

P5

Explorelab Graduation Studio

Tectonics and the Contemporary Vernacular

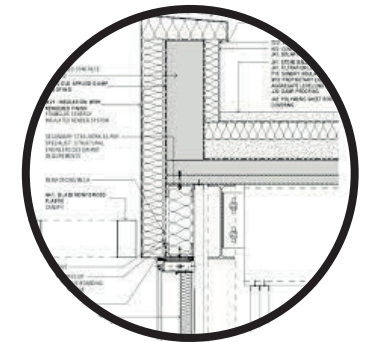
14 January 2025

Feiko Nooyens | 4714822

introduction
research
translation to design
material
structure
context
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conclusion

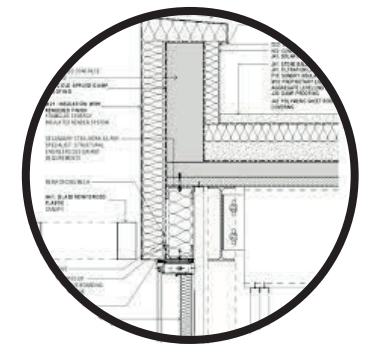
fascination

traditionally:



fascination

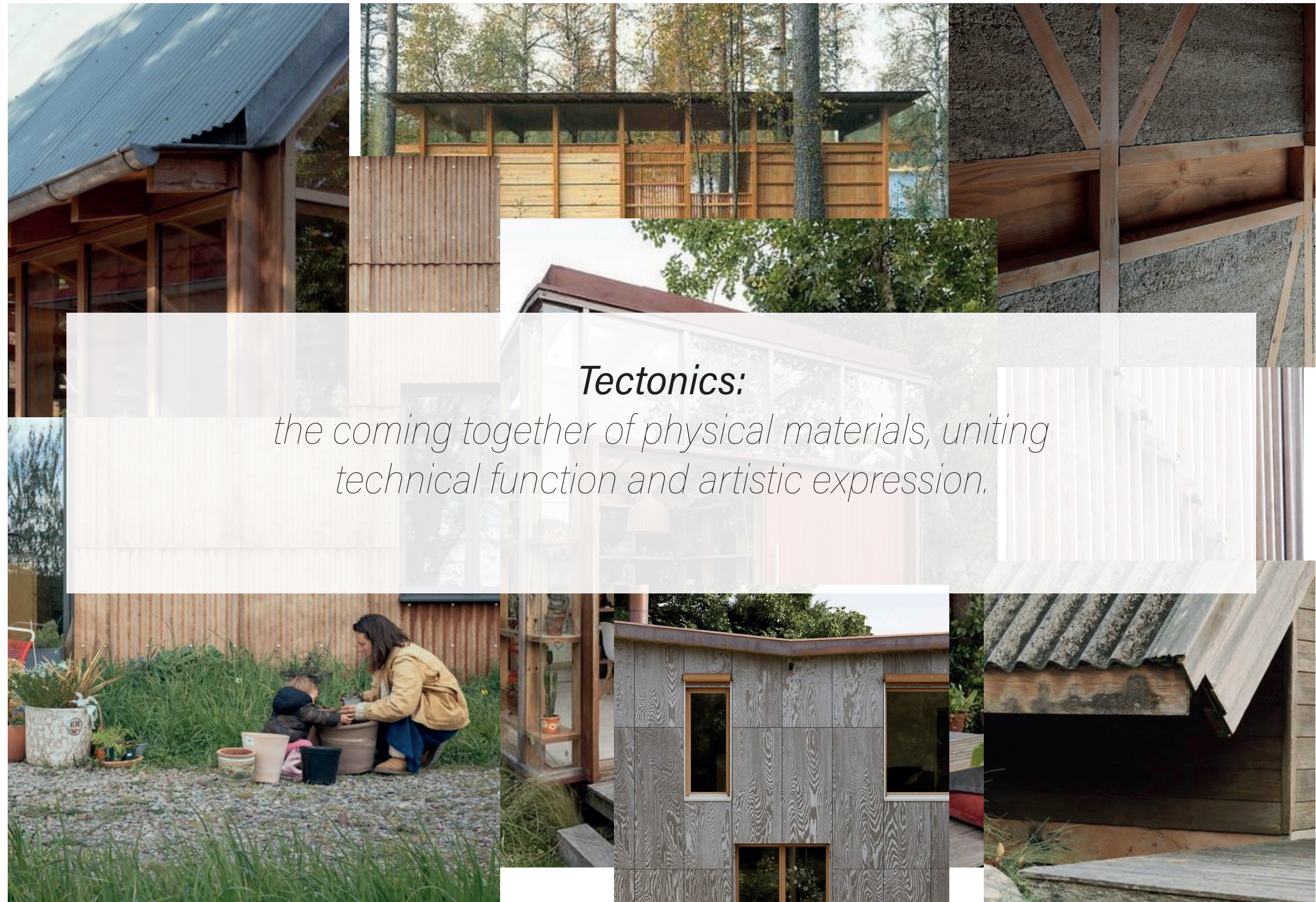
but what if...?



fascination



fascination



Tectonics:

the coming together of physical materials, uniting technical function and artistic expression.

problem statement

the materials we use:



problem statement

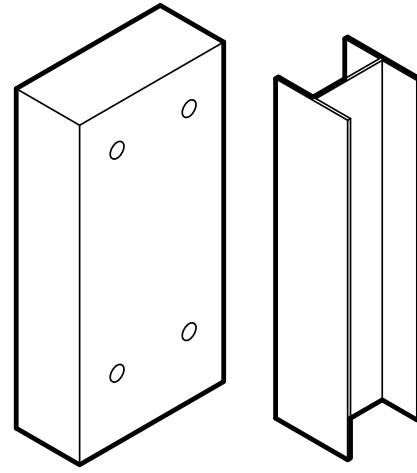
the resulting tectonics:



neutral!

problem statement

material

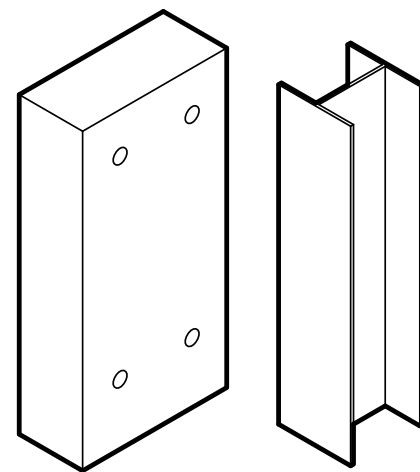


non-sustainable resources

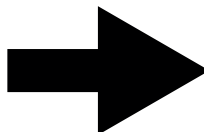
tectonics

problem statement

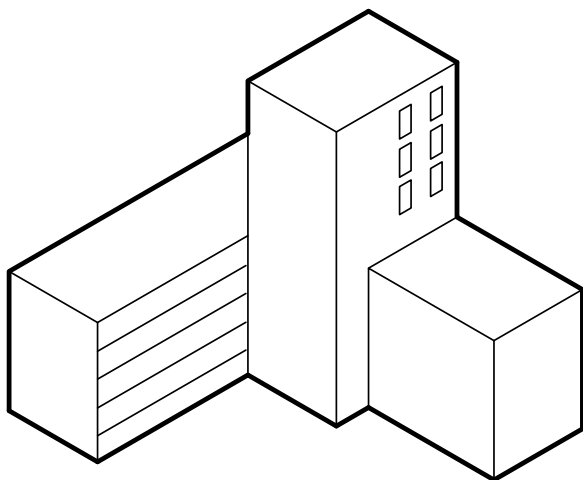
material



non-sustainable resources



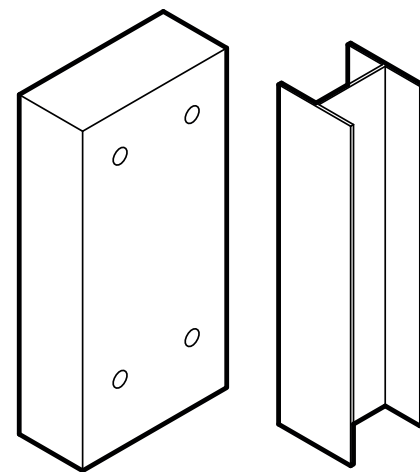
tectonics



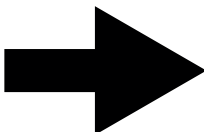
modern construction

problem statement

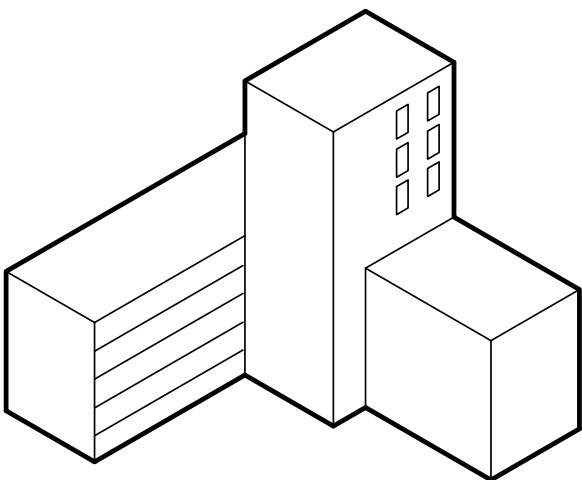
material



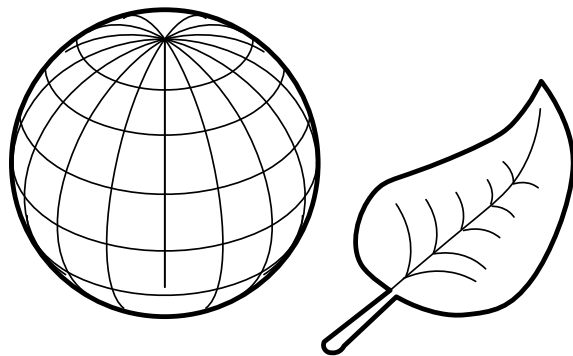
non-sustainable resources



tectonics



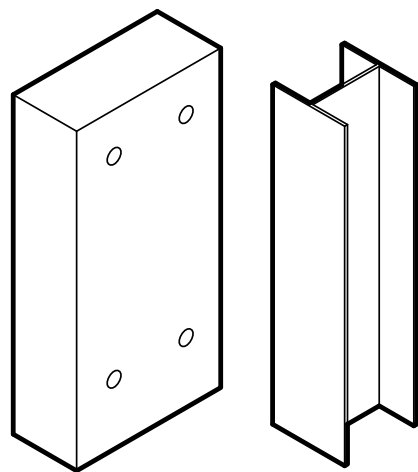
modern construction



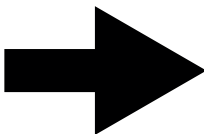
sustainable resources

problem statement

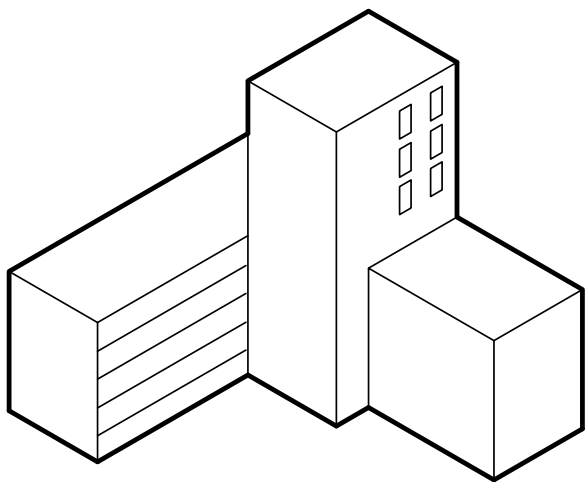
material



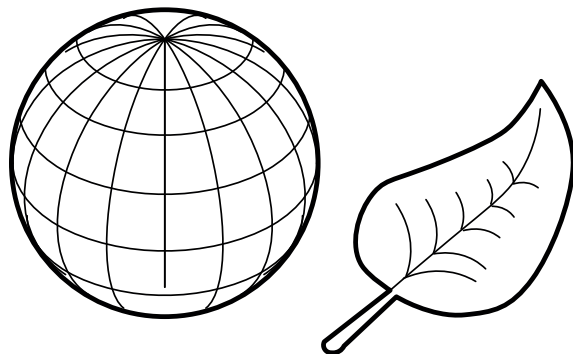
non-sustainable resources



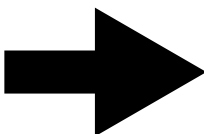
tectonics



modern construction

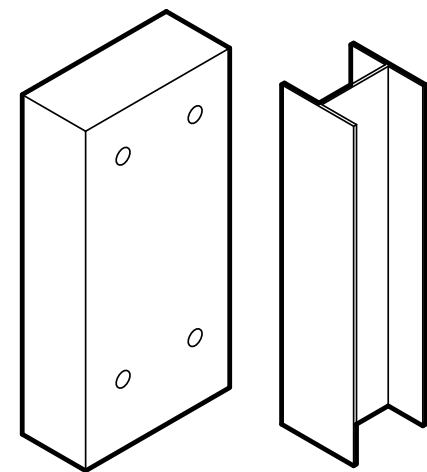


sustainable resources

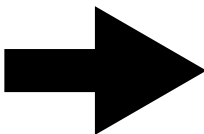


problem statement

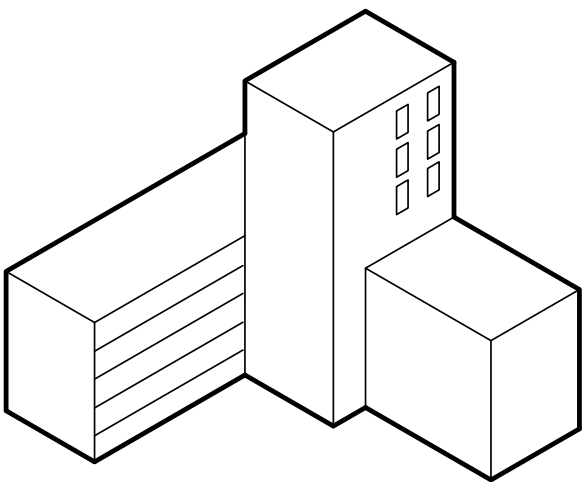
material



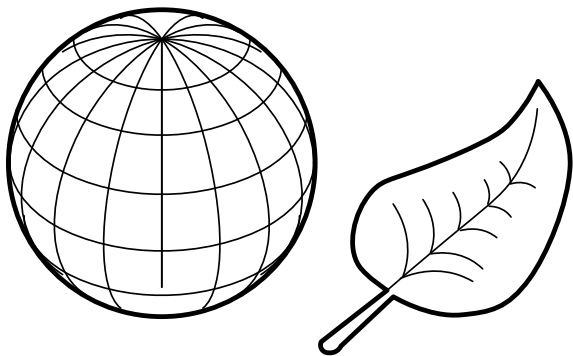
non-sustainable resources



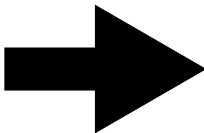
tectonics



modern construction

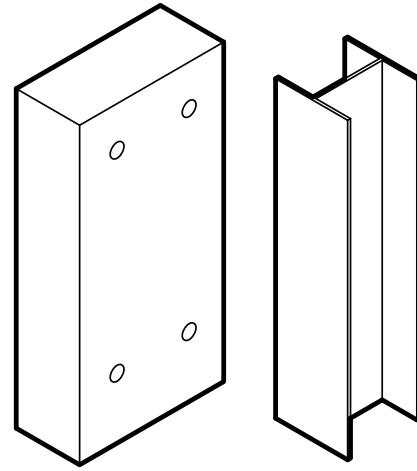


sustainable resources

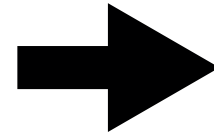


problem statement

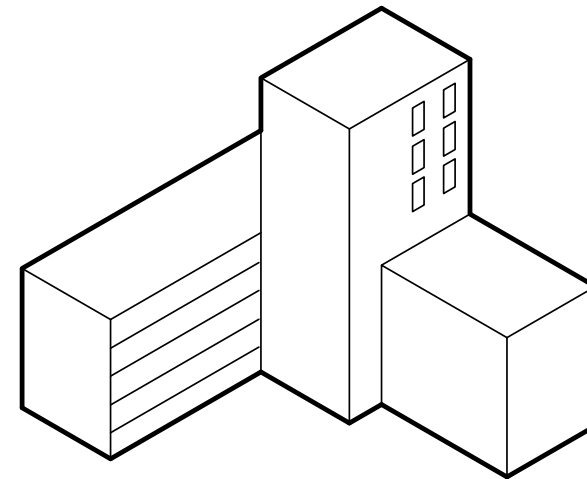
material



non-sustainable resources



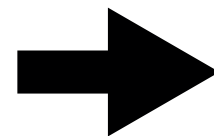
tectonics



modern construction



sustainable resources



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research question

*How are sustainable materials used in
tectonic architectural design?*

research question

How are sustainable materials used in tectonic architectural design?

What makes a material sustainable?

What makes a design tectonic?

How do they relate?

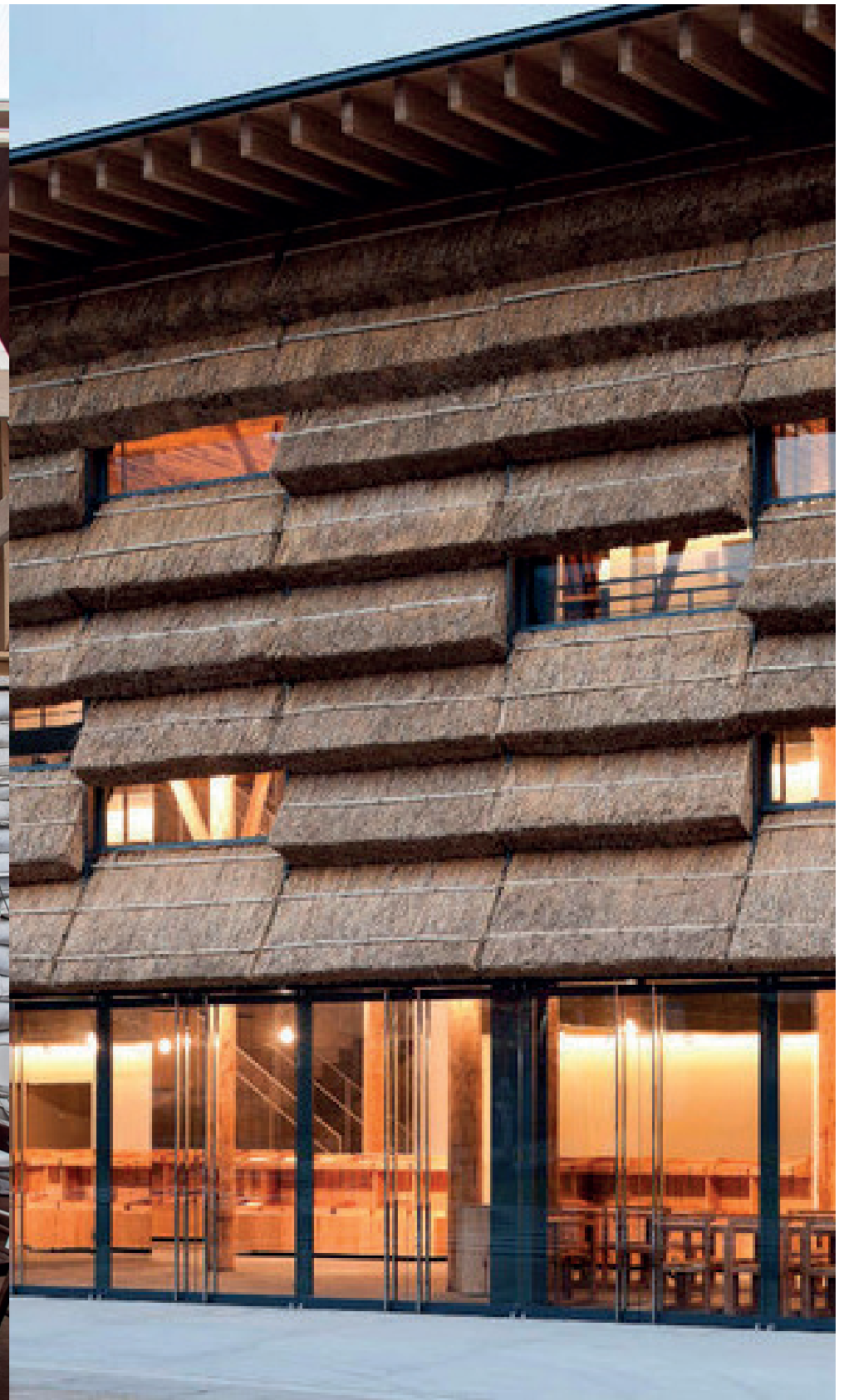
research method



Flat House
Practice Architecture
2019

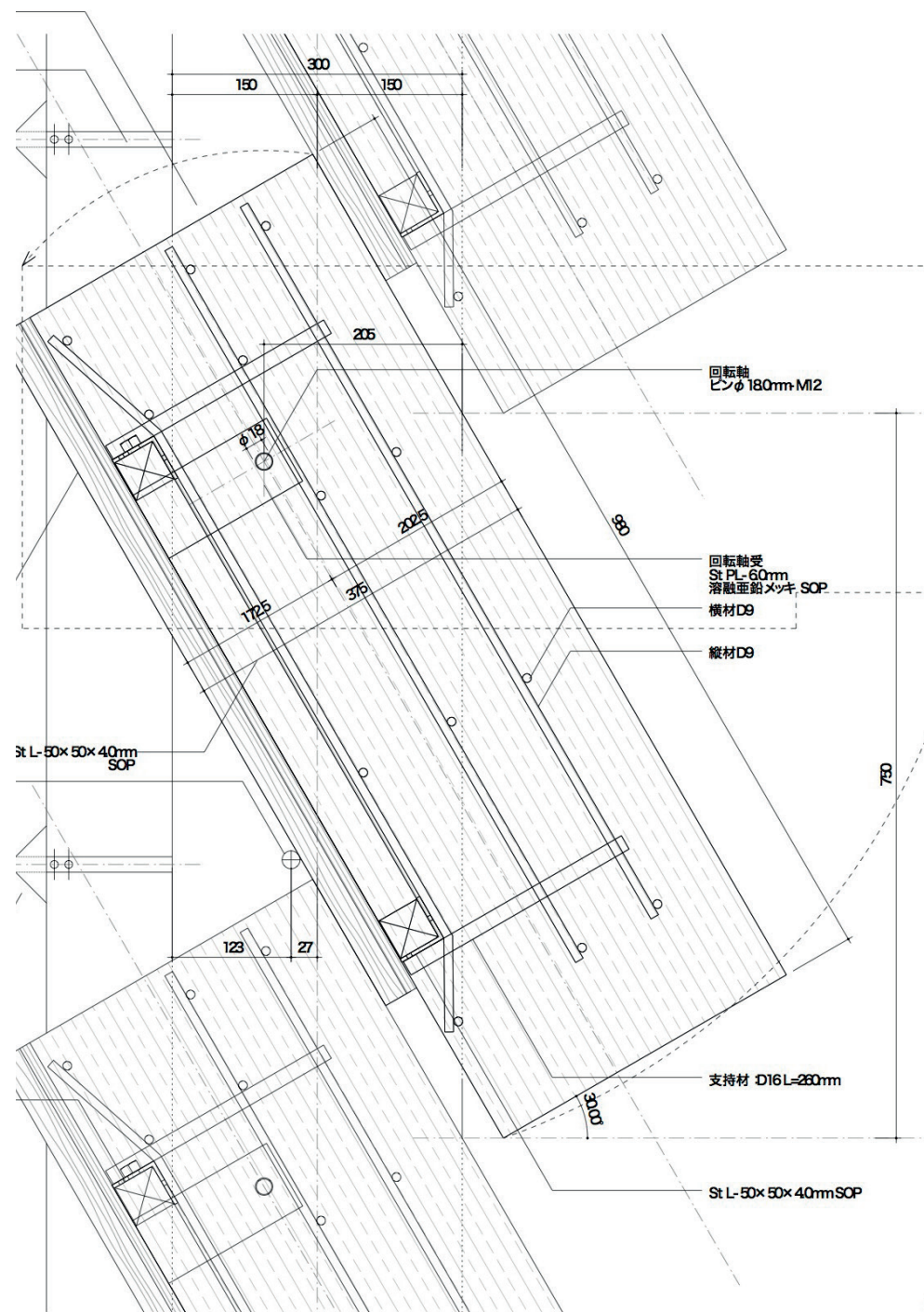
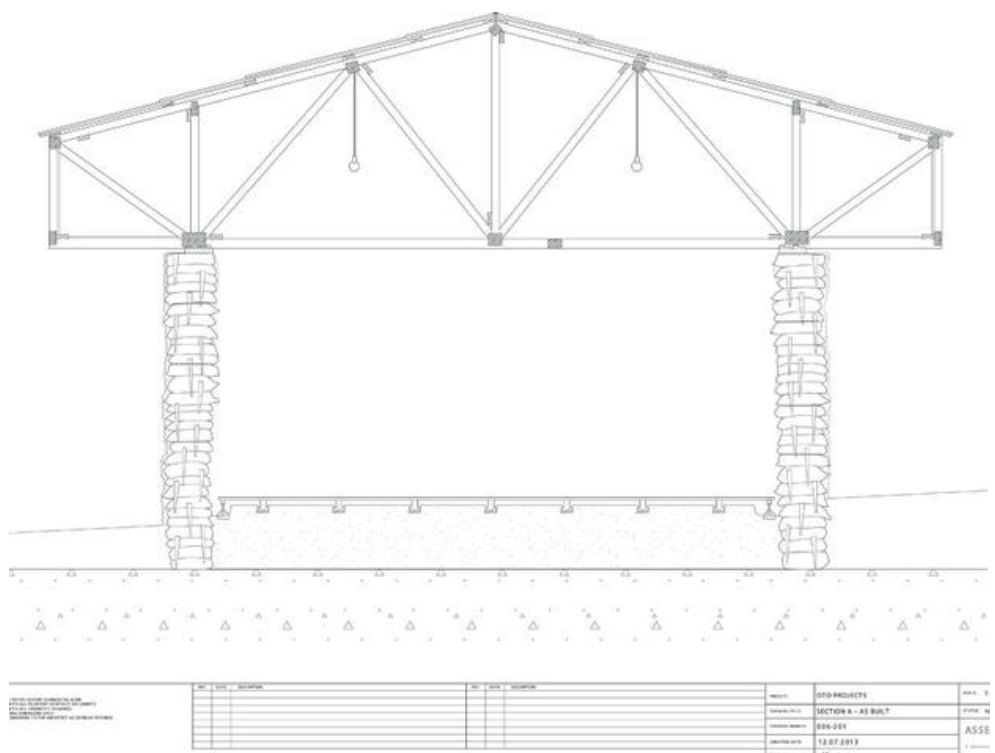
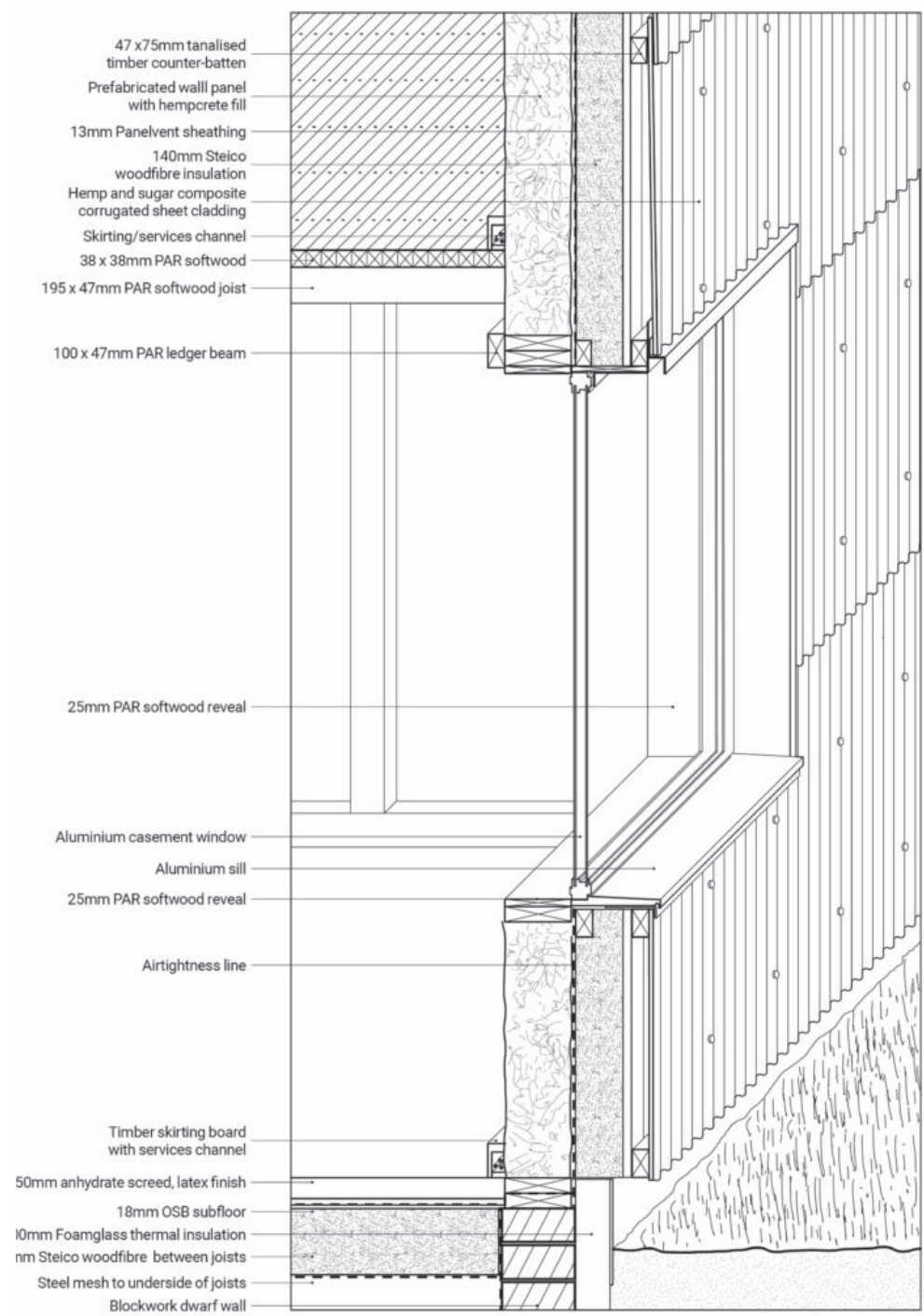


OTOProjects
Assemble Studio
2013



Yusuhara Marche
Kengo Kuma & Associates
2010

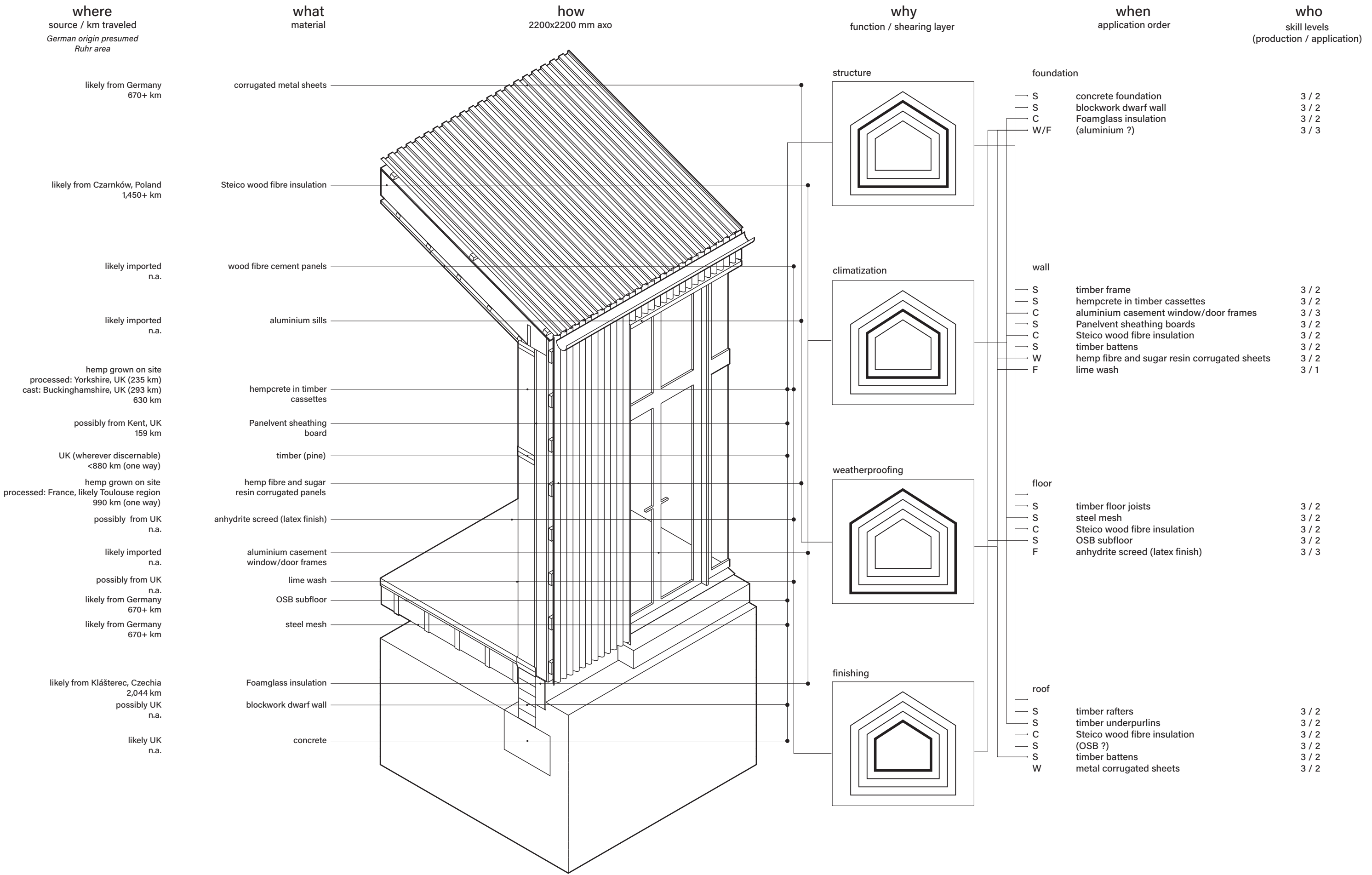
research method



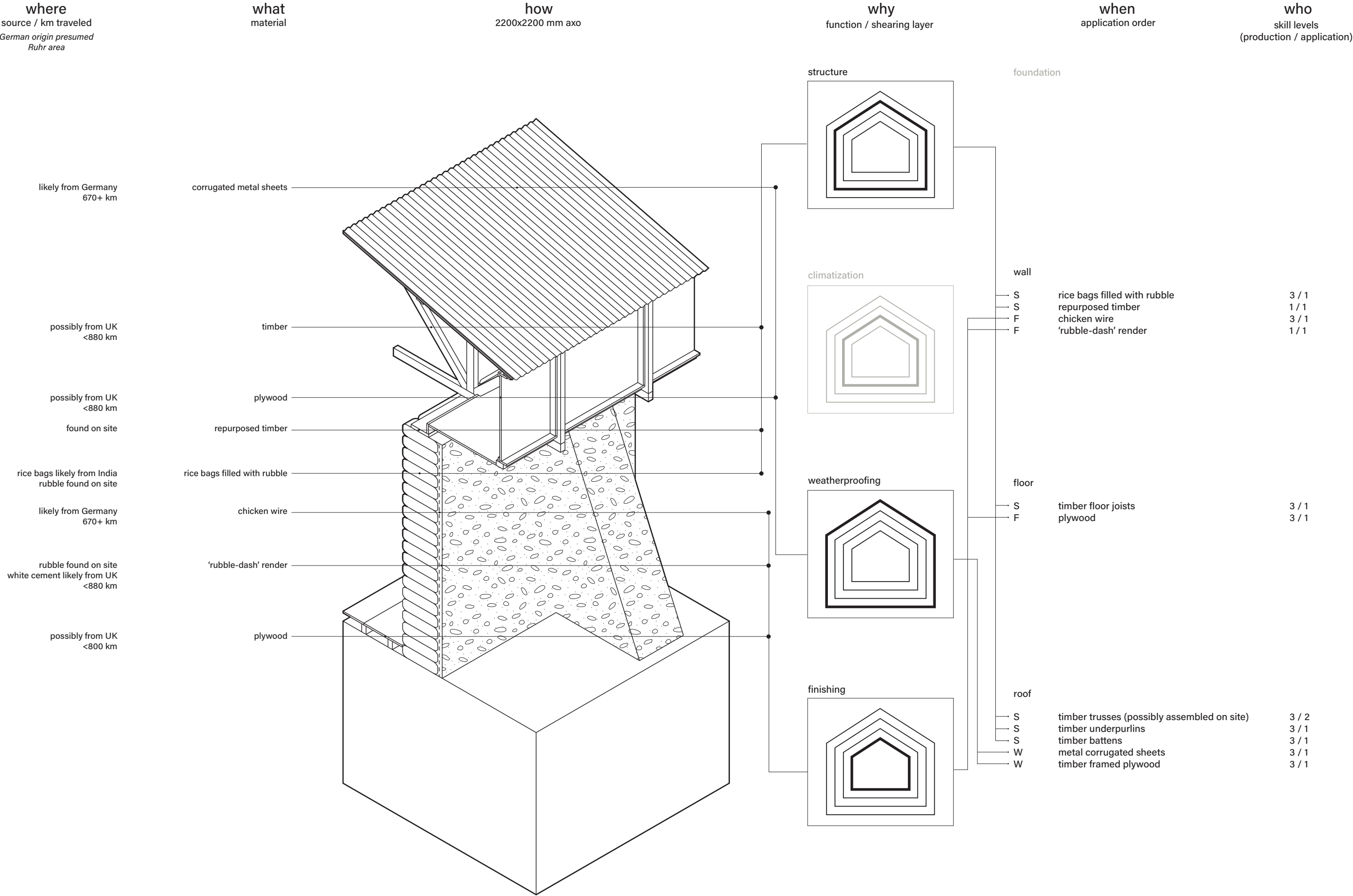
research method



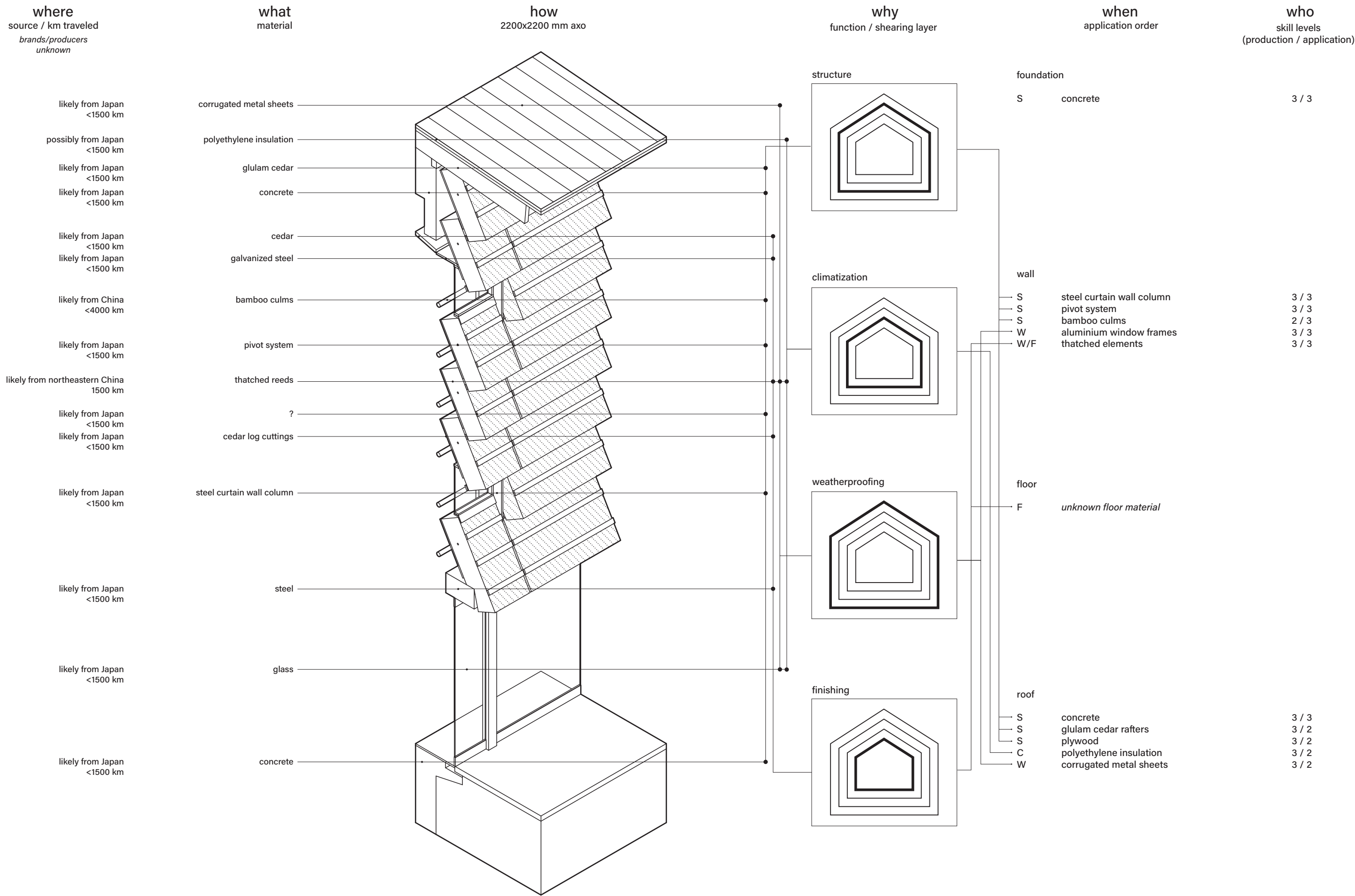
results



results



results



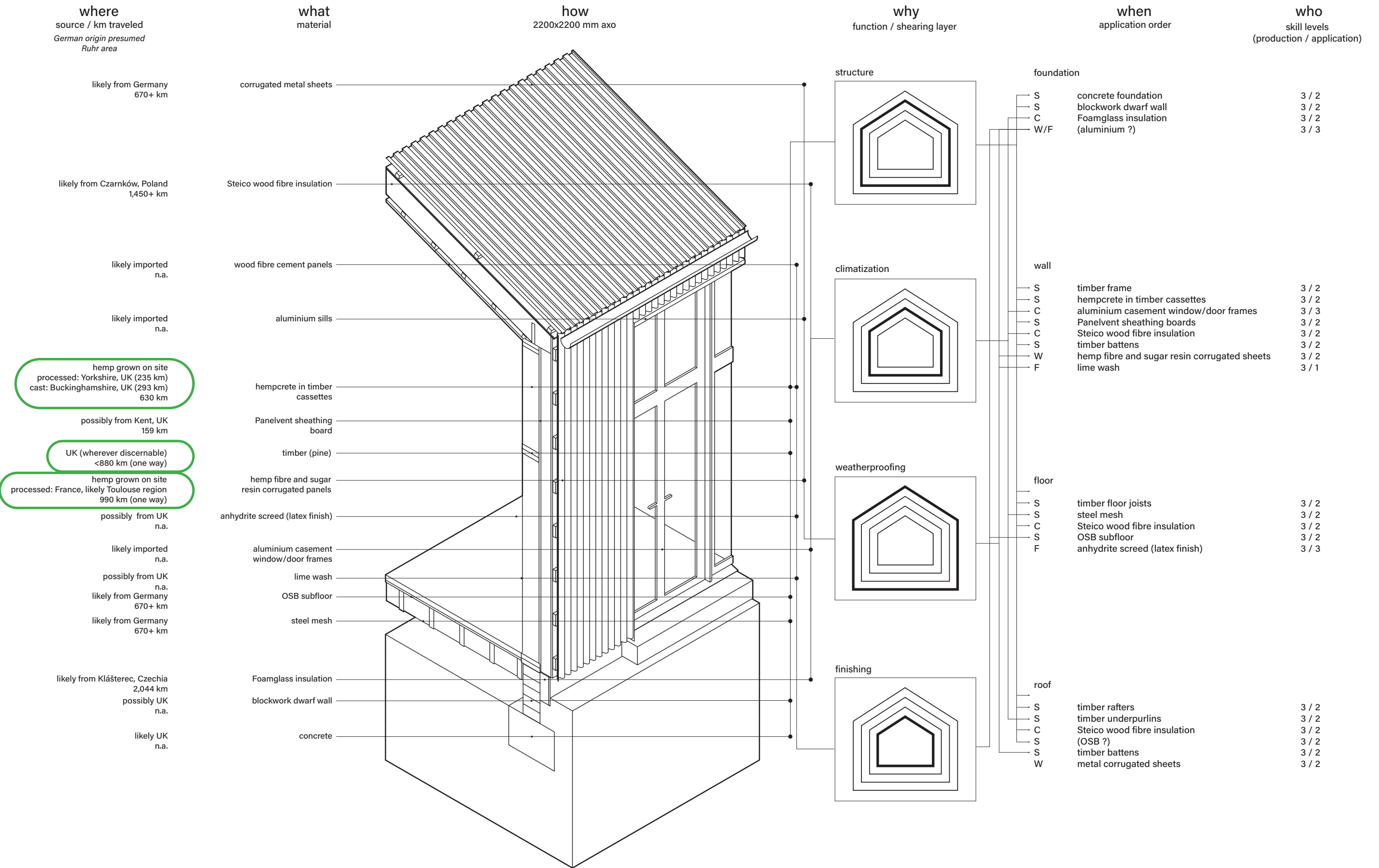
conclusion



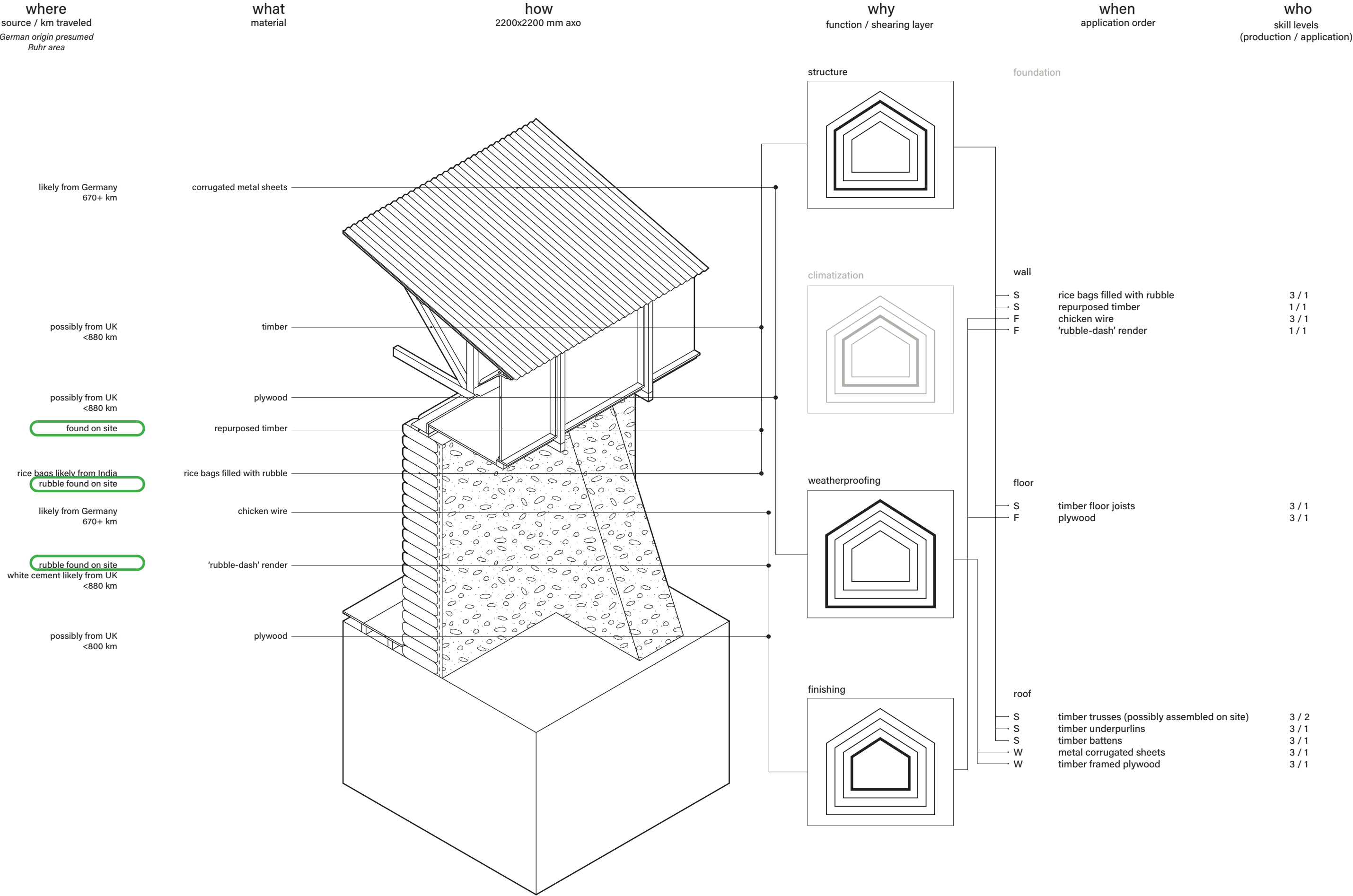
conclusion



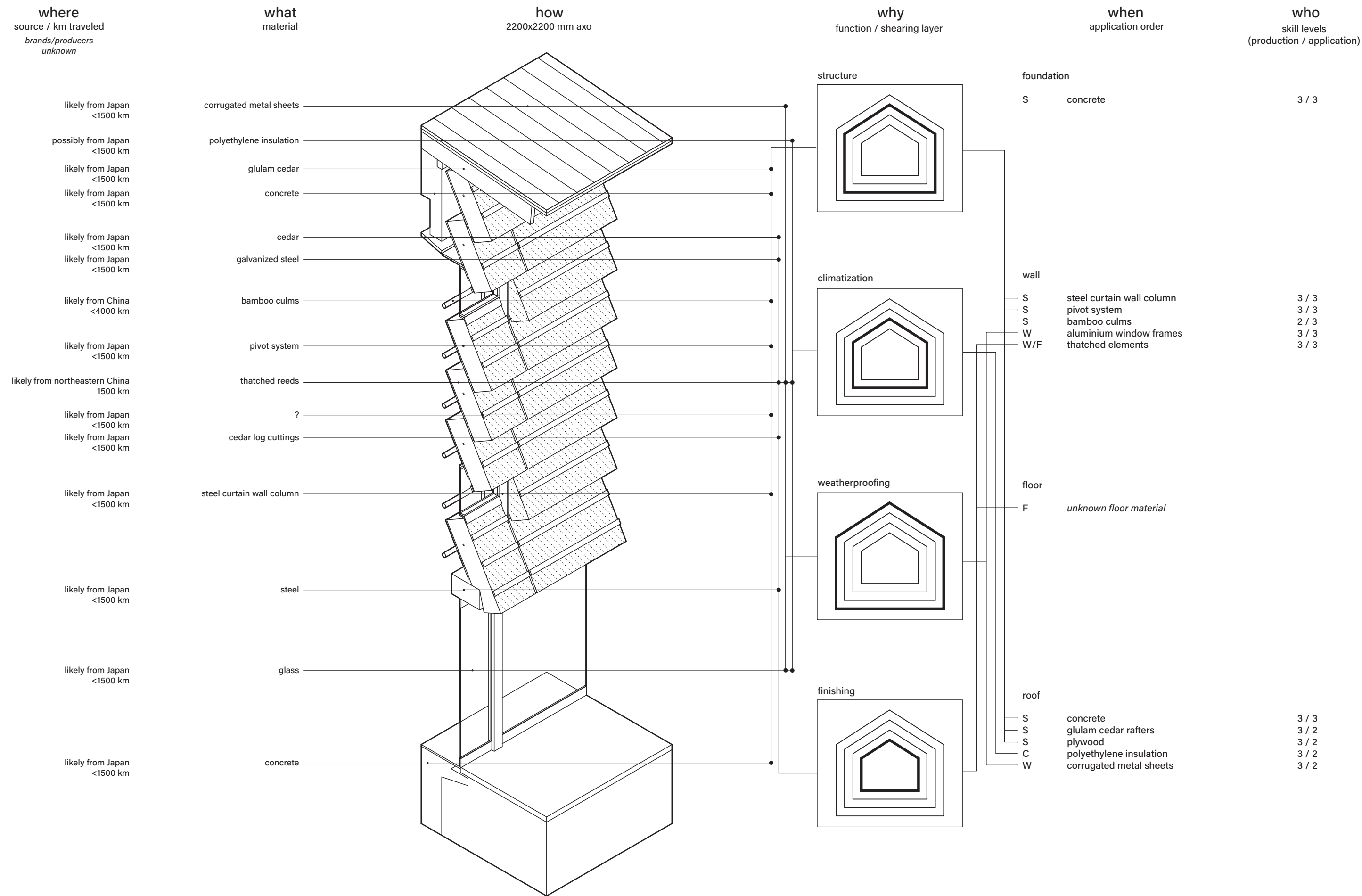
conclusion



conclusion



conclusion

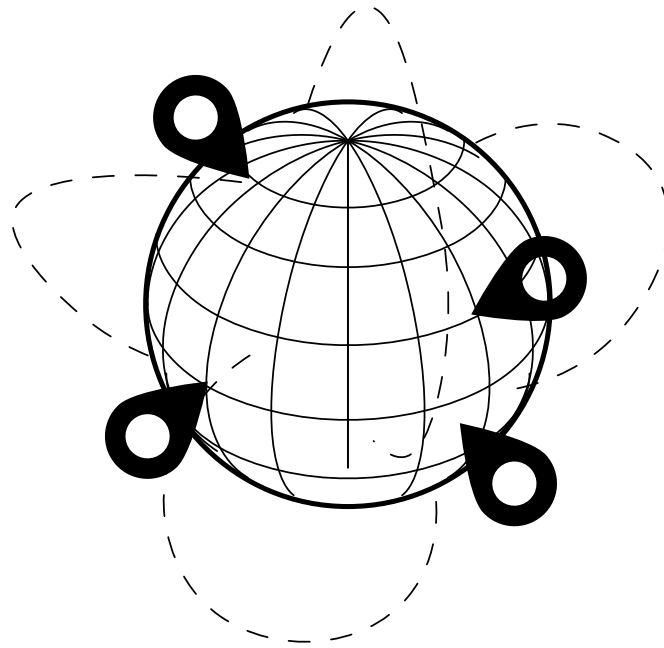


conclusion

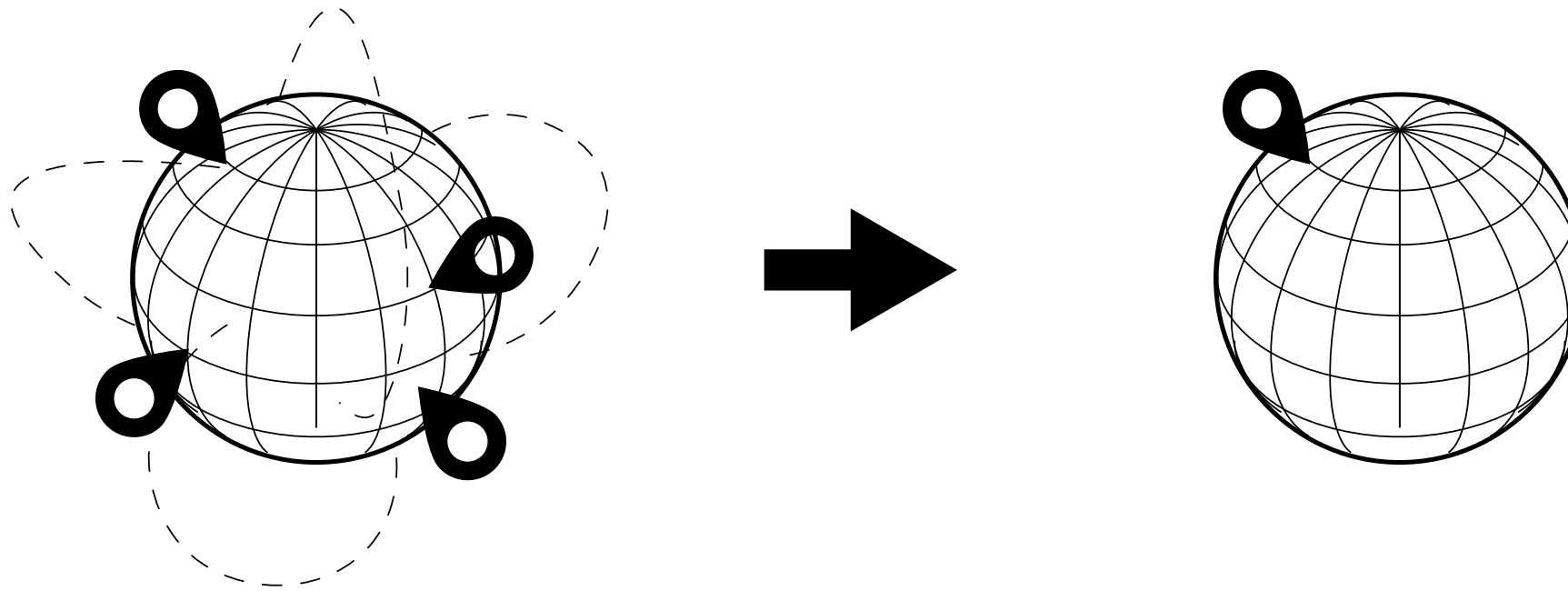
design take-aways

1. **Be inventive and resourceful:** what is already present and available, and how can it be used?
2. **Think outside of the box:** how can the material be manipulated in such a way that it retains its technical qualities, but attains a new form?
3. **Look beyond:** how can the material be exploited to fill multiple functional niches?
4. **Be realistic:** consider the dependency your choices have on the current availability of resources and facilities.
5. **Rethink your standards:** can it be done simpler or by using less material?
6. **Take into account all aspects:** does your material require unconventional accessibility, for example for maintenance?
7. **Recognize all parties:** who will build your design, and who will take care of it?
8. **Be transparent:** document the use of material in such a way that future designers can learn and benefit.

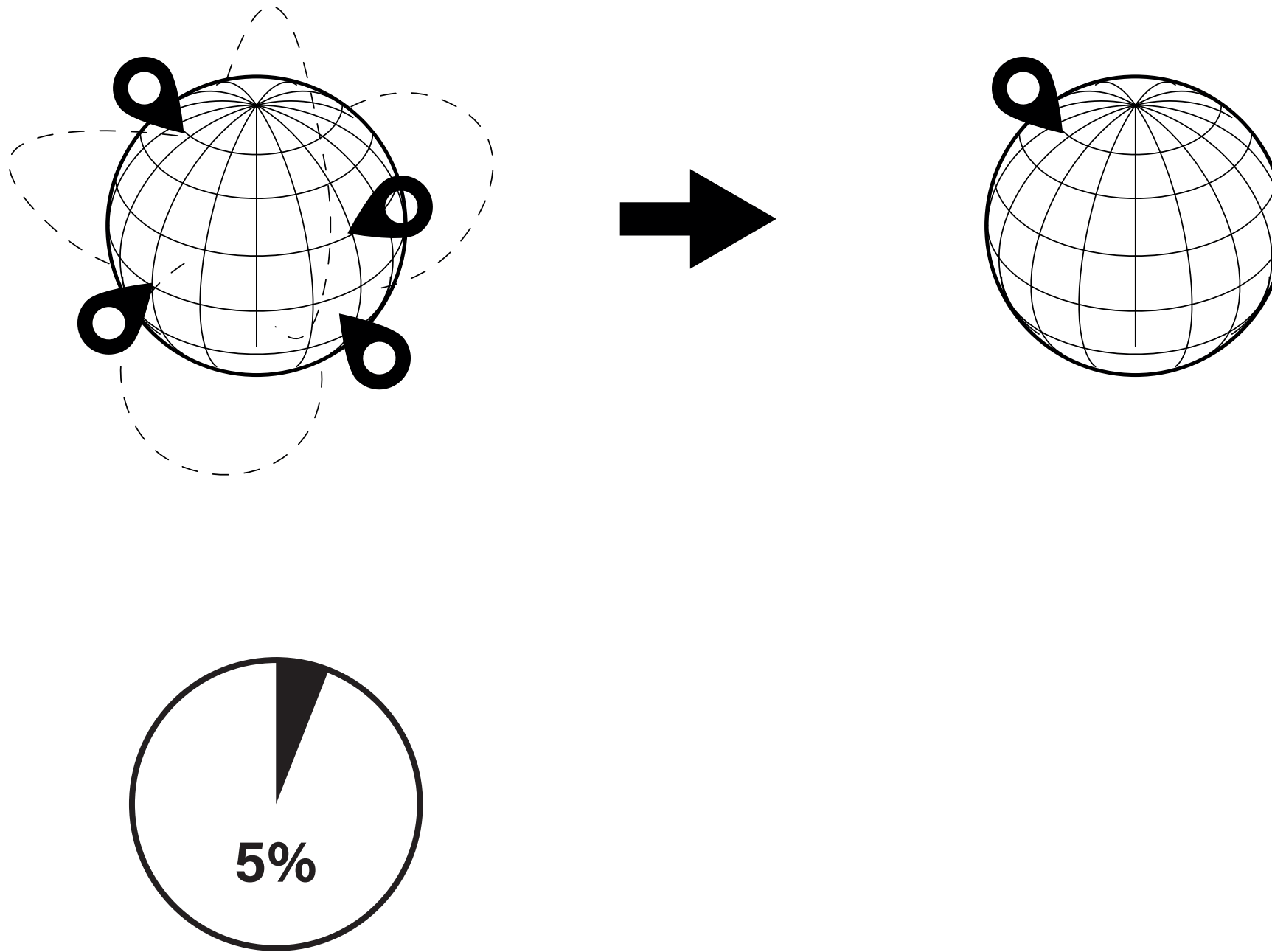
conclusion



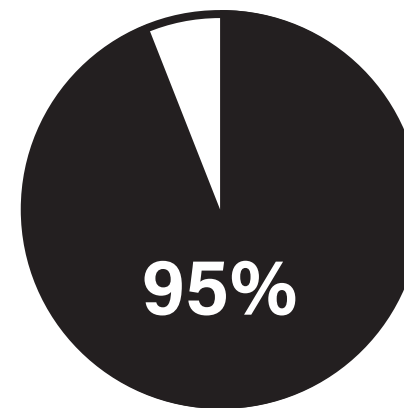
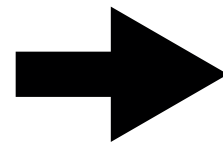
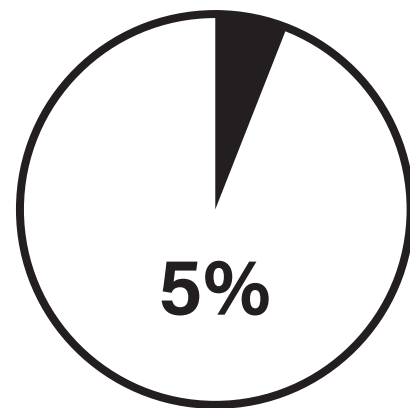
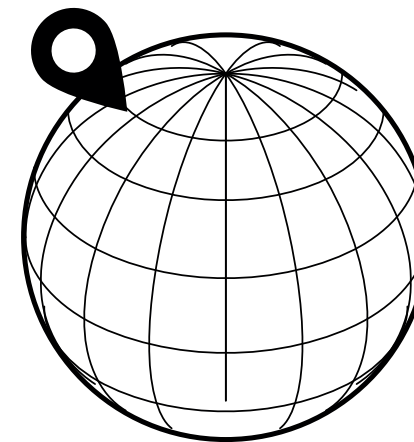
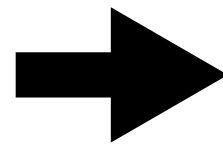
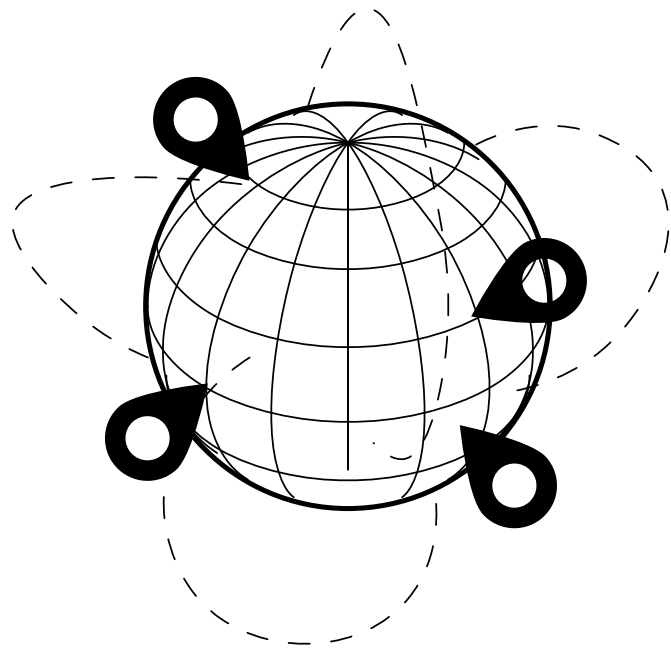
conclusion



conclusion



conclusion



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translation to design

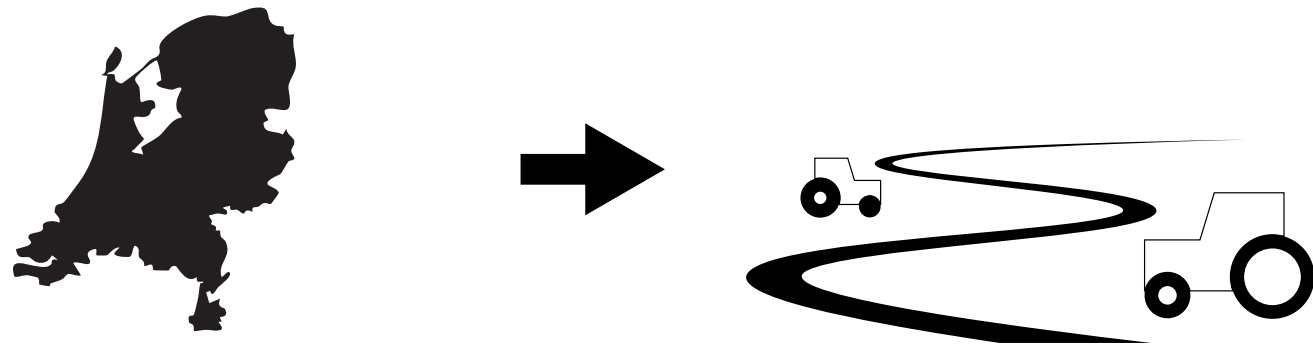


What does an architecture look like that omits green-washing from the start, by looking at material first?

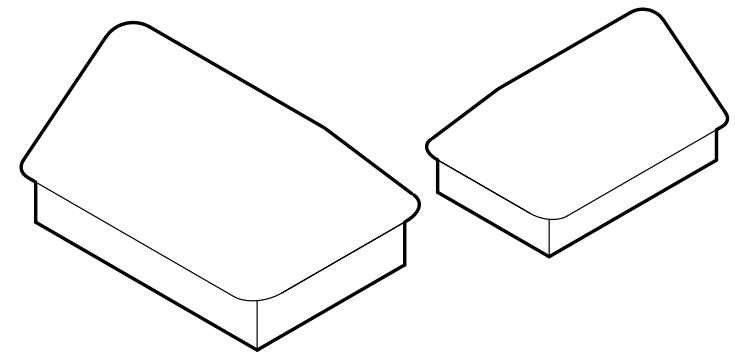
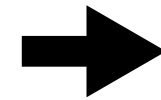
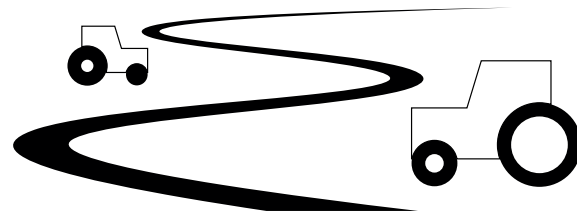
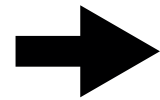
translation to design



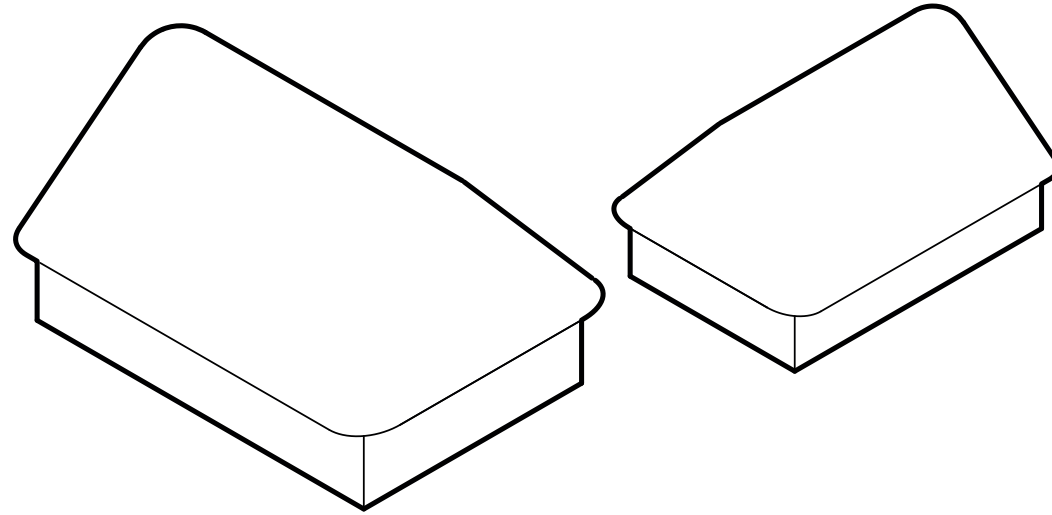
translation to design



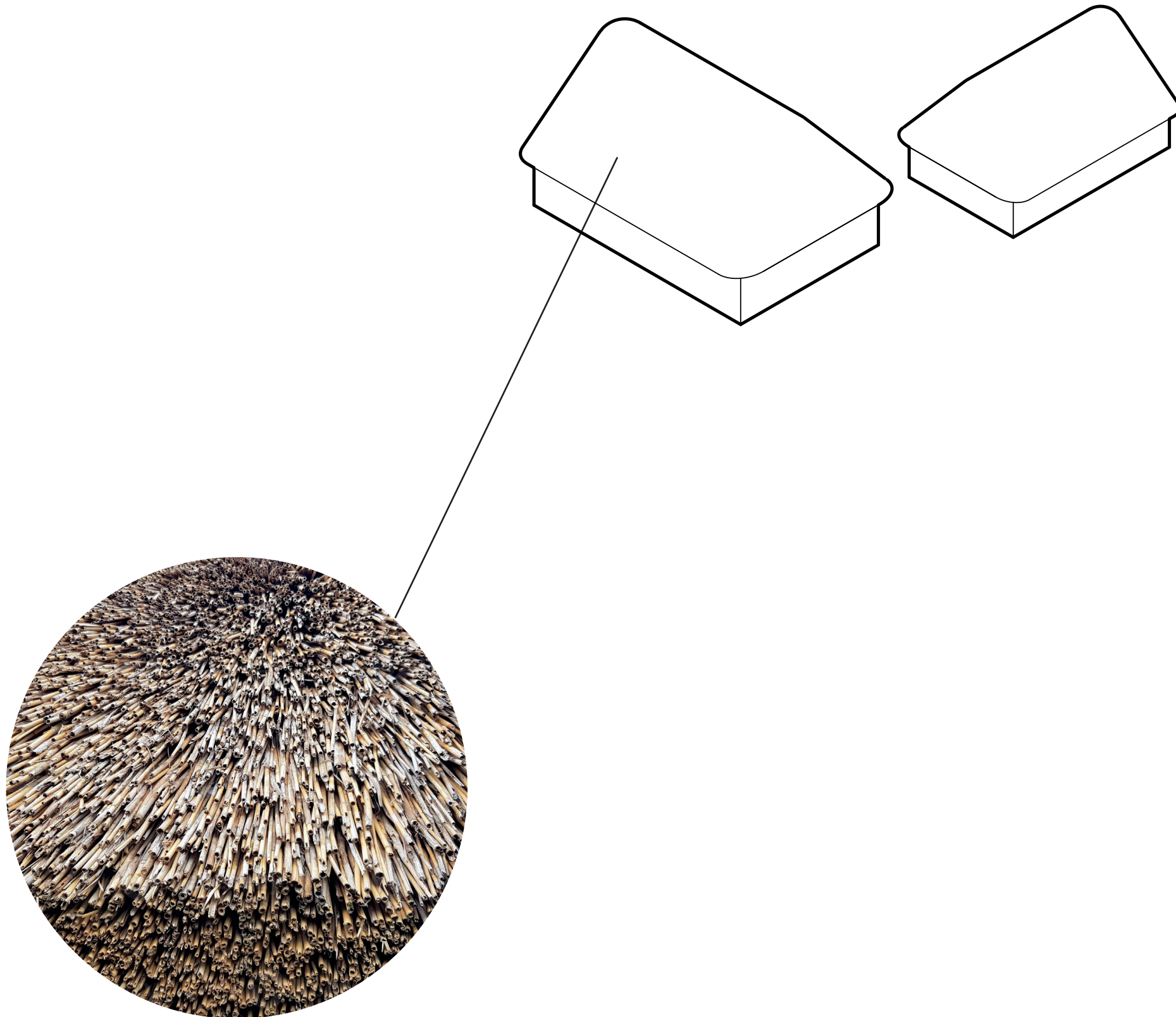
translation to design



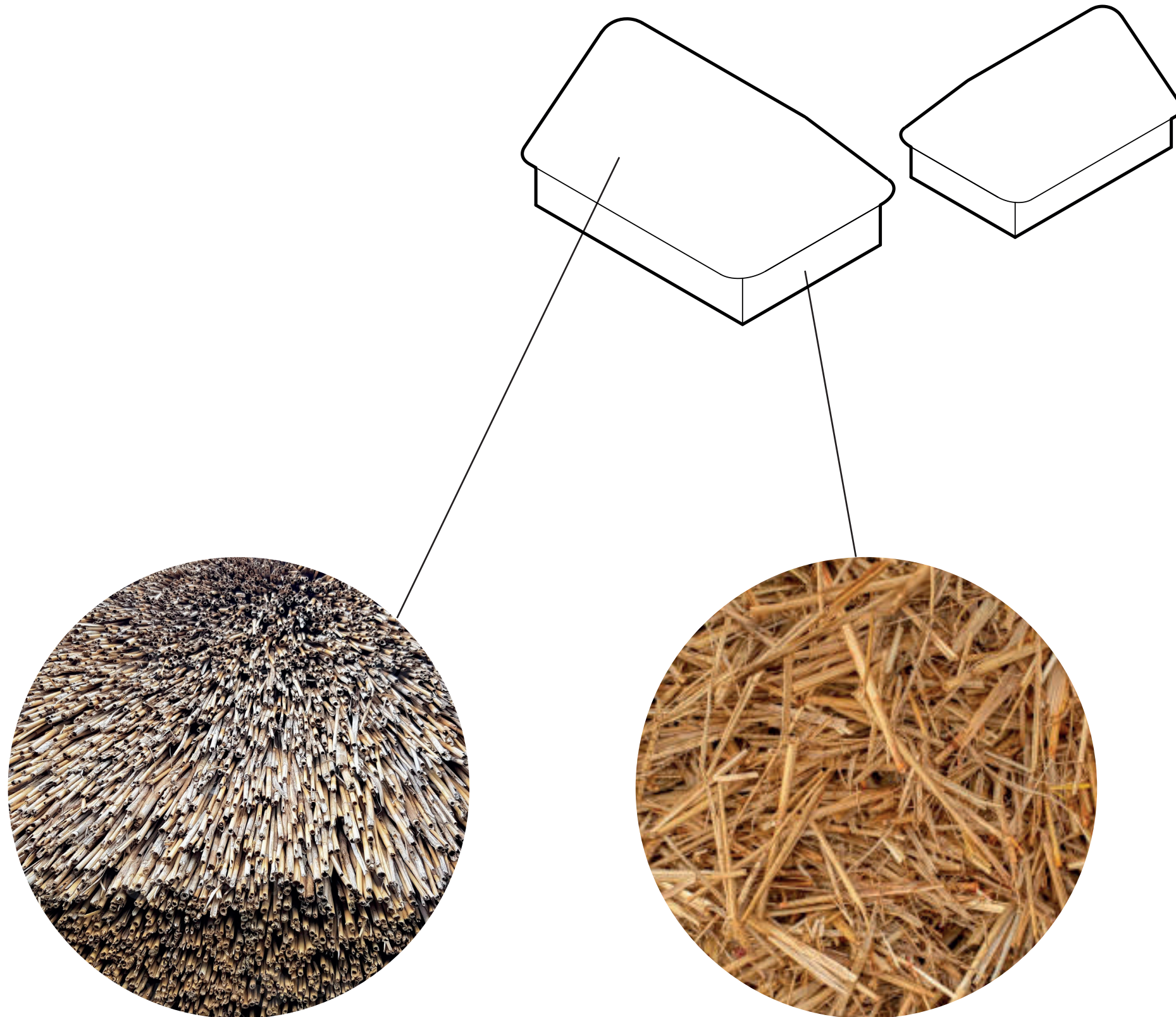
translation to design



translation to design



translation to design



translation to design



translation to design



material origins

- reed
- loam
- straw



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material properties

-



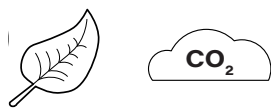
$-182 \text{ kg CO}_2 \text{ eq/m}^2$



$-127 \text{ kg CO}_2 \text{ eq/m}^2$



$-664 \text{ kg CO}_2 \text{ eq/m}^2$



locally harvested



carbon sequestering



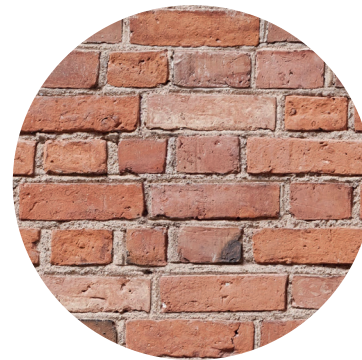
biodegradable



no industrial processing

Data applies to Northwestern Europe and Scandinavia only

+



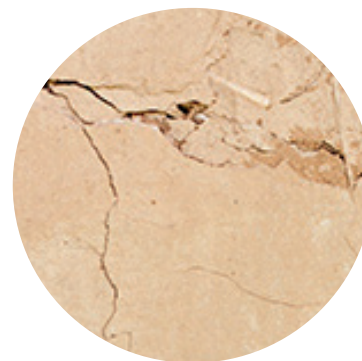
$297 \text{ kg CO}_2 \text{ eq/m}^2$



$215 \text{ kg CO}_2 \text{ eq/m}^2$



$5403 \text{ kg CO}_2 \text{ eq/m}^2$



$98,2 \text{ kg CO}_2 \text{ eq/m}^2$



material properties



reed

phragmites australis



straw

dried wheat stalks



loam

clay + sand + water (+ straw)

<i>origin</i>	<i>lake shores</i>	<i>agriculture byproduct</i>	<i>river deposits</i>
<i>harvest</i>	<i>cut from December to March</i>	<i>cut and dried end of summer</i>	<i>dug up year round</i>
<i>maintenance</i>	<i>depending on design/application</i>	<i>none required</i>	<i>retouch after direct water exposure, patch occasionally</i>
<i>performance</i>	<i>waterproof from 250 mm</i>	<i>$R = 6,0 \text{ 5 } W/(m^2K) \text{ at } 300 \text{ mm}$</i>	<i>moisture-regulating</i>

material conditions



condition

+

goal



=



design theme

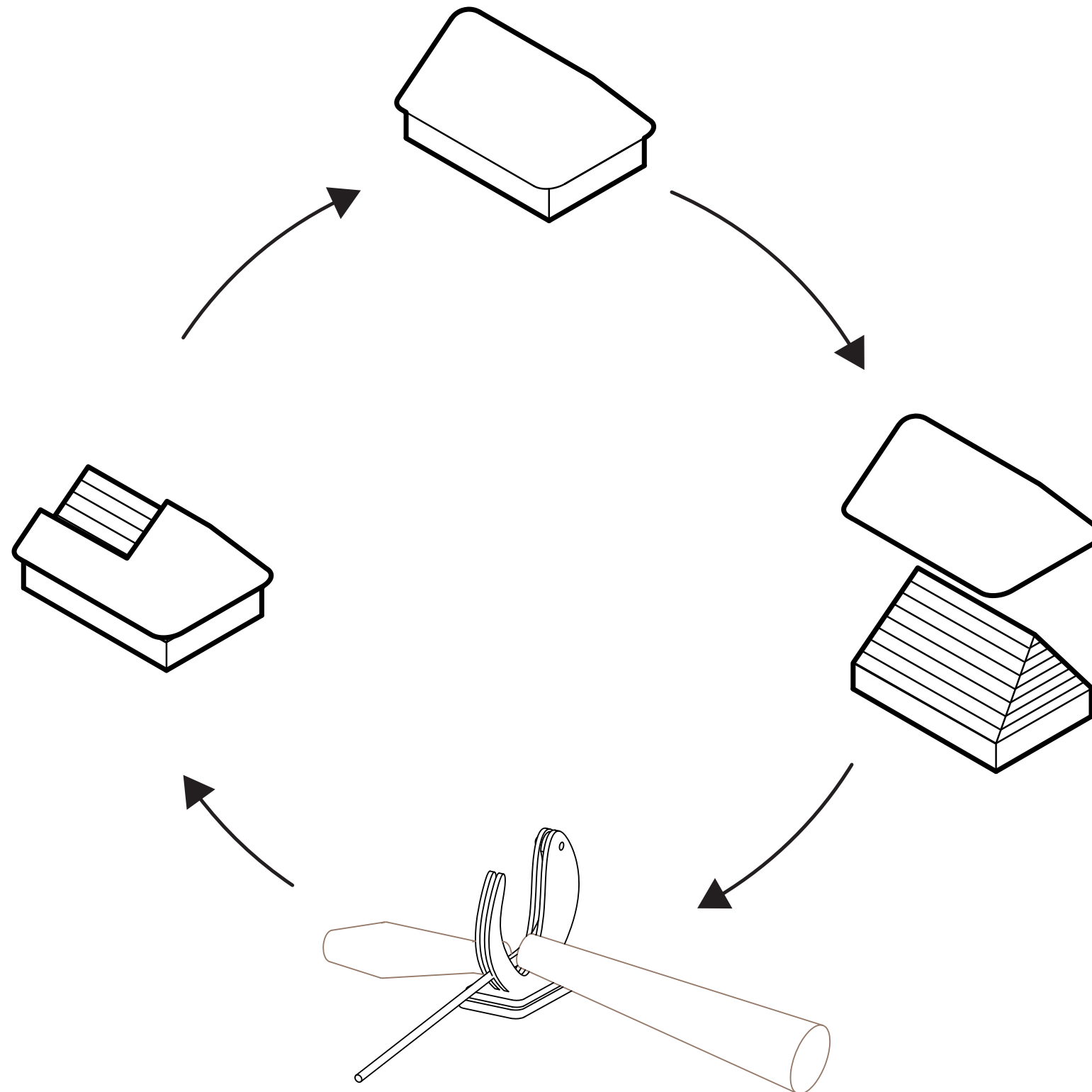
material conditions

maintenance



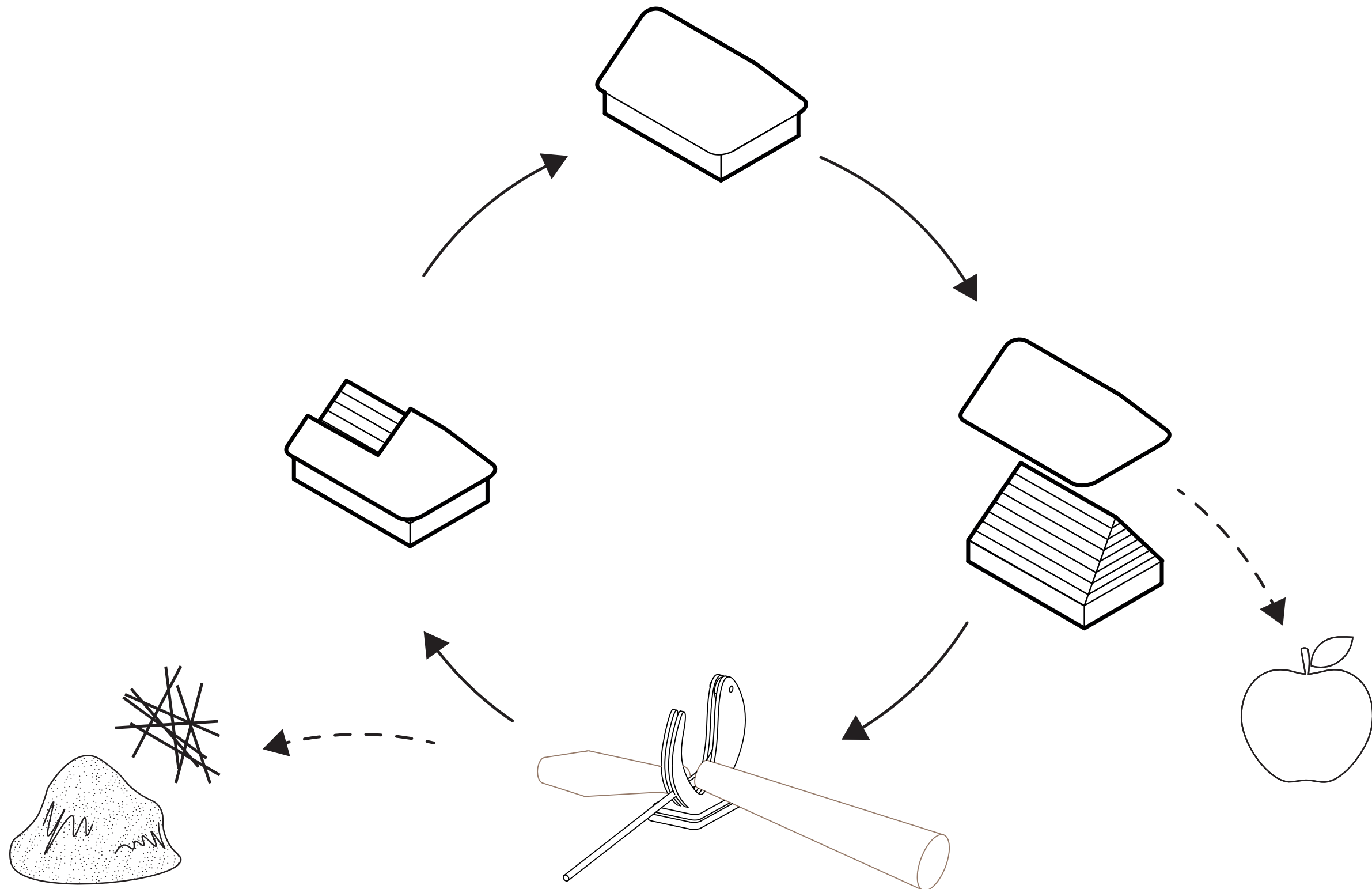
material conditions

maintenance



material conditions

maintenance



material conditions



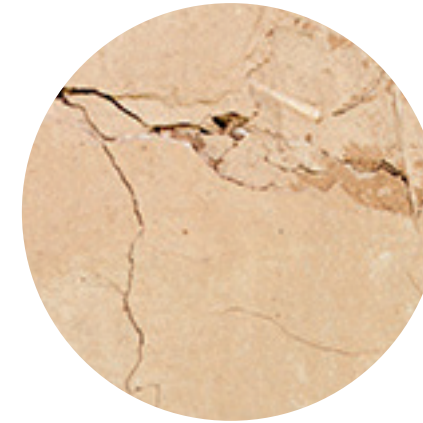
condition

+



goal

=



design theme

maintenance

material conditions



condition

+



goal

=



design theme

maintenance

user-friendliness

material conditions



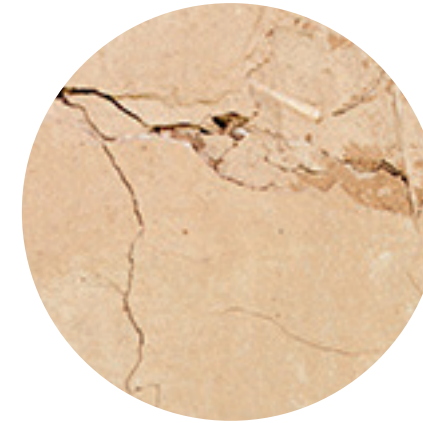
condition

+



goal

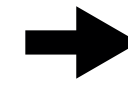
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design theme

maintenance

user-friendliness



accessibility

material conditions

performance density



VS



VS



material conditions



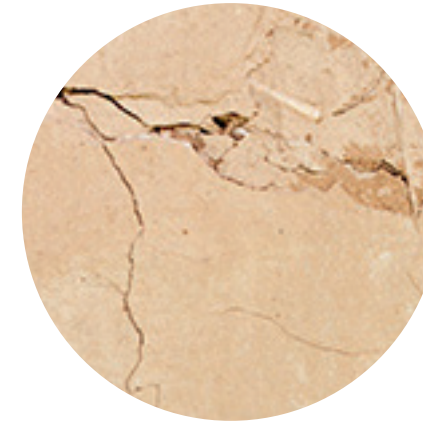
condition

+



goal

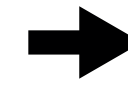
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design theme

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accessibility

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material conditions



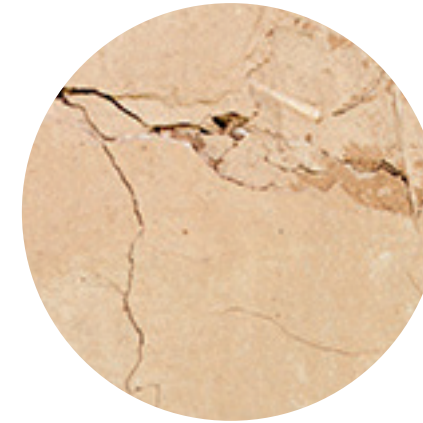
condition

+



goal

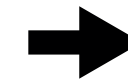
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design theme

maintenance

user-friendliness



accessibility

performance density

efficiency

material conditions



condition

+



goal

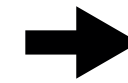
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design theme

maintenance

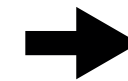
user-friendliness



accessibility

performance density

efficiency



space management

material conditions

agency



material conditions

agency



material conditions

agency



material conditions

agency



"There is something really extraordinary about a group of people doing something collectively that none of them really know how to do."

"It didn't feel like, since I didn't know anything about constructing a building, that I would have less impact or anything, it felt like we were all equally responsible and equally part of the project."

"I like the ever evolving nature of this space as people are making it their own."

material conditions



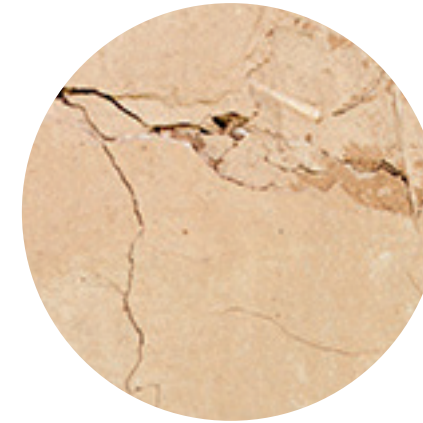
condition

+



goal

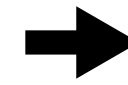
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design theme

maintenance

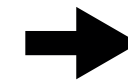
user-friendliness



accessibility

performance density

efficiency



space management

agency

material conditions



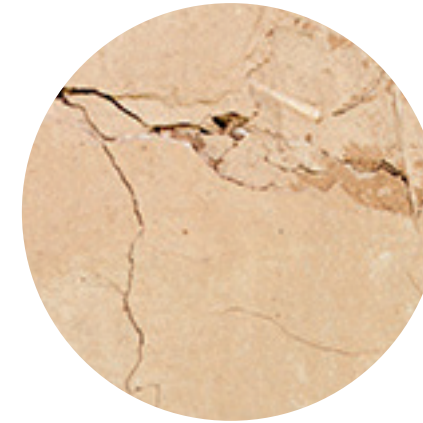
condition

+



goal

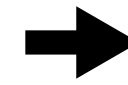
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design theme

maintenance

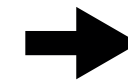
user-friendliness



accessibility

performance density

efficiency



space management

agency

community

material conditions



condition

+



goal

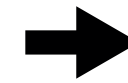
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design theme

maintenance

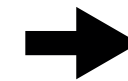
user-friendliness



accessibility

performance density

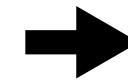
efficiency



space management

agency

community



engagement

material conditions



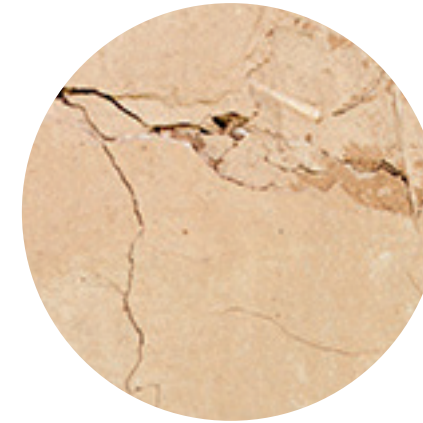
condition

+



goal

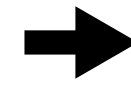
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design theme

maintenance

user-friendliness

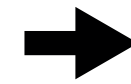


accessibility



performance density

efficiency

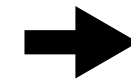


space management



agency

community

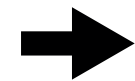


engagement



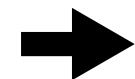
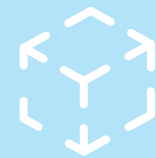
architectural design tools

accessibility



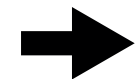
modularity, reachability, legibility, routing

space management



flexible spaces, multi-purpose spaces

engagement



shared spaces, encounters

summary

native materials

summary

native materials



accessibility



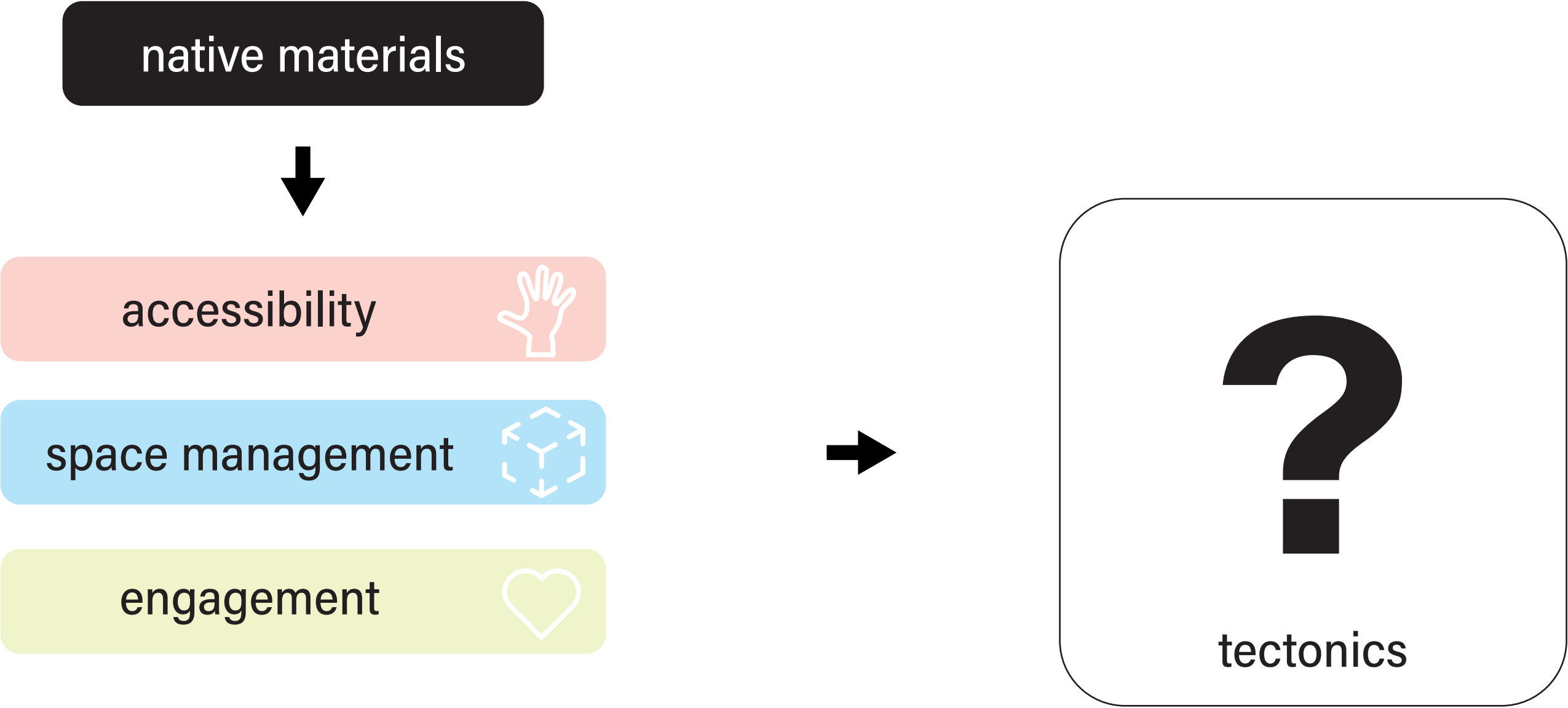
space management



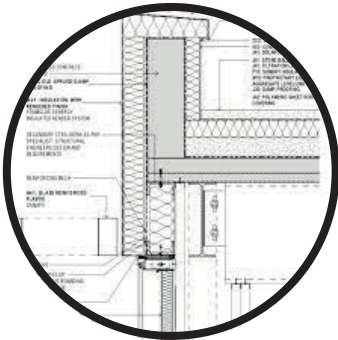
engagement



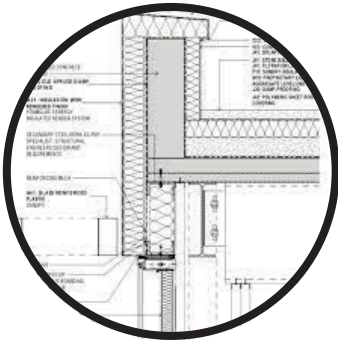
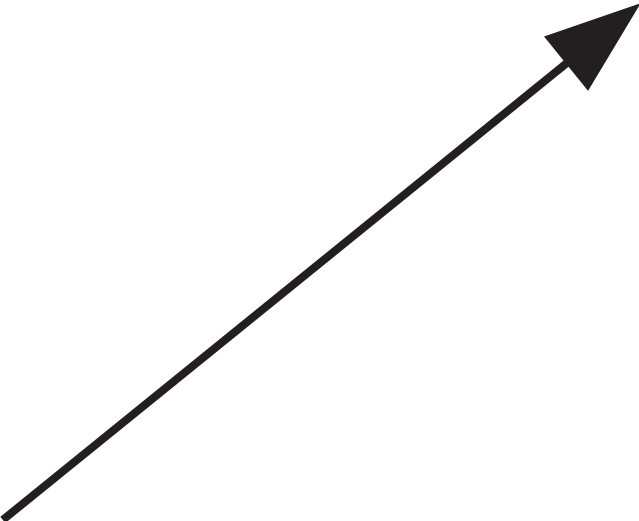
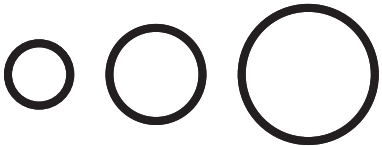
summary



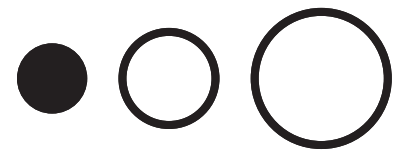
summary



summary



material functionality



reed



straw



loam

material functionality



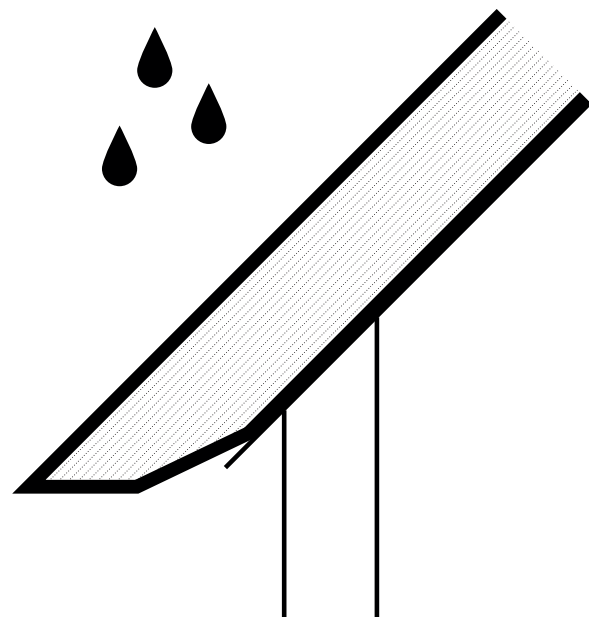
reed



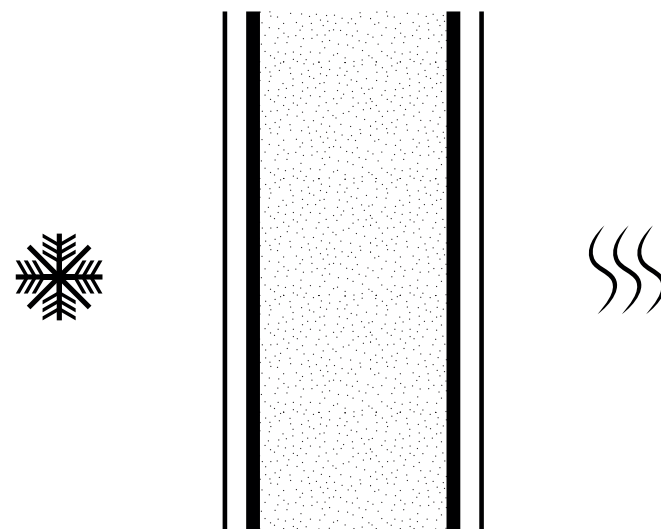
straw



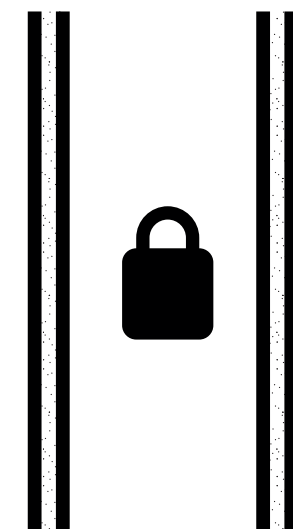
loam



weatherproofing

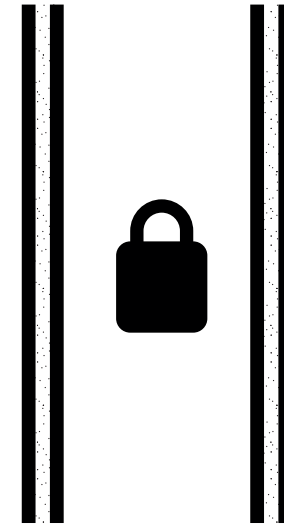
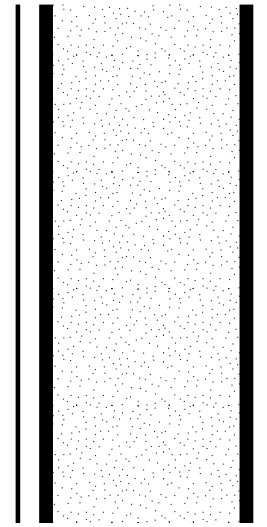
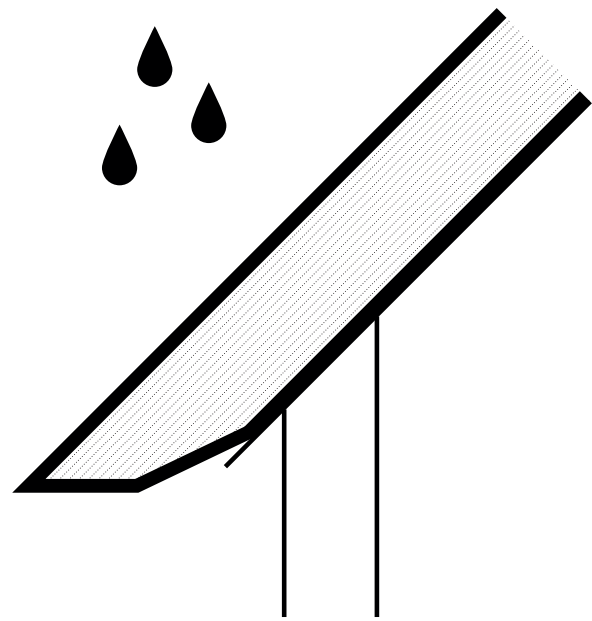


climatisation

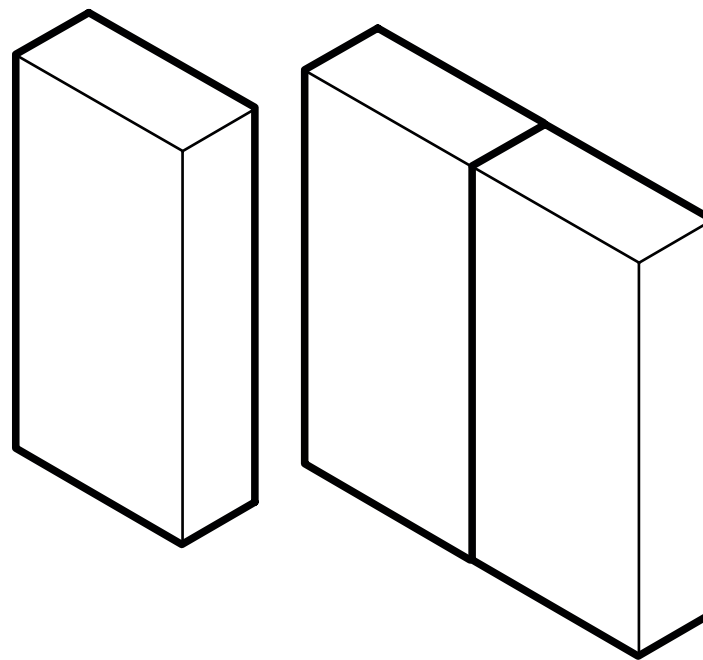
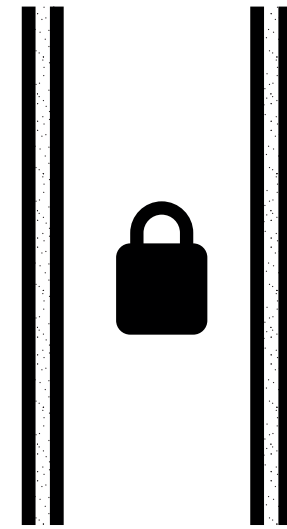
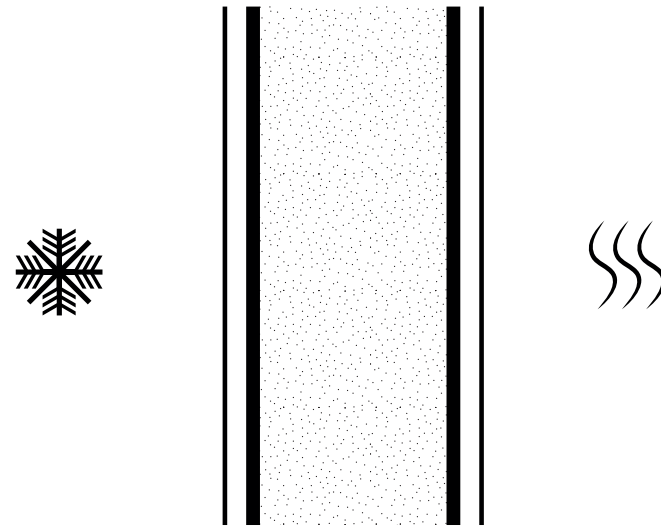
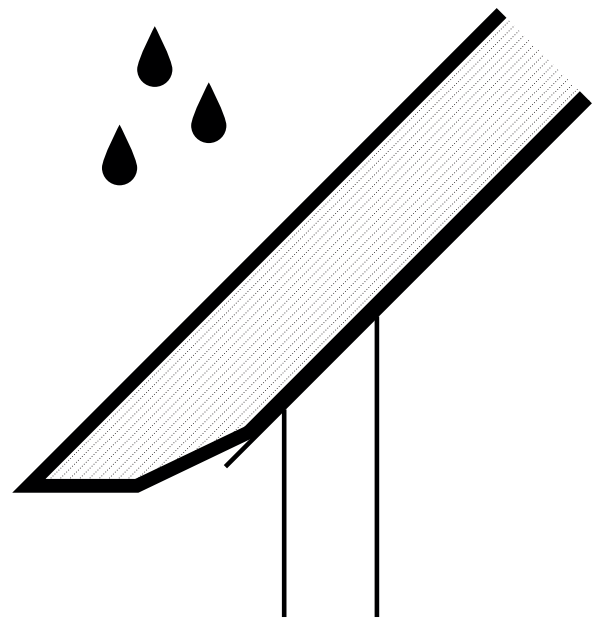


finishing

combined functionality

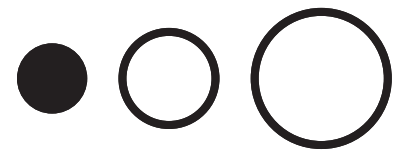


combined functionality



modular system

modularity

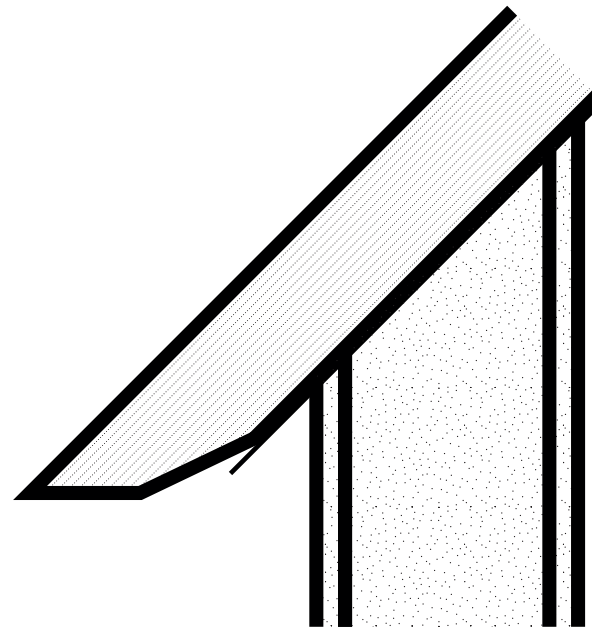
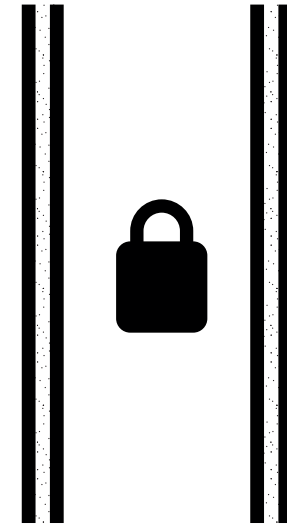
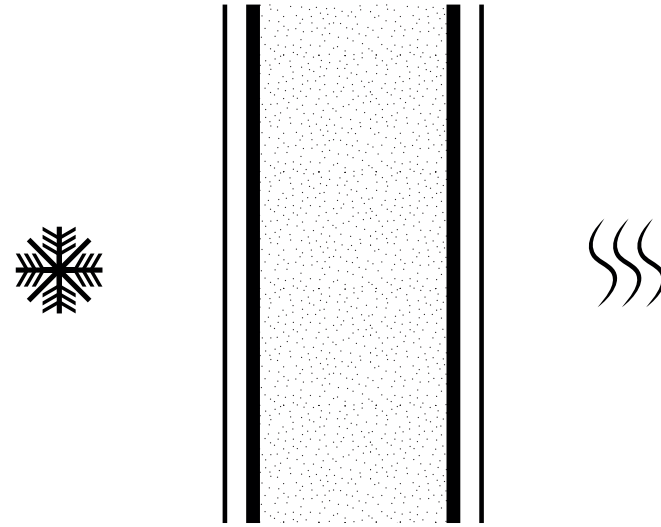
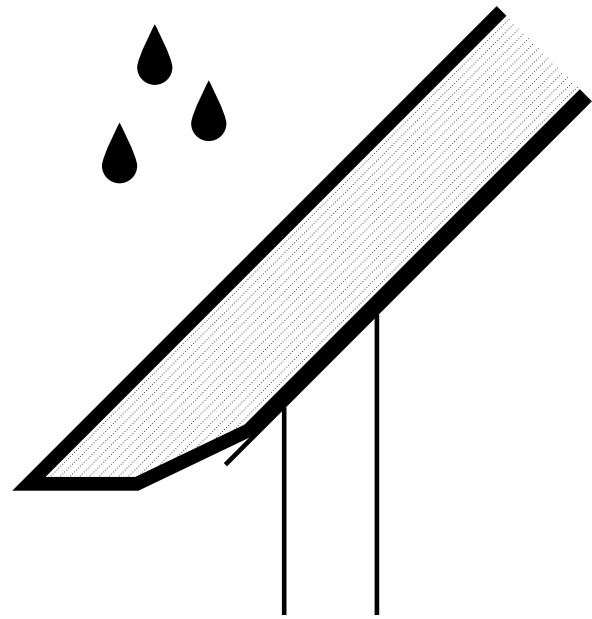


construction speed

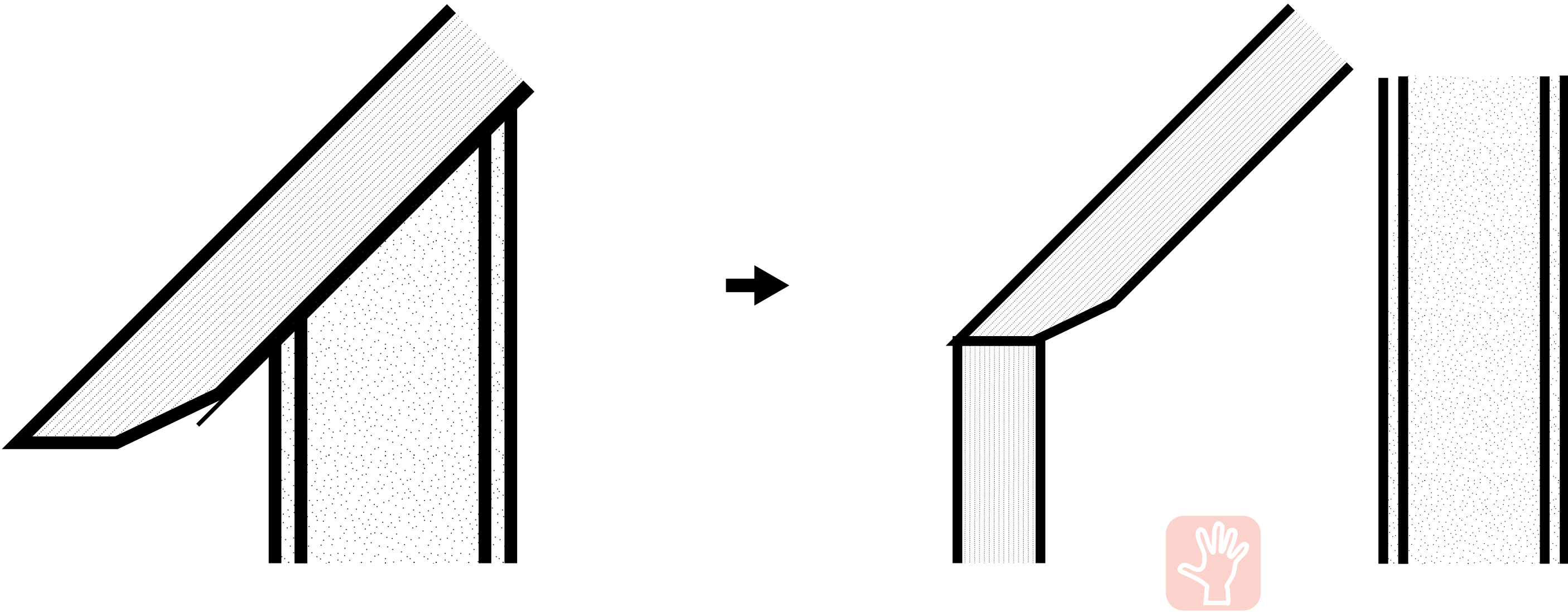


maintenance accessibility

modularity

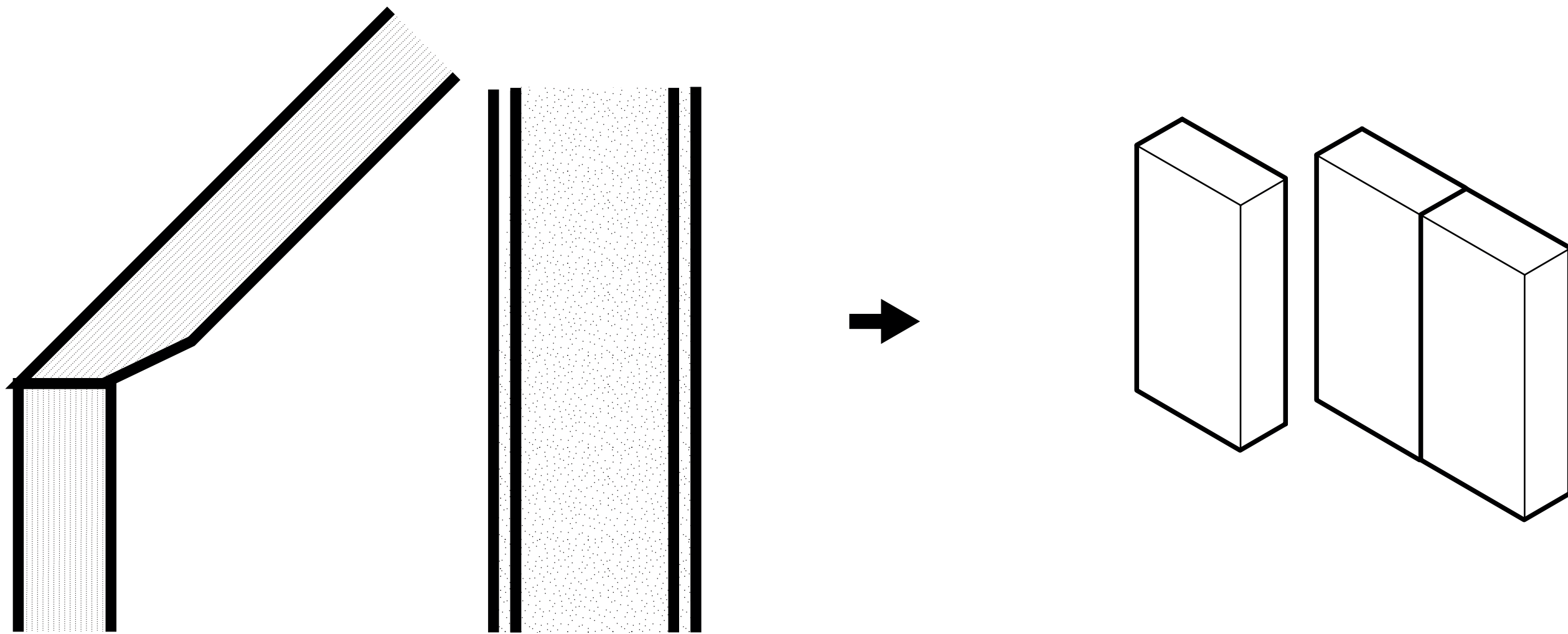
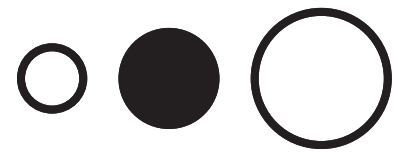




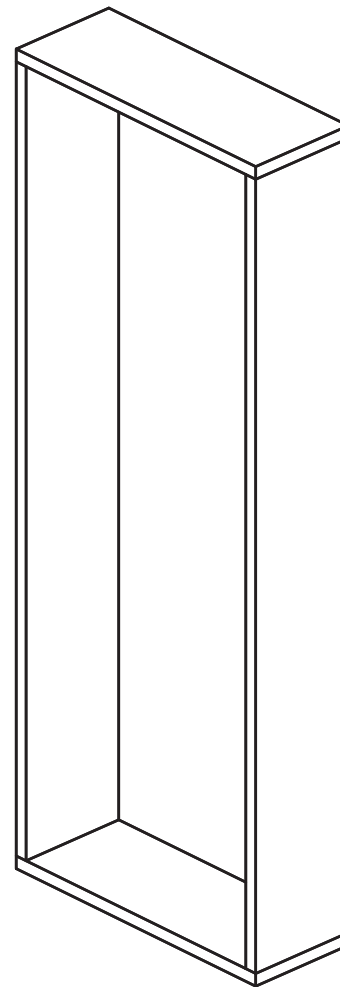
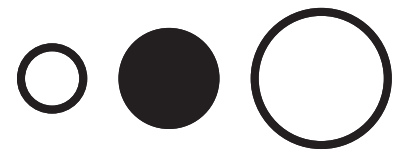


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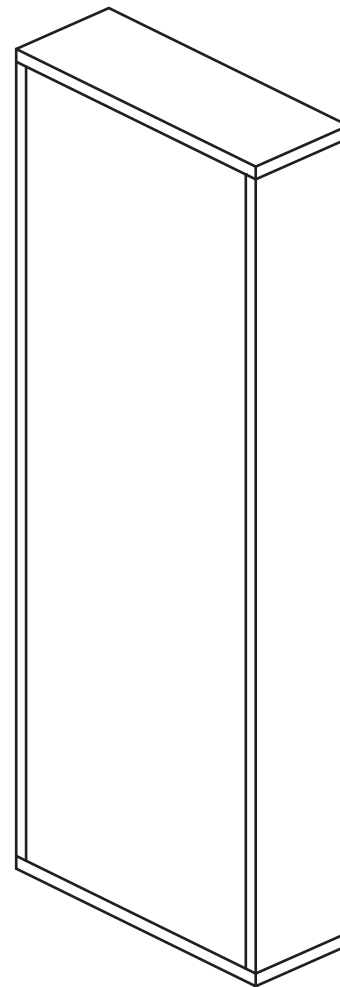
material to building scale



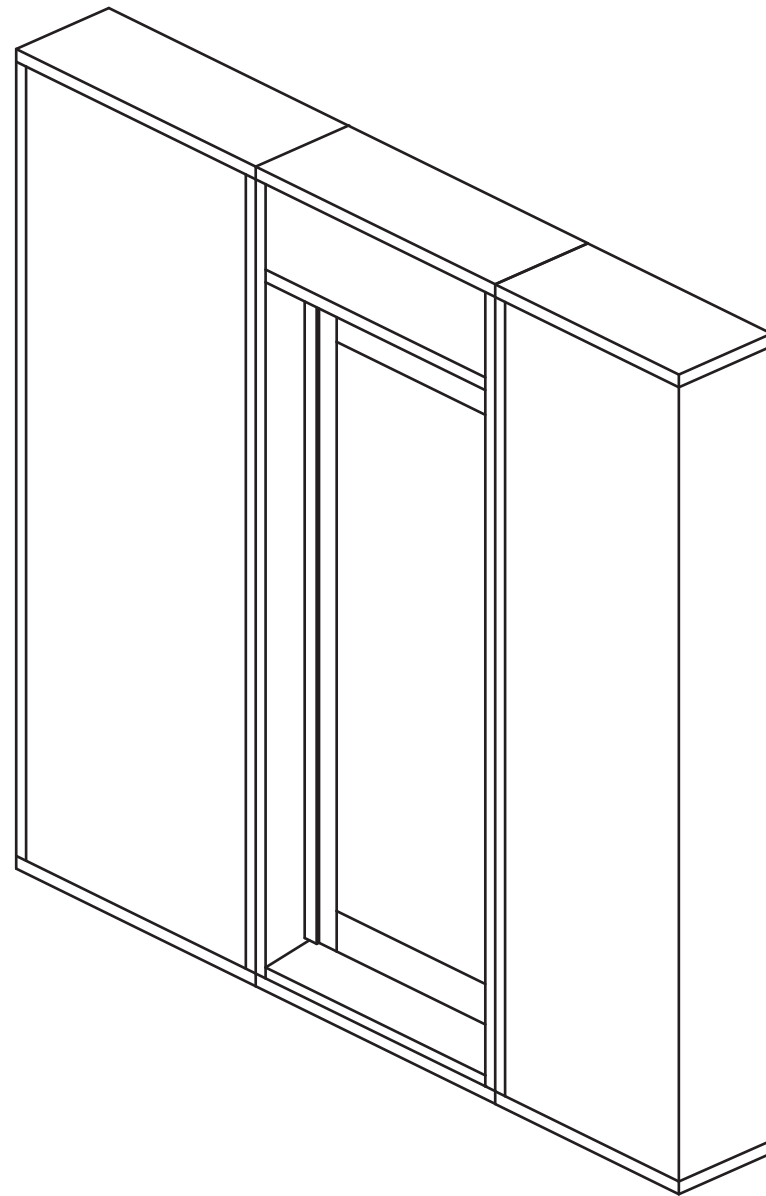
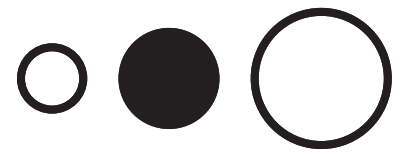
material to building scale



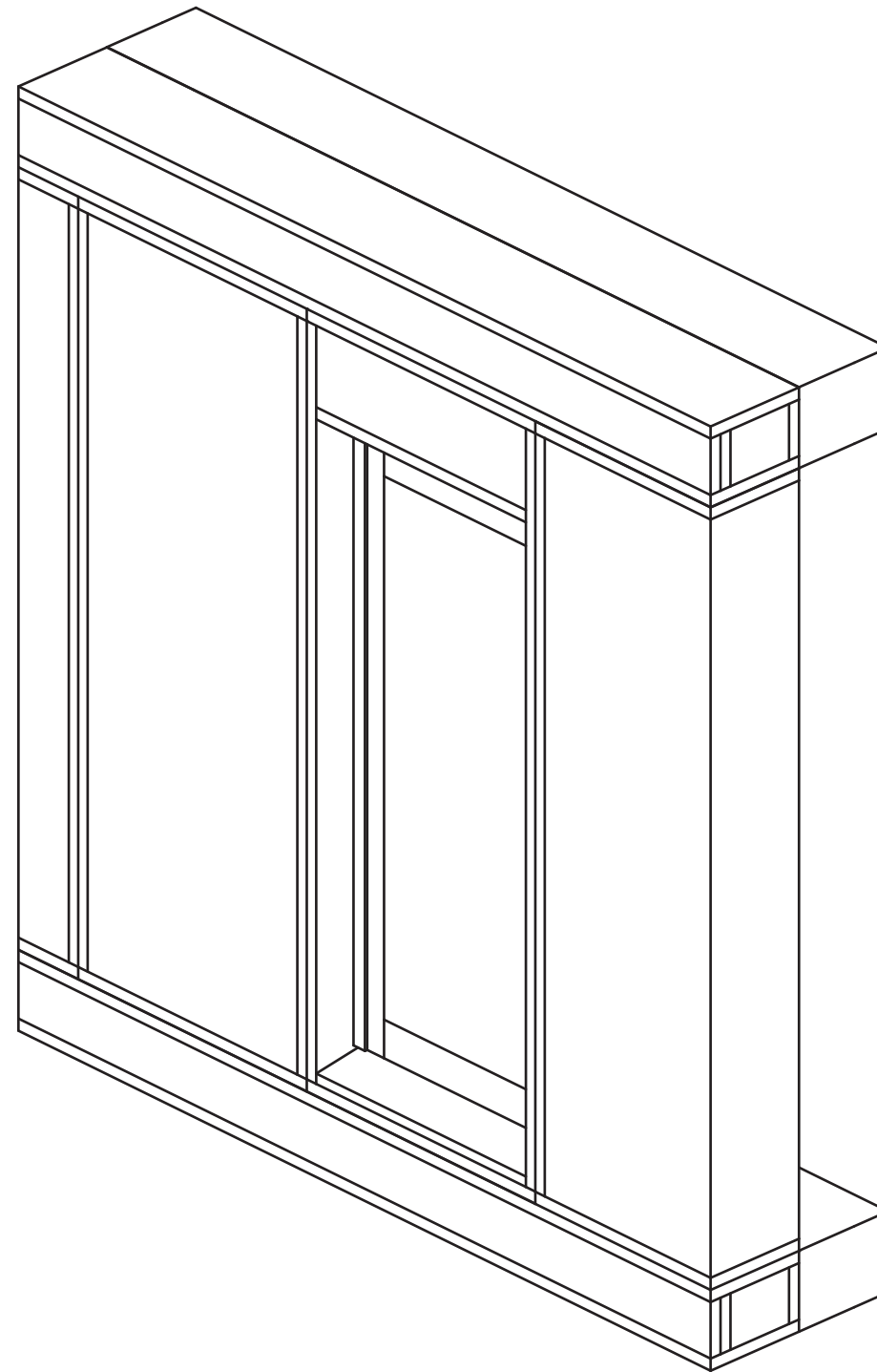
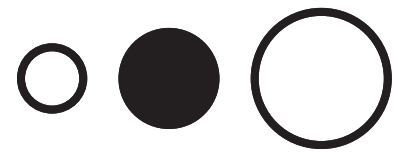
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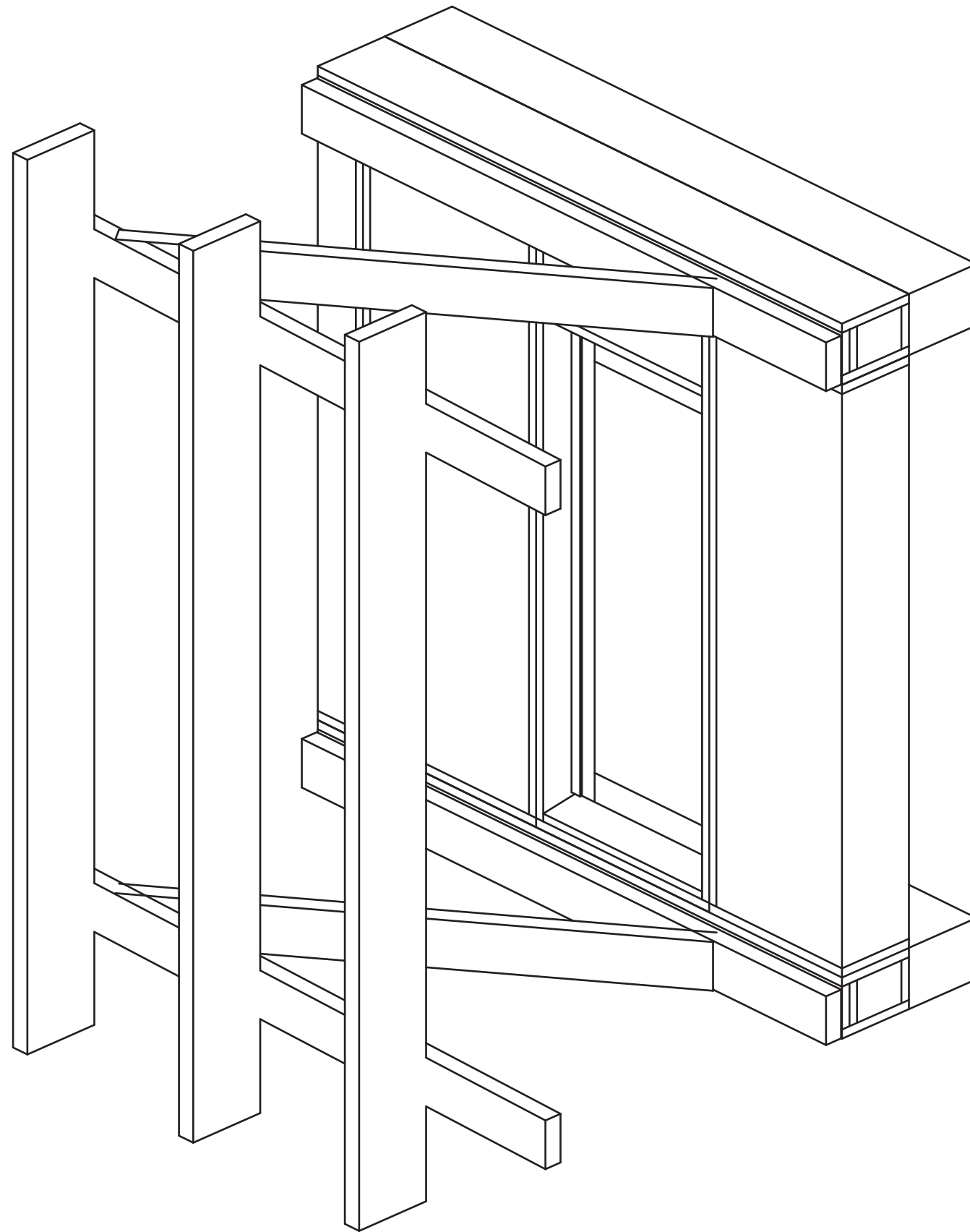
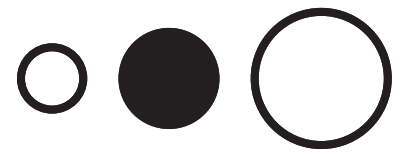
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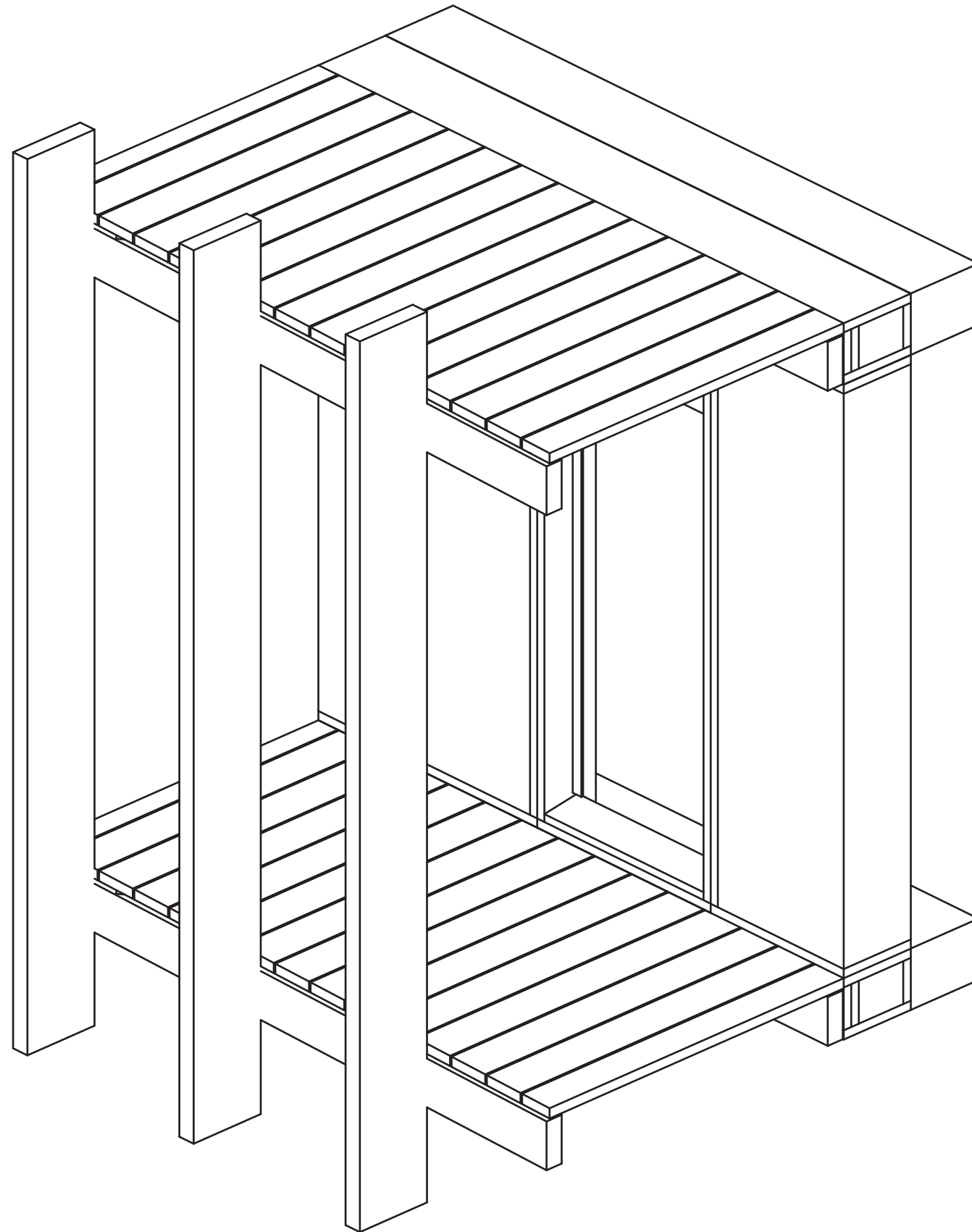
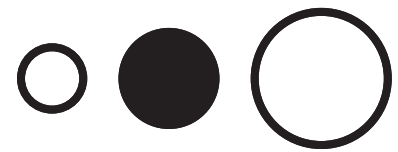
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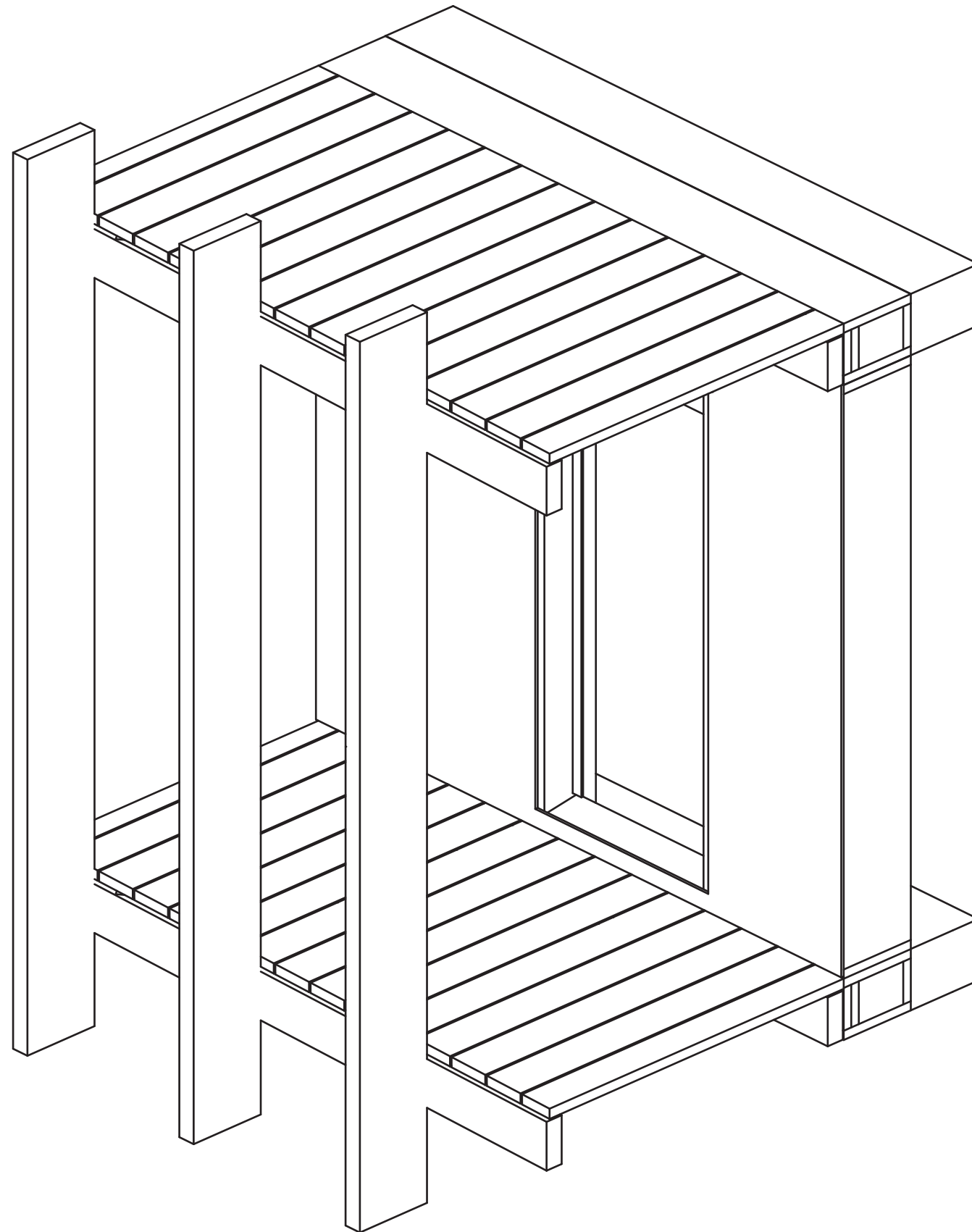
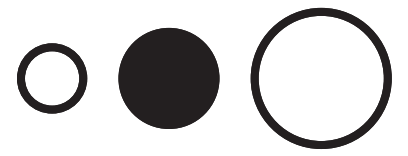
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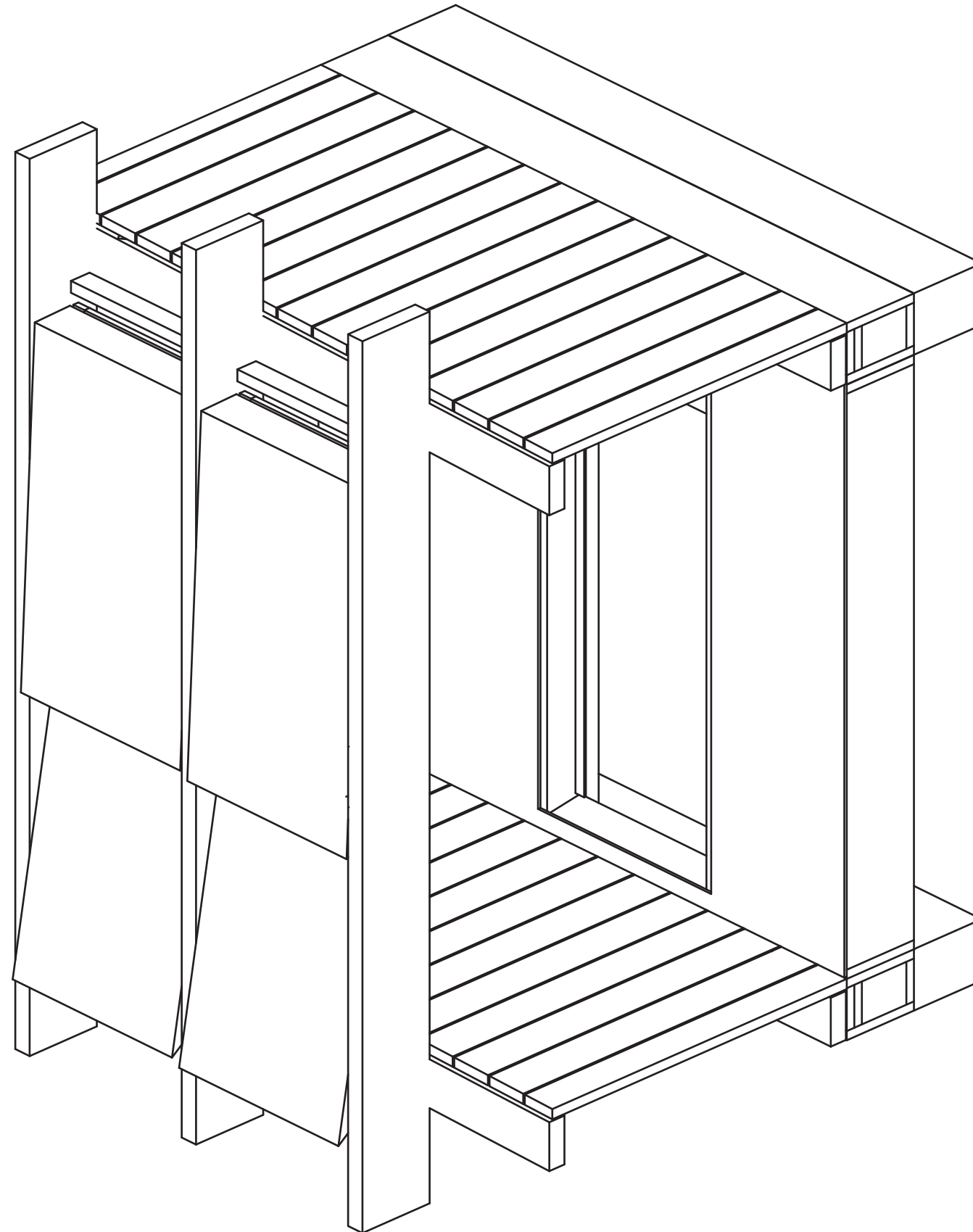
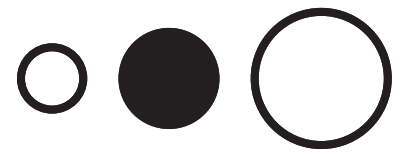
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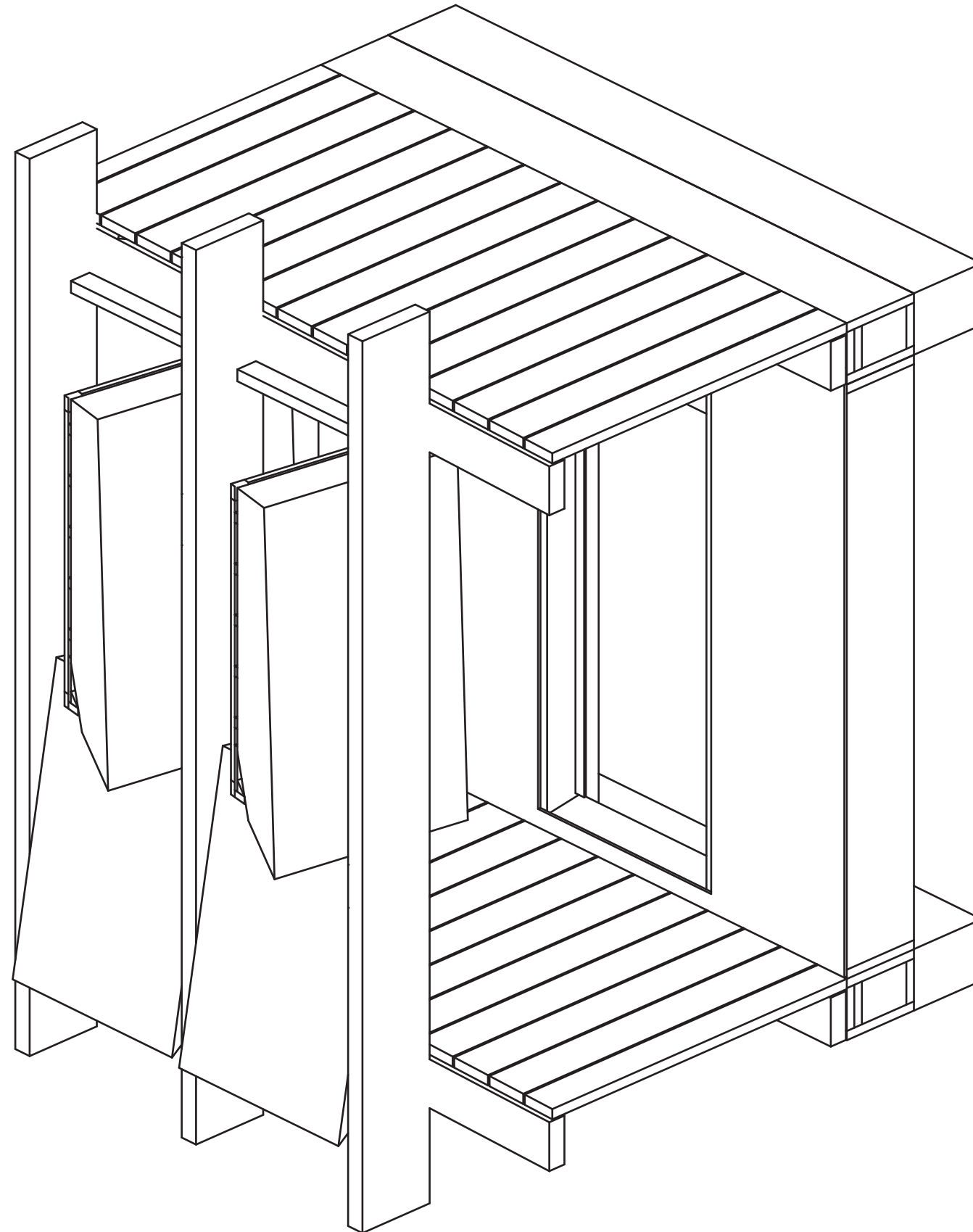
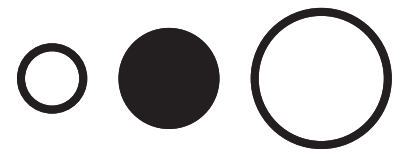
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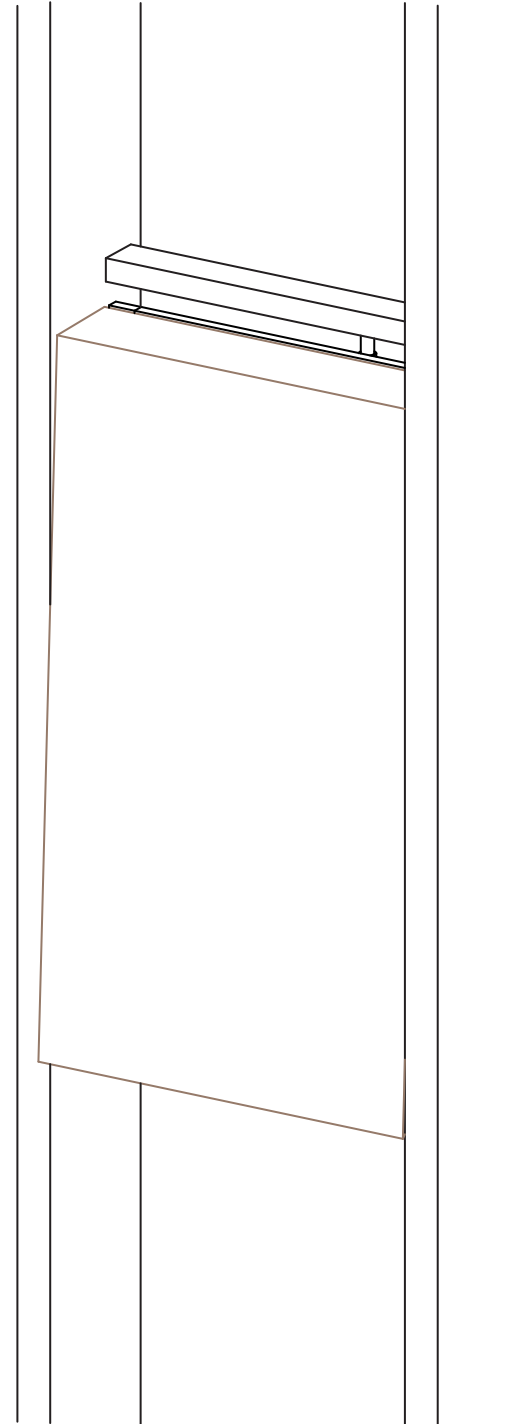
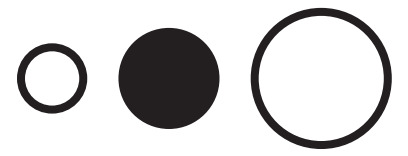
material to building scale



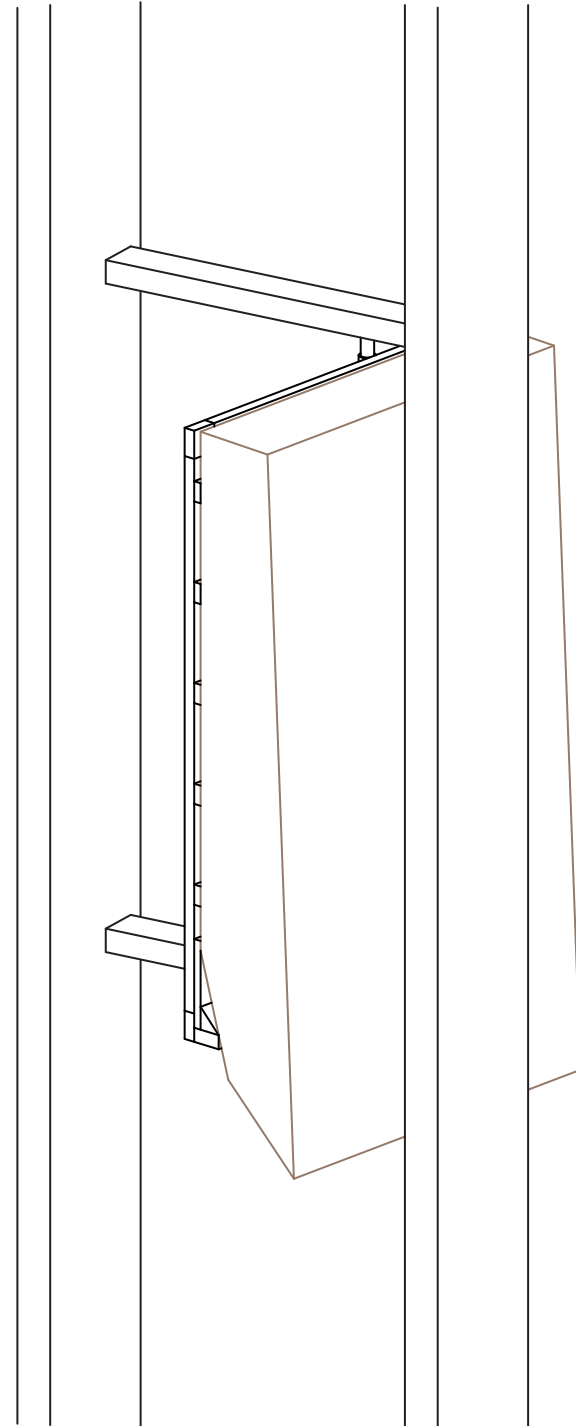
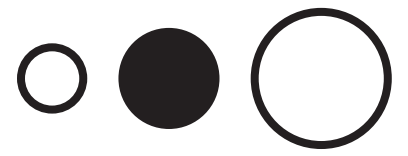
material to building scale



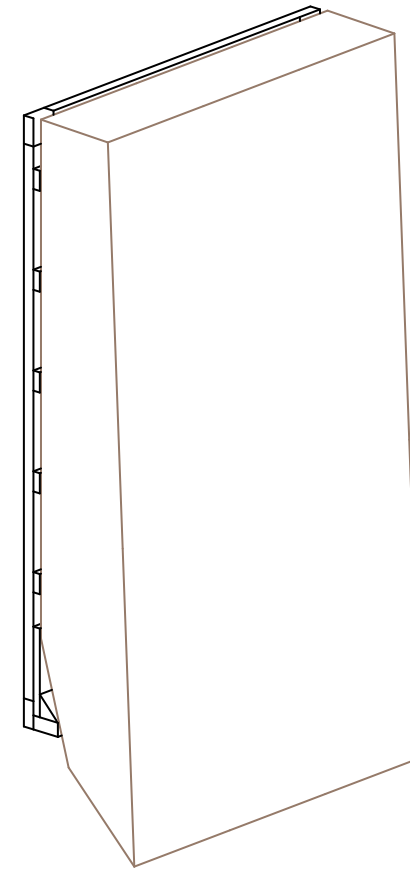
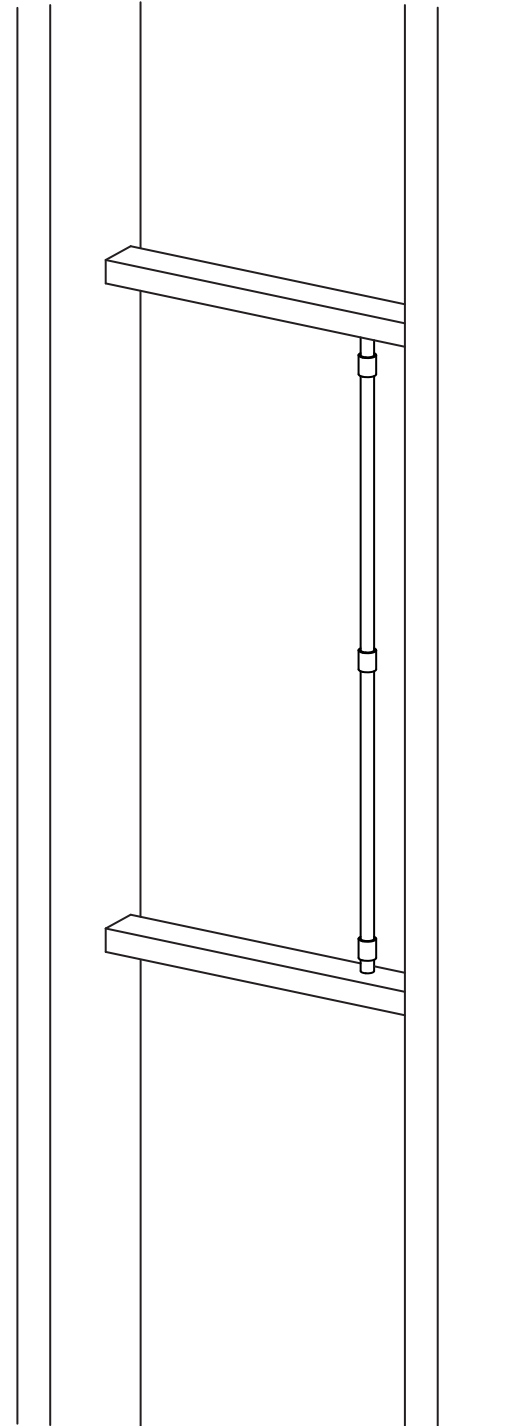
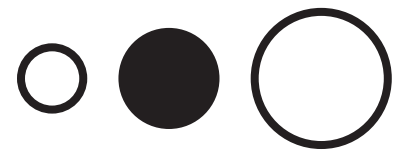
maintenance of the modular system



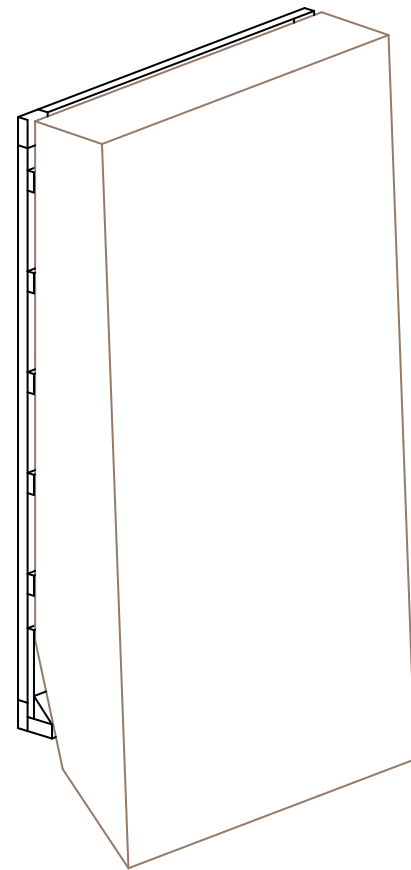
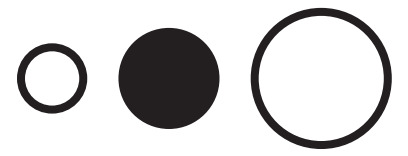
maintenance of the modular system



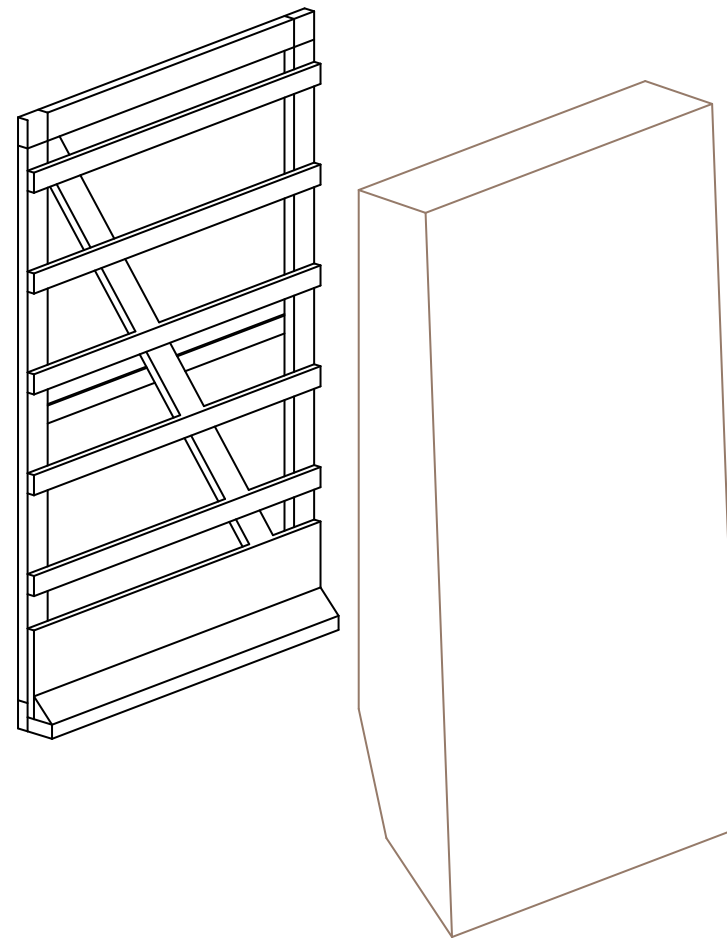
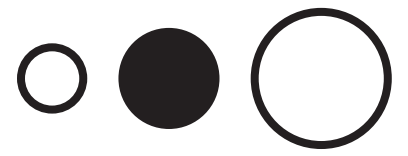
maintenance of the modular system



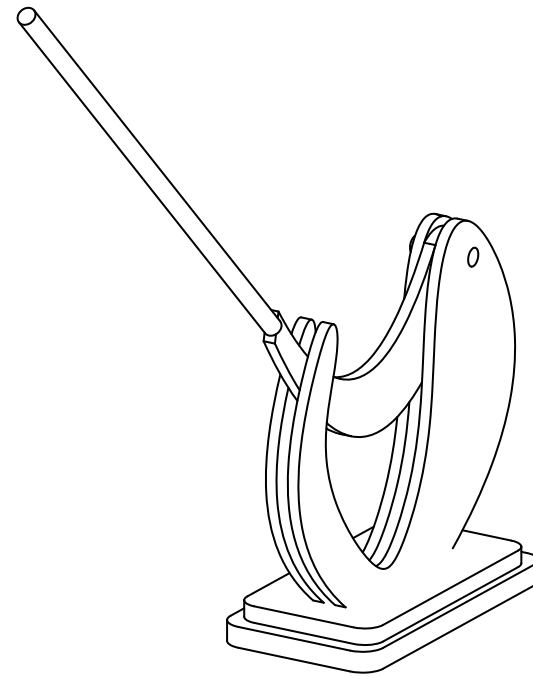
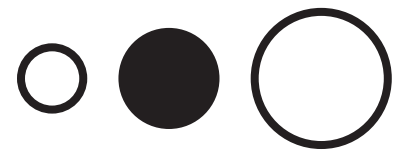
maintenance of the modular system



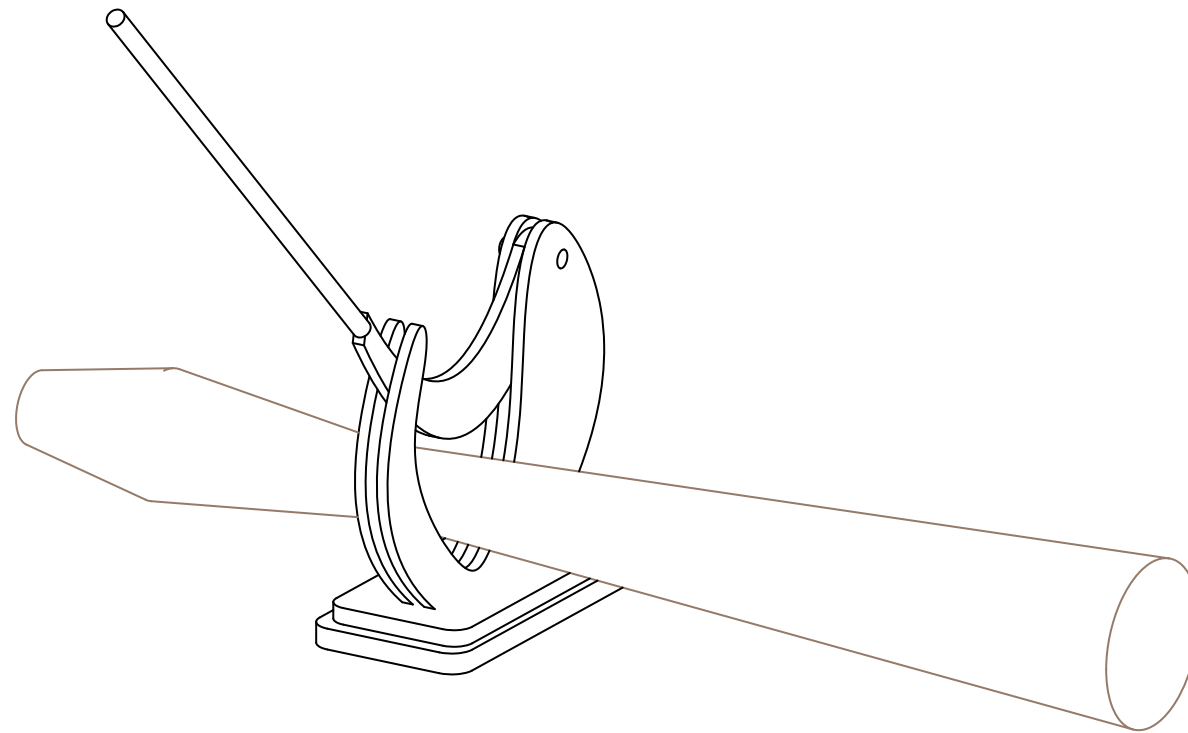
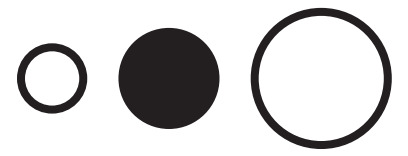
maintenance of the modular system



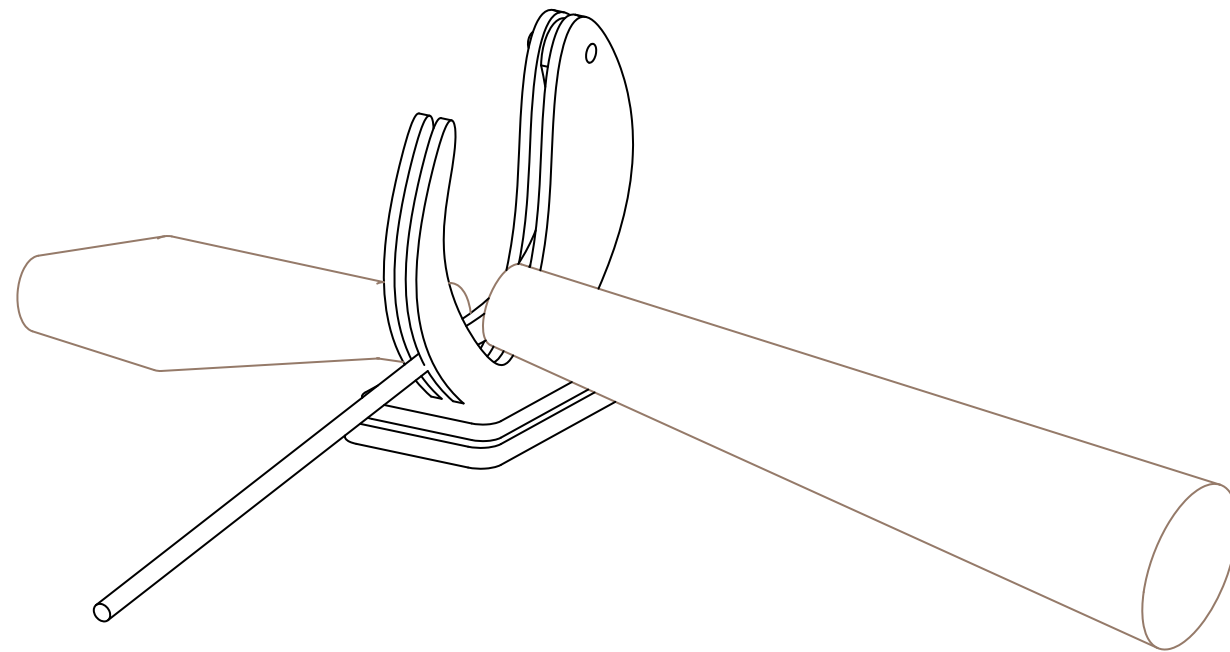
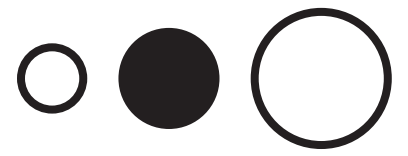
maintenance of the modular system



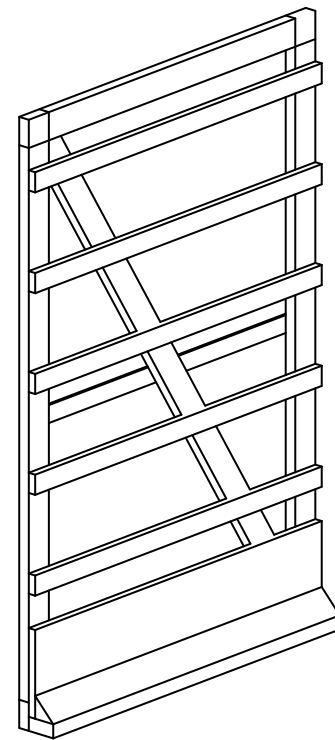
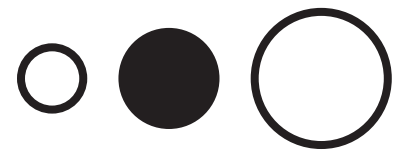
maintenance of the modular system



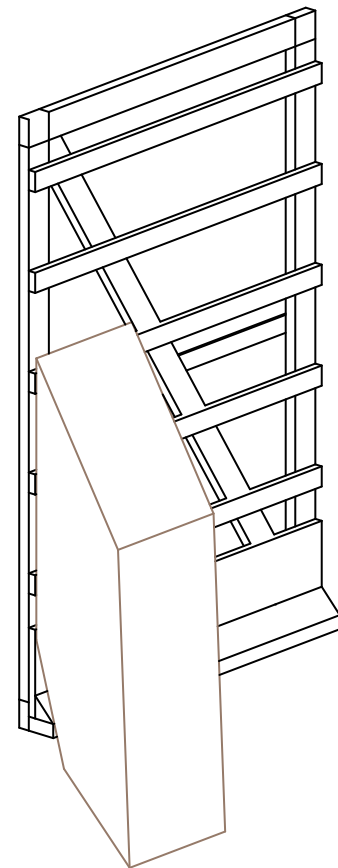
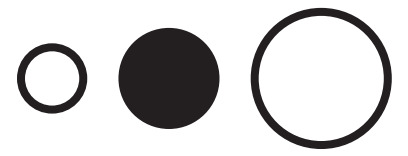
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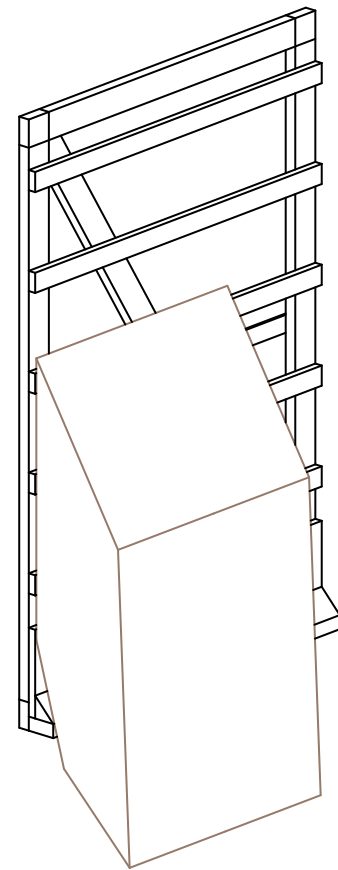
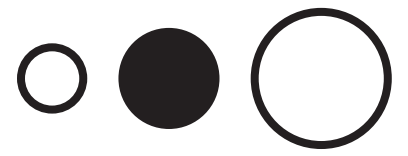
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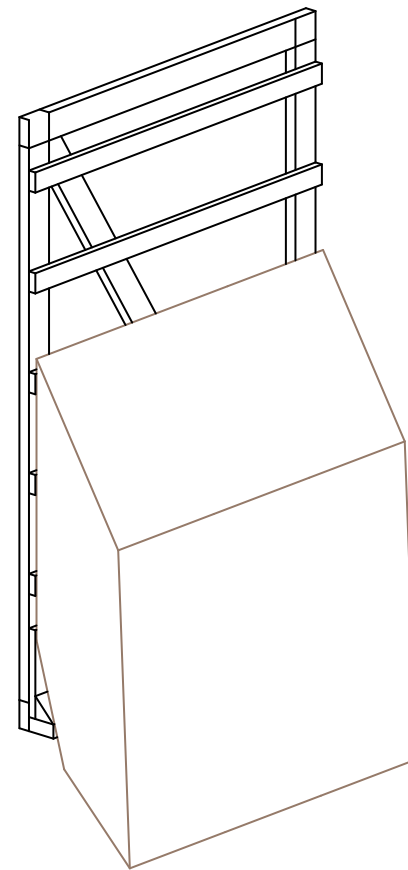
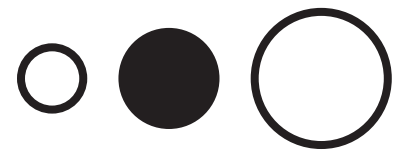
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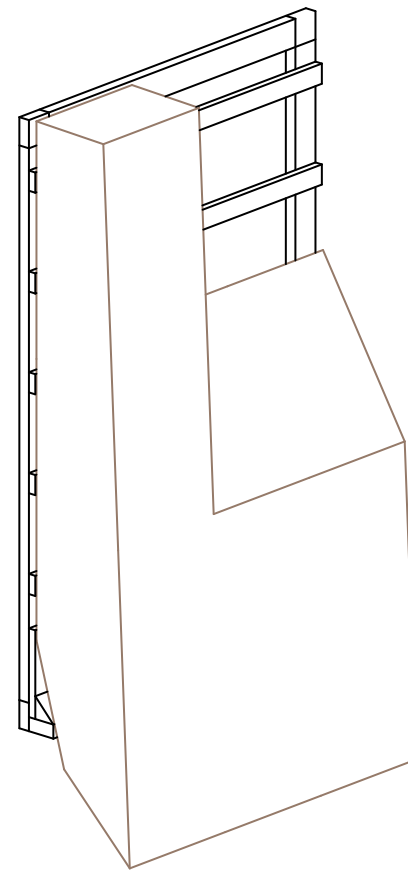
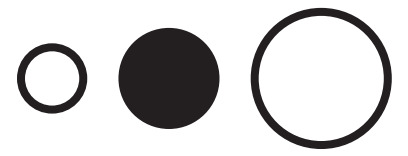
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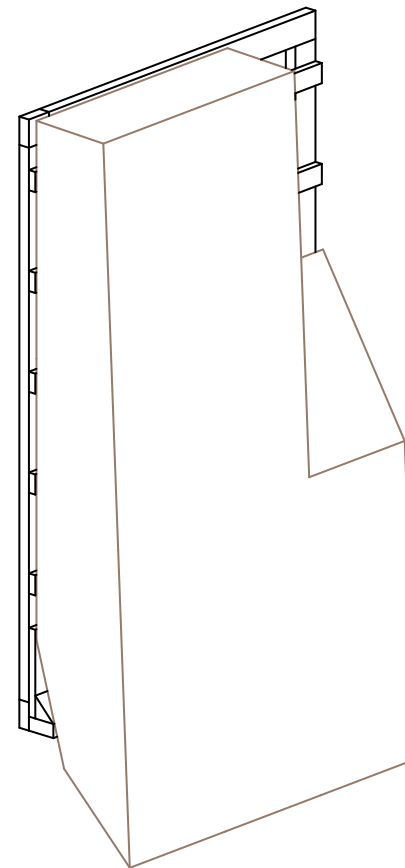
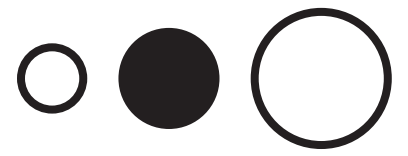
maintenance of the modular system



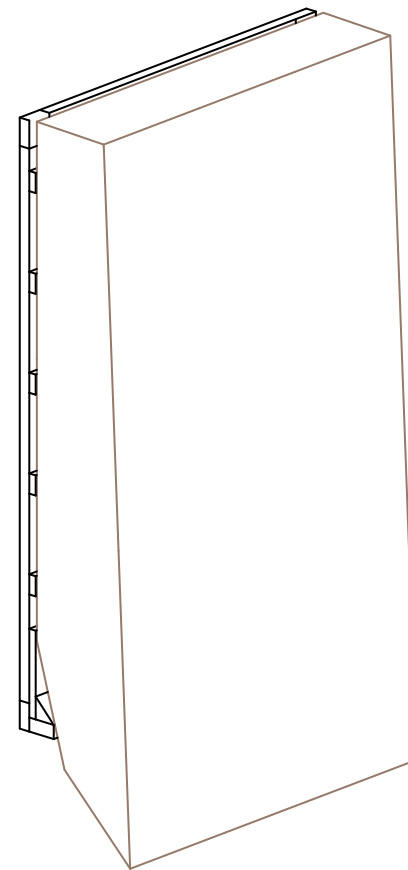
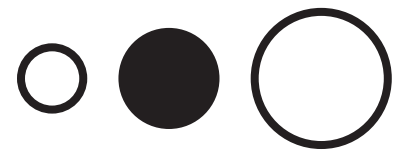
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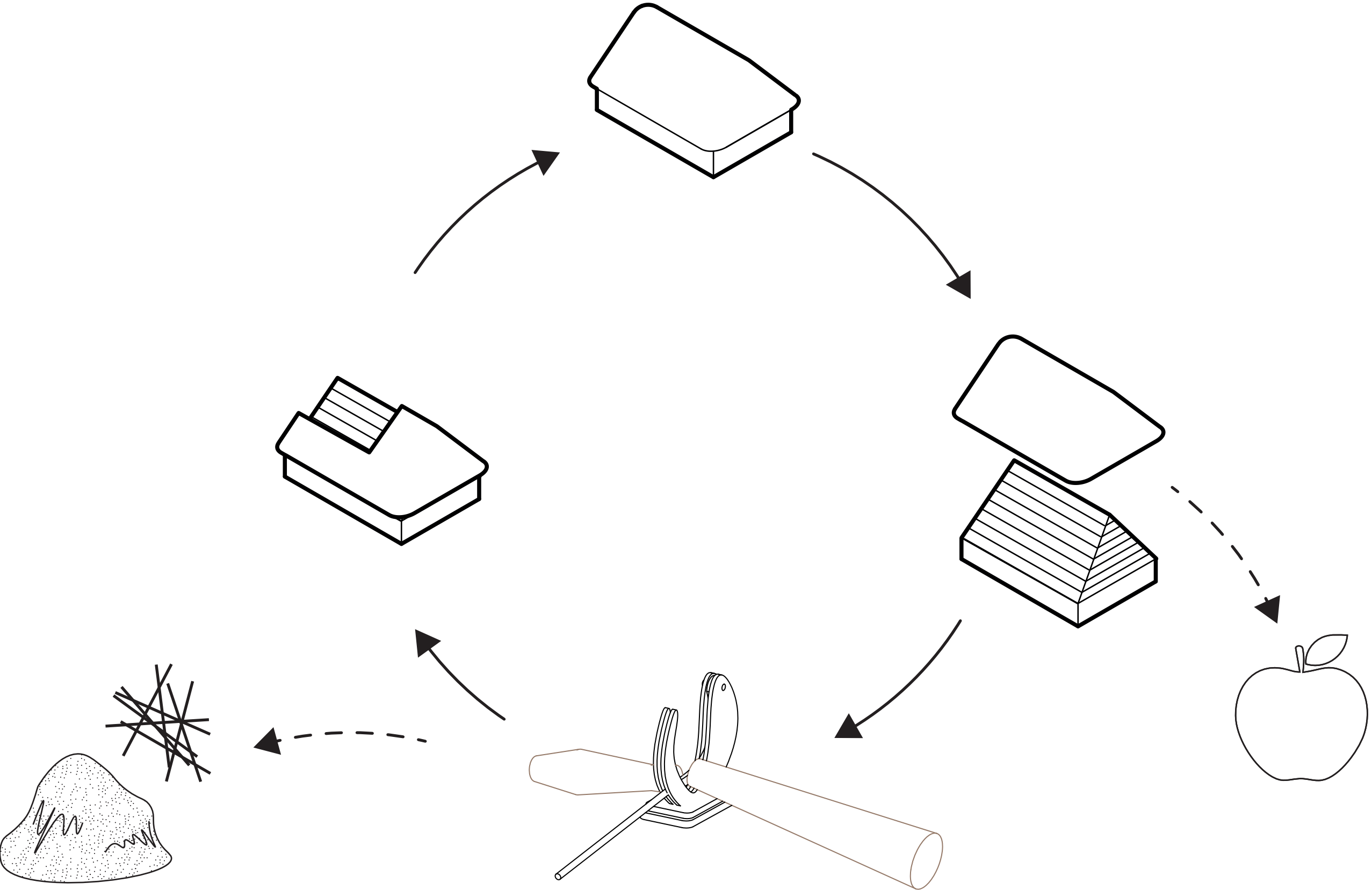
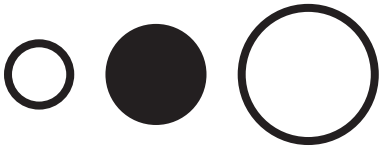
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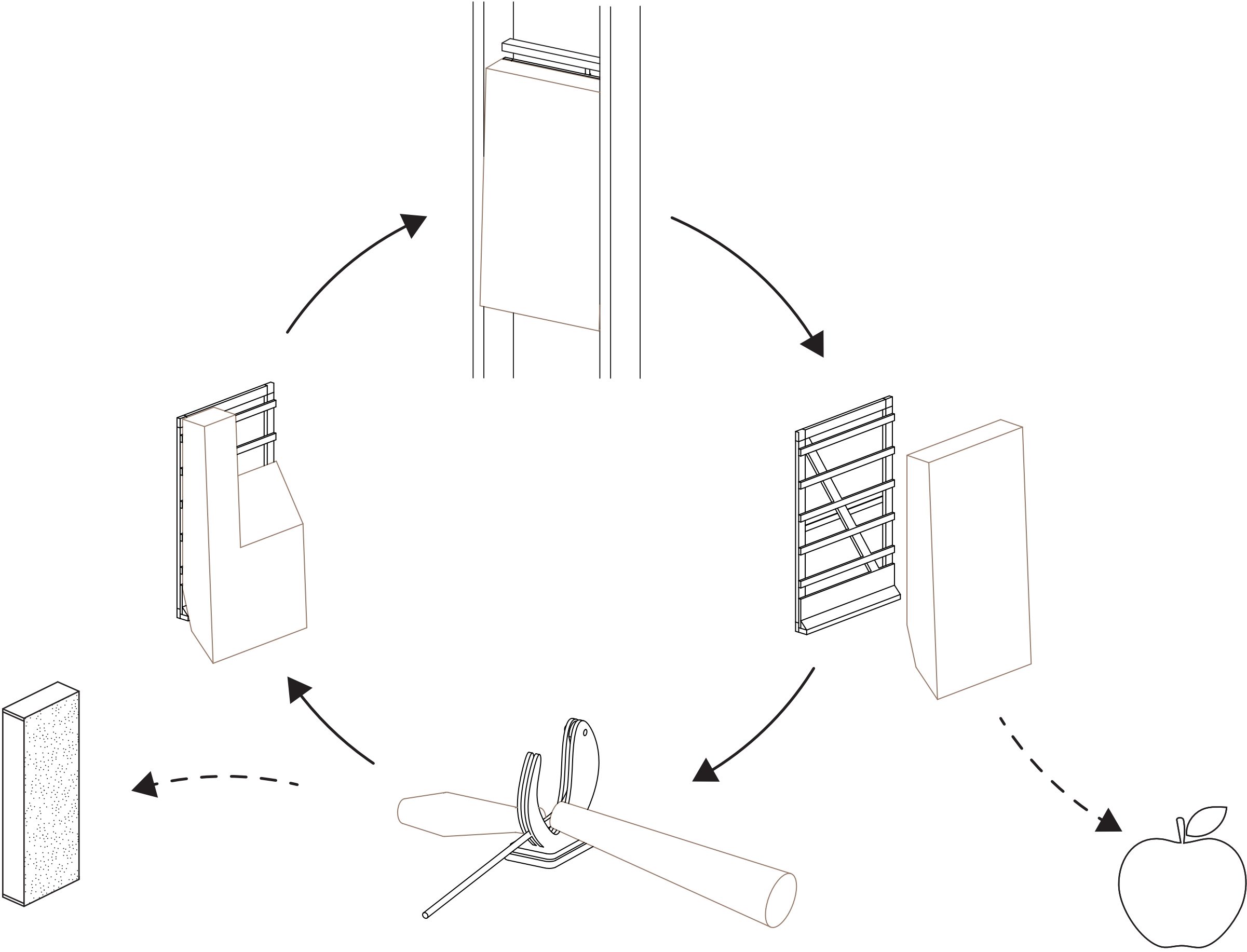
maintenance of the modular system



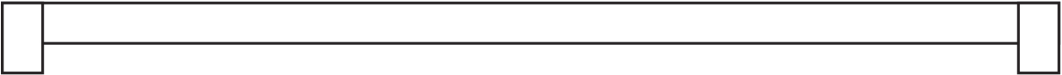
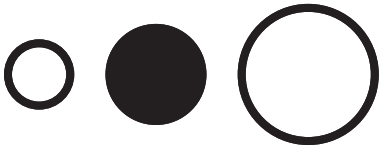
maintenance cycle



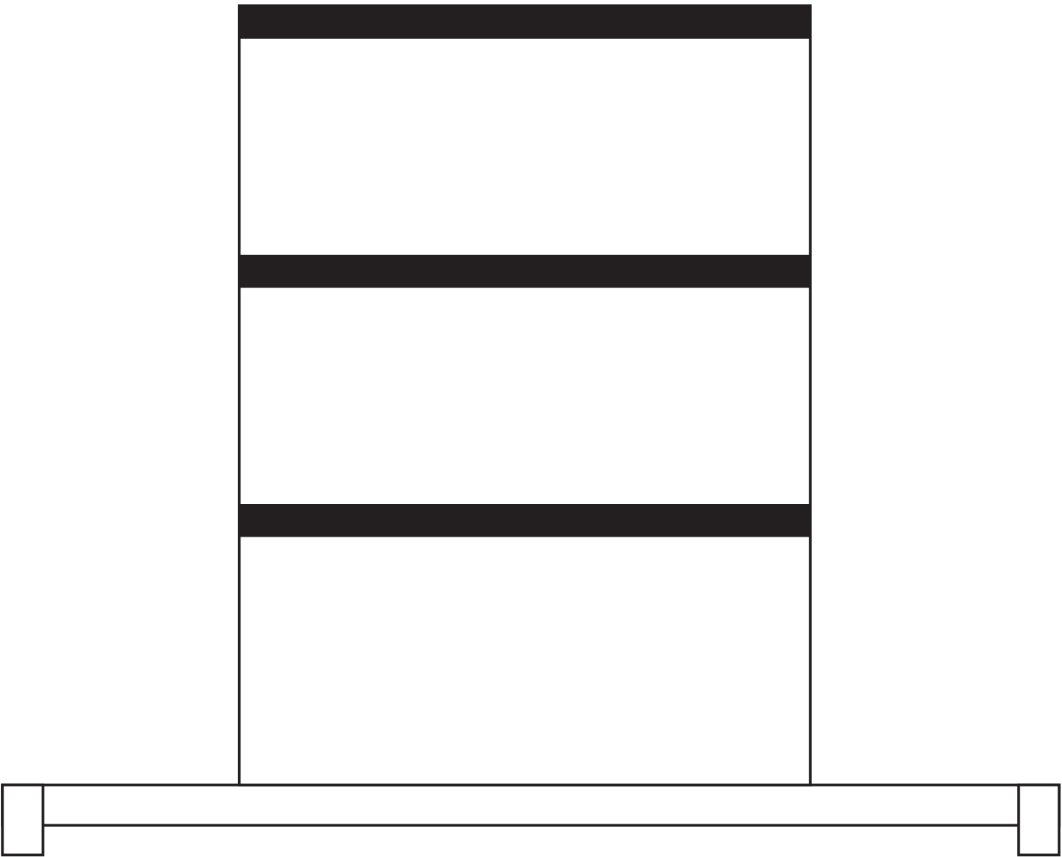
maintenance cycle



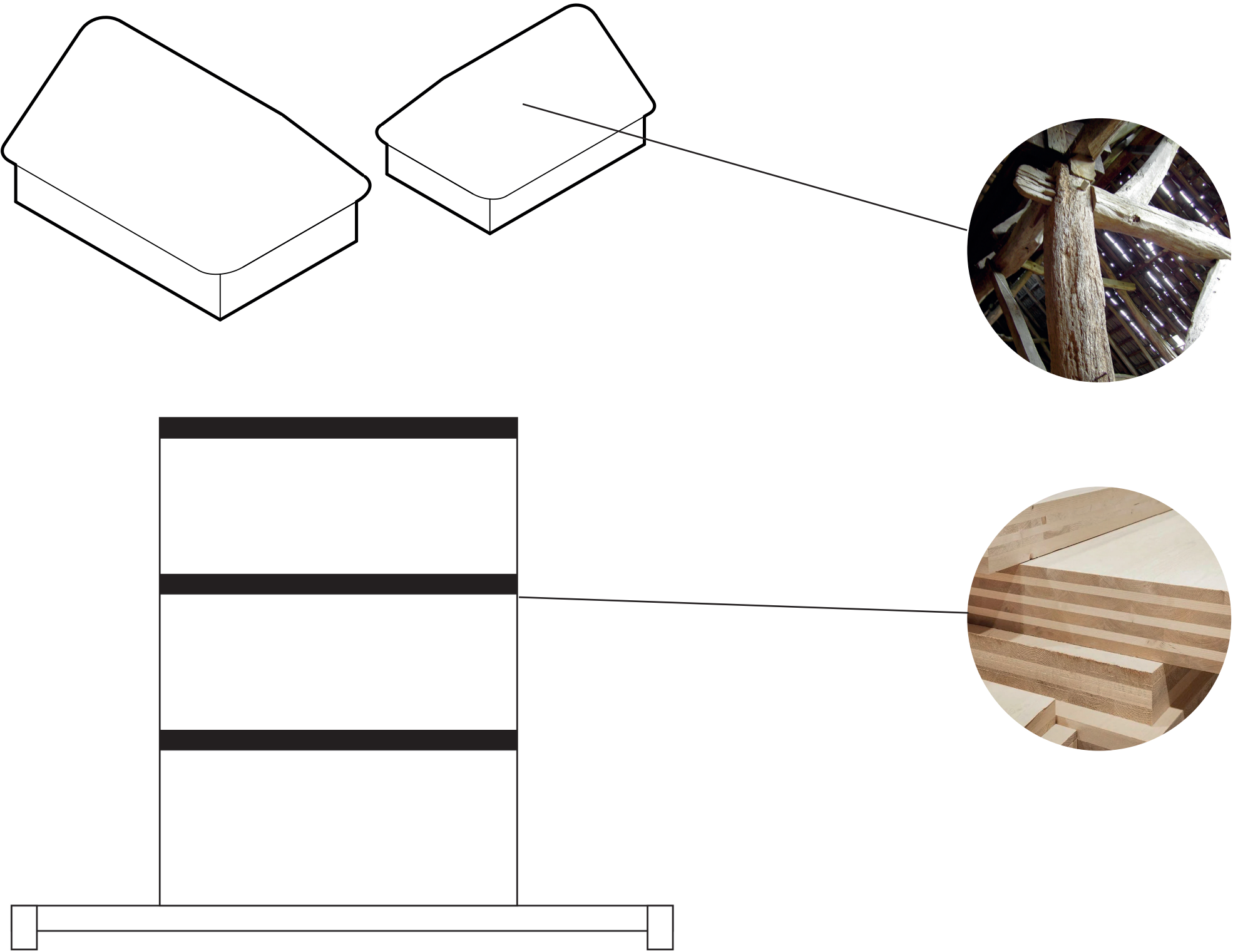
construction principle



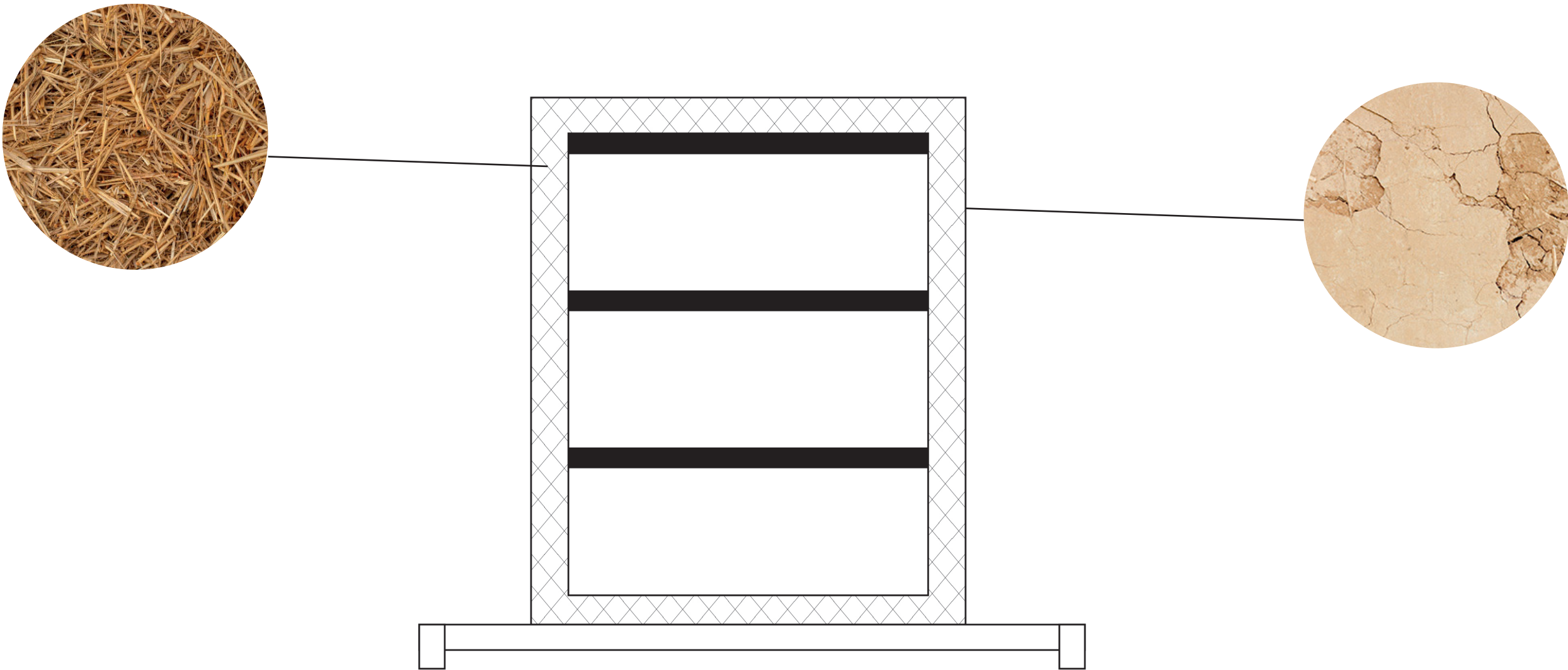
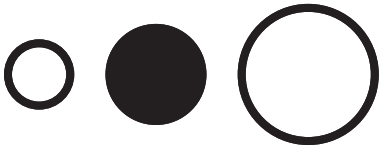
construction principle



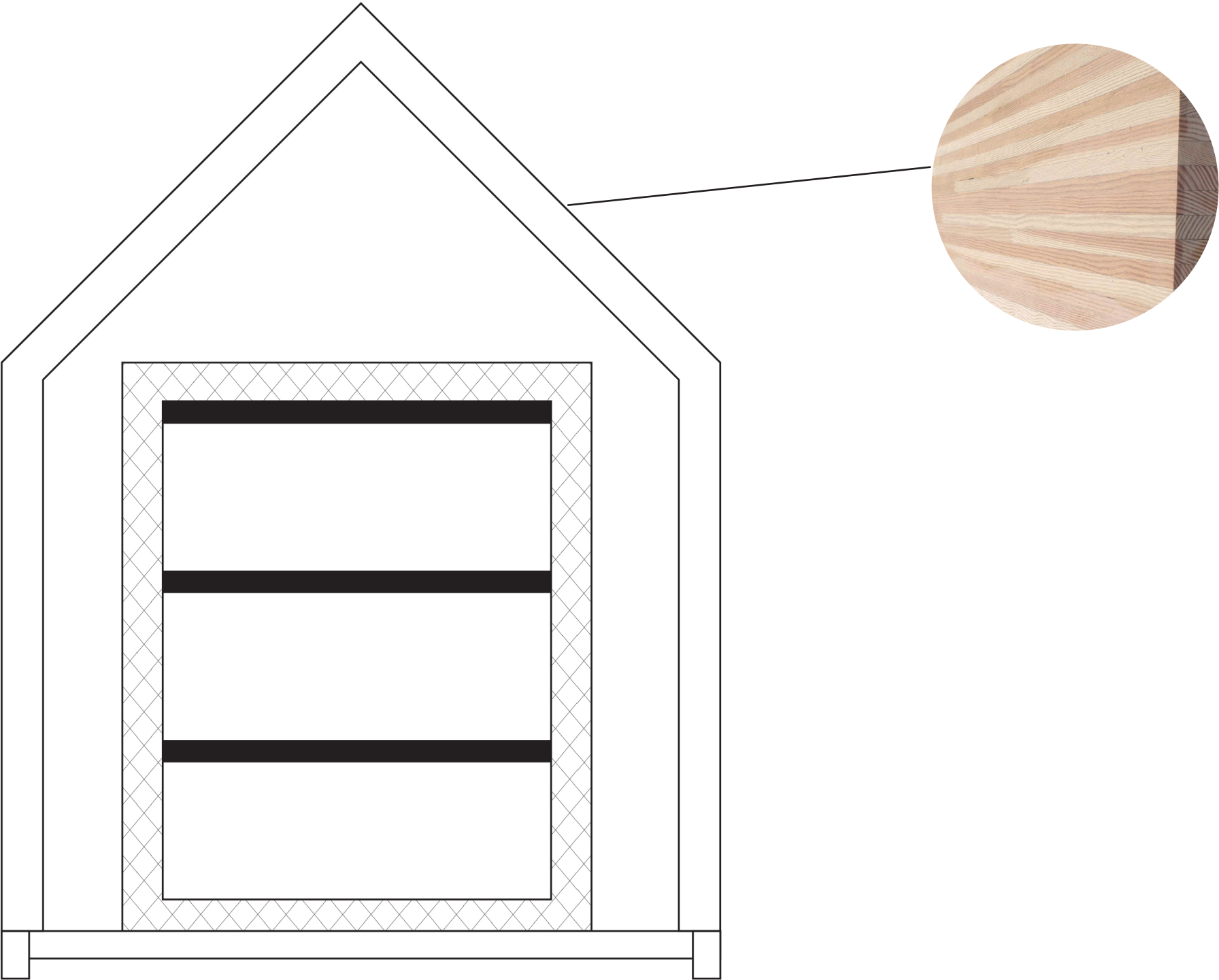
construction principle



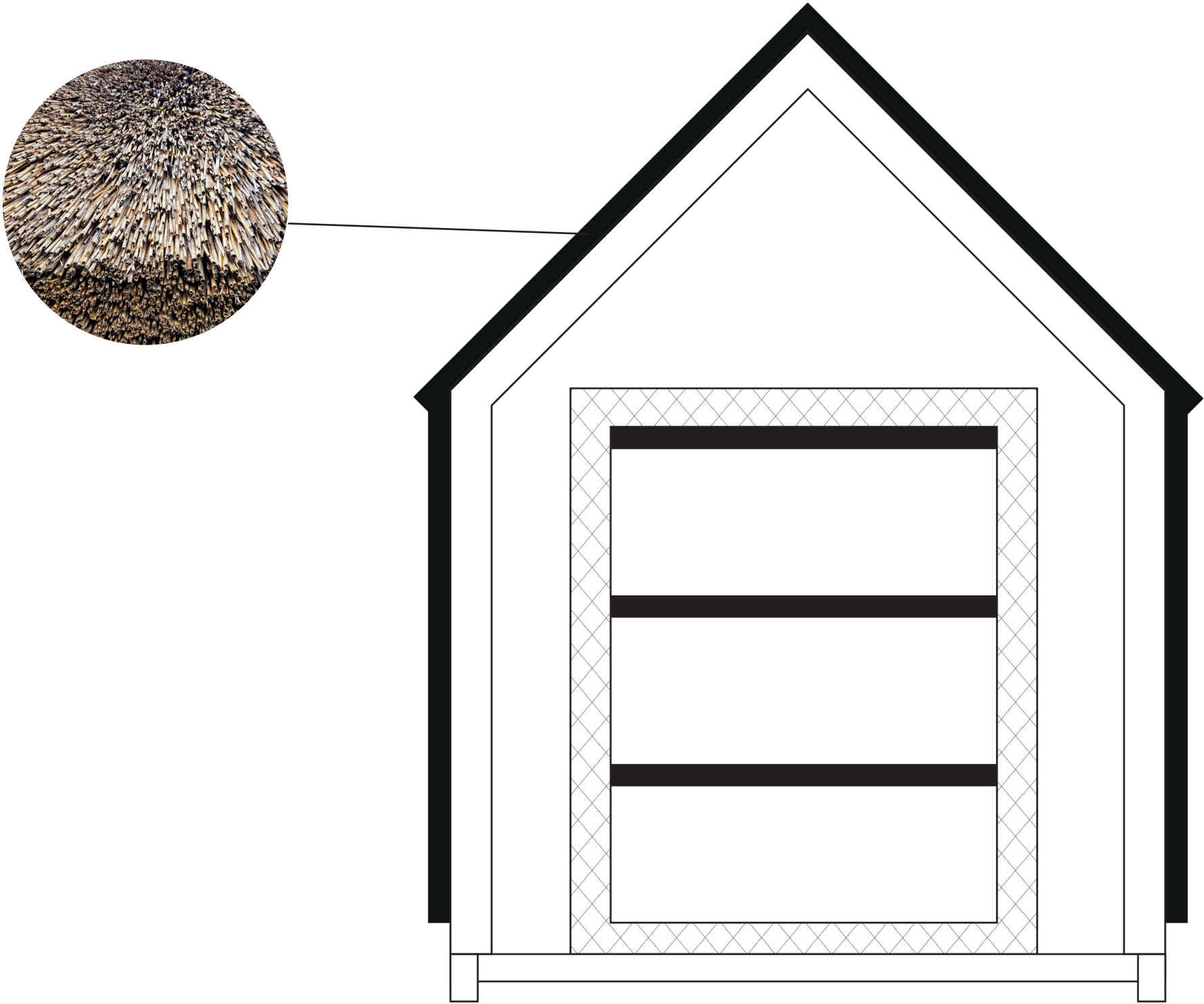
construction principle



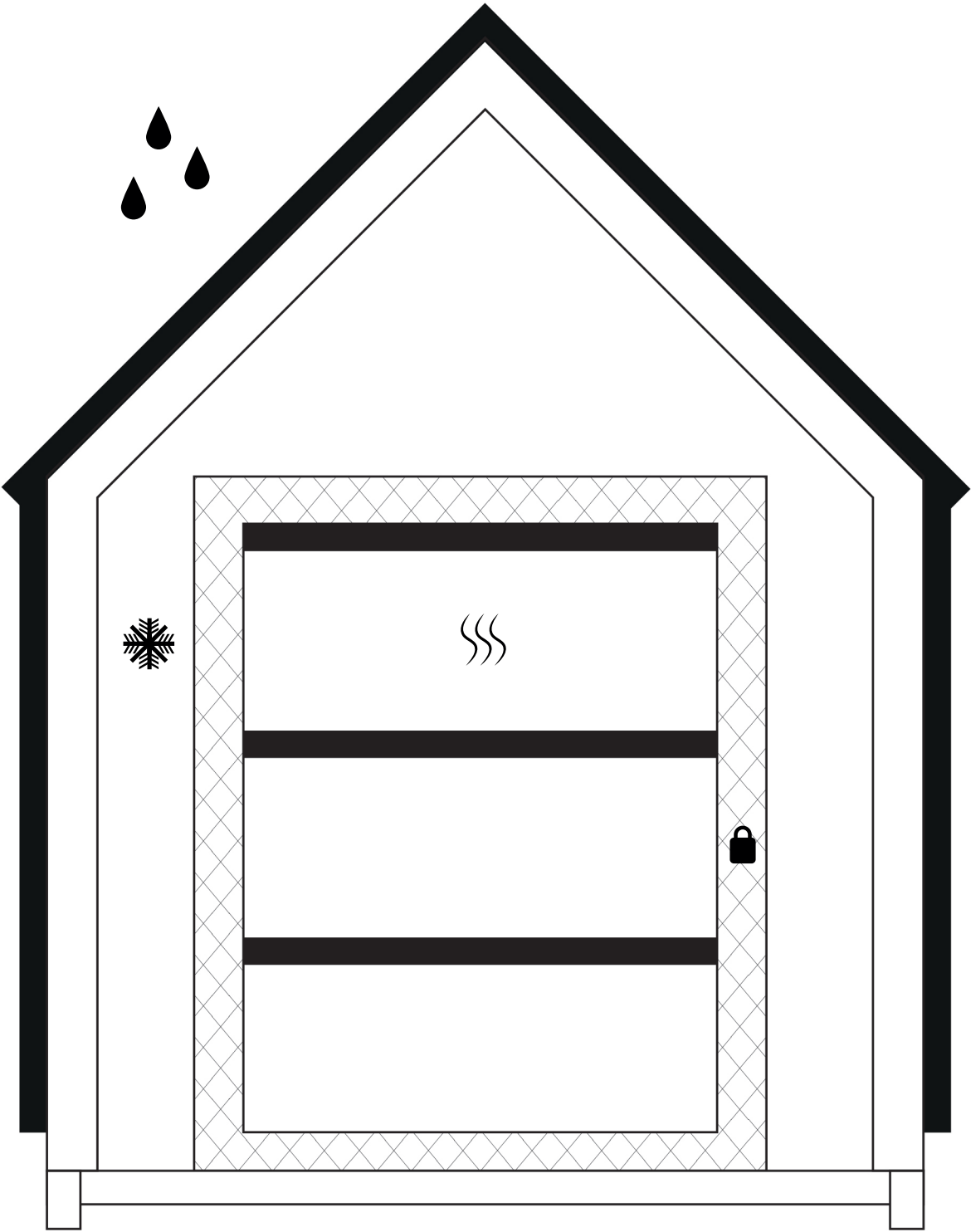
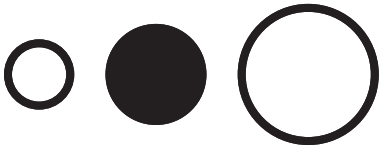
construction principle



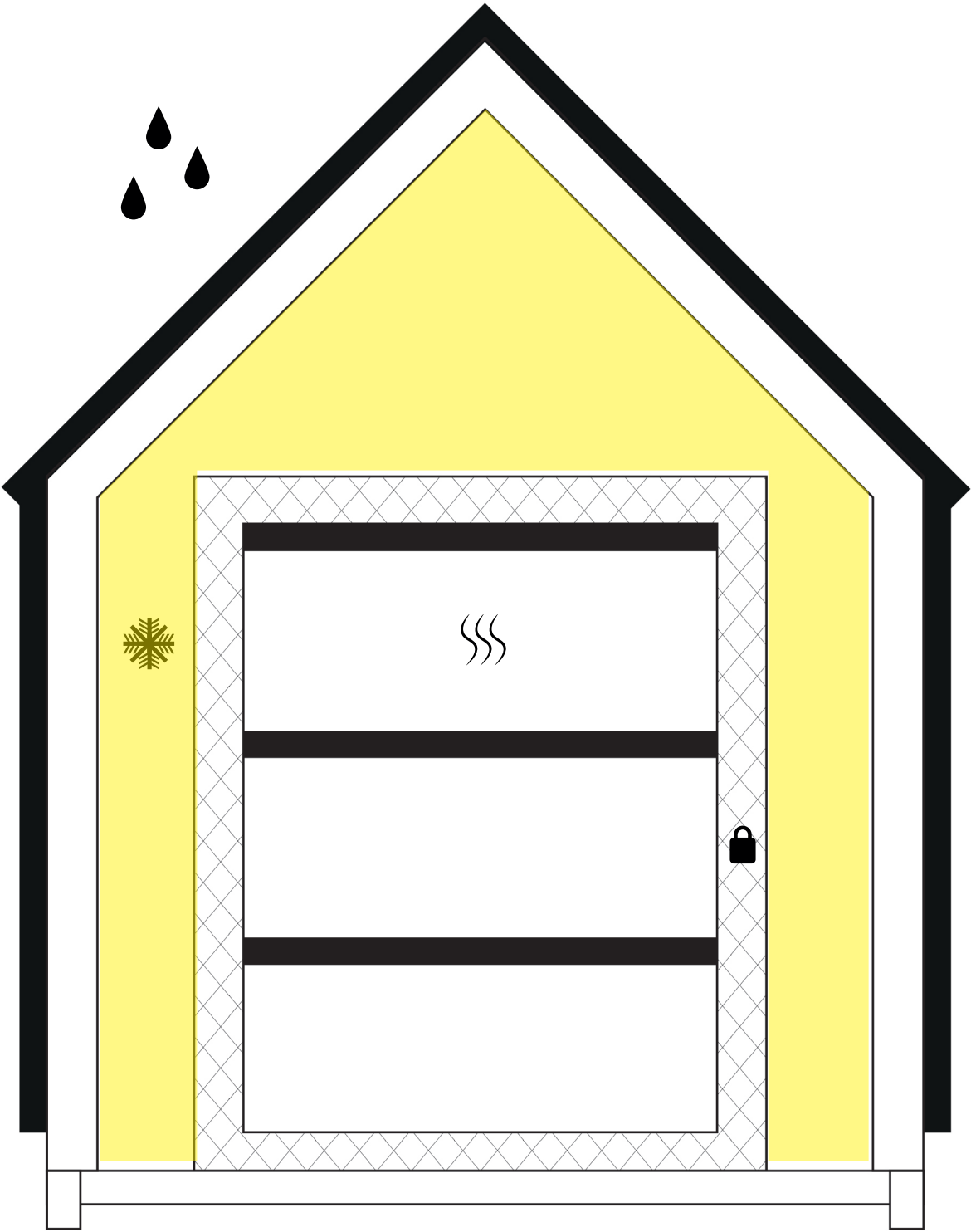
construction principle



construction principle



construction principle



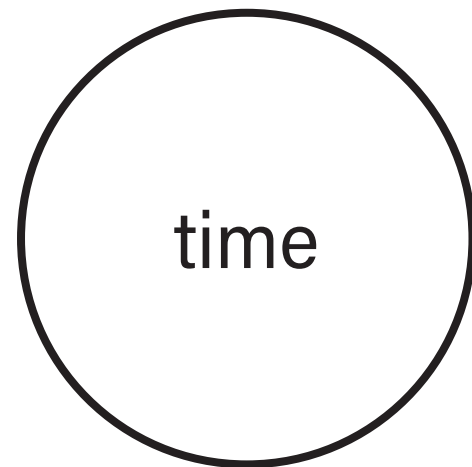
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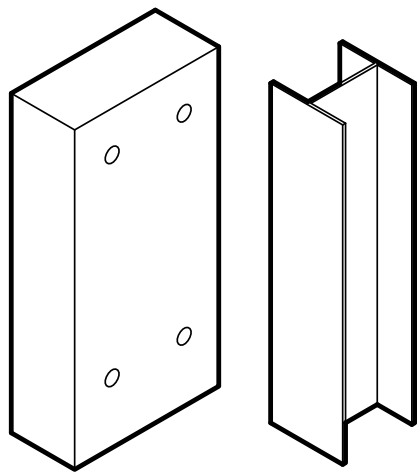


time

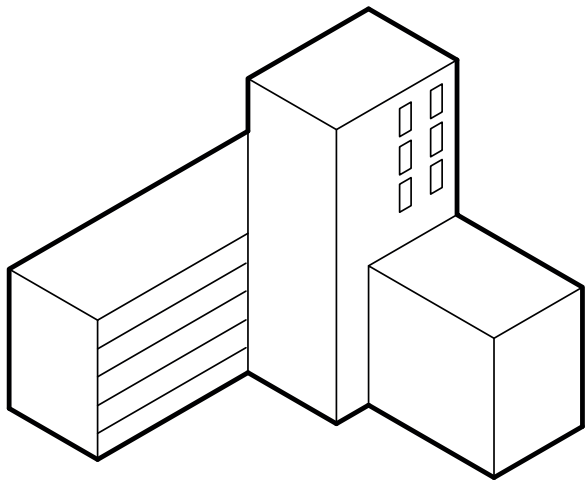
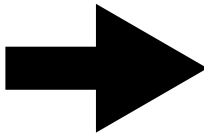
place



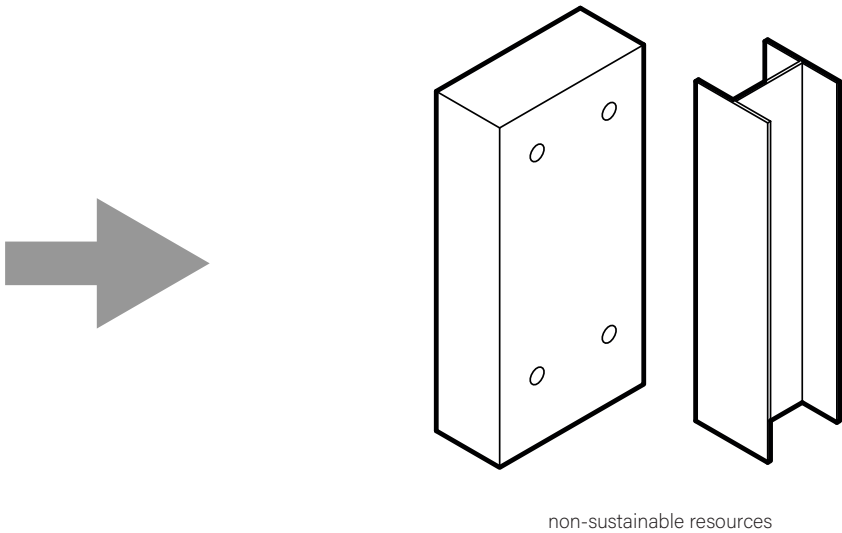
place



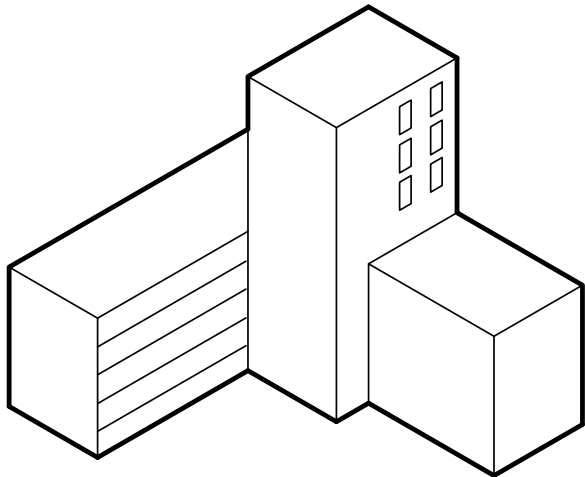
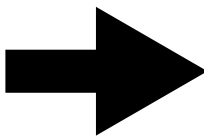
non-sustainable resources



modern construction



non-sustainable resources



modern construction



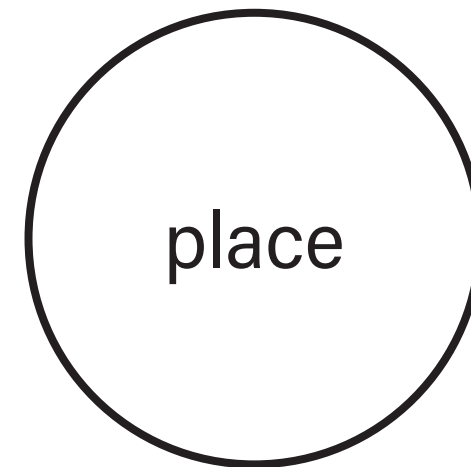


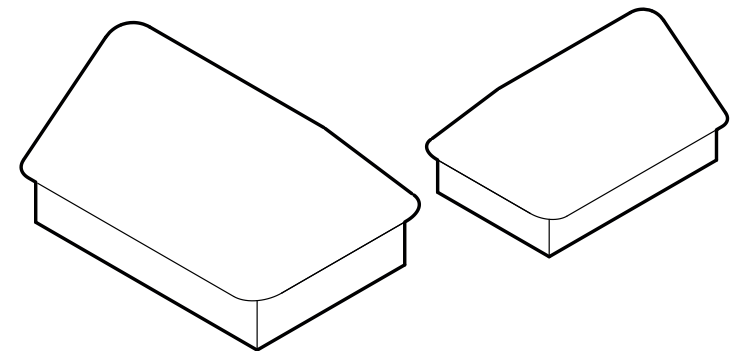
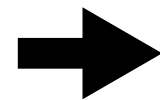
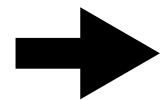


context



time



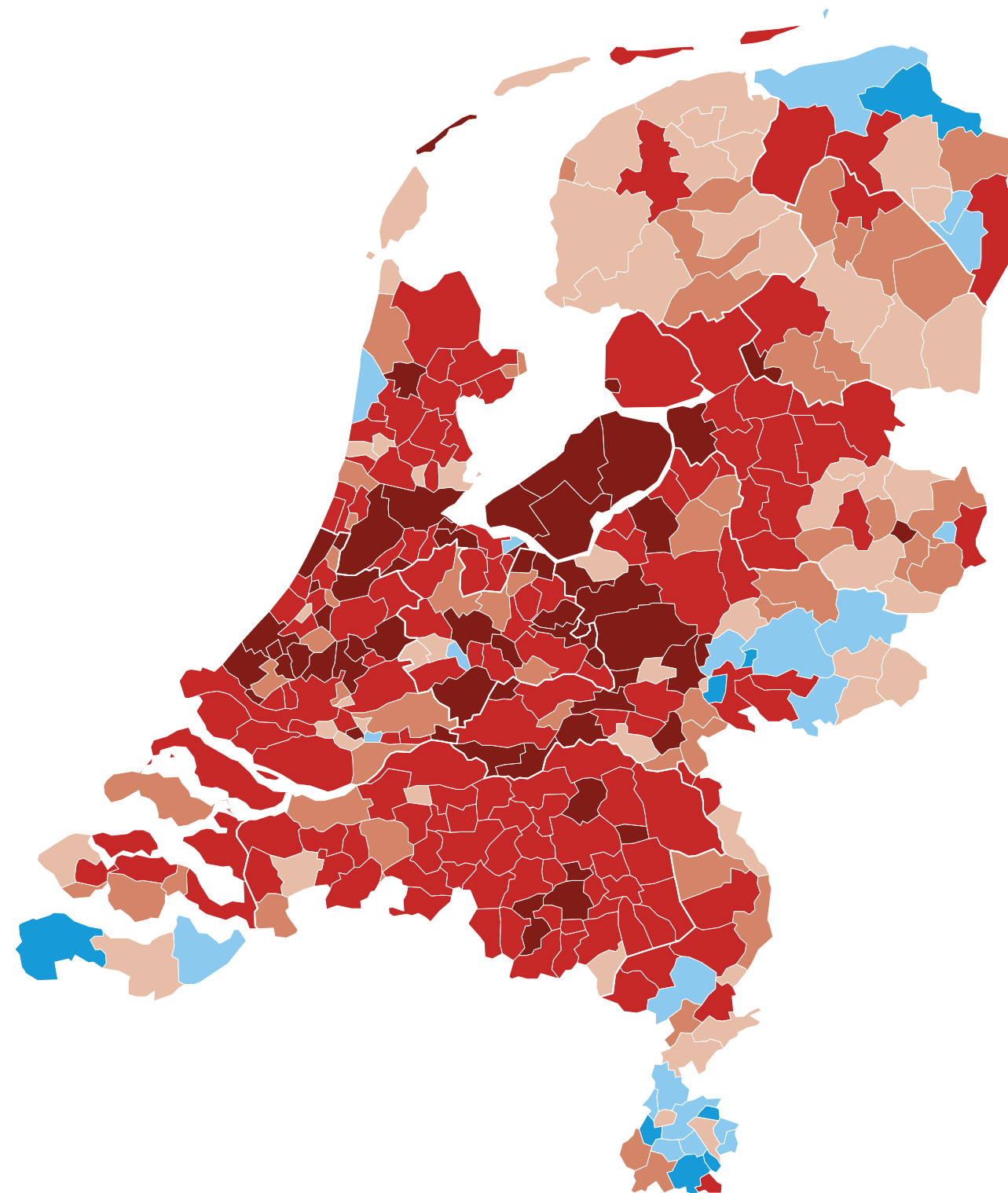








Bevolkingsontwikkeling per gemeente, 2016 – 2024



Verandering in %

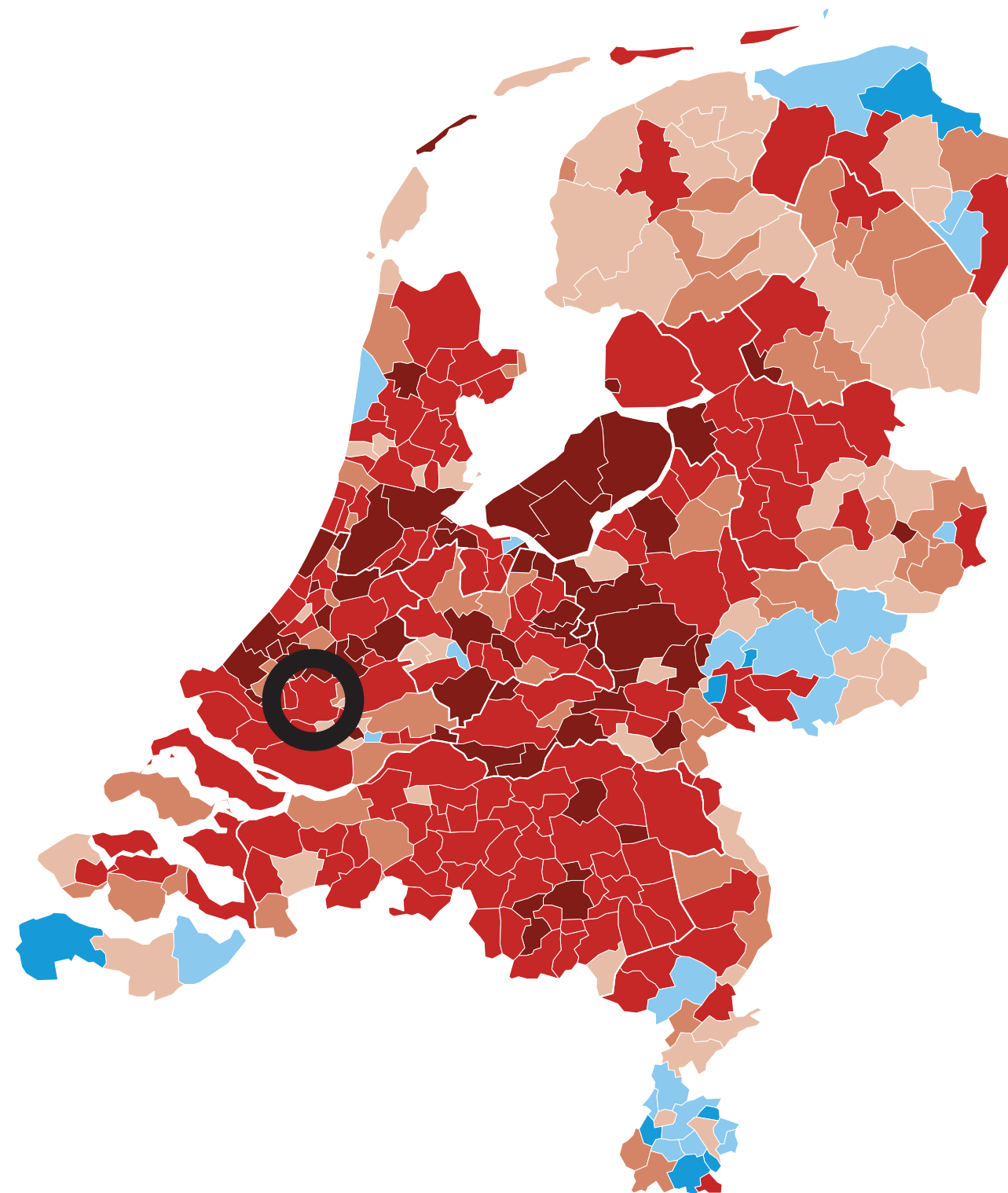


Bron: CBS

CBS/aug24
www.clo.nl/nl210209



Bevolkingsontwikkeling per gemeente, 2016 – 2024



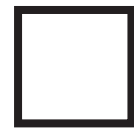
Verandering in %



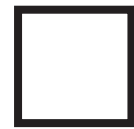
Bron: CBS

CBS/aug24
www.clo.nl/nl210209

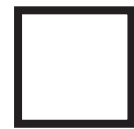
context: place



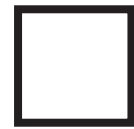
room to experiment



public visibility

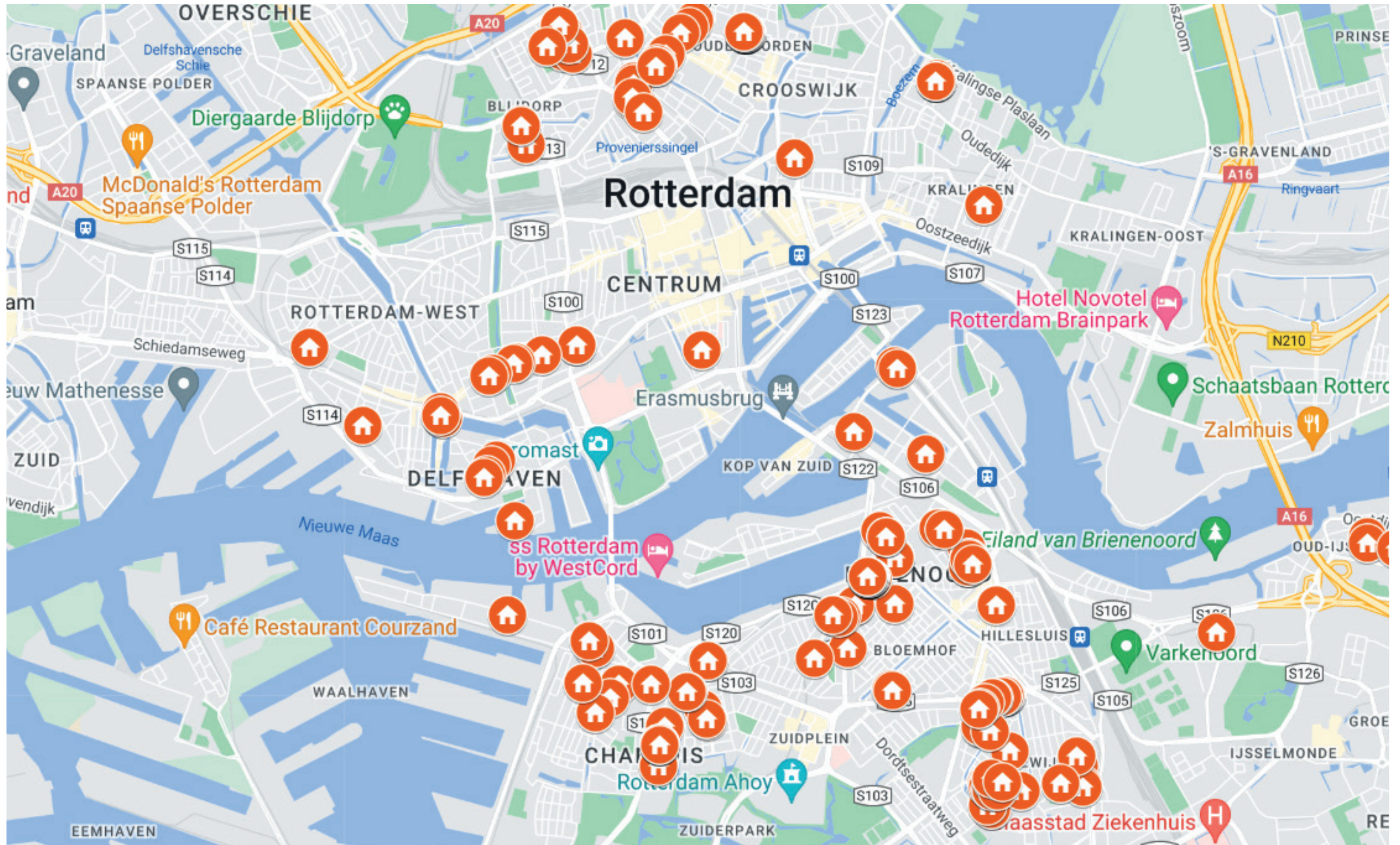


manageable scale



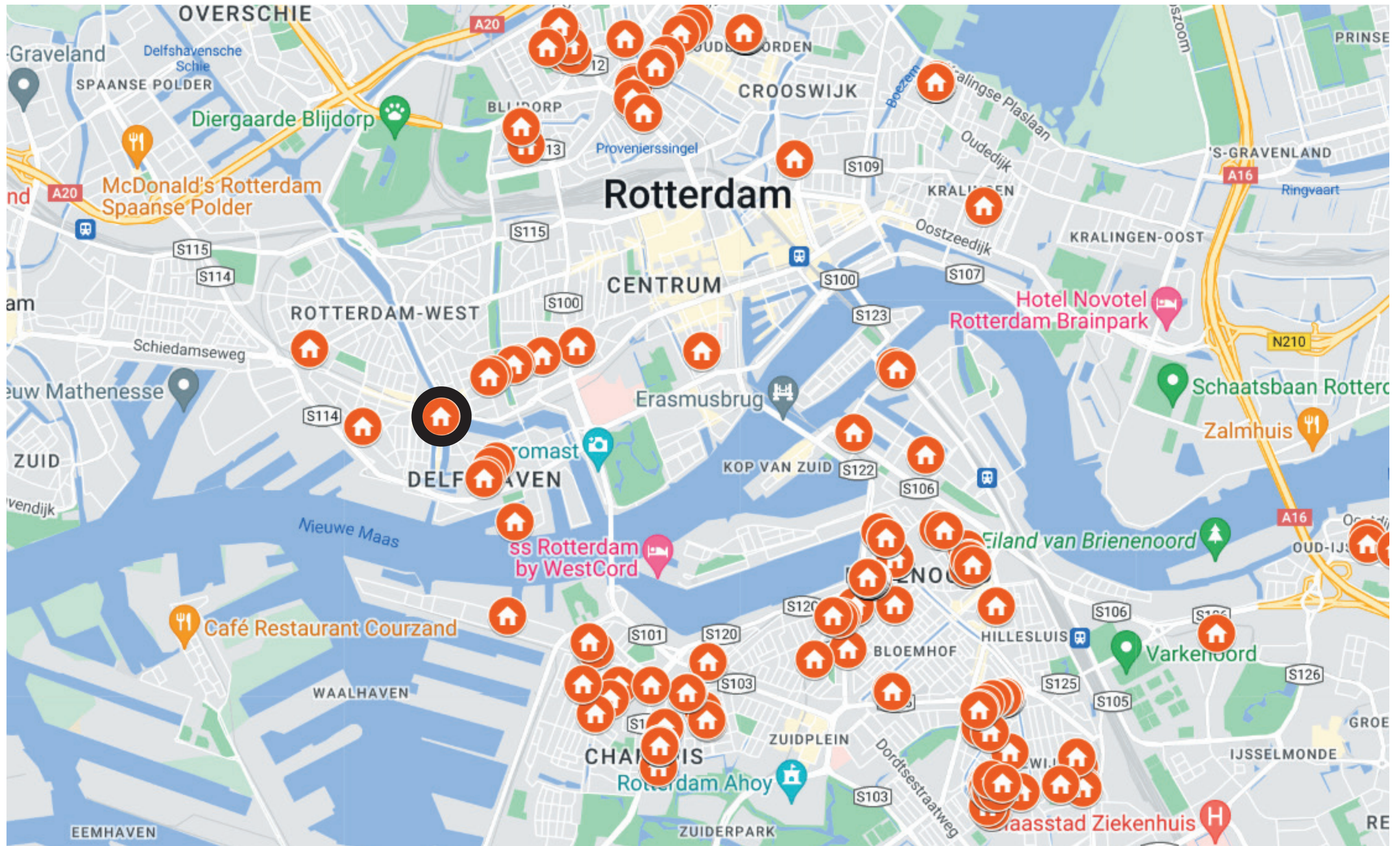
complex urban context

context: place



source: OPEN Rotterdam

context: place



source: OPEN Rotterdam



context: place





context: place



room to experiment



public visibility



manageable scale



complex urban context

context: place

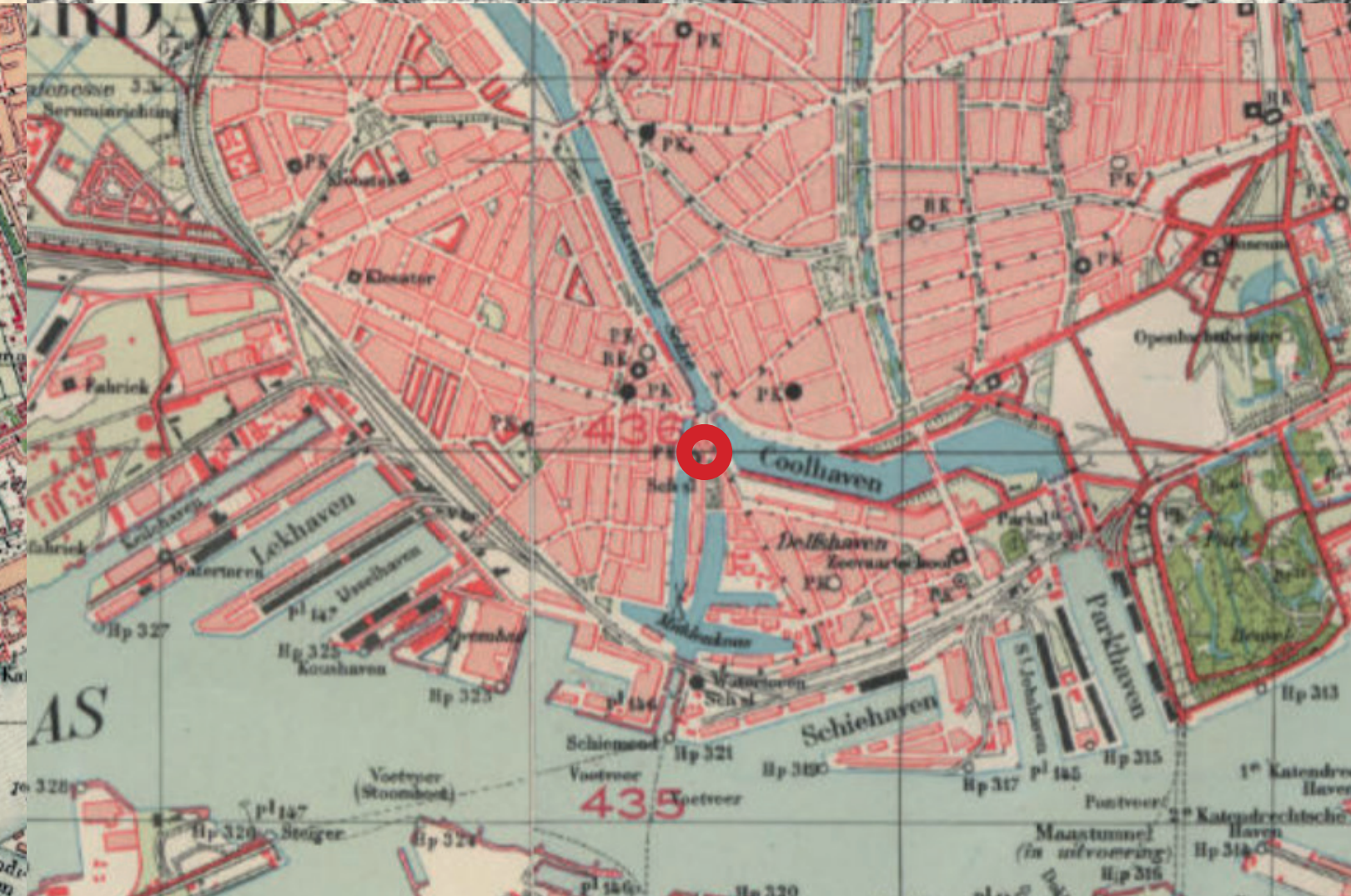
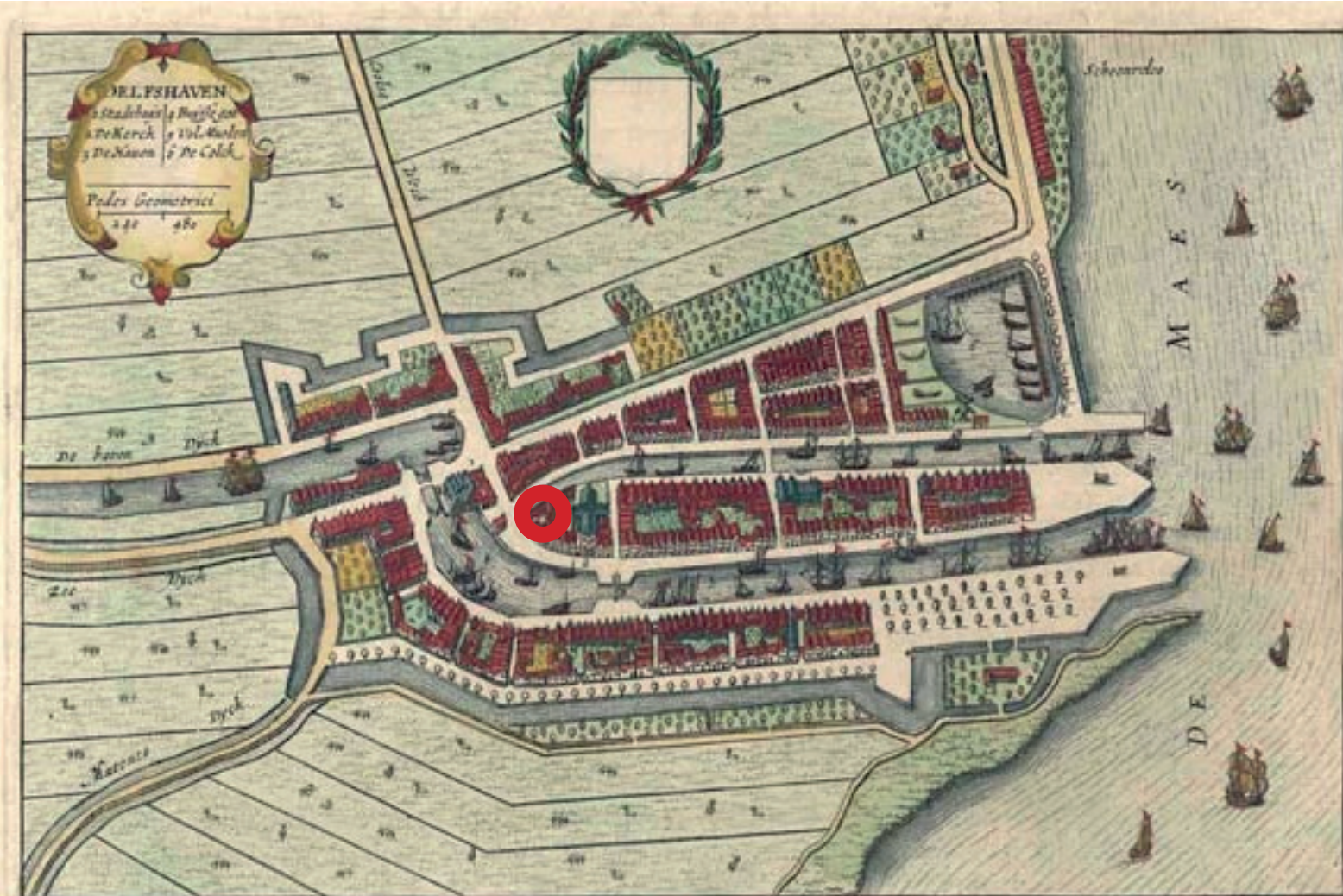








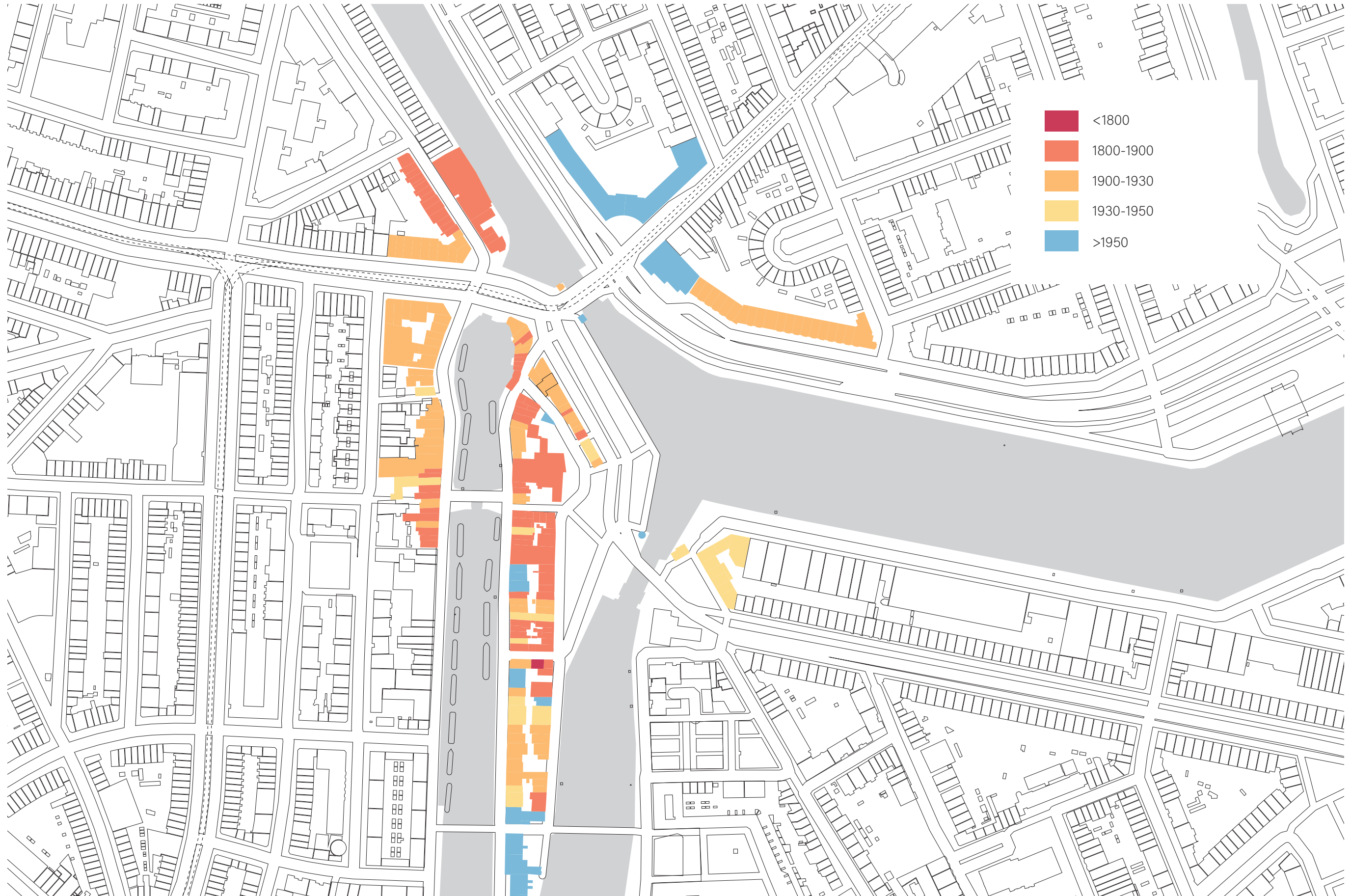








context: place







se
wn



context: place



room to experiment



public visibility



manageable scale



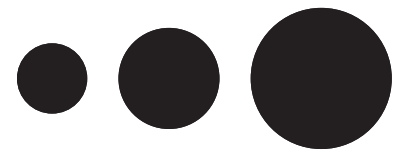
complex urban context

context



time

place



time

place

+

native materials



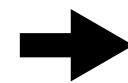
accessibility



space management



engagement



tectonics

program

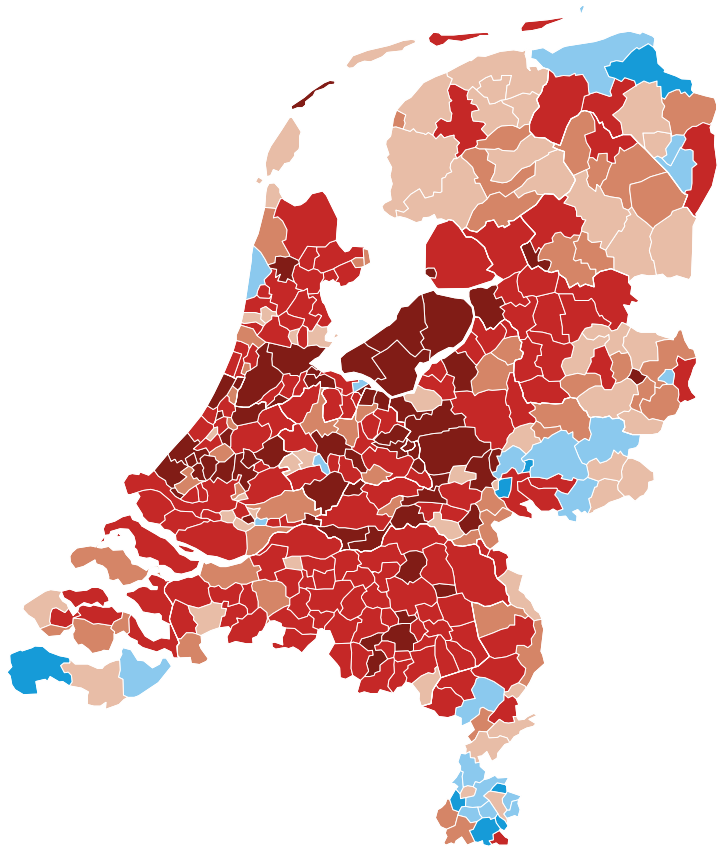
program



societal



material



accessibility

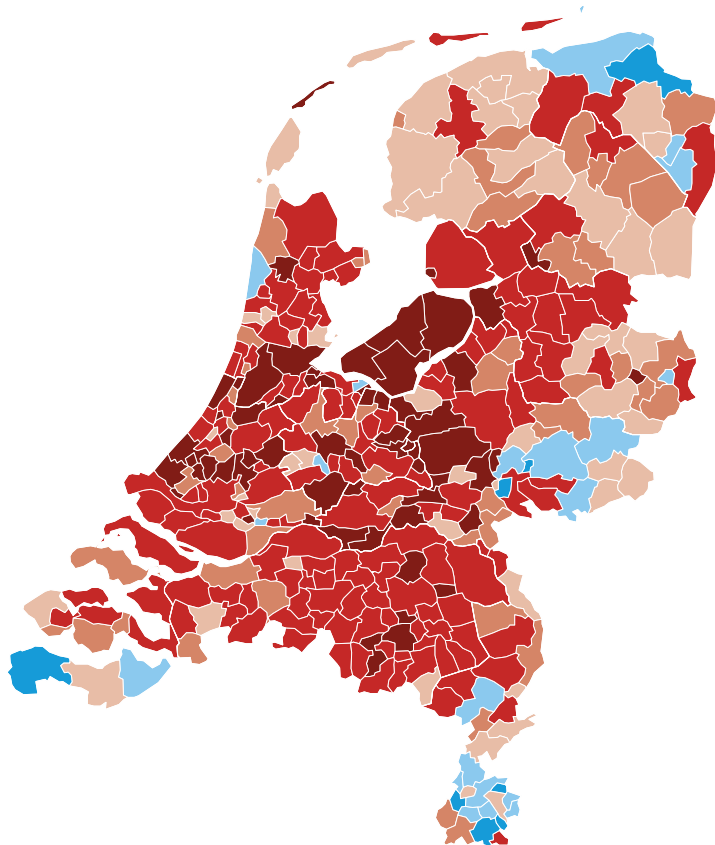
space management

engagement

program

societal

material



accessibility



space management



engagement



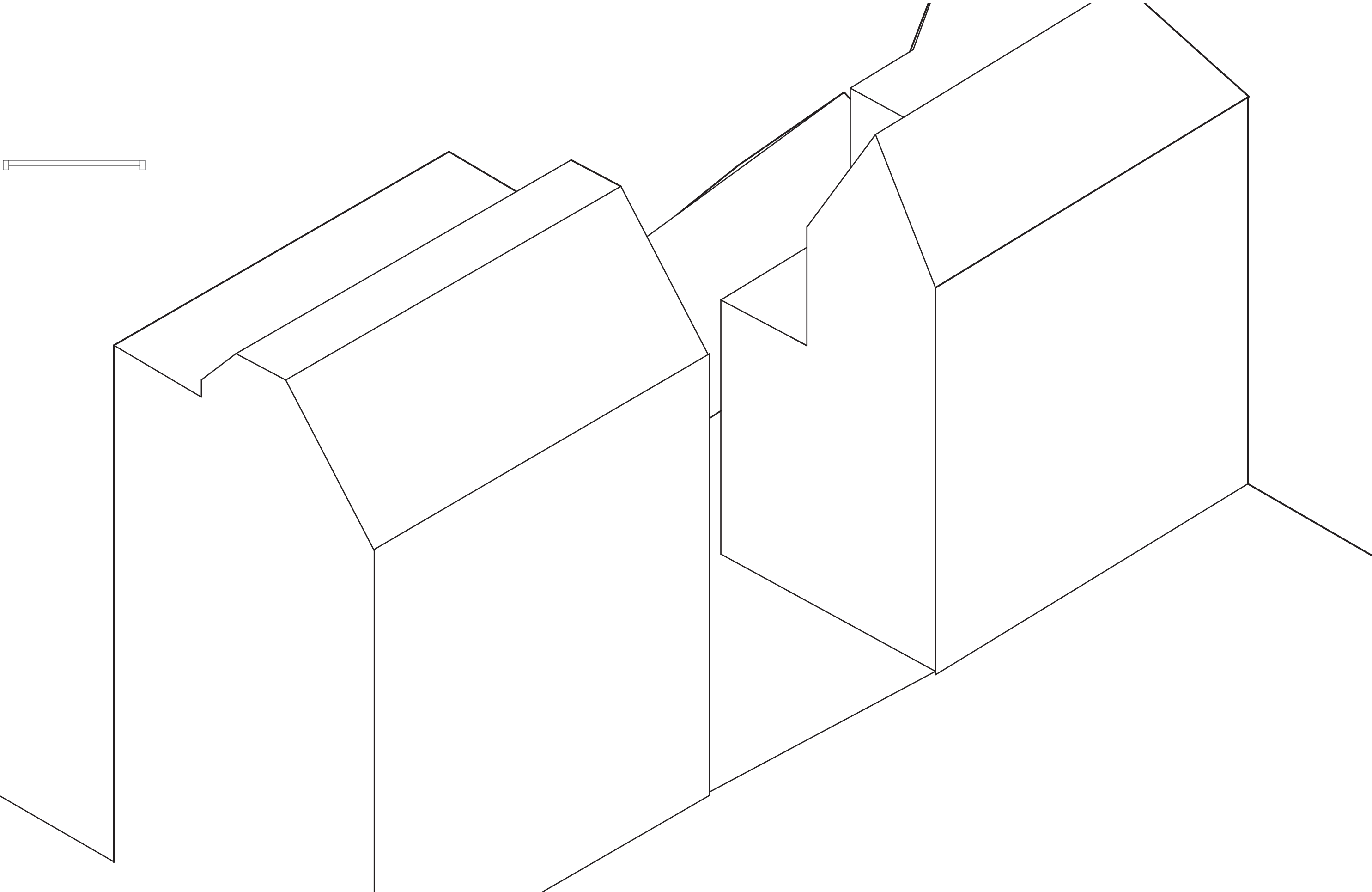
housing
3 x 2 p.

introduction
research
translation to design
material
structure
context
implementation
conclusion

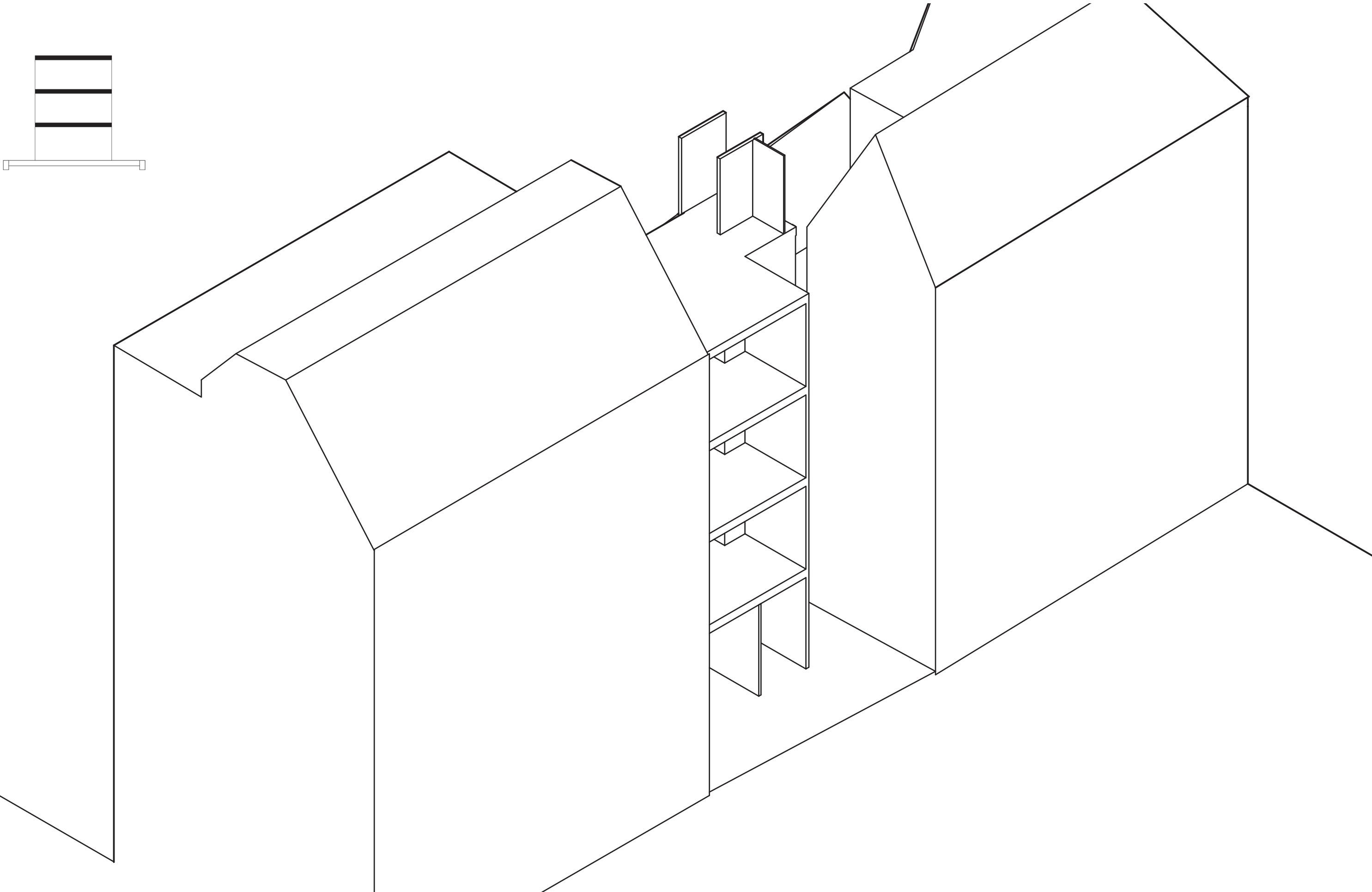
masterplan



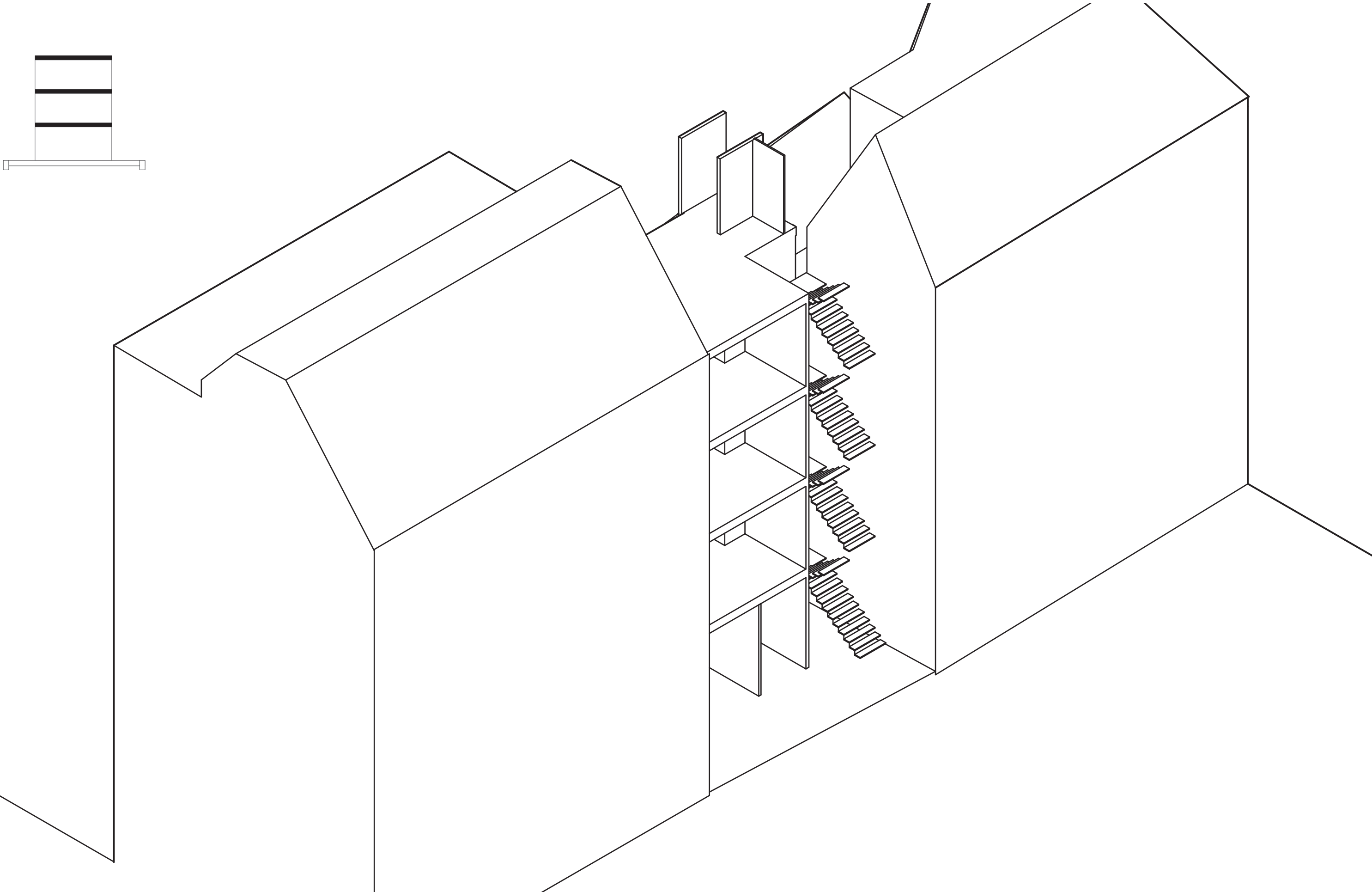
structural implementation



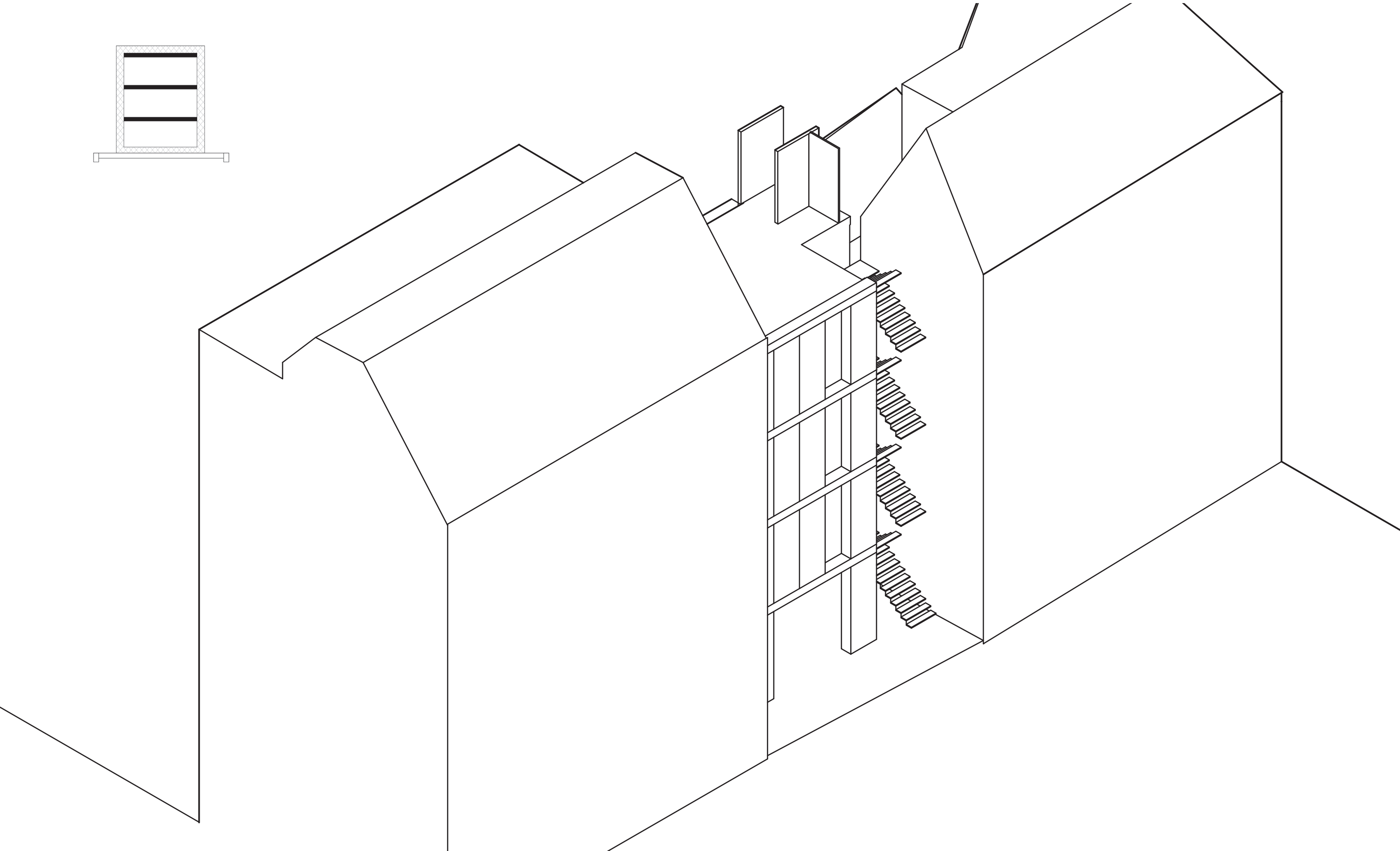
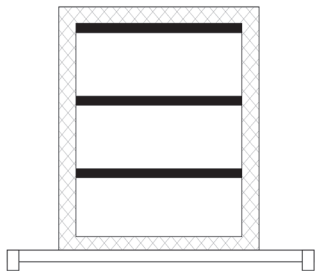
structural implementation



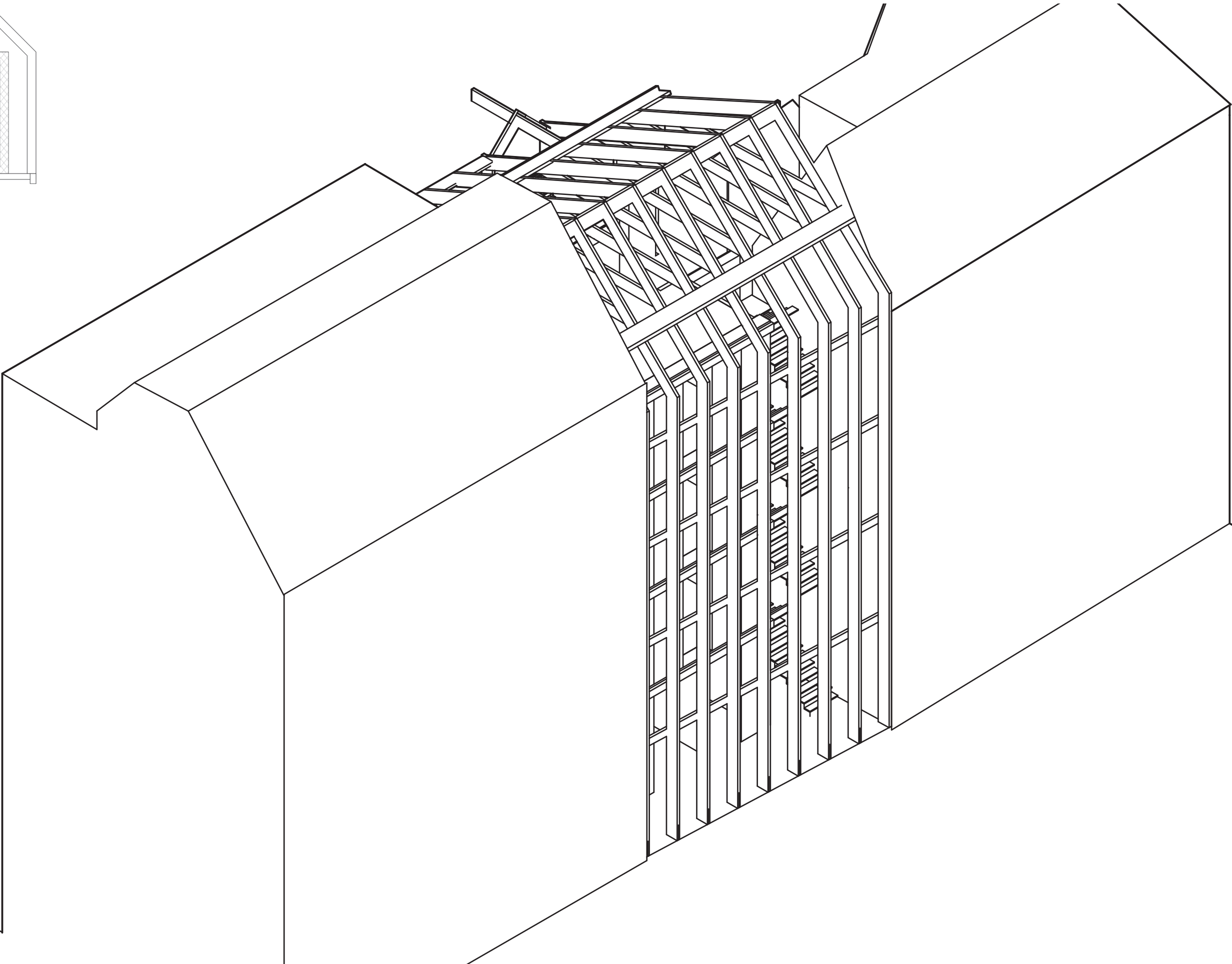
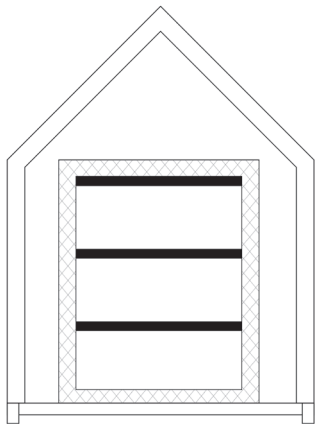
structural implementation



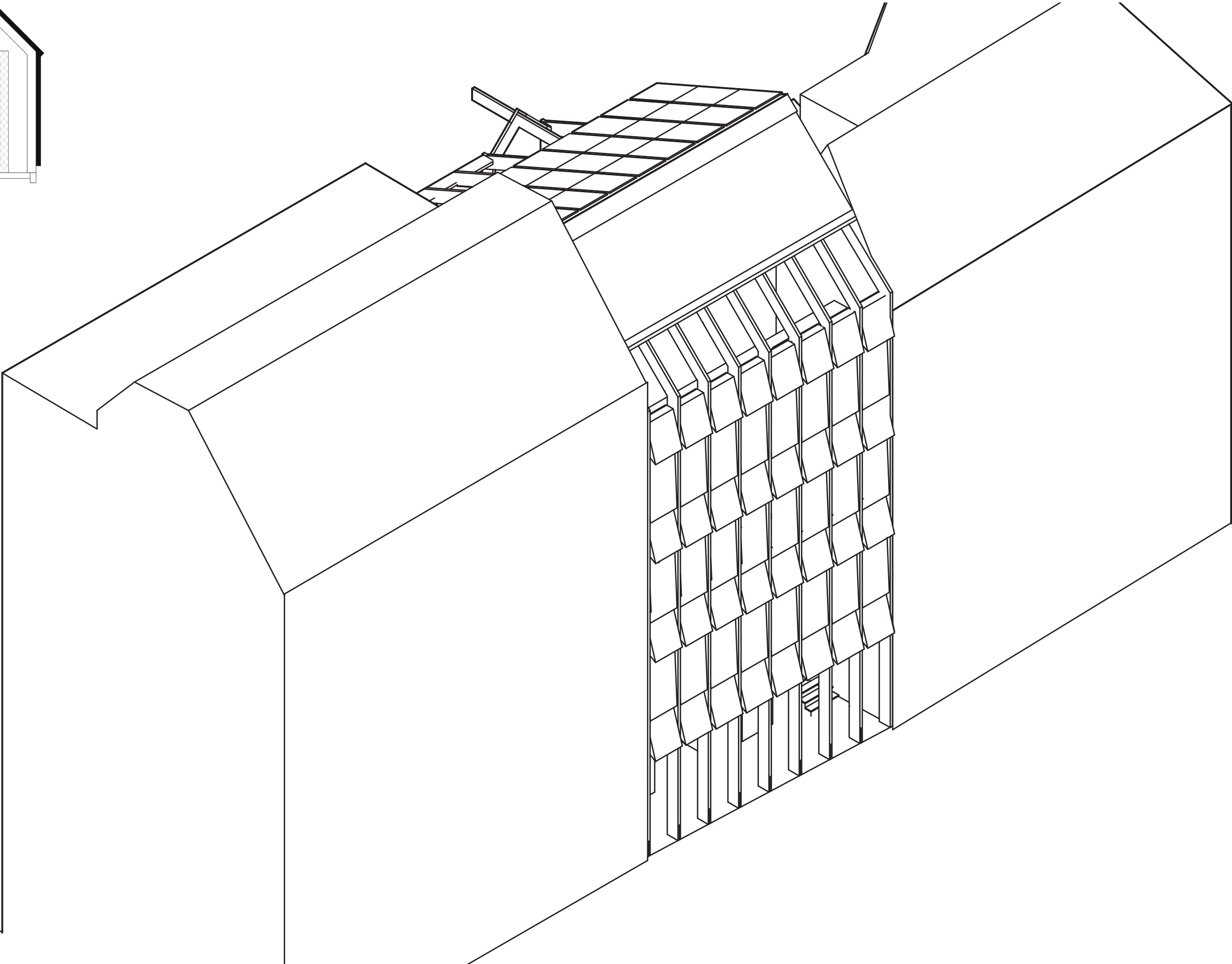
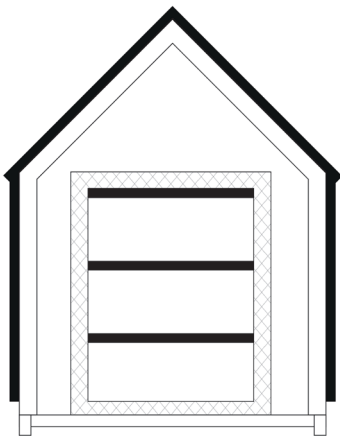
structural implementation



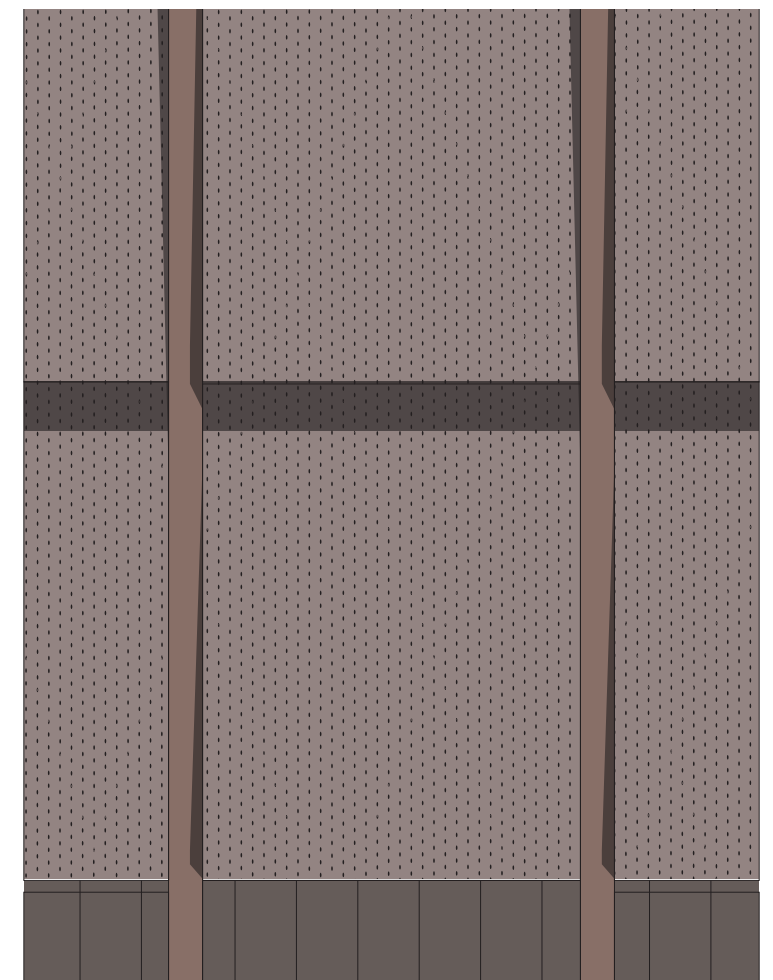
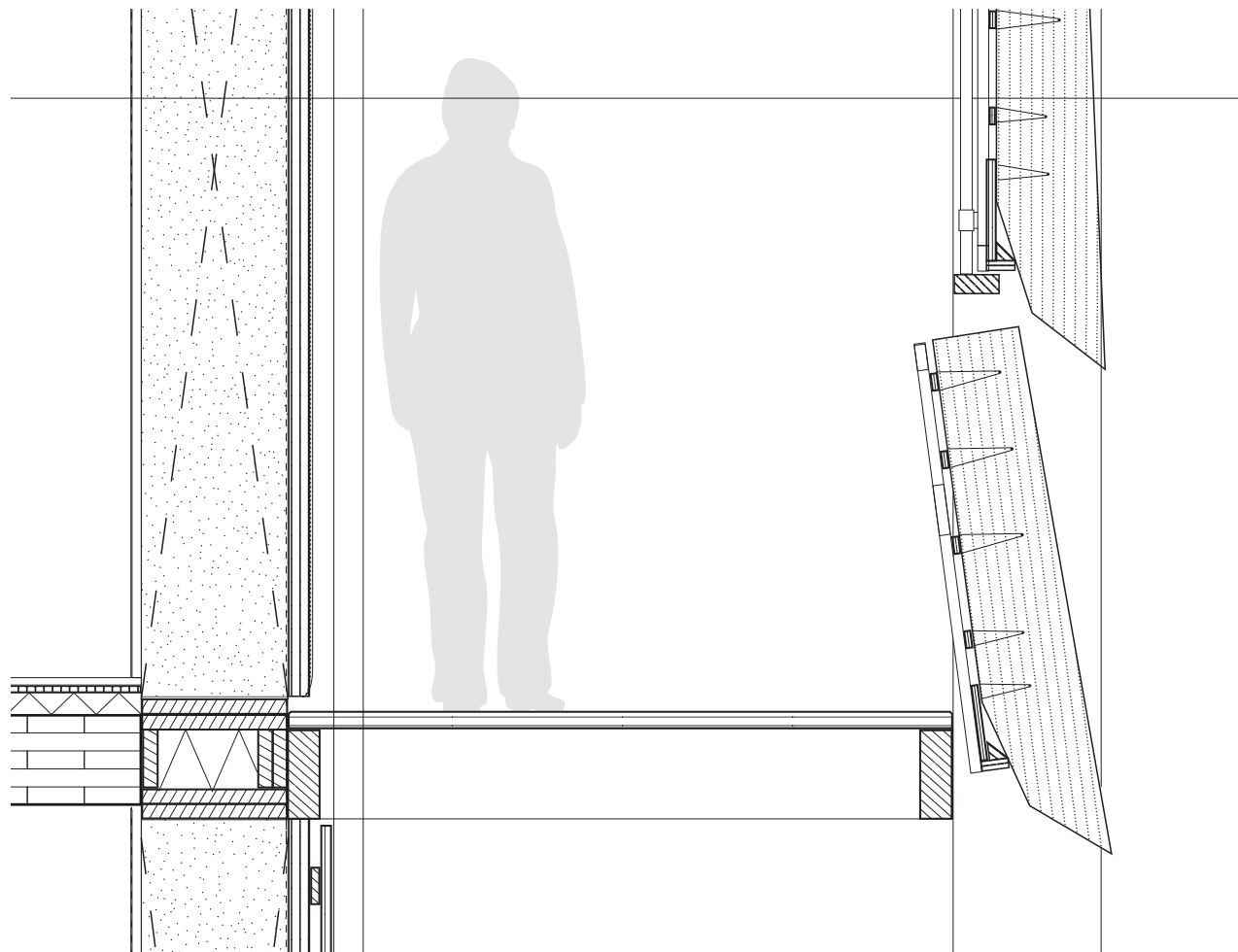
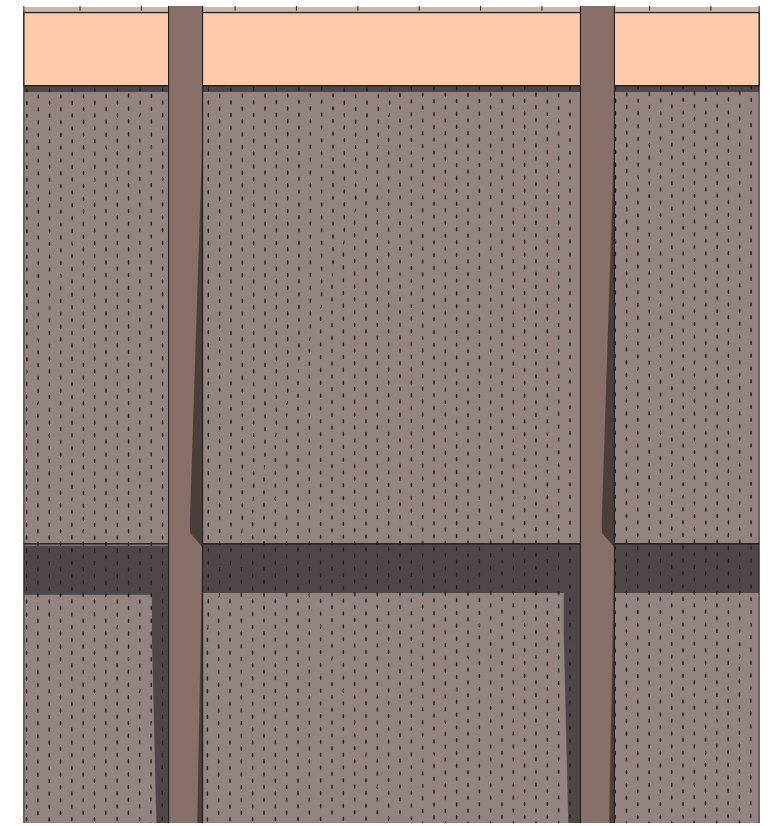
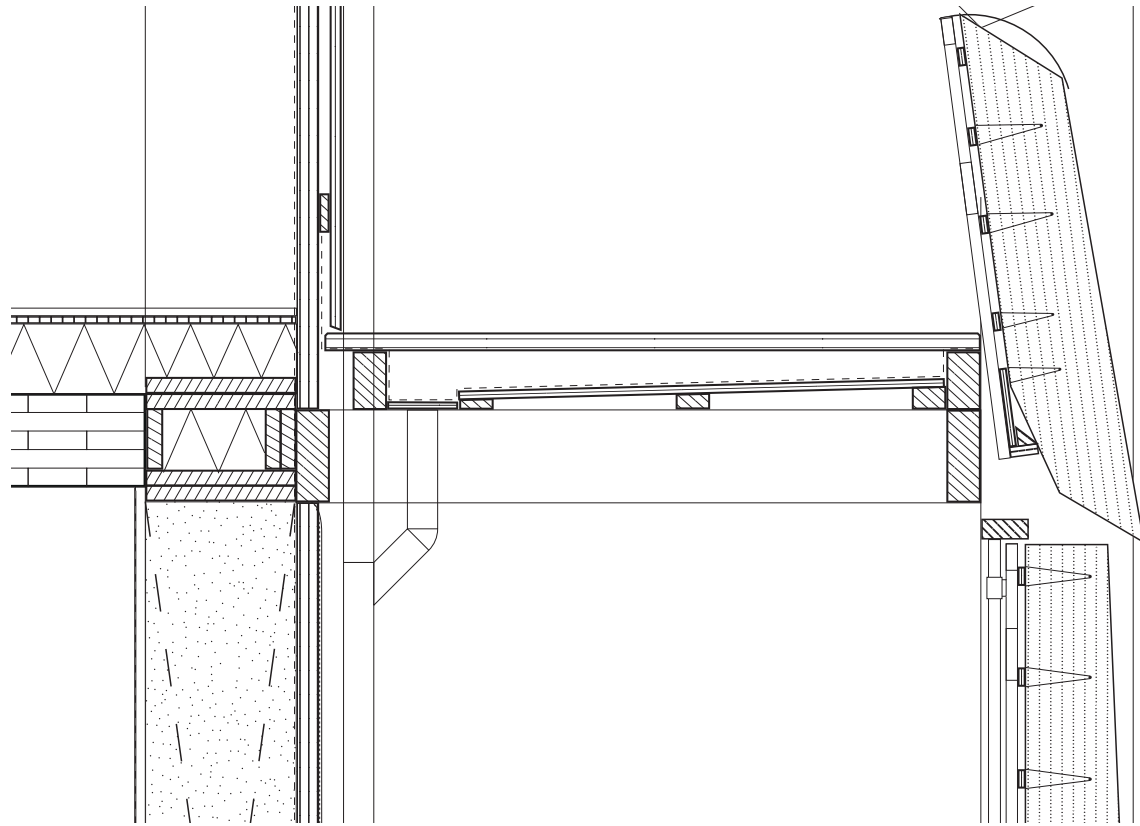
structural implementation



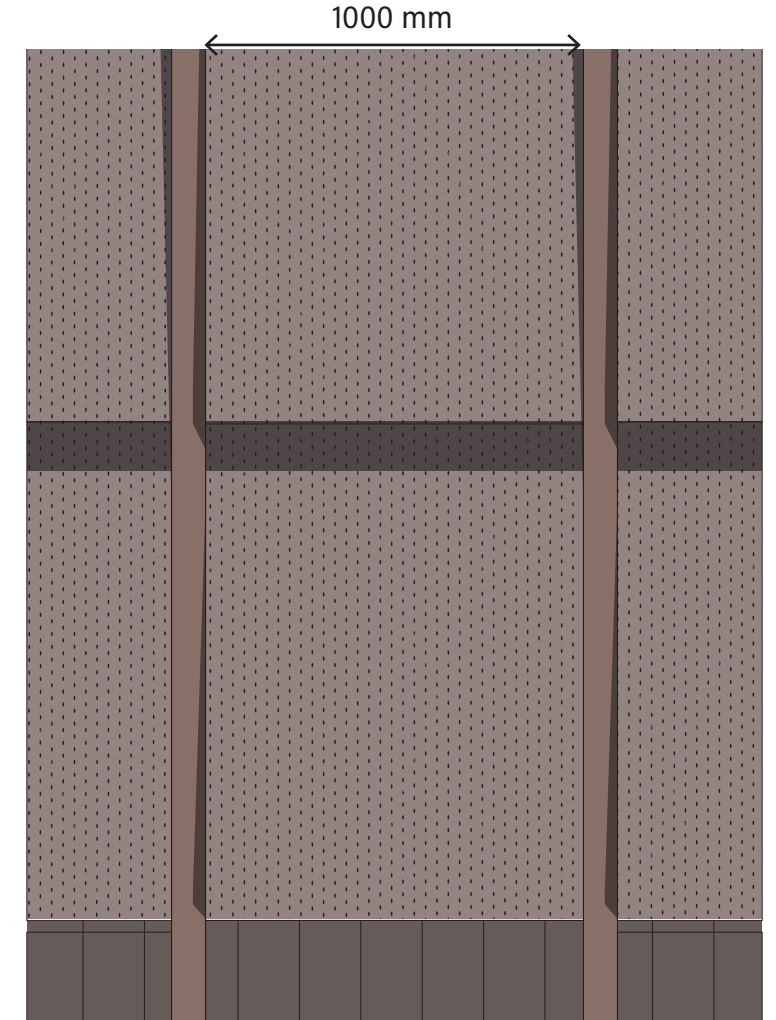
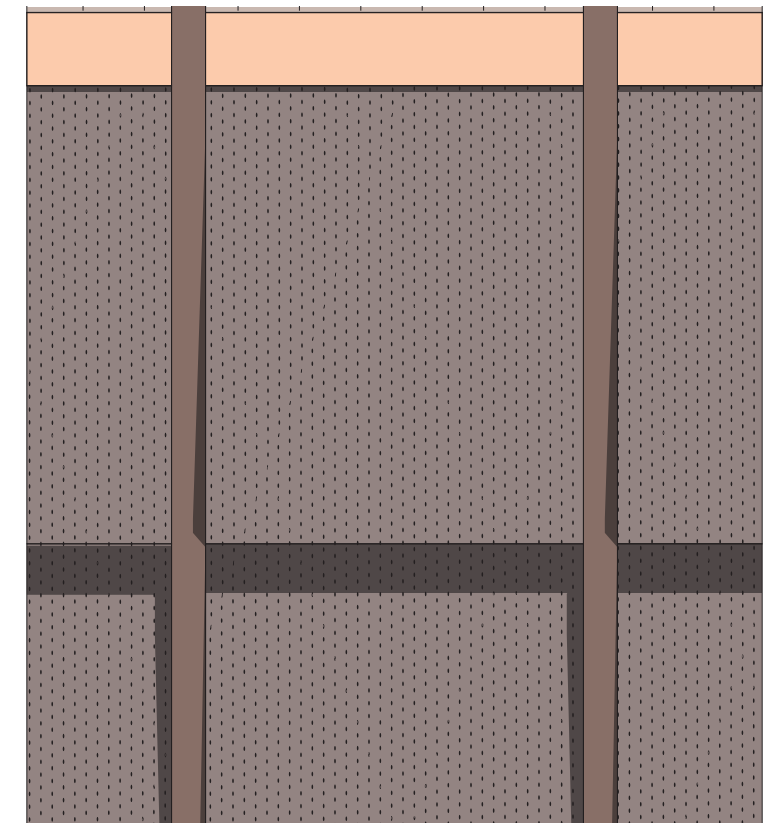
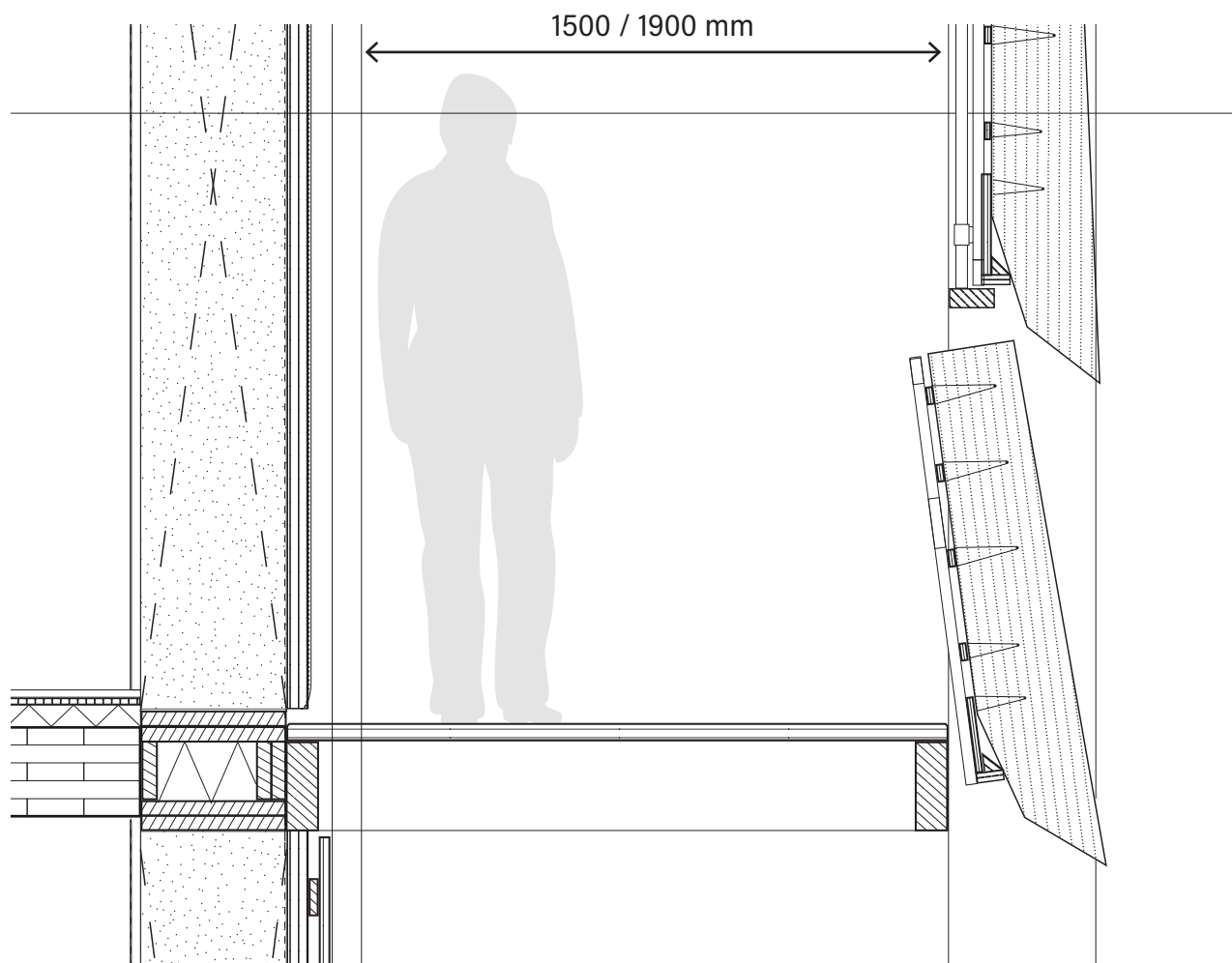
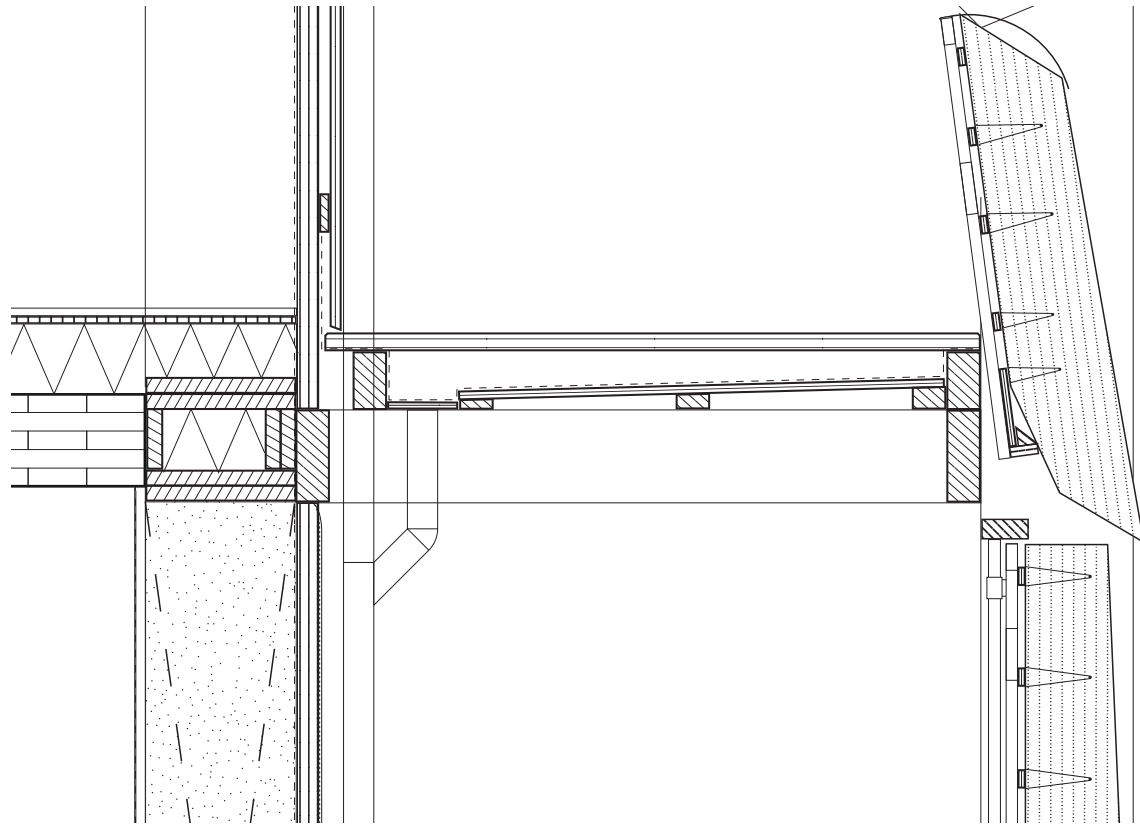
structural implementation

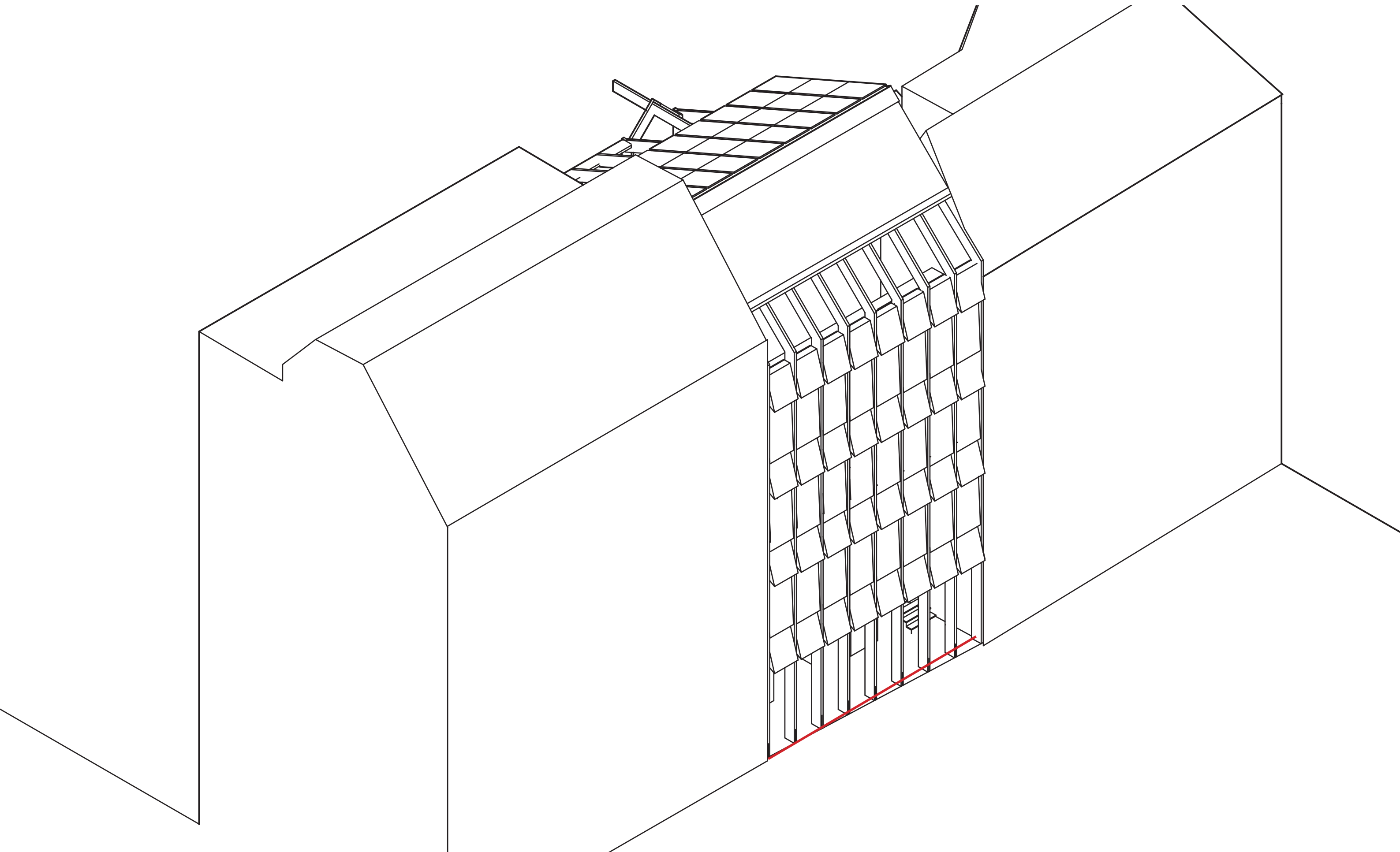


implications for modular system

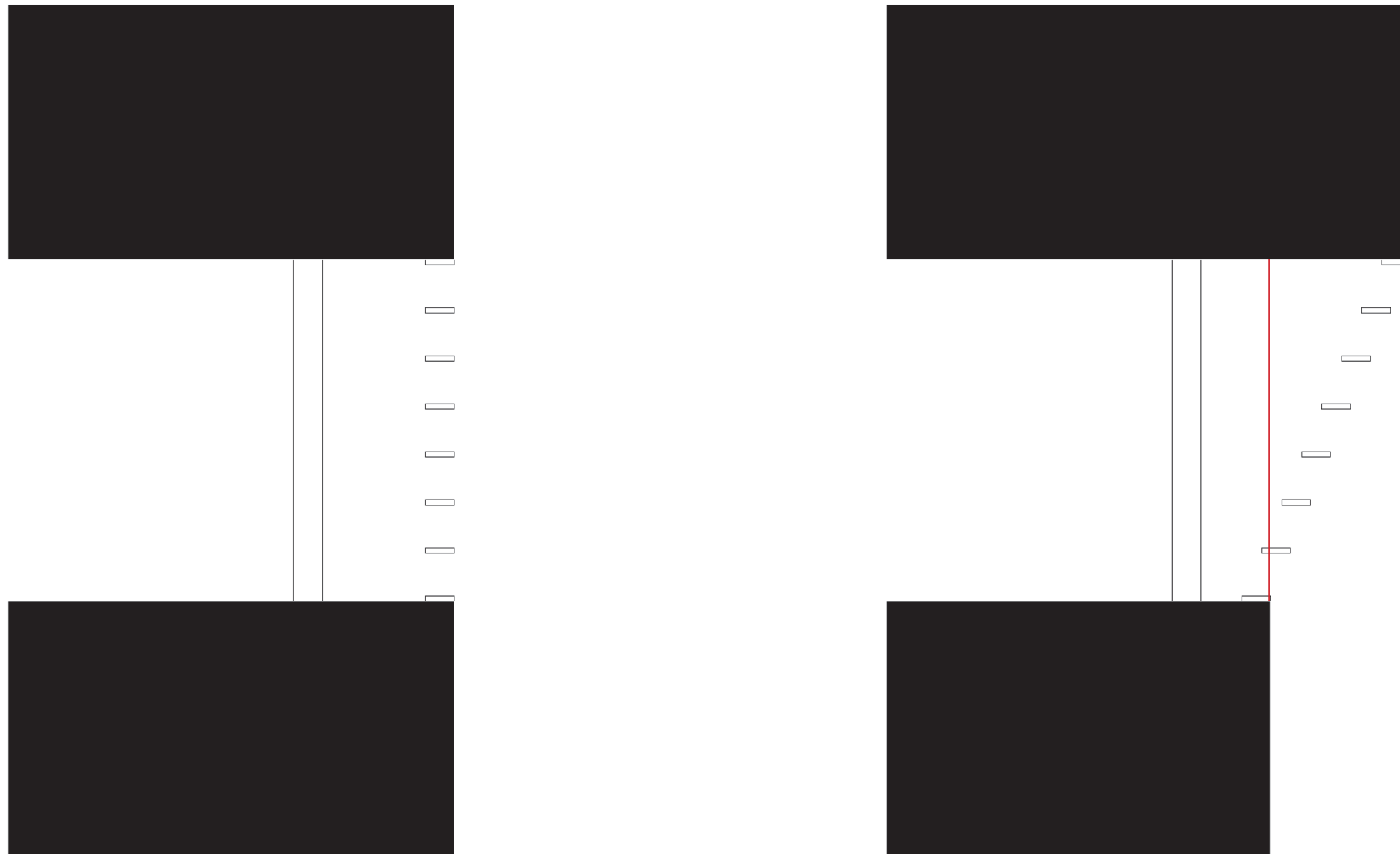


implications for modular system

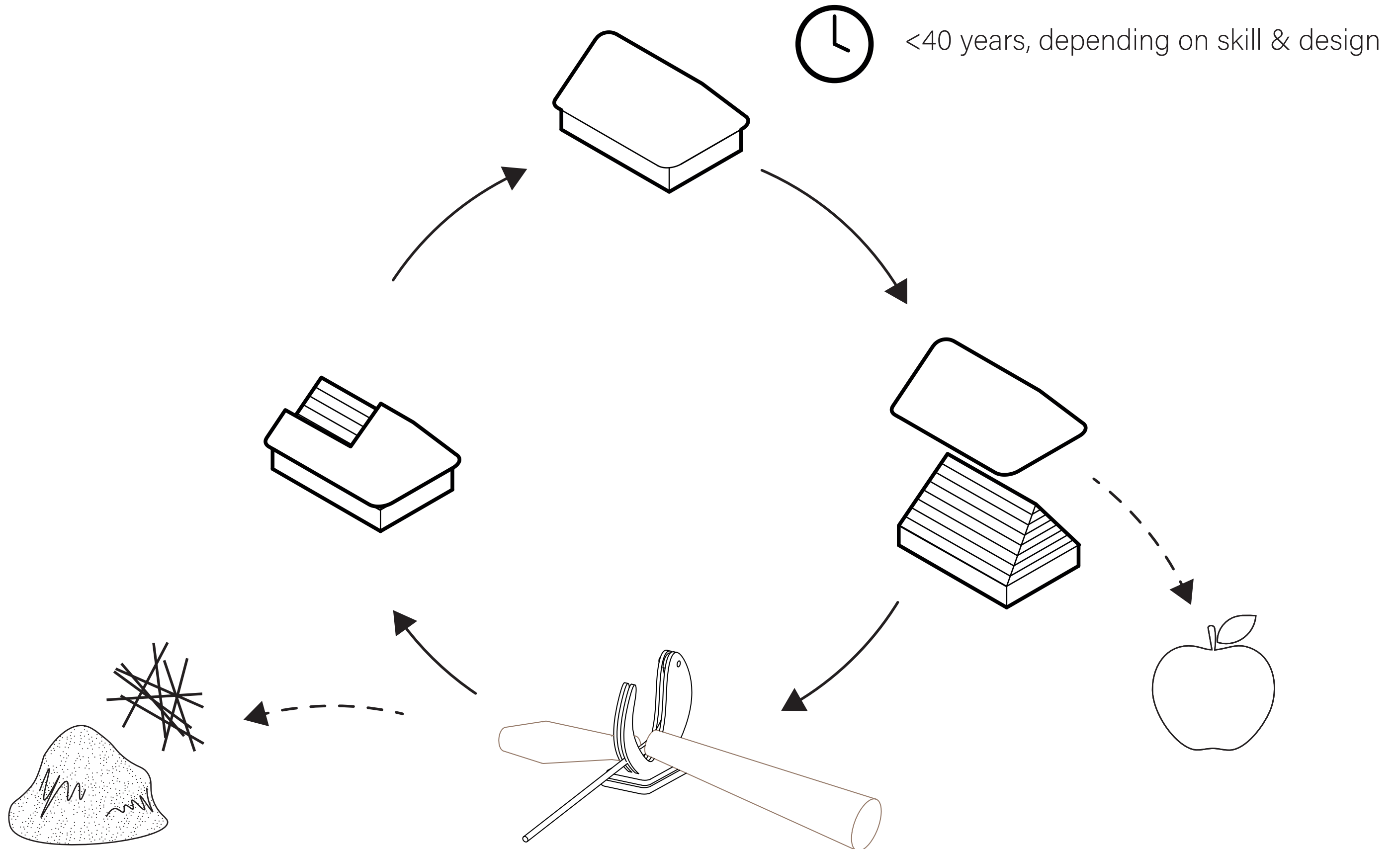




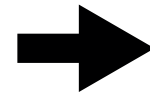
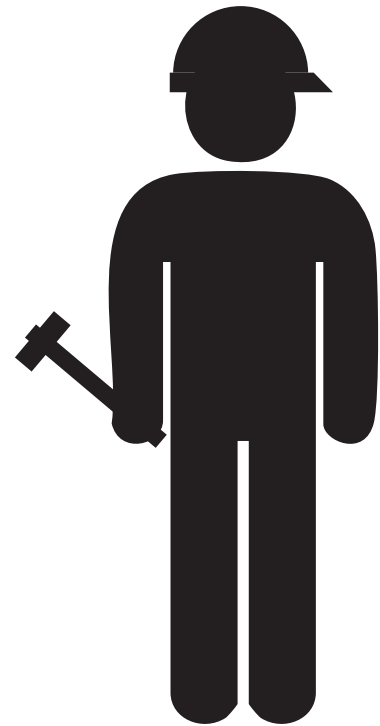
implications for modular system



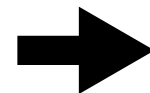
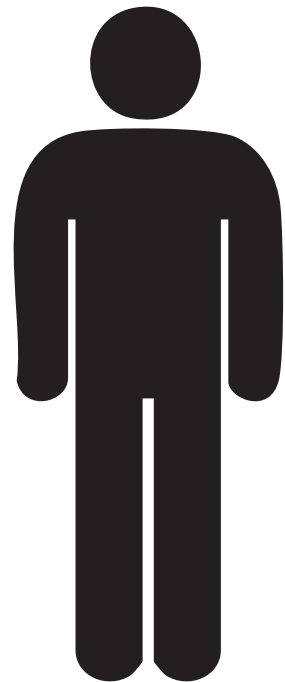
implications for modular system



implications for modular system



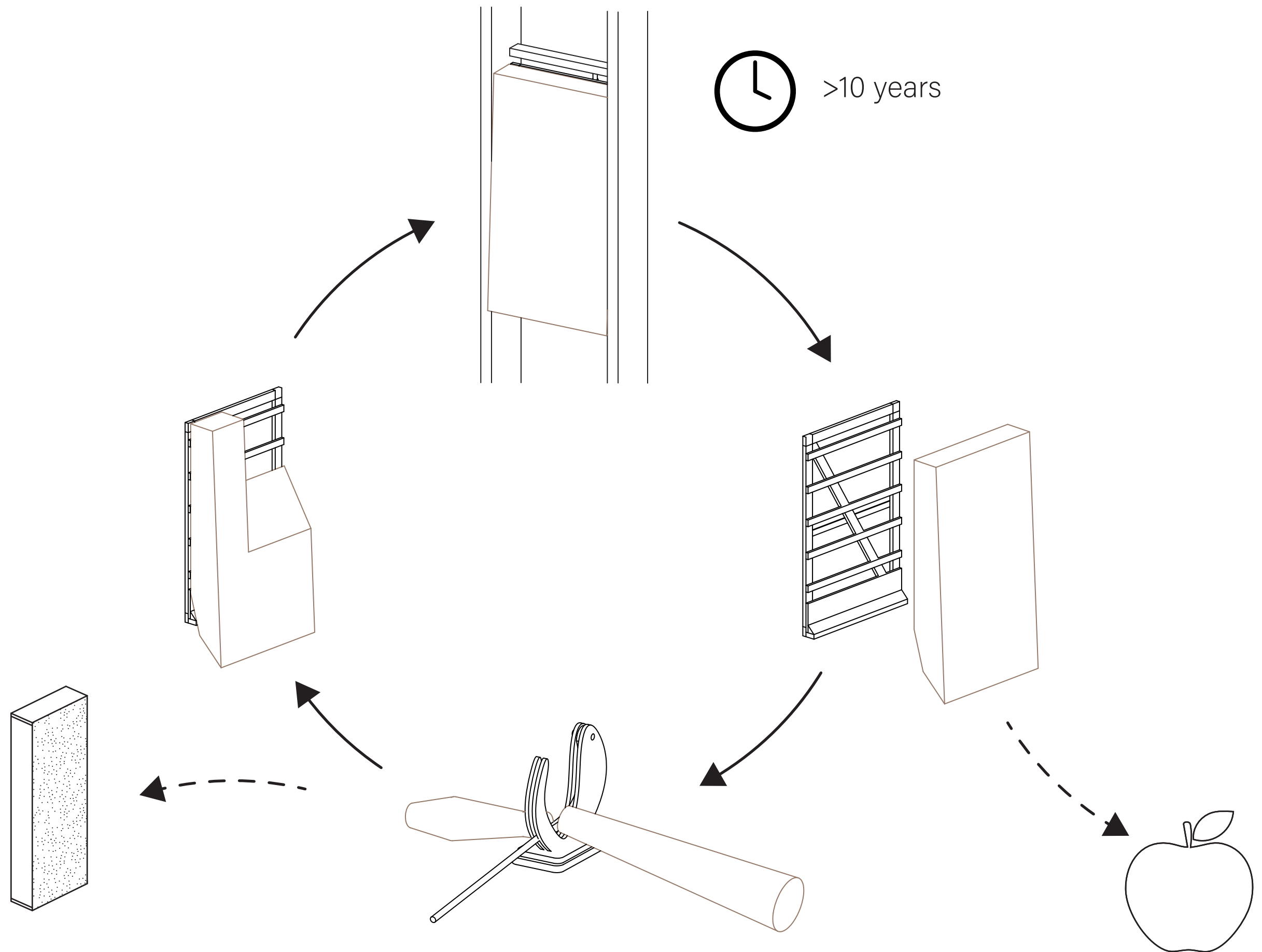
precision
speed
availability



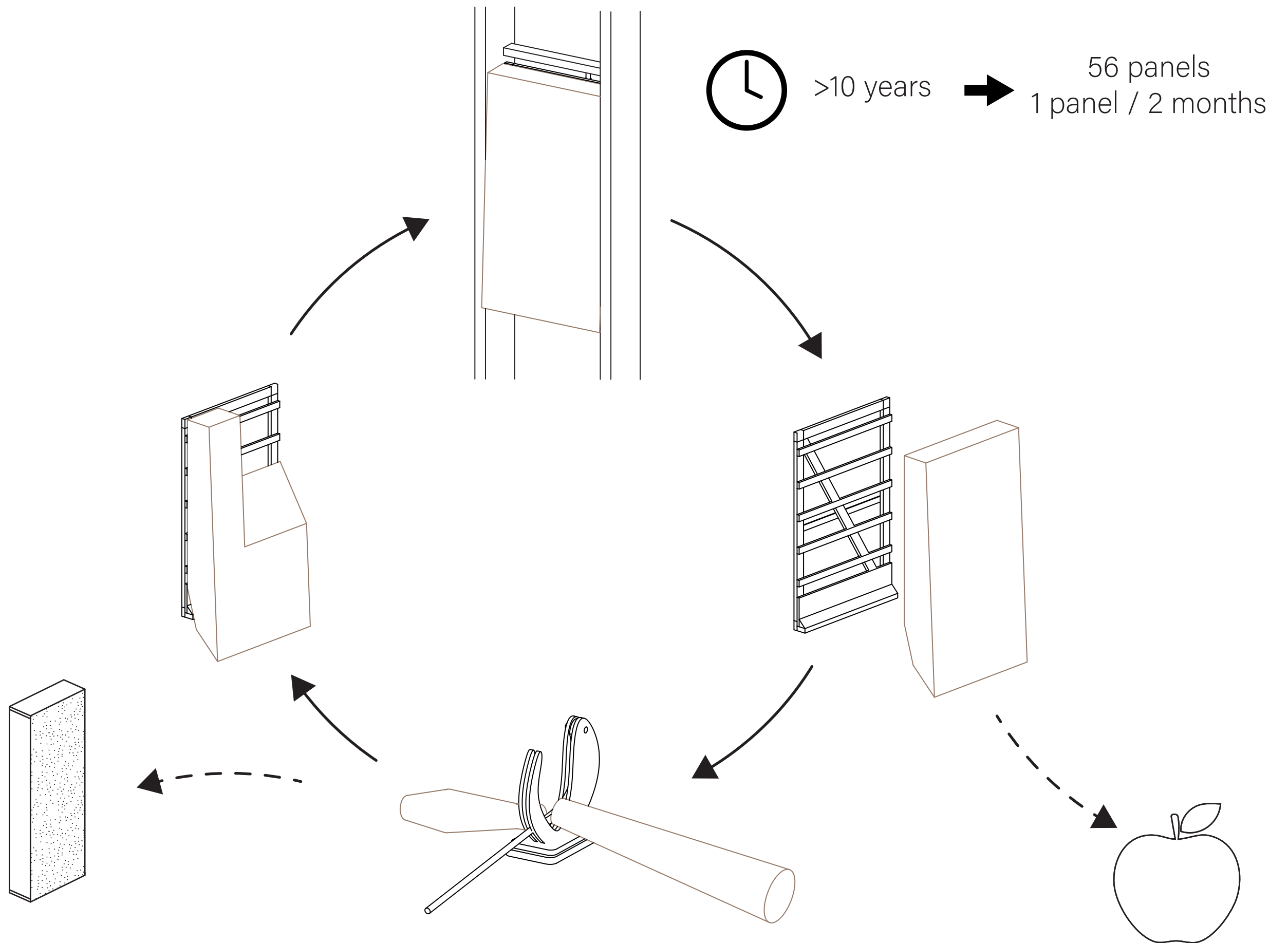
precision
speed
availability



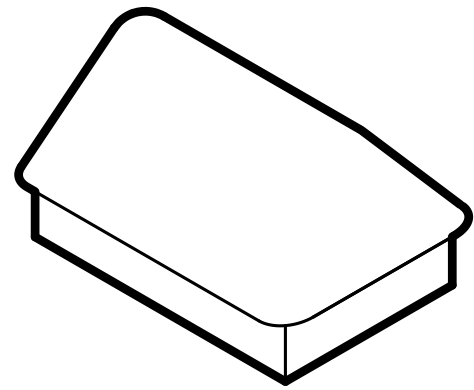
implications for modular system



implications for modular system

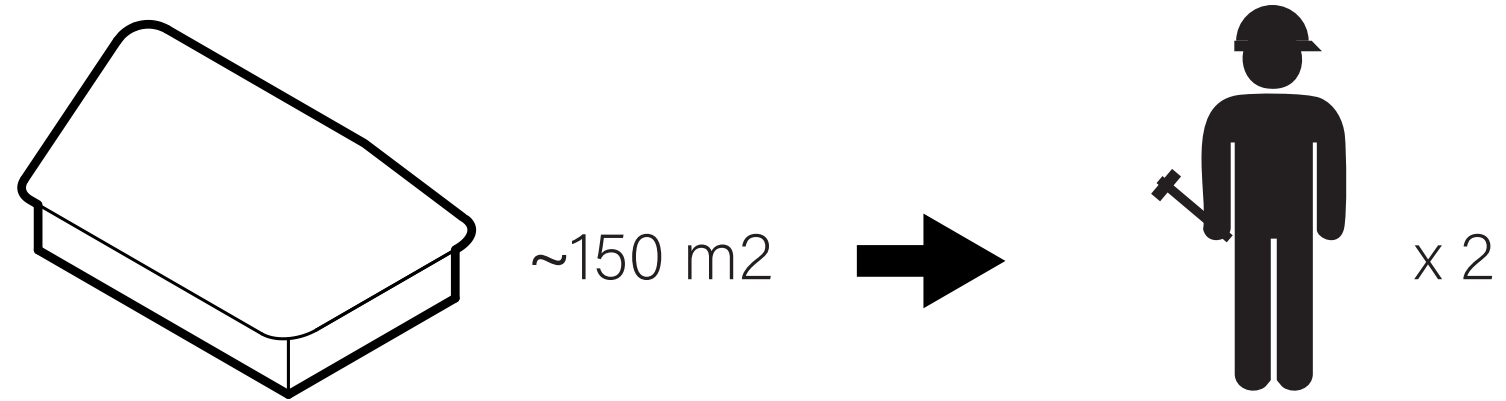


implications for modular system

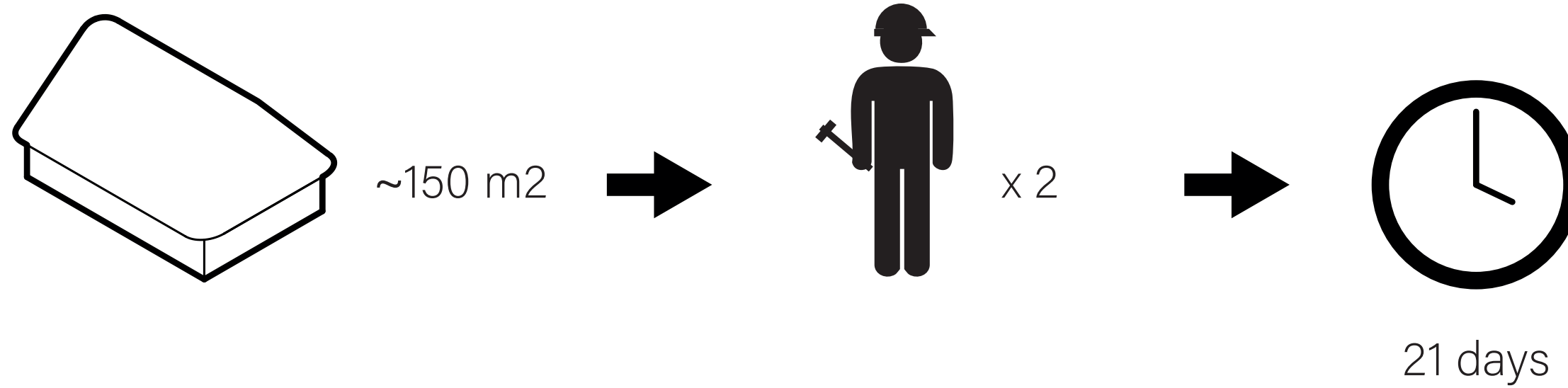


~150 m²

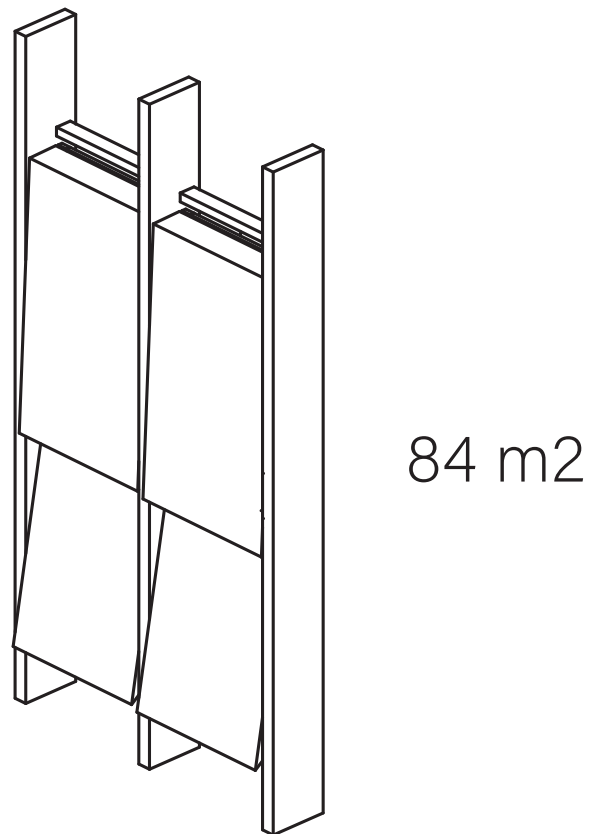
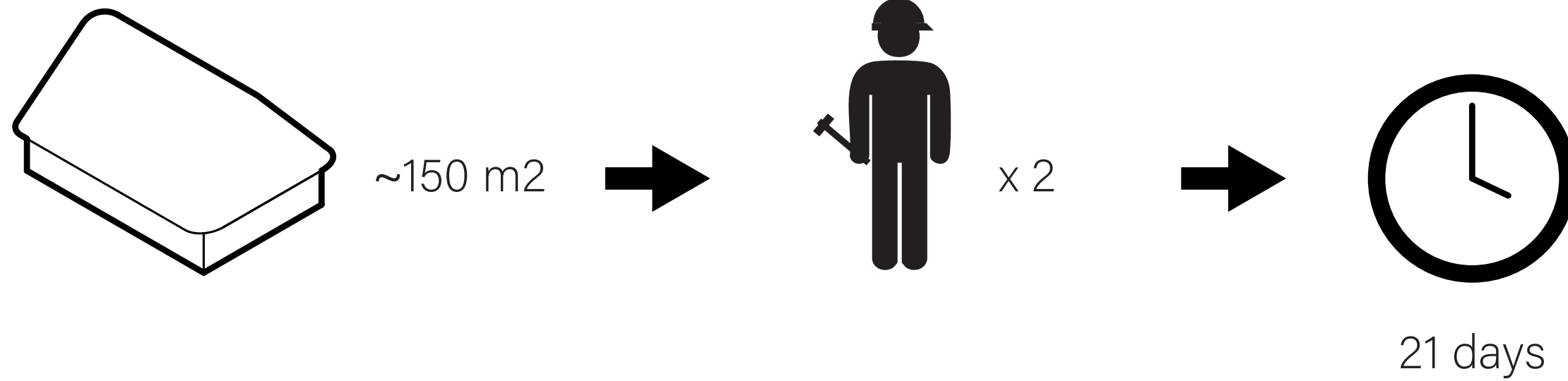
implications for modular system



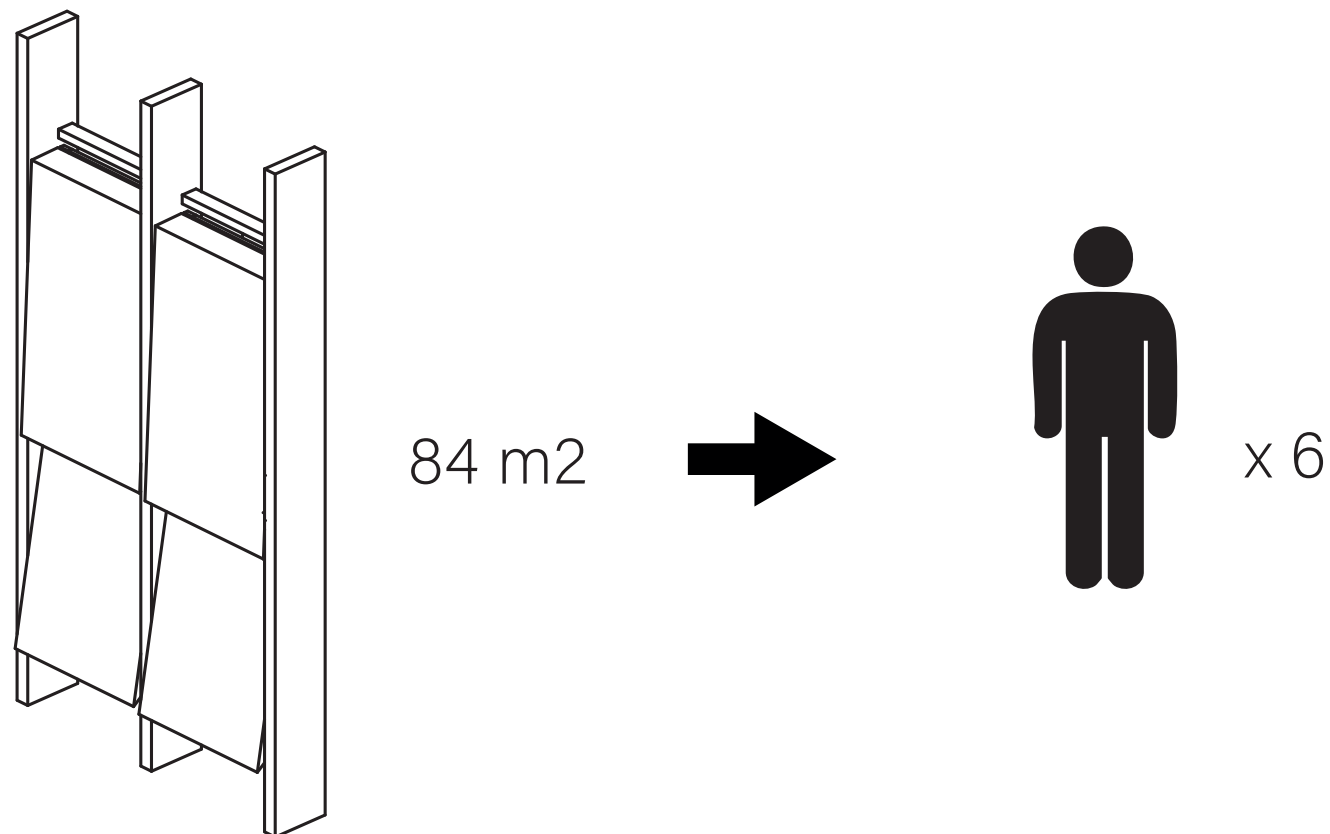
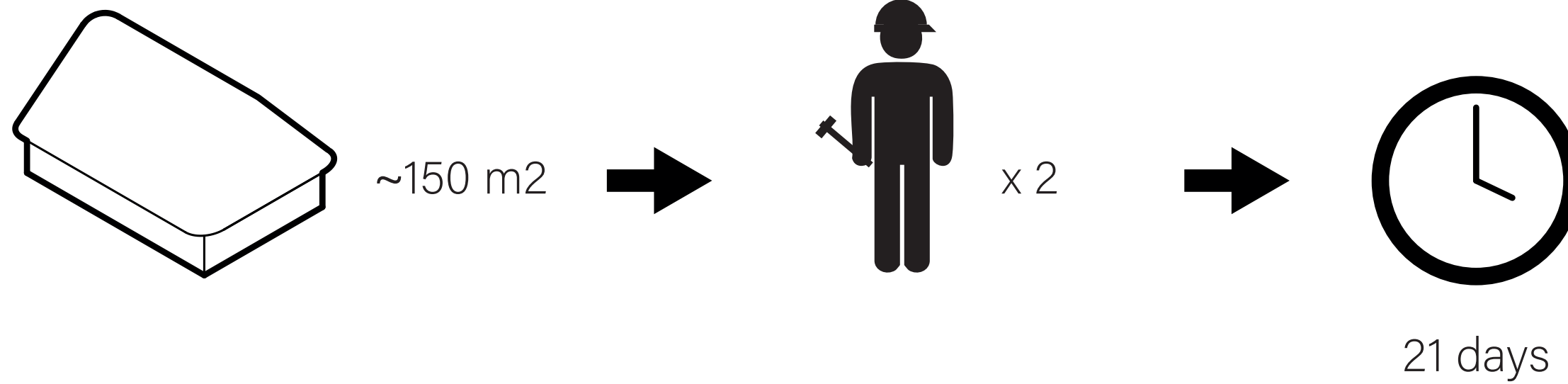
implications for modular system



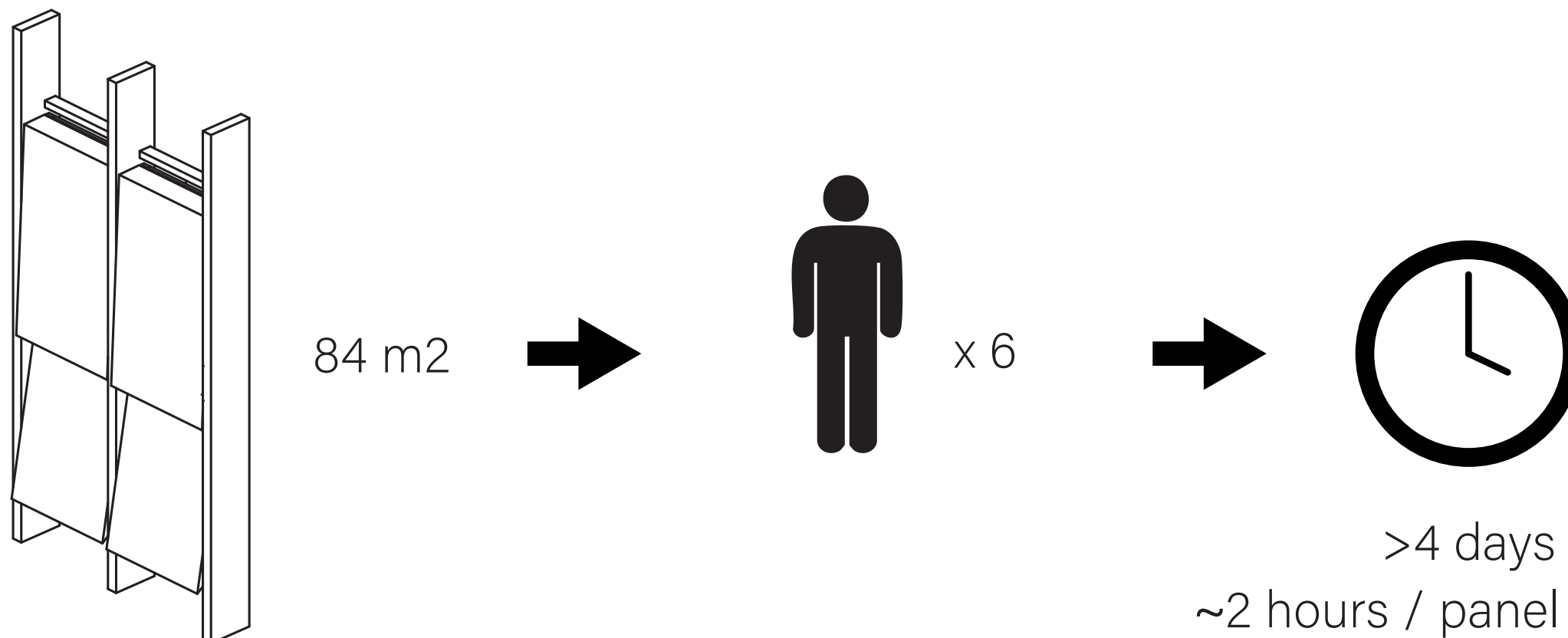
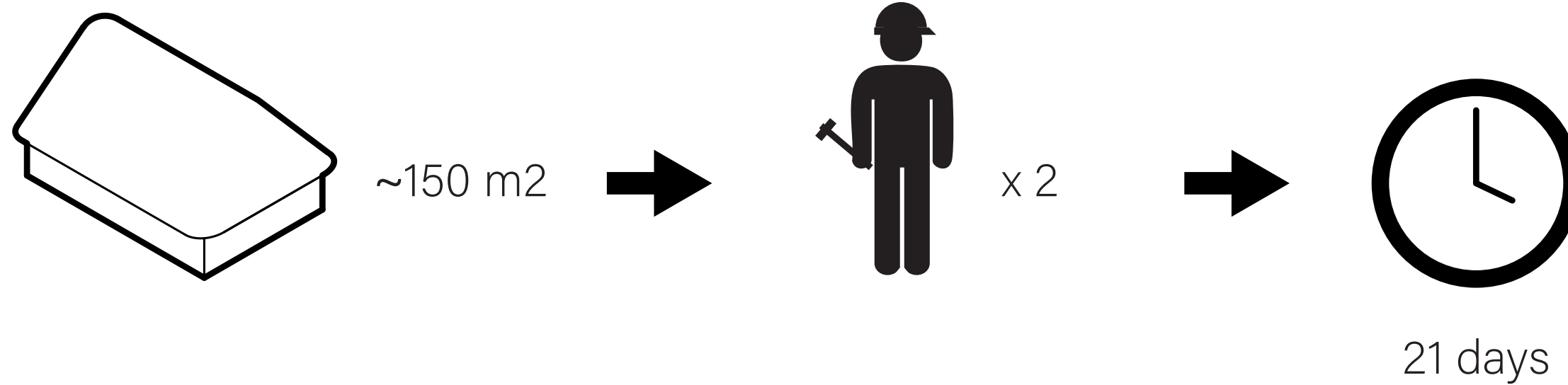
implications for modular system



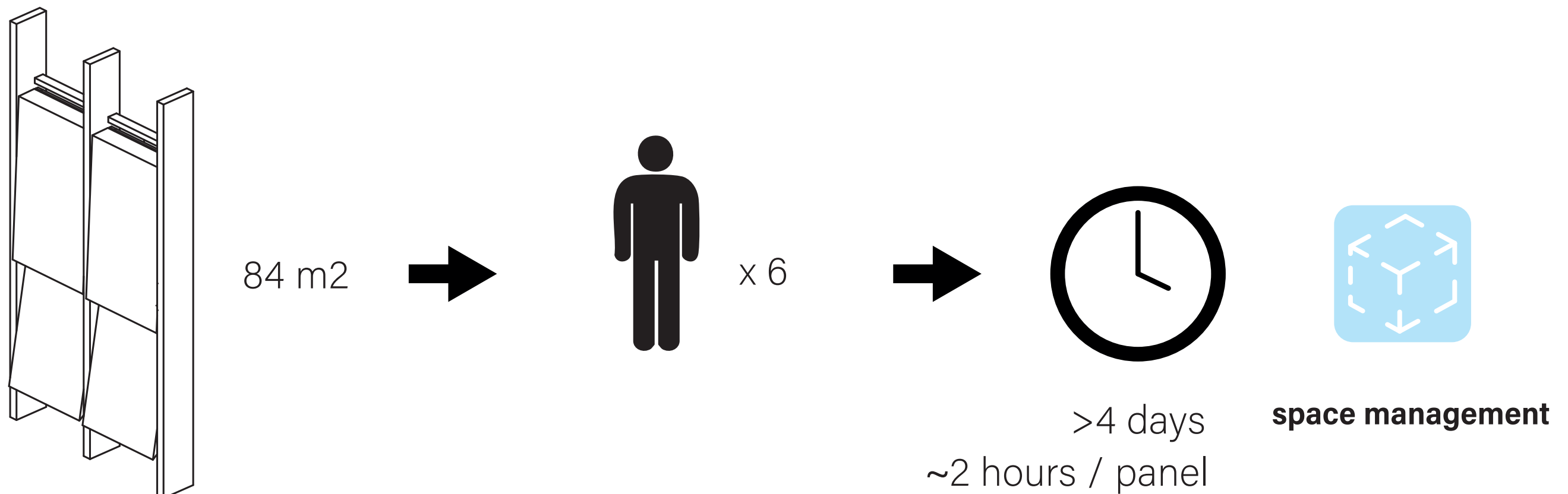
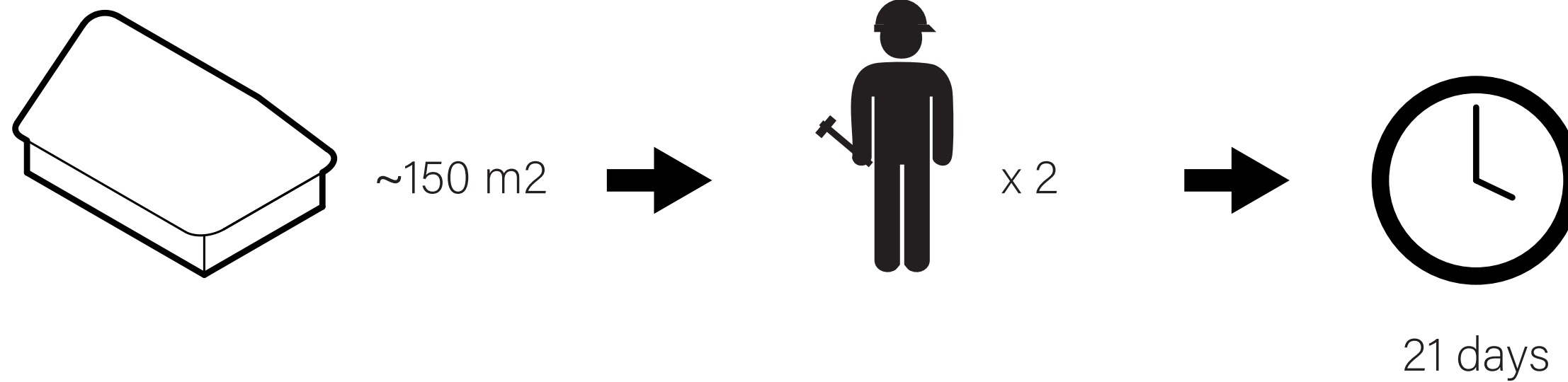
implications for modular system



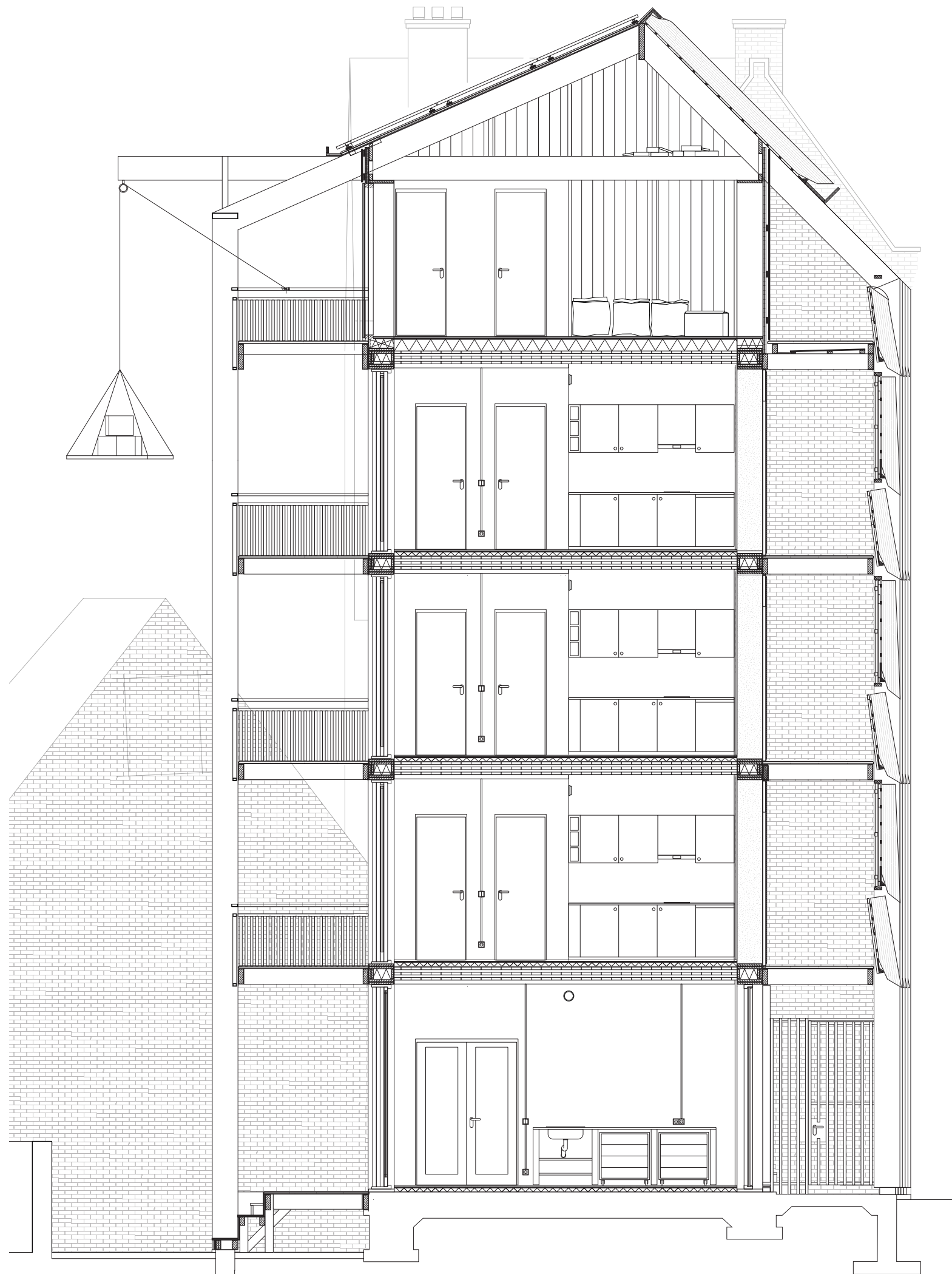
implications for modular system



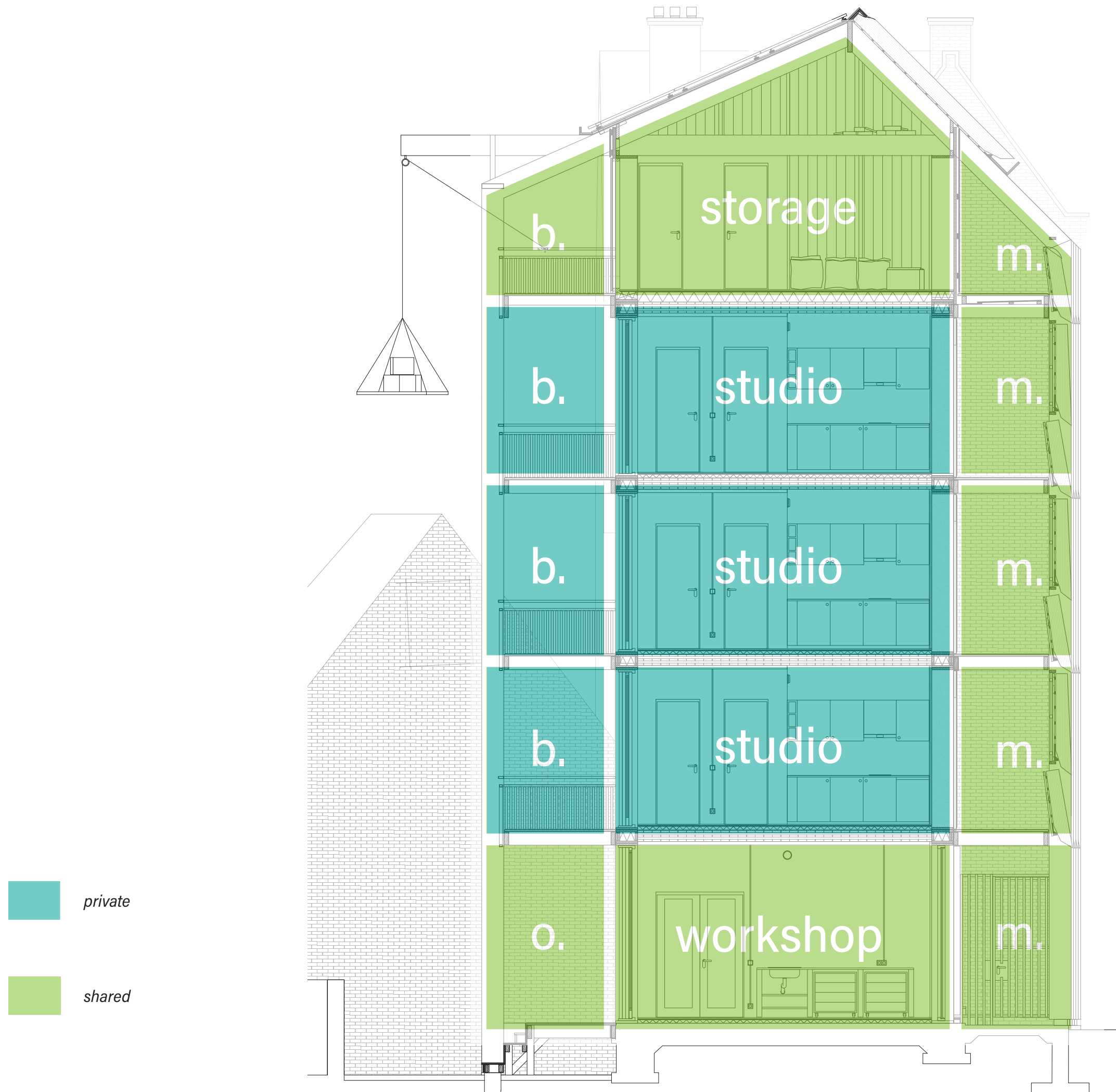
implications for modular system



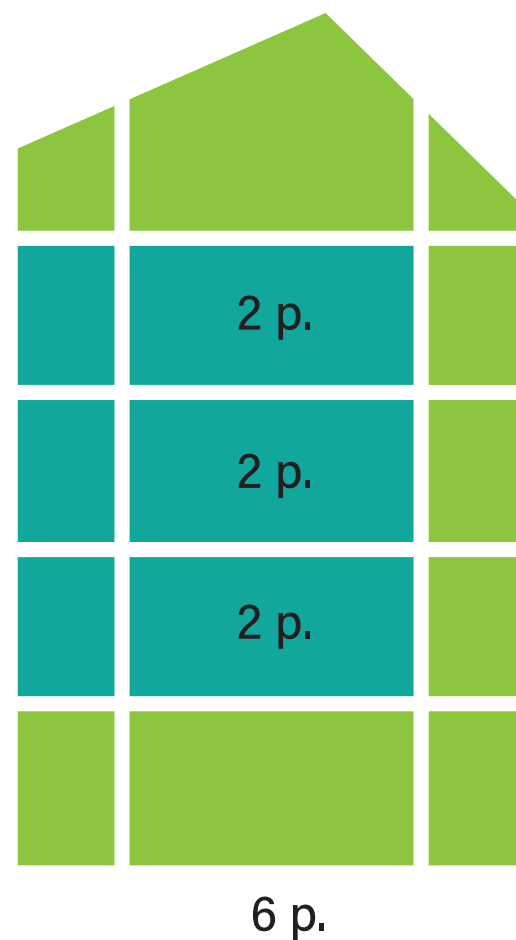




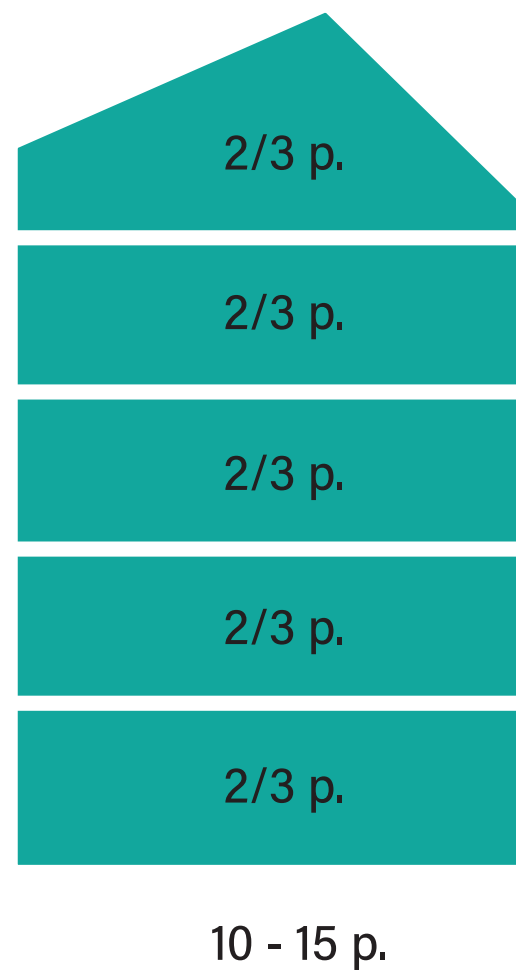




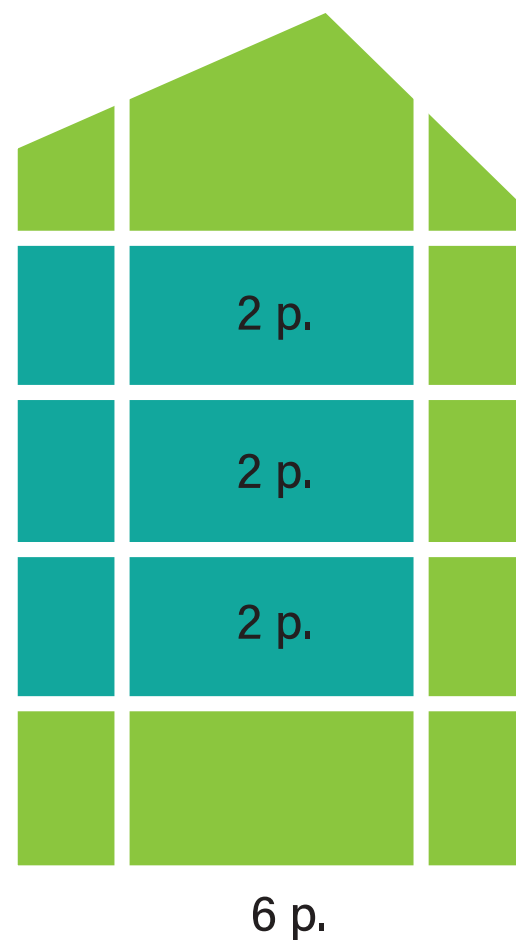




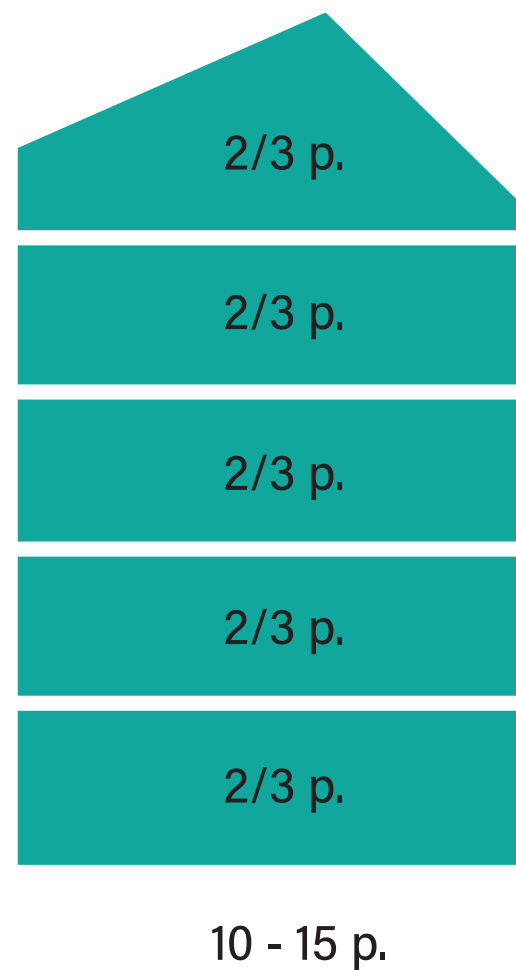
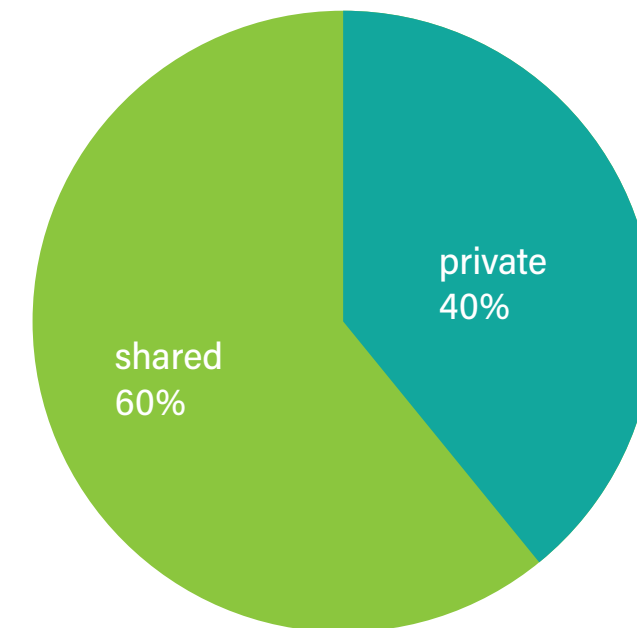
private	shared
0 m ²	74 m ²
50 m ²	14 m ²
50 m ²	14 m ²
50 m ²	14 m ²
0 m ²	74 m ²
<hr/>	
150 m ²	+ 220 m ² = 370 m ²



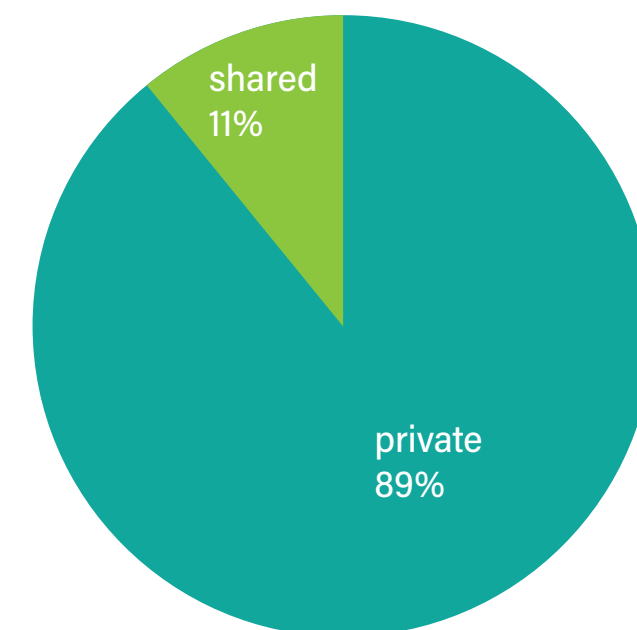
66 m ²	8 m ²
66 m ²	8 m ²
66 m ²	8 m ²
66 m ²	8 m ²
66 m ²	8 m ²
<hr/>	
330 m ²	+ 40 m ² = 370 m ²

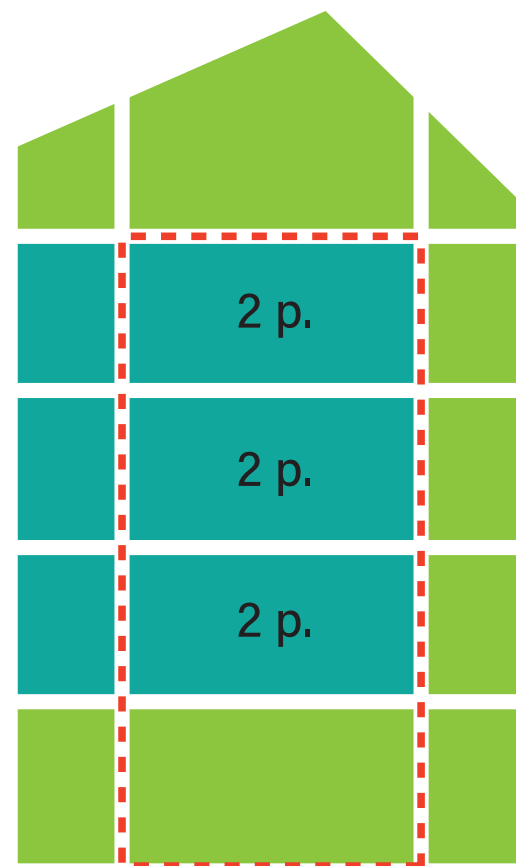


private	shared
0 m ²	74 m ²
50 m ²	14 m ²
50 m ²	14 m ²
50 m ²	14 m ²
0 m ²	74 m ²
<hr/>	
150 m ²	220 m ² = 370 m ²



66 m ²	8 m ²
66 m ²	8 m ²
66 m ²	8 m ²
66 m ²	8 m ²
66 m ²	8 m ²
<hr/>	
330 m ²	40 m ² = 370 m ²



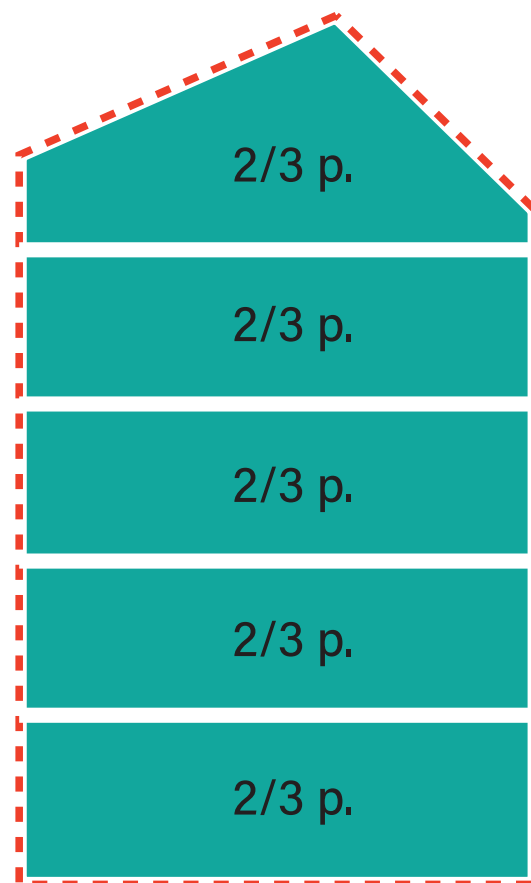
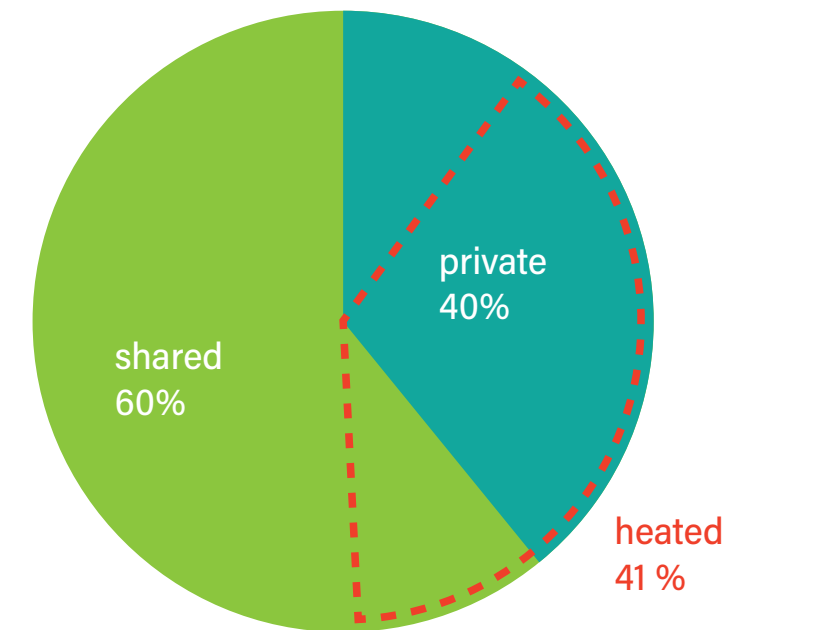


6 p.



private	shared
0 m ²	74 m ²
50 m ²	14 m ²
50 m ²	14 m ²
50 m ²	14 m ²
0 m ²	74 m ²

$$150 \text{ m}^2 + 220 \text{ m}^2 = 370 \text{ m}^2$$

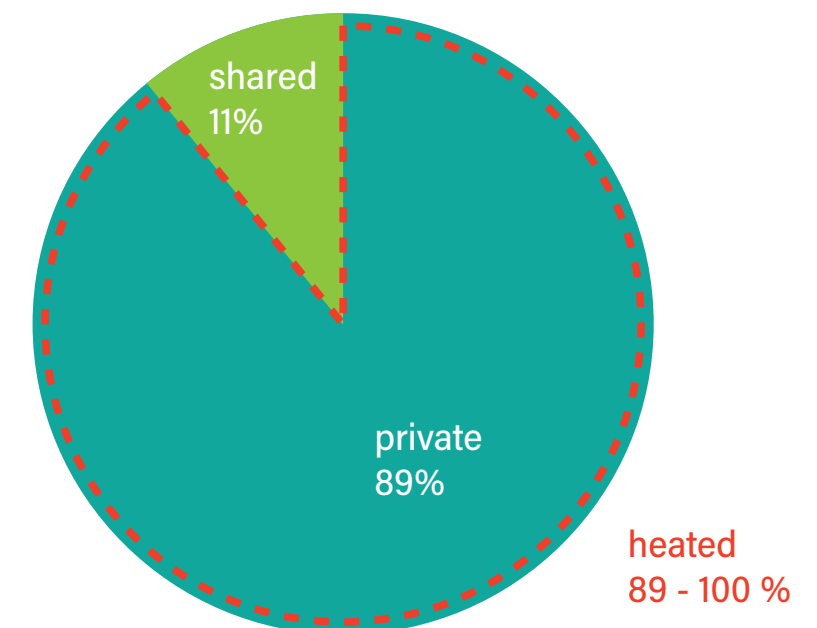


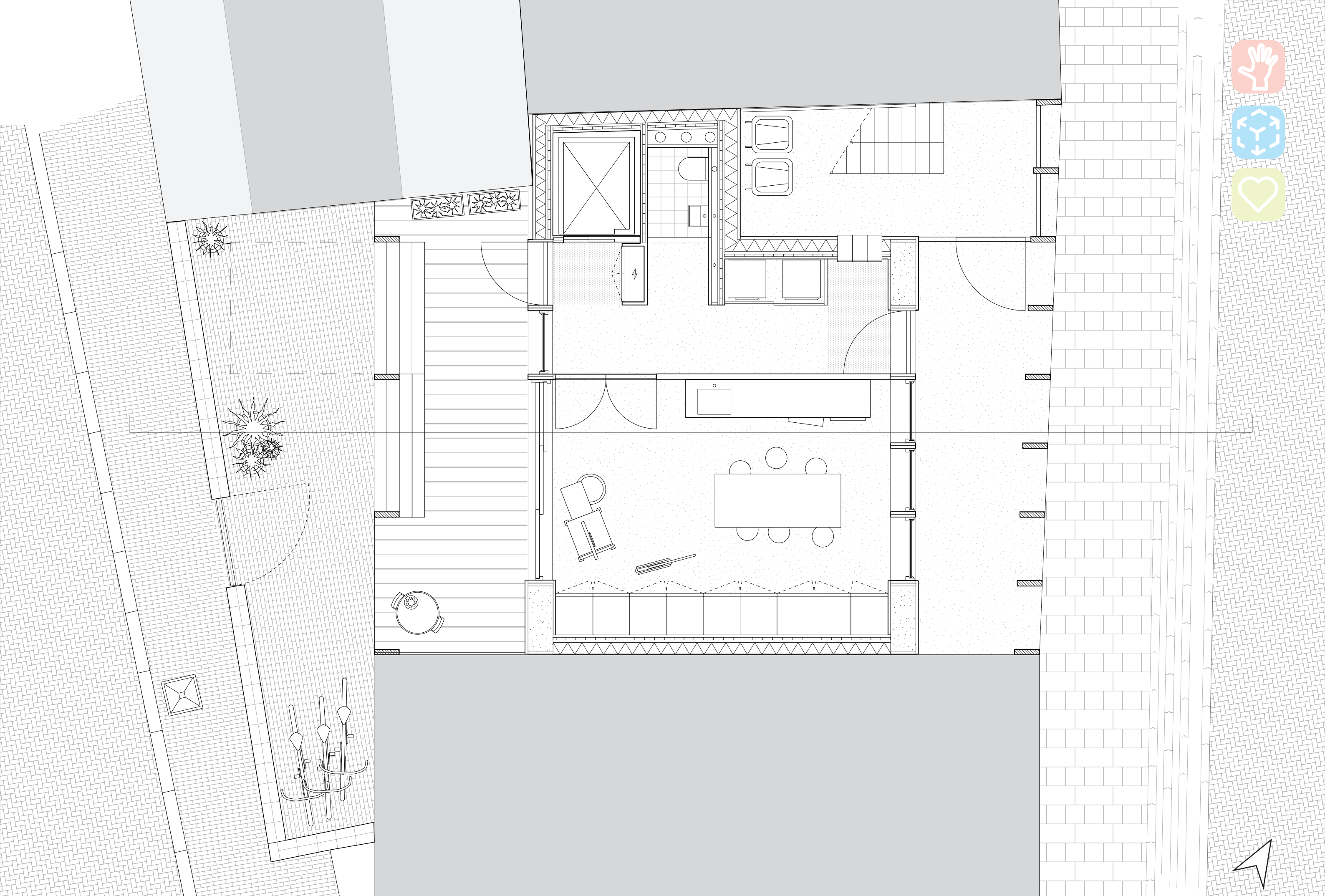
10 - 15 p.

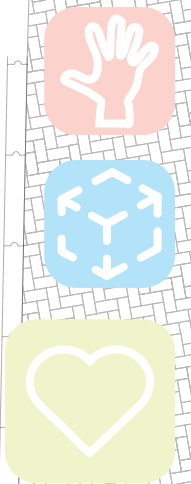
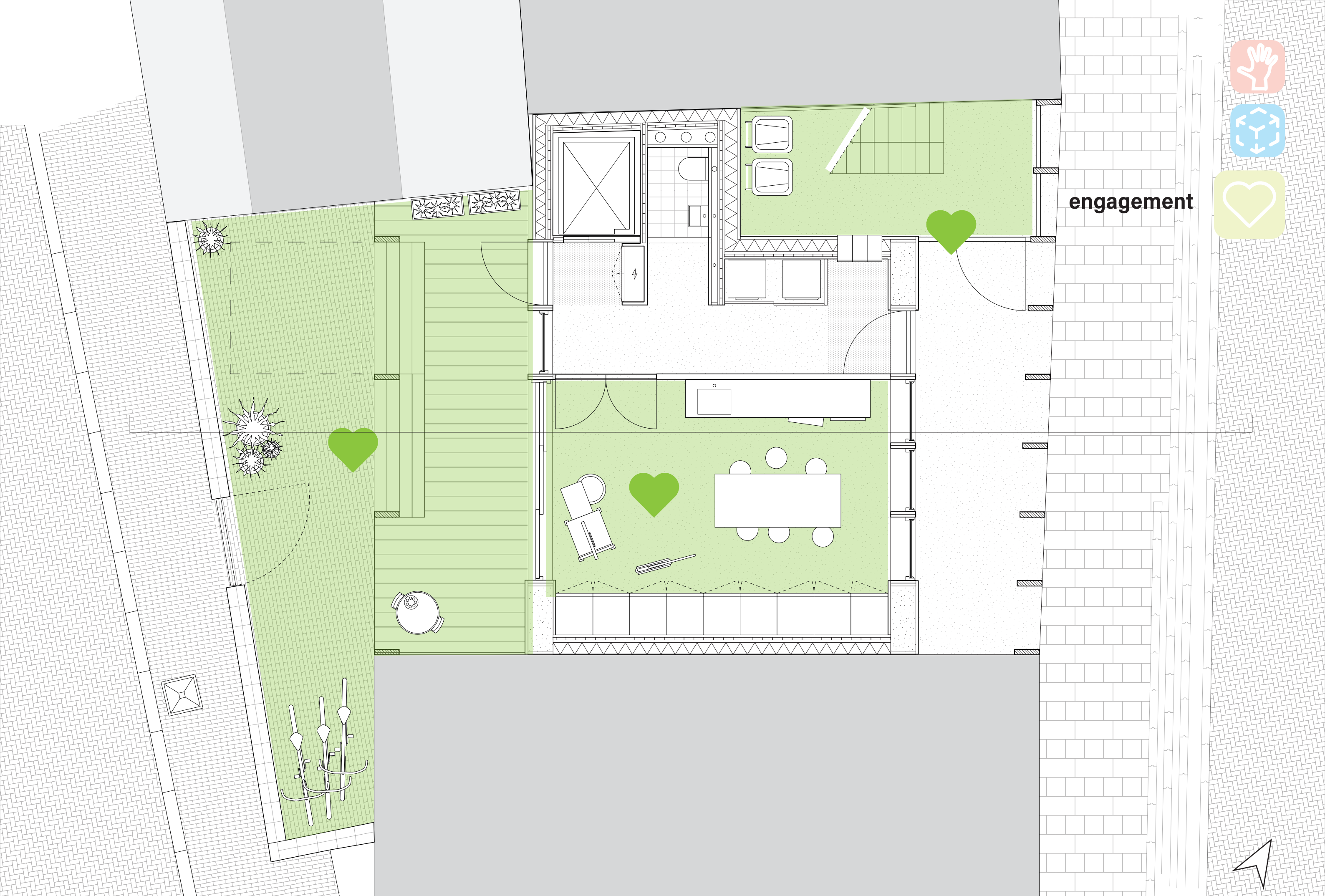


66 m ²	8 m ²
66 m ²	8 m ²
66 m ²	8 m ²
66 m ²	8 m ²
66 m ²	8 m ²

$$330 \text{ m}^2 + 40 \text{ m}^2 = 370 \text{ m}^2$$

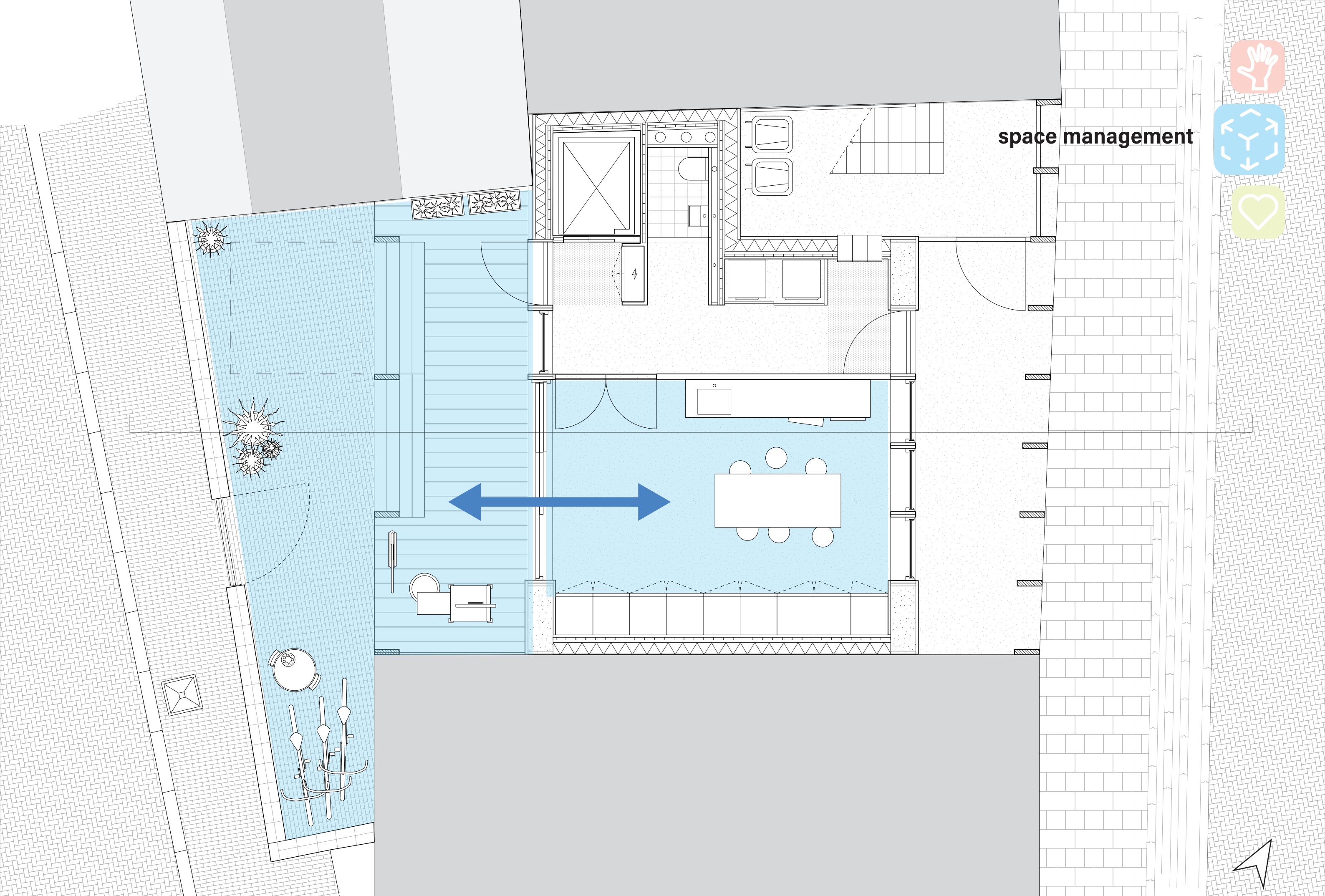




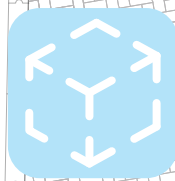




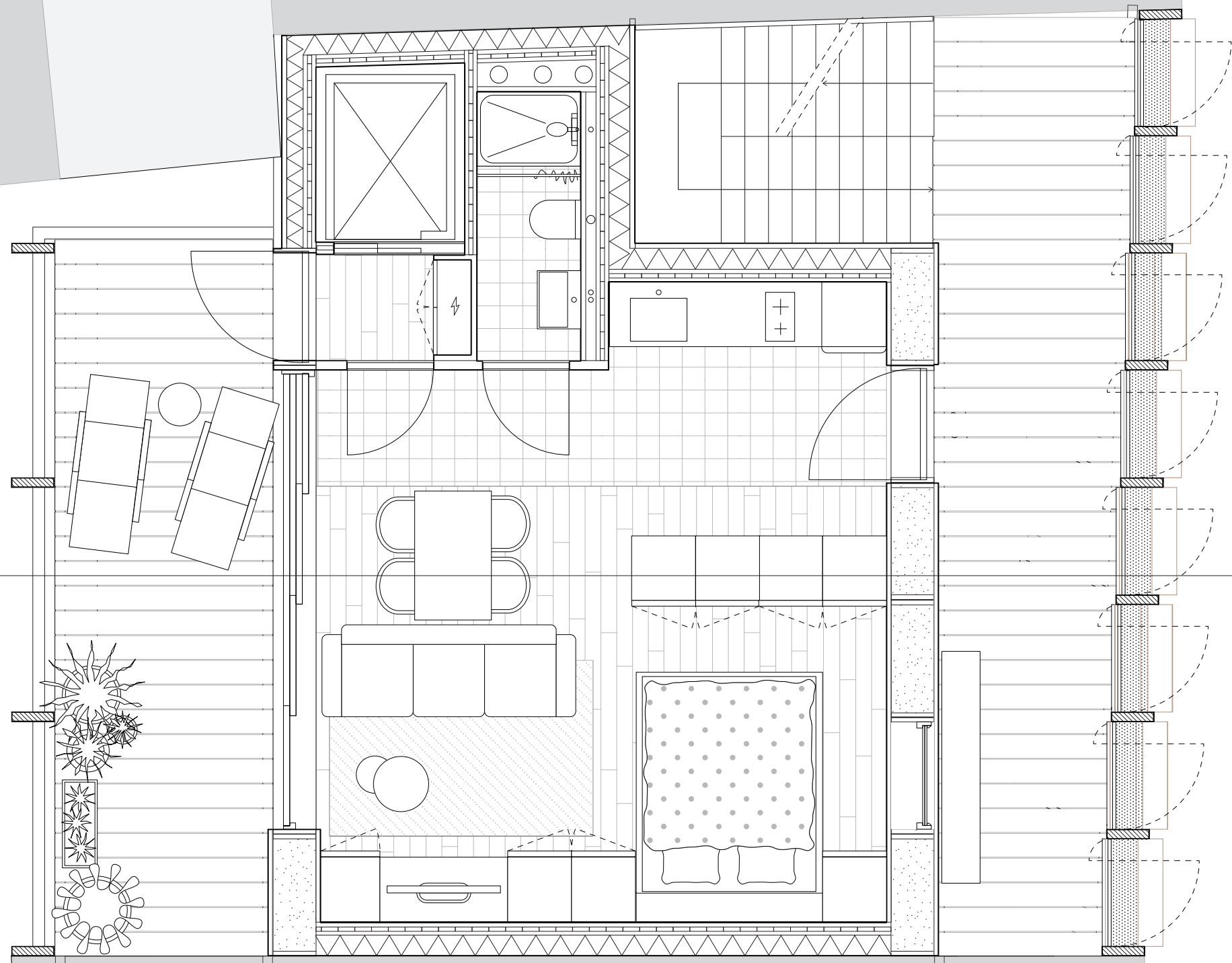
engagement



space management

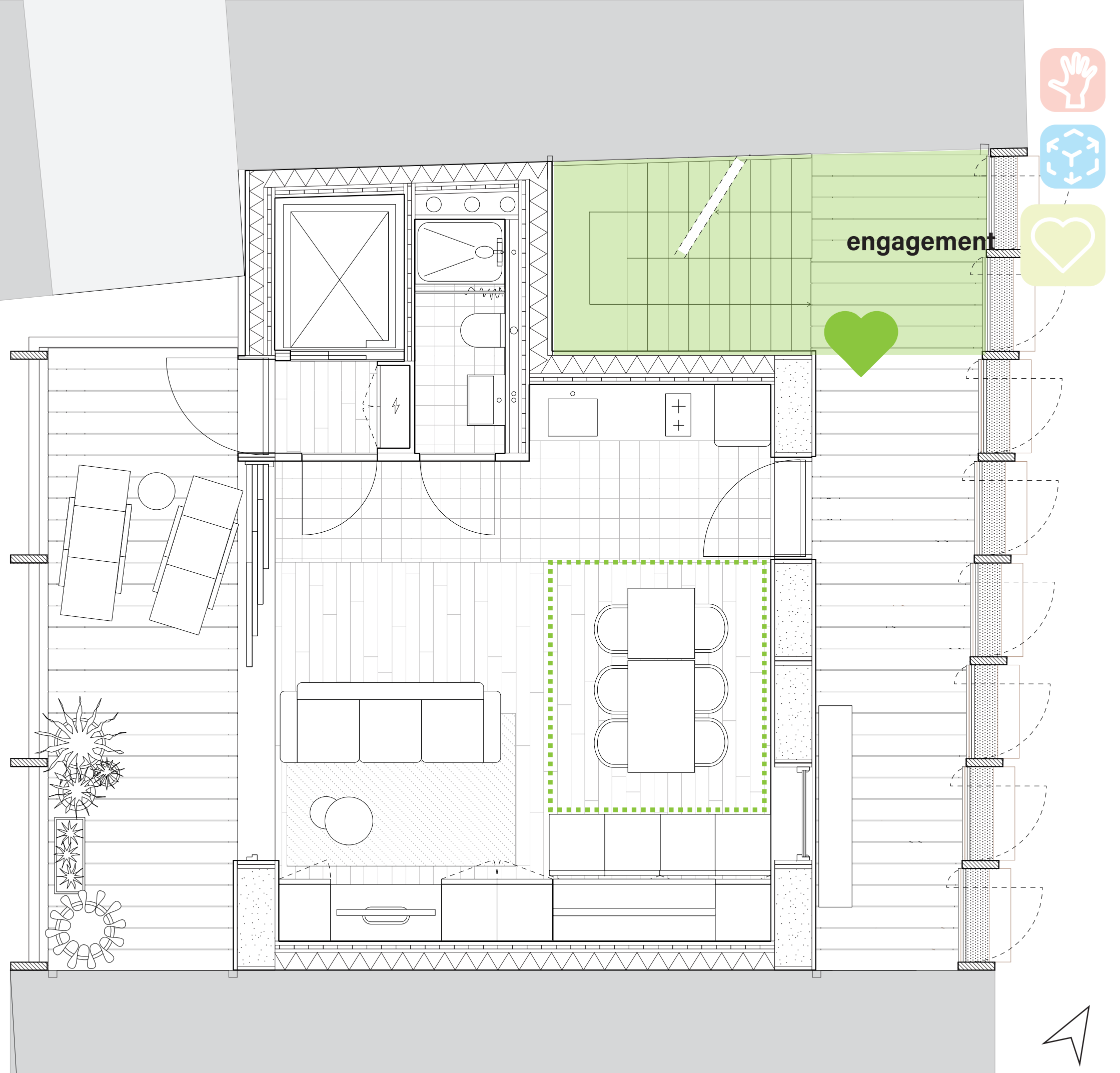








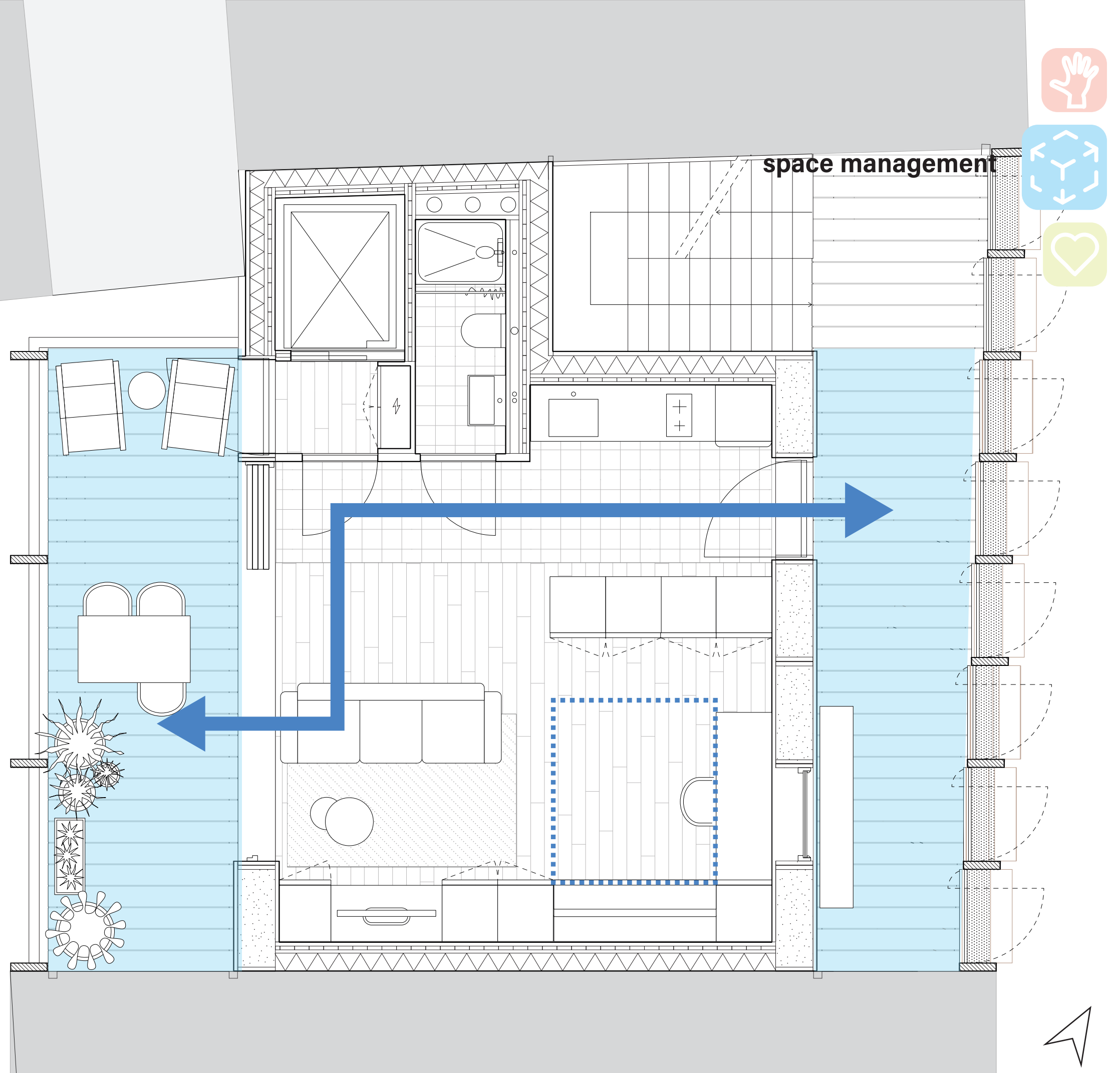




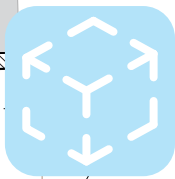


engagement

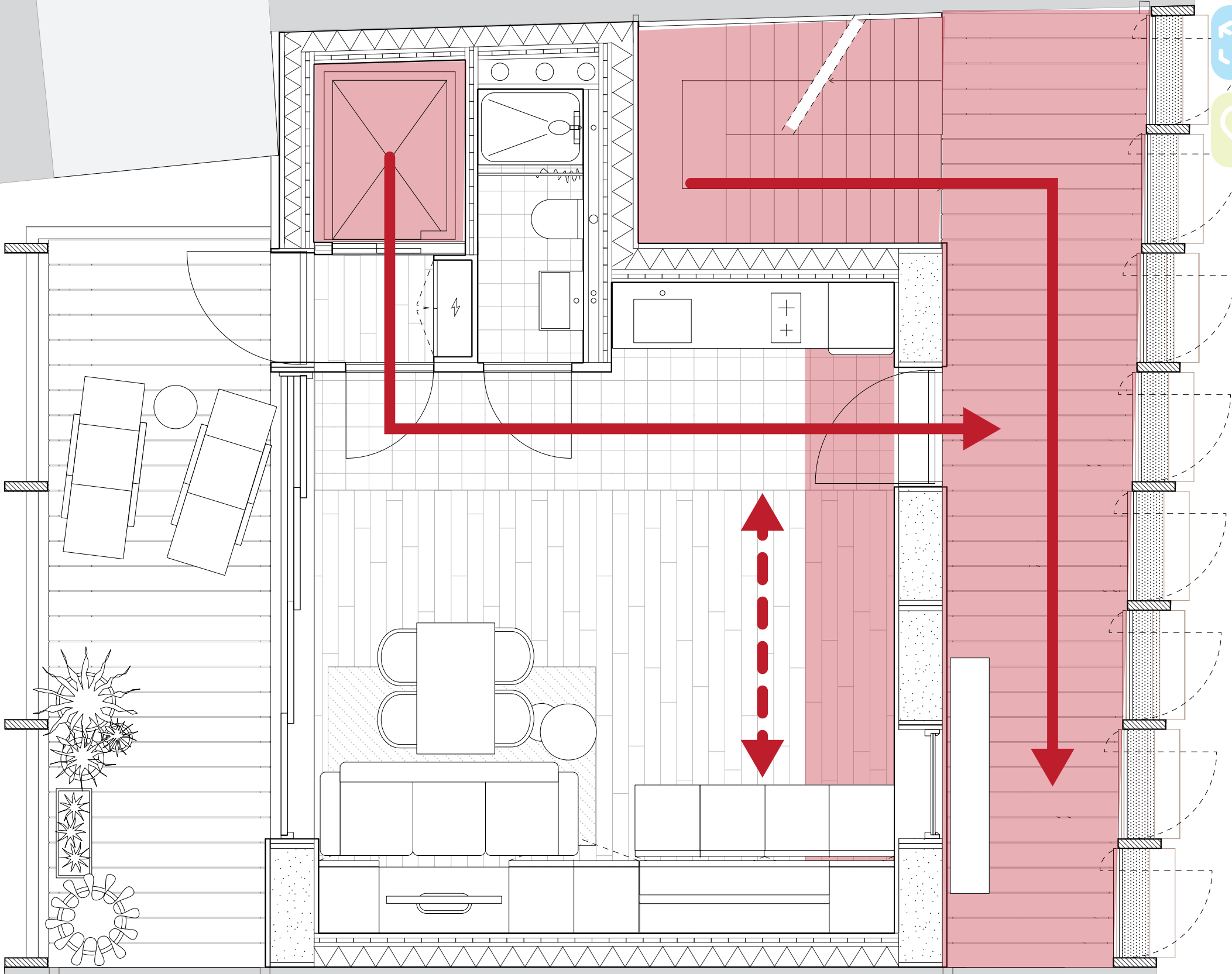


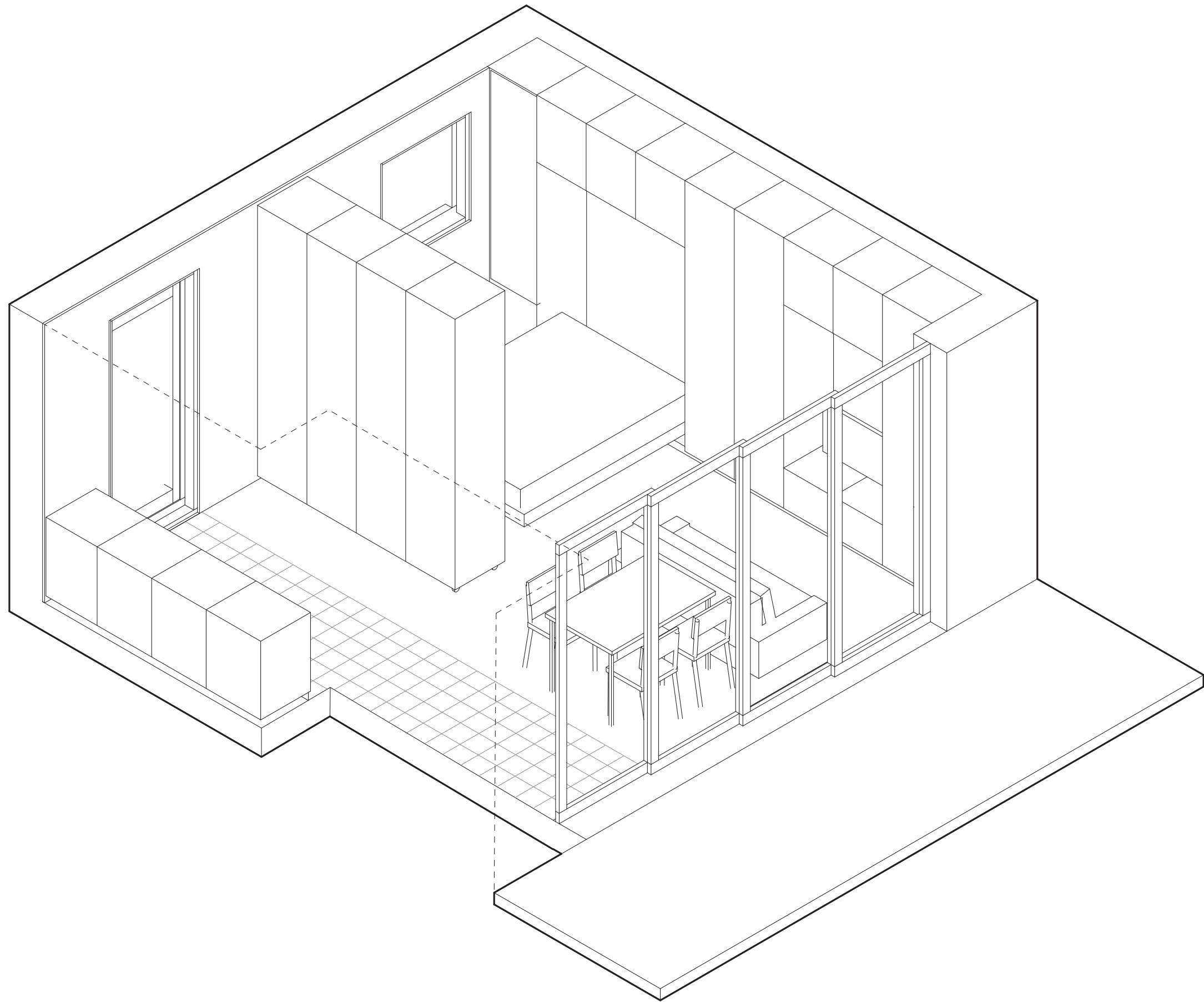


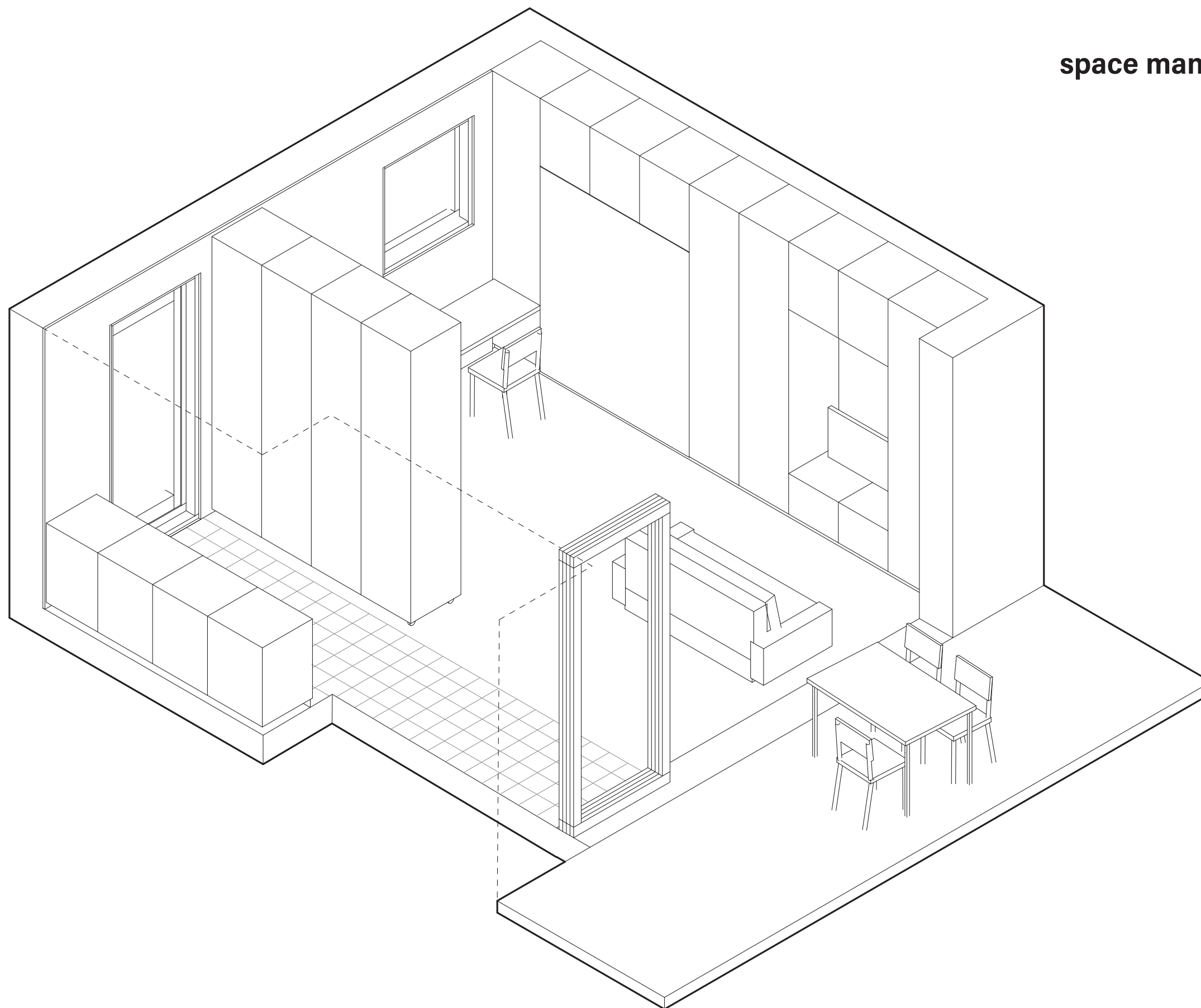
space management





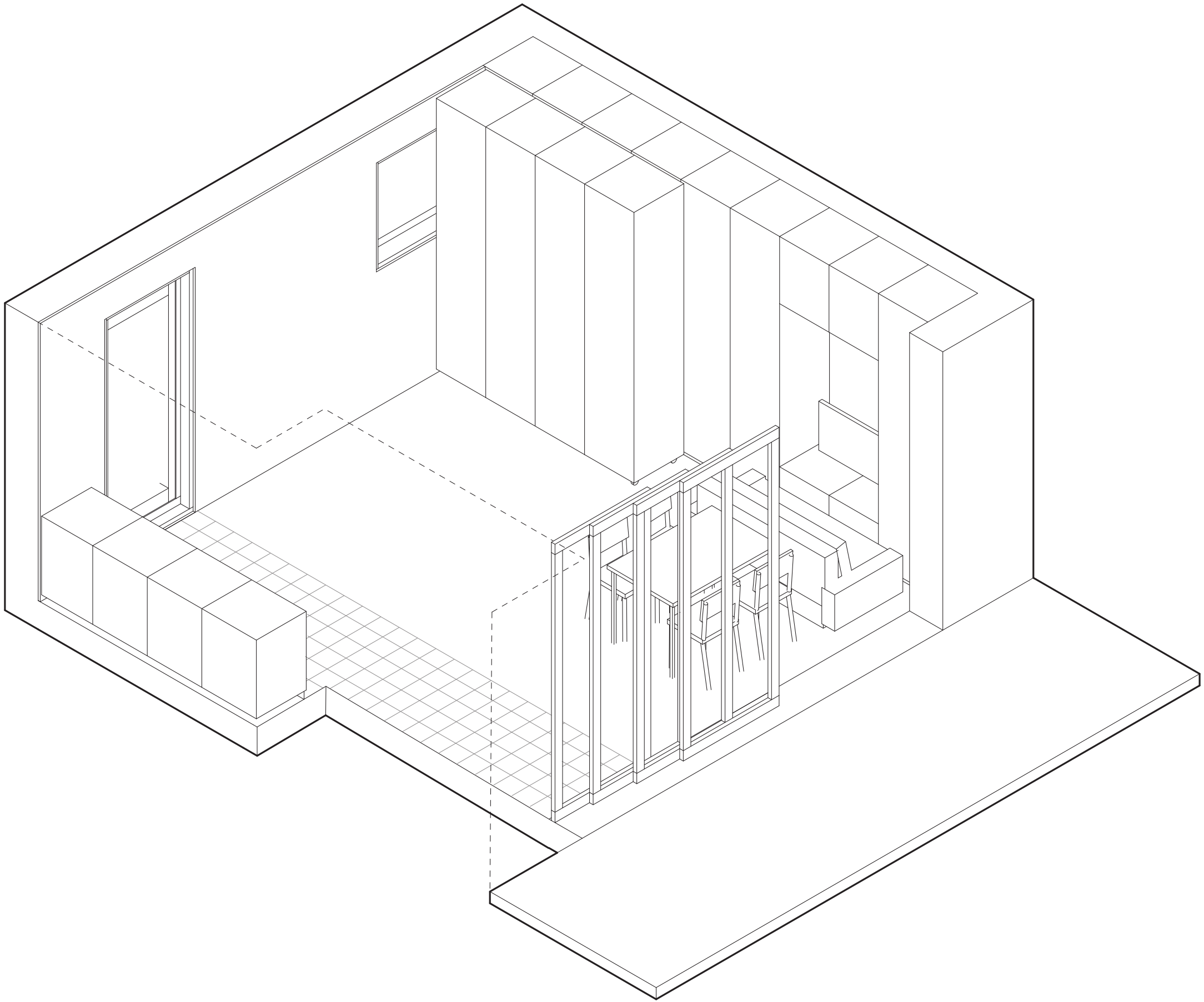


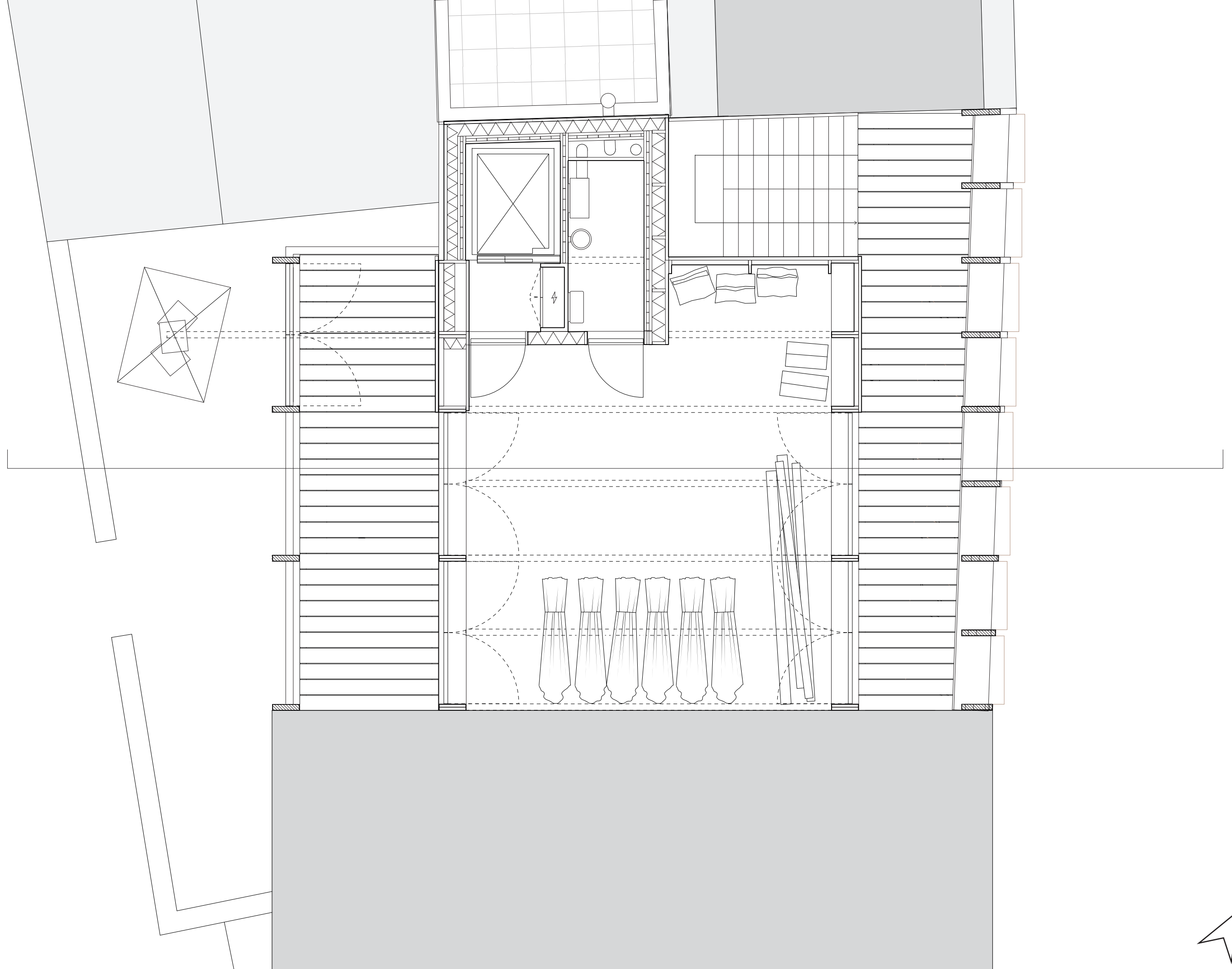


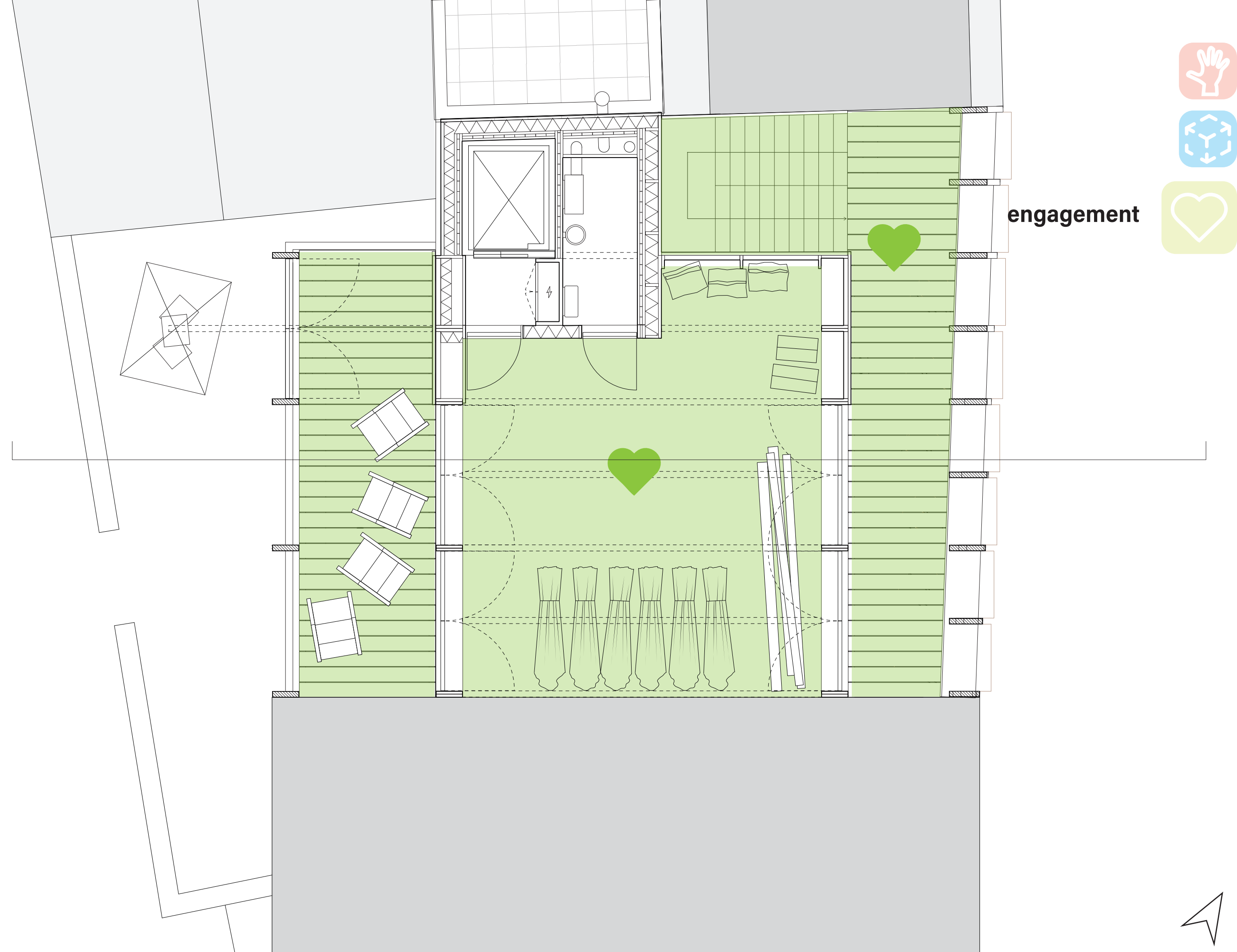


space management









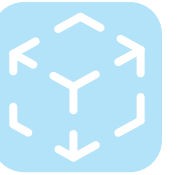
engagement





engagement

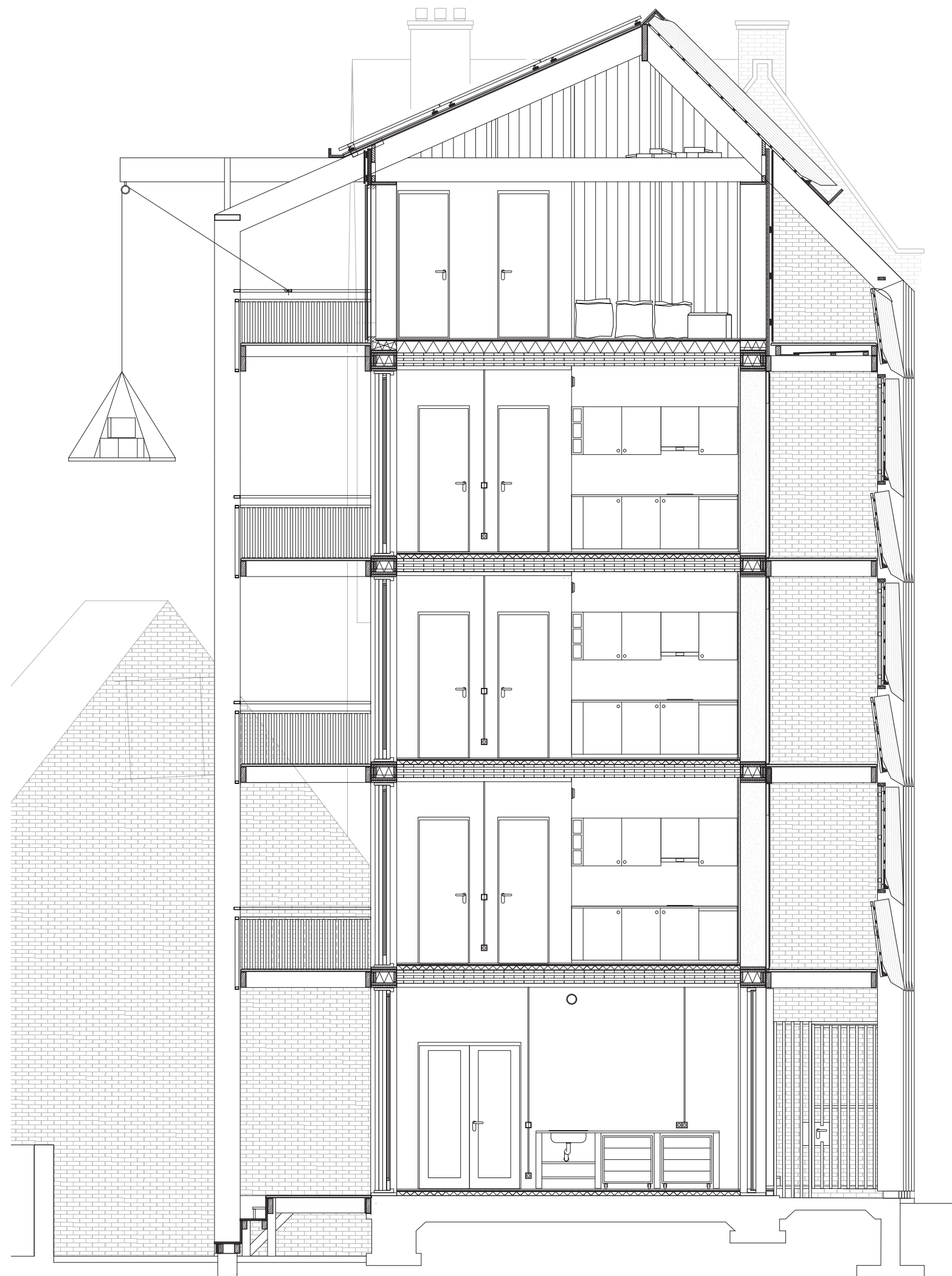




space management



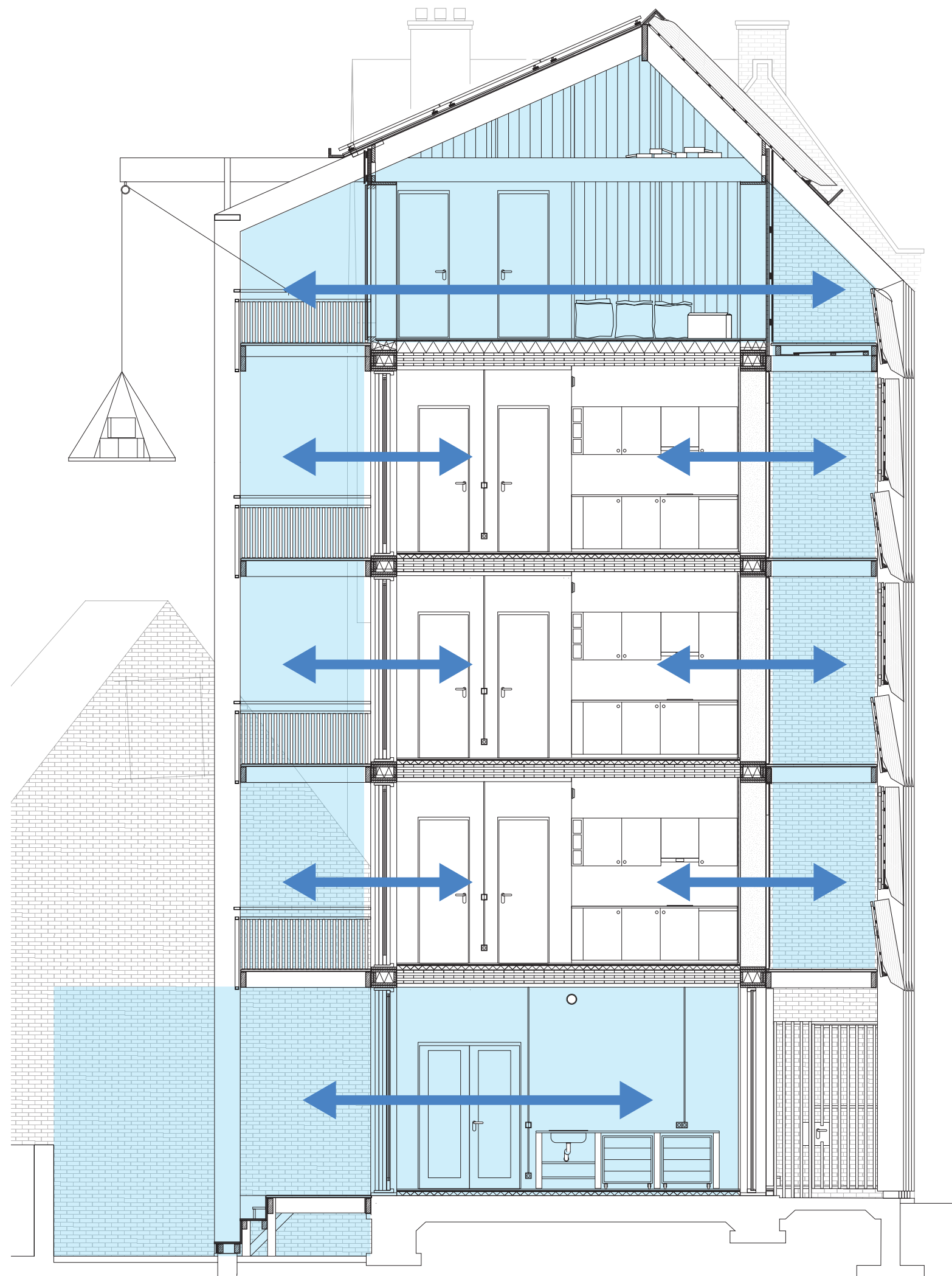




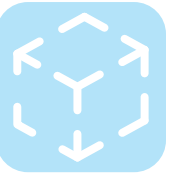


engagement

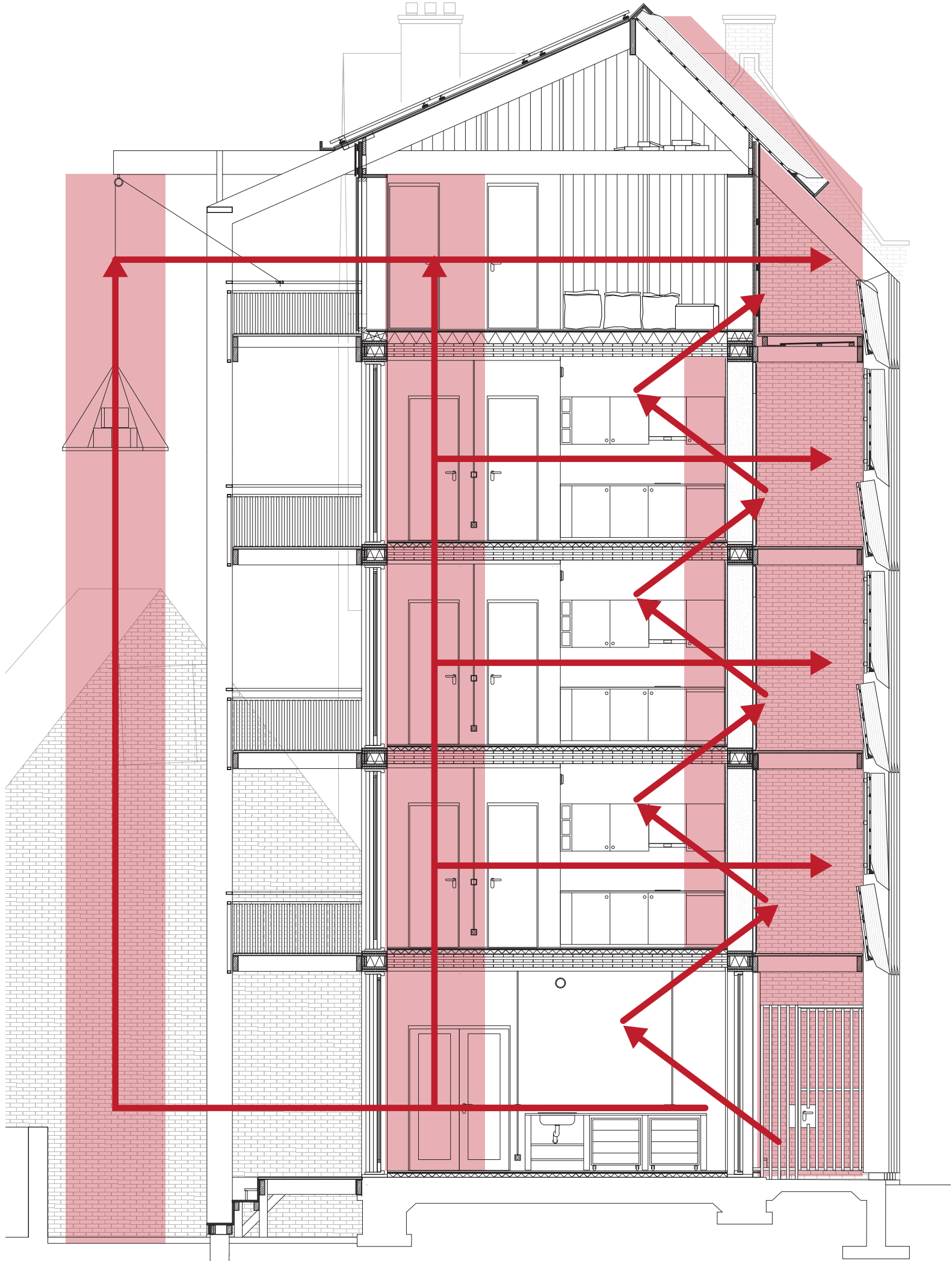




space management

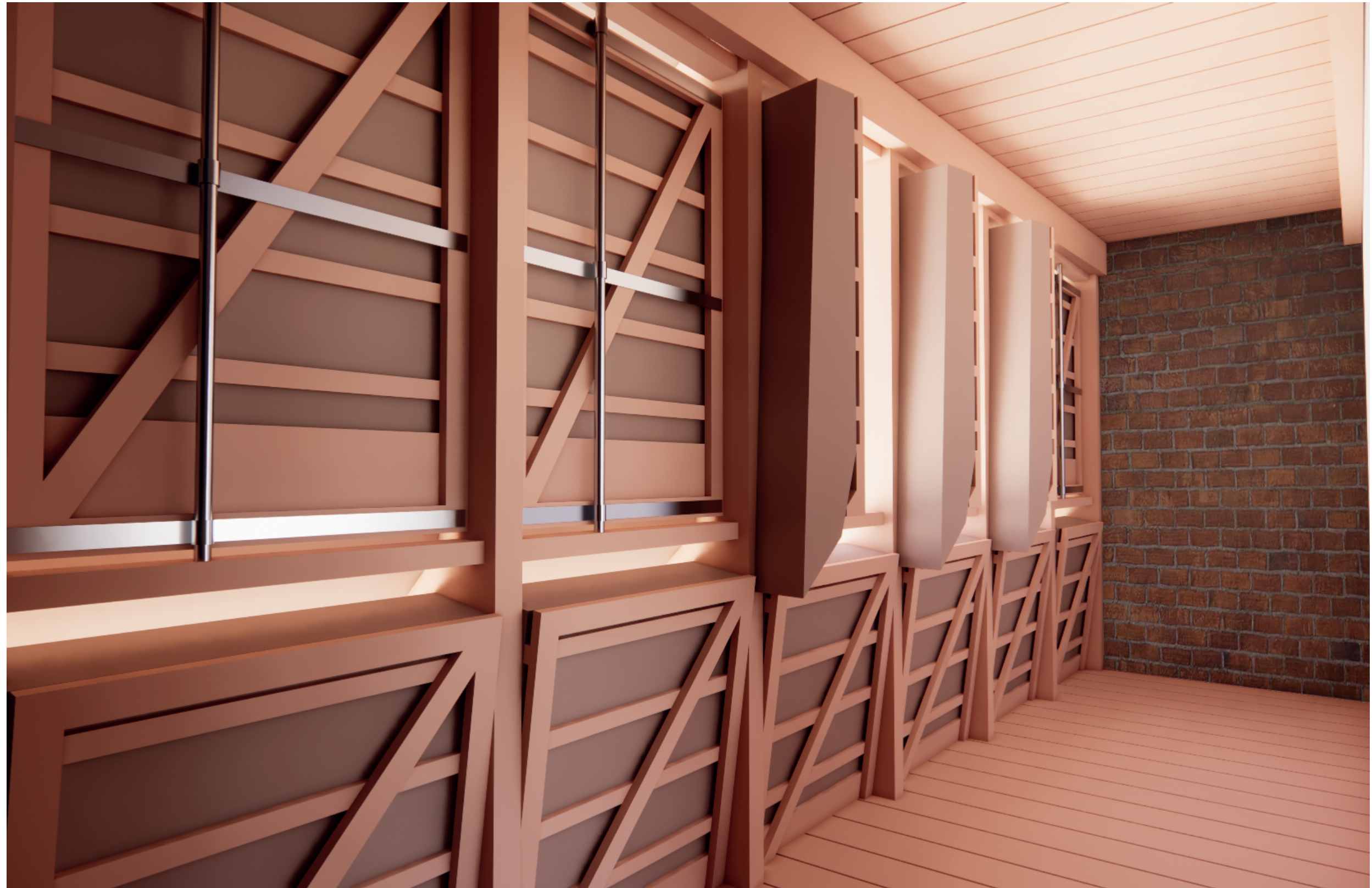


accessibility



legibility

accessibility



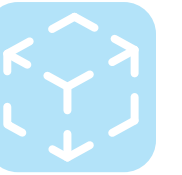
legibility

accessibility

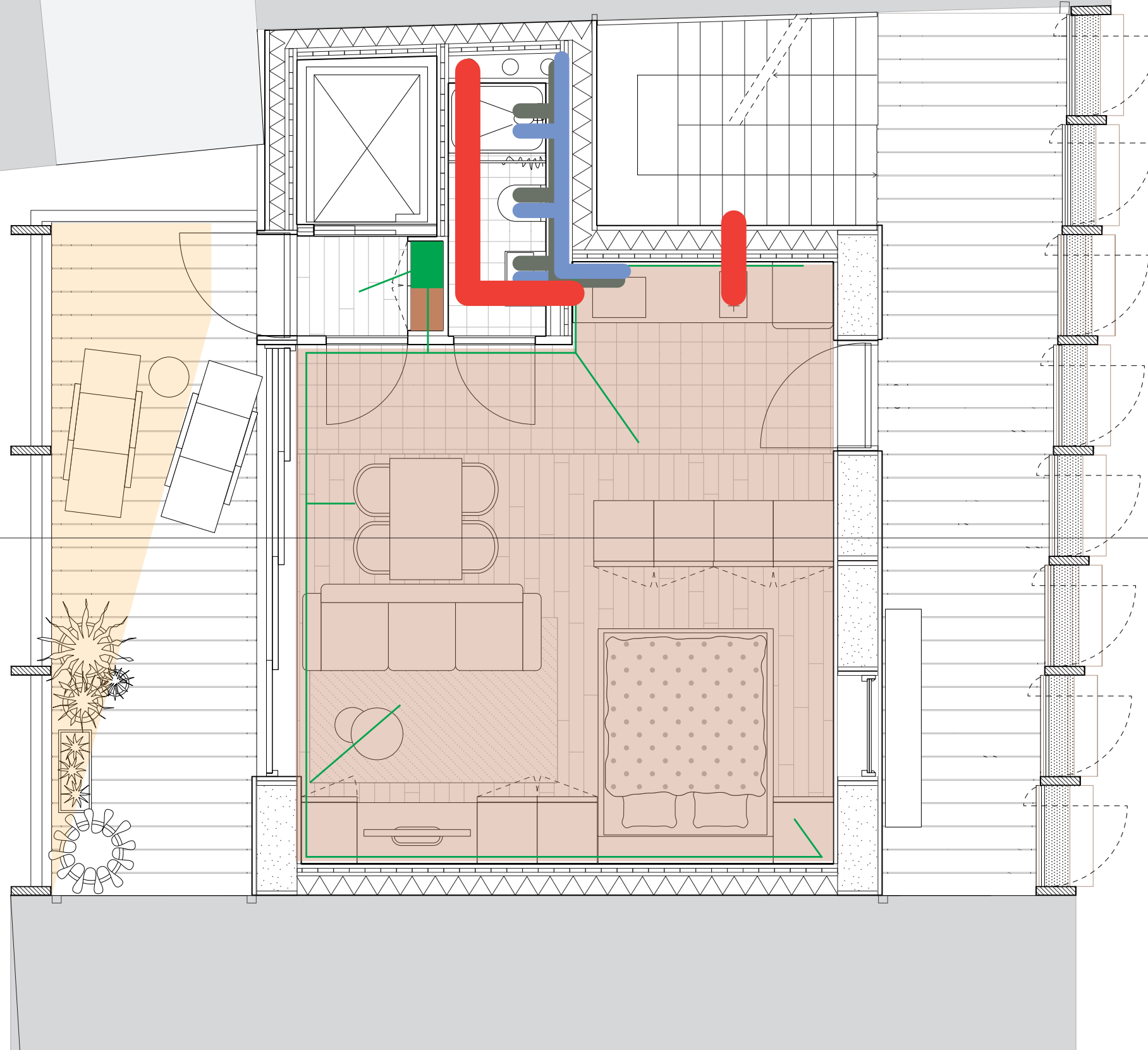


climate

space management



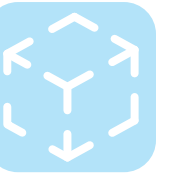
- electricity
- ventilation
- floor heating
- clean water
- grey water



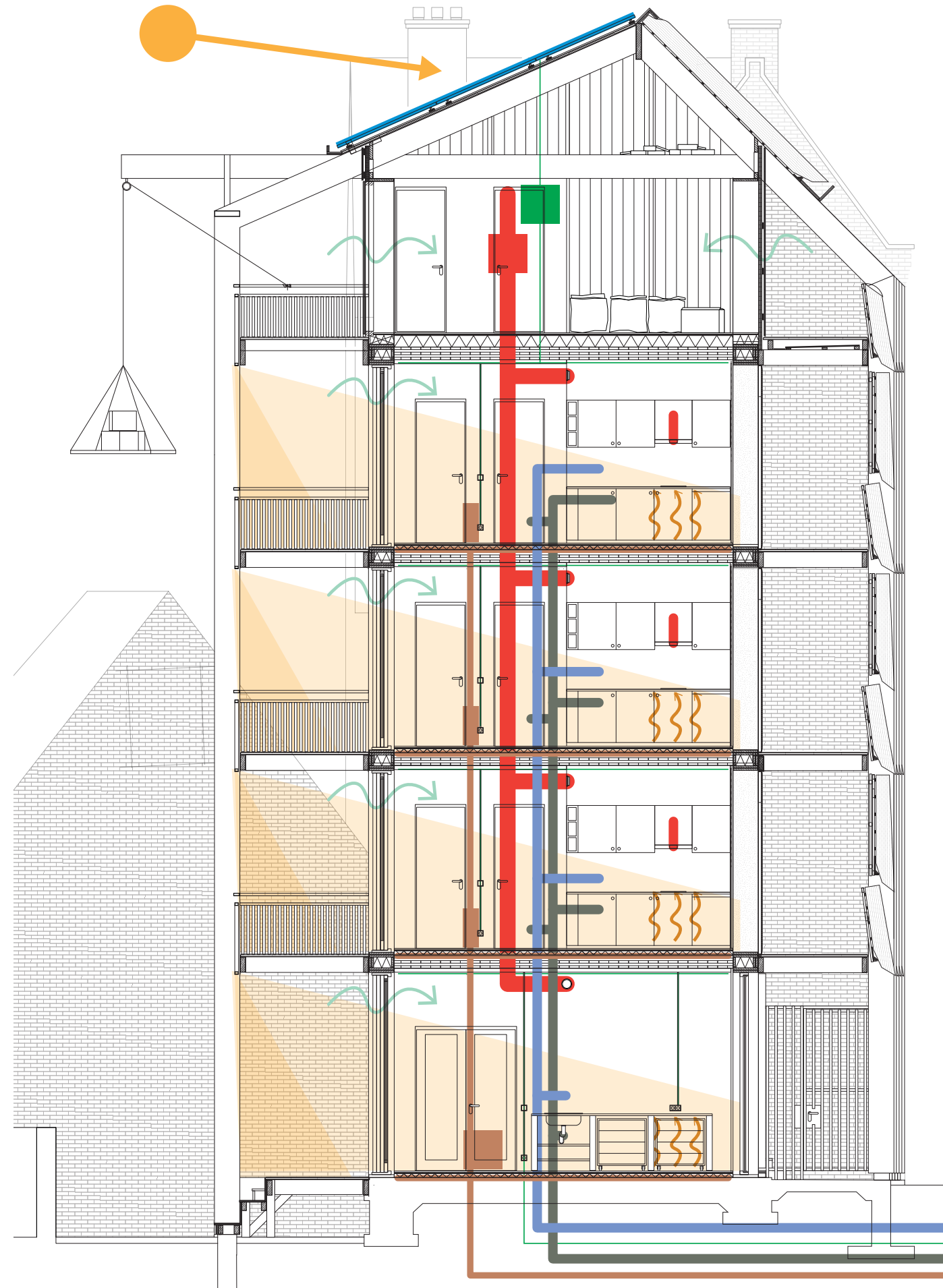
climate



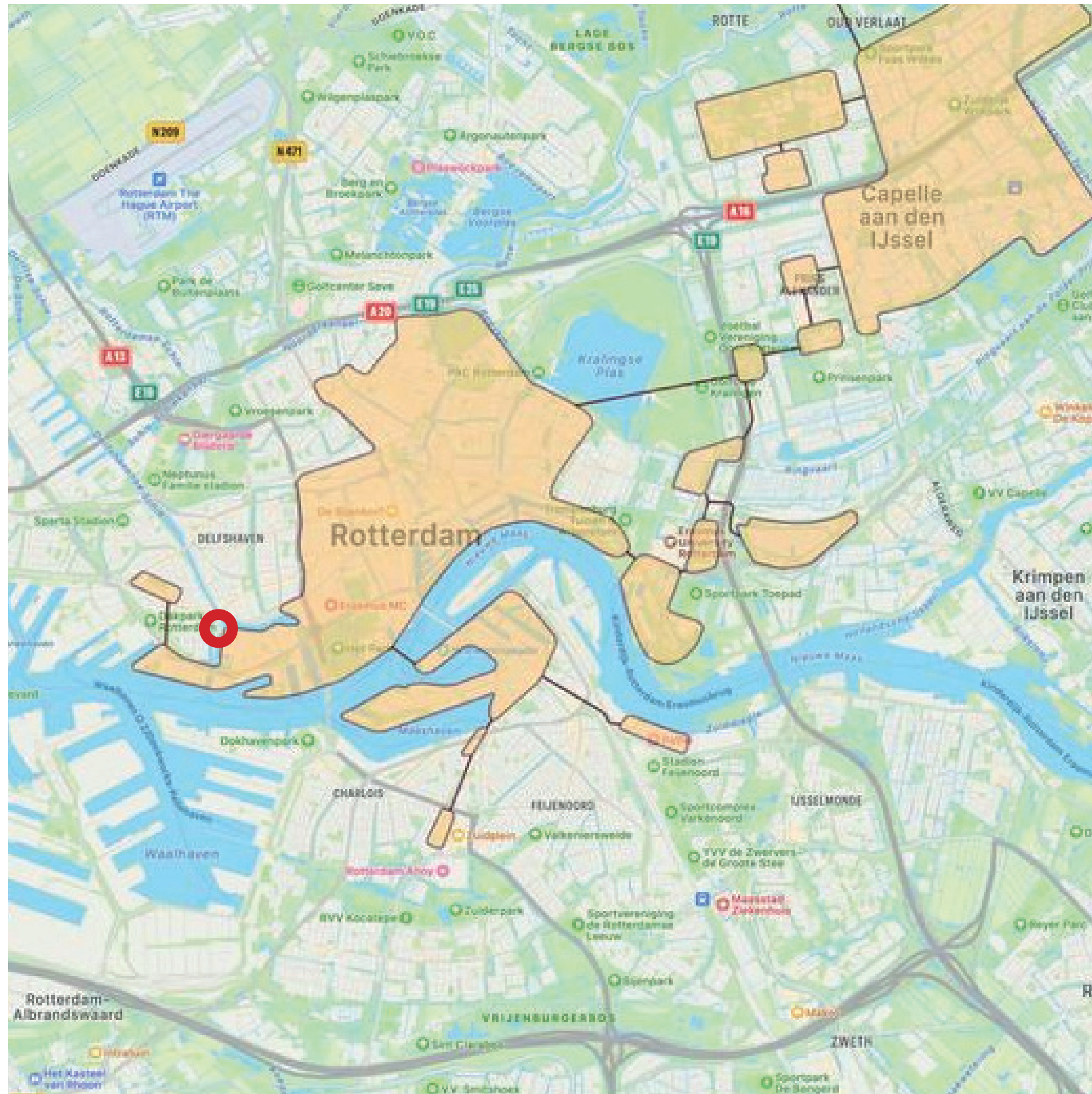
space management



- electricity
- ventilation
- floor heating
- clean water
- grey water

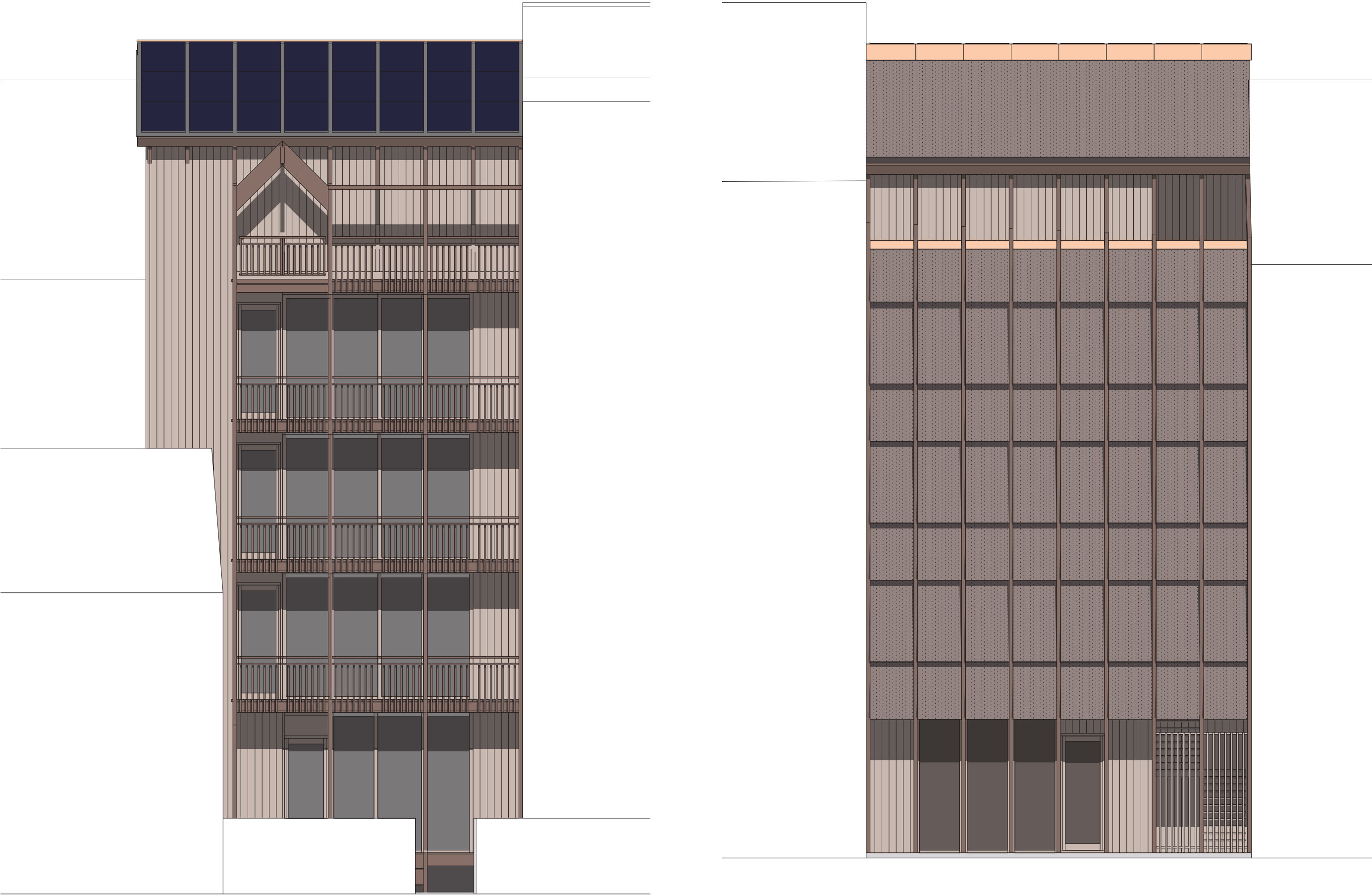


climate



source: Eneco





connection to context



connection to context



connection to context



connection to context



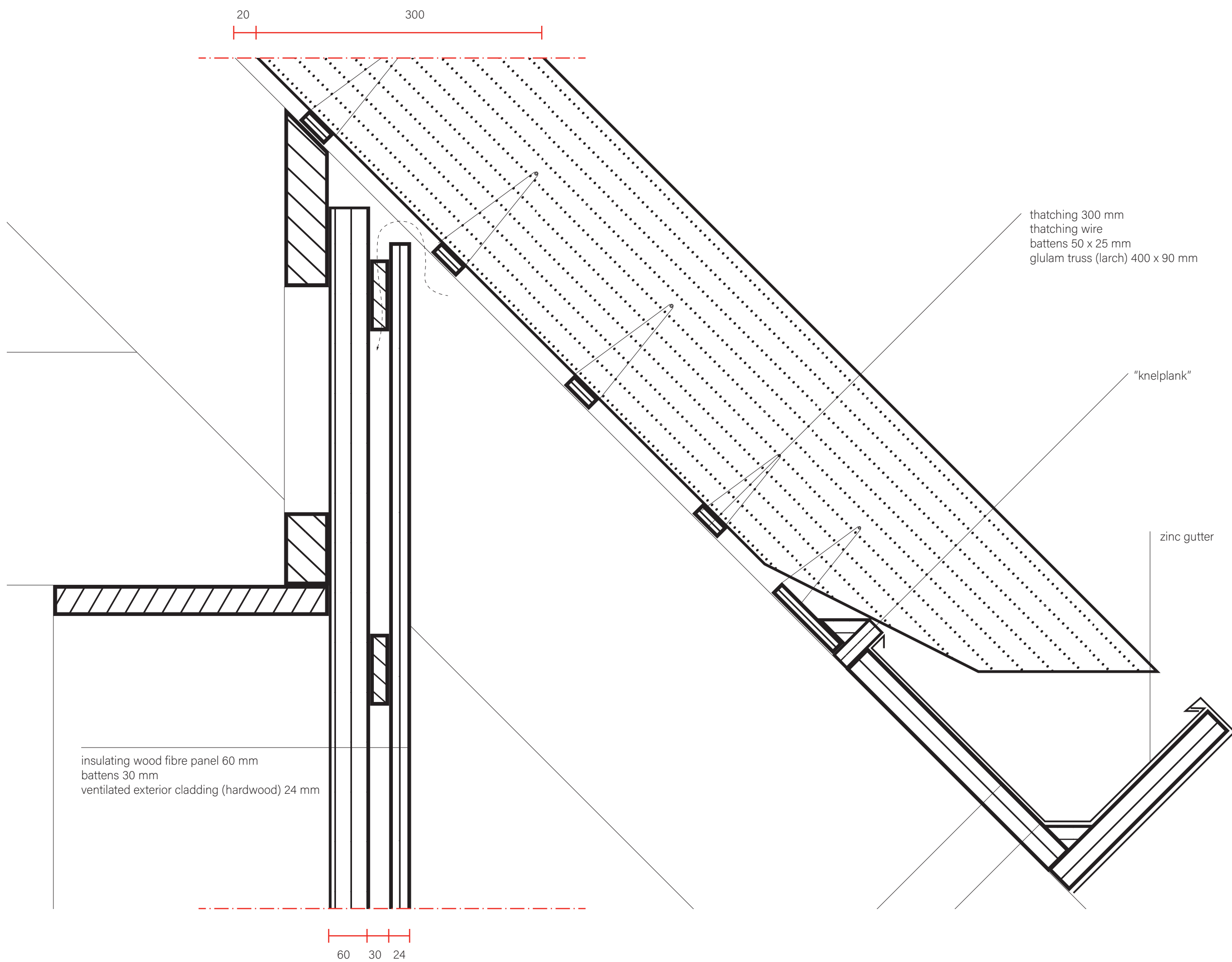
connection to context

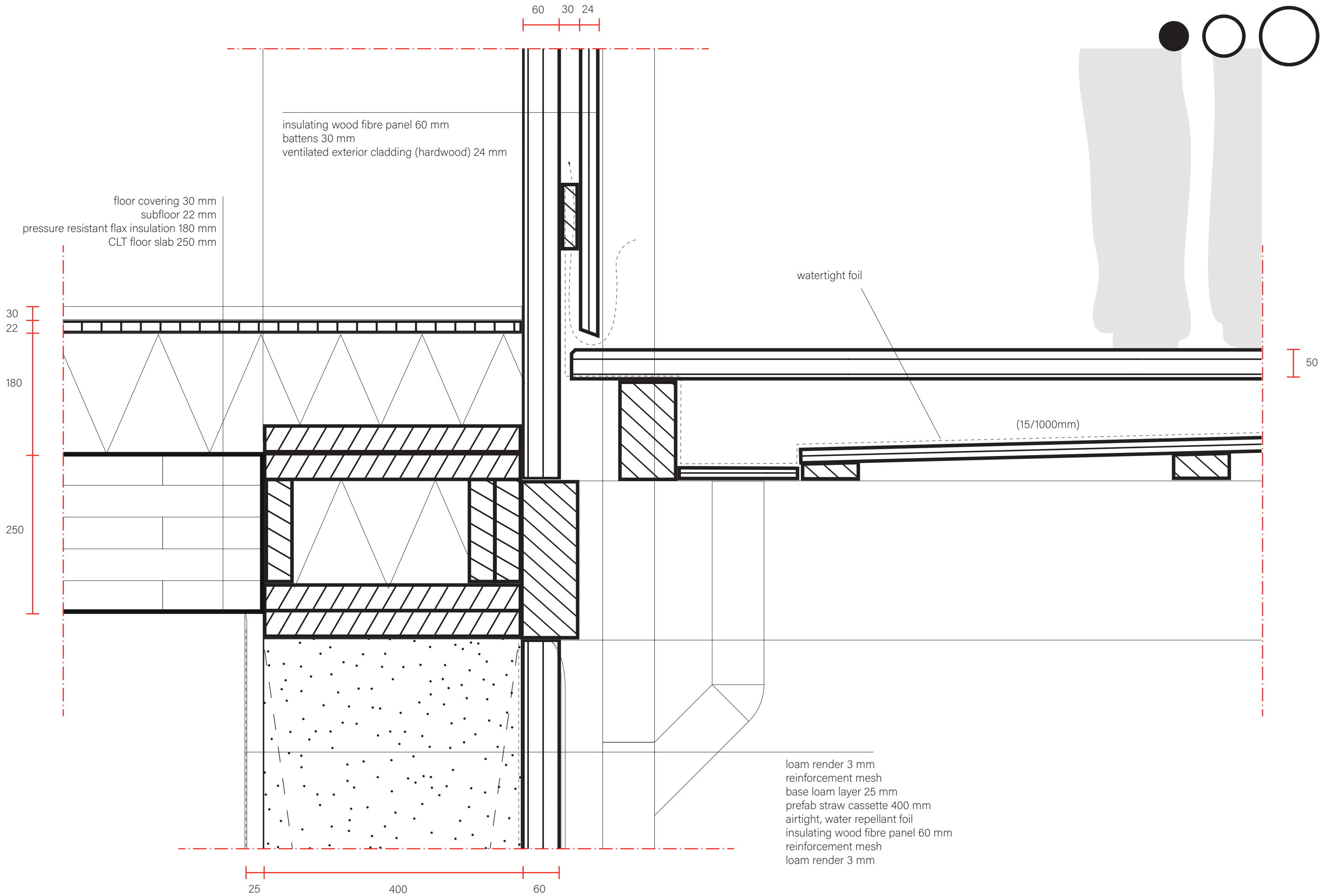


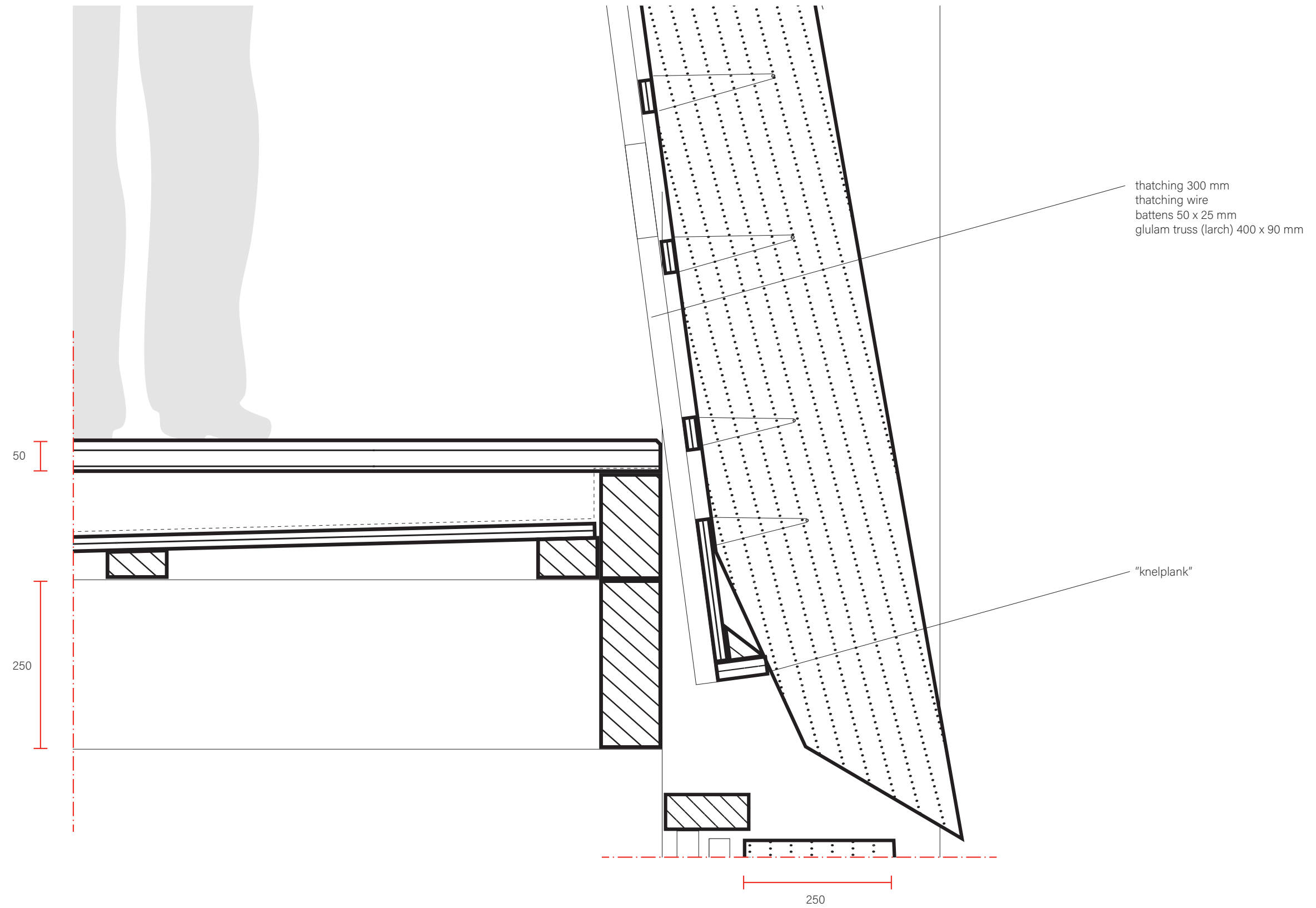


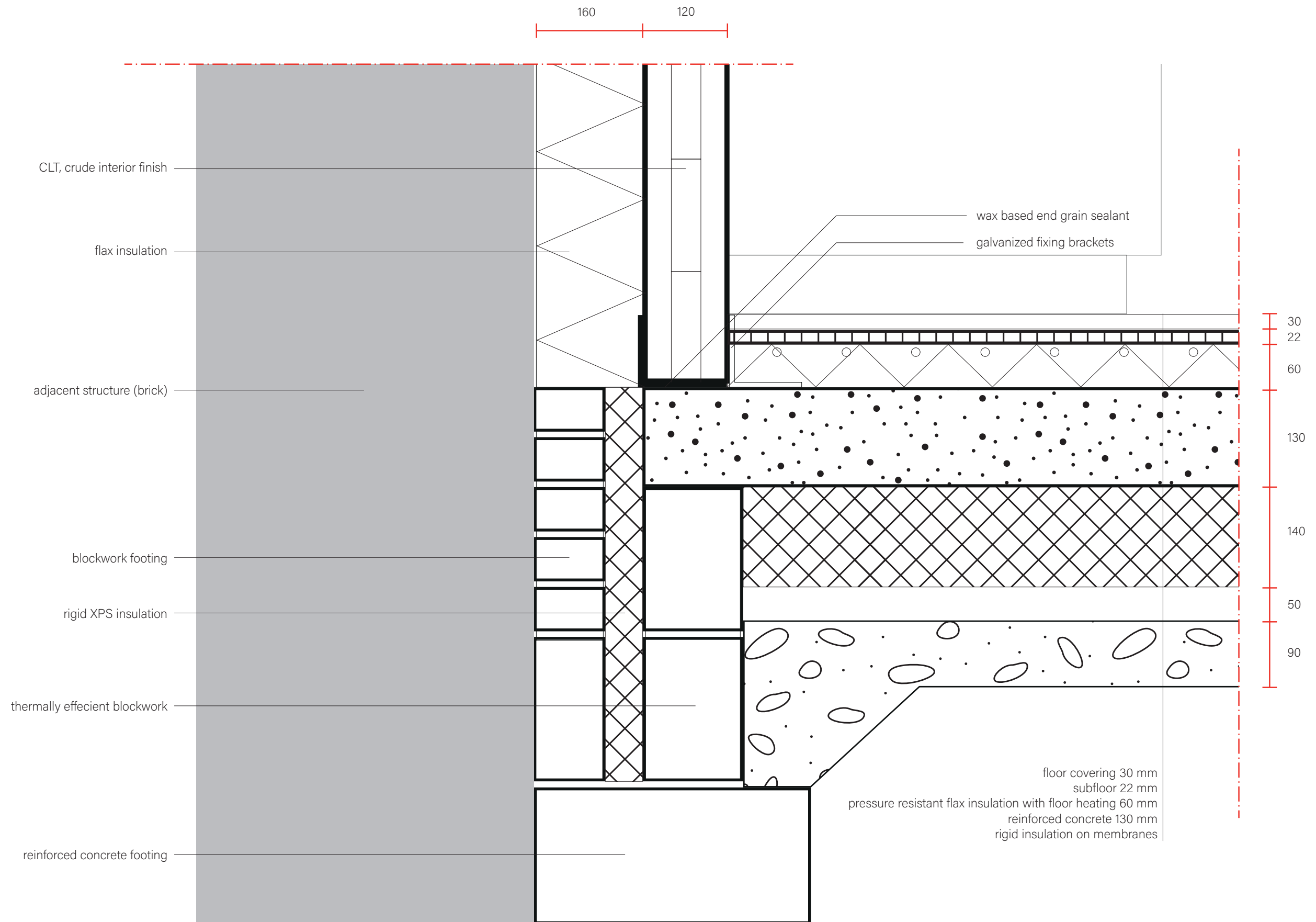


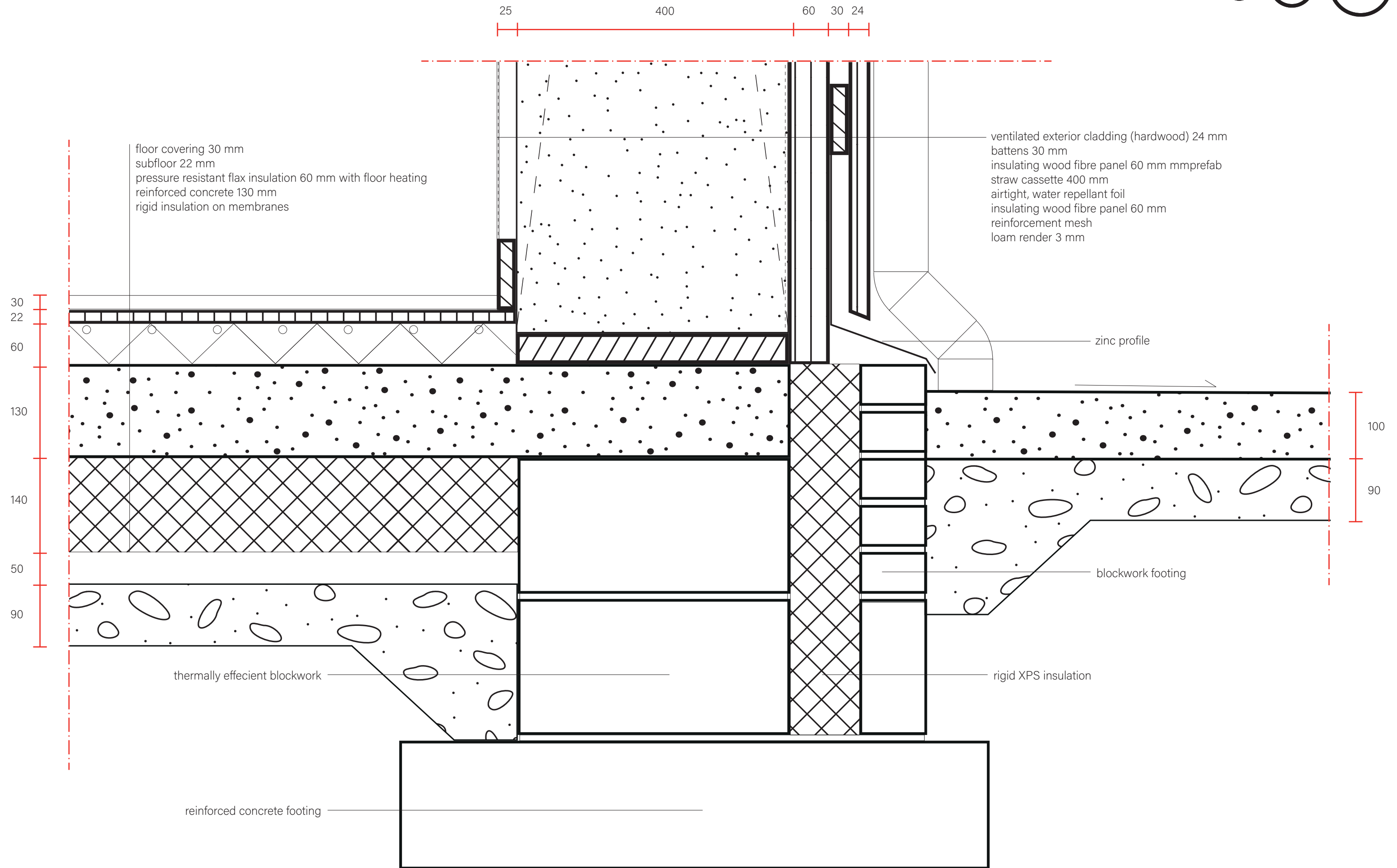
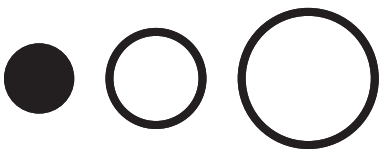




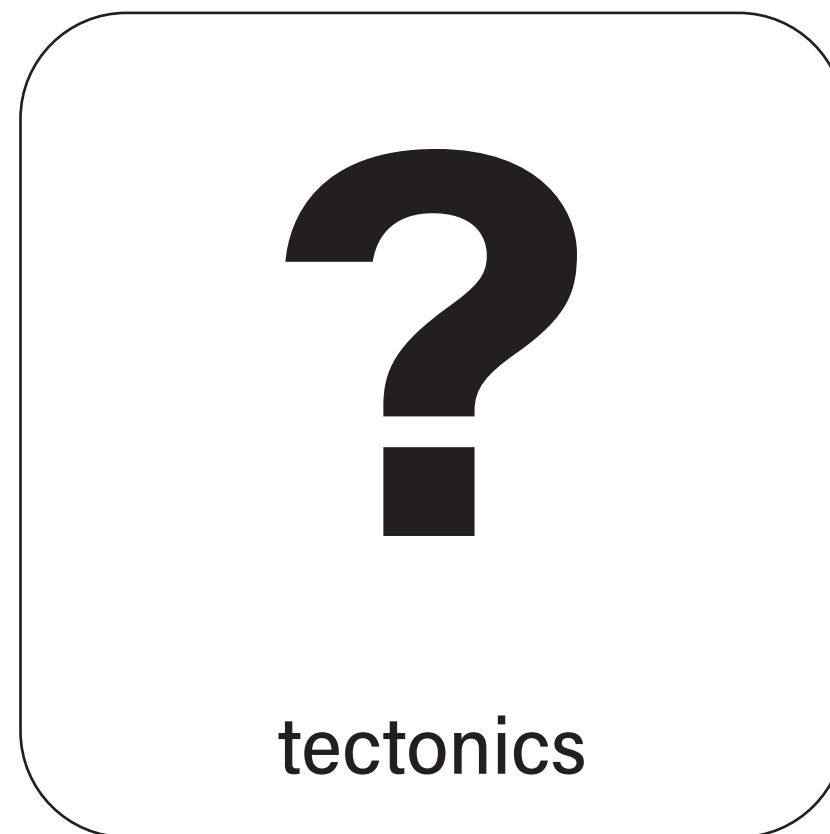








recap through the scales

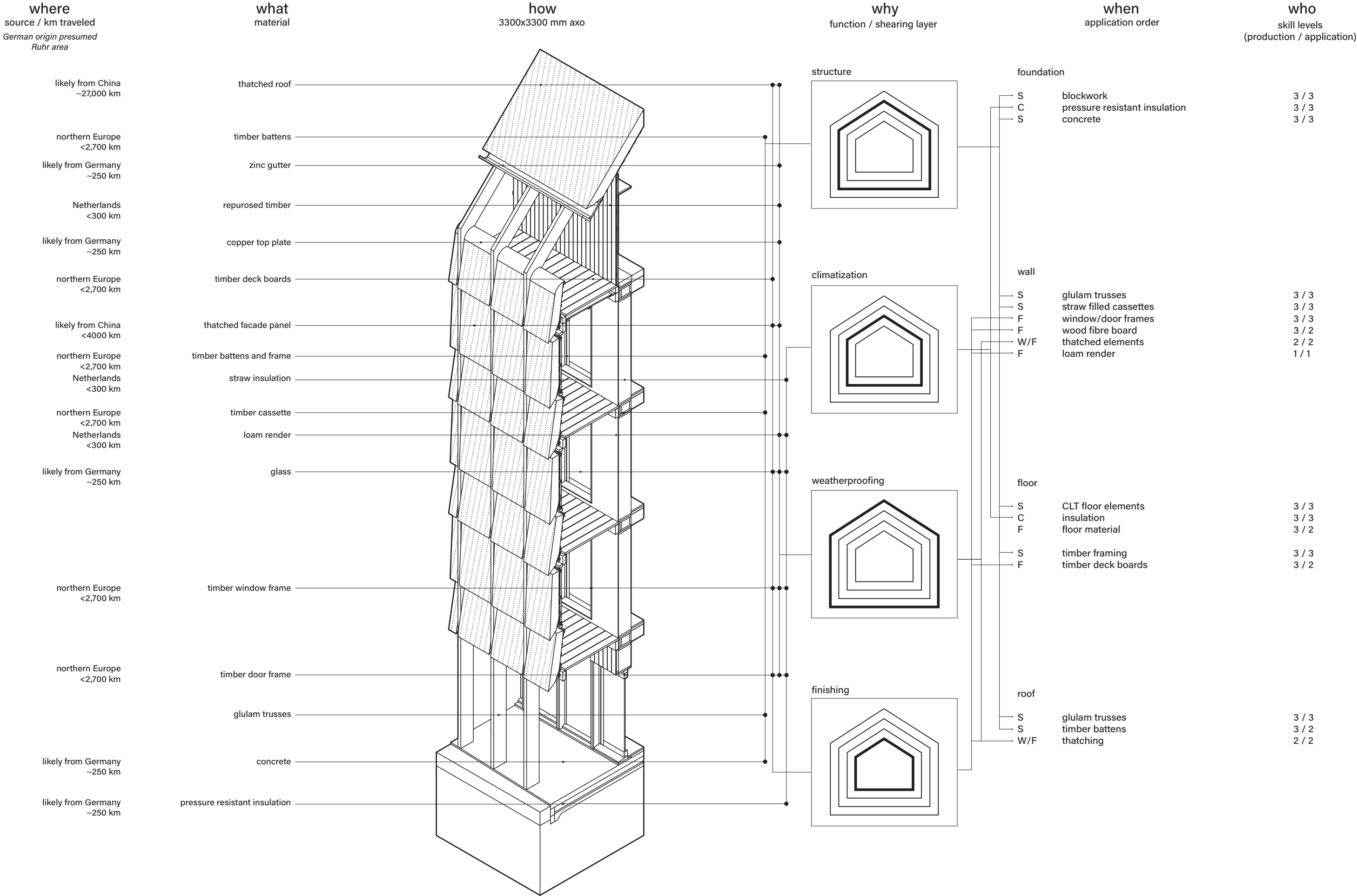


recap through the scales



material choice has led to ...

recap through the scales

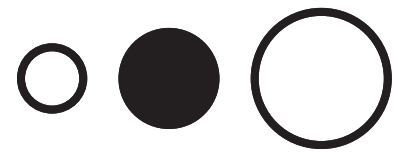


recap through the scales



resulting in a building which ...

recap through the scales



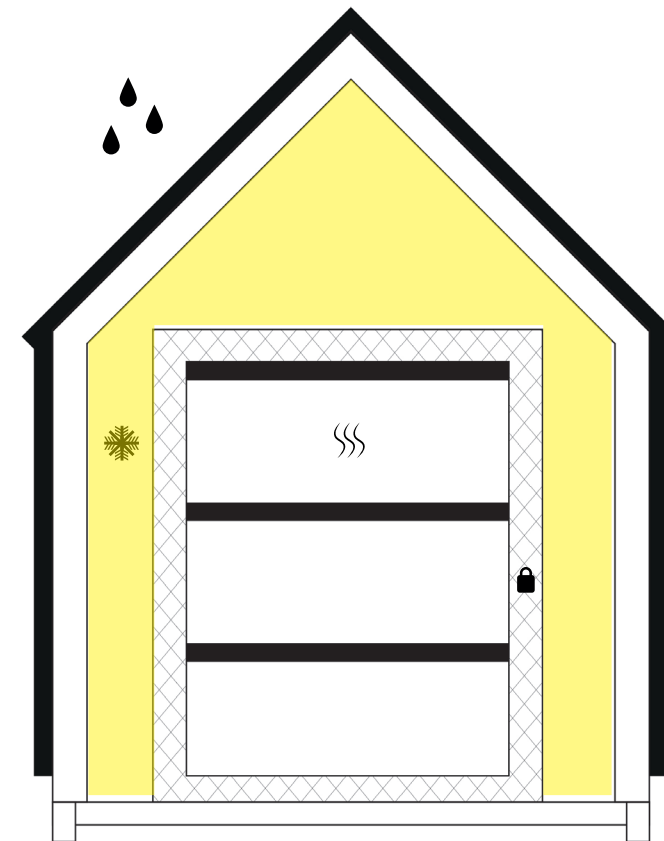
accessibility



space management



engagement



recap through the scales

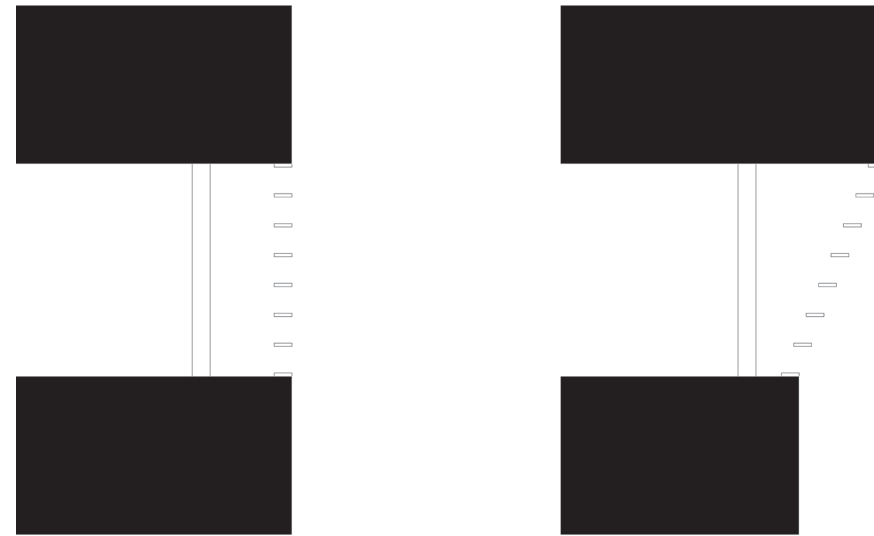


which is able to engage with the context...

recap through the scales



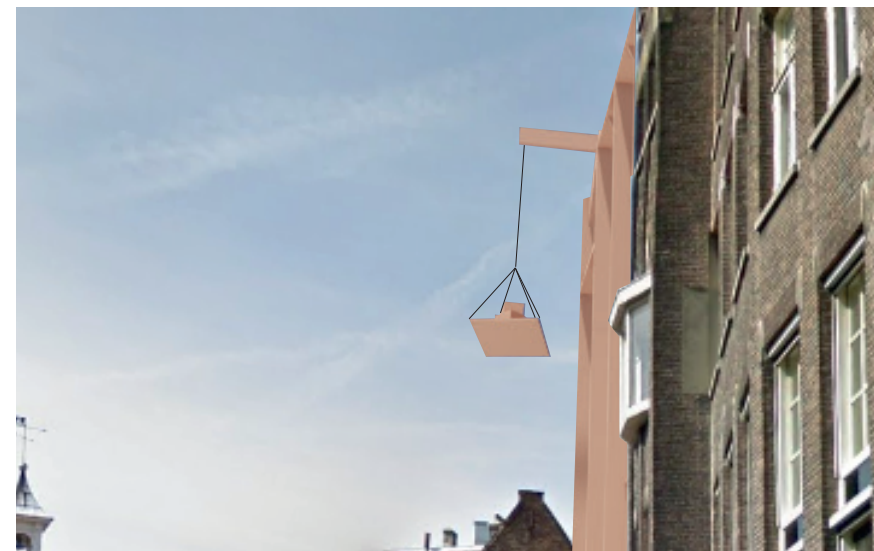
spatially

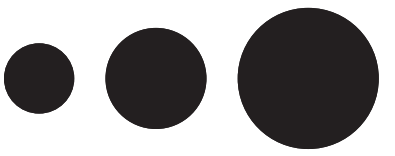


expressively



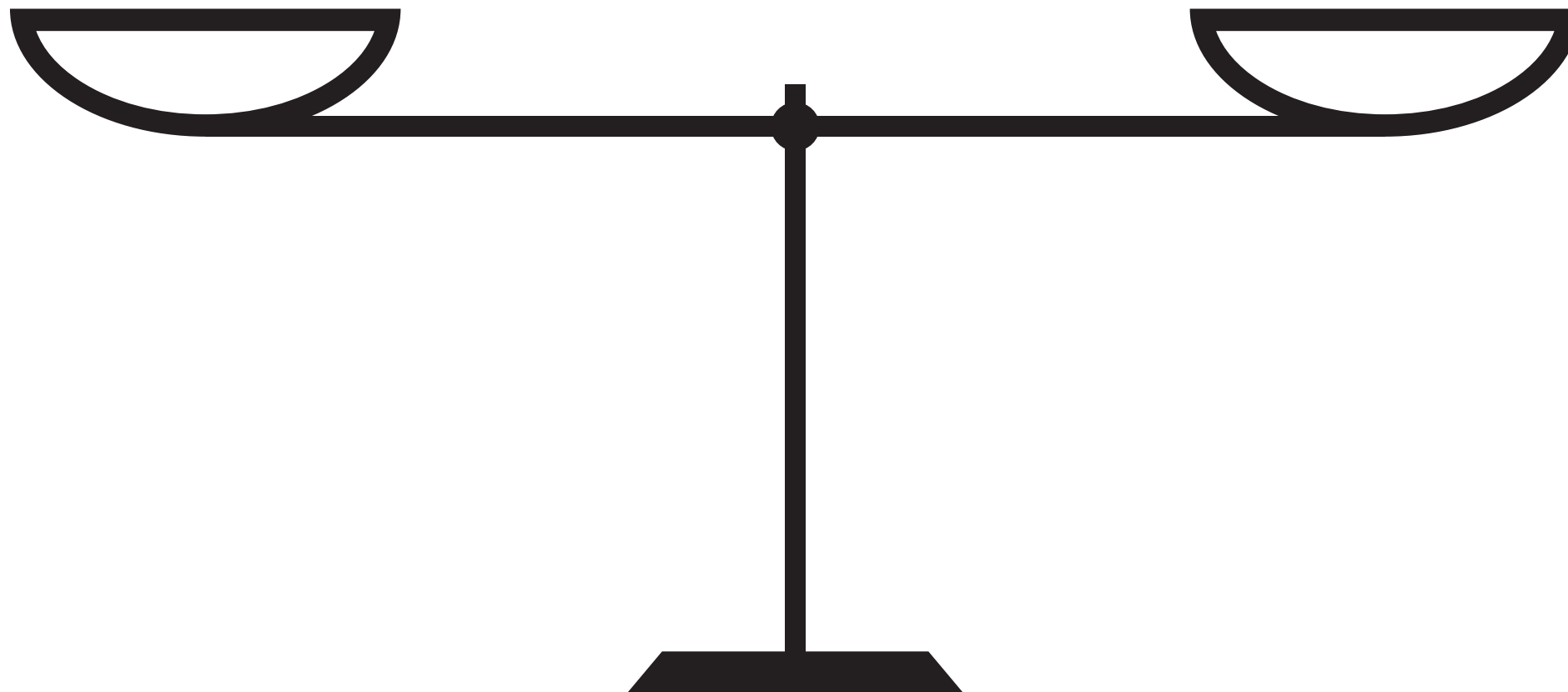
historically



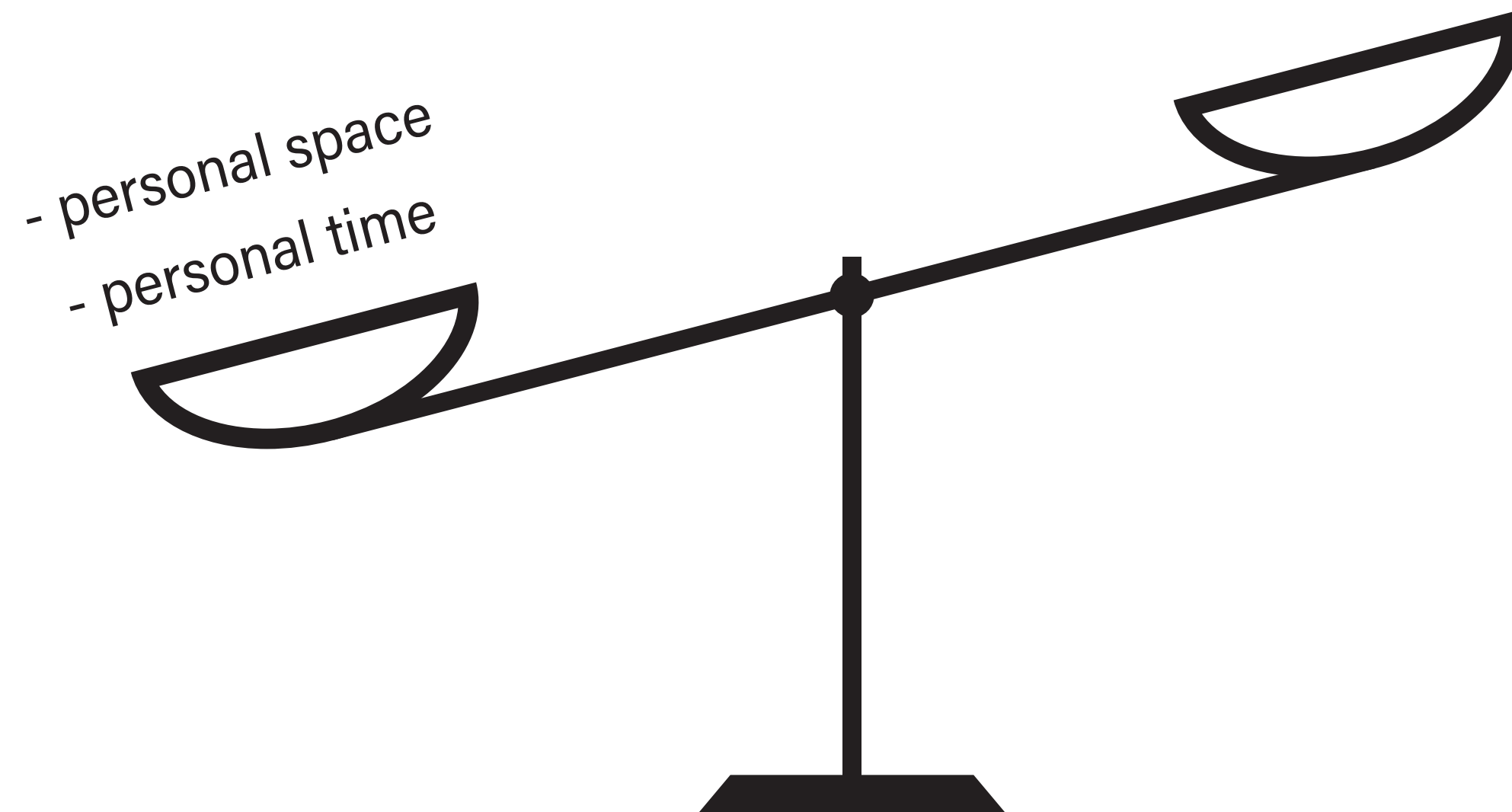


therefore:

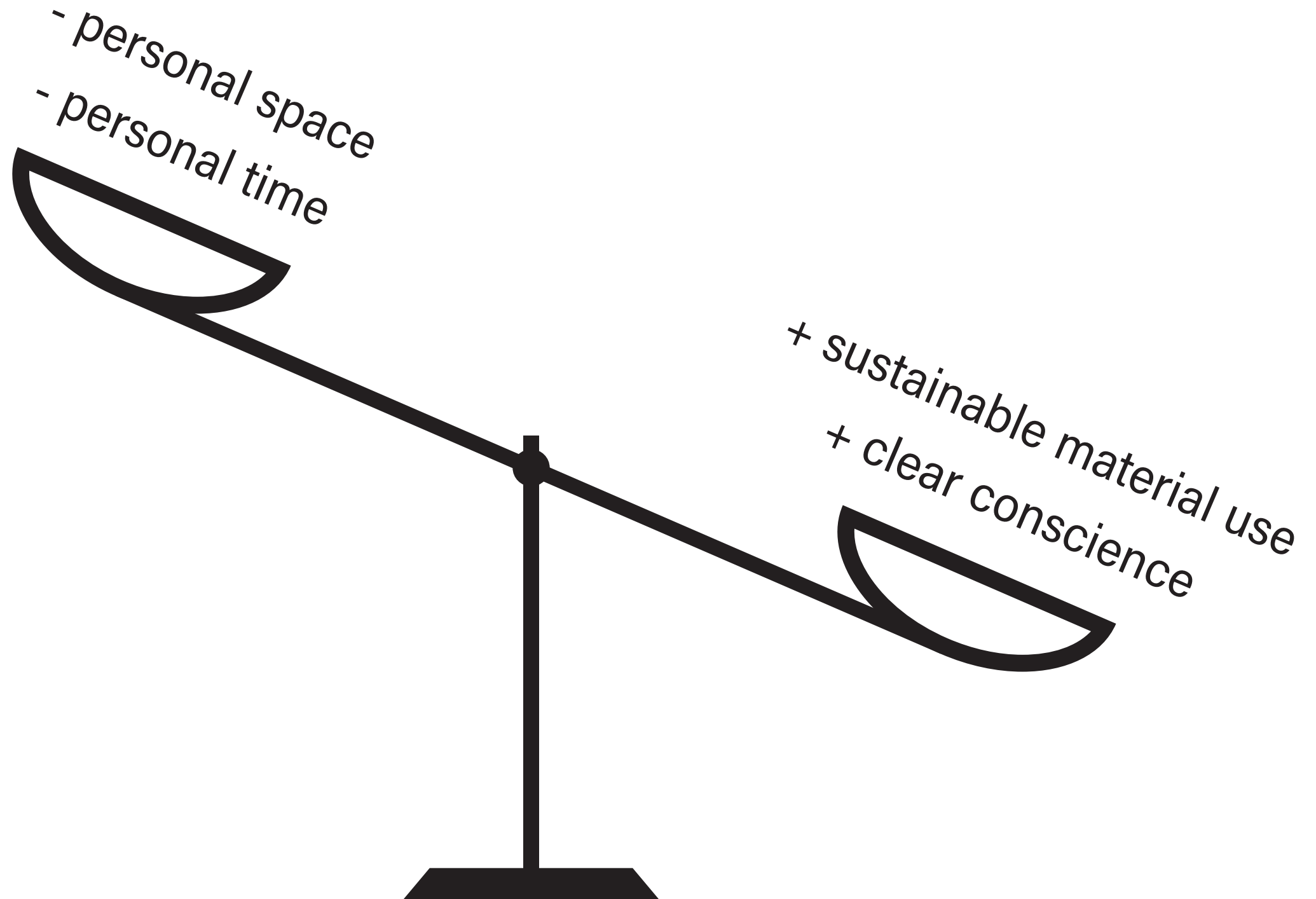
recap through the scales



recap through the scales



recap through the scales

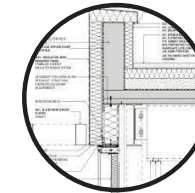


the bigger picture



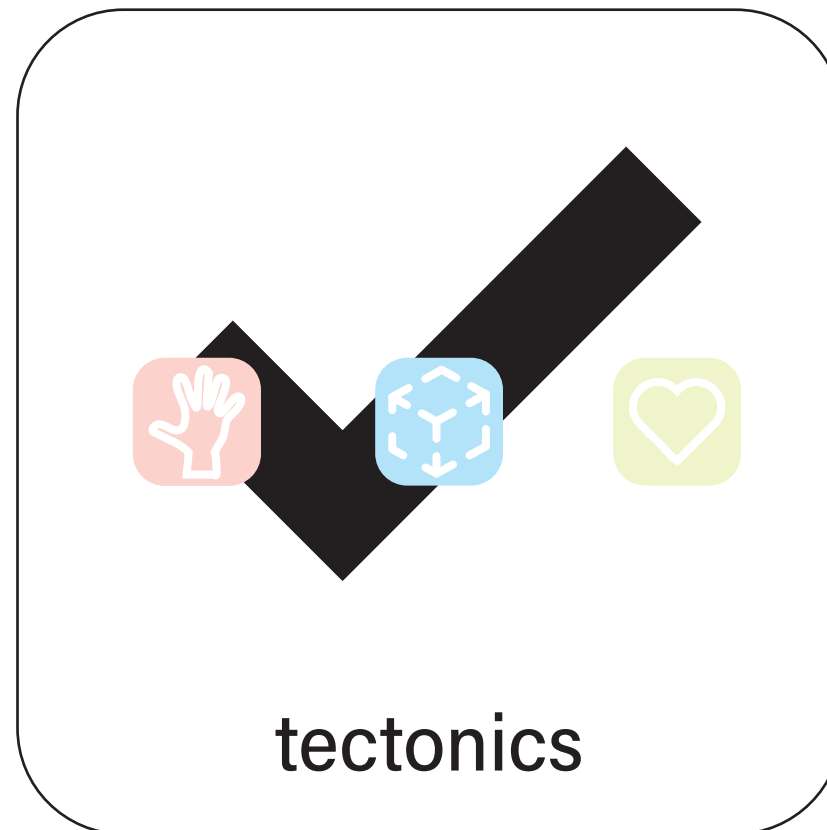
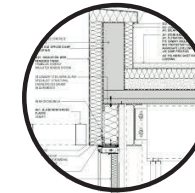
AI generated

conclusion



tectonics

conclusion



build responsibly. ✓

build responsibly. ✓

build expressively. ✓

build responsibly. ✓

build expressively. ✓

build native. ✓



thank you