



THE GREEN TRANSITION
THE TRANSFORMATION AND DENSIFICATION OF POST WAR STAIRCASE ENTRANCE BUILDINGS

INTRODUCTION AND PROBLEMS

PROBLEM STATEMENT



390.000 current SHORTAGE
1.300.000 NEEDED for 2038



847,000 apartments.
sustainability standards



pavement since 2000
increasing by more than 15%

THE GOAL

“To develop a strategy for densifying and improving post-war stair-case-entrance apartment buildings, addressing the housing shortage while preserving and improving the quality of existing green spaces.”



EXPAND & IMPROVE THE EXISTING.

THE POST-WAR HOUSING STOCK: STAIRCASE ENTRANCE APARTMENTS



URBAN

- Anonymous facades
- Often is the green space of low quality
- Social security needs to be improved

BUILDINGS

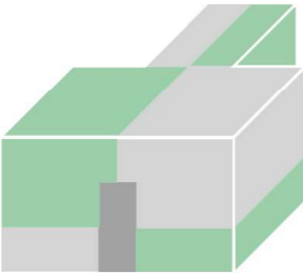
- Sustainability should be improved
- Uniform architecture
- Low dwelling variety
- No variety in functions
- Small balconies

THE TARGET GROUP

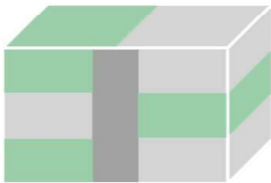
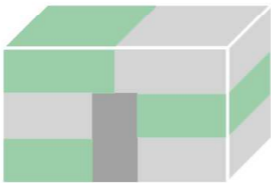
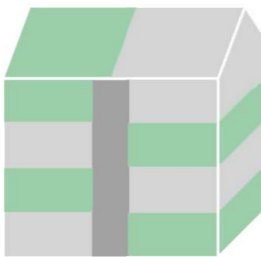
• 1870 - 1916 early fin de siecle



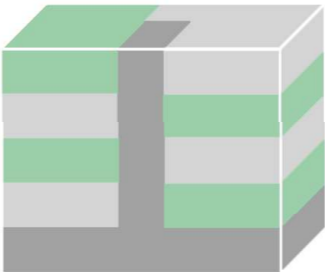
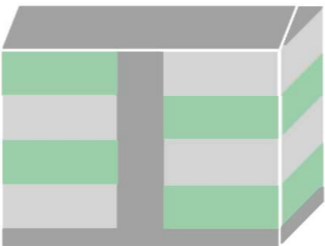
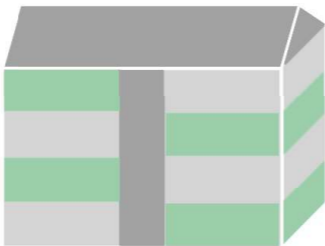
• 1890 - 1916 fin de siecle



• 1916 - 1940 inter war



• 1946 - 1965 post war

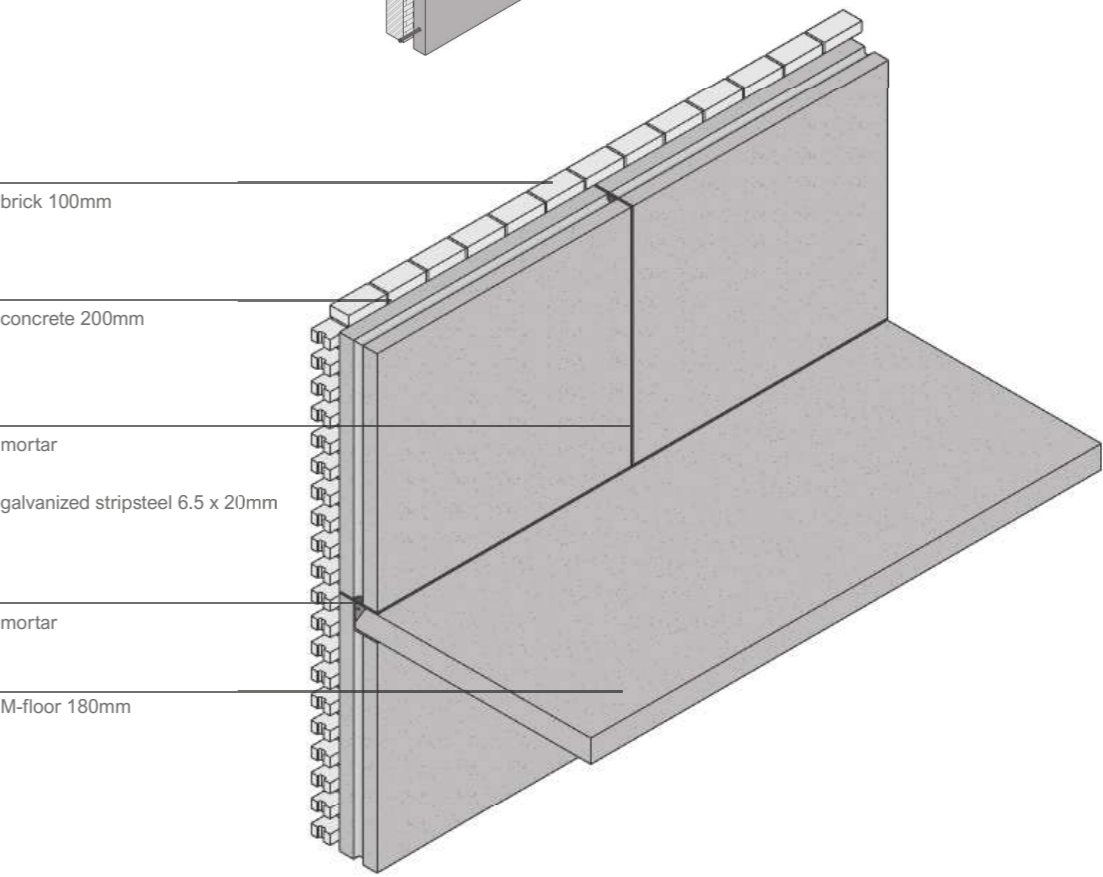
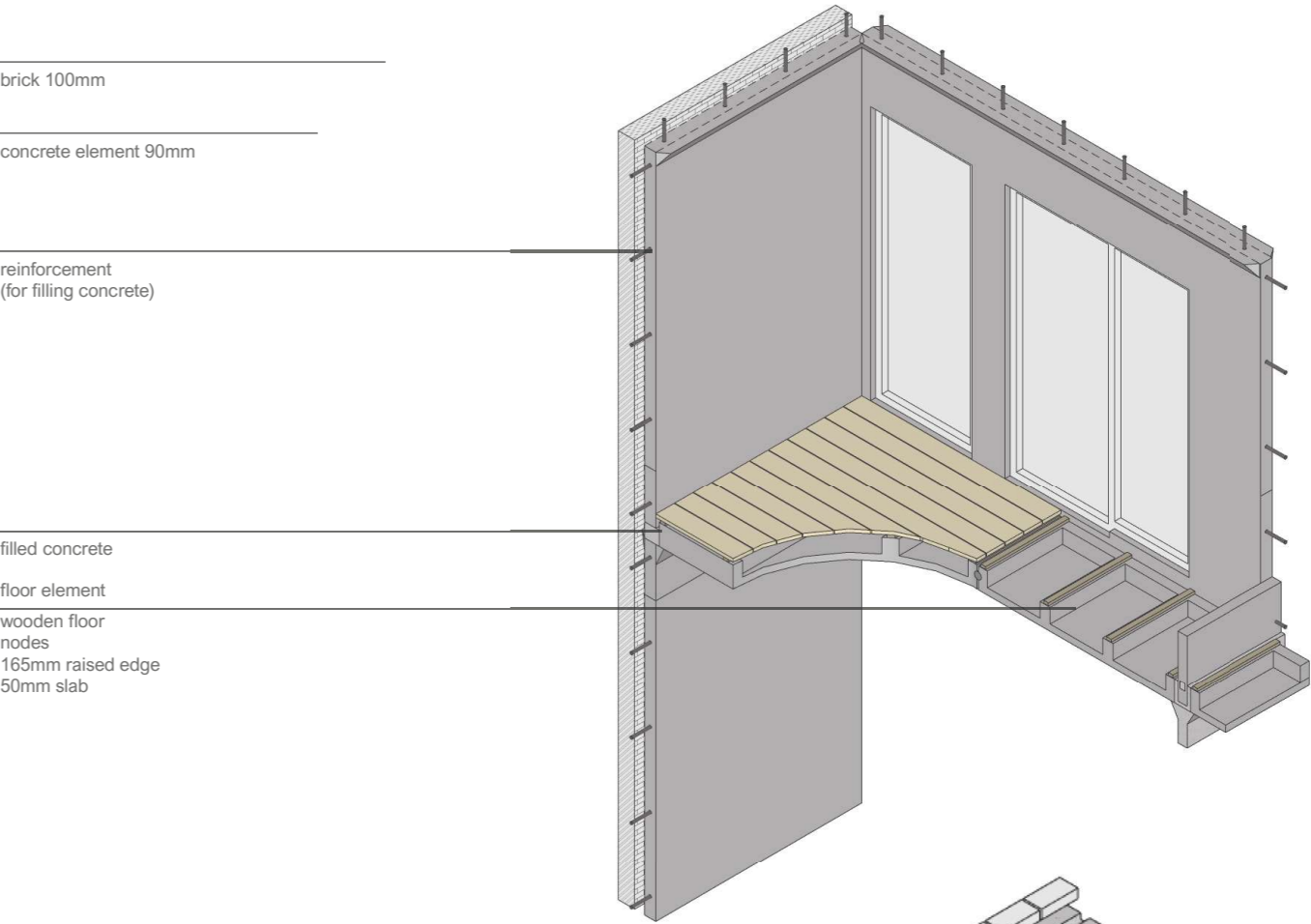
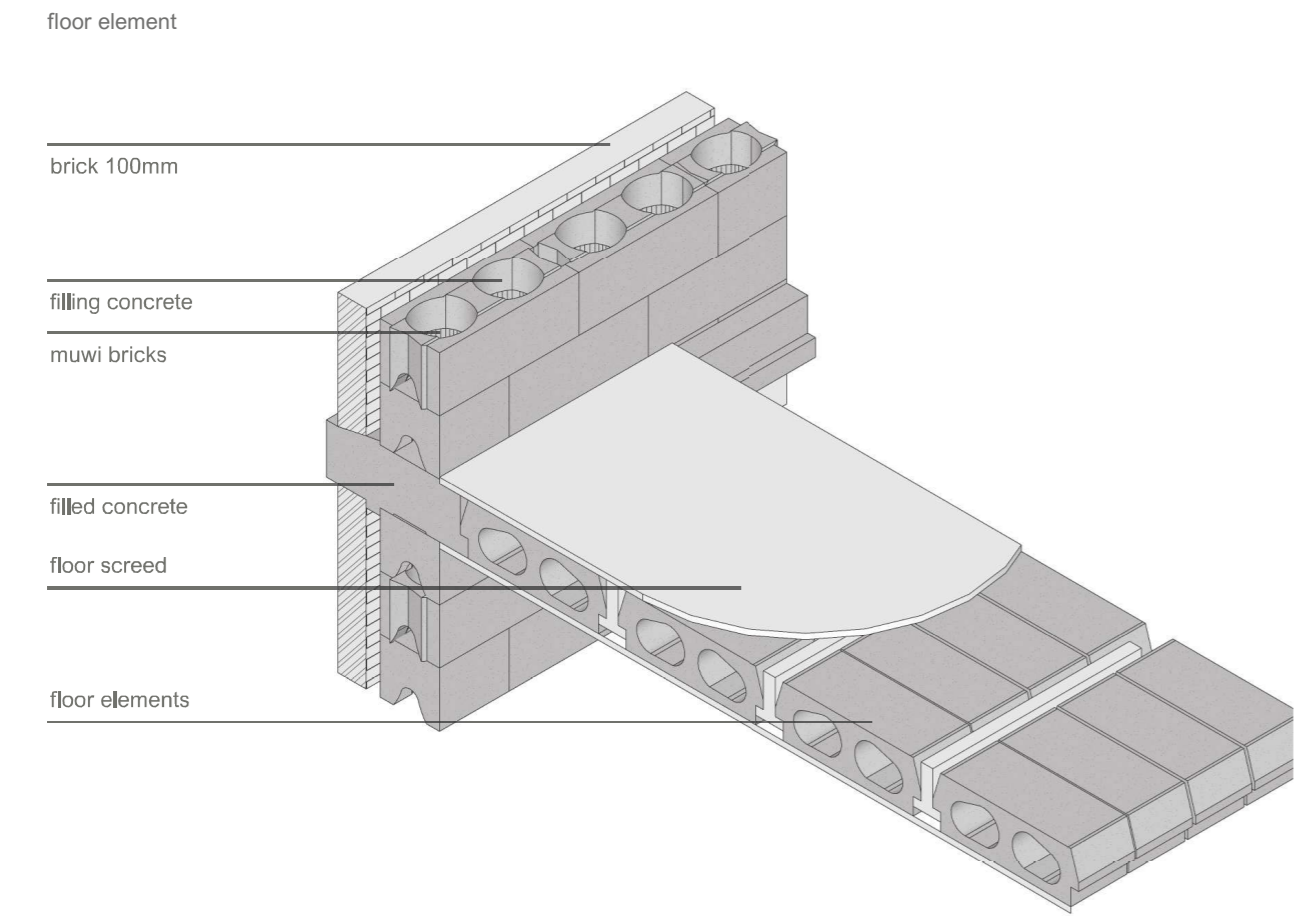


RESEARCH

A DENSIFICATION STUDY INTO BUILDING SYSTEMS

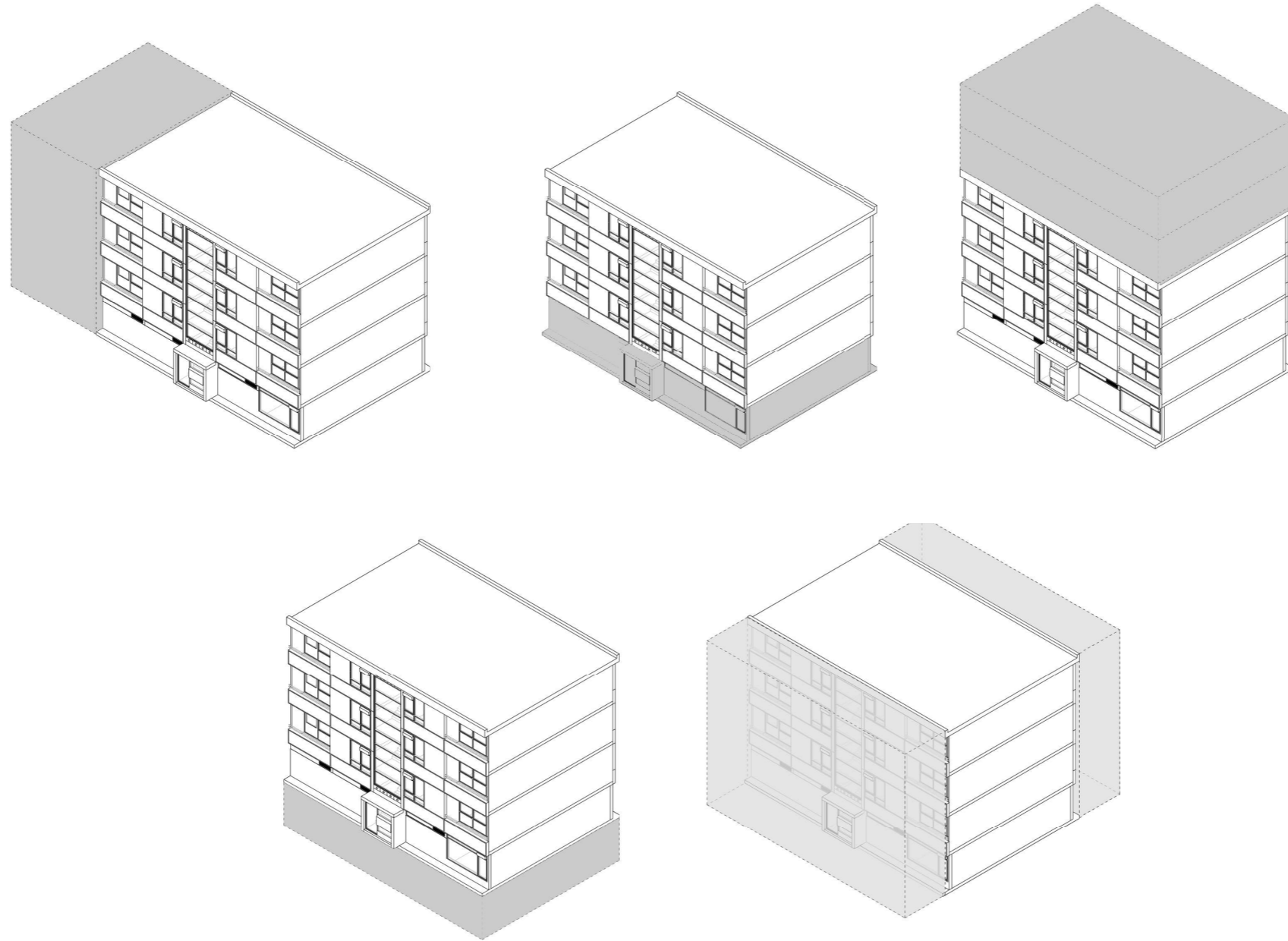
- SIMILAR CAPABILITIES
- SIMILAR TECHNIQUES
- SYSTEMS
- SIMILAR DWELLING PLANS
- SIMILAR URBAN PLANS

System	categorie	Amount
Rottinghuis	Structural element	17.000
MuWi	Stacking construction	36.000
BMB	Finished structural element	30.000

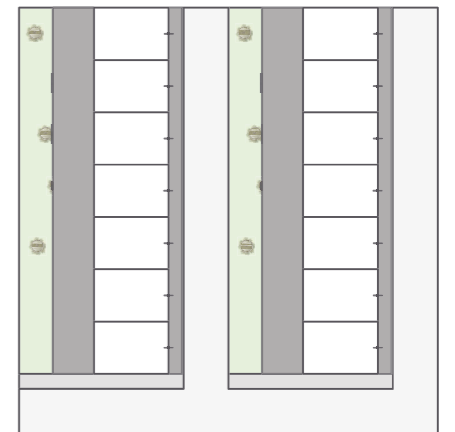
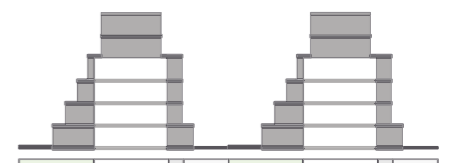
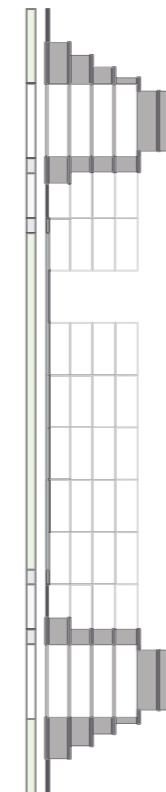
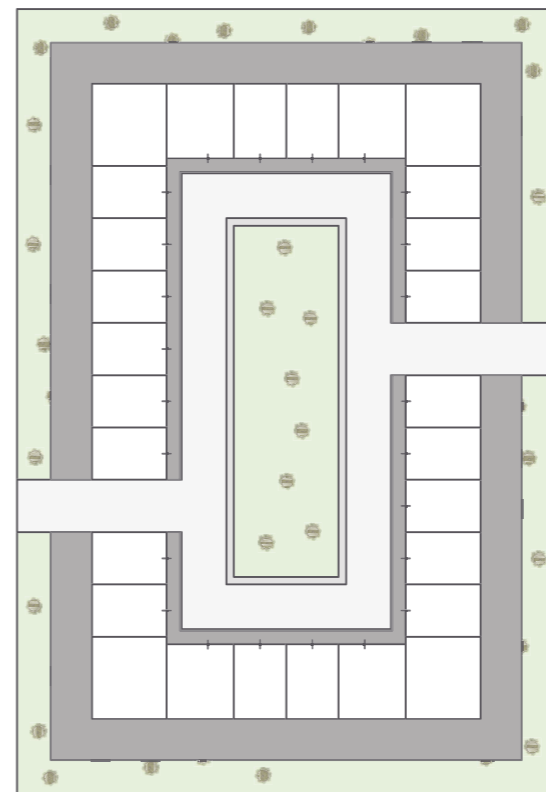
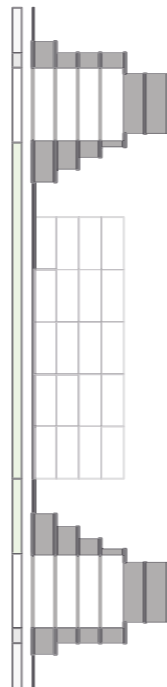
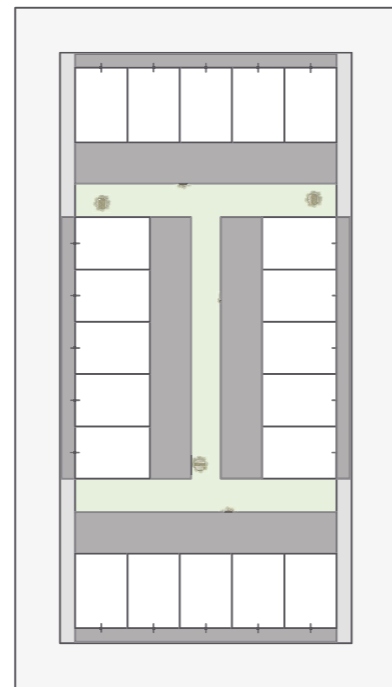
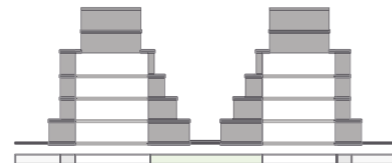
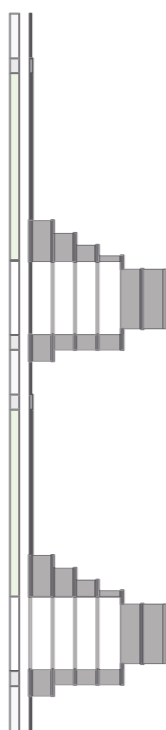
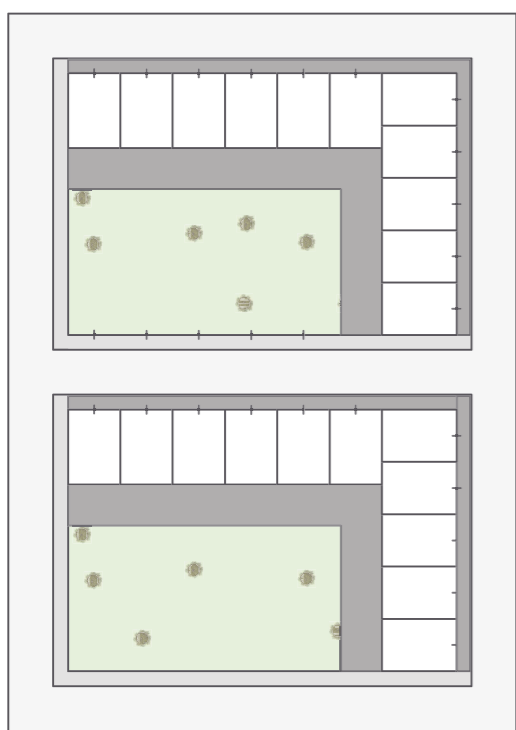
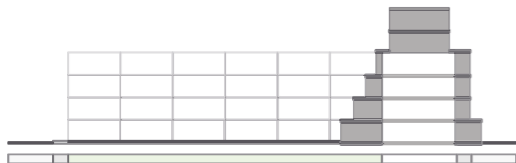
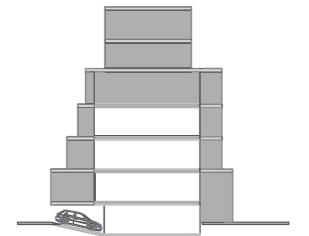
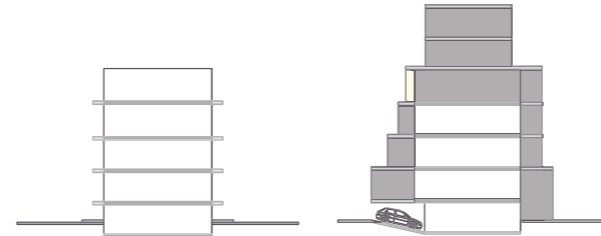
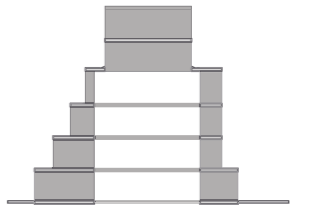
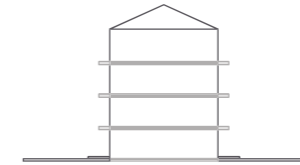
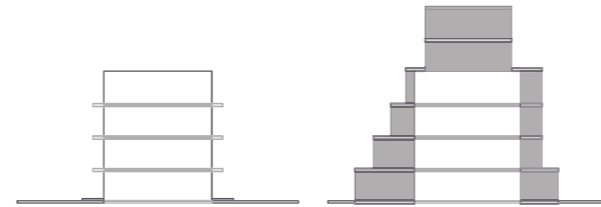
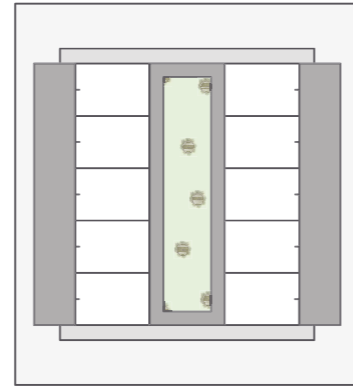
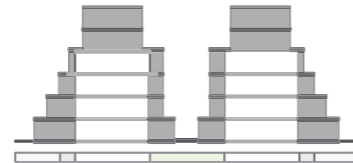
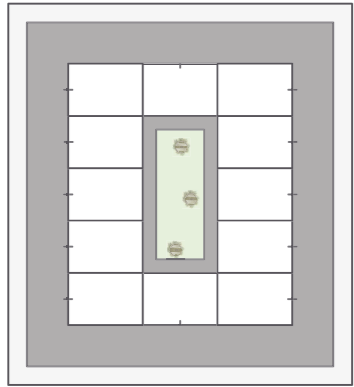
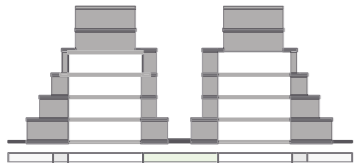


RESEARCH

DENSIFICATION STRATEGIES



URBAN TYPOLOGIES



CONCRETE STRUCTURES

*Why demolish when the concrete frame remains strong?
Retaining it minimizes CO₂ emissions and environmental costs*

on top of that, expand with biobased materials.

OPPORTUNITIES

FILL IN THE DEAD SPACE

WE'RE ALREADY RENOVATING—SO WHY NOT EXPAND AND IMPROVE ?

- new homes
- expand existing apartments
 - energy neutral design
 - diversity in functions
 - collective spaces

Combine this with a **1.5x** Densification to Solve the current Housing Crisis



FEATURES

CONNECTING GREEN



BIOBASED



IN HEIGHT



SUSTAINABLE



VARIETY

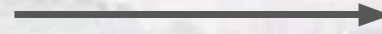


FLEXIBILITY

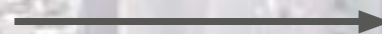


CONTEXT FOR PROJECT

CHOSEN BUILDING



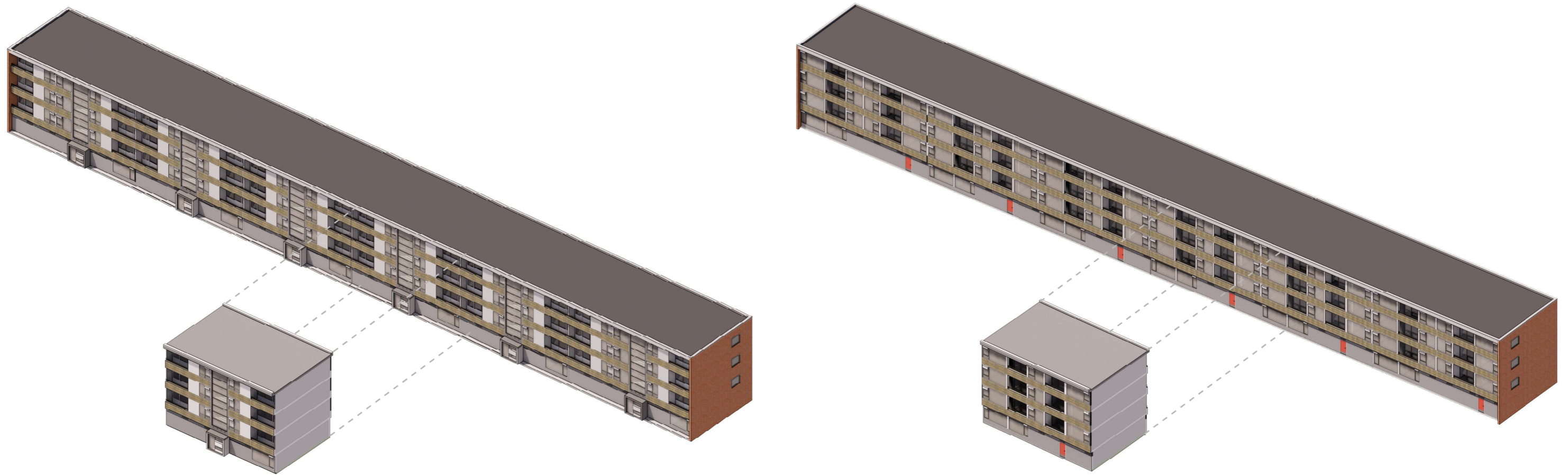
REPETITIVE BUILDINGS



BIRDVIEW LOCATION

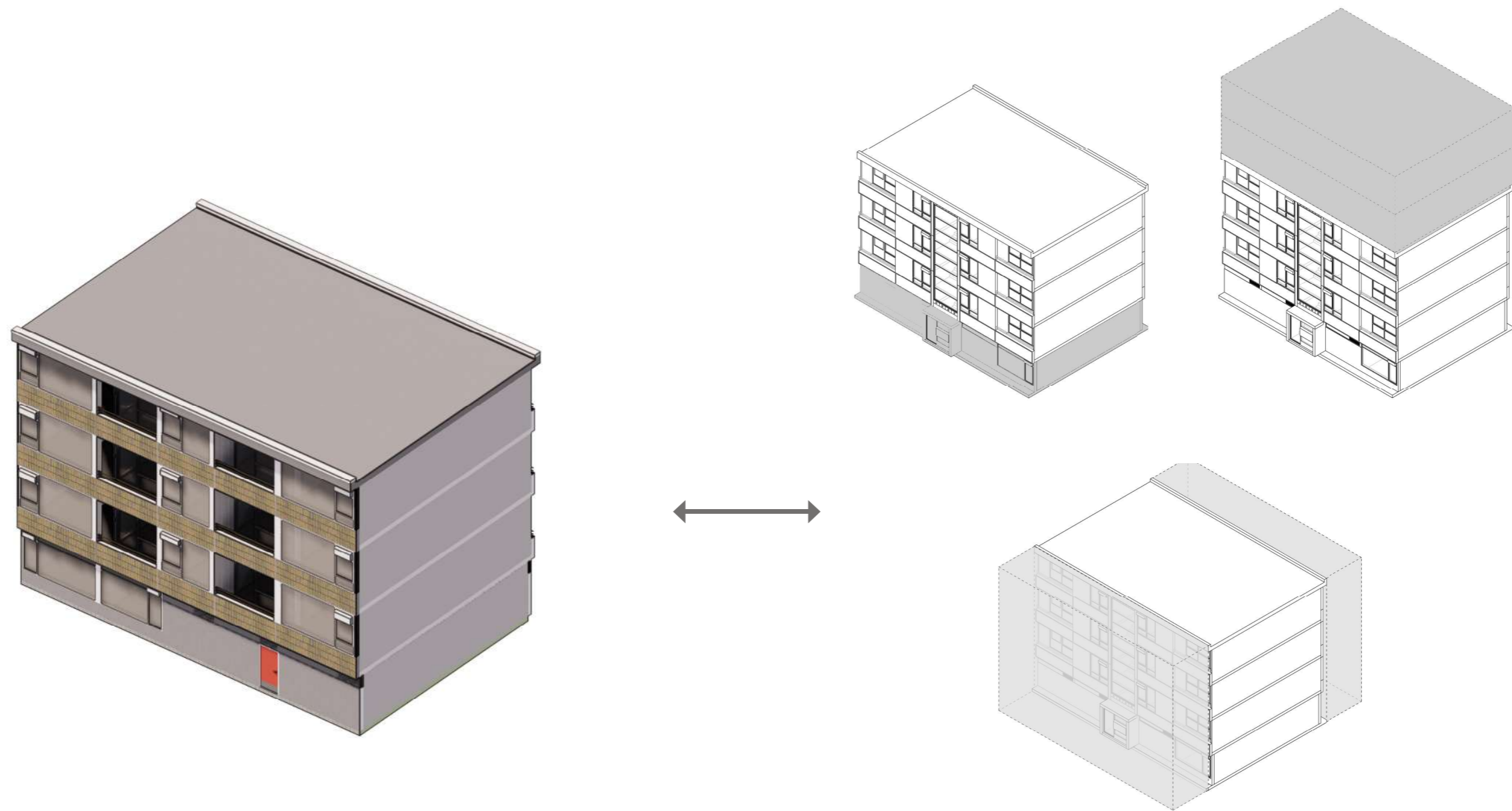


EXISTING BUILDING



- REPETITIVE PLAN
- STORAGES ON GROUND FLOOR FACADE
- TWO DIFFERENT PLANS

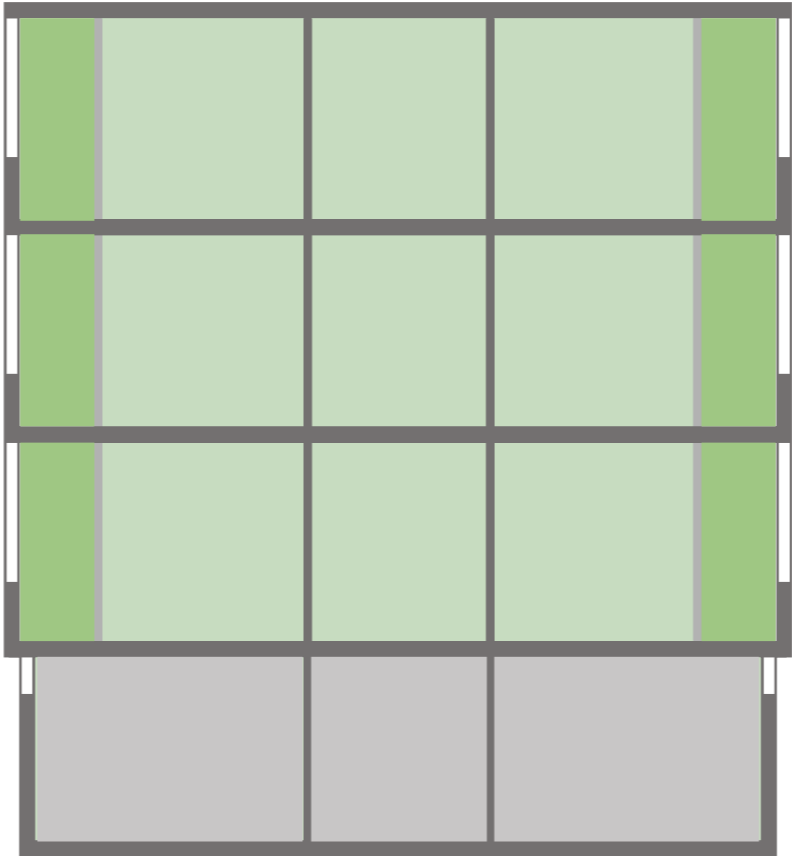
EXPANDING



- EXPAND ON TOP
- EXPAND HORIZONTAL
- FROM STAIRCASE ENTRANCE TO GALLERY
- STORAGE TO PUBLIC AND LIVING

SECTION EXISTING BUILDING

- DWELLINGS
- STORAGES
- BALCONIES



• ANONYMOUS LOWERGROUND FACADE

EXPLAINING SECTION

TWO SIDES

PRIVATE SIDE

SOUTH-WEST

OPEN SPACE

CALM STREET

BALCONY SIDE

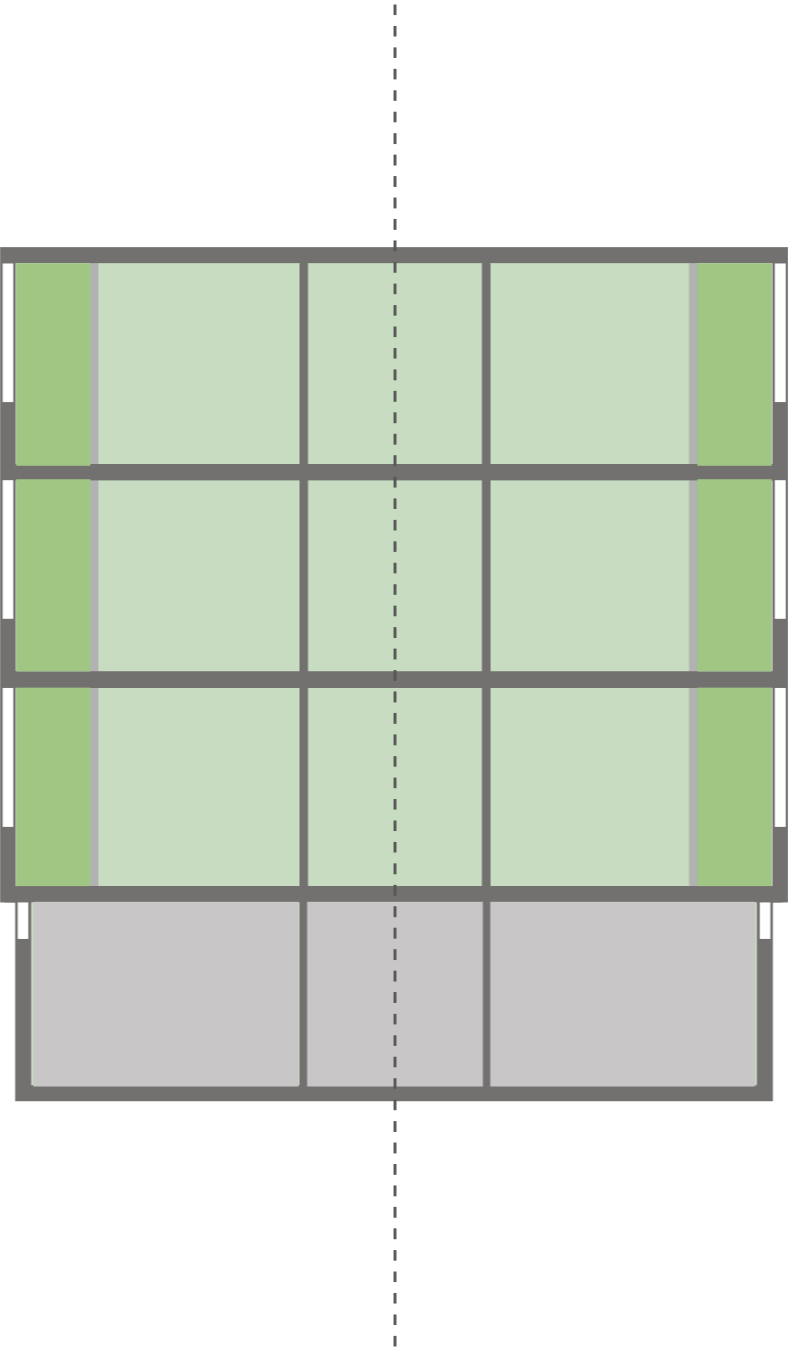
PUBLIC SIDE

NORTH-EAST

URBAN SPACE

BUSY STREET

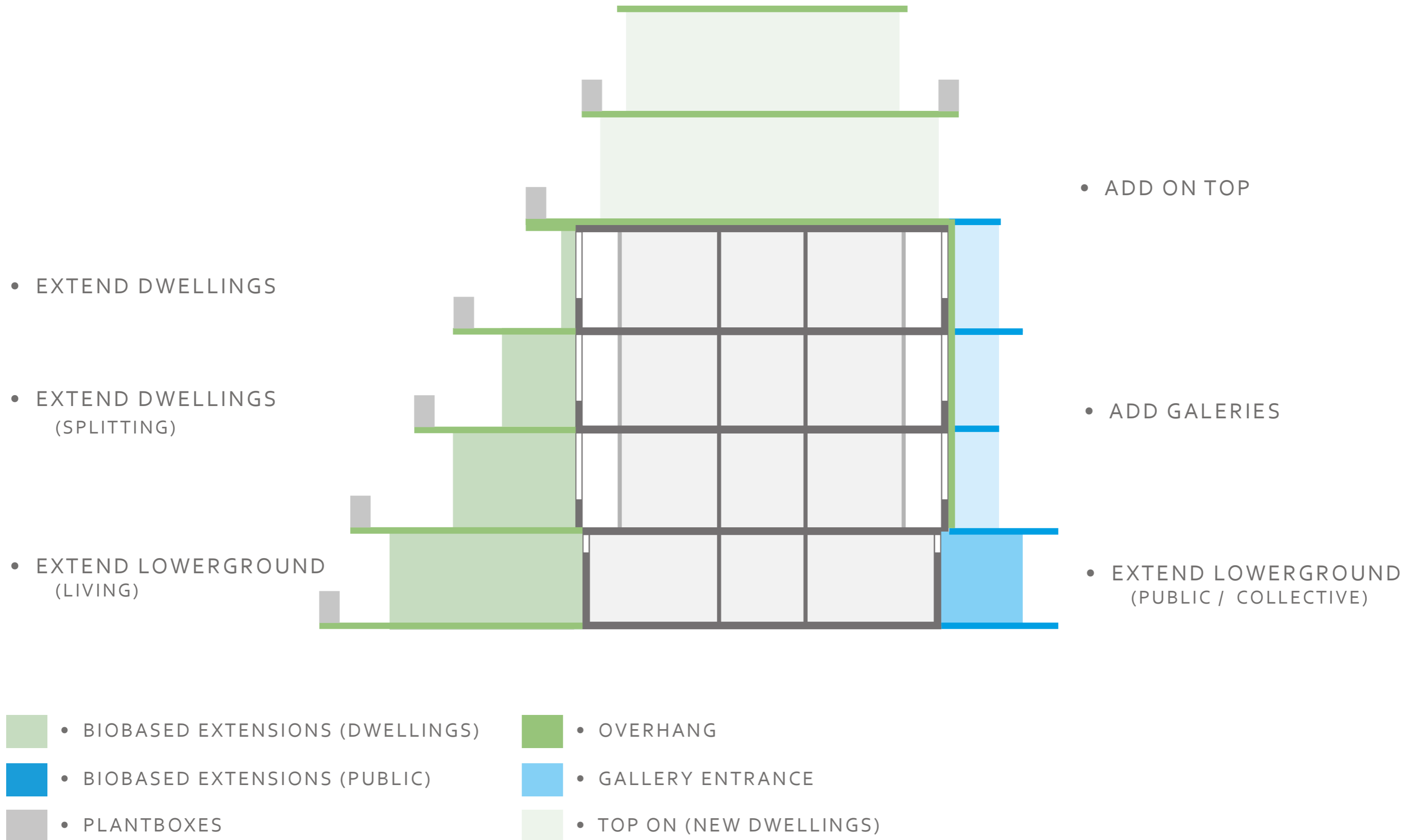
GALLERY SIDE



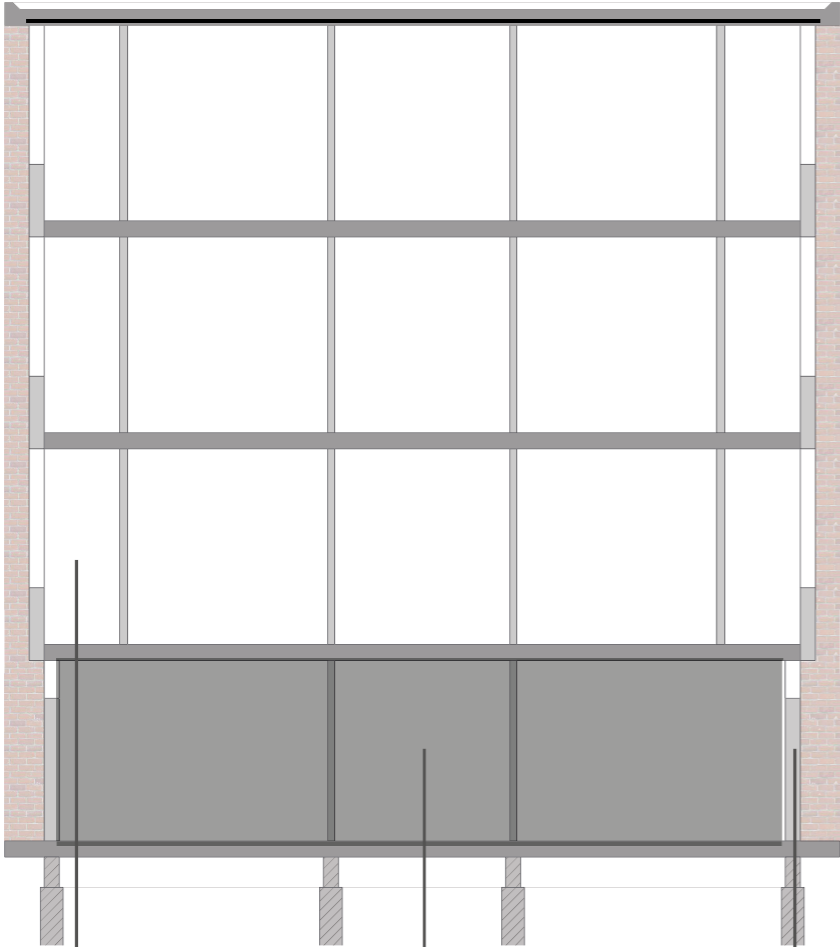
- DWELLINGS
- STORAGES
- BALCONIES

EXPLAINING SECTION

EXISTING CONCRETE STRUCTURE WITH BIOBASED EXTENSIONS



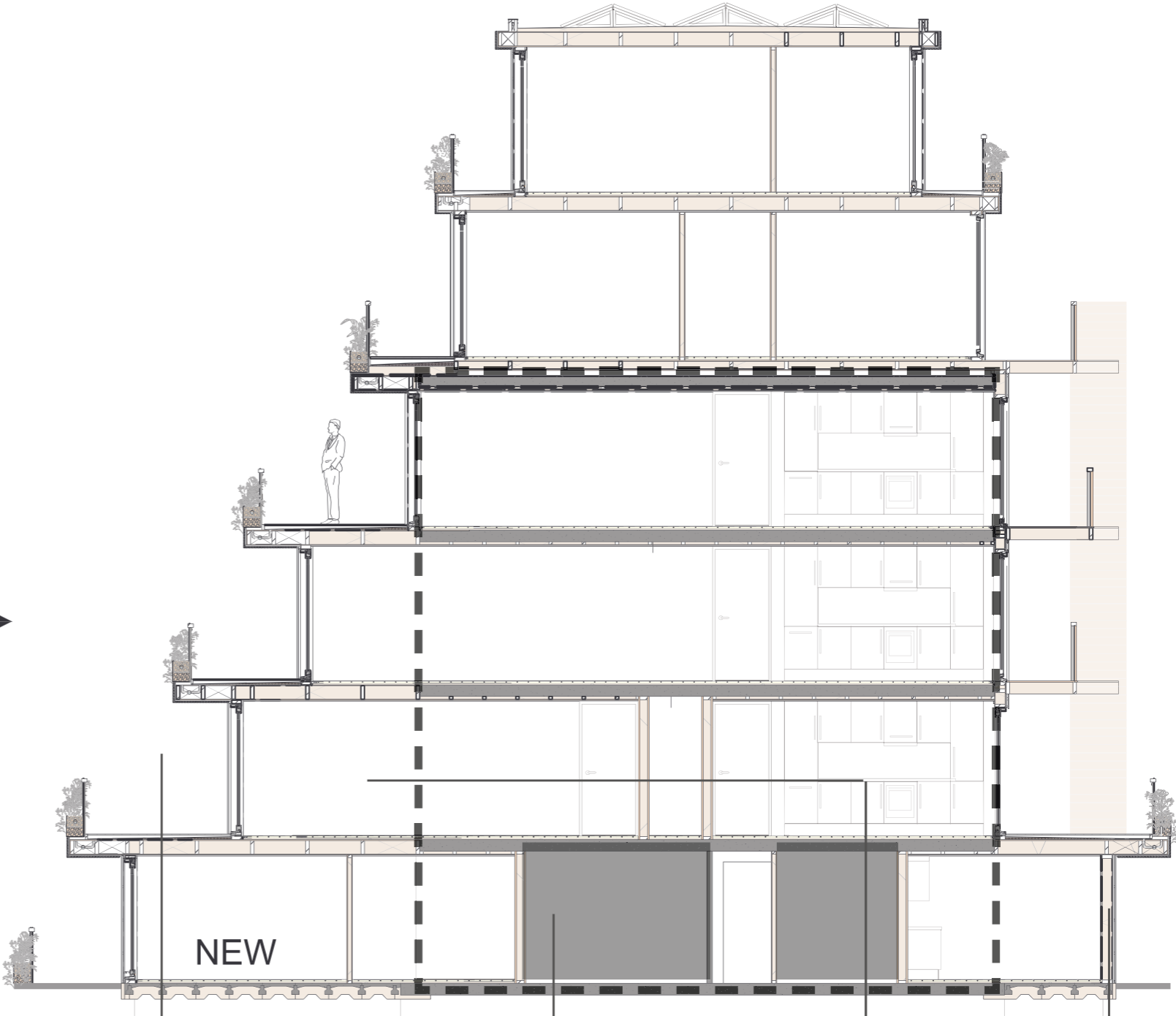
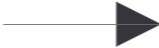
SECTION TECHNICAL



OUTSIDE SPACE
• both sides
• small

STORAGES
• both sides

ANONYMOUS FACADE
• both sides



OUTSIDE SPACE
• both sides
• big

STORAGES
• divided by corridor

studios
• divided by corridor

OPEN FACADE
• both sides

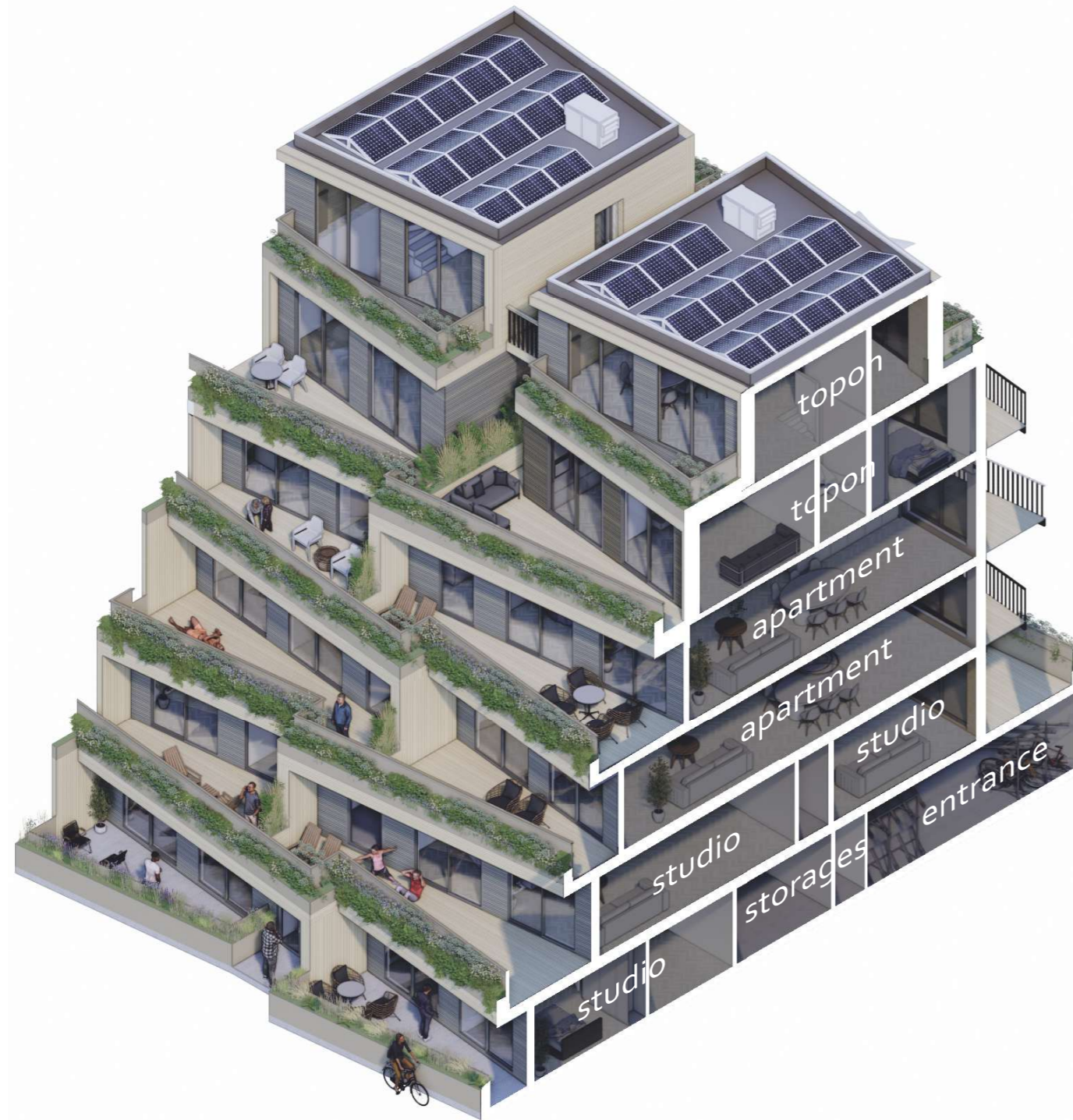
BUILDING SECTION 1:100

- Overhangs and planters provide privacy
- Diverse dwelling types
- Storages in the middle, no sunlight needed
- dwellings connect to public space

- public and collective spaces connect to street
- Gallery can be used as collective balcony
- Lift access benefits those with limited mobility



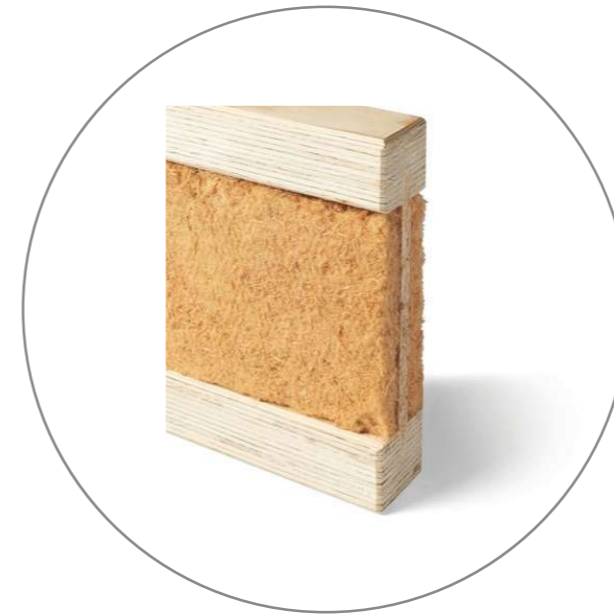
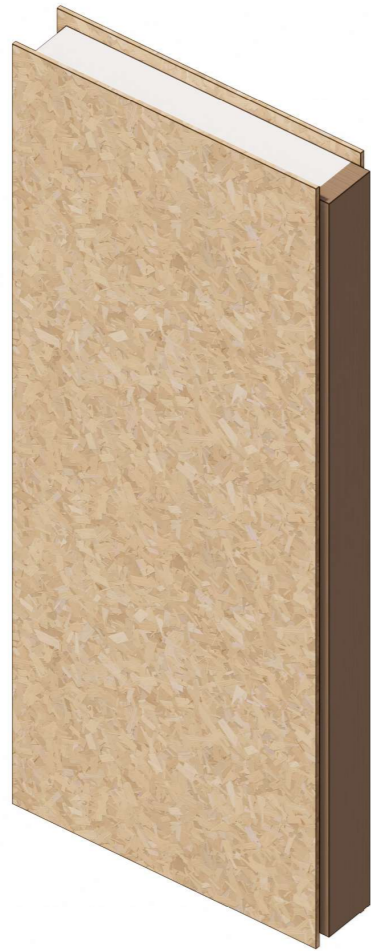
BUILDING SECTION 3D



- private buyer optop dwellings
- collective roofgarden
- expanded existing apartments
- 1st story studios
- collective spaces
- groundfloor apartments
- collective spaces
- groundfloor public functions

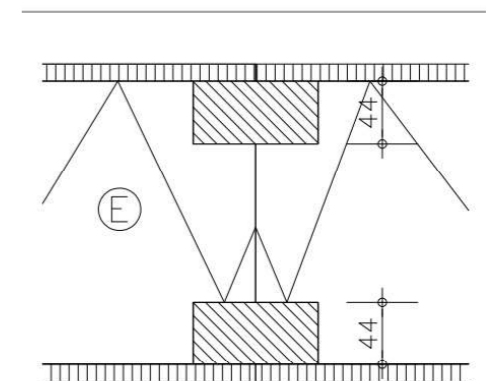
SIP (STRUCTURAL INSULATED PANEL)

SWIFT, EASY & LIGHTWEIGHT



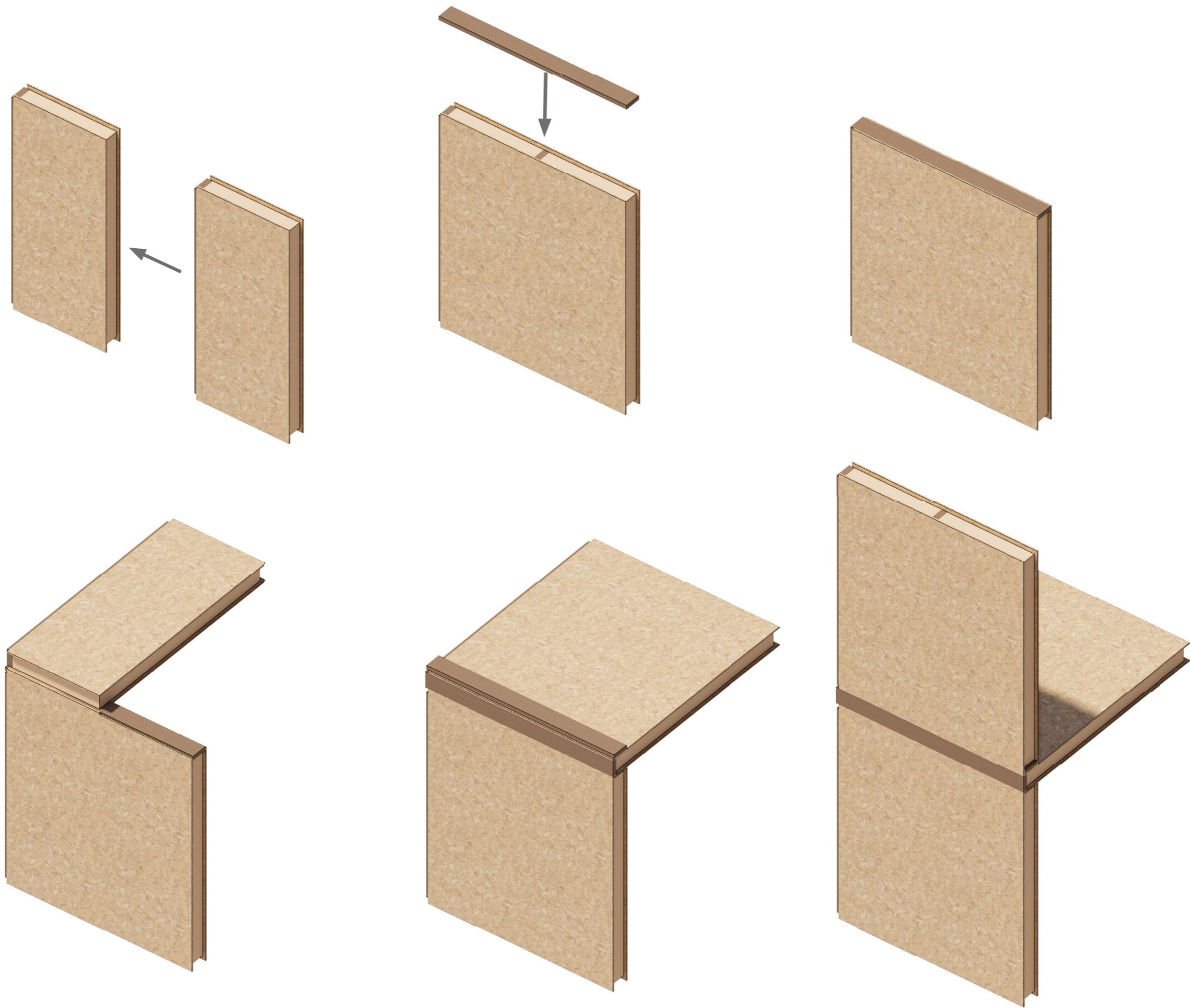
- 205 mm SIP
- 2X 15mm OSB
 - 175mm wood fibre insulation
 - timber studs 175 x 63 mm

- BIOBASED WOODFIBRE INSULATION
- BIOBASED OSB



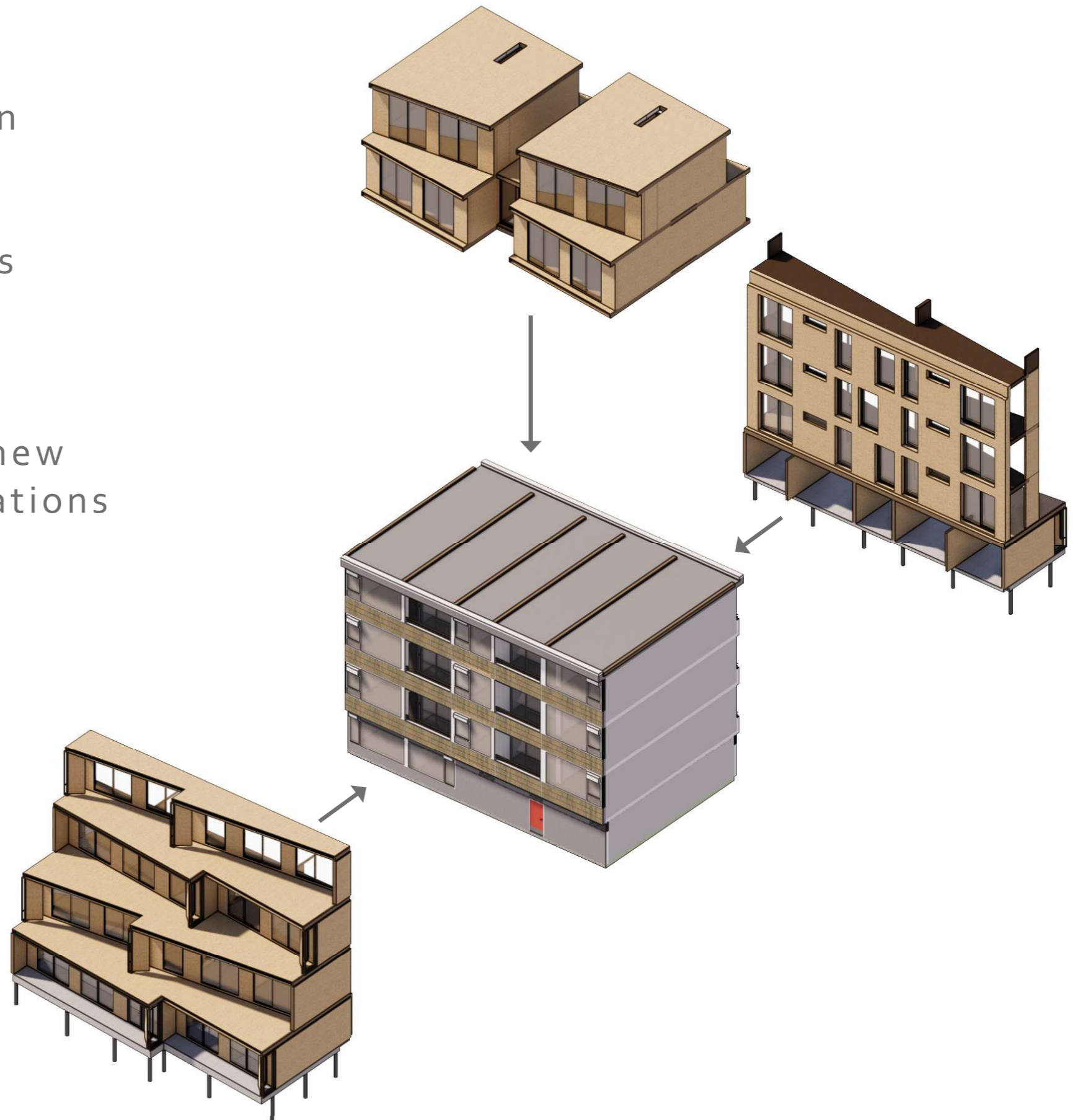
SIP

THE METHOD

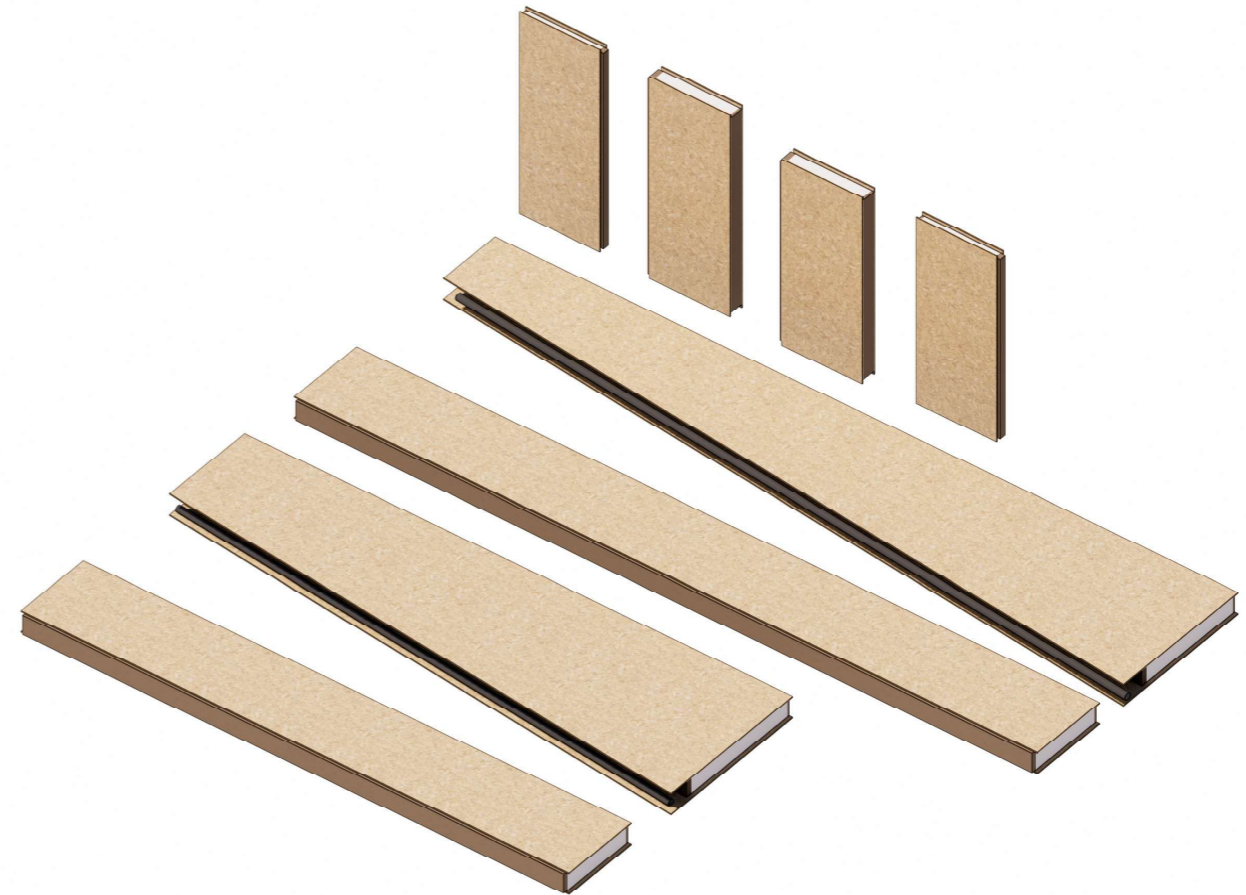
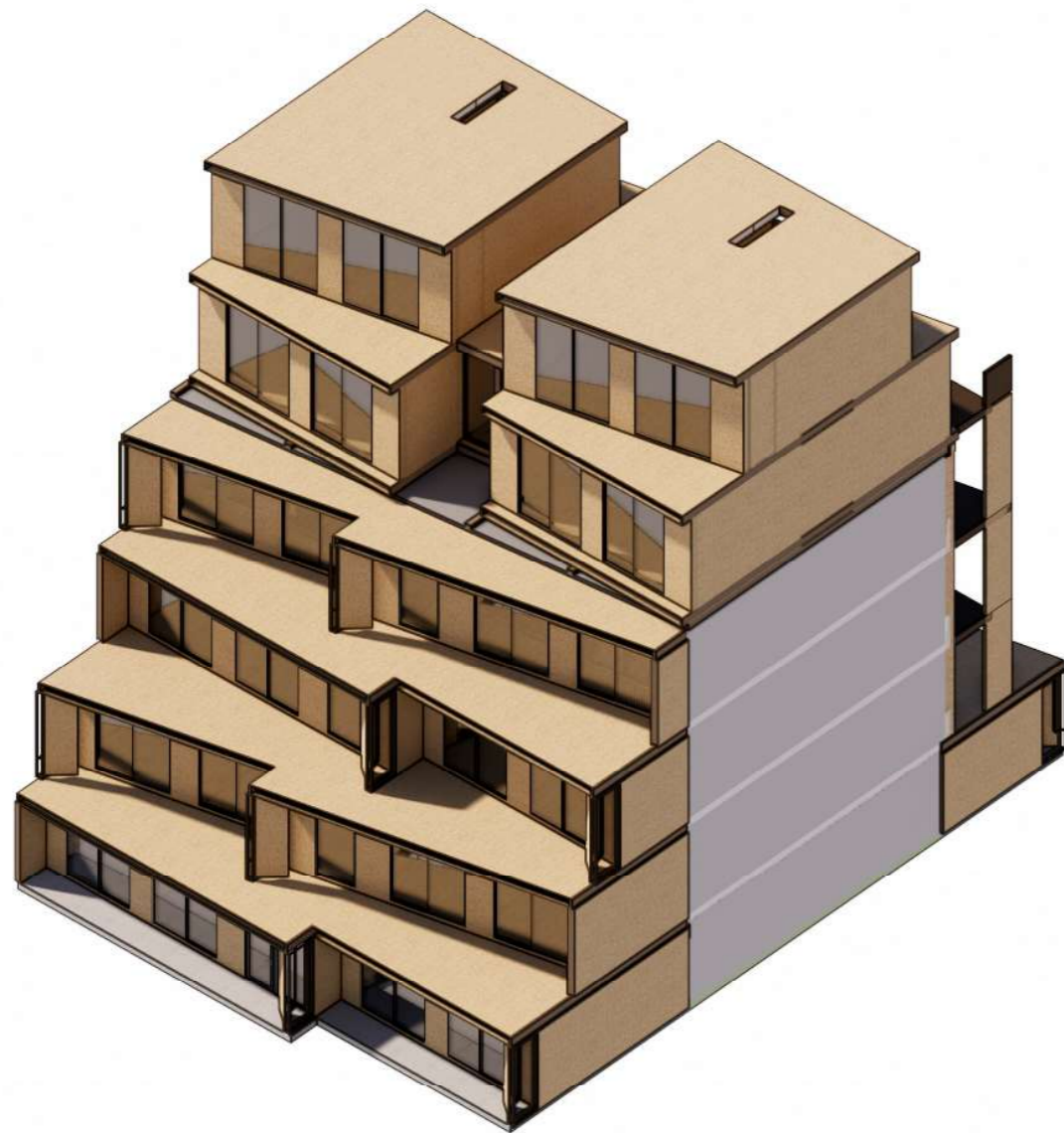


EXPANDING

- REMOVE EXISTING FACADE
 - reduces weight on foundation
- TOP ON WITH LIGHTWEIGHT
 - use current ventilation canals
- EXPAND LIGHTWEIGHT
 - new foundation
 - divide windload with old and new
 - screw injection piles, no vibrations

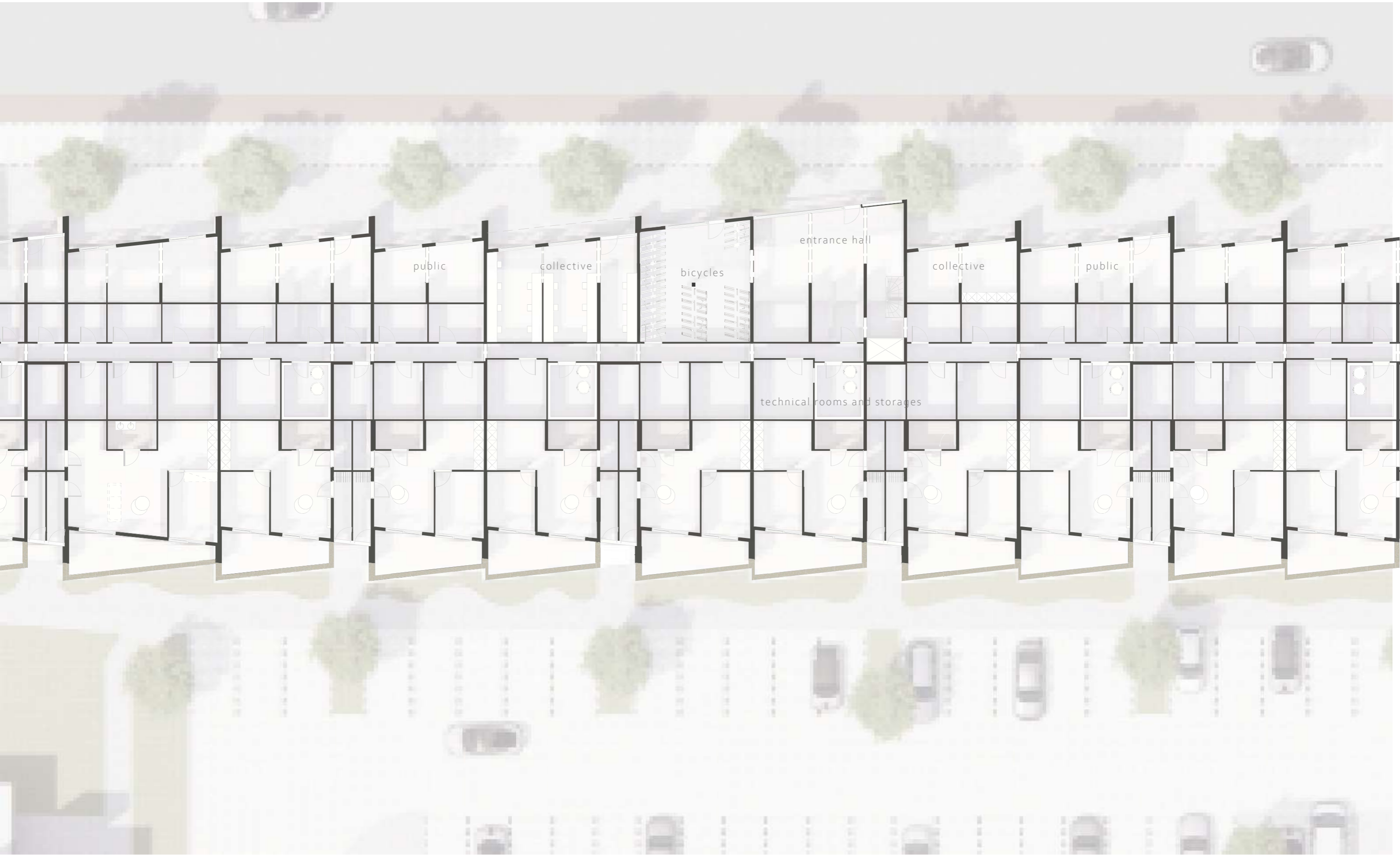


A PREFAB COMPONENT BIOBASED TRANSITION



- INTERIOR WALL SIPS 110mm
- FACADE SIPS 205mm
- DWELLING DIVIDING AND LOADBEARING 205mm
- FLOORSIPS 275mm

GROUND FLOOR 1:200



URBAN LOWERGROUND 1:500



URBAN EXPLANATION

PUBLIC / COLLECTIVE / GALLERY SIDE (NORTH)



COLLECTIVE ROOFGARDEN

- two stories
- places to sit, south oriented

ENTRANCE

- with place to sit
- connected with bicycle storage
- next to collective spaces
- postmail boxes

EMERGENCY STAIRS

- both sides

PUBLIC SPACES

- shops
- small buisnesses
- flex places

BIG STREET

PRIVATE SIDE (SOUTH)



COLLECTIVE ROOFGARDEN

- two stories
- places to sit, south oriented

GROUNDFLOOR APARTMENTS

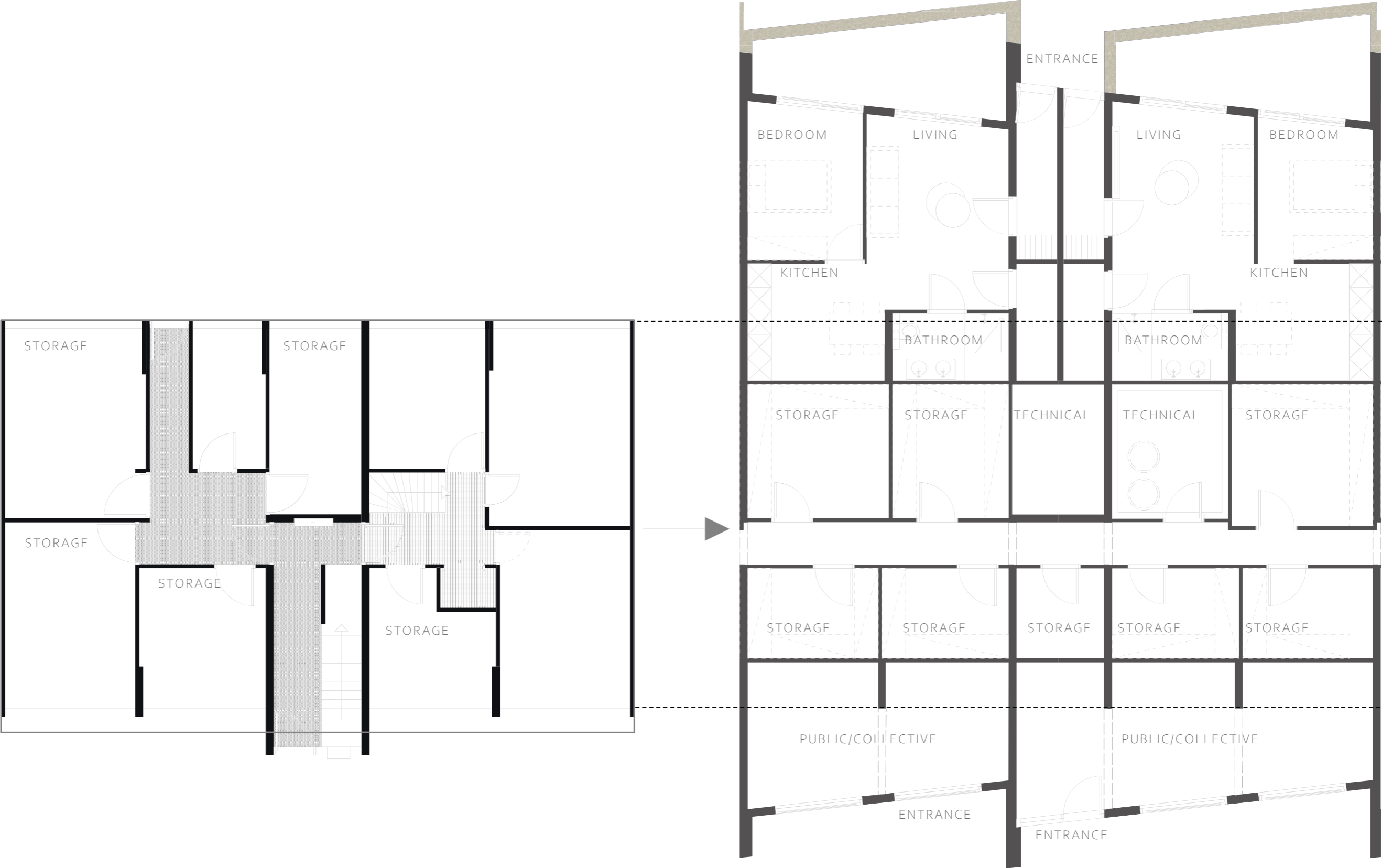
- own groundfloor entrances
- from public to semi, to private

EMERGENCY STAIRS

- both sides

CALM STREET

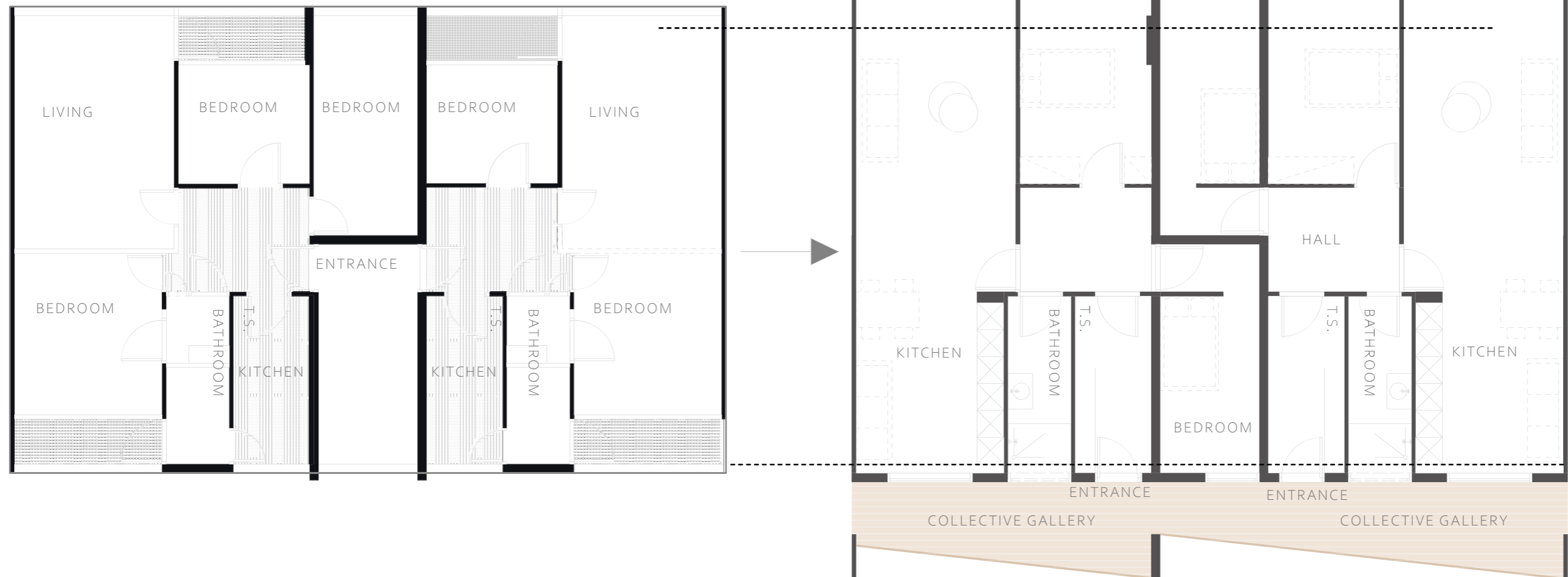
GROUND FLOOR 1:100



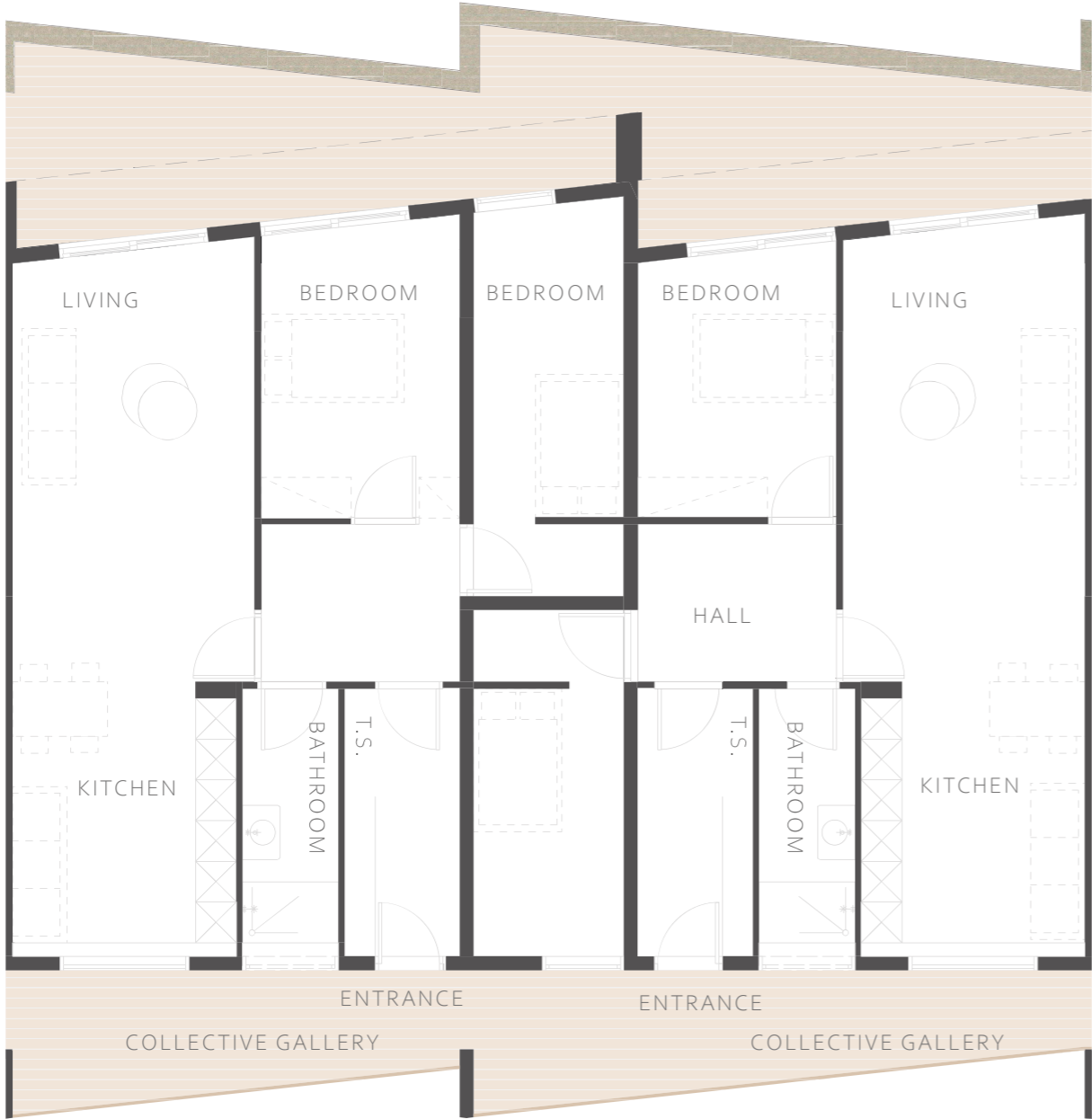
2nd FLOOR 1:100

PRINCIPLES

- use existing concrete walls as much as possible
- Use existing technical shafts (T.S)
- technical spaces close to each other
 - kitchen and bathroom close to each other
- ceiling for ventilation from hall

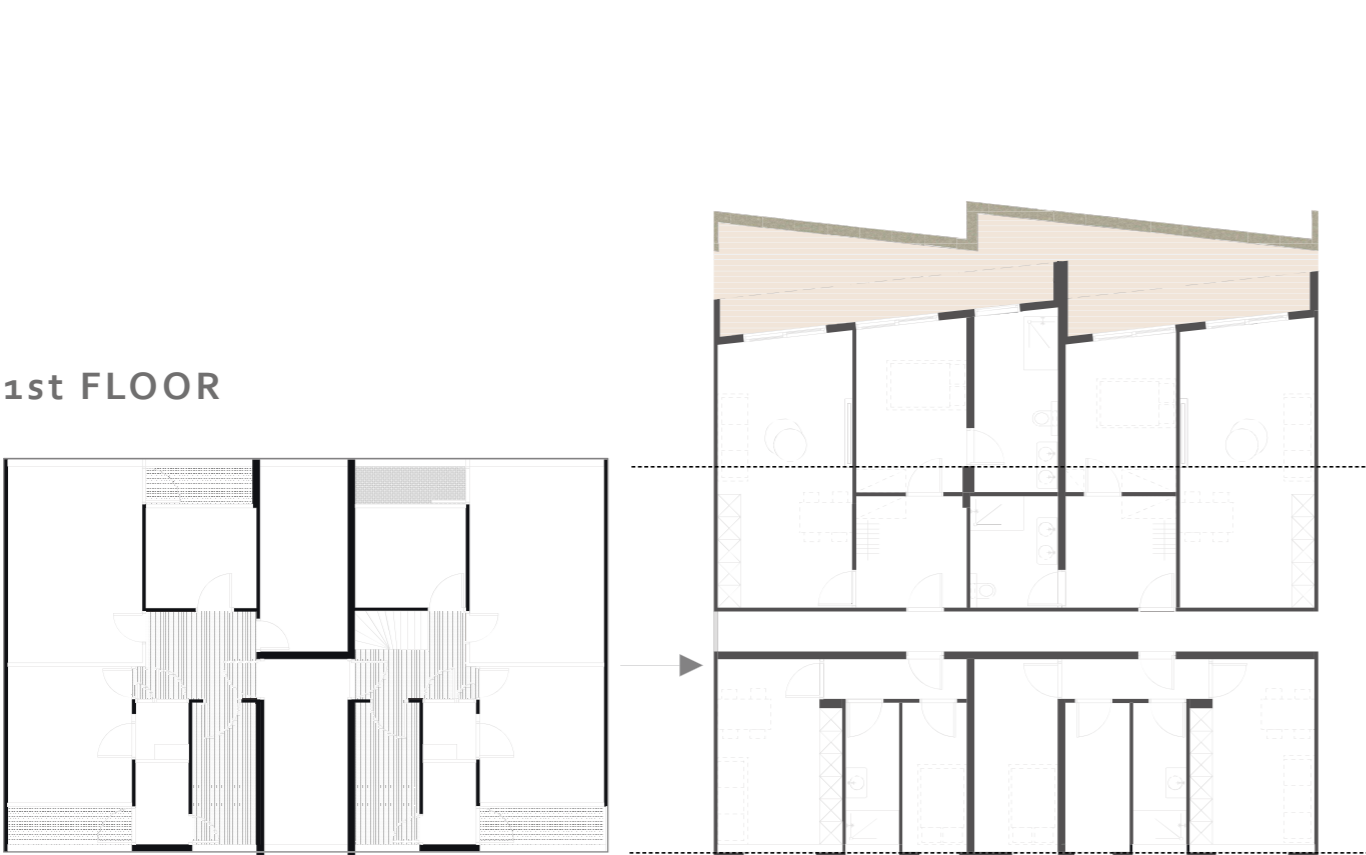


FLEXIBILITY

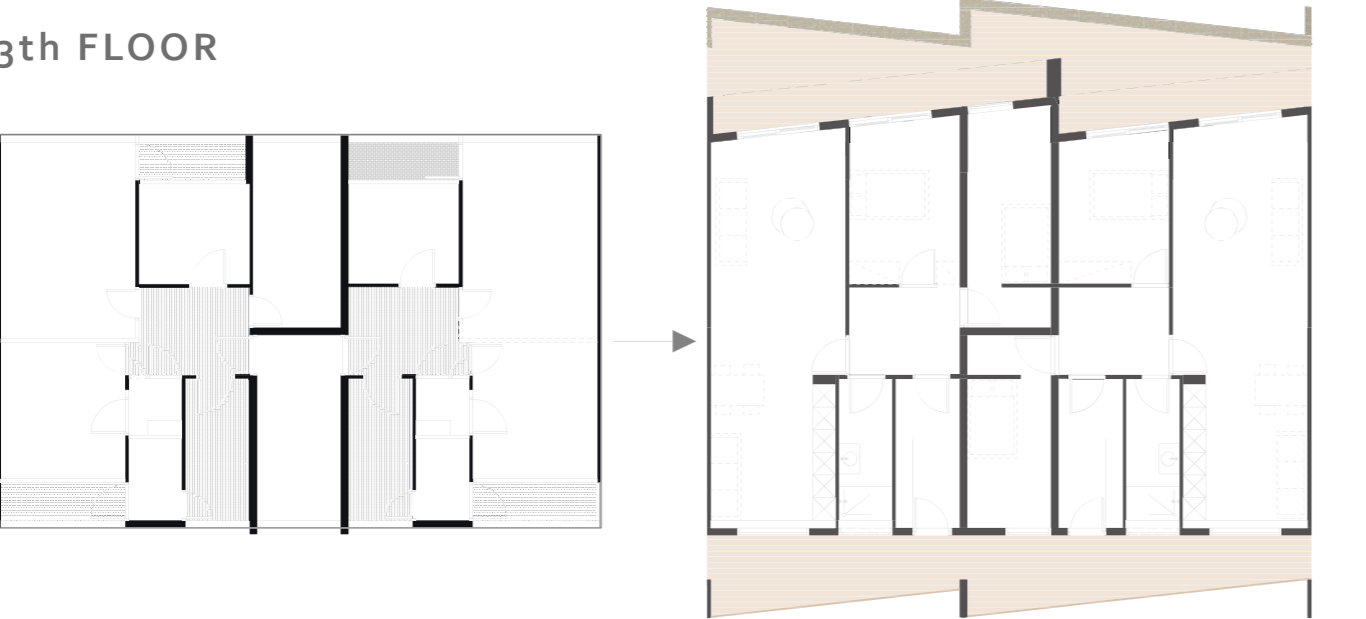


ALL PLANS 1:200

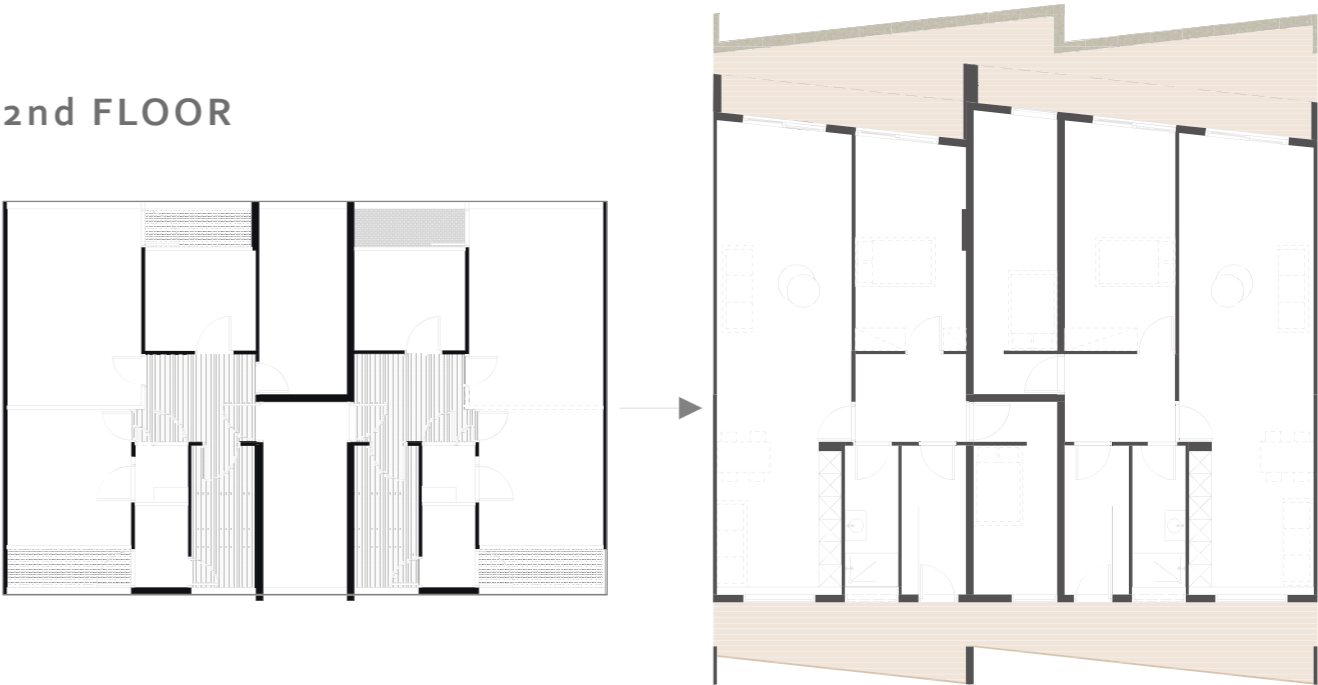
1st FLOOR



3th FLOOR



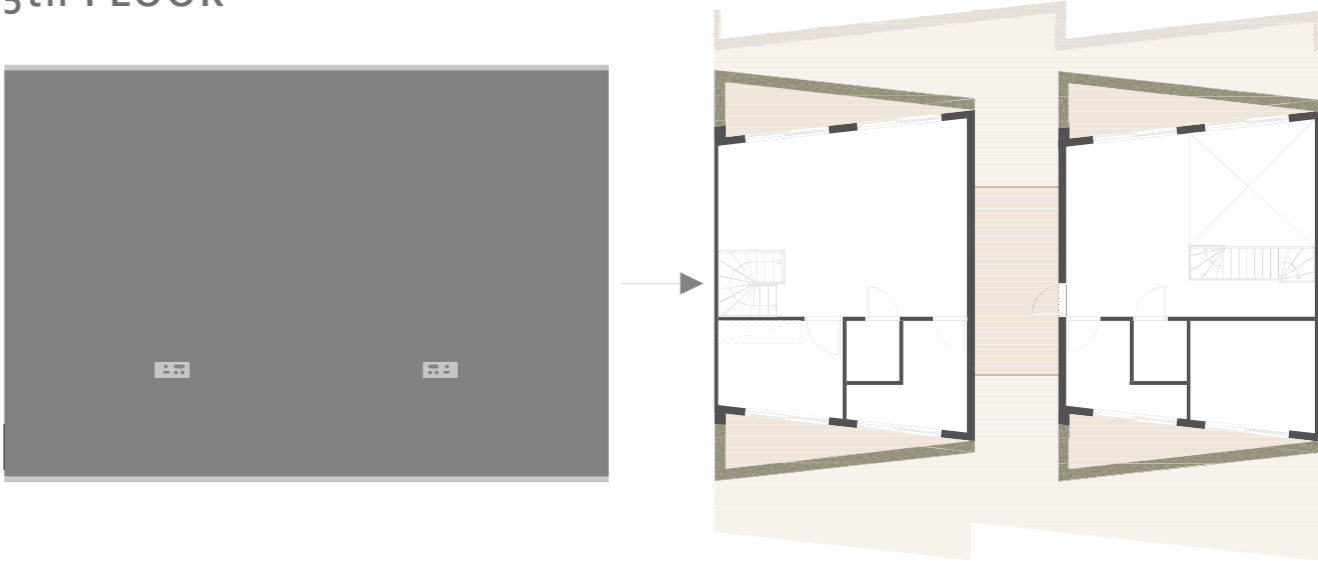
2nd FLOOR



4th FLOOR

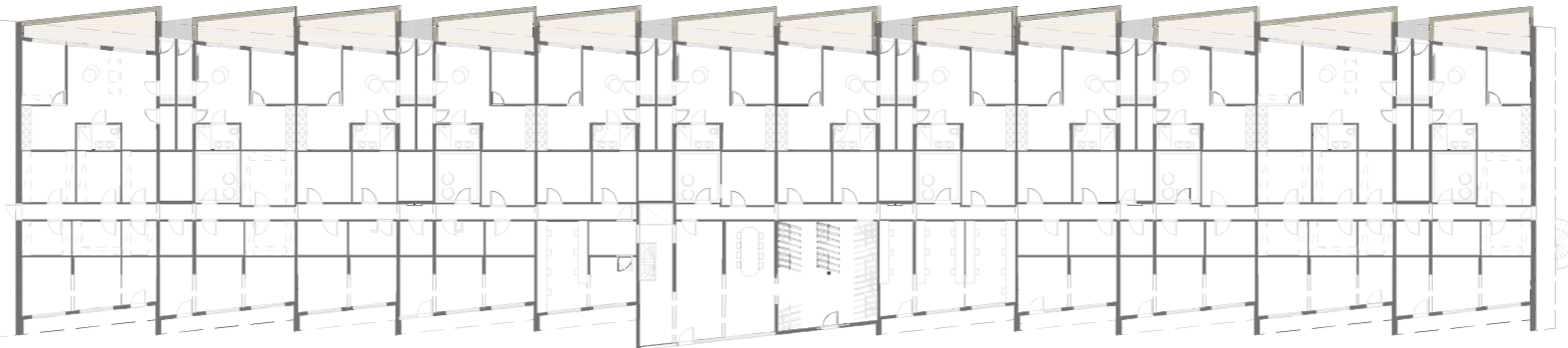


5th FLOOR

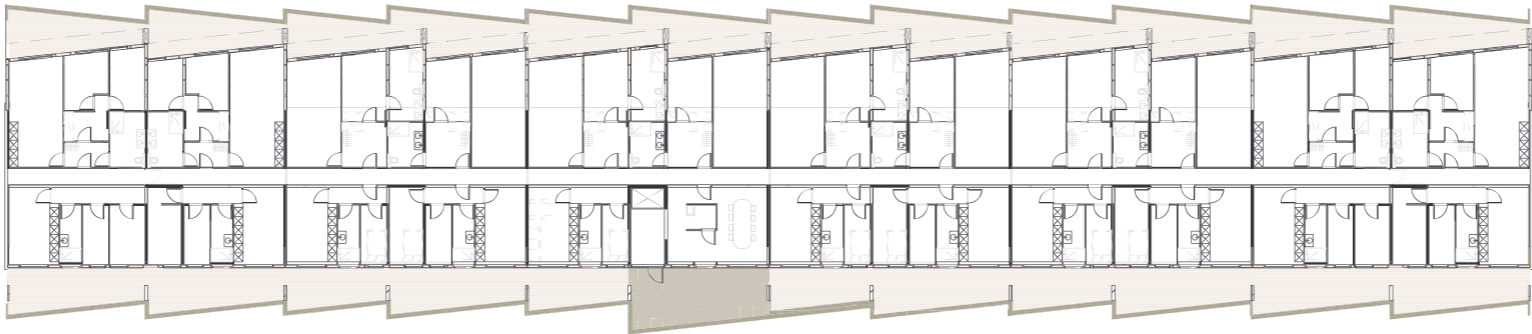


STANDARD PLANS 1:500

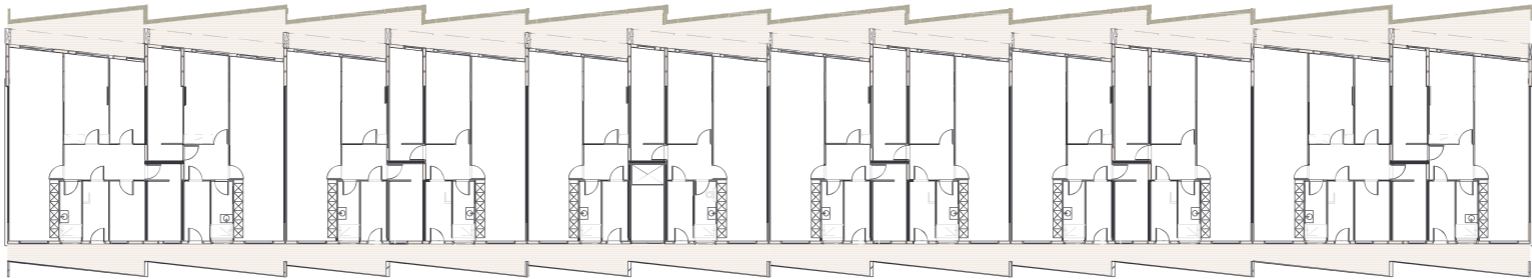
GROUND FLOOR



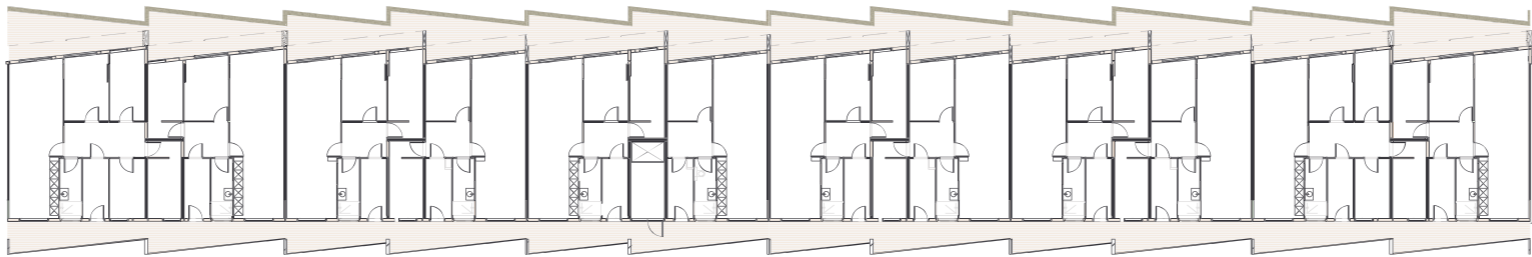
1st FLOOR



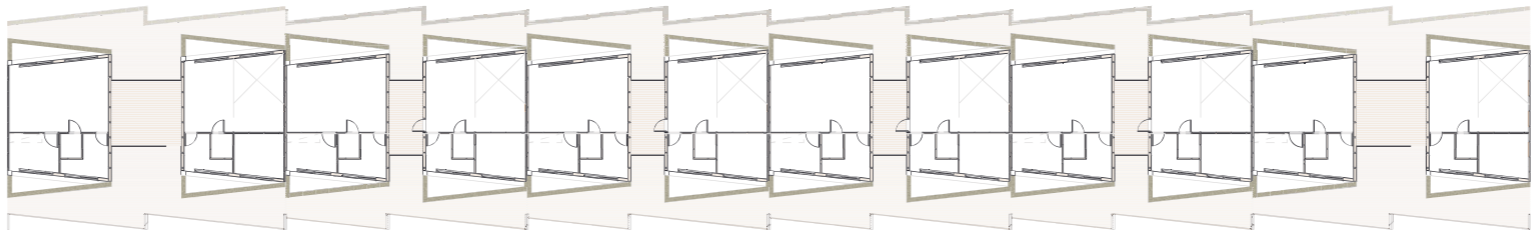
2nd FLOOR



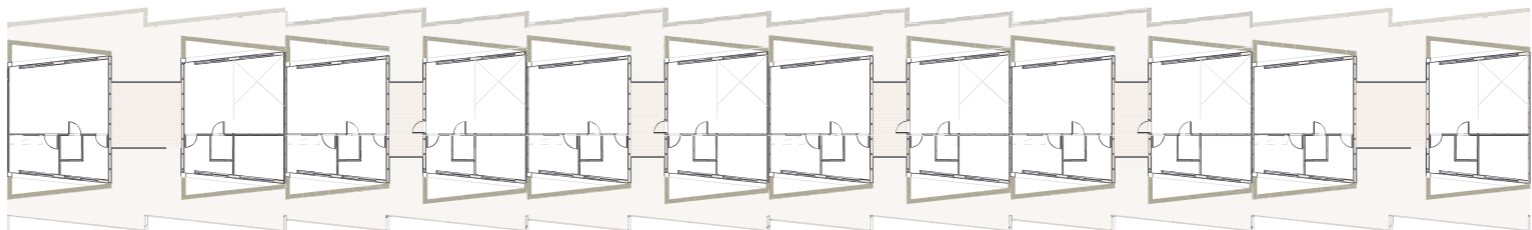
3th FLOOR



4th FLOOR

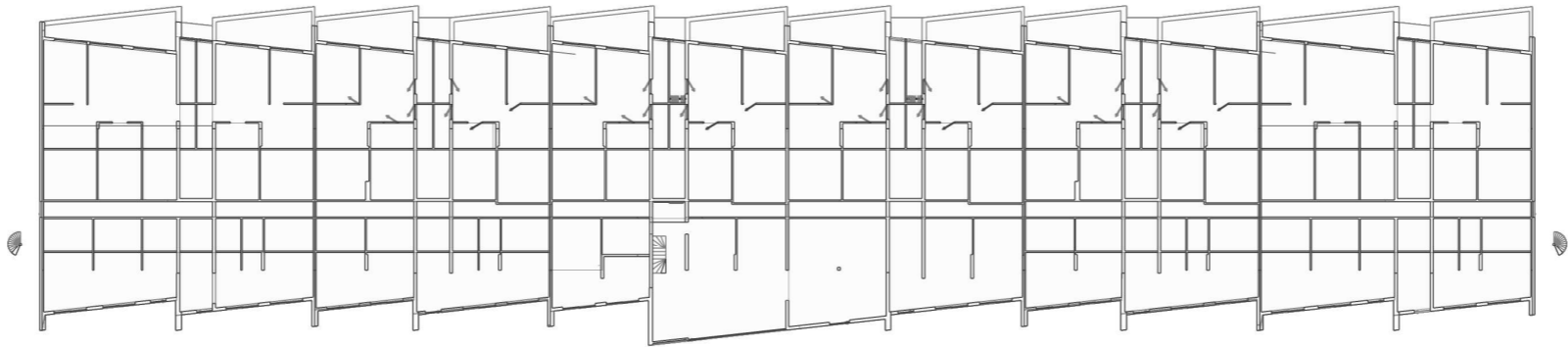


5th FLOOR

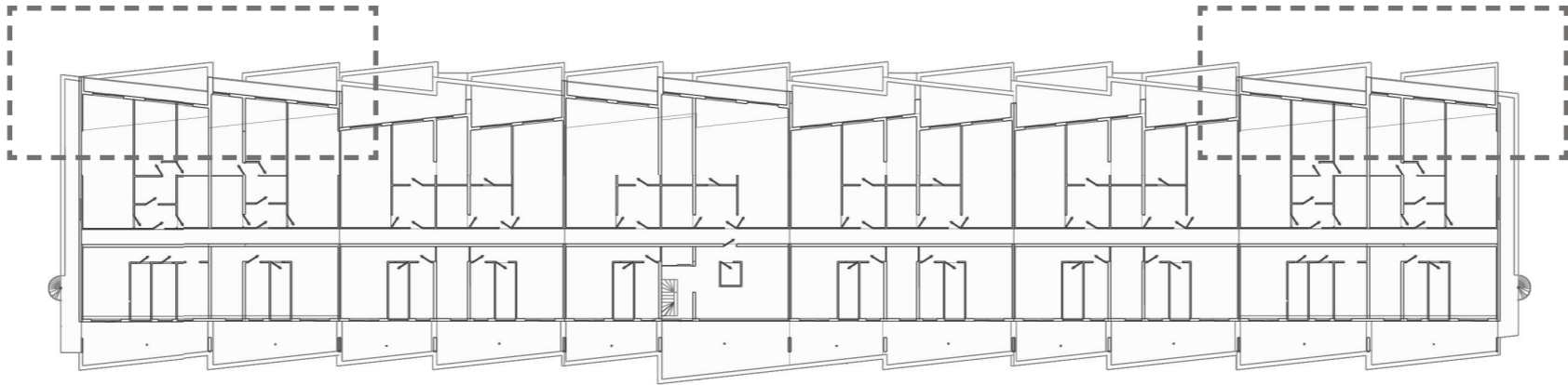


DIVERSE PLANS 1:500

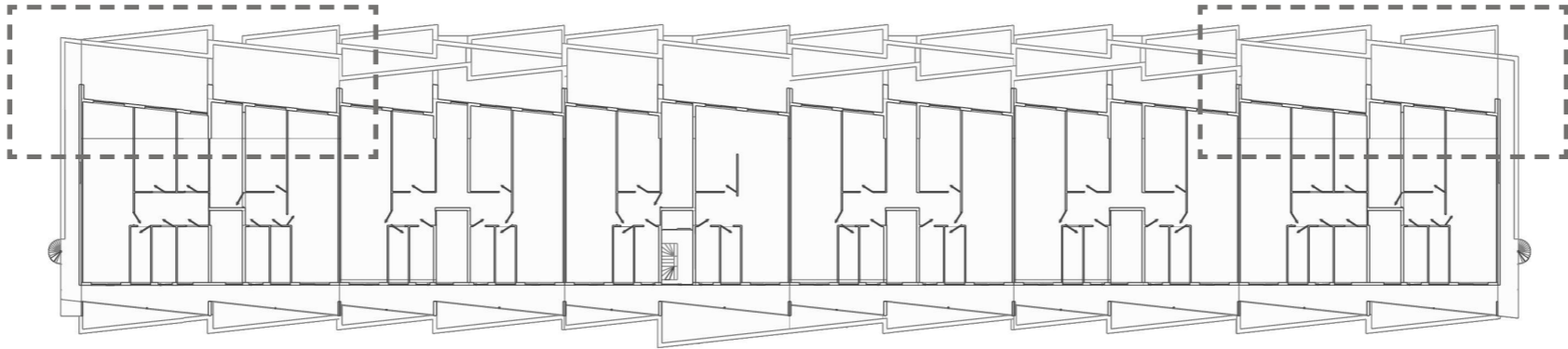
GROUND FLOOR



1st FLOOR

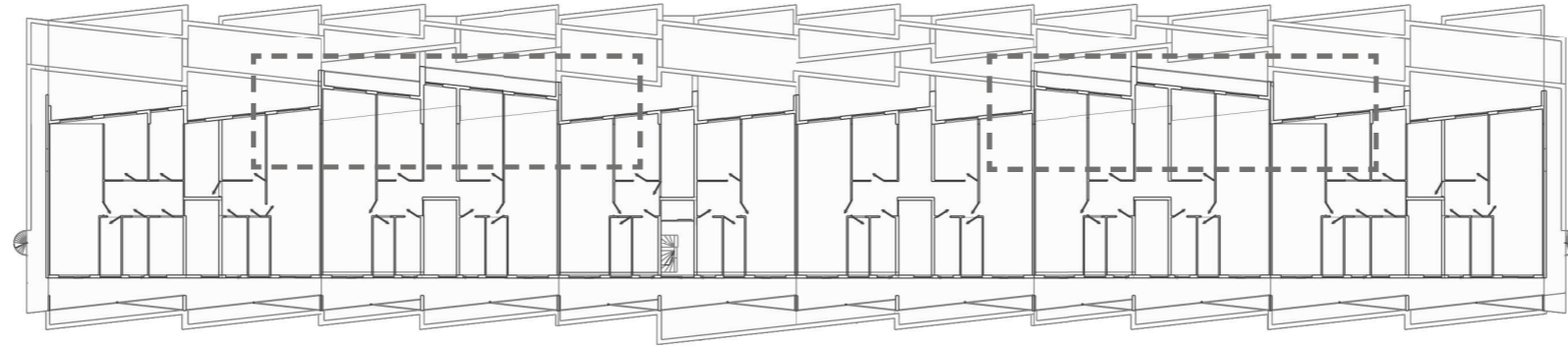


2nd FLOOR

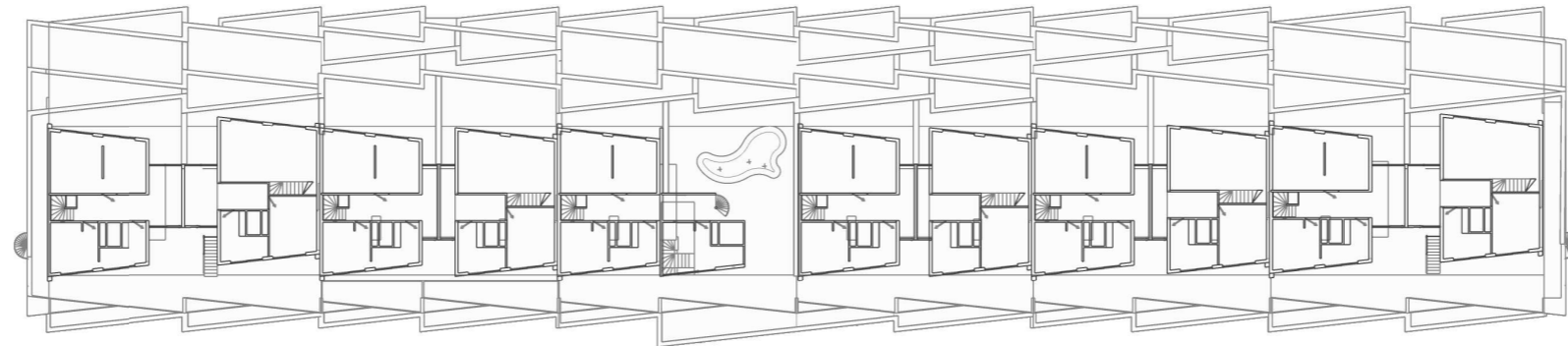


PLANS 1:500 WHOLE BUILDING

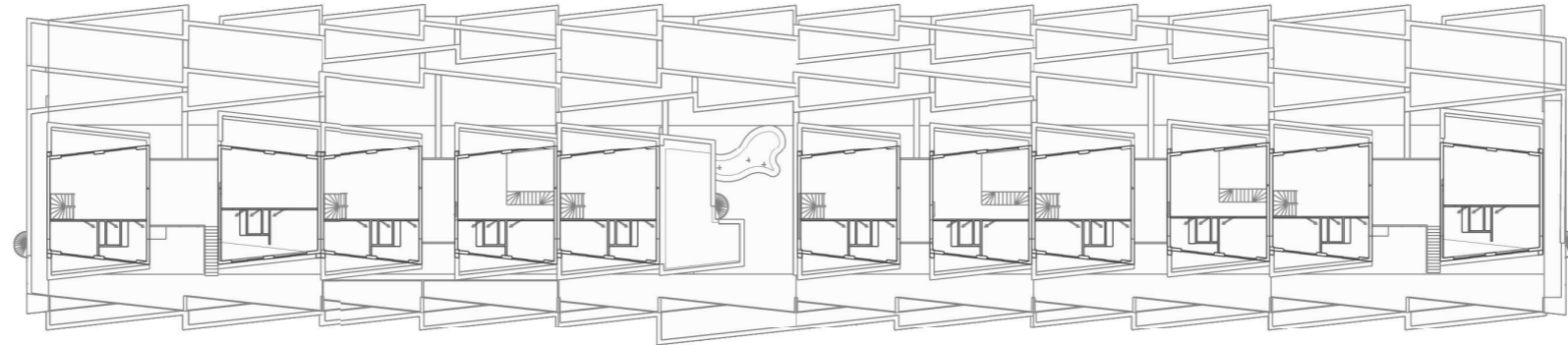
3th FLOOR



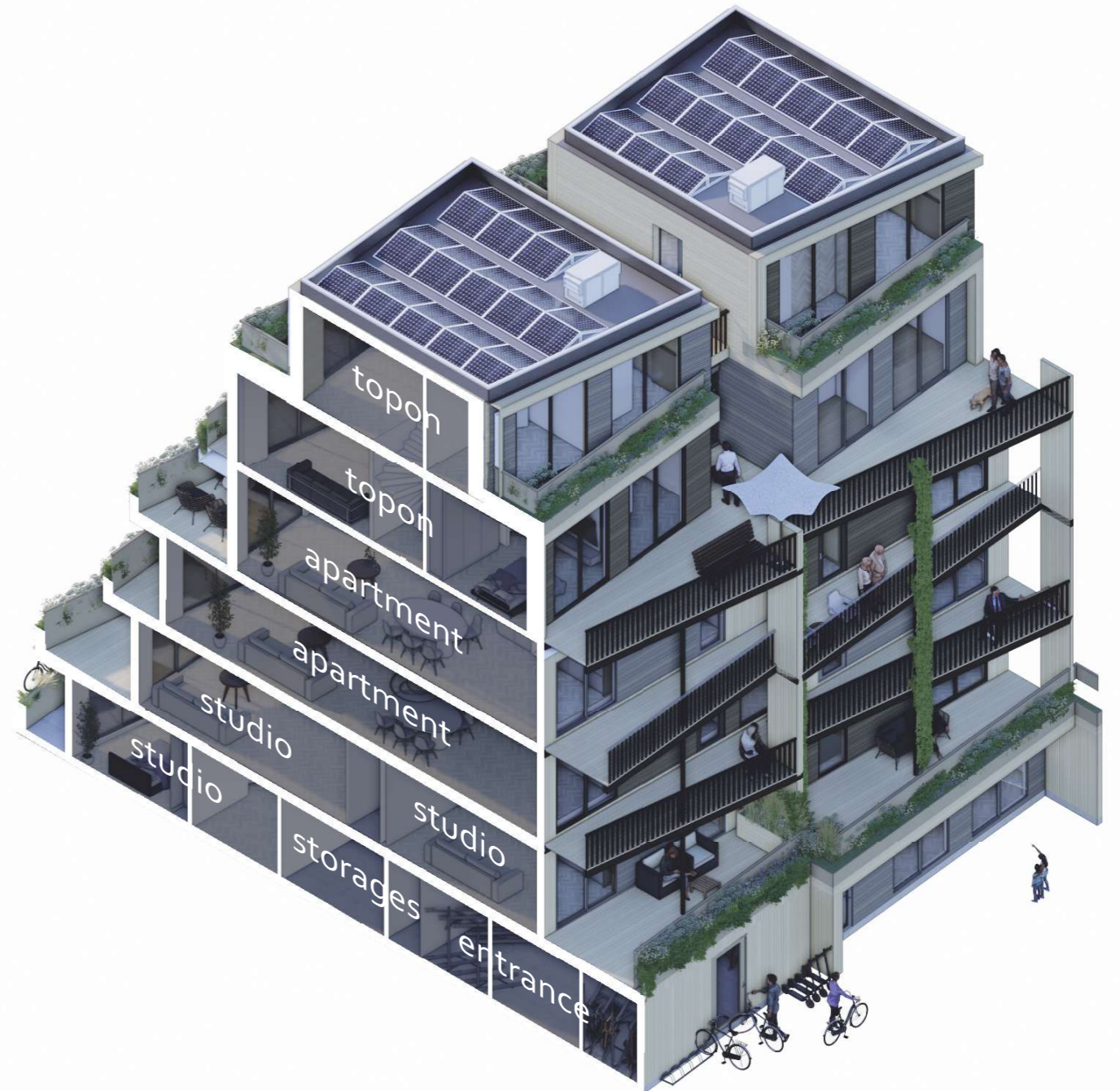
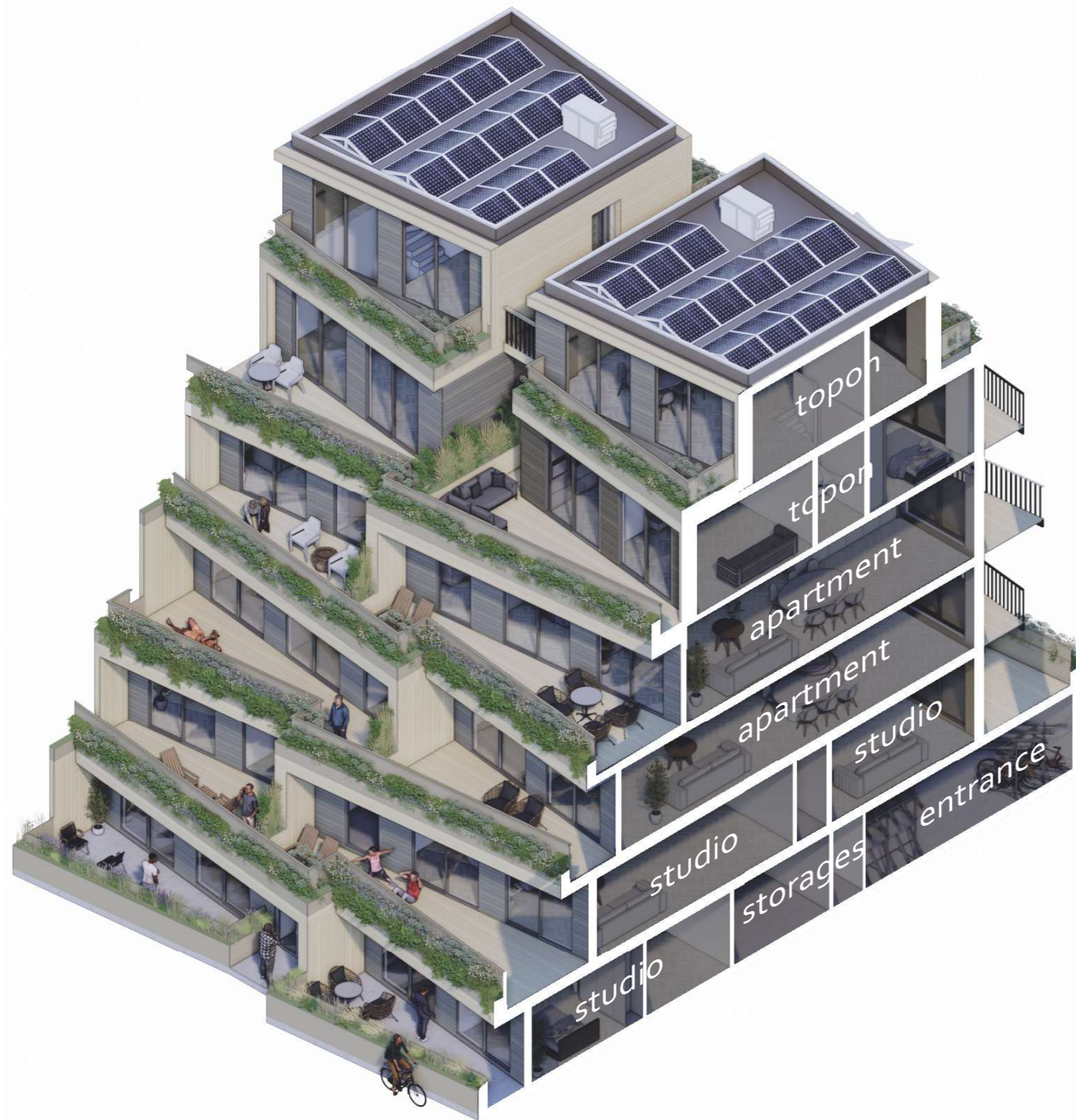
4th FLOOR



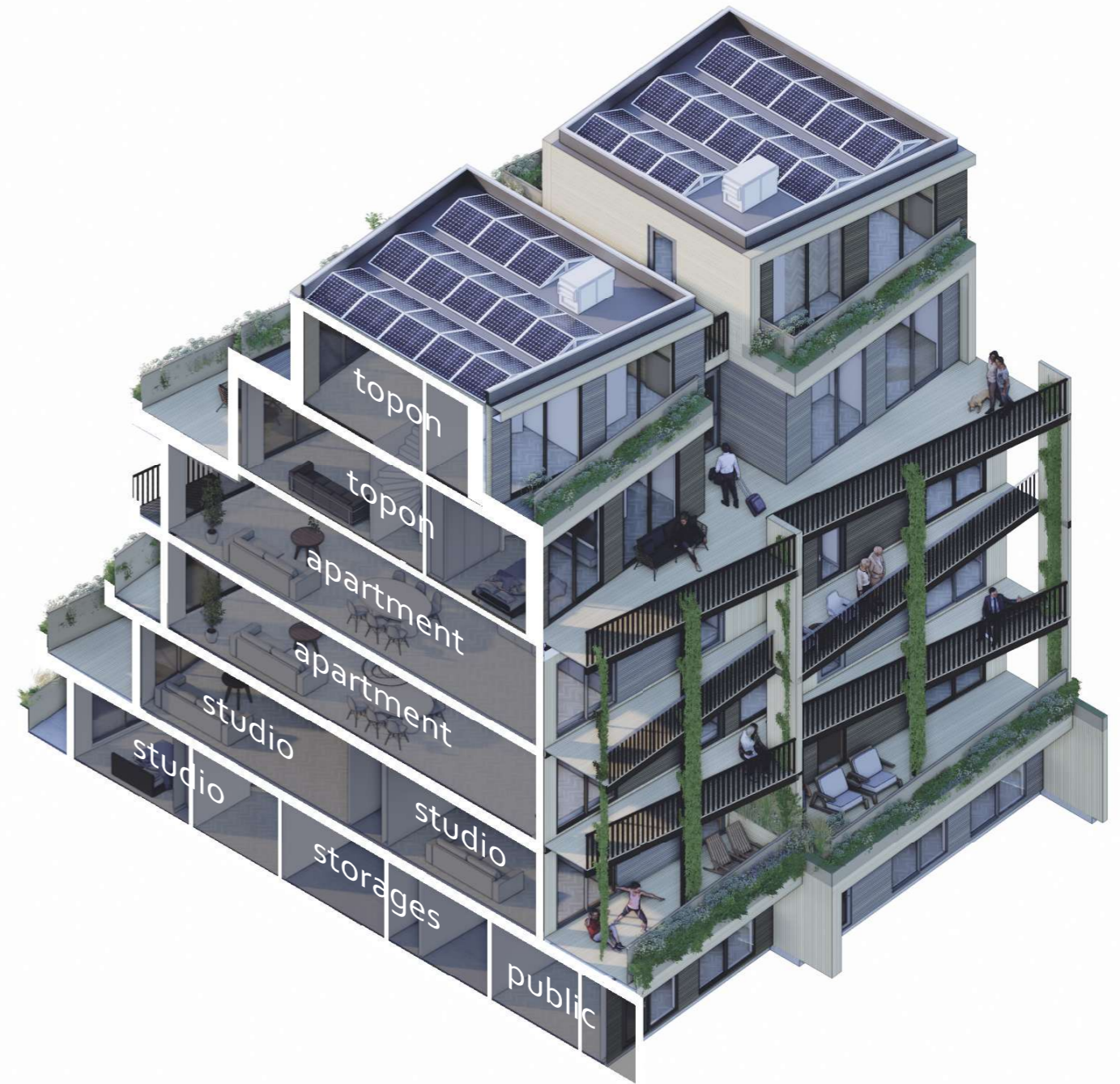
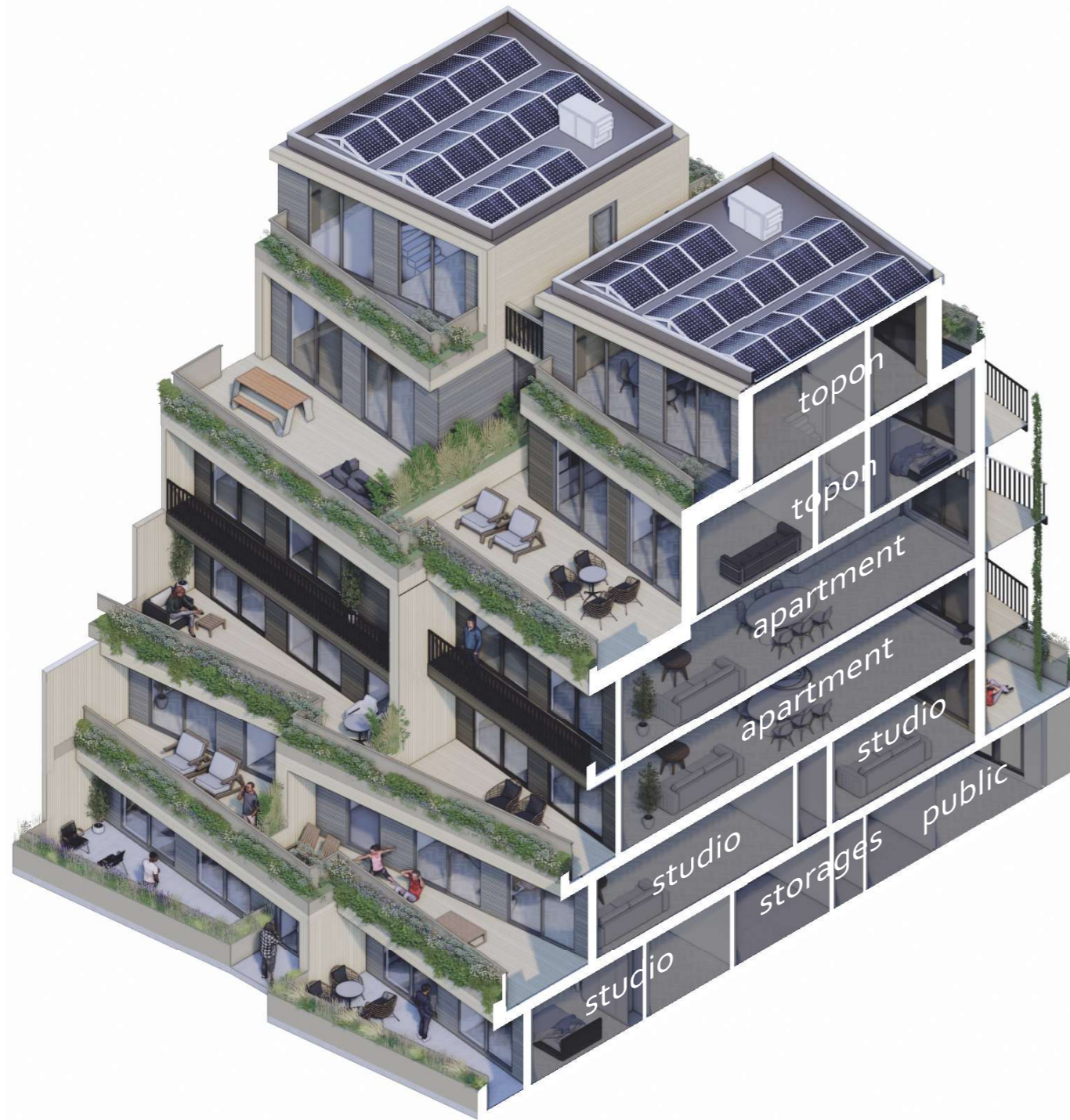
5th FLOOR



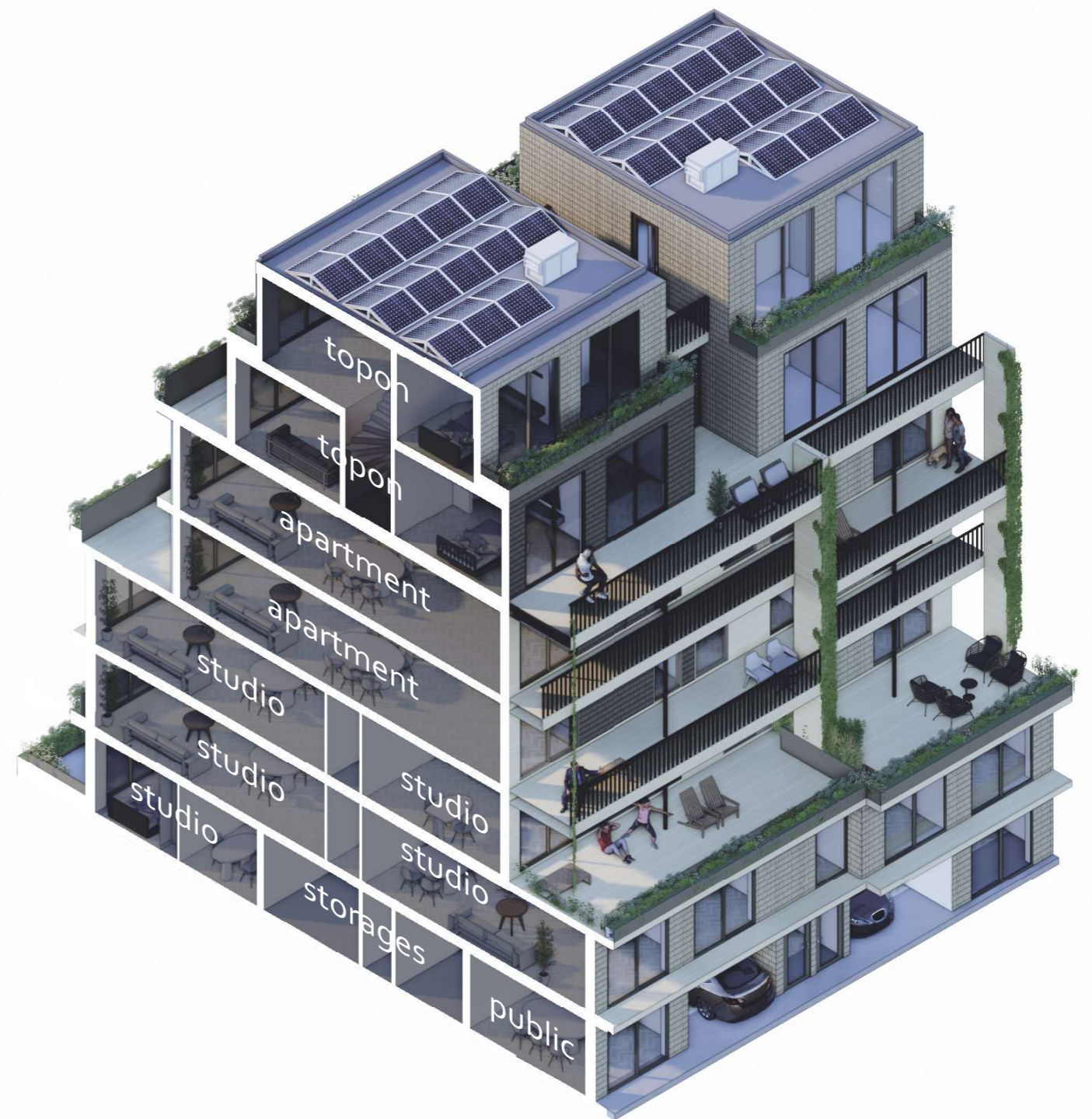
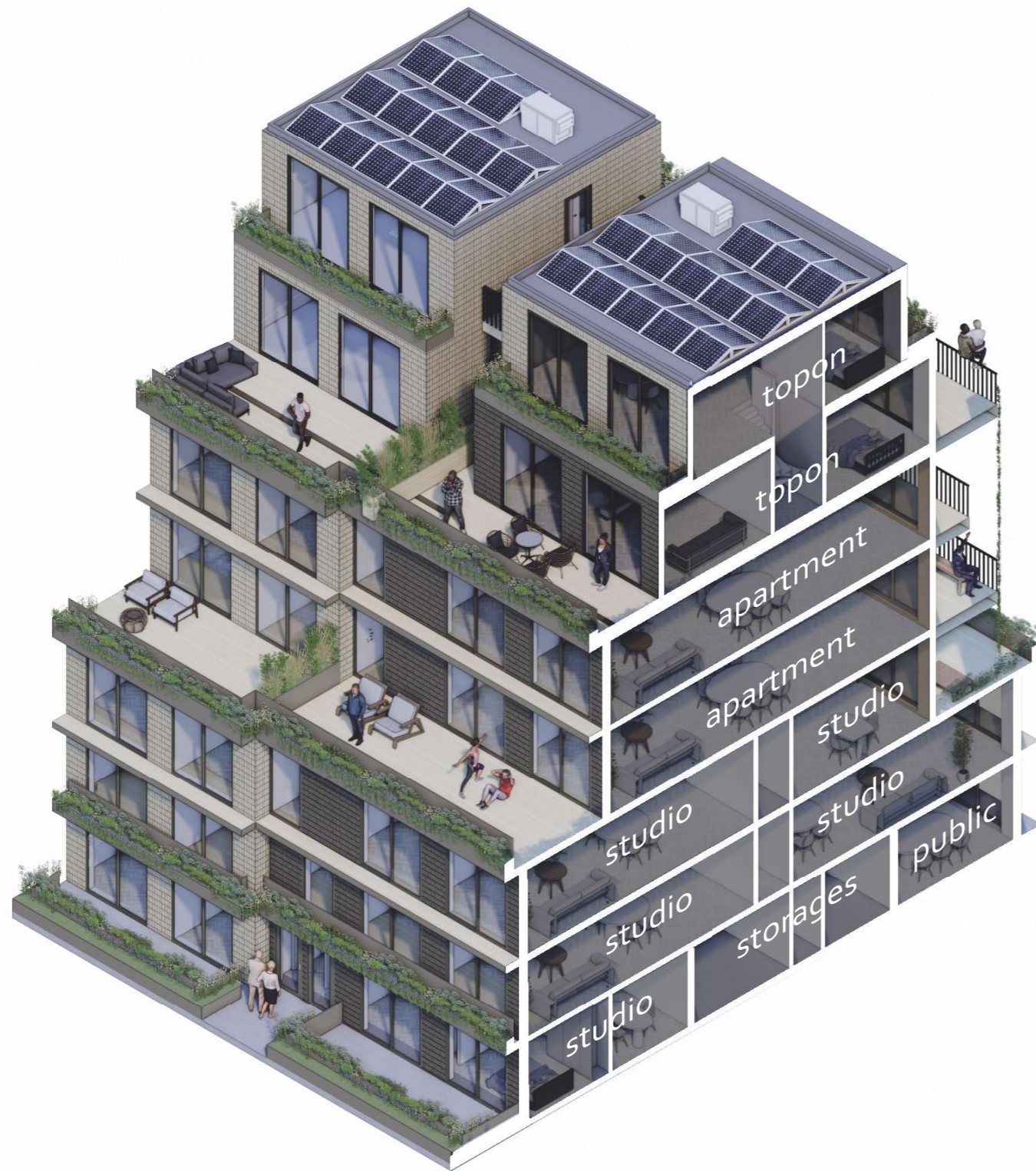
PLANS 1:500 WHOLE BUILDING



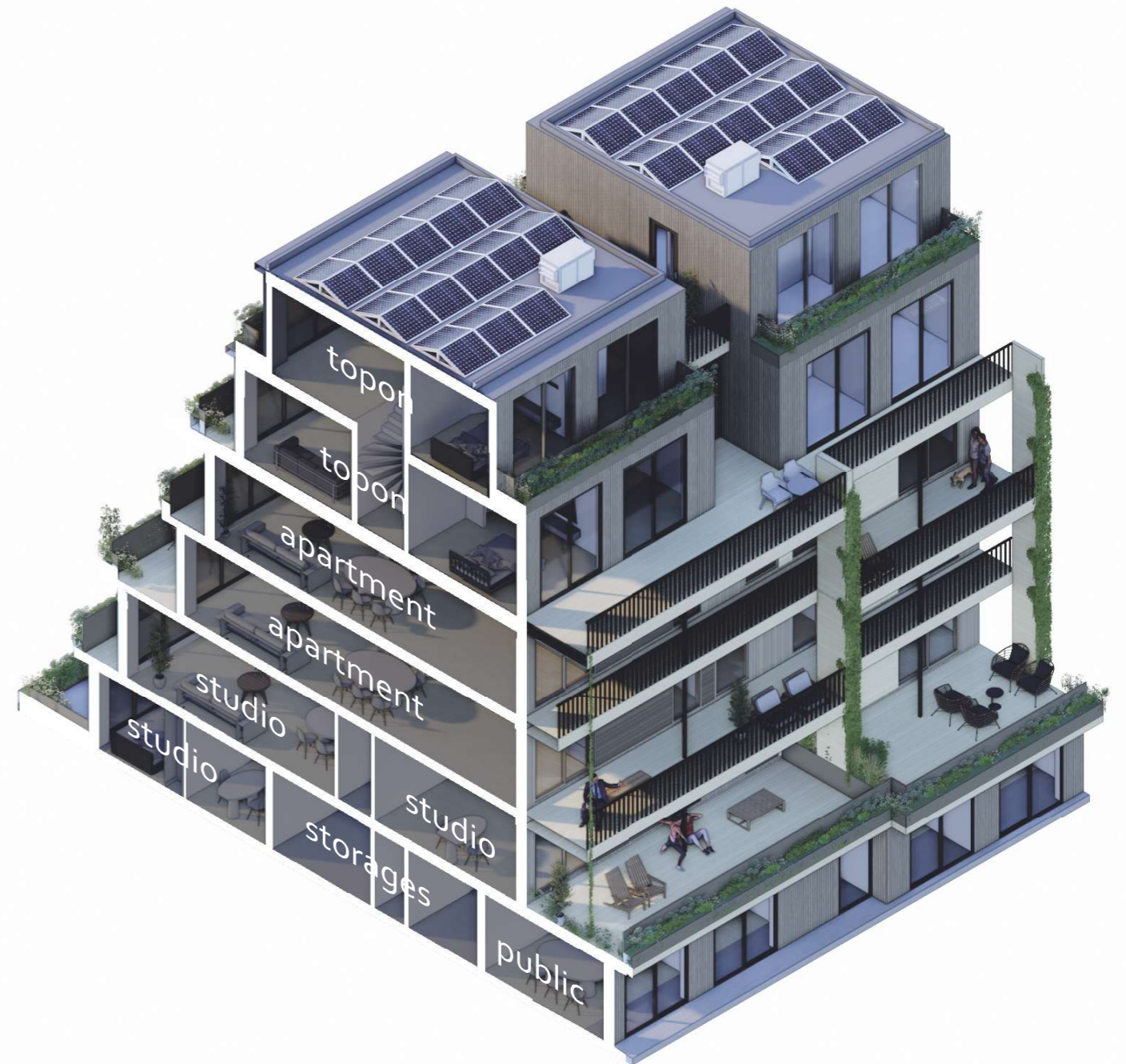
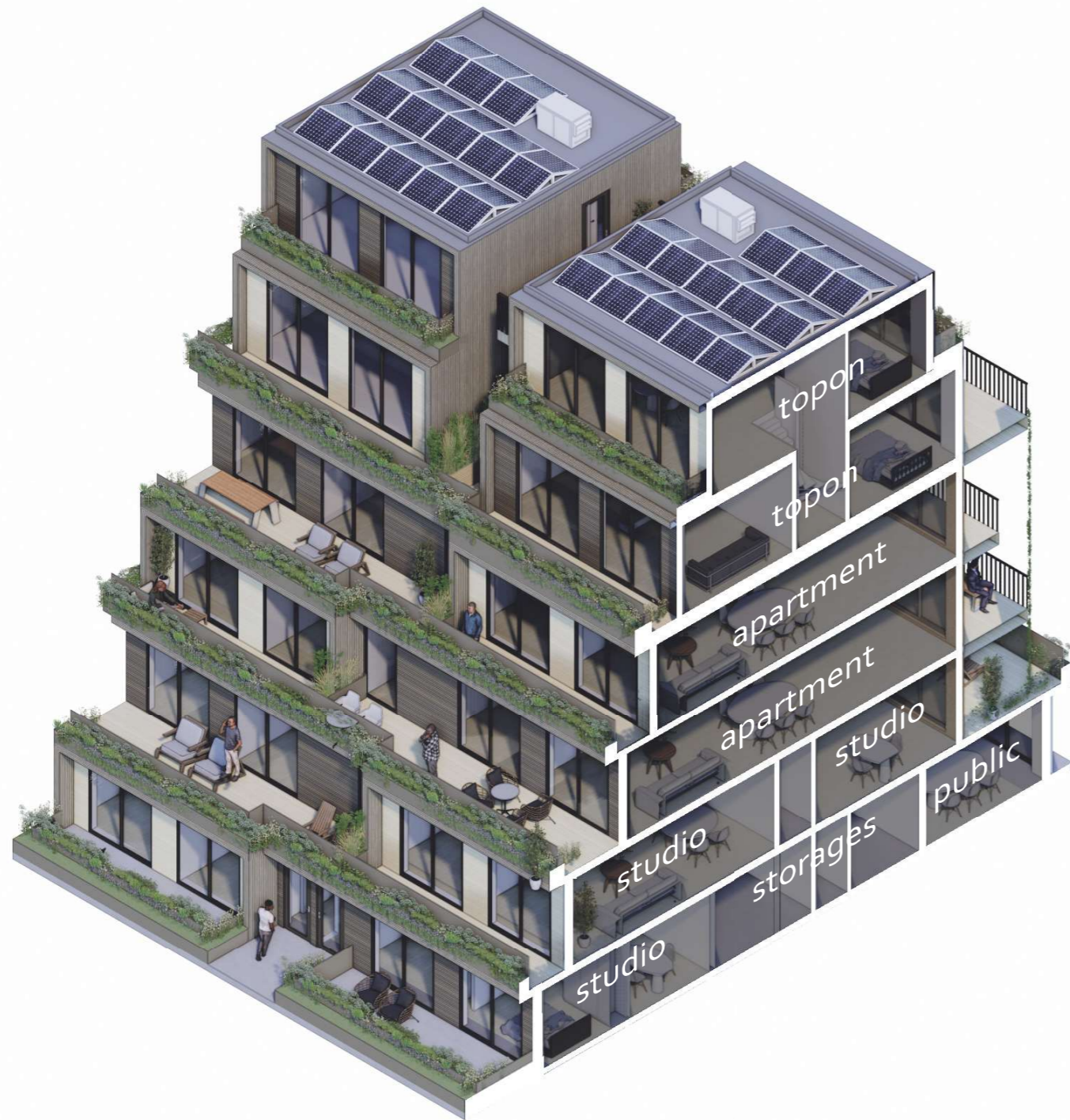
PLANS 1:500 WHOLE BUILDING



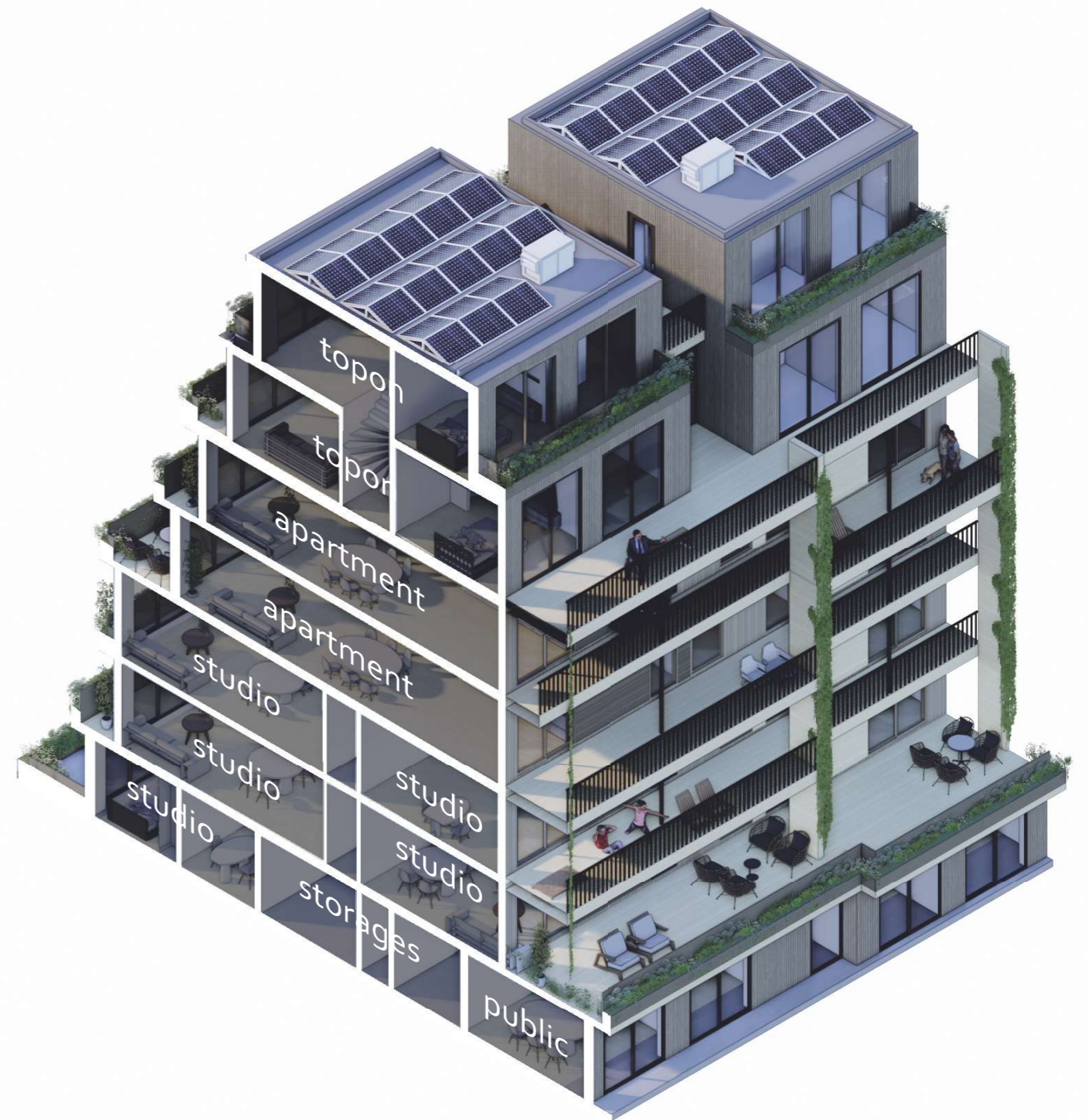
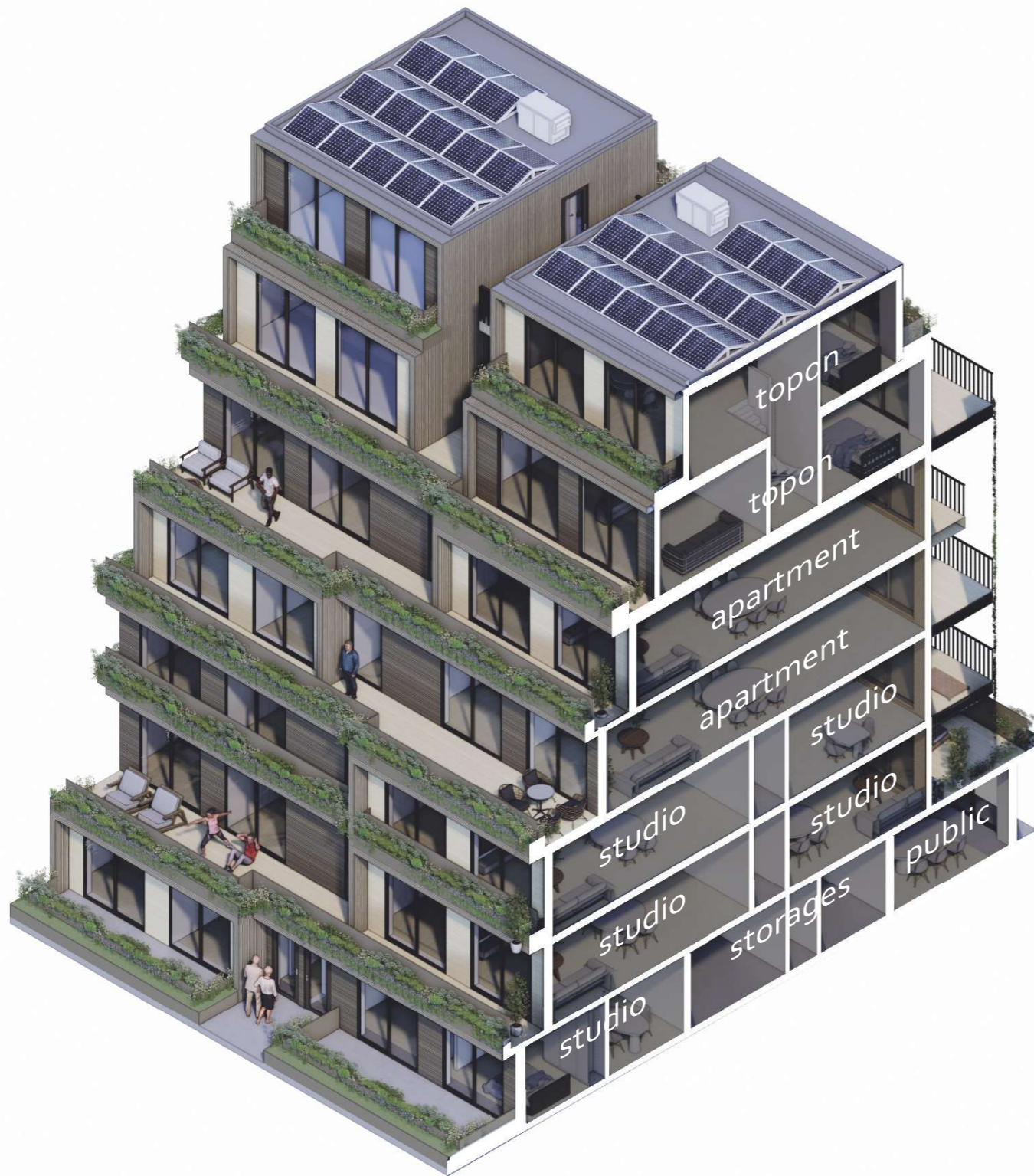
PLANS 1:500 WHOLE BUILDING



PLANS 1:500 WHOLE BUILDING



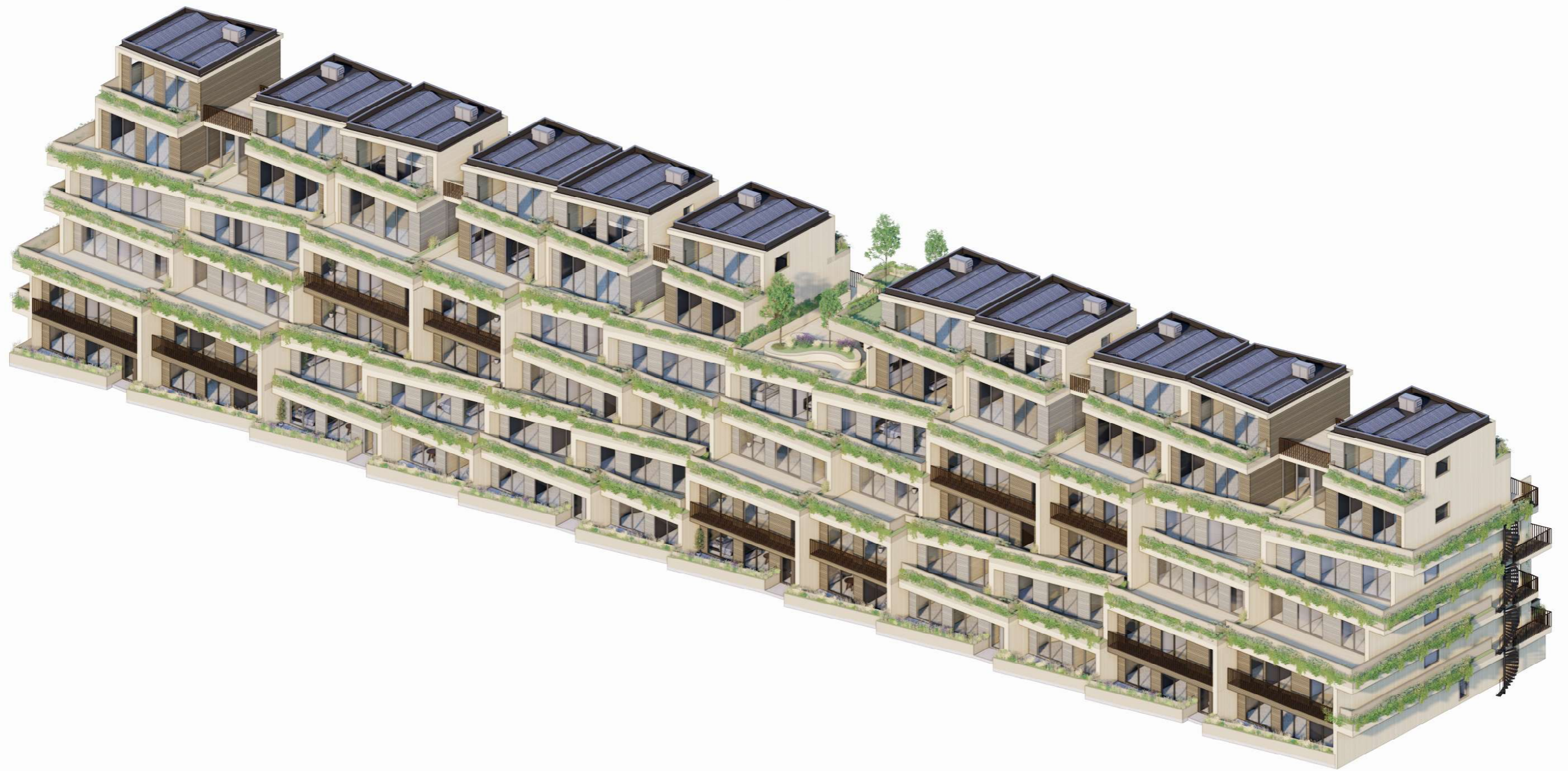
PLANS 1:500 WHOLE BUILDING



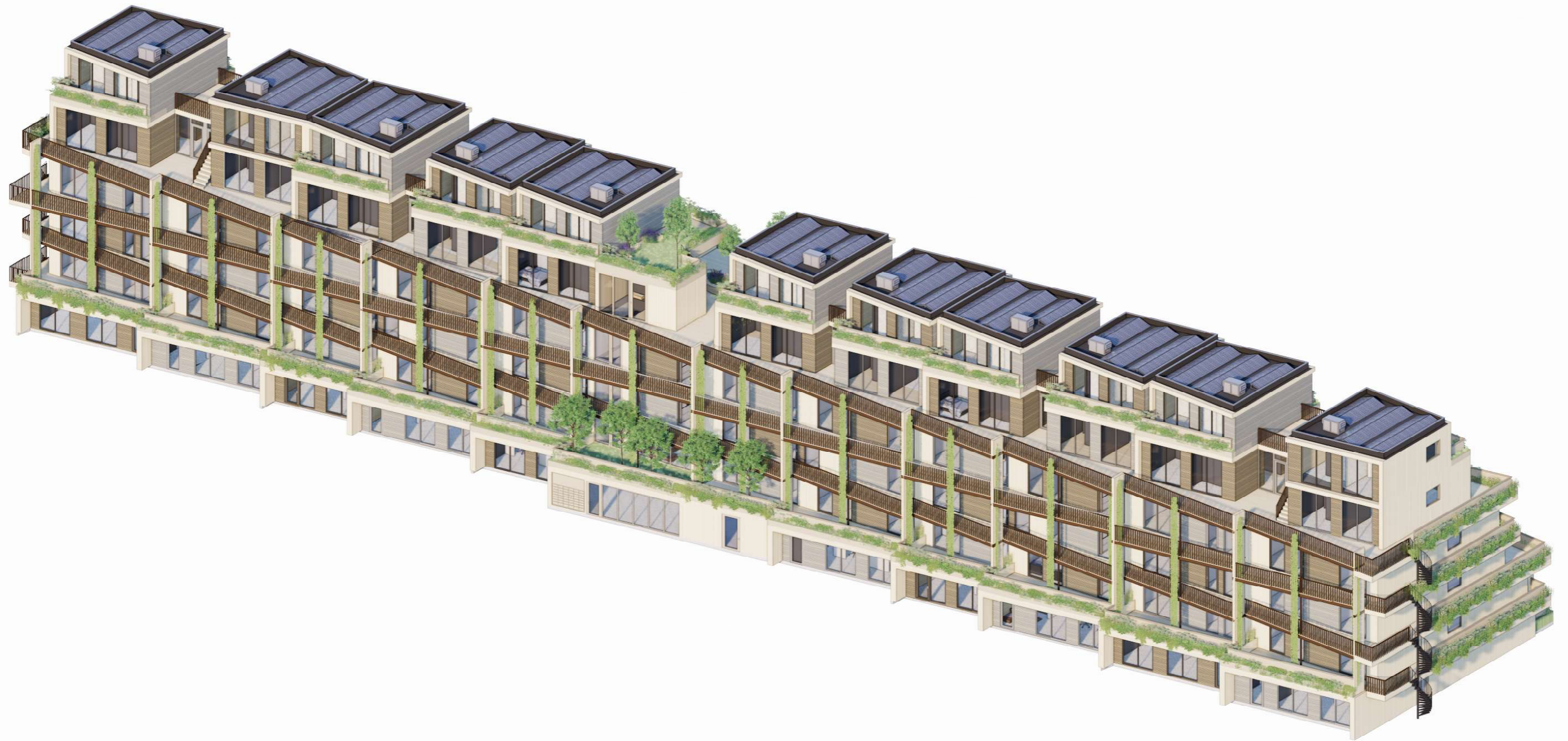
BUILDING ELEVATIONS 1:200 (SCALED)



ISOMETRIC



ISOMETRIC



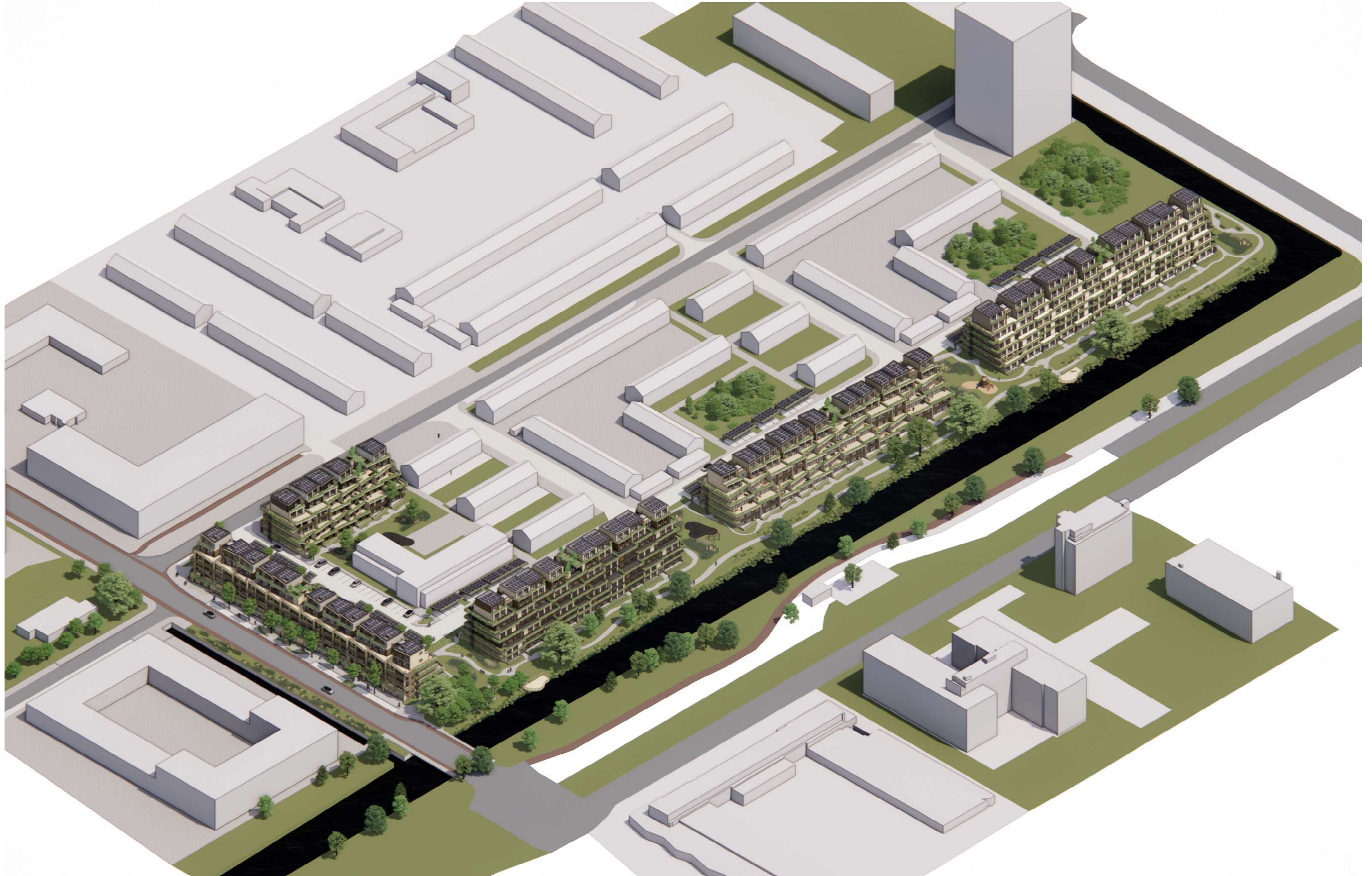
URBAN AXO BACK



URBAN AXO BACK



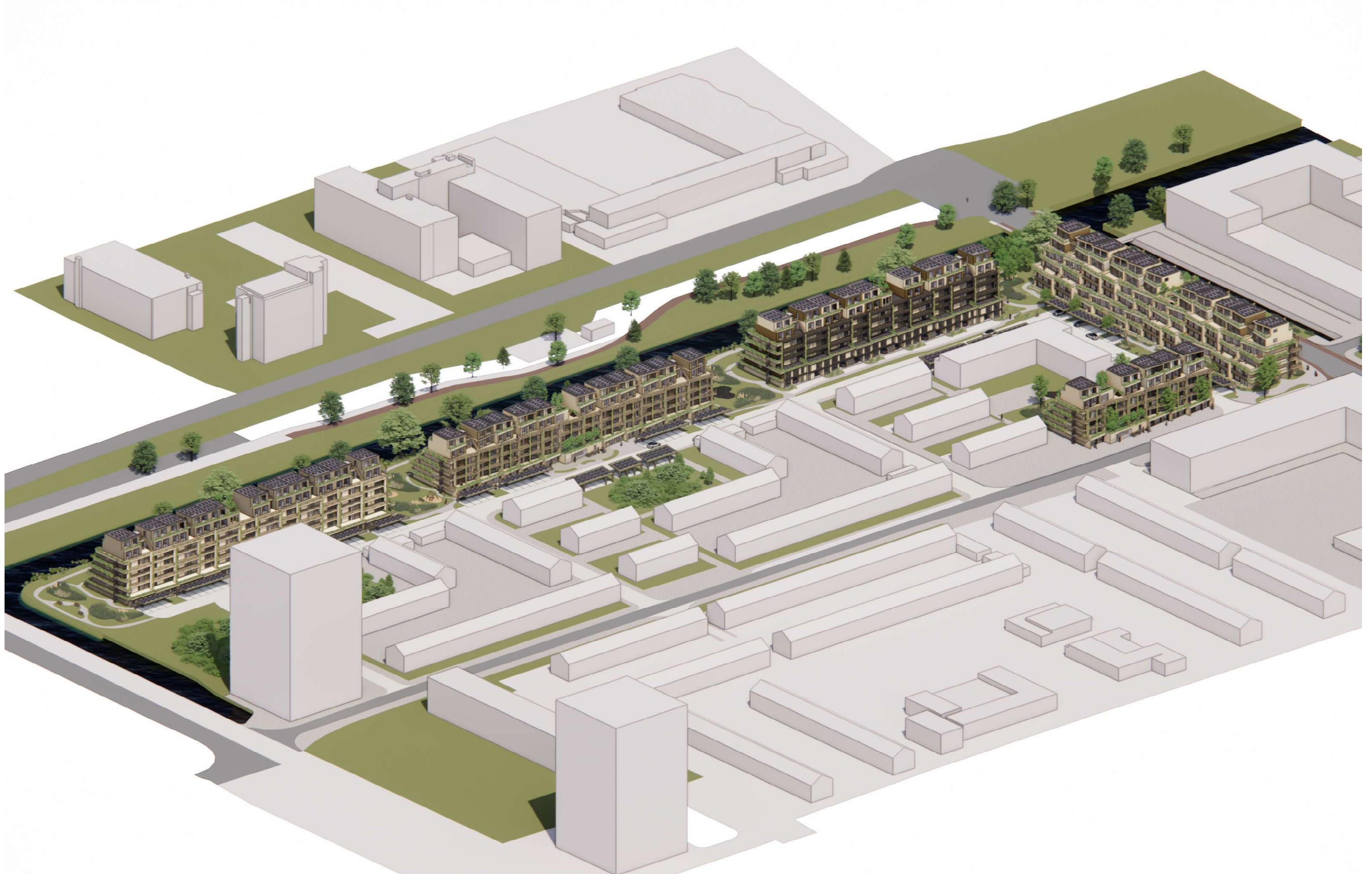
URBAN AXO



URBAN AXO



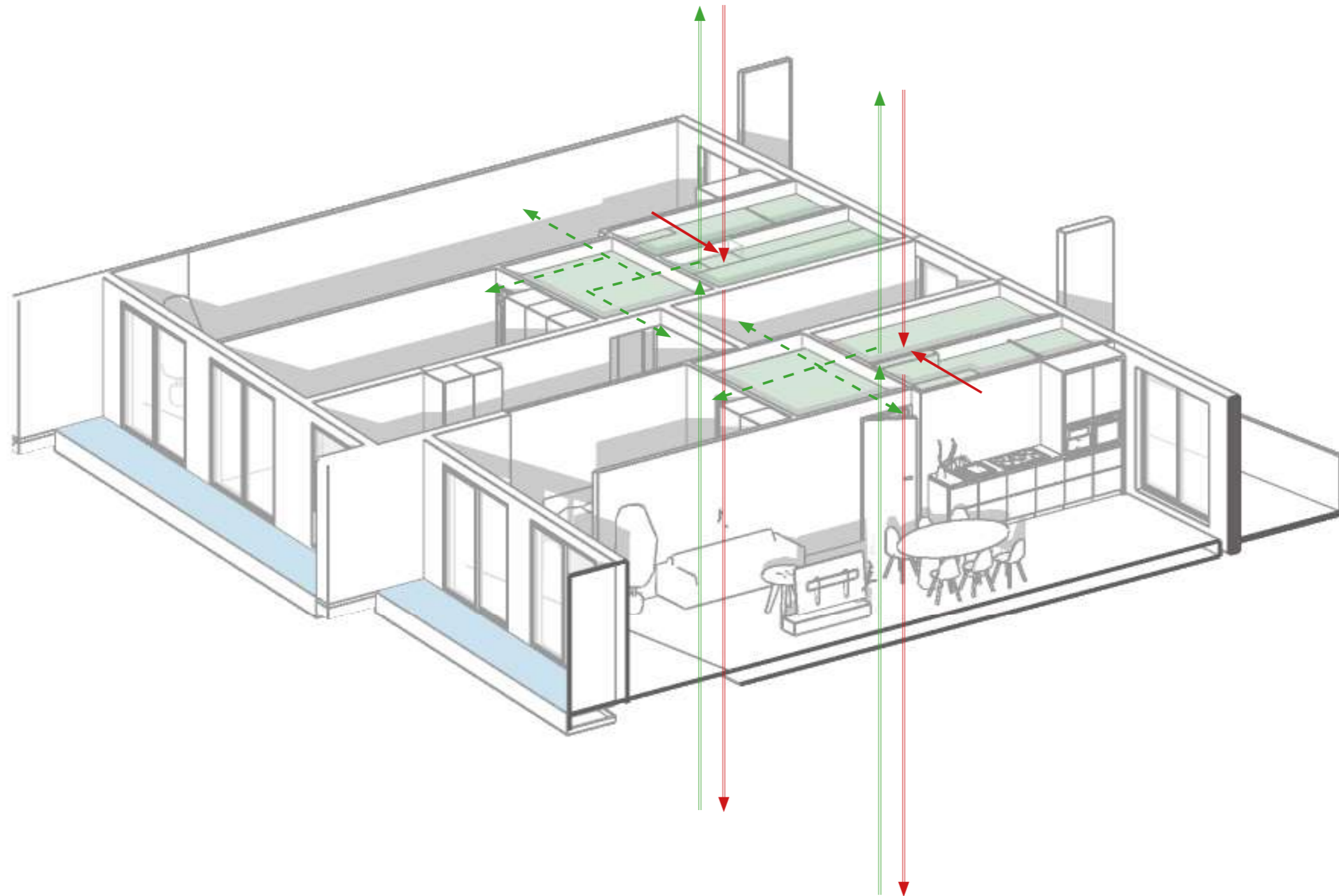
URBAN AXO



URBAN AXO



CLIMATE SCHEME



CLIMATE SCHEME

SOLAR PANELS

- 26 solar panels per roof
- 400Wp

PLANTBOXES

- With automatic watering system
- making use of rainwater

LOWERED CEILINGS

- for ventilation type D
- Cooling in summer. • Heating in winter.

FLOORHEATING

- connected to heatpump
- Cooling in summer. • Heating in winter.

THERMAL HEATING STORAGE

- Open Aquifer Thermal Energy Storage system
- Cooling in summer. • Heating in winter.

VENTILATION BOX

- type D collective. 1200x 650x 800mm

RAIN WATER

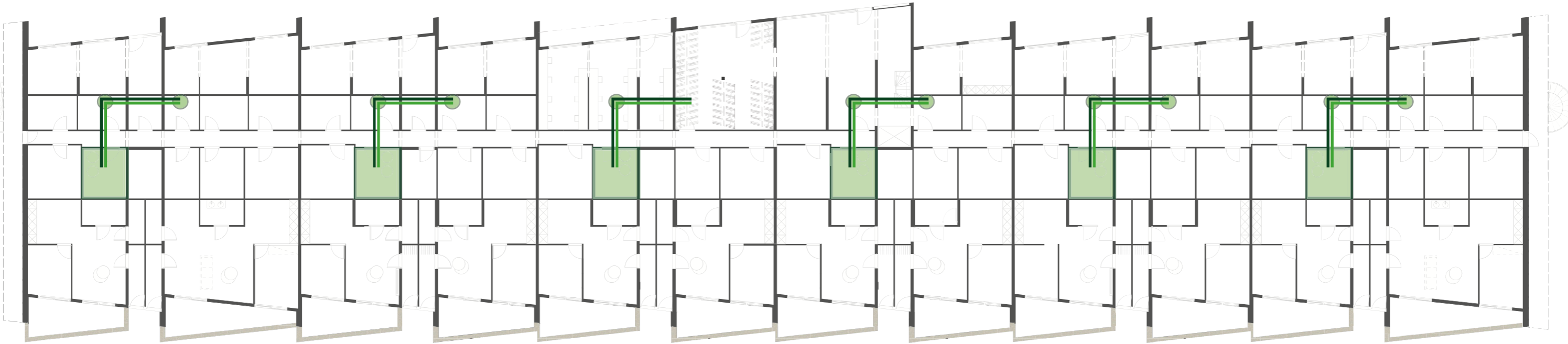
- used for plantboxes

PIPE DUCT

- riser pipes toilettes
- ventilation ducts
- plumbing pipes

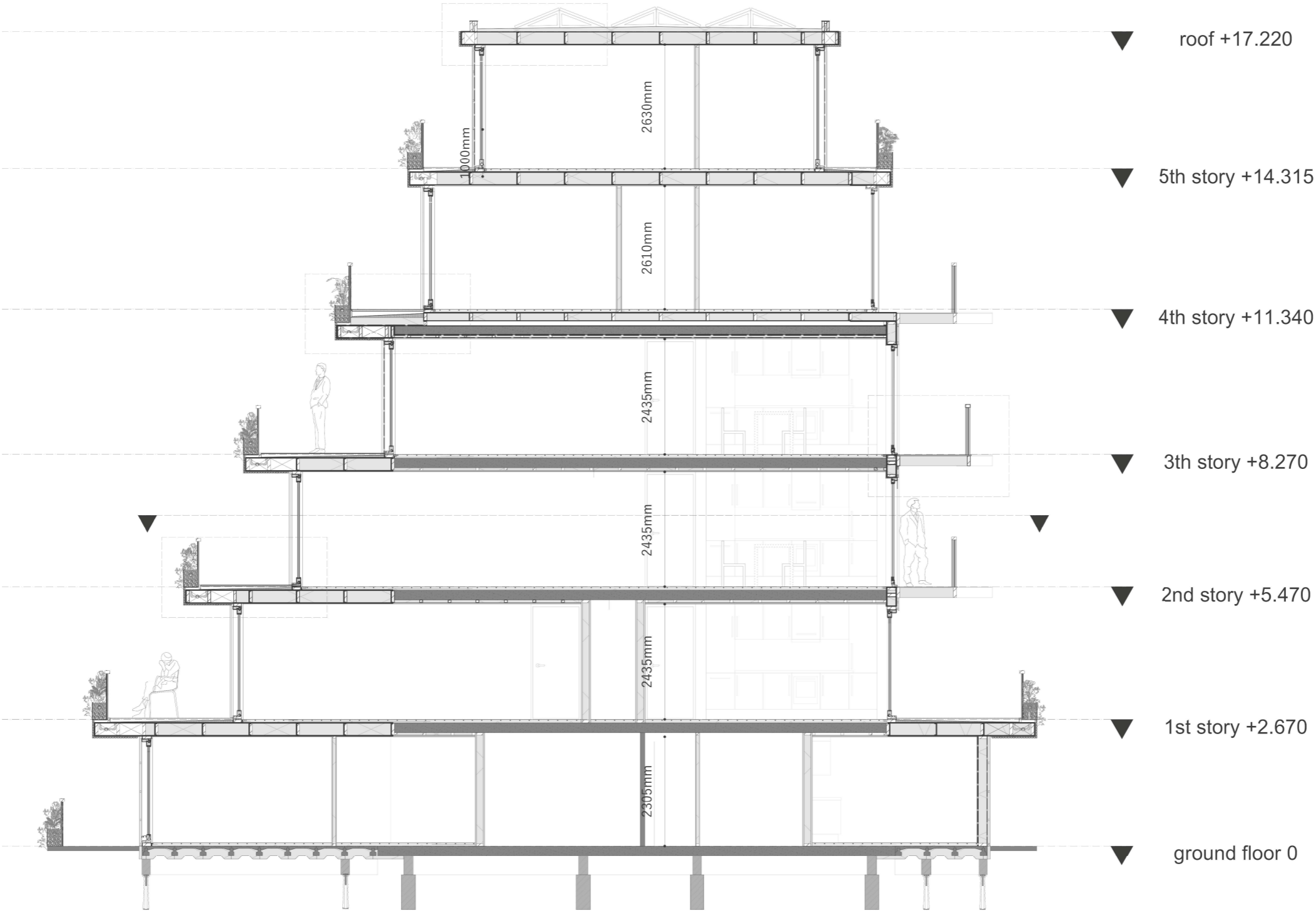
TECHNICAL ROOM

- with heatpump
- Insulated for noise

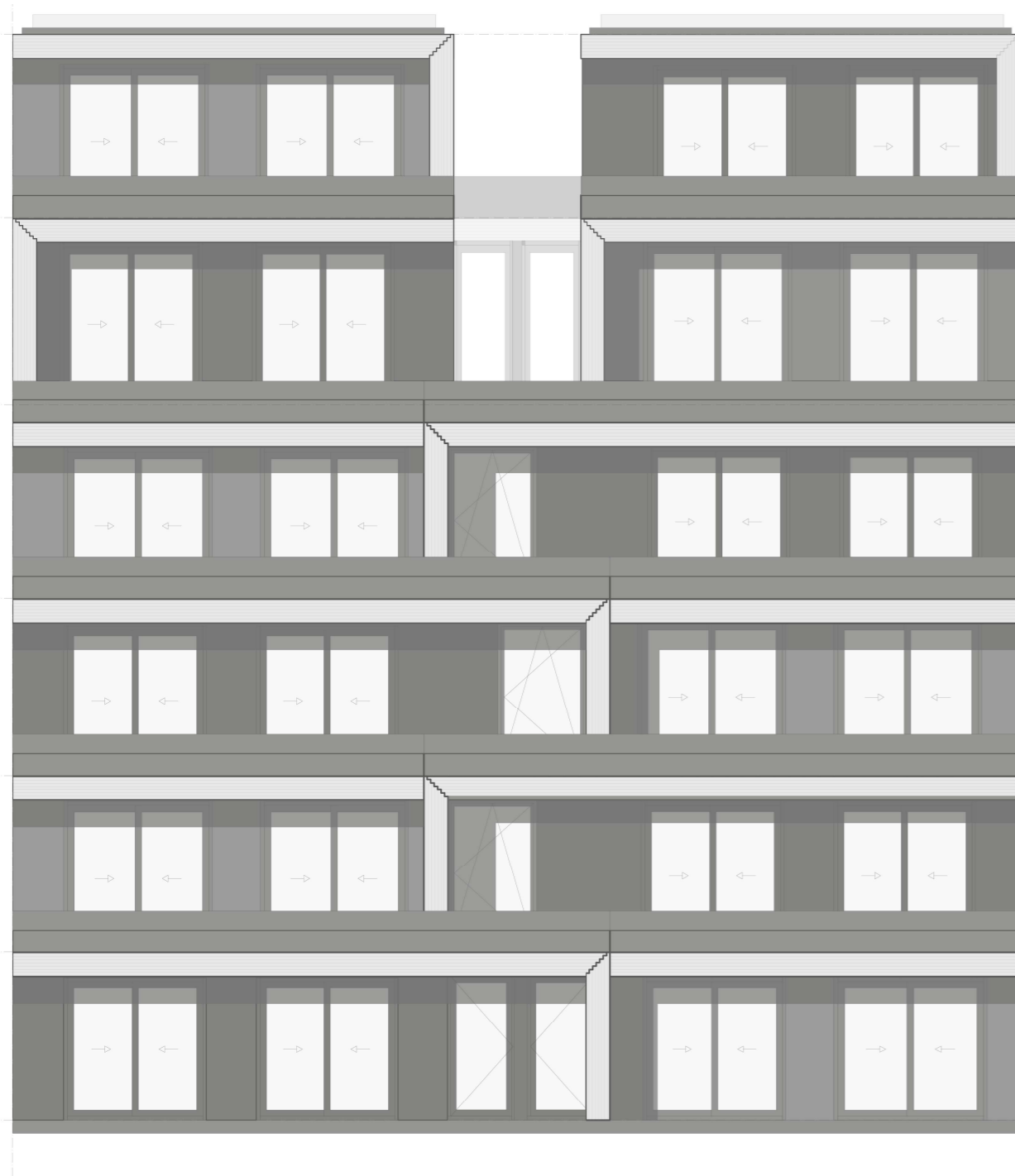


TECHNICAL DETAILS

BUILDING SECTION TECHNICAL 1:100



FACADE AND HORIZONTAL SECTION 1:100



roof +17.220

5th story +14.315

4th story +11.340

3th story +8.270

2nd story +5.470

1st story +2.670

ground floor 0



roof +17.220

5th story +14.315

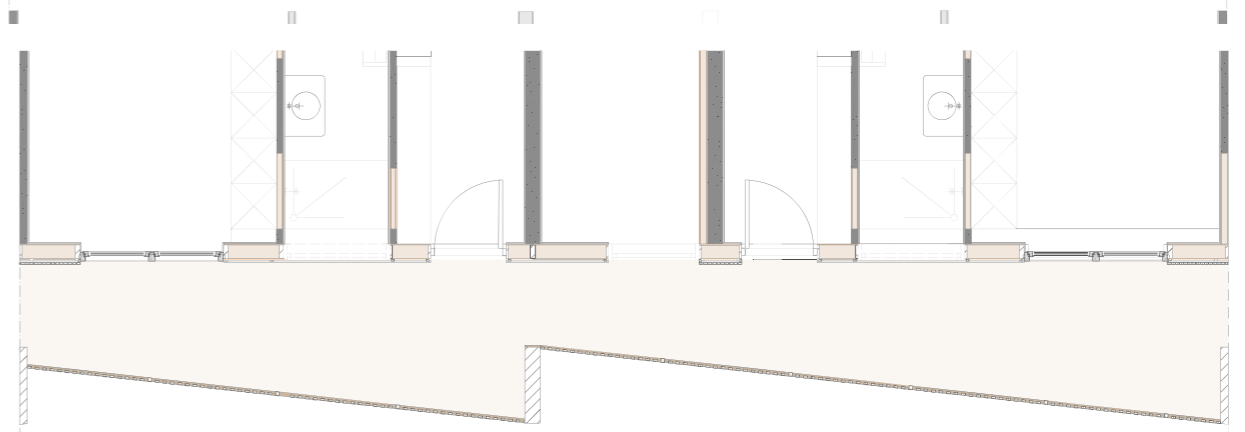
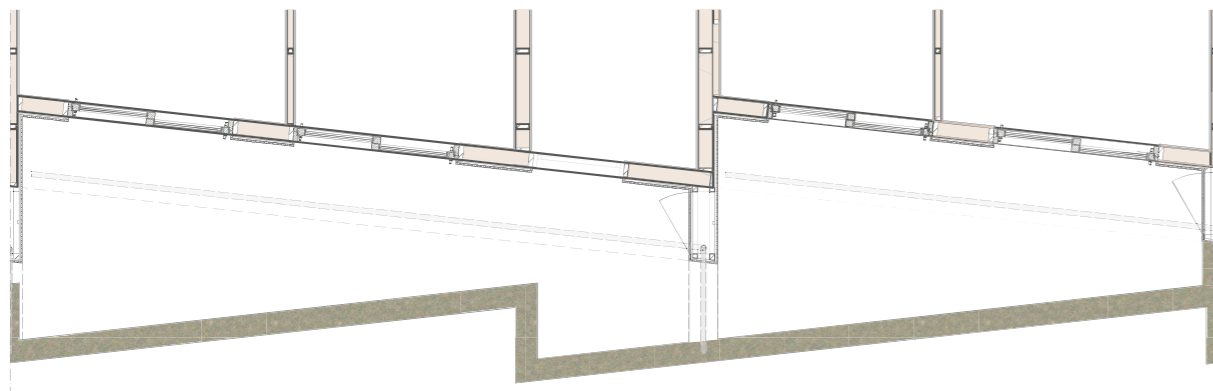
4th story +11.340

3th story +8.270

2nd story +5.470

1st story +2.670

ground floor 0



FACADE AND HORIZONTAL SECTION 1:100



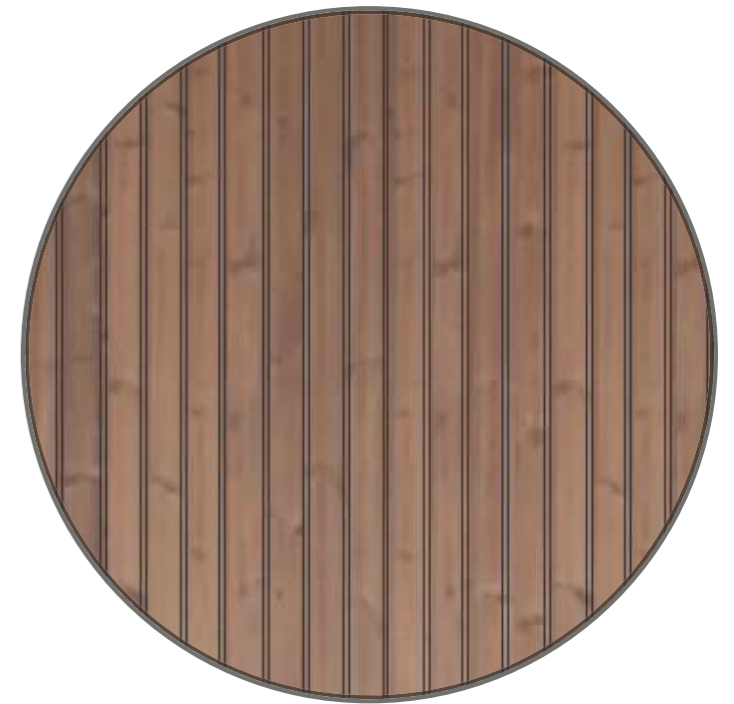
BIOBASED COMPOSITE
planters



THERMOWOOD NATURAL
facade horizontal



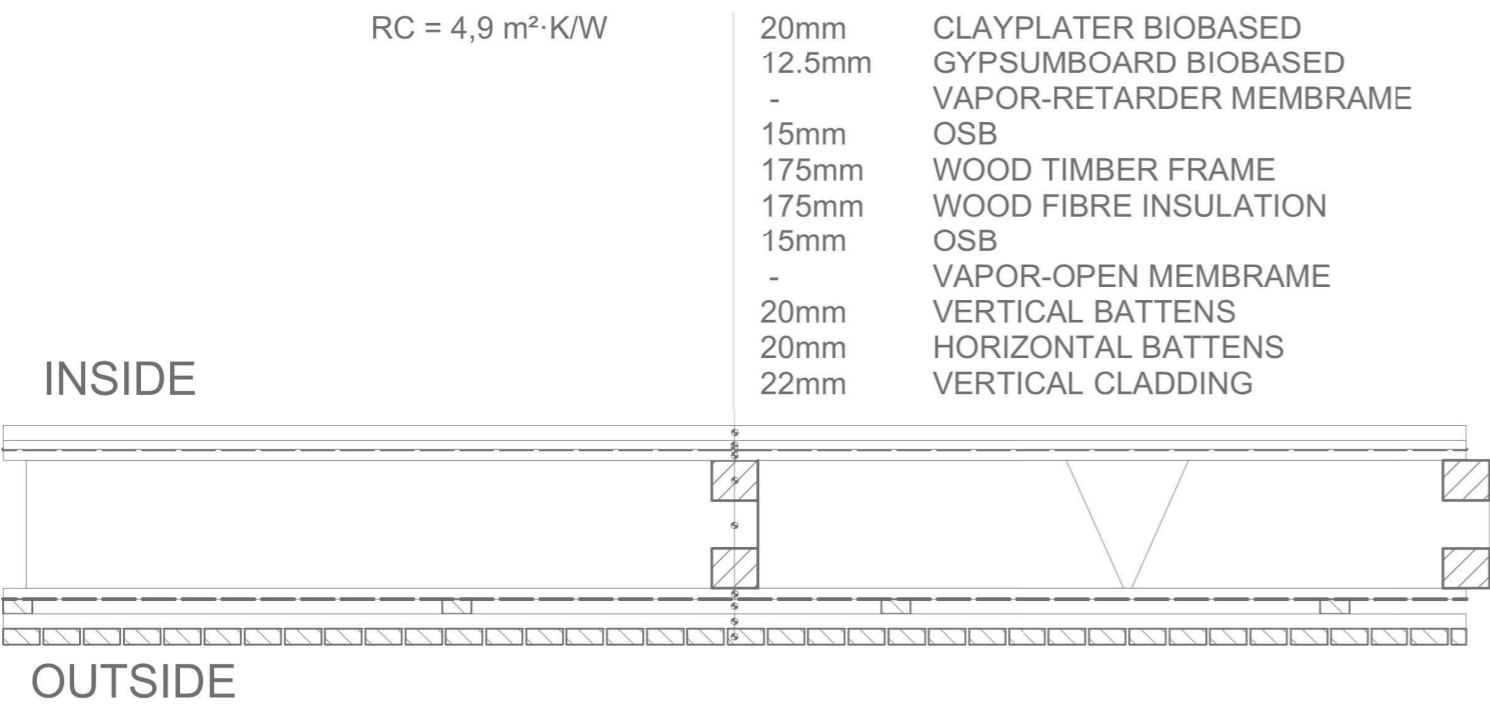
THERMOWOOD GREY
facade vertical infill



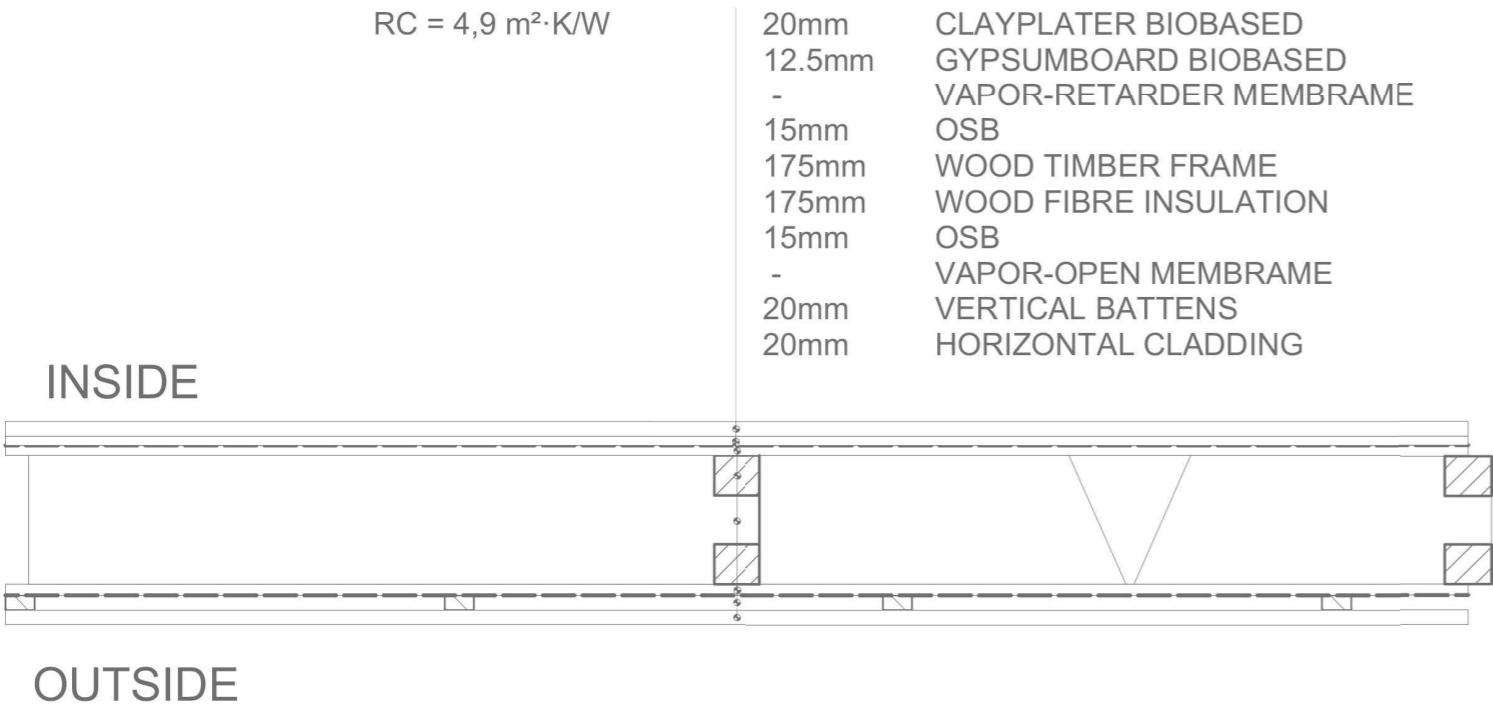
THERMOWOOD BROWN
facade vertical infill

WALL- AND ROOF PACKAGES 1:10

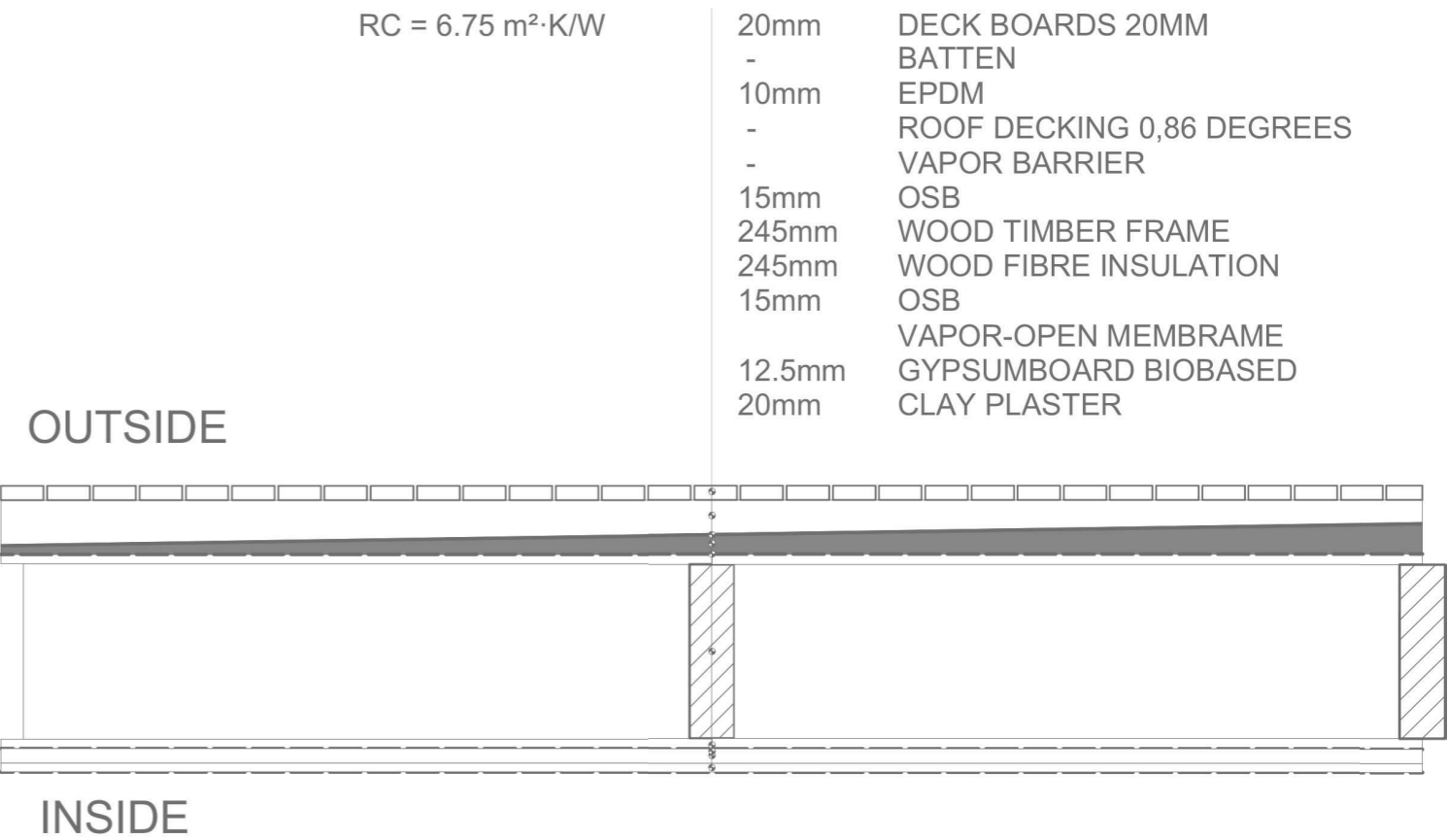
WALL PACKAGE HORIZONTAL SECTION 1:10



WALL PACKAGE HORIZONTAL SECTION 1:10

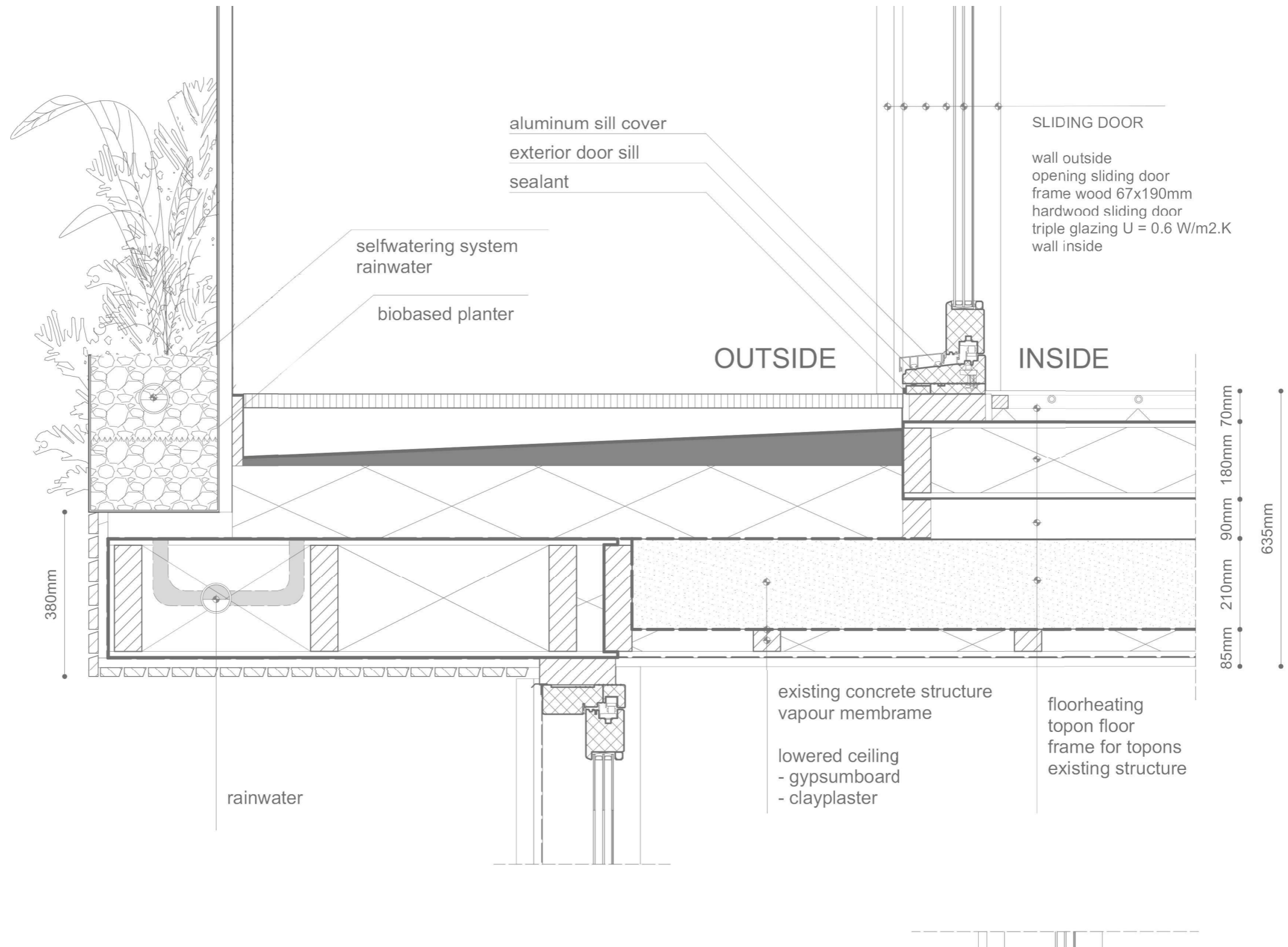


ROOF PACKAGE VERTICAL SECTION 1:10

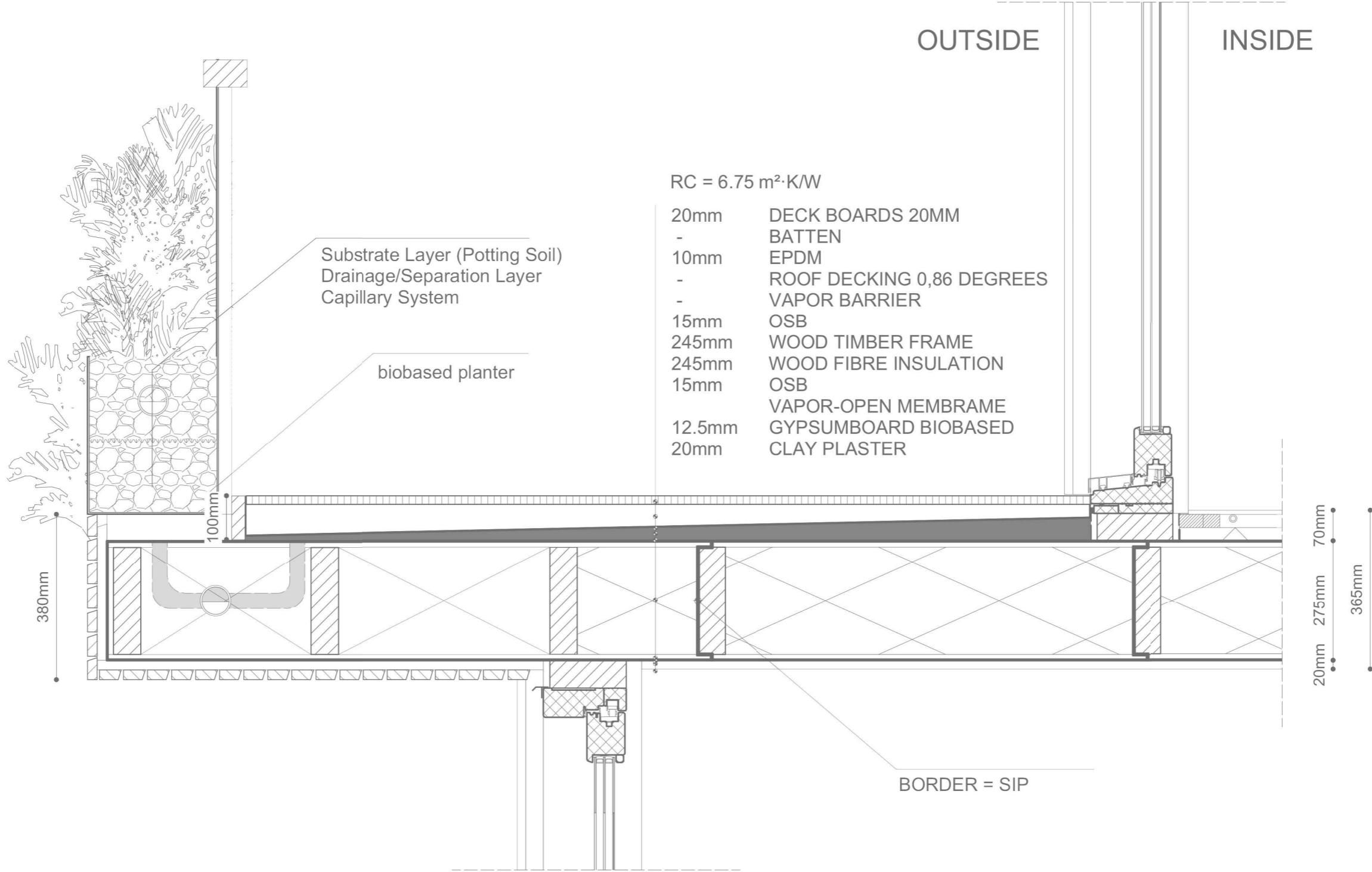


DETAIL 1:10

VERTICAL SECTION EXISTING AND EXTENSION



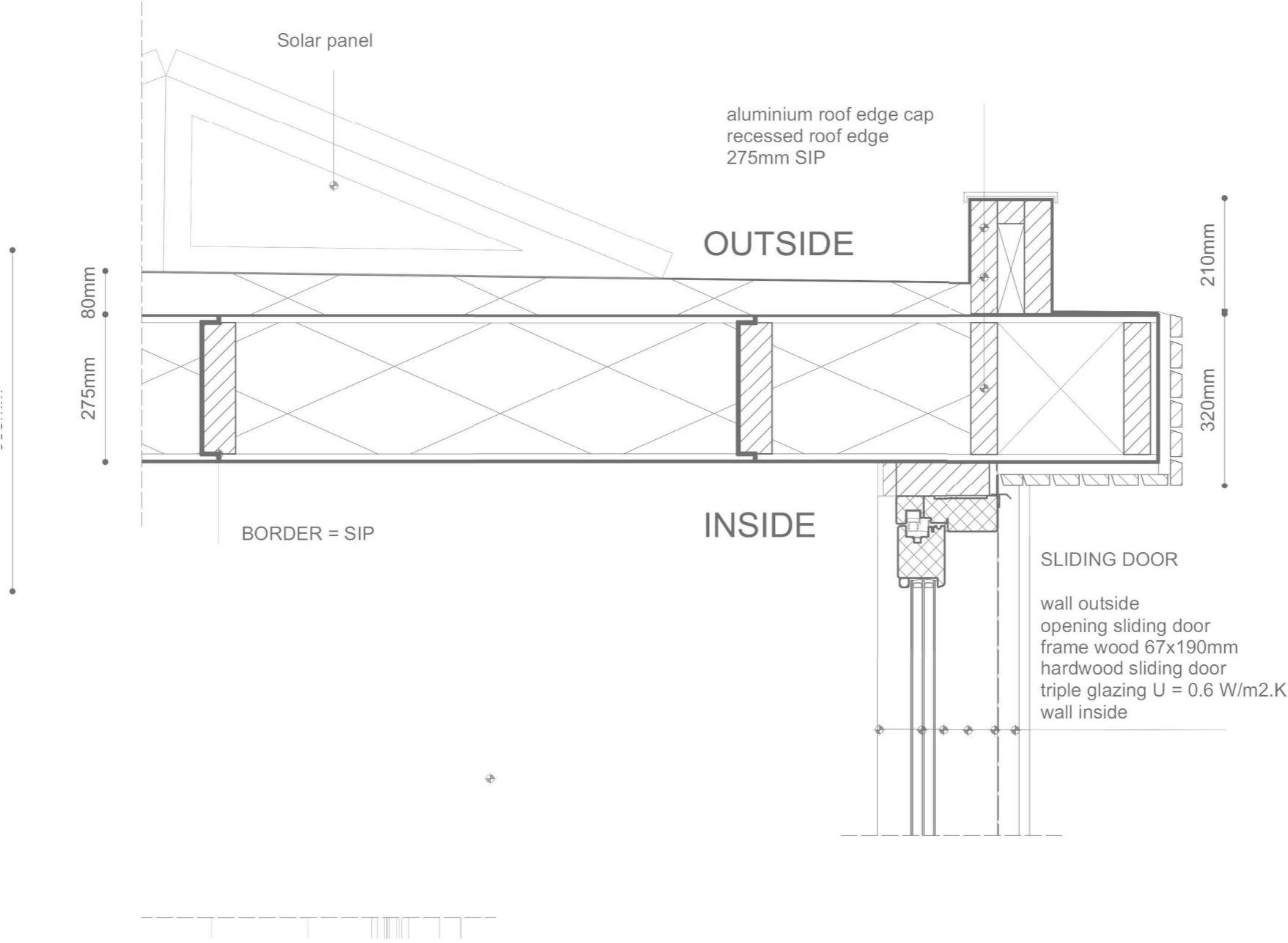
DETAIL 1:10
VERTICAL SECTION OF EXTENSION



Vector

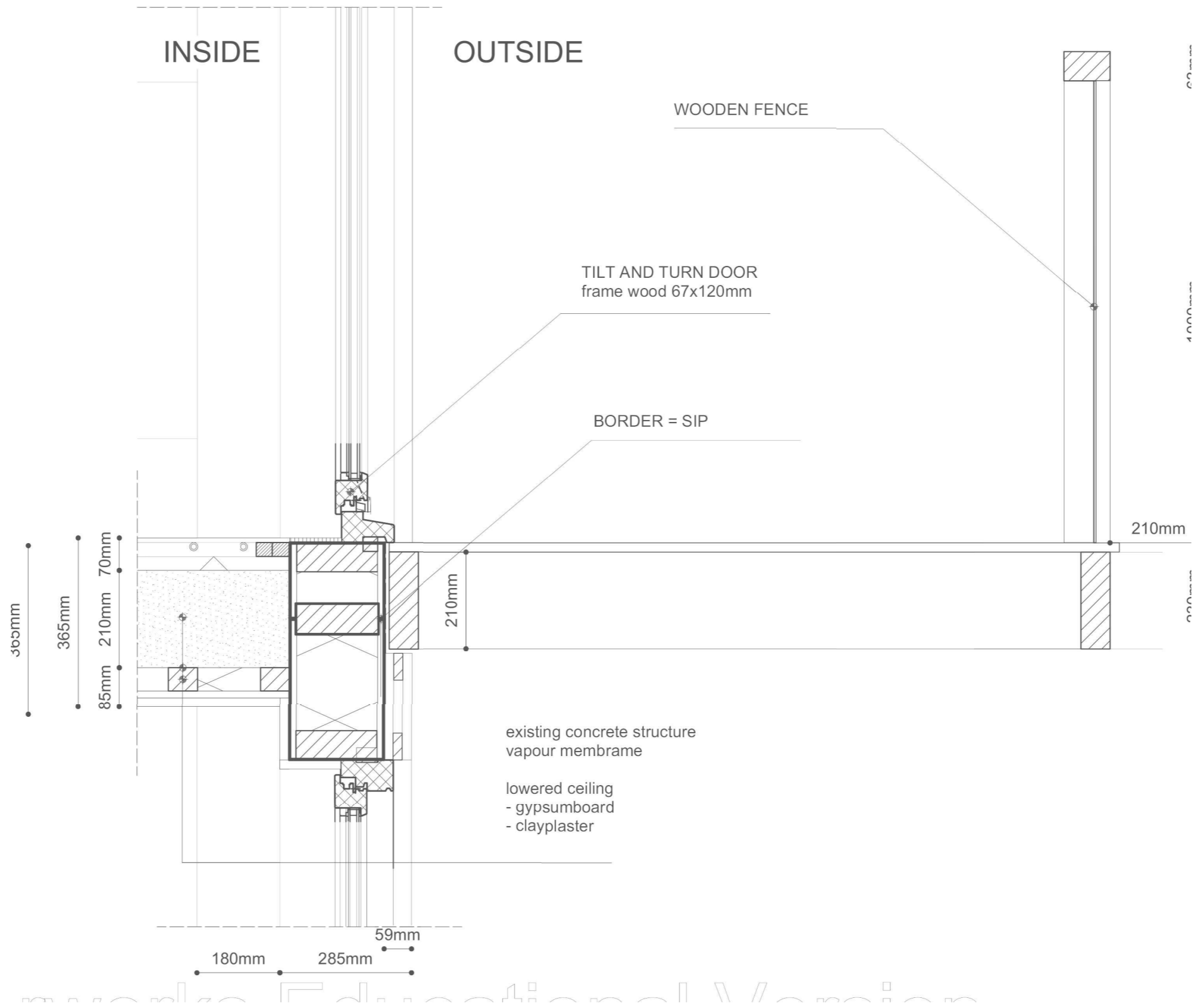
DETAIL 1:10

VERTICAL SECTION RECESSED ROOF EDGE

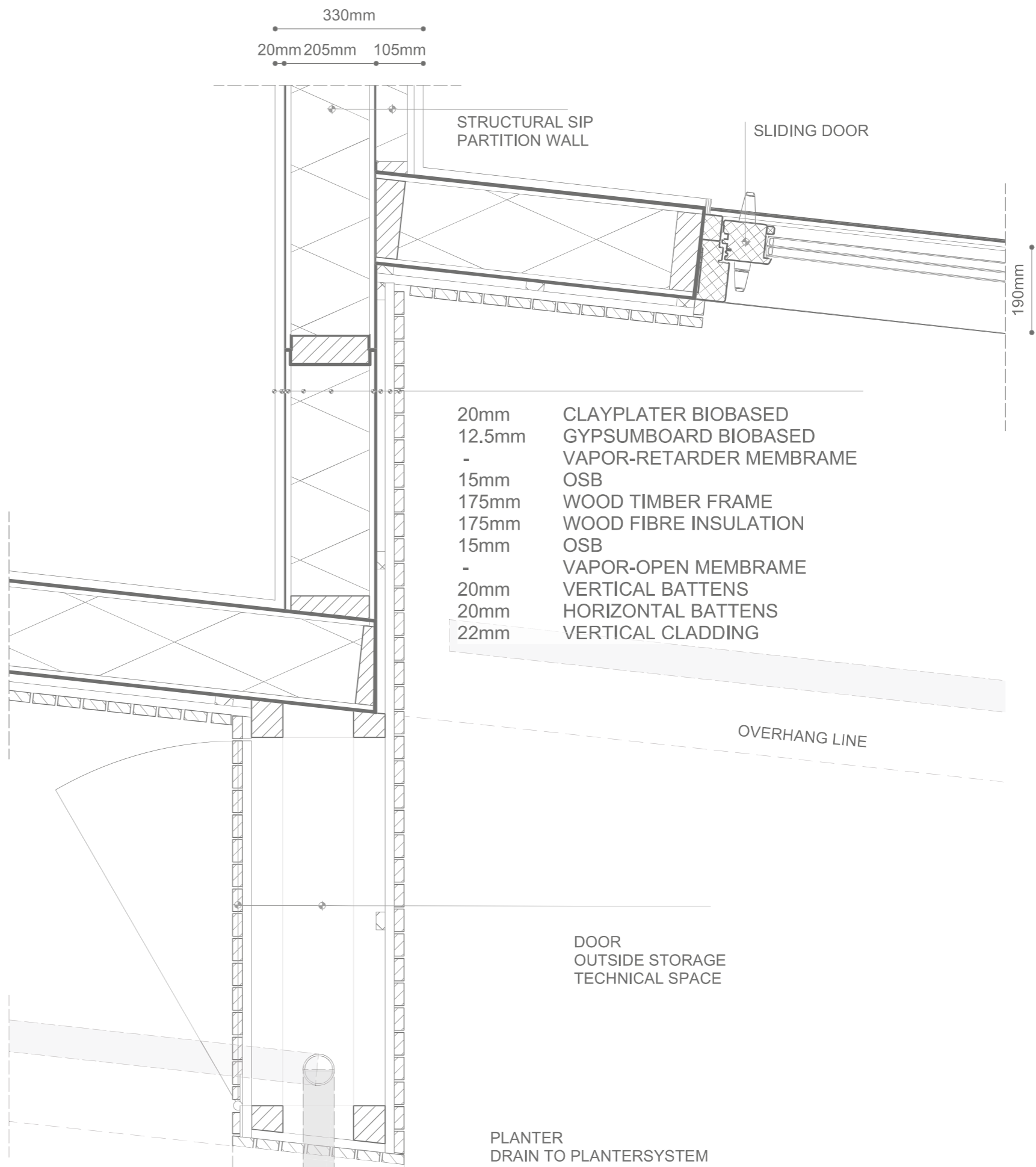


DETAIL 1:10

VERTICAL SECTION GALLERY SIDE



DETAIL 1:10 HORIZONTAL SECTION SLIDING-AND OUTSIDE DOOR



PLANTS FOR ALL FACADES

CATEGORY	PLANT	CONTRIBUTION TO BIODIVERSITY	GROWING CONDITIONS	
GRASSES REEDS	CAREX MORROWII ('ICE DANCE')	SHELTER FOR INSECTS AND SMALL ANIMALS.	THRIVES IN SHADE TO PARTIAL SHADE.	
	MISCANTHUS SINENSIS ('GRACILLIMUS')	ATTRACTIVE TO BIRDS AS NESTING MATERIAL, SHELTER FOR INSECTS.	SUITABLE FOR SUN TO LIGHT SHADE.	
	PENNISETUM ALOPECUROIDES ('HAMELN')	SEED SOURCE FOR BIRDS IN AUTUMN, PROVIDES SHELTER FOR INSECTS.	PREFERS SUN TO PARTIAL SHADE.	
FLOWERS	GERANIUM 'ROZANNE'	LONG BLOOMING PERIOD, IDEAL FOR BEES AND BUTTERFLIES.	THRIVES IN SUN AND PARTIAL SHADE.	
	ECHINACEA PURPUREA	SEED SOURCE FOR BIRDS, NECTAR FOR BEES AND BUTTERFLIES.	SUITABLE FOR SUN TO LIGHT SHADE.	
	SALVIA NEMOROSA ('CARADONNA')	ATTRACTIVE TO BEES AND BUMBLEBEES.	PREFERS FULL SUN BUT TOLERATES PARTIAL SHADE.	
FILLERS	SEDUM SPECTABILE ('HERBSTFREUDE')	NECTAR SOURCE FOR BEES, BUTTERFLIES, AND HOVERFLIES, SEED SOURCE FOR BIRDS.	SUITABLE FOR SUN TO LIGHT SHADE.	
	VERBENA BONARIENSIS	NECTAR SOURCE FOR BUTTERFLIES (LIKE SWALLOWTAILS) AND BEES, PROVIDES HEIGHT TO ARRANGEMENTS.	THRIVES IN SUN.	

NORTH

CATEGORY	PLANT	CONTRIBUTION TO BIODIVERSITY
GRASSES/ REEDS	HAKONECHLOA MACRA ('AUREOLA')	PROVIDES STRUCTURE AND HABITAT FOR SOIL ORGANISMS.
FLOWERS	HOSTA SPECIES	NECTAR SOURCE FOR MOTHS, SHELTER FOR SLUGS AND FROGS.
FILLERS	ALCHEMILLA MOLLIS	ATTRACTIVE TO POLLINATORS, DEW DROPLETS PROVIDE HYDRATION FOR SMALL INSECTS.



EAST

CATEGORY	PLANT	CONTRIBUTION TO BIODIVERSITY
GRASSES/ REEDS	HAKONECHLOA MACRA ('AUREOLA')	PROVIDES STRUCTURE AND HABITAT FOR SOIL ORGANISMS.
FLOWERS	HOSTA SPECIES	NECTAR SOURCE FOR MOTHS, SHELTER FOR SLUGS AND FROGS.
FILLERS	ALCHEMILLA MOLLIS	ATTRACTIVE TO POLLINATORS, DEW DROPLETS PROVIDE HYDRATION FOR SMALL INSECTS.



SOUTH

CATEGORY	PLANT	CONTRIBUTION TO BIODIVERSITY
GRASSES/ REEDS	STIPA TENUISSIMA ('PONYTAILS')	SHELTER FOR INSECTS, SEED SOURCE FOR BIRDS.
FLOWERS	RUDBECKIA FULGIDA ('GOLDSTURM')	NECTAR FOR BUTTERFLIES AND BEES, SEED SOURCE FOR BIRDS.
FILLERS	VINCA MINOR	EVERGREEN GROUND COVER, PROVIDES SHELTER FOR SMALL ANIMALS AND SOIL LIFE.



WEST

CATEGORY	PLANT	CONTRIBUTION TO BIODIVERSITY
FLOWERS	RUDBECKIA FULGIDA ('GOLDSTURM')	NECTAR FOR BUTTERFLIES AND BEES, SEED SOURCE FOR BIRDS.
FILLERS	VINCA MINOR	EVERGREEN GROUND COVER, PROVIDES SHELTER FOR SMALL ANIMALS AND SOIL LIFE.



VISUALIZATIONS



VISUALIZATIONS



VISUALIZATIONS



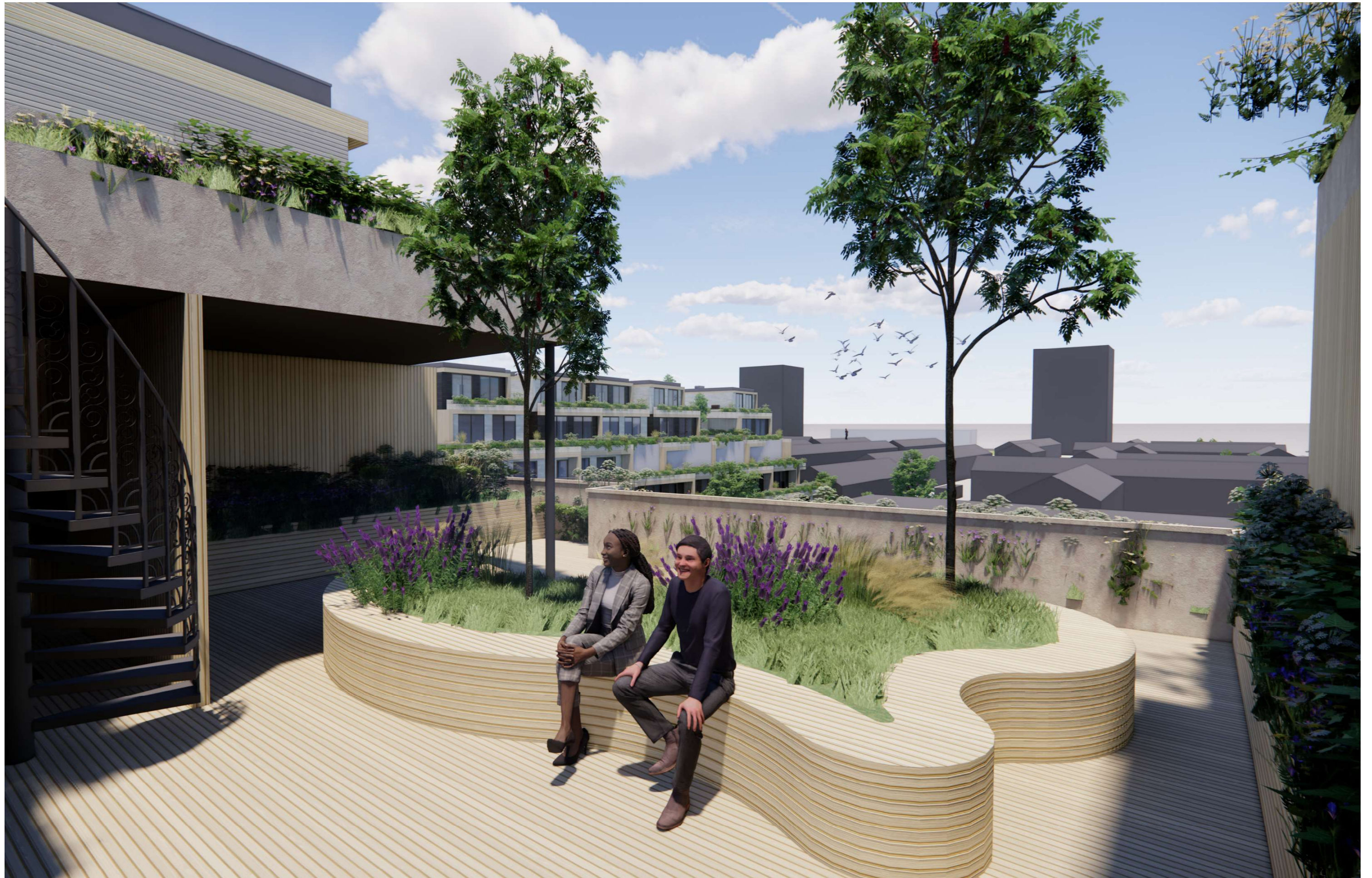
VISUALIZATIONS



VISUALIZATIONS



VISUALIZATIONS



VISUALIZATIONS



VISUALIZATIONS



VISUALIZATIONS



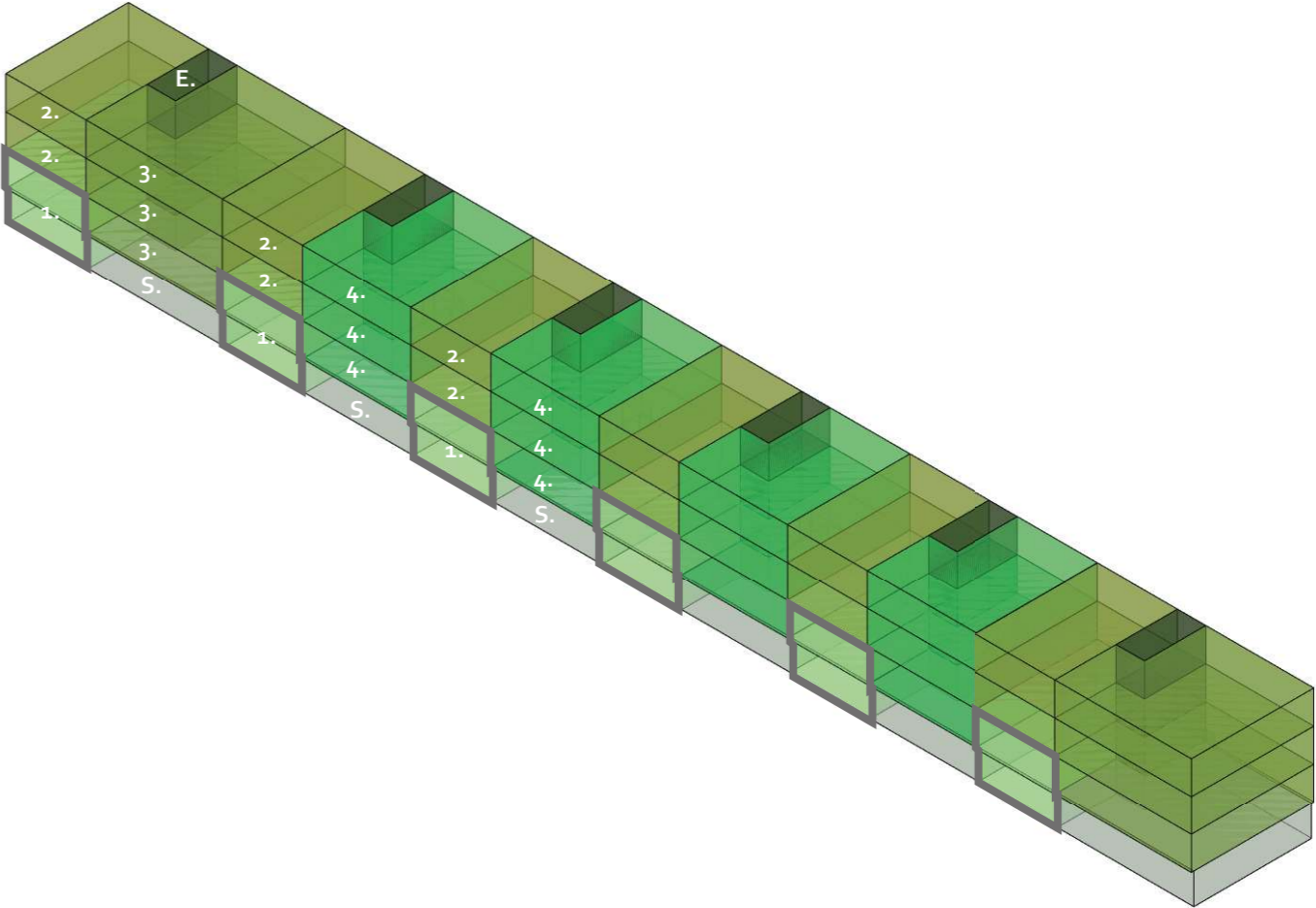
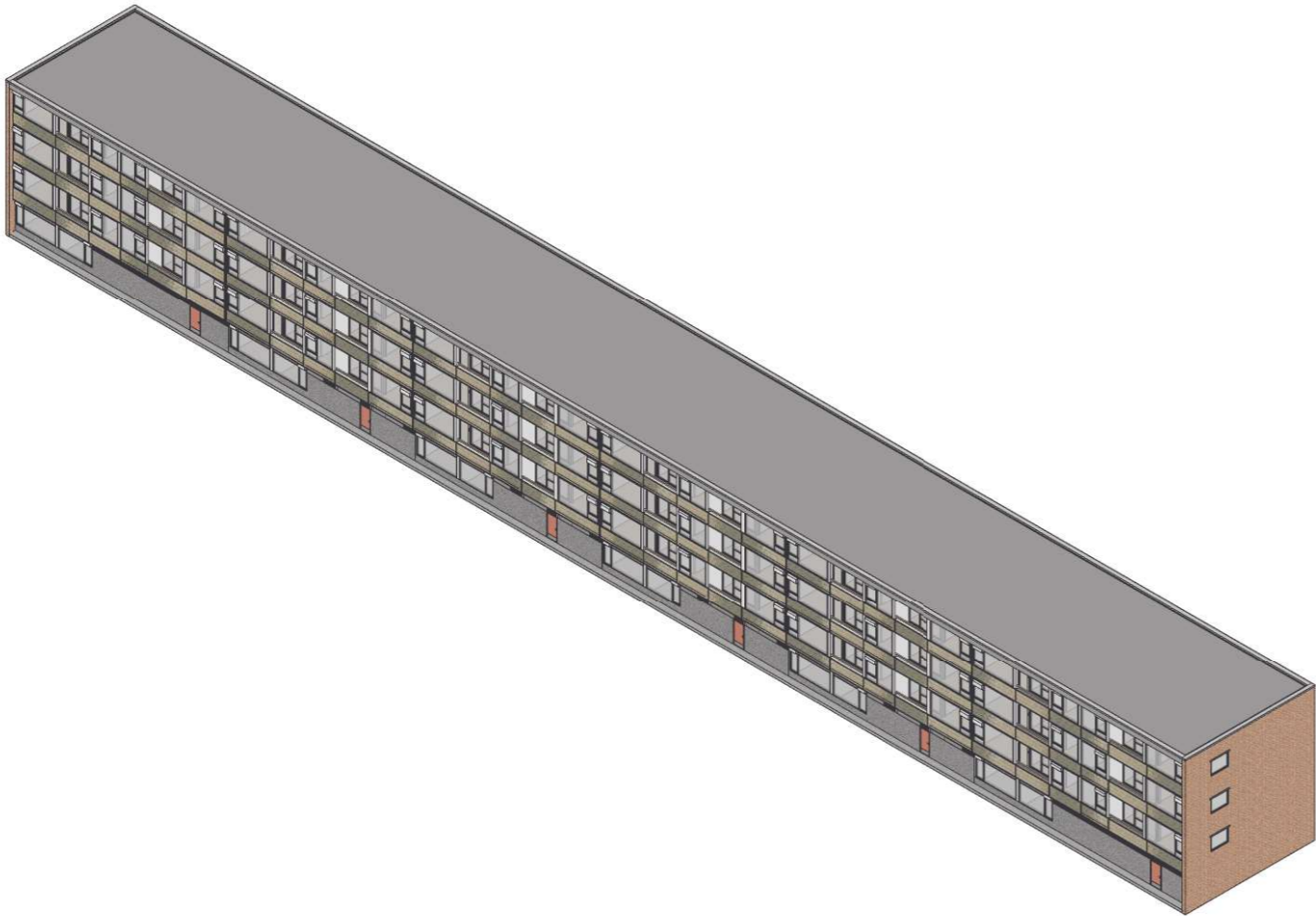
VISUALIZATIONS



VISUALIZATIONS

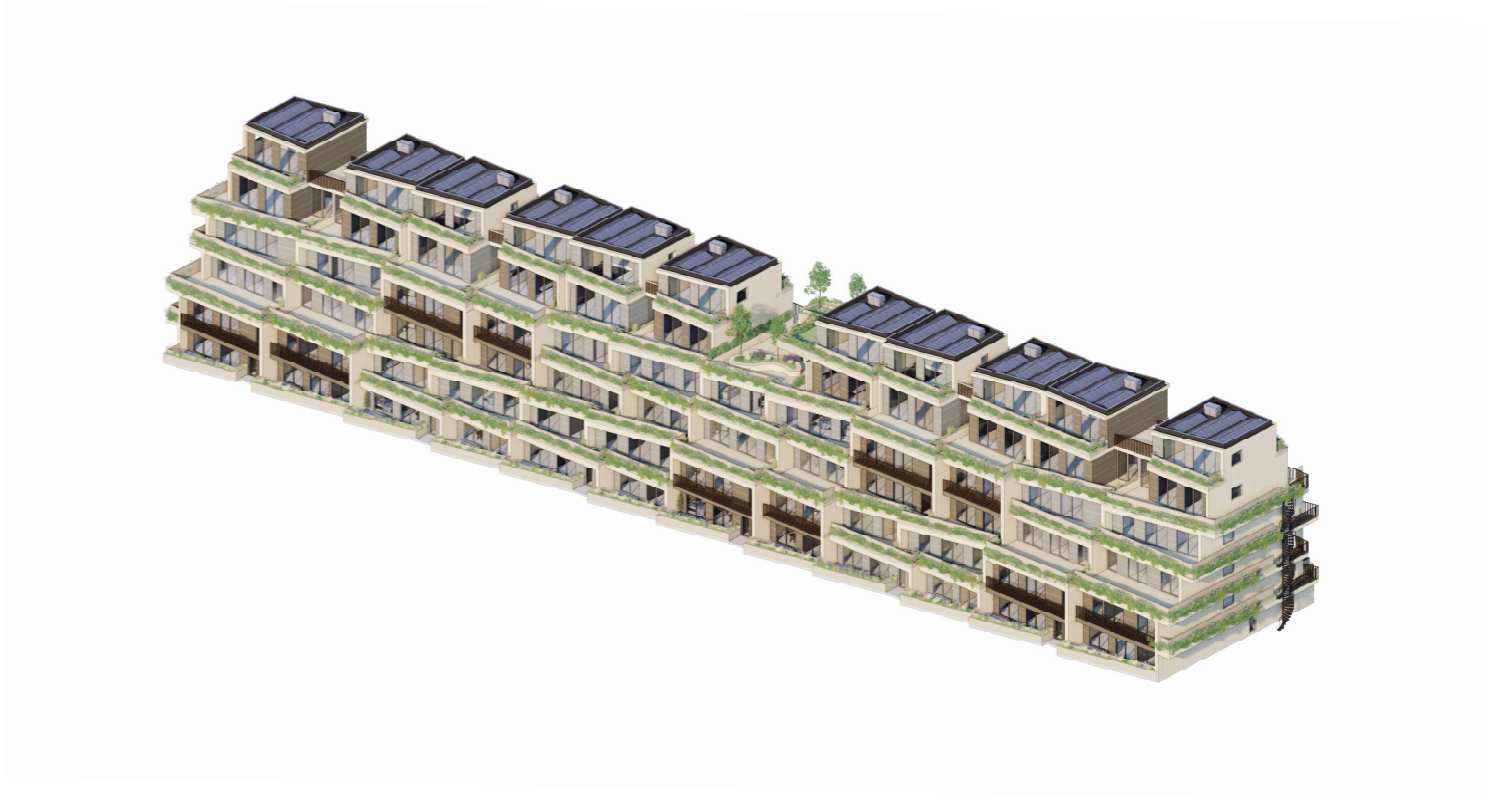
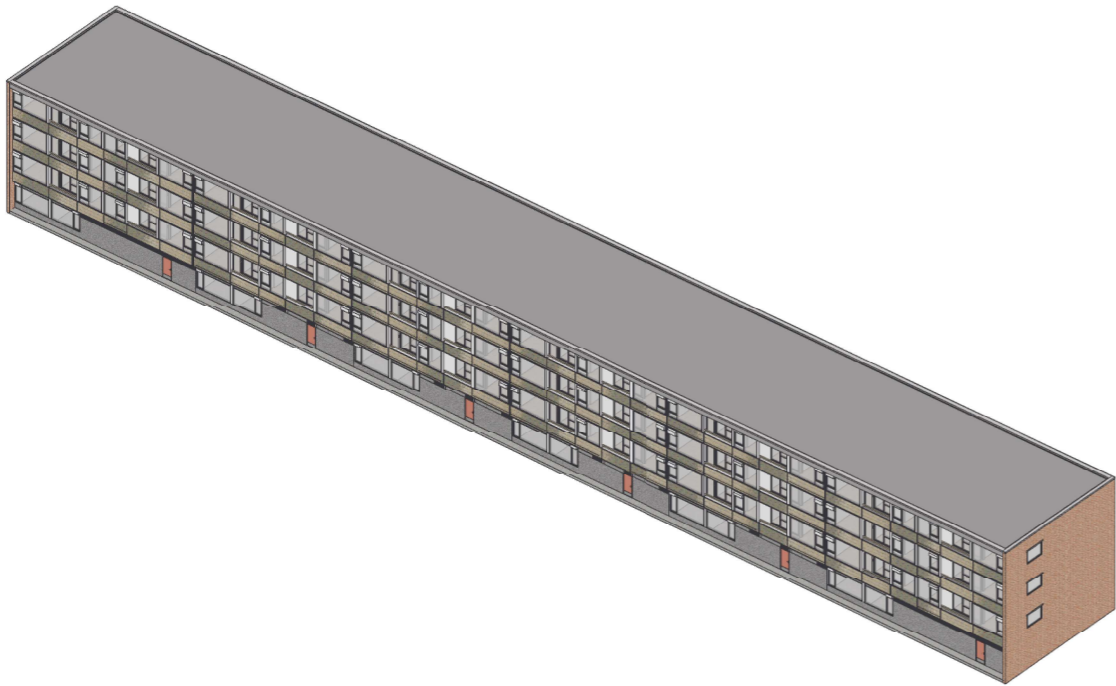


NUMBERS



	categorie	size (inc outside)	m2	Amount
1	double layer dwelling	130m2	780	6
2	dwelling	70m2	840	12
3	dwelling	110m2	660	6
4	dwelling	83m2	996	12
S	storages	-	-	
E	entrance	-	-	
TOTAL			3.276	36

NUMBERS



	categorie	size (m2)	Amount	m2	amount of dwellings	
1	ground studio 1	50m2	8	400	8	
2	ground studio 2	62m2	4	248	4	
3	studio	70m2 (45+30)	3	210	6	
4	studio big	120 (60+60)	4	480	8	
5	studio big big	140 (70+70)	2	280	4	
2e ver	apartment	200 (100+100)	4	800	8	
2e ver B	apartment	220 (110+110)	2	440	4	
3e ver	apartment	170 (85+85)	4	680	8	
3e ver	apartment	190 (95+95)	2	380	4	FACTOR OF 1,74 M2 dwellingsurface
top	top on	70m2	11	770	9	
top 2	top on	44m2	11	484	4	FACTOR OF 1,86 M2 dwellings
P	public	260m2	-			
C	collective	245m2	-			
S	storages	523m2	-			
TOTAL				5172	67	

BUISSNESS CASE

- SELL

- roof
- groundfloor space apartments
- groundfloor space shops

- IMPROVE EXISTING

- Expand
- Insulate
- Collective spaces
- Acces (Elevator)

- VALUE INCREASES





QUESTIONS?

REFLECTION INTRODUCTION

The process of the research and design.

The goal of this graduation project was to work on a topic that is truly relevant, preferably within the Netherlands, as I plan to work there in the near future after graduation.

After exploring many subjects, I decided to focus on post-war apartment buildings. This topic has been relevant for a long time, but there are still new perspectives to explore and ways to improve these buildings. The reason I wanted to address this is that many existing transformations often appear very similar, and in my vision, they are not particularly appealing.

My research focused on the densification of post-war staircase-access apartment buildings in relation to the load-bearing capacities of their structures. This research was, of course, highly technical and involved calculations and other complex aspects, which were sometimes challenging because I am not an expert in structural engineering.

However, this challenge also taught me a great deal about various building systems and the history of pre- and post-war construction. Although this historical aspect was not the primary focus of my research, it provided valuable insights into the basic and underlying concepts of these buildings. As a result, I now have a strong understanding of these structures, which proved to be very beneficial during the initial, as well as later, stages of the design.

For me, the process of the graduation project felt relatively smooth overall. The biggest challenge was finding a suitable theme for both the research and design that would form the foundation of a solid graduation project. Once this was established, I was able to start working on a larger scale.

One aspect of my approach that differed somewhat from my peers, I think, was my simultaneous focus on both the finer details and broader elements, such as urban design. This was because I wanted to integrate specific building systems, which had a significant influence on the building's design. As a result, I had most of the building details universally prepared by the end of the process. This gave me the flexibility to make design changes relatively easily while still maintaining the same structural setup.

During the design process, I was also continuing my research—even after the P2 stage—because the technical calculations were discussed with a structural engineering tutor, and these sessions only took place after P2. This meant that I reached some conclusions later in the process, which led to impactful changes in my project at a relatively late stage. But this was doable because I had already designed the details, the building system, and the rules.

Feedback in the tutoring sessions.

The feedback from the tutors mostly helped me to consider aspects I sometimes overlooked. At times, I would design a specific area of the building without fully addressing certain arguments or perspectives, and the tutors helped me recognize and address these gaps.

At the same time, this process reinforced the importance of standing by my own design decisions and not always altering my work based solely on their feedback. There were moments when tutors offered contrasting opinions about the project, reflecting their subjective perspectives. The key takeaway for me is the importance of being 100% confident in my design choices when I can back them up with well-founded arguments that address nearly all aspects. I translated their feedback by trying to consider every aspect of the project. I hope this makes the project very realistic and complete.

What have i learned form this gradation project?

This graduation project has been a valuable learning experience on multiple levels. First and foremost, I deepened my understanding of post-war apartment buildings and their unique challenges, the load-bearing systems, and building characteristics. This is a very relevant topic in the Netherlands and could turn out to be great knowledge for the future. This understanding has made me more confident in tackling similar projects in the future.

I also learned the value of balancing the different scales in architecture. By working simultaneously on multiple levels, I was able to maintain a strong conceptual foundation while ensuring that the practical aspects of the project, such as building systems and structural rules, were consistently applied. This approach allowed for greater flexibility in the later stages of the process while keeping the project coherent and grounded.

The feedback from my tutors highlighted areas I might have overlooked, pushing me to think more comprehensively about the project. At the same time, the experience taught me the value of standing by my own well-argued design decisions, especially when facing subjective opinions. I've learned that confidence in my work comes from a solid foundation of research, reasoning, and clarity of vision.

Overall, this project taught me to approach design with an integrated mindset, balancing creativity, technical knowledge, and real-world feasibility. It has strengthened my confidence as a designer and prepared me to handle complex architectural challenges in my professional career.

REFLECTION QUESTIONS

1. What is the relation between your graduation project topic, your master track and your master programme?

My graduation project is aligned with my master track in Architecture, as it addresses architectural challenges across multiple scales. The project focuses on residential buildings, a topic that shows similarity with my previous Master studios that I have completed (for instance: fundamentals of housing design). In my opinion residential buildings are the most fun to work on in architecture because it is nice to imagine living in a design and how to improve it from your own, but also from other people's perspectives. On top of that, it is one of the most important building types to focus on because dwellings represent the largest share of the building stock.

Overall, my project shows the interdisciplinary nature of the Architecture track, combining theoretical research with practical design to tackle real-world architectural and urban issues.

2. How did your research influence your design/recommendations and how did the design/recommendations influence your research?

The research influenced the project by the drawn conclusions and the framework which was made. On top of that, the general knowledge created by doing the research allowed me to estimate what was possible and identify the problems with the post-war buildings.

On the other hand, my design plan was to expand and improve postwar housing. To do this, I needed to know about the capabilities and limitations of the buildings. The whole research is specifically based on the design question. In that way, the research and design influenced each other a lot.

3. How do you assess the value of your way of working (your approach, your used methods, used methodology)?

I think this way of working was quite valuable for me. Once I had identified a solid topic, I dedicated a lot of time to acquiring the necessary knowledge through technical research at the beginning of the process. This research proved very handy, as all the knowledge I gained could be directly used in the design phase.

As mentioned earlier, this approach provided me with freedom in the later stages of the process. It allowed me to make big changes without disrupting the entire structure of the project. For instance, a research conclusion that emerged late in the process led to a change in the design outcome, a change of the topping. Thanks to the integrated setup, I was able to incorporate these adjustments smoothly and effectively without overhauling the entire project.

This methodology not only supported a flexible design process but also ensured that the project remained both realistic and coherent throughout. I found this approach to be very effective.

4. How do you assess the academic and societal value, scope and implication of your graduation project, including ethical aspects?

The academic and societal value of my graduation project lies in the pressing issue of the housing shortage and in the pressing issue of transforming post-war apartment buildings, a topic of relevance in the Netherlands.

Academically, the project contributes by combining technical research on structural capacities with an integrated design approach. This exploration of densification strategies provides insights into how such buildings can be adapted.

From a societal perspective, the project addresses the growing demand for sustainable urban densification. By reimagining existing post-war apartment buildings, the project aims to enhance their functionality, aesthetics, and efficiency, making better use of the existing housing stock while minimizing the environmental impact of new construction. This aligns with broader societal goals of sustainability and resource optimization.

Ethically, the project considers the impact of design decisions on both the current and future residents of these buildings. The integration of urban design, structural improvements, and livable spaces ensures that the proposed interventions improve quality of life.

In scope, the project balances technical depth with design innovation, making it applicable to a wide range of postwar buildings.

5. How do you assess the value of the transferability of your project results?

The results of my graduation project are transferable because the project was designed as a strategic framework. The research can be expanded, and additional designs can be developed based on its foundations. It is applicable to similar structures in a variety of contexts.

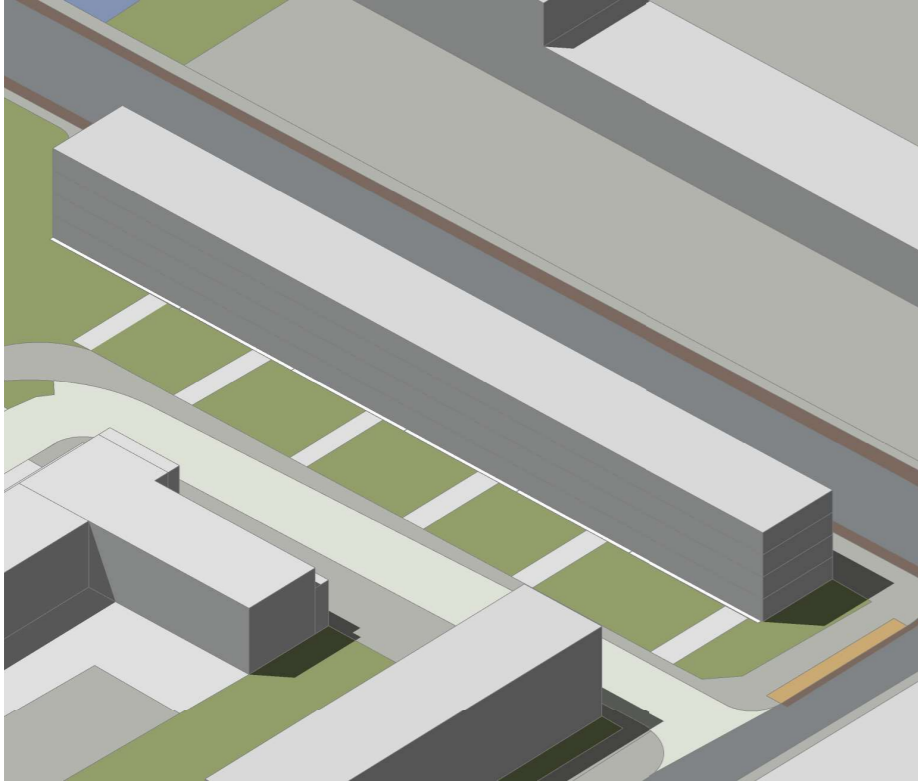
The technical research on load-bearing systems and the integration of densification strategies offer a clear and adaptable framework for architects, urban planners, and engineers.

This methodology can provide guidance for addressing comparable challenges in other post-war neighborhoods, both within the Netherlands and internationally.

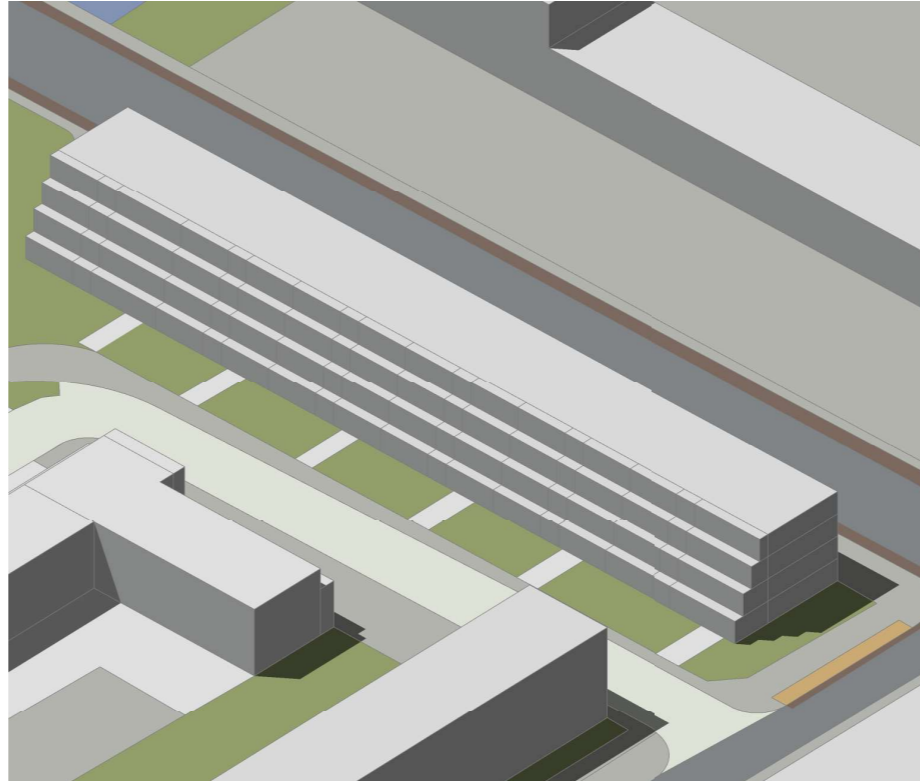
From an academic perspective, the combination of research, technical analysis, and design serves as a robust foundation for further exploration. The findings have the potential to inspire future studies—especially more studies into the foundation capabilities in terms of technical research.

DESIGN PROCESS

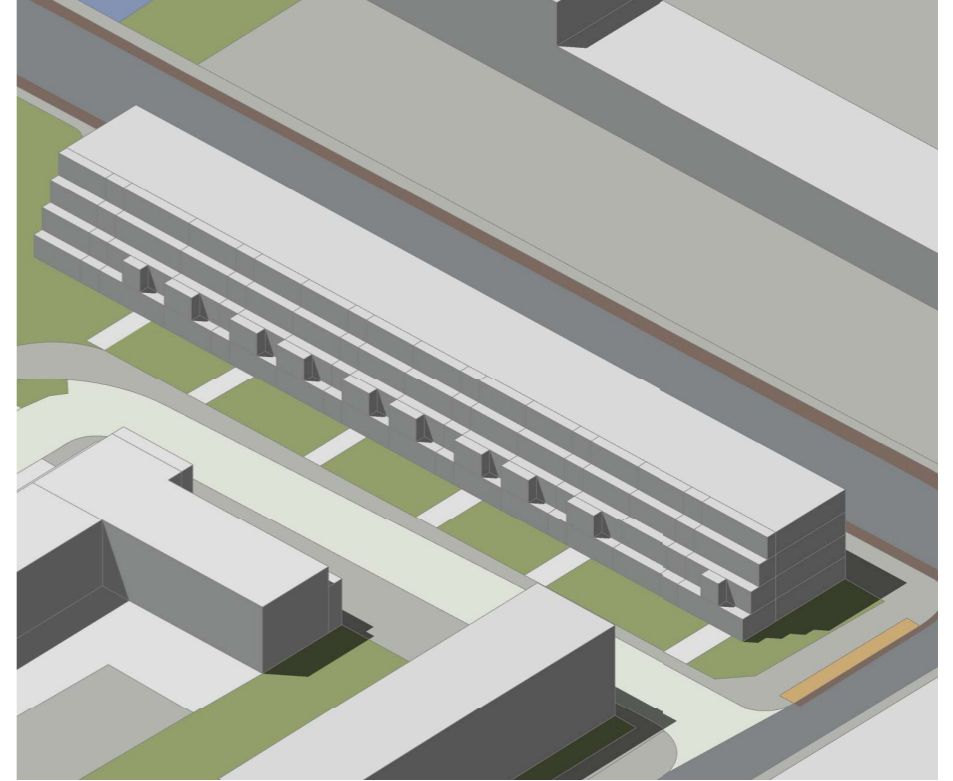
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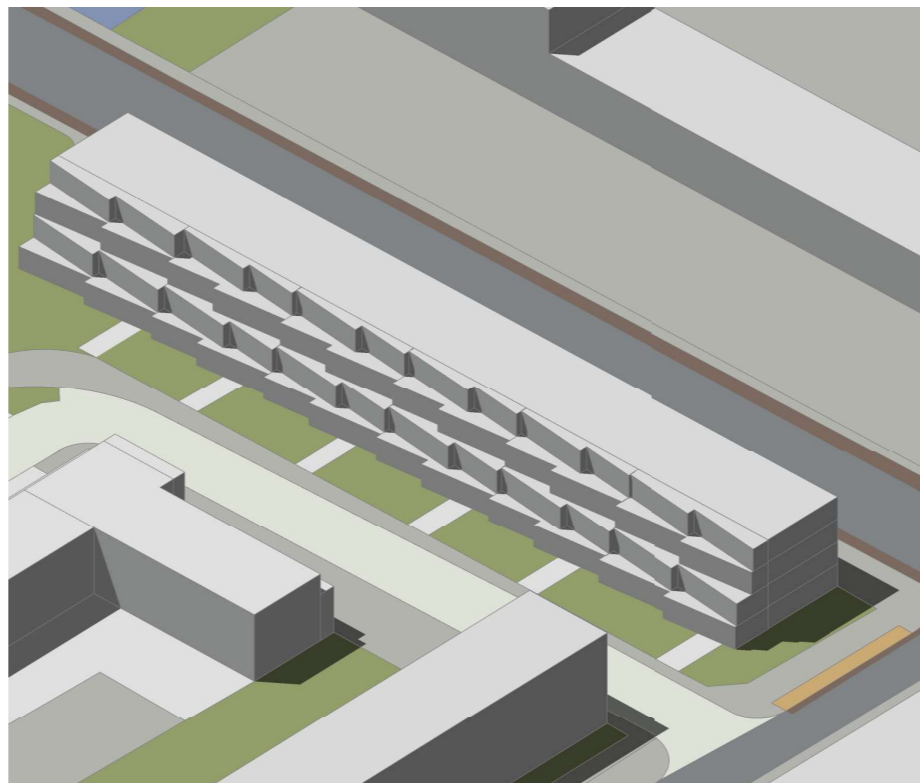
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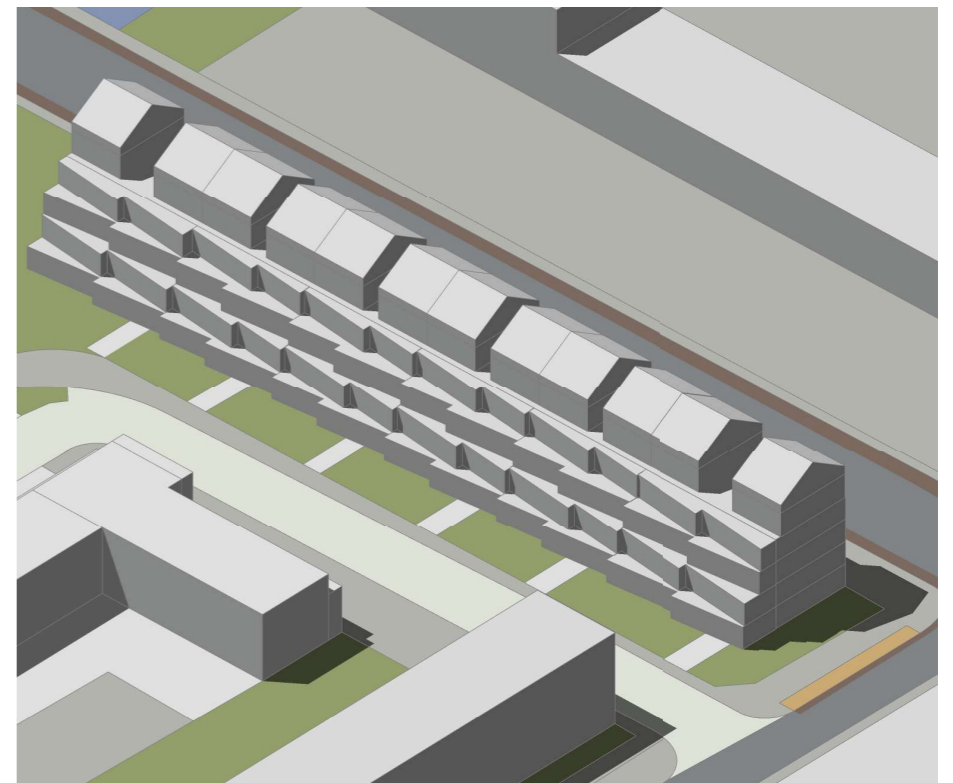
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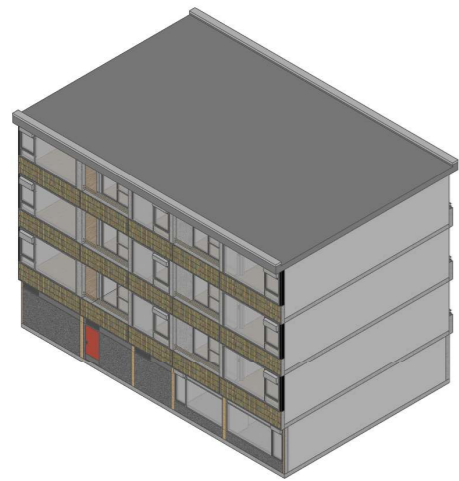
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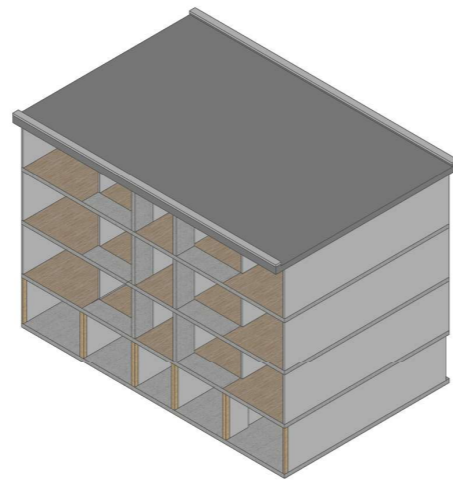
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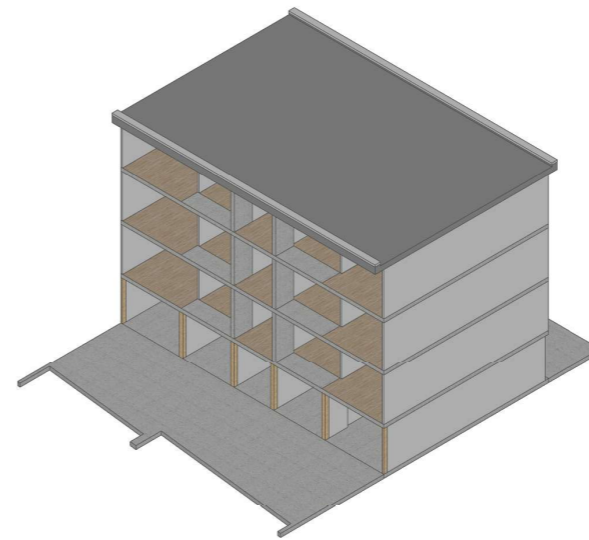
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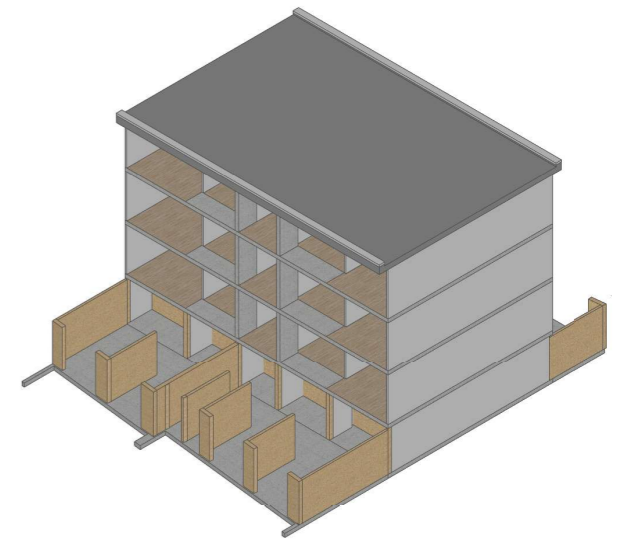
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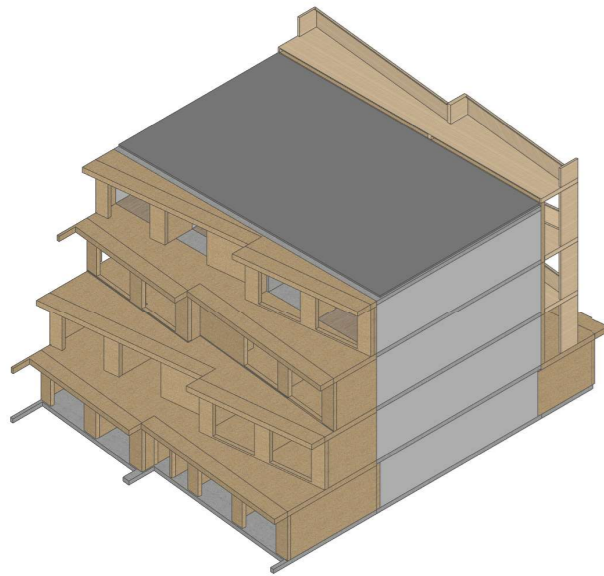
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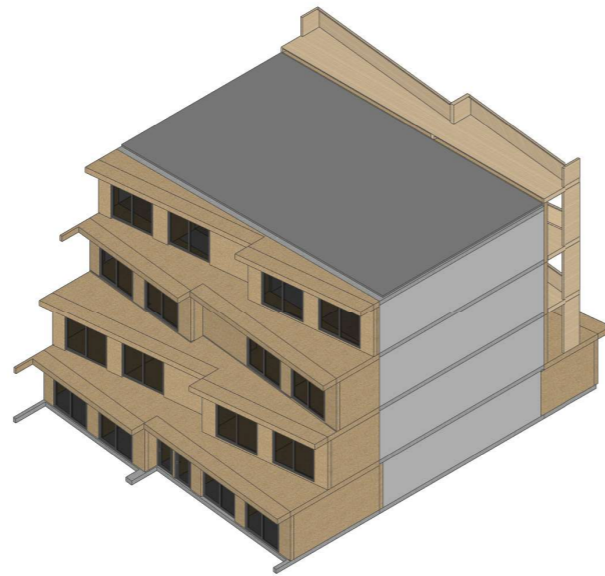
4. SIP WALLS



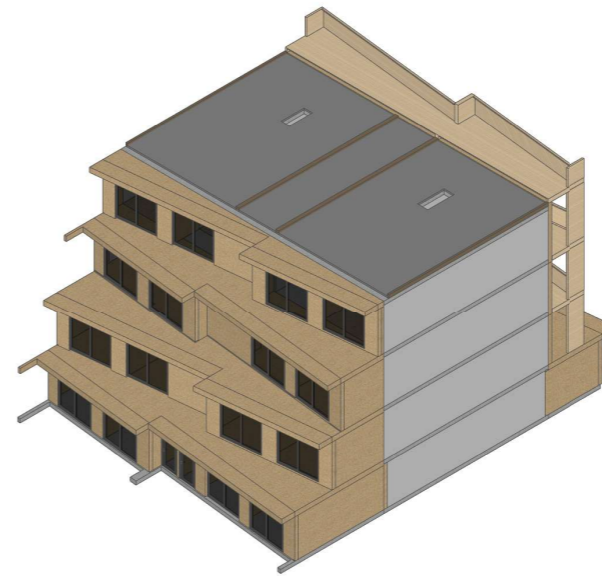
5. FINISH SIP WALLS



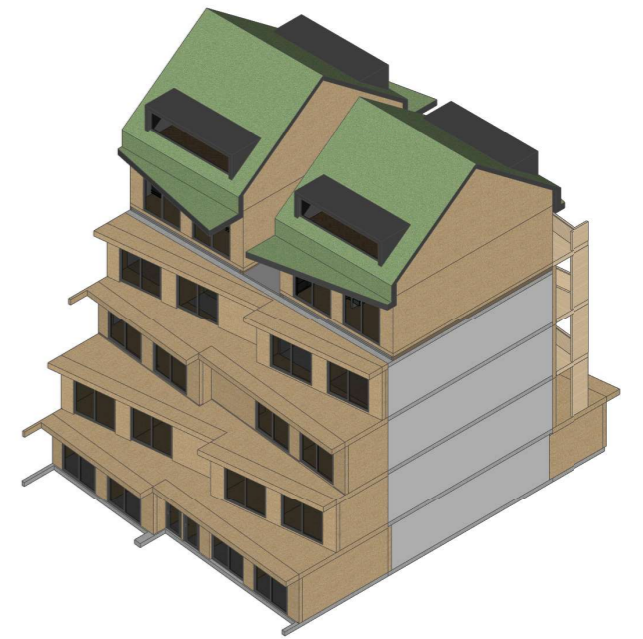
6. WINDOW FRAMES



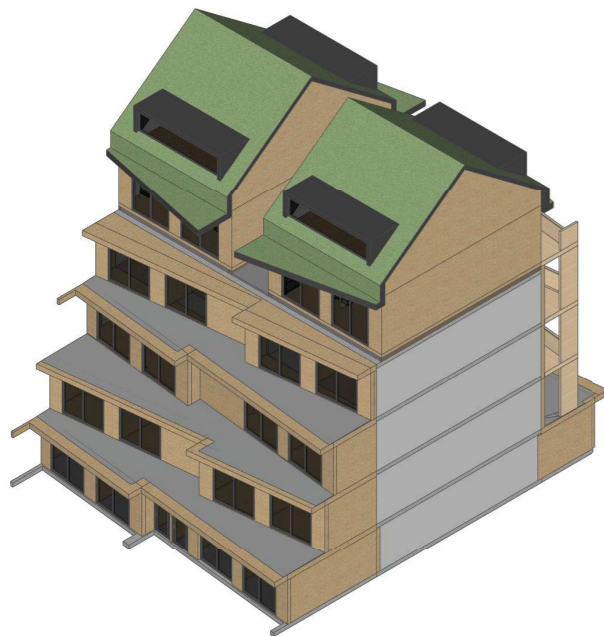
7. PREPARE OPTOPPING



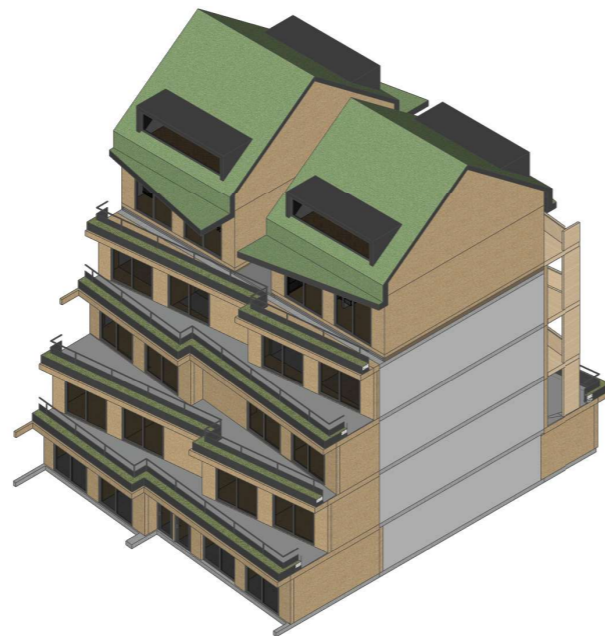
8. PLACE OPTOPPING



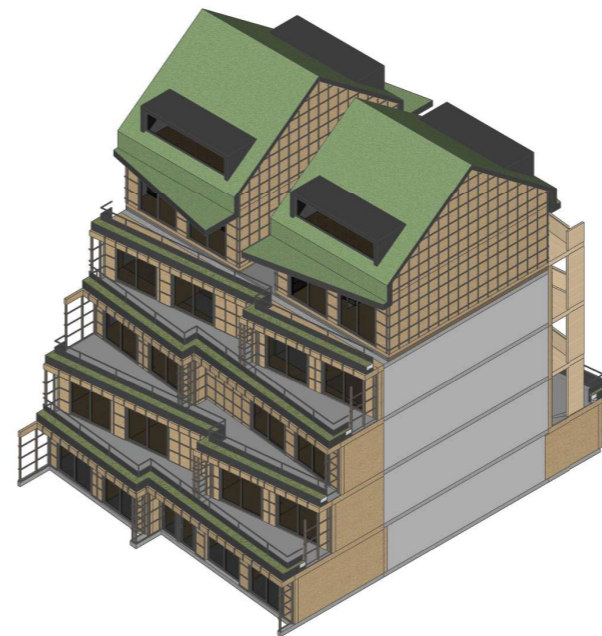
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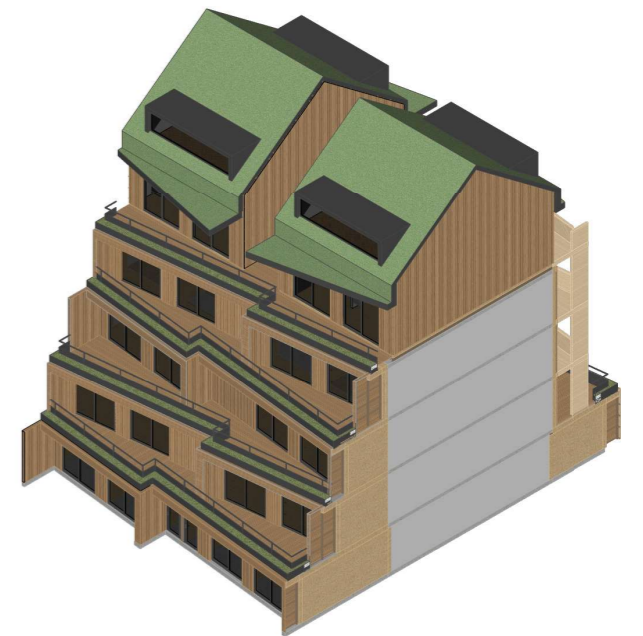
10. PLANTBOXES



7. BATTENS



8. FINISHED



CLIMATE CONCEPT

ENERGY - GENERATING

- Solar panels on roofs of the rooftops.
 - energy is used for collective spaces and individual dwellings.

• COLLECTIVE HEAT PUMP

PER 12 APARTMENTS - 1 TECHNICAL SPACE WITH:

o SPACE HEATING BUFFER TANK:

- ONE TANK OF 1000 LITERS.

o DOMESTIC HOT WATER BUFFER TANK:

- ONE TANK OF 800 LITERS.

o HEATPUMP

• VENTILATION WITH HRV (Heat Recovery Ventilation)

COLLECTIVE BALANCED VENTILATION (Type D)

- MAIN DUCTS: 200x300 mm
- APARTMENT BRANCHES: 100x150 mm
- SUPPLY / EXHAUST : 100mm diameter
- VERTICAL DUCTS SPACES 450x450mm

• INSULATION

- RC EXCEED ALL BUILDING STANDARDS
- AIRTIGHTNESS
- GREEN

• WATER

- RAINWATER FOR PLANTS

VENTILATION BOX ON ROOF

about 450m²

De WOLF CKL evo is een compacte ventilatie-unit met warmteterugwinning (WTW), ontworpen voor efficiënte ventilatie in gebouwen. Voor jouw project, met een benodigde ventilatiecapaciteit van 1600 m³/h, is de CKL 1600 evo een geschikte optie.

Afmetingen van de WOLF CKL 3300 evo:

Breedte: 1200 mm

Diepte: 650 mm

Hoogte: 800 mm

Warmteterugwinning:

Rendement van meer dan 90%

Energie-efficiëntie: Uitgerust met EC-ventilatoren van de nieuwste generatie voor laag energieverbruik en geluidsniveau

Hygiëne: Ontworpen volgens de hoogste hygiënenormen, met gladde oppervlakken voor eenvoudige reiniging

Flexibiliteit: Beschikbaar met horizontale of verticale kanaalaansluitingen en als buitenunit



URBAN LOWERGROUND 1:1000



PLANS 1:500 WHOLE BUILDING

