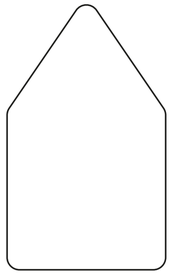
DESIGNING WITH RECLAIMED TIMBER

reusable building elements for topping-up and social cohesion

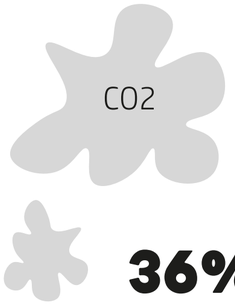
A4 presentation
anne smeenk

17 - 06 - 2026



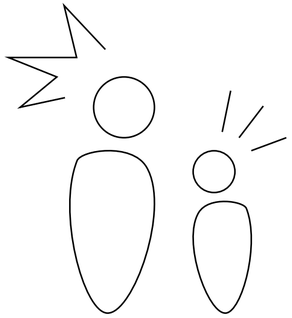
housing shortage

396.000
dwellings

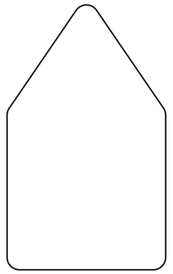


36%

of global CO_2 emissions comes from the construction industry

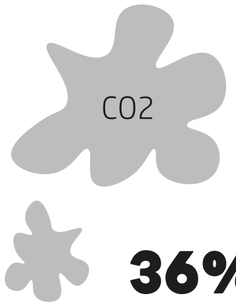


vulnerable neighbourhoods



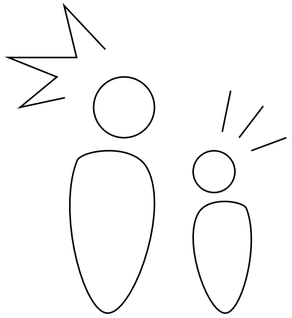
housing shortage

396.000
dwellings

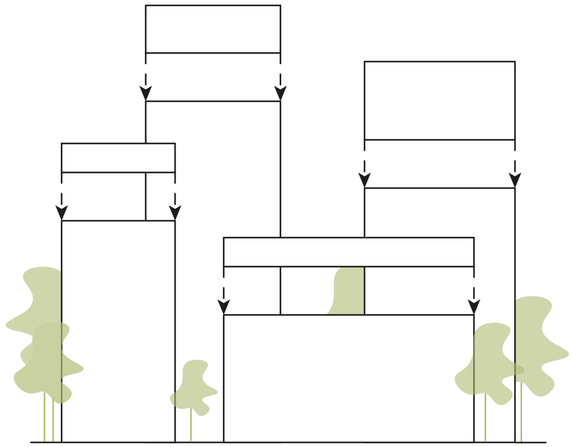


36%

of global CO_2 emissions comes from the construction industry

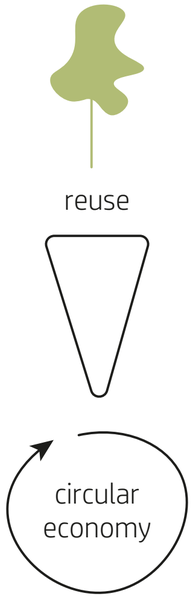


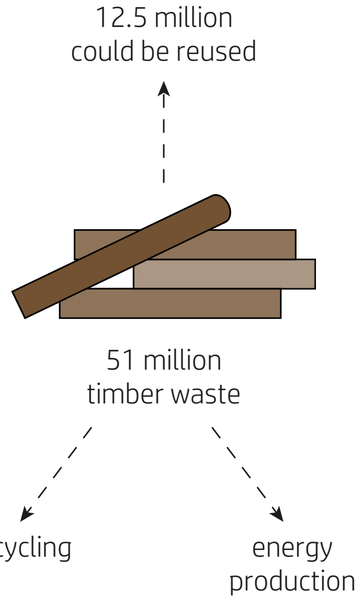
vulnerable neighbourhoods



limited space

topping-up dense urban areas







social connection

THE GAP

between circular ambitions and architectural practice

reclaimed timber is available
direct reuse is limited
research on the technical and logistical challenges
reclaimed timber a driver for architectural design

RQ:

How can reclaimed timber be translated into reusable building elements for application in the contemporary building industry?

Sub questions

What is the current reclaimed timber stock in the Netherlands?
What reclaimed timber elements can be created from the stock?
How can the elements be used in a design?

DQ:

How can reclaimed timber elements be applied in a topping-up strategy to improve social cohesion, safety and spatial quality in Wittenburg, Amsterdam?

Sub questions

How can the vulnerable state of Wittenburg be improved?
How can reclaimed timber be used as an architectural driver in a topping-up?

1 RECLAIMED TIMBER

the stock
the database
the elements

2 IN PRACTICE

case-study Wittenburg
a reclaimed timber construction

3 THE ARCHITECTURE

architectural expression
the program
the gallery
experiencing the buildings

conclusion

RECLAIMED TIMBER

imported	0.131 Mton
produced in the NL	1.610 Mton
total timber waste	**1.741 Mton**

Illustration 3: timber waste in the Netherlands in 2017 (Bruggen & Zwaag, 2017)

processed in the NL	1.120 Mton
processed outside the NL	0.621 Mton
total timber waste	**1.741 Mton**

Illustration 4: timber waste processed in and outside the Netherlands in 2017 (Bruggen & Zwaag, 2017)

downcycled	0.260 Mton
incinerated	0.860 Mton
total processed in the NL	**1.120 Mton**

Illustration 5: timber waste processed in the Netherlands in 2017 (Bruggen & Zwaag, 2017)

A wood



source: recycling.nl

B wood

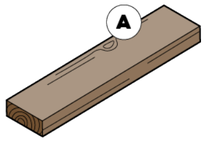


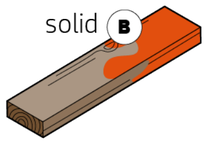
source: veolia.be

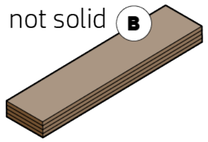
C wood

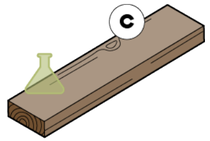


source: decovik.nl







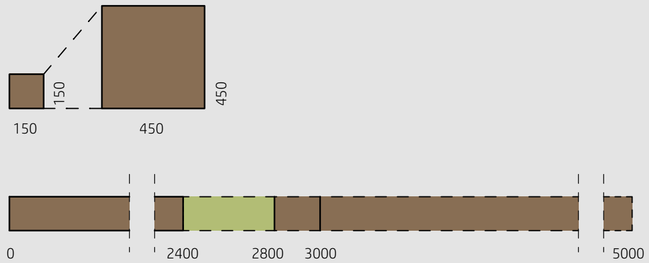


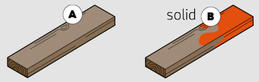
uncertain supply
variation in dimensions and quality
damage and grading
logistics and regulations
economic competitiveness
lack of representive database

limitation > opportunities

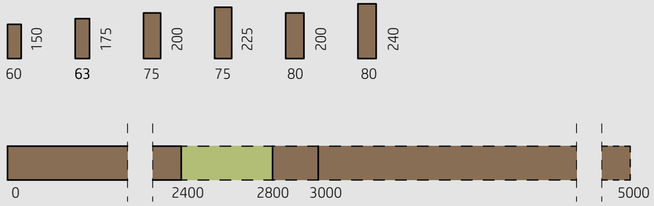
= organistaion of the reuse chain

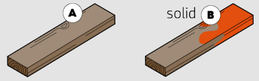
structural timber
beams



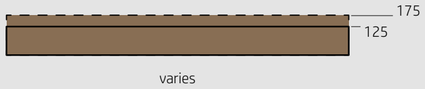


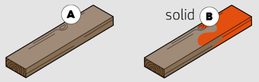
joists



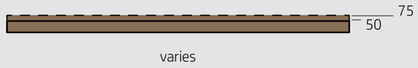


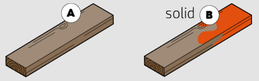
non-structural timber
timber floorboards



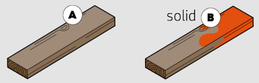


timber strip flooring



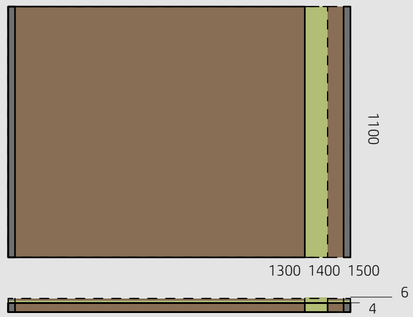


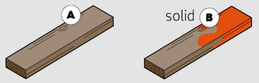
structural timber
studwork

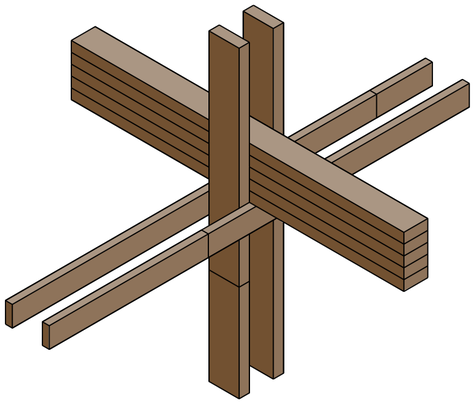




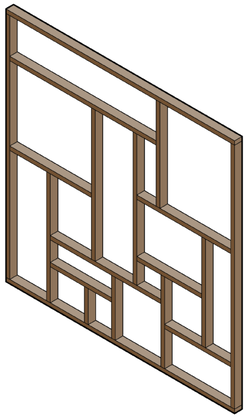
stone slabs



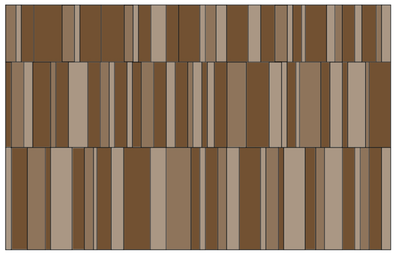




beams and columns

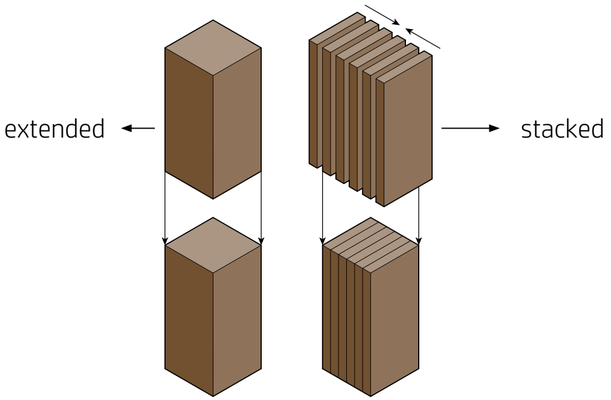


timber frames

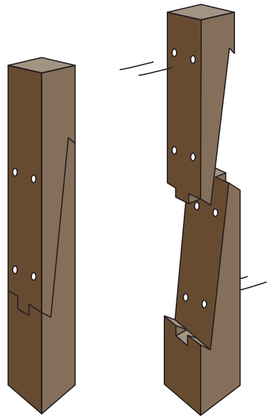


finishing layers

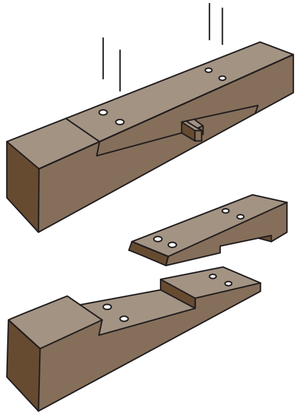
required transformations



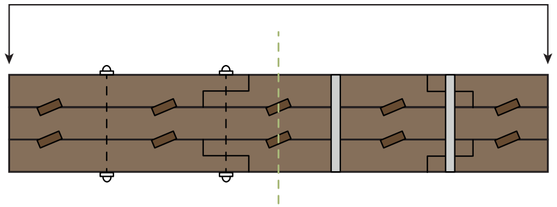
assembly strategies



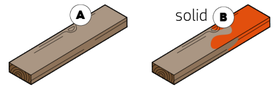
stop-splayed undersquinted and cogged scarf joint



stop-splayed undersquinted and tabled scarf joint with wedges

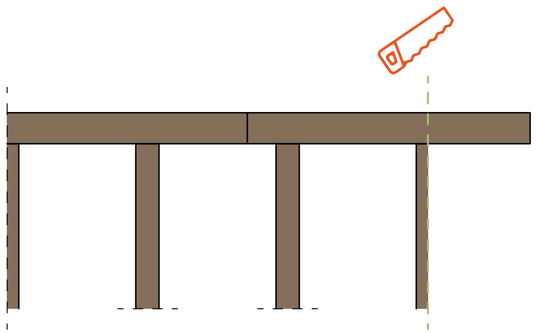


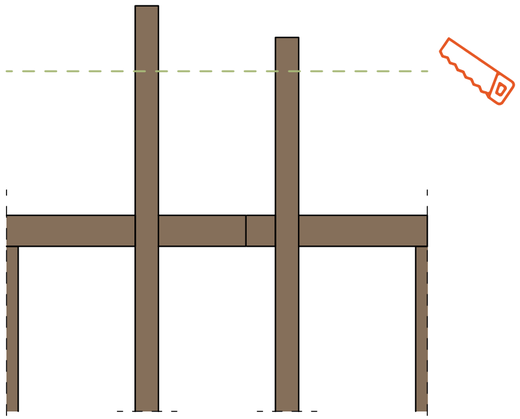
keyed beam



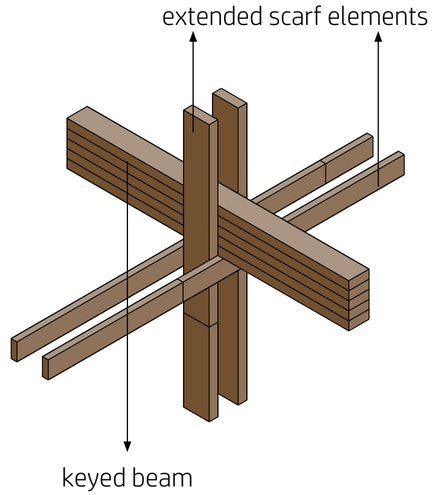
design application

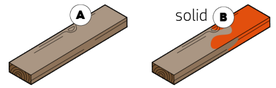
reduce cutting > only at ends





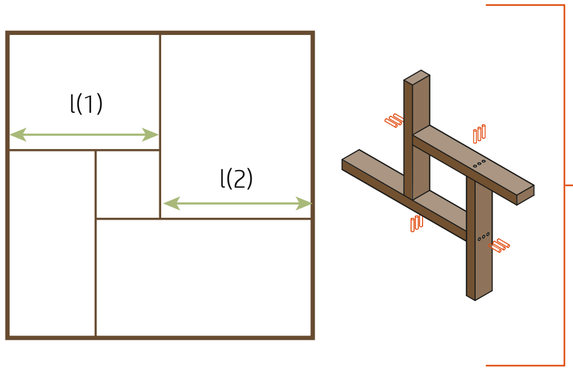
continuous structure



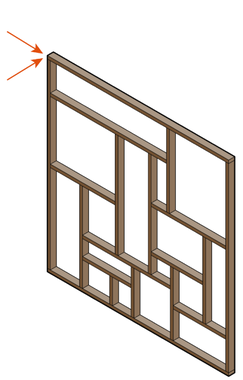


assembly strategies

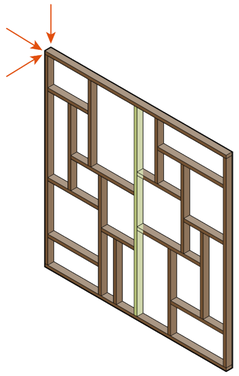
minimal transformation > reciprocal system
adapt to available stock



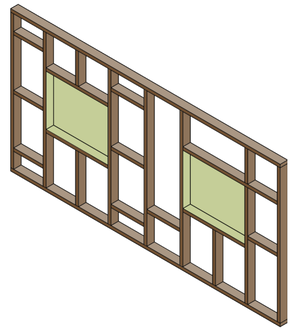
l(1) + l(2) > l(total)



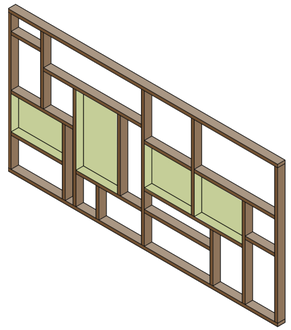
fully inner reciprocity structure



hybrid frame structure

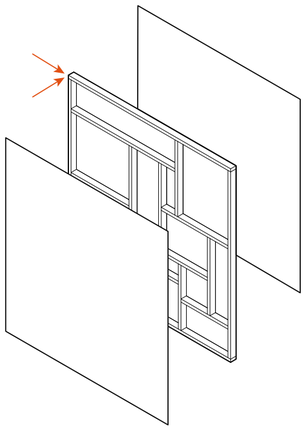


predefined openings in reciprocal structure

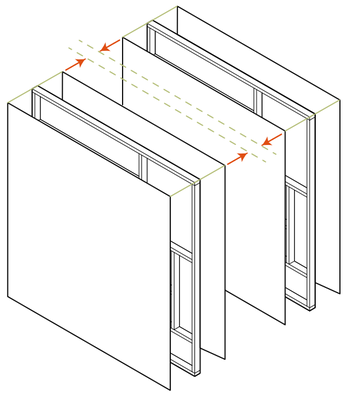


openings defined by reciprocal structure

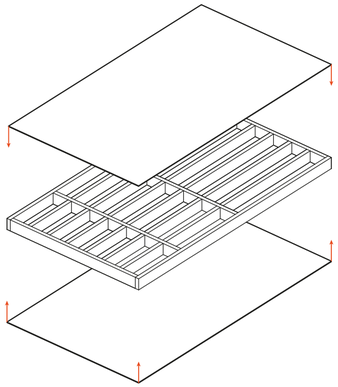
design application



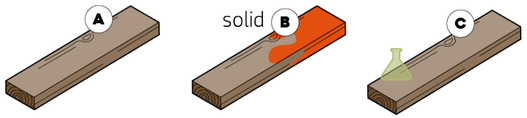
internal wall



partition wall



floors



design application
expression > standardisation



three dimensional finishing layer



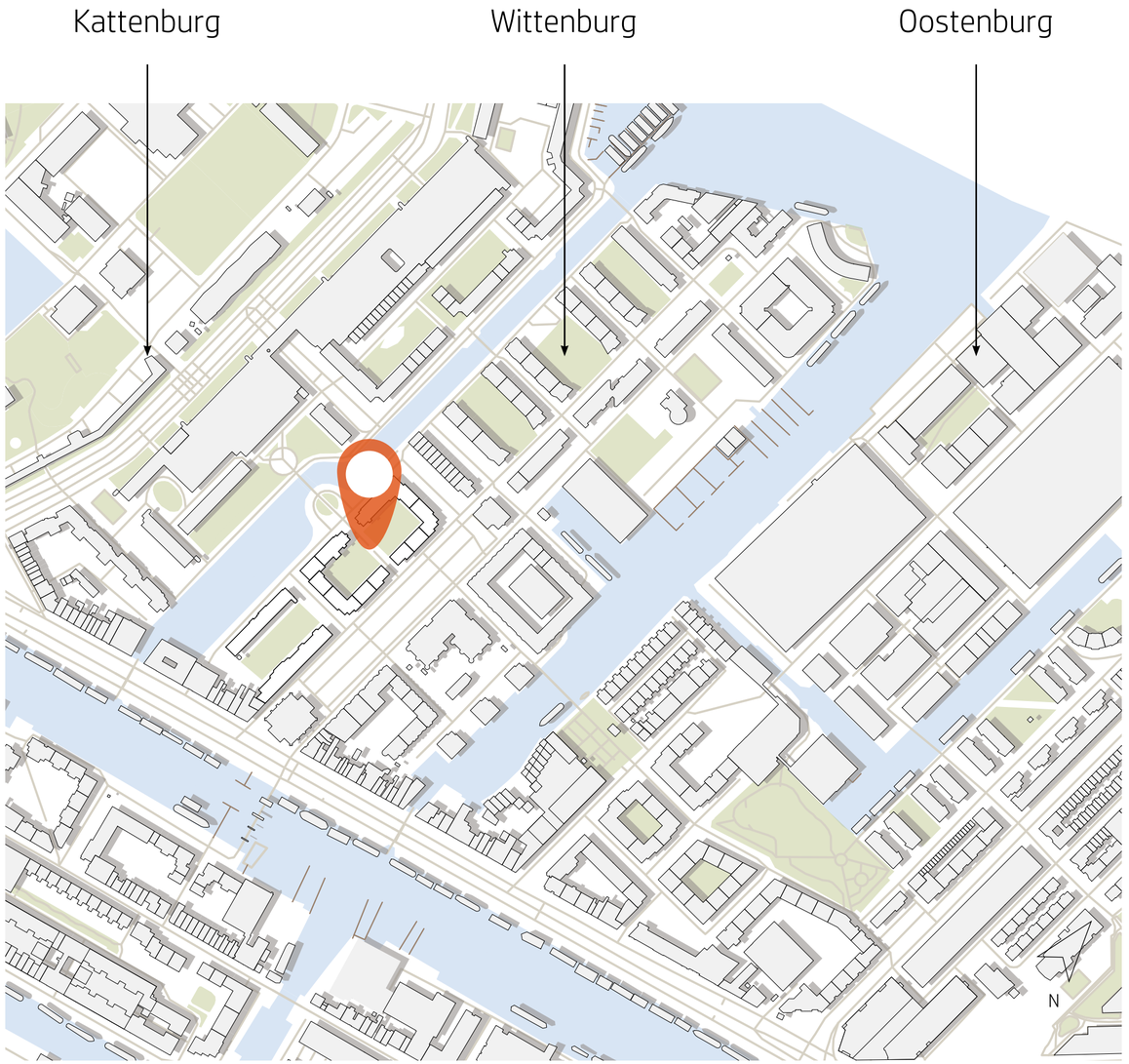
dimensions based on mode of stock



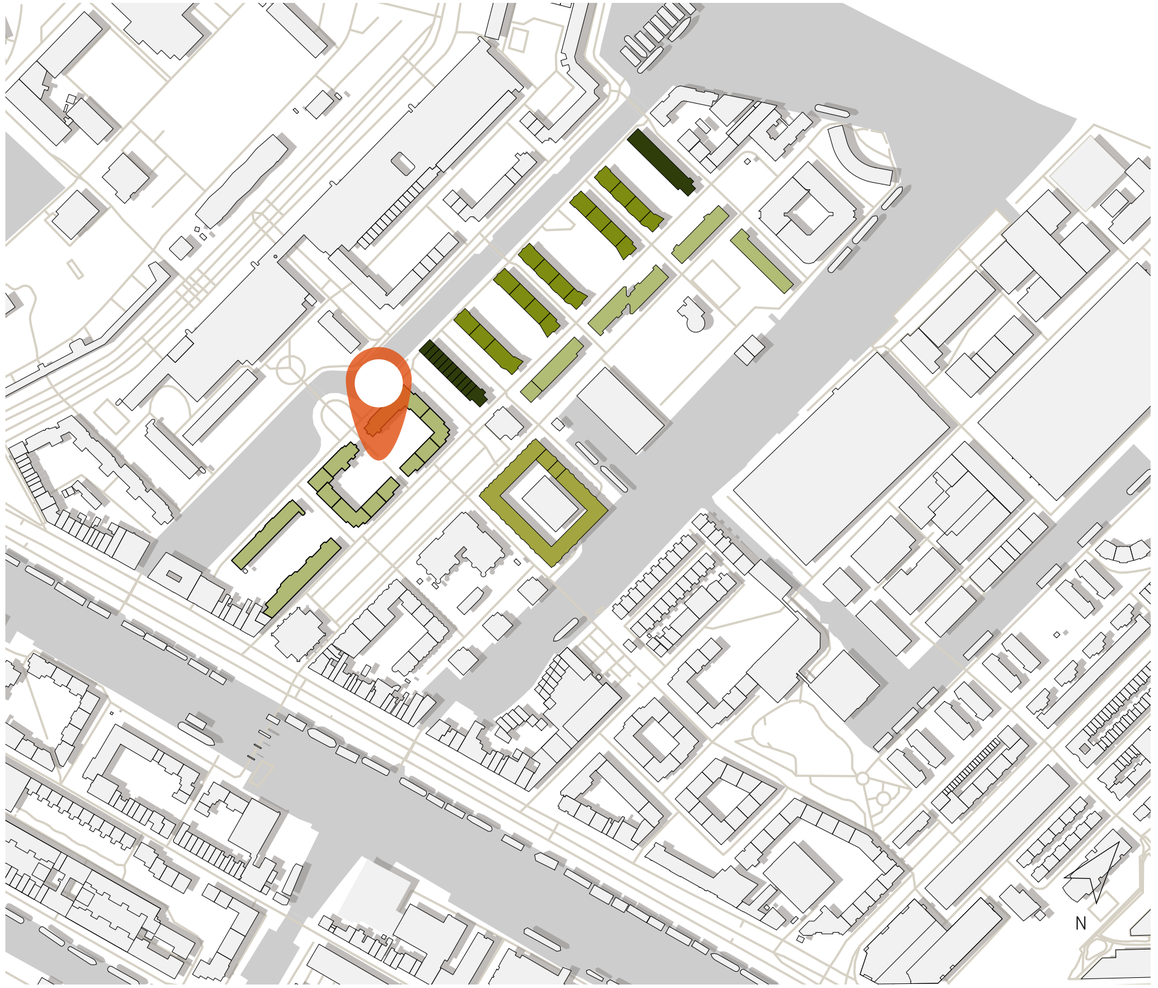
standardized dimensions

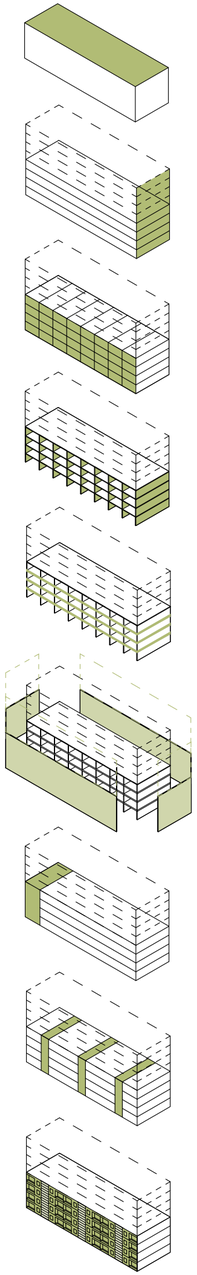
IN PRACTICE

vulnerable neighbourhood
low-density urban area
central amsterdam location
opportunity for densification
opportunity for social improvement



repetitive structural grid
flat roofs
concrete structure
structural overcapacity
repeatable neighbourhood typology





flat roof

4 to 8 layers

repetitive design based on house width

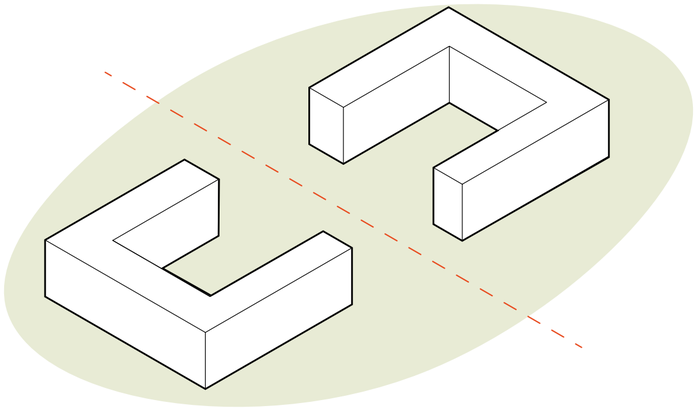
concrete slab construction

overdimensioning

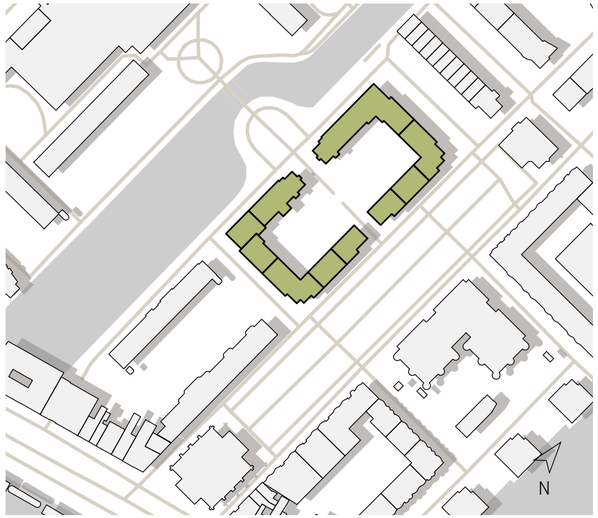
facades are not load-bearing

vertrical traffic space

repetition in the facades



symmetrical character of U-shape
selected building



selected building

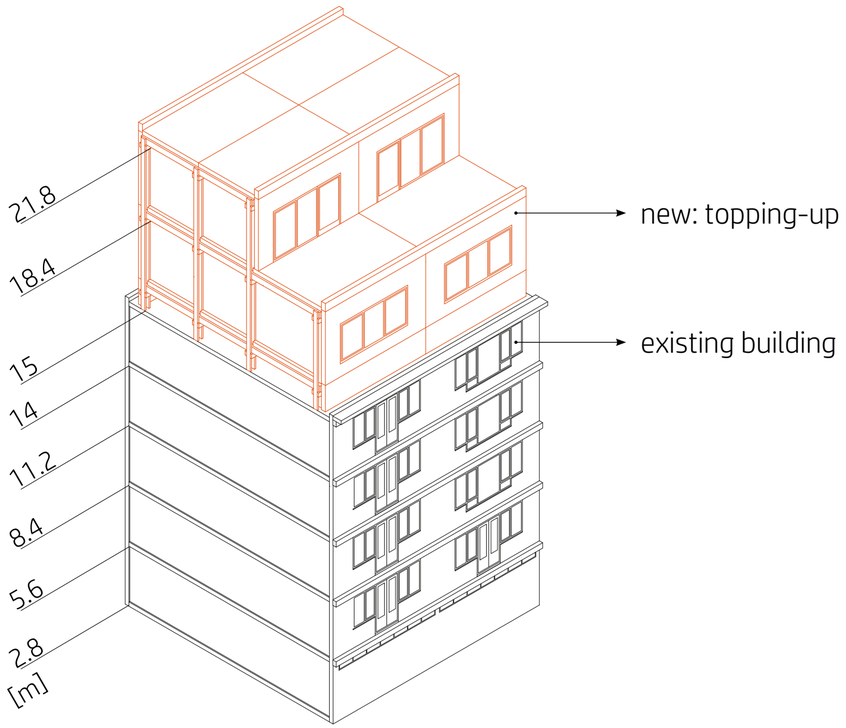


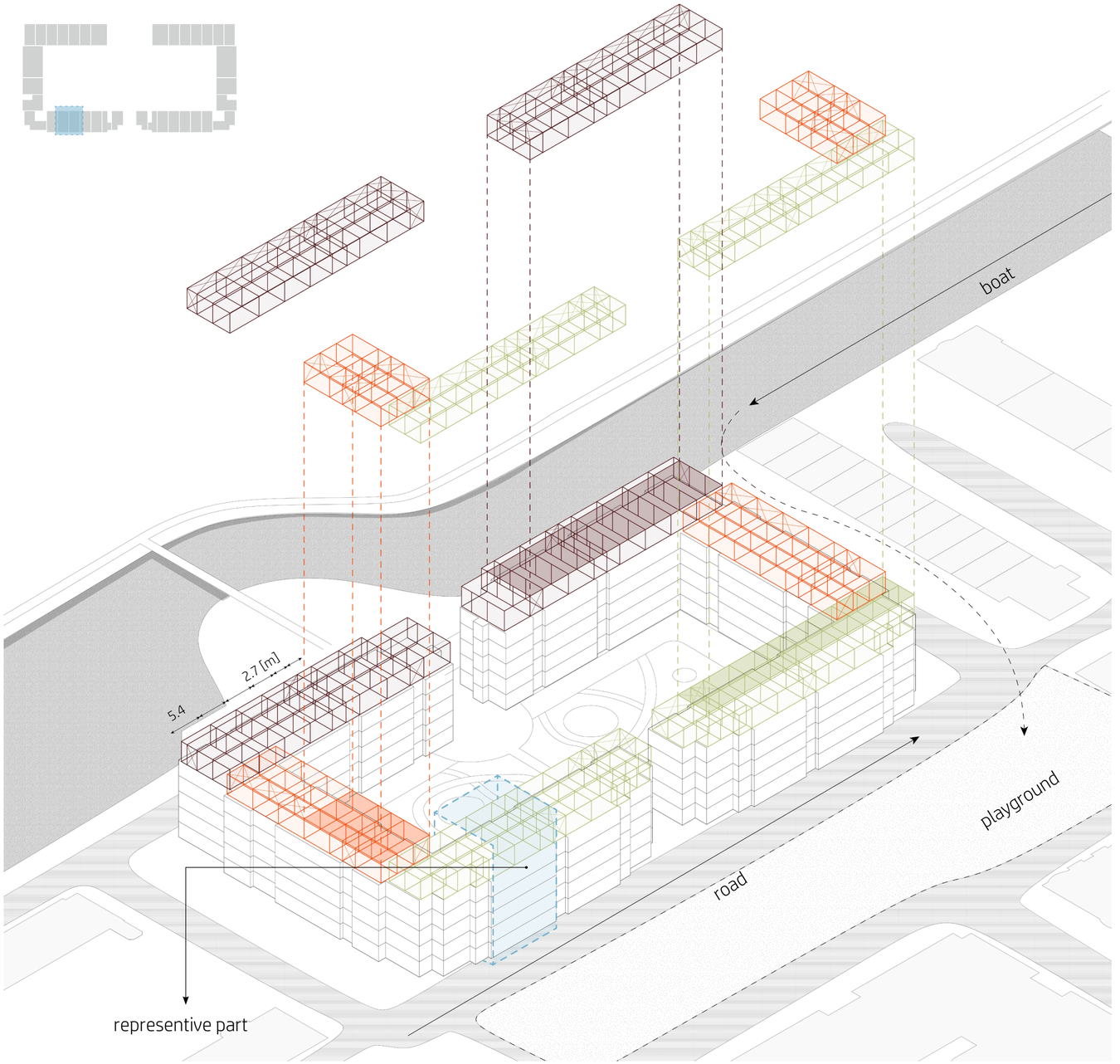
aerial view

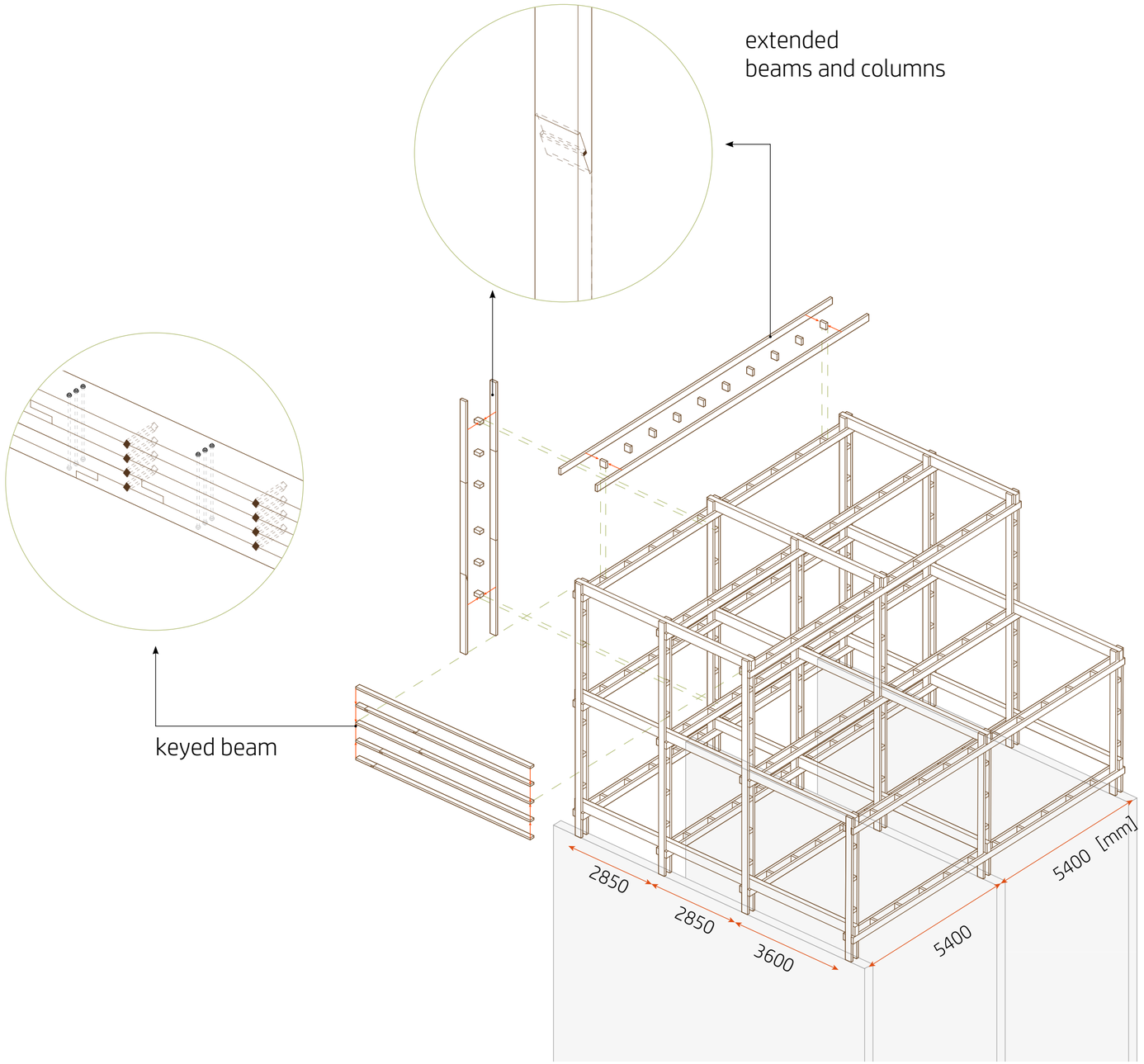
source: google earth

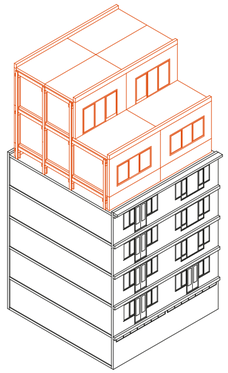
IN PRACTICE STRUCTURE

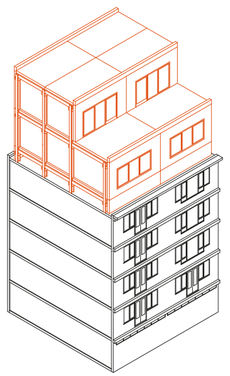
topping-up with 2 stories
existing grid 2.7 and 5.4 meters
dimensions reclaimed timber stock
beam and column structure
open floorplan
3 structures

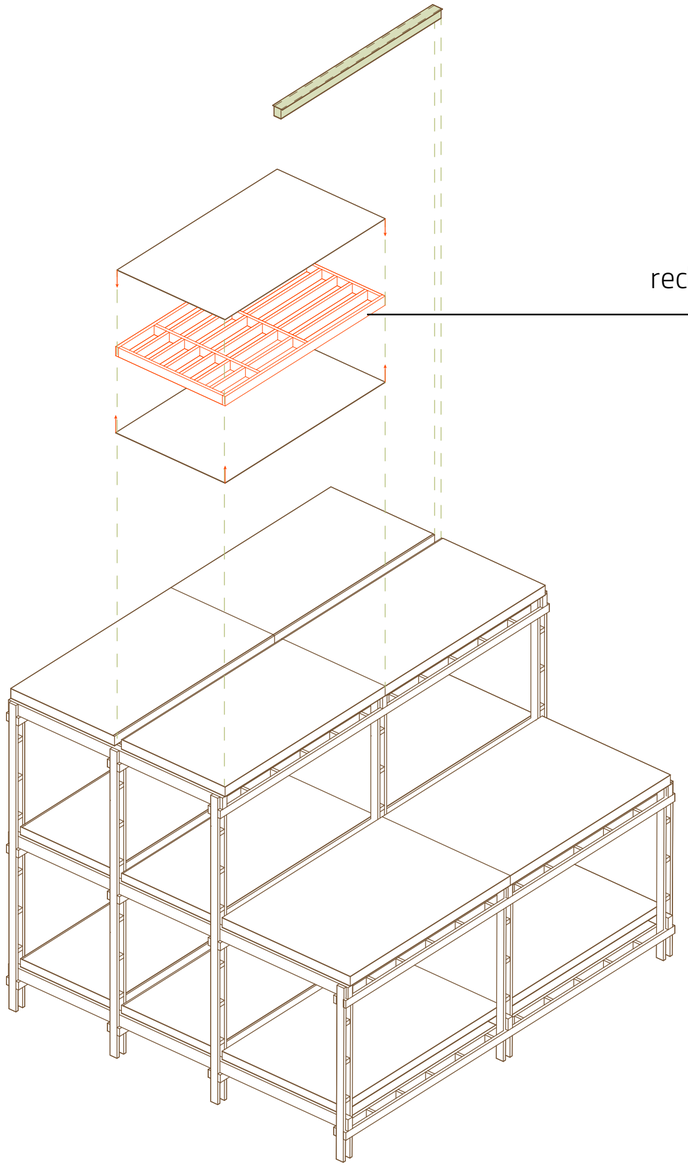




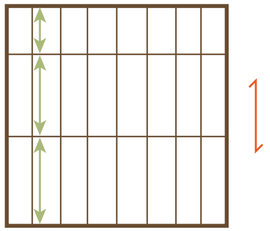

extended
beams and columns
keyed beam
2850
2850
3600
5400
5400 [mm]



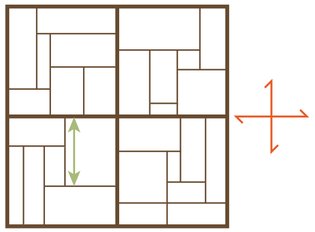




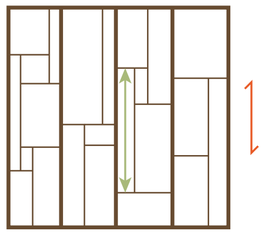
reclaimed timber frame element



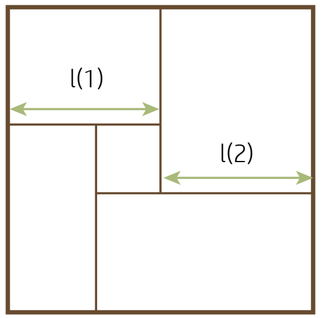
built-up system



modular system

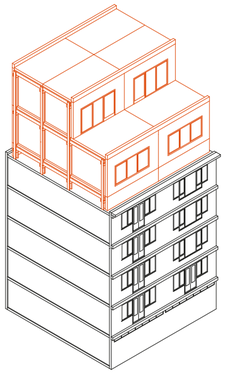


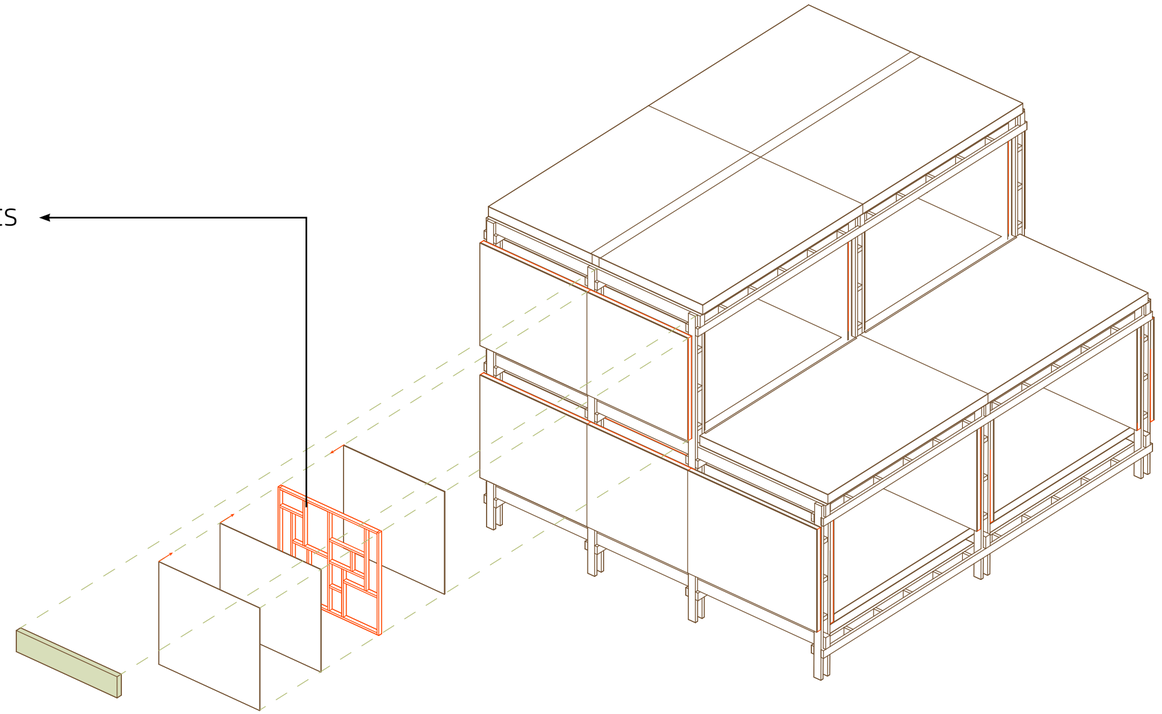
single-span system

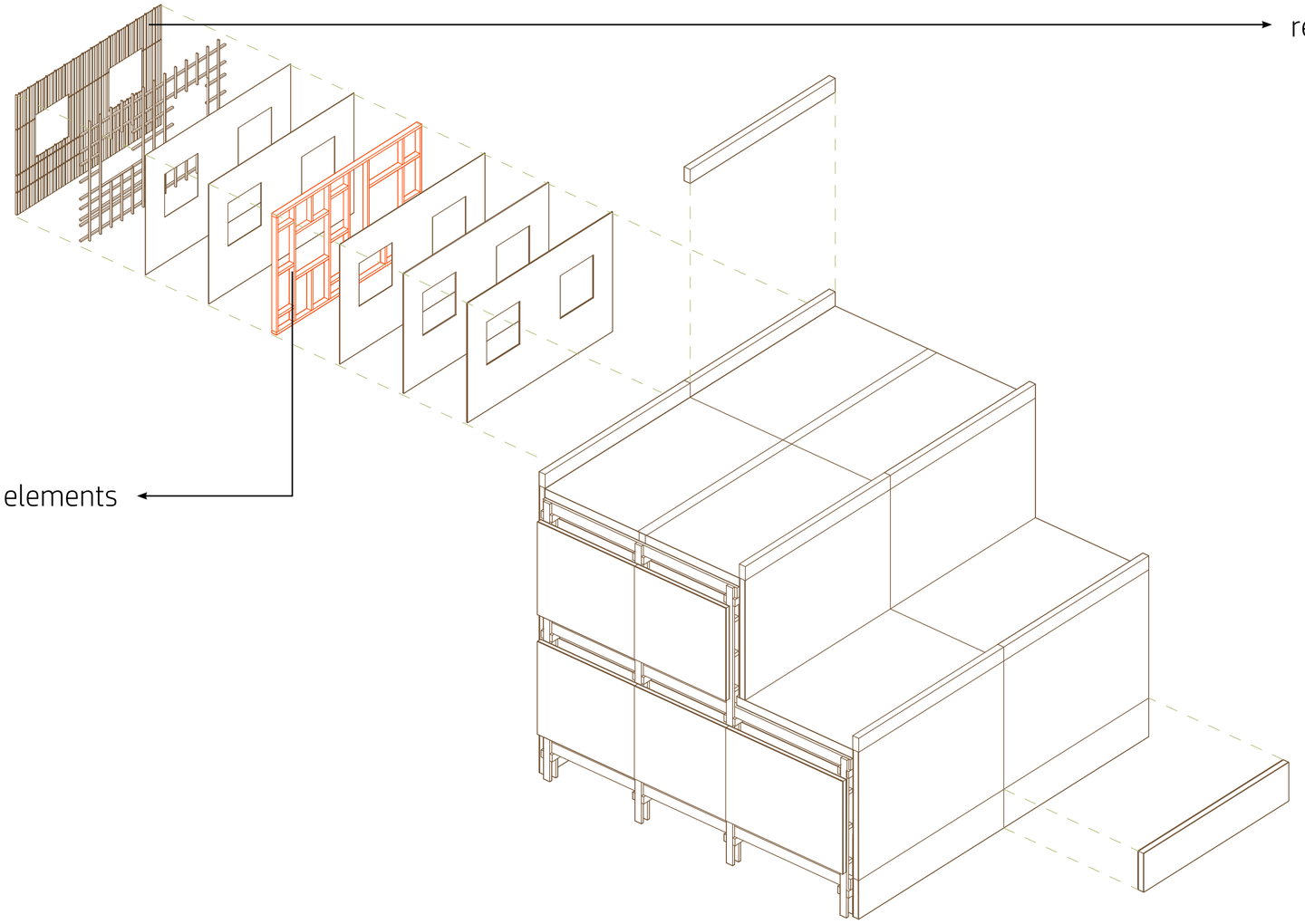


l(1) + l(2) > l(total)

reciprocal timber frame elements



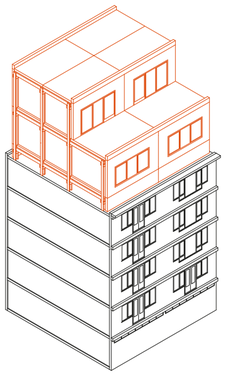




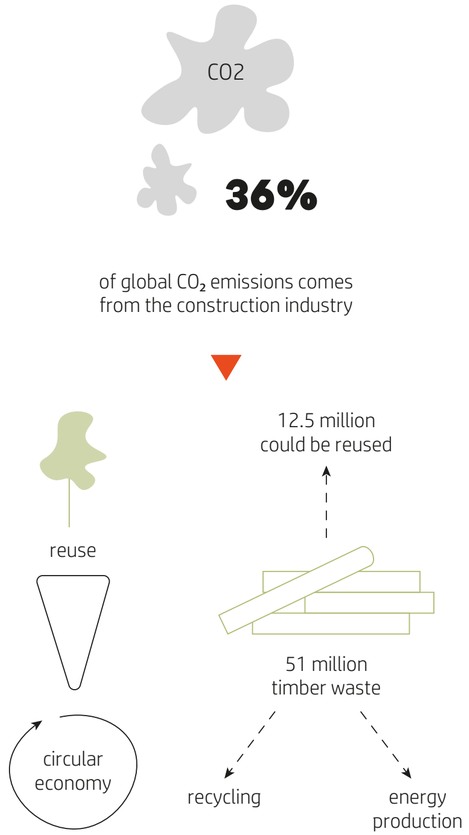
reclaimed timber finishing layer



reciprocal timber frame elements



challenge and proposed solution



direct substitution new timber for reclaimed timber 0.5 kg CO_2 per kg = 225 kg CO_2/m^3
hardwood saves approximately 7.2 kg CO_2/m^2
softwood saves approximately 4.3 kg CO_2/m^2

scenario	representive building fragment	1 building (11 x fragment)	2 buildings
80/20 hardwood	9,28 ton CO_2	102,08 ton CO_2	204,16 ton CO_2
50/50 hardwood and softwood	10,77 ton CO_2	118,47 ton CO_2	236,94 ton CO_2
20/80 softwood	12,27 ton CO_2	134,97 ton CO_2	269,94 ton CO_2

200 return flights between Amsterdam and Barcelona

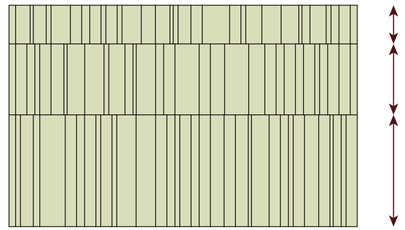
note!

indicative calculation
not a full lca

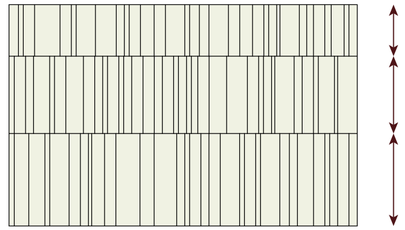
THE ARCHITECTURE

facade strategies
expressive
stock-based
standardised

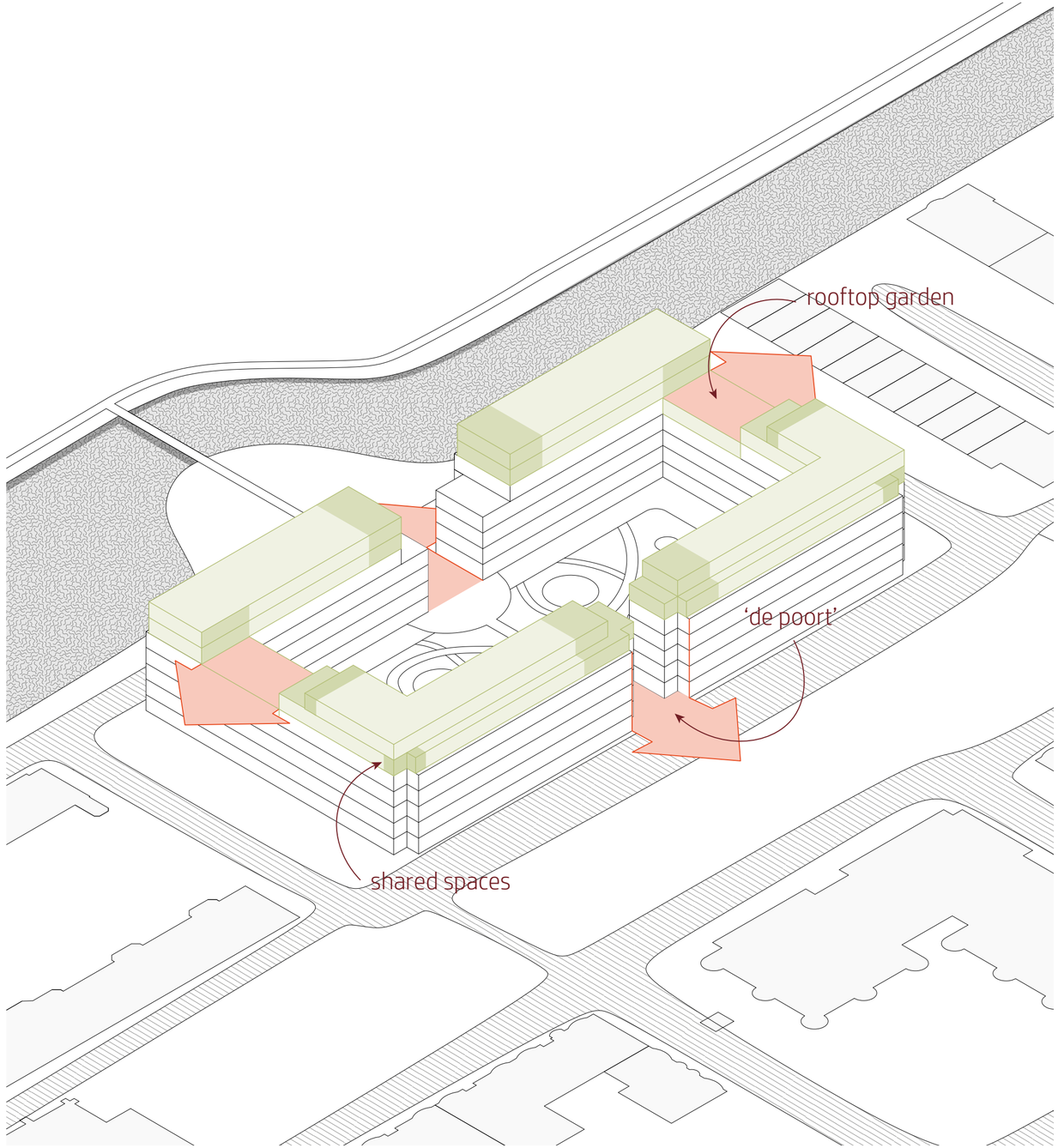
applied to emphasise
entrances
collective spaces
transitions
residential facades



panel a



panel b



entrance to the neighbourhood
public and private transition
neighbourhood event space
residents & community

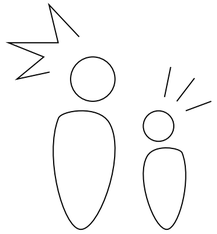
a place for encounter



challenges
vulnerable neighbourhood
ageing population
59% single households
social isolation

opportunities
co-housing
everyday interaction
informal social safety
existing community initiatives

building upon existing community initiatives



vulnerable neighbourhoods



social connection

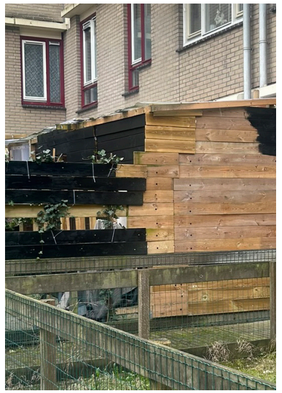






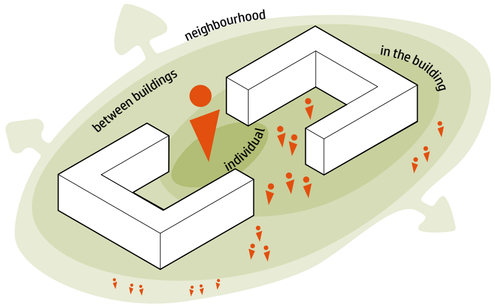
existing qualities

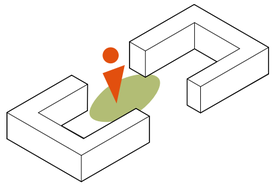


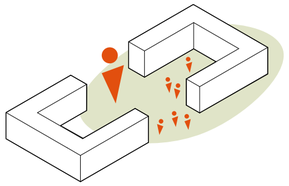



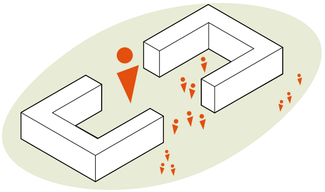
existing challenges

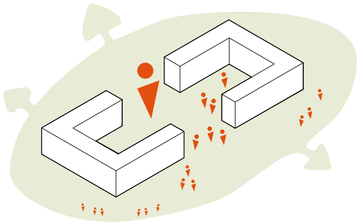
ARCHITECTURE 4 LEVELS OF COLLECTIVE LIVING









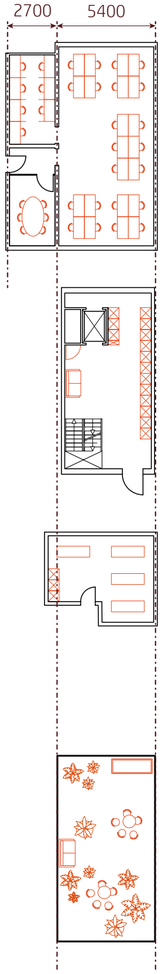


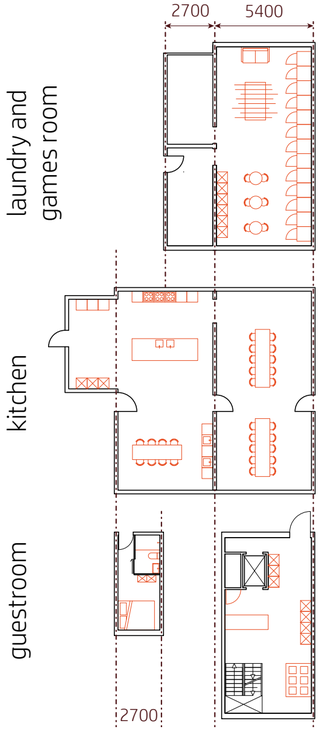
individual

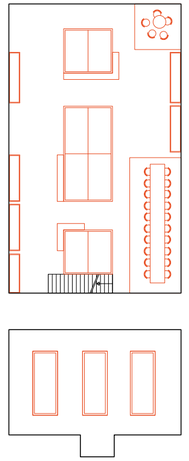
within the building

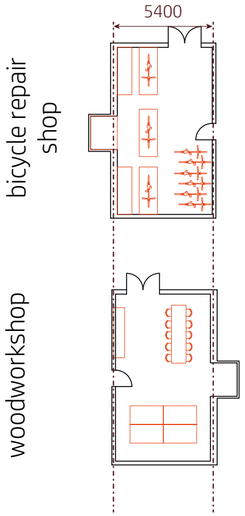
between the buildings

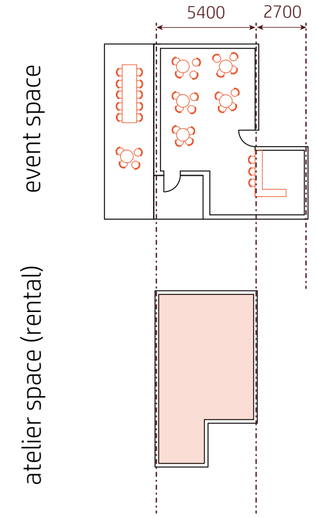
neighbourhood scale





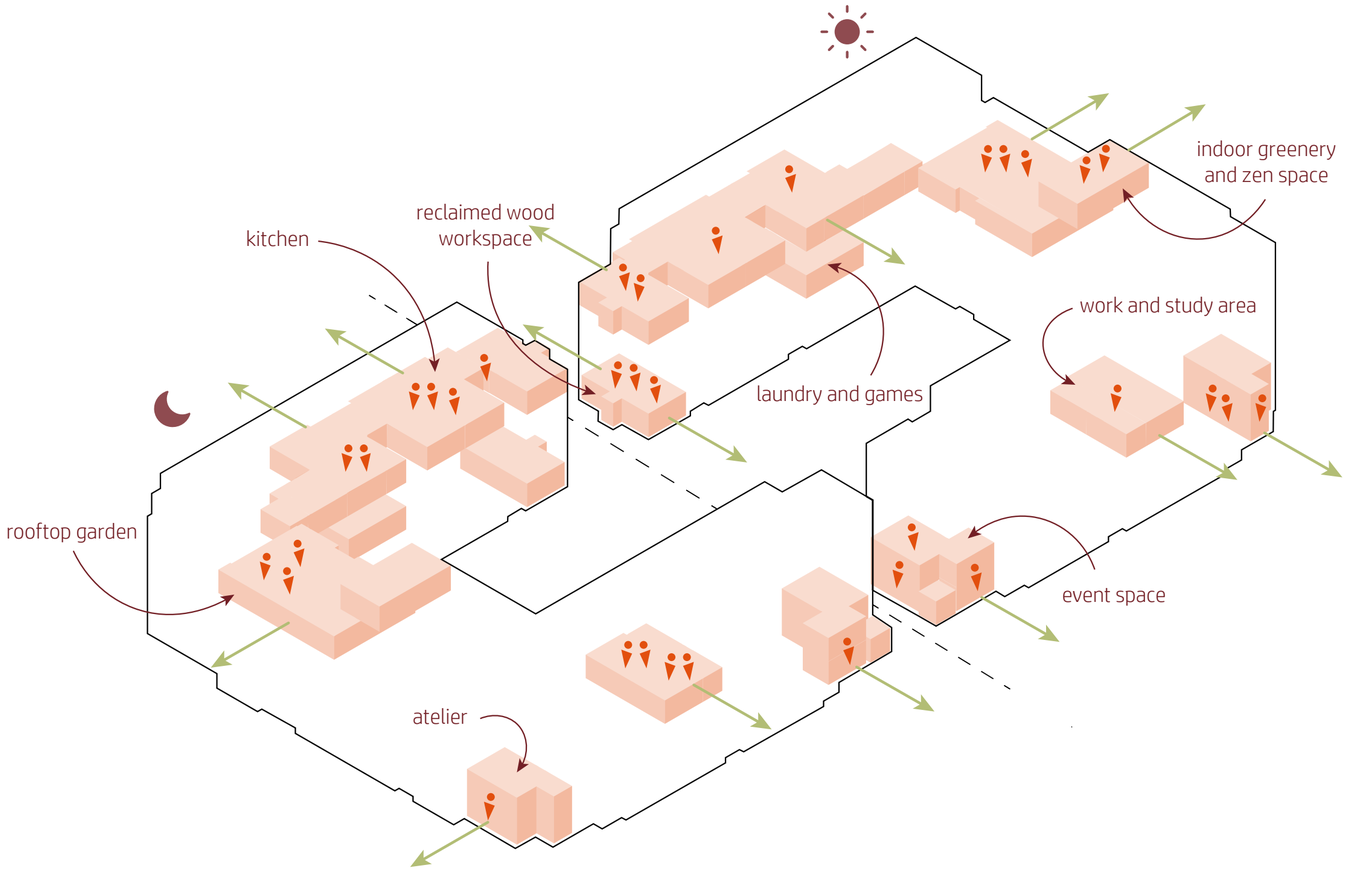






day & night occupation
street, gallery & courtyard
shared programmes
informal surveillance
social safety

a building that remains active throughout the day and year



existing

8 separate entrances

limited interaction

no elevators

new

continuous gallery

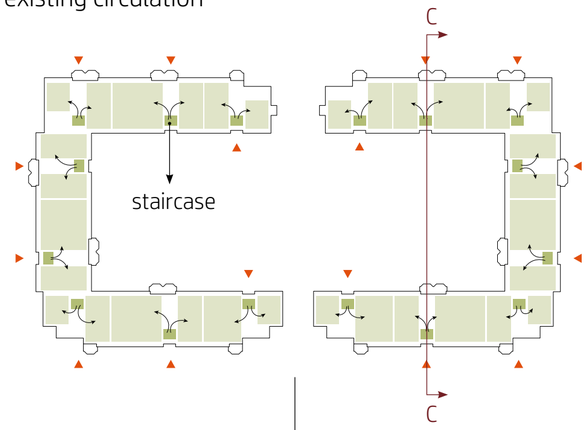
shared circulation

new elevators

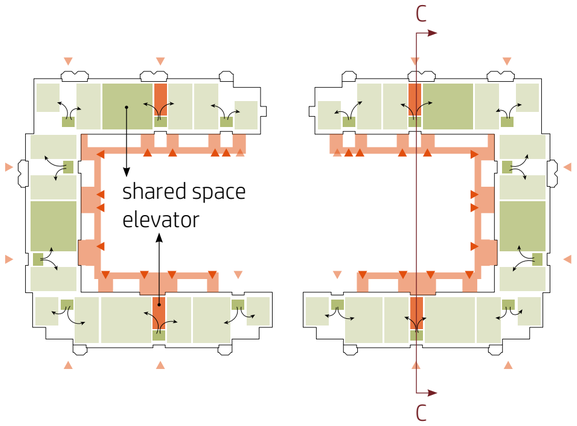
collective spaces connected

movement creates encounter

existing circulation



new circulation

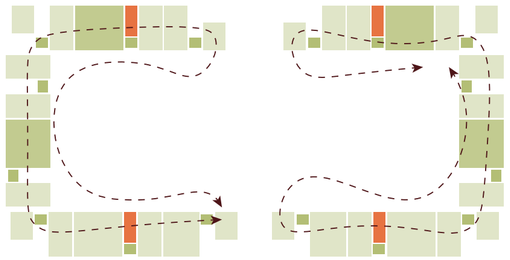


existing circulation

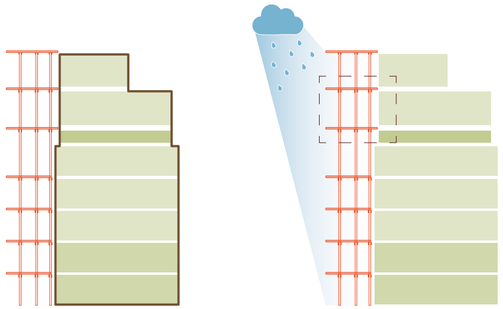


new circulation





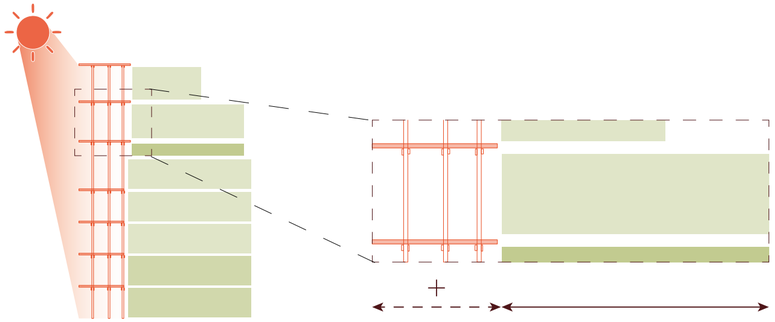
connecting spaces



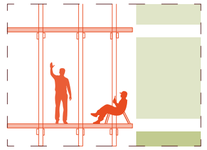
a second skin protecting:

1. the building

2. the residents against weather and provide shade



extended living space



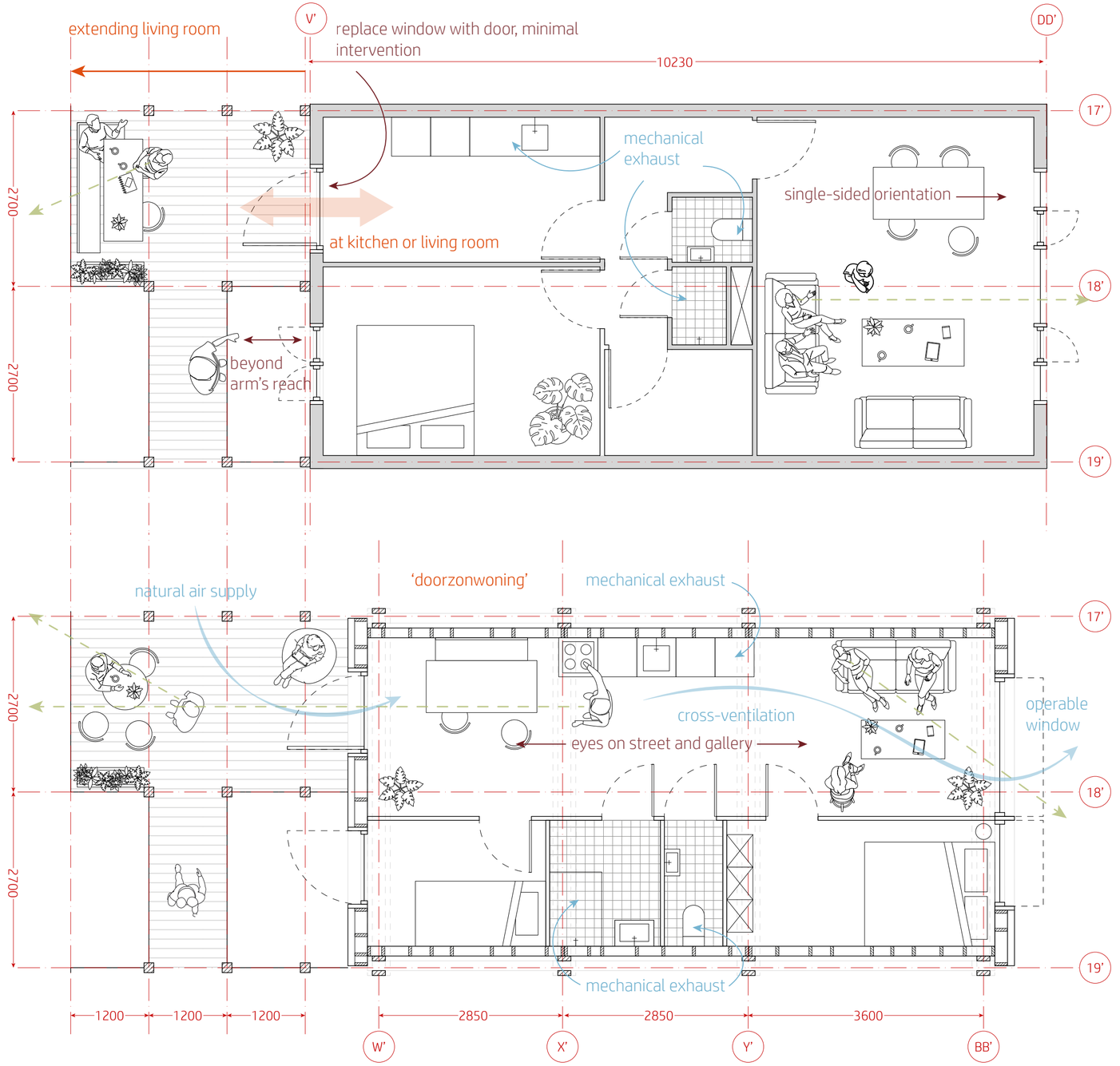
connecting residents

existing dwelling
single-sided orientation
limited social connection

new dwelling
dual-aspect layout
gallery connection
balance between privacy & encounter

existing appartment

topping-up appartment





ARCHITECTURE 5TH FLOOR

central courtyard
shared spaces
everyday movement
visual connections

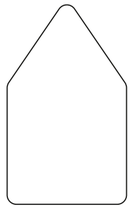




CONCLUSION

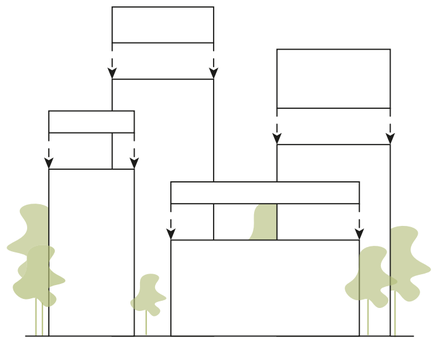
design actions

representative reclaimed timber database
reusable building elements
prefabricated & demountable system
four levels of collective living
living gallery as social interface
eyes on the street strategy



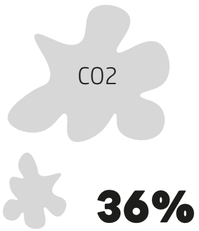
housing shortage

396.000
dwellings

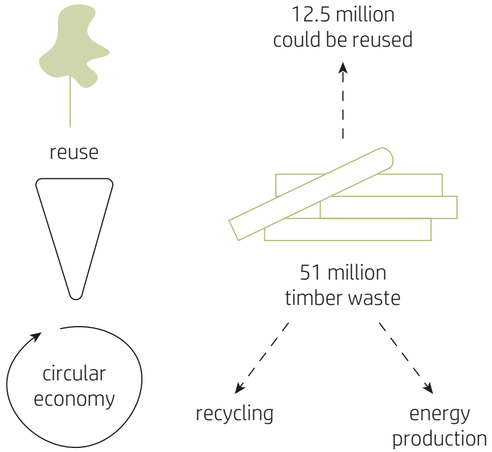


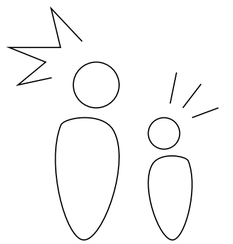
limited space

topping-up dense urban areas



of global CO_2 emissions comes from the construction industry





vulnerable neighbourhoods



social connection

RQ:

How can reclaimed timber be translated into reusable building elements for application in the contemporary building industry?

By defining a realistic reclaimed timber stock and translating it into reusable building systems that accommodate uncertainty while anticipating future reuse.

DQ:

How can reclaimed timber elements be applied in a topping-up strategy to improve social cohesion, safety and spatial quality in Wittenburg, Amsterdam?

By combining reclaimed timber construction with co-housing, eyes on the street and a layered social structure from the dwelling to the neighbourhood.

FROM MATERIAL CHOICE TO DESIGN DRIVER

THANK YOU!

QUESTIONS?



housing mix
1-room apartments
2-room apartments
family dwellings
shared facilities

target groups
starters
elderly residents
single households

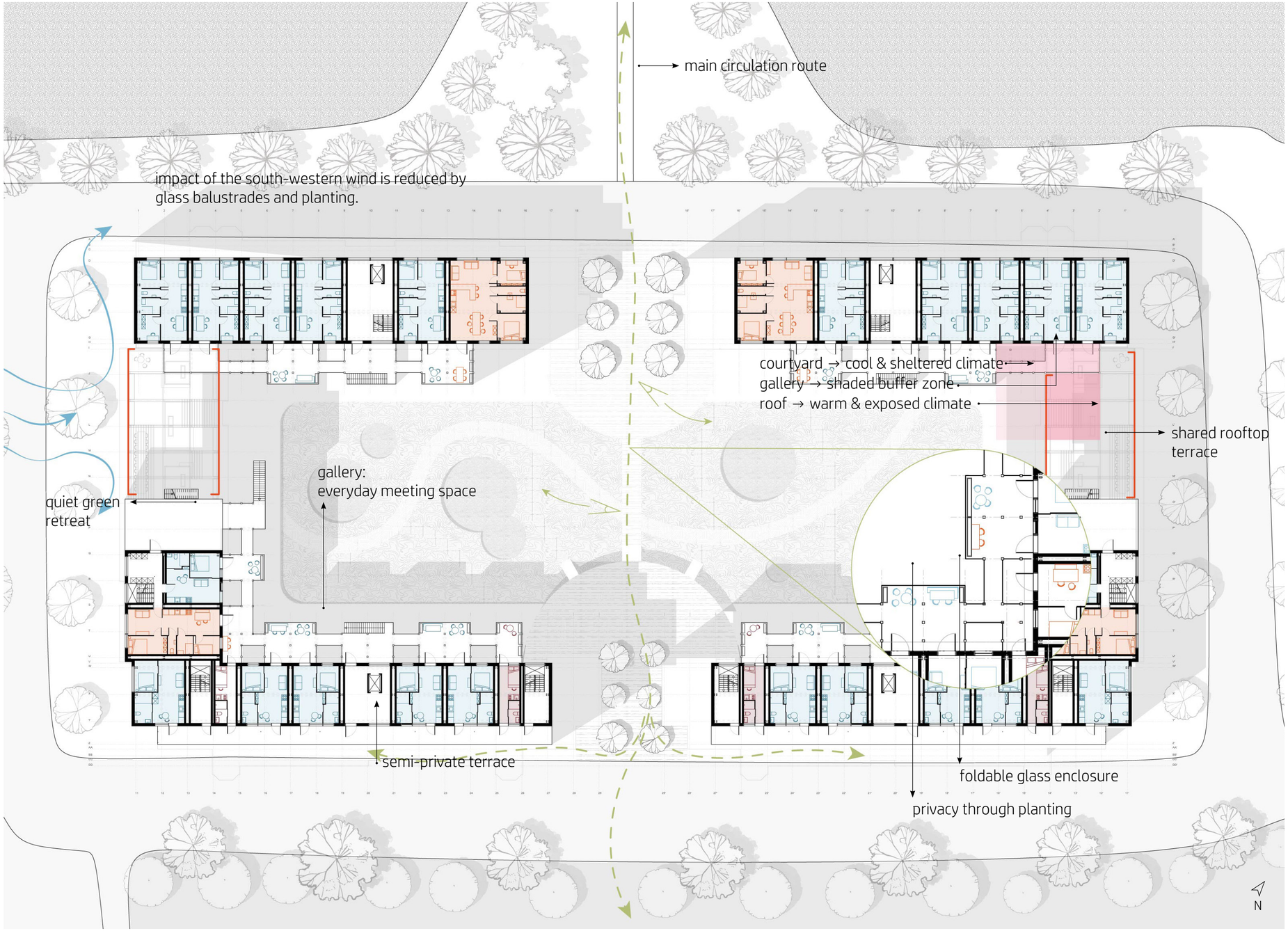
goal
diverse resident mix
everyday interaction
social cohesion

responding to changing housing needs



private > semi-private > public
three microclimates
wind protection
rust > ruis > reuring

different degrees of comfort and interaction



climate buffer
extended outdoor living
year-round use
more than circulation

spring



fall

