TOWARD AUTONOMY

Low impact living in a converted highrise

Masterarbeit / FS 2020
Thema C / RE-USE CIBA
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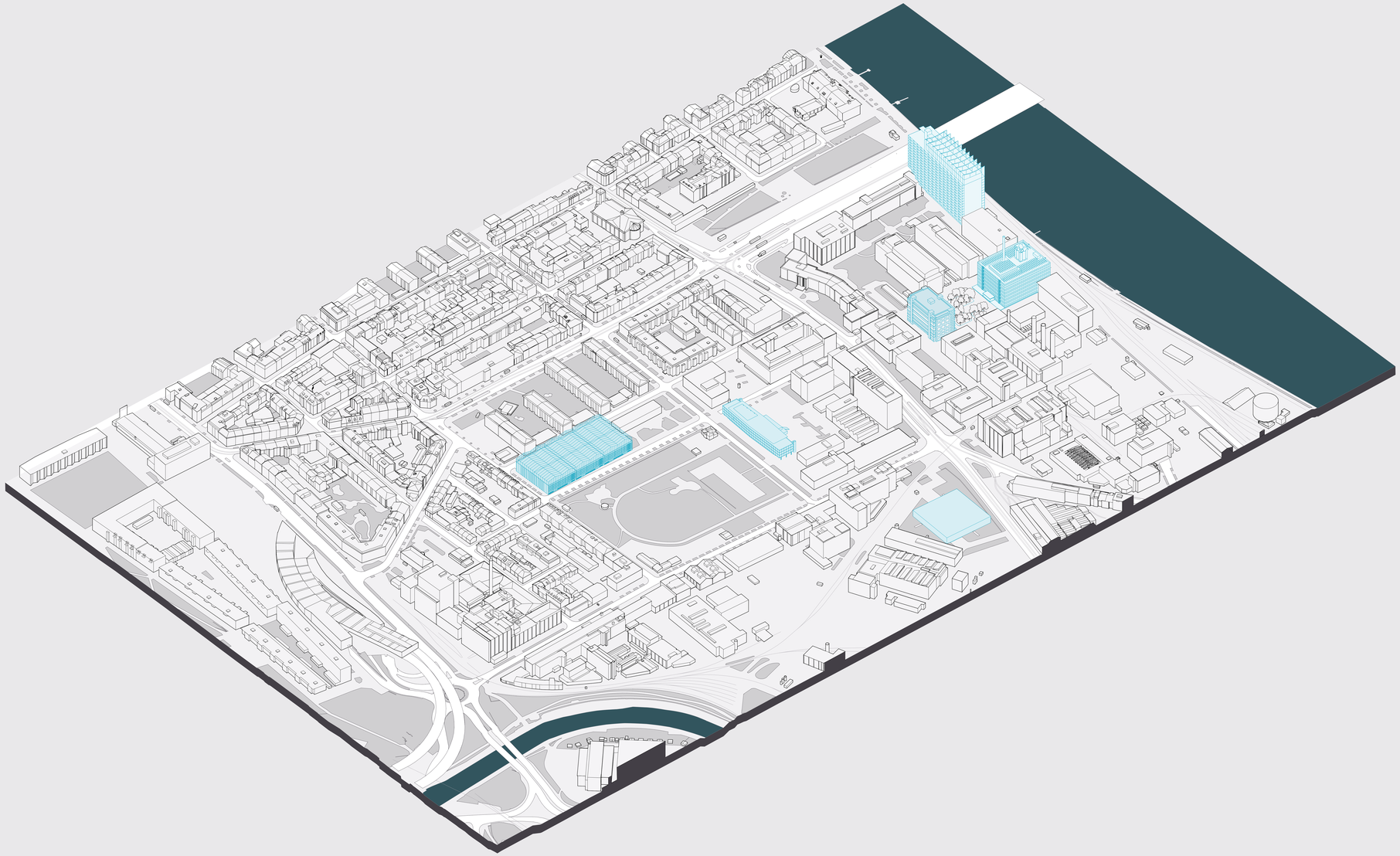
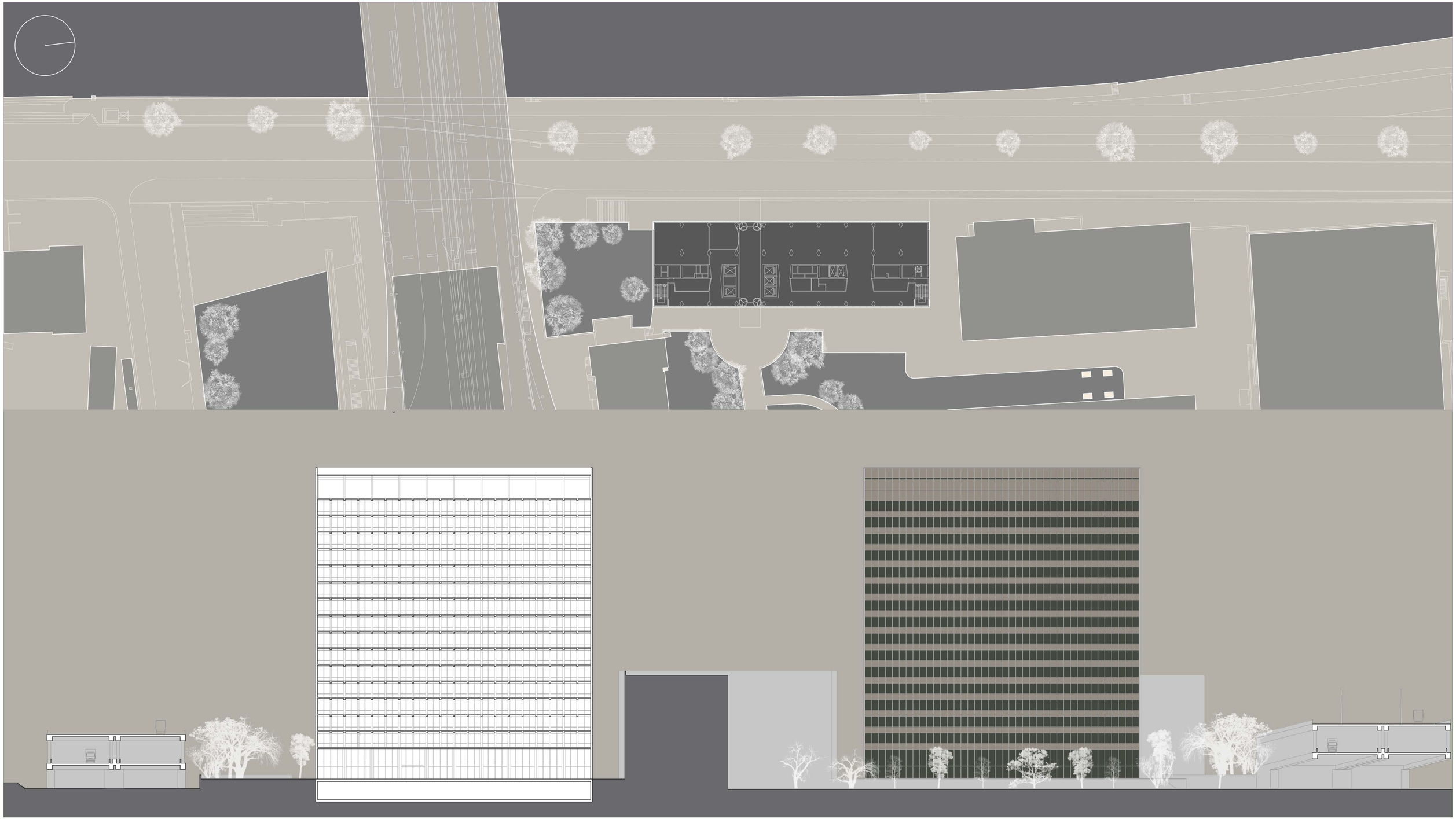
Dawit Tadesse

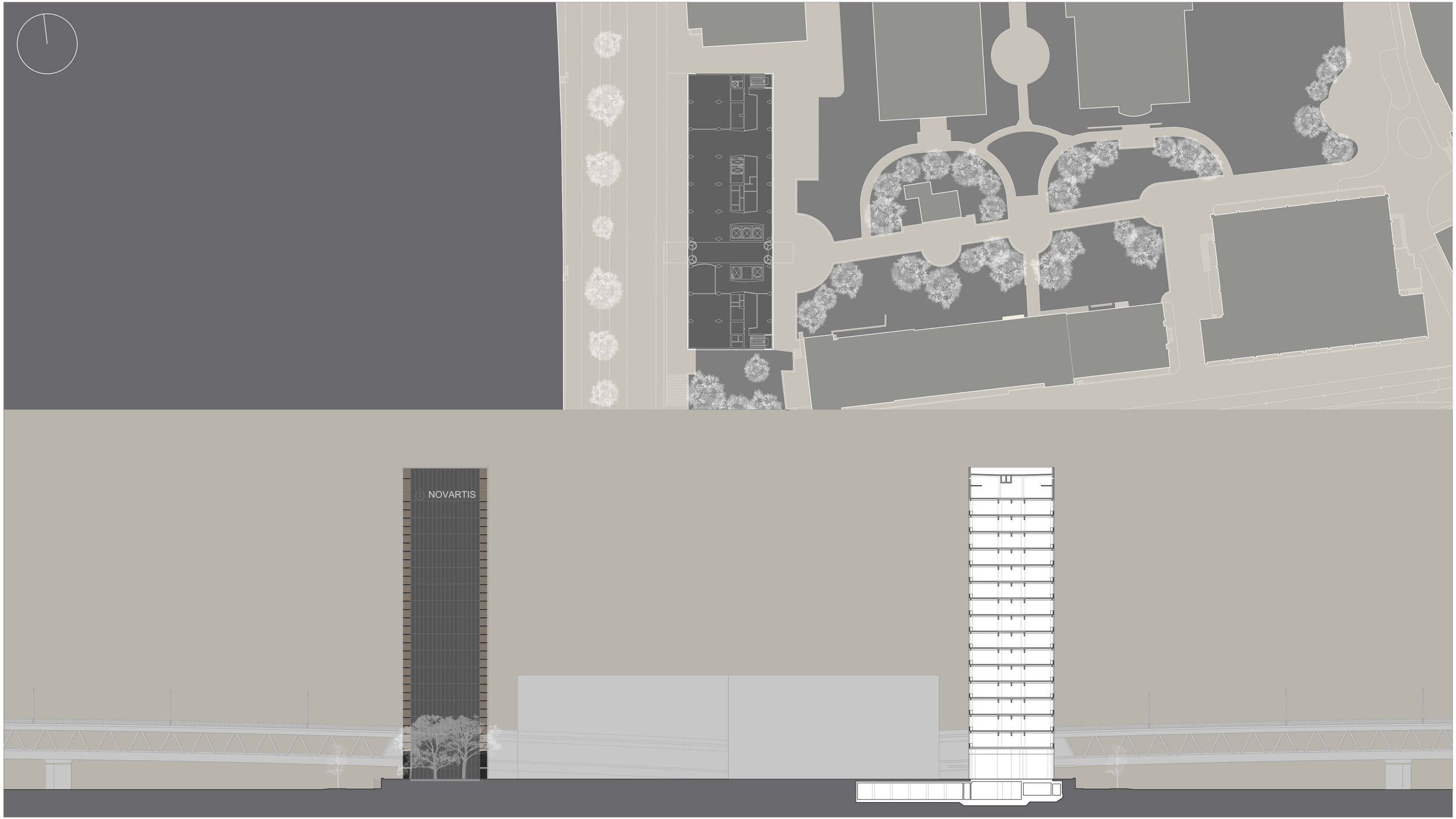


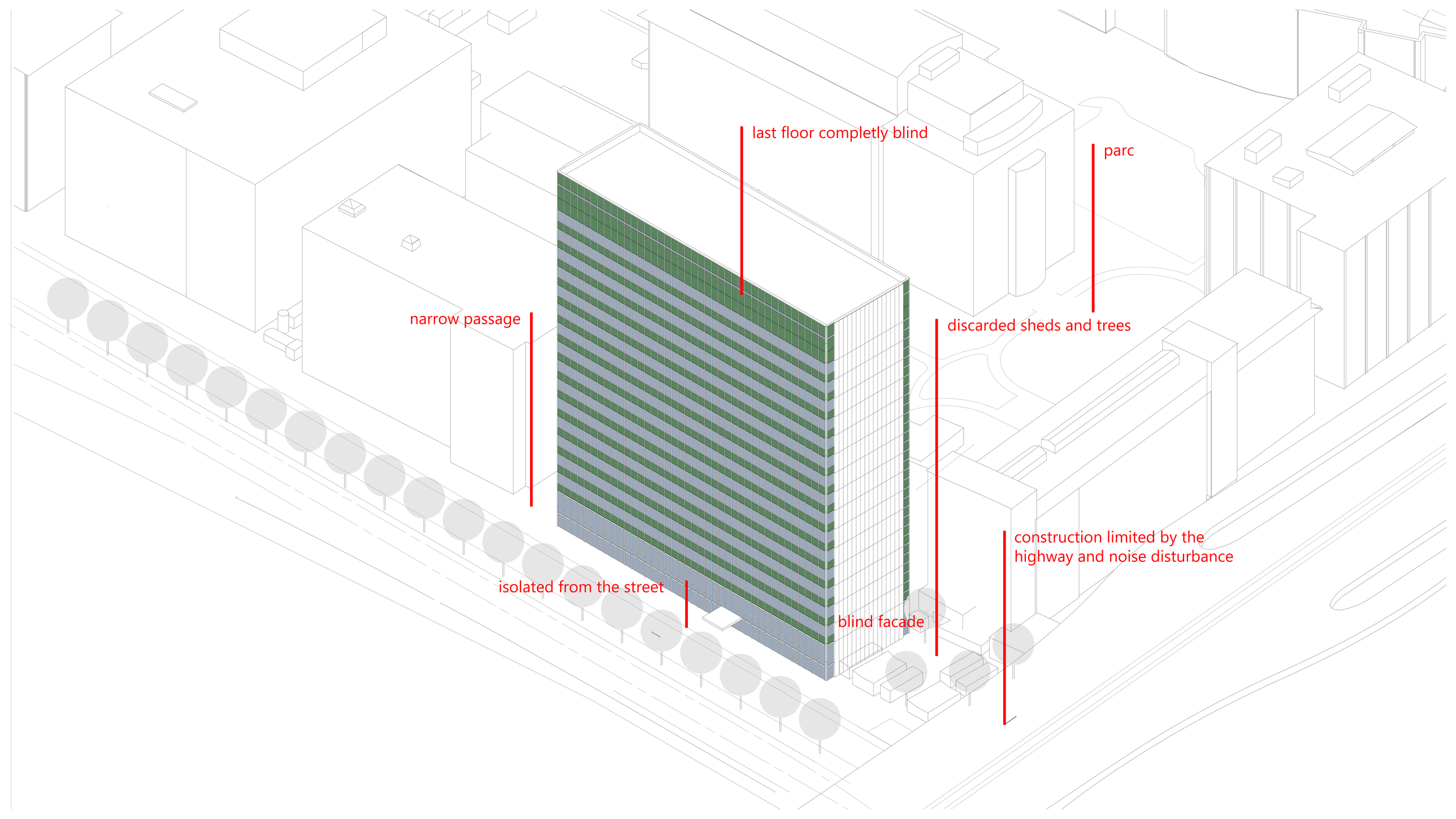
THE EXISTING

Unterer Rheinweg 180

A 75-metre-high laboratory building for biological research placed at the junction of river and highway.



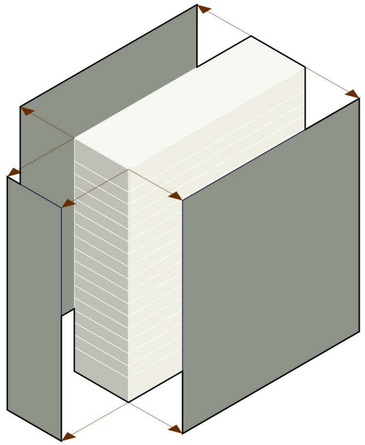

NOVARTIS


last floor completly blind
parc
narrow passage
discarded sheds and trees
construction limited by the
highway and noise disturbance
isolated from the street
blind facade

PROPOSITION

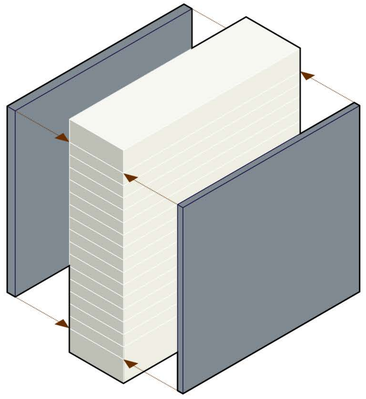
From laboratories to affordable housing

From the first to the 15th floor of the building, the ceiling height is 4m. The building enjoy a good exposure with an east-west orientation and has 2 blind facades allowing for extention. It present a good potential for housing as well as a privileged relation to the river and the parc. A mixed used is prioritized for the ground floor as well as for the 16th floor and the roof.



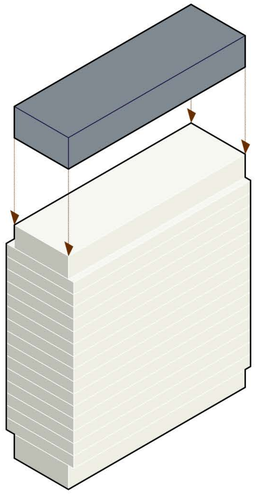
1 façade removal

the current glazing do not respond to current energic standard and must be replaced



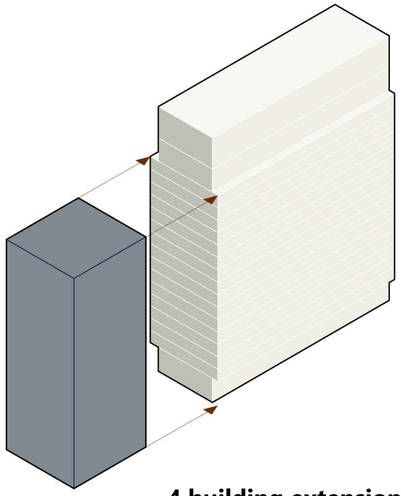
2 façade replacement

the replacement of the facade is a good opportunity to increase the livable floor area in a logic of generosity of space



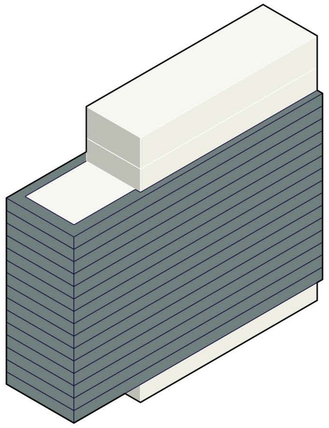
3 roof extension

the roof enjoy a privilegied view on top of this 75m high building surrounded by the industrial area, the river and the highway



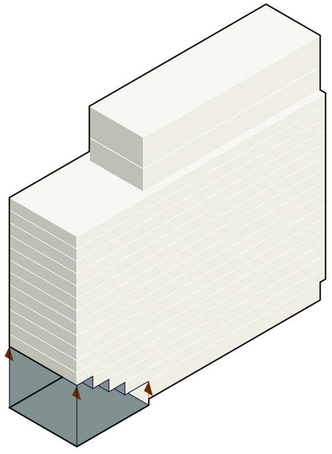
4 building extension

the blind southern facade is an opportunity to extend the building and utilize the maximum potential of the plot



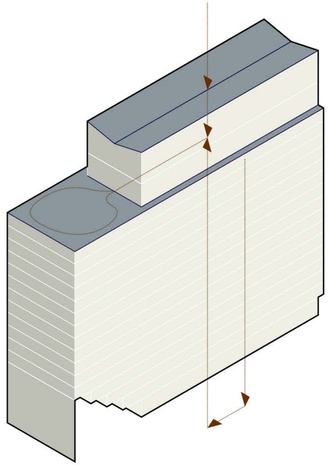
5 wintergardens

a continous stretch of wintergarden are added in order to give thermic and accoustic insulation as well as extra living space



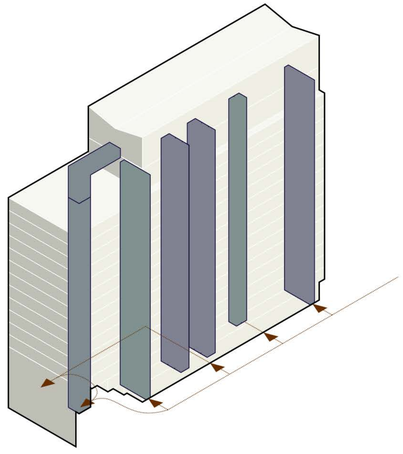
6 void

the area directly in front of the highway remains empty and is protected by sounds barrier, preserving the trees and buffering the space behind



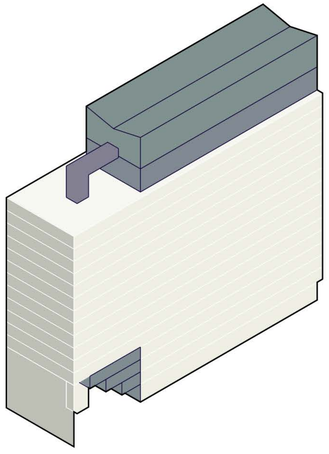
7 water cycle

a holistic approach to water use is integrated to the building, collecting rainwater and processing greywater in a constructed wetland on the roof



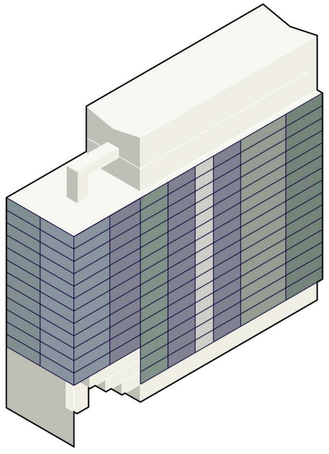
8 distribution

the circulation system utlize the existing structure while converting 2 shafts, adding 3 elevator and 4 staircase



9 public and communal

the 16th floor and the roof are dedicated to urban agriculture, the area facing the highway into workplaces and a belvedere makes the junctions of it all



10 residential typologies

A diversity in term of typologies is put forward to allow maximal flexibility

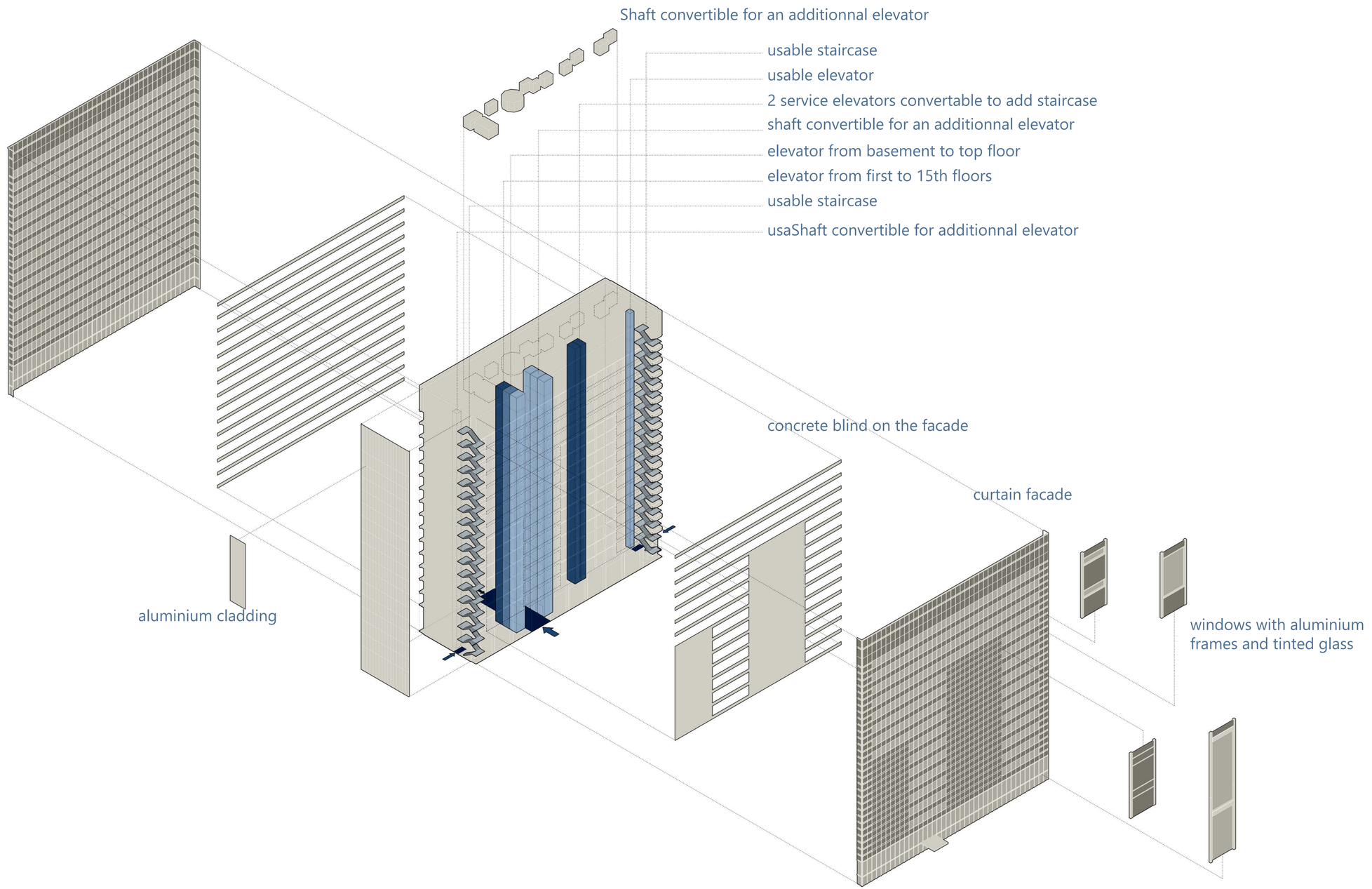
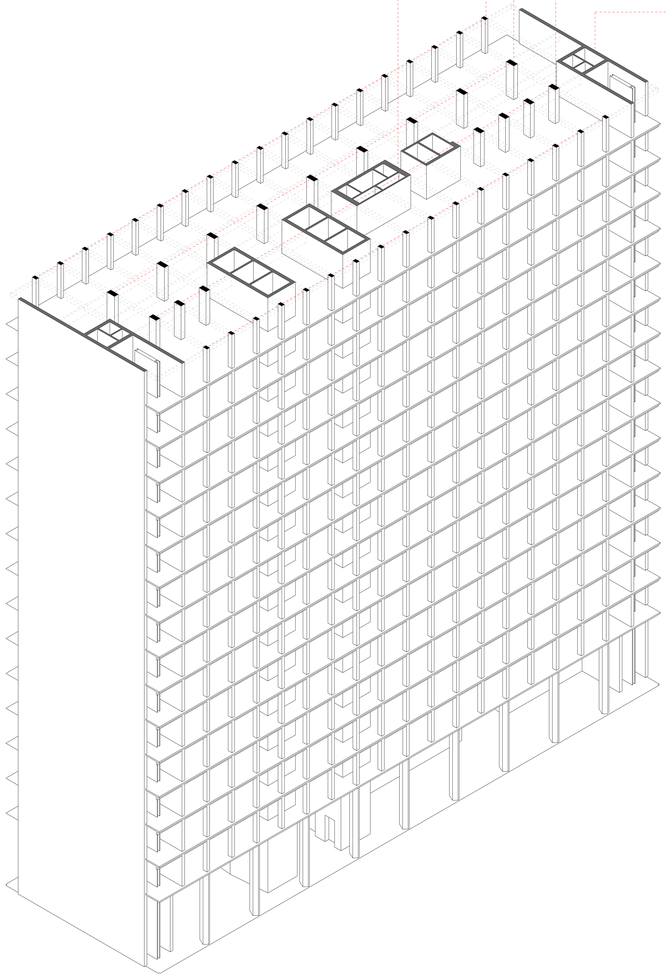
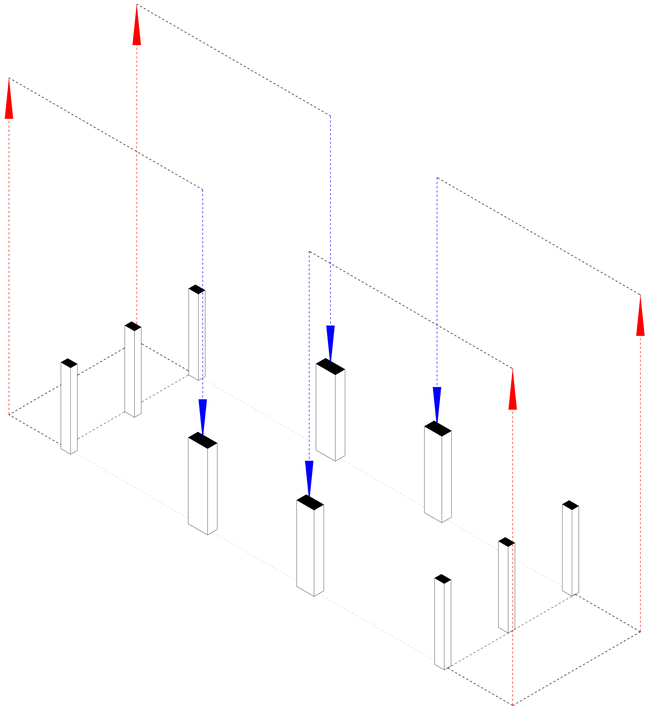


diagram of the discarded and the modified



elevators well and ventilation shafts are load bearing
concrete columns connected by concrete beam of 3.3m span
central columns with a 6.6m span
central columns with a 3.3m span
load bearing walls around staircases and elevator shafts

To **minimize** the additional load bearing element to be added, a **tensil structure** is used at the periphery in order to carry the load back into the central structure thus **saving material and embeded energy**



Hinged industrial windows

1 Counterweight cover in aluminium
2 Counterweight in concrete
3 Door track
4 Double glazing 1” INSULATED
5 Hinge

Slim Floor Construction system

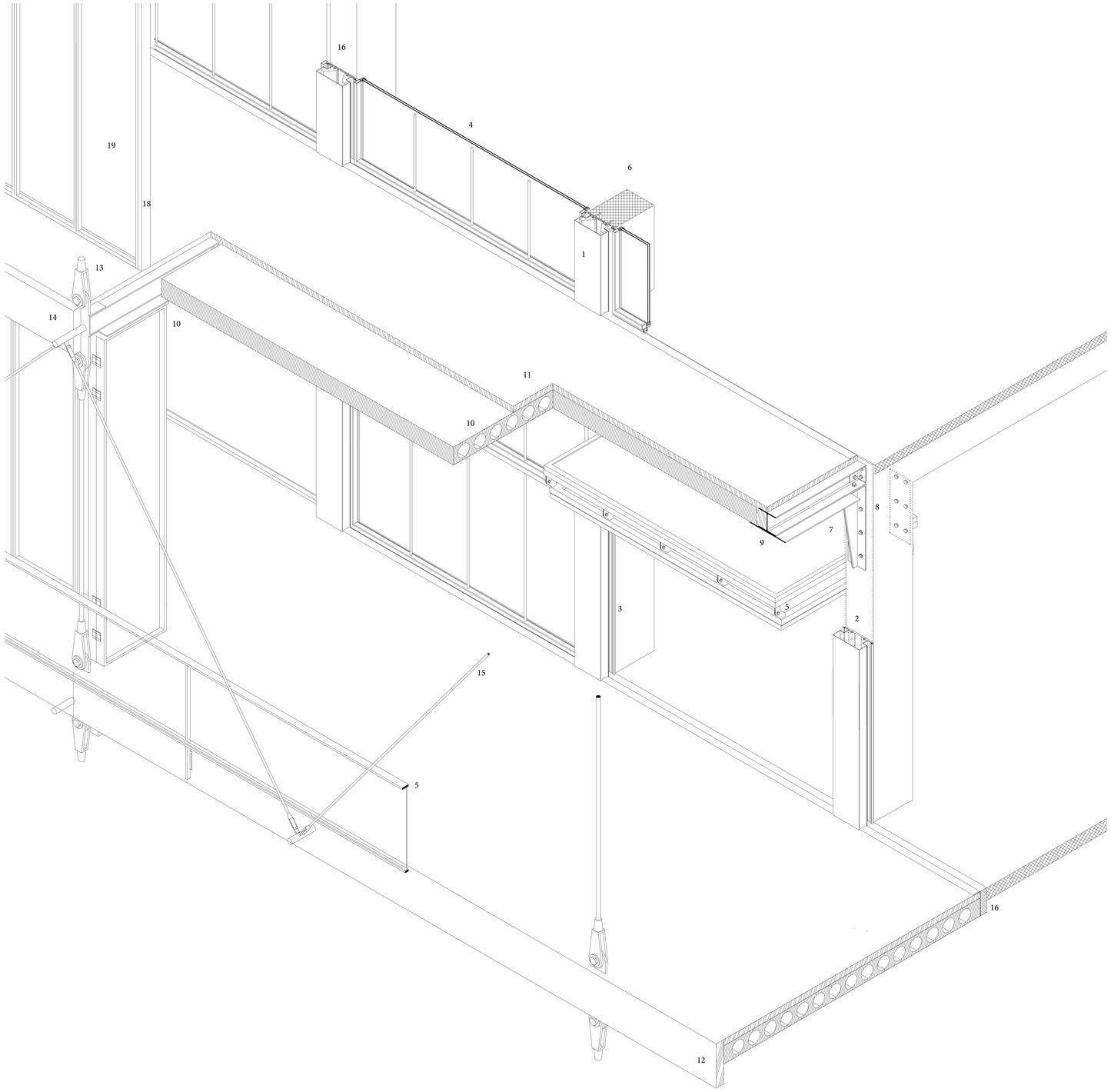
6 Existing RC columns
7 Steel plates
8 Anchor bolts
9 HE sections with welded bottom plate
10 Hollowcore concrete slabs 150”
11 In situ concrete 60”
12 Prefabricated concrete element
13 Steel cable head welded to steel beam
14 Steel tube welded to steel beam
15 Steel cables stiffners

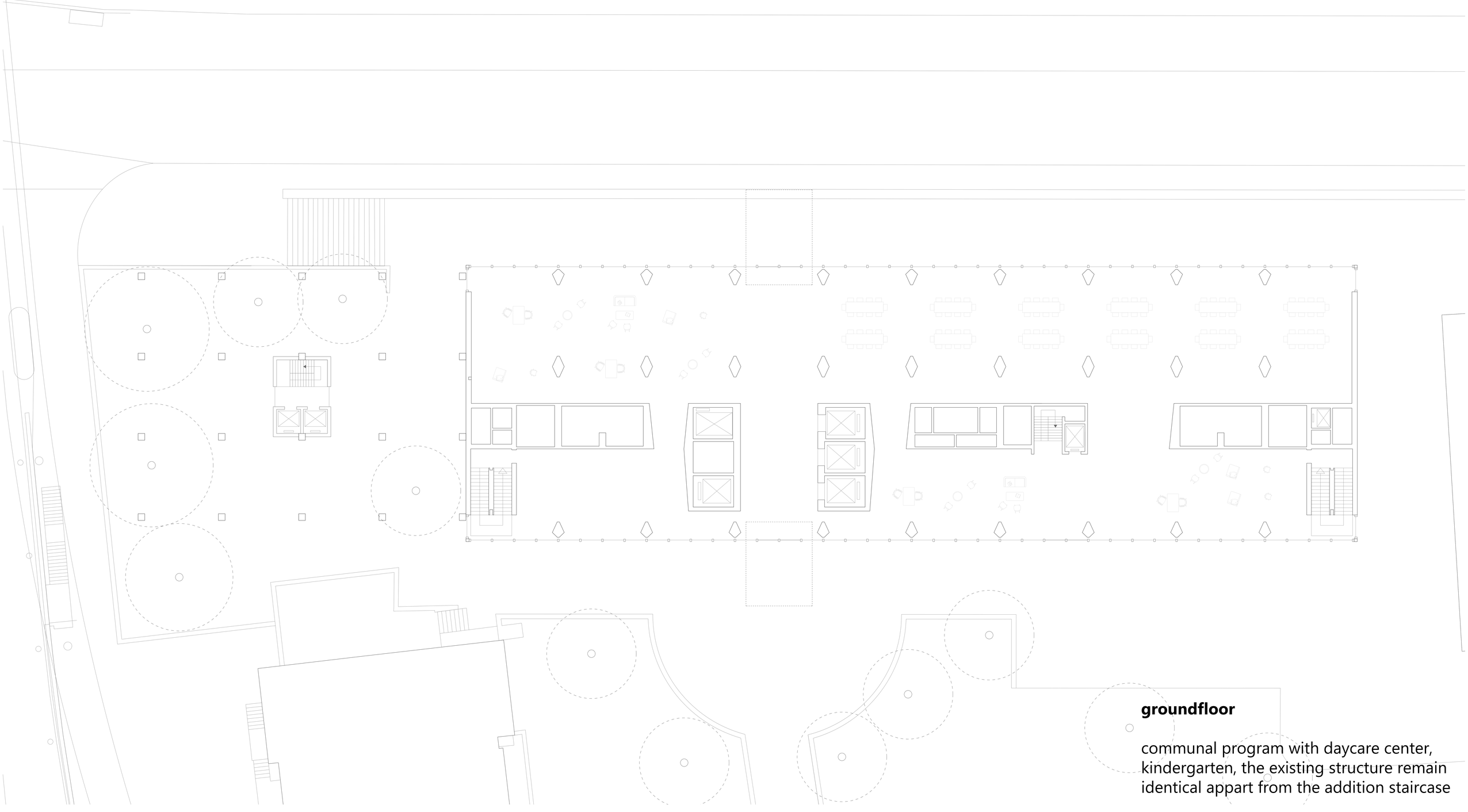
Thermal barrier

16 Insulation board 60”
17 Expansion joint 40”

Winter garden glazing

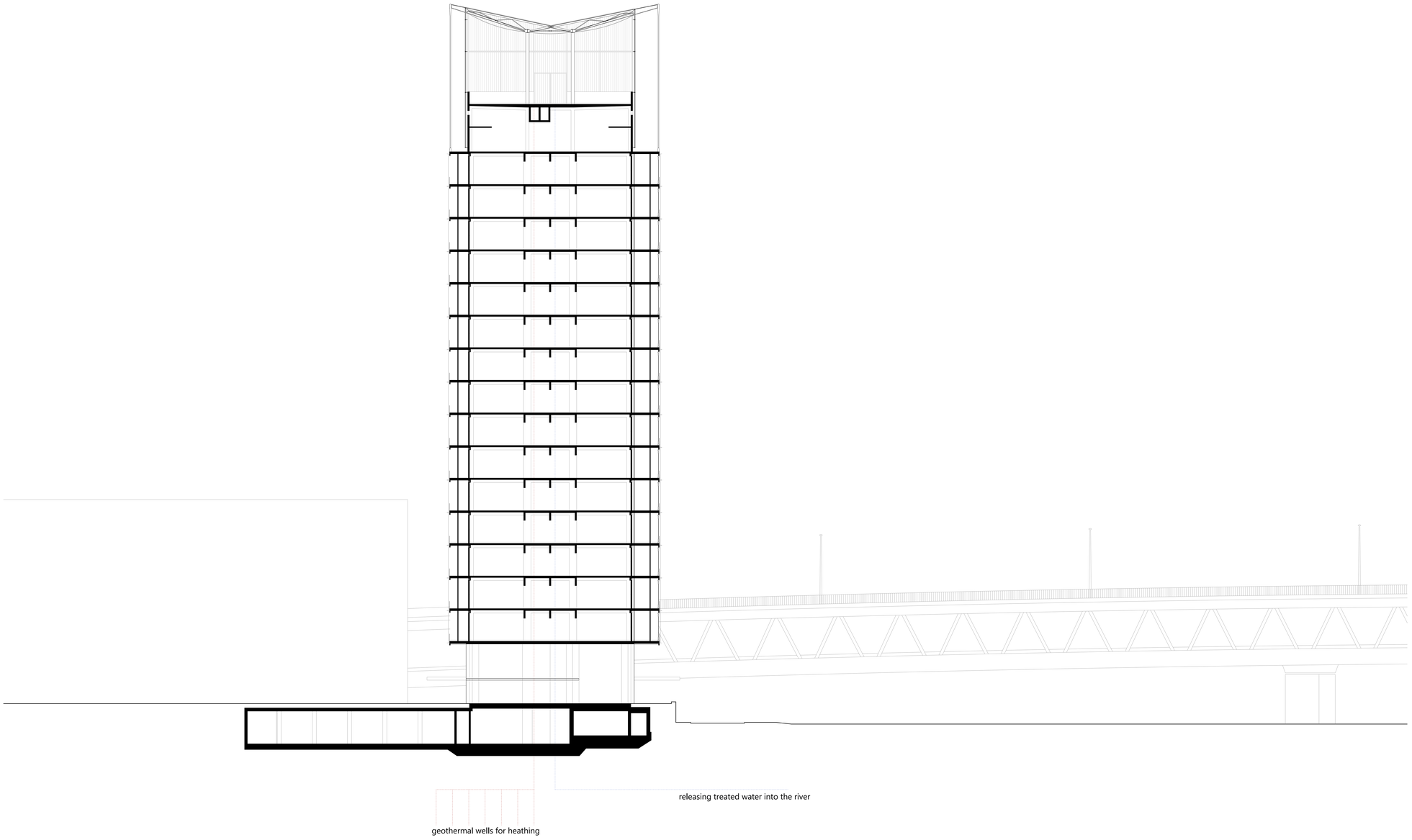
18 Aluminium frame with bifold track
19 Single glazing

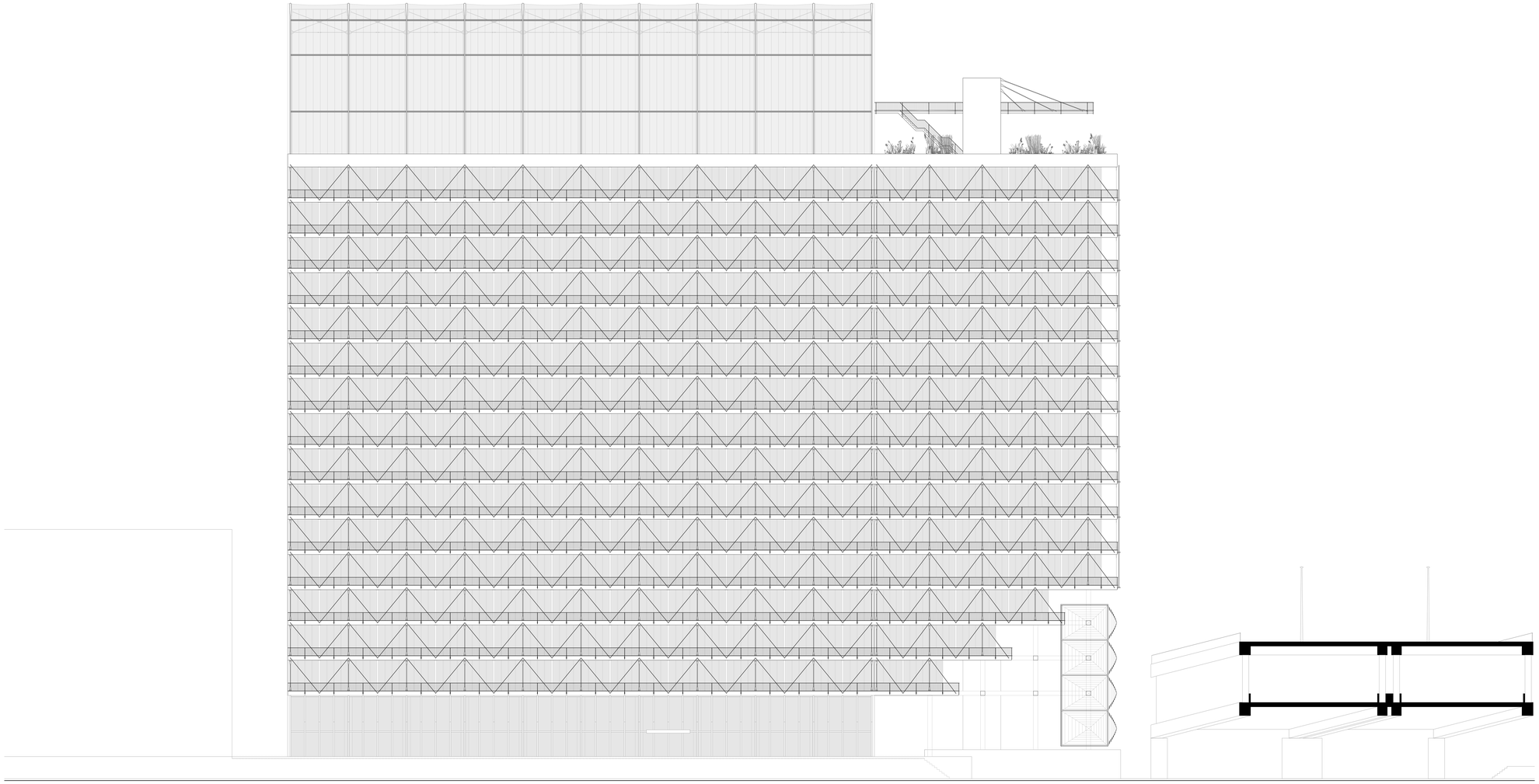


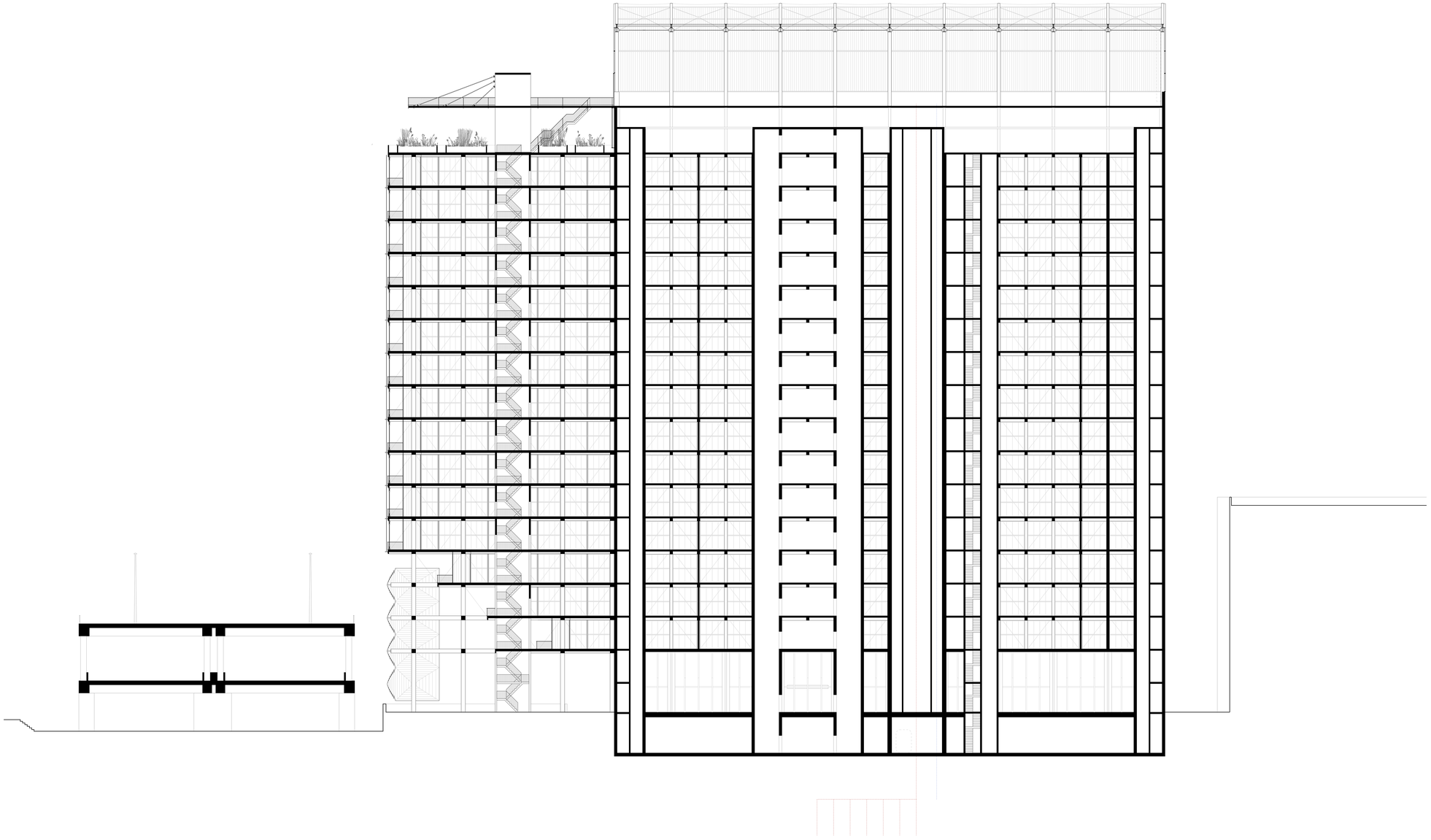


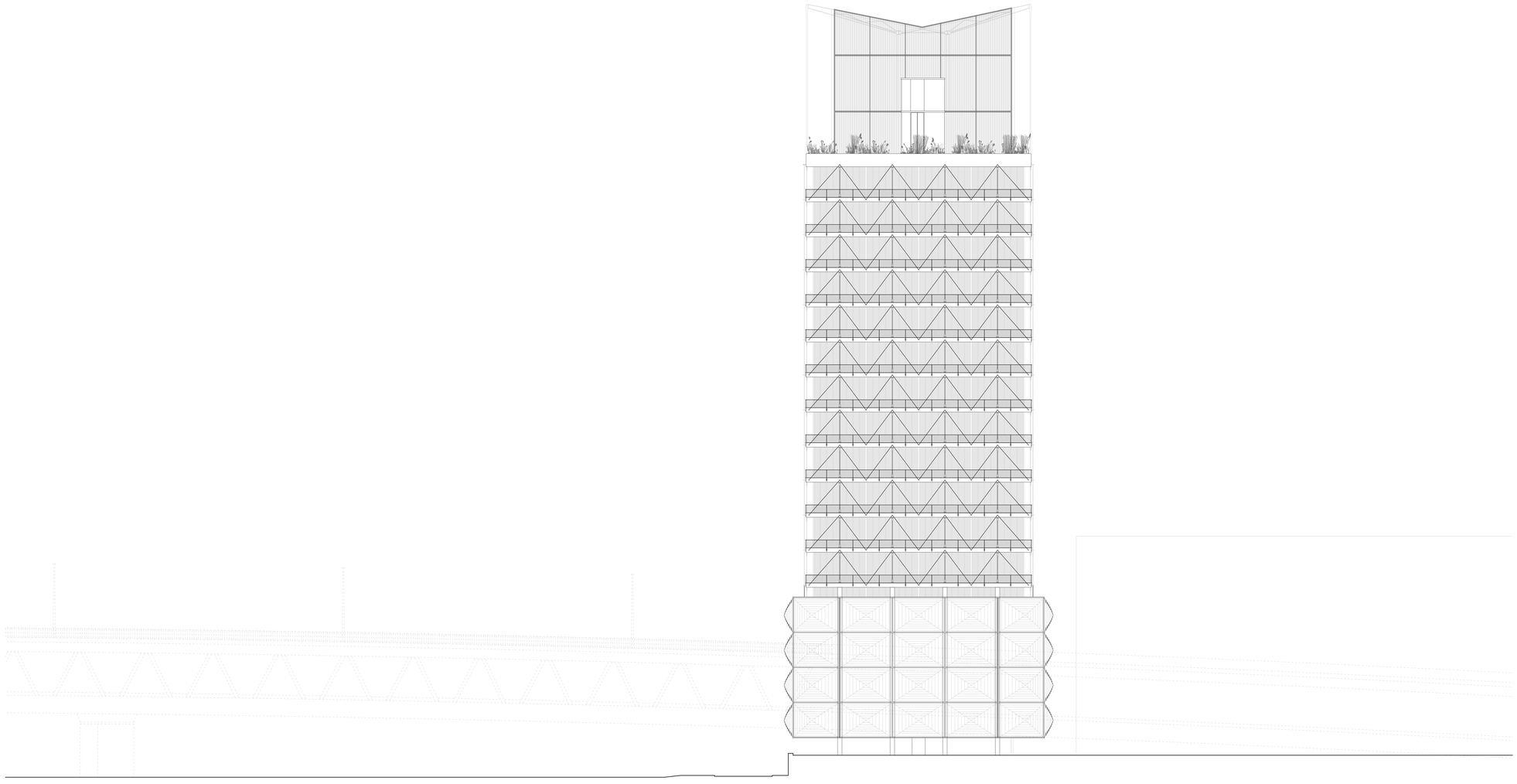
groundfloor

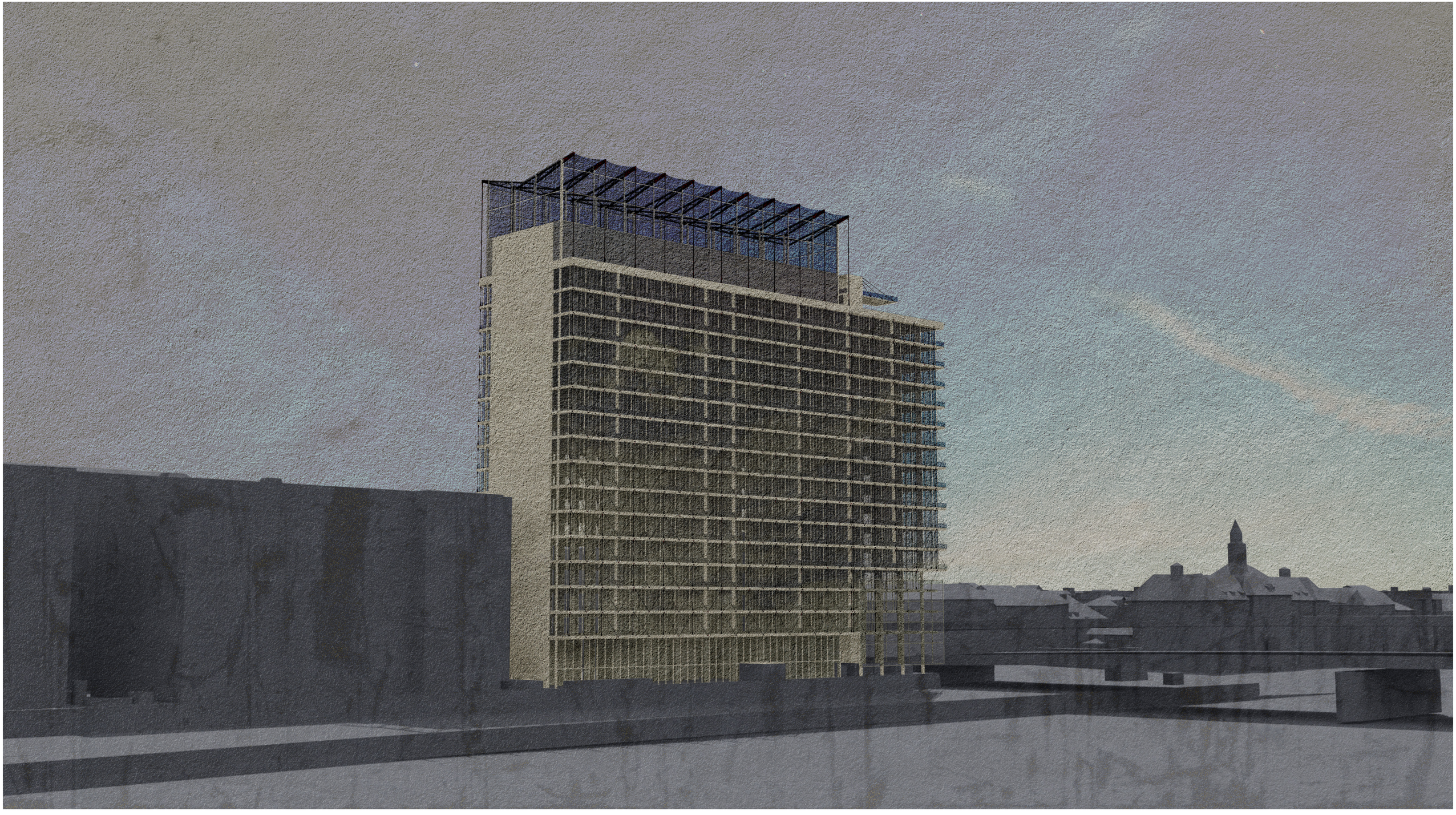
communal program with daycare center, kindergarten, the existing structure remain identical appart from the addition staircase

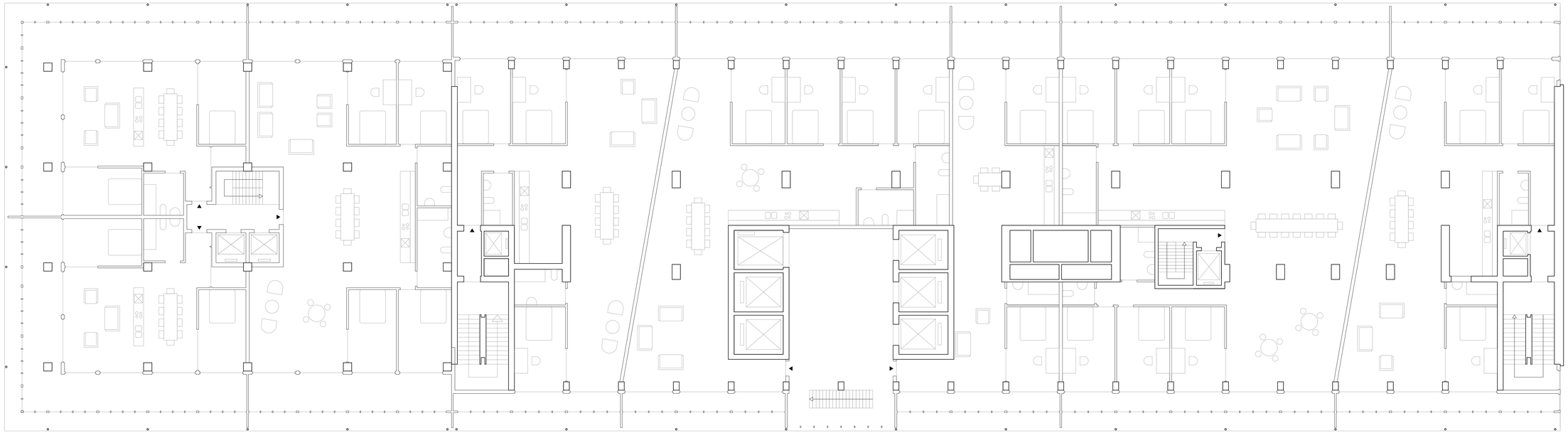

releasing treated water into the river
geothermal wells for heathing











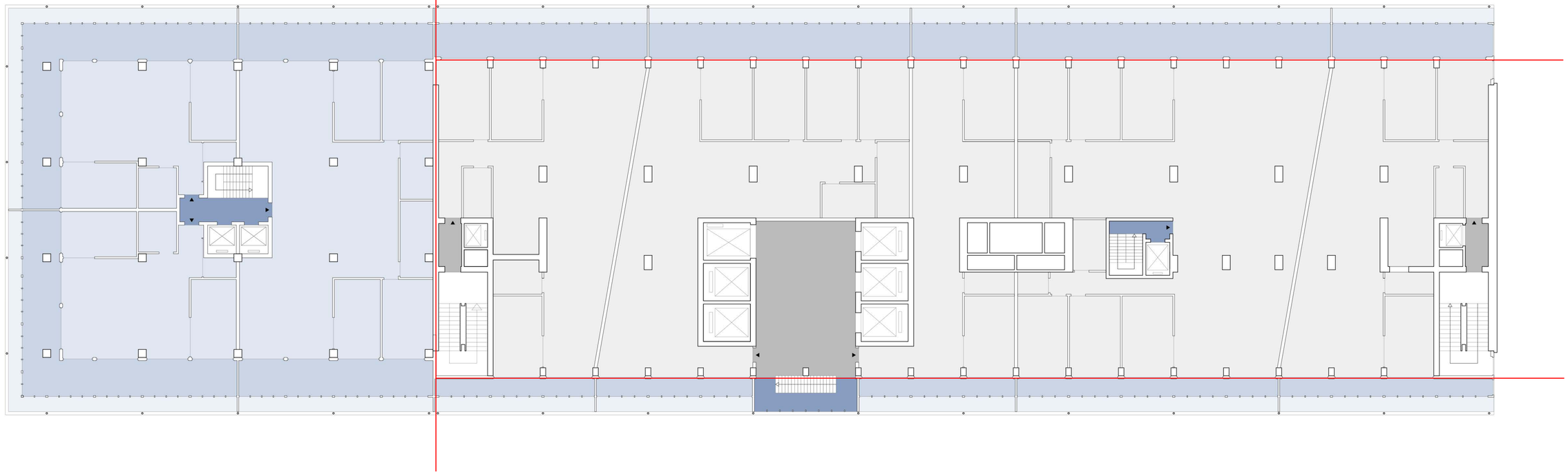
First to 15th floors
residential

exisiting access

exisiting floor area 1340 m²

building extention

façade extention



additional access

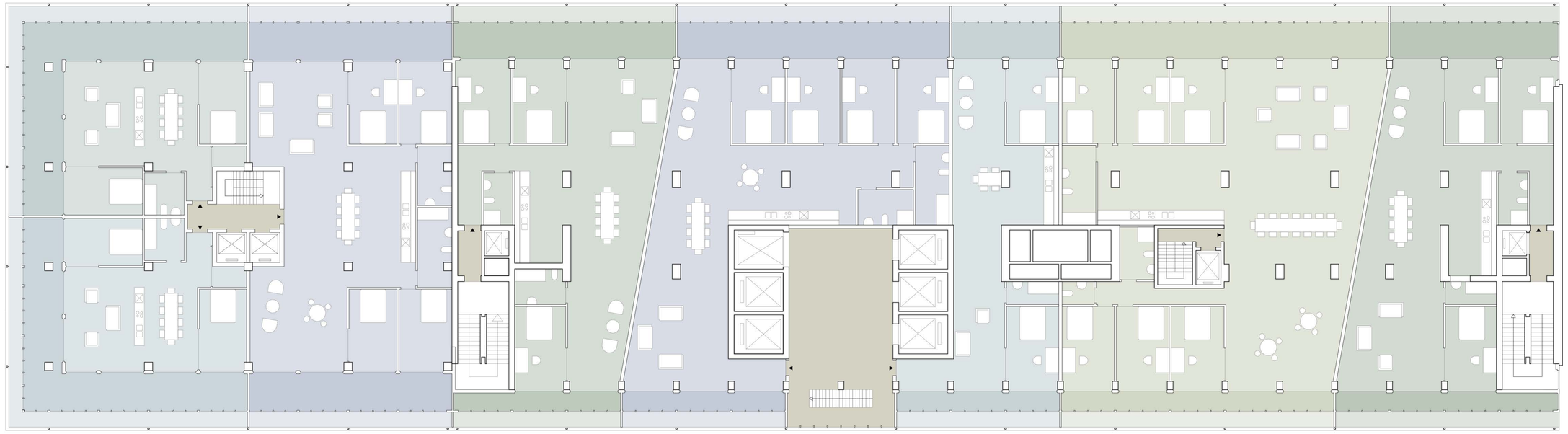
additional non heated floor area 375 m²

additional heated floor area 435 m²

additional balco-nies 188 m²

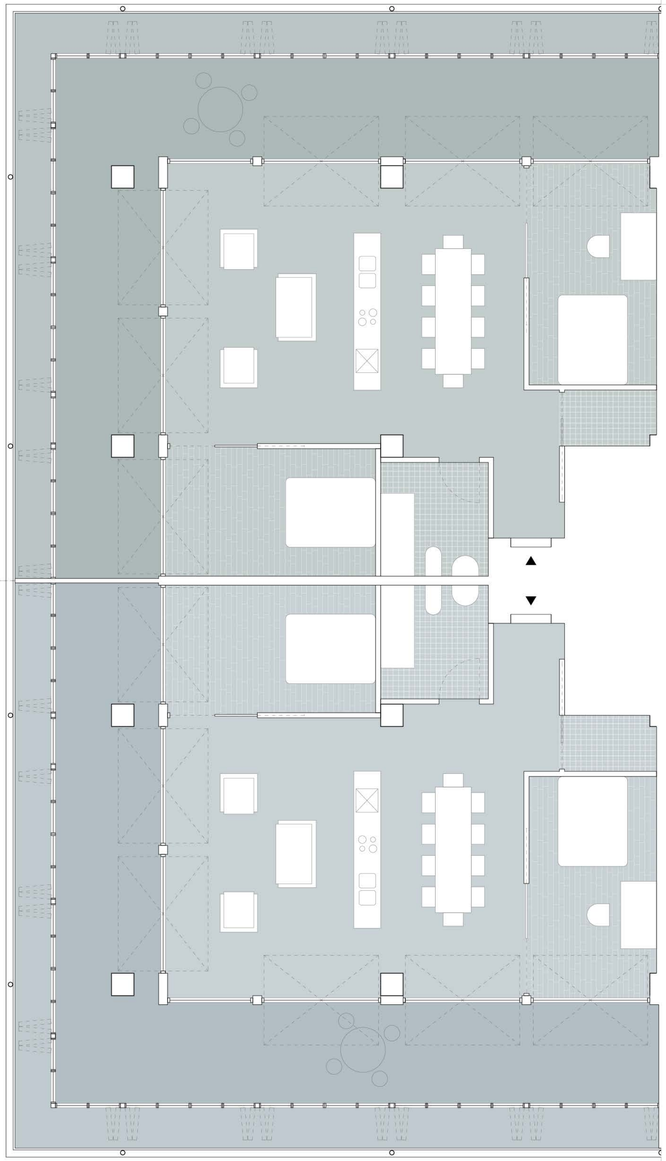
surfaces in numbers

120 appartements 8 appartements per floor, on 15 floors



2 (to 3) bedrooms 3 (to 4) bedrooms 4 (to 5) bedrooms 6 (to 8) bedrooms

plan of the typologies

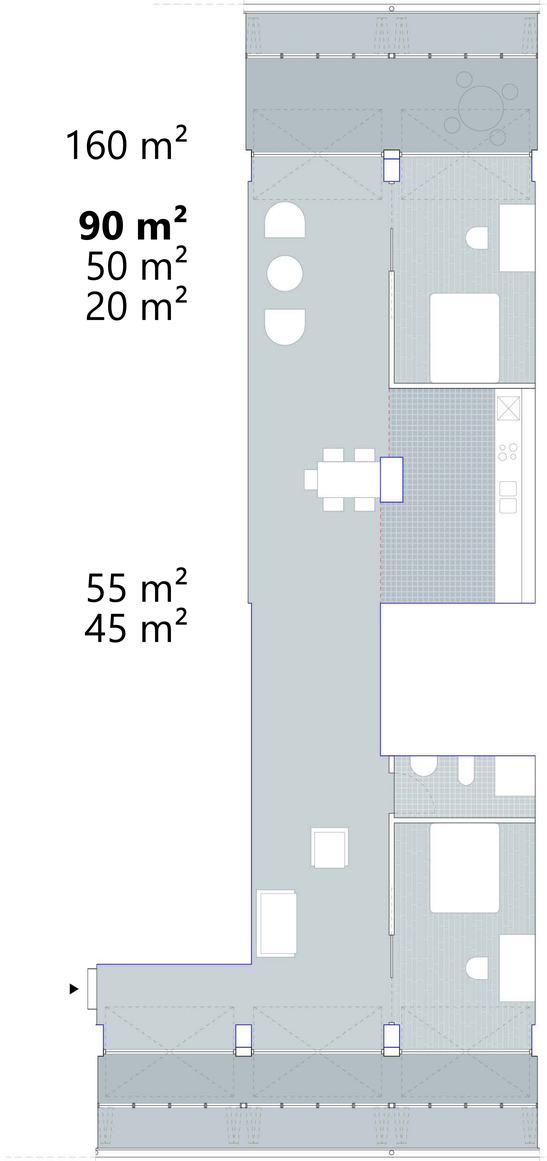


2 bedrooms flat
(combinable with twin)

total surface	160 m²
heated surface	**90 m²**
wintergardens	50 m²
balconies	20 m²

1 kitchen
1 bathroom
1 toilet
2 bedrooms

westward façade	55 m²
southward façade	45 m²

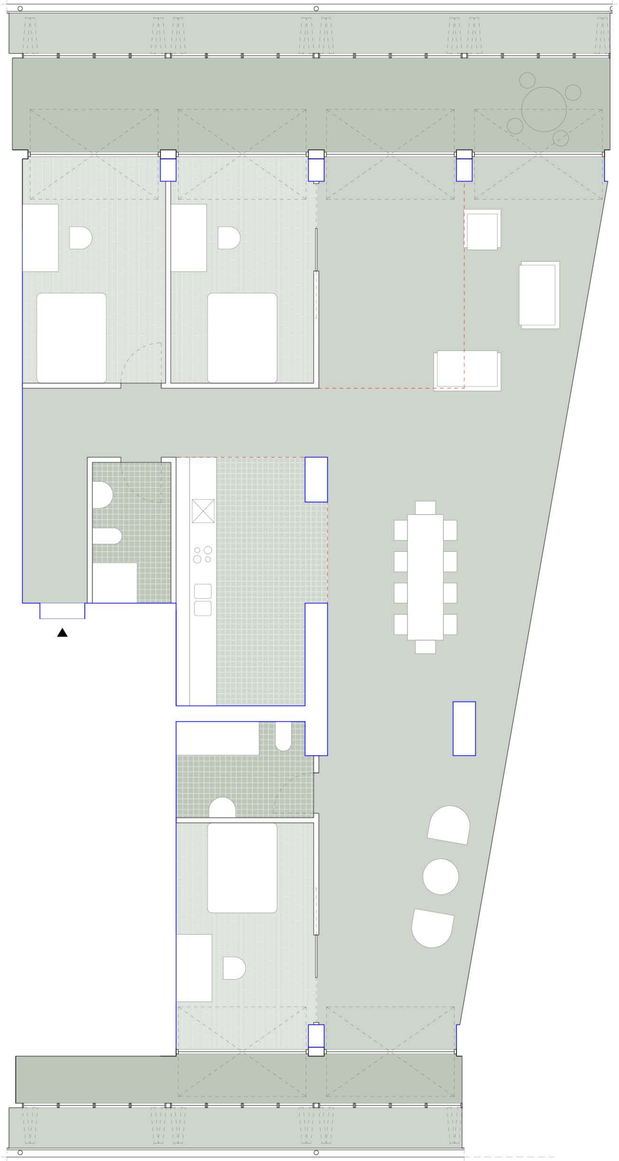


2 bedrooms flat

total surface	160 m²
heated surface	**120 m²**
wintergardens	25 m²
balconies	15 m²

1 kitchen (partitionable)
1 bathroom
2 bedrooms

westward façade	26 m²
eastward façade	40 m²

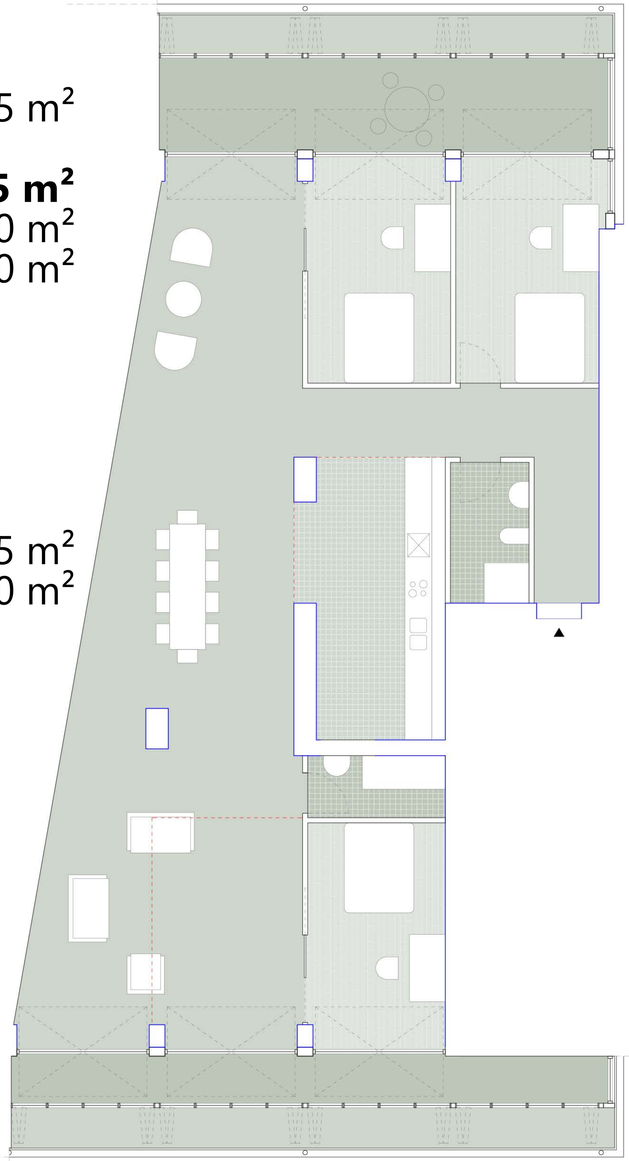


3 (4) bedrooms flat

total surface	245 m²
heated surface	**185 m²**
wintergardens	40 m²
balconies	20 m²

1 kitchen (partitionable)
2 bathrooms
3 bedrooms
(+1 bedroom)

westward façade	55 m²
eastward façade	40 m²

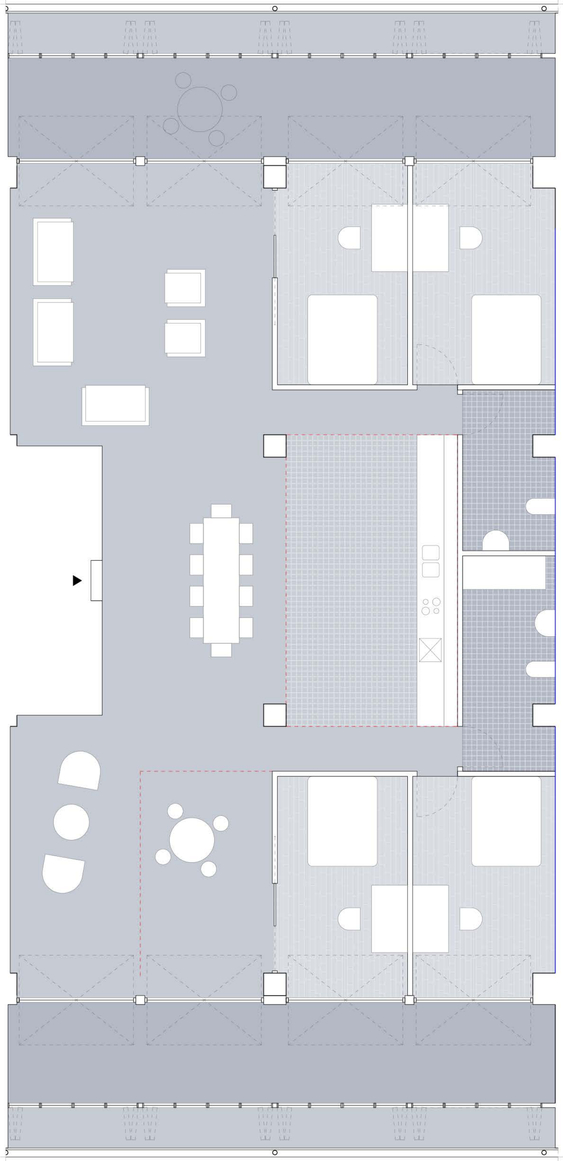


3 (4) bedrooms flat

total surface	245 m²
heated surface	**185 m²**
wintergardens	35 m²
balconies	25 m²

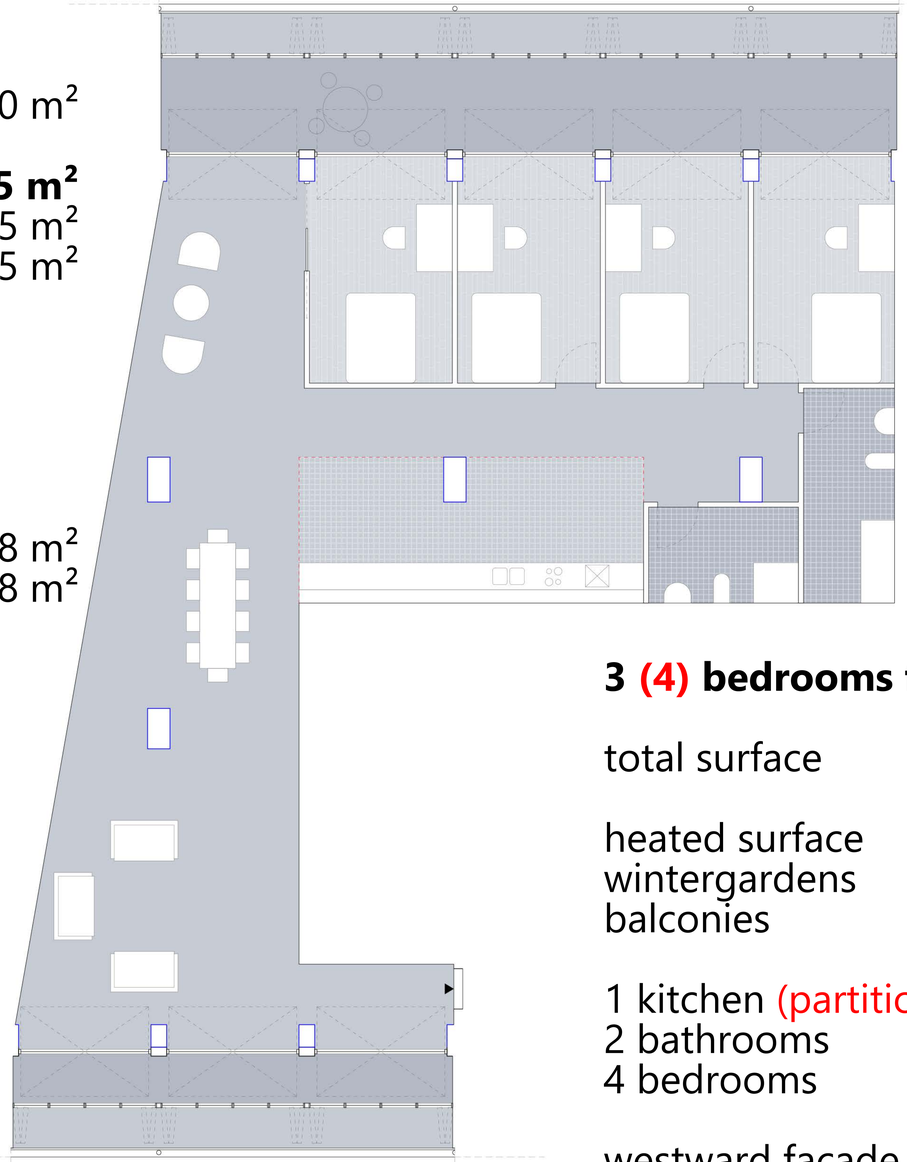
1 kitchen (partitionable)
2 bathrooms
3 bedrooms
(+1 bedroom)

westward façade	40 m²
eastward façade	55 m²



4 (5) bedrooms flat

total surface	290 m²
heated surface	**205 m²**
wintergardens	55 m²
balconies	25 m²
1 kitchen (partitionable)	
2 bathrooms	
4 bedrooms	
(+1 bedroom)	
westward façade	48 m²
eastward façade	48 m²



3 (4) bedrooms flat

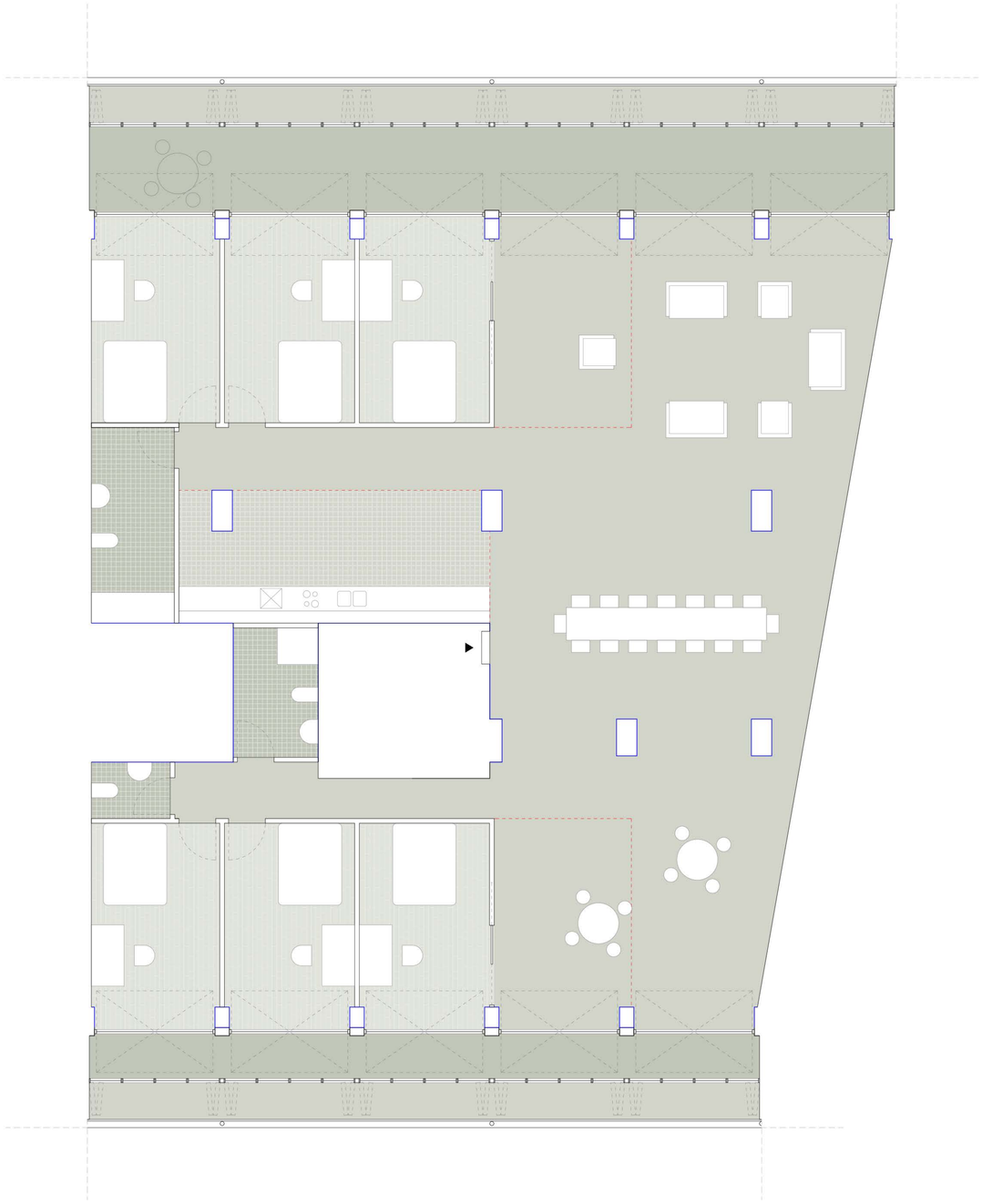
total surface	295 m²
heated surface	**225 m²**
wintergardens	45 m²
balconies	25 m²
1 kitchen (partitionable)	
2 bathrooms	
4 bedrooms	
westward façade	66 m²
eastward façade	39 m²

6 (7-8) bedrooms flat

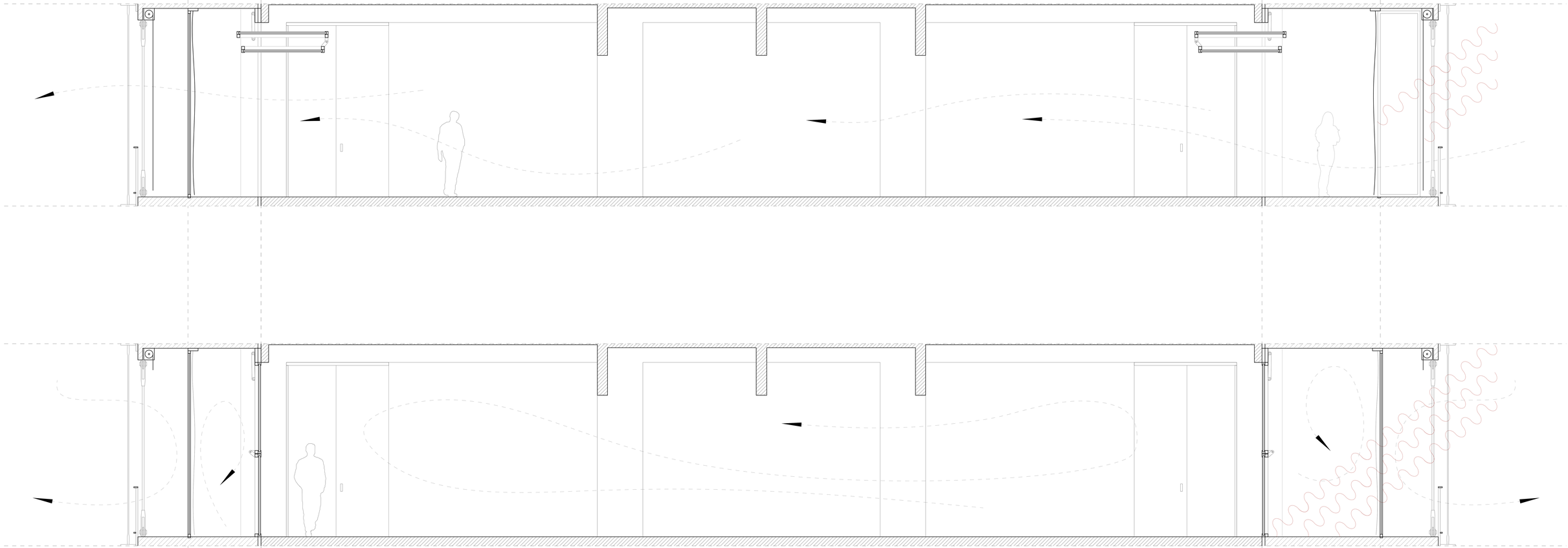
total surface	420 m²
heated surface	**320 m²**
wintergardens	65 m²
balconies	35 m²

1 kitchen (partitionable)
2 bathrooms
1 toilet
6 bedrooms
(+1 or 2 bedroom)

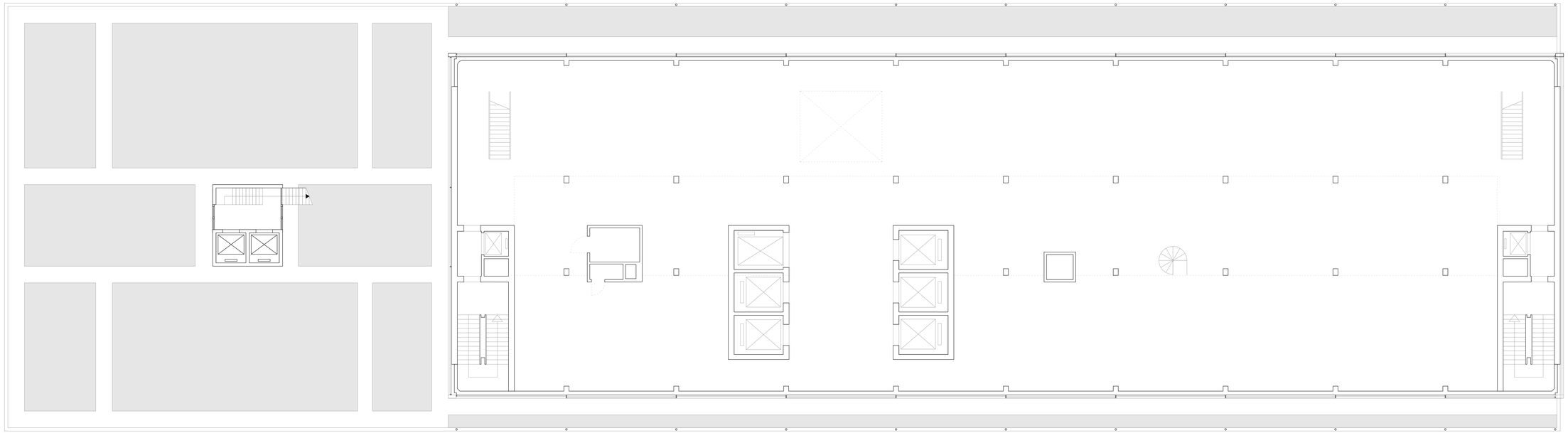
westward façade	79 m²
eastward façade	66 m²



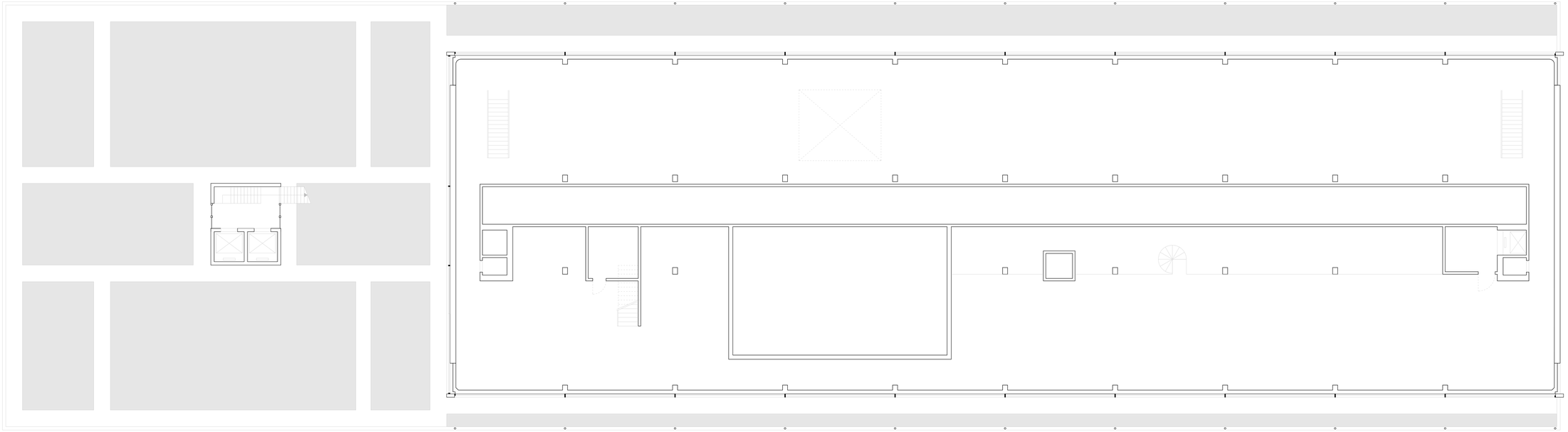
Section in summer
Double facing appartement allow unobstructed cross-ventilation



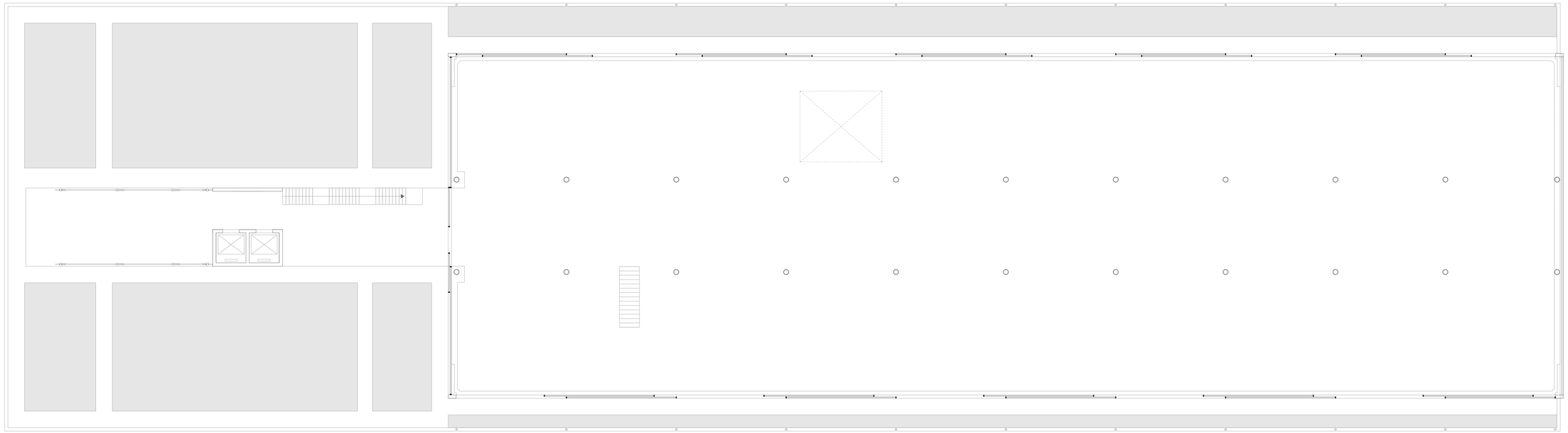
Section in winter
wintergardens as climatic buffers



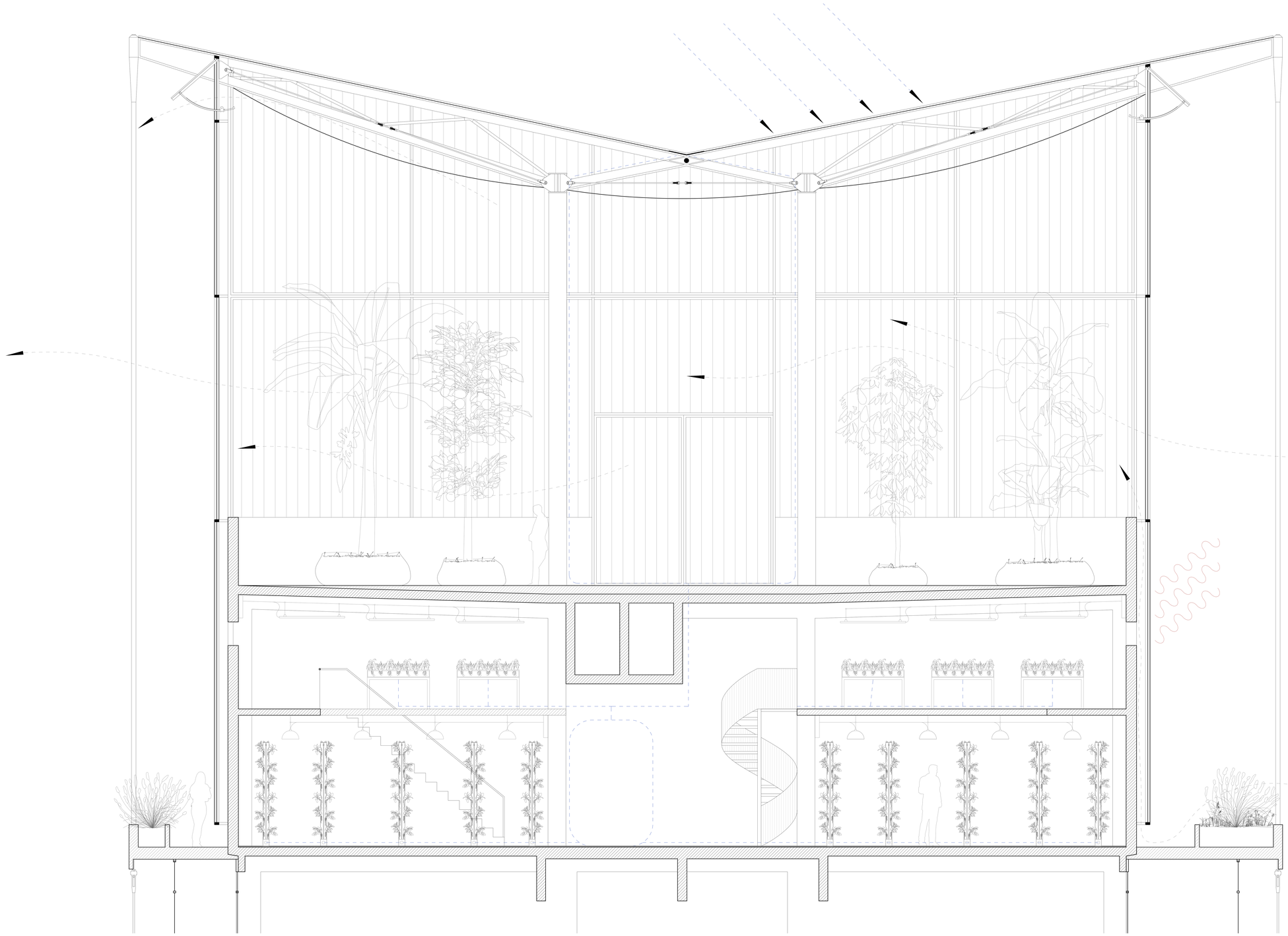
16th floor
growroom



16th floor
growroom



17th floor
greenhouse



rainwater collection

secondary opening

reflective curtains

main sliding windows

tropical greenhouse

thermic solar by placing the glazing in front of the existing concrete facade

LED powered indoor farming, using hydroponic and aquaponic for closed loop water managemente

section 16th and 17th floors