Nieuwenhuysenbuurt
/future proof

15.04.2021
Architectural Engineering Studio

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P5 presentation

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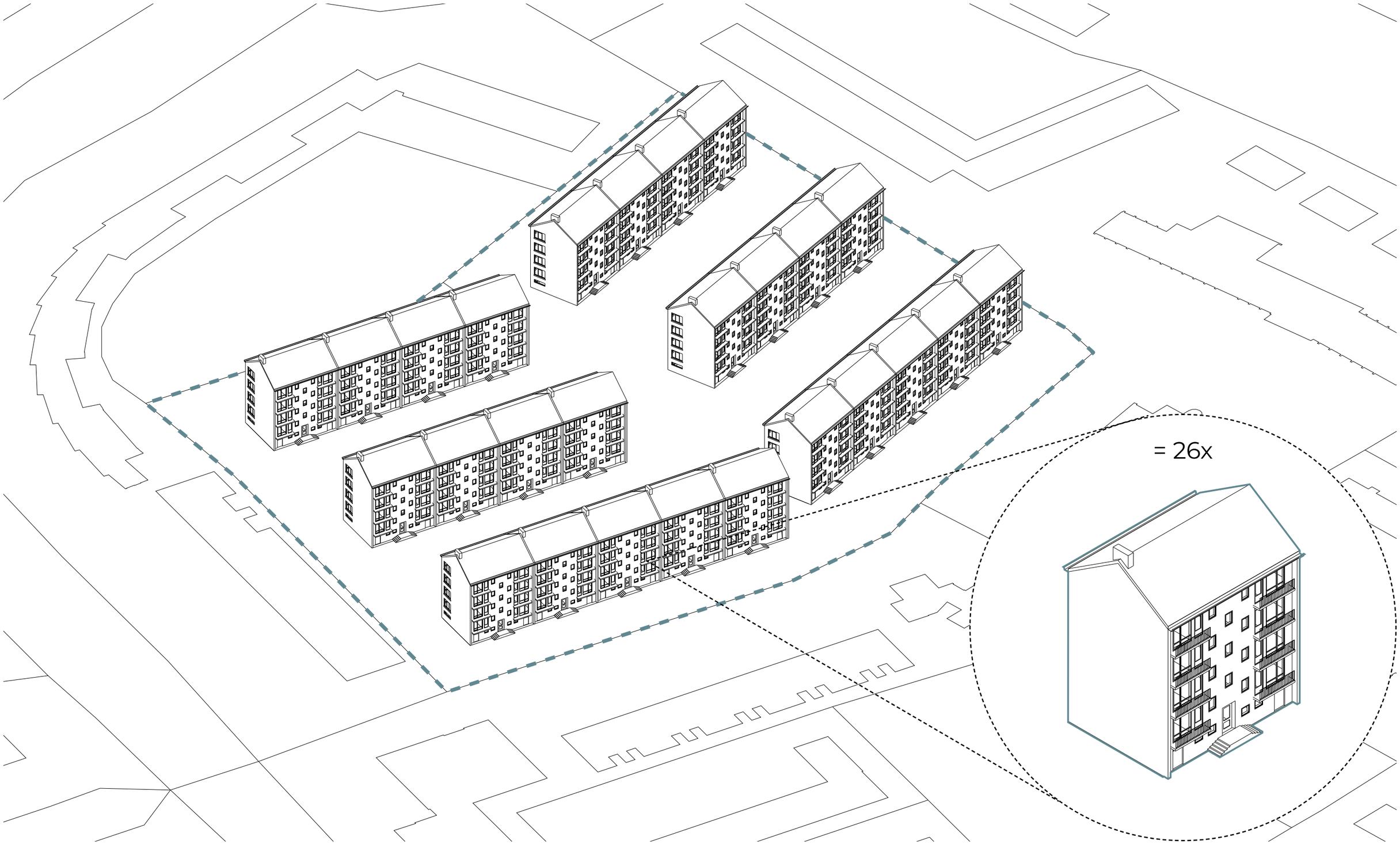
De Nieuwenhuysenbuurt

De Nieuwenhuysenbuurt

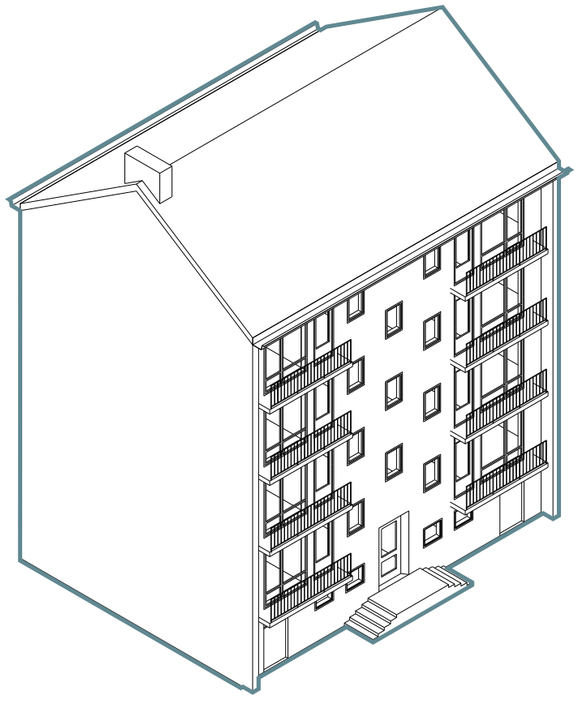
De Nieuwenhuysenbuurt

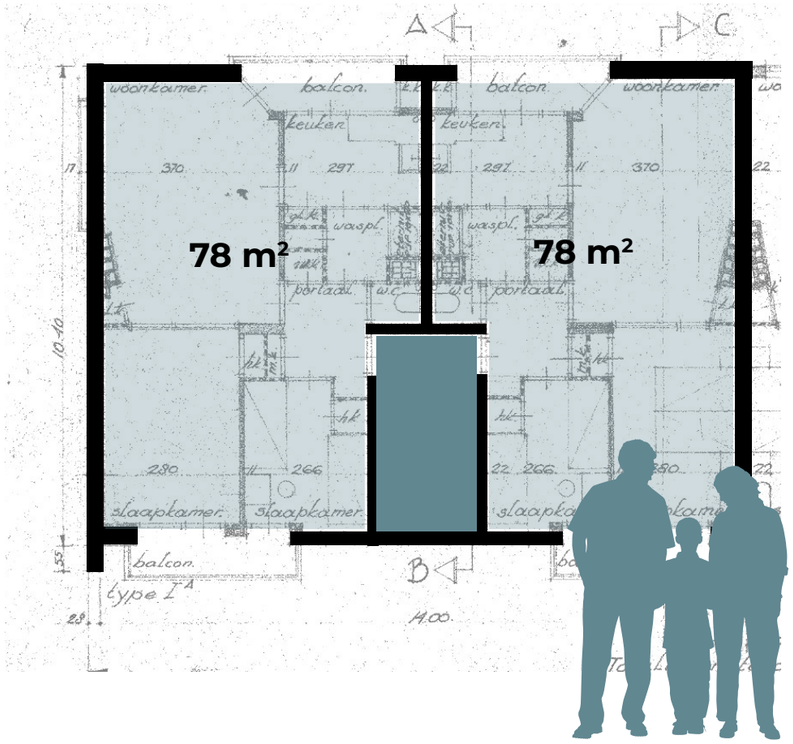
De Nieuwenhuysenbuurt (1954)

De Nieuwenhuysenbuurt



Dwelling typology





Family dwellings (78 m²)

→ **Monotonous**

Increasing number of 1-person households

deVolkskrant

NIEUWS NEDERLAND GROEIT

Aantal alleenstaanden in 2035 naar 20 procent; grote en middelgrote steden zullen blijven groeien

In Nederland zullen steeds meer mensen alleen wonen. In de grote steden zal in 2035 de helft van de huishoudens bestaan uit alleenstaanden. Landelijk zal dat bijna 20 procent zijn. Dit blijkt uit een prognose van het Centraal Bureau voor de Statistiek (CBS) en het Planbureau voor de Leefomgeving (PBL).

Redactie 10 september 2019, 0:01

Het Parool

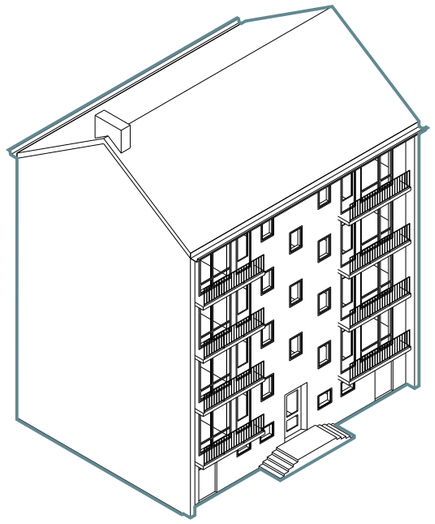
Vrij. Onverzwerd

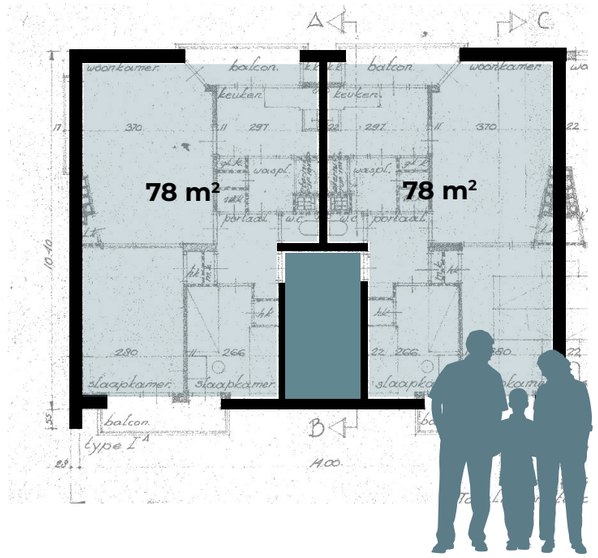
Aantal alleenstaanden groeit: straks 1 op 4 volwassenen alleen

Het aantal alleenstaanden neemt explosief toe. Nog nooit waren er zo veel alleenstaanden in Nederland. Sinds 2013 is het aantal alleenstaandenhuishoudens in Amsterdam met 6,4 procent gestegen.

Hanneke van Houwelingen 25 juni 2018, 15:11

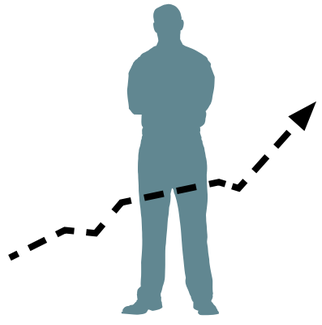
Dwelling typology





Not suitable within a changing society

Housing shortage

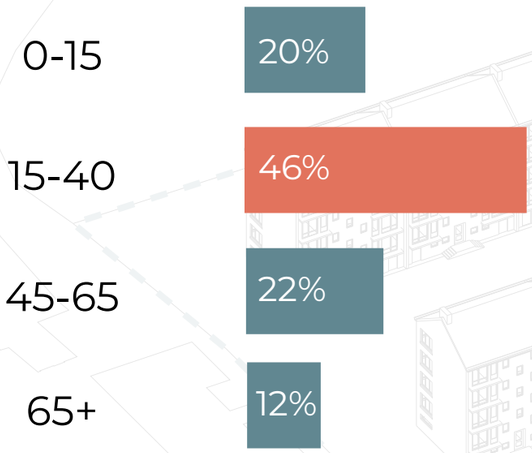


Growing number of 1-person households

Loneliness

Social situation

mostly young people

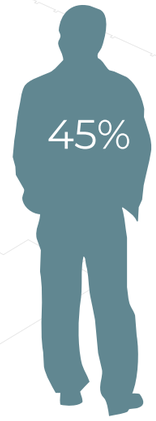


low social cohesion

high unemployment

majority one-person households

loneliness



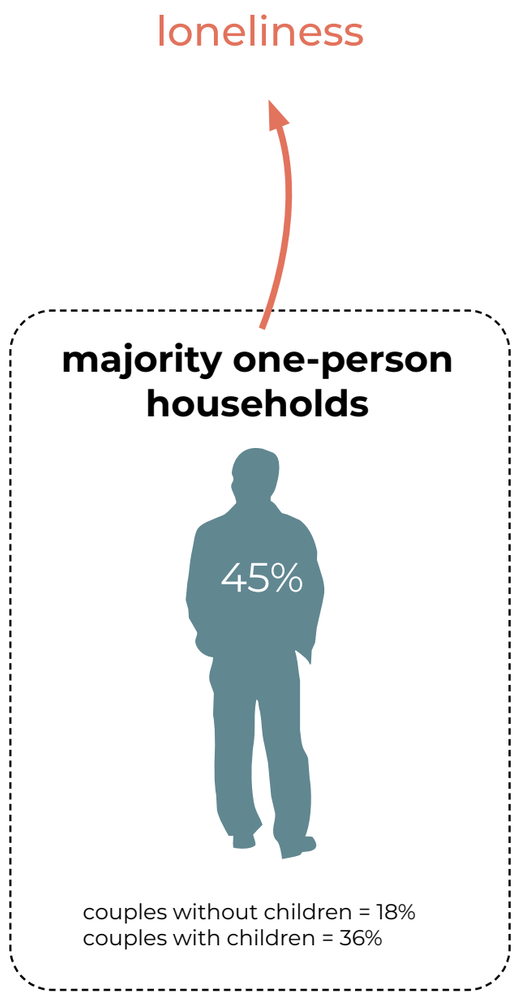
couples without children = 18%
couples with children = 36%

(CBS, 2018)

Social situation

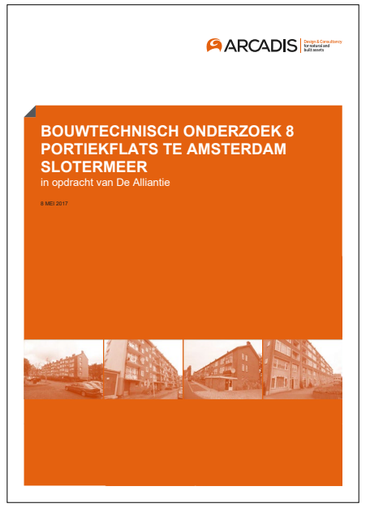
43% of the adult population is feeling lonely. **10%** experiences severe loneliness.

(2016) https://www.volksgezondheidenzorg.info/onderwerp/eenzaamheid/cijfers-context/samenvatting#node-eenzaamheid-samengevat



Exterior space

Technical quality



Building inspection report

Too expensive for the housing corporation to upgrade the dwellings

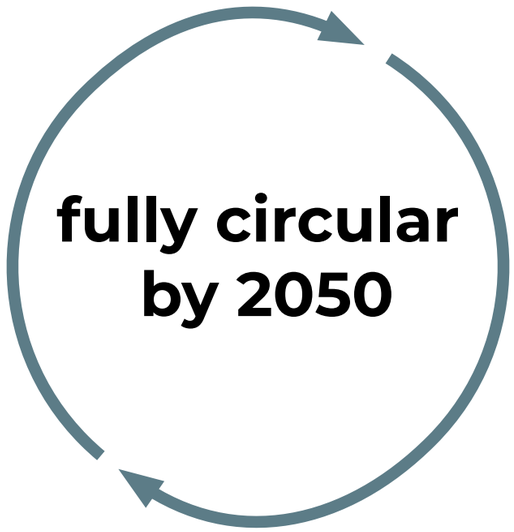
→ **Decided upon demolition**

Demolition


Construction
waste

Construction waste?

Ambitious Circularity goals Dutch government



Innovation needs to start **now**

Design goal

To **minimize the construction waste** released by the demolition of 282 dwellings in the Nieuwenhuysenbuurt whilst constructing a **future proof neighbourhood** that **promotes interaction** between residents

Minimize waste

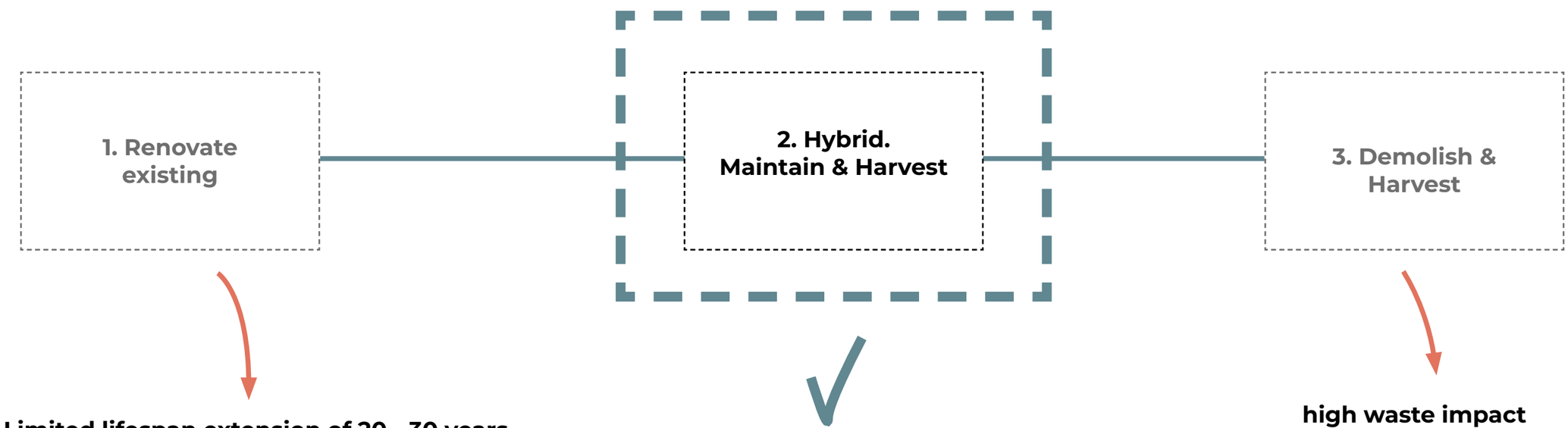
promote interaction

Future proof

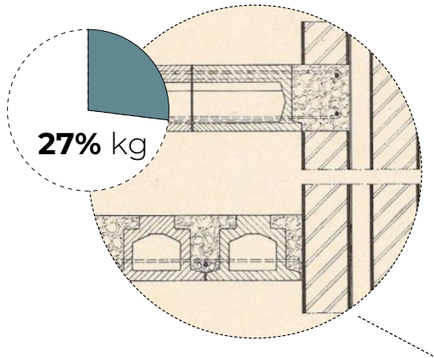
Design Strategy

Design strategy

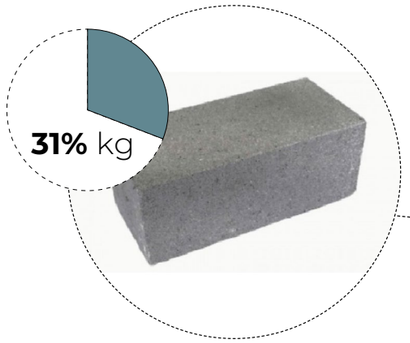
Why not renovate existing to minimize construction waste?



What can be re-used?

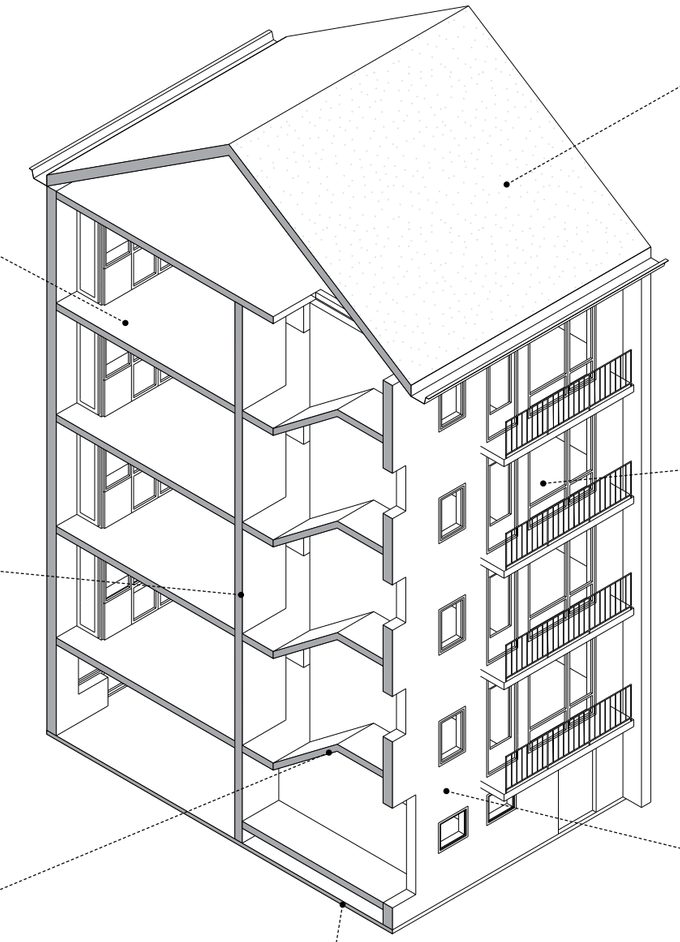


Concrete
Cusveller Floors

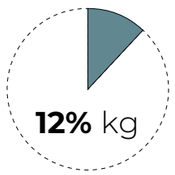


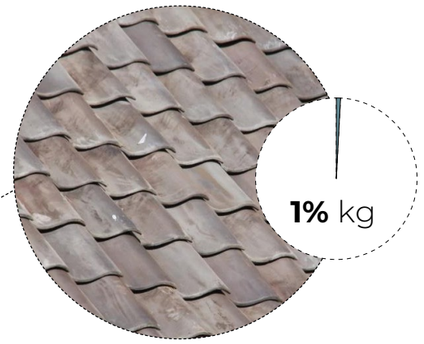
Concrete masonry interior
walls

Concrete staircases



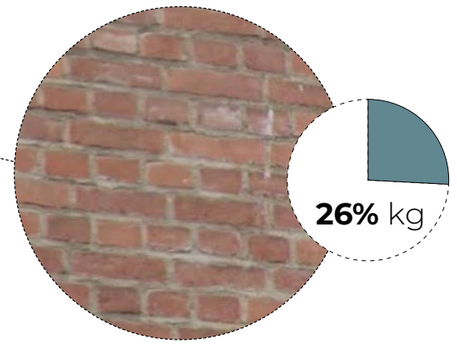
Concrete foundation





Ceramic roof tiles

Windows with PVC frames



Load bearing
brick facade

Maintaining parts of the load bearing structure?

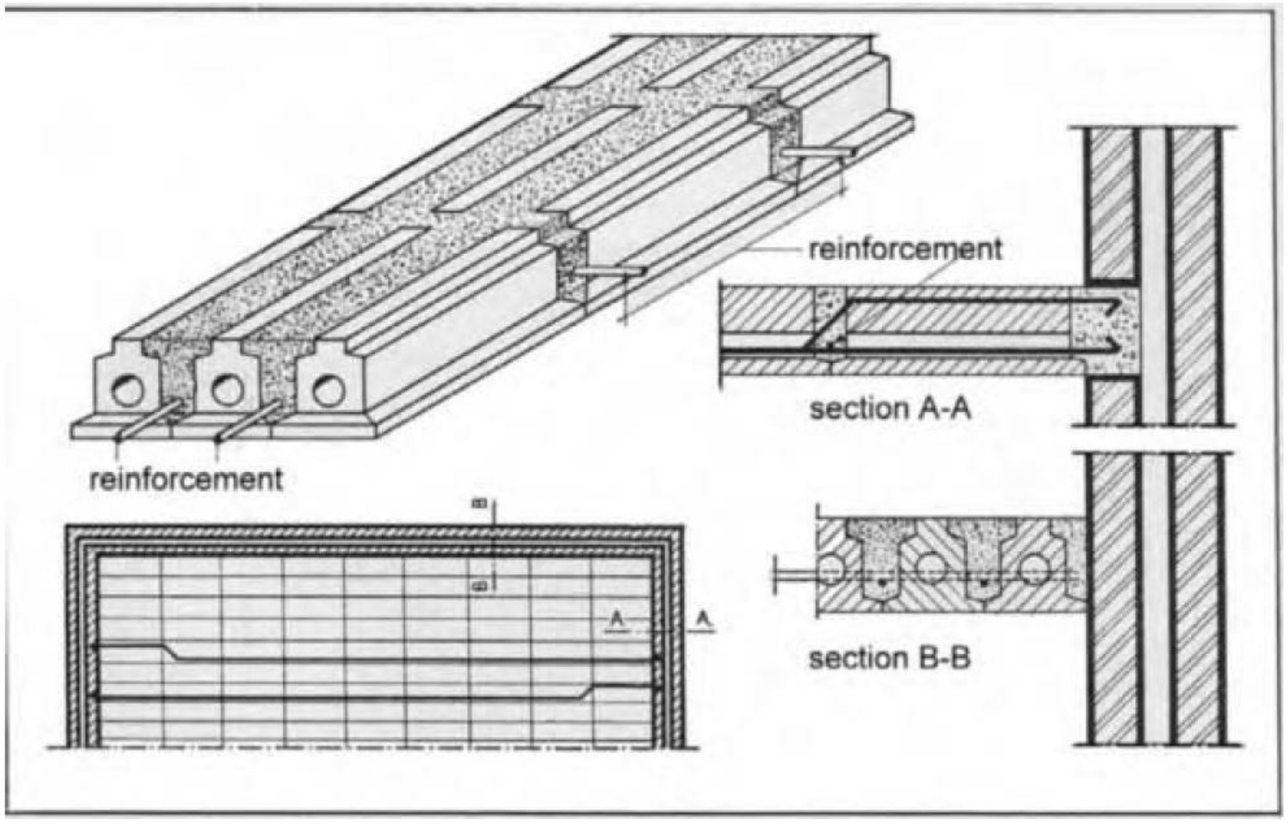
No

Floors & walls depend on each other

→ Creating openings in the floors?

Creating openings in the floors?

Concrete Cusveller floors



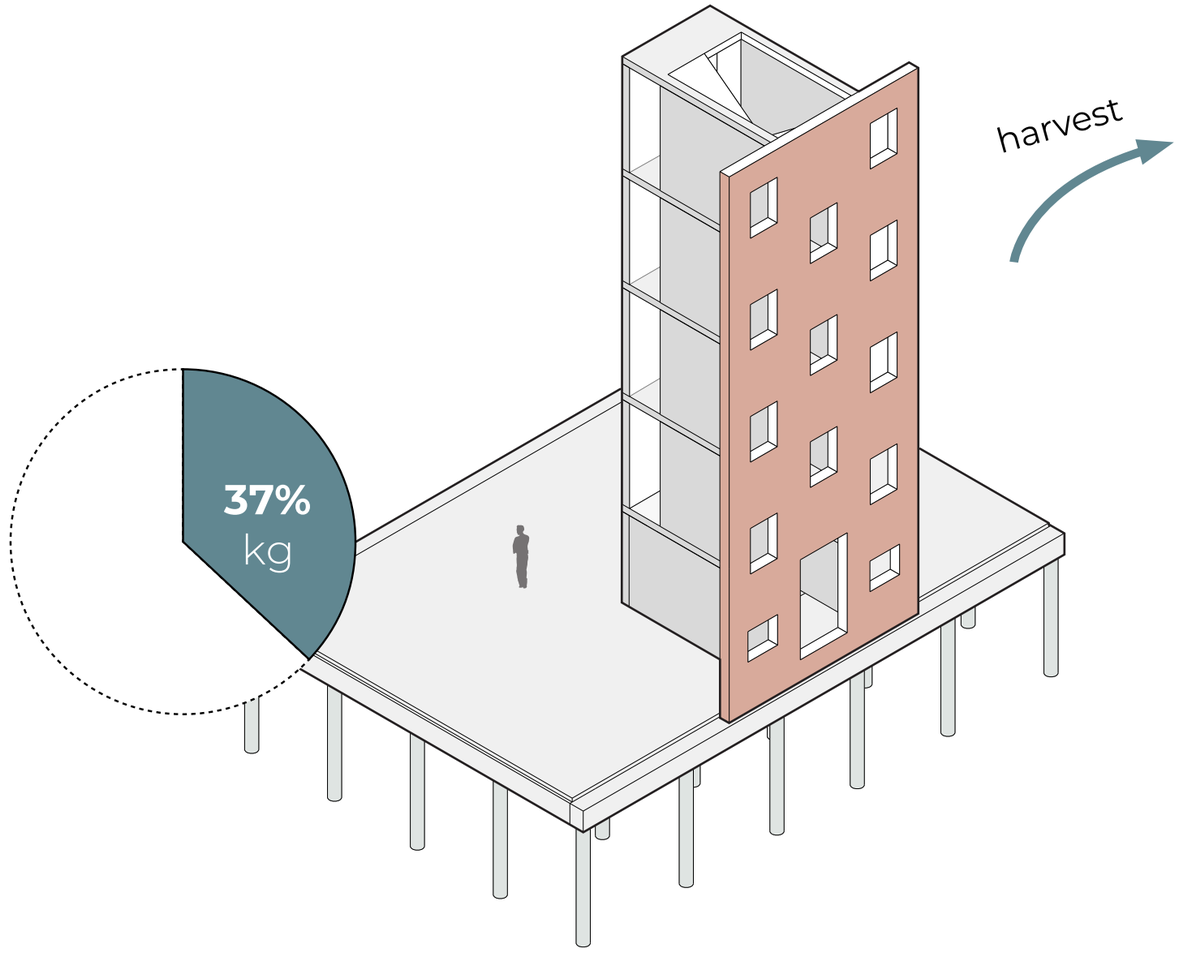
No

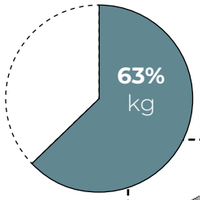
Redesign of these building blocks by joining existing apartments vertically, is hampered by the poor quality of these floors. ***Making an opening in this type of floor is virtually impossible.***

(Andeweg & Koopman 2007)

Conclusion

Maintain core & foundation



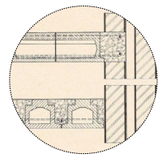


re-use or downcycle

Ceramic roof tiles

PVC window frames

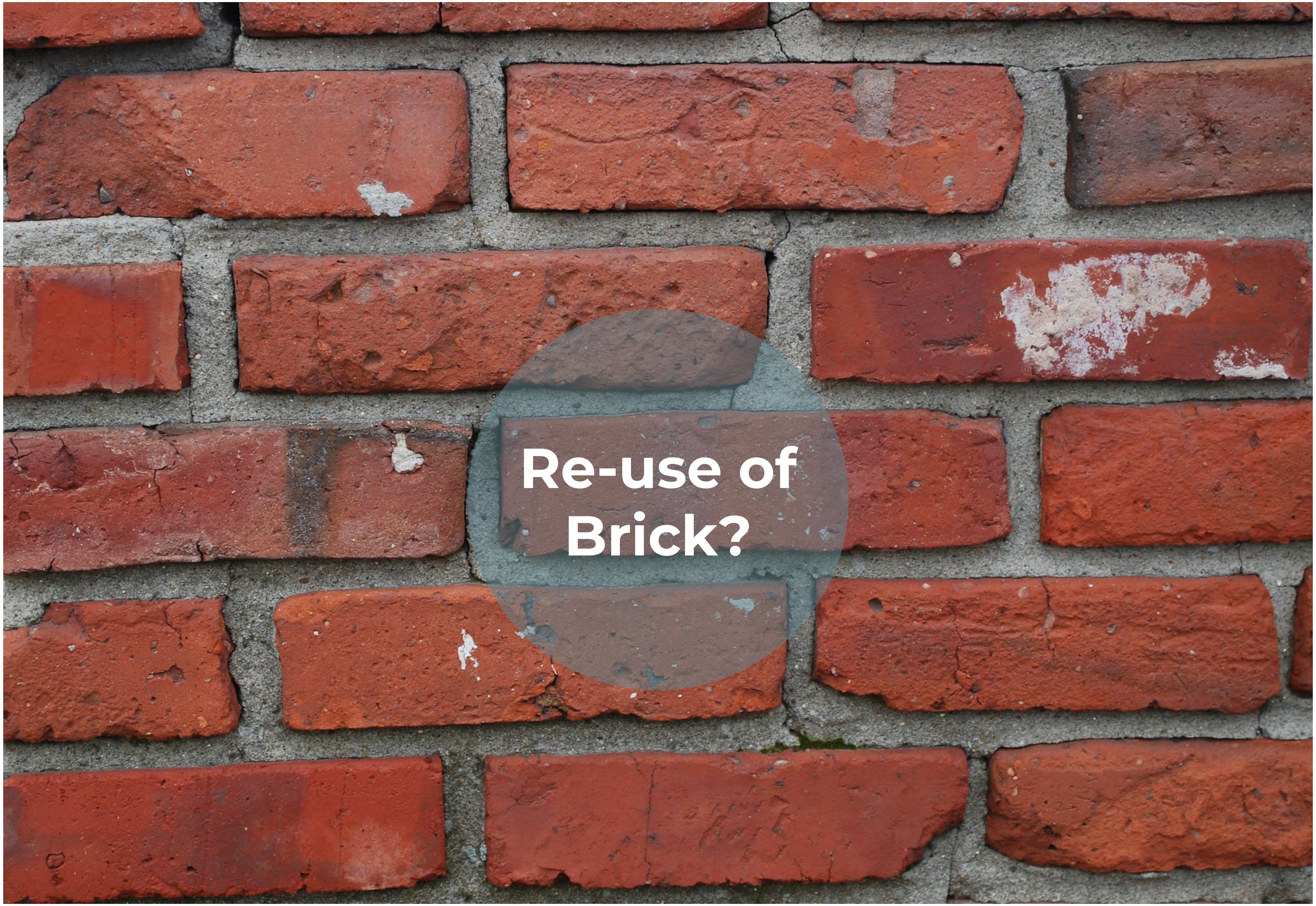
Load bearing brick facade



Cusveller Floors

Concrete masonry interior walls

harvest


Re-use of
Brick?

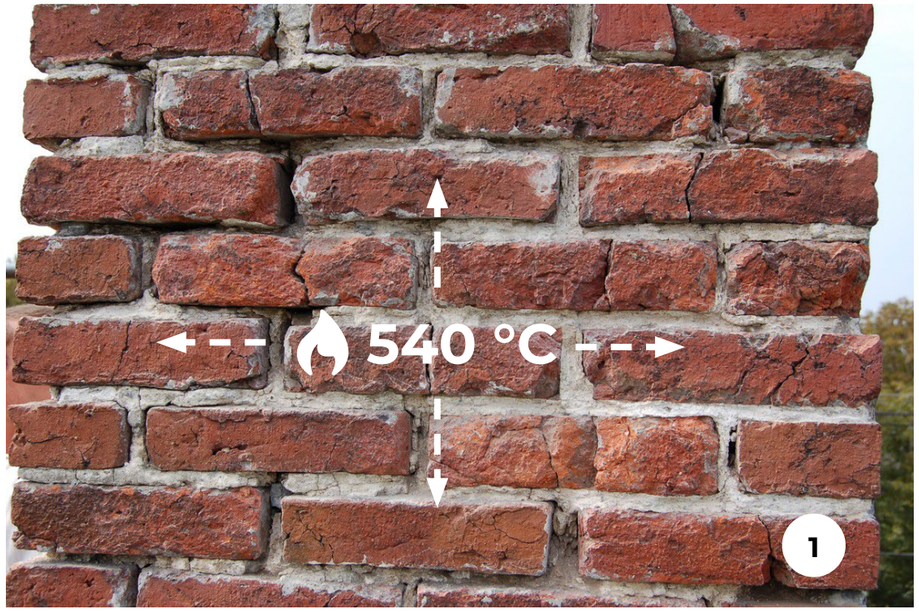
Characteristic Material

Research

How can **bricks** from Dutch **post-war housing** (1945-1970) be **re-used** in the **circular** built environment?

Conclusions

3 methods of brick harvesting



Thermal seperation

Cutting panels

Vibrational rasping

*only with lime mortar

Conclusions

→ Apply in design

Thermal seperation

-9% kg ECO_2

Cutting panels

-48%* kg ECO_2

*with a 50 mm concrete back structure.

Vibrational rasping

-45% kg ECO_2

*only with lime mortar

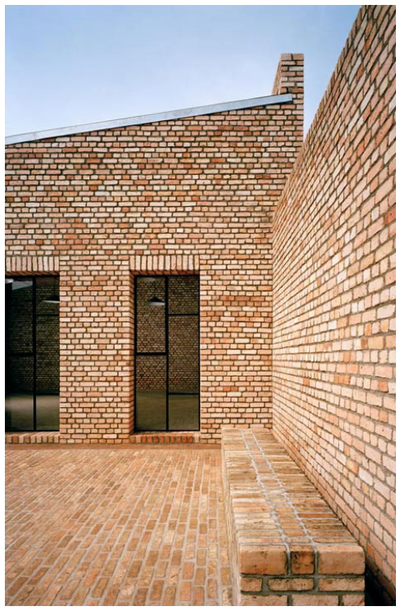
CO_2 emitted to make new facade product in comparison with new bricks

Conclusions

Application in the circular built environment

Do’s

Exterior space



Building skin

Durable & Flexible

Conclusions

Application in the circular built environment

Don’ts

interior walls

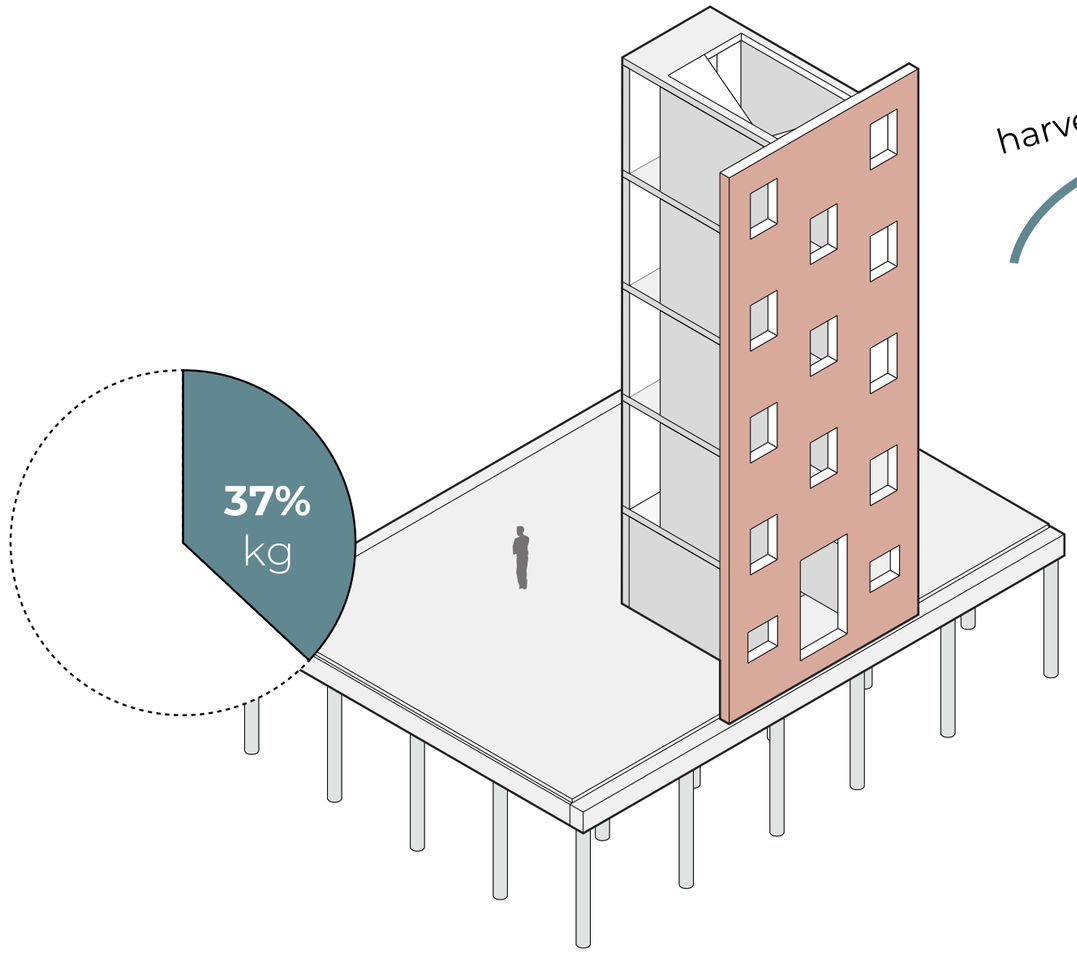
load bearing structure

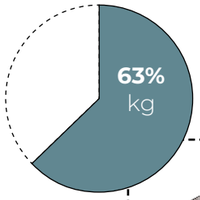
Low flexibility

Design

Starting point

Maintain core & foundation





re-use or downcycle

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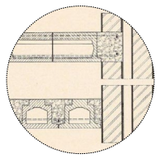
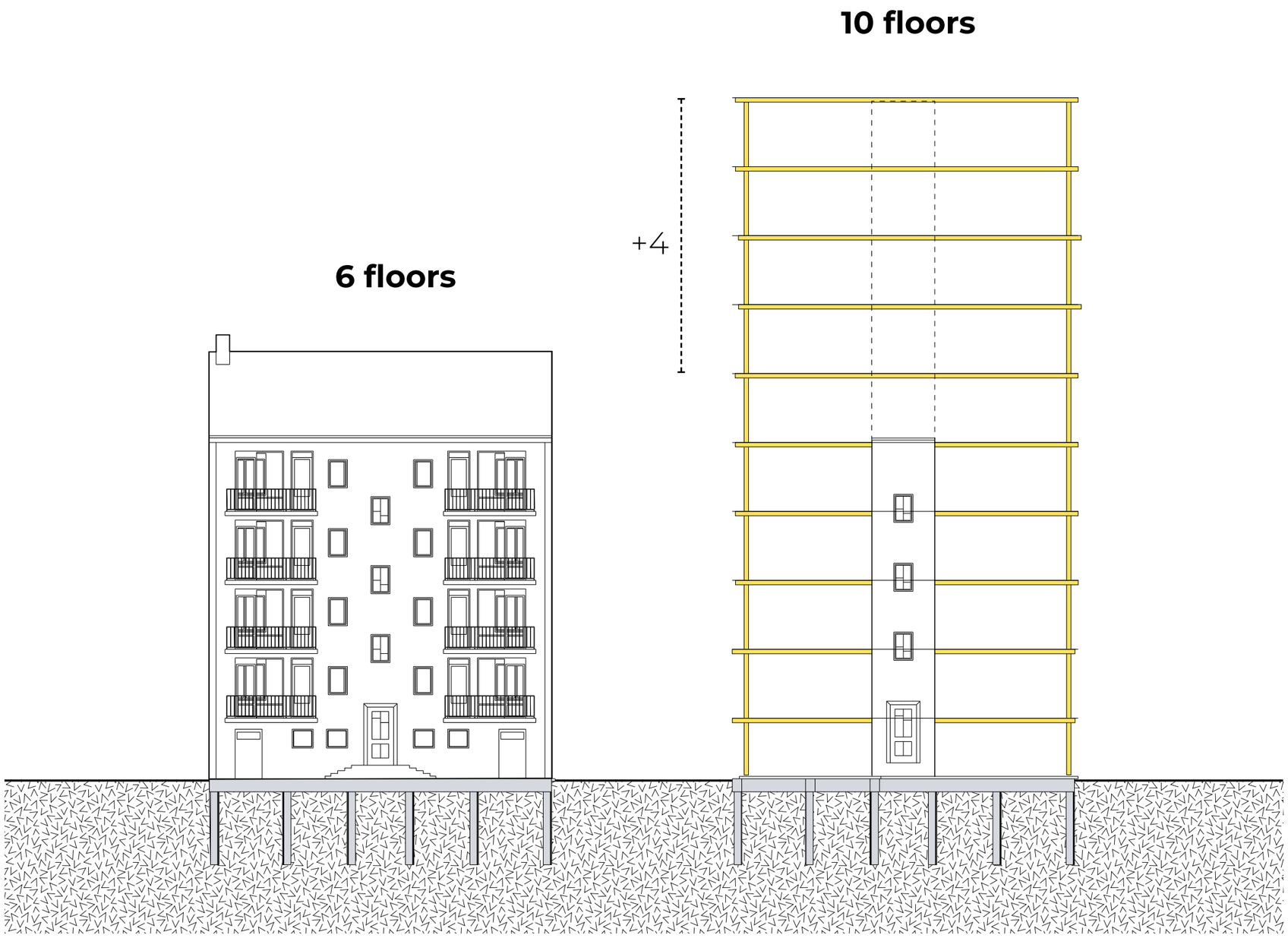
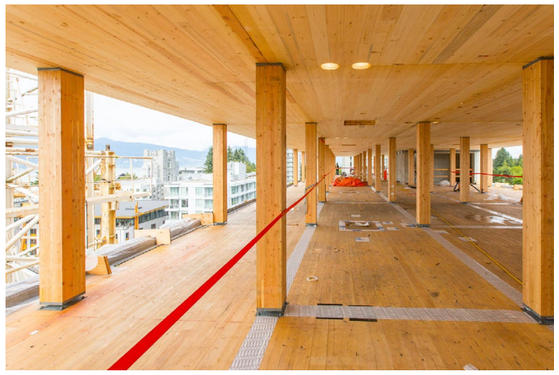


Cusveller Floors

Concrete masonry interior walls

How many floors can be added with a wood construction?





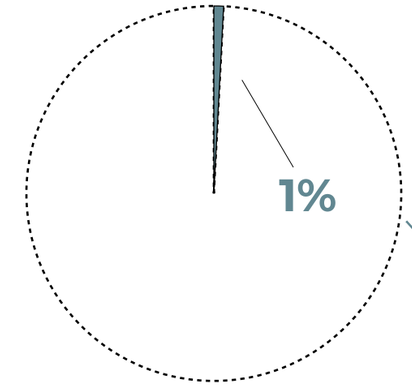
Conclusions

number of floors	10,5
safety factor	1,1

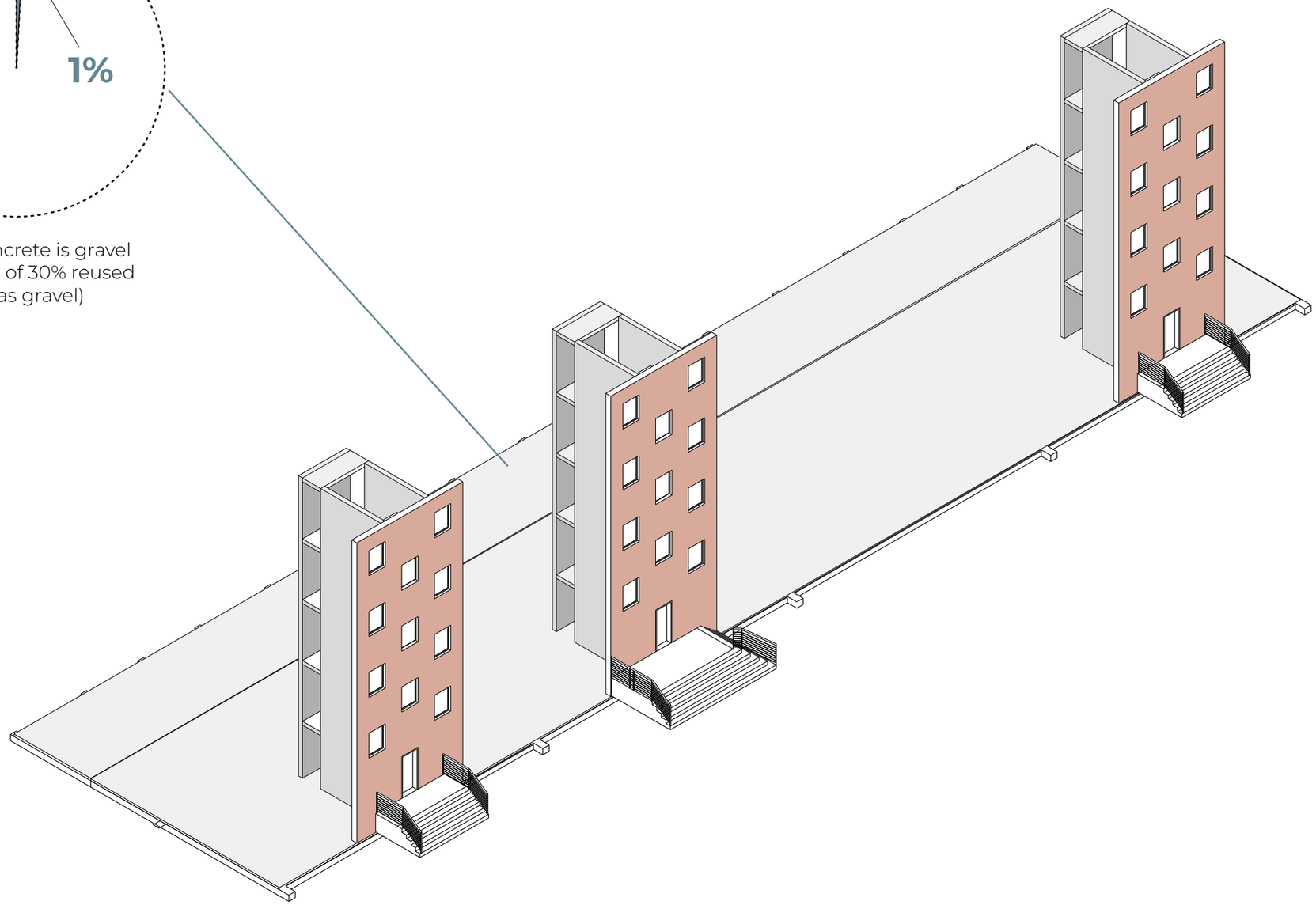
weight per floor	8.080	kg
total façade weight	107.421	kg
roof weight	14.301	kg
re-used features	7.096	kg
extra core	126.141	kg
total weight	339.722	kg
incl. safety factor	373.694	kg
Total available	373.694	kg
remaining	**-**	**kg**

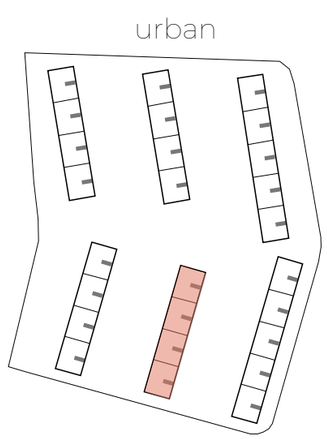
Original cores + foundation

Reused granulate in new foundation



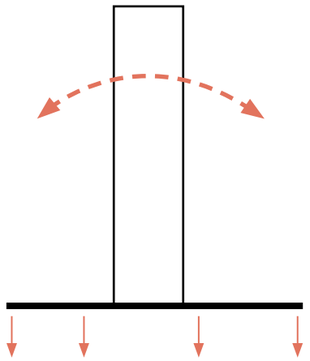
(53% of new concrete is gravel
/ max allowance of 30% reused
granulate as gravel)

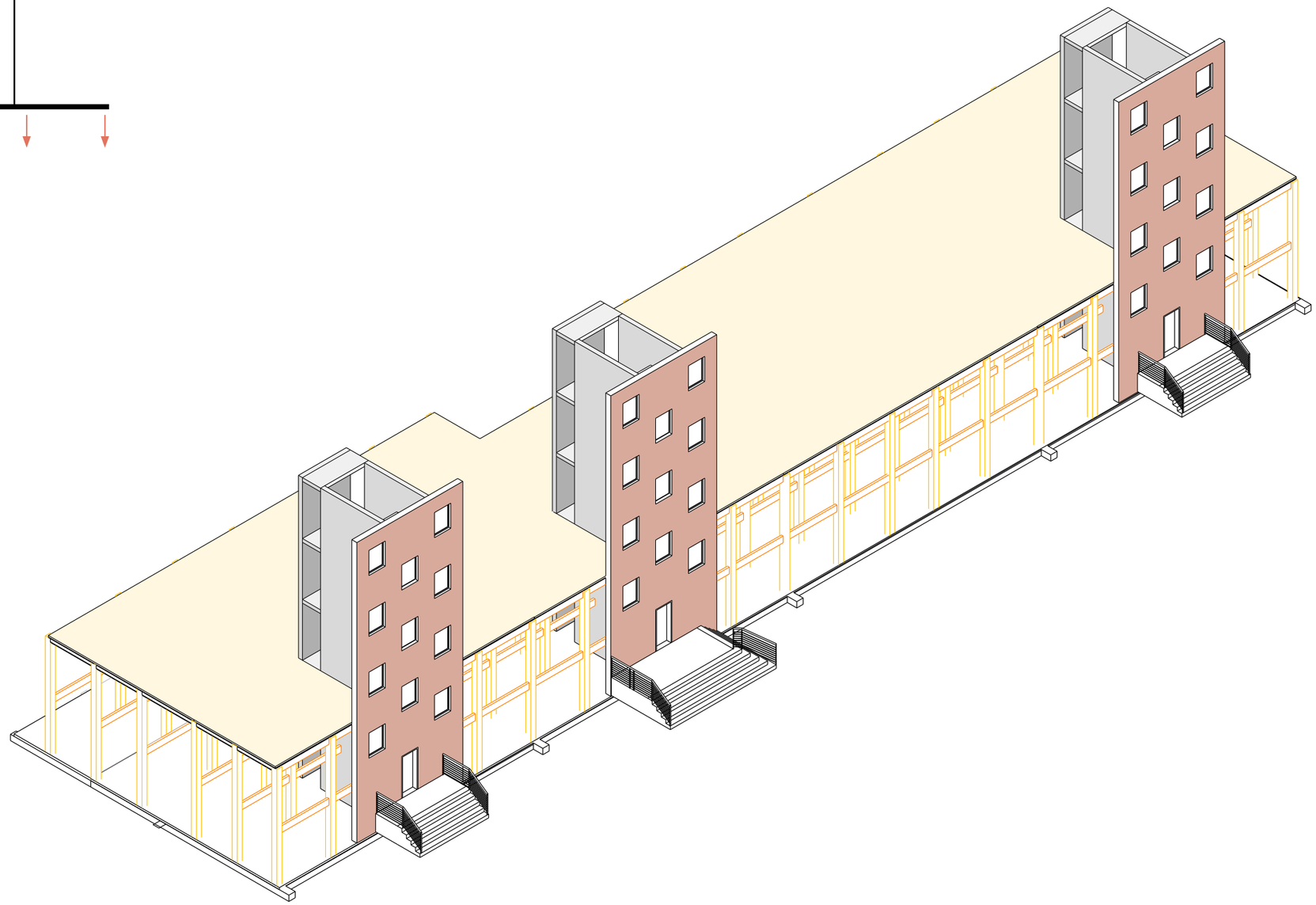


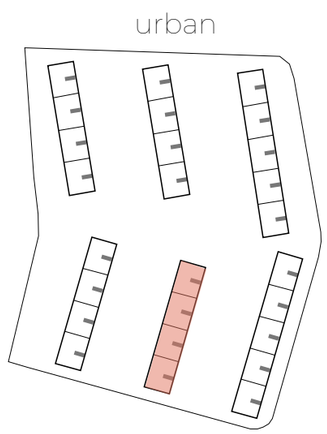


Add wood structure

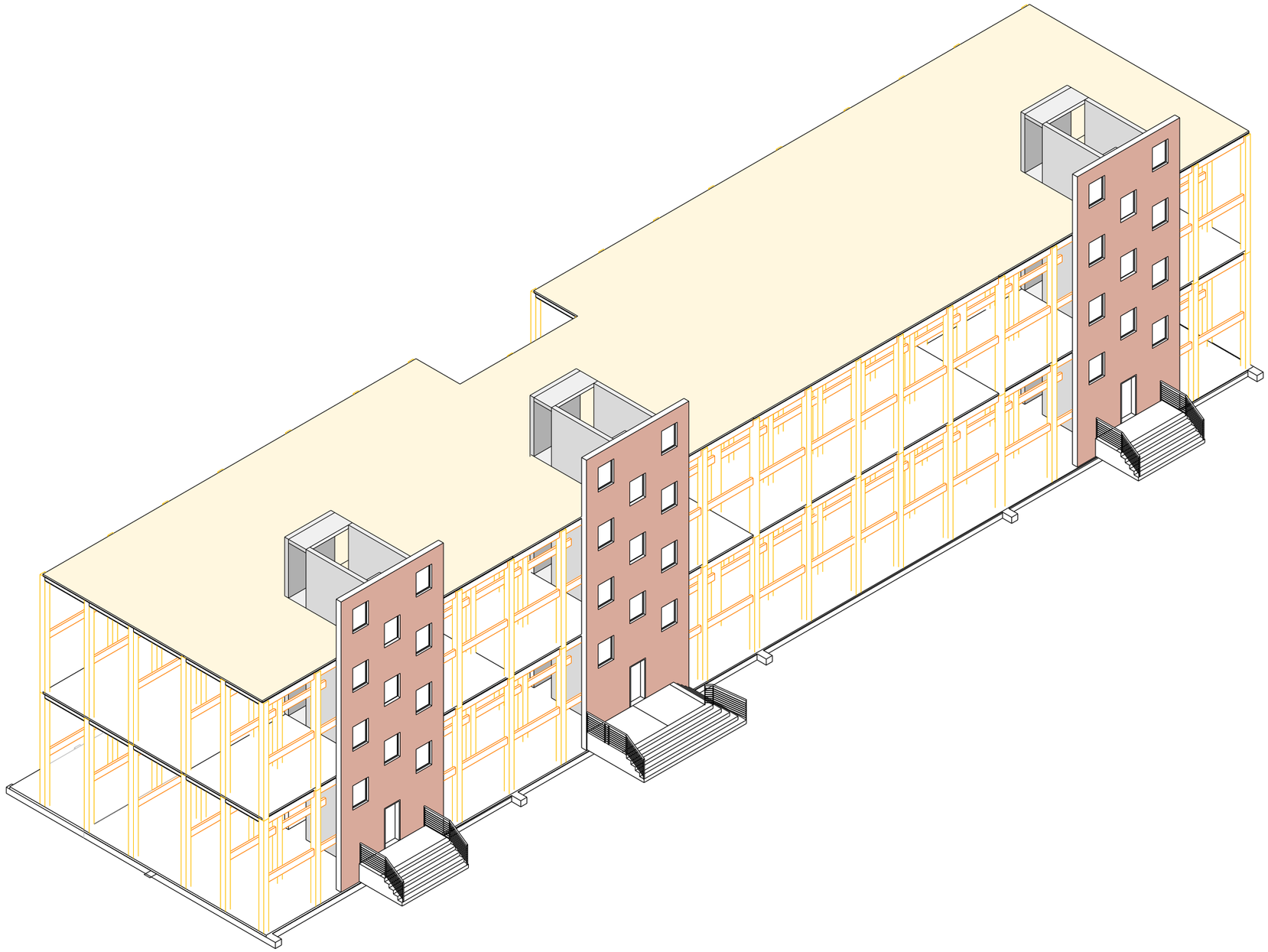
Core = stability

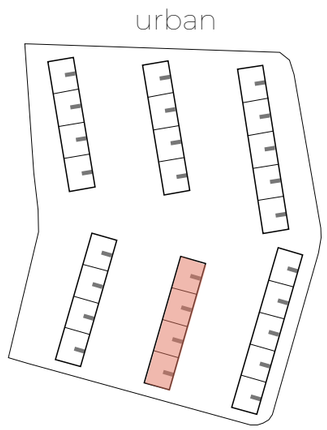




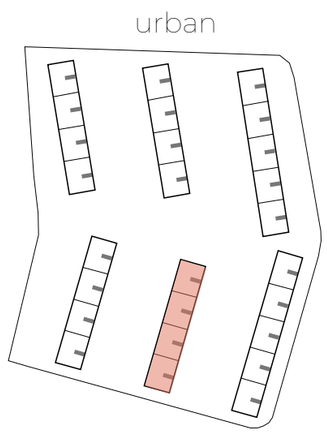


Add wood structure

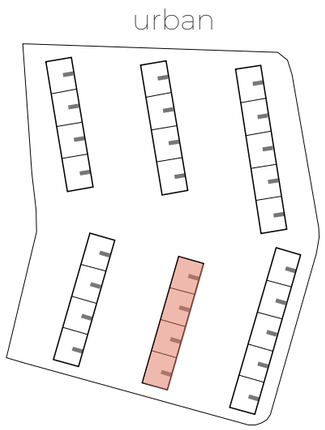




+ top up

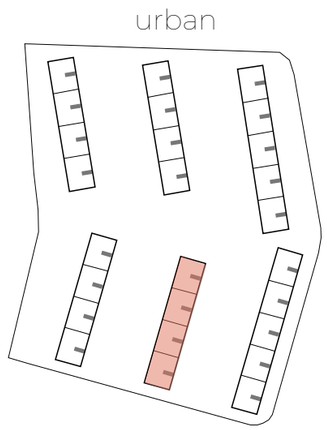


+ facade



add floor?

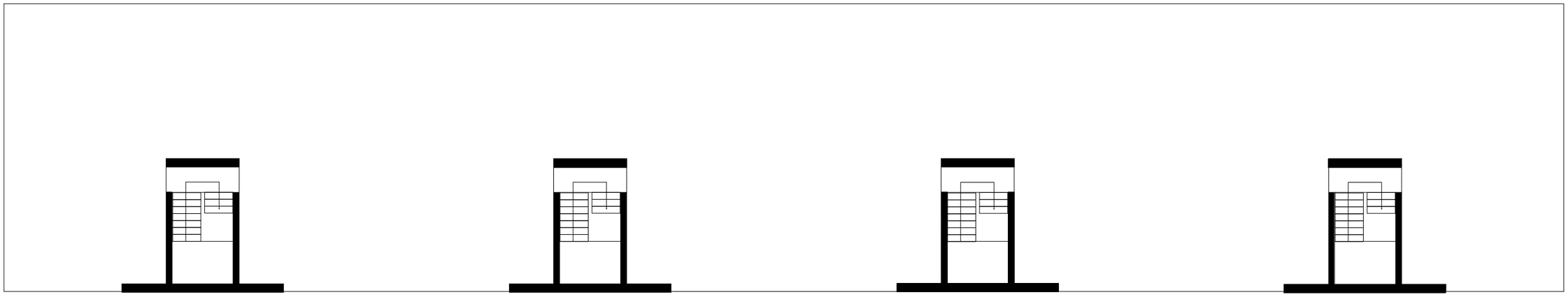
= optional



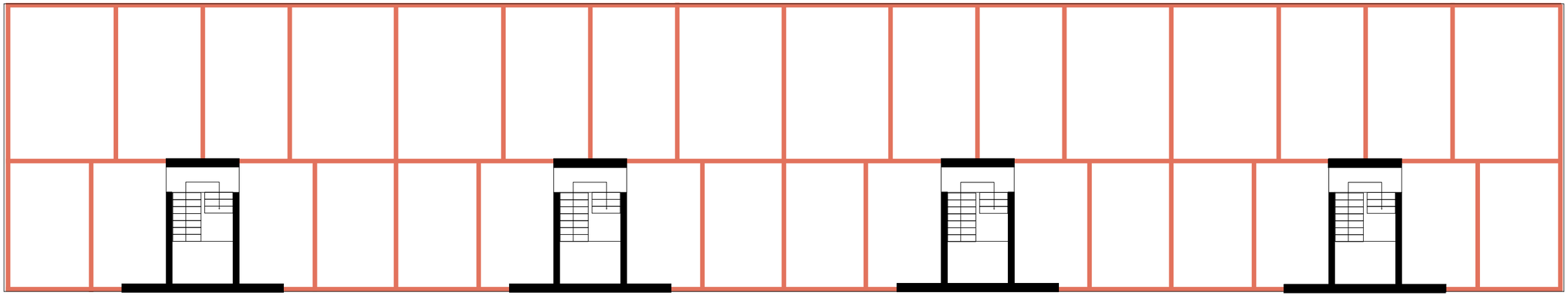
Facade impression

How does this work?

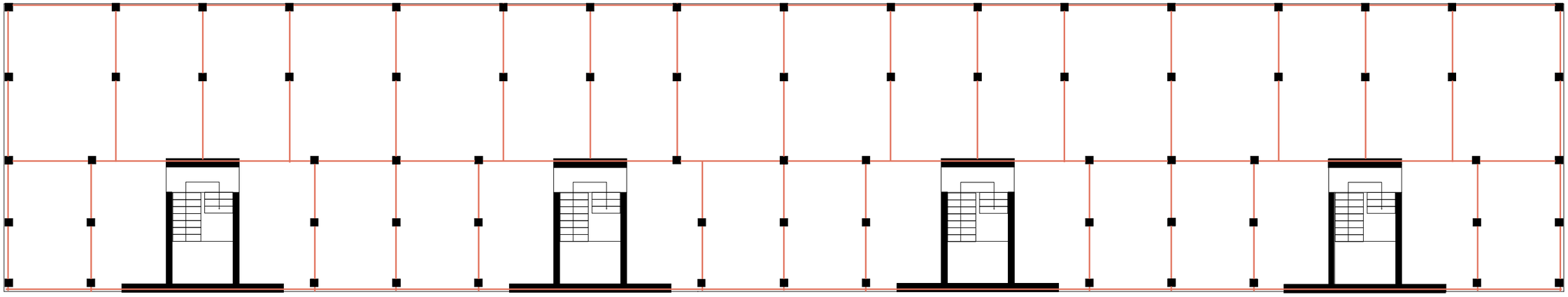
Basic floor plan



Existing foundation



Place column structure

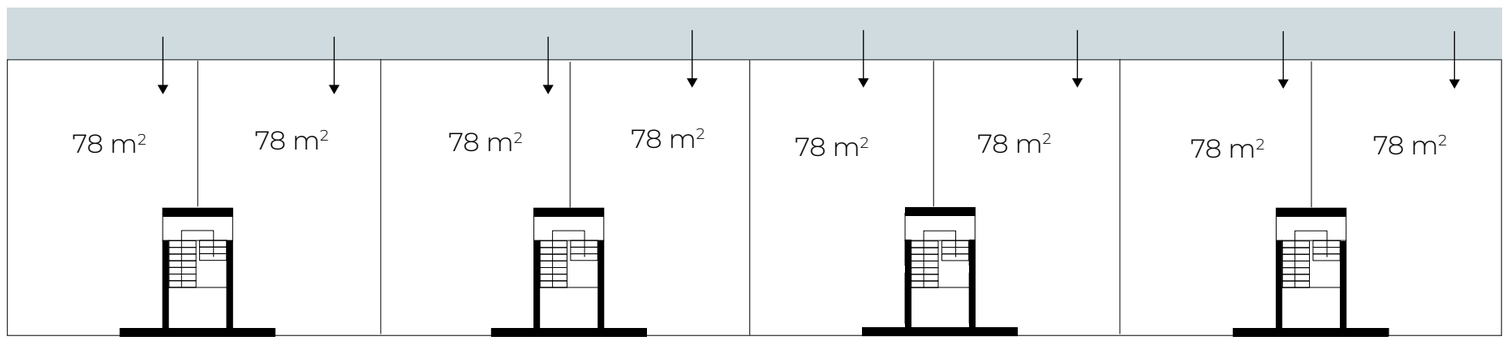


Entrance & Routing?

Option A: Central cores

limited in typology 78 m² **Elevator?** **Little interaction**

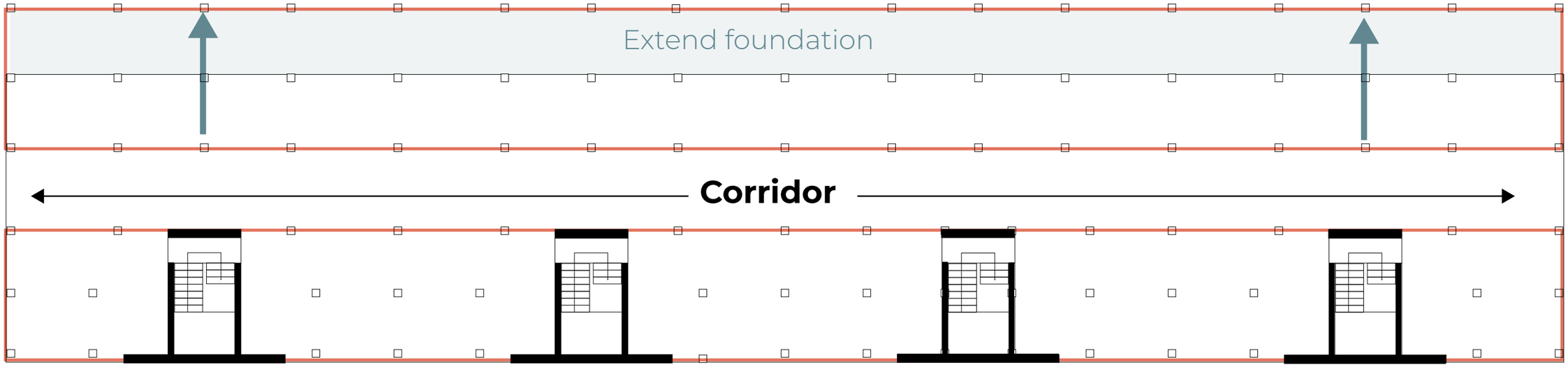
Option B: Exterior corridor



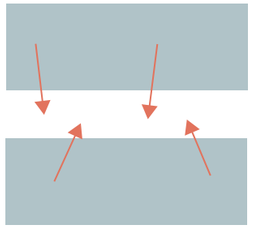
limited in typology 78 m²

Central corridor

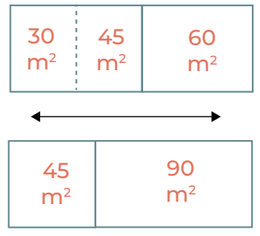
✓



Place of interaction

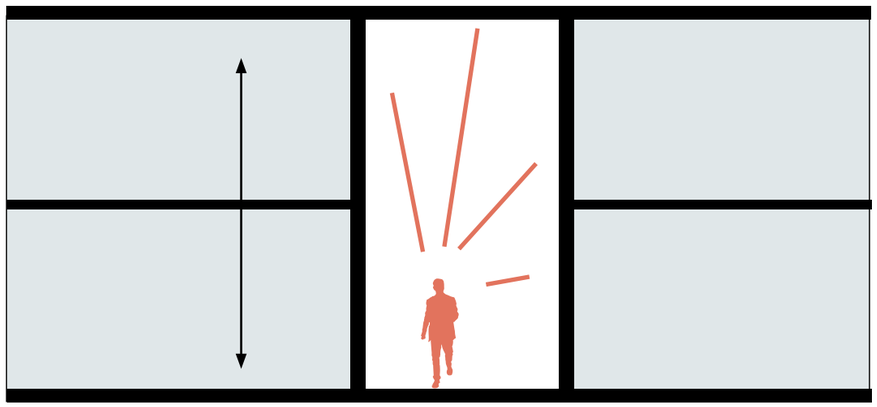


various dwelling sizes possible

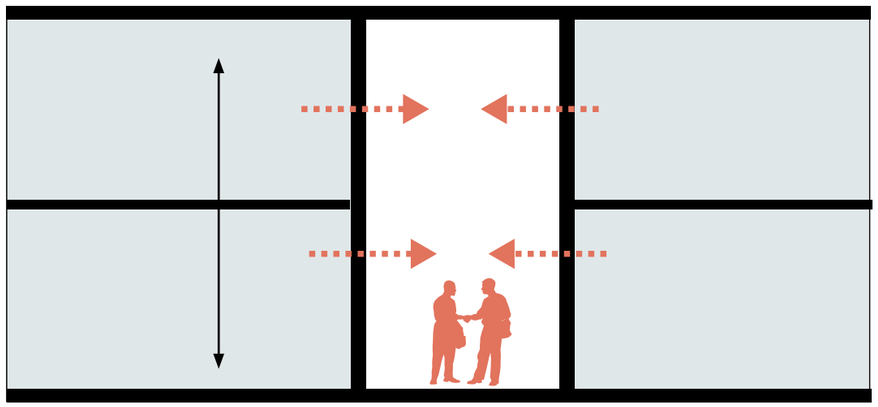


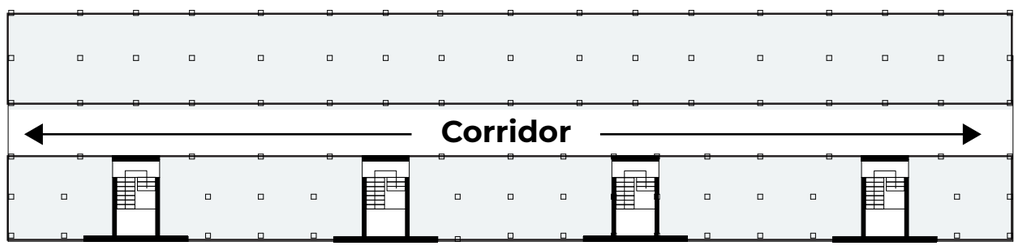
Double height corridor

Attractive traffic space

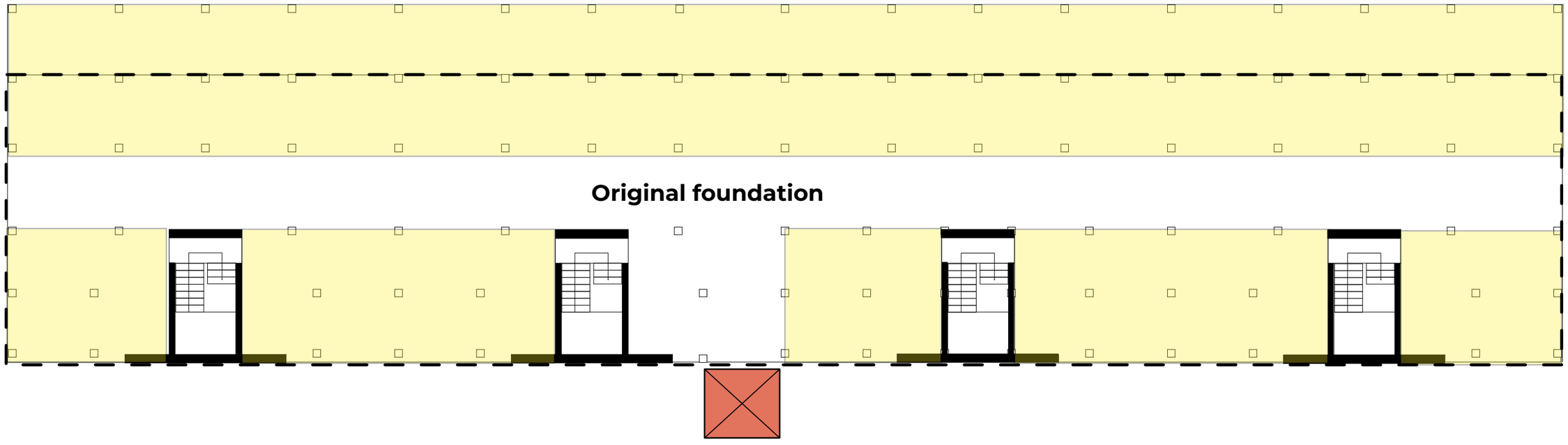


Space for interaction

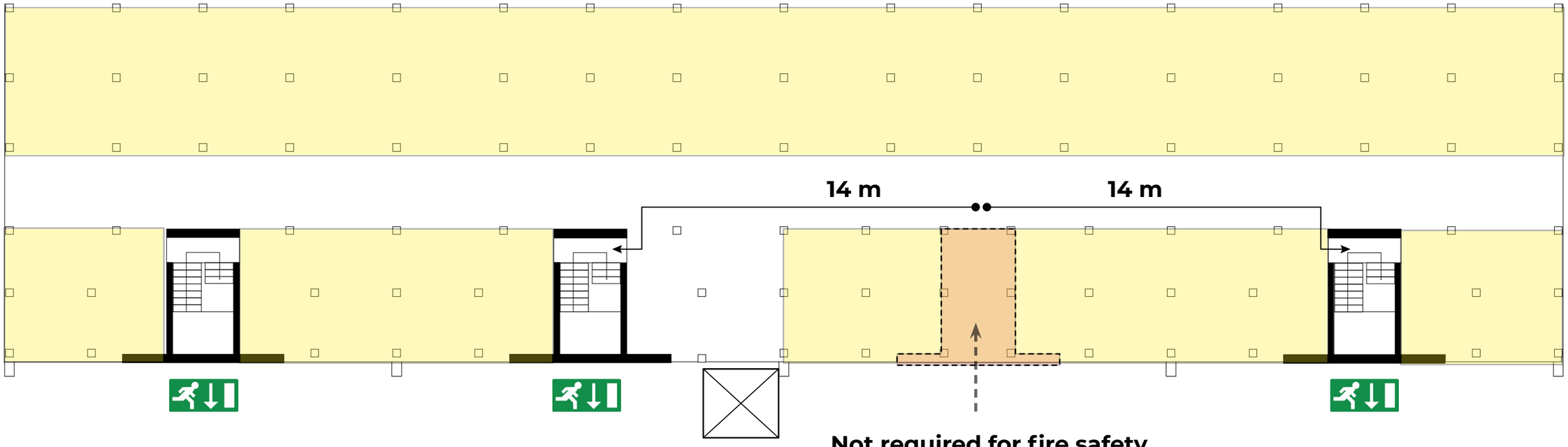




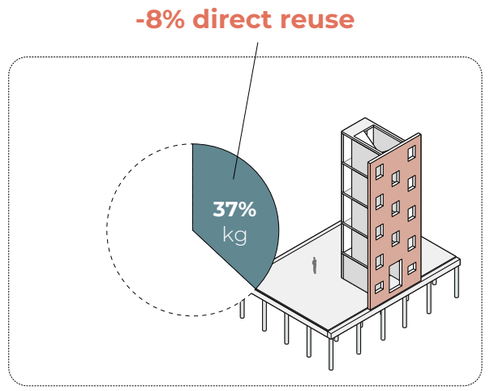
Add elevator



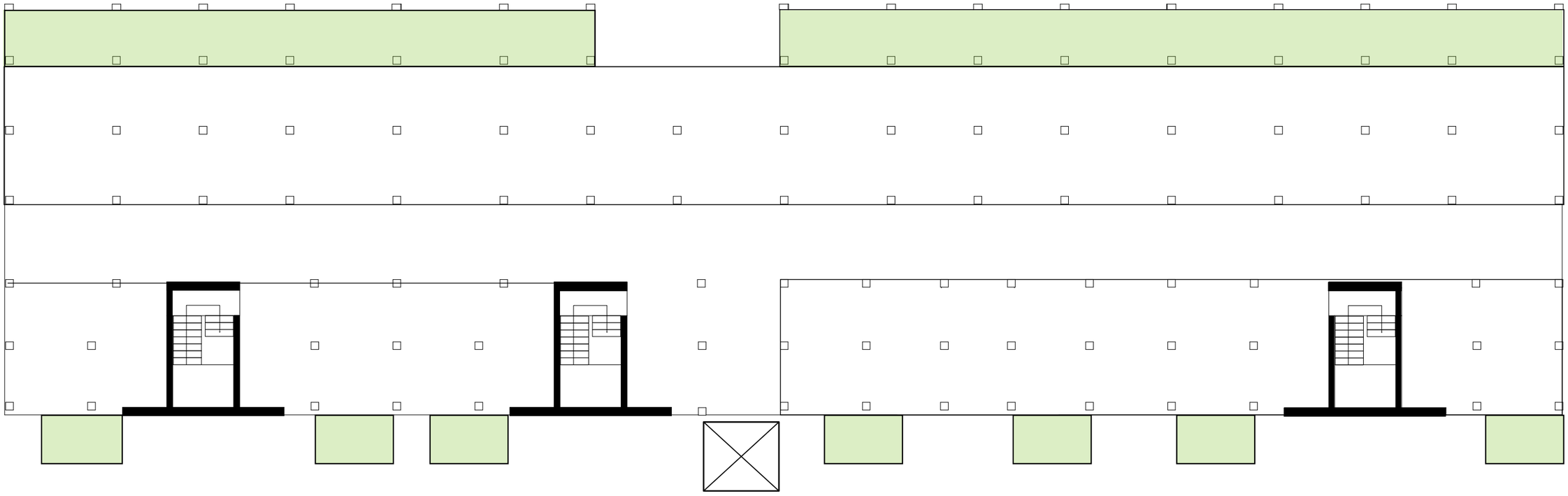
Remove core



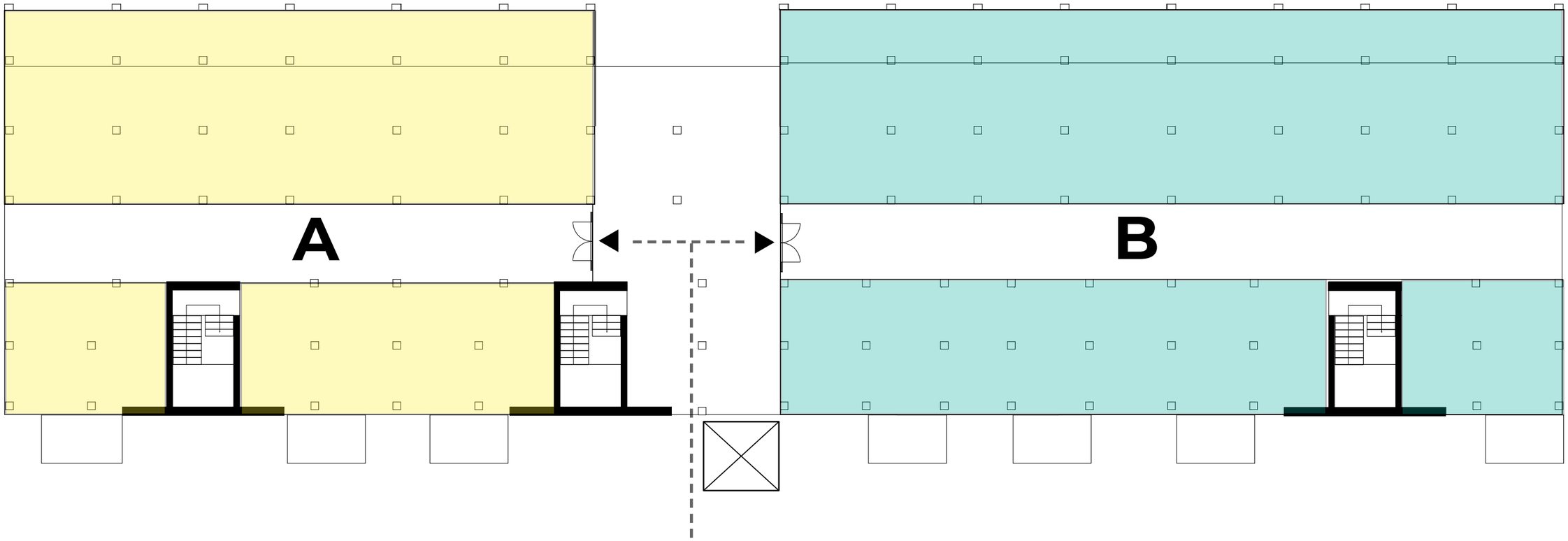
Not required for fire safety
max 30 meter



Add balconies



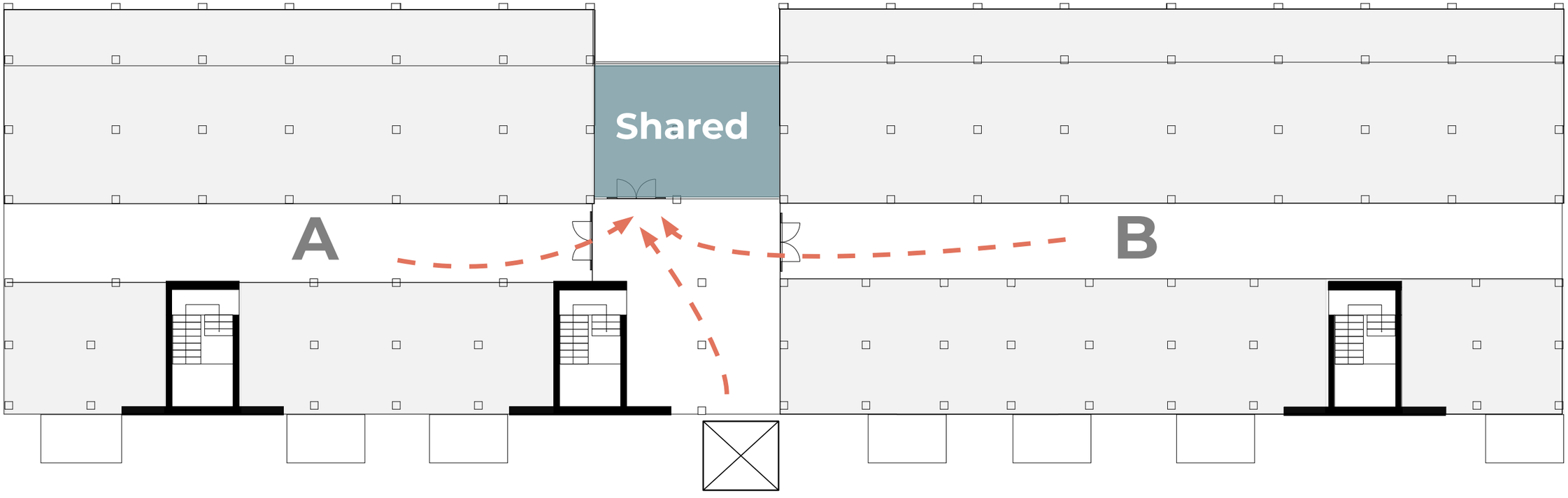
Two living communities



Barrier semi-public / private

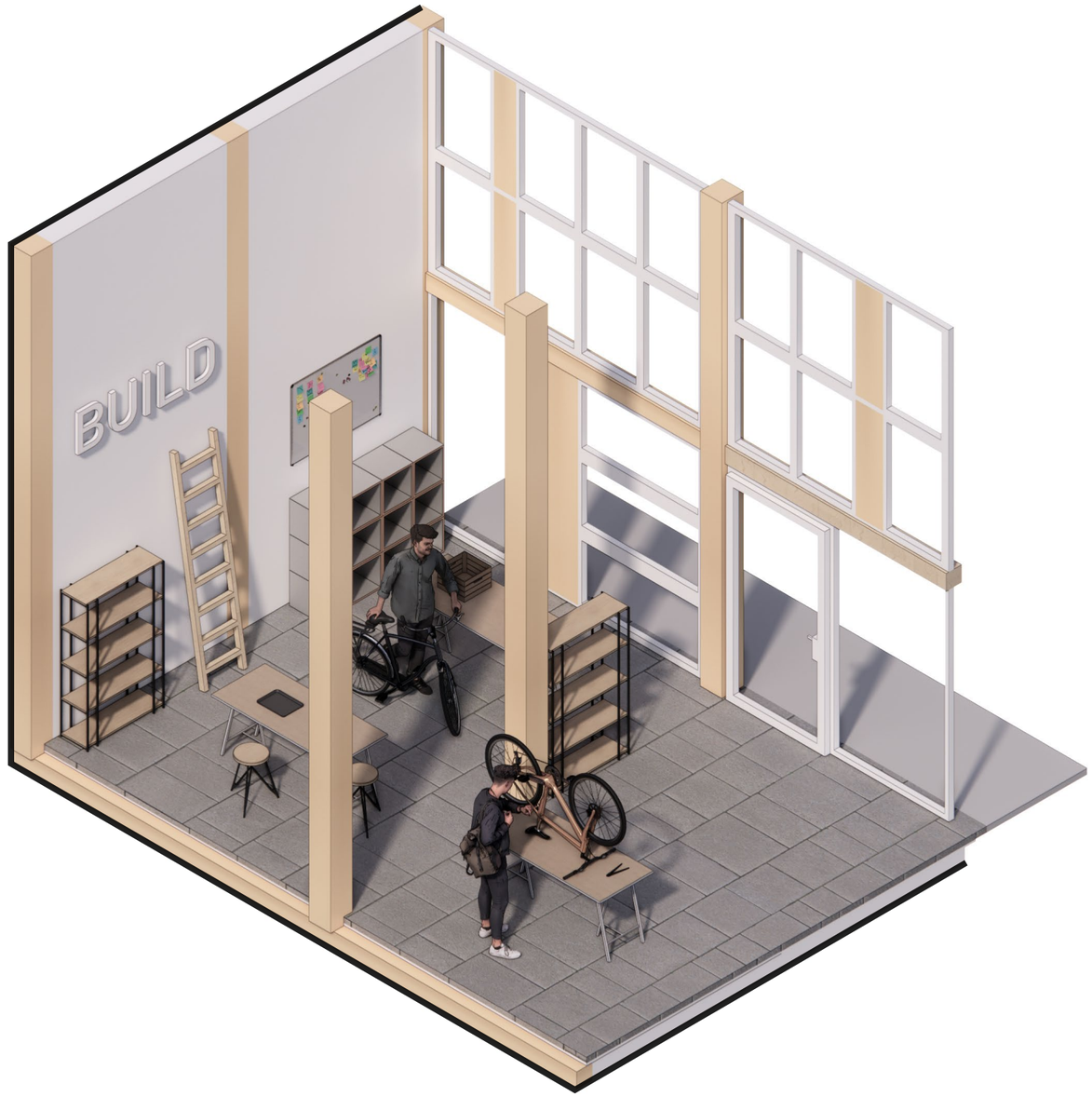
Shared facilities in the core

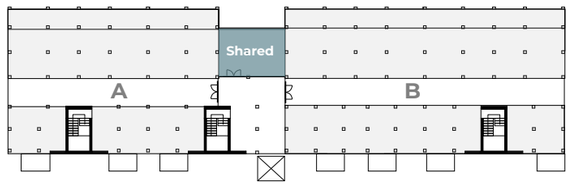
- Increase interaction
- Decrease monetary expenses



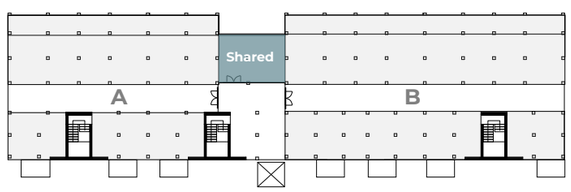
accesible for the whole building

Workshop

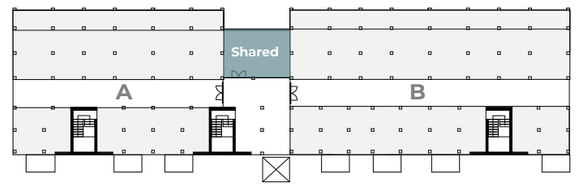




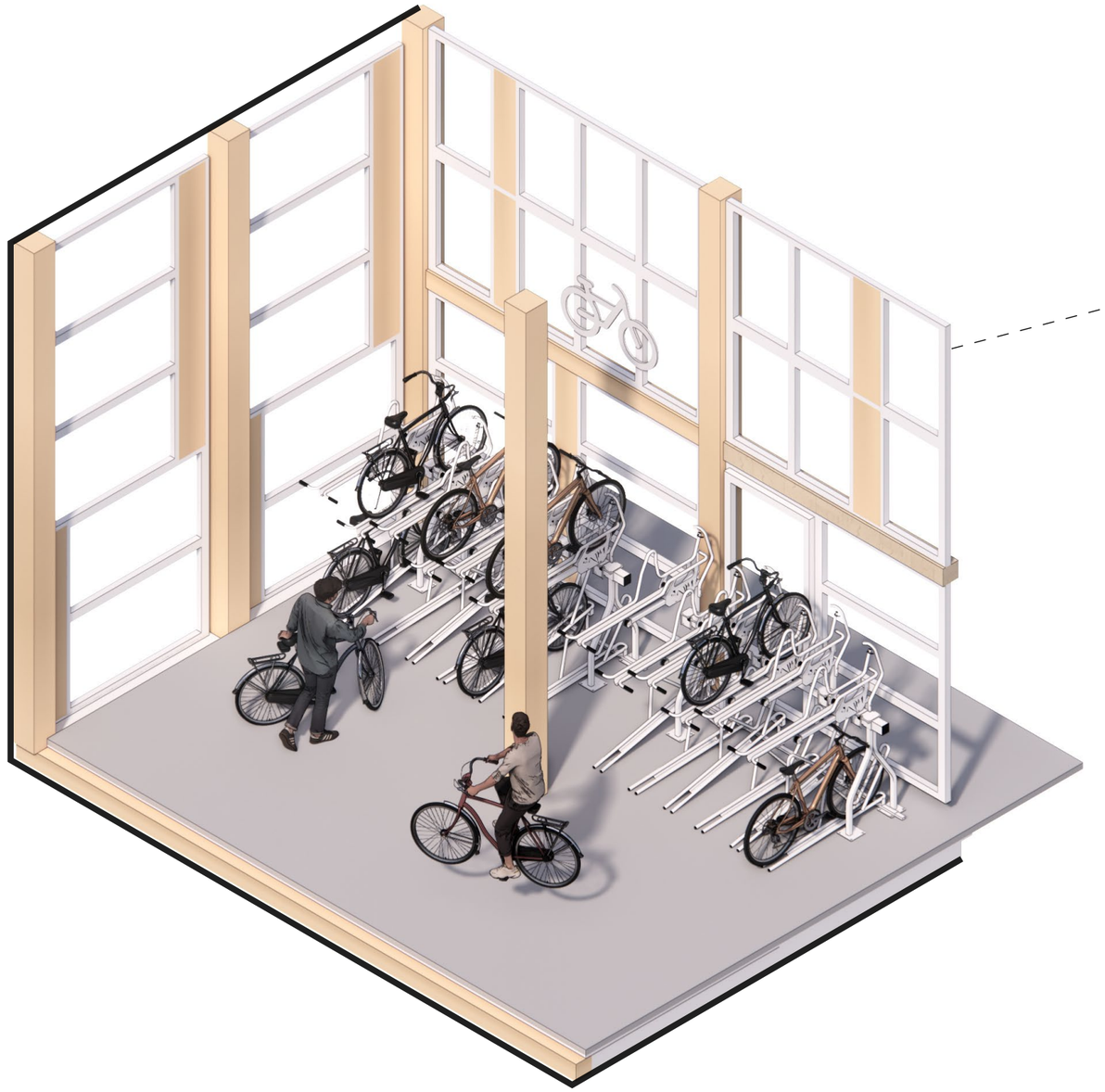
Laundry



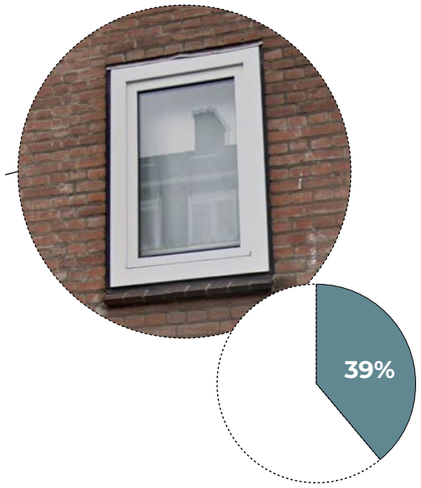
Working from home

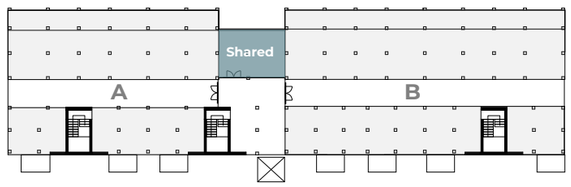


Bicycle parking



All interior facades = reused glazing

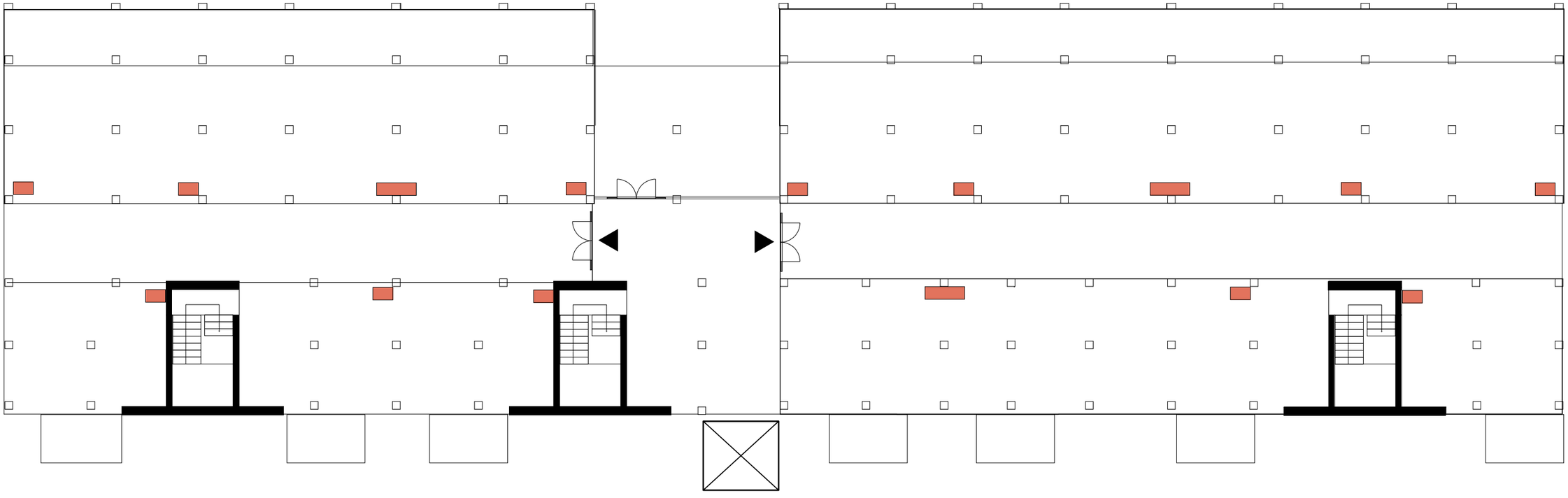


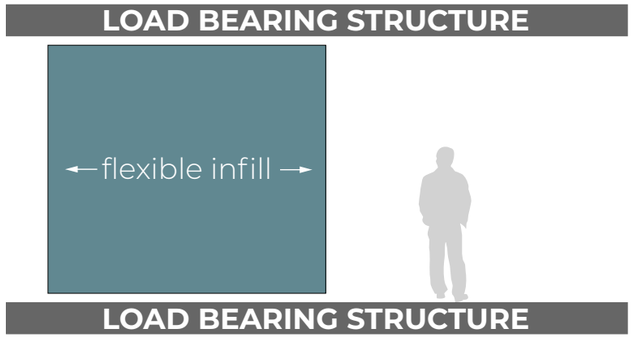


Ground floor

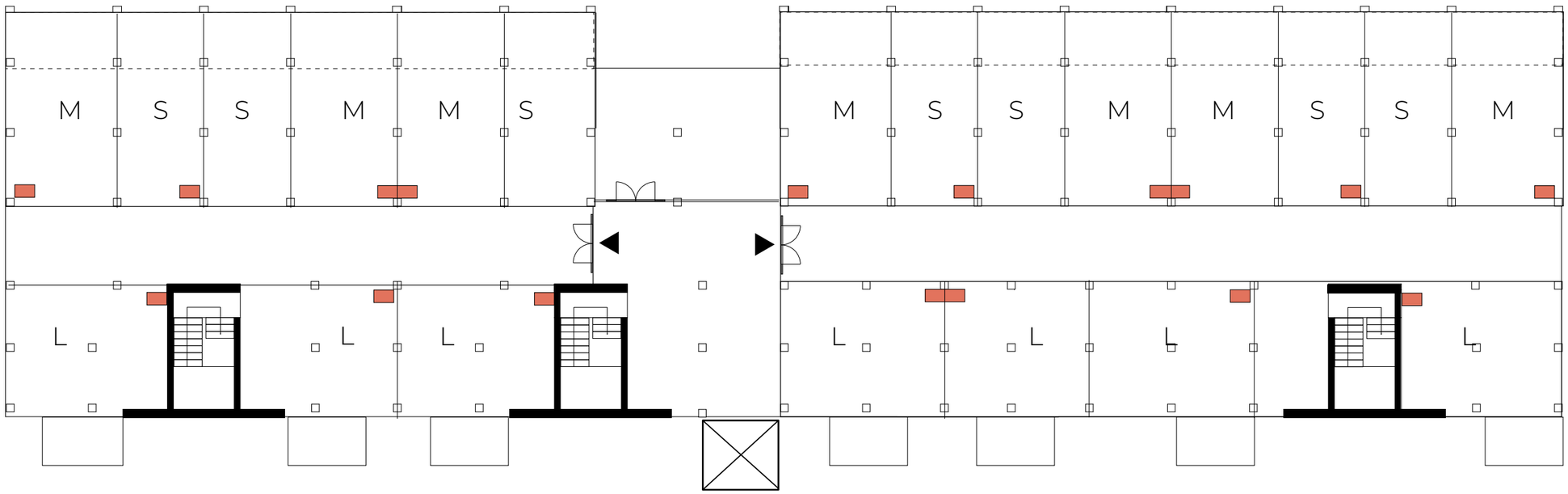
Placement of shafts

Shafts + load bearing structure = fixed
infill = flexible

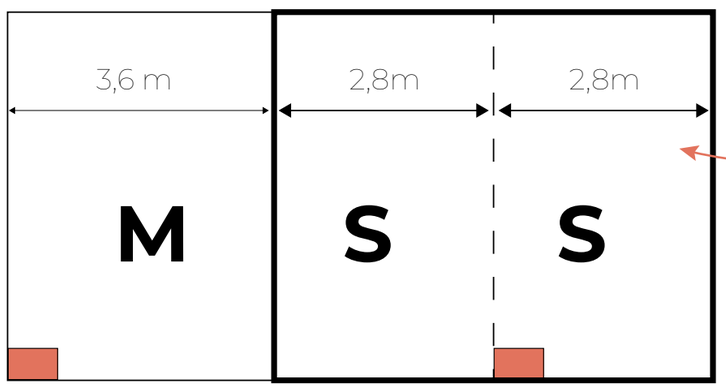




Placement of shafts



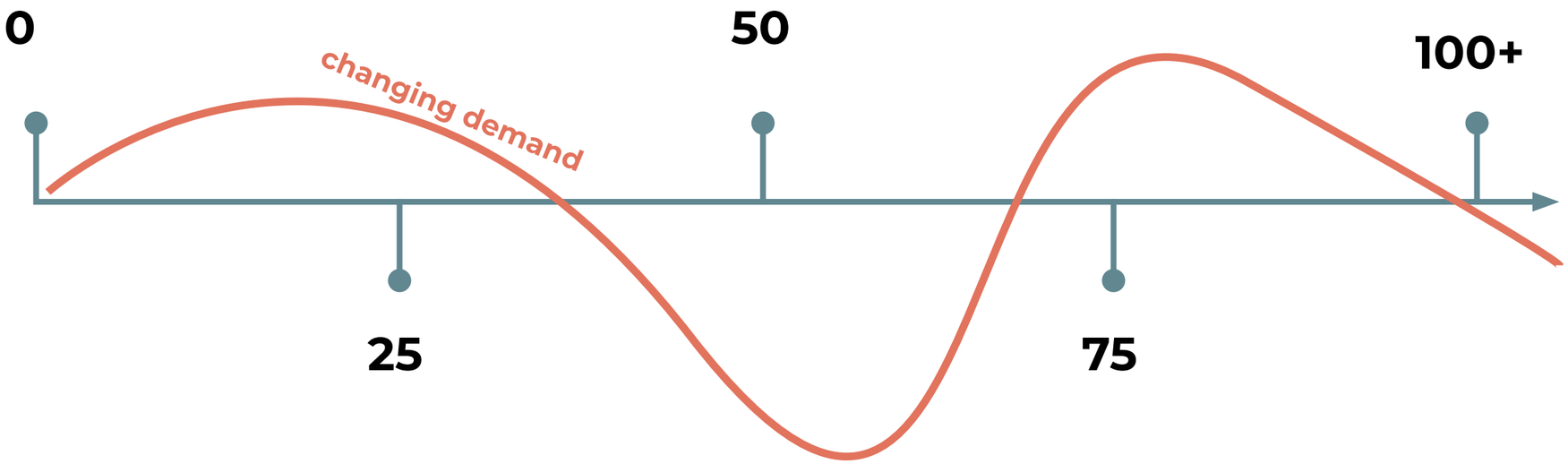
Minimize amount of shafts



width is too small for one appartment

Double S = one shaft

Different configurations within building lifespan



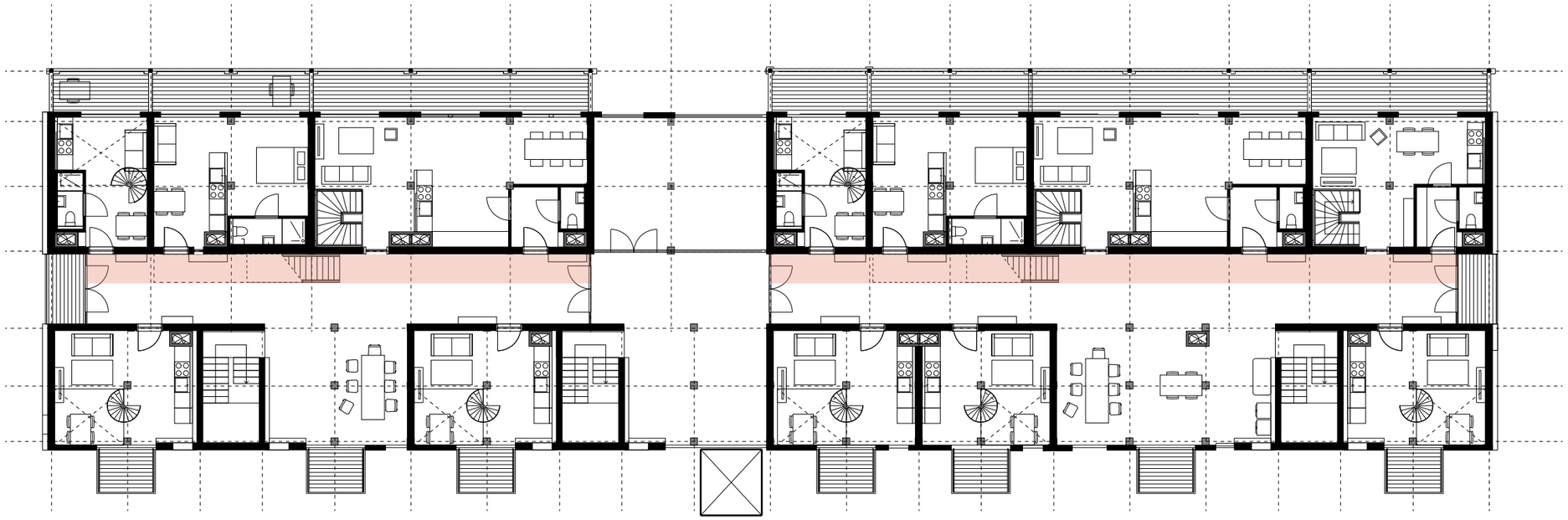
Allow for change, prevent demolition

Typical floorplan

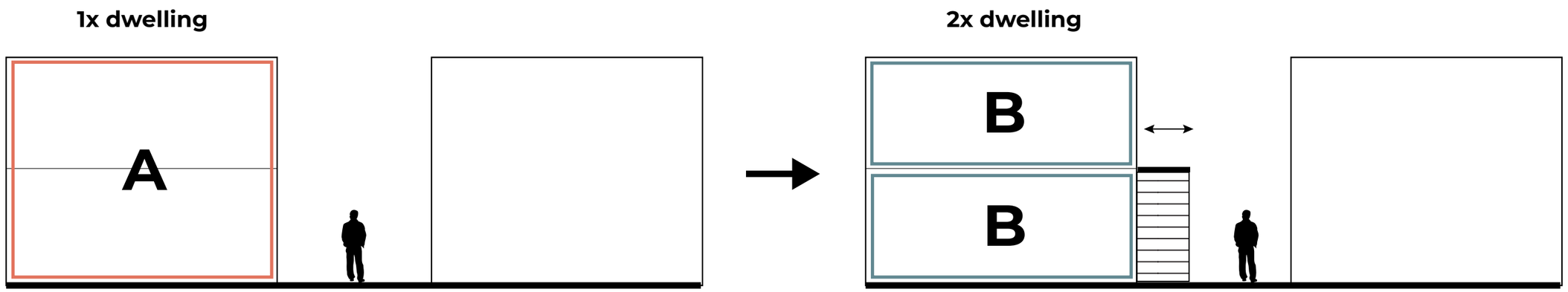
4-block
Typical floor - 0 and +1
1:200

Split dwellings

optional vertical seperation on one side of the hallway.

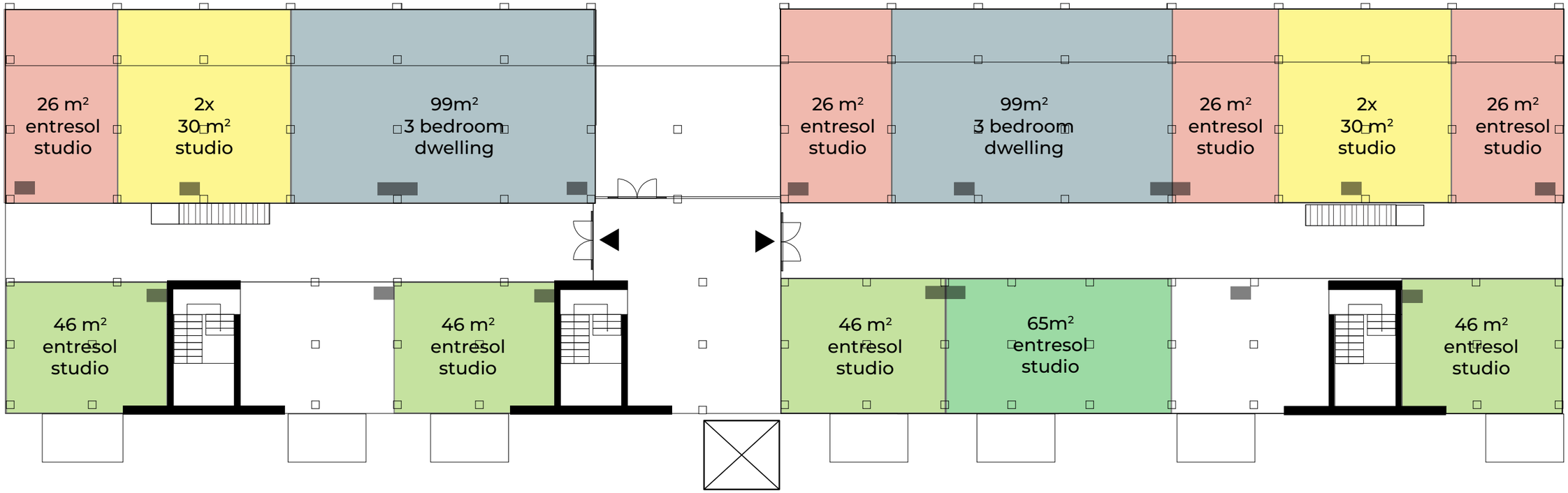


0



Variety of dwelling configurations

Mix of dwelling types

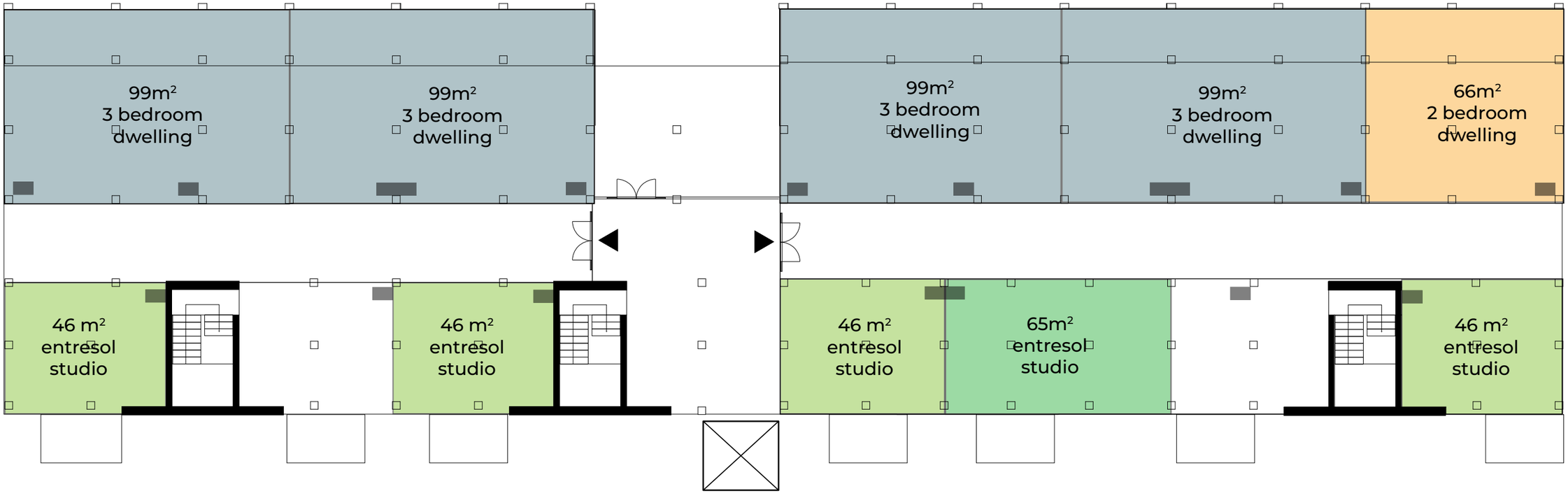


Variety of dwelling configurations

Focus on small dwellings

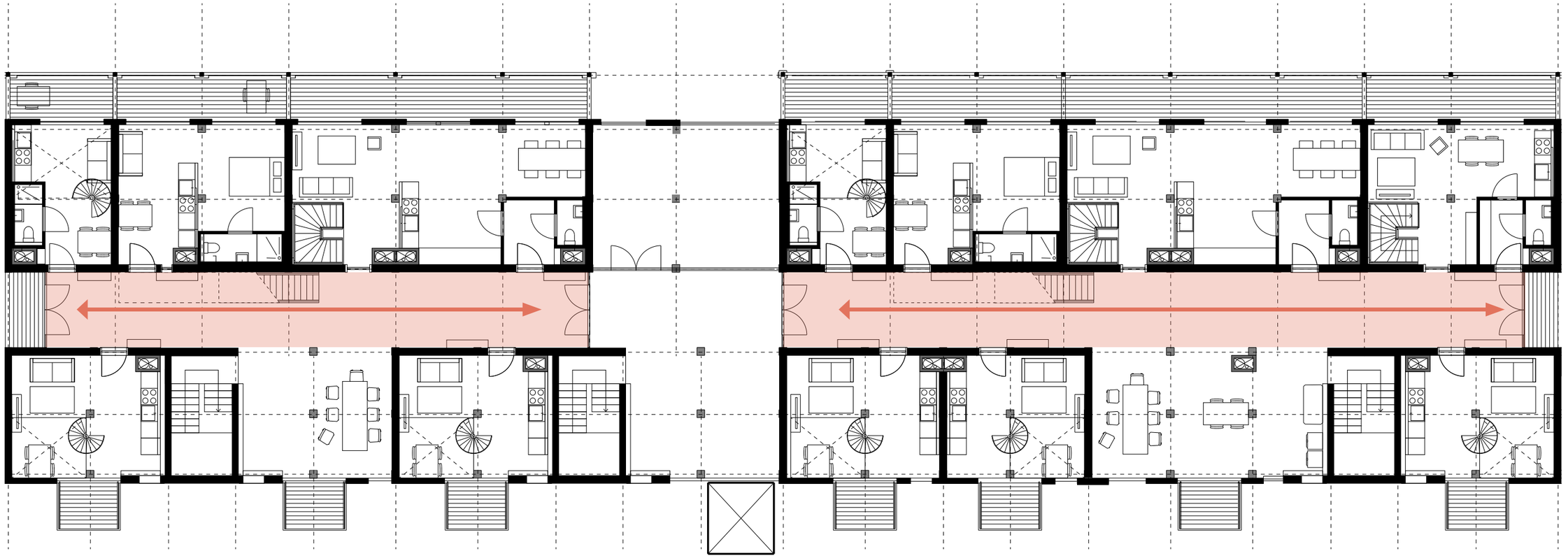
Variety of dwelling configurations

Focus on large dwellings



Interior corridor

Connecting element

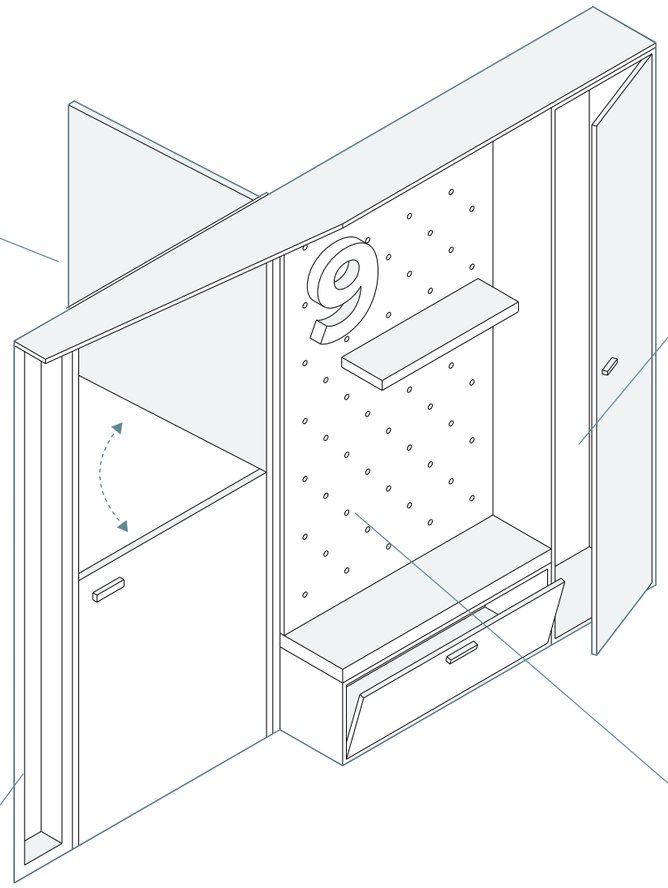


Front door furniture element

Recognize where people live

Folding door for purge ventilation

Lockers

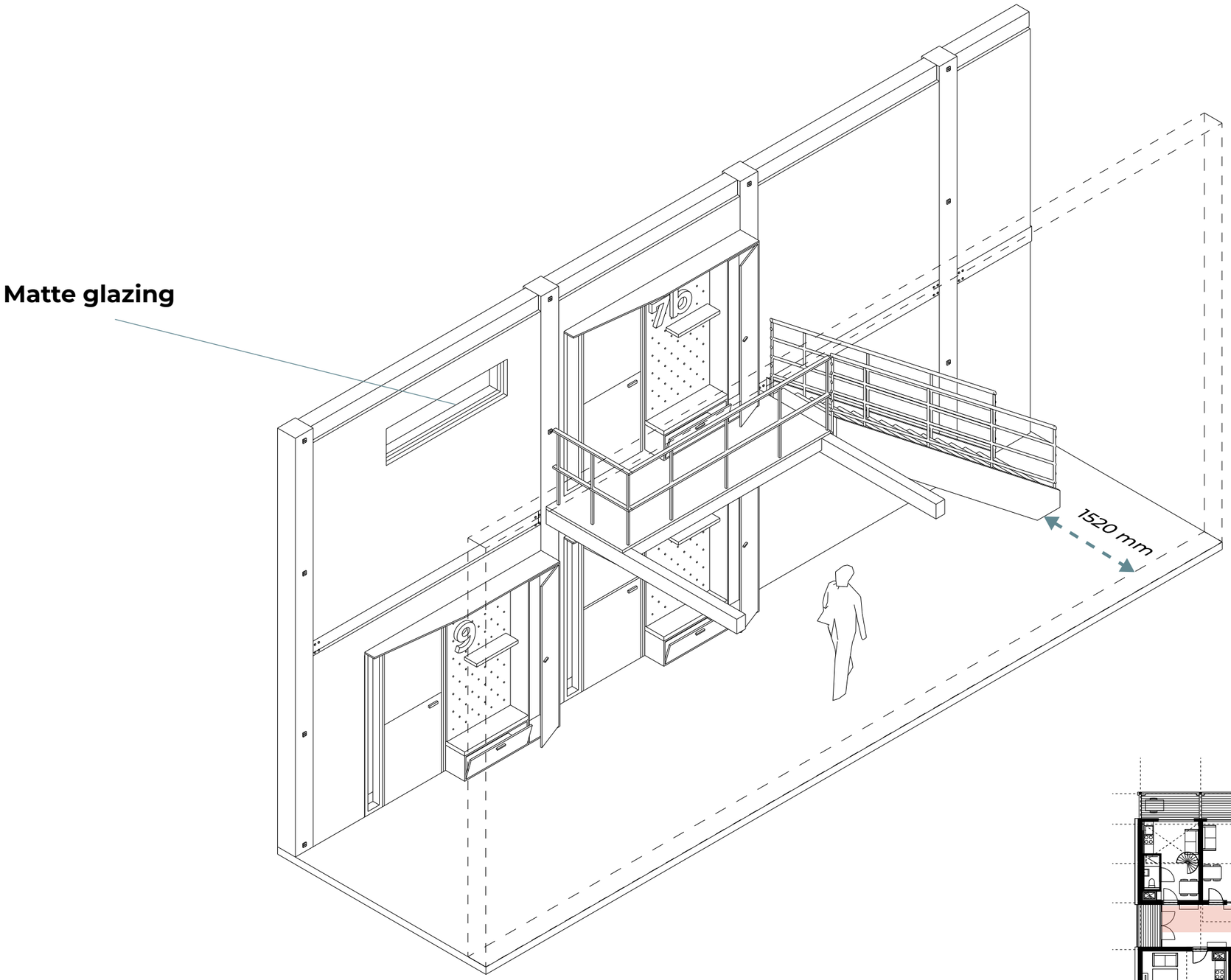


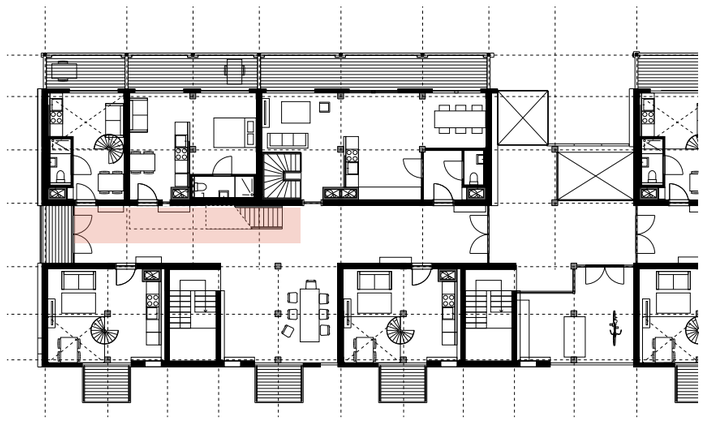
Small window

Promote interaction

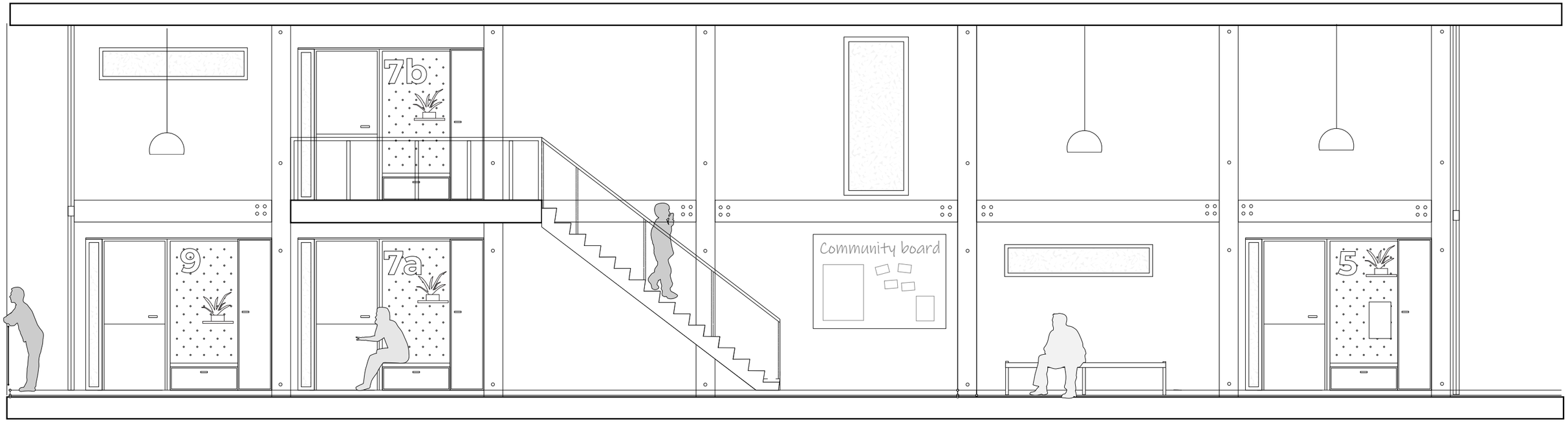
Customizable peg-board

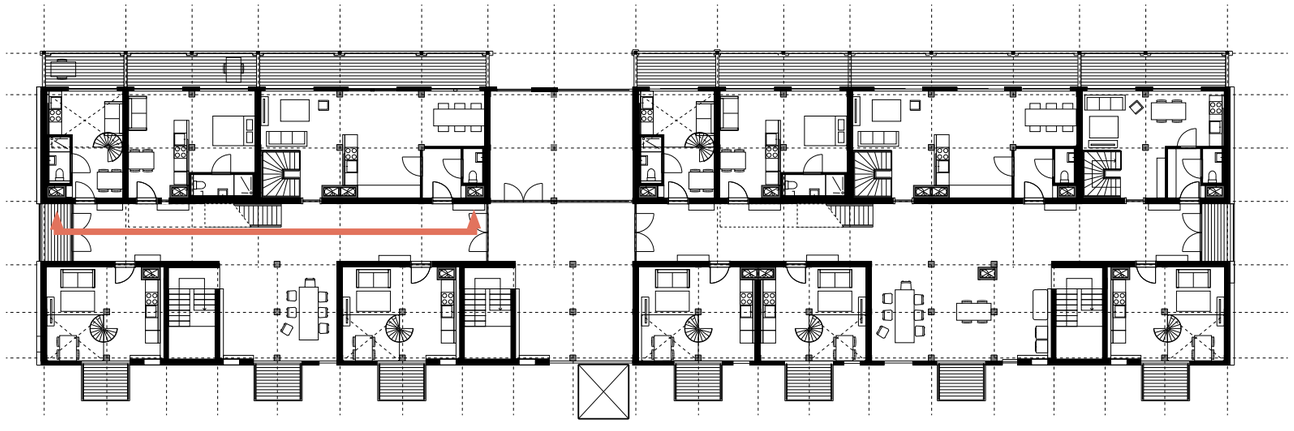
interior corridor





Interior corridor





0

Interior corridor

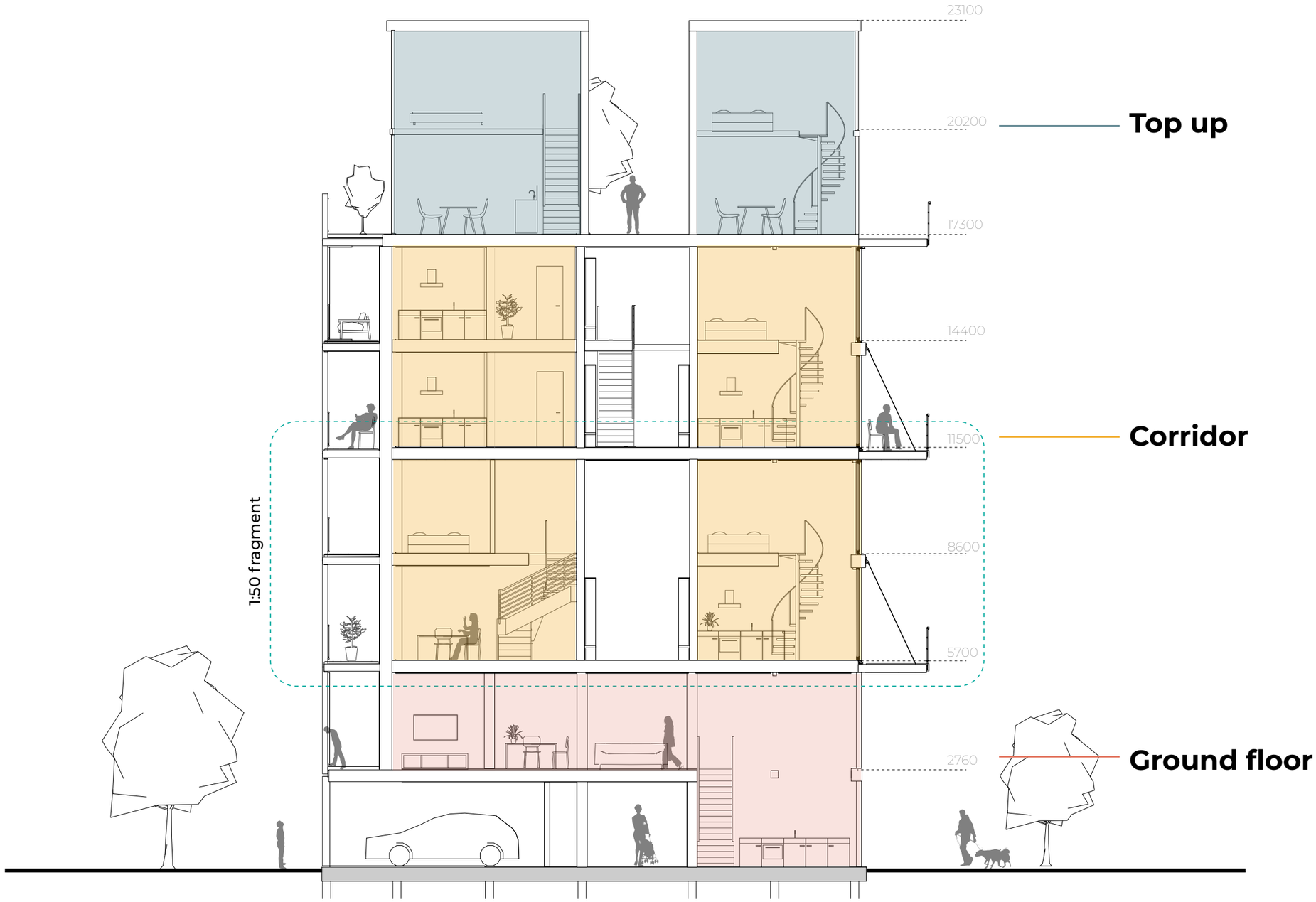
Common room

Space for interaction

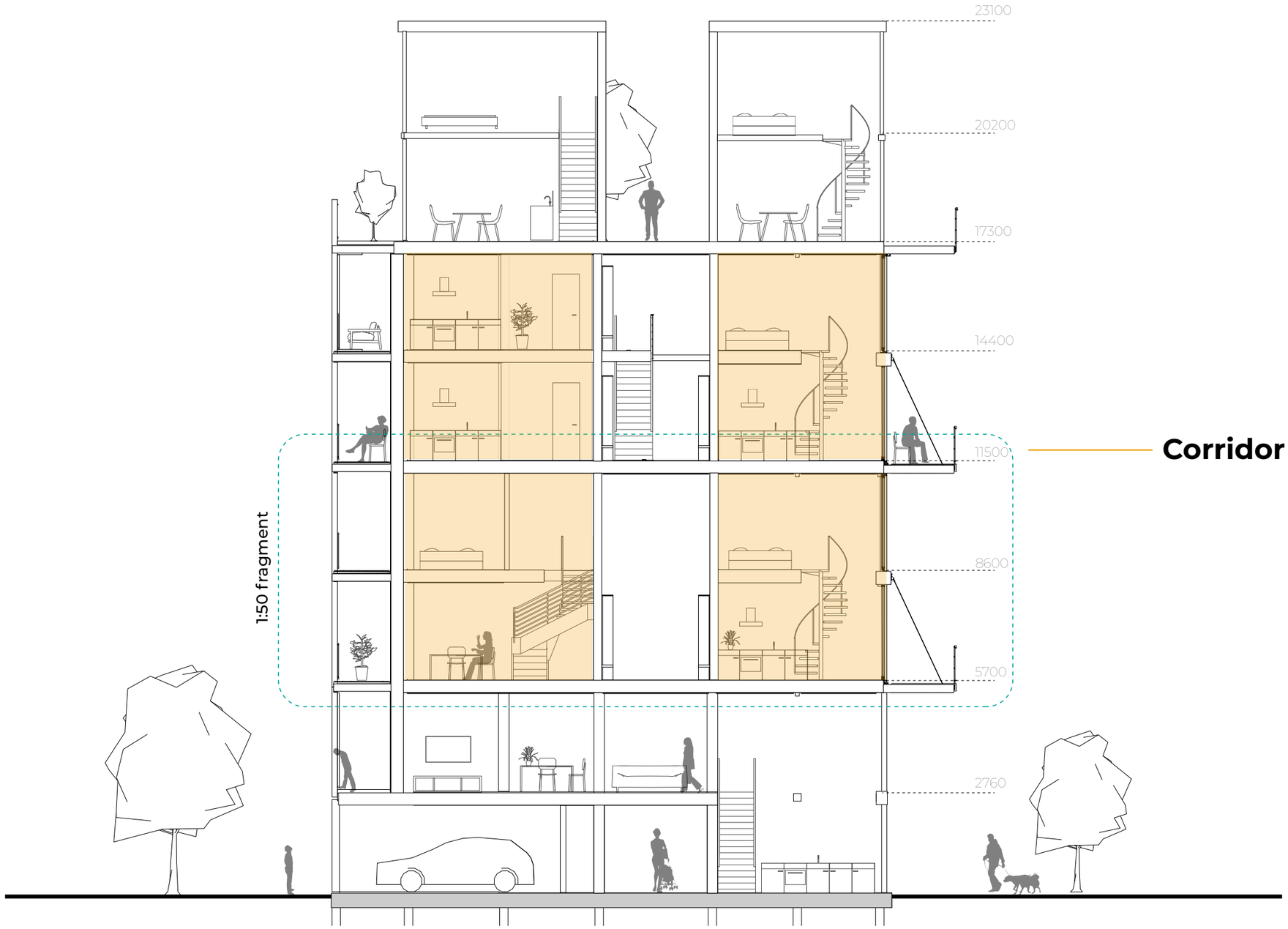
0

Common room

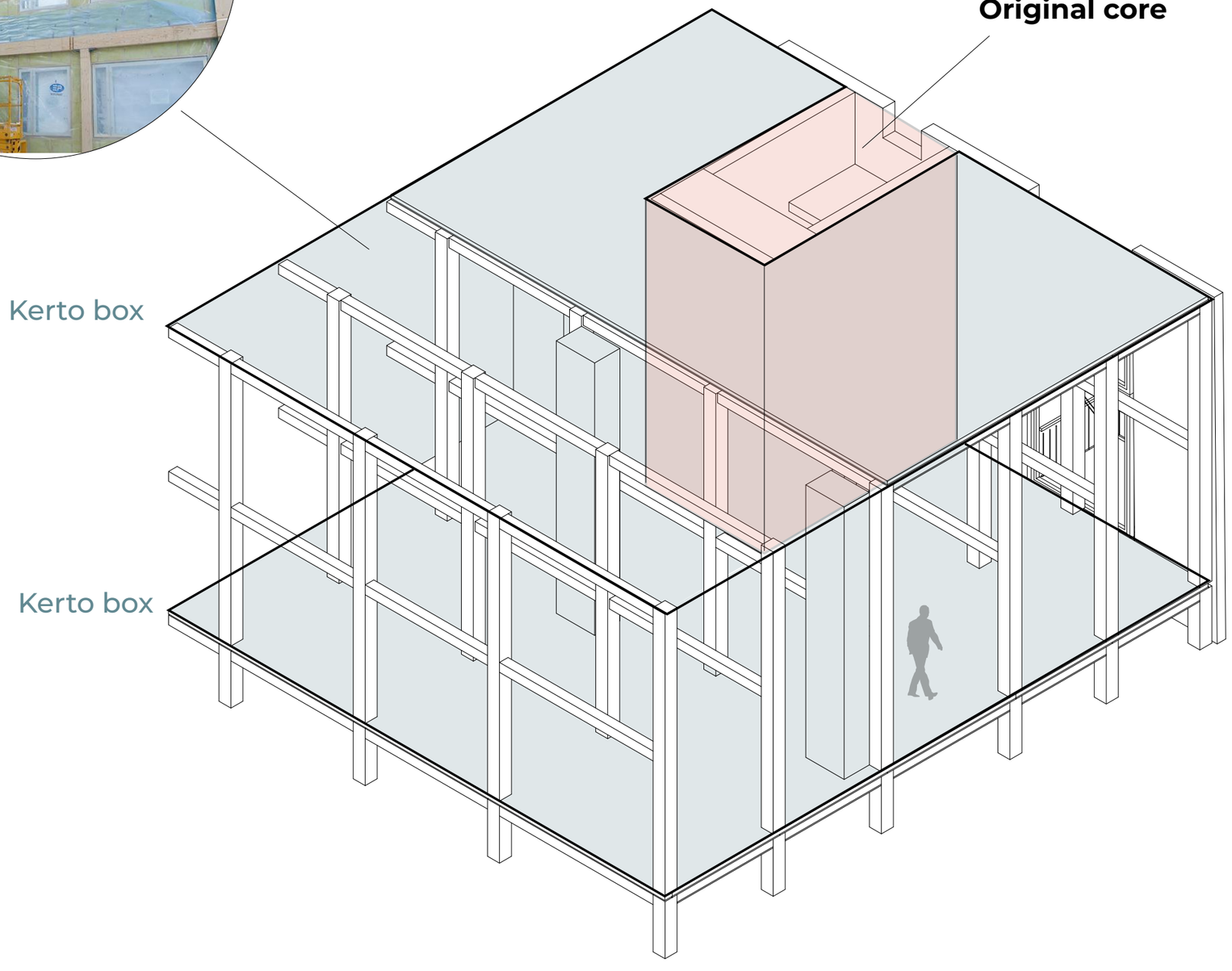
Result: 3 living typologies



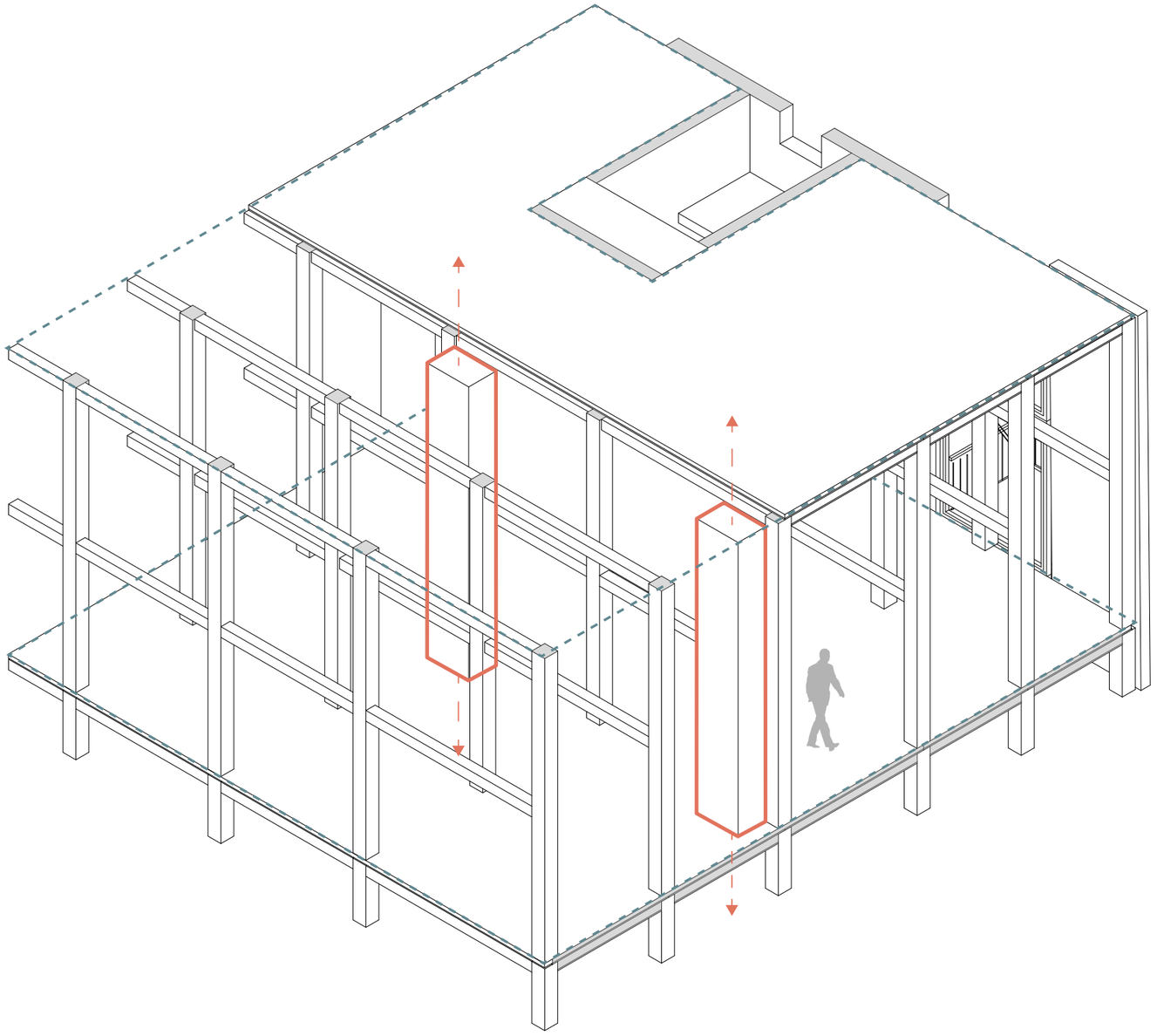
Living typology: corridor



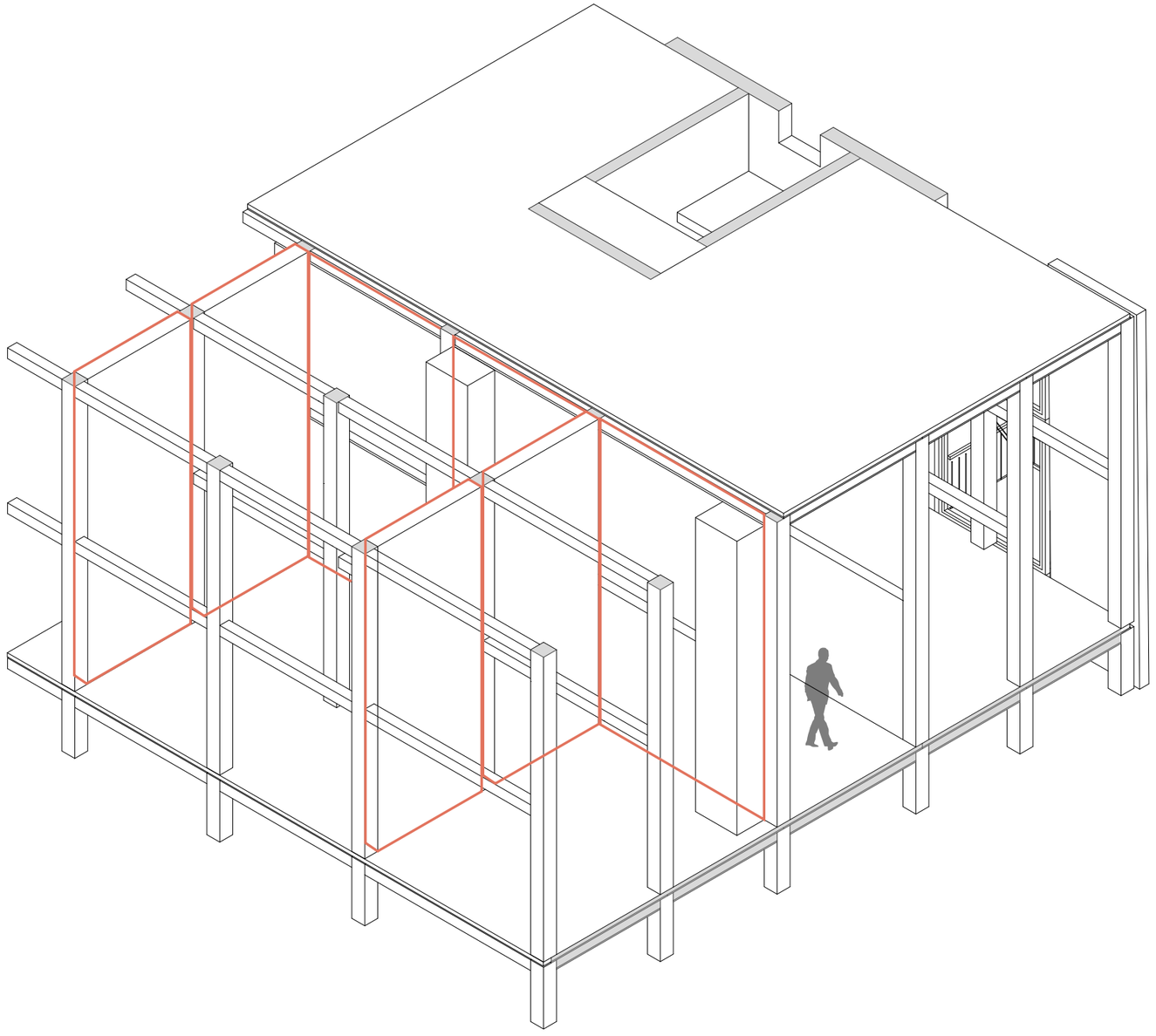
Empty structure



Installation shafts

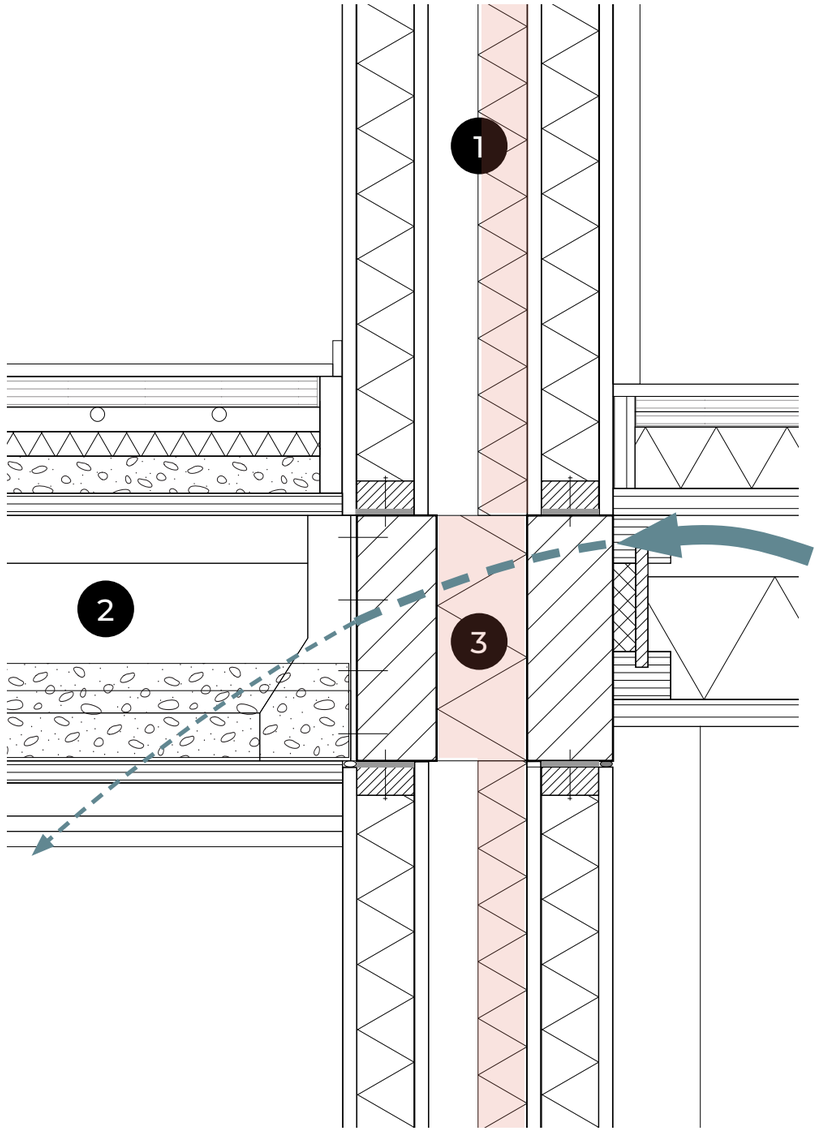


Wall elements



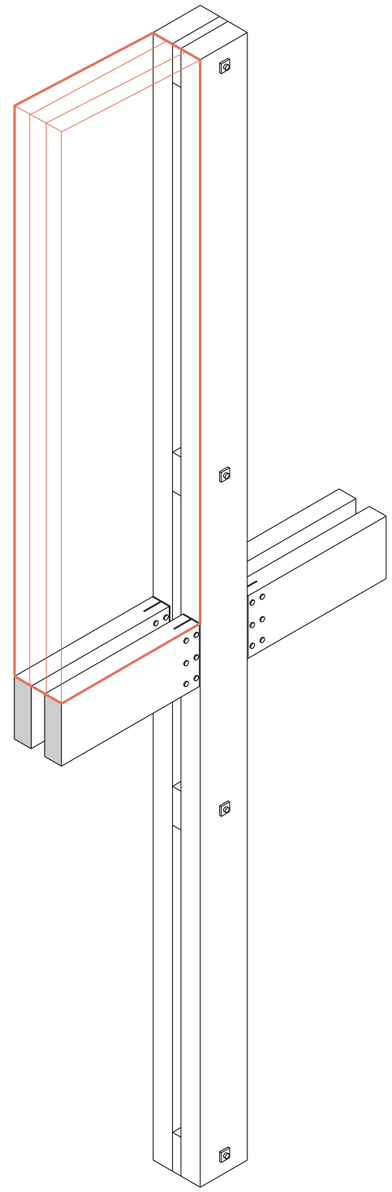
Acoustics of walls

Acoustically disconnected beams & columns

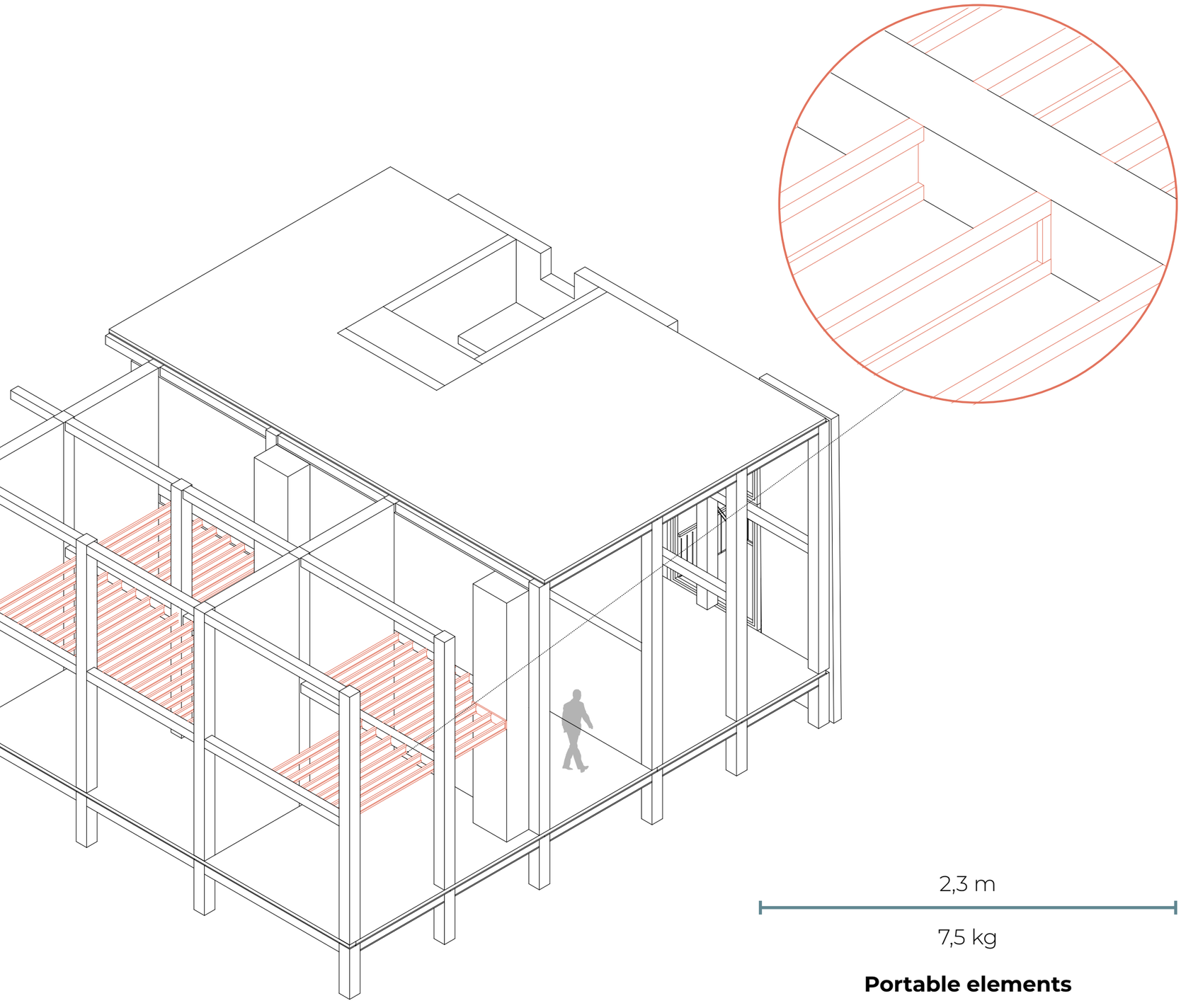


1:5 vertical detail

wall element



Wood I-beam floors



2,3 m

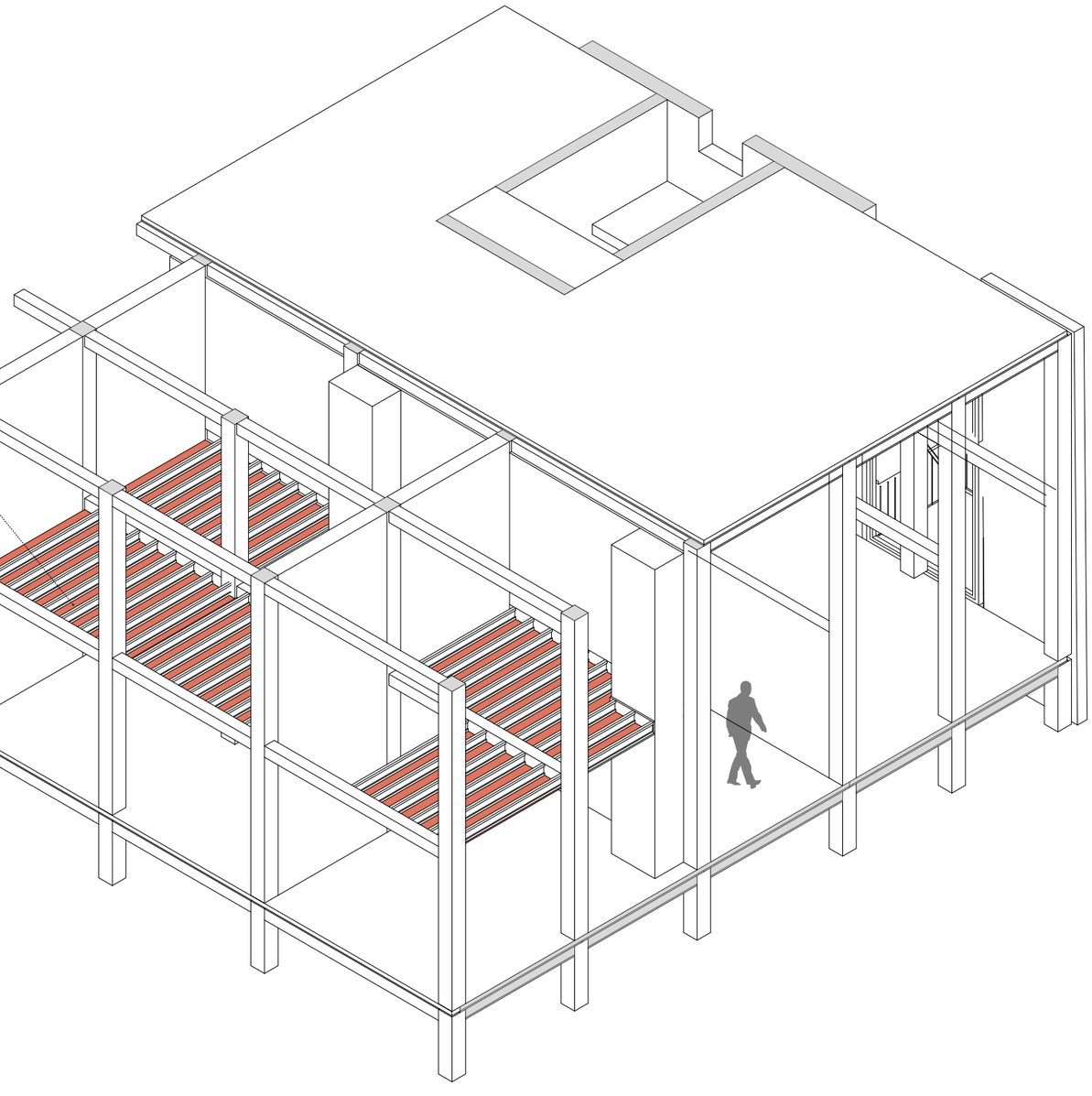
7,5 kg

Portable elements

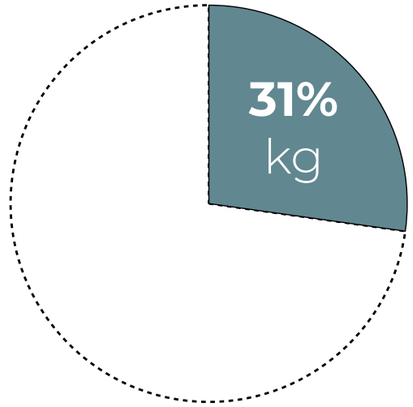
Fill floors with concrete gravel

Concrete gravel in plastic bags

100 kg/m2



Percentage of conrete reused



Fill floors with concrete gravel

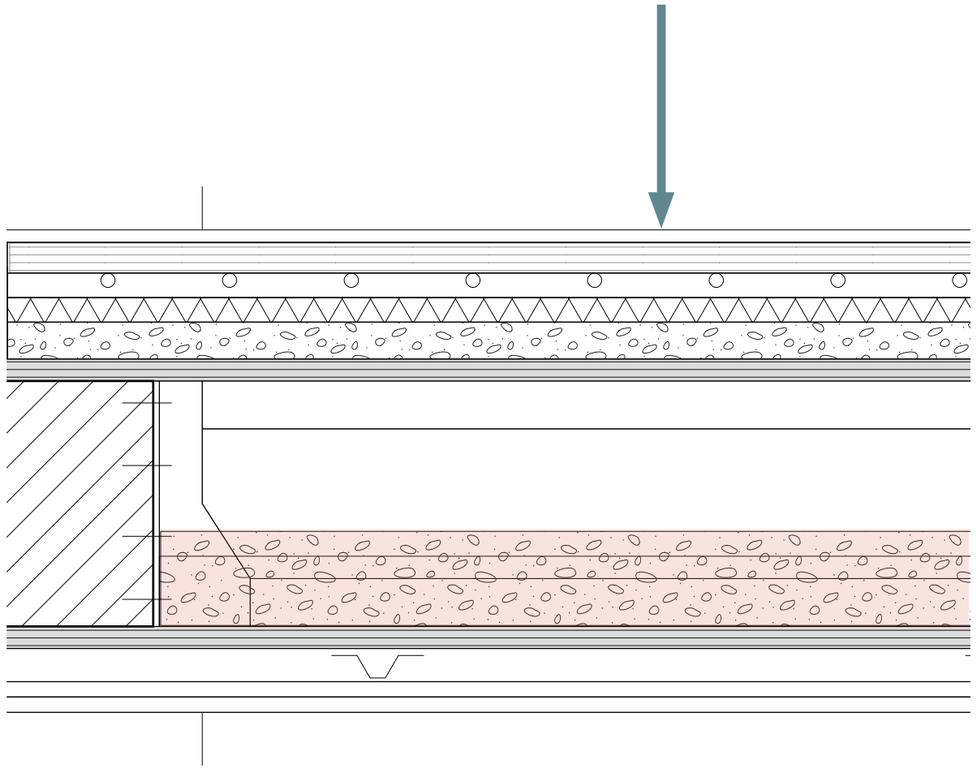


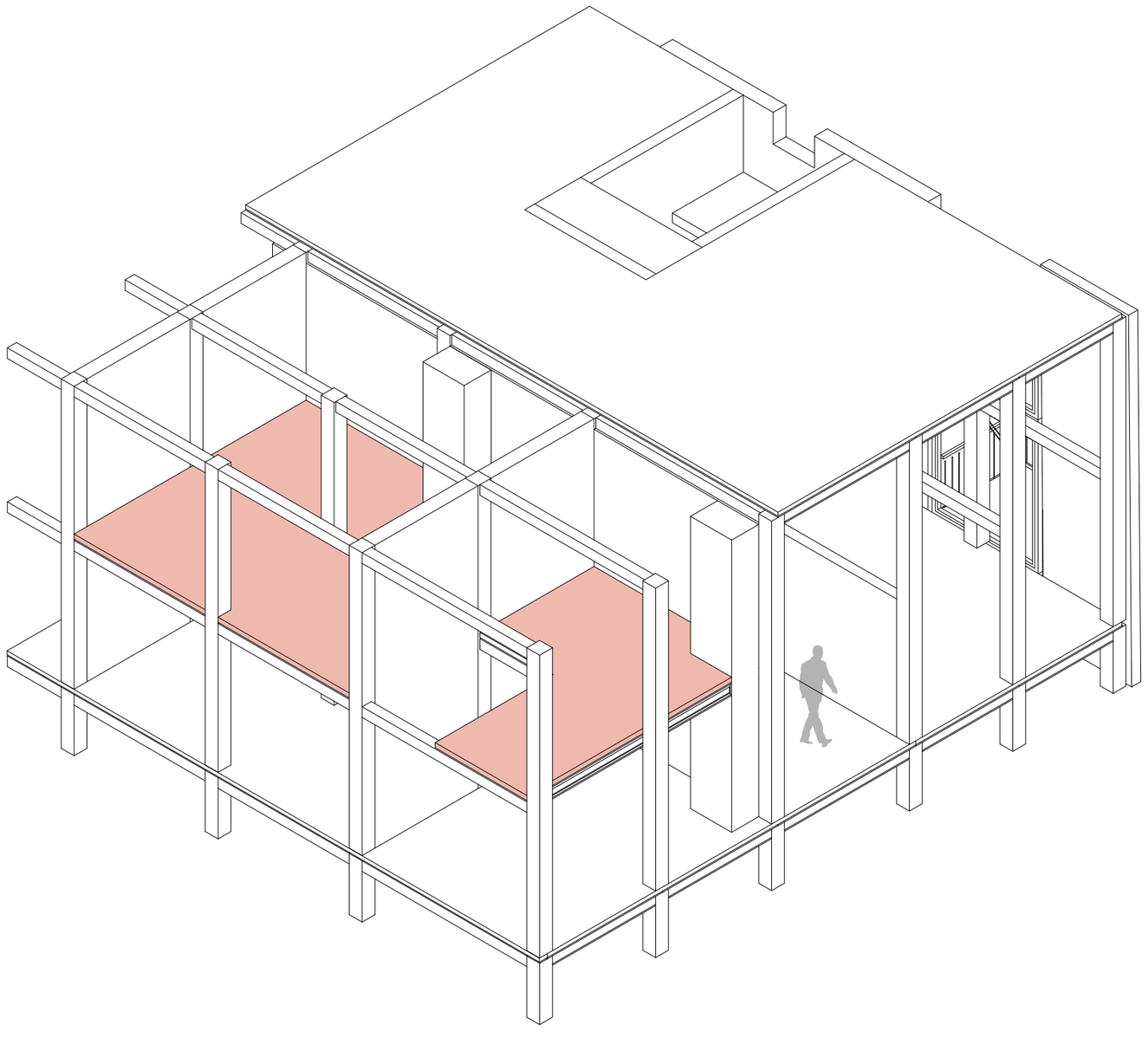
Fig. 6. Element cavity with the gravel bags.

Adding concrete gravel in the cavity reduces impact sound Ln by 6 dB

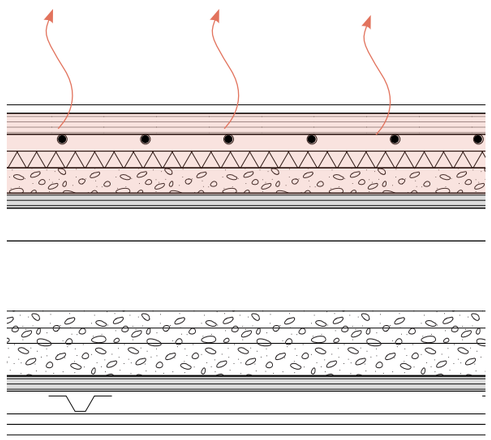
(Conta, Homb (2019) Sound radiation of hollow box timber floors under impact excitation:

An experimental parameter study. Applied acoustics (161).)

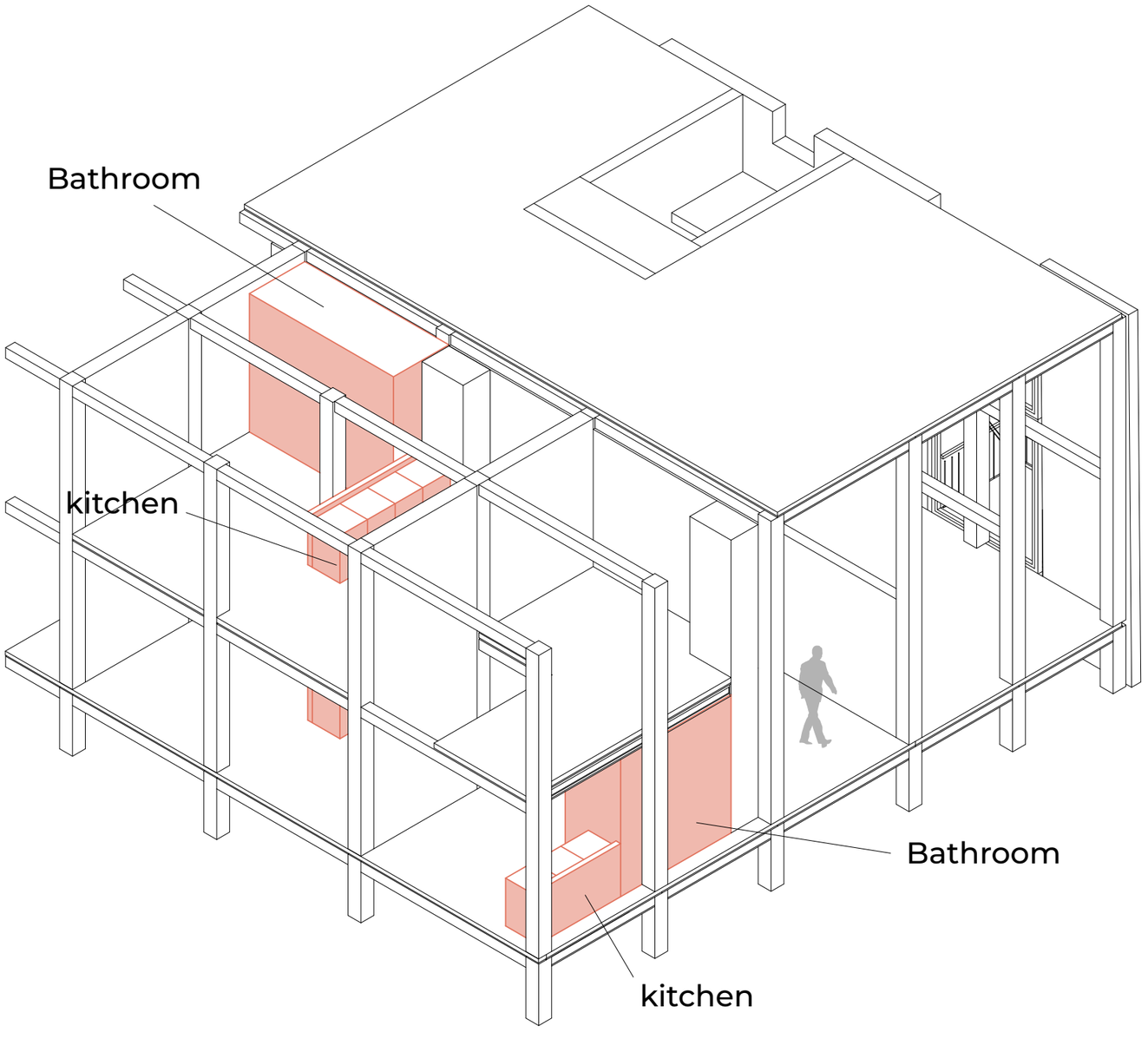
Finishing layers



Floor heating

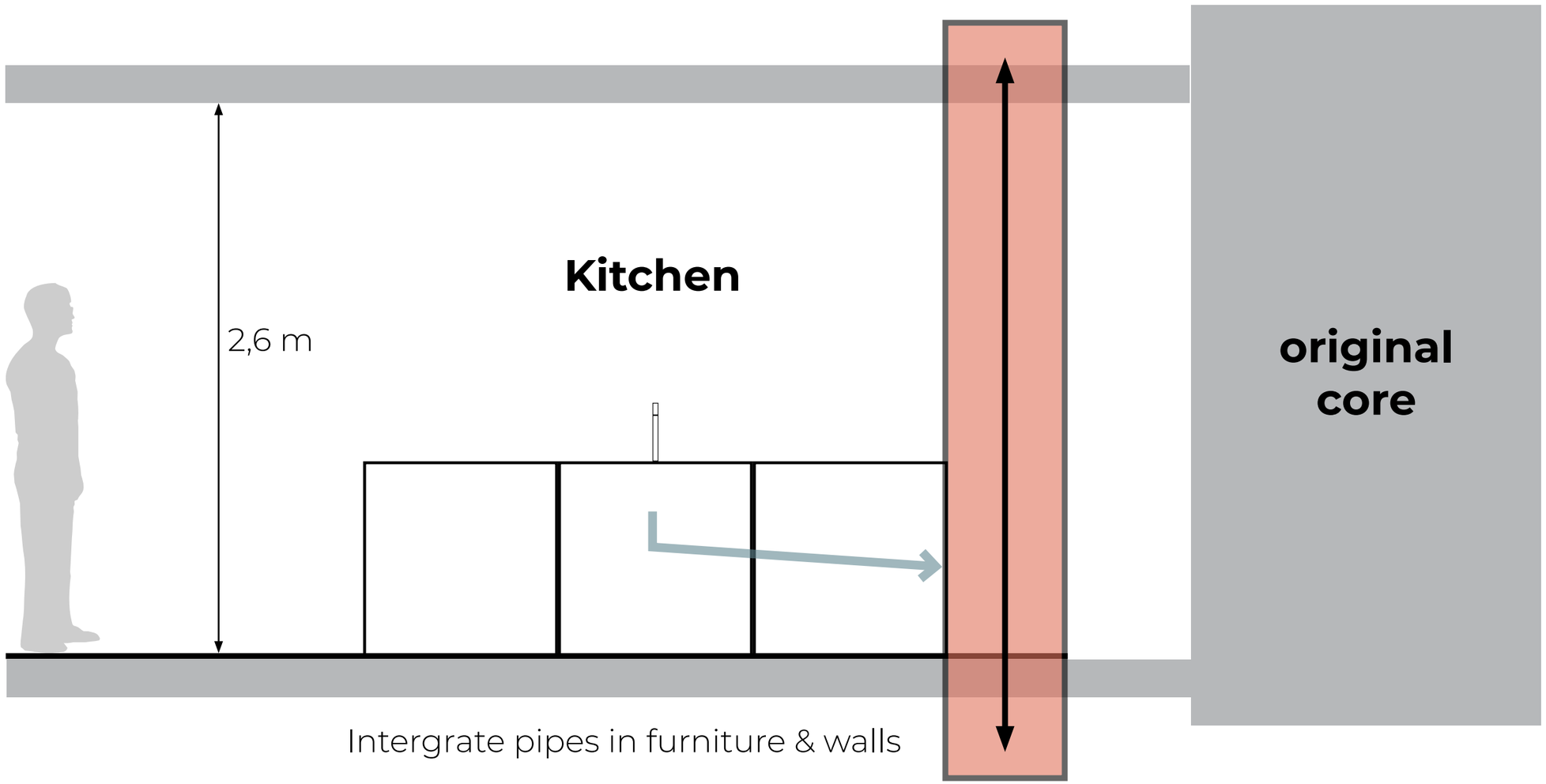


Installations

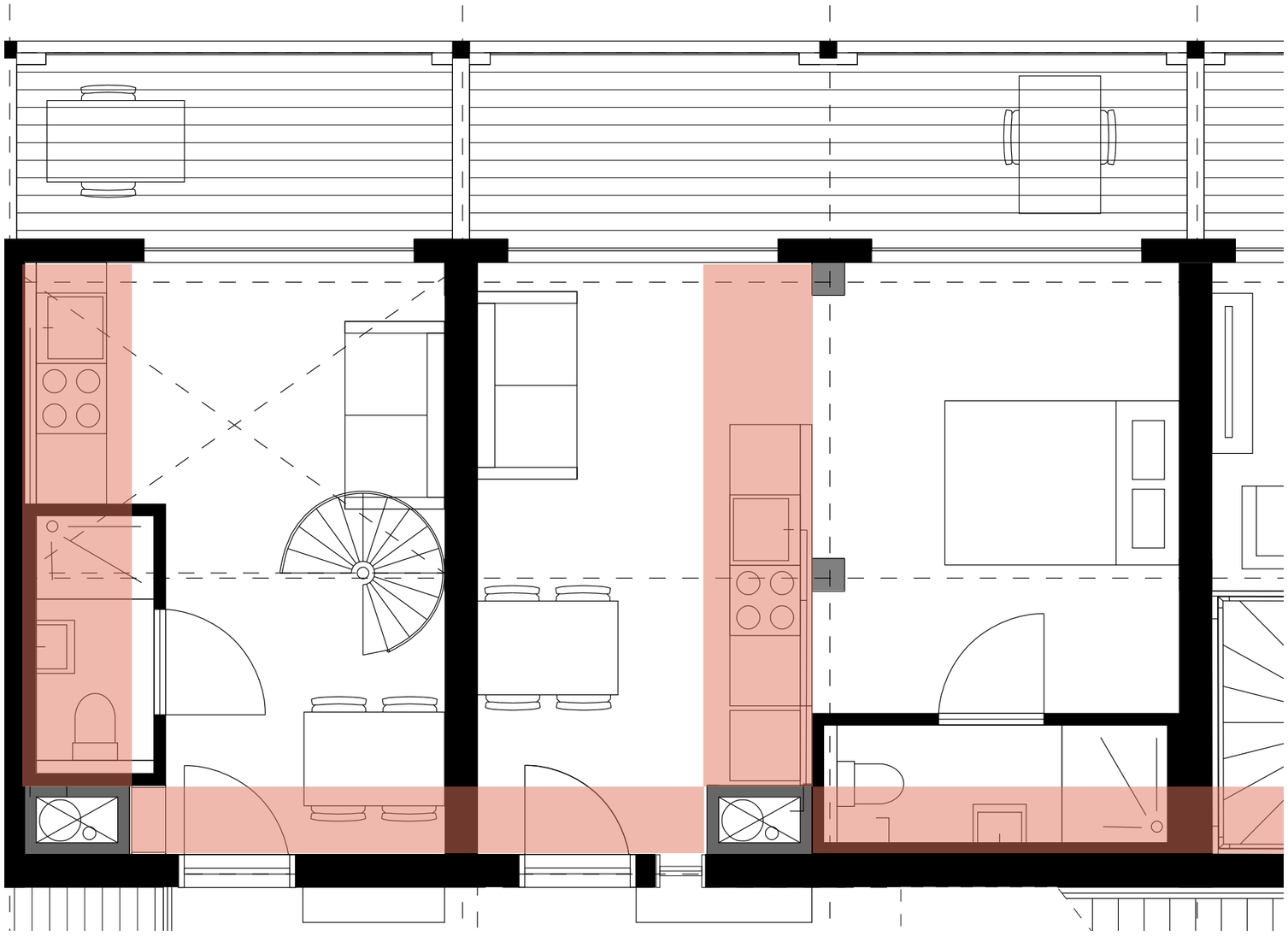


Installation concept

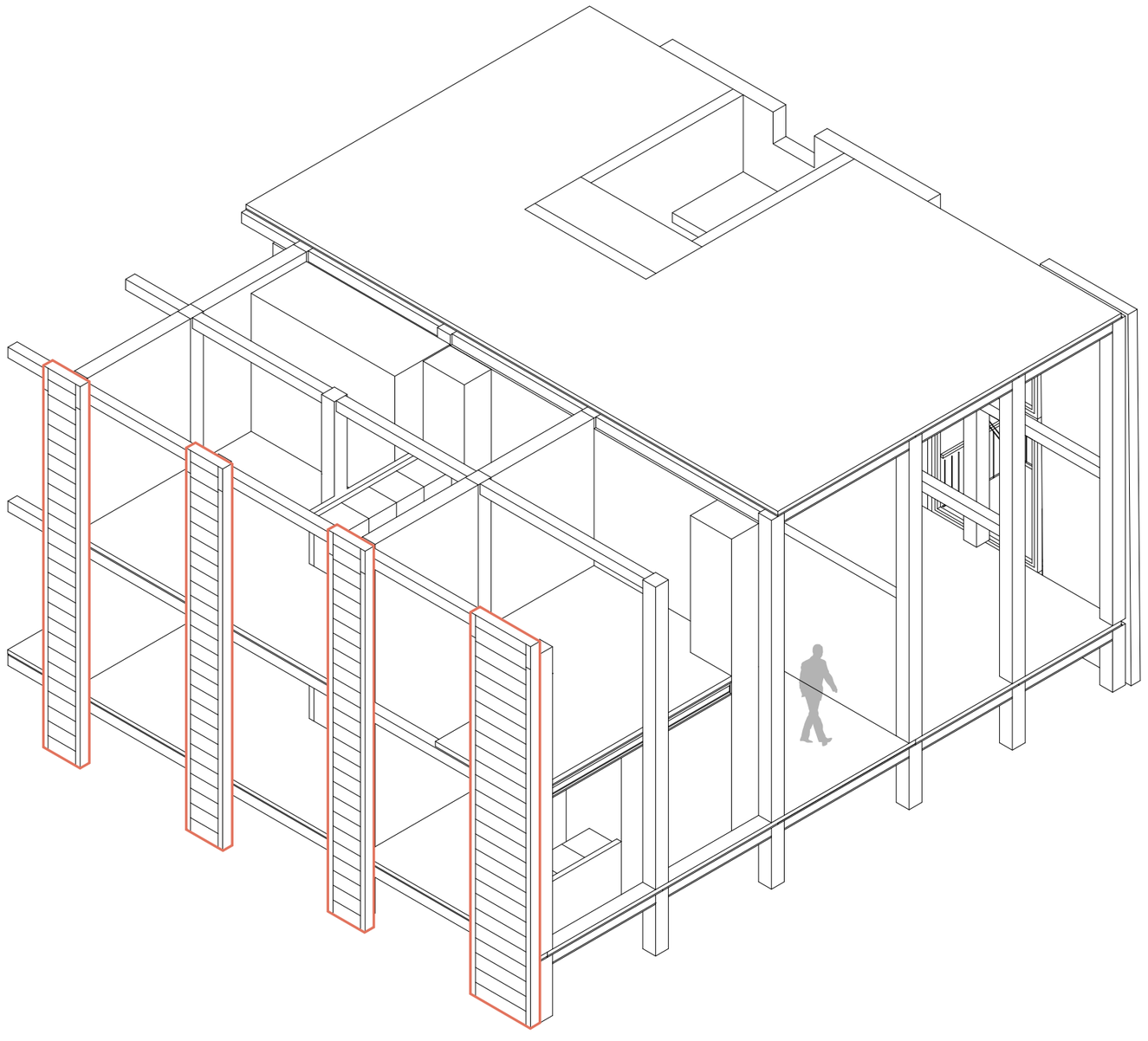
Limited ceiling height



Installation zones



Brick facade modules

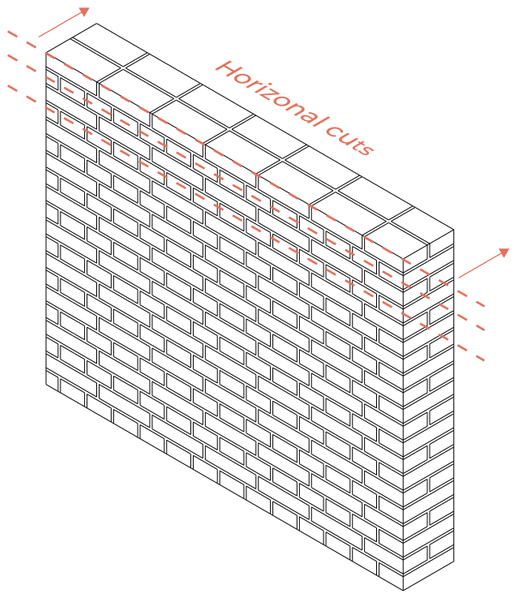


Brick facade modules

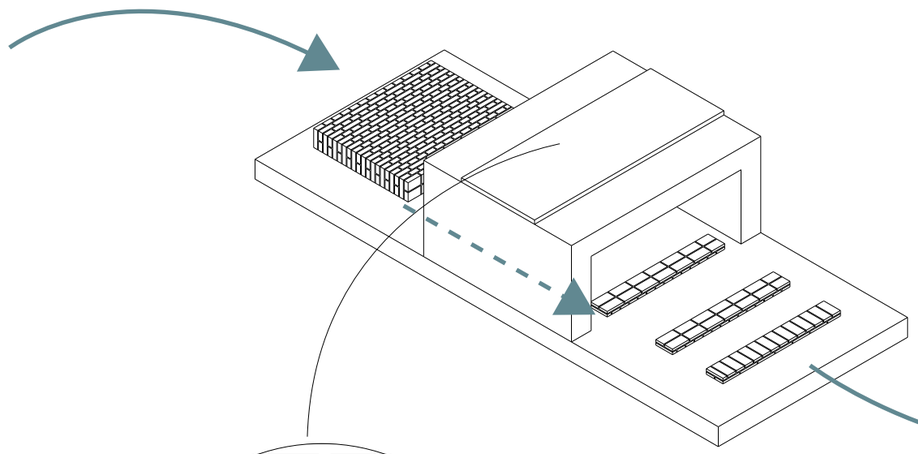
Harvesting from existing facade

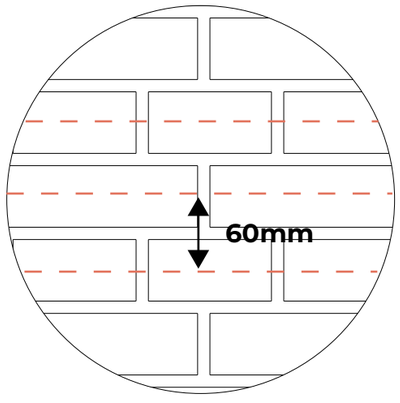
Brick facade modules

Brick panel

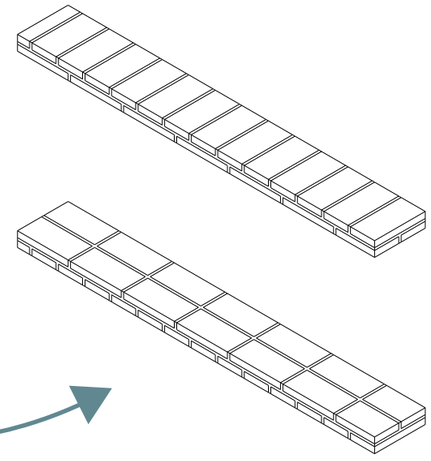


On-site CNC cutting



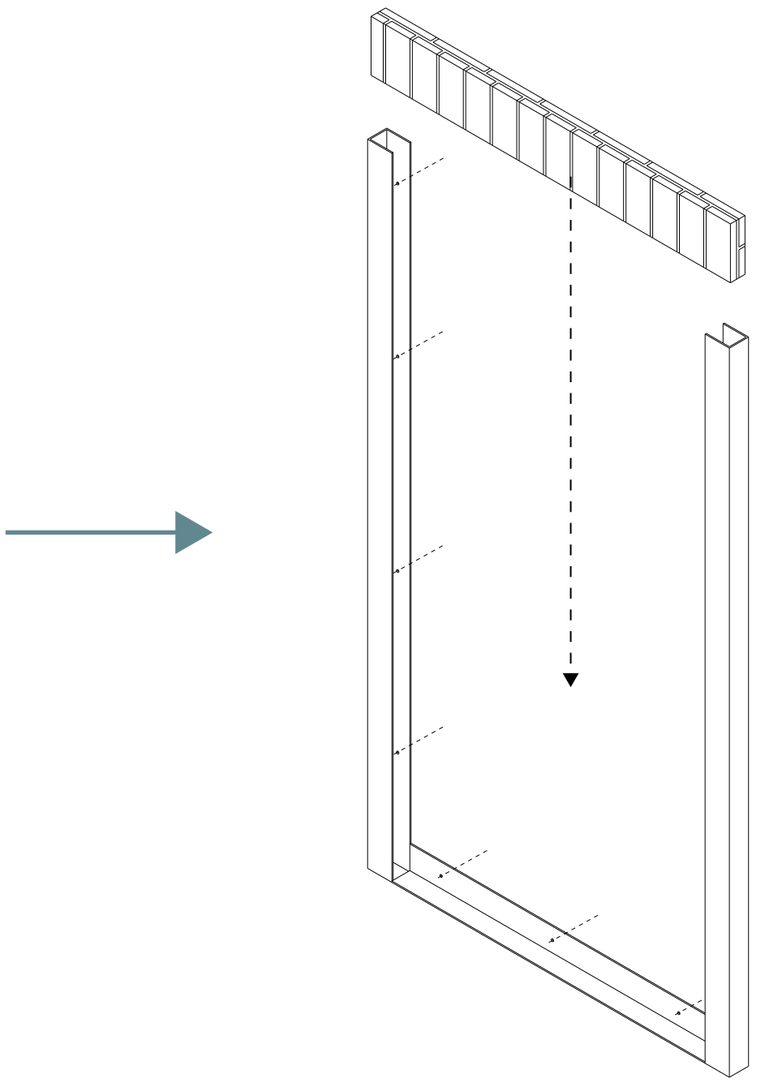


60 mm slices

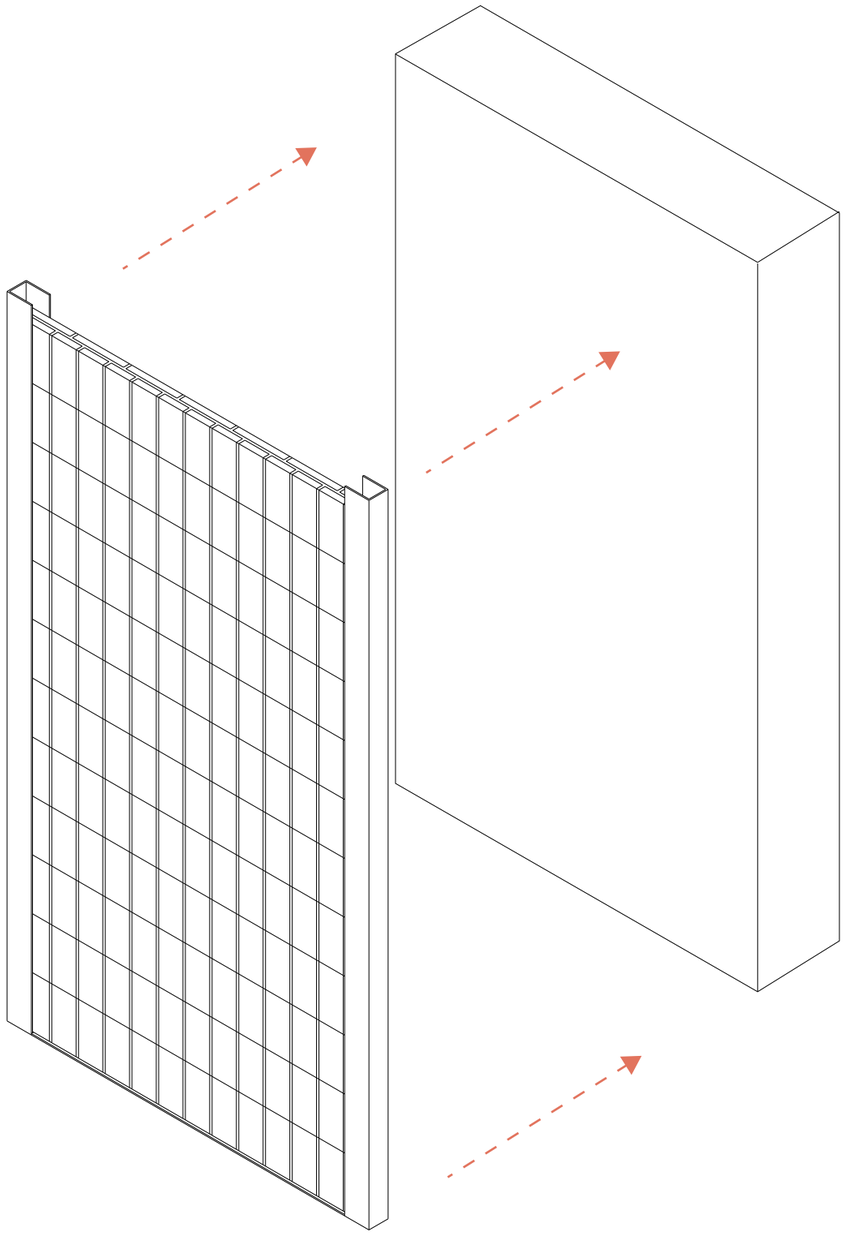


Brick facade modules

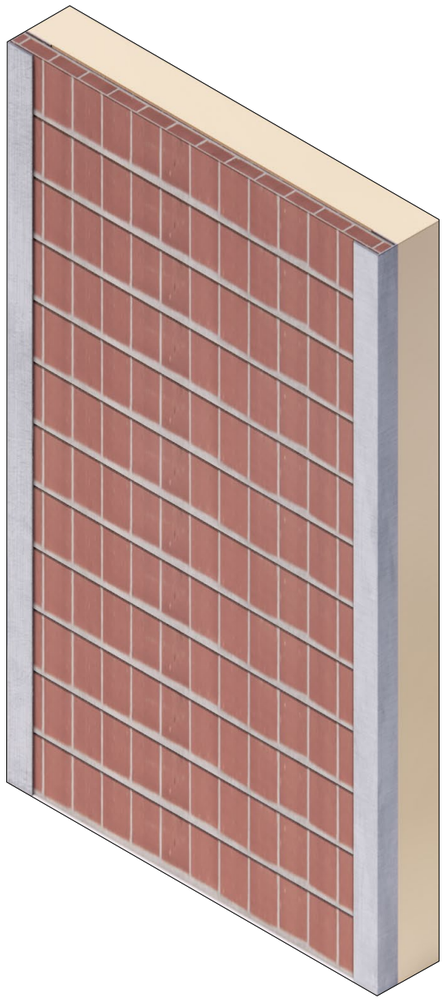
Stack in U profile
(dry connection)

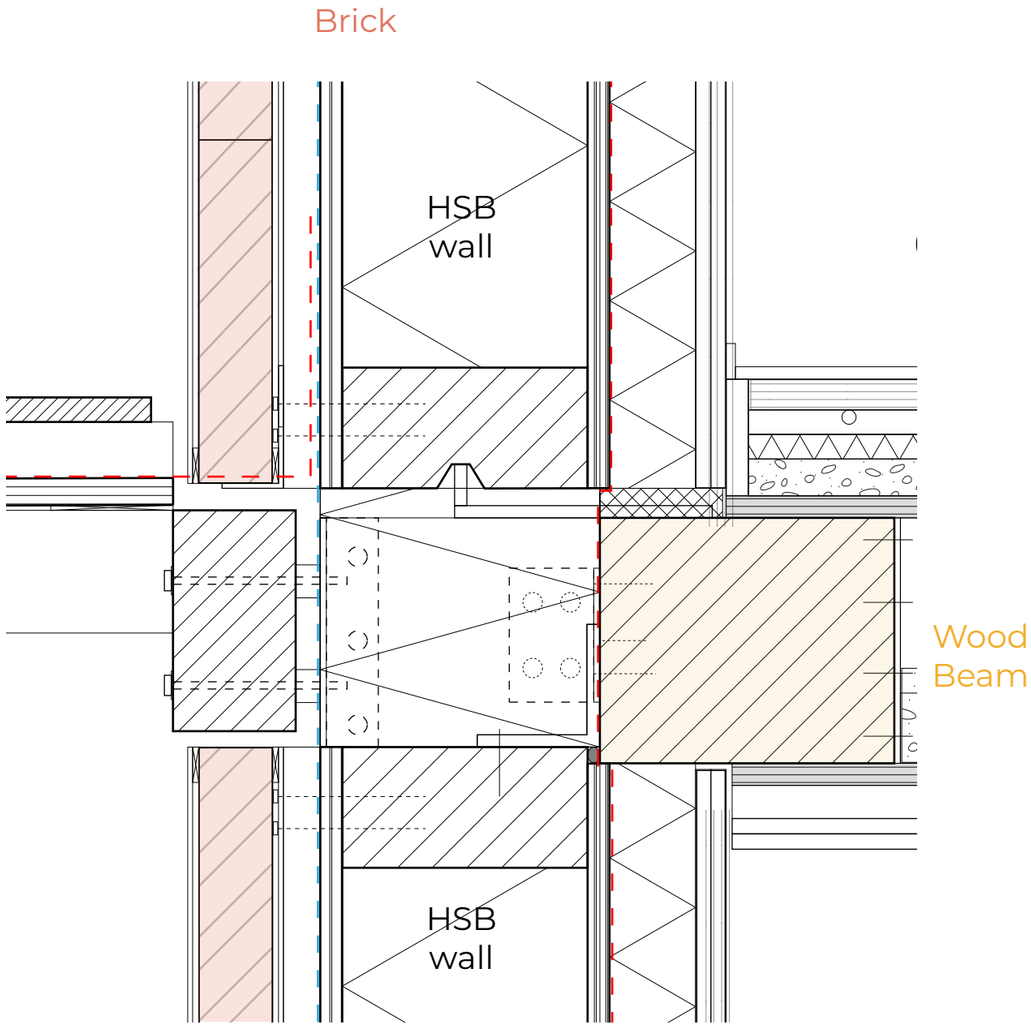


Mount on HSB wall



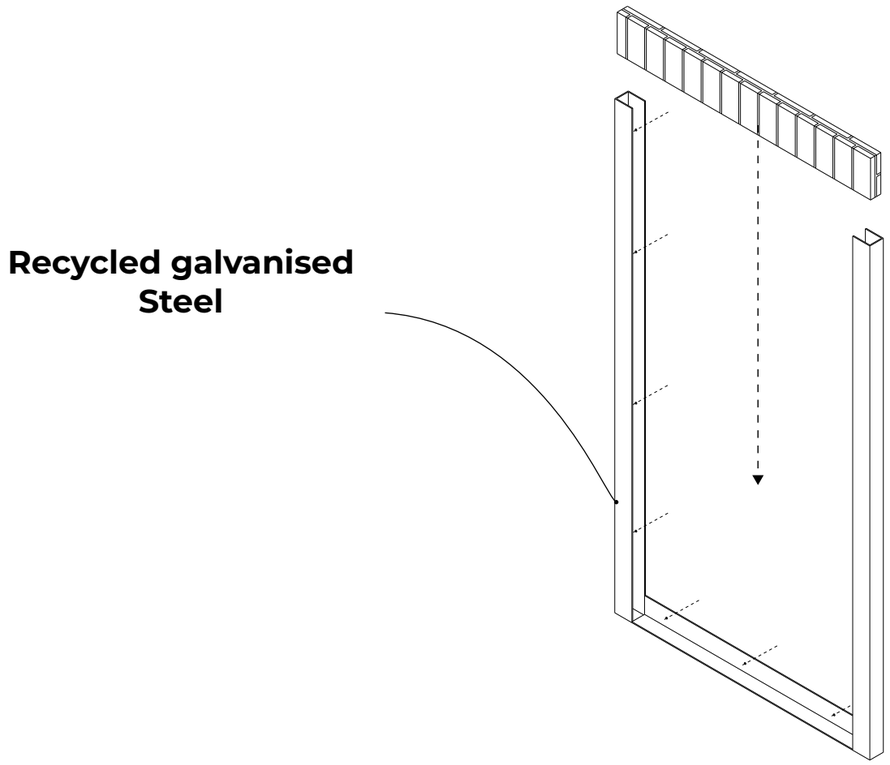
Brick facade modules



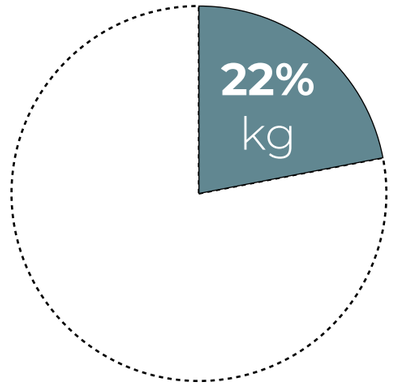


1:5 vertical detail

Brick facade modules



Percentage of brick reused



-40% ECO_2 reduction in comparison with using new brick

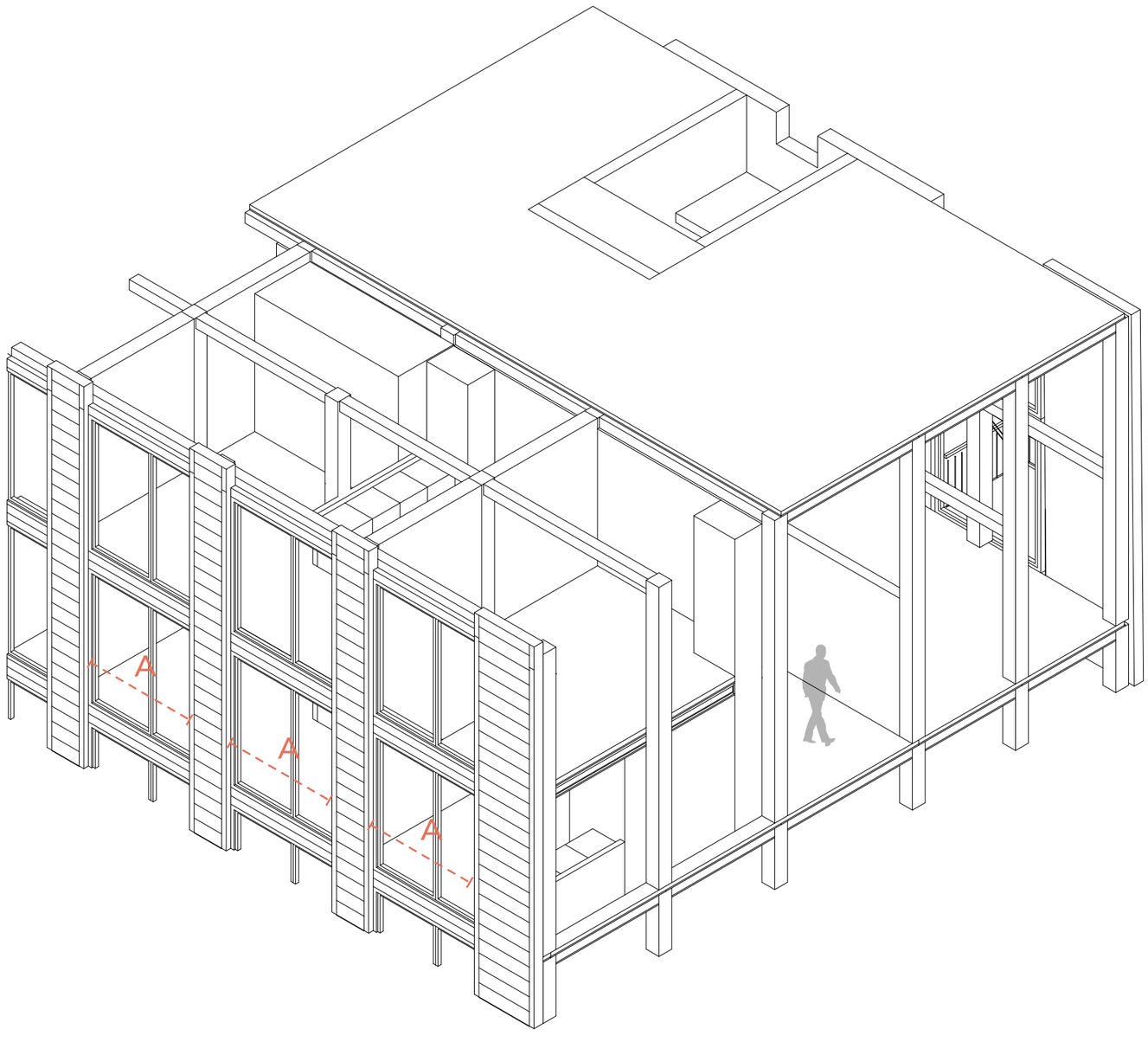
(Jones, Hammond (2019) Inventory of Carbon & Energy V 3.0 . University of Bath)

1,62 kg CO2e / kg

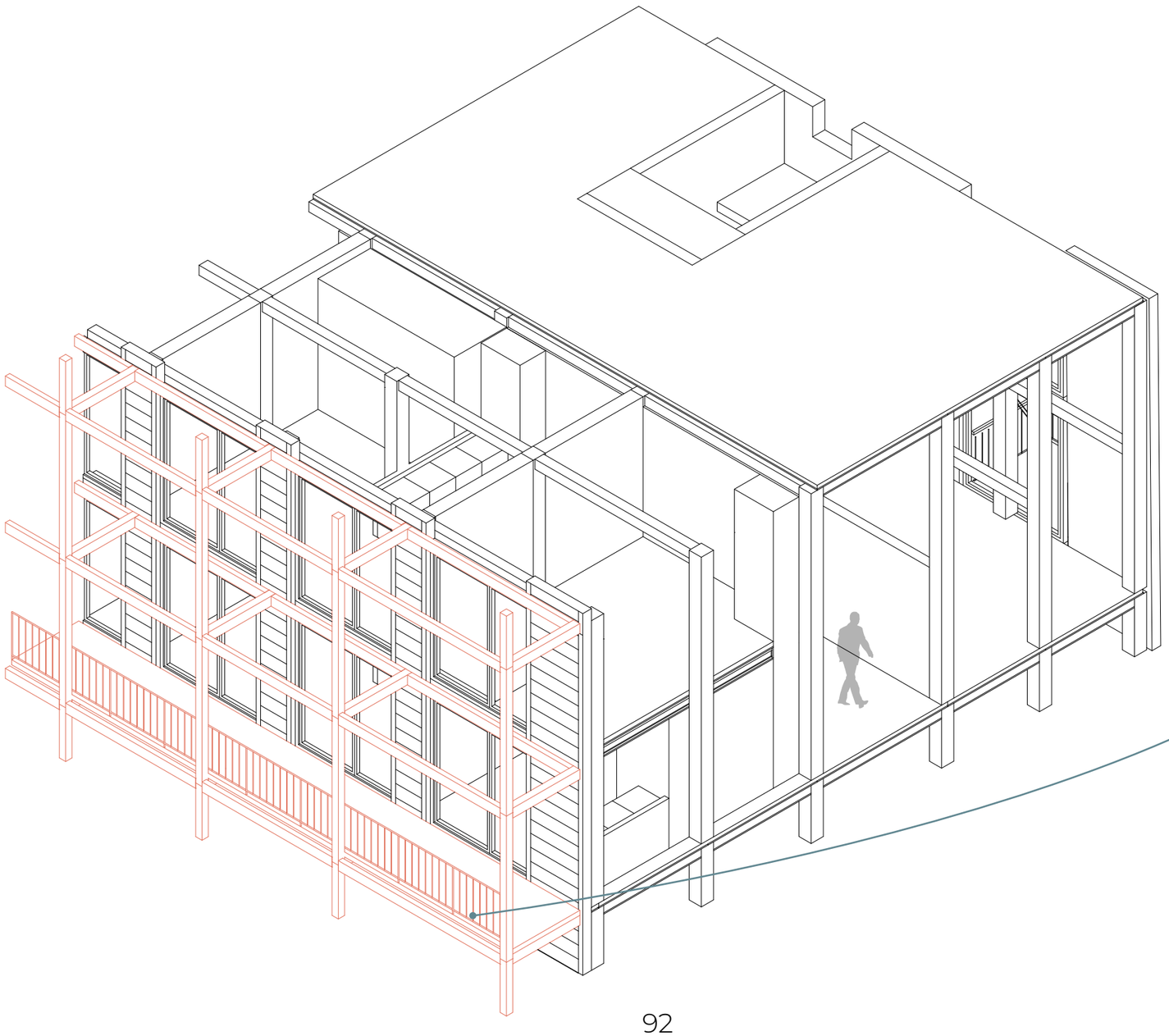
vs. 3,03 kg CO2e / kg

windows

Equal sizing = higher re-use potential



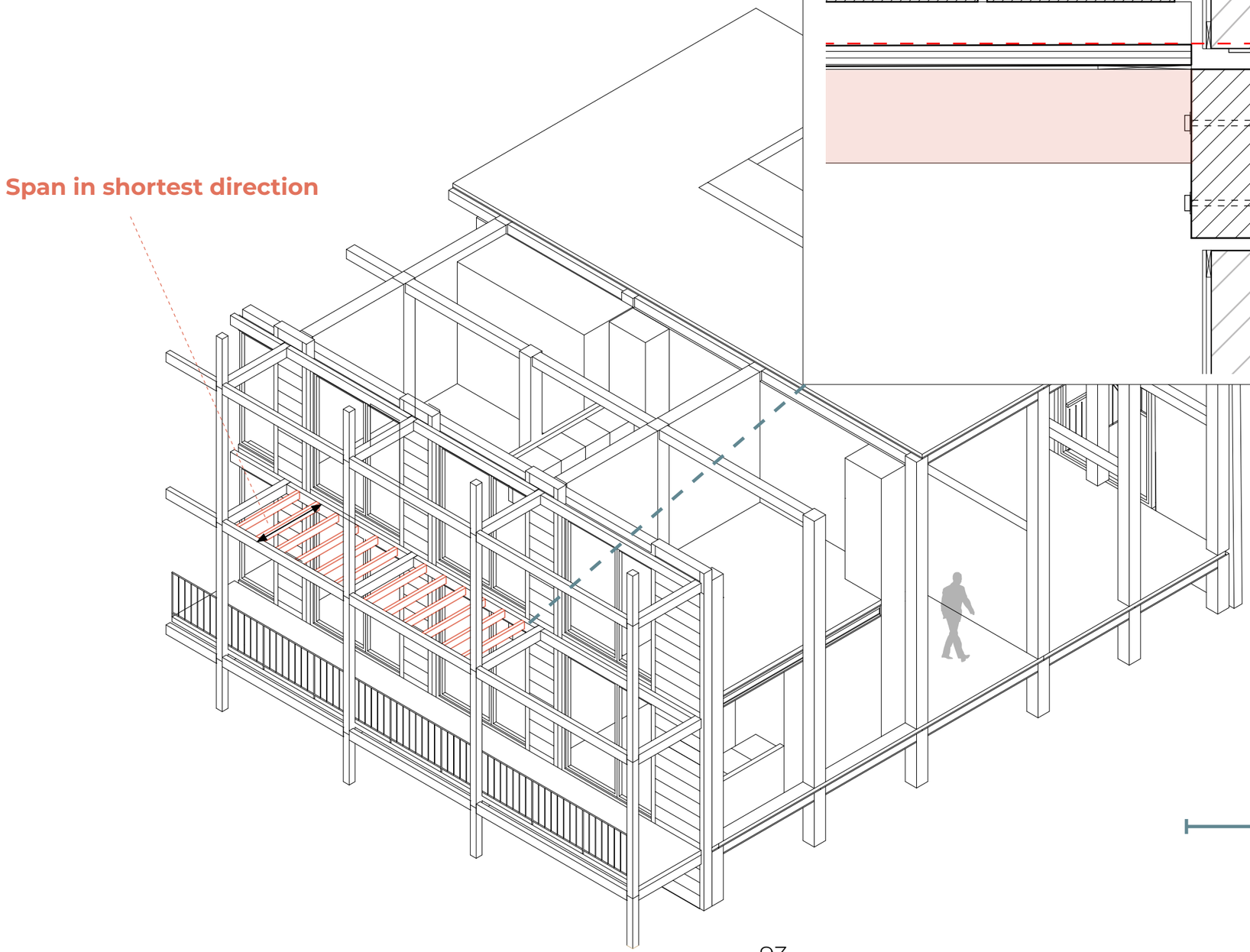
Flexible balcony structure

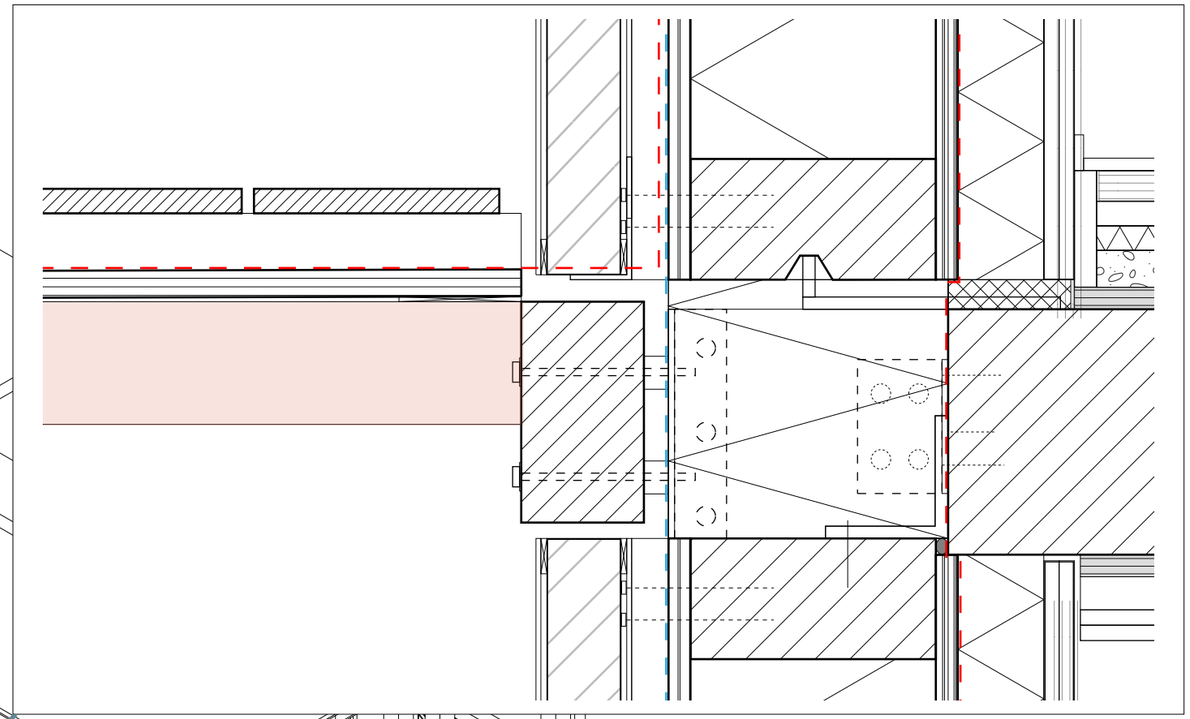


100% re-use
(minus loss)

Refurbished steel balcony railing

Flexible balcony structure





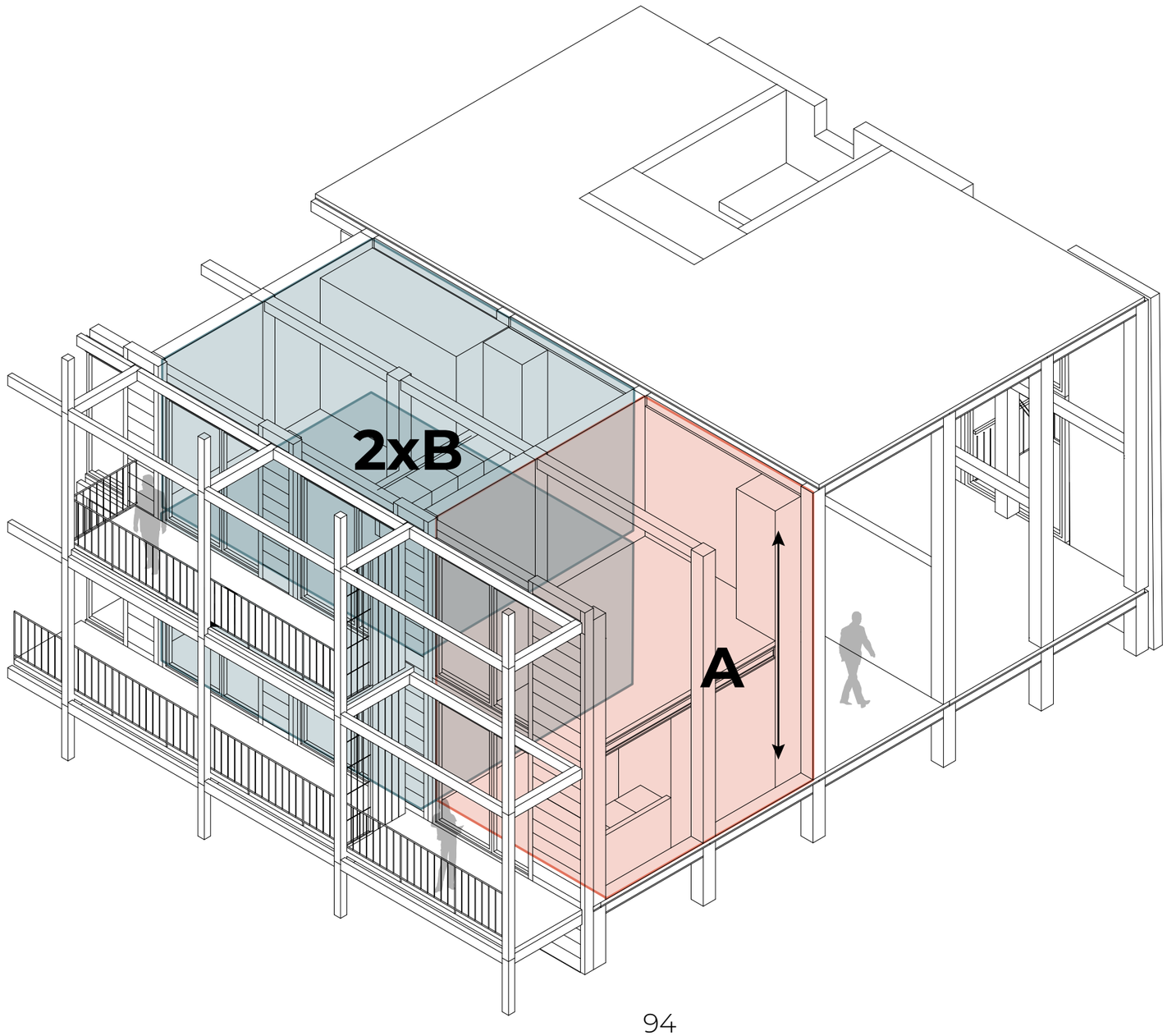
1:5 vertical detail

1,5 m

Portable elements

Flexible balcony structure

Adjusted to appartment types

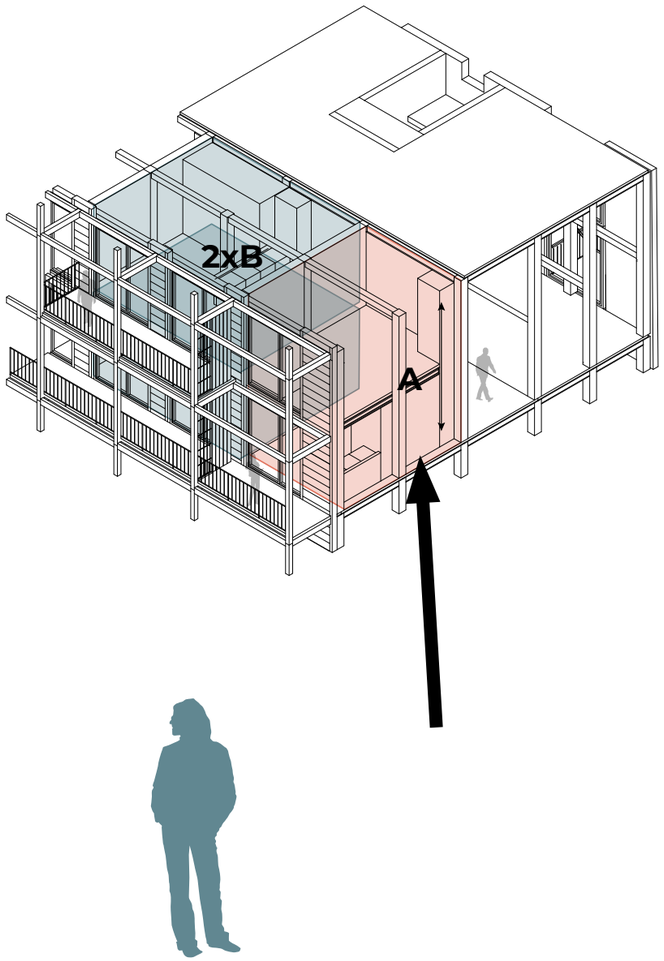


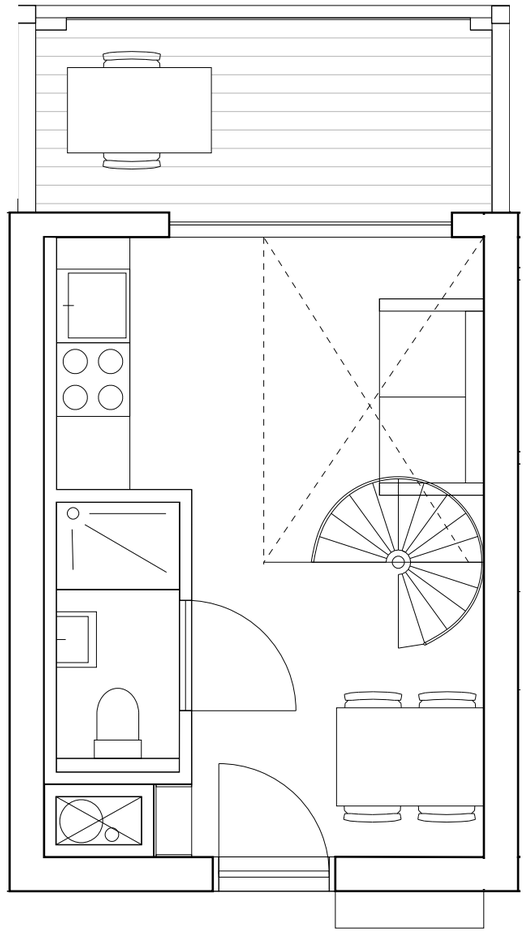
Facade impression

Facade impression

Appartment typologies

Entresol studio (30 m²)





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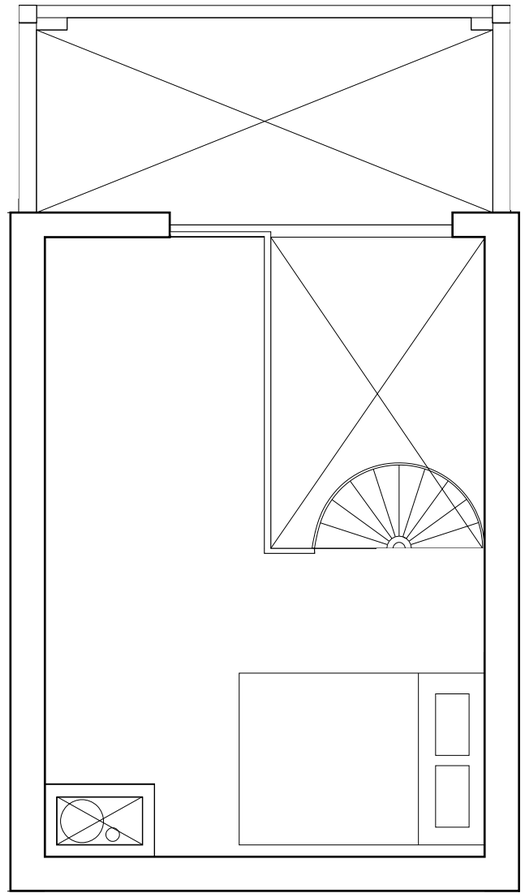


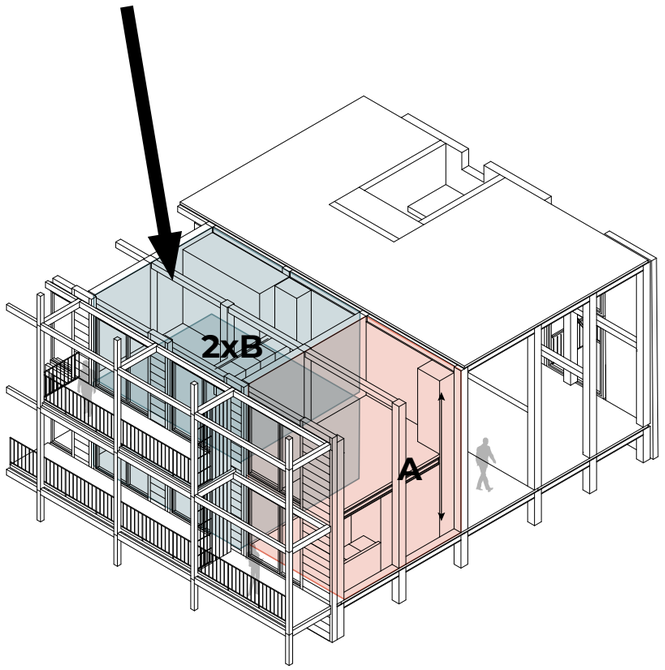
+1

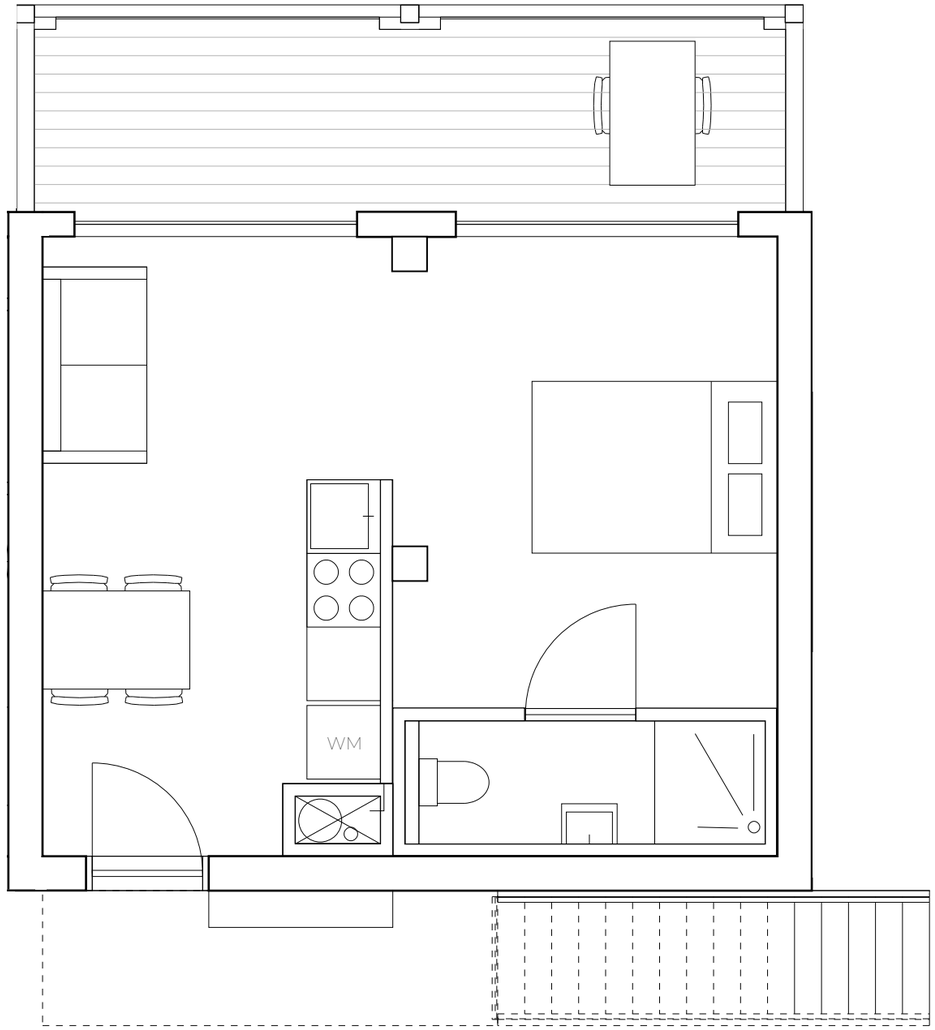
Compact living

Interior impression

Appartment typologies

2x Single floor studio (30 m²)





Top floor

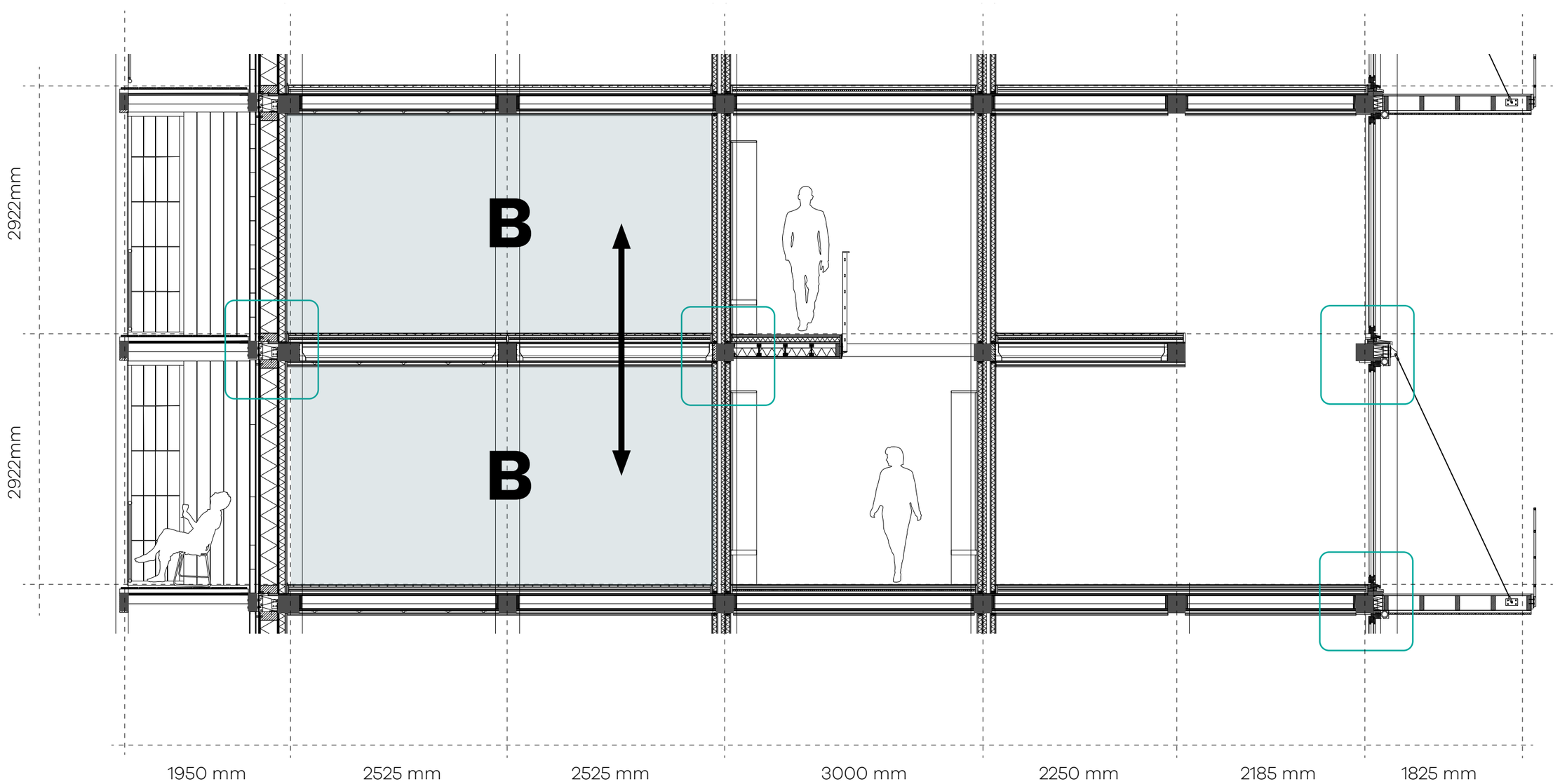
Bottom floor

Compact living

Interior impression

Appartment typologies

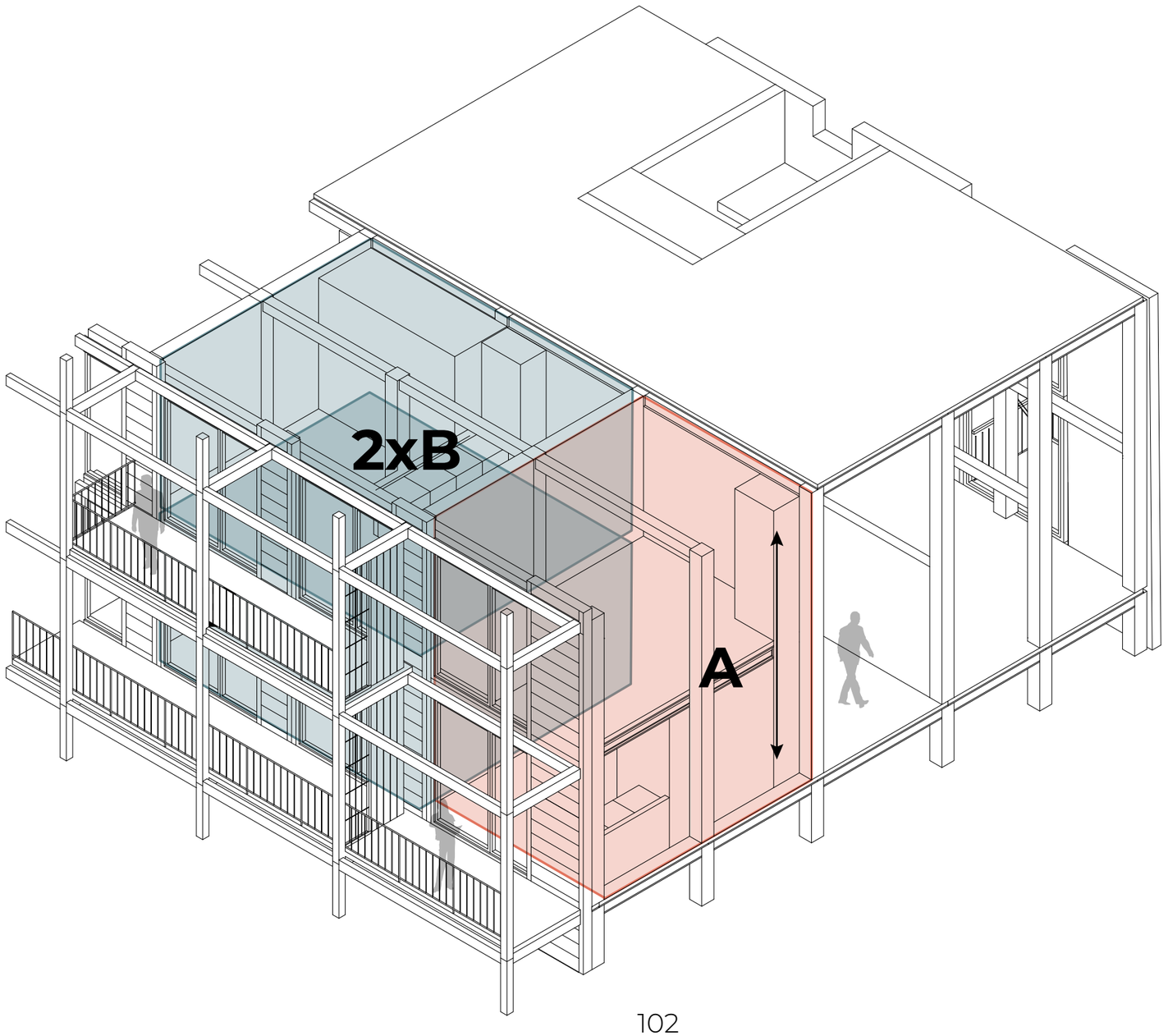
2x Single floor studio (30 m²)



Can be combined

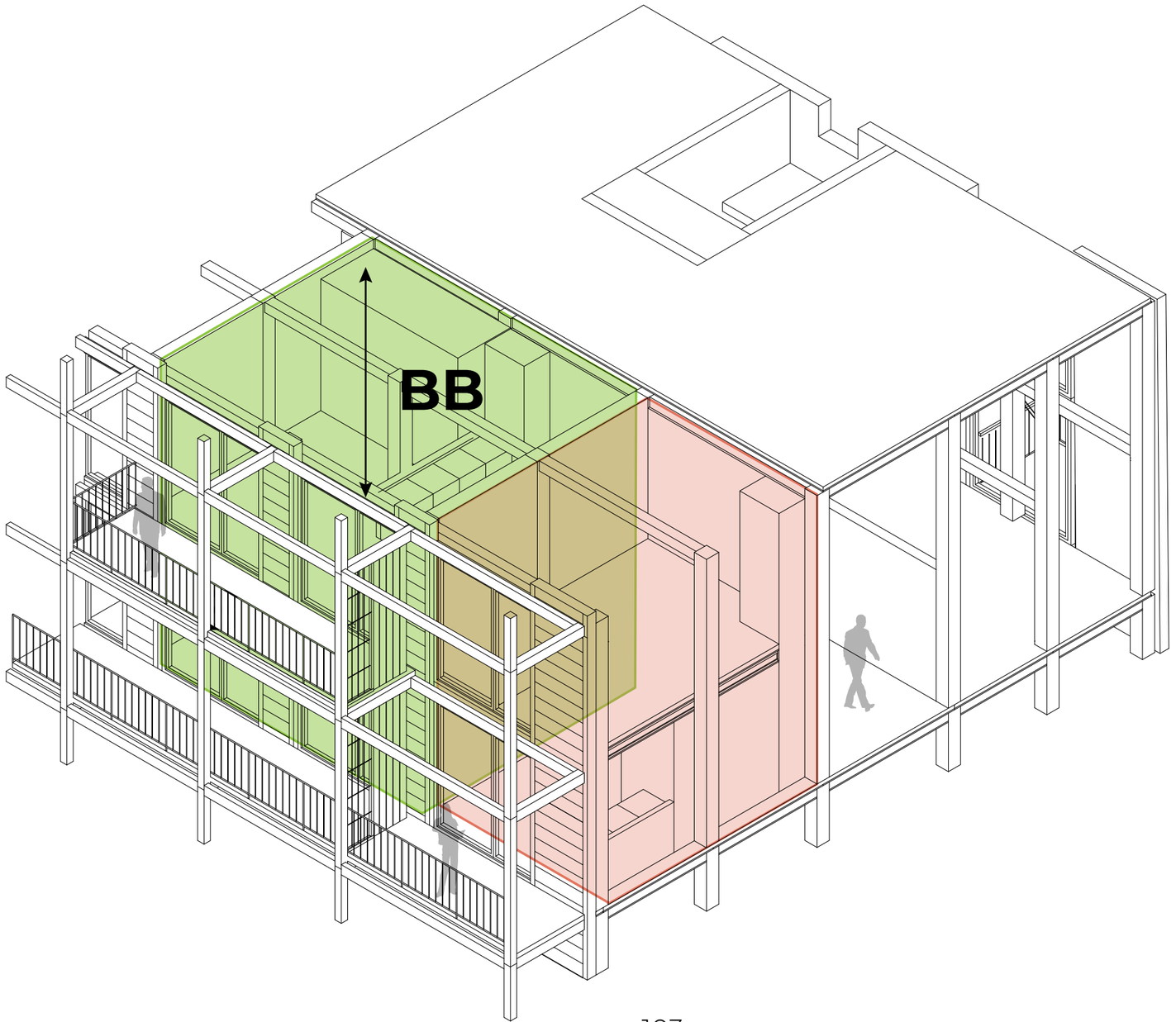
Appartment typologies

Combine appartments



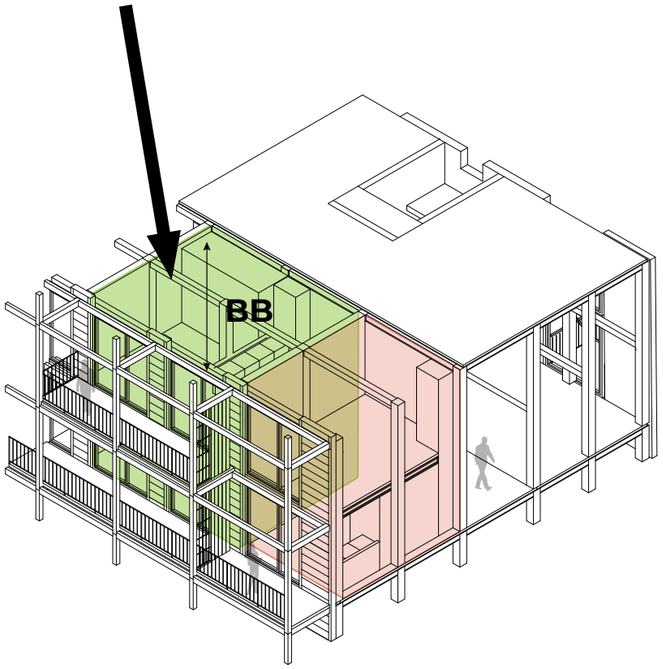
Double B

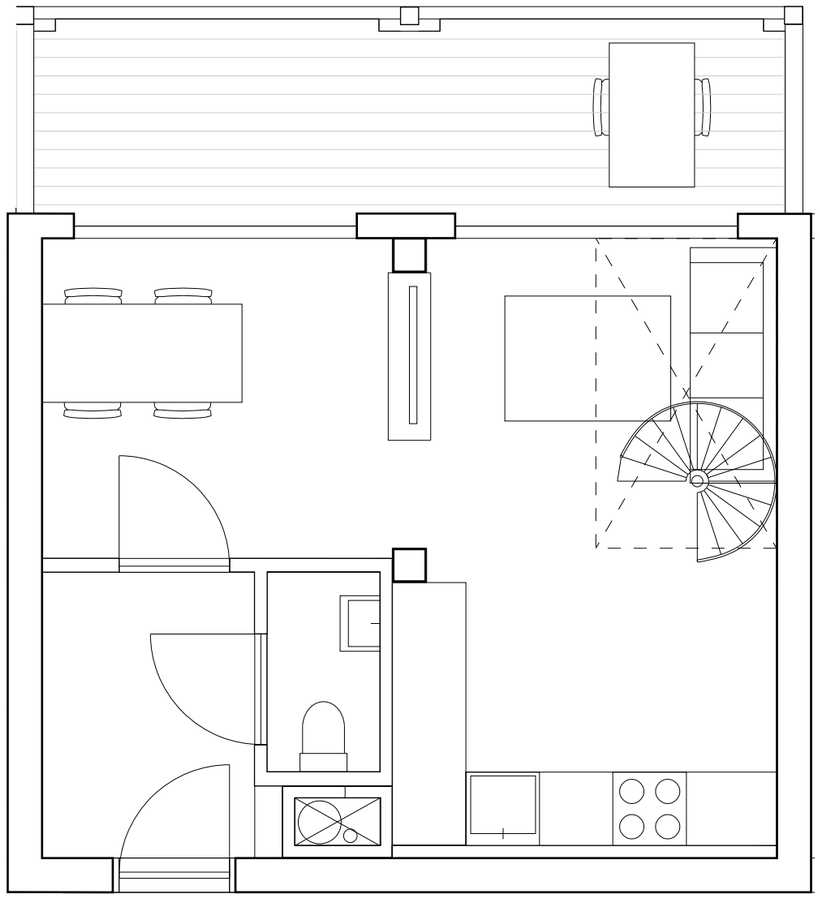
Combine appartments



Appartment typologies

1 bedroom appartment (54 m²)





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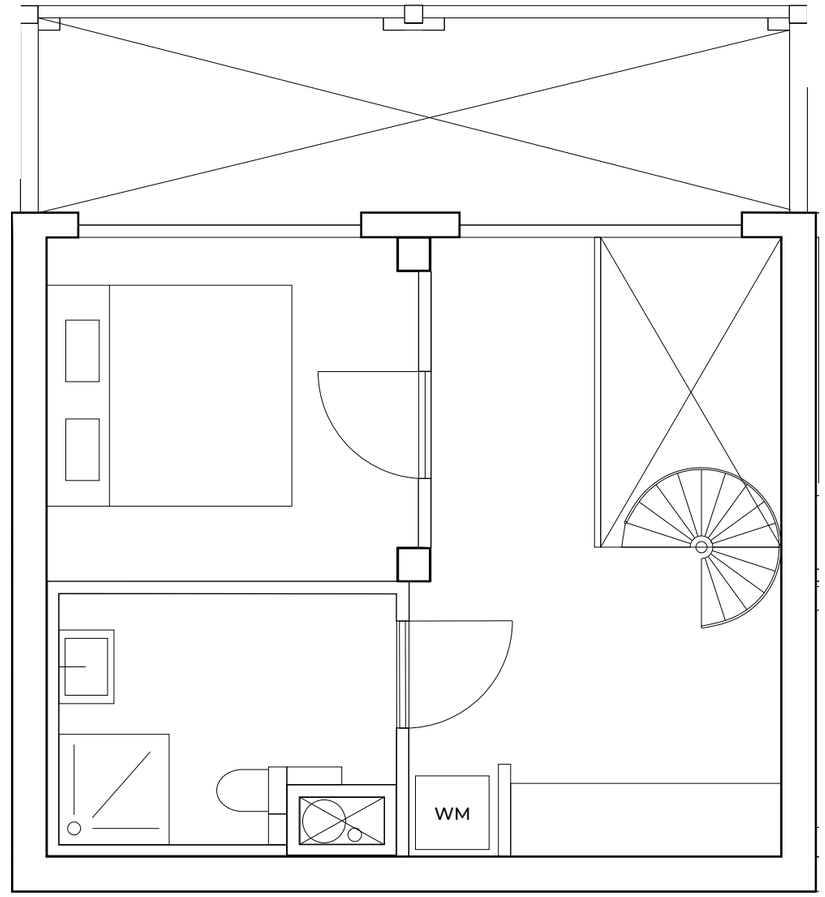
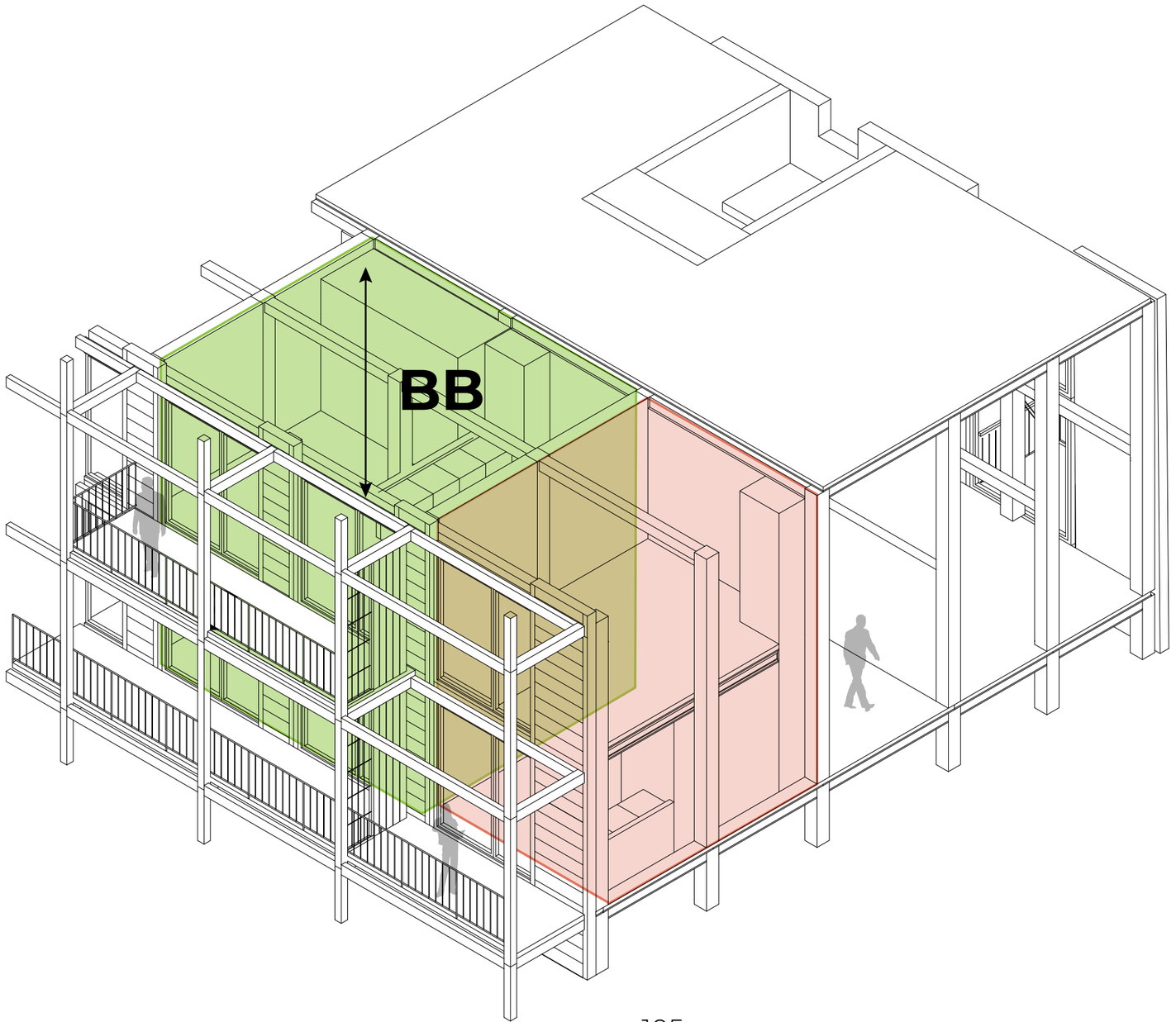


+1

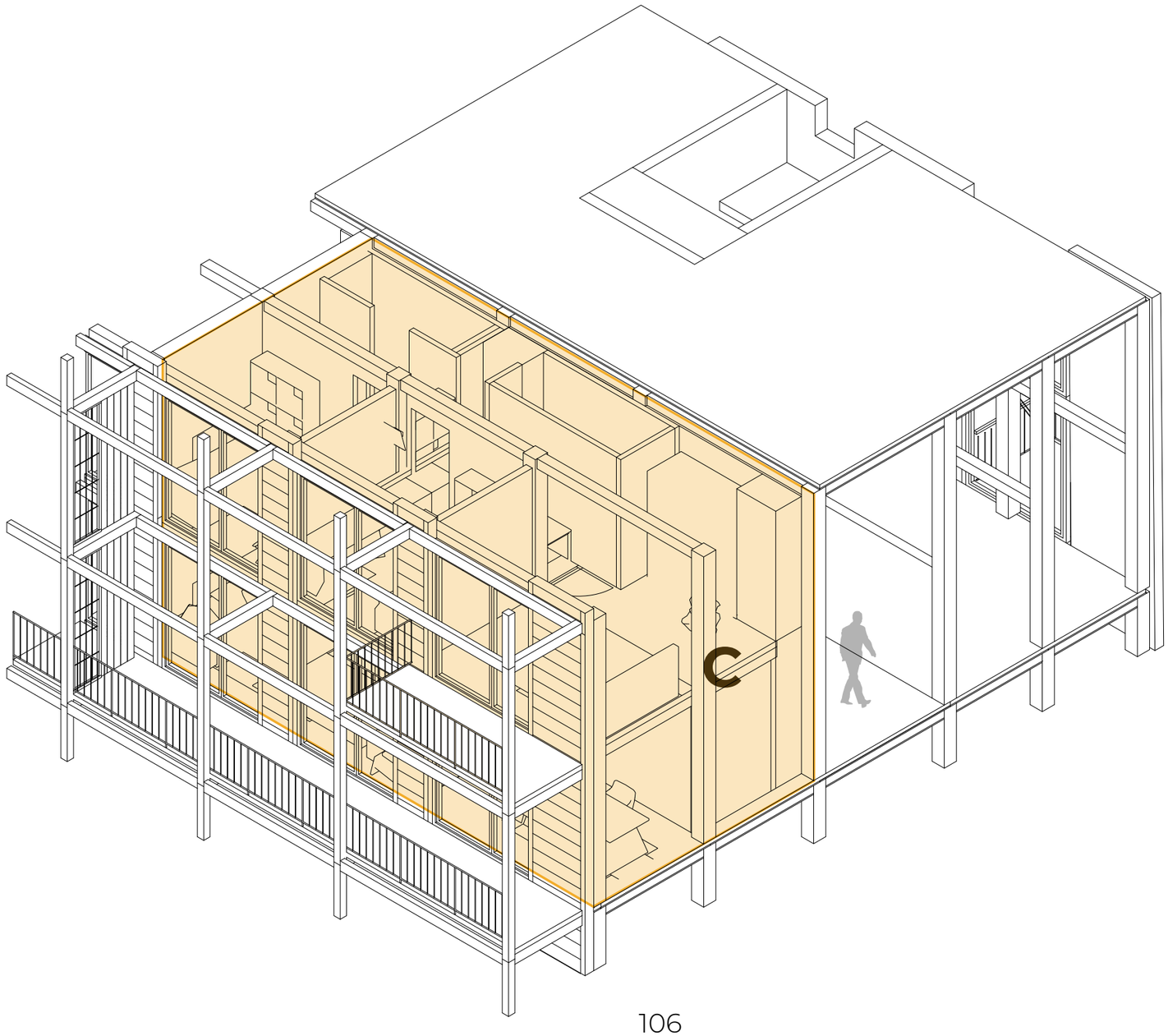
Double B

Combine appartments



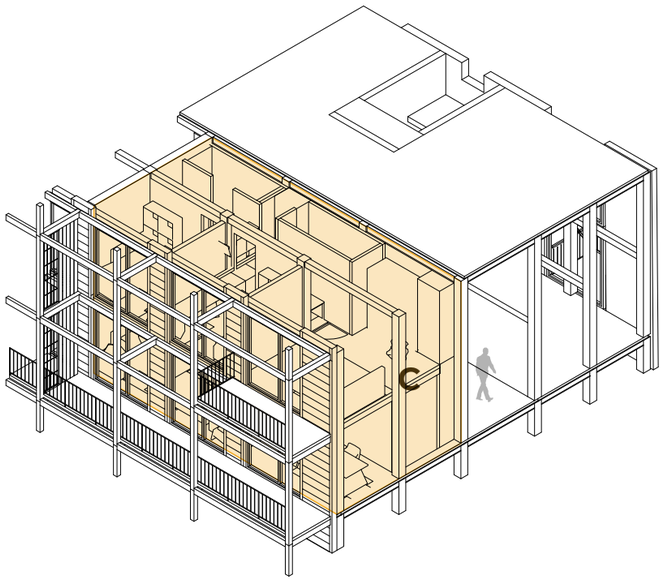
Appartment typologies

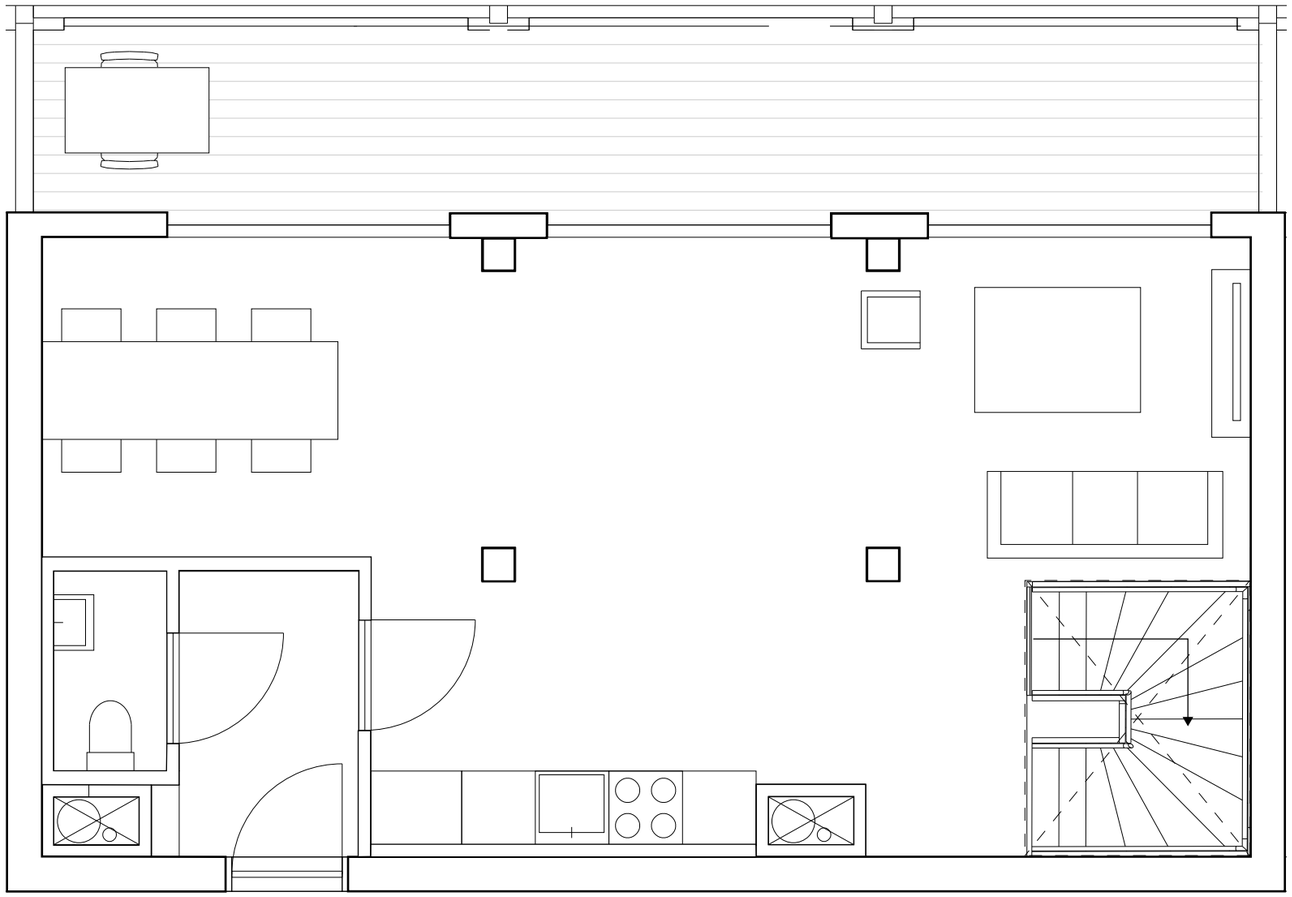
Combine appartments



Appartment typologies

3 bedroom (99 m²)





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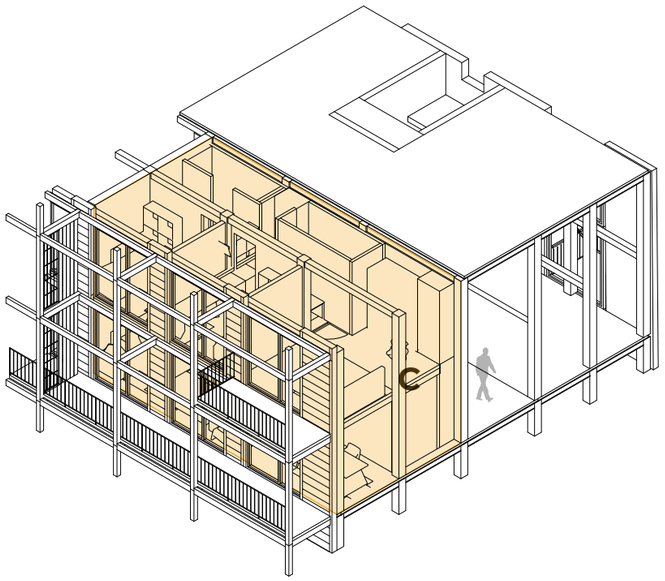
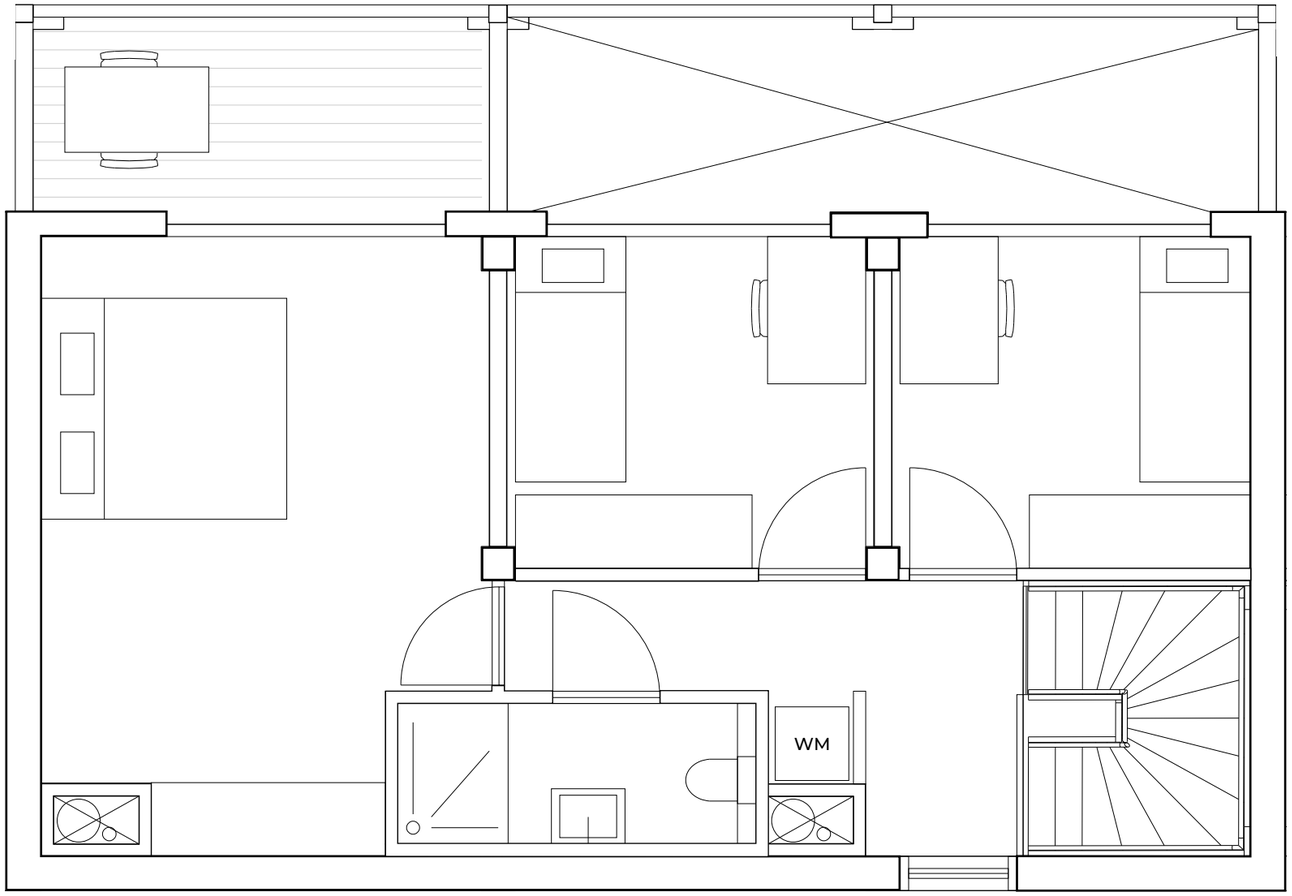
Appartment typologies

3 bedroom (99 m²)

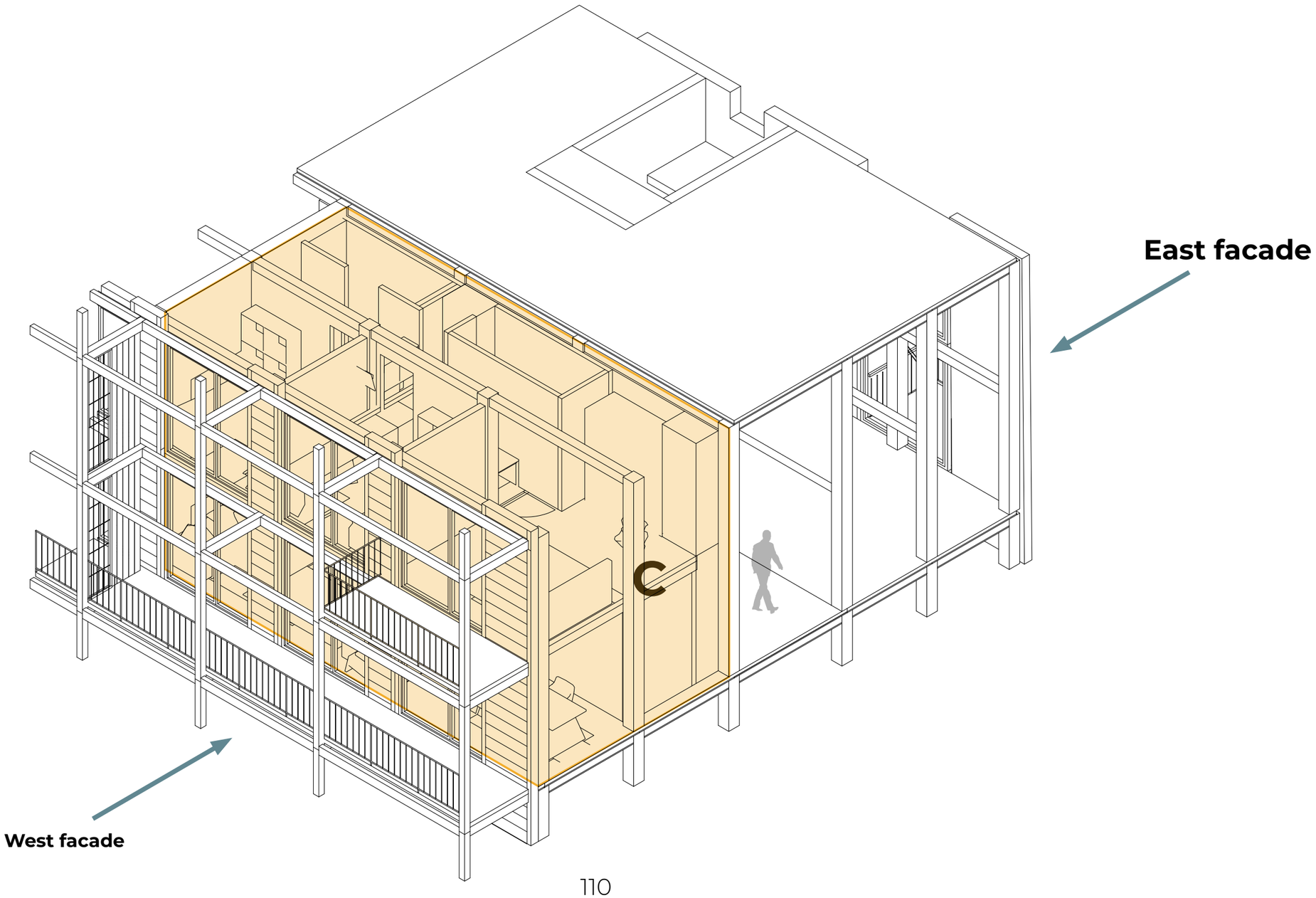




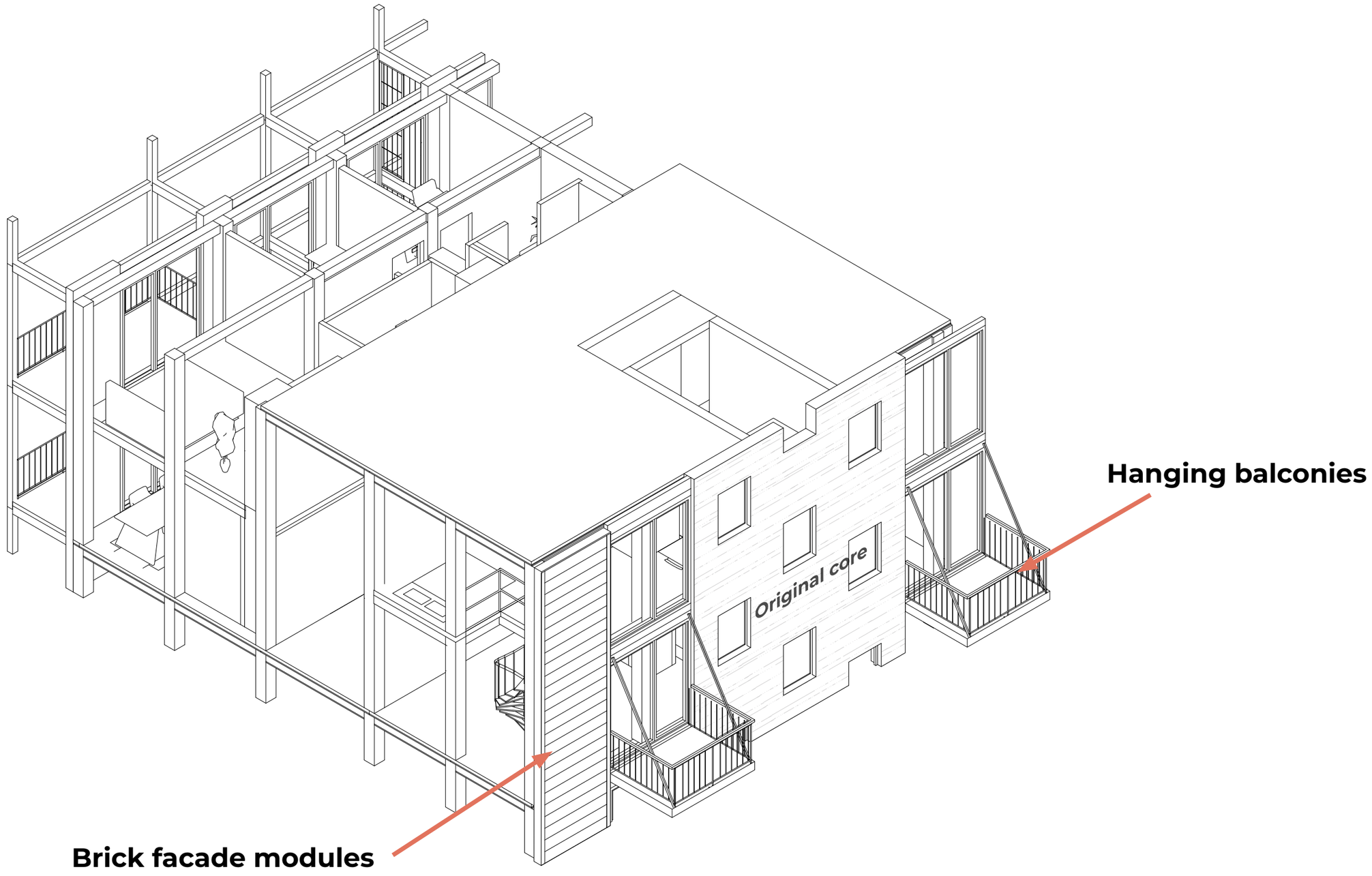
+1

Interior impression

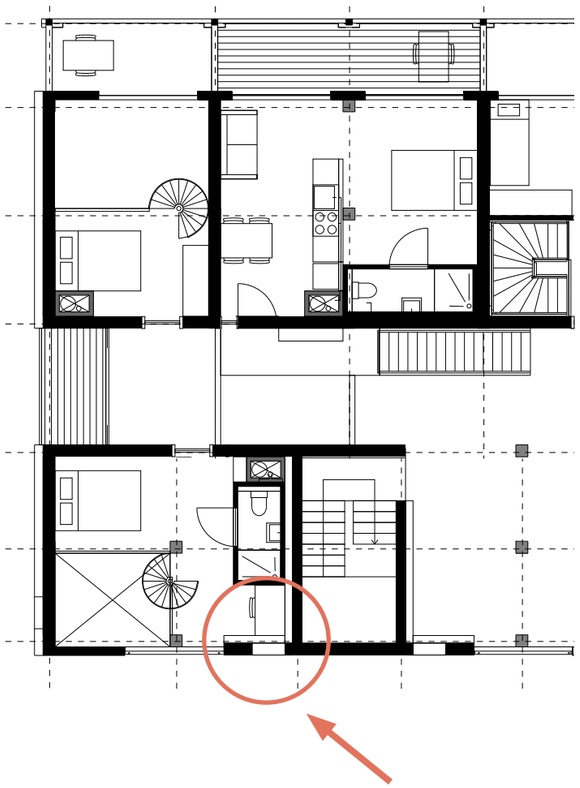
East facade



East facade



Connection to original core

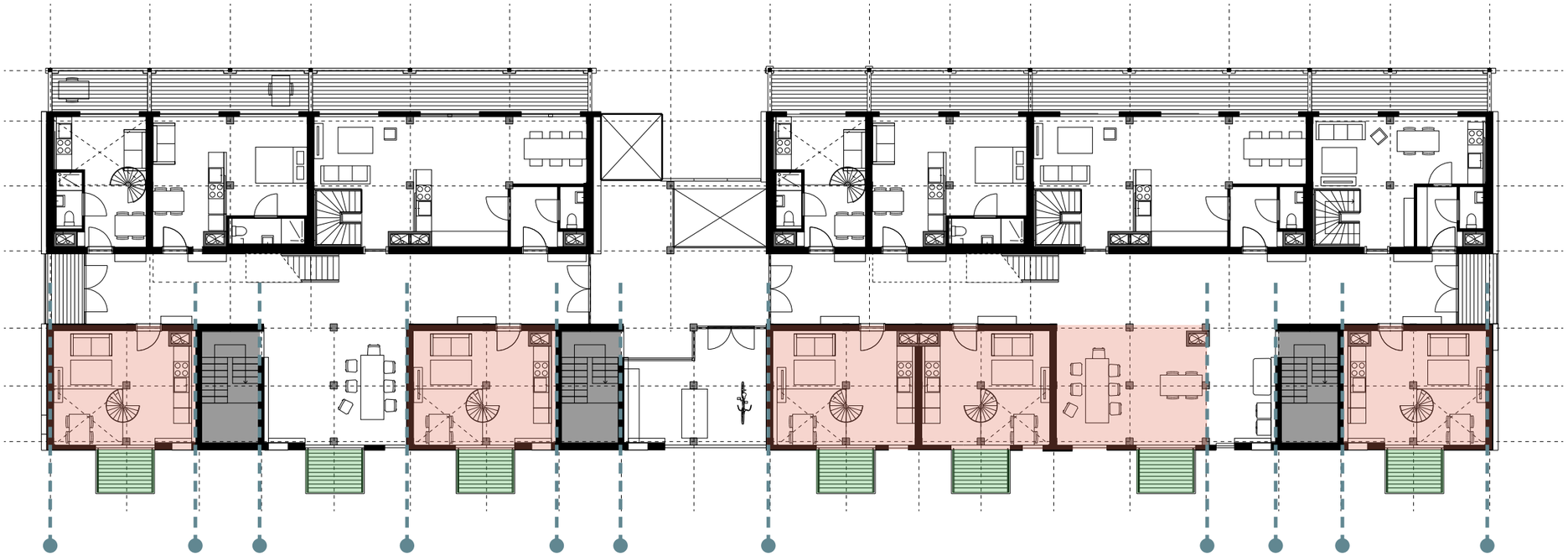


1:10 detail

Insulate from the inside , maintain brick facade

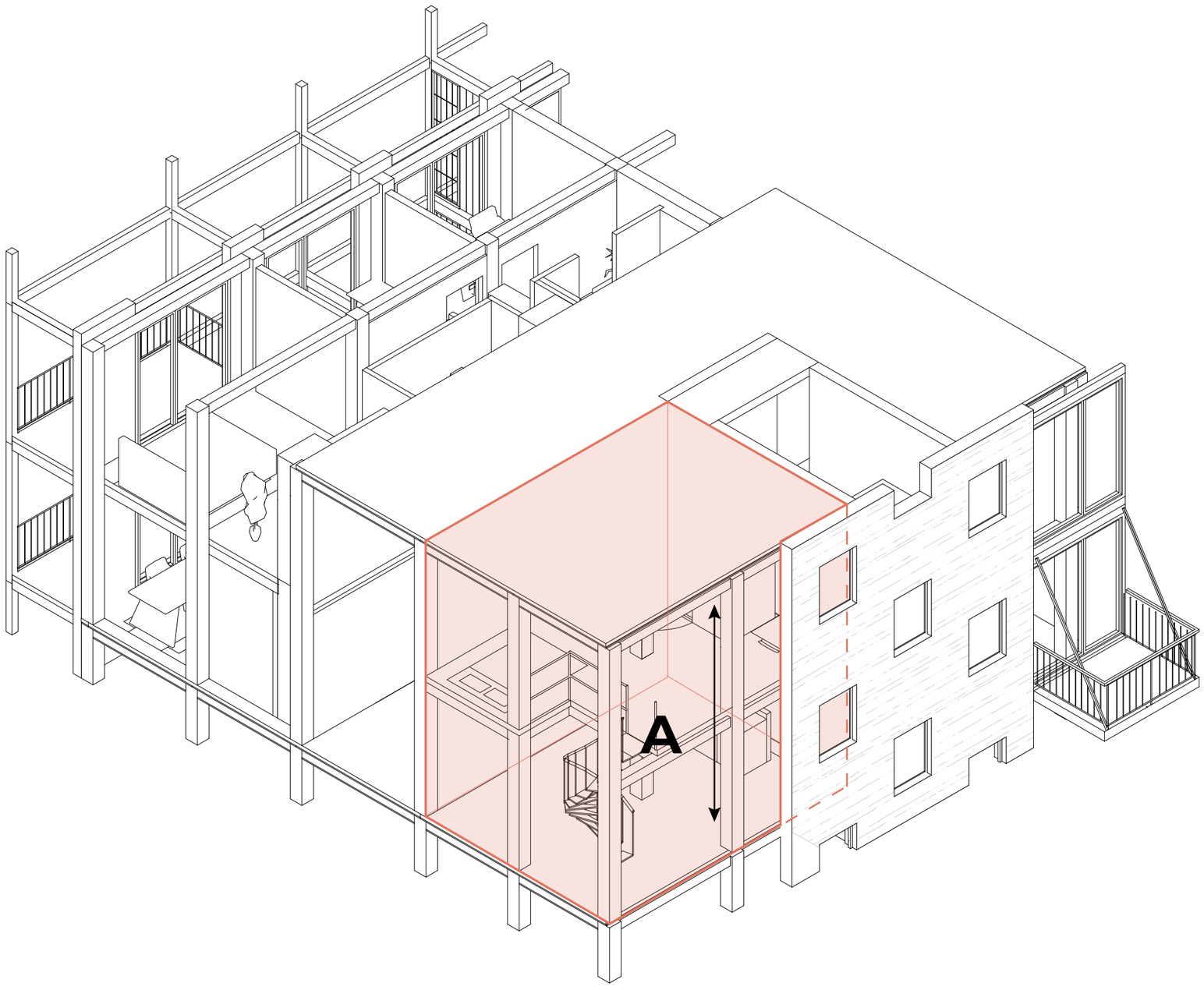
East facade

Balconies on east facade



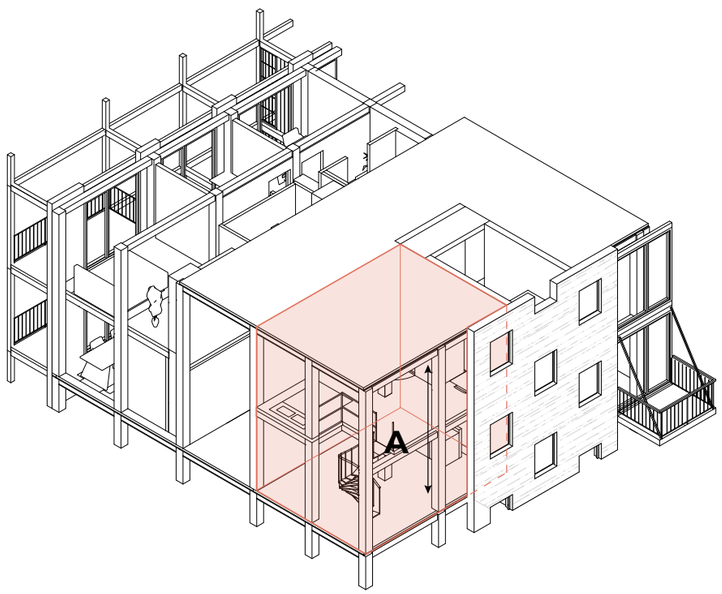
More limited in grid > fixed balcony locations

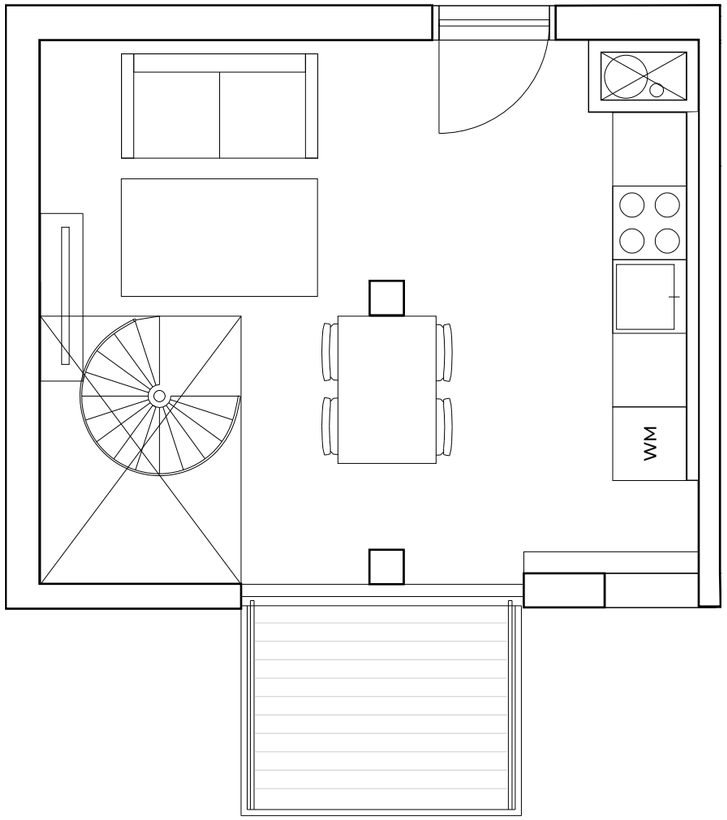
Dwelling typology

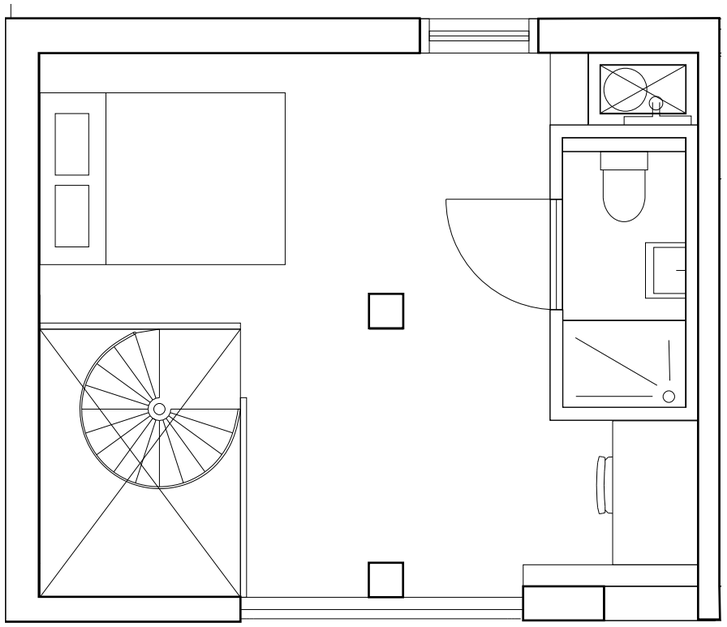


Appartment typologies

Double level studio (42 m²)







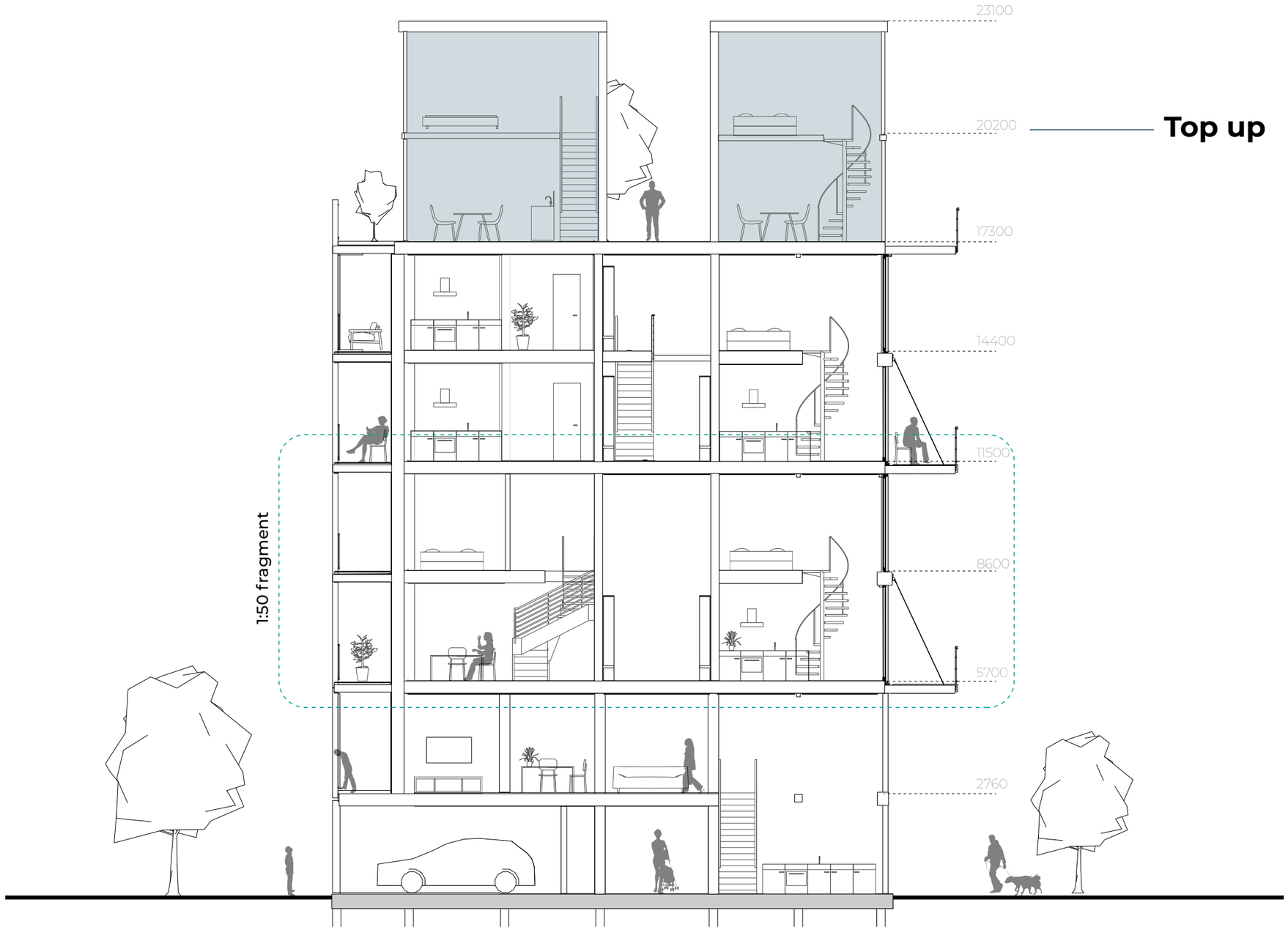
0

+1

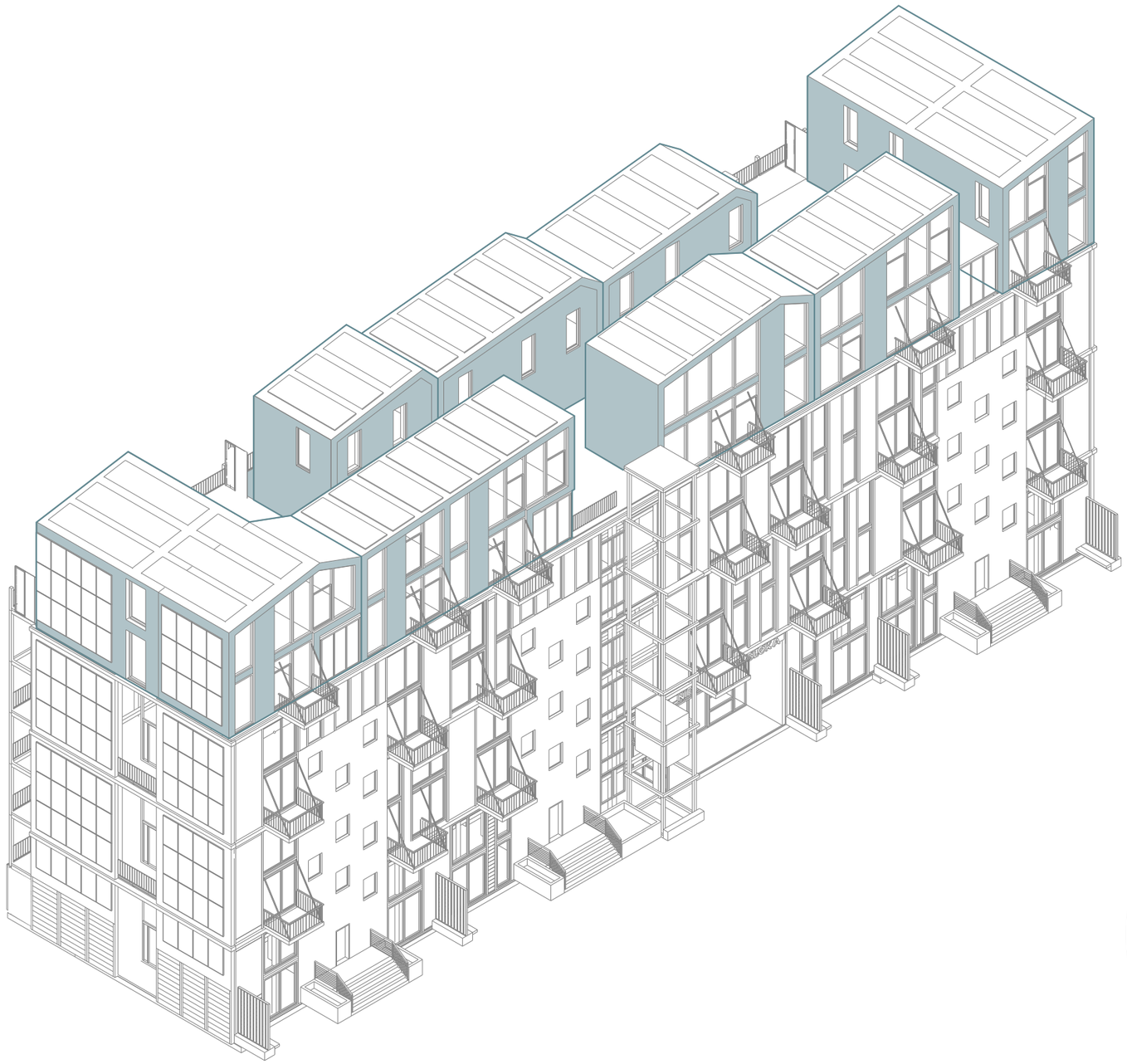
Appartment typologies

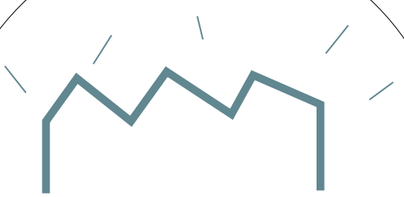
Expansion in width where possible

Living typology: Roof top up



Roof top up



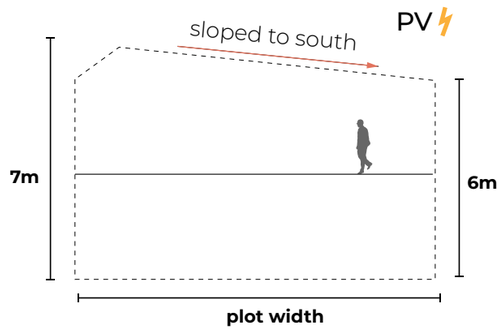


Skyline

Crown of the building

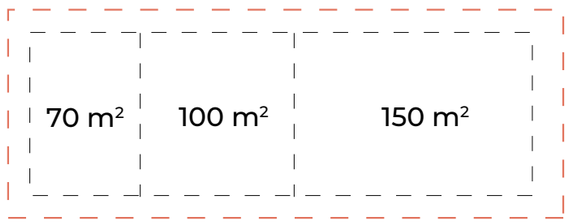
Roof top dwellings

Geometry



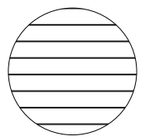
Plot size

Different plot sizes available



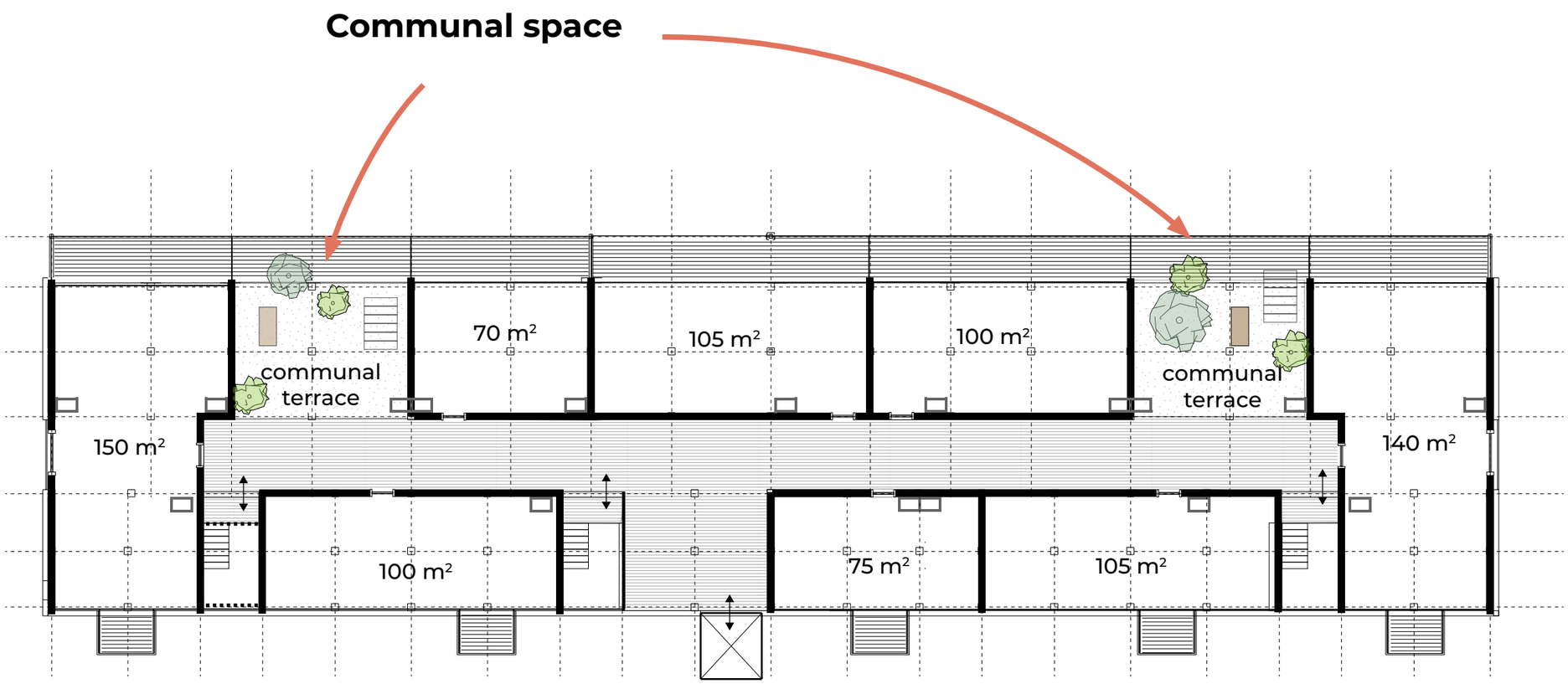
Material

Wood structure



Demountable wood facade cladding

Roof top up



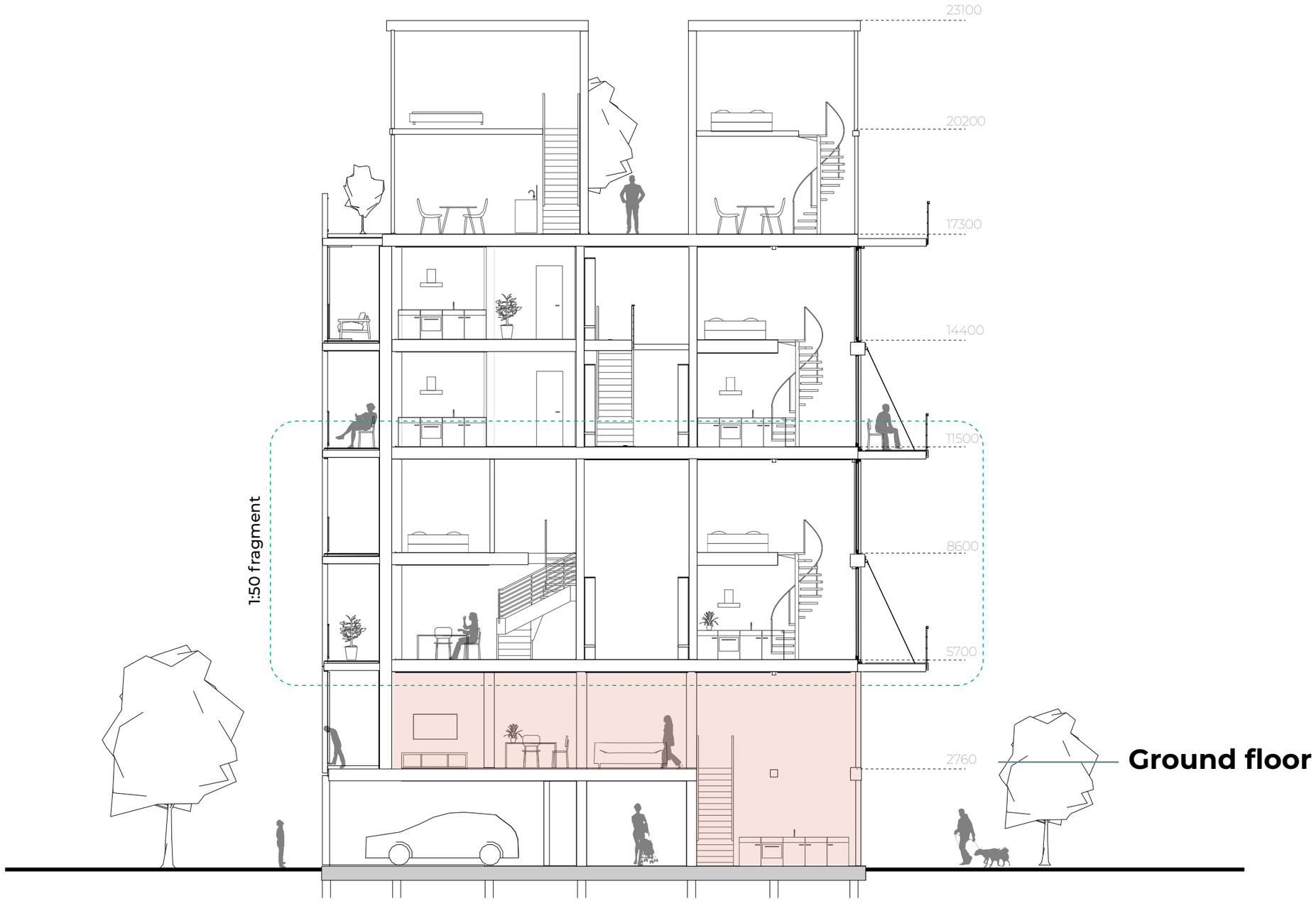
Space for interaction

4-block
Roof top up
1:200

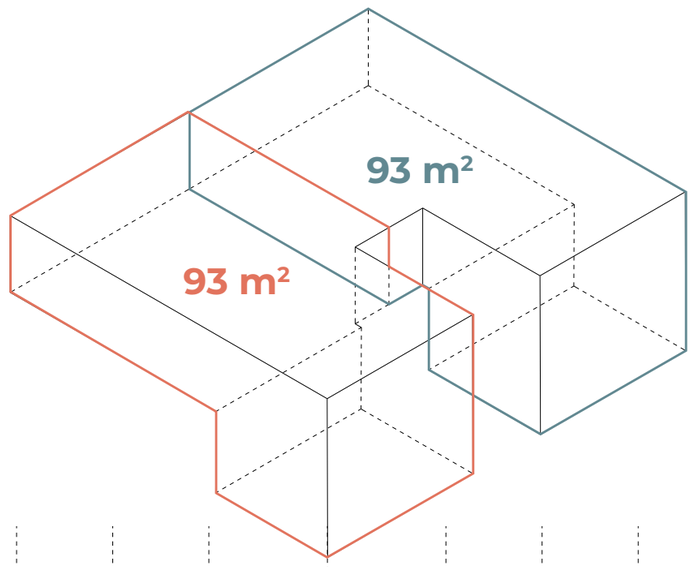
z

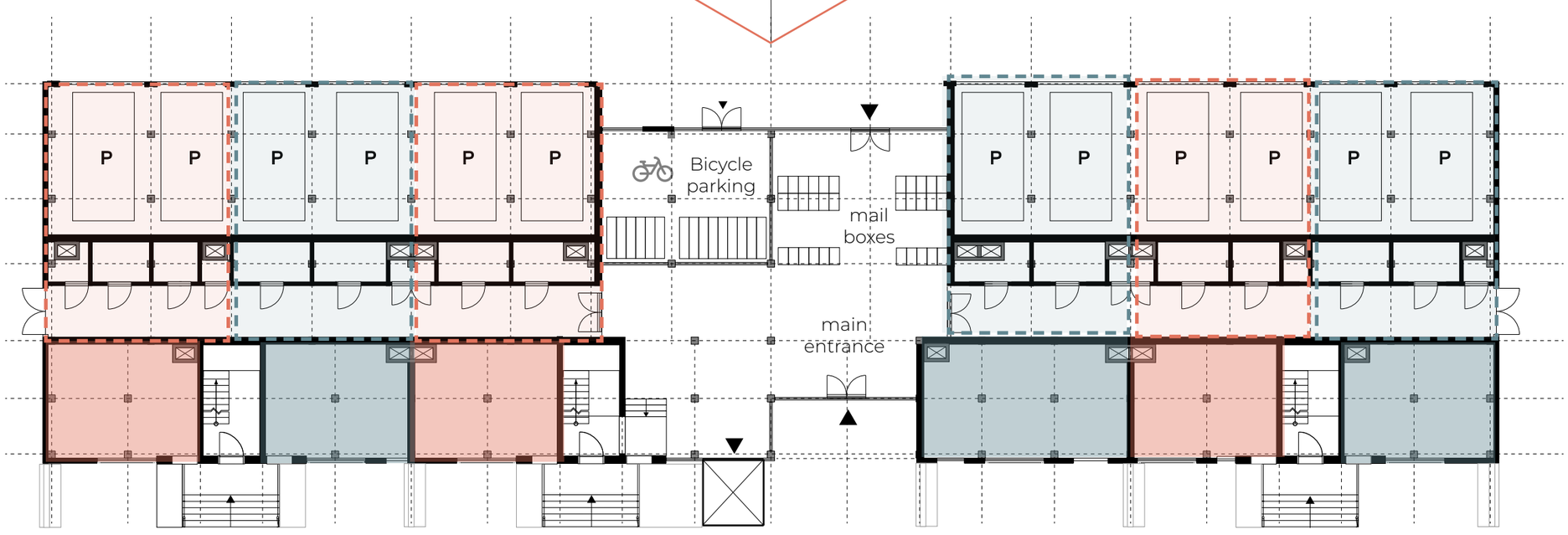
Communal space

Living typology: Ground floor



Living typology: Ground floor

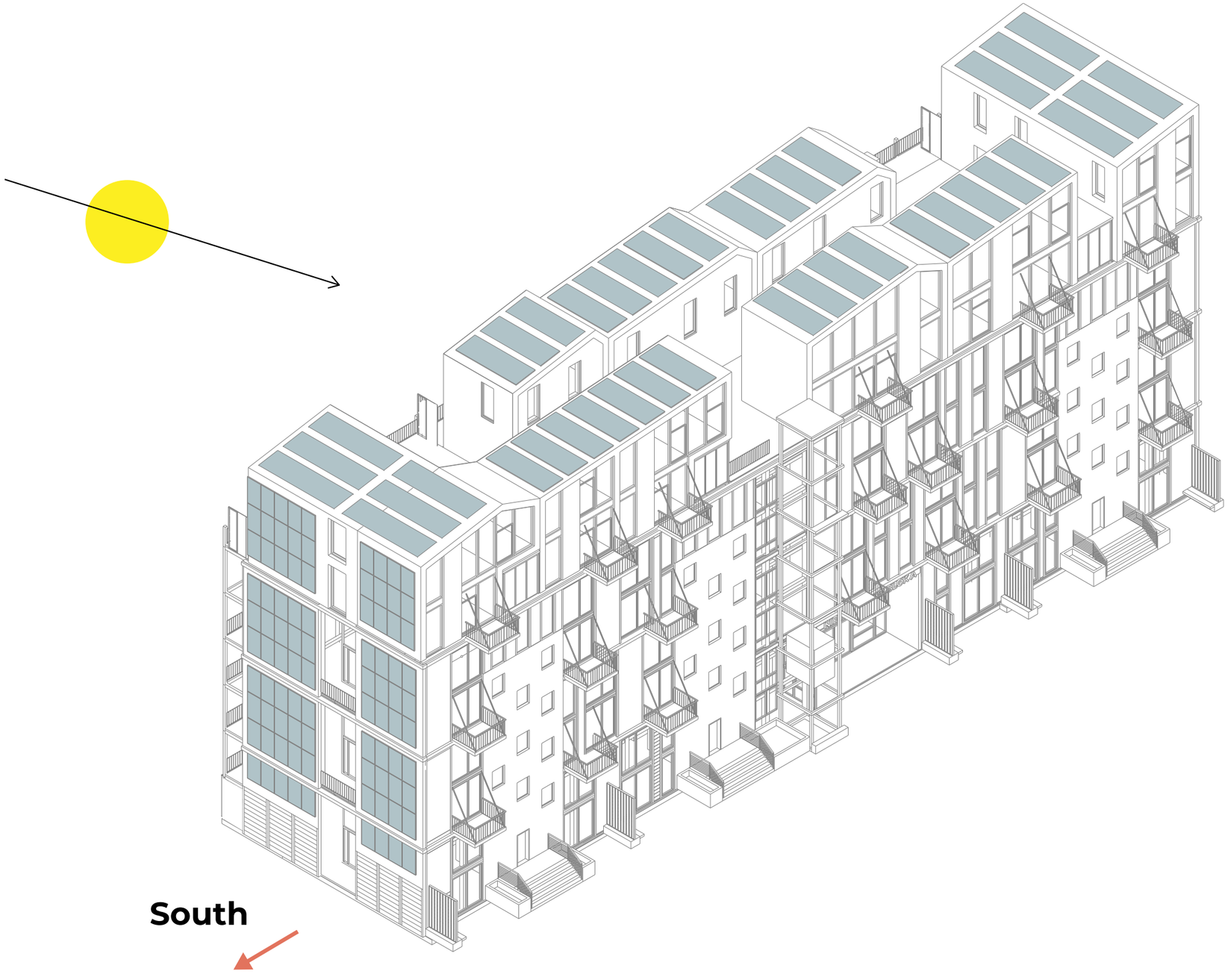




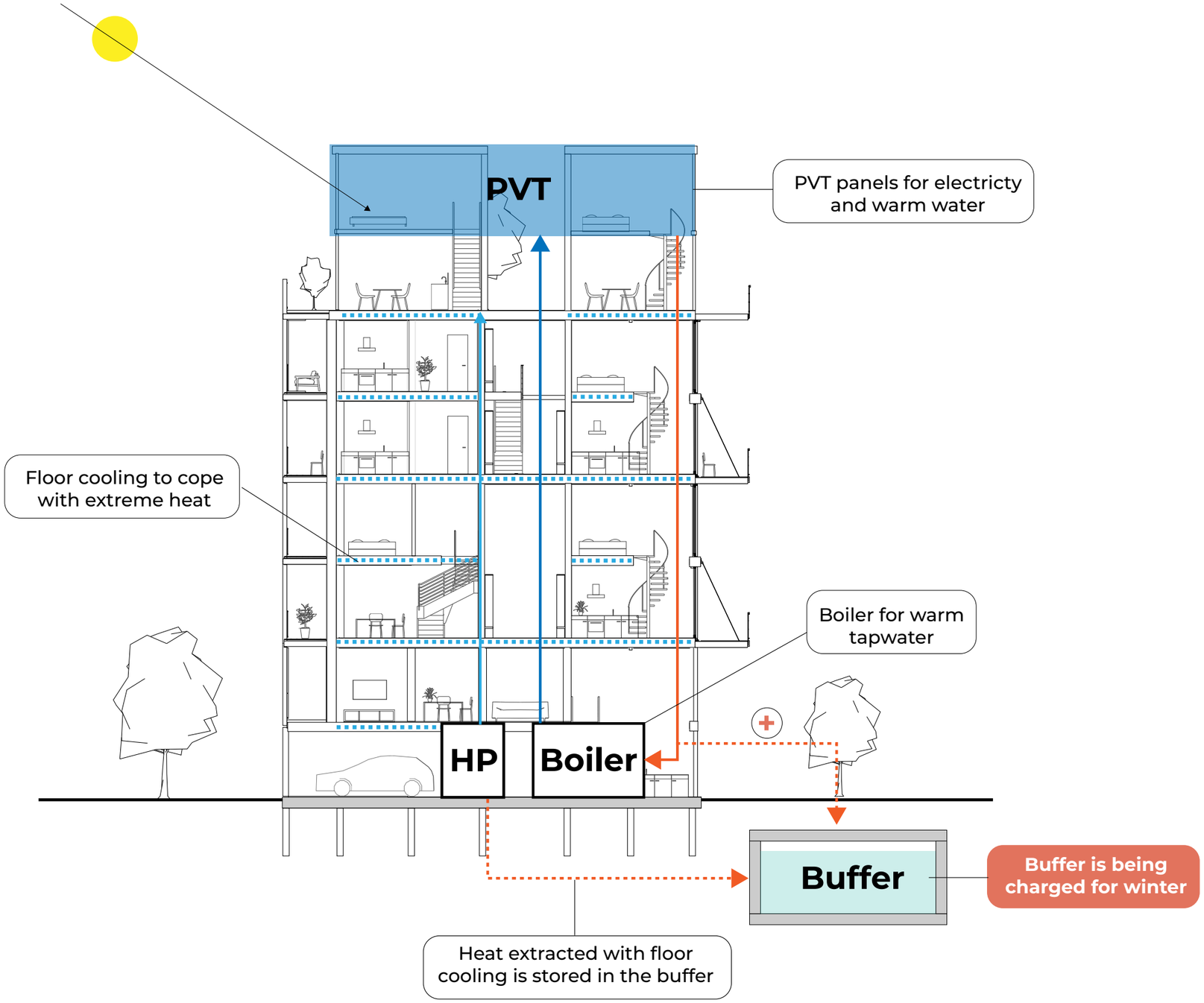
4-block
Ground floor
1:200

Climate Design

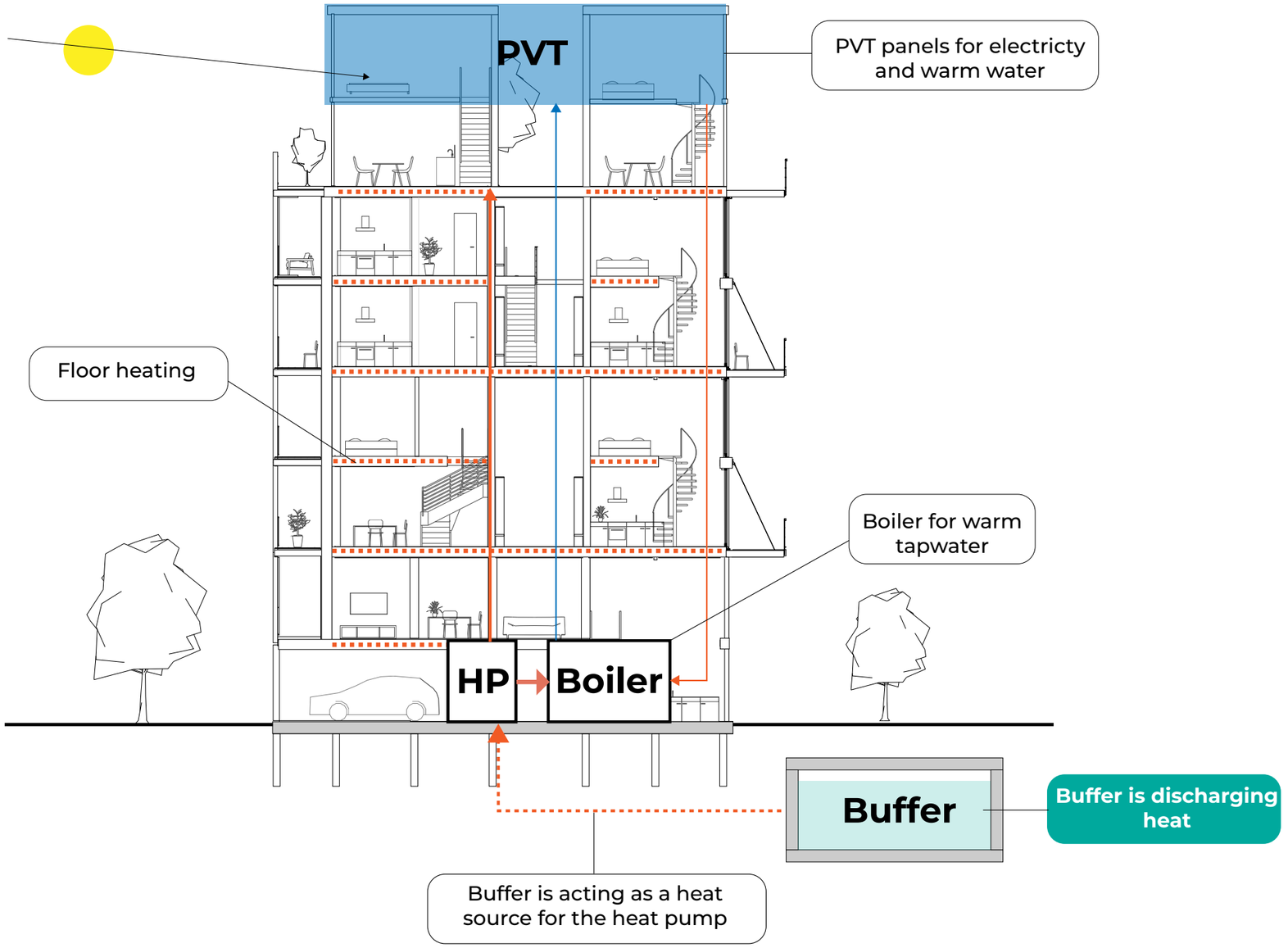
PVT panels



Summer situation



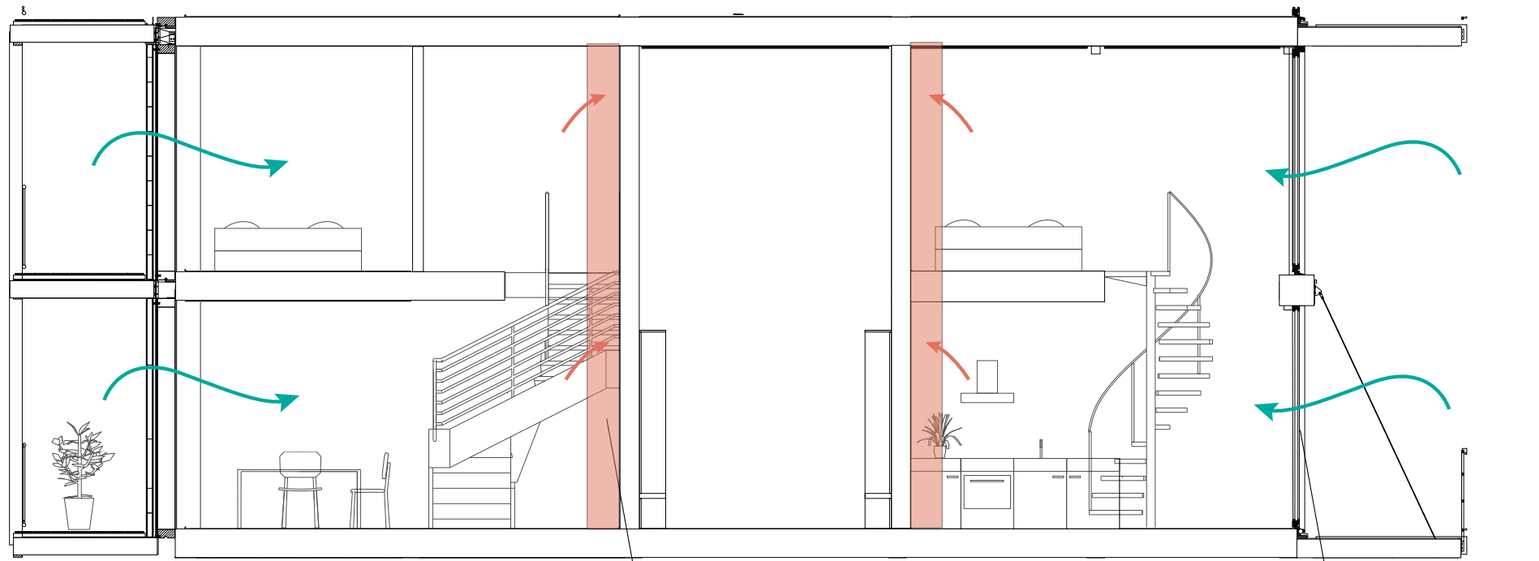
Winter situation



Ventilation

Type C

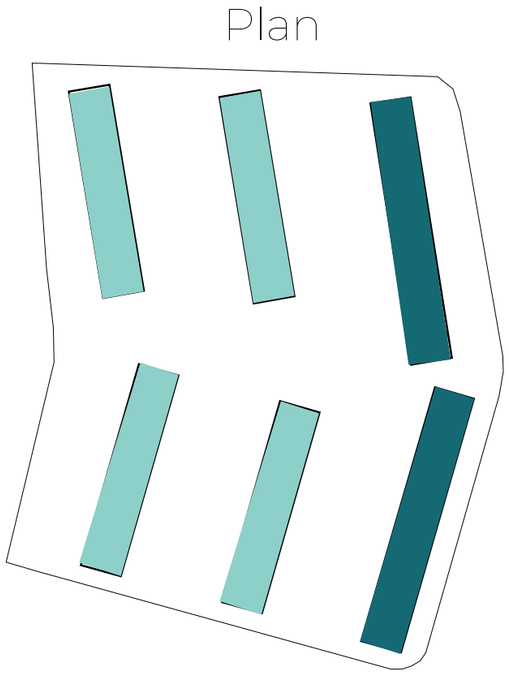
natural in
mechanical out



Urban space

Building height

Maximize solar gain



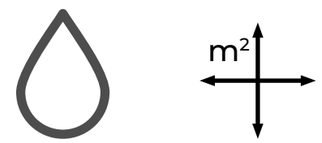
Interior garden

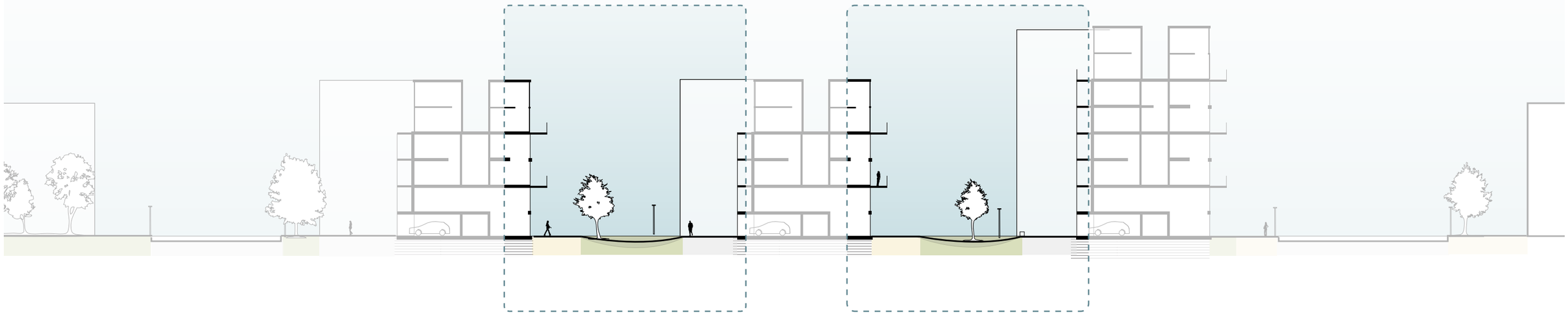
Goal

Minimize waste

Increase interaction

Future proof





Interior garden

Place for interaction + material reuse

Brick seating / planter

Brick slabs stacked to playground / podium

‘Islands’ made with concrete floors

Interior garden

Place for interaction + material reuse

communal vegetable garden

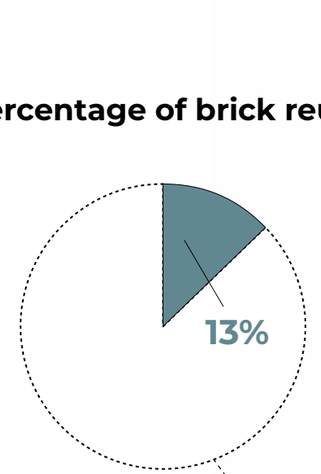
Roof tile ‘Stapelmuren’ > biodiversity

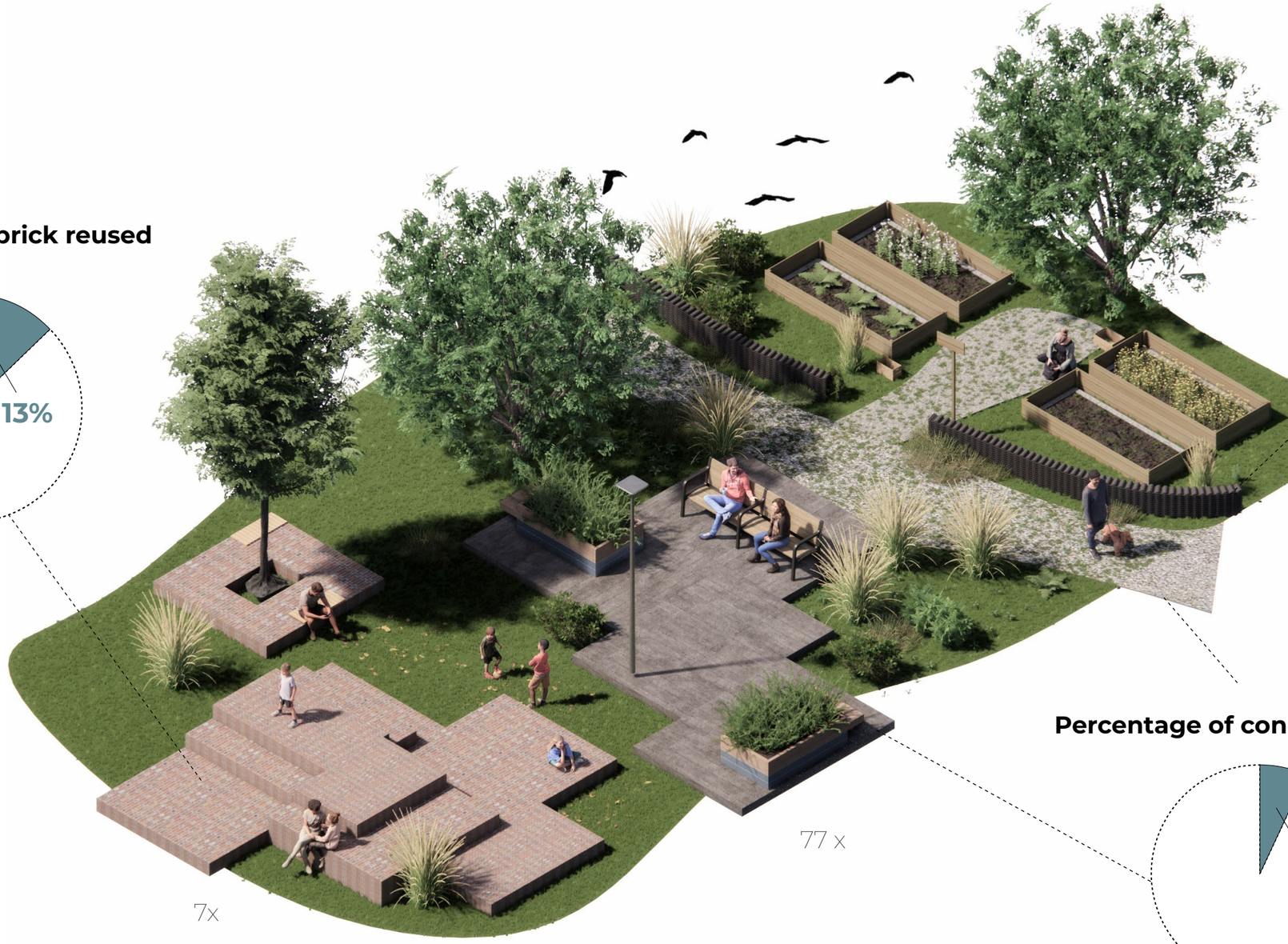
‘Halfverharding’ betongrind

Interior garden

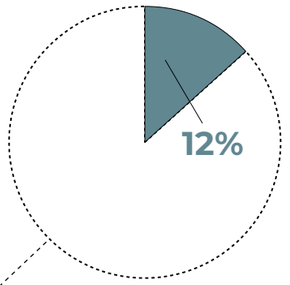
Use harvested elements as exterior furniture

Percentage of brick reused





Percentage of roof tiles reused



Percentage of concrete reused

Interior garden

Rainwater strategy

Creating resilience for a changing climate

Future proof

Climate

Het Parool

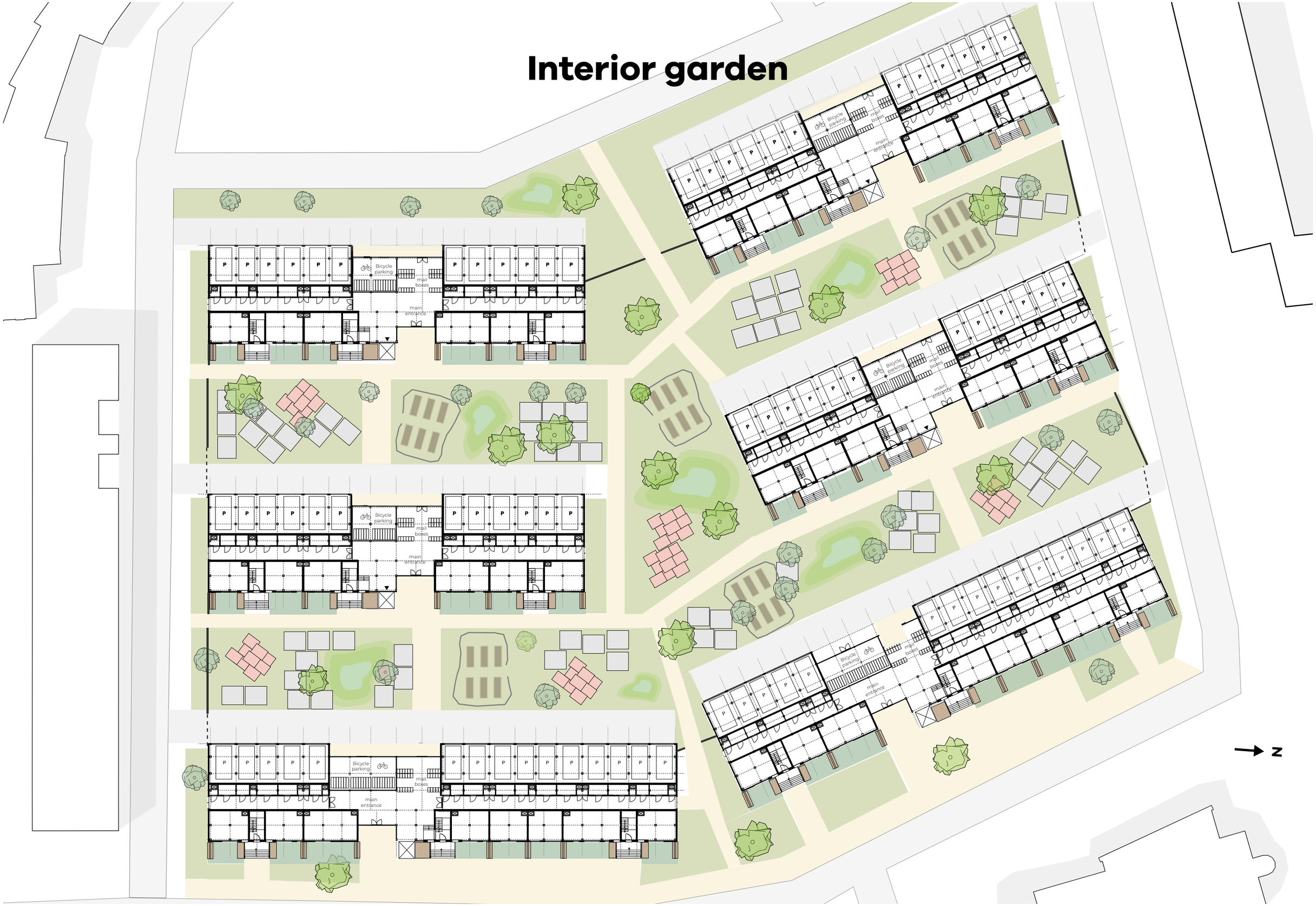
Steeds meer schade door extreme neerslag: 'Vaker verrast door hoosbuien'

Nederland krijgt steeds vaker te maken met extreme buien, die alsmaar meer schade aan woningen veroorzaken. Het aantal meldingen door neerslagoverlast is in drie jaar tijd met 77 procent gestegen en de schades door storm zijn ruim verdubbeld.

Edwin van der Aa 7 juli 2020, 8:41

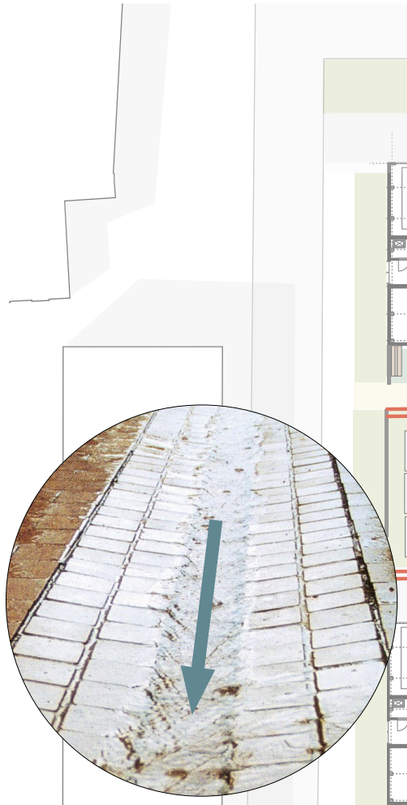
Een inwoner van Kaatsheuvel probeert een overgelopen put door te prikken. BEELD ANP

Interior garden



Rainwater strategy

Creating rainwater buffers



Rainwater gutters

(image by atelier GROENBLAUW)

Rainwater strategy

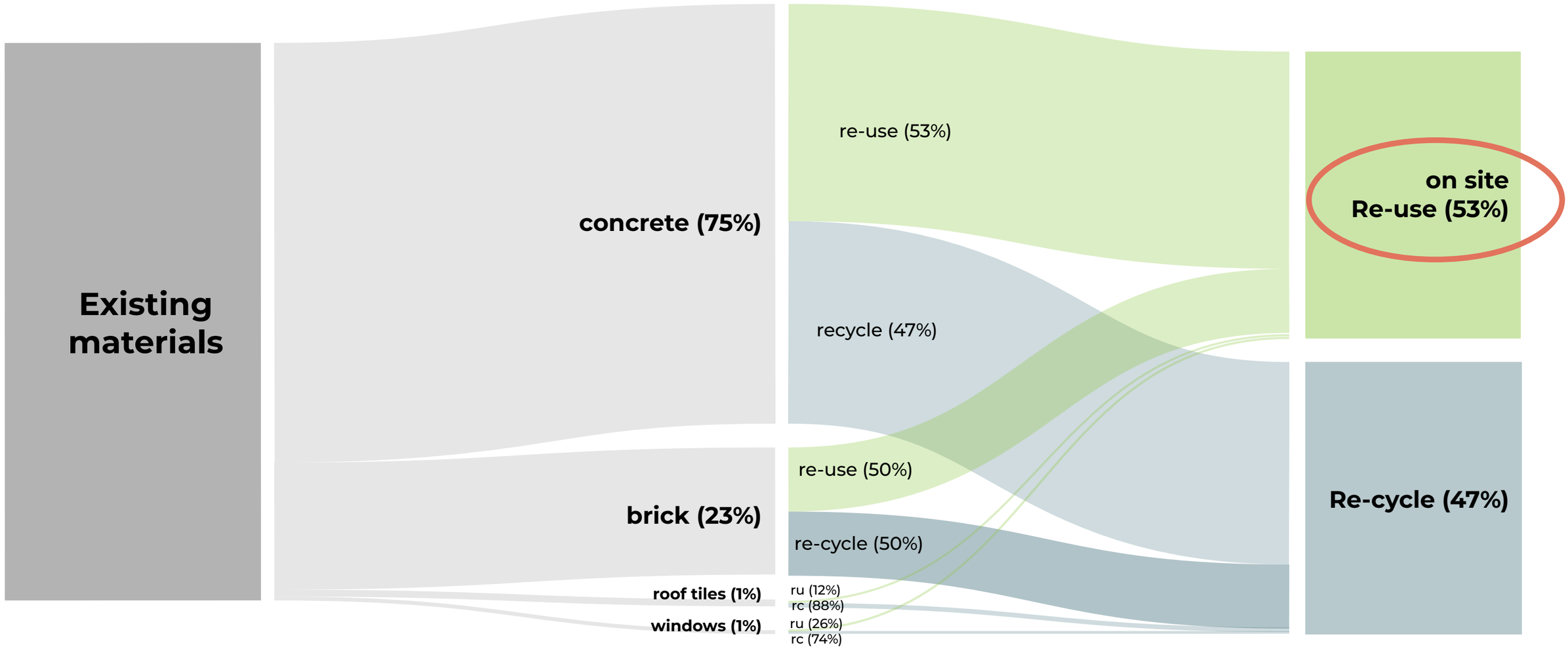
Infiltration zones

(image by atelier GROENBLAUW)

Material reuse overview

Material overview

On-site reuse & recycle



Evaluation & recommendations

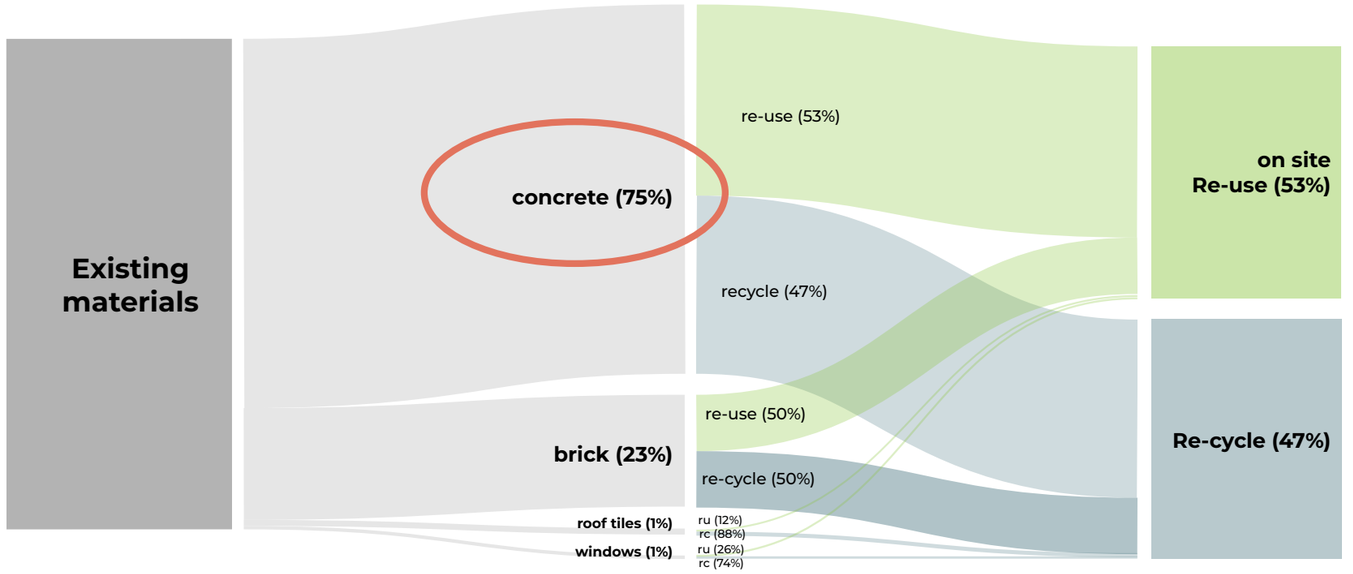
Evaluation & recommendations

Minimize waste

promote interaction

Future proof

Evaluation & recommendations



How could the reuse percentage be **higher than 53%?**

Increase to **88%** if all the **existing concrete** would've been used

Reusing granulate and pouring it into new concrete emits a lot of CO_2 (Portland cement)

→ **Waste reduction vs. CO_2 reduction?**

Further research required

Evaluation & recommendations

Minimize waste

promote interaction

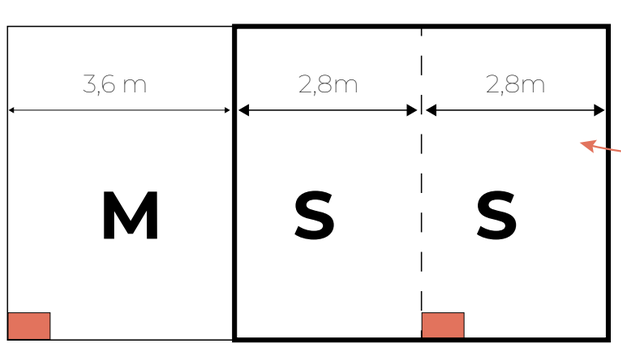
Future proof

This project has given shape to the **physical environment** that promotes social interaction

→ Developing the **social structure** behind it is crucial for making this project a succes

- Do tenants **support** the communal functions?
- Should there be a **selection process** among future tenants?
- Should a '**building mayor**' be appointed?

Evaluation & recommendations



width is too small for one appartment

Future proof

Climate

m²

Program

Lesson learned

Creating a building with a flexible infill on an existing load bearing structure is **challenging**.
Existing grids are leading.
(ceiling height, location of columns)

→ **Inventarise limitations, right away**

Thank you

questions?