

# City Hall Brussels

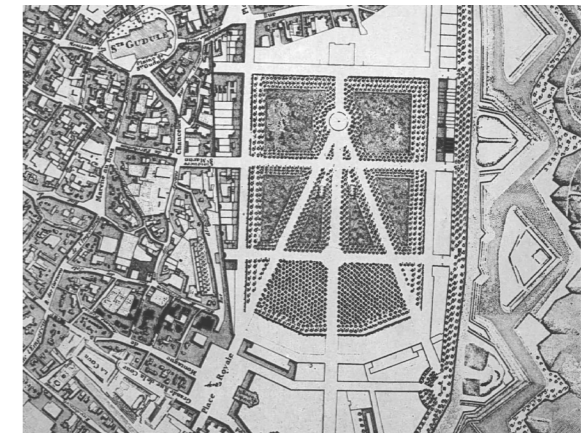
# Context

# Brussels 1745



Palace on the Koudenberg

# Brussels 1777



Warande Park

## Brussels 1837

replacement of the fortification by a ringway



Ringway; originally intended to take a stroll

# Brussels 1860



The Zenne

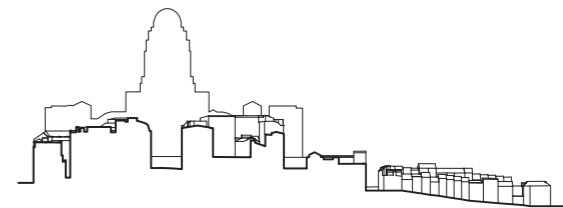
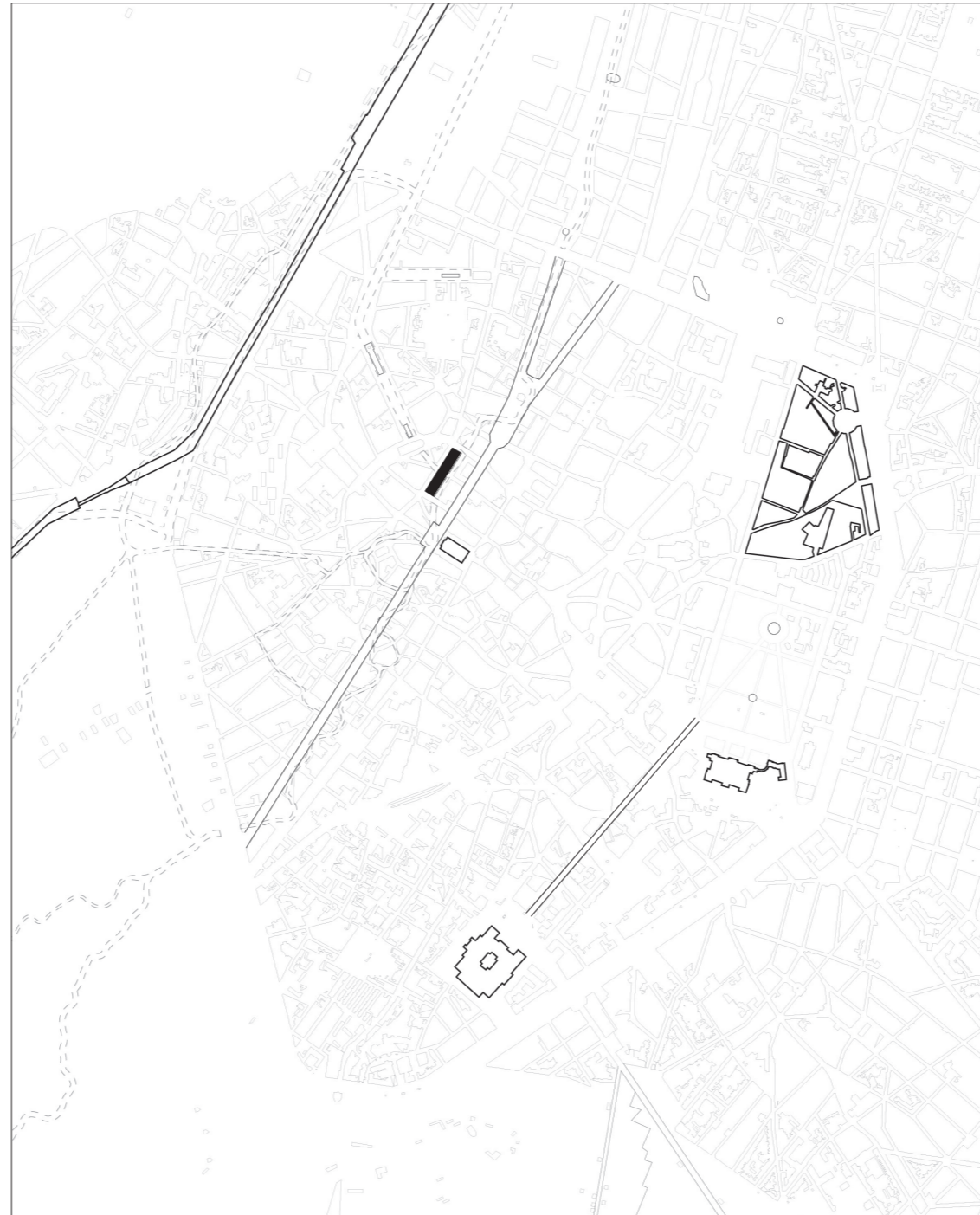


# Brussels 1874

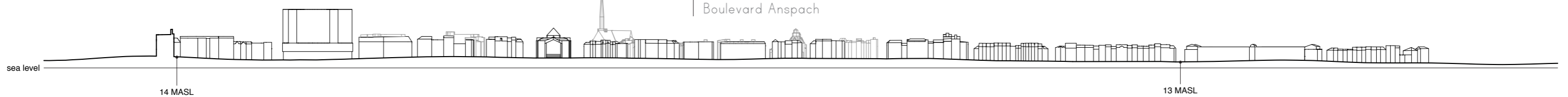
covering of the zenne | monumental axes leading to the Warande



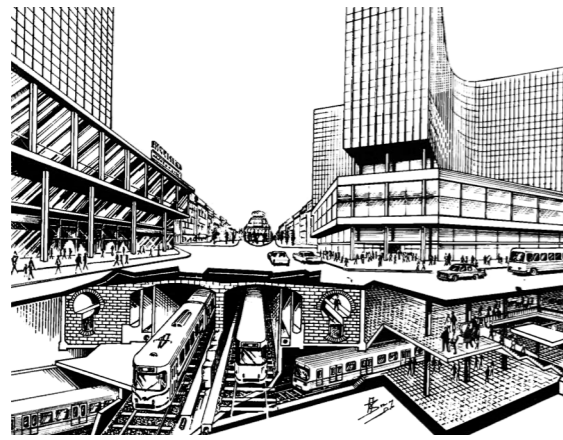
Boulevard Anspach



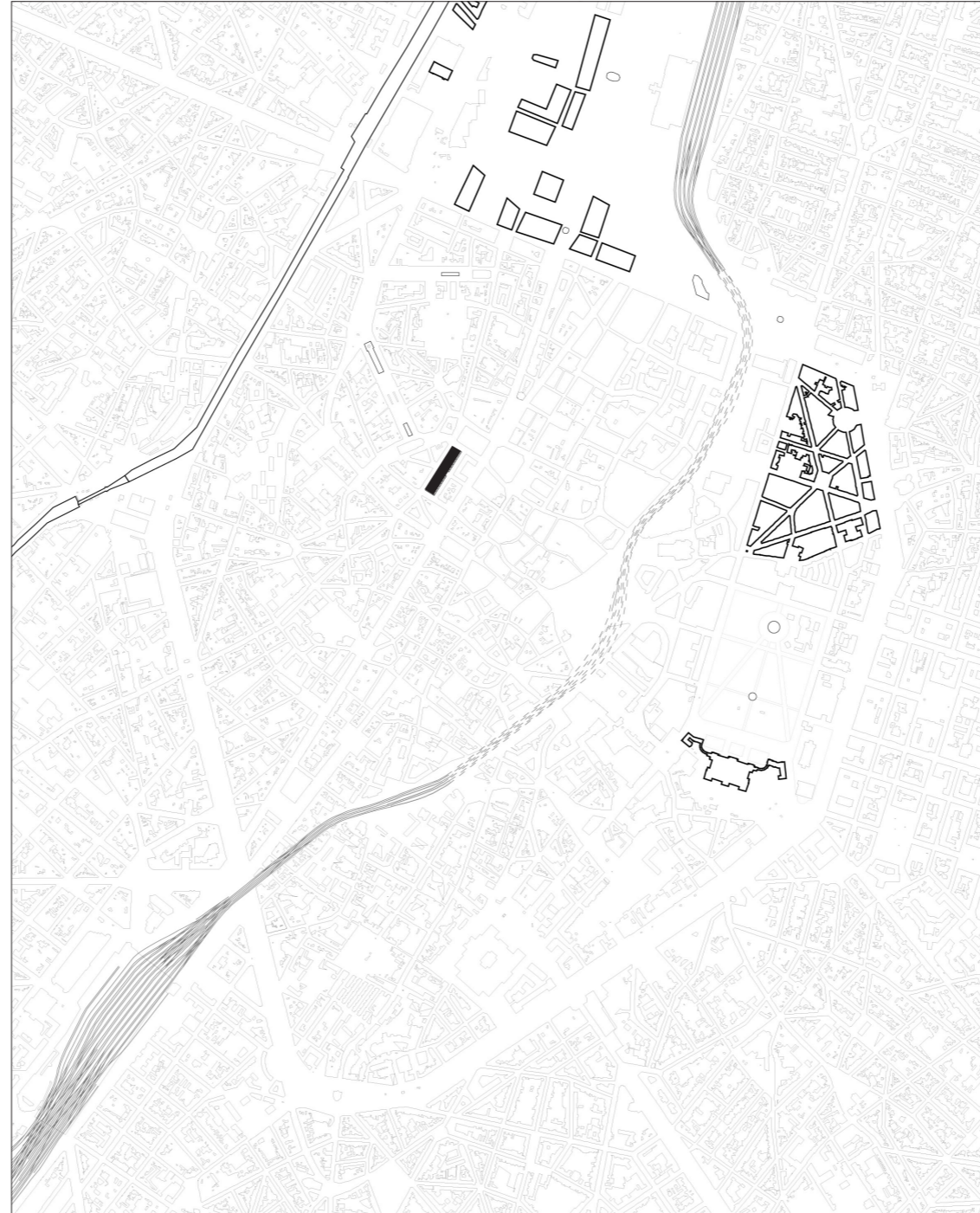
Palais de Justice



# Brussels 1952



Metro underneath Boulevard Anspach



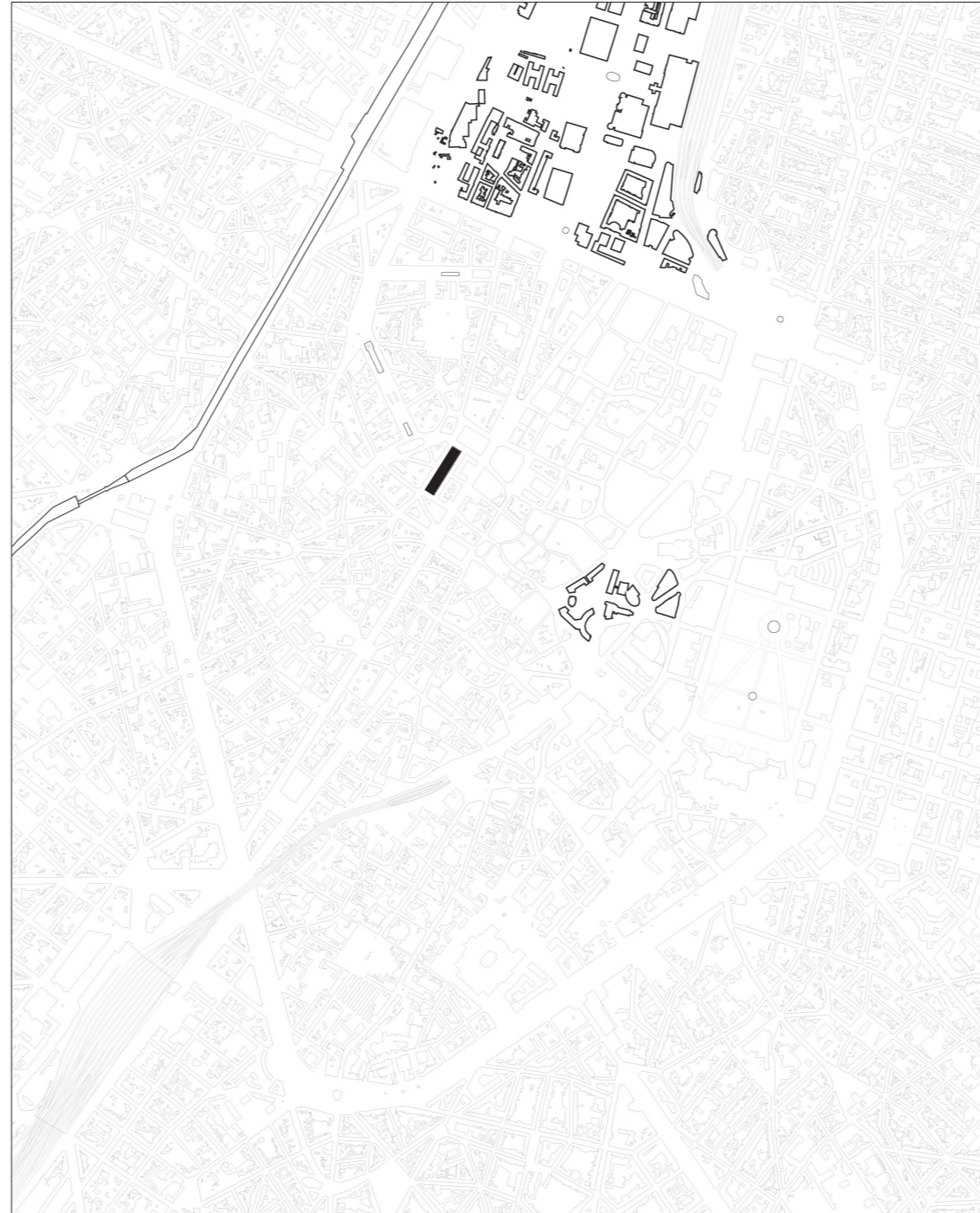


# Brussels 2019

Noordwijk, European Quarter - Scale increase



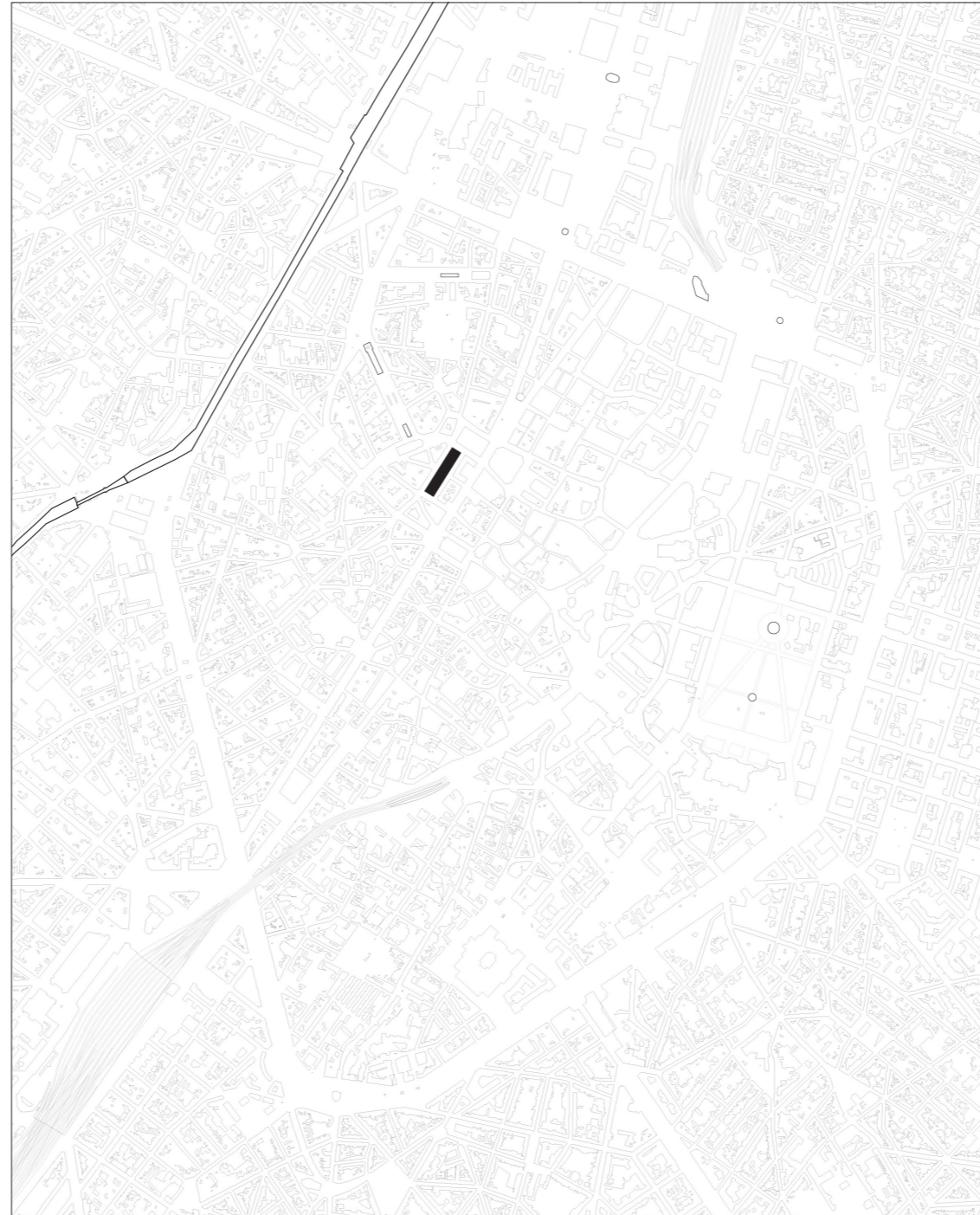
Noordwijk



European Quarter



Boulevard Anspach



Site - Parking '58



Site - Before 1870 and Current Situation

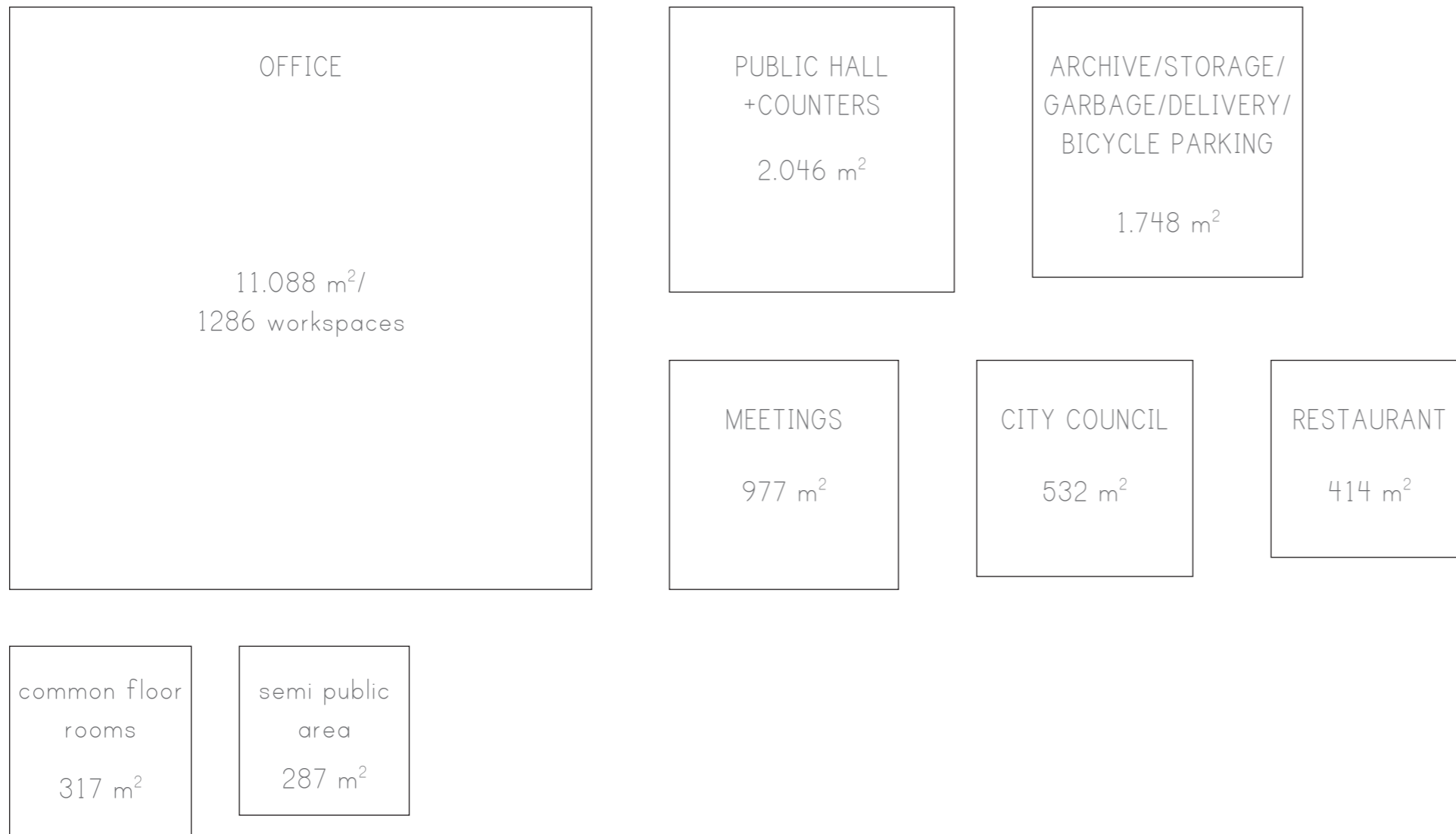


## Brucity - Winning Competition Project

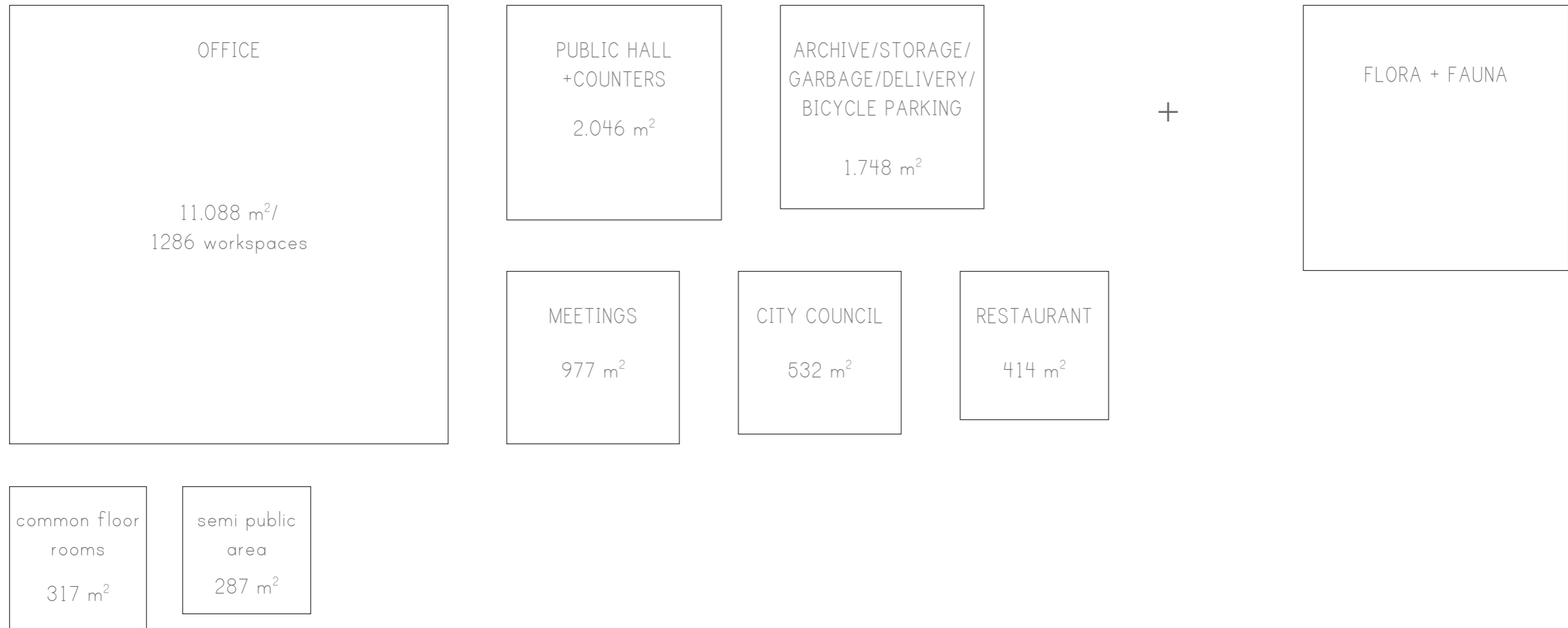


# Programme

# Programme Brucity



# Programme City Hall Brussels





## Brussels Inhabitants

Brussels counts 182 nationalities

+

44 species of indigenous mammals

92 species of indigenous breeding birds

12 species of indigenous amphibians and reptiles

19 species of bats

the fox, the hedgehog, red squirrel, roe deer, bees

841 different plant species, half indigenous

# Spread of Common Swift (left), Hedgehog (right)

Brussels, from 2008 and 2000



...jungie: stedelijke pogingen om groener en wilder te worden, boeken succes

# 'De gierzwaluw en egel hebben ook recht op plek in de stad'

In de stad van de toekomst wonen ook wilde dieren. Dat is de droom van de aanhangers van 'natuurinclusief ontwerp'.



Een roodborstje prinkt in een oude fabriek die weldra een stuk park wordt.

**TOM VERHAERT**  
 'Munnikeninvers hadden er in de middeleeuwen hun bijenroede. Die moest wijken voor het industriële geweld van een textiel fabriek en een metaalbedrijf. Vandaag zijn de bijen terug in het Gentse Bijenpark. Wilde, deze keer.'  
 In dit park is het klassieke grasperk-met-speteligen begreemd door het ruimere werk. Met opzet. 'Dat past in ons soortenplan, het eerste van het land', zegt Geert Heyneman, de Gentse stadsecoloog. Samen met zijn collega's van de groendienst moet hij meer natuur in de stad brengen.  
 'Het verwilderde groen in de strook naast de spoorweg mocht blijven', toont hij. 'We hebben er wat hoge bomen uitgehaald, zodat de rest meer zonlicht krijgt. Daardoor krijg je dichte braamstruiken en wilde rozen. Prima leefgebied voor insecten, die op hun beurt de maaltijd vormen voor de mussen en vleermuizen die hier rondvliegen.'

**Lokken met geluid**  
 In deze wilde buffer leven een vos, steenmarter en eekhoorn. De vleermuizen vinden een winterverblijfplaats in de kelder van het vervallen fabrieksgelouwe. Aan de gevel hangen kasten voor gierzwaluwen en geperforeerde houtblokken voor de wilde bijen. Reageert de natuur positief op al dit menselijk werk? 'We telzen een twintigtal overwinterende vleermuizen', zegt Heyneman. 'Nog niet veel, maar wel de grootste kolonie van Gent. De gierzwaluwen hebben de weg naar de kasten nog niet gevonden. We zullen ze volgend jaar lokken met geluiden, want ze vliegen hier wel degelijk rond.'  
 Wat Gent hier en elders in de stad doet, past in een prille maar groeiende internationale trend. In Nederland heet het 'natuurin-

... dat zijn typische dieren waar natuurinclusief op mikt, het gaat niet om de wolf', zegt Maïke van Stiphout van het gespecialiseerde bureau DS Landschapsarchitecten in Amsterdam, die er een introductie toe schreef. DS werkte onder meer mee aan het iconische woontorenproject Vertical in Slo-terdijk. De ambitie is om er ooit de nachtopaal te vervelkomen.  
 Van Stiphout somt op wat de ingrepen zoal kunnen inhouden: klimplanten op gevels en groendaken, speciale dubbeldekking voor de gierzwaluw, verwijderde tegels ten gunste van de regenworm, Gaten in onbethingen, zodat de egel zich kan verplaatsen. Gevels worden opgetrokken uit poreuze materialen, of er worden zaaitjes in geboord. Daar hechten planten zich beter aan en insecten kunnen er hun eitjes in leggen. Die 'alternatieve' gevels kunnen ook ~~degestrookte~~ worden in de bestrating, zoals in het Parijse Boulogne-Billancourt is toegepast.

**Geduld**  
 Voor spectaculaire resultaten is het nog te vroeg. 'Het is geduld nodig', zegt Van Stiphout. 'Al heb je om het draagvlak te vergroten ook kleine successen nodig. En die zijn er. In Utrecht stelde de stads-ecoloog binnen het jaar vast dat in de kasten die voor gierzwaluwen bedoeld waren, plots mussen bleken te huizen. Een goed teken. Mussen zijn weghereiders.'  
 Maar *animal aided design* is meer dan wat nestkastjes hangen. 'Nestkastjes kunnen ecologische vallen zijn als er niet voldoende voedsel voor de bewoners in de buurt is', waarschuwt Deléage. 'Daar moet je dus ook aan denken bij het ontwerp. Of neem vlinders. Nectarrijke bloemen zaiten is prima, maar vele soorten voeden zich met brandnetels. Die moeten we dus ook toelaten.'  
 Wie dieren zegt, zegt ook kans op ziektes en overlast. 'Ook daar, mee moet je bewust omgaan', besamt Deléage. 'Als je open water aanlegt, dreigen muggen te komen. Dan moet je de omgeving aantrekkelijk maken voor dieren die muggen opeten. Dat kan kun je naar plekken lokken die je netjes houdt en waar je het aantal eieren kunt controleren. De steden Nottingham en Basel hebben dat voor elkaar gekregen.'  
 'Je moet je voorzorgen nemen', benadrukt ook Maïke van Stiphout. 'Een geplante gevel kan niet zonder horen voor de ramen.'

**'Het belangrijkste is dat dieren bij de stad horen, al eeuwenlang. En dat mensen ze ook gewoon mooi en leuk vinden'**

**GLENN DELÉAGE**  
 Landschapsfilosoof

Dierschap, naar een gedeelde ruimte voor mens en dier. Glenn Deléage en Sylvie Van Daren (red.) Uitgeverij Gompel & Suijckens, 22,50 euro

Heronder ligt het winterverblijf van de Gentse vleermuizen.

Maison du Peuple Victor Horta | Political Space Model



Political Space Model - Rights of Nature



Jan Brueghel de Oude, The Earthly Paradise, 1568-1625



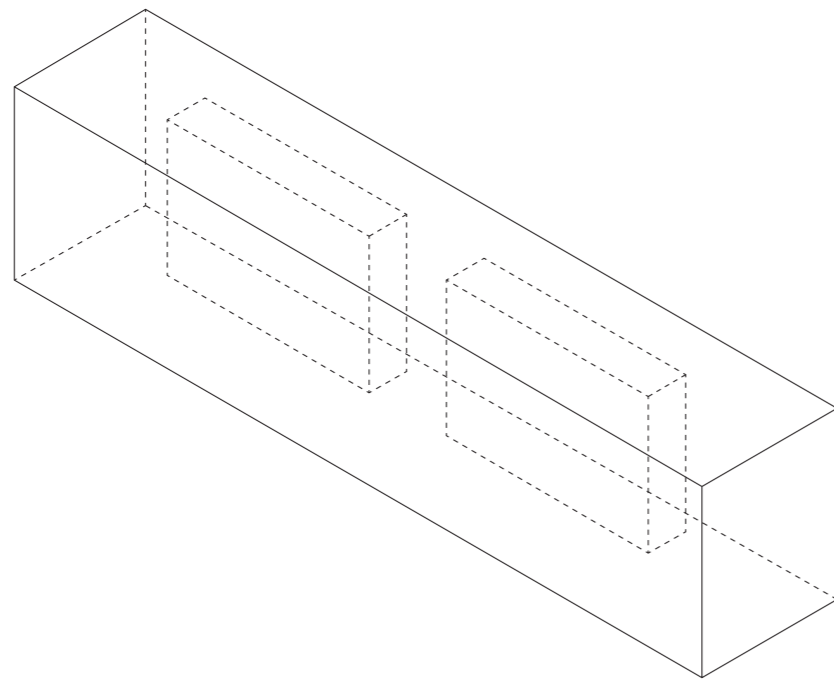
To what extent can such a large public building with its representational character by nature, answer questions of environmental responsibilities and awareness, nature-inclusiveness, sensitivity to material properties and how will this translate in program as well as architectural and construction qualities?

## Initial Proposal including Courtyards

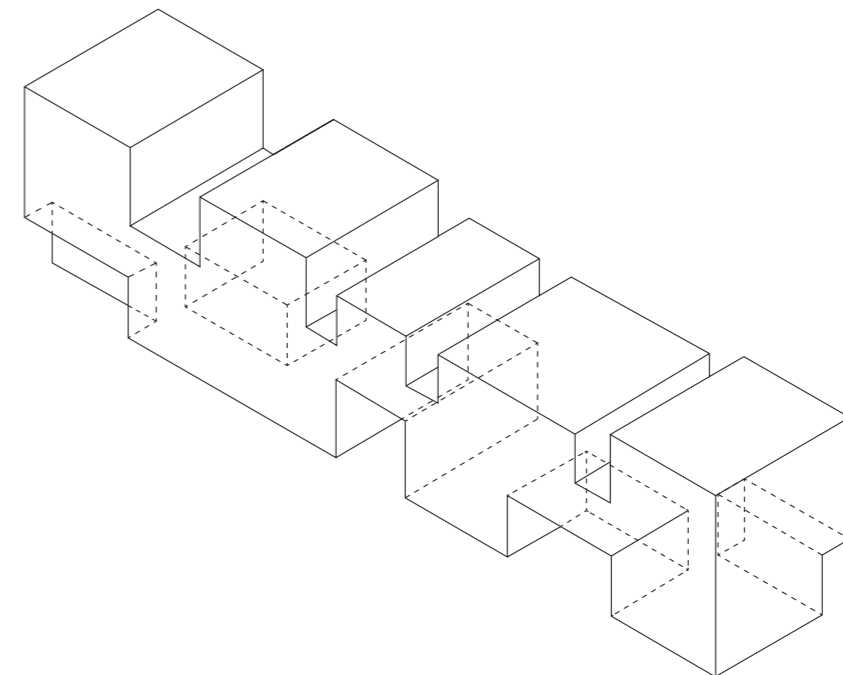




# Comparison Brucity and Design Proposal

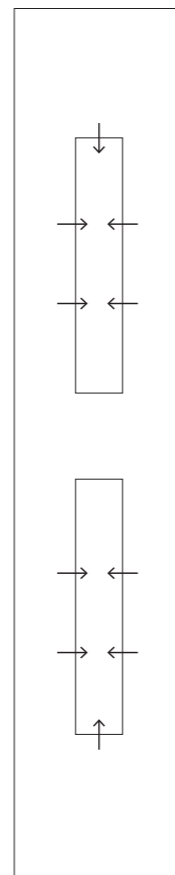


Brucity

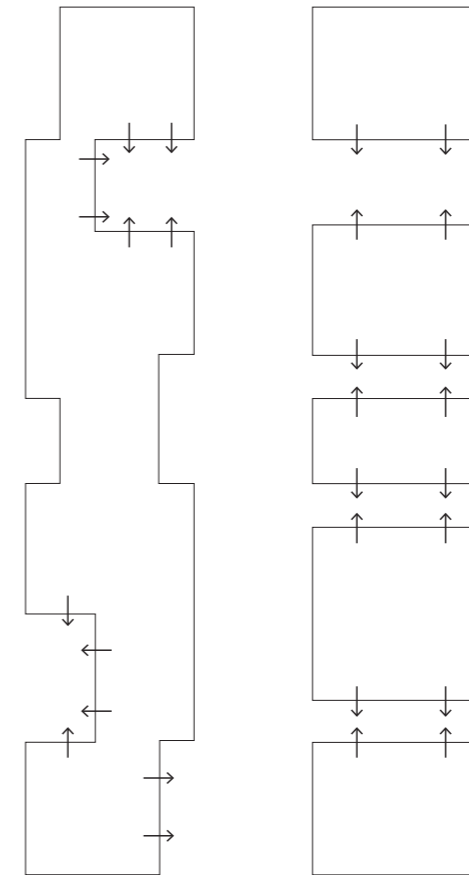


City Hall Brussels

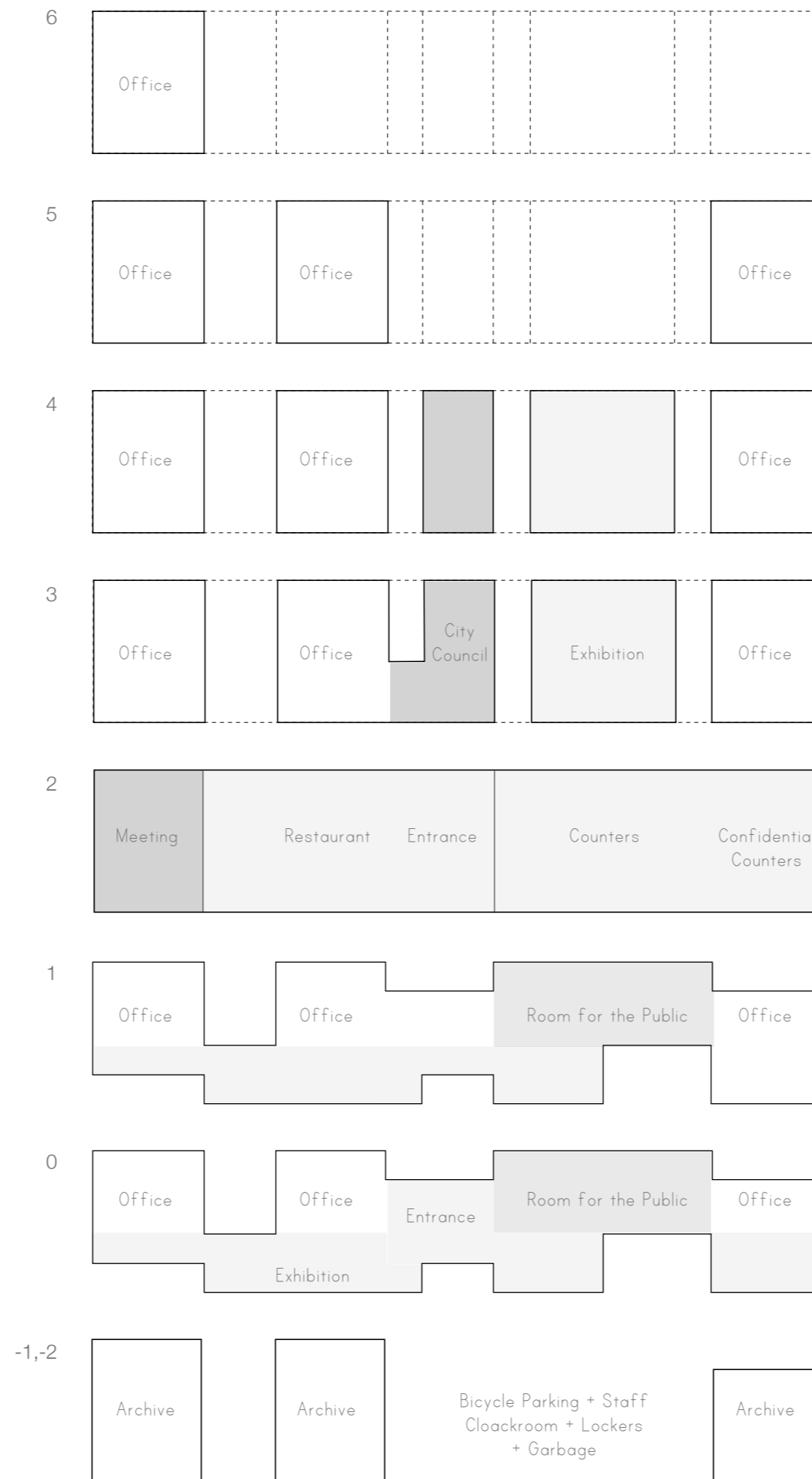
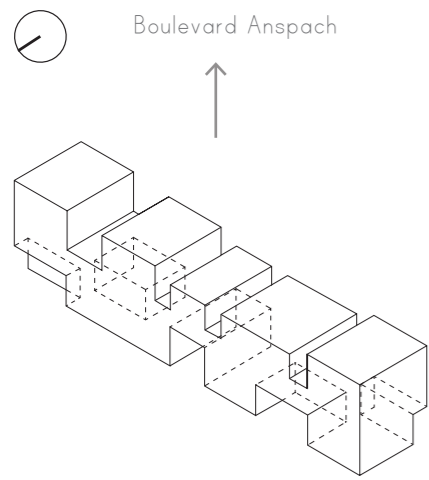
# Comparison Brucity and Design Proposal

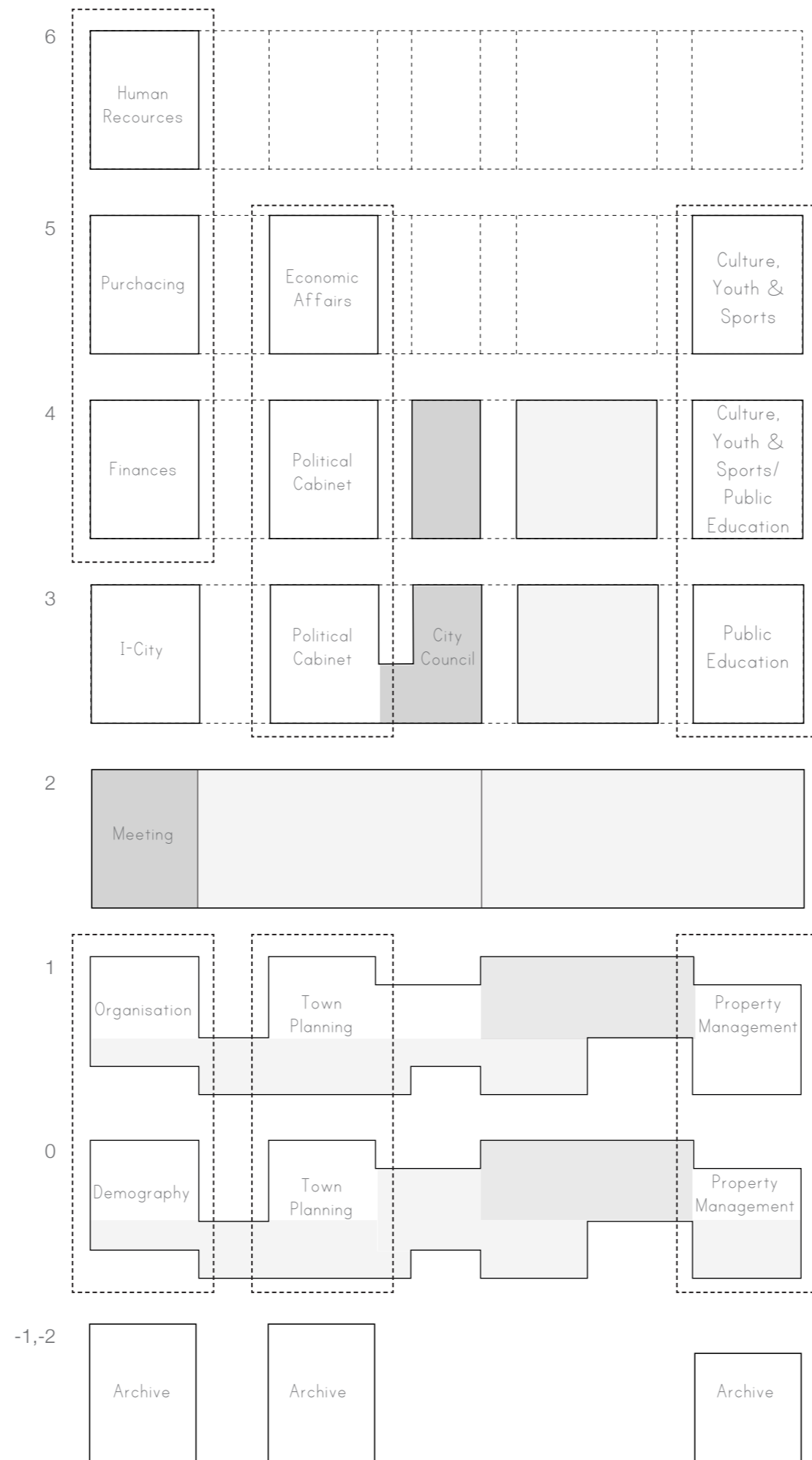
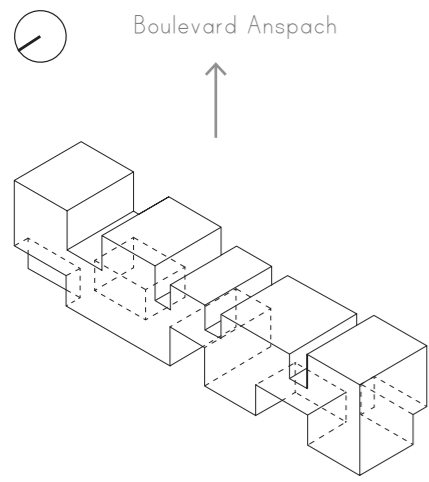


Brucity



City Hall Brussels



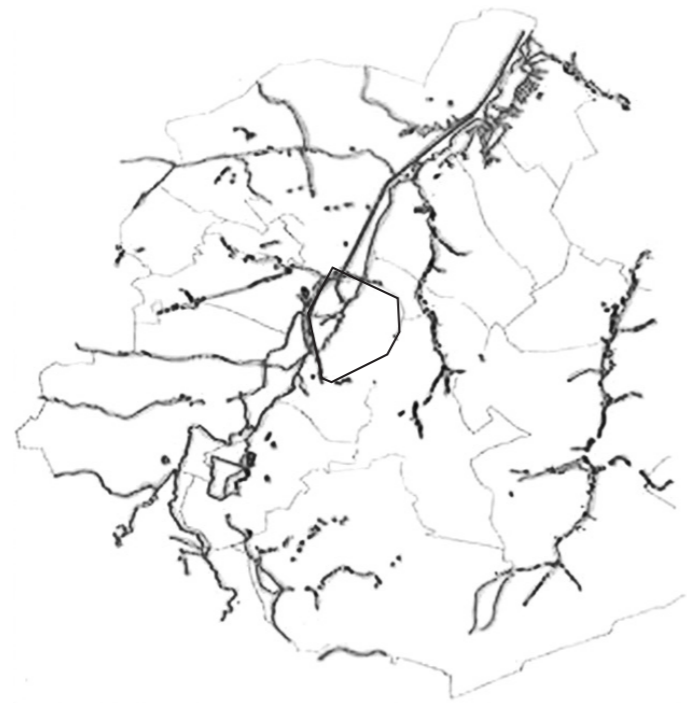


# Design

# Urban Context



# Loss of Rivers in Brussels



1770

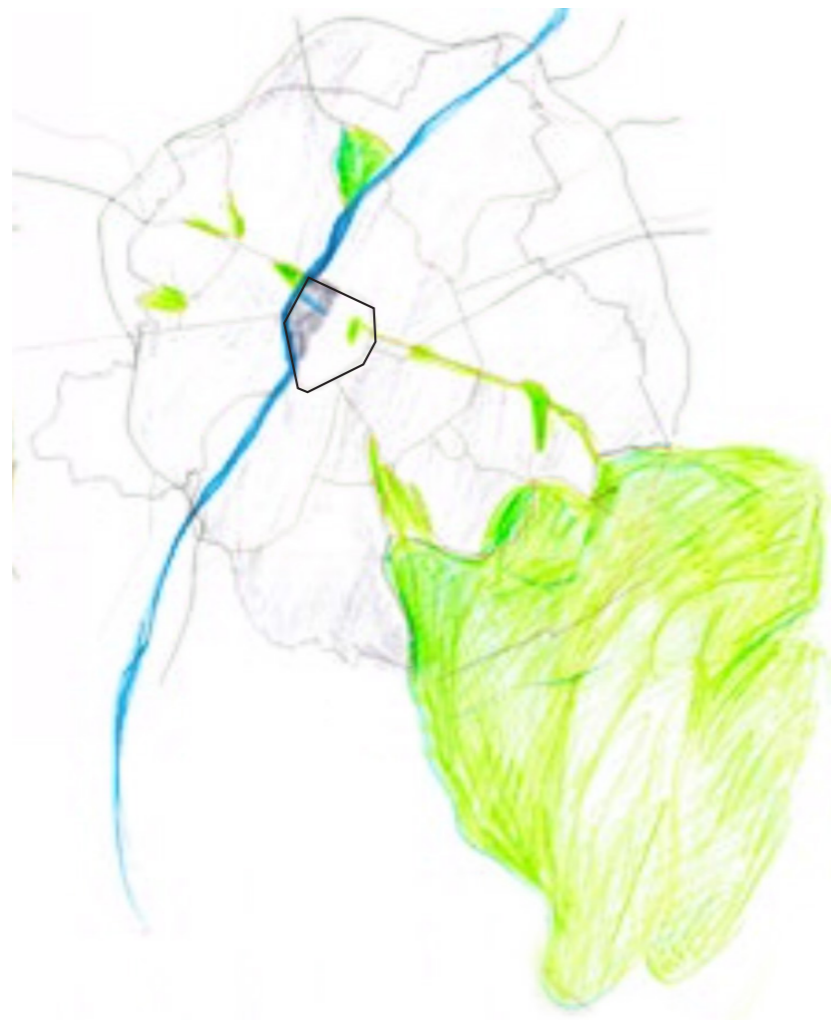


1858



2000

Spread of Nature in Brussels - Observation by Citizens





# Ecological Network Brussels

current situation



# Ecological Network Brussels

future scenario



# Ecological Network Brussels

animals' range seen from our site

- 1 Mole;  
Blue Tit/Great Tit;  
Male Butterflies
- 2 House Martin
- 3 City Fox
- 4 Hedgehog
- 5 Bees; City Bats



## Urban Context

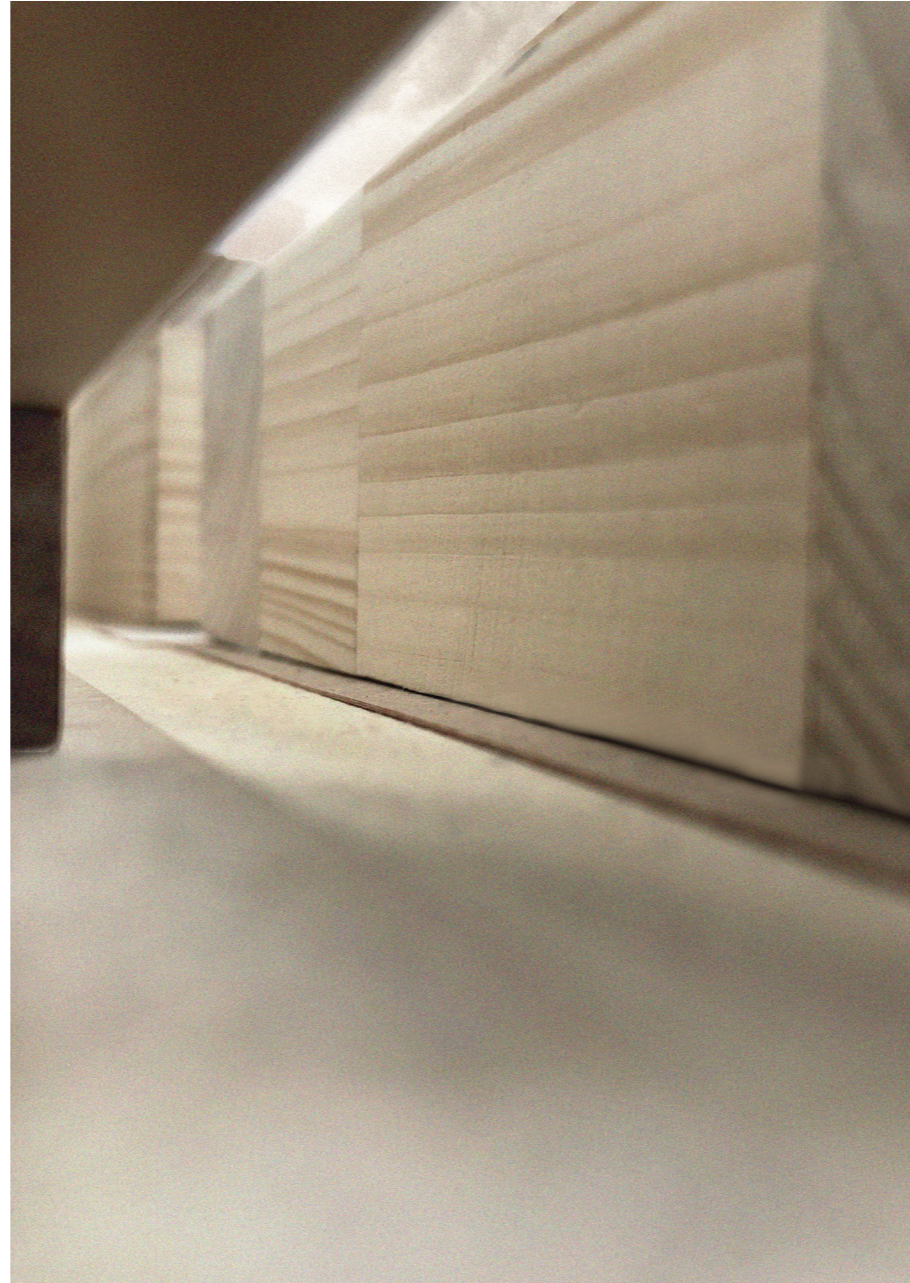


Design Proposal - View from the Lakensestraat/Philips Tower





Design Proposal - View across the courtyard to the Hallenstraat

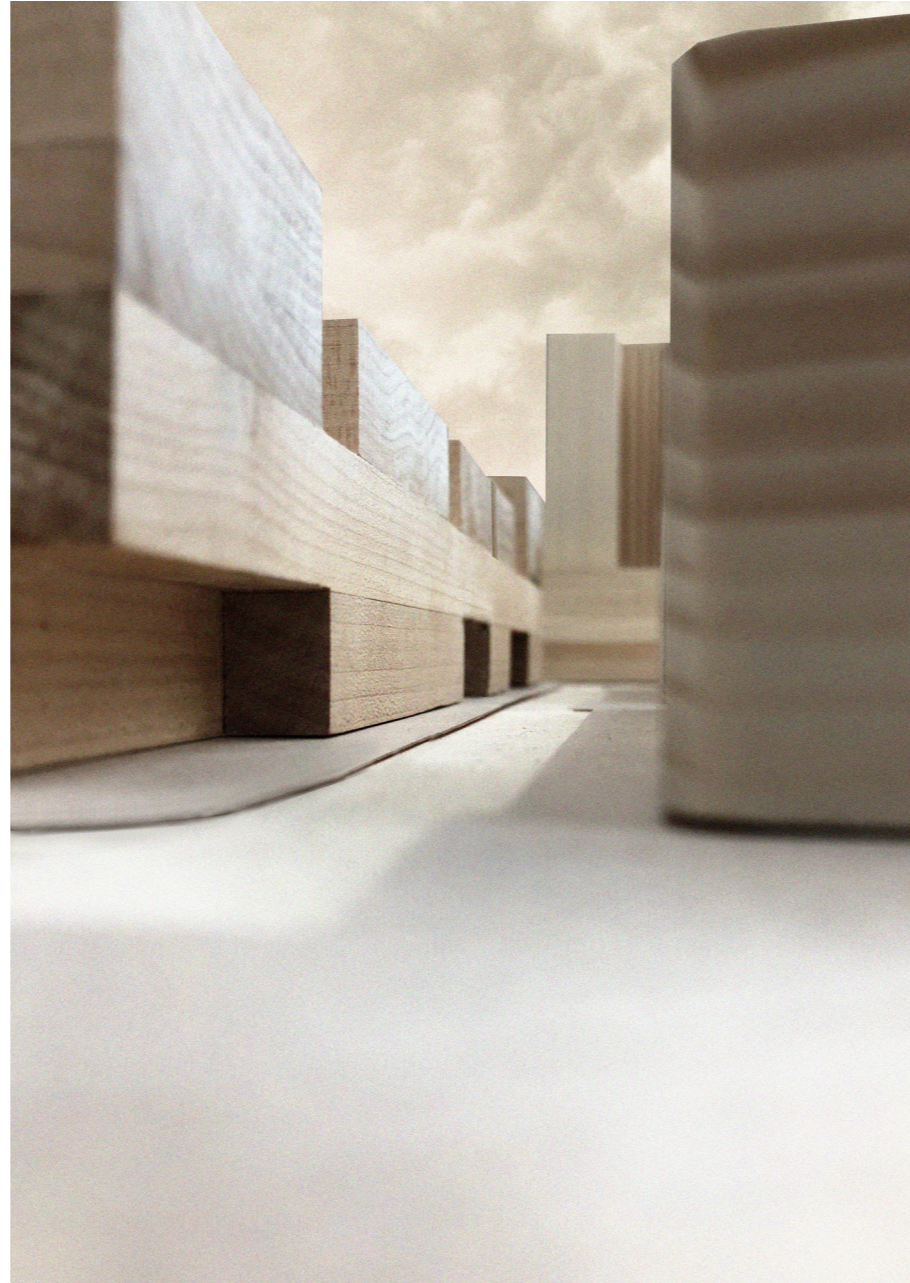


Design Proposal - View from Boulevard Anspach

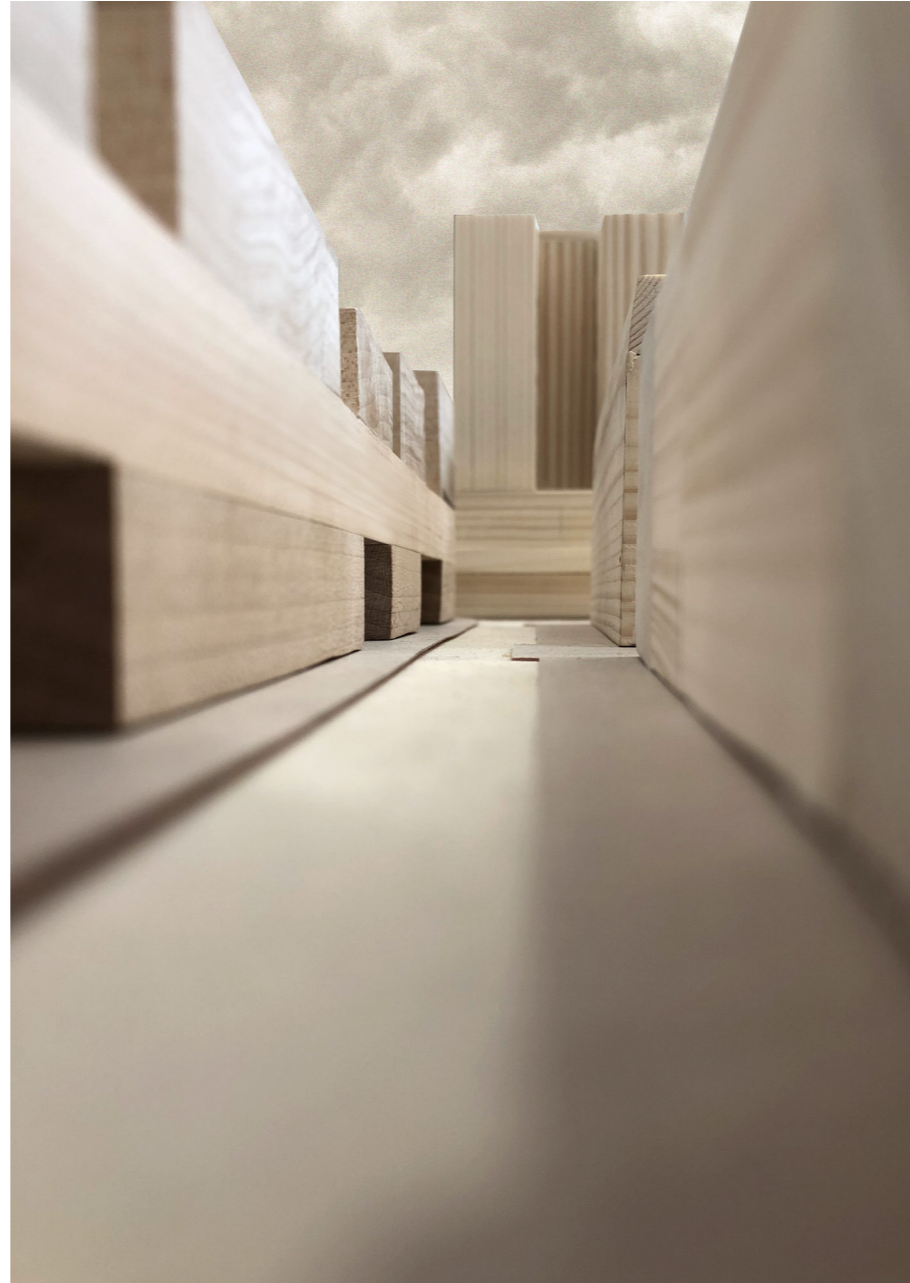




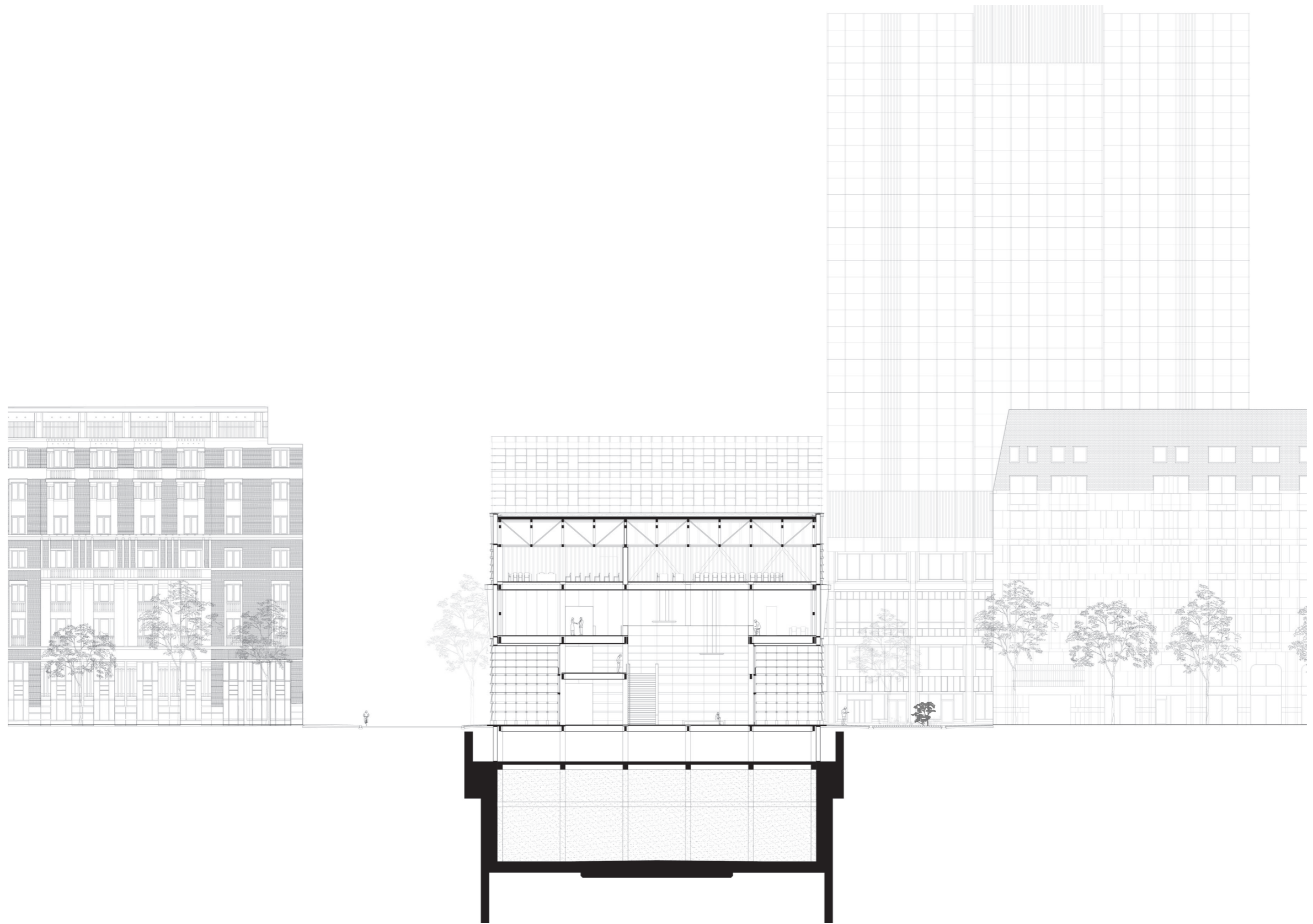
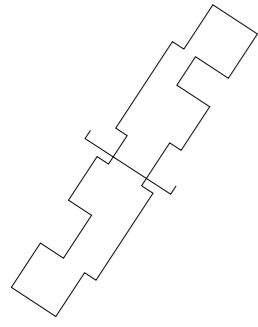
Design Proposal - View from Boulevard Anspach into the Hallenstraat



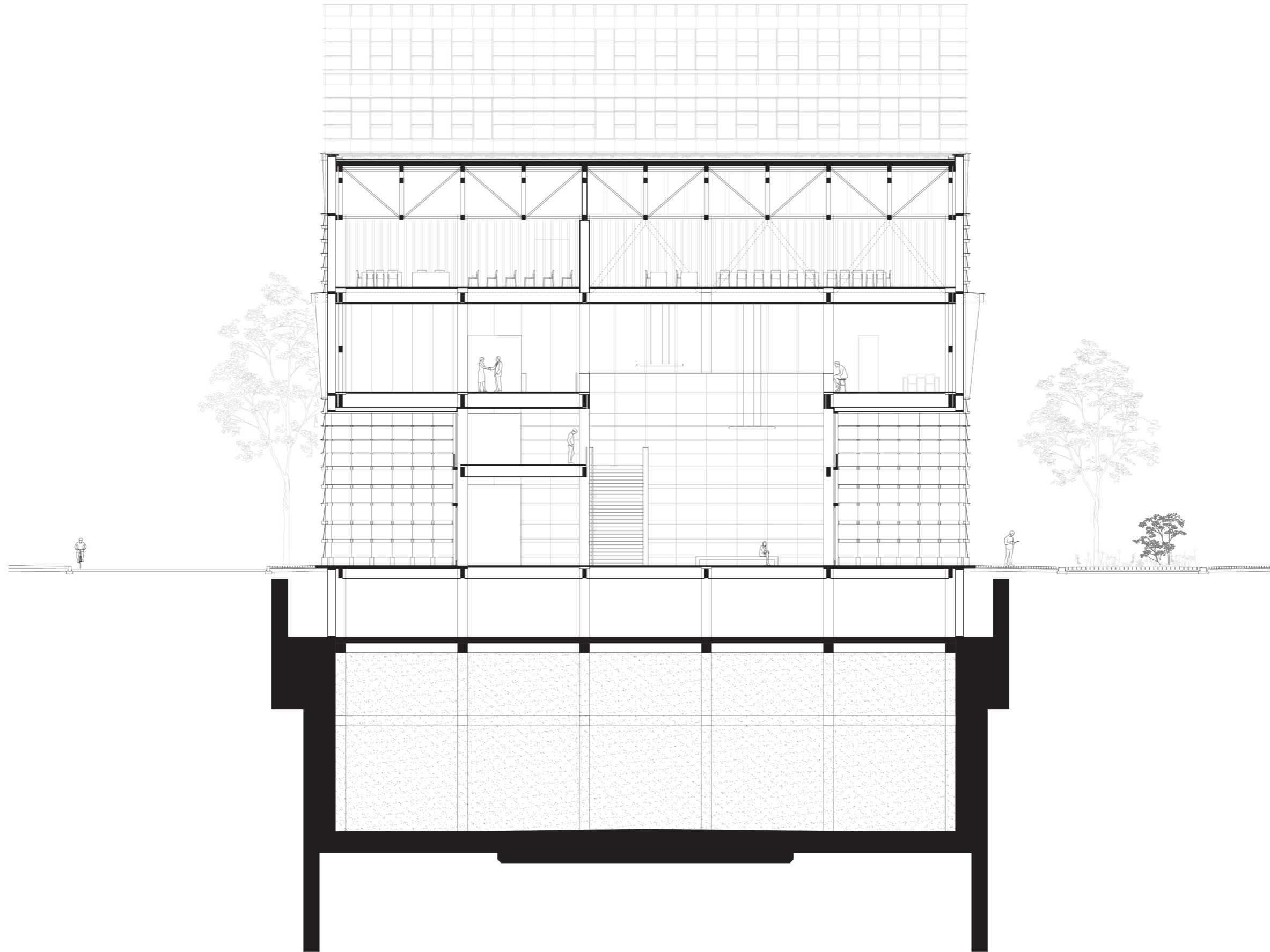
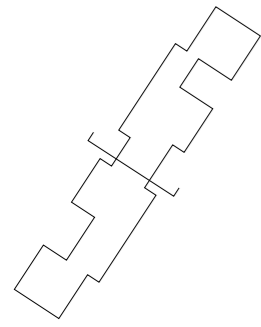
## Design Proposal - View into Hallenstraat



Section through the Entrance

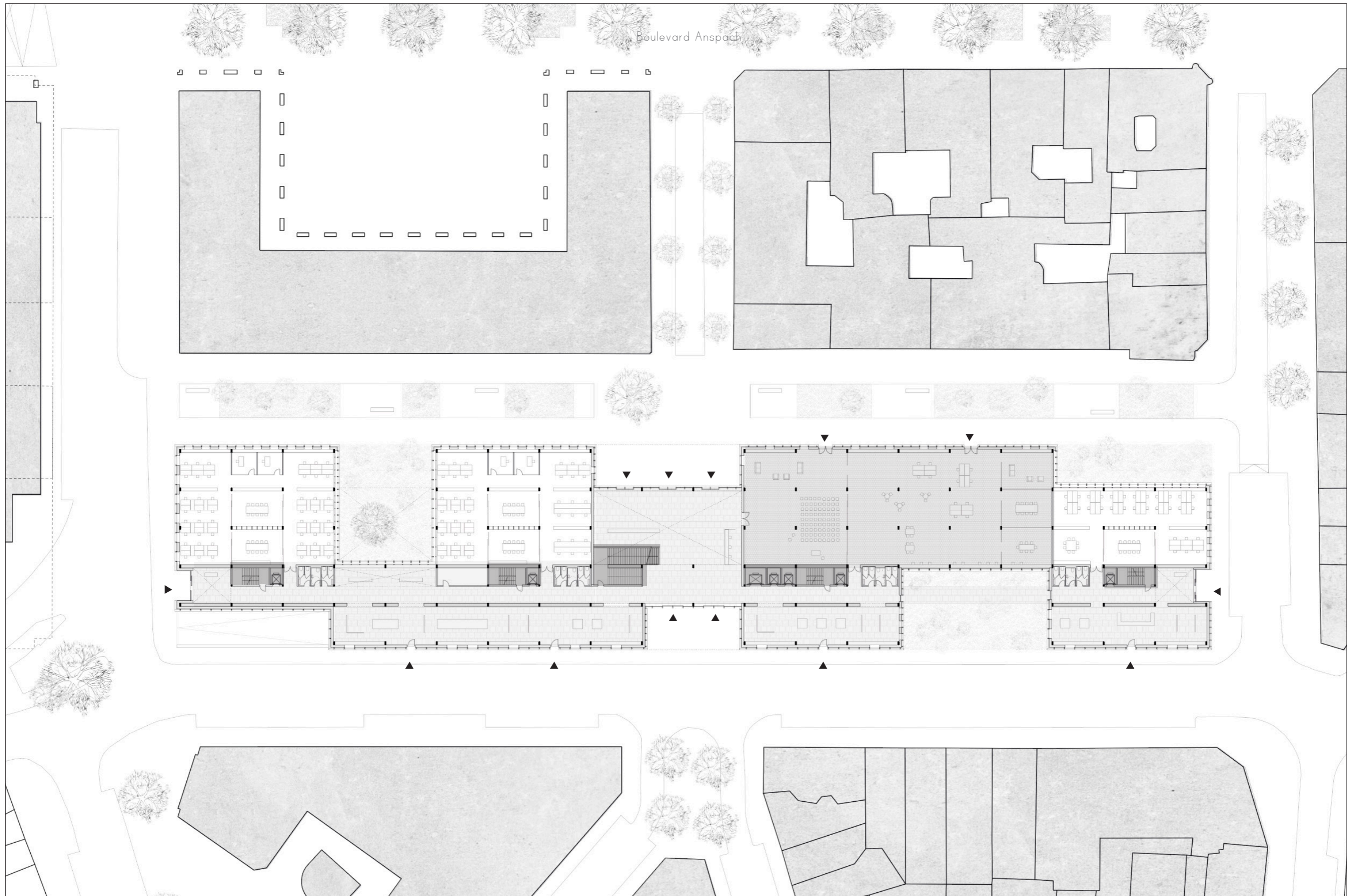


Section through the Entrance

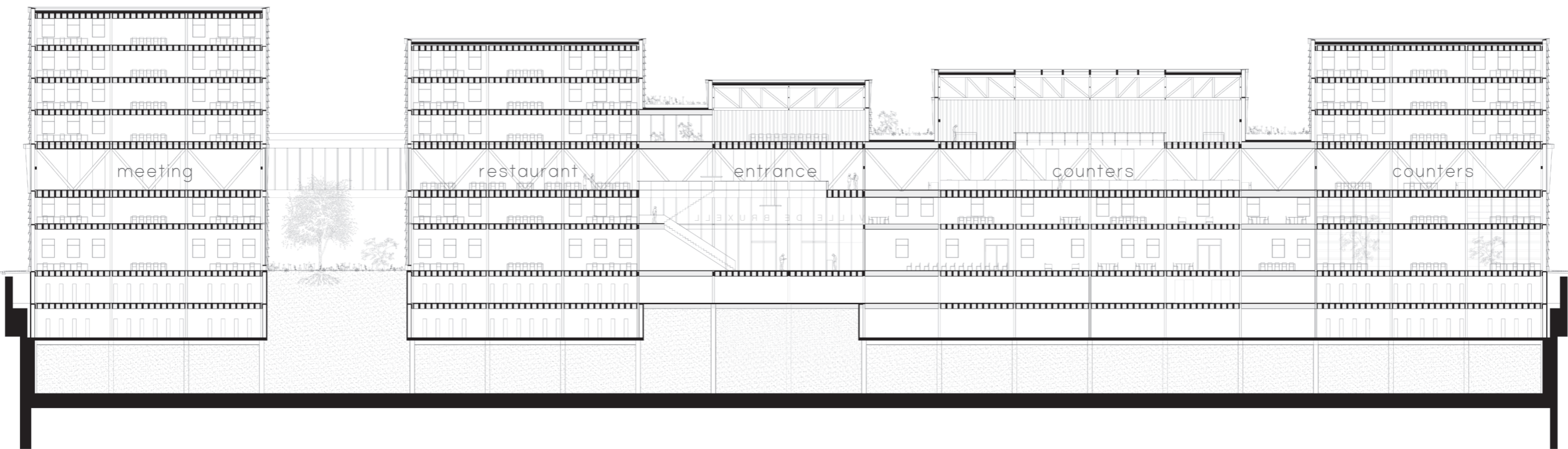
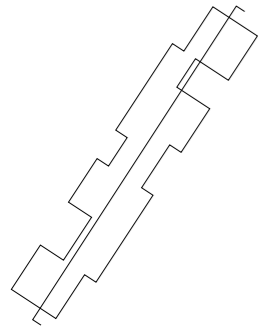


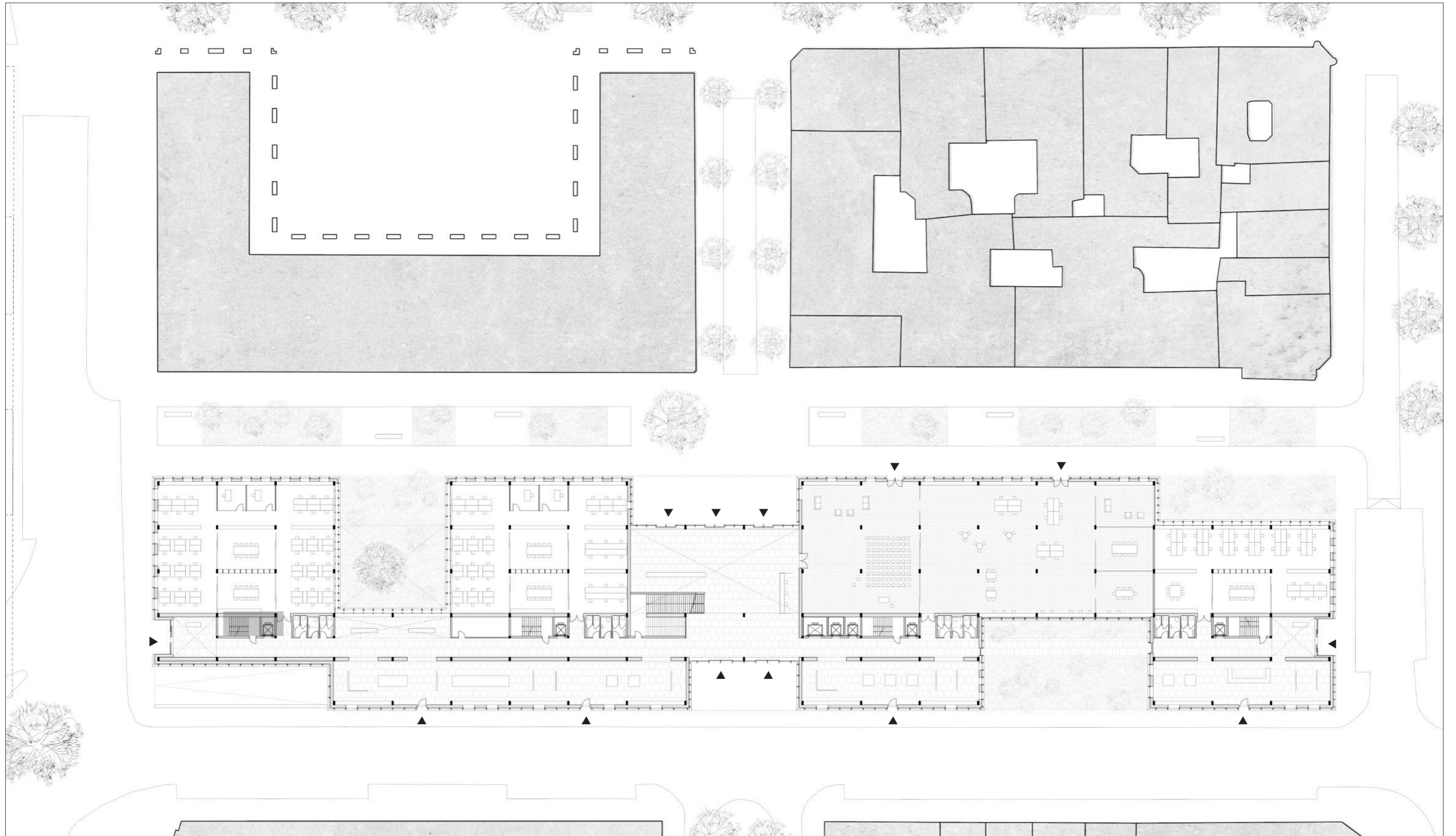


# Entrances and Movement



# Longitudinal Section



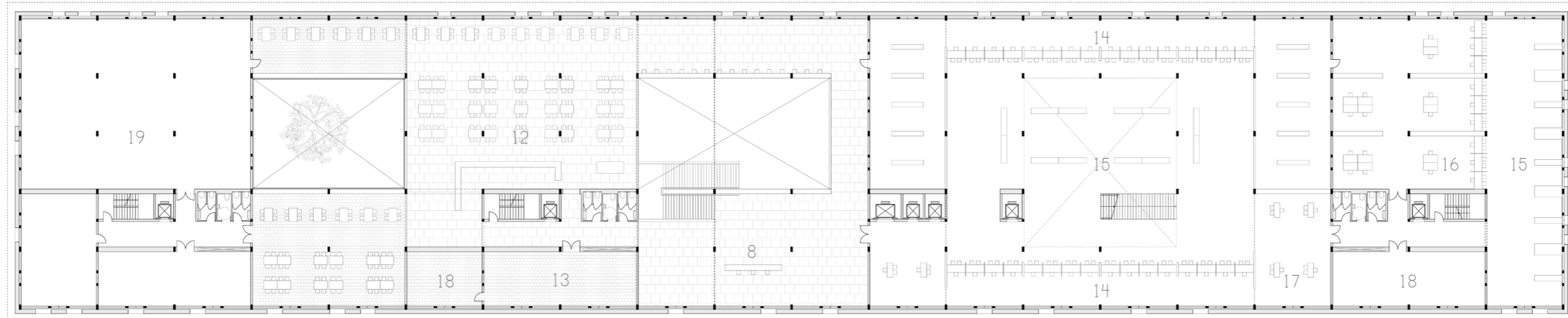


- 8 Entrance
- 9 Exhibition
- 10 City Room
- 11 Departments



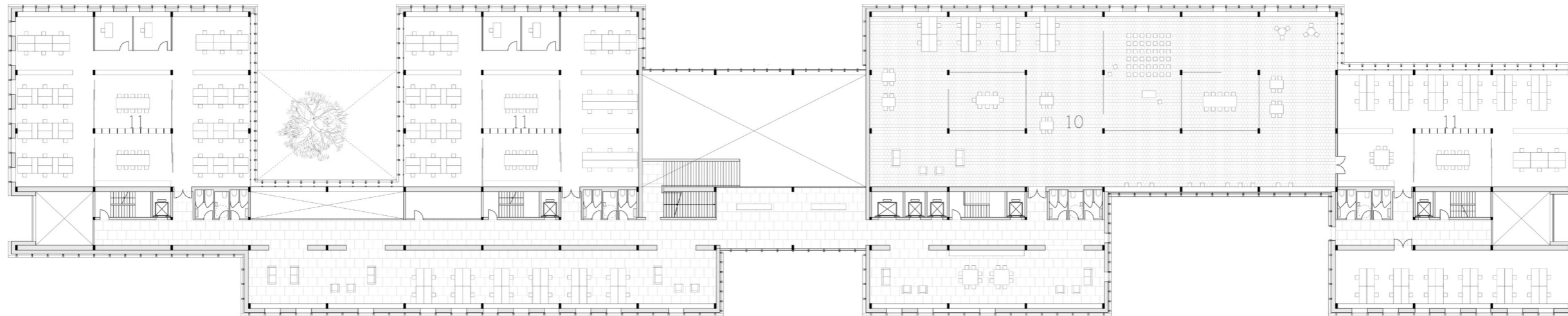
# Plans 1 500

+2



- |    |             |    |                       |
|----|-------------|----|-----------------------|
| 8  | Entrance    | 14 | Counters              |
| 9  | Exhibition  | 15 | Waiting Area          |
| 10 | City Room   | 16 | Confidential Counters |
| 11 | Departments | 17 | Standing Counters     |
| 12 | Restaurant  | 18 | Storage               |
| 13 | Kitchen     | 19 | Meetings              |

+1

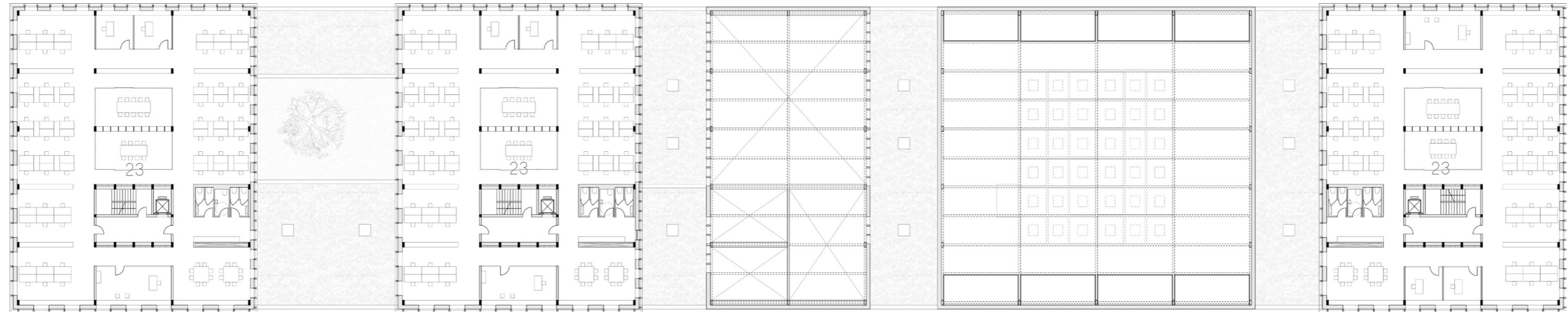






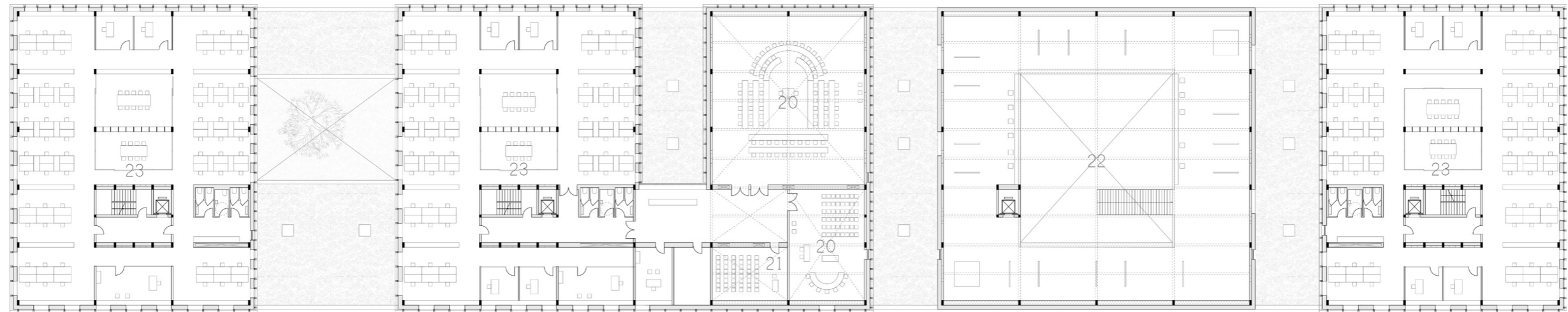
# Plans 1 500

+4



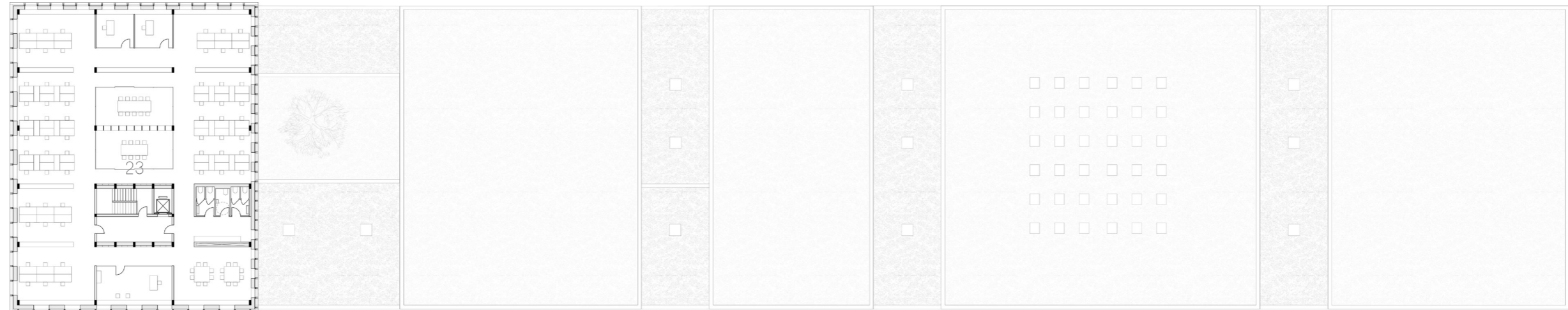
- 20 City Council
- 21 Lecture Hall
- 22 Exhibition
- 23 Departments

+3



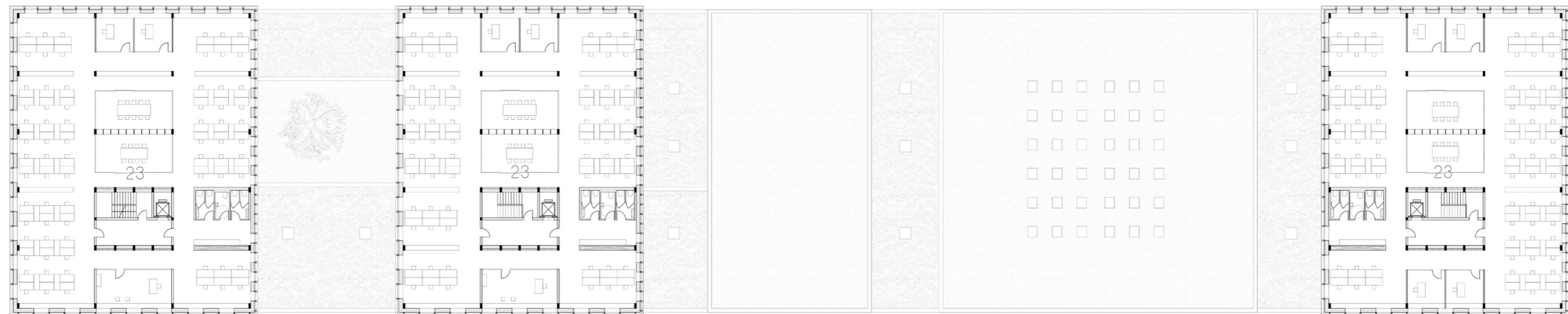


+6

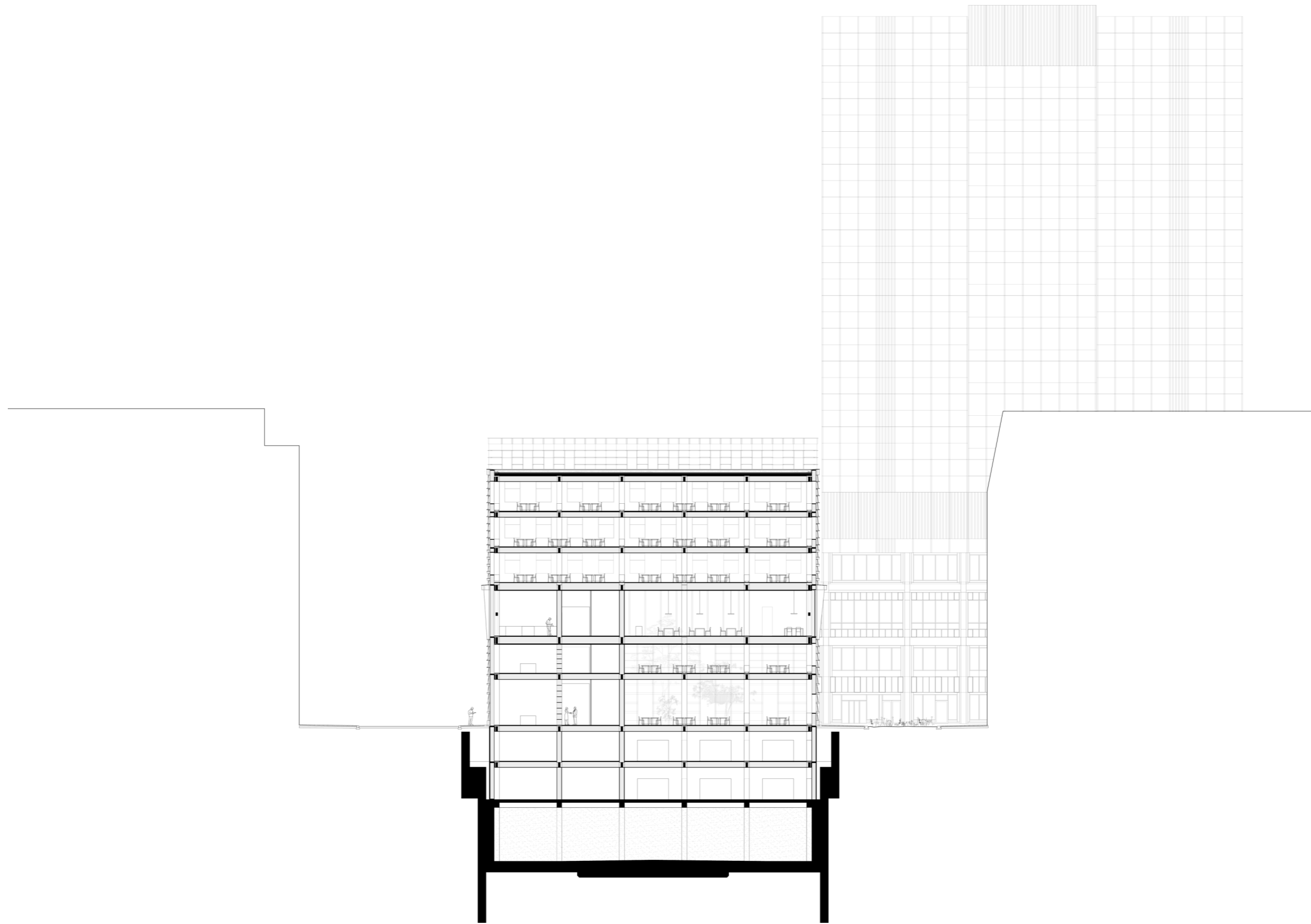
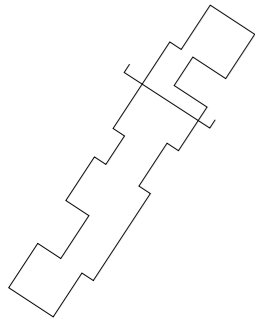


23 Departments

+5

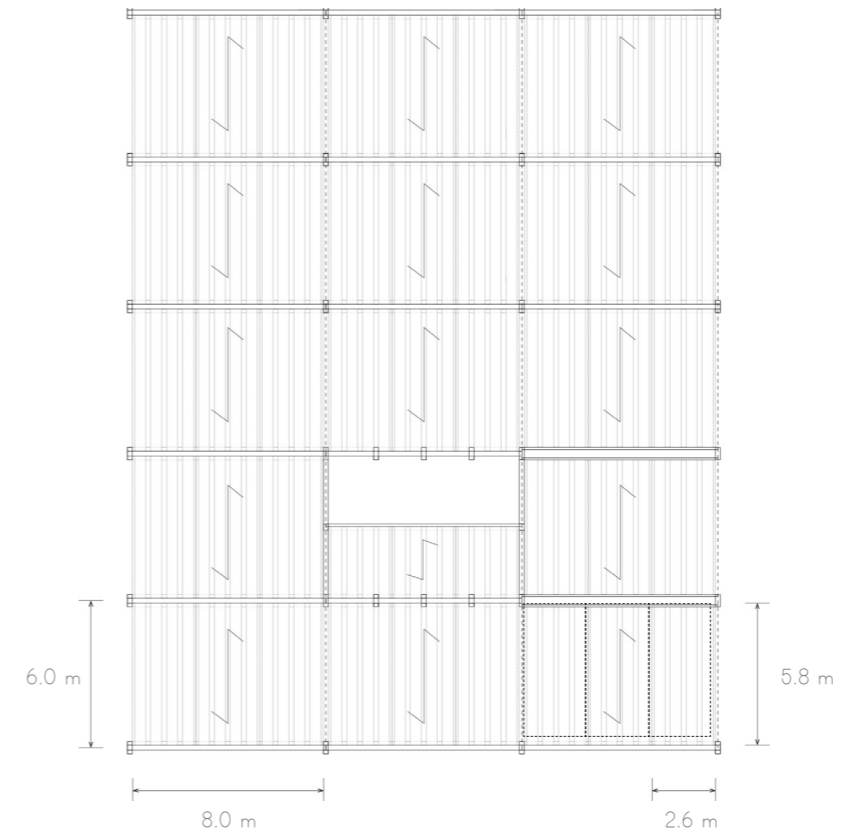
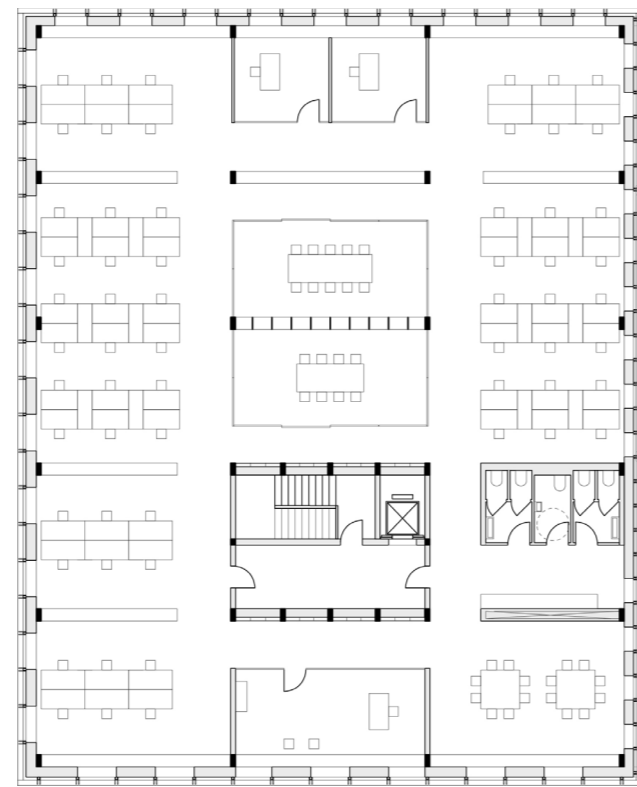


Section through an Office Tower



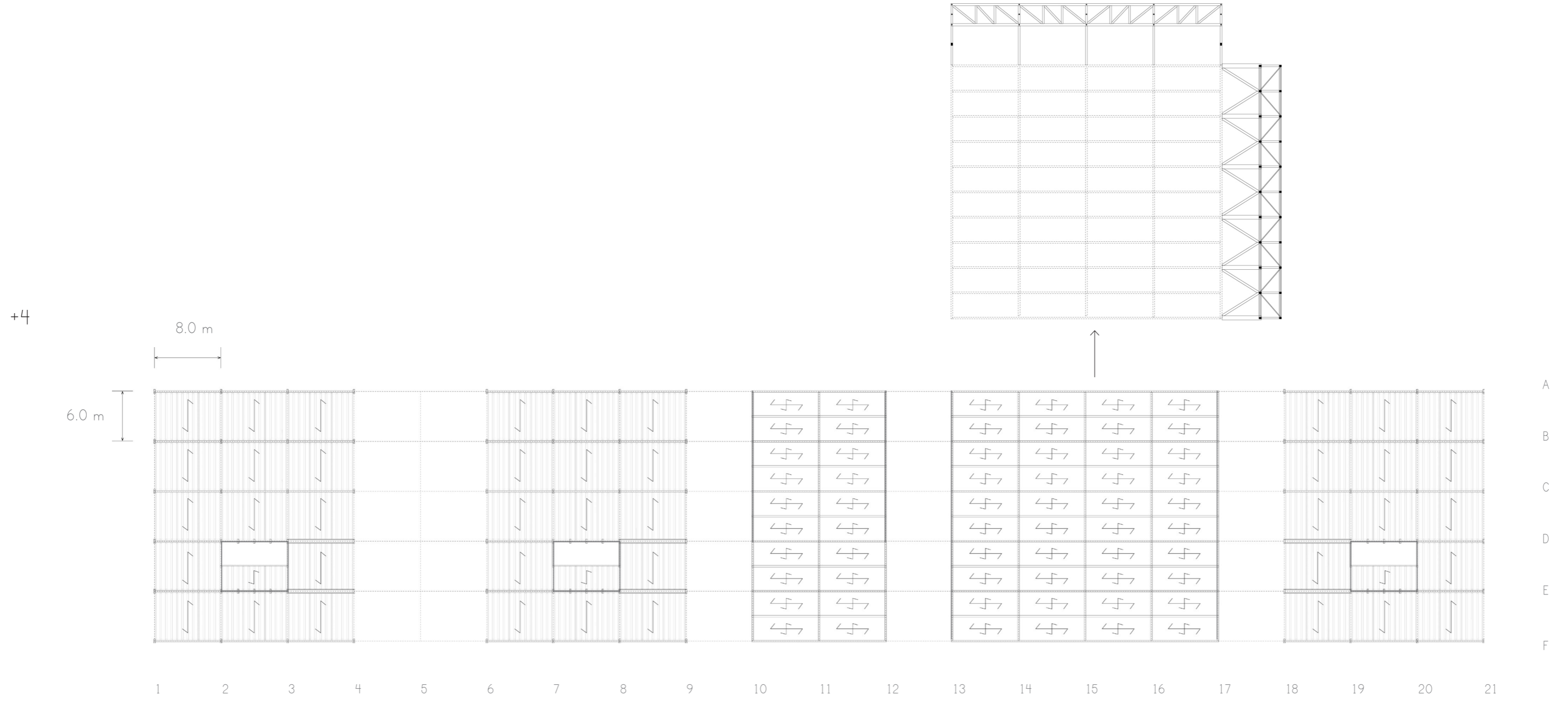


(Structural) Plan Typical Office Floor



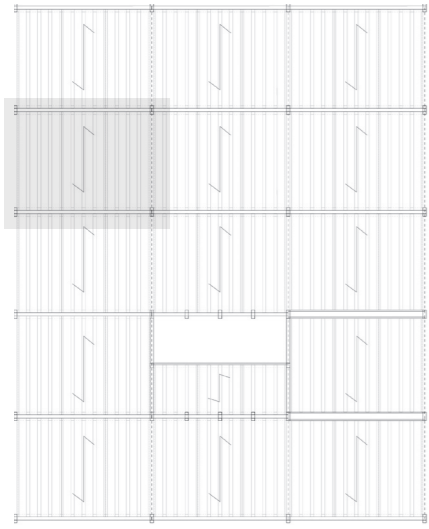


# Structural Ceiling Plan 1 500

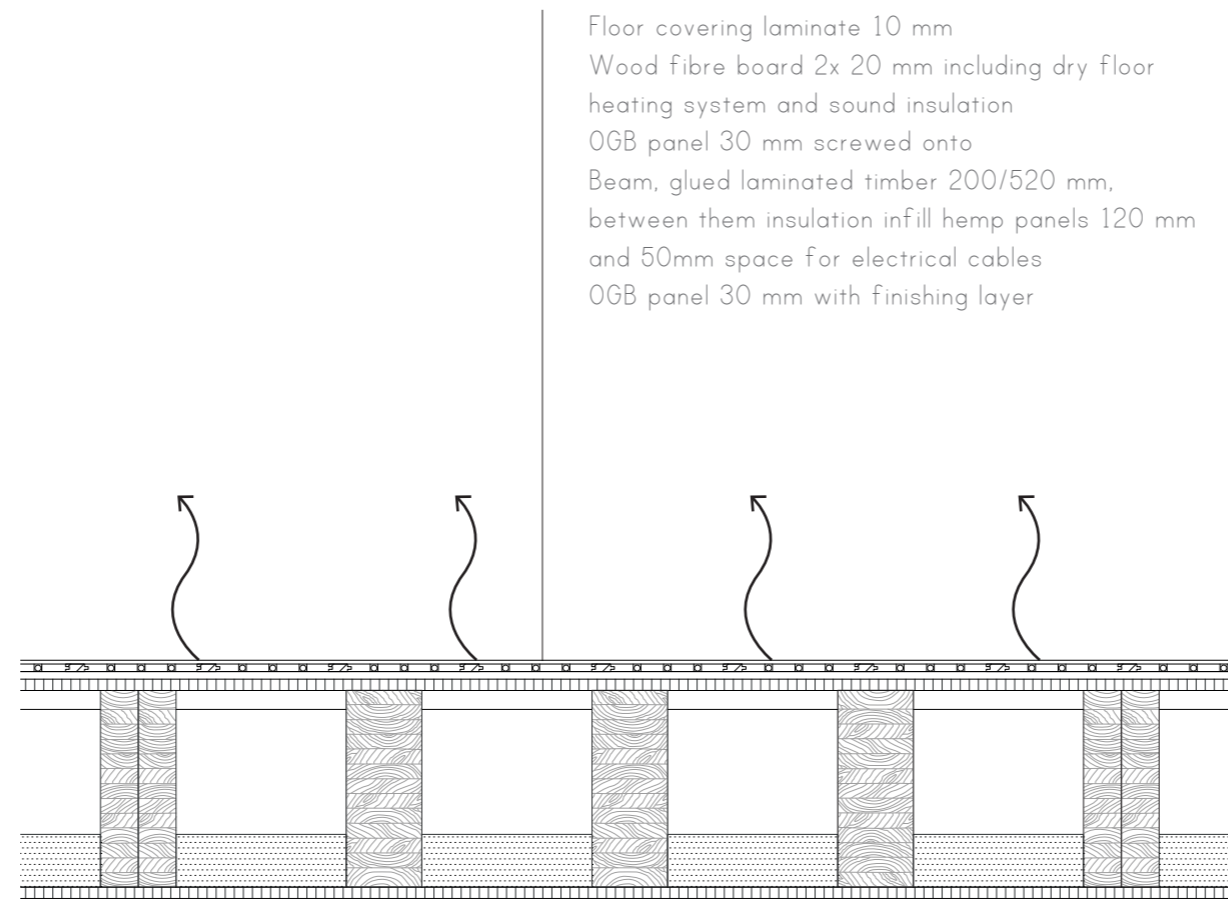


— diagonal bracing

# Structural Model



## Low Temperature Floor Heating - Dry System



## Structural Model - Typical Floors

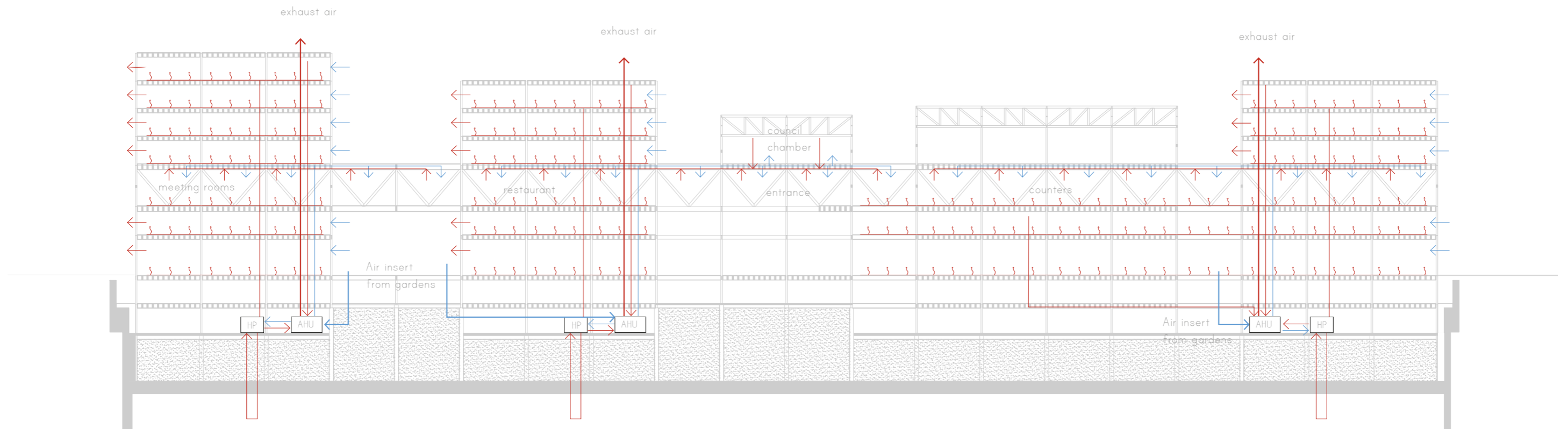




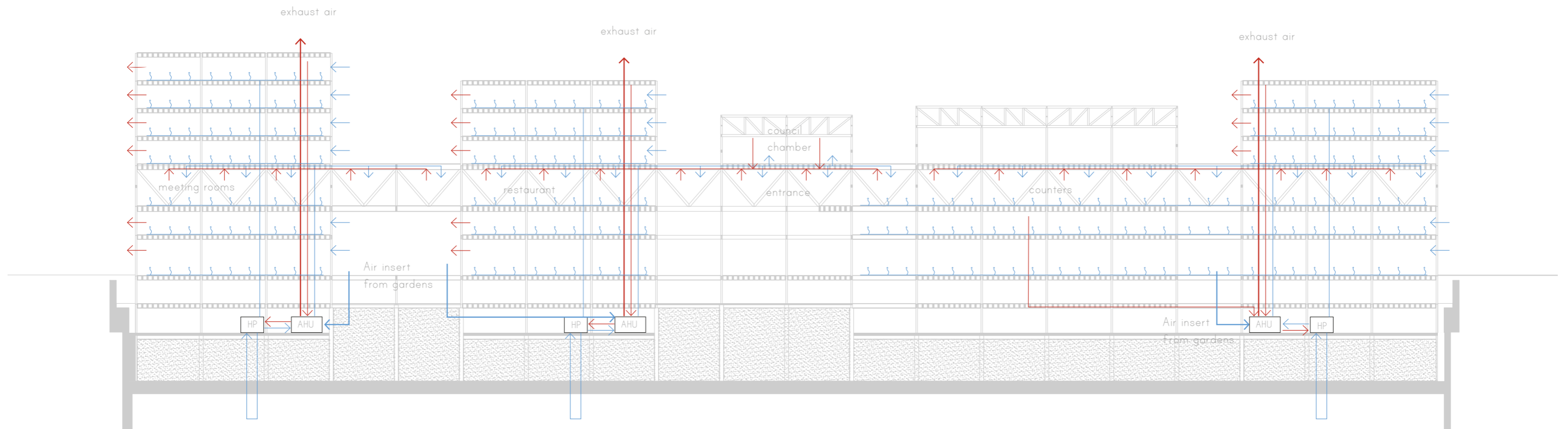
## Structural Model - Public Floor



# Climate Design / Winter Situation

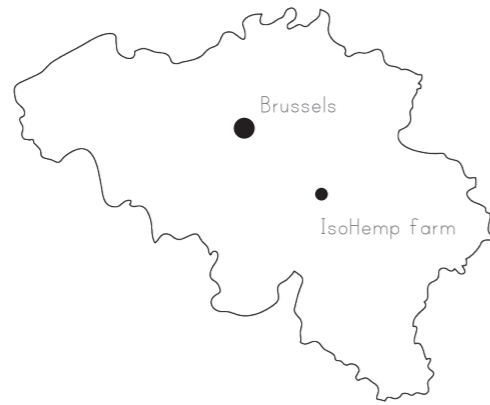


# Climate Design / Summer Situation



# Material Measures

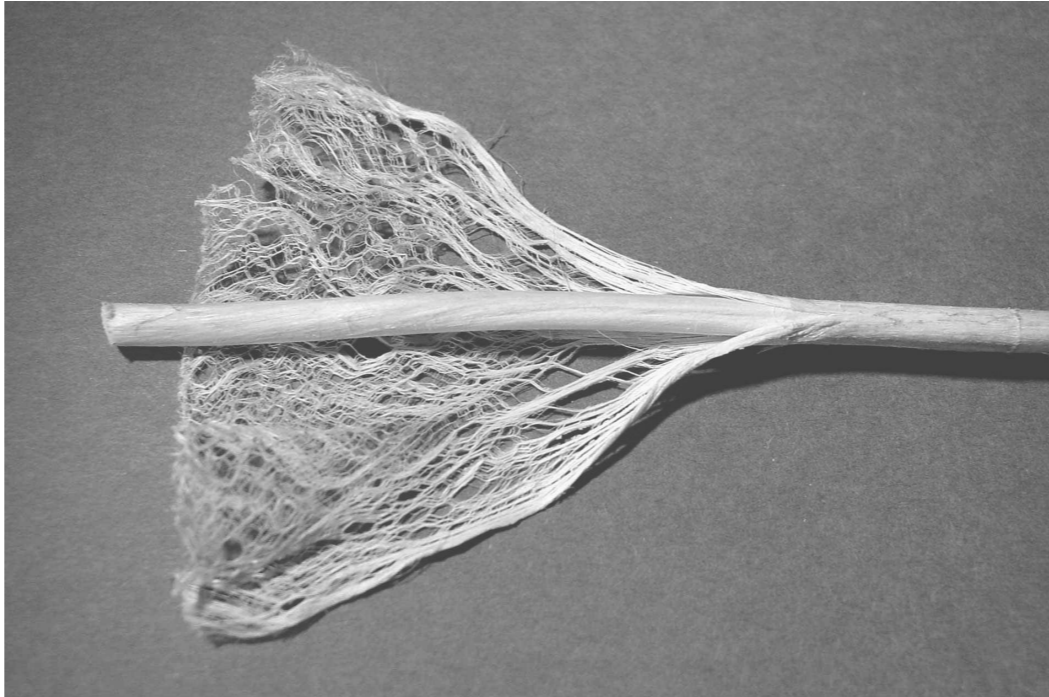
## Lime Hemp



### During Growth

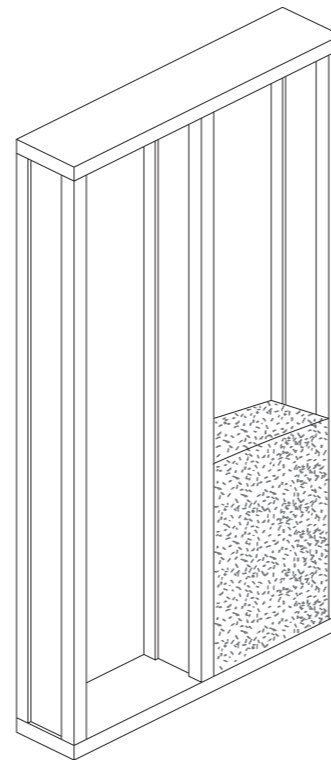
- 1.8 tons of CO<sub>2</sub> is sequestered for 1 ton of hemp
- Soil is improved
- Biodiversity is increased
- Not much fertilizations nor much water is required
- full length is reached in only 100 days
- Both lime and hemp is obtained in Belgium

# Lime Hemp - Woody Stem



<u>Part of hemp straw</u>	<u>Percentage</u>
Shiv: woody core of stem	60
Bast fibre: strong fibres in which stem is wrapped	30
Fines: small pieces of bast fibre	7
Dust	3

## Lime Hemp Building Method: Precast Panels

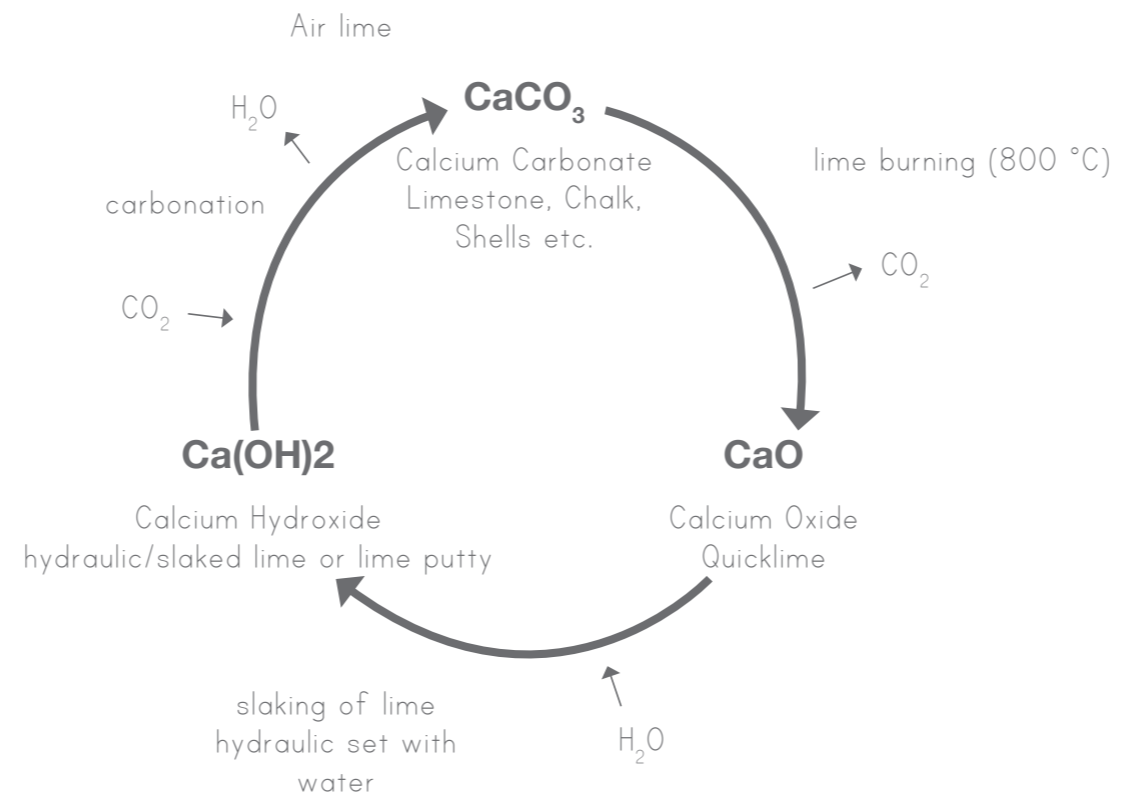


### Producing in factory

- Waste is minimized
- Use of air lime: sets through absorbing CO<sub>2</sub>
- Build proces is made predictable:
  - no dependency on drying times,
  - no dependency on season/weather conditions
  - quick assembly on site
- Traditional techniques required
- Lime hemp is lightweight: 110-250 kg/m<sup>3</sup>
- Limehemp replaces all requirements of a wall build-up
- Material itself is cheap
- Cheapest method of construction in large scale

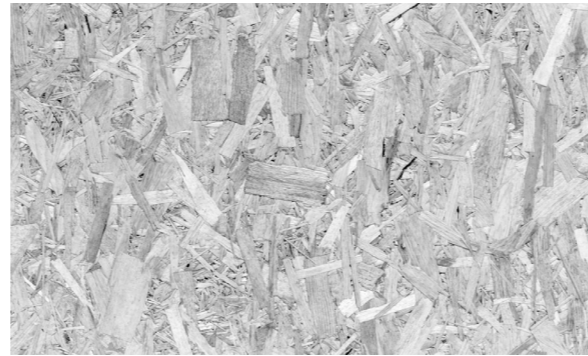
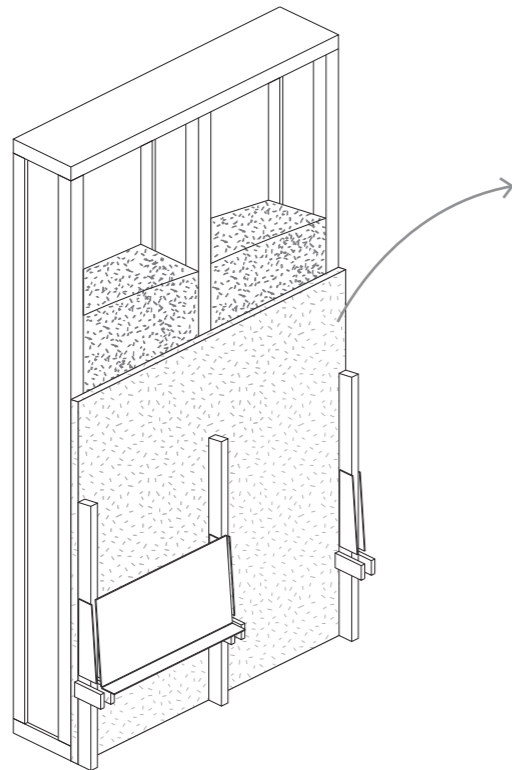
Composition	Percentage
Air lime	13
Water	17
Hemp shiv: particle size 15-20 mm	70

# The Lime Cycle





## Lime Hemp - Back Board



### OSB

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Fire class: D-s2,d0 (EN 13501-1): burns easily

High heat and pressure during production

Short lifespan: vulnerable to swelling/  
delamination if exposed to hot temperatures or  
humidity

Binders contain toxic formaldehyde

Difficult to recycle: can only be incinerated

Difficult to reuse: because of its low durability

Compressive strength 12.4 - 14.0 MPa

### Seagrass Plate

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Fire Class: B

Heat during production (130 °C)

Life span of over 150 years

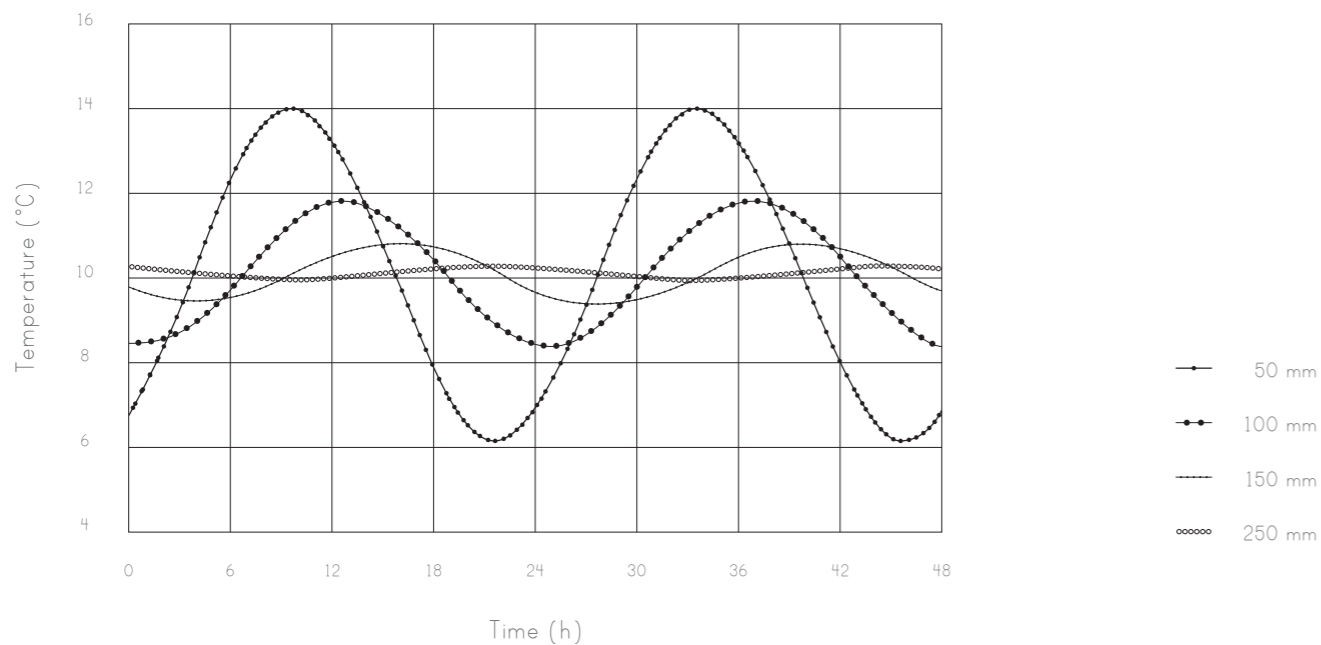
Hygroscopic/breathable: water, mold resistant

100% organic: compostable, non - toxic

Strong fibres (compressive strength unknown)

## Lime Hemp - Characteristics

	Technical Characteristics	Value	Unit
$\rho$	Density	110 - 250	kg/m <sup>3</sup>
	Compressive strength	100 - 200	kPa
R	Thermal resistance	5.0	m <sup>2</sup> K/W (d 300 mm)
$\lambda$	Thermal conductivity (Bath University)	0.056 - 0.06	W/mK
$\mu$	Water vapour resistance factor	3.5 - 4.8	-
c	Specific heat capacity (BESRAC)	1560	J/kgK
$\phi$	Moisture capacity	11	%
R <sub>w</sub>	Sound reduction index (NEN5077)	52	dB (d 300 mm)
$\alpha$	Sound absorption coefficient (BESRAC)	0.3 - 0.9	-
	Fire class (NF EN 13501-1)	B-s1,d0	-
	Fire resistance	90 (105)	min (d 300 mm)



Dampening of sinusoidal temperature change by depth lime hemp facade

### During the buildings' use

- Breathing construction:
  - air quality is improved
  - air moisture is self regulated
  - mould growth is prevented
- No 24 hour temperature fluctuations
- Once fully hardened the lime hemp gives added rigidity
- Cladding protects the walls from rain
- Back panels ensure airtightness
- High pH value of 12:
  - prevents mould growth
  - keeps insects, rats and mice away

### Afterwards

- The lime hemp is 100% compostable

# Lime Hemp - Traditional Building Process and Appearance



Impression of an Office Space - South Facade

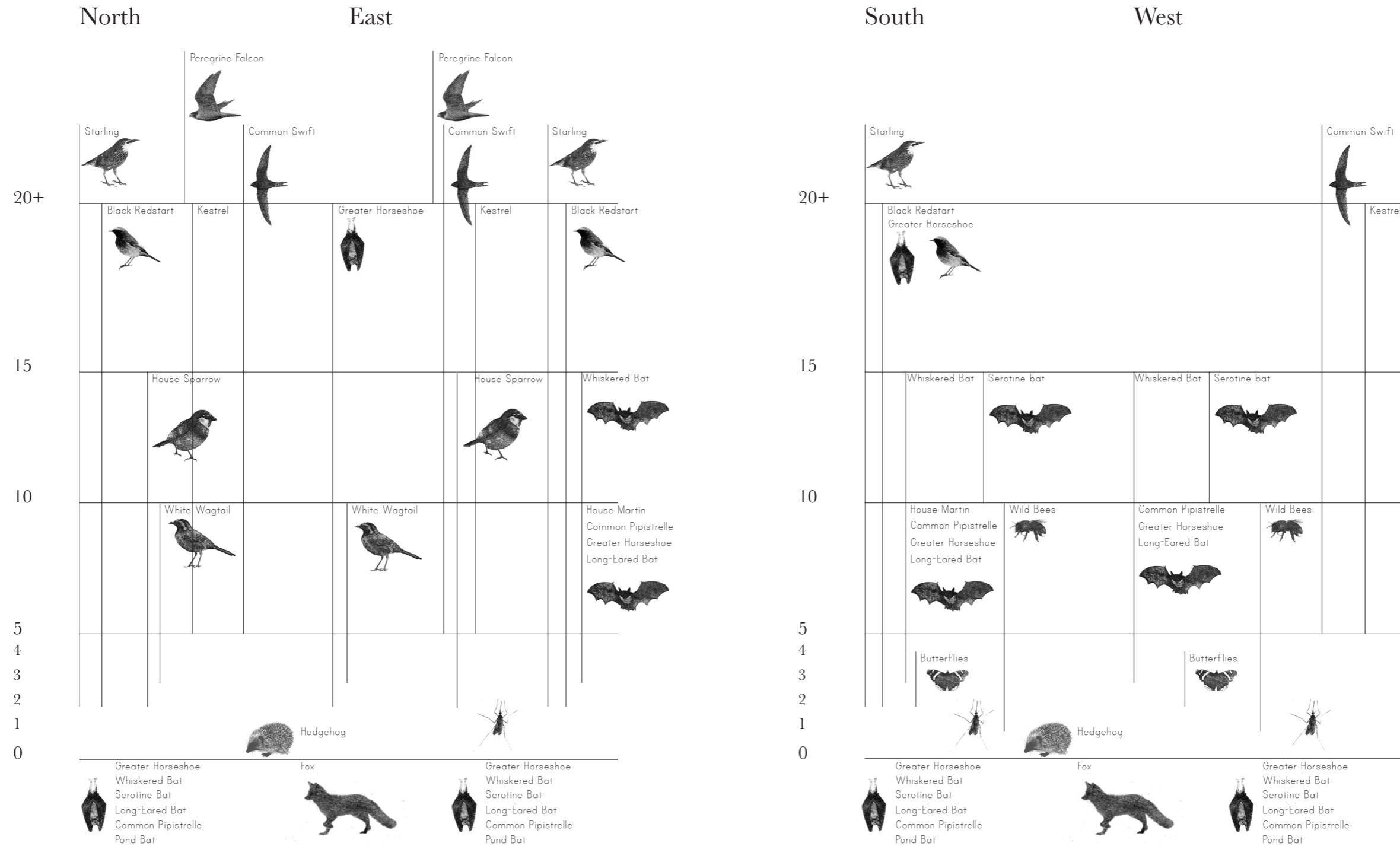


# Facade Design

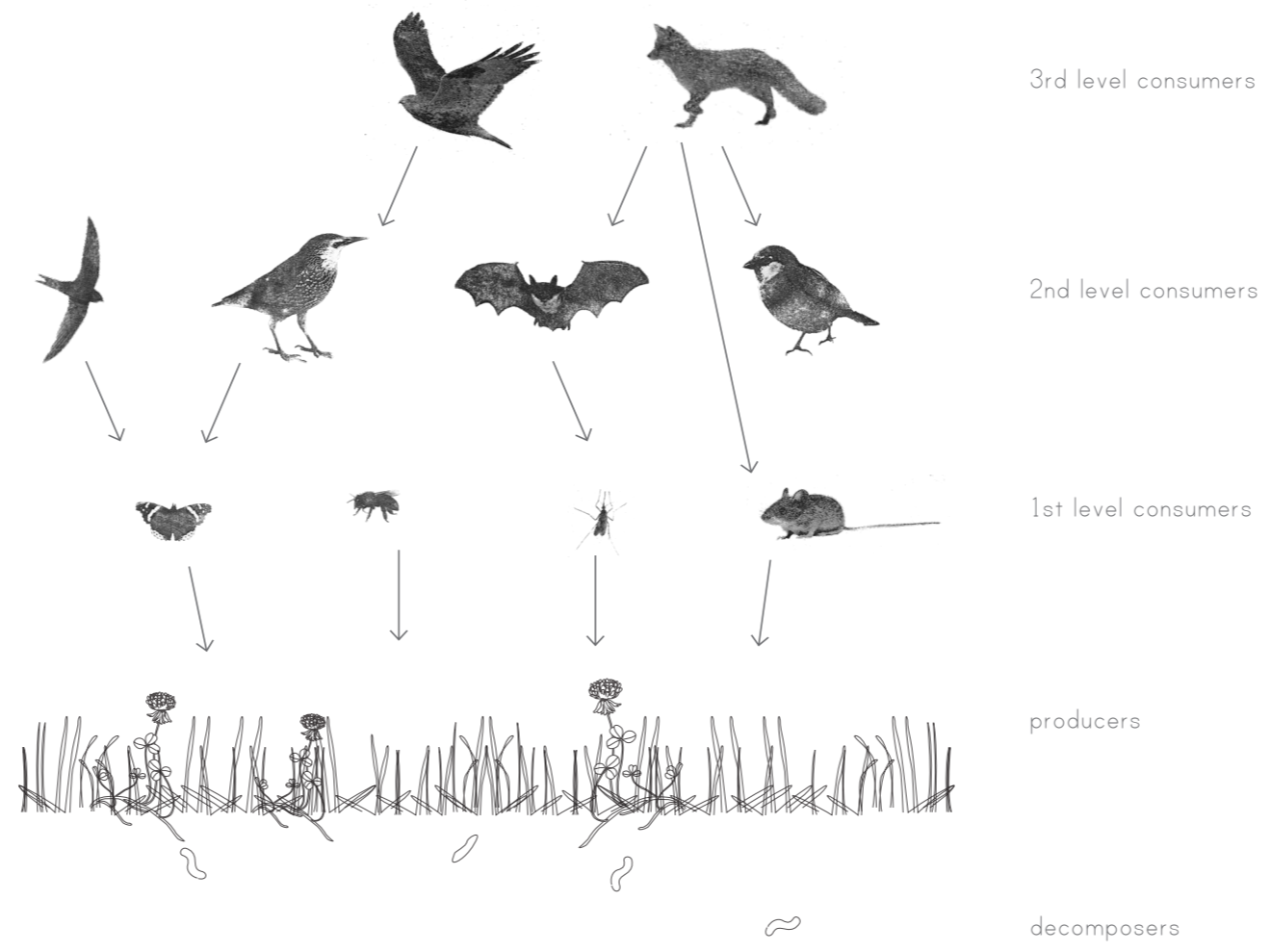
From reflecting building facade to inhabitable building facade



# Orientation and Heights according to Animal Specie

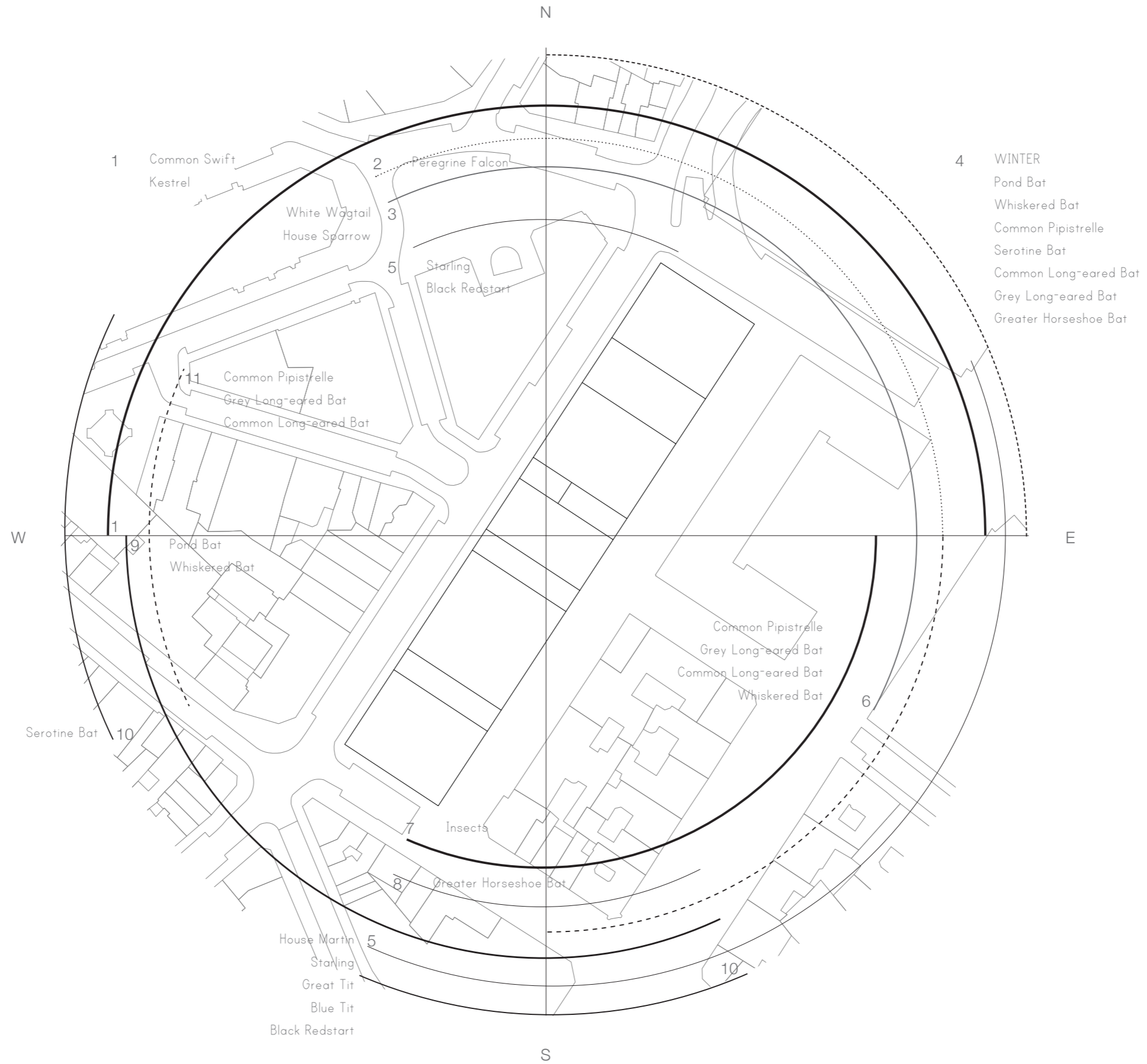


# Food Web

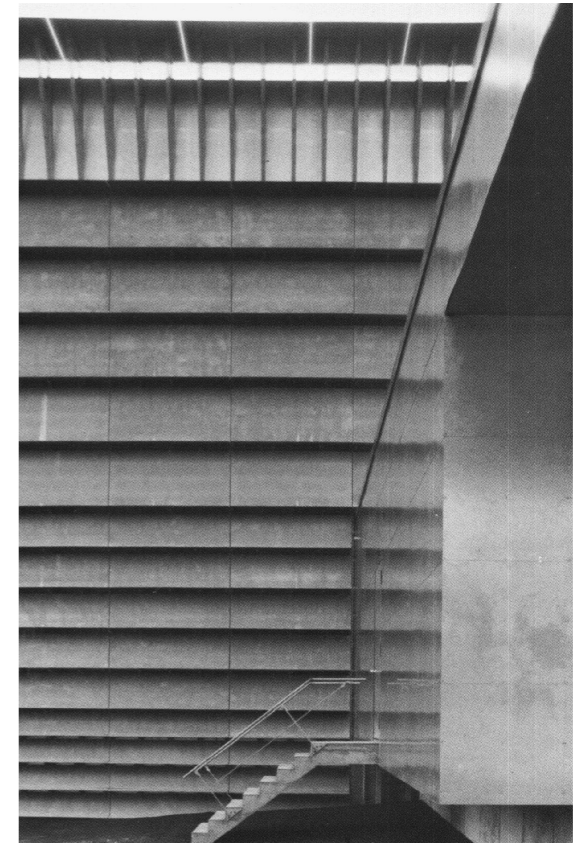
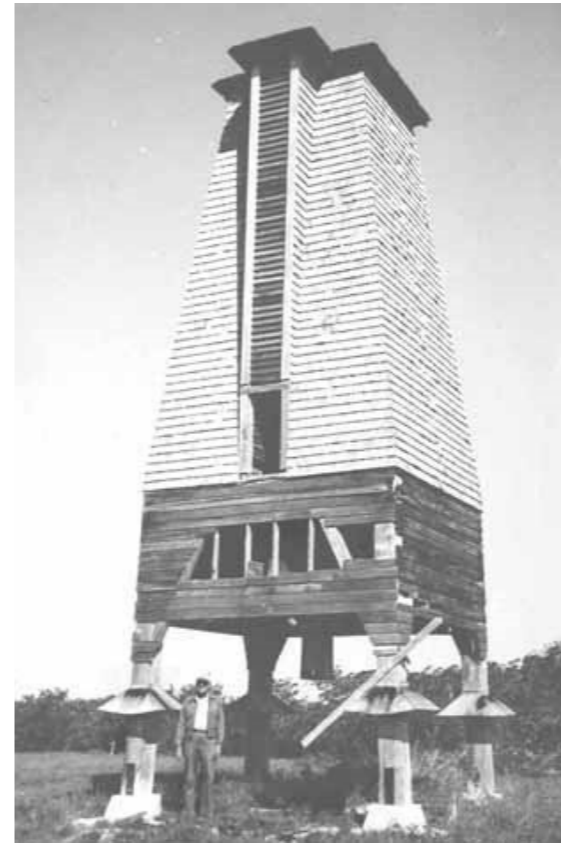
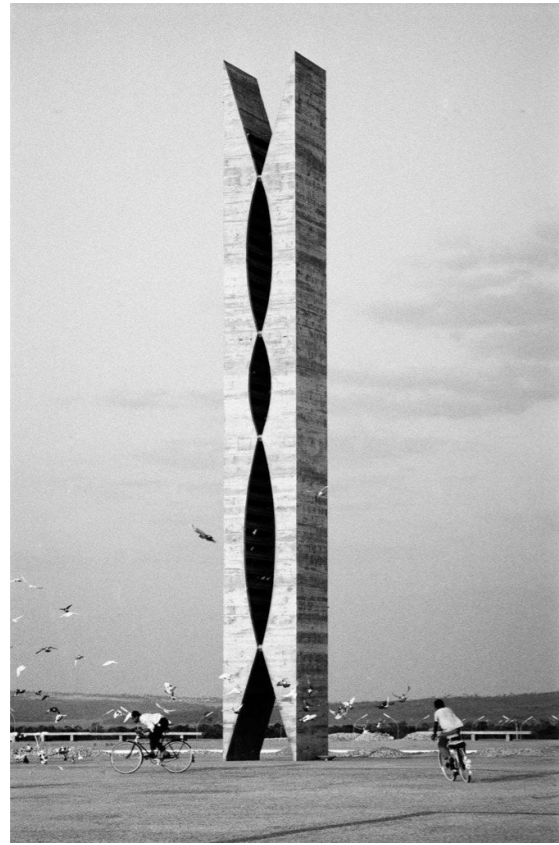




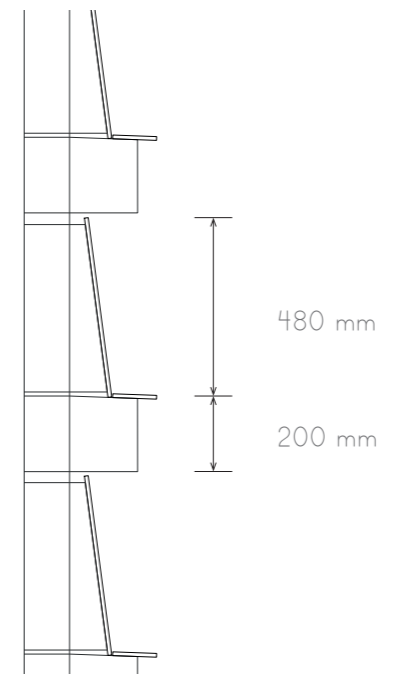
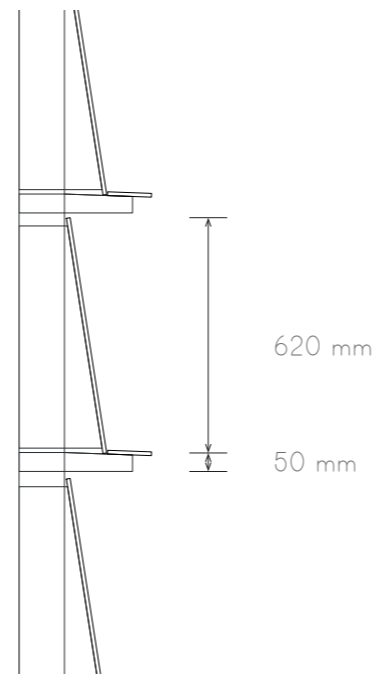
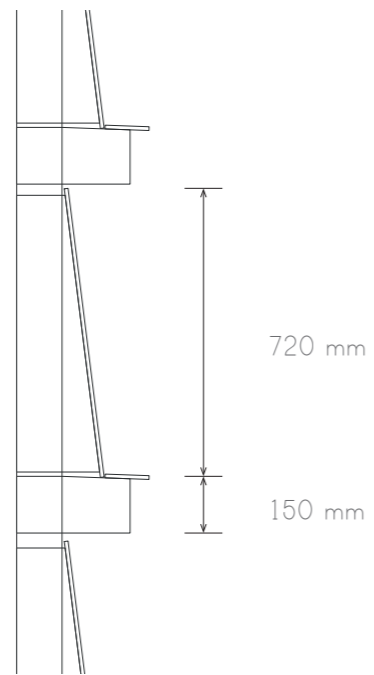
# Orientation in Relation to Animal Specie



## Horizontal lines - Ledges



# Panel Sizes

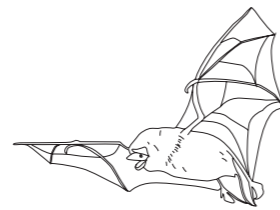


## Body Size of Species



Great/Blue/Crested Tit/Tree Sparrow

10 - 14 cm



Common Pipistrelle, Pond, Whiskered, Serotine, Common Long-Eared, Grey Long-Eared, Greater Horseshoe bat

3,5 - 9 cm



Common Swift

16 cm



Black Redstart, White Wagtail, Spotted Flycatcher, European Robin

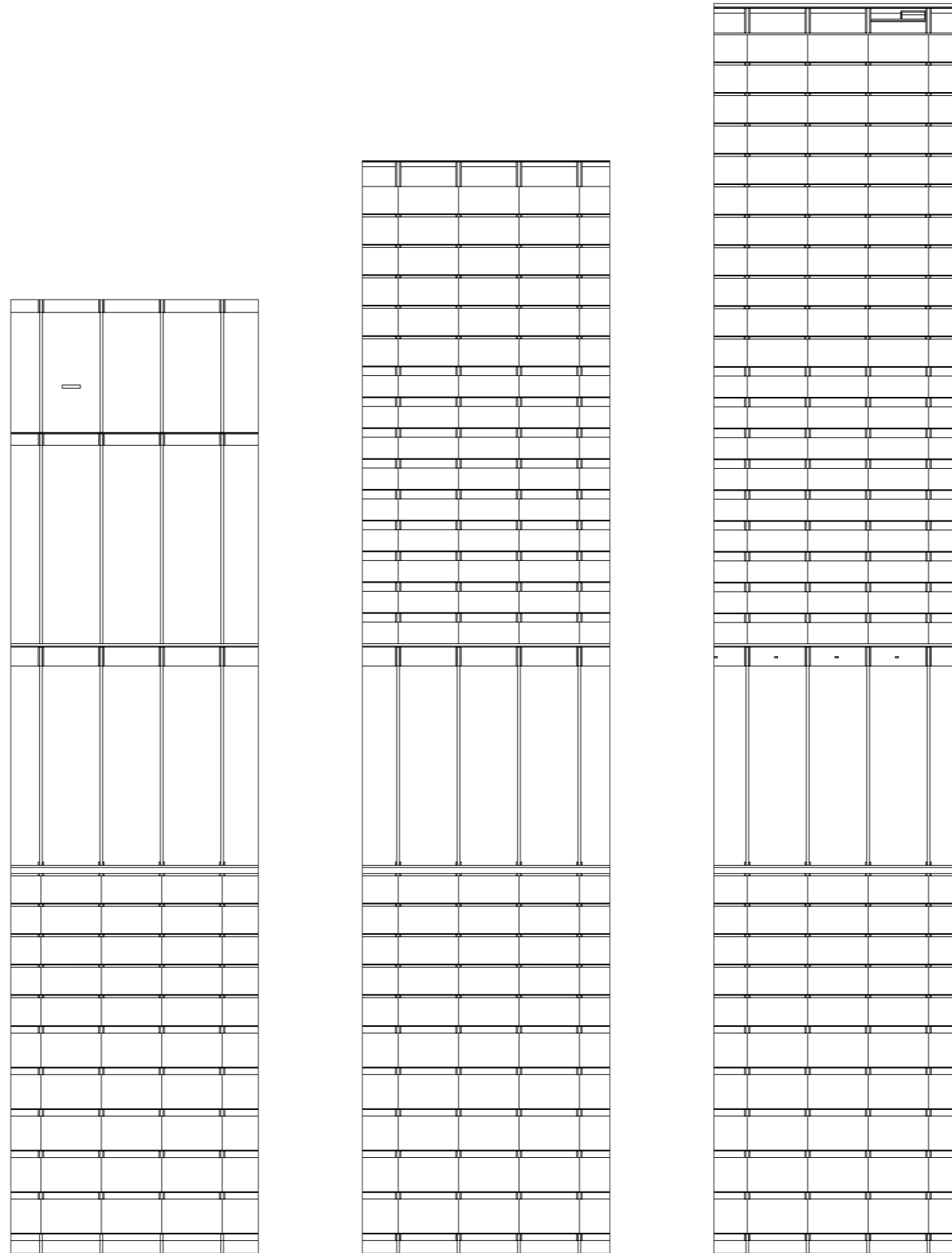
12 - 19 cm



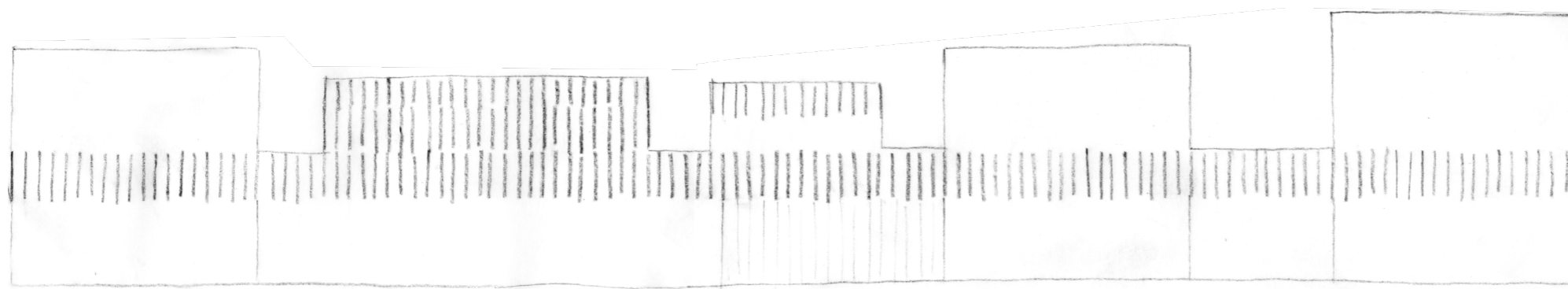
House Sparrow

14 - 18 cm

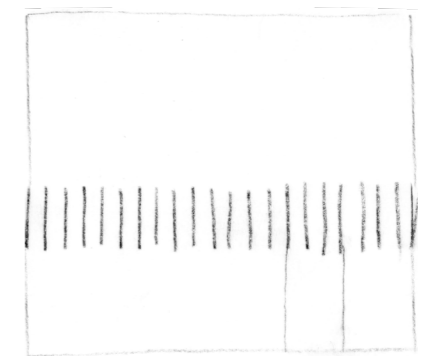
# Panel Divisions



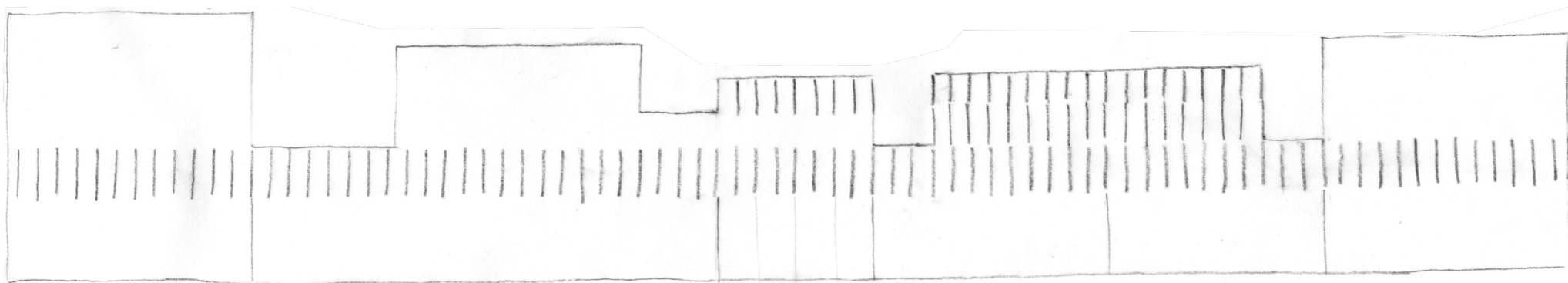
# Facade Rhythm



(S) East Facade (1.33)



North (W) Facade (1.5)

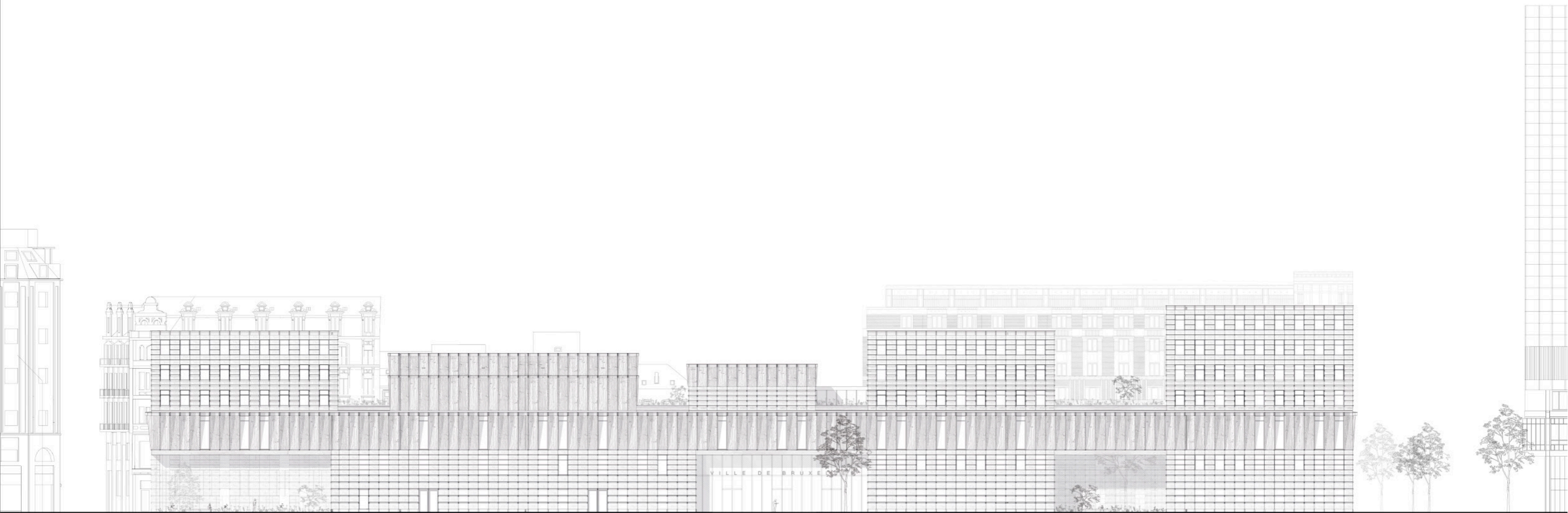


(N) West Facade (1.6)

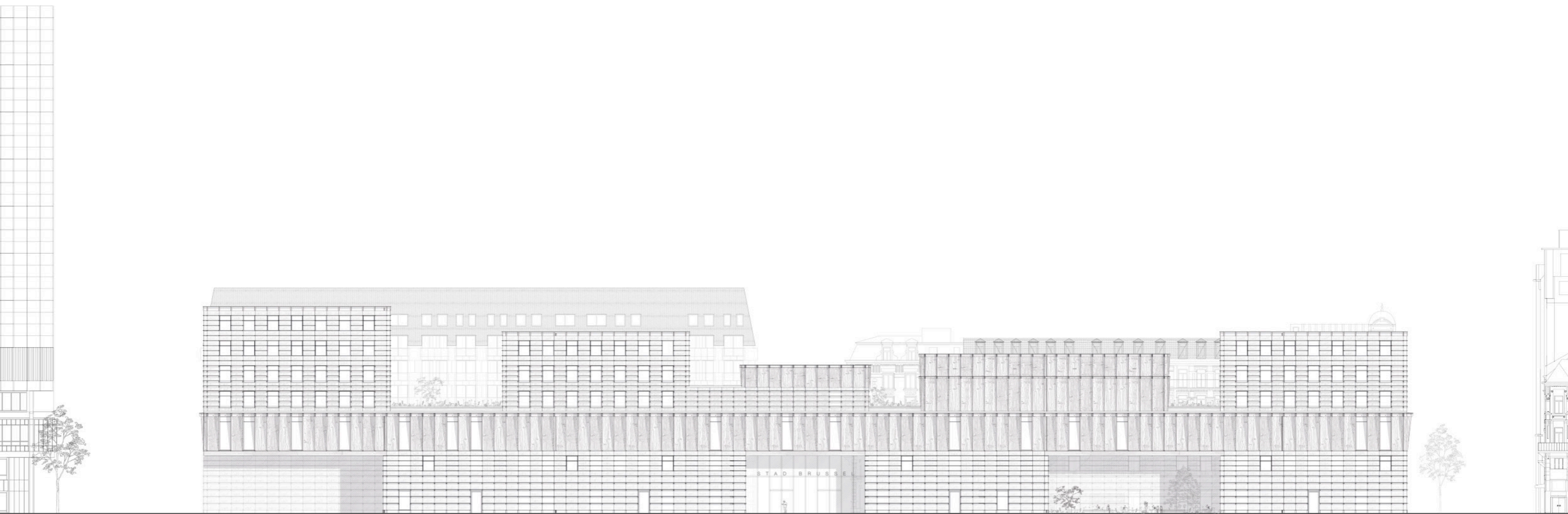


South (W) Facade (1.0)

(South) East Facade



(North) West Facade



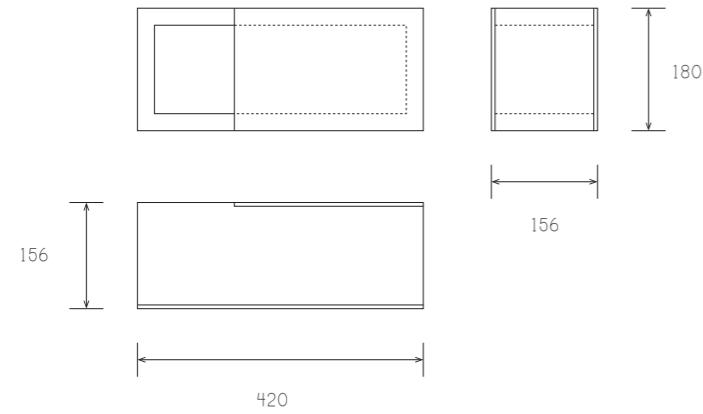


# Prefabricated Nest Boxes from Wood Concrete (75% wood + porous materials (breathable))

## Vivara Pro IB GZ 04

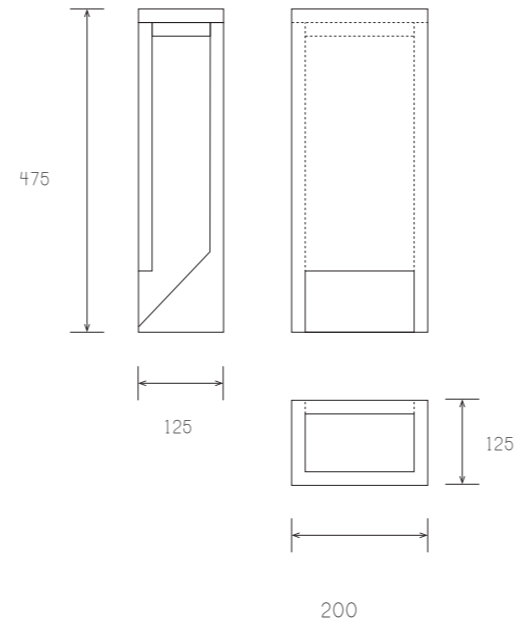
Breathable Wood Concrete

Common Swift



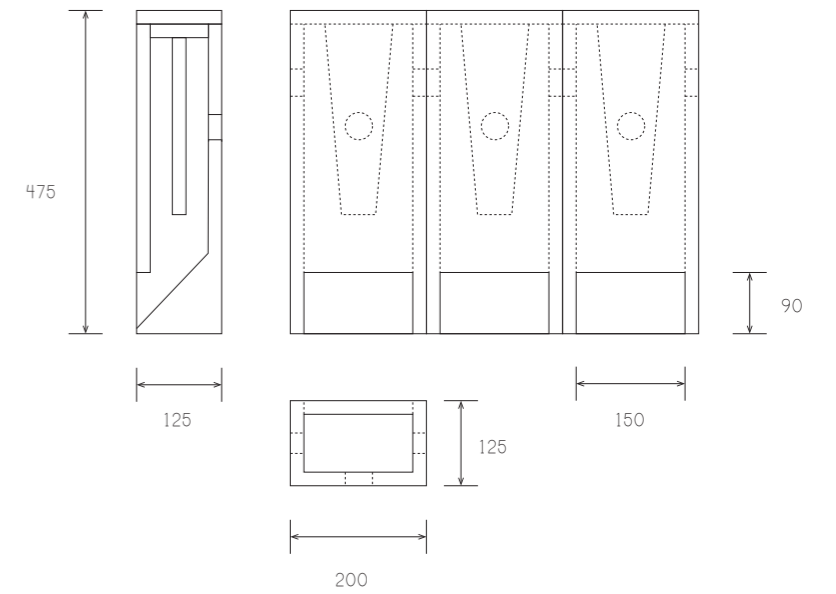
## Bat Tube 1FR Schwegler

Breathable wood-concrete



## Bat Tube 2FR Schwegler

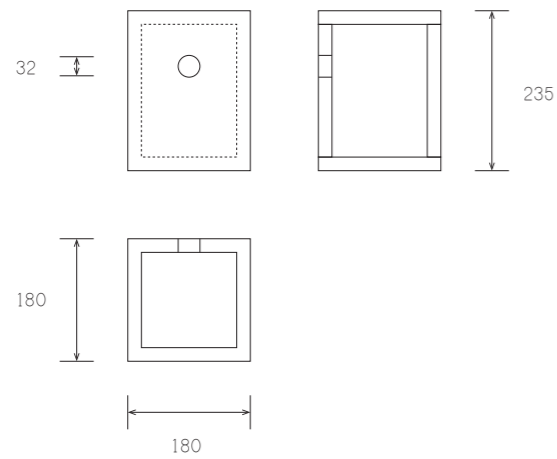
Breathable wood-concrete



## Brick Box Type 24 Schwegler

Breathable Wood Concrete

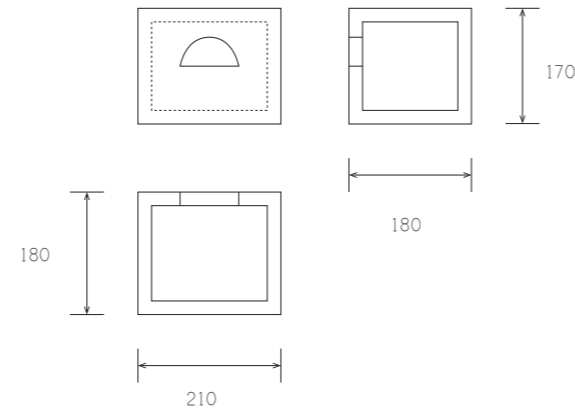
Great, Blue, Marsh, Coal, and Crested Tits, Redstarts, Nuthatches, Tree and House Sparrows



## Vivara Pro IB DI 01 Inbouwsteen Halfopen

Breathable Wood Concrete

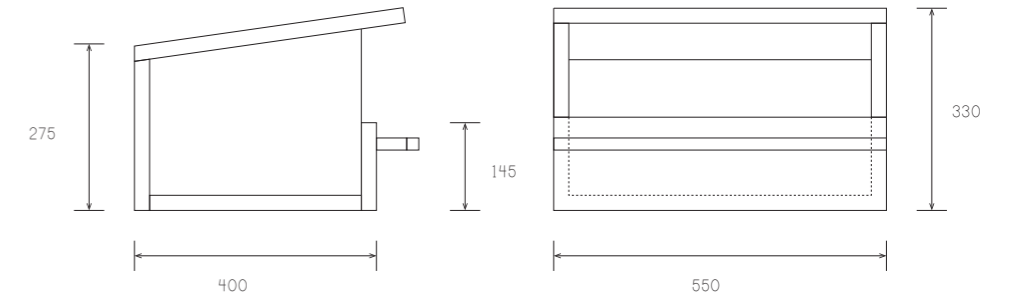
Black Redstart, White Wagtail, Spotted flycatcher, European Robin



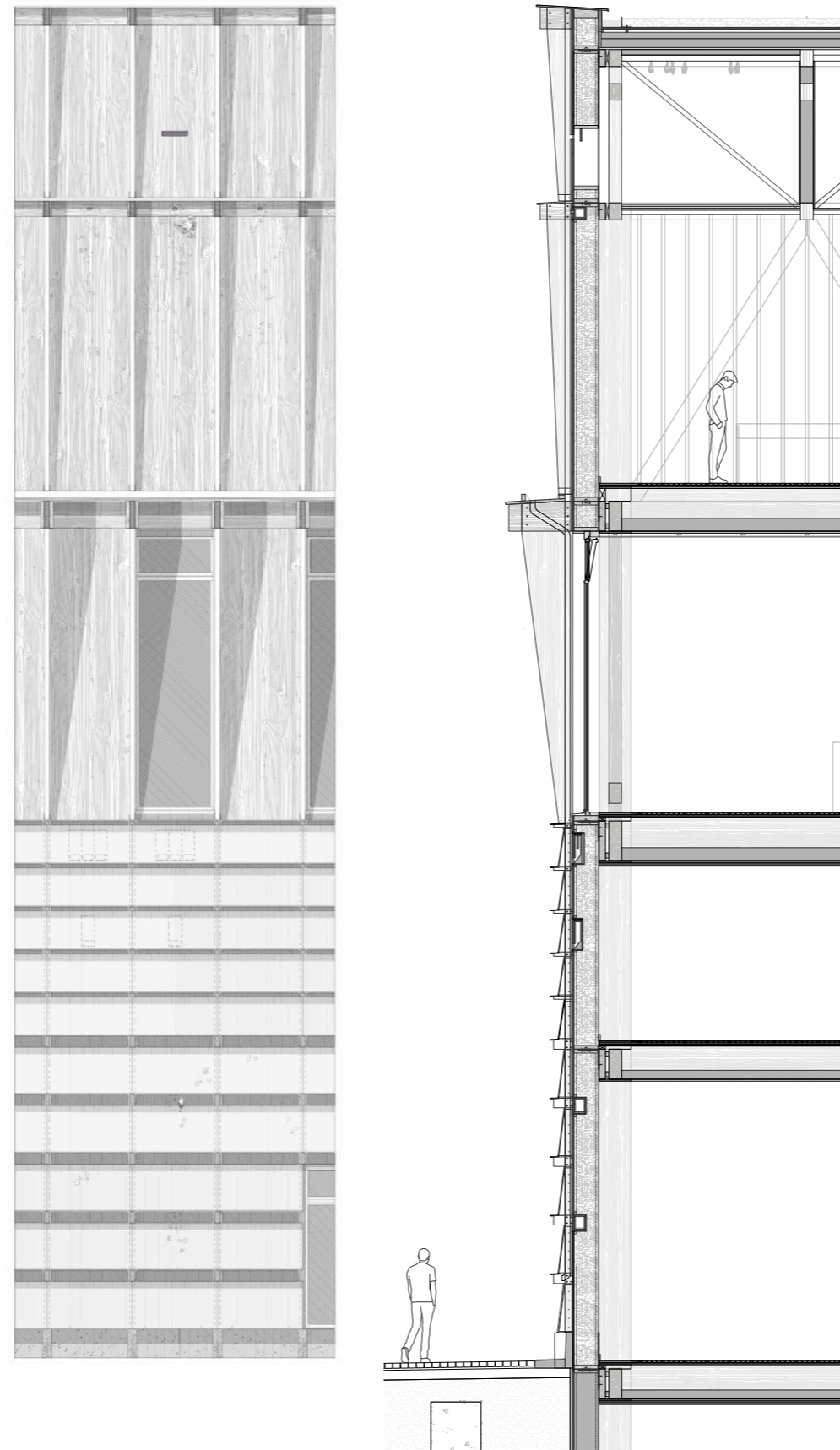
## Custom Nest Box

Wood

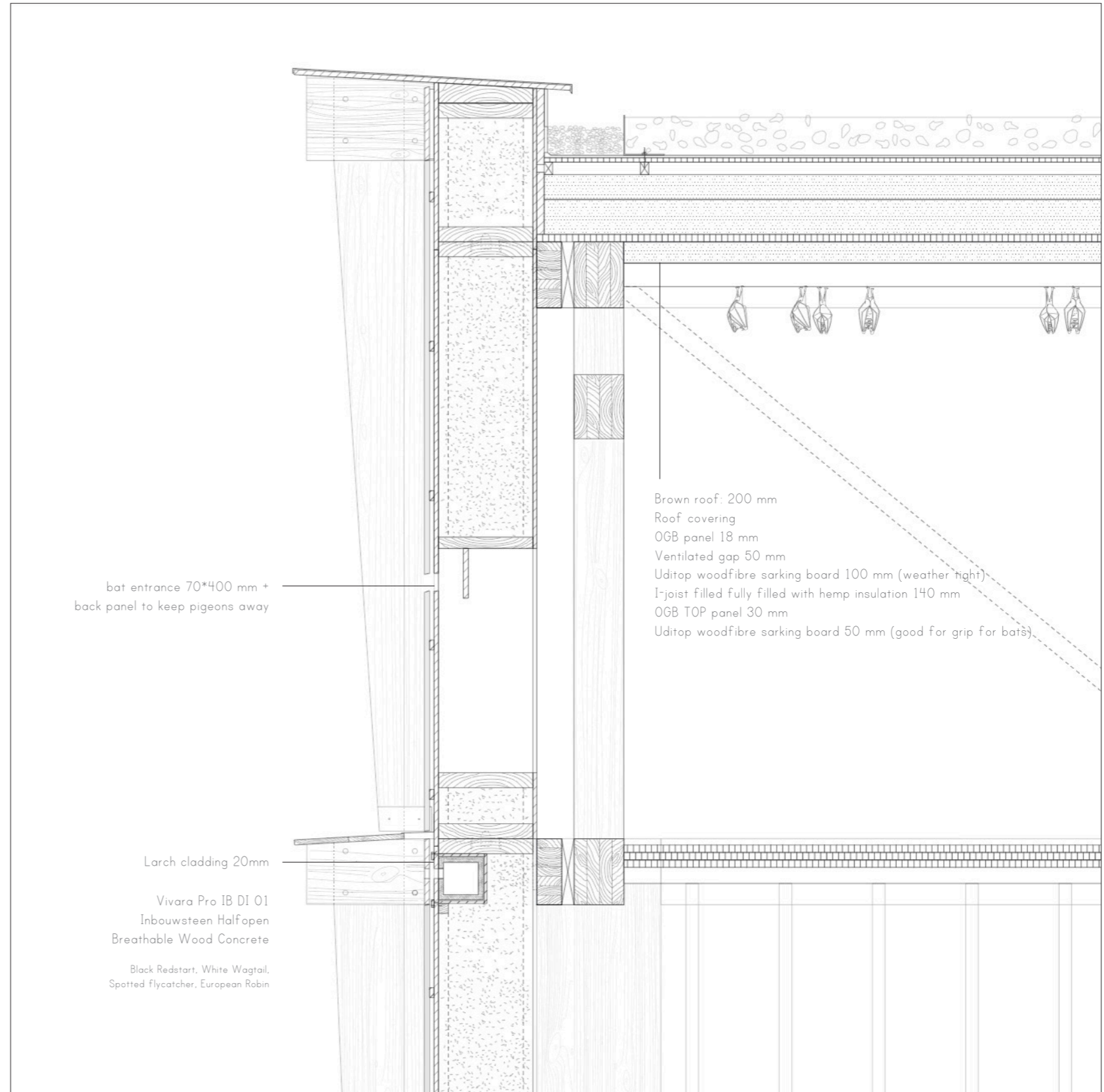
Kestrel



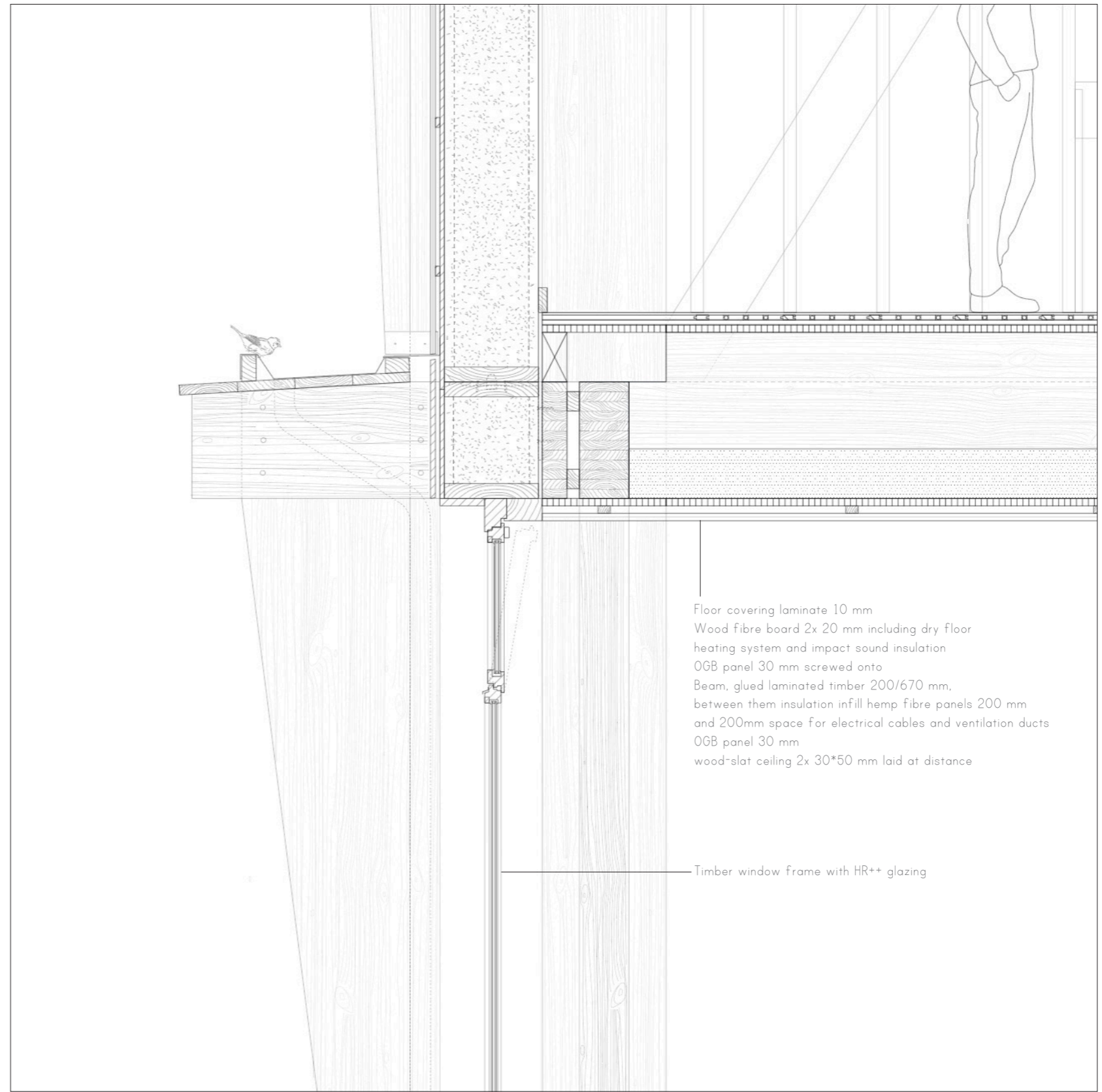
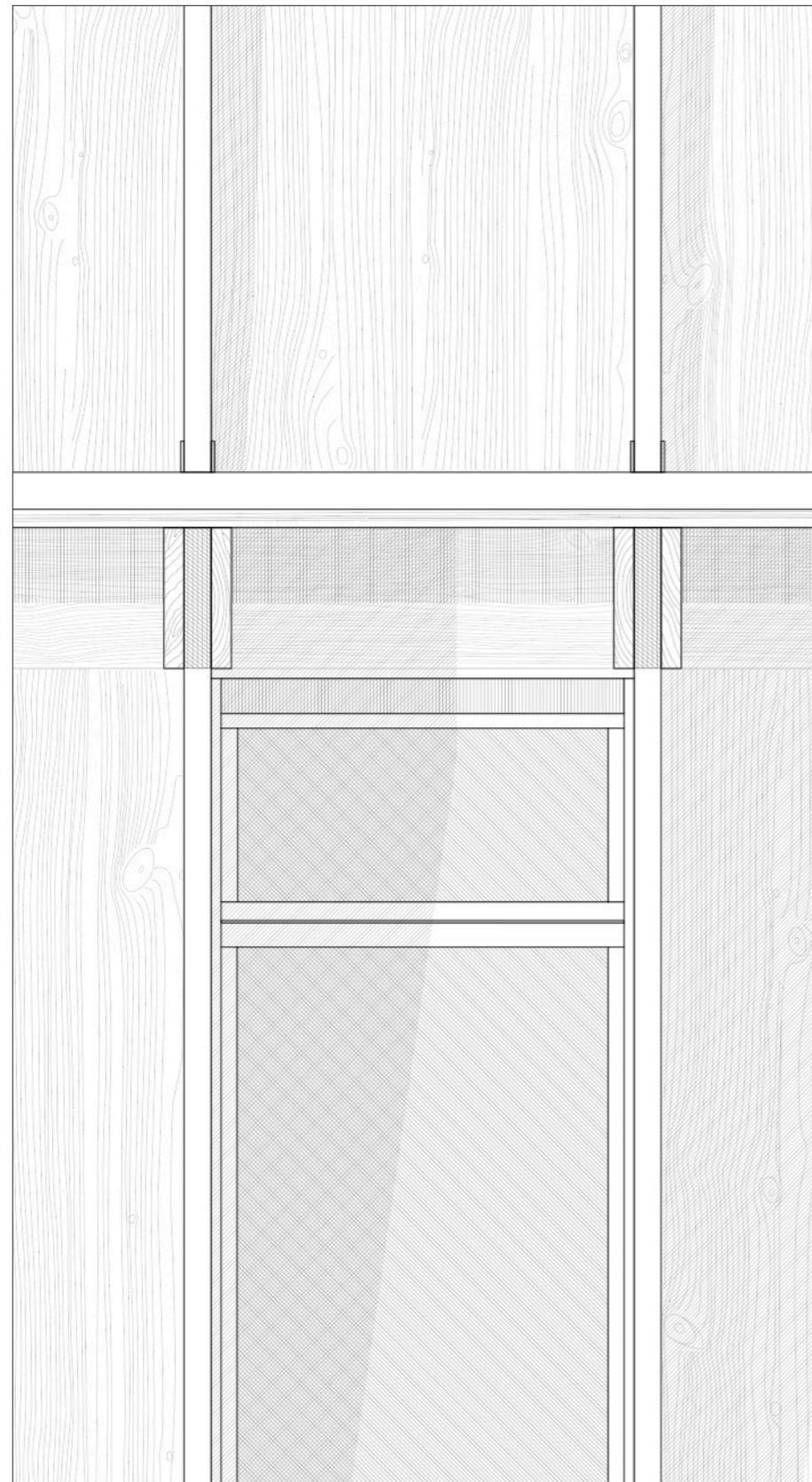
Facade Fragment + Vertical Section | East Facade



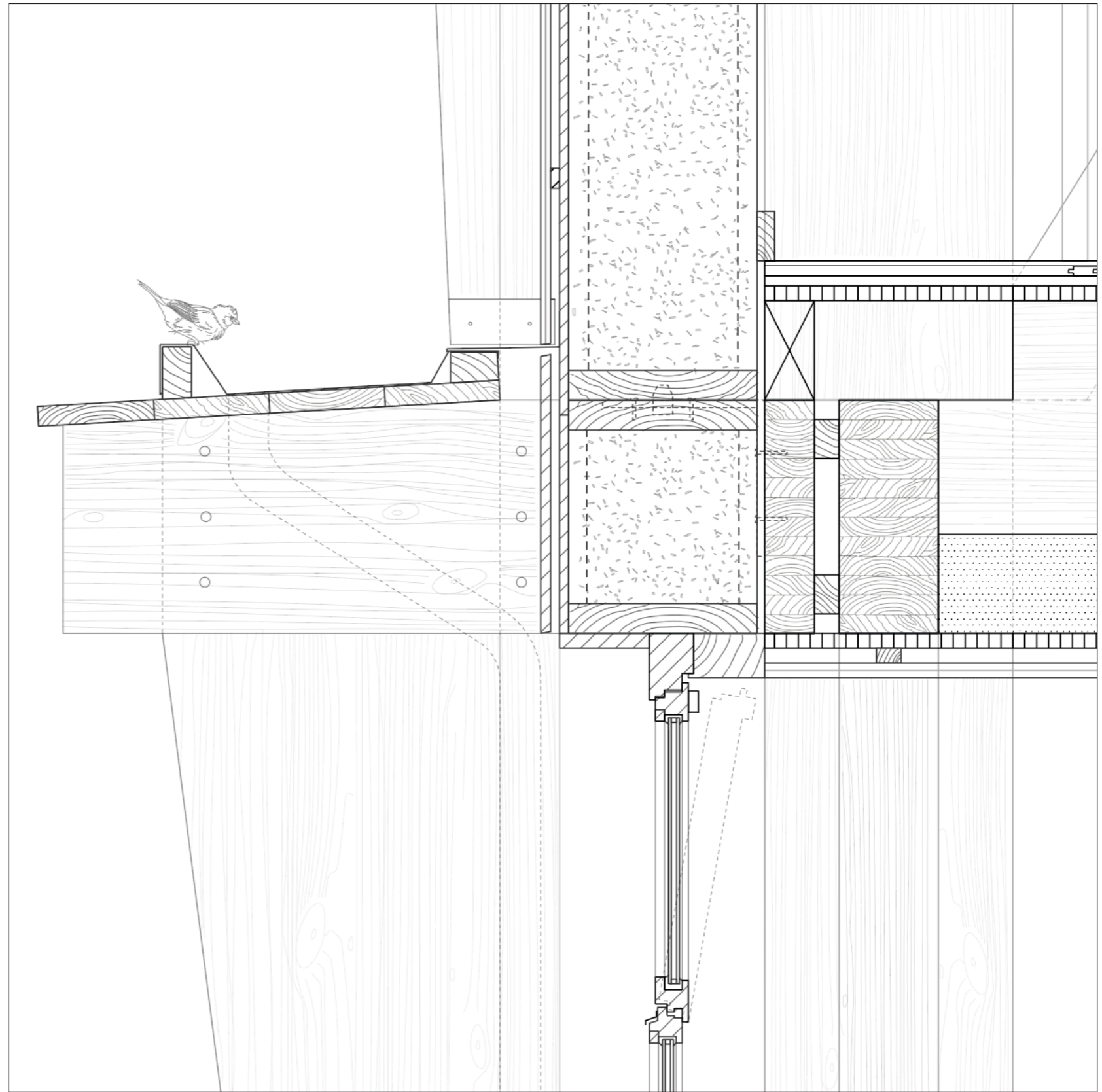
# Facade Fragment + Vertical Section | East Facade 1 20



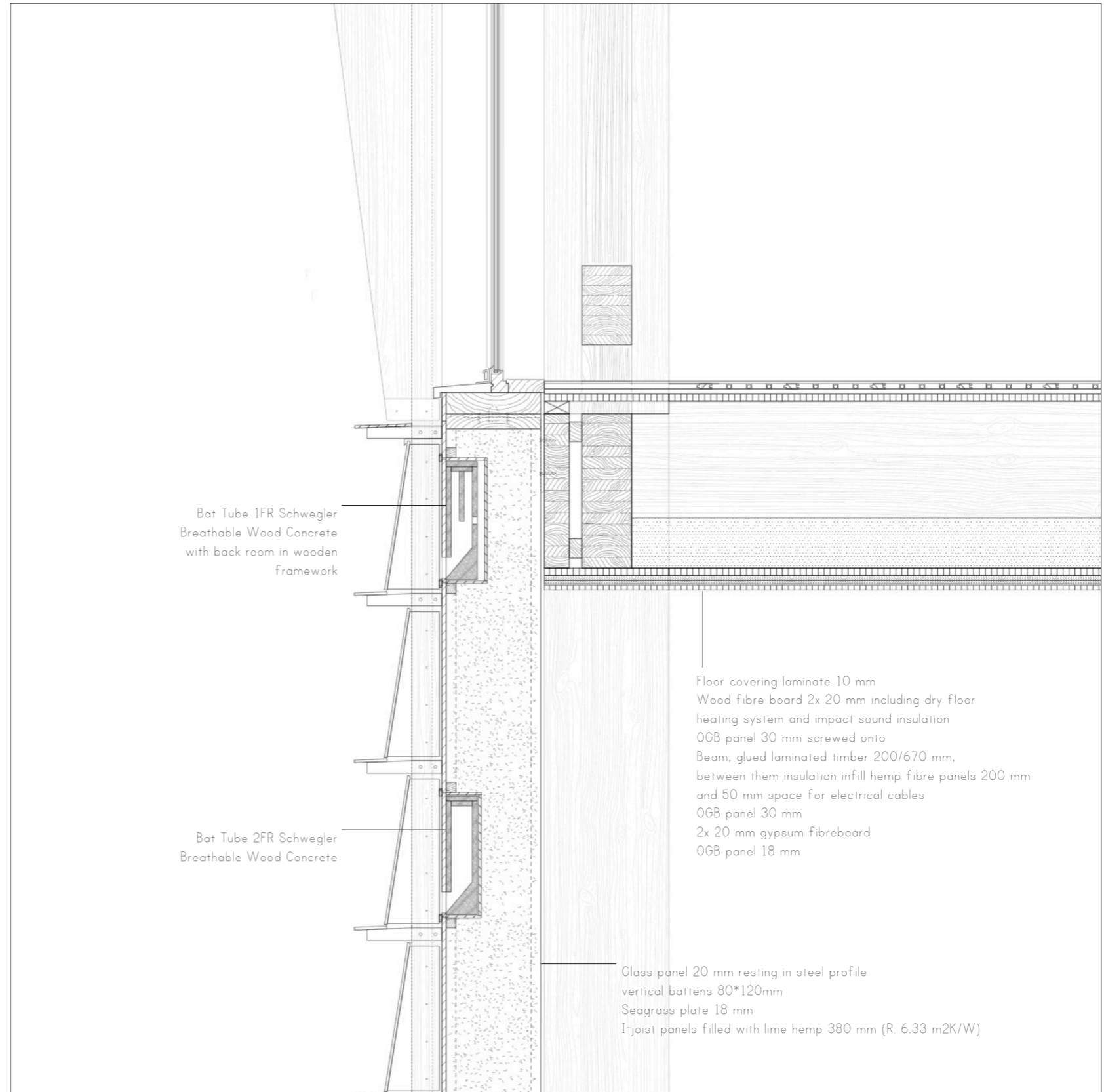
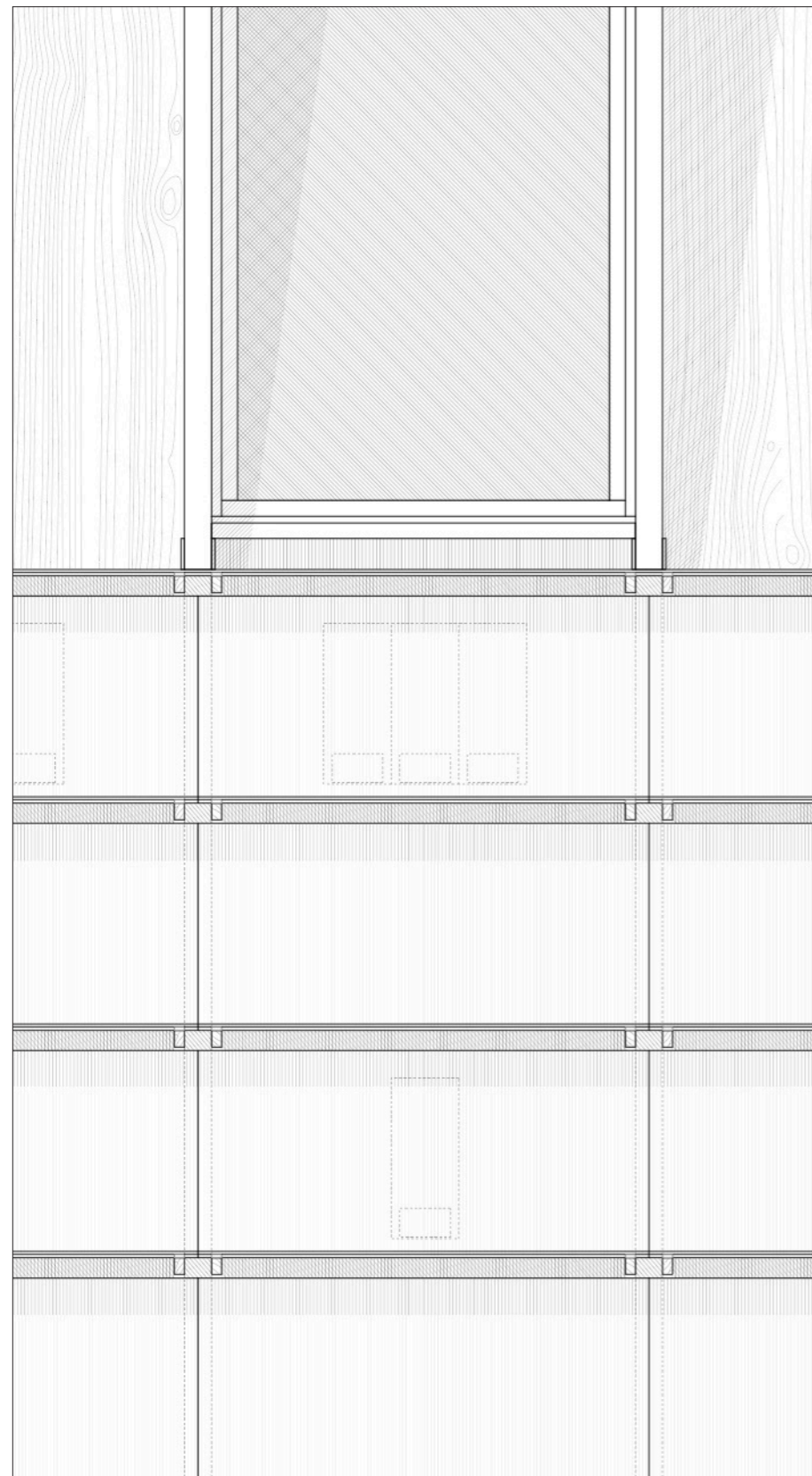
Facade Fragment + Vertical Section | East Facade 1 20



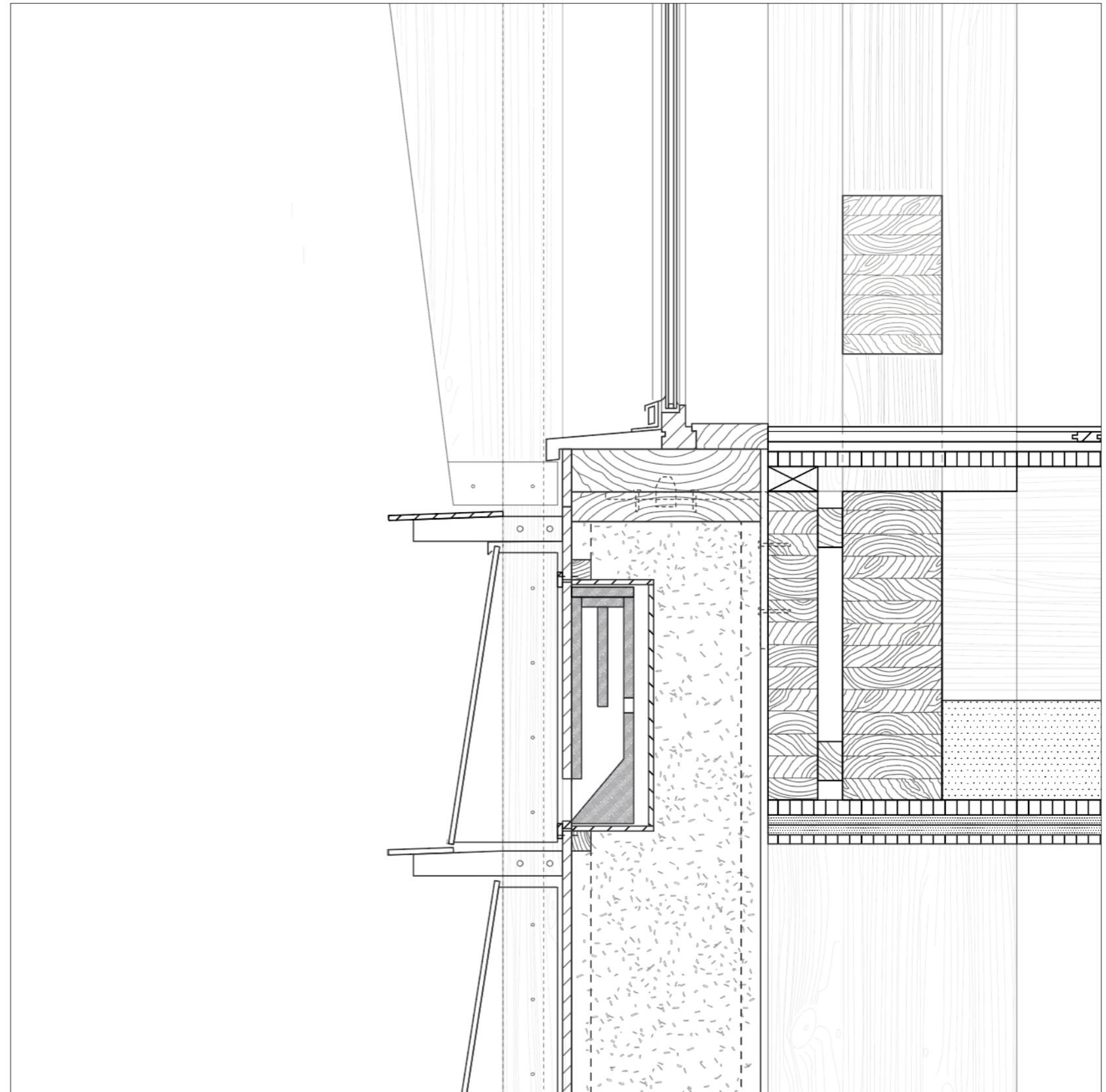
Vertical Section | East Facade 1 10



# Facade Fragment + Vertical Section | East Facade 1 20

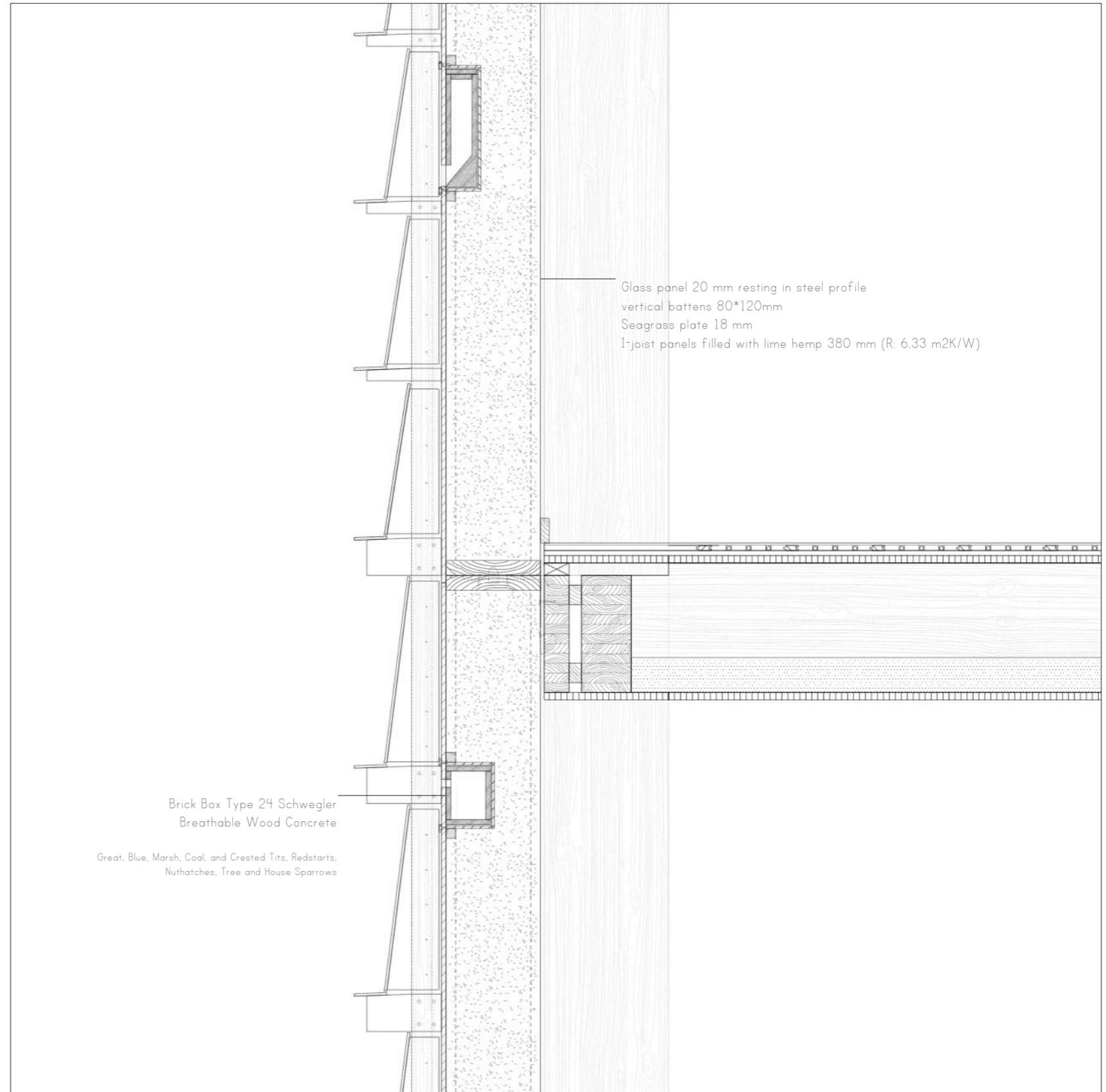


Facade Fragment + Vertical Section | East Facade 1 10



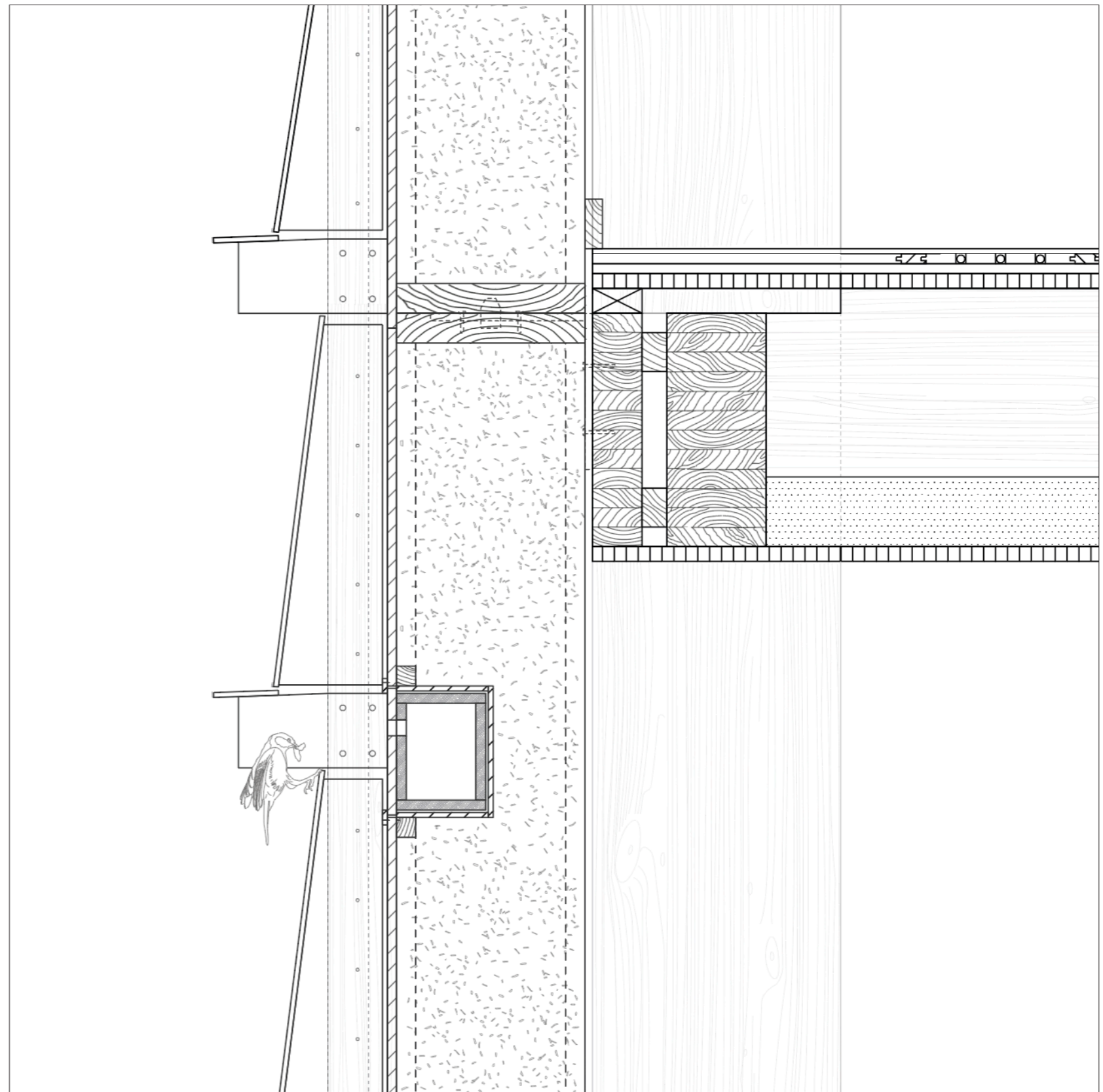
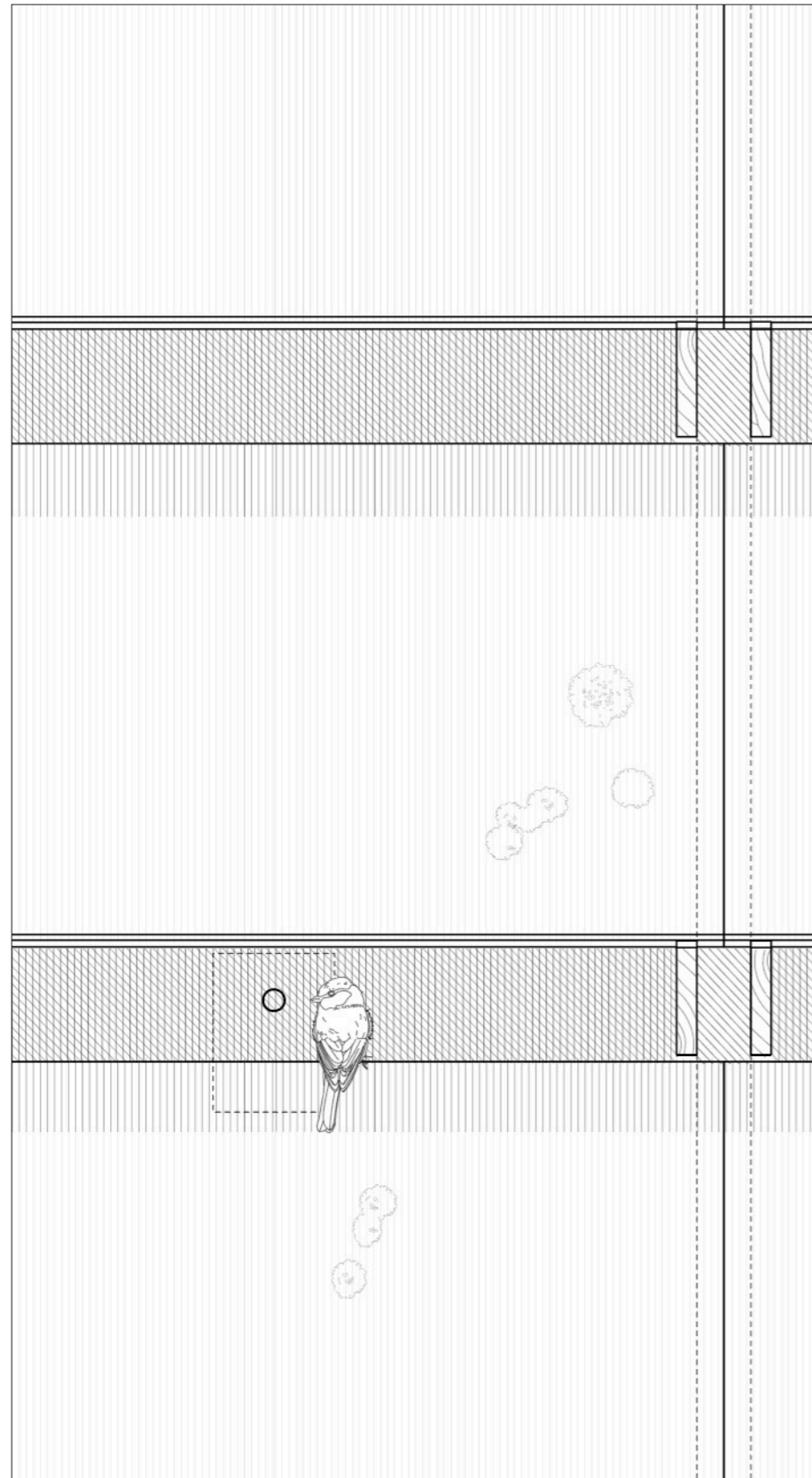
Specie	Breeding Season	Maintenance
Great tit/blue tit	April - July	October - November
Bats	May - April	October - November
Black Redstart	April - June	October - November
Starling	April - June	October - November

Facade Fragment + Vertical Section | East Facade 1 20

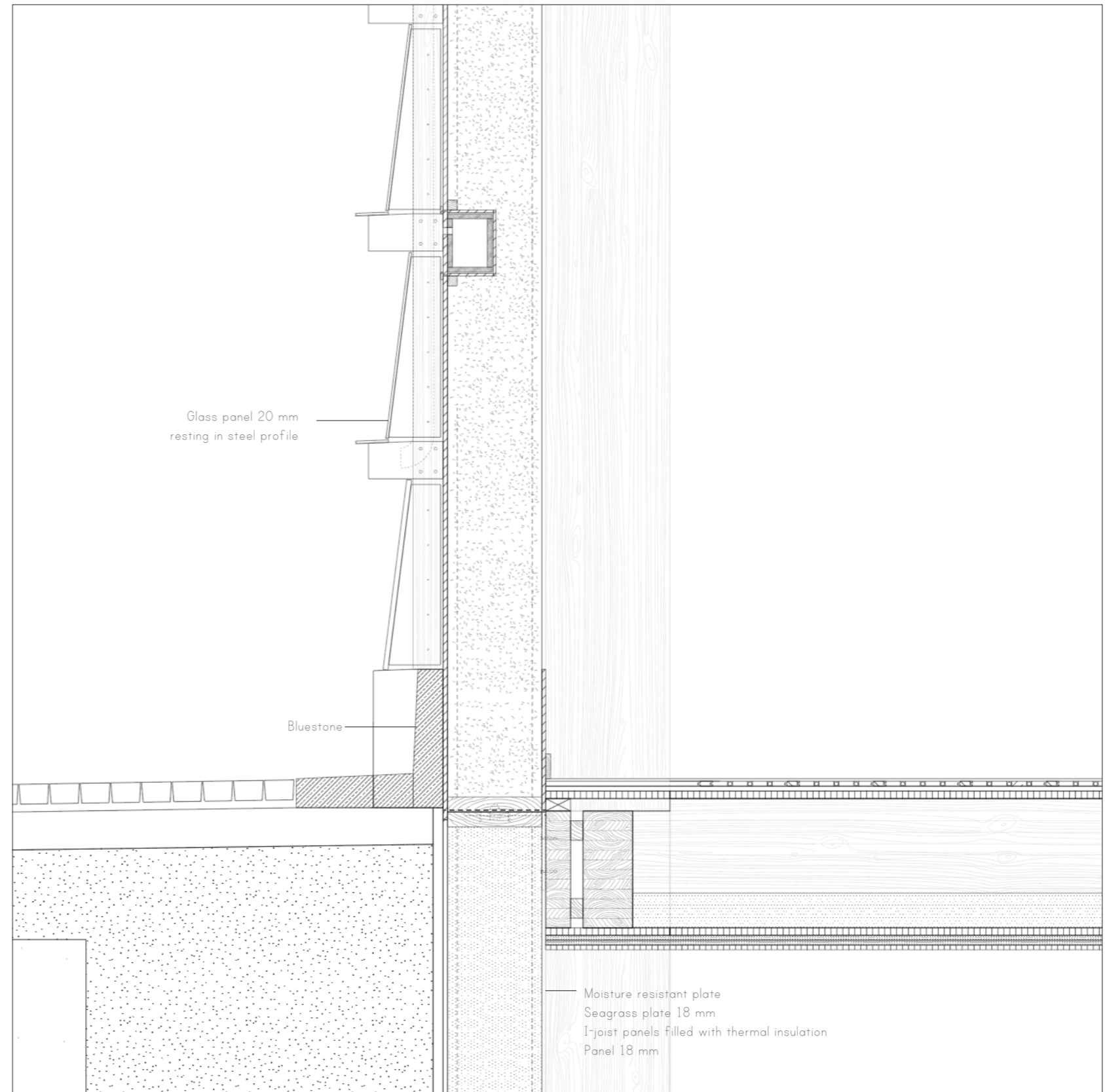
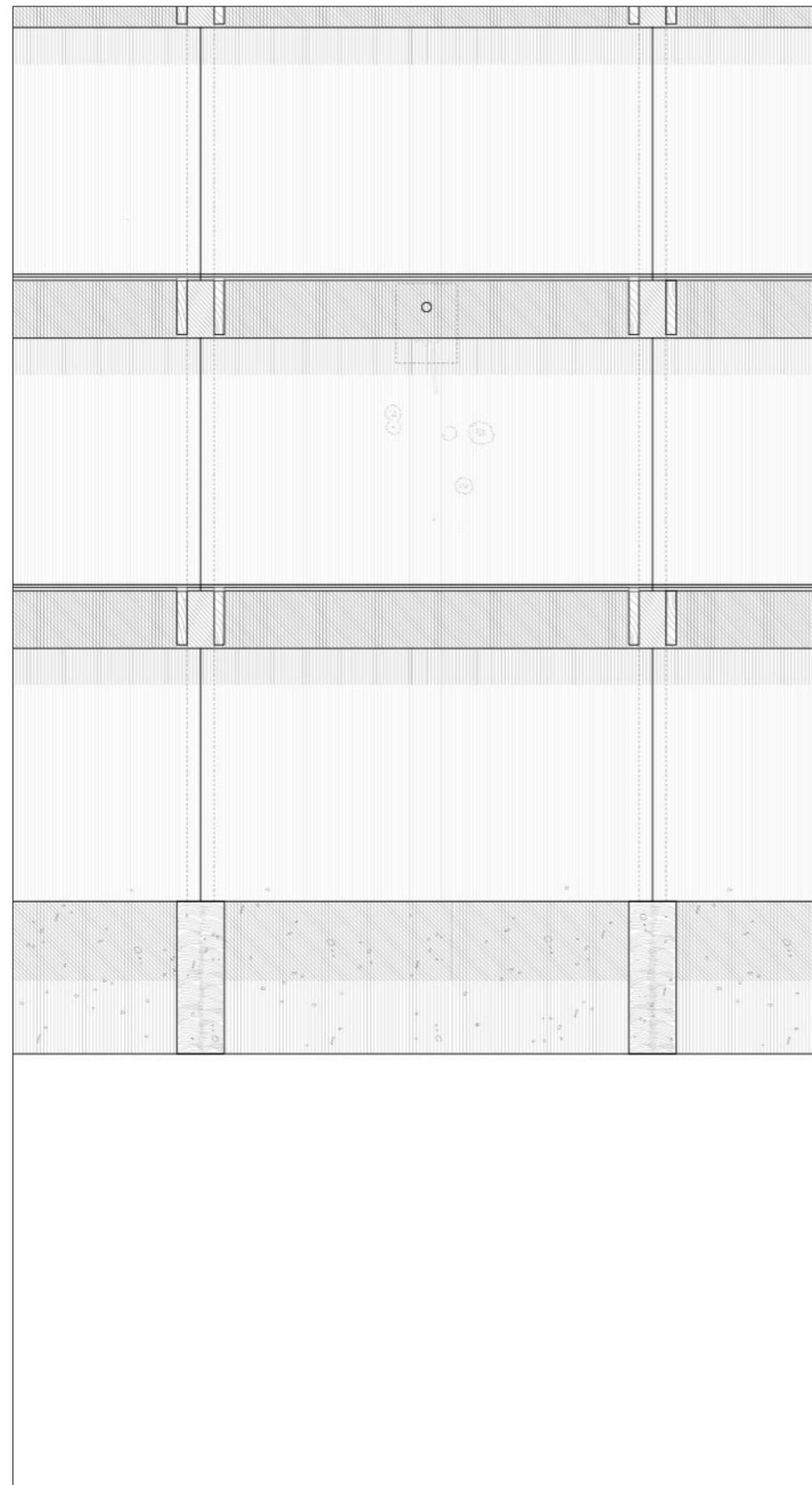




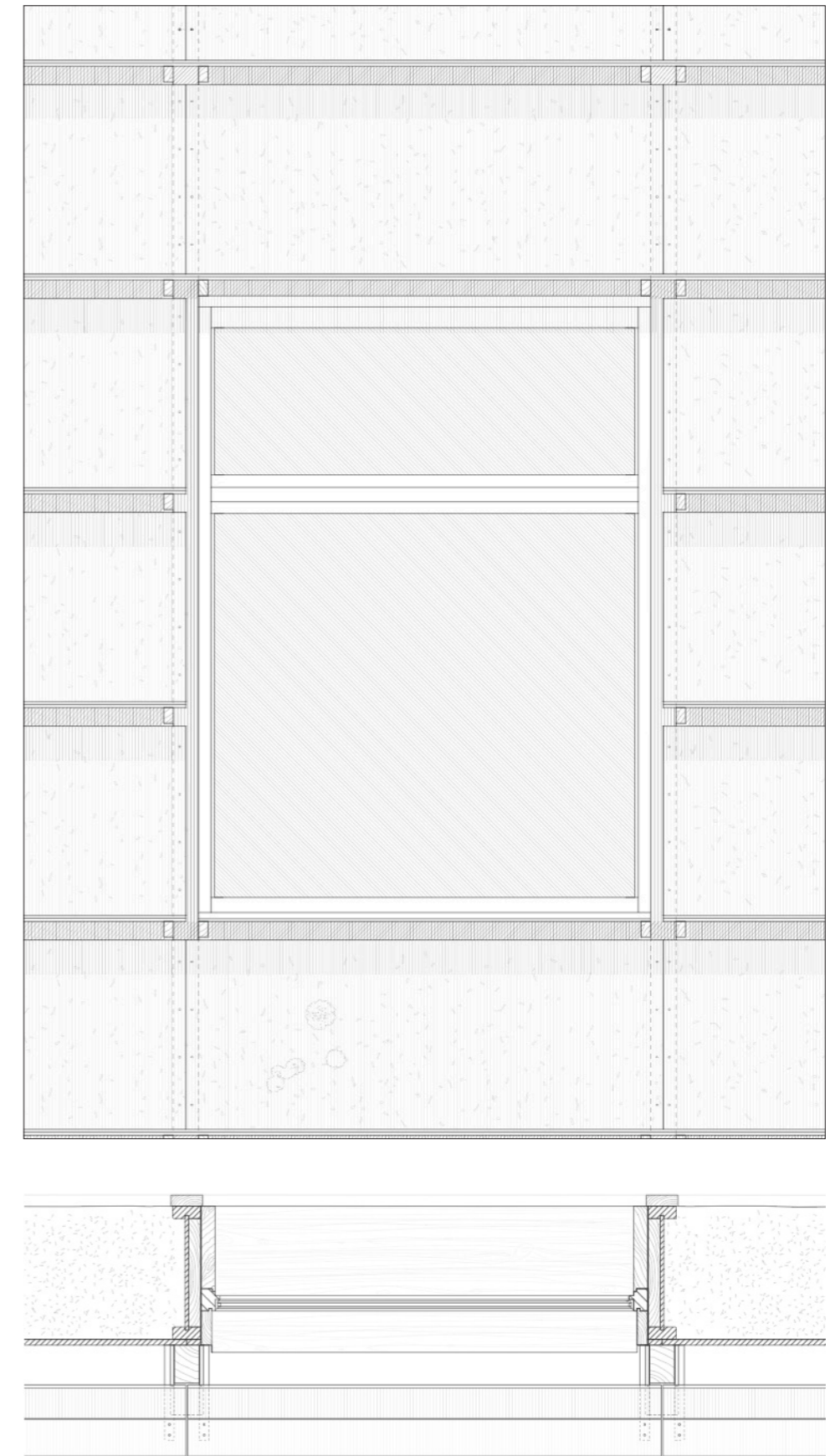
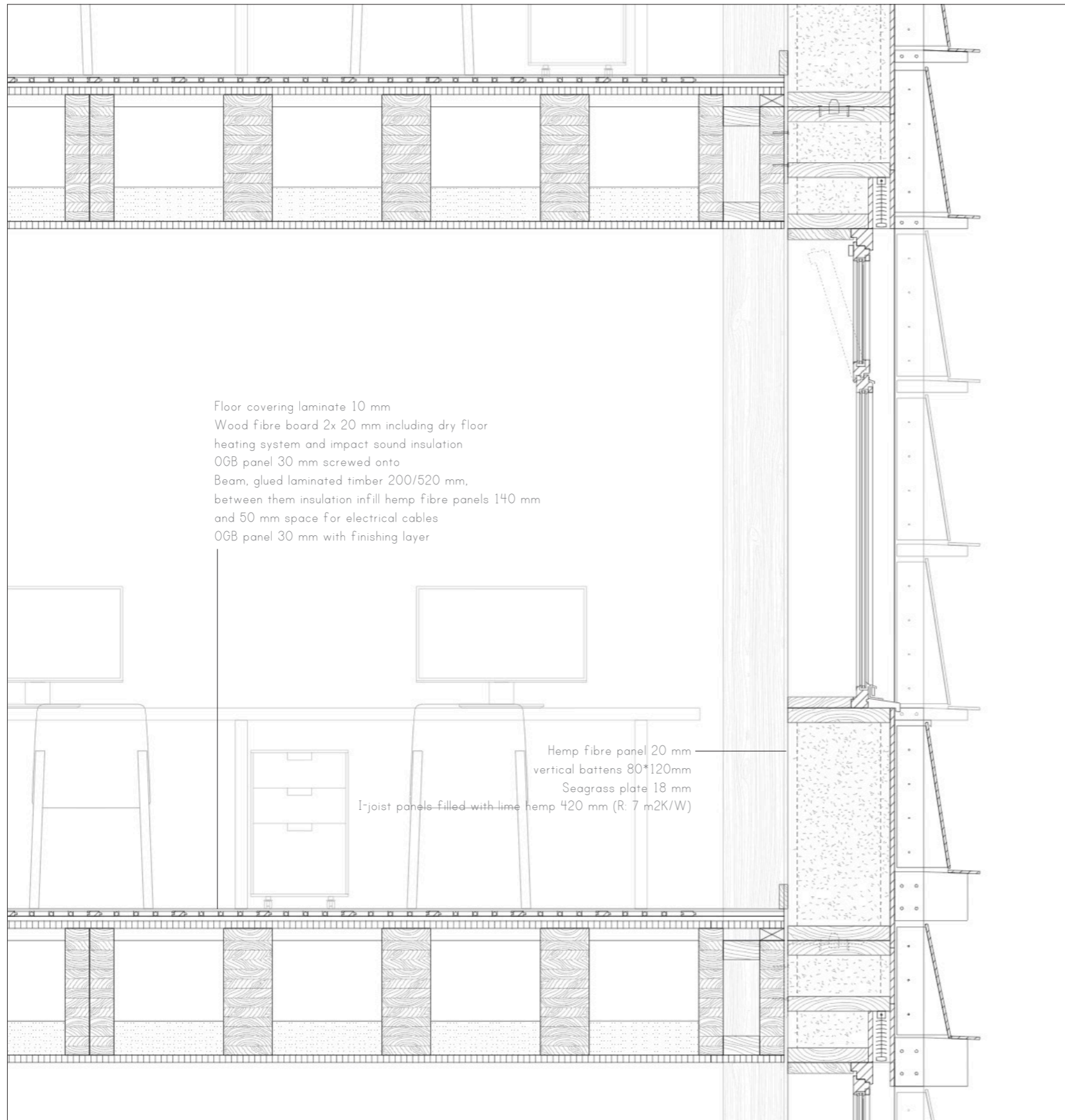
Facade Fragment + Vertical Section | East Facade 1 10



Facade Fragment + Vertical Section | East Facade 1 20

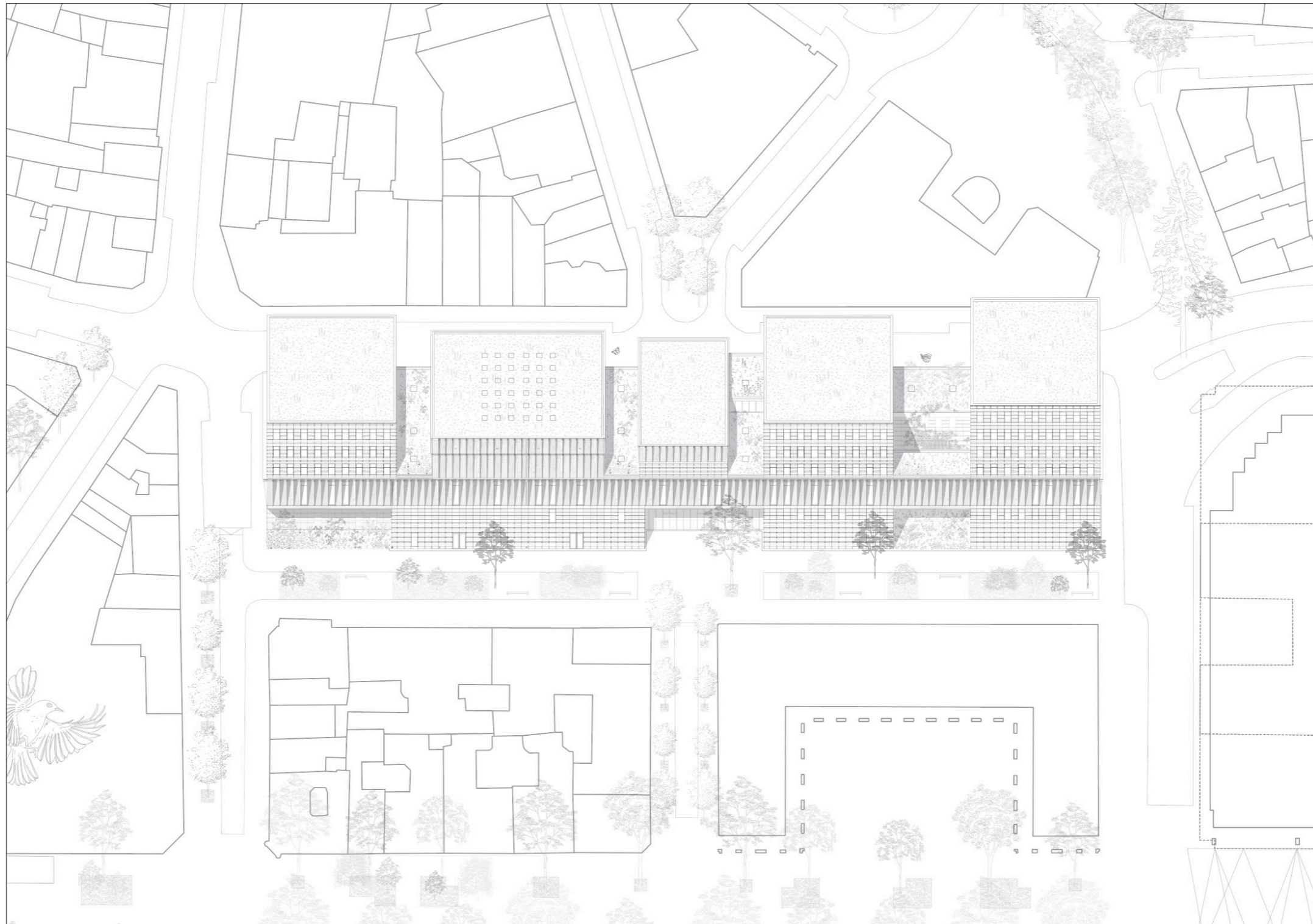


# Facade Fragment + Vertical and Horizontal Section | North Facade 1 20

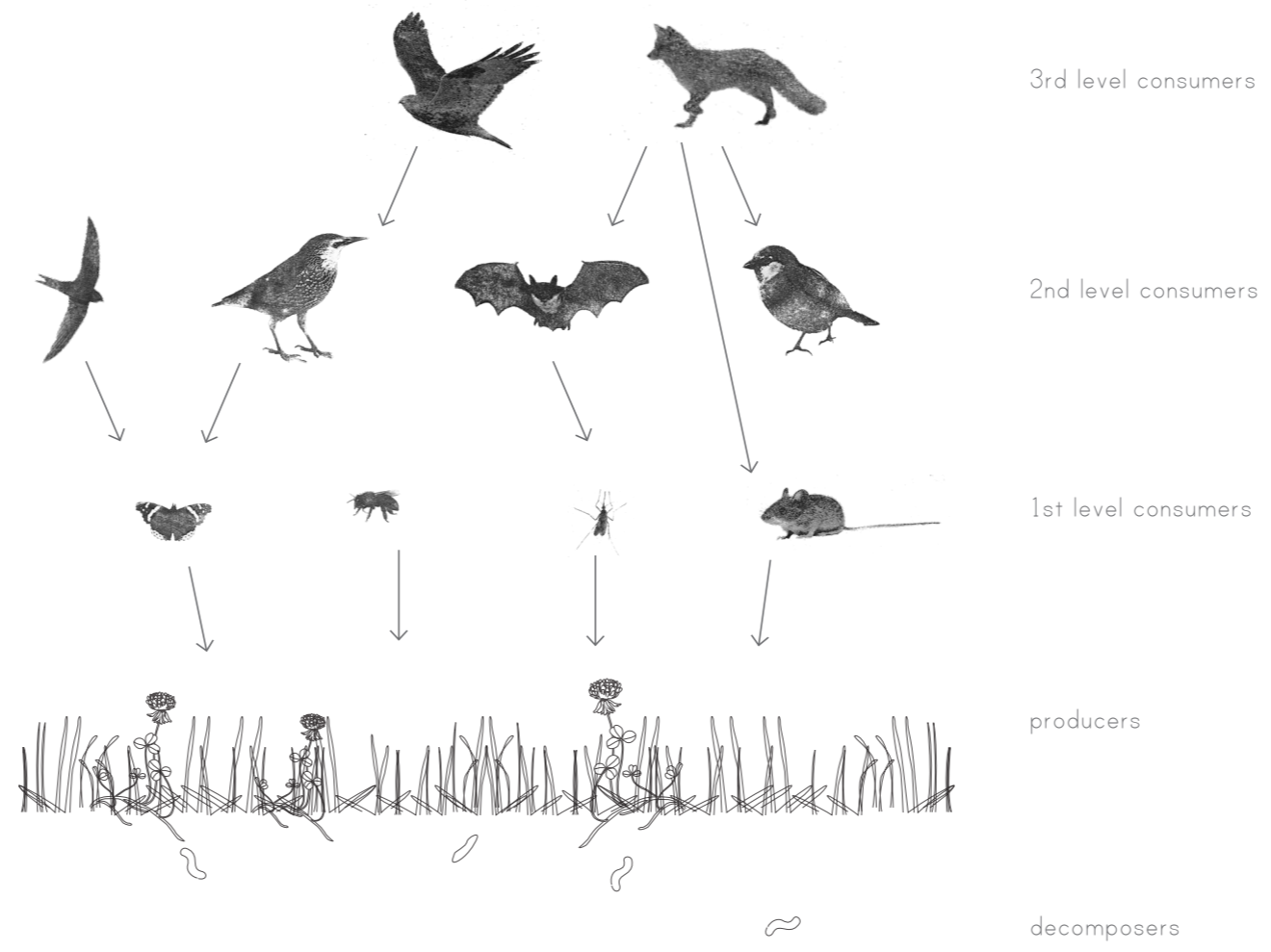


# Impressions Gardens

(South) East View



# Food Web



## Plants

indigenous and recommended species in Brussels Capital Region



*Helleborus foetidus*  
*Stinkend nieskruid*

Bloom: january - april  
Biodiversity: bees  
Halfshadow  
Fragrant flower  
Height: up to 60 cm  
Colour: green white



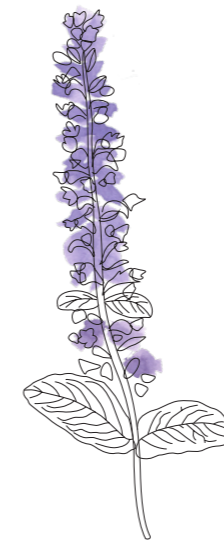
*Viola odorata*  
*Maarts viooltje*

Bloom: february - april  
Biodiversity: insects, butterflies  
Halfshadow  
Fragrant flower, edible  
Height: 5 to 15 cm  
Colour: blue



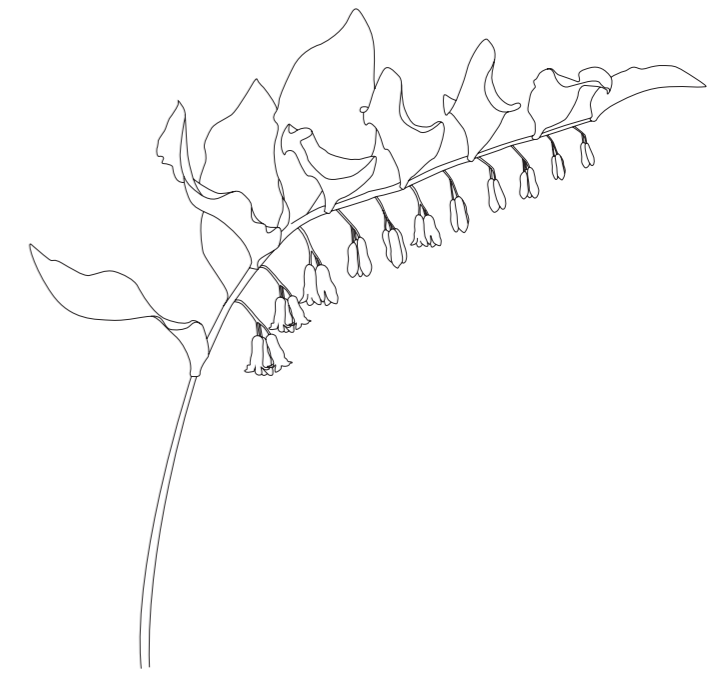
*Crataegus monogyna*  
*Eenstijlige meidoorn*

Bloom: march - june  
Biodiversity: bees, butterflies, birds  
Halfshadow  
Height: 2 to 8 m  
Colour: white



*Ajuga reptans*  
*Kruipend zenegroen*

Bloom: april - june,  
green through winter  
Biodiversity: bees, butterflies  
Halfshadow  
Ground covering  
Height: 10 to 40 cm  
Colour: blue



*Polygonatum multiflorum*  
*Gewone Salomonszegel*

Bloom: may - june  
Biodiversity: humblebees  
Shadow, green through winter  
Height: 40 to 60 cm  
Colour: white

## Plants

indigenous and recommended species in Brussels Capital Region



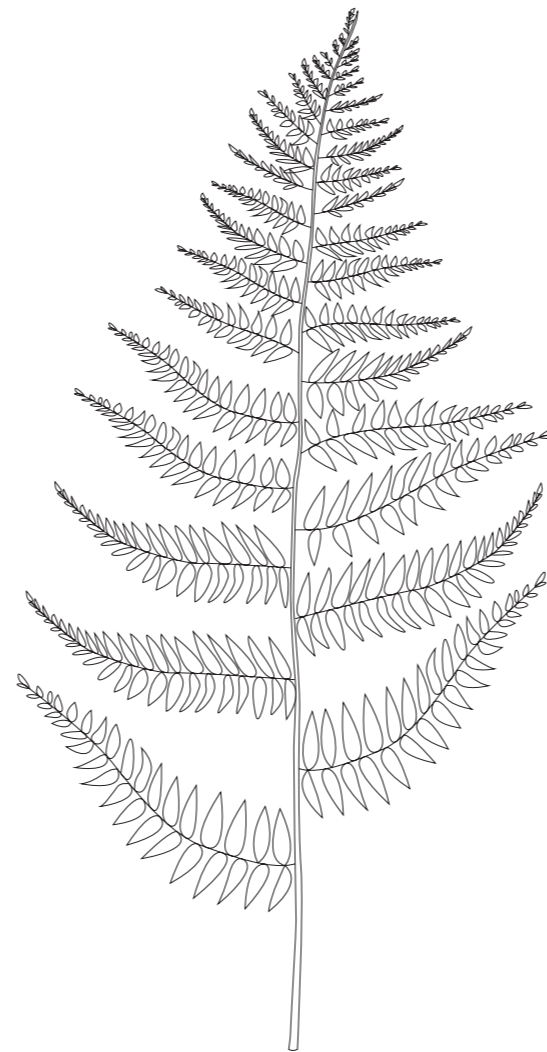
*Geranium pratense*  
Beemdoovievaarsbek

Bloom: may - august  
Biodiversity: bees, butterflies  
Halfshadow  
Ground covering  
Height: 30 to 90 cm  
Colour: lilac



*Trifolium repens*  
Witte klaver

Bloom: may - october  
Biodiversity: bees, butterflies  
Sun  
Height: 5 to 25 cm  
Colour: white



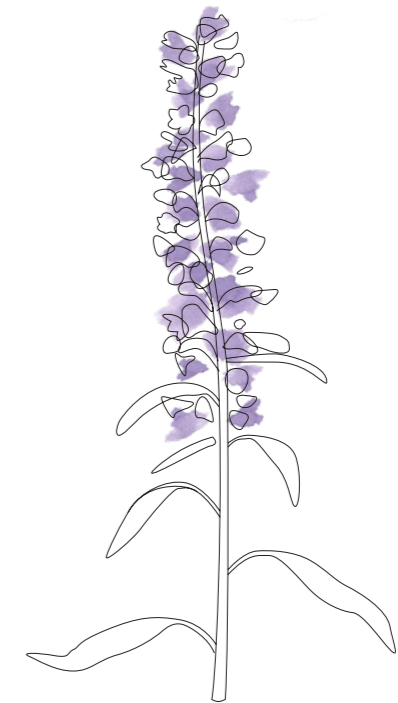
*Athyrium filix-femina*  
Wijfesvaren

Bloom: july - august  
Shadow  
Height: 30 to 150 cm



*Asplenium scolopendrium*  
Tongvaren

Bloom: green through winter  
Halfshadow, green through winter  
Height: 10 to 50 cm

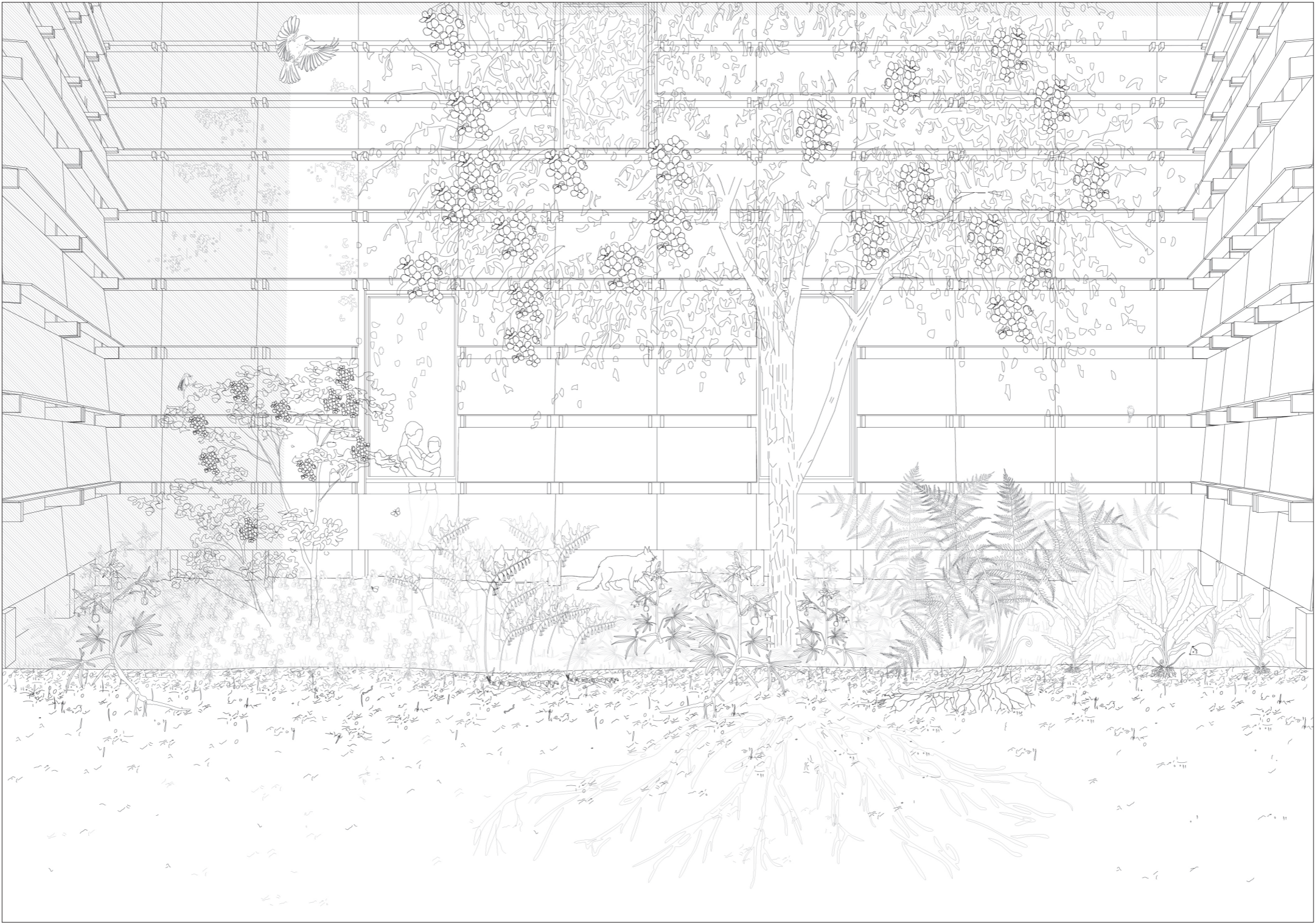
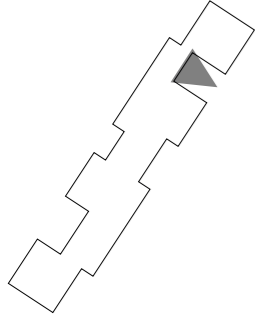


*Echium vulgare*  
Slangenkruid

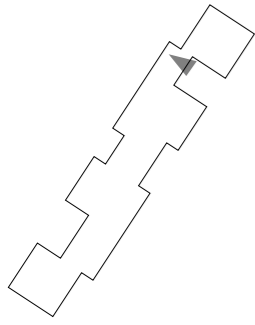
Bloom: may - september  
Biodiversity: bees, butterflies  
Sun  
Height: 30 to 100 cm  
Colour: blue



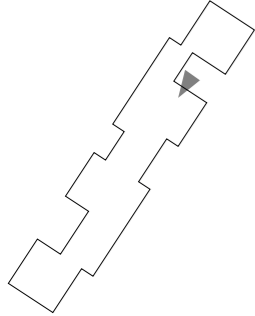
Garden (South) East



# Impression Ground Floor Hallway View into Courtyard



Impression Ground Floor Office View into Courtyard



Thank You!

