



Renewal and reuse: Holistic sustainable transformation
of modern shopping mall “In de Bogaard”



1970-2002
Jan Luijben



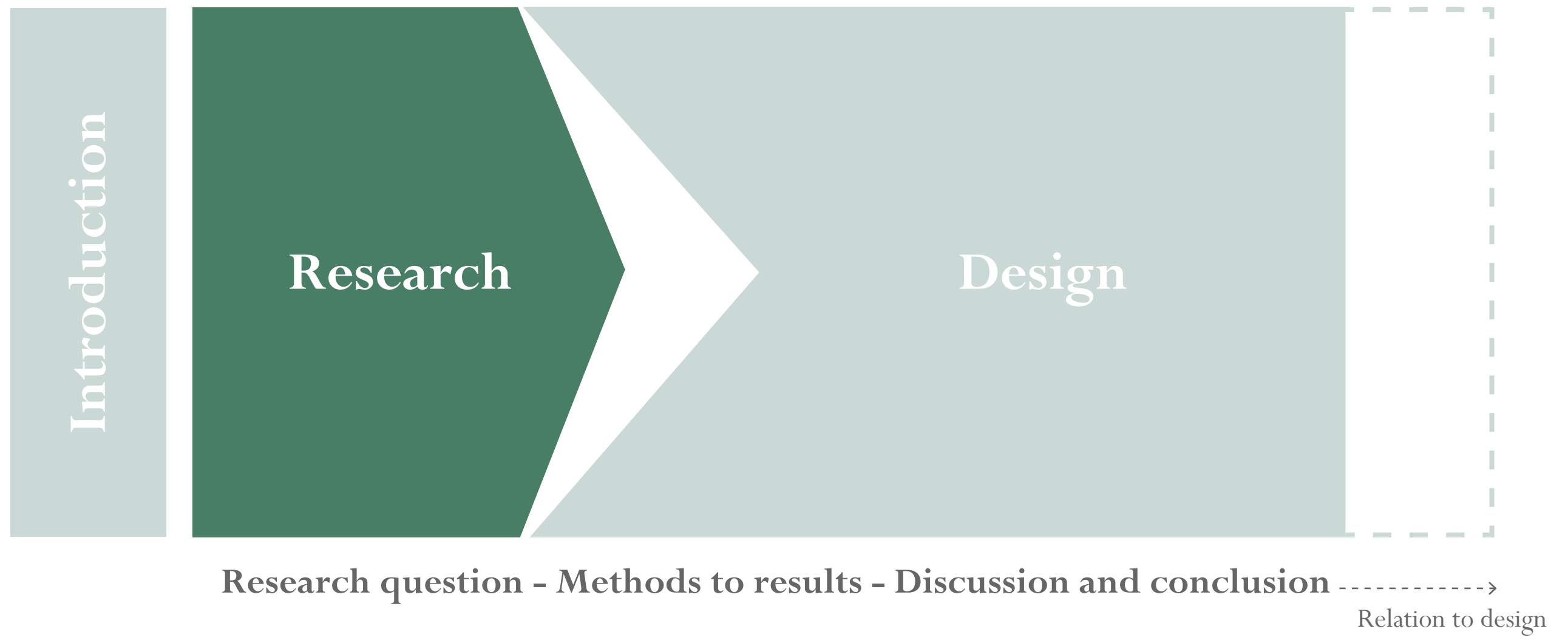
2002 >
GDAi Architects

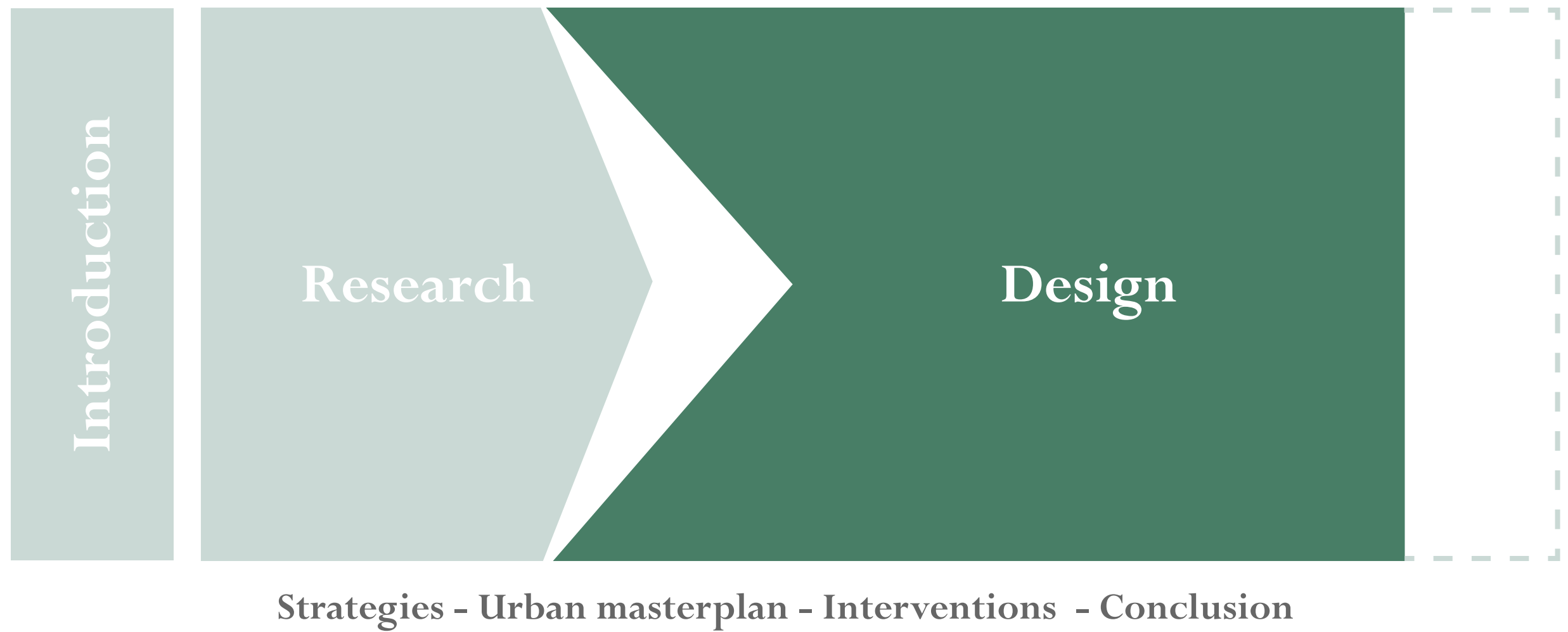
De Hoven shopping passage, Delft

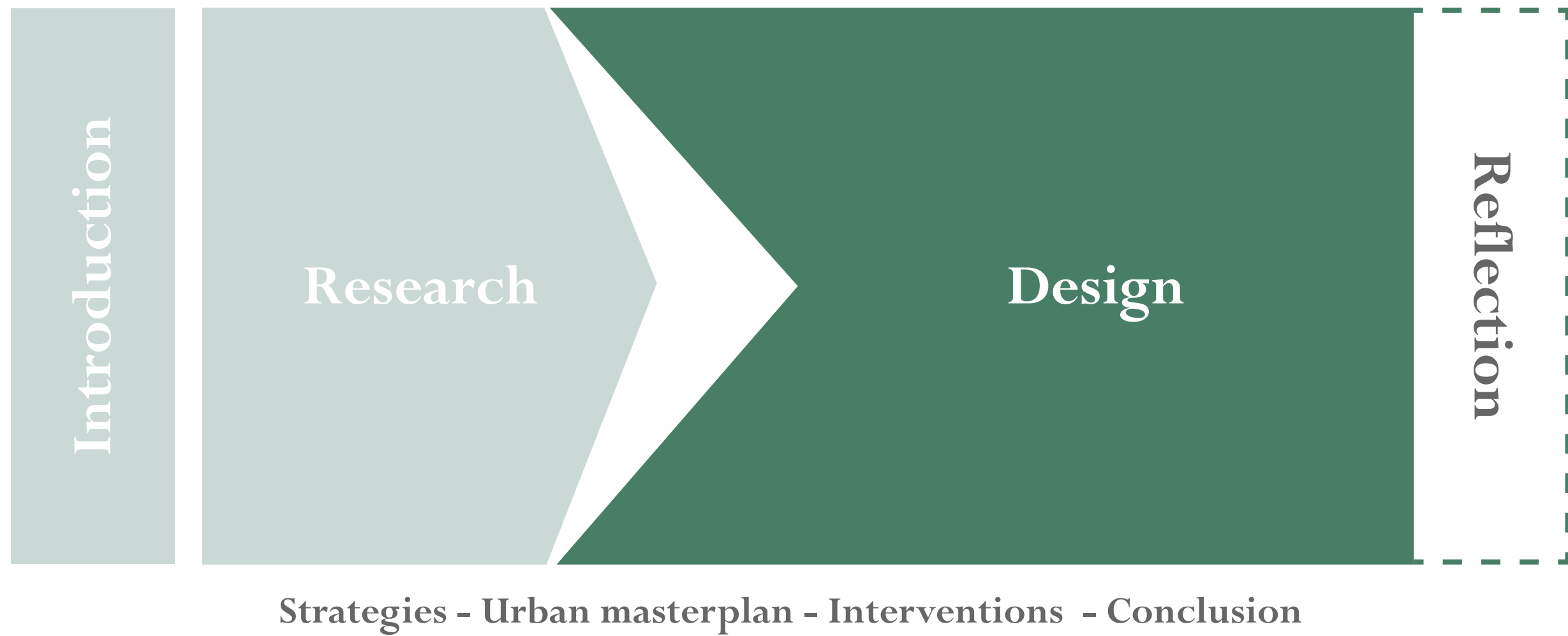
Introduction

Research

Design







Introduction



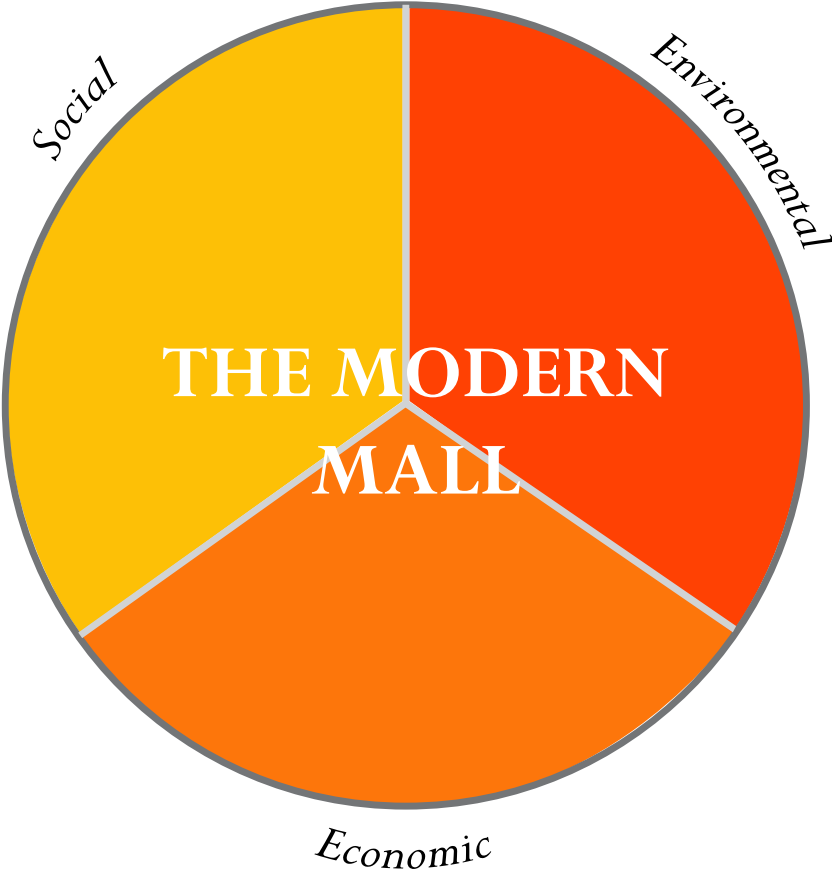
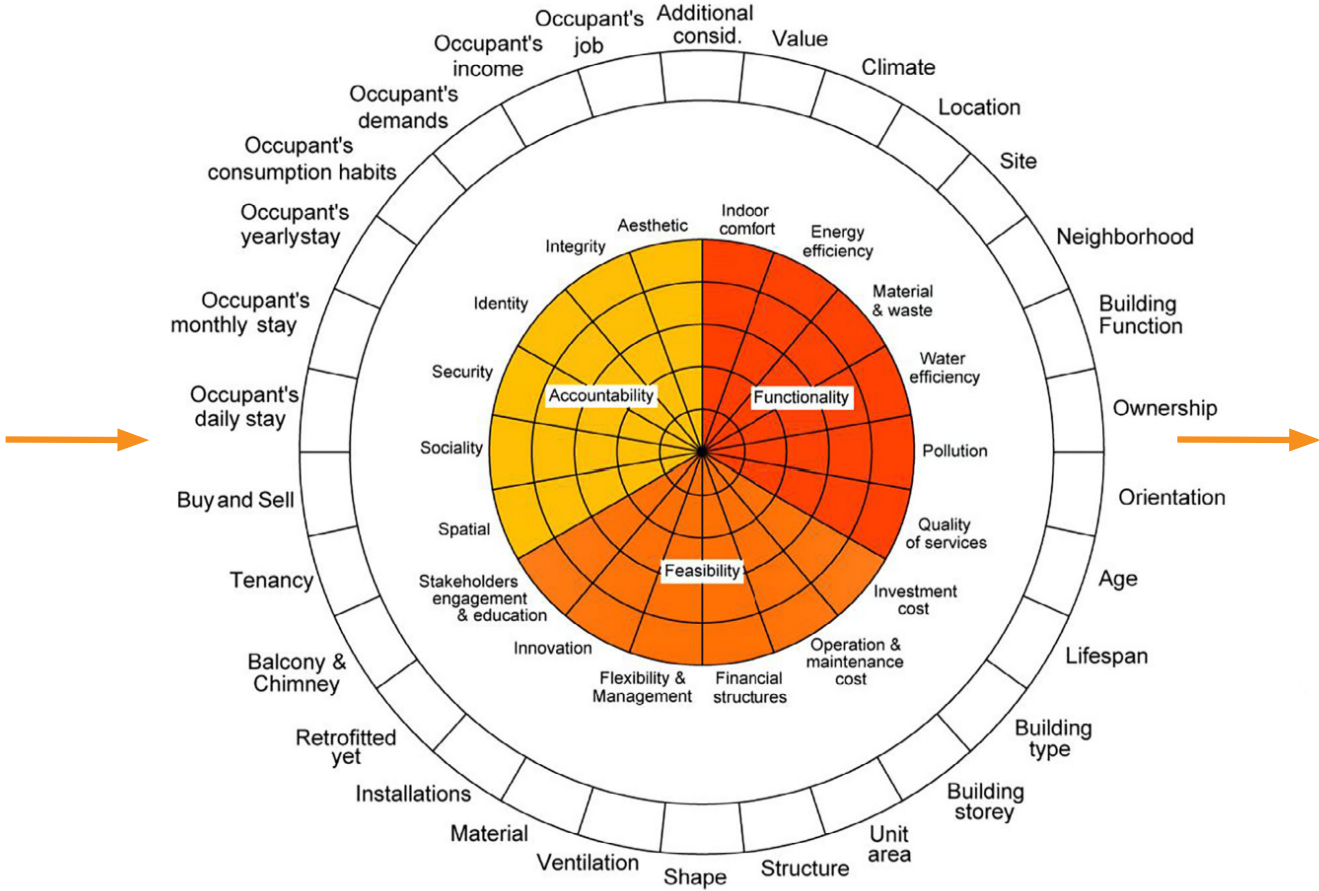
1963



2023

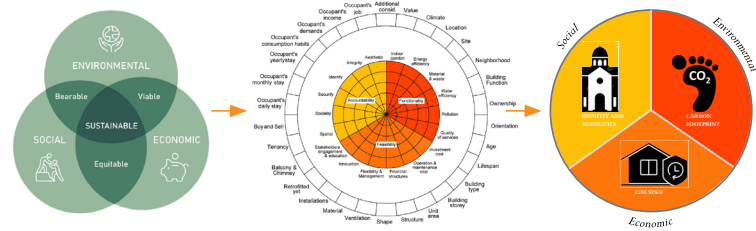
In the Bogaard, Rijswijk

Introduction



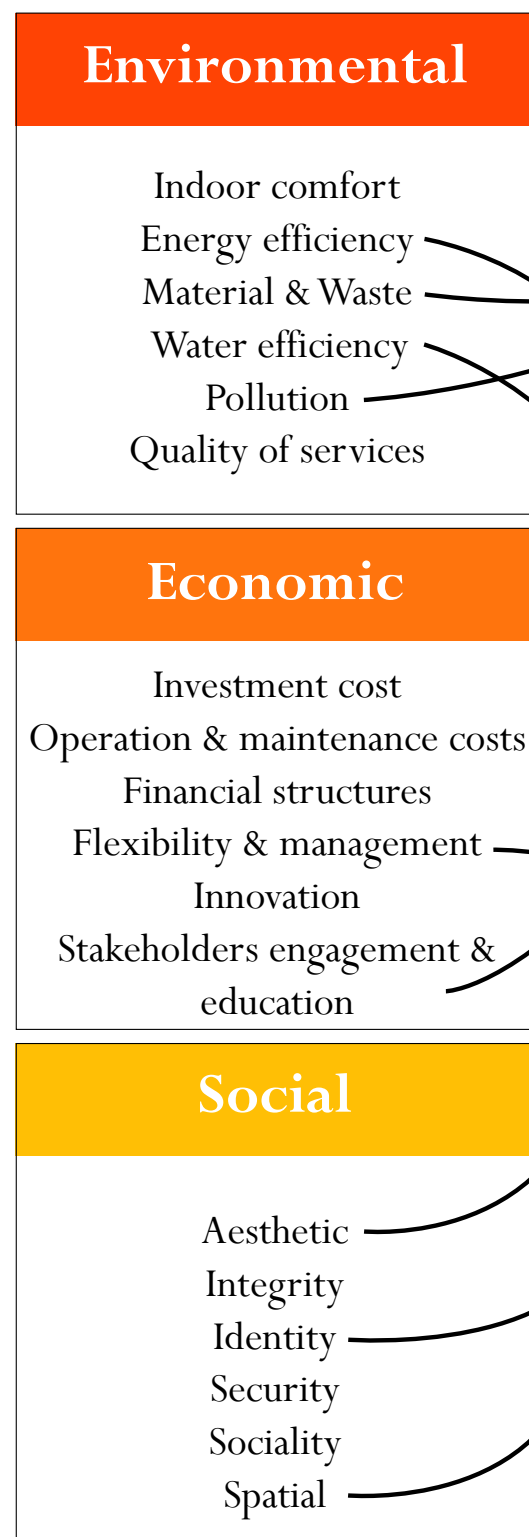
RESEARCH.

What is the effect of renovations in three Dutch modern shopping malls with different structures [covered, partly covered and open] on the environmental, social and economic aspects of sustainability?



METHODS

Indicators Kamari et al.



Indicators Lin et al. Ranked from “high importance” (1) to “low importance” (17)

1. Firm’s experience
2. Green building materials
3. Elegant presentation
4. Adjacent unit connection
5. Cultural heritage connection
6. Energy conservation
7. Water conservation
8. Appropriation control
9. External resource import
10. Schedule management
11. Low operating cost
12. Familiarization with laws
13. Create new source of revenue
14. Easily maintainable
15. Excellent word-of-mouth
16. Modularity easily adjustable
17. Multiple-lease potential

Feasibility within the scope of the research project

- Material pollution
- Aesthetics
- Identity
- Not feasible
- Not feasible
- Not feasible
- Not feasible
- Operation cost
- Maintenance cost

Chosen indicators



Chosen assessment methods

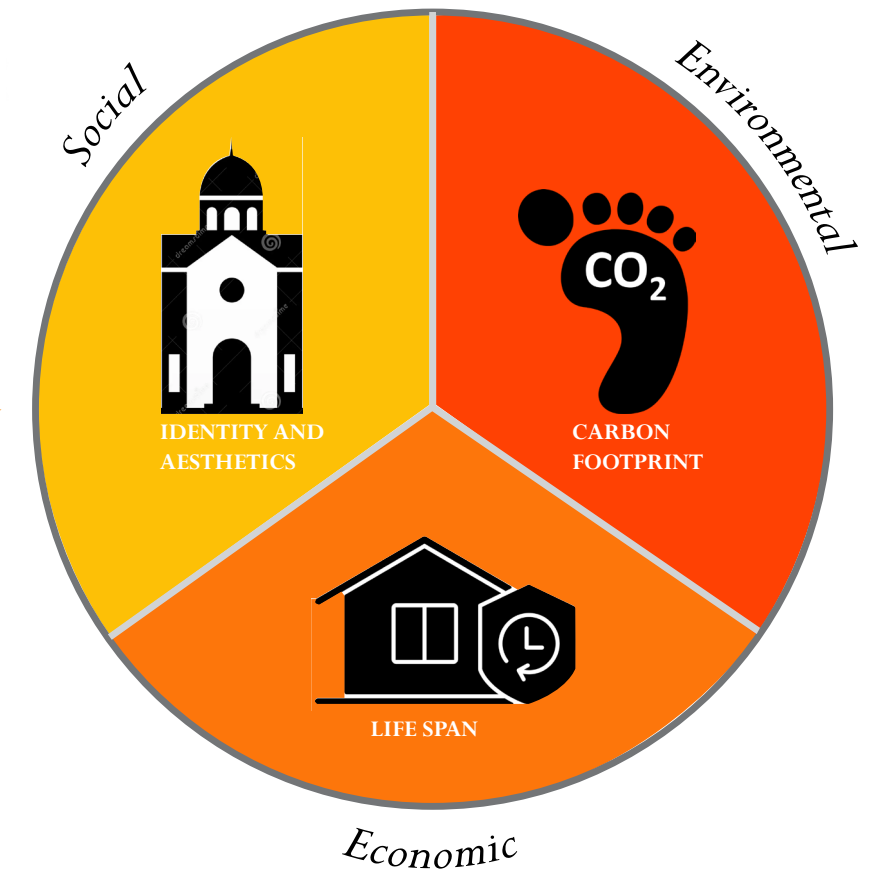
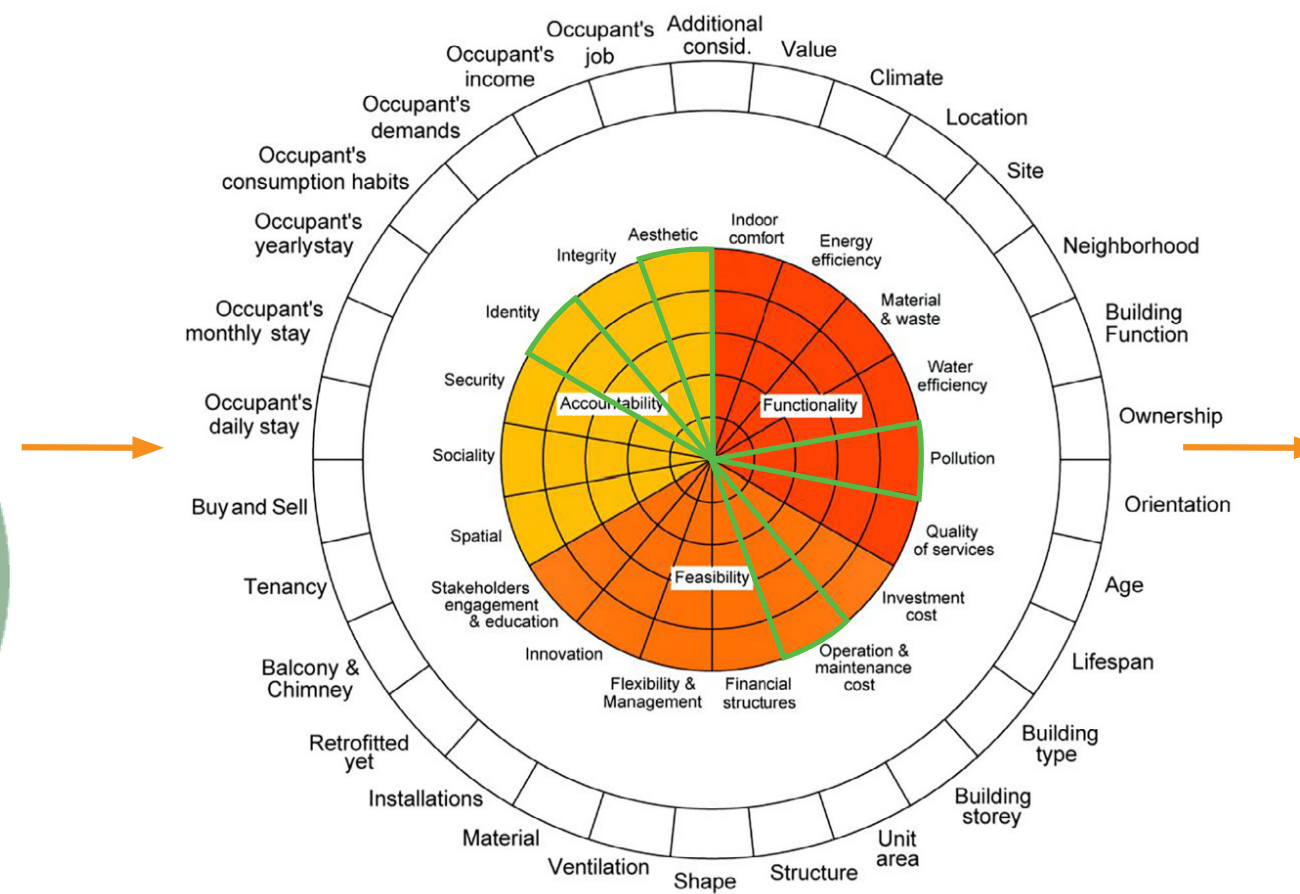
eCO2 production assessment

Questionnaire with open and closed questions

Product life span assessment

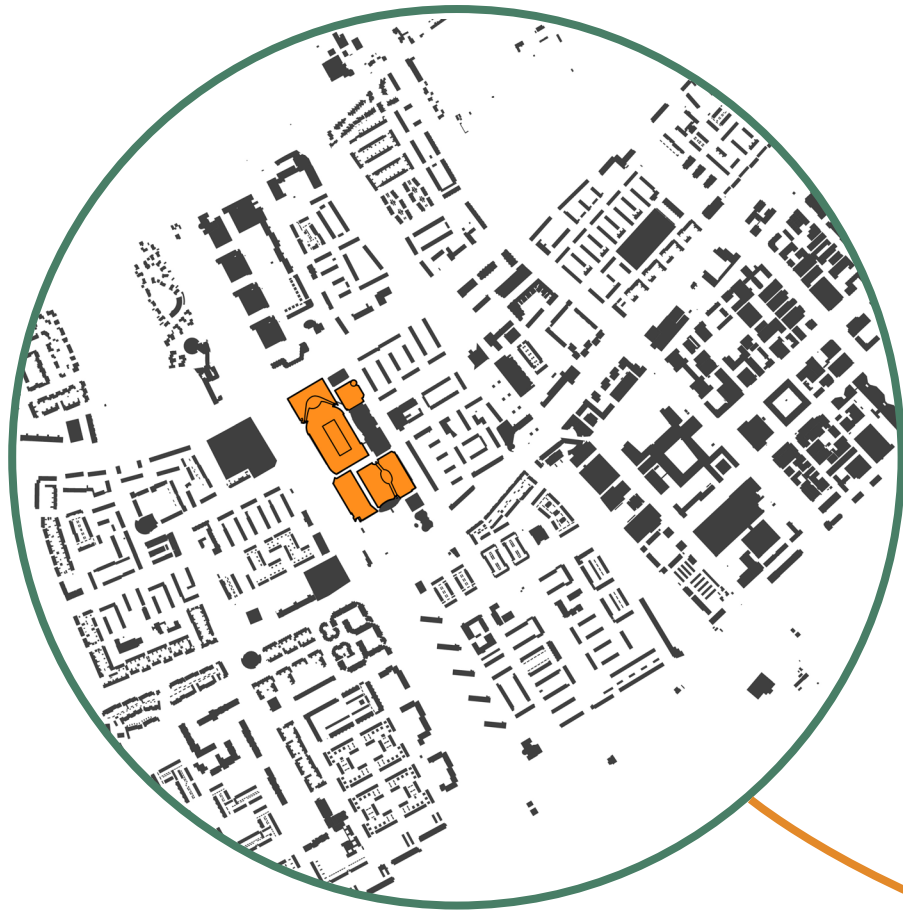
METHODS

By literature research



In de Bogaard, *Rijswijk*

Westfield Mall of the Netherlands, *Leidschendam*



The Hague



Lijnbaan, *Rotterdam*

Rotterdam

FROM METHODS TO RESULTS

Lijnbaan, Rotterdam Characteristic façade part

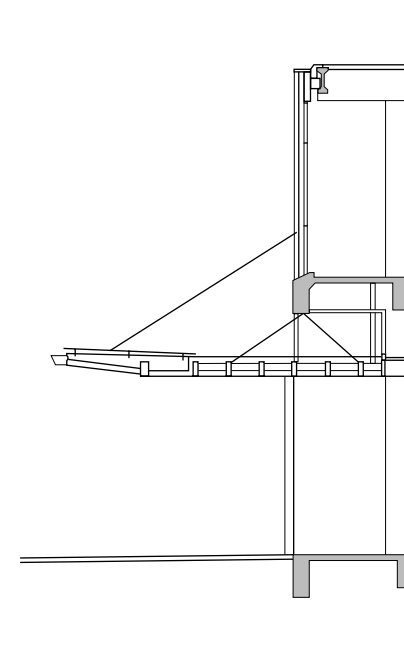
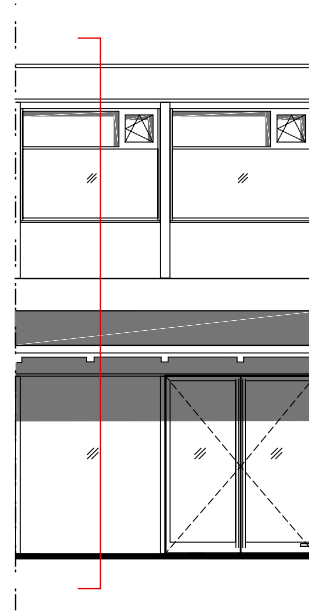
1.



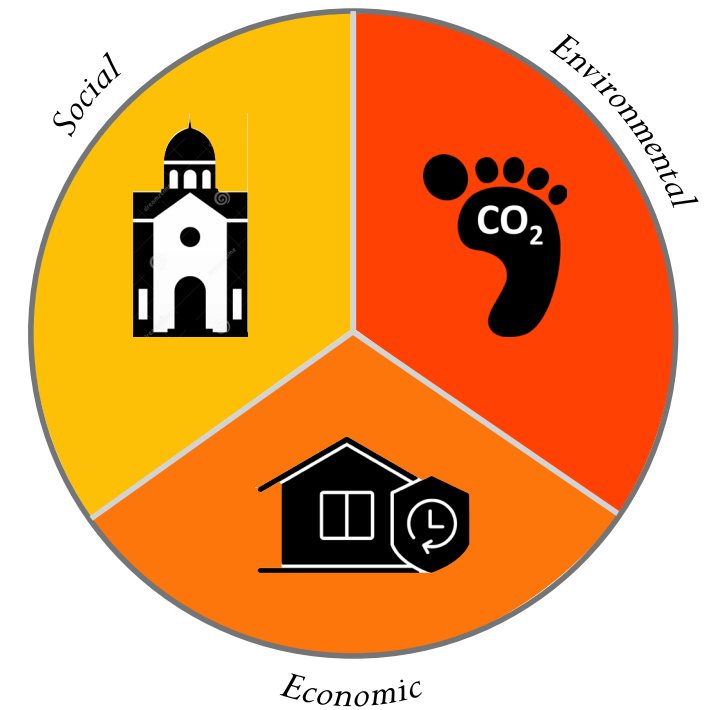
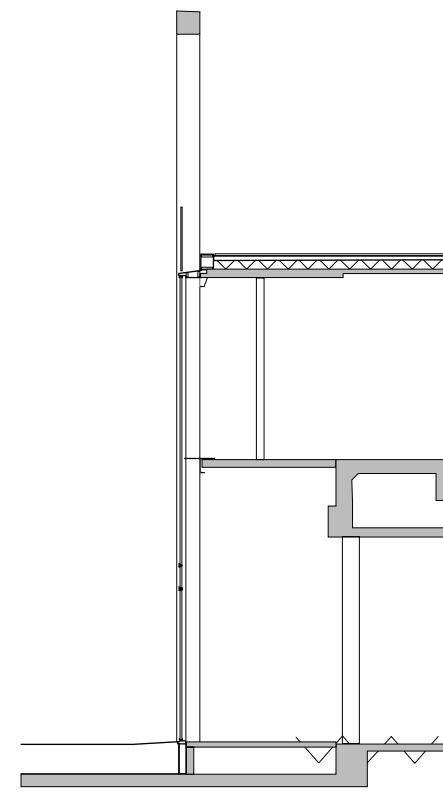
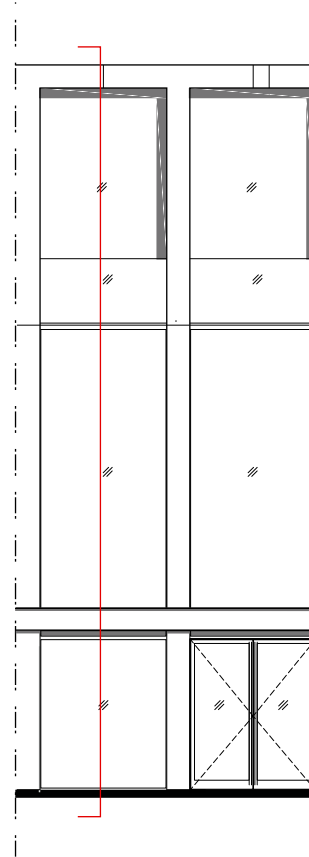
2.



Before renovation



After renovation



1. Retrieved from: <https://mei-arch.eu/projecten/de-lijnbaan/>

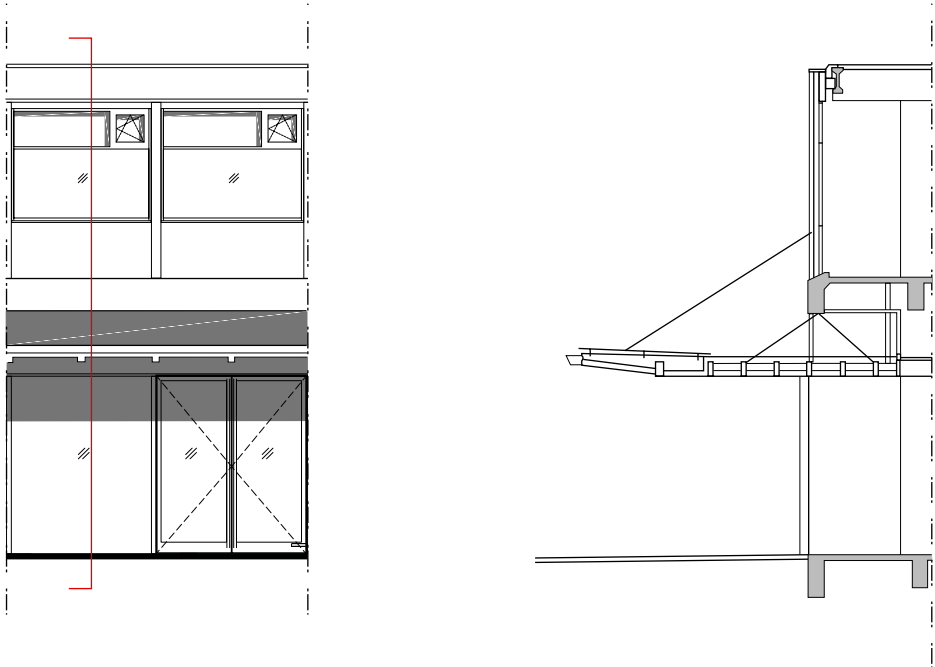
2. Retrieved from: <https://www.wdjarchitecten.nl/projecten/winkels-horeca-h-h-de-klerk/>

FROM METHODS TO RESULTS

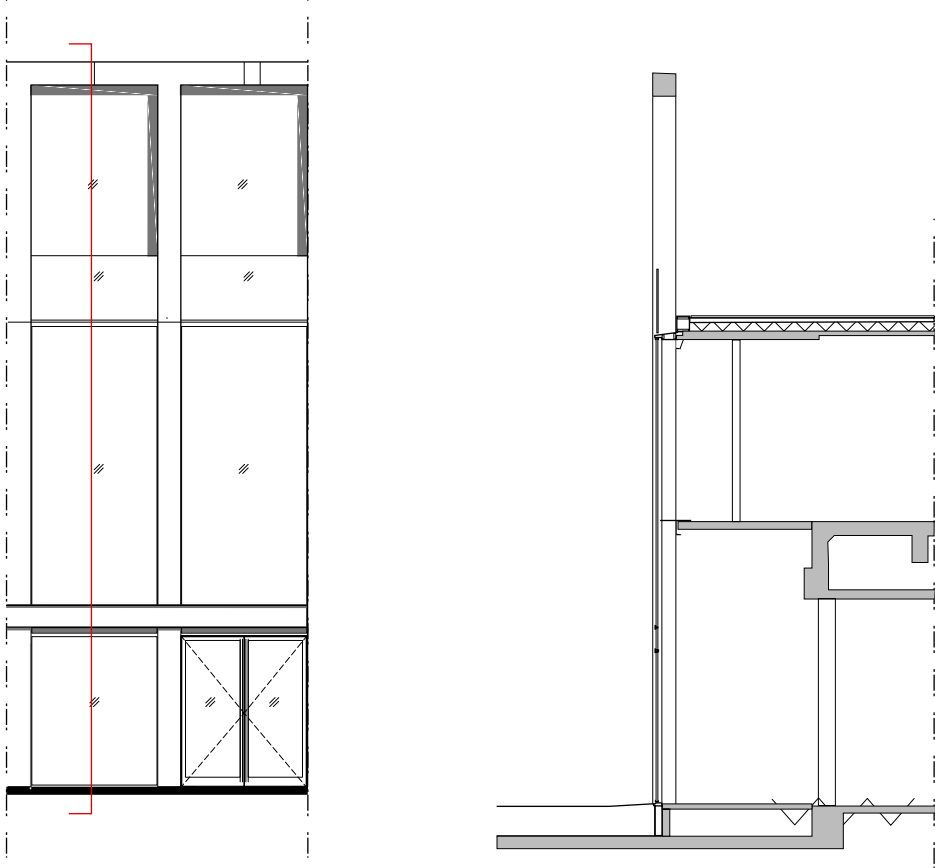
Lijnbaan, Rotterdam
Characteristic façade part



Before renovation



After renovation



Generalised outcome questionnaire Lijnbaan

Social sustainability indicator	Sort question/statement	Findings (answers)
Aesthetics	Closed: This shopping mall is aesthetically well put together (coherent and a pleasure for the eye).	Score: 4,3 out of 5
	Open: What do you find elegant, special or less pretty about this mall?	The mall is being called spacious, clean, light and it is often subject to change.
Identity	Closed: If I think of this city, then this shopping mall comes to mind.	Score: 3,3 out of 5
	Open: Which parts of this mall give identity to the neighborhood that it is situated in?	A few of the participants were not from the area and did not know the neighborhood very well. Change is a typical description that is given.

Lifespan of characteristic façade materials Lijnbaan

Characteristic building materials for renovation	eCO ₂	Source
High end insulation with patio covering (outdoor tiles)	3300-4200 g/kg	Carbon footprint for building products, VTT Technology, A. Ruuska (2013).
Prefabricated reinforced concrete columns and beams	120,5 g/kg	Carbon footprint for building products, VTT Technology, A. Ruuska (2013).
Double glazing	2740 g/kg	Sustainable light concrete structures, Springer tracts in civil engineering, K.D. Hertz & P. Halding (2022).
Recycled aluminum frame	2264 g/kg (if properly recycled) Up to 10930 g/kg if not properly recycled	Carbon footprint for building products, VTT Technology, A. Ruuska (2013) Sustainable light concrete structures, Springer tracts in civil engineering, K.D. Hertz & P. Halding (2022).
Newly attached part concrete foundation	140 g/kg	Sustainable light concrete structures, Springer tracts in civil engineering, K.D. Hertz & P. Halding (2022).

eCO2 of characteristic materials Lijnbaan

Characteristic building materials for renovation	Estimated lifespan	Source
High end insulation with patio covering (outdoor tiles)	Depending on insulation type 36-100+ years	Building component life expectancy, Etoolglobal (2015).
Prefabricated reinforced concrete columns and beams	81 years	
Double glazing with recycled aluminum frame	44 years	
Recycled aluminum frame	44 years	
Newly attached part concrete foundation	110 years	

1. Retrieved from: <https://mei-arch.eu/projecten/de-lijnbaan/>
2. Retrieved from: <https://www.wdjarchitecten.nl/projecten/winkels-horeca-h-h-de-klerk/>



FROM RESULTS TO CONCLUSIONS AND DISCUSSION



Social

Partly covered mall gives the most identity to the neighbourhood

The three shopping mall typologies evoke contrasting feelings on aesthetics



Environmental

Focus on insulation the way of recycling to reduce the eCO₂



Economic

The three typologies use robust exterior

Demountable interior finishes make it easy to follow the shopping trends

FROM RESEARCH TO DESIGN STRATEGIES.



Social

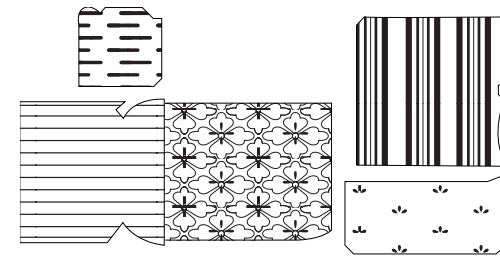


Environmental

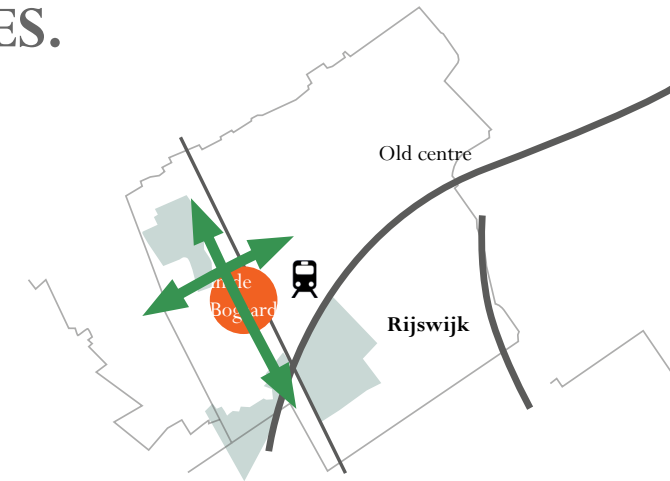


Economic

URBAN SCALE

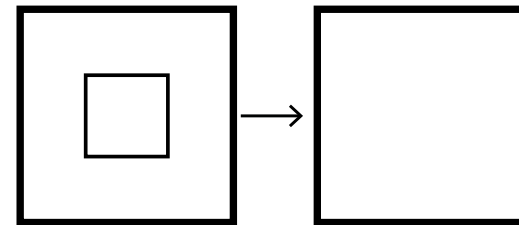


Conserve identity per block

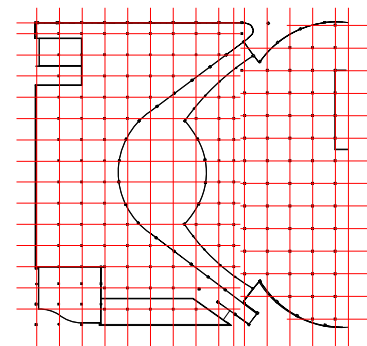
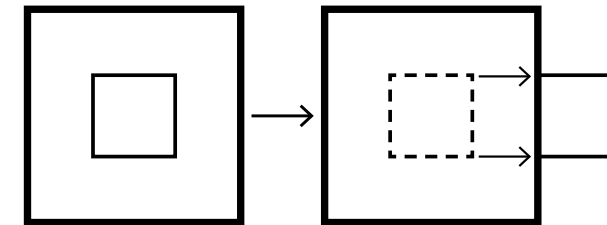


In the Bogaard as transition between green zones and city

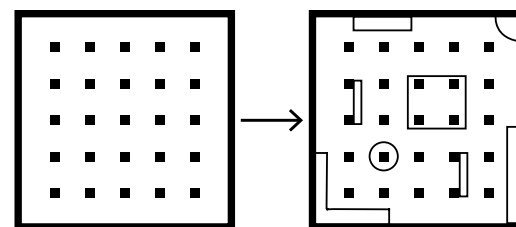
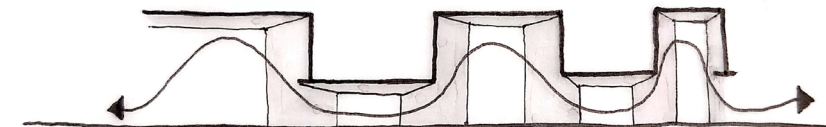
BUILDING SCALE



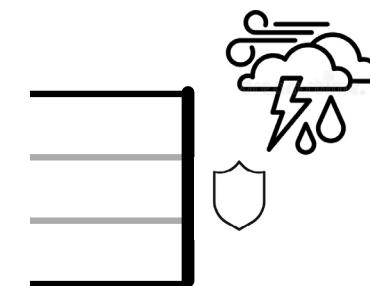
REDUCE: No unnecessary use of material and (re-)moving elements



REUSE: Revive the strengths of the building



REFILL: Make use of the plan libre for flexible new functions and possibilities



Create robust façade with long lasting material

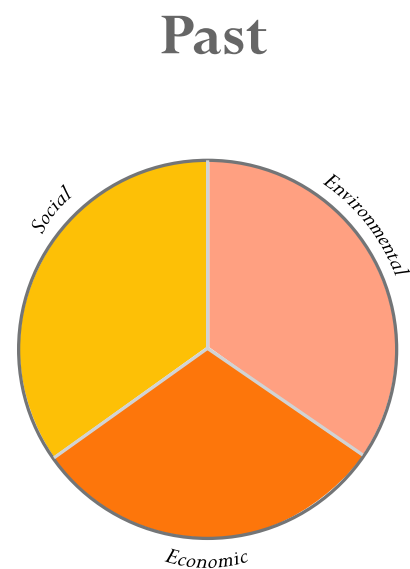
DESIGN.

Research in practice - Strategies - Urban masterplan - Interventions - Conclusion



“Design starts with finding, rather than inventing”
(PhD graduate student, TU Delft, 2023)

RESEARCH IN PRACTICE.



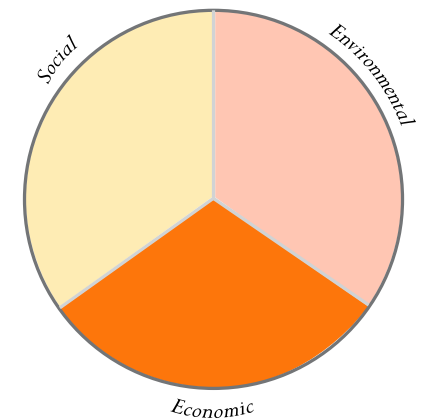
1.



2.



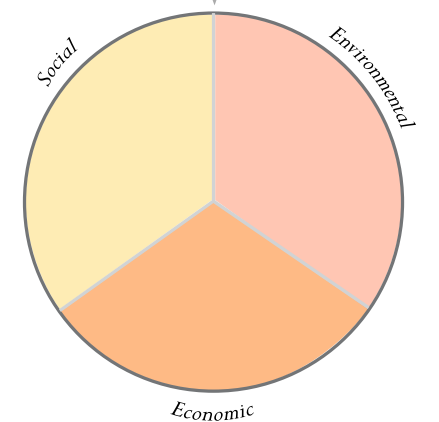
Present



3.



4.



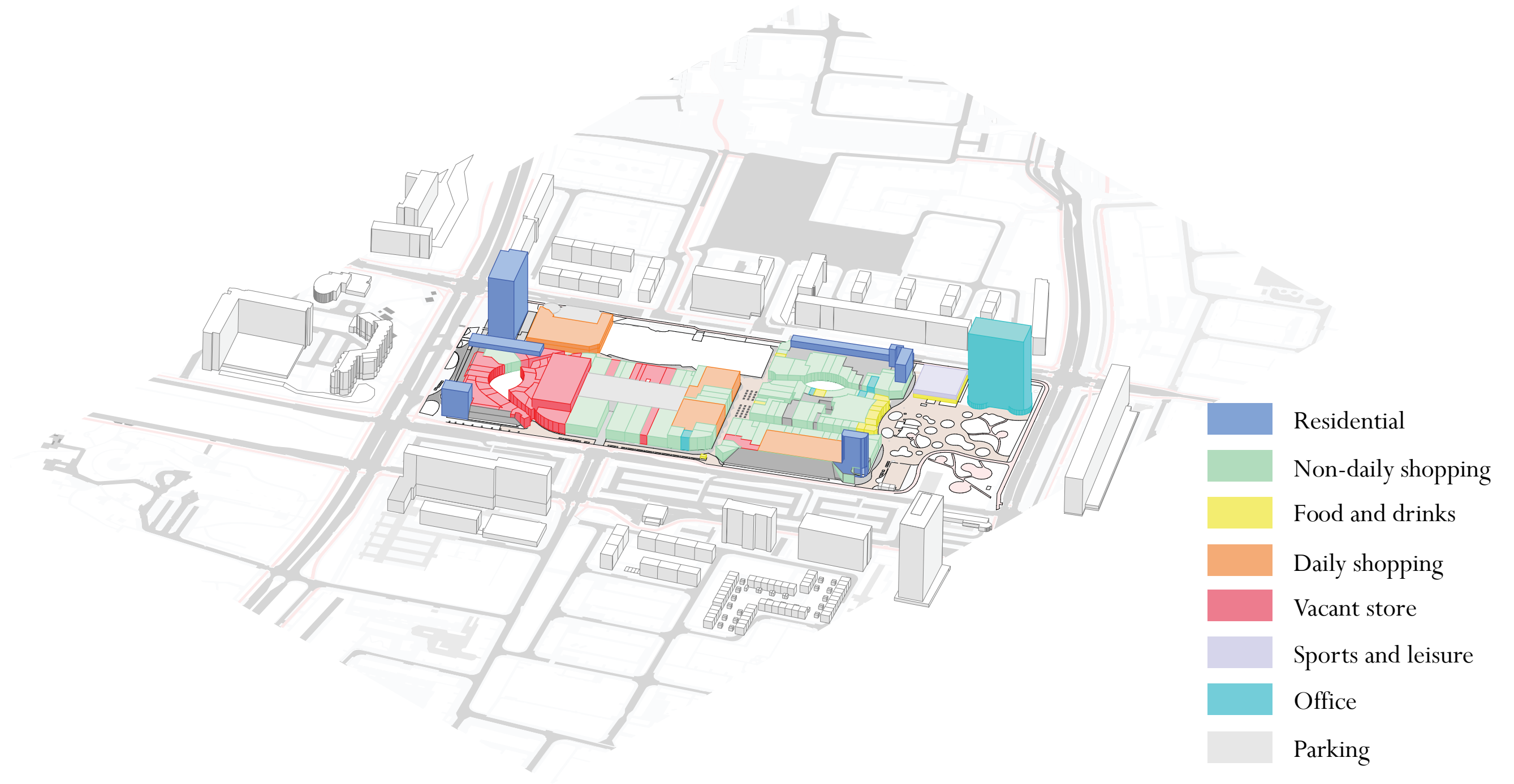
Future



P5 - Joël Moens

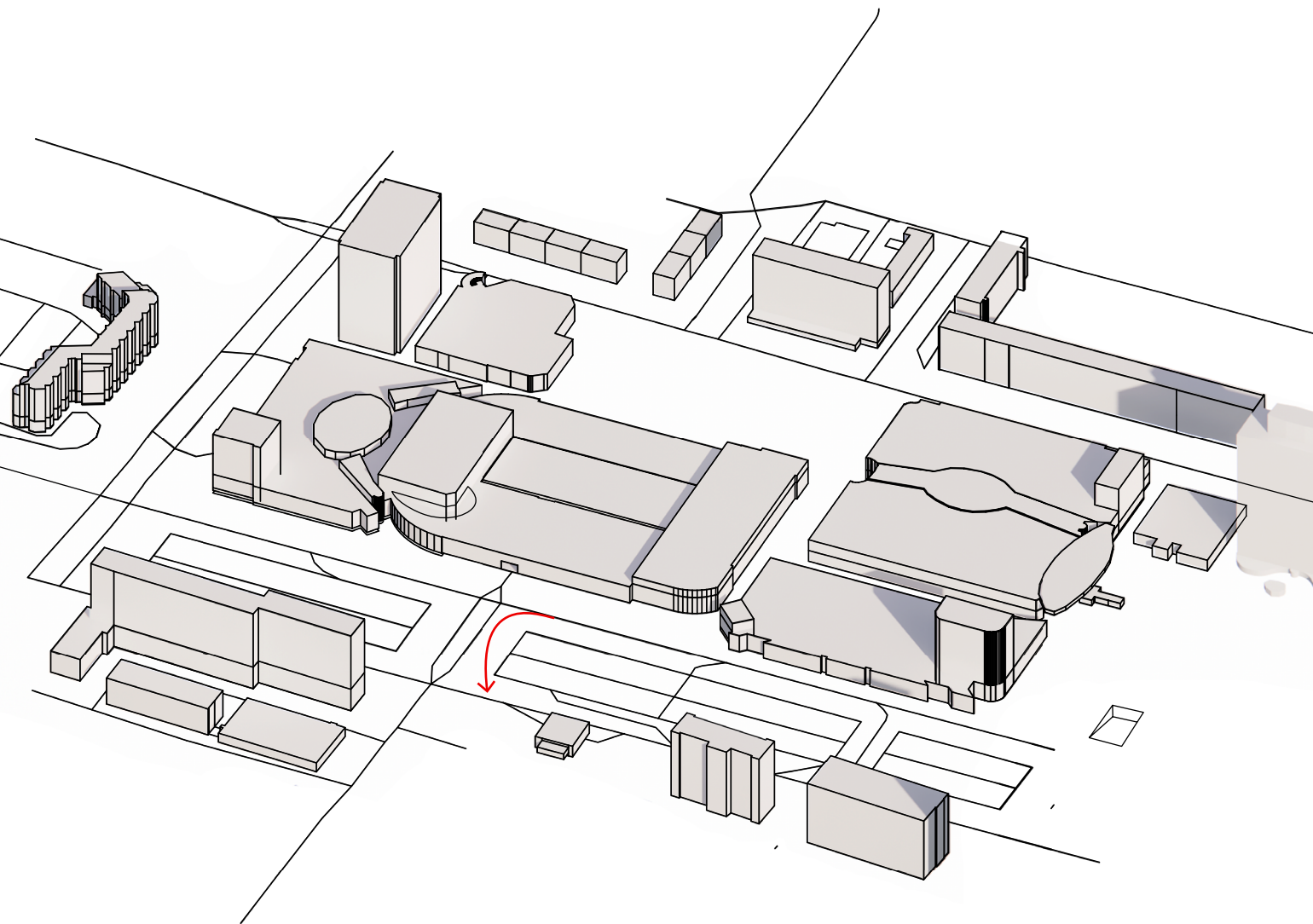
1. Retrieved from: <https://www.facebook.com/photo/?fbid=506413406195251&set=oh-ja-dat-ding-voor-de-bogaard>
2. Retrieved from: <https://www.flickr.com/photos/pietg/4401684805>
3. Retrieved from: <https://rijswijksdagblad.nl/algemeen/gezellige-koningsdag-in-de-bogaard->
4. Retrieved from: <https://www.gebiedsontwikkeling.nu/artikelen/functiemenging-is-de-manier-om-het-buurtwinkelcentrum-van-nieuw-elan-te-voorzien/>

MASTERPLAN. EXISTING FUNCTIONS.



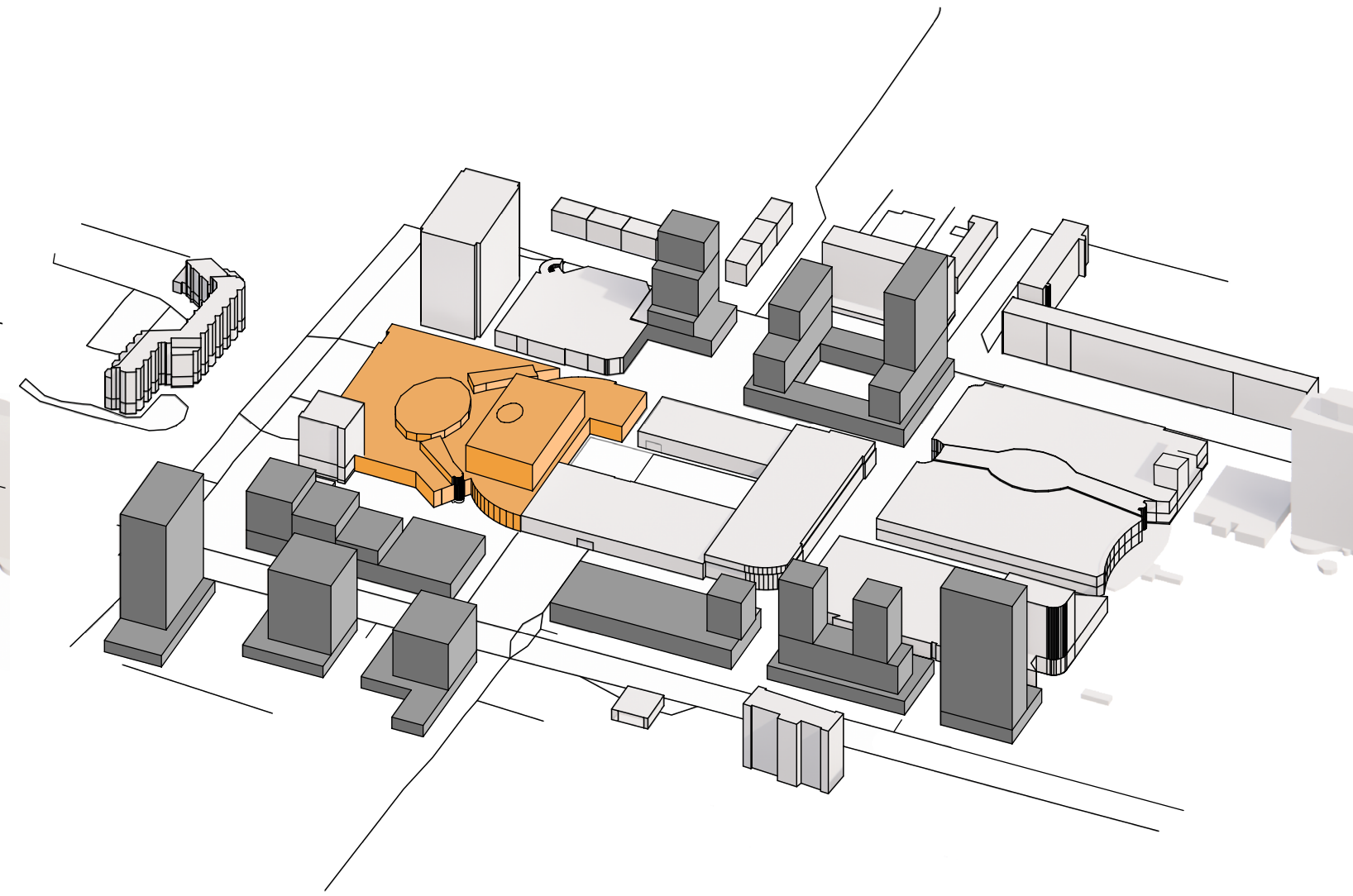
MASTERPLAN. OLD AND NEW SITUATION.

Existing



1963 - 2023

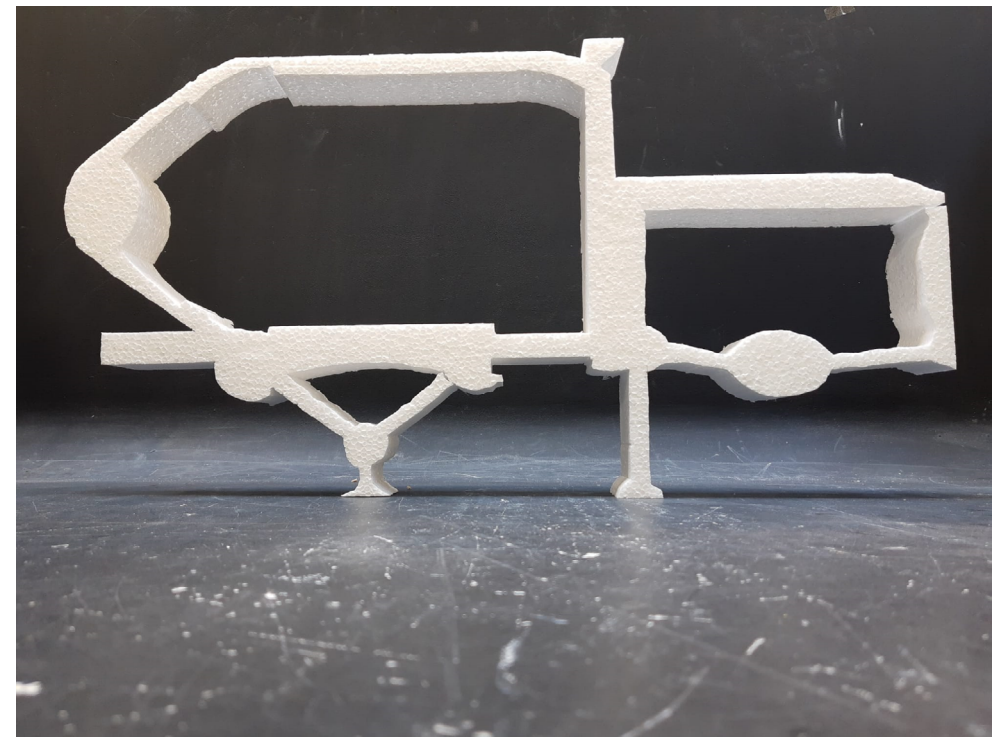
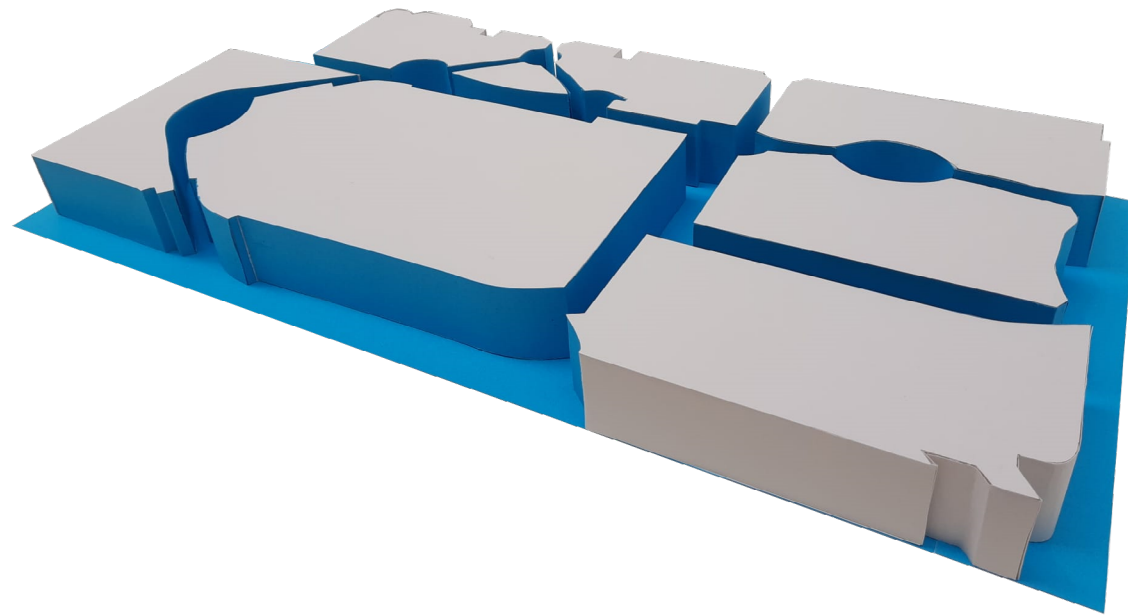
New



2023 >

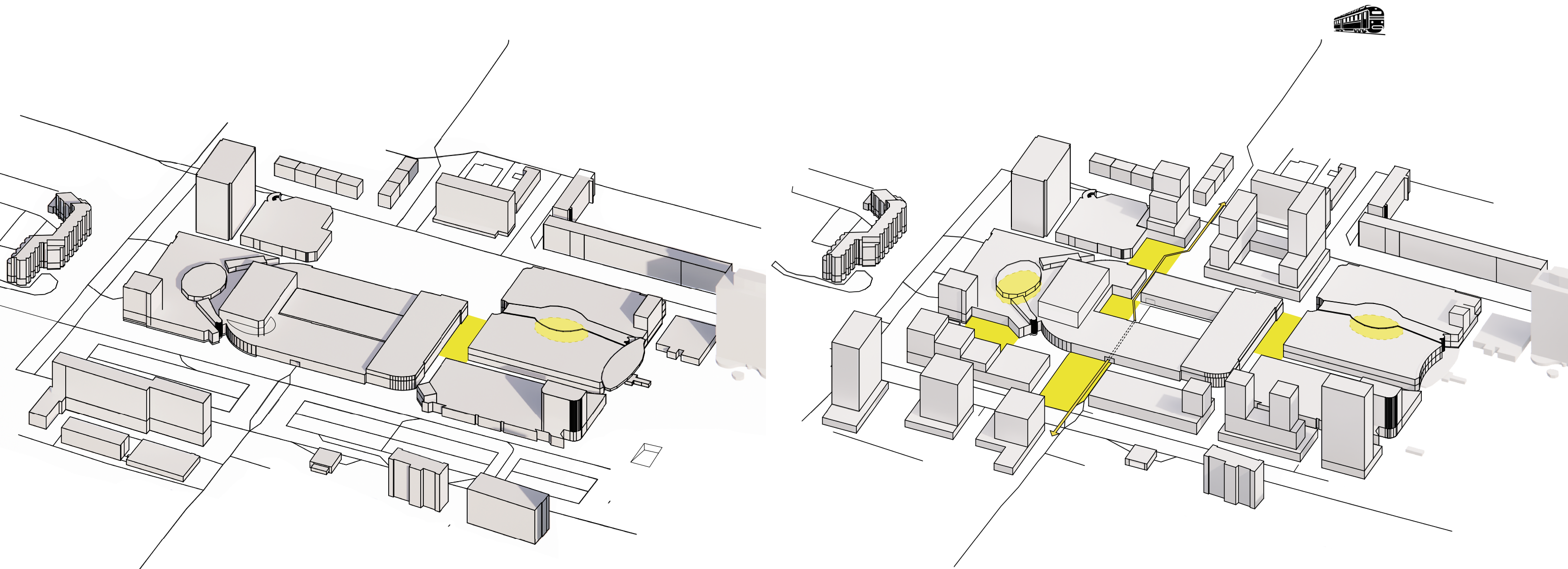
 De Terp

MASTERPLAN. ESSENCE MODEL

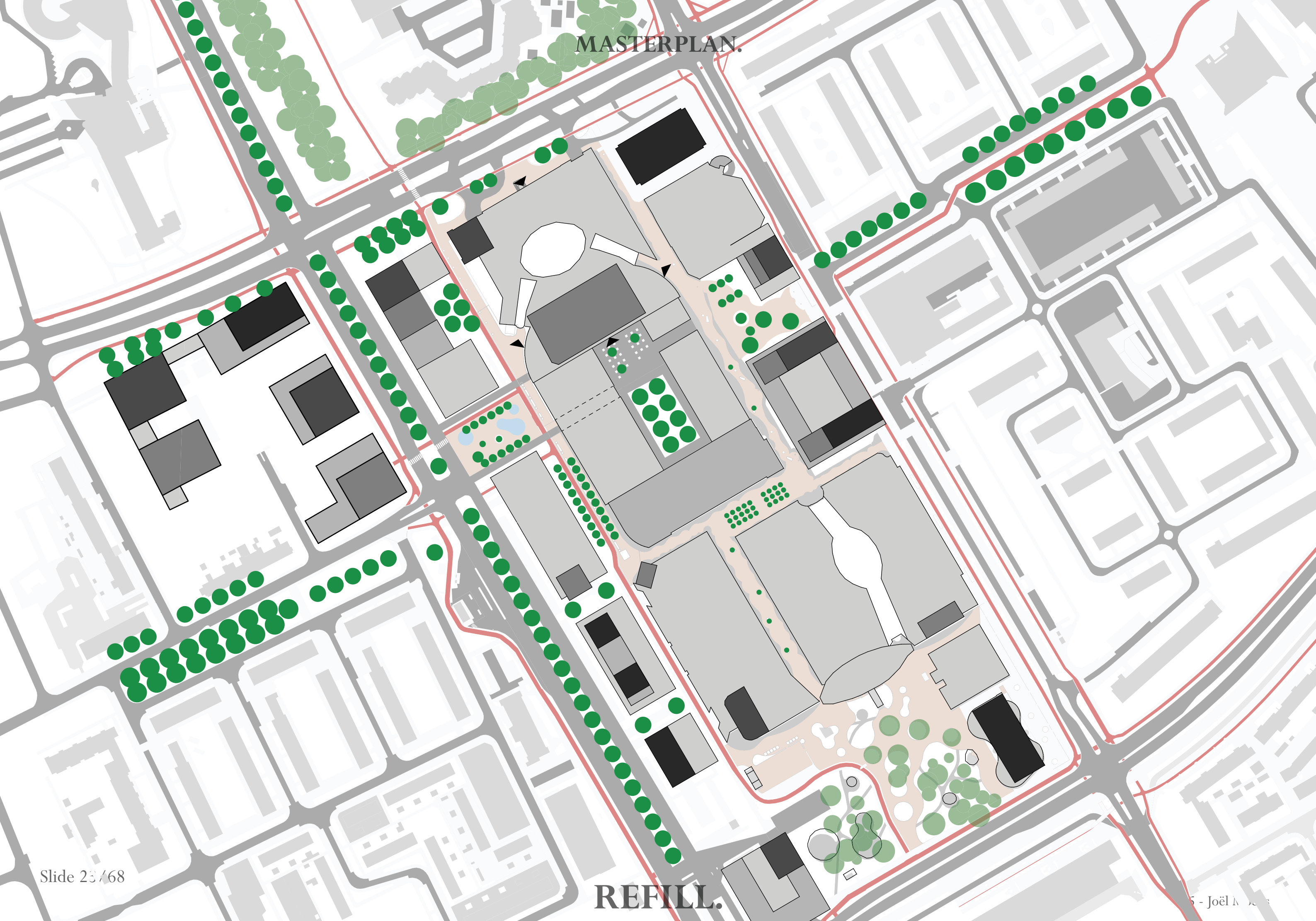




MASTERPLAN. OPEN SPACES OLD AND NEW SITUATION.

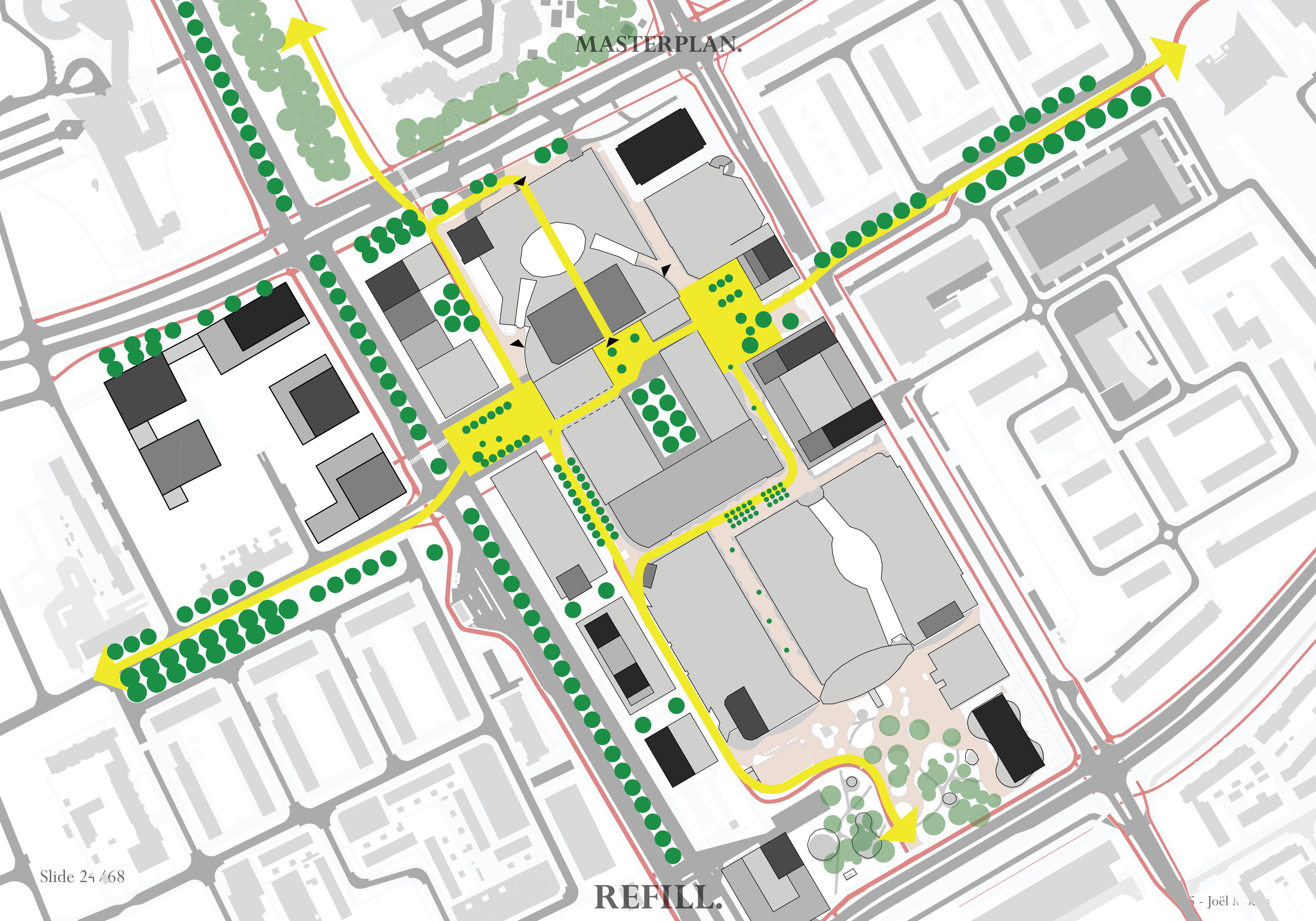


MASTERPLAN.



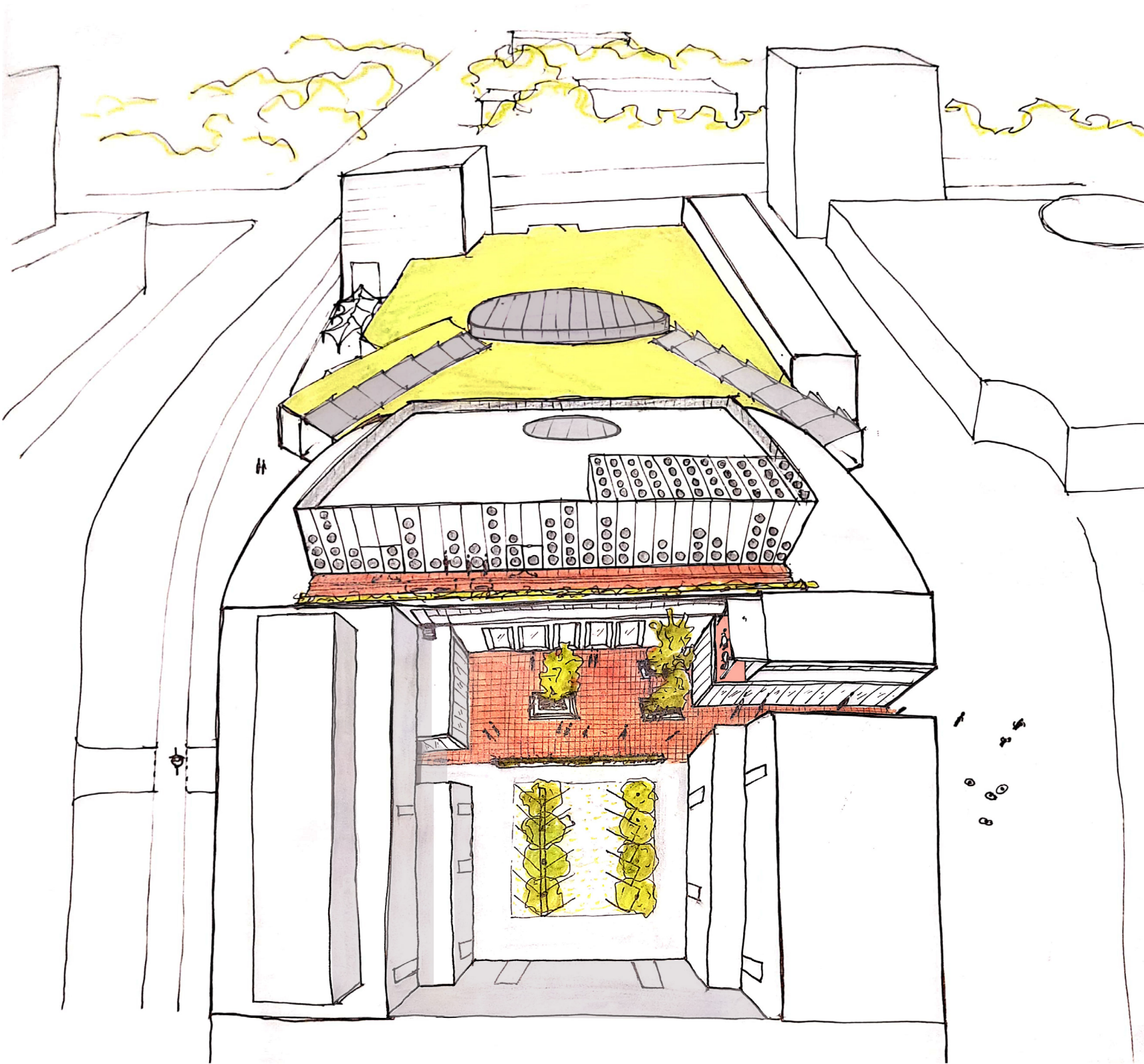
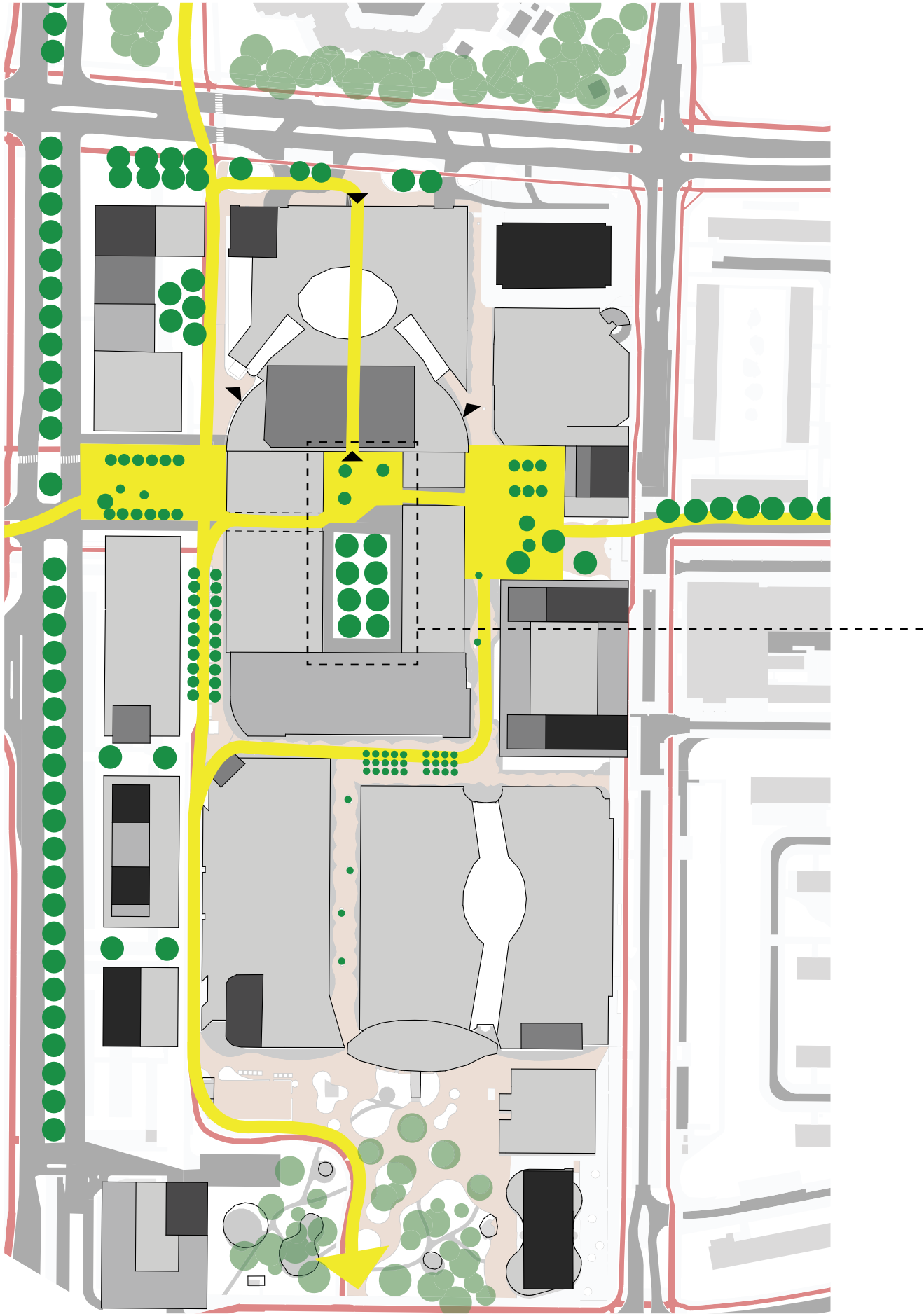
REFILL.

MASTERPLAN.



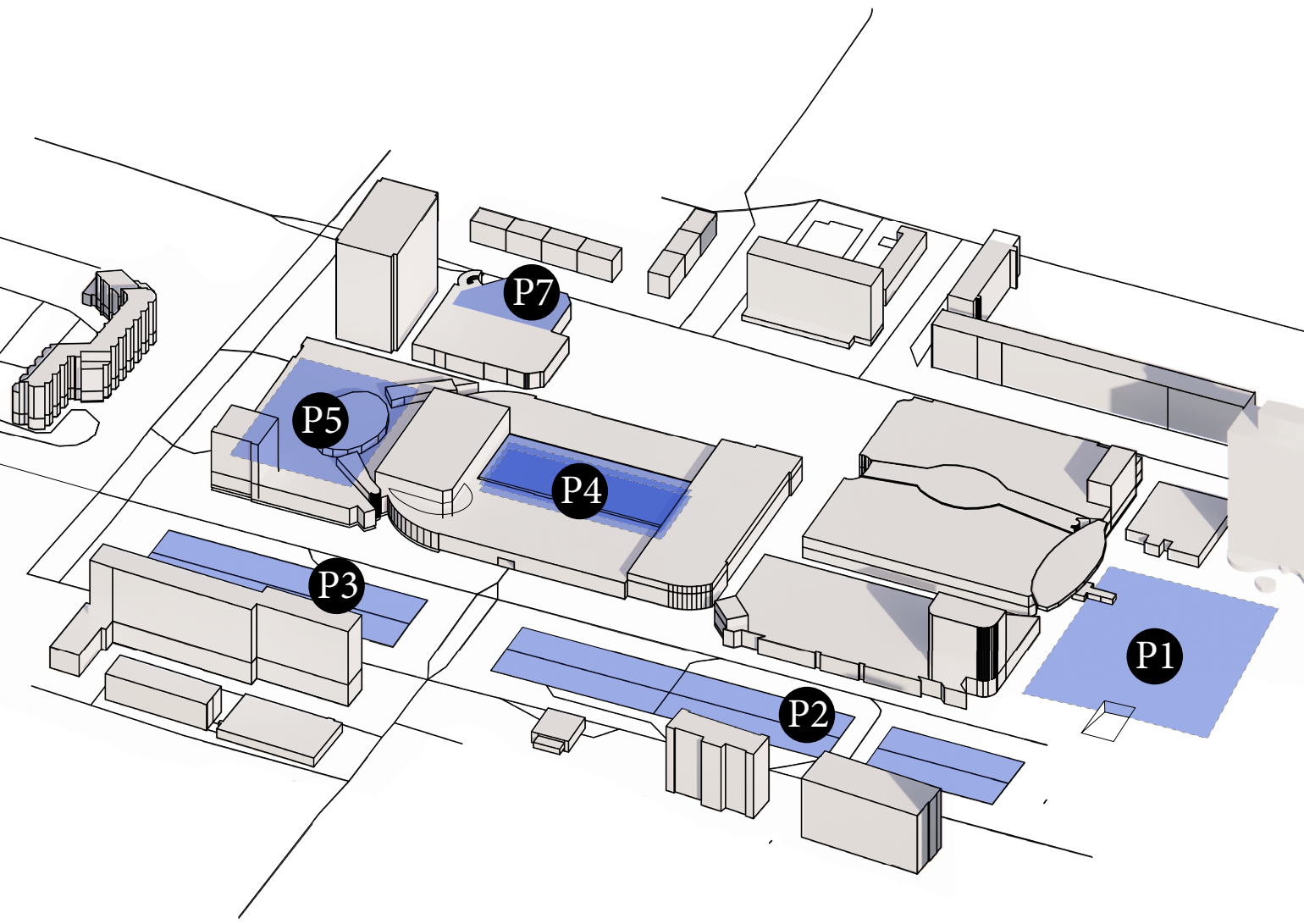
REFILL.

MASTERPLAN.



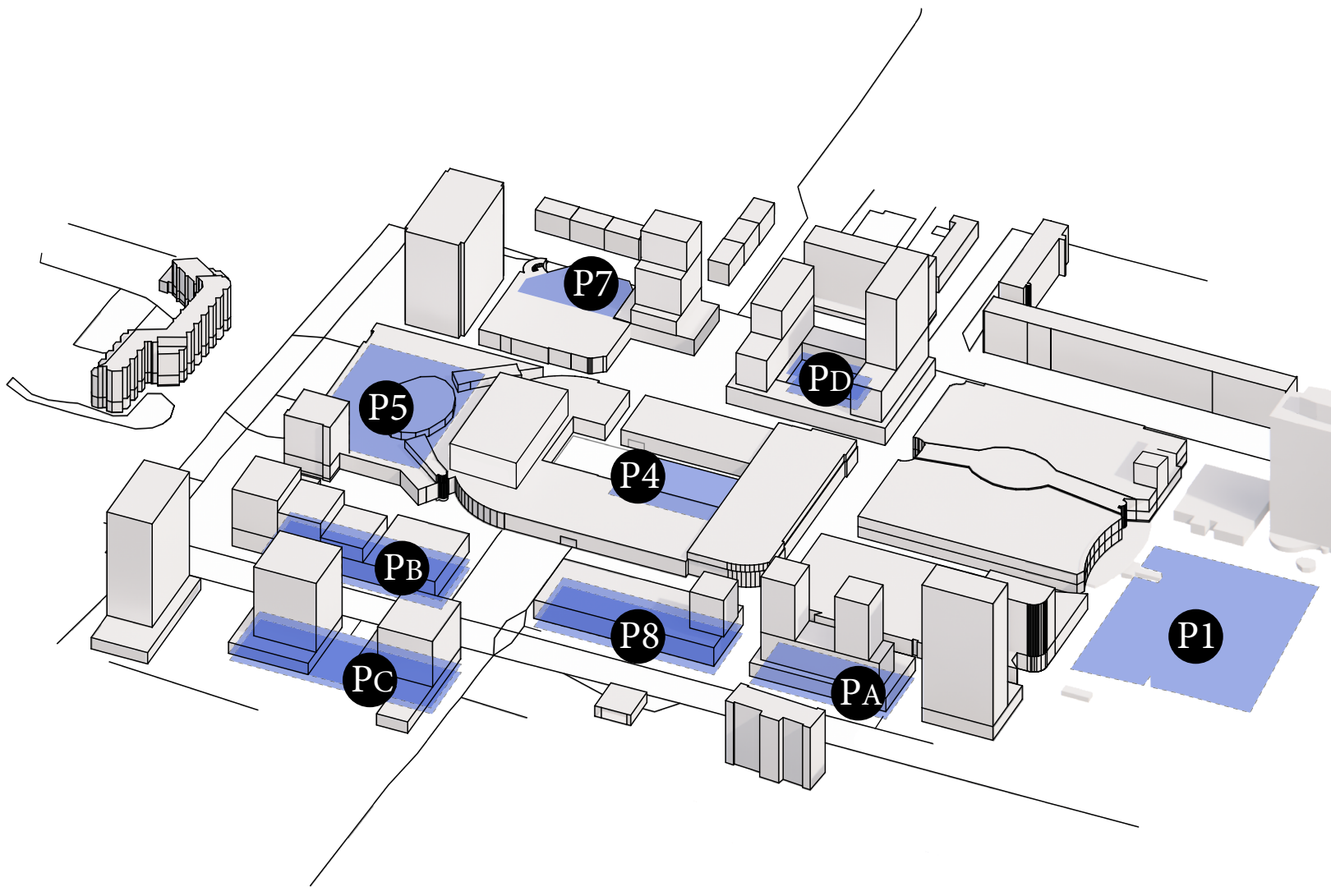
MASTERPLAN.
PARKING OLD AND NEW SITUATION.

Existing



Existing parking lots
2.102 spaces total

New

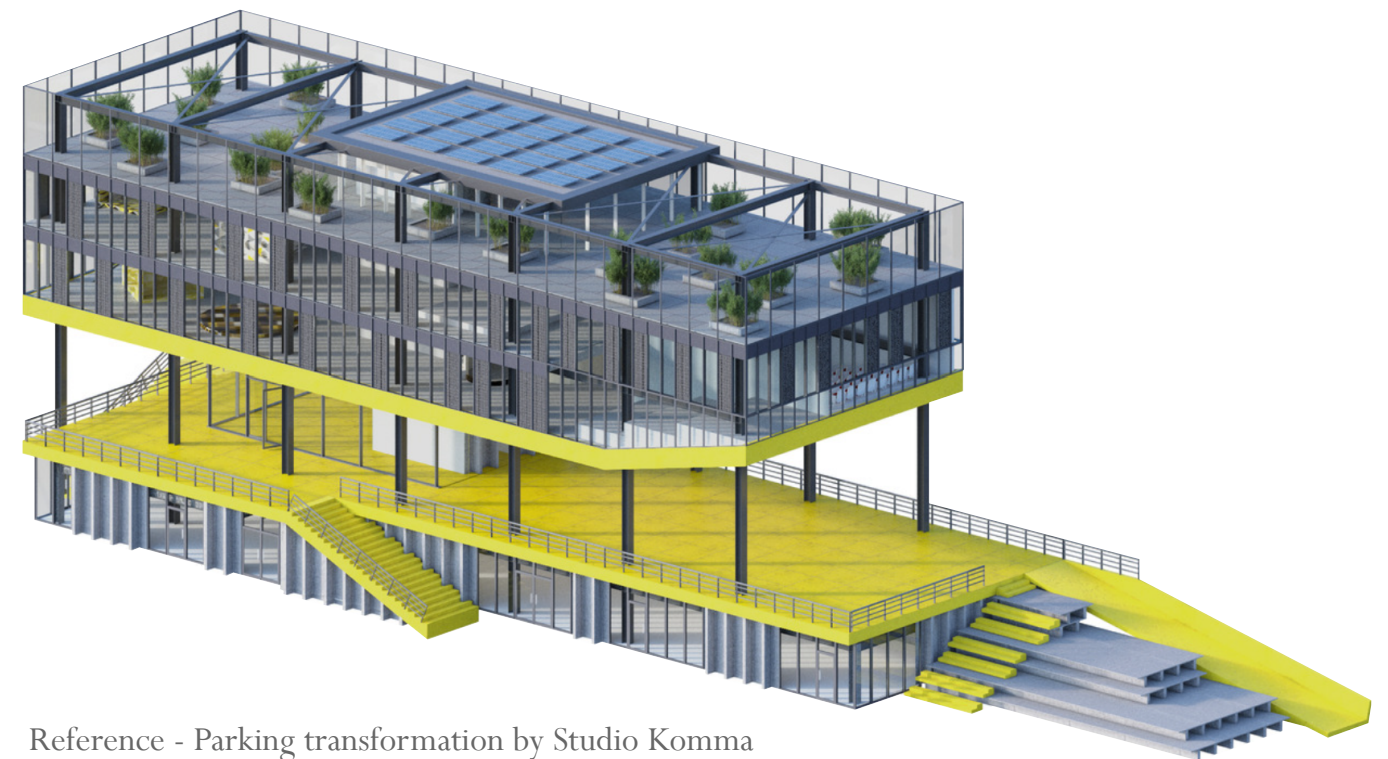
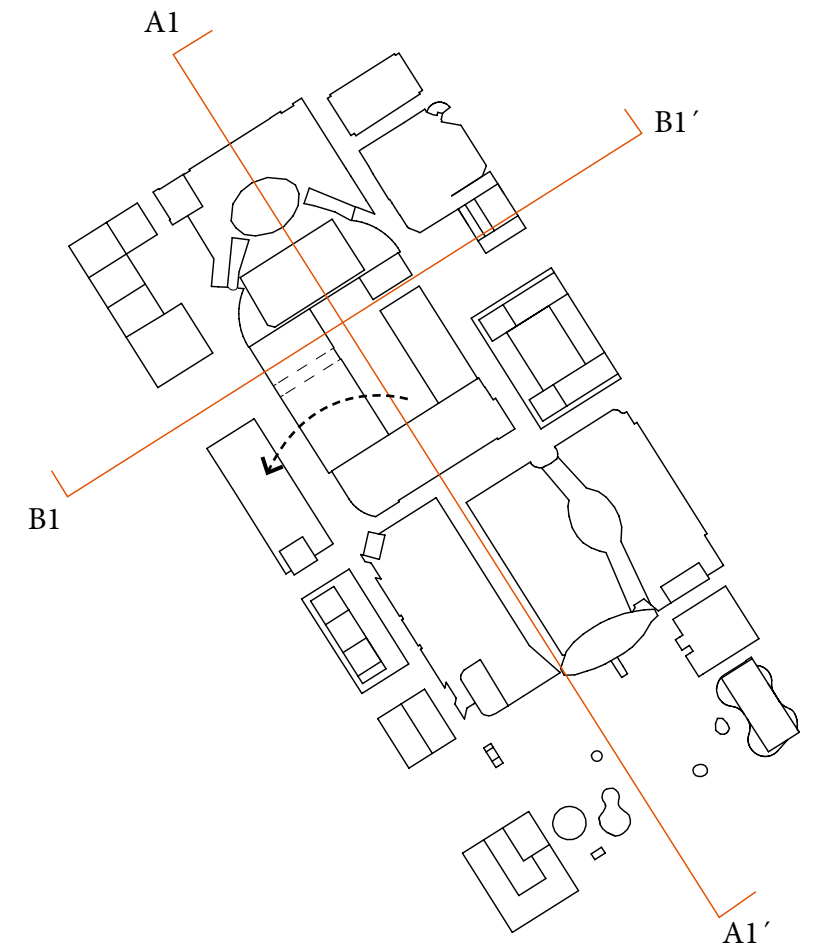
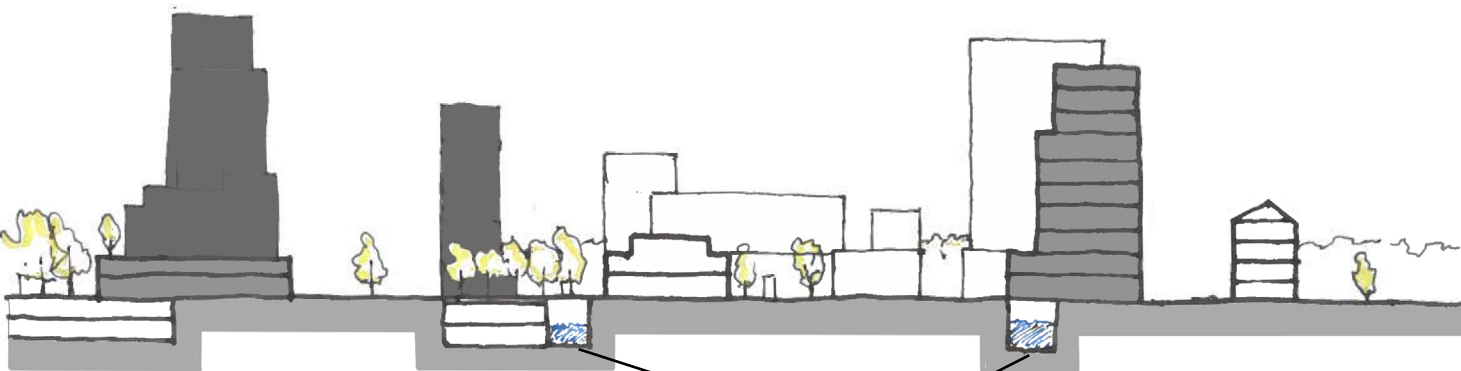
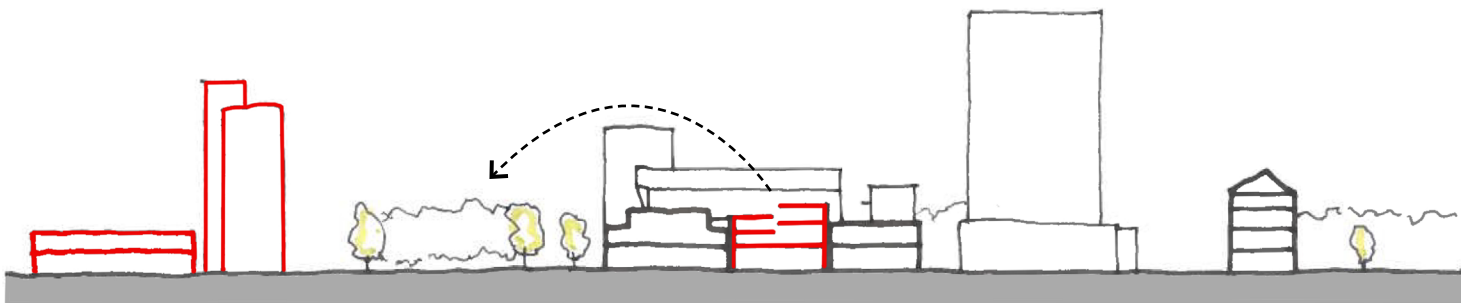
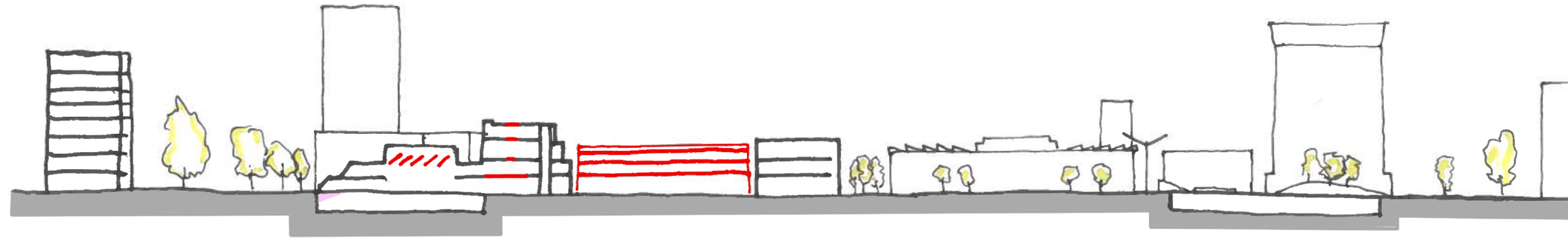


New parking lots focused on building block
 $2.102 - 993 + 1.400 = 2.499$ spaces total





MASTERPLAN. SECTIONS OLD AND NEW.



Reference - Parking transformation by Studio Komma

4.000 m³ water storage *

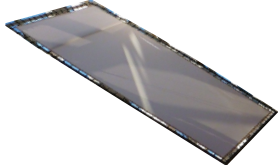
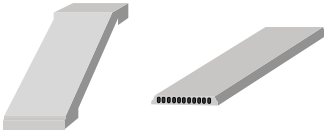
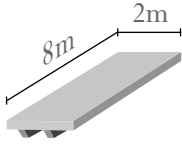
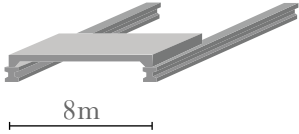
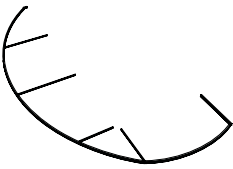
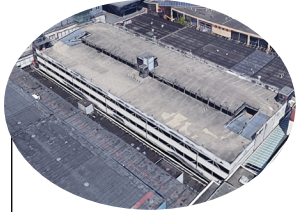
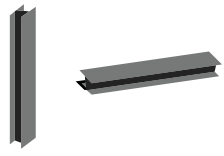
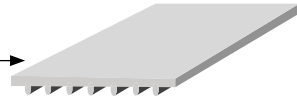
*51.177 m² roof makes it possible to capture 35.824 L water yearly, so a tank of $0,08 \times 35.824 = 2866$ L is necessary



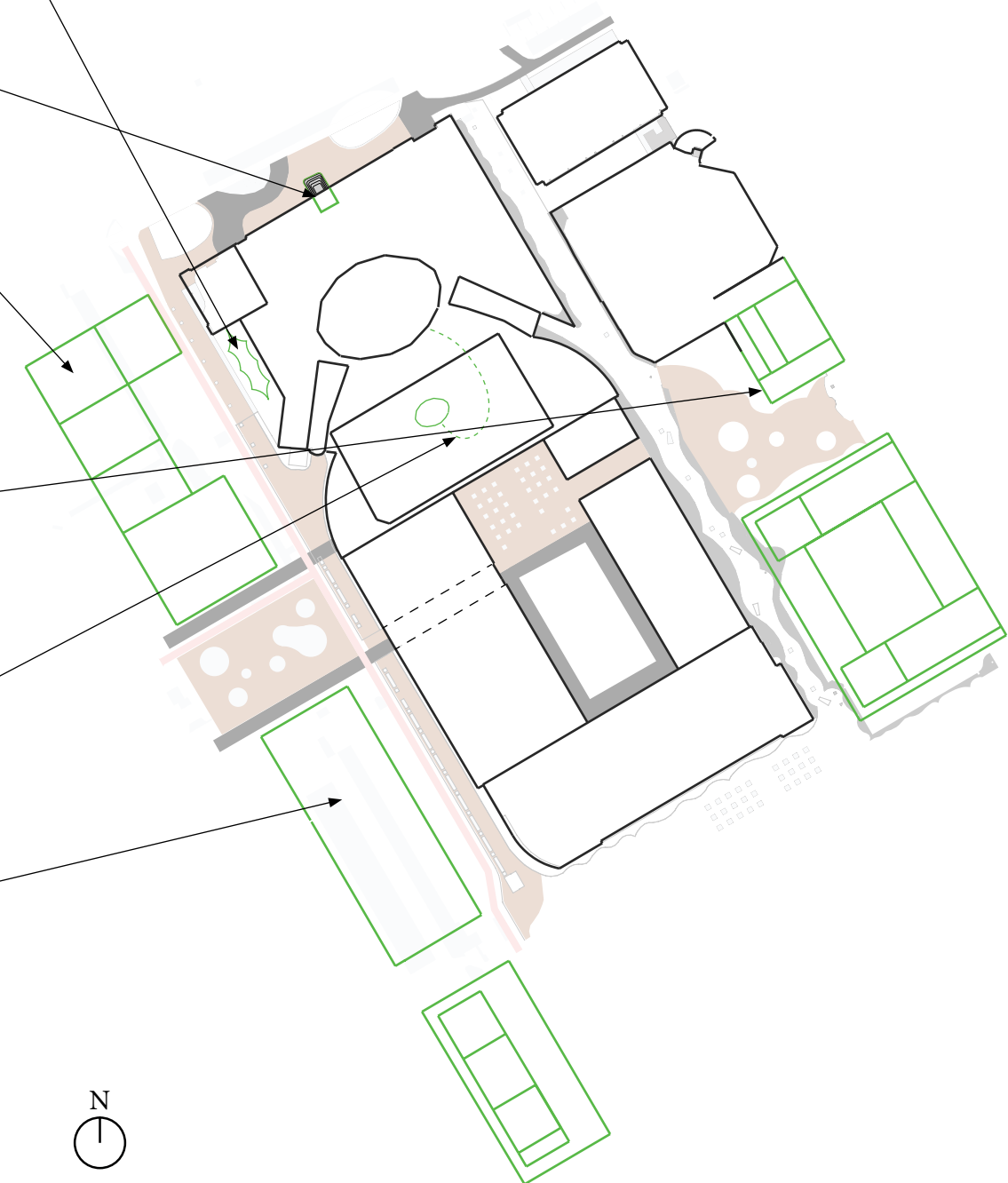
Existing situation

INTERVENTIONS.

Reused elements

	144 m ² textile panel
	360 m ² concrete slabs
	105x Double T concrete floor slabs 1680 m ²
	320 m ² Cast-in-situ concrete floor slabs
	<i>Steel bracket</i>
	Parking garage
	432x steel columns 126x steel beams
	Precast, prestressed composite thin slabs with long span

New situation





INTERVENTIONS.

Existing facades (closed)



1



2

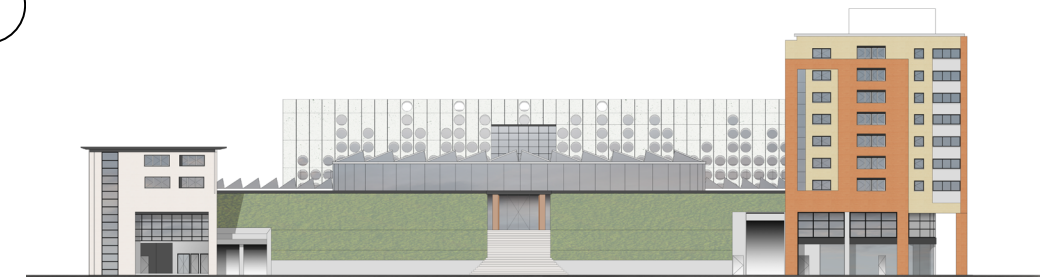


3

Opening up

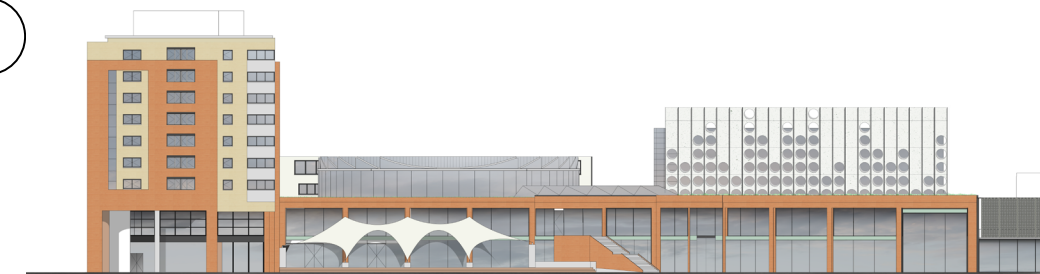
Creating a new entrance on the north side

①



Opening up the green west facade

②

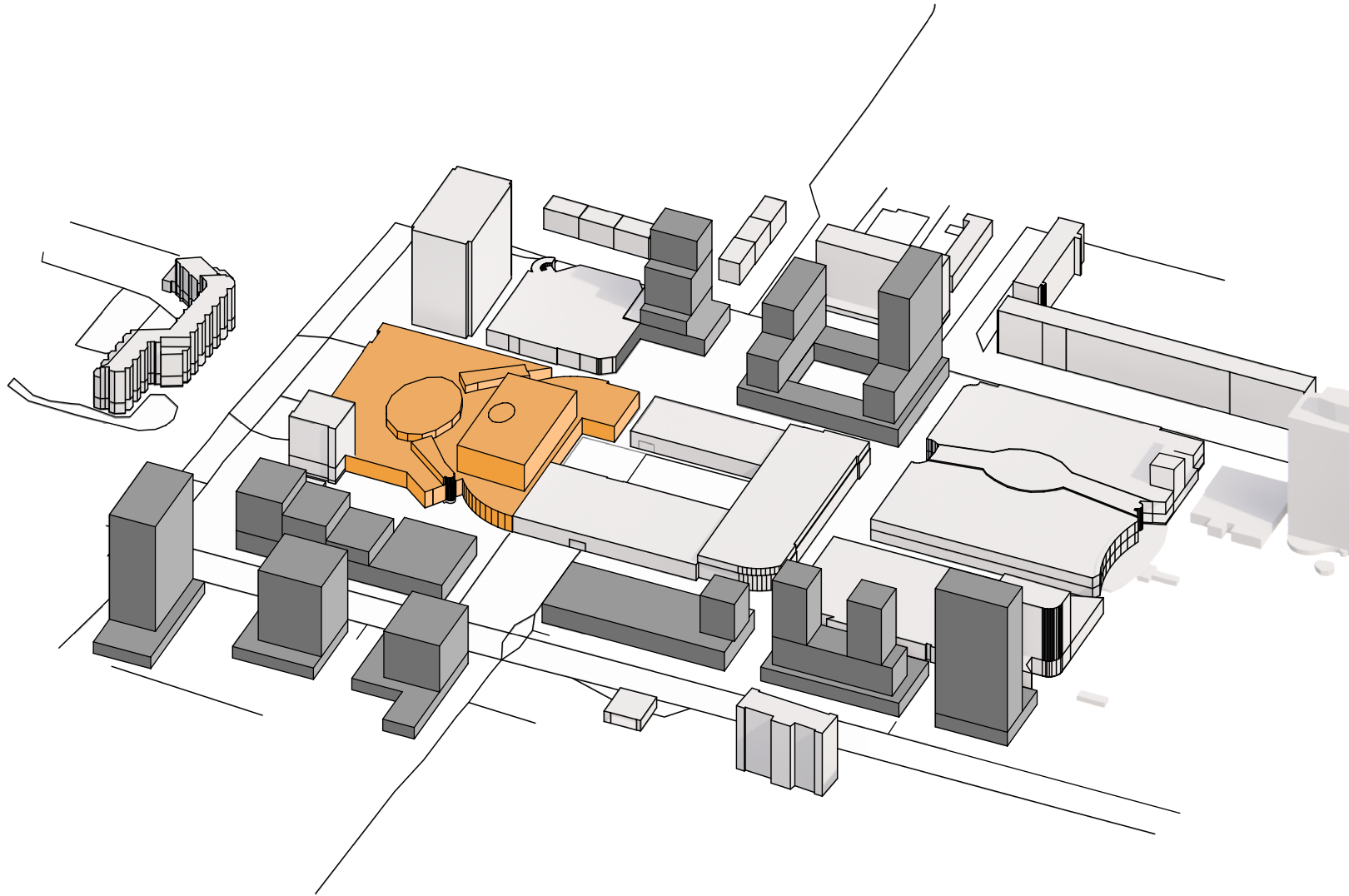


Demolition of the parking garage and creating an intimate green square and expedition space with a new facade for the indoor market

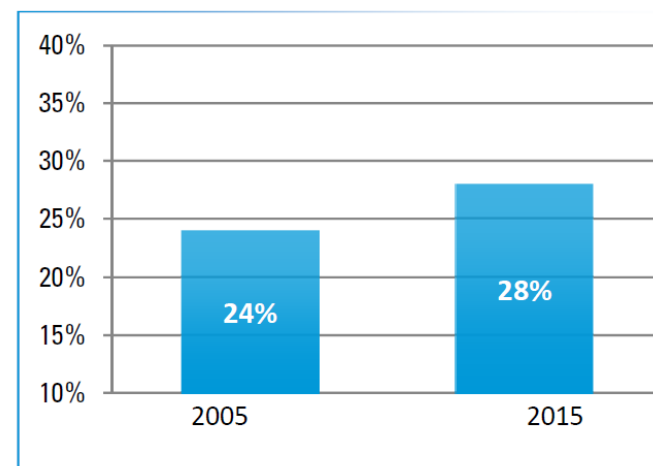
③



MASTERPLAN.



Figuur 6. Aandeel horeca centrale winkelgebieden Nederland, 2005-2015



Bron: CBRE food & beverage in winkelcentra, 2016

Eten is het nieuwe shoppen

30% van consumenten laat keuze voor winkelcentrum afhangen van horeca-aanbod
40% van consumenten bezoekt winkel, terwijl horecabezoek hoofdmotief centrumbezoek was
25% horeca is standaard voor vitaal centrum.

Bron: CBRE food & beverage in winkelcentra, 2016



▲ Oude stadhuis met vijver vanaf de Schouwburg. © Jacques Zorgman

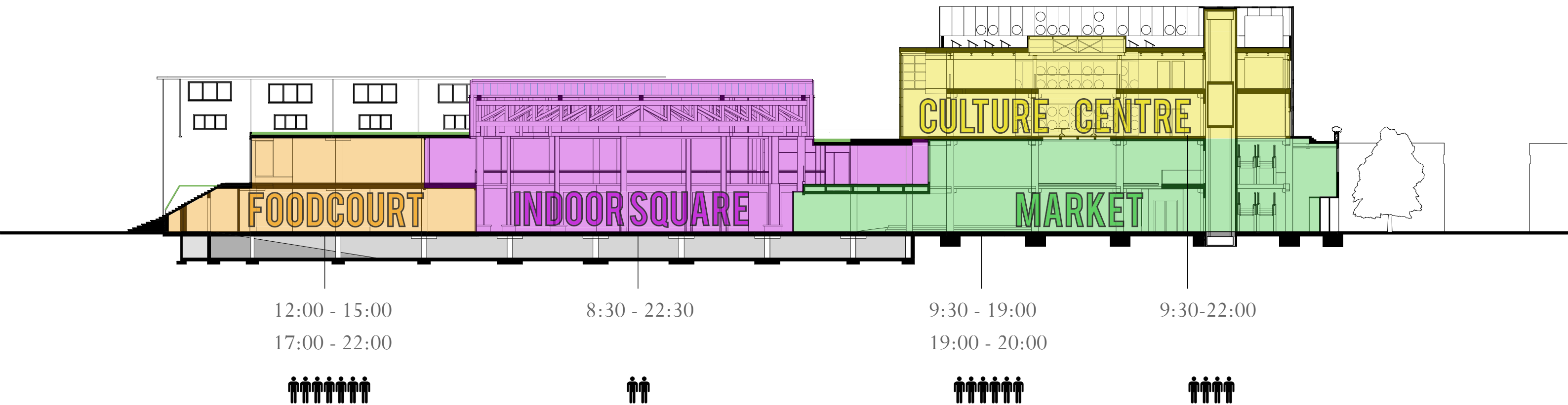
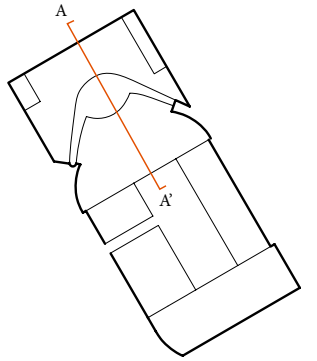
Rijswijk verhuist ondanks extra miljoenen terug naar oude stadhuis: 'Goedkoper dan nu stoppen'

Door nog eens 6,3 miljoen euro extra te steken in het verwijderen van asbest, kan de verhuizing van het Rijswijkse ambtenarenapparaat, de raadzaal en een aantal maatschappelijke organisaties naar het oude stadhuis doorgaan. Dat heeft de gemeenteraad van Rijswijk besloten.

Maaïke Kraaijeveld 12-11-20, 18:19



MASTERPLAN. NEW FUNCTIONS.



STRATEGIES.

REDUCE.



CREATE SPACE BY MOVING AND REMOVING ELEMENTS

REUSE.

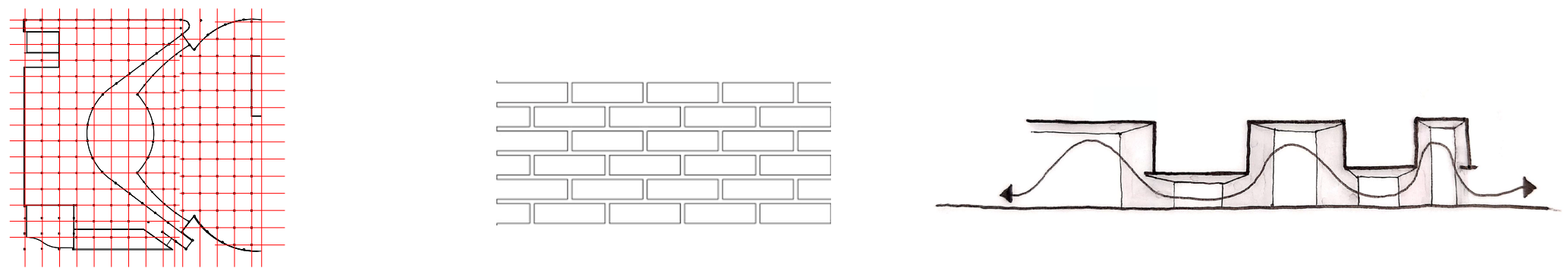
REFILL.

STRATEGIES.

REDUCE.



REUSE.



REUSE AND REVIVE THE STRENGTHS OF THE BUILDING

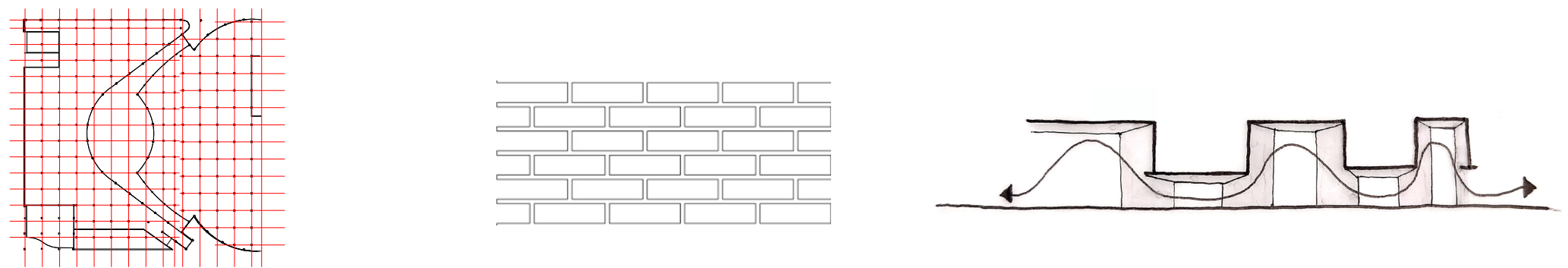
REFILL.

STRATEGIES.

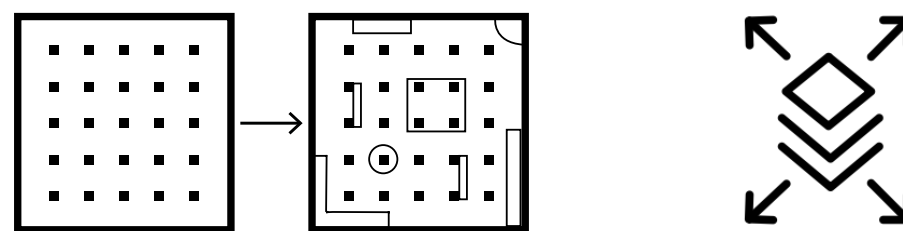
REDUCE.



REUSE.

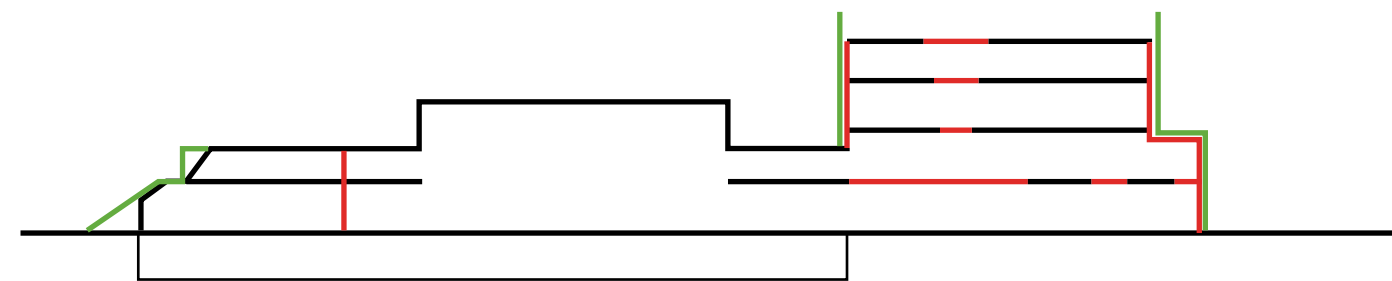
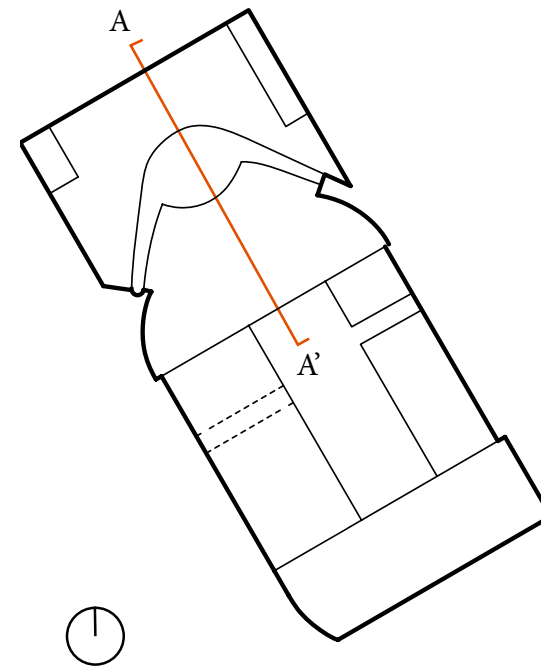
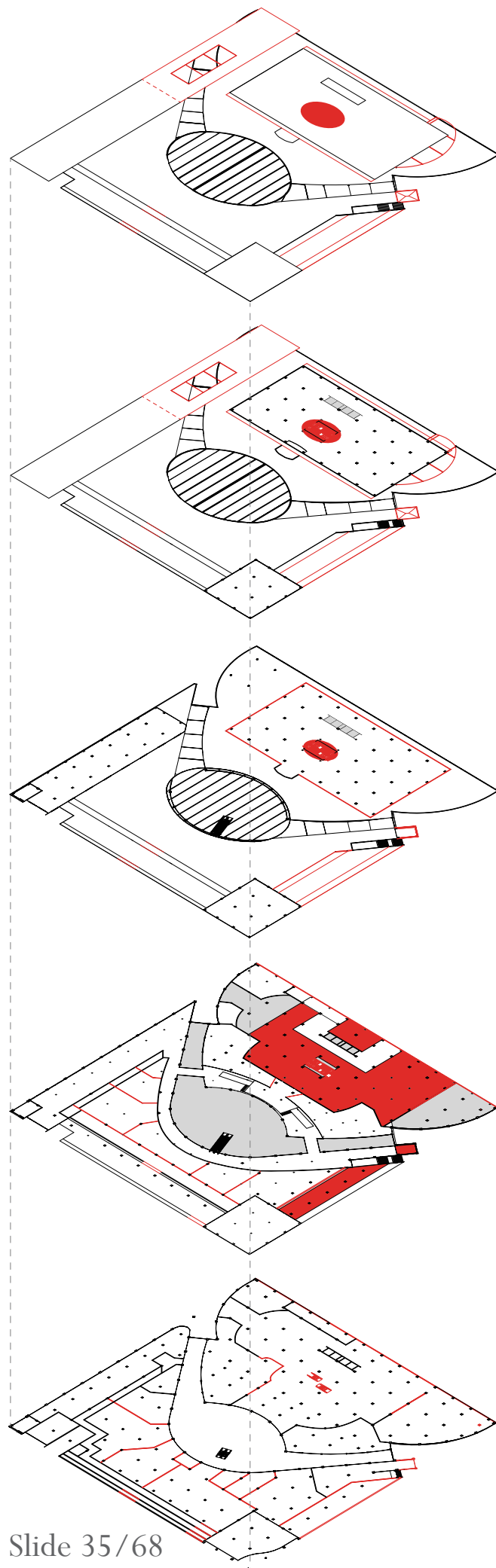


REFILL.



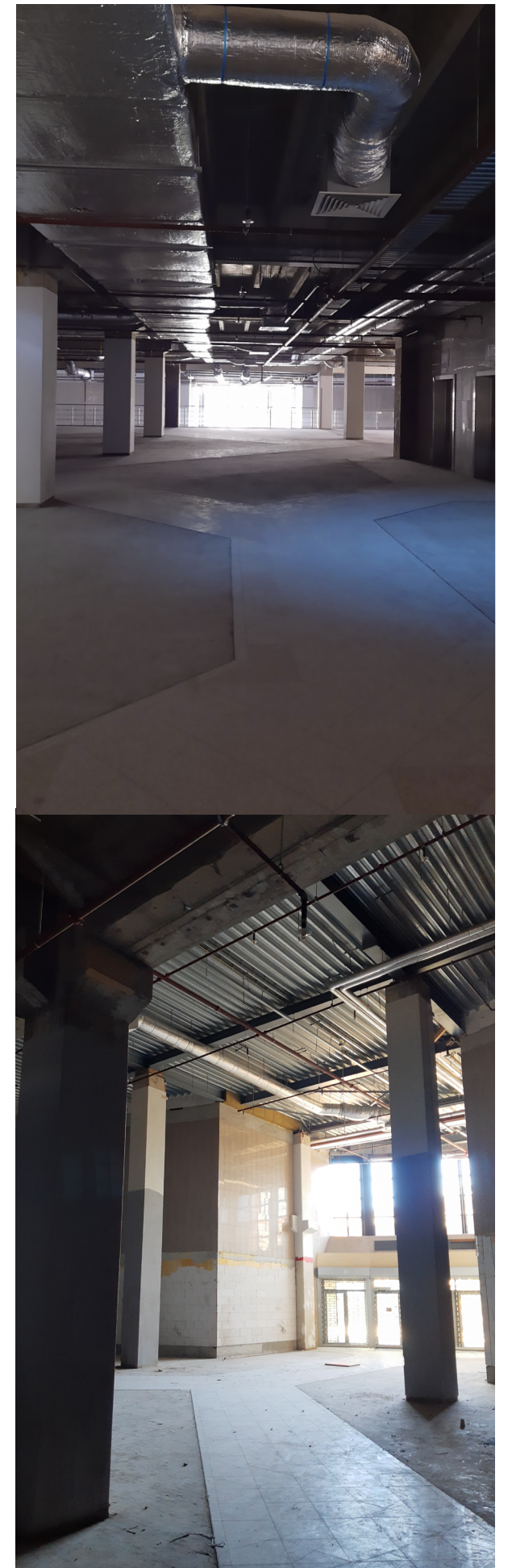
MAKE USE OF THE PLAN LIBRE TO CREATE A FLEXIBLE LAYOUT FOR FUNCTIONS
THAT FIT THE CONTEMPORARY TRENDS AND DEMANDS

INTERVENTIONS. PRINCIPLES.



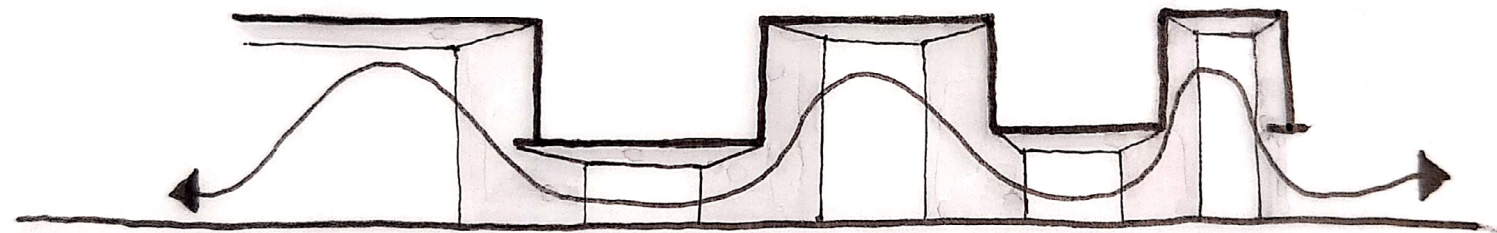
Section A-A'

- New
- - - Demolished
- Existing

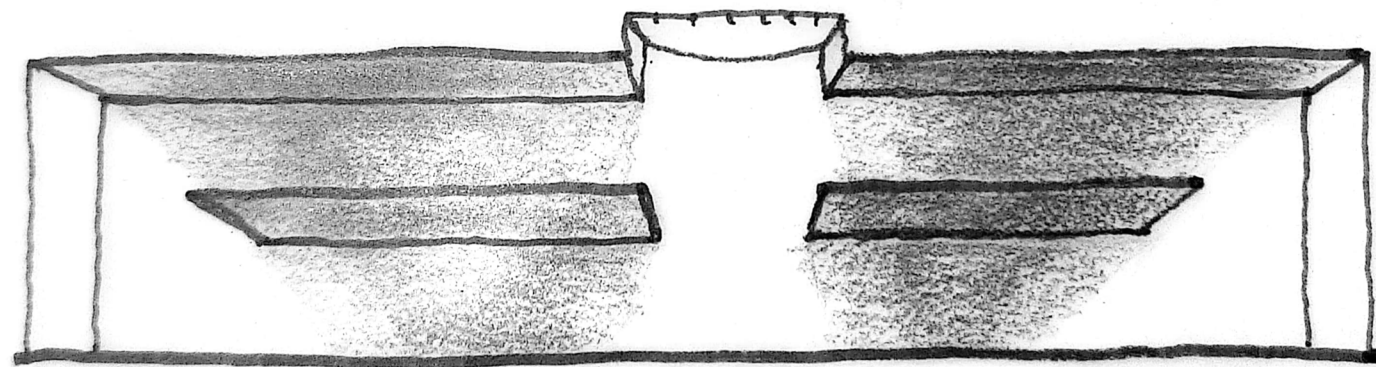




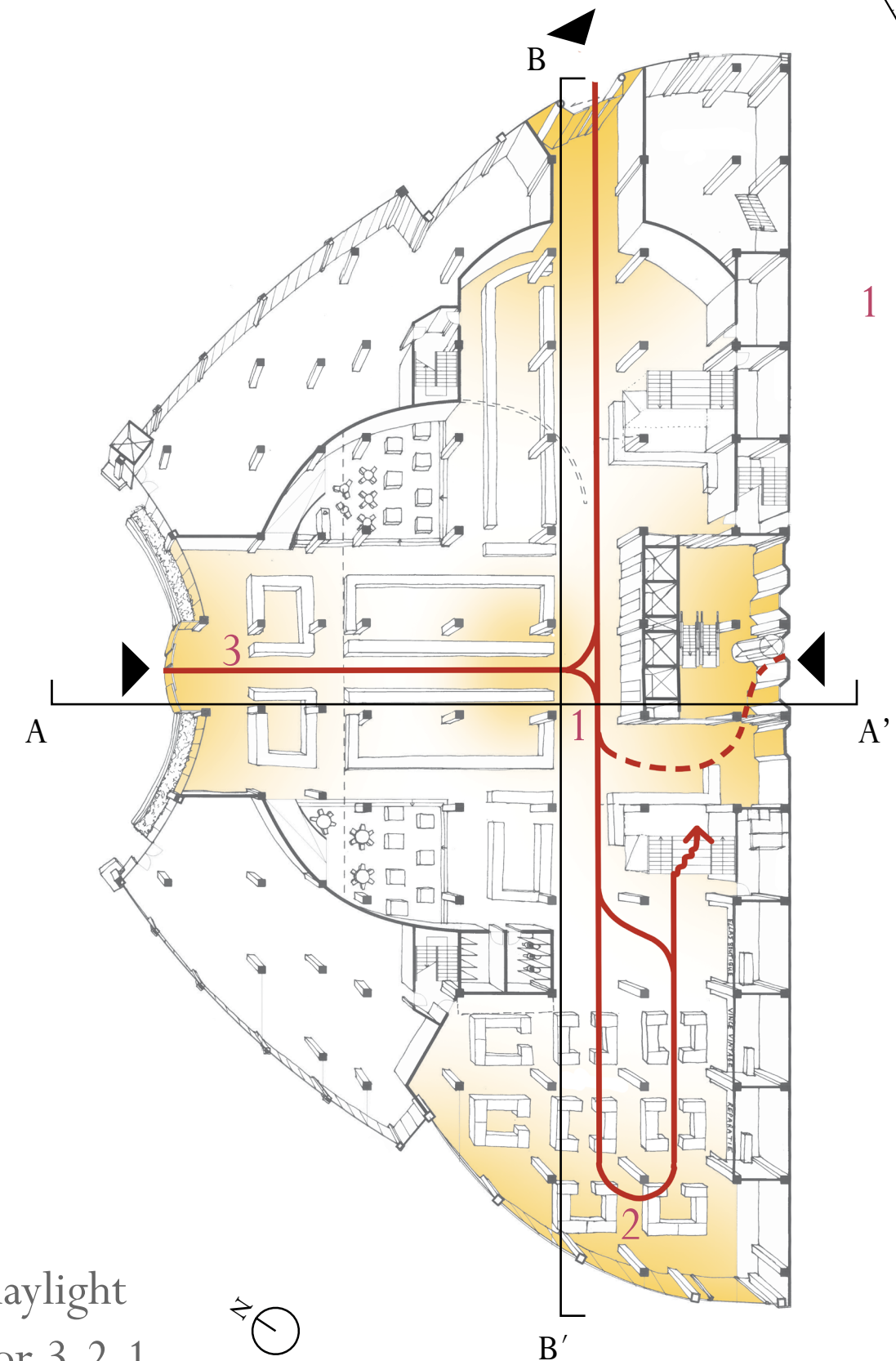
INTERVENTIONS. PRINCIPLES.



Space diagram section A-A'



Daylight diagram section B-B'



- Wayfinding through daylight
- Walking route 1-2-3 or 3-2-1

REFILL.

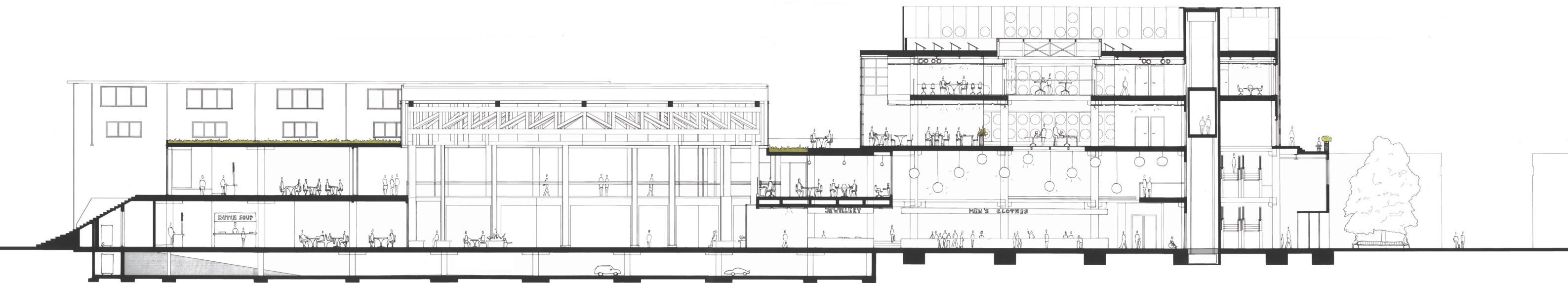
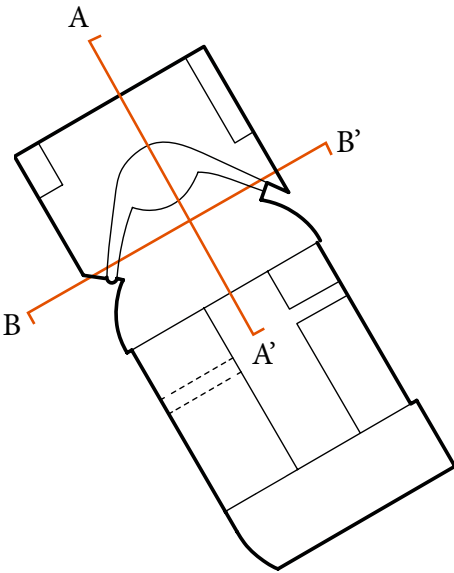
Palais de Tokyo, Paris



The Barn and indoor market, Lake Park

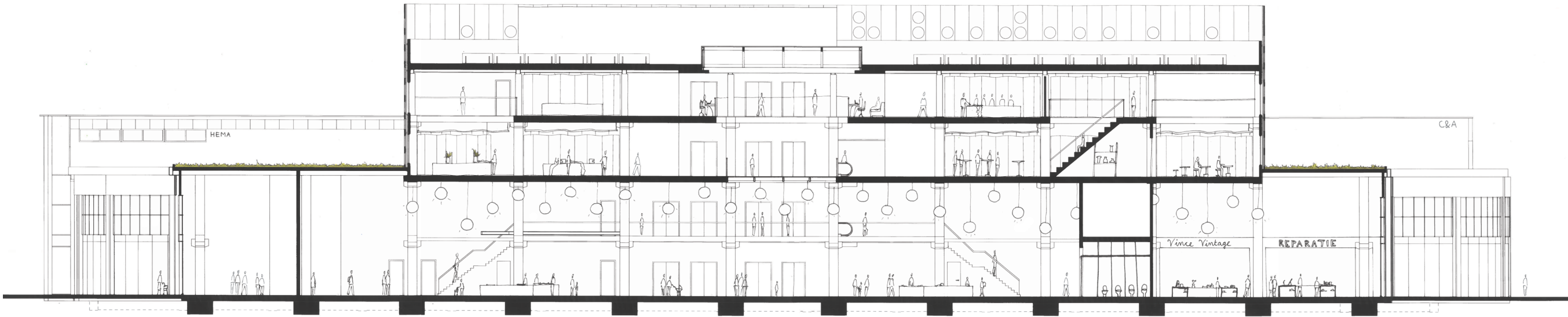


The Neuzelbeurs, Rijswijk



Section A-A'

0 2 4 12m



Section B-B'

0 2 4 12m

REFILL.

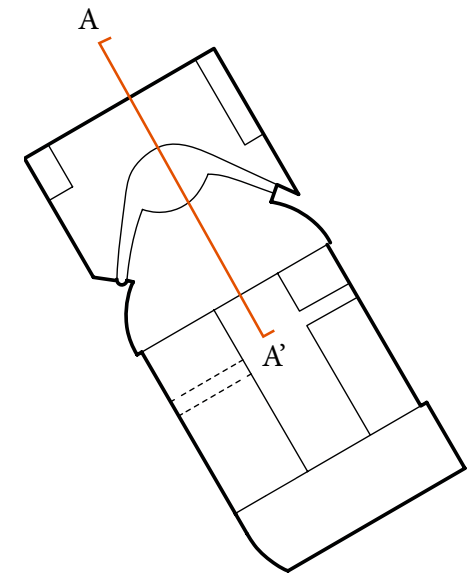
Palais de Tokyo, *Paris*



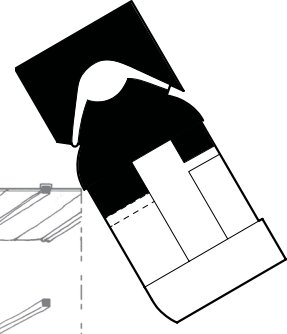
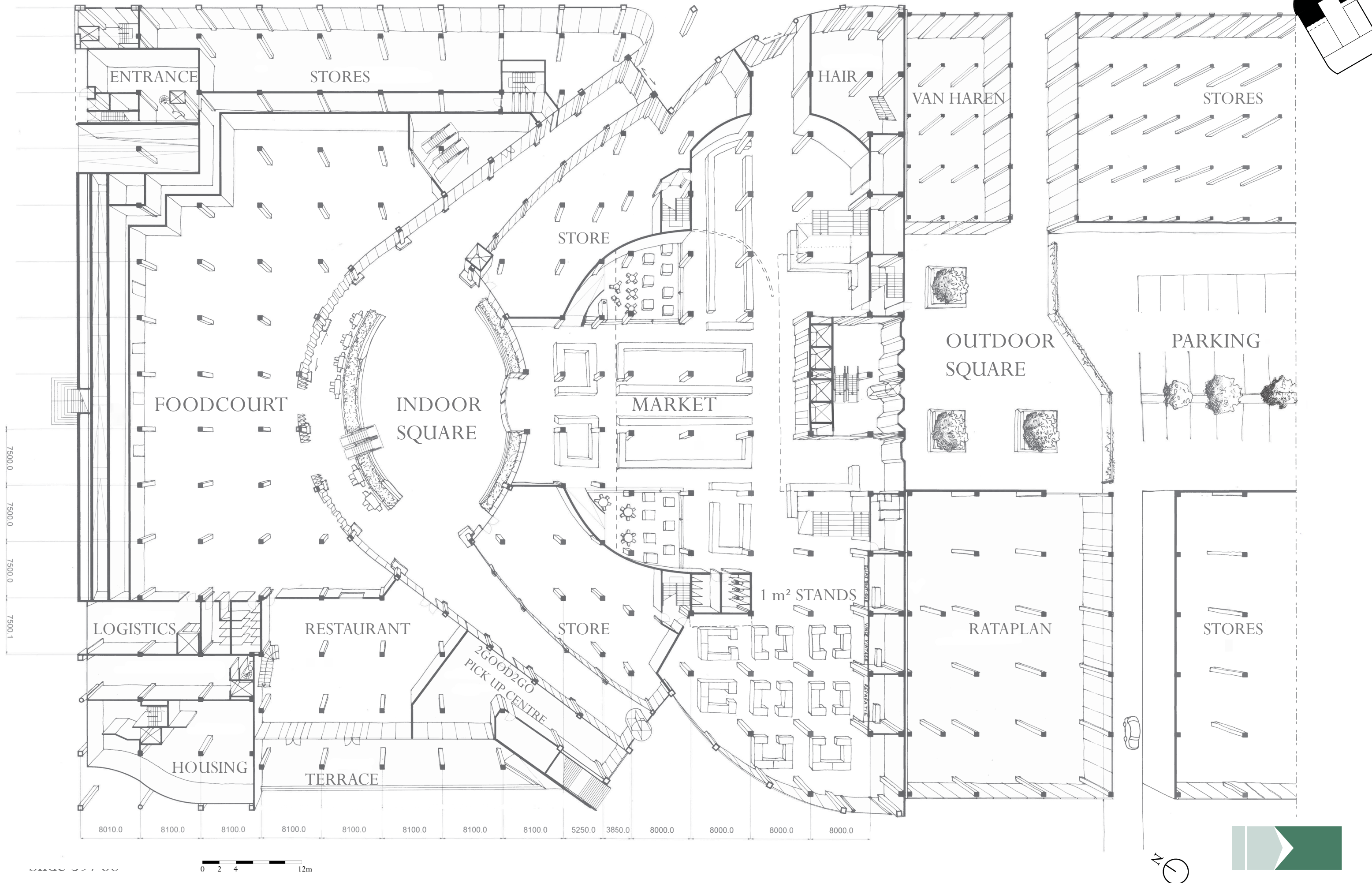
The Barn and indoor market, *Lake Park*



The Neuzelbeurs, *Rijswijk*

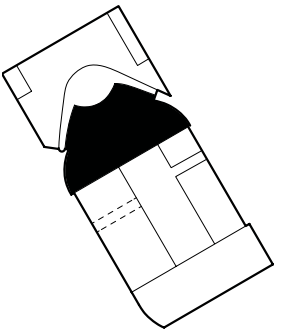


REFILL.

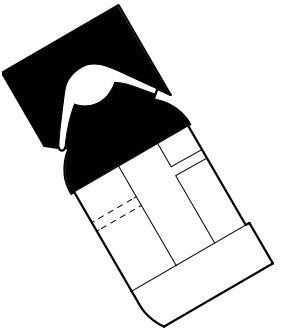
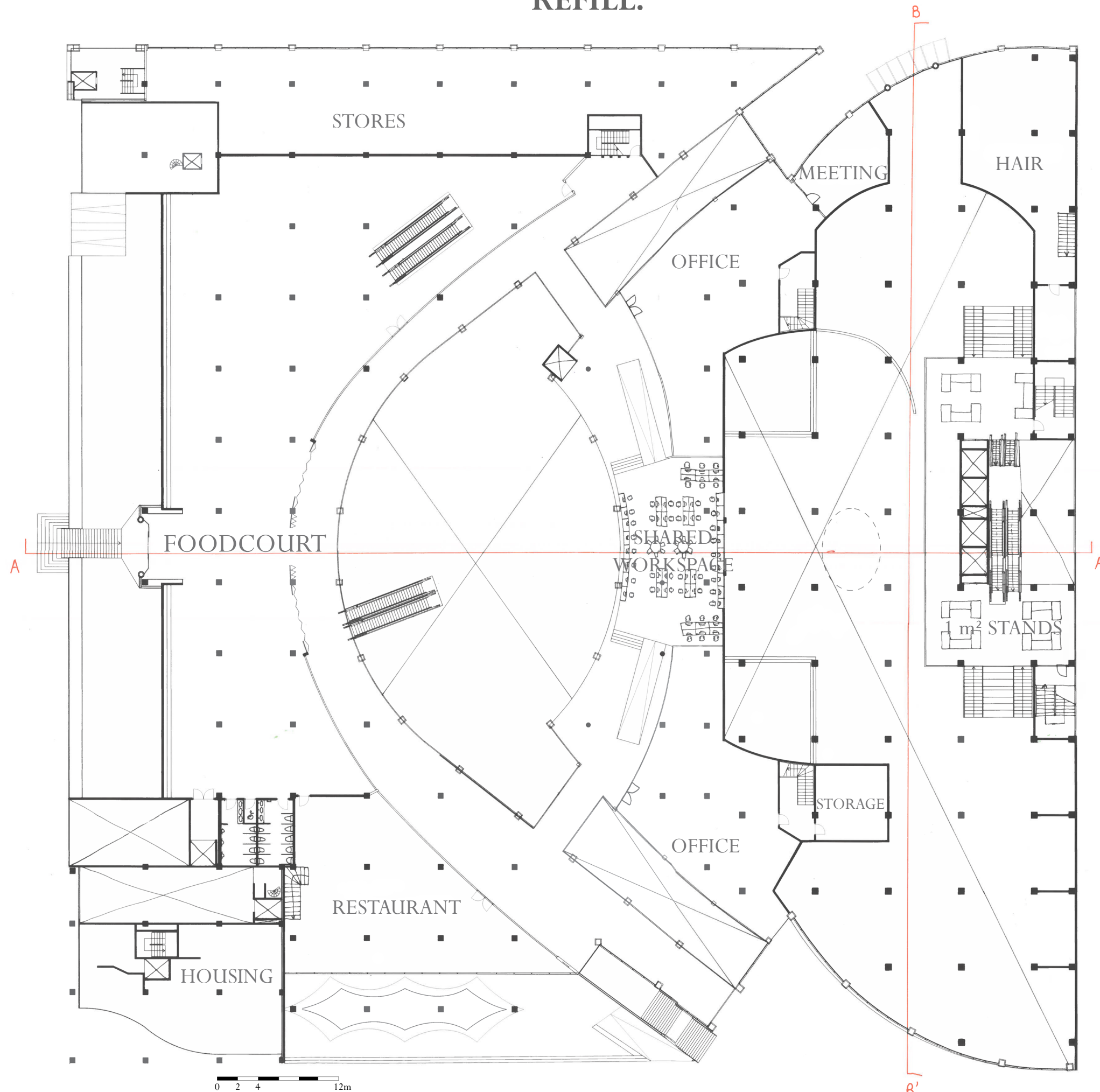




REFILL.



REFILL.

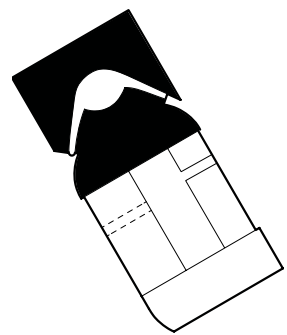
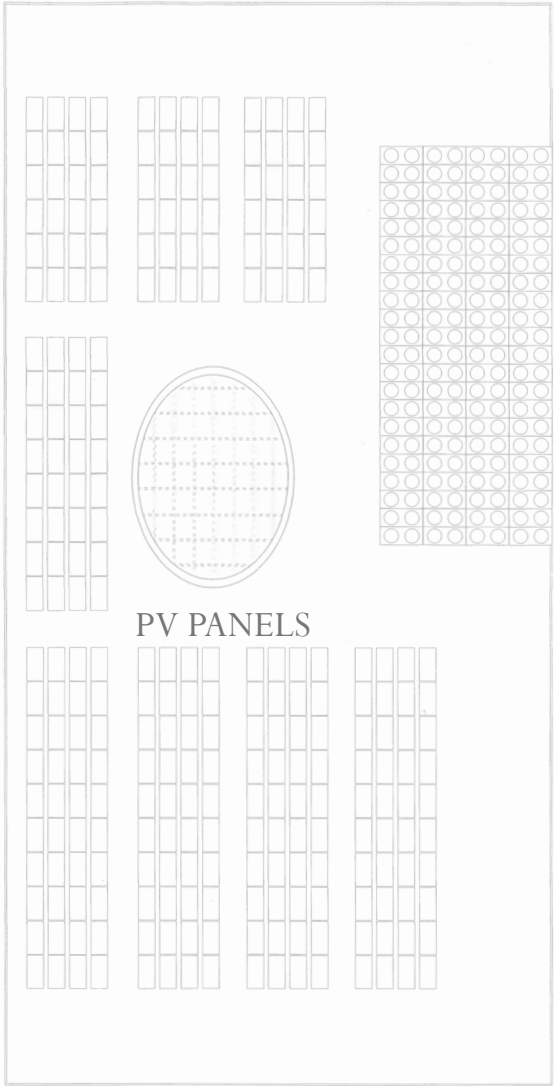
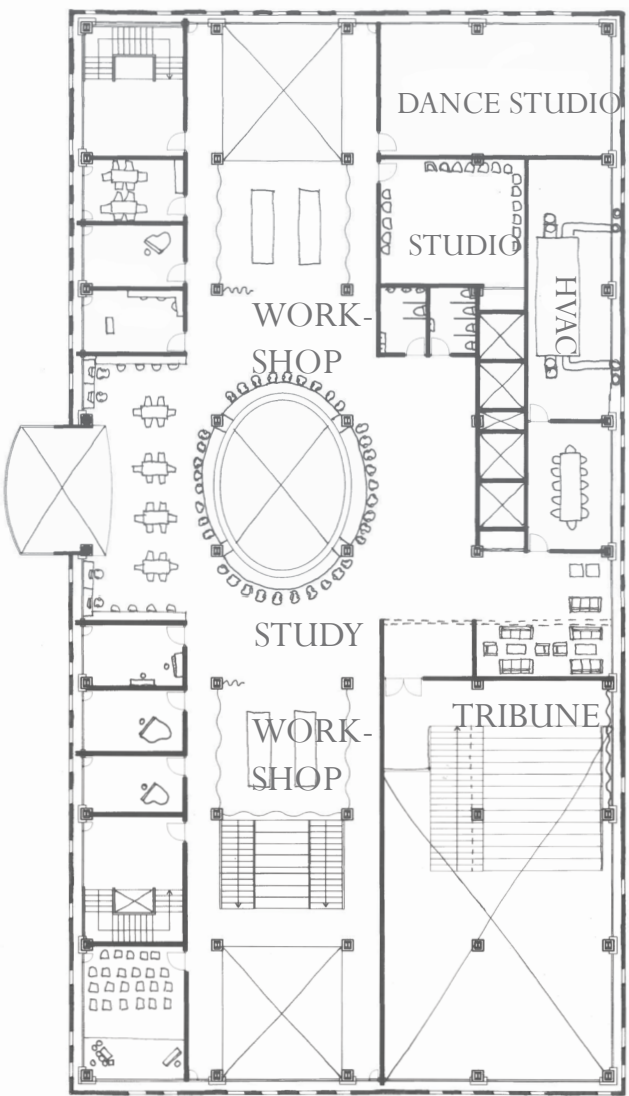
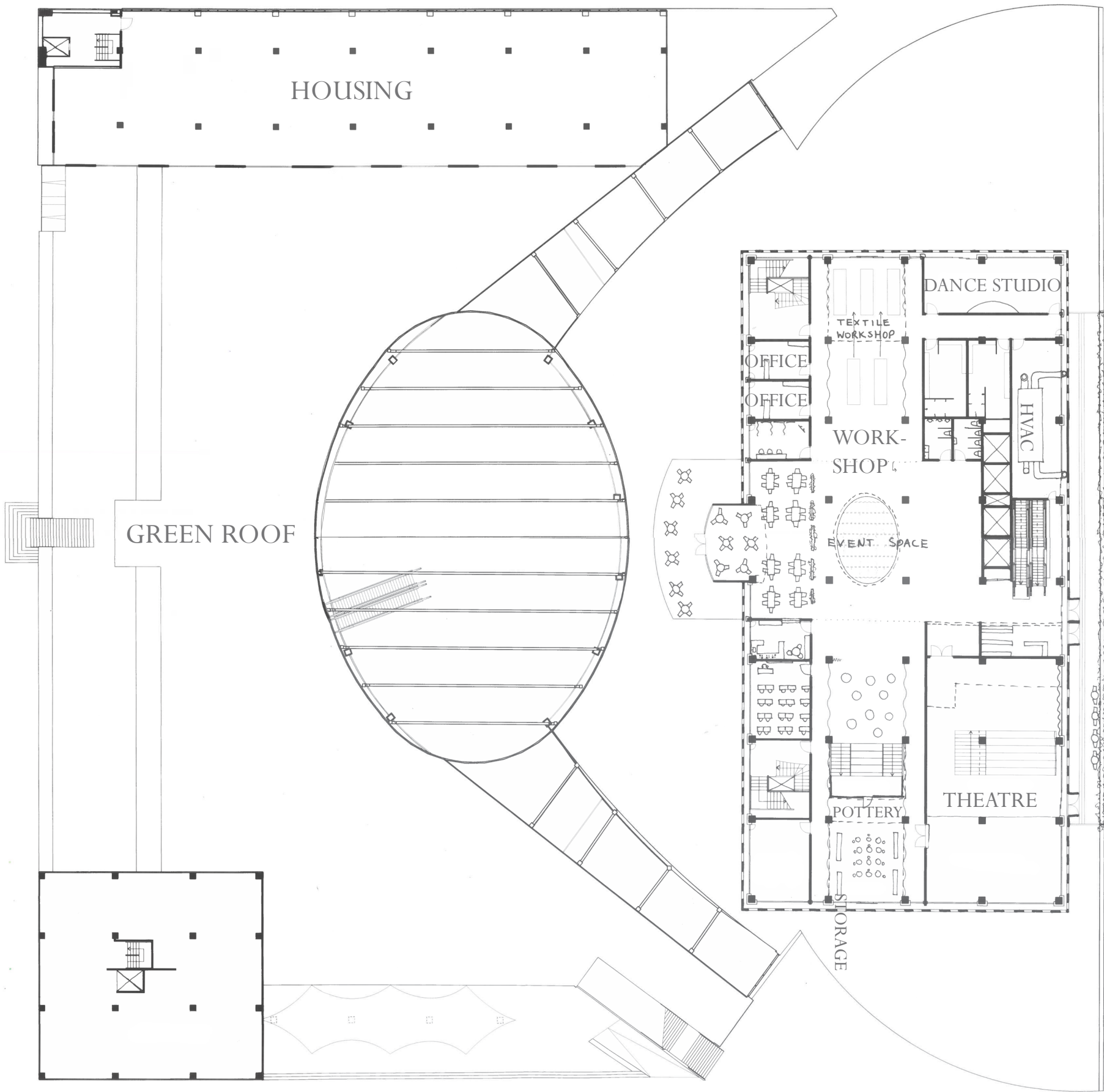


REFILL.



First floor view

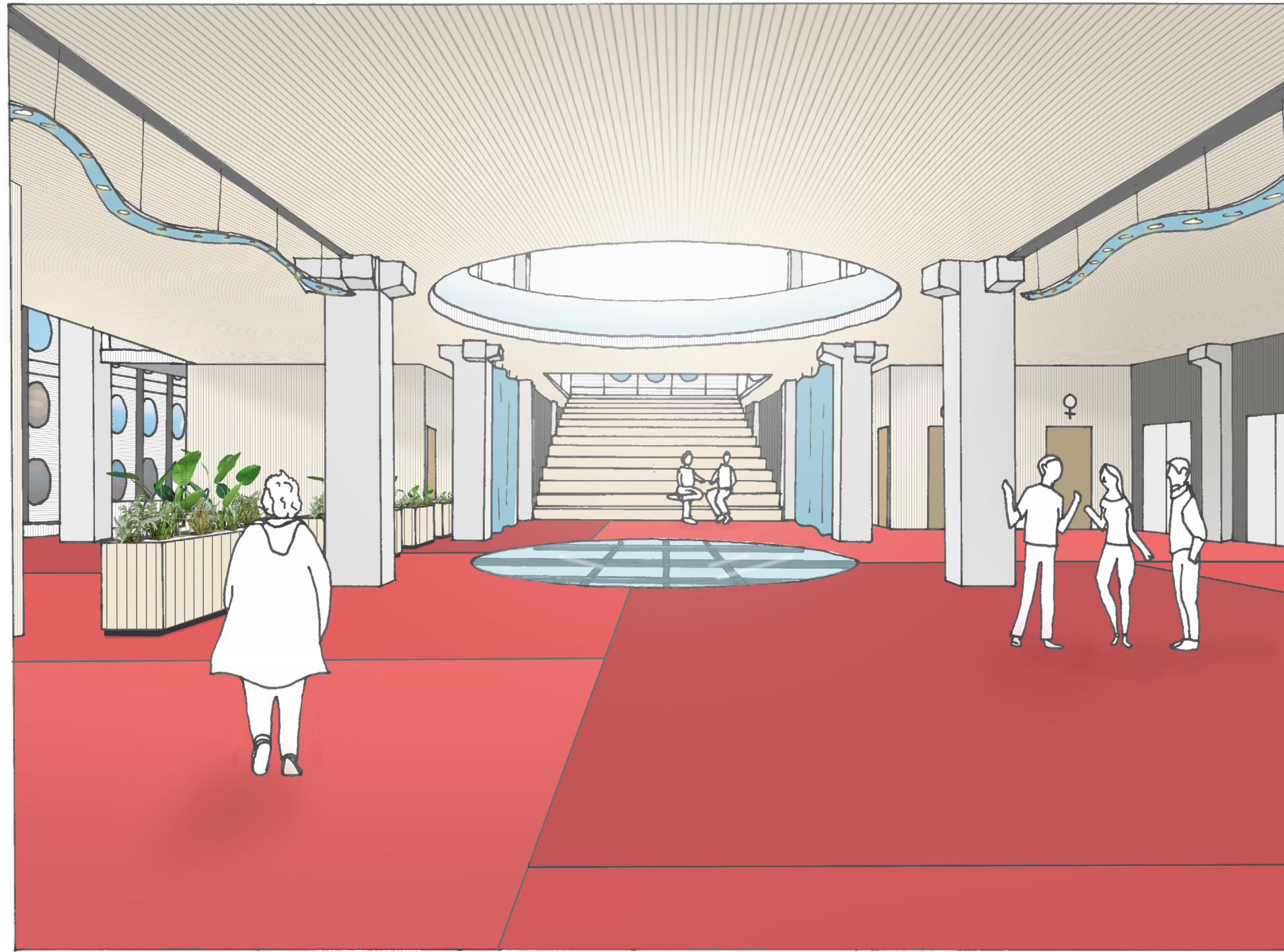
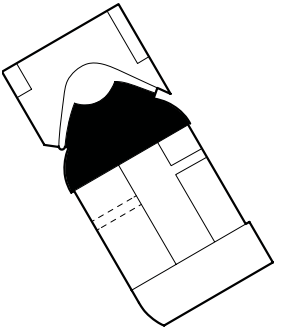
REFILL.



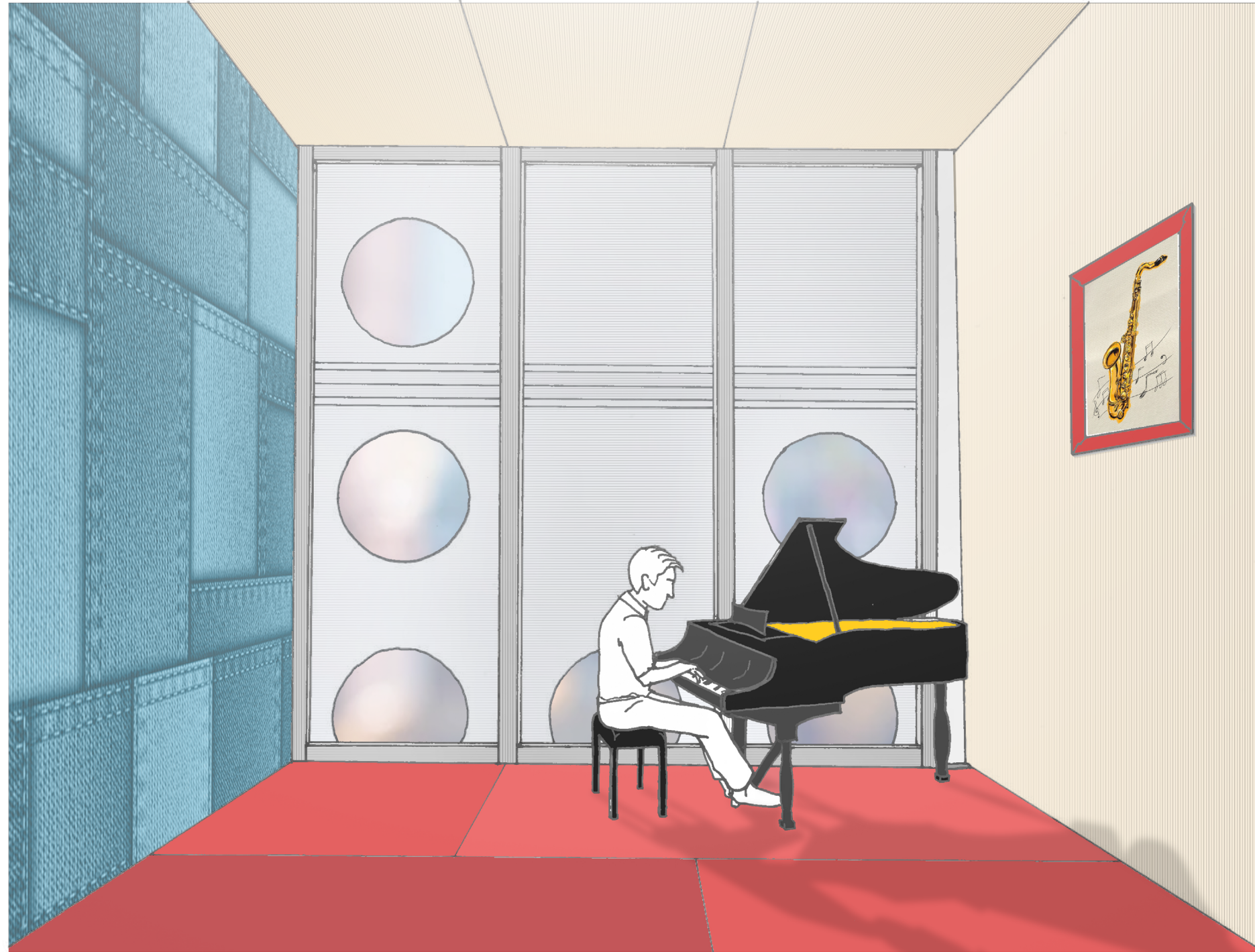
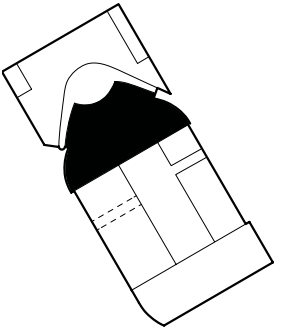
HOUSING



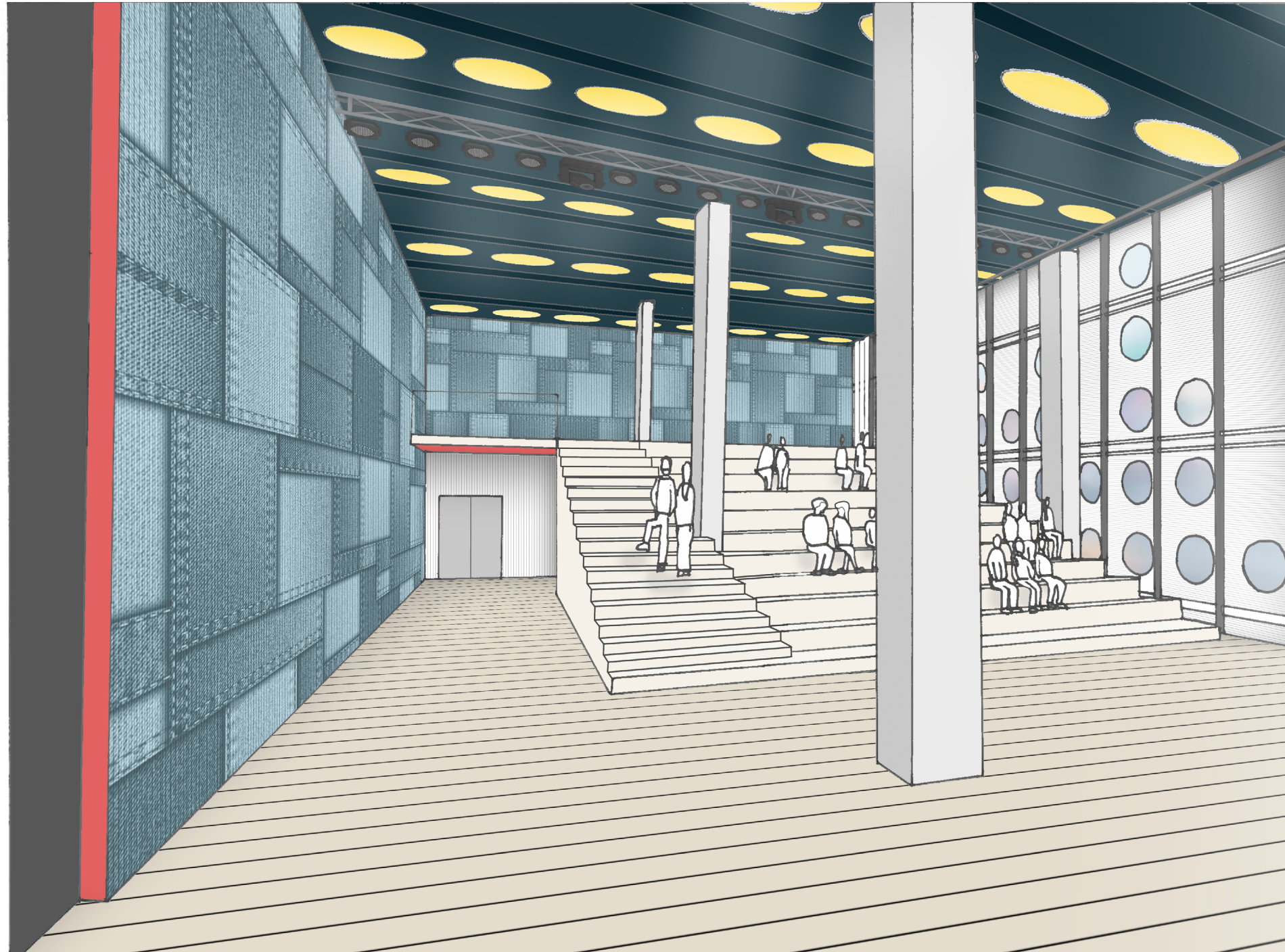
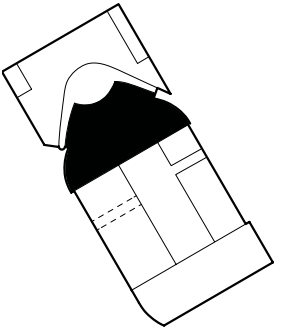
INTERVENTIONS. VISUALISATION.



INTERVENTIONS.
VISUALISATION.

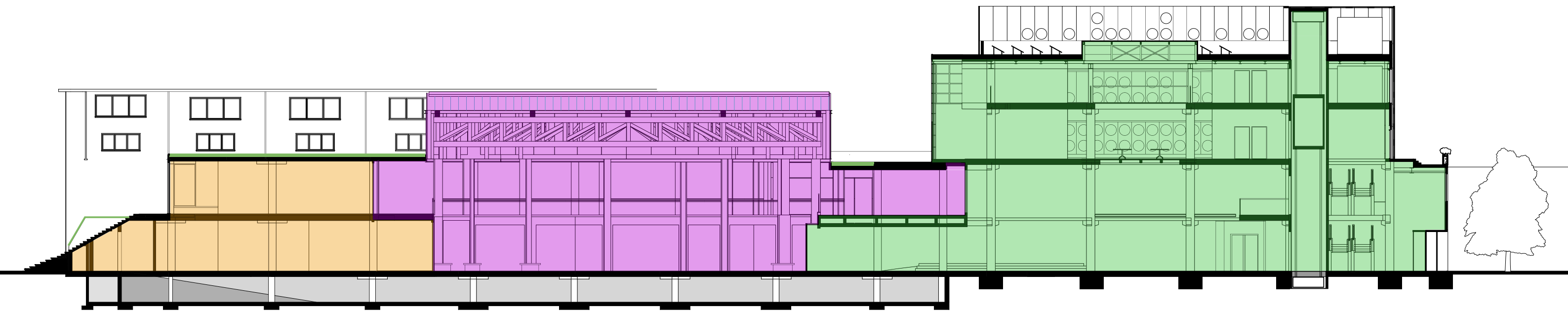
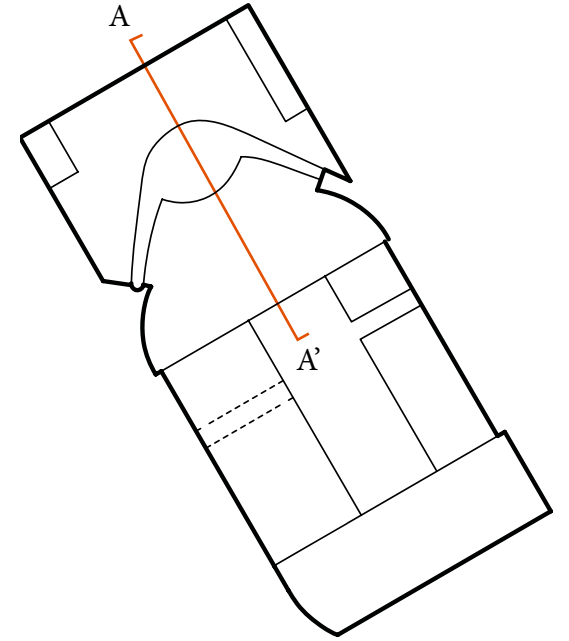
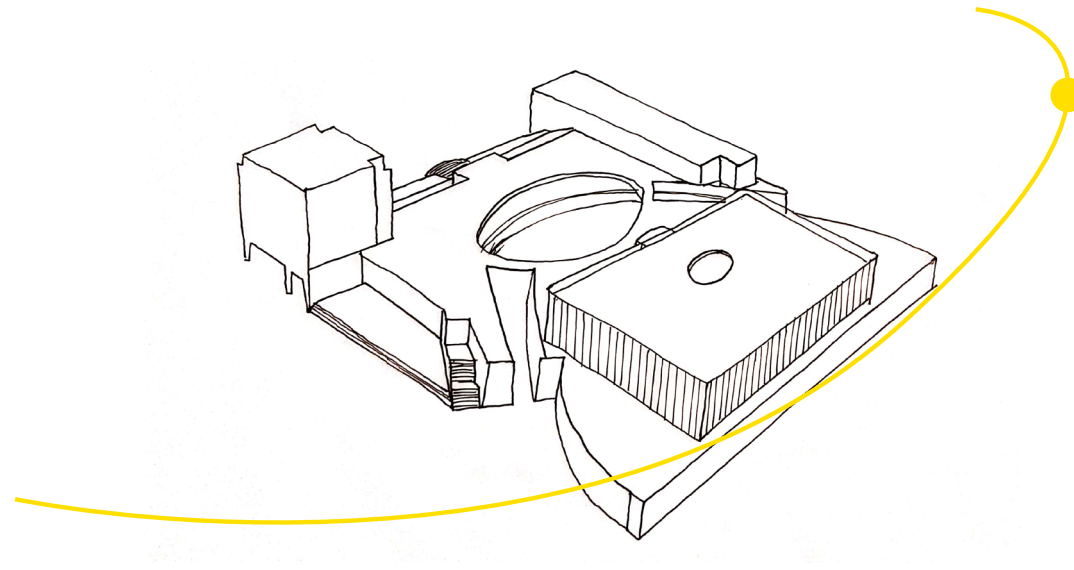


INTERVENTIONS. VISUALISATION.





INTERVENTIONS. CLIMATE



Building part 1
Foodcourt

*Low temperature heating and cooling (water)
combined with air cooling*

Temp: ~20 °C

Building part 2
Indoor square

*Natural ventilation and air inlet through cold-fall
system (heat in winter)*

Temp: 14-26 °C

Building part 3
Indoor market and culture centre

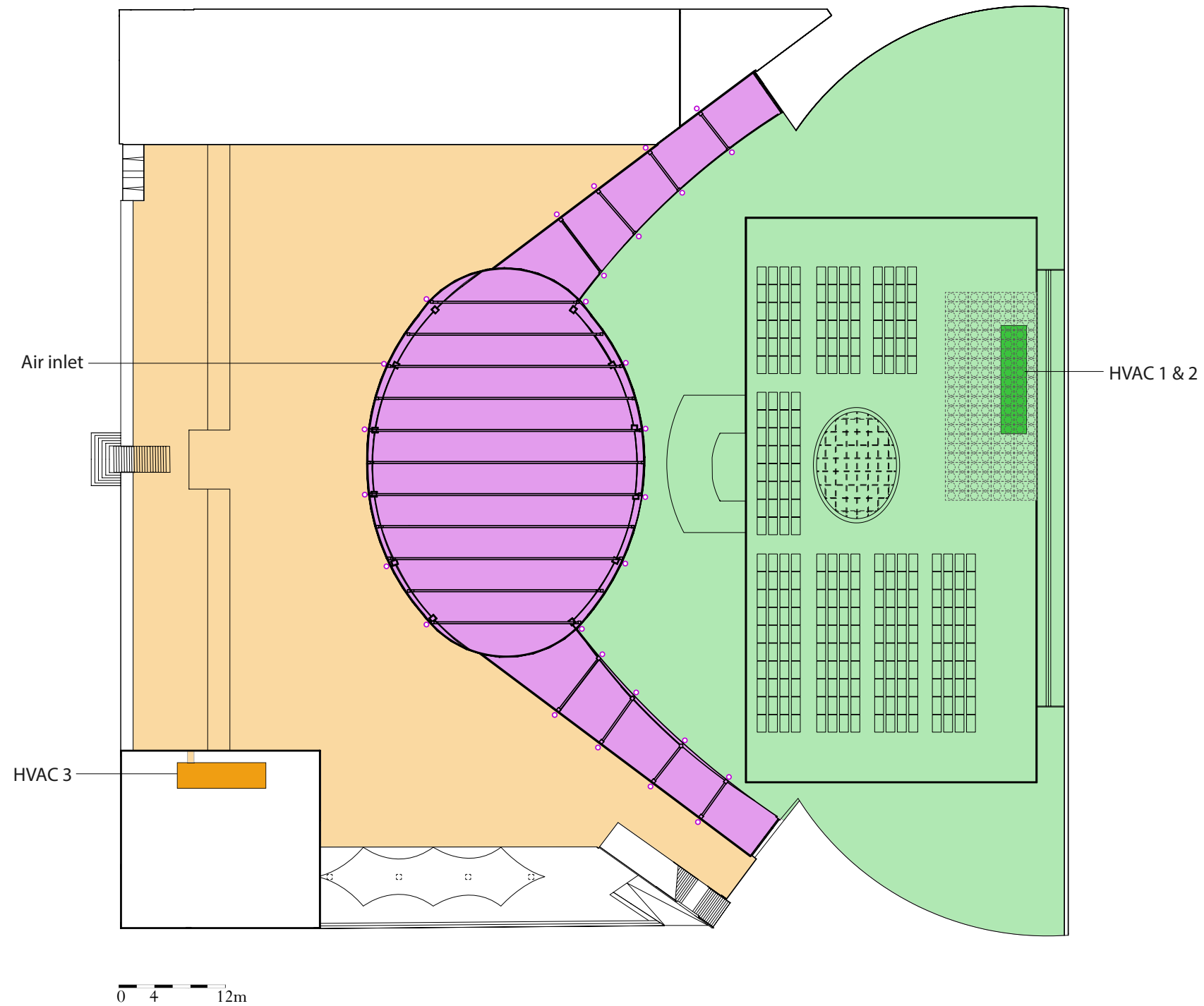
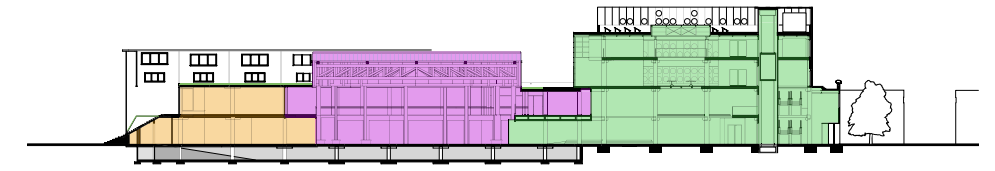
Heating and cooling through air (HVAC)

Temp: 18-22 °C

0 2 4 12m

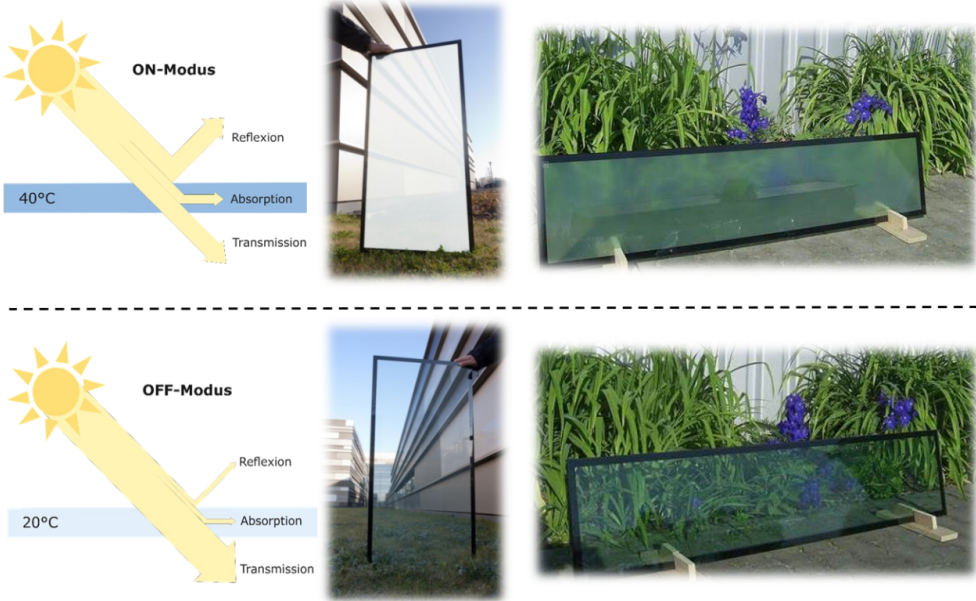


INTERVENTIONS. CLIMATE

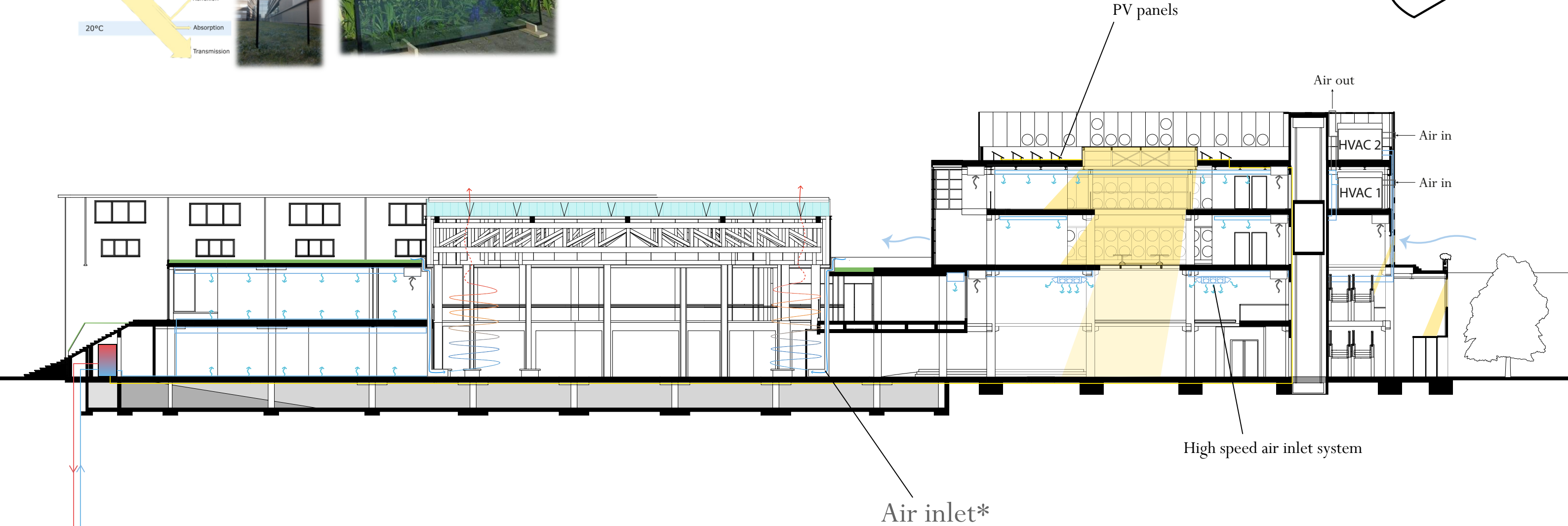
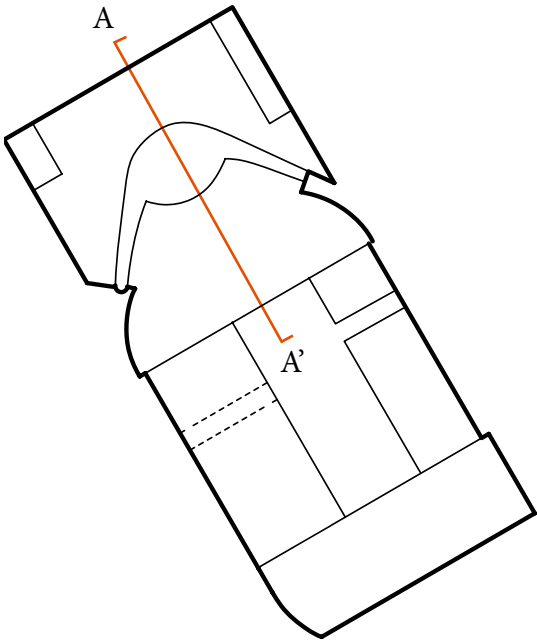


INTERVENTIONS.
CLIMATE summer

Thermotropic glass with triple glaze integration



20 % solar transmittance reduction
G-value below 20 degrees: 0,32
G-value between 20-40 degrees: 0,27

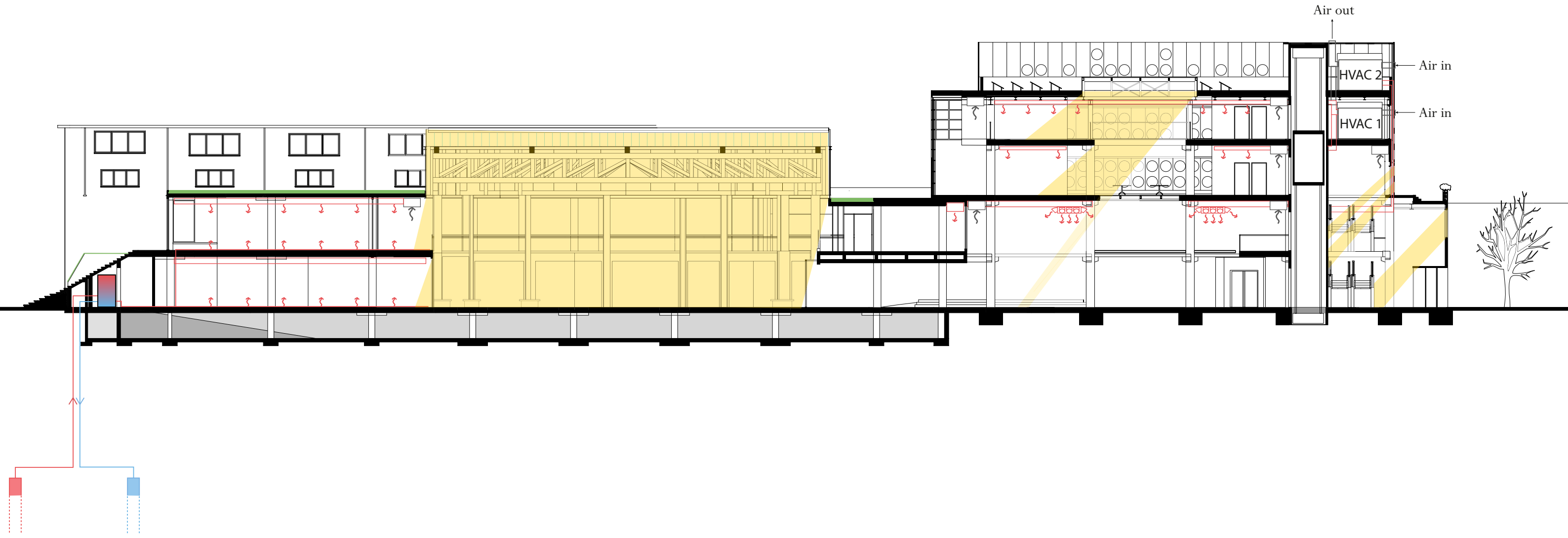
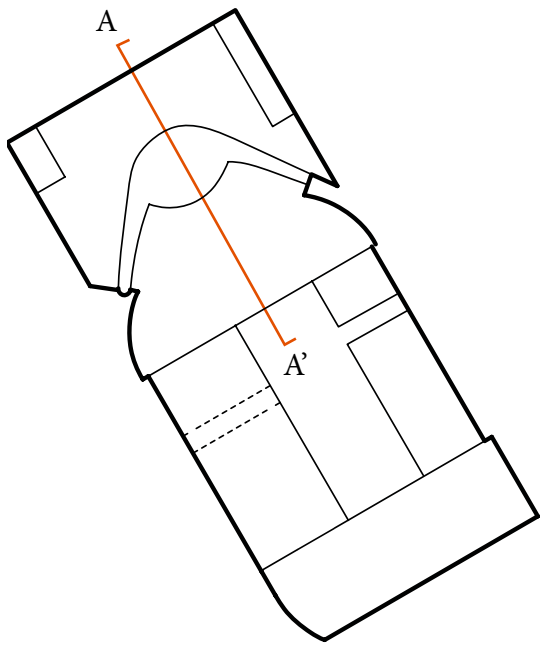


Ground-source heat pump
Possible for this location according to wkotool.nl

*20.532 m³ space (ventilation rate taken as 6), with air inlet of 1 m/s, there is 34,22 m² inlet necessary, resulting in a design of benches and planters around the columns, good for 42 m² inlet opening



INTERVENTIONS.
CLIMATE winter



0 2 4 12m

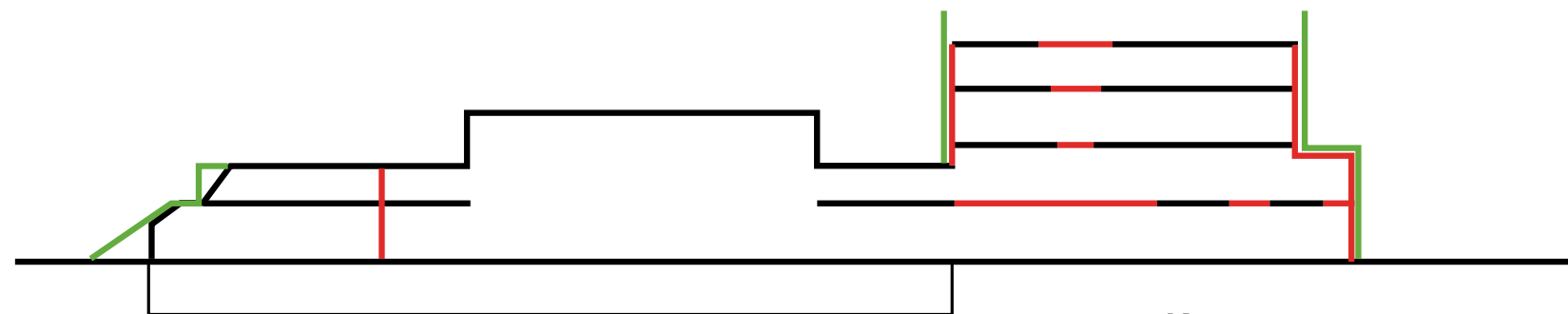
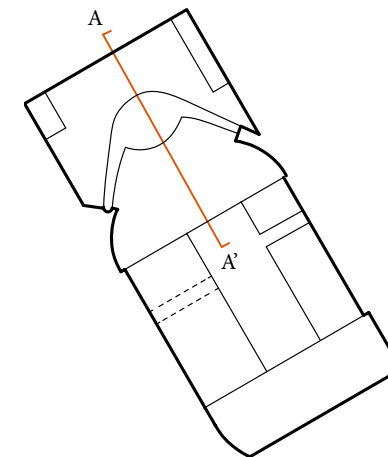
REDUCE.

REUSE.



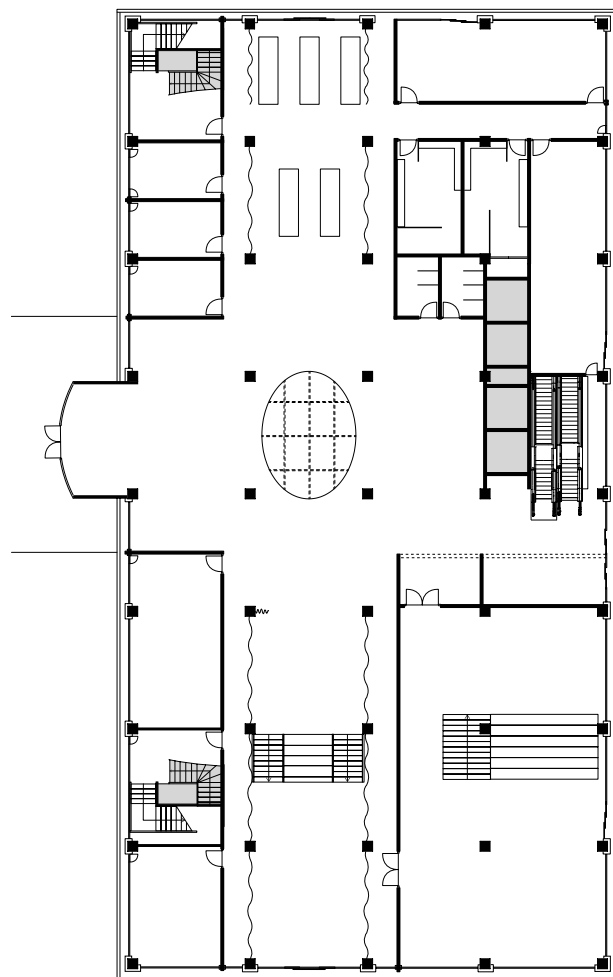


INTERVENTIONS. CONSTRUCTION

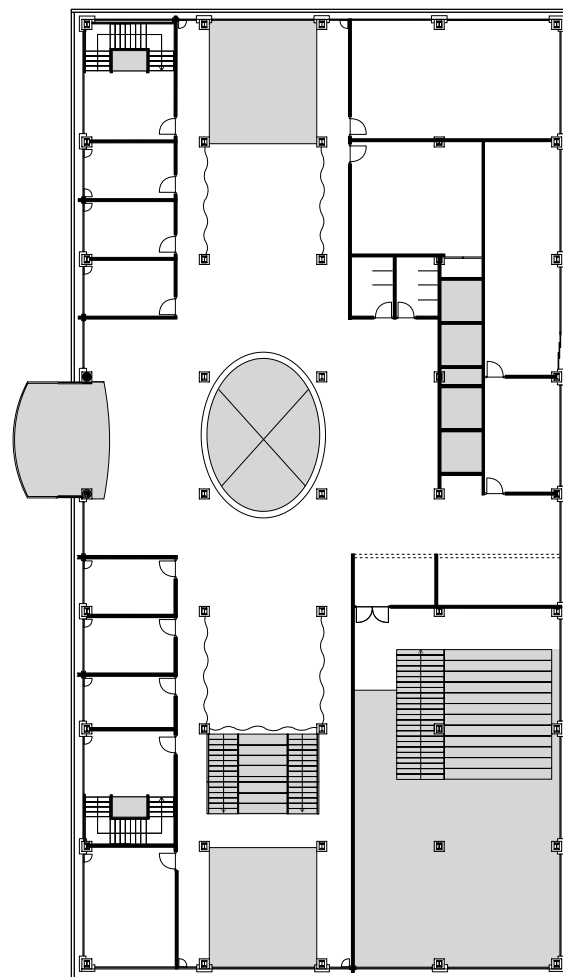


Section A-A'

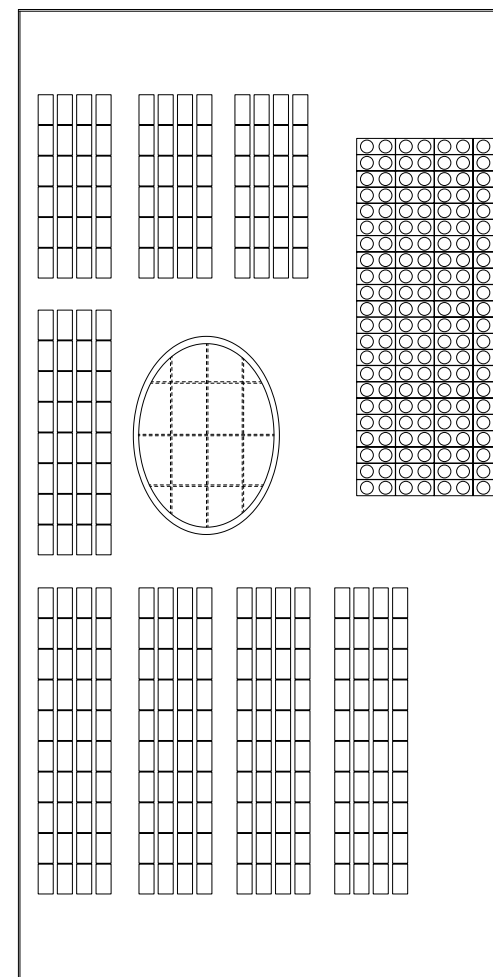
- New
- Demolished
- Existing



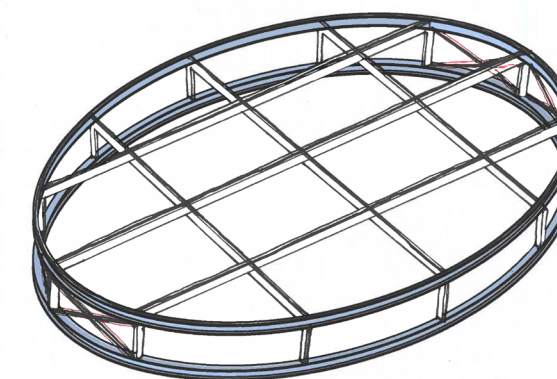
Second floor



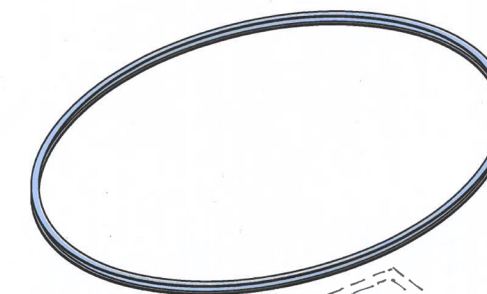
Third floor



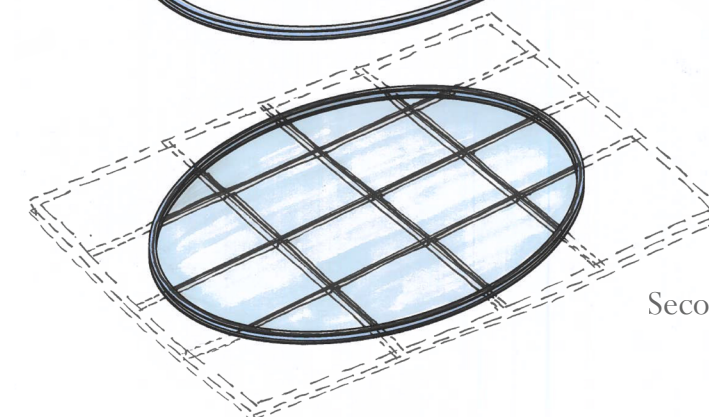
Roof



Roof



Third floor

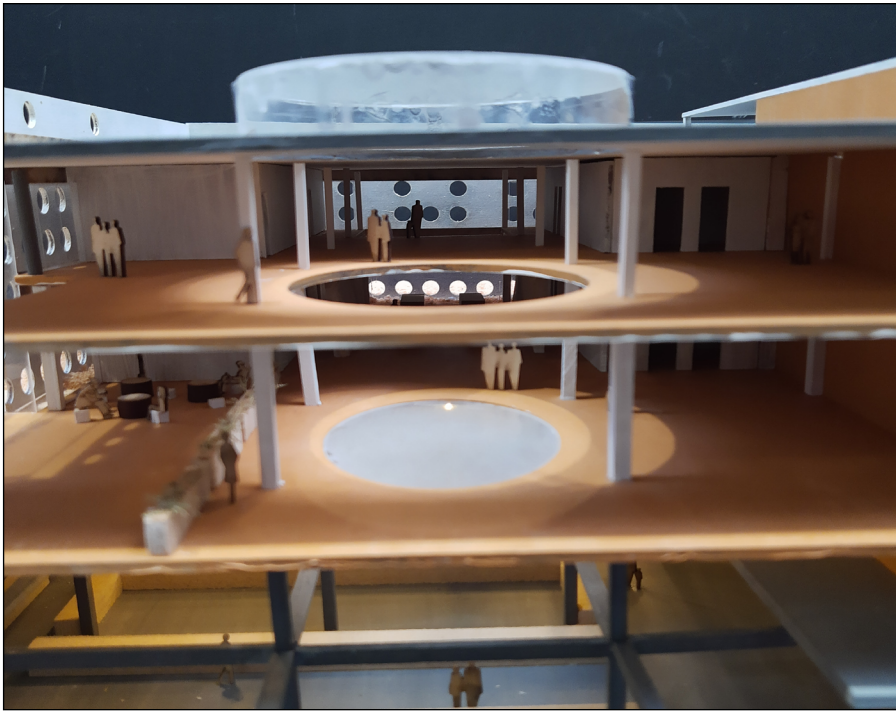


Second floor

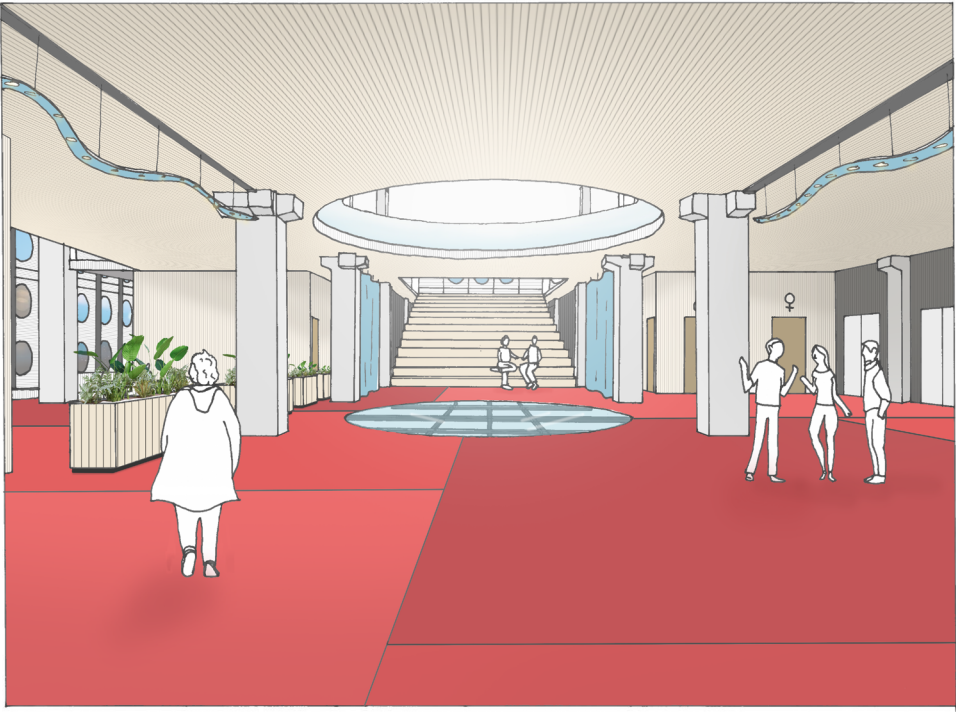
INTERVENTIONS.
VISUALISATION



Ground floor

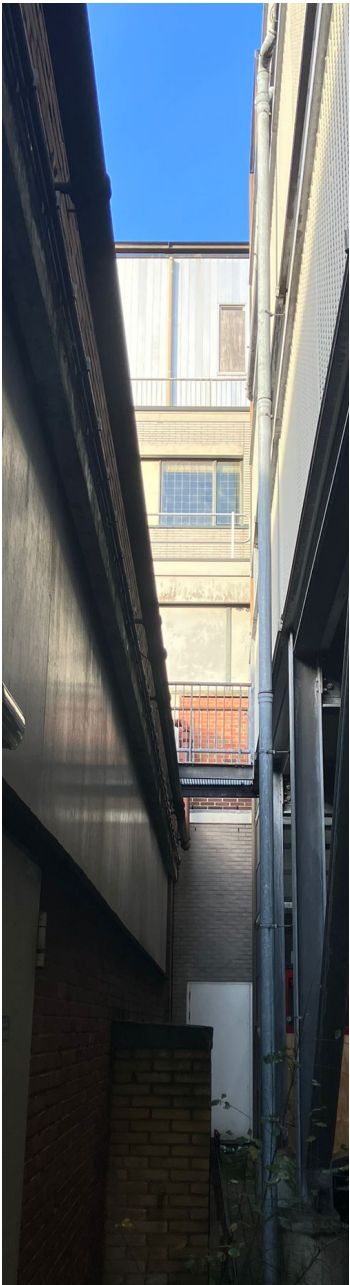
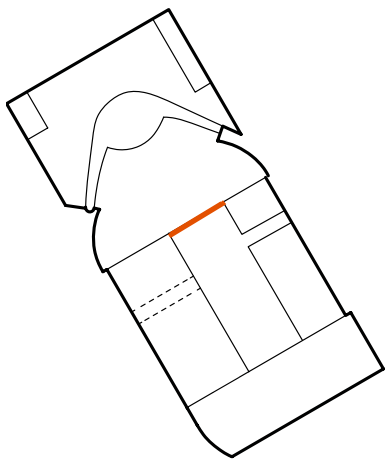


Maquette

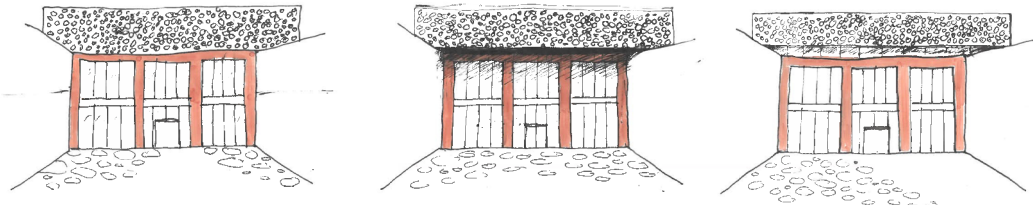


Second floor

INTERVENTIONS.
FACADES

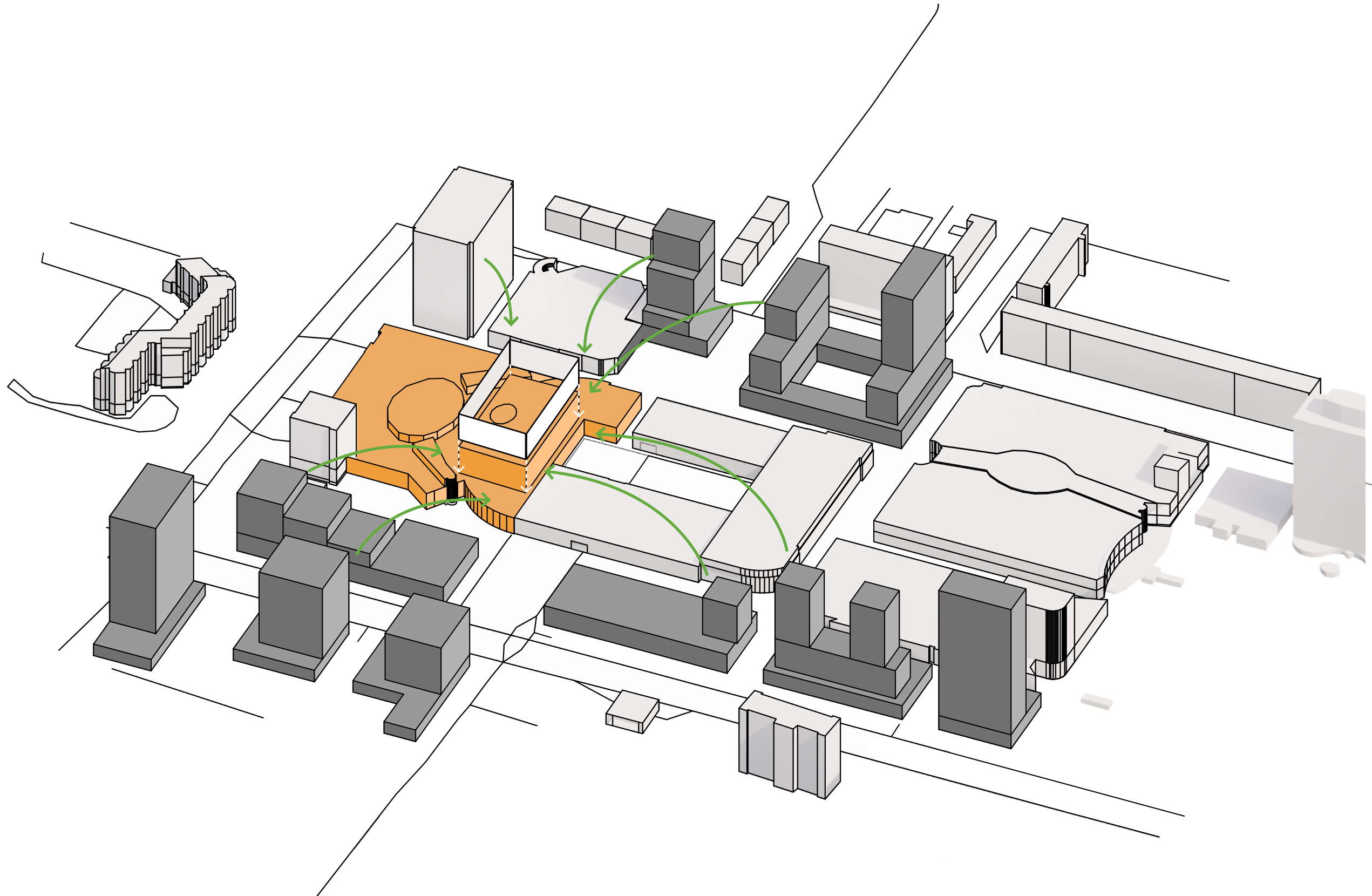


Existing



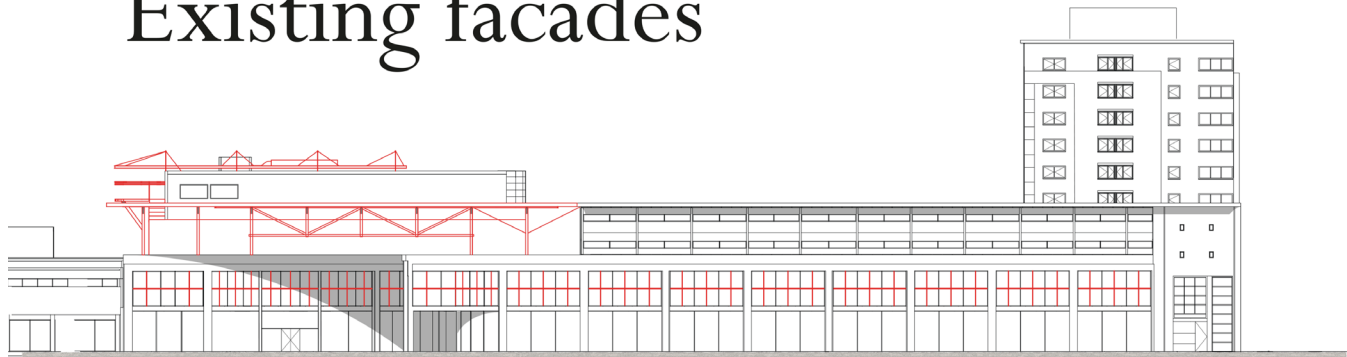


INTERVENTIONS. FACADES

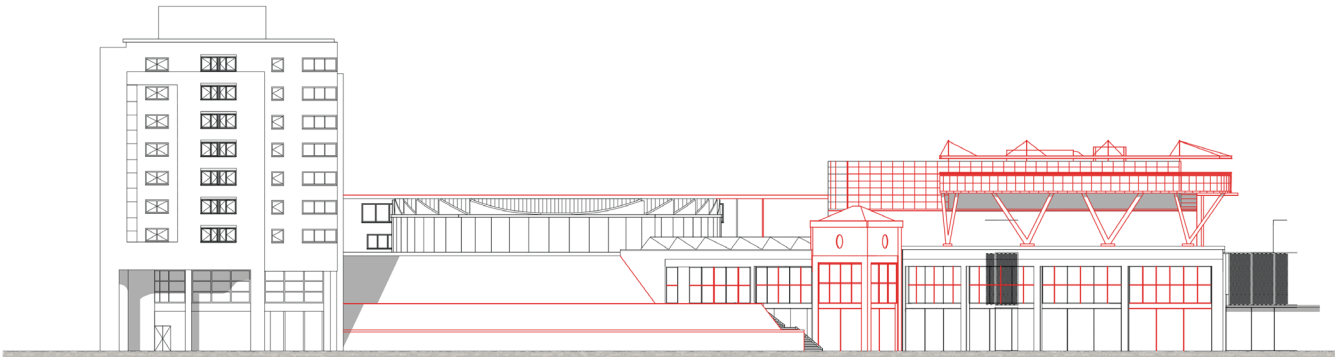


INTERVENTIONS.
FACADES

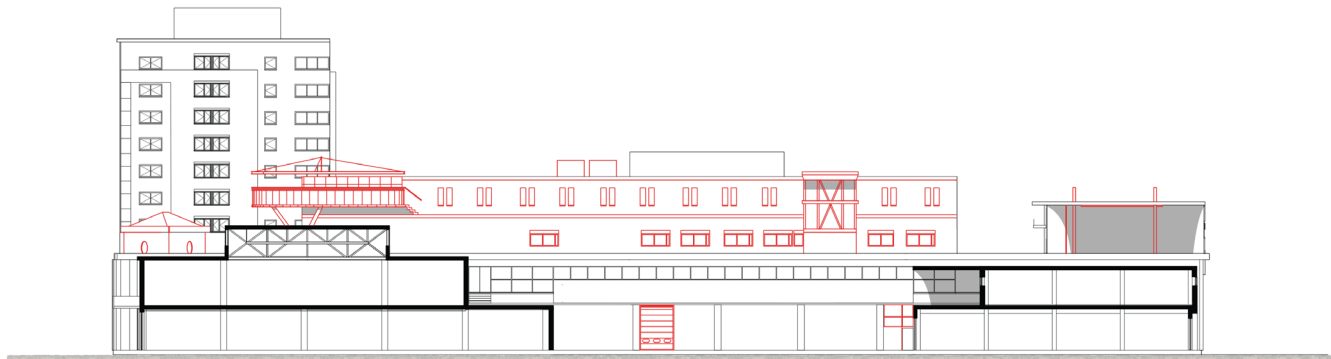
Existing facades



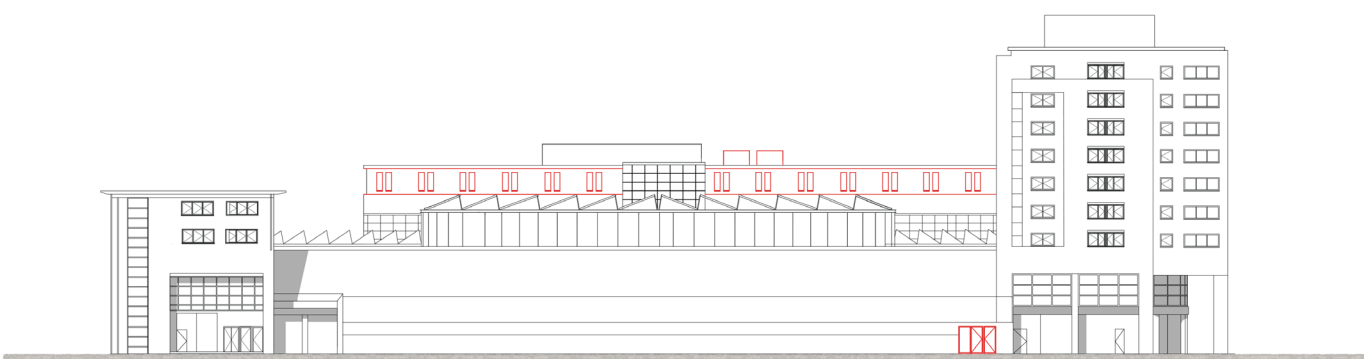
East facade



West facade



South facade



North facade

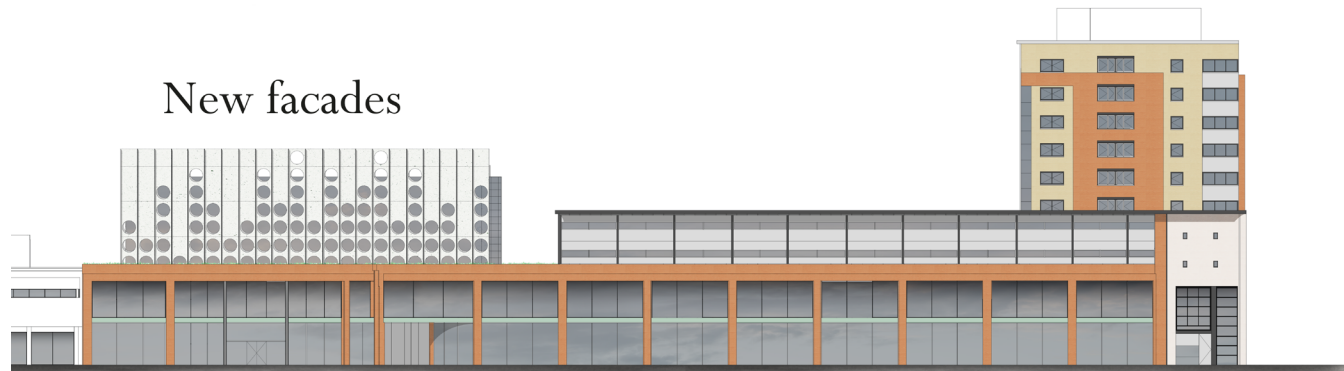
— = Demolished



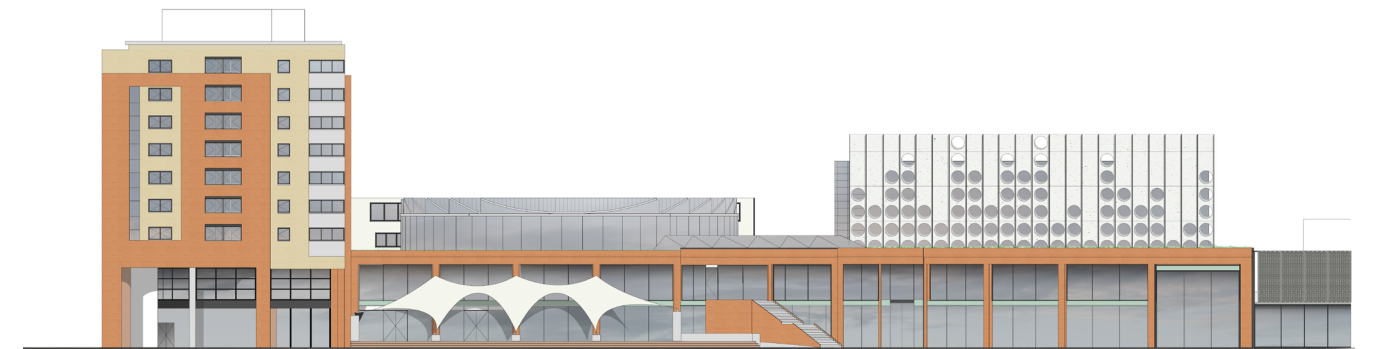


INTERVENTIONS. FACADES

New facades



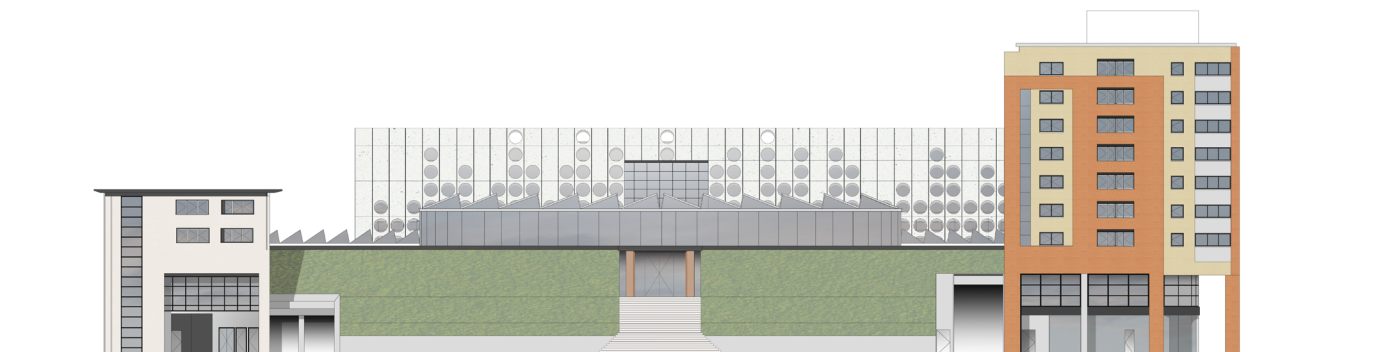
East facade



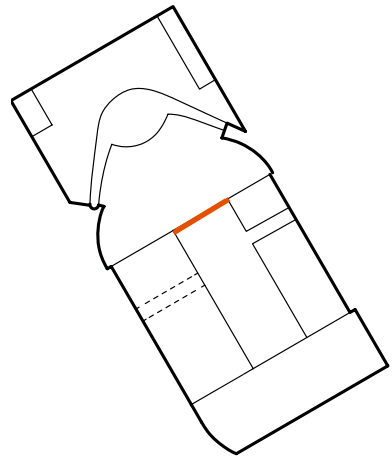
West facade



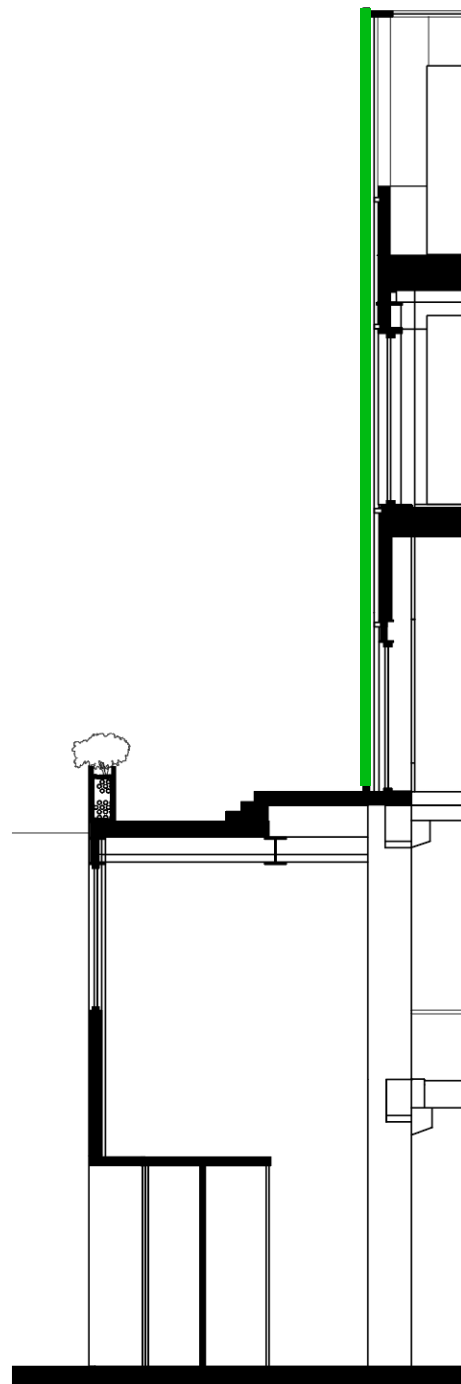
South facade



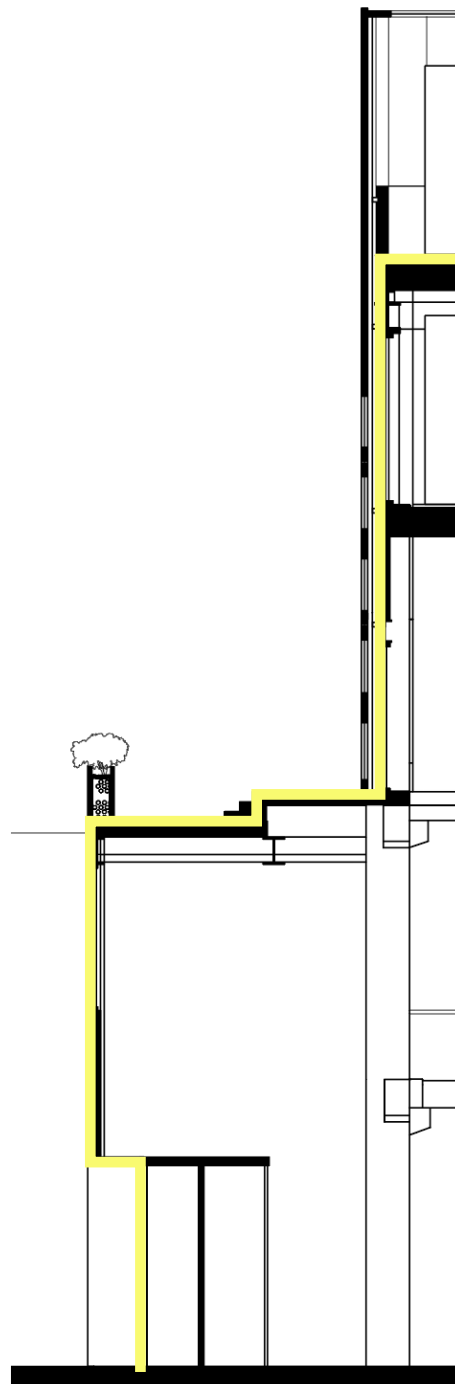
North facade



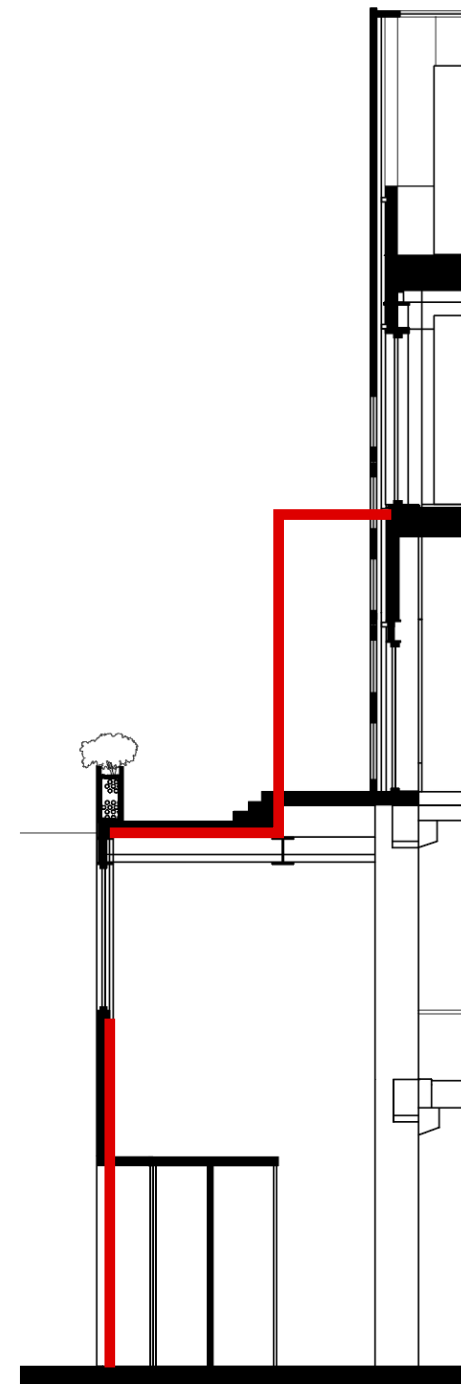
INTERVENTIONS. SOUTH FACADE



■ New front facade



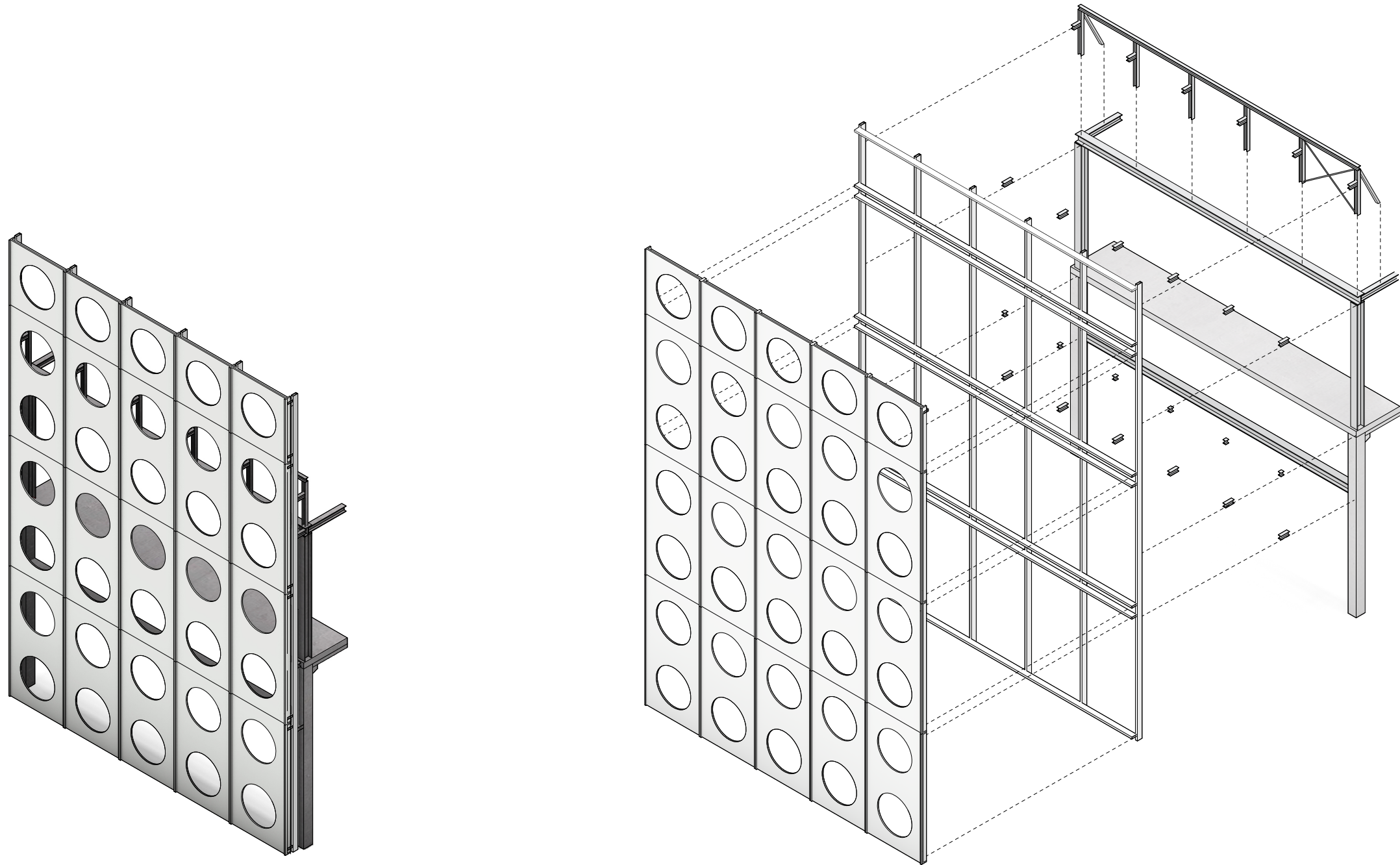
■ Enhanced insulation



■ Demolished

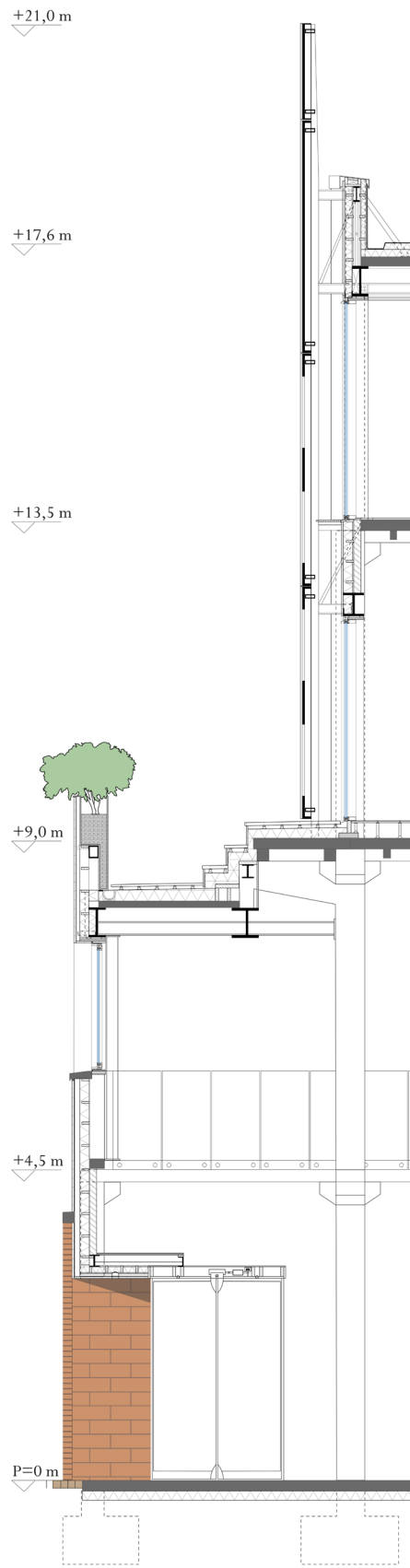


INTERVENTIONS. FACADES

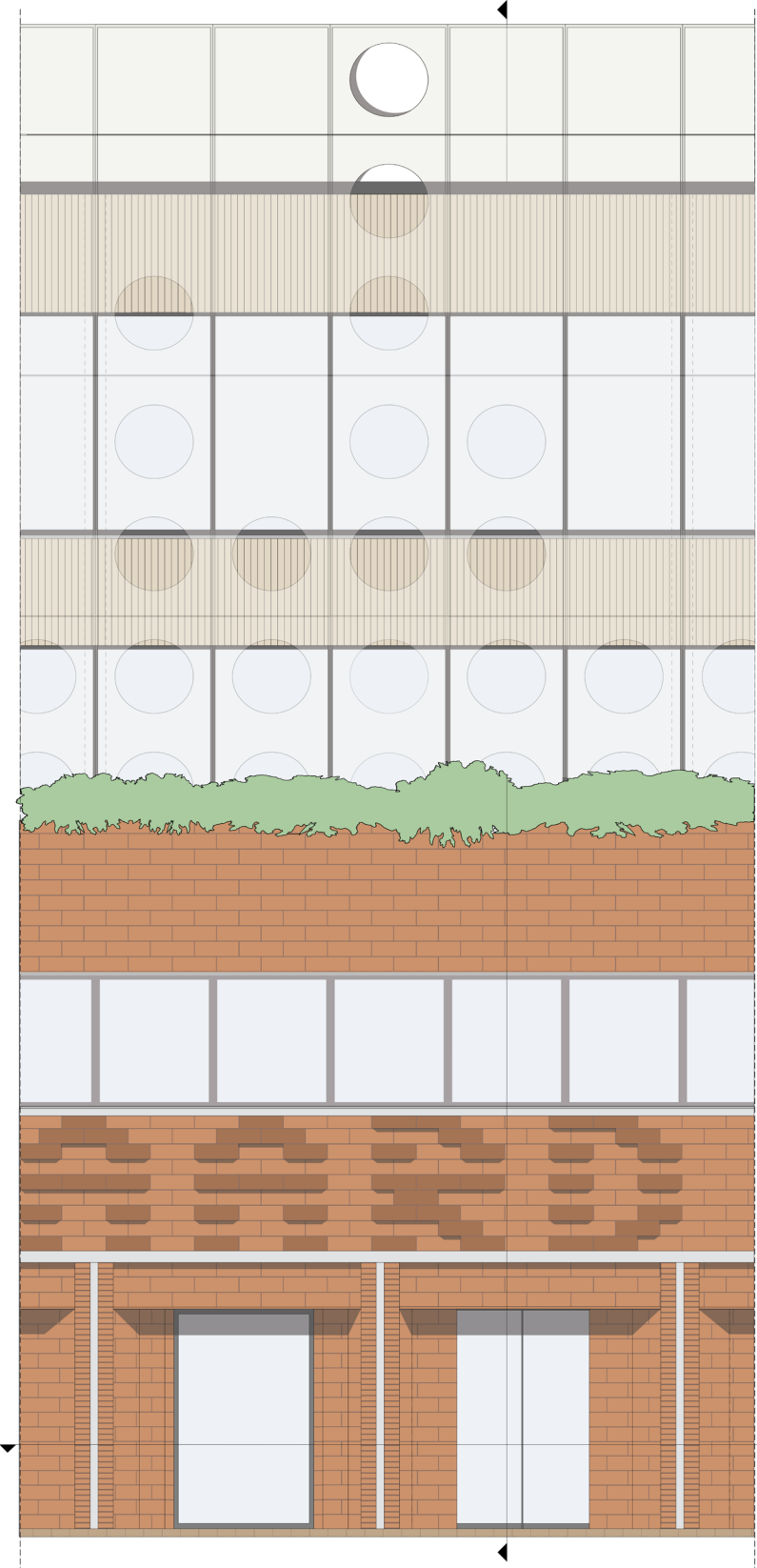
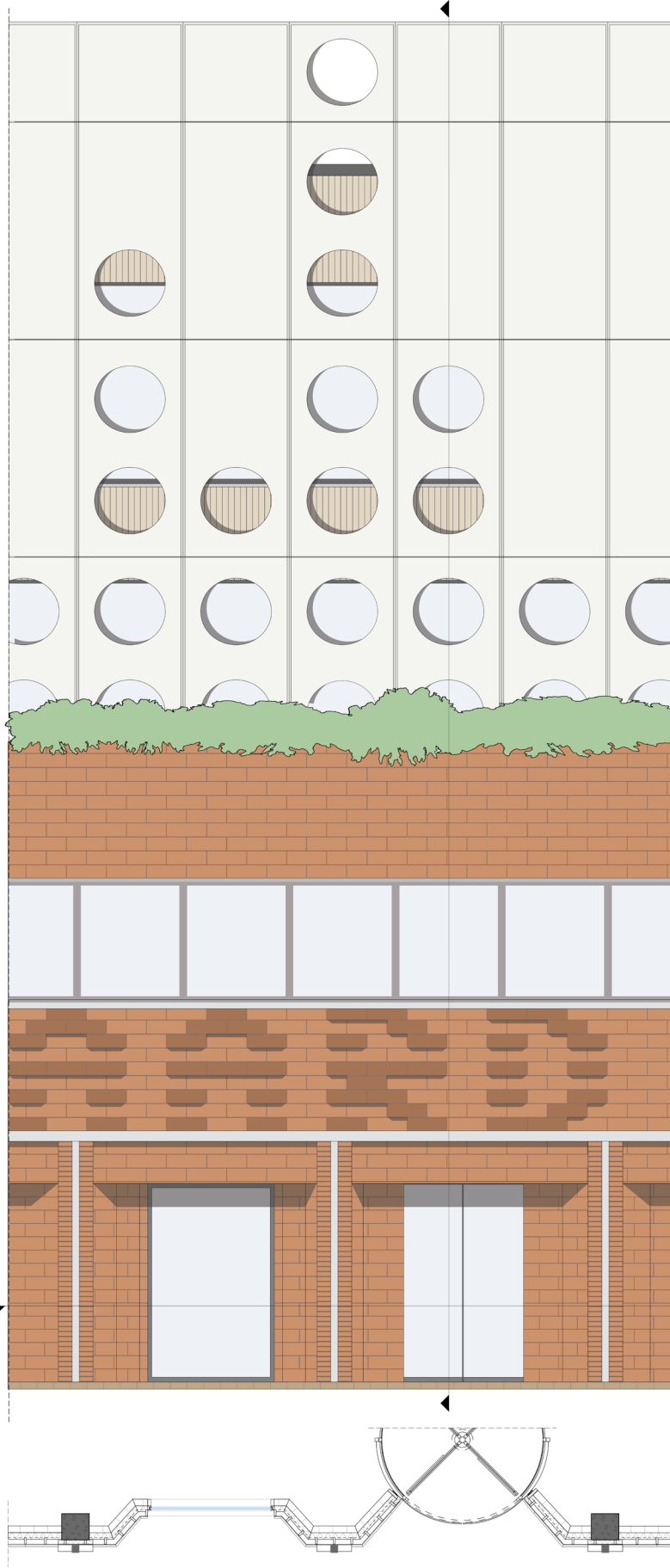


Cementitious front façade with reinforced micro-fibers

INTERVENTIONS.
FACADES



New facade fragment 1:20

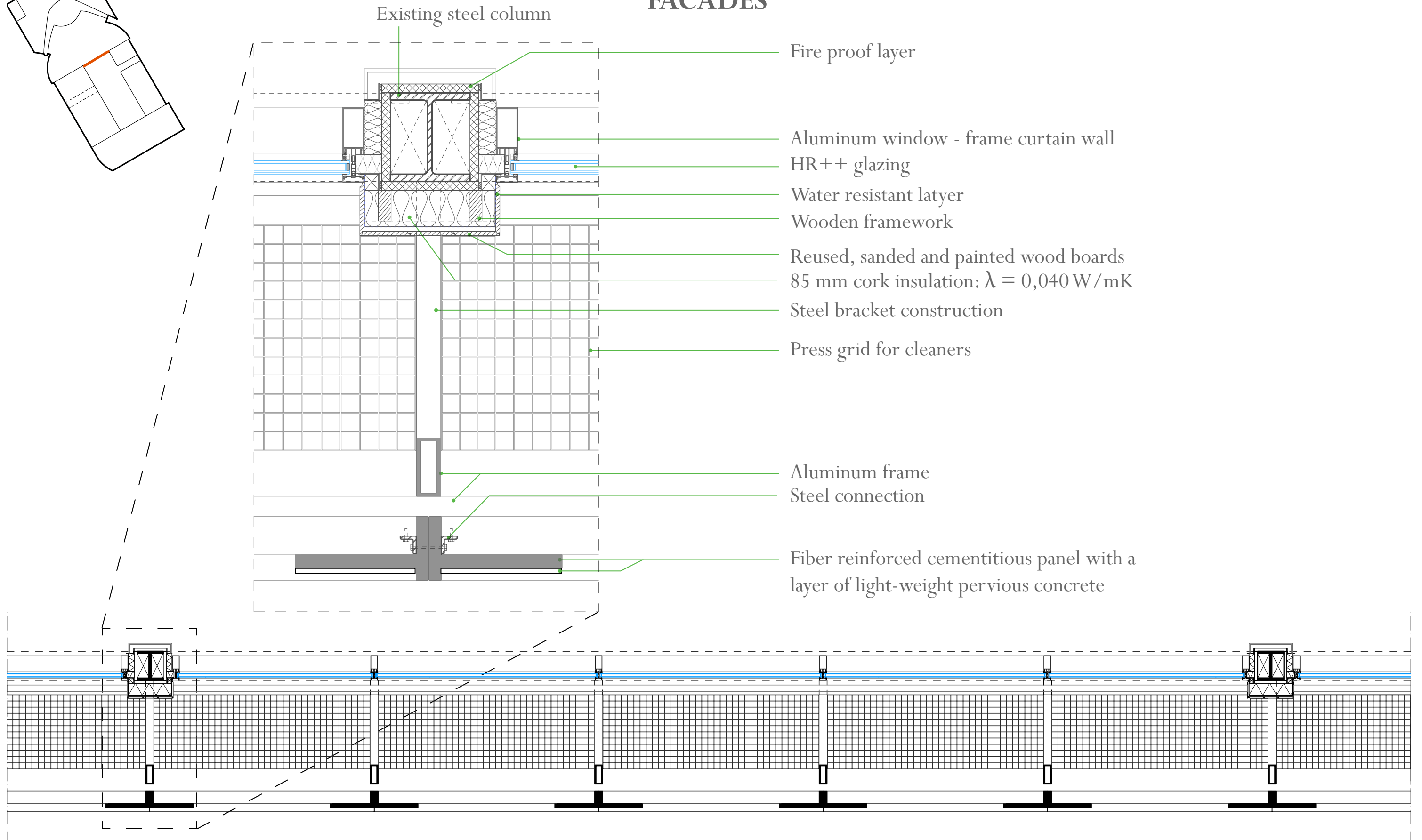
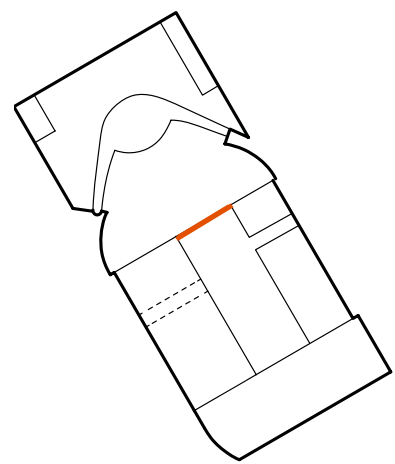


In 5 years

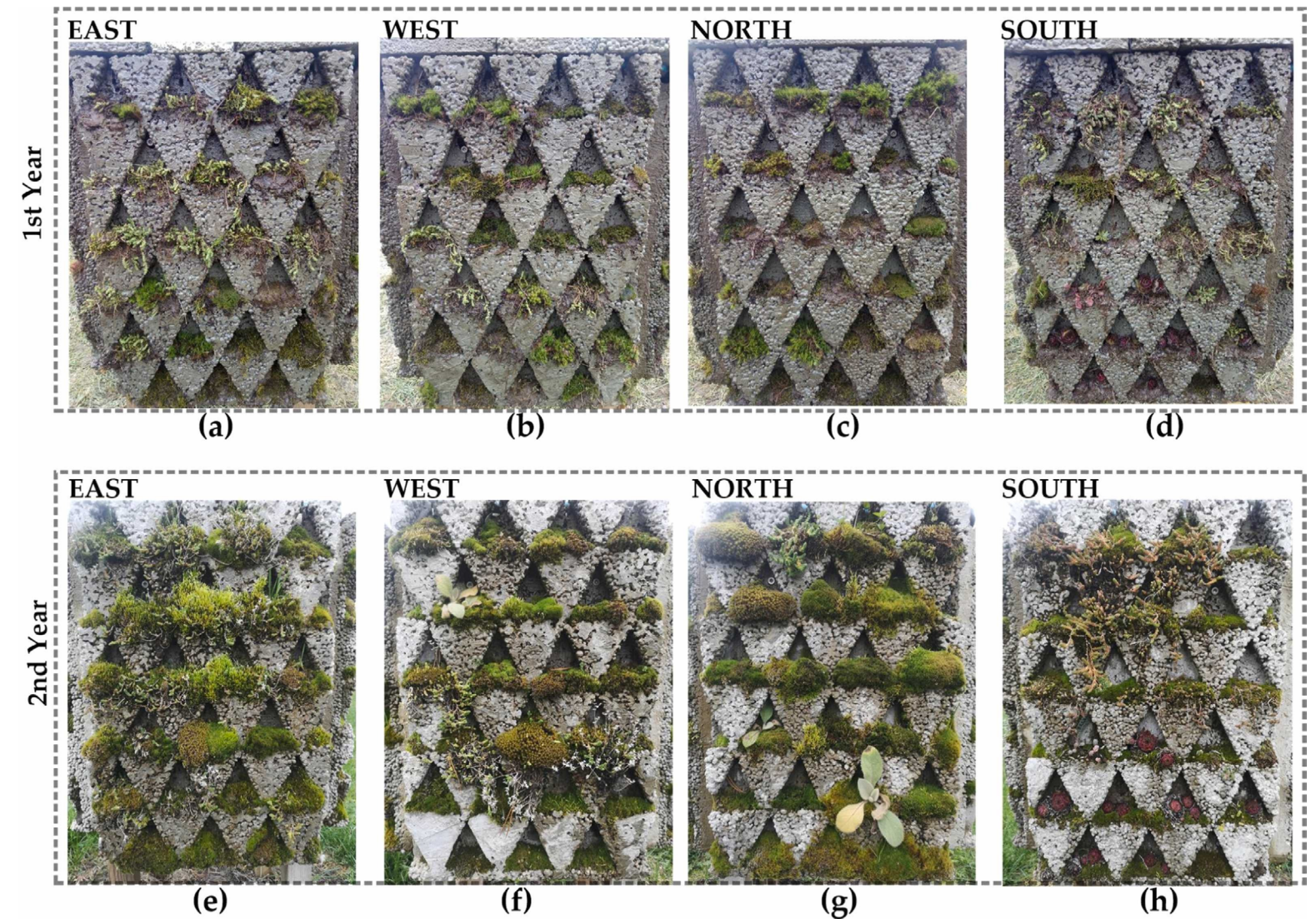
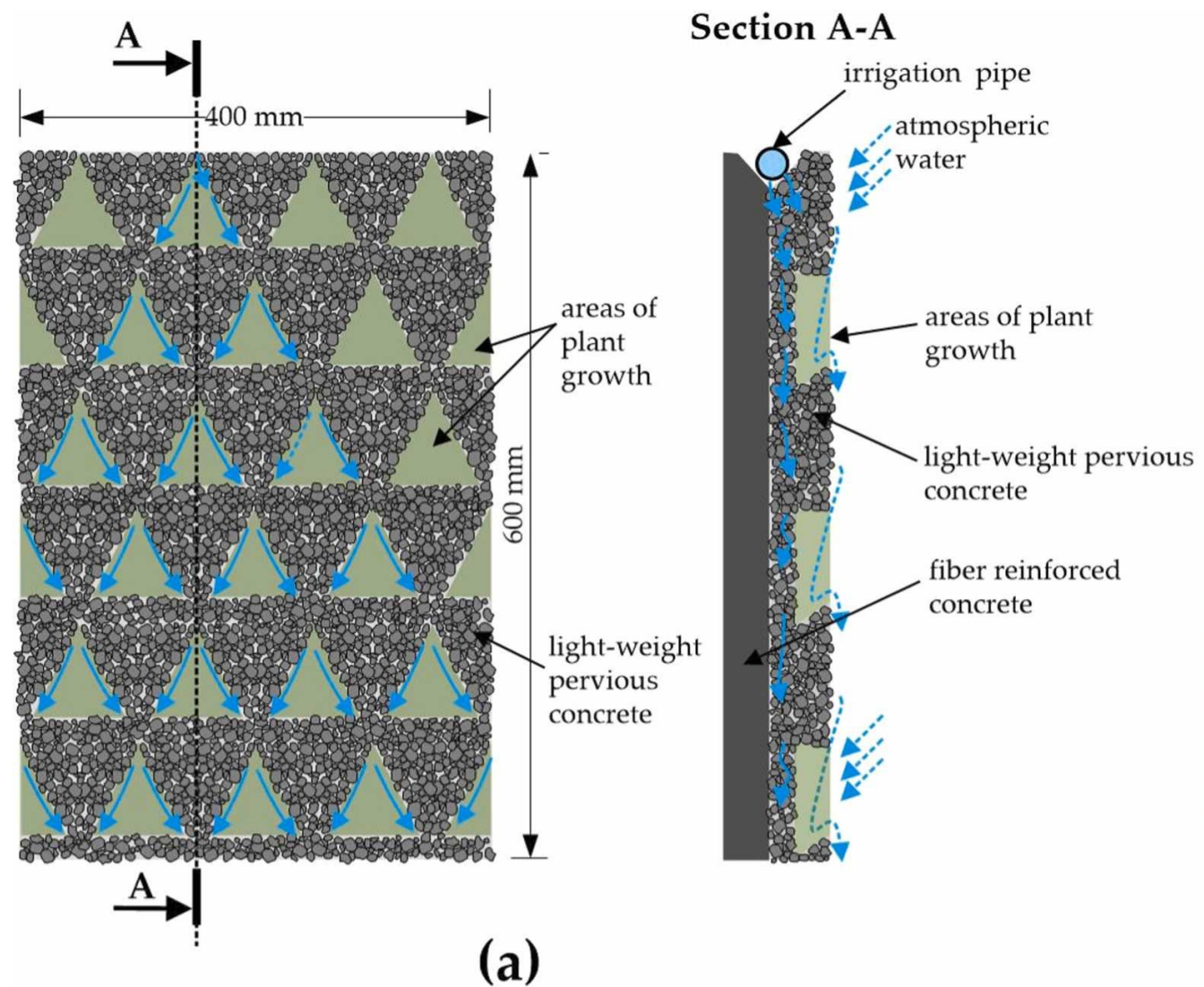


INTERVENTIONS.

FACADES



INTERVENTIONS. FACADES



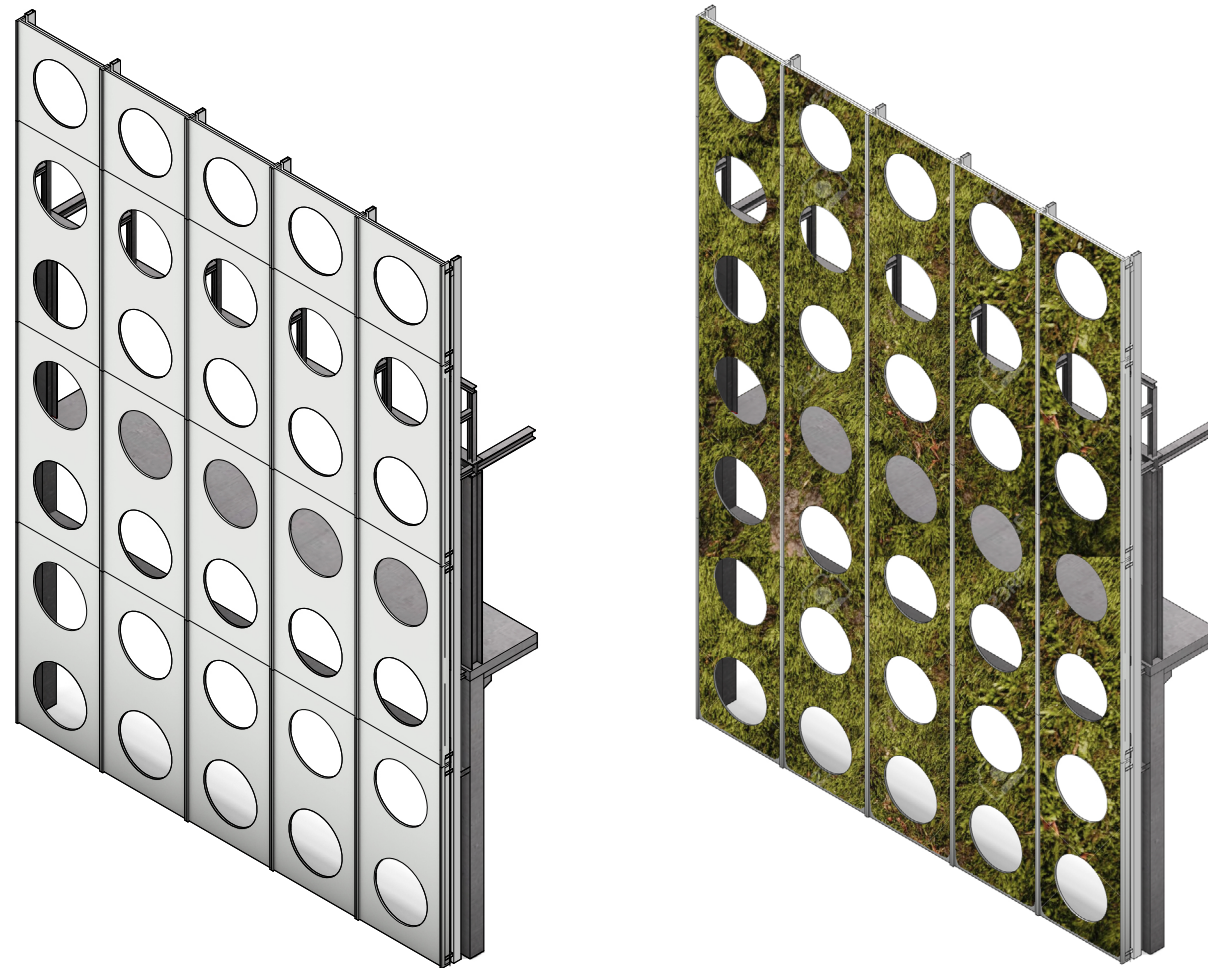
Bio colonisation panel reference

Retrieved from: Jakubovskis, R., Malaiškien, J., & Gribniak, V. (2023). Bio-colonization Layered concrete panel for greening vertical surfaces: a field study. Case Studies in Construction Materials, 19, e02394. <https://doi.org/10.1016/j.cscm.2023.e02394>

INTERVENTIONS. FACADES



Unification of façade creates a more coherent building block. New material shows development and enhances aesthetic



In 5 years

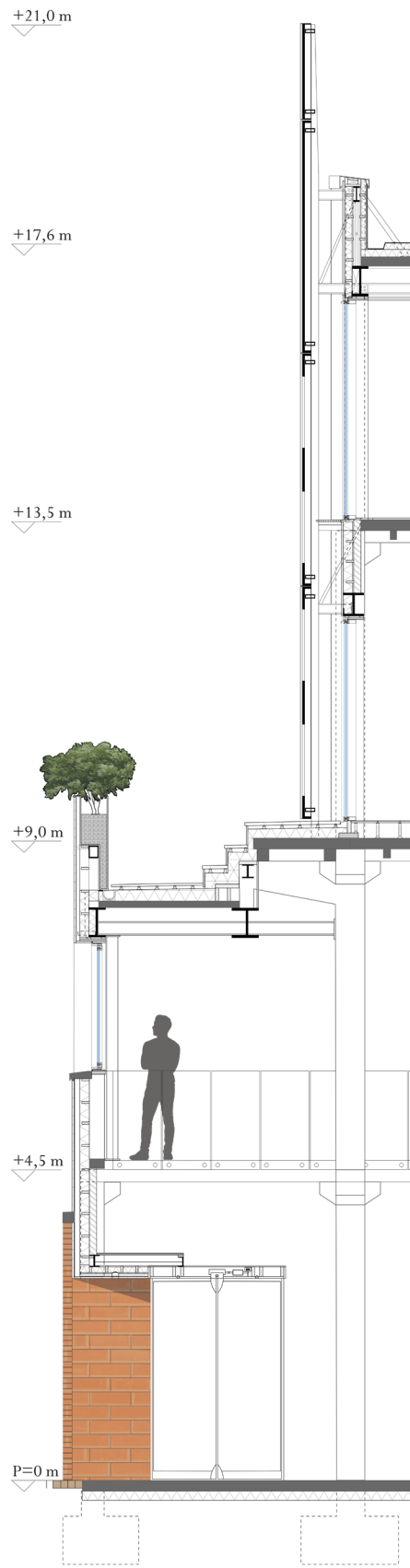


Material represents a great potential of CO₂ reduction in concrete based constructions. *

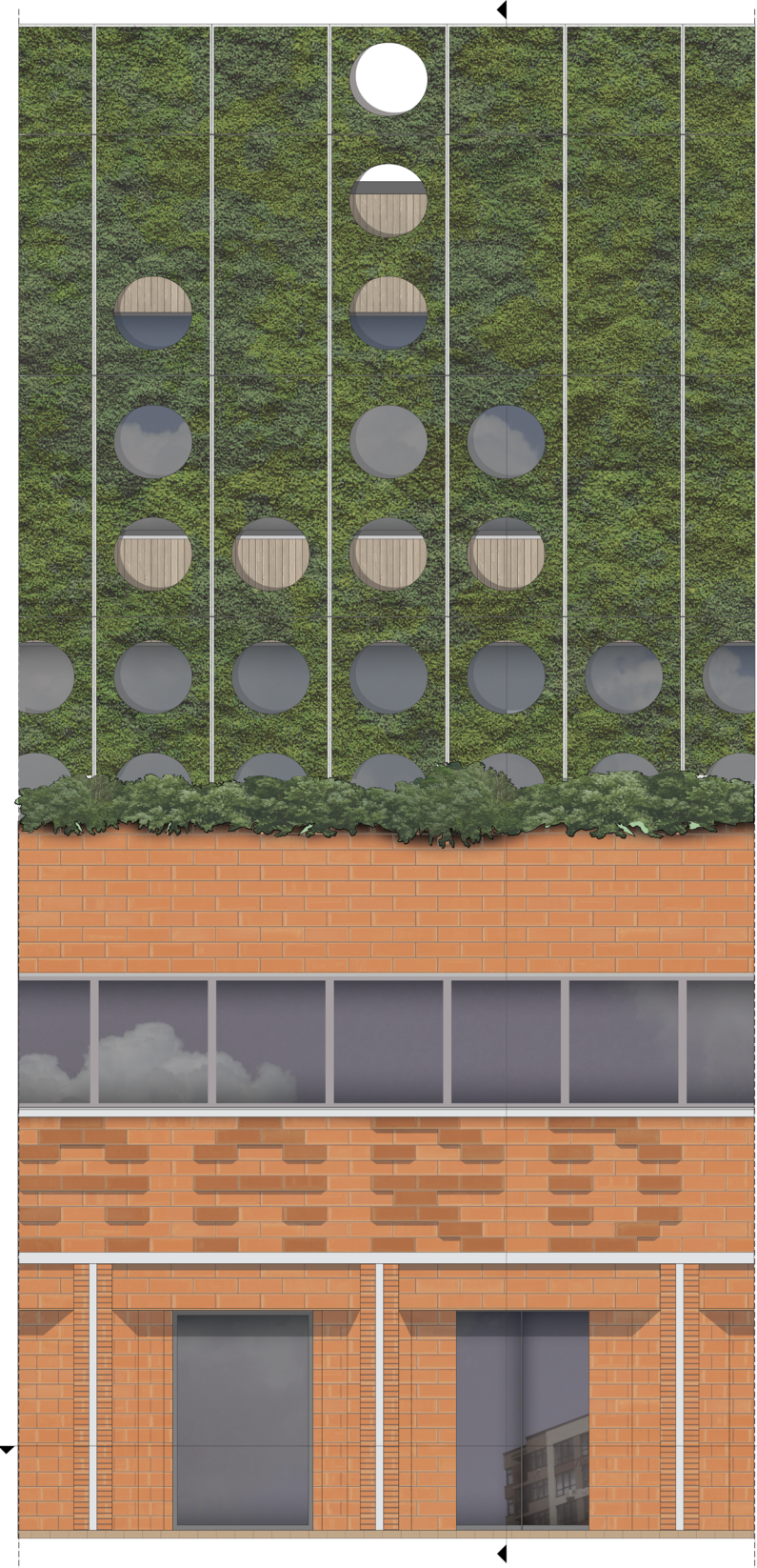
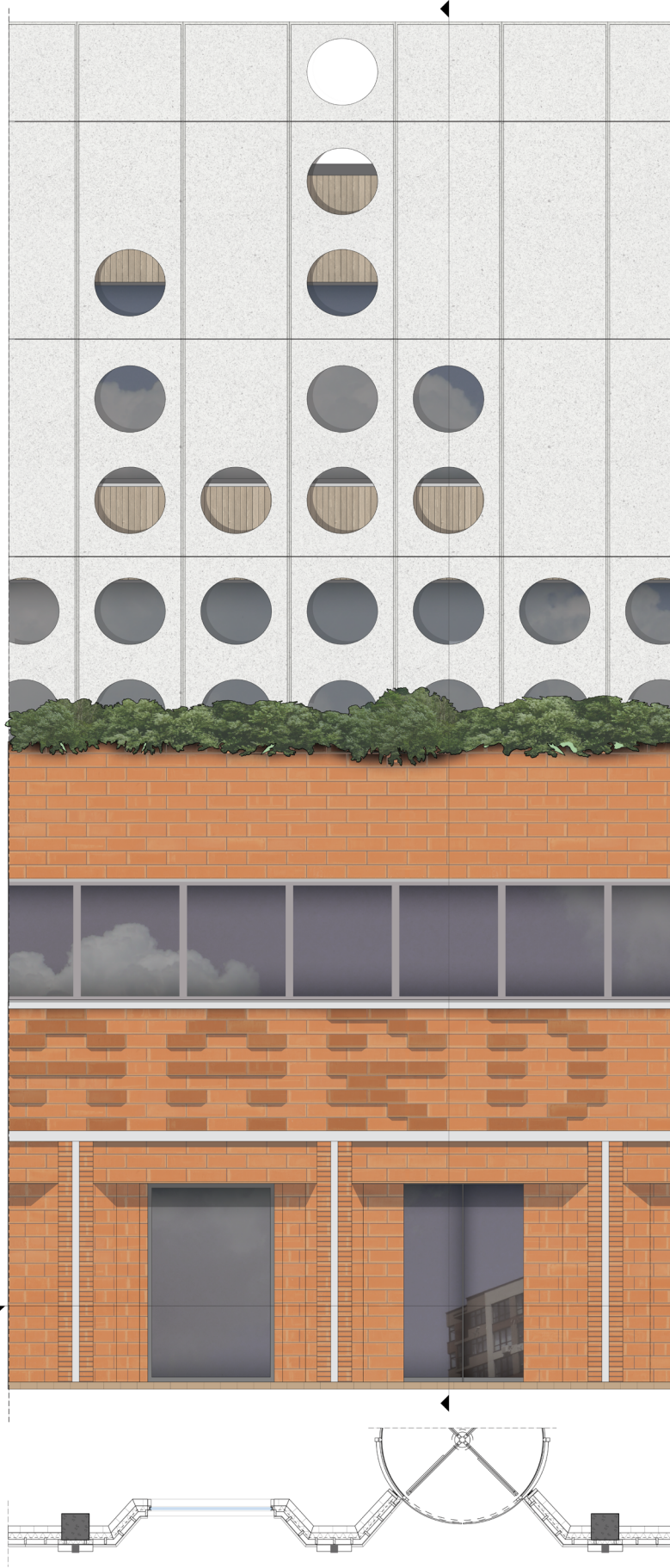


Long life span (70 years)
Detail applicable on all parts of the facade

INTERVENTIONS.
FACADES



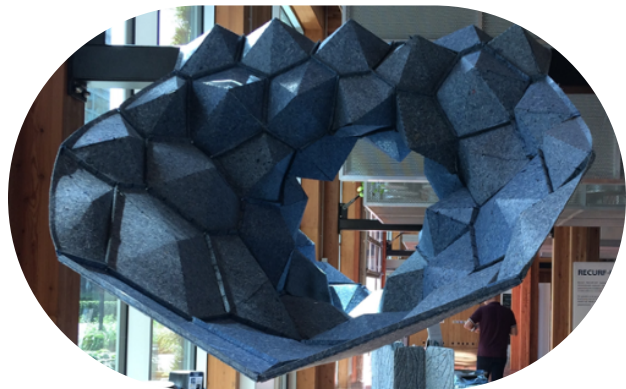
New facade fragment 1:20



In 5 years



INTERVENTIONS.
VISUALISATION



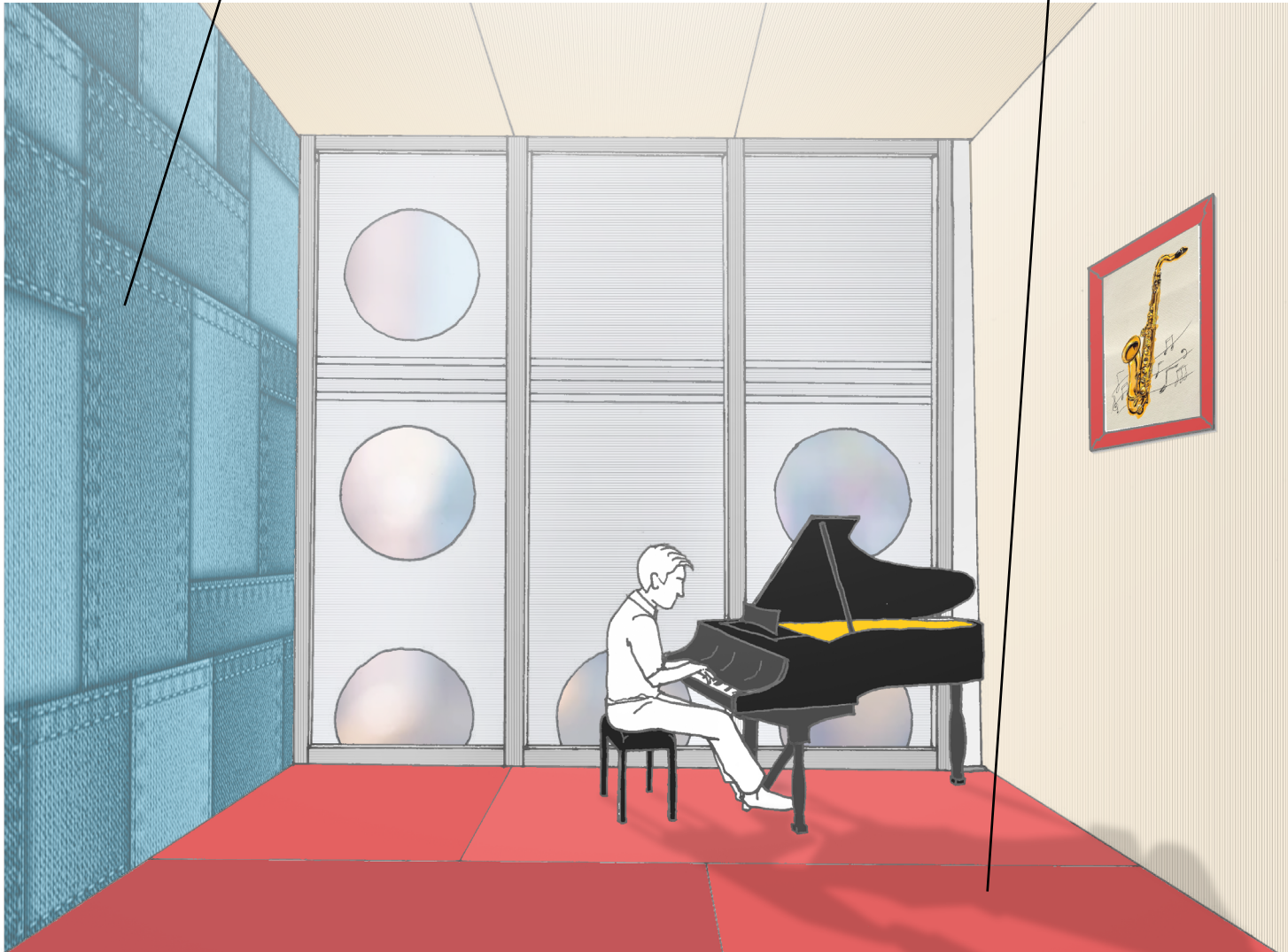
Recycled denim wall panel (sound insulation)



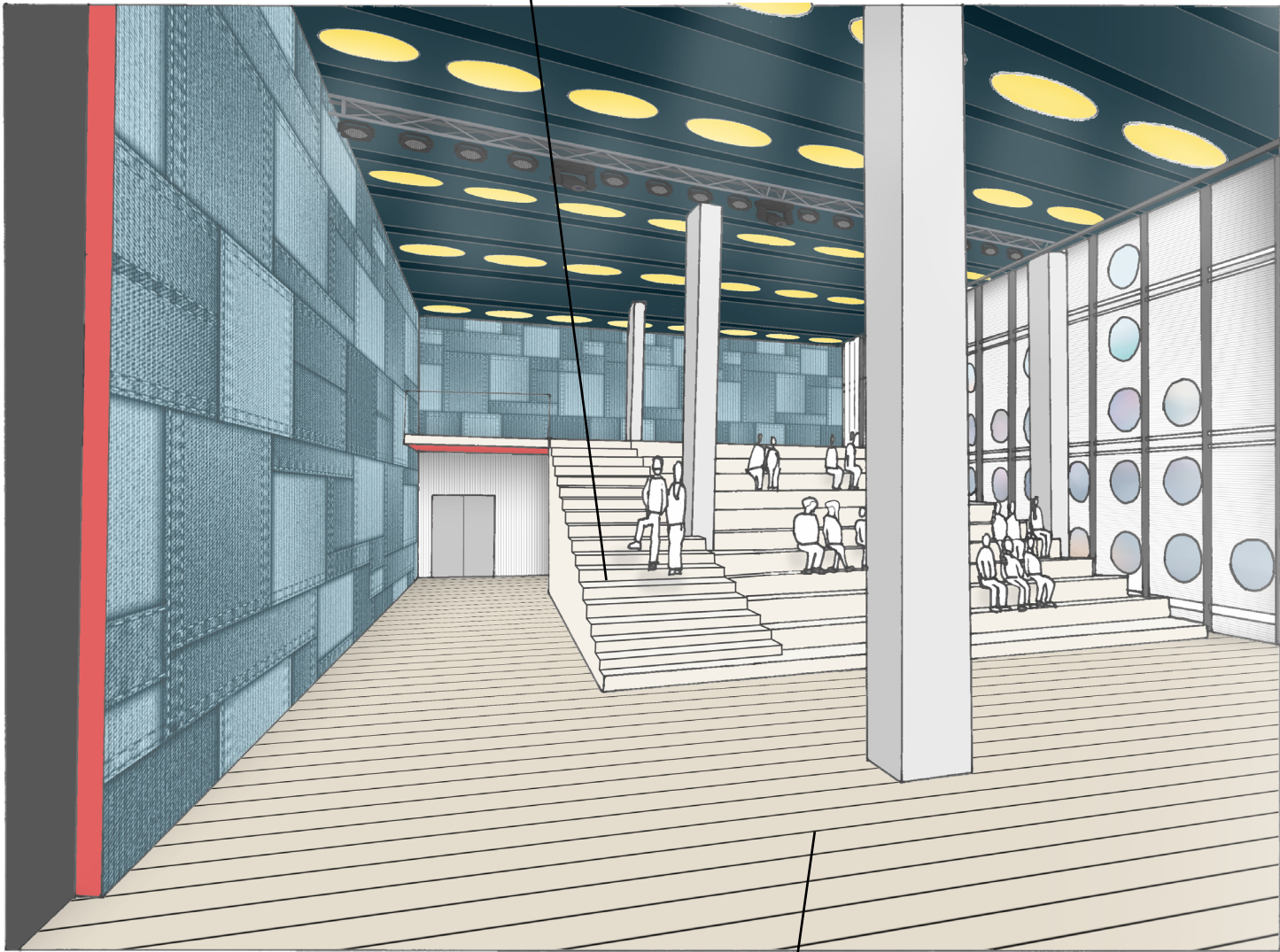
Recycled carpet floor Rubicon



Retractable tribune



Second floor

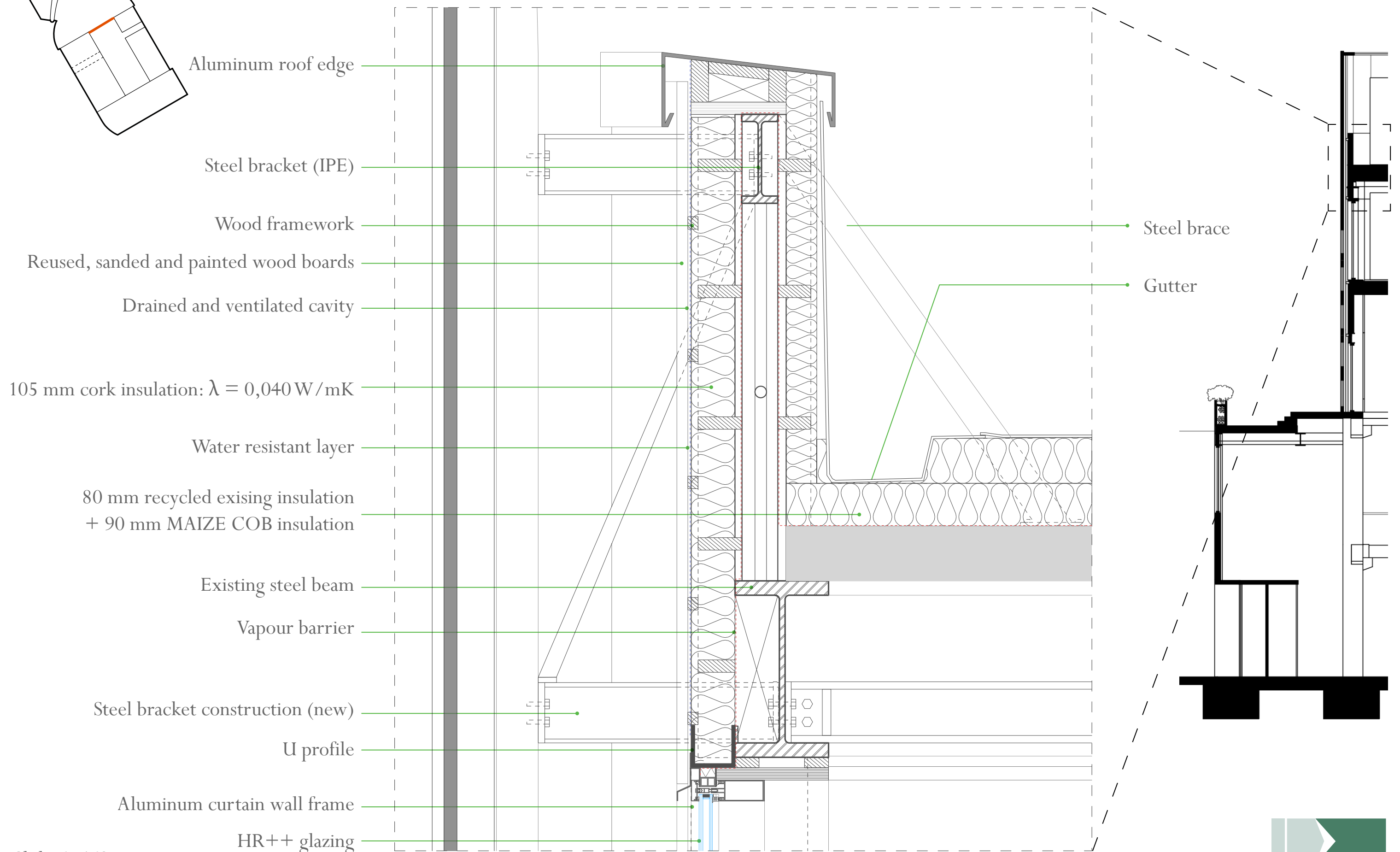
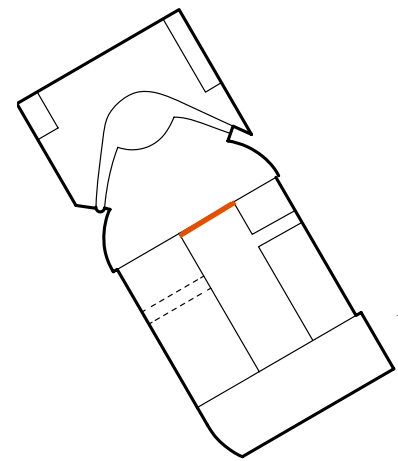


Second floor

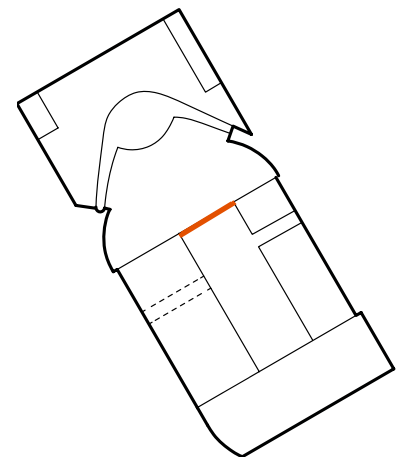
Oak wood (30 mm)



INTERVENTIONS. FACADES



INTERVENTIONS. FACADES



Outdoor tiles on carriers

A-brick ceramic stone strips 300x180x18 mm

Steel construction

Alucobond aluminum planter

Aluminum frame for stone strips

Gutter

Hard foam insulation

125 mm cork insulation: $\lambda = 0,040 \text{ W/mK}$

Existing steel beam

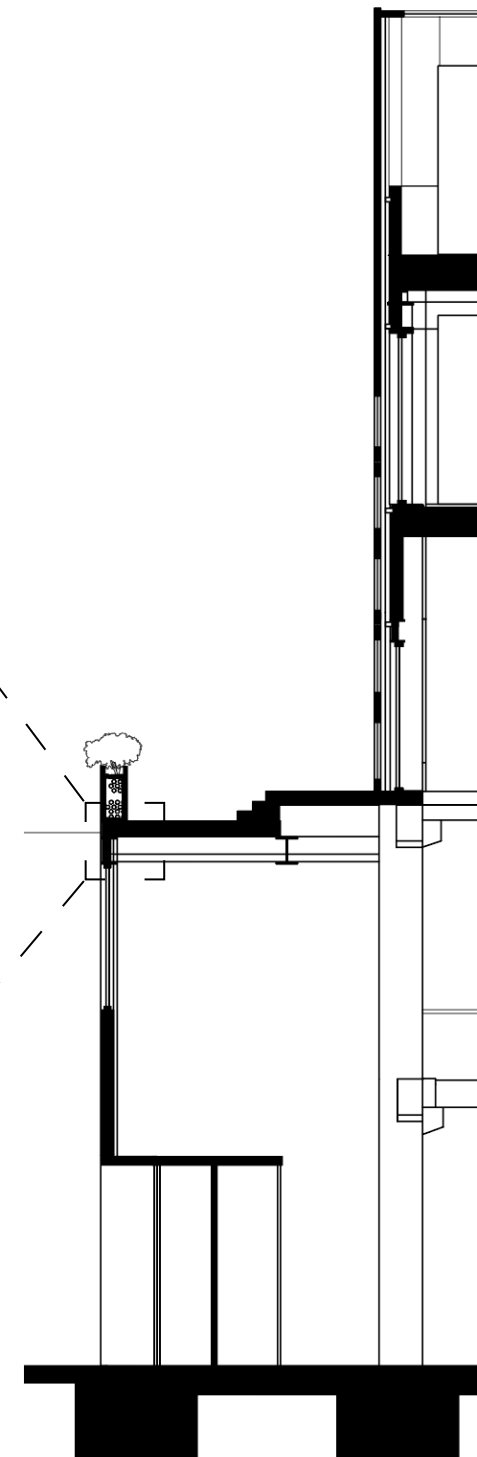
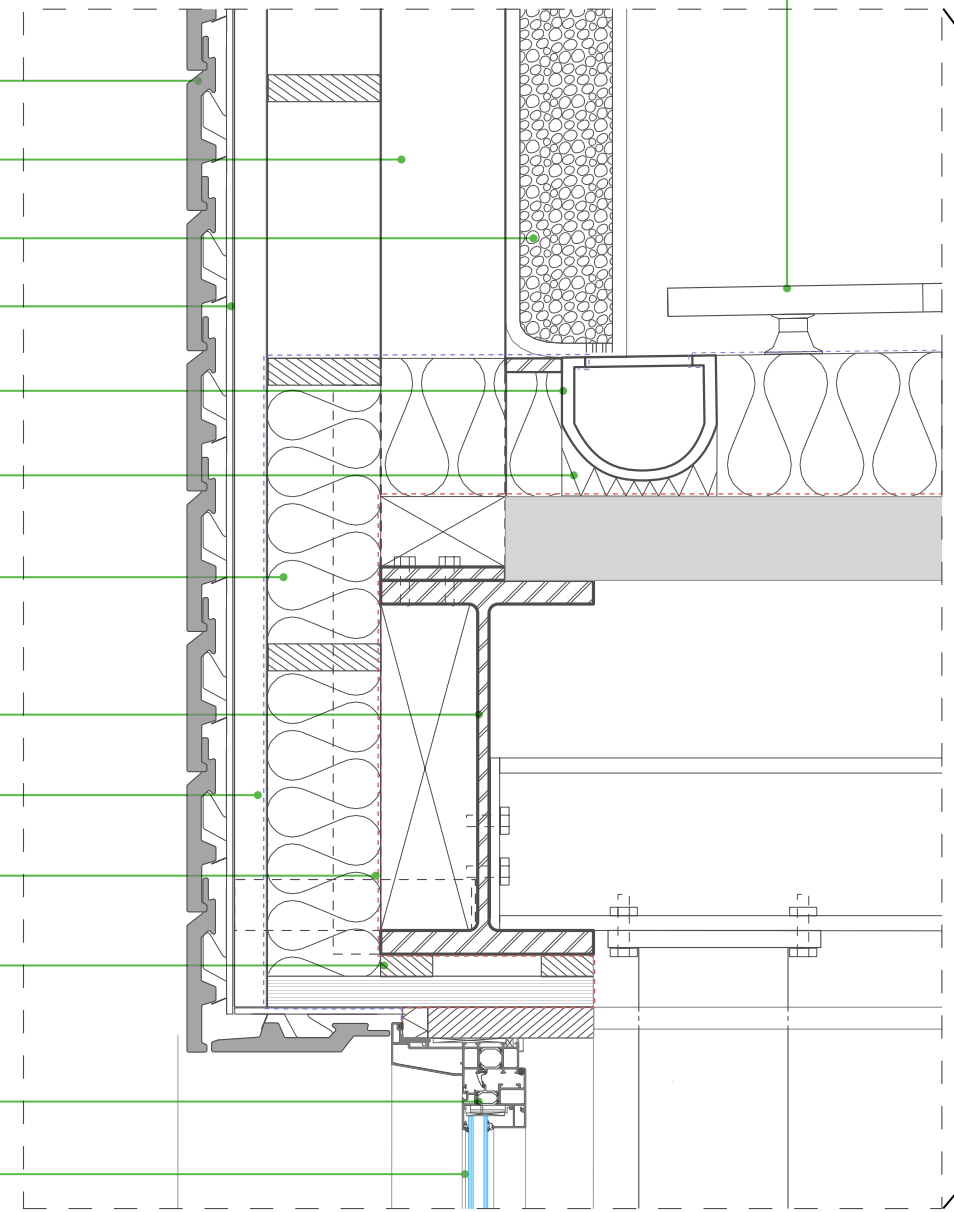
Water resistant layer

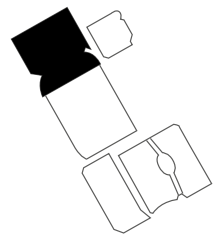
Vapour barrier

Wooden adjusting blocks

New aluminum profile

Double glazing





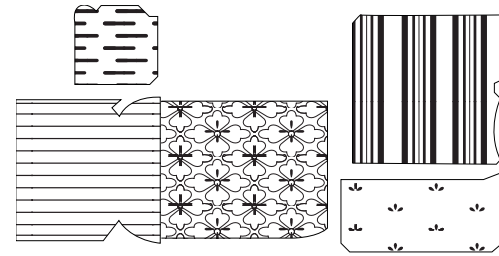
RESEARCH TO DESIGN CONCLUSIONS.

STRATEGIES.

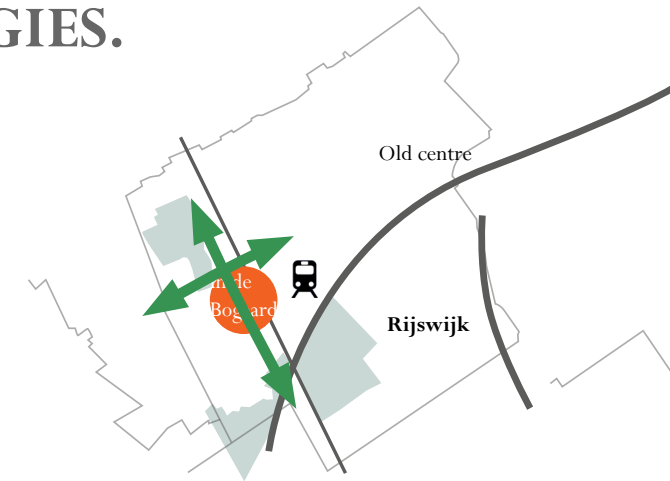


Social

URBAN SCALE



Conserve identity per block

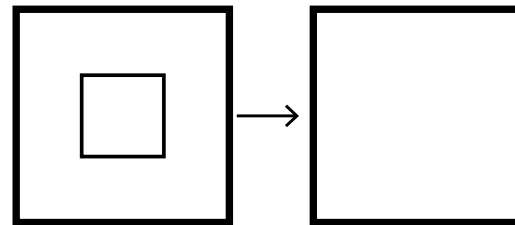


In the Bogaard as transition between green zones and city

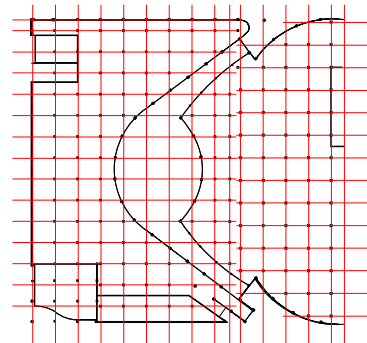
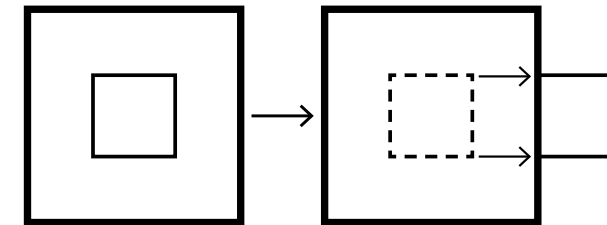


Environmental

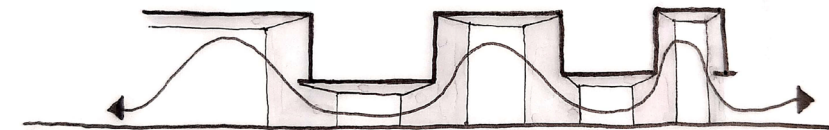
BUILDING SCALE



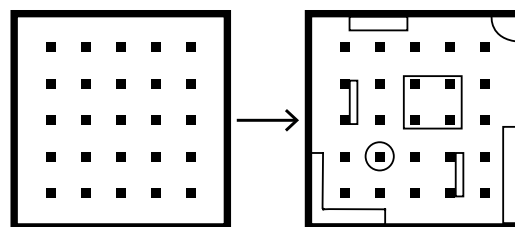
REDUCE: No unnecessary use of material and (re-)moving elements



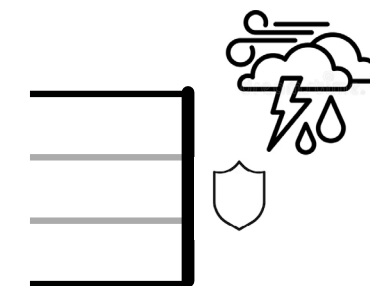
REUSE: Revive the strengths of the building



Economic



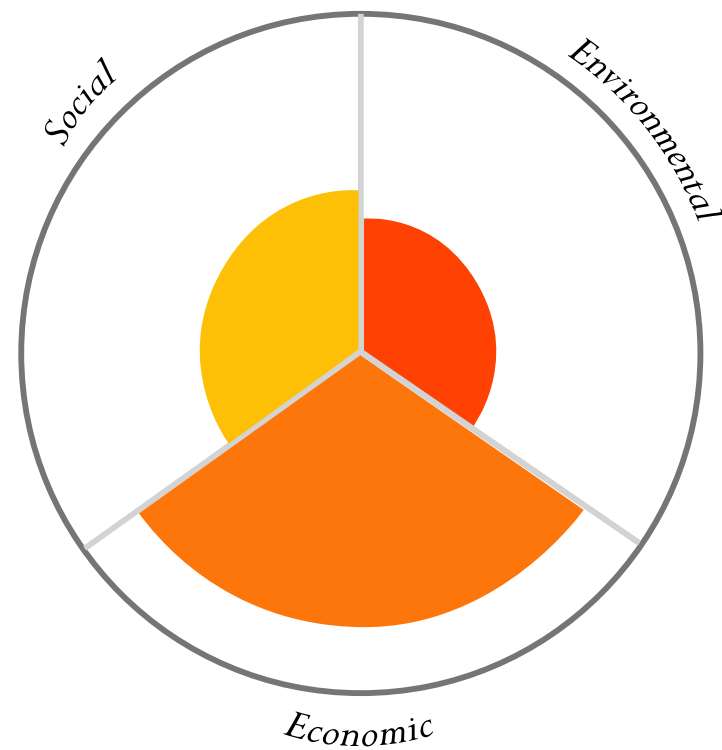
REFILL: Make use of the plan libre for flexible new functions and possibilities



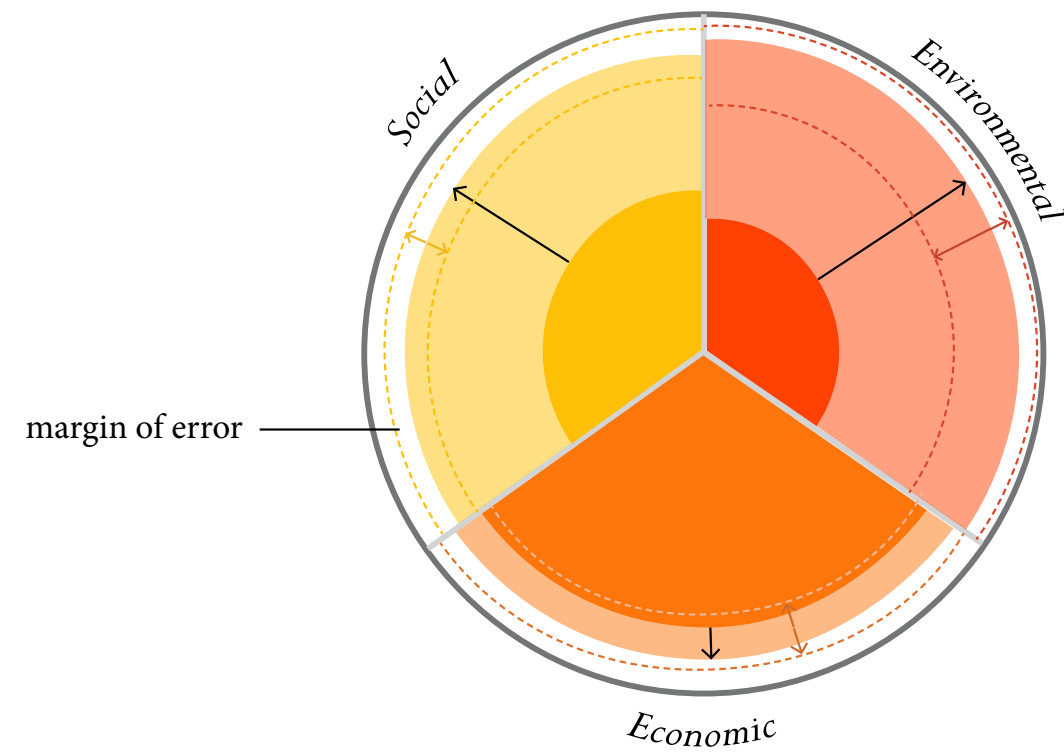
Create robust façade with long lasting material

CONCLUSION AND REFLECTION

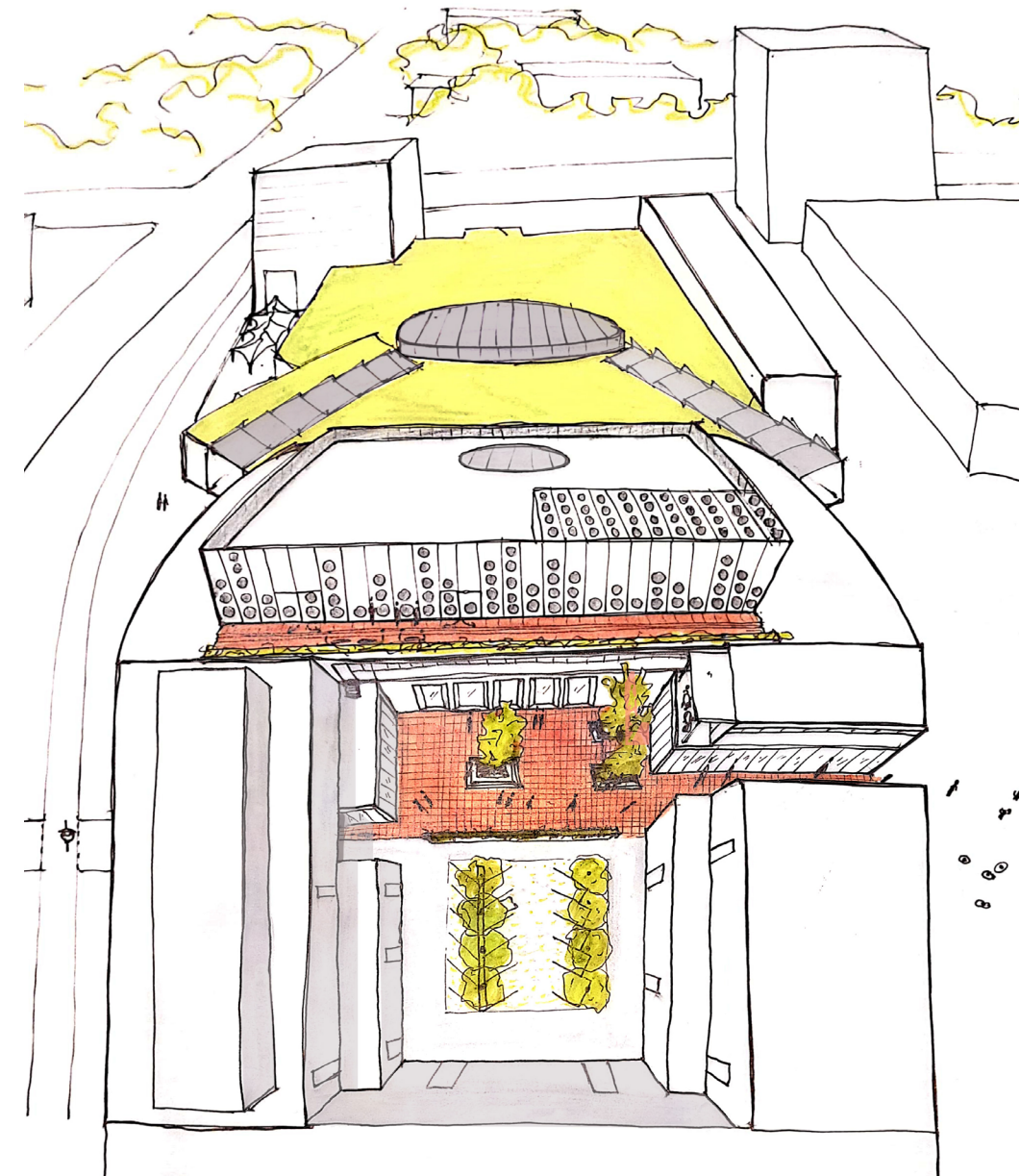
BEFORE RENOVATION



AFTER RENOVATION



Old



New

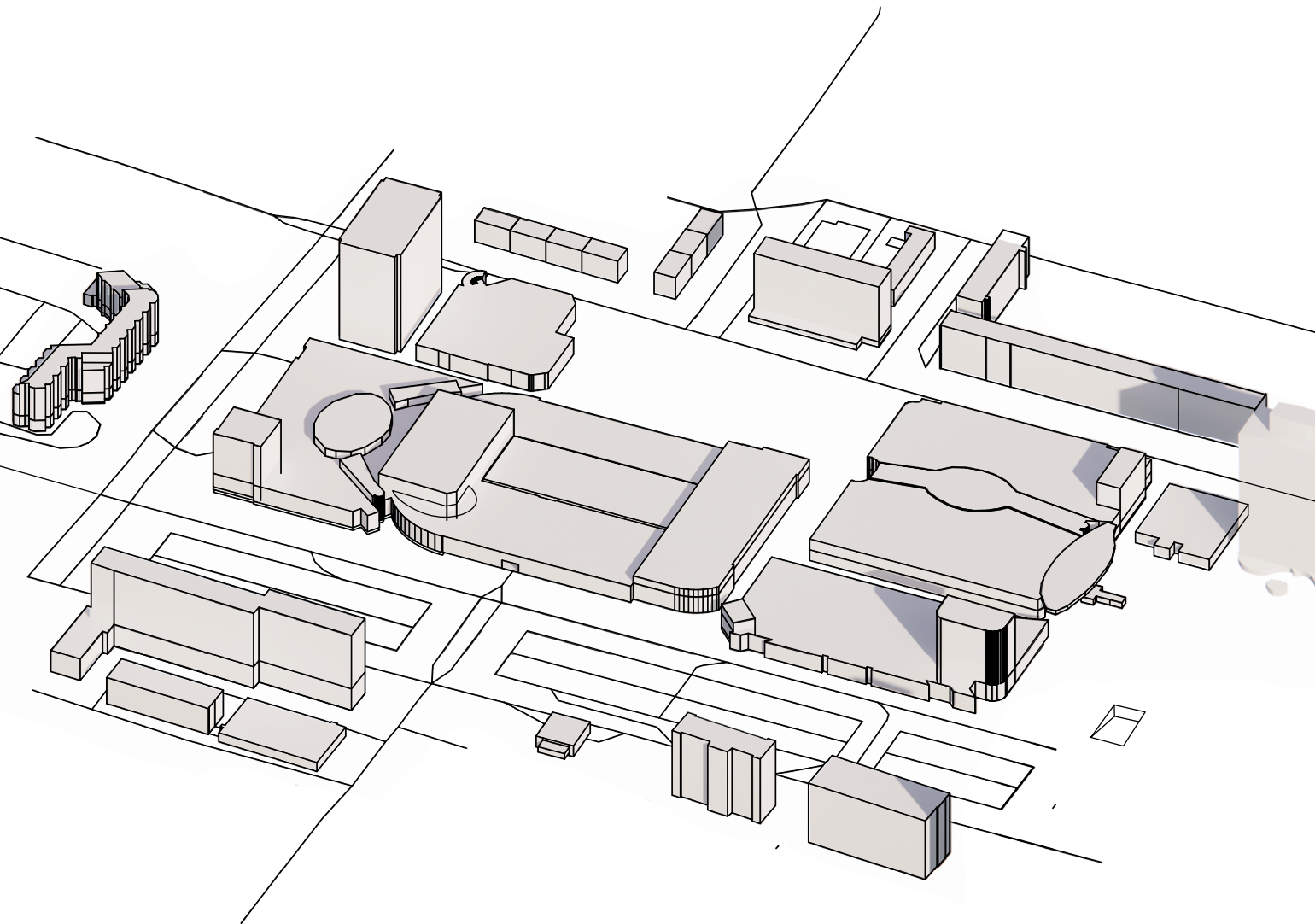


Thank you.

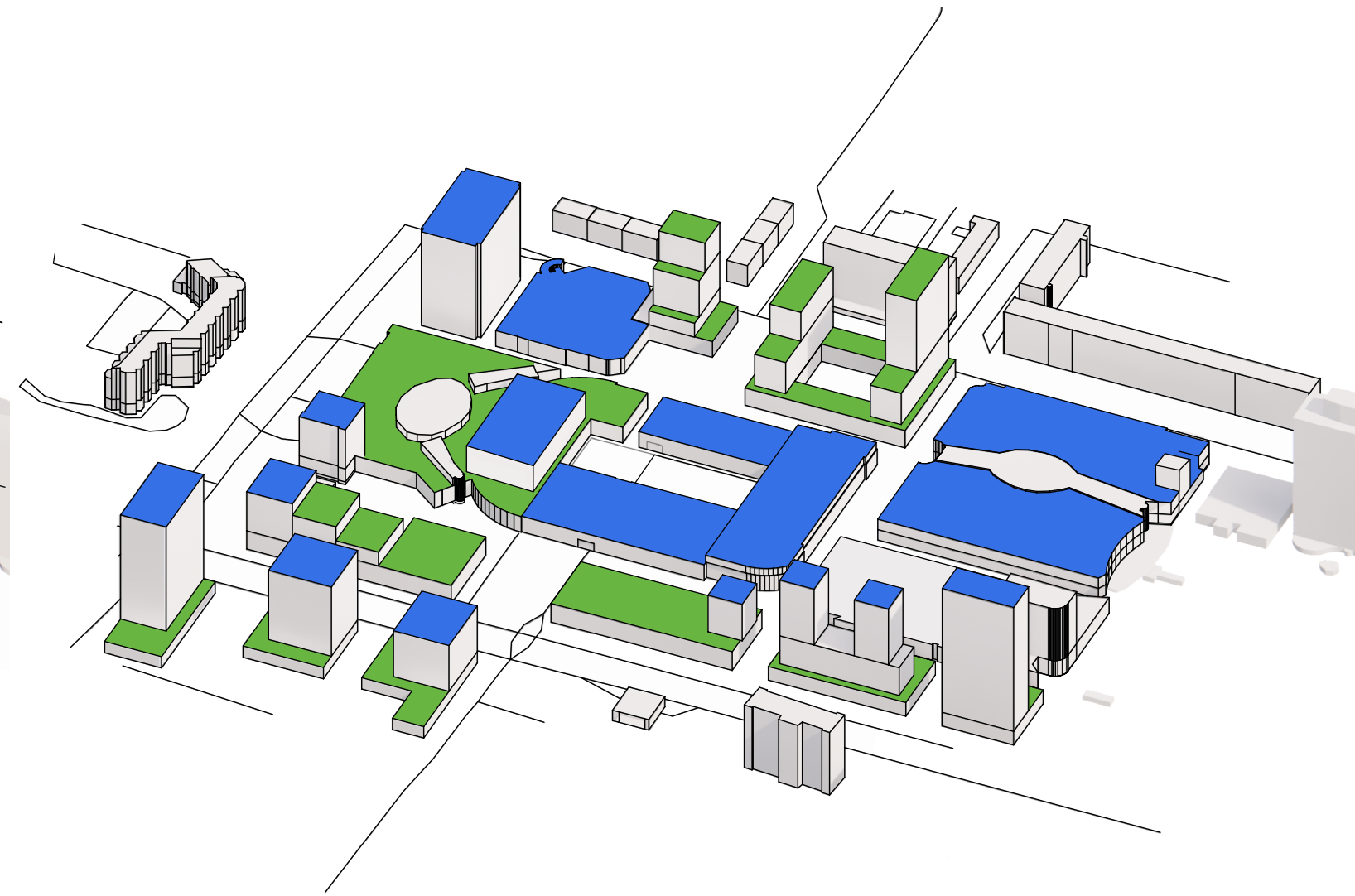


EXTRA SLIDE. OLD AND NEW SITUATION.

Existing



New

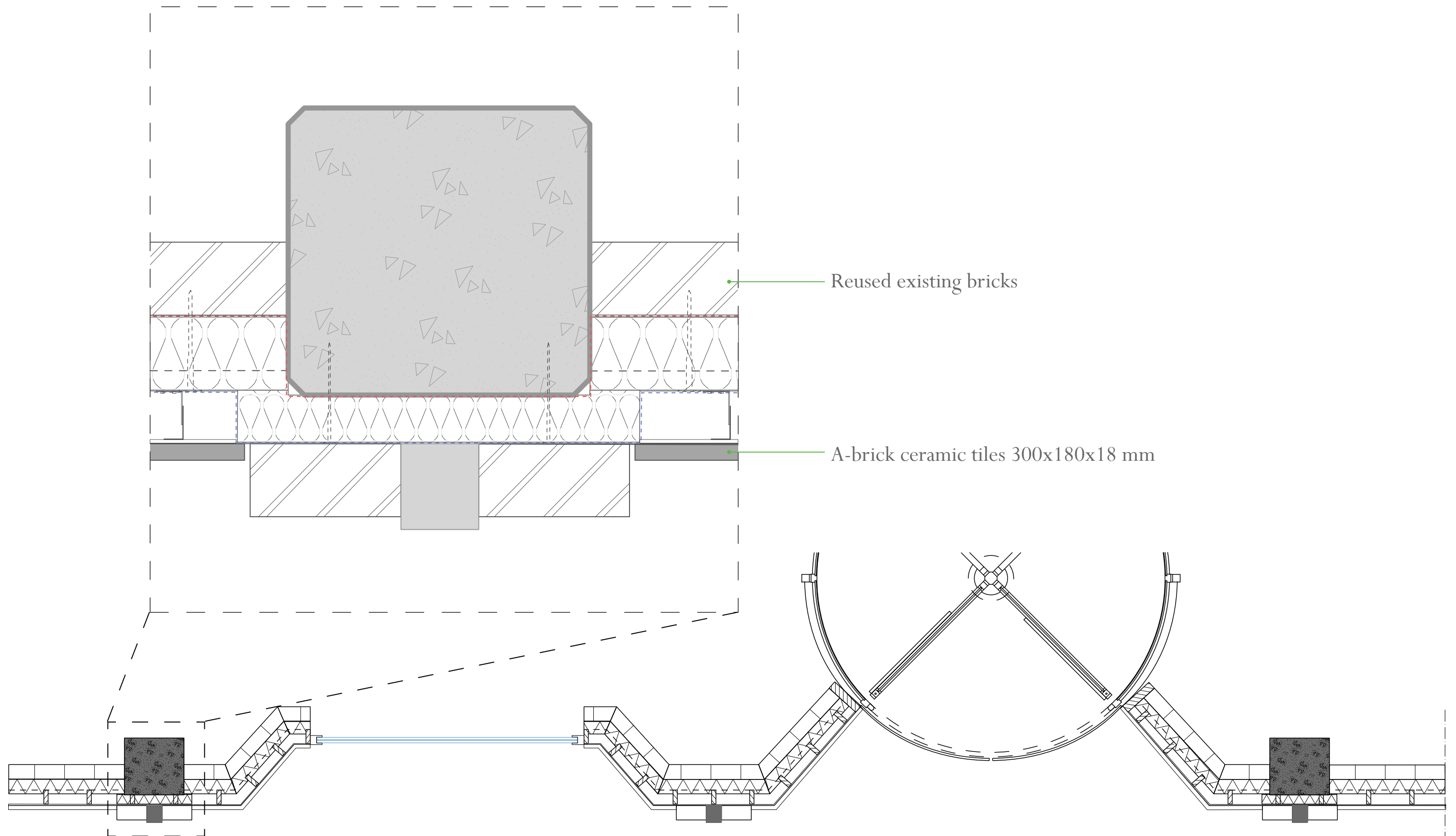


■ PV panels: $\pm 40.000 \text{ m}^2$ *

■ Green roof: $\pm 25.000 \text{ m}^2$

* 32.000 pv panels > $32.000 \times 400 \times 0,85 = 10.880.000 \text{ kWh/year}$

EXTRA SLIDE.
1 to 5 Detail NEW south facade



EXTRA SLIDE.
SECTION A-A' and B-B' (Existing)

