AM
STEL III
THE RE
USE CITY
Beelen sloopwerken

*"Implementing **urban mining** as a tool to **transform** vacant office buildings, **reusing** 100% of the existing **building components**."*

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- Urban mining
- Component reuse

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RE
SEARCH

1) Research

- Upcycle Amstel
- Urban mining
- Component reuse

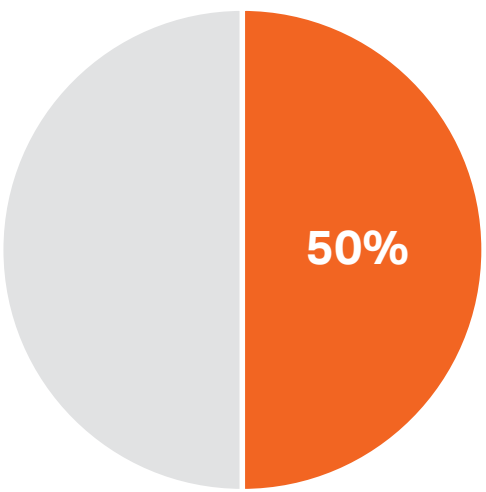
UP CYCLE AMSTEL

Initial studio brief

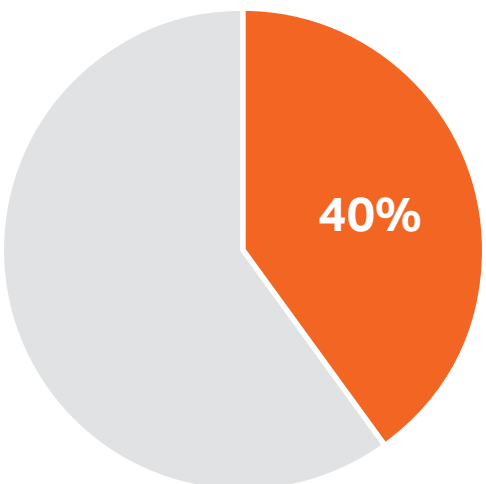
*"We will explore the **urban mining** of **construction waste streams** by mapping and analysing these waste streams in the **Amstel III** area. This will provide a palette of **resources** from which to **synthesize new architecture**."*

Consumption

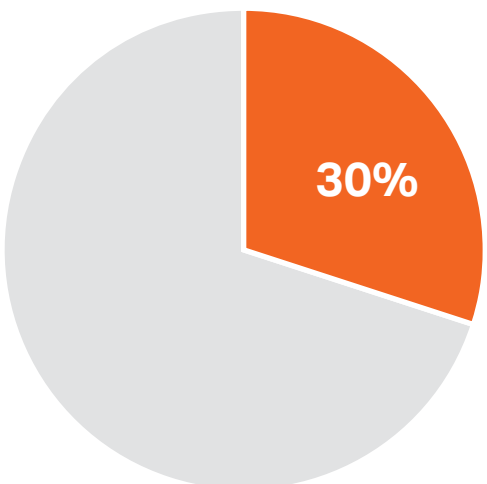
Raw Materials



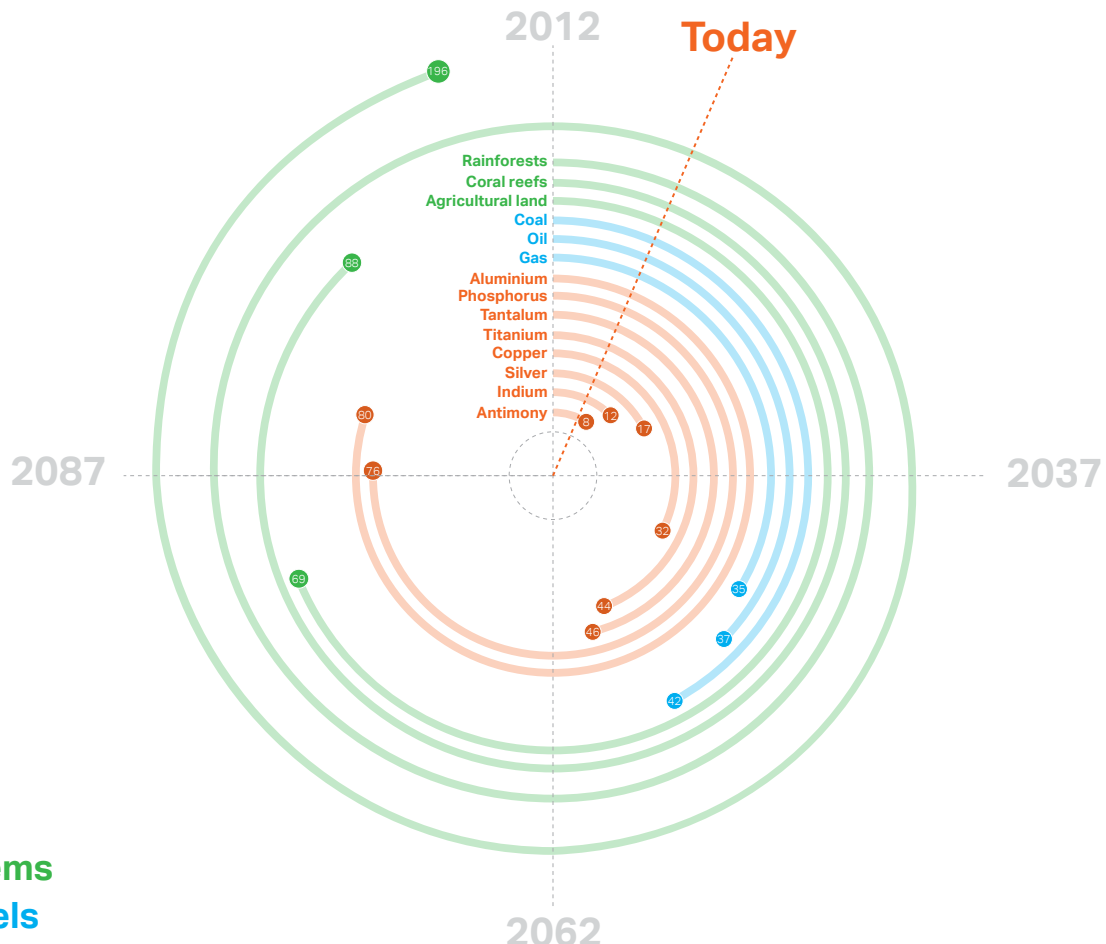
Energy



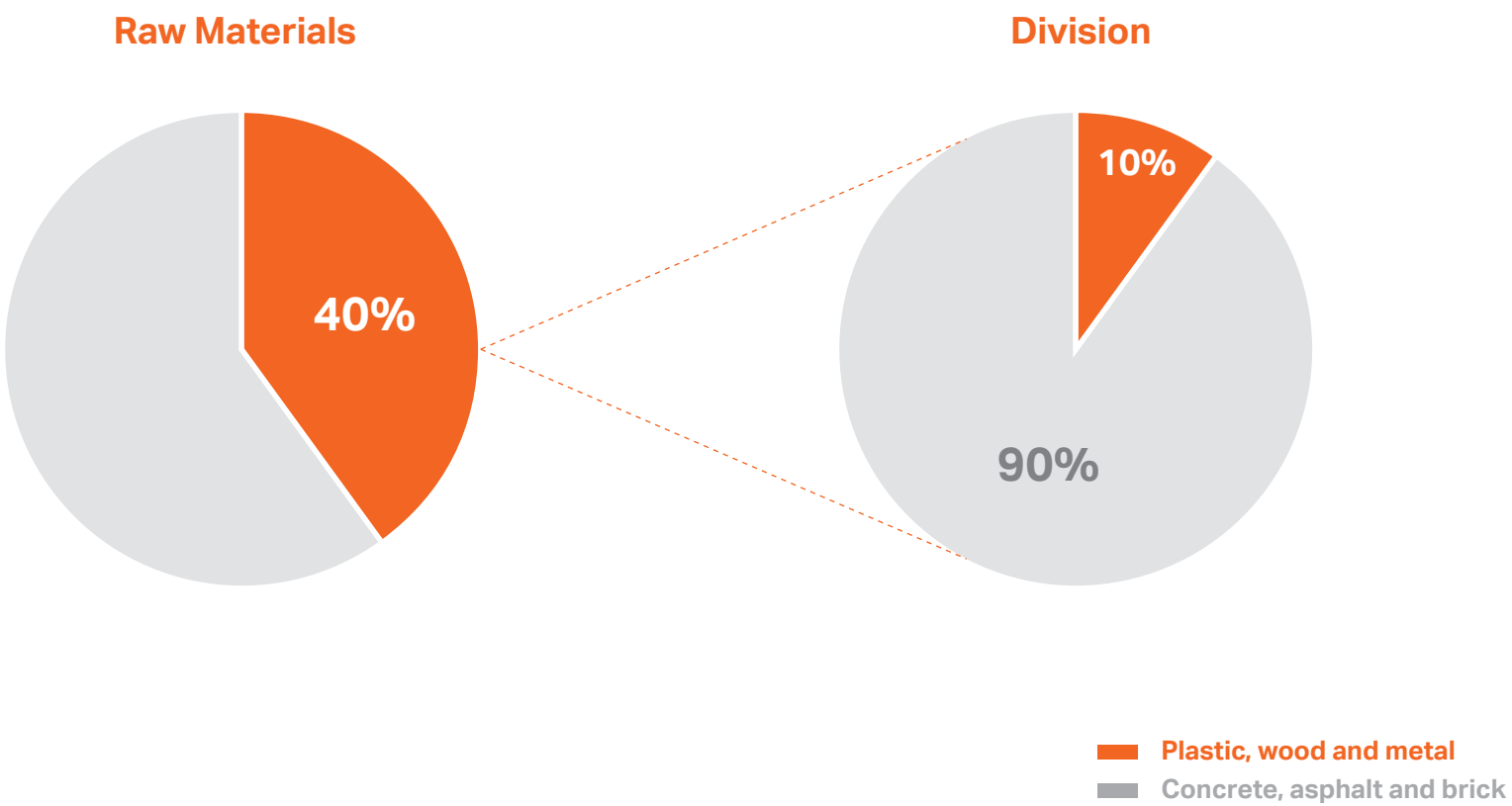
Water



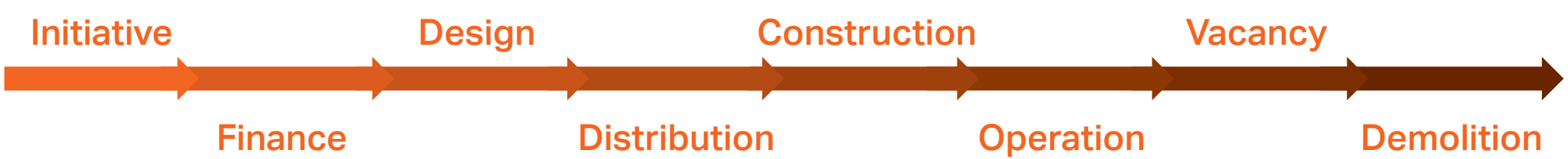
Material depletion



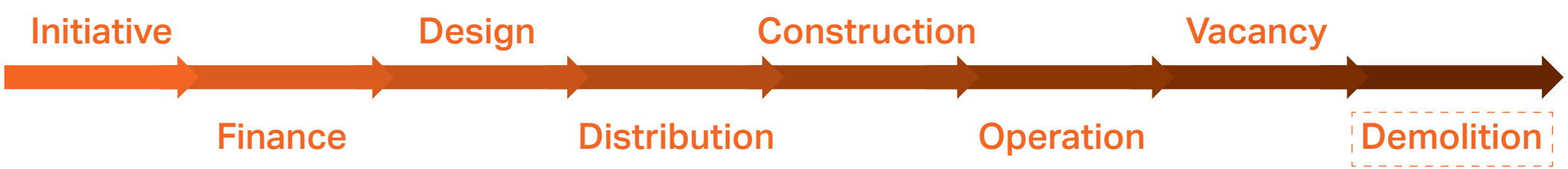
Construction waste



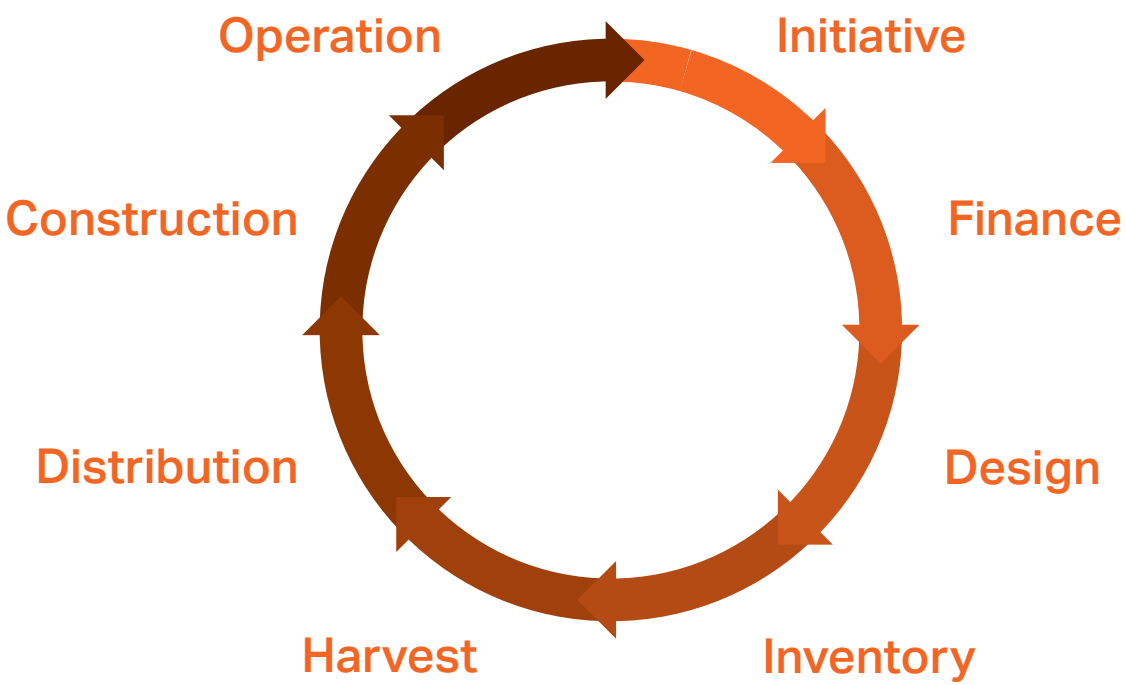
Linear building chain



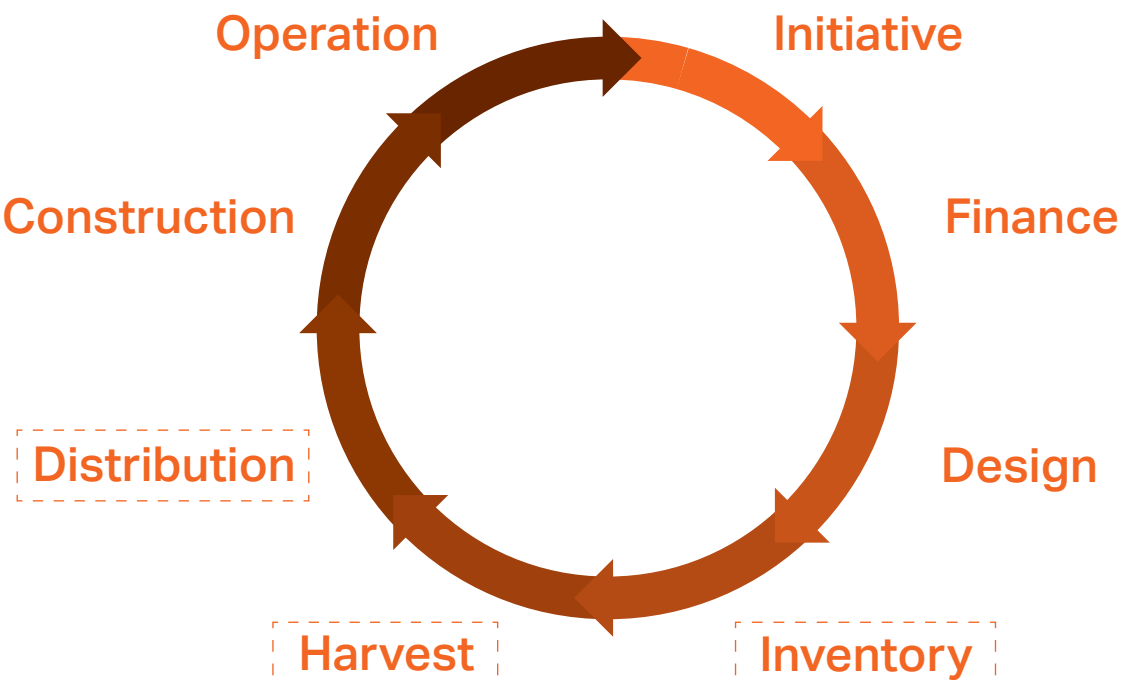
Linear building chain



Circular building chain



Urban mining



URBAN MINING

amc
Beelen
Beelen

*"To see urban areas, such as **cities and buildings**, as potential **material mines**, focussing on the **recovery** of these materials from the **urban catabolism**"*

Phases

1. Inventory

Phases

1. Inventory

2. Harvest

Phases

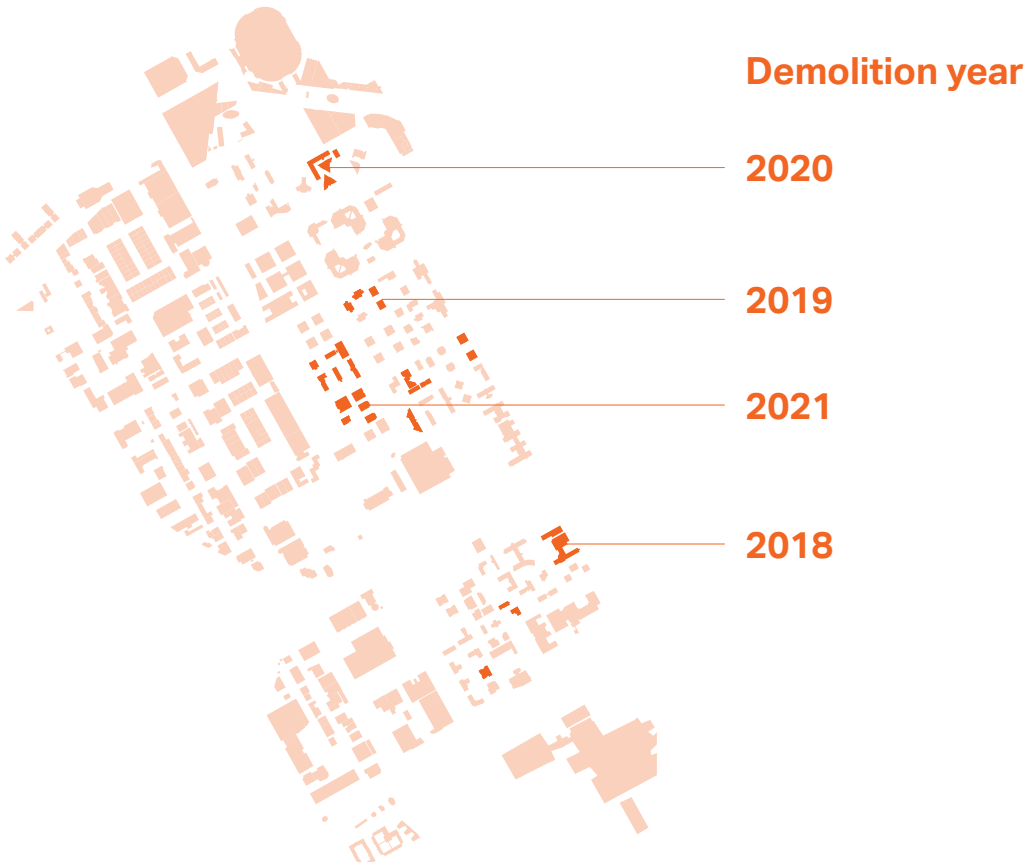
1. Inventory

2. Harvest

3. Distribution

Amstel III

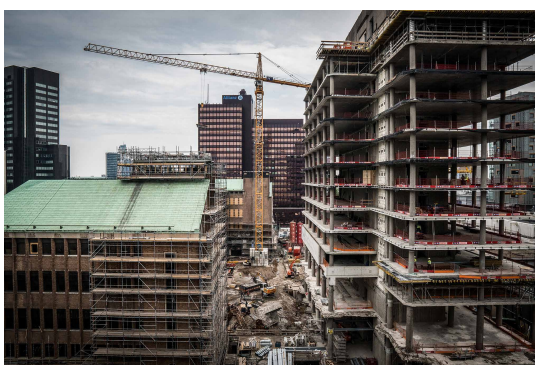
Harvestmap



COMPONENT REUSE

Component reuse

Prolong or reuse 1:1



Component reuse

Prolong or reuse 1:1

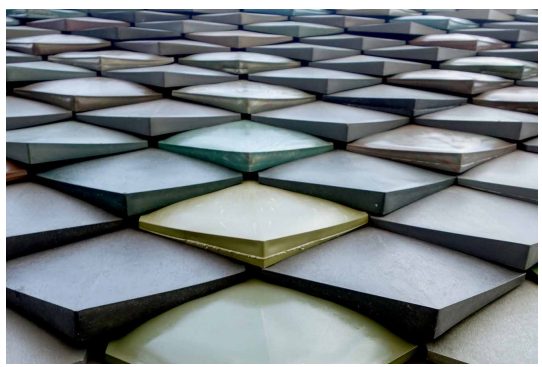
Refurbish or recondition

Component reuse

Prolong or reuse 1:1

Refurbish or recondition

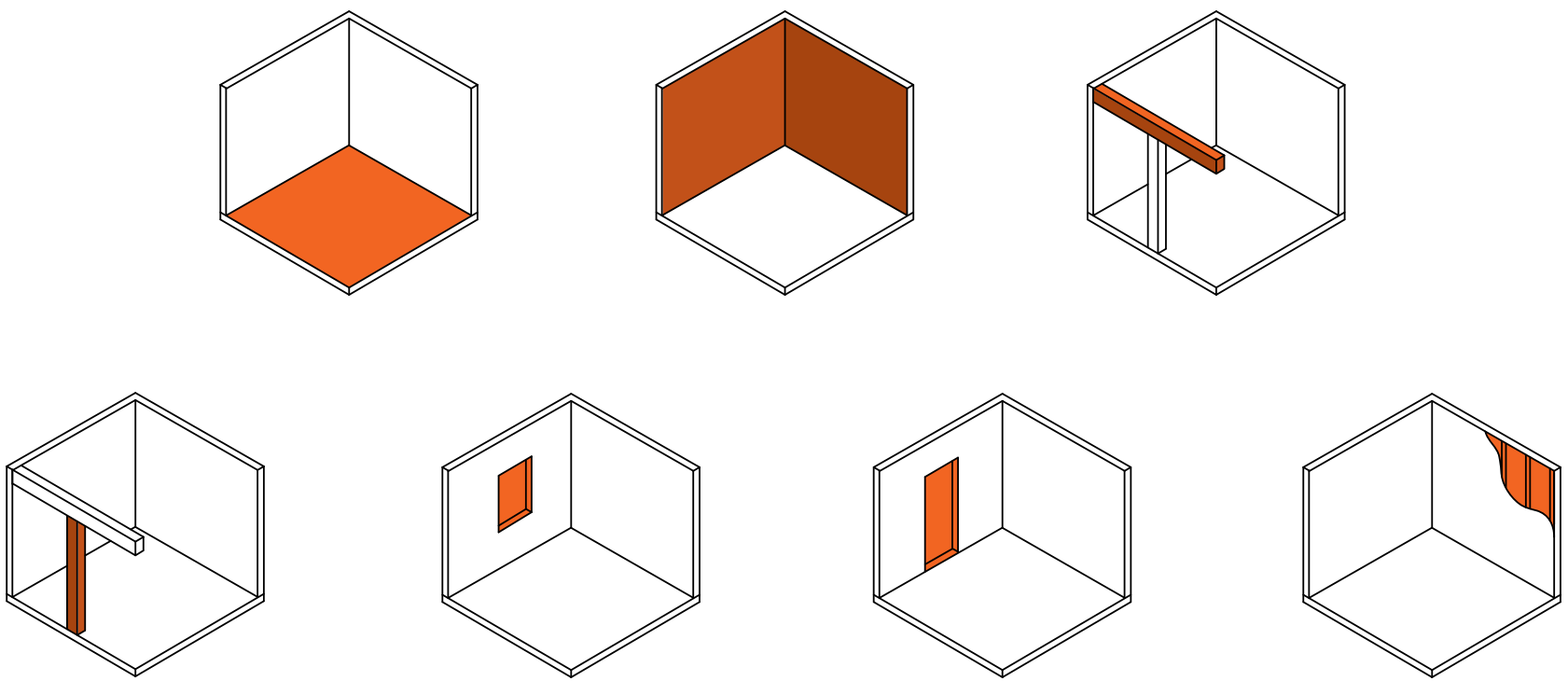
Recycle or downcycle



‘Good’ vs ‘less bad’

1. Prolong
2. Reuse 1:1
3. Refurbish/remanufacture
4. Recycle
5. Downcycle

Frequently reused components

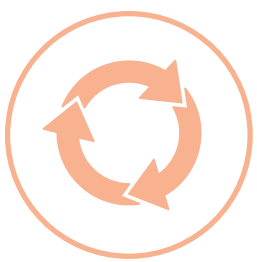


Influences

Reusability

Influences

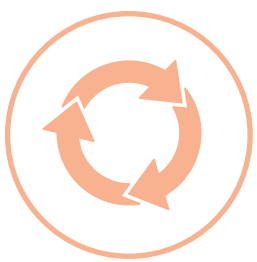
Reusability



Availability and demand

Influences

Reusability



Availability and demand

Benefits

Conclusions

1:1 reuse is most preferred

Conclusions

1:1 reuse is most preferred

Information is vital for urban mining

Conclusions

1:1 reuse is most preferred

Information is vital for urban mining

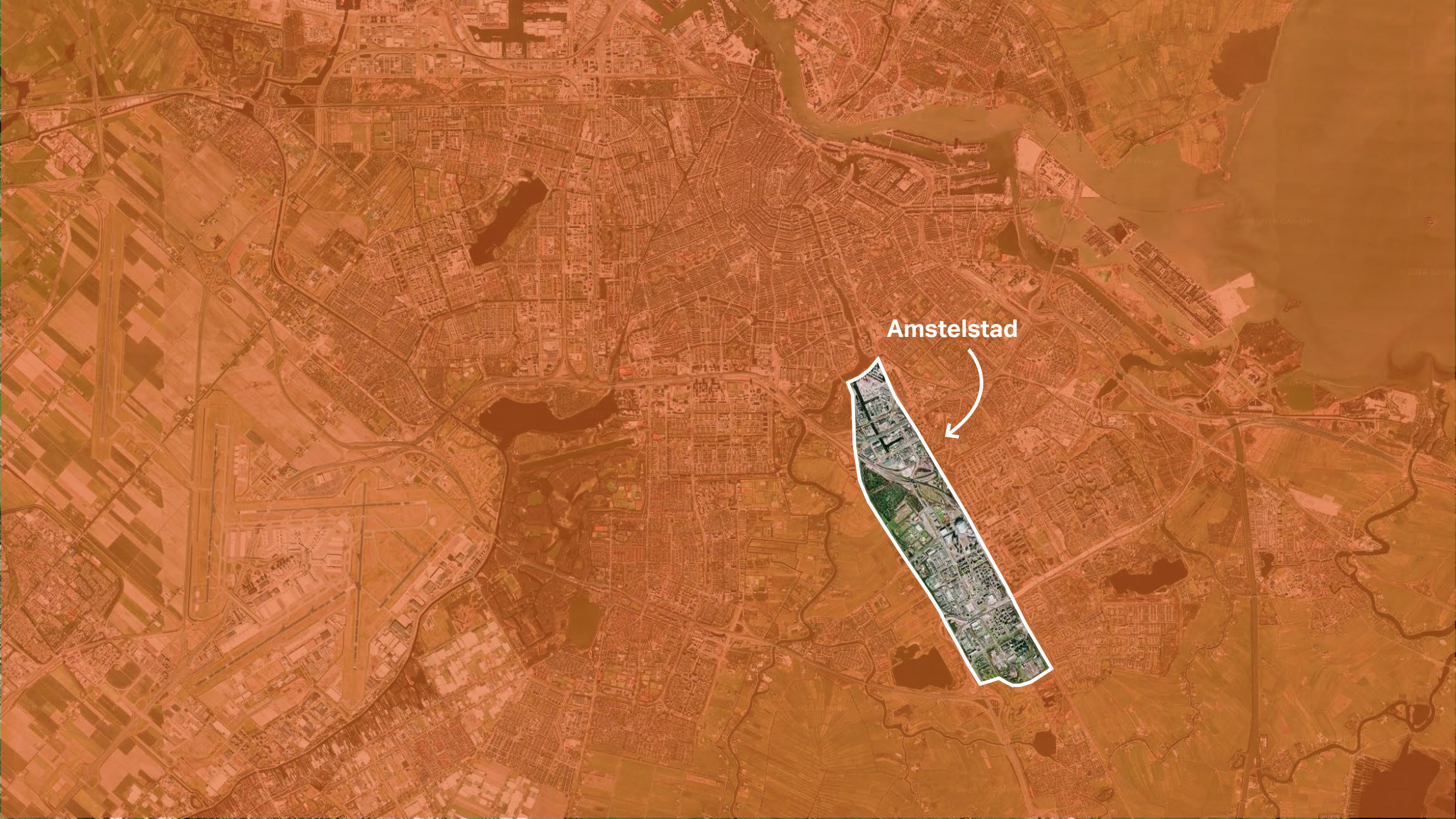
Buildings today are not meant for reuse

ANALYSIS

2) Analysis

- Context
- Site
- Inventory

CONTEXT


Amstelstad

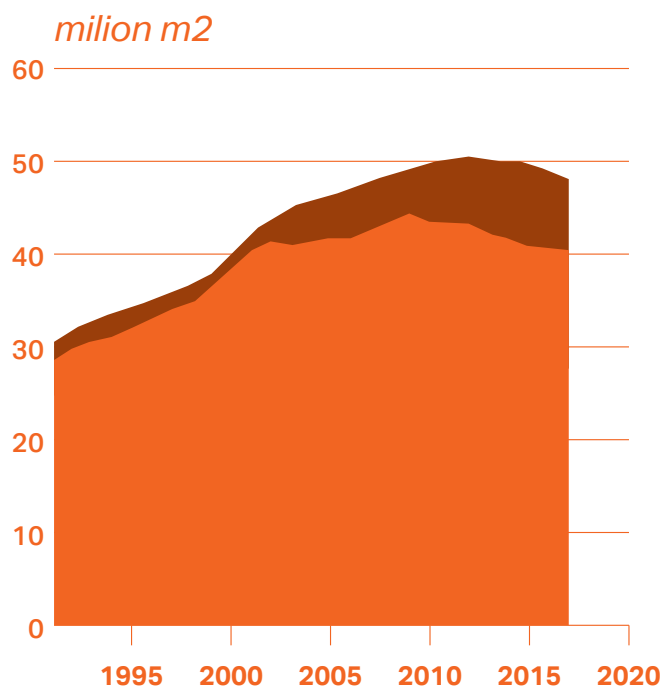
Diemen
Amsterdam-Zuid
Diemen-Zuid
Duivendrecht
Bijlmer-Oost
Bijlmer-Centrum
Amstelveen
Gaasperdam
Ouderkerk aan
de Amstel

ArenaPoort
Bijlmer-Centrum
Holendrecht en
Reigersbos
Ouderkerk aan
de Amstel

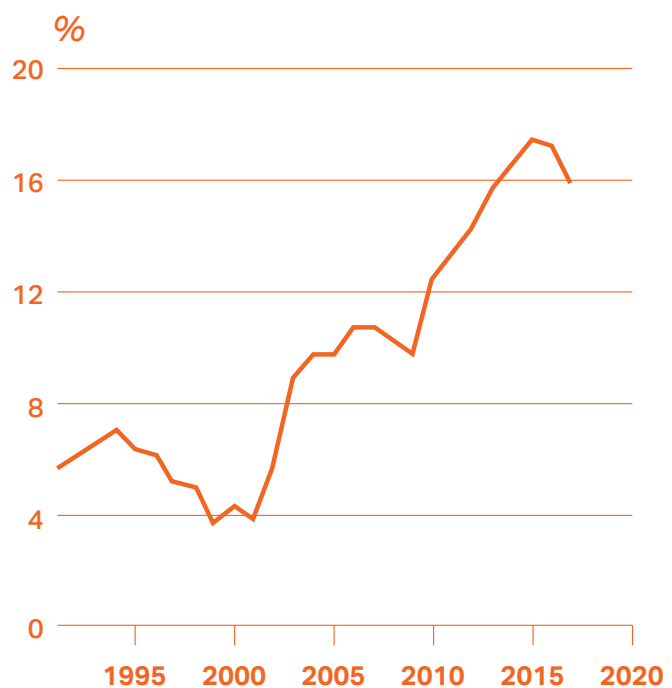
Strandvliet
Amsterdam Central Station (10 min)
Bijlmer Arena
Schiphol Airport (15 min)
A2
Bullewijk
Almere (20 min)
A9
Holendrecht

Office vacancy

Total stock



Percentage vacant



Vacant

In use

Municipal goal

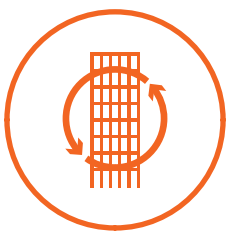
*"The goal is to make the area known as an **attractive** and **versatile** area of Amsterdam, where people **live** and **work**."*

Facts and figures

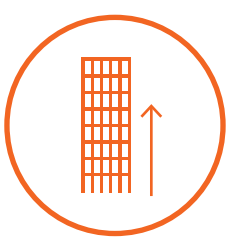
720.000 m² office space

+15.000 dwellings

Circular transformation



High density



40% social housing

Larger dwellings

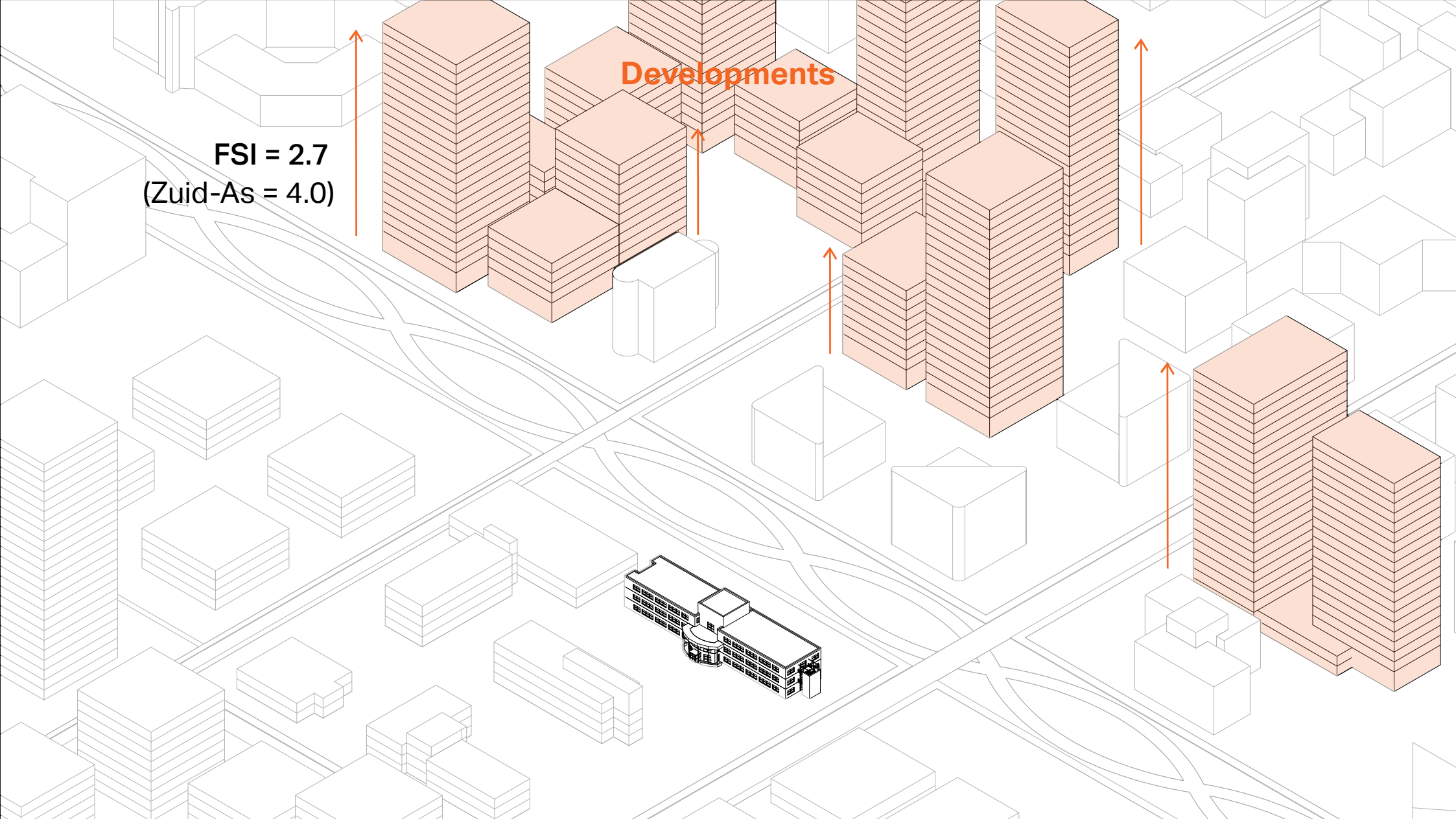
SI
TE

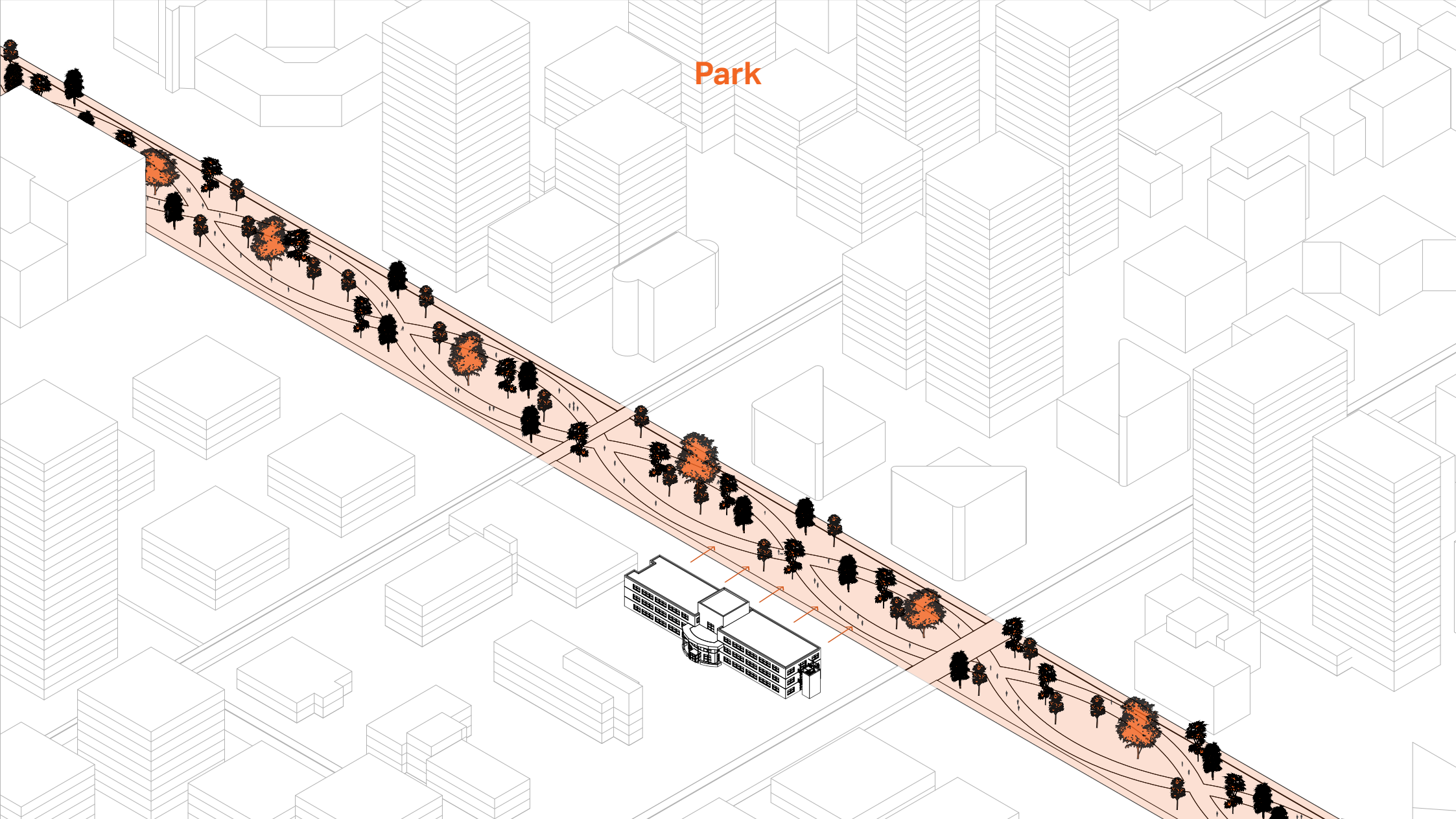
Amsterdam-Arena
Spot-Amsterdam
IKEA
AMC

Harvest Locations

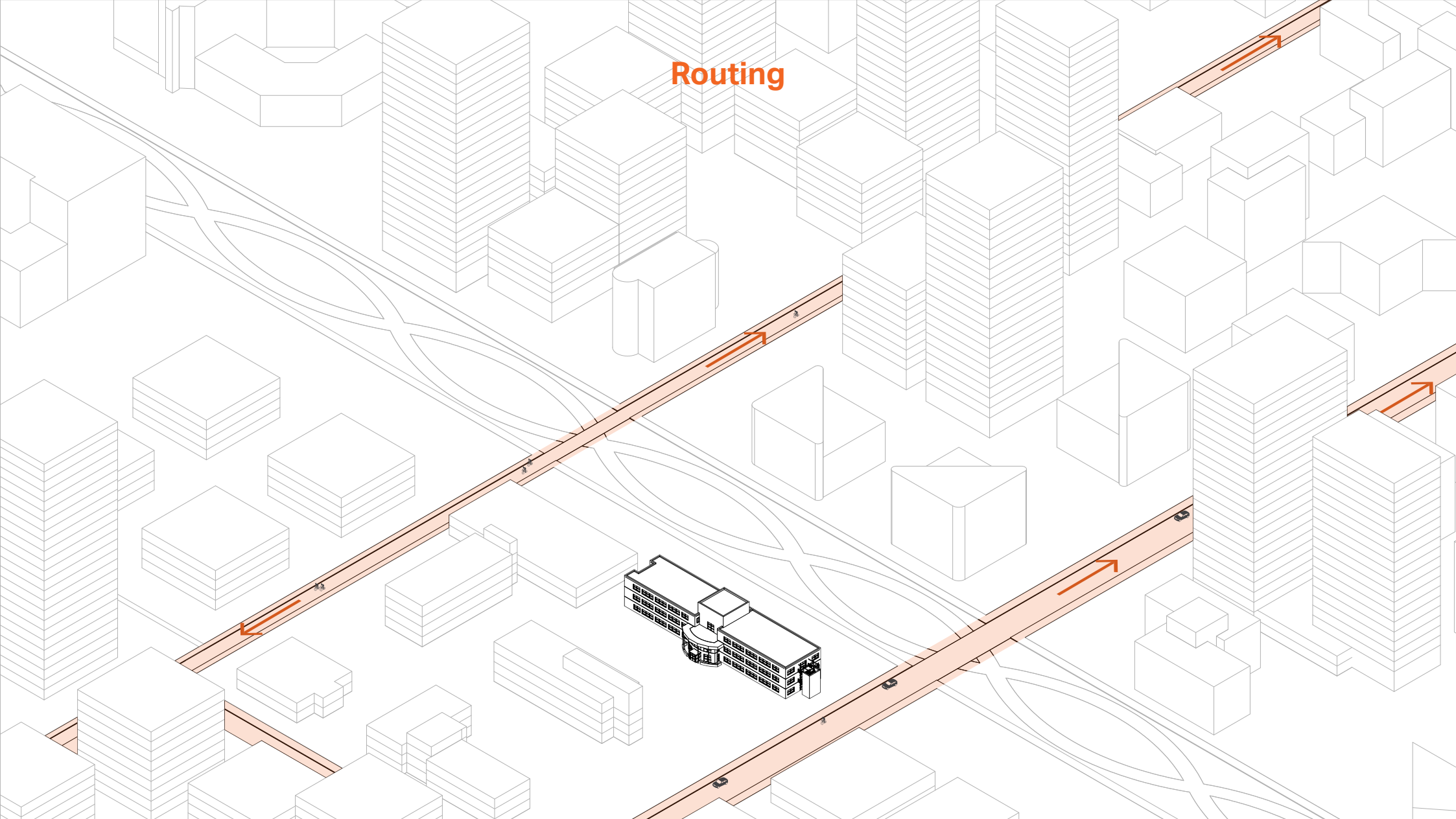
Project-site

Hessenbergweg 109-119


Developments
FSI = 2.7
(Zuid-As = 4.0)

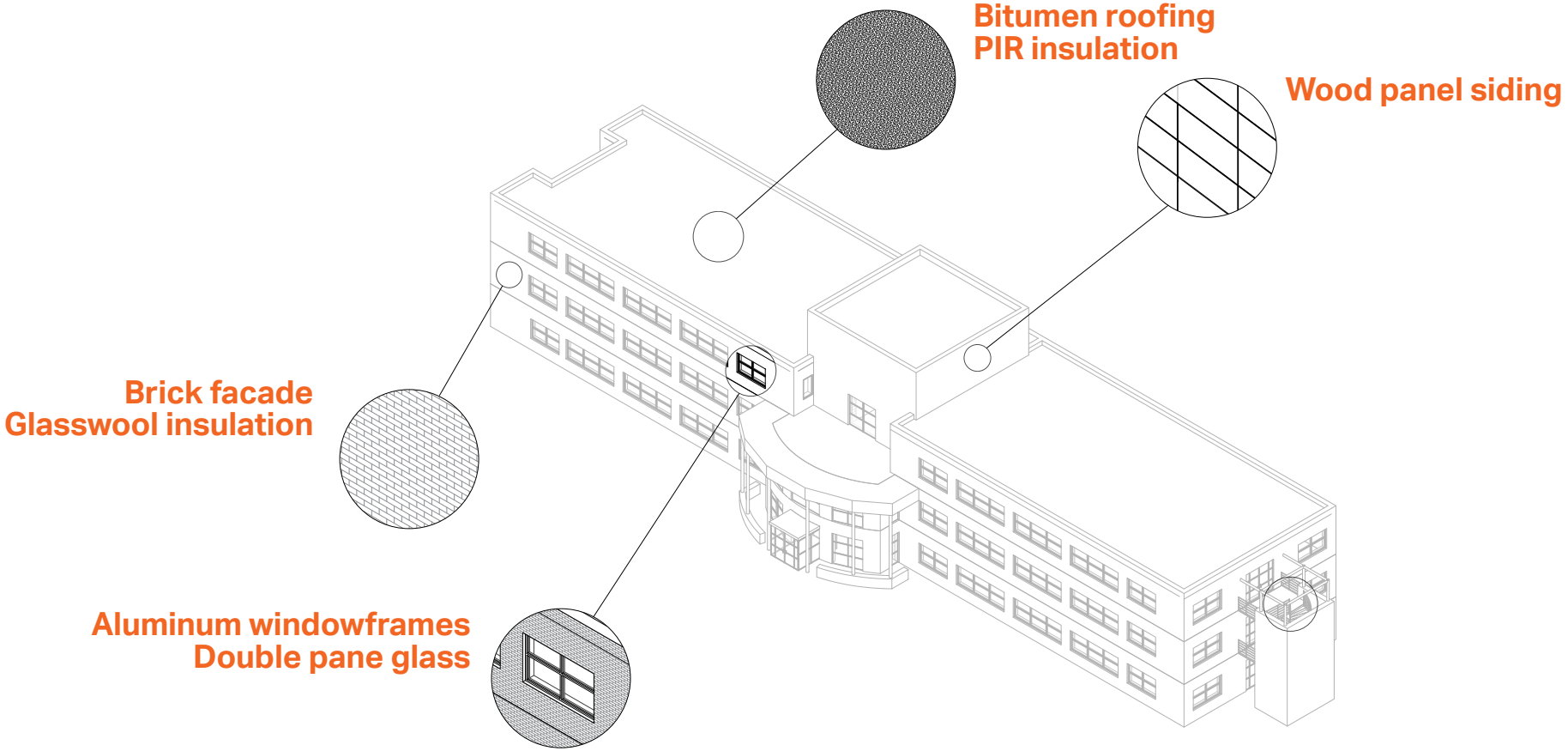

Park

Routing

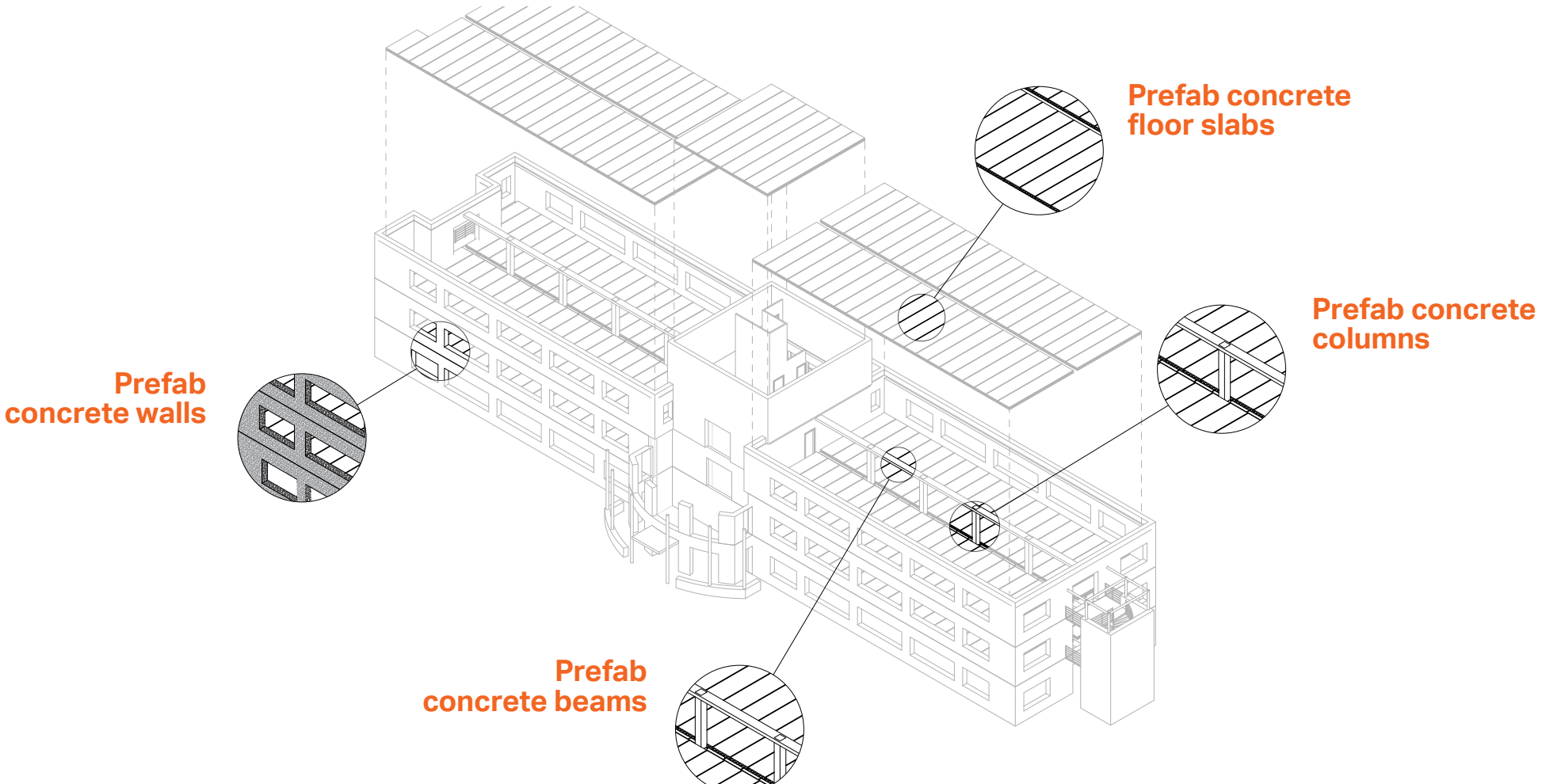


INVENTORY

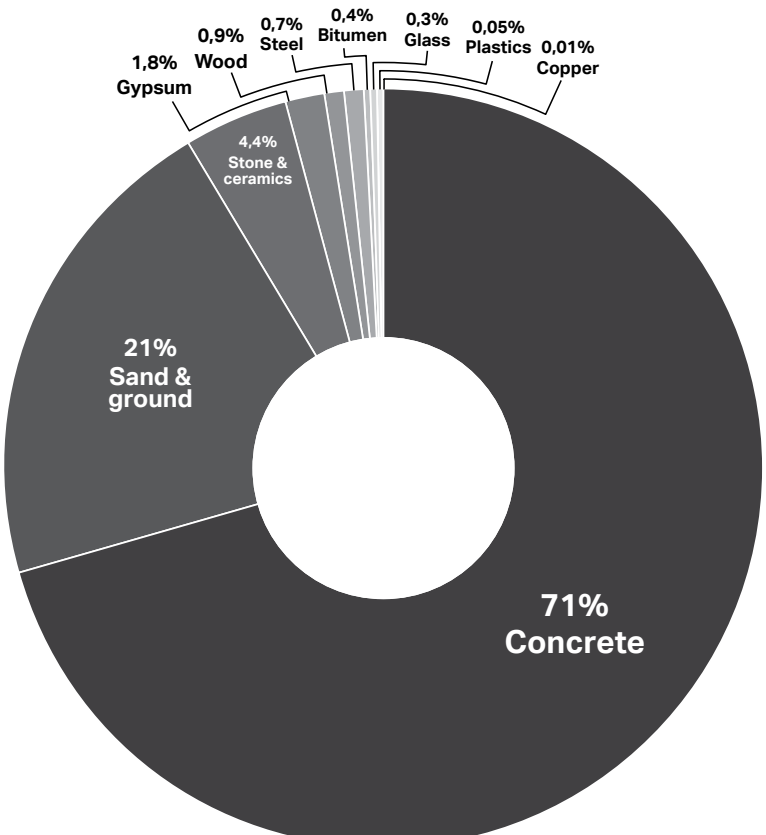
Facade


Bitumen roofing
PIR insulation
Wood panel siding
Brick facade
Glasswool insulation
Aluminum windowframes
Double pane glass

Structure


Prefab concrete floor slabs
Prefab concrete columns
Prefab concrete walls
Prefab concrete beams

Material inventory



Embodied Energy

*"Embodied energy is the **energy consumed** by **all** of the **processes** associated with the **production** of building."*

Embodied energy and carbon

Component	Amount (tons)	Embodied energy (MJ)	Embodied carbon ($kgCO_2$)	Life expectancy (years)
Concrete walls Concrete floors Concrete columns Concrete beams	3147	4.311.390	557.019	100+
Brick facade	195	585.000	42.900	100+
Wood panel siding	2	19.000	1.020	20-50
Aluminum windowframes	0,5	77.500	4.120	20-50
Double pane glass	14	210.000	11.900	20-50
Bitumen roofing	16	752.000	7.680	30
EPS insulation	1,4	124.040	3.500	100+
Glasswool insulation	2	56.000	2.700	100+

Embodied energy and carbon

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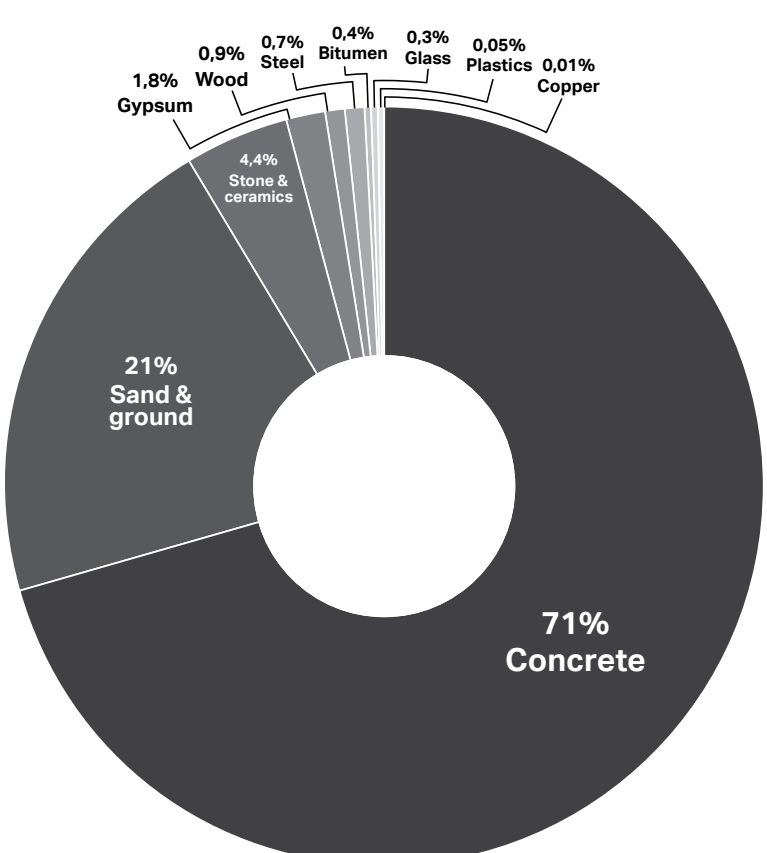
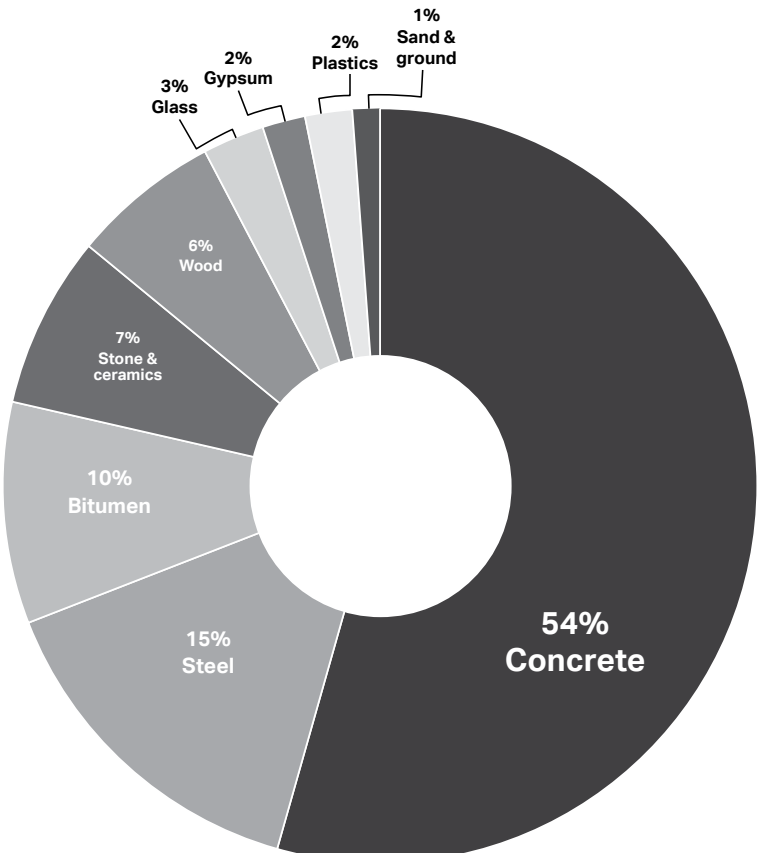
Material amounts vs embodied energy





Conclusions

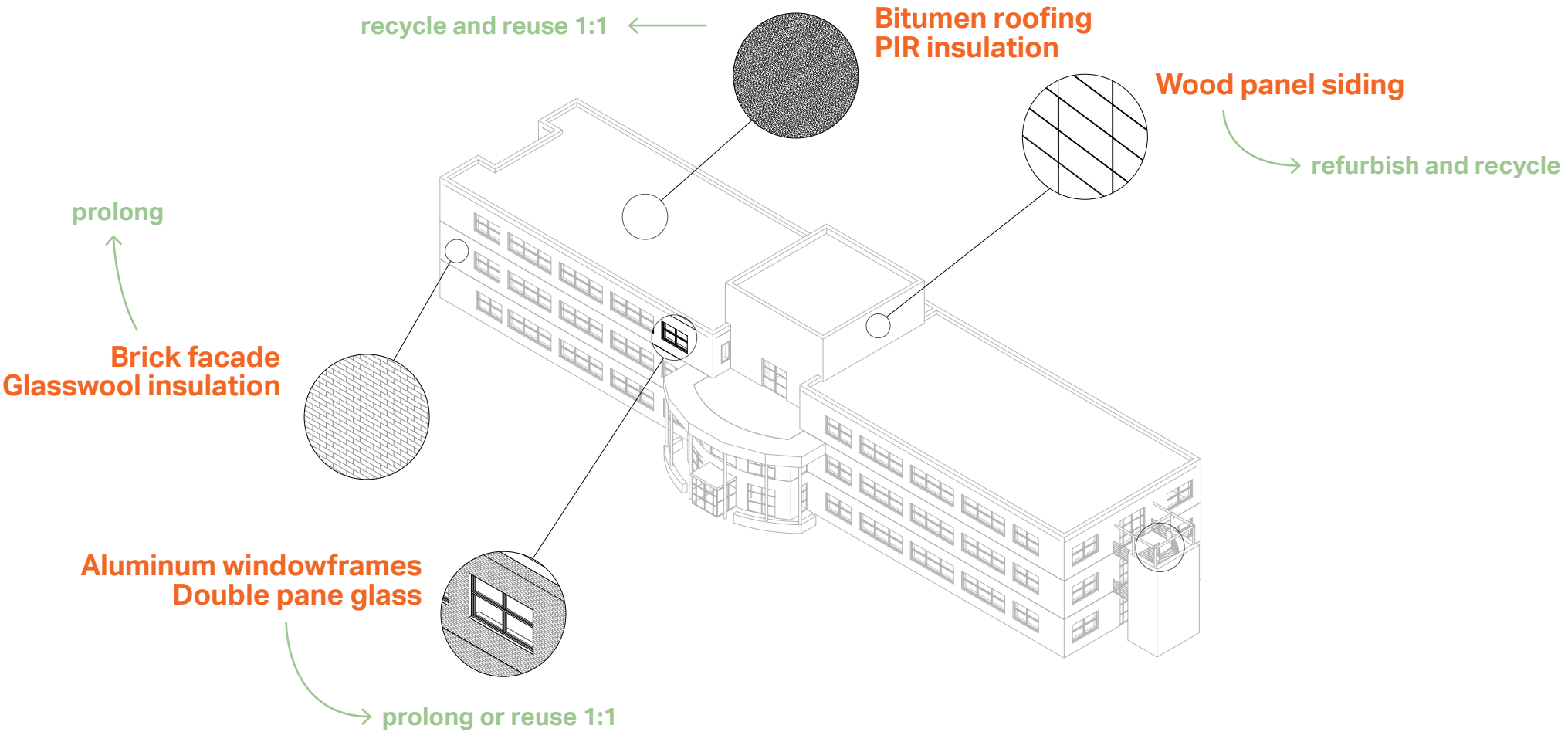
1) Concrete and brick - high quantity, high impact

2) Aluminum and insulation - low quantity, high impact

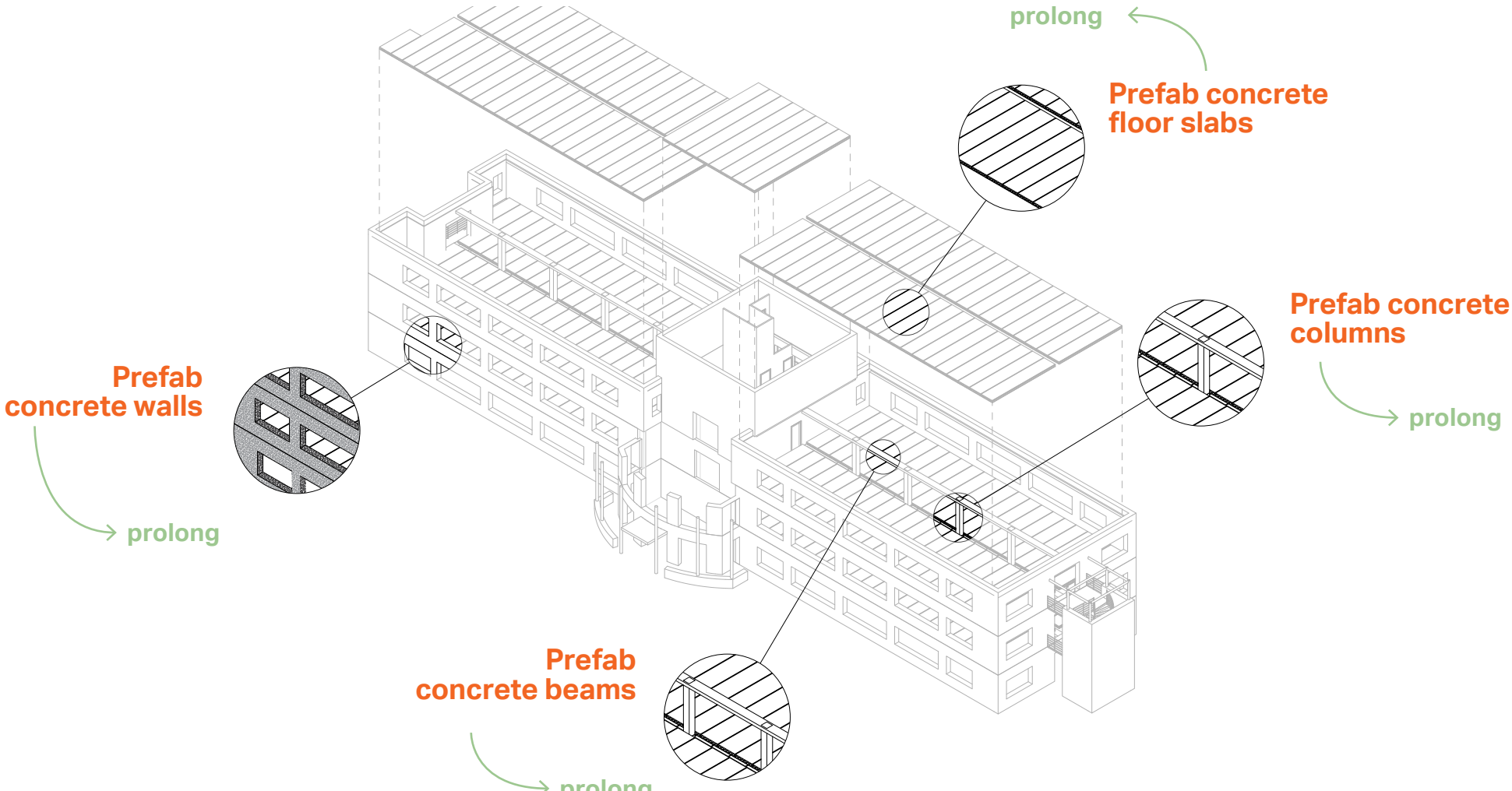
3) Glass and bitumen - medium quantity, high impact

4) Wood - no significant impact

Conclusions

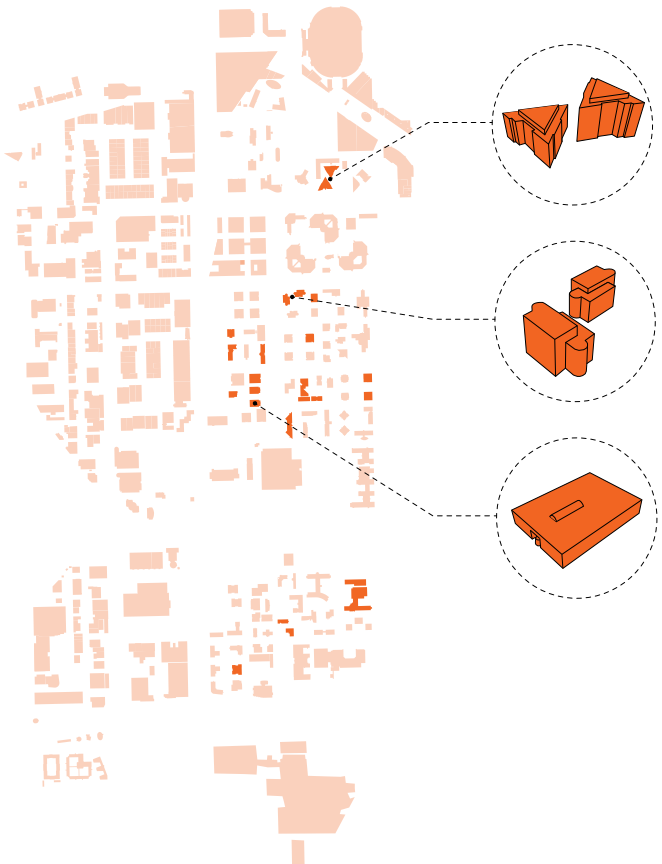


Conclusions



Additional harvest locations

Additional harvest locations



Hoogoorddreef 60 + 62
1988
12.600 m²

Hogehilweg 5 + 7
1984
5.400 m²

Hettenheuvelweg 8
1987
2.400 m²

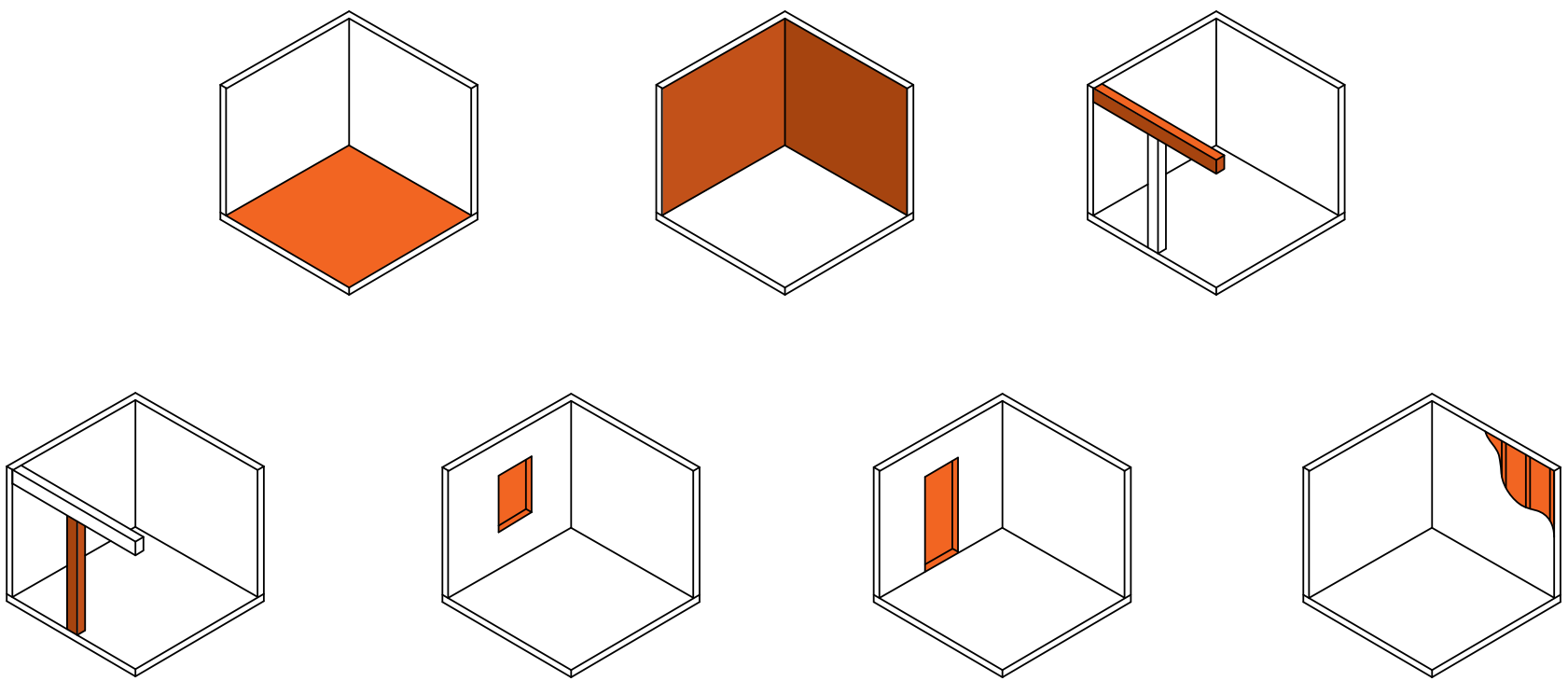
Demo year: 2019-2020

Hoogoorddreef 60 + 62

Hogehilweg 5 + 7
NEPTUNUS

Hettenheuvelweg 8

Building components



Component reuse

refurbish

Gypsum wall board

reuse 1:1

Interior doors

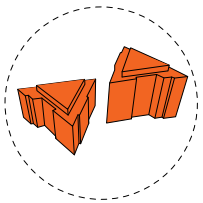
refurbish and reuse 1:1

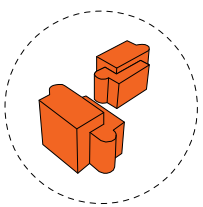
Insulation

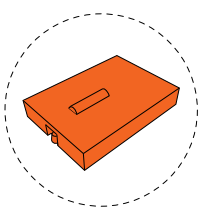
Wires, pipes and ducts

recycle

Bitumen roofing







recycle and reuse 1:1

Concrete columns

Concrete beams

Concrete floors

Concrete walls

recycle and reuse 1:1

Aluminum window frames

Reflective glass

DE
SIGN

3) Design

- Goals & principles
- Proposal
- Scenario

GOALS & PRINCIPLES

Goals

1. **The building will be transformed where the office spaces make place for dwellings and public functions.**

Goals

1. The building will be transformed where the office spaces make place for dwellings and public functions.

2. All existing building components shall be reused.

Goals

1. The building will be transformed where the office spaces make place for dwellings and public functions.

2. All existing building components shall be reused in some way.

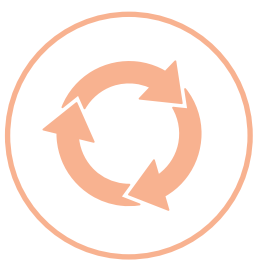
3. **The process of urban mining shall be used as a tool to make the reuse of components possible.**

Design Principles

Reuse existing building components for 100%

Design Principles

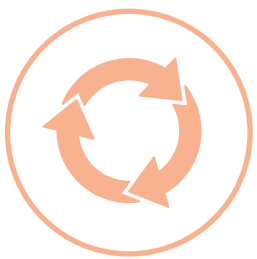
Reuse existing building components for 100%



Additional materials are to be harvested locally

Design Principles

Reuse existing building components for 100%

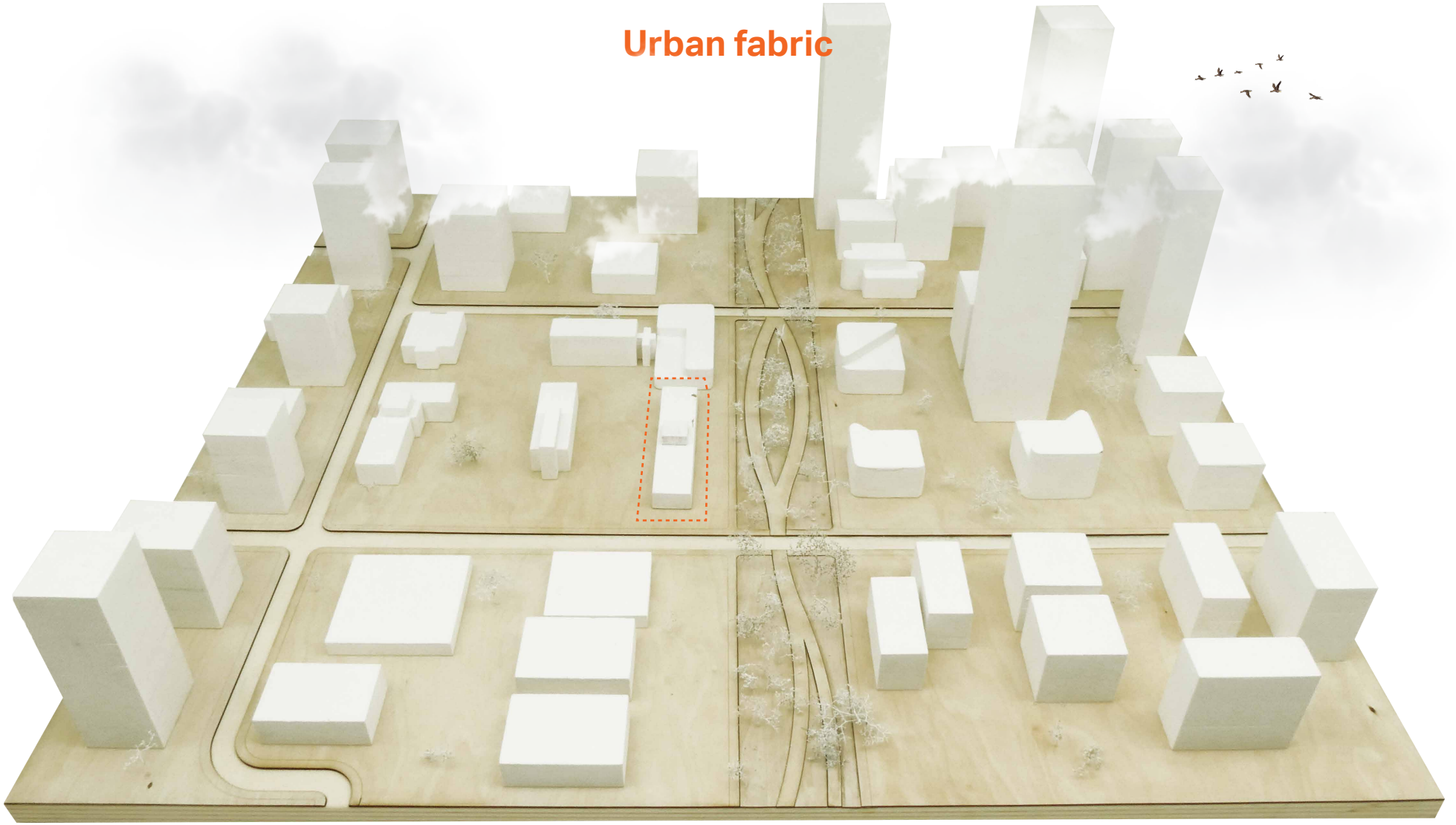


Additional materials are to be harvested locally

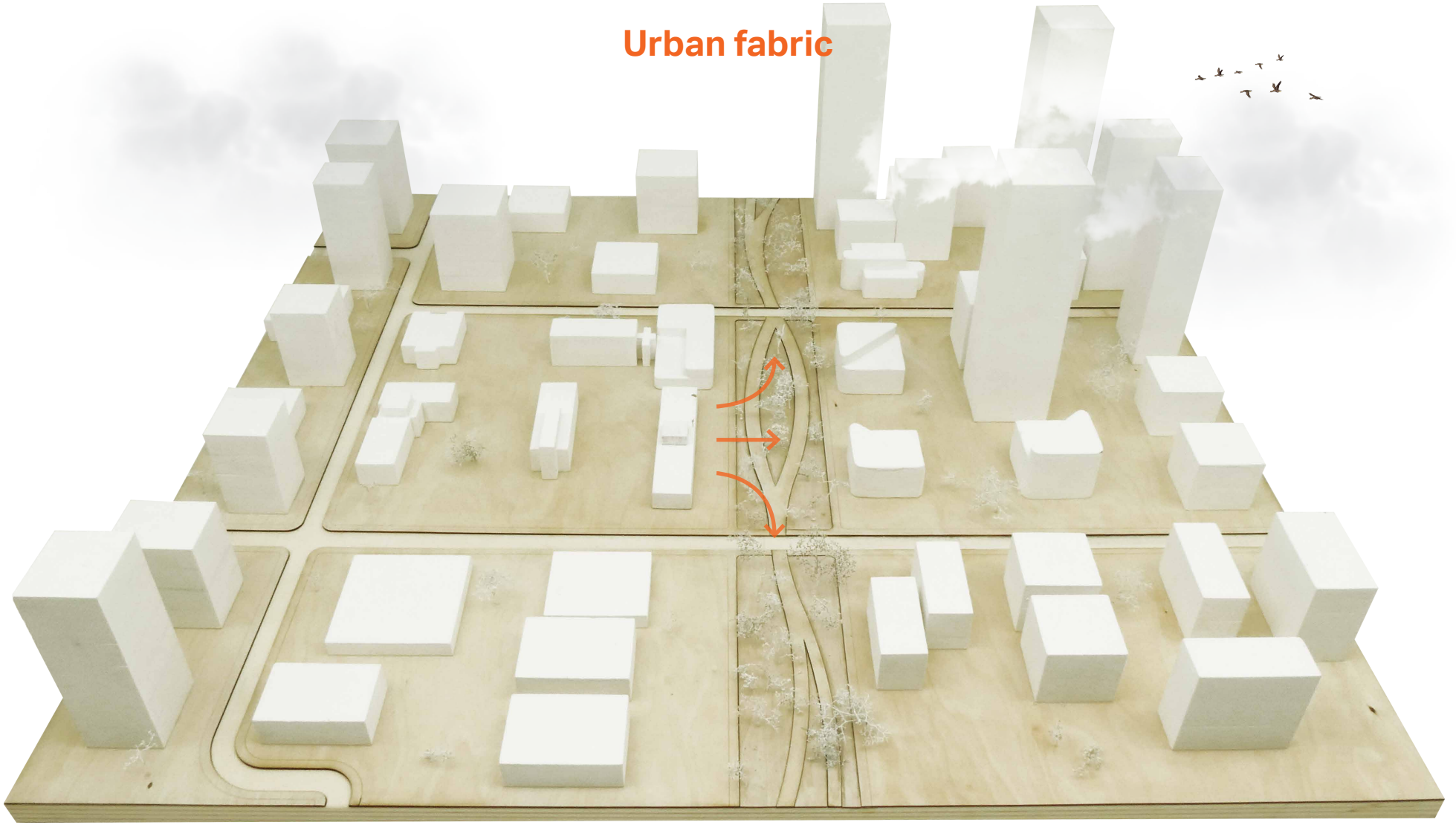
Design for disassembly

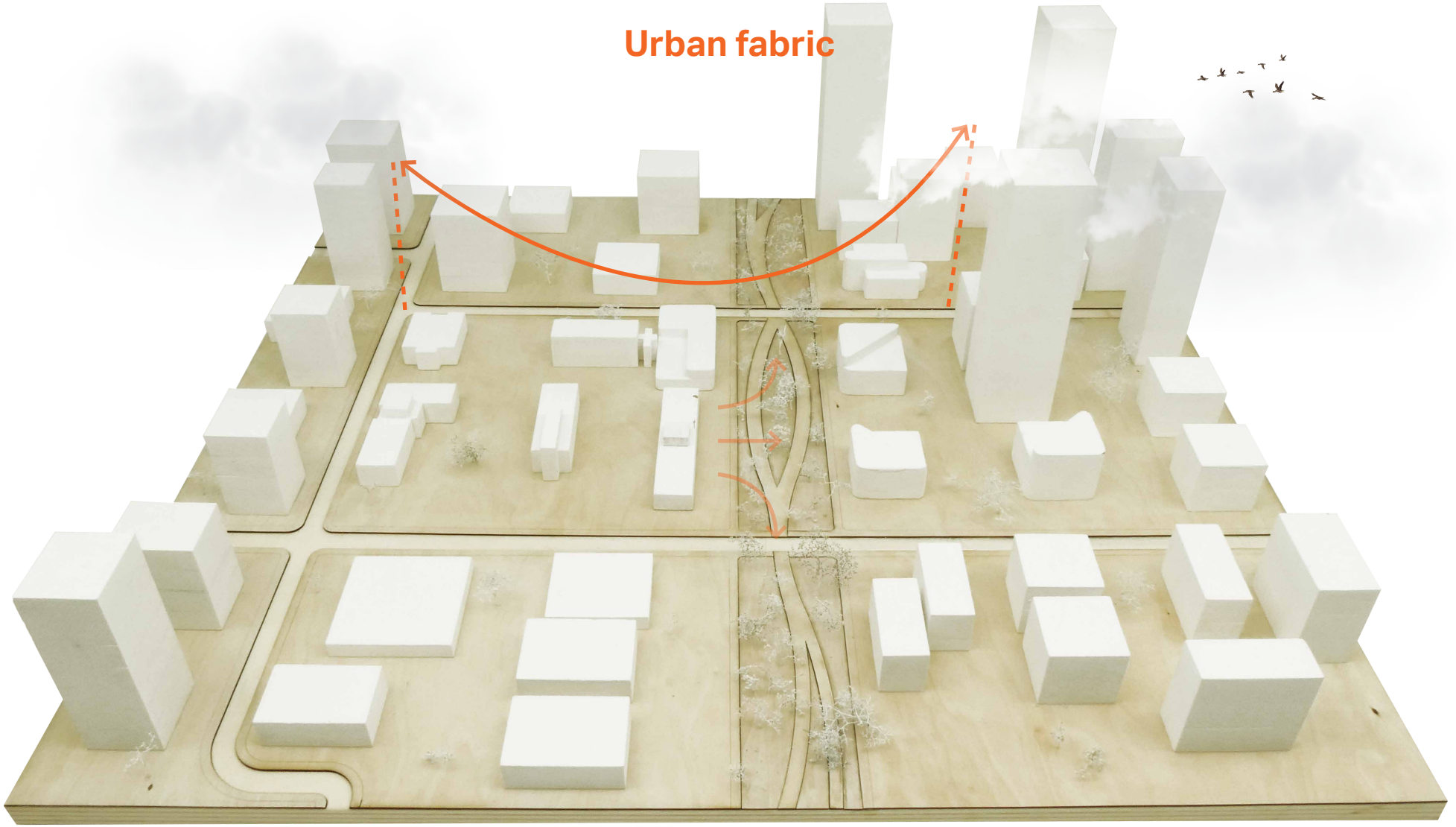
PROPOSAL

Urban fabric

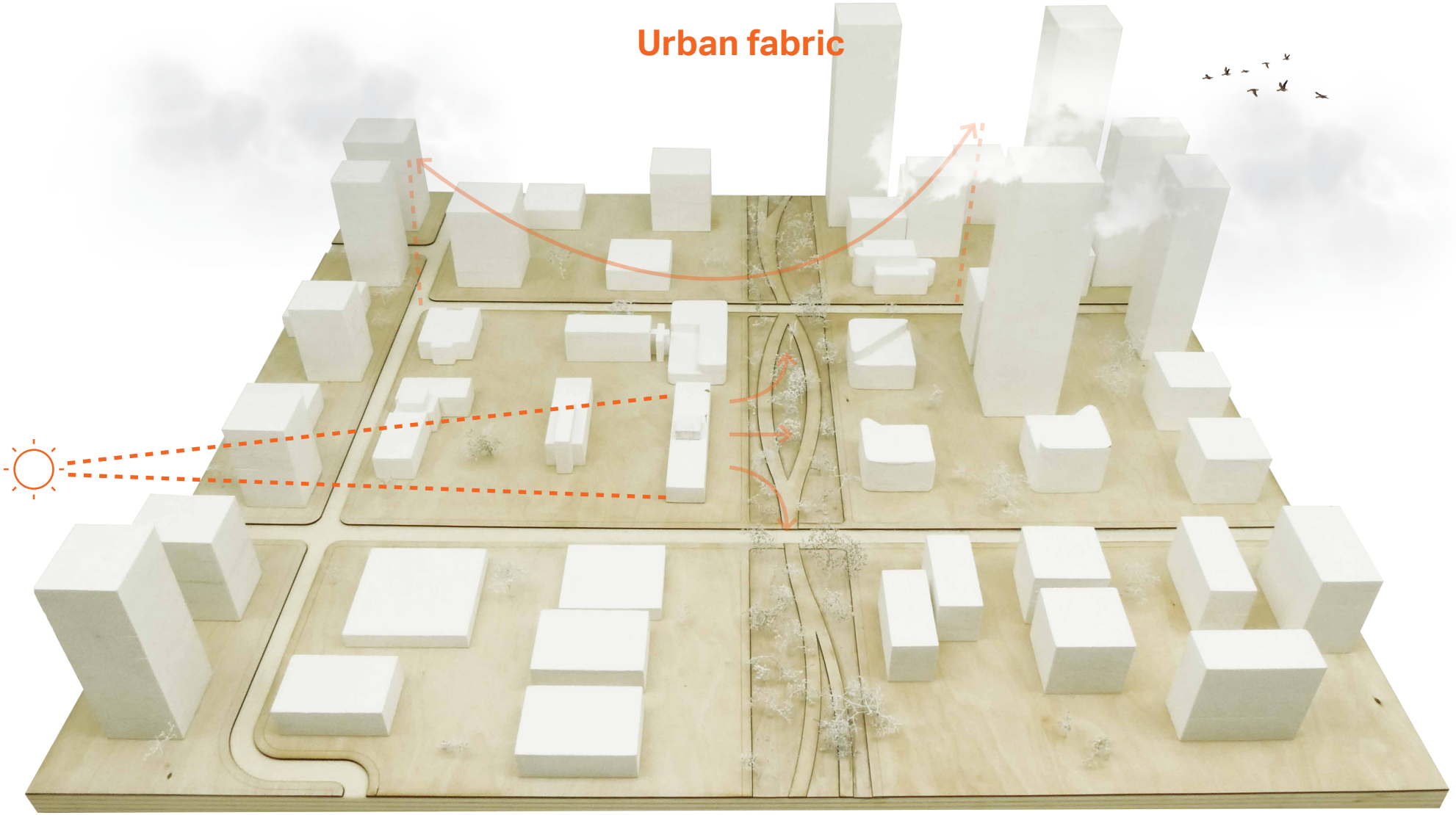


Urban fabric




Urban fabric

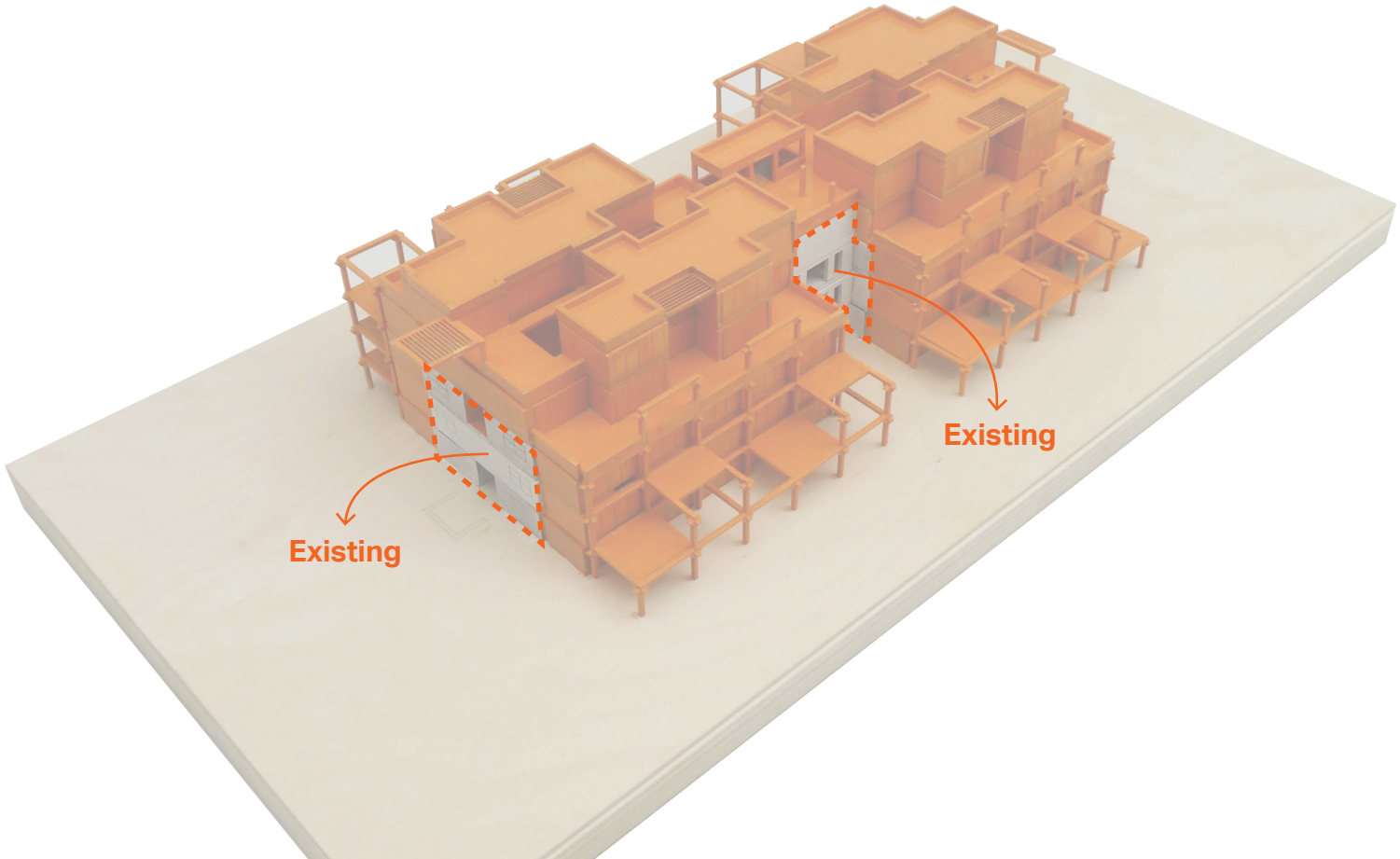
Urban fabric



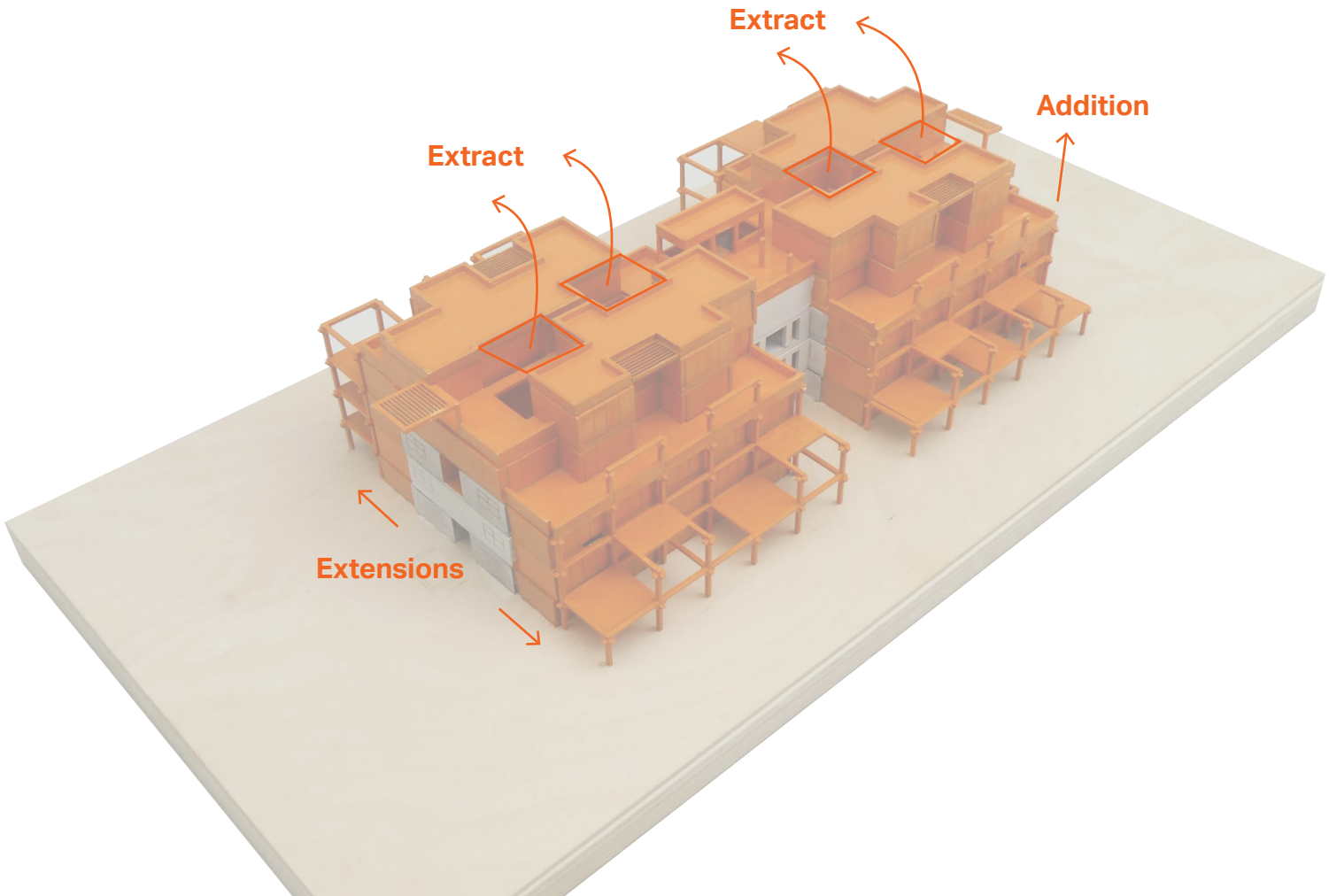
Proposal

Existing and proposed

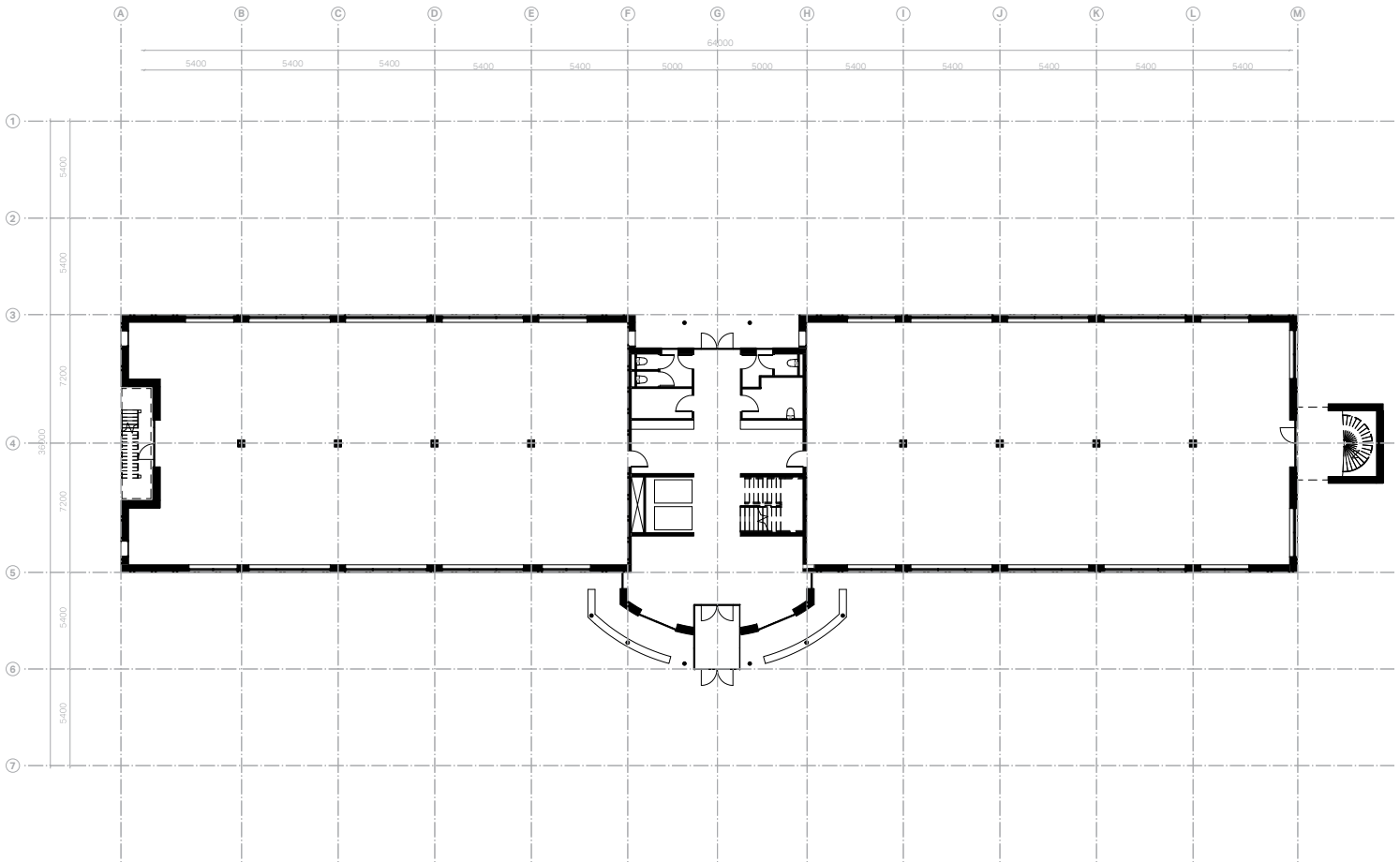
Existing and proposed



Existing and proposed

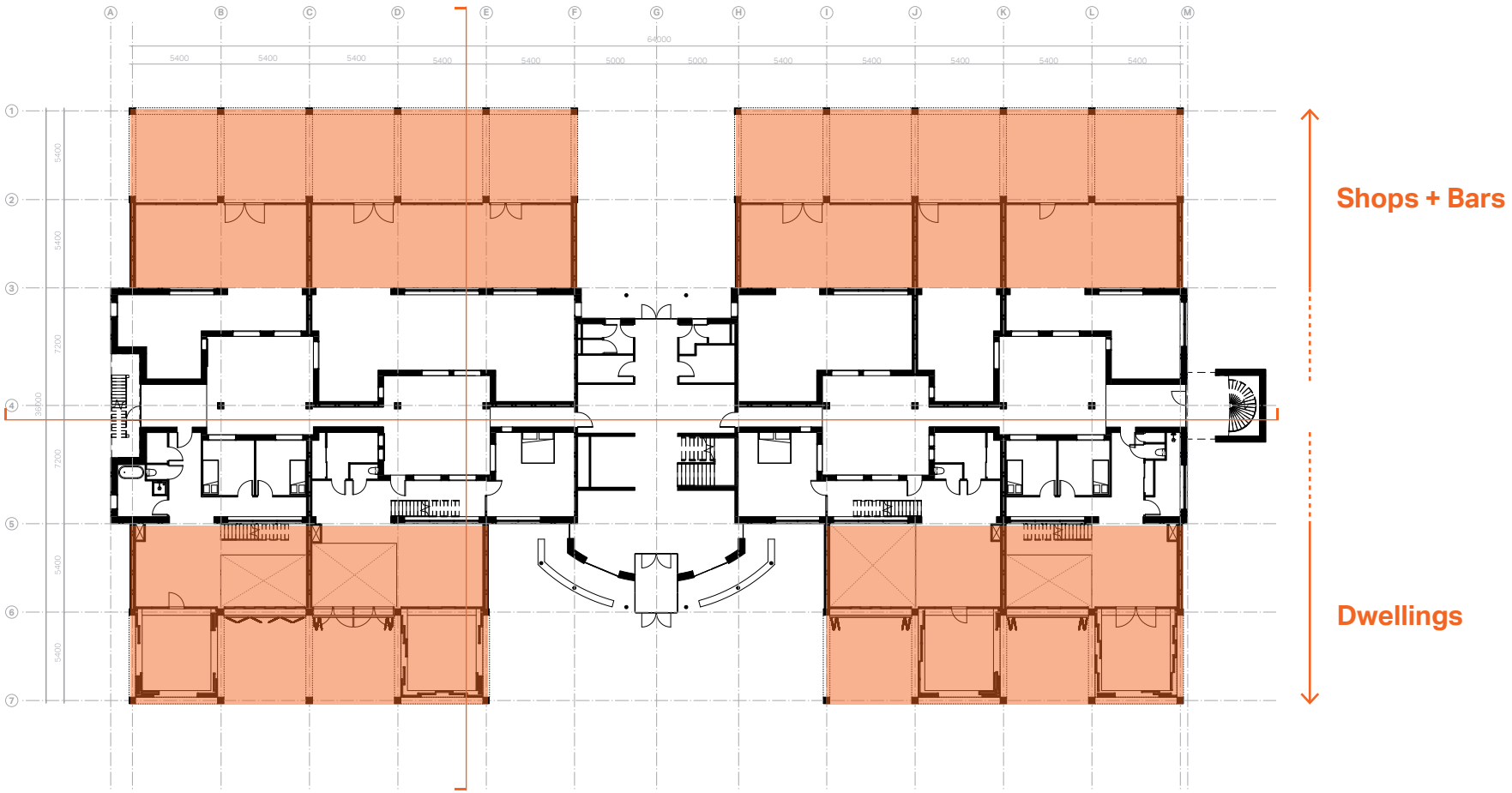


Existing situation



Ground Floor

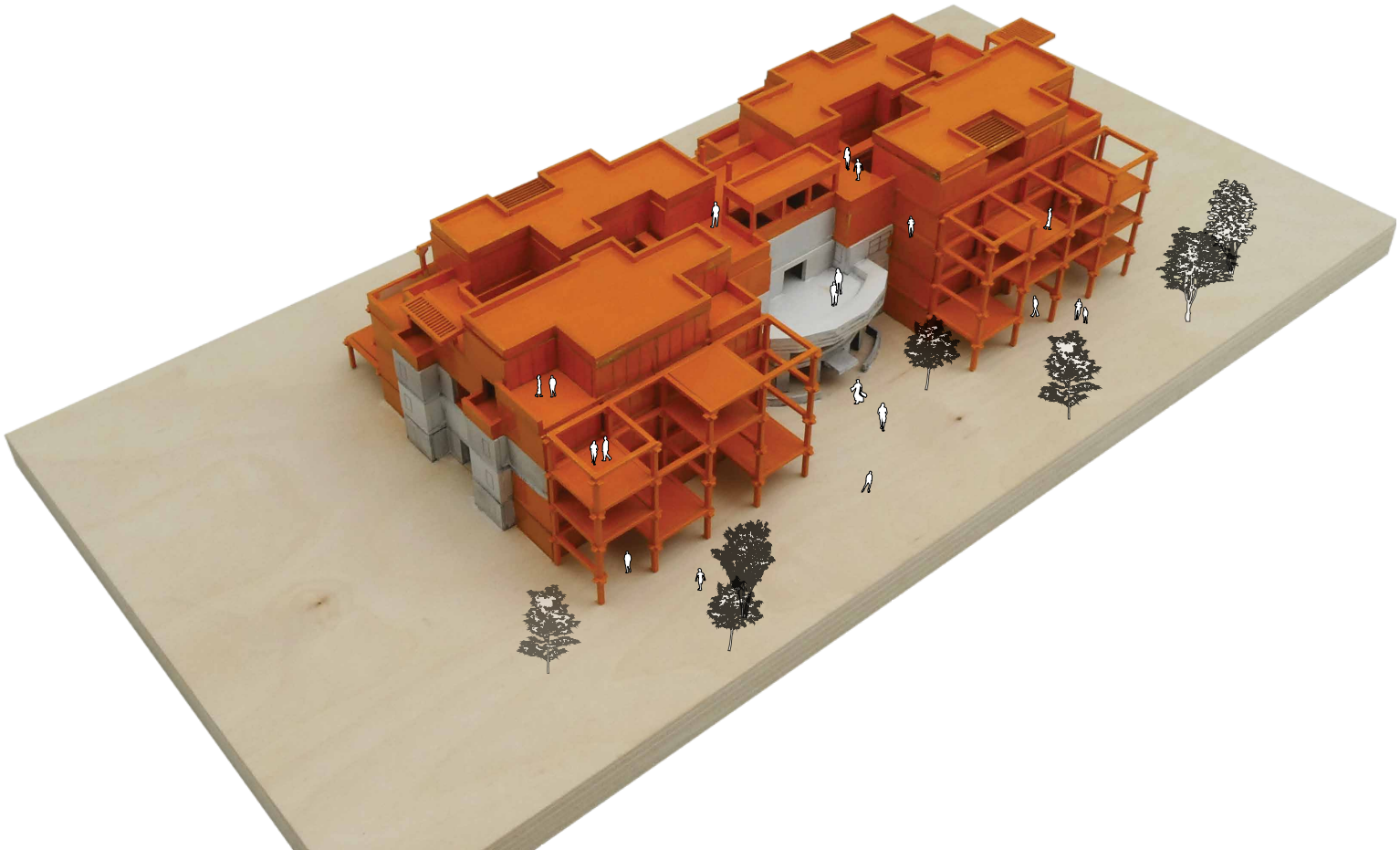
Extensions



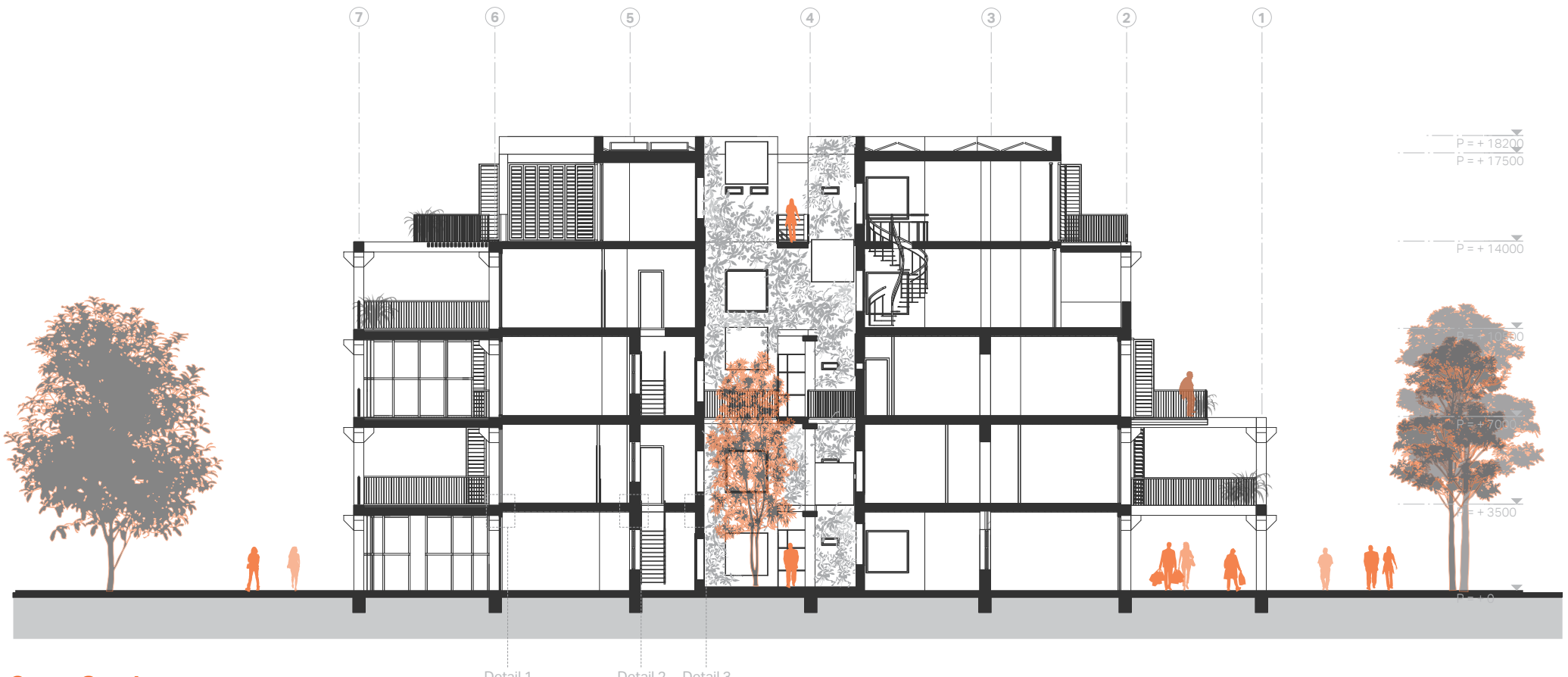
Ground Floor

Public side

Private side

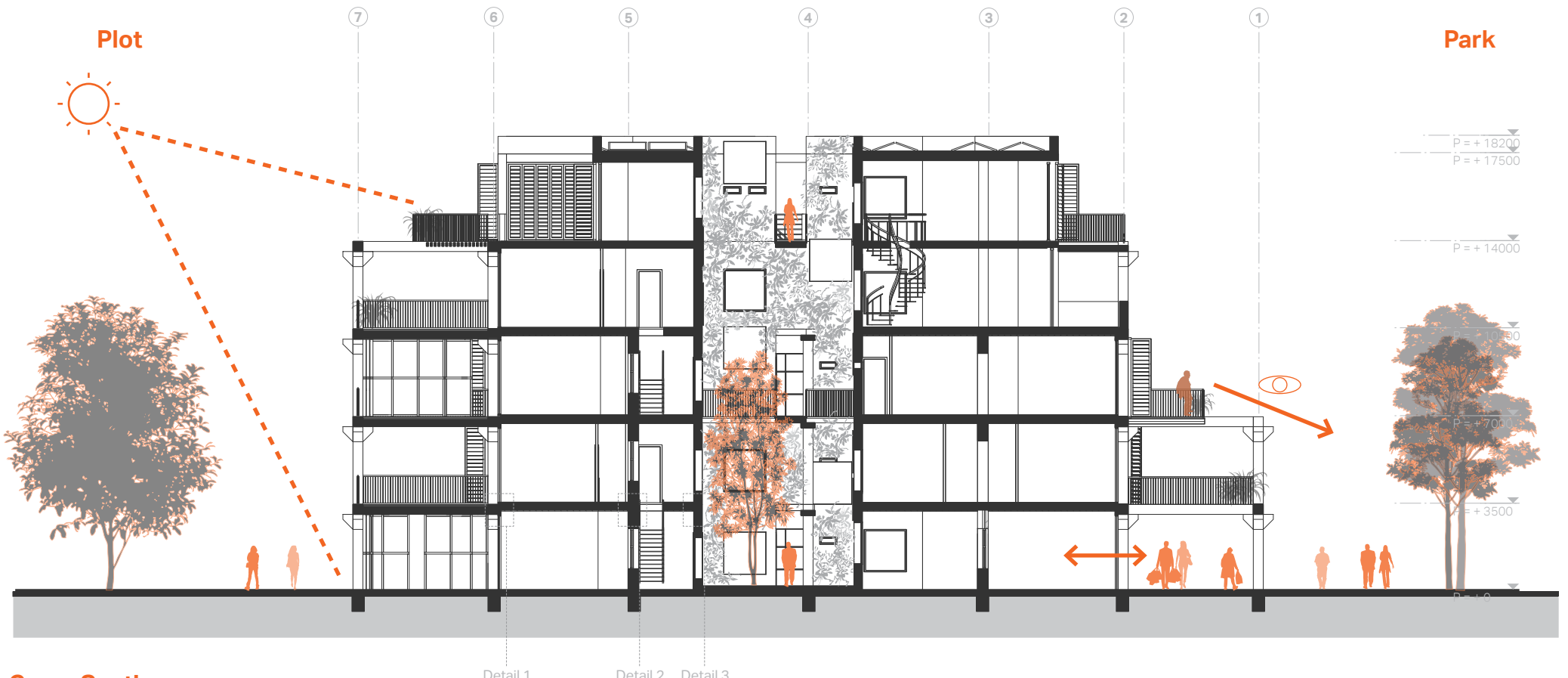


Section view



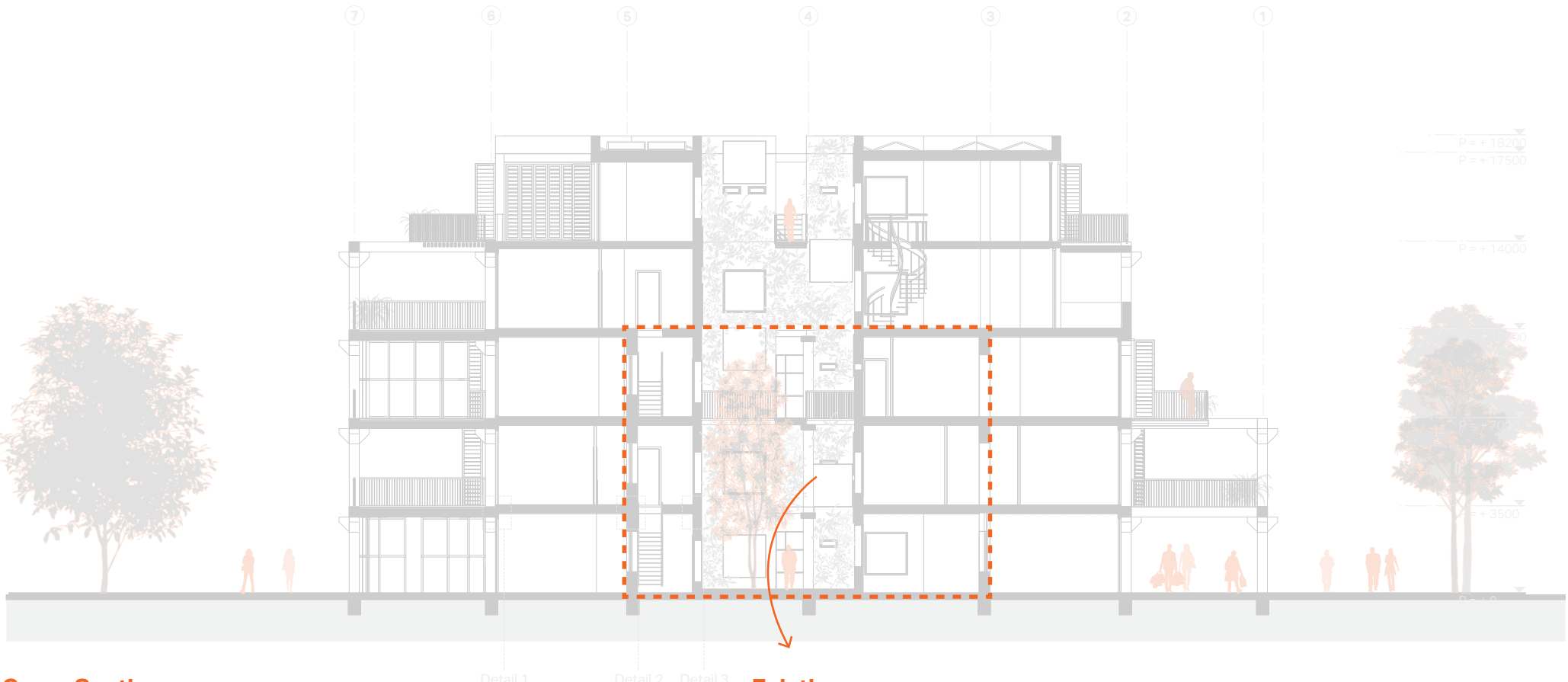
Cross Section

Oriëntation



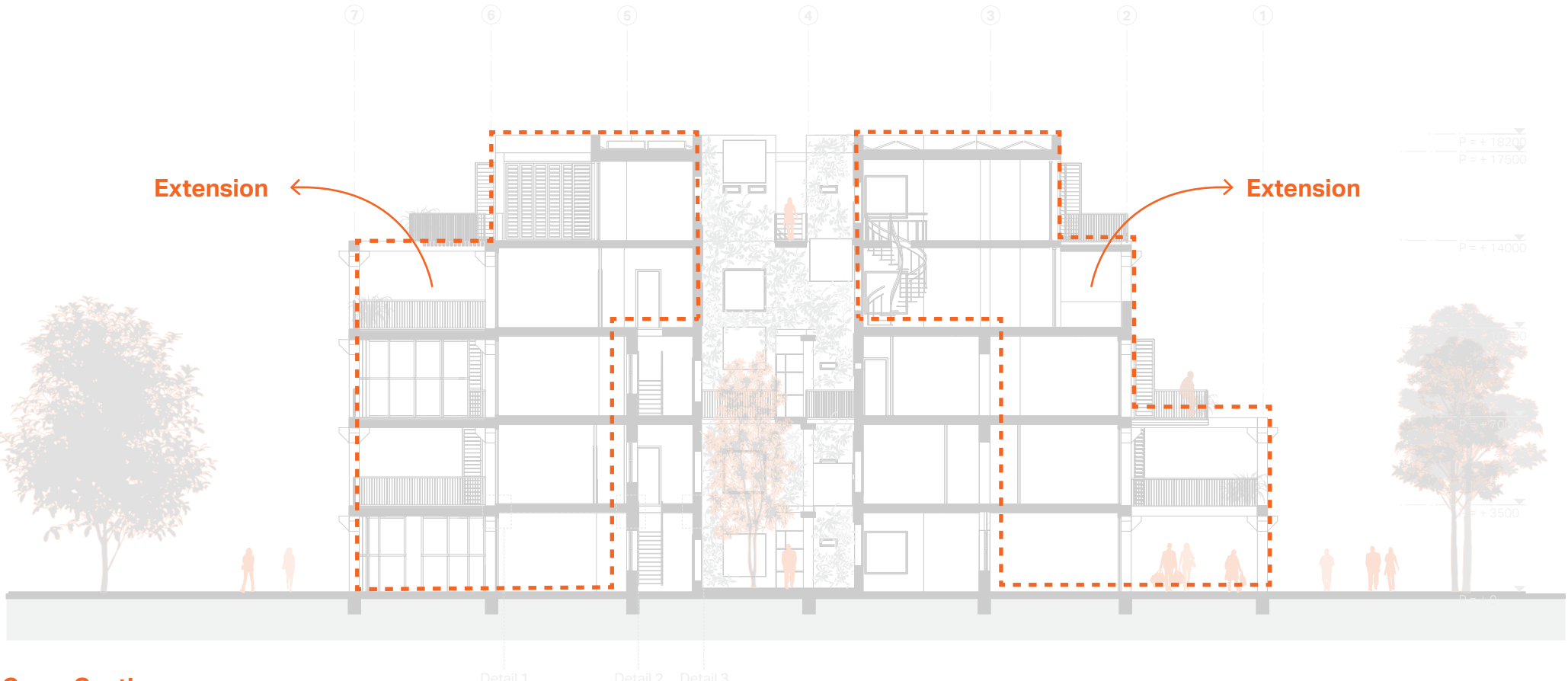
Cross Section

Interventions



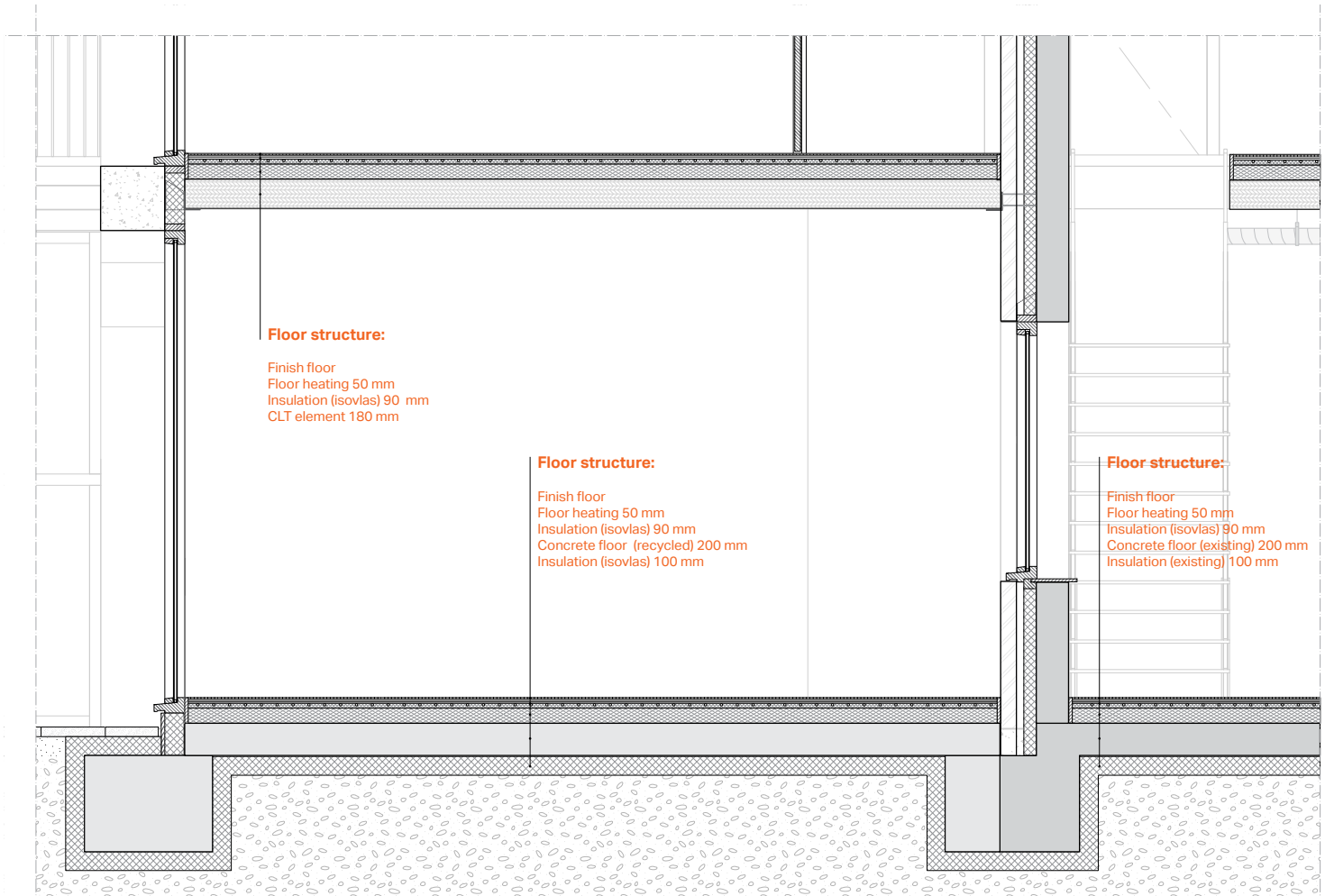
Cross Section

Interventions

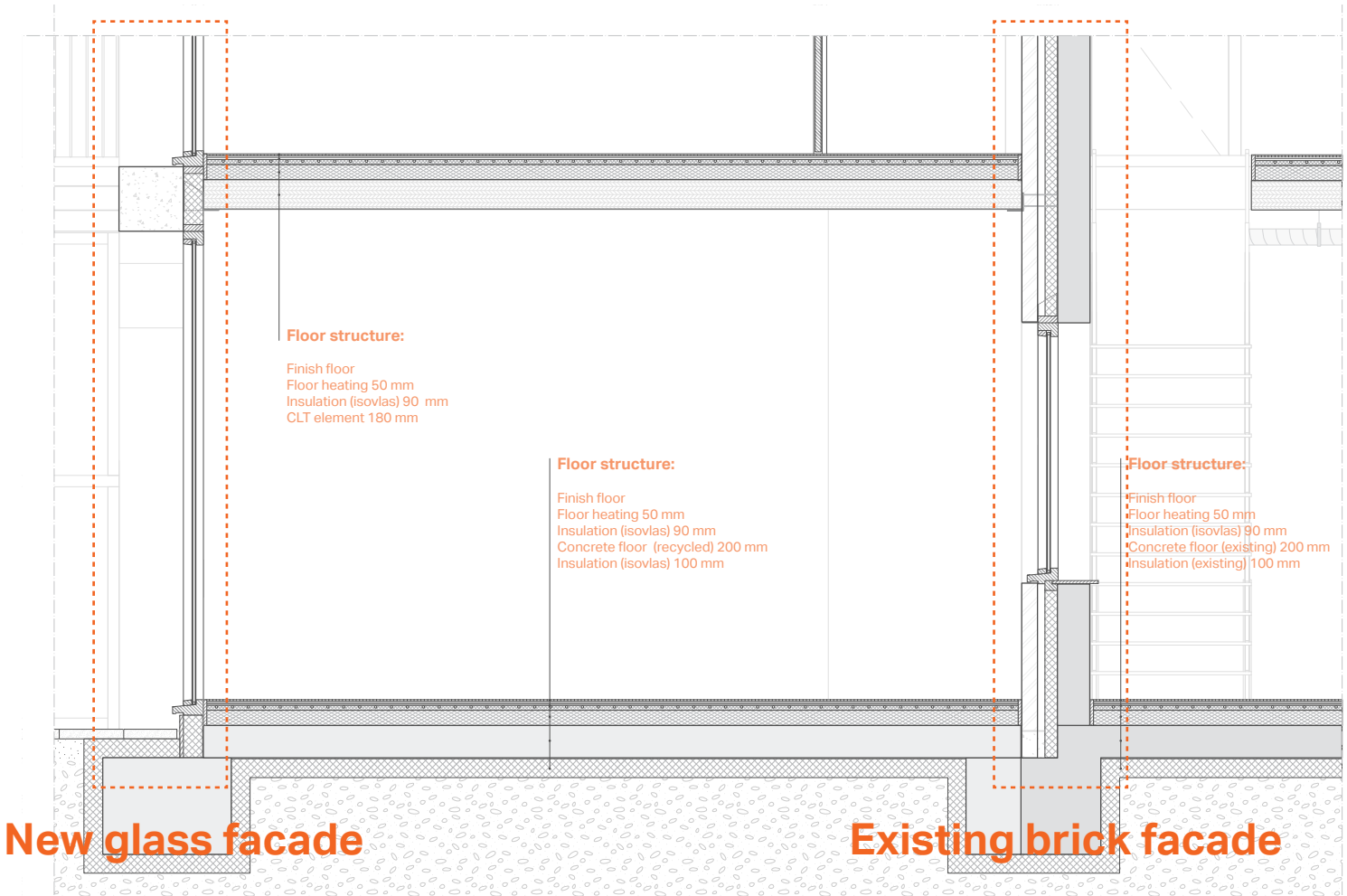


Cross Section

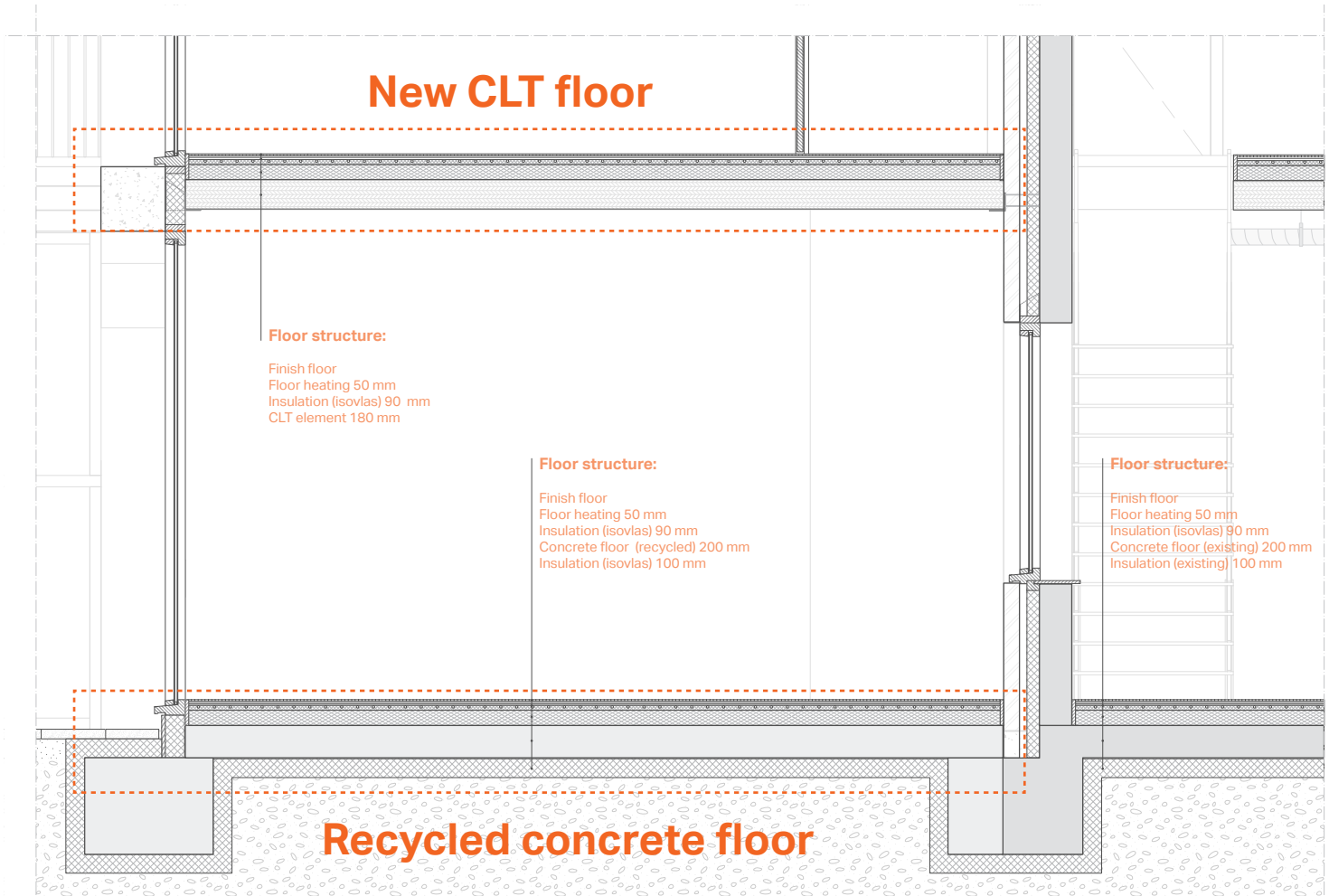
Extension


Floor structure:
Finish floor
Floor heating 50 mm
Insulation (isovlas) 90 mm
CLT element 180 mm
Floor structure:
Finish floor
Floor heating 50 mm
Insulation (isovlas) 90 mm
Concrete floor (recycled) 200 mm
Insulation (isovlas) 100 mm
Floor structure:
Finish floor
Floor heating 50 mm
Insulation (isovlas) 90 mm
Concrete floor (existing) 200 mm
Insulation (existing) 100 mm

Extension


Floor structure:
Finish floor
Floor heating 50 mm
Insulation (isovlas) 90 mm
CLT element 180 mm
Floor structure:
Finish floor
Floor heating 50 mm
Insulation (isovlas) 90 mm
Concrete floor (recycled) 200 mm
Insulation (isovlas) 100 mm
Floor structure:
Finish floor
Floor heating 50 mm
Insulation (isovlas) 90 mm
Concrete floor (existing) 200 mm
Insulation (existing) 100 mm
New glass facade
Existing brick facade

Extension

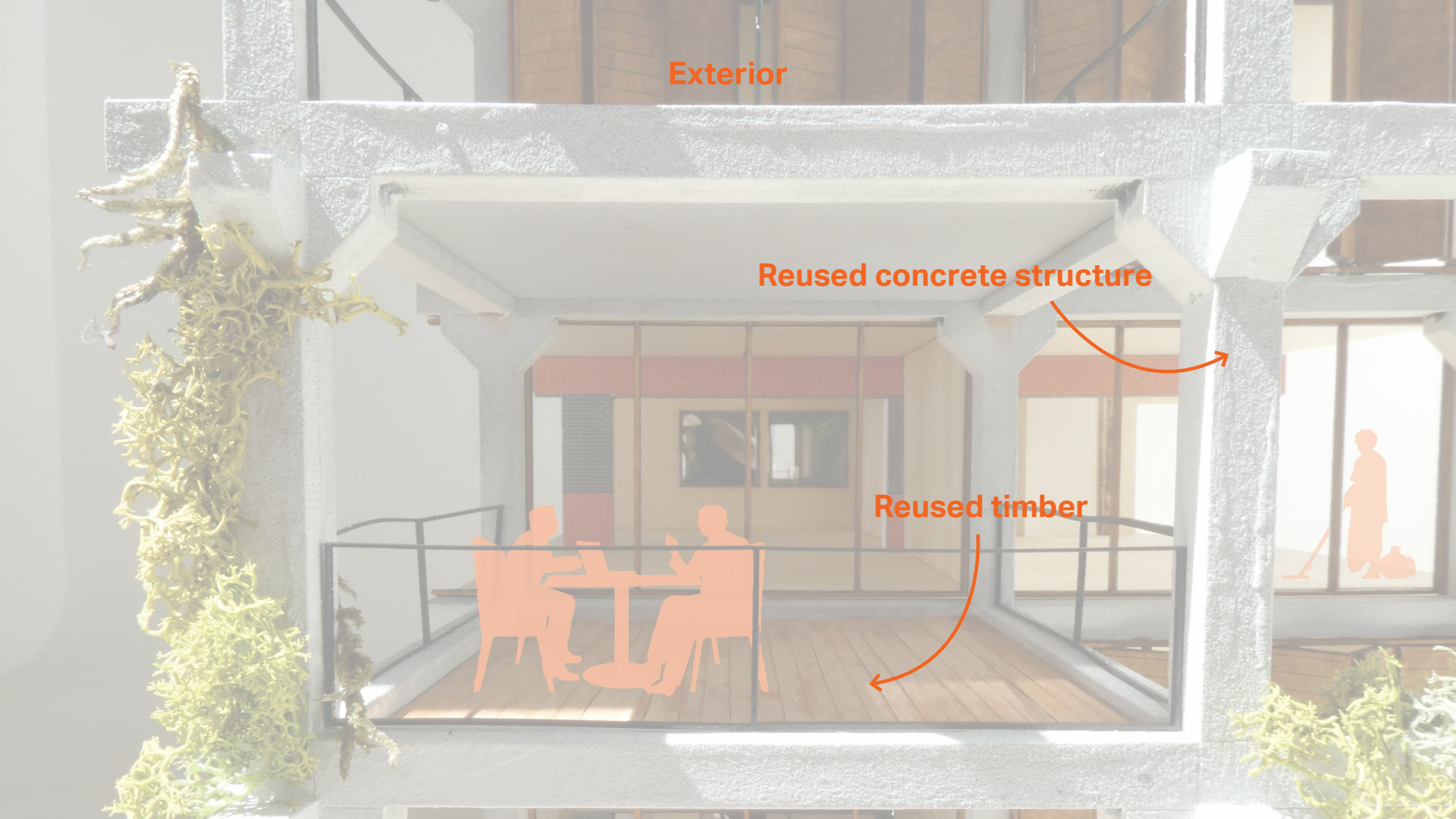

New CLT floor
Floor structure:
Finish floor
Floor heating 50 mm
Insulation (isovlas) 90 mm
CLT element 180 mm
Floor structure:
Finish floor
Floor heating 50 mm
Insulation (isovlas) 90 mm
Concrete floor (recycled) 200 mm
Insulation (isovlas) 100 mm
Floor structure:
Finish floor
Floor heating 50 mm
Insulation (isovlas) 90 mm
Concrete floor (existing) 200 mm
Insulation (existing) 100 mm
Recycled concrete floor

Section model

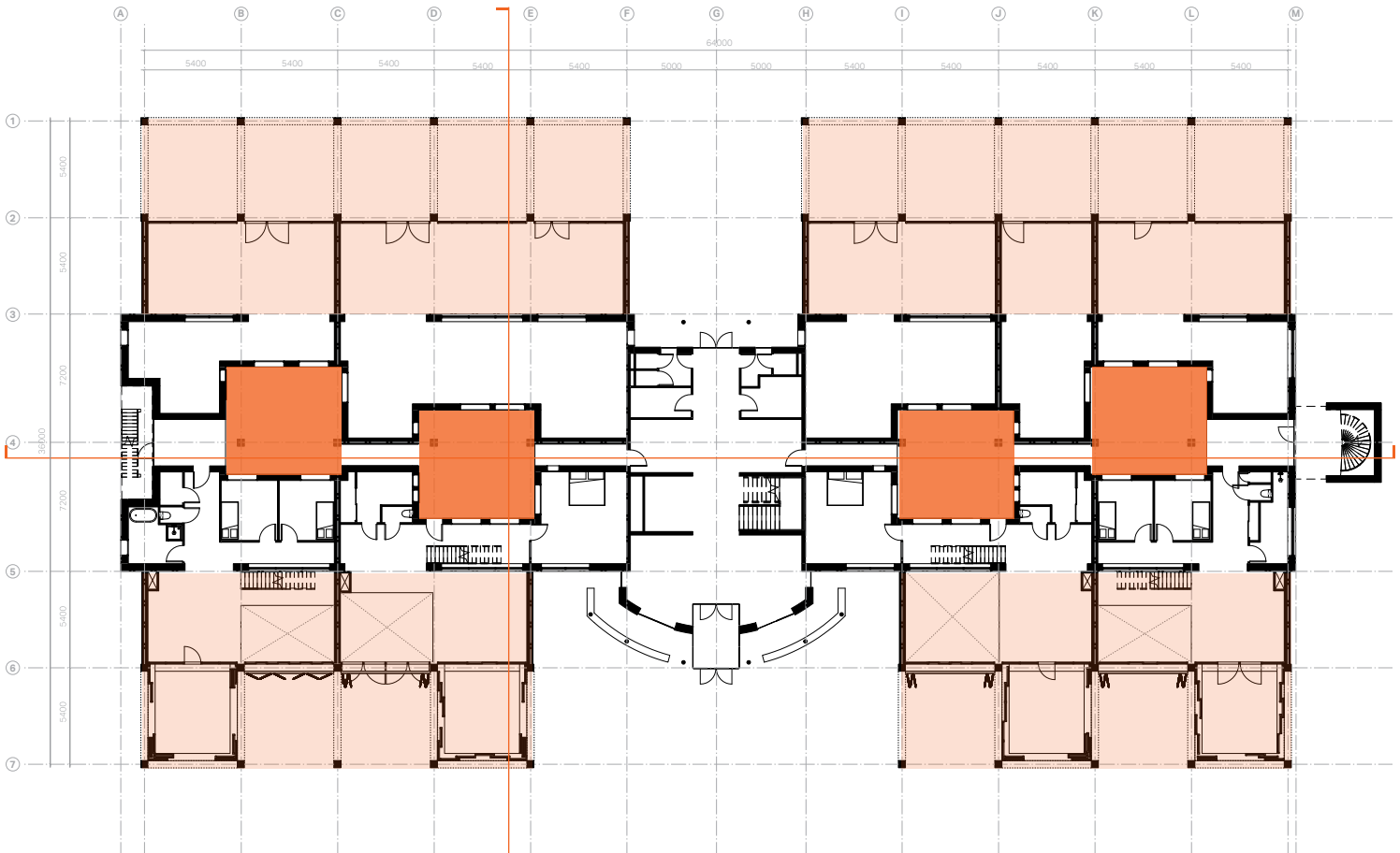
Interior

Interior
New CLT timber
Existing brick wall
Reused timber

Exterior


Exterior
Reused concrete structure
Reused timber

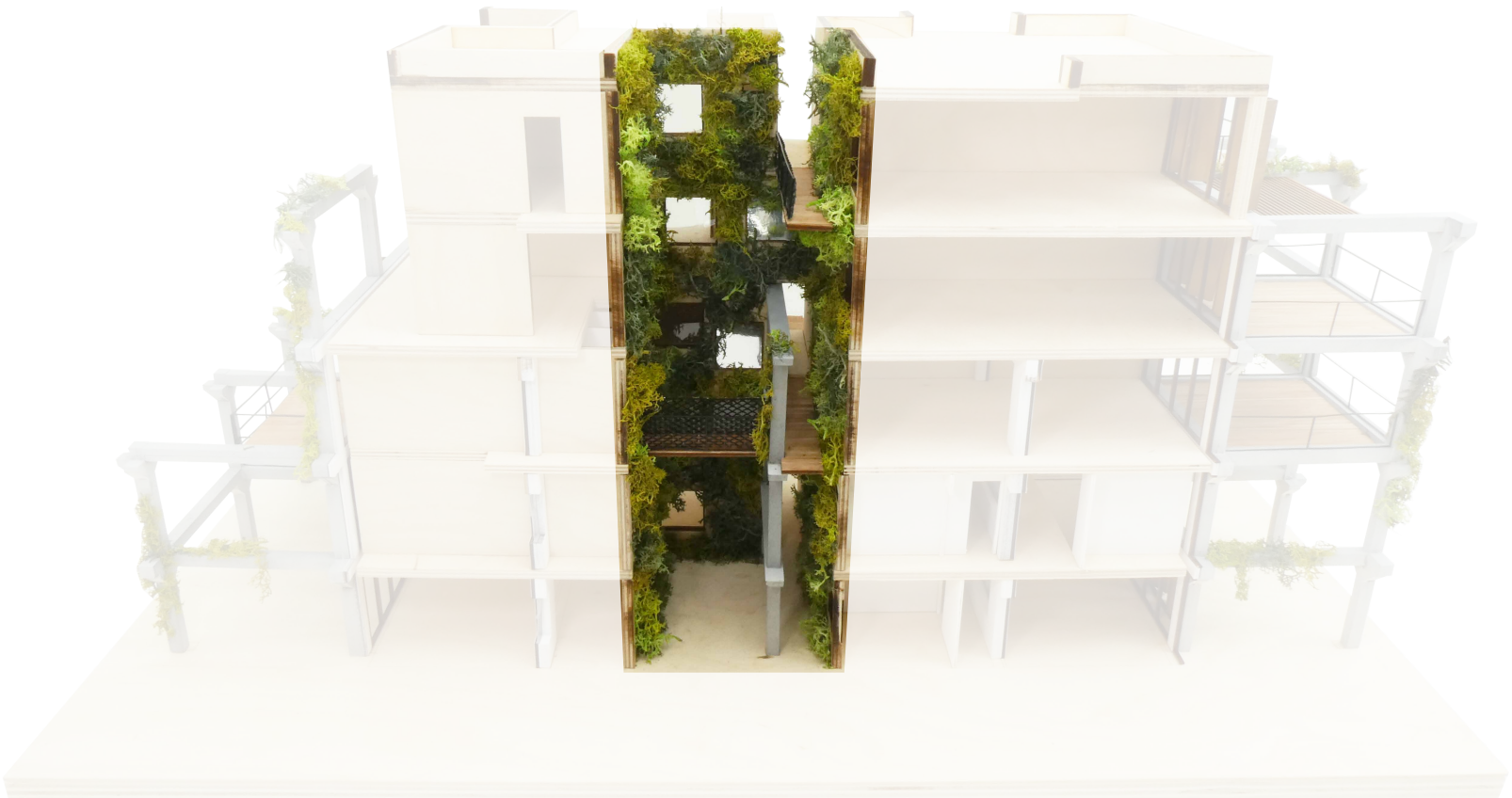
Extraction



Ground Floor

Courtyard

Courtyard



Courtyard

Courtyard
Existing concrete structure
Green facade

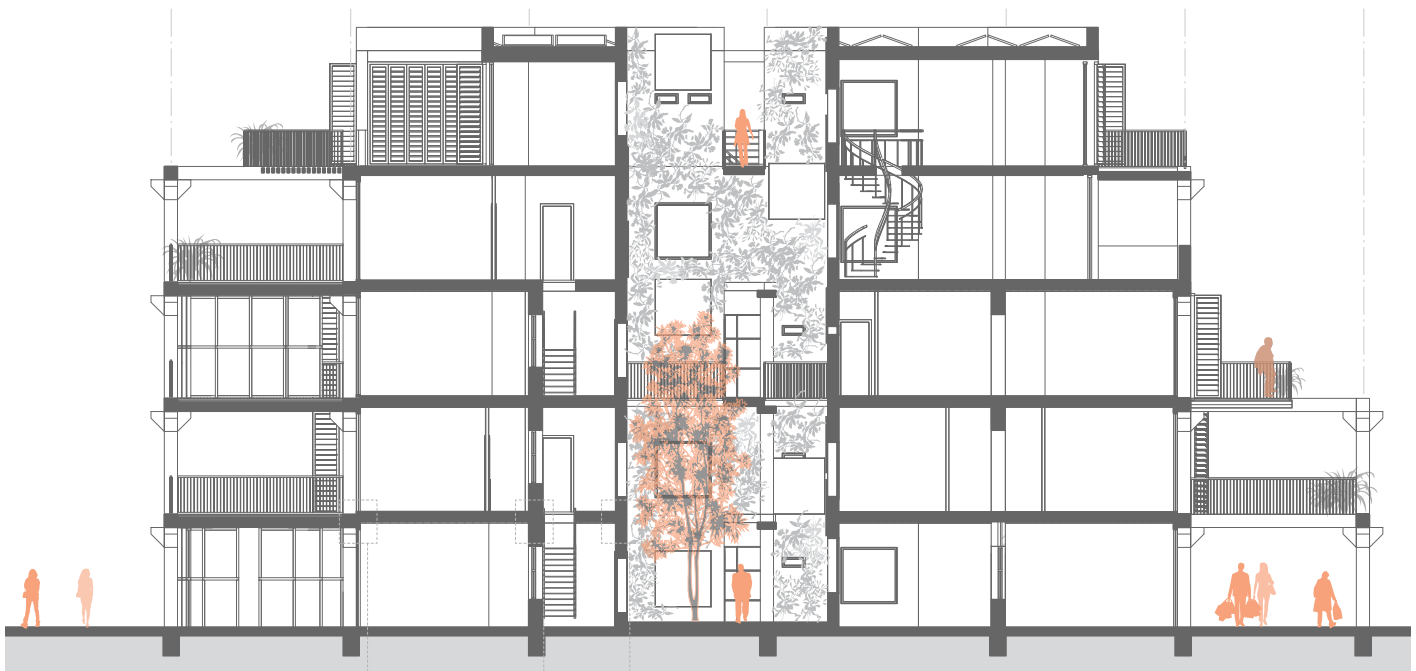
Courtyard

Courtyard
Reused mirror glass

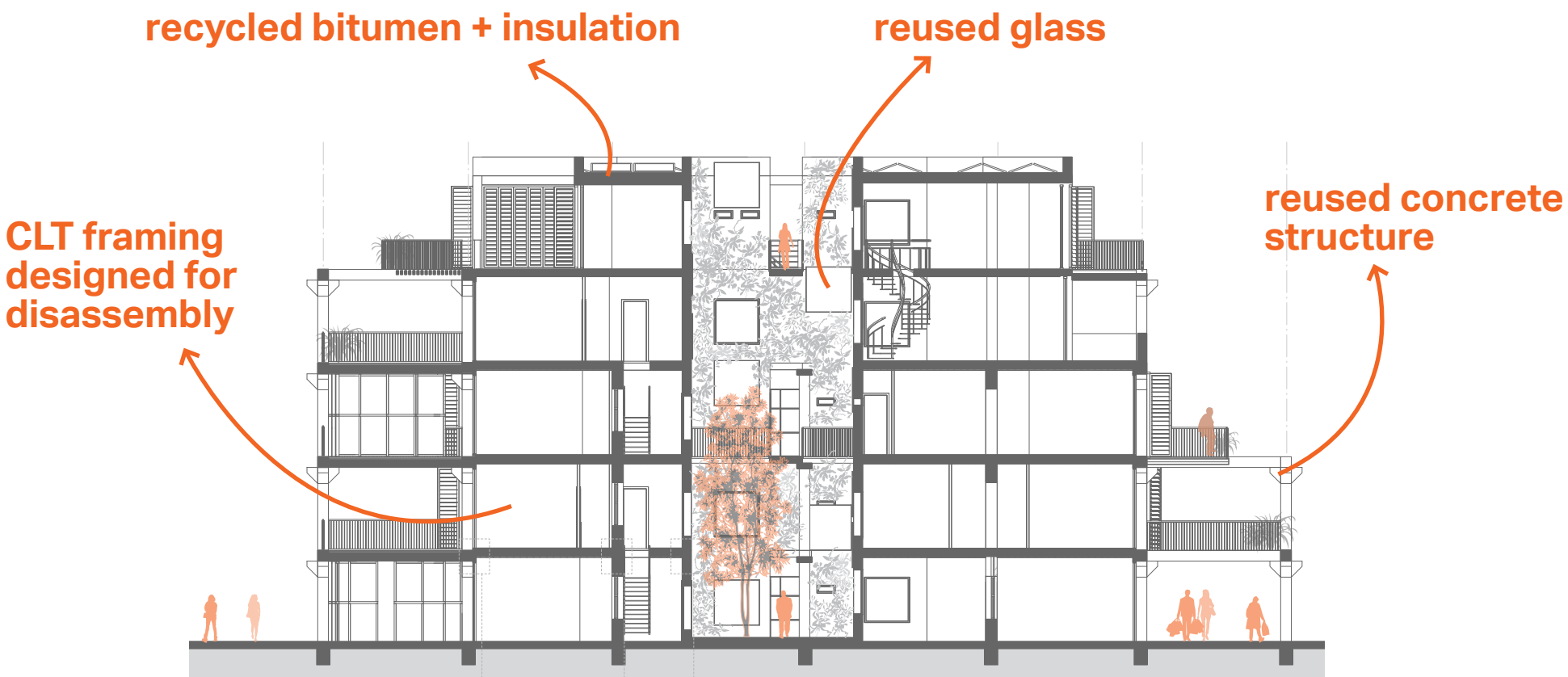
Mirror glass

Privacy

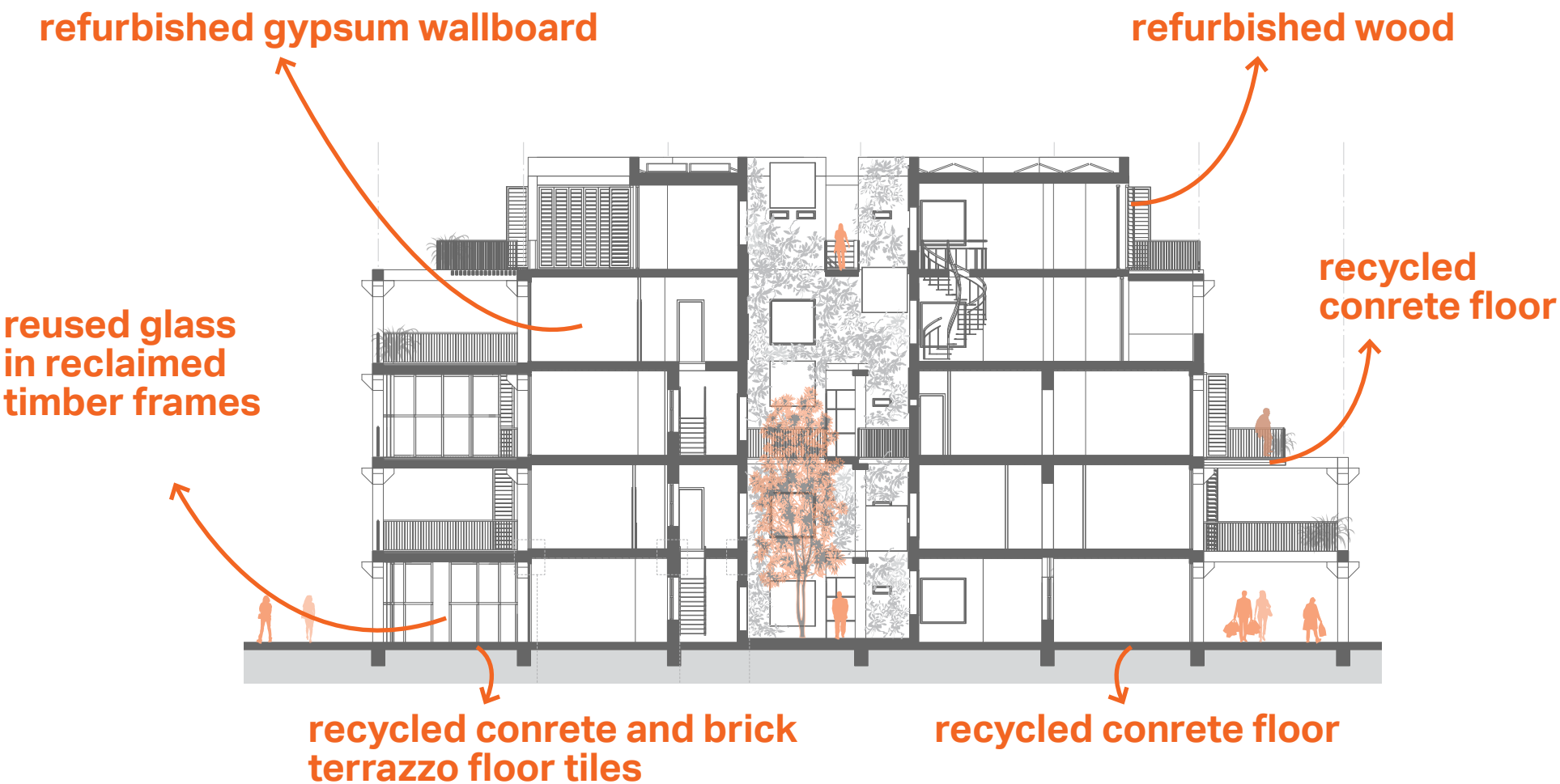
Overview



Overview

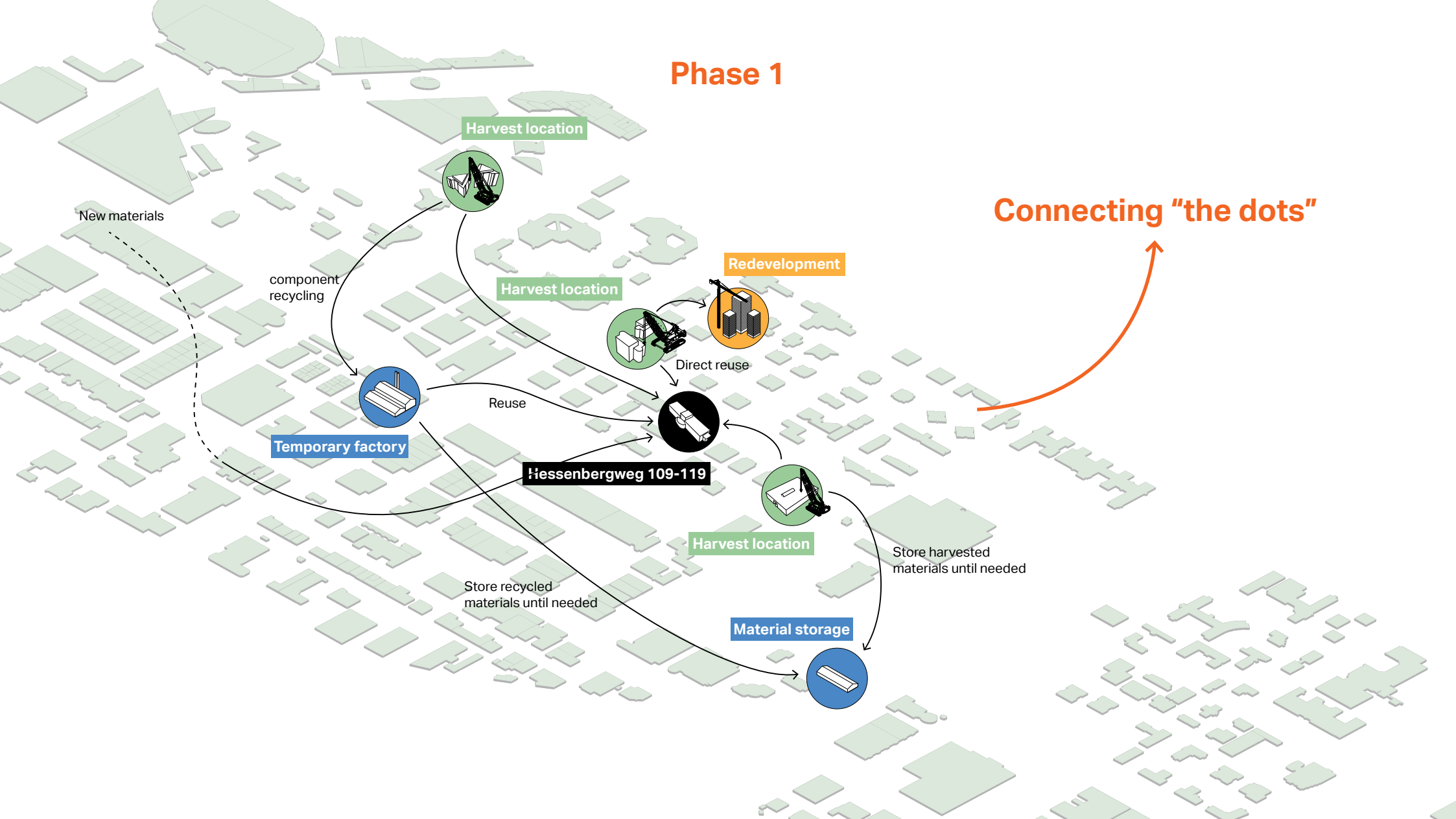

recycled bitumen + insulation
reused glass
CLT framing designed for disassembly
reused concrete structure

Overview

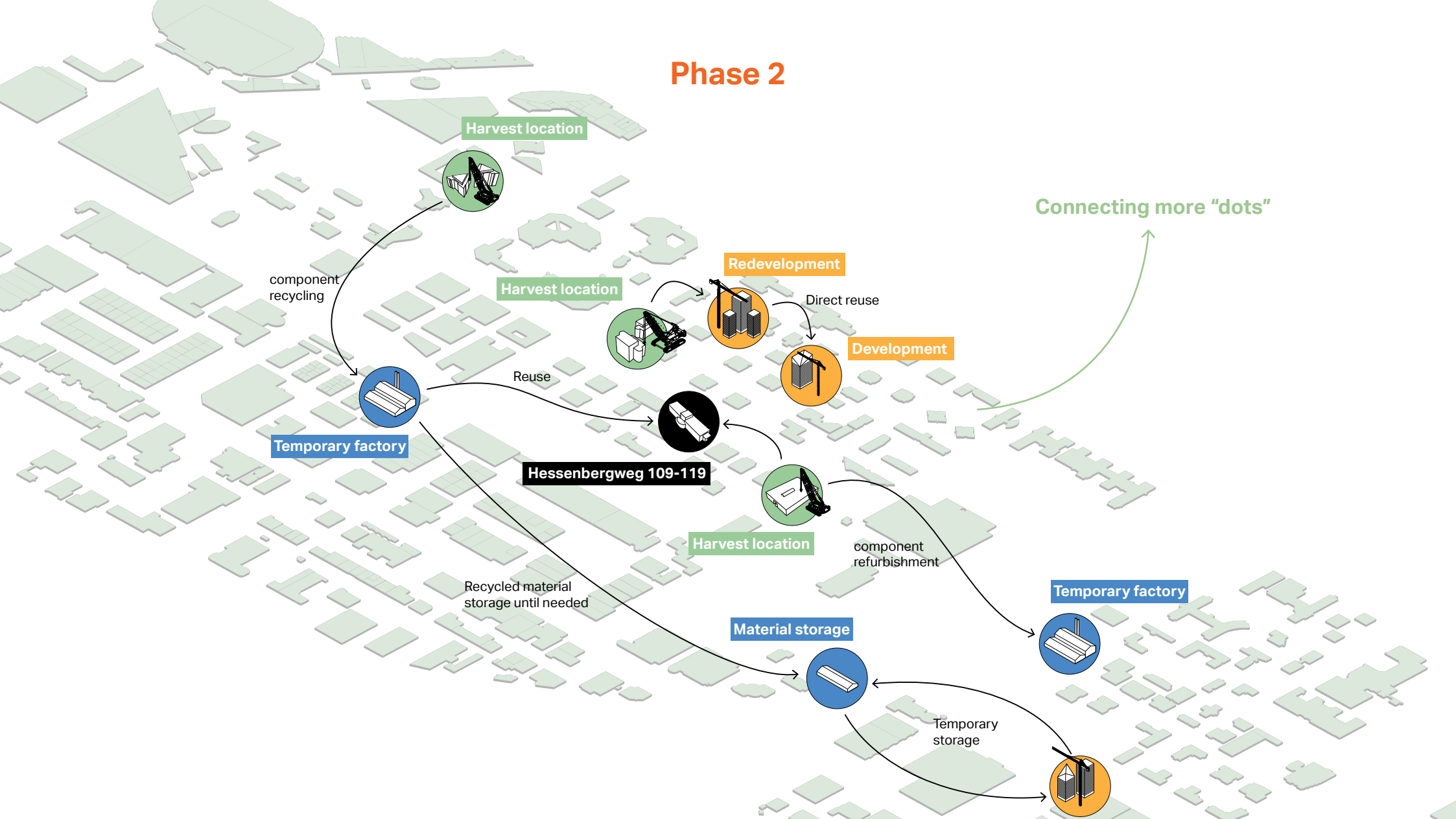

refurbished gypsum wallboard
refurbished wood
recycled
conrete floor
reused glass
in reclaimed
timber frames
recycled conrete and brick
terrazzo floor tiles
recycled conrete floor

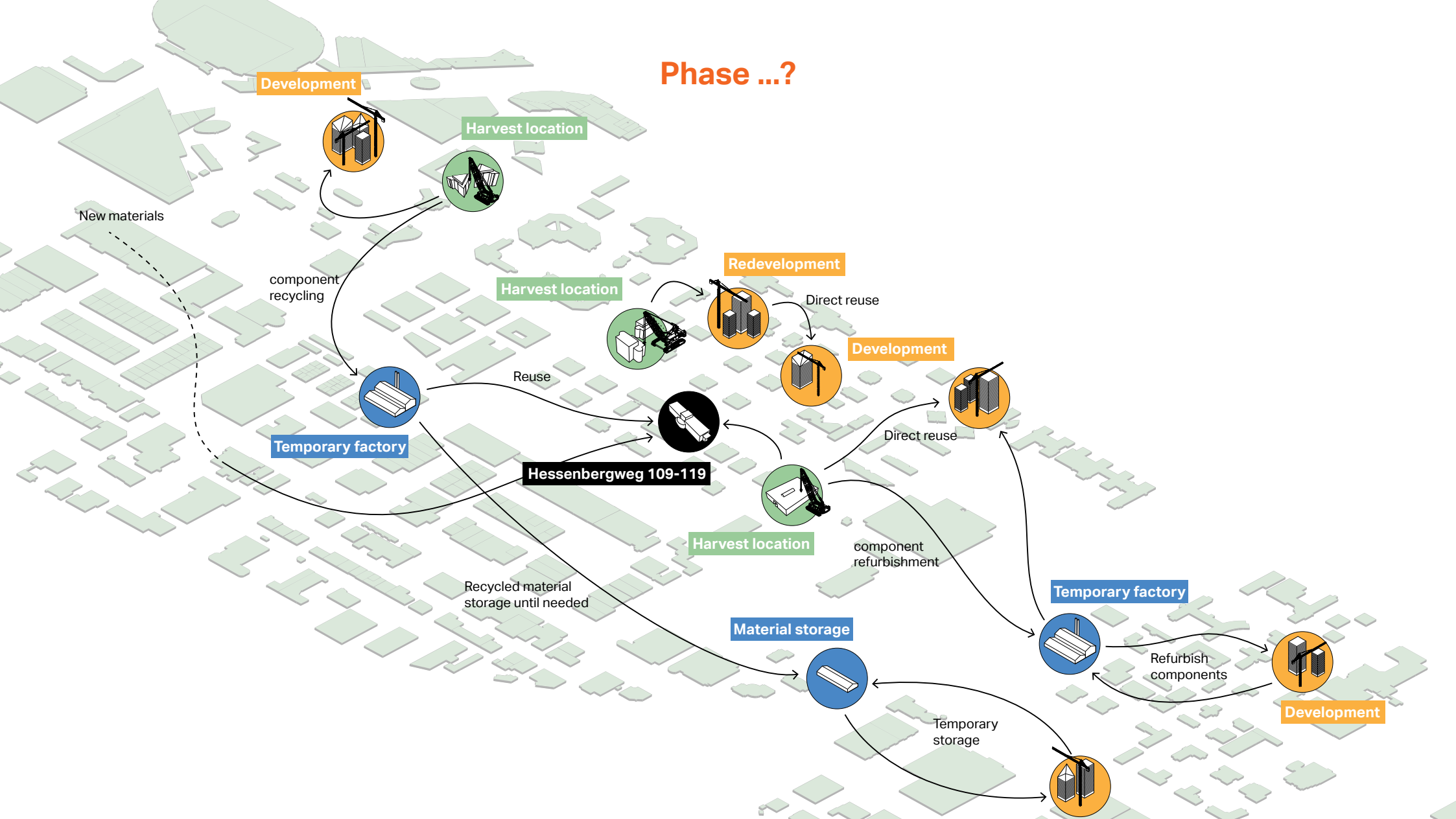
SCE
NARIO

Phase 1



Connecting “the dots”


Phase 2
Harvest location
component recycling
Harvest location
Redevelopment
Direct reuse
Development
Connecting more “dots”
Reuse
Temporary factory
Hessenbergweg 109-119
Harvest location
component refurbishment
Recycled material storage until needed
Temporary factory
Material storage
Temporary storage


Phase ...?
Development
Harvest location
New materials
component recycling
Redevelopment
Harvest location
Direct reuse
Development
Reuse
Temporary factory
Hessenbergweg 109-119
Direct reuse
Harvest location
component refurbishment
Recycled material storage until needed
Temporary factory
Material storage
Refurbish components
Development
Temporary storage

AM
STEL III
THE RE
USE CITY
Beelen sloopwerken

"Introducing the architectural language of imperfection."