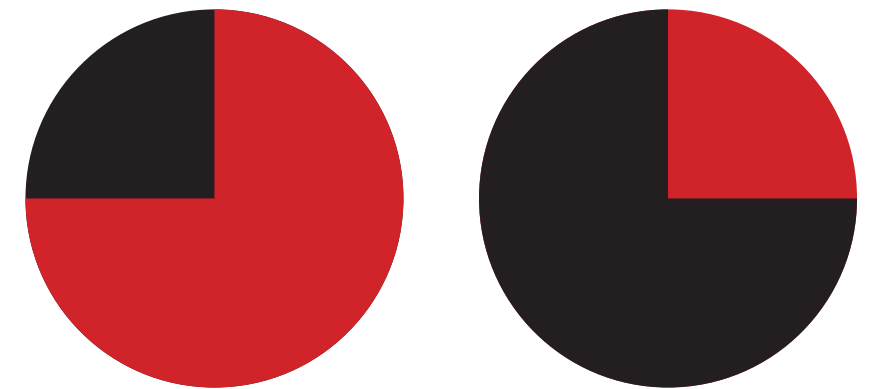
Modules: **functional rules**



Max. 3
modules/home



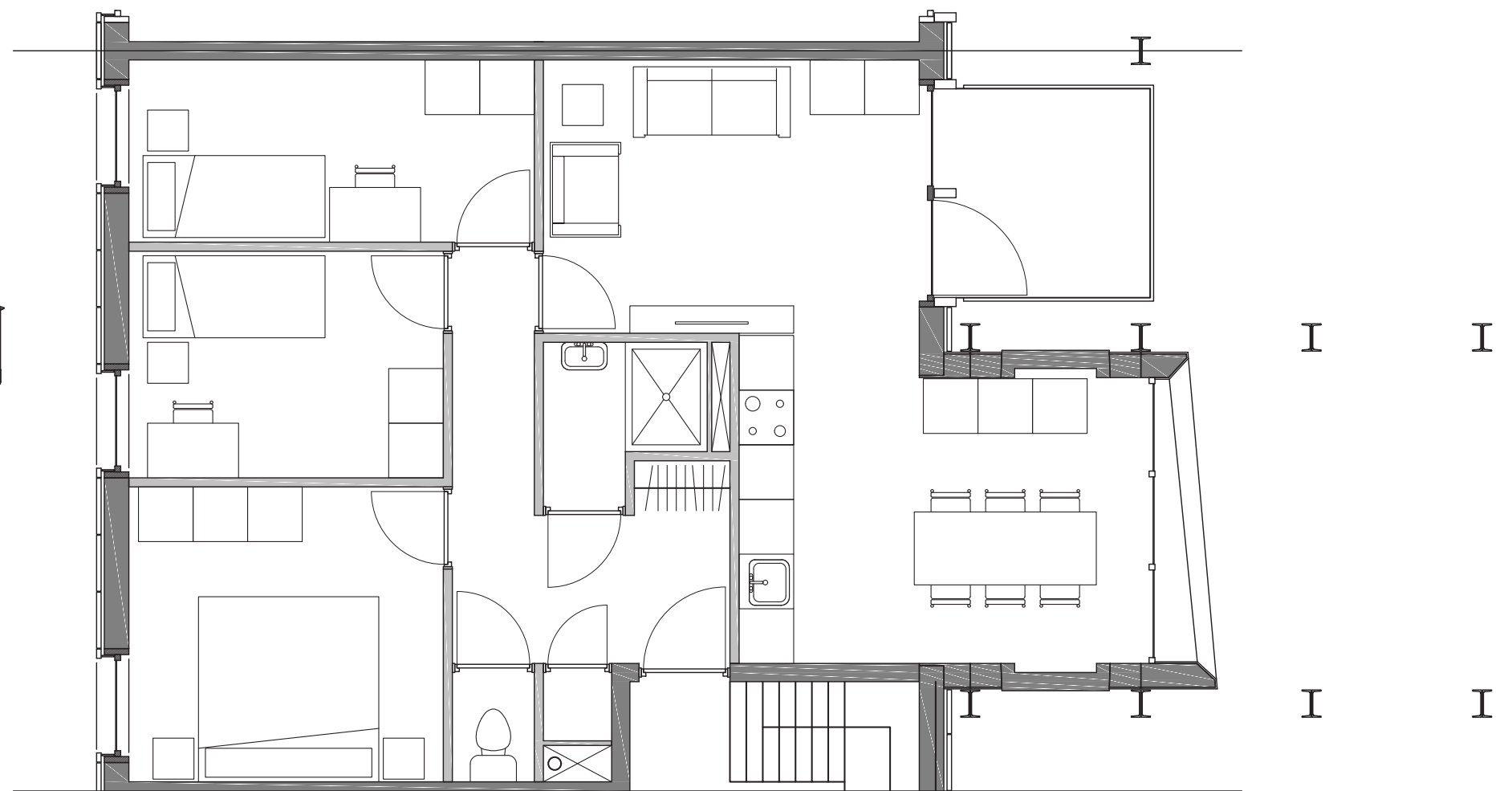
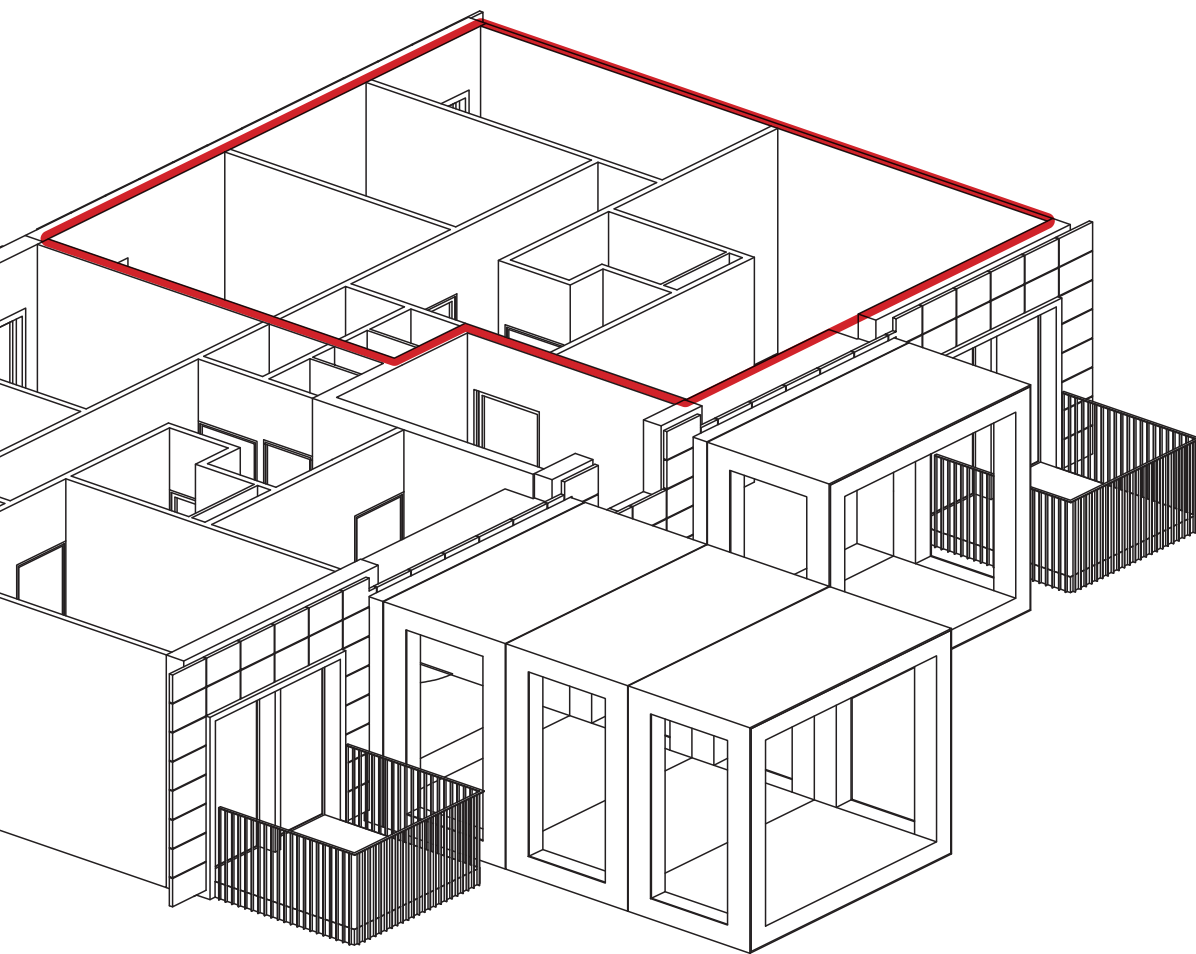
Max. 59
modules total



Contribute
25/75%
money or socially

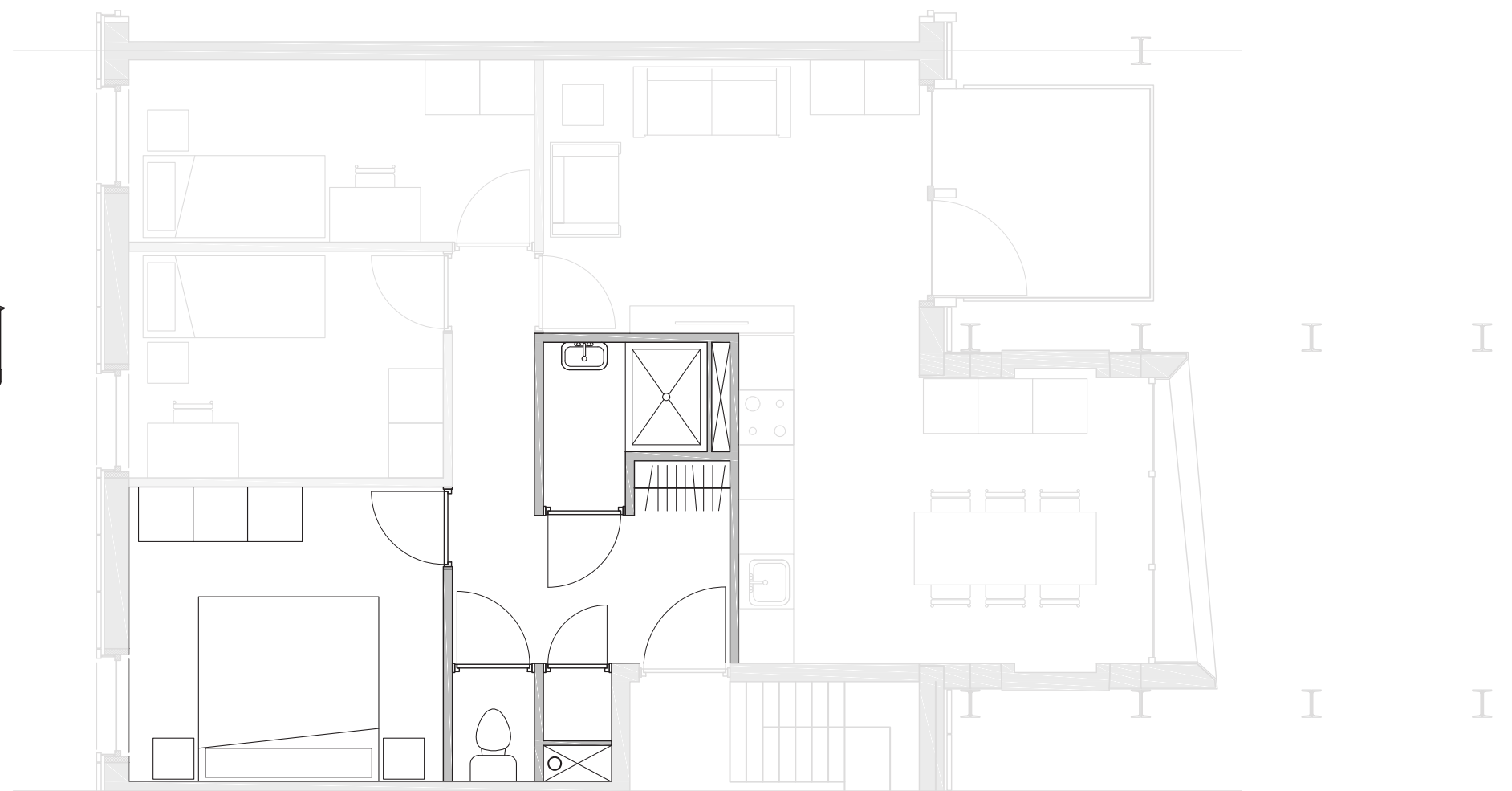
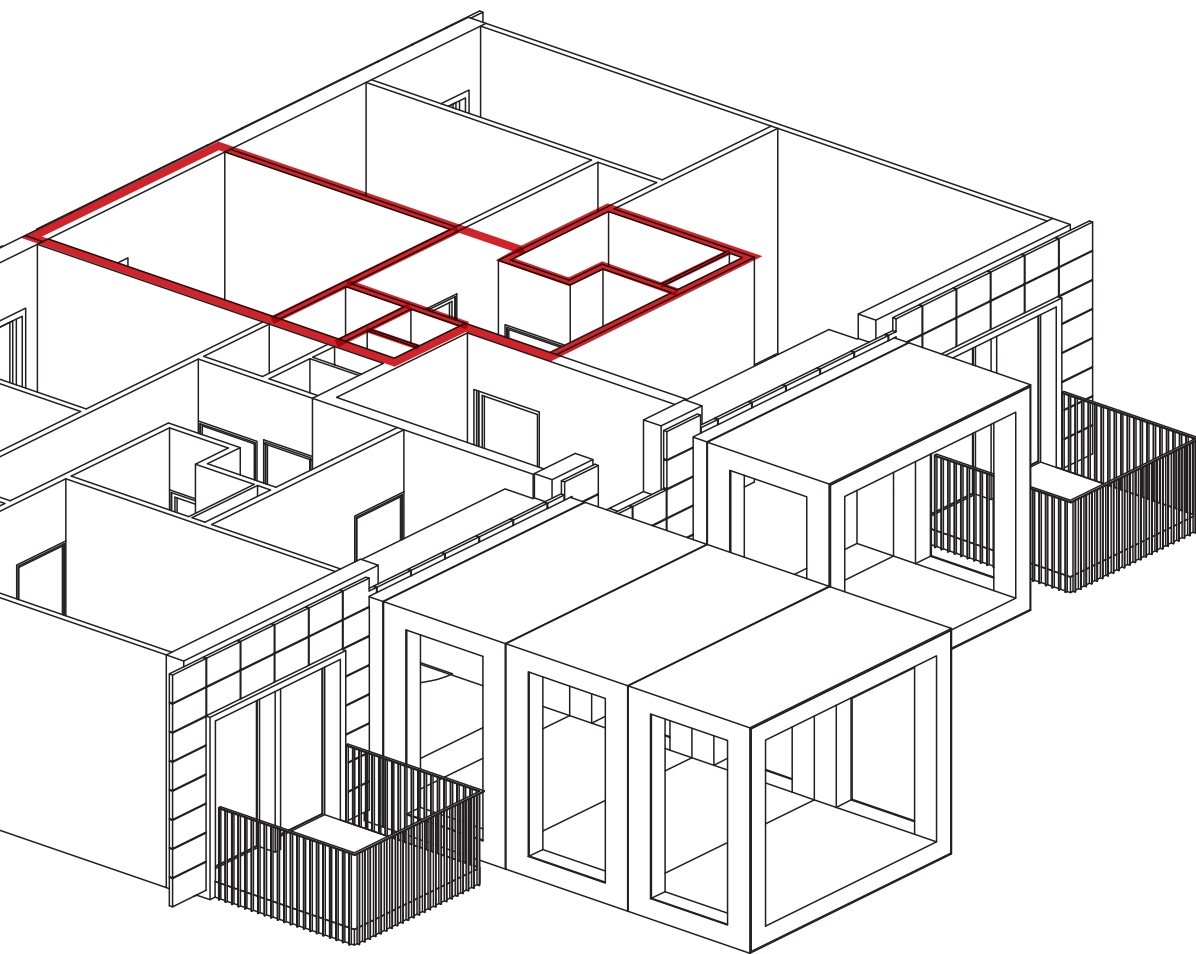
Dwelling

Plan development



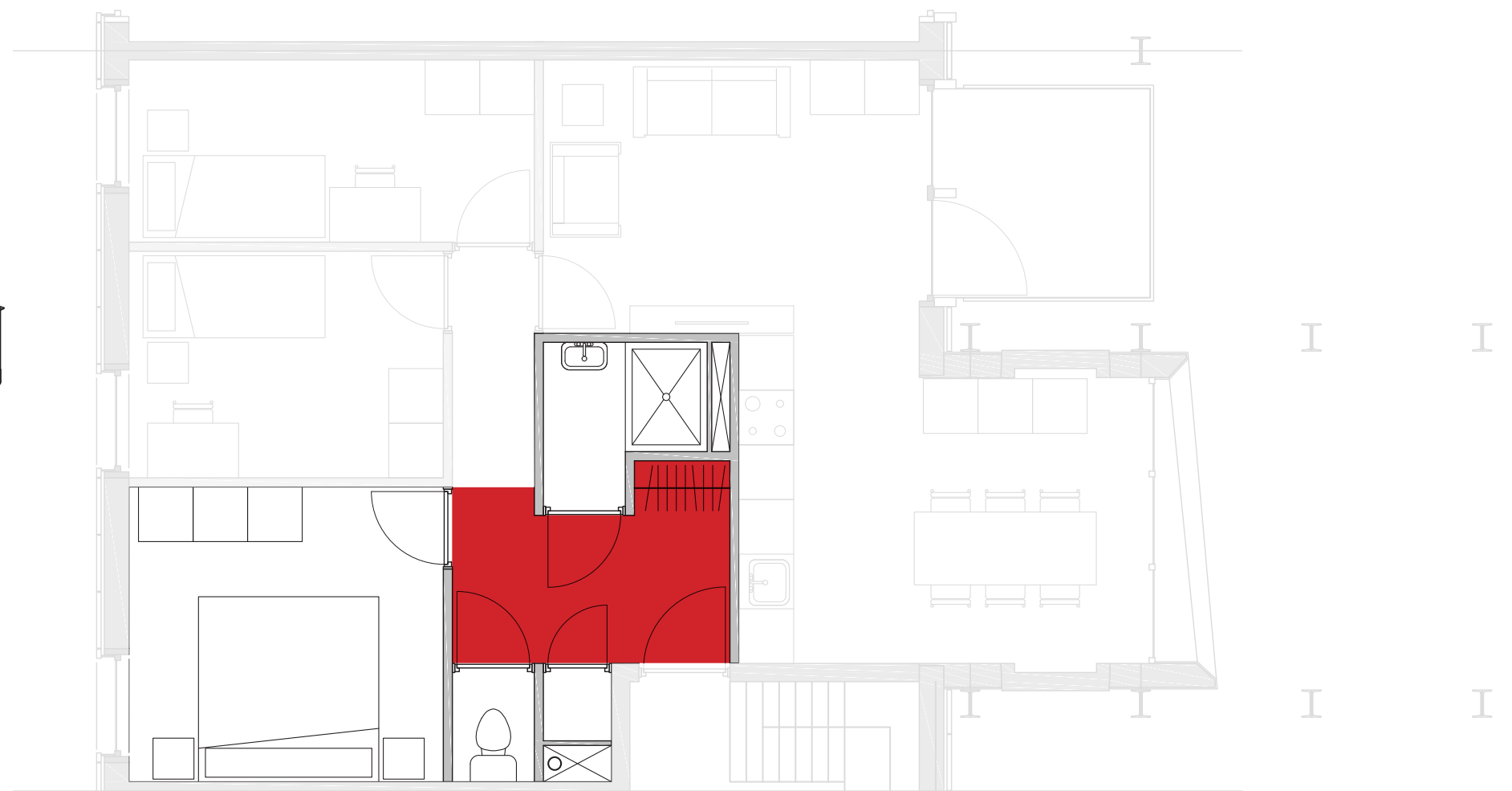
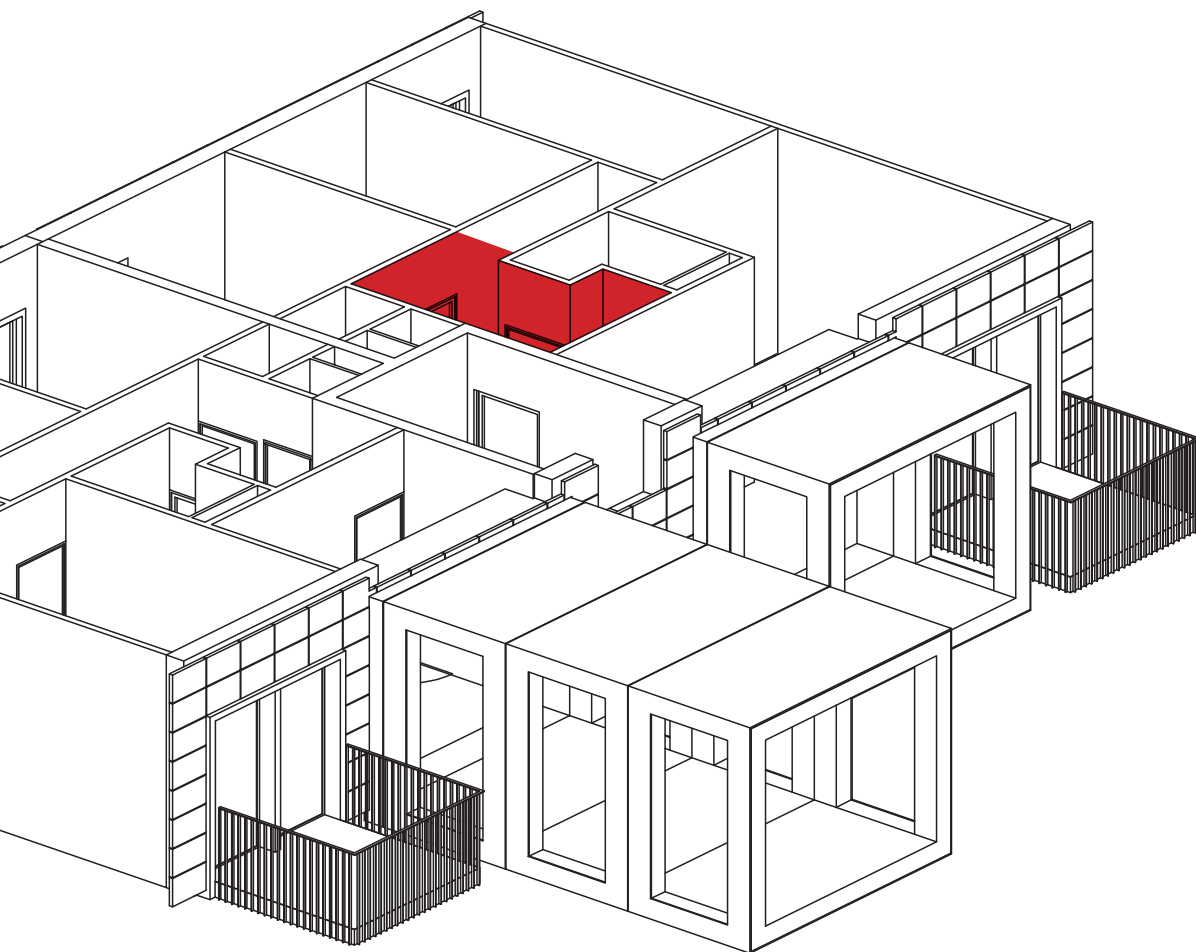
Dwelling

Plan development: **add default**



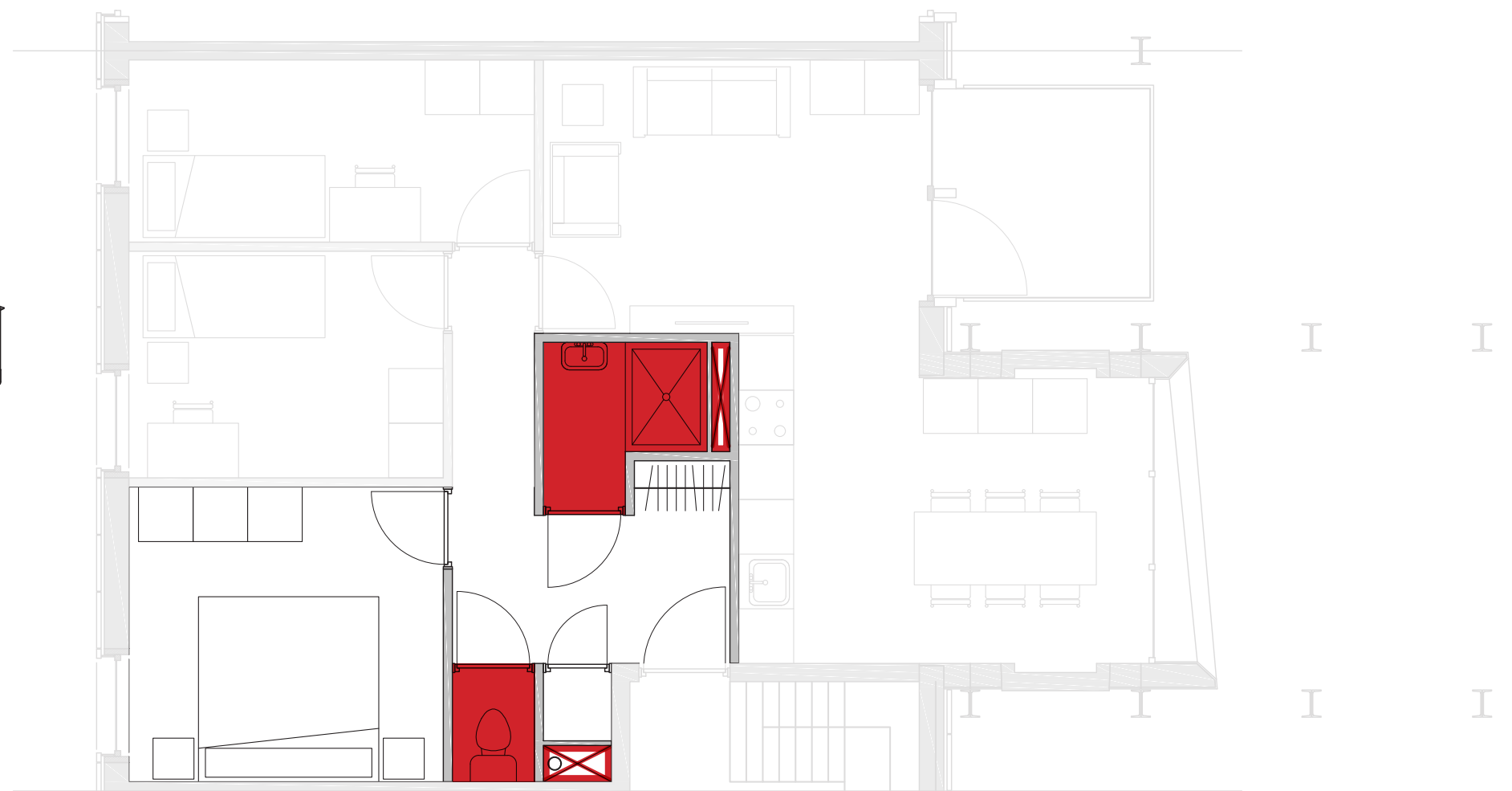
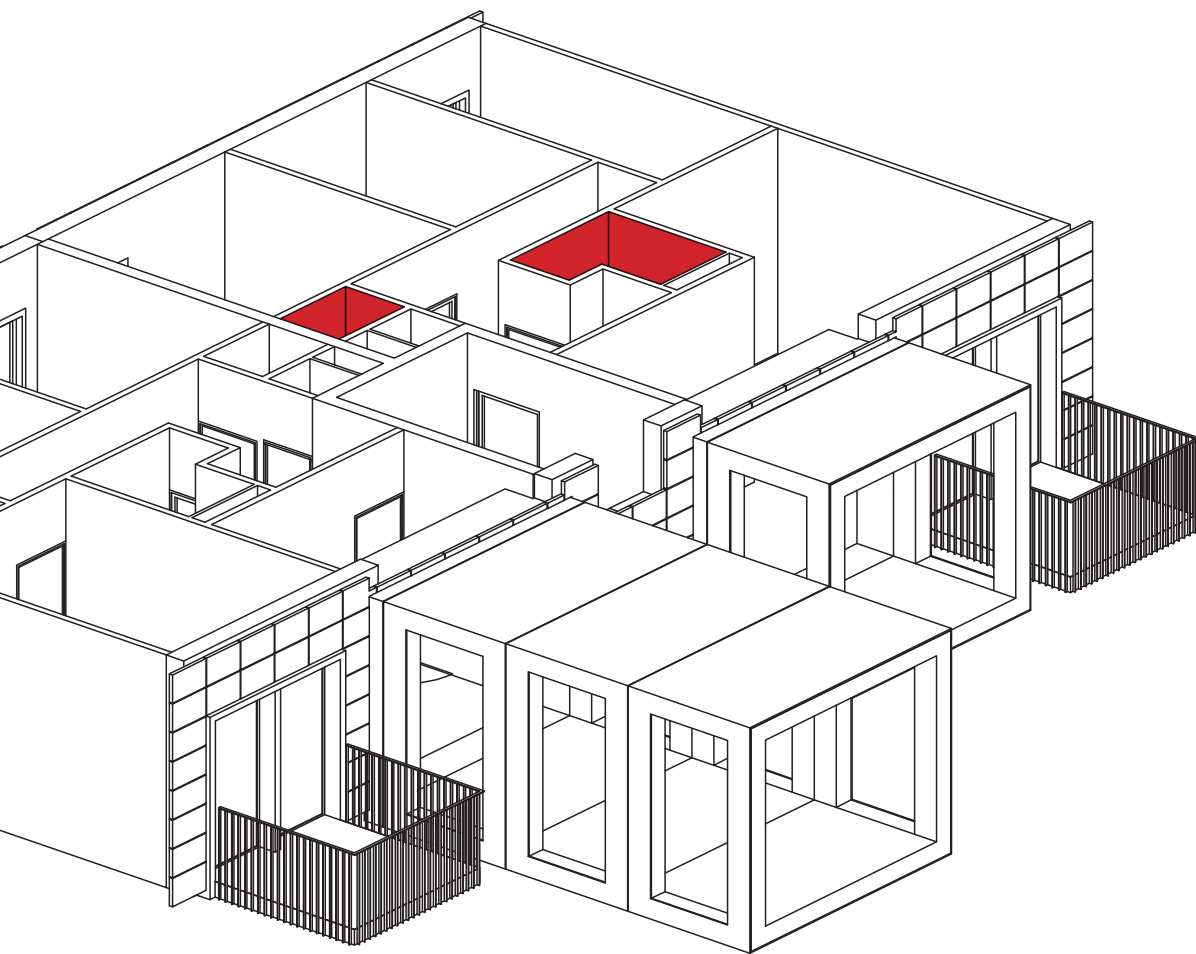
Dwelling

Default layout: **hallway**



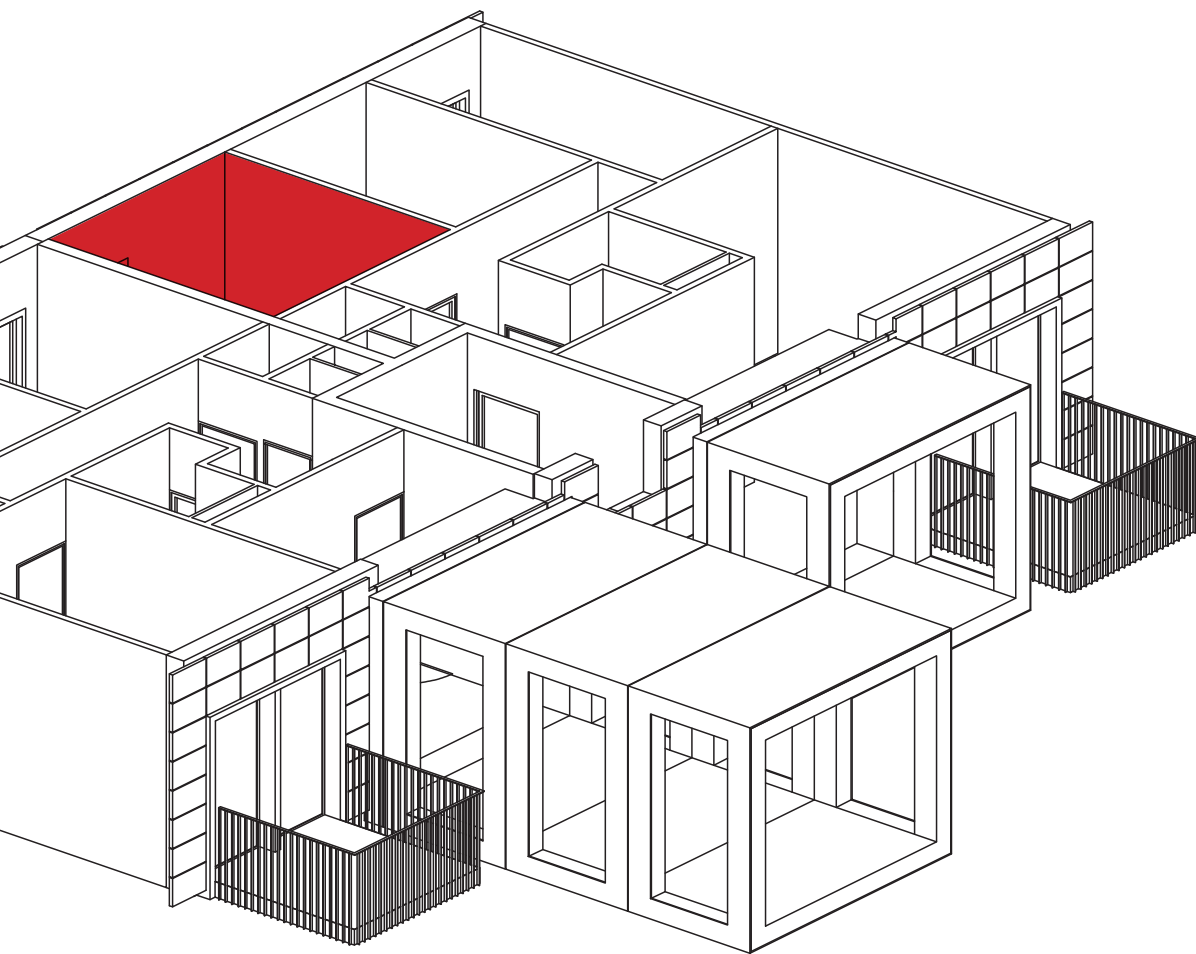
Dwelling

Default layout: **toilet & bathroom**



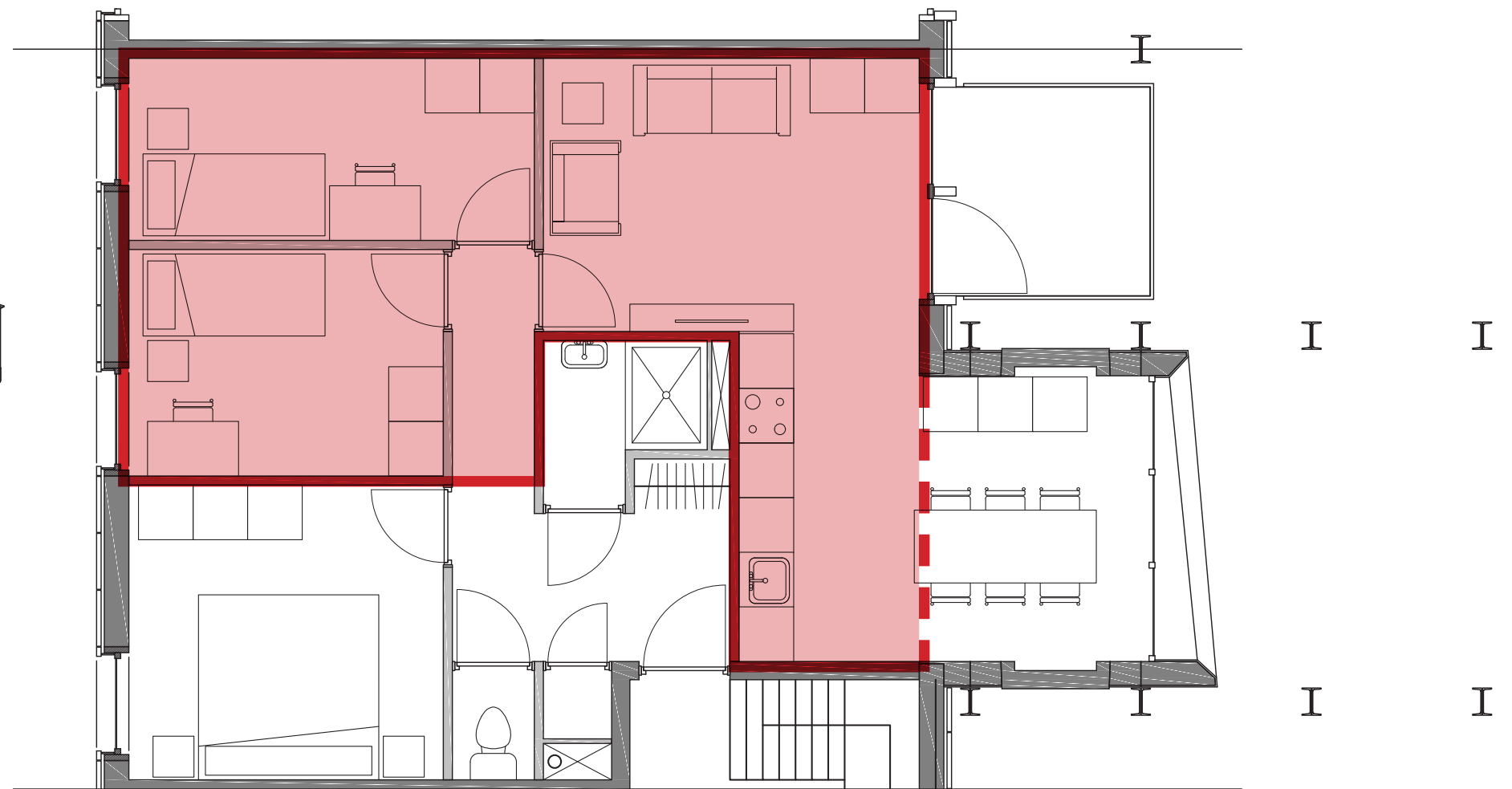
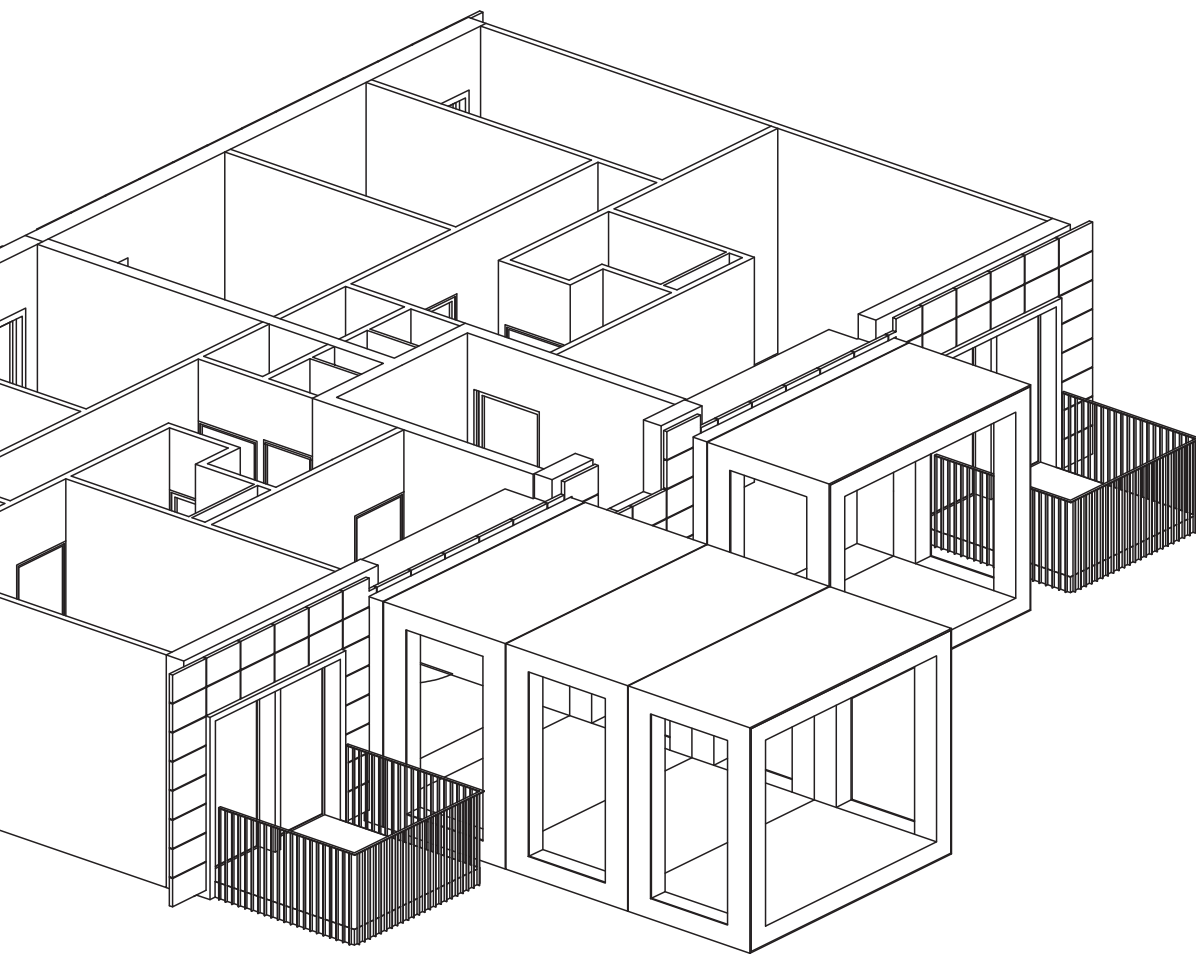
Dwelling

Default layout: **master bedroom**



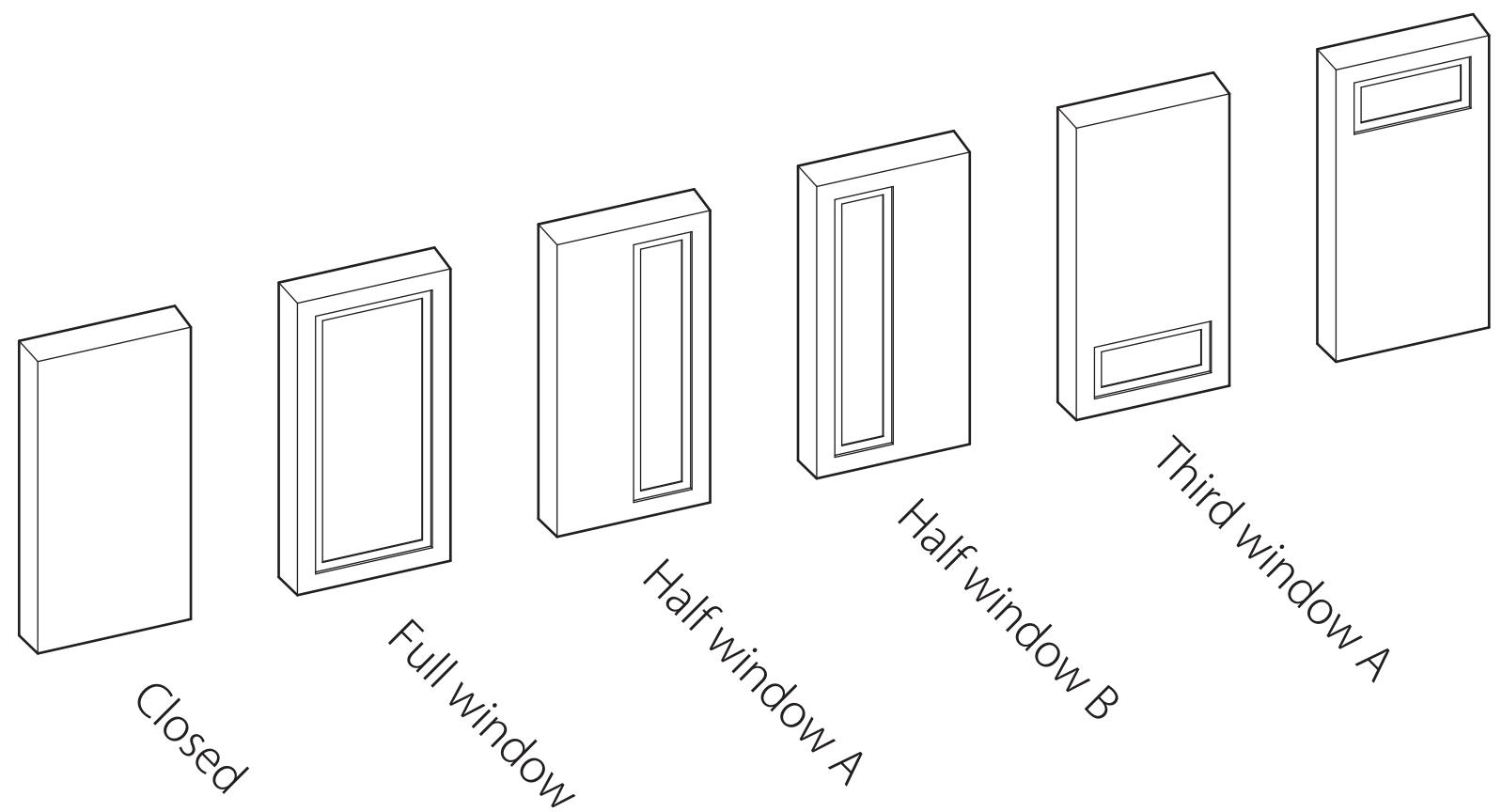
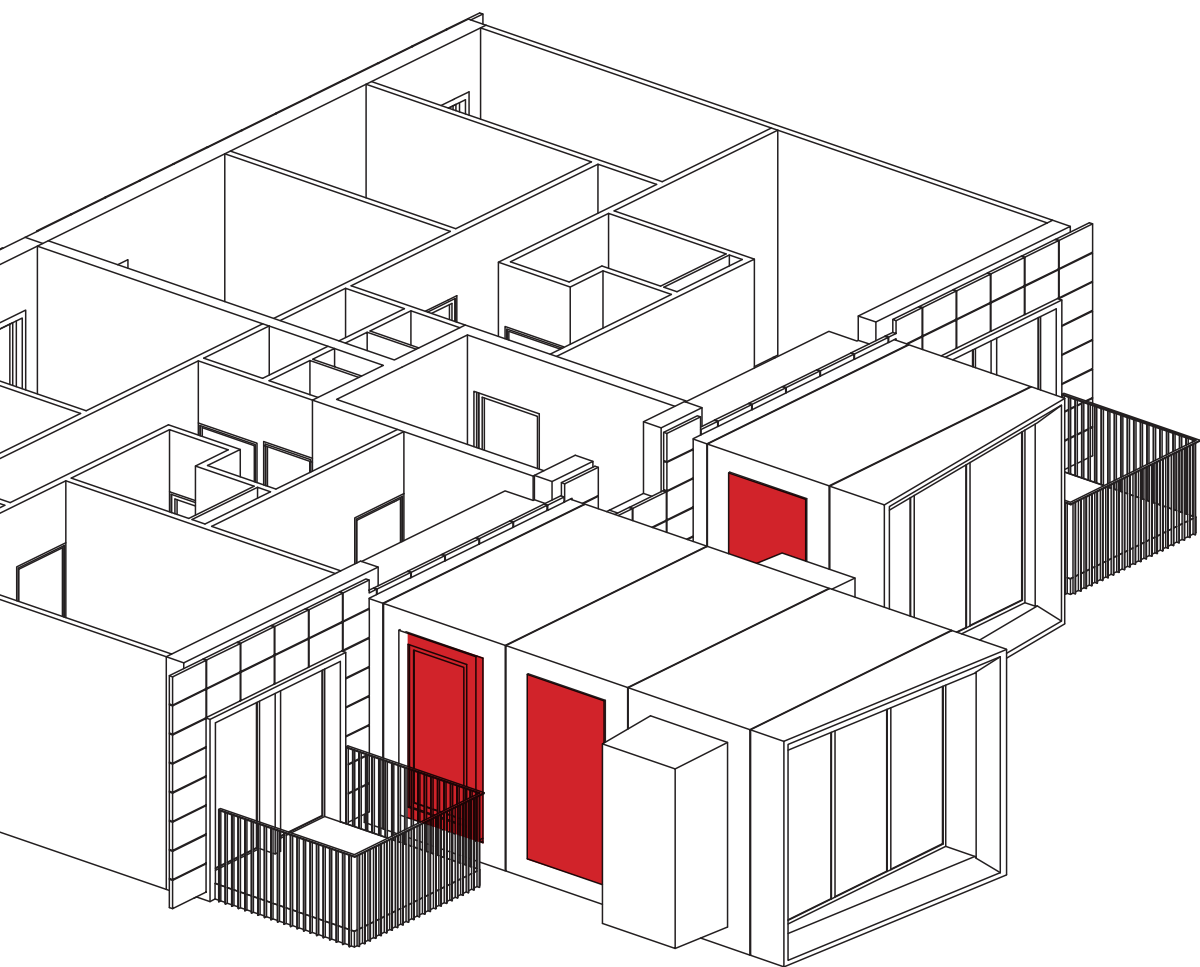
Dwelling

Optional layout: **choose desired configuration**



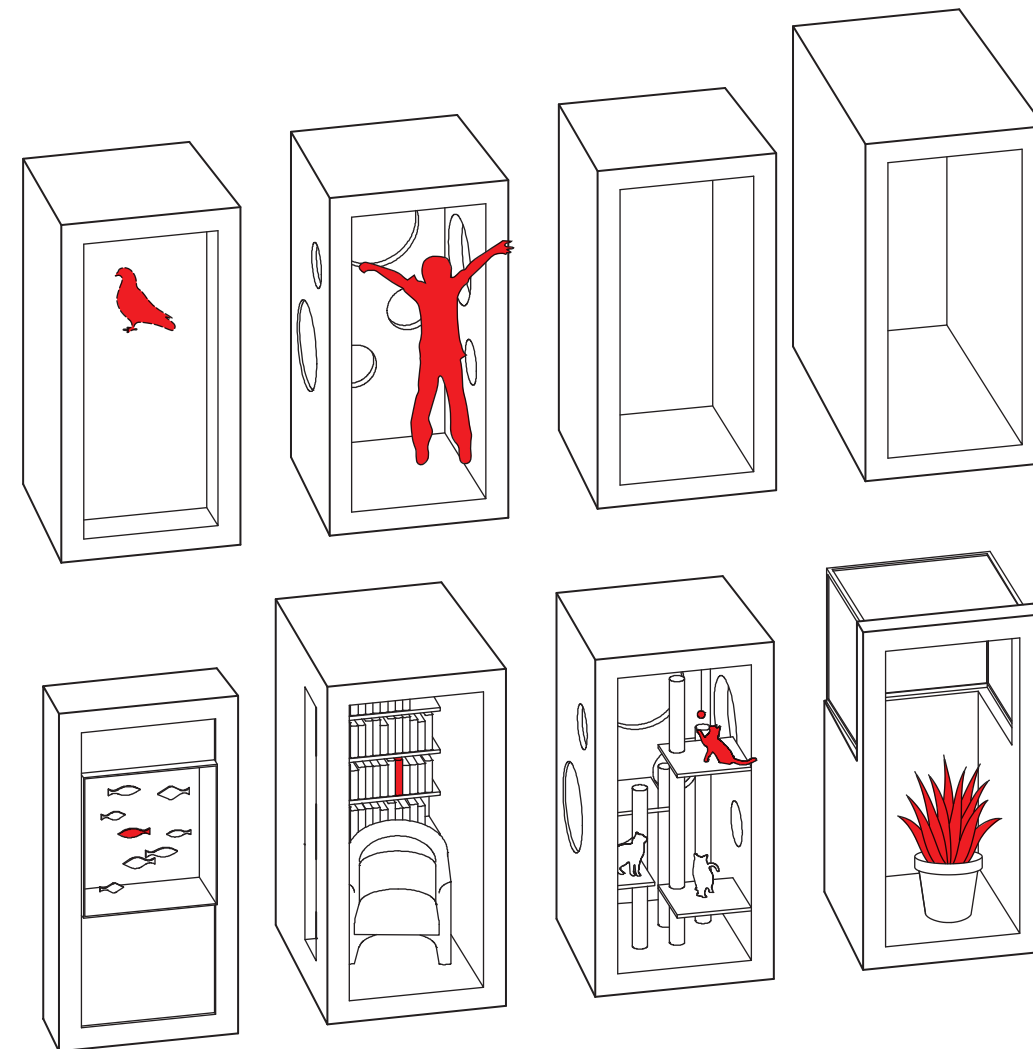
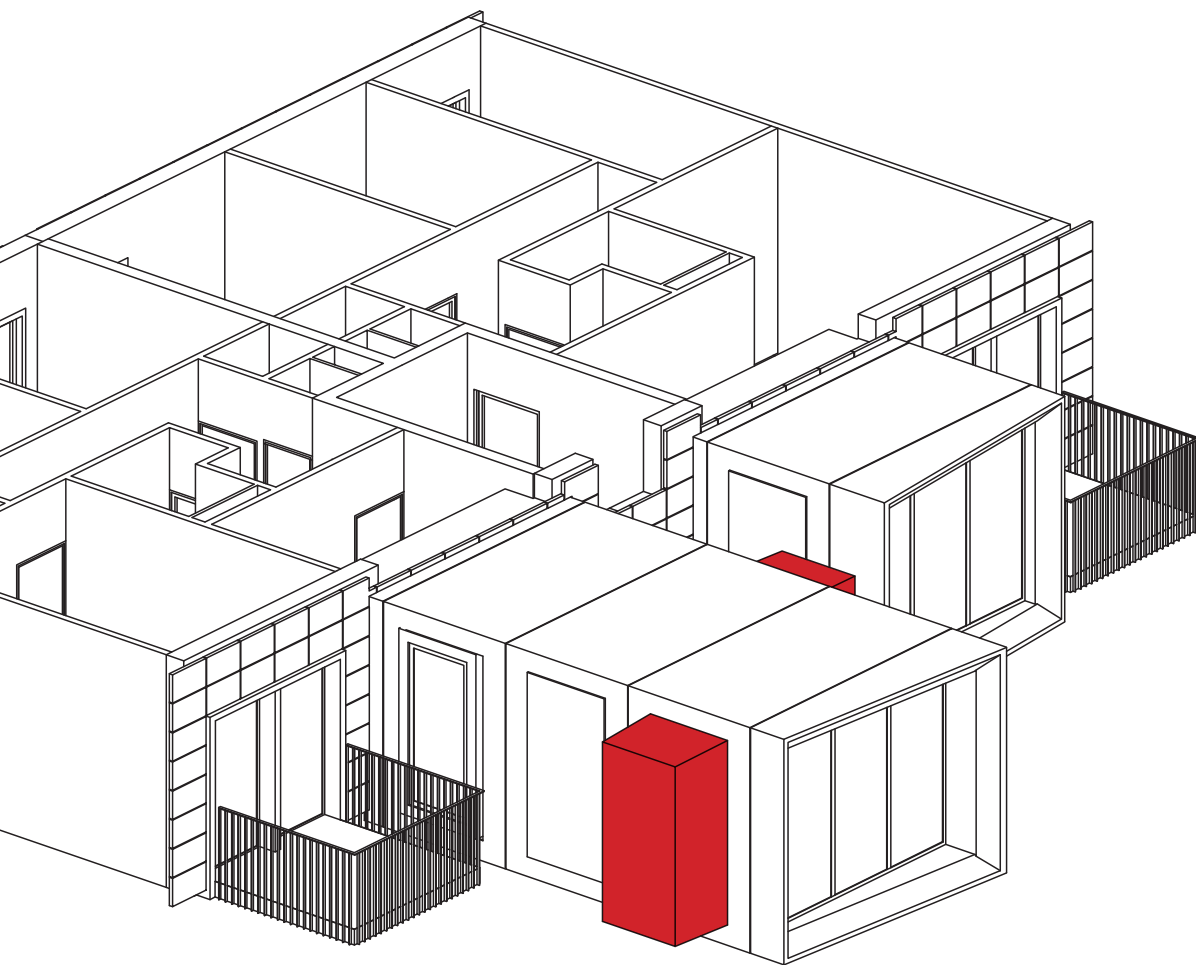
Dwelling

Place **infill** pieces



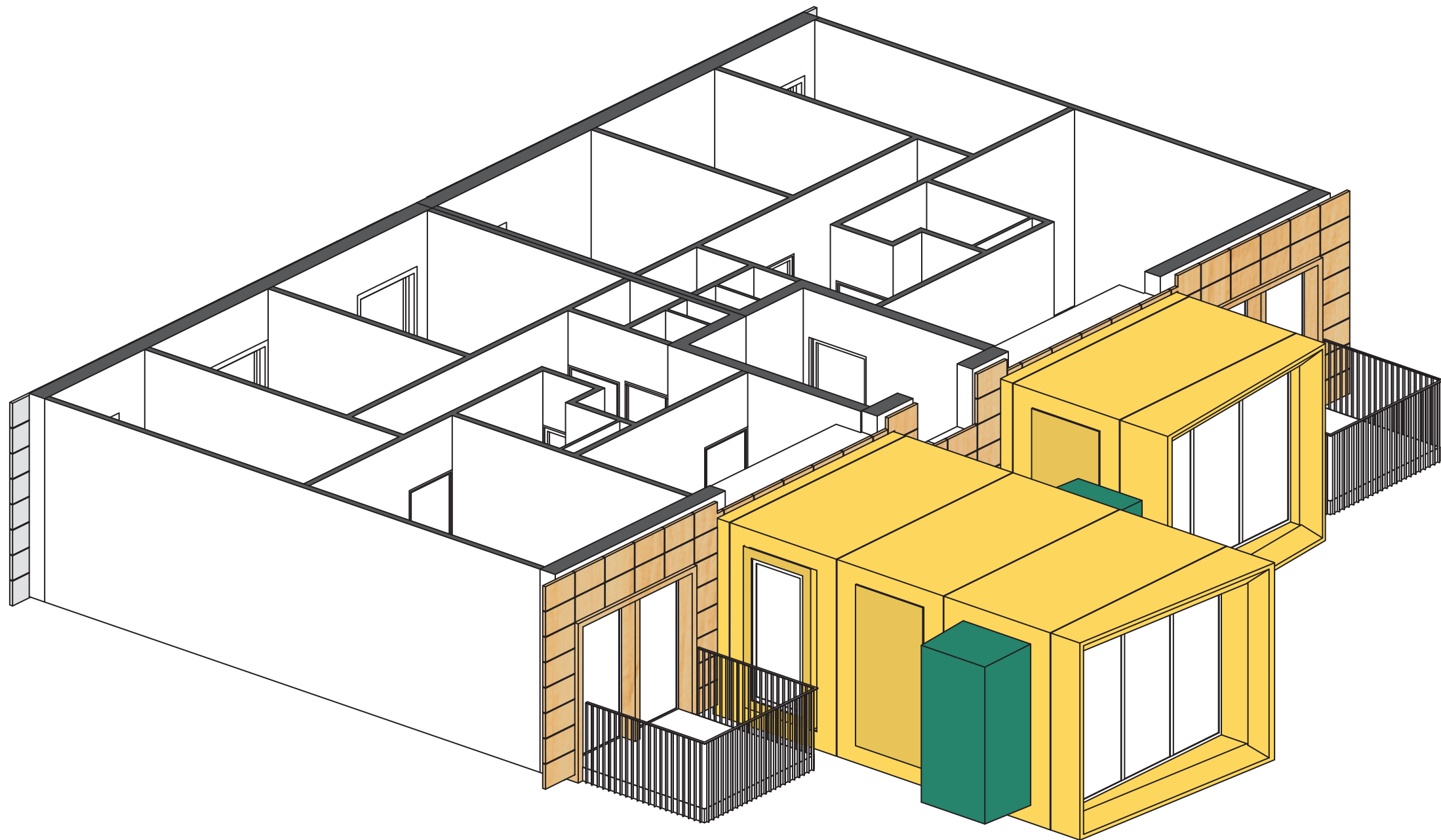
Dwelling

Place **bonusses**



Dwelling

Possible end result



Dwelling

App: **splash screen**

Loading app...



Dwelling

App: **login**

Login with credentials



Dwelling

App: **home screen**

Photo of user/family

Short **description**

Overview of **configurations**

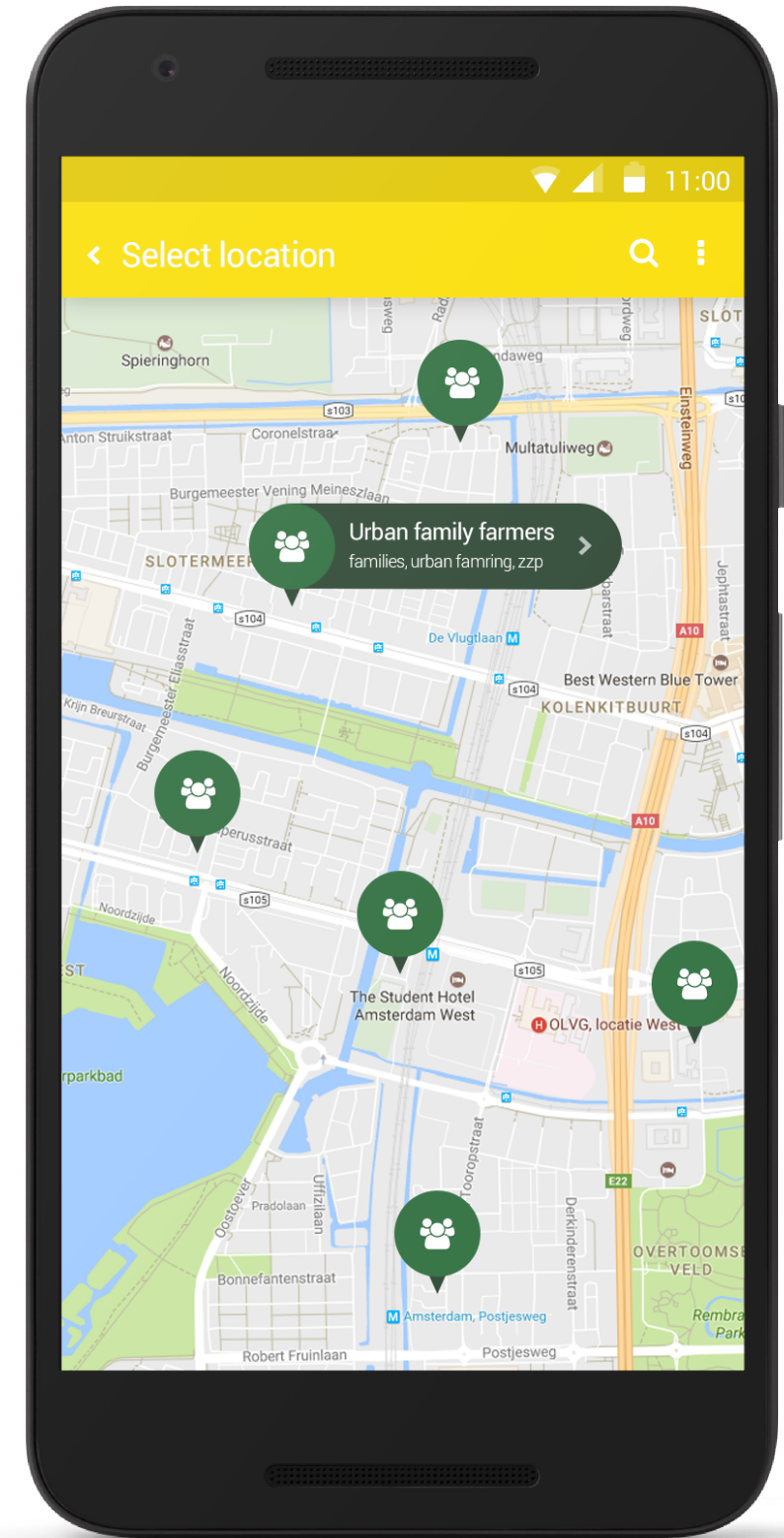


Dwelling

App: **select community**

Search for community

Select community for more



Dwelling

App: **community details**

Information about community

Available dwellings for users

Face-to-face interaction needed before choosing to move to community



Dwelling

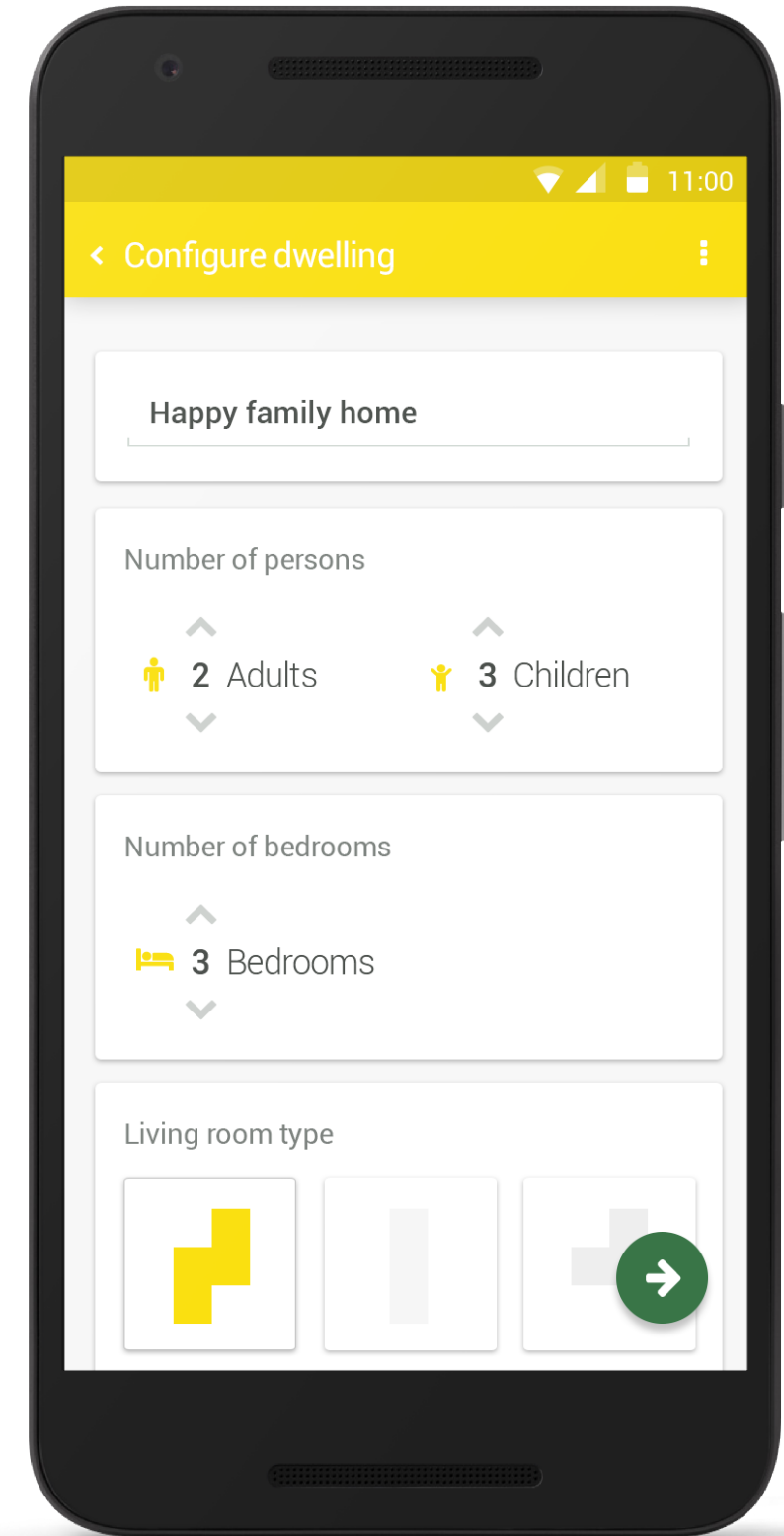
App: **configuration, general data**

Give config a **name**

Amount of people

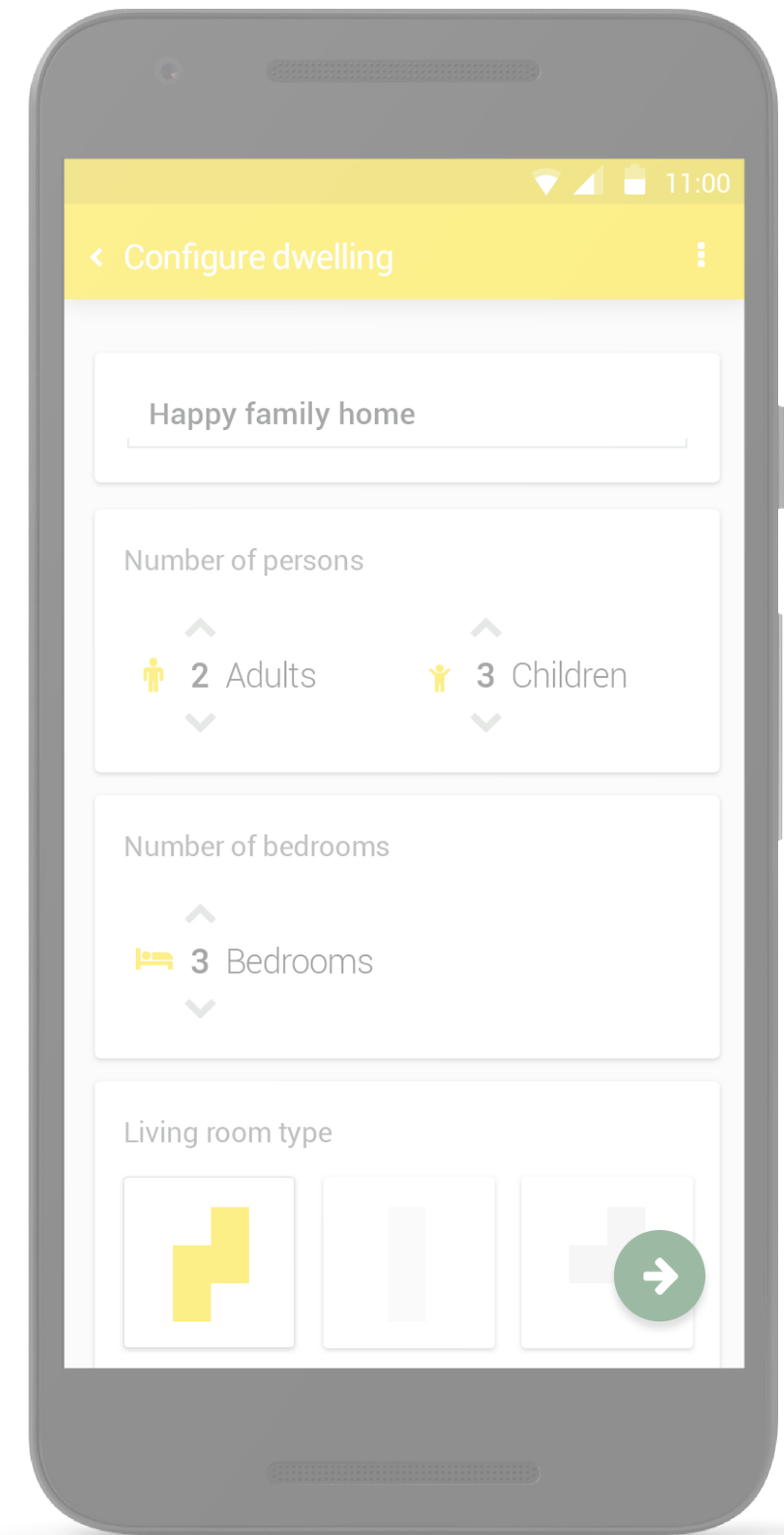
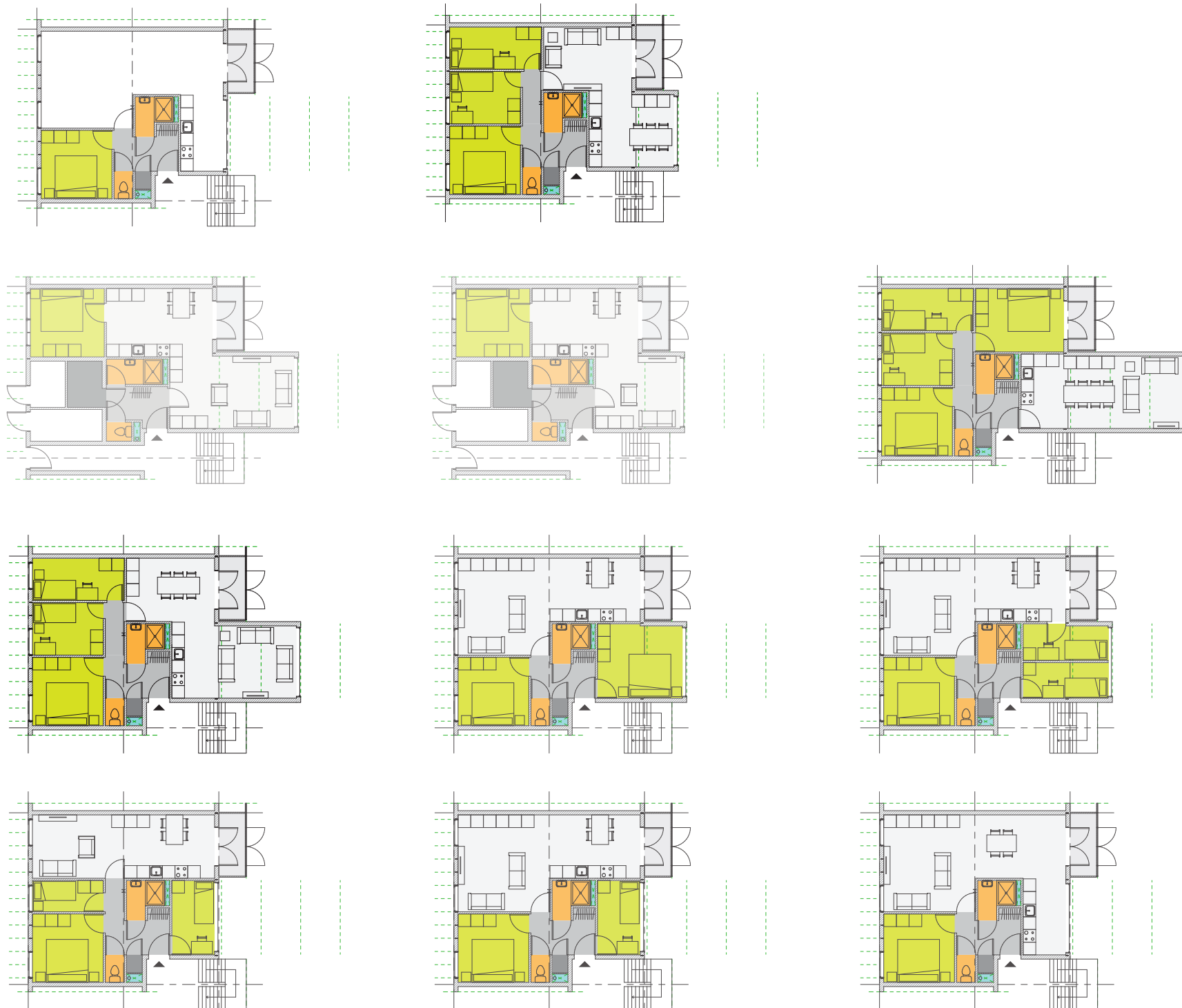
Number of bedrooms

Desired living room **layout**



Dwelling

App: **choose possible layouts**



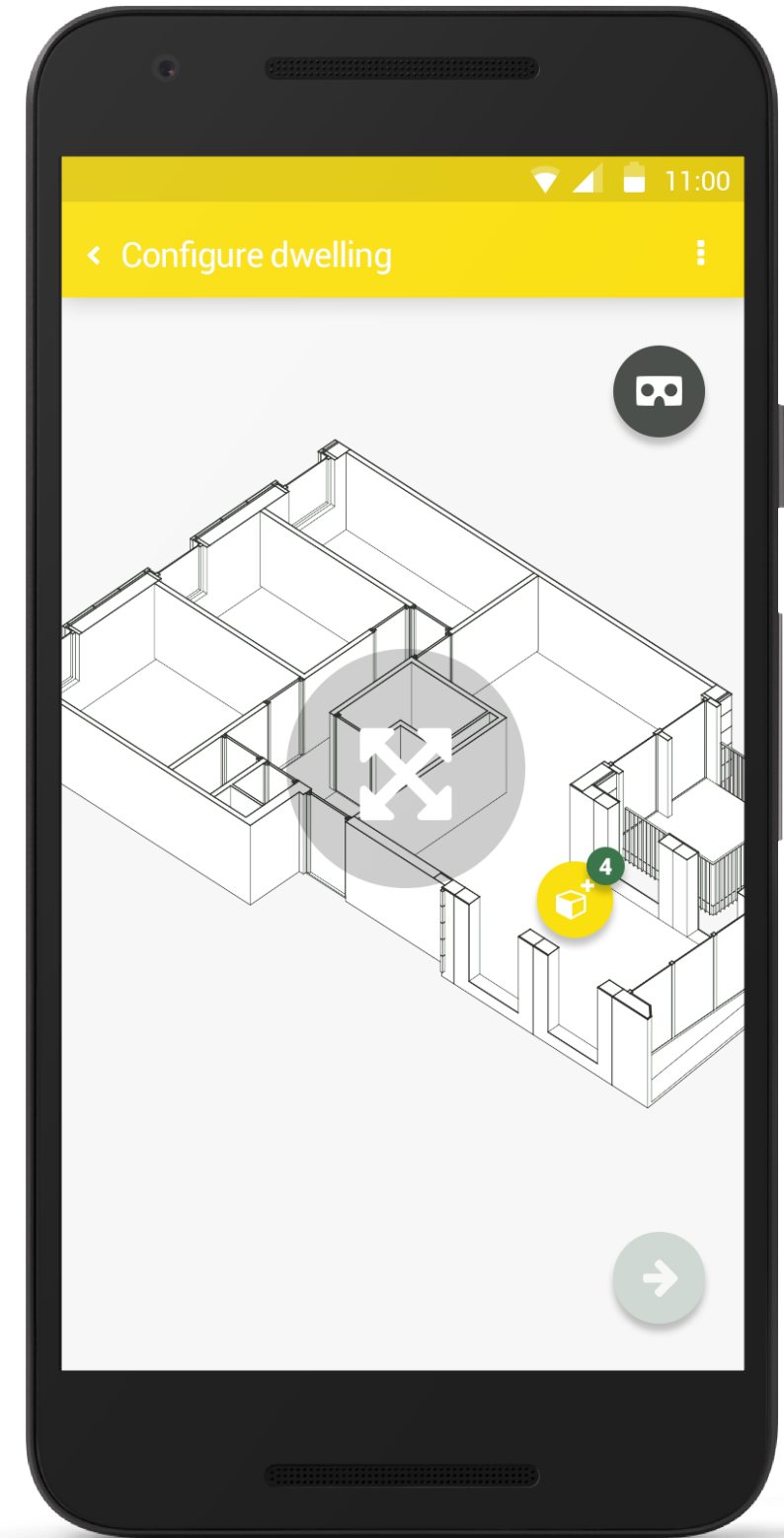
Dwelling

App: **overview of dwelling**

Overview of configured dwelling

Zoom & pinch to see more

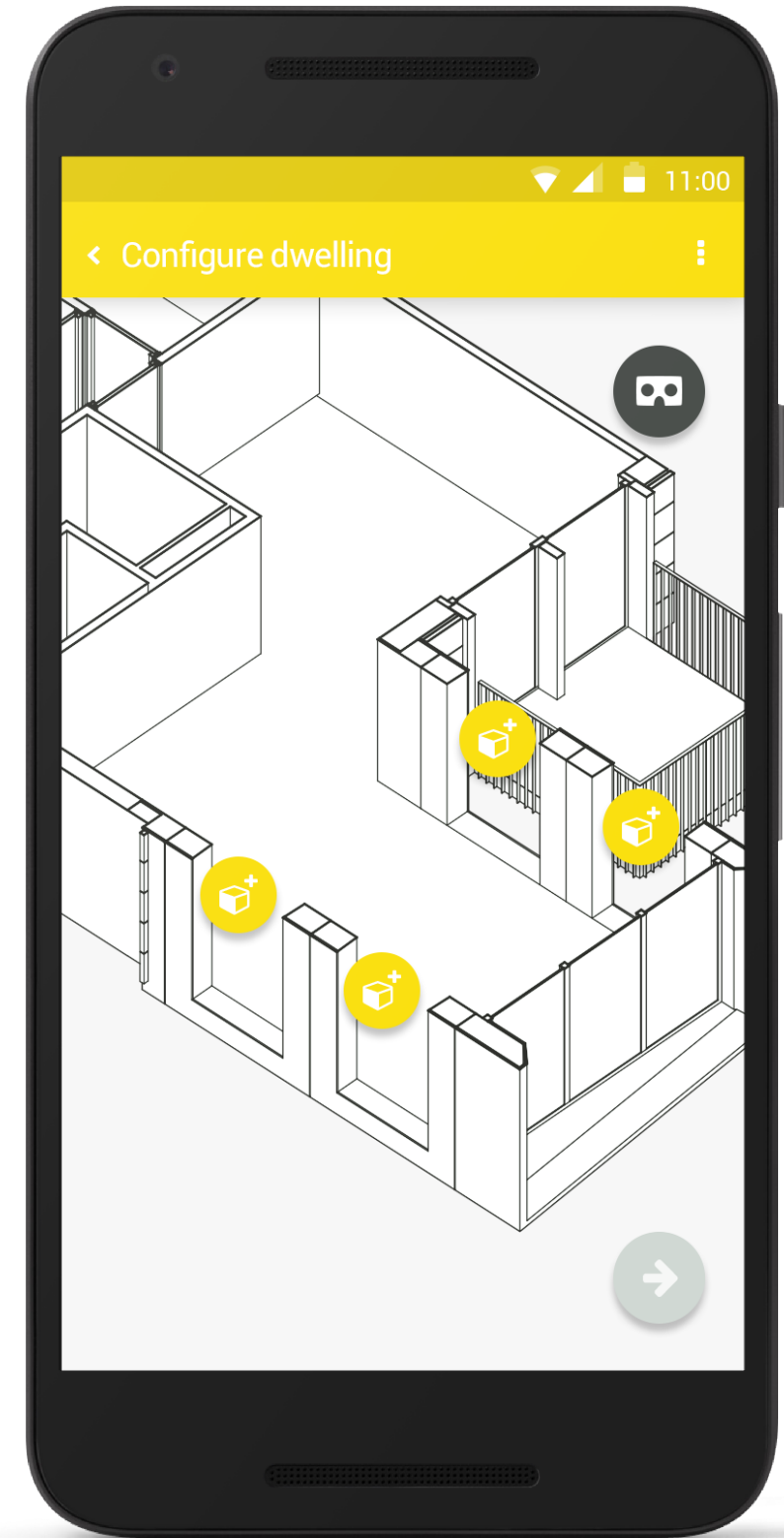
Hint: configure more parts



Dwelling

App: **zoom in on dwelling**

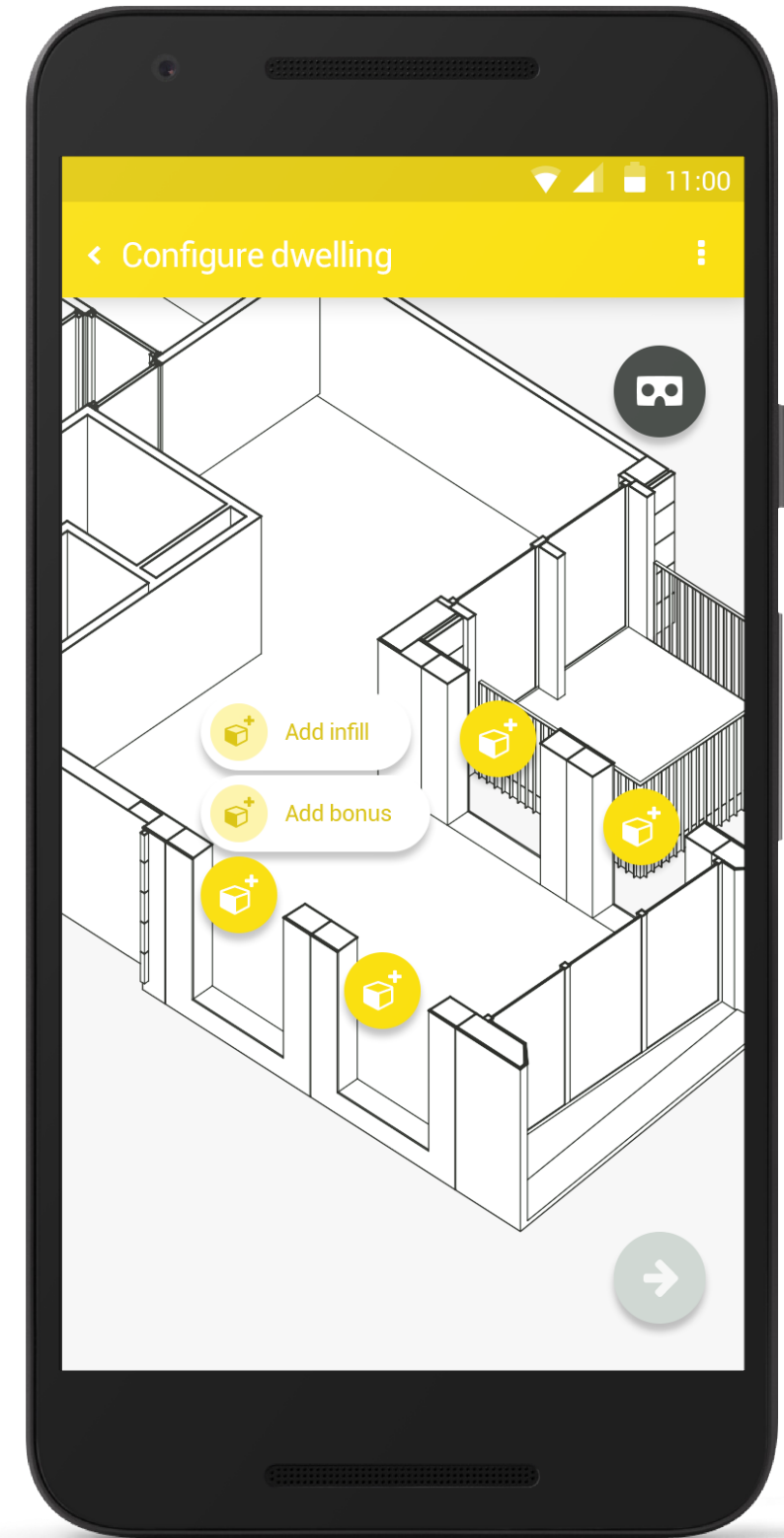
Overview of places for infills/bonusses



Dwelling

App: **add bonus #1**

Add infill or bonus -> bonus



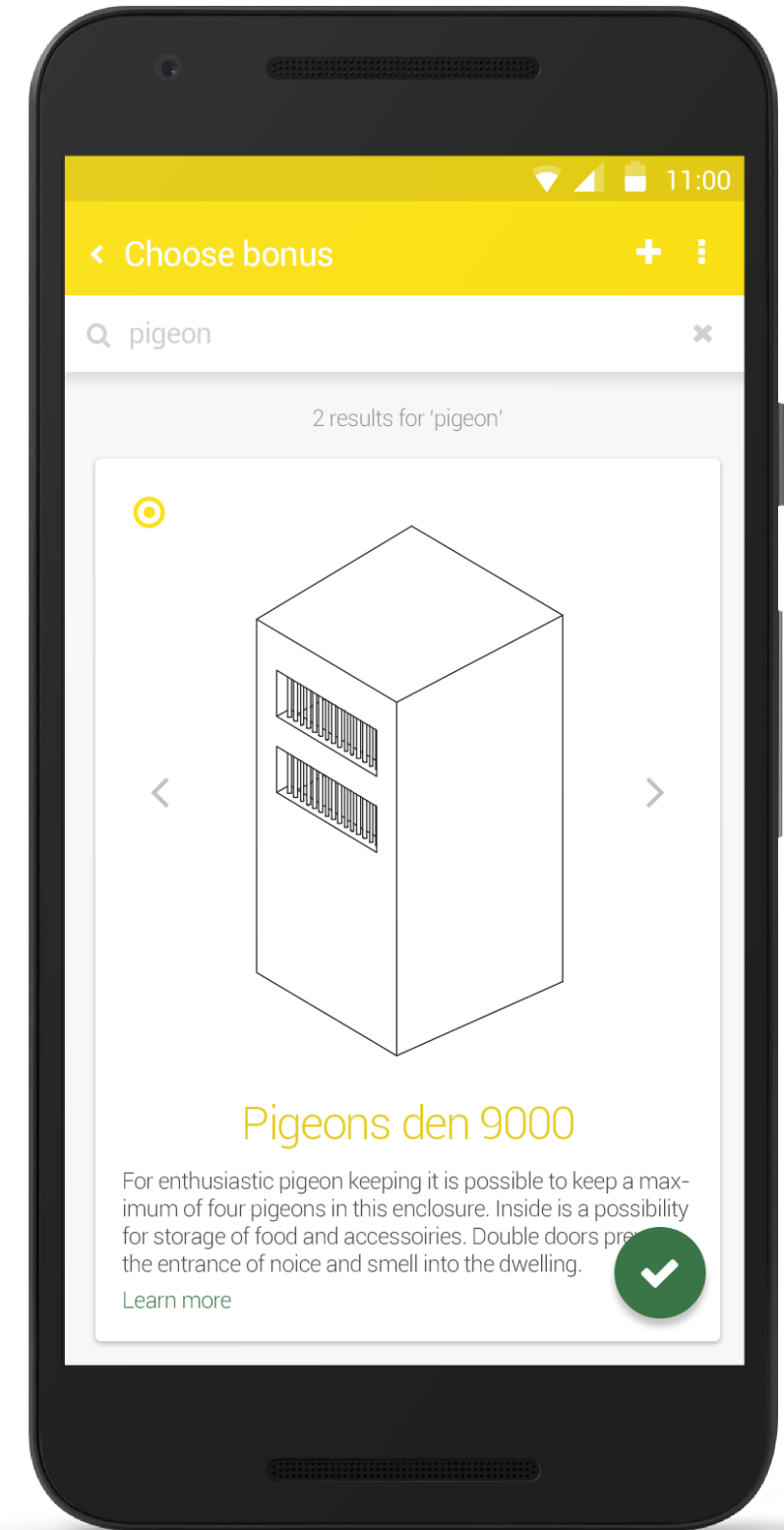
Dwelling

App: **search & select bonus #1**

Search for pigeon keeping bonus

Select preferred bonus

Finish action

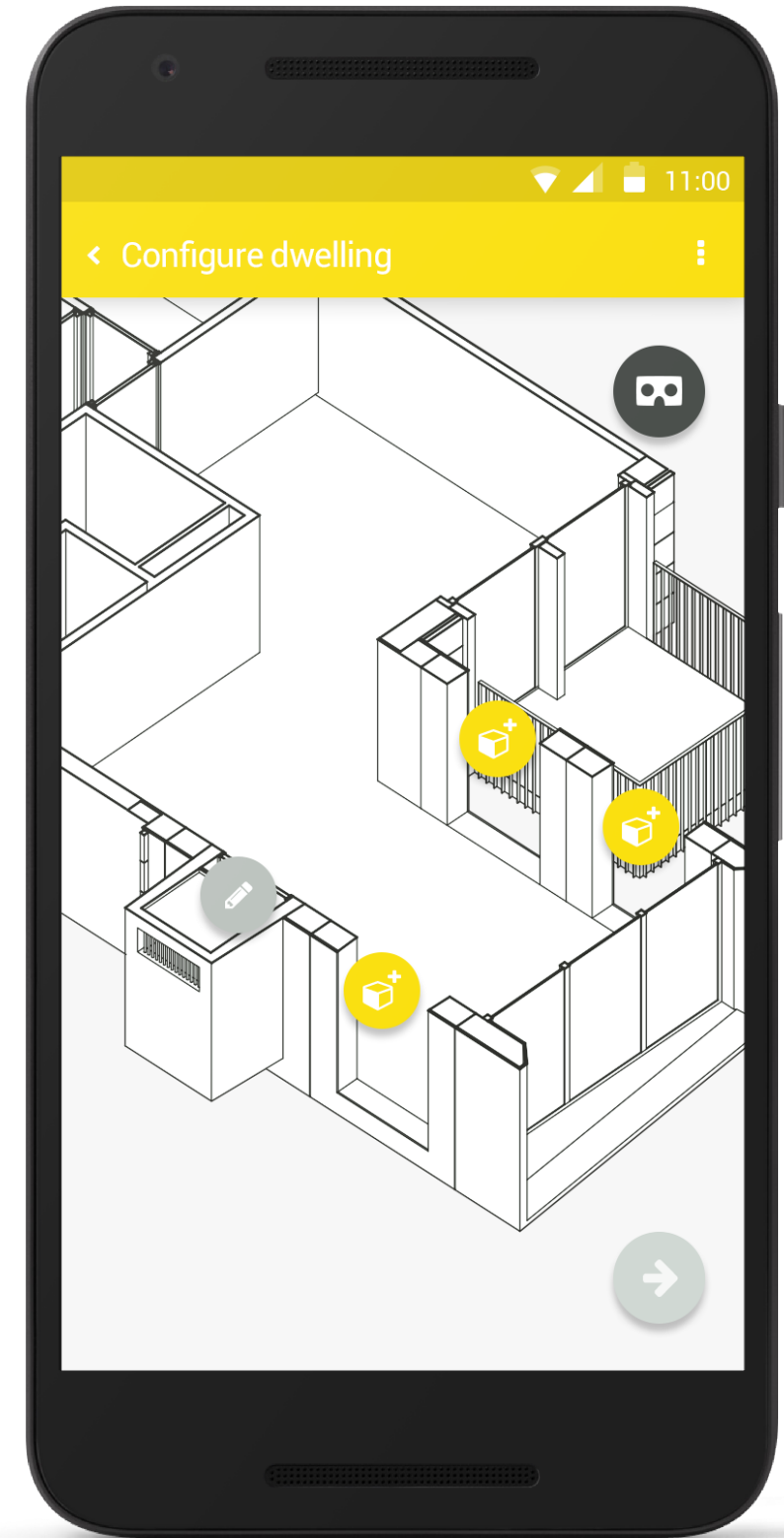


Dwelling

App: **add bonus #2**

Overview of result so far

Add another bonus



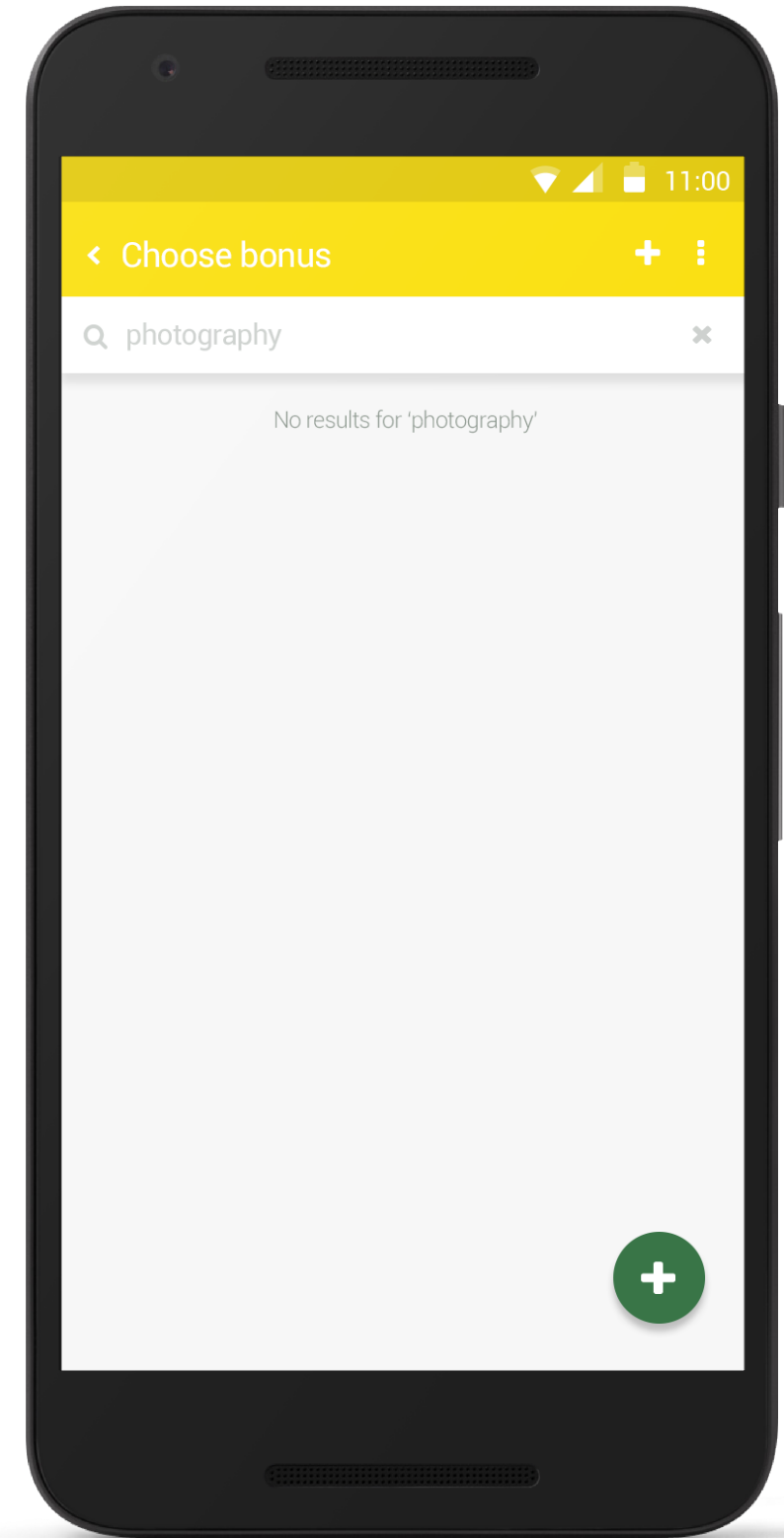
Dwelling

App: **search bonus #2**

Search for photography bonus

No results found

Request creation of new bonus



Dwelling

App: **submit bonus #2**

Give bonus a name

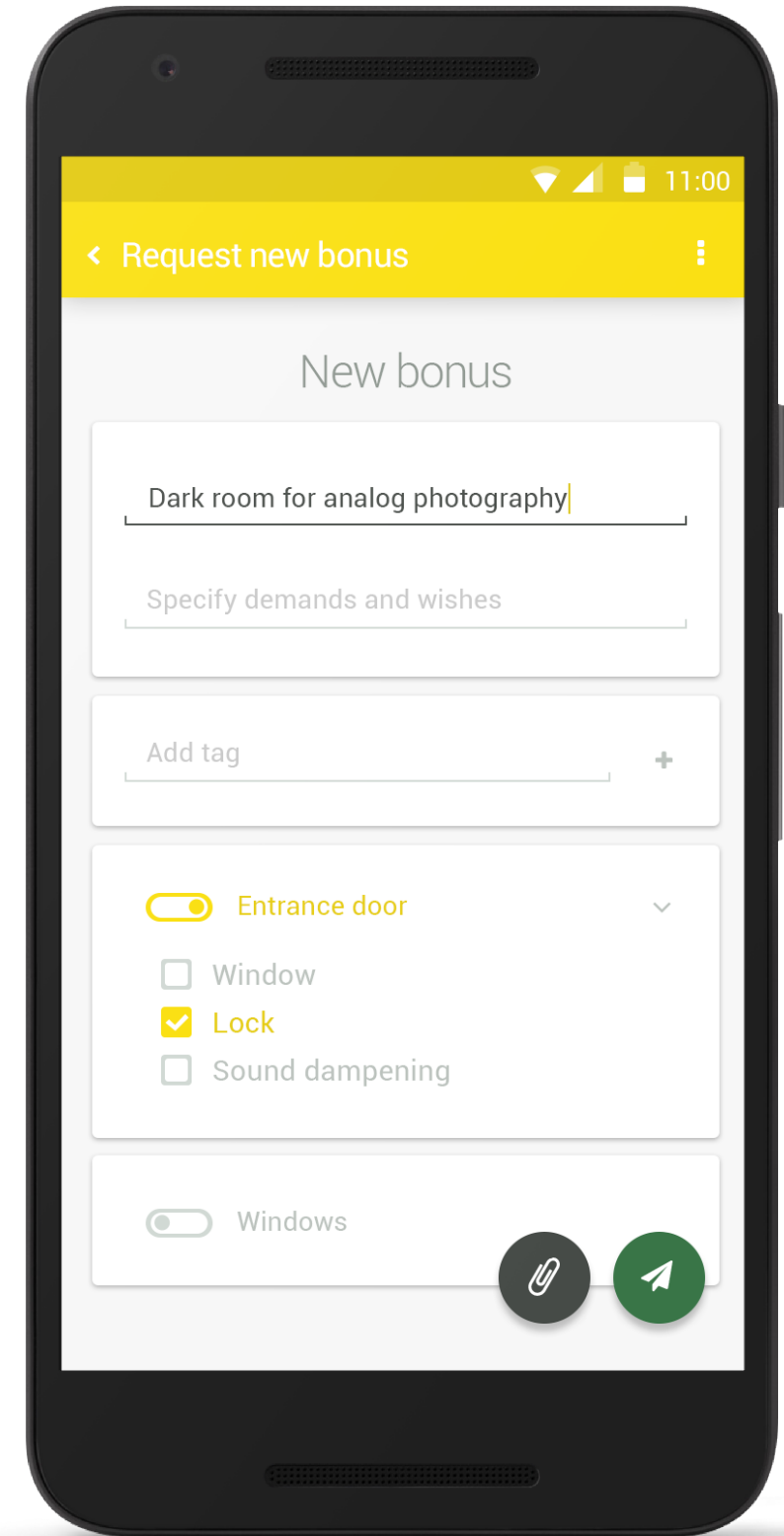
Add tags for clarity

Door options

Window options

Optional: add sketches of references

Submit request

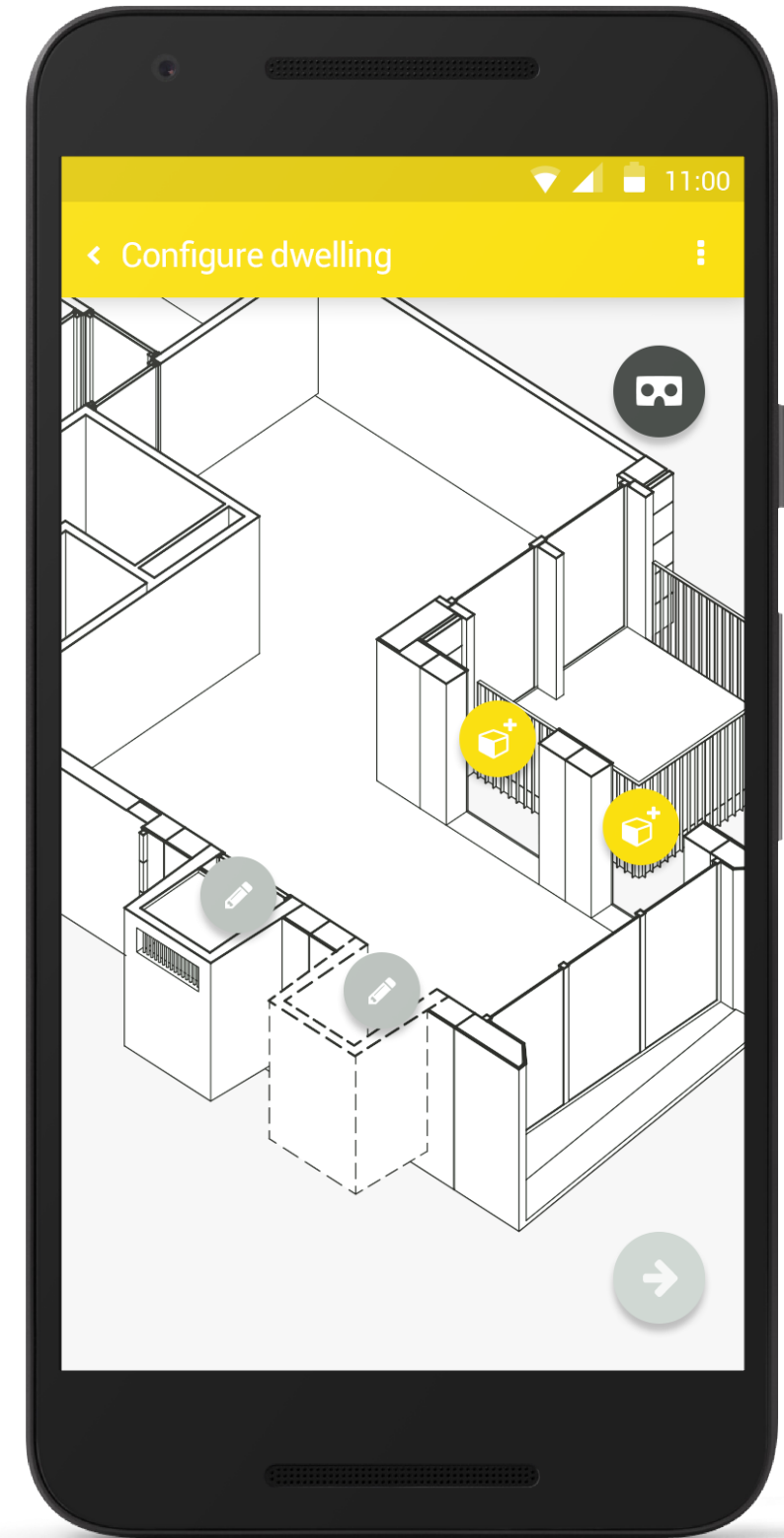


Dwelling

App: **add infill #3**

Overview of result so far

Add an infill

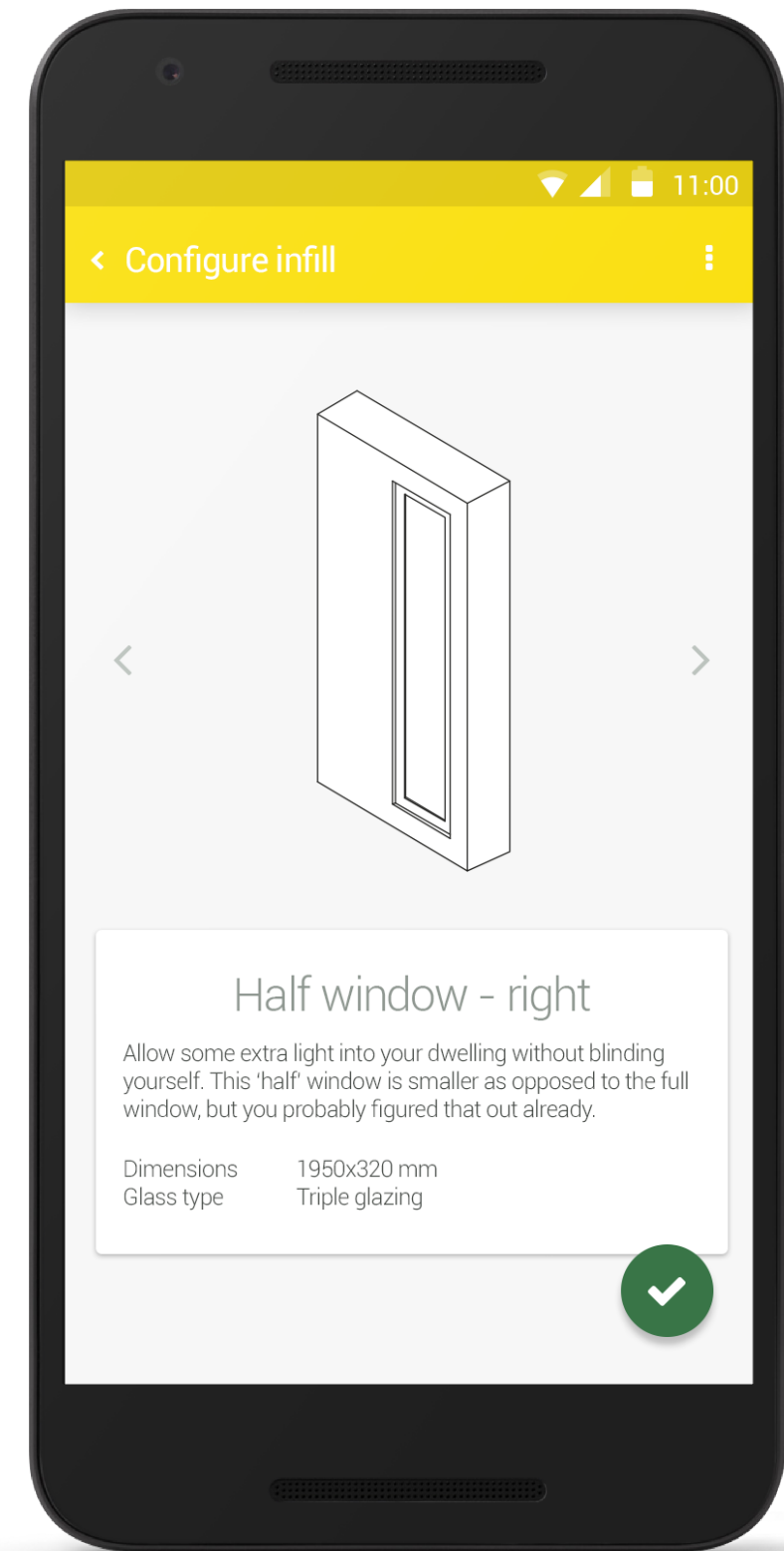
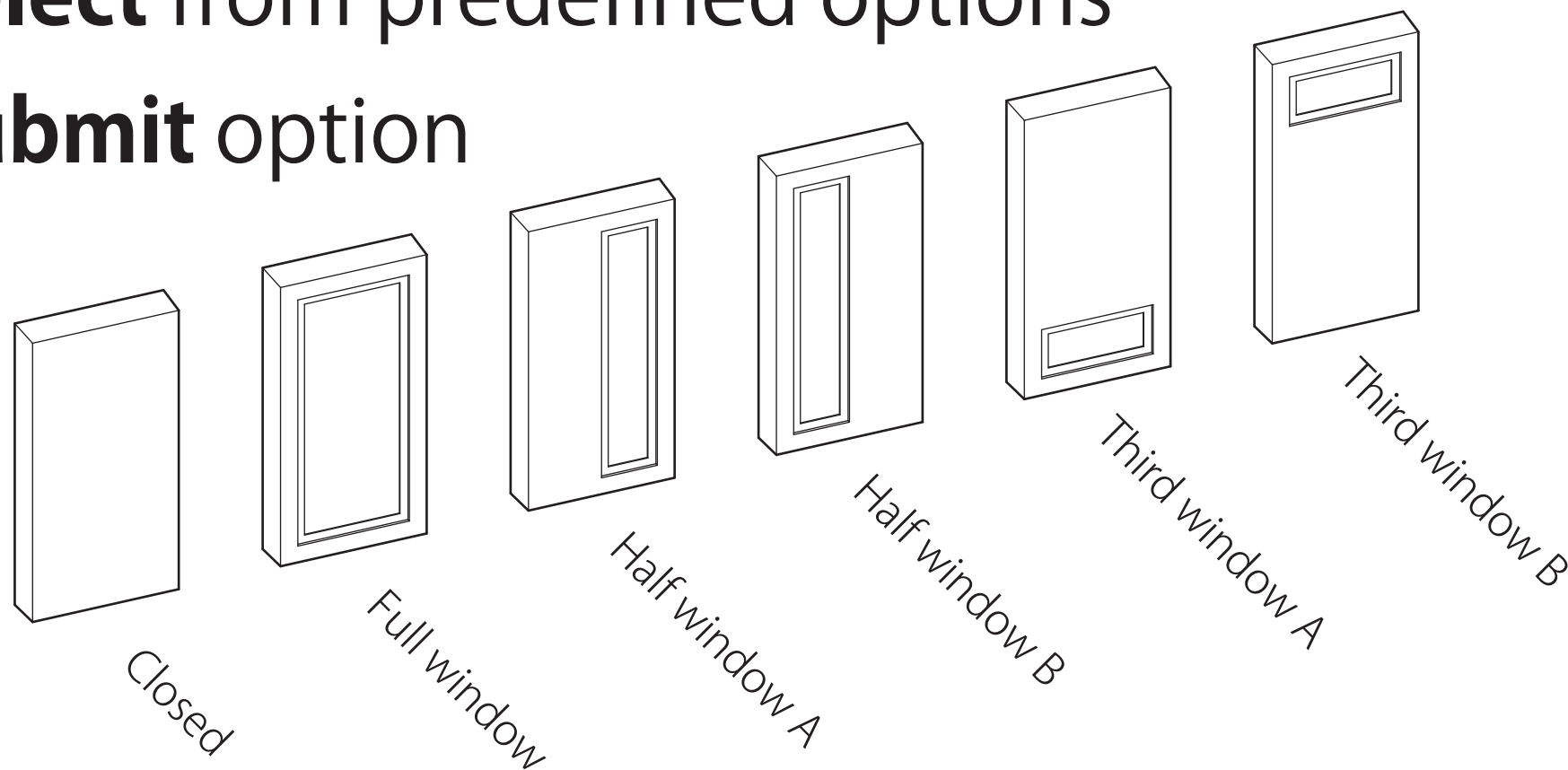


Dwelling

App: **add infill #3**

Select from predefined options

Submit option

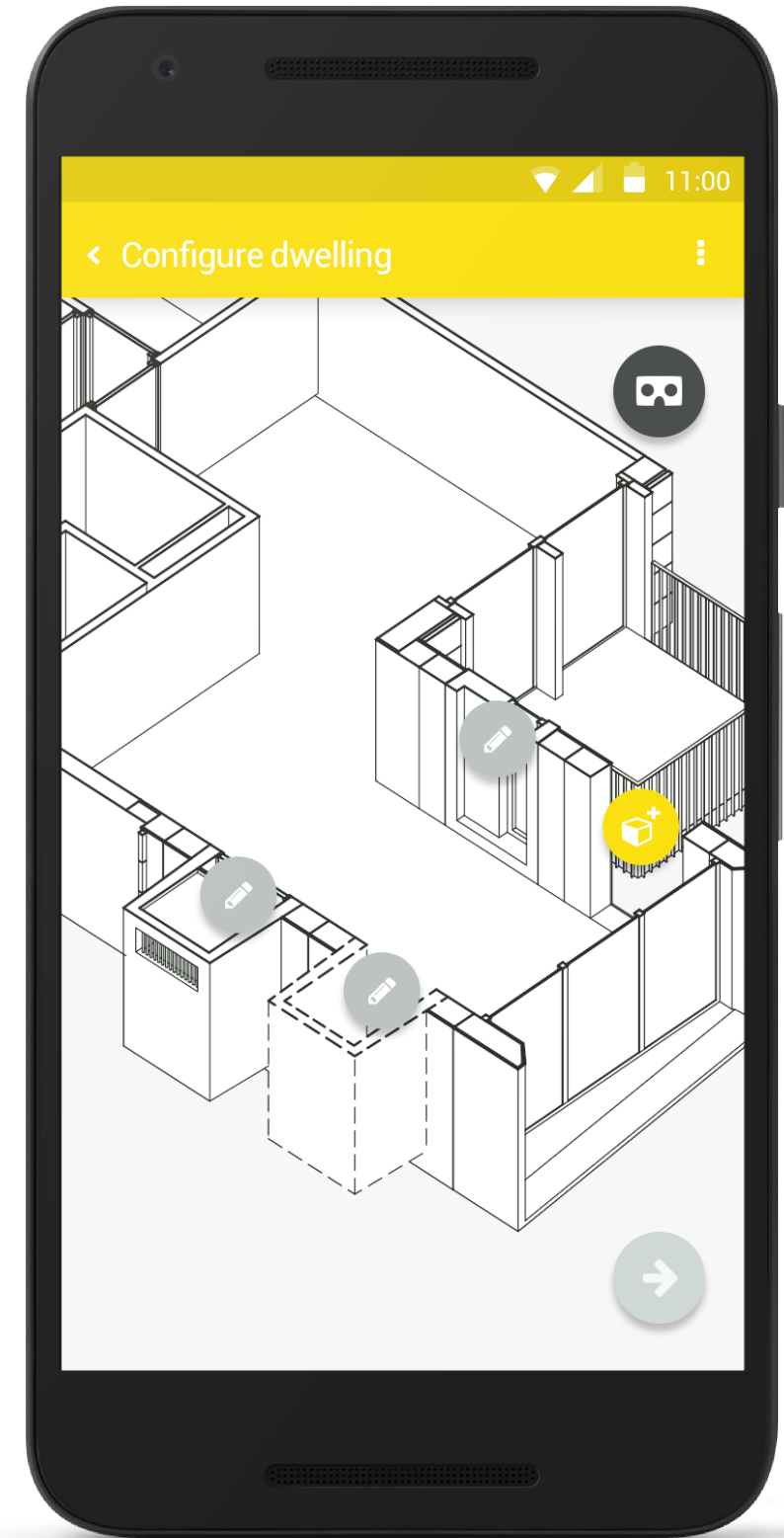


Dwelling

App: **add infill #4**

Overview of result so far

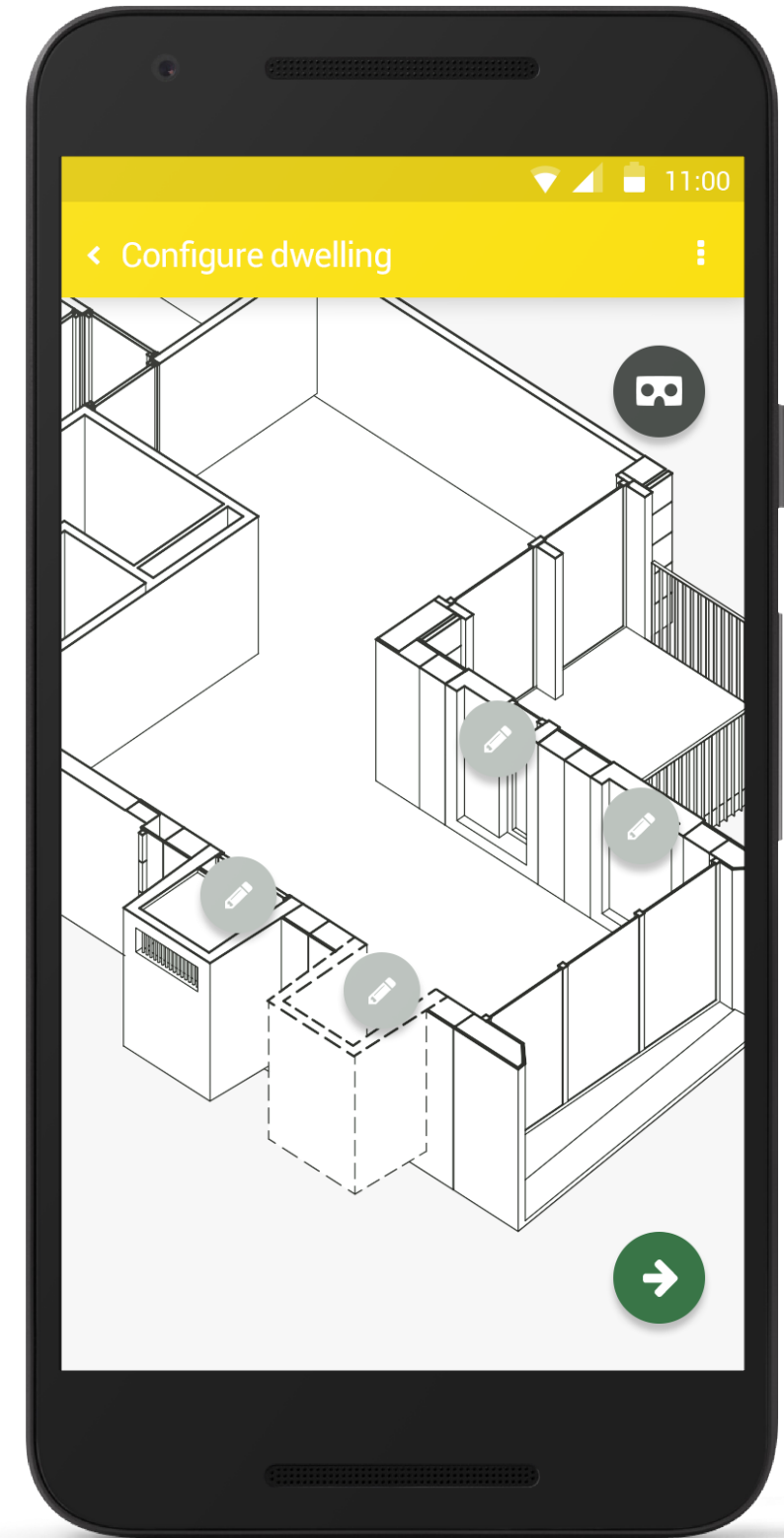
Add an infill



Dwelling

App: **configuration done**

All **optional spaces filled**
Continue configuration

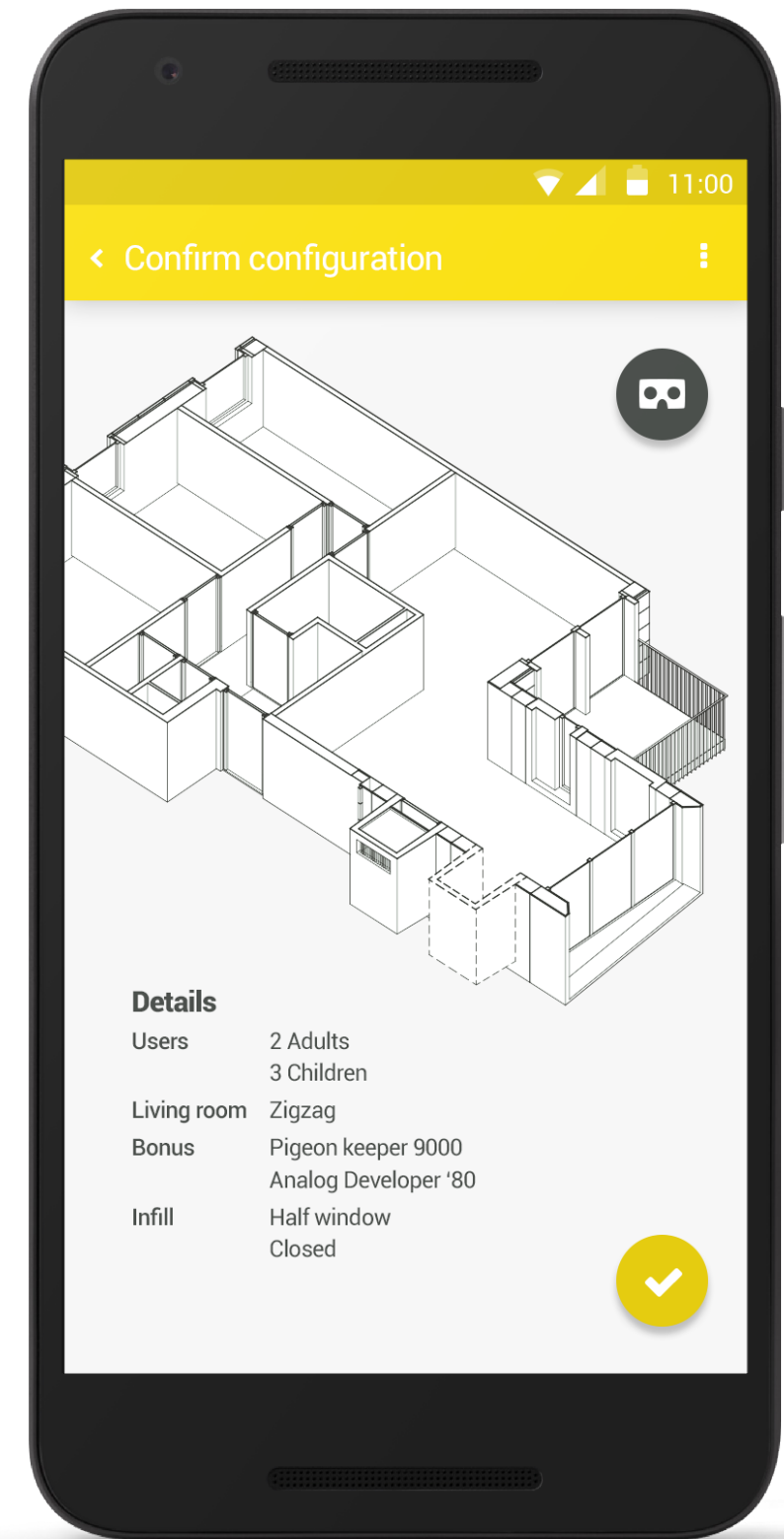


Dwelling

App: **check configuration**

Overview of result

List of **input data**

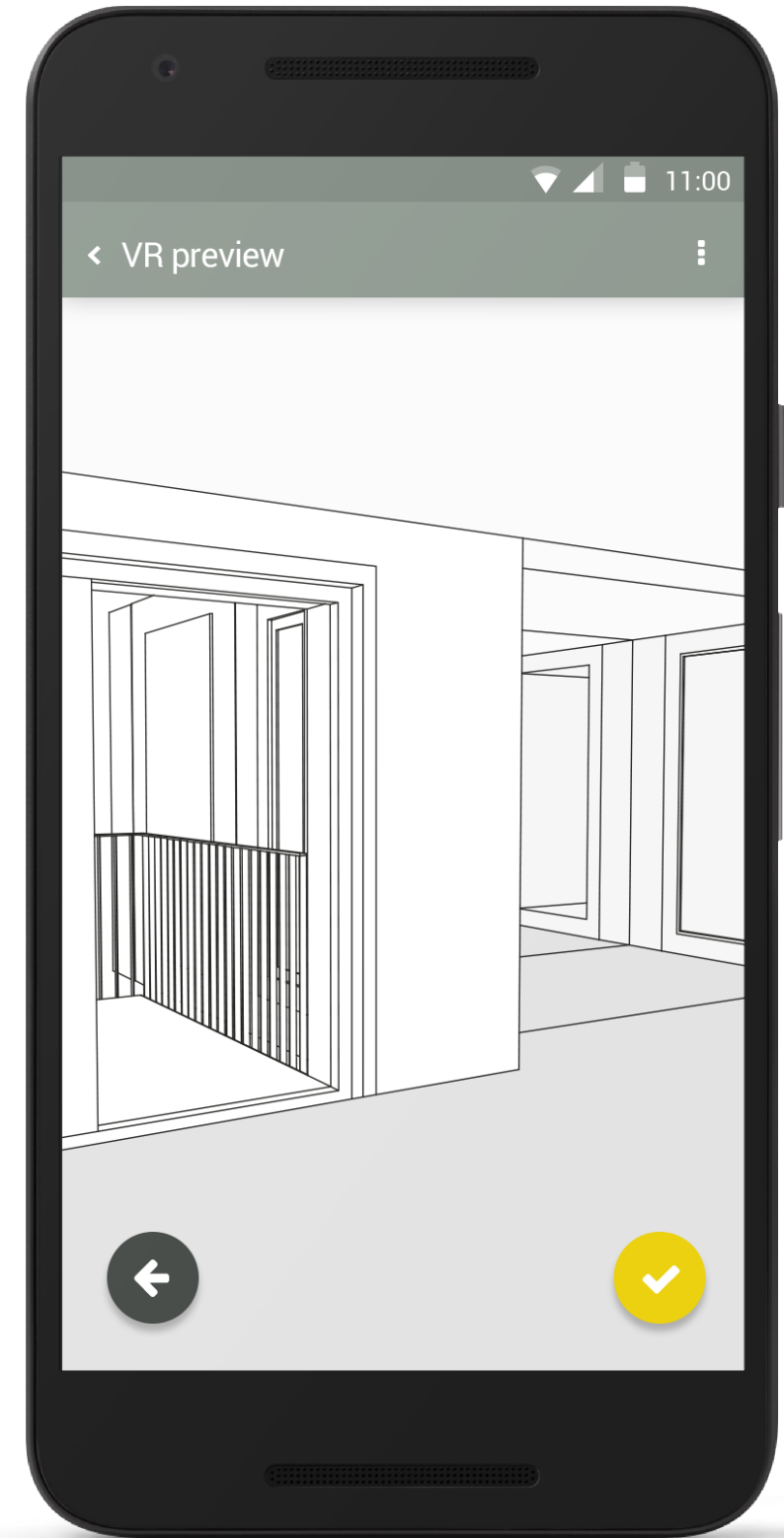


Dwelling

App: **get VR impression**

Overview of result in Virtual Reality

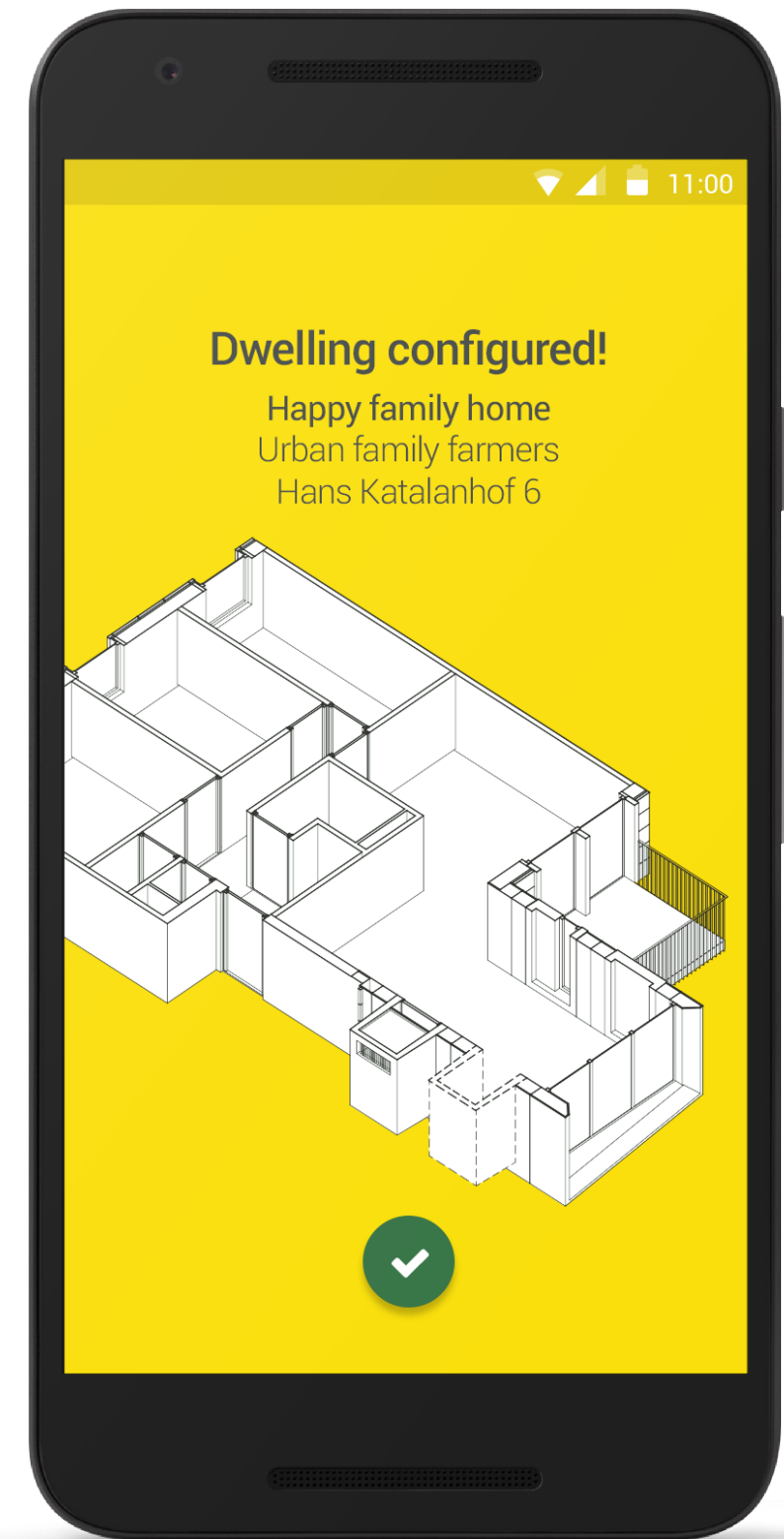
Submit configuration



Dwelling

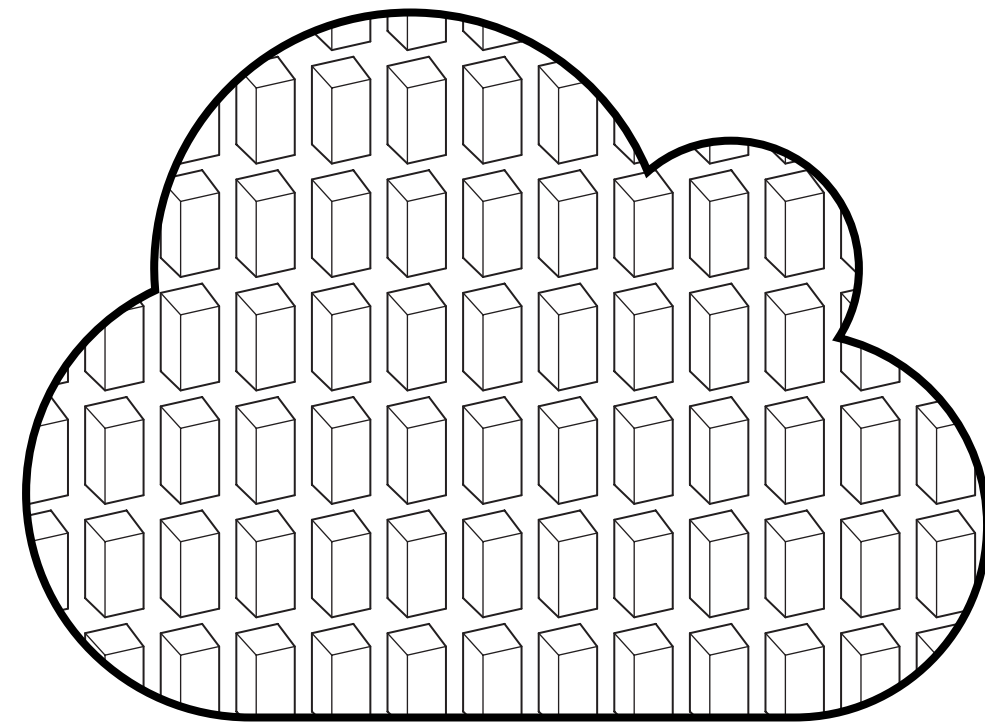
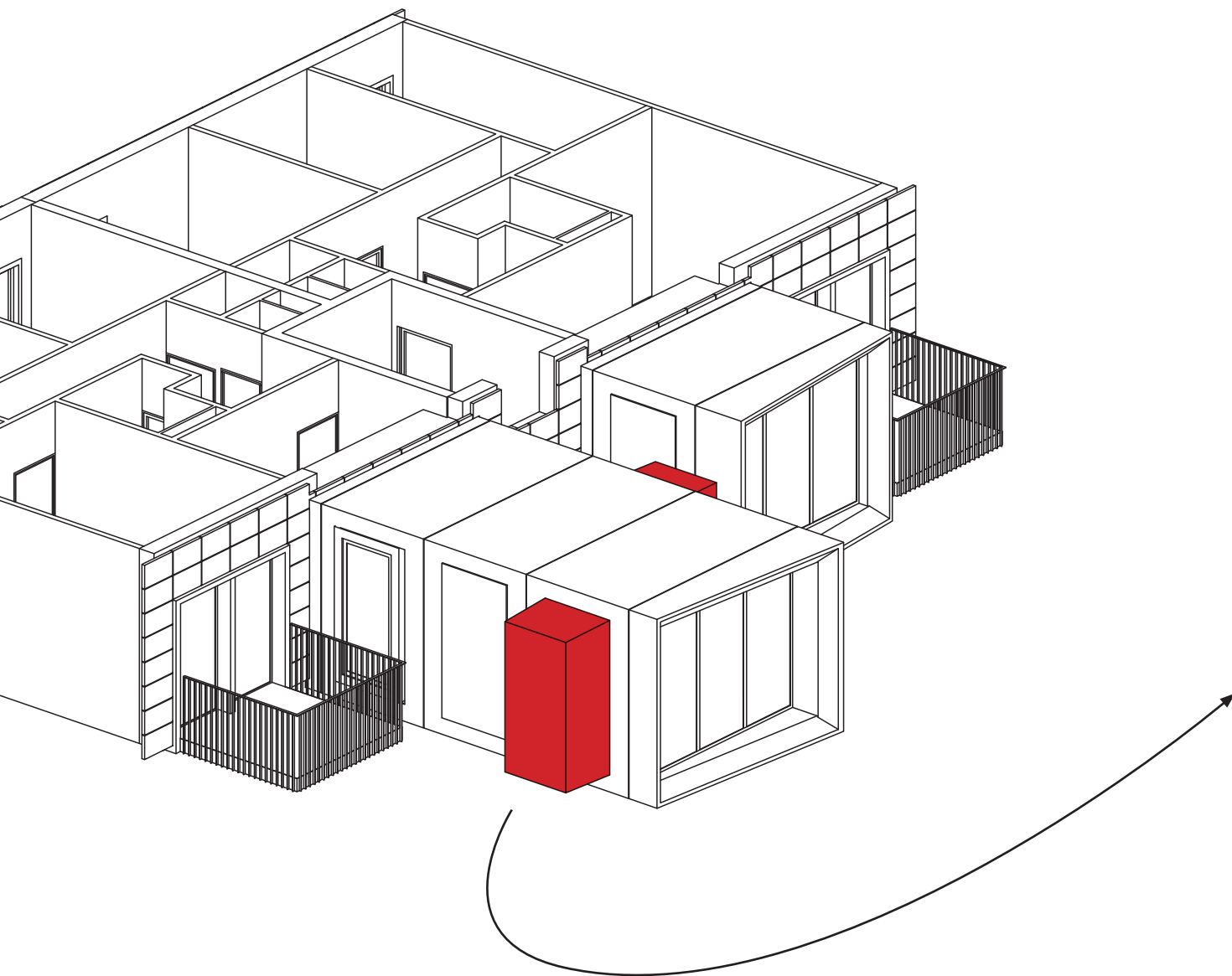
App: **all done!**

Confirmation



Modules

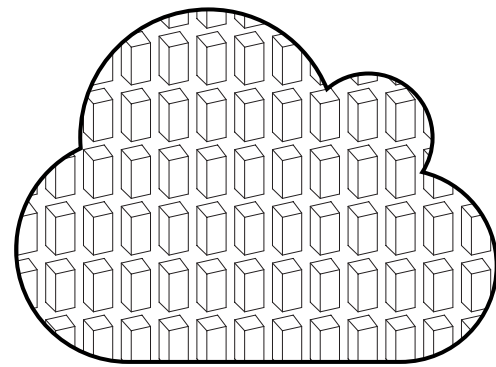
Module database



Module database

Modules

Module types

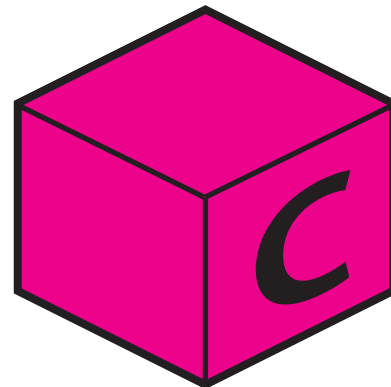


Cyber connected
Digital driven



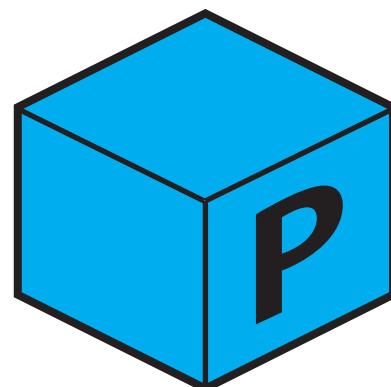
Generic

(Mass Production)



Customise

(Mass Customisation)

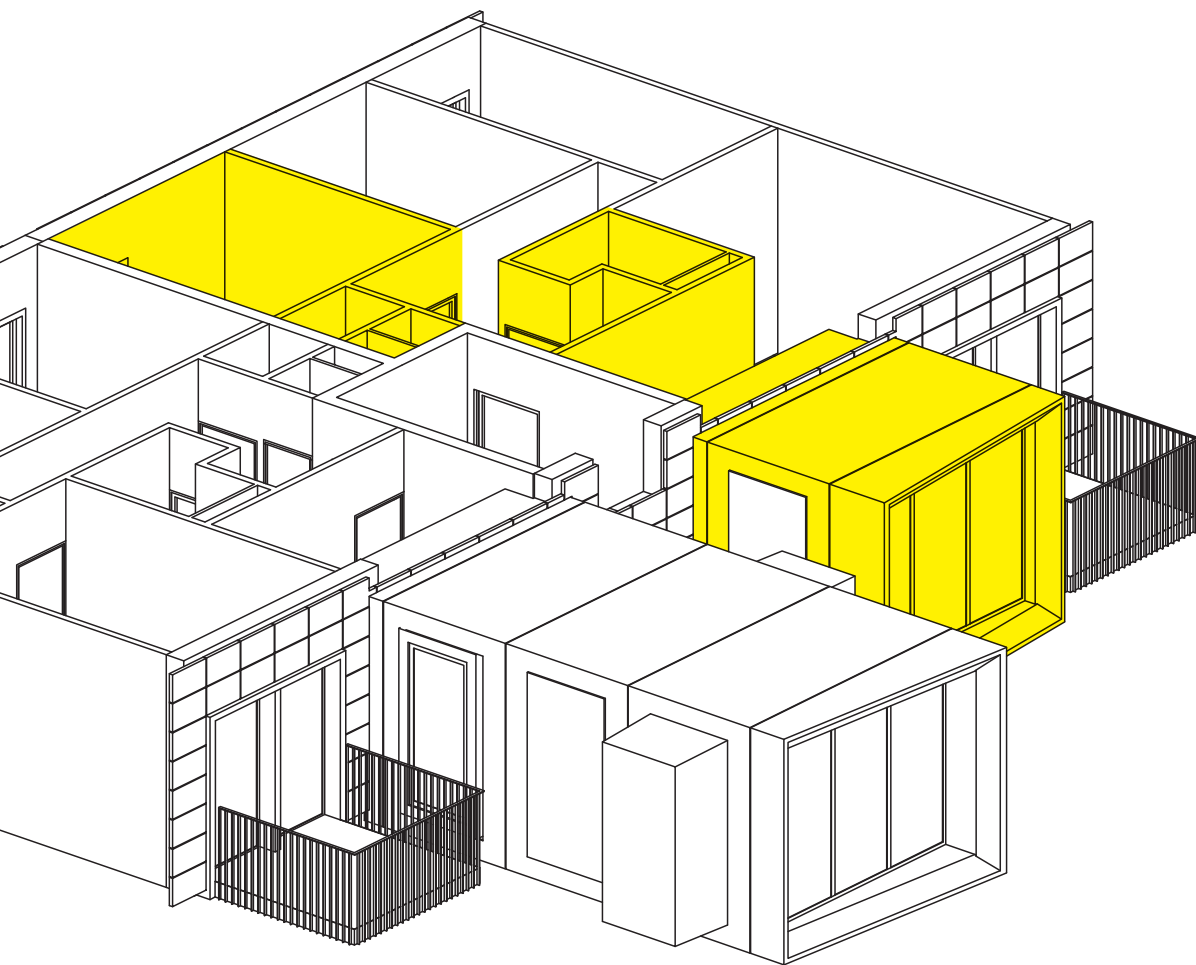


Personalise

(Mass Personalisation)

Modules

Generic



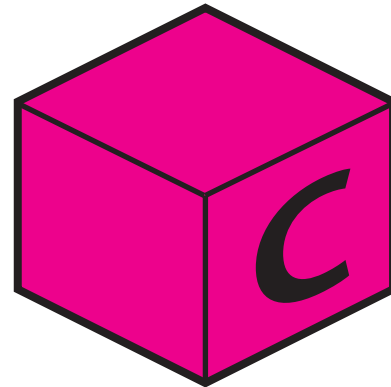
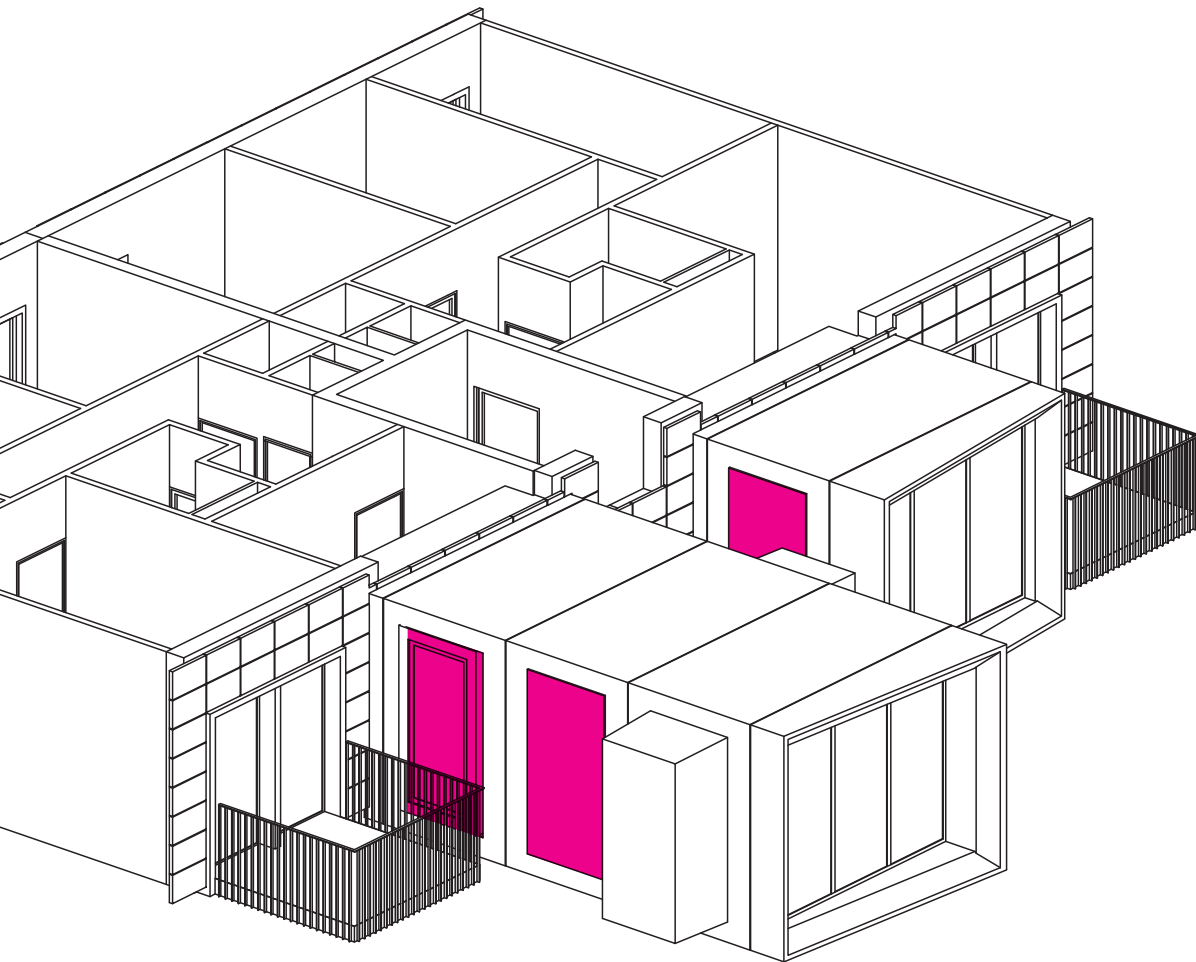
Platform modules

(Mass Production)

General functions
Master bedroom, toilet,
bathroom
Connector module
Module
End window

Modules

Customisation



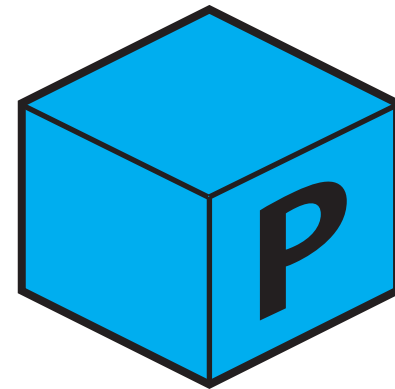
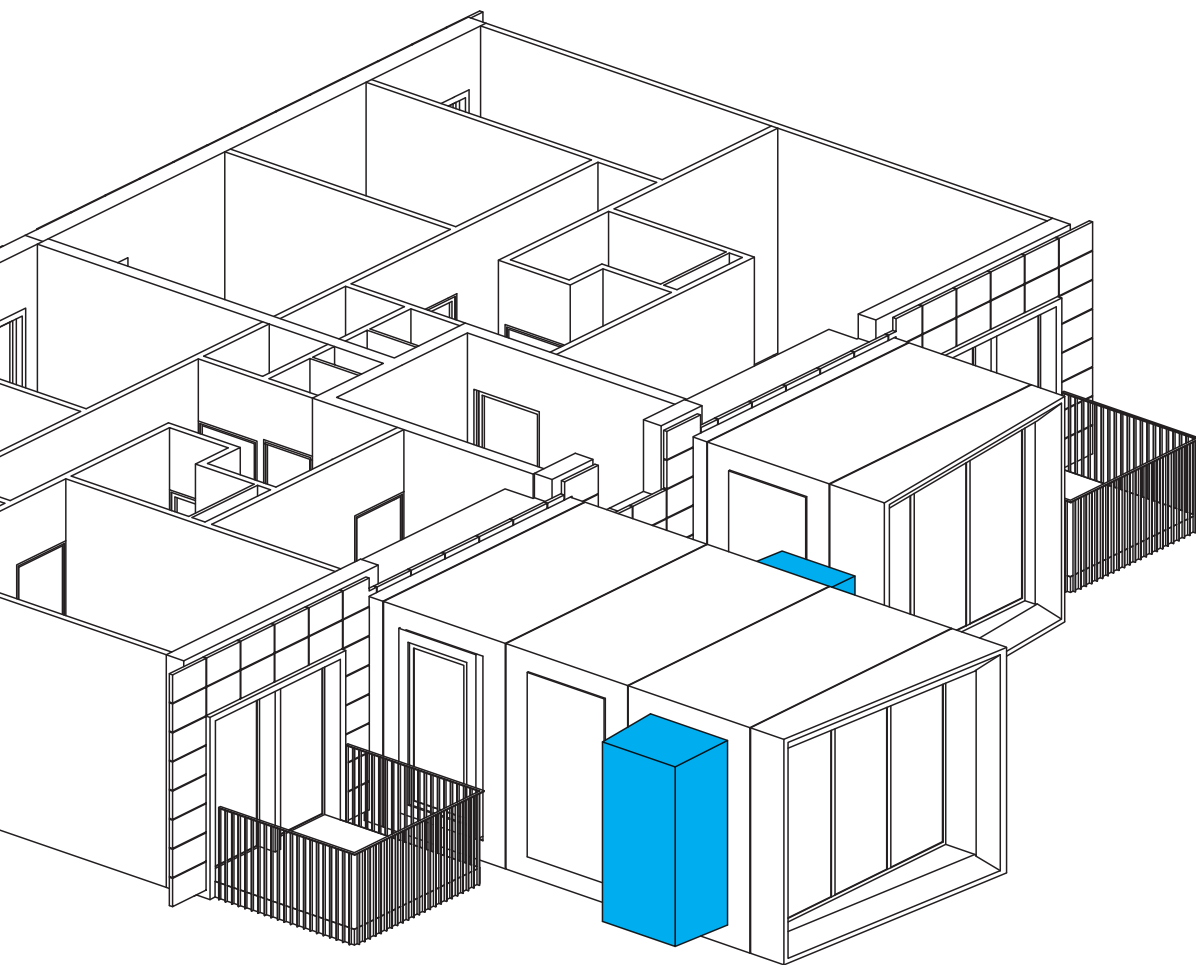
Customised mod.

(Mass Customisation)

Infill options

Modules

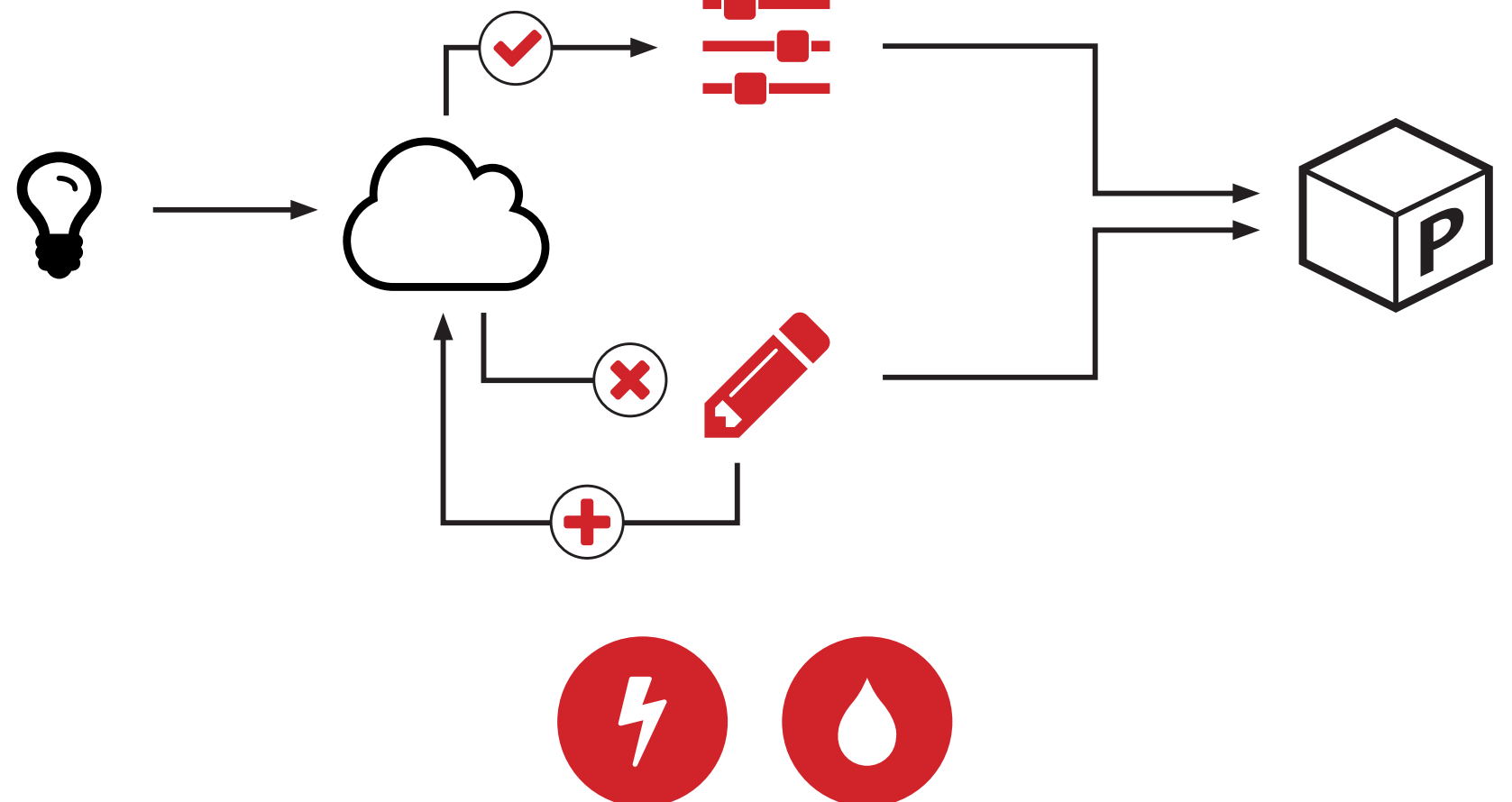
Personalisation



Personalised mod.

(Mass Personalisation)

Bonusses



Modules

Personalisation: **paradigm parts**

Direct digital manufacturing

User involvement: personalisation

Demand driven

Open platform

Cyber connected

File to factory



Modules

Personalisation: **production methods**

Built environment & direct digital manufacturing?

3D printing plastics & concrete

- Plastic: unknown as building material
- Concrete for rough building parts

CNC milling: more advanced

- Proven technology
- Wood is common material

Modules

Personalisation: **production methods**

Built environment & direct digital manufacturing?

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Adaptability

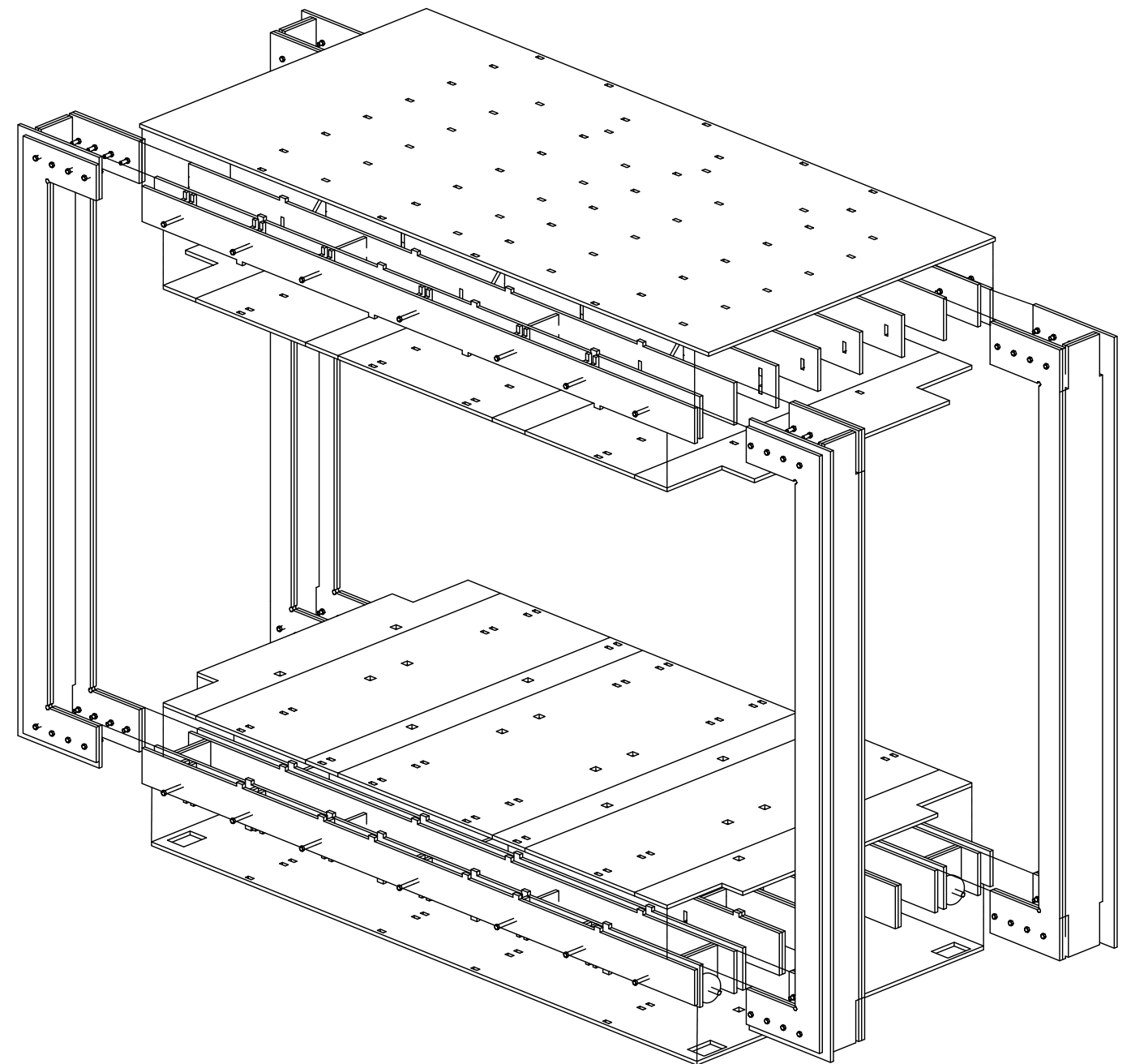
Flexible building: **modules, infills & bonuses**

Friction fit, slim tolerances

Less permanent **joints**

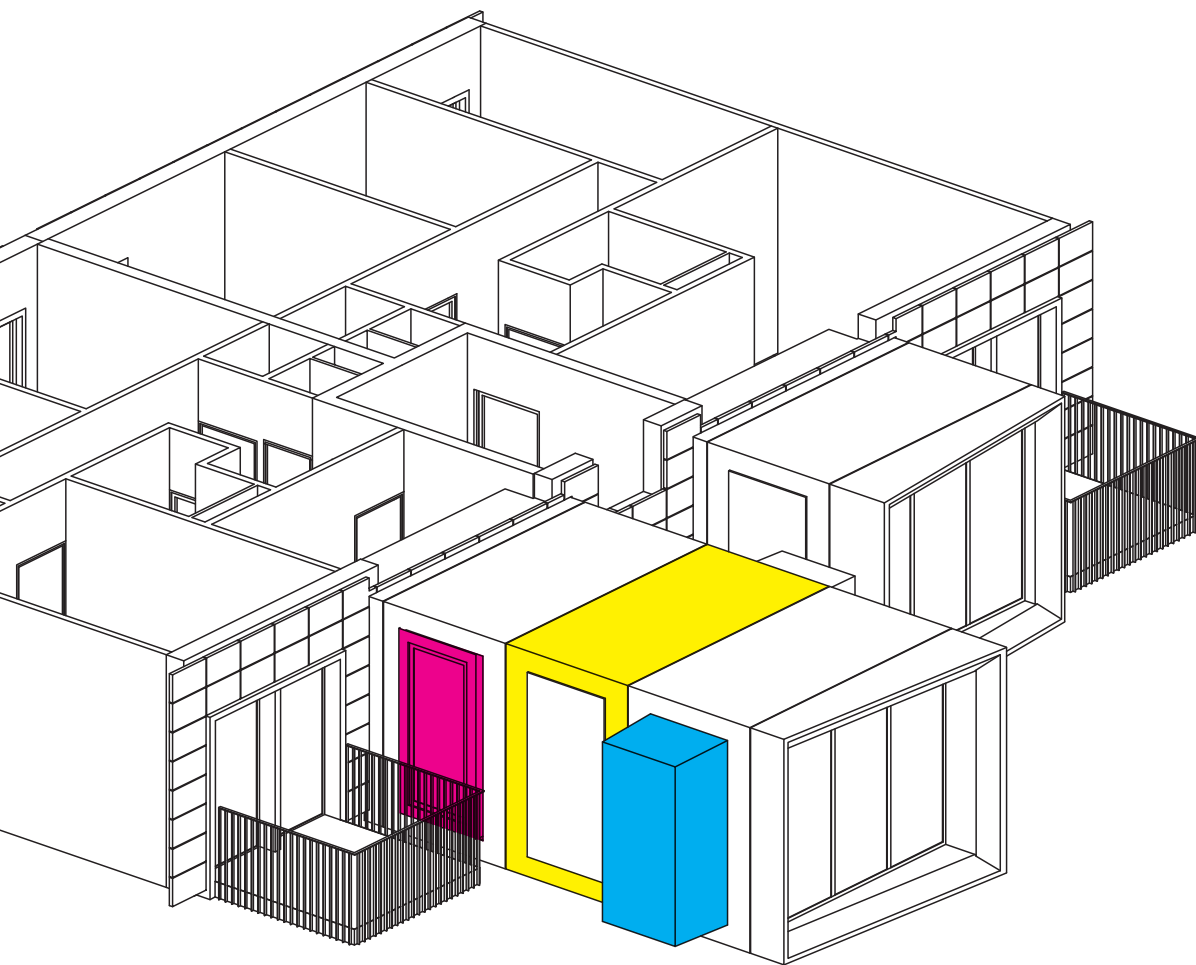
Possible to **disassemble**

Store as smaller parts



Adaptability

Flexible building: **modules, infills & bonuses**



Adapt dwelling over lifetime

Evolving user can stay

More possible **target groups**

Re-use large portion of building

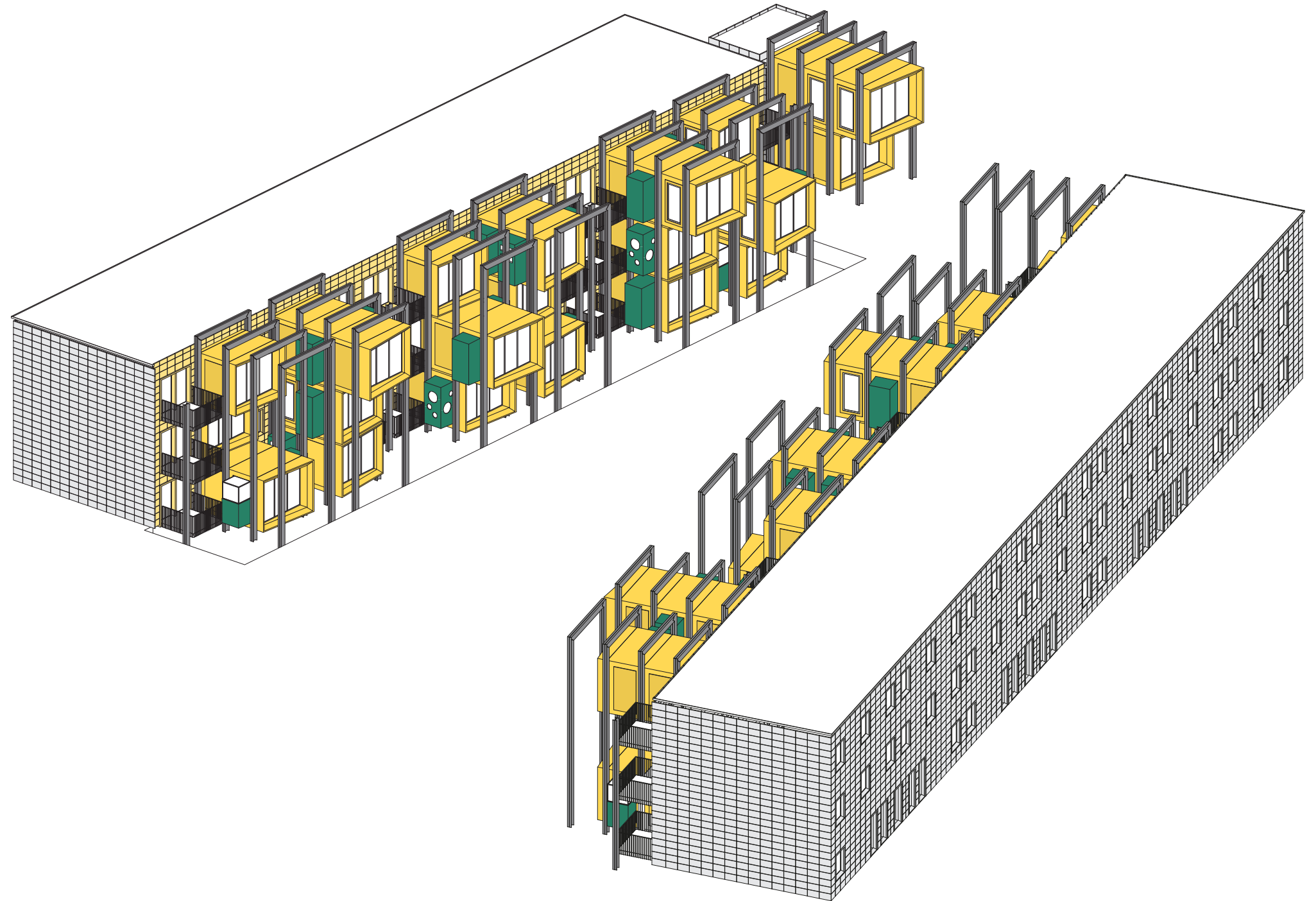
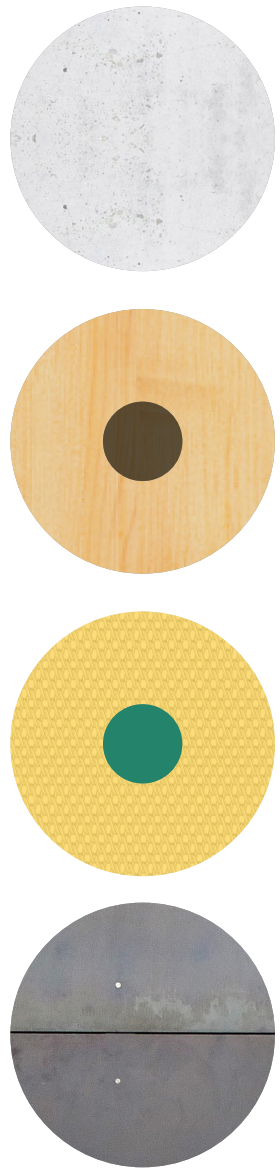






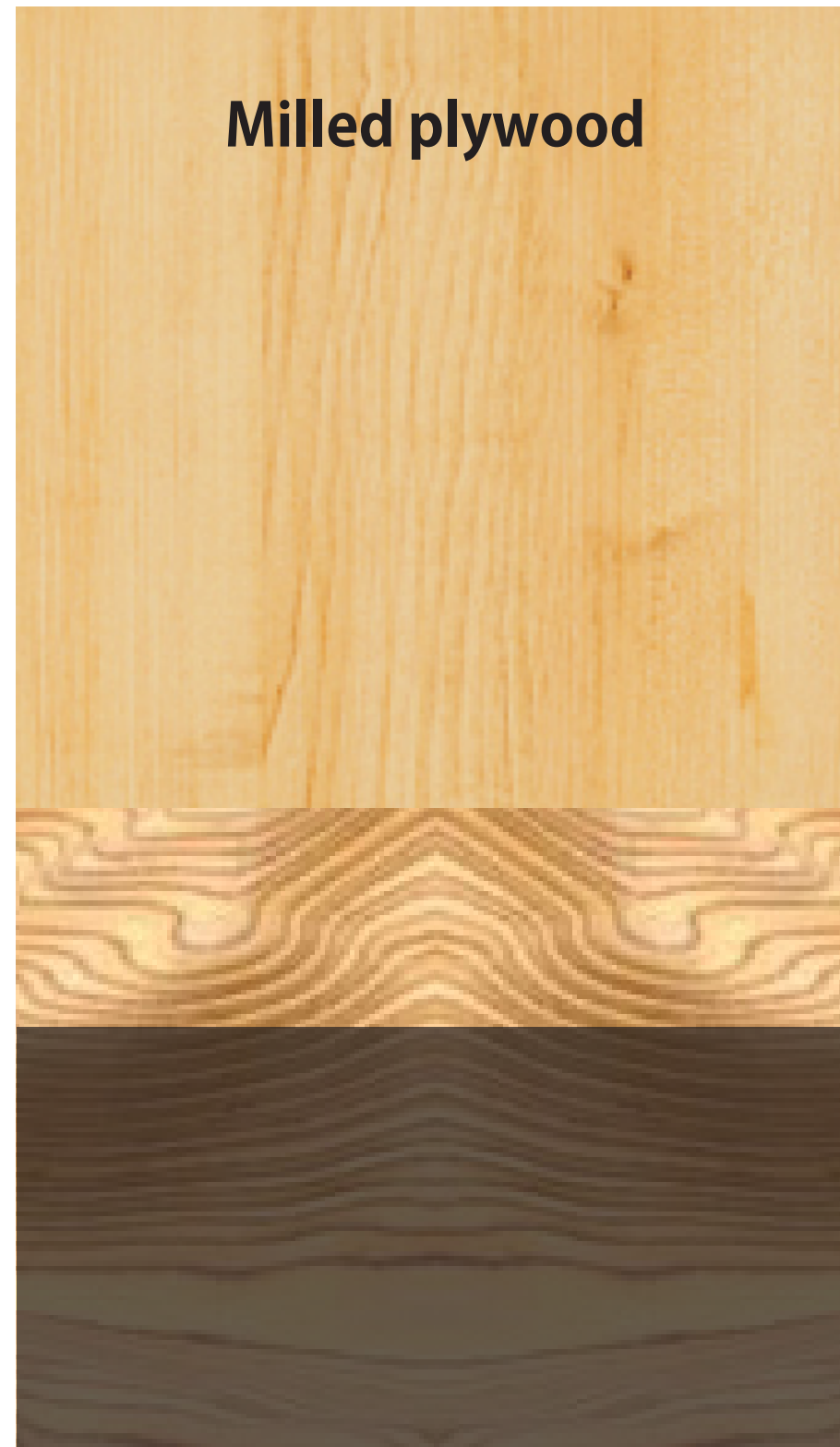
Materialisation

Overview: **combined colours**



Materialisation

Scheme #1: **outer facade**



Materialisation

Scheme #2: **inner facade**

Tensioned fabric

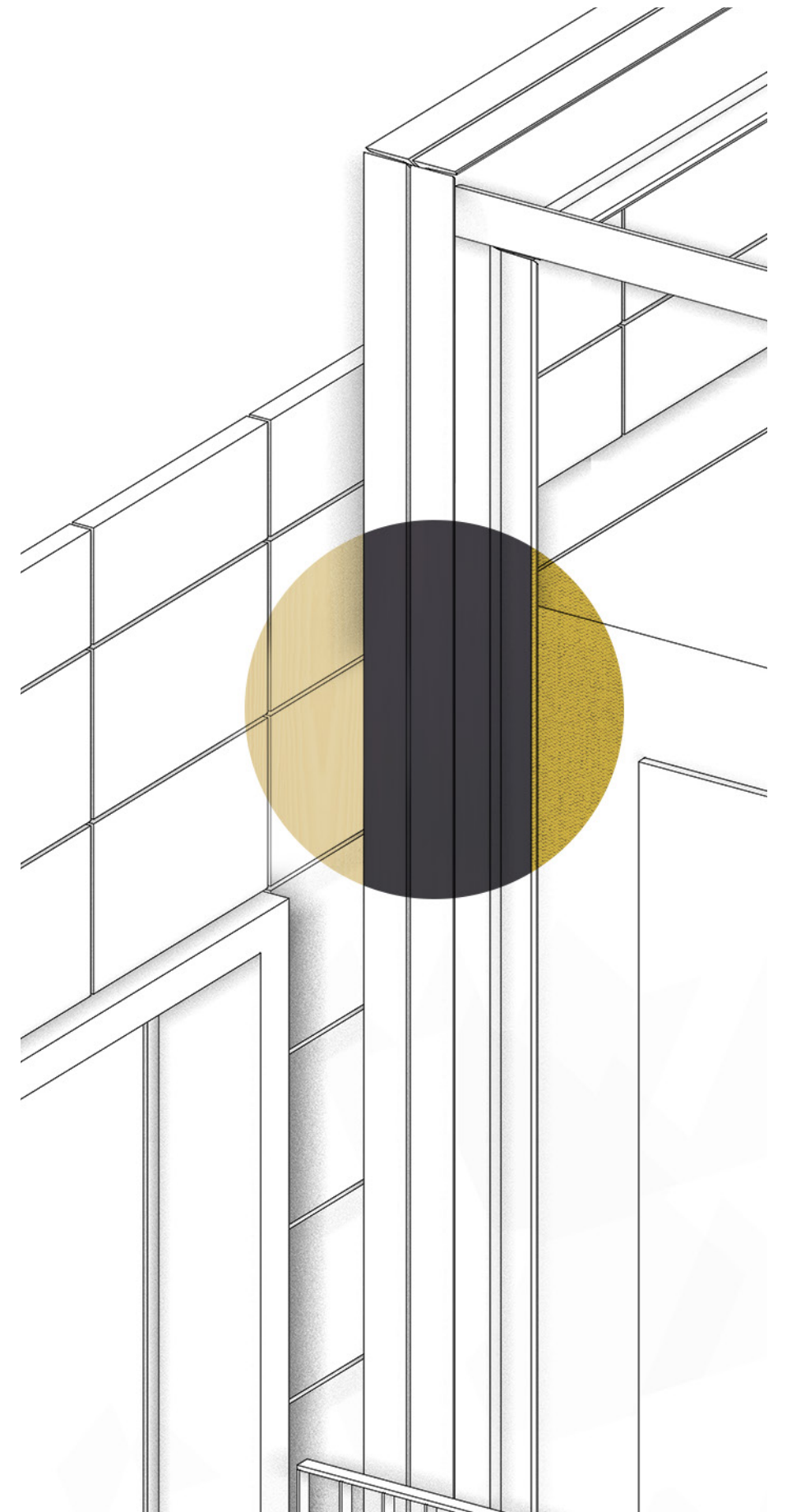
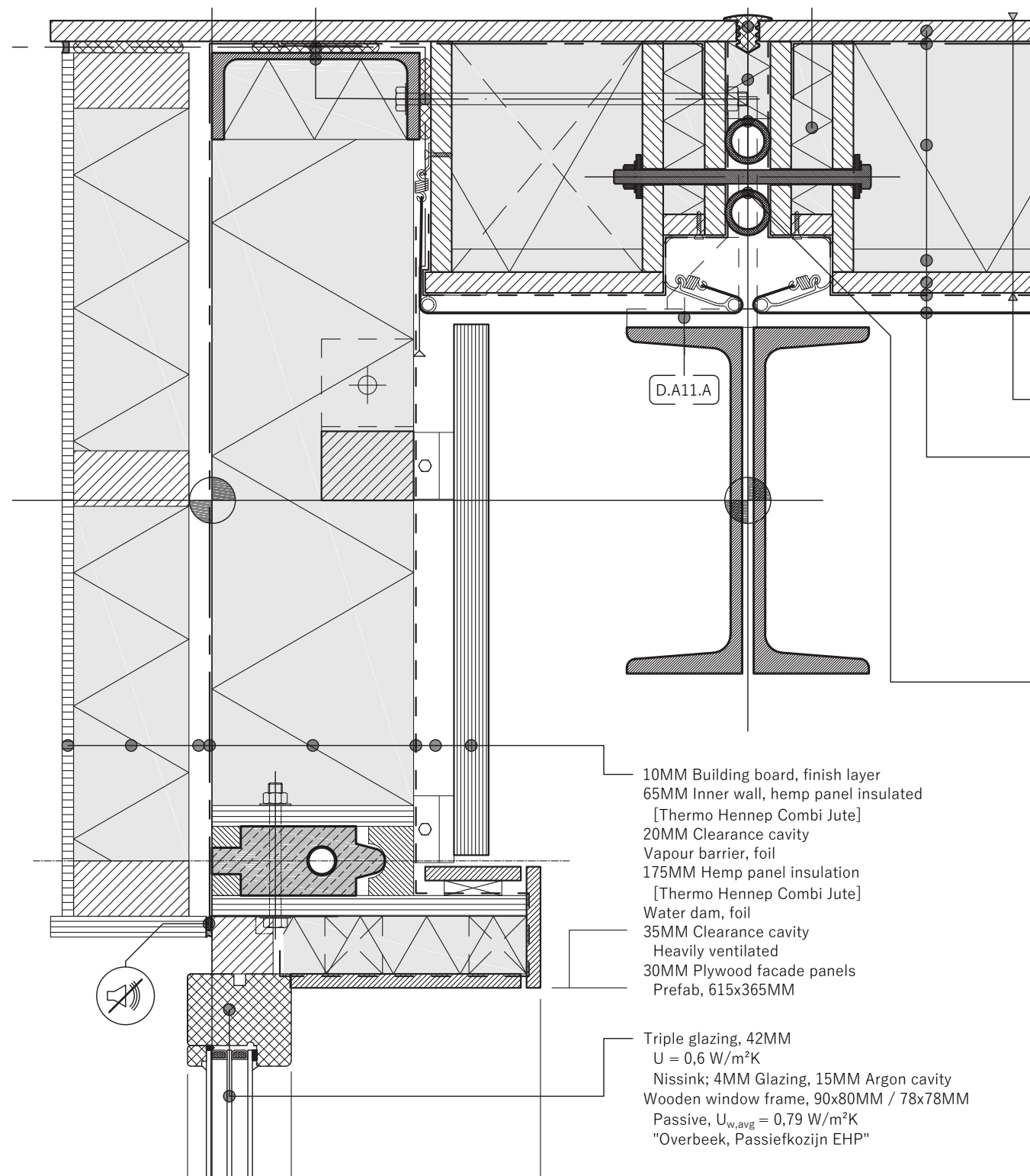
Milled plywood

Bare steel, lacquered

Painted

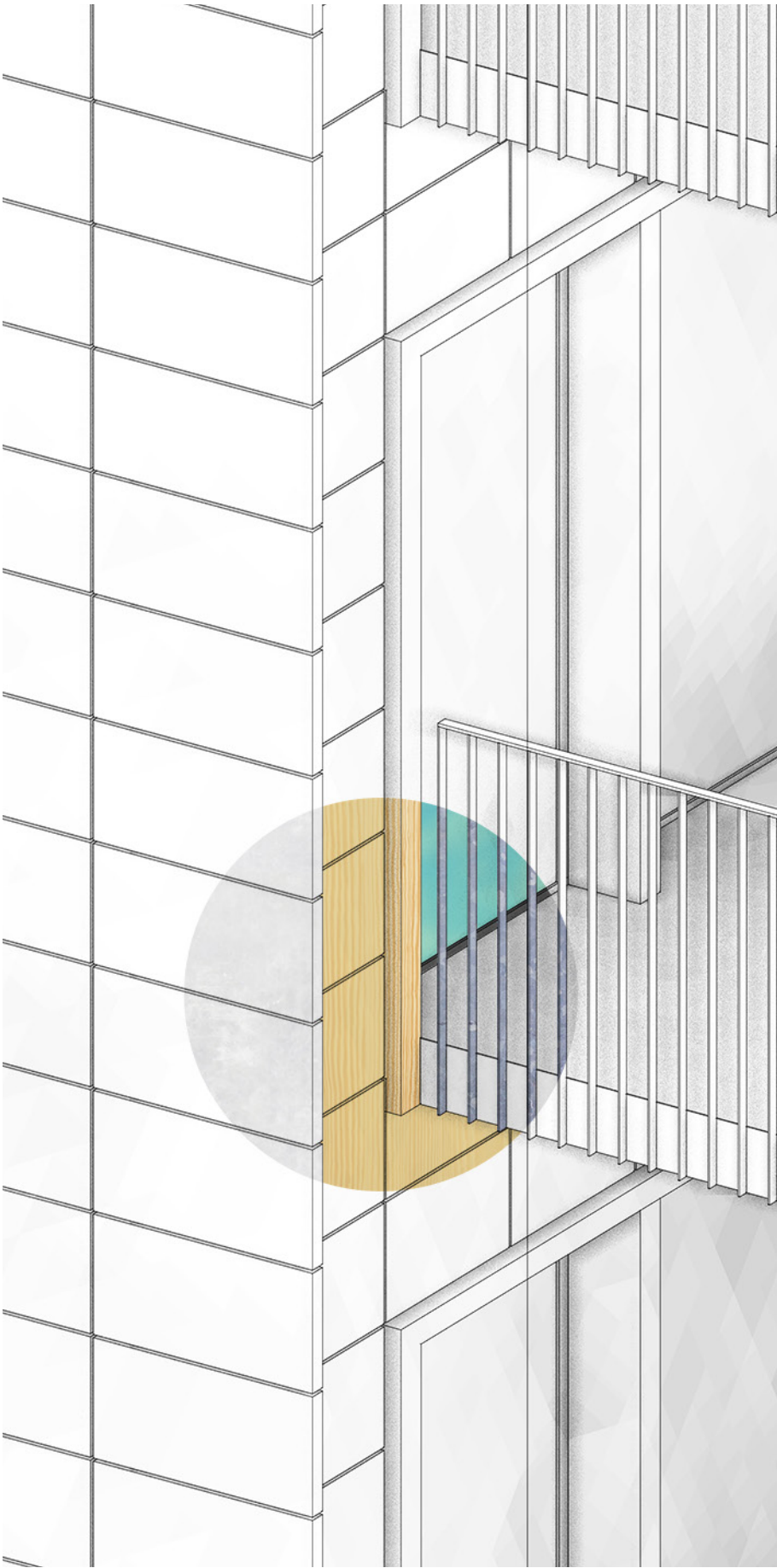
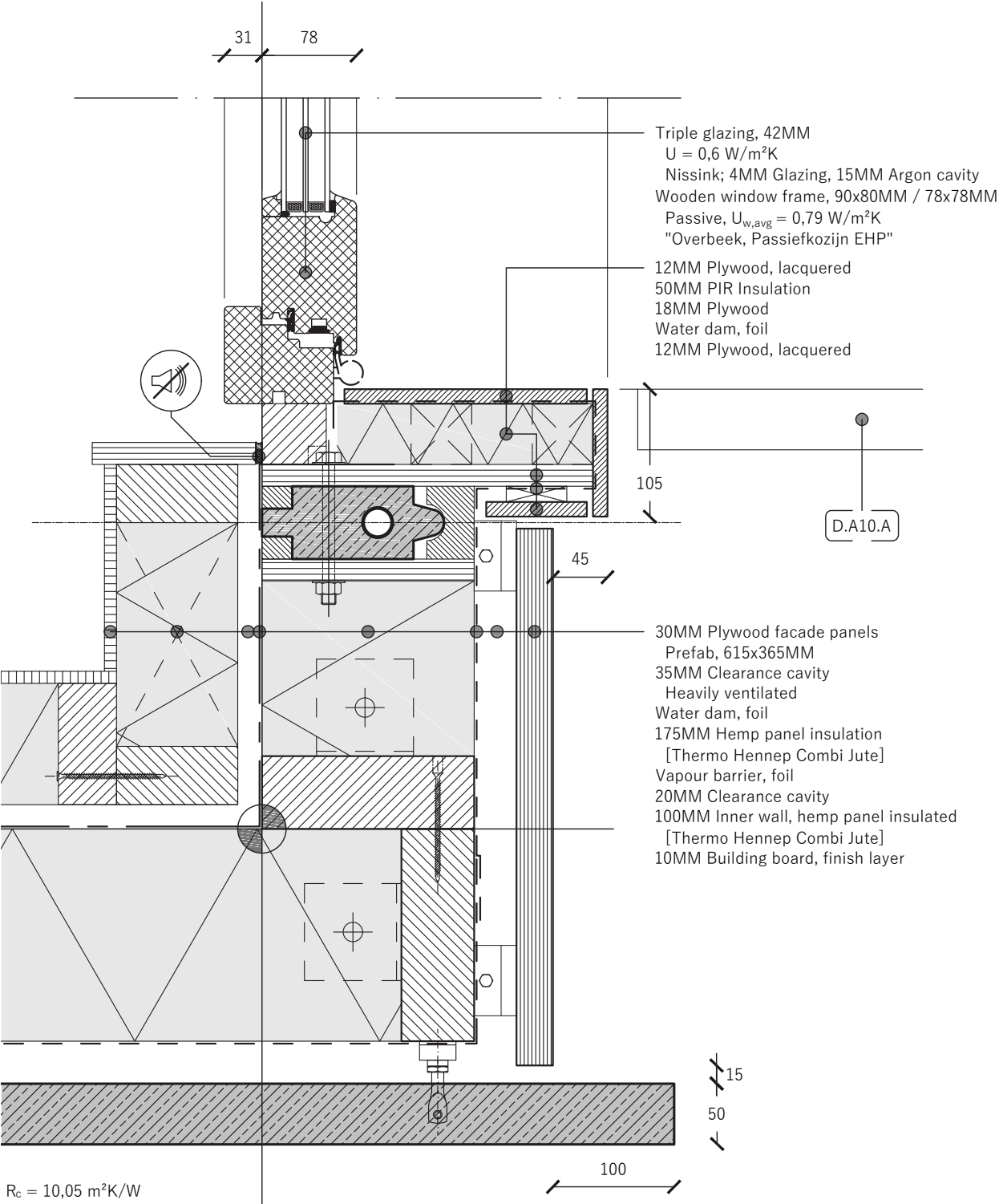
Details

Connection: **building-module**



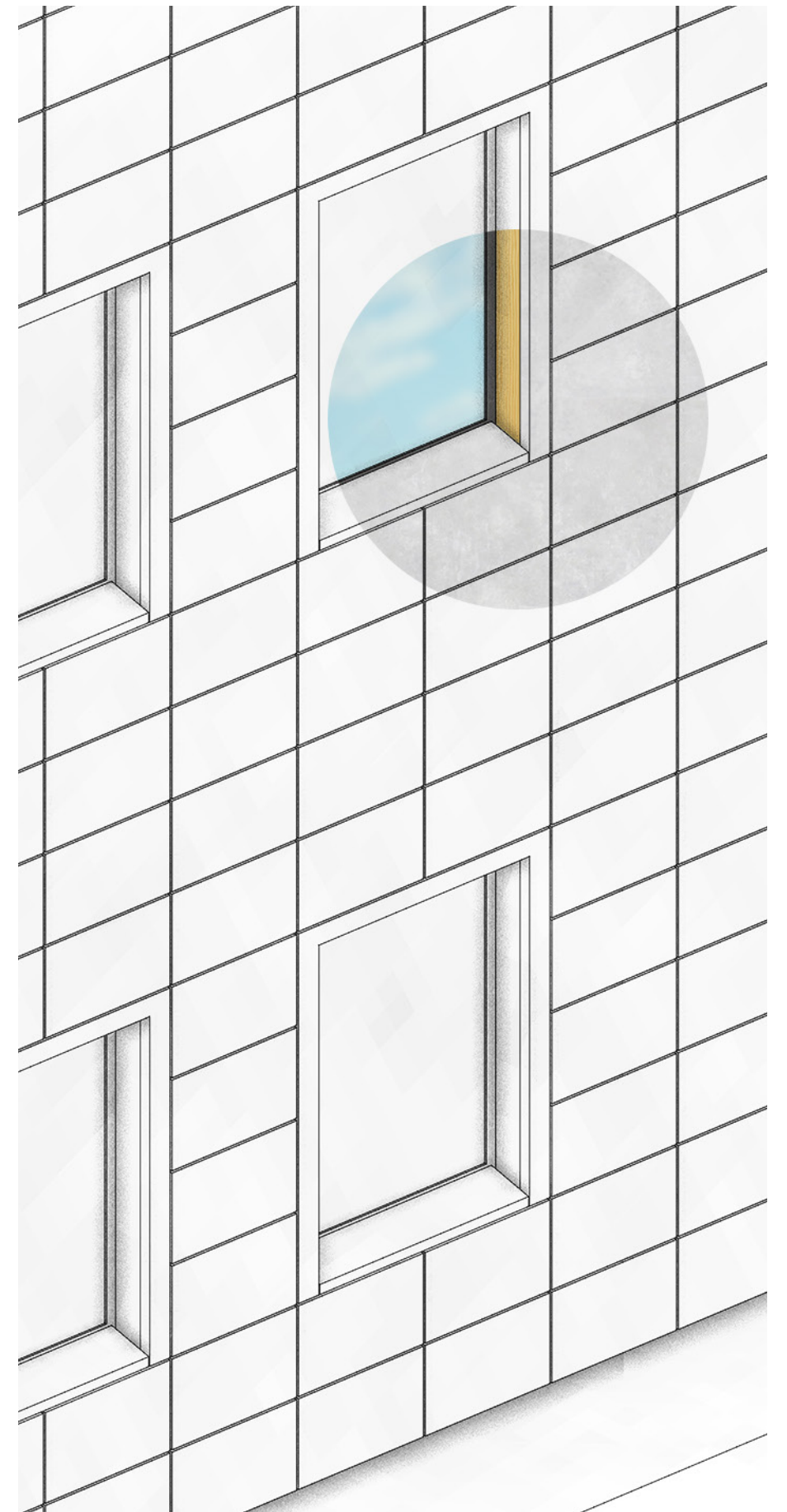
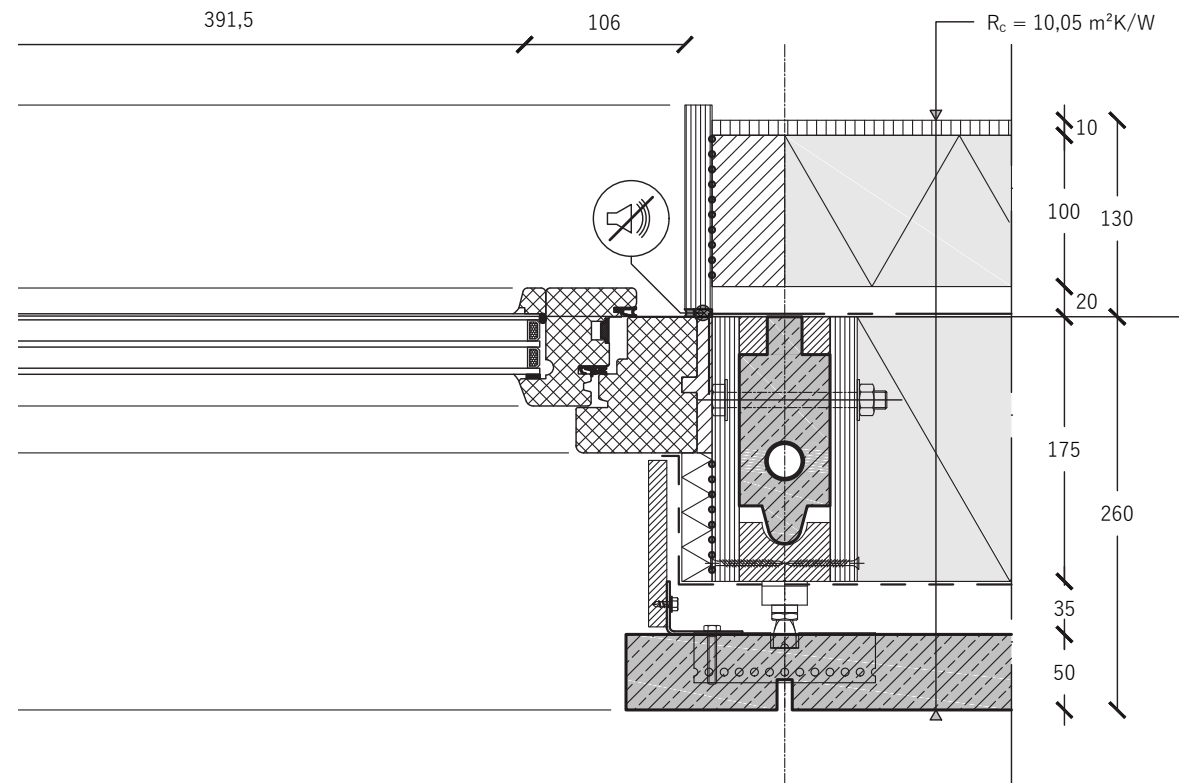
Details

Corner: **outside-inside**



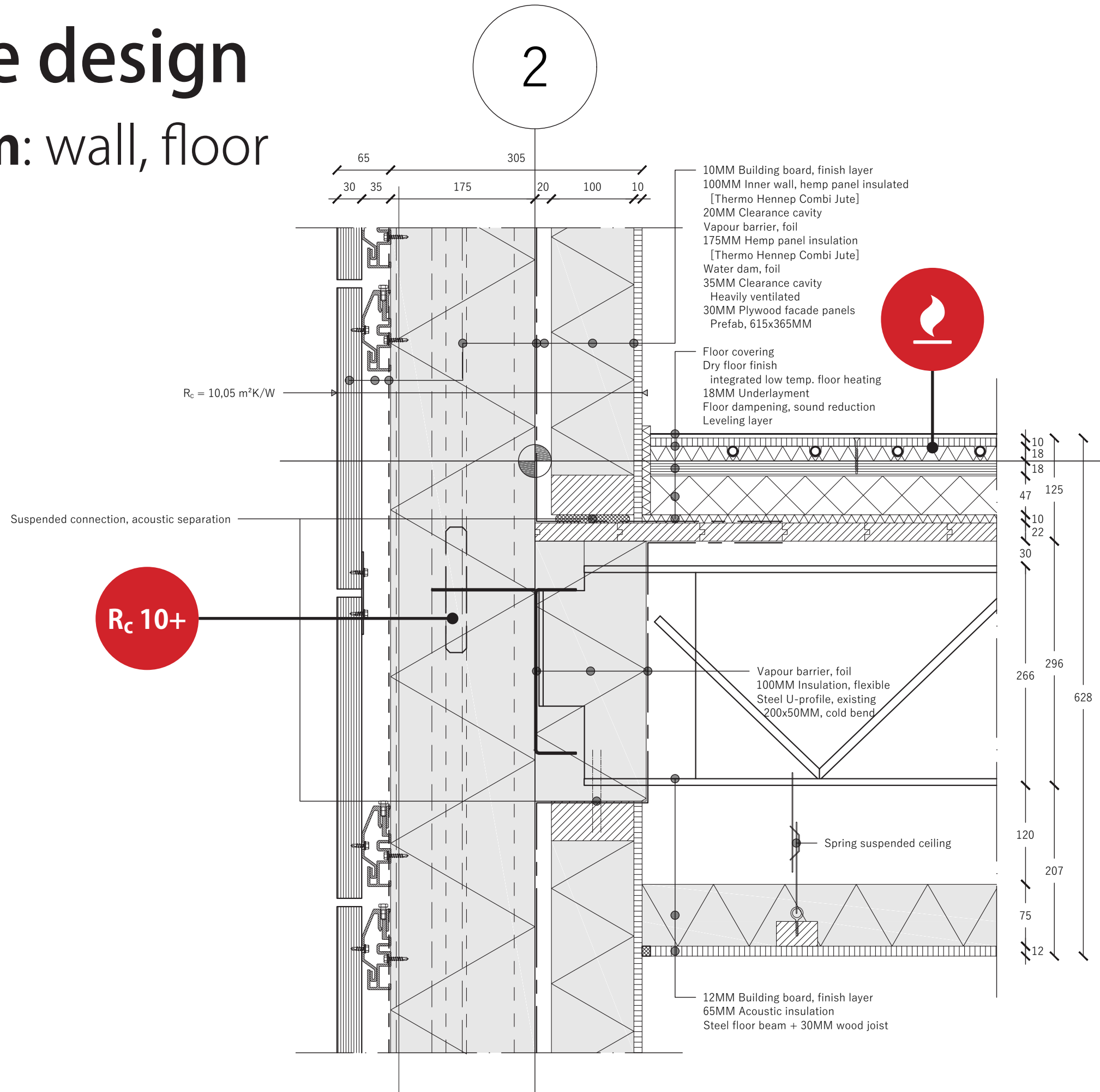
Details

Window: **pushed into facade**



Climate design

Insulation: wall, floor



Climate design

Sustainability: towards 2050



Solar panels



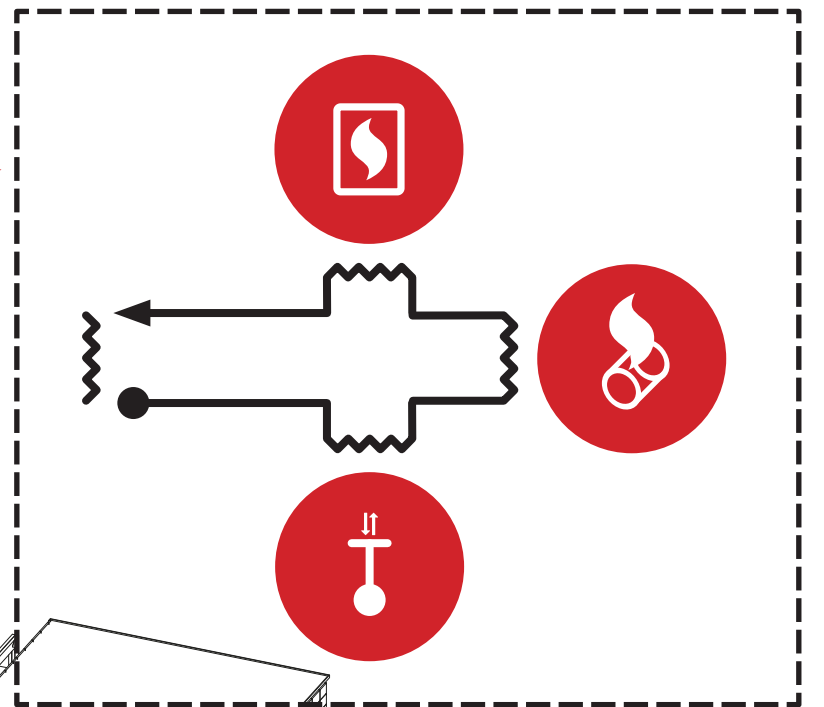
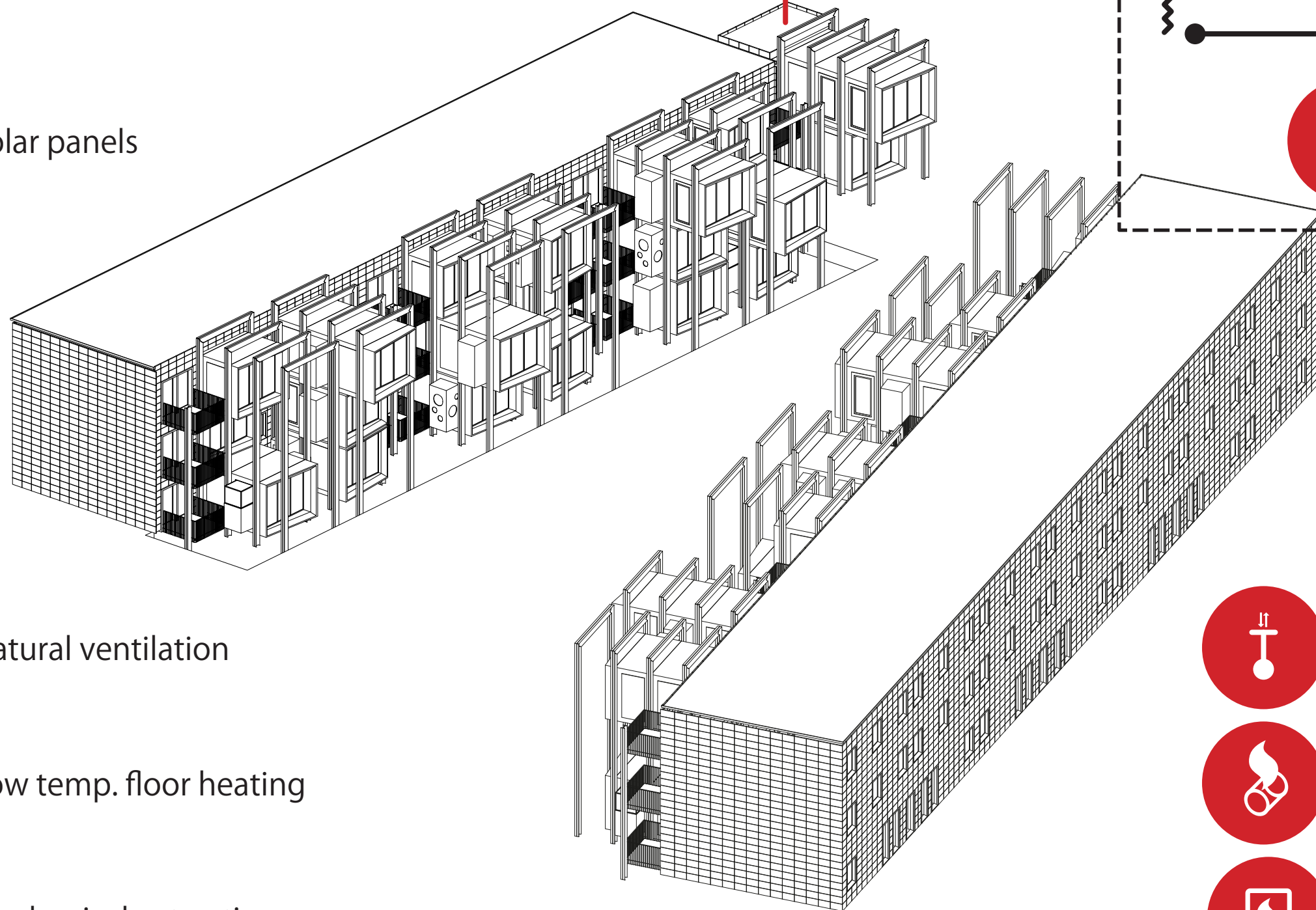
Natural ventilation



Low temp. floor heating



Mechanical extraction



Heat pump



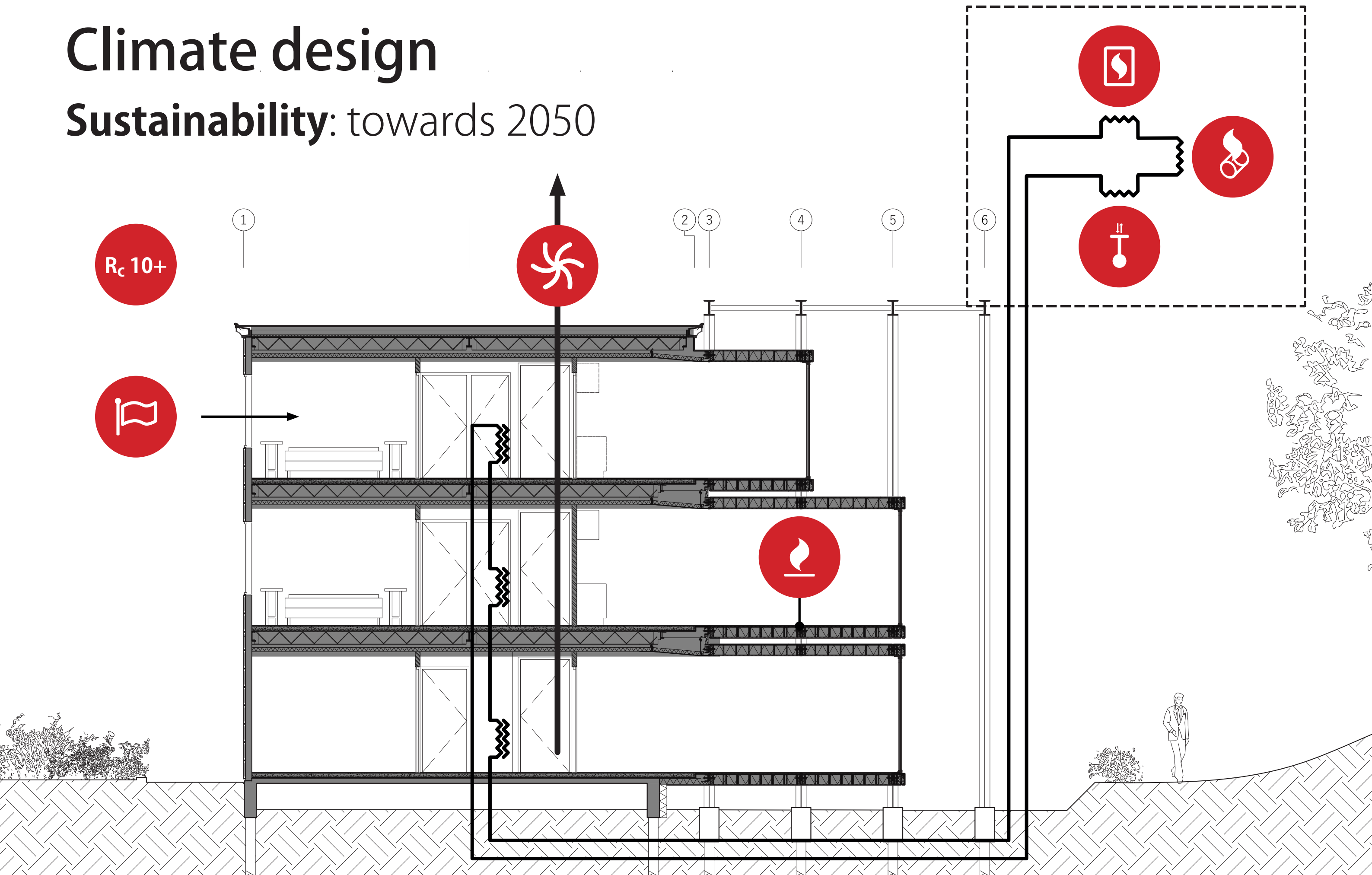
District heating



Backup boiler

Climate design

Sustainability: towards 2050





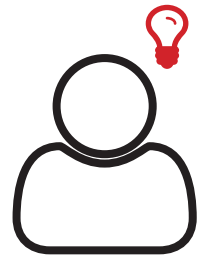
CONCLUSION

Reflection

Reflecting on problem statement

High quality, non repetitive
housing for an affordable price

User participation in existing
building, now and in the future



User participation with a sense of home





