

# HOUSING THE UNKNOWN FUTURE

## TOWARDS ADAPTABILITY IN OFFICE TRANSFORMATION



ARCHITECTURAL ENGINEERING  
GRADUATION STUDIO

P5 PRESENTATIE  
DINSDAG 27 JUNI 2017

**B** niels  
buring 4089049

# Technische Universiteit Delft

**N. Buring**

Kaartnr. 200011782



**Student**

**4089049**

Als collegekaart alleen geldig met bewijs van inschrijving



Challenge the future

# INTRODUCTIE

*"YOU CANNOT STEP TWICE INTO THE SAME RIVER"*

*HERACLITUS C., 544-483 V.CHR.*

**FASCINATIE**

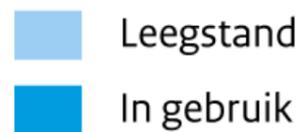
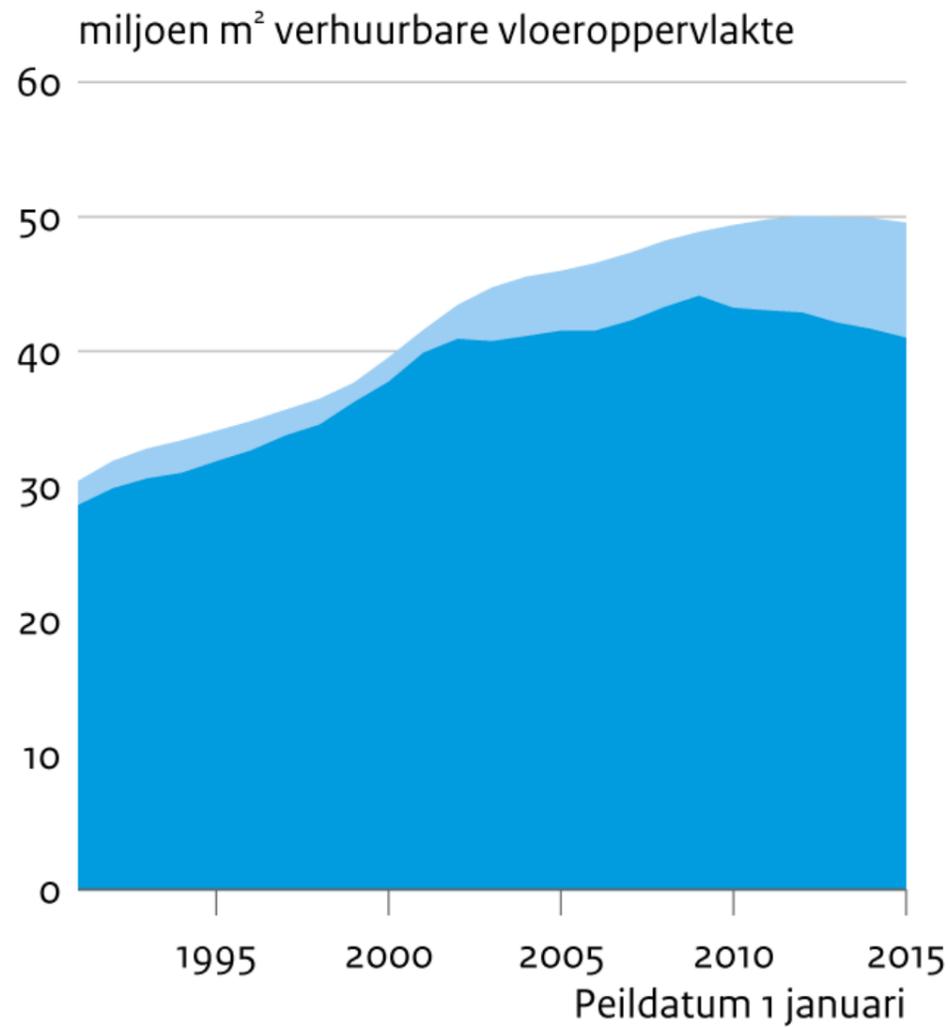


# PROBLEEMSTELLING

# KANTORENLEEGSTAND

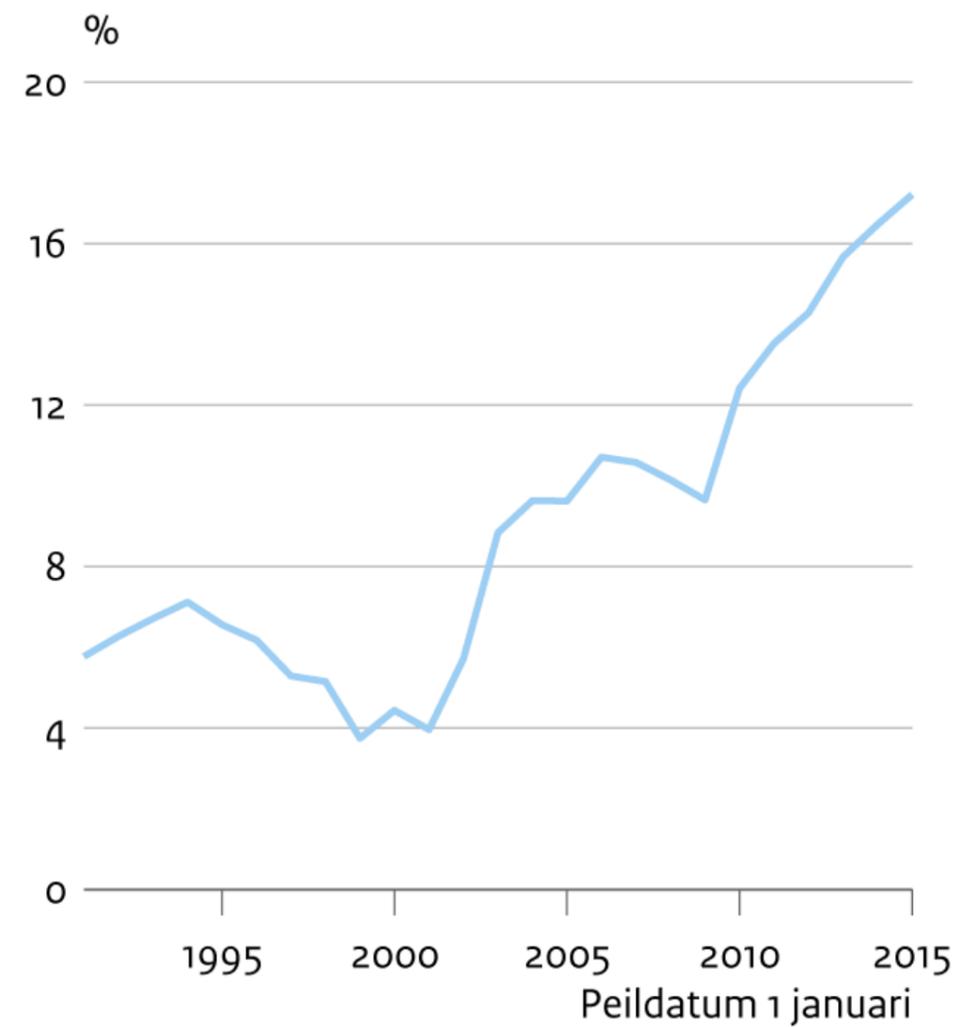
## Oppervlakte en leegstand van kantoren

Totaal



Bron: Bak; bewerking PBL

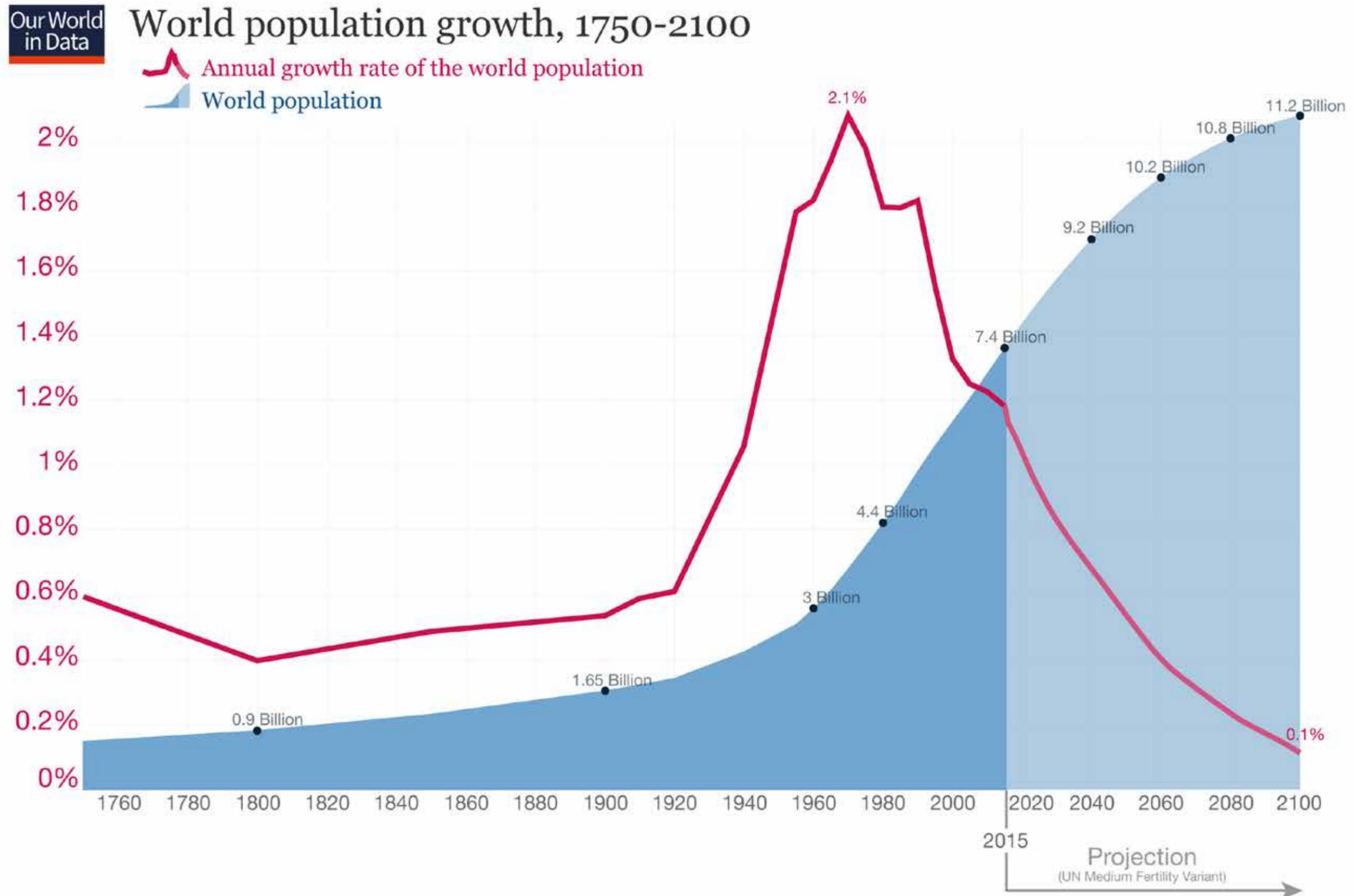
Aandeel leegstand



PROBLEEMSTELLING

PBL/jun15  
[www.clo.nl/nl215203](http://www.clo.nl/nl215203)

# BEVOLKINGSGROEI



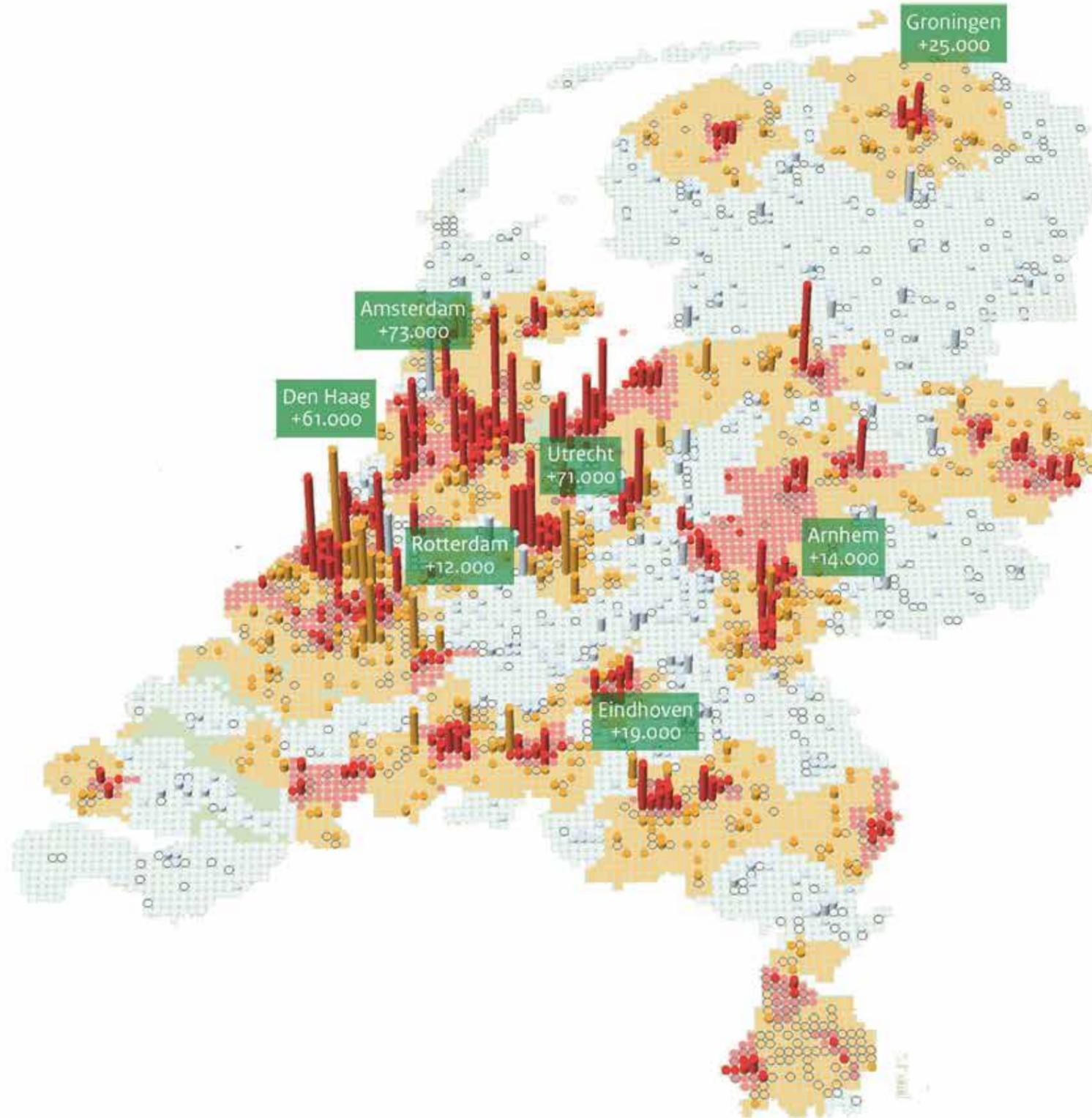
PROBLEEMSTELLING

Data sources: Up to 2015 OurWorldInData series based on UN and HYDE. Projections for 2015 to 2100: UN Population Division (2015) – Medium Variant. The data visualization is taken from [OurWorldInData.org](https://ourworldindata.org). There you find the raw data and more visualizations on this topic.

Licensed under CC-BY-SA by the author Max Roser.

SOURCE: [HTTPS://OURWORLDINDATA.ORG/WORLD-POPULATION-GROWTH/](https://ourworldindata.org/world-population-growth/)

# 'TREK NAAR DE STAD'



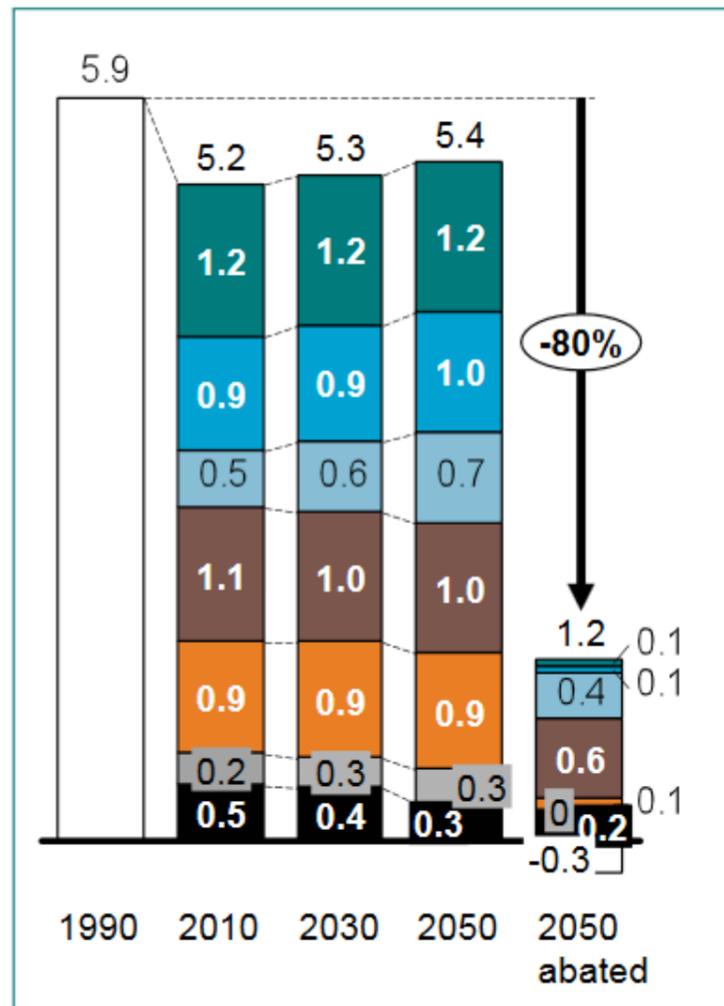
PROBLEEMSTELLING



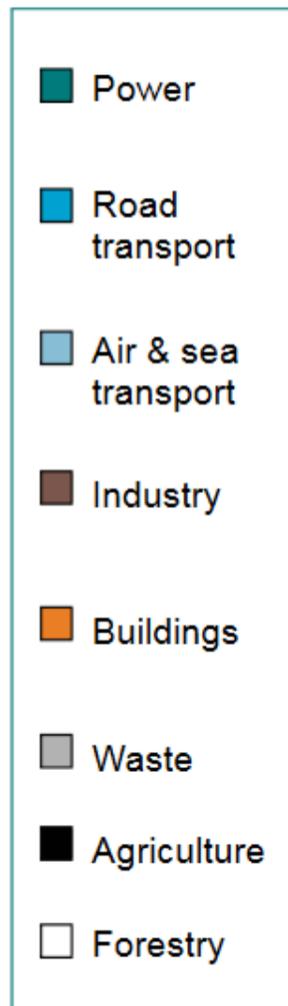
## 80% decarbonization overall means nearly full decarbonization in power, road transport and buildings

GtCO<sub>2</sub>e per year

EU-27 total GHG emissions



Sector



Total abatement

Power	95% to 100%
Road transport	95%
Air & sea transport	50%
Industry	40%
Buildings	95%
Waste	100%
Agriculture	20%
Forestry	-0.25 GtCO <sub>2</sub> e

Abatement within sector<sup>1,2</sup>

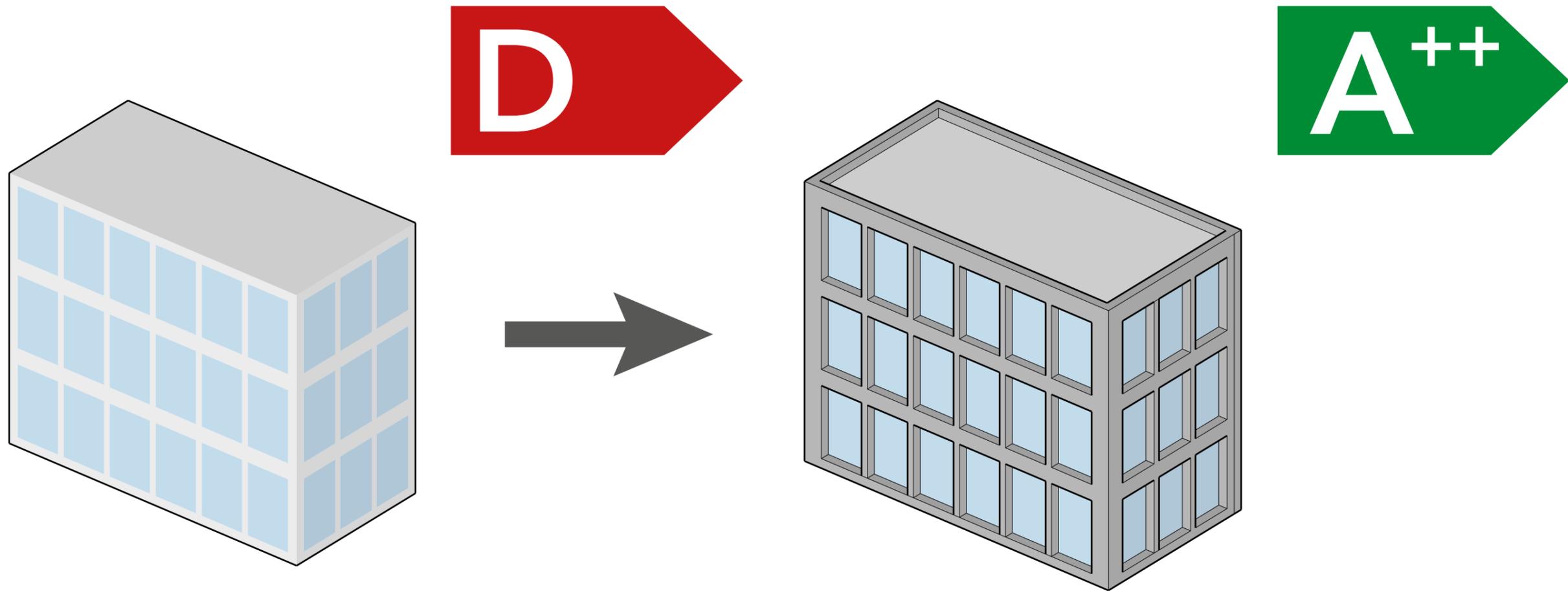
Power	>95%
Road transport	20%
Air & sea transport	30%
Industry	35% (efficiency, CCS <sup>3</sup> )
Buildings	45% (efficiency)
Waste	100%
Agriculture	20%
Forestry	Carbon sinks

Abatement from fuel shift

Power	75% (electric vehicles, biofuels and fuel cells)
Road transport	20% (biofuels)
Industry	5% (heat pumps)
Buildings	50% (heat pumps)

1 Abatement estimates within sector based on the McKinsey Global GHG Cost Curve  
 2 Large efficiency improvements are already included in the baseline based on the IEA WEO 2009, especially for industry  
 3 CCS applied to 50% of large industry (cement, chemistry, iron and steel, petroleum and gas, not applied to other industries)

INTERVENTIE IS NODIG!



PROBLEEMSTELLING

**ONDERZOEKSVRAAG**

# ONDERZOEKSVRAAG

*HOE KAN EEN LEEGSTAAND KANTOORPAND  
WORDEN GETRANSFORMEERD TOT EEN  
GEBOUW DAT ZICH KAN AANPASSEN AAN  
TOEKOMSTIGE BEHOEFTE EN VERSCHILLENDE  
FUNCTIES KAN HUISVESTEN, OP DUSDANIGE  
MANIER DAT HET DE ENERGIE-EFFICIËNTIE VAN  
HET GEBOUW VERBETERD?*

ONDERZOEKSVRAAG

# CASE STUDY

# LOCATIE BINNEN ROTTERDAM



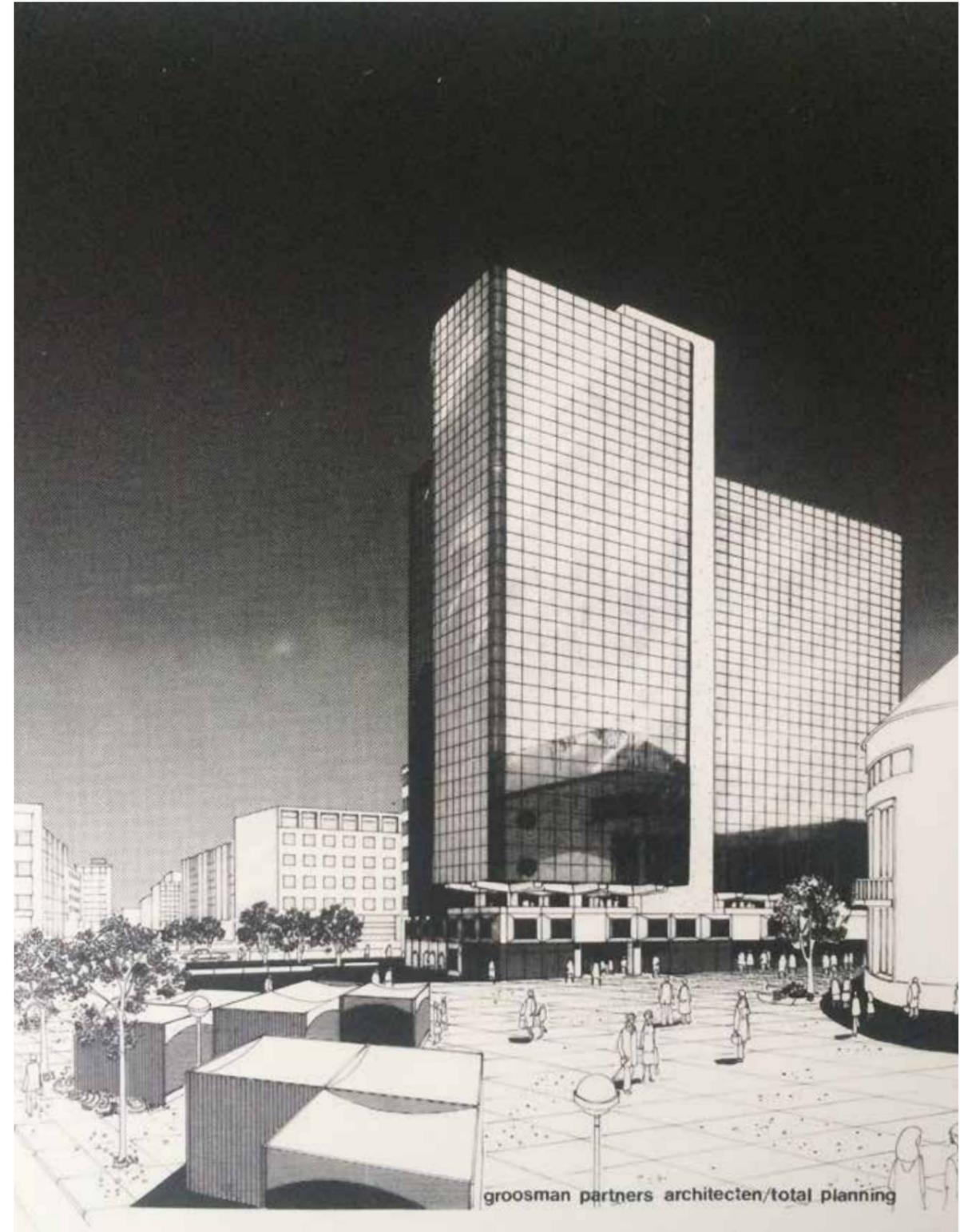
CASE STUDY

# COOLSE POORT



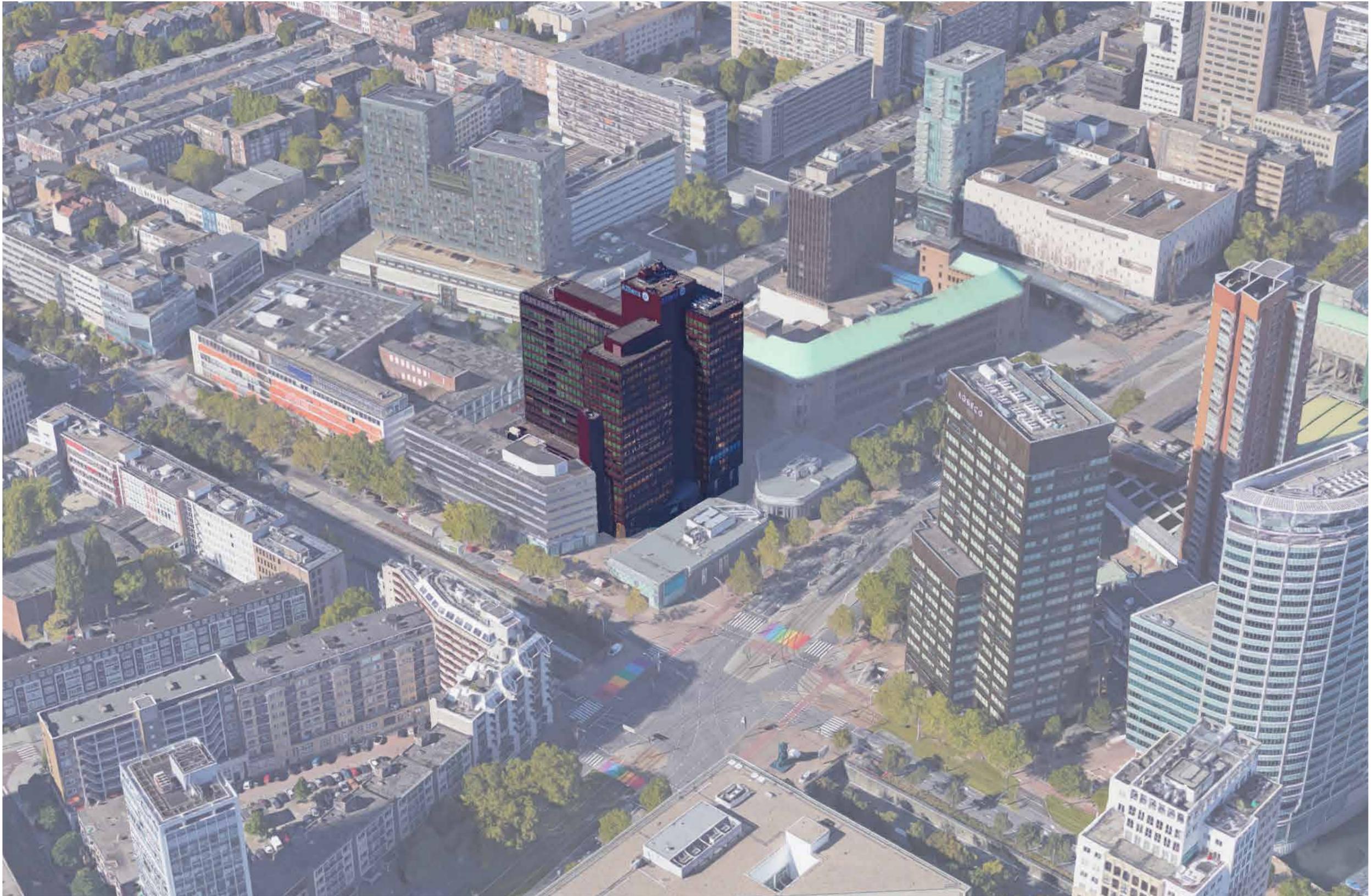
CASE STUDY

# COOLSE POORT



CASE STUDY

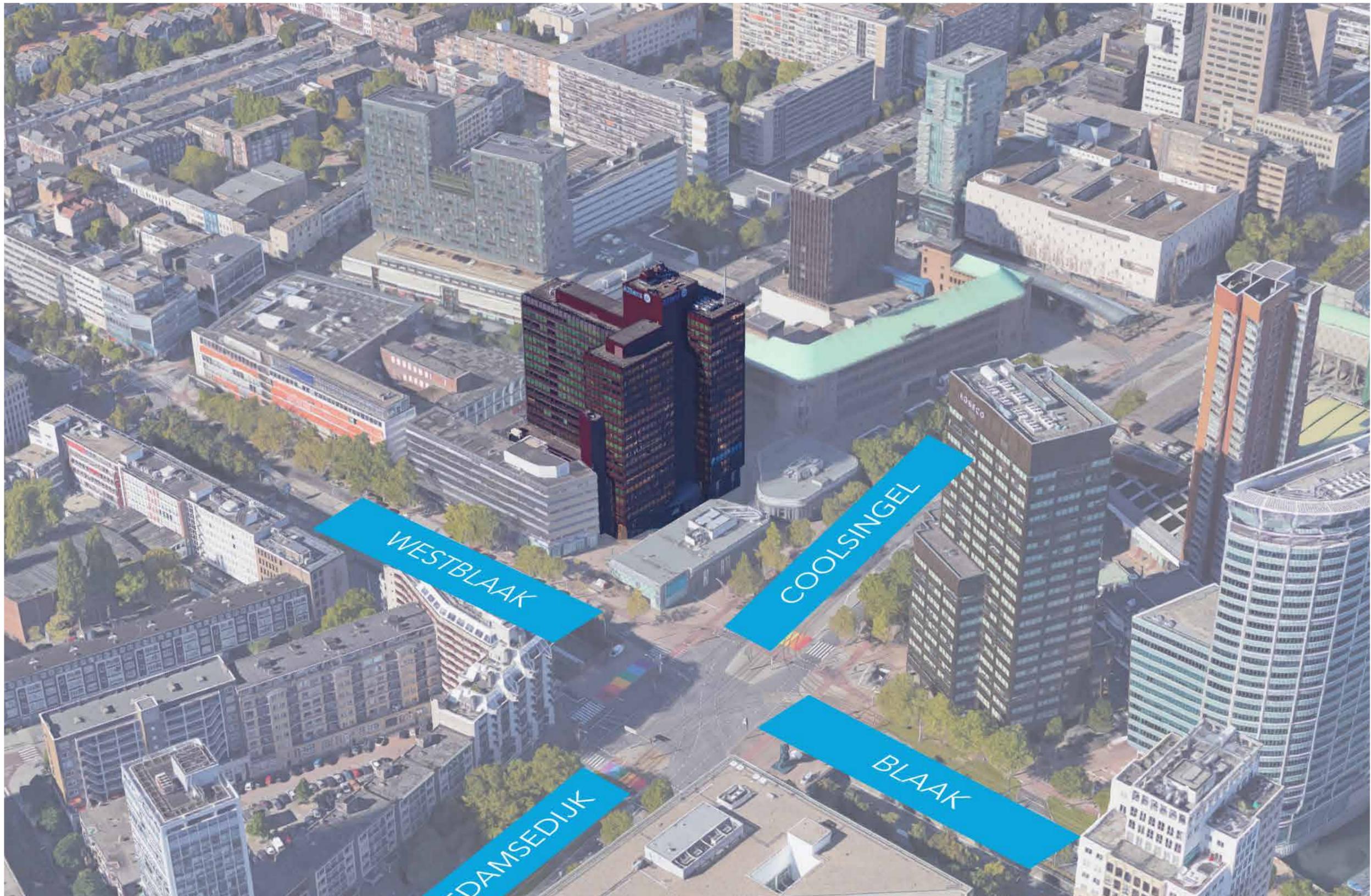
# GEBOUWKEUZE



SOURCE: GOOGLE EARTH

CASE STUDY

# 'RIGHT IN THE CENTRE'



SOURCE: GOOGLE EARTH

CASE STUDY

# NIEUWE COOLSINGEL



CASE STUDY

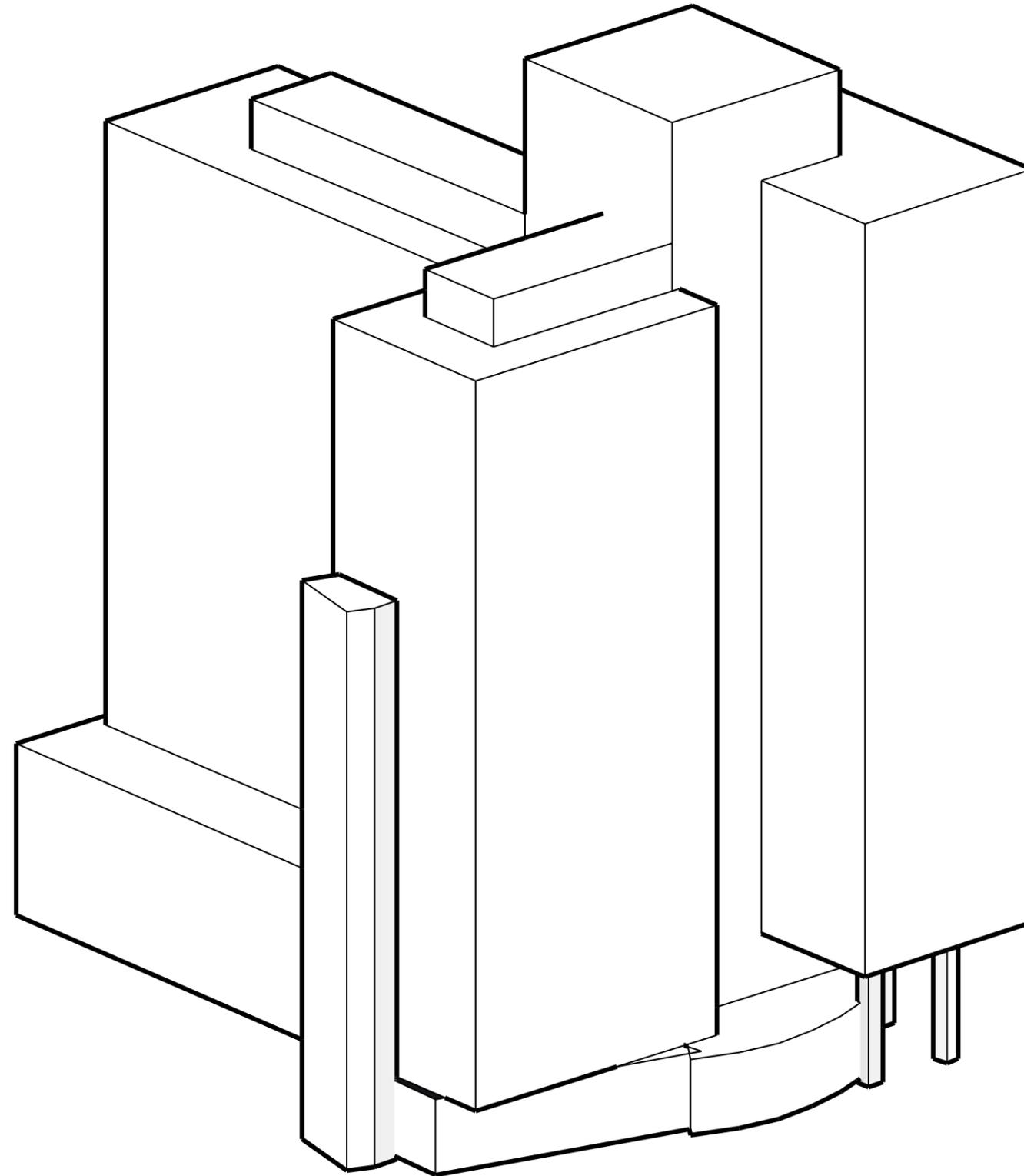
SOURCE: WEST8

# ... OF PUBLIC TRANSPORTATION



SOURCE: GOOGLE EARTH

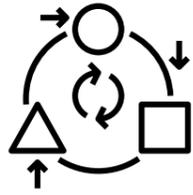
# GEBOUWMASSA



CASE STUDY

# DESIGN CONCEPT

# ONDERZOEKSTHEMA'S



FLEXIBILITEIT



GEBOUW EN CONTEXT



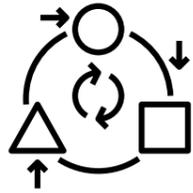
MIX VAN  
FUNCTIES



DUURZAAMHEID

DESIGN CONCEPT

# ONDERZOEKSTHEMA'S



FLEXIBILITEIT



MIX VAN  
FUNCTIES

## Housing the unknown future

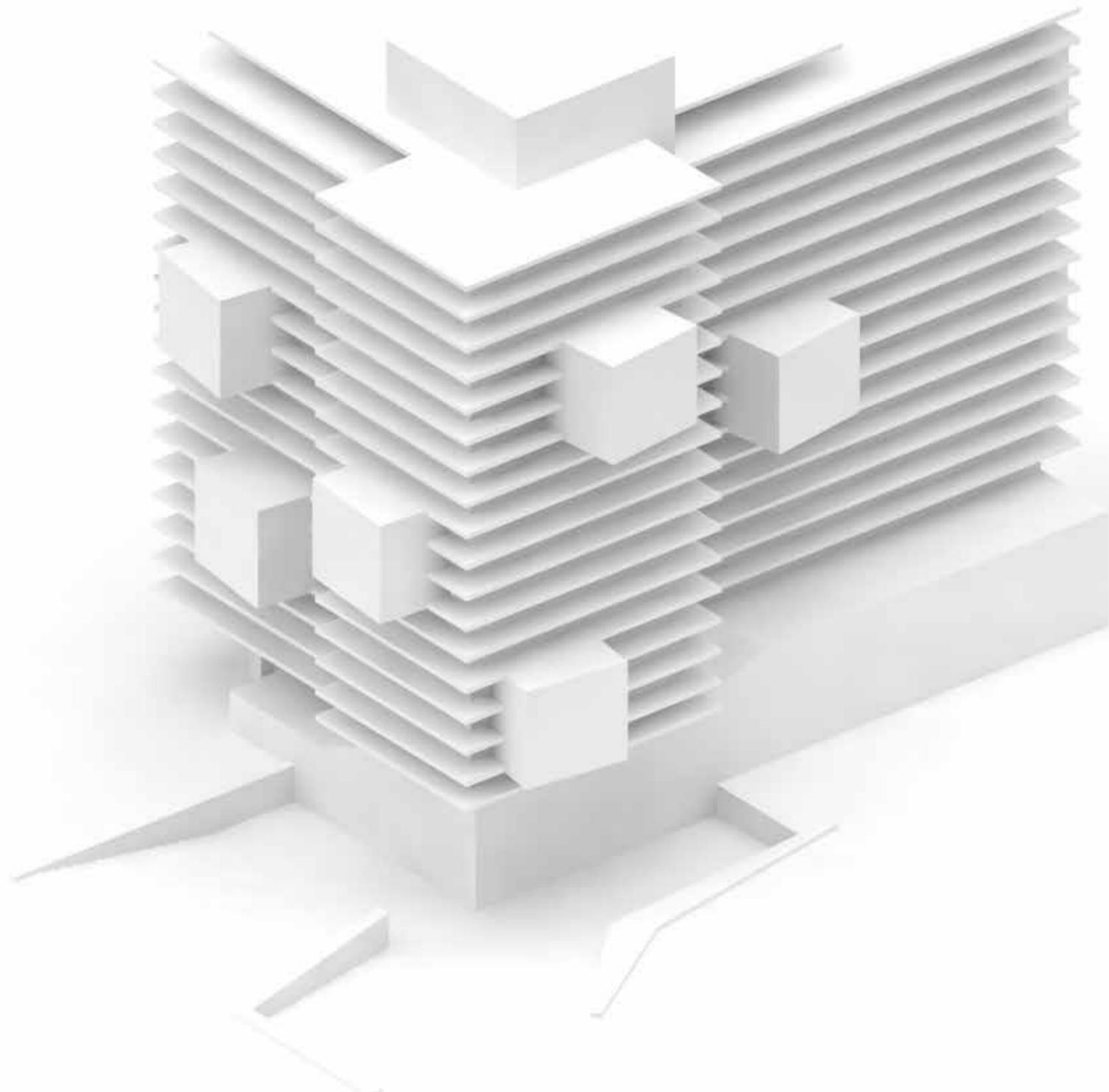
Towards adaptability in vacant office transformation

Niels Buring, 4089049

Architectural Engineering Graduation Studio

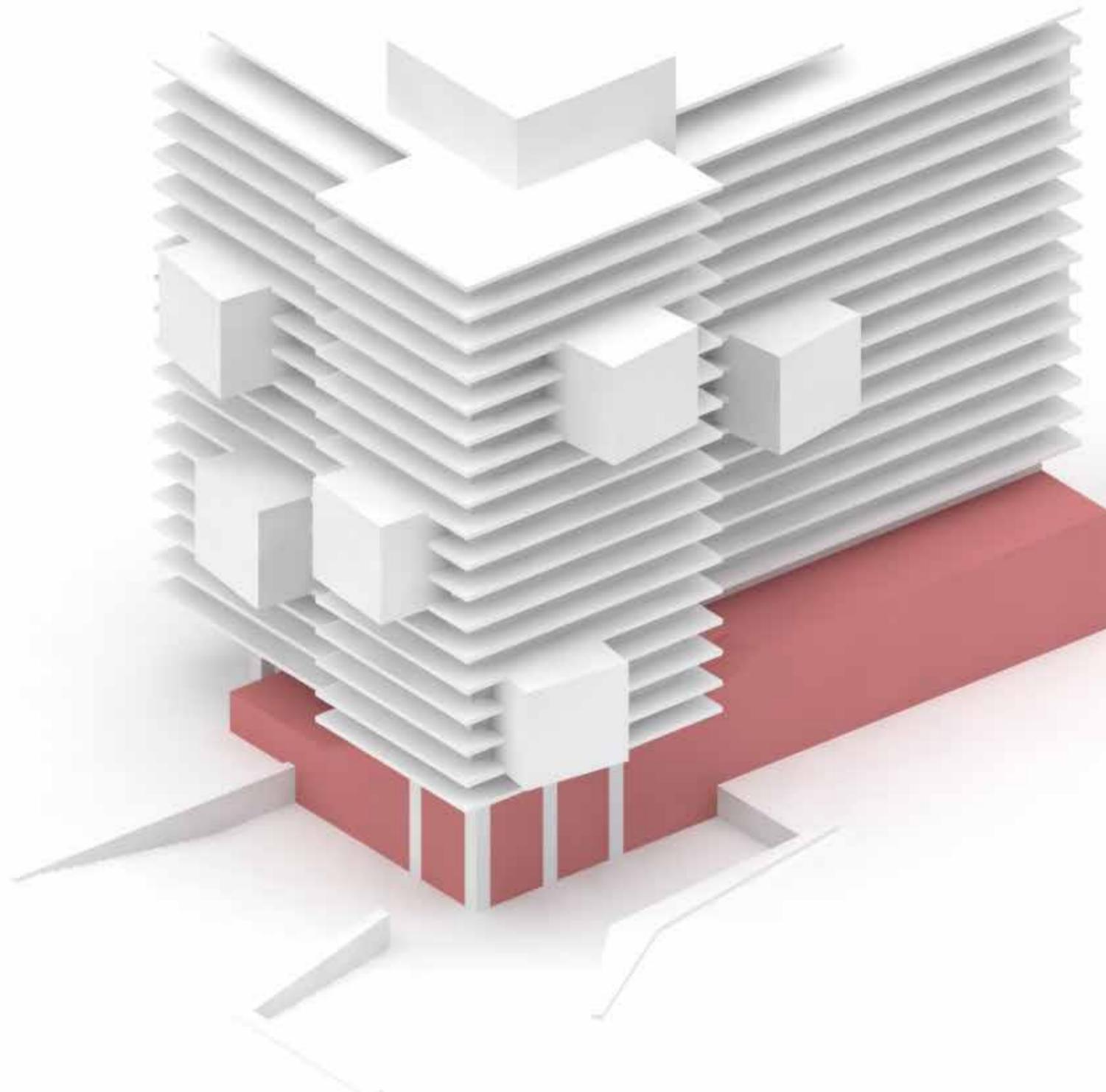
DESIGN CONCEPT

# GEBOUWDELEN



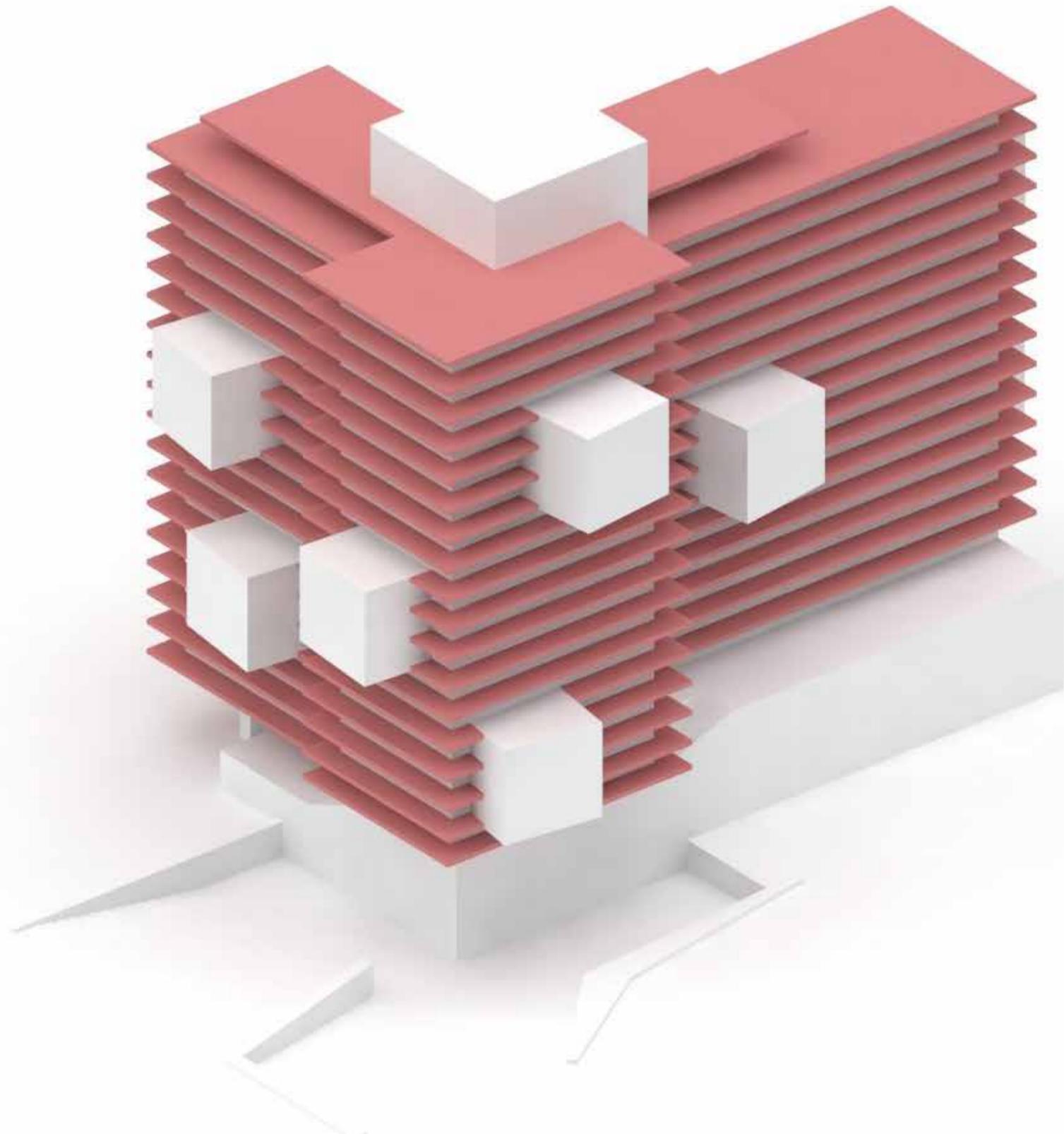
DESIGN CONCEPT

# HORIZONTALE CONNECTIE



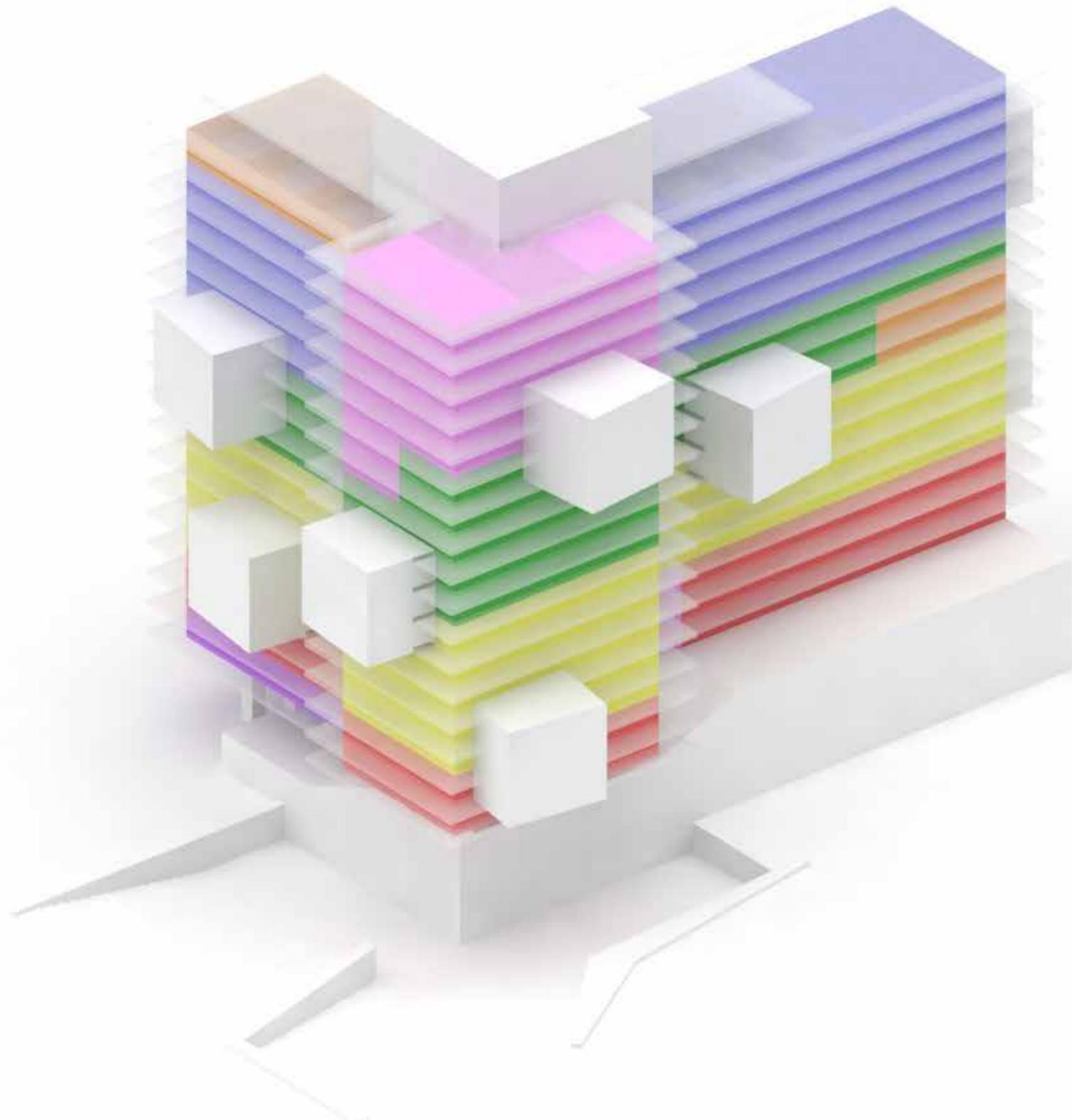
DESIGN CONCEPT

# FLEXIBELE UITBREIDING



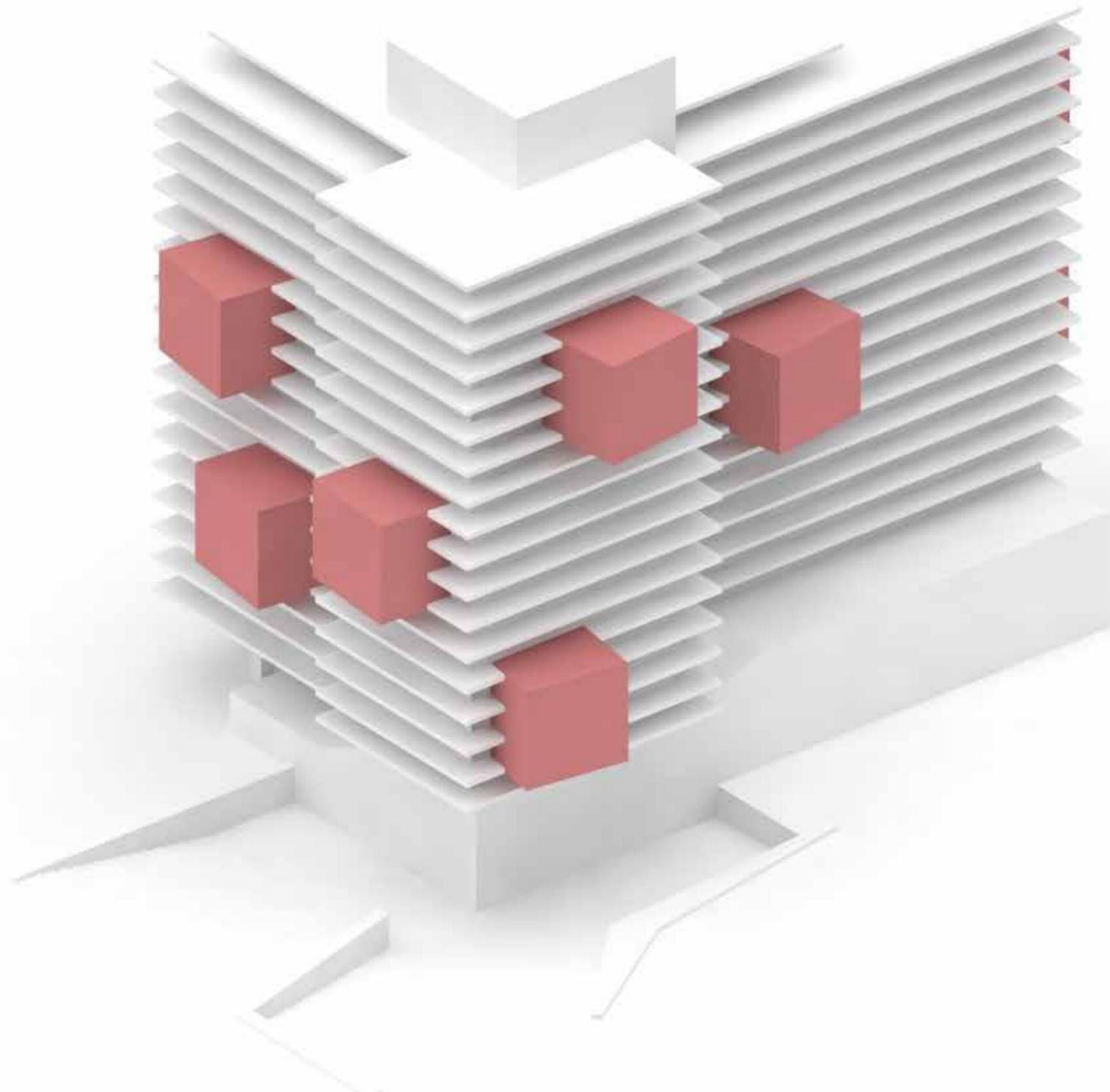
DESIGN CONCEPT

# VERTICALE STAD



DESIGN CONCEPT

# POCKETS

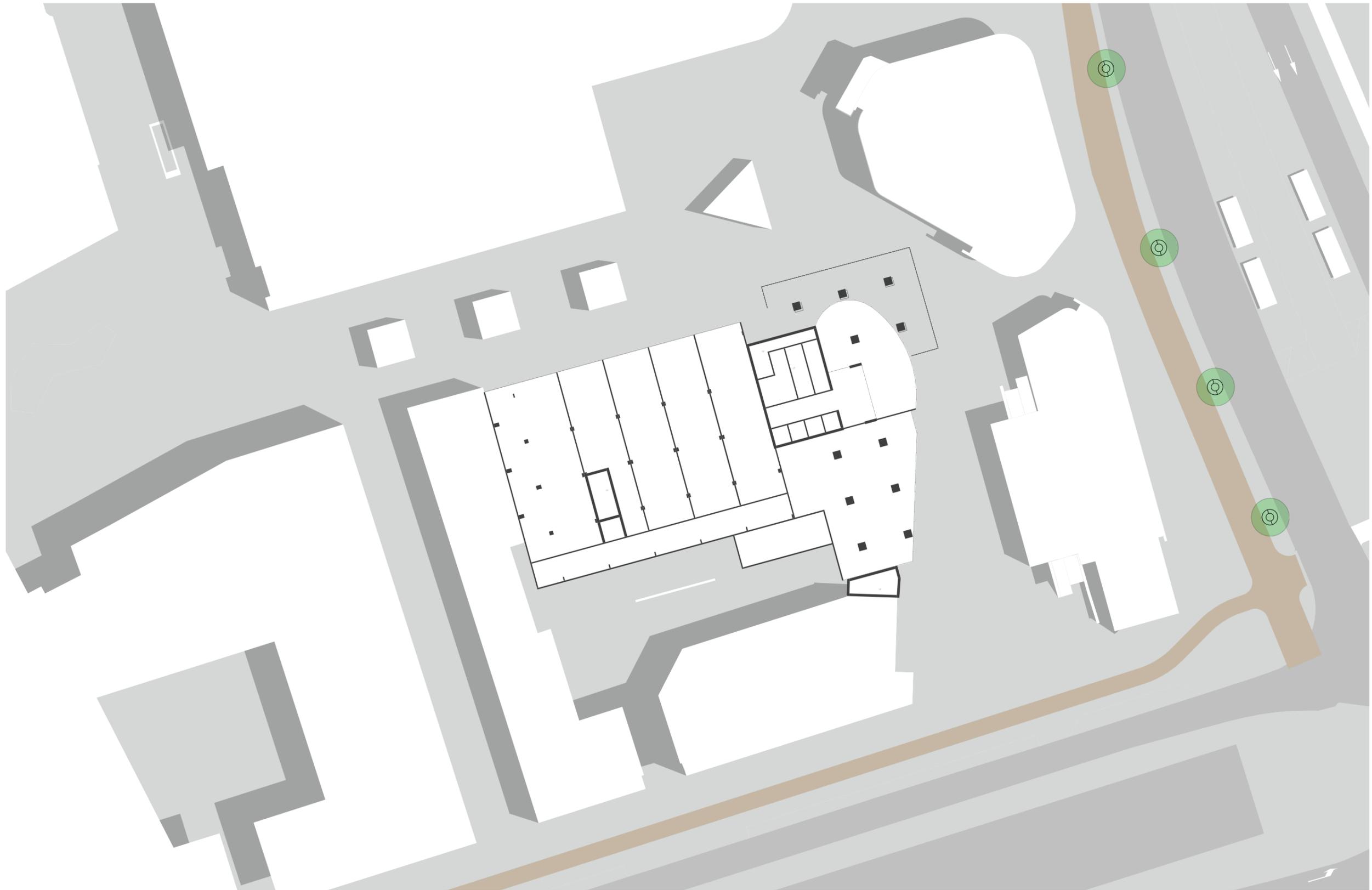


DESIGN CONCEPT

**HORIZONTALALE CONNECTIE**

# STEDENBOUWKUNDIGE SITUATIE

BESTAAND



HORIZONTALE CONNECTIE

# STEDENBOUWKUNDIGE SITUATIE

BESTAAND



HORIZONTALLE CONNECTIE

SOURCE: LOCATION VISIT

# STEDENBOUWKUNDIGE SITUATIE

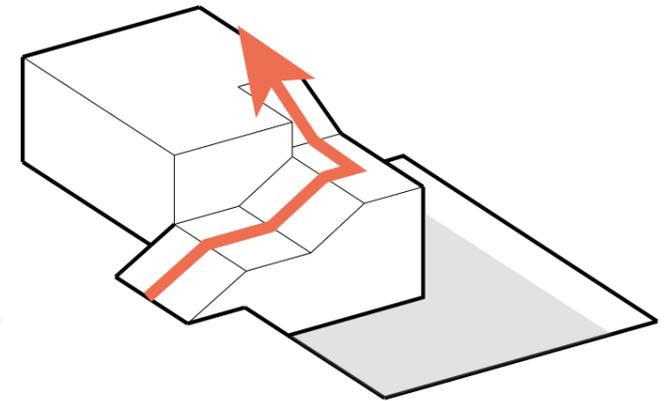
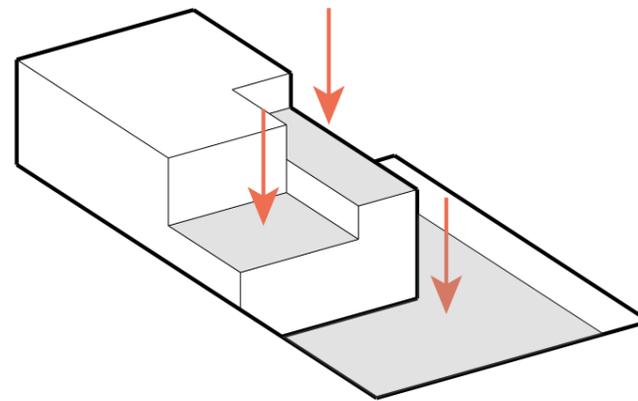
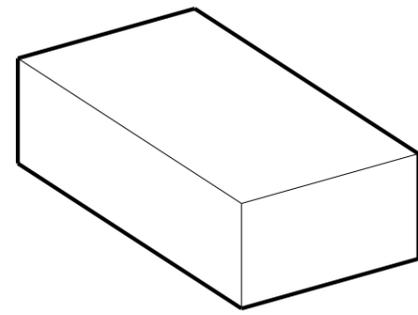
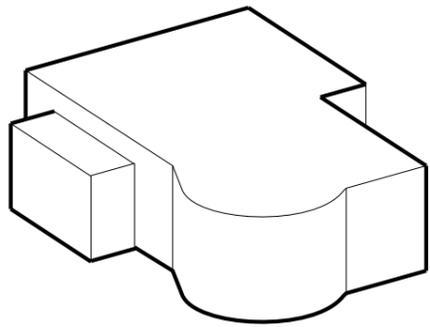
BESTAAND



HORIZONTALE CONNECTIE

SOURCE: LOCATION VISIT

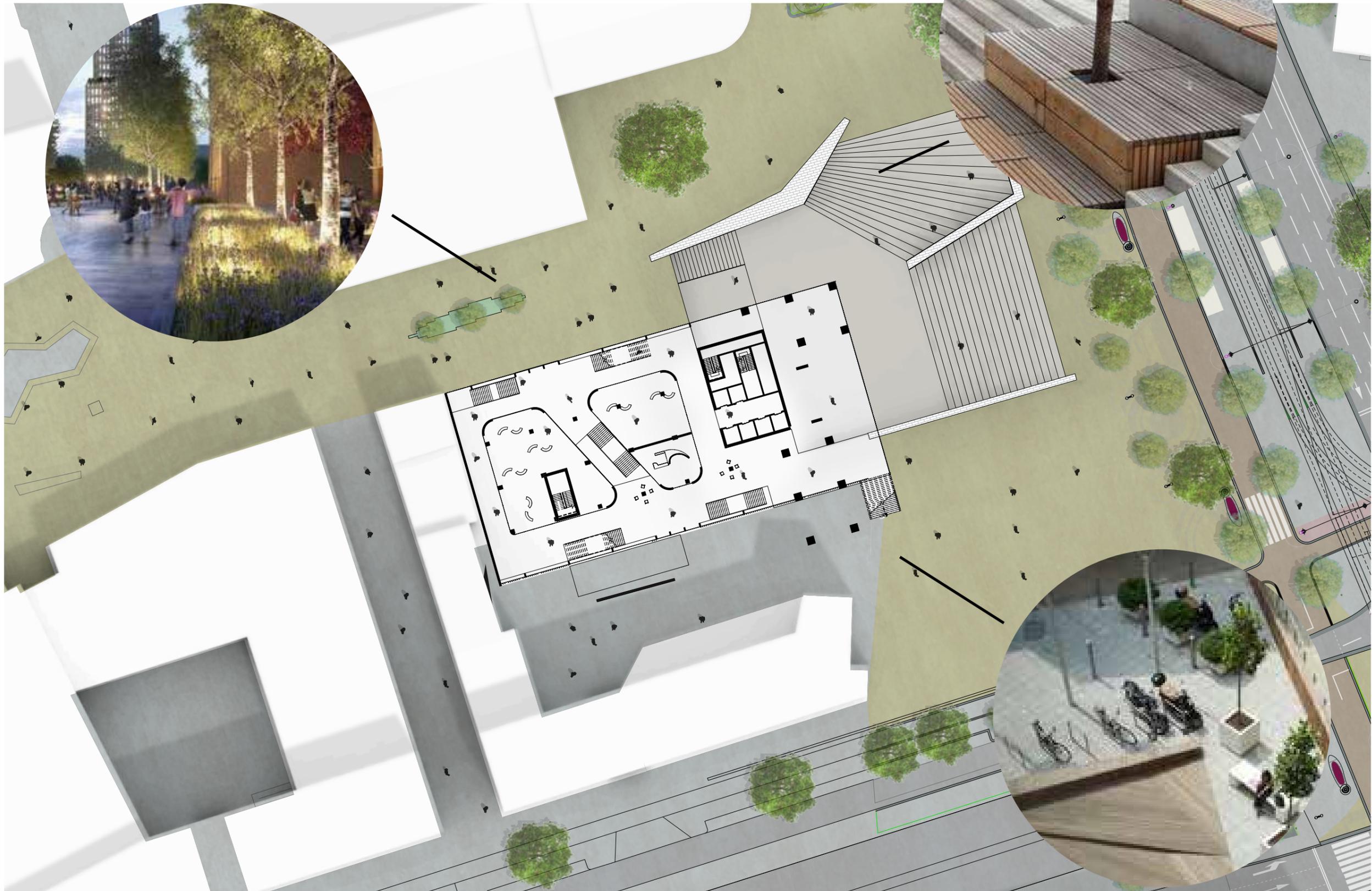
# MASSACONCEPT



HORIZONTALE CONNECTIE

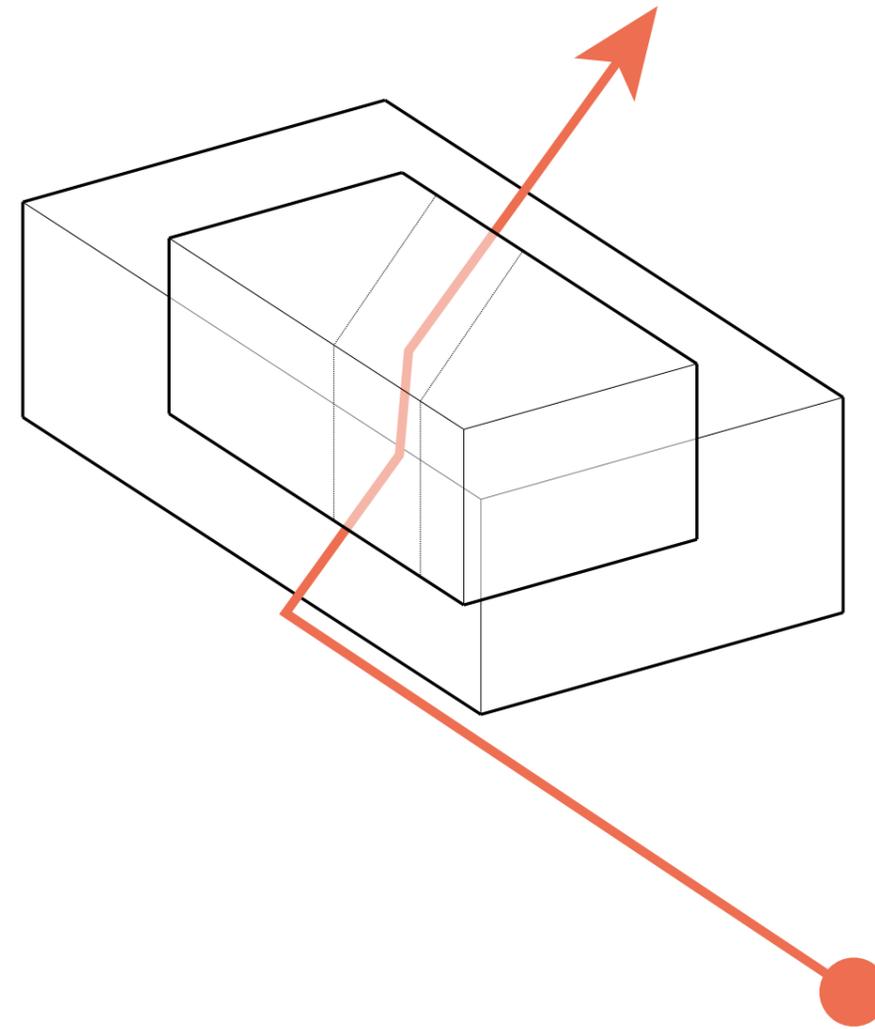
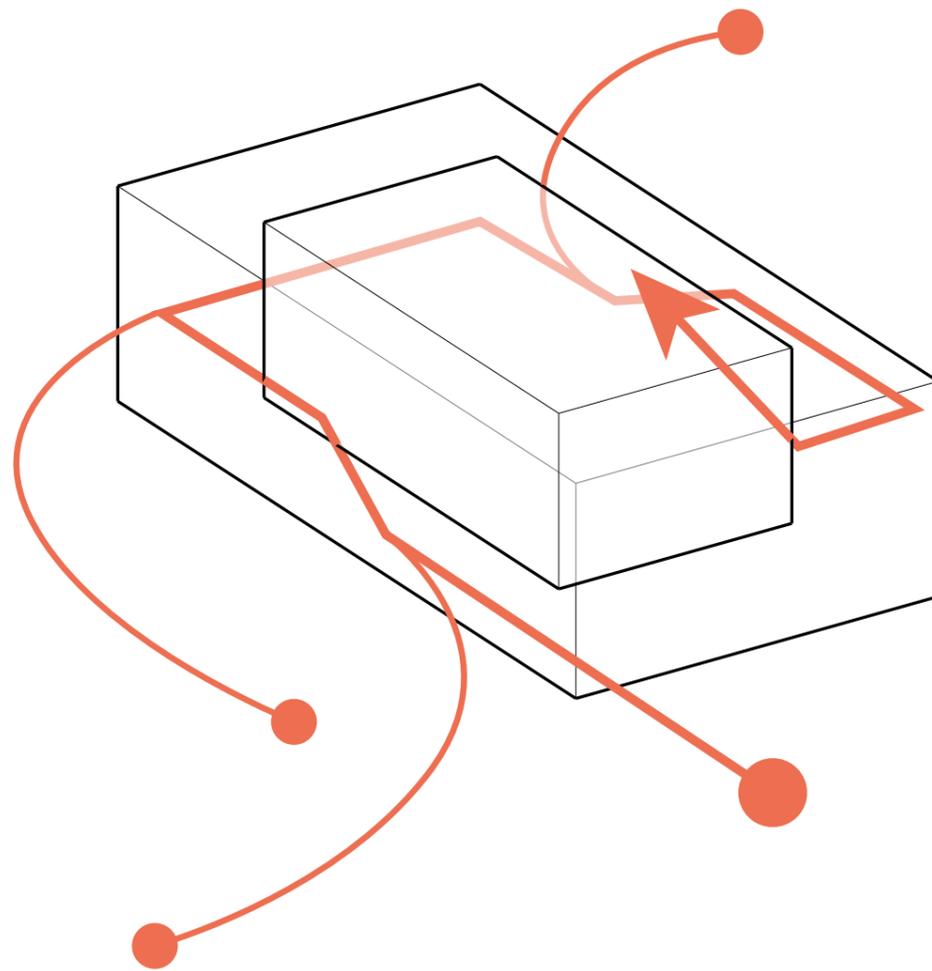
# STEDENBOUWKUNDIGE SITUATIE

NIEUW



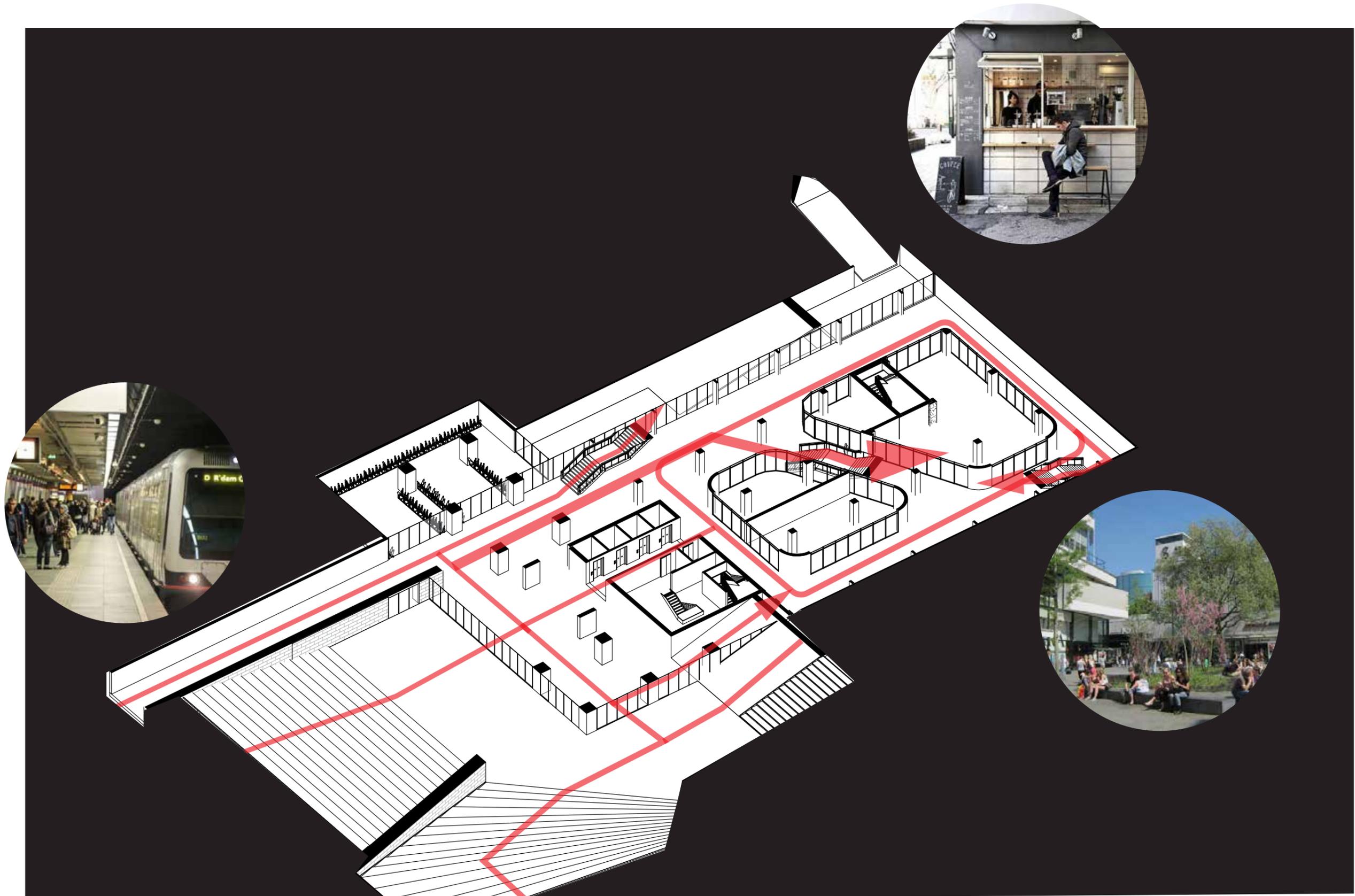
HORIZONTALE CONNECTIE

# ROUTE DOOR DE CONNECTIE



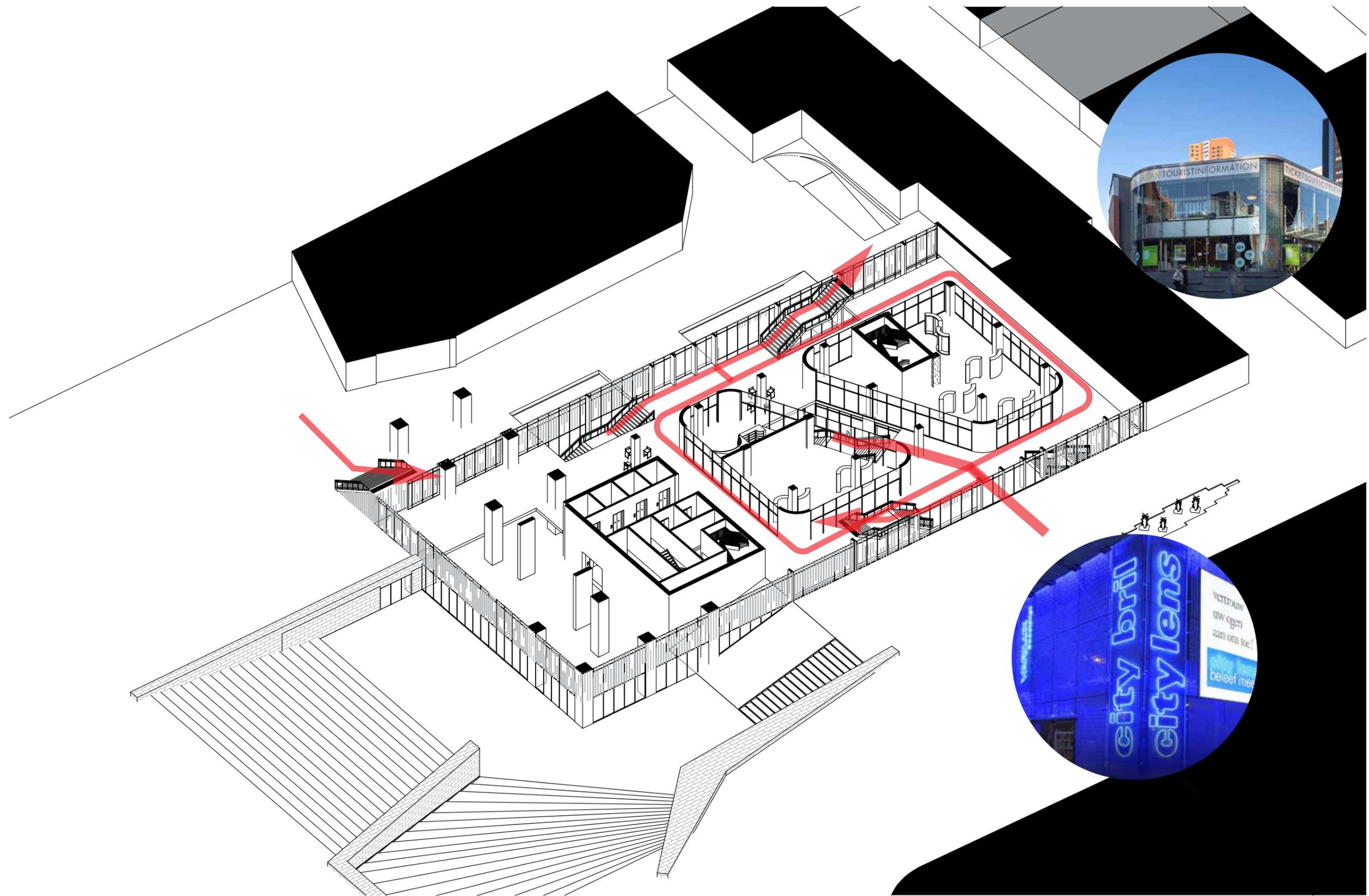
HORIZONTALE CONNECTIE

# KELDER -1



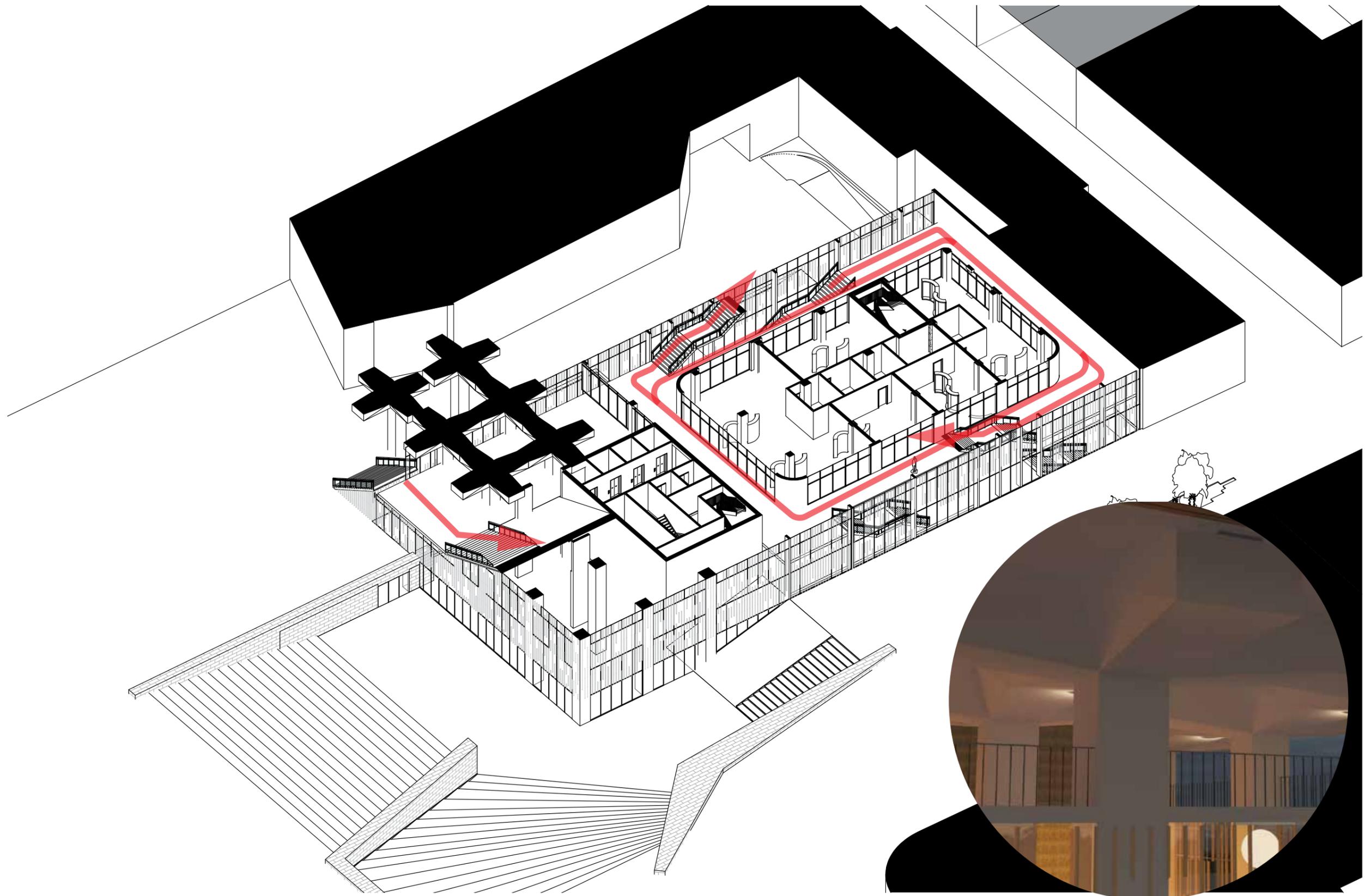
HORIZONTALLE CONNECTIE

# BEGANE GROND



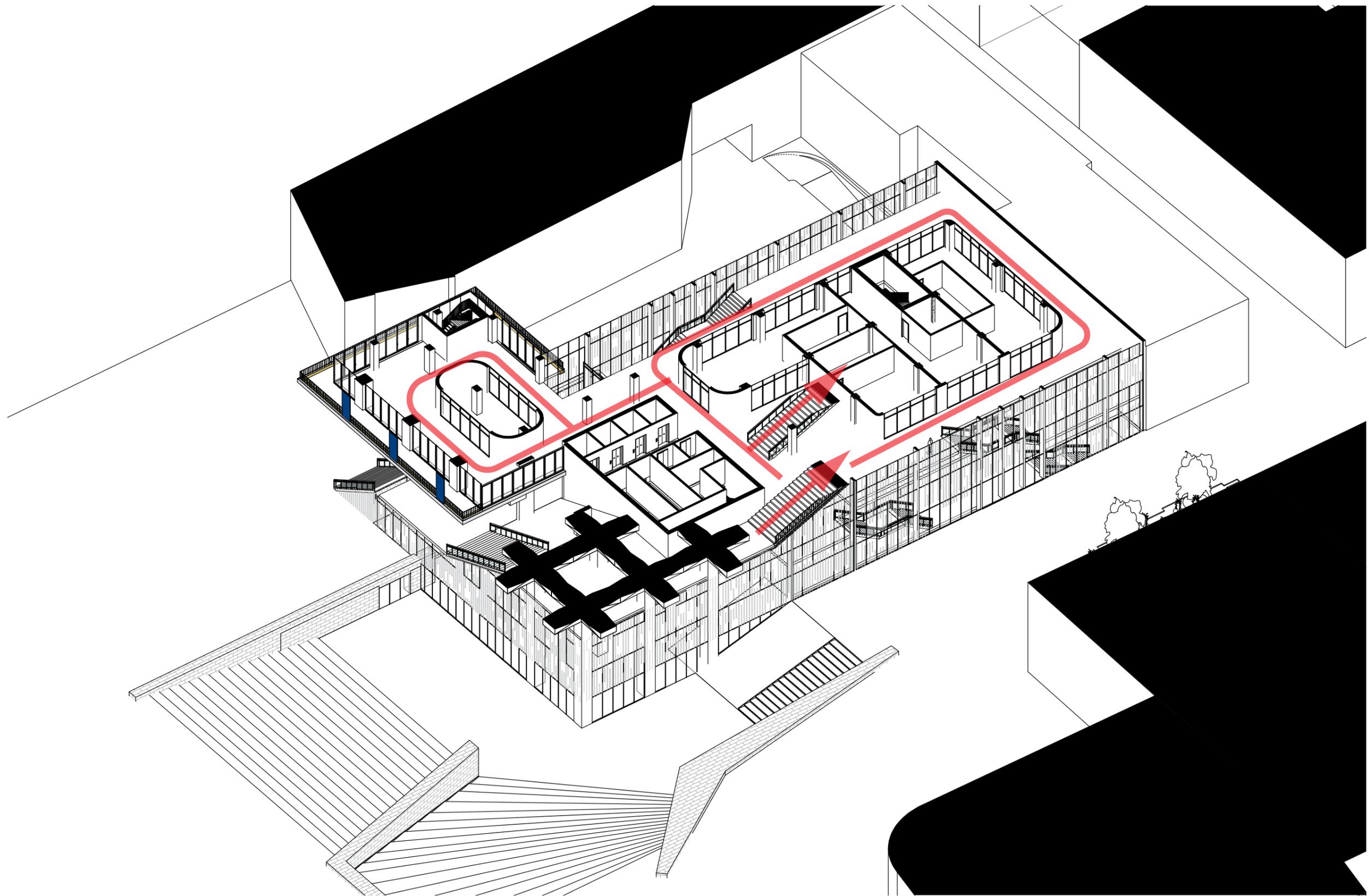
HORIZONTALE CONNECTIE

# EERSTE VERDIEPING



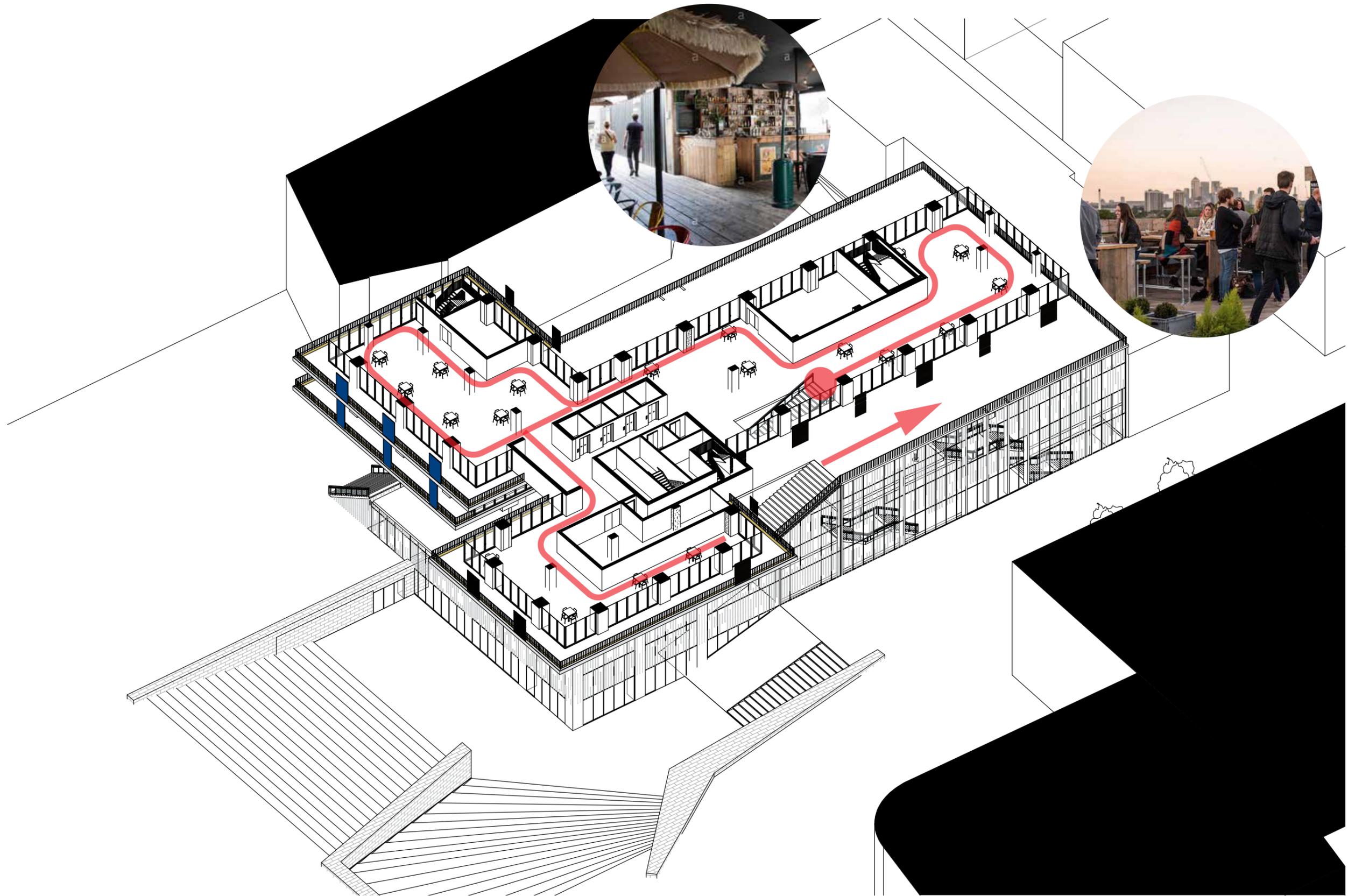
HORIZONTALLE CONNECTIE

# TWEEDE VERDIEPING



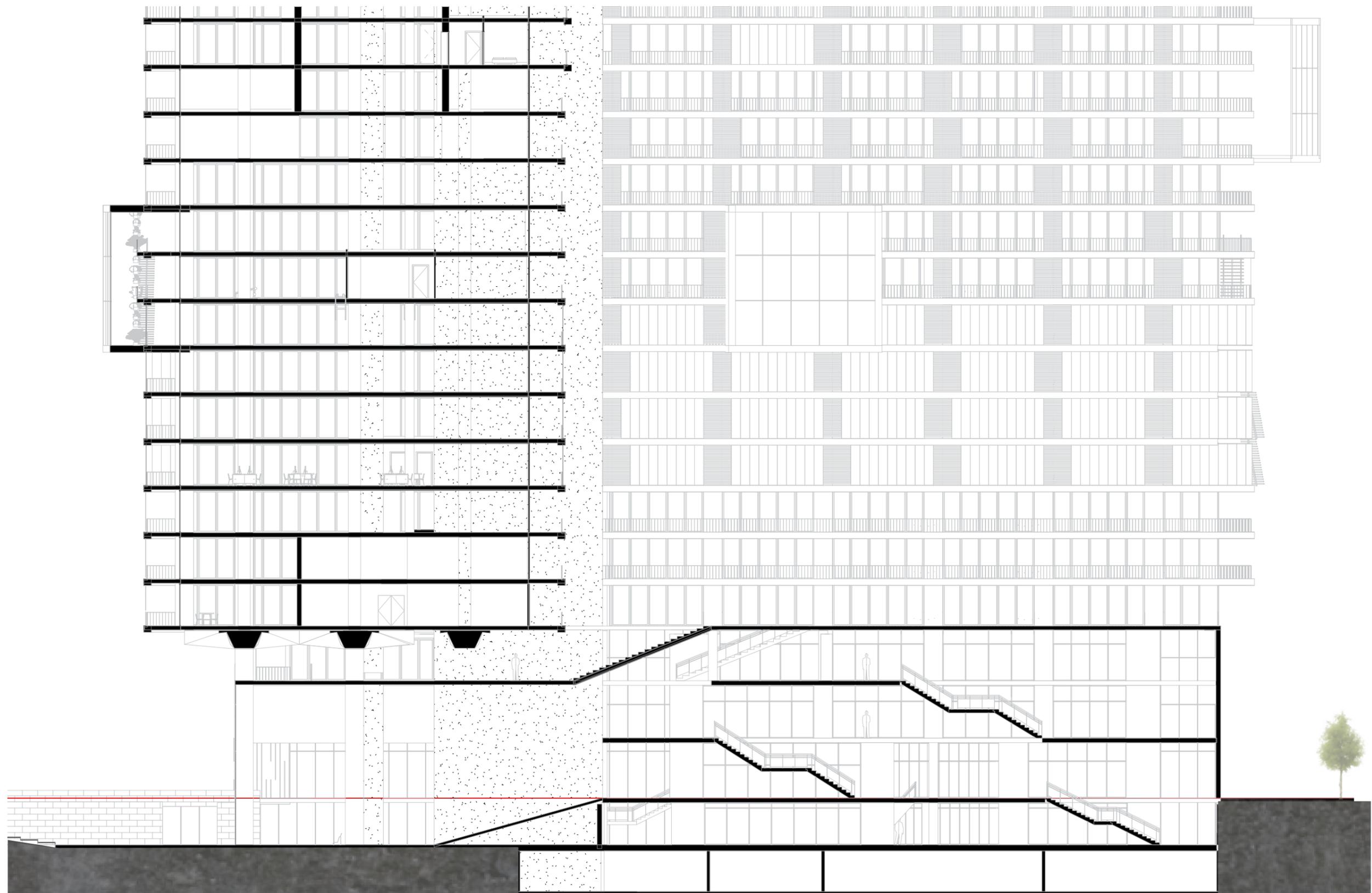
HORIZONTALLE CONNECTIE

# DERDE VERDIEPING



HORIZONTALLE CONNECTIE

# DOORSNEDE



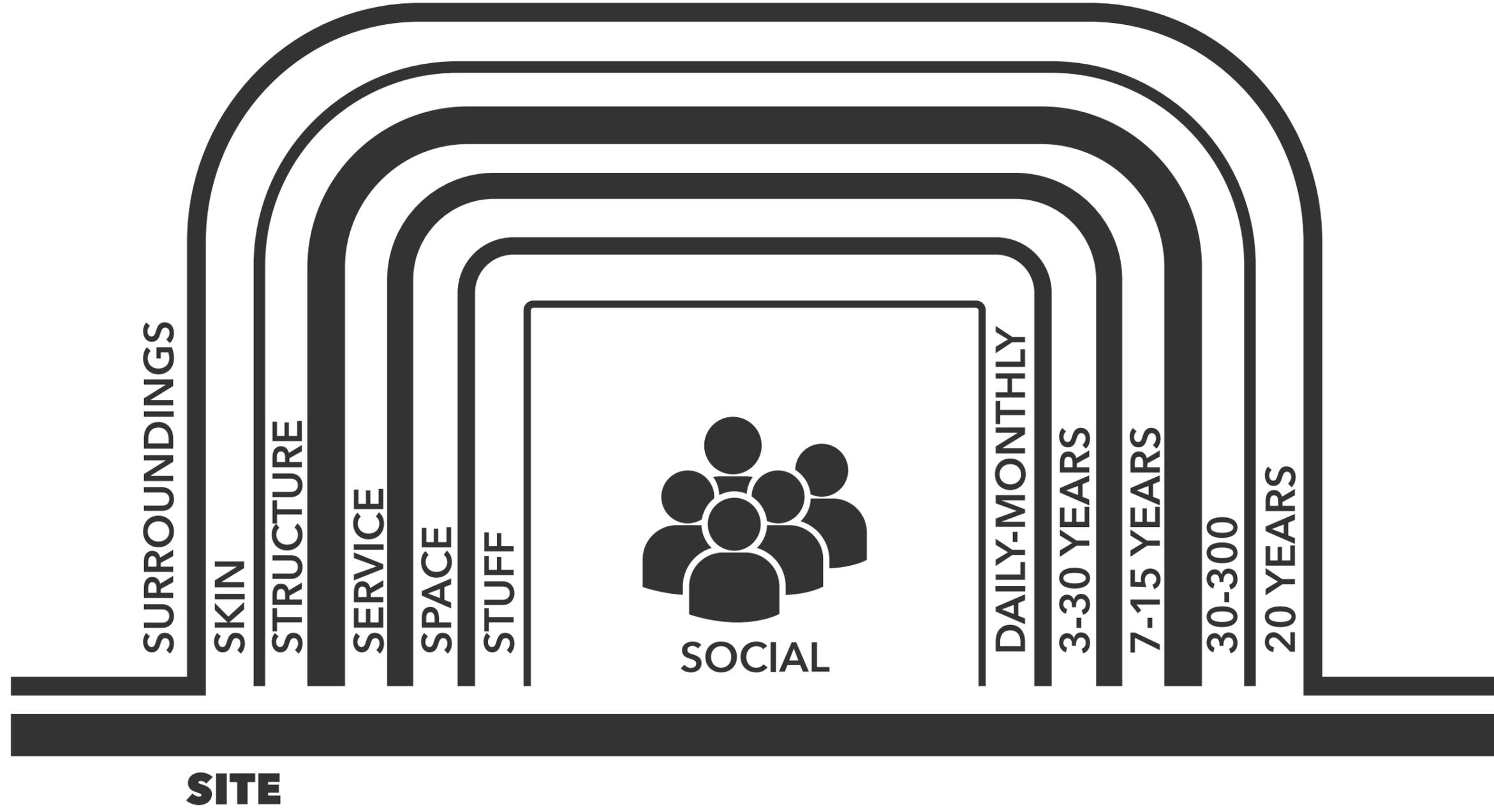
HORIZONTALE CONNECTIE





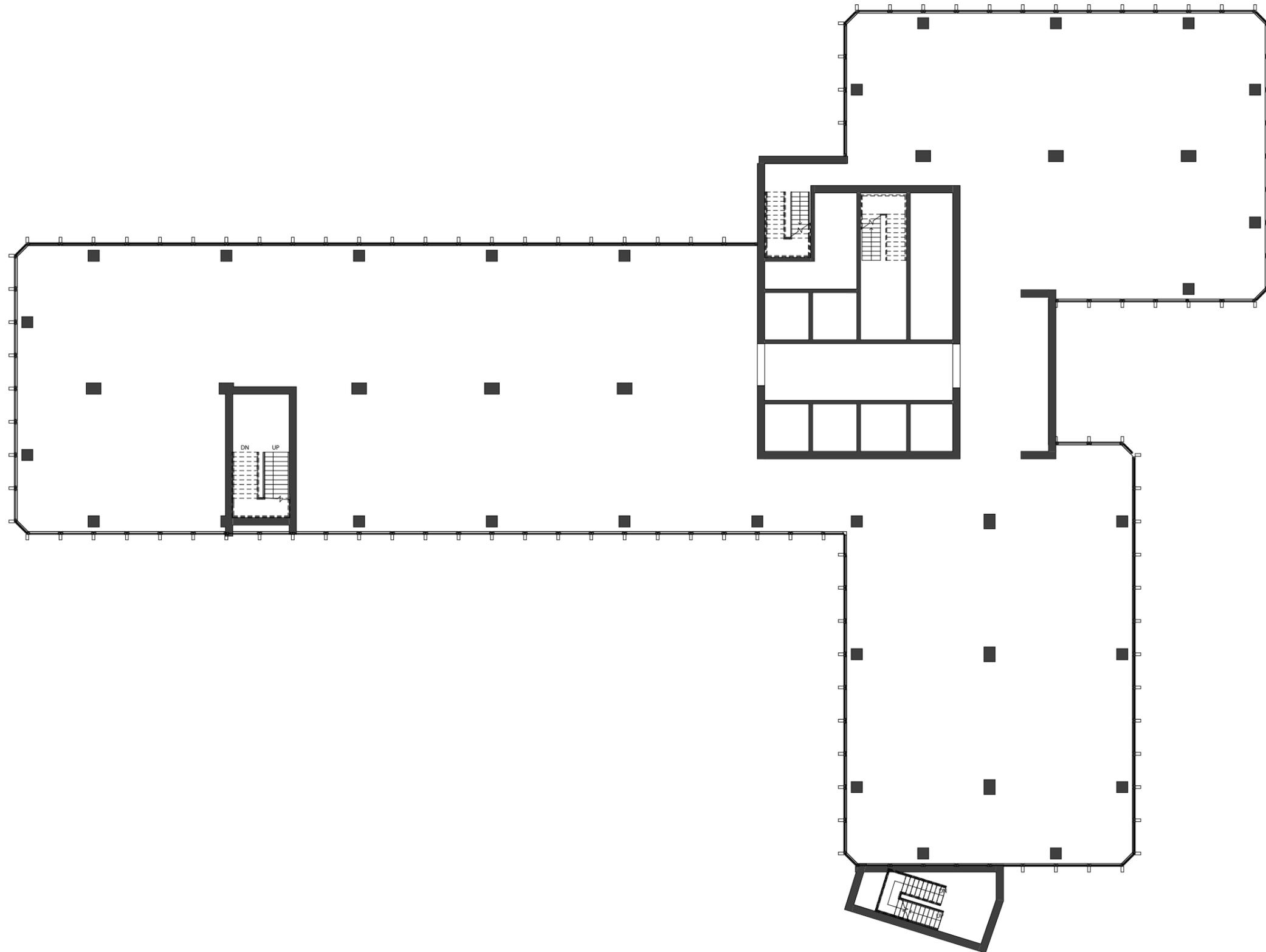
**FLEXIBELE UITBREIDING**

# GEBOUWLAGEN



FLEXIBELE UITBREIDING

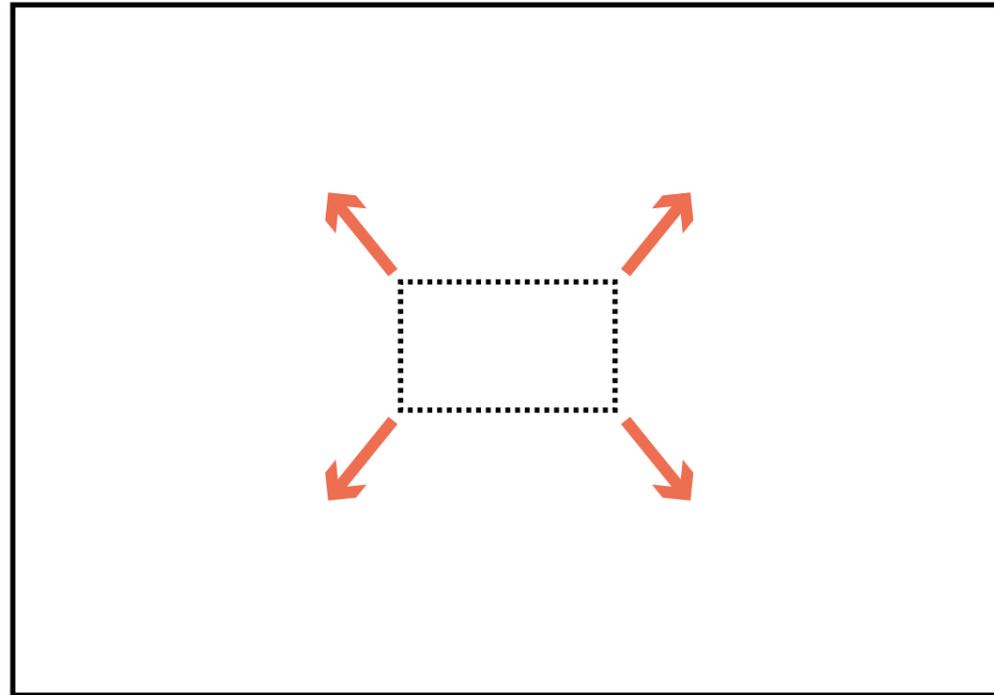
# TYPISCHE PLATTEGROND BESTAAND



FLEXIBELE UITBREIDING

# CONCEPT

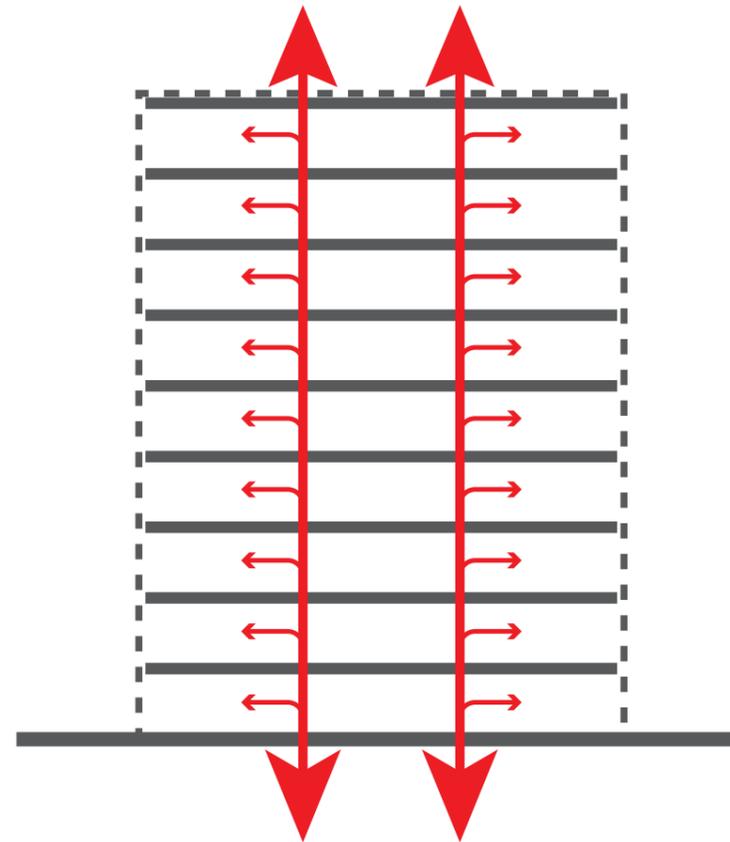
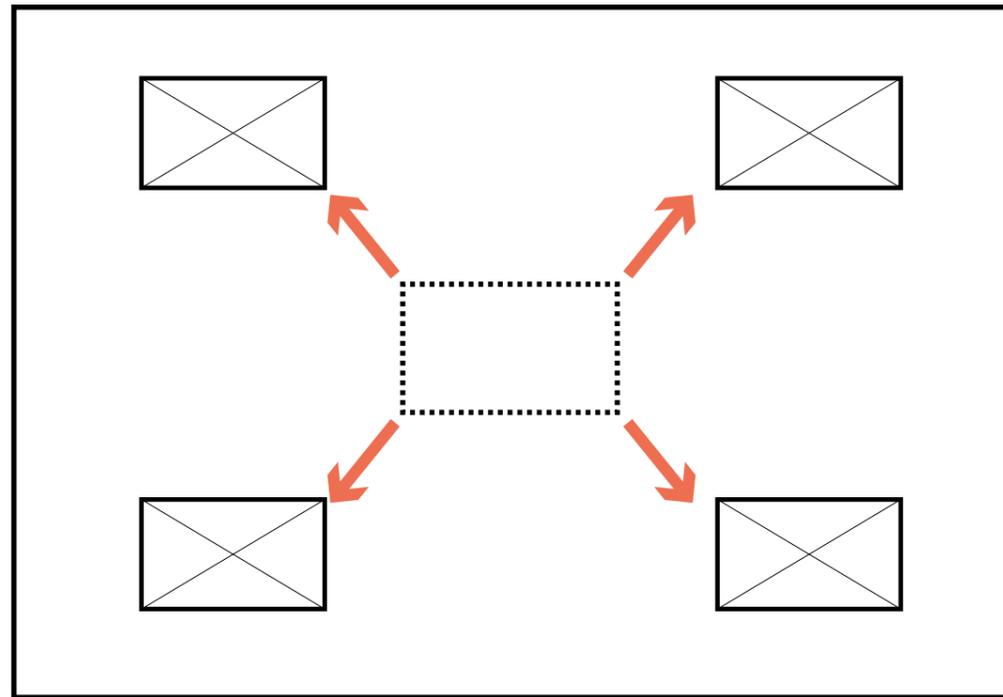
SCHACHTEN



FLEXIBELE UITBREIDING

# CONCEPT

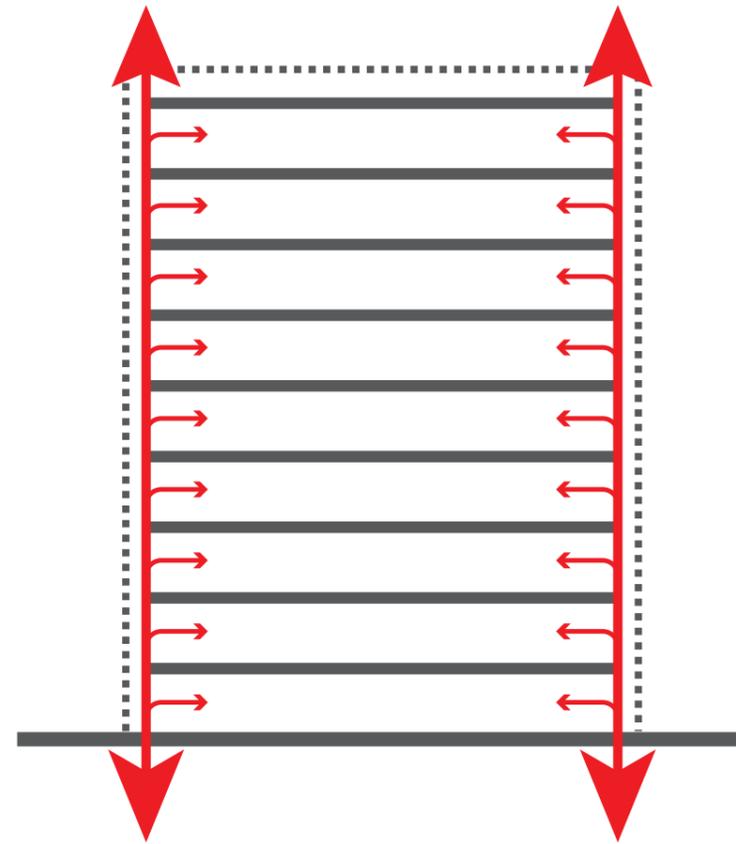
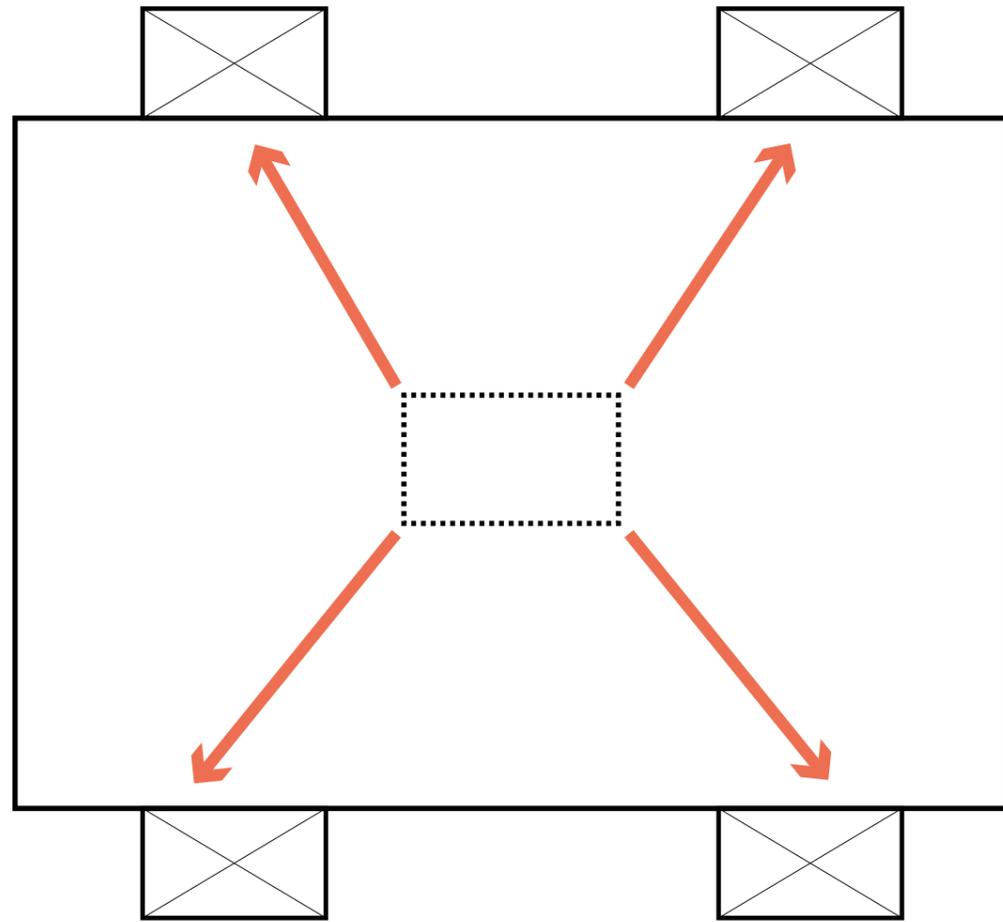
SCHACHTEN



FLEXIBELE UITBREIDING

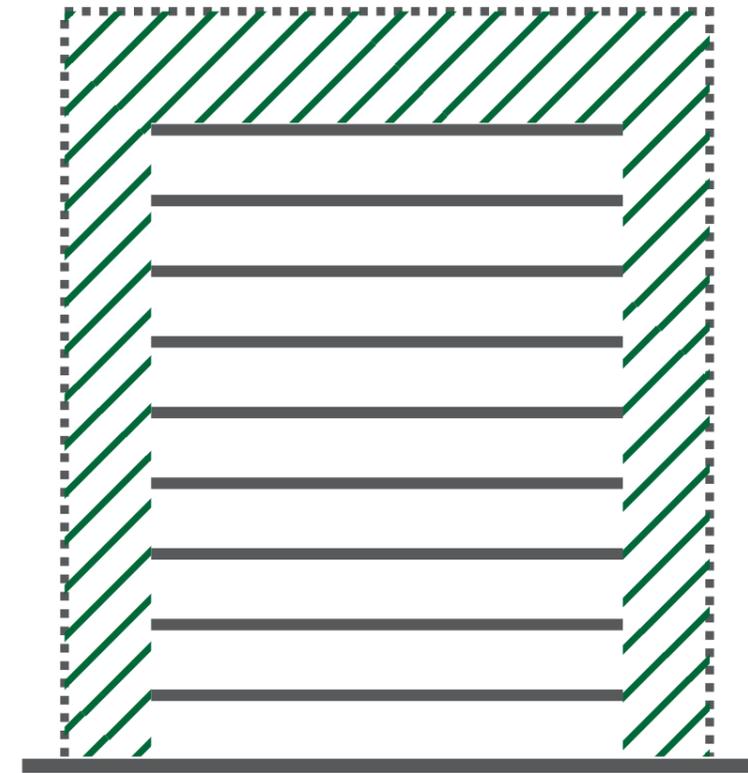
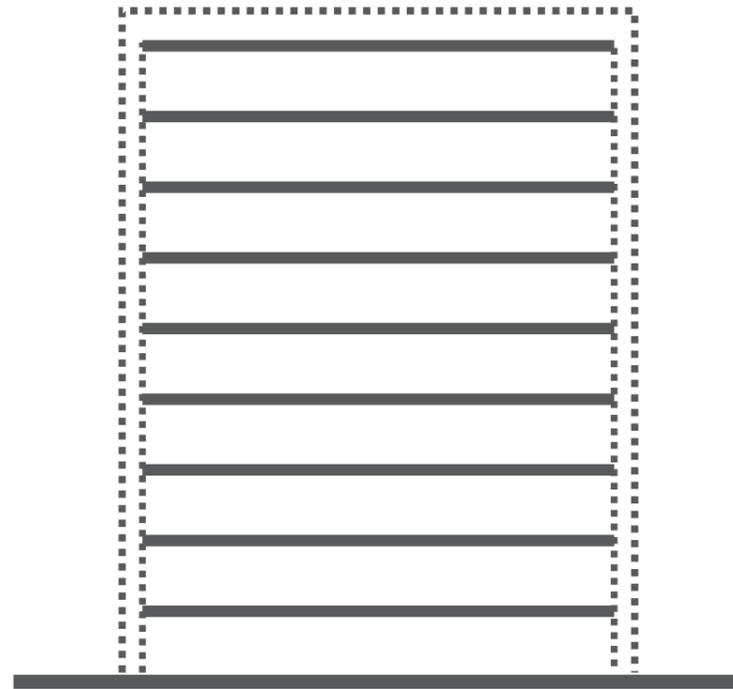
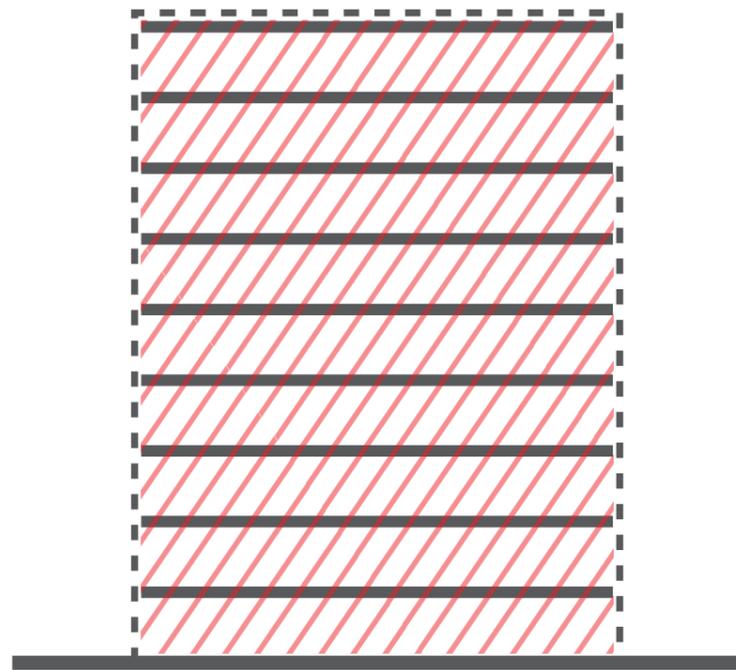
# CONCEPT

SCHACHTEN



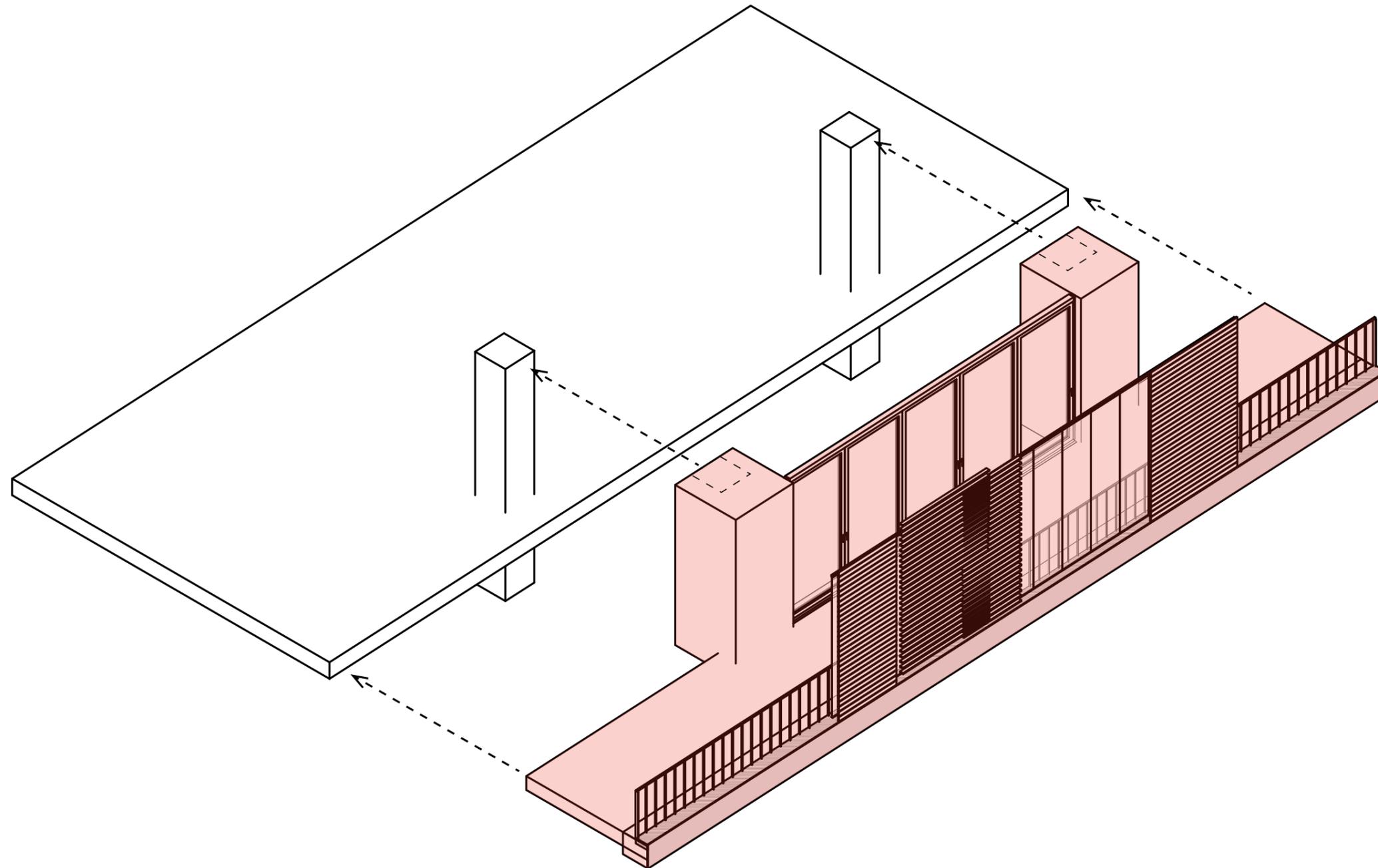
FLEXIBELE UITBREIDING

# CONCEPT



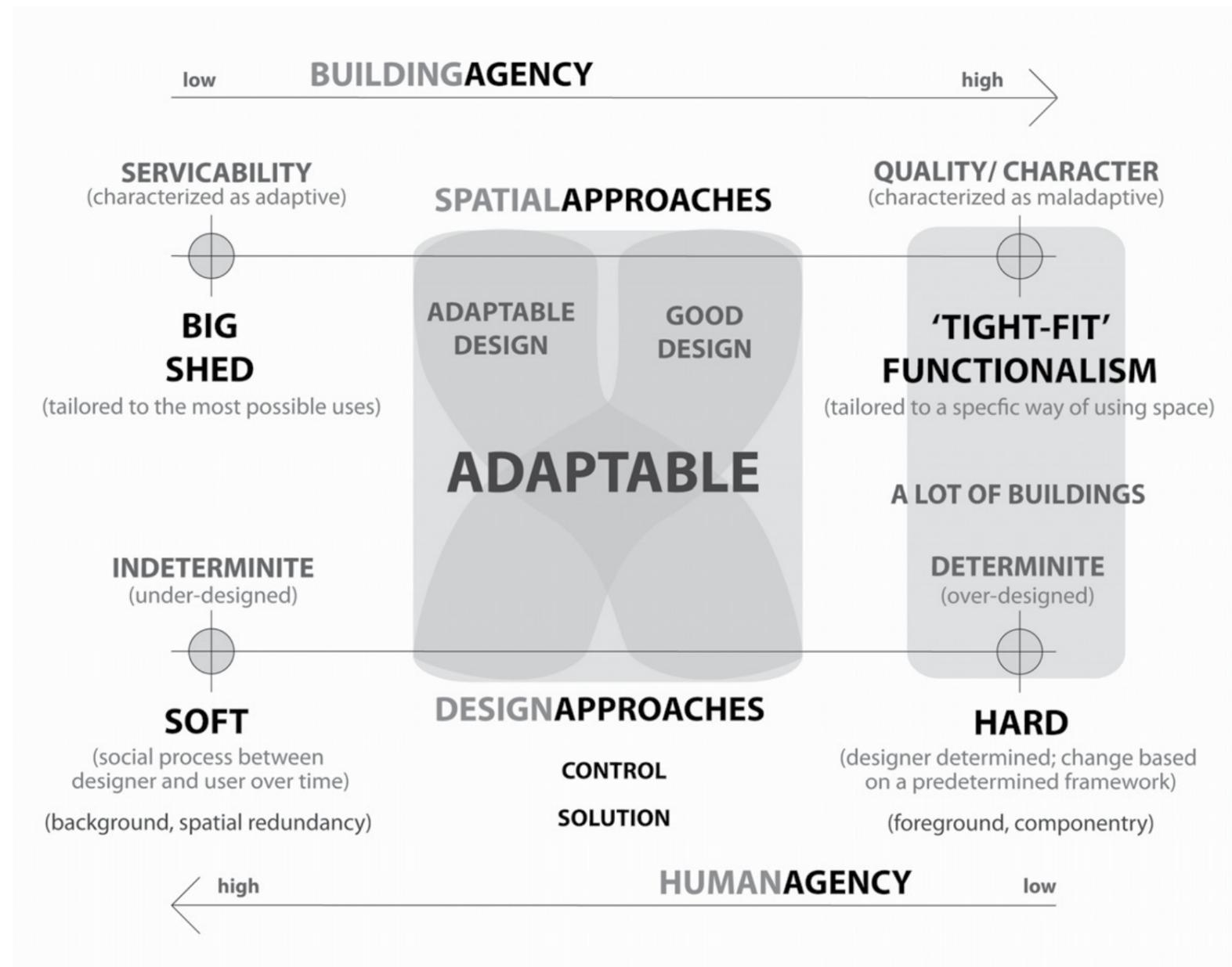
FLEXIBELE UITBREIDING

# FLEXIBELE UITBREIDING



FLEXIBELE UITBREIDING

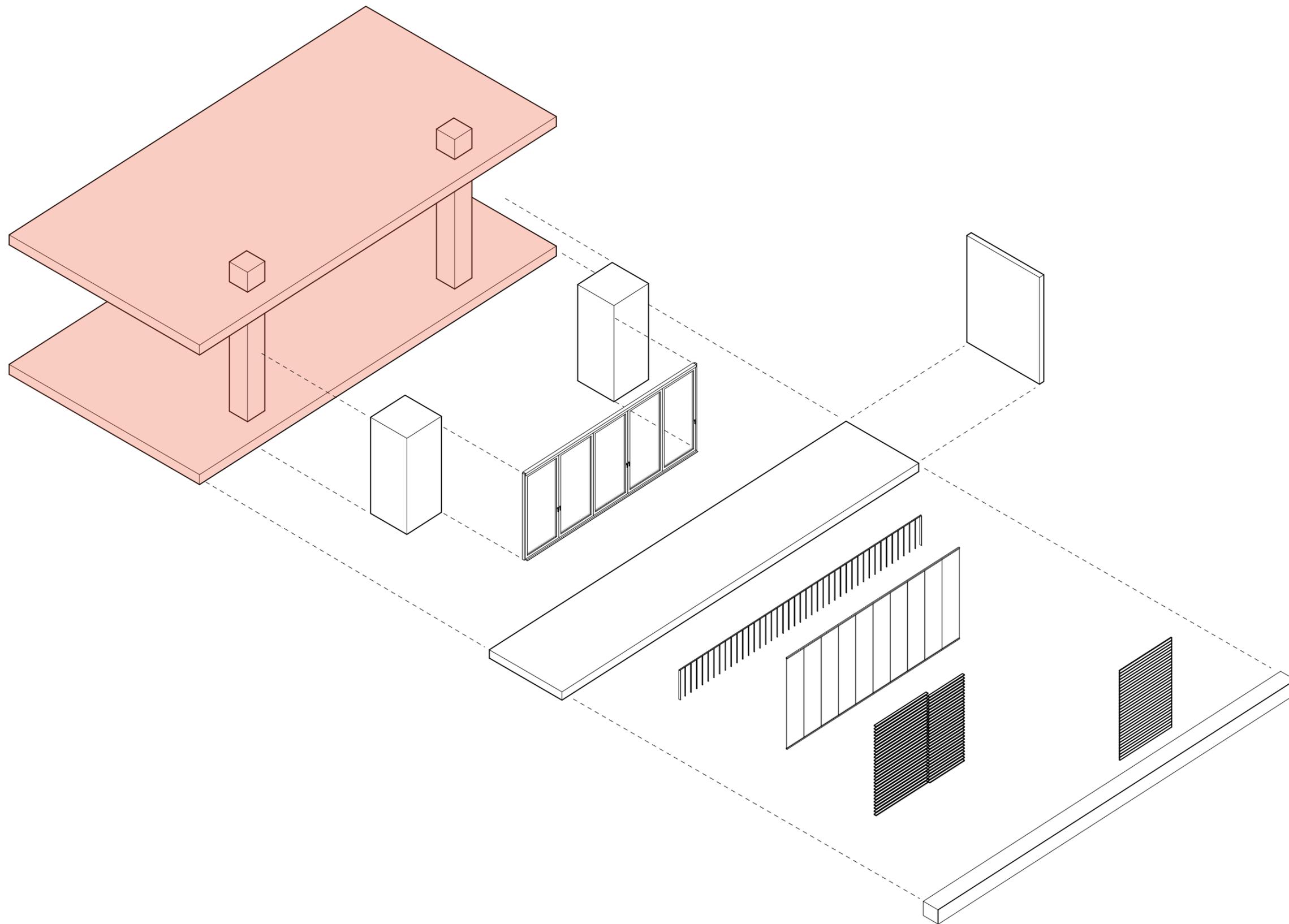
# AANPASBAAR DESIGN



FLEXIBELE UITBREIDING

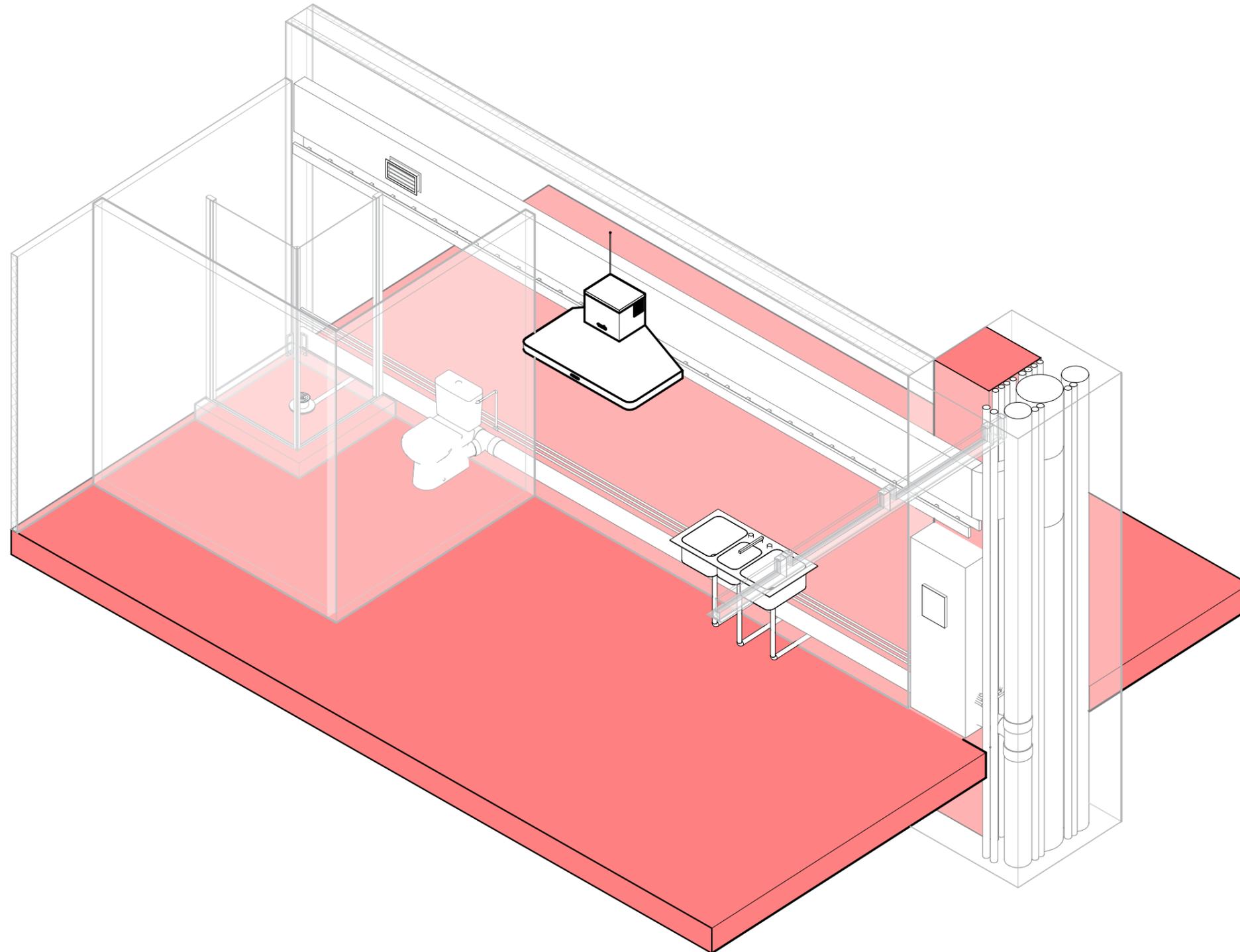
SCHMIDT III, R., EGUCHI, T., AUSTIN, S., & GIBB, A. (2010). WHAT IS THE MEANING OF ADAPTABILITY IN THE BUILDING INDUSTRY. PAPER PRESENTED AT THE 16TH INTERNATIONAL CONFERENCE ON "OPEN AND SUSTAINABLE BUILDING."

# GELAAGDE FACADE



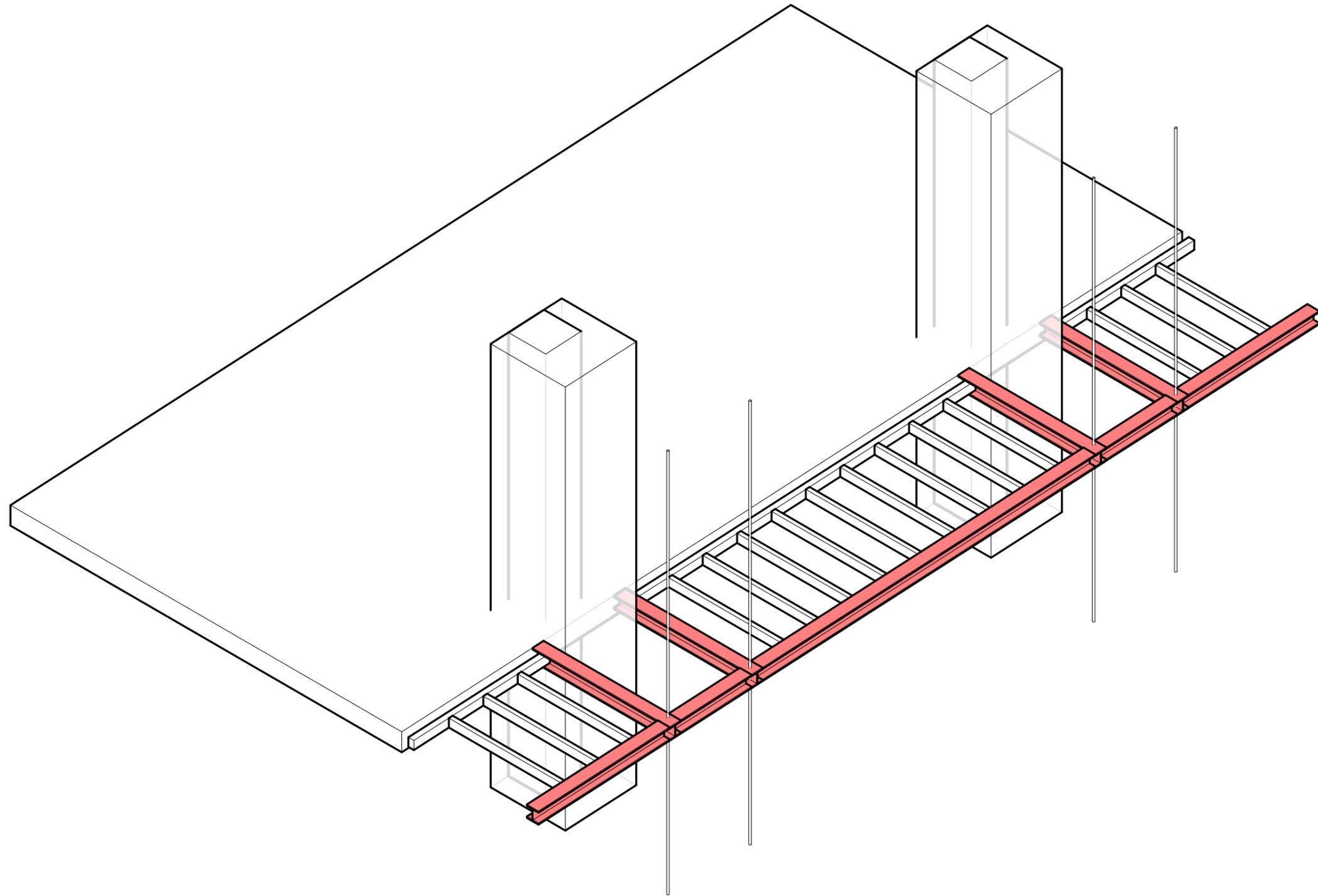
FLEXIBELE UITBREIDING

# SCHACHTEN



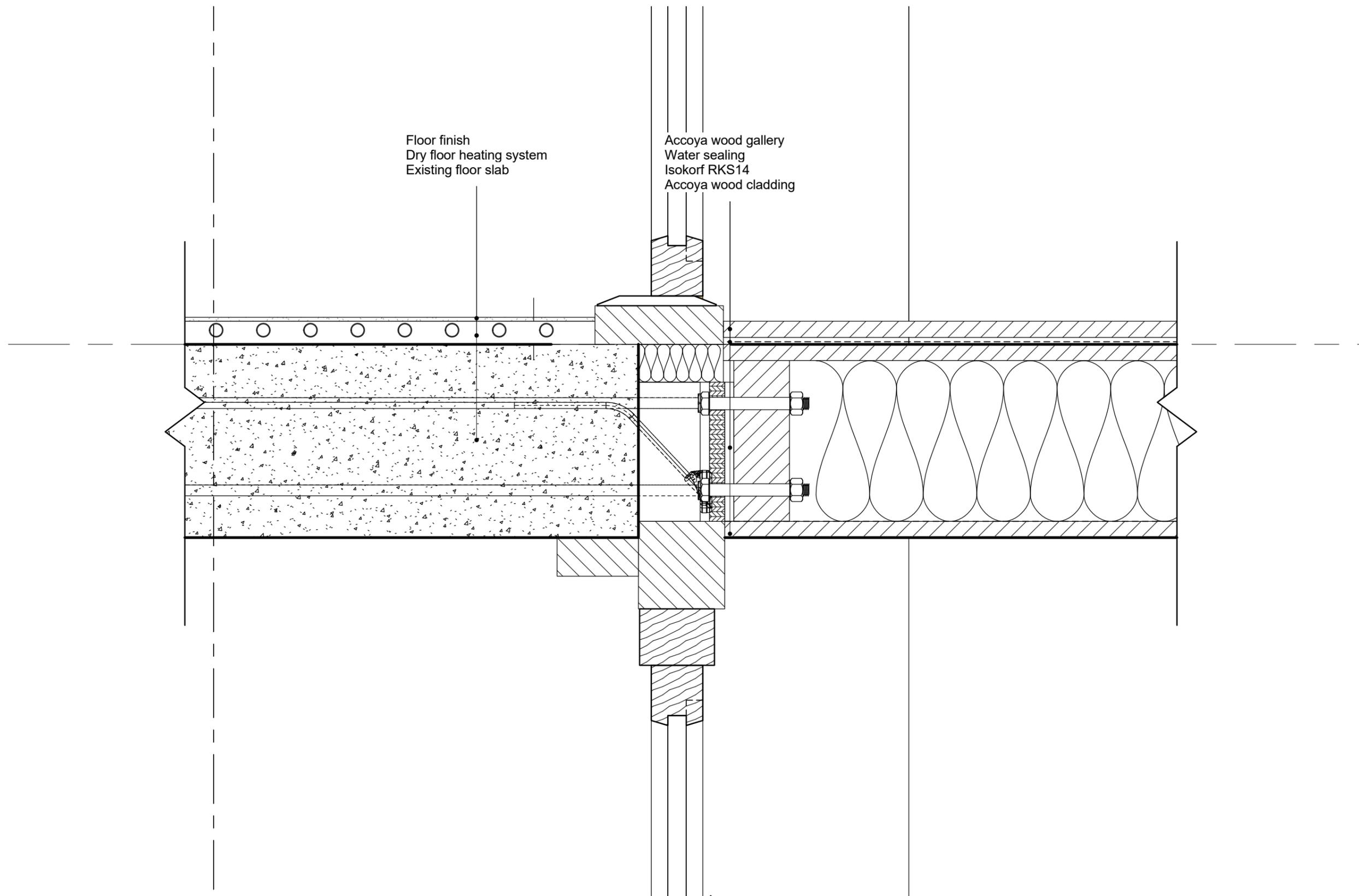
FLEXIBELE UITBREIDING

# CONSTRUCTIE



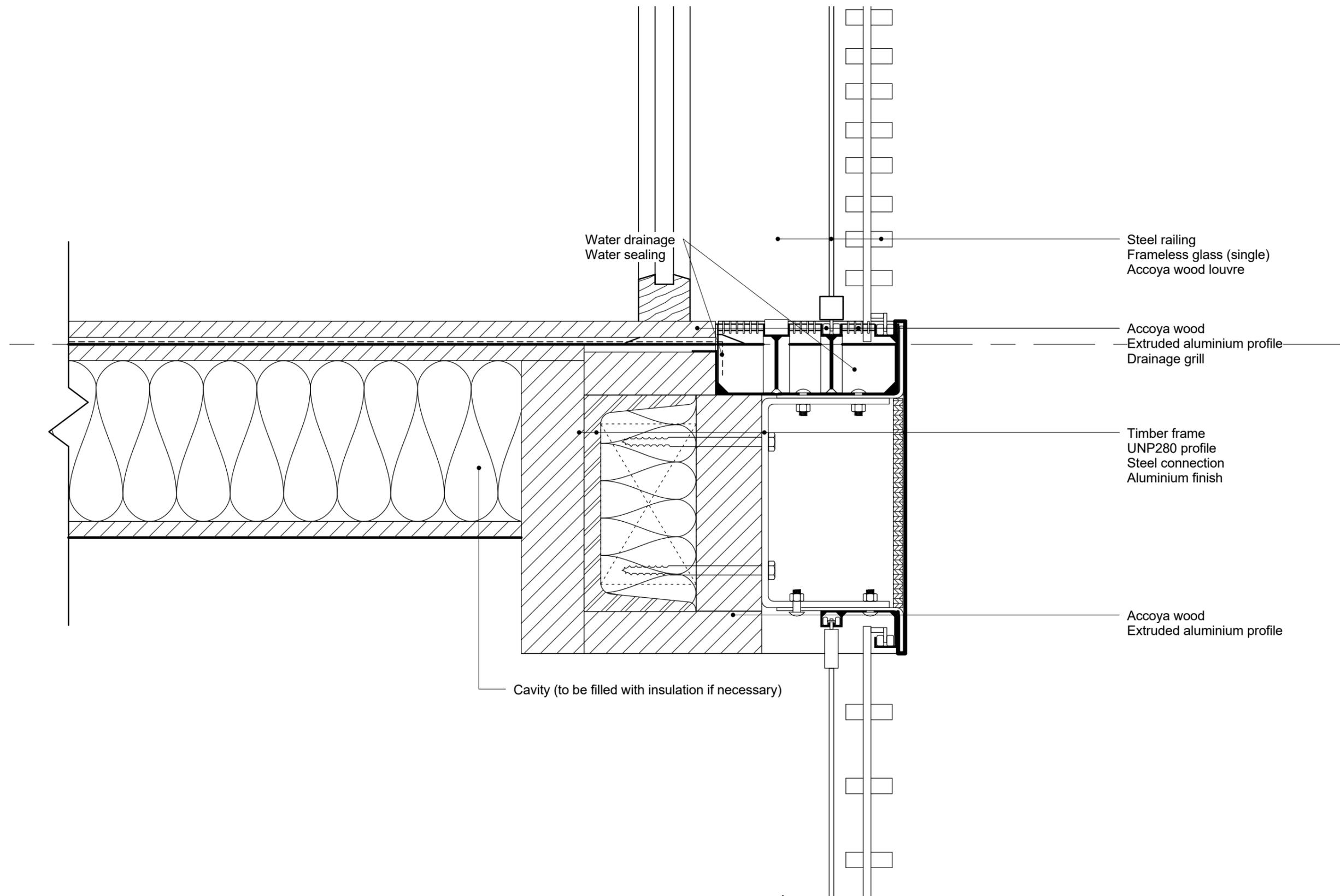
# FLEXIBELE UITBREIDING

# DETAIL BESTAAND-NIEUW



FLEXIBELE UITBREIDING

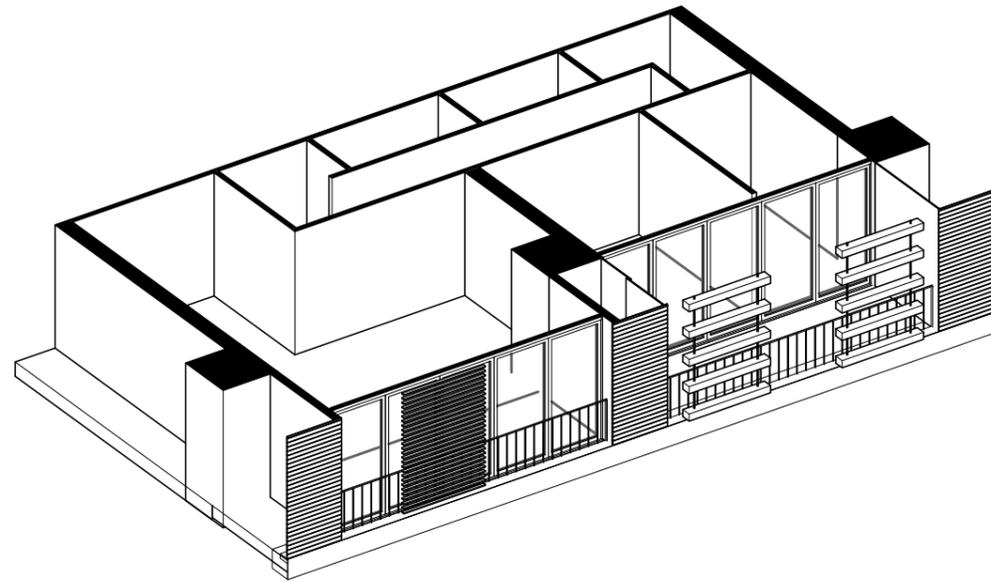
# DETAIL BUITENZIJDE



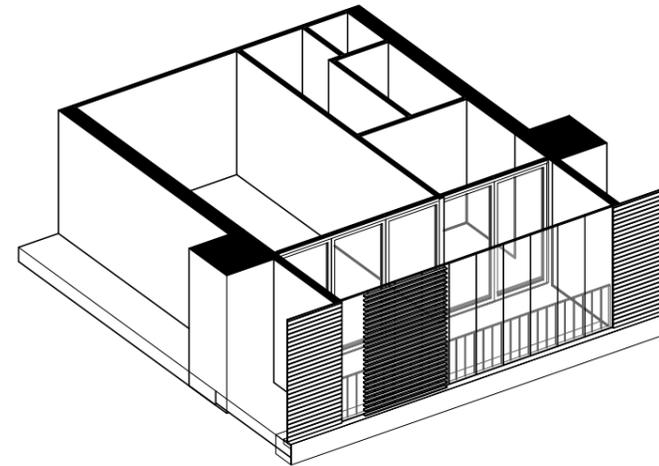
FLEXIBELE UITBREIDING

# FLEXIBILITEIT IN OPTIES

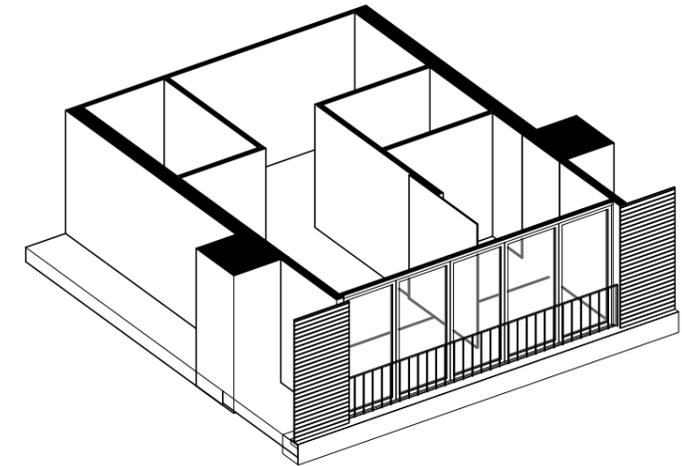
APPARTEMENT



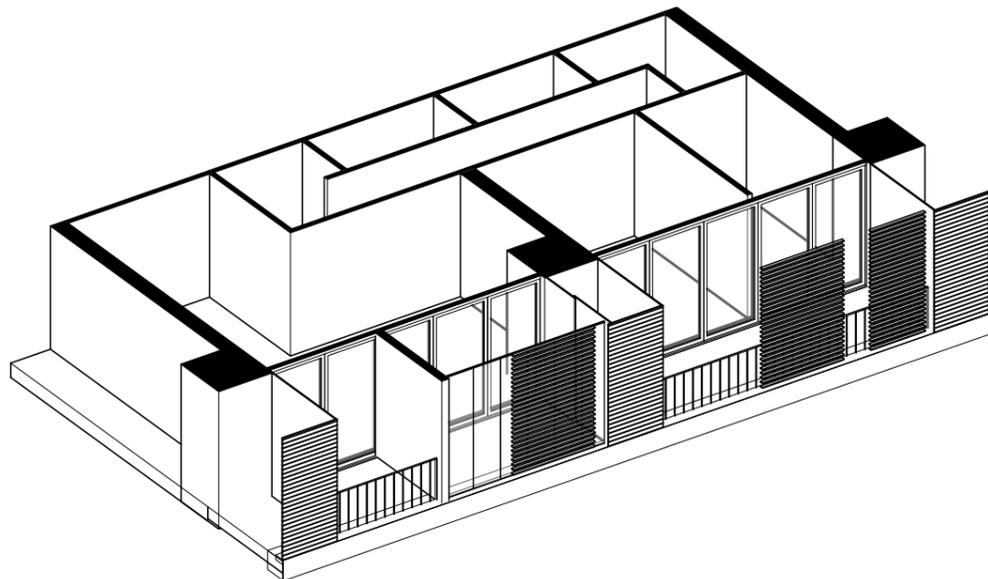
UITBREIDING WOONKAMER



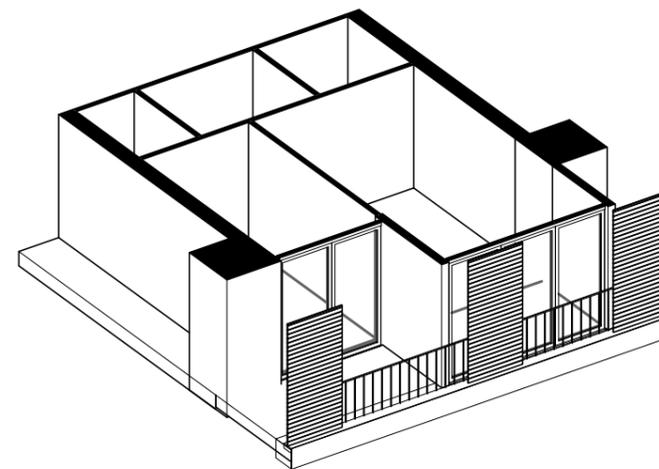
WINTERTUIN



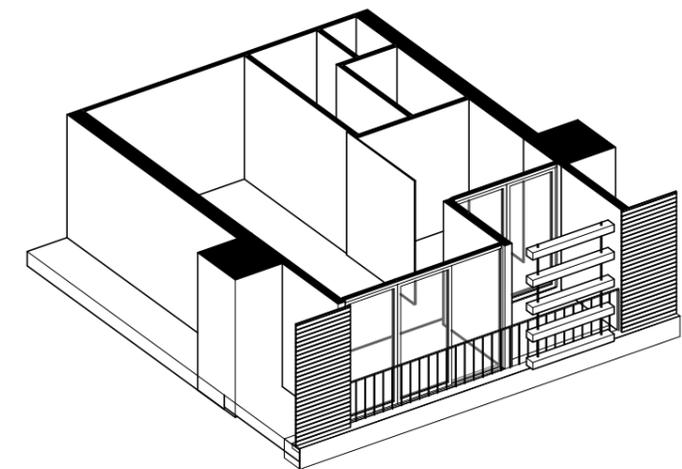
COMPLETE UITBREIDING



WINTERTUIN



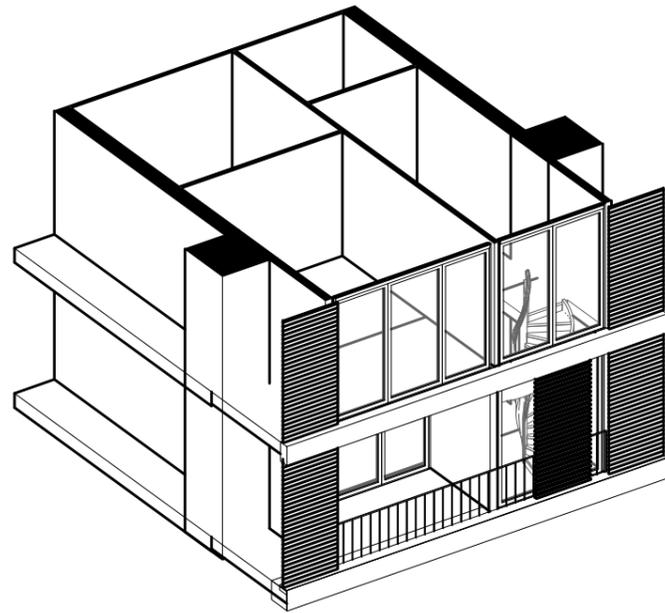
UITBREIDING WOONKAMER



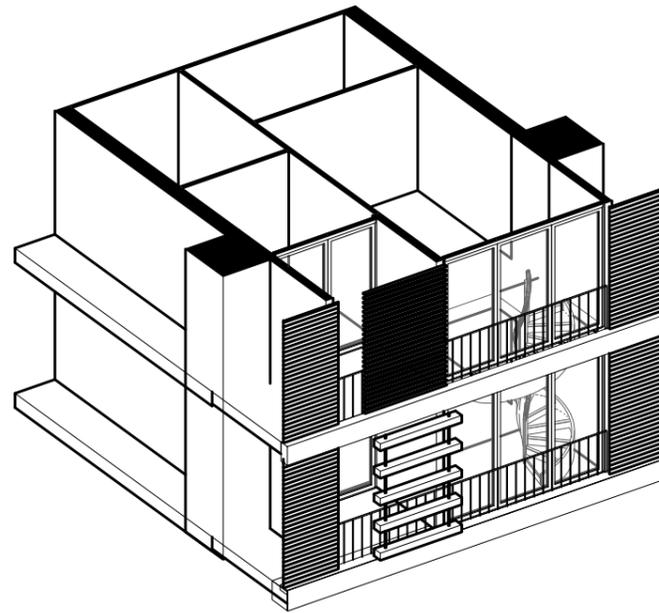
FLEXIBELE UITBREIDING

# FLEXIBILITEIT IN OPTIES

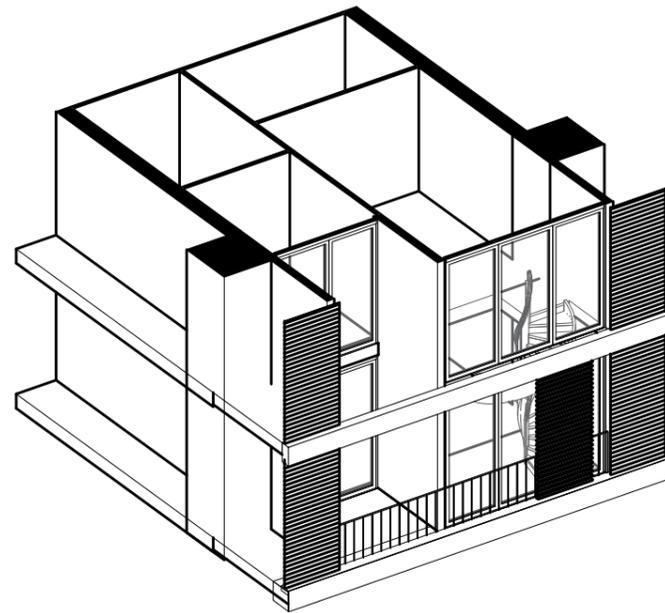
MAISONNETTE



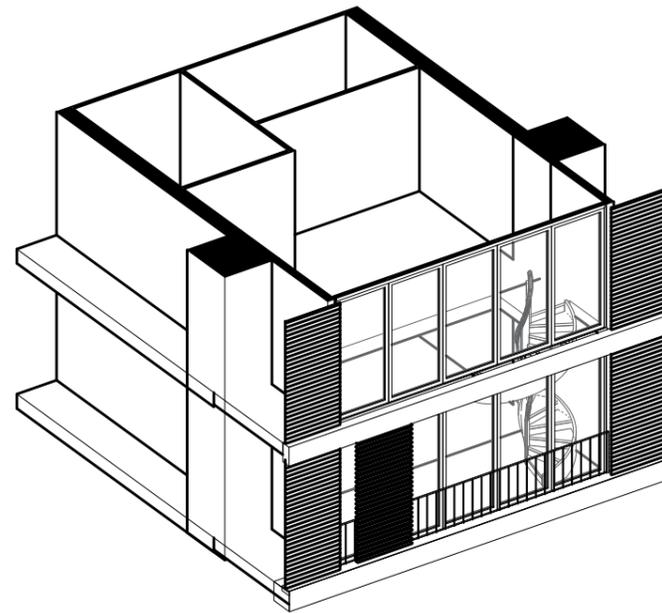
UITBREIDING WOONKAMER EN  
SLAAPKAMER



UITBREIDING WOONKAMER

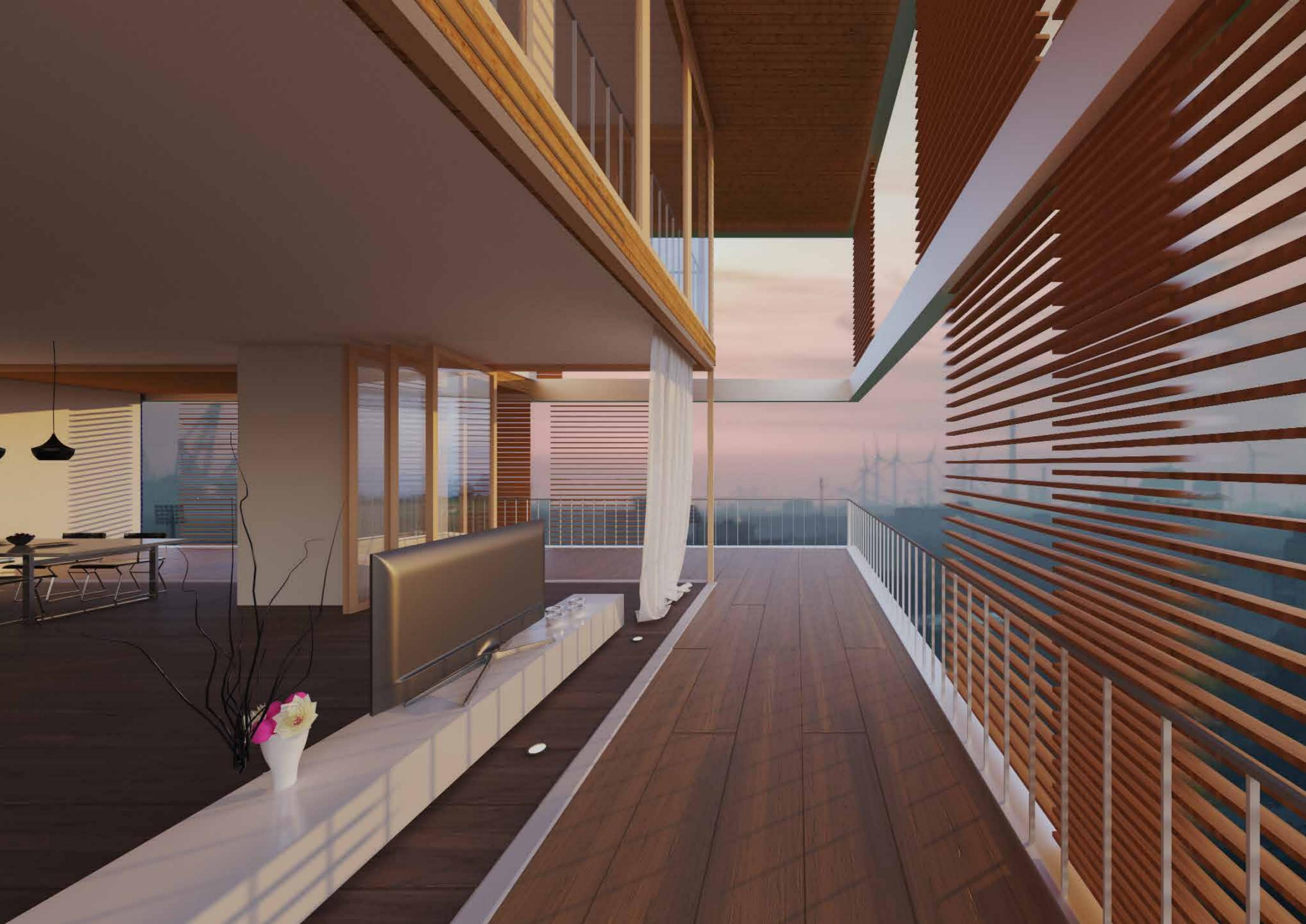


DUBBELHOOG BALKON



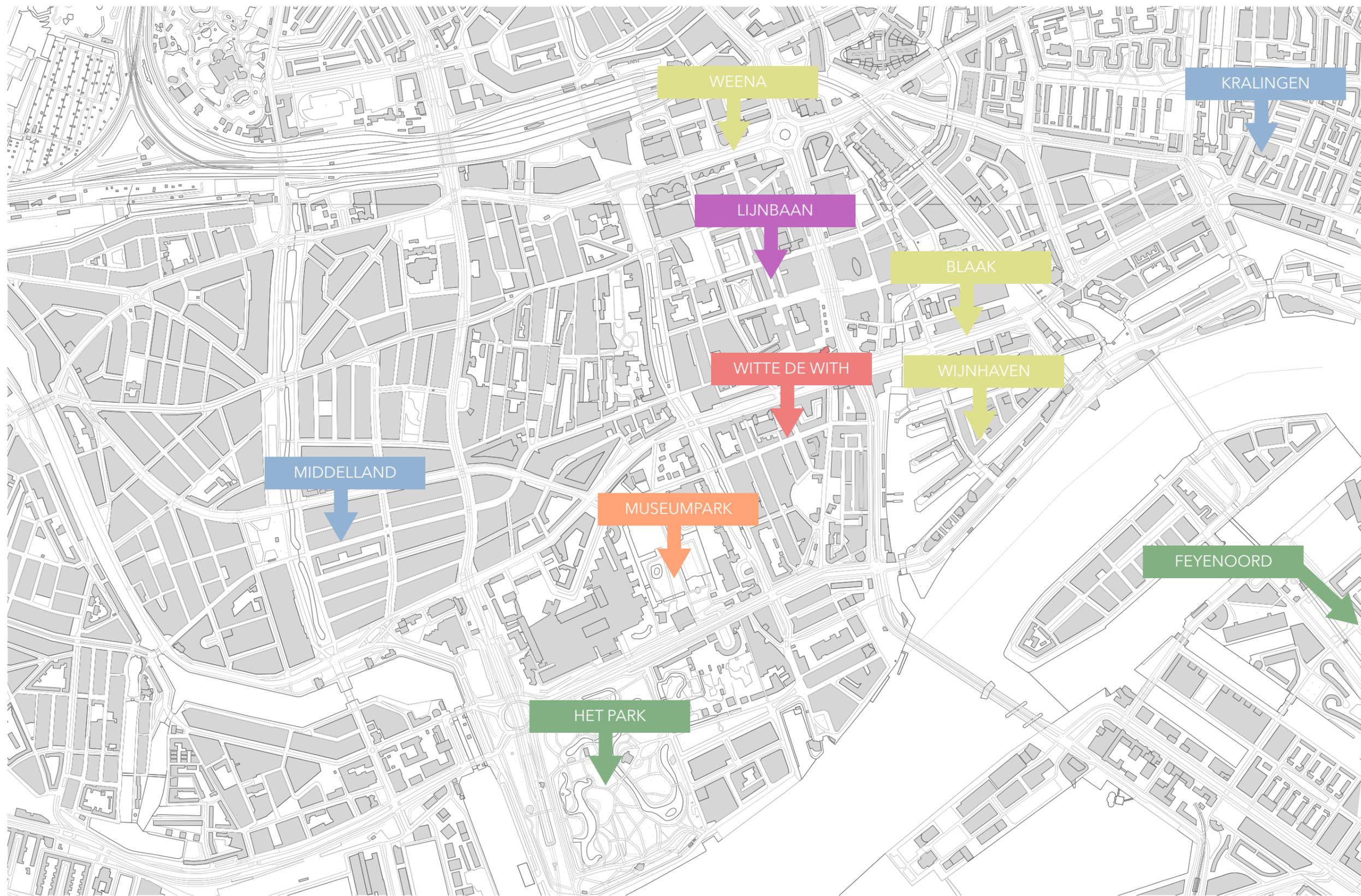
COMPLETE UITBREIDING

FLEXIBELE UITBREIDING



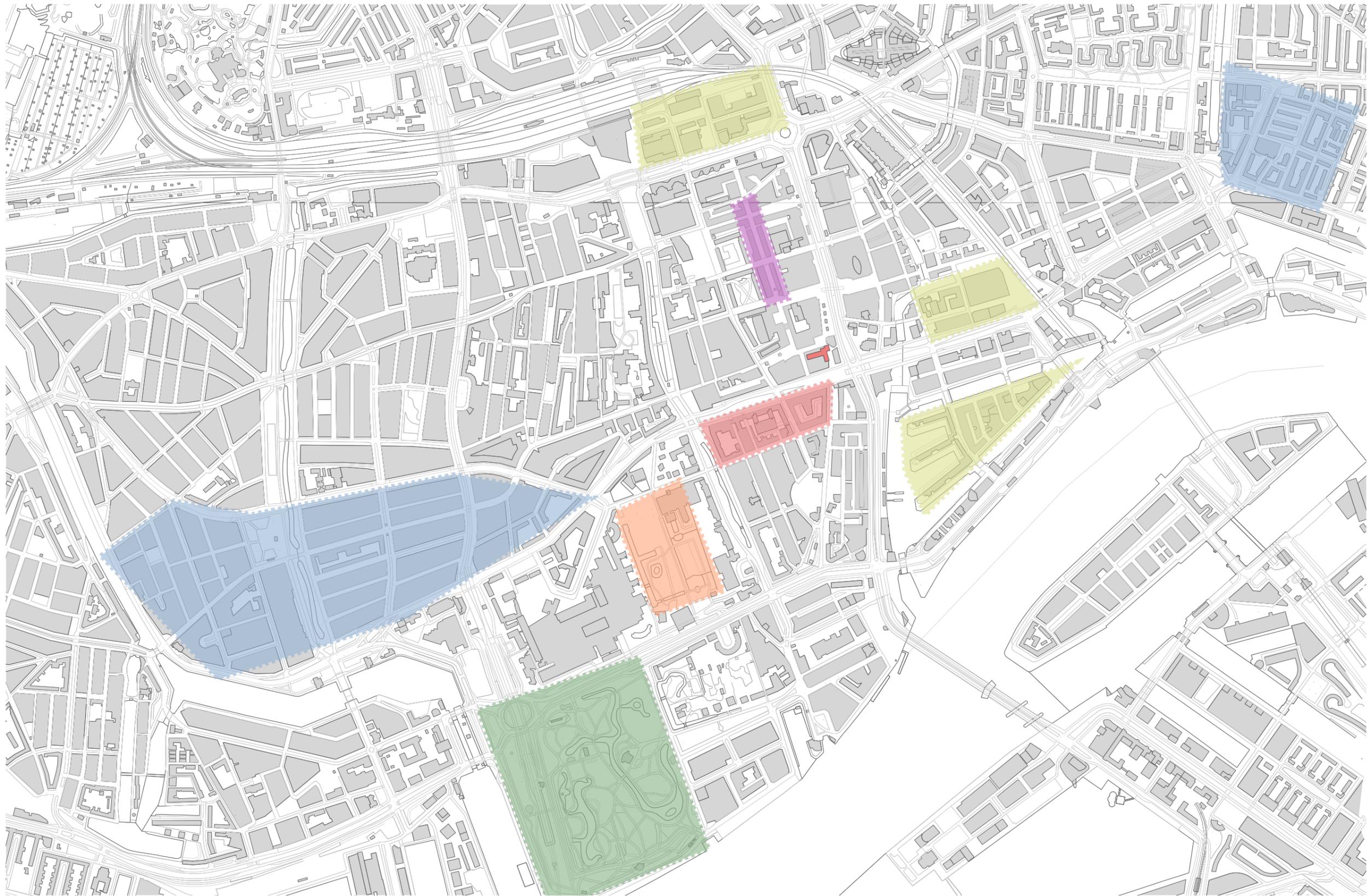
**VERTICALE STAD**

# ROTTERDAMSE WIJKEN



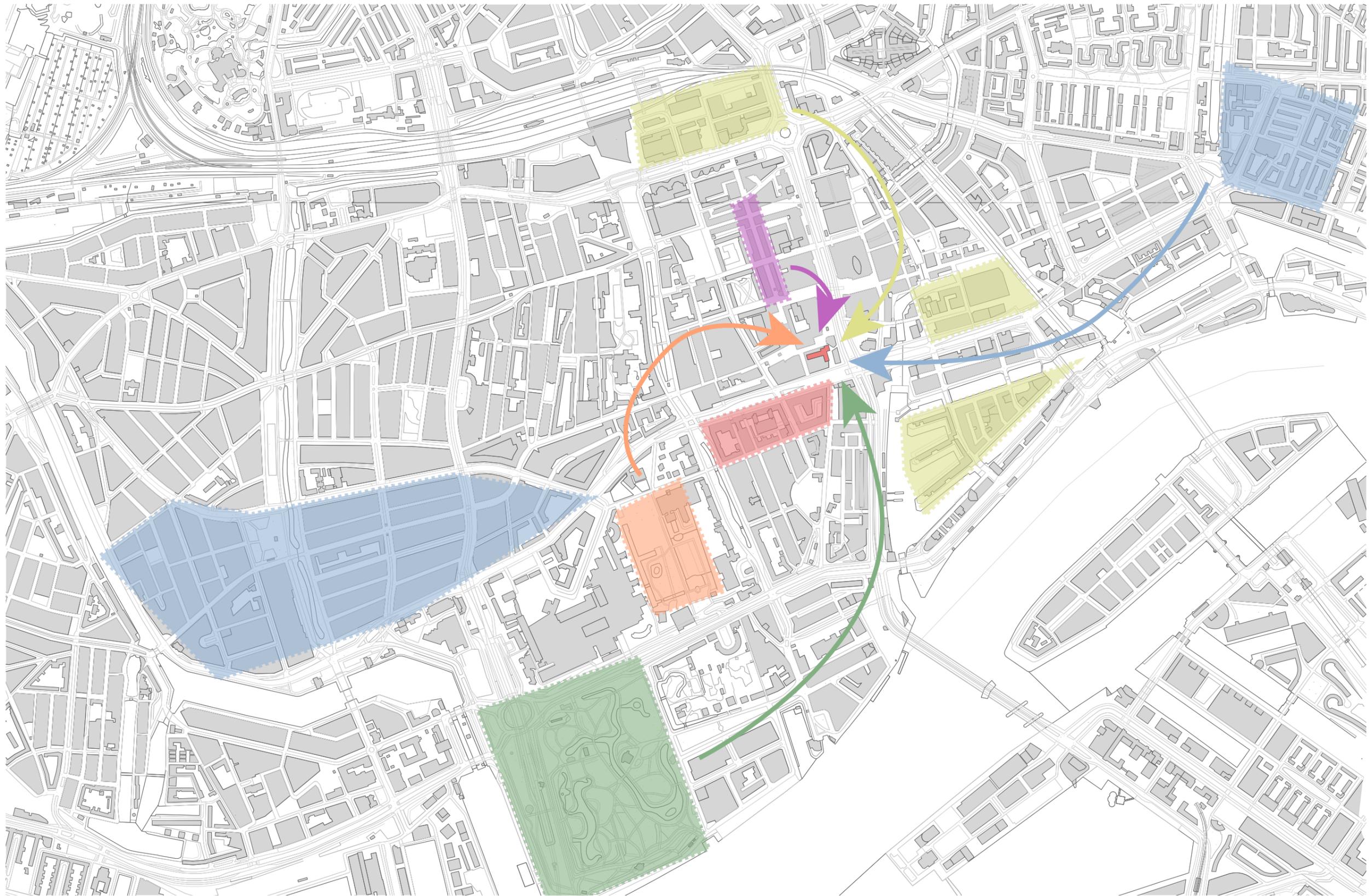
VERTICALE STAD CONCEPT

# ROTTERDAM ZONES



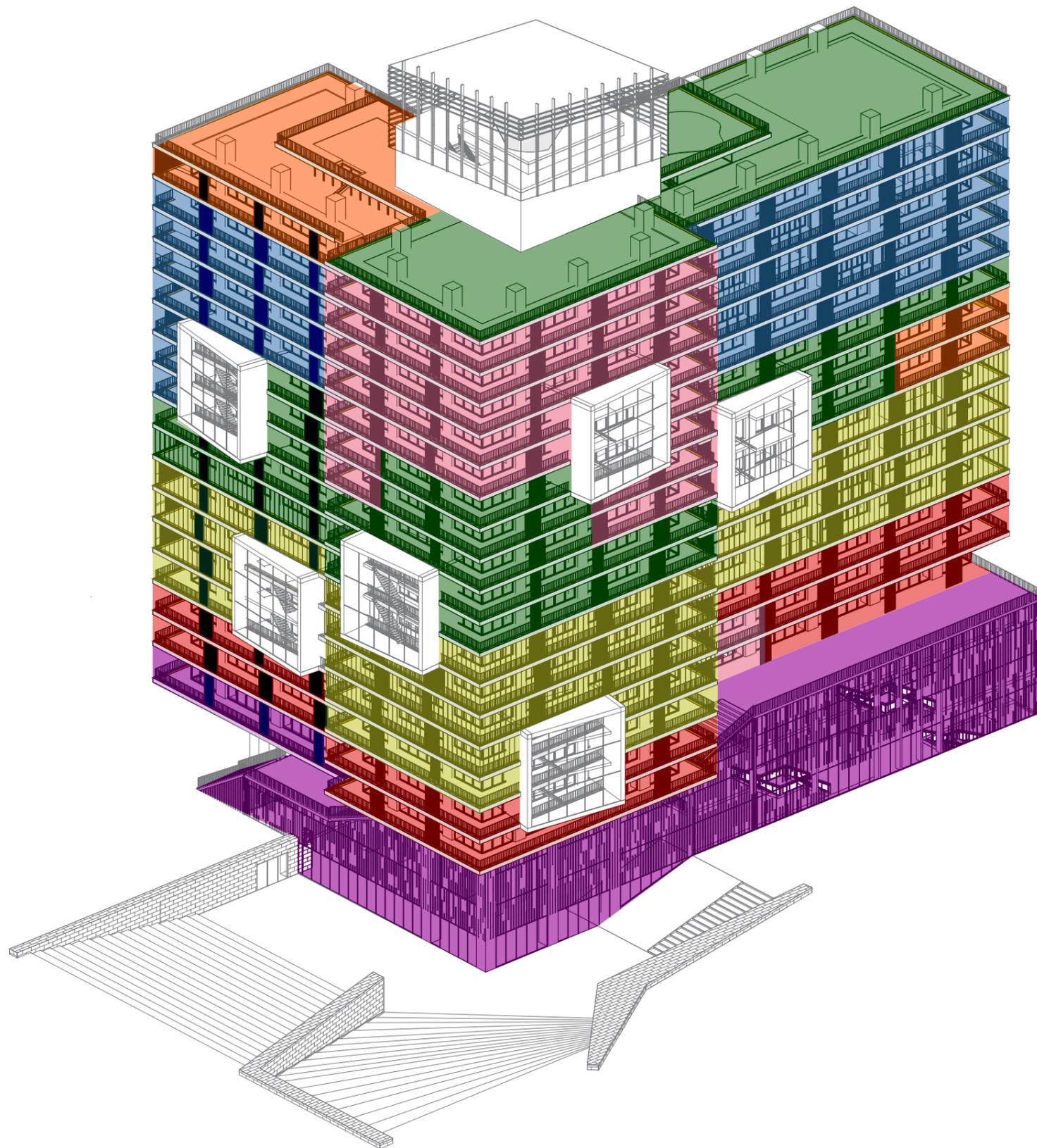
VERTICAL CITY CONCEPT

# ROTTERDAMSE WIJKEN



VERTICALE STAD CONCEPT

# GEBOUWZONES



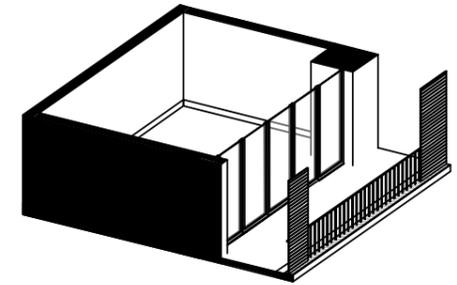
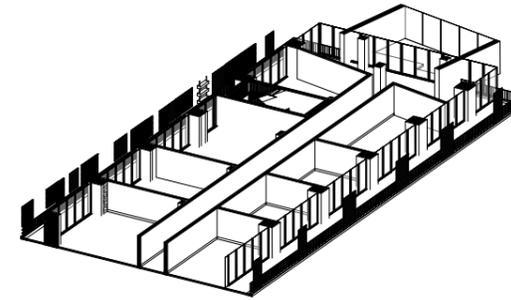
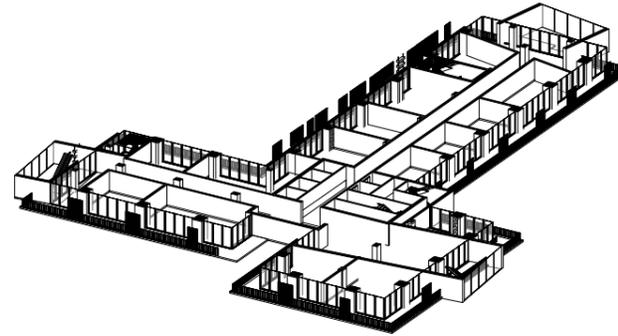
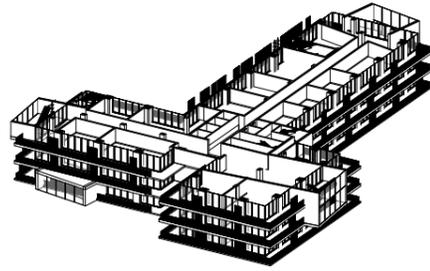
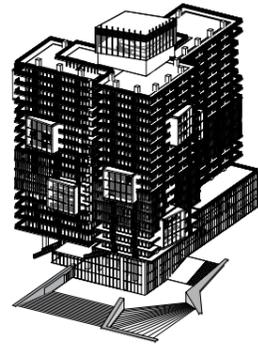
- WONINGEN
- ONTSPANNING EN VRIJE TIJD
- KANTOOR
- HORECA
- HOTEL
- CULTUUR
- COMMERCIEEL

VERTICALE STAD CONCEPT

# STRATEGIEEN IN AANPASBAAR DESIGN

Type of change			Brand's layers						Scale of change	
Strategy	Cause	Affect	Stuff	Space	Service	Skin	Structure	Site	Physical	Time
Adjustable	Change of task/climate	Furniture, façade elements	X			X			Component	Hourly to daily
Flexible	Change of use	Spatial lay-out	X	X					Component	Daily to monthly
Refitable	Change of performance	Building component		X	X	X			Component	1-7 years
Convertible	Change of function	Function		X	X	X			Building	1-15 years
Scalable	Change of size	Size		X	X	X	X		Building	5-30 years
Moveable	Change of location	Location						X	Building	Weekly to yearly

# SCHALEN VAN VERANDERING



BUILDING  
ZONE

BUILDING  
FLOOR

FLOOR  
WING

FLOOR  
UNIT

STRATEGY

SCALEABLE  
5-30 YEARS

CONVERTIBLE  
1-15 YEARS

REFITABLE  
1-7 YEARS

FLEXIBLE/ADJUSTABLE  
HOURLY TO MONTHLY

MAIN ACTION

ADD OR REMOVE  
FLOOR FROM ZONE

CHANGE BUILDING  
FLOORS FUNCTION

CHANGE UNIT  
PERFORMANCE

CHANGE UNIT USE

AFFECT

ADD OR REMOVE  
FLOOR FROM ZONE

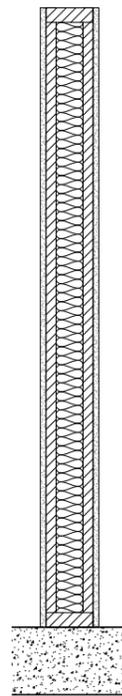
CHANGE FLOOR LAY-  
OUT

MAINTAIN/UPGRADE  
BUILDING SERVICES

(RE)PLACE OR (RE)  
MOVE INTERIOR WALLS

VERTICALE STAD

# BINNENWANDEN

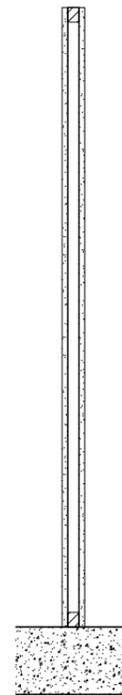
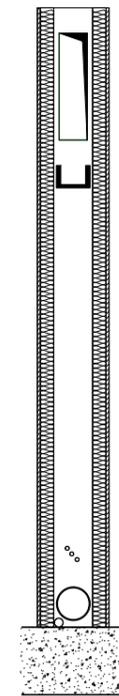


## FUNCTIESCHEIDENDE WAND

CONVERTIBLE  
1-15 JAAR  
ACOUSTISCHE GRENS  
VERVANGBAAR EN TE  
HERGEBRUIKEN PANELEN

## SCHACHTENWAND

REFITABLE  
1-7 JAAR  
OPENABLE ON TWO  
SIDES WITH CENTRAL  
SERVICES CORE

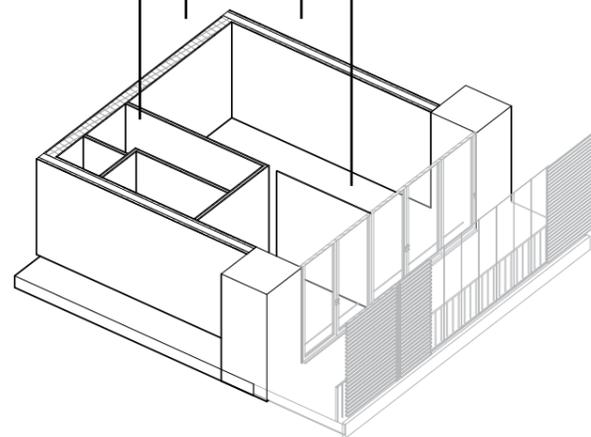
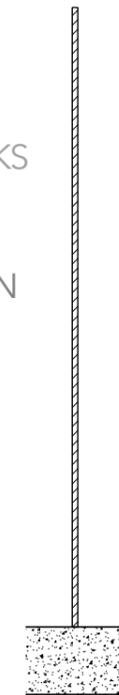


## BINNENWAND

FLEXIBLE  
6-12 MAANDEN  
ALLEEN ELEKTRA IN  
WAND  
PREFAB, HER TE  
GEBRUIKEN PANELEN

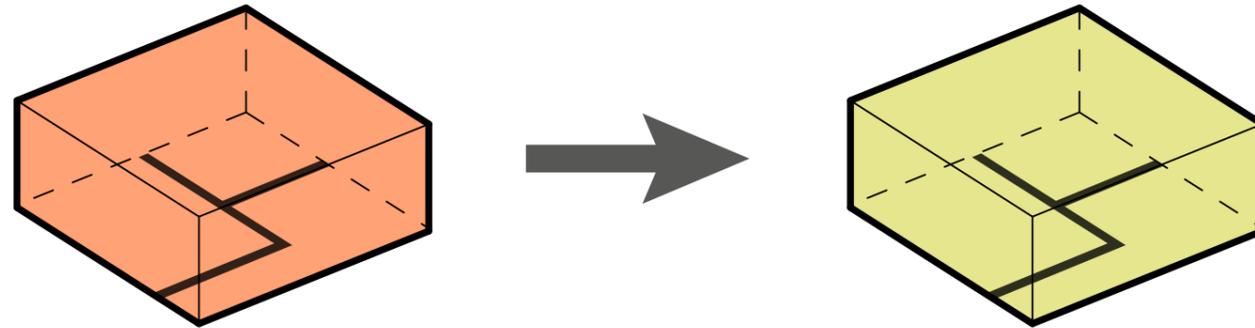
## SCHUIFWAND

ADJUSTABLE  
UURLIJKS-DAGELIJKS  
MASSIEF PANEEL,  
OPGEHANGEN AAN  
RAILS IN PLAFOND

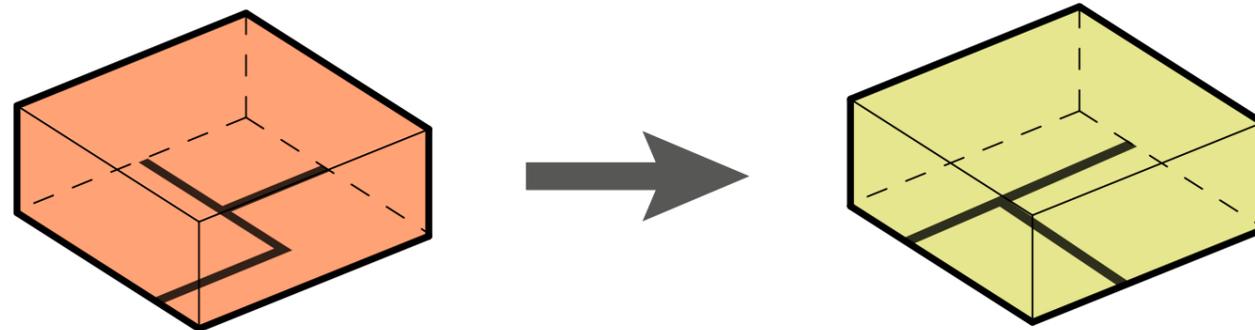


VERTICALE STAD

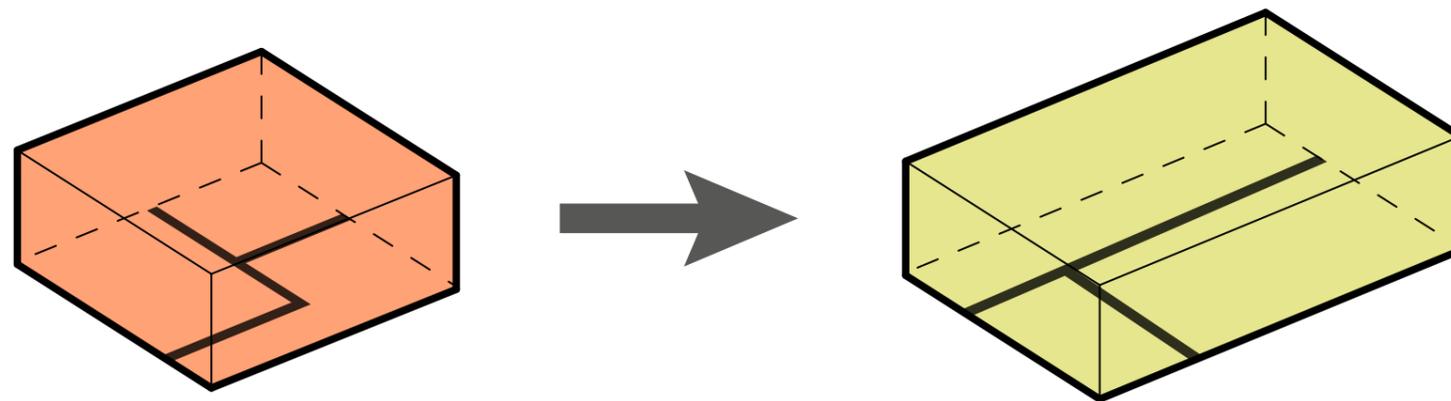
# SCHALEN VAN VERANDERING



HOTELKAMER - SHORT STAY - STUDENTENSTUDIO



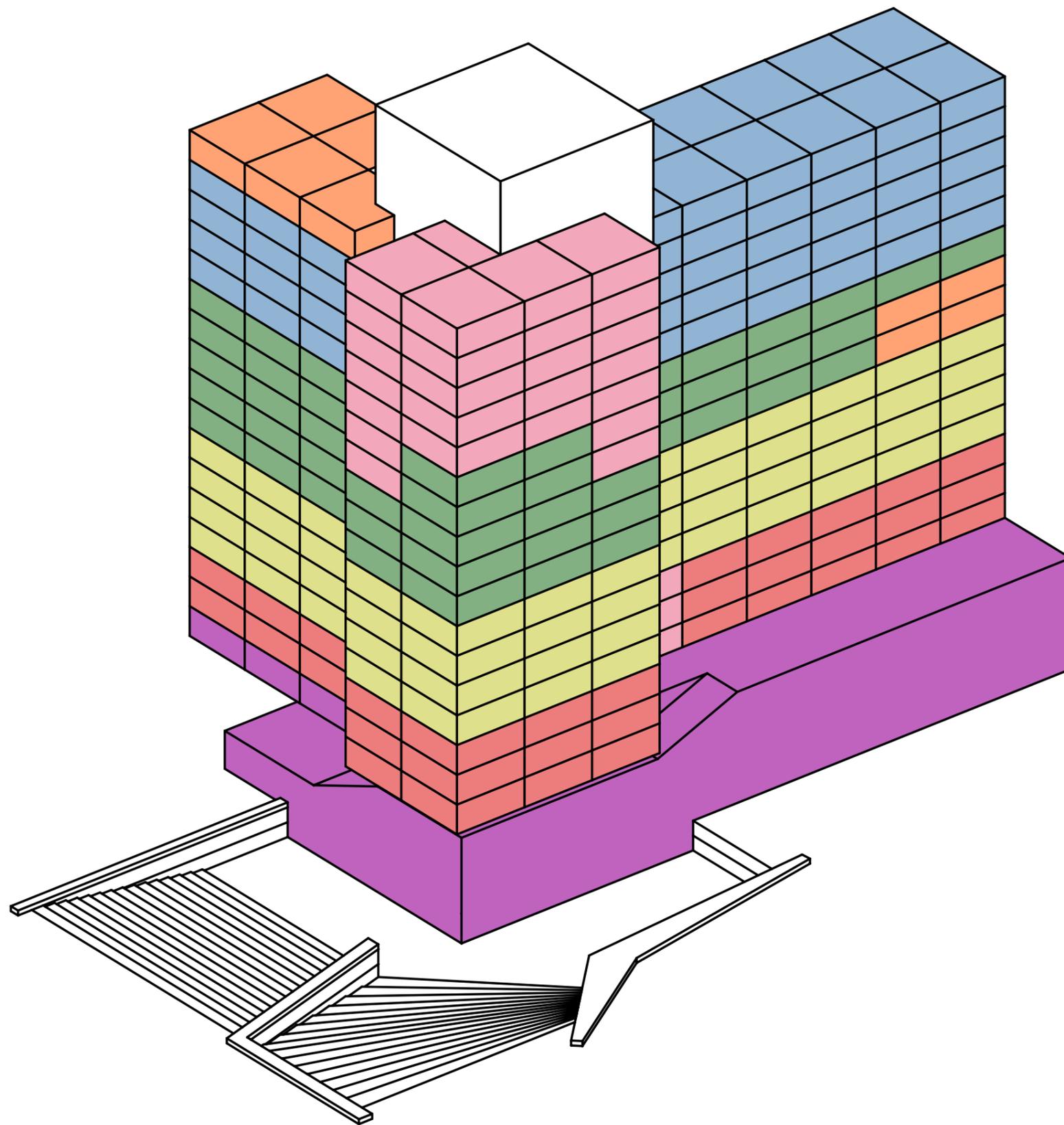
LOFT - WOON-WERK UNIT - SENIORENWONING



KANTOOR - APPARTEMENT - WINKELRUIMTE

VERTICALE STAD

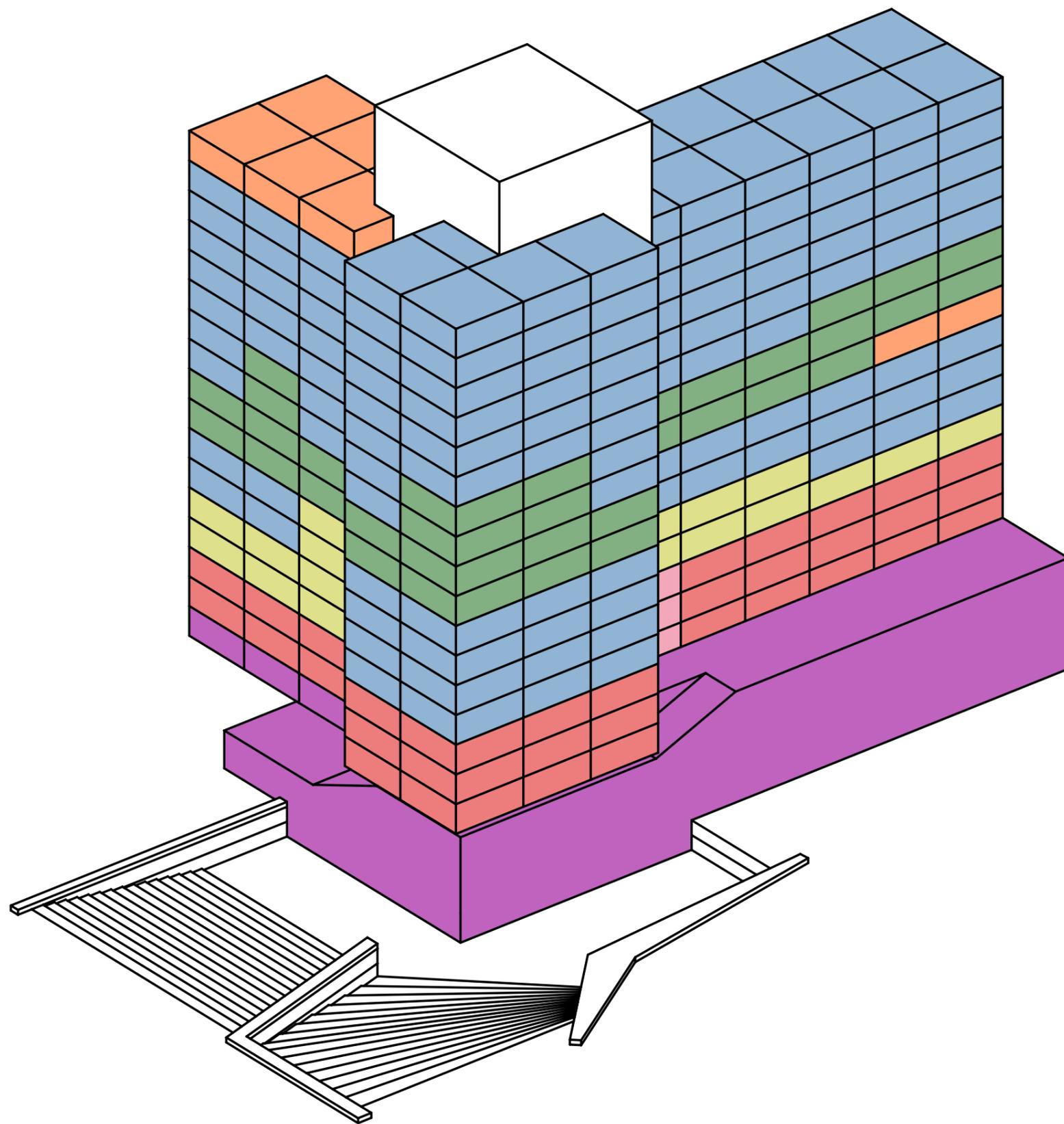
# VOORGESTELD PROGRAMMA



- WONINGEN
- ONTSPANNING EN VRIJE TIJD
- KANTOOR
- HORECA
- HOTEL
- CULTUUR
- COMMERCIEEL

VERTICALE STAD

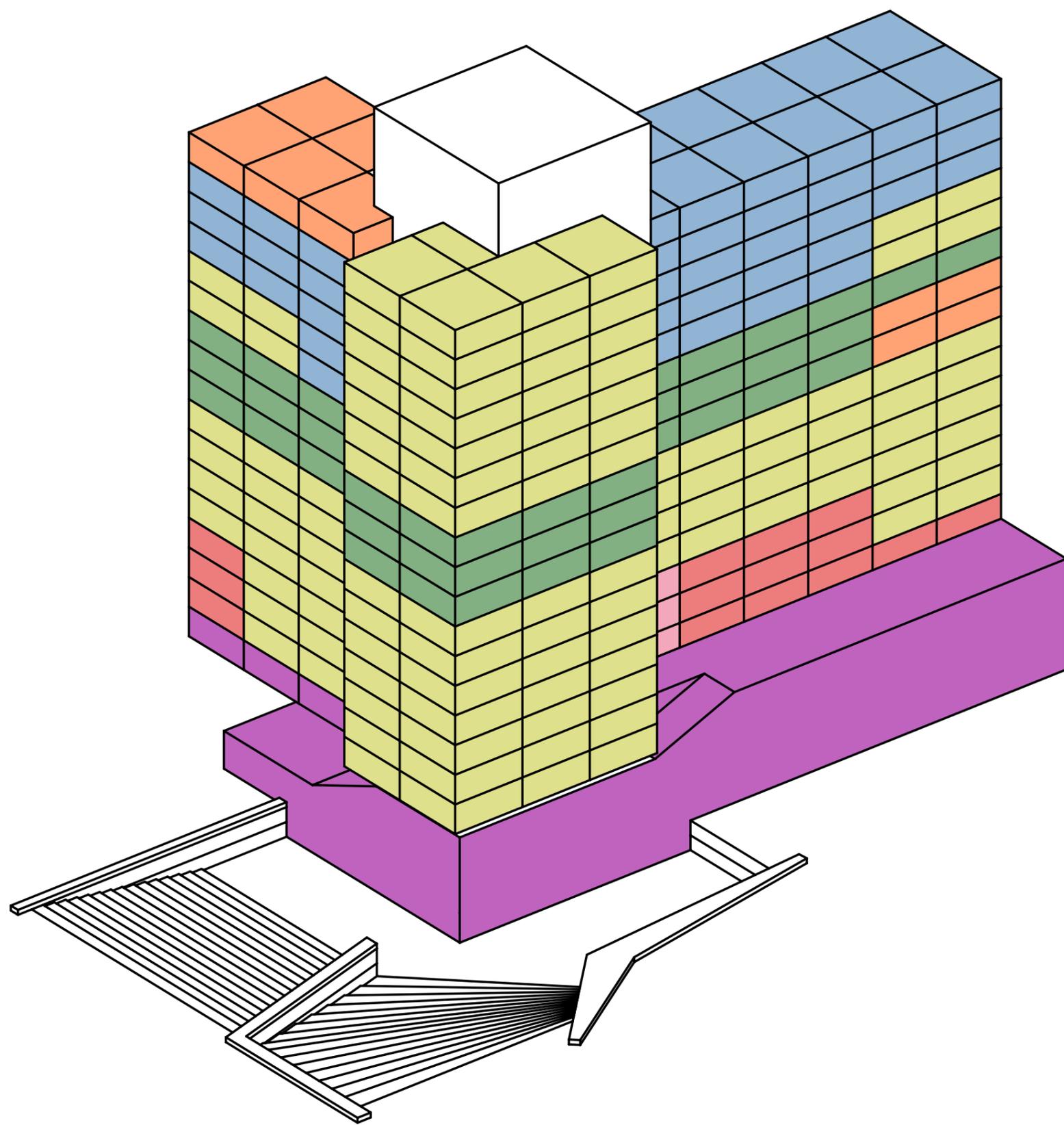
# MEER VRAAG NAAR WONINGEN



- WONINGEN
- ONTSPANNING EN VRIJE TIJD
- KANTOOR
- HORECA
- HOTEL
- CULTUUR
- COMMERCIEEL

VERTICALE STAD

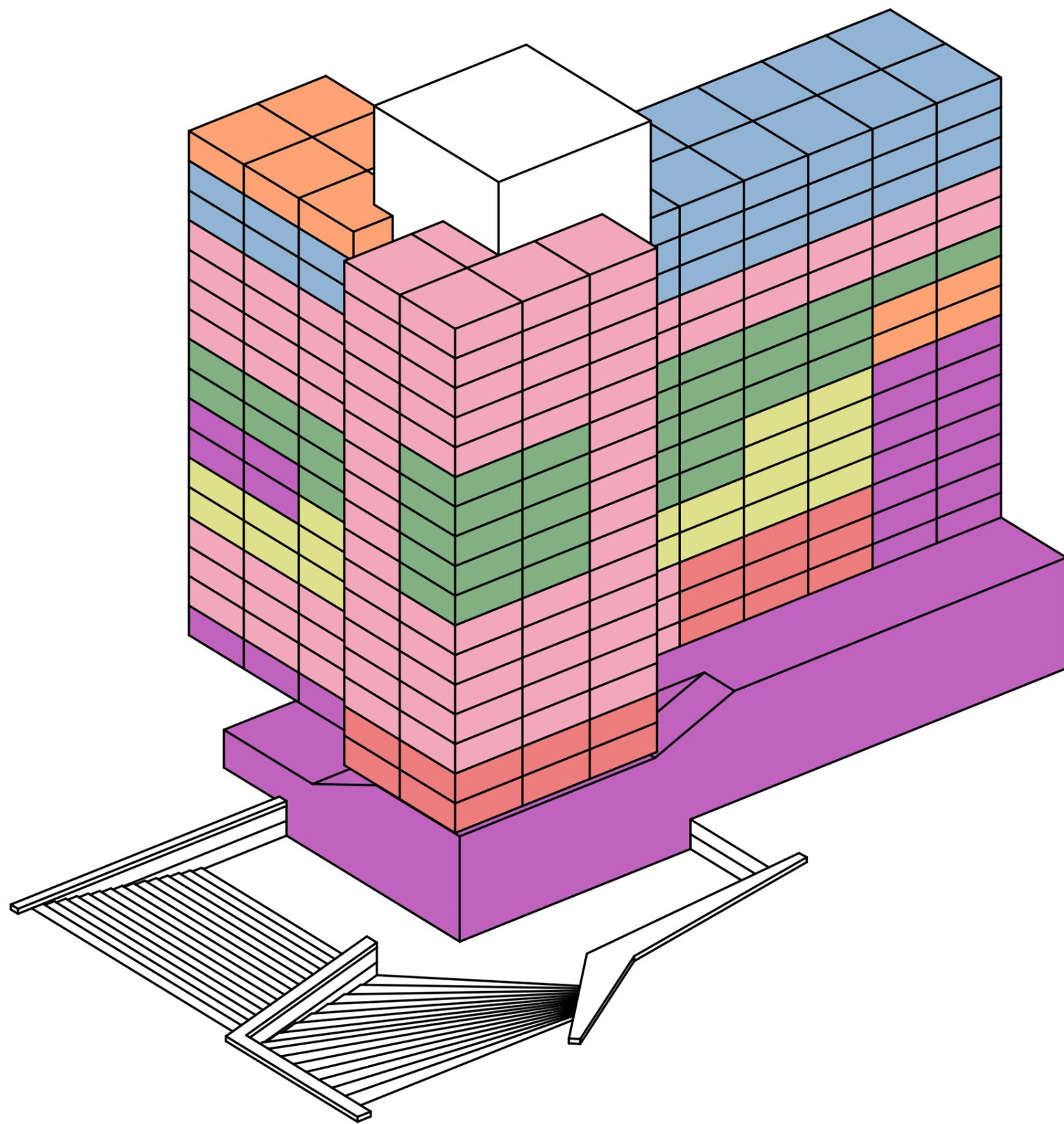
# MEER VRAAG NAAR KANTOOR



- WONINGEN
- ONTSPANNING EN VRIJE TIJD
- KANTOOR
- HORECA
- HOTEL
- CULTUUR
- COMMERCIEEL

VERTICALE STAD

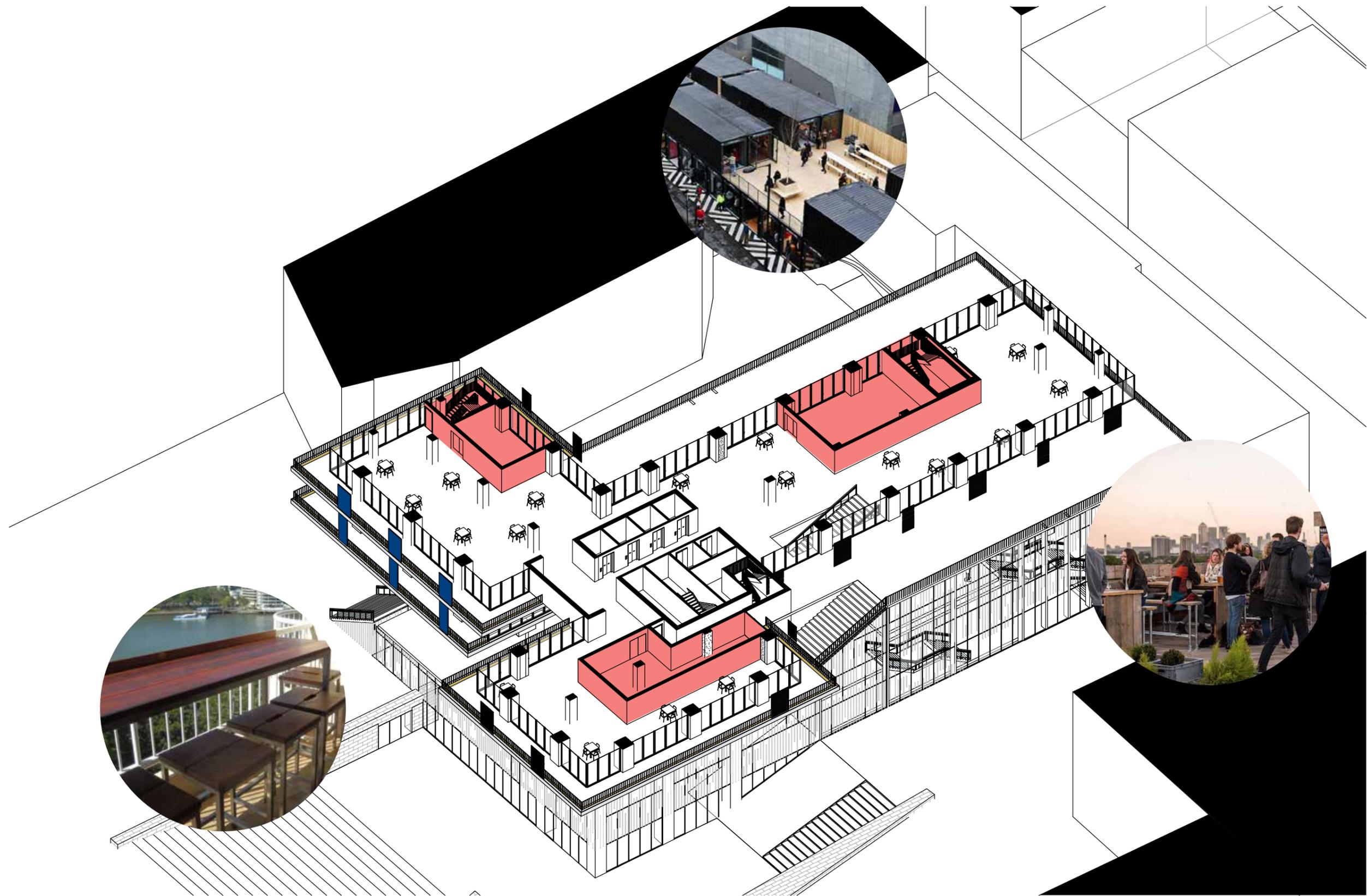
# MEER VRAAG NAAR COMMERCIEEL EN HOTEL



- WONINGEN
- ONTSPANNING EN VRIJE TIJD
- KANTOOR
- HORECA
- HOTEL
- CULTUUR
- COMMERCIEEL

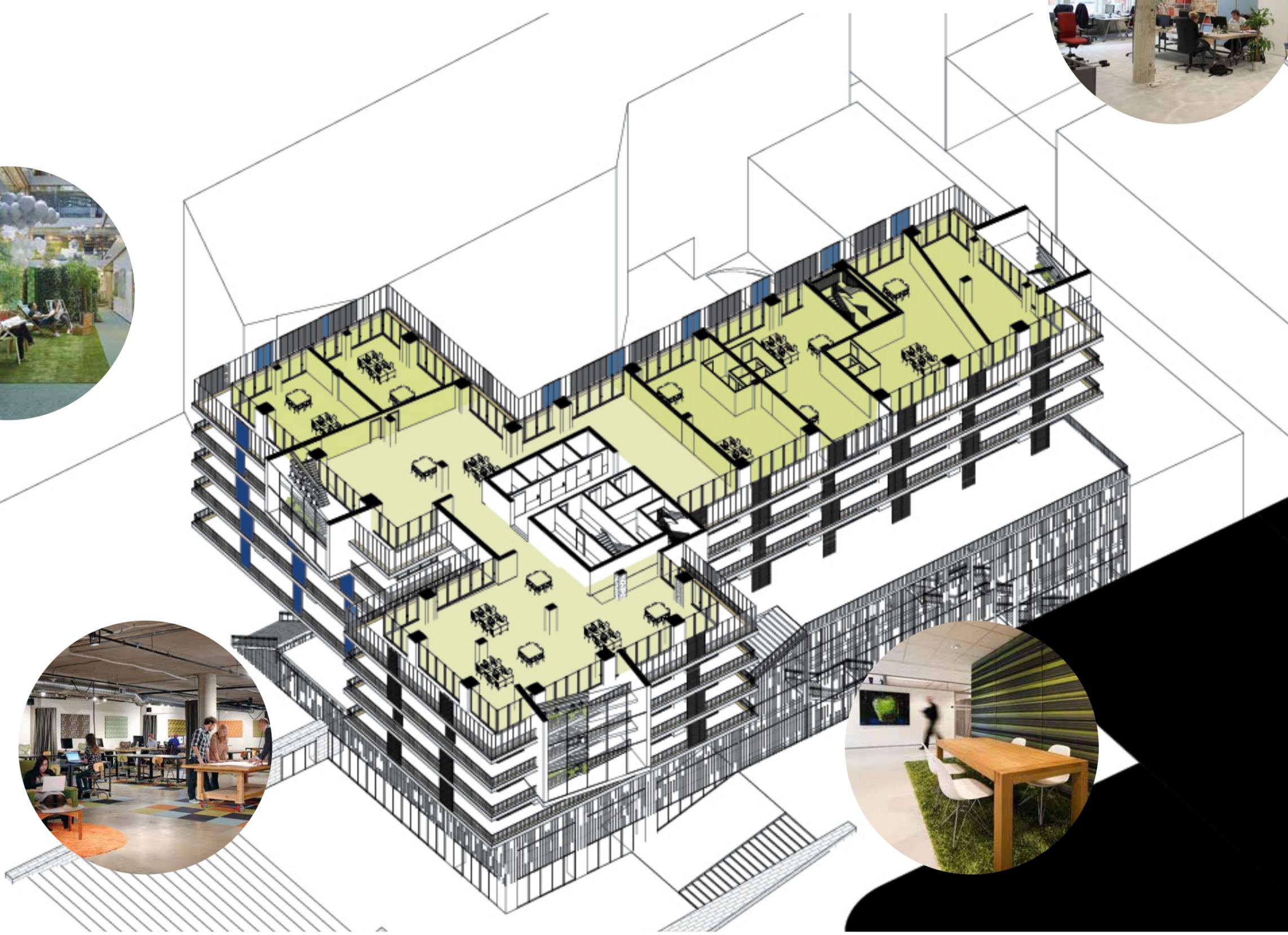
VERTICALE STAD

# HORECA ZONE



VERTICALE STAD

# KANTOORZONE



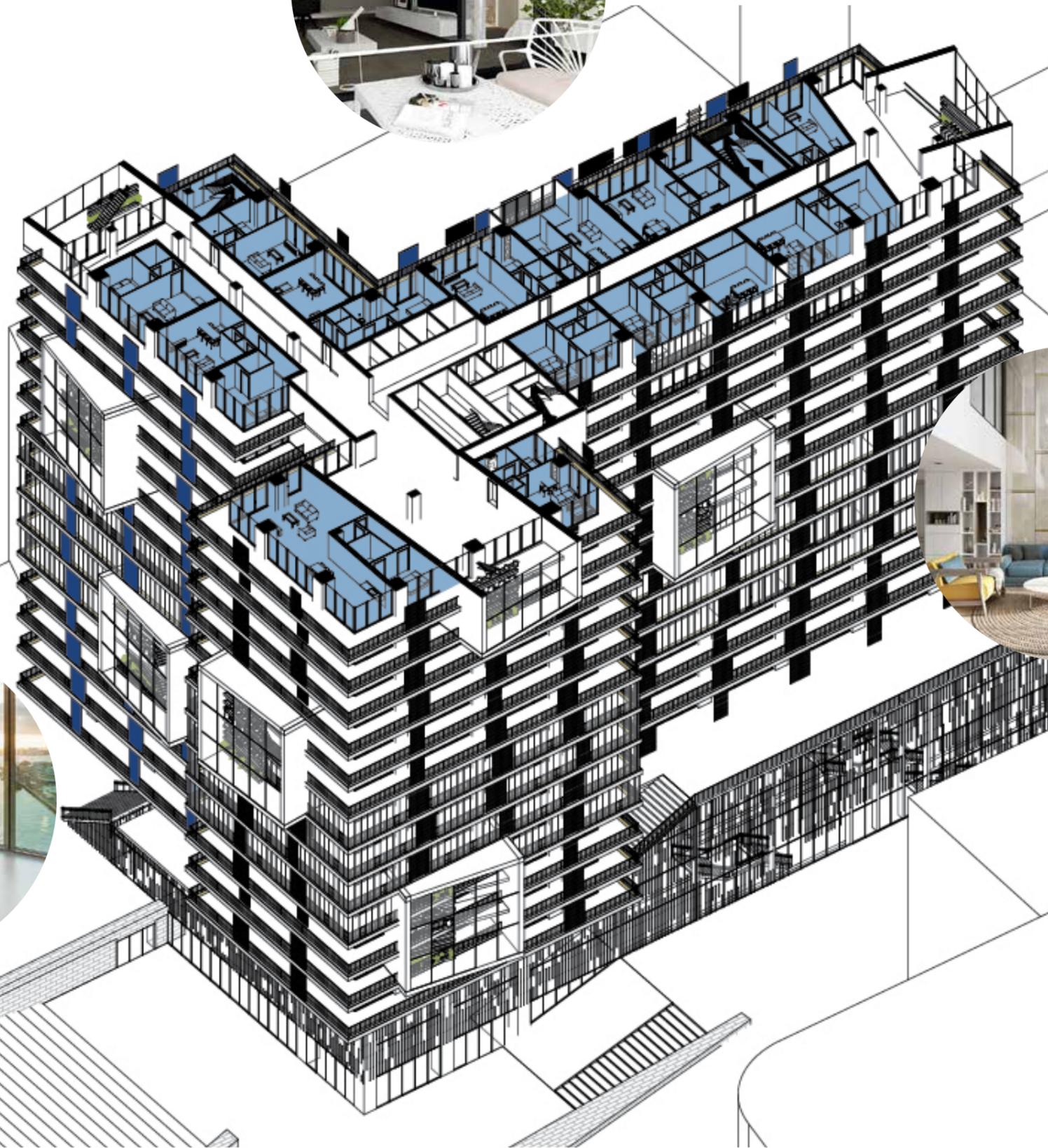
VERTICALE STAD

# ONTSPANNINGSZONE



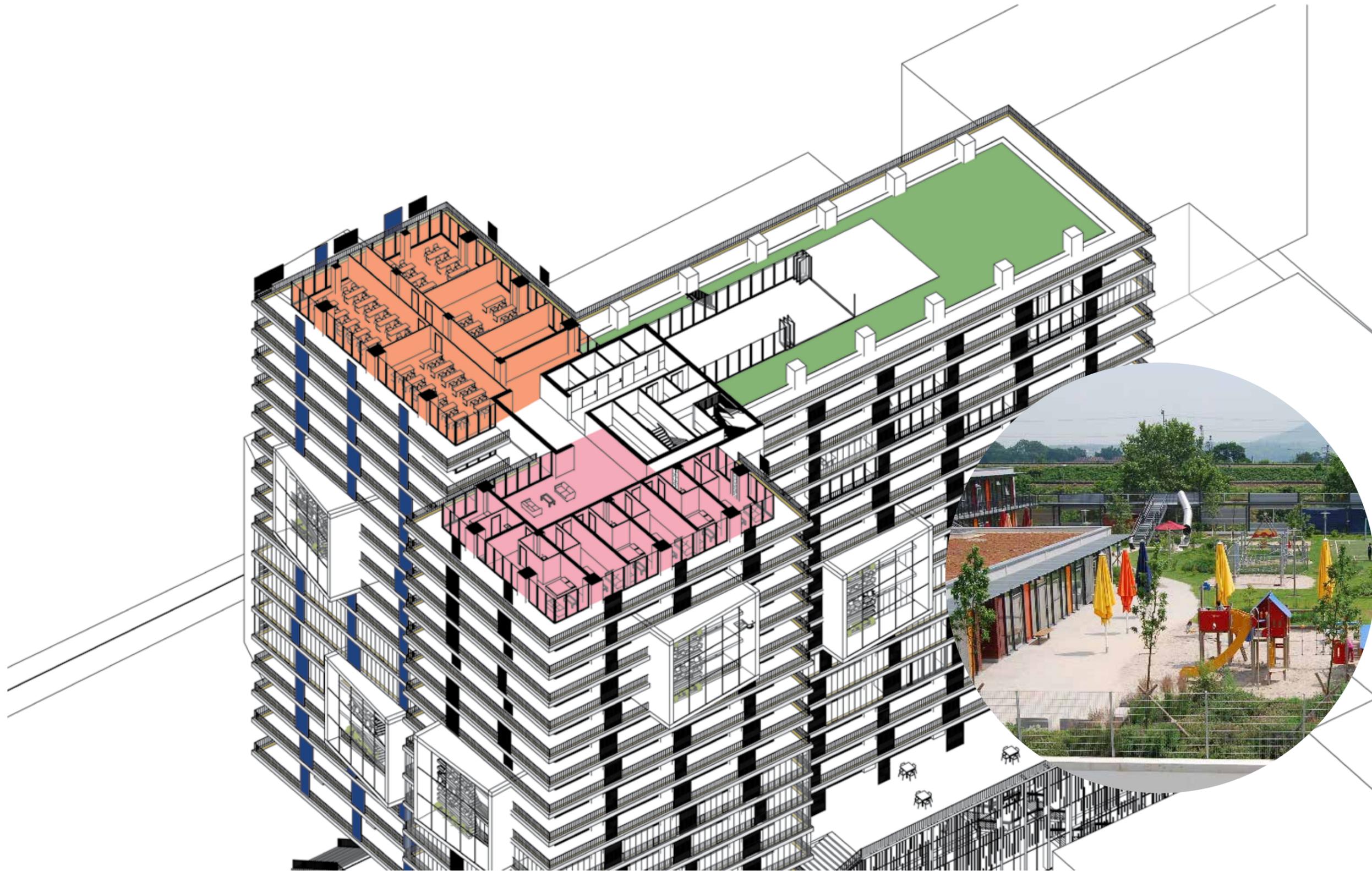
VERTICALE STAD

# WONINGZONE



VERTICALE STAD

# DAKTUINEN TOREN C



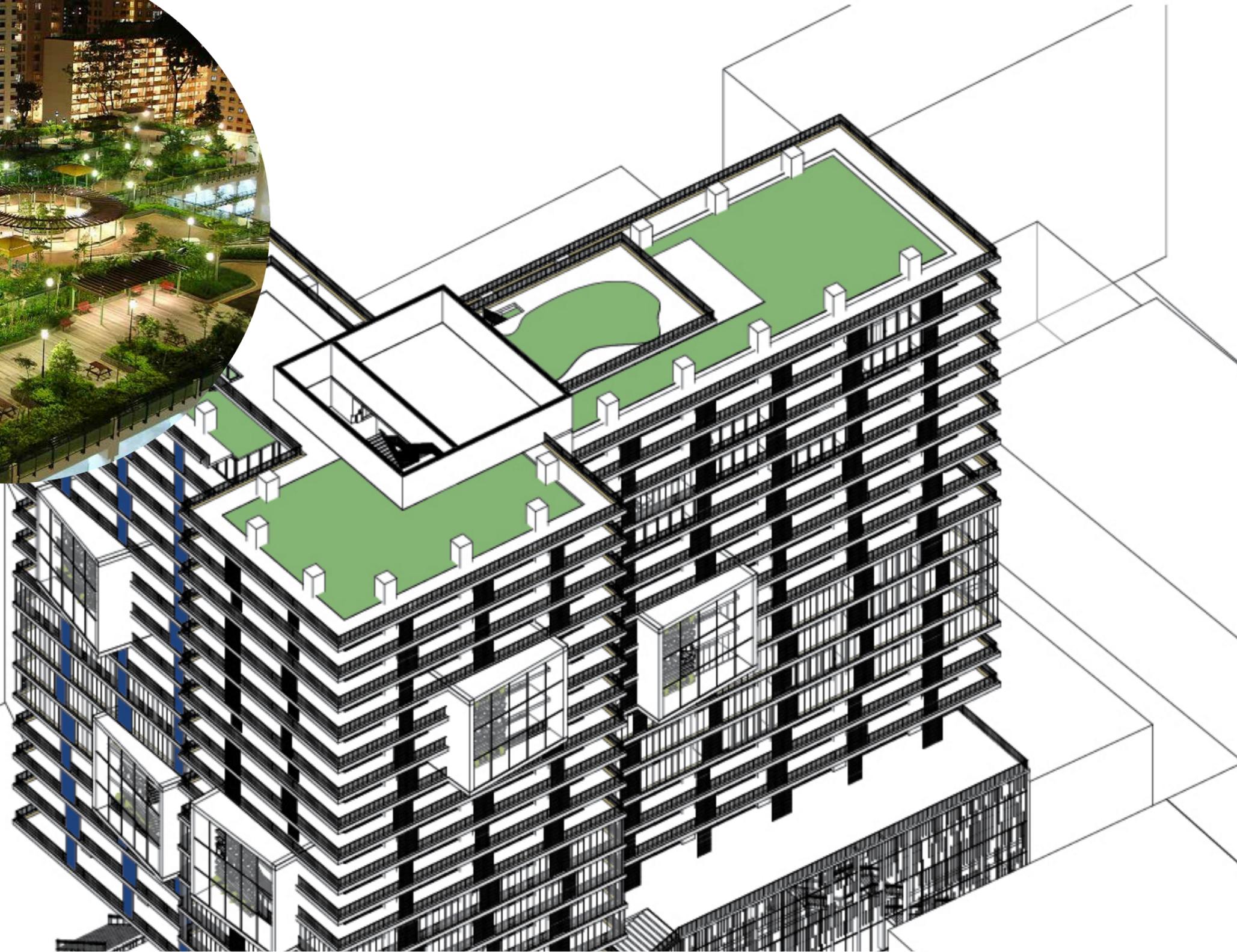
VERTICALE STAD

# DAKTUINEN TOREN B



VERTICALE STAD

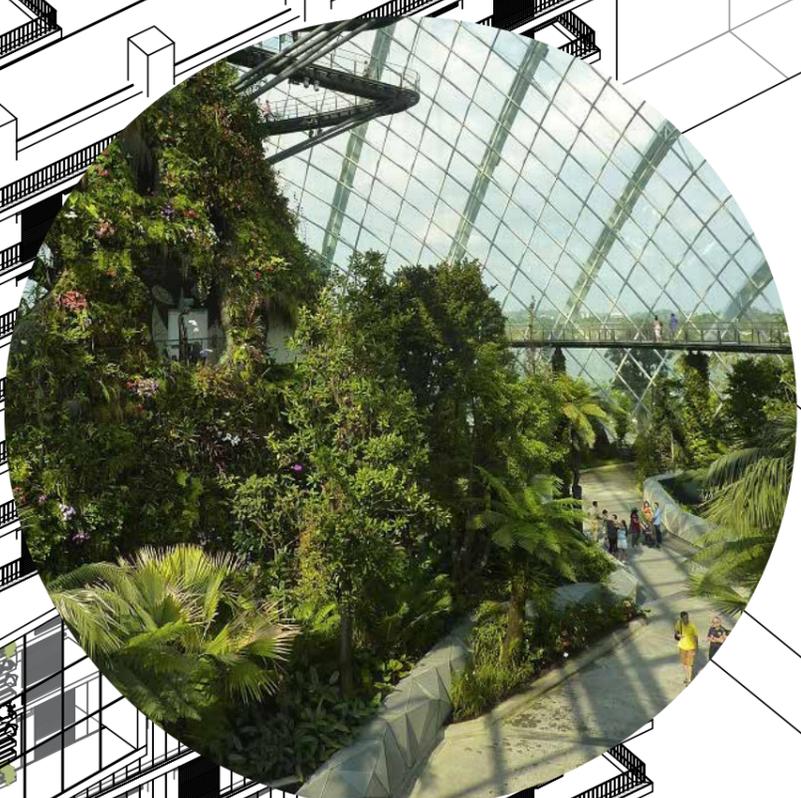
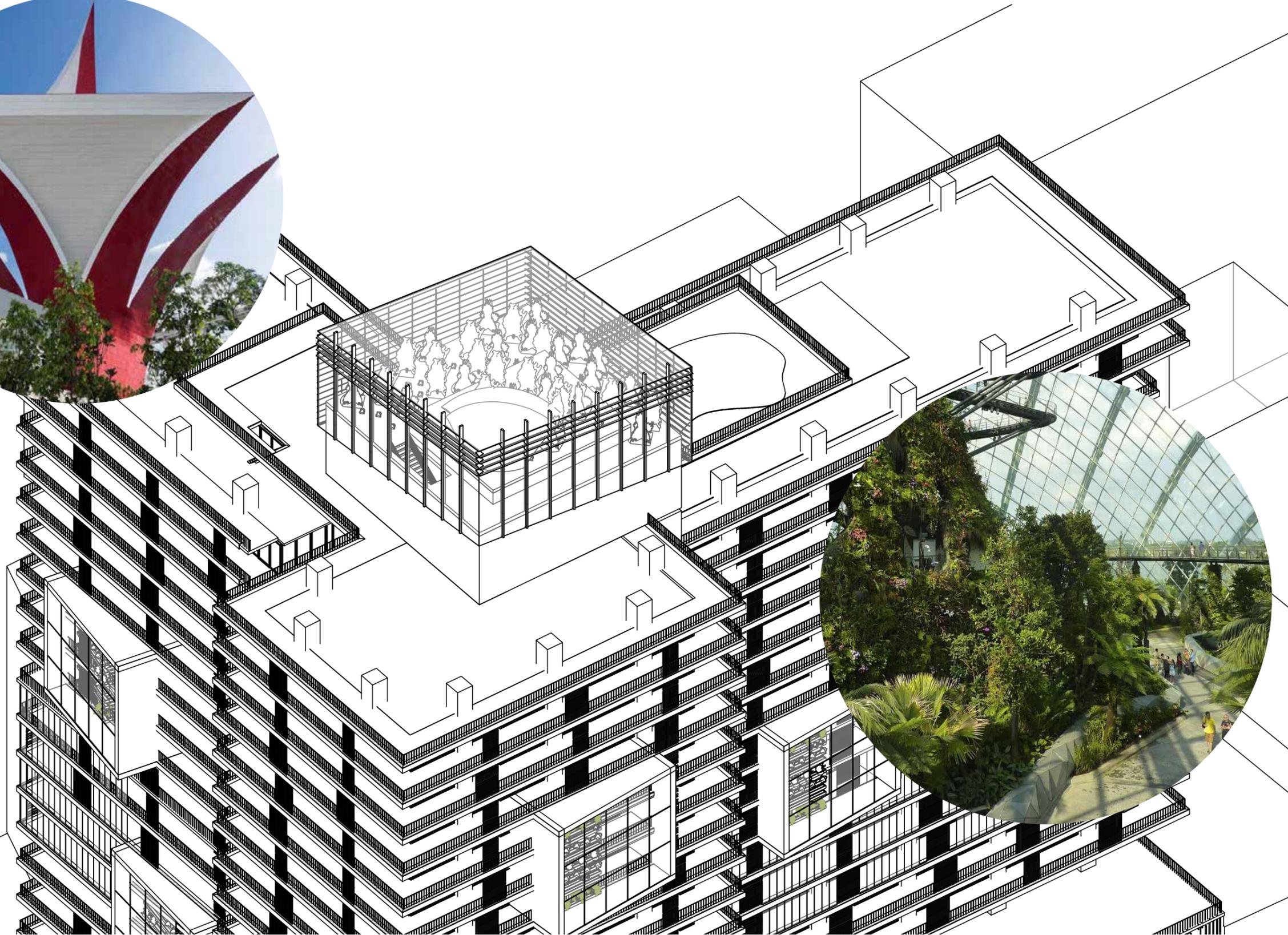
# DAKTUINEN TOREN A



VERTICALE STAD



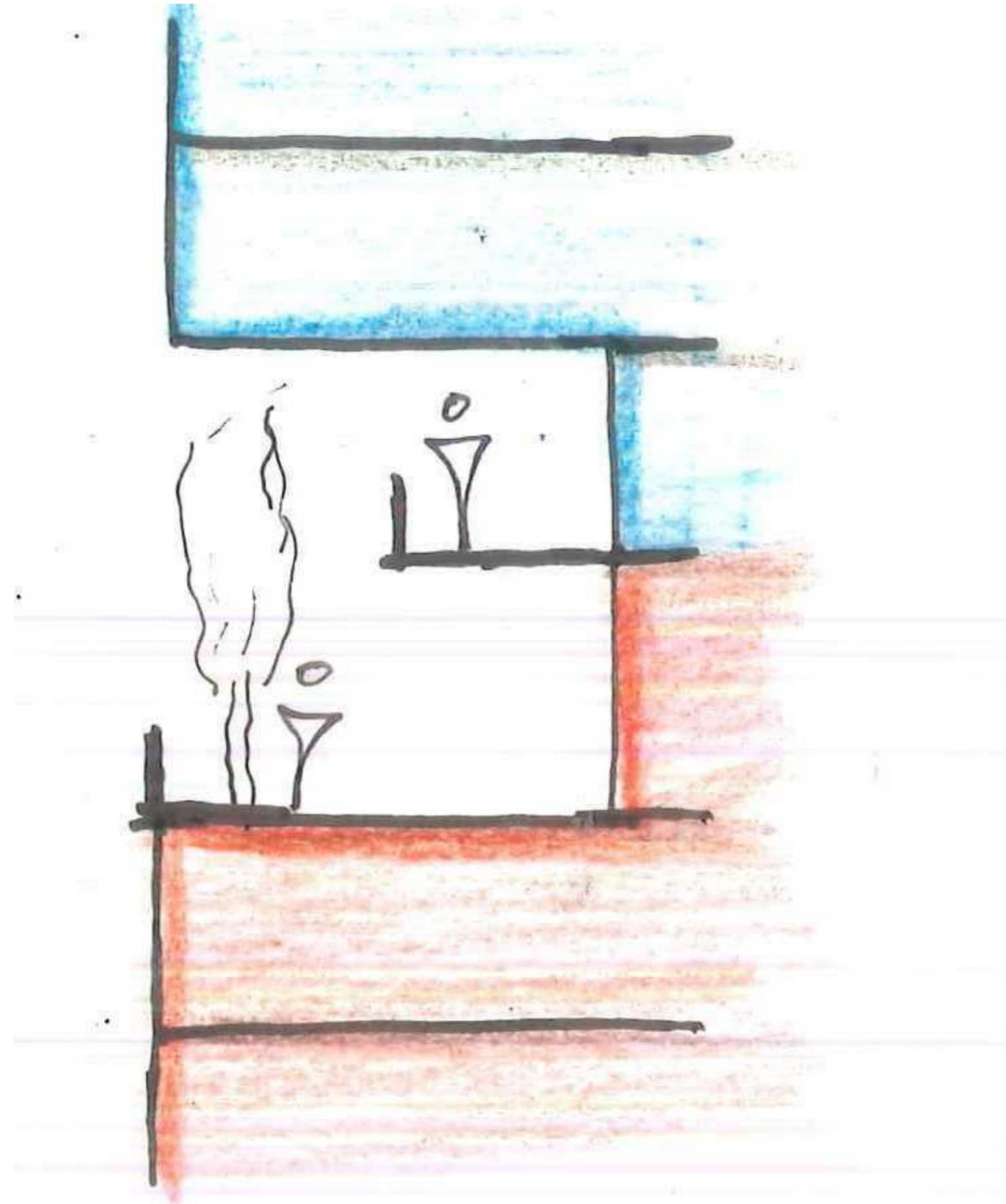
DAKBOS



VERTICALE STAD

**POCKETS**

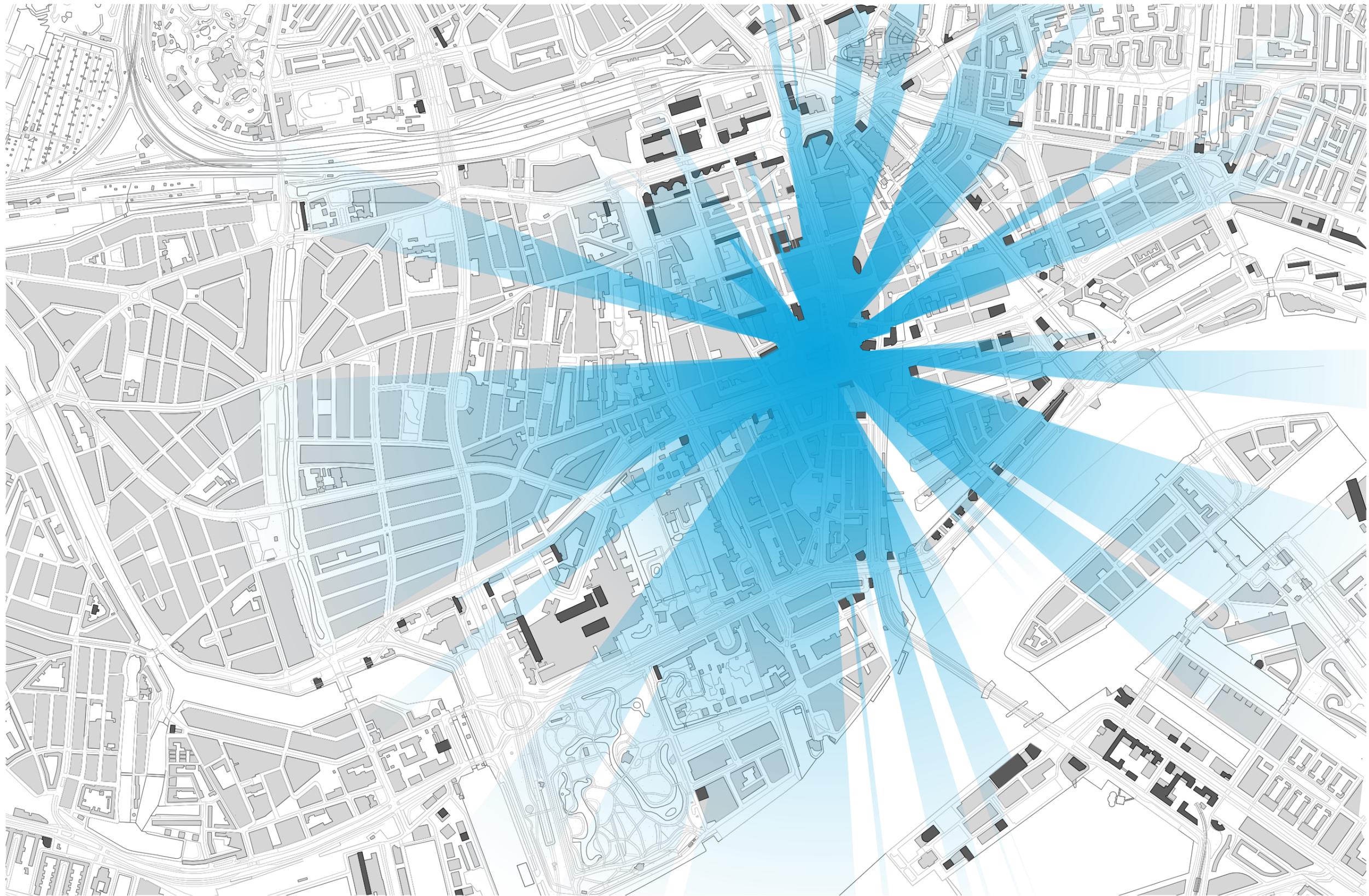
# POCKET CONCEPT



POCKETS CONCEPT

# CONCEPT

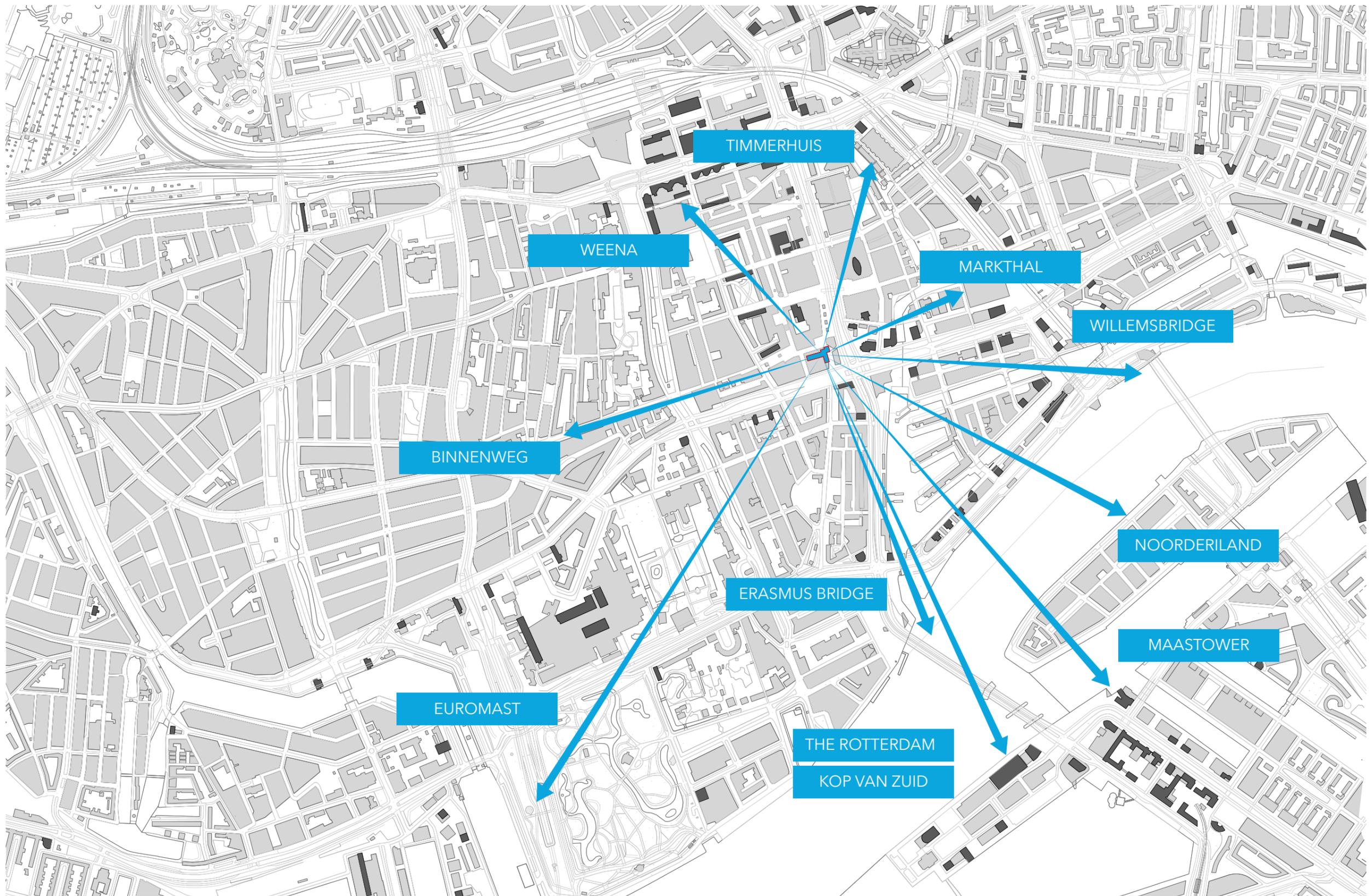
ISOVIST STUDIE



POCKETS CONCEPT

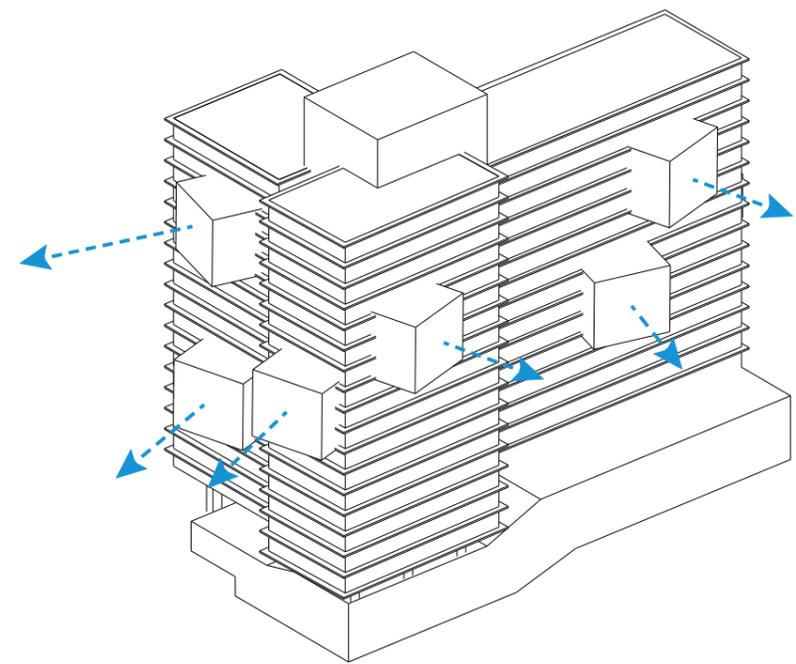
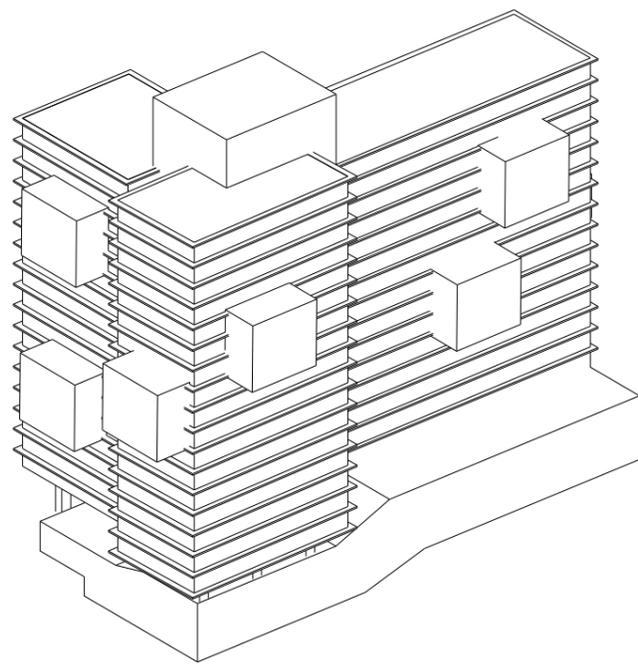
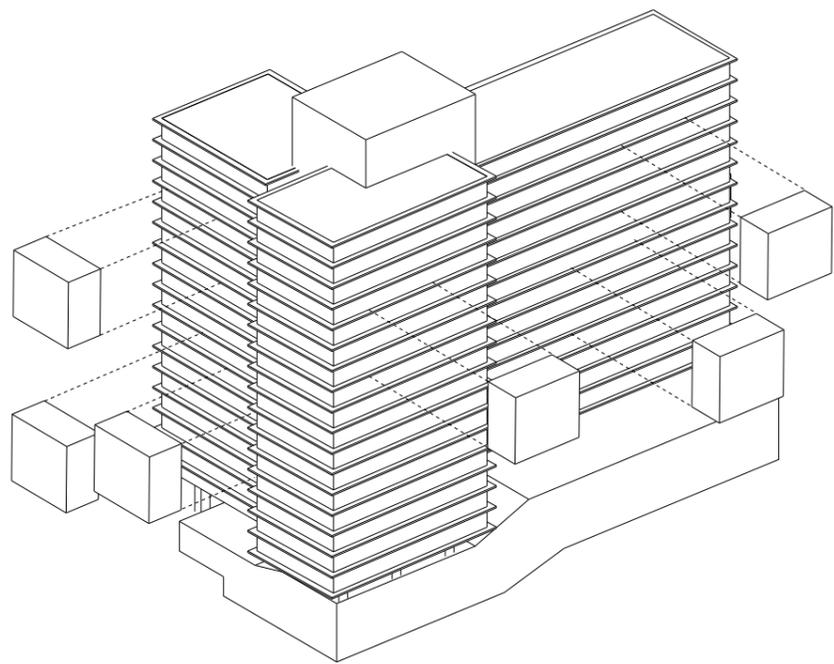
# CONCEPT

## ROTTERDAM HIGHLIGHTS



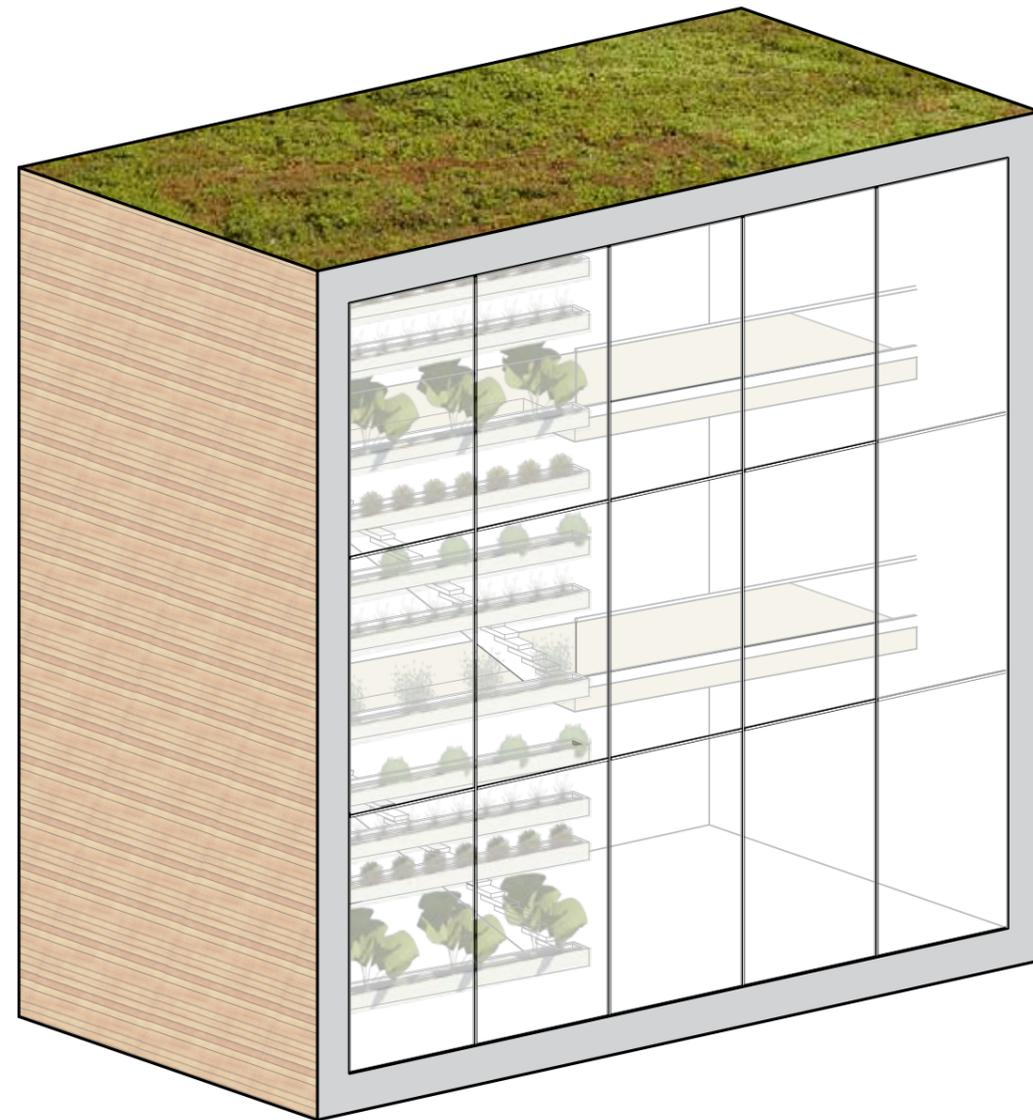
POCKETS CONCEPT

# CONCEPT



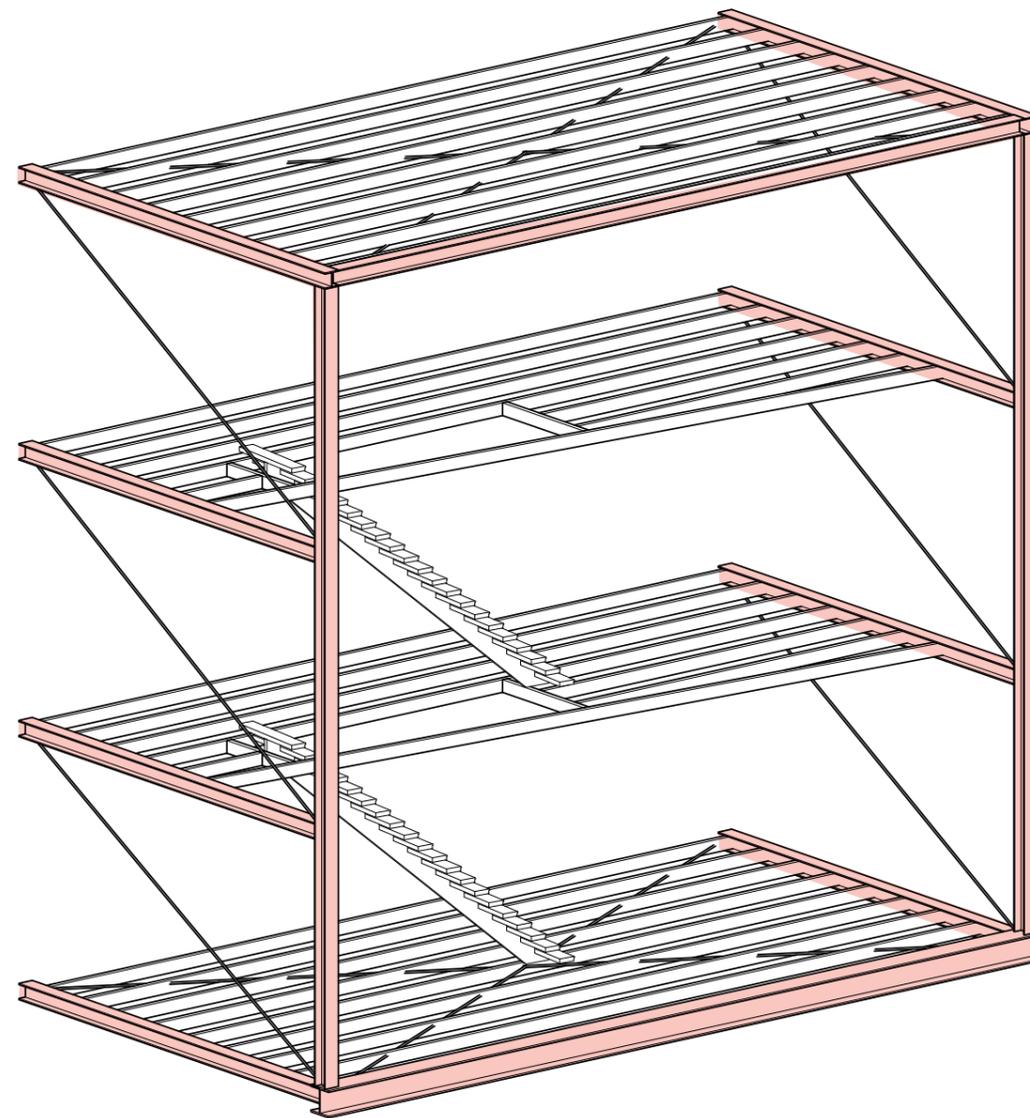
POCKETS CONCEPT

# POCKET OPBOUW



POCKETS

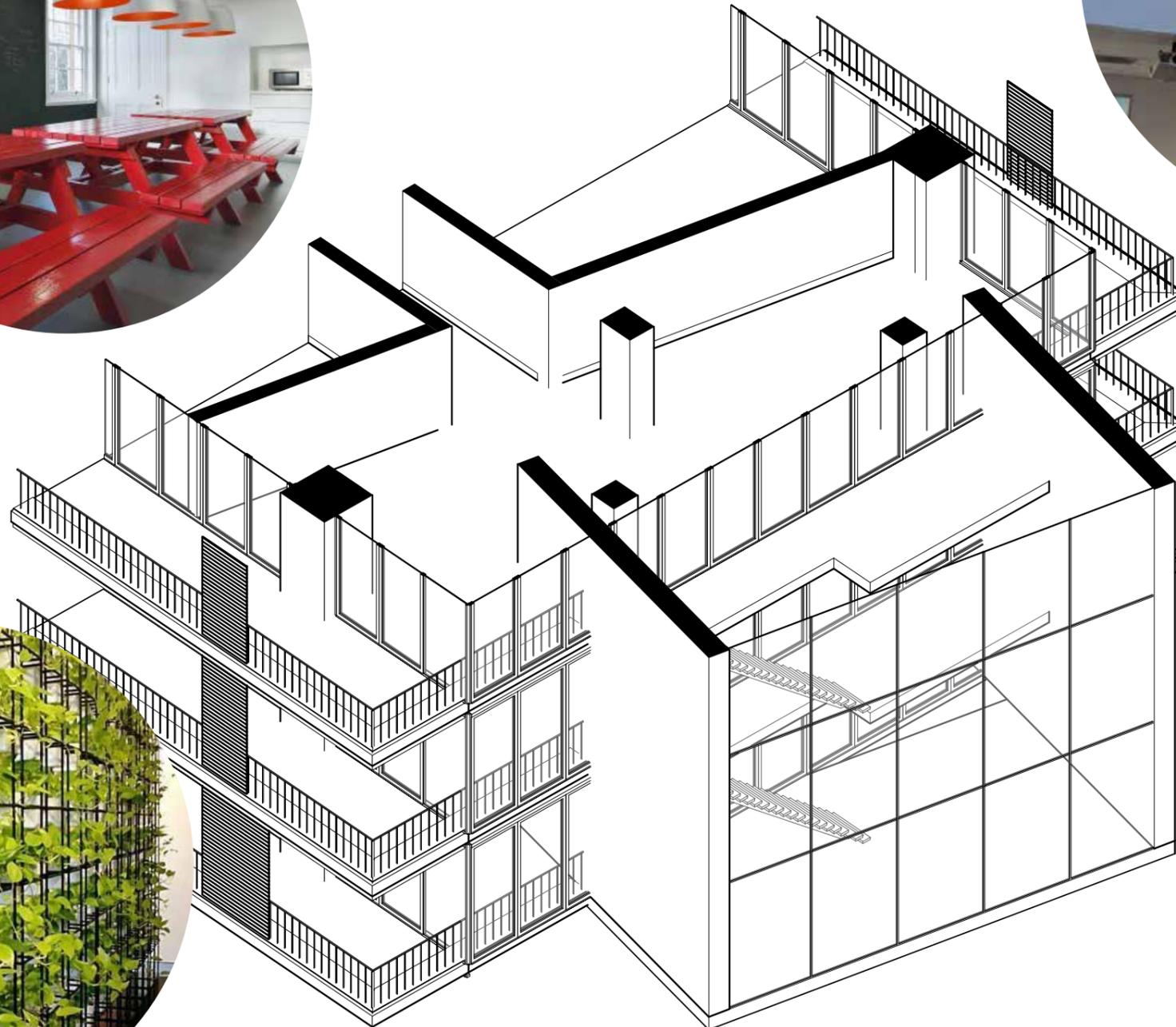
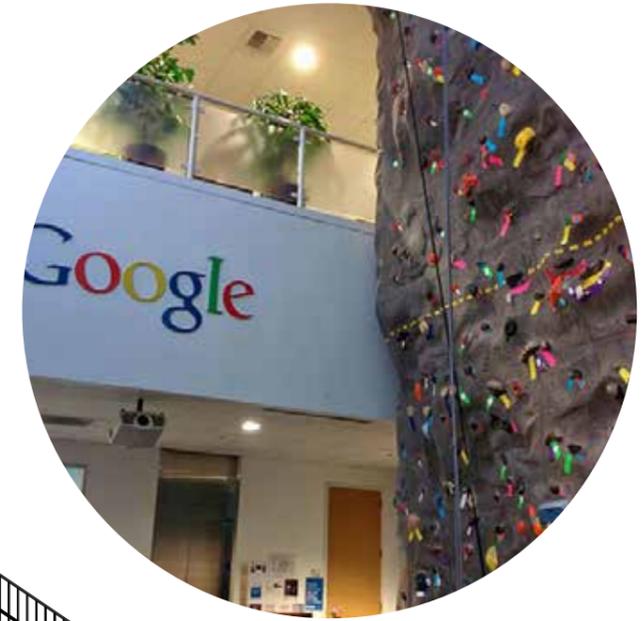
# CONSTRUCTIE



POCKETS

# POCKET

INTERIEUR



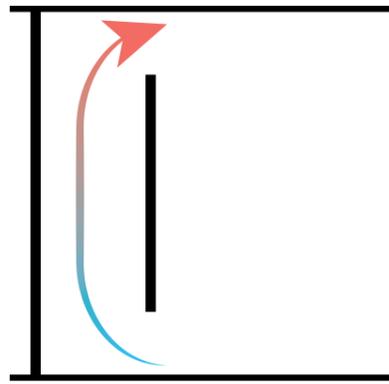
POCKETS

# POCKET

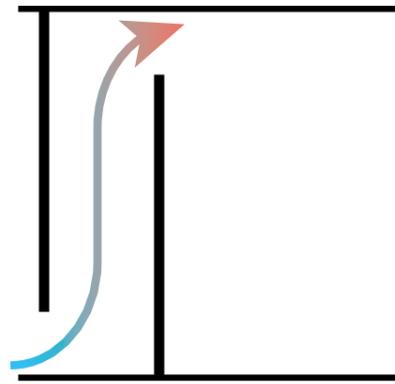


POCKETS

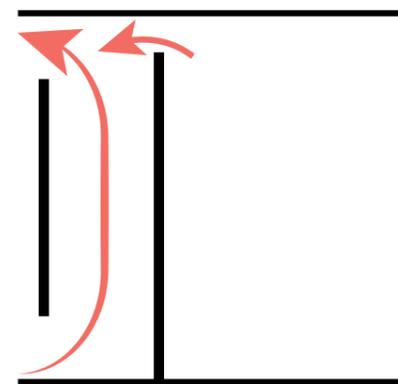
# POCKET MODI



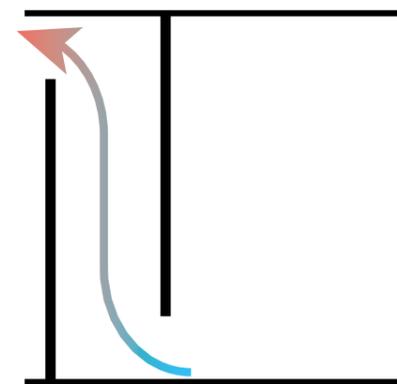
A  
INNER CIRCULATION



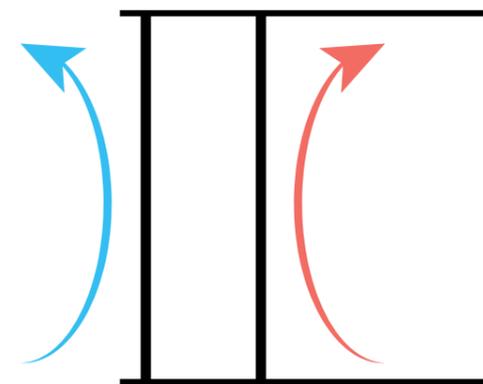
B  
SUPPLY MODE



C  
EXTERIOR CIRCULATION



D  
EXHAUST MODE

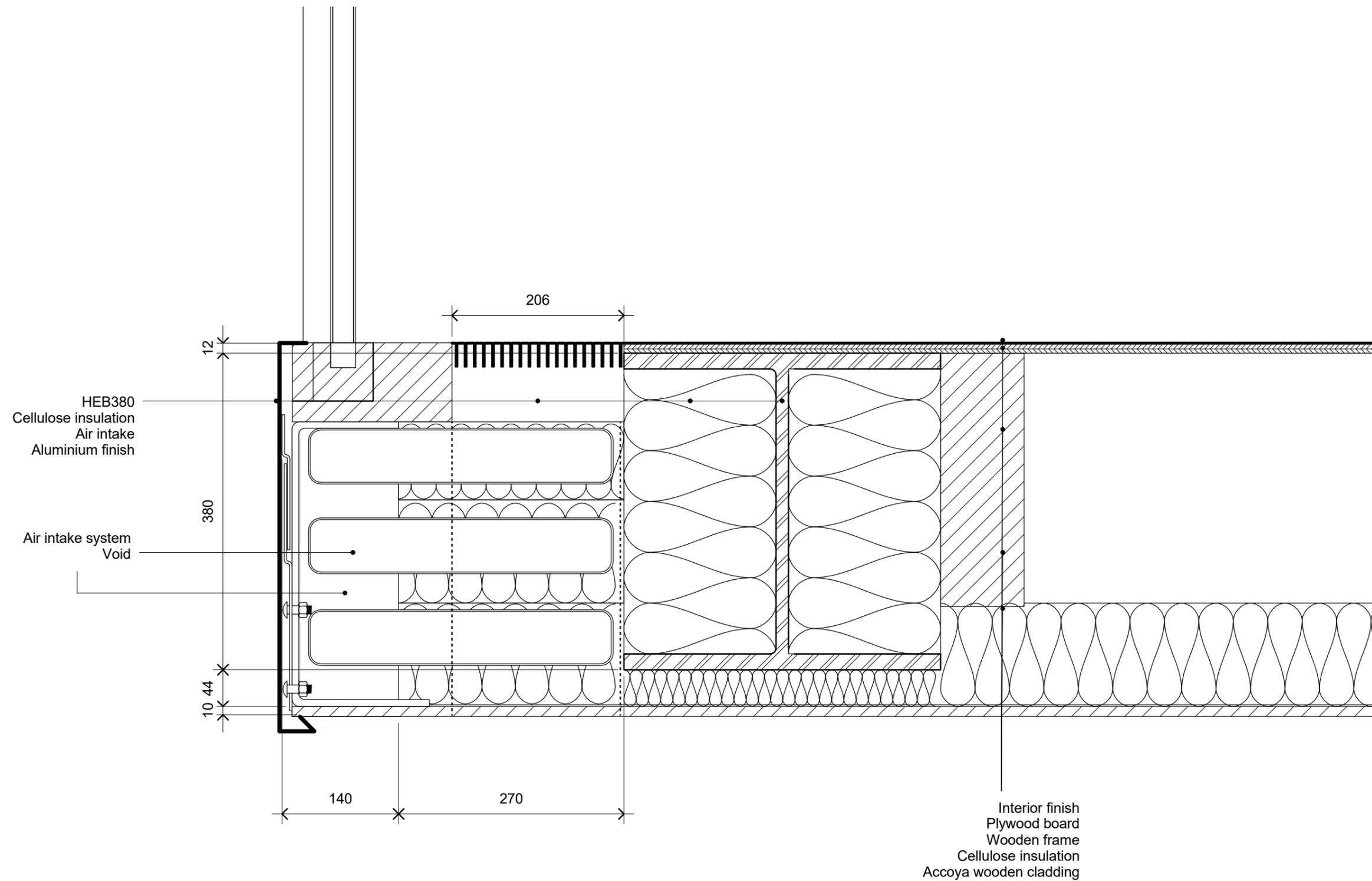


E  
INSULATION MODE

POCKETS

# POCKET

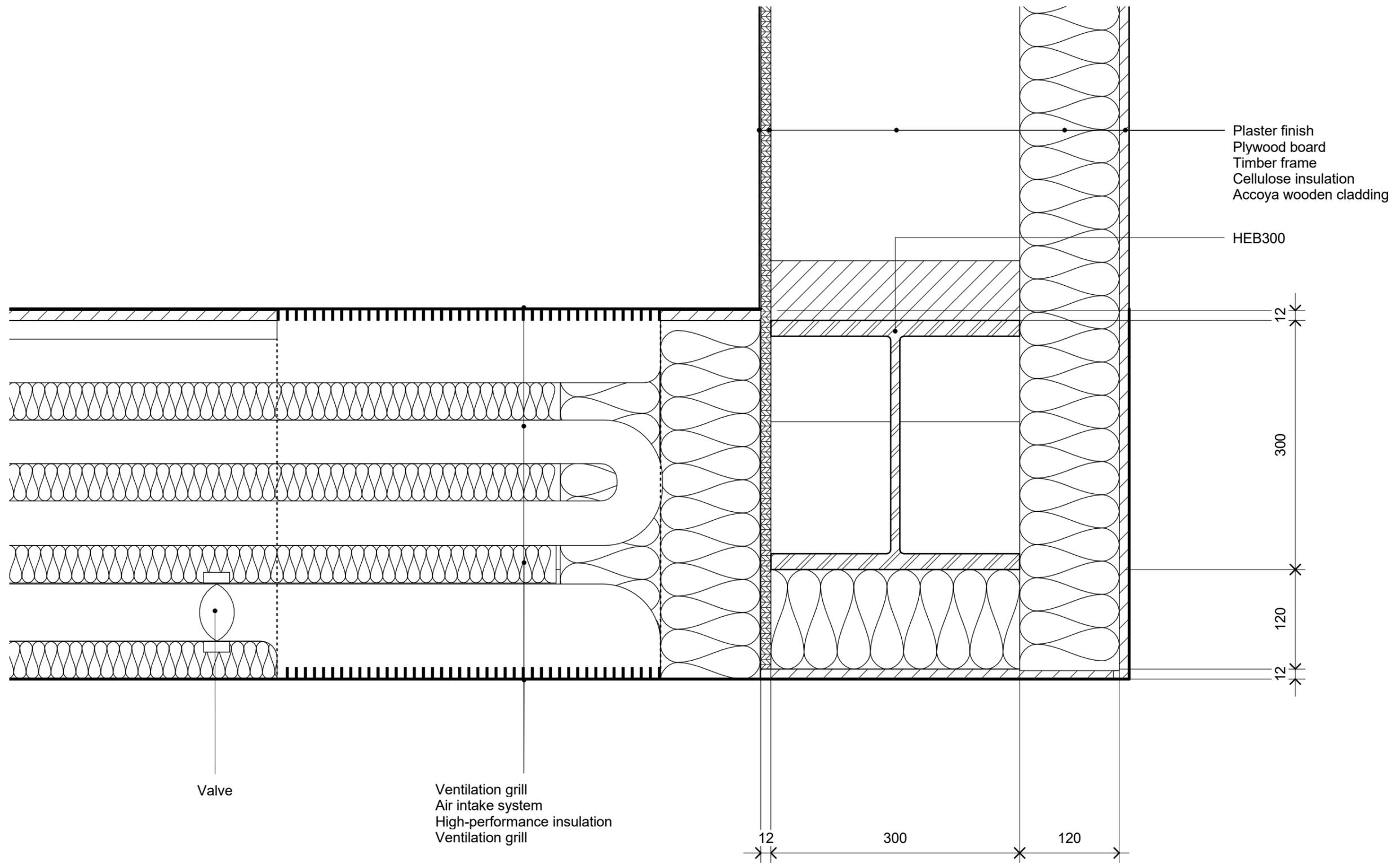
## VLOERDETAIL ZIJAANZICHT



POCKETS

# POCKET

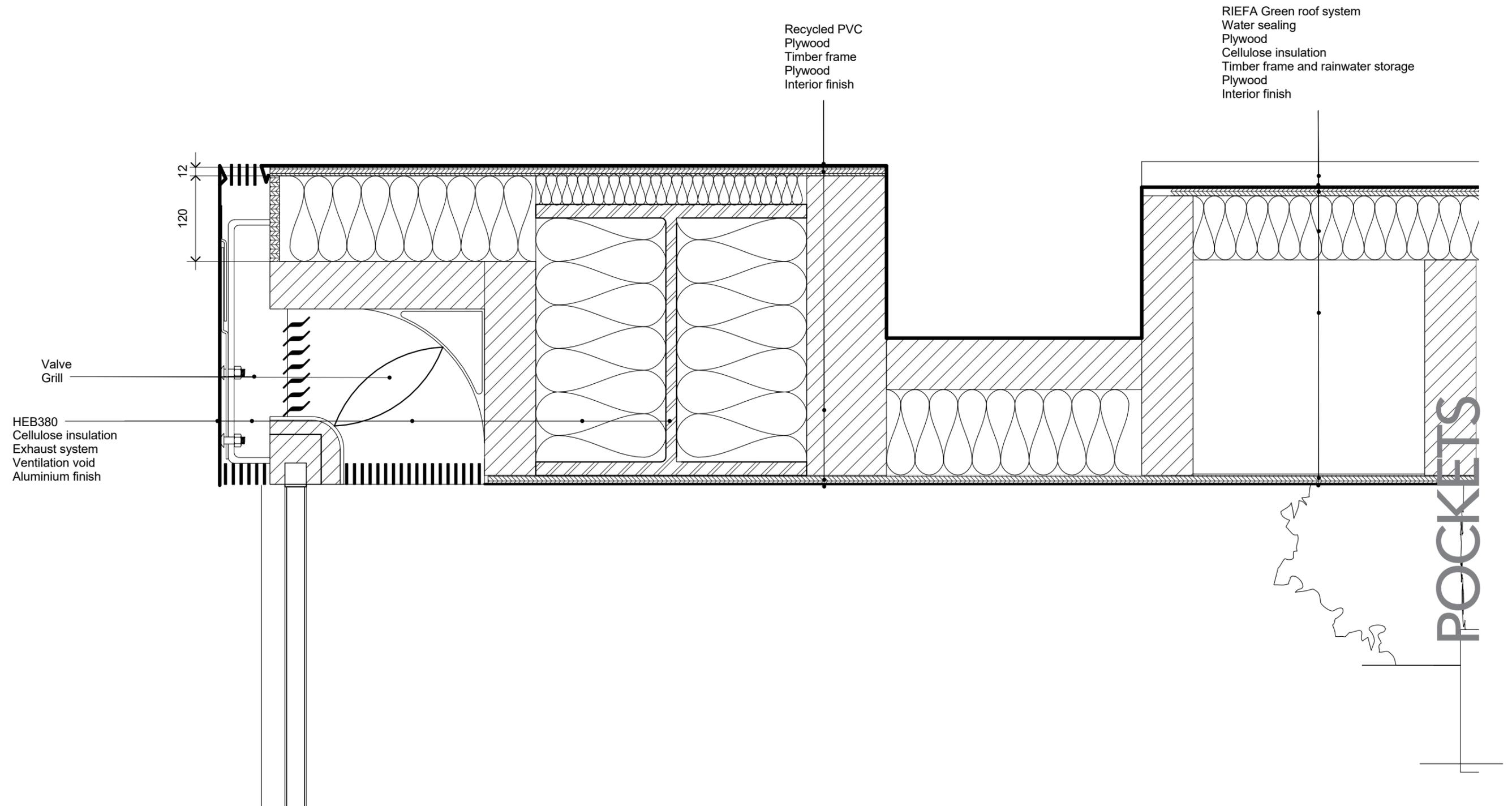
VLOERDETAIL VOORAANZICHT



POCKETS

# POCKET

## DAKDETAIL ZIJAANZICHT

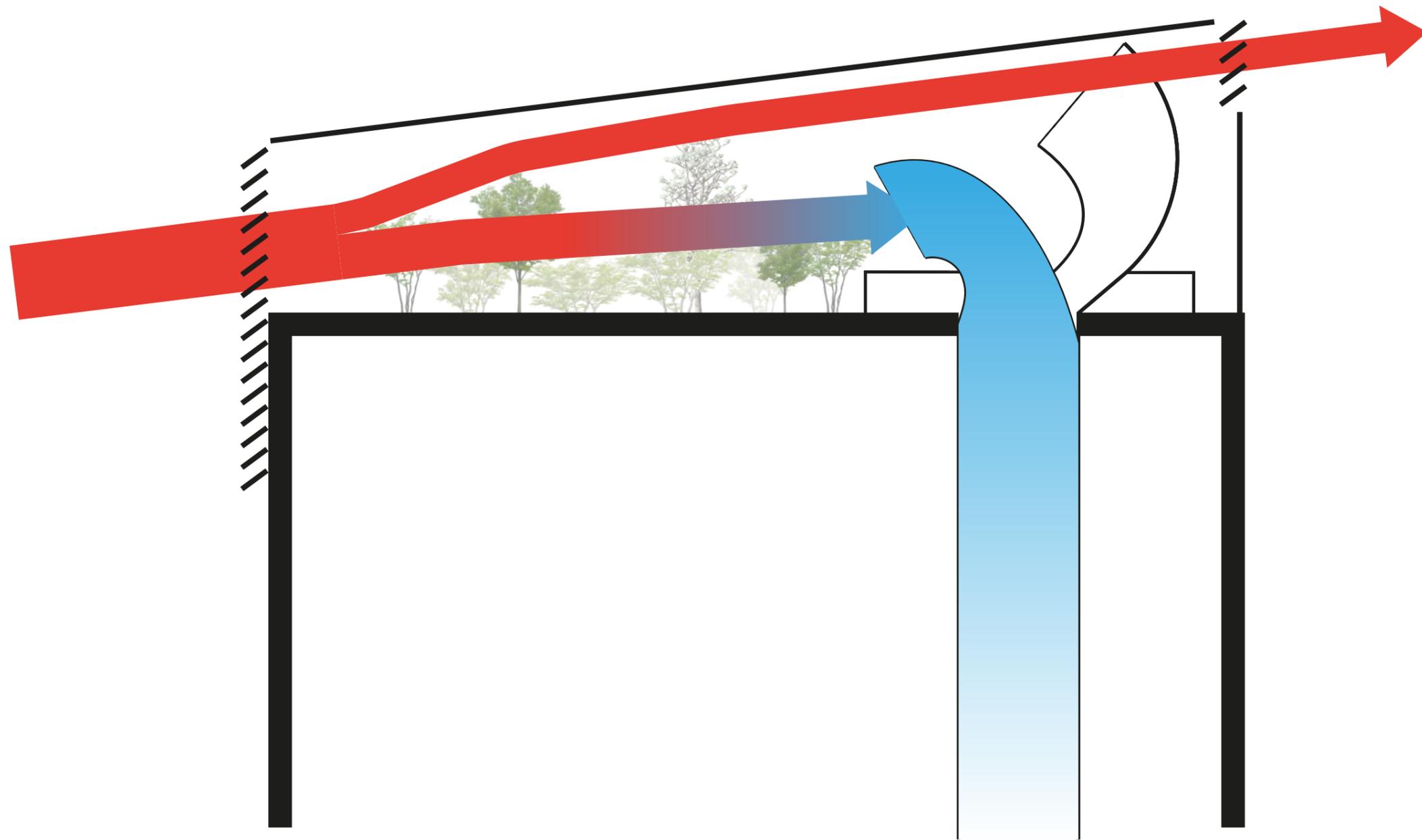




# GEBOUWSYSTEMEN

# LUCHTINLAAT VIA DAKBOS

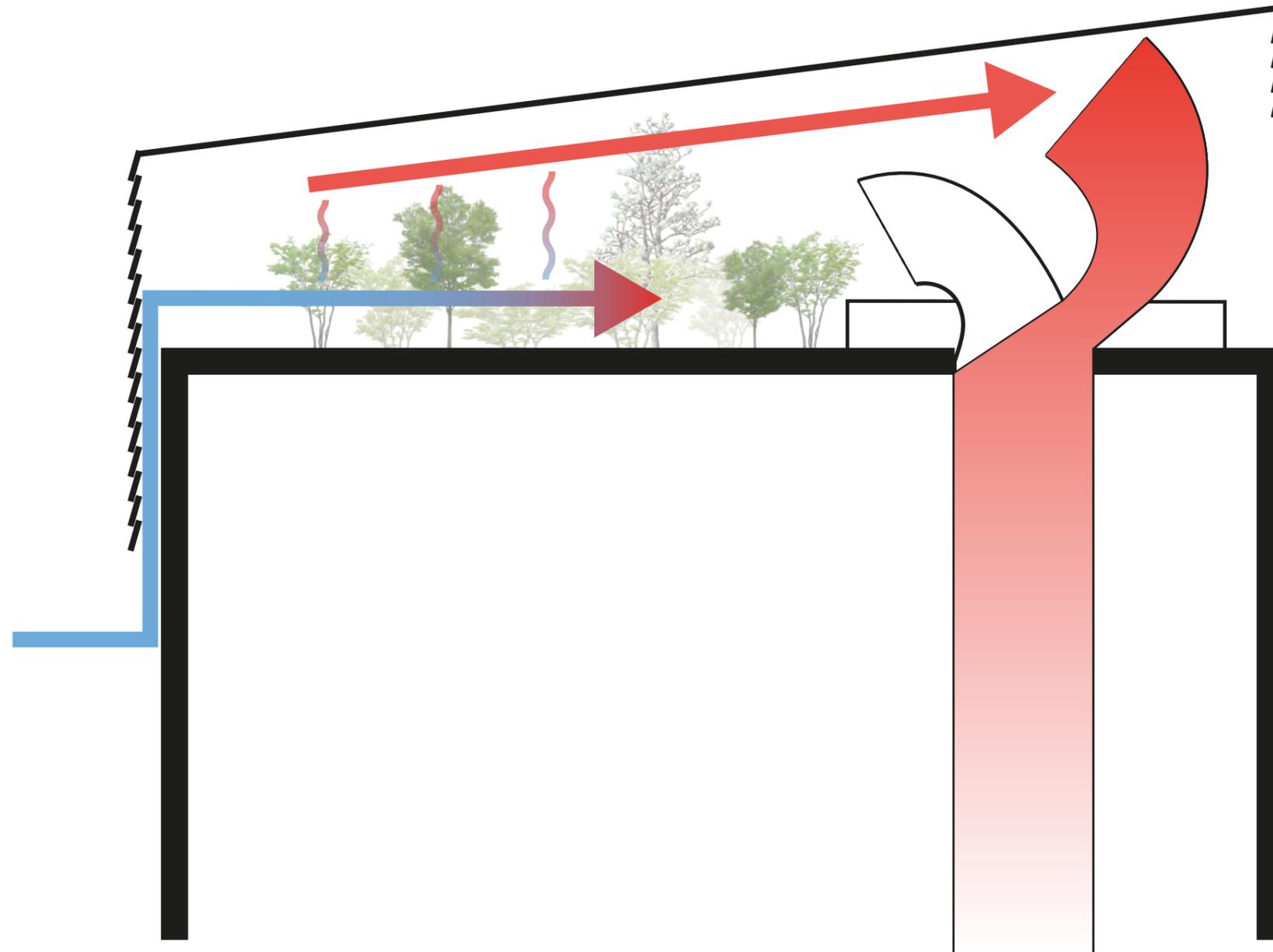
ZOMER



GEBOUWSYSTEMEN

# LUCHTINLAAT VIA DAKBOS

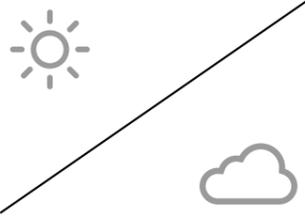
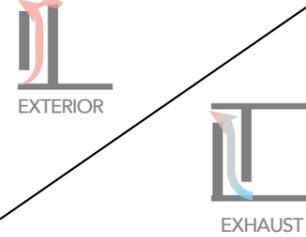
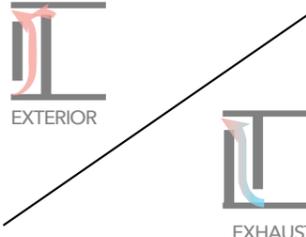
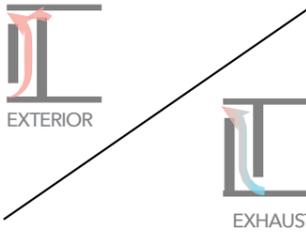
WINTER



GEBOUWSYSTEMEN

# POCKET MODI

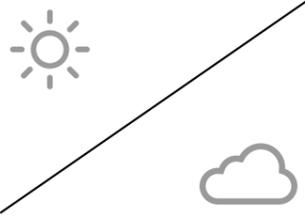
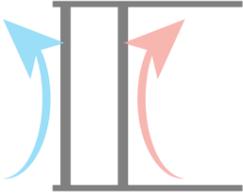
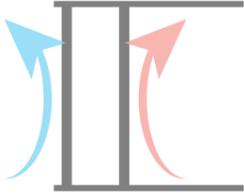
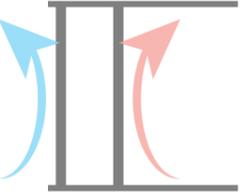
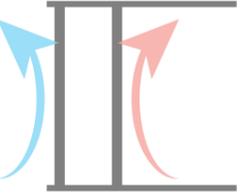
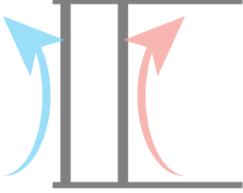
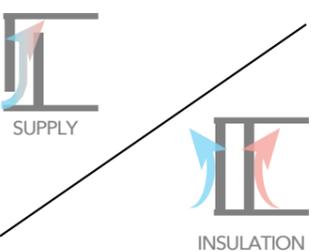
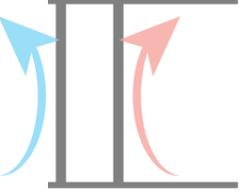
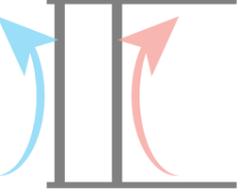
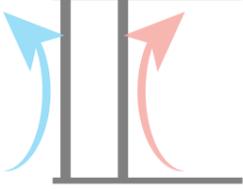
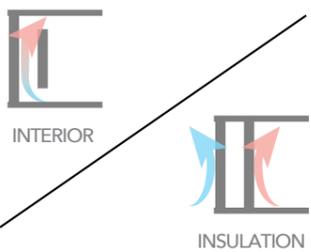
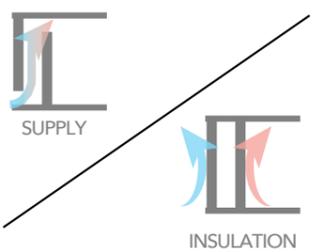
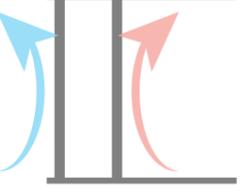
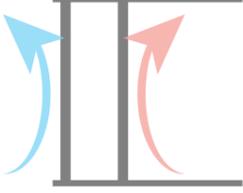
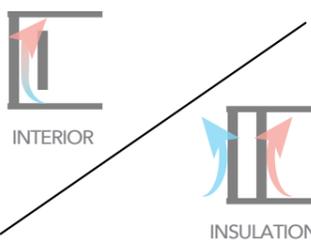
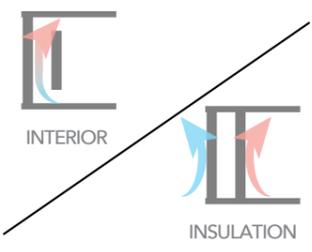
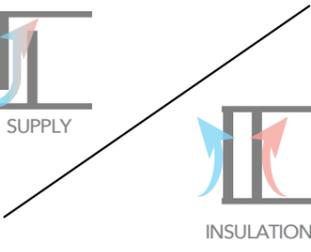
ZOMER

	N	SE	S	SW
NIGHT	 EXHAUST	 SUPPLY	 SUPPLY	 EXHAUST
9:00	 SUPPLY	 EXHAUST	 SUPPLY	 SUPPLY
13:00	 SUPPLY	 EXHAUST	 EXHAUST	 SUPPLY
17:00	 SUPPLY	 EXHAUST	 EXHAUST	 EXHAUST

GEBOUWSYSTEMEN

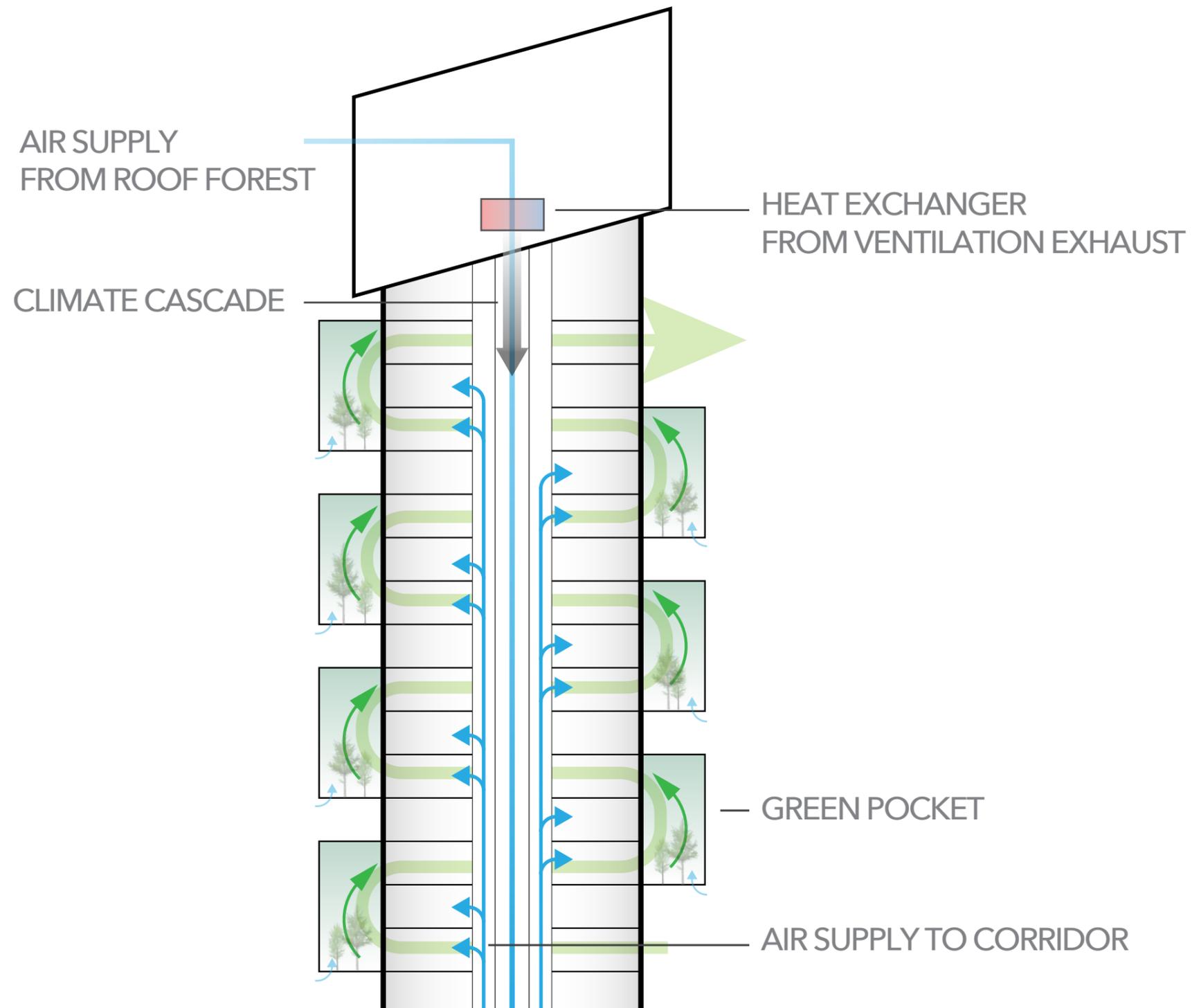
# POCKET MODI

WINTER

	N	SE	S	SW
NIGHT	 INSULATION	 INSULATION	 INSULATION	 INSULATION
9:00	 INSULATION	 INSULATION	 INSULATION	 INSULATION
13:00	 INSULATION	 INSULATION	 INSULATION	 INSULATION
17:00	 INSULATION	 INSULATION	 INSULATION	 INSULATION

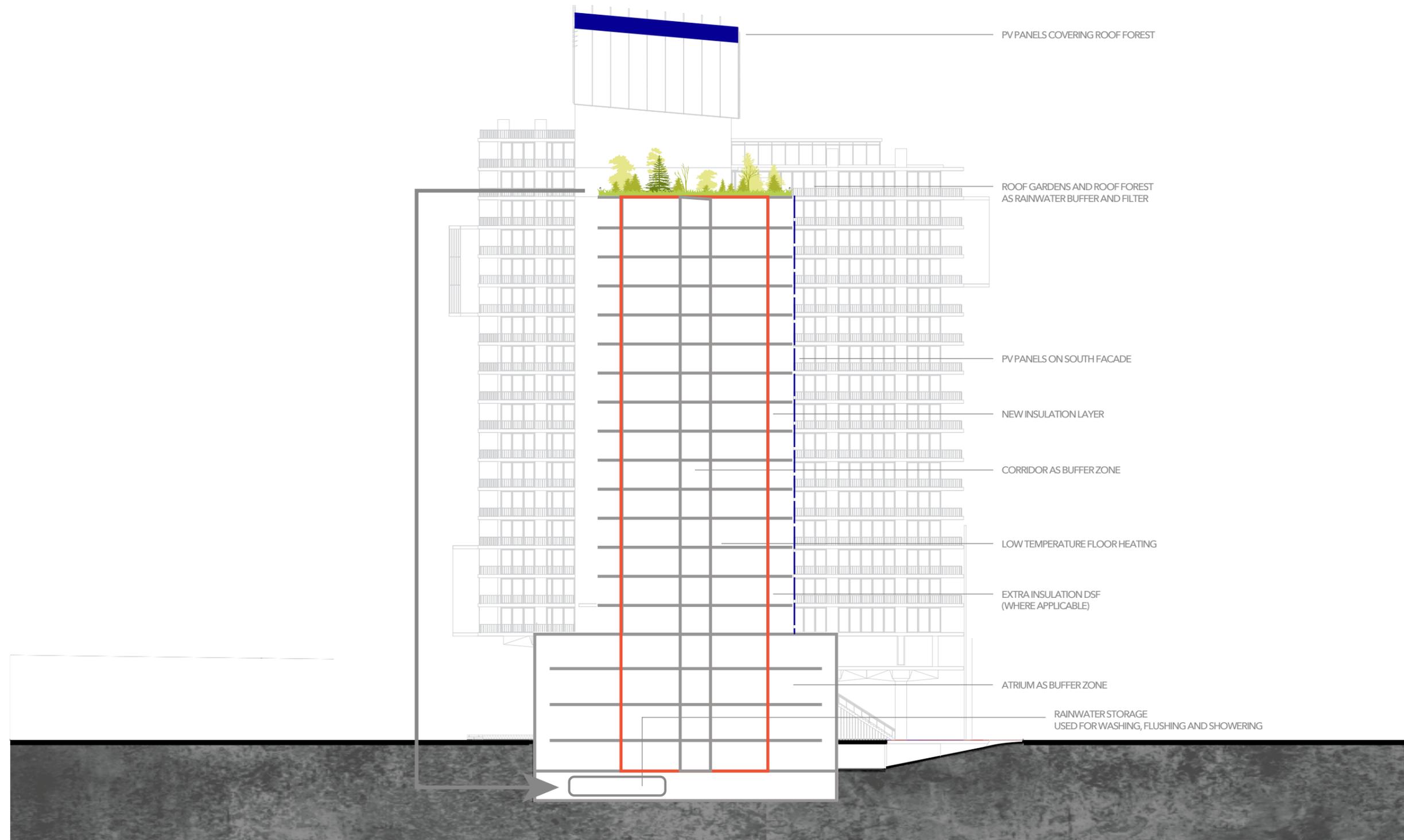
GEBOUWSYSTEMEN

# LONGEN VAN HET GEBOUW



GEBOUWSYSTEMEMEN

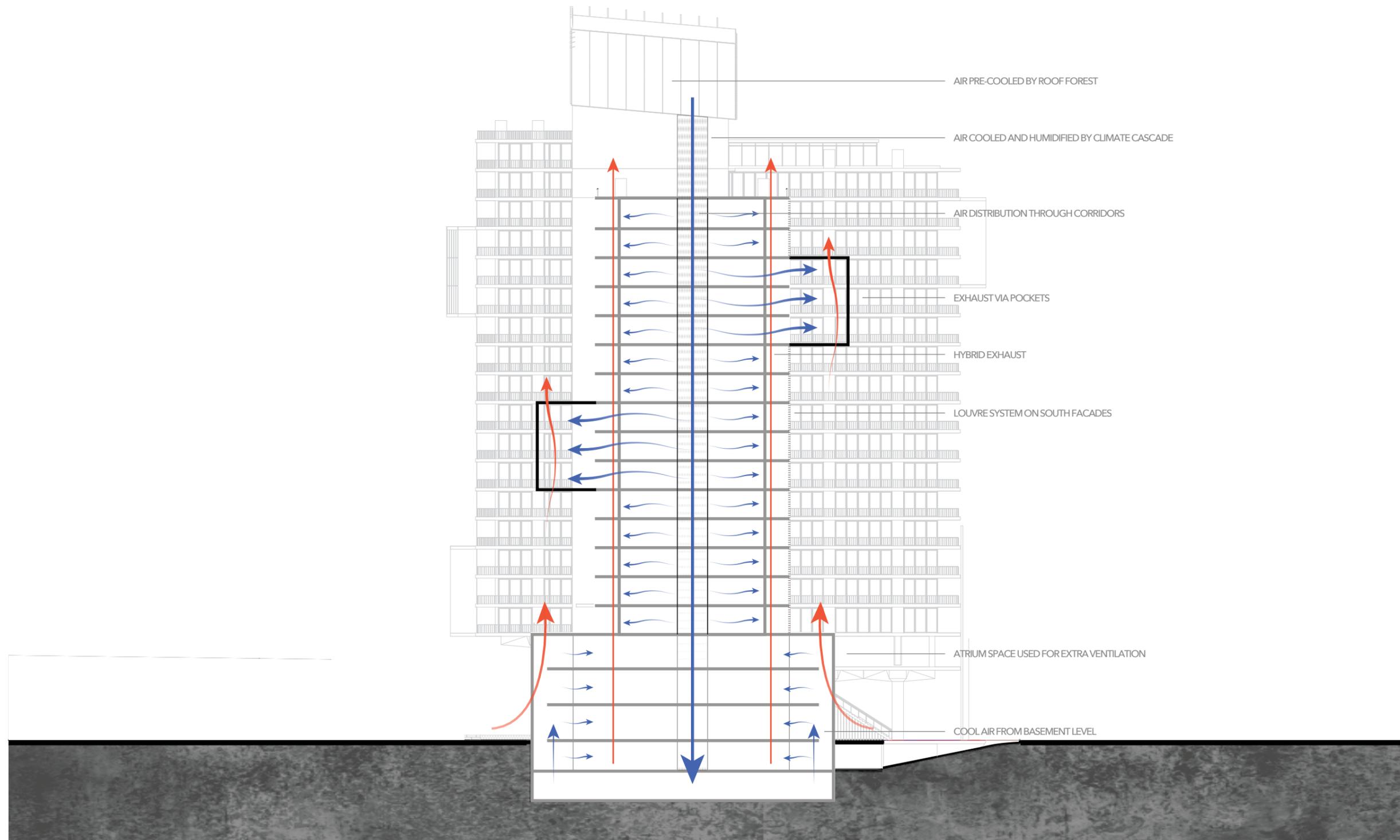
# ENERGIECONCEPT



GEBOUWSYSTEMEMEN

# EEN PASSIEVE STRATEGIE

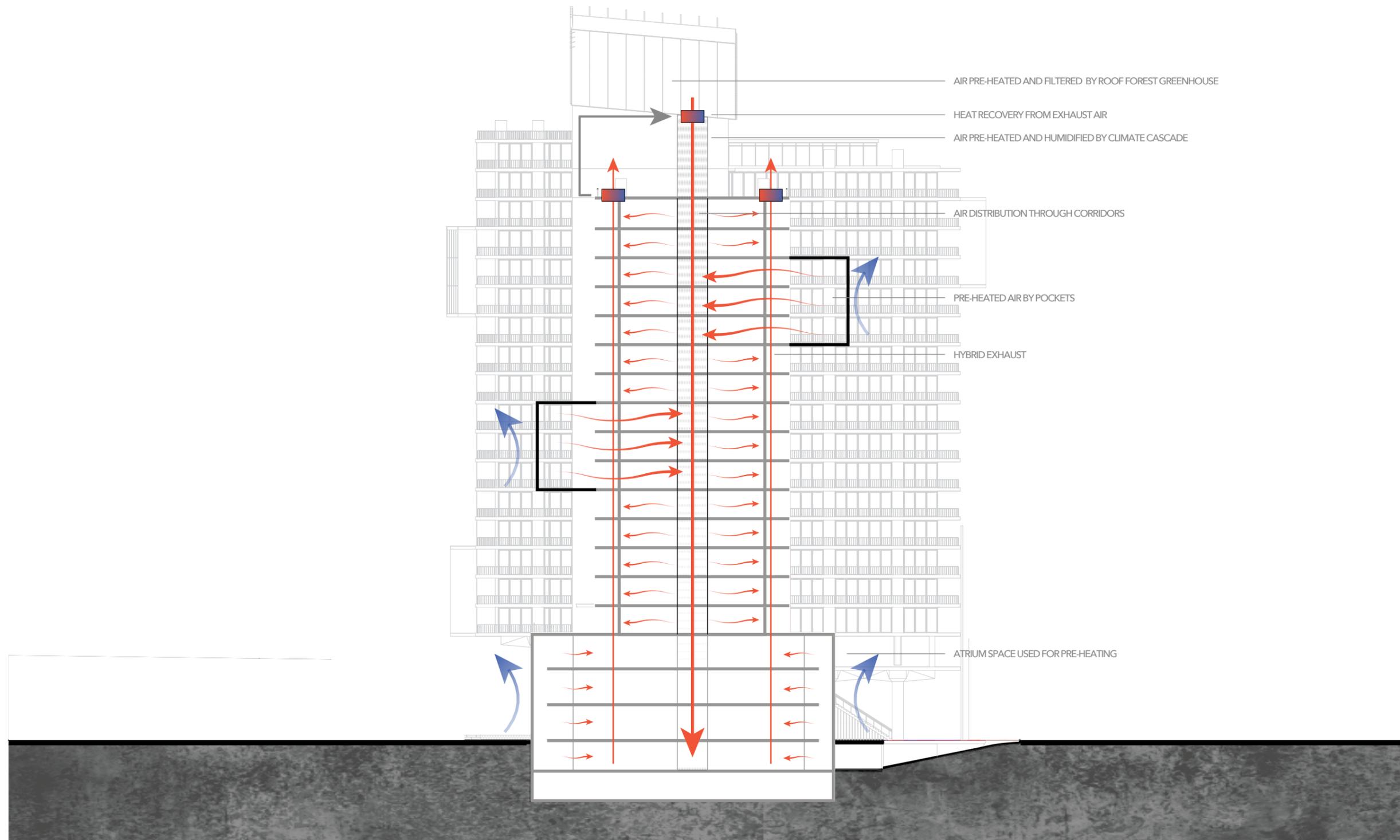
ZOMERSITUATIE



GEBOUWSYSTEMEN

# EEN PASSIEVE STRATEGIE

WINTER



GEBOUWSYSTEMEN

# ARCHITECTURAL ENGINEERING

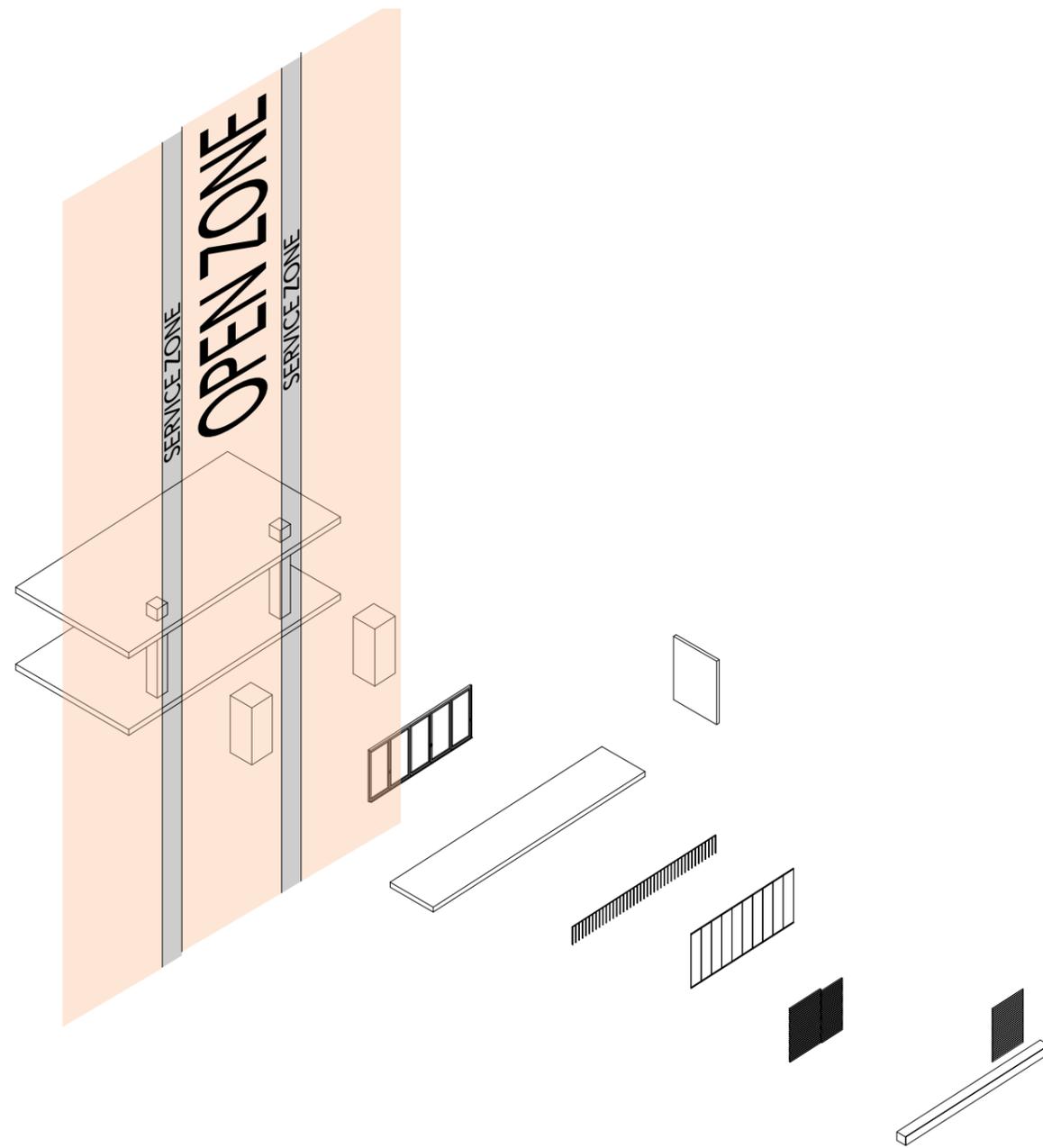
*"YOU CANNOT STEP TWICE INTO THE SAME RIVER"*

*HERACLITUS C., 544-483 V.CHR.*



# LAYERED FACADE

FACADE ZONES VERTICAL

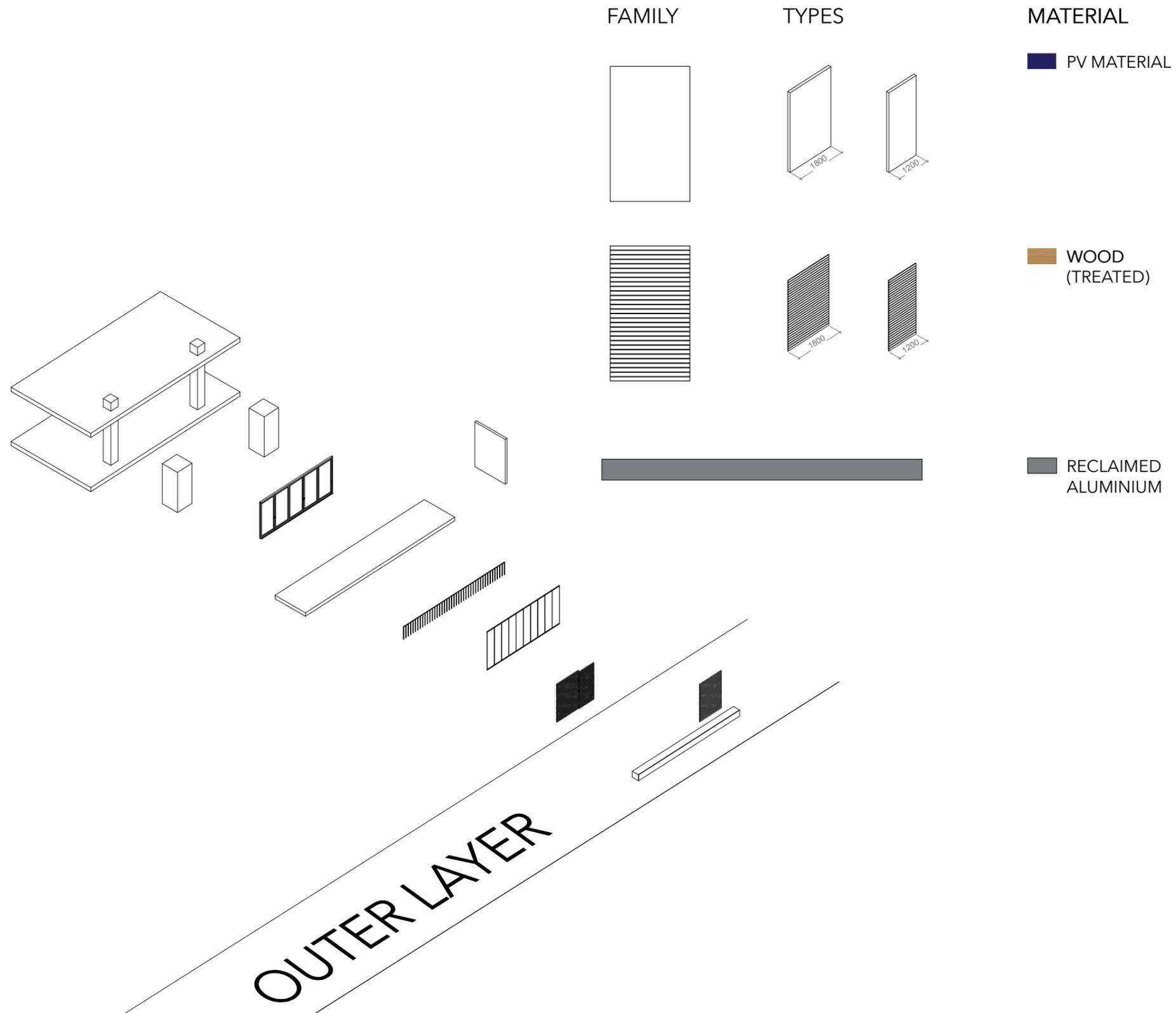


FLEXIBELE UITBREIDING



# LAYERED FACADE

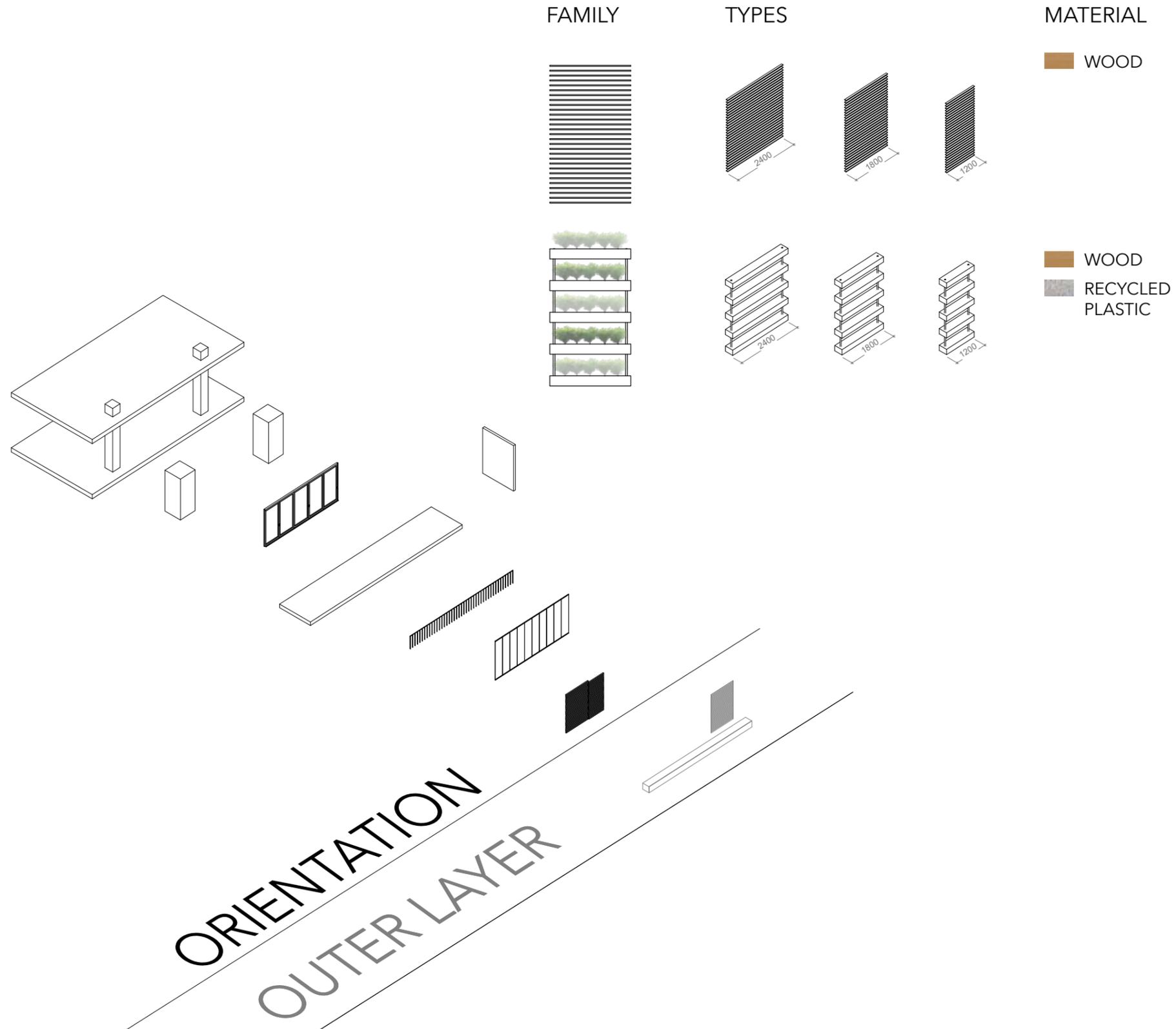
## OUTER LAYER



FLEXIBELE UITBREIDING

# LAYERED FACADE

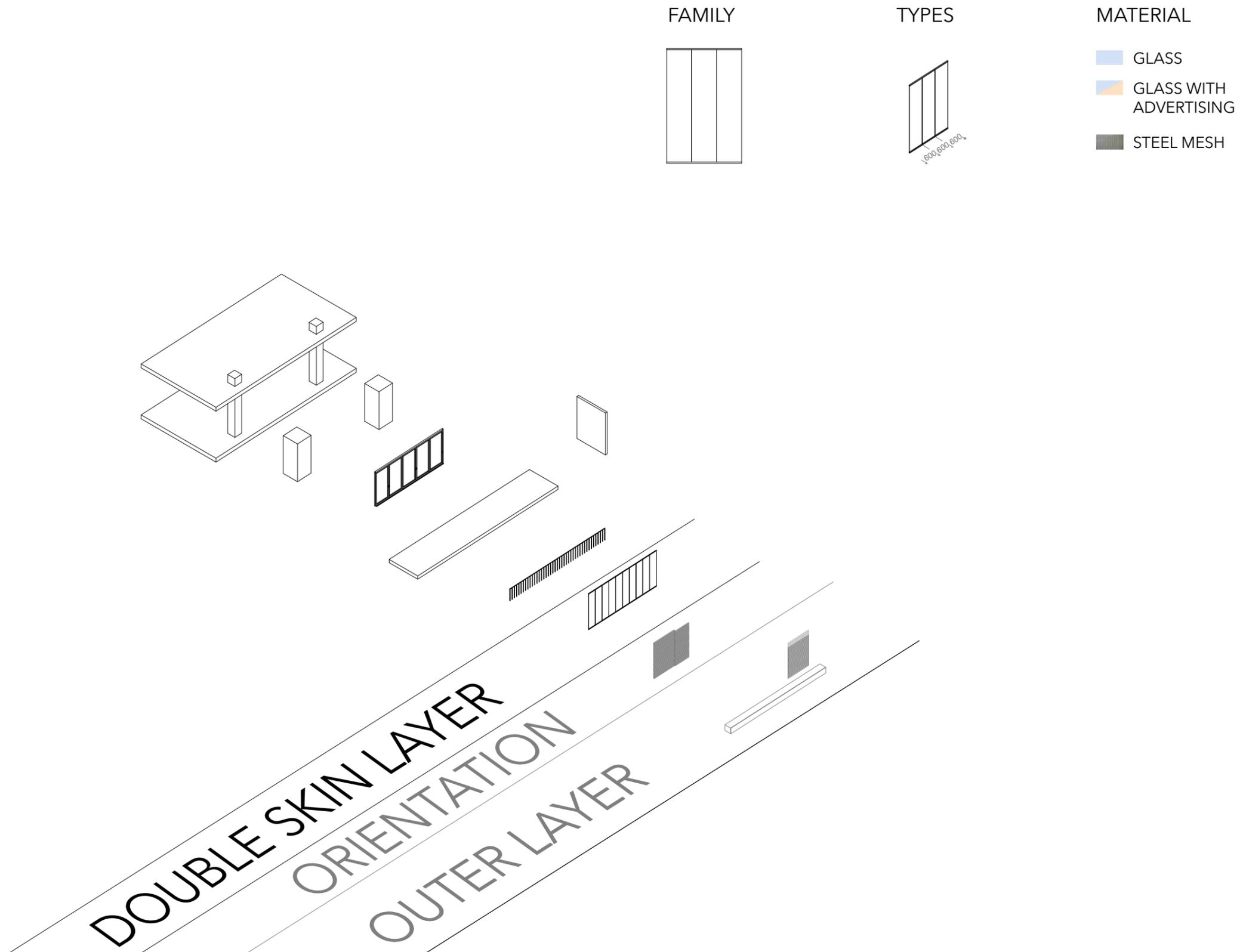
## ORIENTATION LAYER



FLEXIBELE UITBREIDING

# LAYERED FACADE

DOUBLE SKIN LAYER

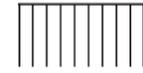


FLEXIBELE UITBREIDING

# LAYERED FACADE

RAILING LAYER

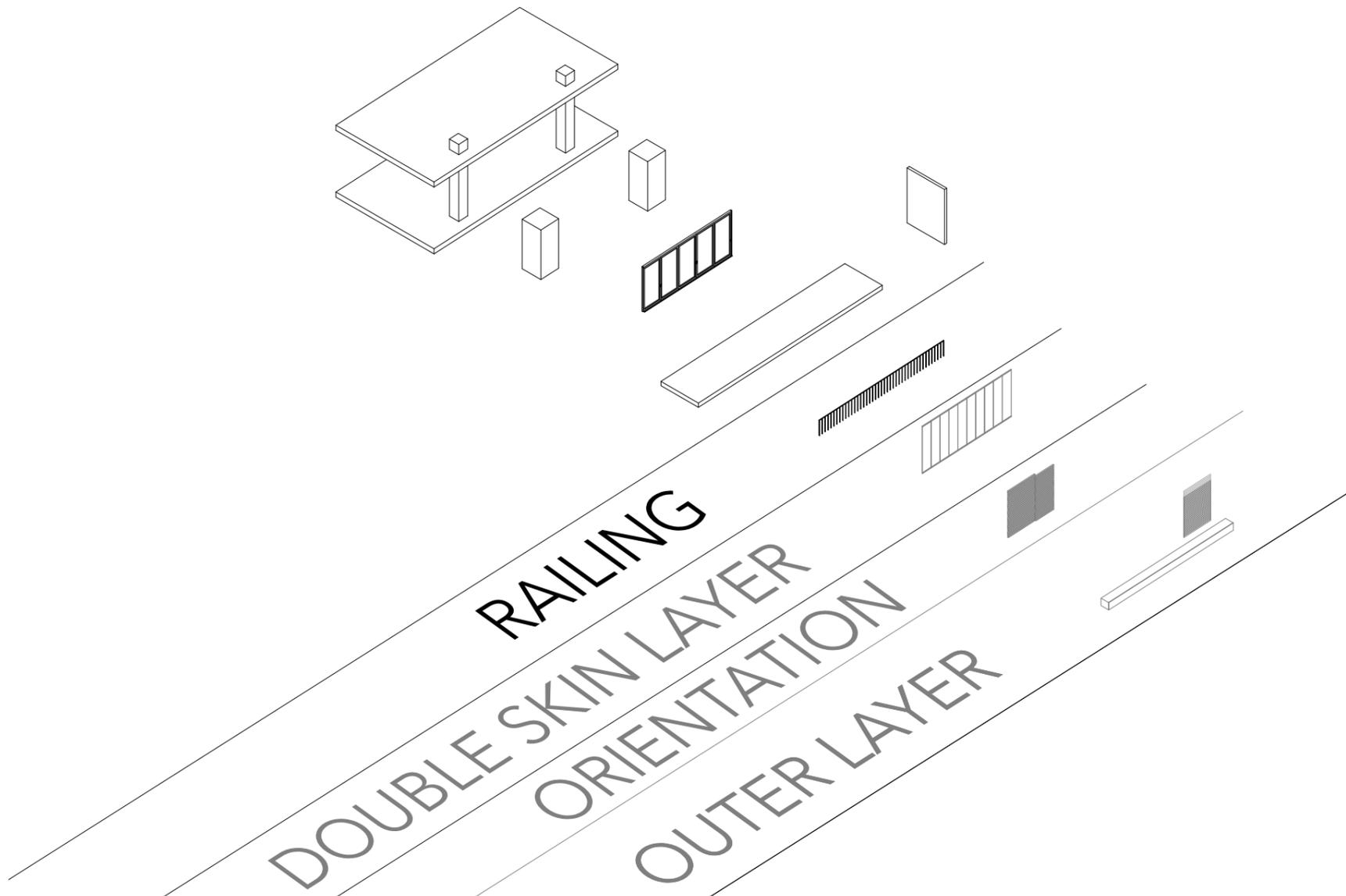
FAMILY



TYPES



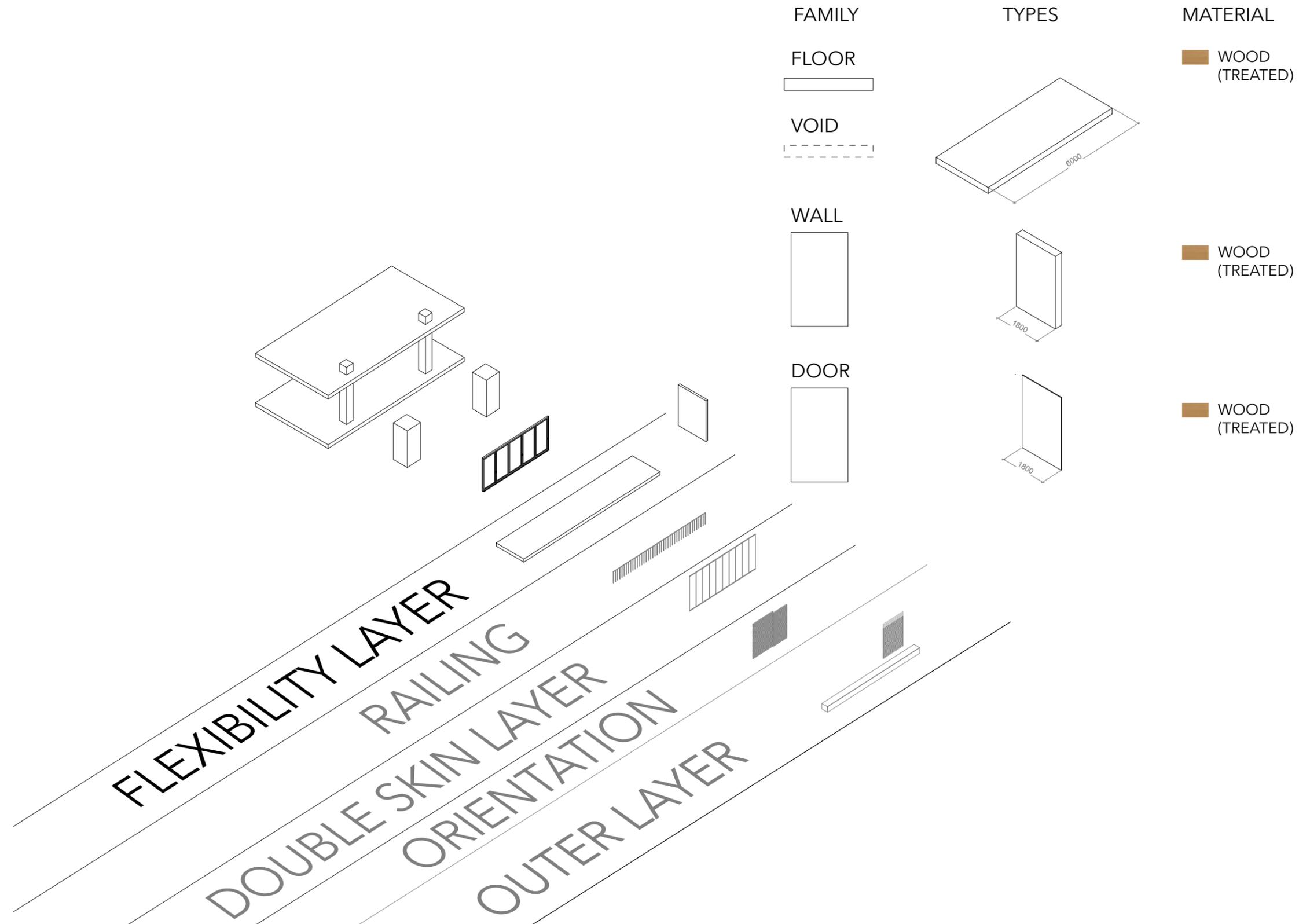
MATERIAL



FLEXIBELE UITBREIDING

# LAYERED FACADE

FLEXIBILITY LAYER

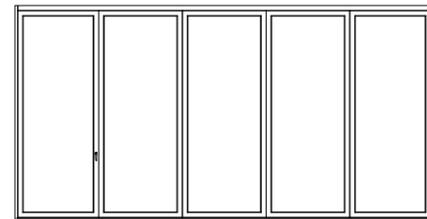


FLEXIBELE UITBREIDING

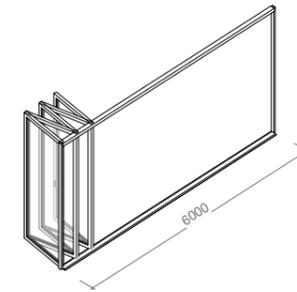
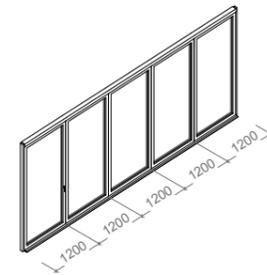
# LAYERED FACADE

THERMAL LAYER

FAMILY



TYPES

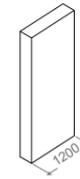
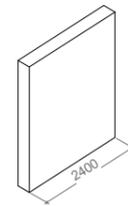
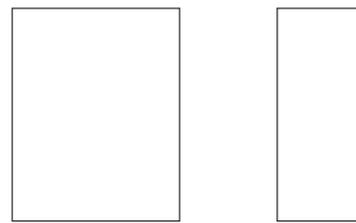


MATERIAL

WOOD (TREATED)

GLASS

WOOD (TREATED)



FLEXIBELE UITBREIDING

THERMAL LAYER

FLEXIBILITY LAYER

RAILING

DOUBLE SKIN LAYER

ORIENTATION

OUTER LAYER

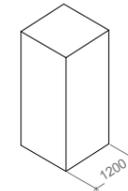
# LAYERED FACADE

SERVICE ZONE

FAMILY

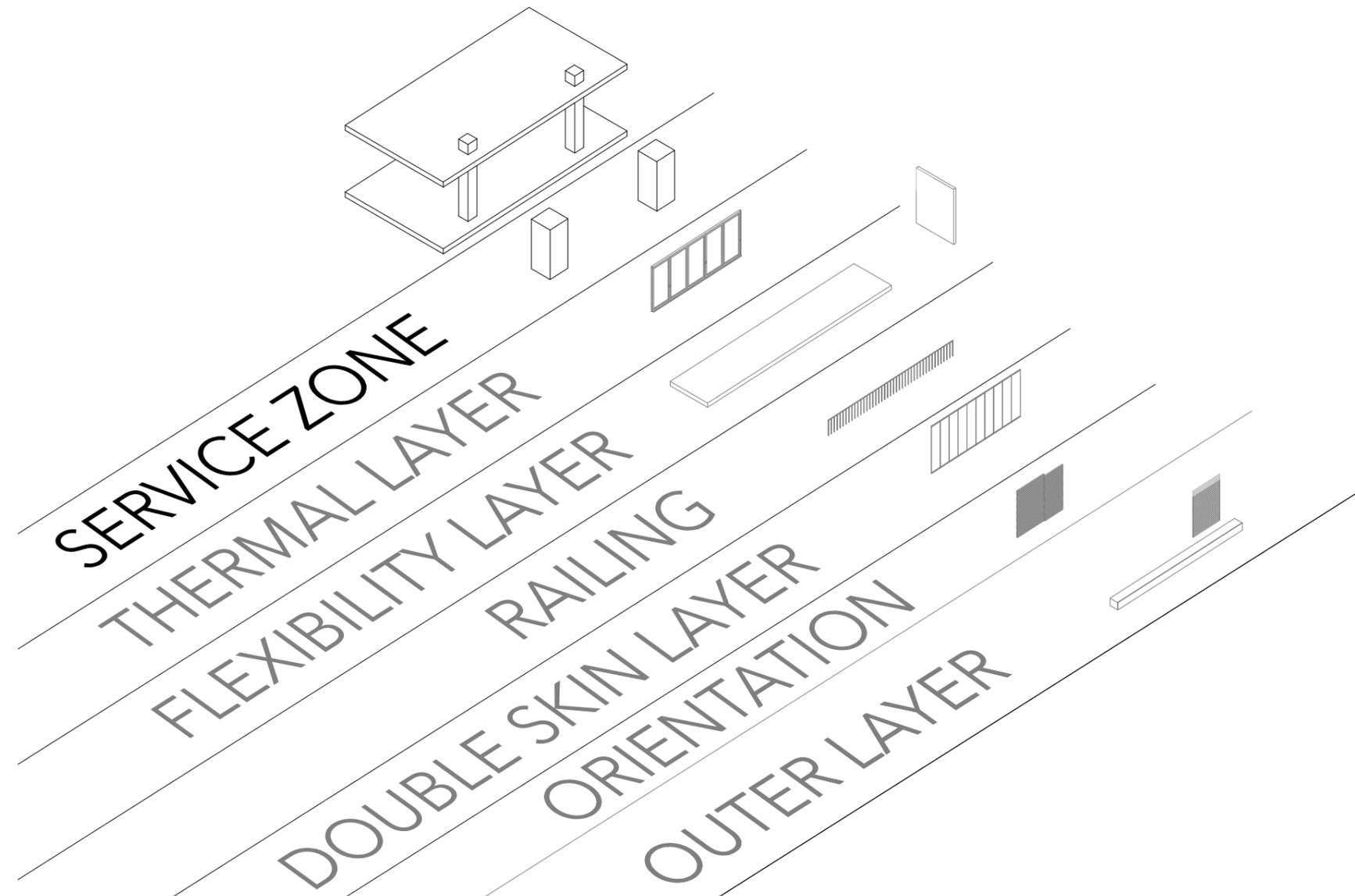


TYPES



MATERIAL

WOOD  
CLADDING



FLEXIBELE UITBREIDING

# DAYLIGHT

EXISTING

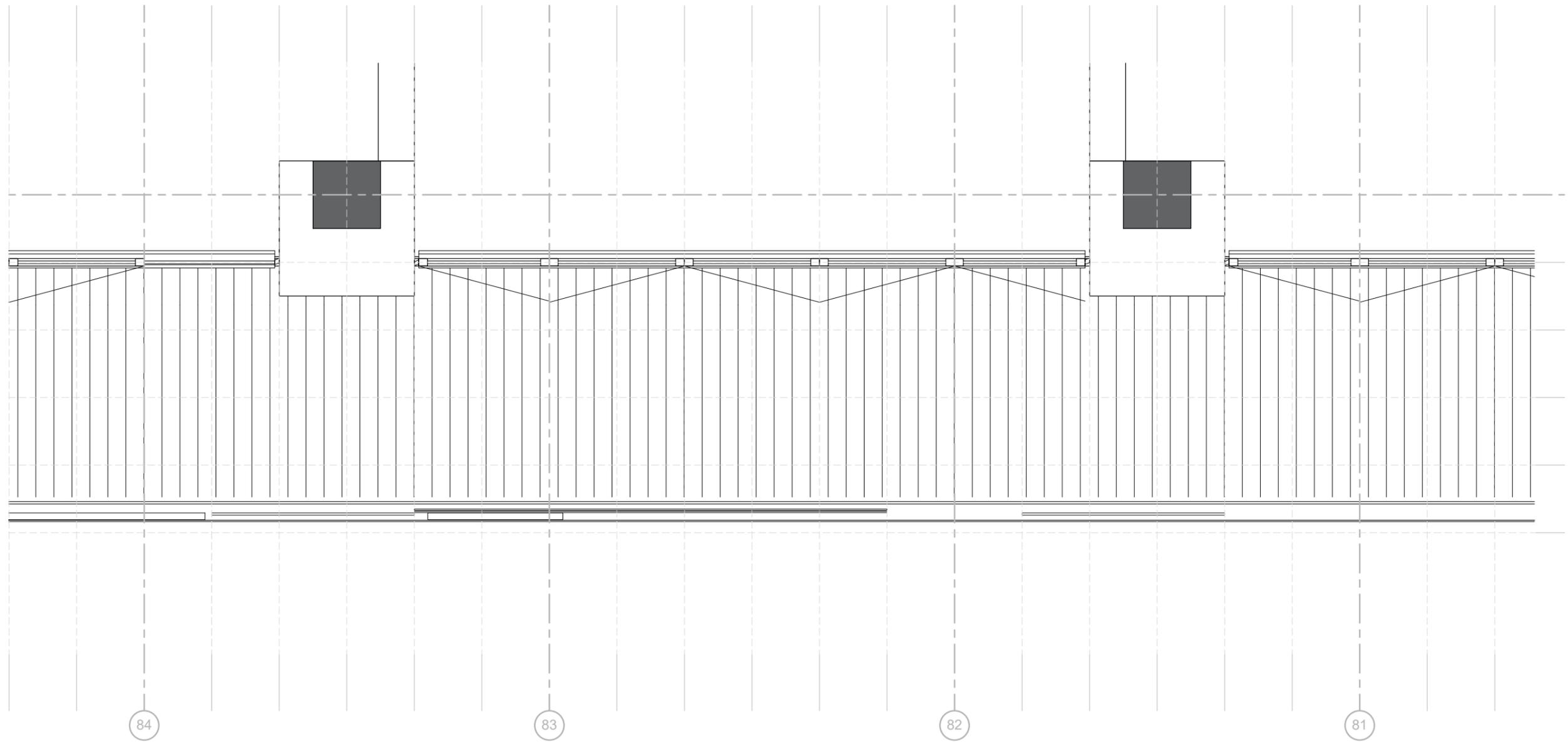


# DAYLIGHT

PROPOSED

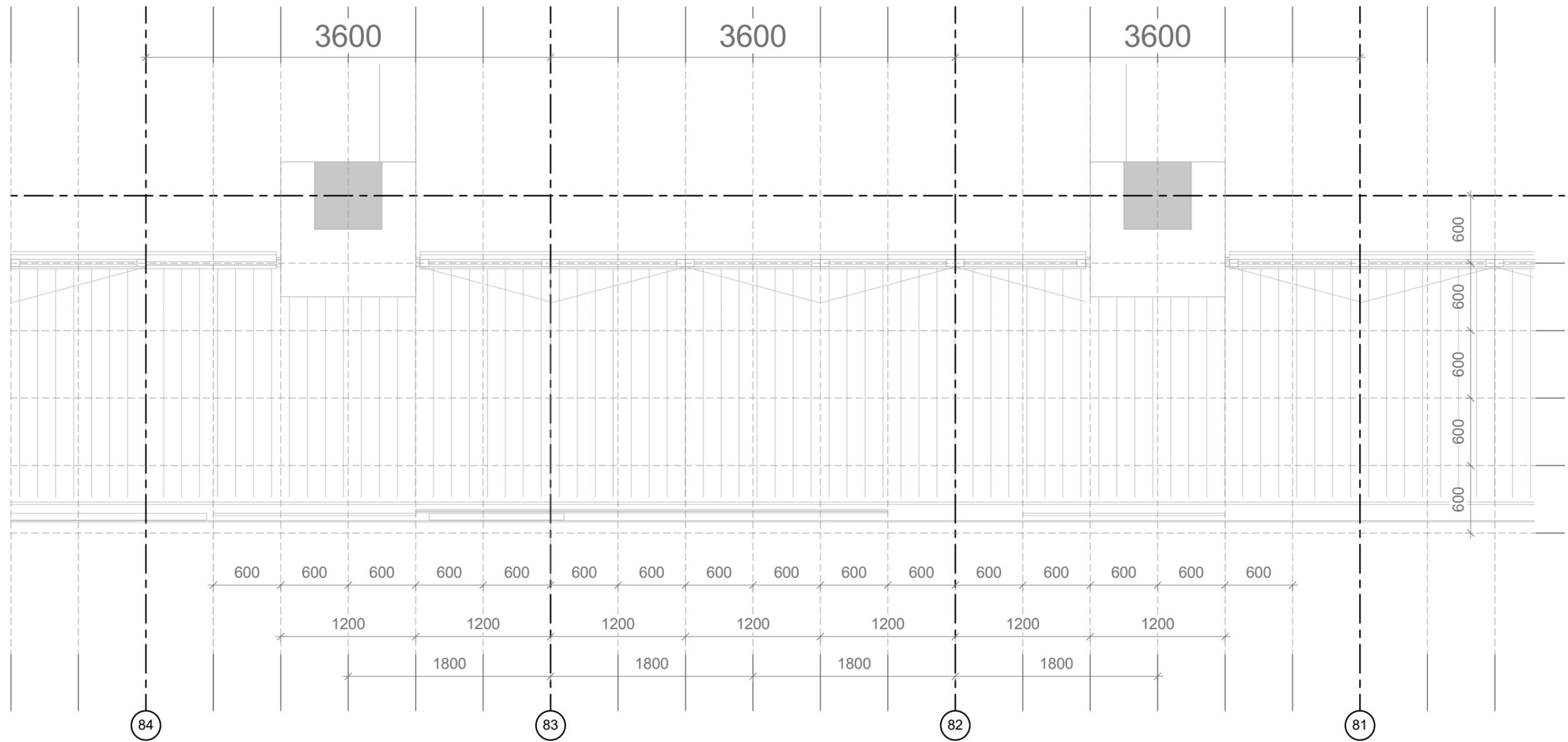


# FLEXIBLE FACADE



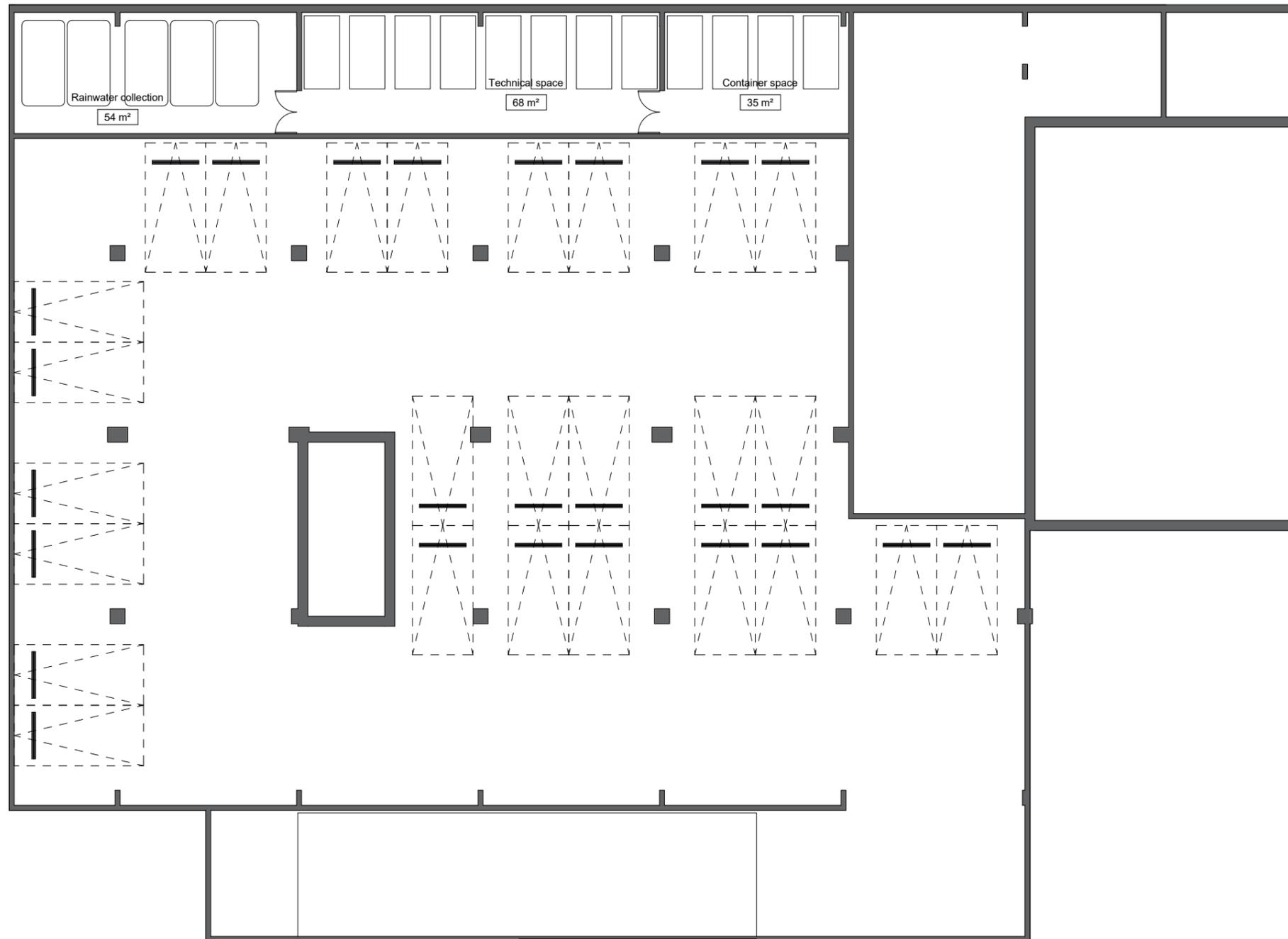
CONCEPT

# FLEXIBLE FACADE



CONCEPT

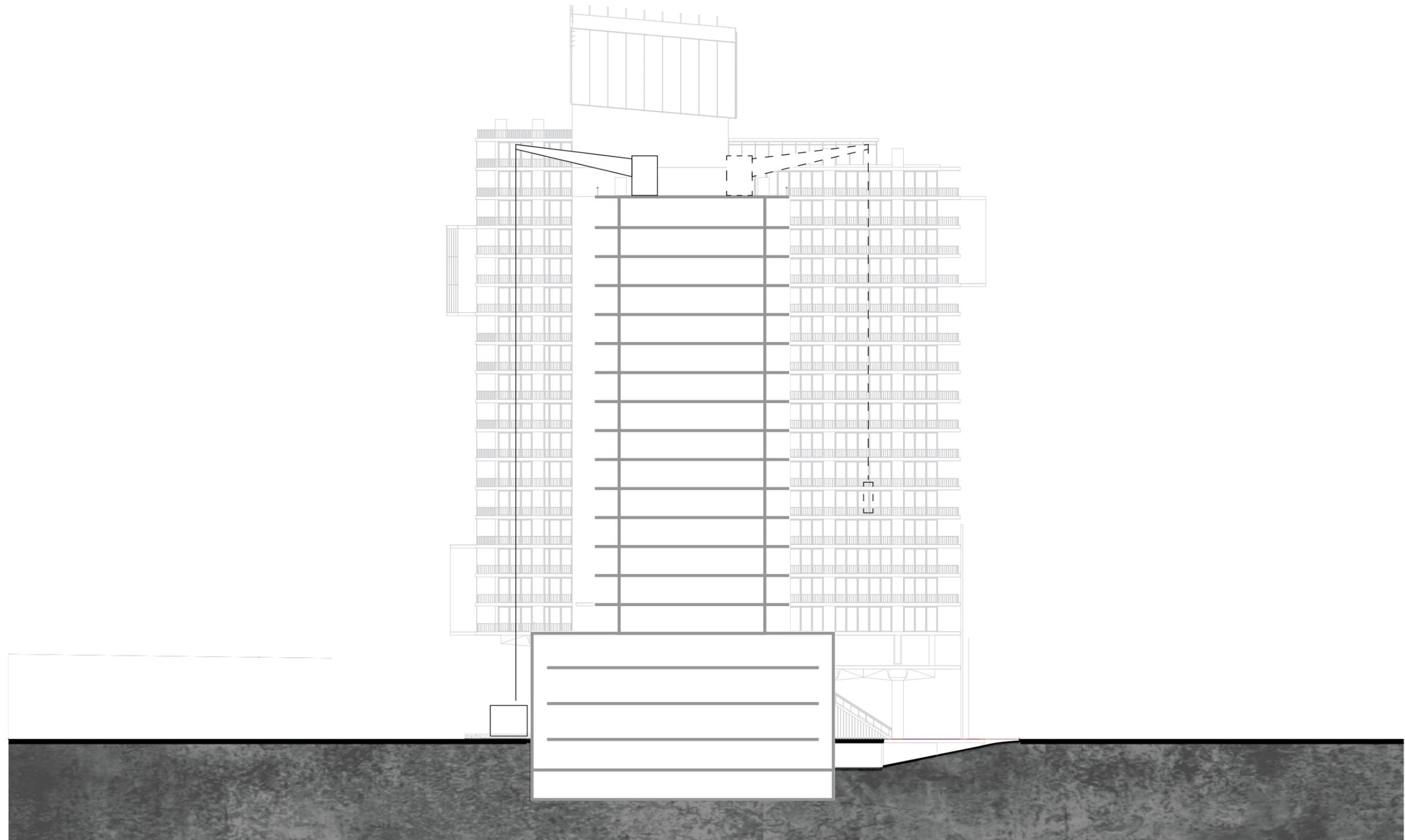
# -2 KELDERVERDIEPING



VERTICALE STAD

# LAYERED FACADE

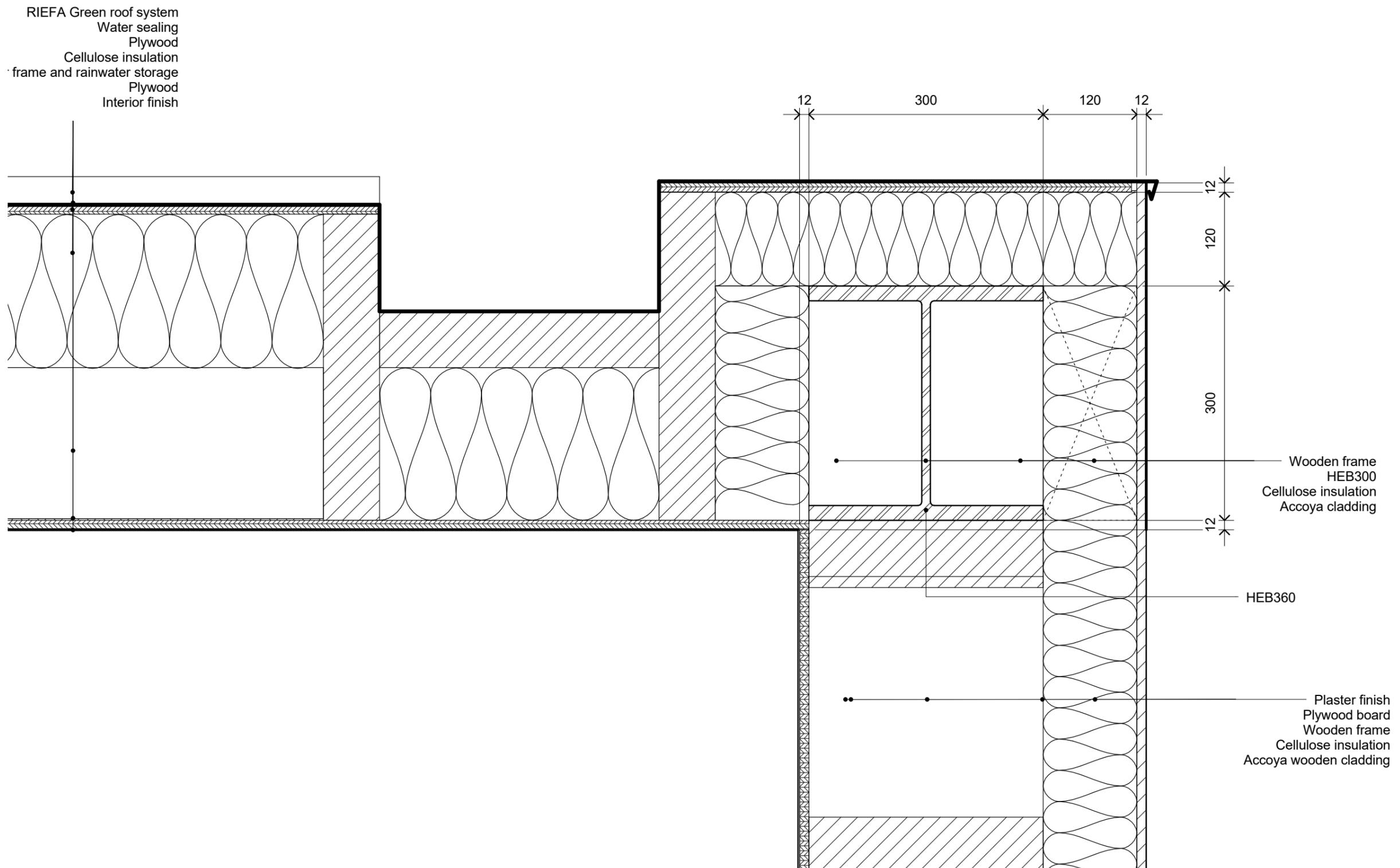
CONSTRUCTION SCHEME



CONCEPT

# POCKET

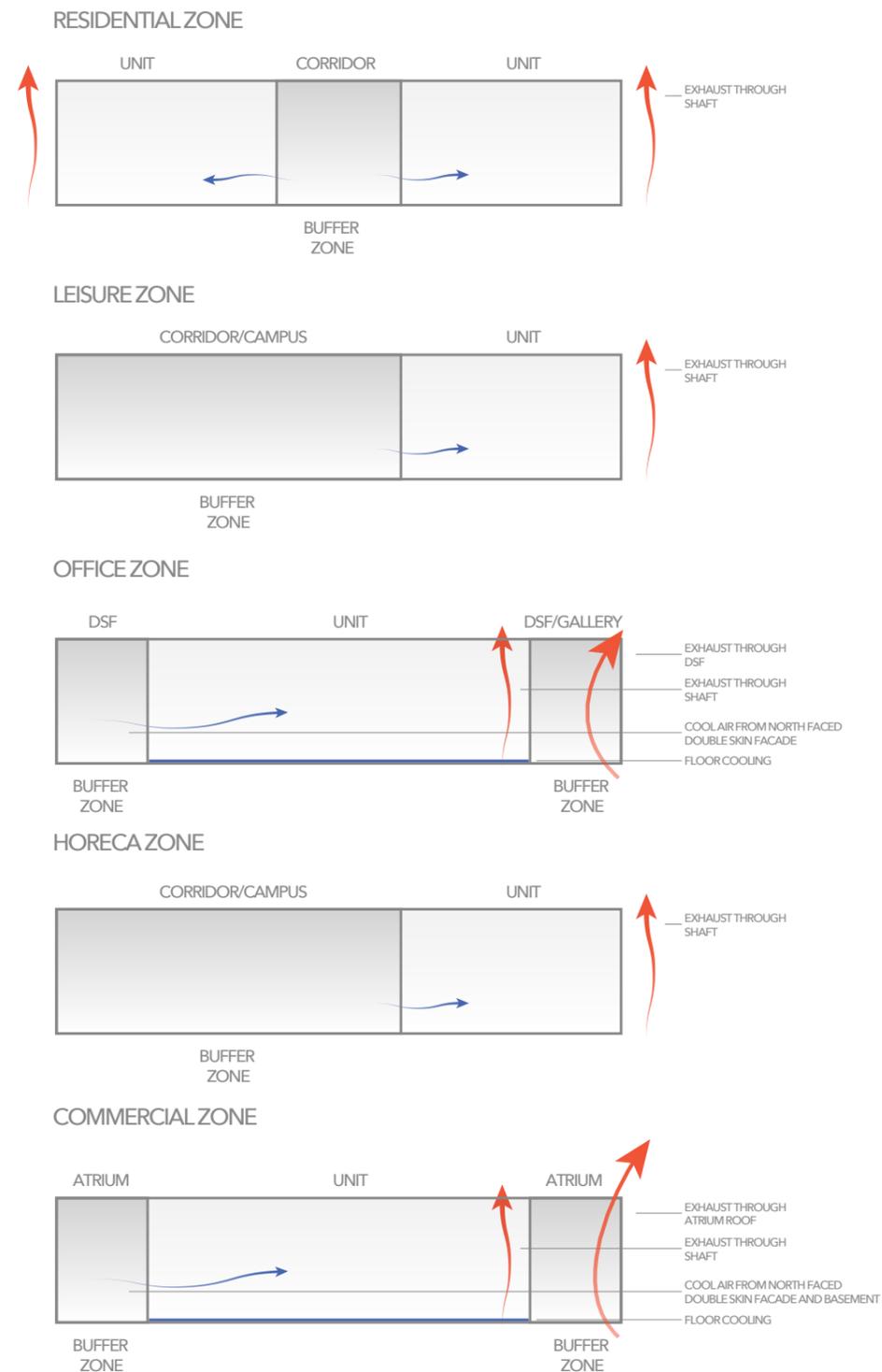
## SIDE ROOF DETAIL



BACKGROUND

# CLIMATE CONCEPT ZONES

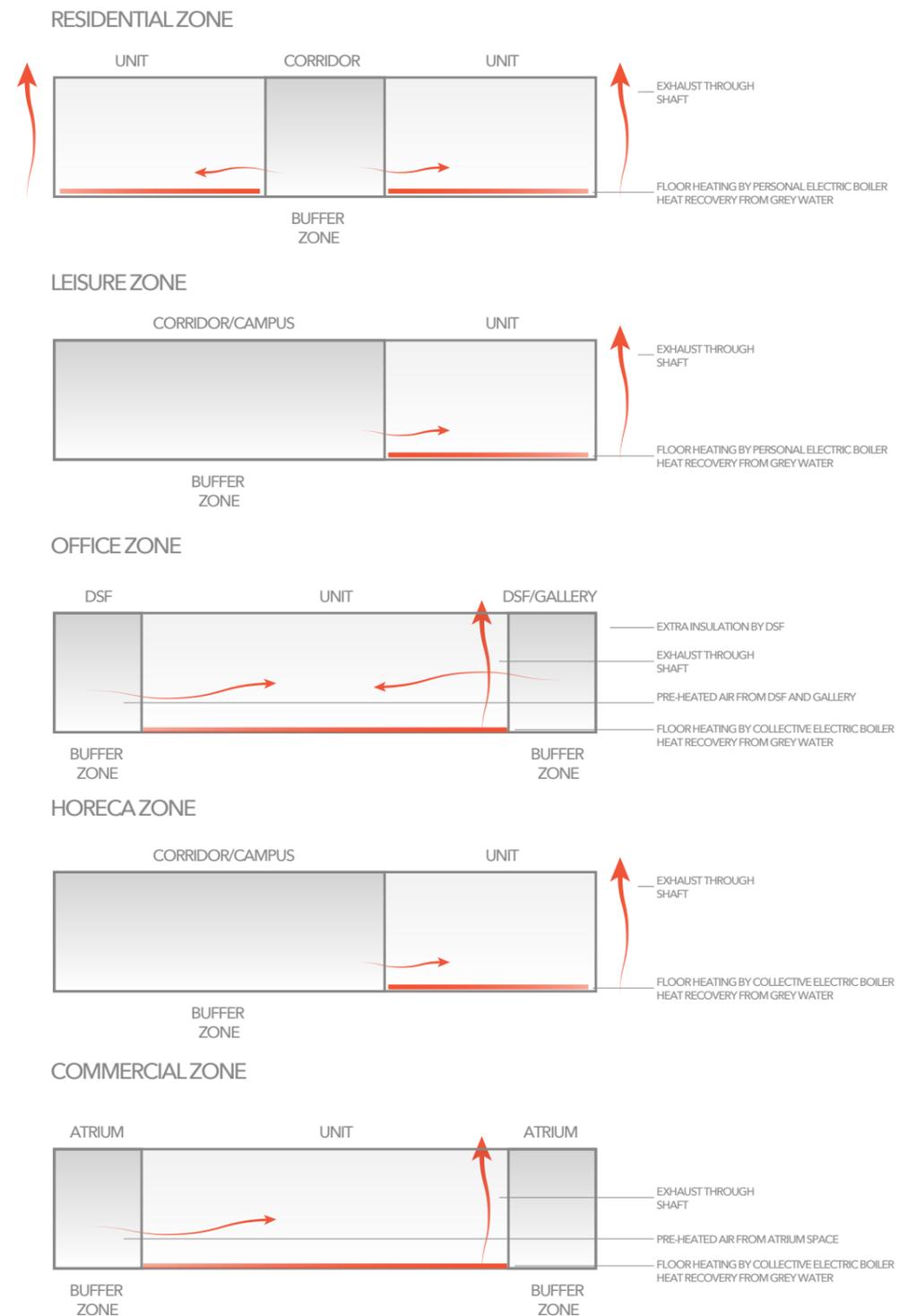
SUMMER



BUILDING SYSTEMS

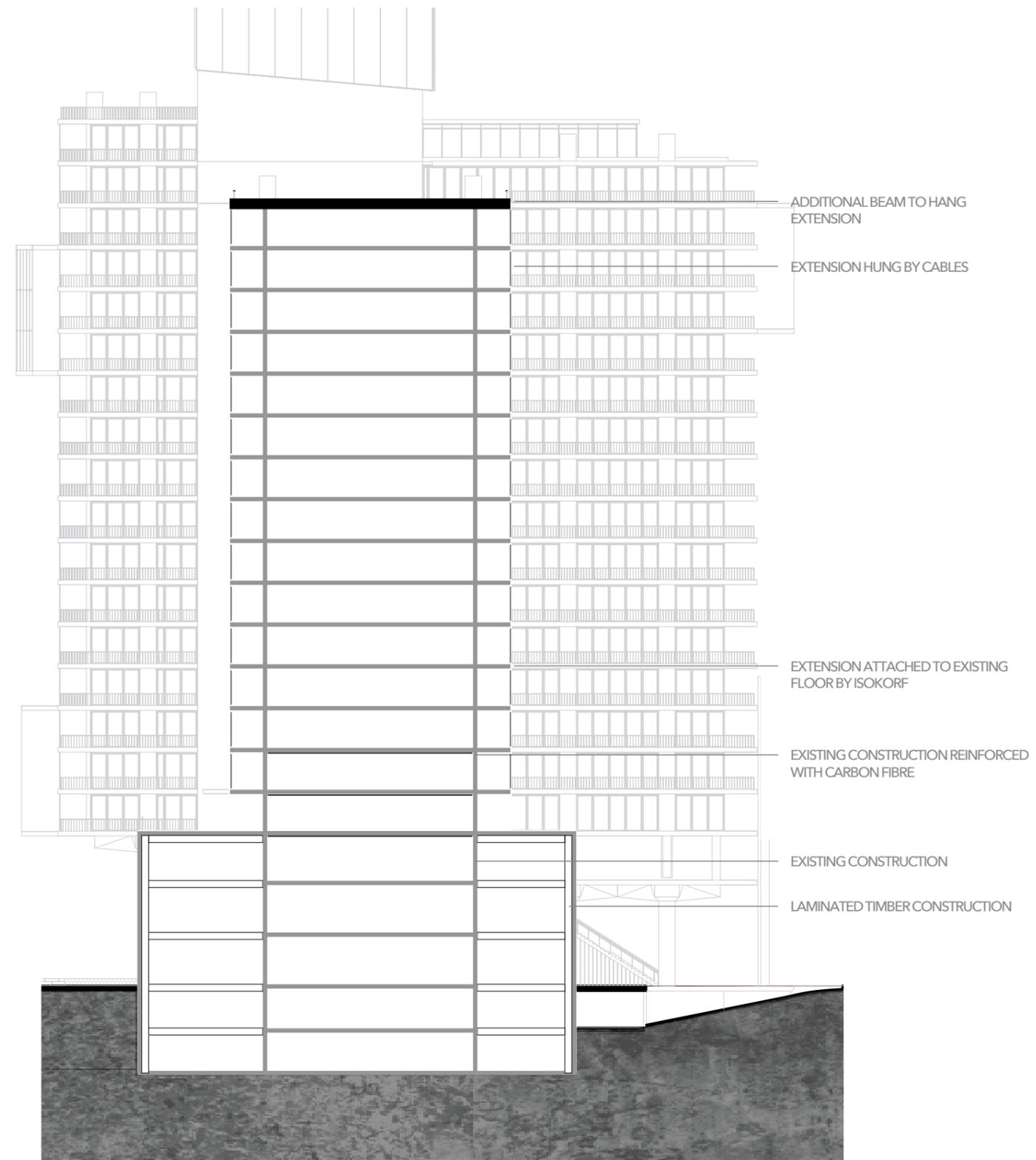
# CLIMATE CONCEPT ZONES

WINTER



BUILDING SYSTEMS

# CONSTRUCTION SCHEME



BUILDING SYSTEMS

# LAYERED FACADE

## LAYER RULES

### FACADE PARAMETERS/RULES

CONTEXT  
EXPANSION/NO EXPANSION

ROOF NO EXPANSION

FACADE → EXPANSION



SERVICE LAYER?  
CLOSED/OPEN PANEL

YES → CLOSED

NO → OPEN

SOLAR ORIENTATION?  
SHADING LAYER

SOLAR → PV PANEL

NON SOLAR → WOOD PANEL

SOLAR → SHADING LAYER

NON SOLAR → NO SHADING LAYER

BUILDING ZONE  
SECOND SKIN LAYER

RESIDENTIAL → OPENABLE RAINSCREEN + RAILING

LEISURE → FIXED WINDSCREEN

OFFICE → FIXED DOUBLE SKIN FACADE

HORECA → RAILING

COMMERCIAL → FIXED DOUBLE SKIN FACADE

CIRCULATION  
FLEXIBILITY LAYER TYPE

→ NO EXPANSION POSSIBLE

→ EXPANSION POSSIBLE

FUNCTION  
THERMAL BOUNDARY LAYER

STREET → NO CLOSED LOOP

CAMPUS → NO CLOSED LOOP

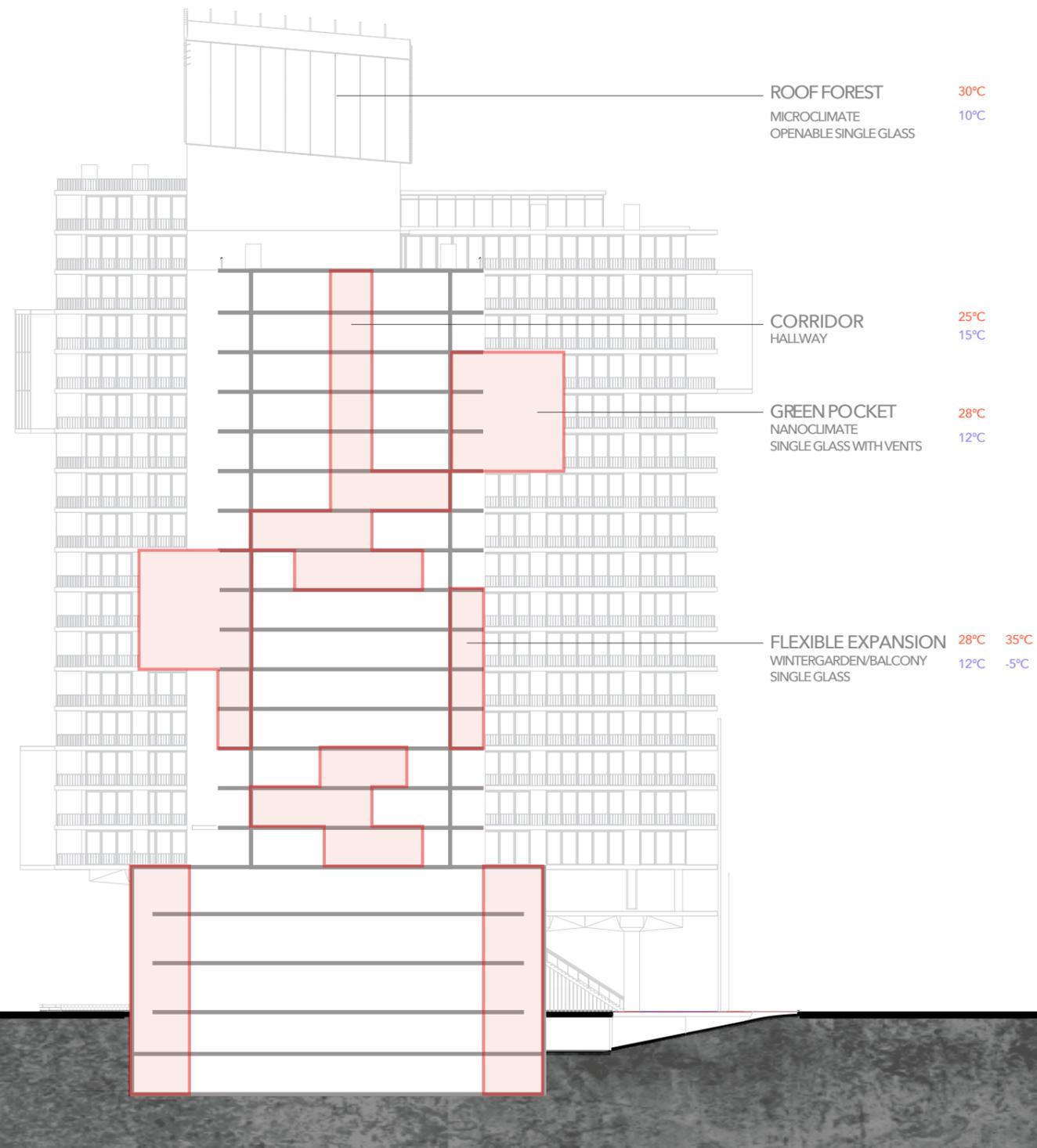
BLOCK → NO CLOSED LOOP

SQUARE → CLOSED LOOP

SPIRAL → CLOSED LOOP

FLEXIBLE EXPANSION

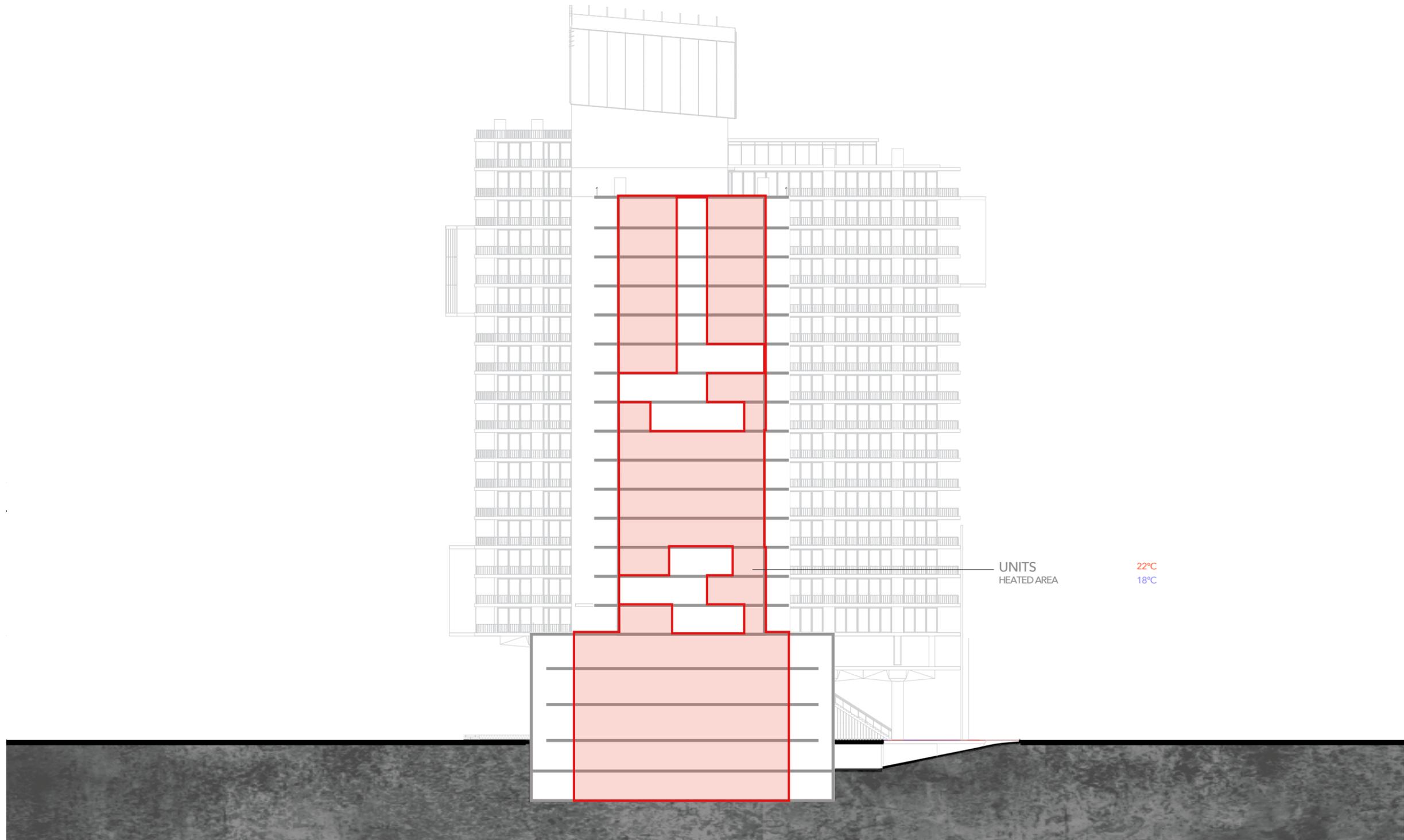
# CLIMATE ZONES



BACKGROUND

# CLIMATE ZONES

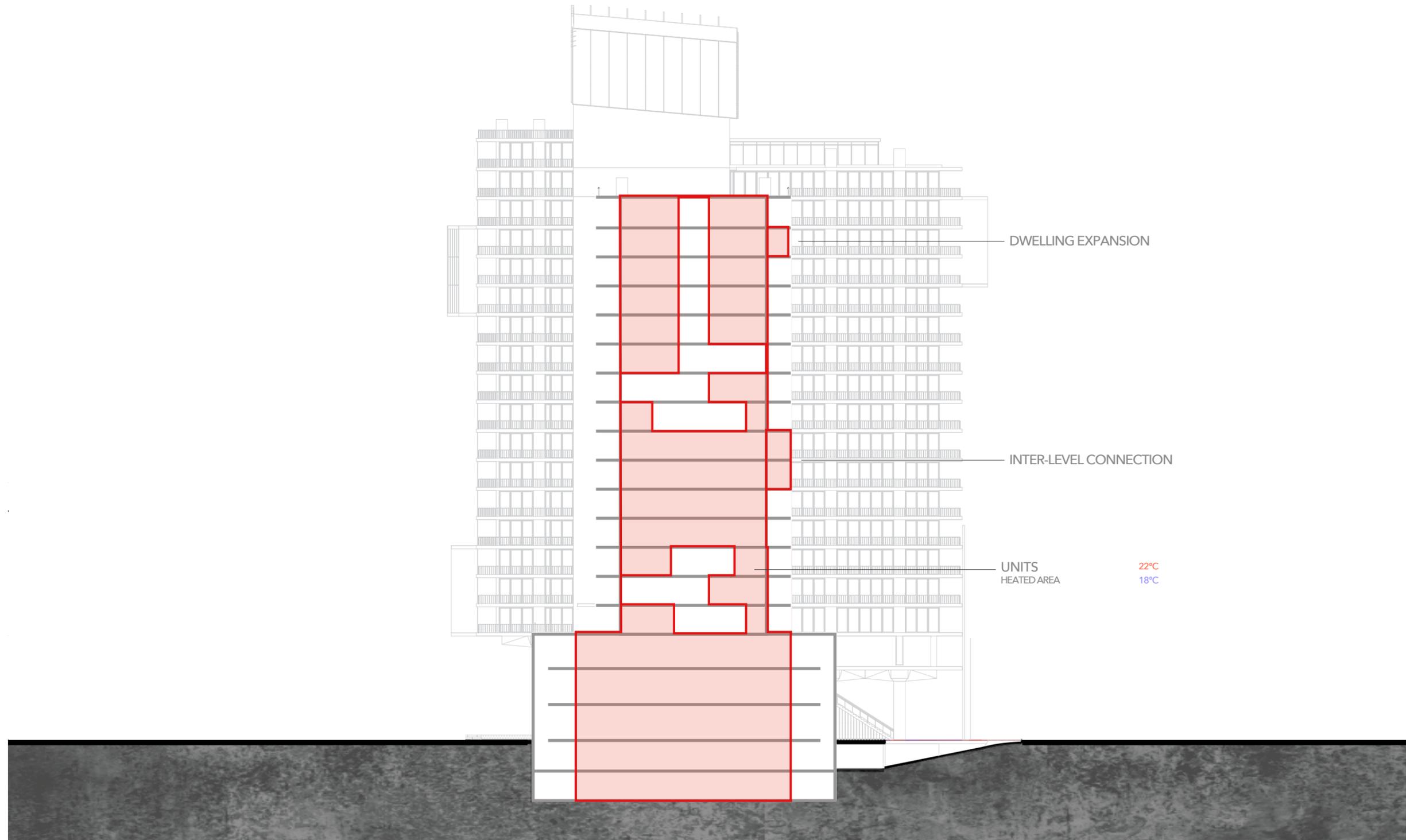
THERMAL BOUNDARY



BACKGROUND

# CLIMATE ZONES

## THERMAL BOUNDARY EXPANSION



BACKGROUND