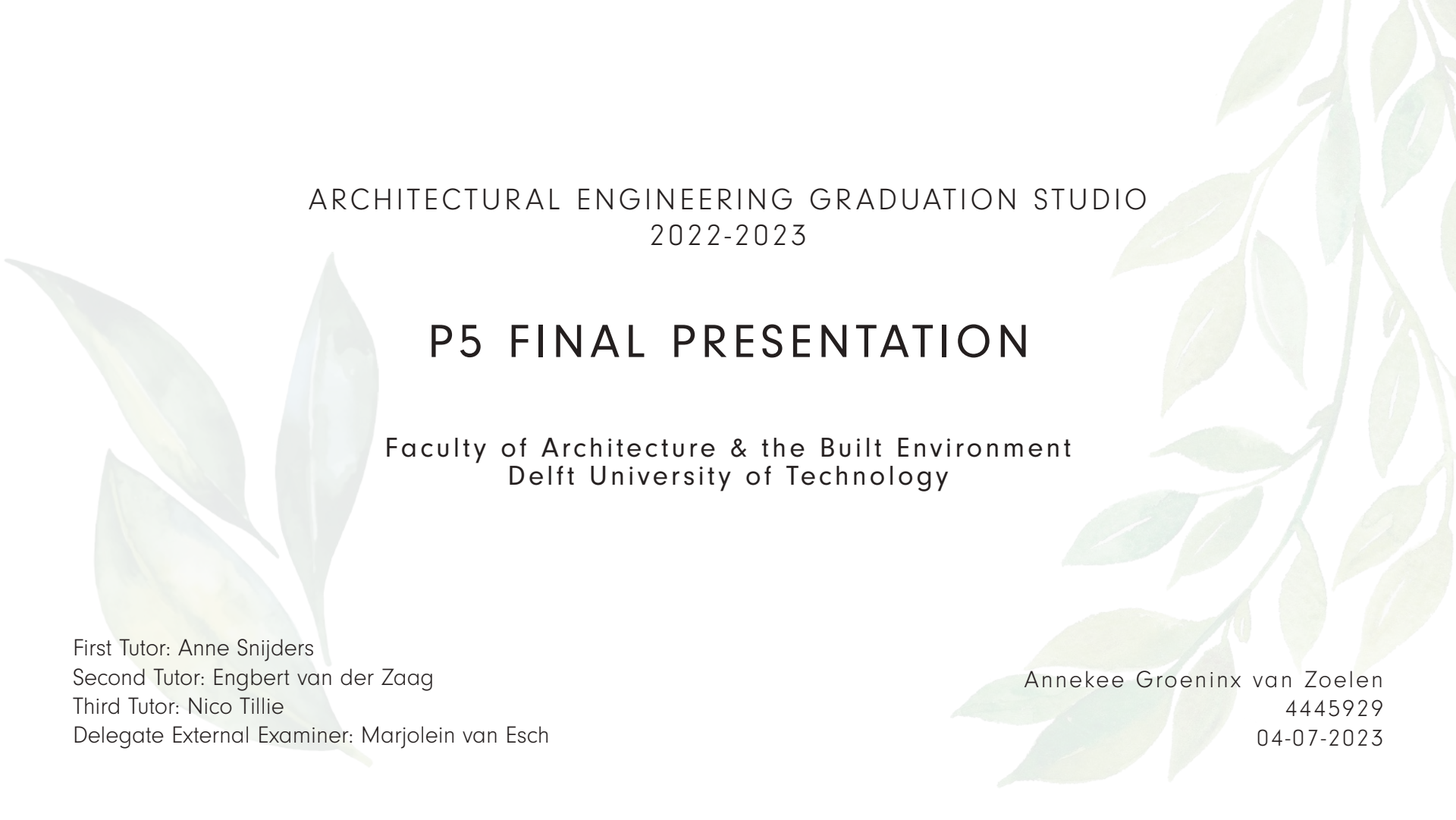




ARCHITECTURAL ENGINEERING GRADUATION STUDIO
2022-2023

P5 FINAL PRESENTATION

Faculty of Architecture & the Built Environment
Delft University of Technology

First Tutor: Anne Snijders
Second Tutor: Engbert van der Zaag
Third Tutor: Nico Tillie
Delegate External Examiner: Marjolein van Esch

Annekee Groeninx van Zoelen
4445929
04-07-2023

Exploring Opportunities for Rewilding the Built Environment through Nature-Inclusive Design

Case study Boerhaavewijk, post-war residential neighbourhood in Haarlem, the Netherlands

Introduction to Rewilding

Research: Rewilding Strategies

Case study: Boerhaavewijk

Architectural Design

Conclusion

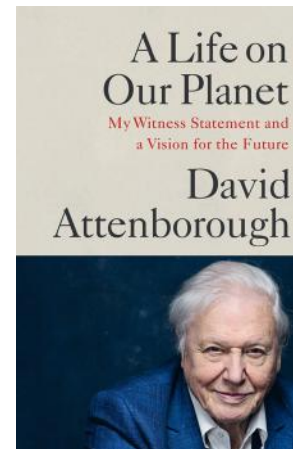


"Over the years, we lost our balance.
We moved from being a part of nature to
being apart from nature."

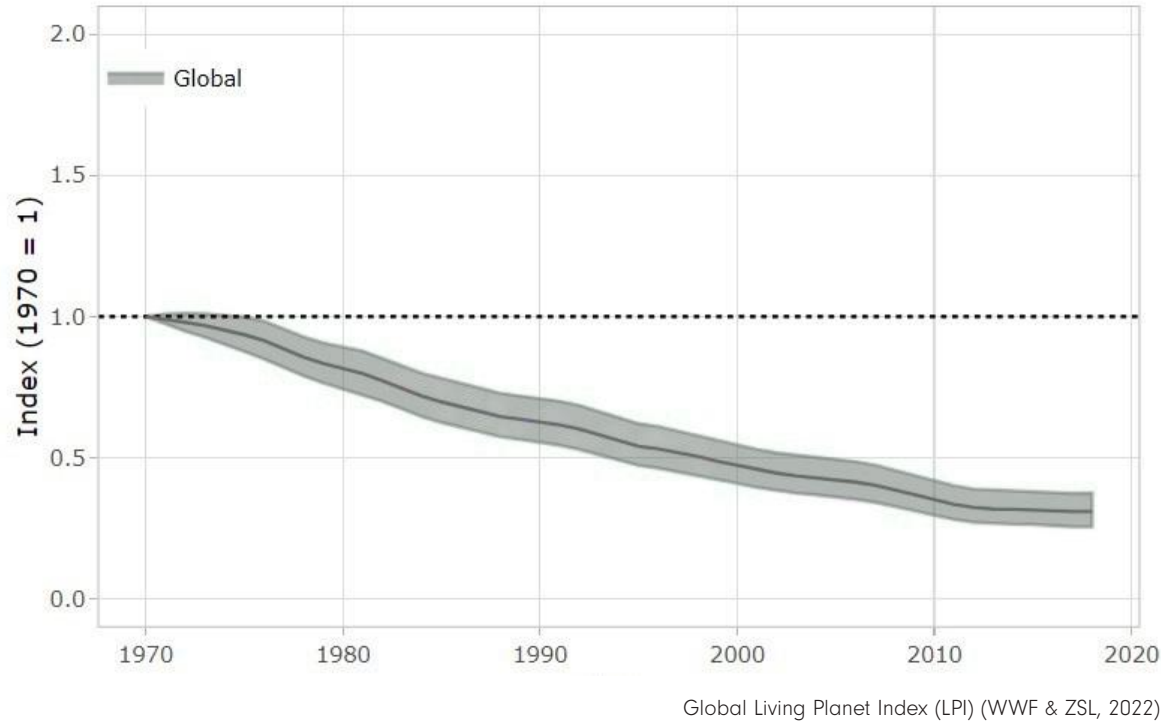
(Attenborough & Hughes, 2022)

"Over the years, we lost our balance.
We moved from being a part of nature to
being apart from nature."

(Attenborough & Hughes, 2022)



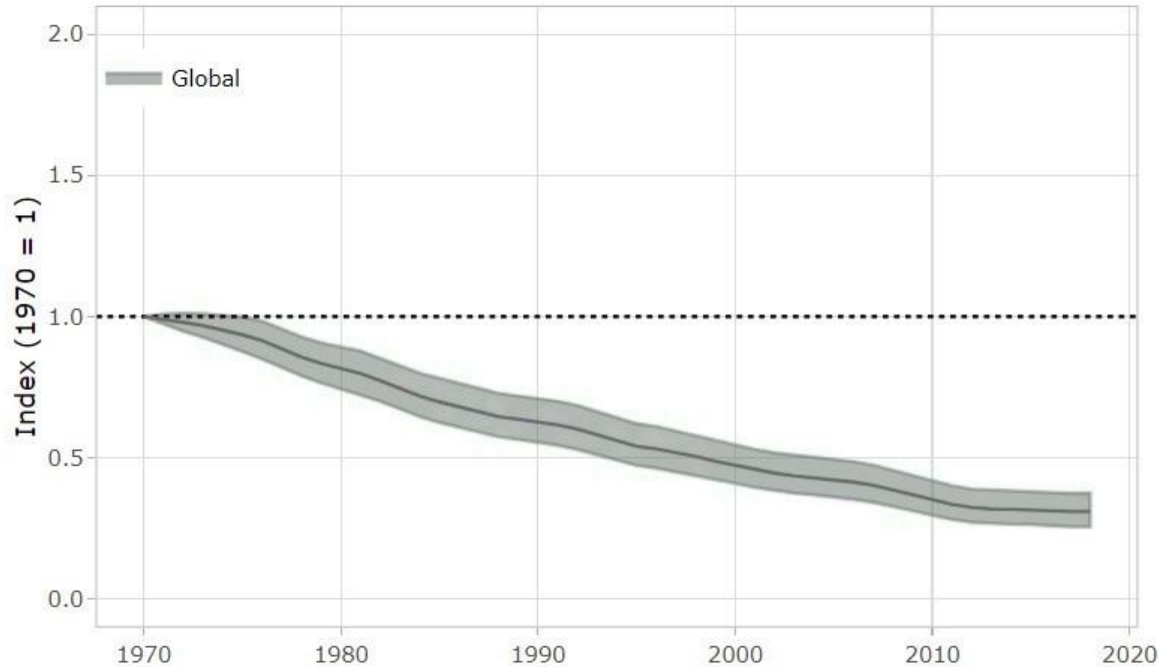
GLOBAL BIODIVERSITY LOSS



GLOBAL BIODIVERSITY LOSS

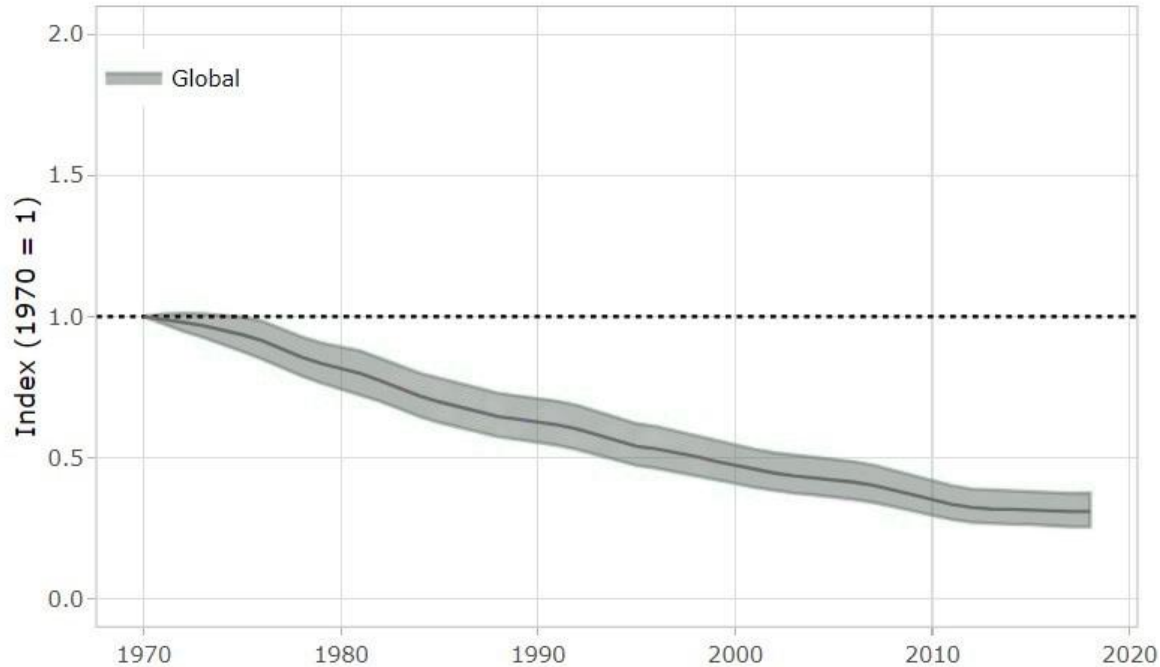


Also in cities



Global Living Planet Index (LPI) (WWF & ZSL, 2022)

GLOBAL BIODIVERSITY LOSS



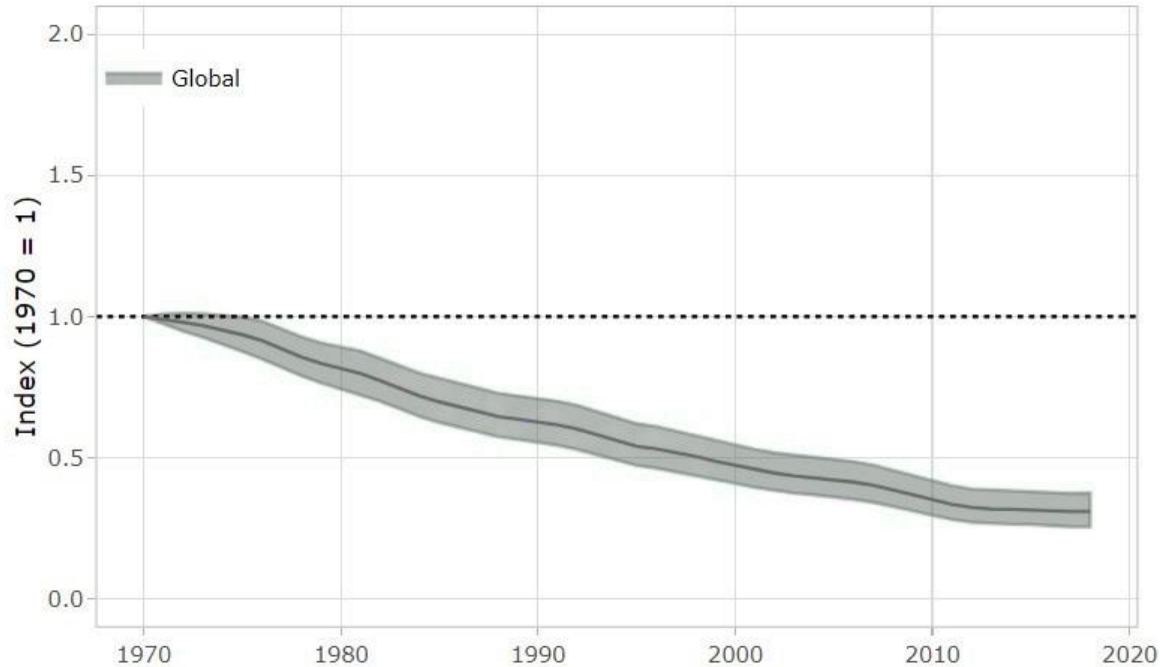
Global Living Planet Index (LPI) (WWF & ZSL, 2022)



Also in cities



GLOBAL BIODIVERSITY LOSS



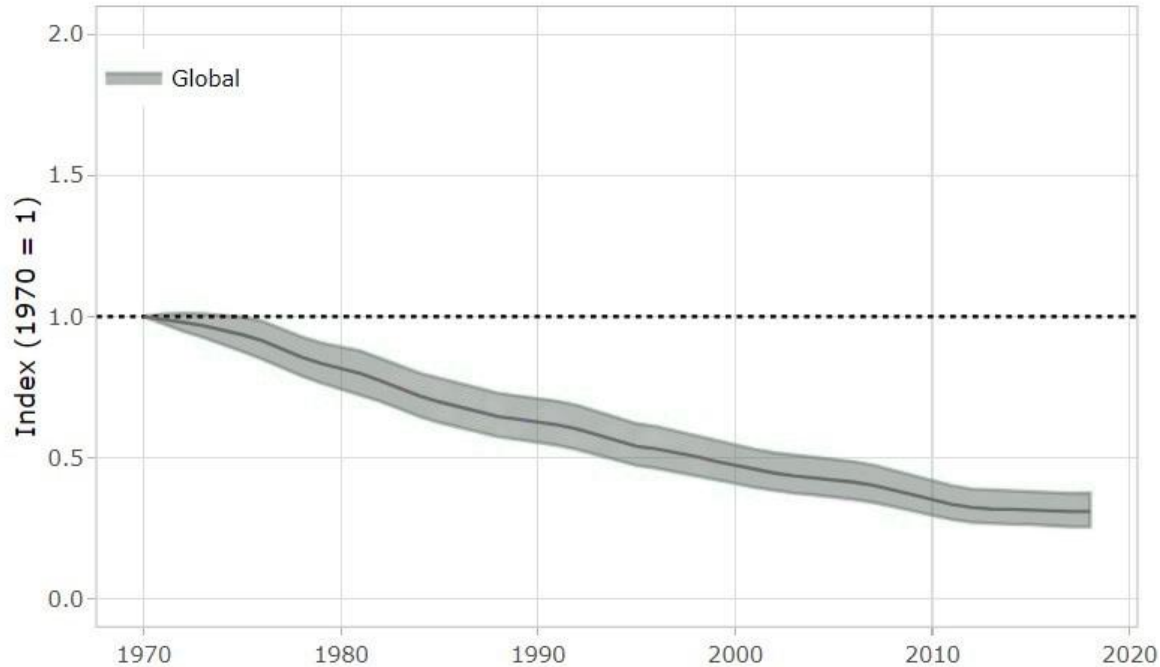
Global Living Planet Index (LPI) (WWF & ZSL, 2022)



Also in cities



GLOBAL BIODIVERSITY LOSS



Global Living Planet Index (LPI) (WWF & ZSL, 2022)



Also in cities



RESTORING BIODIVERSITY

More natural
areas



Increasing
biodiversity



RESTORING BIODIVERSITY

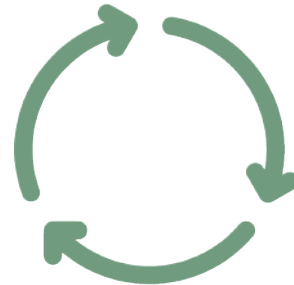
More natural
areas



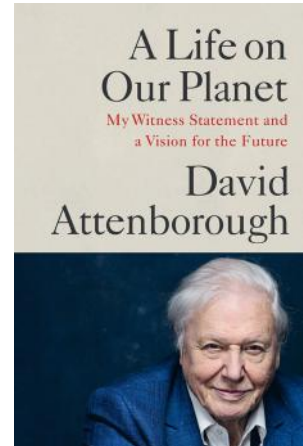
Increasing
biodiversity

=

Increasing liveability, circularity,
and climate-adaptation



Rewilding



Rewilding

Reintroduction of nature
Allowing it to take the lead
Minimal human intervention

Rewilding

Reintroduction of nature
Allowing it to take the lead
Minimal human intervention



Ecological rewilding
biophysical nature:
rewilding of water, land
and wildlife

Rewilding

Reintroduction of nature
Allowing it to take the lead
Minimal human intervention



Ecological rewilding
biophysical nature:
rewilding of water, land
and wildlife



Human rewilding
personal/social/cultural:
urban rewilding

FILLING THE KNOWLEDGE GAP



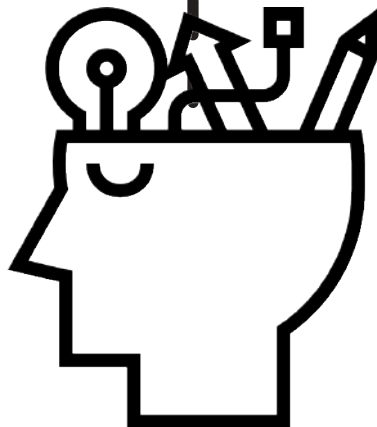
FILLING THE KNOWLEDGE GAP



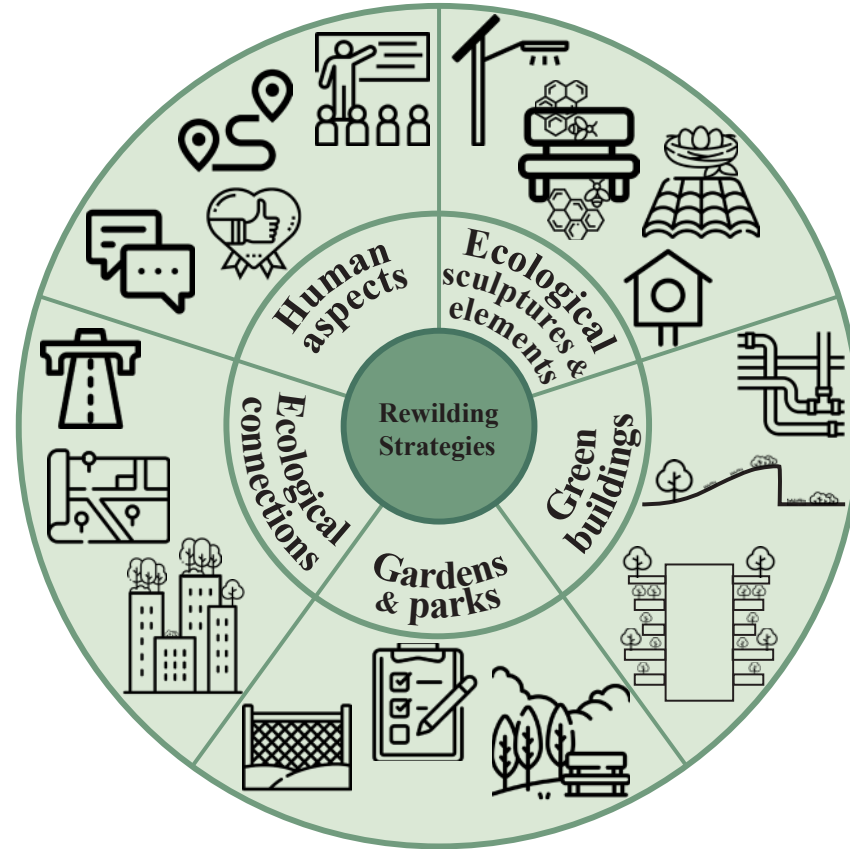
FILLING THE KNOWLEDGE GAP



FILLING THE KNOWLEDGE GAP



NATURE-INCLUSIVE DESIGN TOOLBOX



NATURE-INCLUSIVE DESIGN TOOLBOX



NATURE-INCLUSIVE DESIGN TOOLBOX

The diagram is a circular 'Nature-Inclusive Design Toolbox' centered on 'Rewilding Strategies'. It is divided into five segments, each with icons and a corresponding image collage:

- Human aspects:** Icons include a location pin, a person at a table, a heart with a thumbs up, and speech bubbles. The collage shows a museum interior, people in a park, and a tree with a heart-shaped sign.
- Ecological sculptures & elements:** Icons include a stylized tree, a beehive, a nest, and a house. The collage shows a wooden sculpture, a beehive, a nest, and a house with a green roof.
- Green buildings:** Icons include a building with a green roof, a tree, and a building with a green wall. The collage shows a building with a green roof, a tree, and a building with a green wall.
- Gardens & parks:** Icons include a park bench, a clipboard, and a tree. The collage shows a park bench, a clipboard, and a tree.
- Ecological connections:** Icons include a road, a bridge, and a tree. The collage shows a road, a bridge, and a tree.

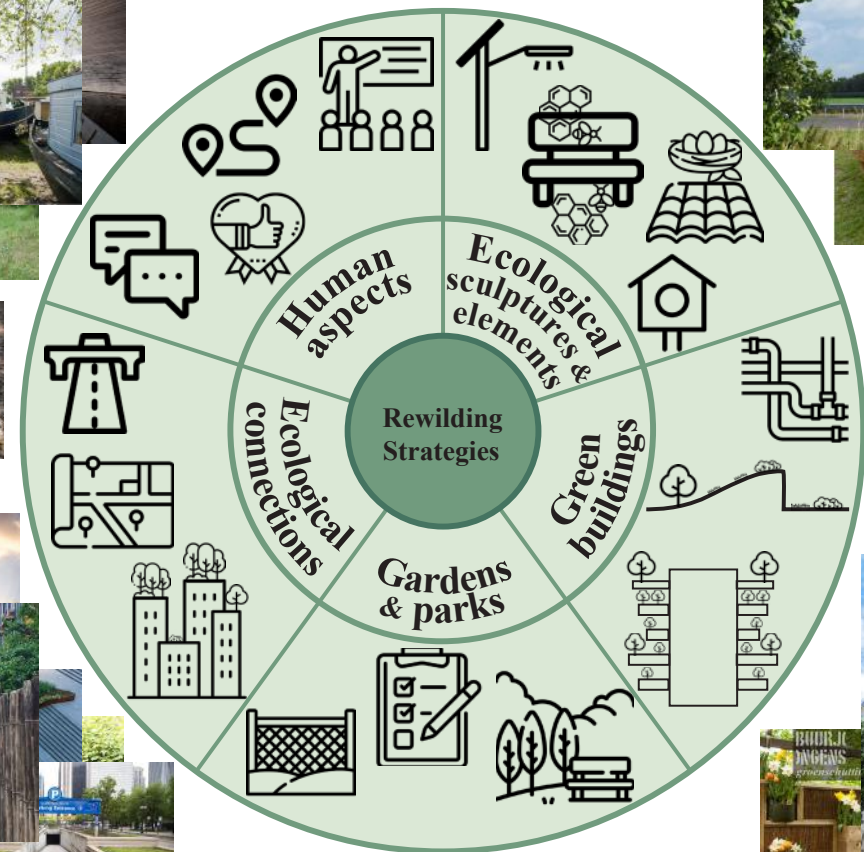
The surrounding collage includes images of various nature-inclusive design projects, such as green roofs, vertical gardens, urban parks, and naturalistic landscaping.

NATURE-INCLUSIVE DESIGN TOOLBOX

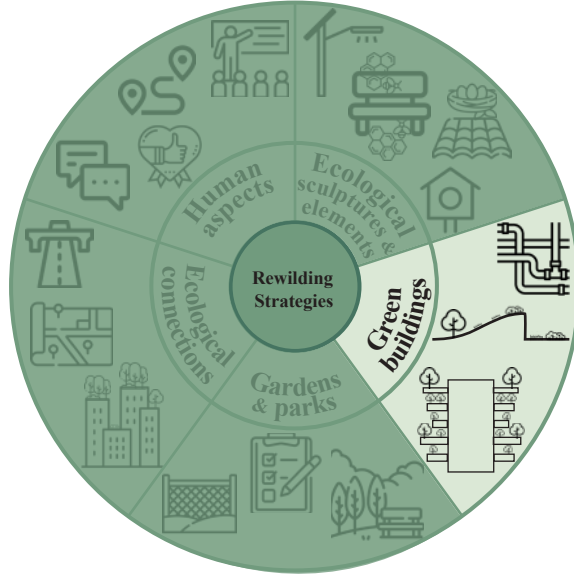
The diagram is a circular 'toolbox' for rewilding strategies, centered around 'Rewilding Strategies'. It is divided into five segments, each with a set of icons:

- Human aspects:** Icons include a location pin, a person at a desk, a heart with a thumbs up, and speech bubbles.
- Ecological sculptures & elements:** Icons include a stylized tree, a beehive, a birdhouse, and a nest.
- Green buildings:** Icons include a building with a tree, a tree, and a building with a green roof.
- Gardens & parks:** Icons include a building with a tree, a tree, and a building with a green roof.
- Ecological connections:** Icons include a road, a bridge, a tree, and a building with a green roof.

The background of the slide is a collage of various nature-inclusive design projects, including green roofs, urban parks, and integrated infrastructure.

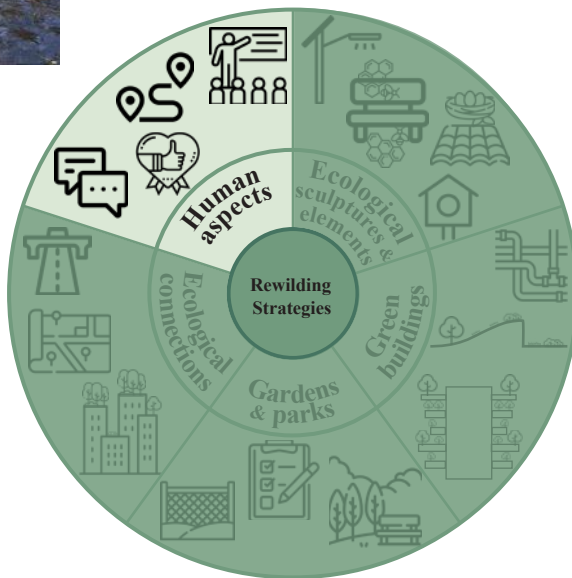








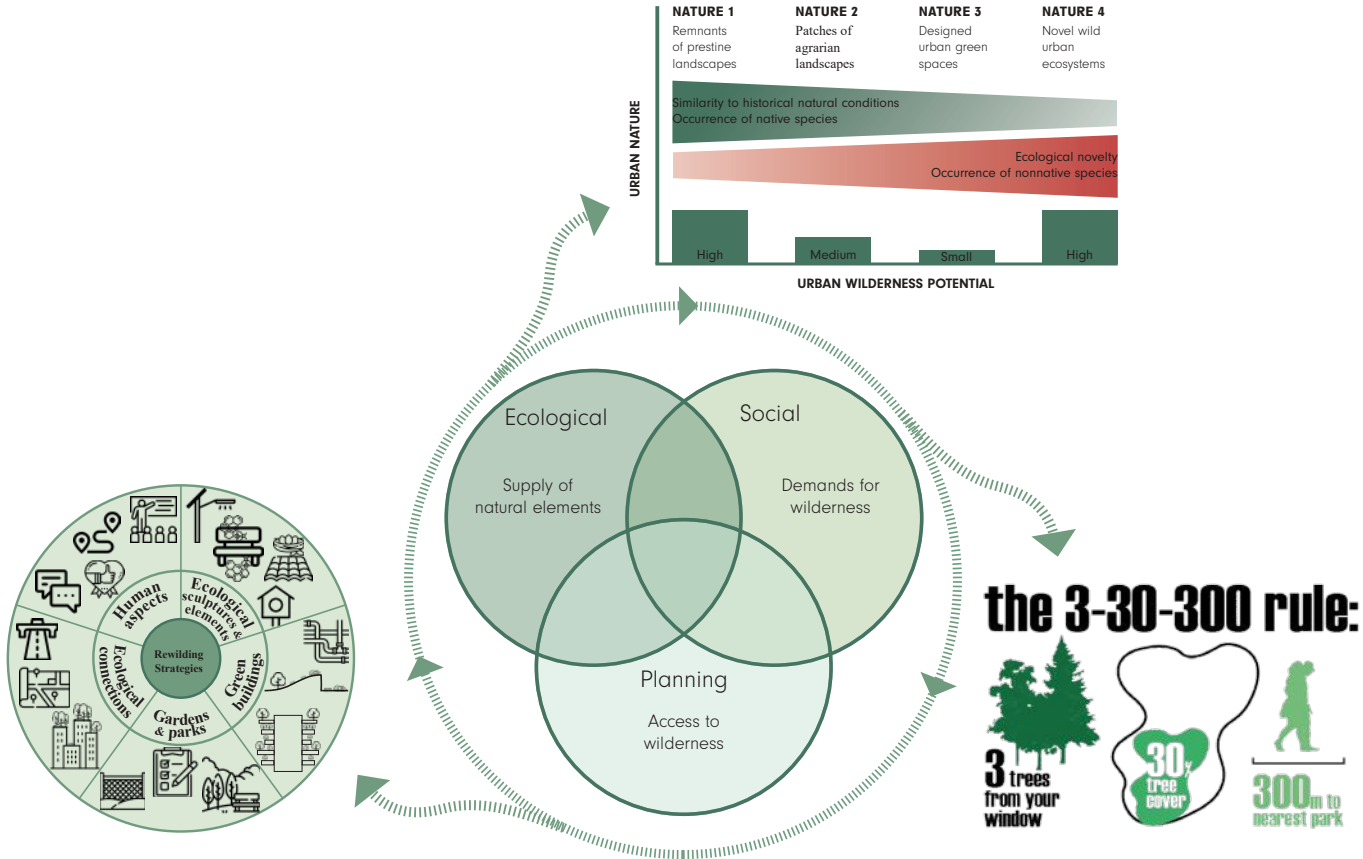




REWILDING A NEIGHBOURHOOD: BOERHAAVEWIJK

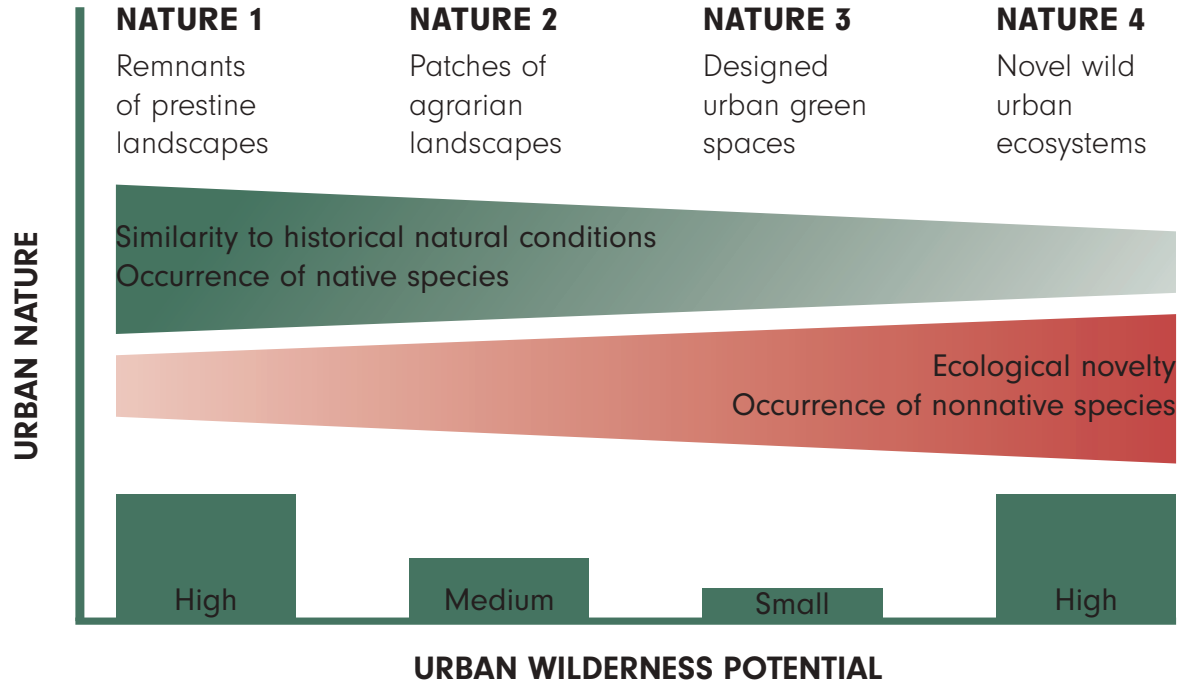
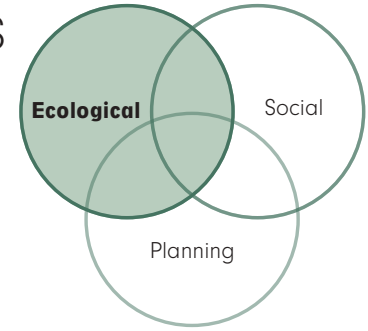


LARGE-SCALE STRATEGY: Urban Wilderness as Social-Ecological System



ECOLOGICAL: SUPPLY OF NATURAL ELEMENTS

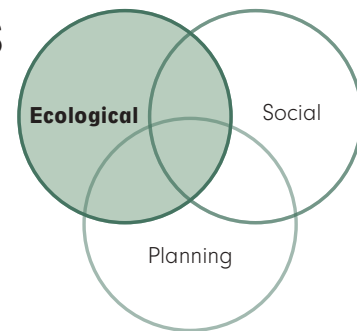
'Four Natures Approach'



'Four Natures Approach' (Kowarik, 2018)

ECOLOGICAL: SUPPLY OF NATURAL ELEMENTS

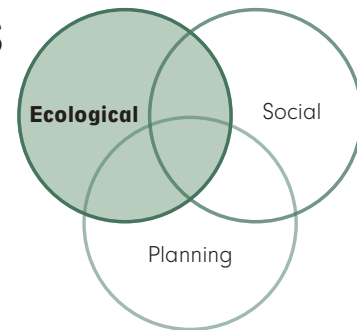
'Four Natures Approach' Boerhaavewijk



- Nature 1: Remnants of pristine landscapes
- Nature 2: Patches of agrarian landscapes
- Nature 3: Designed urban green spaces
- Nature 4: Novel wild urban ecosystems
- Water

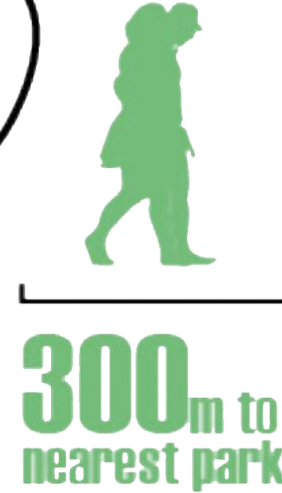
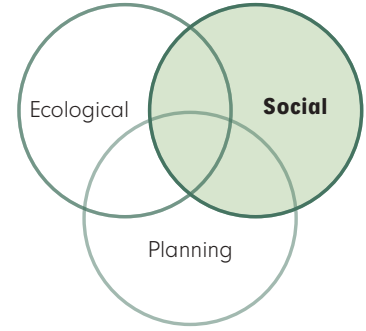
ECOLOGICAL: SUPPLY OF NATURAL ELEMENTS

Connecting Nature



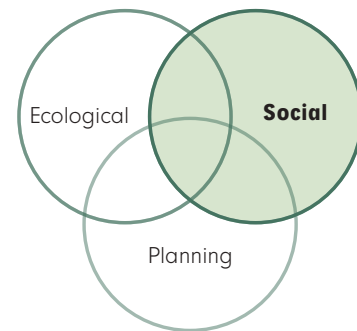
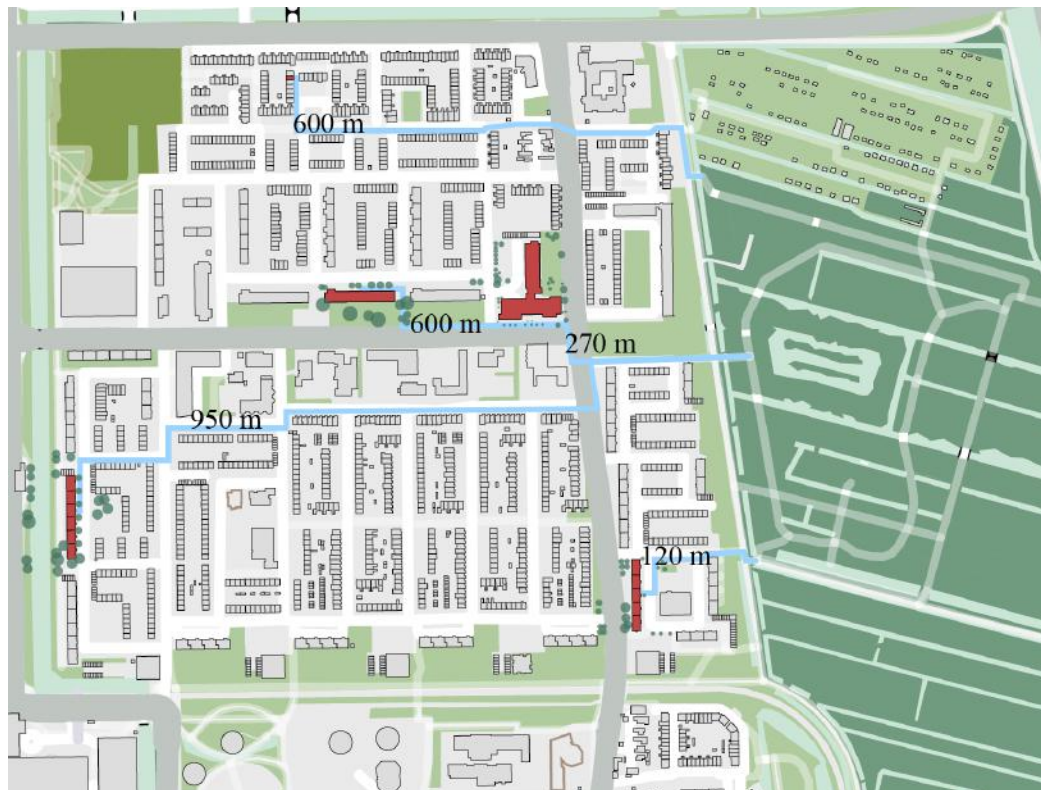
SOCIAL: DEMANDS FOR WILDERNESS

3-30-300 Rule



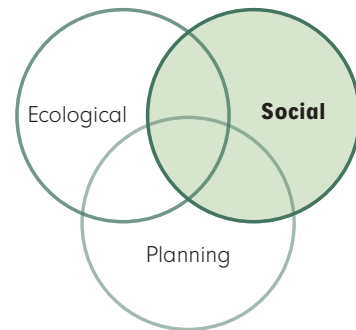
SOCIAL: DEMANDS FOR WILDERNESS

3-30-300 Rule



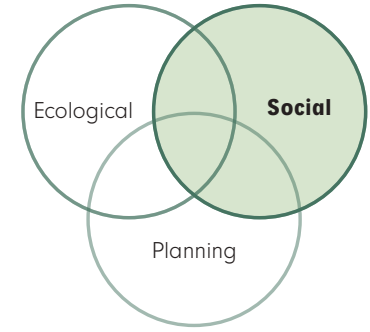
SOCIAL: DEMANDS FOR WILDERNESS

300M to Poelpolder

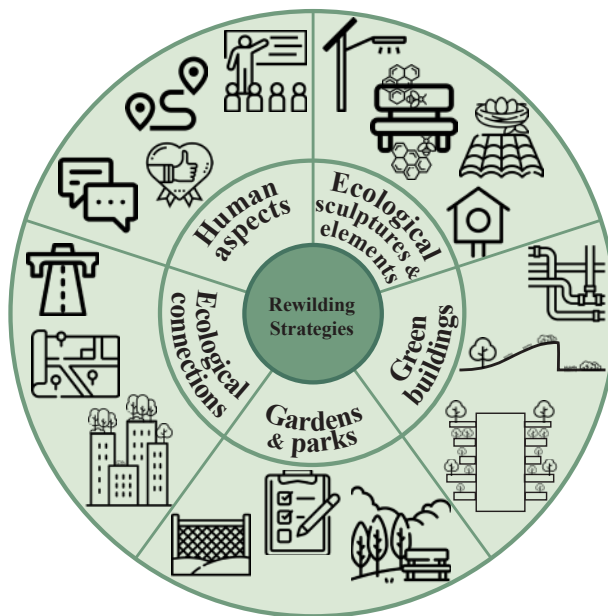


SOCIAL: DEMANDS FOR WILDERNESS

Tree Canopy Cover: 27%



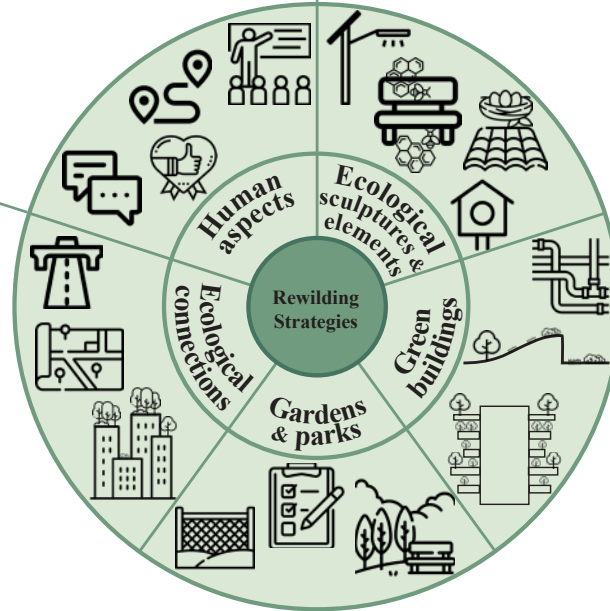
PLANNING: ACCESS TO WILDERNESS



PLANNING: ACCESS TO WILDERNESS



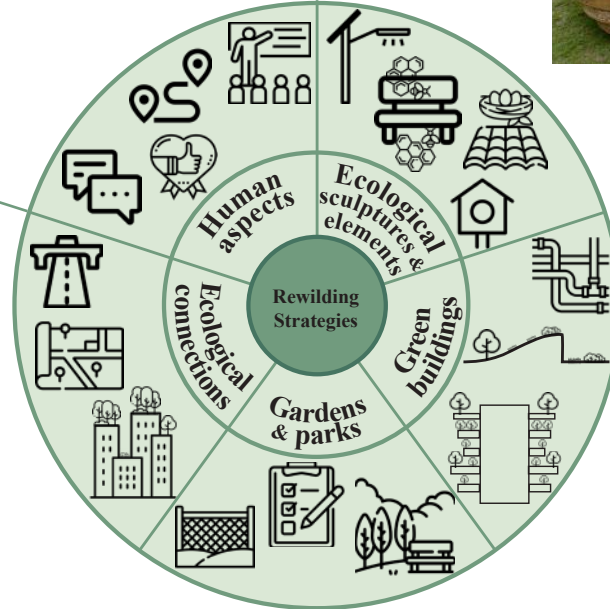
Mental access



PLANNING: ACCESS TO WILDERNESS



Mental access



Physical access



I'M SPEAKING AT #ECOCITY2023

**ECOCITY
WORLD SUMMIT**

LONDON

6-8 JUNE 23



BOERHAAVEWIJK, SCHALKWIJK, HAARLEM

CASE STUDY



- Forest
- Park
- Green
- Water
- Sports

SITE VISITS



DEFICIENCIES IN BOERHAAVEWIJK

- Monofunctional neighbourhood
- Few public buildings & meeting spaces
- Paving, 'kijkgroen' & 'grasfalt'



- Enclosed private gardens
- No green roofs
- Poor rainwater management
- No green corridors with surroundings

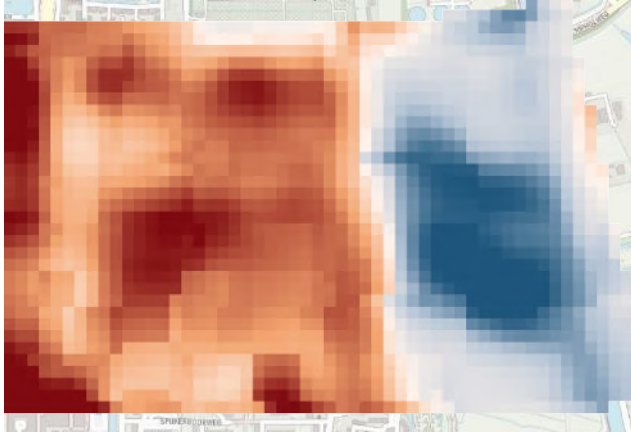
ECOLOGICAL ROUTES



CONNECTING NATURE



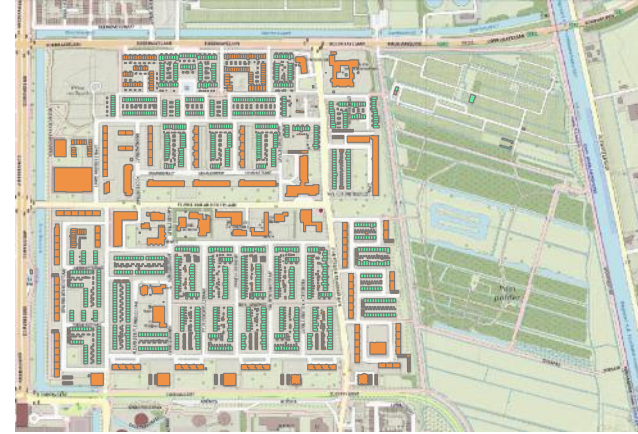
Urban Heat Map



Urban Heat Map



Flat roof vs Non-flat roof

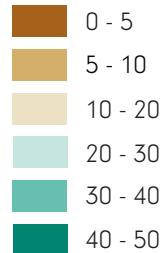
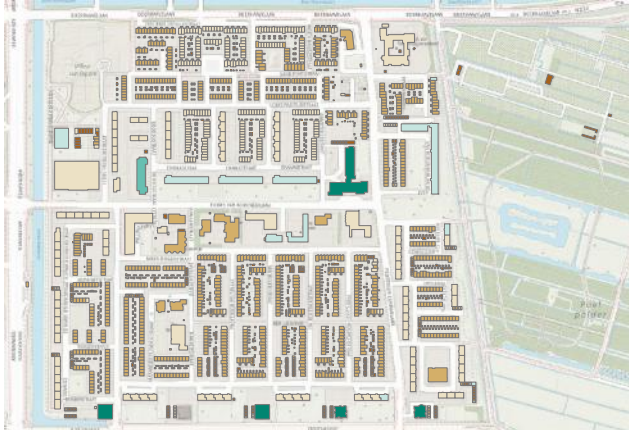


- Flat roof
- Non-flat roof

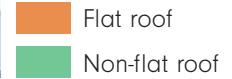
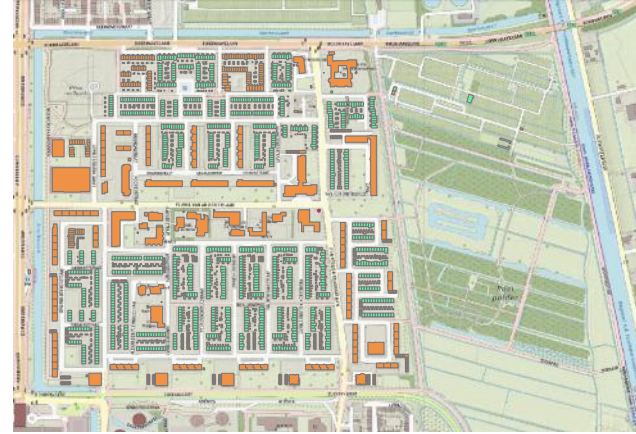
Urban Heat Map



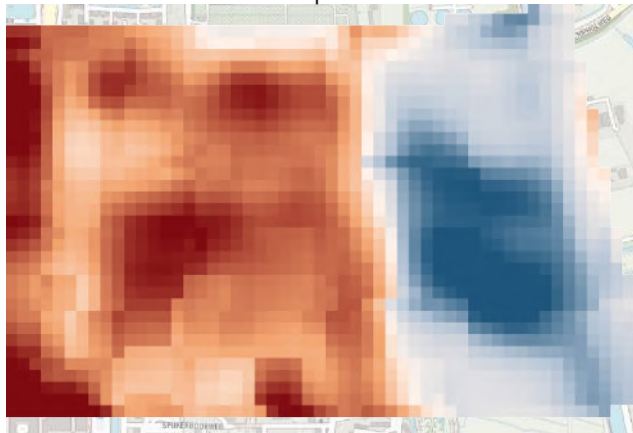
Building Height (m)



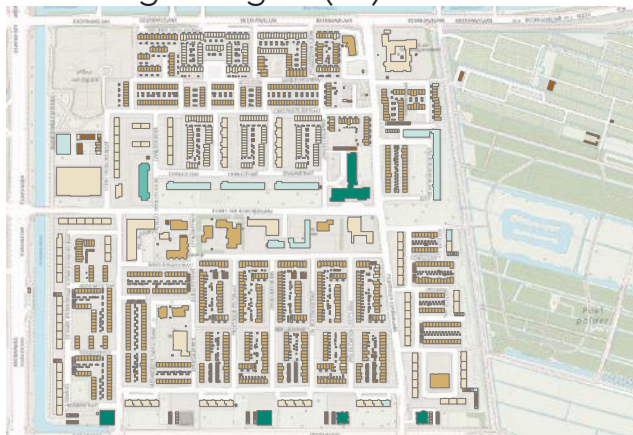
Flat roof vs Non-flat roof



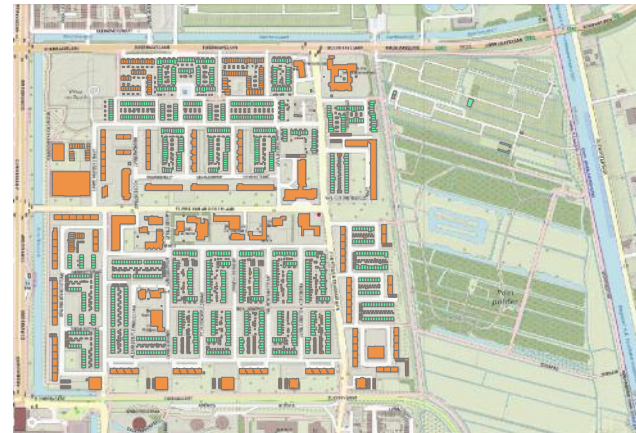
Urban Heat Map



Building Height (m)



Flat roof vs Non-flat roof



Local Species



SWIFT



SMALL NEWT



DRAGONFLY



LONGHORN BEETLE



MARTEN



HOUSE SPARROW

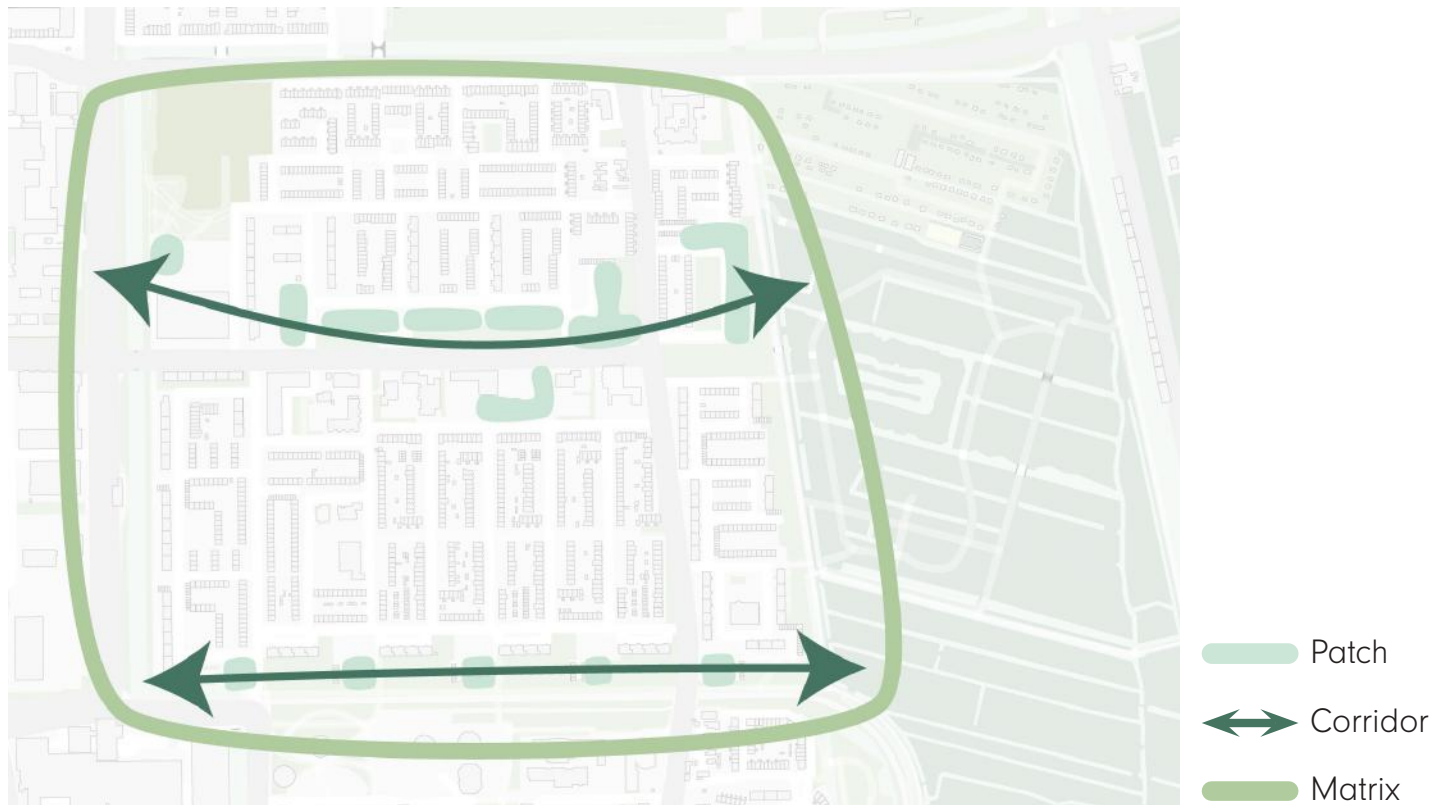


HEDGEHOG



SAND BEE

PATCH-CORRIDOR-MATRIX

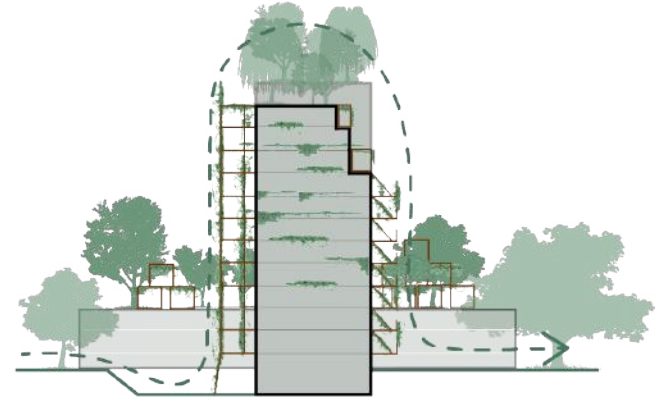
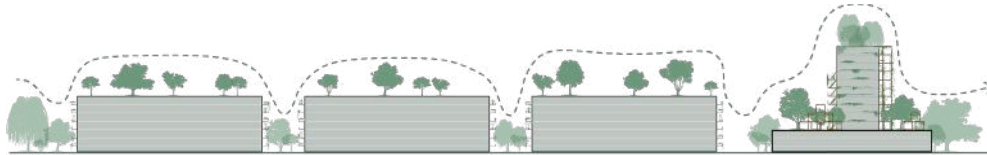


VISION: "VOORZIENINGENSTROOK"



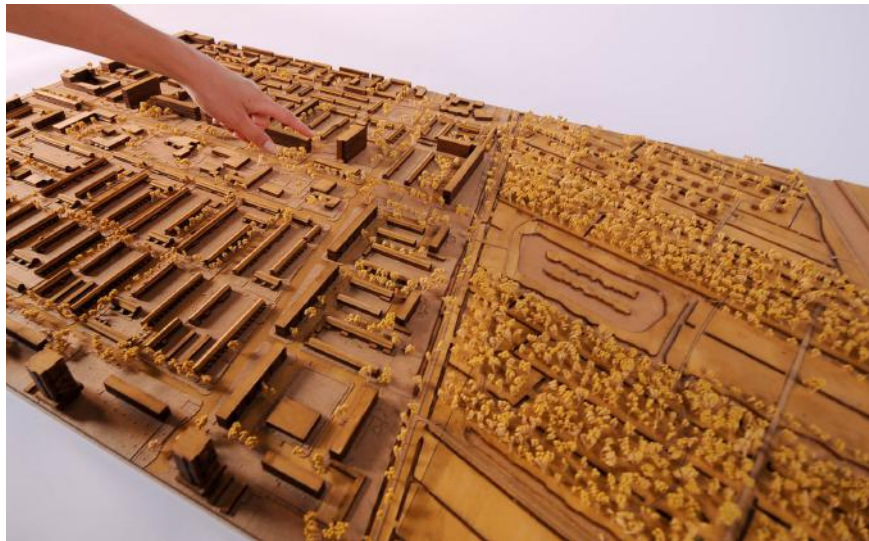
VISION: "VOORZIENINGENSTROOK"

CASE STUDY

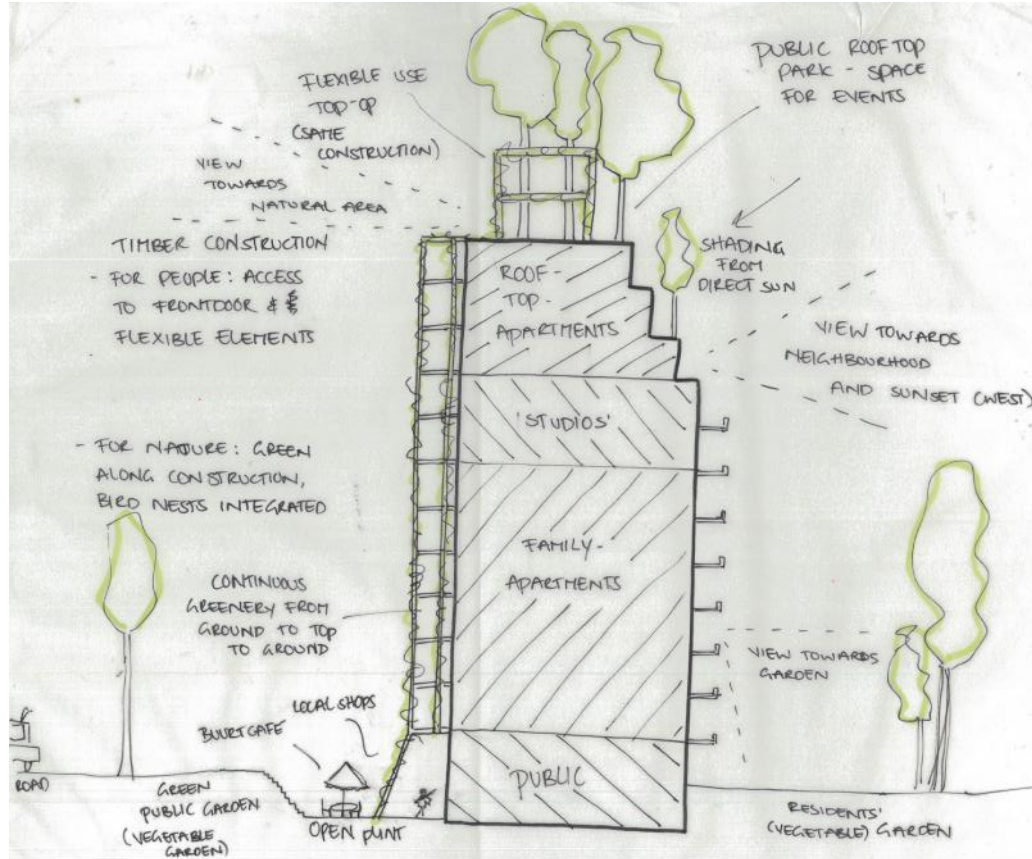


STICHTING SINT JACOB - WOONZORGCENTRUM SCHALKWEIDE

Current Situation



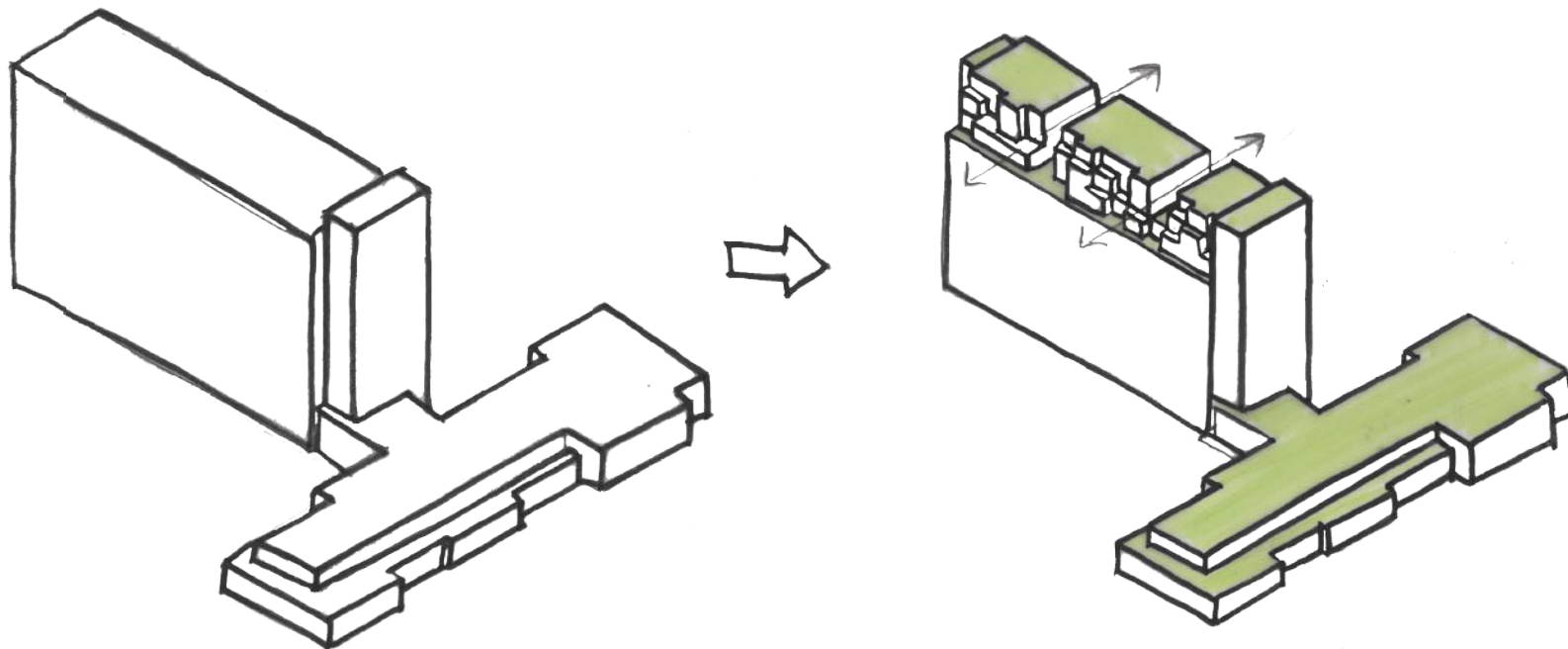
INTEGRATION OF NATURE IN BUILDING



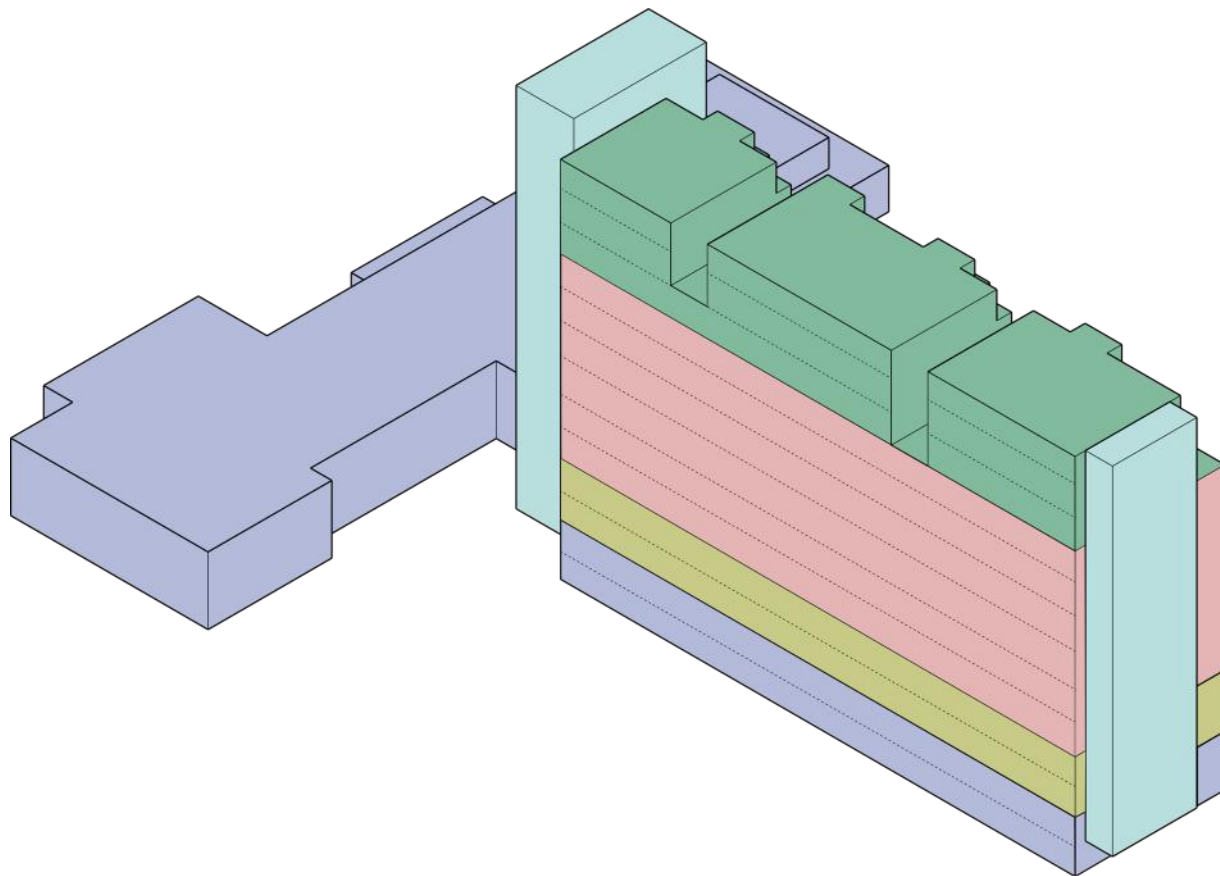
Valuing all forms of nature:

- Considering fauna
- Use of materials
- Impact of building

CREATING SPACE FOR NATURE



PROGRAMME



Public area

Stairwell

Studios

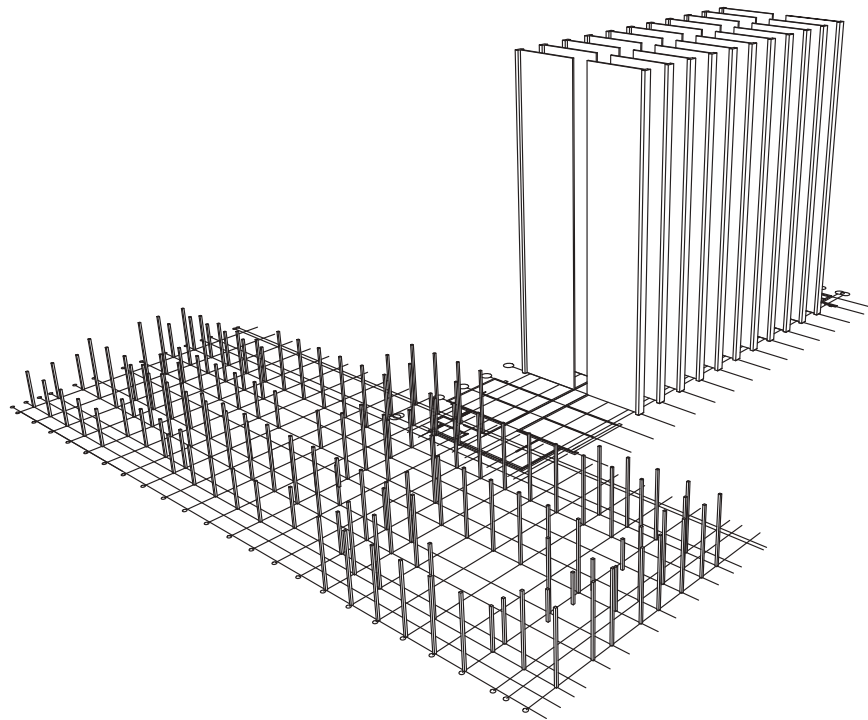
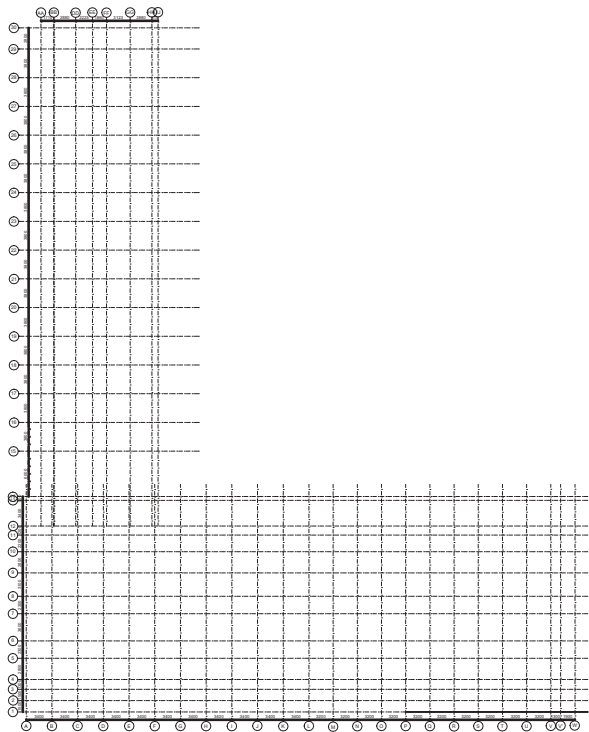
Family apartments

Rooftop Apartments



GRID & STRUCTURE

DESIGN

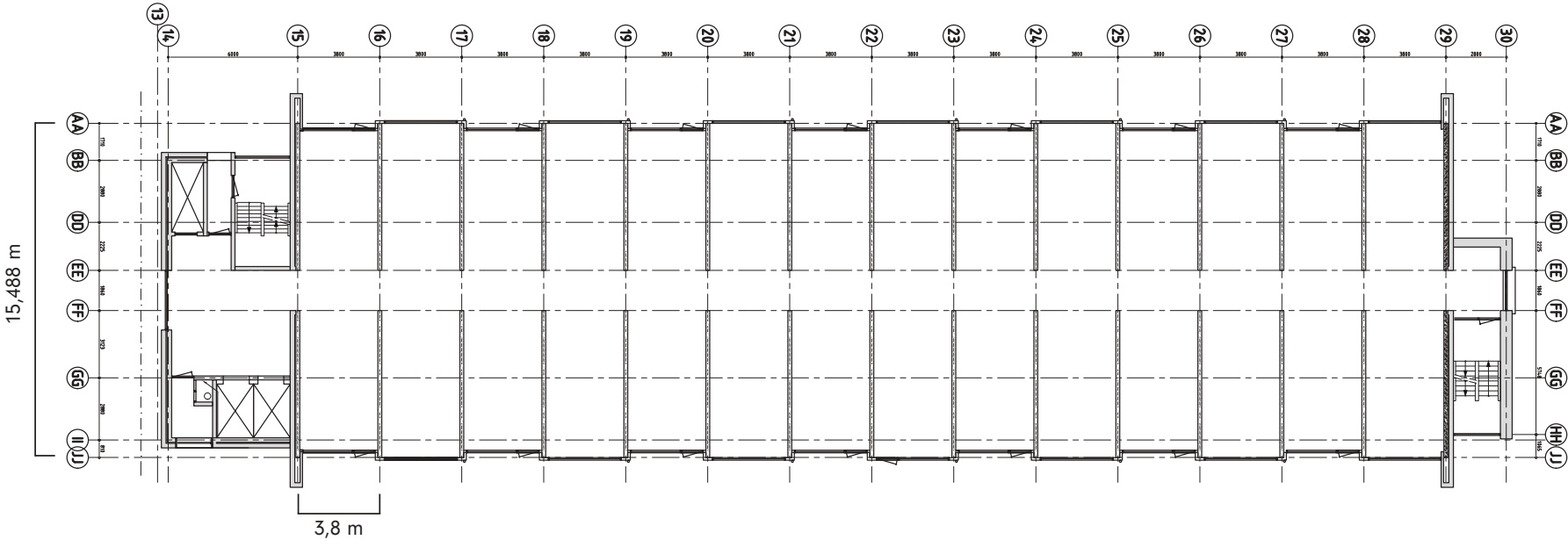


Existing structure: columns & load-bearing walls



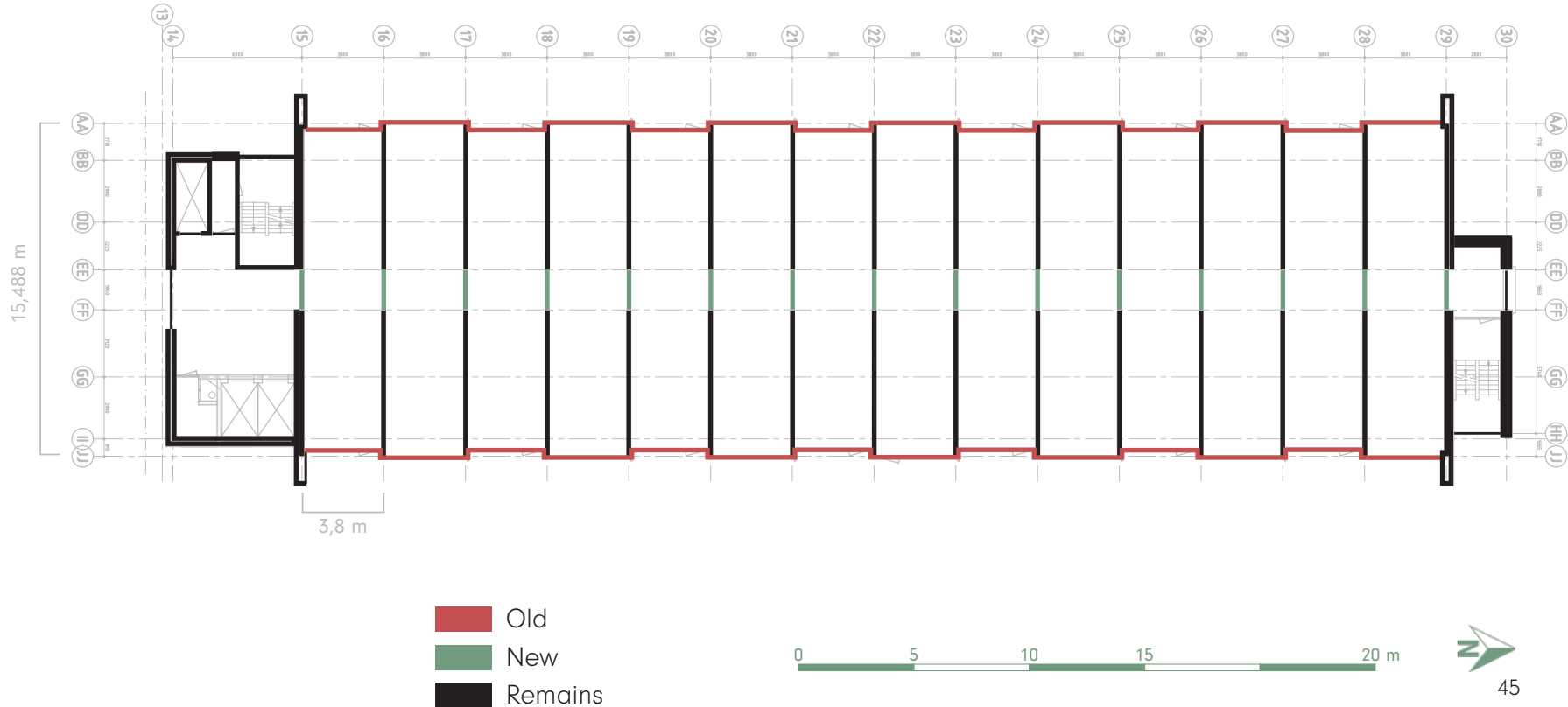
FLOORPLAN ON GRID

DESIGN

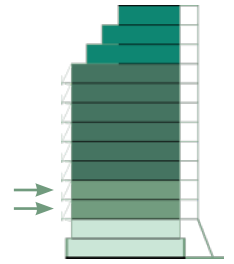


STRATEGY FOR HOUSING: STUDIOS & FAMILY APARTMENTS

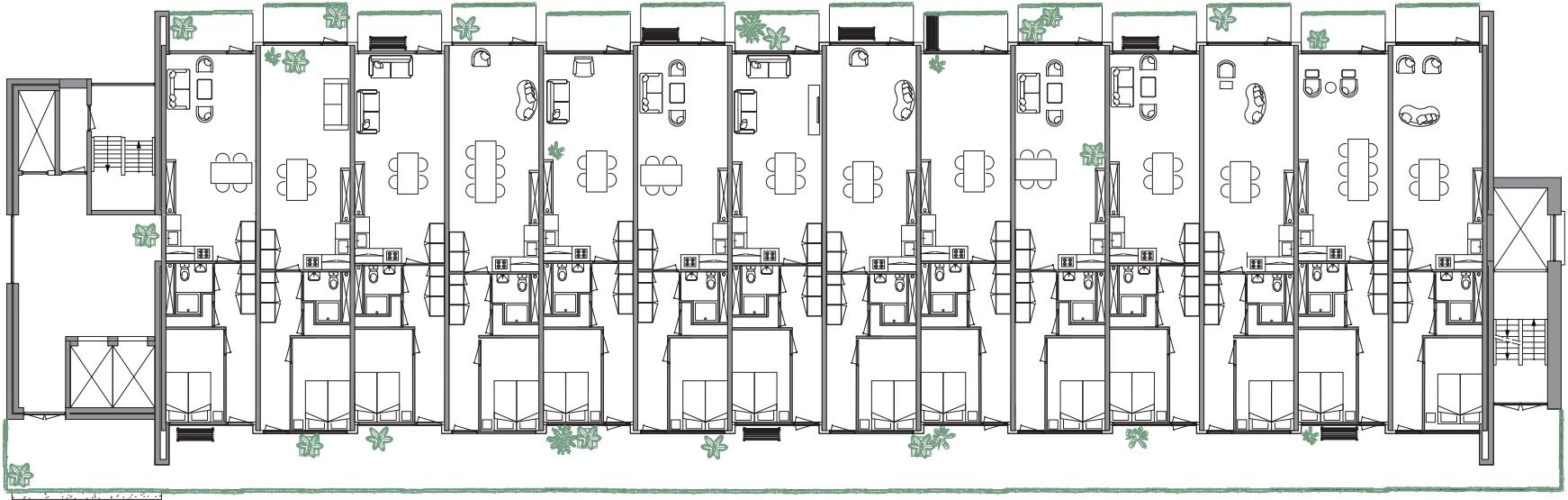
DESIGN



FLOORPLAN STUDIOS



DESIGN

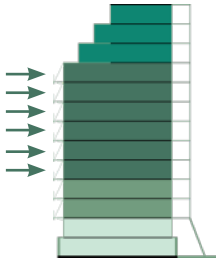


First & second floor

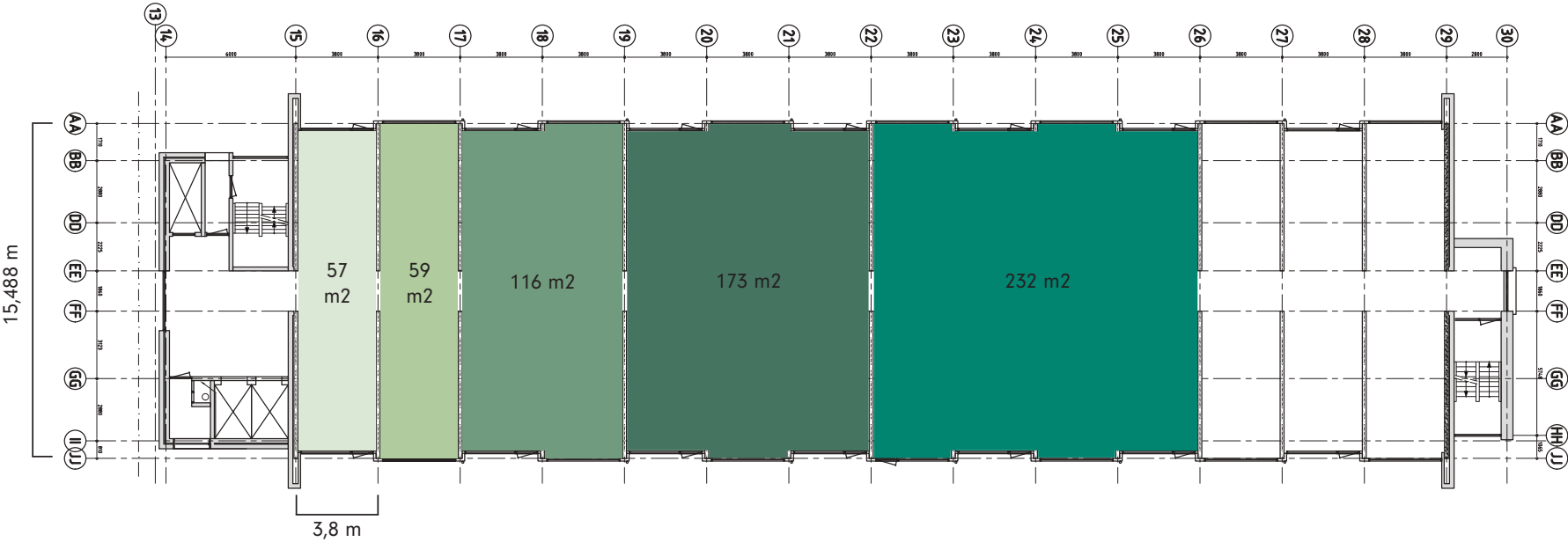
0 5 10 15 20 m



STRATEGY FOR HOUSING: FAMILY APARTMENTS

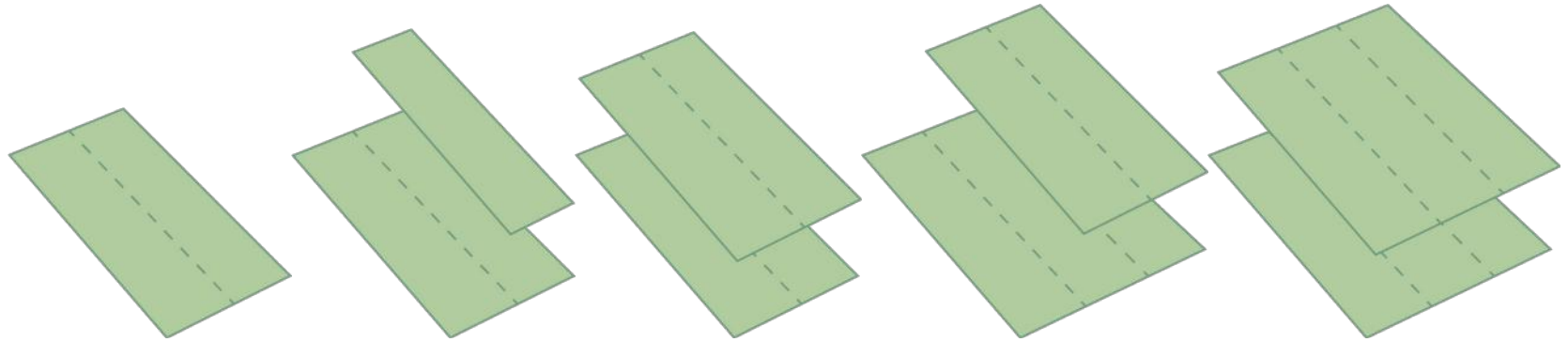


DESIGN



STRATEGY FOR HOUSING: SMALL, MEDIUM & LARGE DWELLINGS

DESIGN



A

2 strips
1 floor

1-3 pers.

B

3
2 floors

2-4 pers.

C

4
2 floors

3-5 pers.

D

5
2 floors

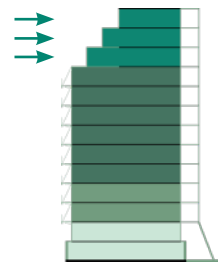
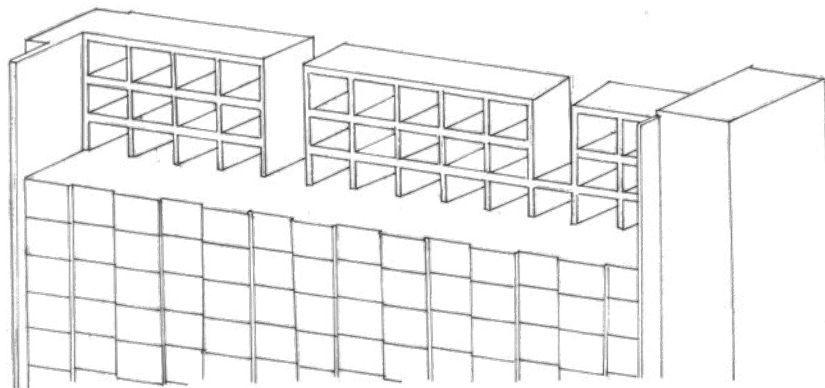
4-6 pers.

E

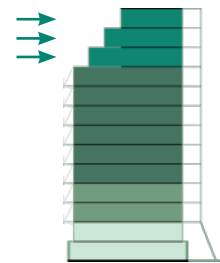
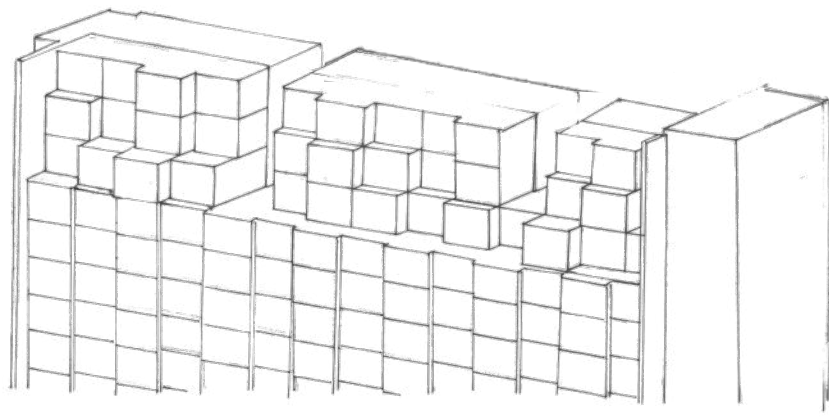
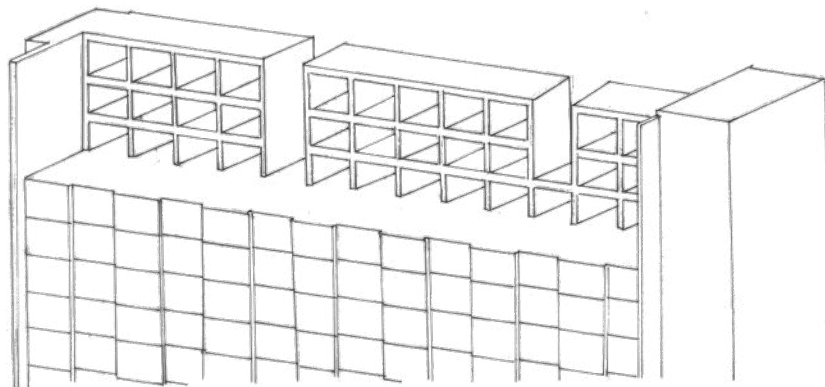
6
2 floors

5-8 pers.

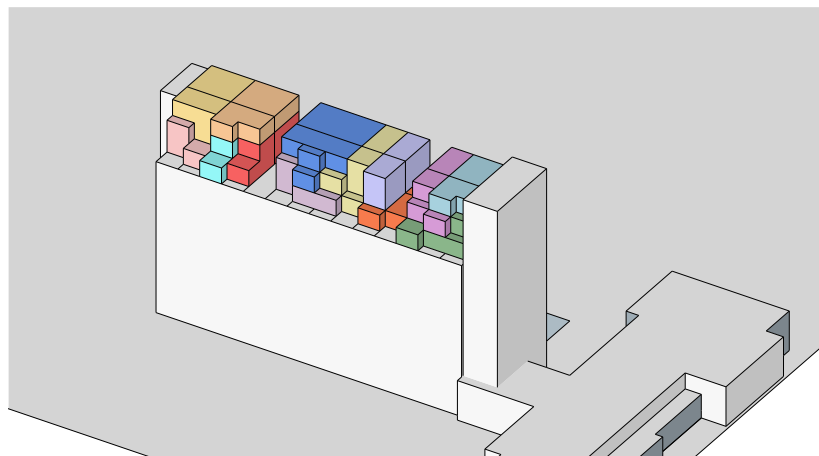
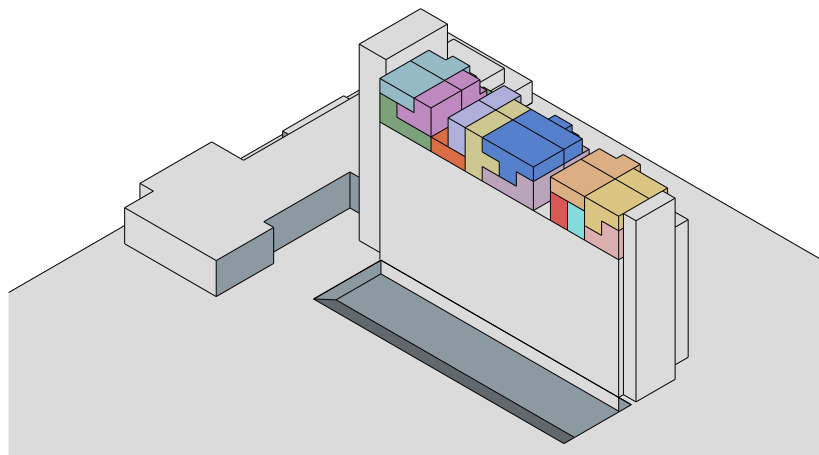
STRATEGY FOR HOUSING: ROOFTOP APARTMENTS



STRATEGY FOR HOUSING: ROOFTOP APARTMENTS

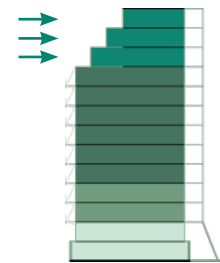


CONFIGURATION ROOFTOP APARTMENTS

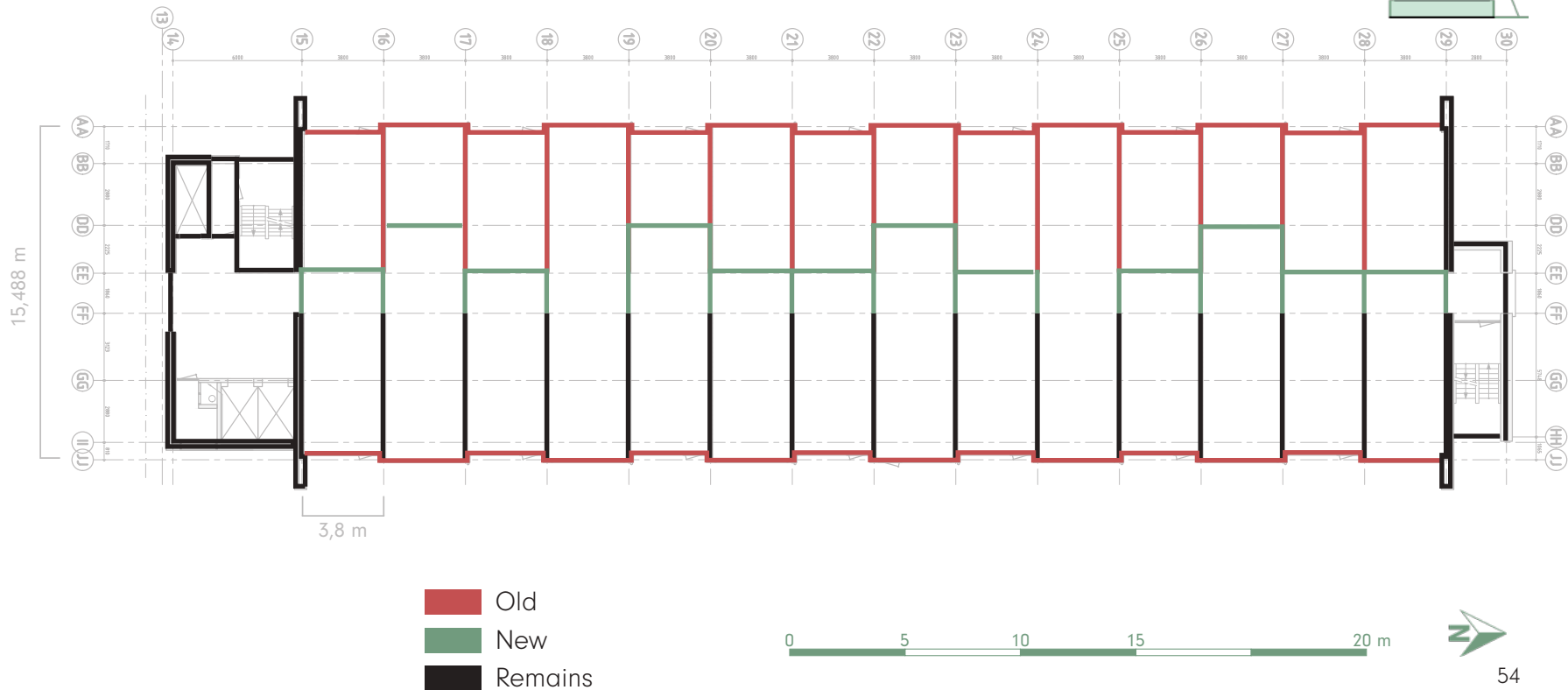


Pink:	3 bedrooms, 2 bathrooms 2 floors
Yellow:	3 bedrooms, 1 bathroom (+ wc) 2 floors
Blue:	2 bedrooms, 1 bathroom (+ wc) 2 floors
Red:	2 bedrooms, 1 bathroom (+ wc) 2 floors
Orange:	1 bedroom, 1 bathroom 1 floor
Lilac:	4 bedrooms, 2 bathrooms (+ wc) 2 floors
Purple-blue:	5 bedrooms, 2 bathrooms (+ wc) 2 floors
Yellow:	5 bedrooms, 3 bathrooms (+ wc) 3 floors (incl. masterbedroom)
Orange:	2 bedrooms, 2 bathrooms 1 floor
Lilac:	2 bedrooms, 1 bathroom (+ wc) 2 floors
Green:	5 bedrooms, 4 bathrooms 2 floors
Purple-pink:	3 bedrooms, 2 bathrooms 2 floors
Blue:	1 bedroom, 1 bathroom 1 floor

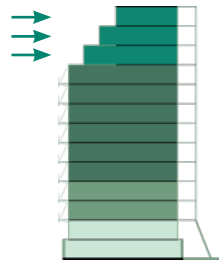
STRATEGY FOR HOUSING: ROOFTOP APARTMENTS



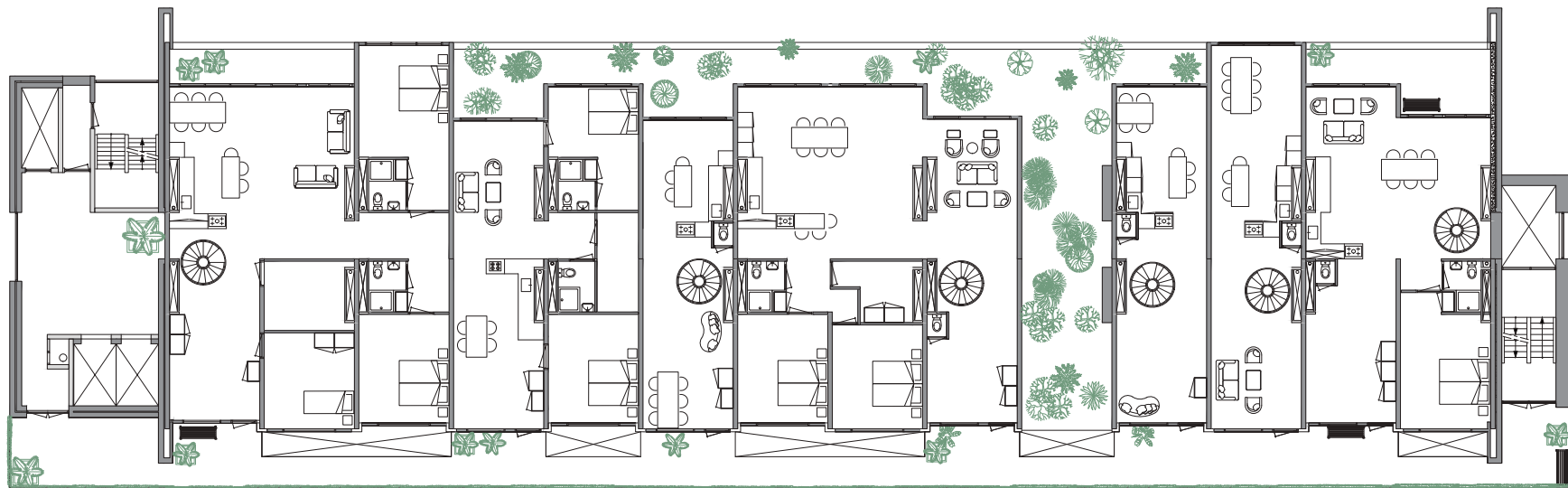
DESIGN



FLOORPLAN ROOFTOP APARTMENTS



DESIGN

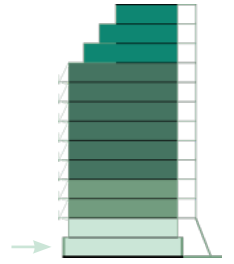


9th floor

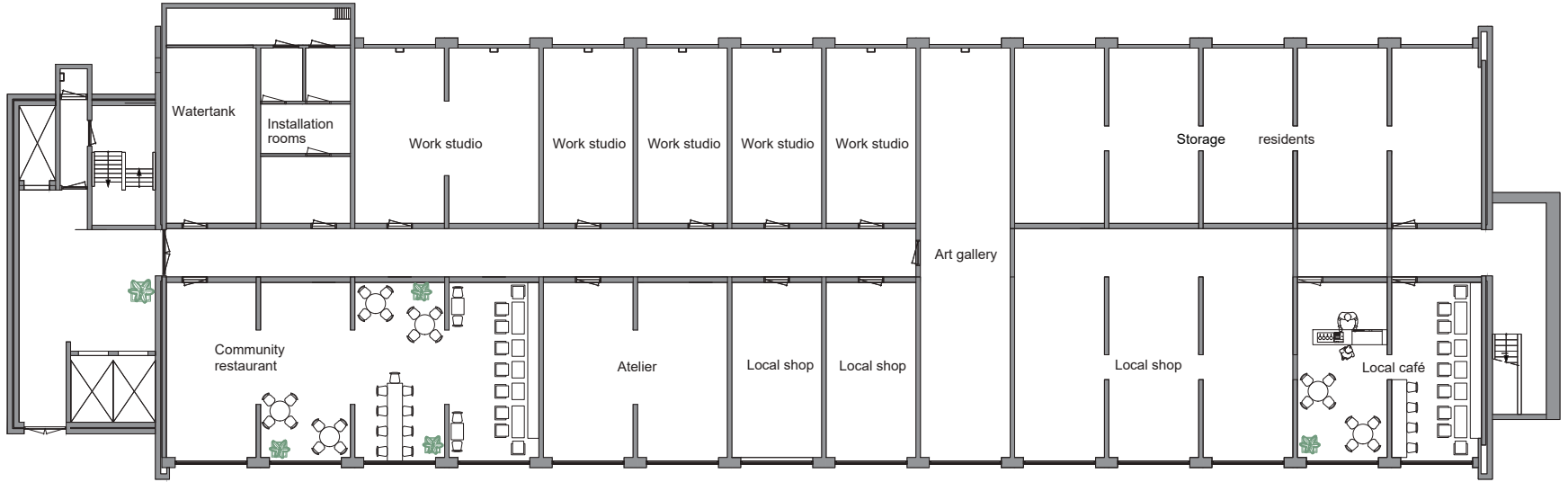
0 5 10 15 20 m



FLOORPLAN BASEMENT: PUBLIC SPACES



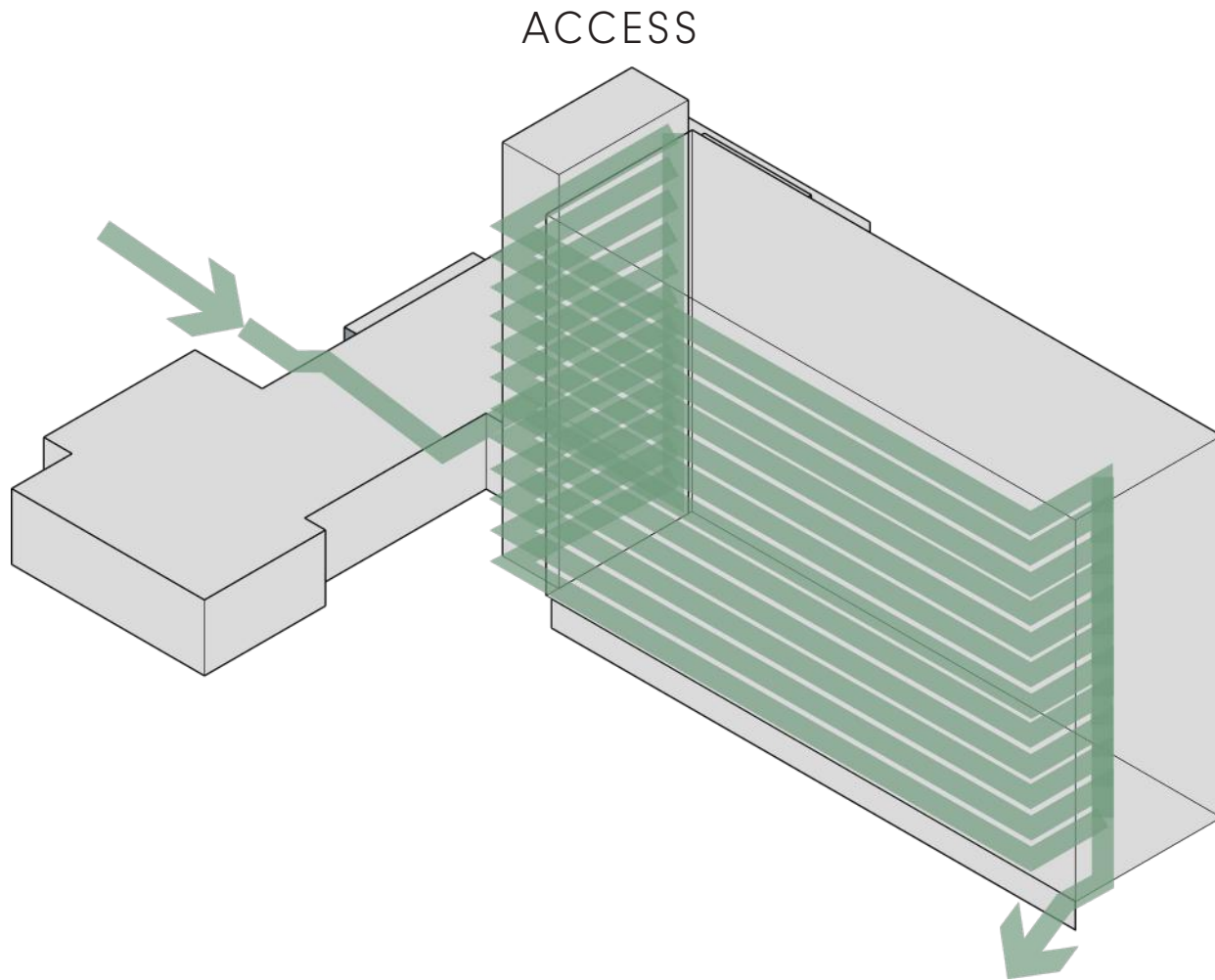
DESIGN



Basement

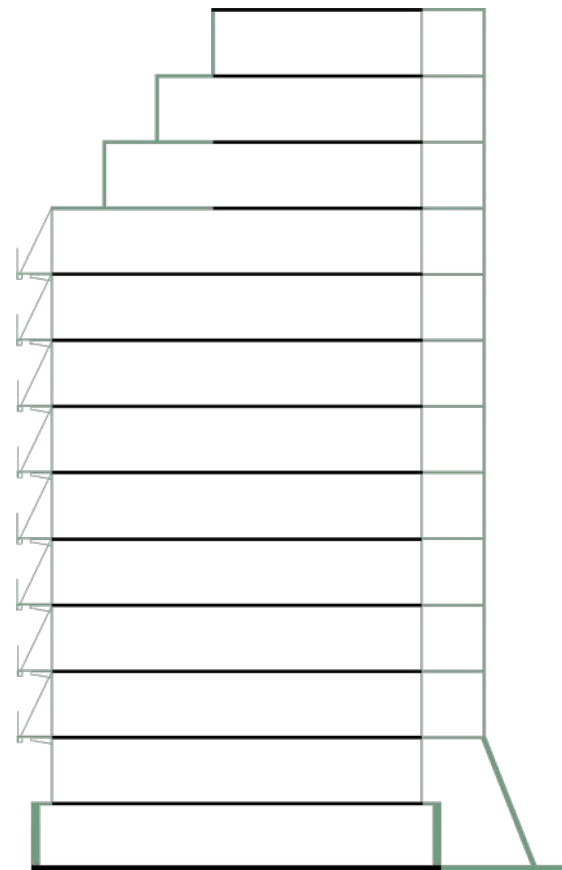
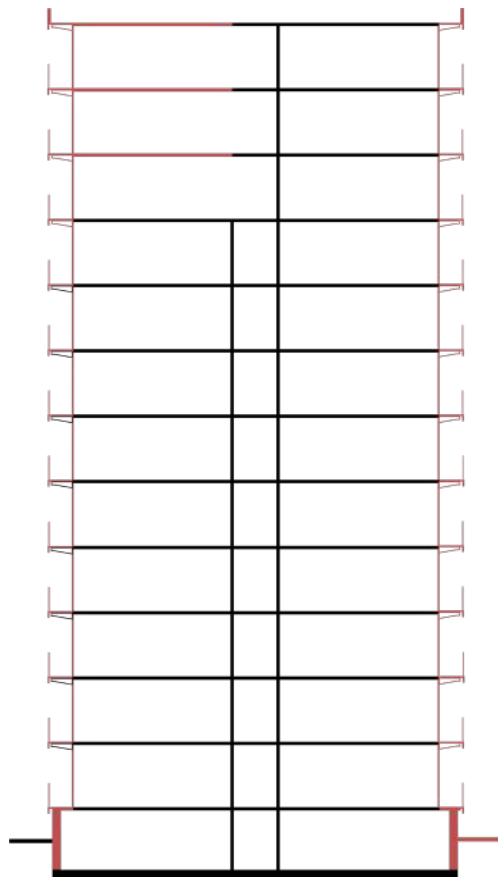
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TRANSFORMATION

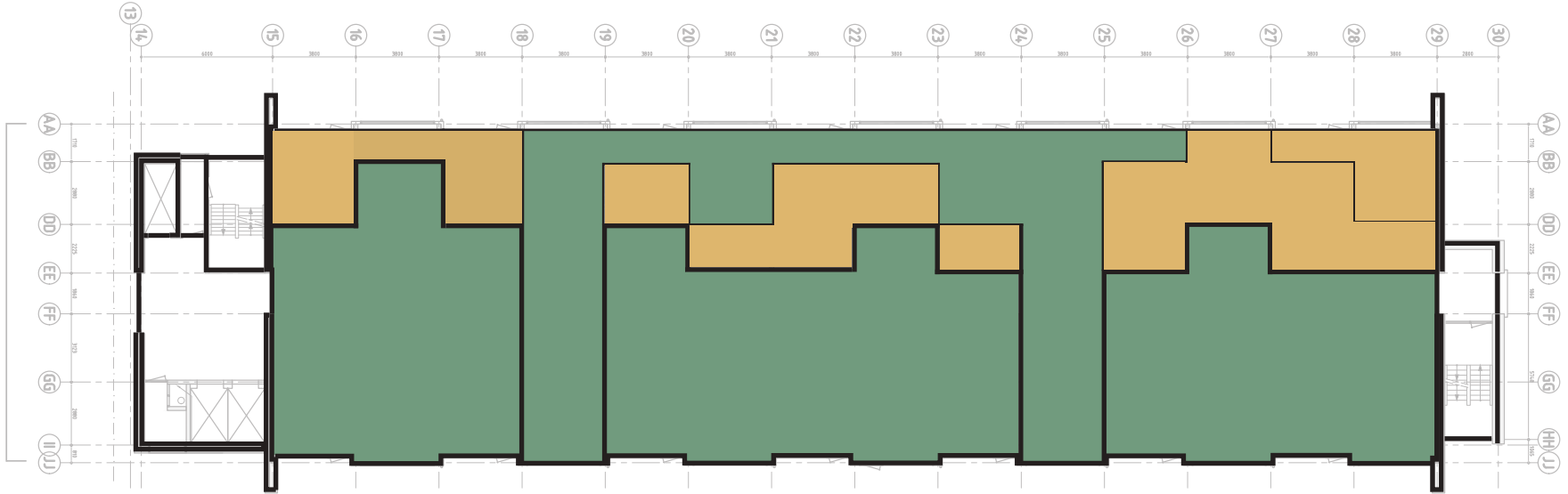
DESIGN



- Old
- New
- Remains

ZONING

DESIGN



Topview

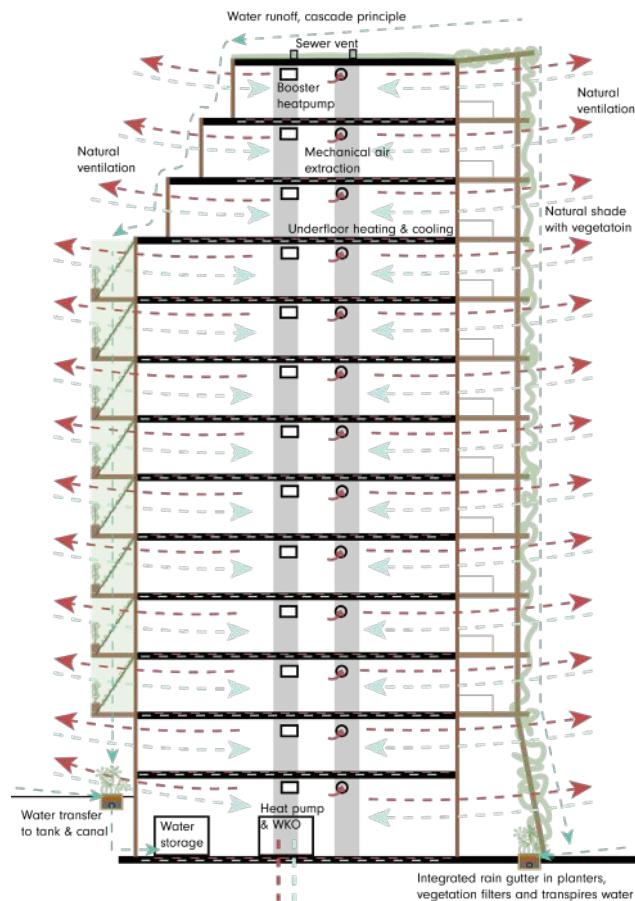
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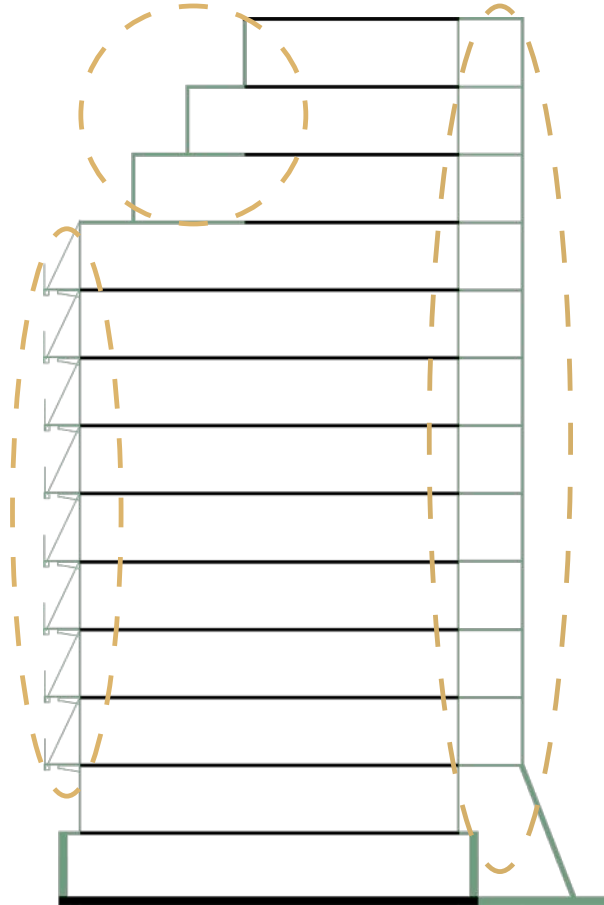
Humans
Nature

 Humans
 Nature

CLIMATE DESIGN

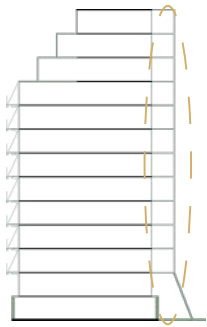
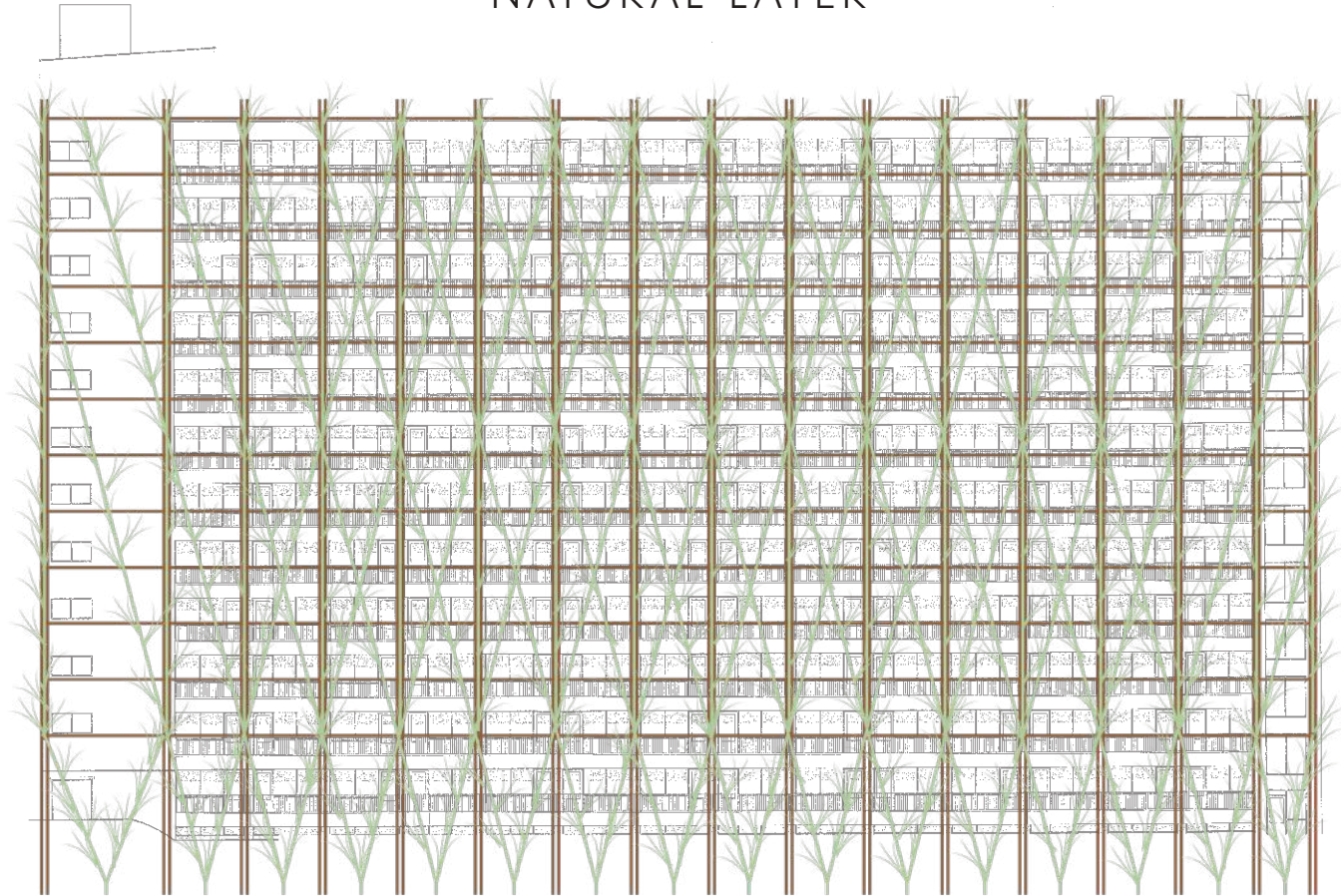


ARCHITECTURAL COMPONENTS

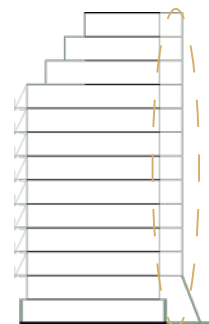
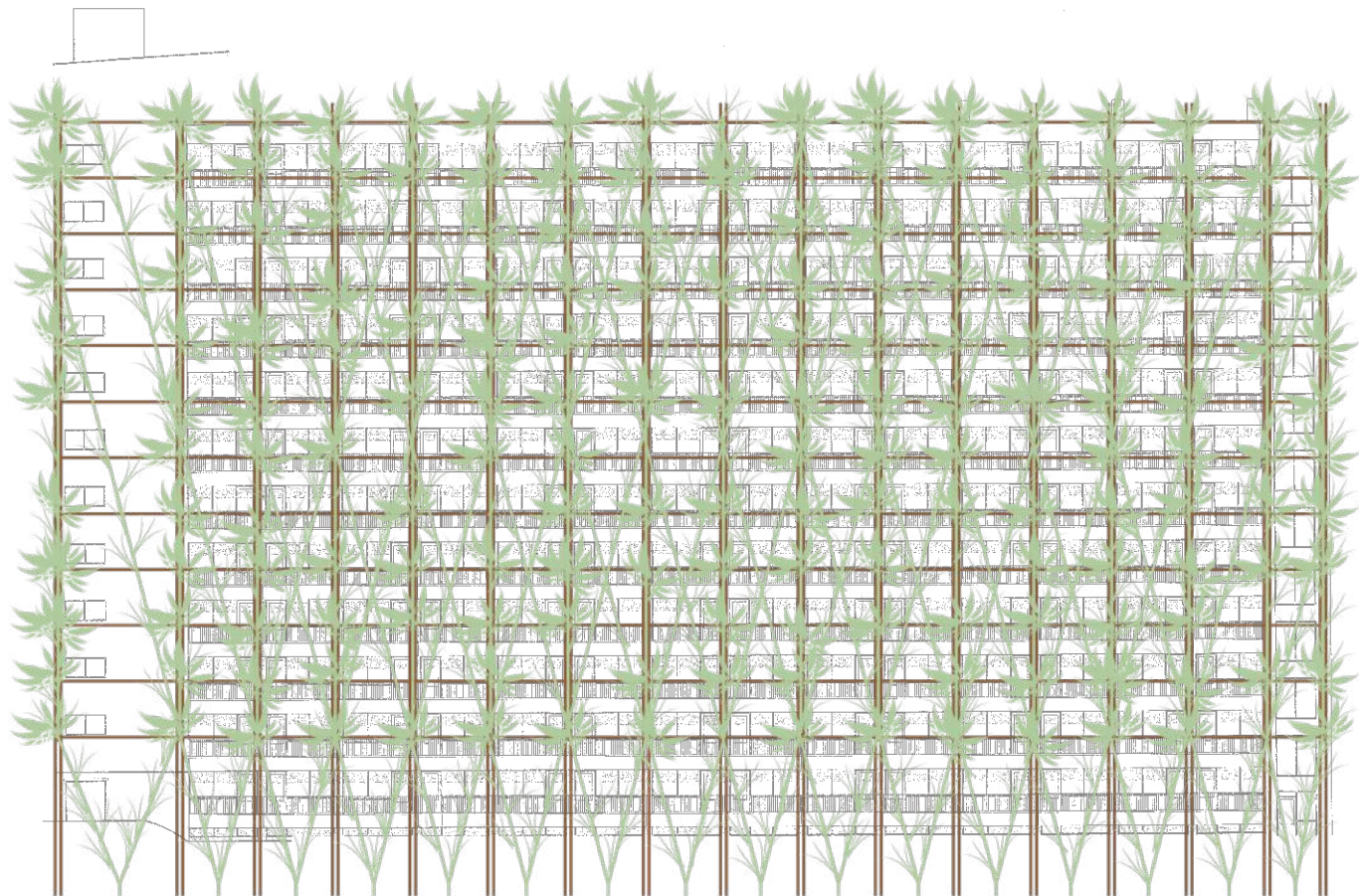


EAST FAÇADE: GALLERY CONSTRUCTION NATURAL LAYER

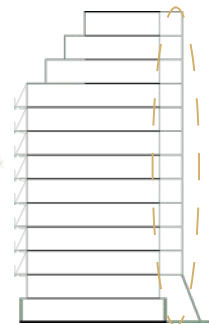
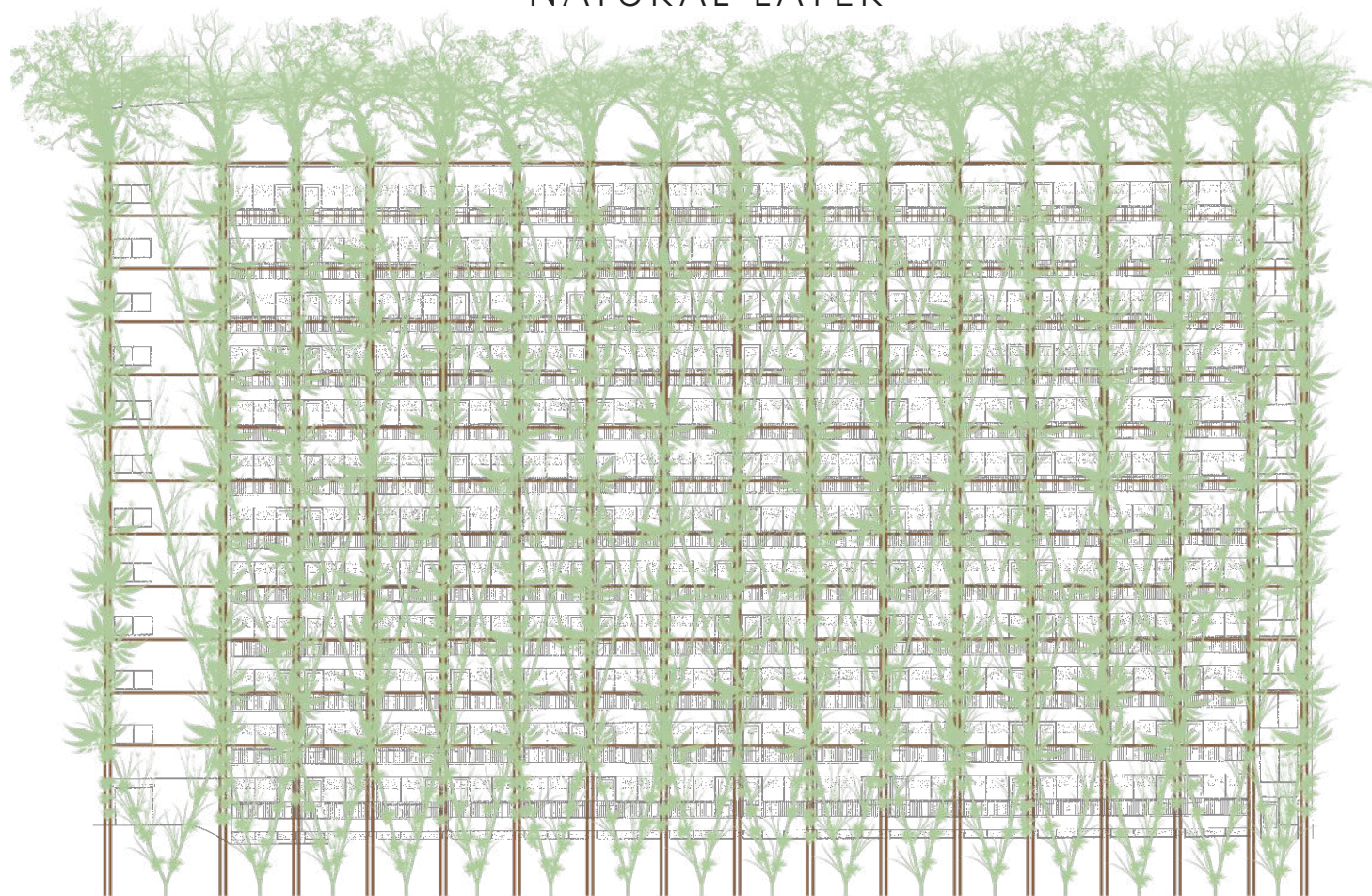
DESIGN



NATURAL LAYER

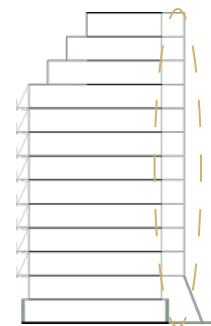


NATURAL LAYER



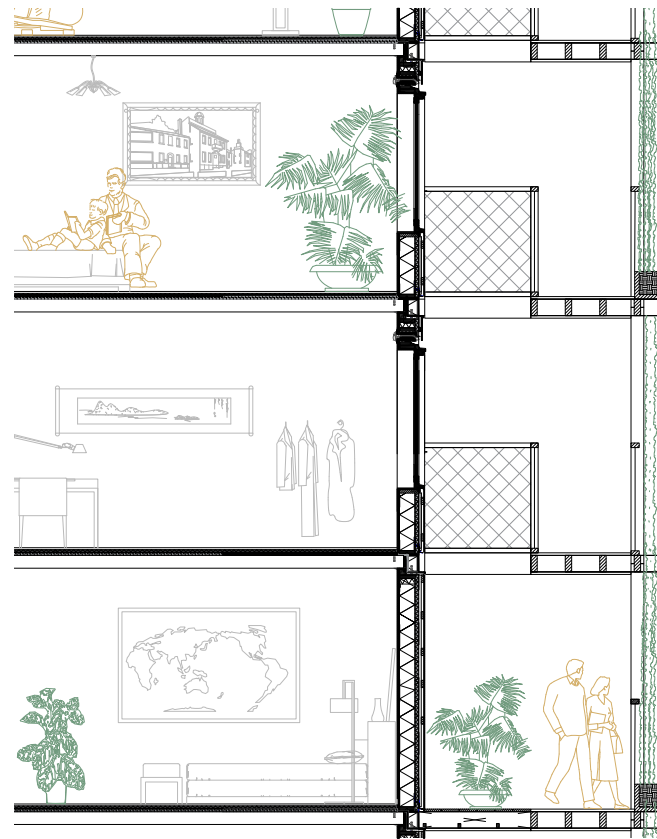
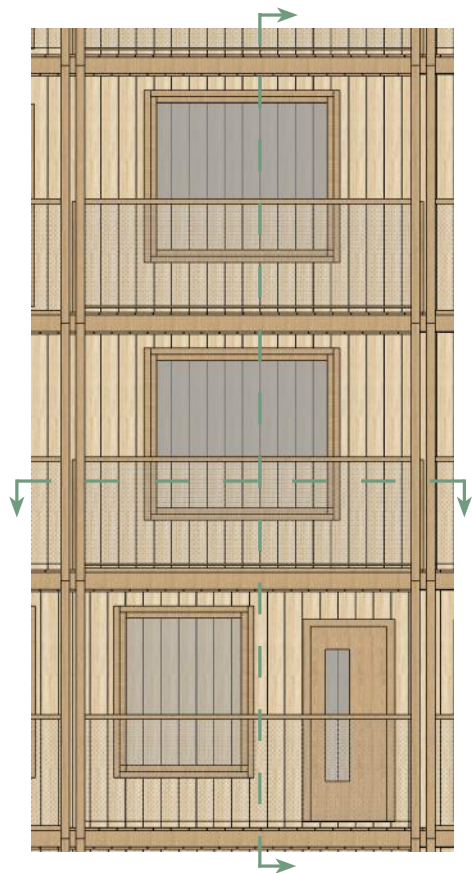
EAST FAÇADE ELEVATION

DESIGN



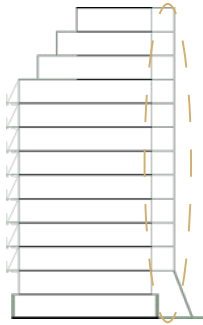
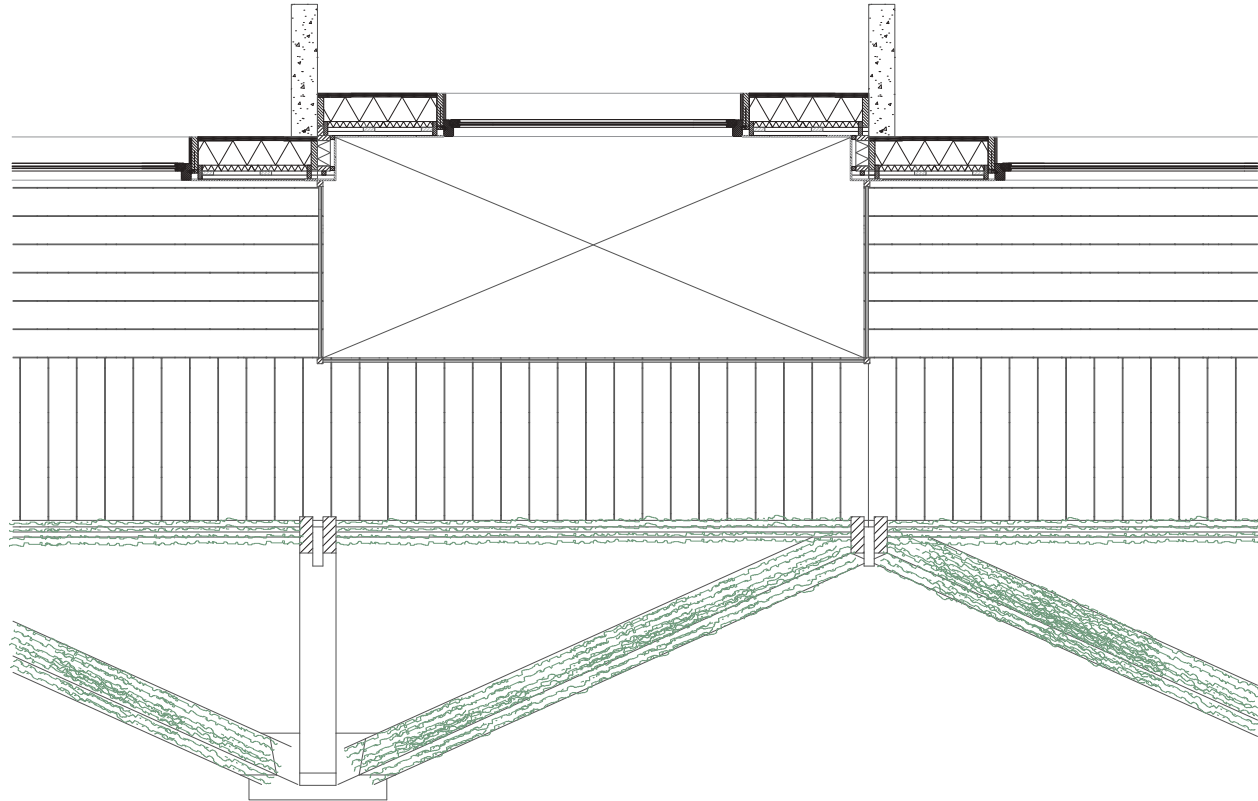
EAST FAÇADE FRAGMENT

DESIGN



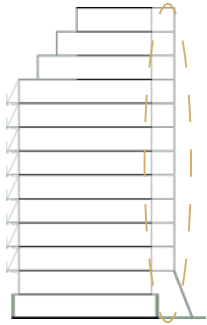
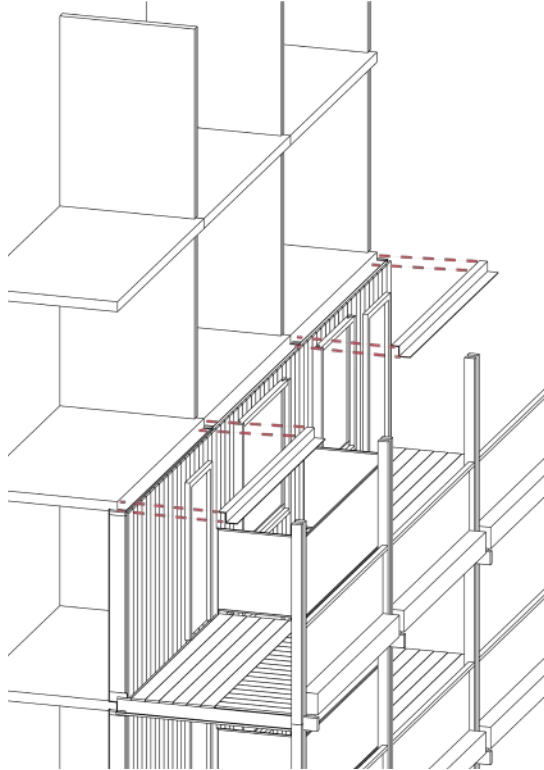
EAST FAÇADE HORIZONTAL SECTION

DESIGN



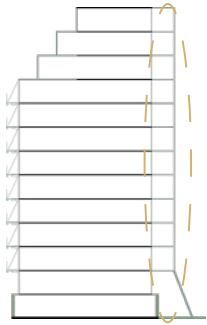
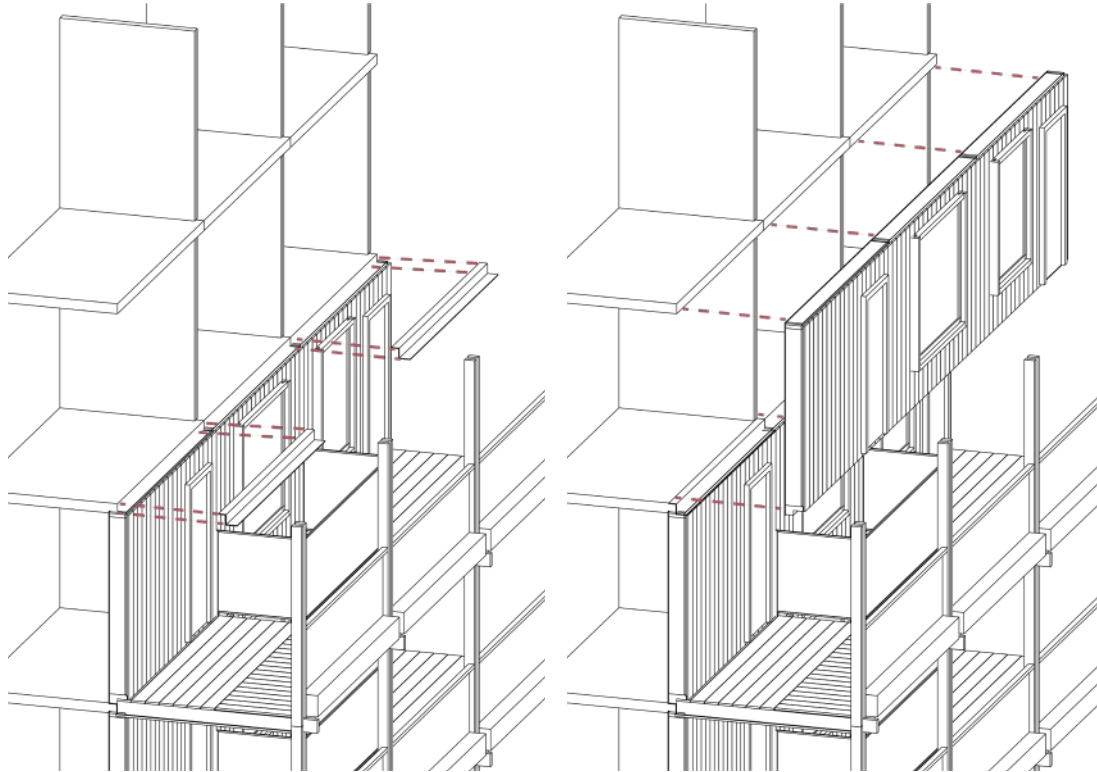
STEP-BY-STEP GALLERY CONSTRUCTION

DESIGN



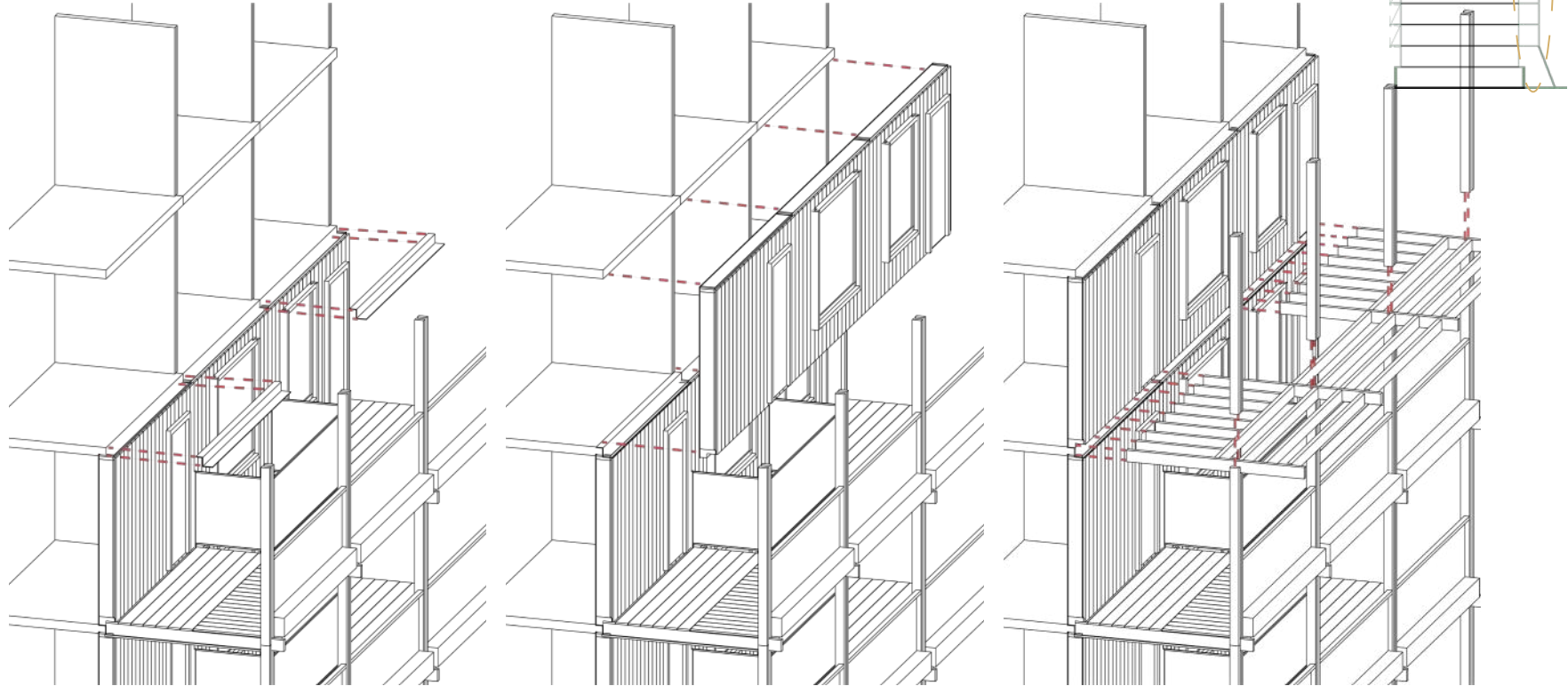
STEP-BY-STEP GALLERY CONSTRUCTION

DESIGN



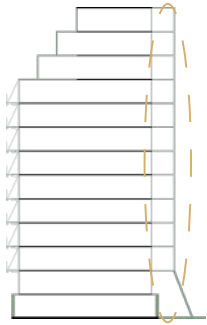
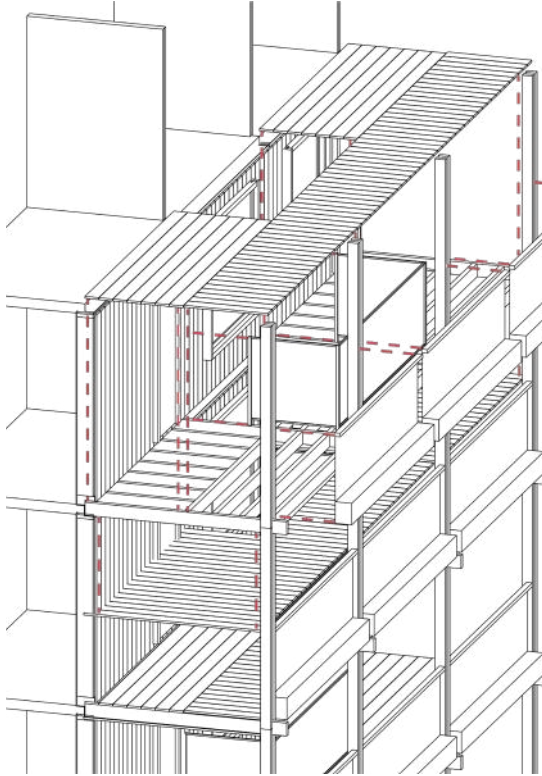
STEP-BY-STEP GALLERY CONSTRUCTION

DESIGN



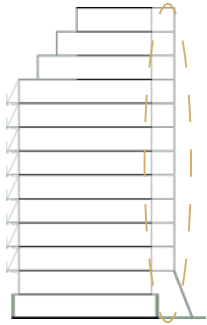
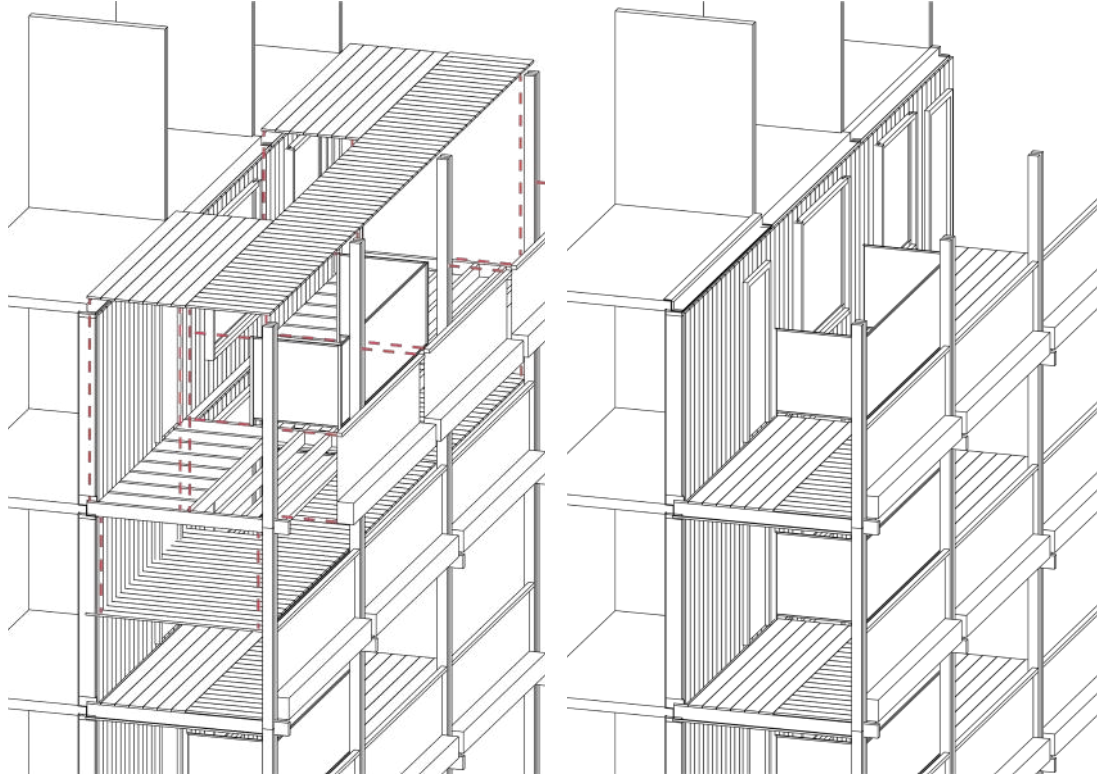
STEP-BY-STEP GALLERY CONSTRUCTION

DESIGN



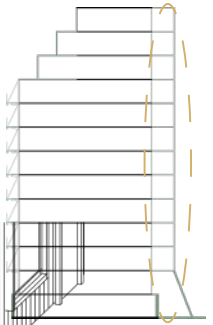
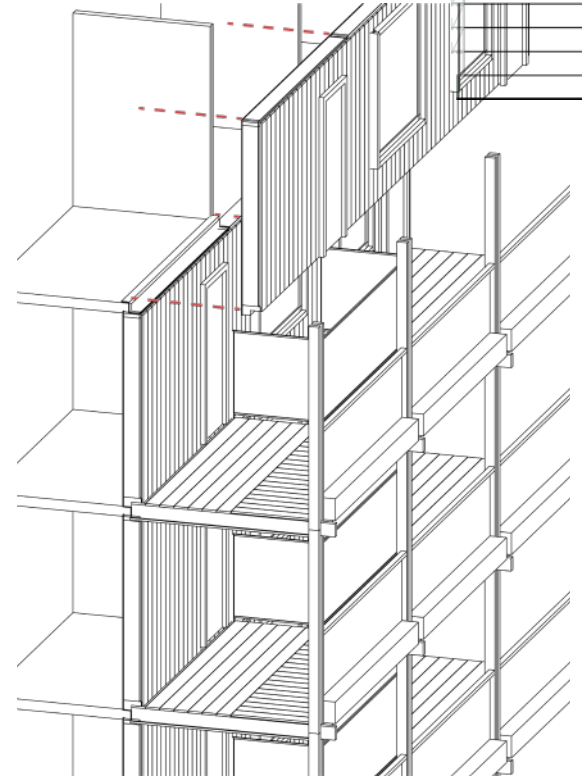
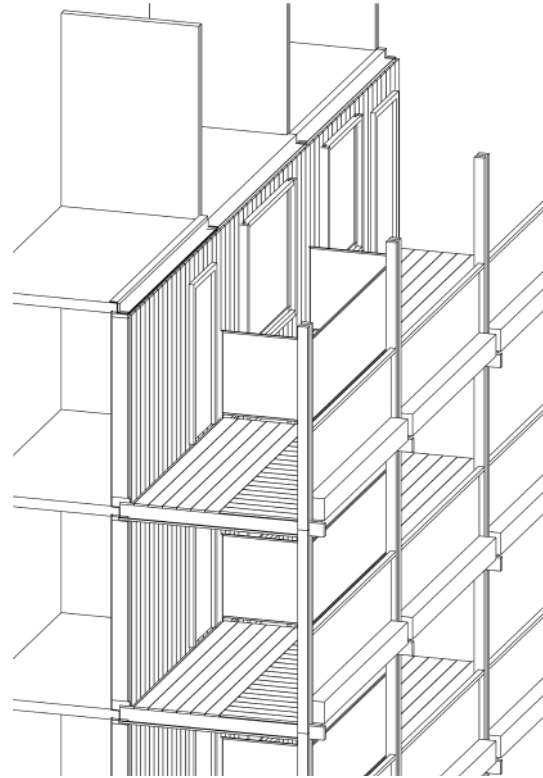
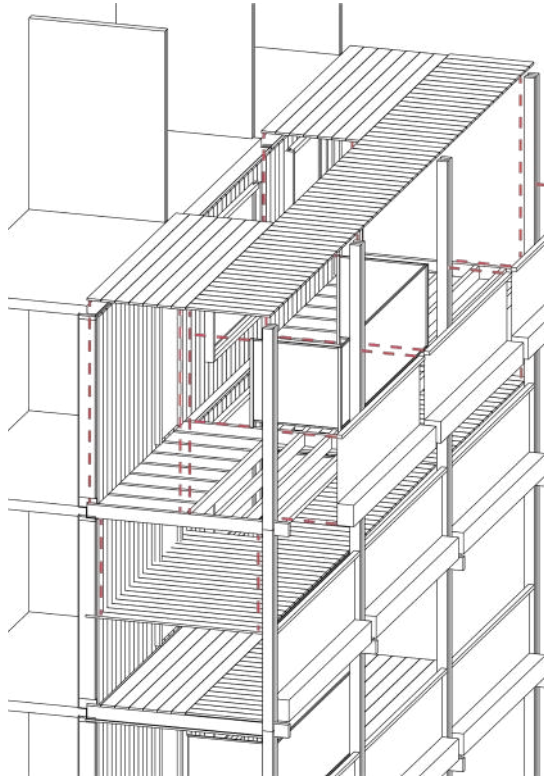
STEP-BY-STEP GALLERY CONSTRUCTION

DESIGN

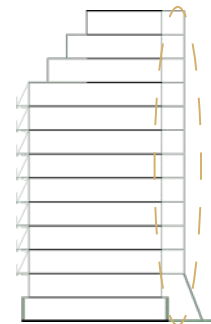


STEP-BY-STEP GALLERY CONSTRUCTION

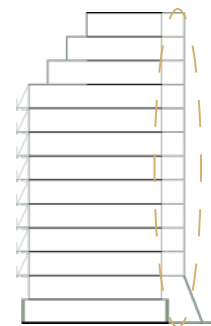
DESIGN



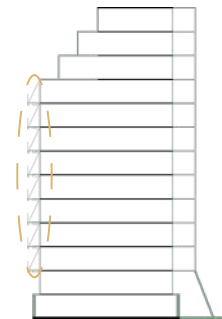
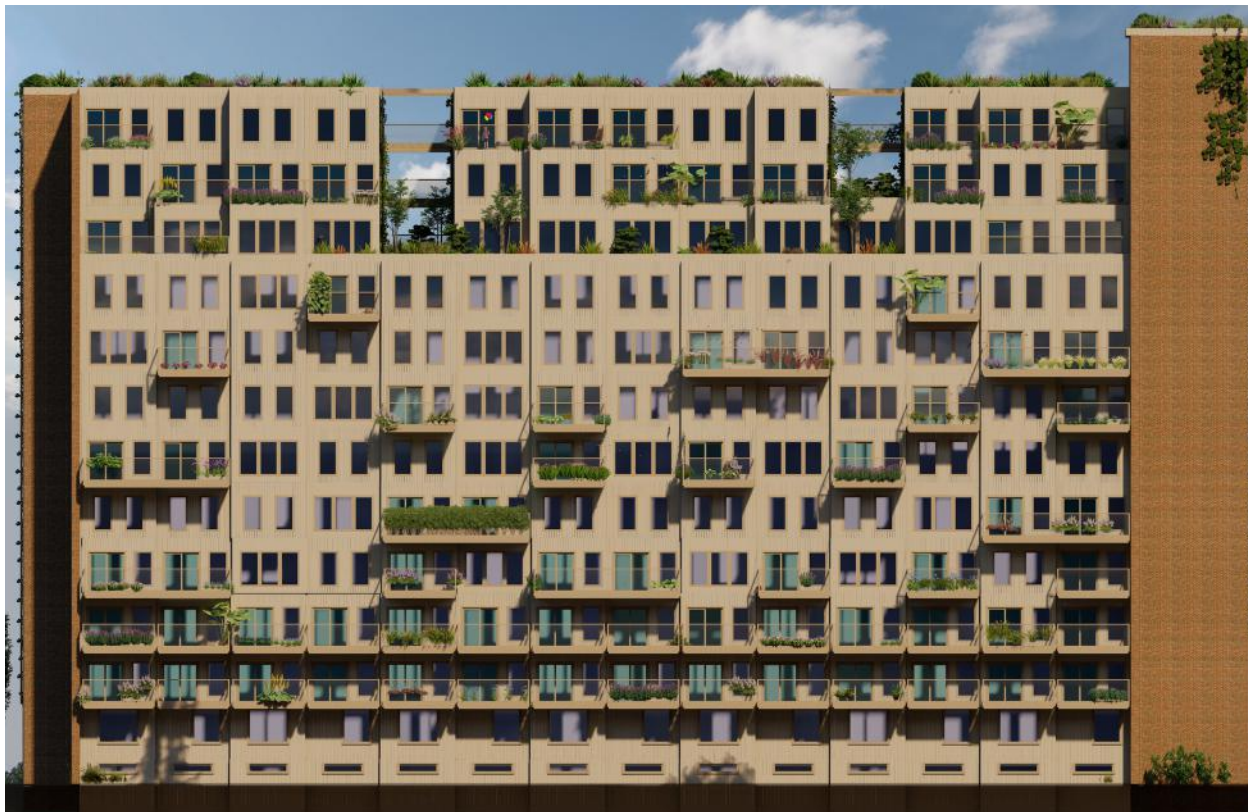
EAST FAÇADE IMPRESSIONS



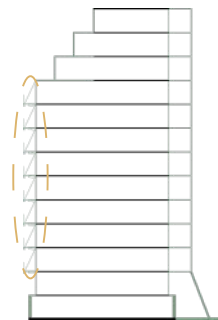
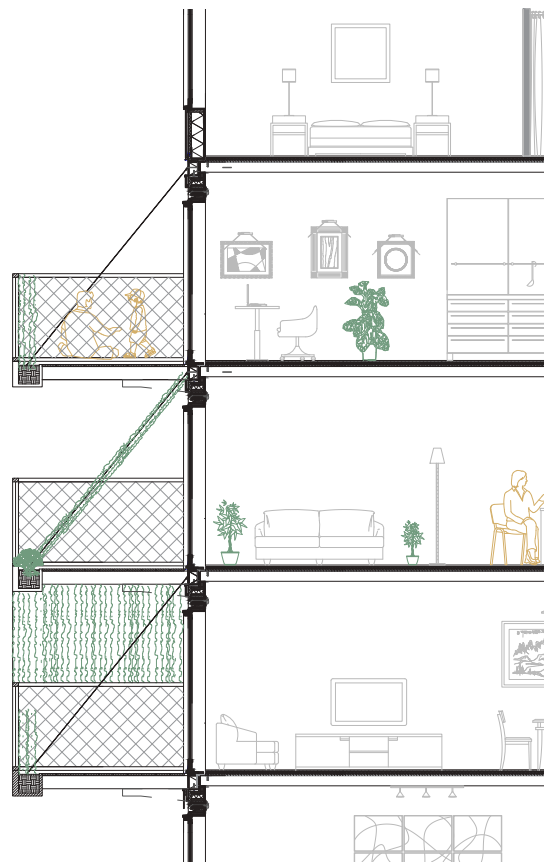
EAST FAÇADE IMPRESSIONS



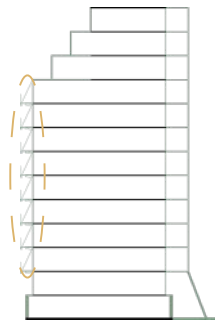
WEST FAÇADE ELEVATION



WEST FAÇADE FRAGMENT



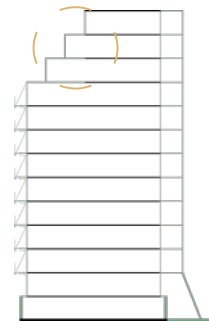
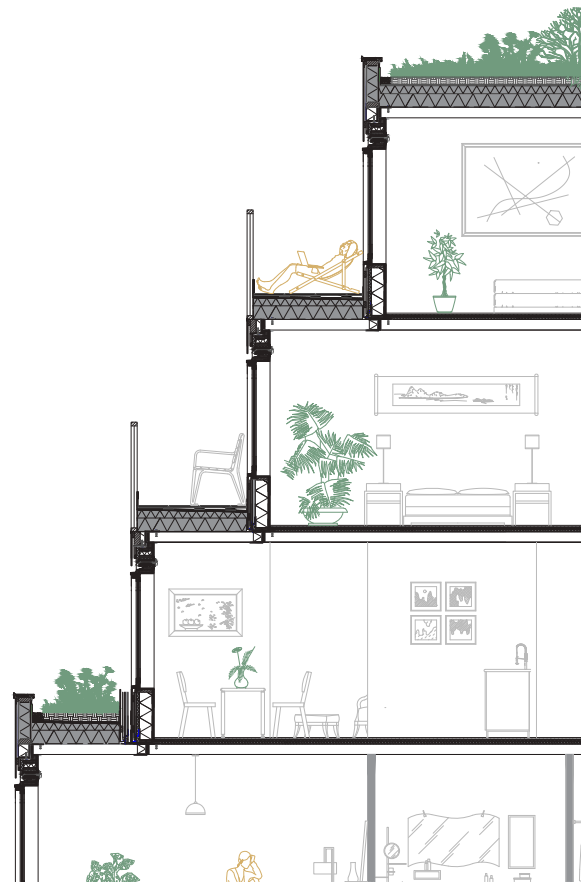
WEST FAÇADE IMPRESSIONS



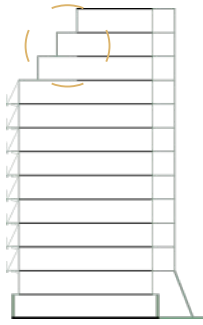
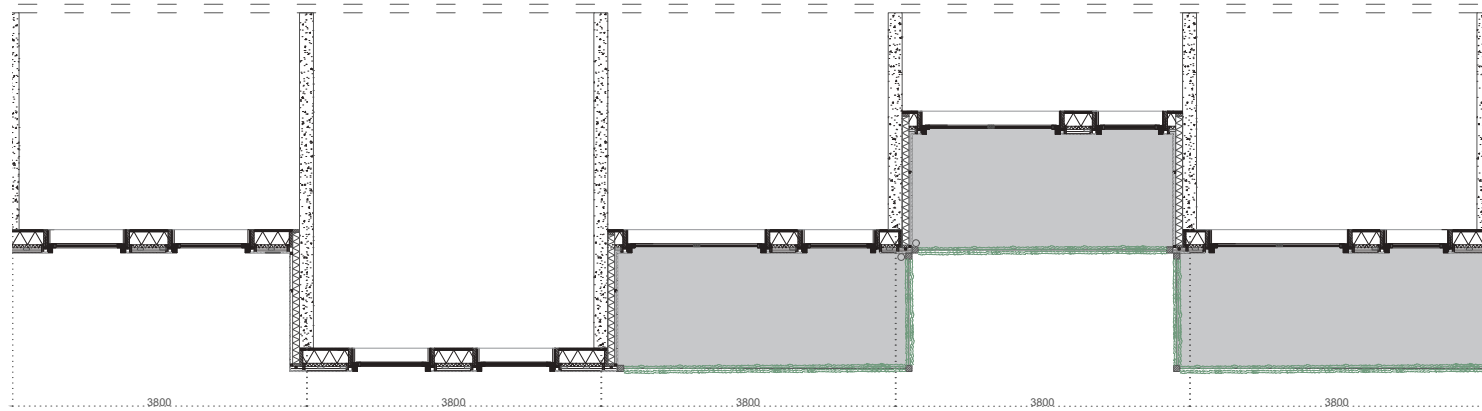
BALCONIES IMPRESSION



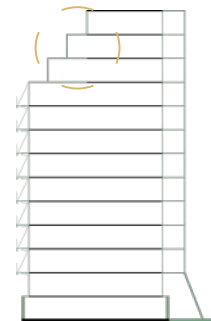
WEST FAÇADE: ROOFTOP FRAGMENT



HORIZONTAL SECTION ROOFTOP



ROOFTOP IMPRESSIONS



WEST FAÇADE



COMMUNITY BUILDING

DESIGN

Participatory kitchen

Meeting places

Dining room

Vegetable garden



Educational activities

Library

Theater

Art expositions

COMMUNITY BUILDING

DESIGN



ECOLOGY



SWIFT



DRAGONFLY



SMALL NEWT



SAND BEE



HEDGEHOG



SHREW MOUSE



SEROTINE BAT

FAUNA
BOERHAAVEWIJK

COMMON TOAD



HOUSE SPARROW



MASON BEE



MARTEN



ERMINE



NATTERJACK TOAD

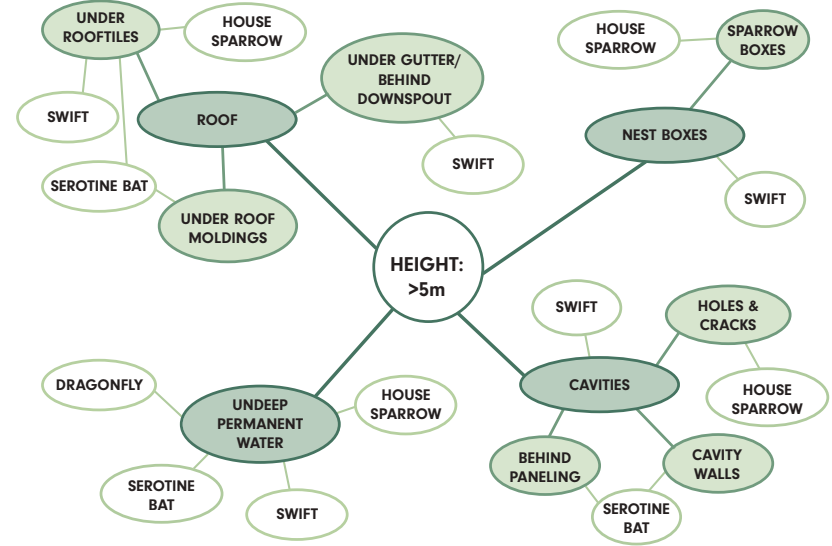
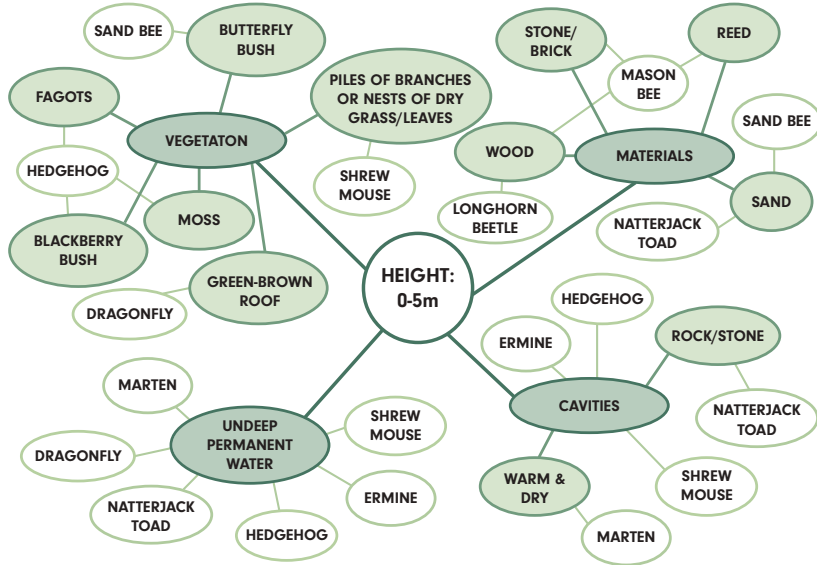


LONGHORN BEETLE

HABITAT HEIGHT FAUNA



PREFERENCES LOCAL FAUNA



ECOLOGICAL DESIGN INTERVENTIONS FAÇADES



Cavities, cracks, greenery



SWIFT



SEROTINE BAT



HOUSE SPARROW



MARTEN



ERMINE



NATTERJACK TOAD



HEDGEHOG



SHREW MOUSE

ECOLOGICAL DESIGN INTERVENTIONS

ROOF



Different types of vegetation
Green-brown roof, sand, stones & bricks



SWIFT



DRAGONFLY



MASON BEE



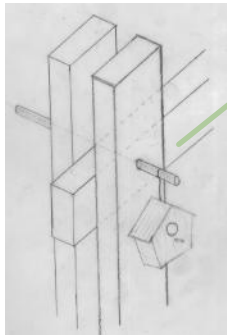
SAND BEE



SHREW MOUSE

ECOLOGICAL DESIGN INTERVENTIONS

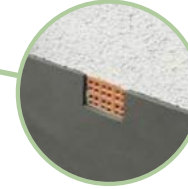
Nests on construction



SWIFT



HOUSE SPARROW



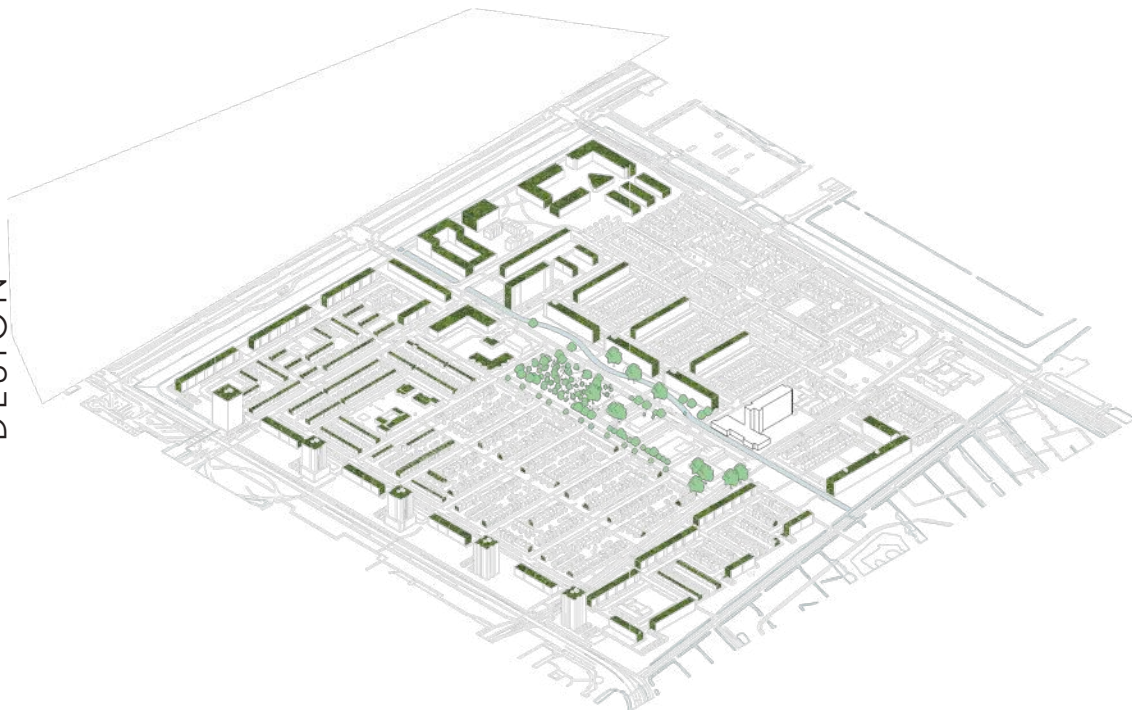
Nests in façade



SEROTINE BAT

IMPLEMENTATION ON SCALE OF NEIGHBOURHOOD

DESIGN



REFLECTION



REWILDING STRATEGIES



REWILDING STRATEGIES

Create opportunities for biodiversity
& make cities greener and more resilient



REWILDING STRATEGIES

Create opportunities for biodiversity
& make cities greener and more resilient

- Site-specific & depend on characteristics



REWILDING STRATEGIES

Create opportunities for biodiversity
& make cities greener and more resilient

- Site-specific & depend on characteristics
- Start at smaller scale



REWILDING STRATEGIES

Create opportunities for biodiversity
& make cities greener and more resilient

- Site-specific & depend on characteristics
- Start at smaller scale
- Rewild together



REWILDING STRATEGIES

Create opportunities for biodiversity
& make cities greener and more resilient

- Site-specific & depend on characteristics
- Start at smaller scale
- Rewild together
- Rewild architecture





LET'S REWILD OUR CITIES!