

WAYFINDING IN THE EVER-CHANGING SHOPPING MALL

Lijnbaan

P5 Presentation MSc4
Adapting 20th Century Heritage

Vinny van Buren
4844637

22-06-2023

INTRODUCTION

De Lijnbaan / Rotterdam

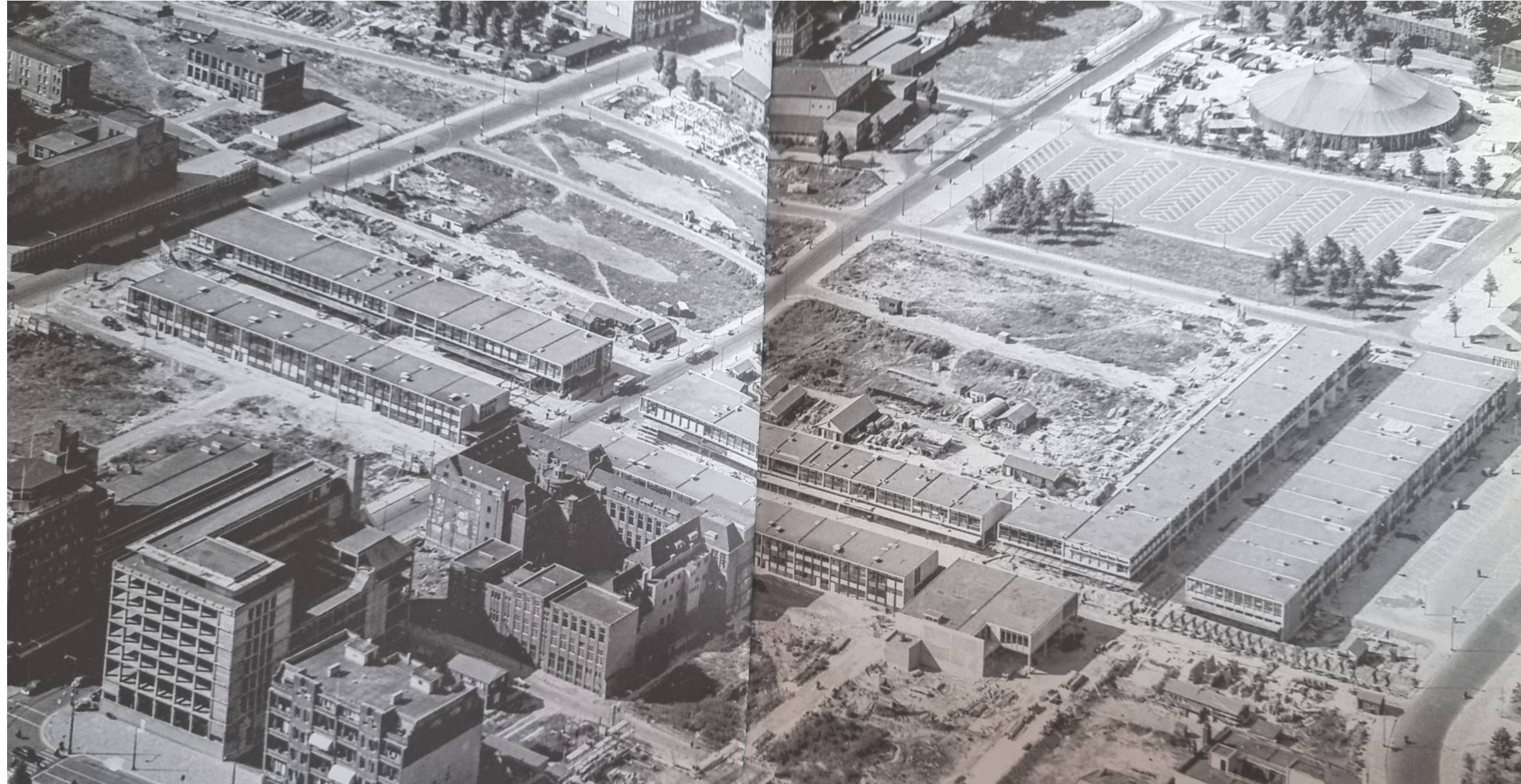
INTRODUCTION



INTRODUCTION



INTRODUCTION



INTRODUCTION



INTRODUCTION



INTRODUCTION

"...the original quality and 1950s appearance were restored to approximately 800 linear metres of Lijnbaan's facades. With this, De Lijnbaan has been restored to its former glory..."

- Mei Architects



INTRODUCTION



INTRODUCTION



INTRODUCTION

Research & Design

RESEARCH

The influence of architectural interventions on the visitors' experience

INTRODUCTION

Research & Design

RESEARCH

The influence of architectural interventions on the visitors' experience

DESIGN

Using that knowledge to improve upon 'neglected' parts of the Lijnbaan

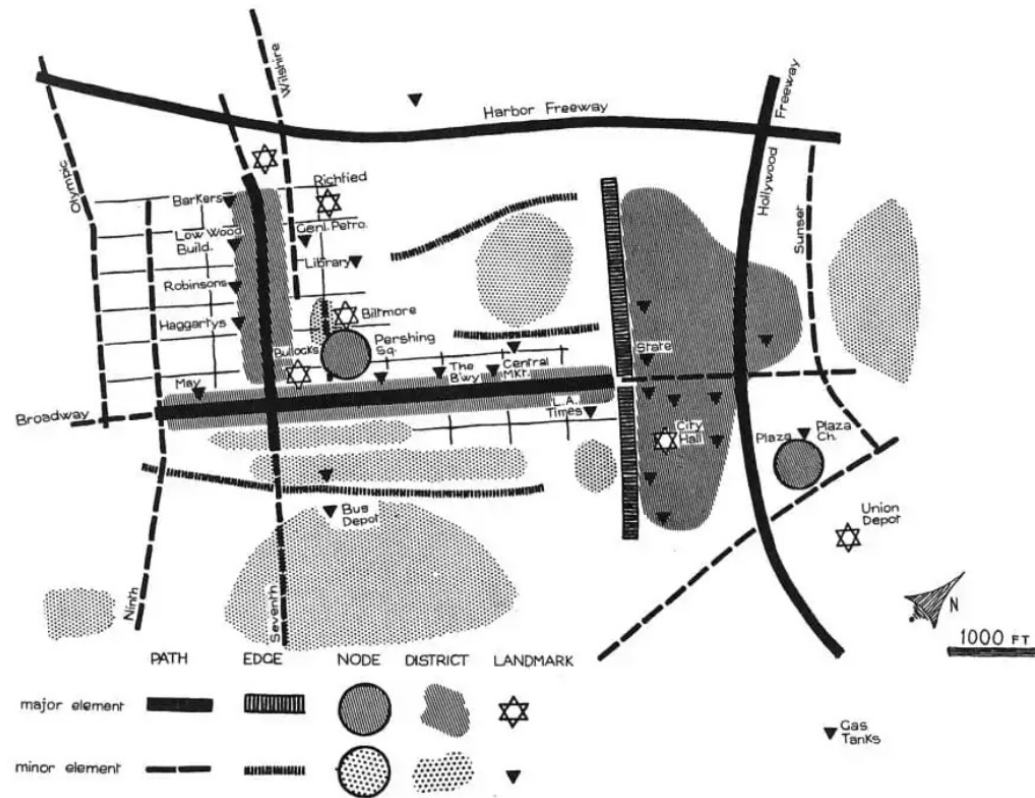
RESEARCH

RESEARCH

Goal

Existing literature:

FIG. 14. *The visual form of Los Angeles as seen in the field*



URBAN SCALE

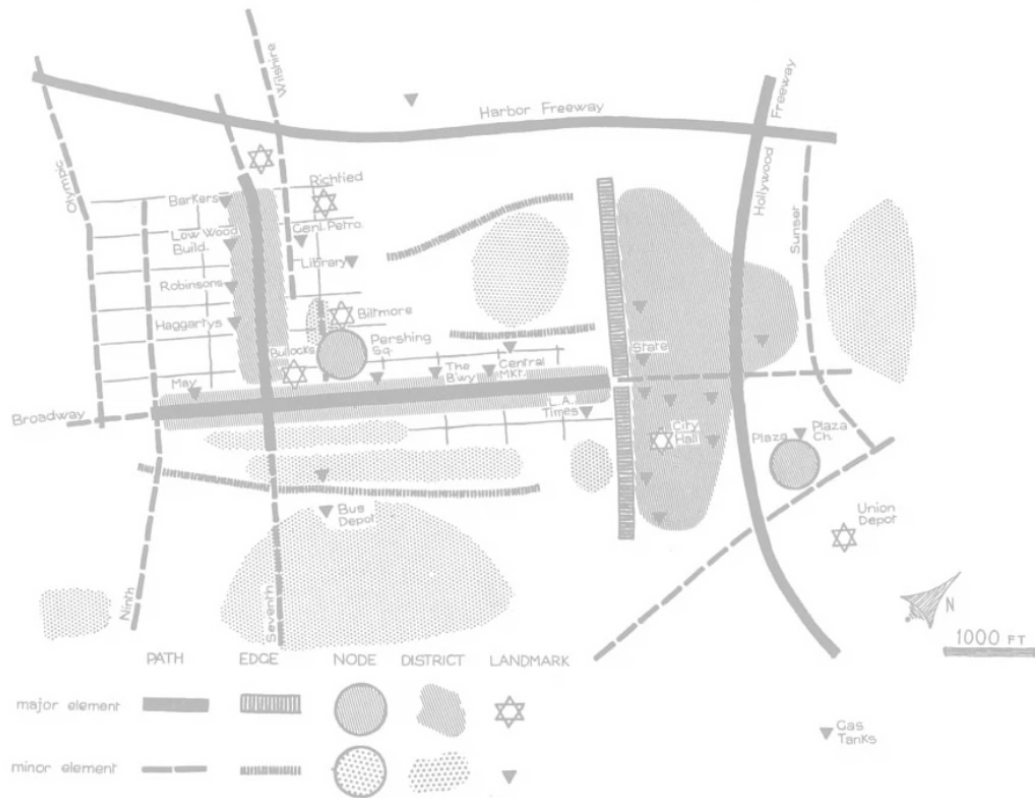
HUMAN SCALE

RESEARCH

Goal

Existing literature:

FIG. 14. *The visual form of Los Angeles as seen in the field*



URBAN SCALE

BUILDING SCALE

HUMAN SCALE

RESEARCH

Goal

Existing literature:

Applying theory on a Dutch post-war shopping mall, The Lijnbaan

More complete understanding of mall visitor experiences

Use for intervention decision making in design



BUILDING SCALE

HUMAN SCALE

RESEARCH

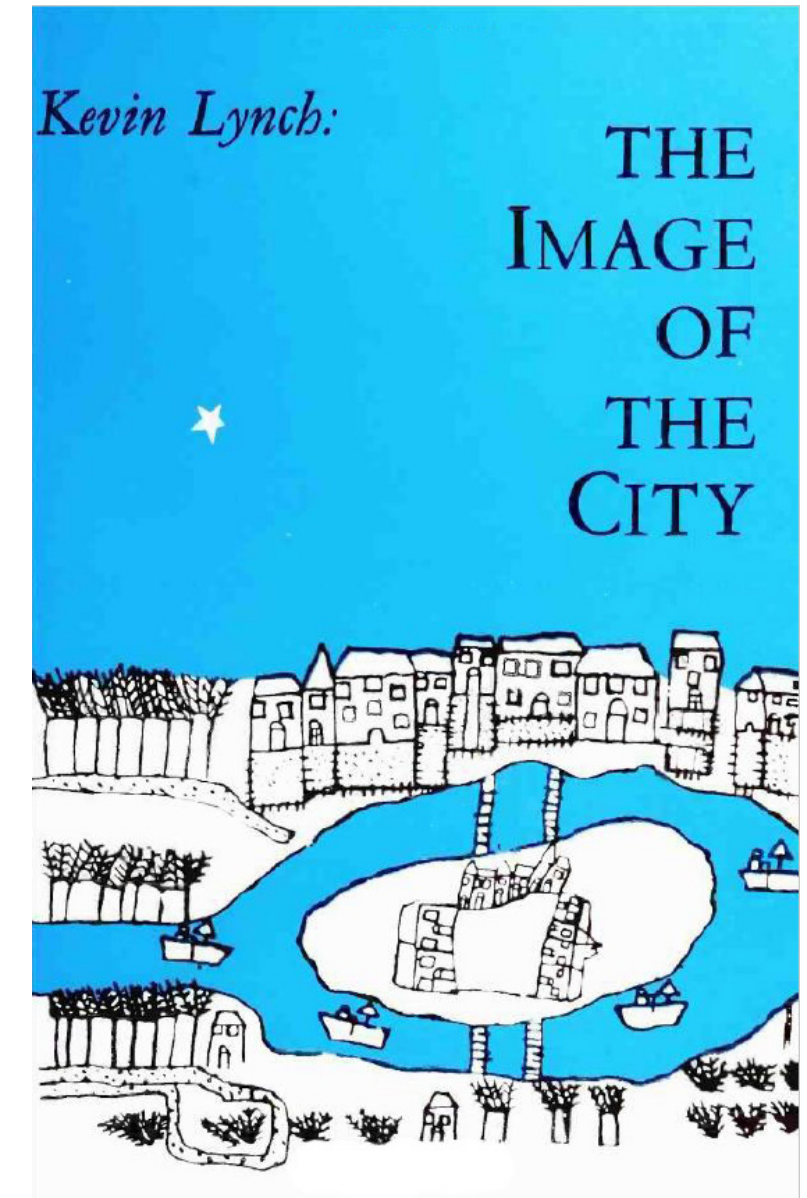
Research Questions & Methodology

How do interventions in the spatial composition influence the way visitors navigate a Dutch post-war shopping mall?

RESEARCH

Wayfinding in Malls

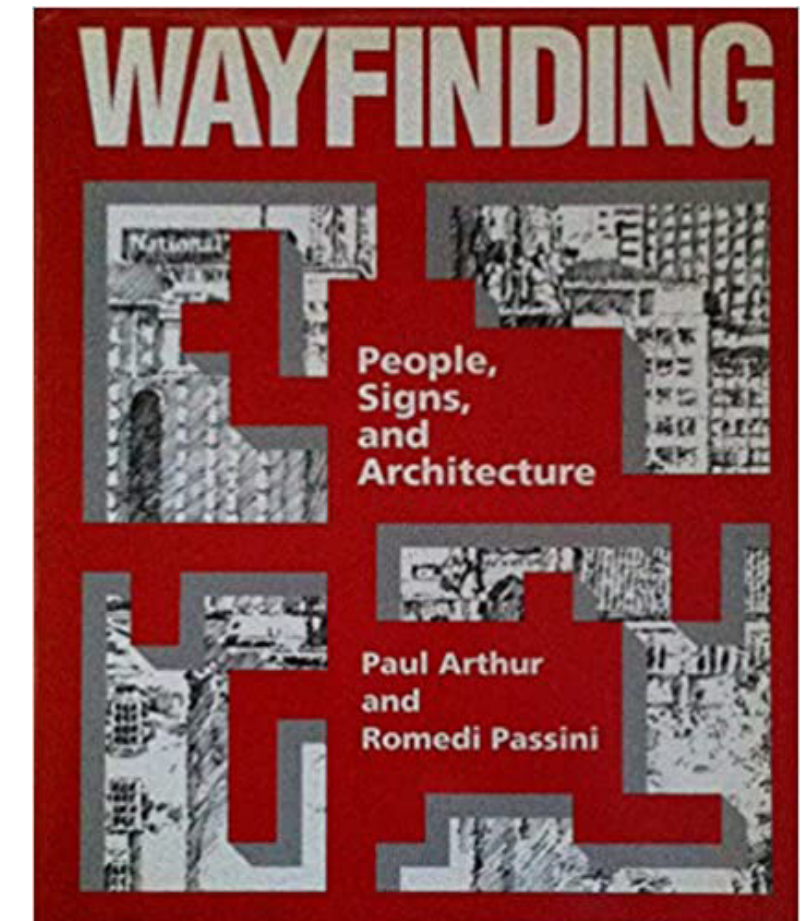
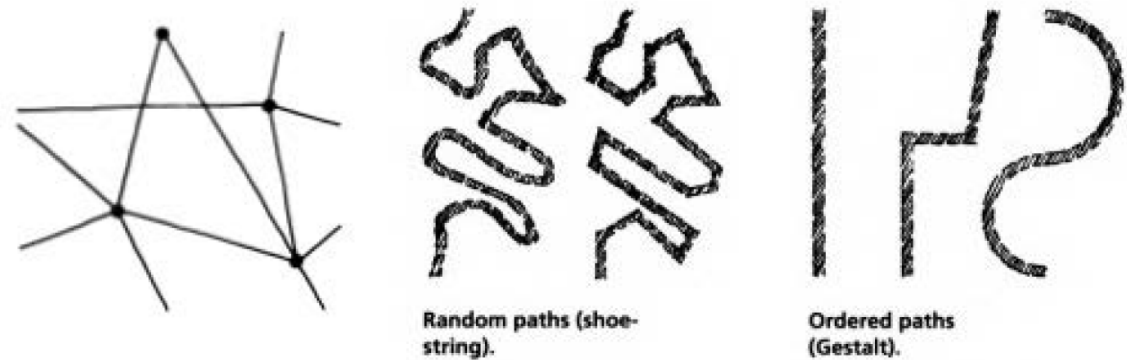
- ***The Image Of The City*** - Kevin Lynch, 1960



RESEARCH

Wayfinding in Malls

- *The Image Of The City* - Kevin Lynch, 1960
- **Wayfinding: People, Signs and Architecture**
Paul Arthur & Romedi Passini, 1992
 - Form
 - Visibility, Access
 - Use
 - Symbolism

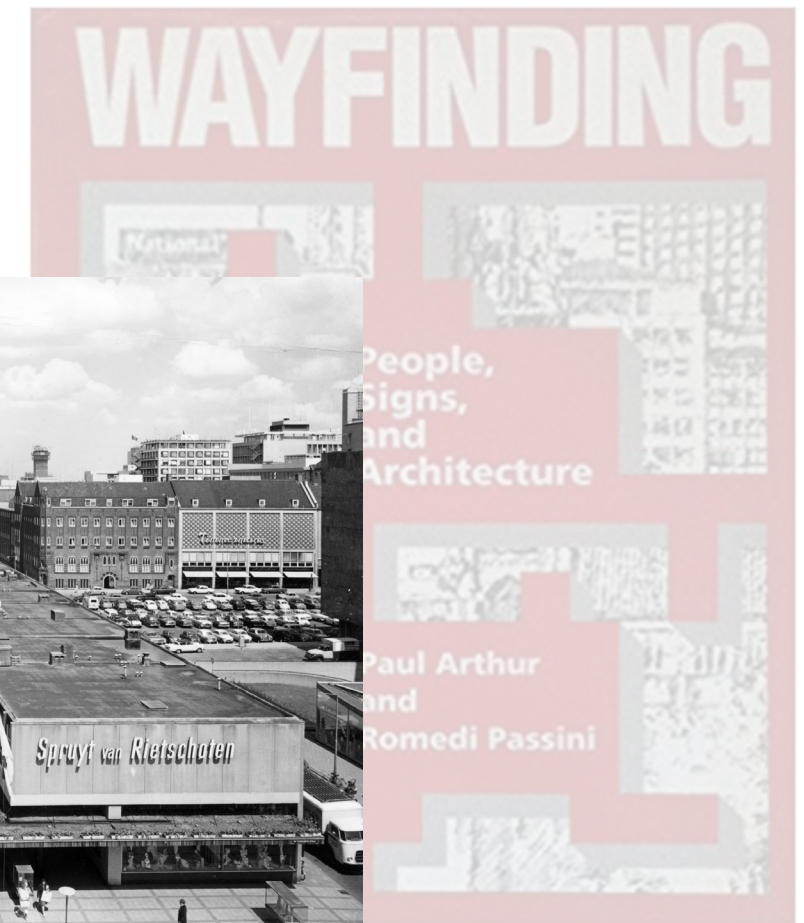


RESEARCH

Wayfinding in Malls

- *The Image Of The City* - Kevin Lynch, 1960
- *Wayfinding: People, Signs and Architecture*
Paul Arthur & Romedi Passini, 1992

- Form
- Visibility, Access
- Use
- Symbolism



RESEARCH

Interventions

Re-Arch

+

Reduce, Reuse, Recycle

1+1=2

1+1=1

FACE-LIFT

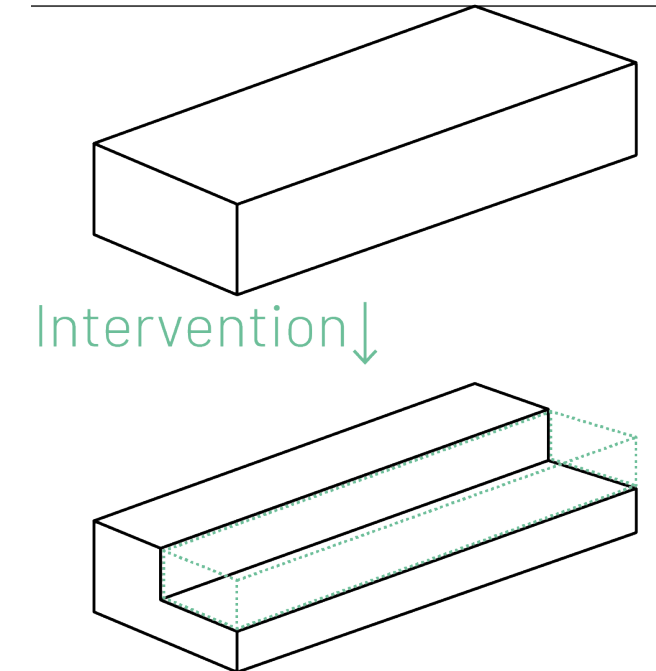
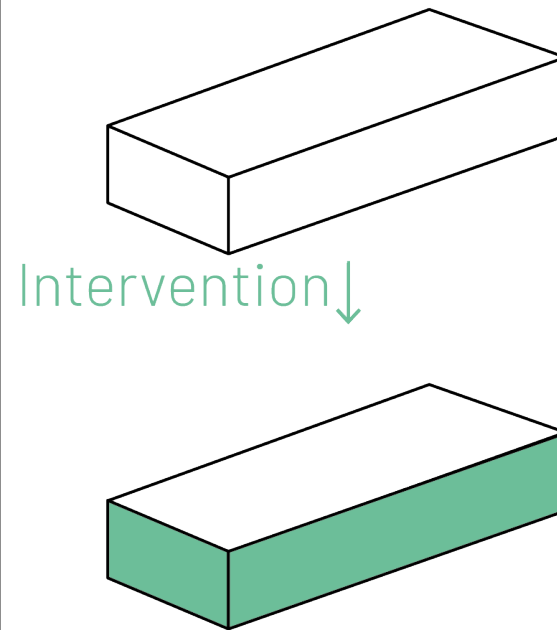
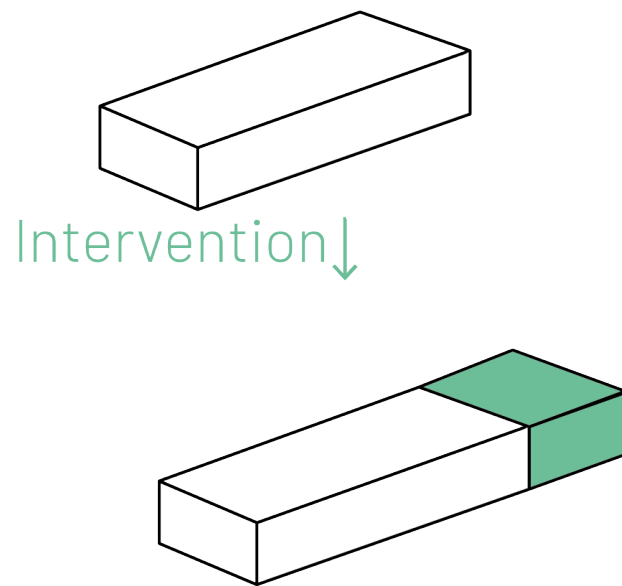
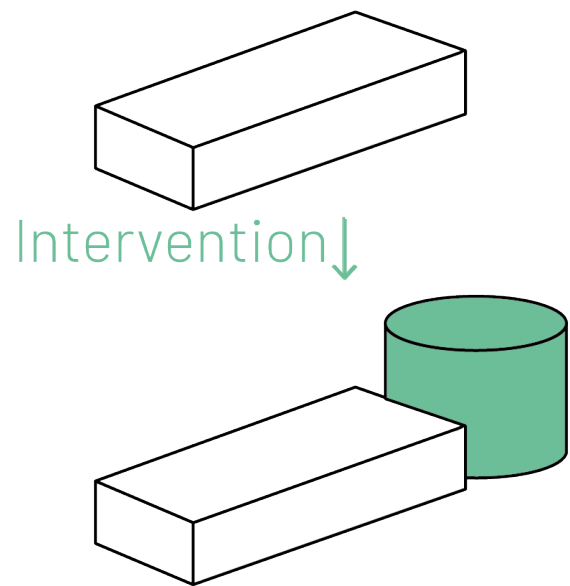
SUBTRACTION

Adding a new, contrasting volume next to the existing

Adding a new volume that merges with the existing

Improving the façade with design, as well as the installations

Removing, downsizing, dismantling of a volume



RESEARCH

Interventions, Lijnbaanplein



1971



2022

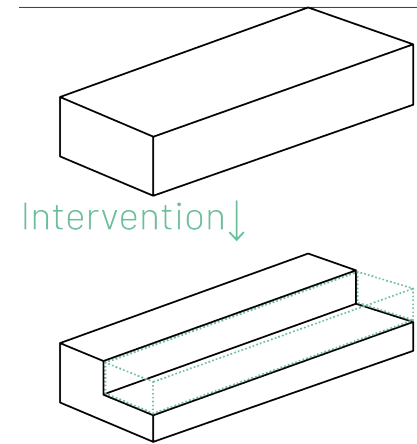


RESEARCH

Interventions, Lijnbaanplein

SUBTRACTION

Removing,
downsizing,
dismantling of a
volume



1971



2022

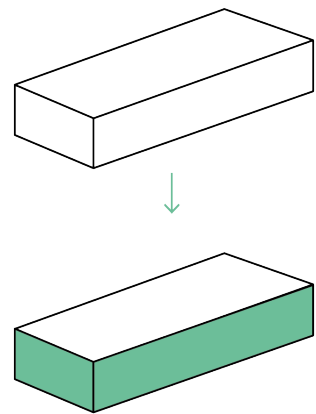


RESEARCH

Interventions, Lijnbaanplein

FACE-LIFT

Improving the façade with design, as well as the installations



RESEARCH

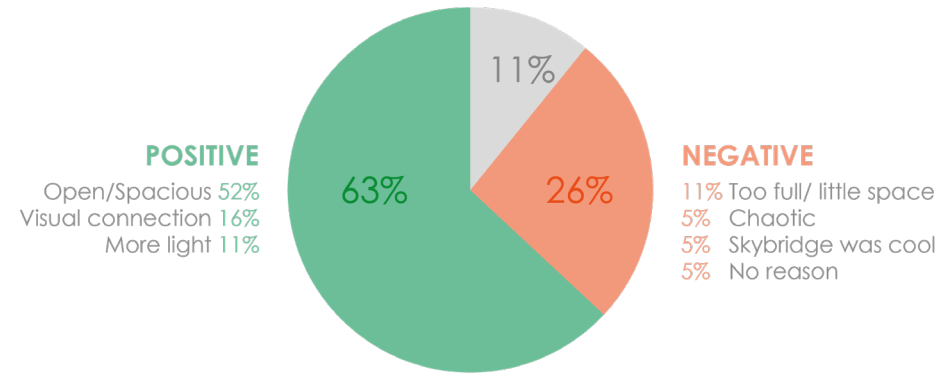
Interview results



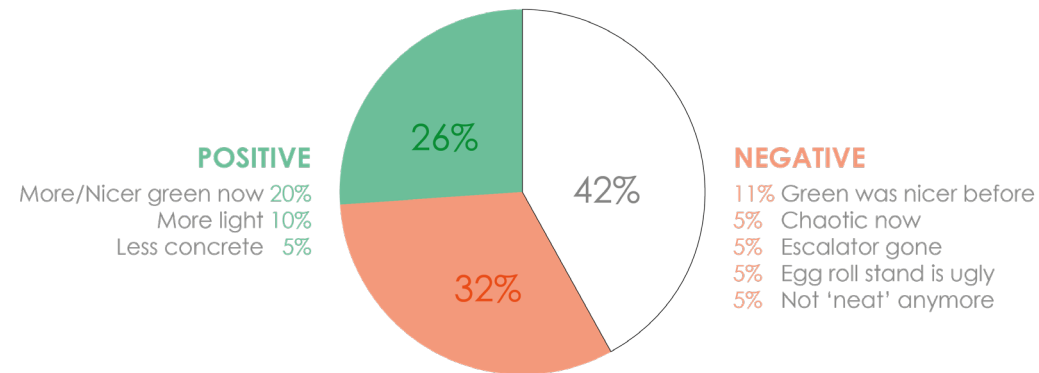
1971



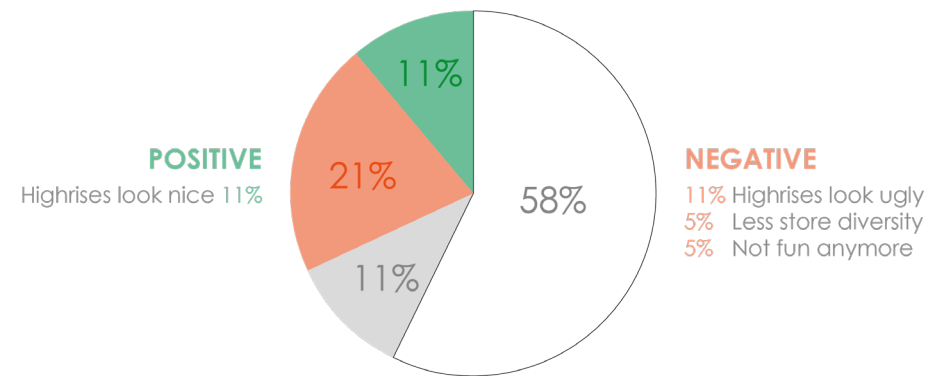
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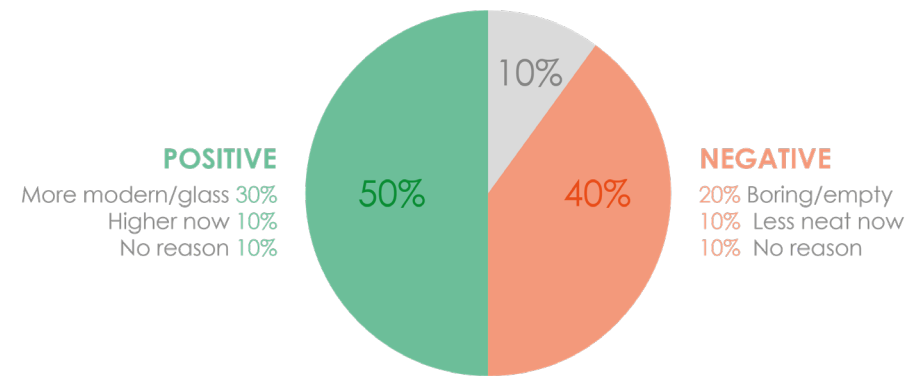
SKYBRIDGE REMOVAL
(n=19)



SQUARE ORGANISATION
(n=19)



CONTEXT (OTHER FACTORS)
(n=19)



NEW FAÇADES FORUM
(n=10)

- Positive opinion on new
- Negative opinion on new
- Indifferent
- Topic not mentioned

RESEARCH

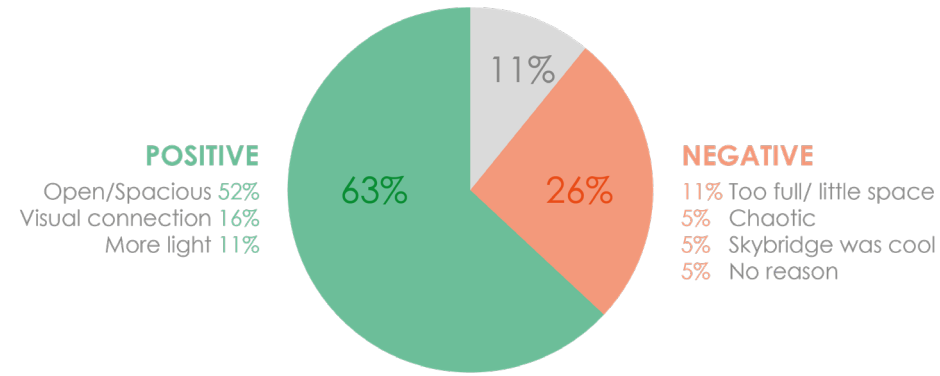
Interview results



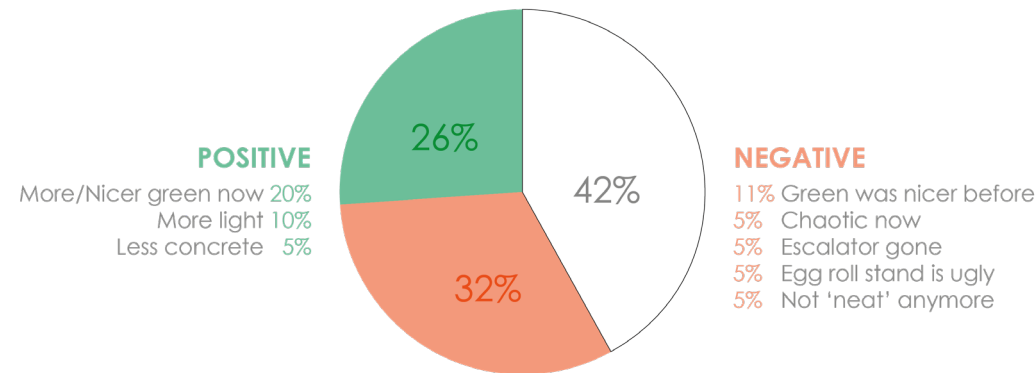
1971



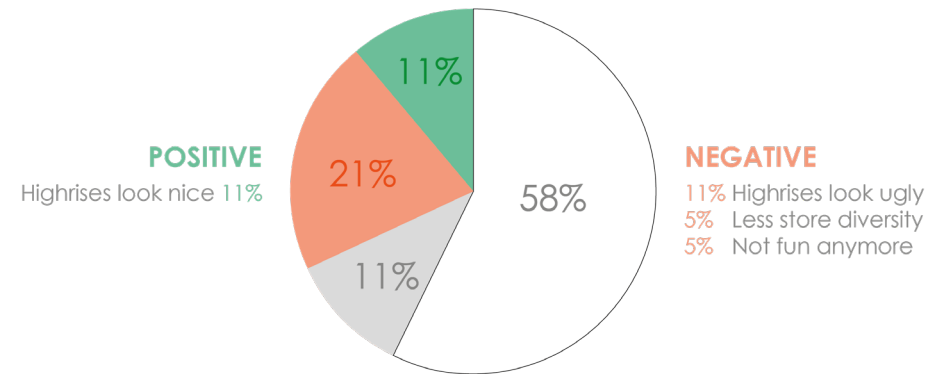
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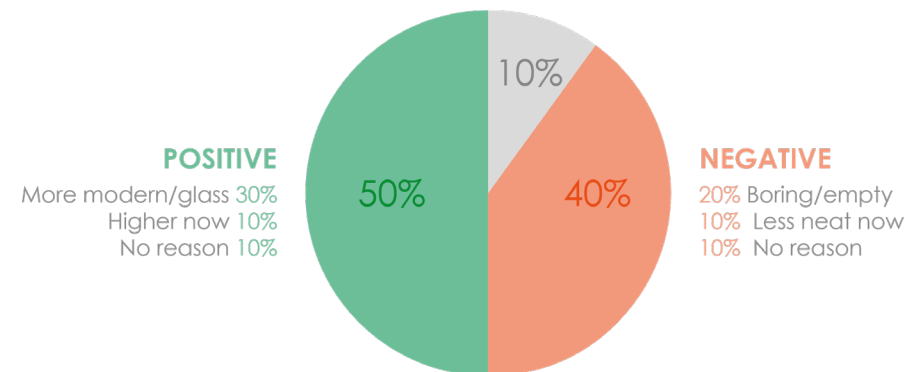
SKYBRIDGE REMOVAL
(n=19)



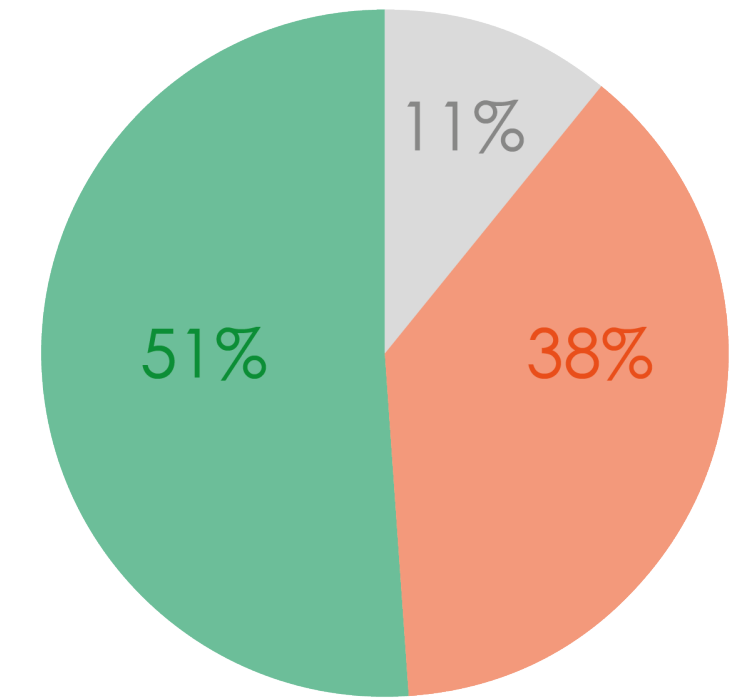
SQUARE ORGANISATION
(n=19)



CONTEXT (OTHER FACTORS)
(n=19)



NEW FAÇADES FORUM
(n=10)



OLD HOSPITAL SQUARE
(n=19, 37 comments)

- Positive opinion on new
- Negative opinion on new
- Indifferent
- Topic not mentioned

RESEARCH

Interview results



1953



2022

RESEARCH

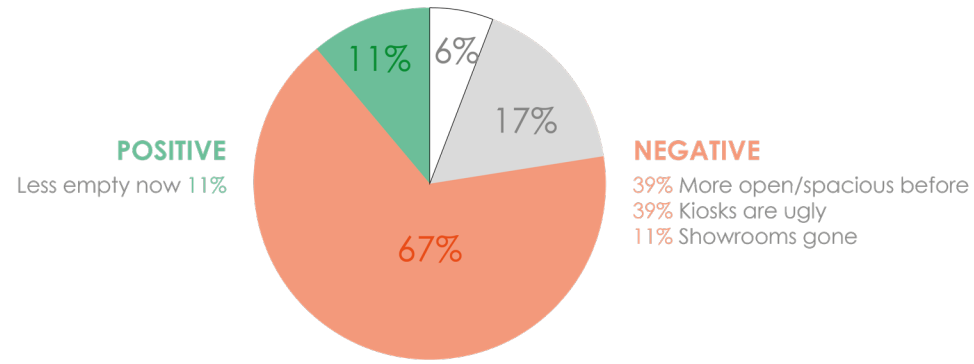
Interview results



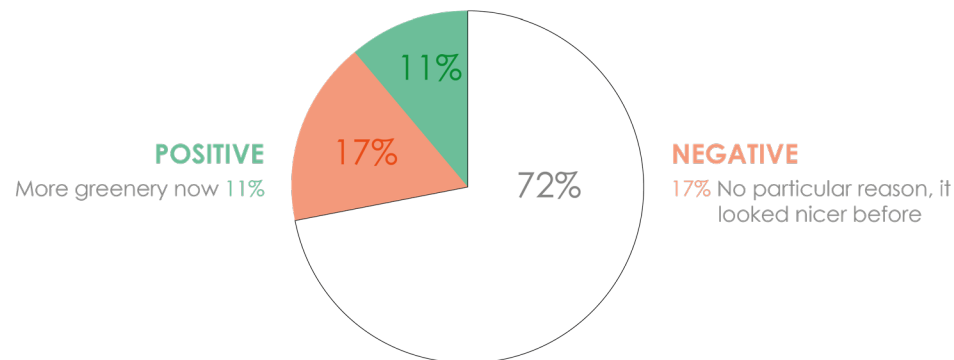
1953



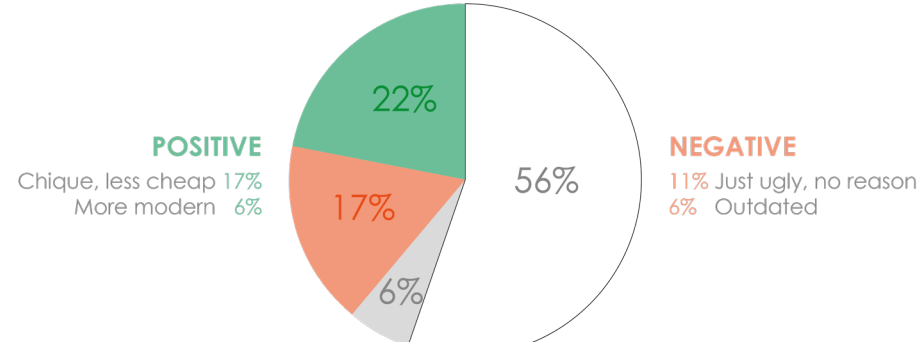
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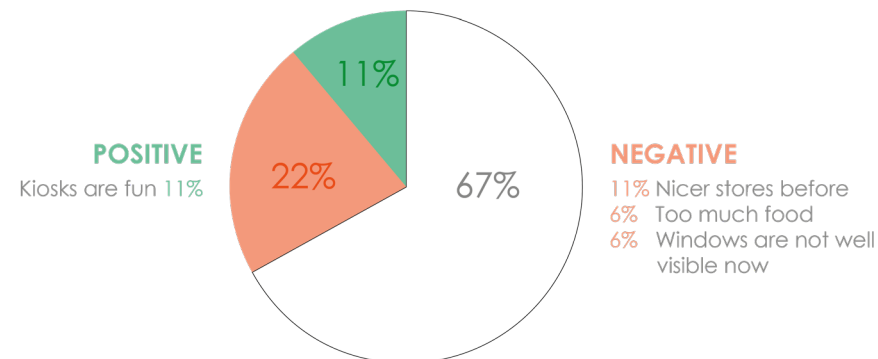
SPATIAL ORGANISATION
(n=18)



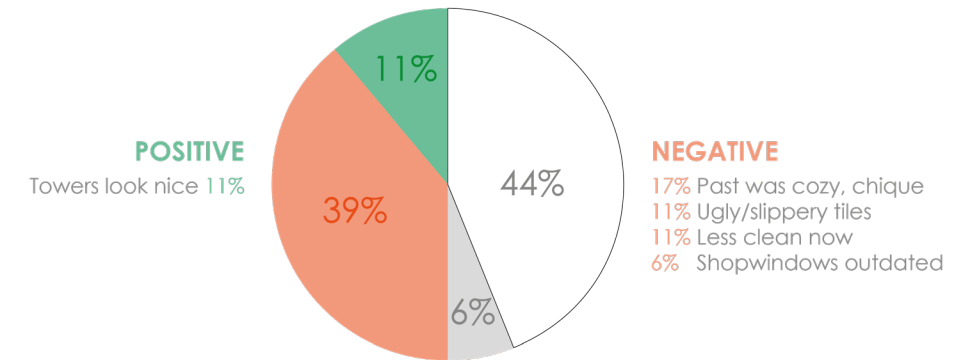
GREENERY
(n=18)



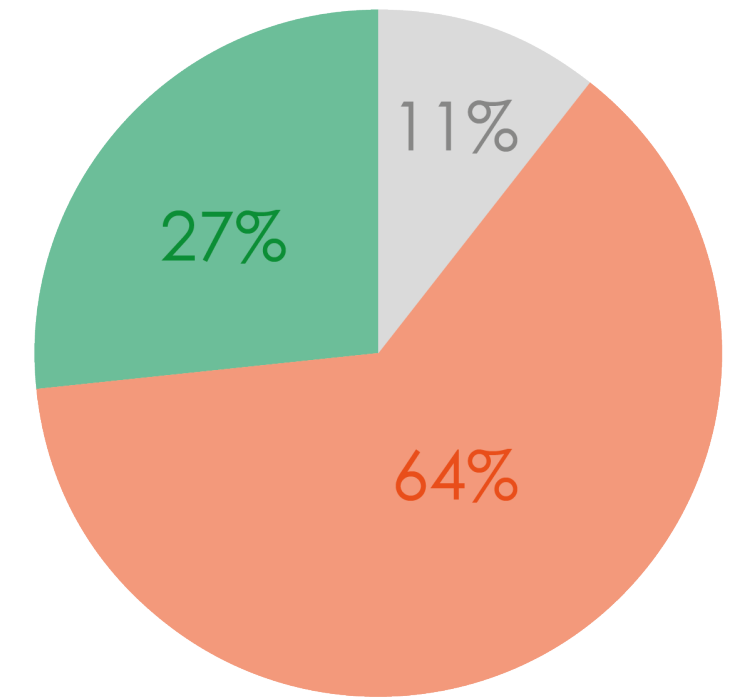
CANOPIES
(n=18)



PROGRAM-RELATED
(n=18)



CONTEXT (OTHER FACTORS)
(n=18)



ORIGINAL LIJNBAAN
(n=18, 46 comments)

- Positive opinion on new
- Negative opinion on new
- Indifferent
- Topic not mentioned

RESEARCH

Interview results



RESEARCH

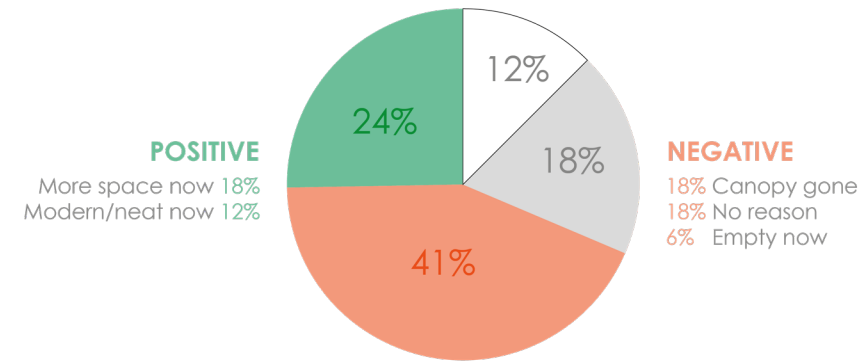
Interview results



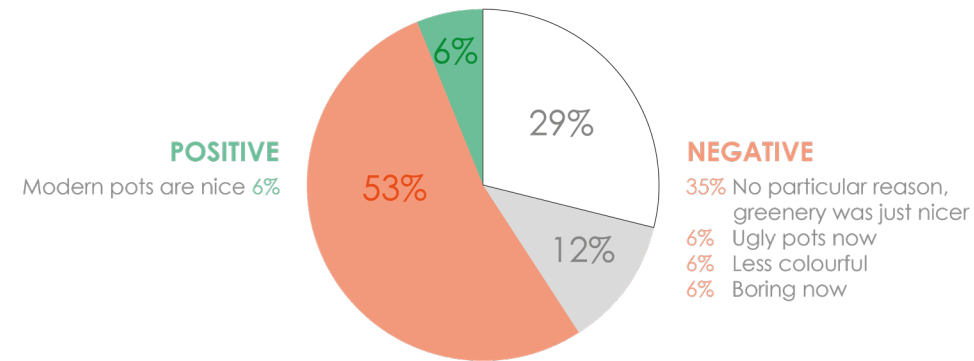
1961



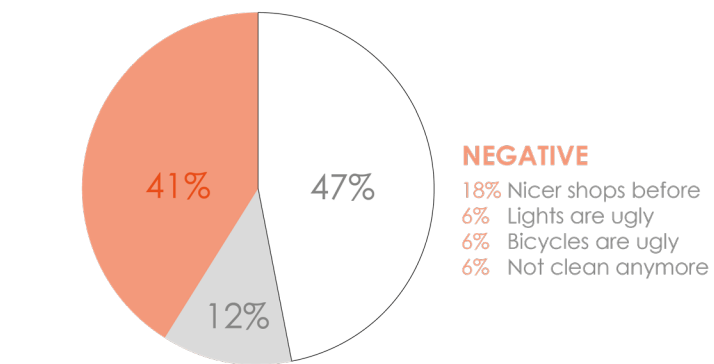
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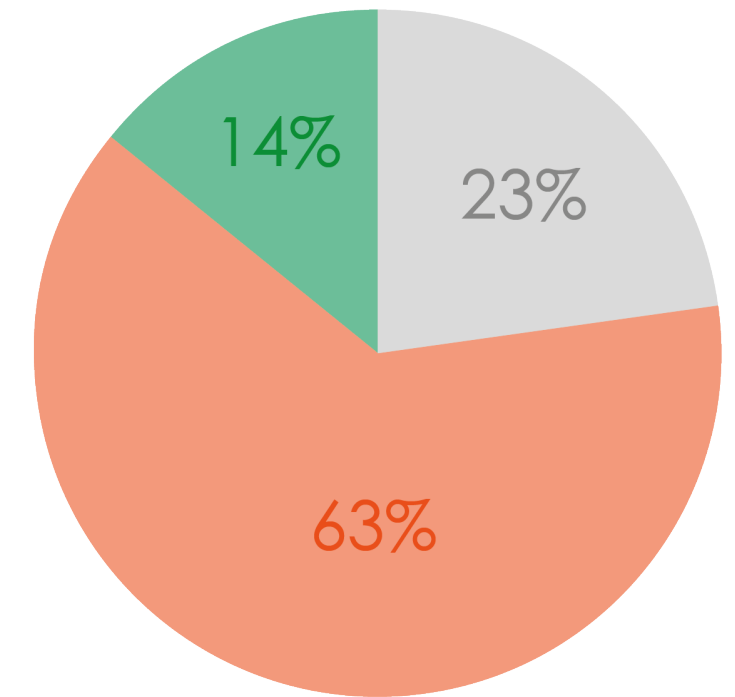
SPATIAL ORGANISATION
(n=17)



GREENERY
(n=17)



CONTEXT (OTHER FACTORS)
(n=17)



KORTE LIJNBAAN
(n=17, 35 comments)

- Positive opinion on new
- Negative opinion on new
- Indifferent
- Topic not mentioned

RESEARCH

Interview results



RESEARCH

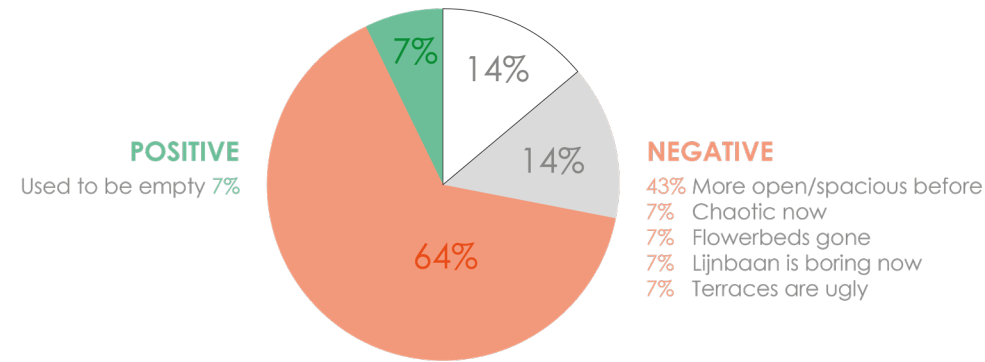
Interview results



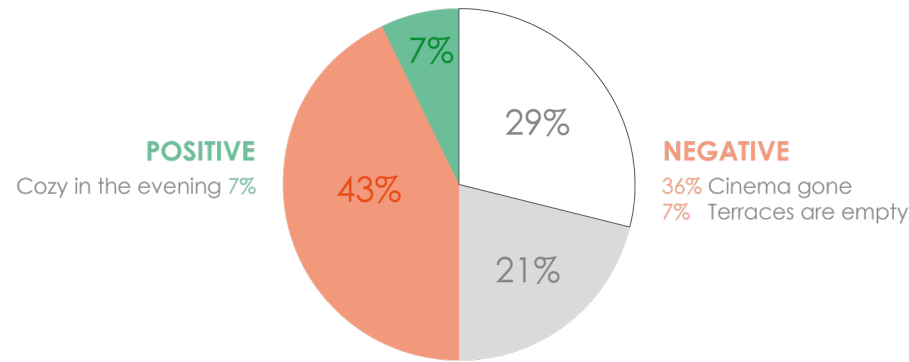
1956



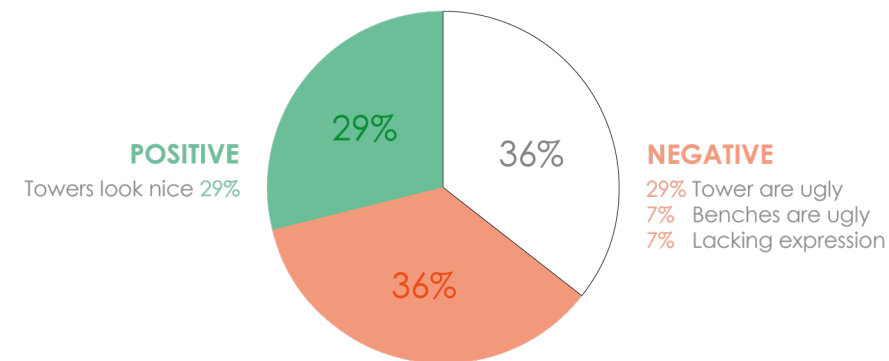
2022



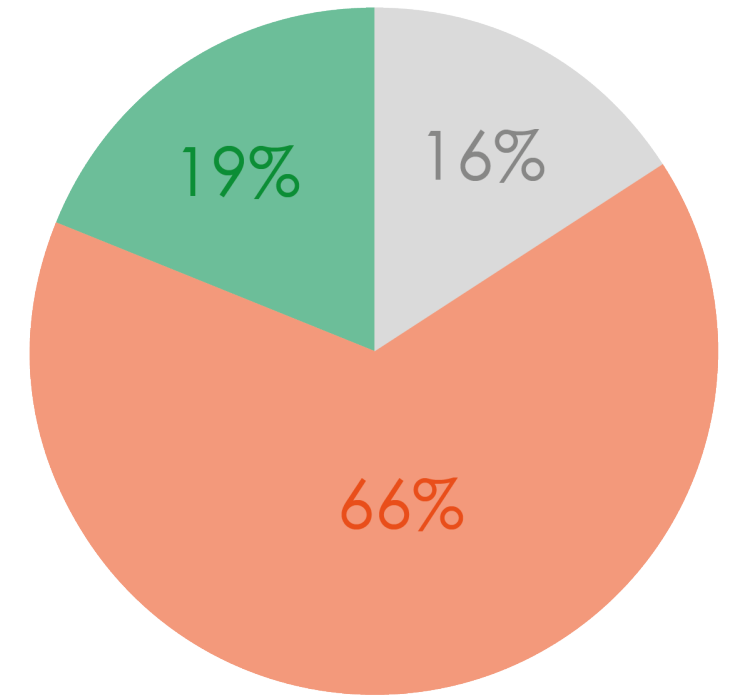
SPATIAL ORGANISATION
(n=14)



PROGRAM-RELATED
(n=14)



CONTEXT (OTHER FACTORS)
(n=14)

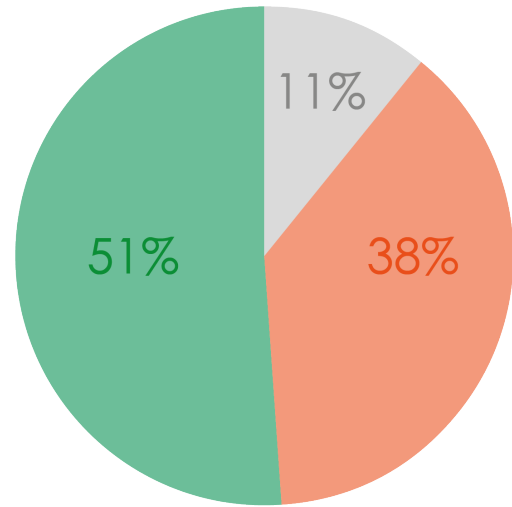


LIJNBAAN-KRUISKADE
(n=14, 32 comments)

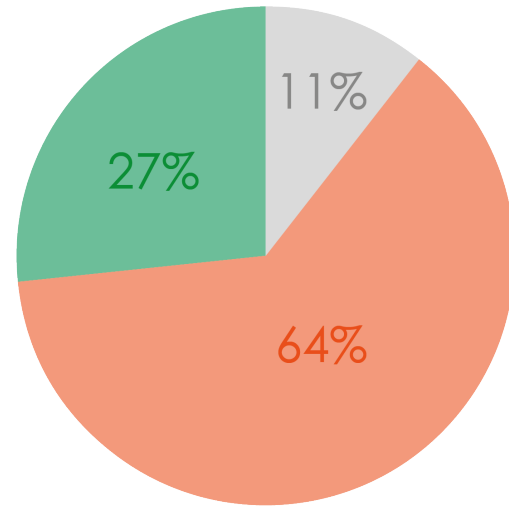
- Positive opinion on new
- Negative opinion on new
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RESEARCH

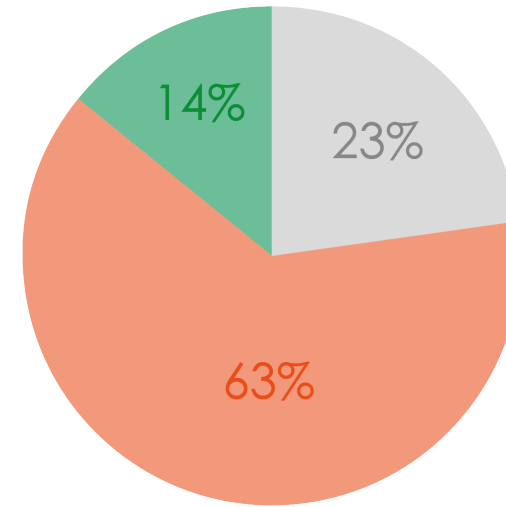
Interview results



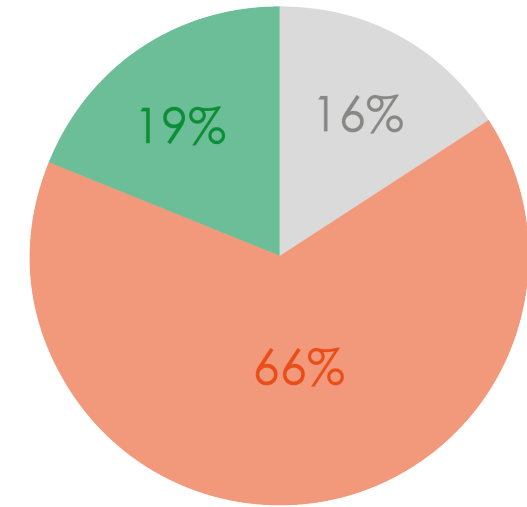
OLD HOSPITAL SQUARE
(n=19, 37 comments)



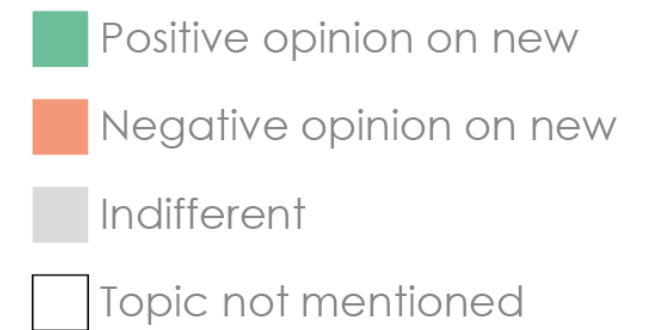
ORIGINAL LIJNBAAN
(n=18, 46 comments)



KORTE LIJNBAAN
(n=17, 35 comments)

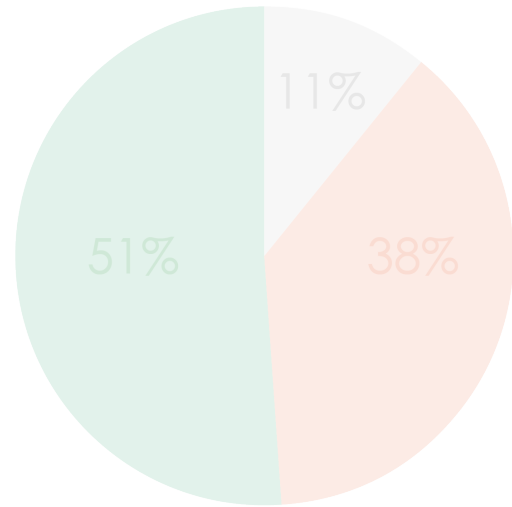


LIJNBAAN-KRUISKADE
(n=14, 32 comments)

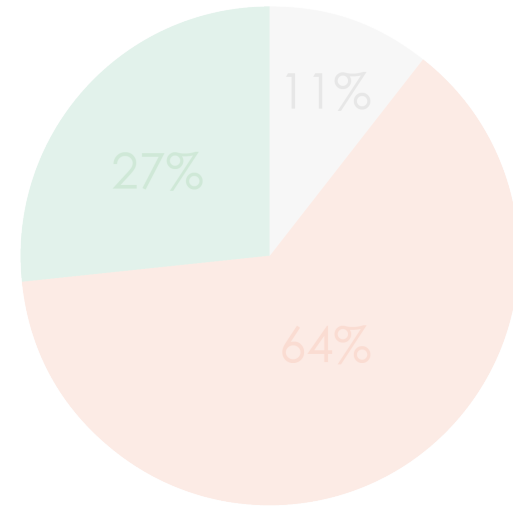


RESEARCH

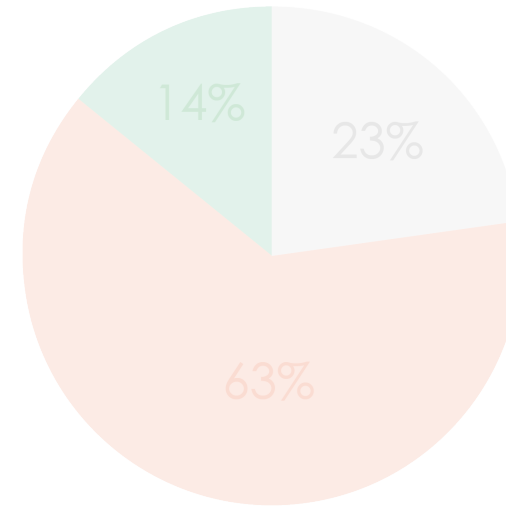
Interview results



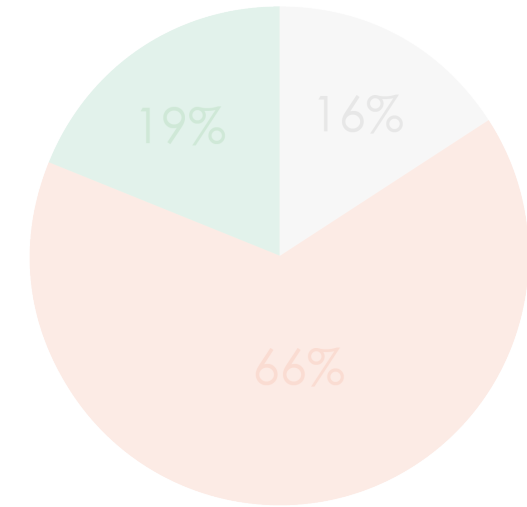
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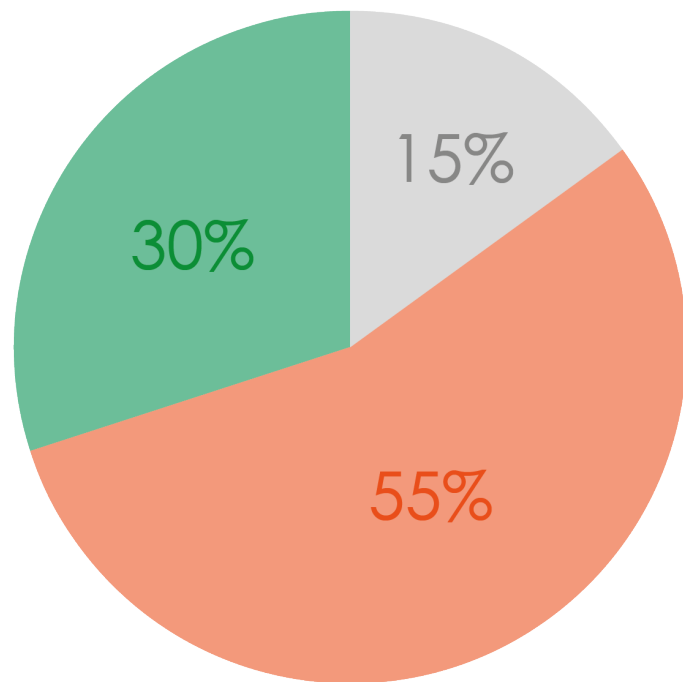
ORIGINAL LIJNBAAN
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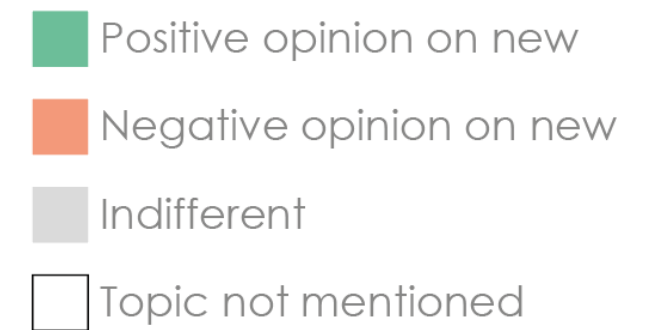
KORTE LIJNBAAN
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LIJNBAAN-KRUISKADE
(n=14, 32 comments)

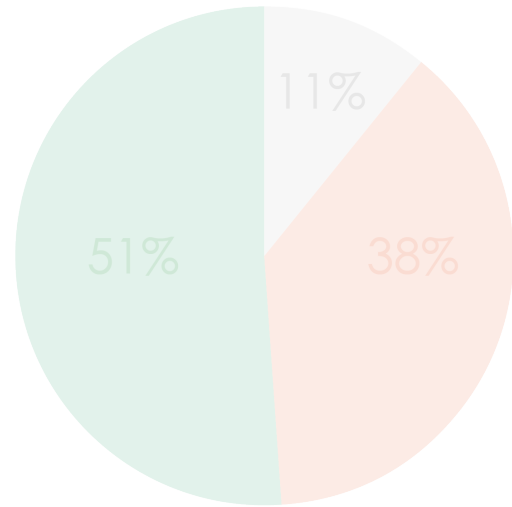


LIJNBAAN TOTAL
(n=78, 160 comments)

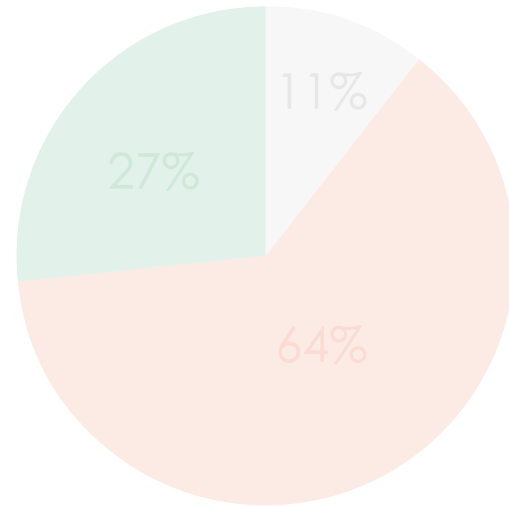


RESEARCH

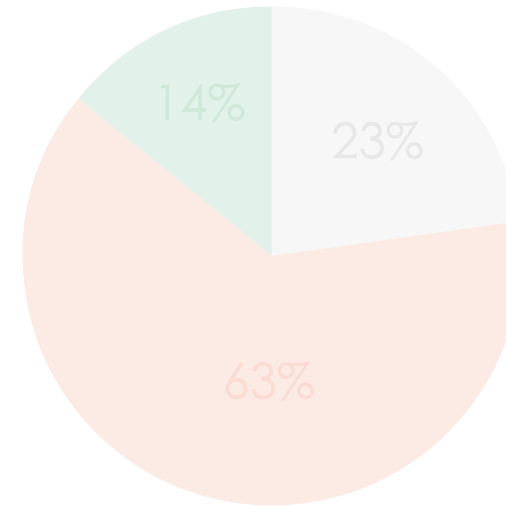
Interview results



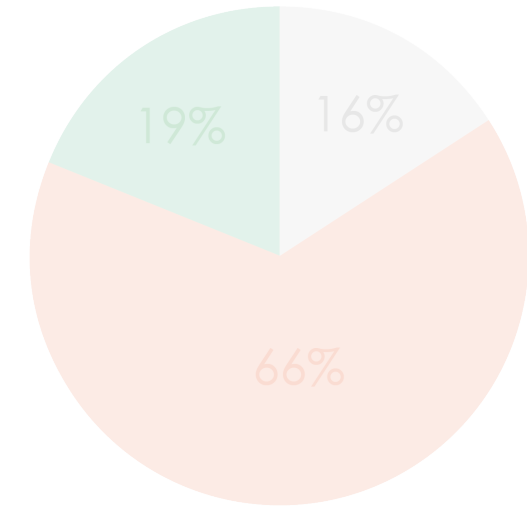
OLD HOSPITAL SQUARE
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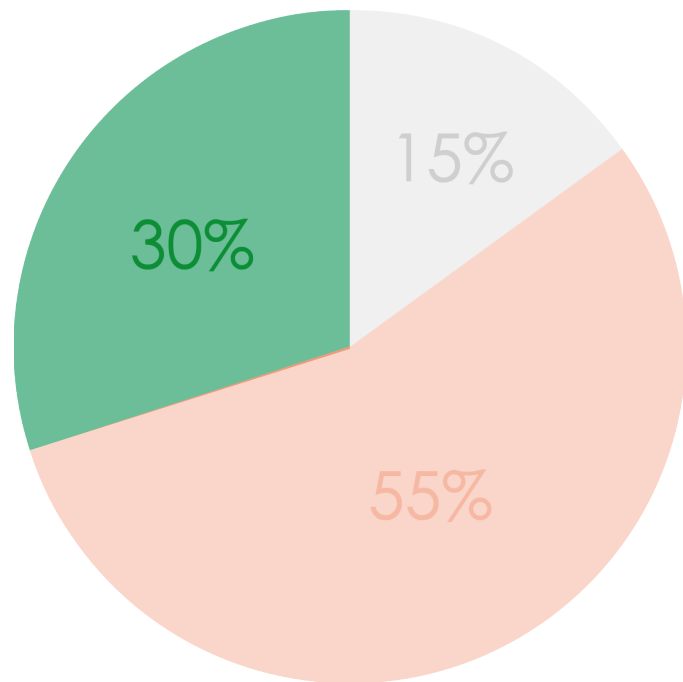
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(n=18, 46 comments)



KORTE LIJNBAAN
(n=17, 35 comments)



LIJNBAAN-KRUISKADE
(n=14, 32 comments)



LIJNBAAN TOTAL
(n=78, 160 comments)

MOST MENTIONED TOPICS

(n=78)

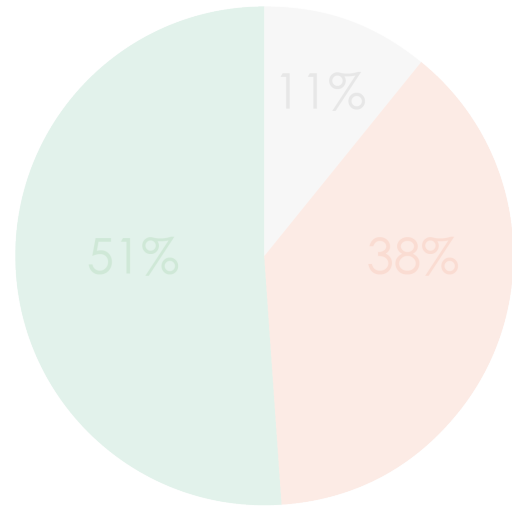
POSITIVE

- 1. More 'open' spatially 21%
- 2. Use of greenery 12%
- 3. Façade and canopy materials 12%
- 4. Highrises in the background 10%

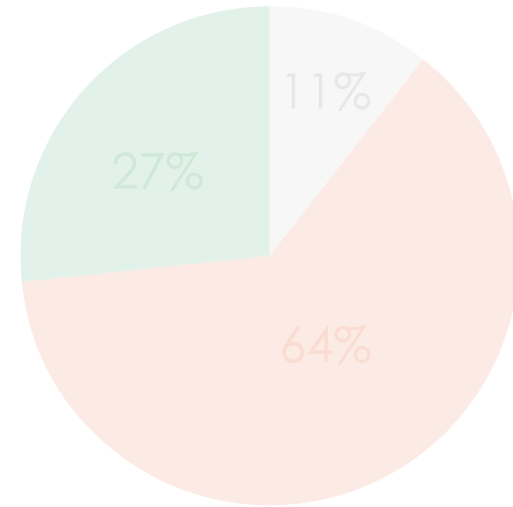
- Positive opinion on new
- Negative opinion on new
- Indifferent
- Topic not mentioned

RESEARCH

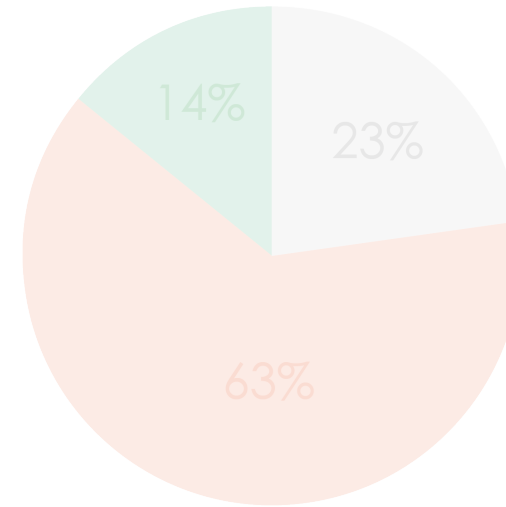
Interview results



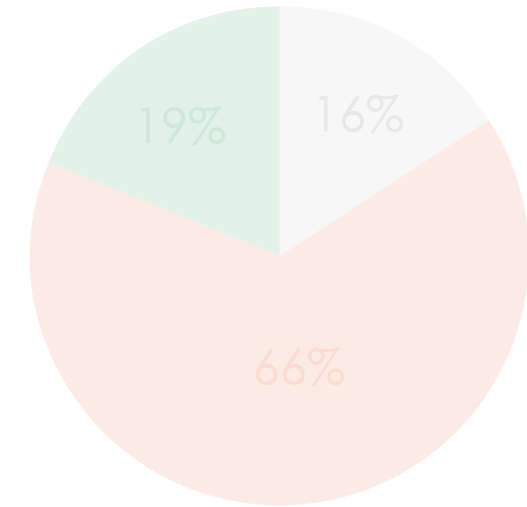
OLD HOSPITAL SQUARE
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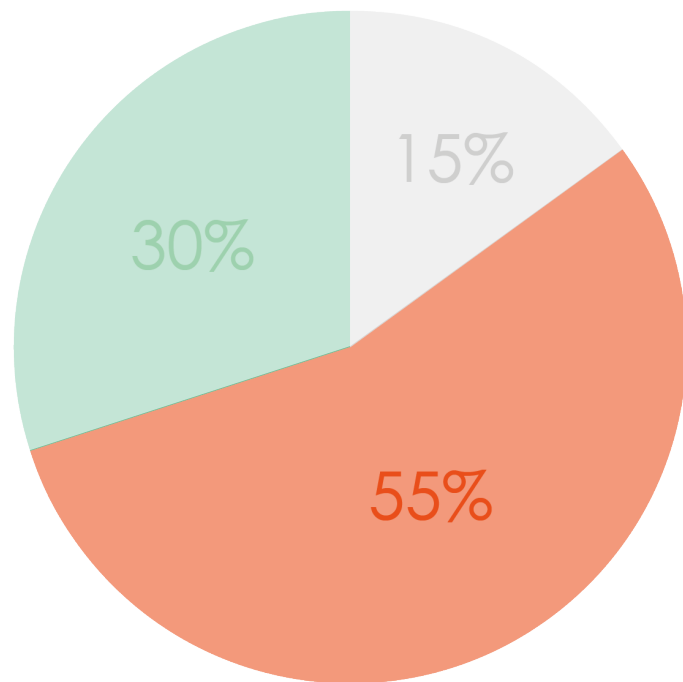
ORIGINAL LIJNBAAN
(n=18, 46 comments)



KORTE LIJNBAAN
(n=17, 35 comments)



LIJNBAAN-KRUISKADE
(n=14, 32 comments)



LIJNBAAN TOTAL
(n=78, 160 comments)

MOST MENTIONED TOPICS

(n=78)

POSITIVE

- More 'open' spatially 21%
- Use of greenery 12%
- Façade and canopy materials 12%
- Highrises in the background 10%

NEGATIVE

1. 37% Less 'open' spatially
2. 26% Past atmosphere/functions
3. 19% Past use of greenery
4. 10% Façade and canopy materials

- Positive opinion on new
- Negative opinion on new
- Indifferent
- Topic not mentioned

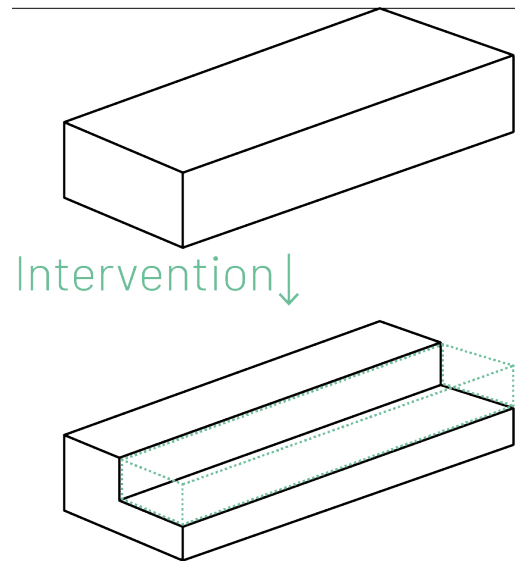
RESEARCH

Conclusions

How do interventions in the spatial composition influence the way visitors navigate a Dutch post-war shopping mall?

SUBTRACTION

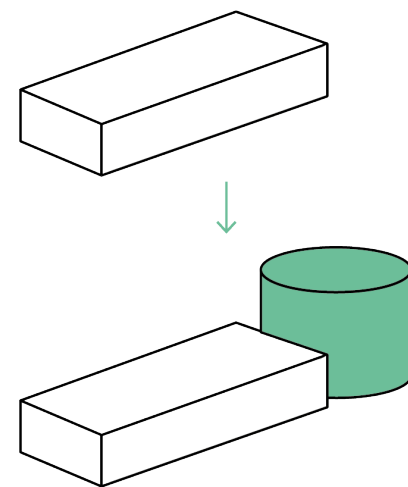
Removing, downsizing, dismantling of a volume



Buildings: +
Greenery: -

1+1=2

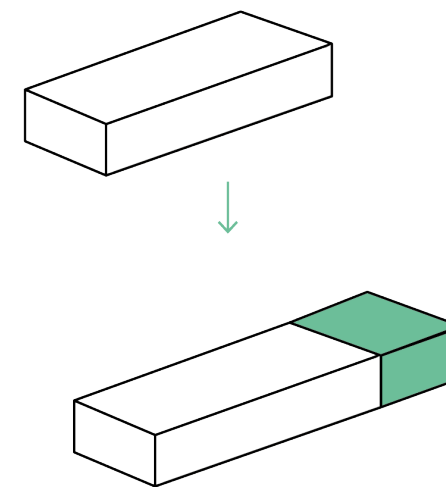
Adding a new, contrasting volume next to the existing



Mostly: -
Chaotic

1+1=1

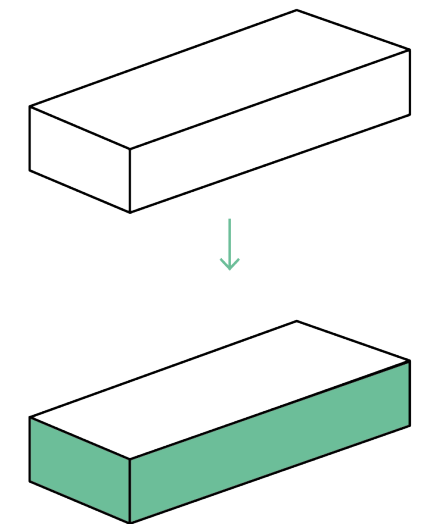
Adding a new volume that merges with the existing



Not mentioned often
Only when gone

FACE-LIFT

Improving the façade with design, as well as the installations



Mixed answers

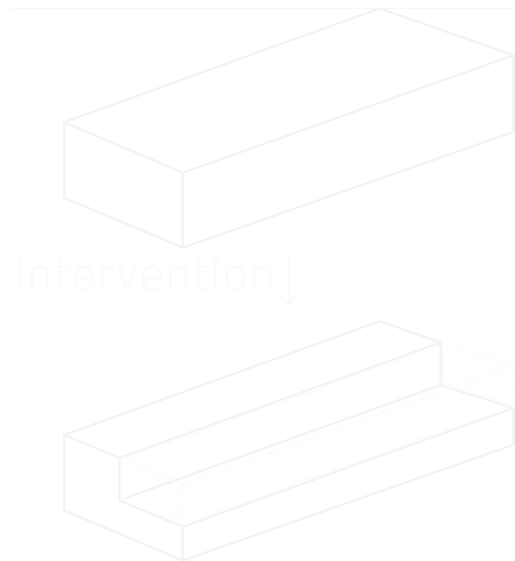
RESEARCH

Conclusions

How do interventions in the spatial composition influence the way visitors navigate a Dutch post-war shopping mall?

SUBTRACTION

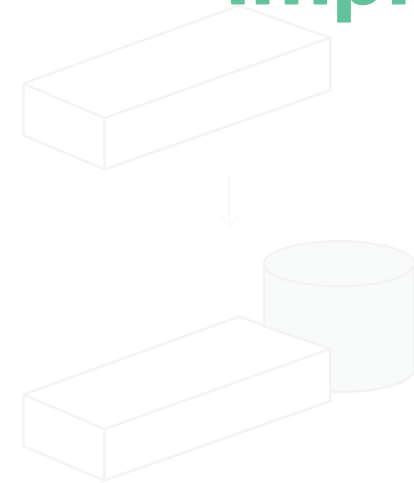
Removing, downsizing, dismantling of a volume



Buildings: +
Greenery: -

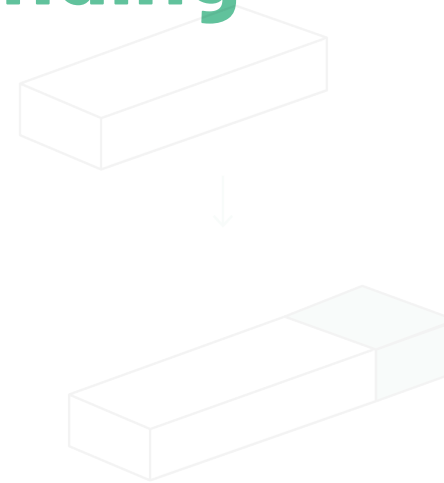
More visual access / openness

Adding a new, contrasting volume next to the existing



Mostly: -
Chaotic

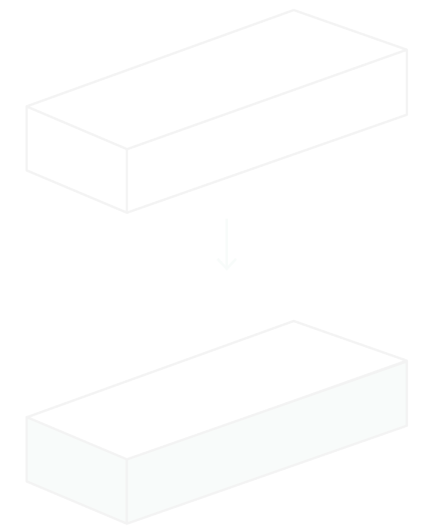
Adding a new volume that merges with the existing



Not mentioned often
Only when gone

FACE-LIFT

Improving the façade with design, as well as the installations



Mixed answers

Better legibility

Improved wayfinding

DESIGN

NEGATIVE

37% Less 'open' spatially

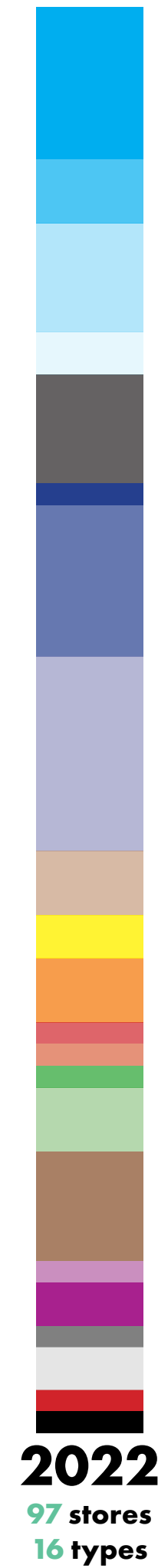
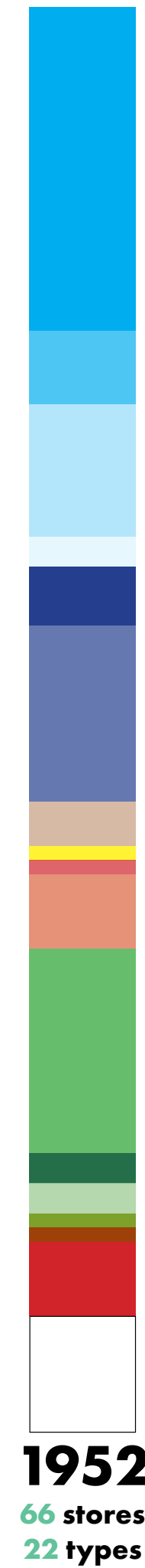
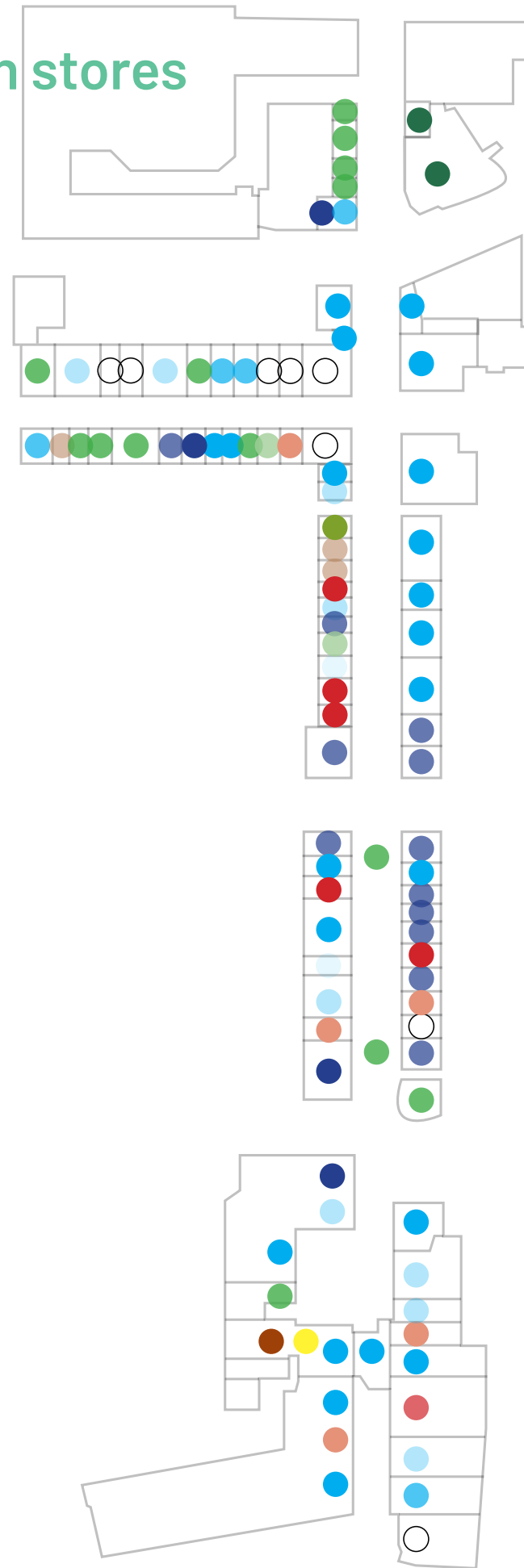
26% Past atmosphere/functions

19% Past use of greenery

10% Façade and canopy materials

DESIGN

Less diversity in stores

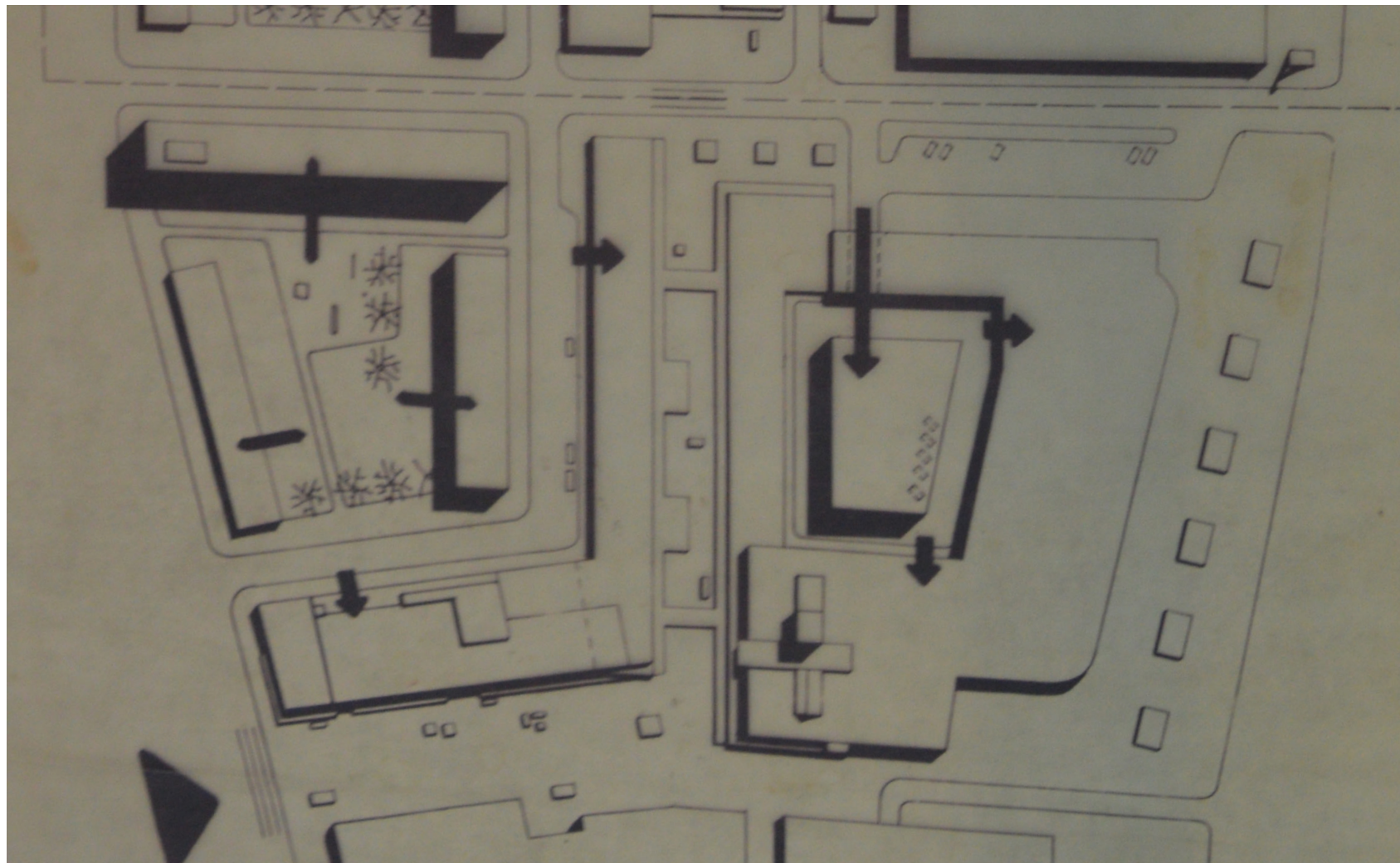


DESIGN

Design area



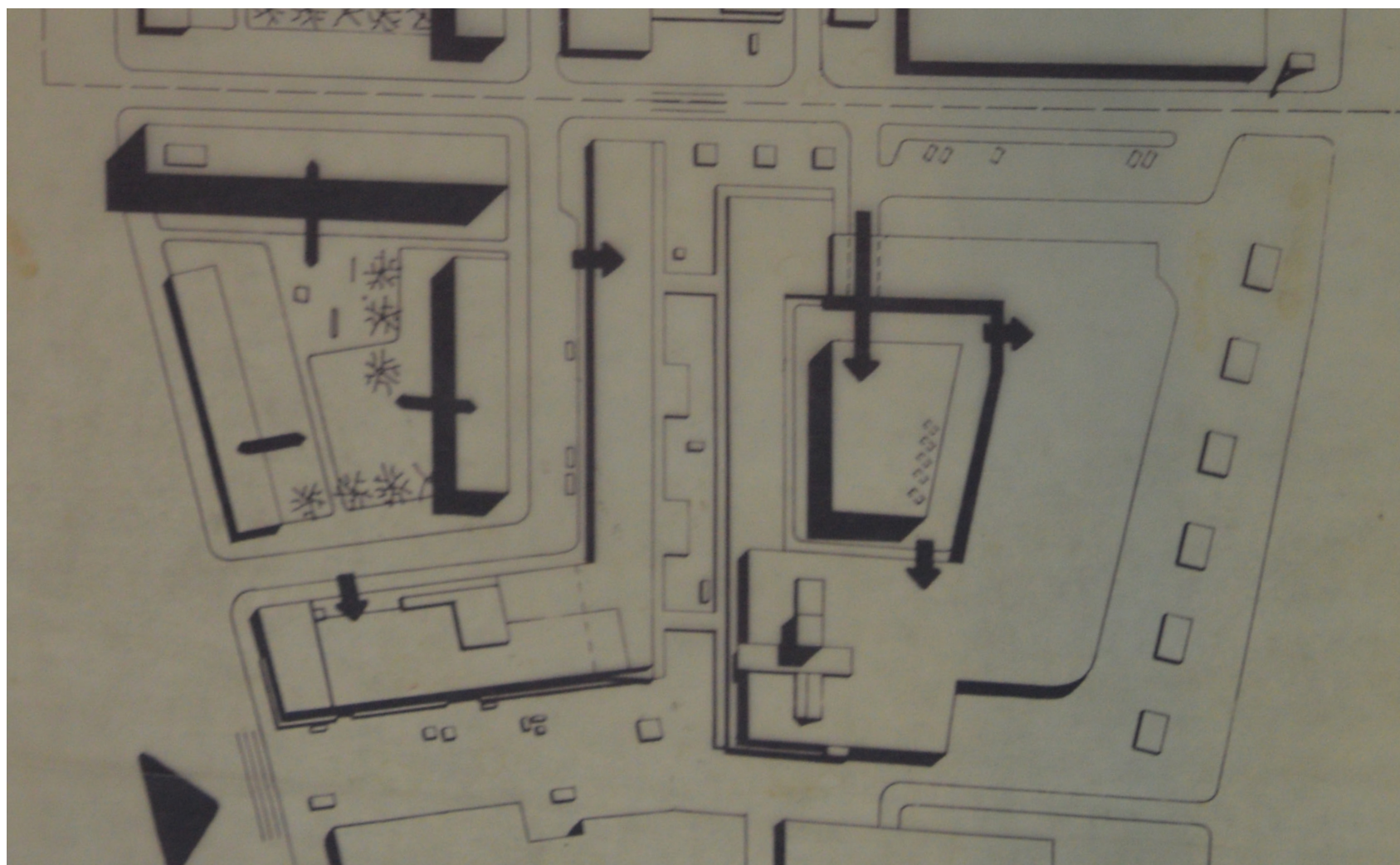
2023



Original plan



Revised plan



Original plan



2023

DESIGN

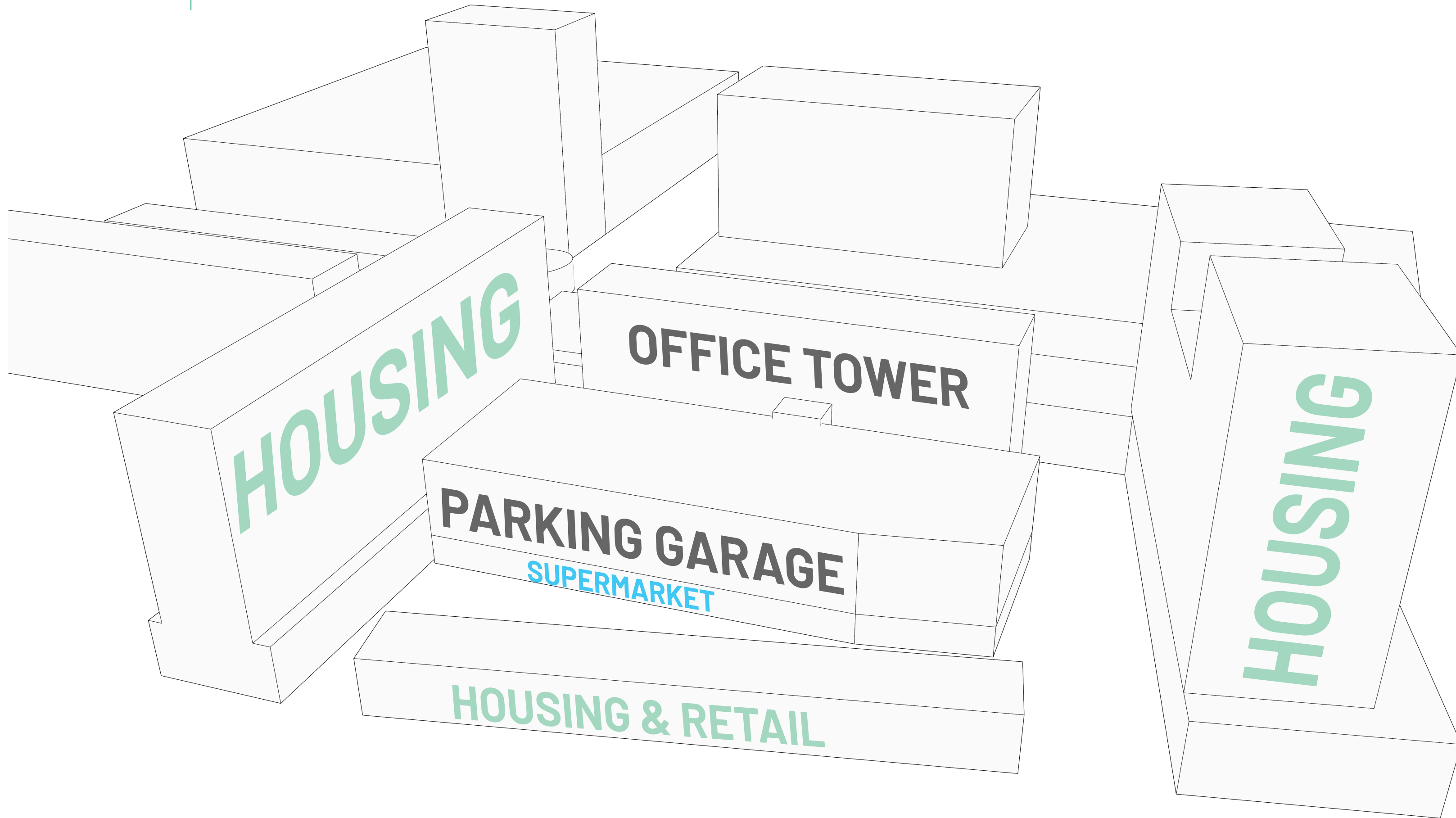
Current situation



DESIGN

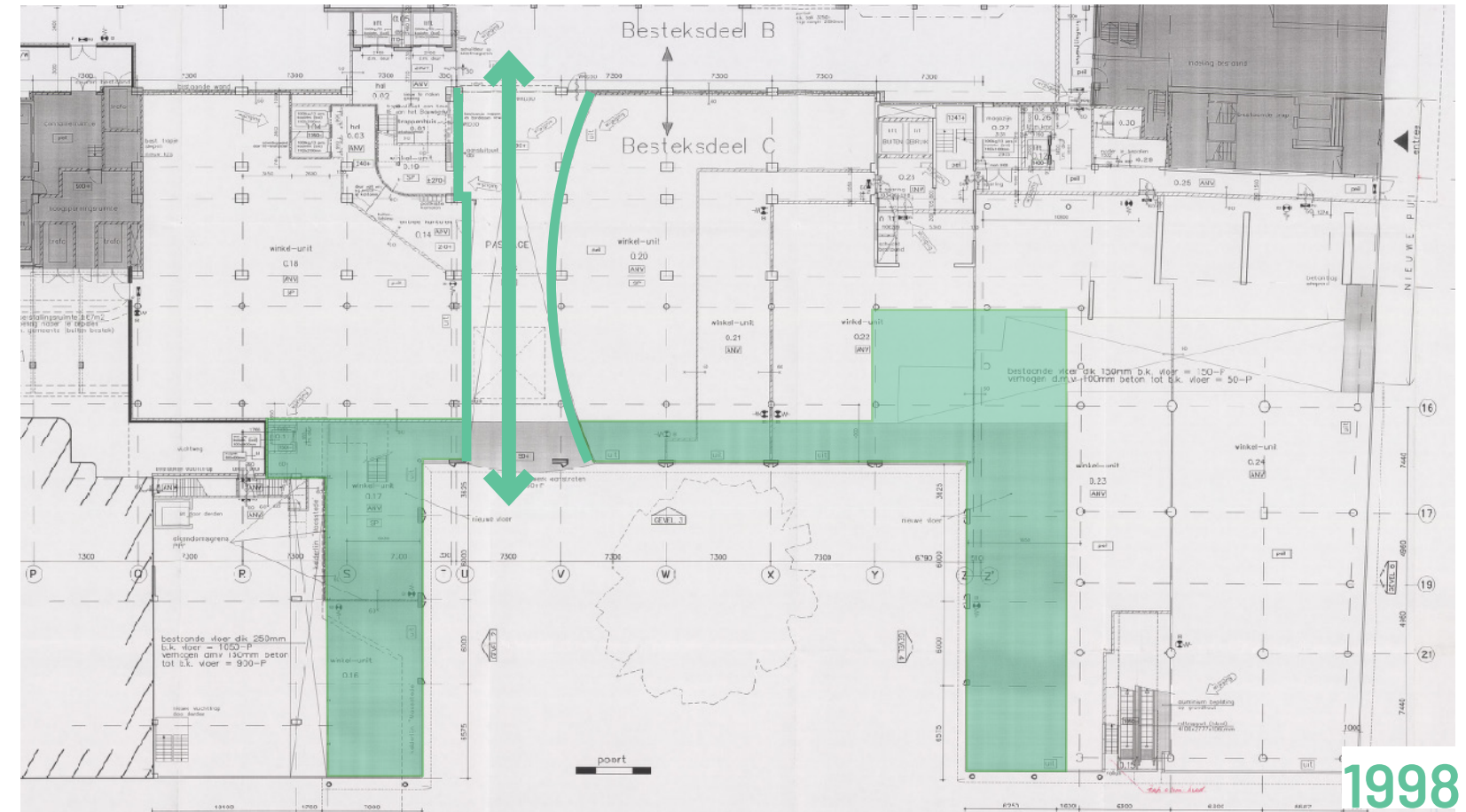
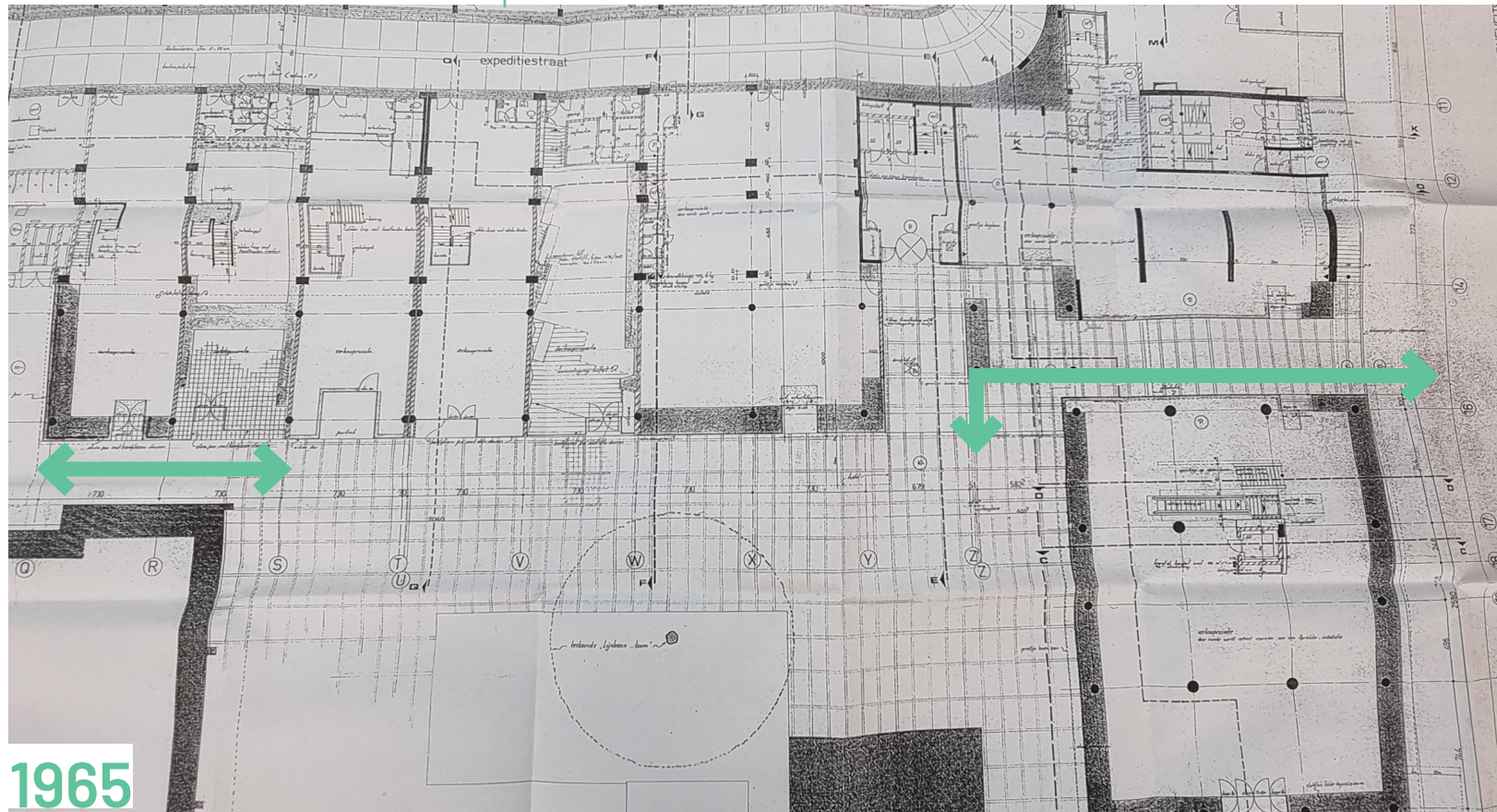
Current situation





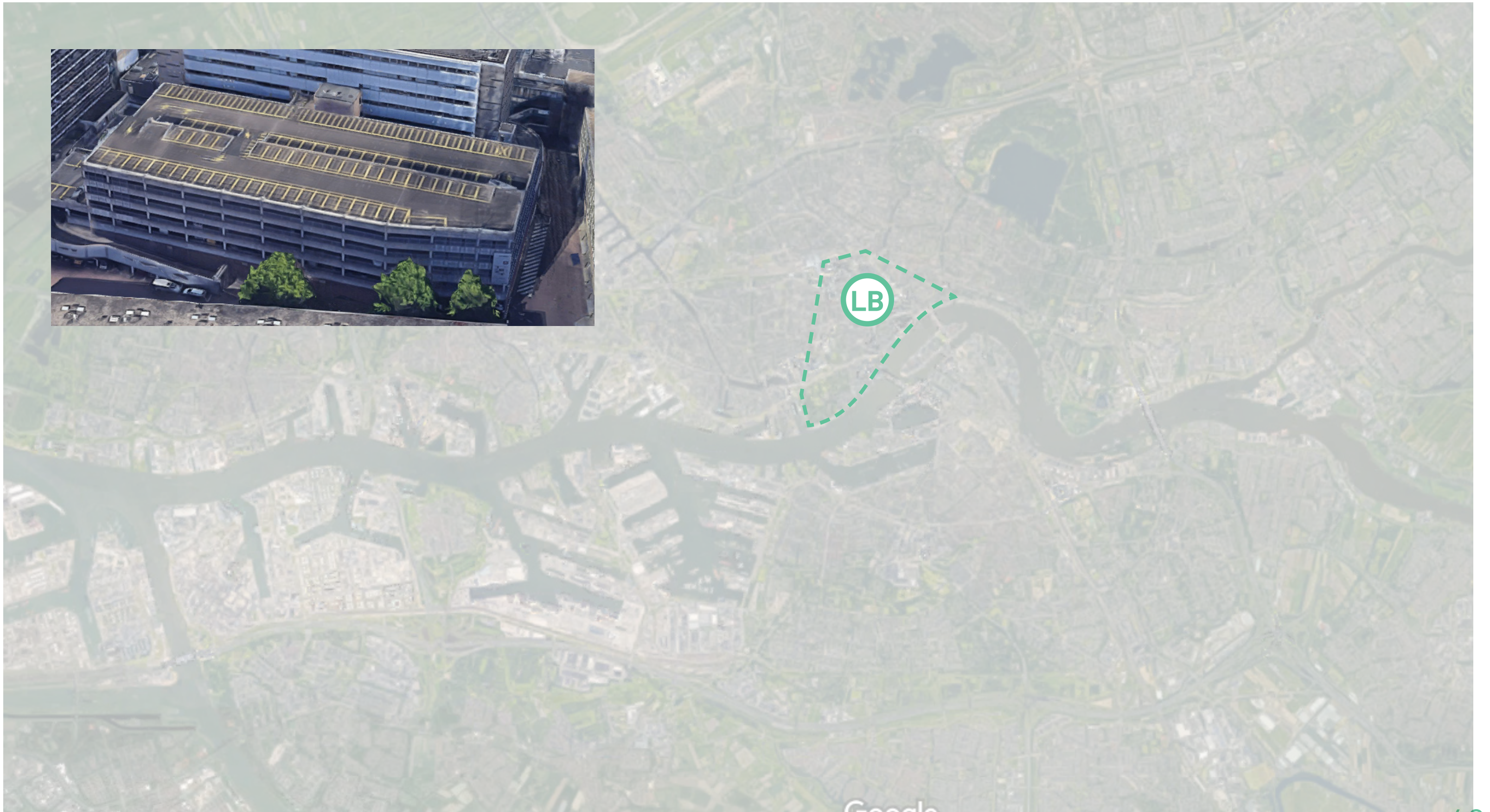
DESIGN

Past intervention



DESIGN

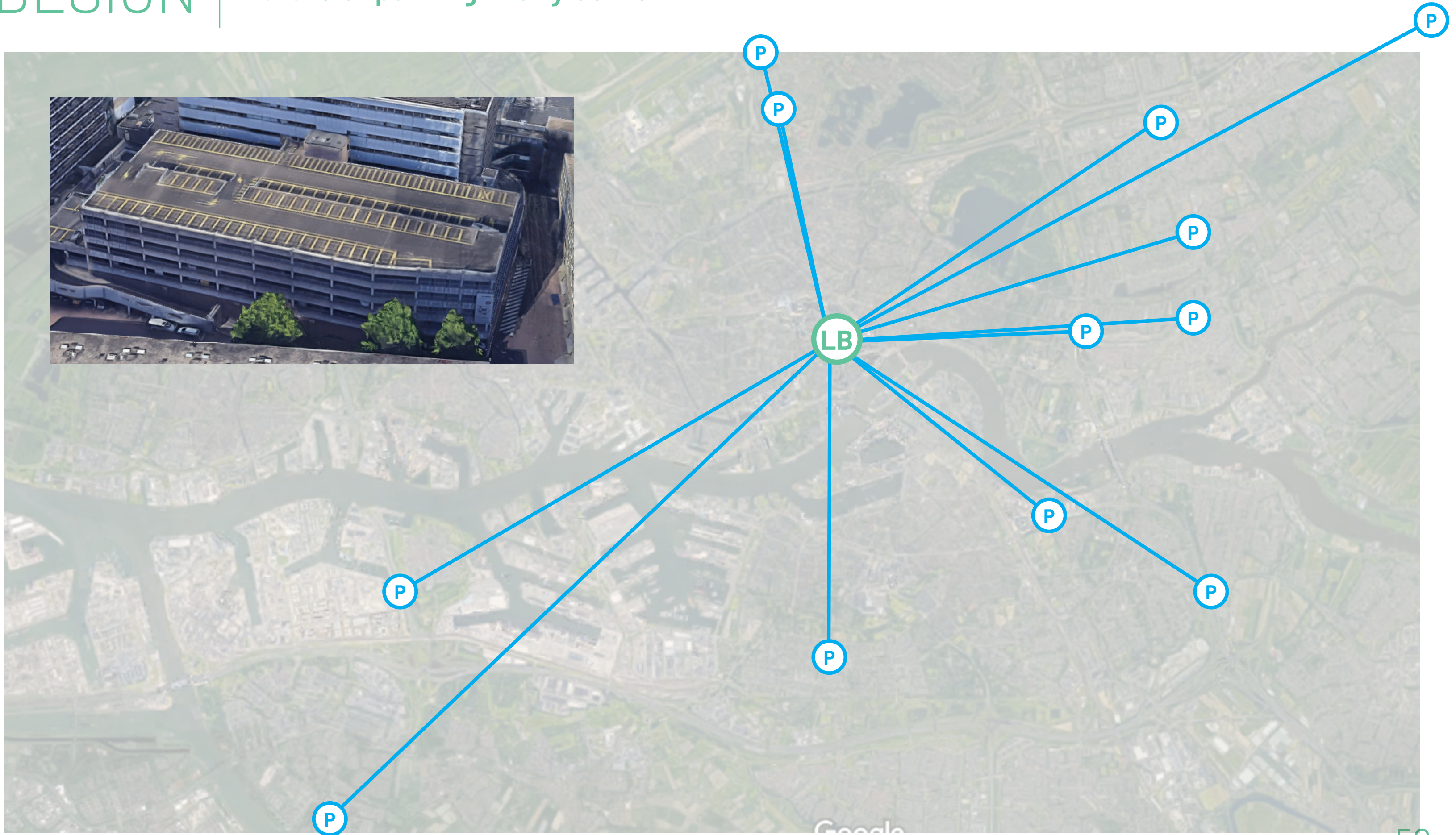
Future of parking in city center



Google

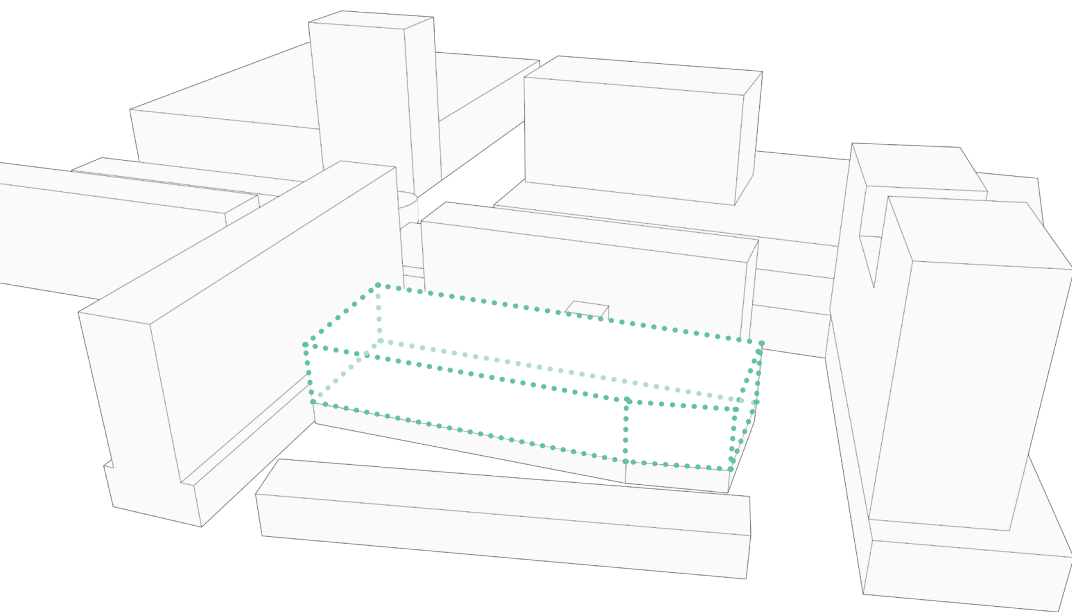
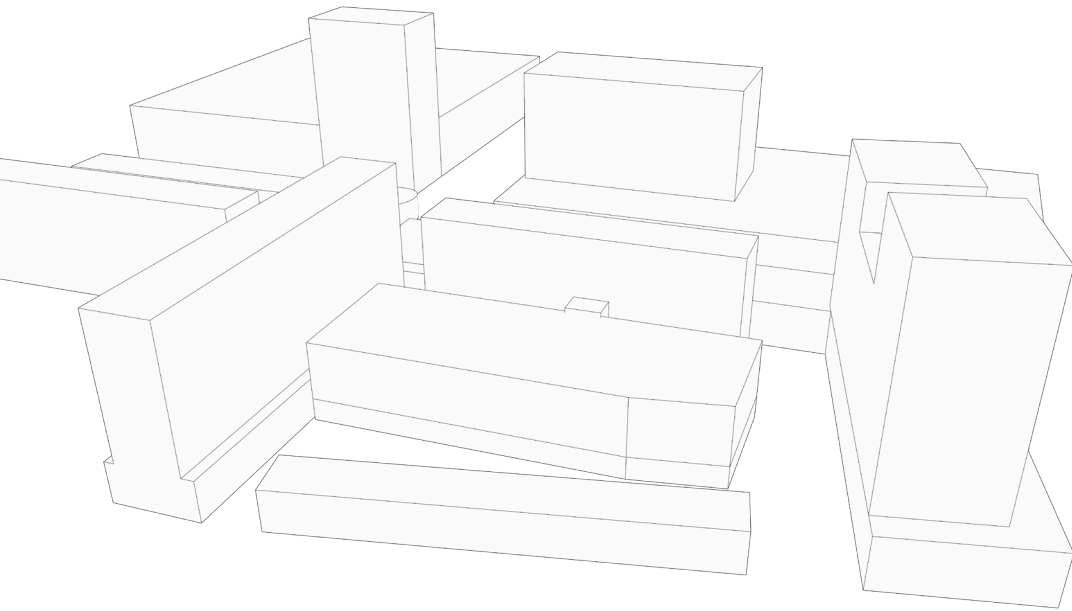
DESIGN

Future of parking in city center



DESIGN

Starting points

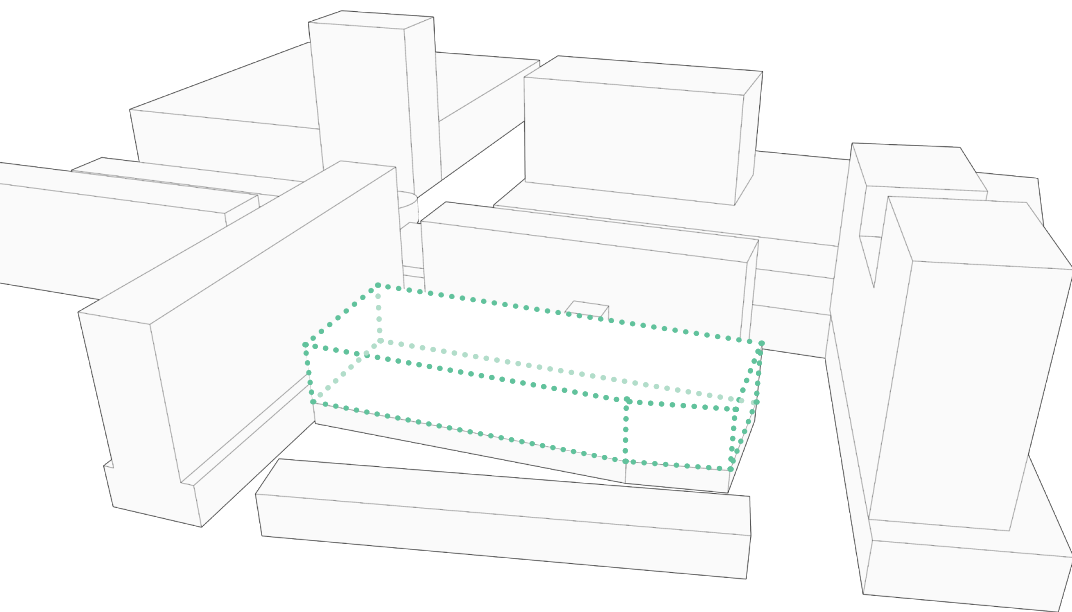
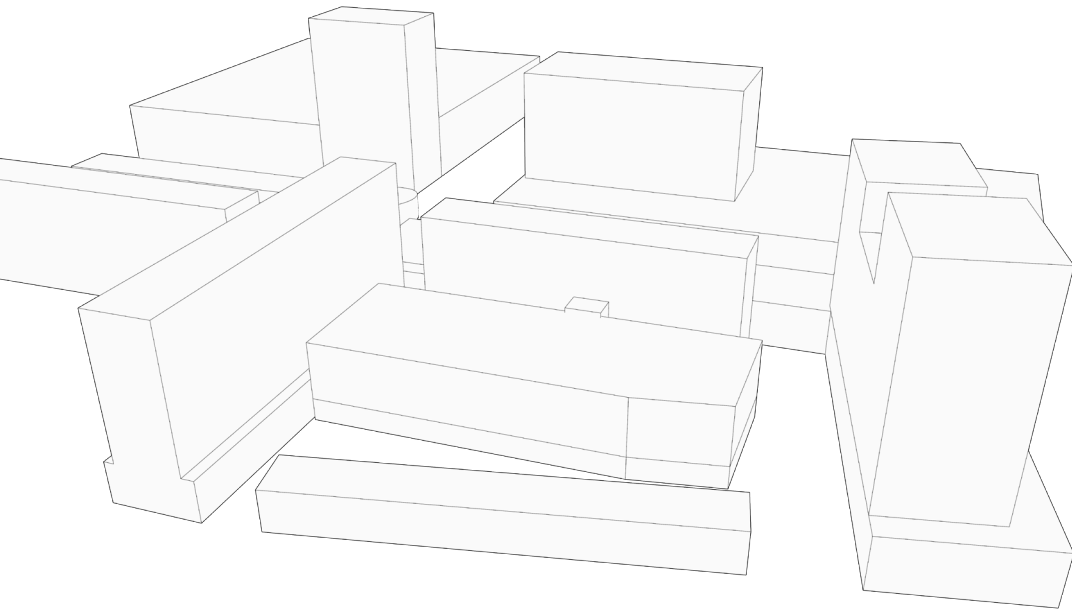


1. NO MORE PARKING

Visitors arrive with PT

DESIGN

Starting points



1. NO MORE PARKING

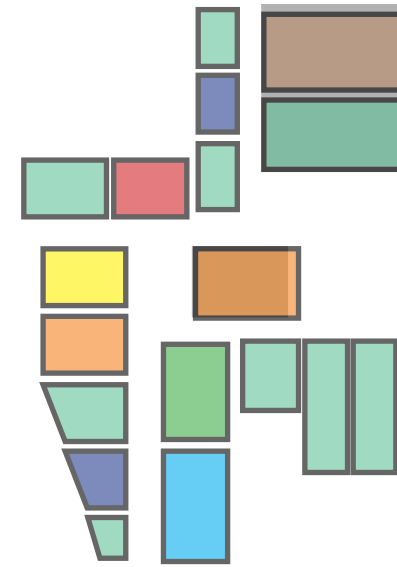
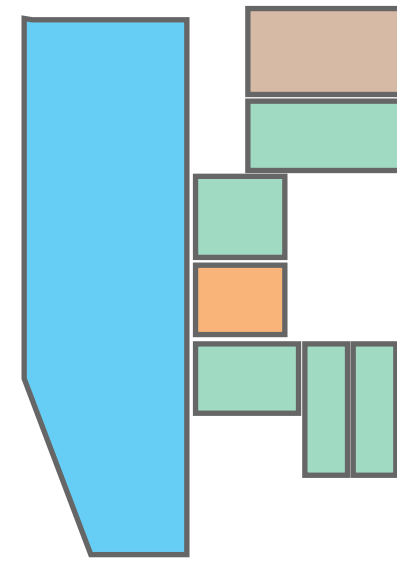
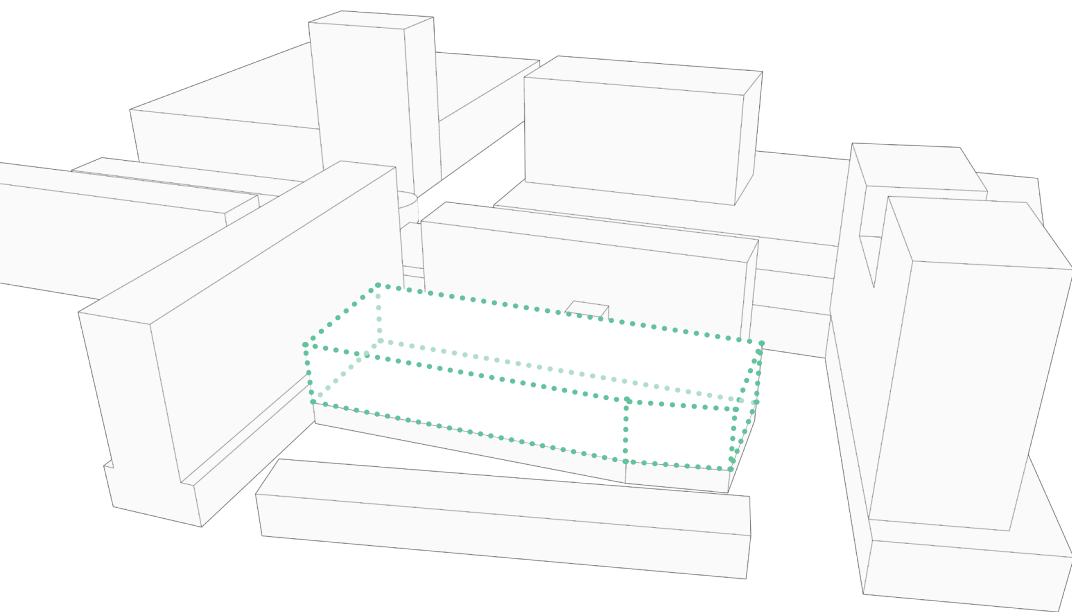
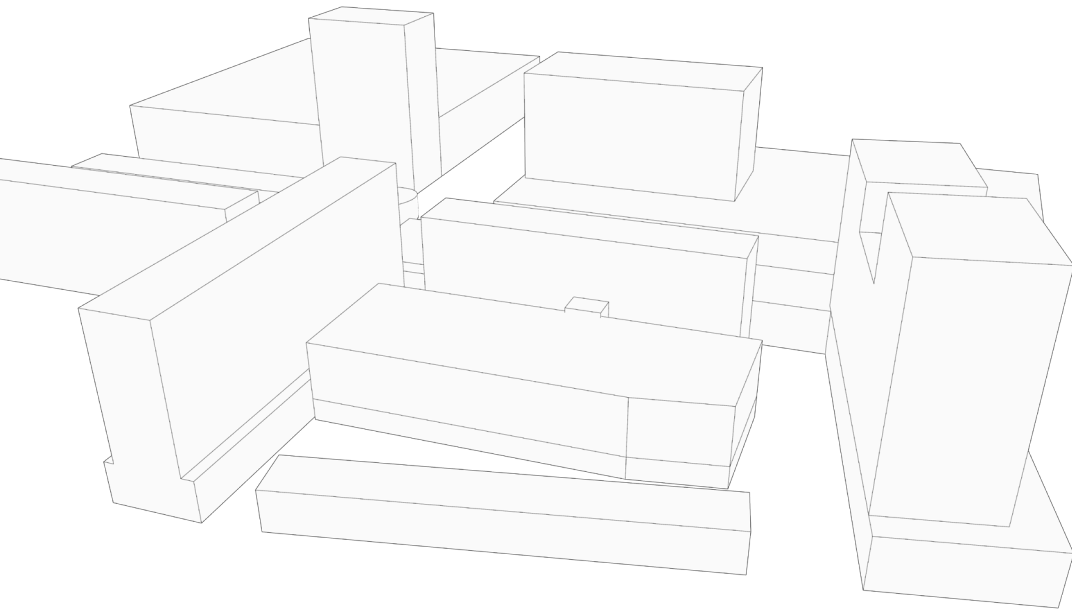
Visitors arrive with PT

2. OPENING UP

In the past Lijnbaan's spirit

DESIGN

Starting points



1. NO MORE PARKING

Visitors arrive with PT

2. OPENING UP

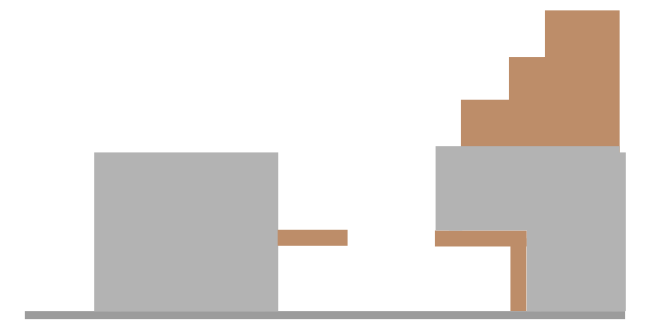
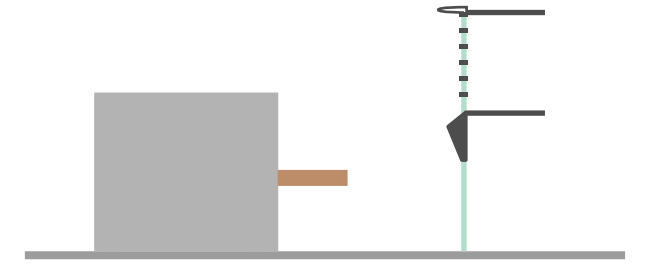
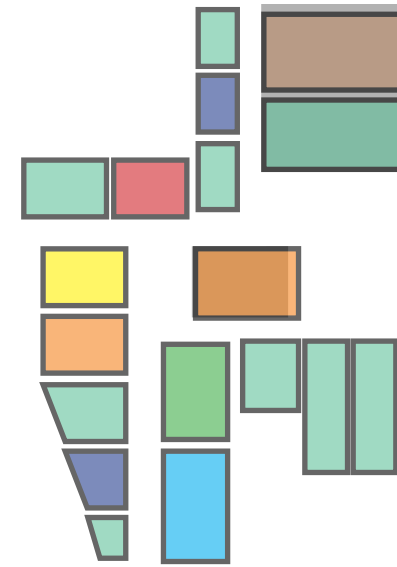
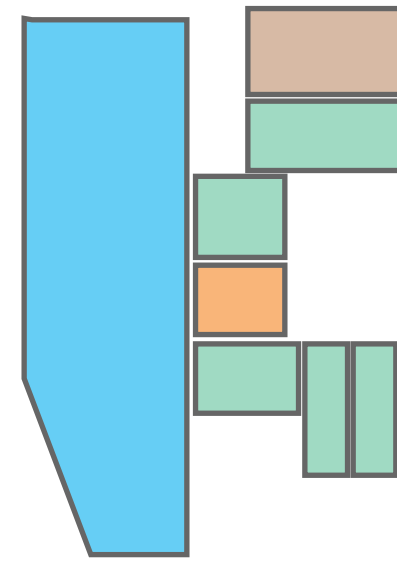
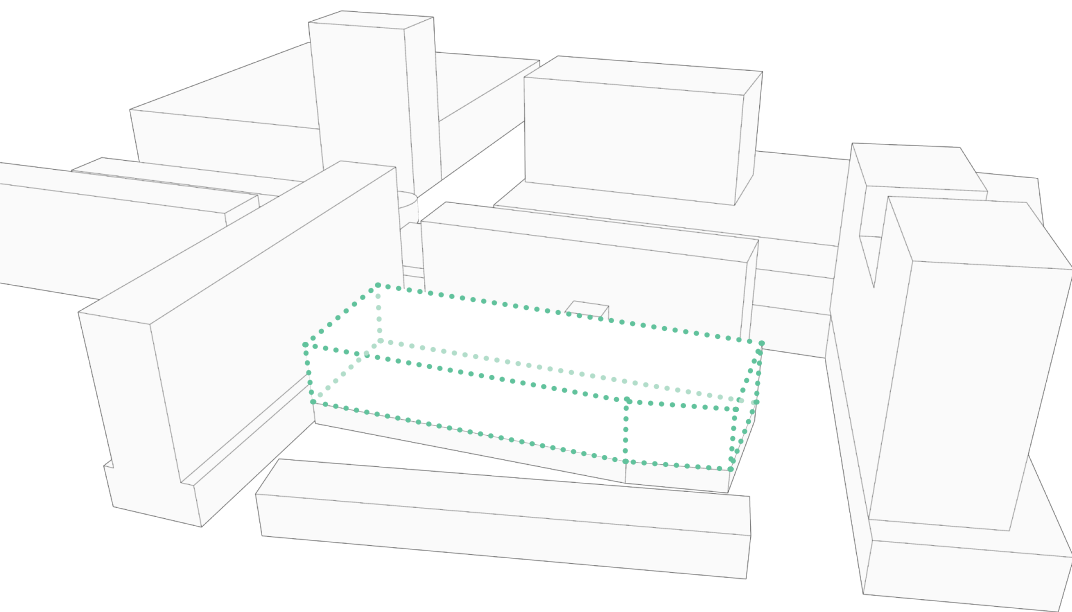
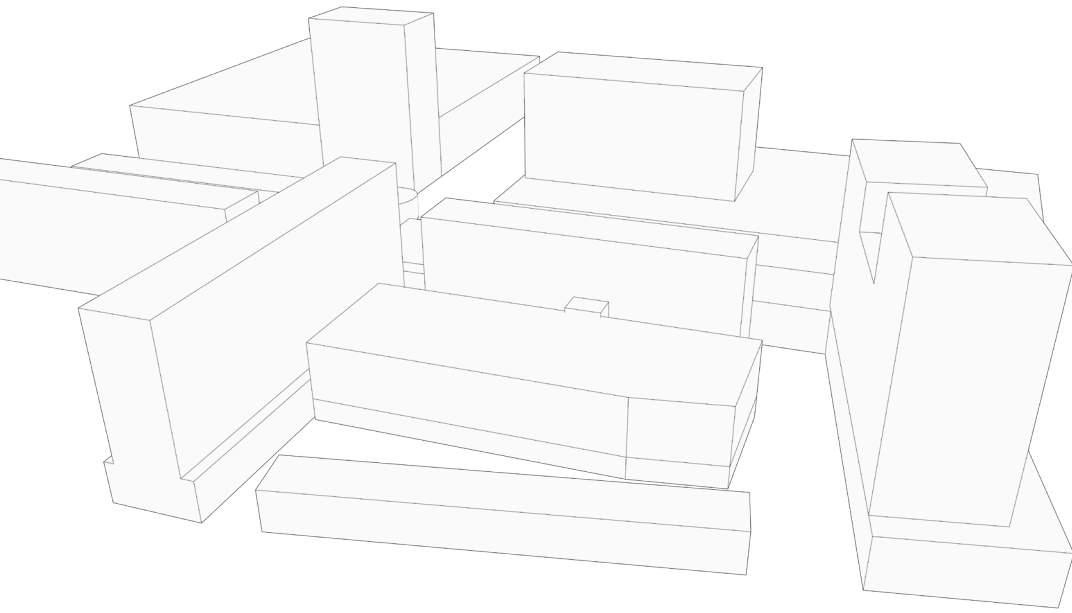
In the past Lijnbaan's spirit

3. SHOP DIVERSITY

'Store of the future'

DESIGN

Starting points



1. NO MORE PARKING

Visitors arrive with PT

2. OPENING UP

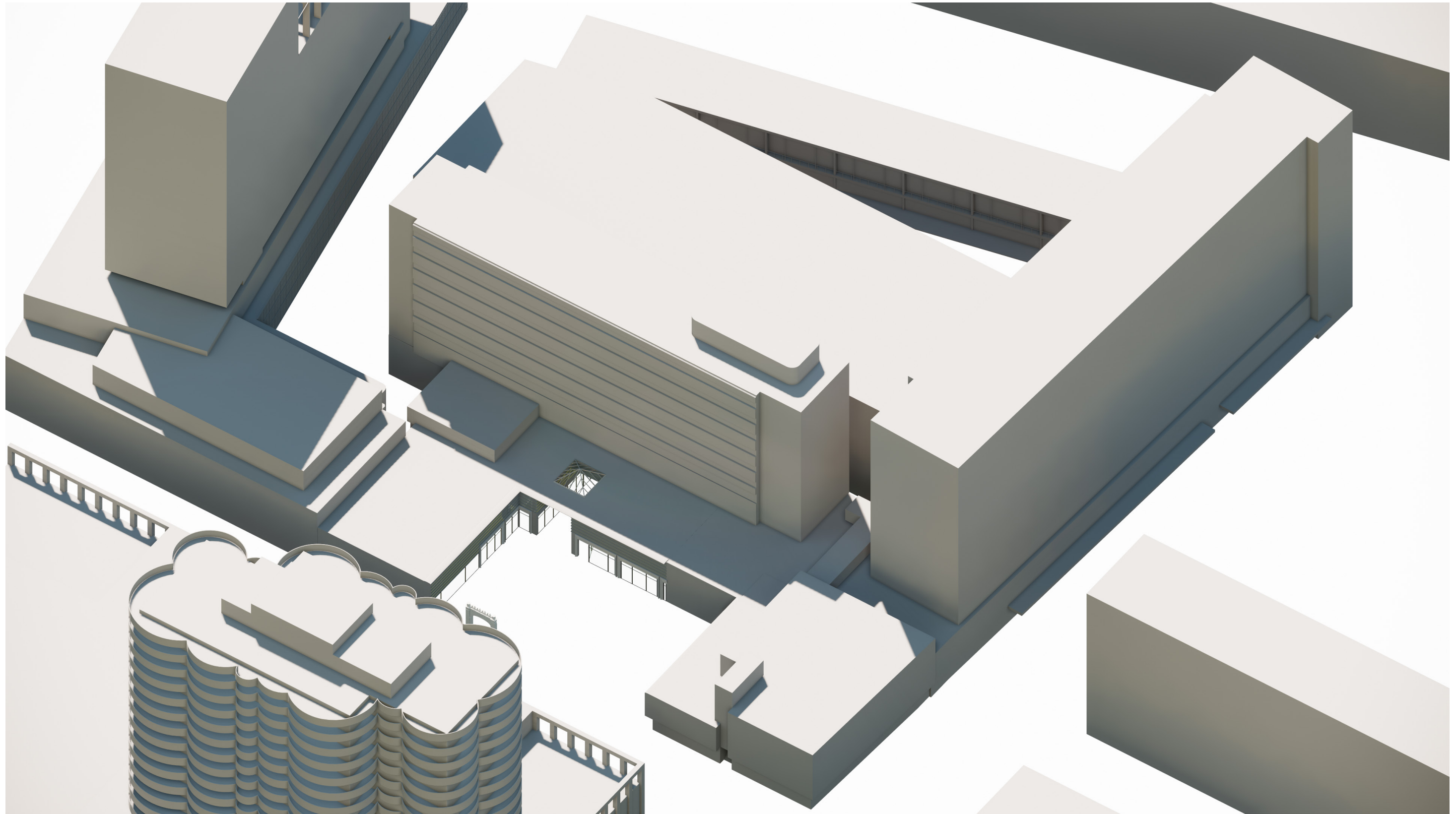
In the past Lijnbaan's spirit

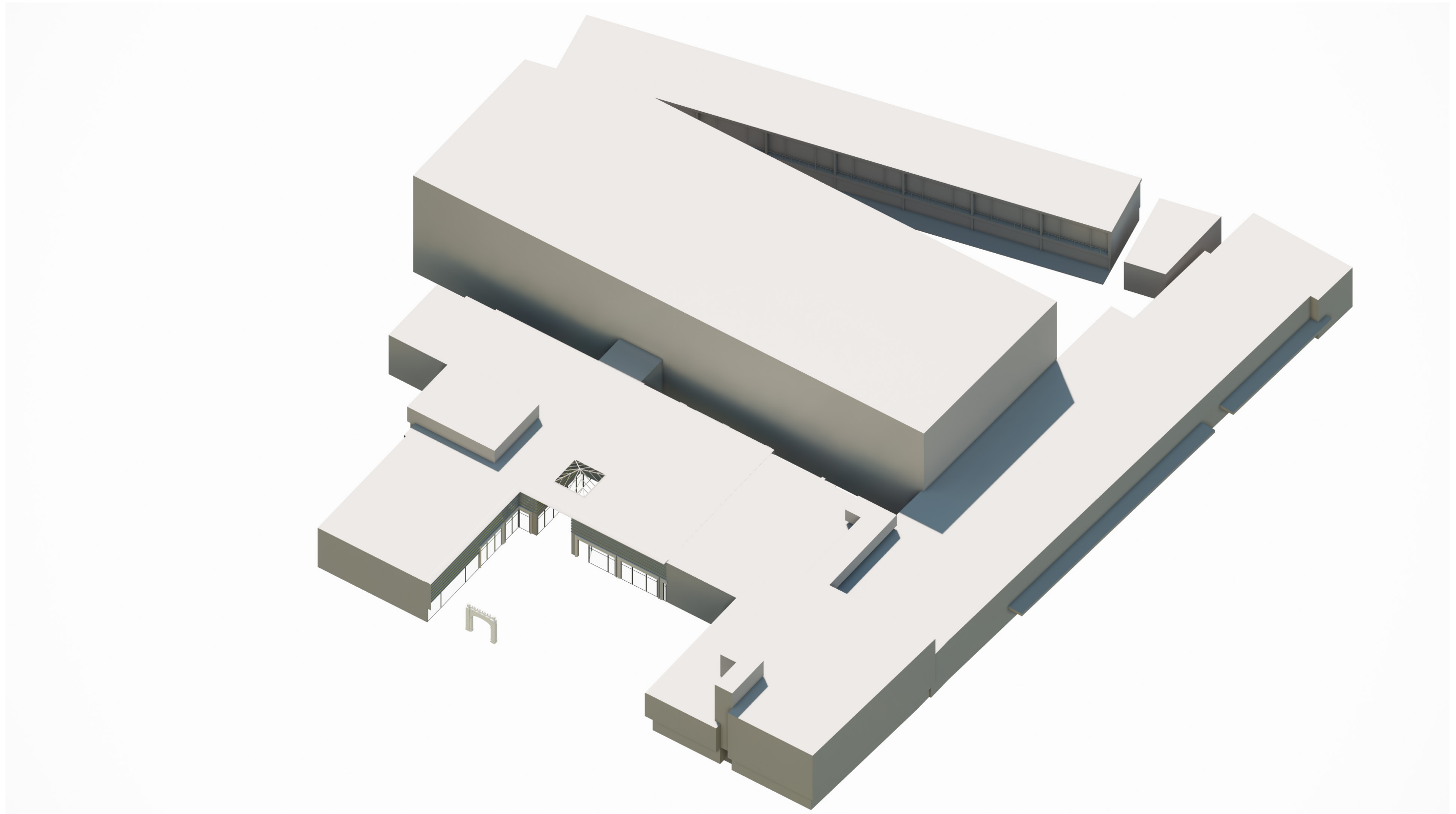
3. SHOP DIVERSITY

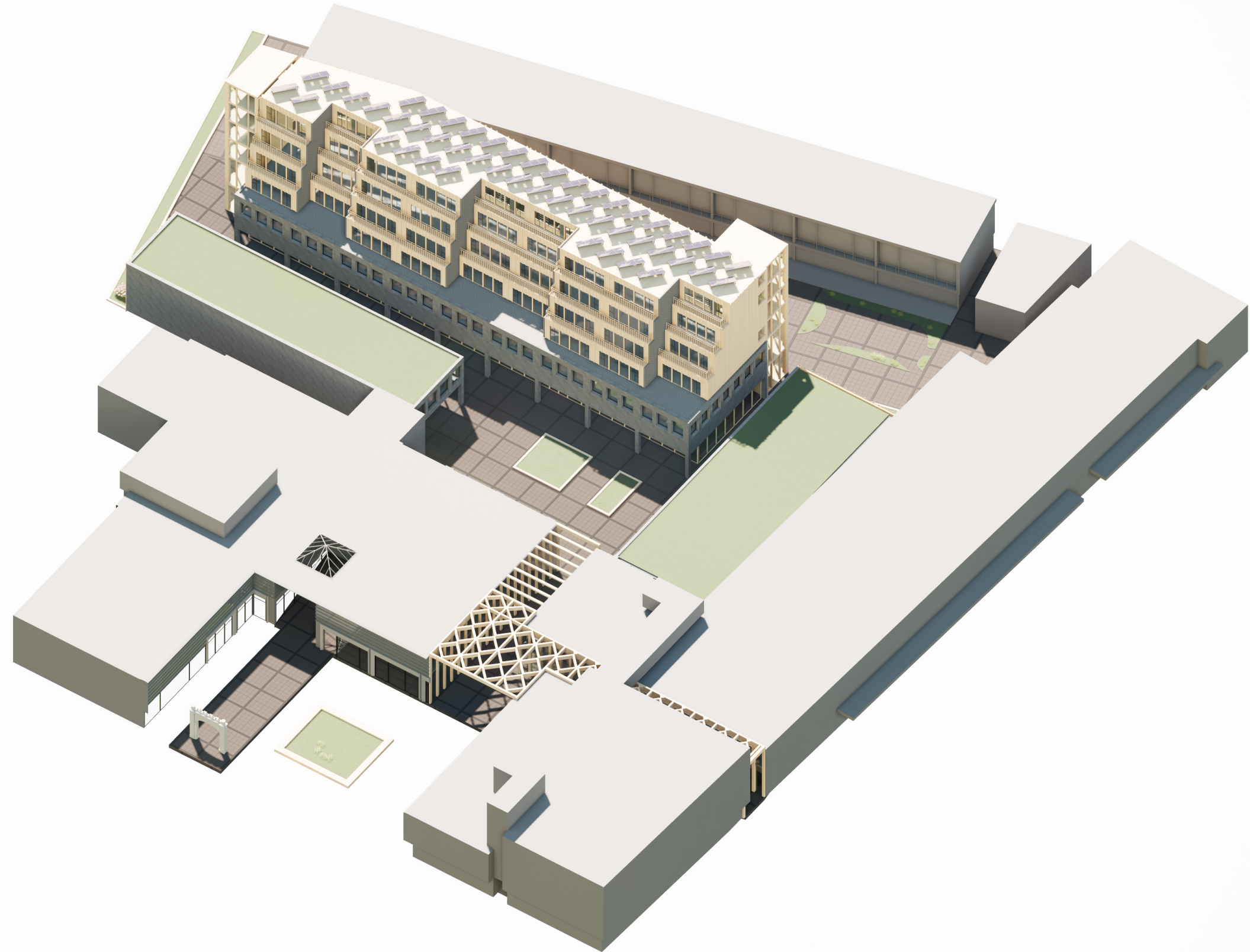
'Store of the future'

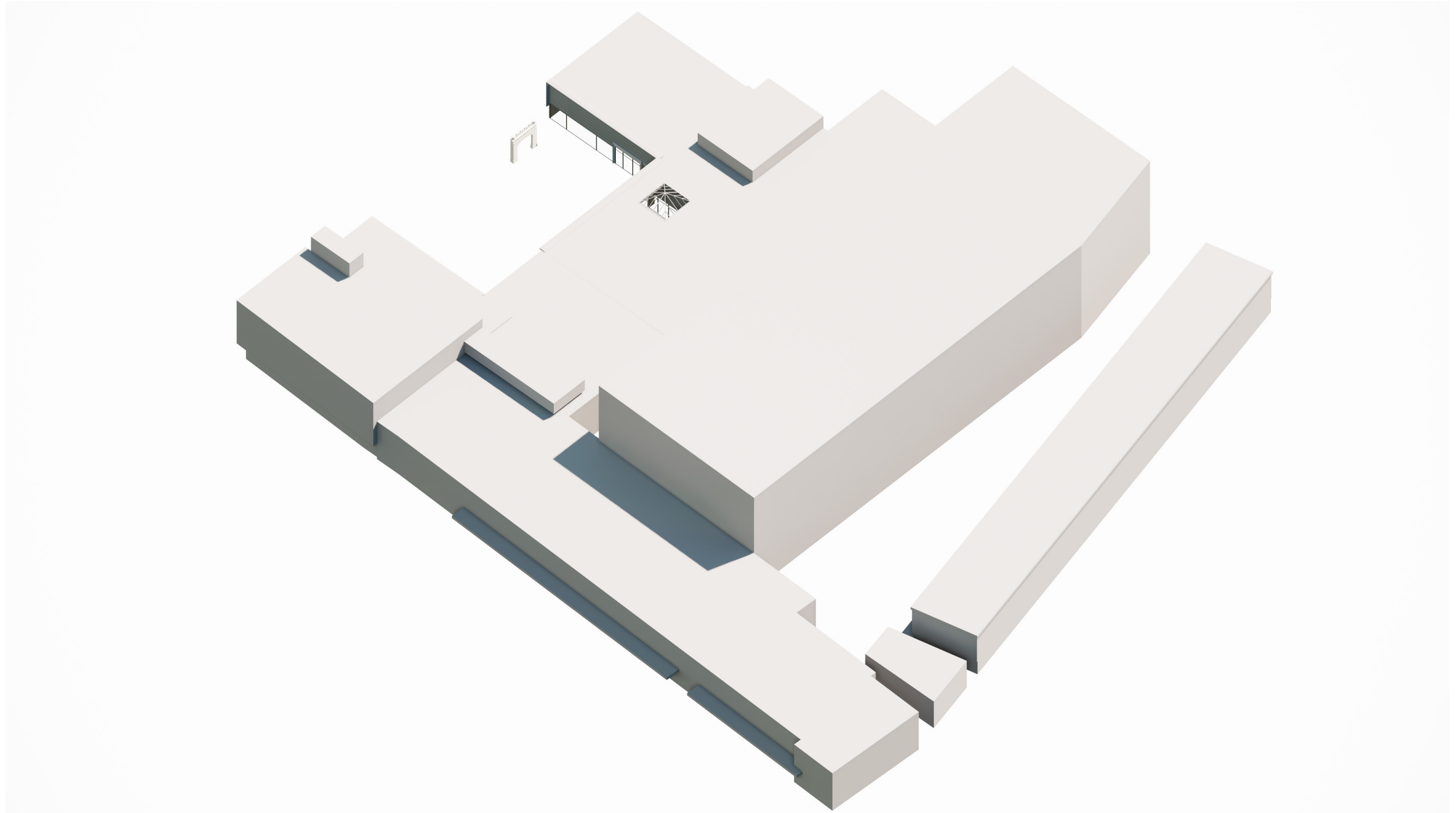
4. COHERENCE

Unity in diversity

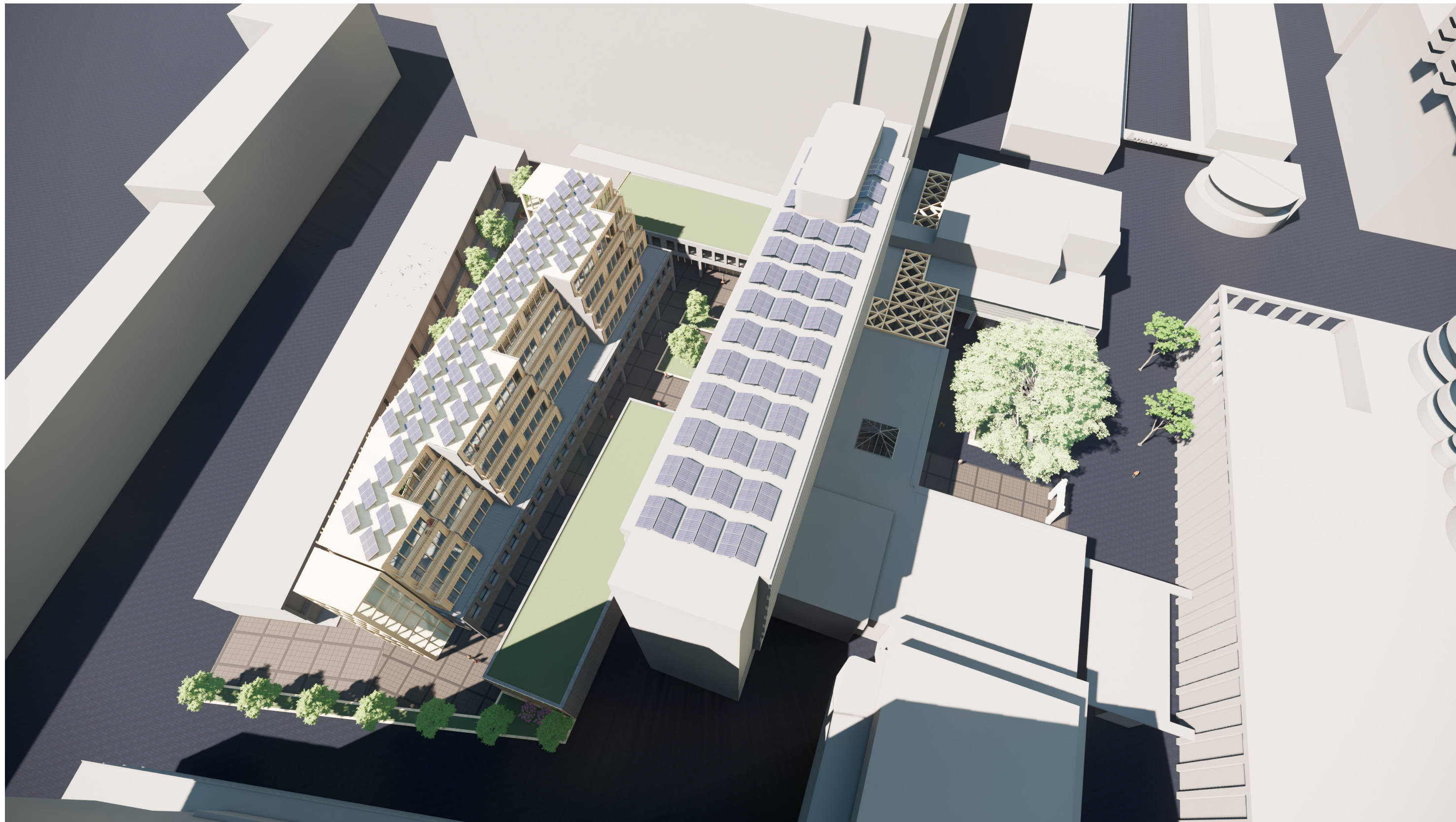


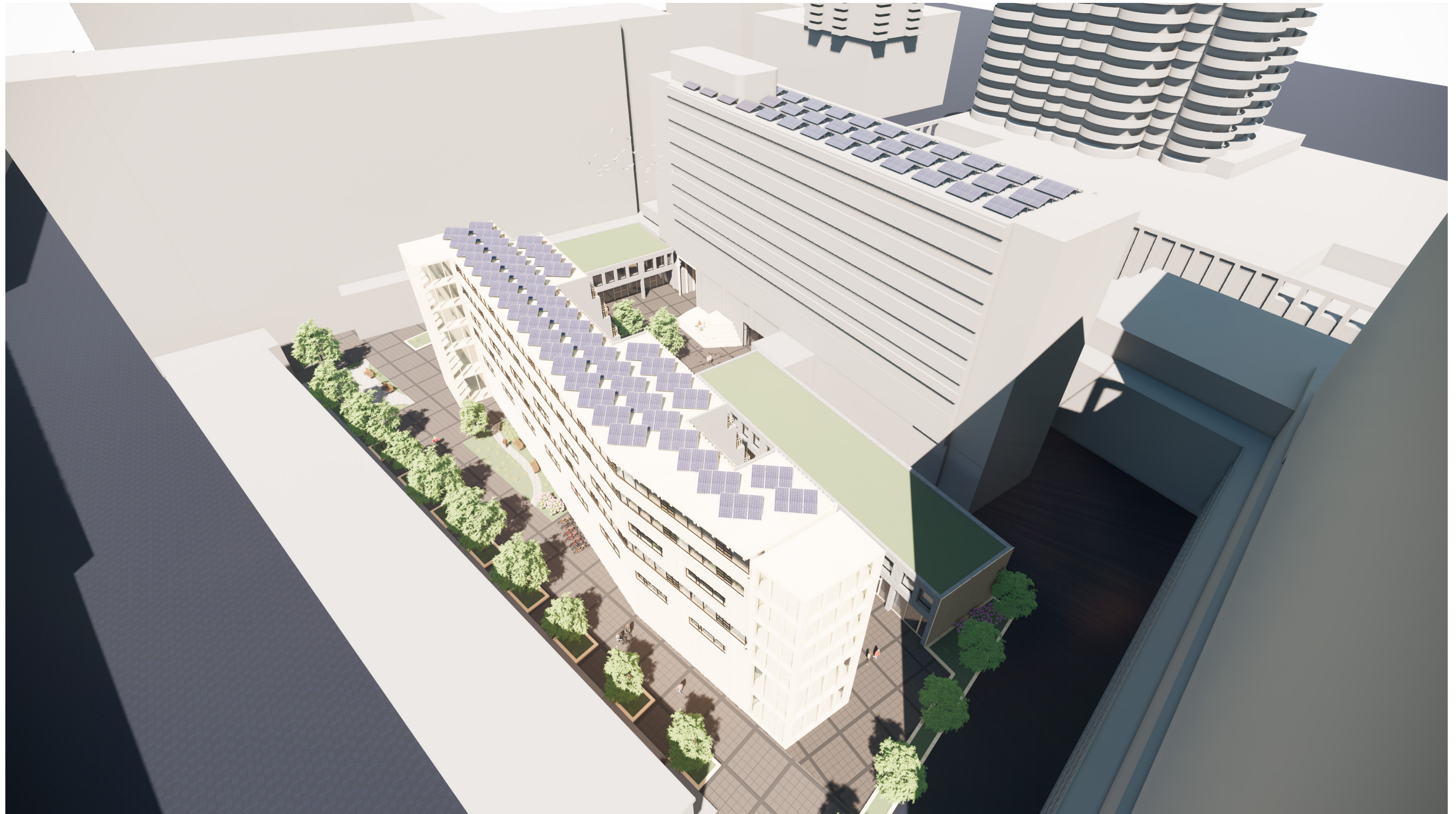










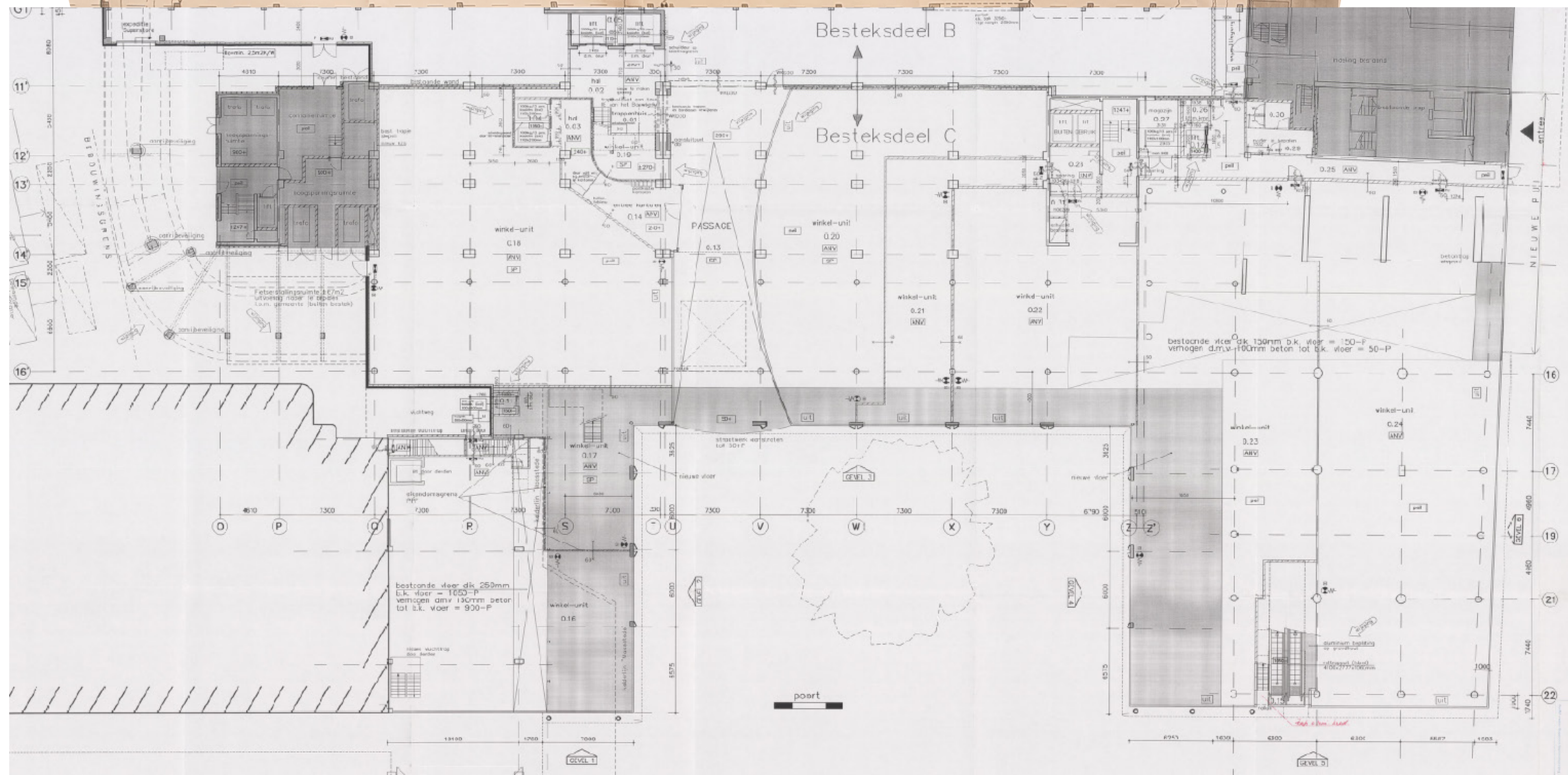






DESIGN

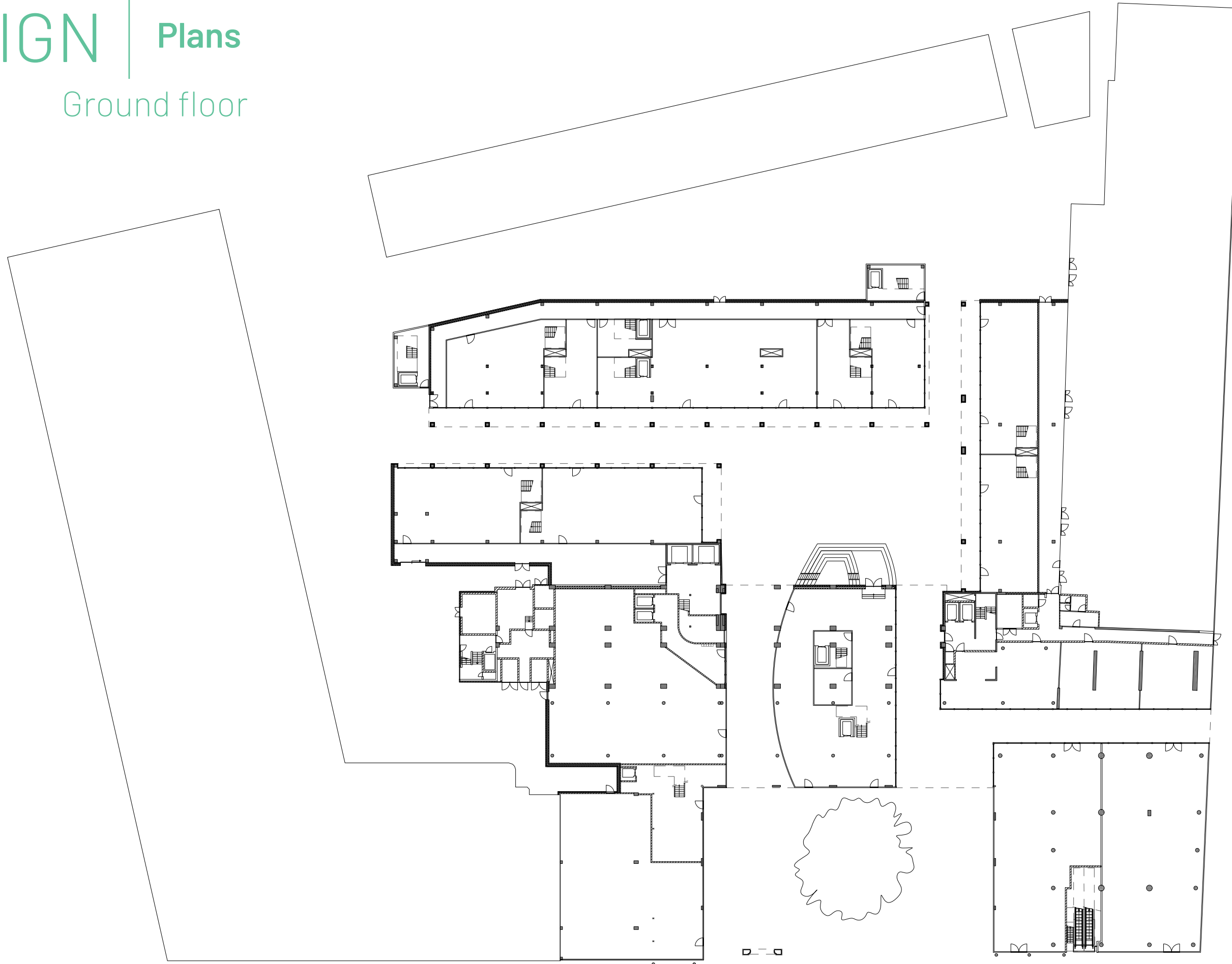
Plans



DESIGN

Plans

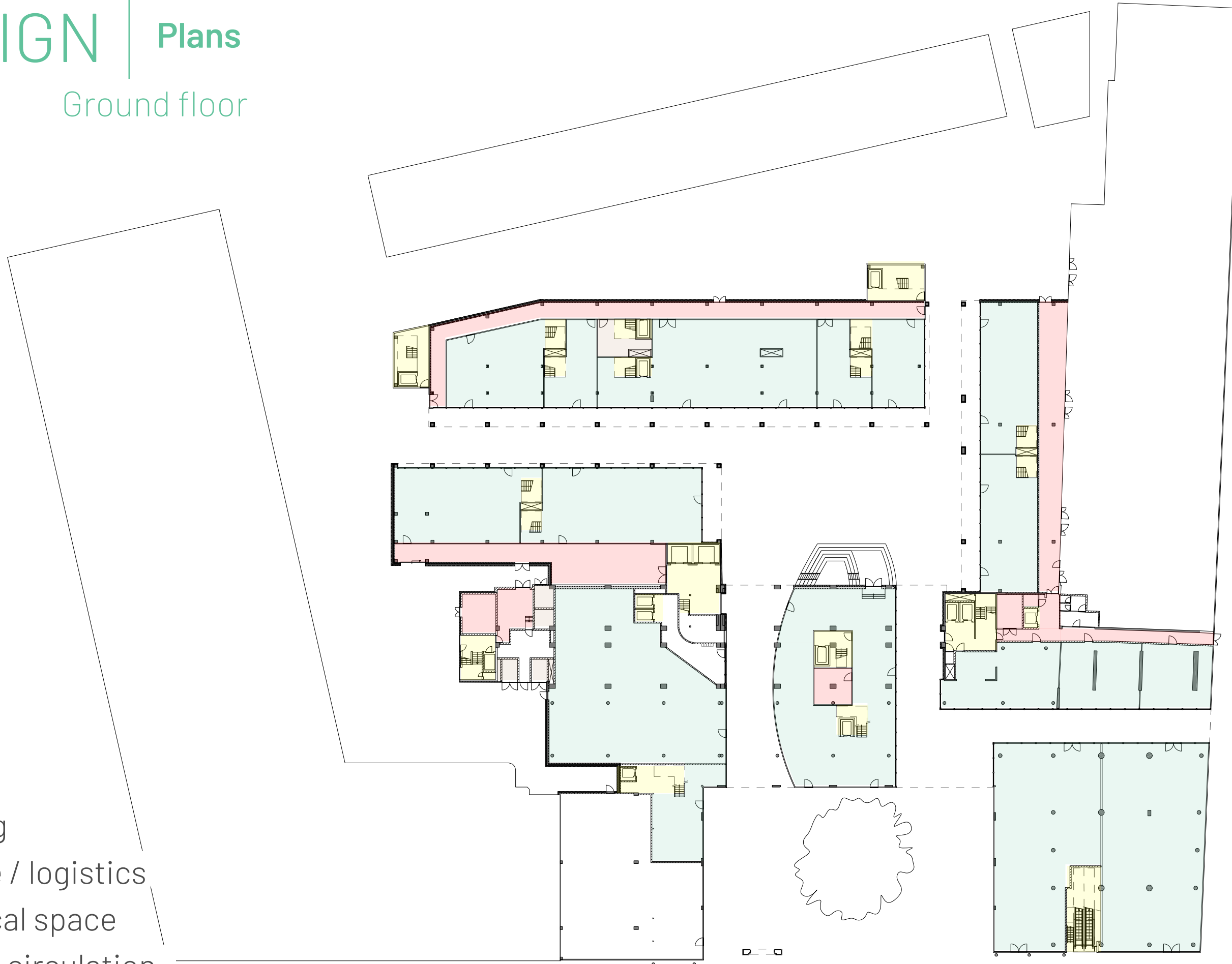
Ground floor



DESIGN

Plans

Ground floor

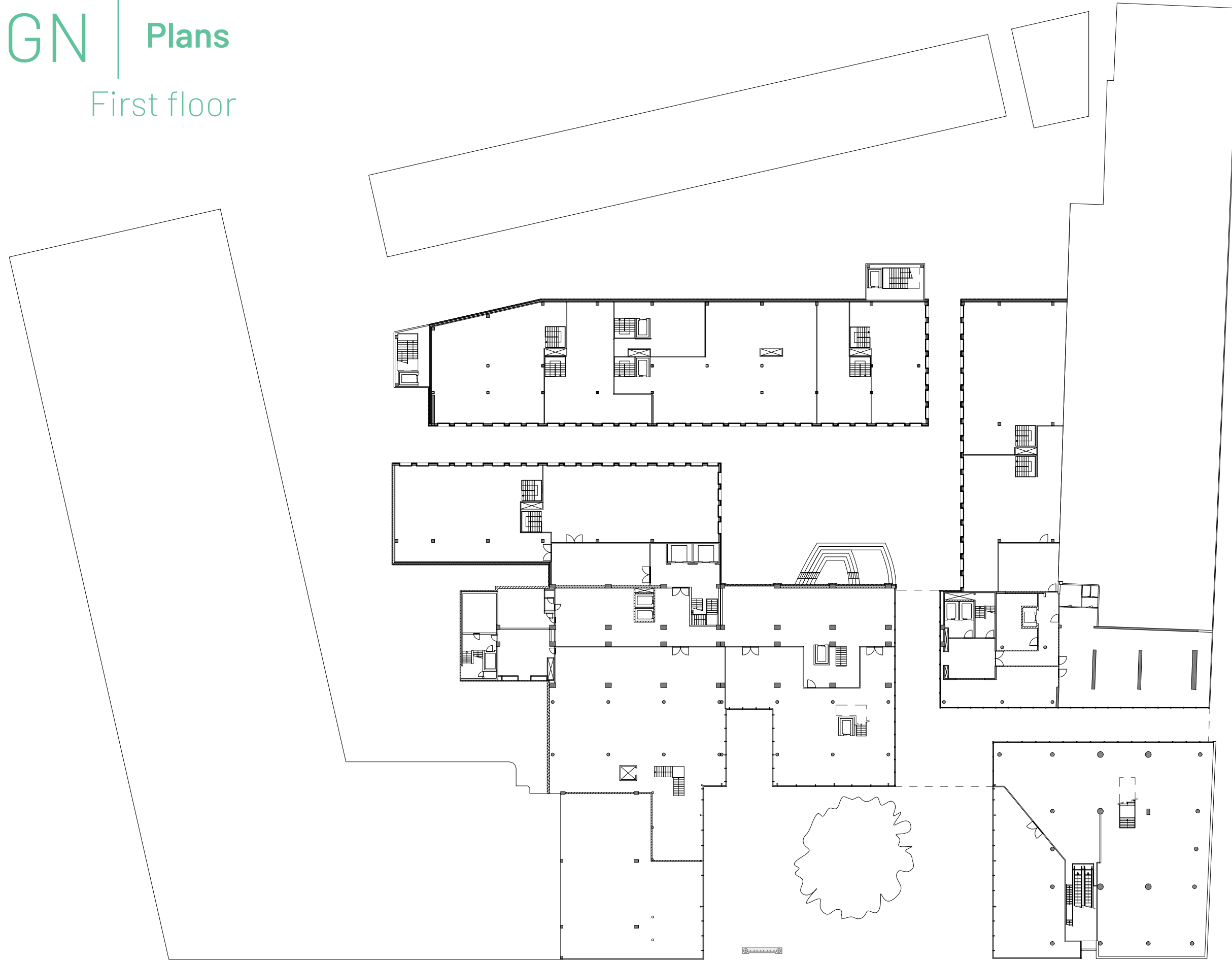


- Retail
- Housing
- Storage / logistics
- Technical space
- Vertical circulation

DESIGN

Plans

First floor


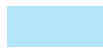

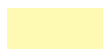


DESIGN

Plans

First floor

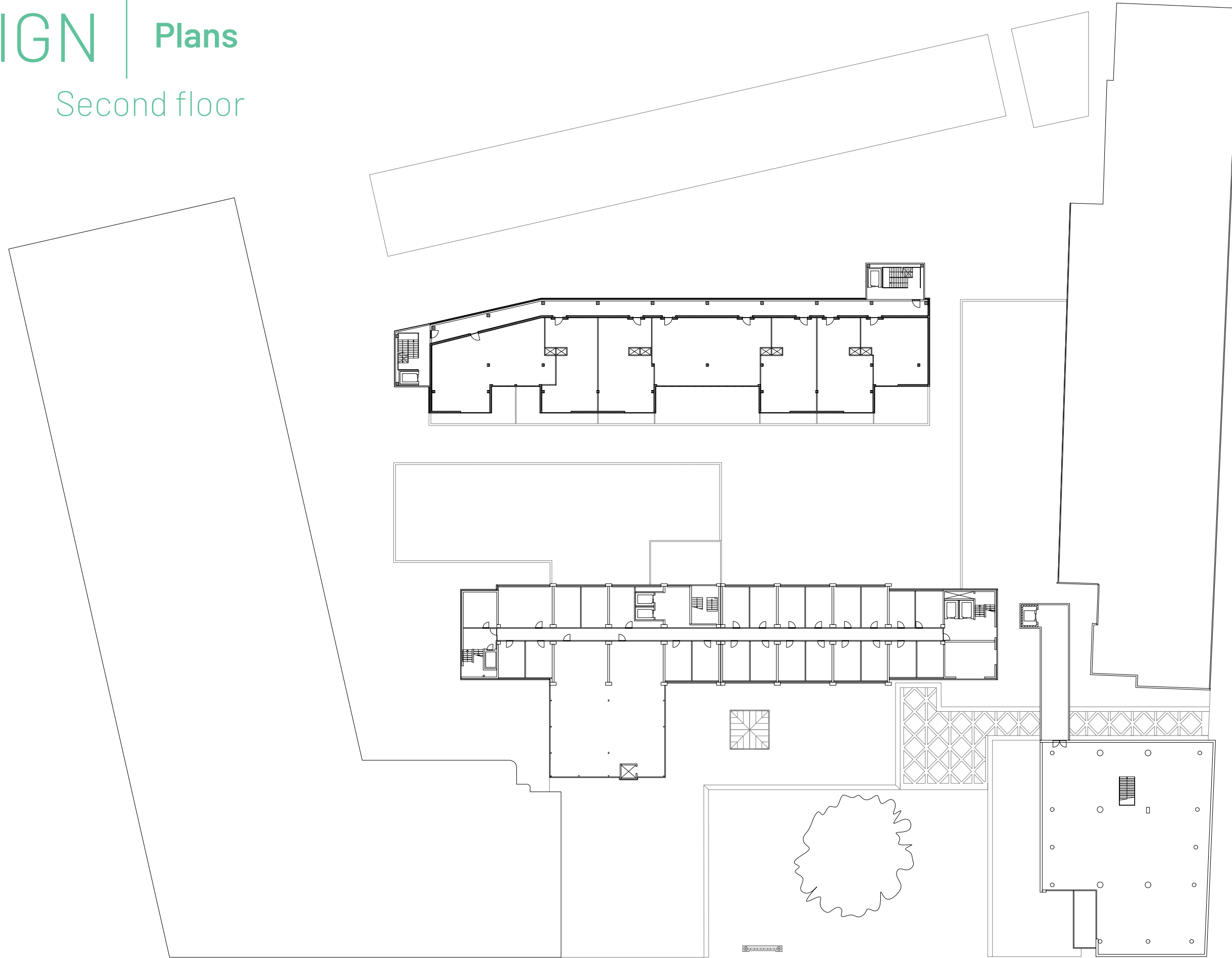


-  Retail
-  Housing
-  Storage / logistics
-  Technical space
-  Vertical circulation

DESIGN

Plans

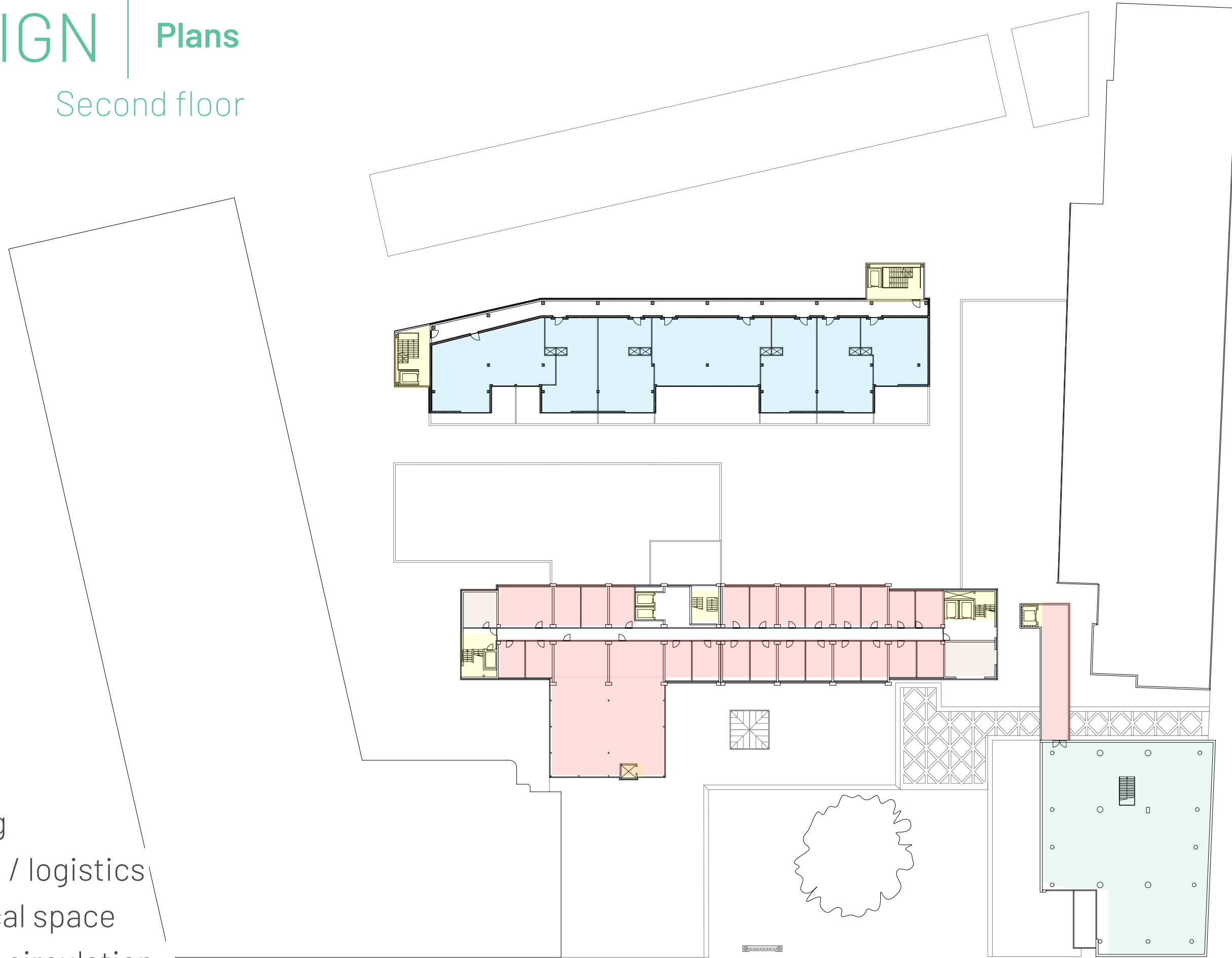
Second floor



DESIGN

Plans

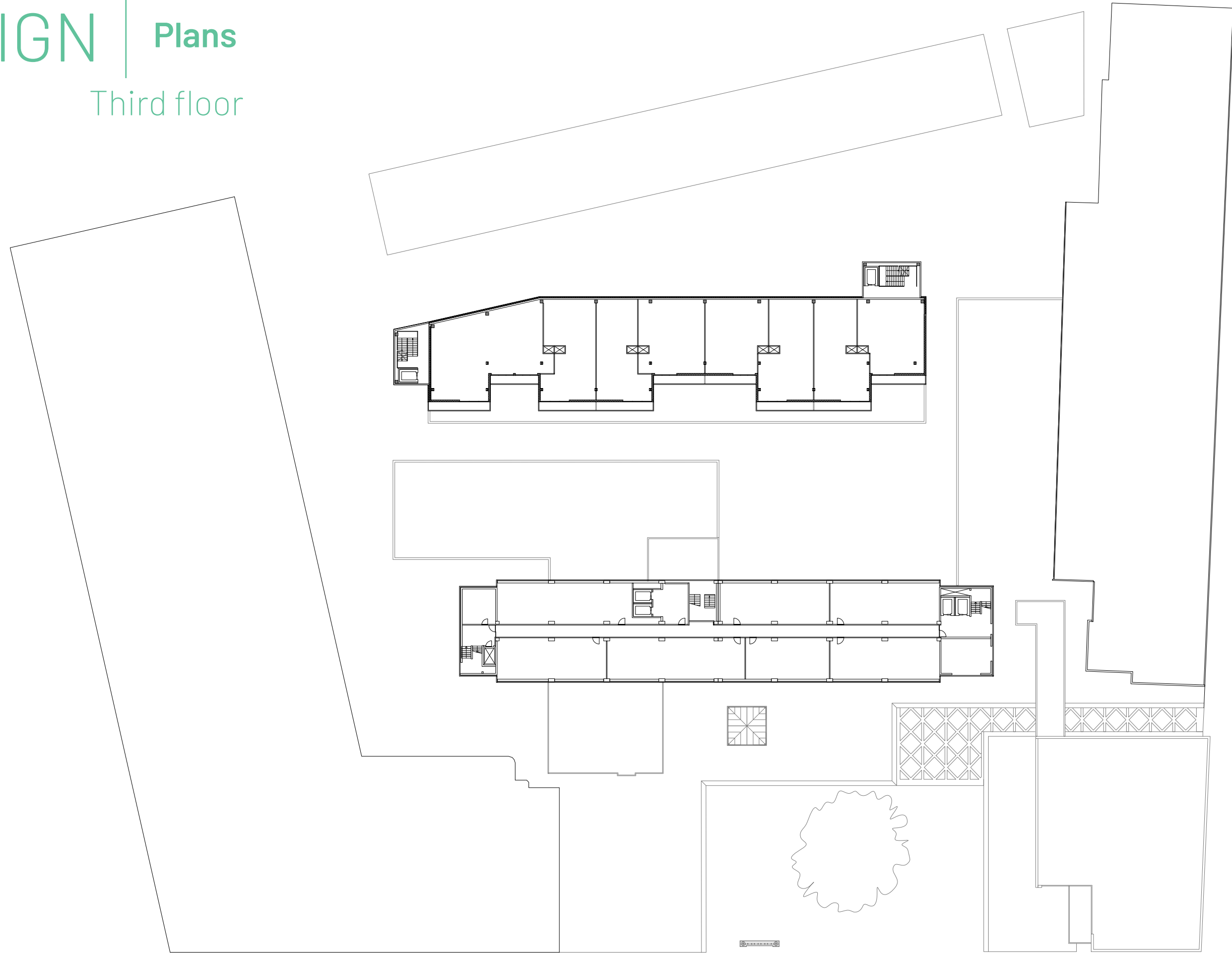
Second floor



- Retail
- Housing
- Storage / logistics
- Technical space
- Vertical circulation

DESIGN | Plans

Third floor



DESIGN

Plans

Third floor

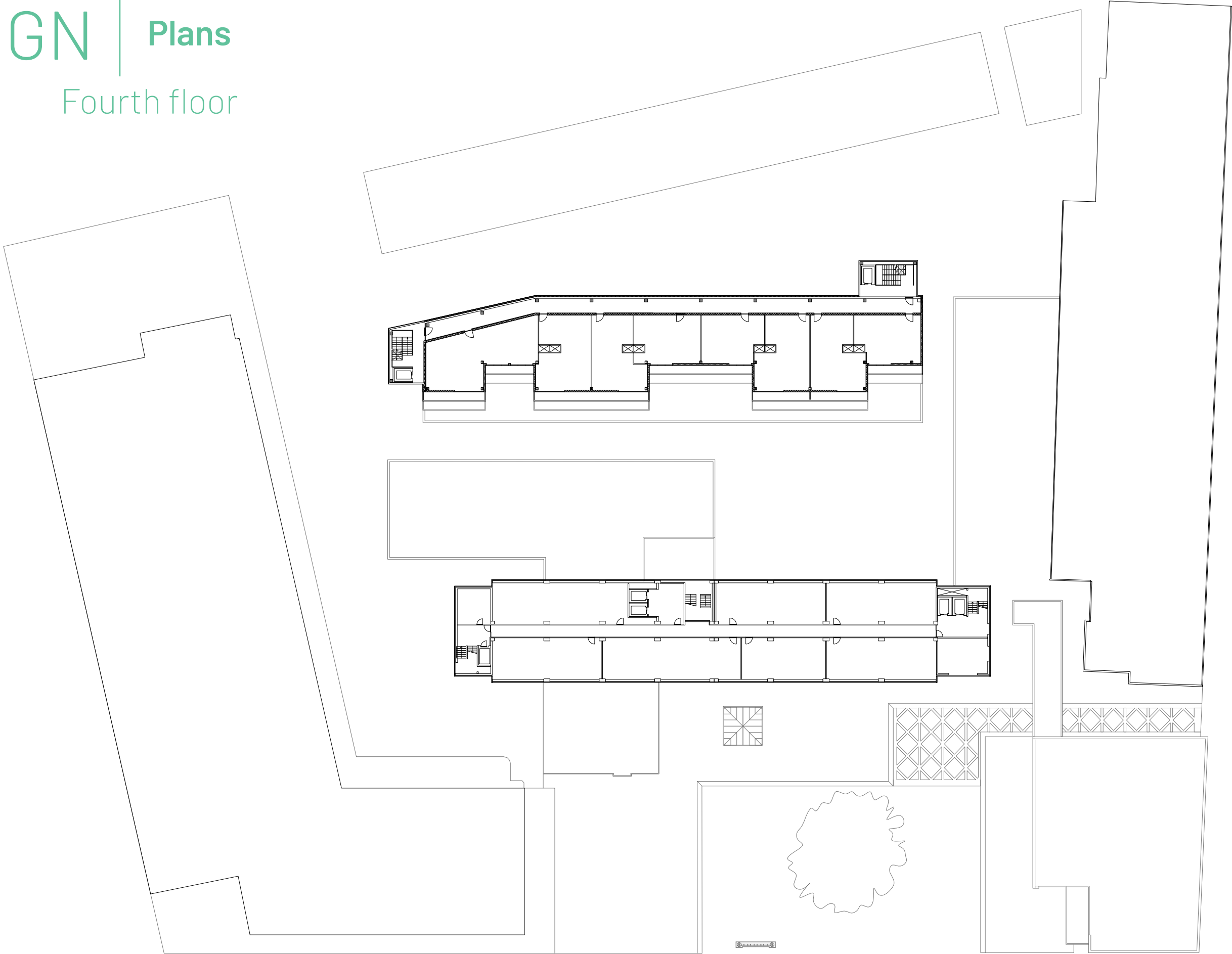


- Retail
- Housing
- Storage / logistics
- Technical space
- Vertical circulation

DESIGN

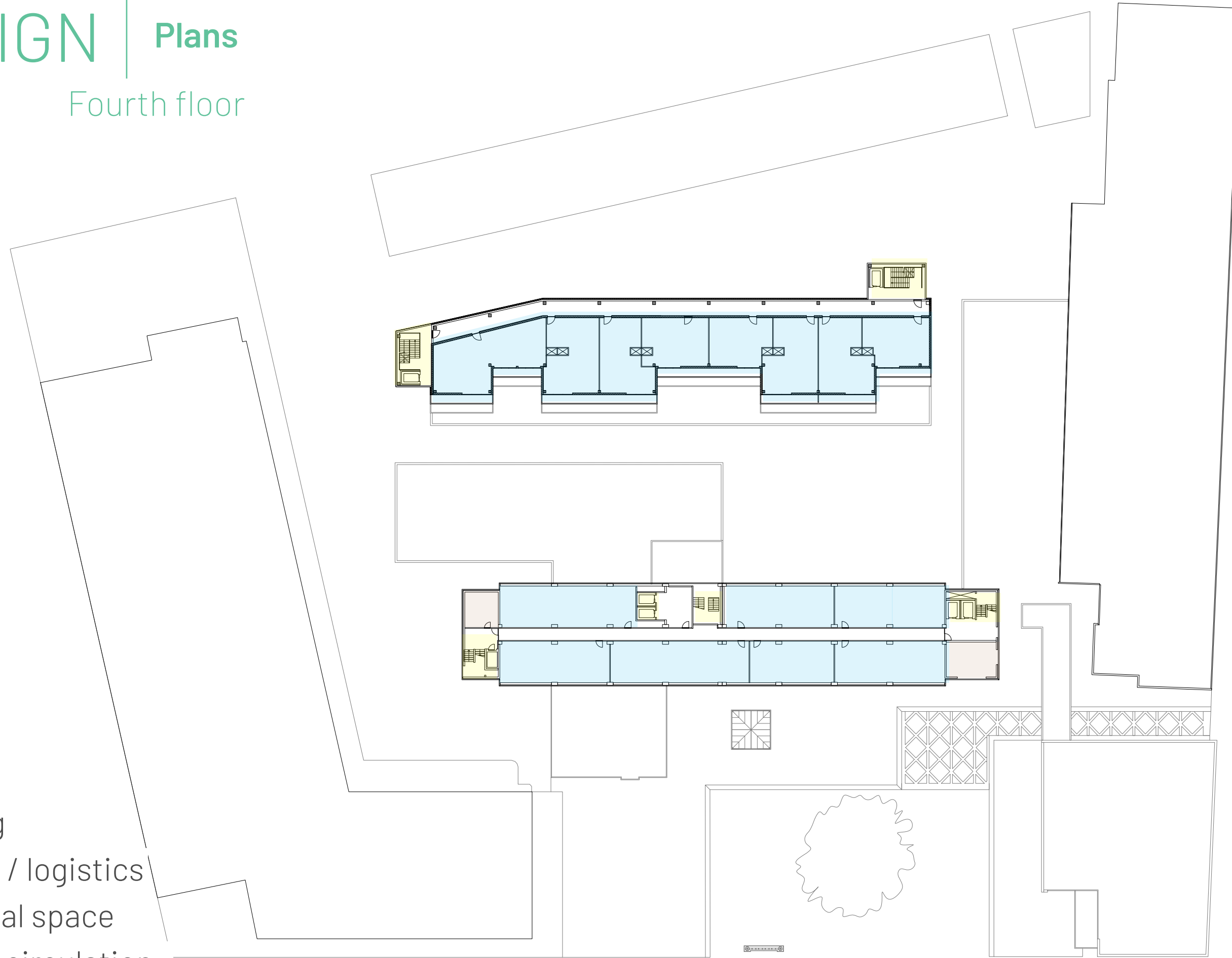
Plans

Fourth floor



DESIGN | Plans

Fourth floor

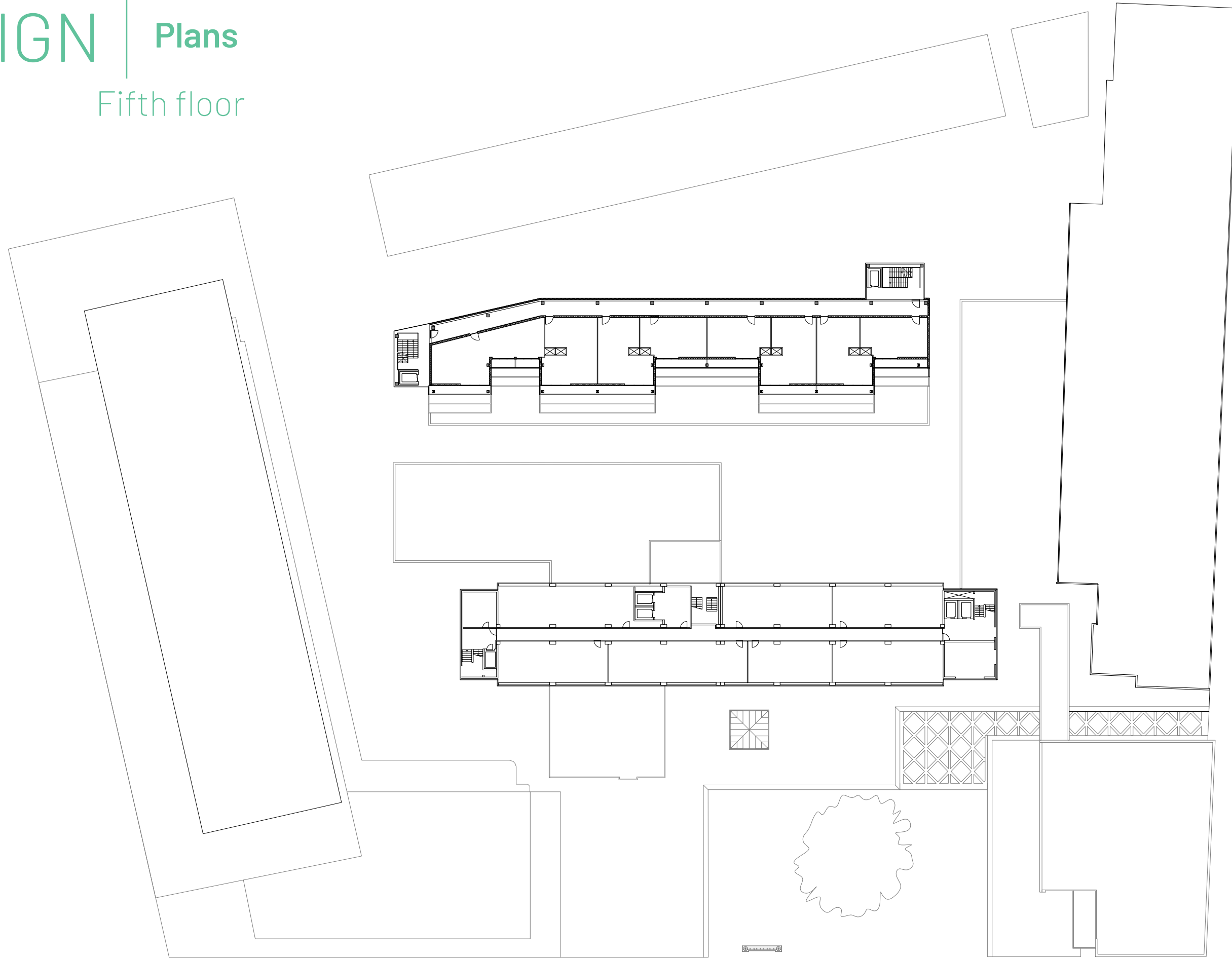


- Retail
- Housing
- Storage / logistics
- Technical space
- Vertical circulation

DESIGN

Plans

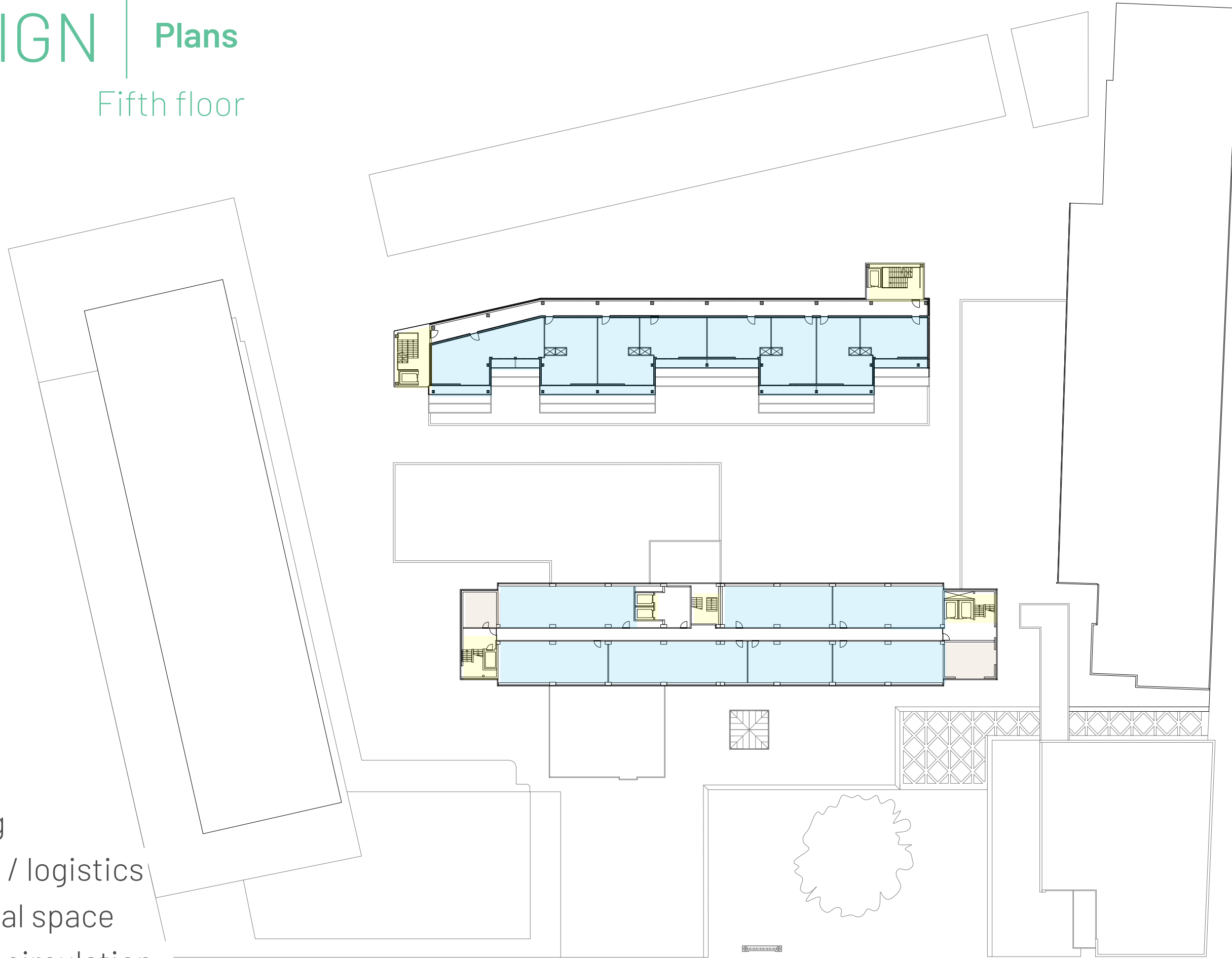
Fifth floor



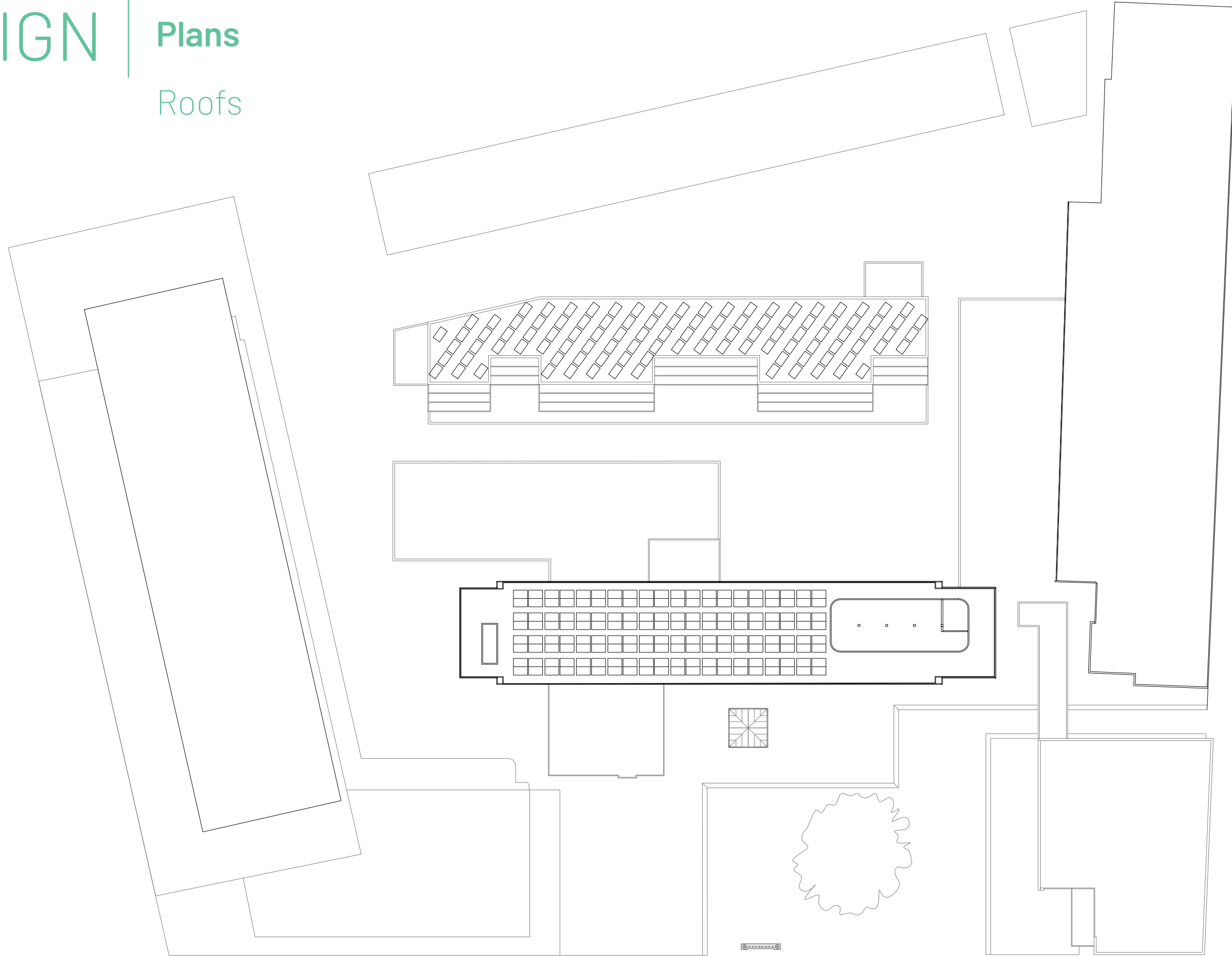
DESIGN

Plans

Fifth floor



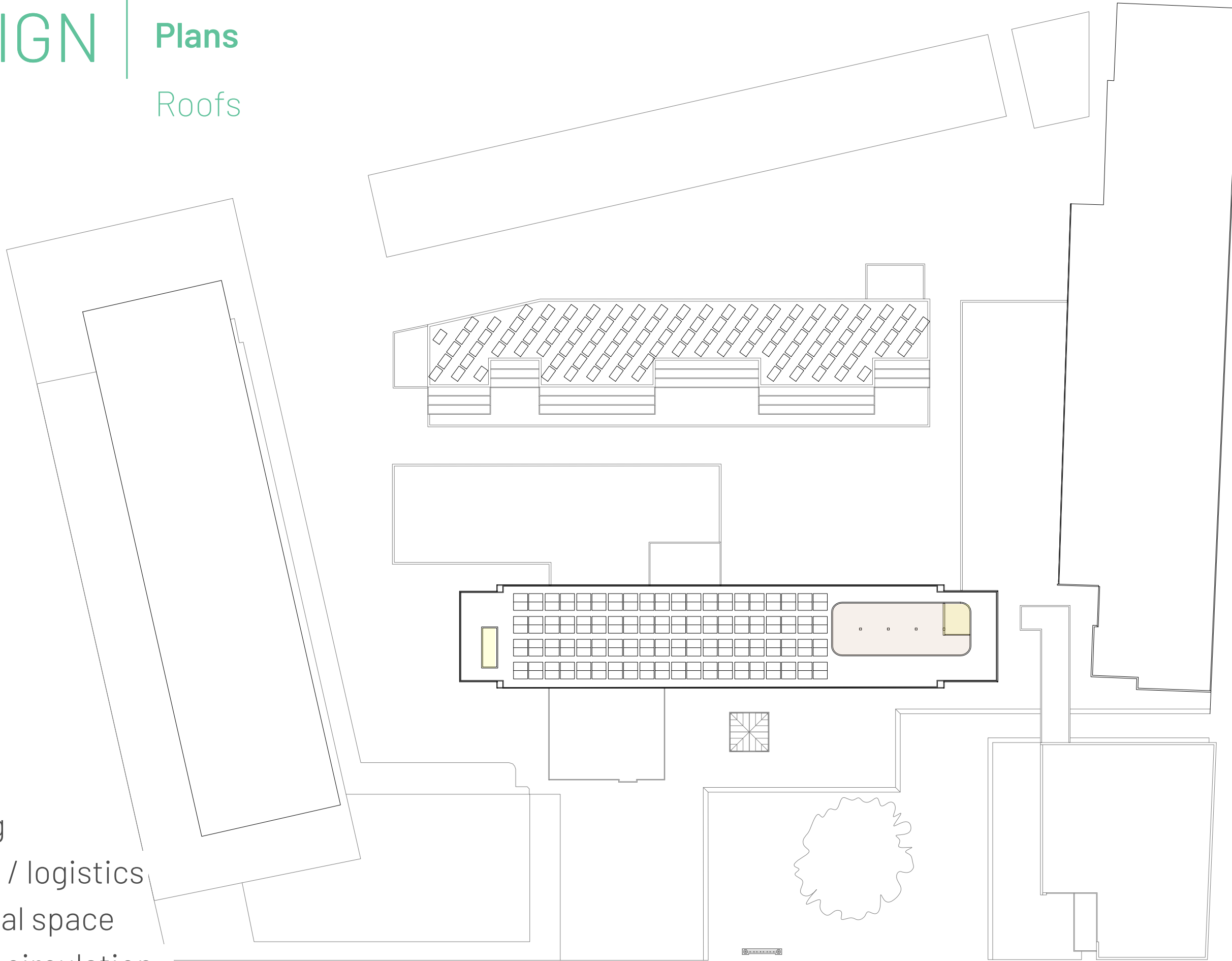
- Retail
- Housing
- Storage / logistics
- Technical space
- Vertical circulation


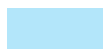





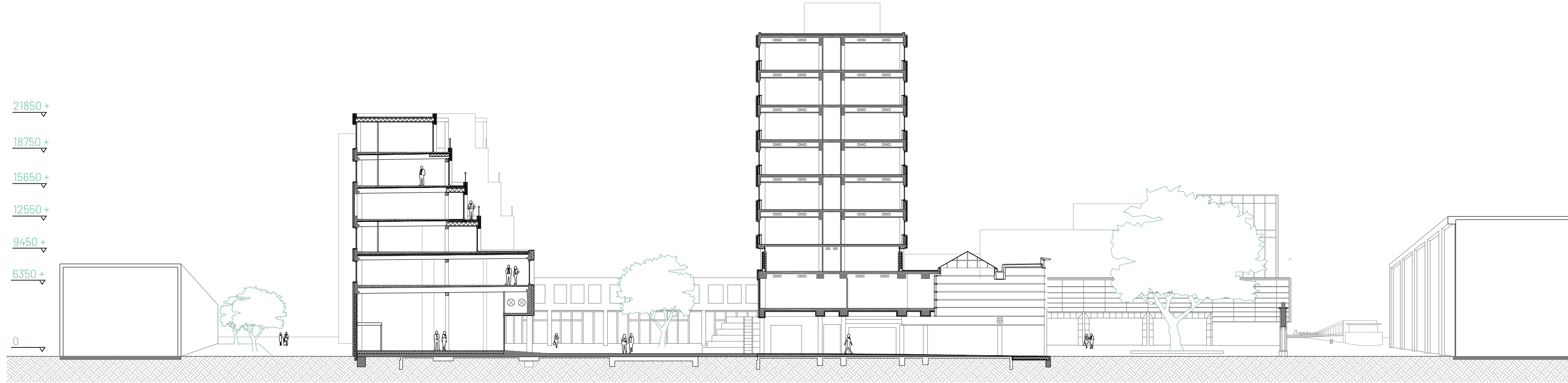
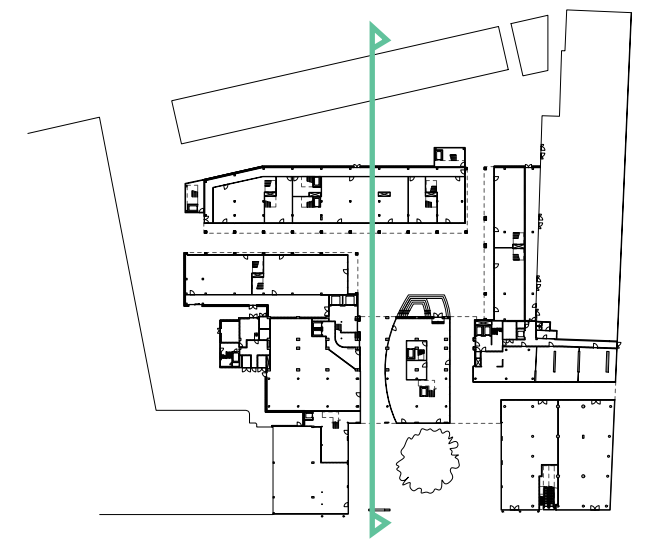
DESIGN

Plans

Roofs



-  Retail
-  Housing
-  Storage / logistics
-  Technical space
-  Vertical circulation

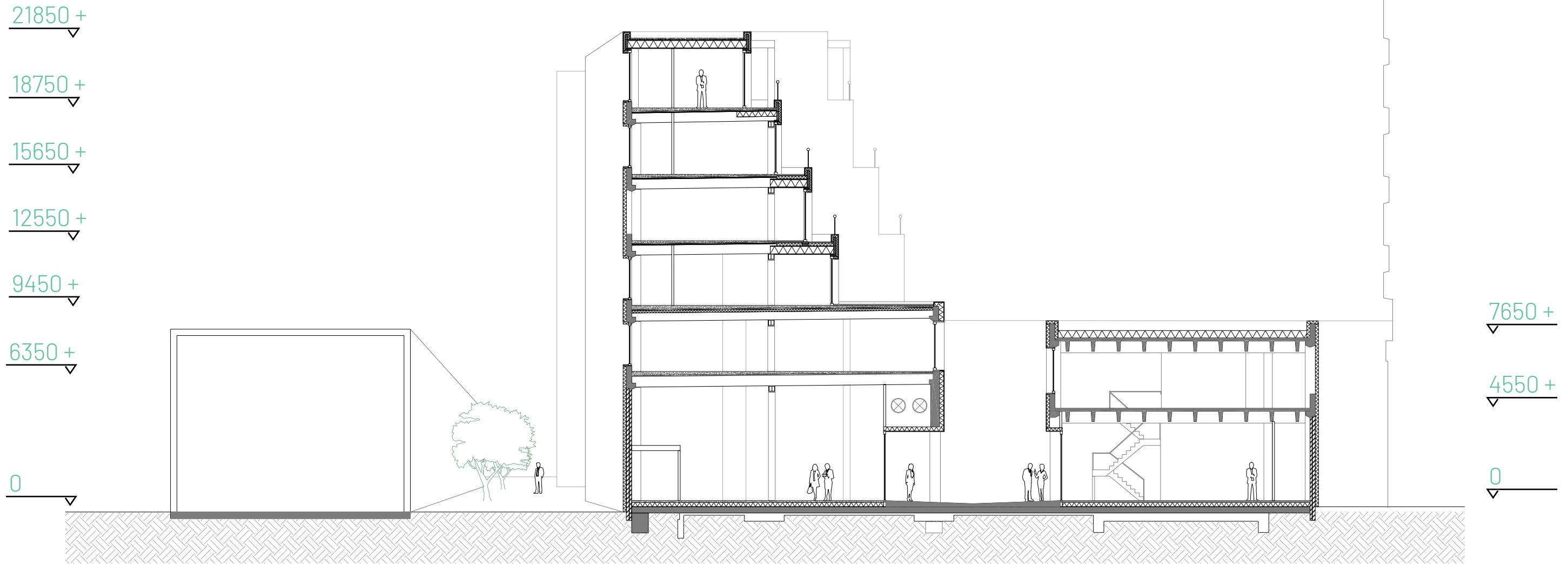
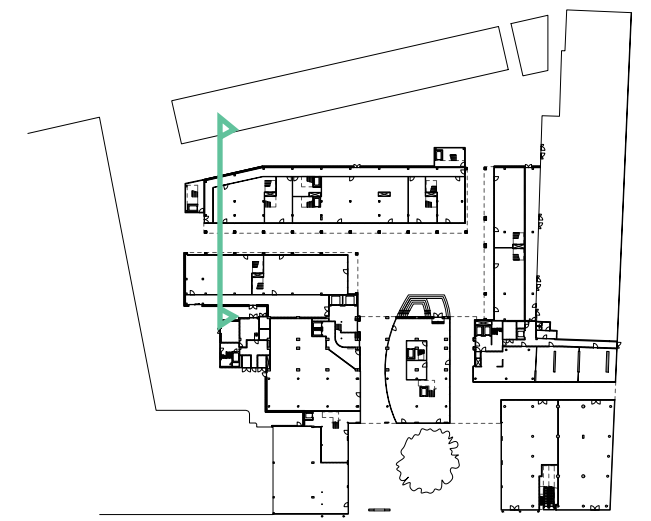


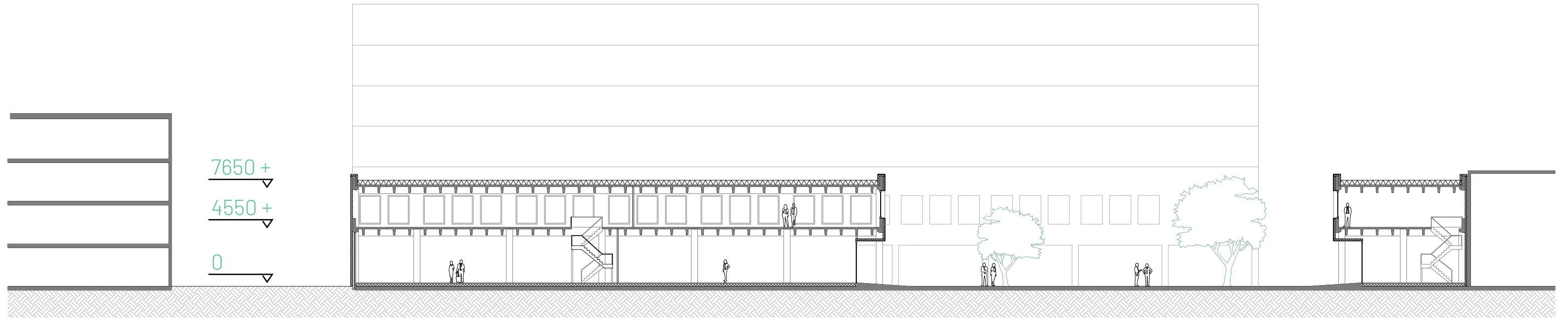
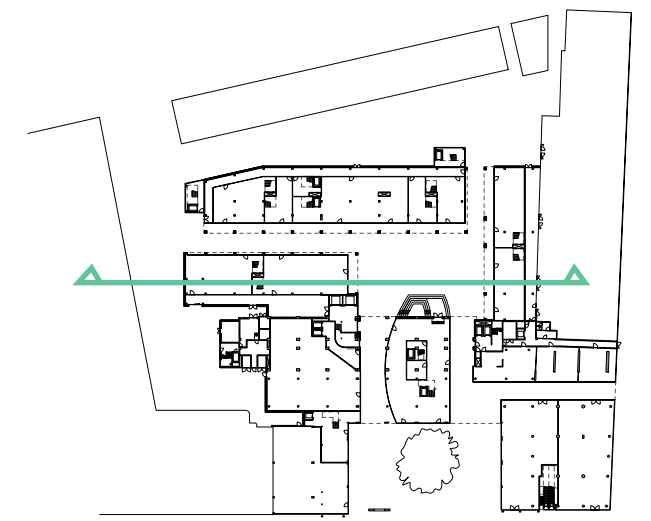


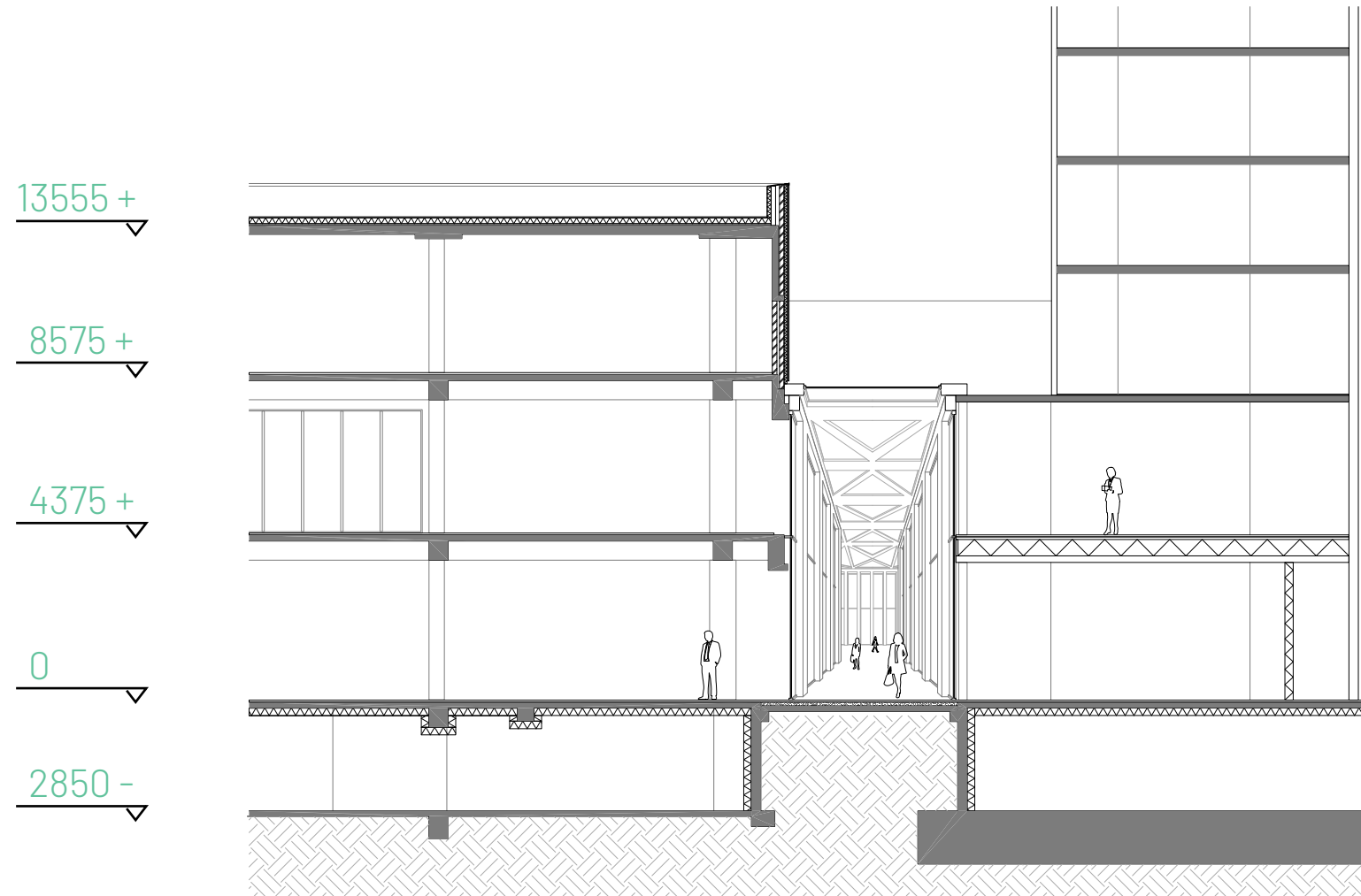
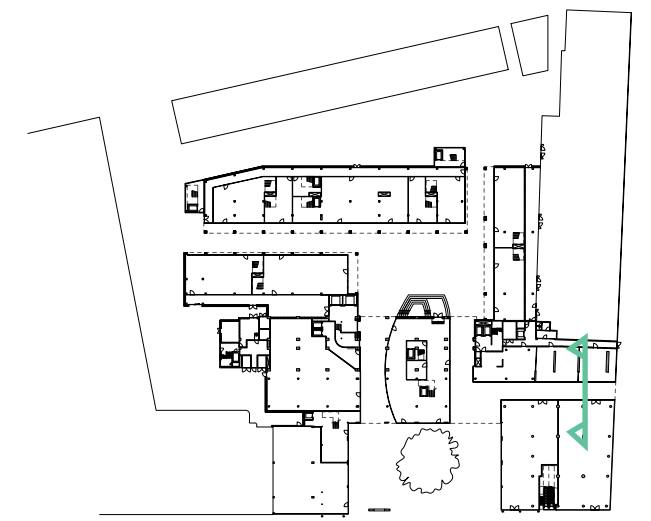
- Retail
- Storage / logistics
- Housing
- Technical space
- Vertical circulation

DESIGN

Sections





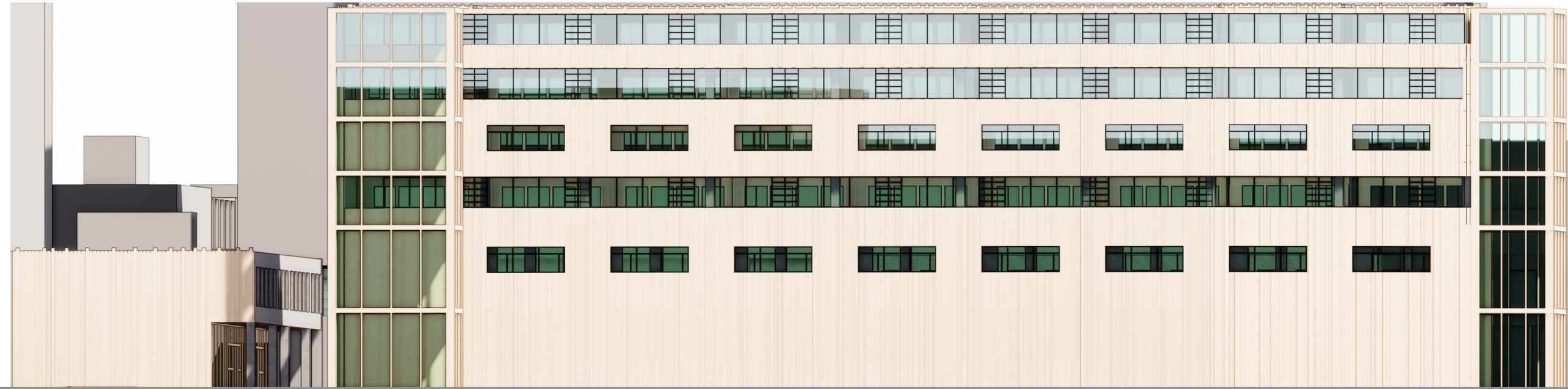


DESIGN

Elevations Square & Building A



Northwest



Southwest



Northeast



Square: Northeast

DESIGN

Impressions



DESIGN

Impressions



DESIGN | Impressions



DESIGN

Impressions



DESIGN

Impressions





DESIGN

Impressions



DESIGN

Impressions



DESIGN

Impressions



DESIGN

Impressions



DESIGN

Impressions



DESIGN

Impressions



DESIGN

Impressions

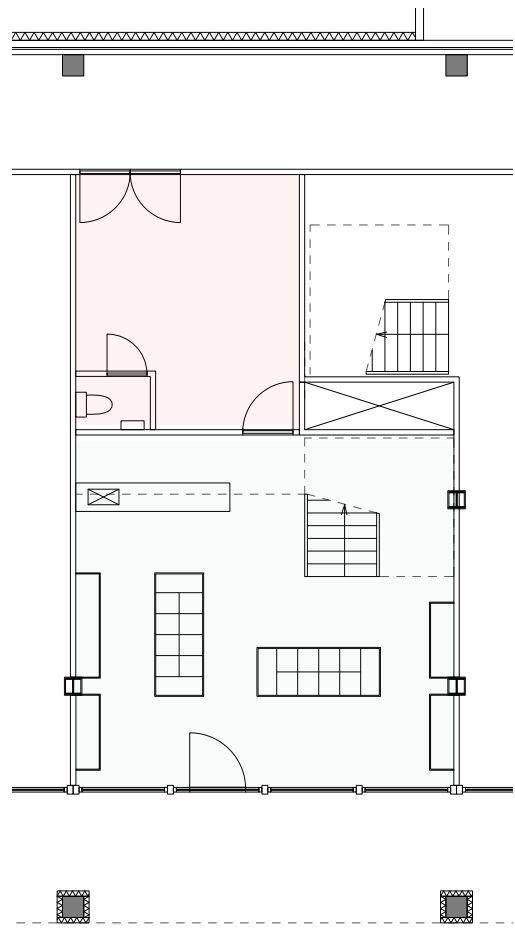


DESIGN

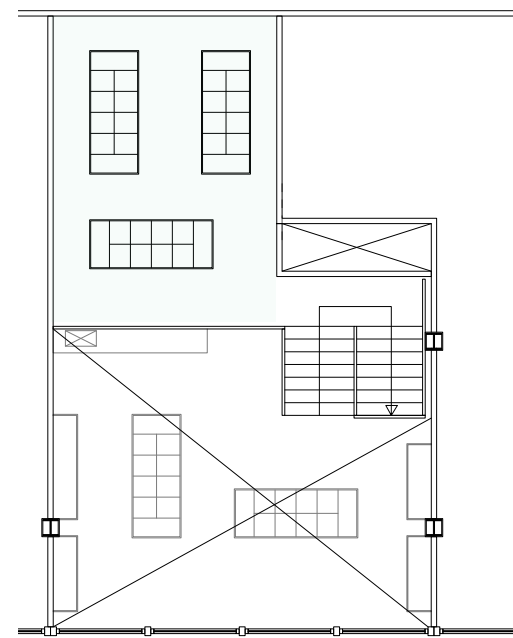
Retail



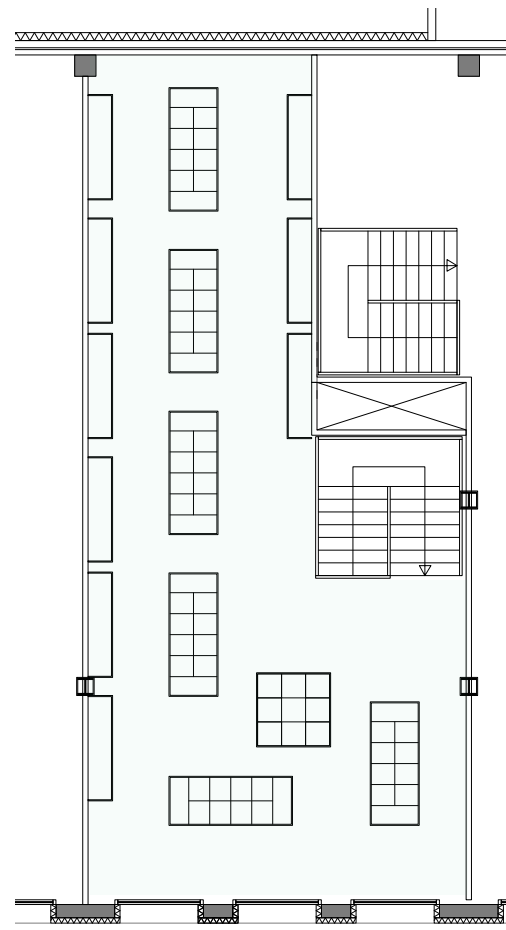
Ground floor



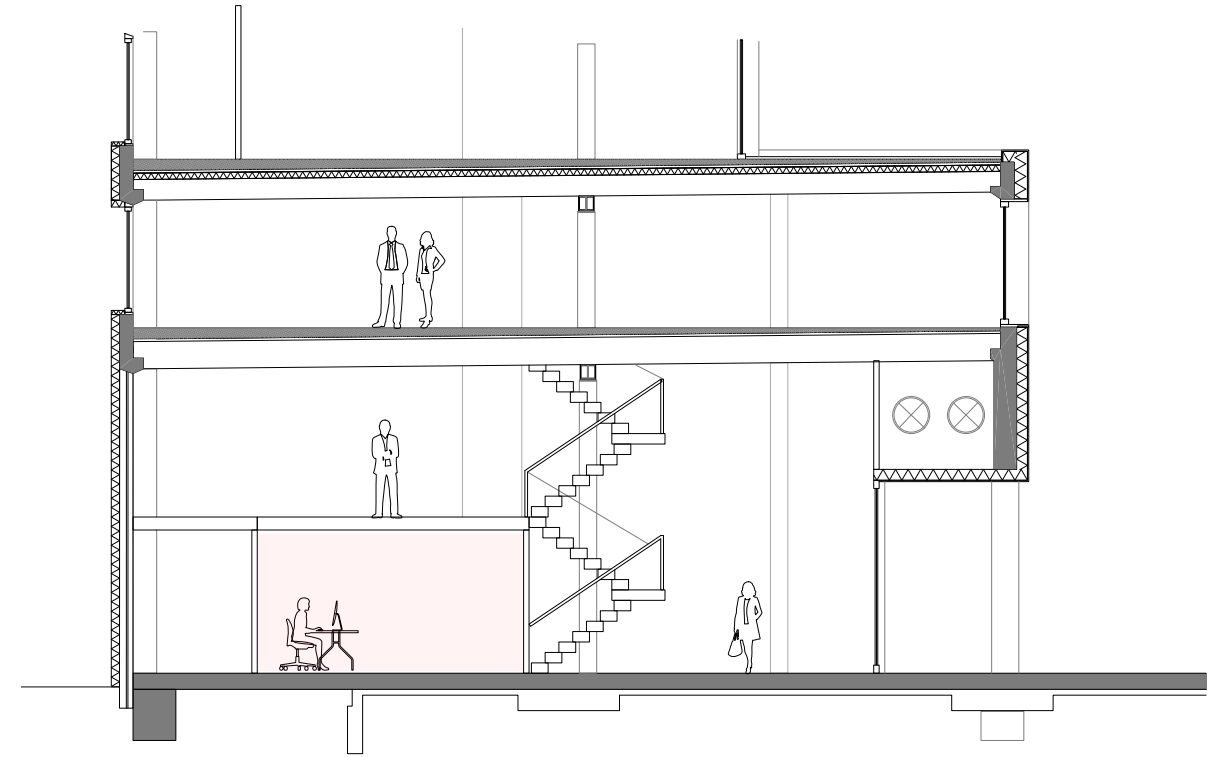
Entresol





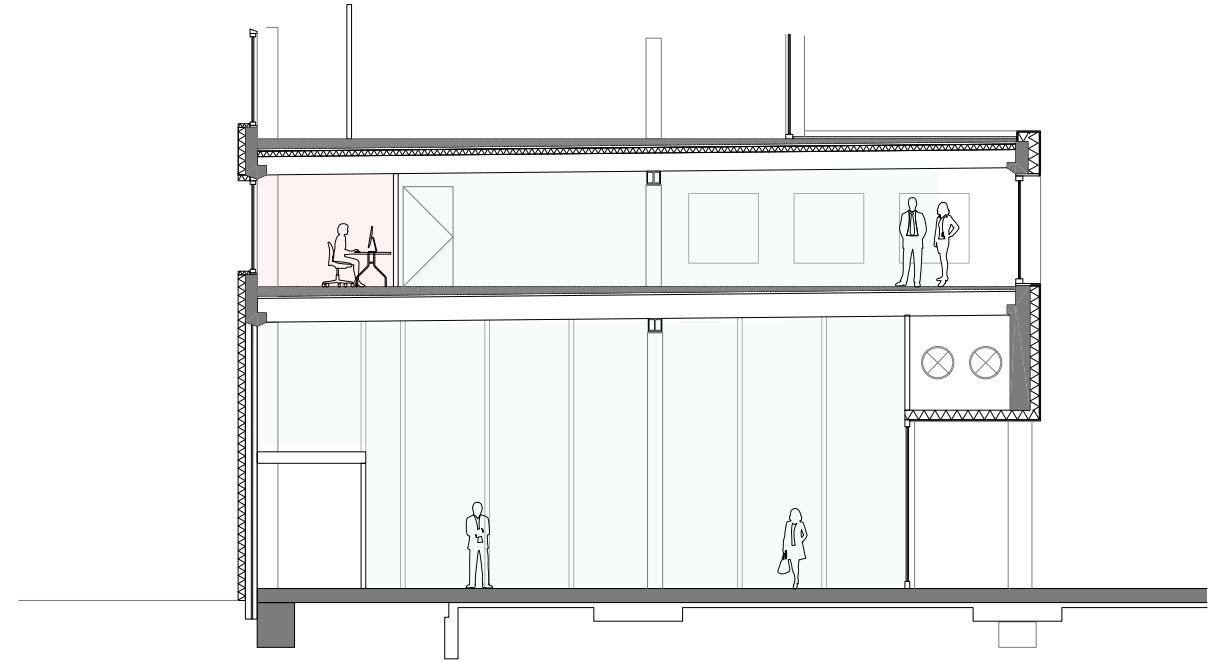
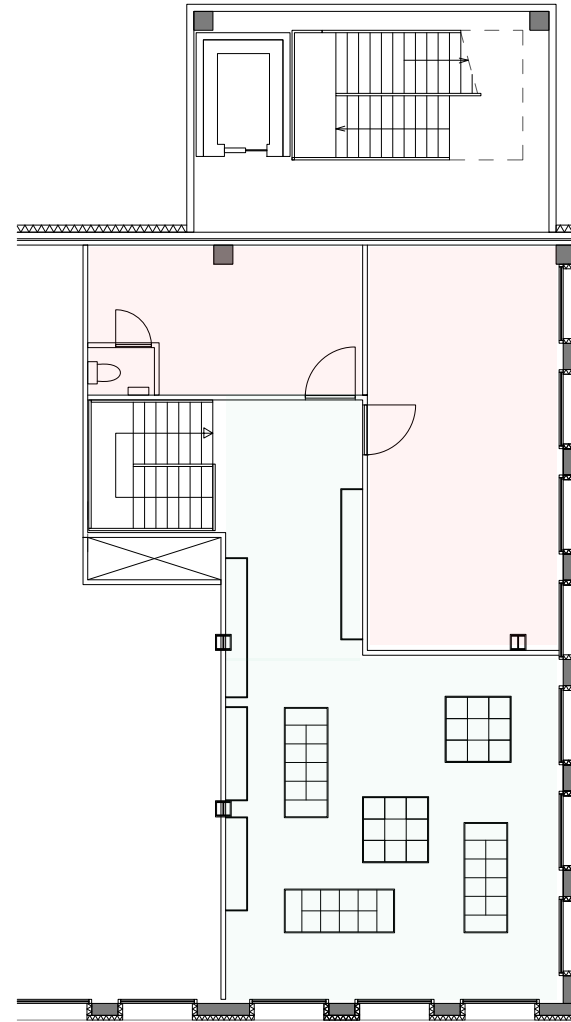
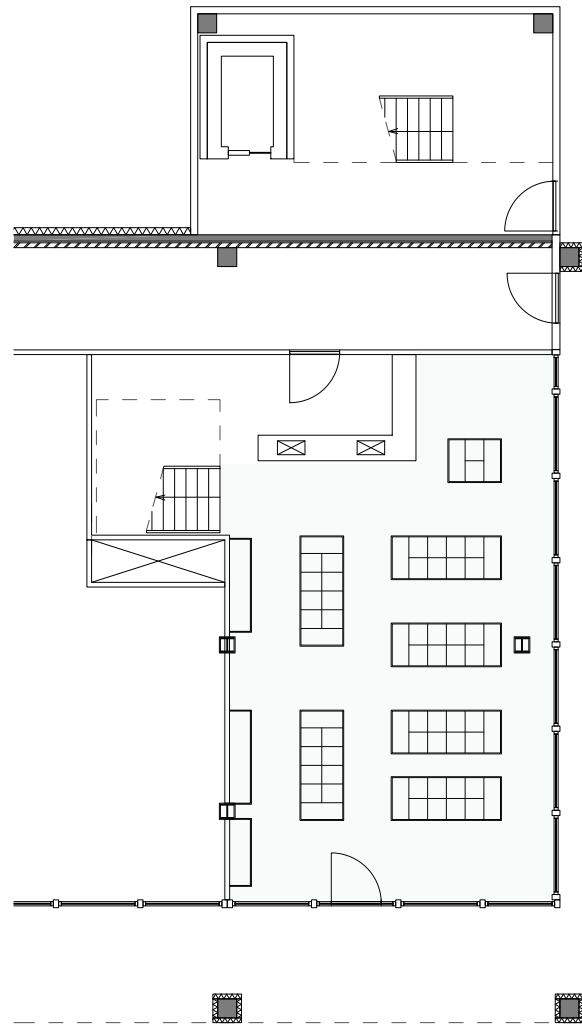
First floor





Section



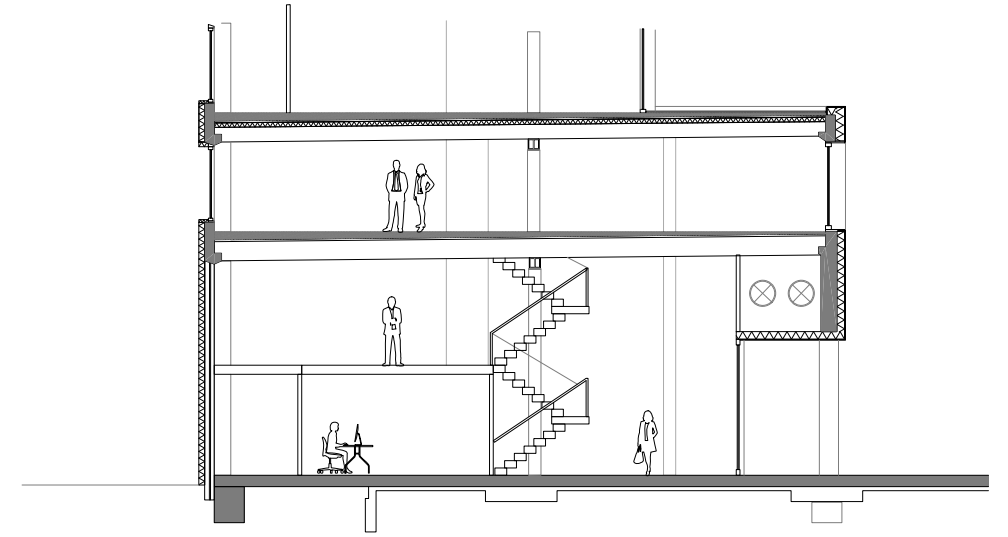
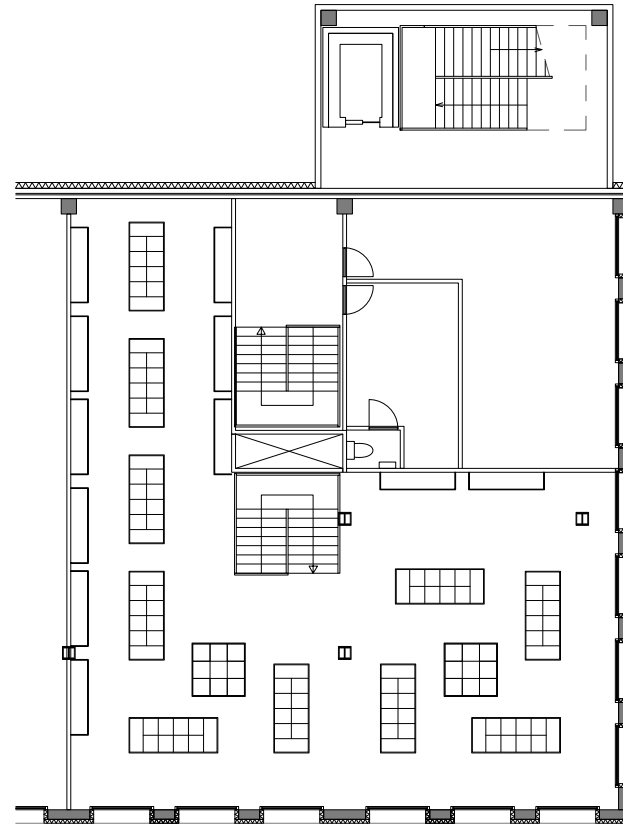
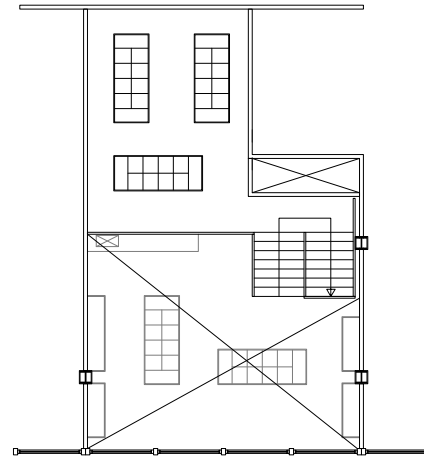
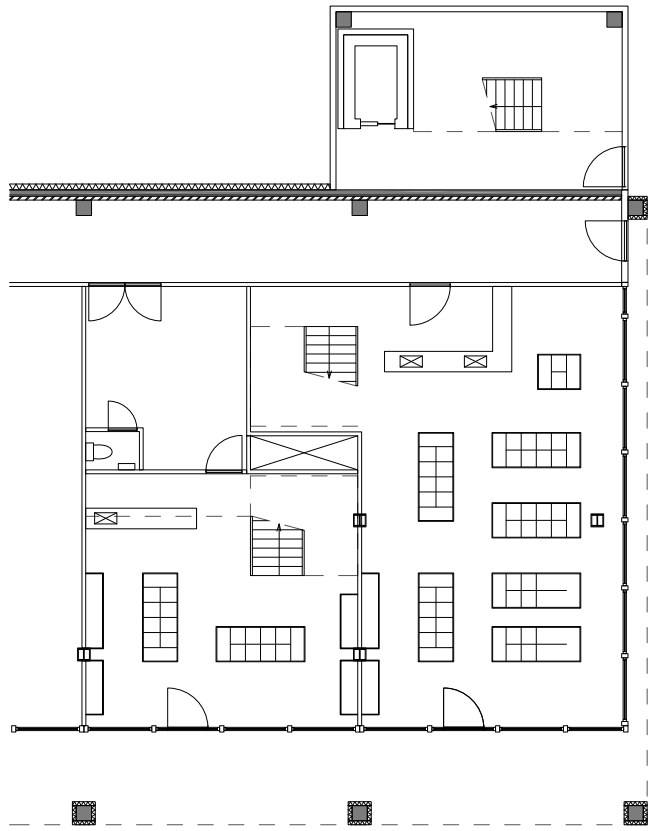
-  Retail 150m²
-  Storage / logistics 20m²



-  Retail 150m²
-  Storage / logistics 20m²

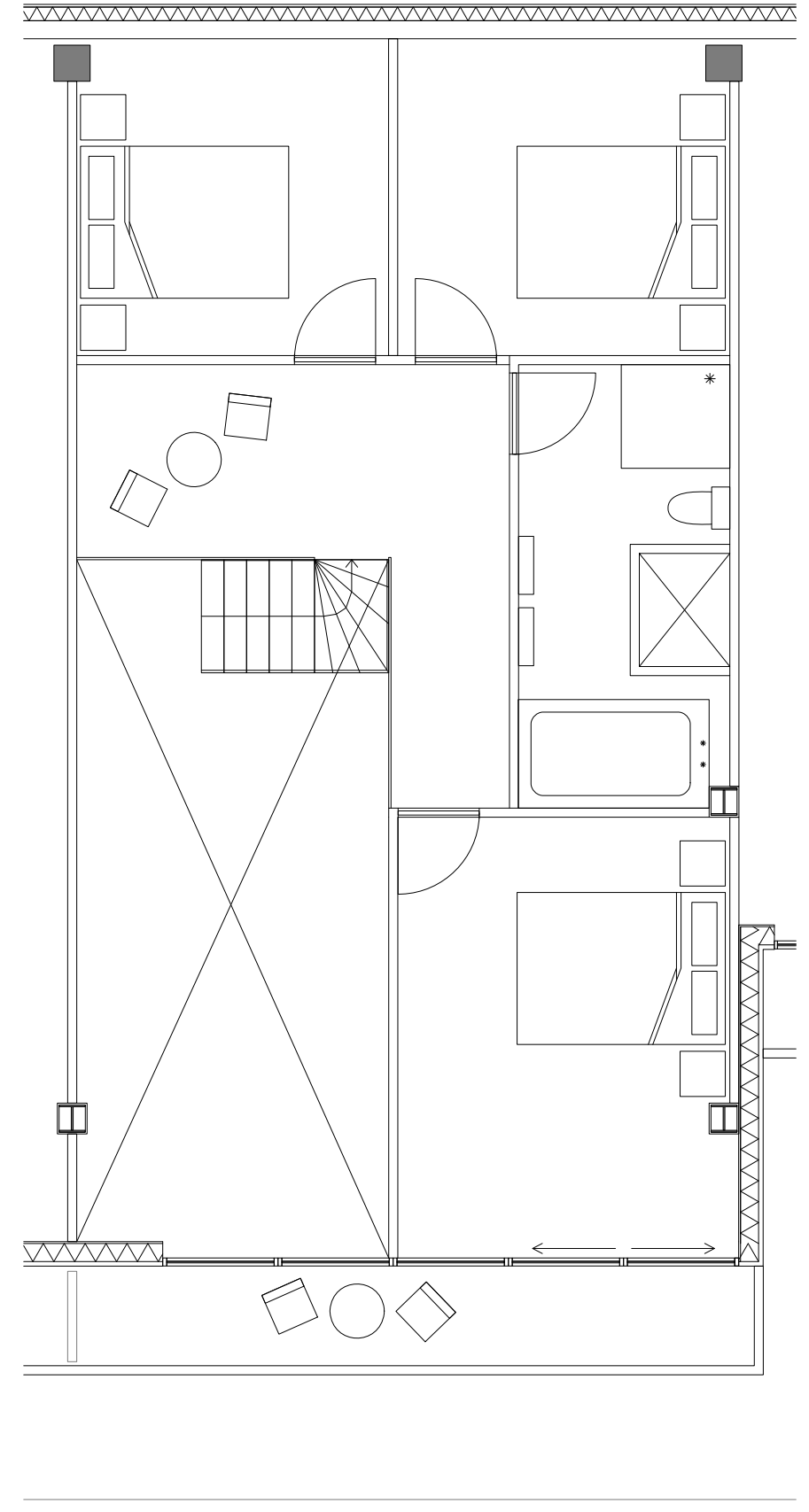
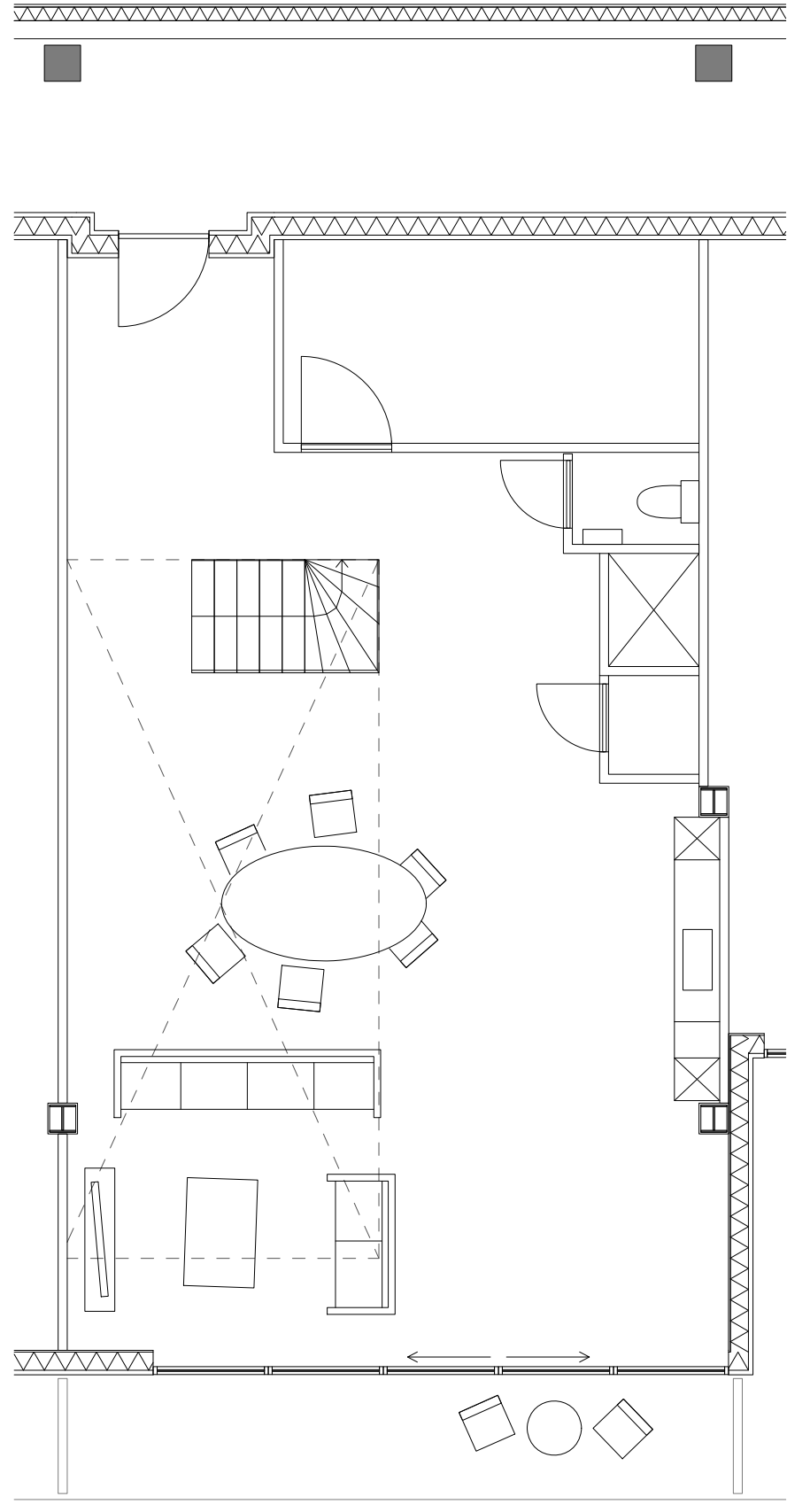
DESIGN

Retail : 2 shops next to each other



DESIGN

Housing in tower, 150 m2 maisonette

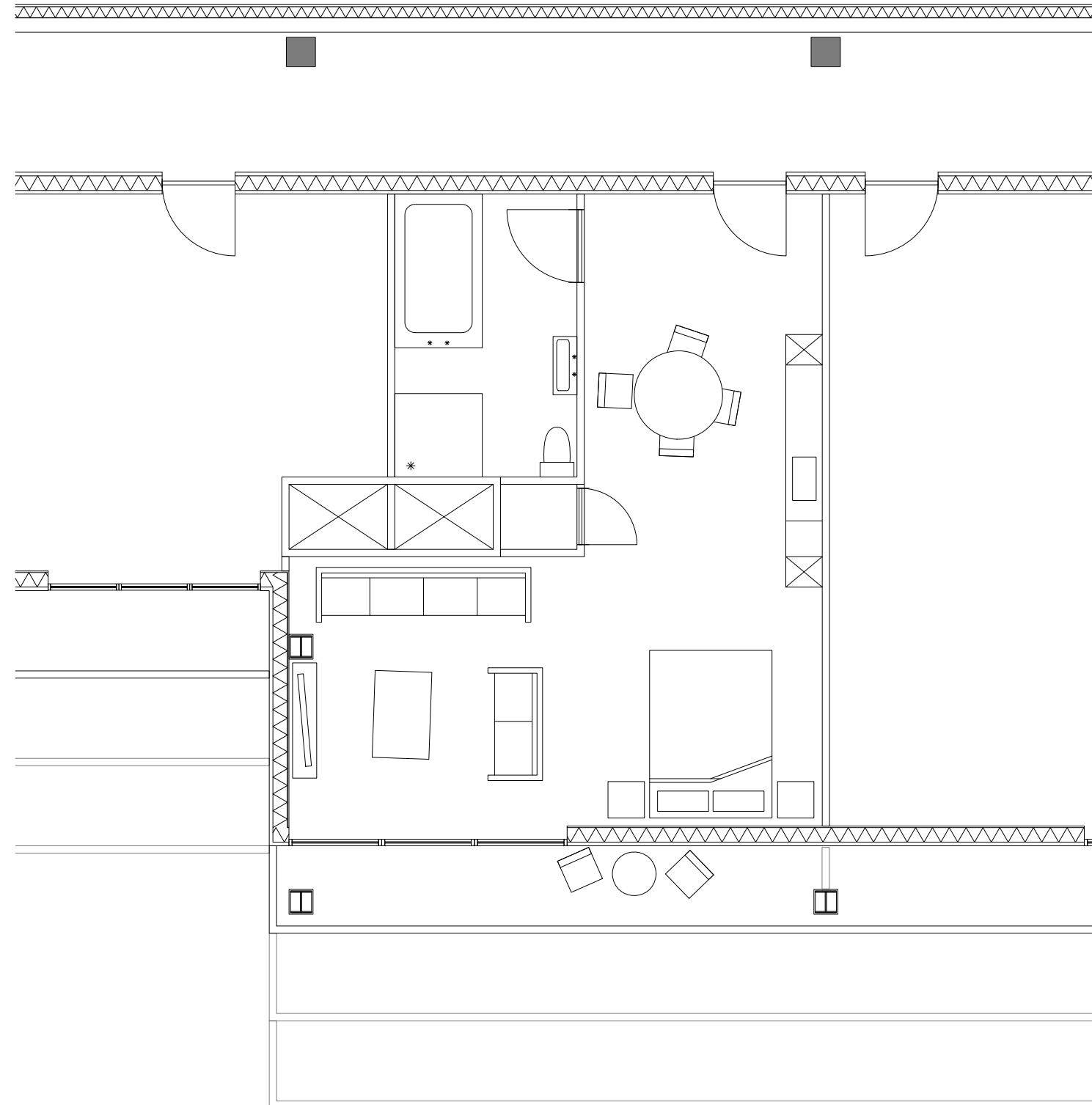


DESIGN

Housing in tower, 50 m2 studio

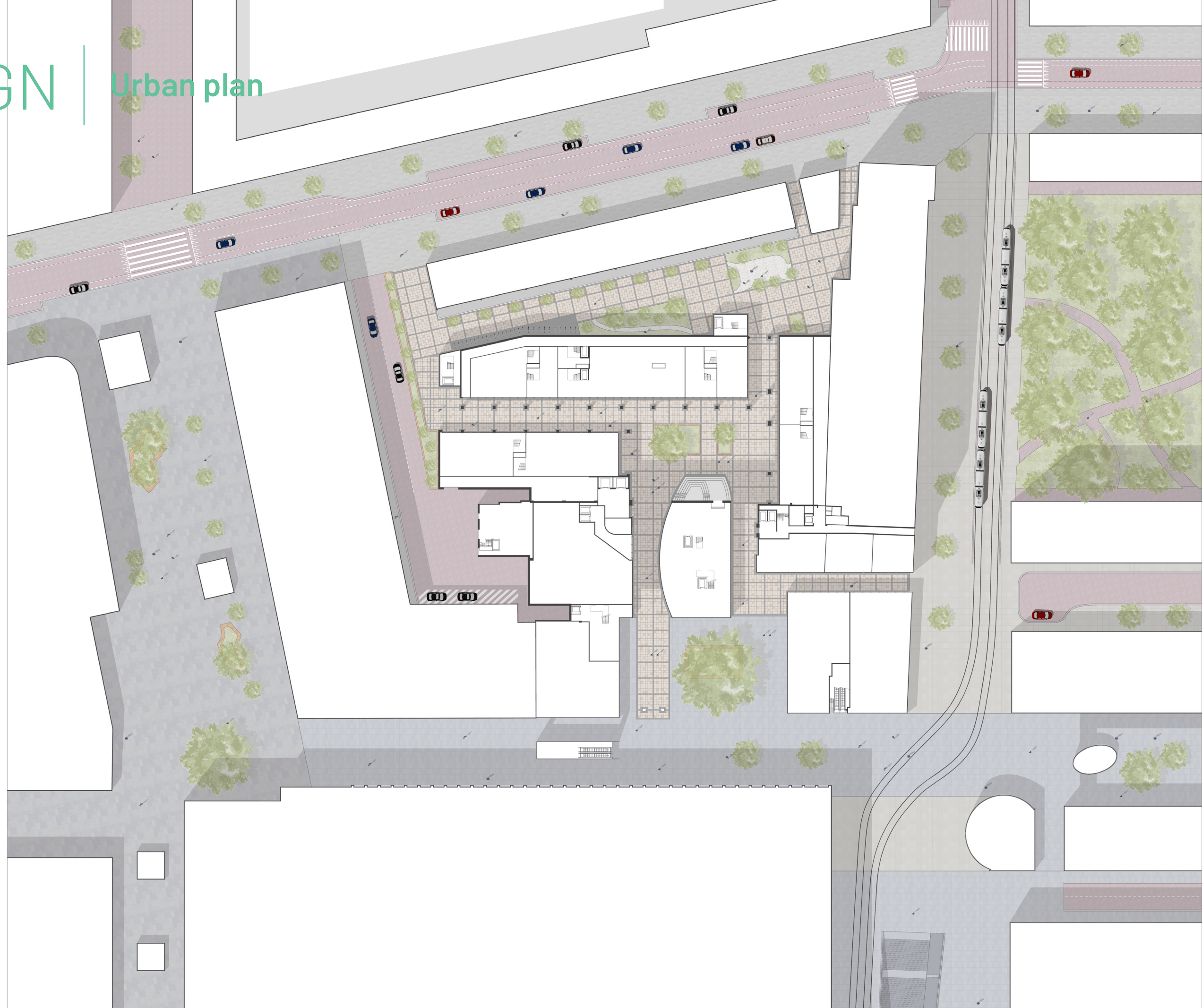


- 10 m2 Bathroom
- 15 m2 Kitchen & eating area
- 25 m2 Living & bedroom
- 8 m2 Balcony



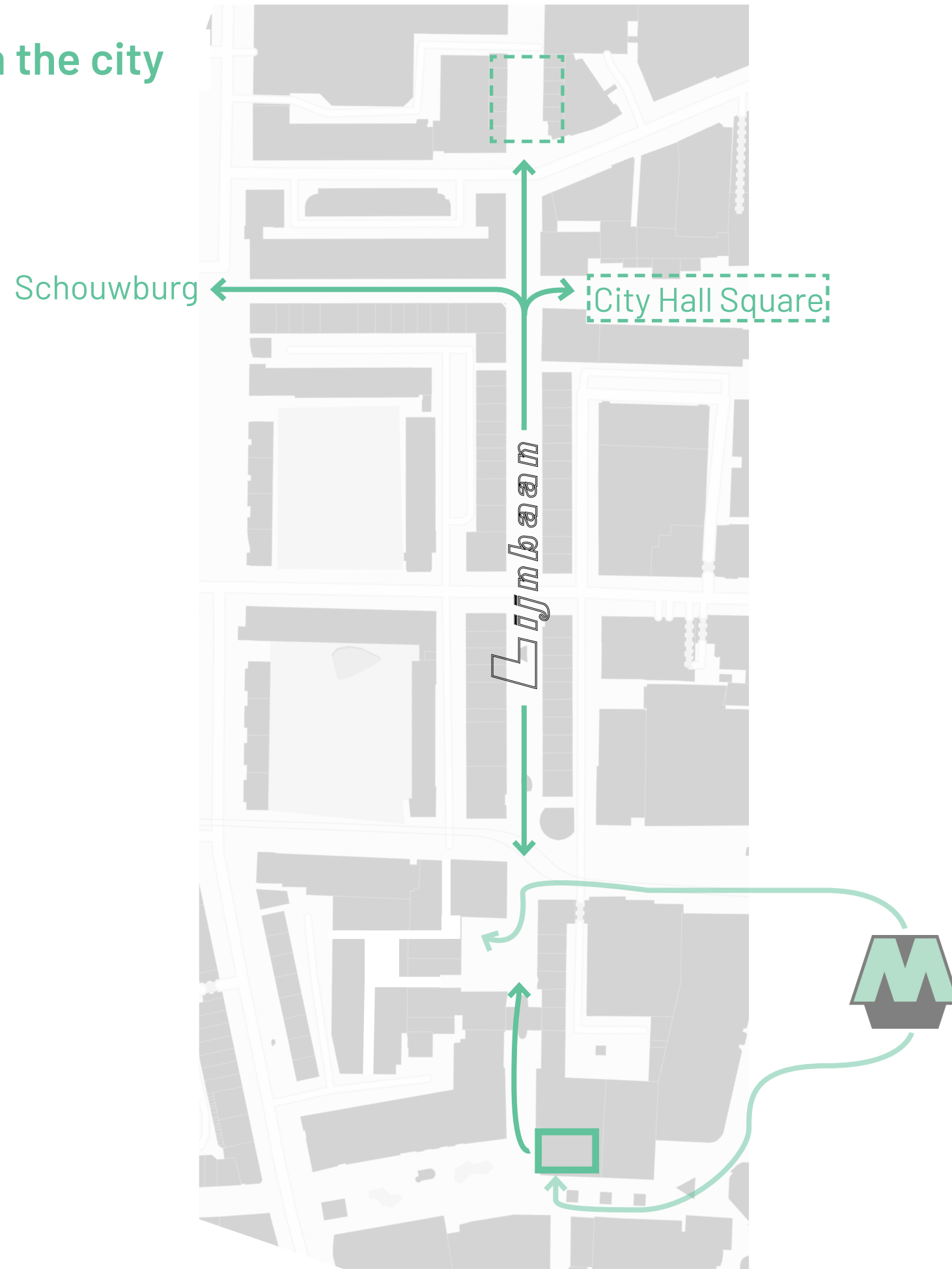
DESIGN

Urban plan



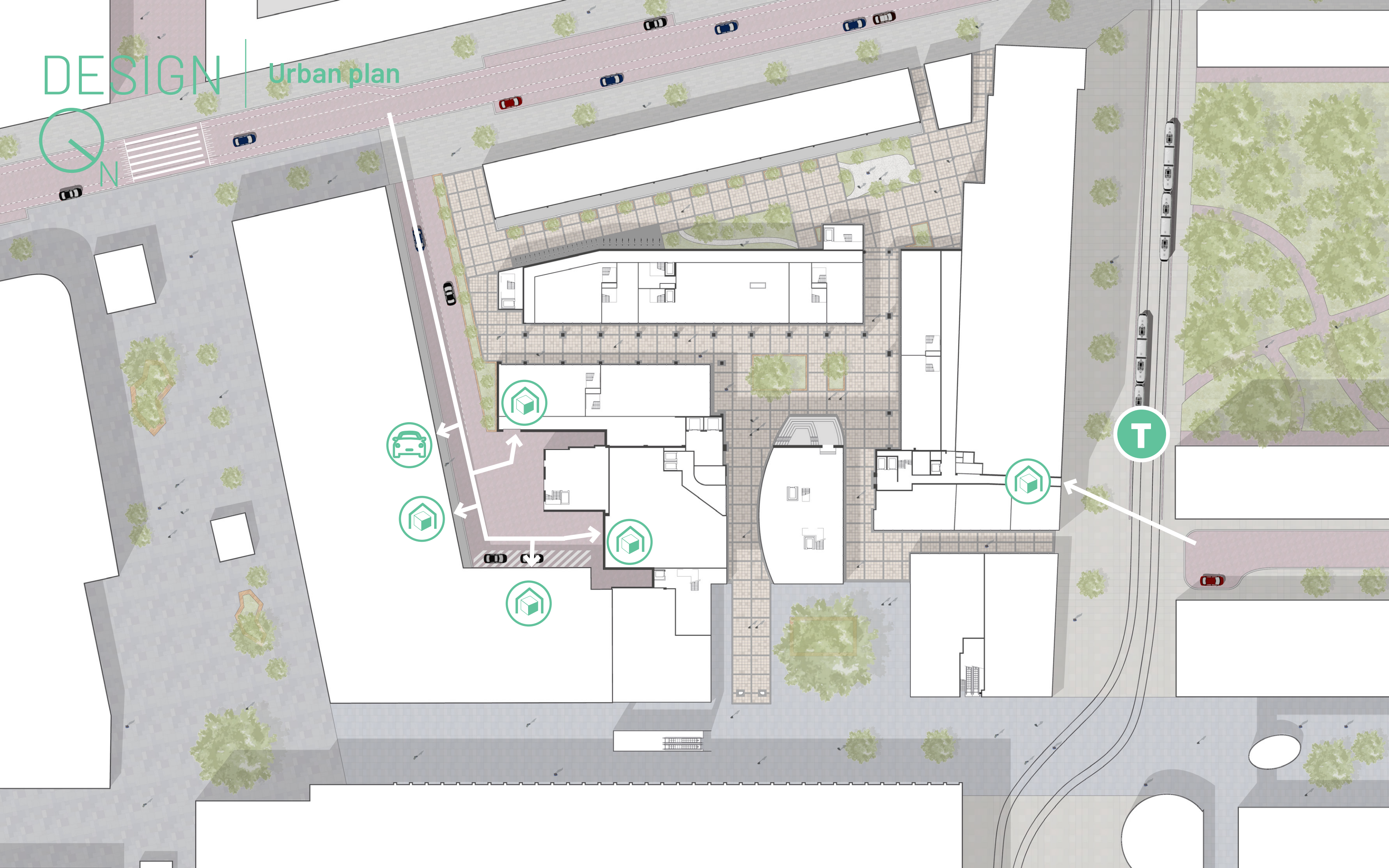
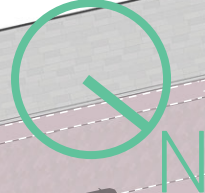
DESIGN

Network in the city



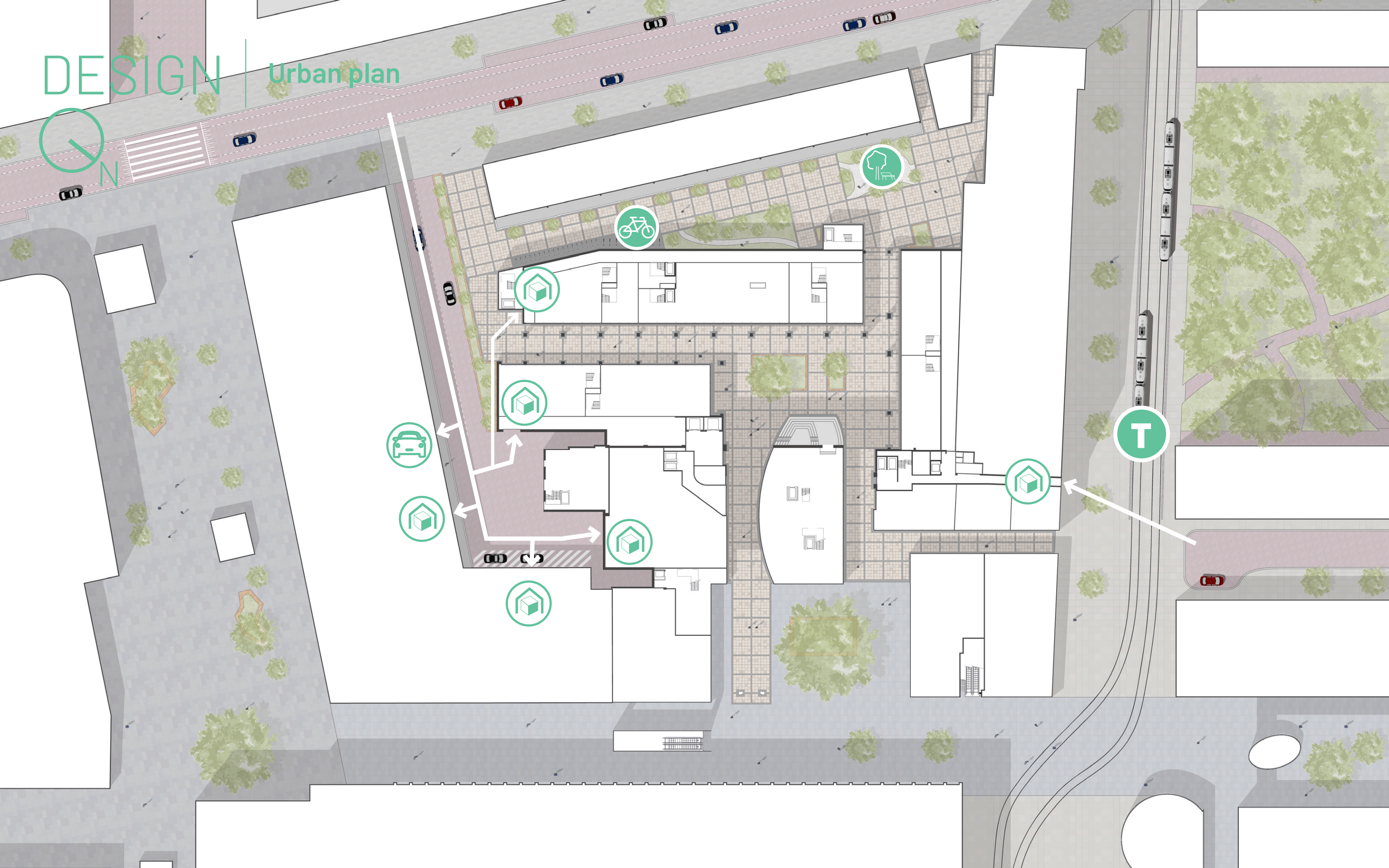
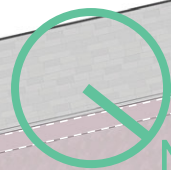
DESIGN

Urban plan



DESIGN

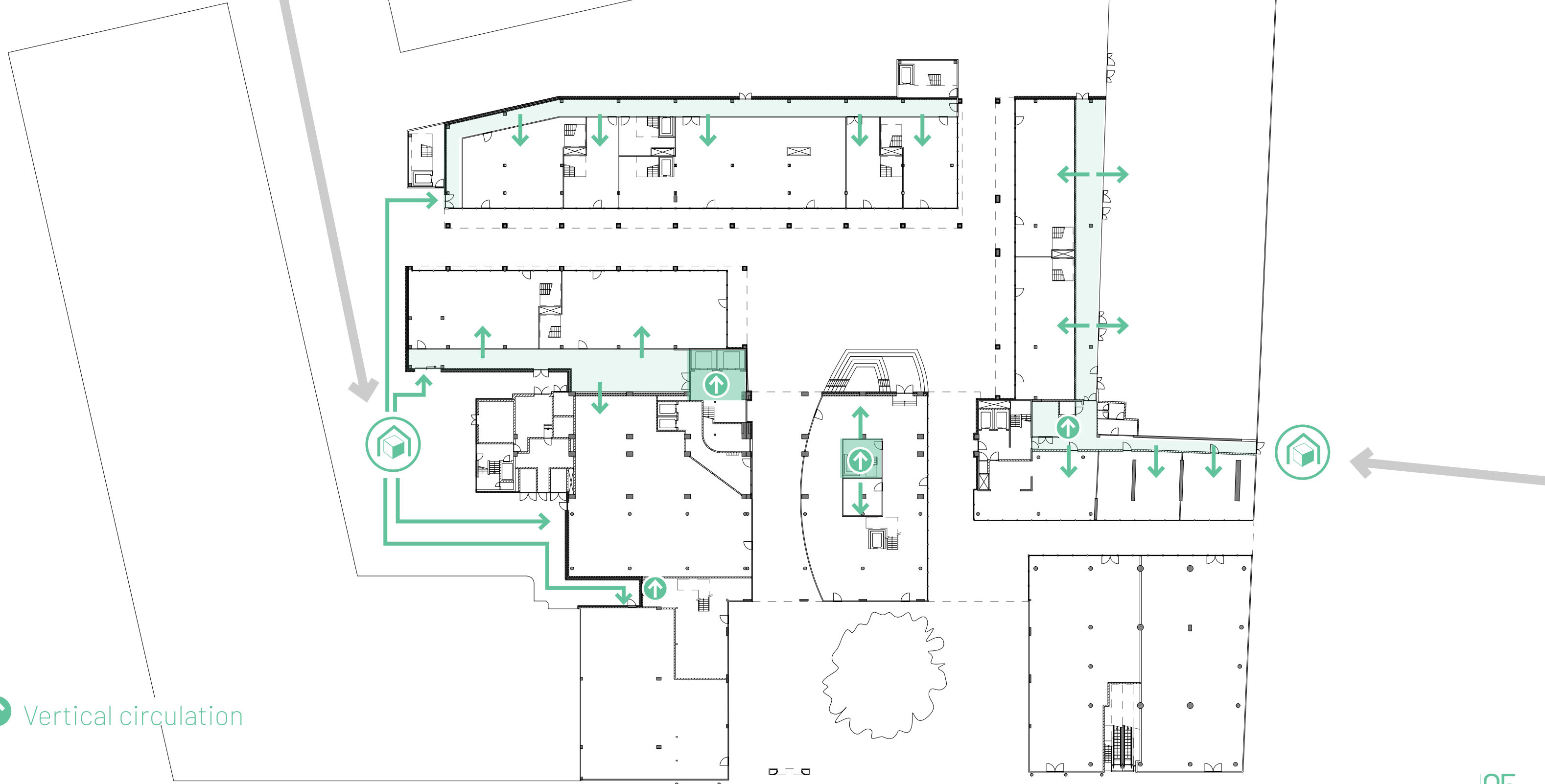
Urban plan



DESIGN

Logistics: Retail

Ground floor

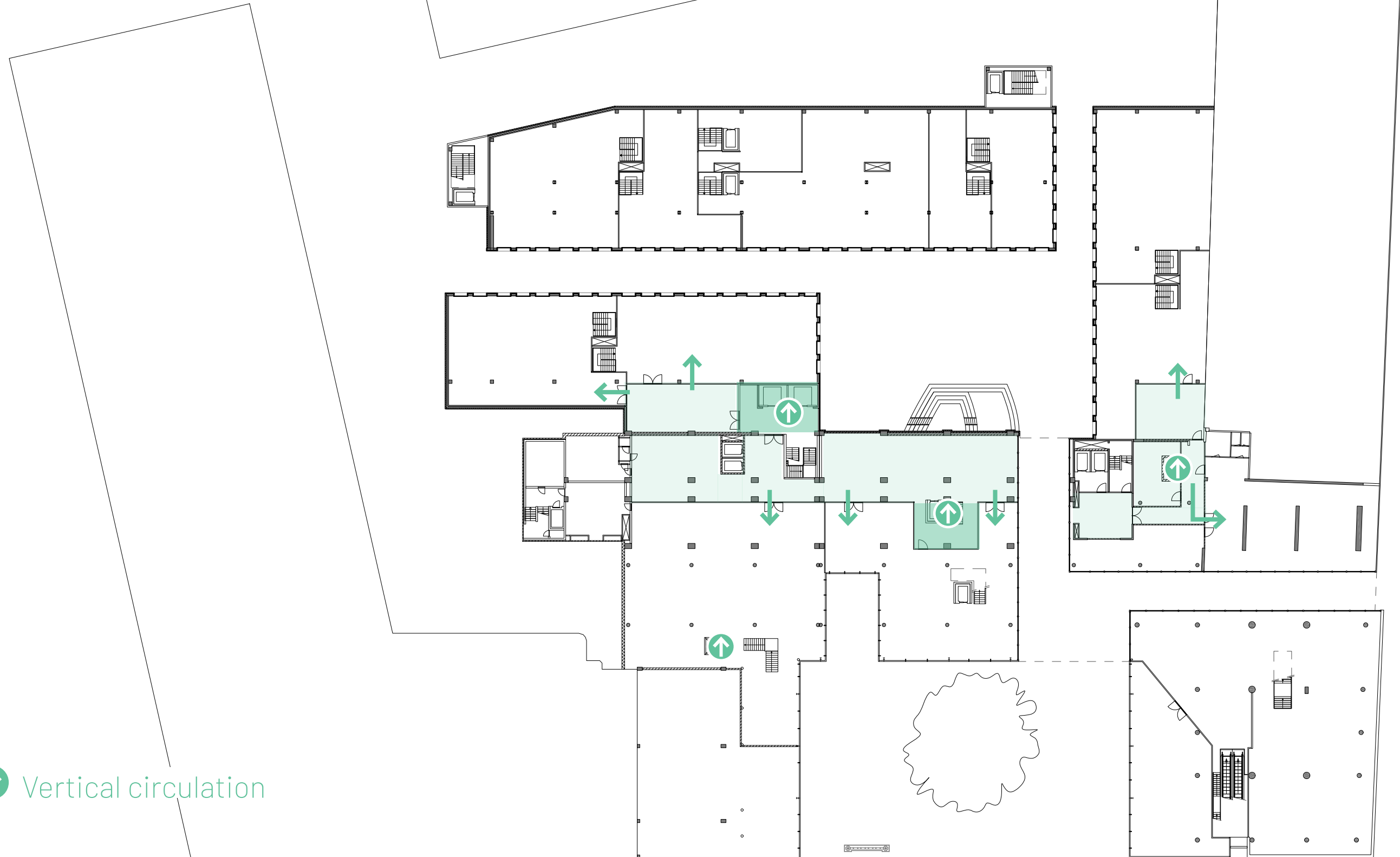


↑ Vertical circulation

DESIGN

Logistics: Retail

First floor

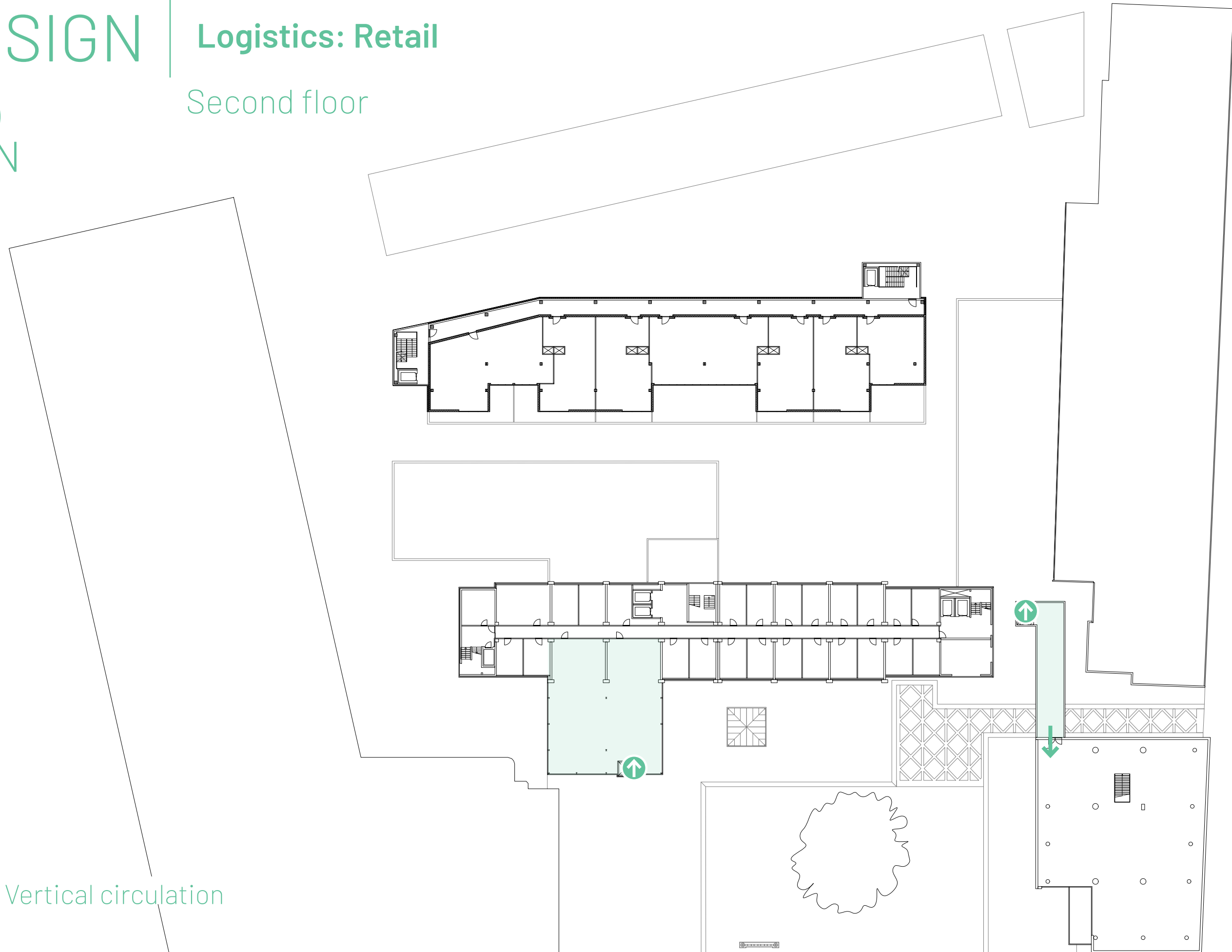


↑ Vertical circulation

DESIGN

Logistics: Retail

Second floor

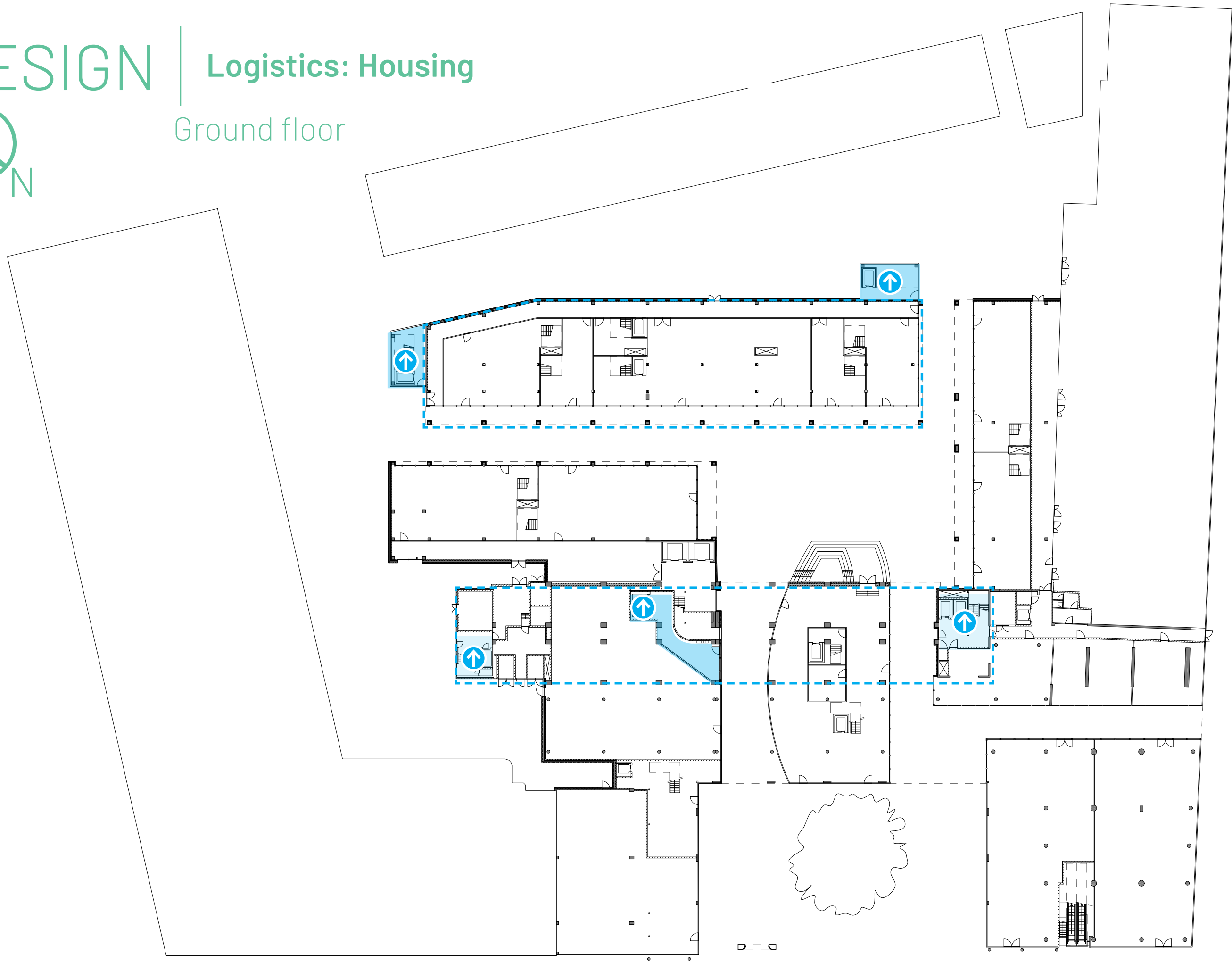


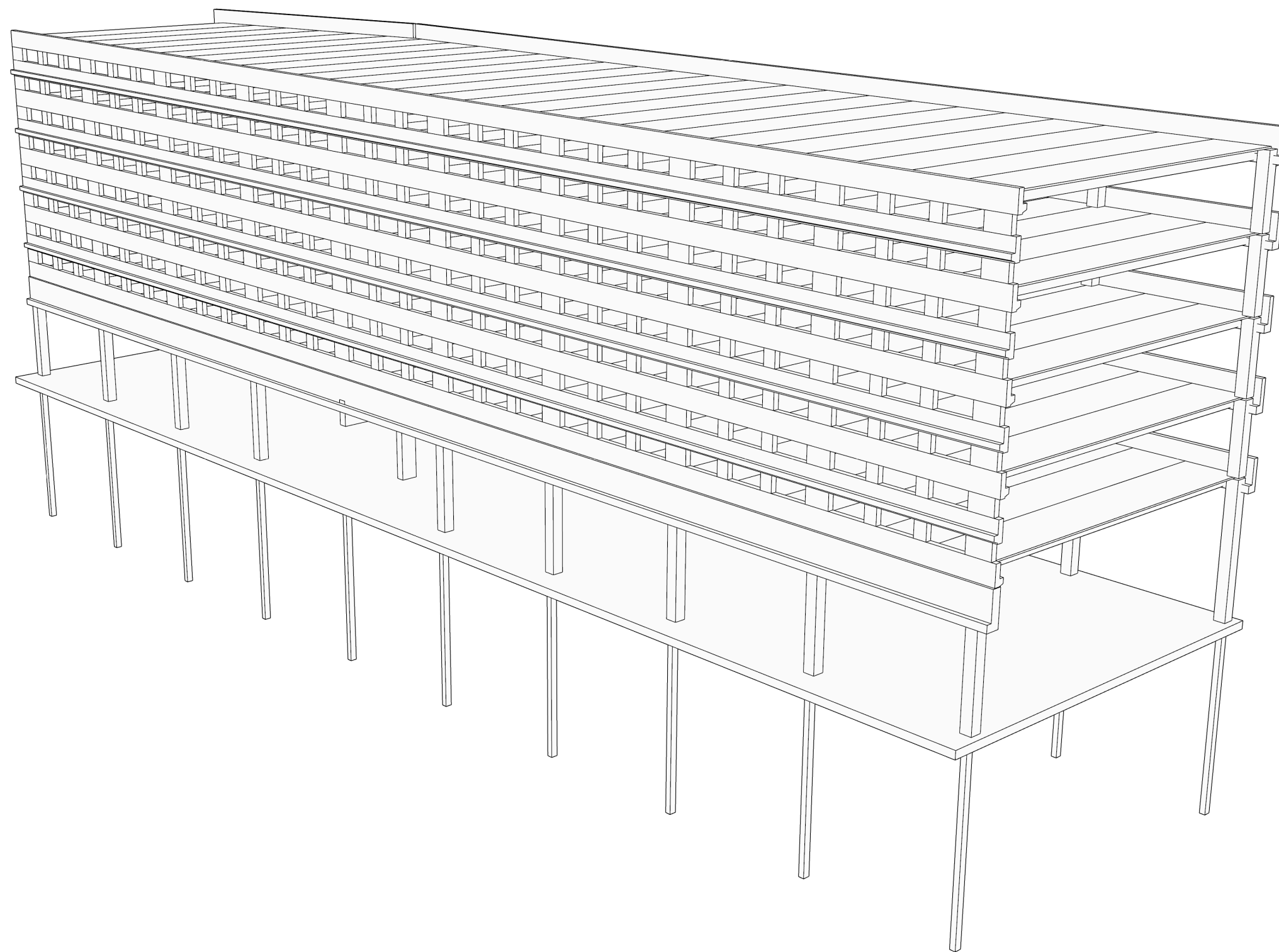
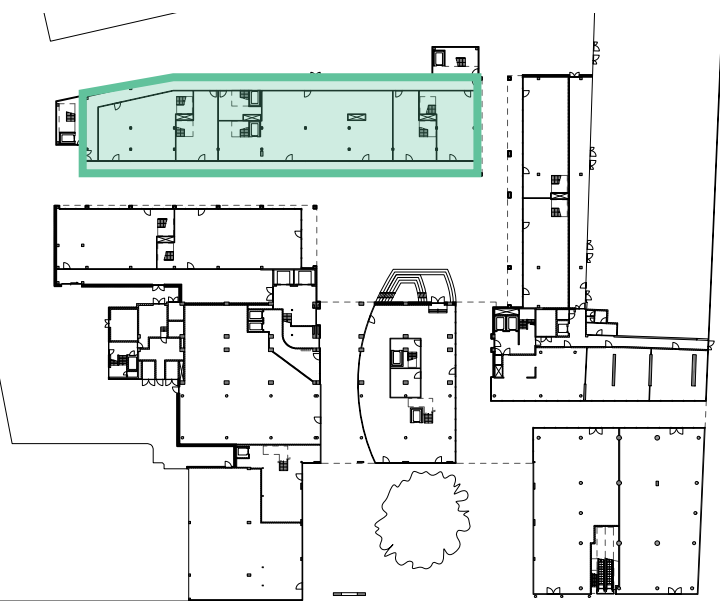
↑ Vertical circulation

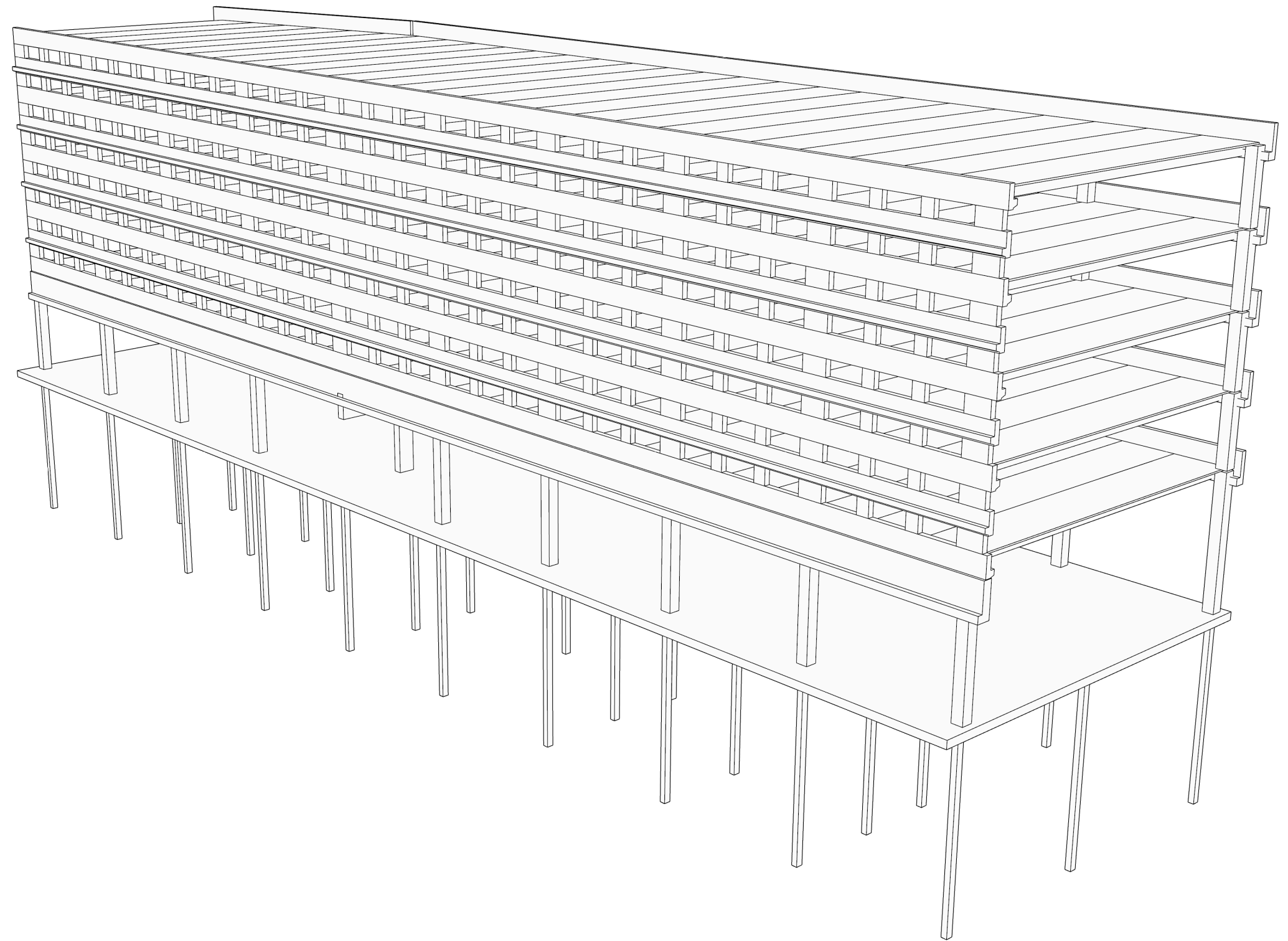
DESIGN

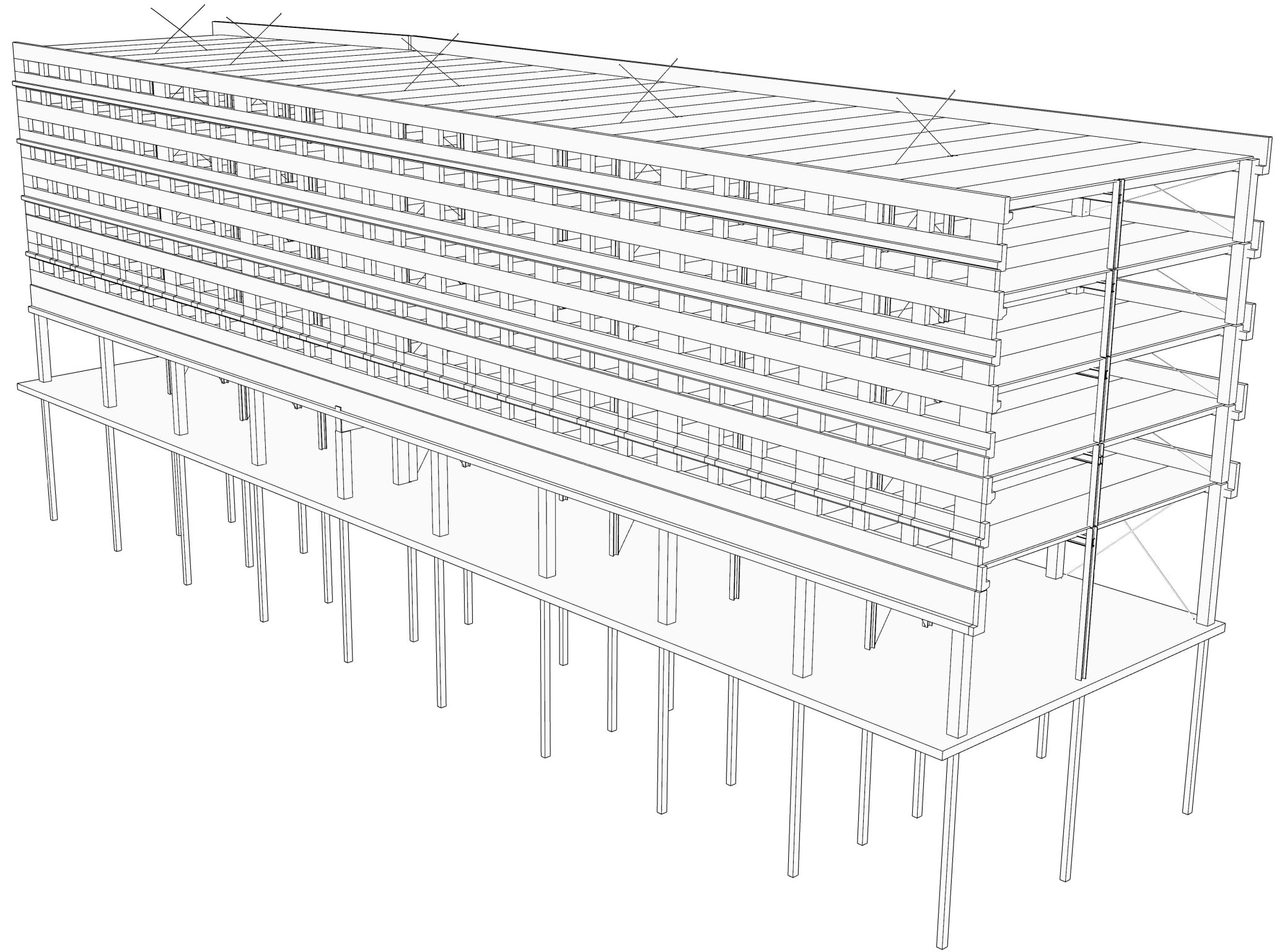
Logistics: Housing

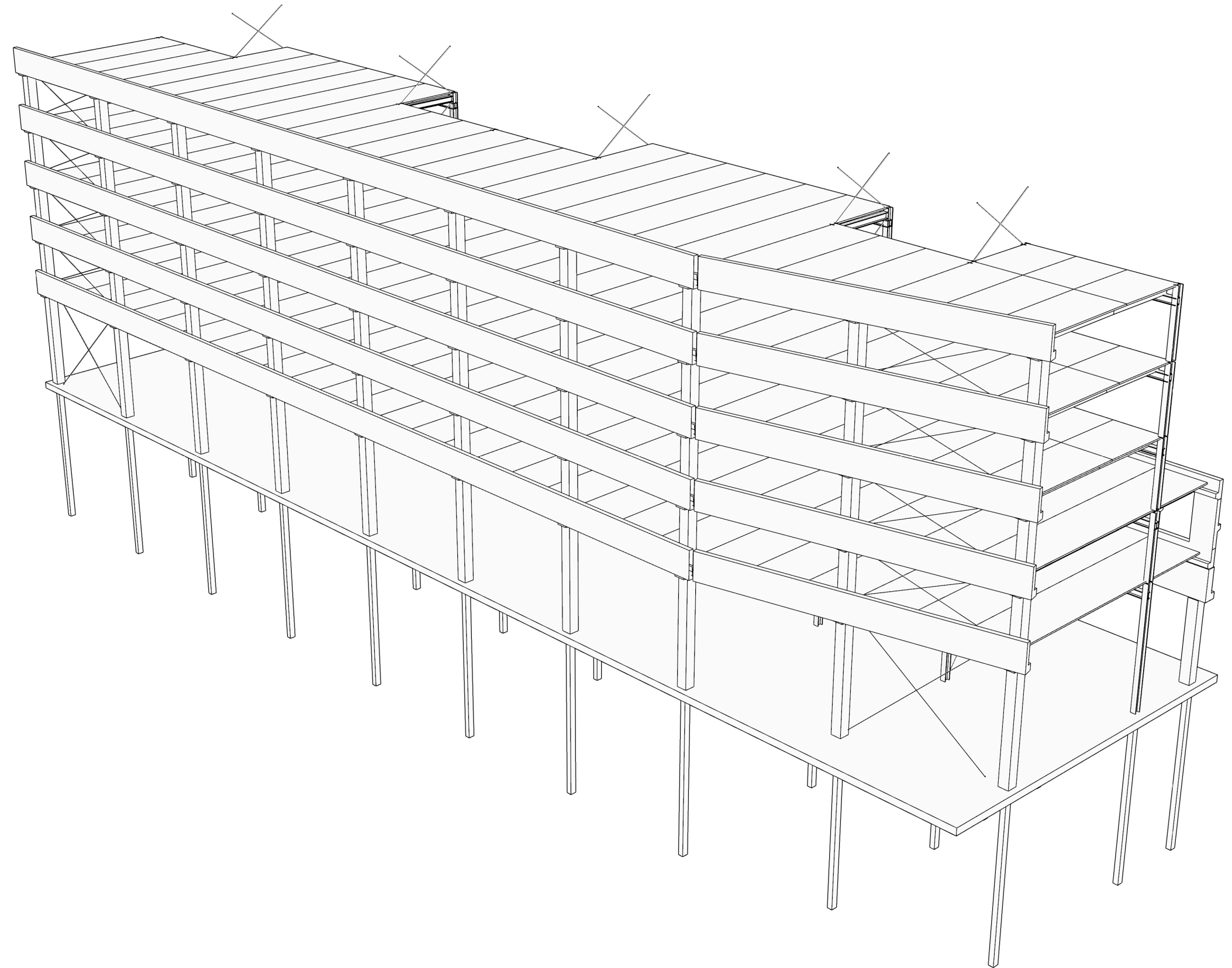
Ground floor

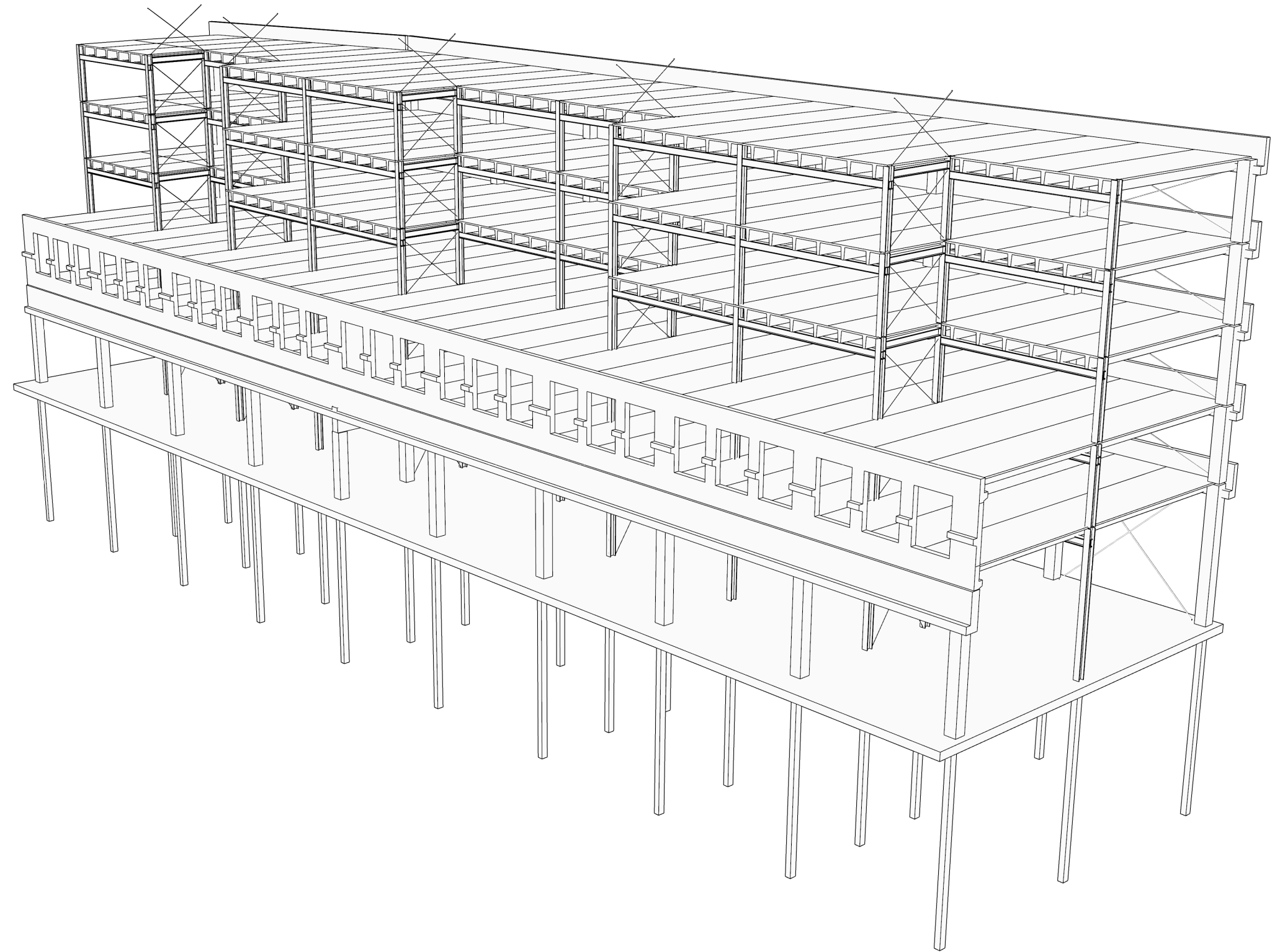


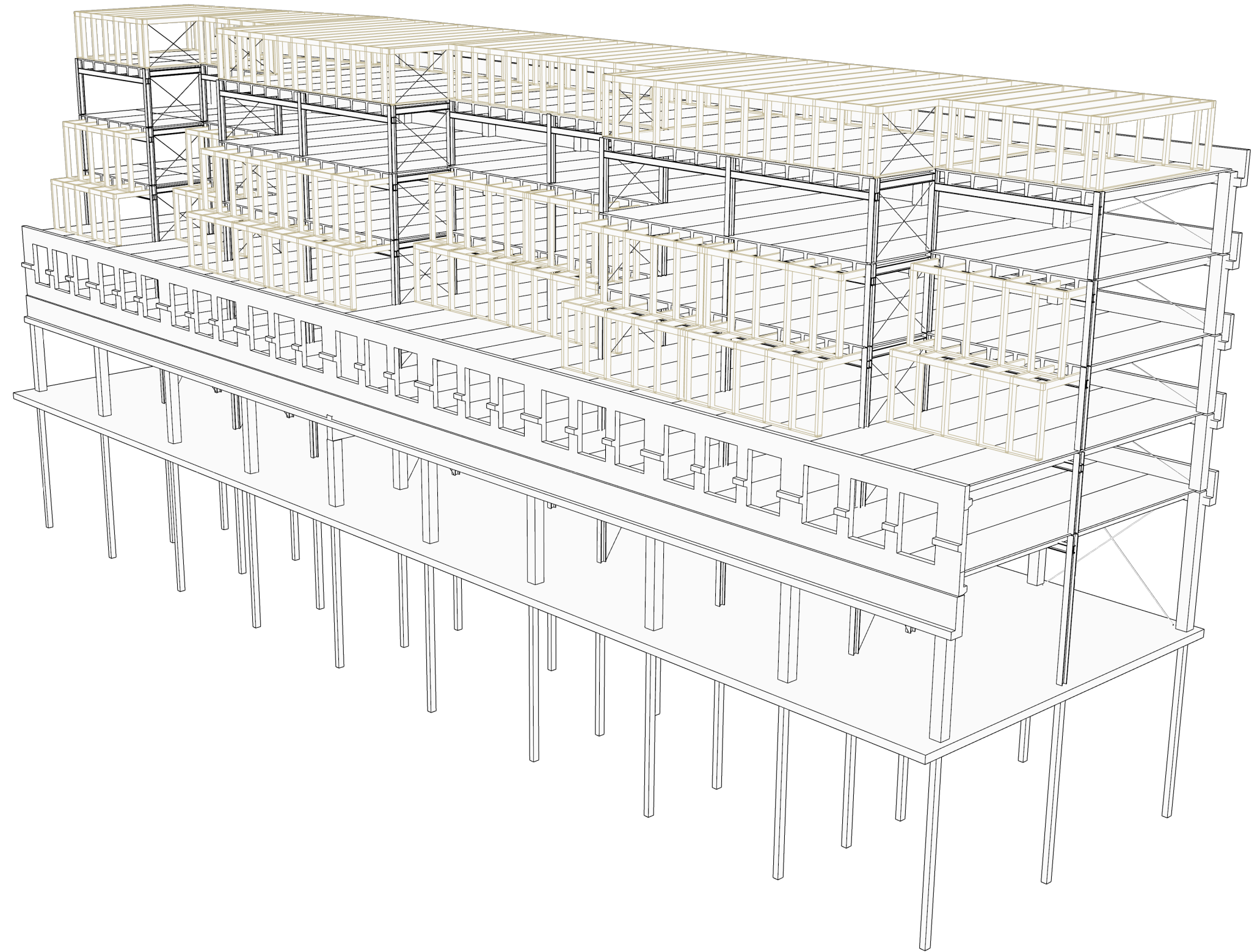












Floor: TT/620/2400

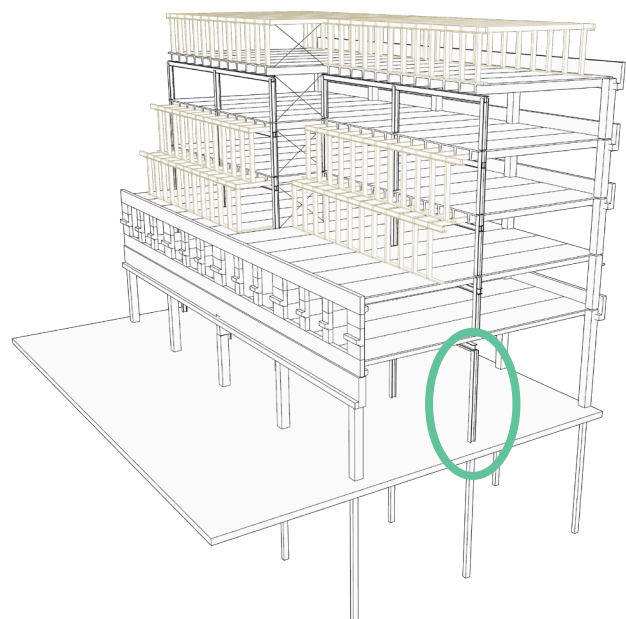
$g = 4,65 \text{ KN/m}^2$

Added load retail: 5 KN/m^2

Added load housing: $2,5 \text{ KN/m}^2$

Load of wooden roof: $2,5 \text{ KN/m}^2$

	lengte		breedte		rekenwaarde		
opp.vl dak	7	[m] x	4	[m] x	2,5	[kN/m ²]	= 70 [kN]
opp.vl dak	7	[m] x	4	[m] x	7,15	[kN/m ²]	= 200,2 [kN]
opp v4	7	[m] x	4	[m] x	7,15	[kN/m ²]	= 200,2 [kN]
opp v3	7	[m] x	4	[m] x	7,15	[kN/m ²]	= 200,2 [kN]
opp v2	7	[m] x	8	[m] x	7,15	[kN/m ²]	= 400,4 [kN]
opp v1	7	[m] x	8	[m] x	9,65	[kN/m ²]	= 540,4 [kN]
							$F_{c;d} = 1611,4 \text{ [kN]}$
$A = F_{c;d}/f_{c;d} =$	6857,02	[mm ²]	-->	HEA 400			
$f_{c;d} =$	235	[N/mm ²]					
$l_{cr} =$	4,5	[m]		$E =$	210000	[N/mm ²]	$I_z = 8,564E+07 \text{ [mm}^4\text{]}$
$F_{cr} =$	8,77E+06	[N]					
$UC =$	0,92			$I_{z \text{ ben}} =$	7,87E+07	[mm ⁴]	--> HEA 400



HEA 400 on ground floor



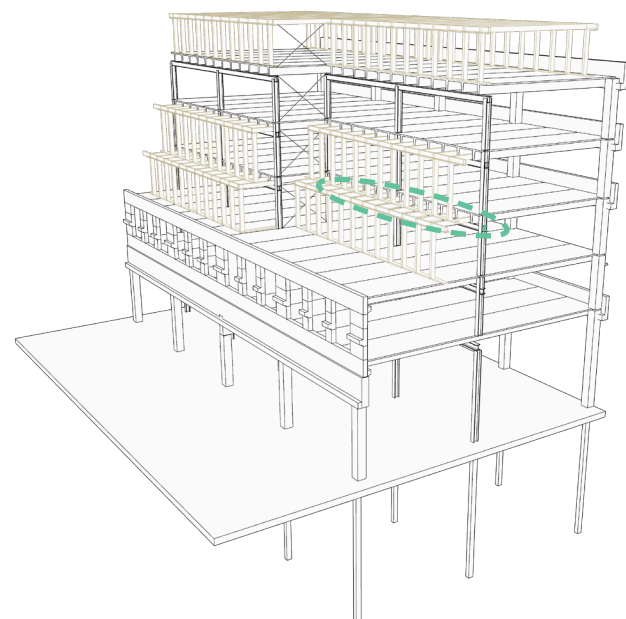
DESIGN

Construction

Floor: TT/620/2400

$g = 4,65 \text{ KN/m}^2$

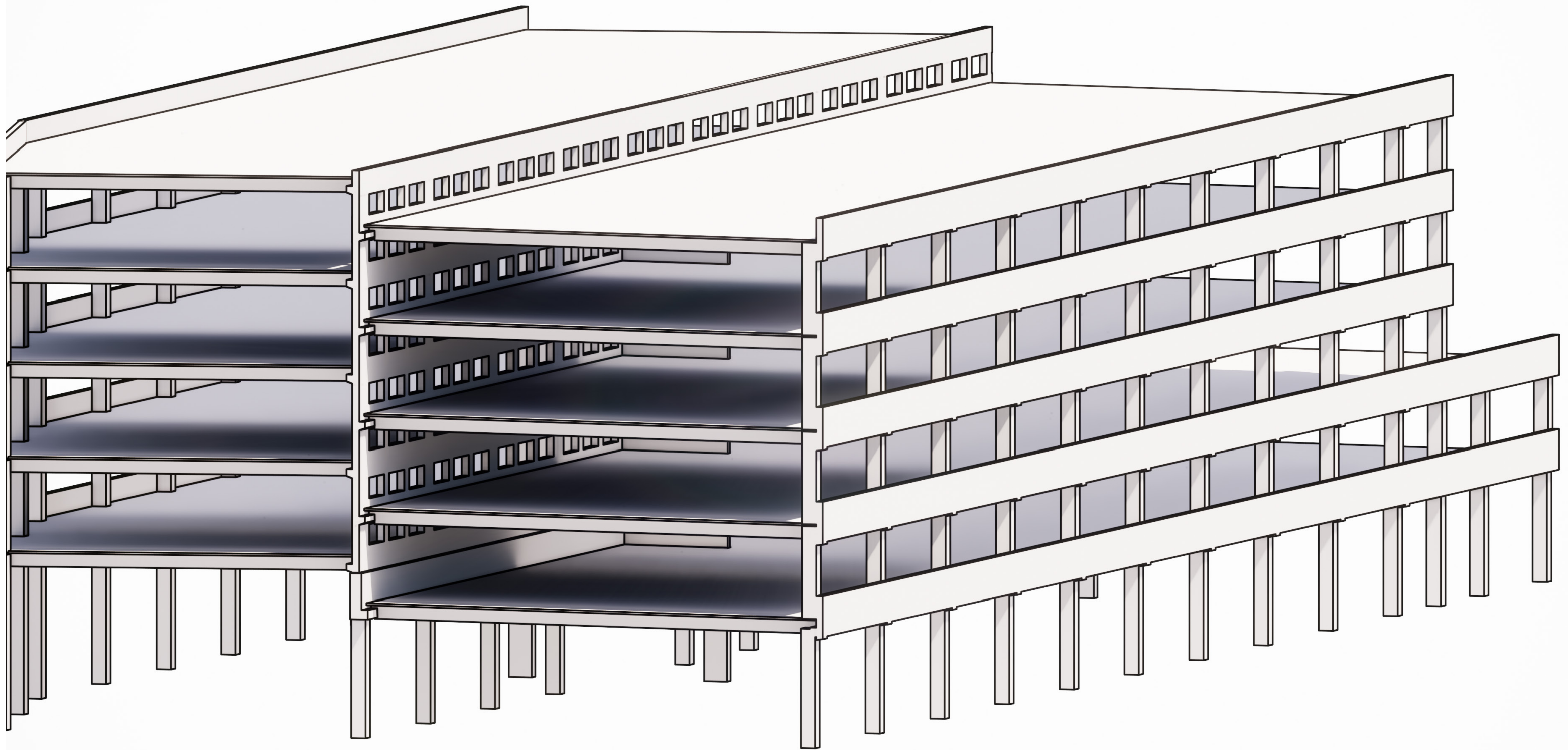
Added load housing: $2,5 \text{ KN/m}^2$

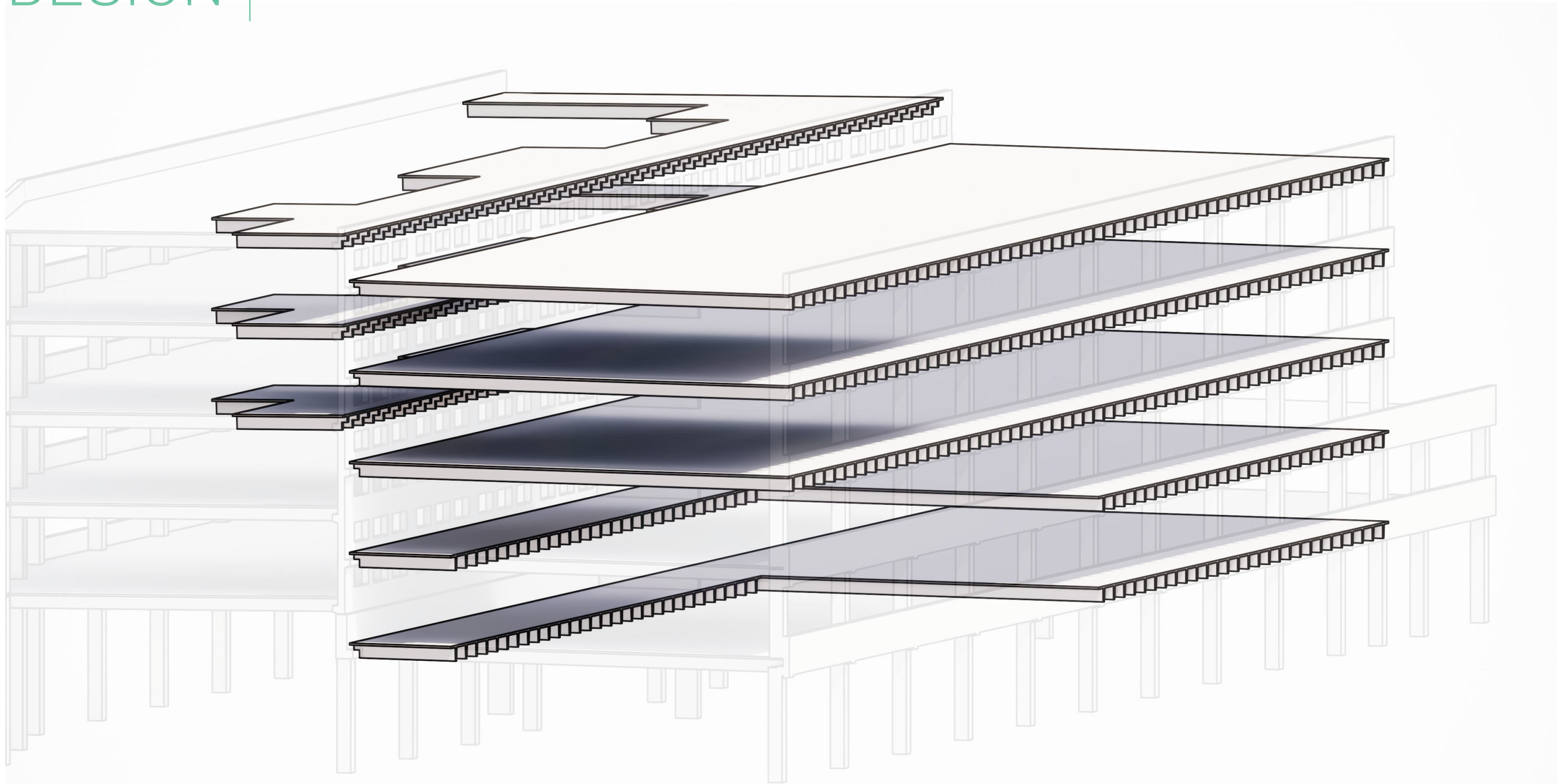


HEM 260	$\ell_{\text{hoh}} =$	11,9	[m]				
	$q_{\text{tot rekenw}} =$	10	[kN/m ²]		$W =$	2159000	[mm ³]
	$q_{\text{UGT}} =$	119	[kN/m]		$I =$	313700000	[mm ⁴]
	$q_{\text{Q;kar.w}} =$	2,5	[kN/m ²]				
	$q_{\text{BGT}} =$	29,75	[kN/m]		$f_{cd} =$	355	[N/mm ²]
	$\ell_{\text{oversp}} =$	7	[m]		$E =$	210000	[N/mm ²]
sterkte							
	veld mom =	728875000	[Nmm]		$\sigma_m =$	337,5984252	[N/mm ²]
	UC =	0,95			$W_{\text{benodigd}} =$	2053169,014	[mm ³]
stijfheid							
	$U_{\text{bij}} =$	14,12	[mm]		$U_{\text{bij norm vloer}} =$	21,0	[mm]
					$U_{\text{bij norm vl.wand}} =$	14,0	[mm]
	UC vloer =	0,67			$I_{\text{benodigd}} =$	210901331	[mm ⁴]
	(UC vl.wand =	1,01			$I_{\text{benodigd}} =$	316351996,5	[mm ⁴]

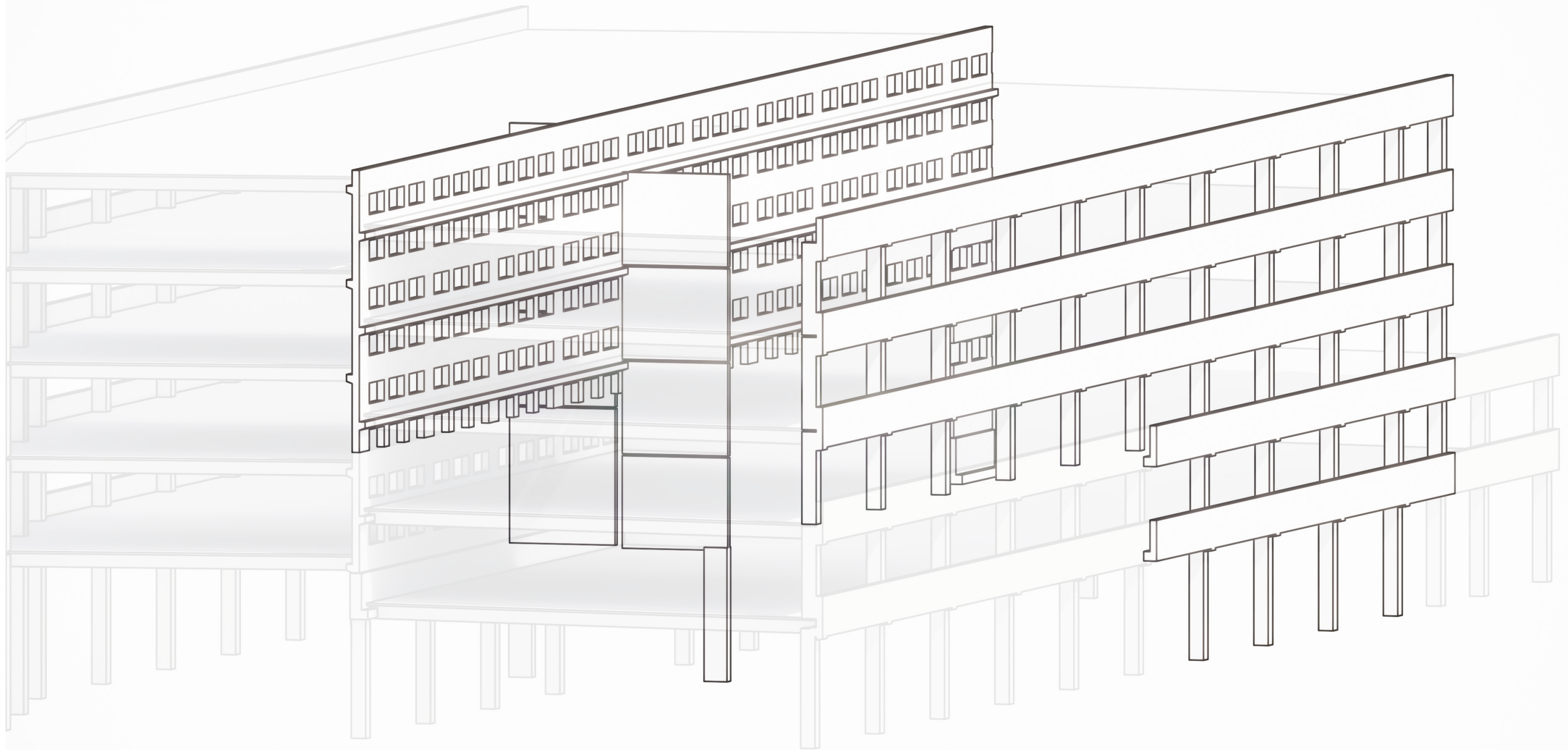
HEM 260 Beam



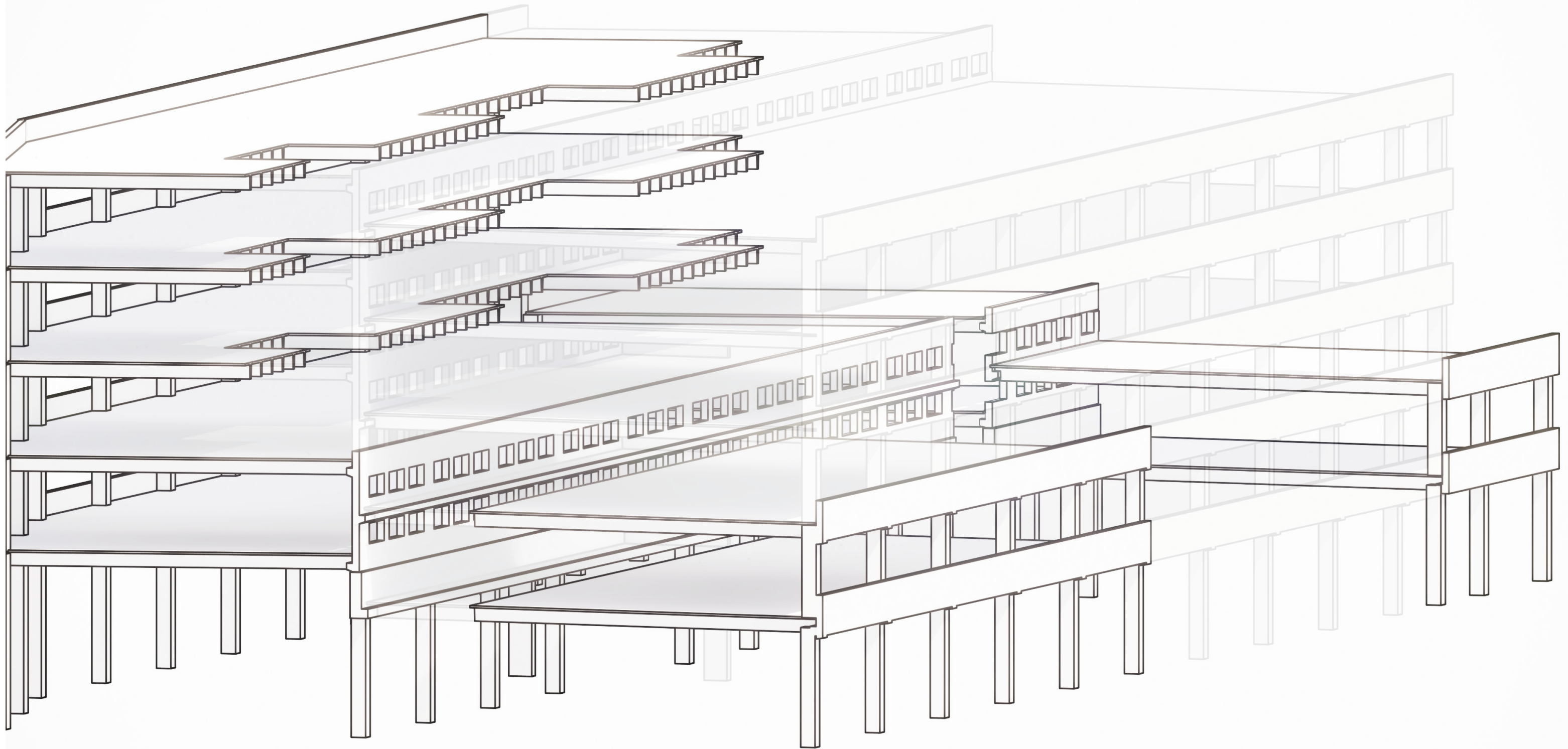




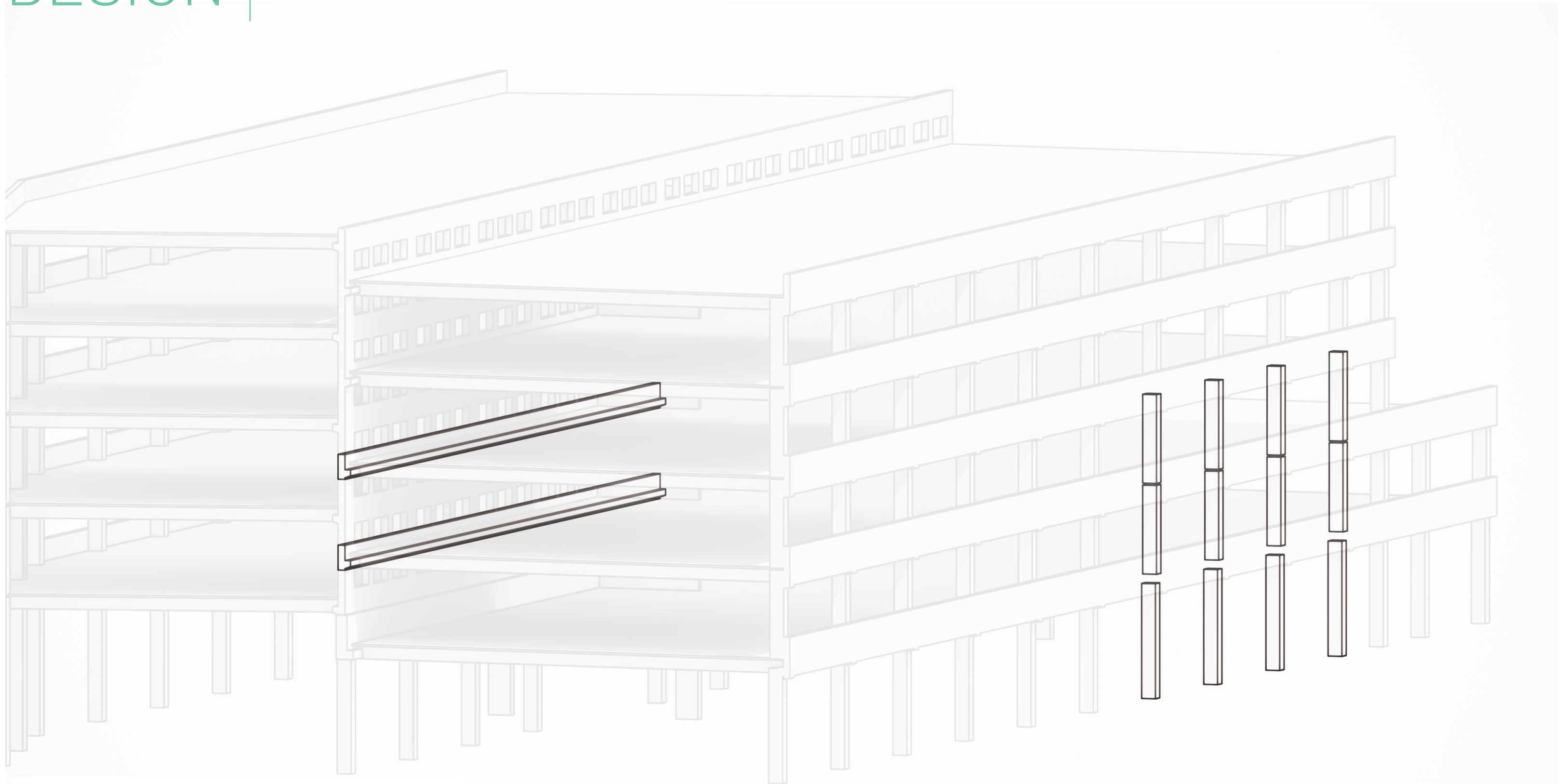
Remove: Concrete Floors
758 m³



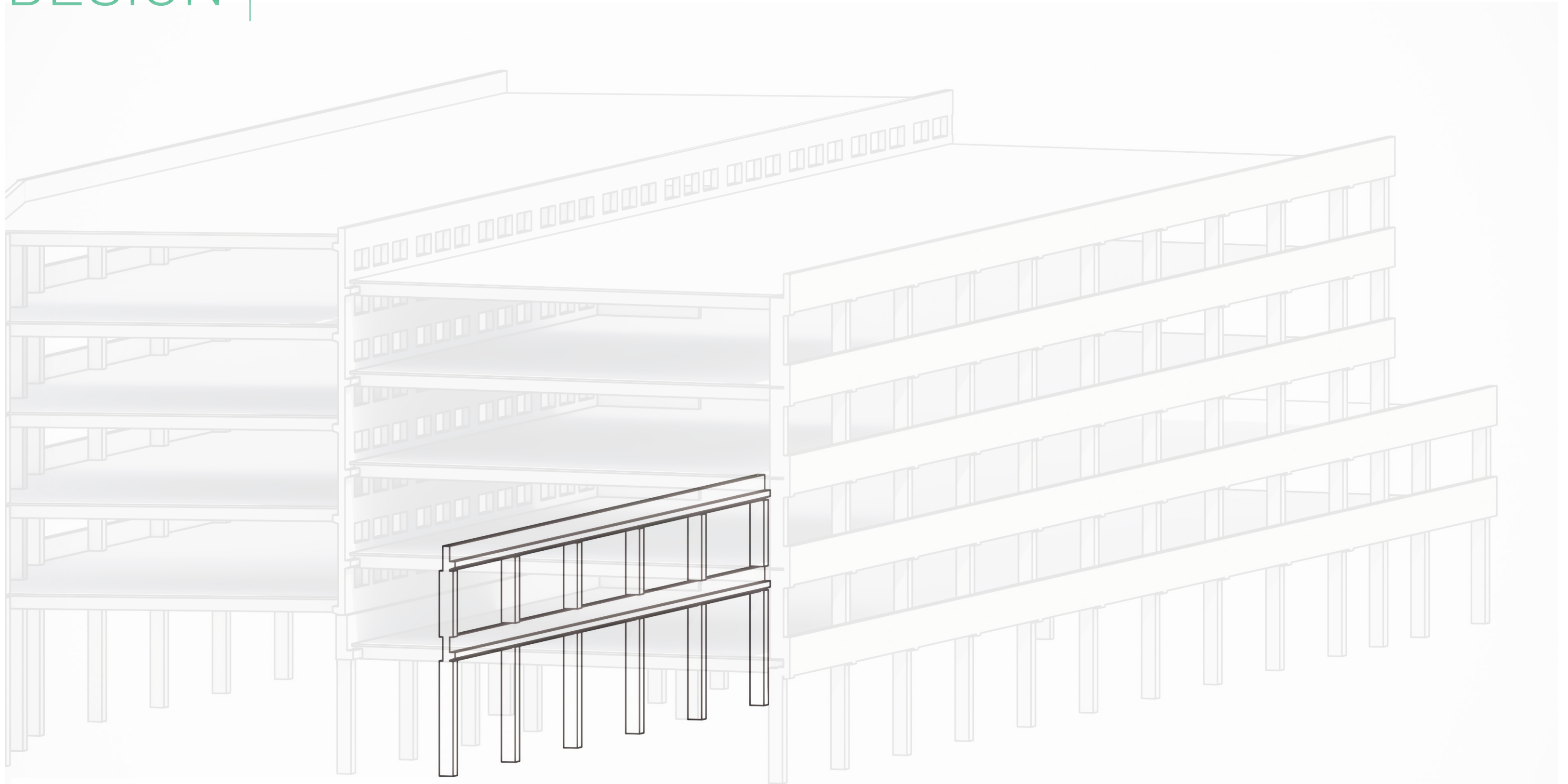
Remove: Concrete construction
305 m³ (Total 1063m³)



Keep : Construction & Floors
1134 m³



Reuse: Construction
30 m³



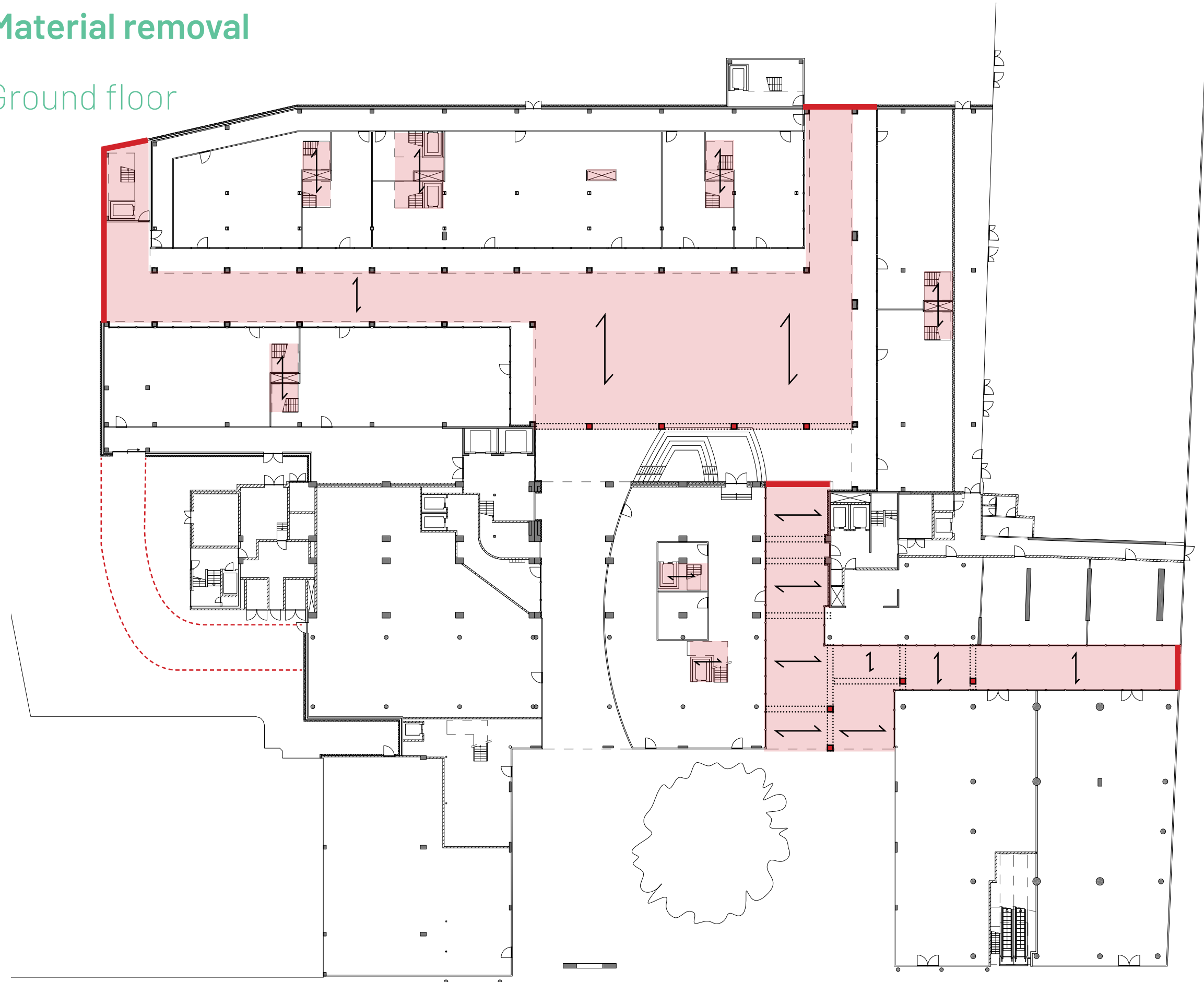
Reuse: Construction
30 m³

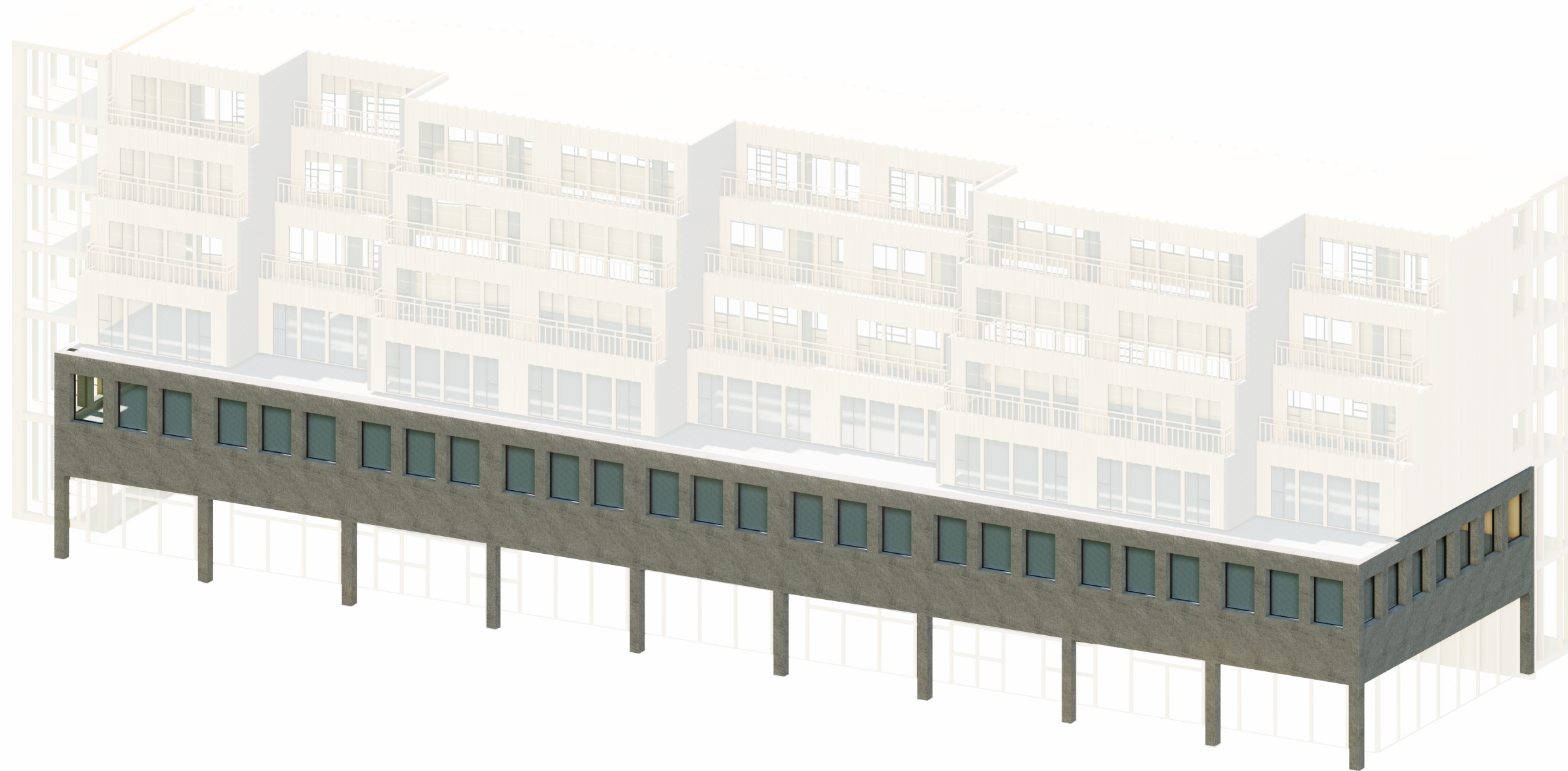
DESIGN



Material removal

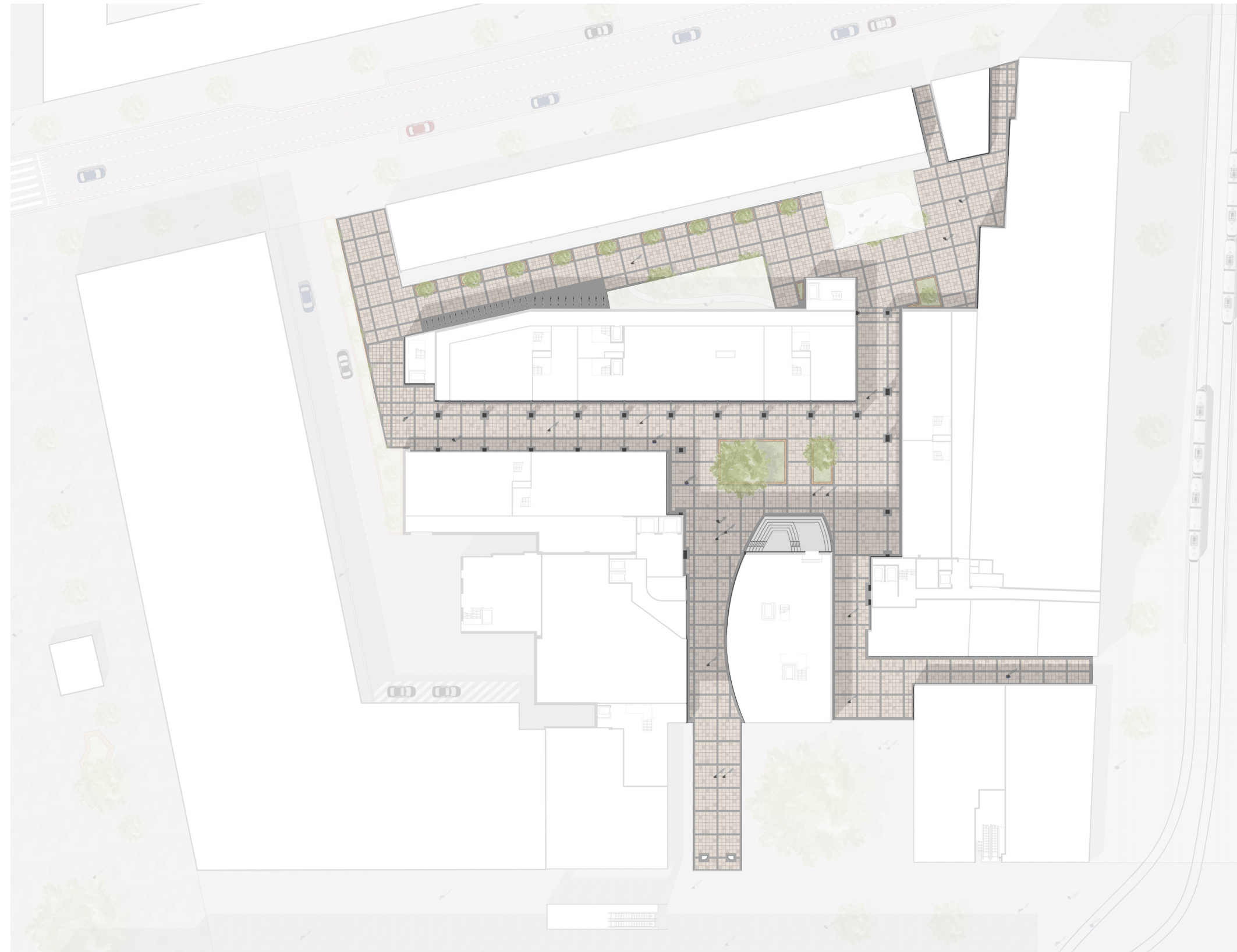
Ground floor





Reuse: Façades

$\sim 950\text{m}^2 * 0.01 = 10 \text{ m}^3$



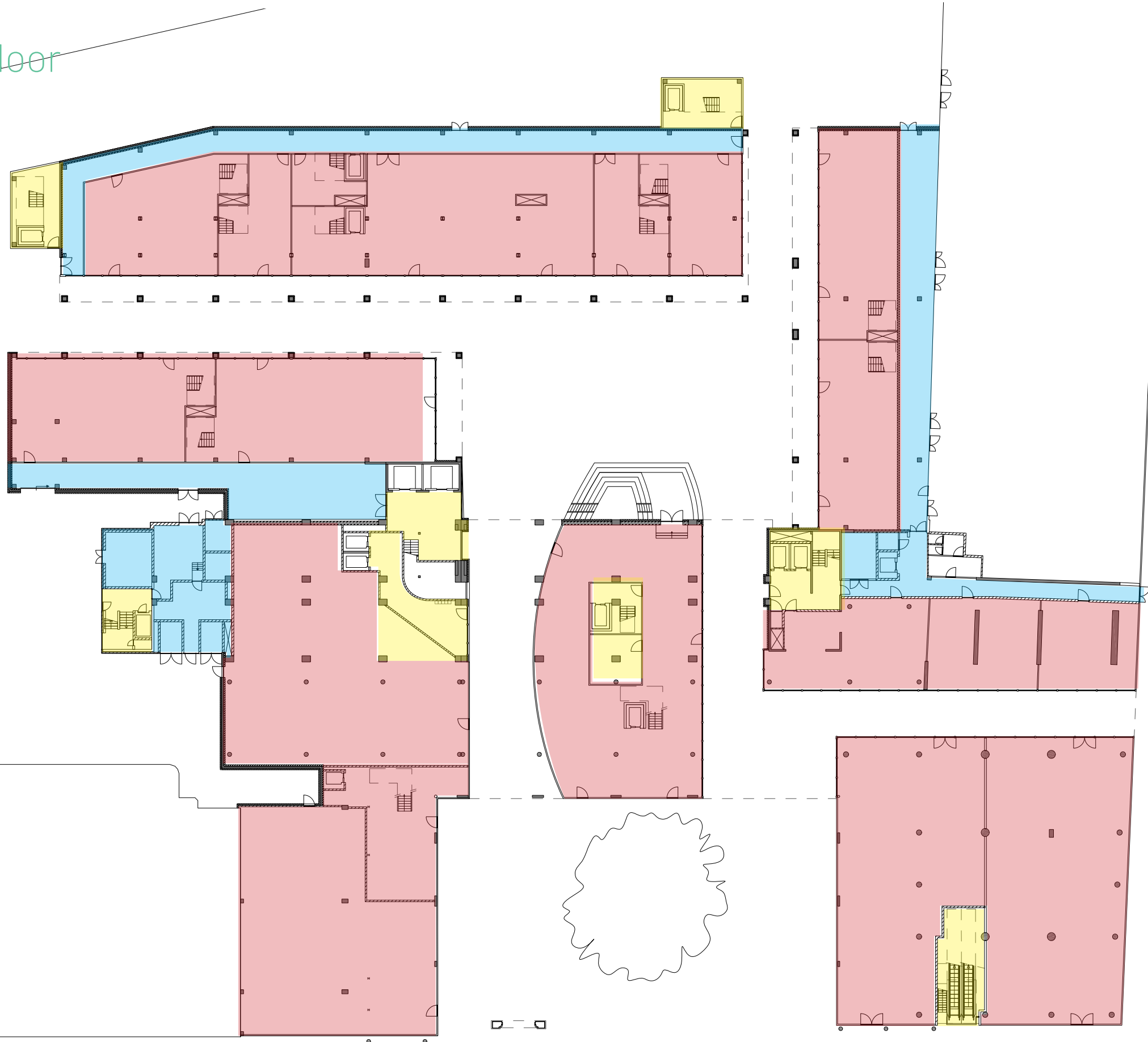
Reuse: Street tiling
 $\sim 4000\text{m}^2 * 0,01 = 40\text{m}^3$





DESIGN



Temperature demands

Ground floor



-  Shopping area: constant heating/cooling
-  Storage/logistics: no heating
-  Circulation spaces: no heating (residual heat)
-  Space for personnel/storage: Less heating





DESIGN



Temperature demands

First floor







-  Shopping area: constant heating/cooling
-  Storage/logistics: no heating
-  Circulation spaces: no heating (residual heat)
-  Space for personnel/storage: Less heating

DESIGN

Temperature demands

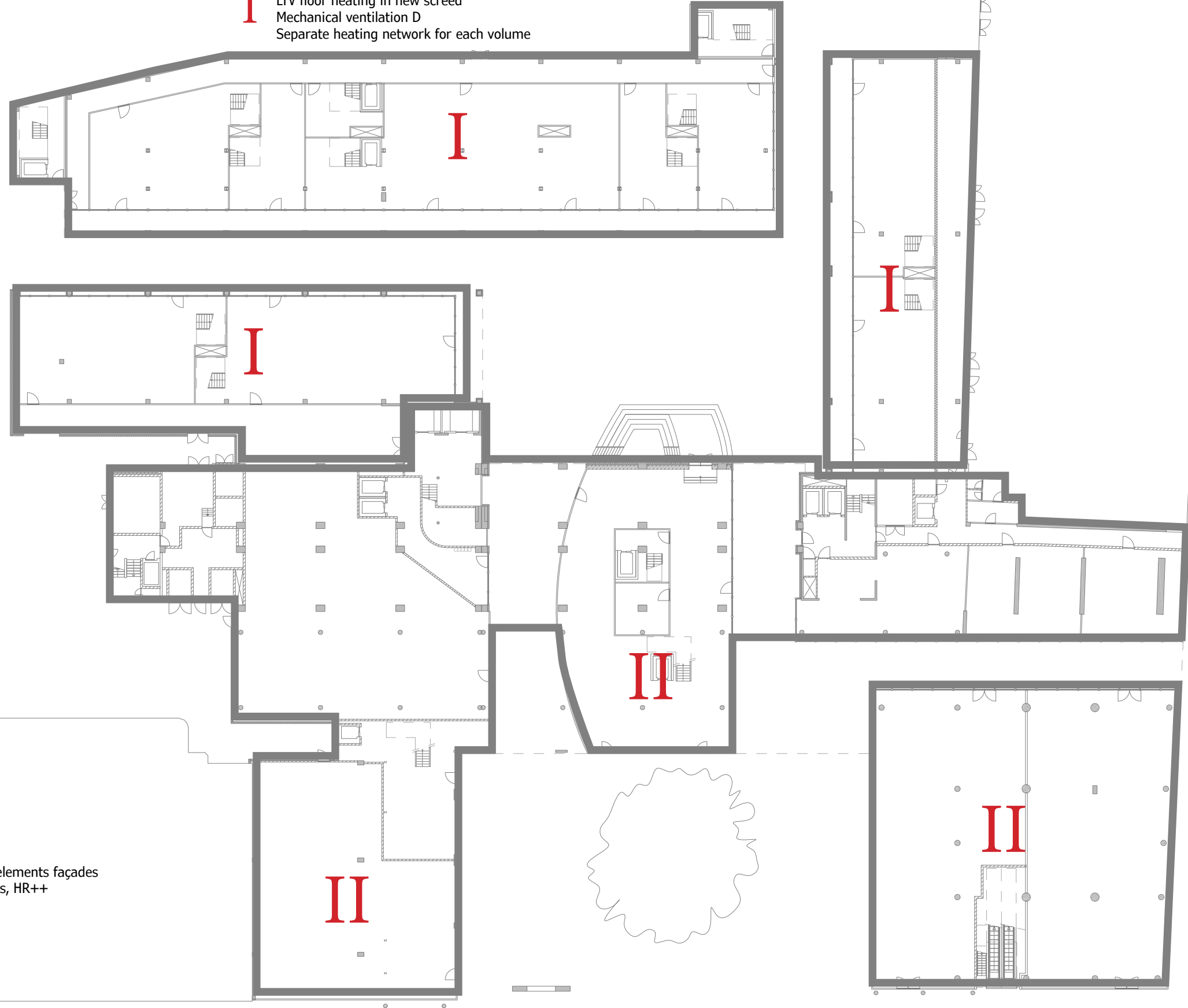


-  Shopping area / housing: constant heating/cooling
-  Storage/logistics: no heating
-  Circulation spaces: no heating (residual heat?)
-  Space for personnel/storage: Less heating



Climate zones

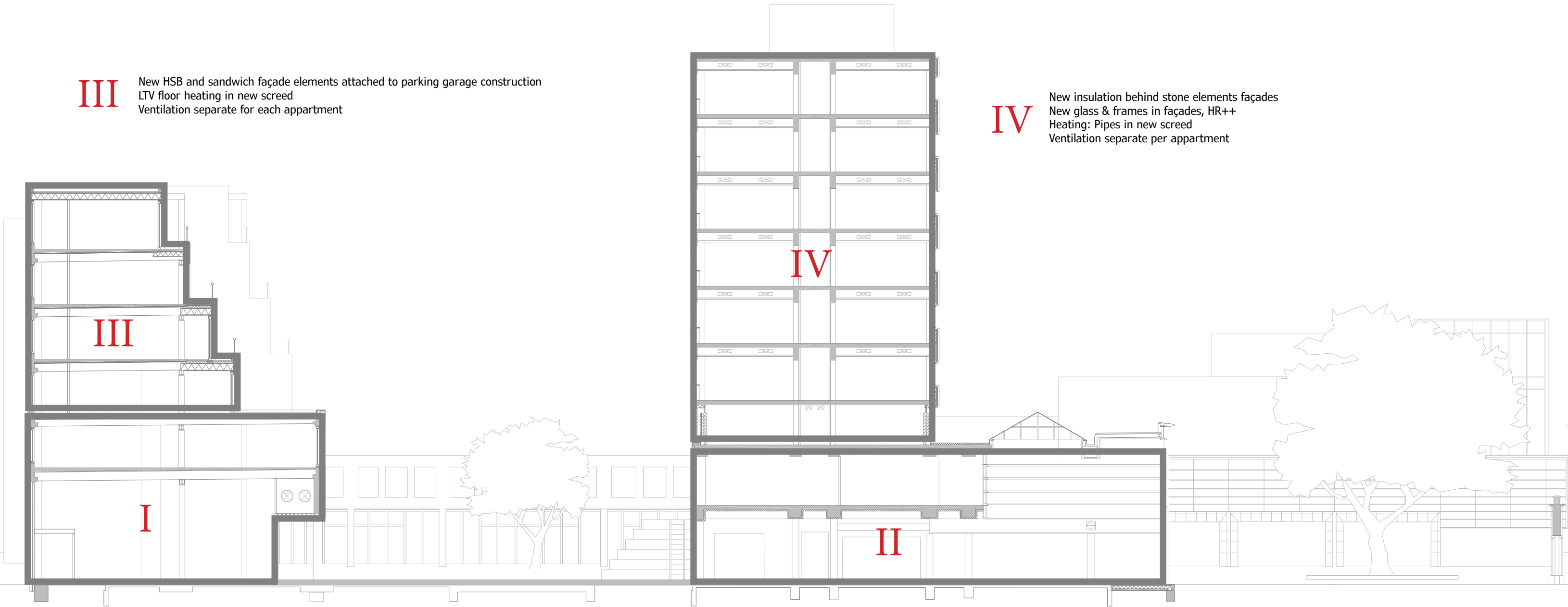
I New HSB façade elements attached to parking garage construction
LTV floor heating in new screed
Mechanical ventilation D
Separate heating network for each volume



II New insulation behind stone elements façades
New glass & frames in façades, HR++
Heating: Pipes in new screed
Mechanical ventilation D

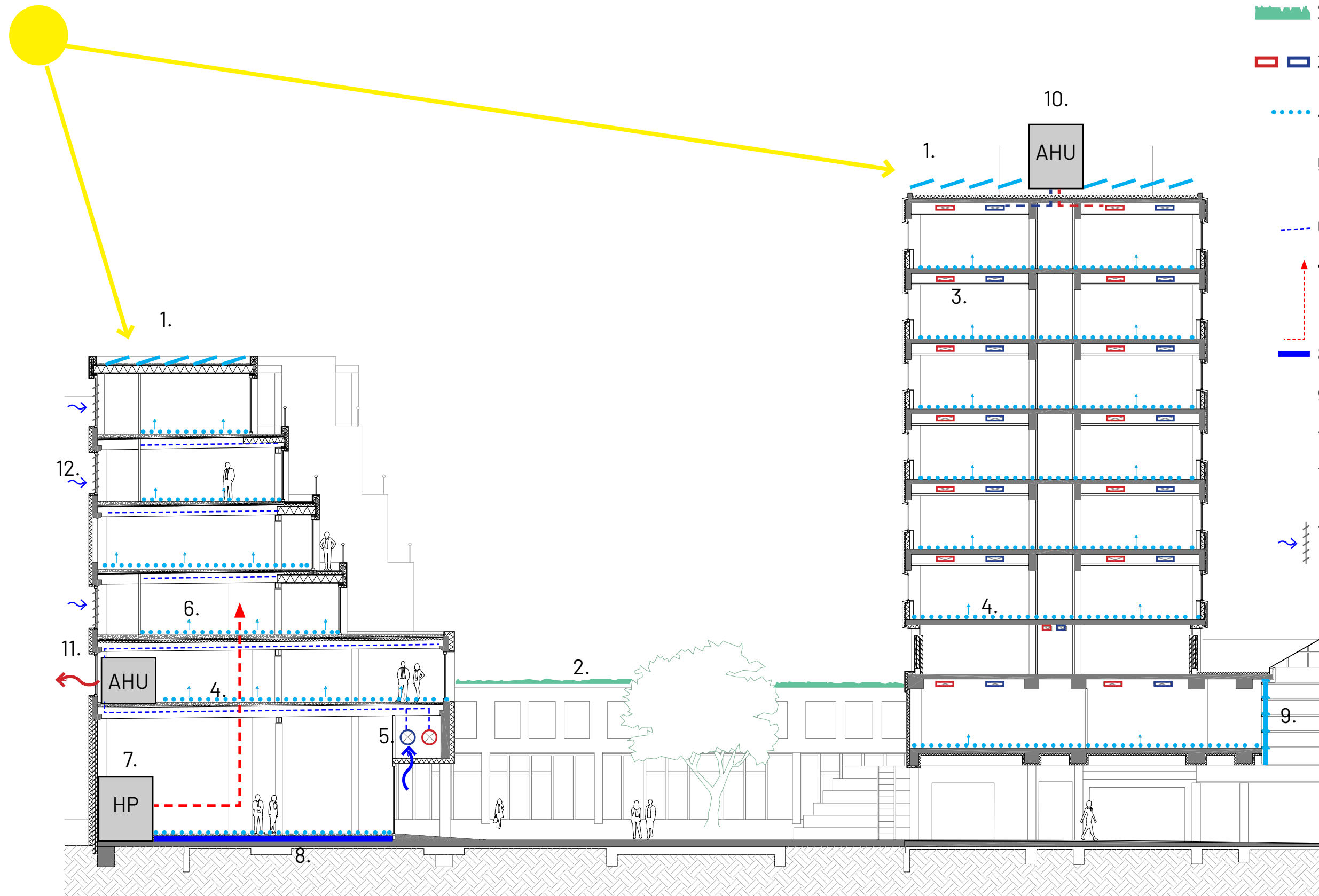
III New HSB and sandwich façade elements attached to parking garage construction
LTV floor heating in new screed
Ventilation separate for each apartment









IV New insulation behind stone elements façades
New glass & frames in façades, HR++
Heating: Pipes in new screed
Ventilation separate per apartment



DESIGN

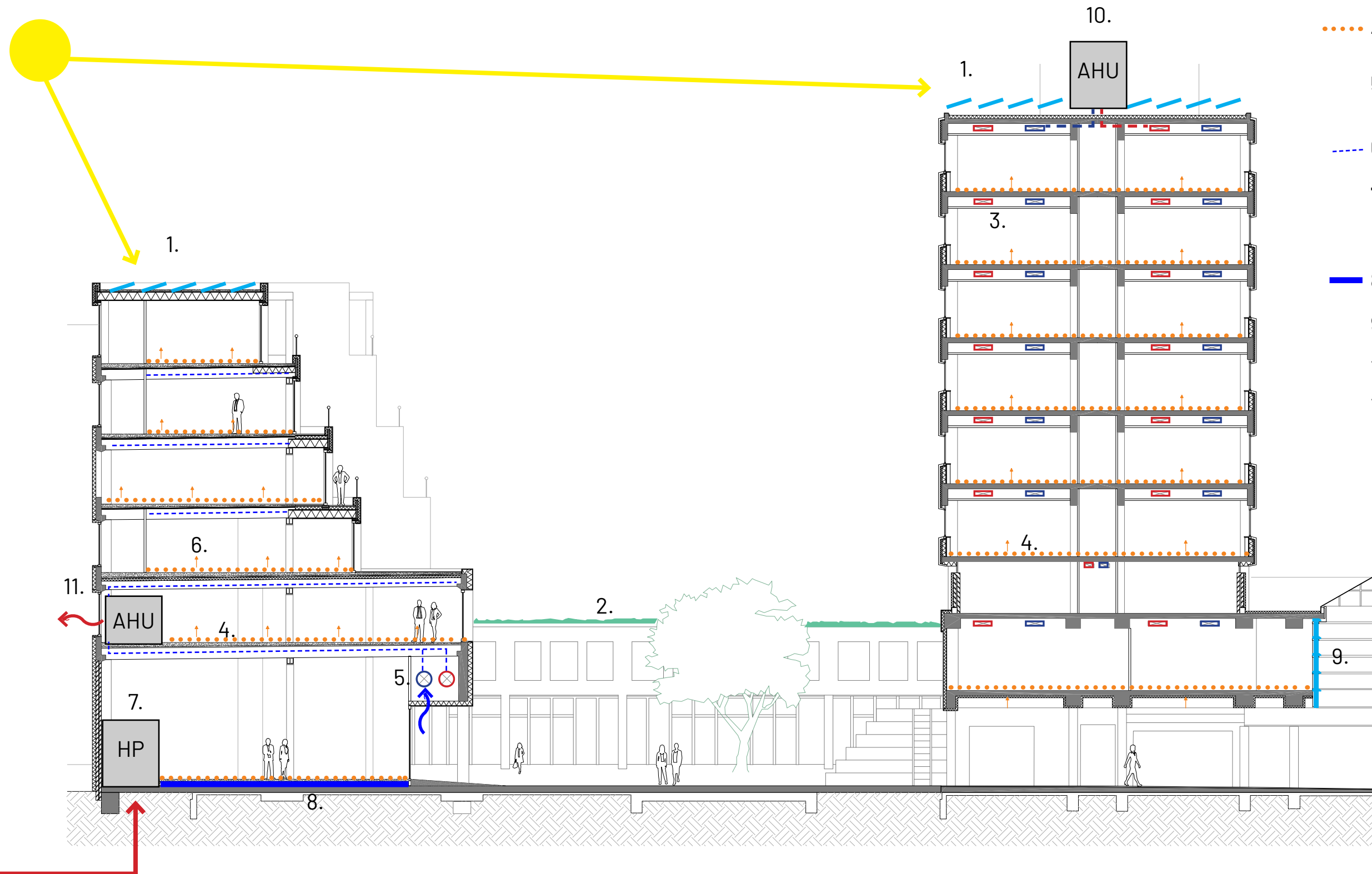
Climatization summer



-  1. PVT Panels on highest roofs: Electricity & housing warm water
-  2. Water retaining green roofs on two lower building volumes
-  3. Lowered ceiling with installation shafts
-  4. Floor cooling
- 5. Installations above arcade, ventilation input
-  6. Installations between TT-floor ribs
-  7. Cooling powered by pvt panels on the roof. Residual heat of installations to warm water housing via shafts
-  8. Piping in ground floor insulation
- 9. Improved HR++ glazing in façade
- 10. AHU with heat recovery for tower
- 11. AHU with heat recovery for retail, ventilation output
-  12. Automatically opened window at southern oriented gallery

DESIGN

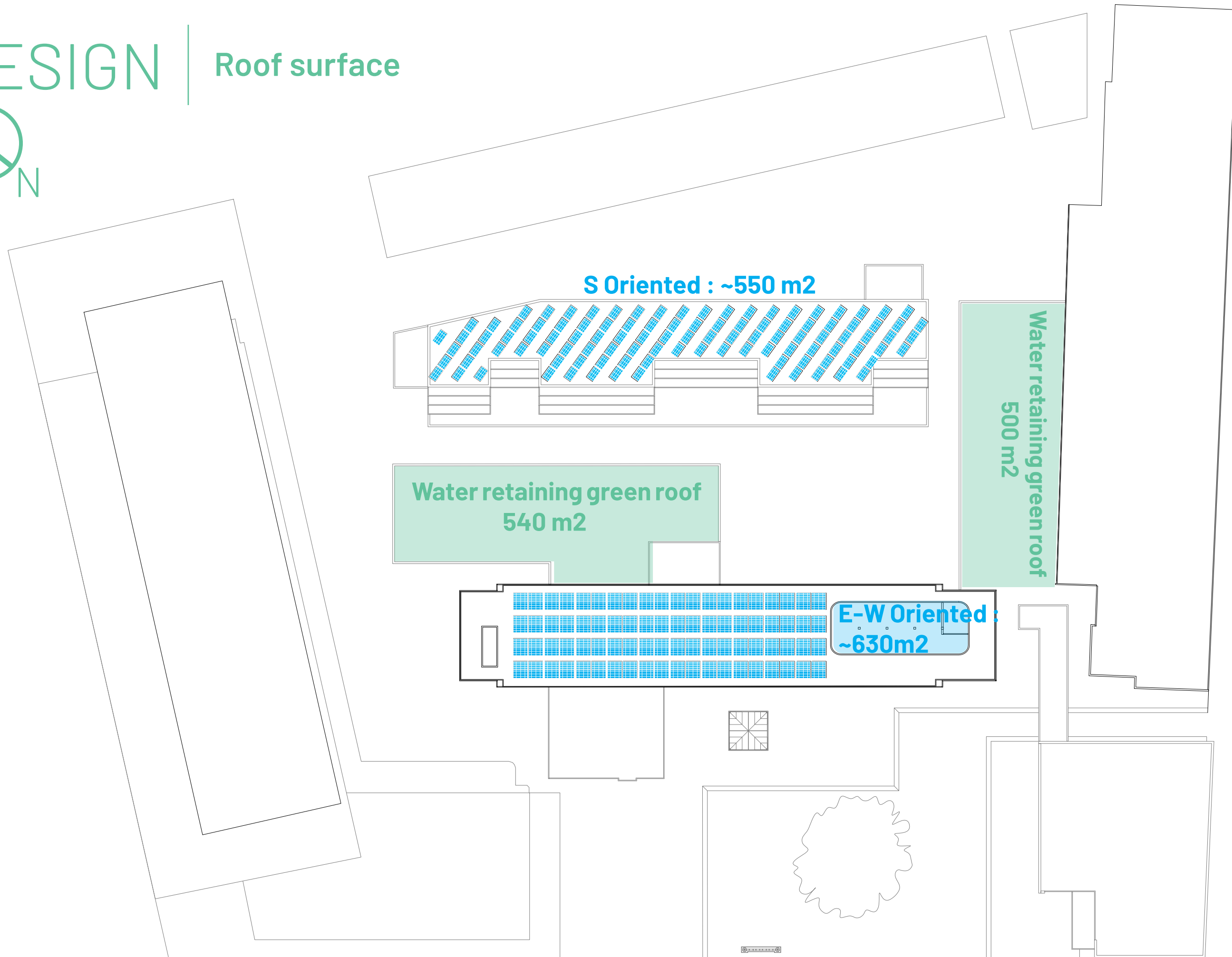
Climatization winter

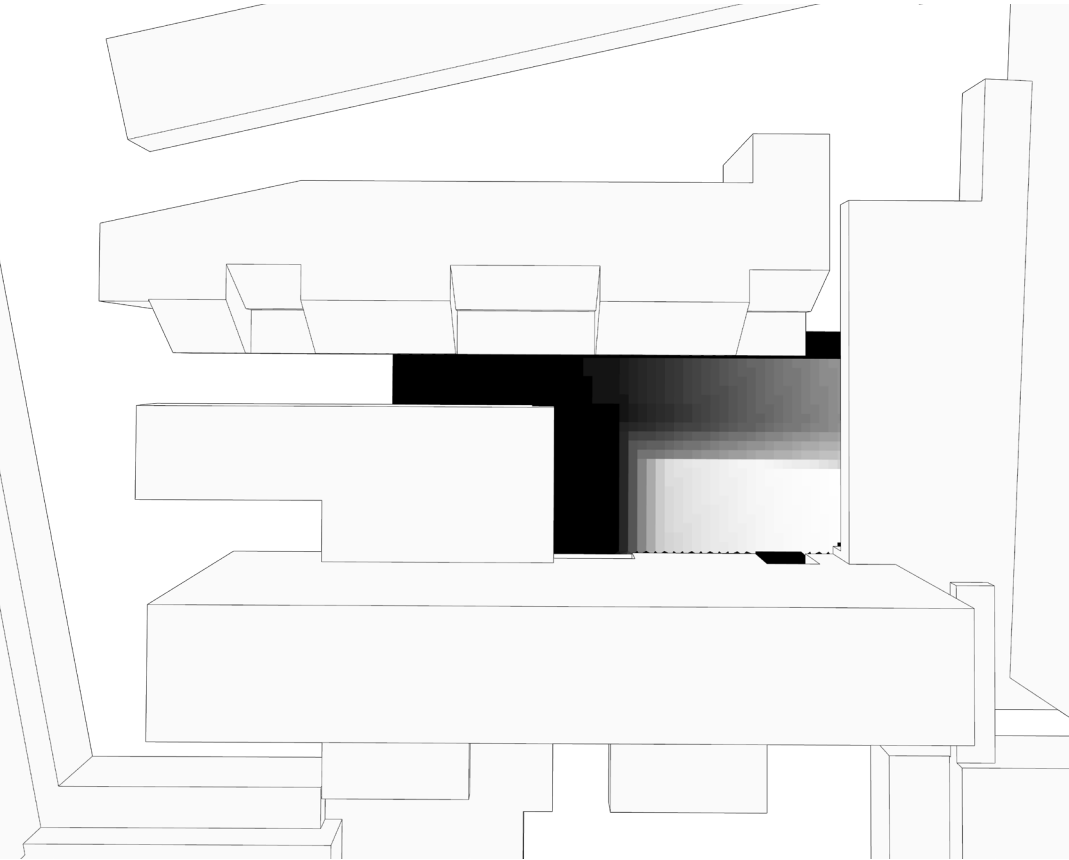


- 1. PVT Panels on highest roofs: Electricity & housing warm water
- 2. Water retaining green roofs on two lower building volumes
- □ 3. Lowered ceiling with installation shafts
- 4. Floor heating
- 5. Installations above arcade, ventilation input
- - - 6. Installations between TT-floor ribs
- 7. Heating via heat pump connected to city heating network (MT/HT)
- 8. Piping in ground floor insulation
- 9. Improved HR++ glazing in façade
- 10. AHU with heat recovery for tower
- 11. AHU with heat recovery for retail, ventilation output

DESIGN

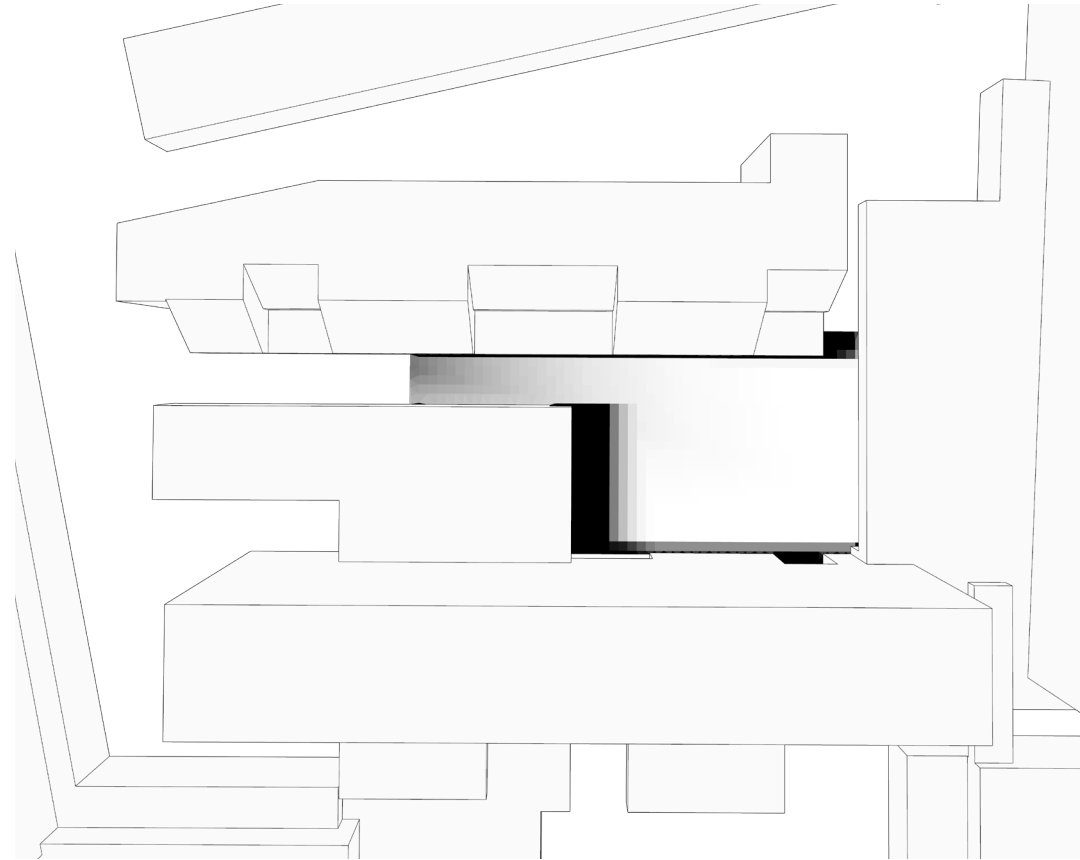
Roof surface





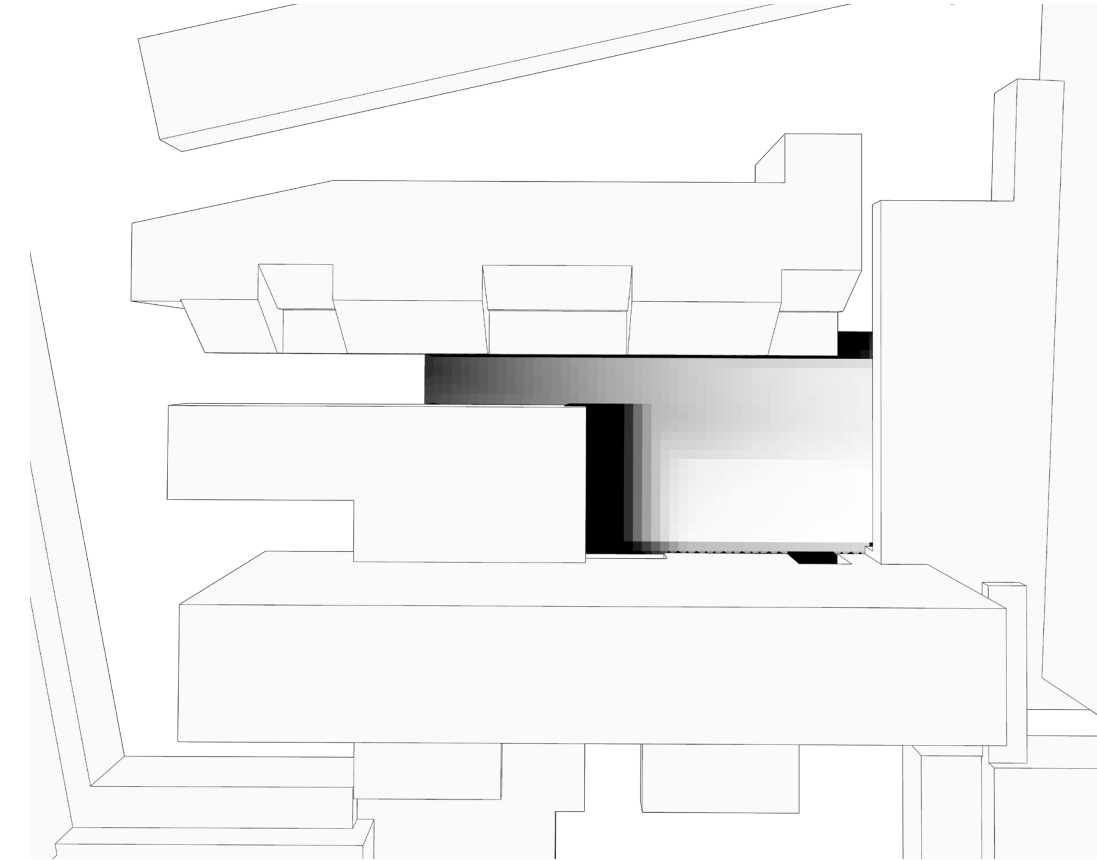
January - March

6444 hours



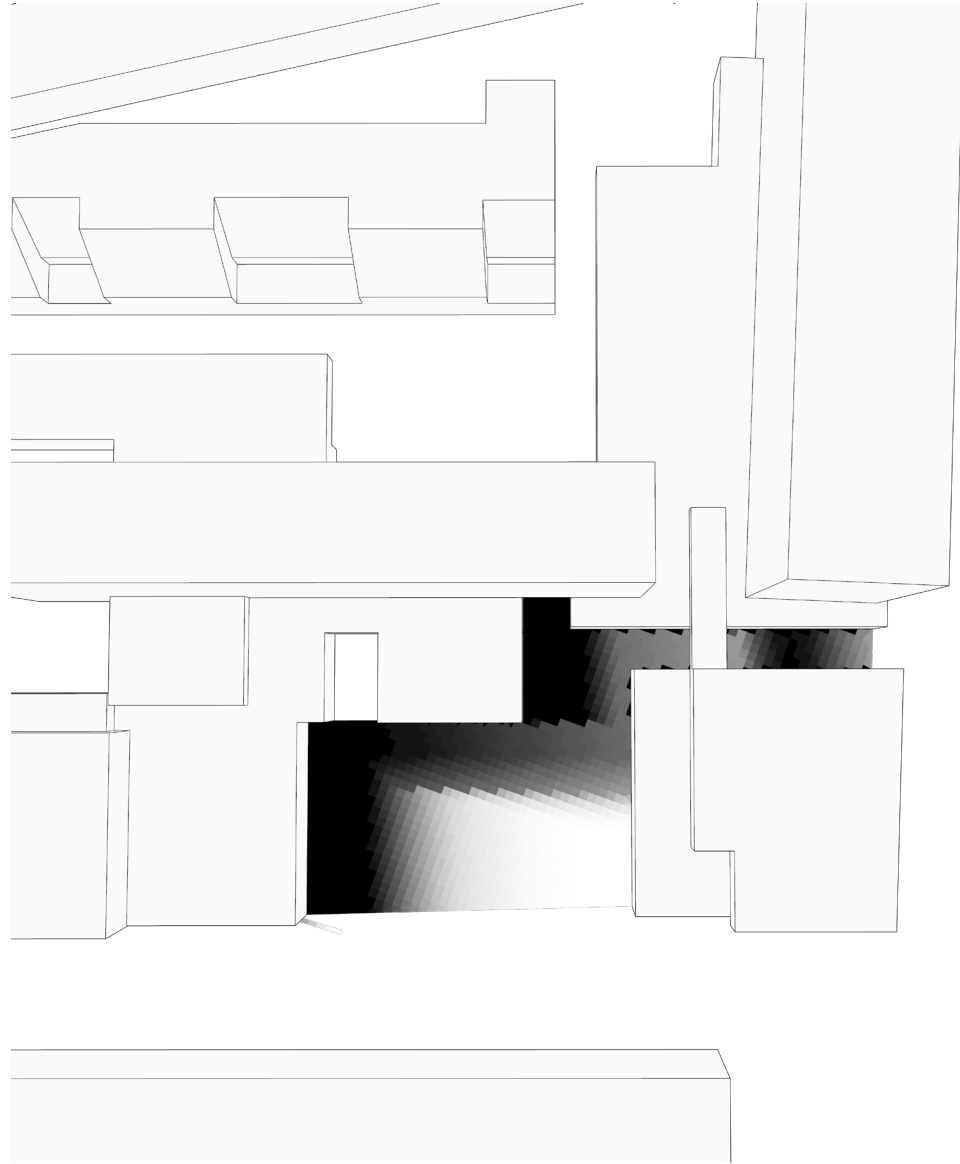
June - August

83616 hours



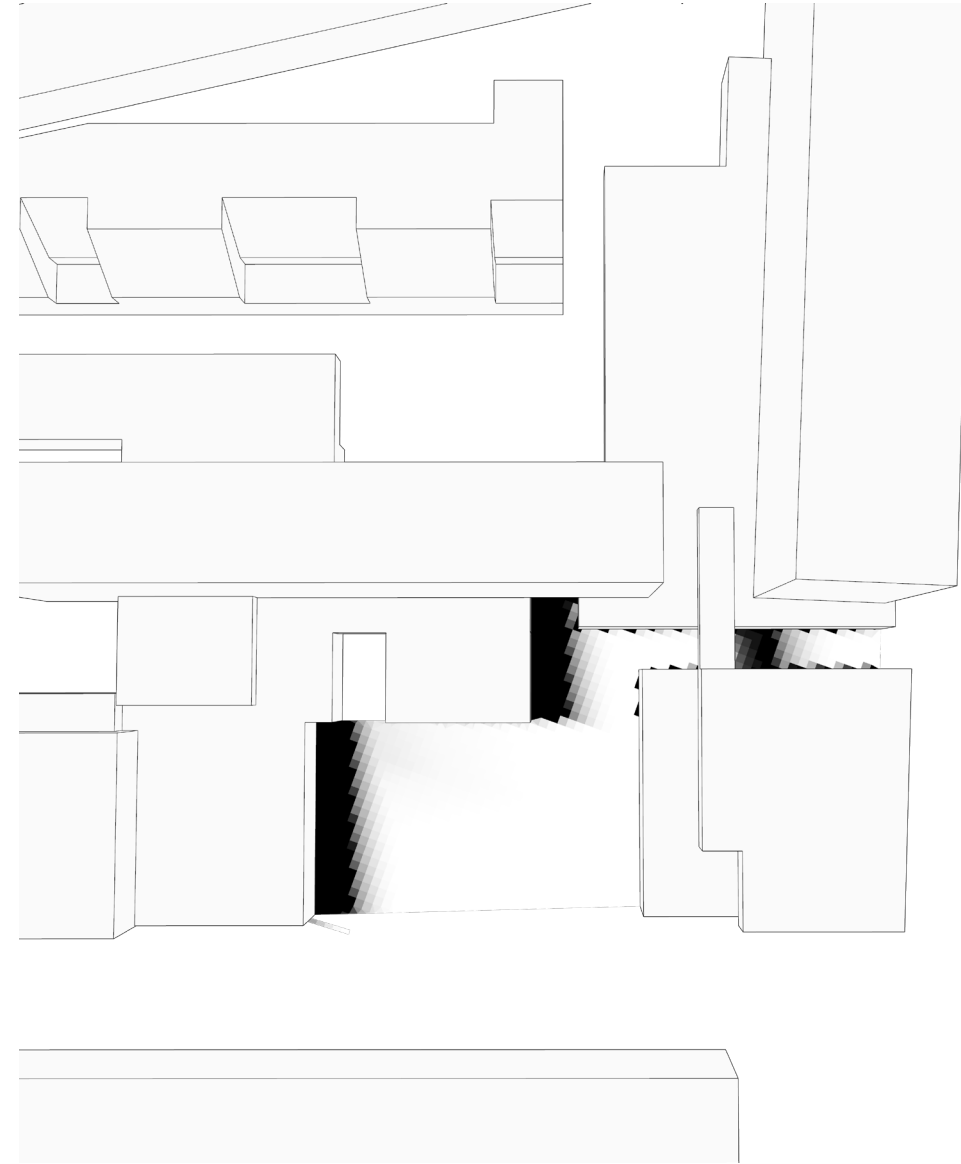
All year

130000



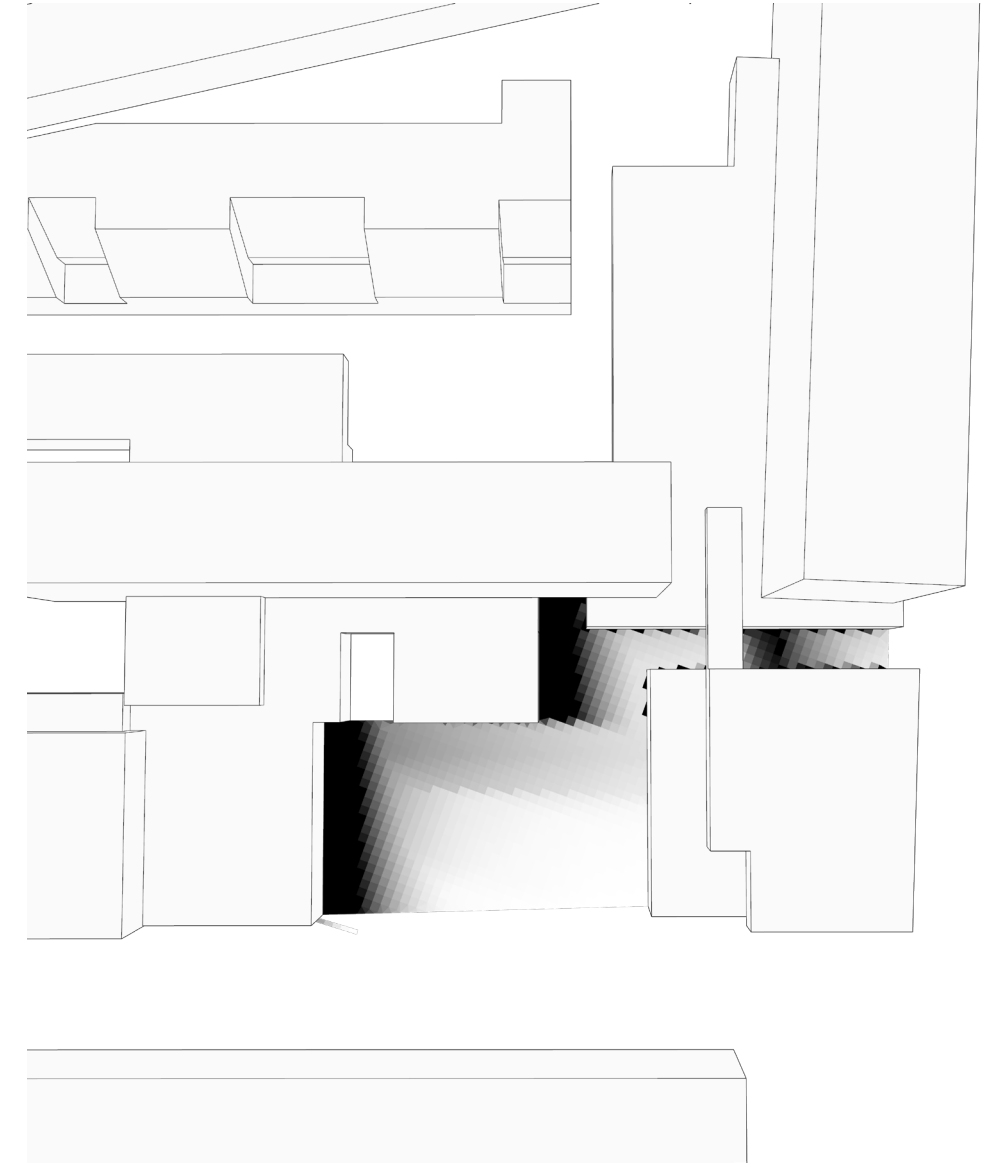
January - March

48700 hours



June - August

121215 hours

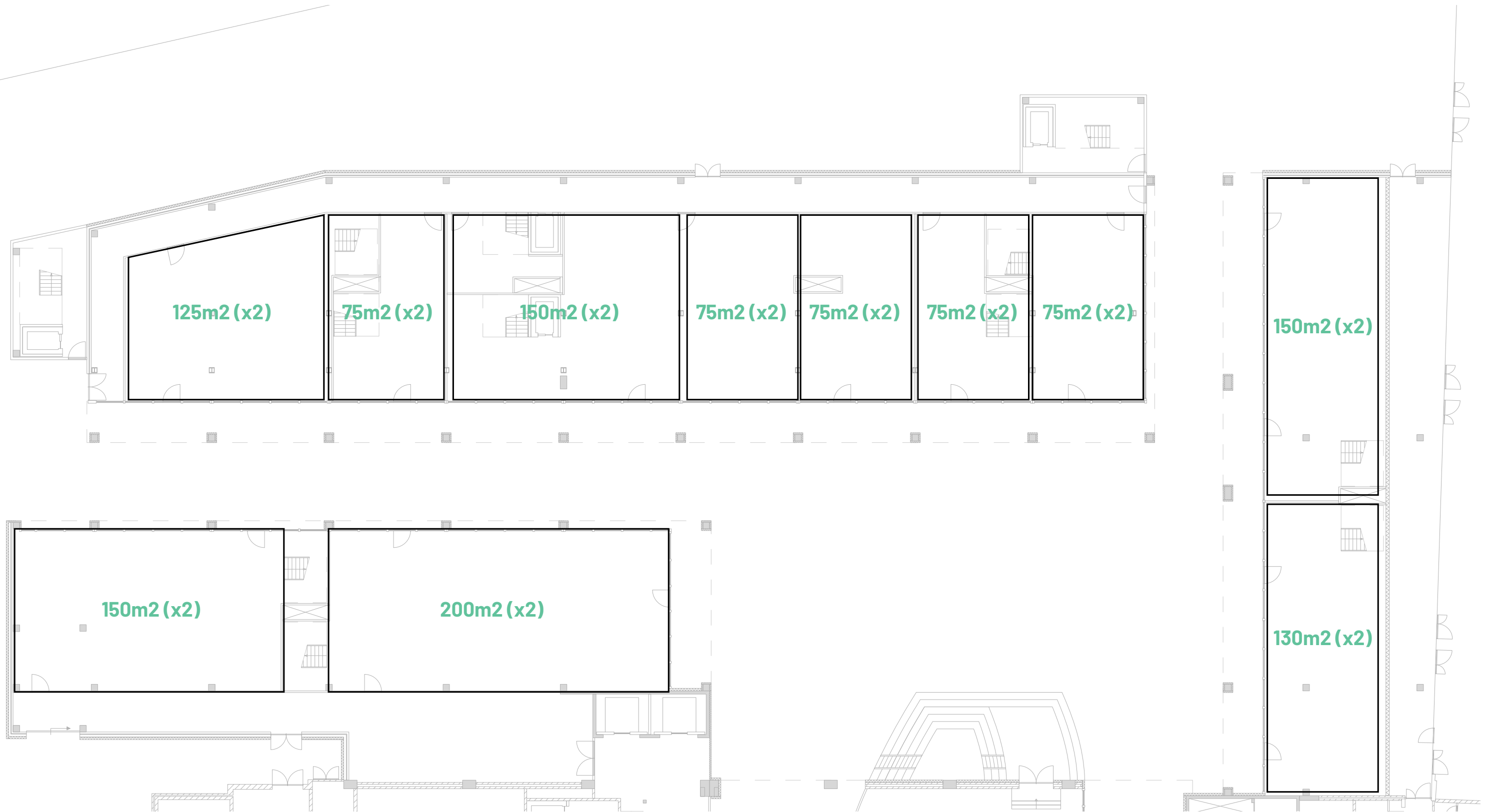


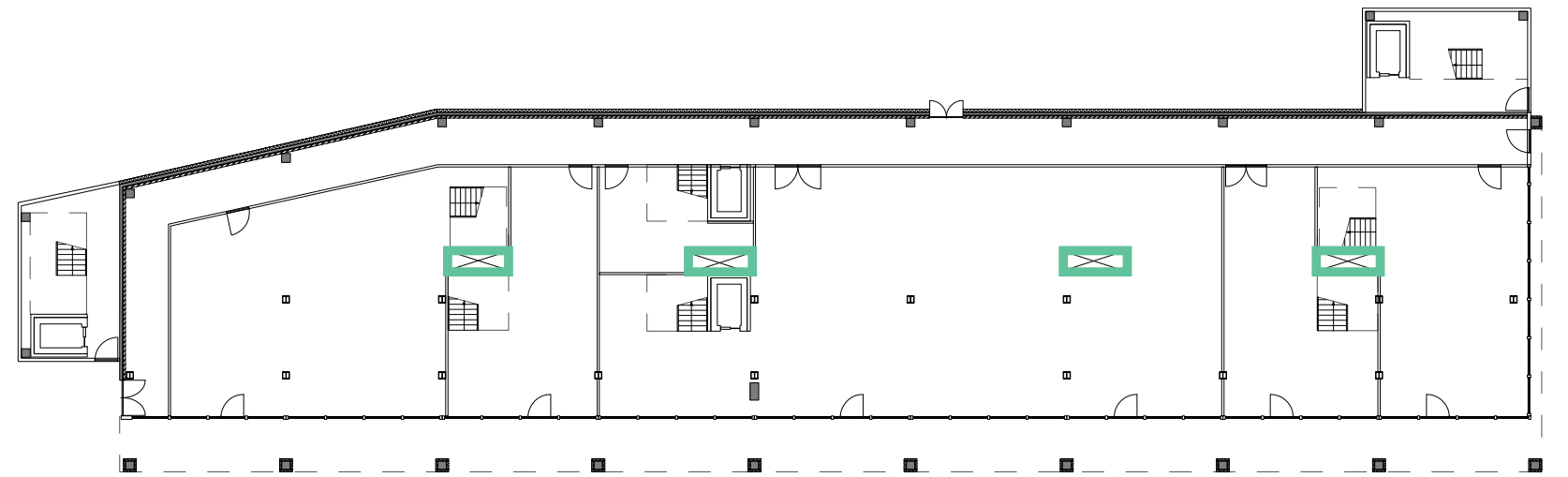
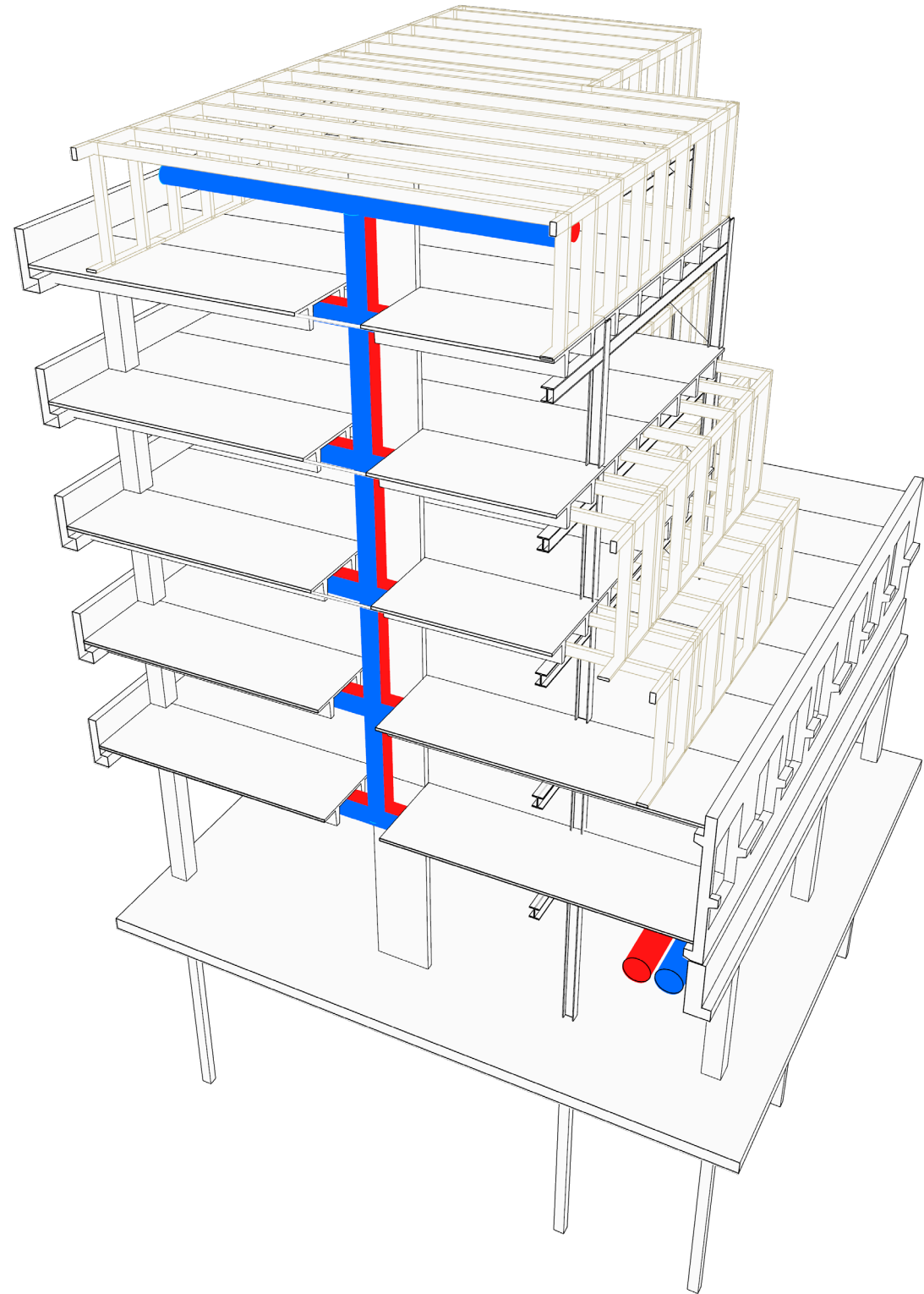
All year

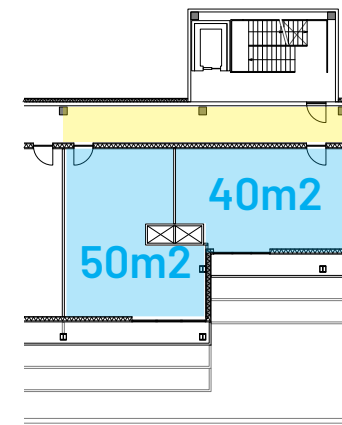
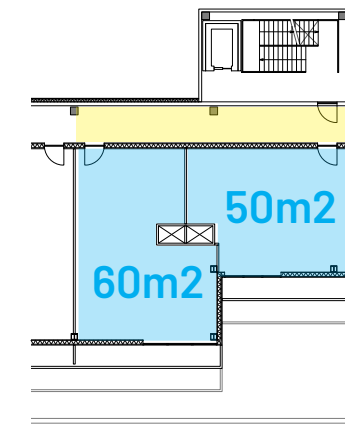
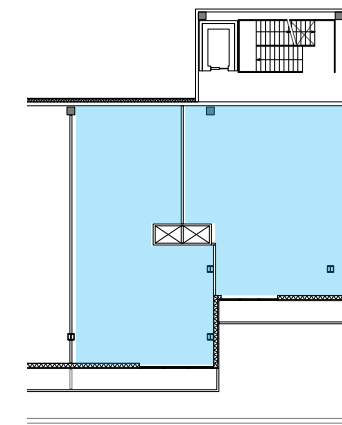
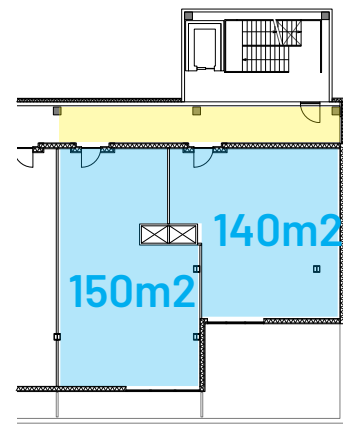
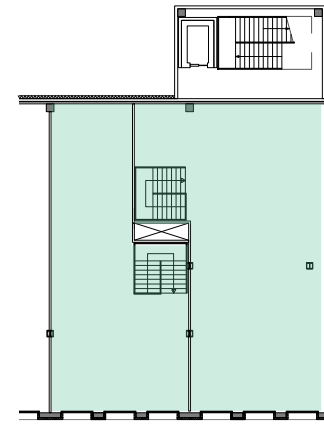
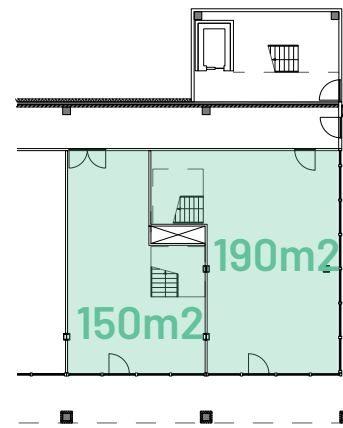
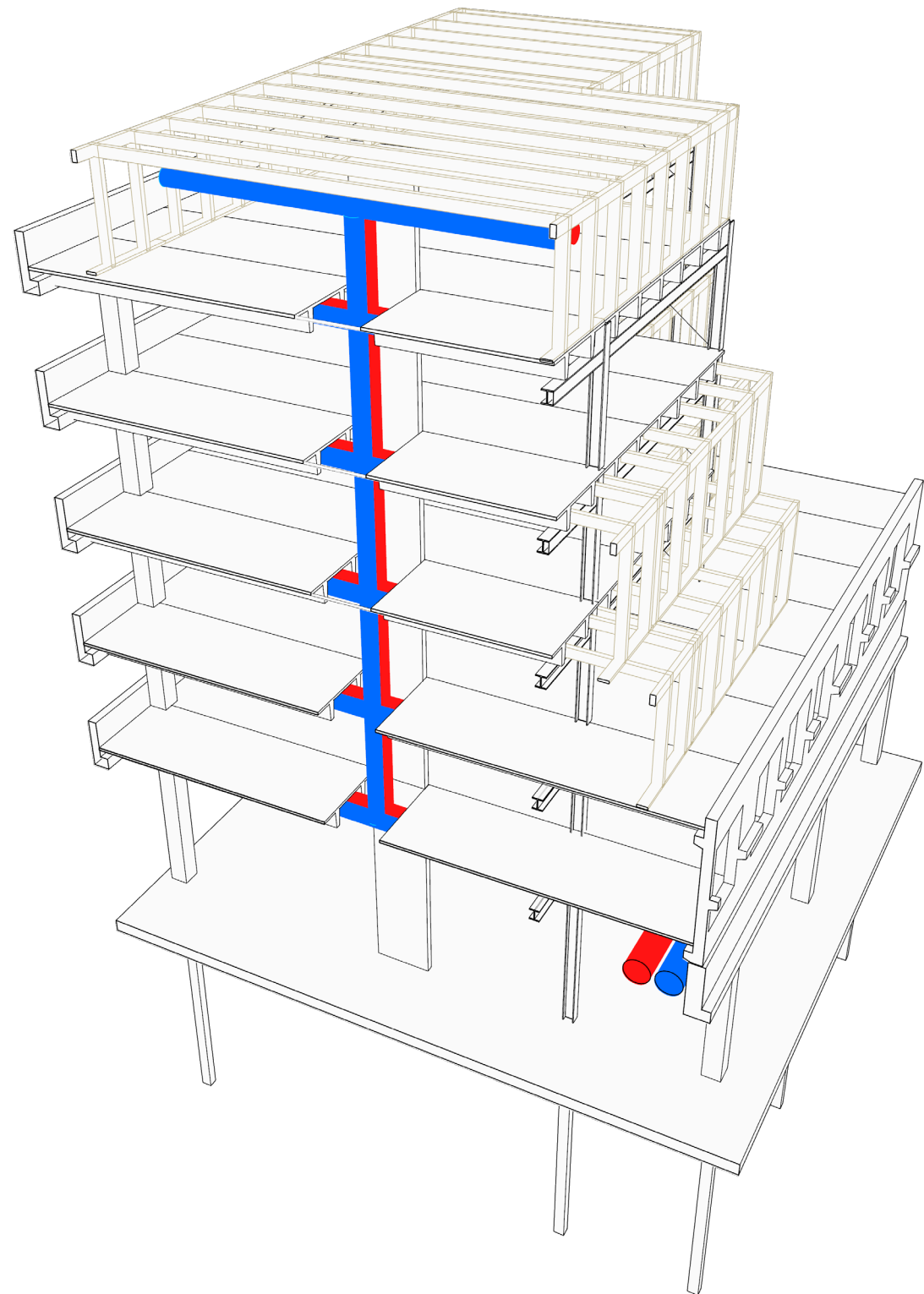
205771 hours

DESIGN

Store climatization







Ventilation demands:
 3,6 m³/hour/m² for housing, 15 m³/hour/m² for hospitality (for peak calculation)

2x retail store 150m² and 190m²

2x maisonette 150m² and 140m²

4x studio 60m², 50m², 50m², 40m²

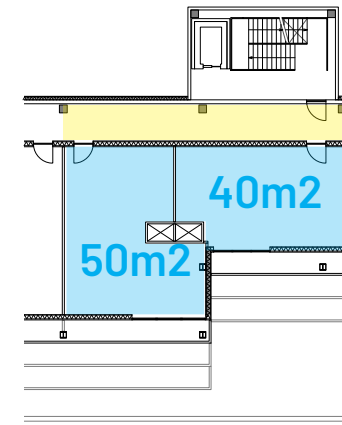
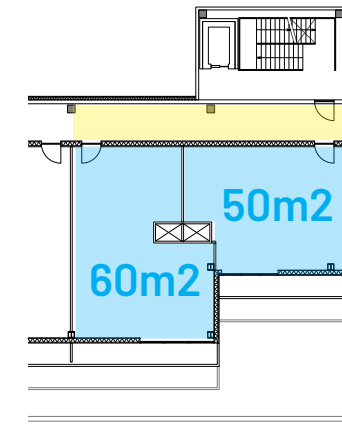
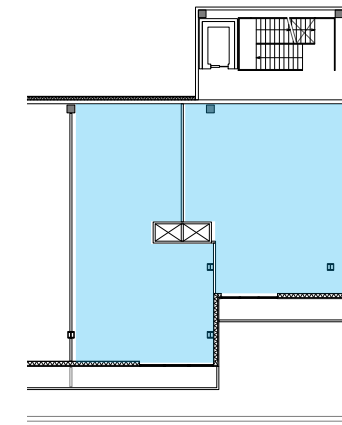
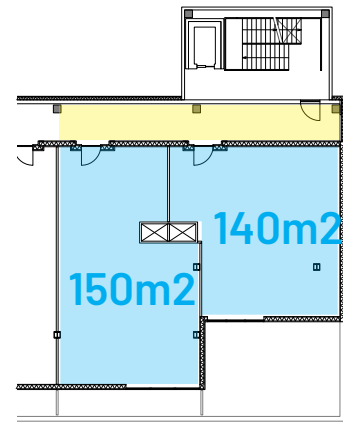
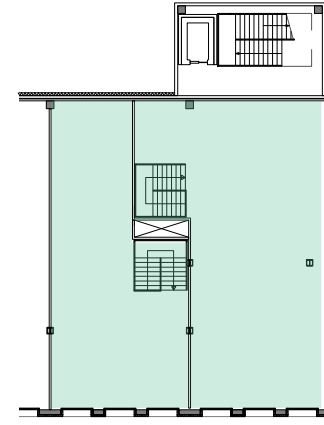
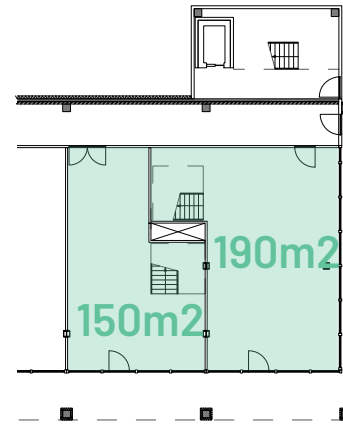
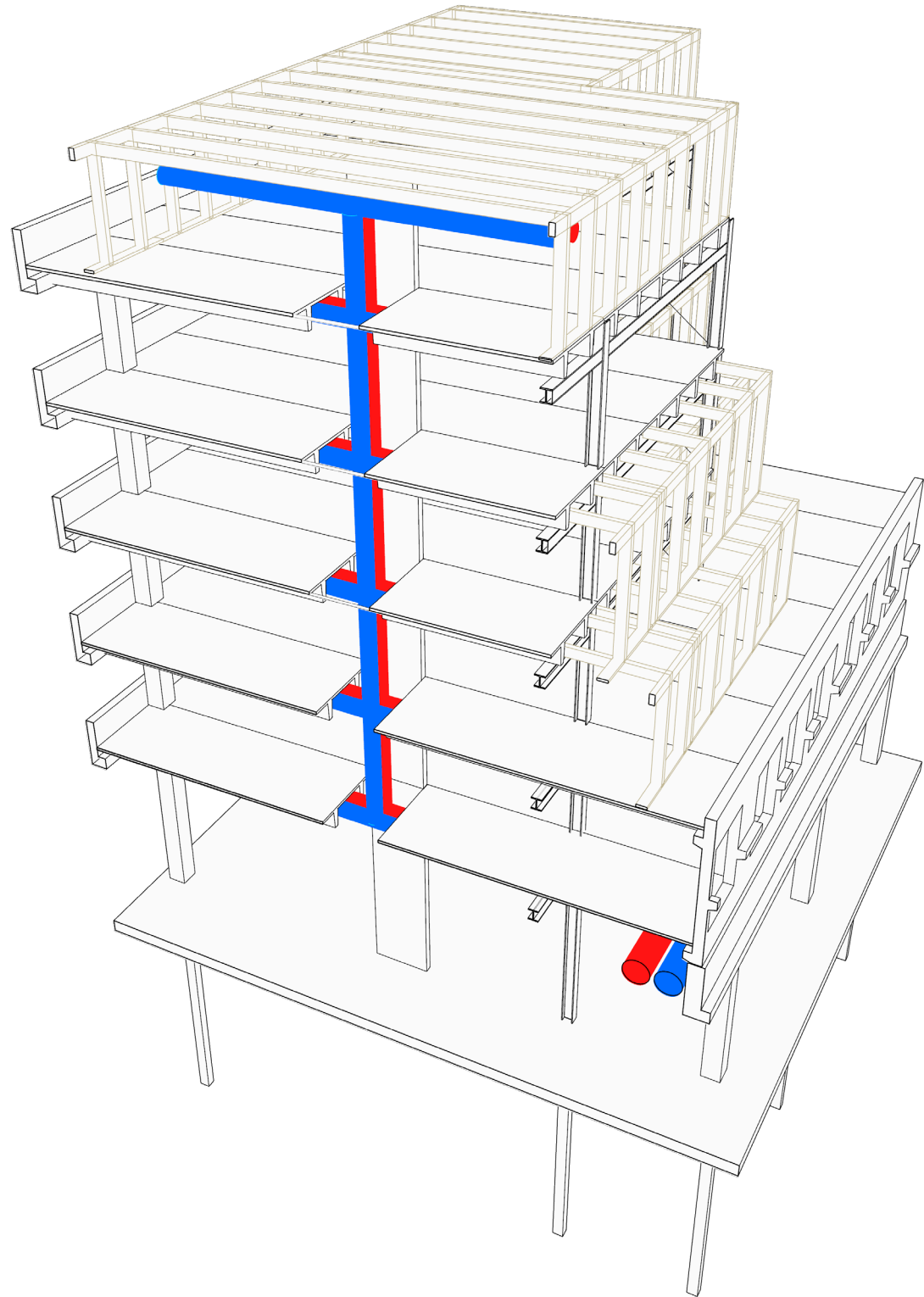
Flow rate = $3,6 \cdot 490 + 15 \cdot 340 = 6864 \text{ m}^3/\text{hour} = 1,9 \text{ m}^3/\text{s}$

Air speed in shaft = 5m/s

Required surface area shaft = $1,9 / 5 = 0,38 \text{ m}^2$

Radius of 1 ventilation shaft = $\sqrt{(0,38 / \pi)} = 0,35 \text{ m}$

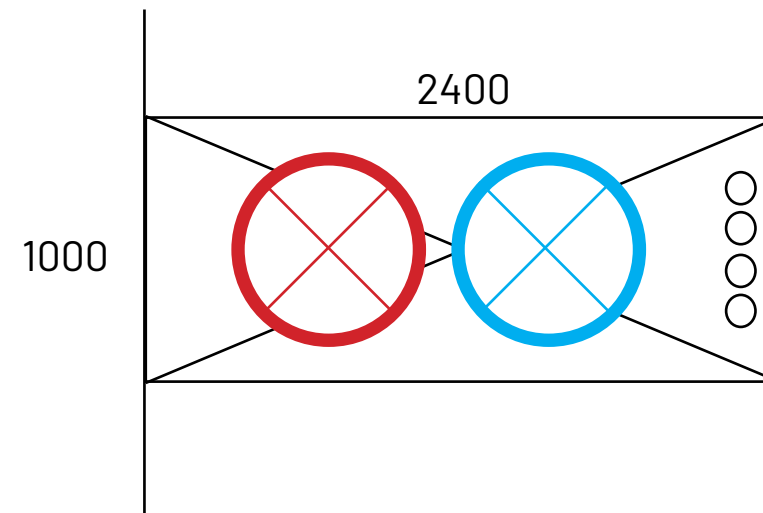
Diameter = 0,7 m



Diameter = 700mm

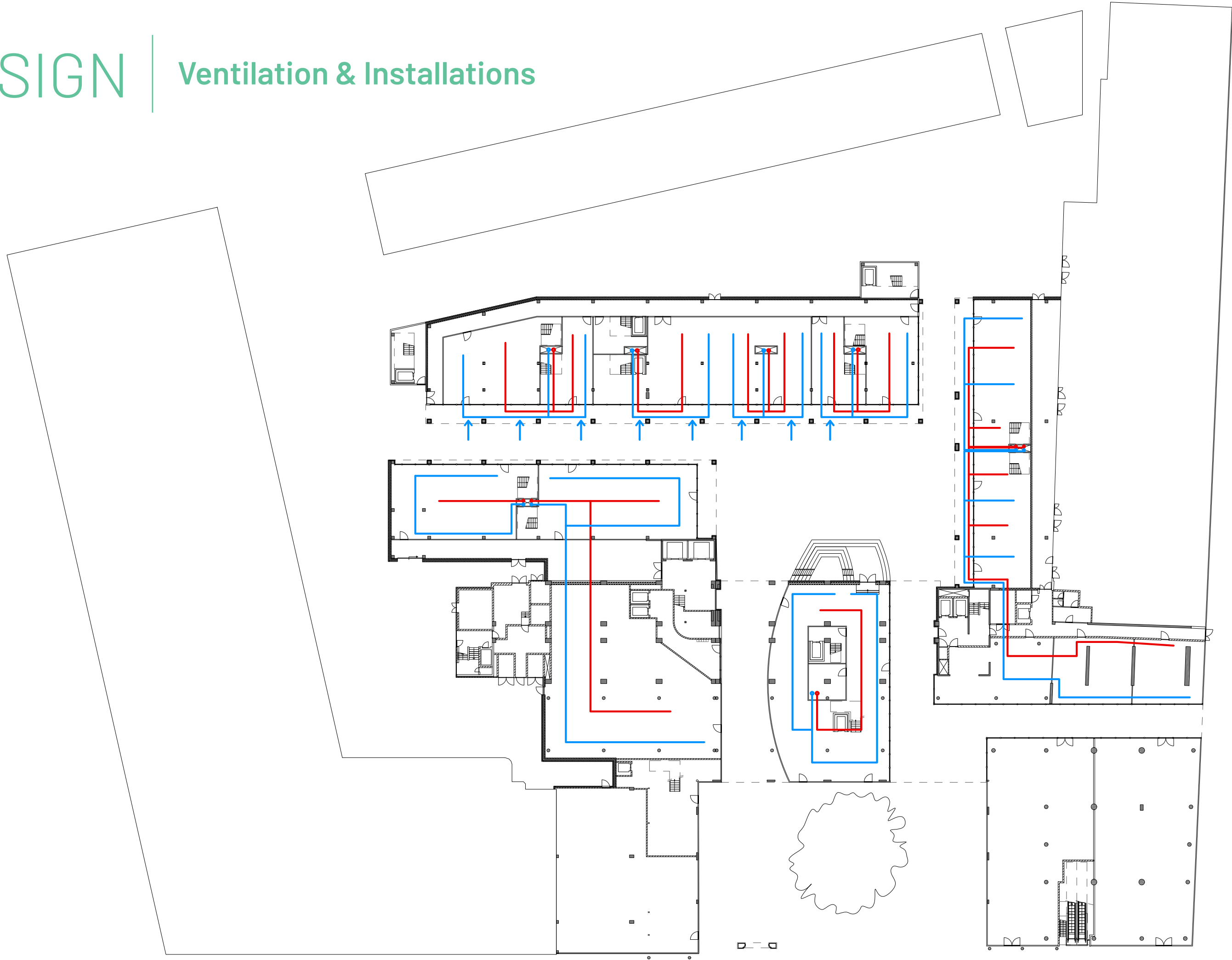
2 canals in shaft

Shaft measurement = 2400mm (width of TT-floor) by 1000mm



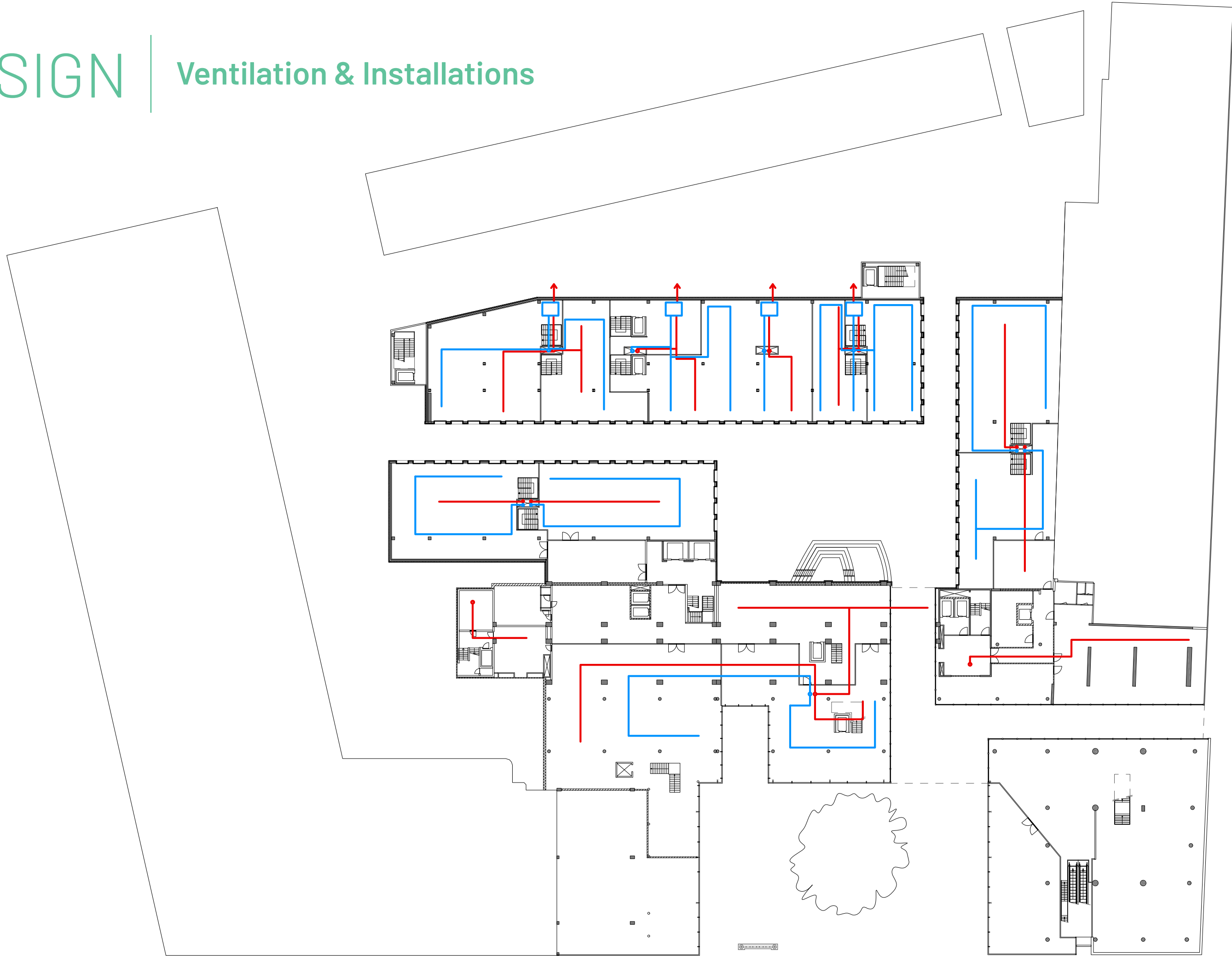
DESIGN

Ventilation & Installations



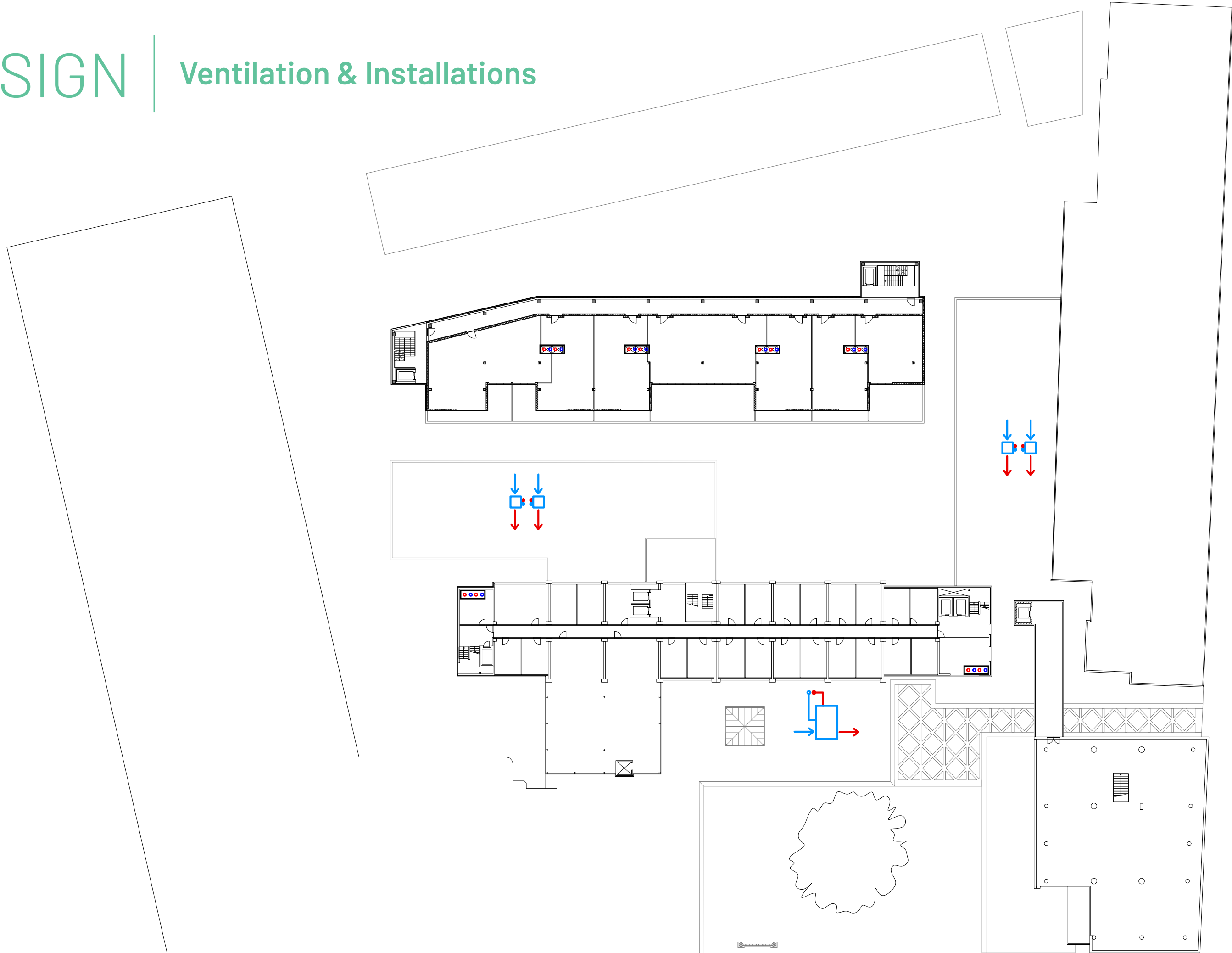
DESIGN

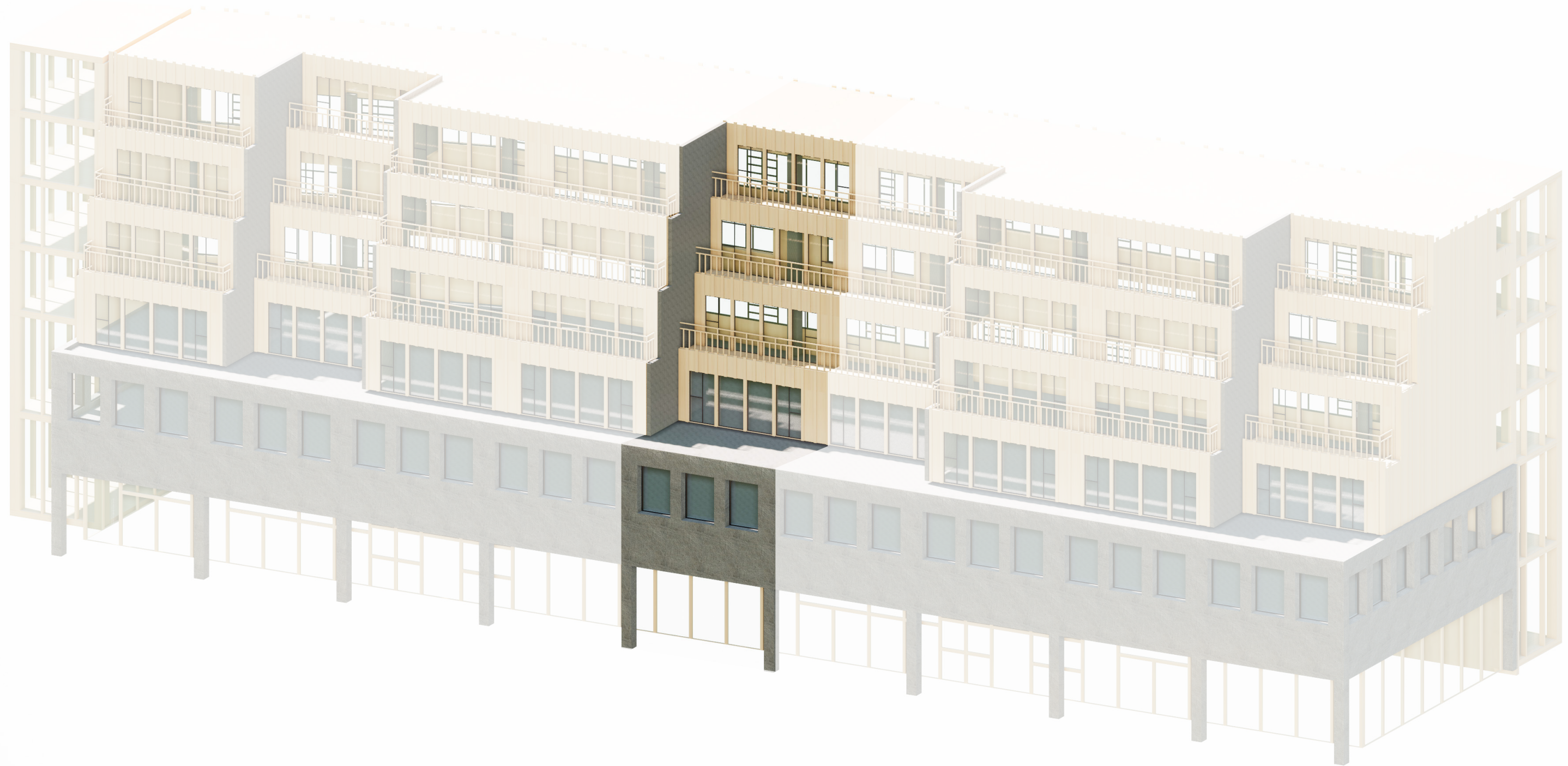
Ventilation & Installations



DESIGN

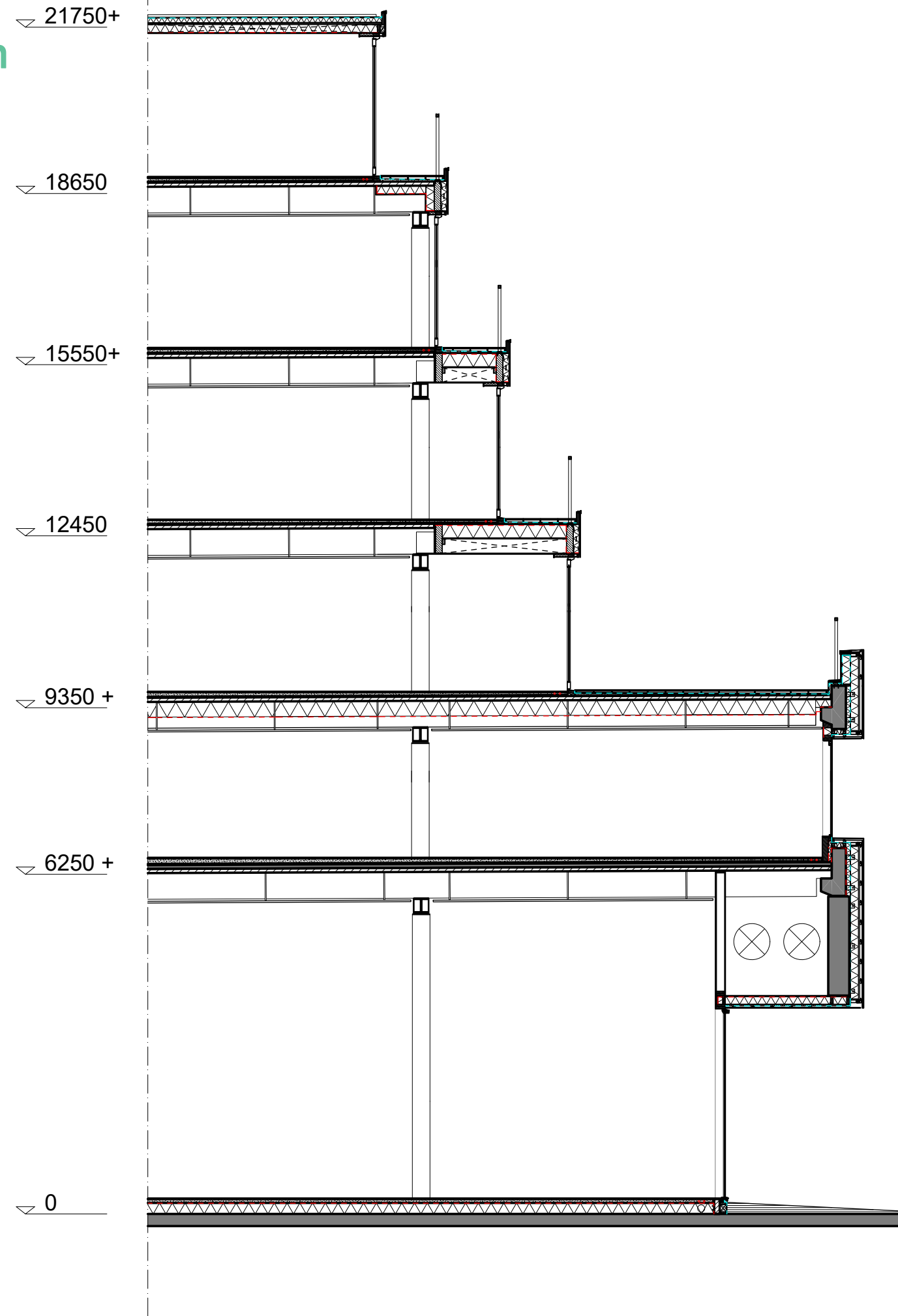
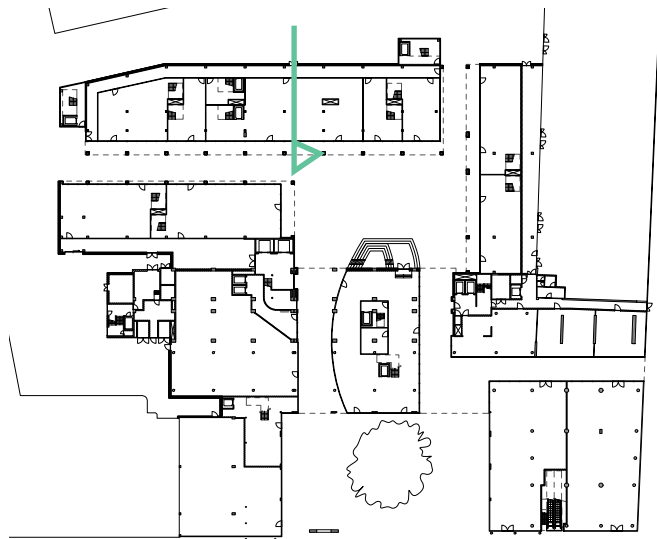
Ventilation & Installations

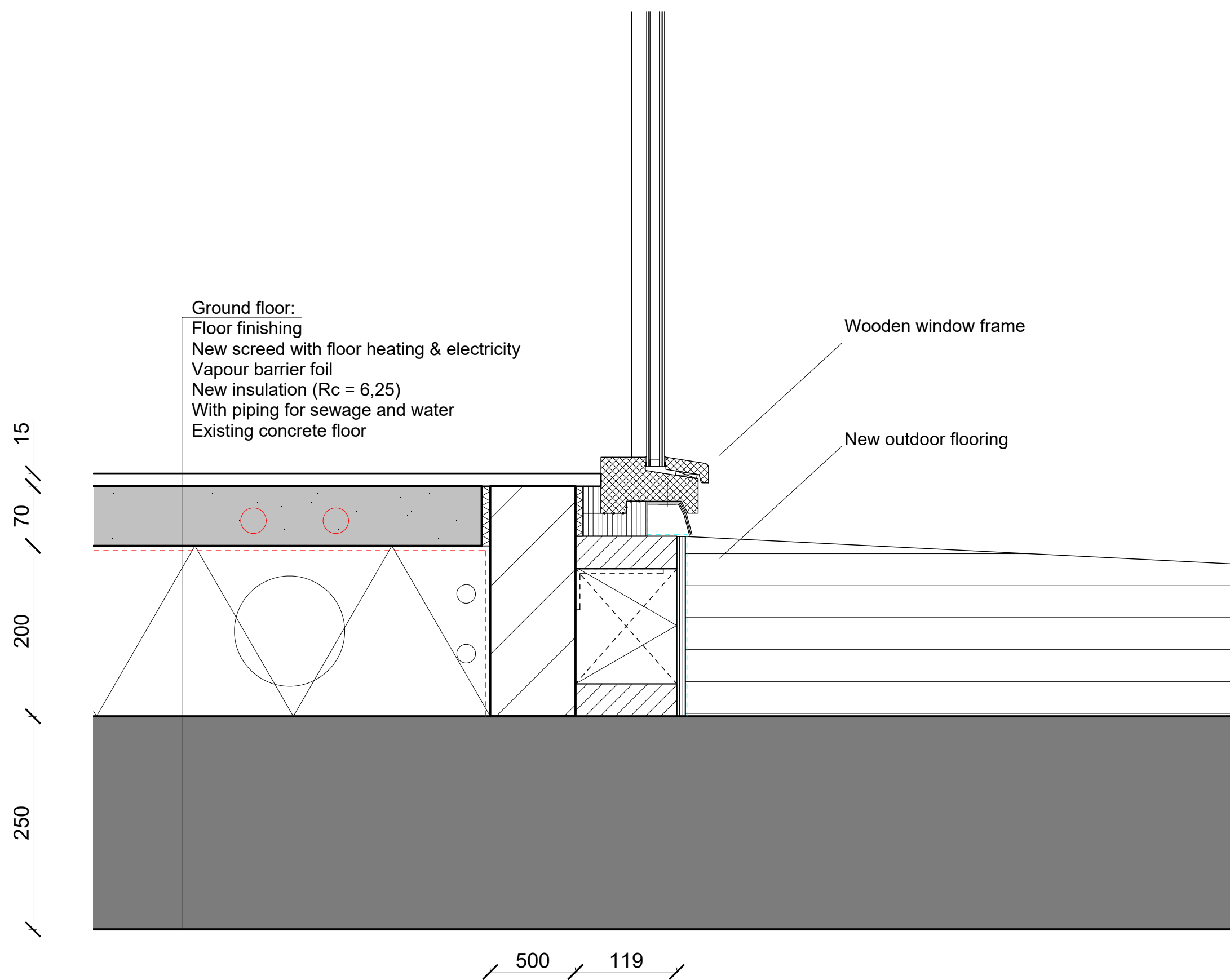
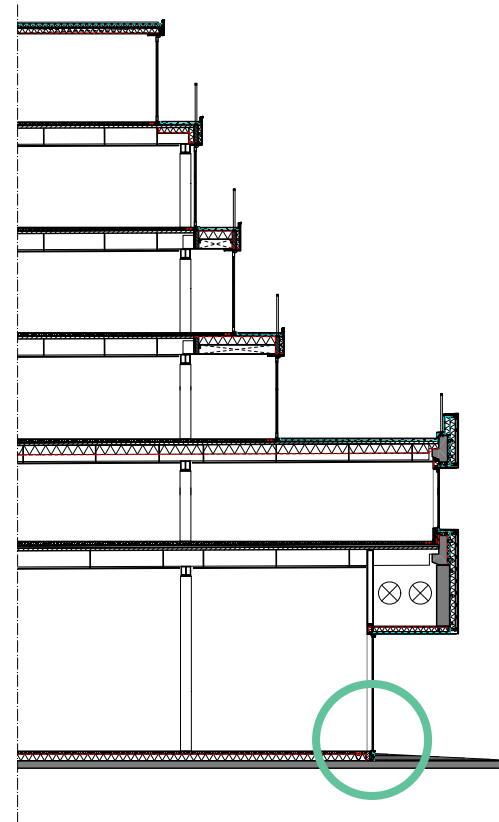


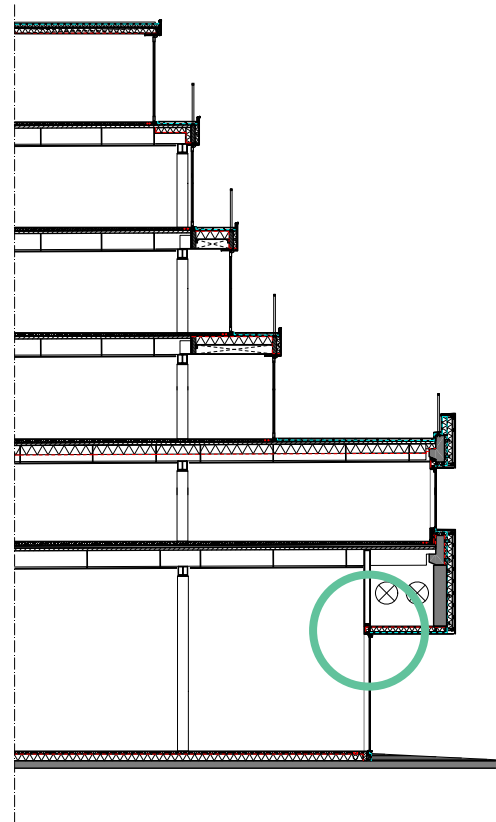


DESIGN

Façade fragm

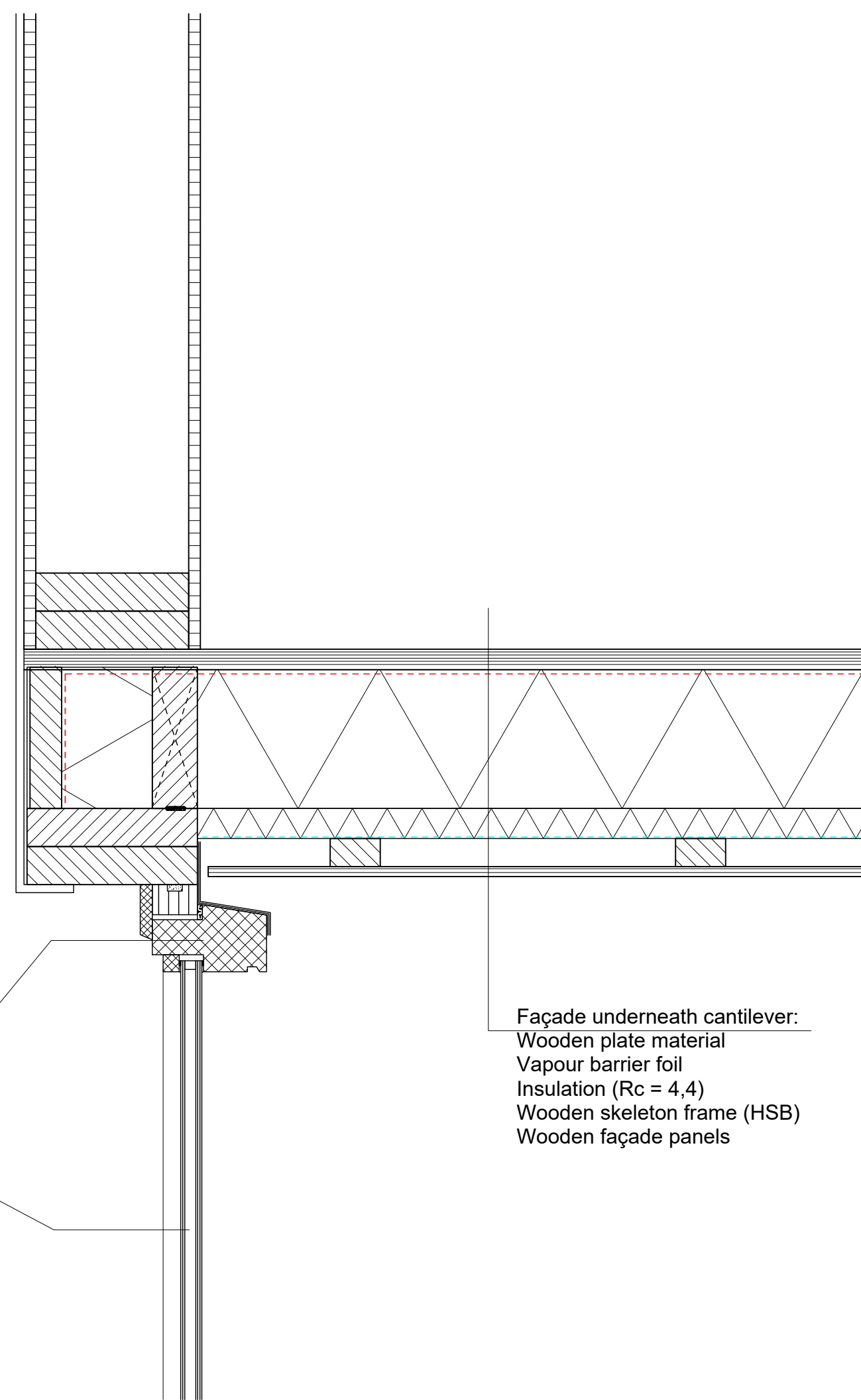






Wooden window frame

Insulated glazing

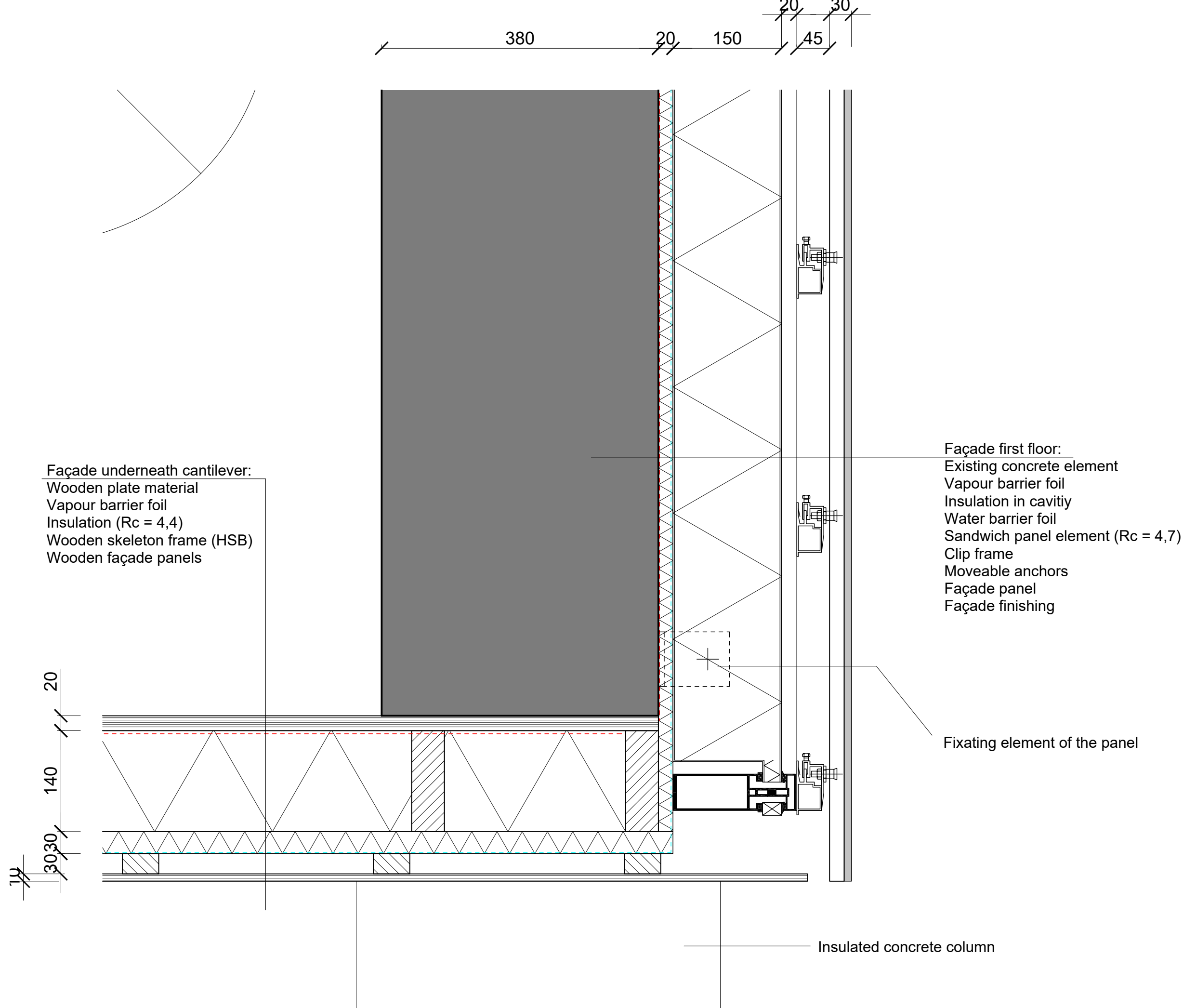
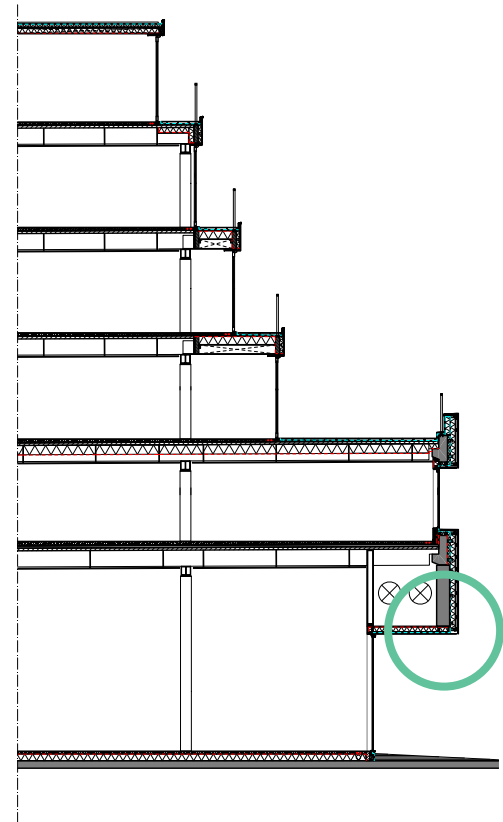


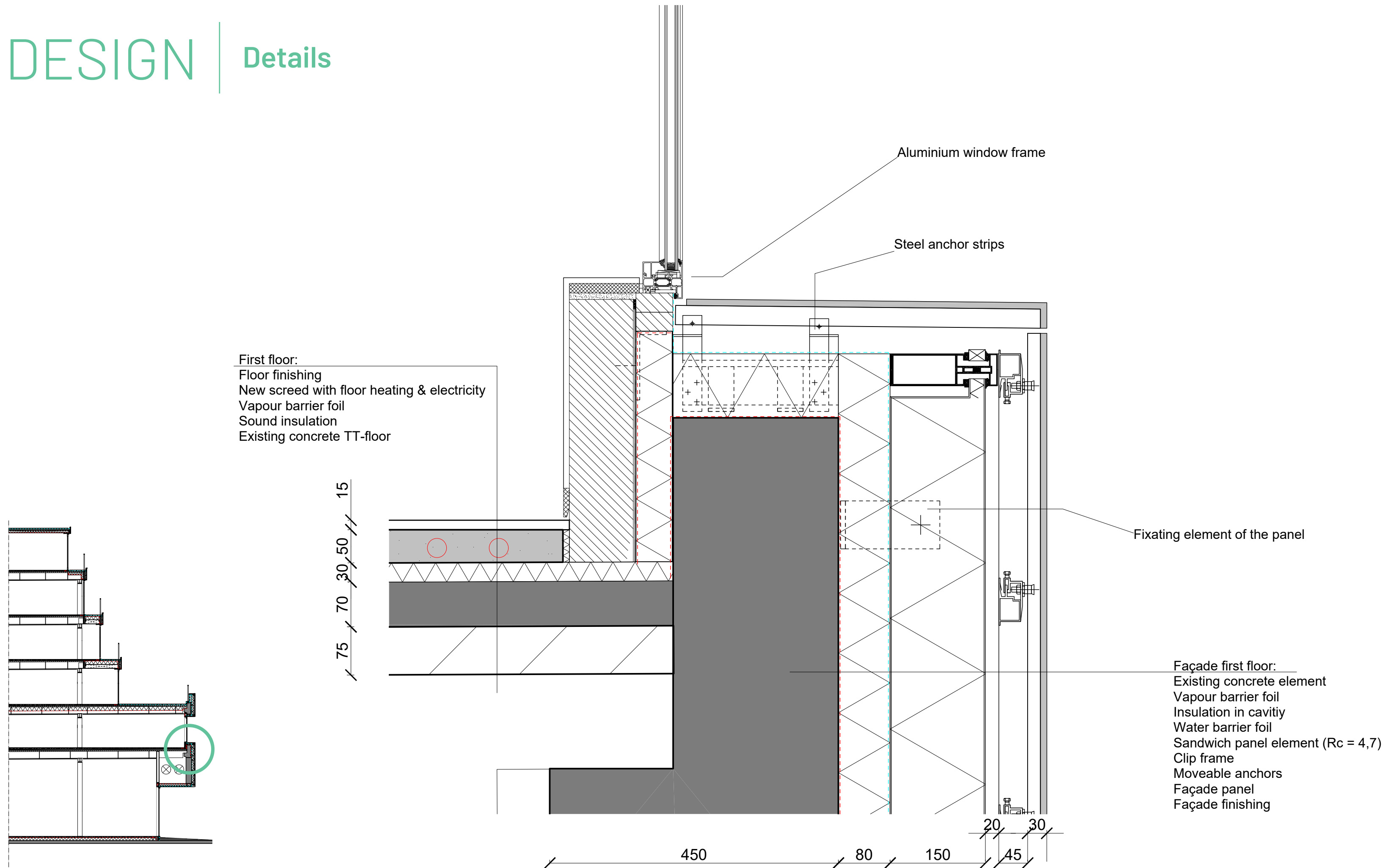
Façade underneath cantilever:
Wooden plate material
Vapour barrier foil
Insulation ($R_c = 4,4$)
Wooden skeleton frame (HSB)
Wooden façade panels

20
140
30/30
10

DESIGN

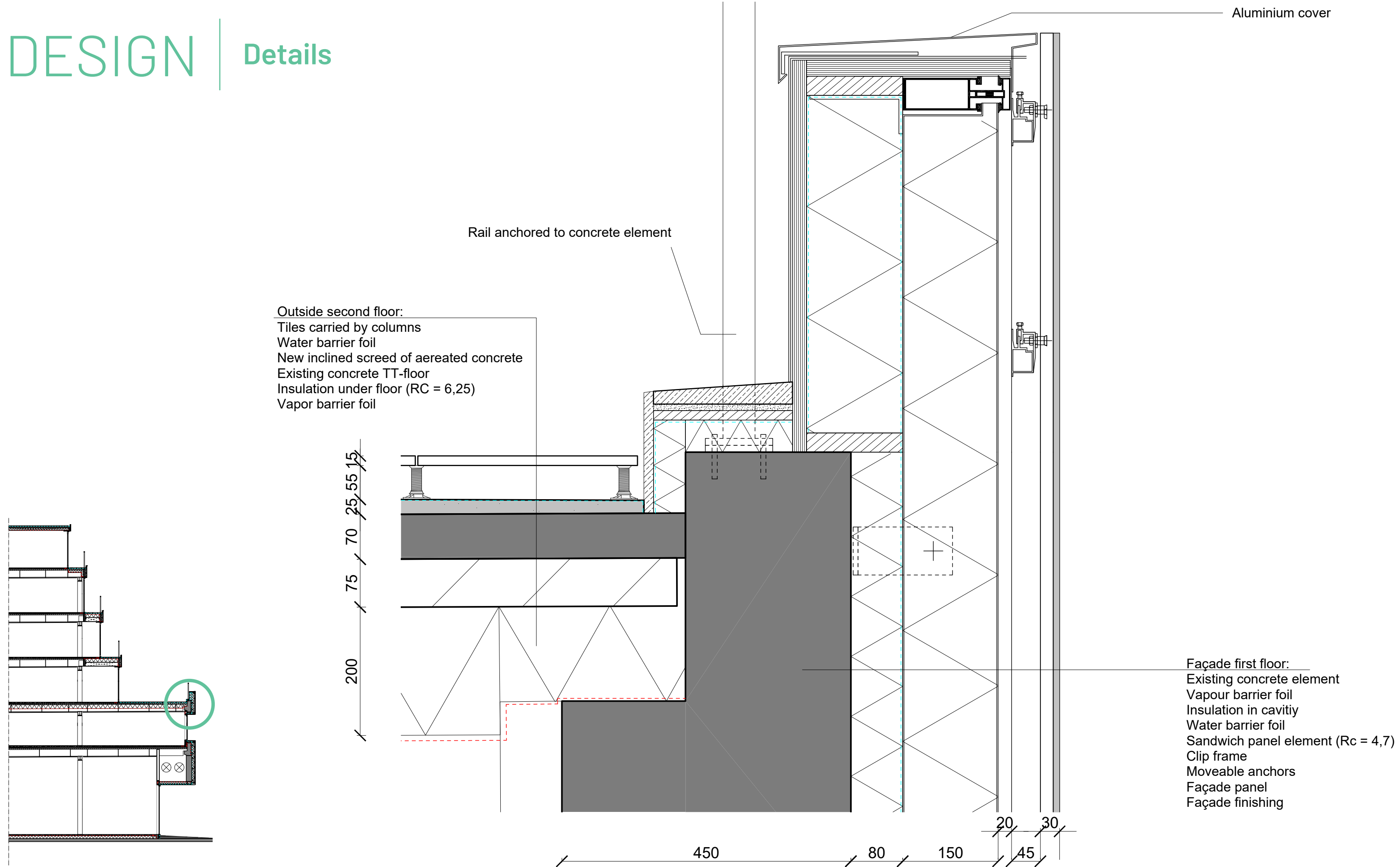
Details

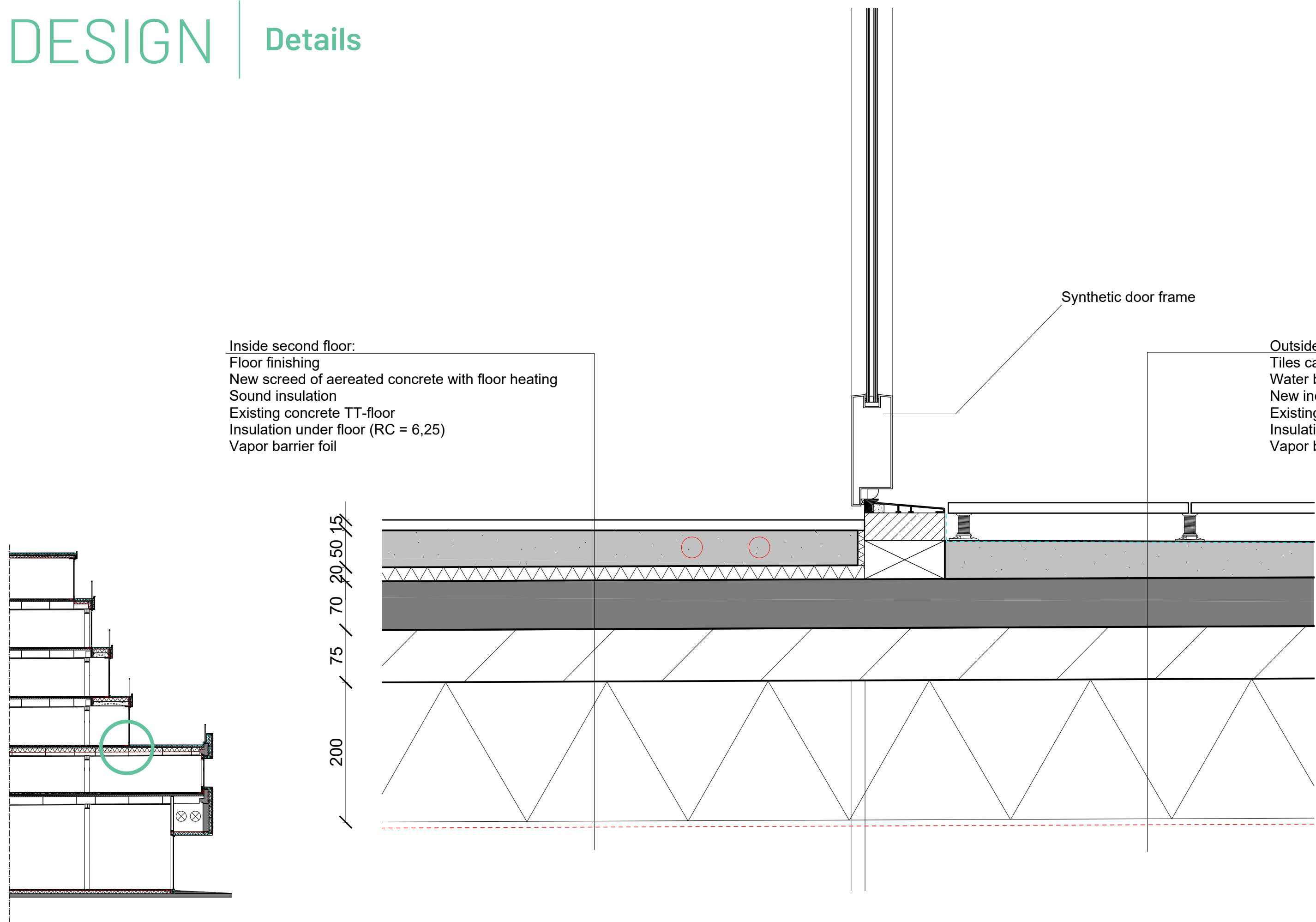




DESIGN

Details



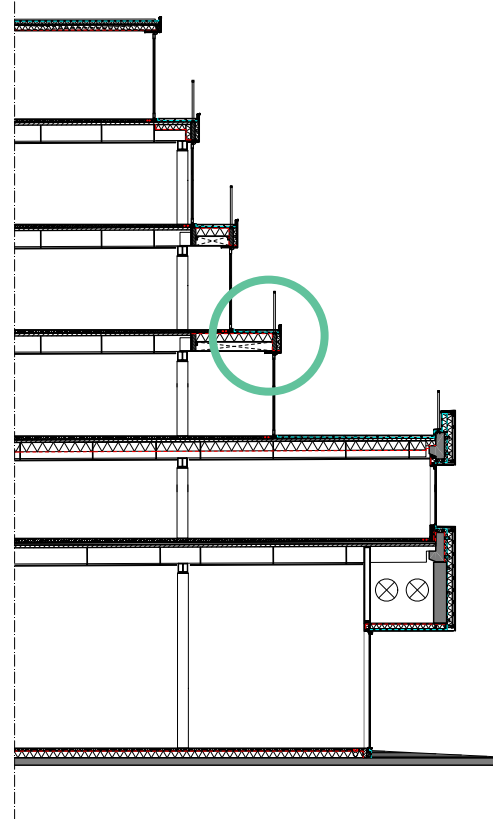


Inside second floor:
Floor finishing
New screed of aerated concrete with floor heating
Sound insulation
Existing concrete TT-floor
Insulation under floor (RC = 6,25)
Vapor barrier foil

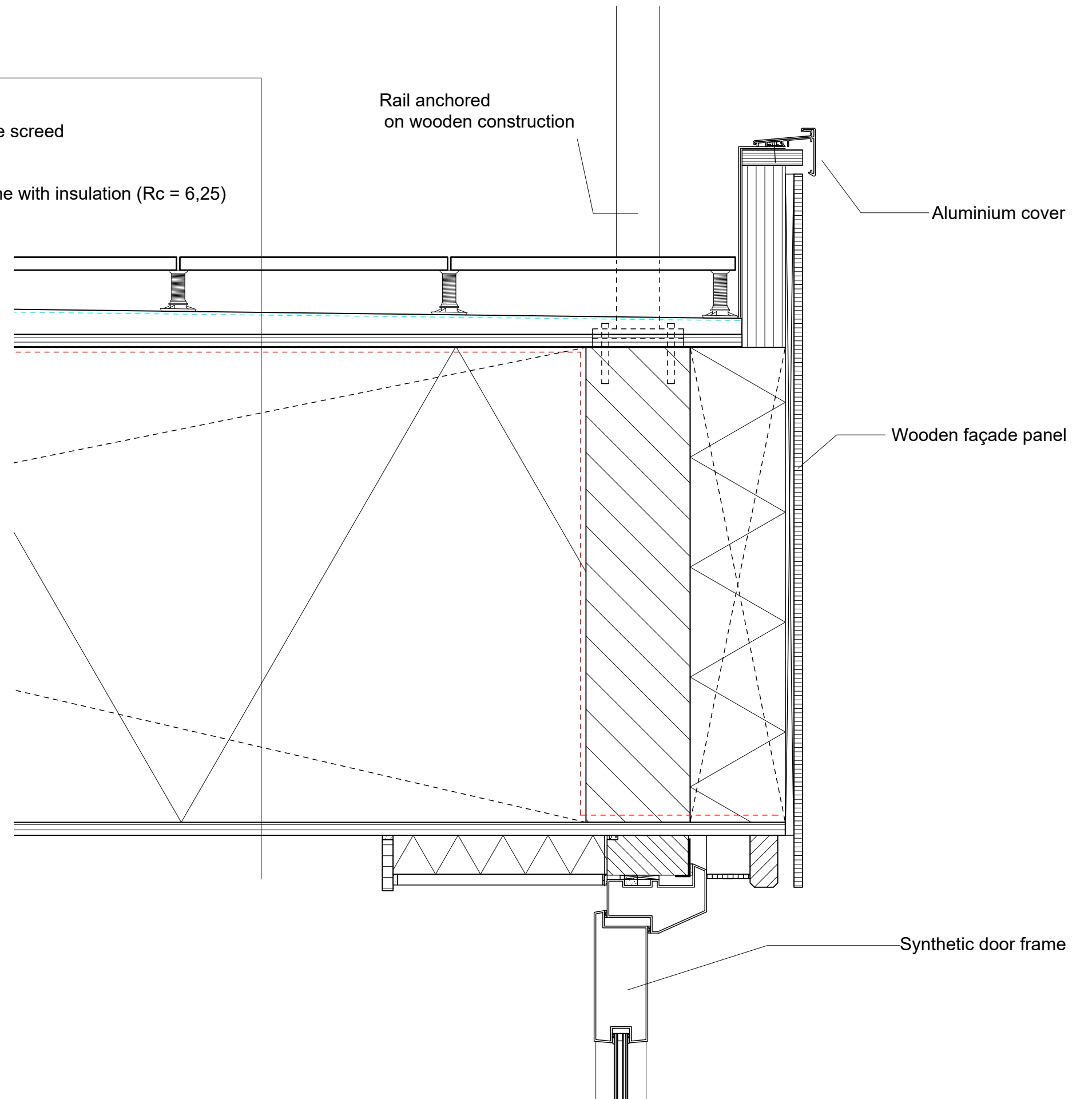
Synthetic door frame

Outside second floor:
Tiles carried by columns
Water barrier foil
New inclined screed of aerated concrete
Existing concrete TT-floor
Insulation under floor (RC = 6,25)
Vapor barrier foil

Outdoor third floor:
Tiles carried by columns
Water barrier foil
Inclined aerated concrete screed
Wooden panel
Vapour barrier foil
Wooden construction frame with insulation (Rc = 6,25)
Wooden panel



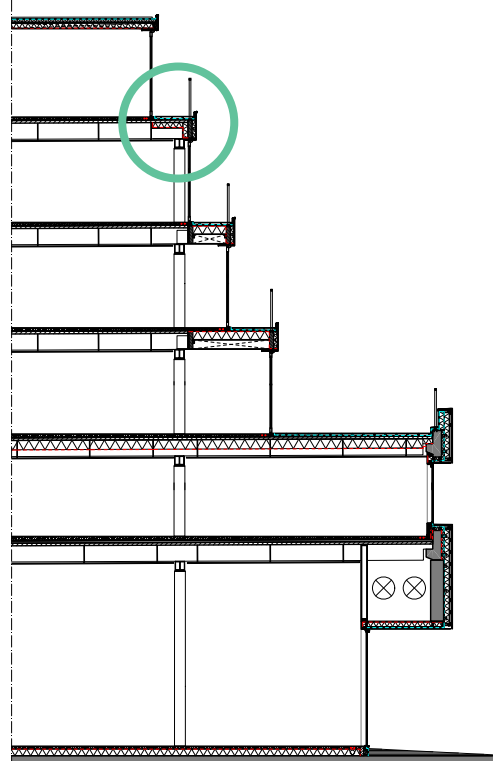
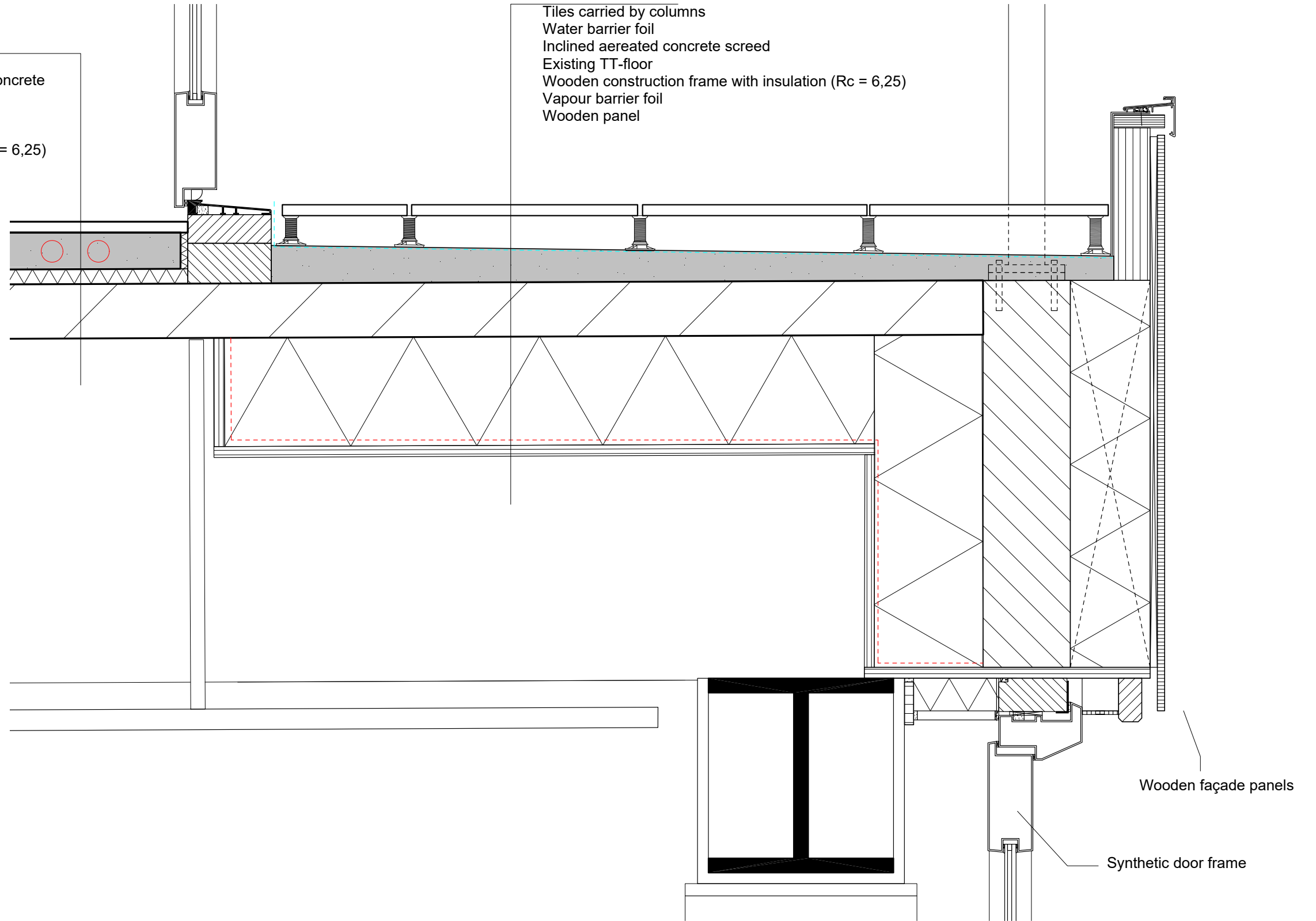
15 / 45 /
25 / 15 /
500
15 /

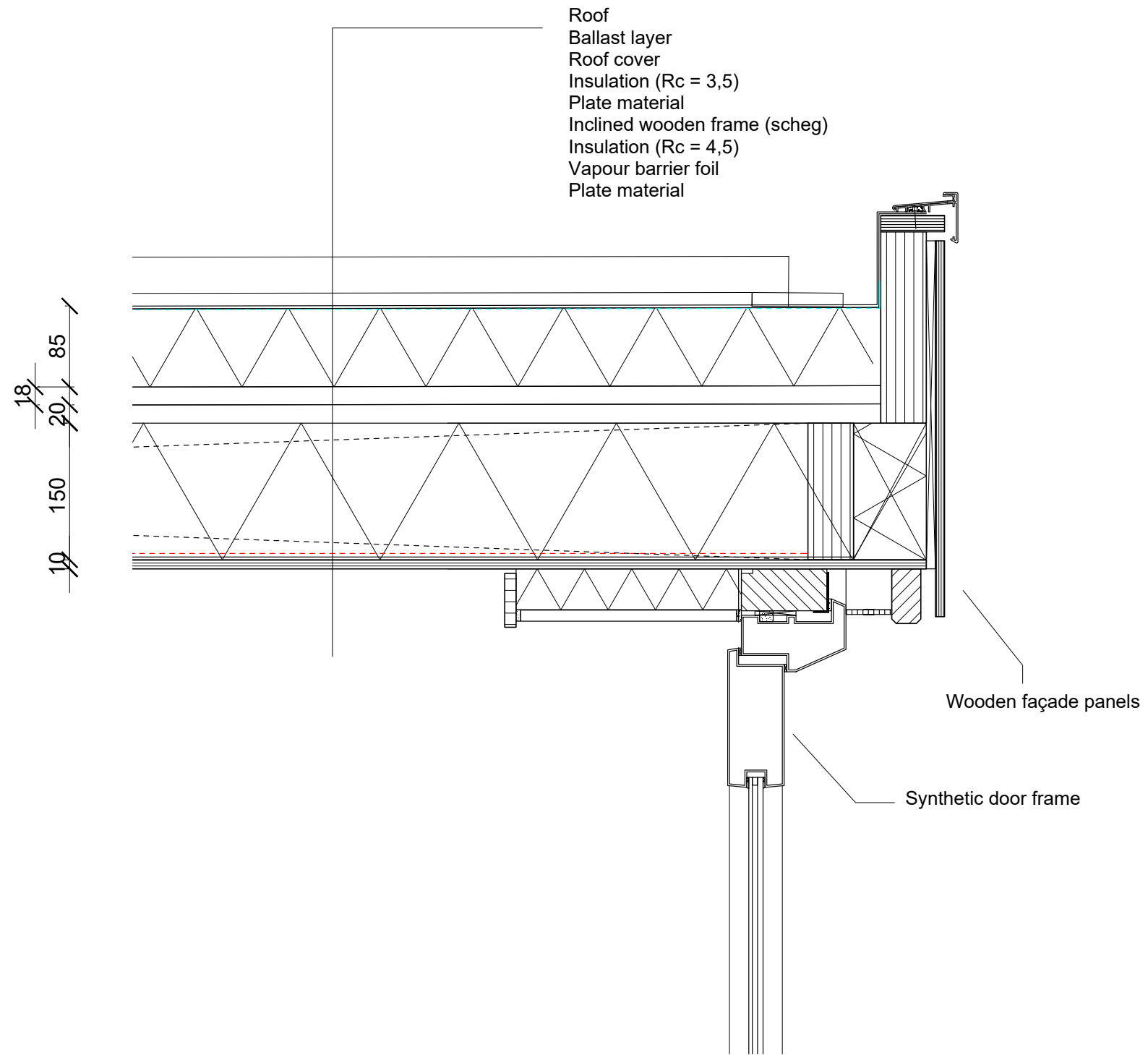
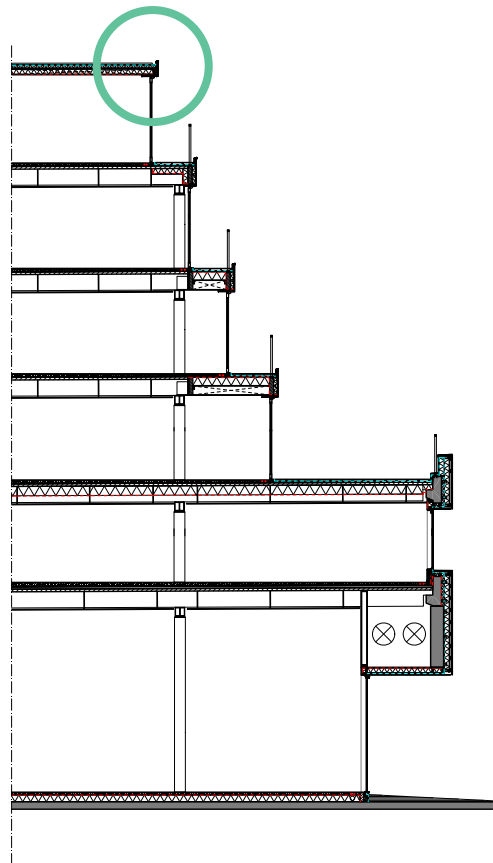


Inside second floor:
Floor finishing
New screed of aereated concrete with floor heating
Sound insulation
Existing concrete TT-floor
Insulation under floor (RC = 6,25)
Vapor barrier foil

Outdoor fifth floor:
Tiles carried by columns
Water barrier foil
Inclined aereated concrete screed
Existing TT-floor
Wooden construction frame with insulation (Rc = 6,25)
Vapour barrier foil
Wooden panel

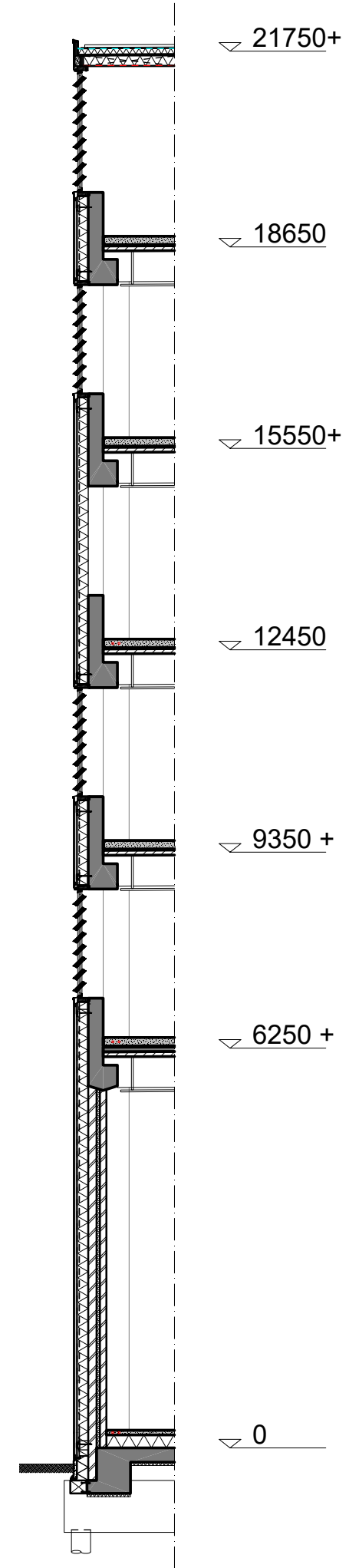
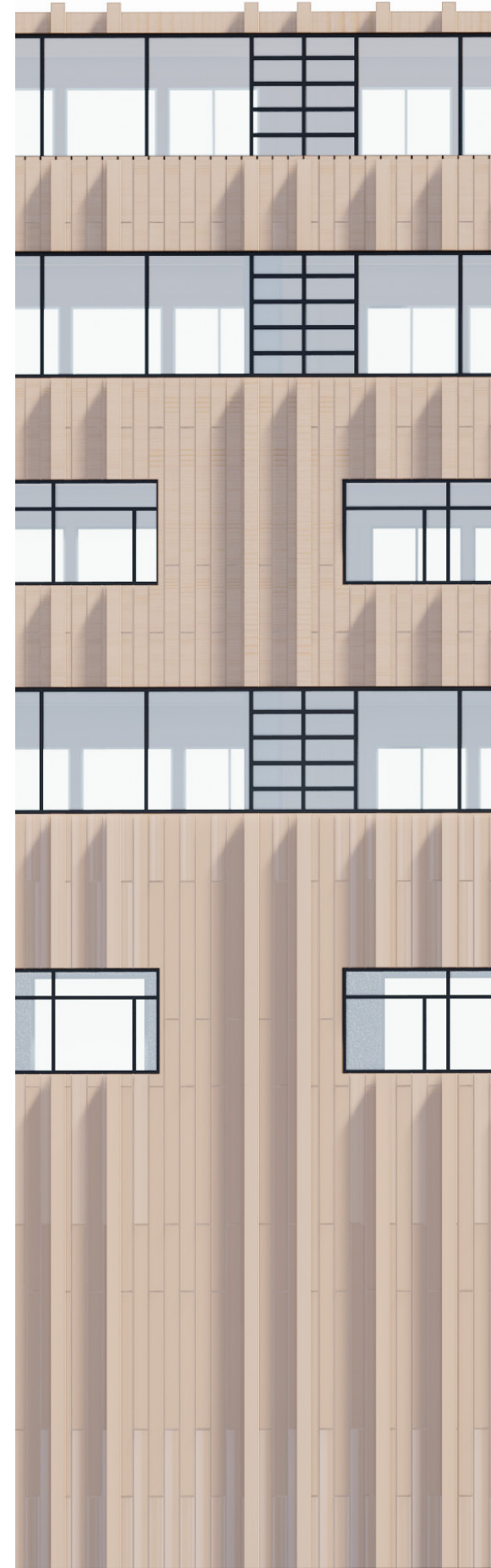
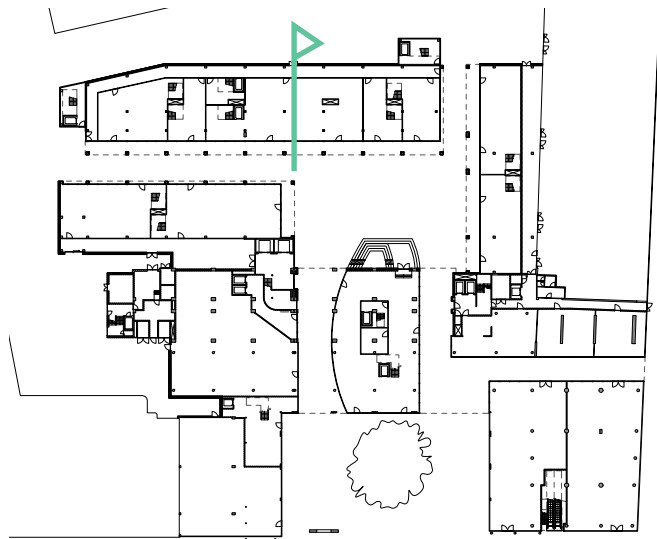
75 20,50 15

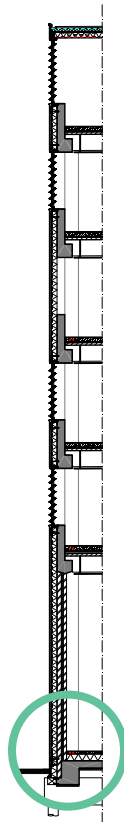
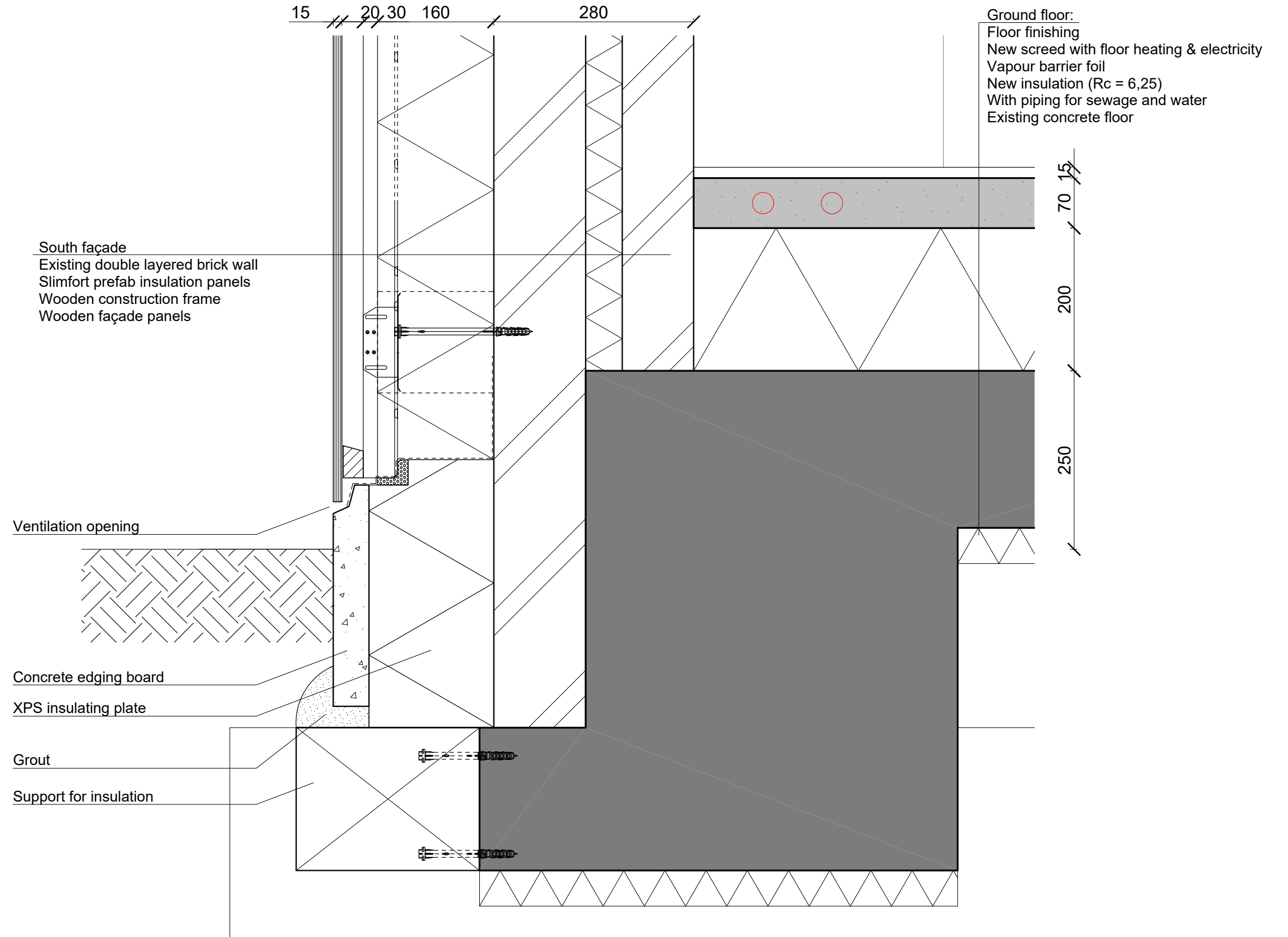


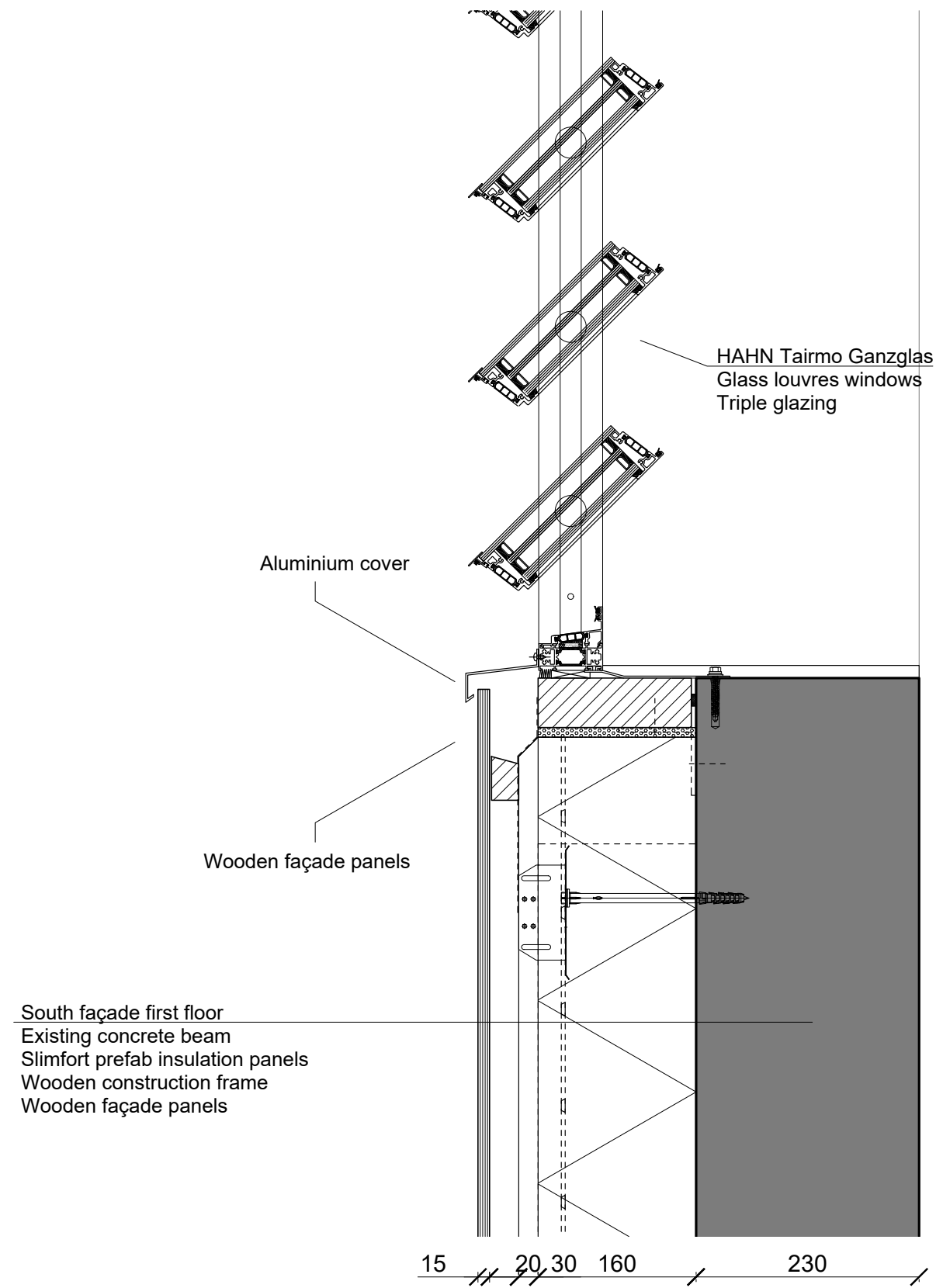
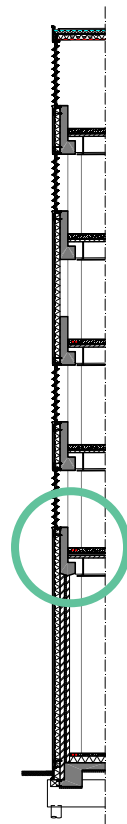


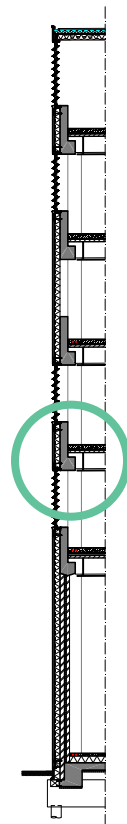
DESIGN

Façade fragment



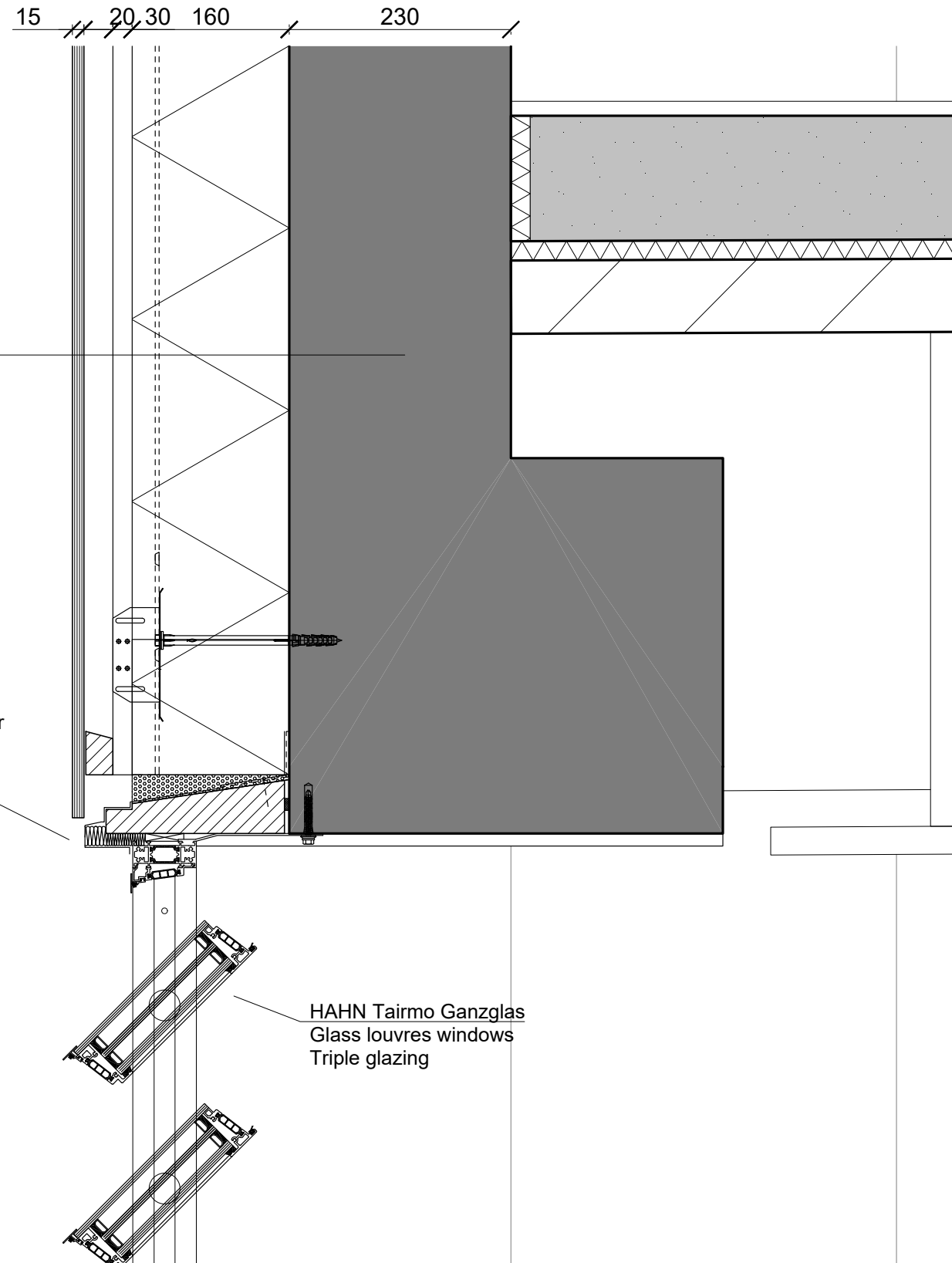




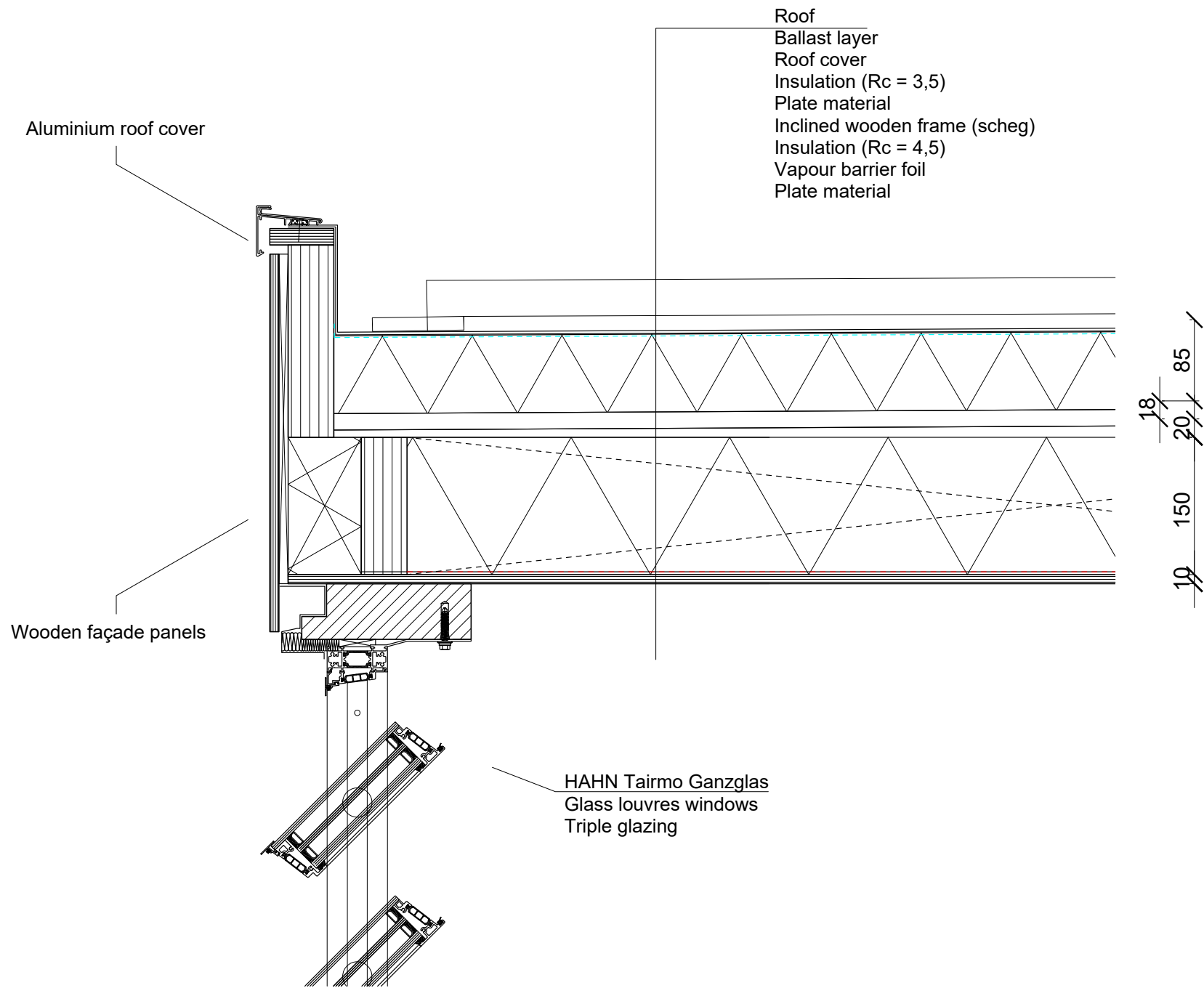
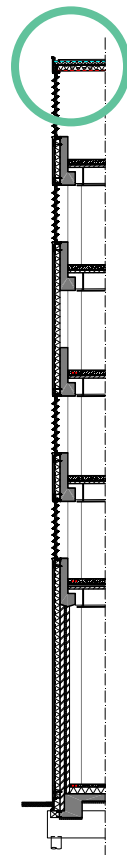


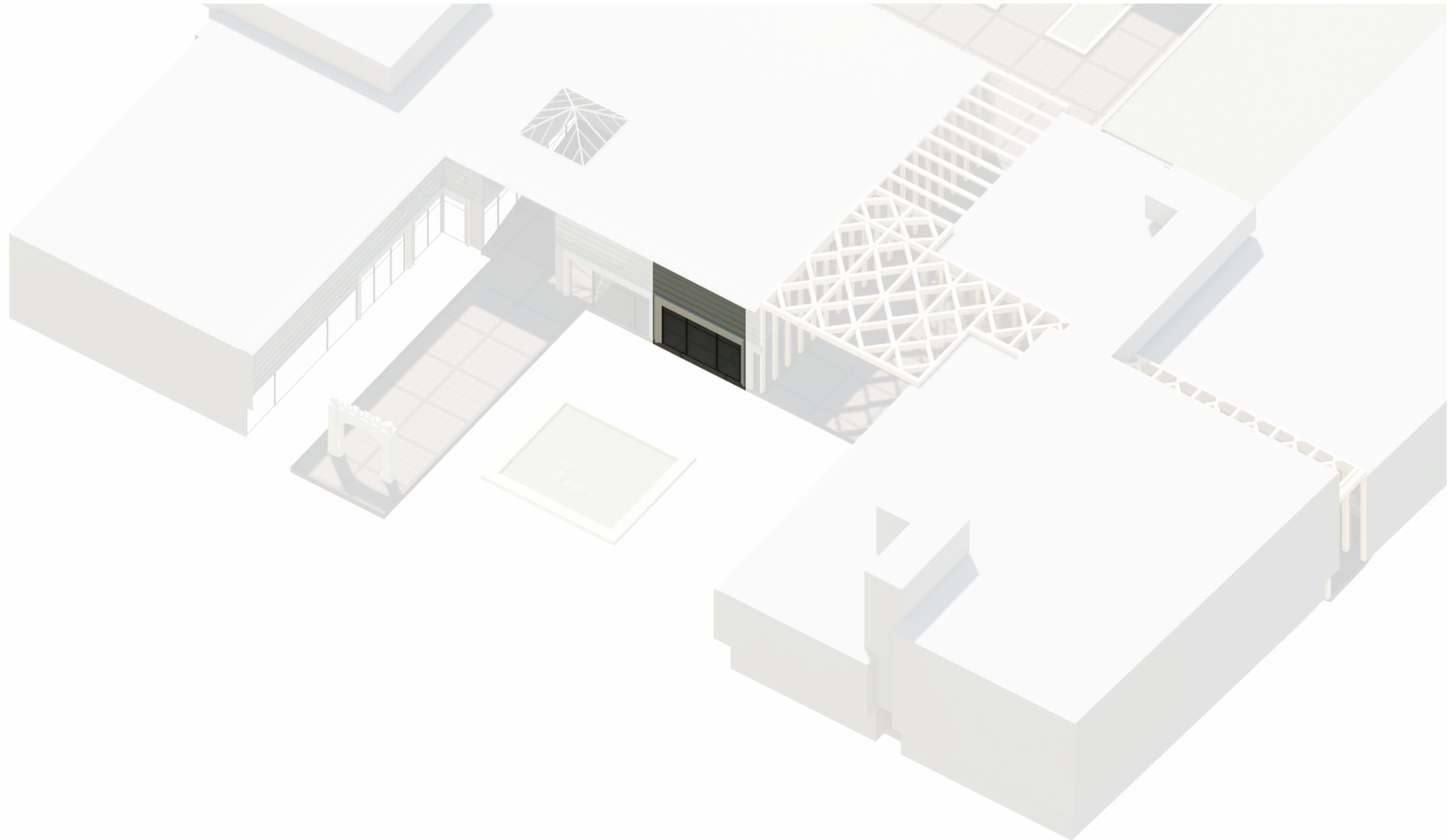
South façade first floor
Existing concrete beam
Slimfort prefab insulation panels
Wooden construction frame
Wooden façade panels

Aluminium cover



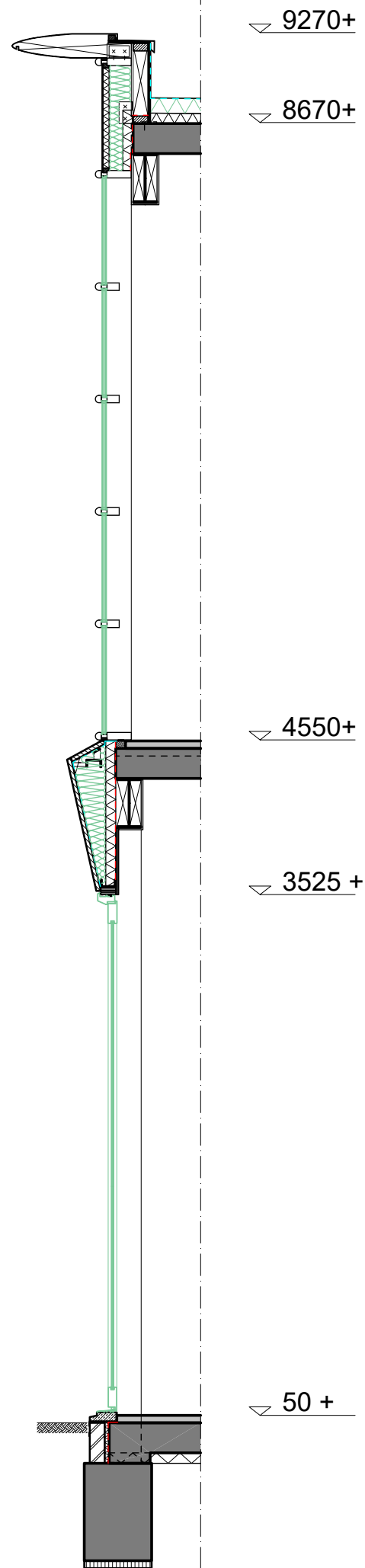
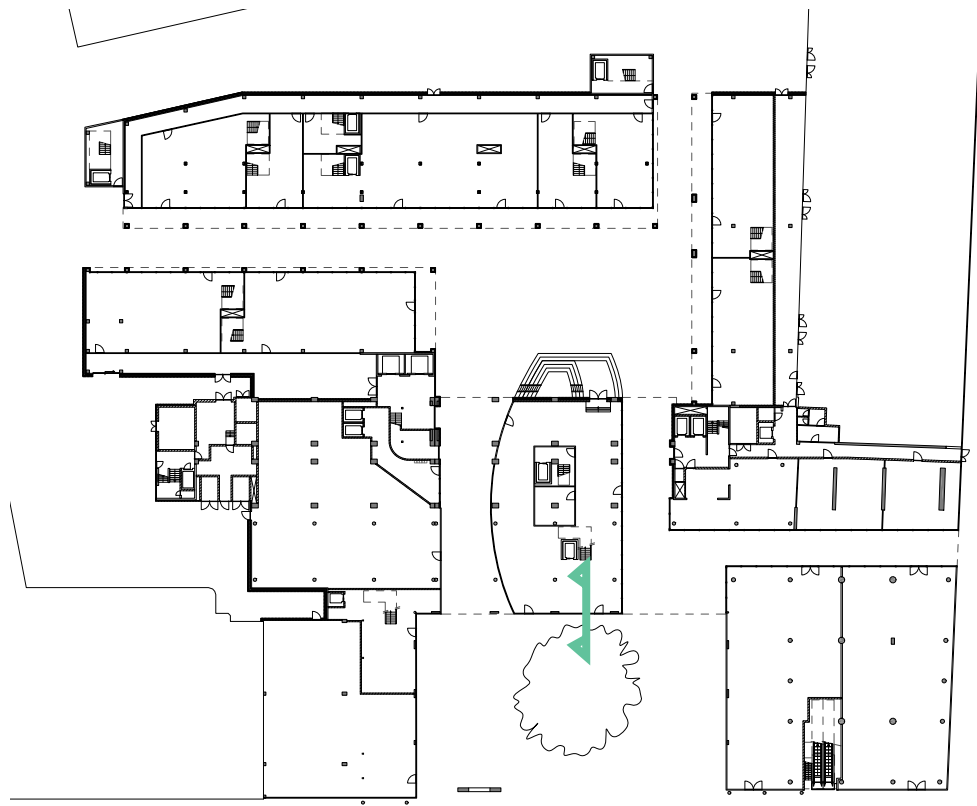
HAHN Tairmo Ganzglas
Glass louvres windows
Triple glazing

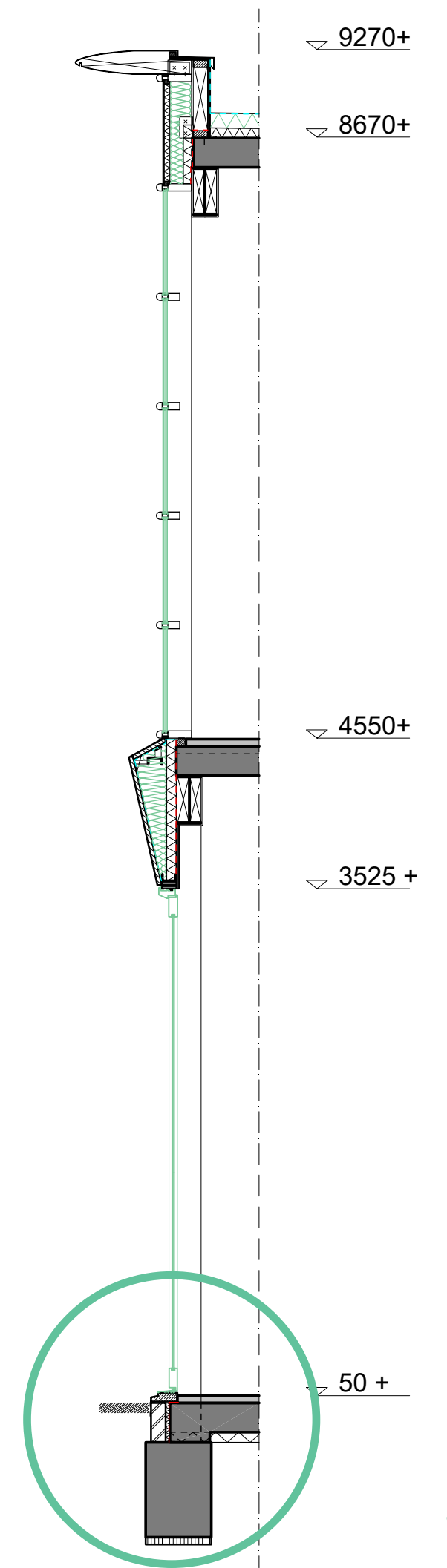
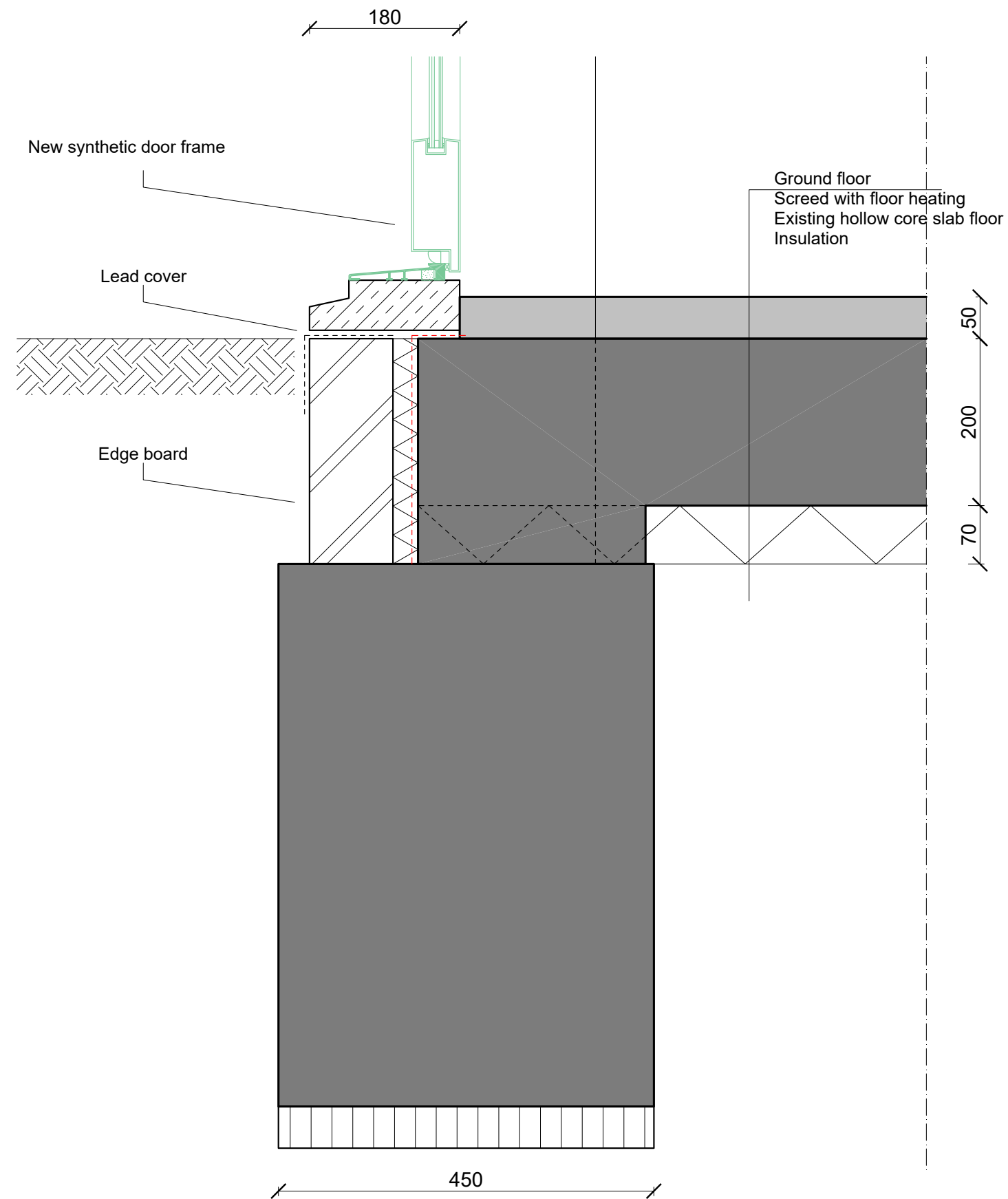




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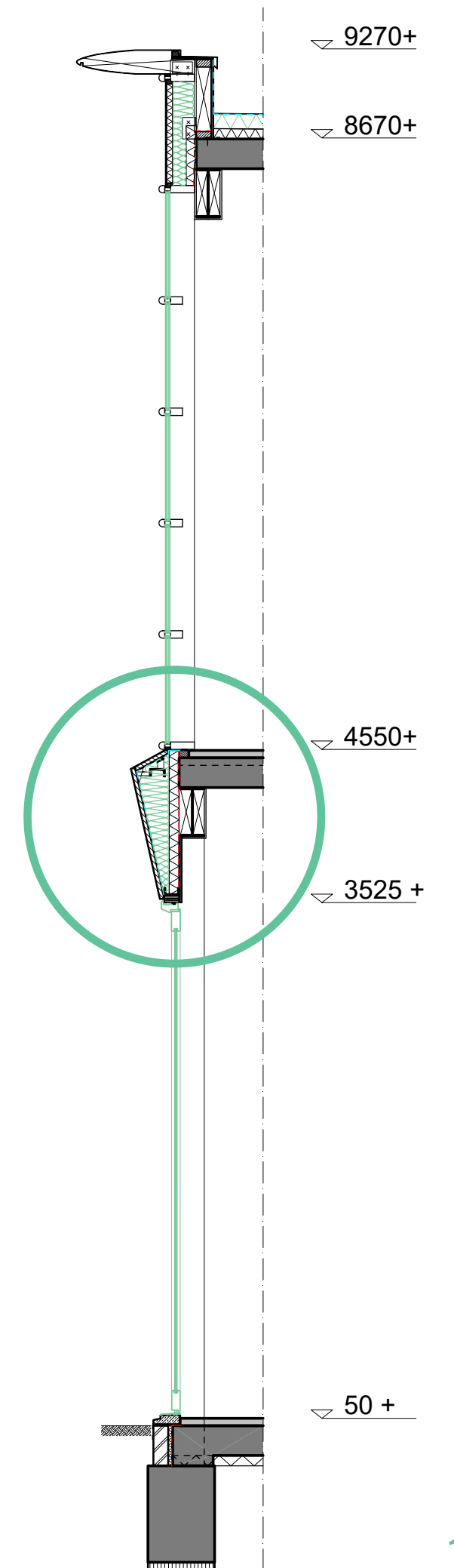
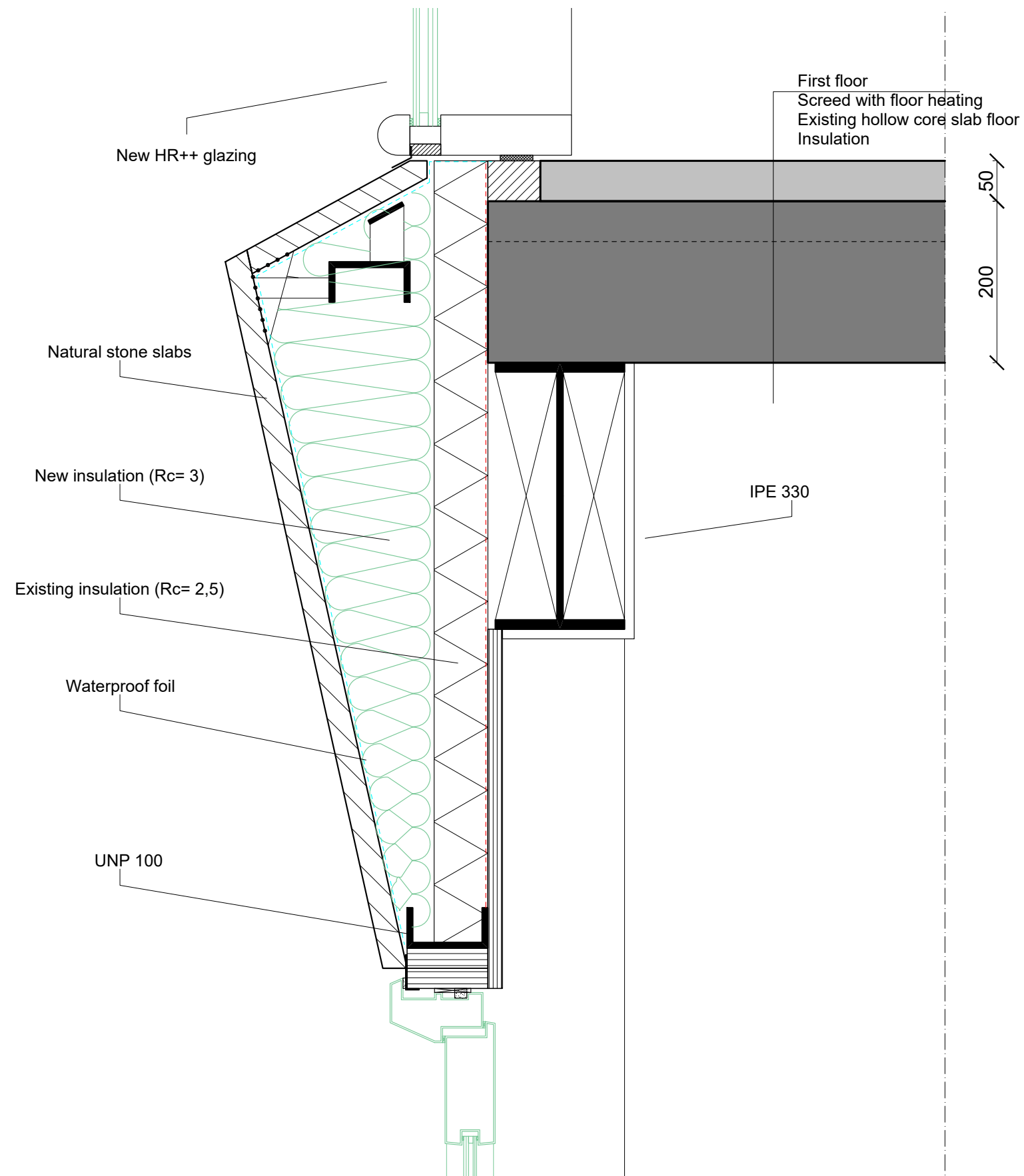
Façade fragment





DESIGN

Façade fragment



DESIGN

Façade fragment

