



# NURTURE. RESEARCH. HARVEST. REPEAT

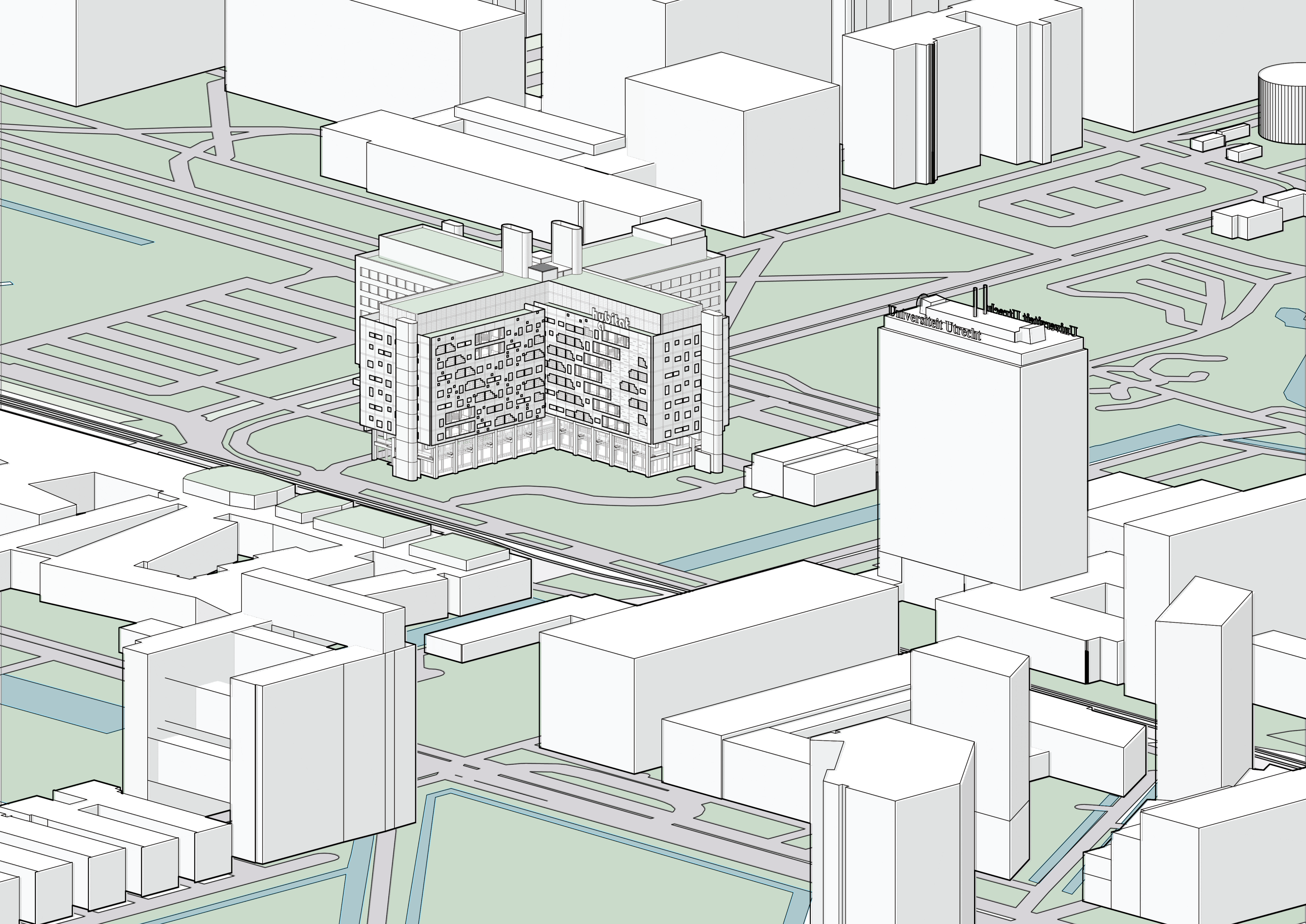
The Kruytgebouw as a biodiversity open lab-farm-hub.

aE Studio | Second Life  
P4 Presentation

Eleni Papaevangelou 5158591  
18/05/2022









**ETHICAL FARMS**

GUANO FARM  
FEATHER FARM  
INSECT FARM  
CHITIN FARM

**OPEN LABS**

**PUBLIC CO-WORKING SPACES**

**EXPERIMENTAL WALL**

**JOB OFFERS**

GREEN MANAGER	full time
GUANO GATHERER	seasonal
FEATHER GATHERER	seasonal
MAINTENANCE PERSON	full time
BIRD FEEDER	part time

**ANIMAL USERS**

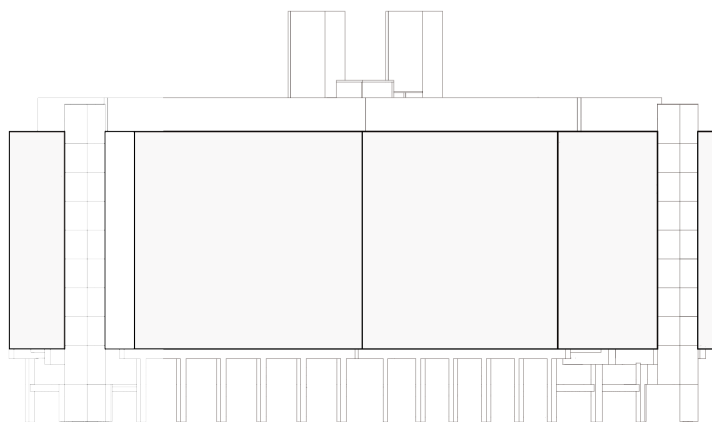


Zazu, I found a cliff in the Netherlands!



## DESIGN QUESTION:

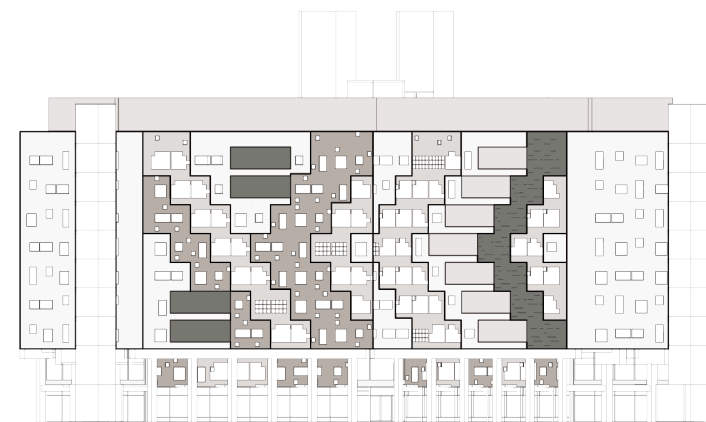
**How to effectively redesign the Hugo R. Kruyt building in Utrecht, into a nature inclusive education-research hub, that promotes biodiversity, human & nature coexistence, and make use of ecofriendly materials?**



A new facade



A Cliff



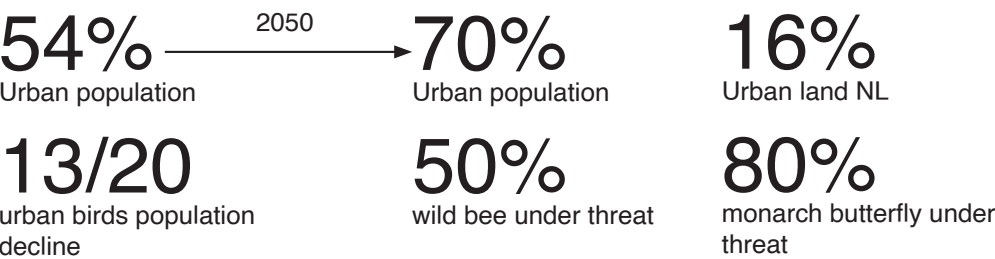
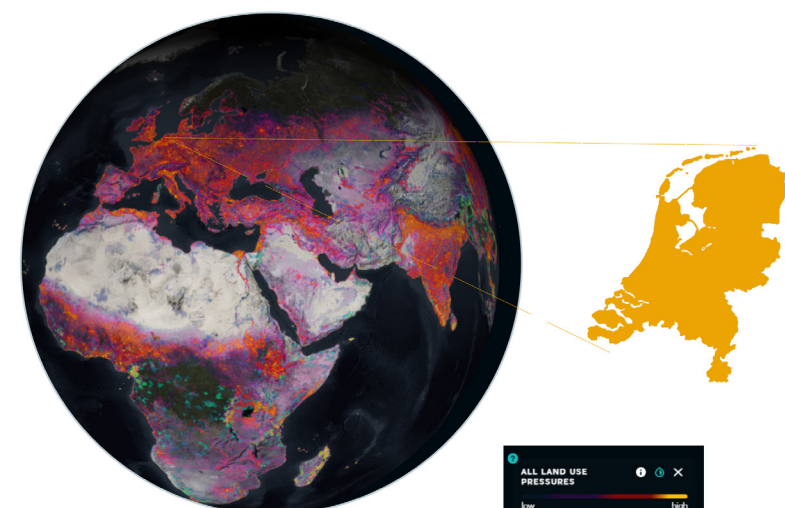
A Green route



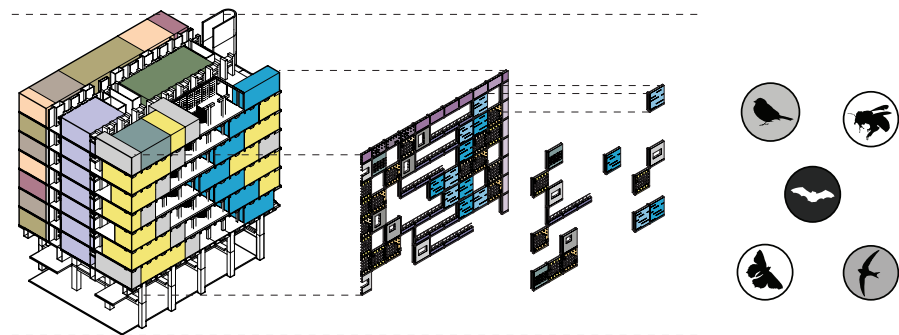
A Hub



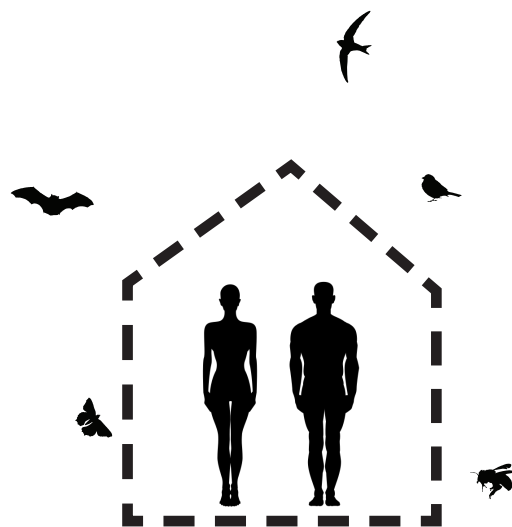
# BUILT ENVIRONMENT vs NATURE



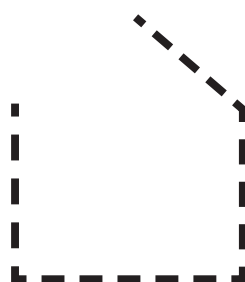
NATURE INCLUSIVITY  
ANIMAL NURTURING  
BIODIVERSITY



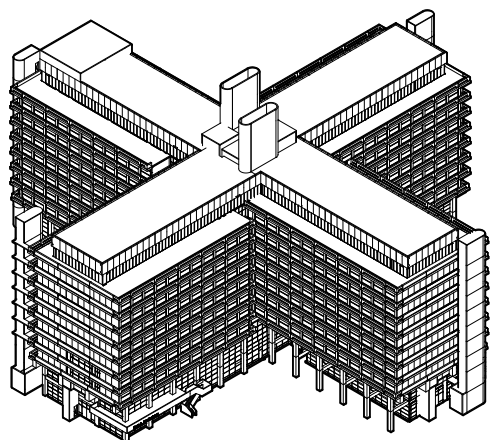
# HUMAN & NATURE DISCONNECTION



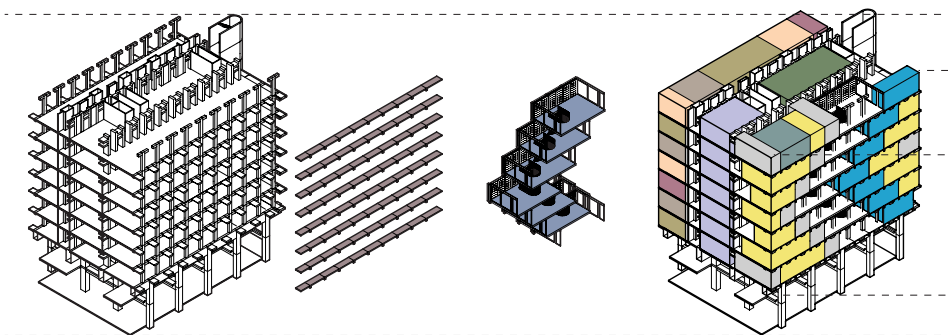
IT'S WIN WIN  
ANIMAL NURTURING  
HUMAN SATISFACTION  
ETHICAL FARMING



# BUILDING vs HUMAN



PUBLIC ENGANGMENT  
NEW WORKING ENVIRONMENT  
HUMAN & NATURE INTERACTION





# BIODIVERSITY, BUT ALSO PEOPLE DIVERSITY



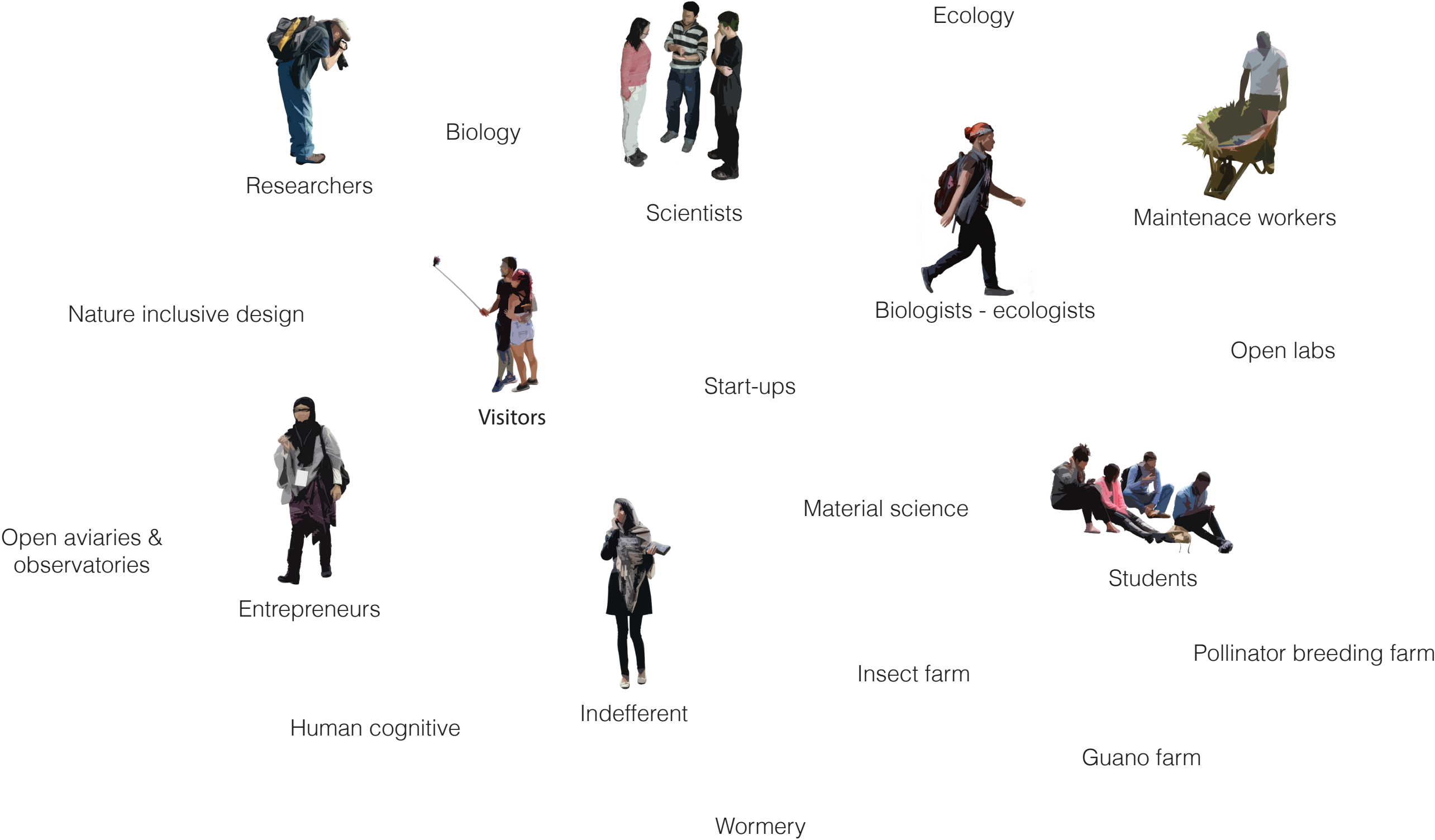
Researchers



Biologists - ecologists



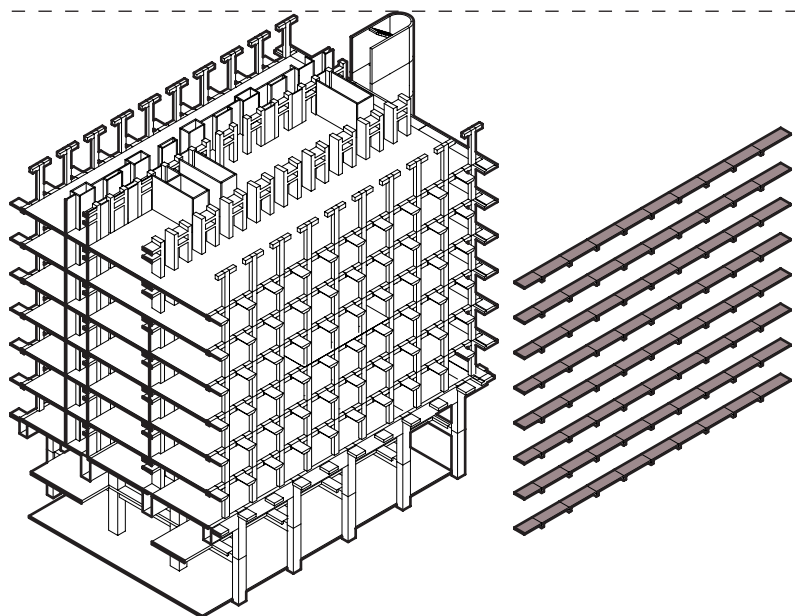
# NATURE: CONNECTING PEOPLE



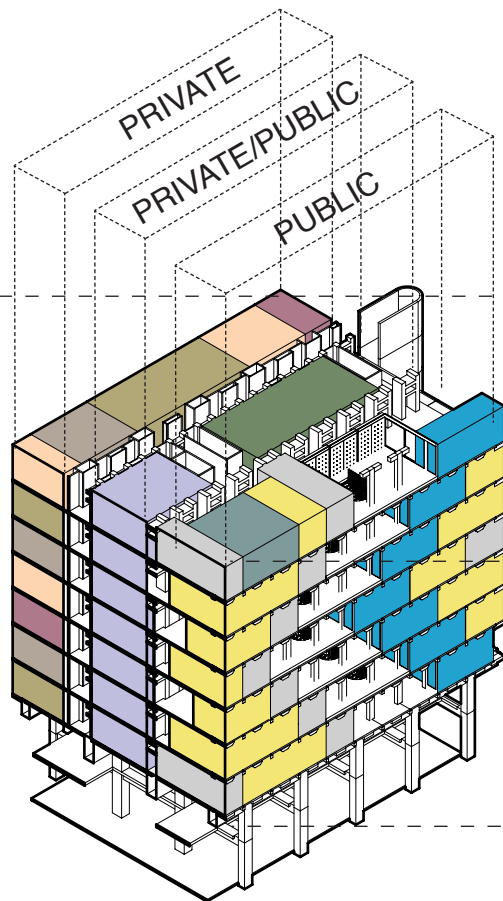
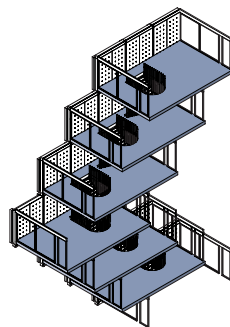


# NATURE INCLUSIVITY

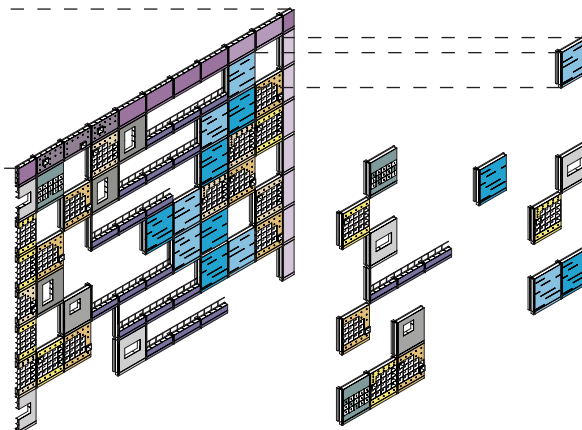
+ biodiversity + modularity + porosity + redundancy + connectivity



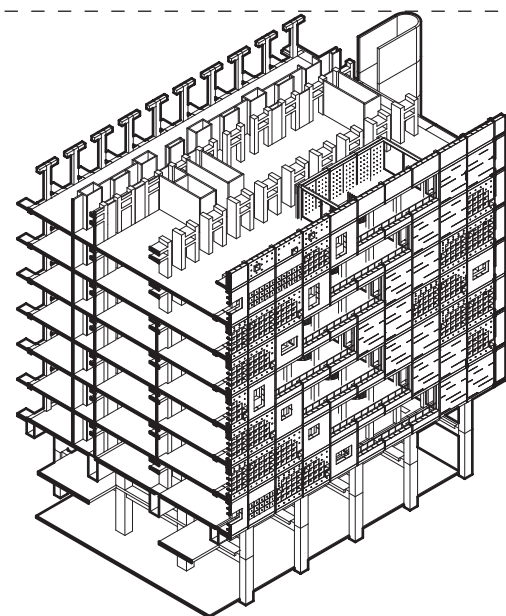
H(u)bitat  
experimental wall  
public engagement  
fixed



fluid plan  
labs - farms - co-working  
- startups  
flexible



modular facade  
flexible



nature design  
animal toolbox  
ethical farms - habitat

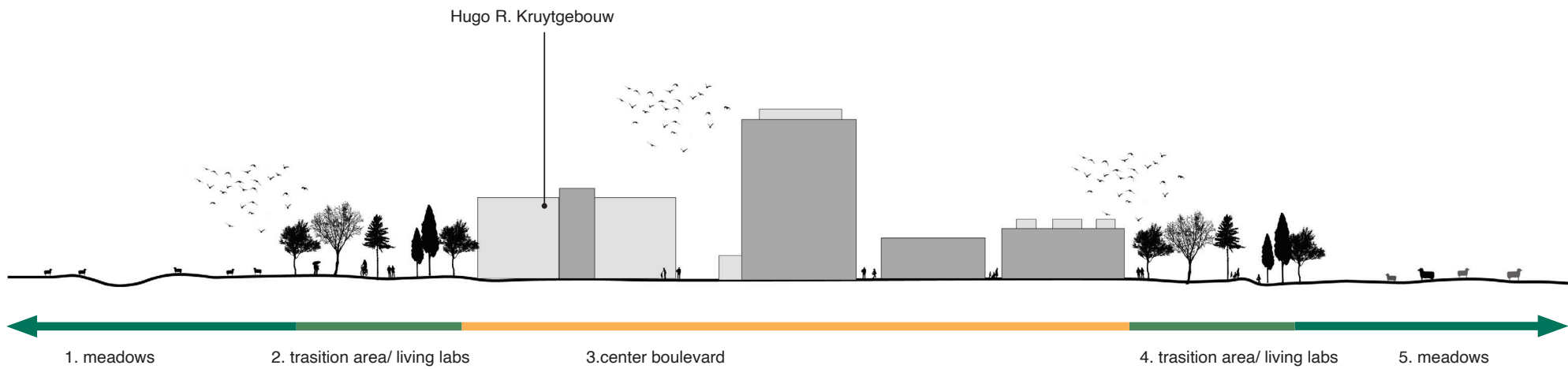
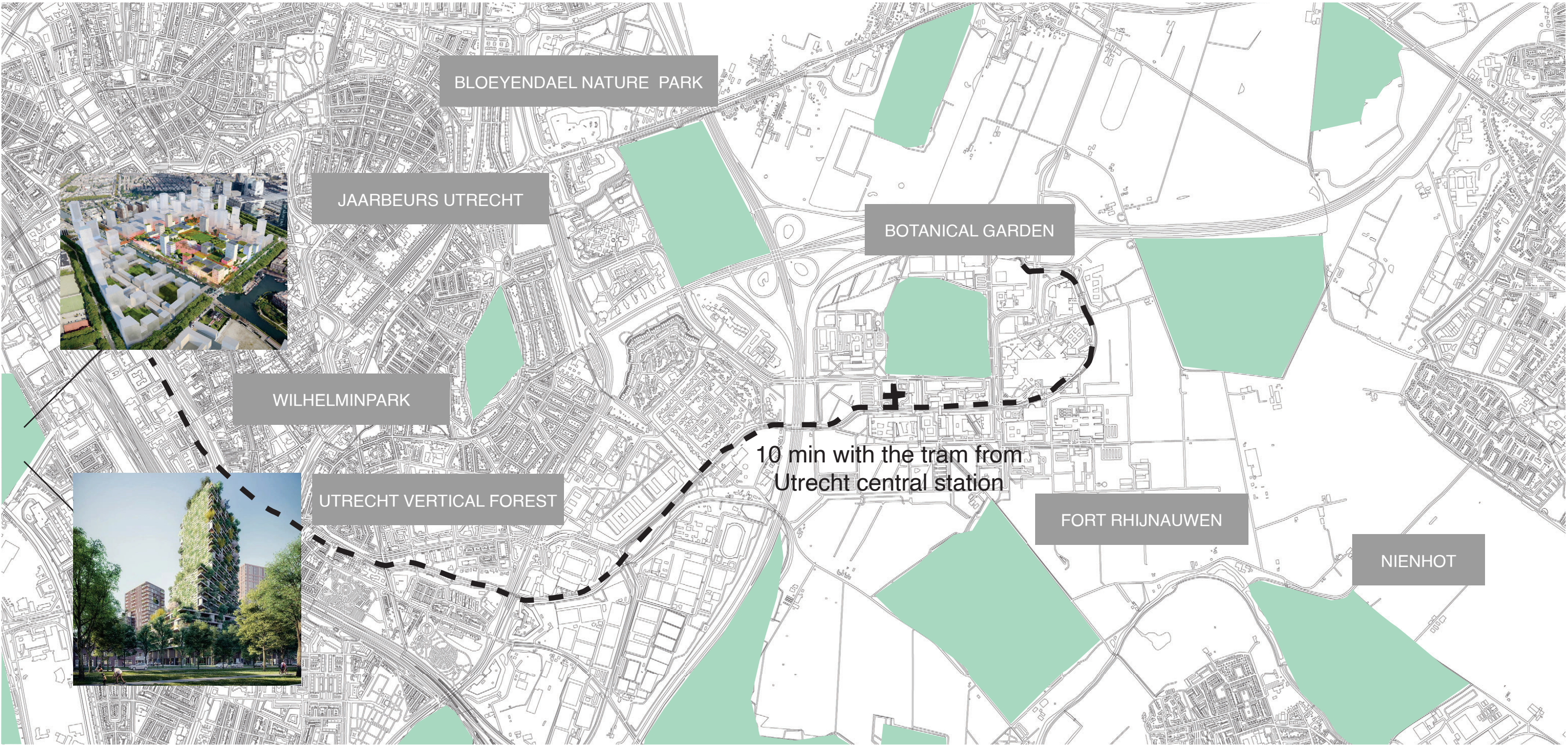




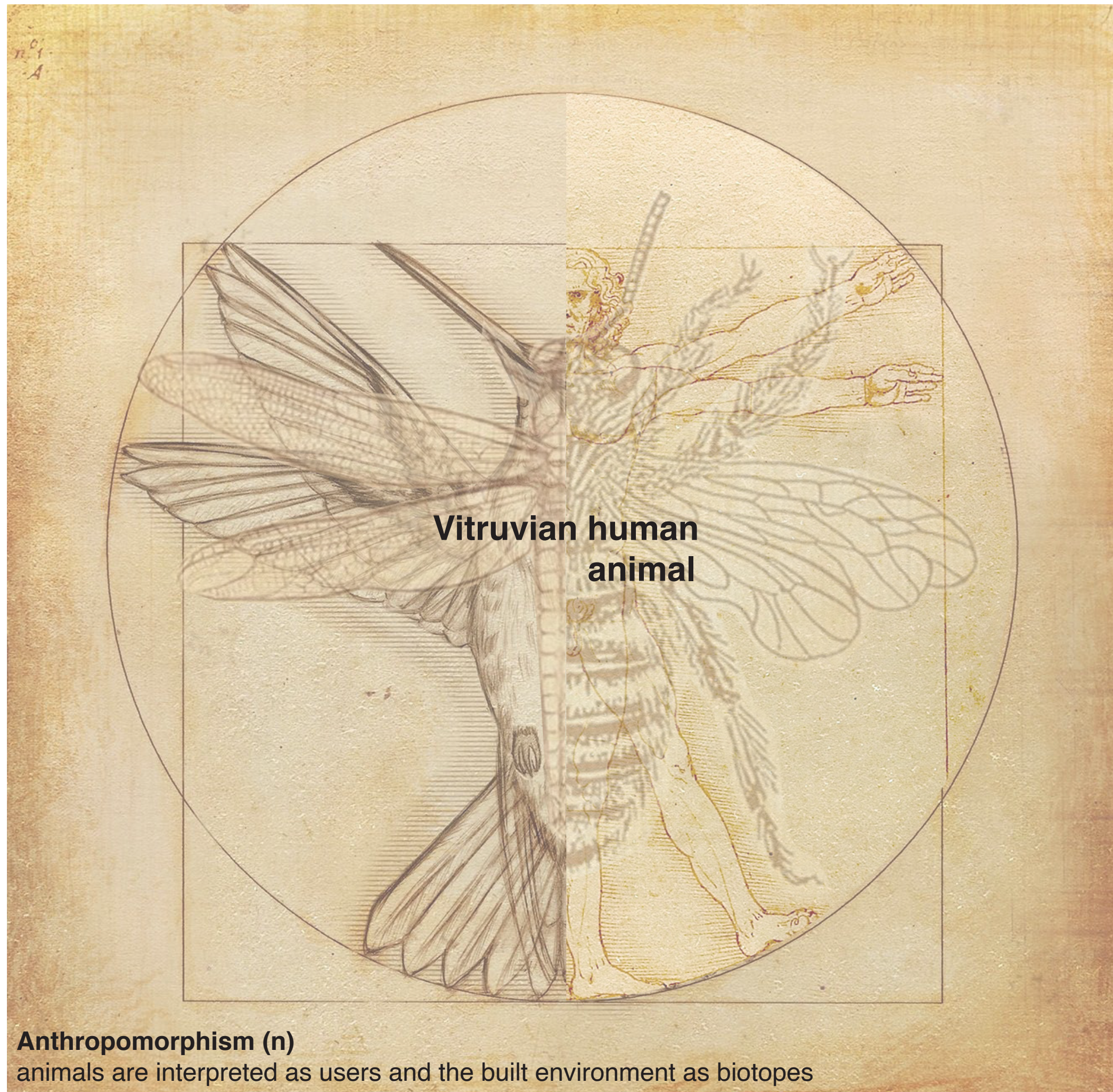




# WIDER CONTEXT



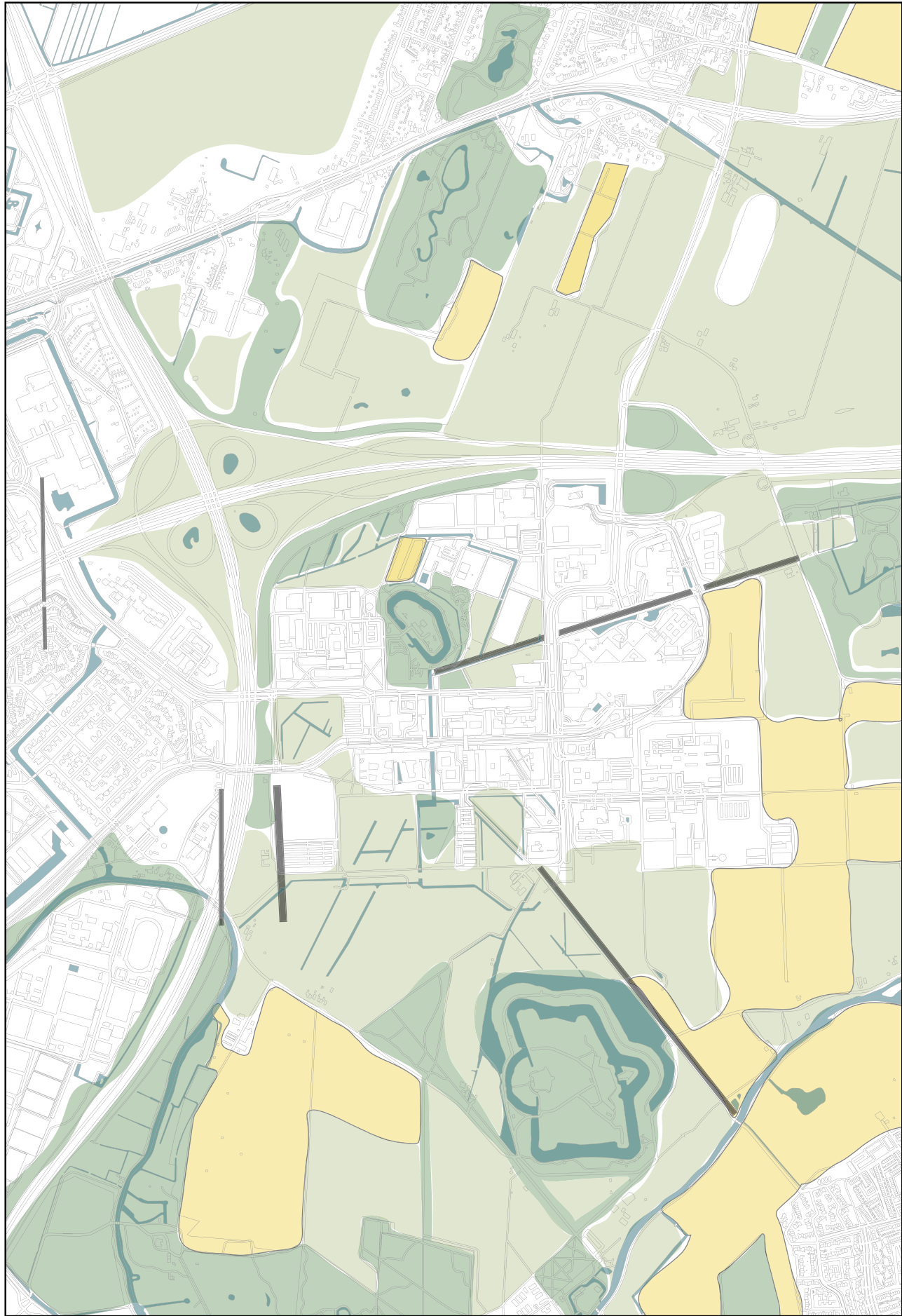




**Anthropomorphism (n)**












































animals are interpreted as users and the built environment as biotopes

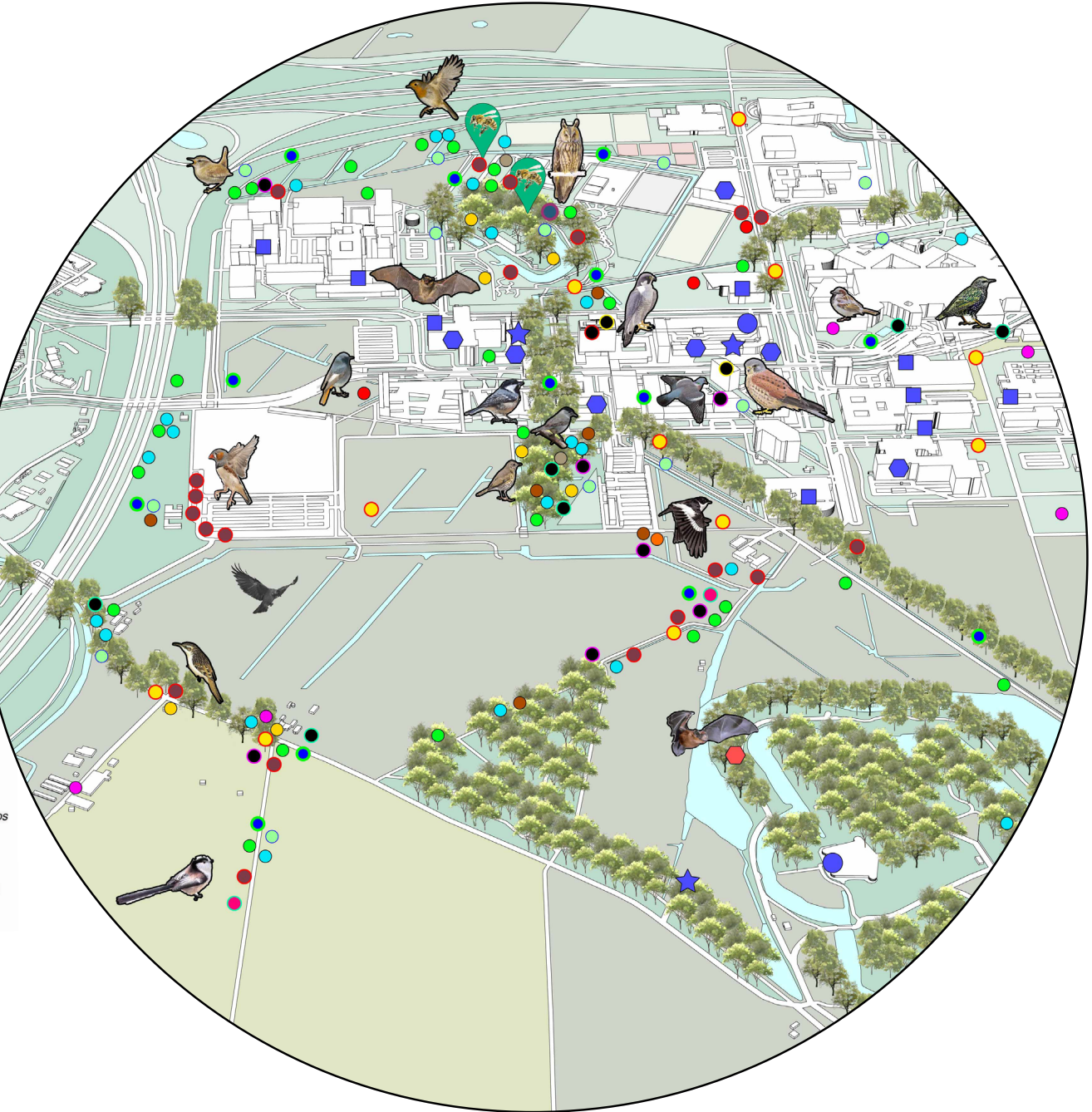




- |   |  |  |
|---|--|--|
|  Woodland biotope           |  Water                                  |  Developed land |
|  Agricultural biotope       |  Garden biotope                         |  |
|  Grassland / meadow biotope |  ImportantTree rows for bats navigation |  |

# BIOTOPES & ANIMAL TERRITORIES

- |   |  |
|---|--|
|    | Common pipistrelle                           |
|    | Winter roosting                              |
|    | Mating roosting                              |
|    | Maternity roosting                           |
|    | Summer roosting                              |
|    | Noctule (red bat)                            |
|    | Summer roosting                              |
|    | Pied flycatcher                              |
|    | Territoria                                   |
|    | Tree creeper                                 |
|    | Territoria                                   |
|    | House sparrow - Passer domesticus            |
|    | Territoria                                   |
|    | Black redstart                               |
|    | Territoria                                   |
|    | Blue Tit - Cyanistes caeruleus               |
|    | Territoria                                   |
|    | Great Tit - Parus major                      |
|    | Territoria                                   |
|   | Peregrine falcon                             |
|  | Territoria                                   |
|  | Kestrel                                      |
|  | Territoria                                   |
|  | Wood pigeon                                  |
|  | Territoria                                   |
|  | Finch - Fringilla coelebs                    |
|  | Territoria                                   |
|  | Long-eared owl, asio otus - uilen(strigidae) |
|  | Territoria                                   |
|  | Starling - Sturnidae                         |
|  | Territoria                                   |
|  | Long-tailed tit - Aegithalos caudatus        |
|  | Territoria                                   |
|  | Finch - Fringilla coelebs                    |
|  | Territoria                                   |
|  | Black head - Sylvia atricapilla              |
|  | Territoria                                   |
|  | Song thrush- Turdus philomelos               |
|  | Territoria                                   |
|  | Wren - Troglodytes troglodytes               |
|  | Territoria                                   |
|  | Robin - Erithacus rubecula                   |
|  | Territoria                                   |



Other bats species seen in the are foraging or passing by:

Water bat  
Pygmy bat  
Late flyer  
Serotine bat

Other bird species seen in the are foraging or passing by with unknow nesting:

Black bird  
Common Swift



KRUYTGEBOUW ANIMAL USER



Honey bee



Solitary bee



Butterfly



Finch



Tree creeper



Starling



Black head



Song thrush



Wren



Robin



House sparrow



Long-tailed tit



Black redstart



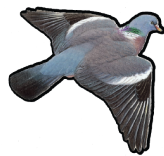
Blue Tit



Great Tit



Little owl



Wood pigeon



Common pipistrelle



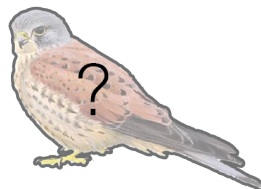
Common swift



Long-eared owl



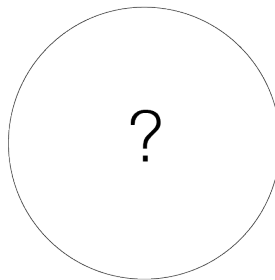
Serotine bat



Kestrel



Peregrine falcon

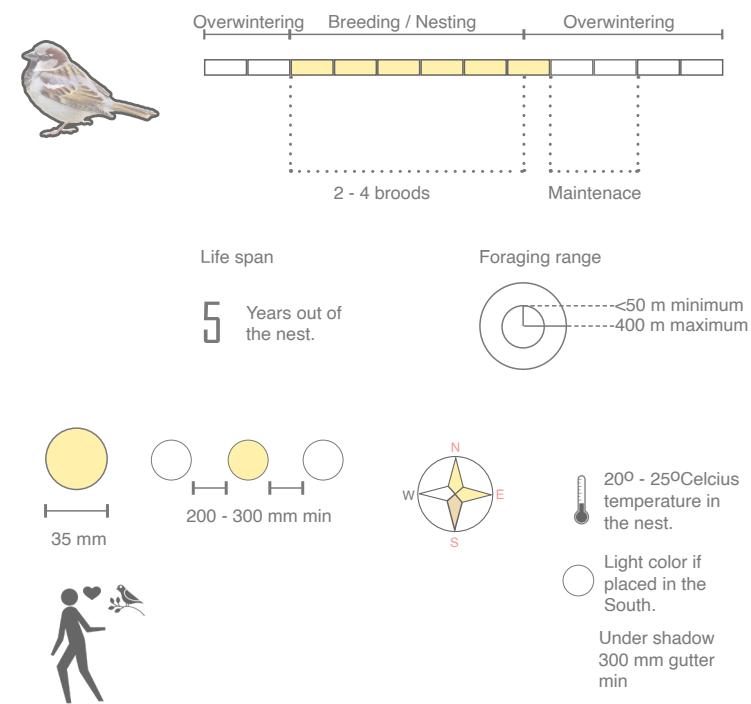


Unknown animal

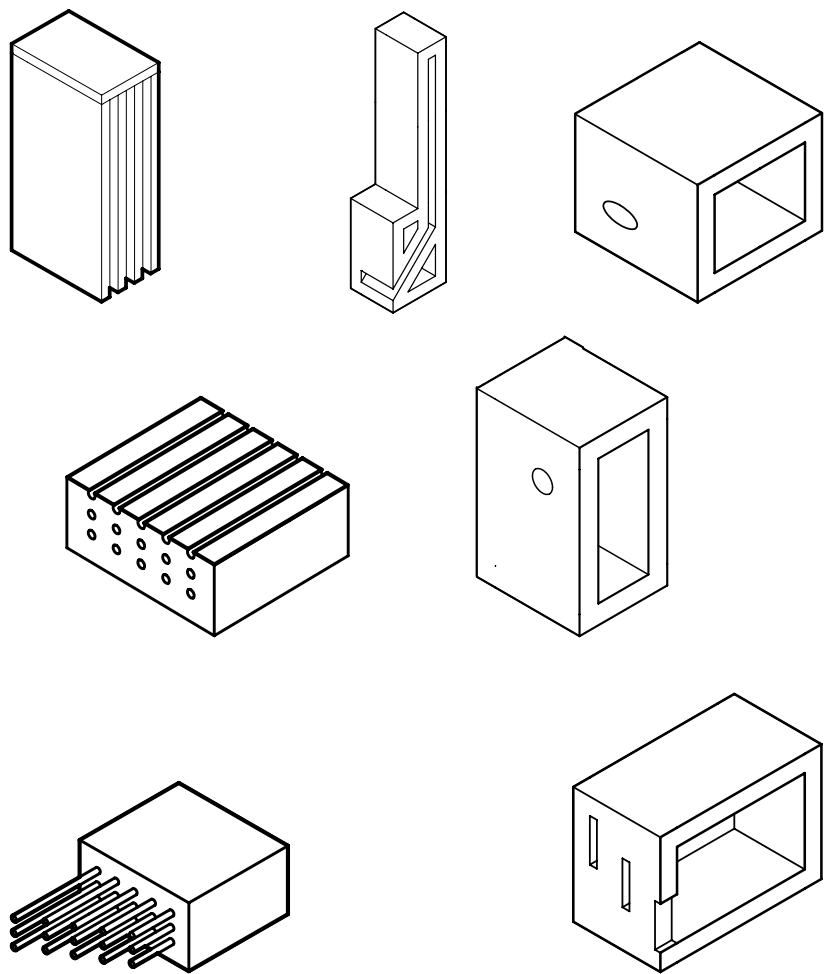
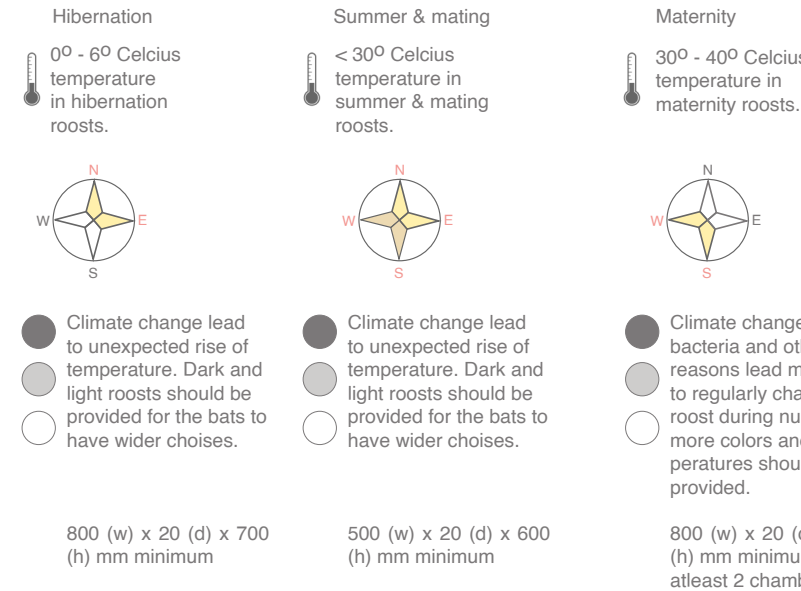
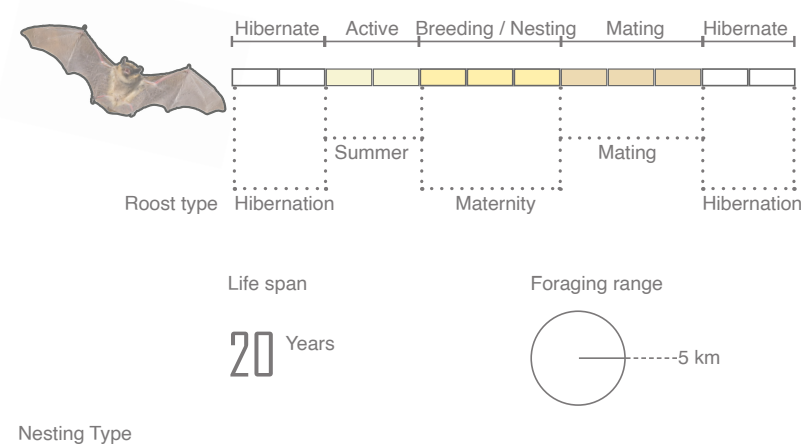
# ANIMAL TOOLBOX

## Requirements & design considerations Daily routine & activity

### House sparrow

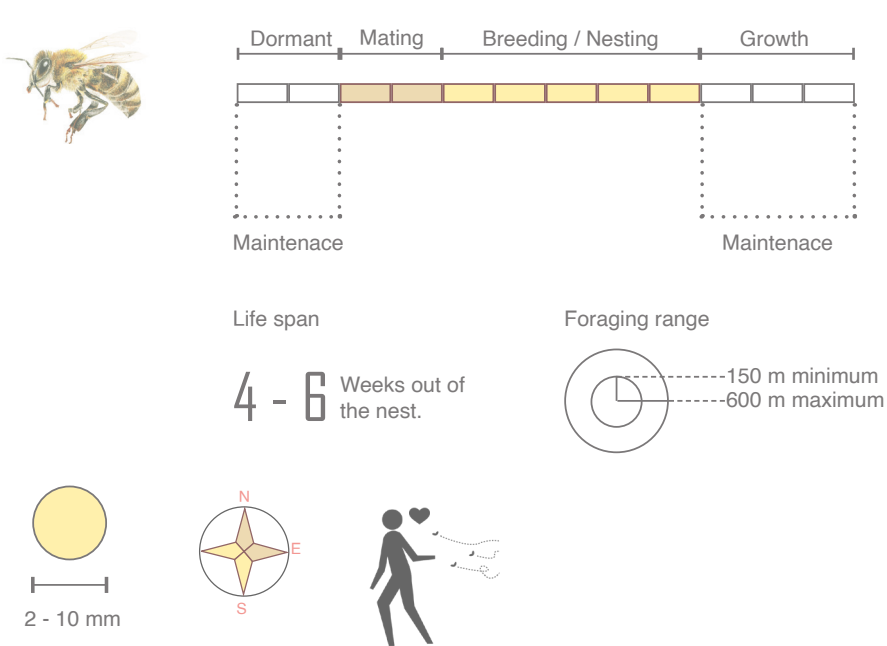


### Bat

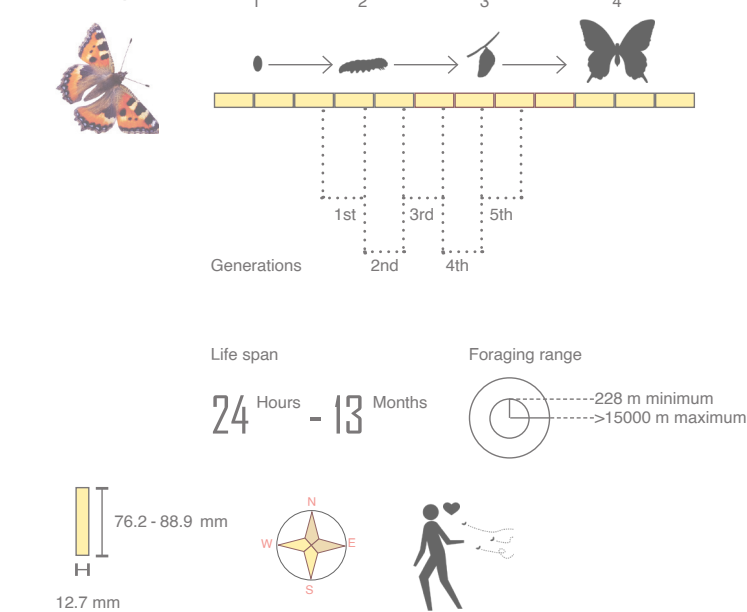


Nest Food Shelter Farm

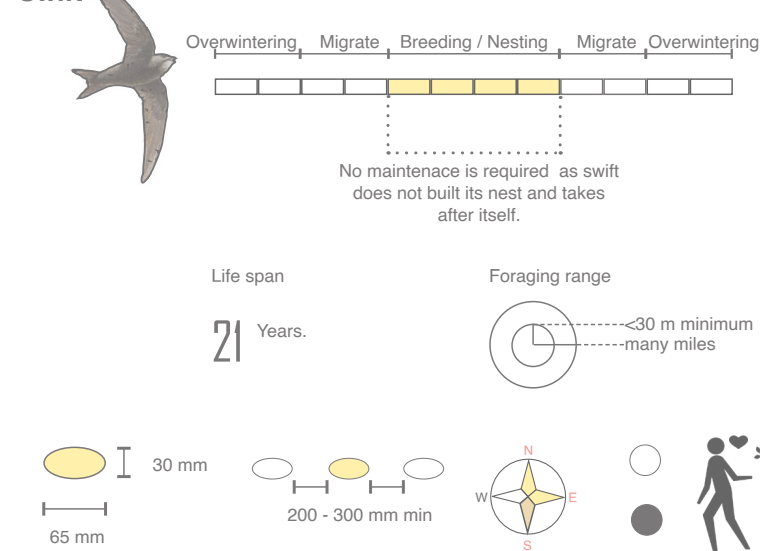
### Solitary Bee



### Butterfly

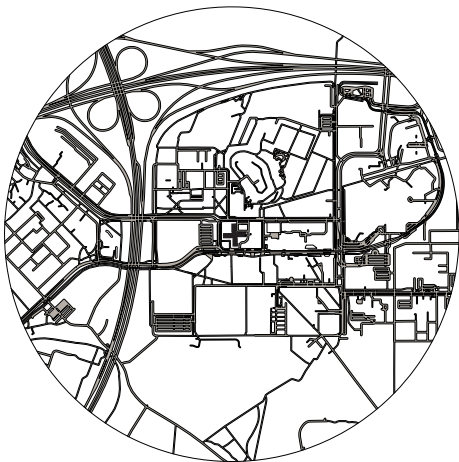


### Swift

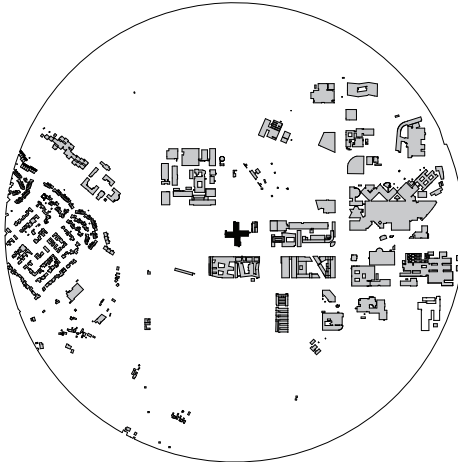




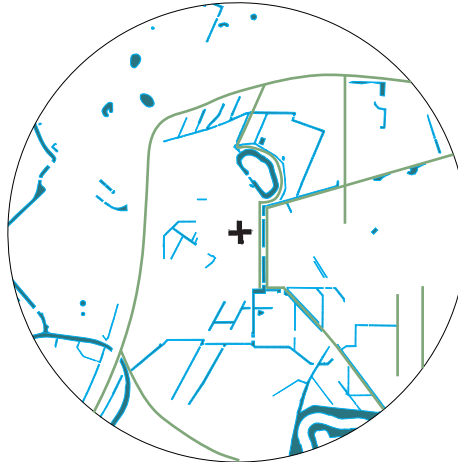
# BUILT ENVIRONMENT TYPOLOGY



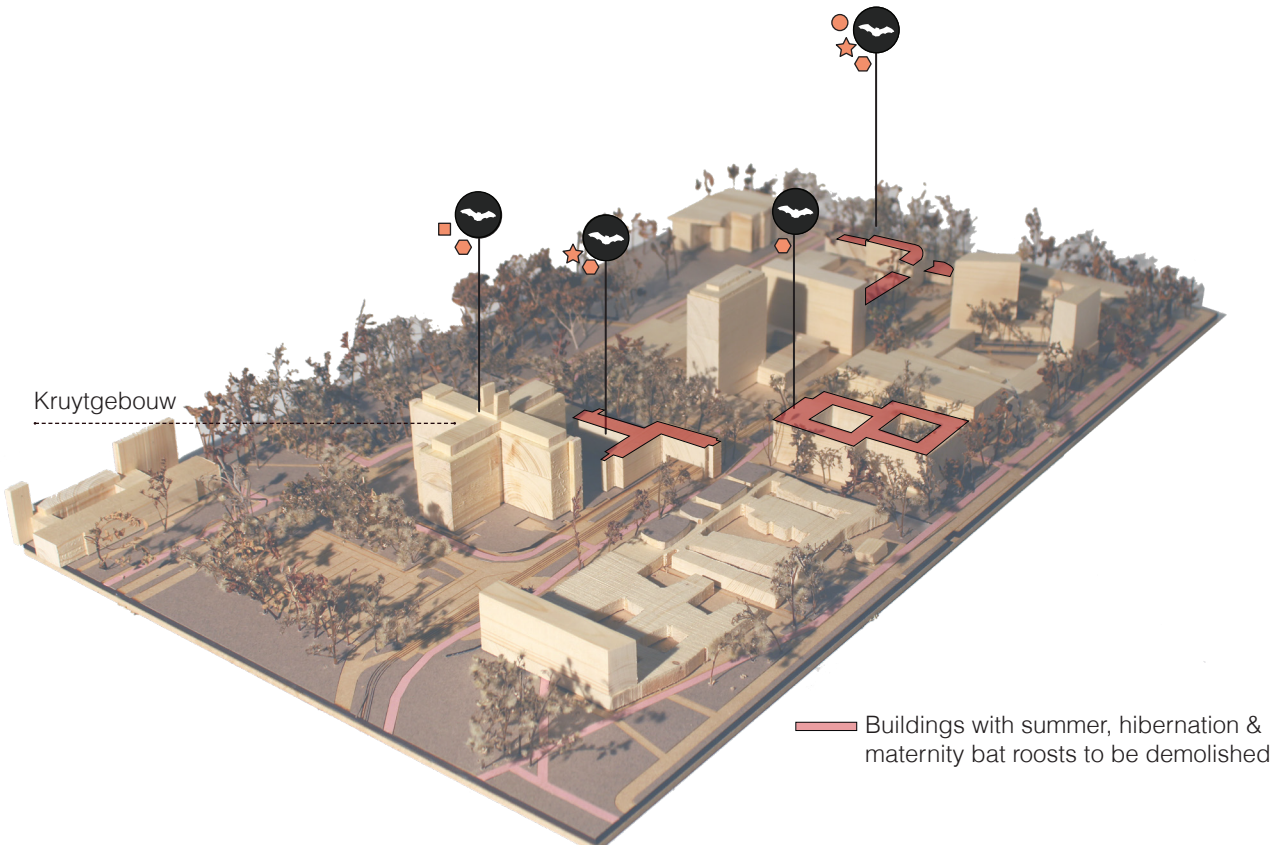
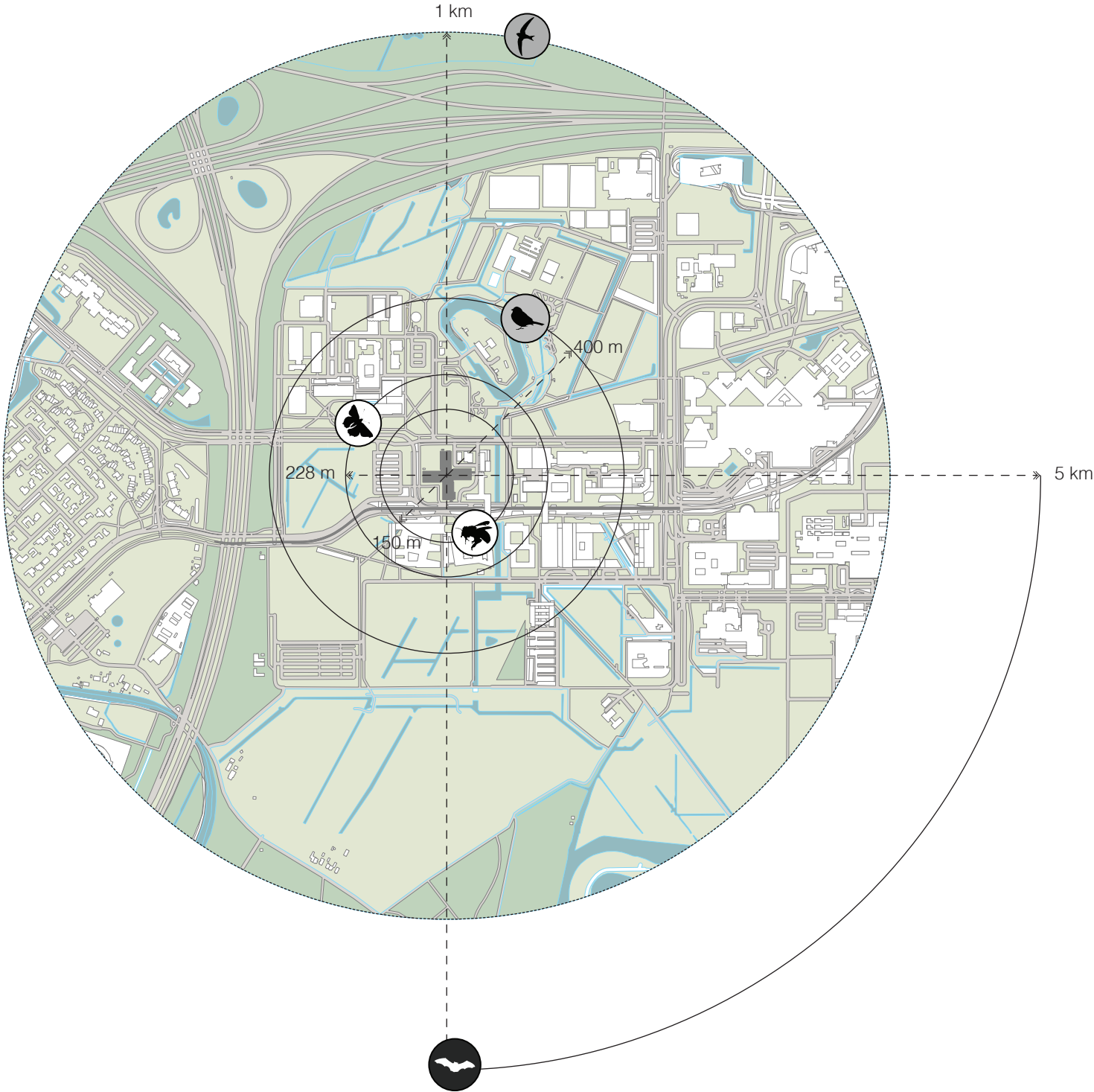
Stressor



Nolli plan



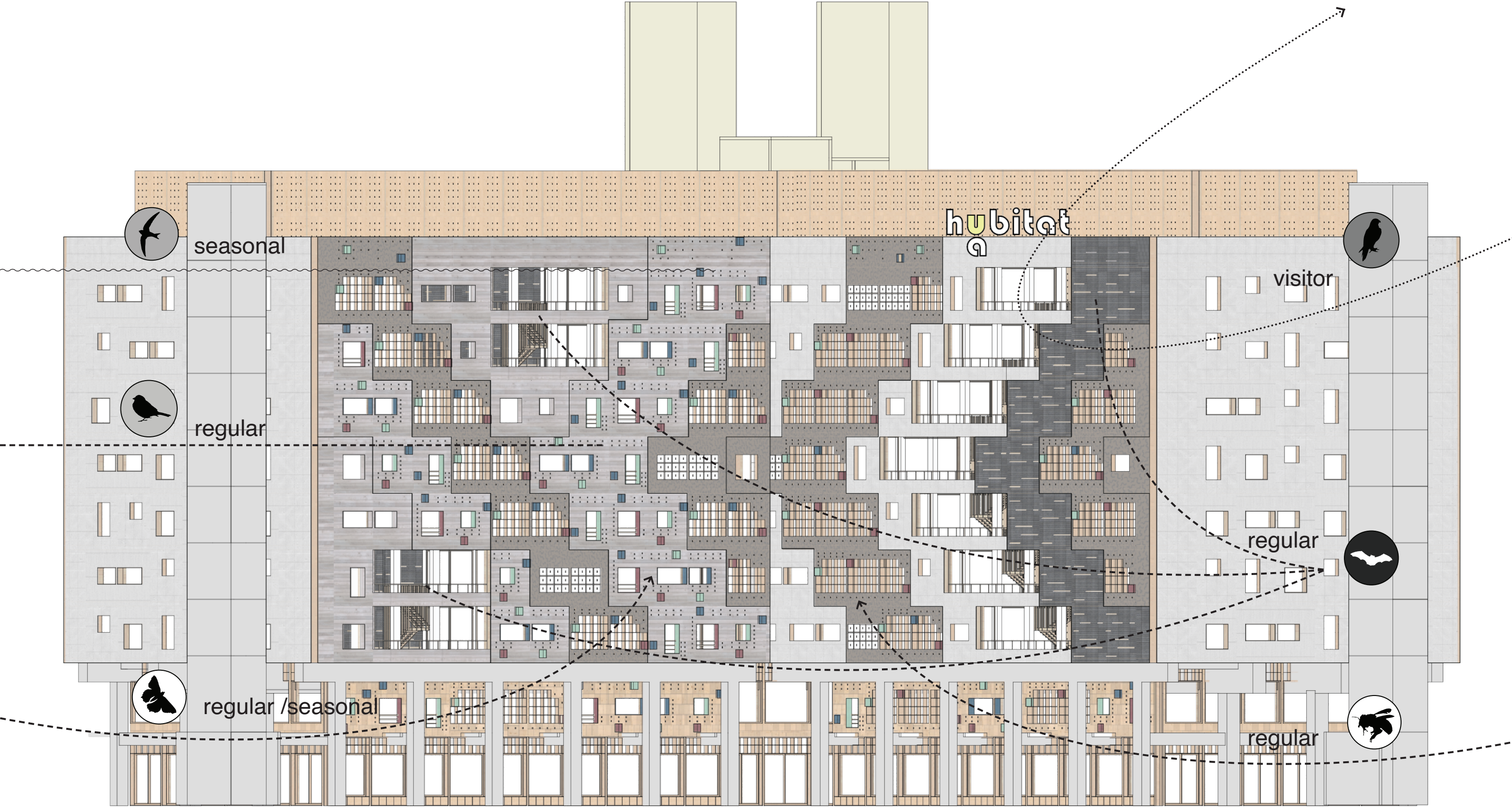
Water and tree corridors



Buildings with summer, hibernation & maternity bat roosts to be demolished



# INHABITANTS IN MOTION



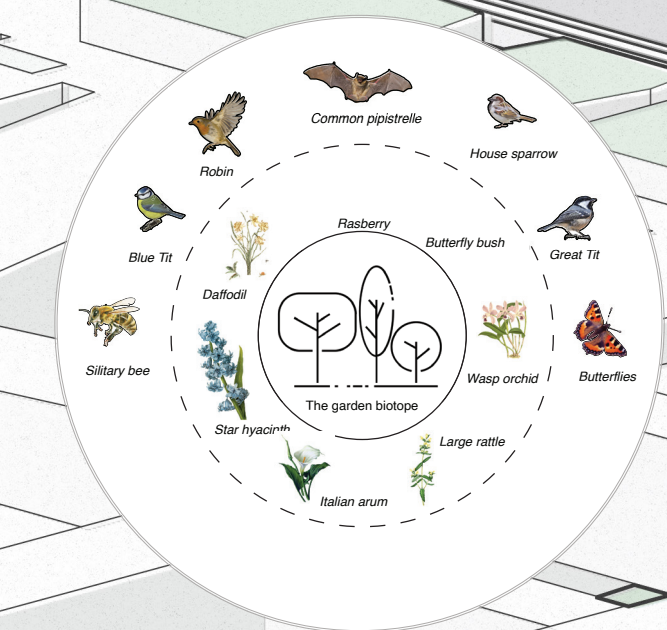
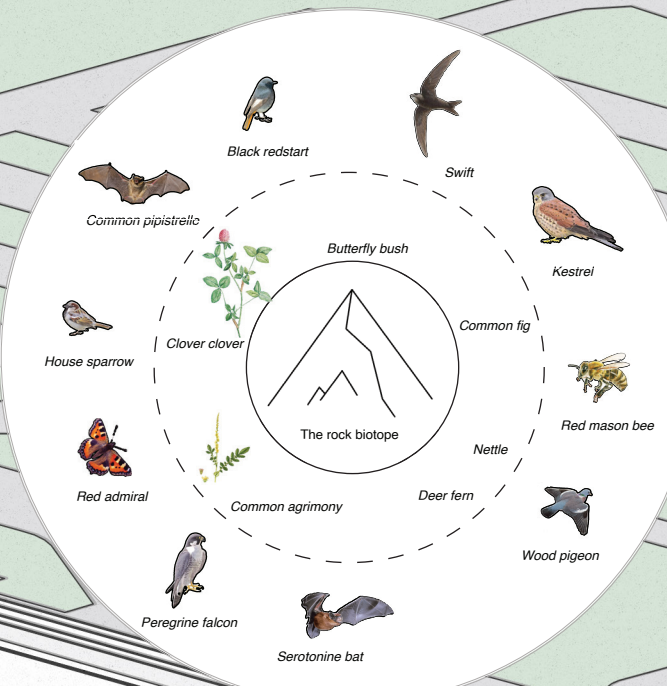
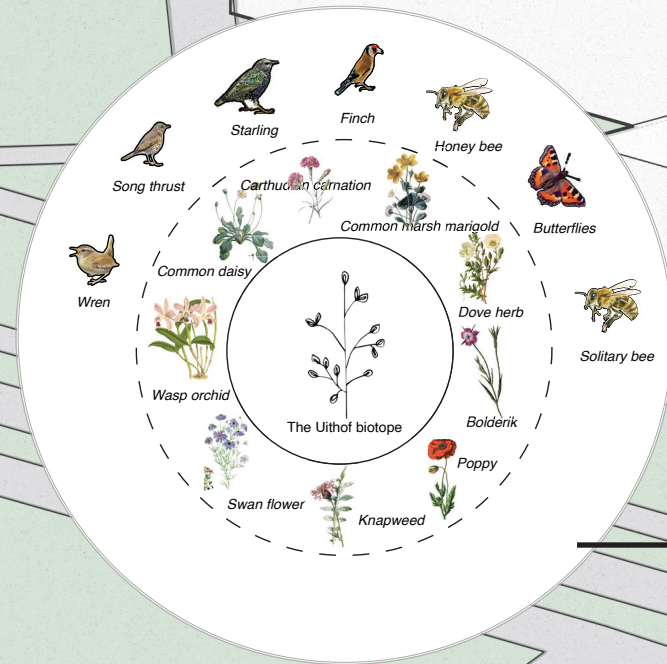


# KRUYTGEBOUW BIOTOPES

**KEEP IT MESSY**

**POROSITY  
CAVITIES FOR  
NESTING**

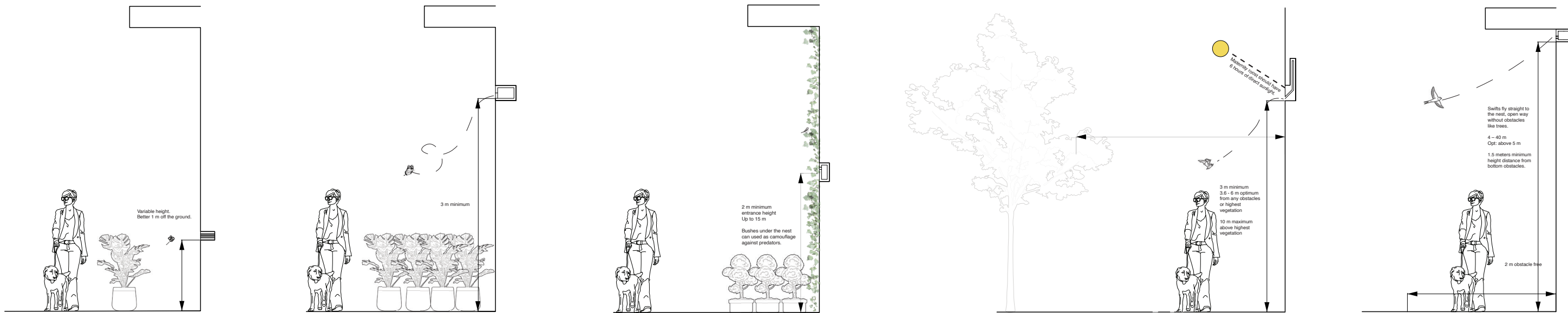
**FOOD FOR  
ANIMALS & HUMAN**





# TOOLBOX

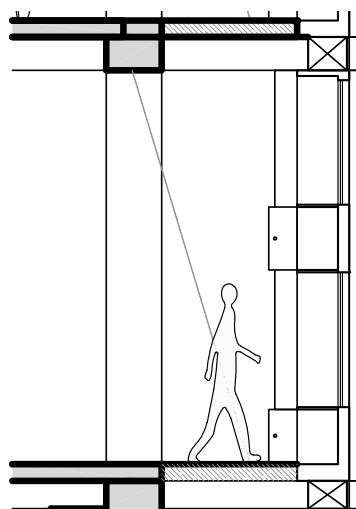
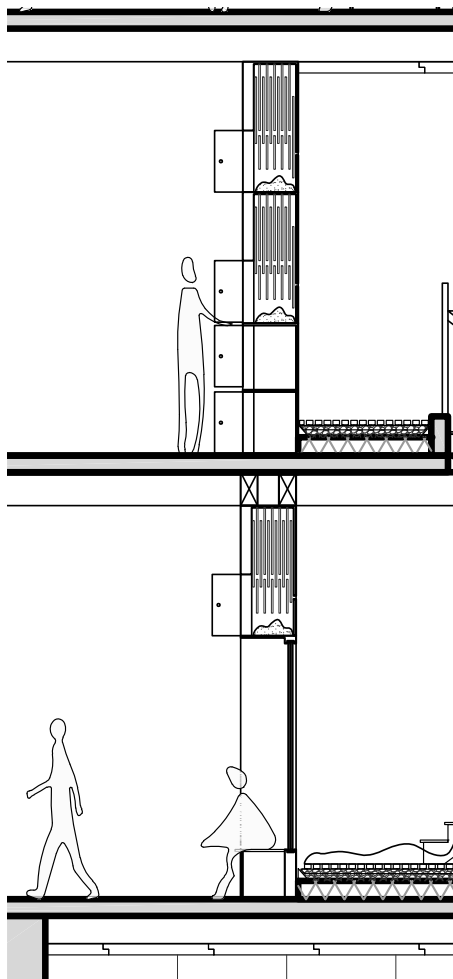
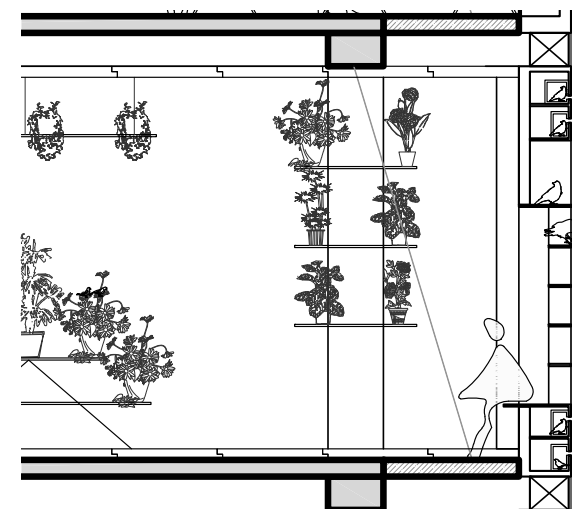
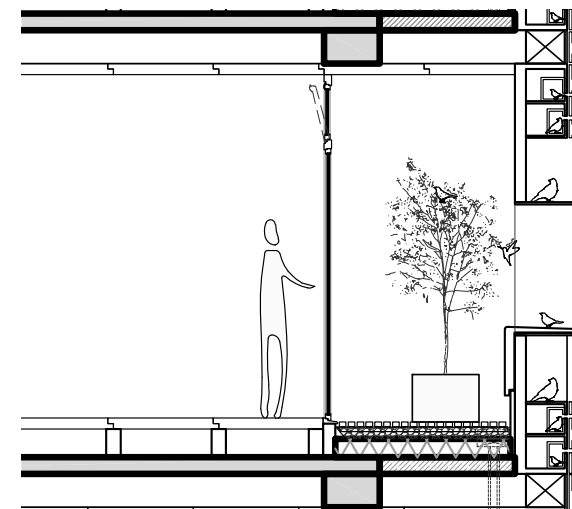
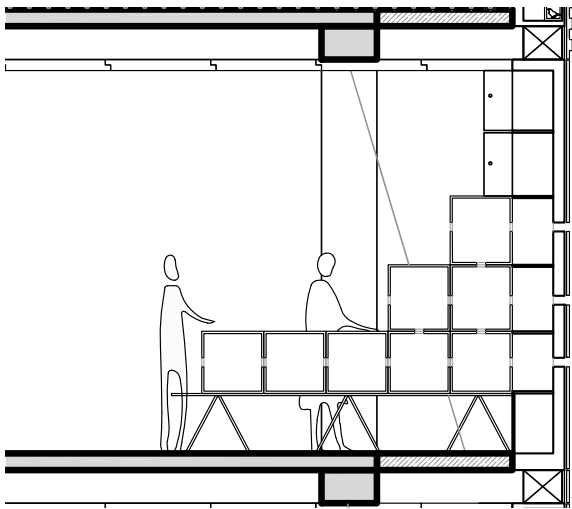
## Distancing for maximum comfort and propability



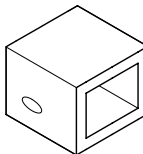


# TOOLBOX

Facade as library

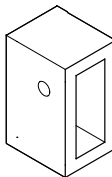


USERS



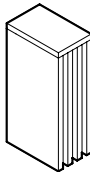
SWIFT NEST

NO MAINTENANCE  
LIFE SPAN:  $\leq$  25 YEARS



A VARIETY OF BIRDS  
NEST

MAINTENANCE (YEARLY)  
WORM PLACEMENT  
LIFE SPAN:  $\leq$  25 YEARS



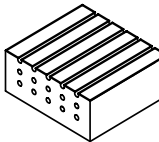
BAT ROOST

NO MAINTENANCE  
LIFE SPAN:  $\leq$  25 YEARS



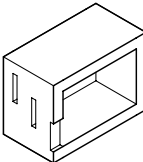
TRACKING DEVICE

INTERGRATED  
ADAPTABLE



SOLITARY BEE NEST

NO MAINTENANCE  
LIFE SPAN: = 1 YEAR

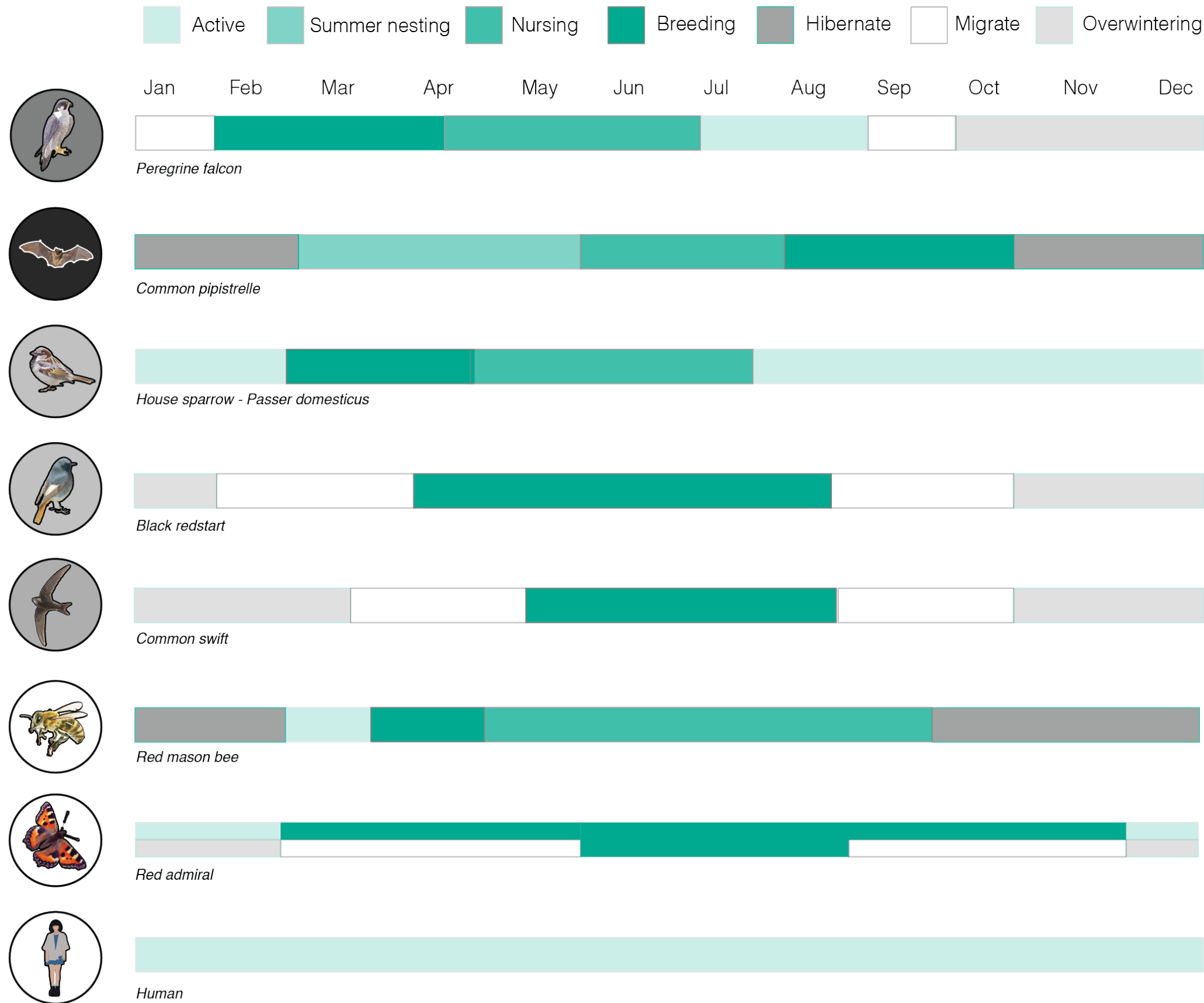


BUTTERFLY NEST

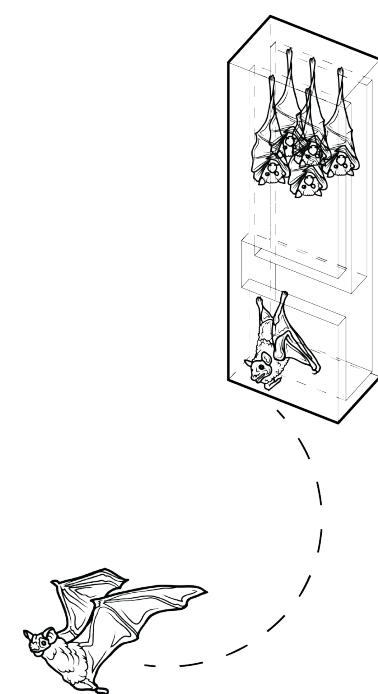
NO MAINTENANCE  
LIFE SPAN:  $\leq$  5 YEARS



# LIFE IN A YEAR

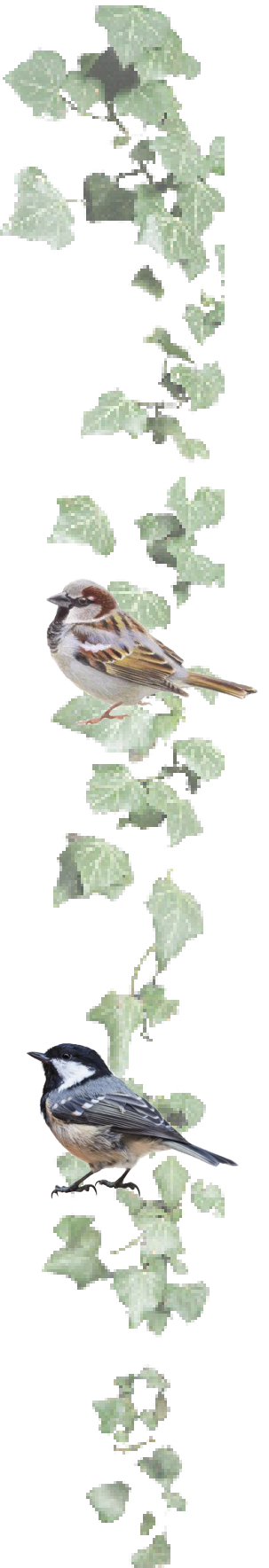


# INTERESTING FACTS



Bat moms change nest daily to keep their babies healthy!

Smaller birds don't sleep in the same nest as their babies, they nest in nearby plants or other nest boxes.





BIODIVERSITY ENHANCEMENT INGREDIENTS

INCREASING LIKELIHOOD

MATERIALS



Food



Cavities for insects

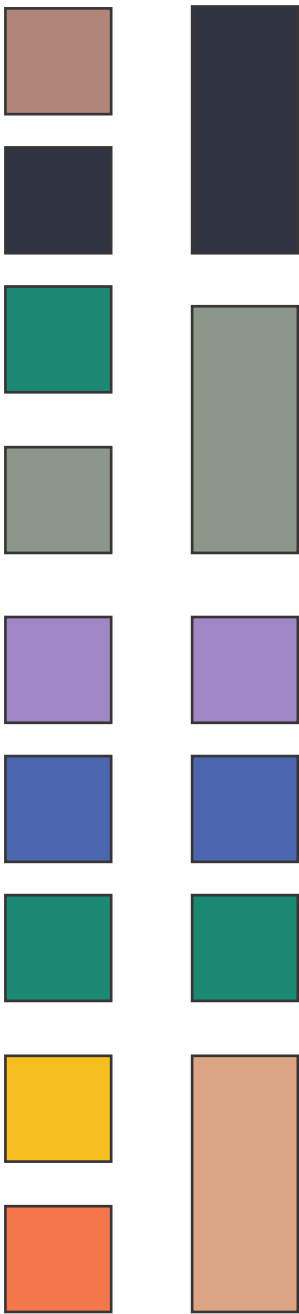


Texture  
Grapping



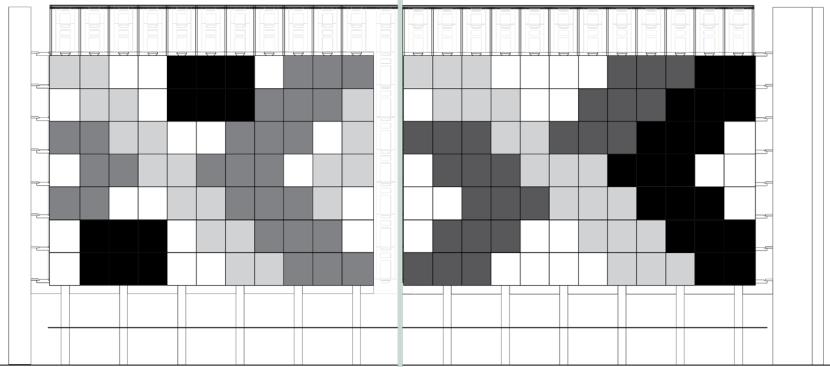
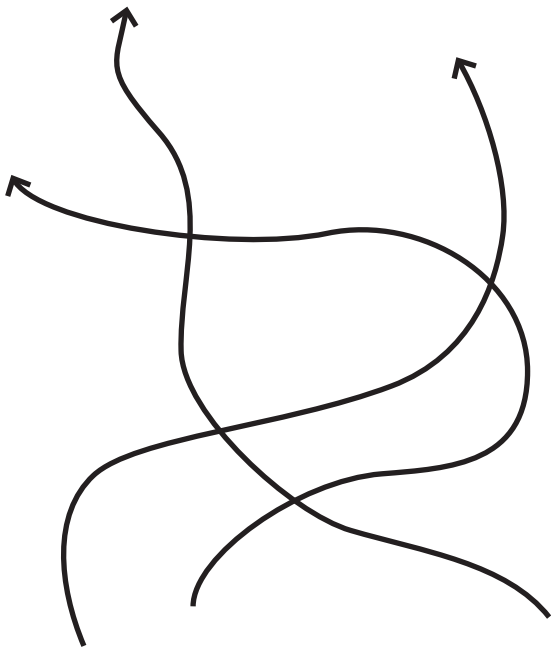
One way glass

COLOR



ENTANGLEMENT

Navigation



GREEN

Eco roof



Vegetation



Pebbles for breeding



Small trees



Herbs, flowers

GAVITIES VARIATION





# CASE STUDIES & INSPIRATION

## PERMANENT SOLUTIONS

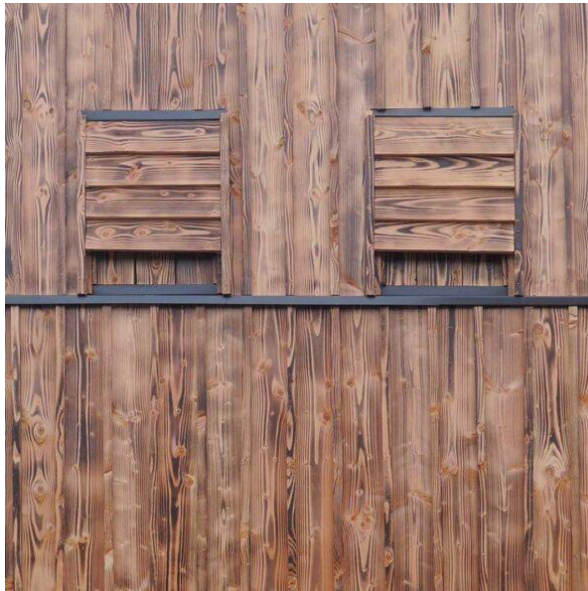
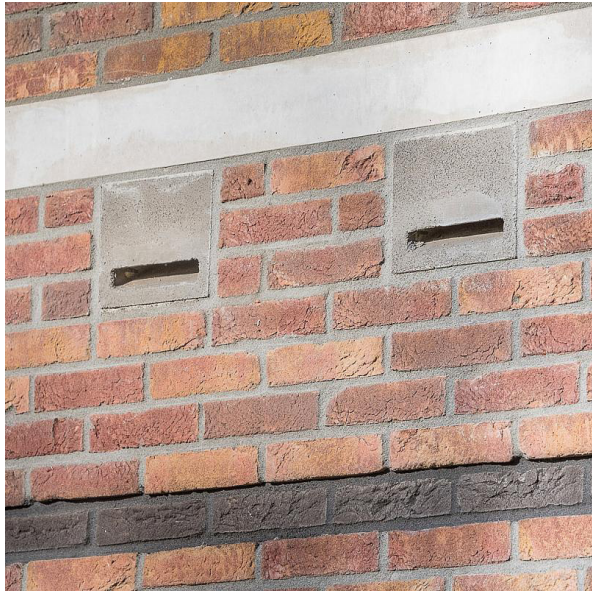
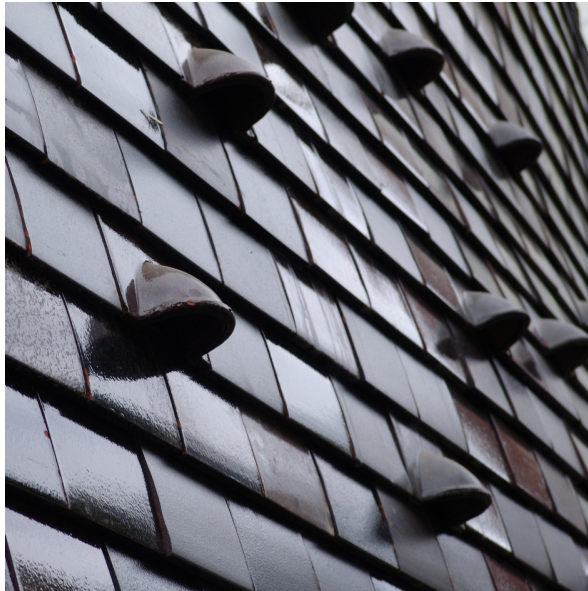
- + low maintenance
- not flexible

## INTERMEDIATE SOLUTIONS

- + medium flexibility
- + medium maintenance

## MODULAR SOLUTIONS

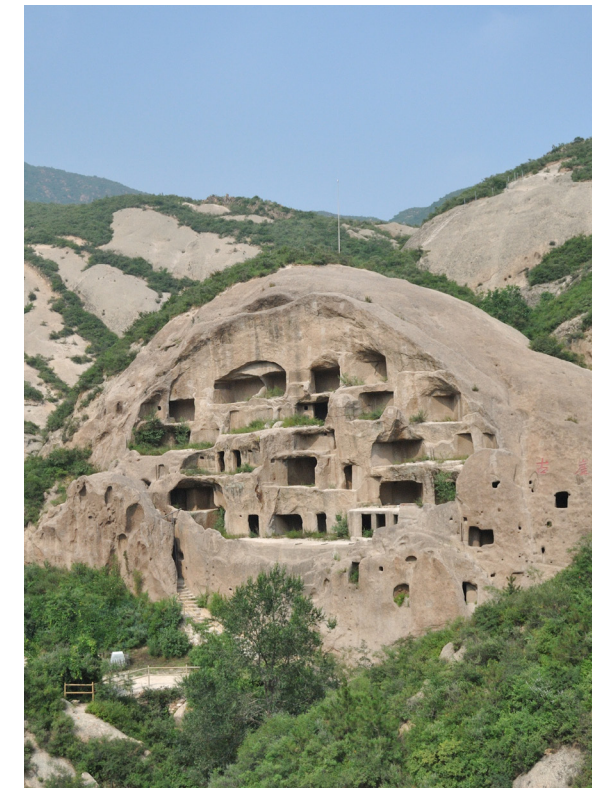
- + flexible
- + easy maintenance



SPANISH TOMBS



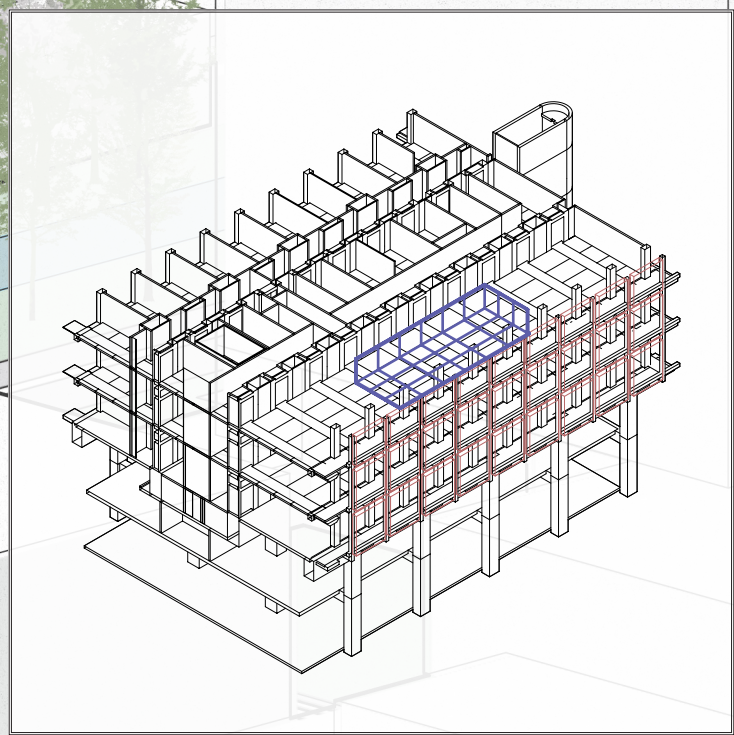
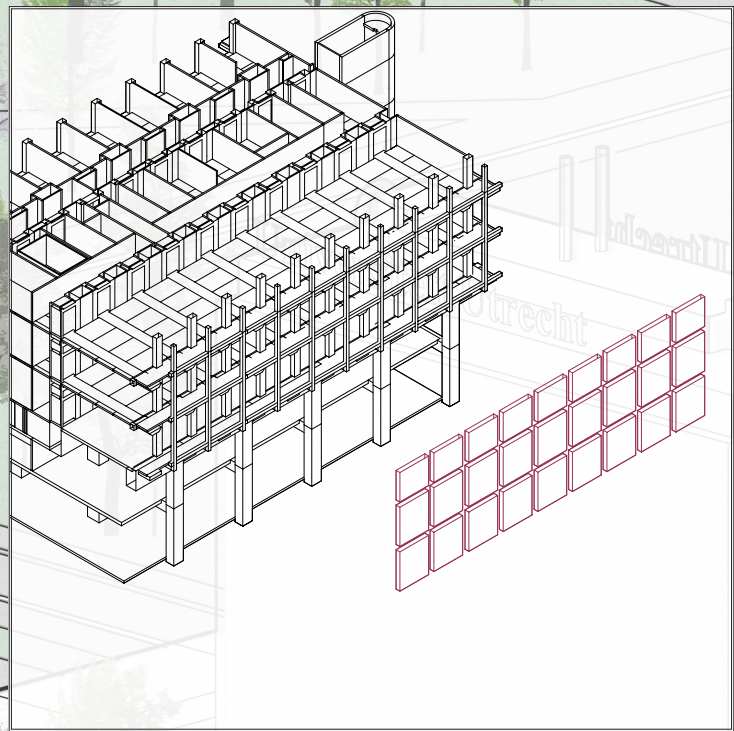
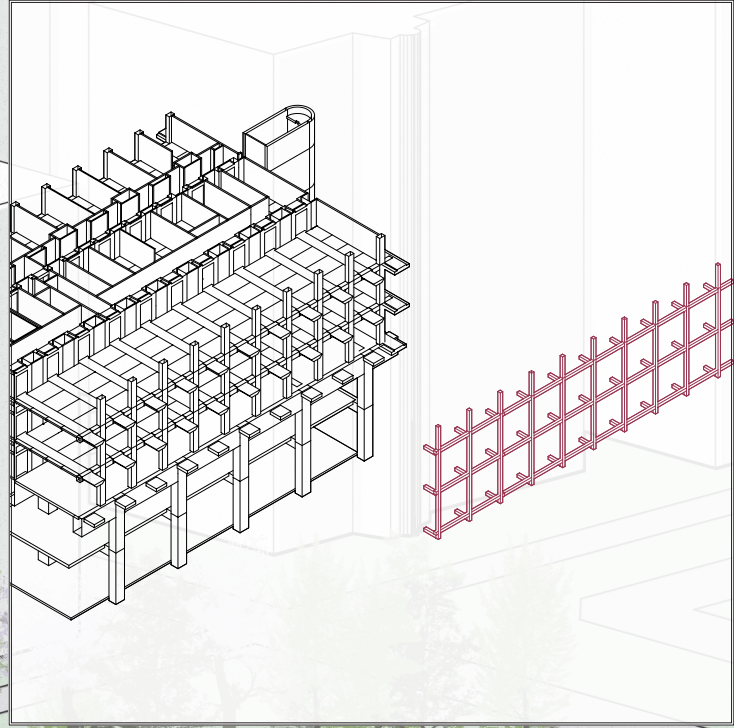
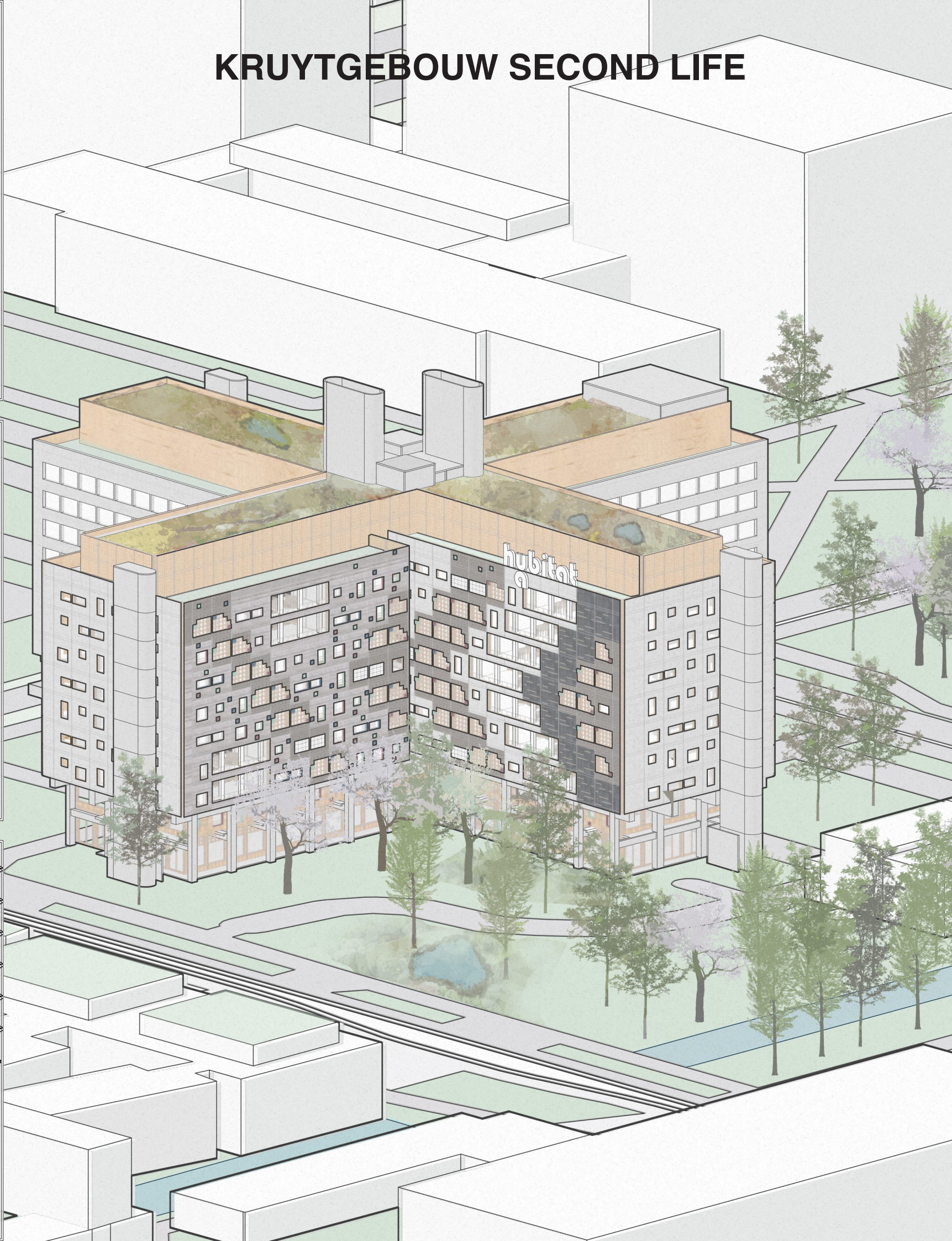
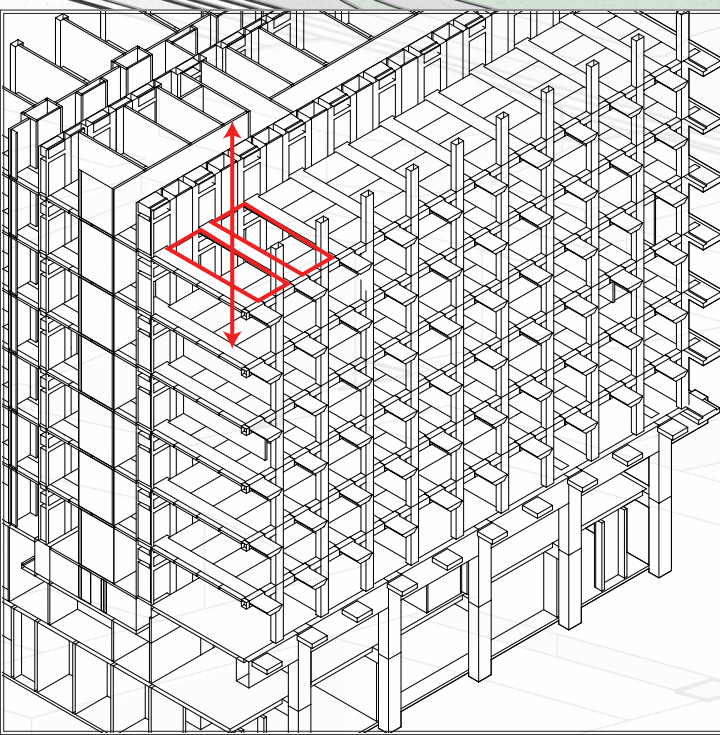
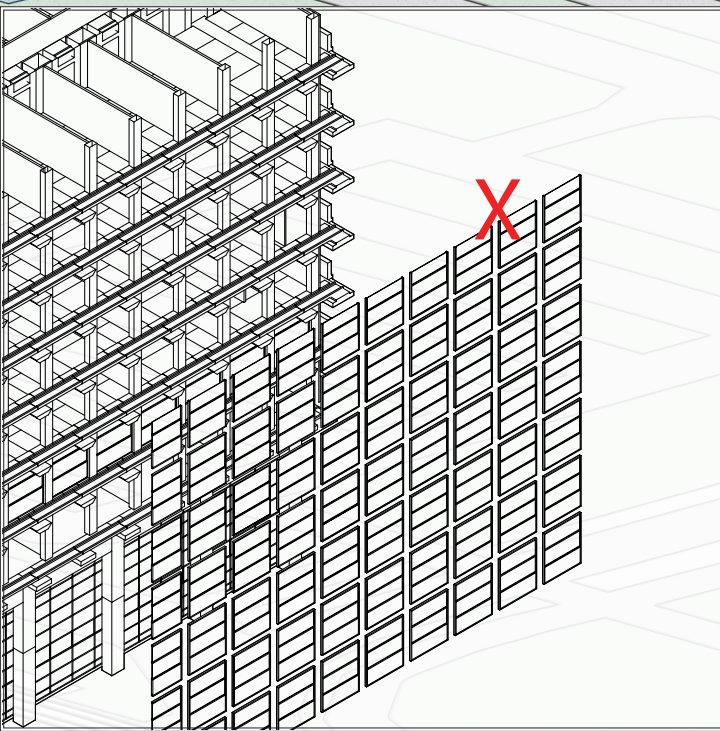
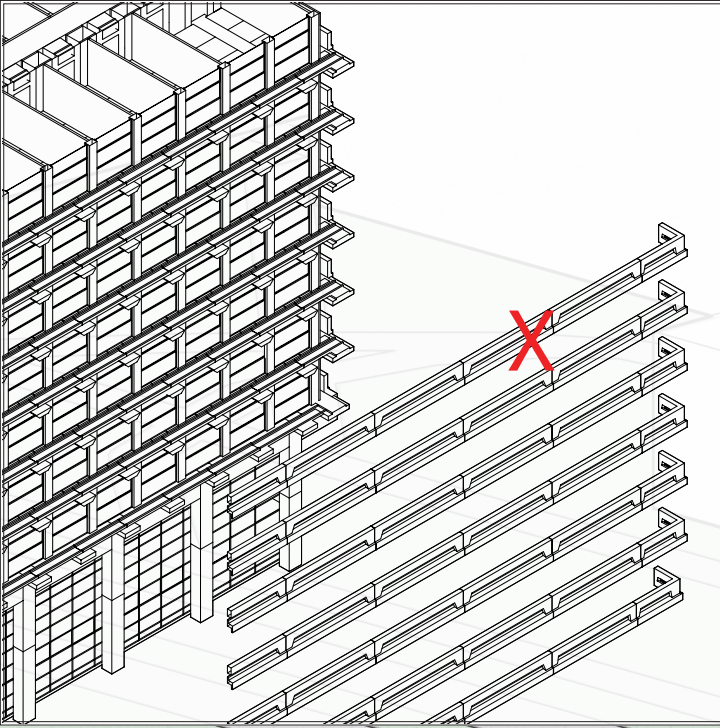
FLEXIBLE INFILL



GUYAJU CAVES



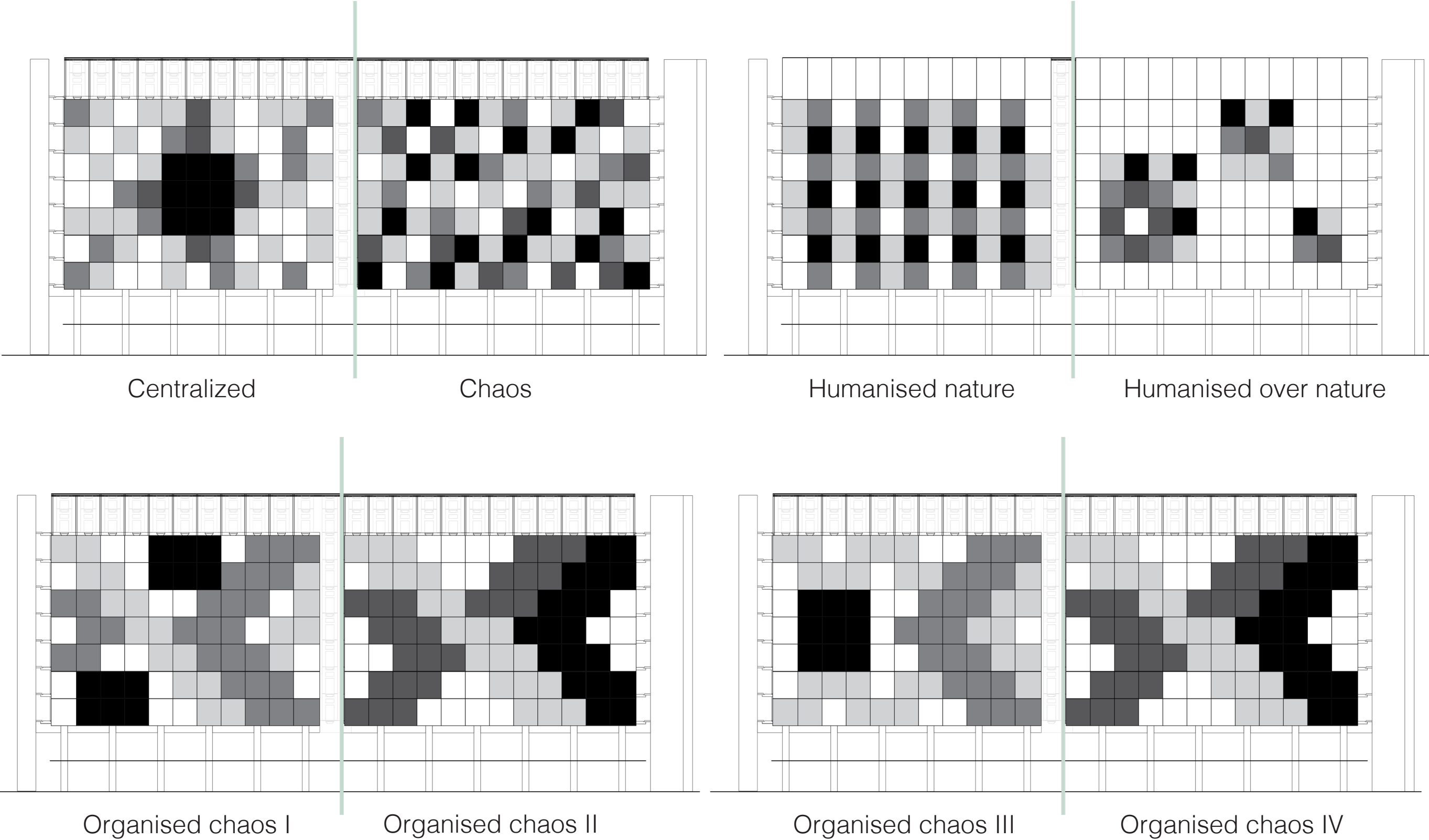
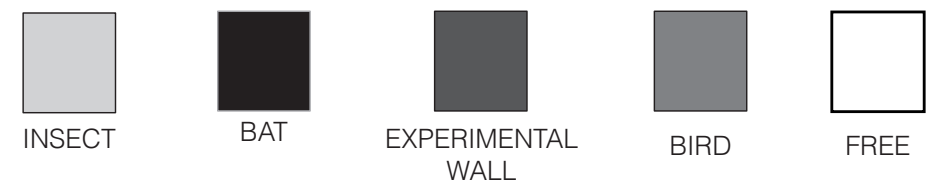
# KRUYTGEBOUW SECOND LIFE





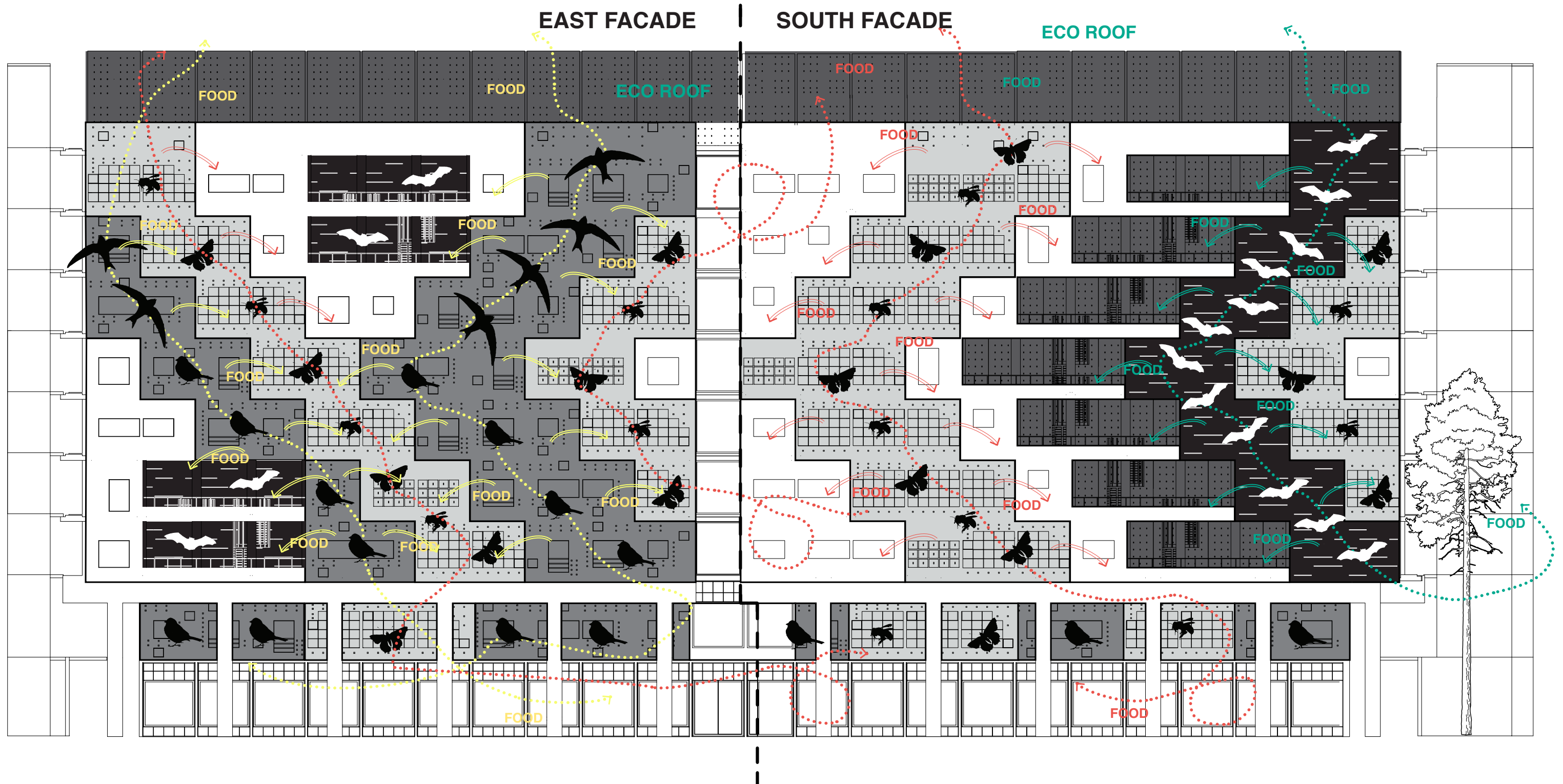
# PIXEL STUDY

FACADE CLUSTERING -> SPECIES ENTANGLEMENT









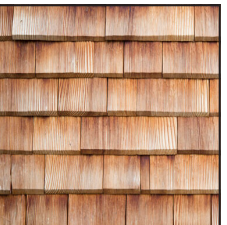
## FACADE CLUSTERING -> SPECIES ENTANGLEMENT

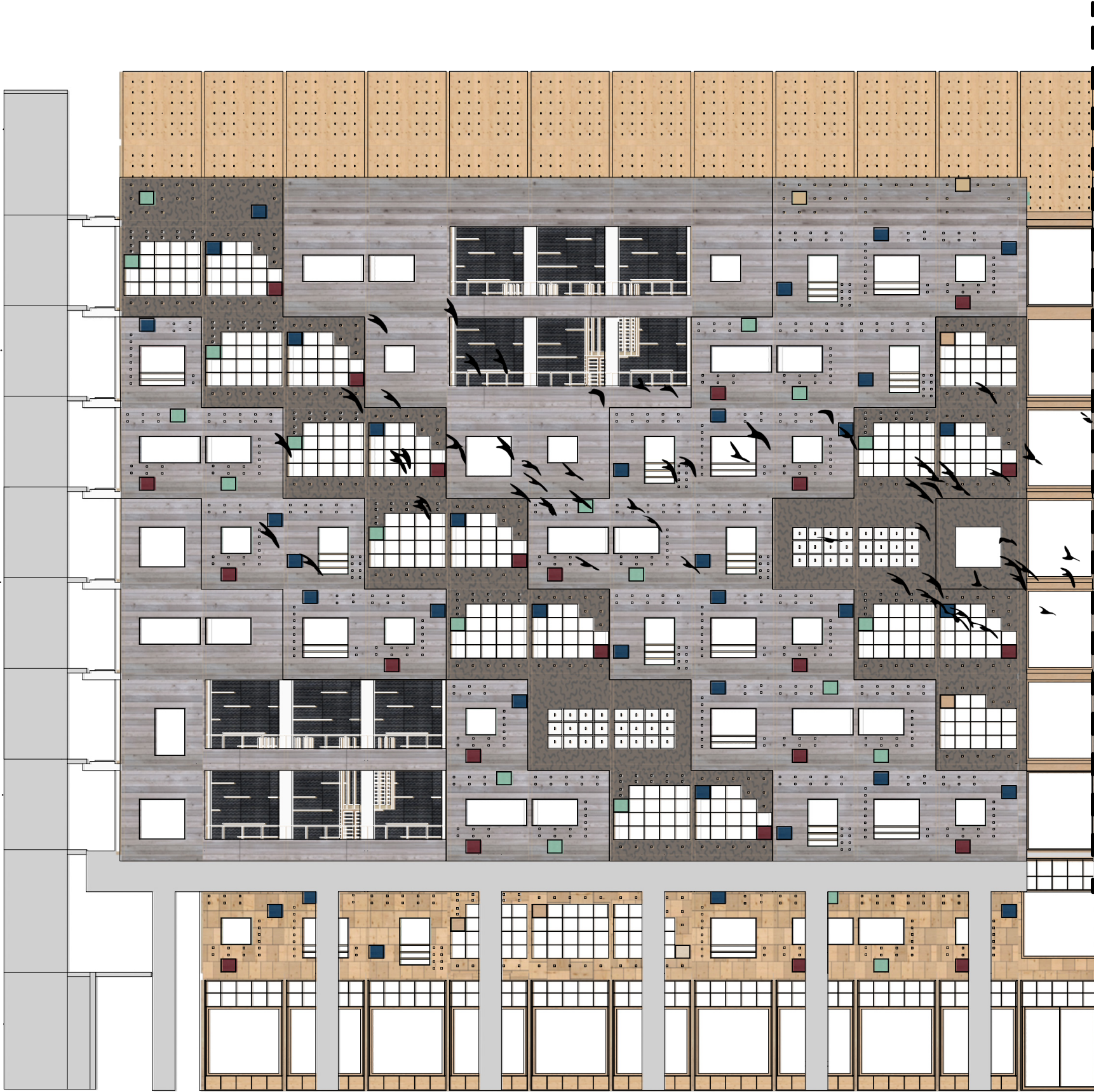




# EAST FACADE MATERIAL PALETTE

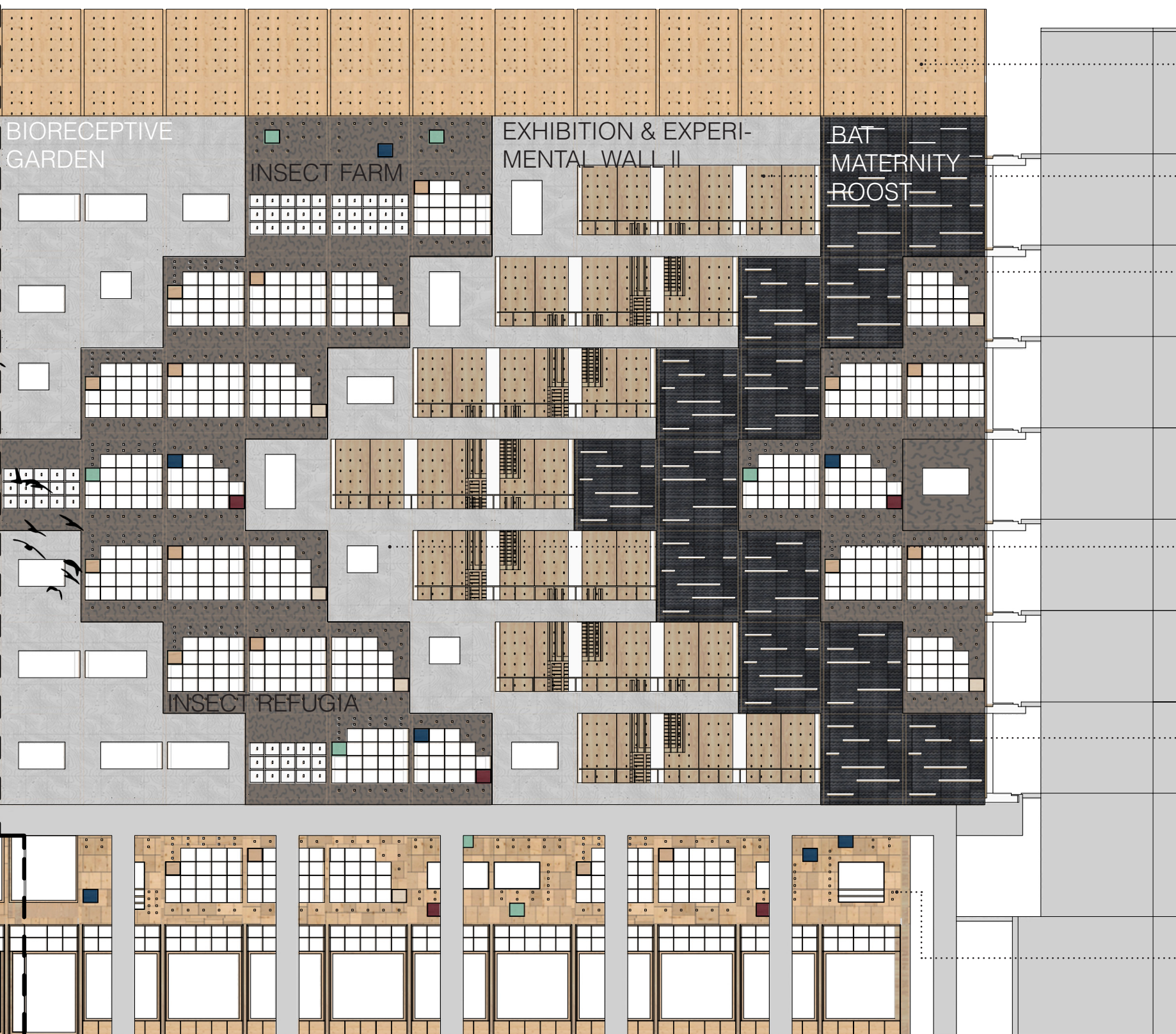



Material Innovation   Environmental Value   Social Value   Biodiversity Function

•	•	•	🏠 🖐️	 Cross laminated timber	Low maintenance green
• •	• •		🏠 🌿 💧	 Green charcoal	
•	• •	•	🖐️	 Scrap reclaimed wood	
•	•		🖐️	 Shou Sugi Ban wood	
•	• •	•	🖐️	 Scrap wood	



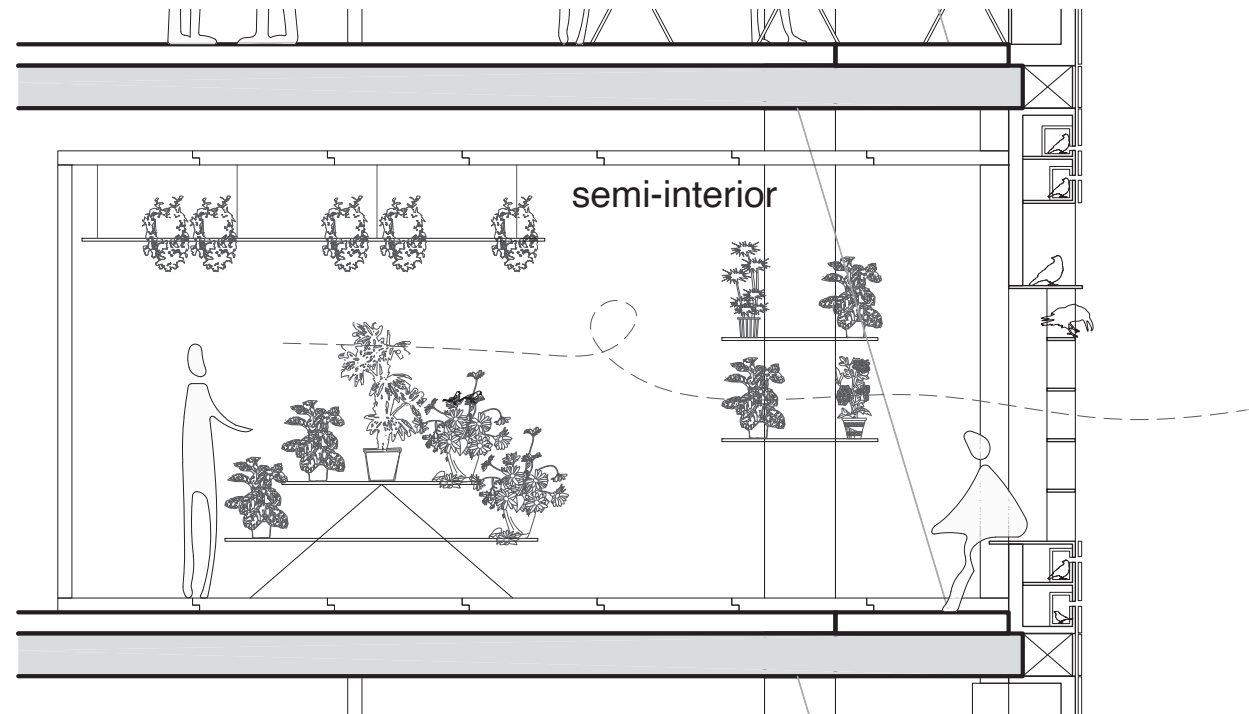
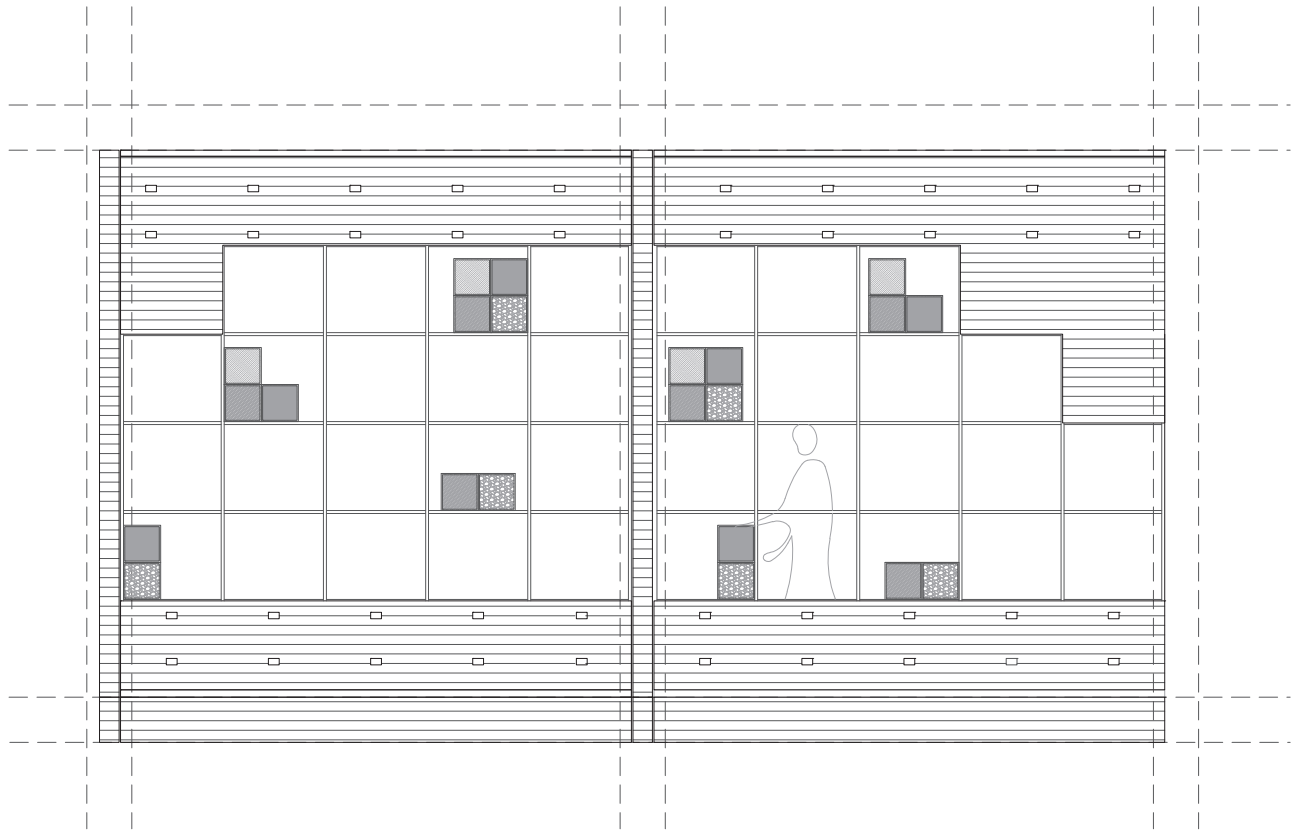


# SOUTH FACADE MATERIAL PALETTE

	Material Innovation	Environmental Value	Social Value	Biodiversity Function		
	 Cross laminated timber	•	•	•	🏠 🧤	
	Low maintenance green	 Green charcoal	• •	• •		🧤 🏠 🌿 💧
		 Scrap reclaimed wood	• •	• • •		🧤 🏠 🌿 💧
	Low maintenance black material	 Reclaimed old car tyres	•	• • •		🧤
		 Scrap wood	•	• • •	•	🧤

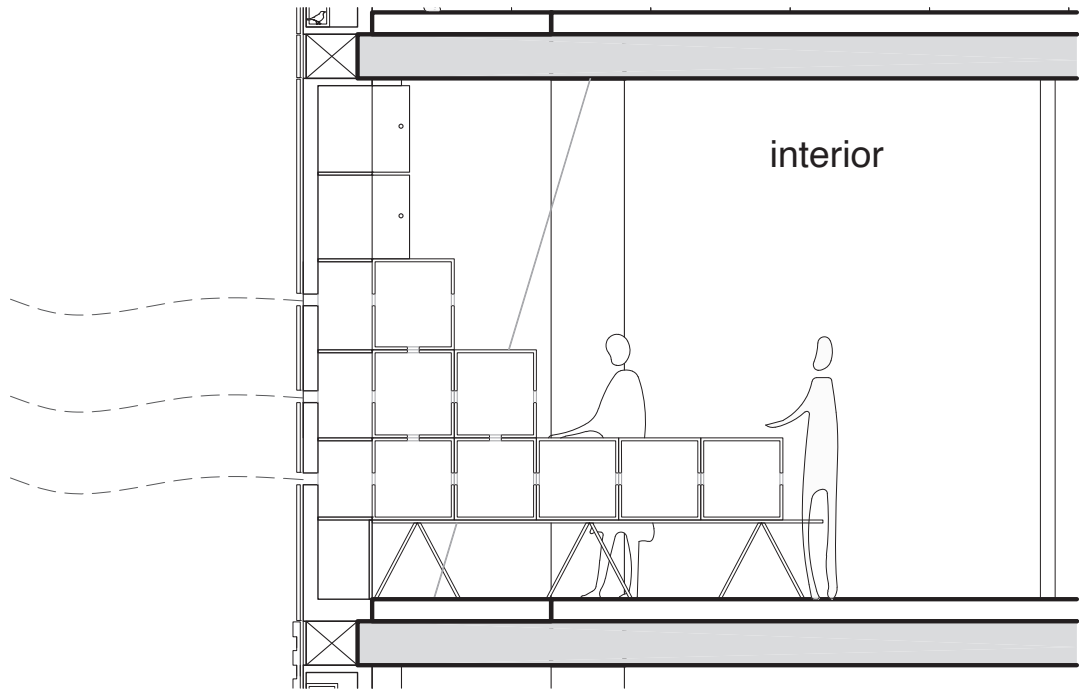
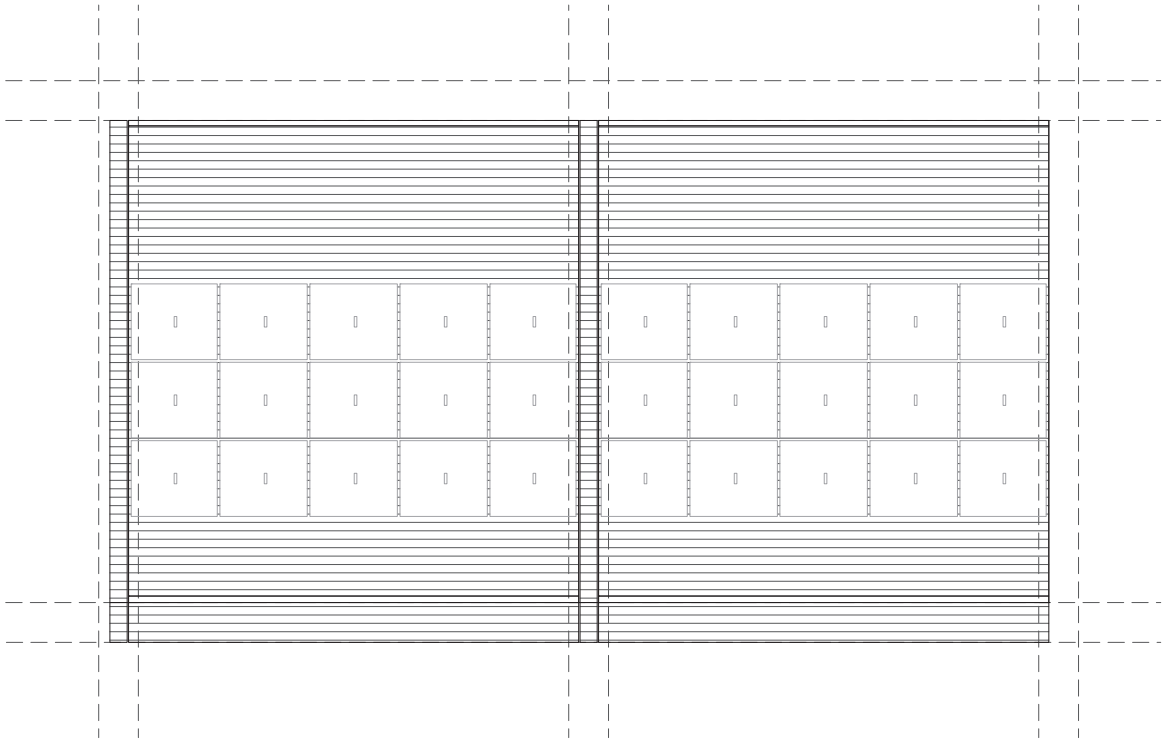


# INSECT FARM MODULE



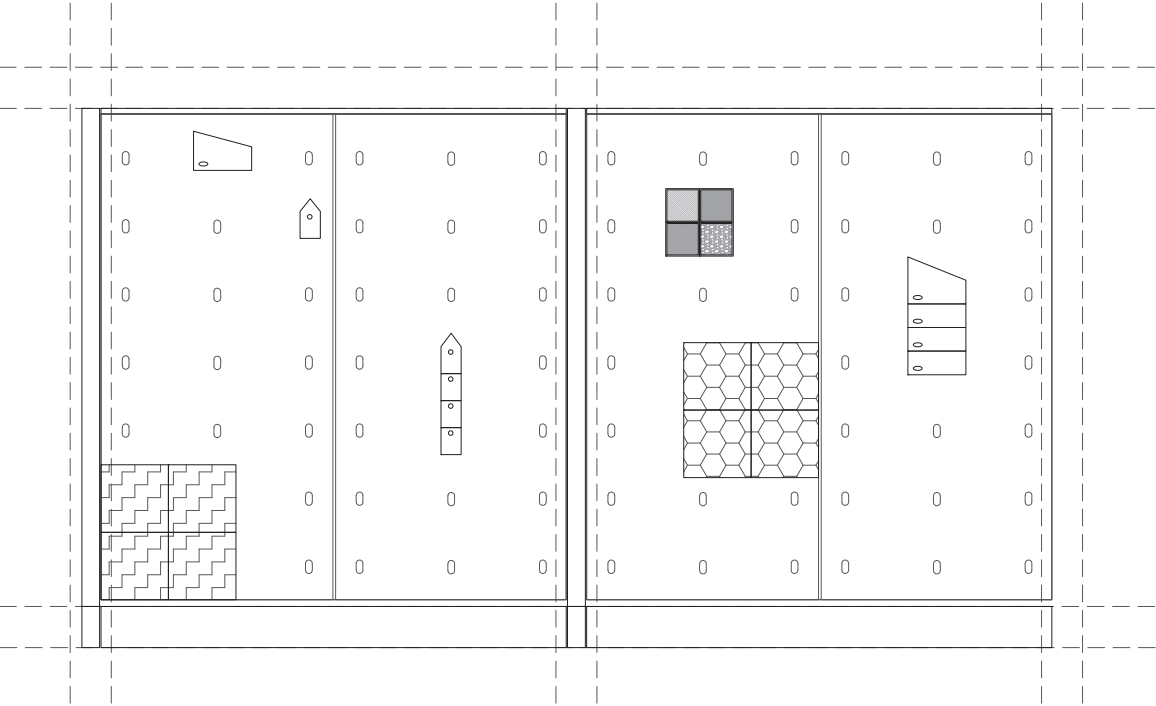


INSECT BREEDING FARM

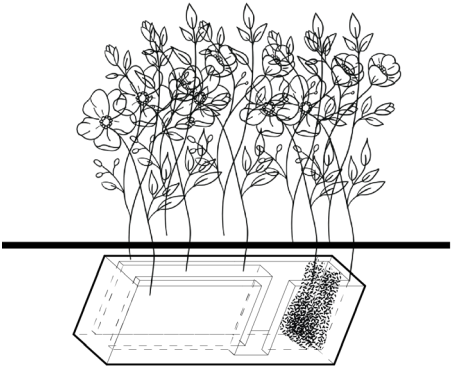
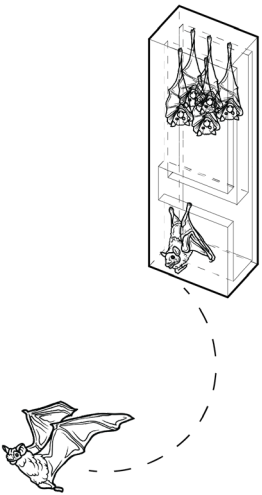




# EXPERIMENTAL WALL

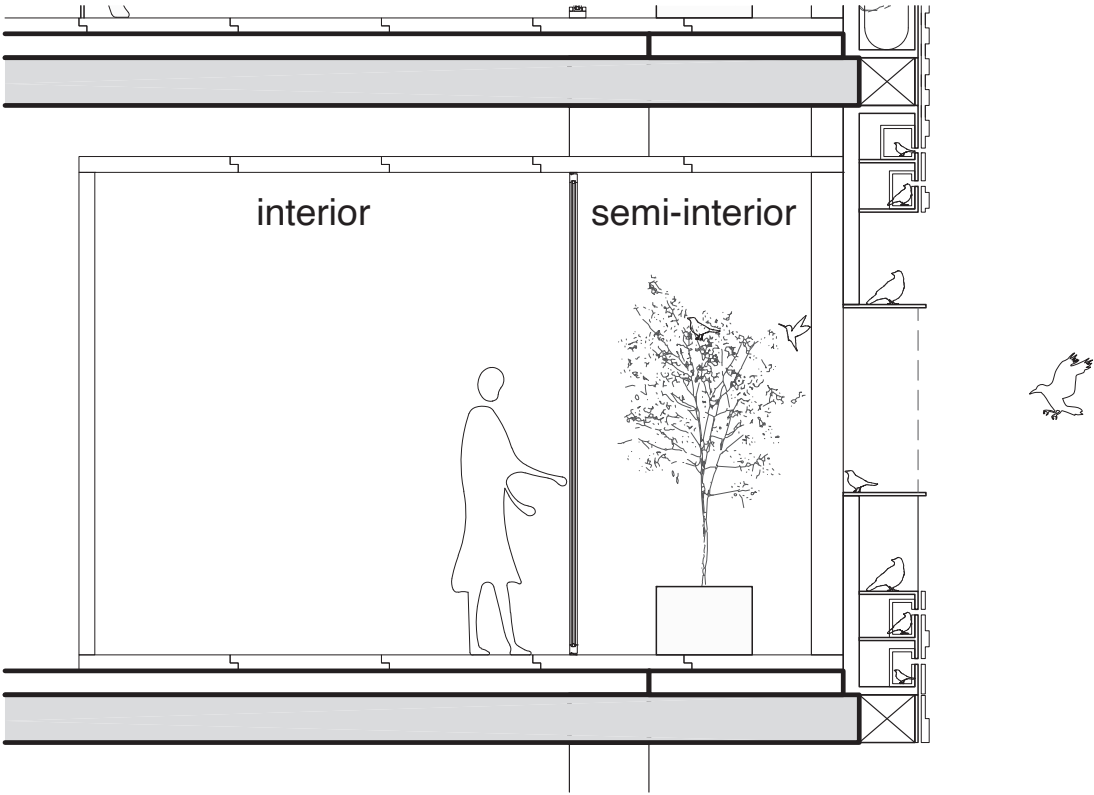
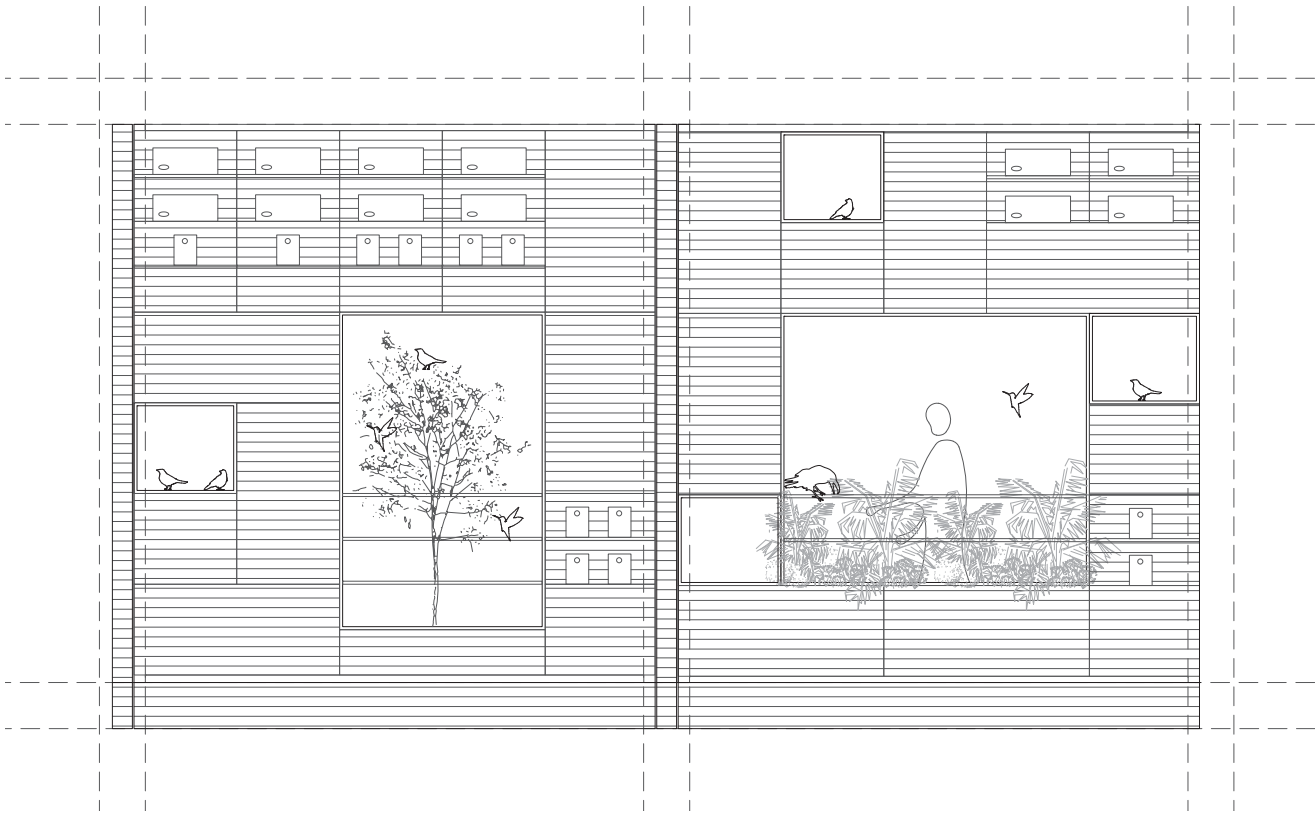


## BIODEGRADABLE MATERIALS CONSTRUCT FOR NATURE WITH NATURE





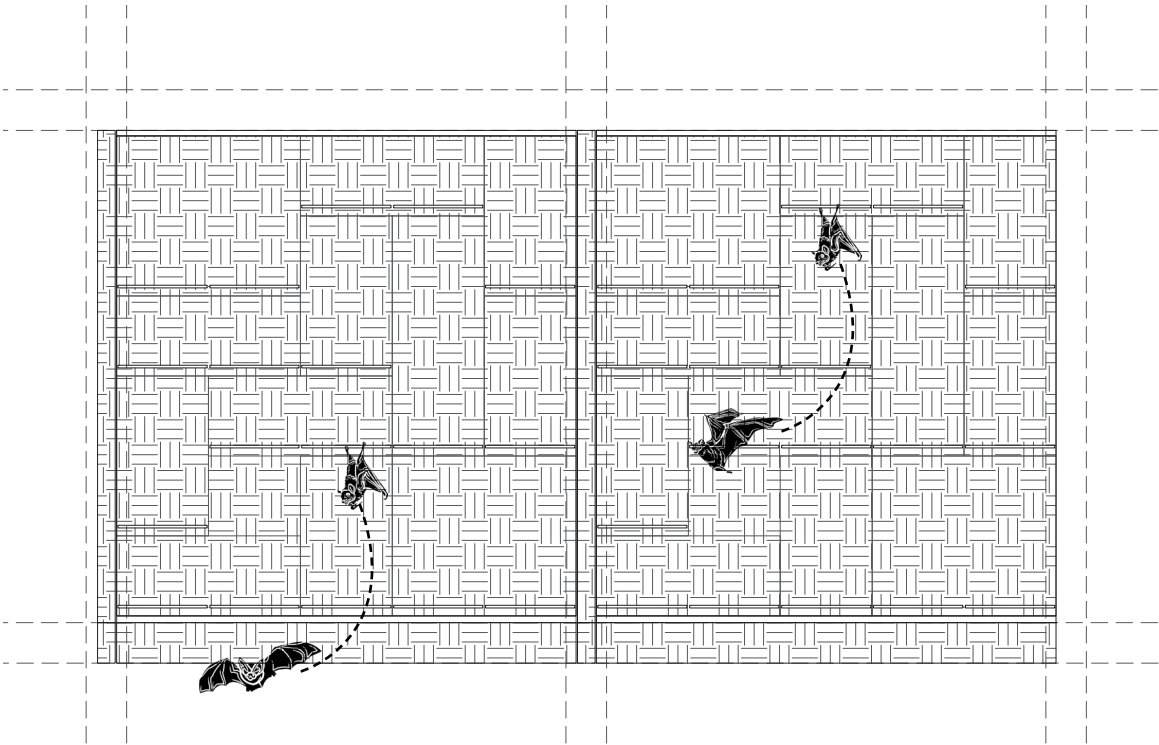
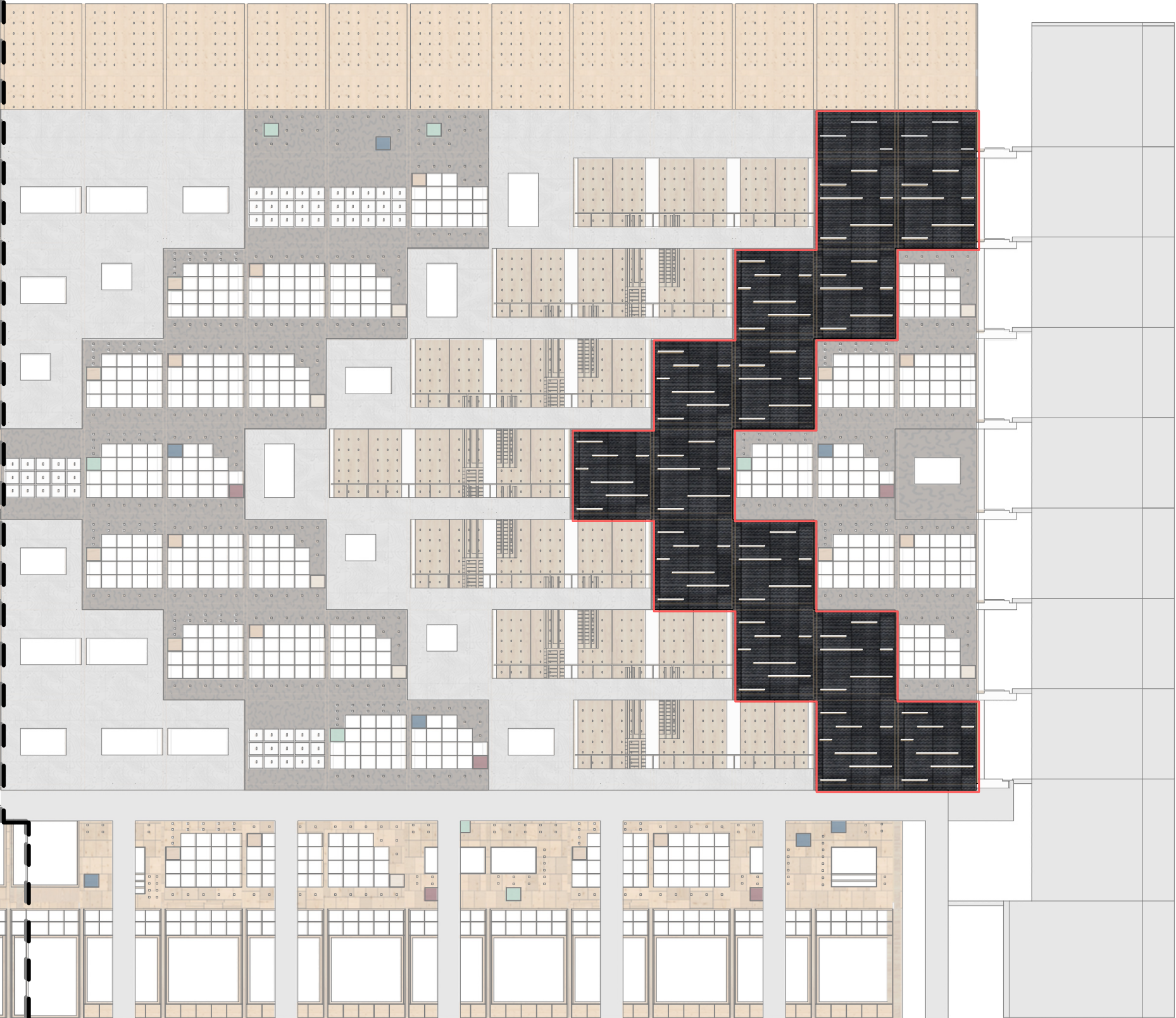
FEATHER FARM MODULE





# GUANO FARM MODULE

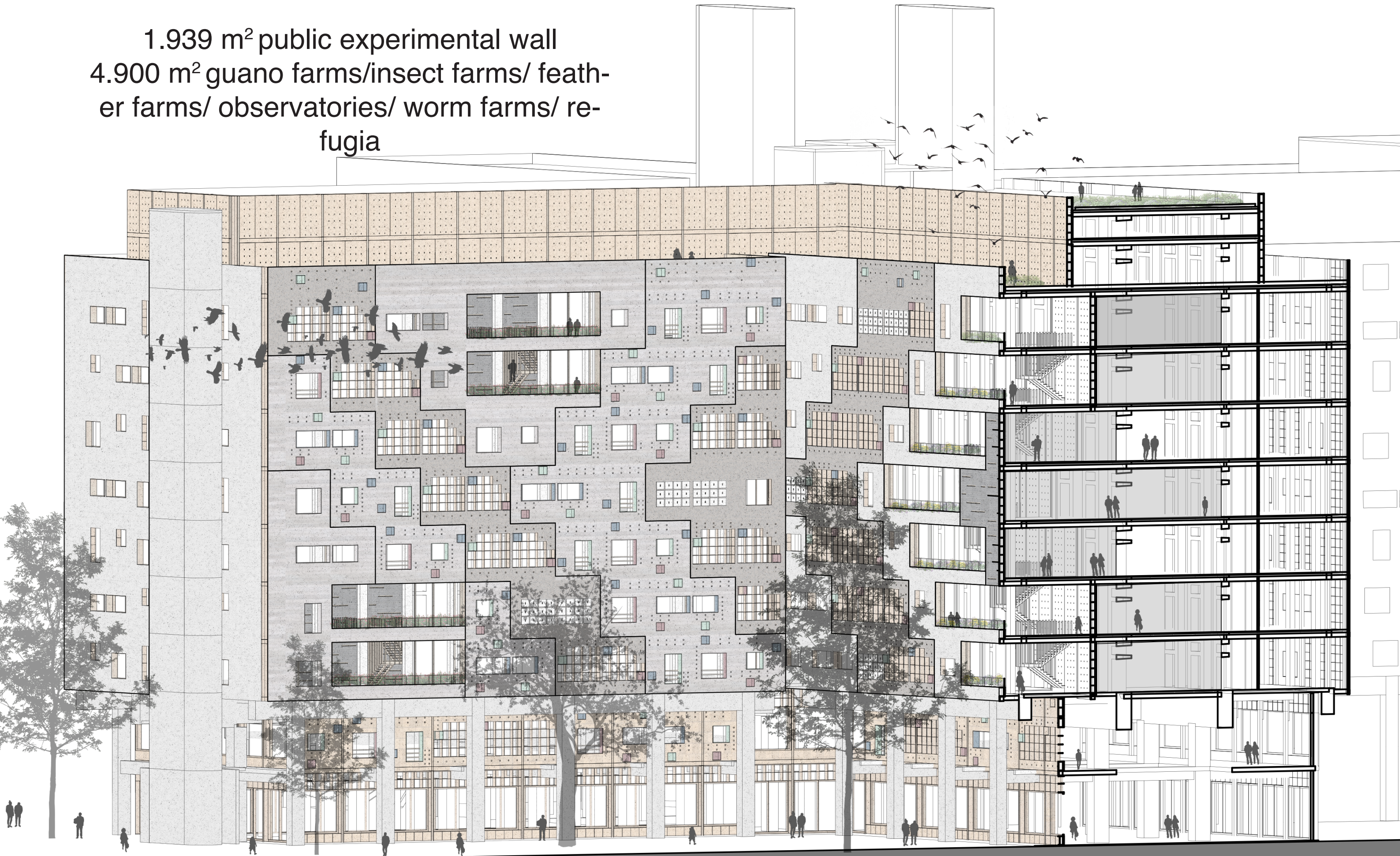
Maternity roost



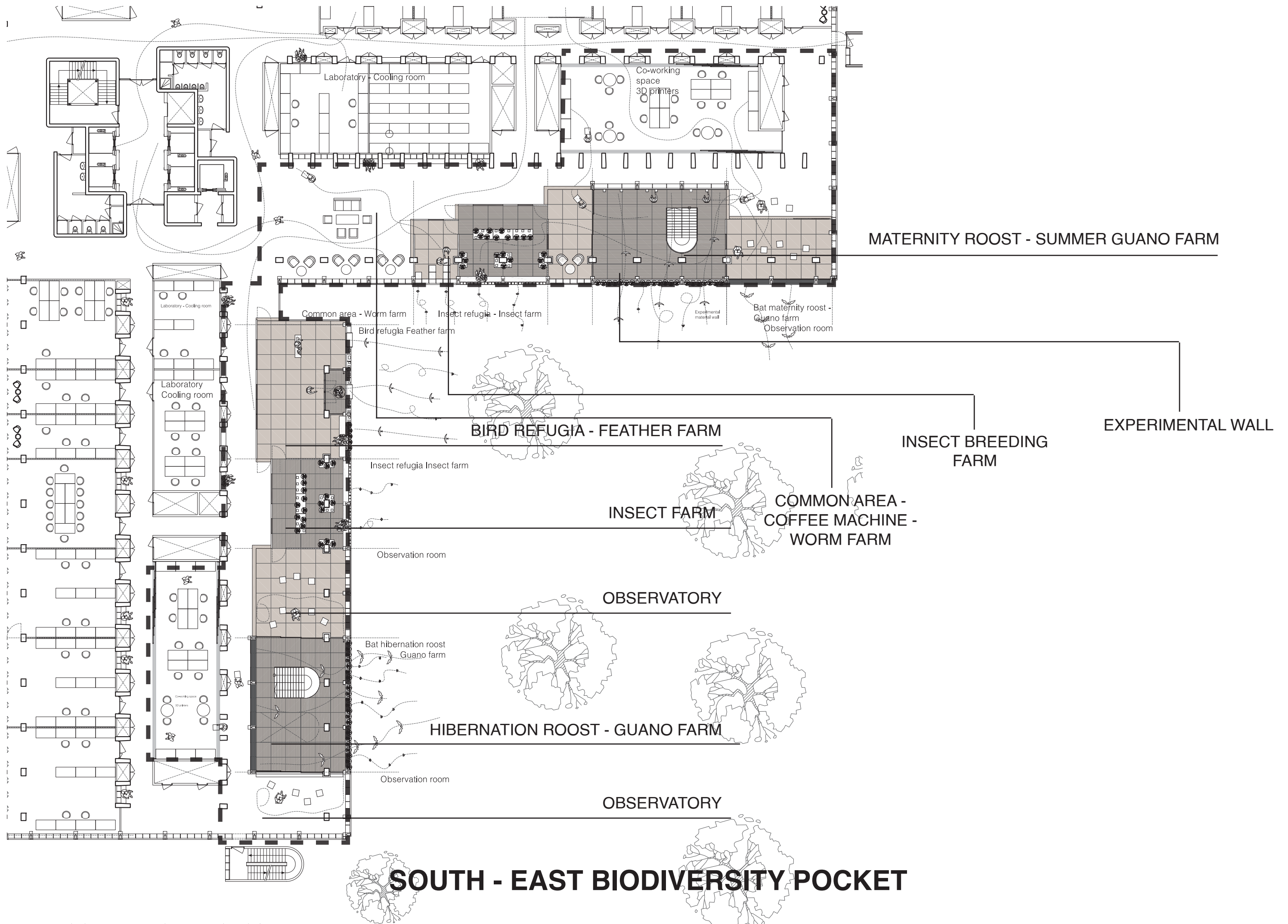


# PROGRAM

1.939 m<sup>2</sup> public experimental wall  
4.900 m<sup>2</sup> guano farms/insect farms/ feather farms/ observatories/ worm farms/ refugia

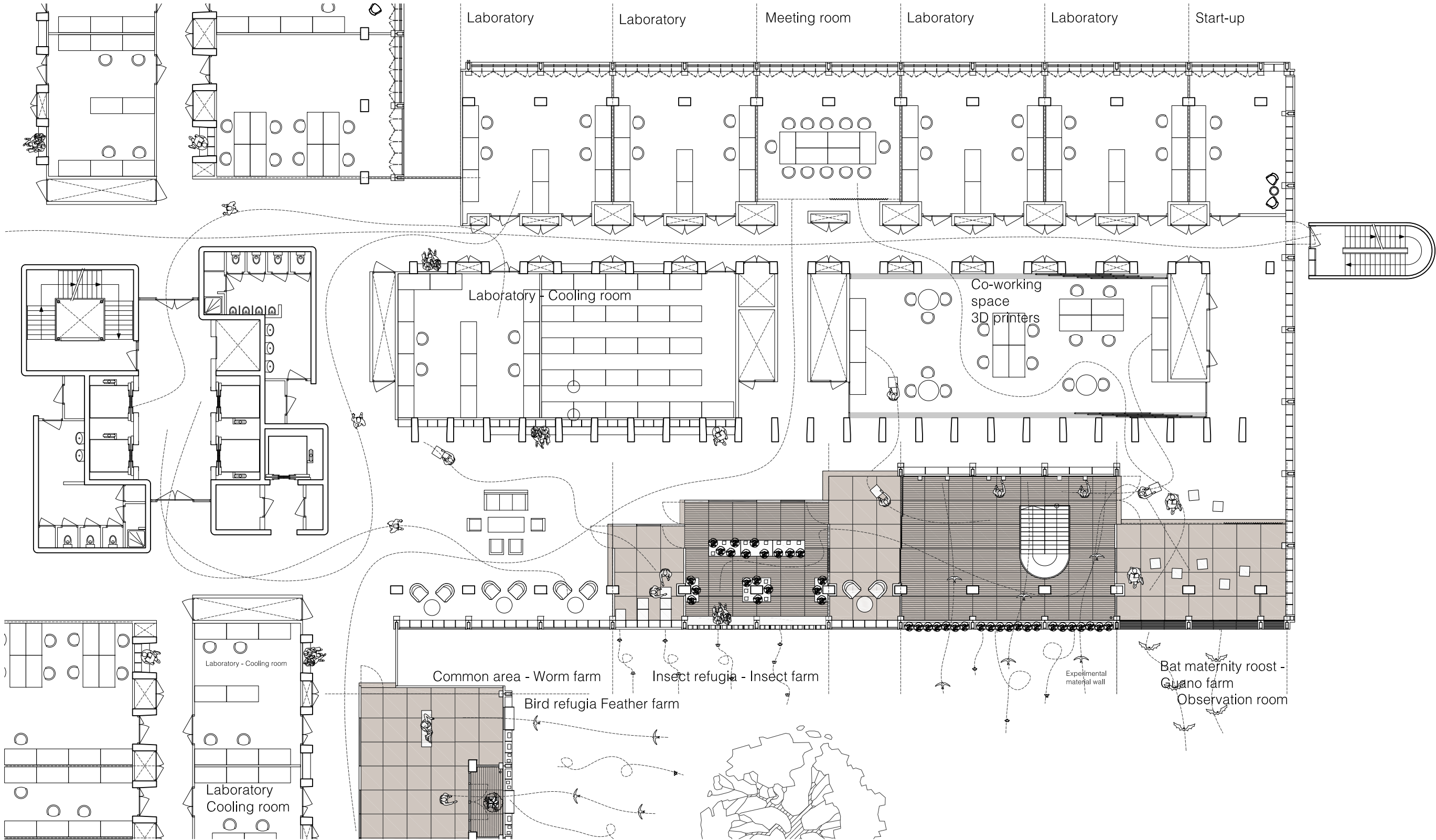








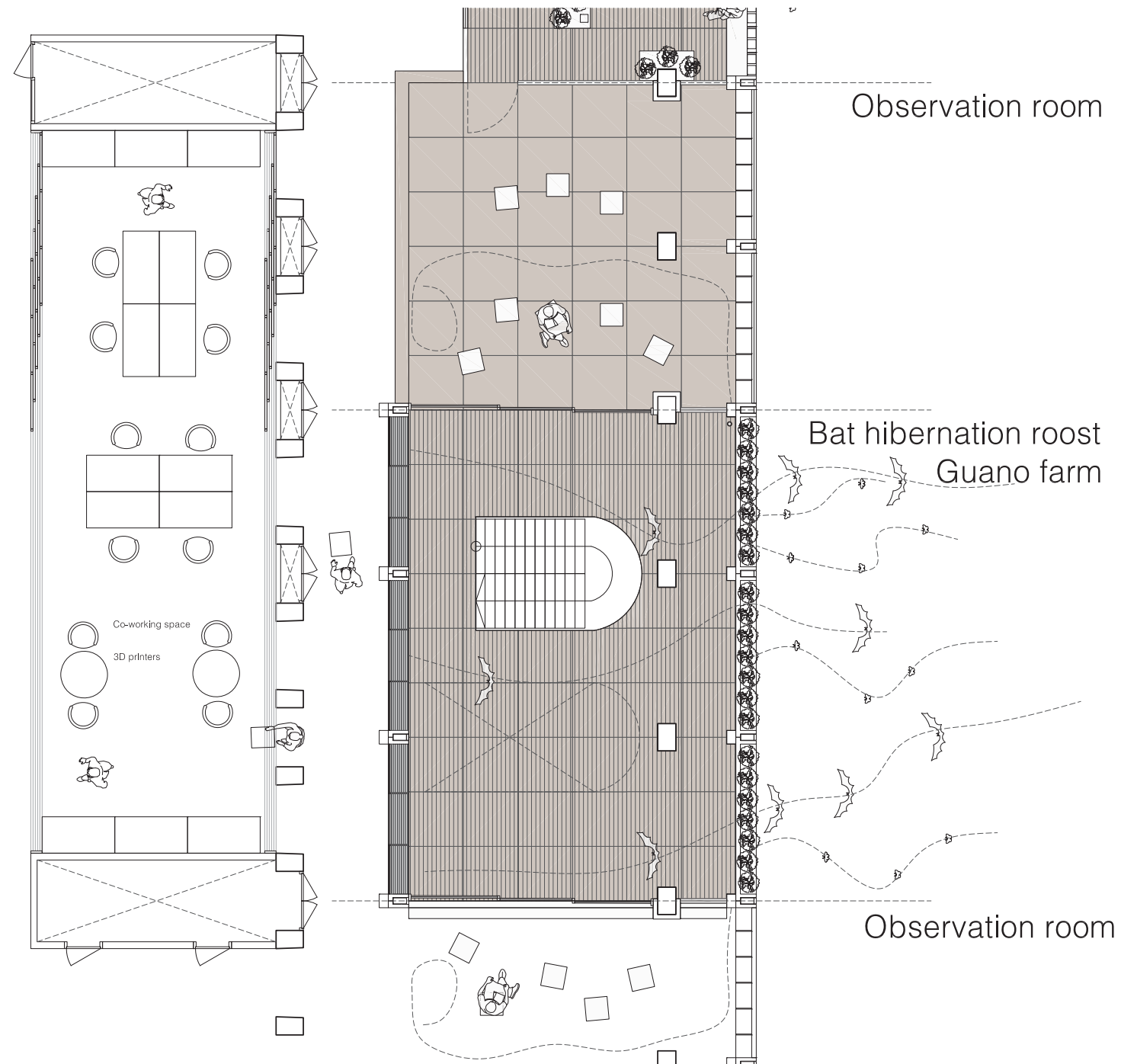
EAST WING - SOUTH FACADE





# HIBERNATION GUANO FARM

## How it works



## Fertiliser

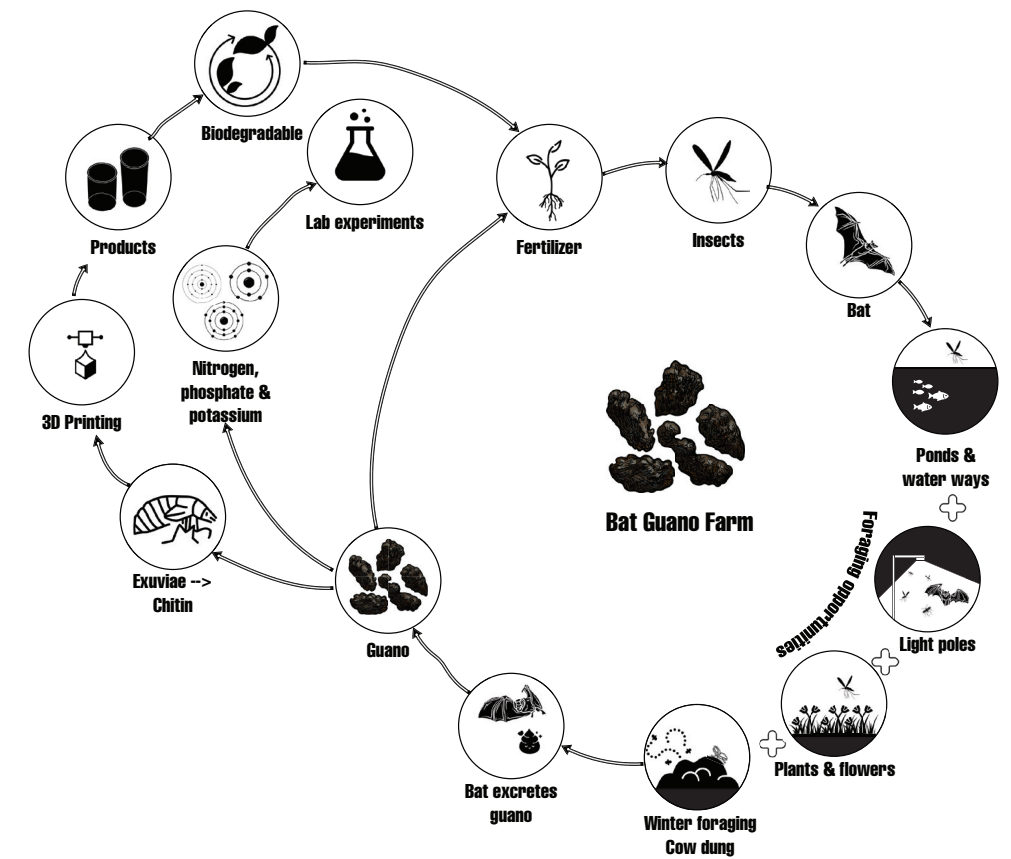


9000 guano drop-  
pings in a year per bat

## Natural pesticide

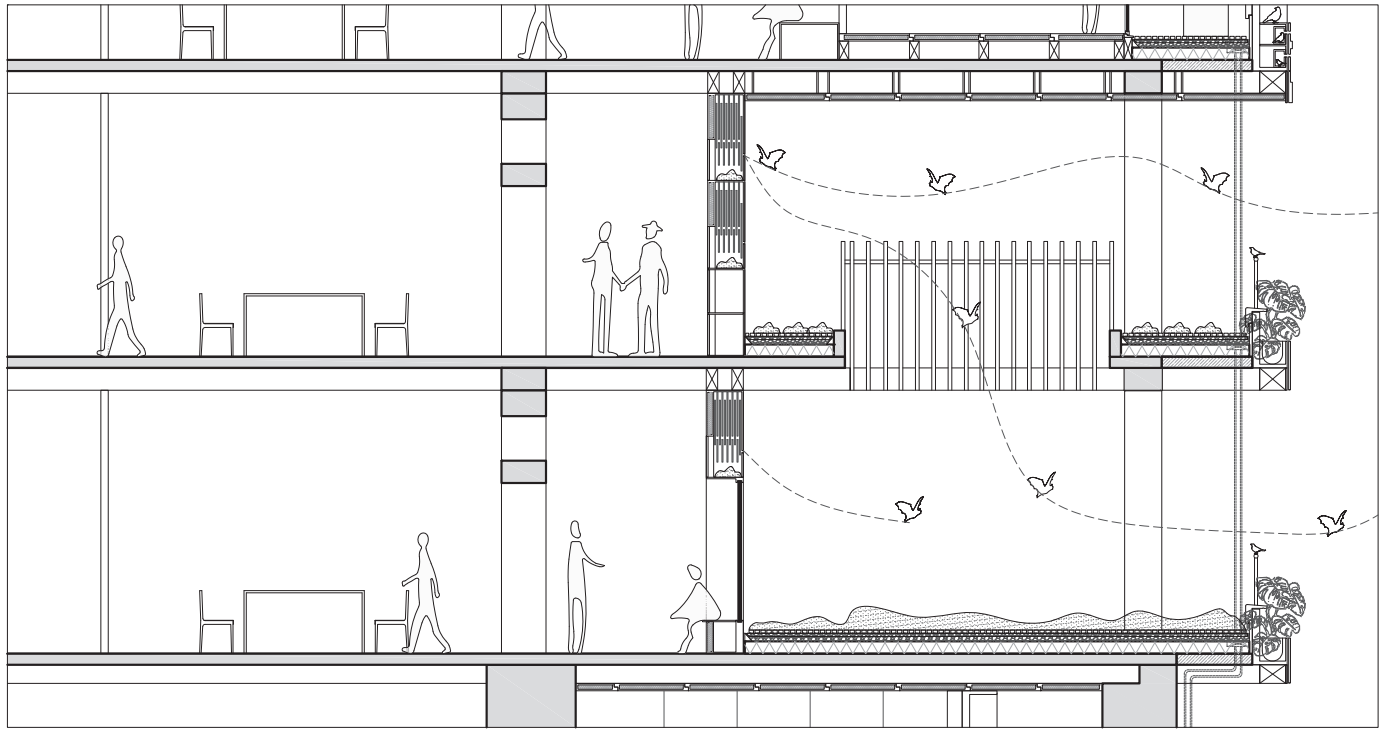


1000 mosquitoes per  
night per bat

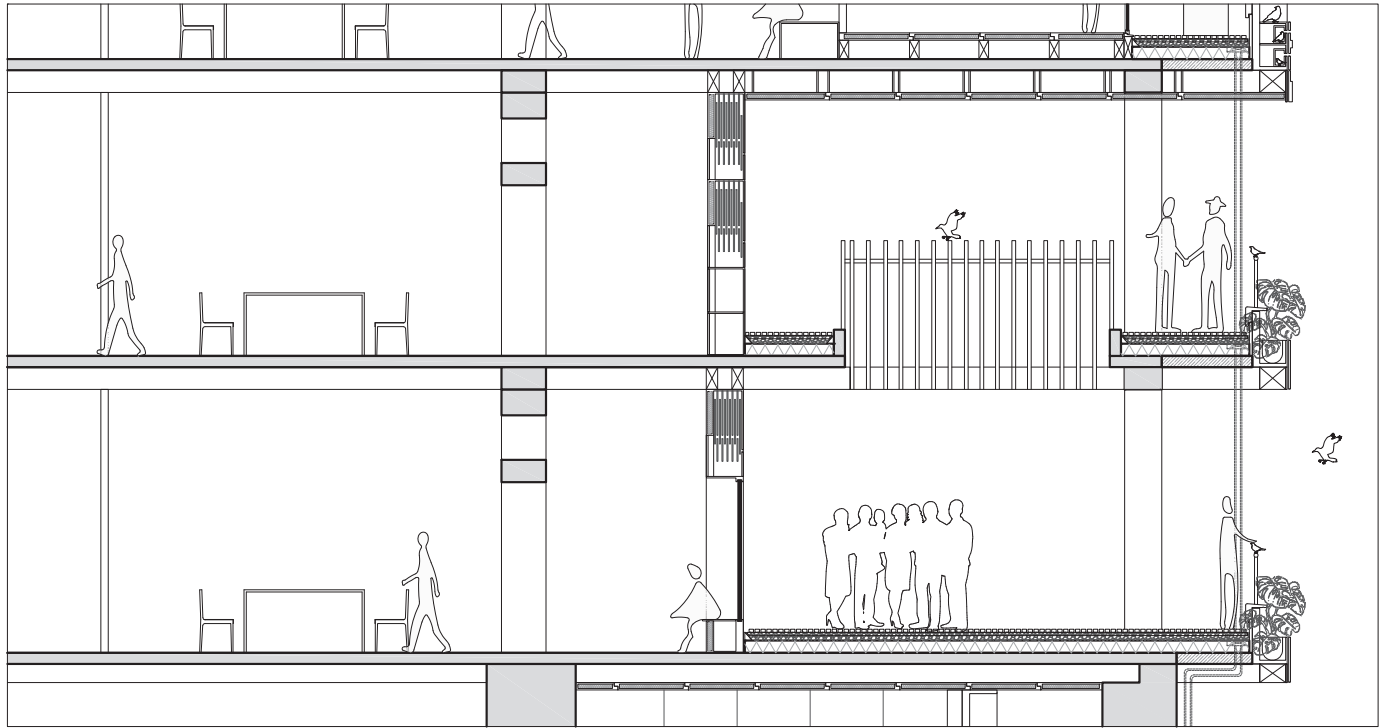




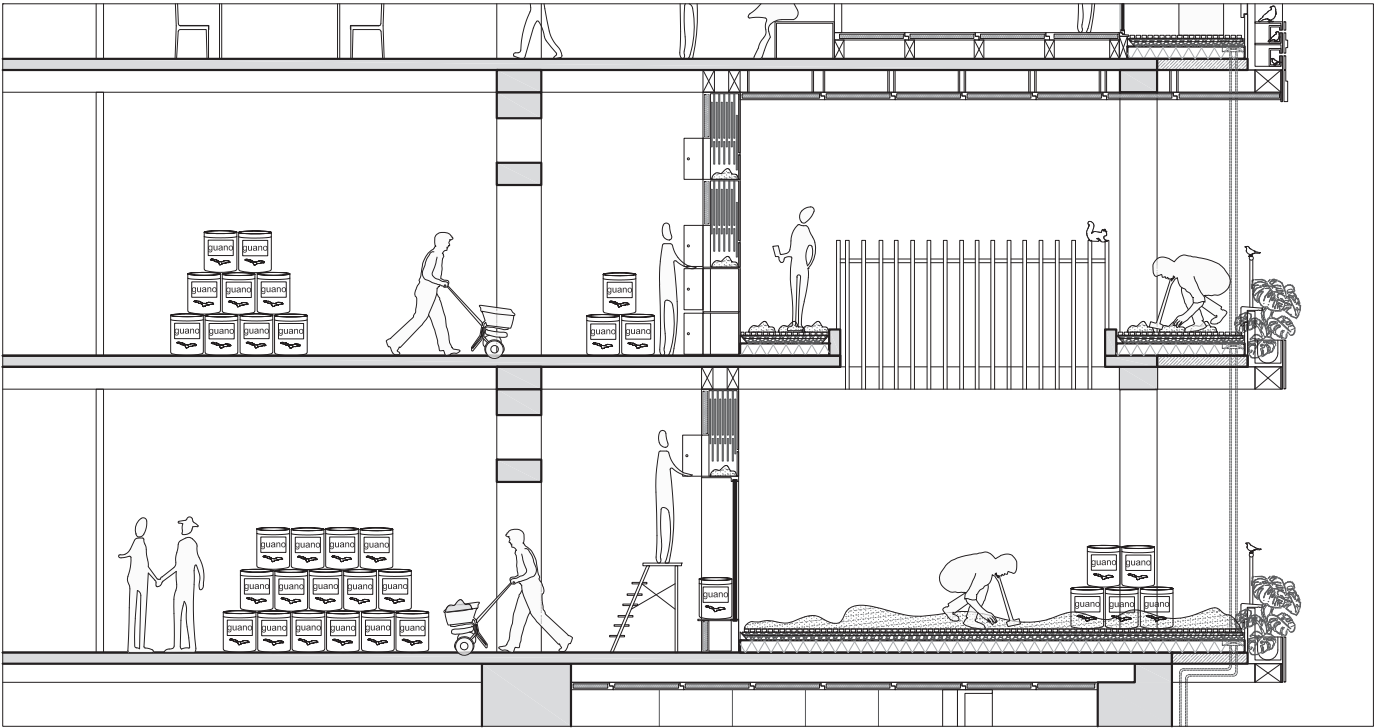
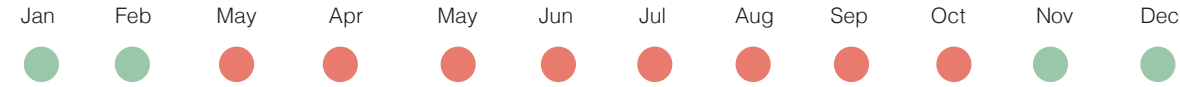
# HIBERNATION GUANO FARM



## 2. HARVEST



## 1. NURTURE

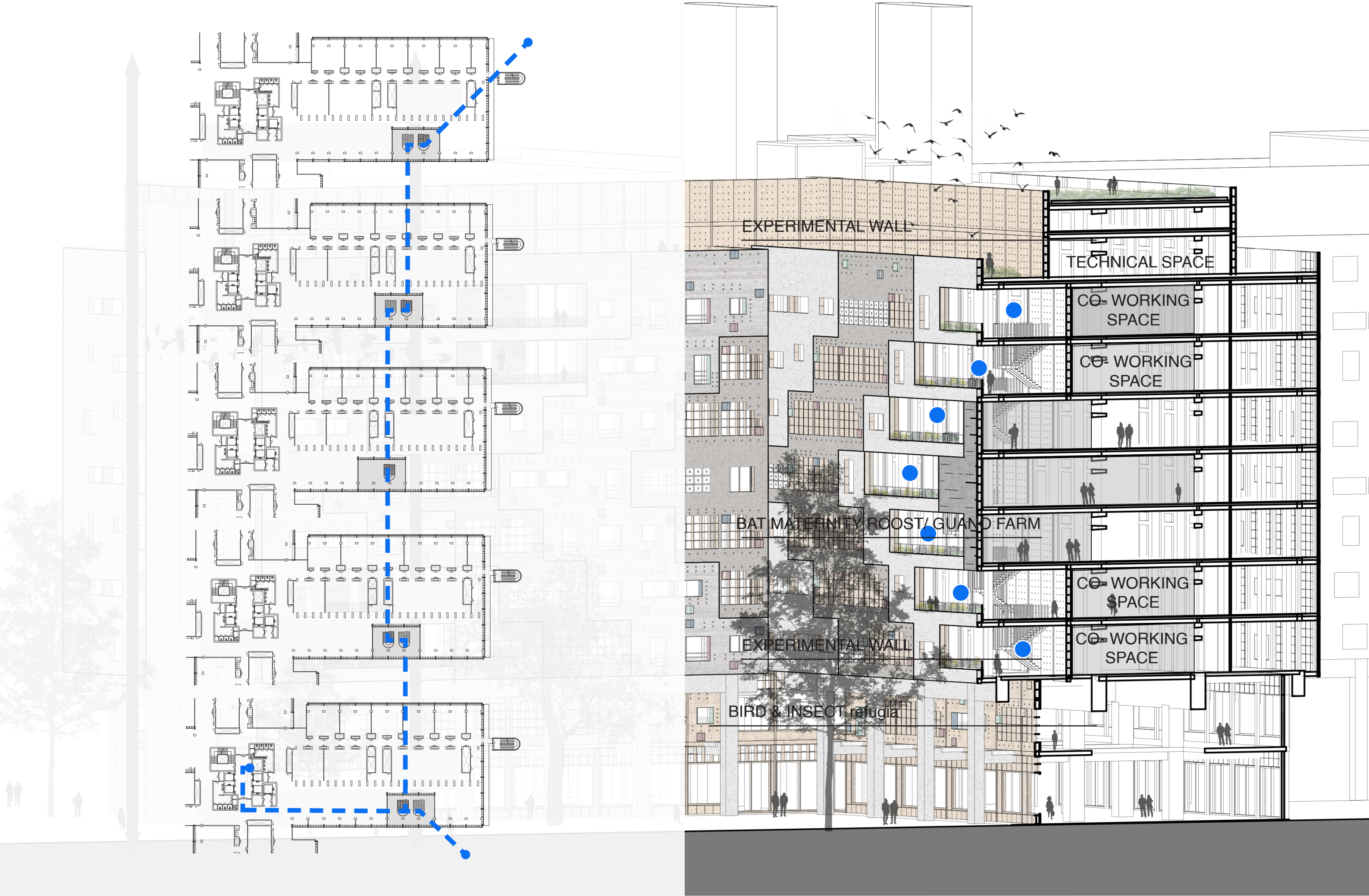


## 3. ENJOY





# PUBLIC CIRCULATION - EXPERIMENTAL WALL



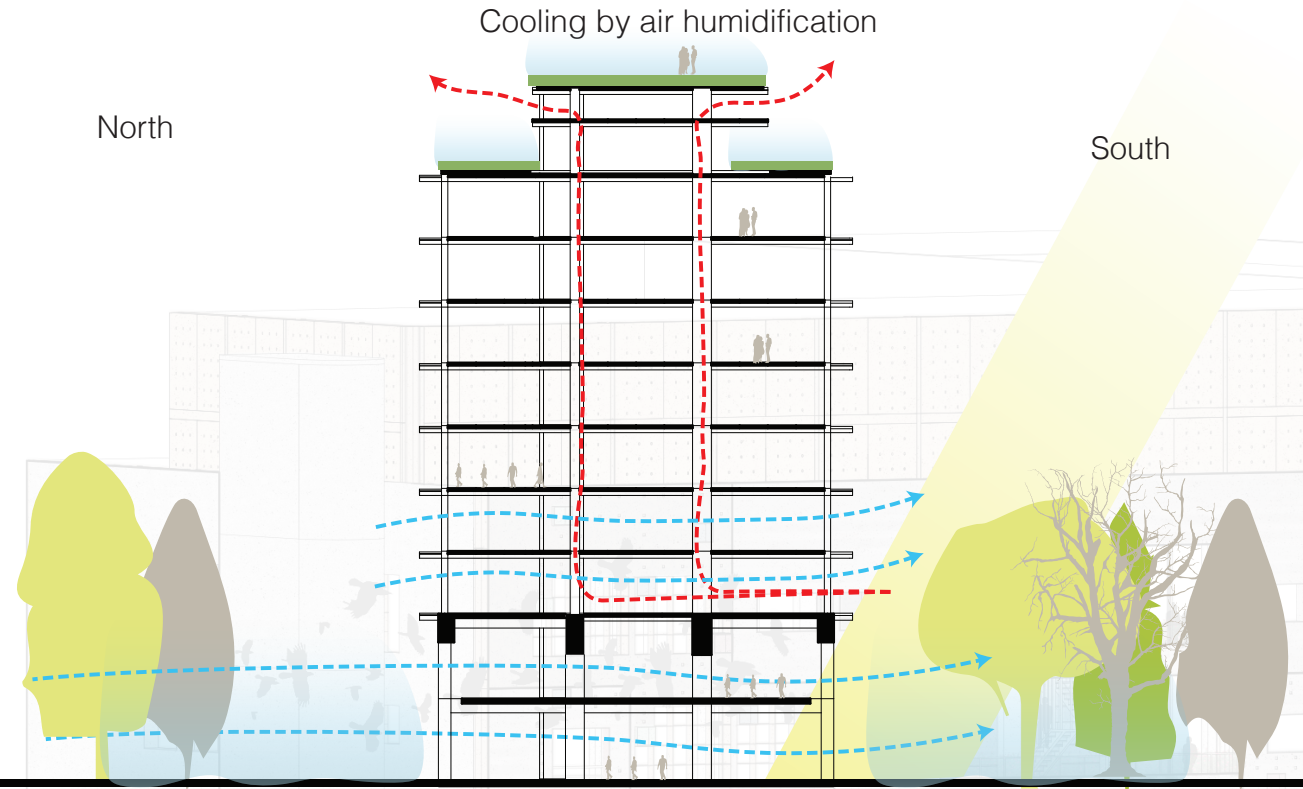


# ACCESS IN A YEAR

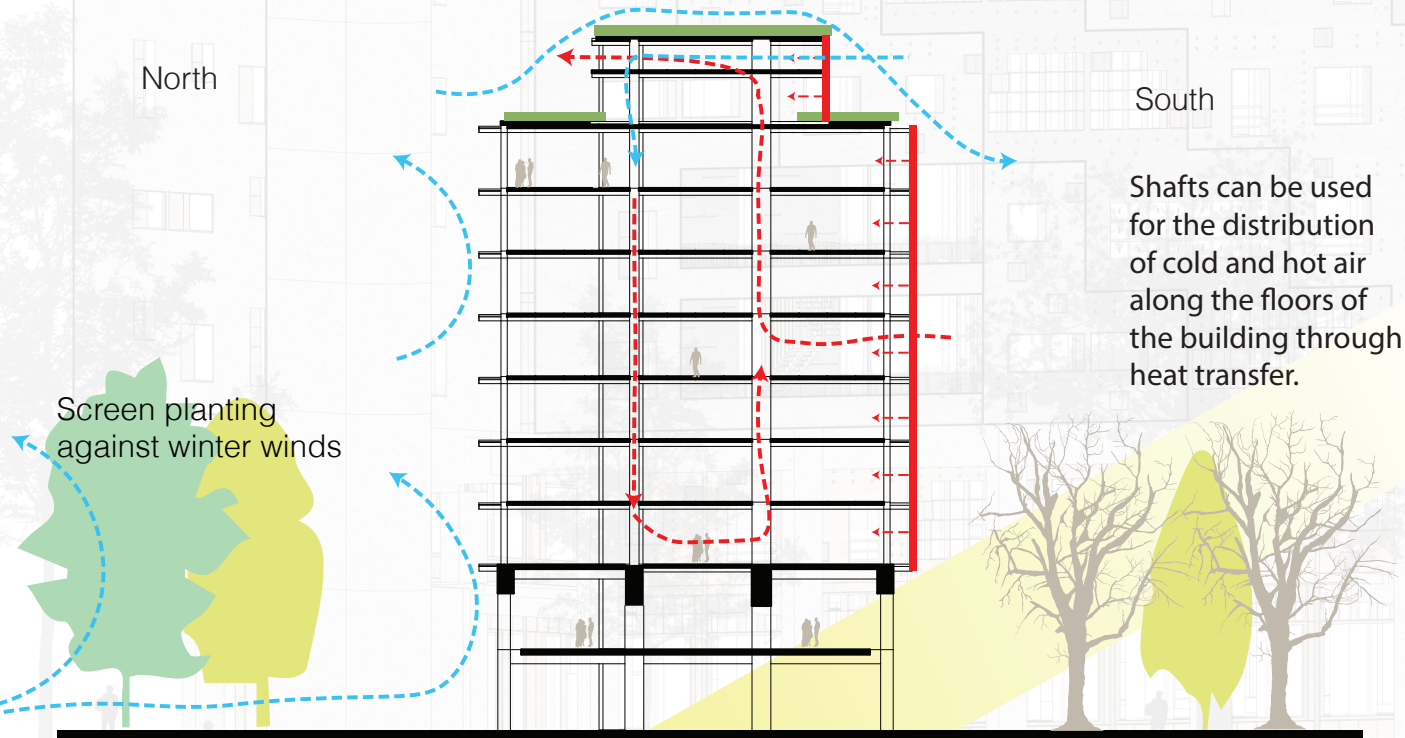




# CLIMATIC STRATEGIES



Summer East wing

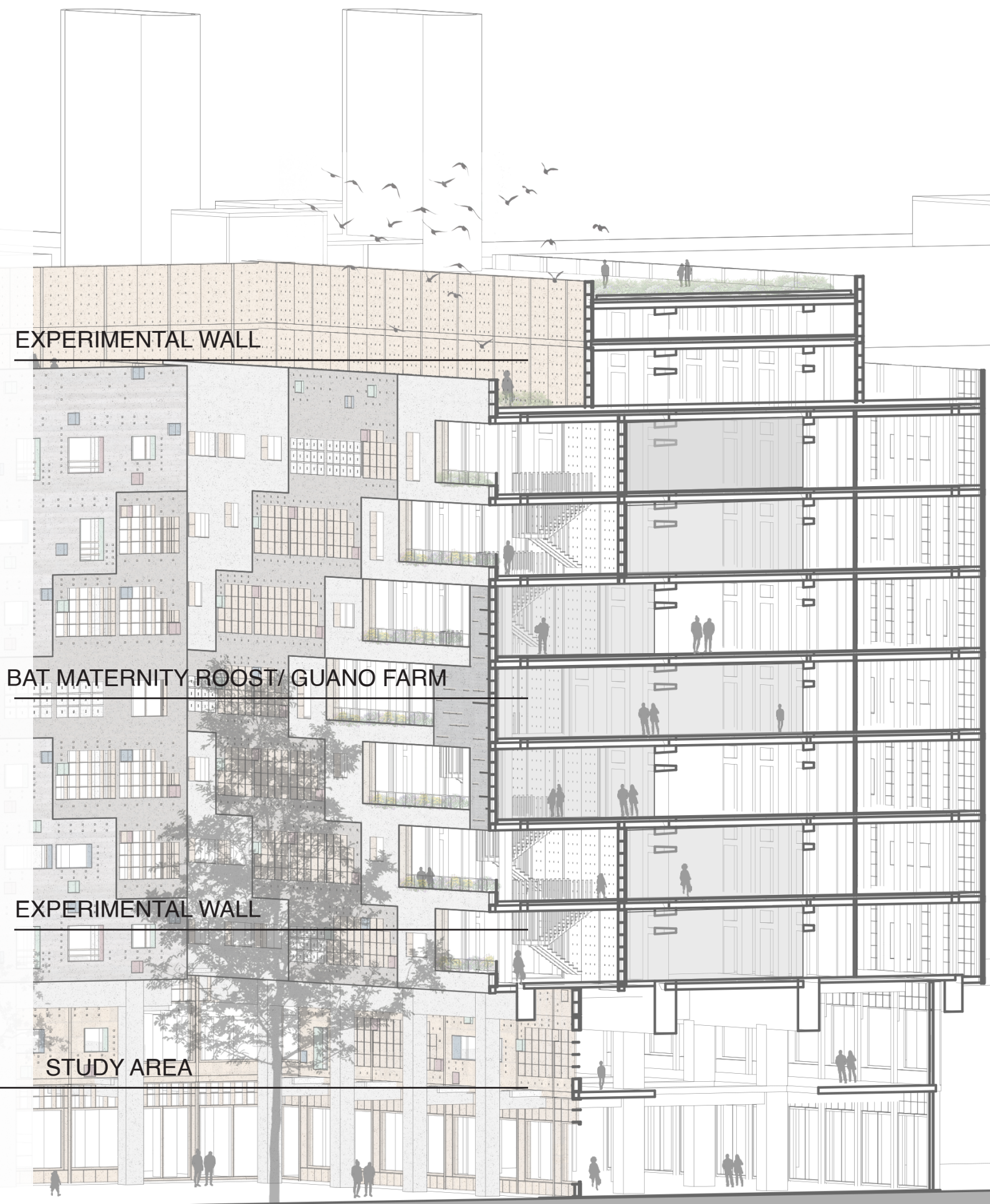
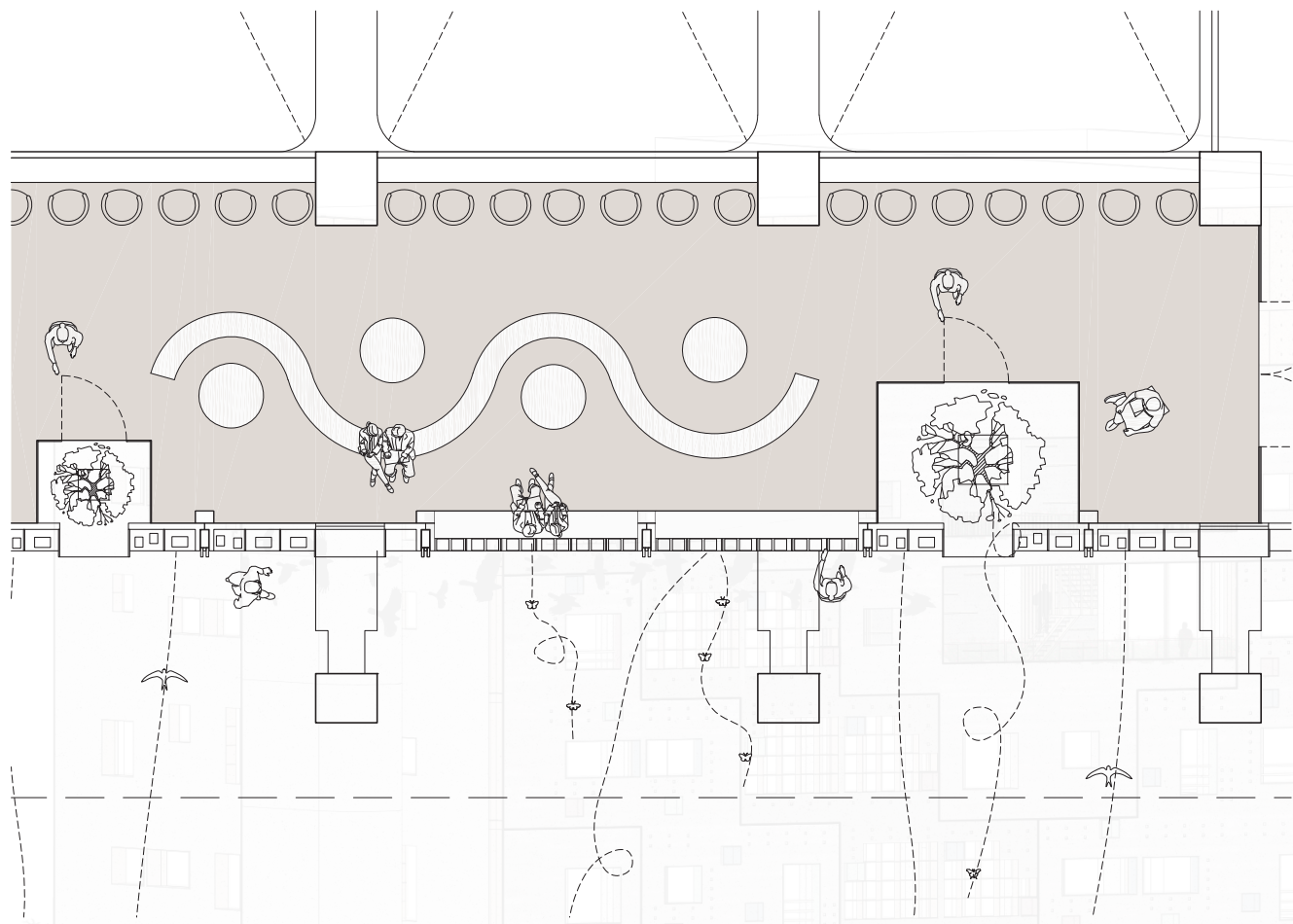


Winter East wing



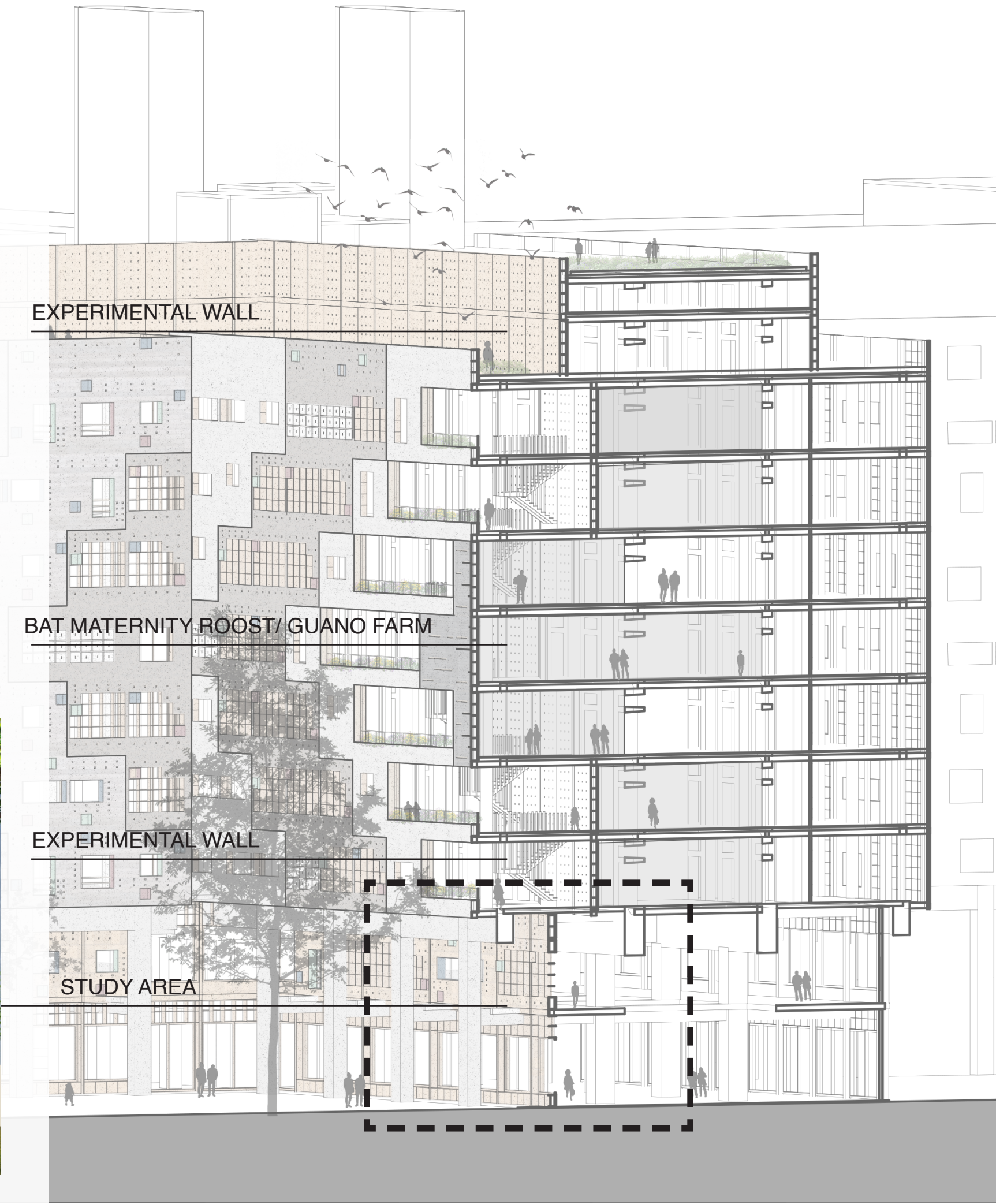
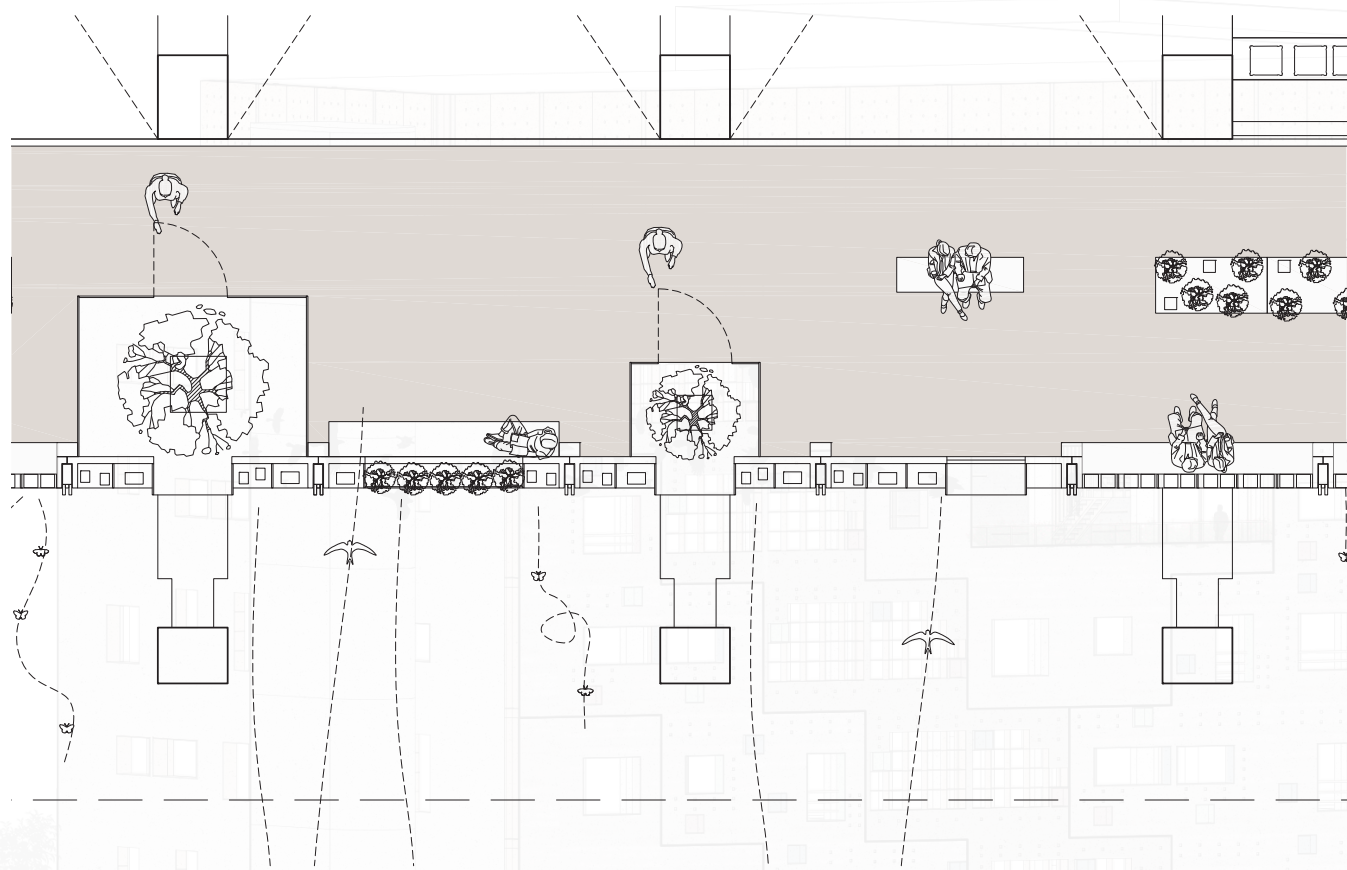


**PLINTH: Biodiversity pocket**  
**Canteen - Nature & human interaction**





**PLINTH: Biodiversity pocket**  
**Study area - Nature & human interaction**





EXPERIMENTAL WALL

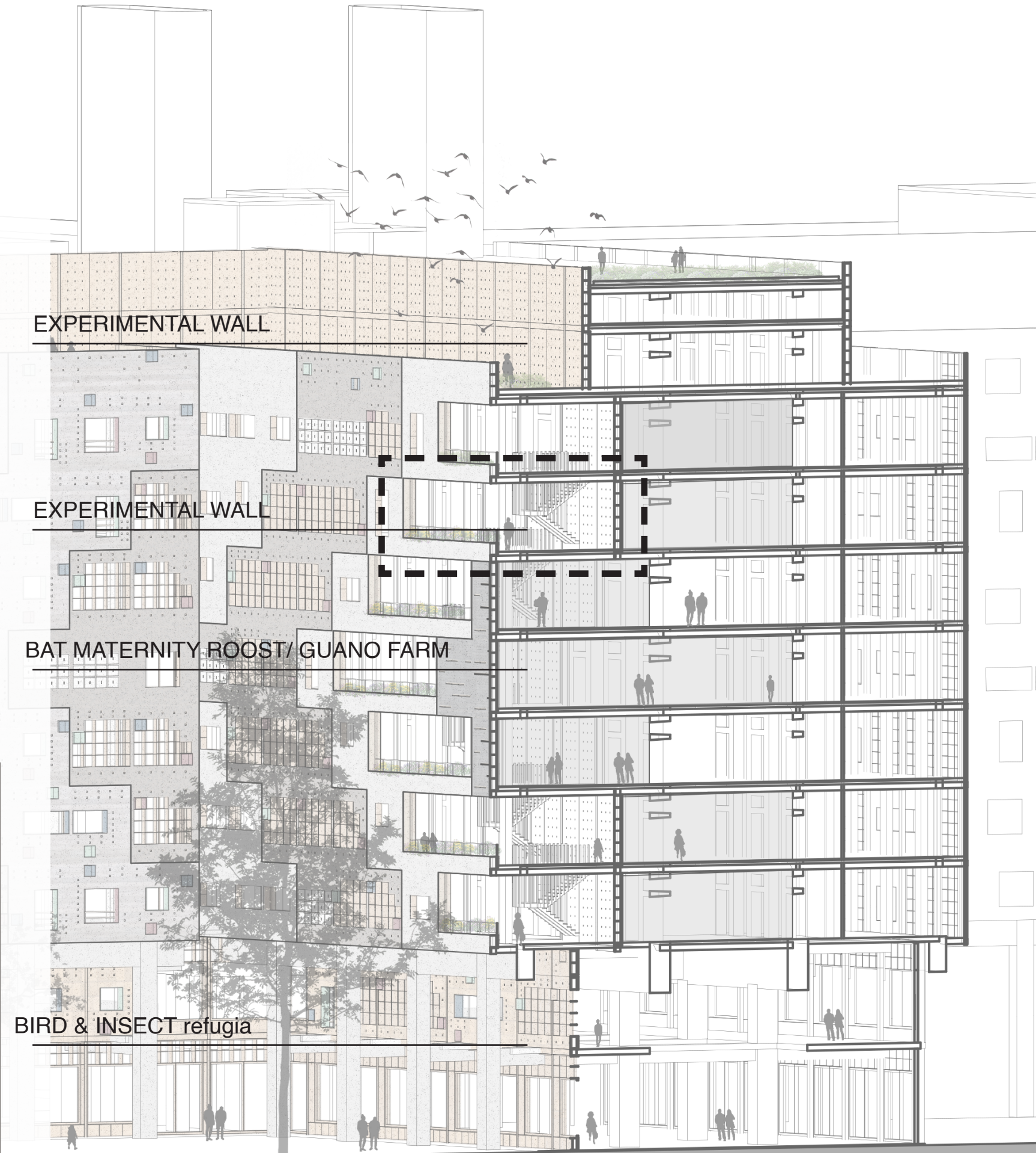
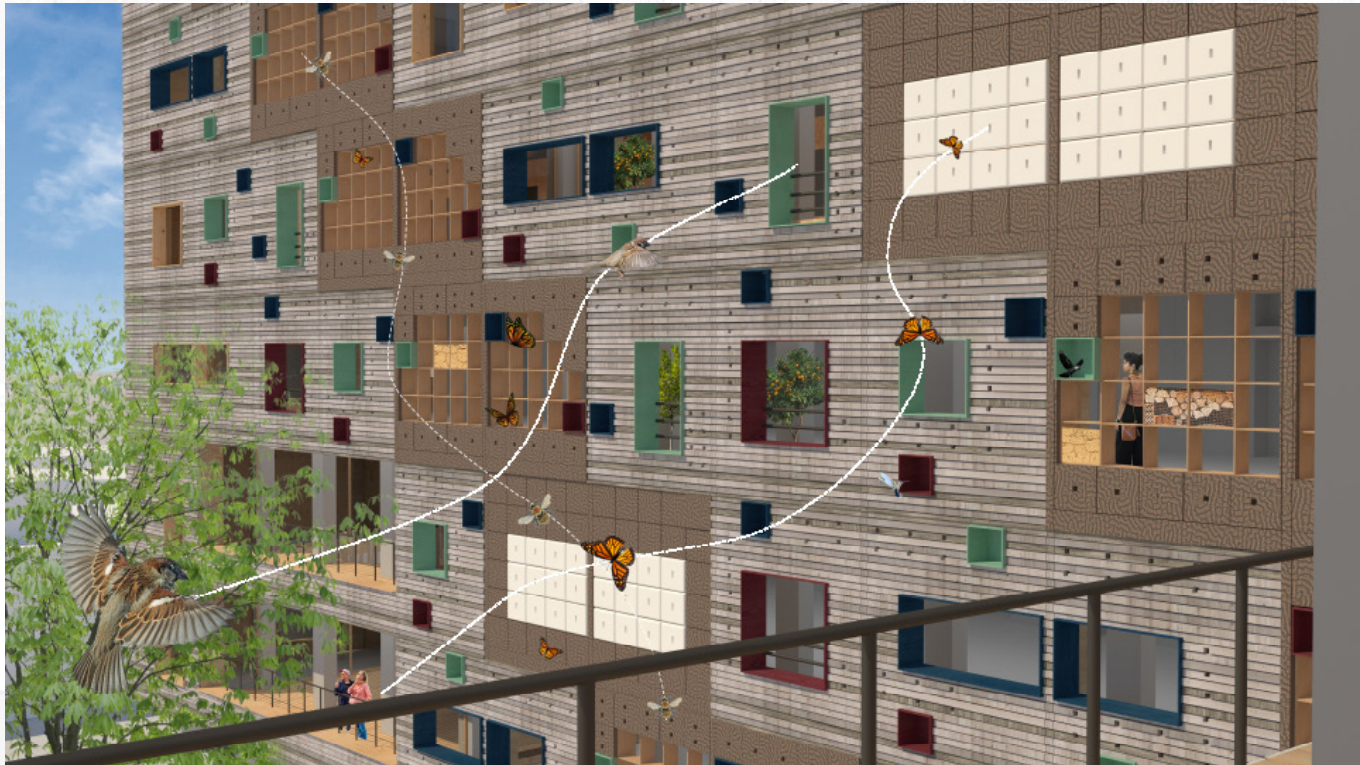


EXPERIMENTAL WALL

EXPERIMENTAL WALL

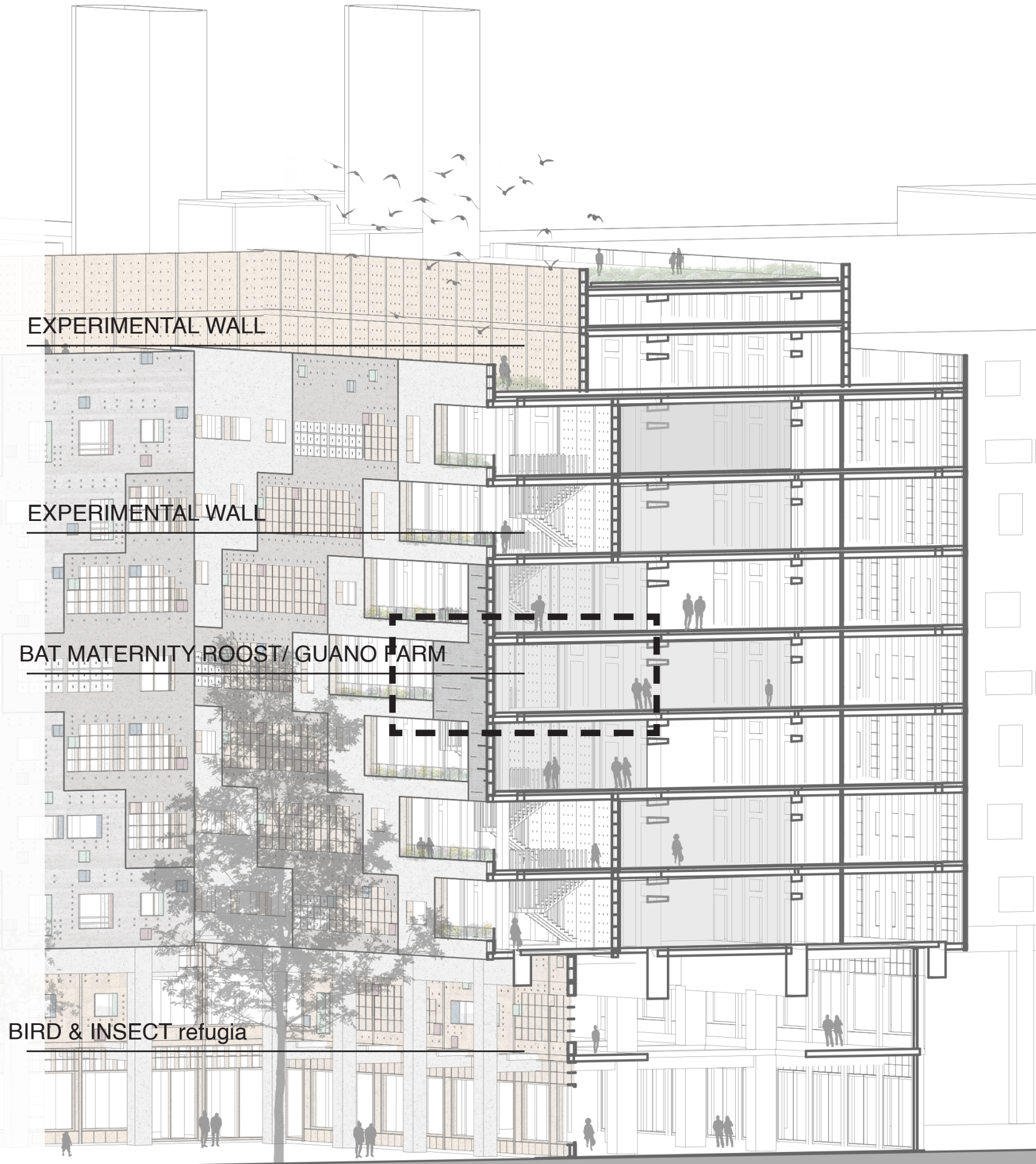
BAT MATERNITY ROOST/ GUANO FARM

BIRD & INSECT refugia





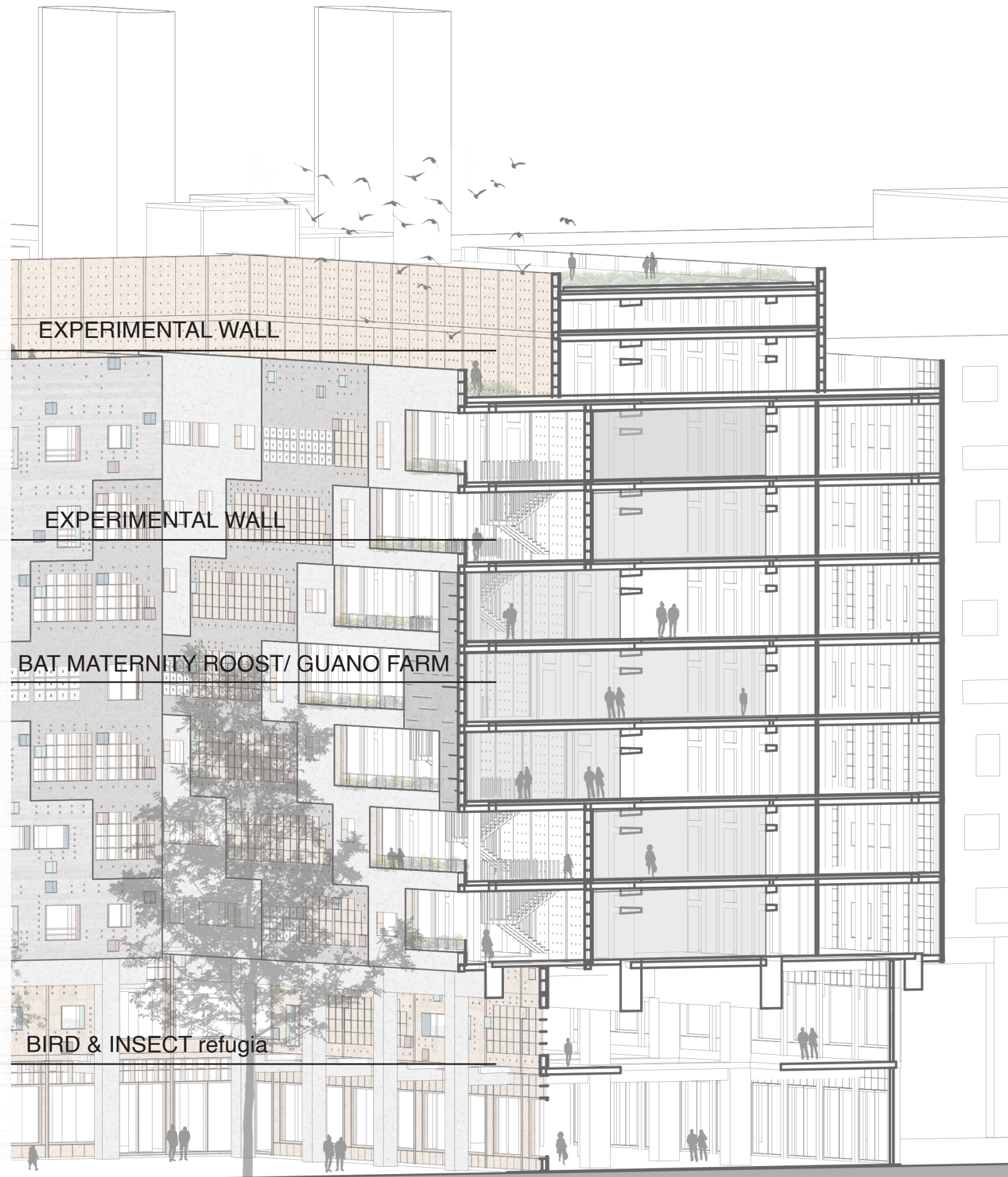
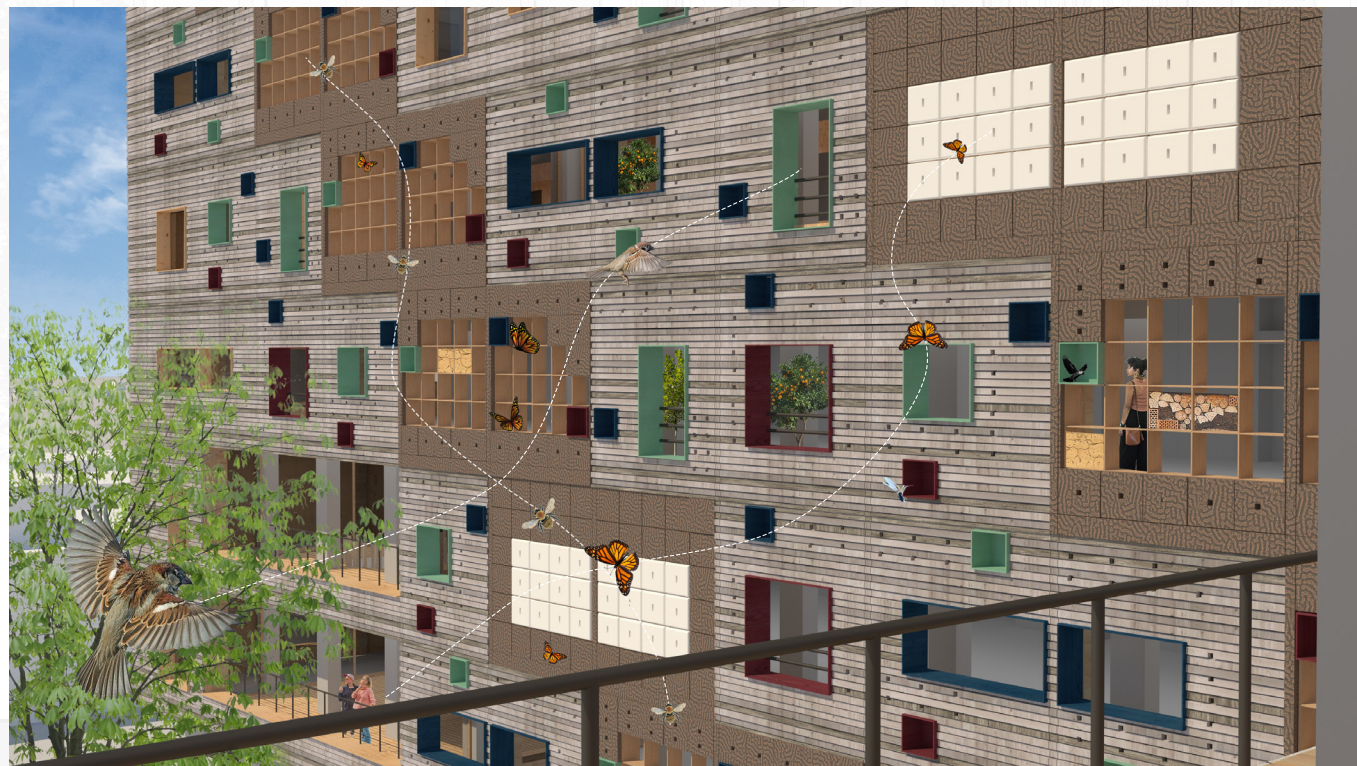
# GUANO FARM Observatory





# FEATHER FARM

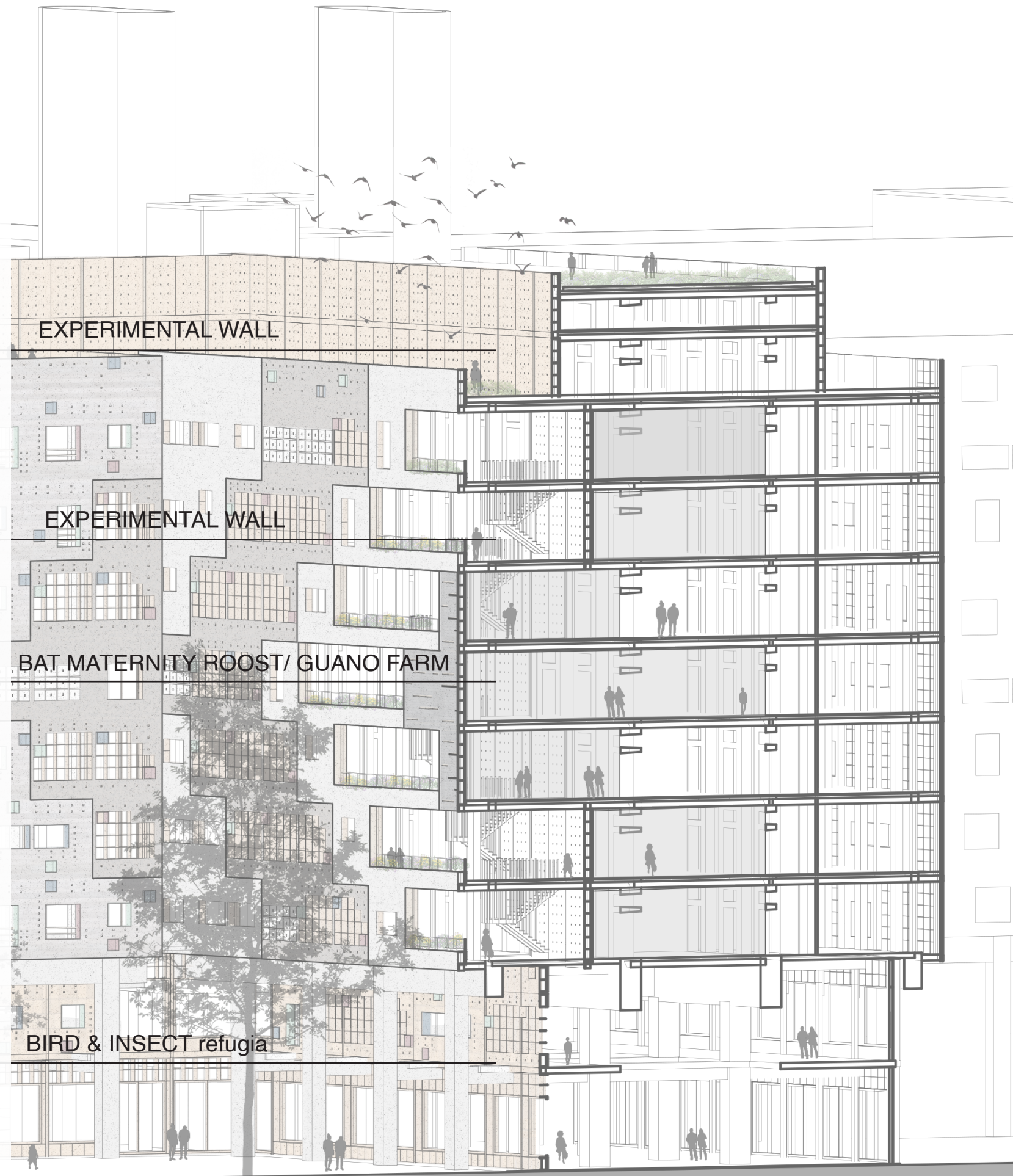
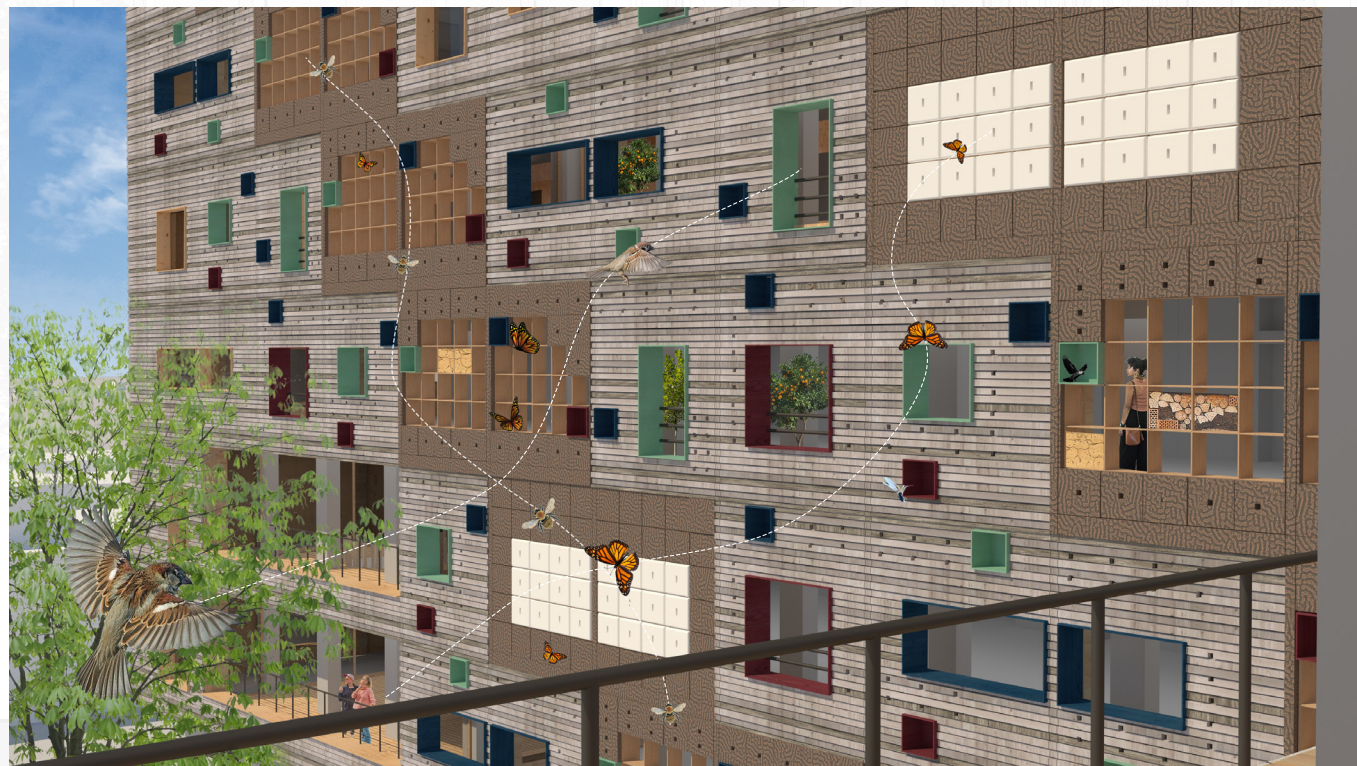
## Human & nature interaction





# INSECT FARM

## Human & nature interaction









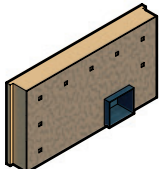




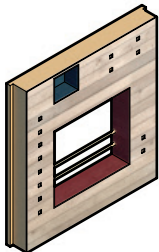
MODULES



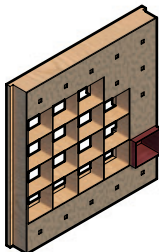
FACADE BALUS-  
TRADE MODULE



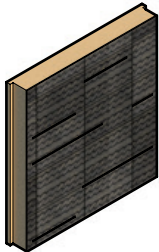
ROOF  
BALUSTRAD  
E MODULE



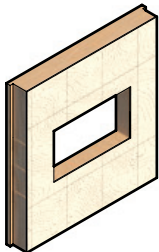
BIRD MODULE



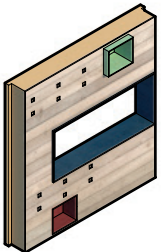
INSECT MODULE



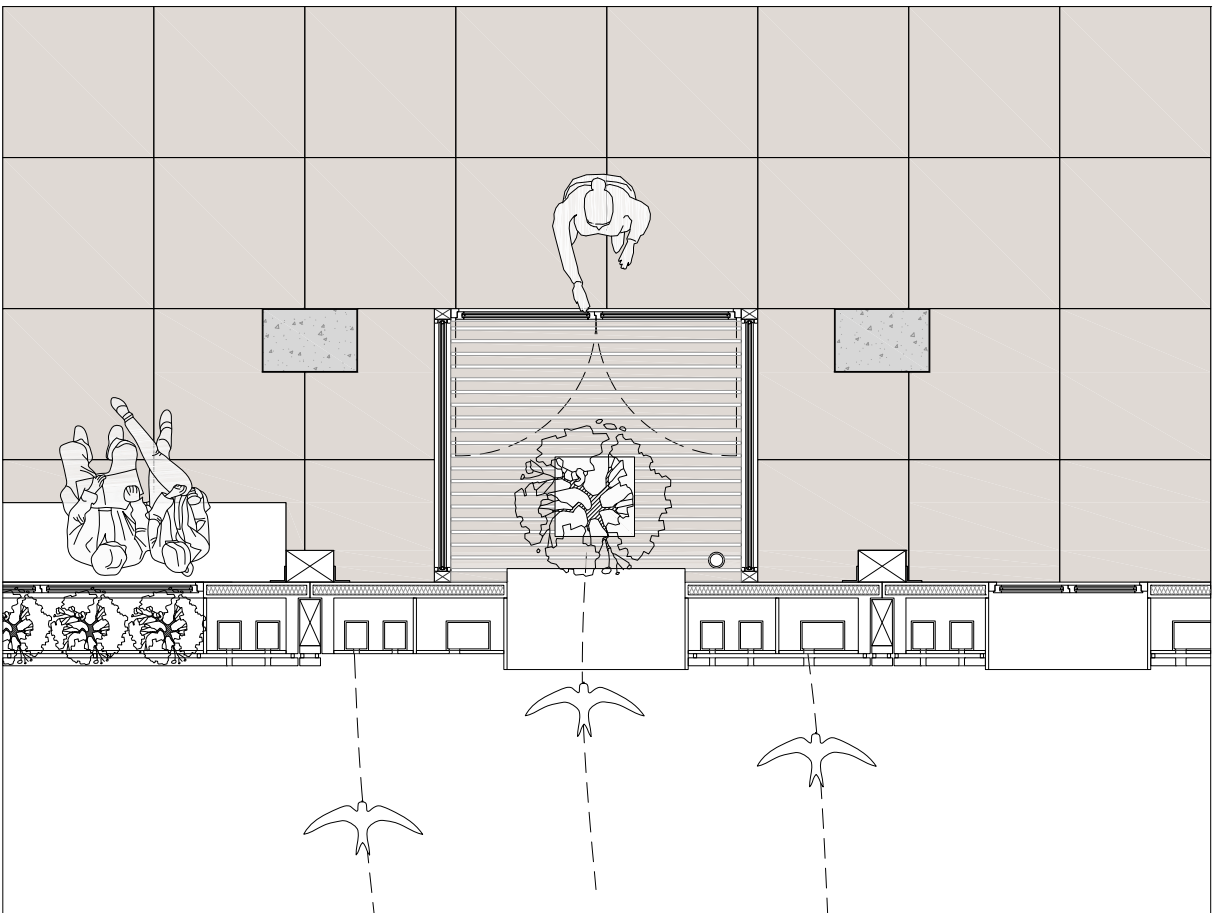
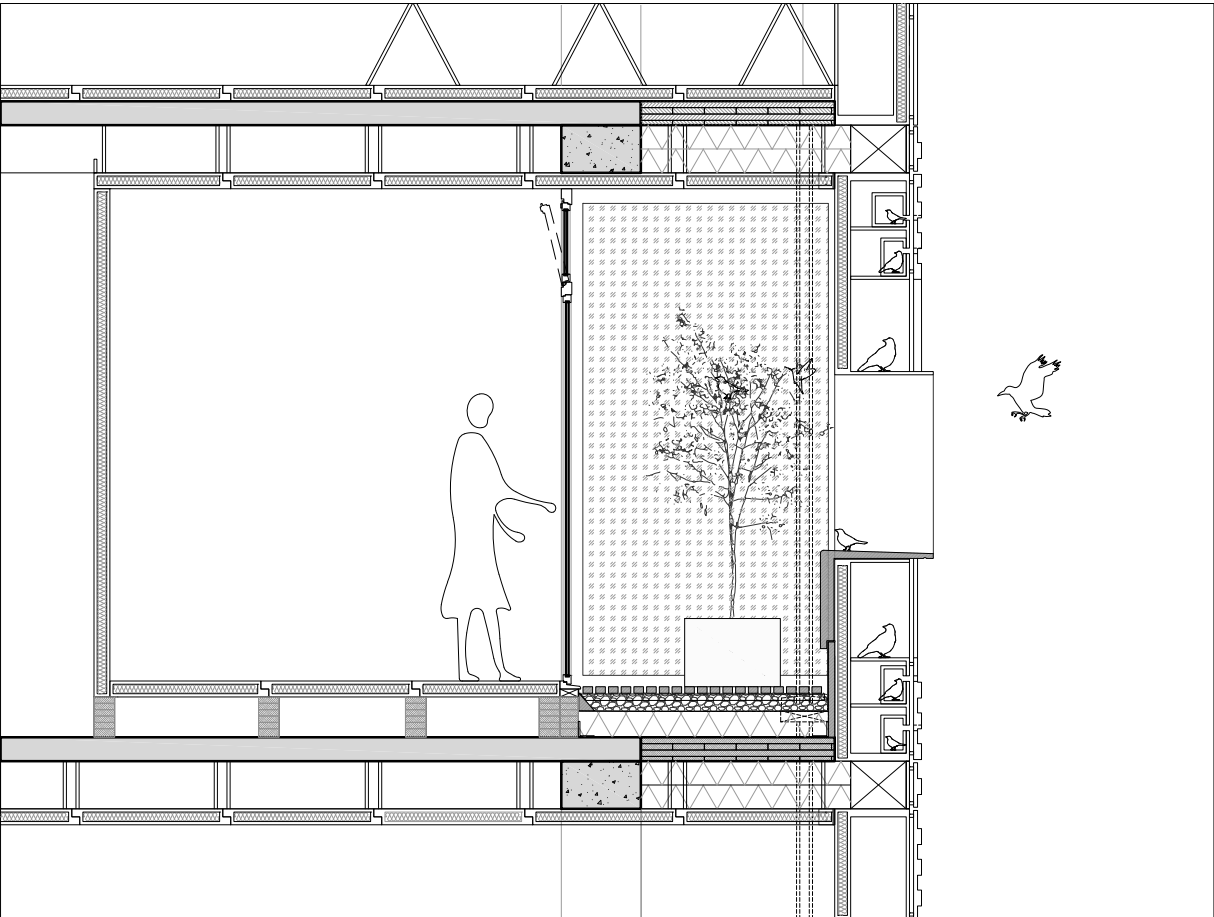
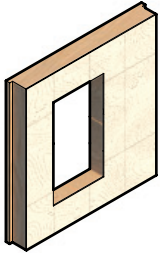
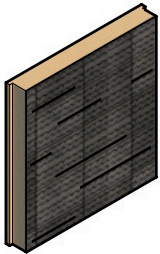
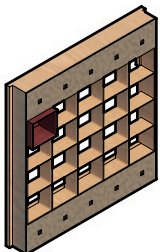
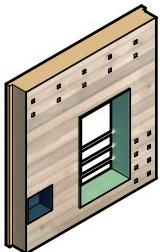
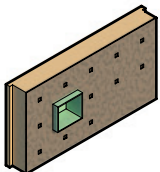
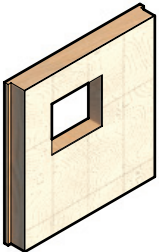
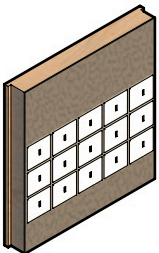
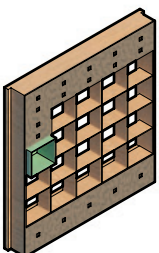
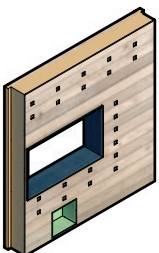
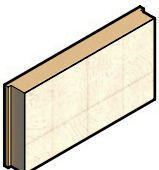
BAT MODULE



FREE SPACE  
MODULE

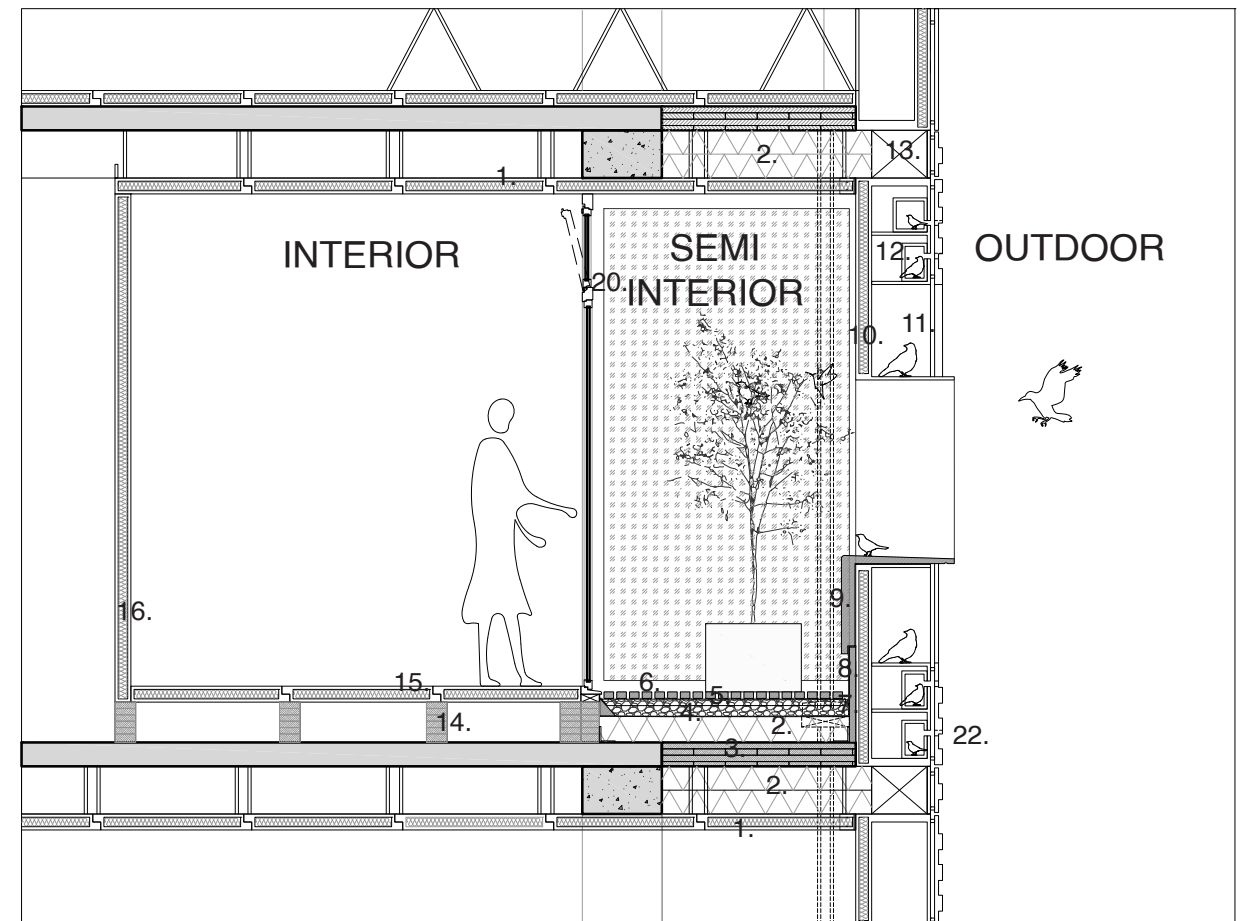
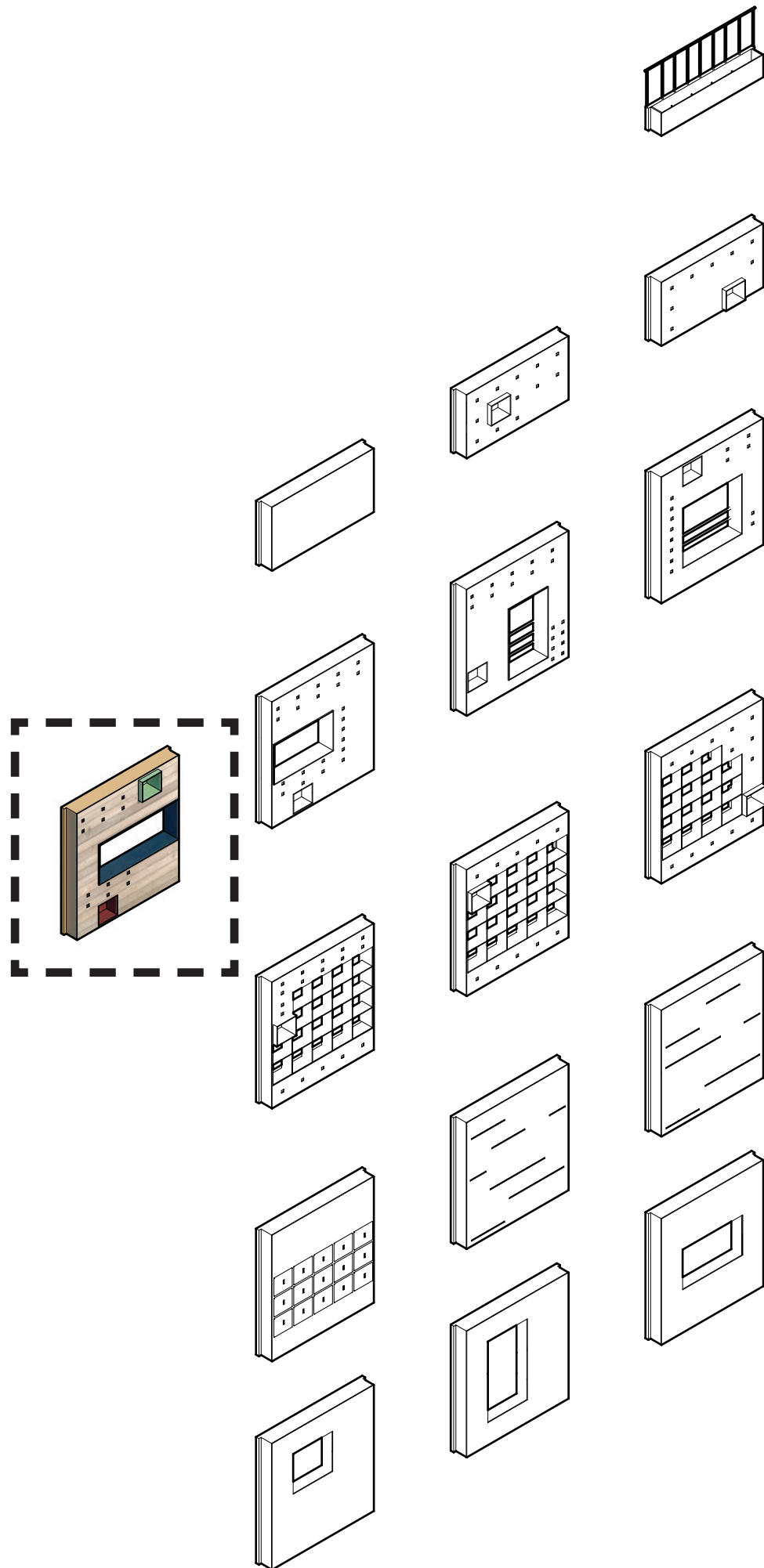


INSECT  
BREEDING  
MODULE

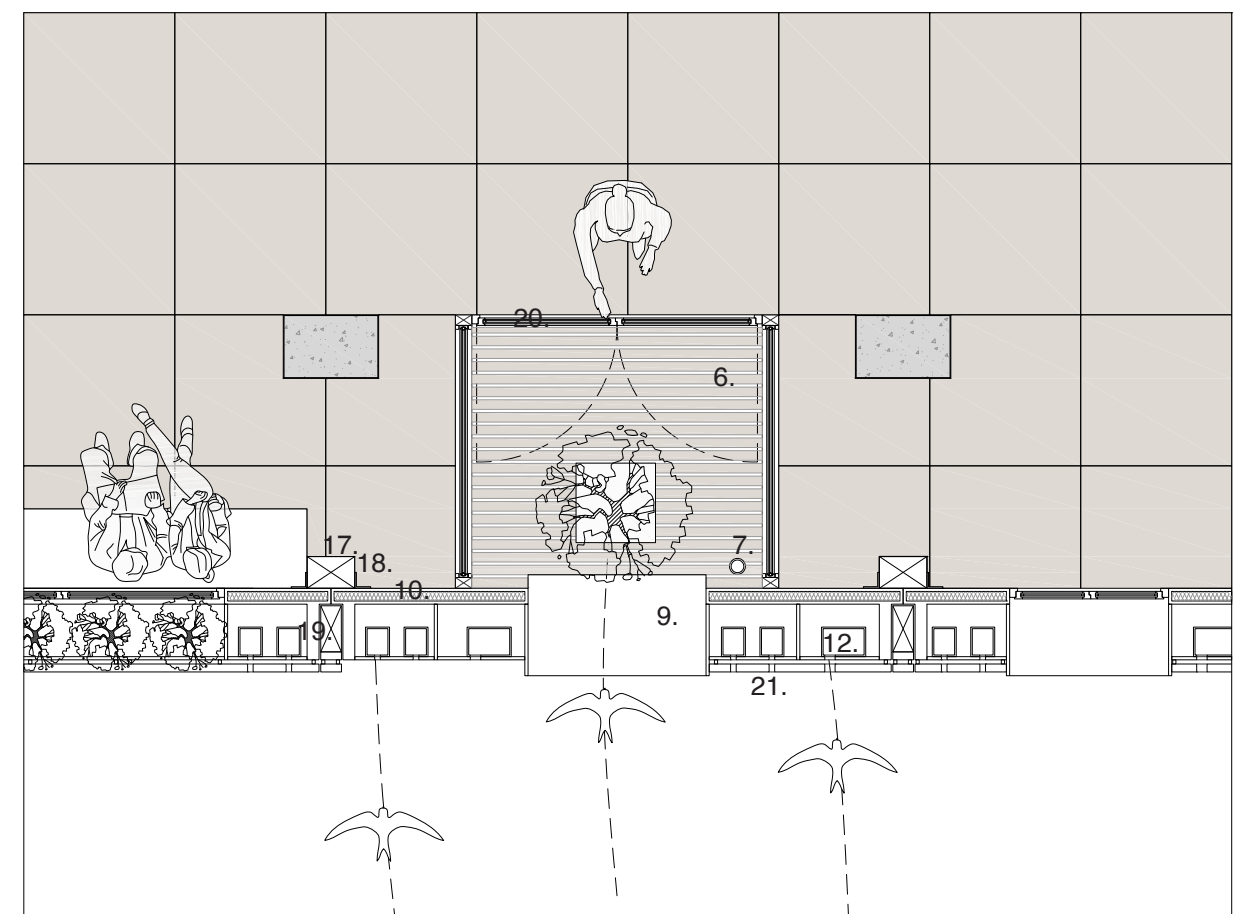




# MODULAR FACADE

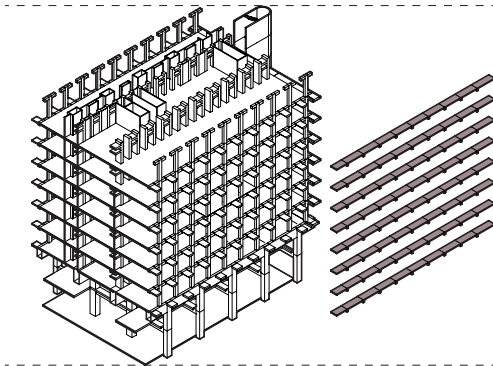
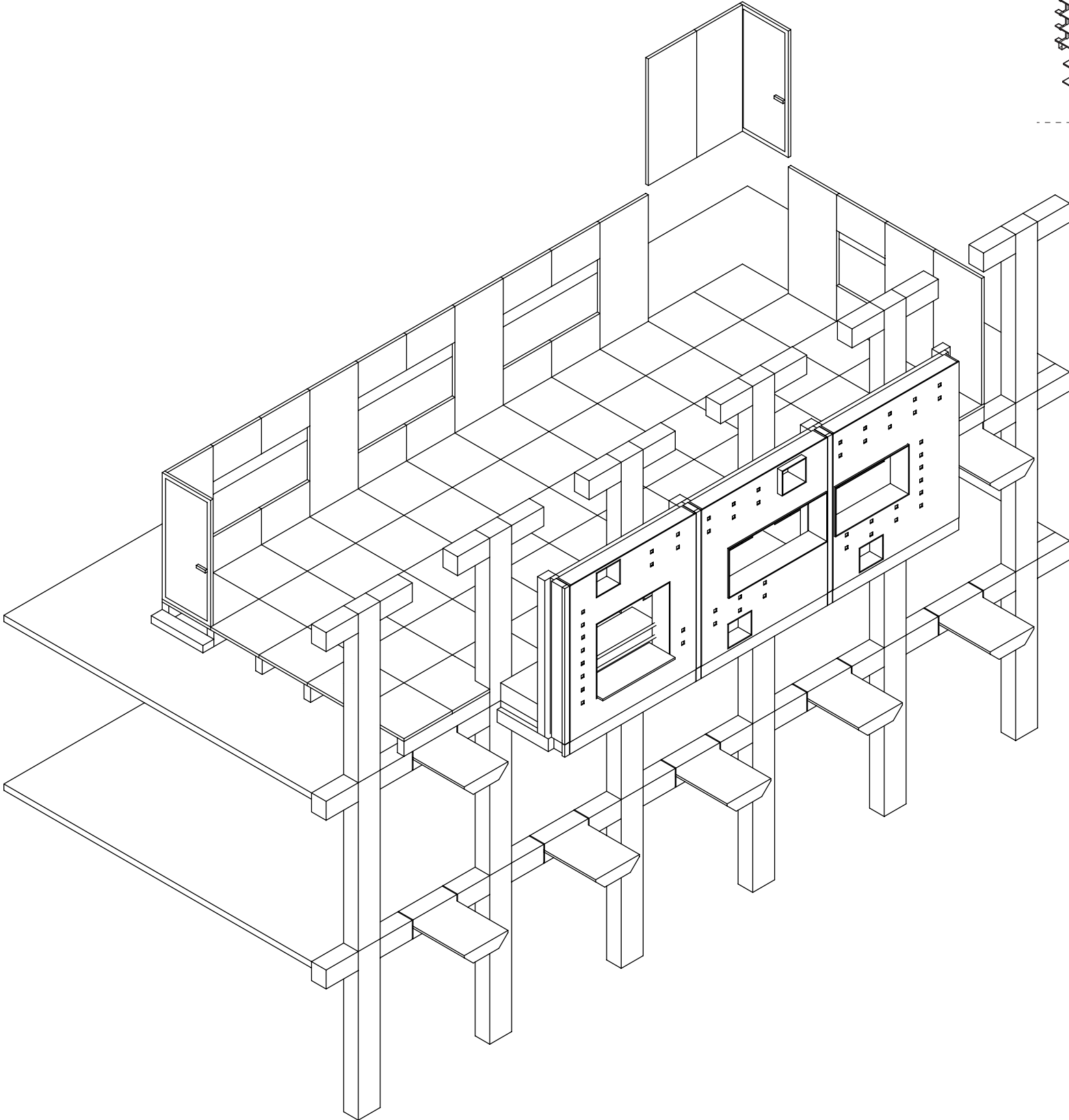


1. Modular roof panel osb & mycelium insulation
2. Reed Insulation 300 mm
3. Prefabricated modular CLT panel floor
4. EPDM 20 mm
5. Gravel 150 mm
6. Solid wood flooring
7. Drain pipe
8. Fixed solid wood for waterproofing
9. Modular wood component for water navigation
10. Prefabricated timber frame panel with wood fiber insulation
11. Stop spot
12. Intergrated bird nesting box Woodcrete
13. Timber CLT beam 300 x 350 mm
14. Beam, glued liminated timber 450 x 200 mm
15. Modular floor OSB & mycelium insulation
16. Modular wall OSB & mycelium insulation
17. Timber beam 300 x 400 mm
18. Steel timber connector
19. Timber beam
20. Timber door frame with HR++ glazing
21. Scrap wood facade cladding

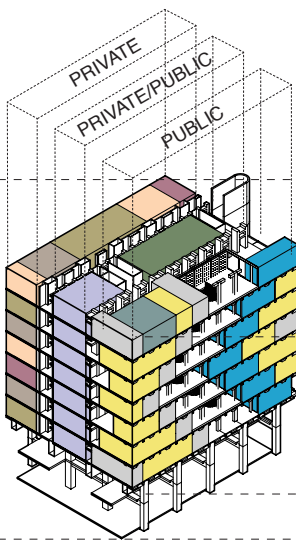
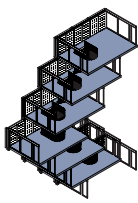




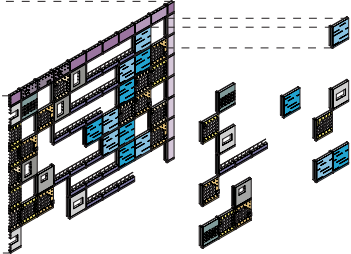
THE INGREDIENTS OF HUBITAT  
MODULAR FACADE => FUTURE UPGRADE & CHANGE



H(u)bitat  
experimental wall  
public engangement  
fixed

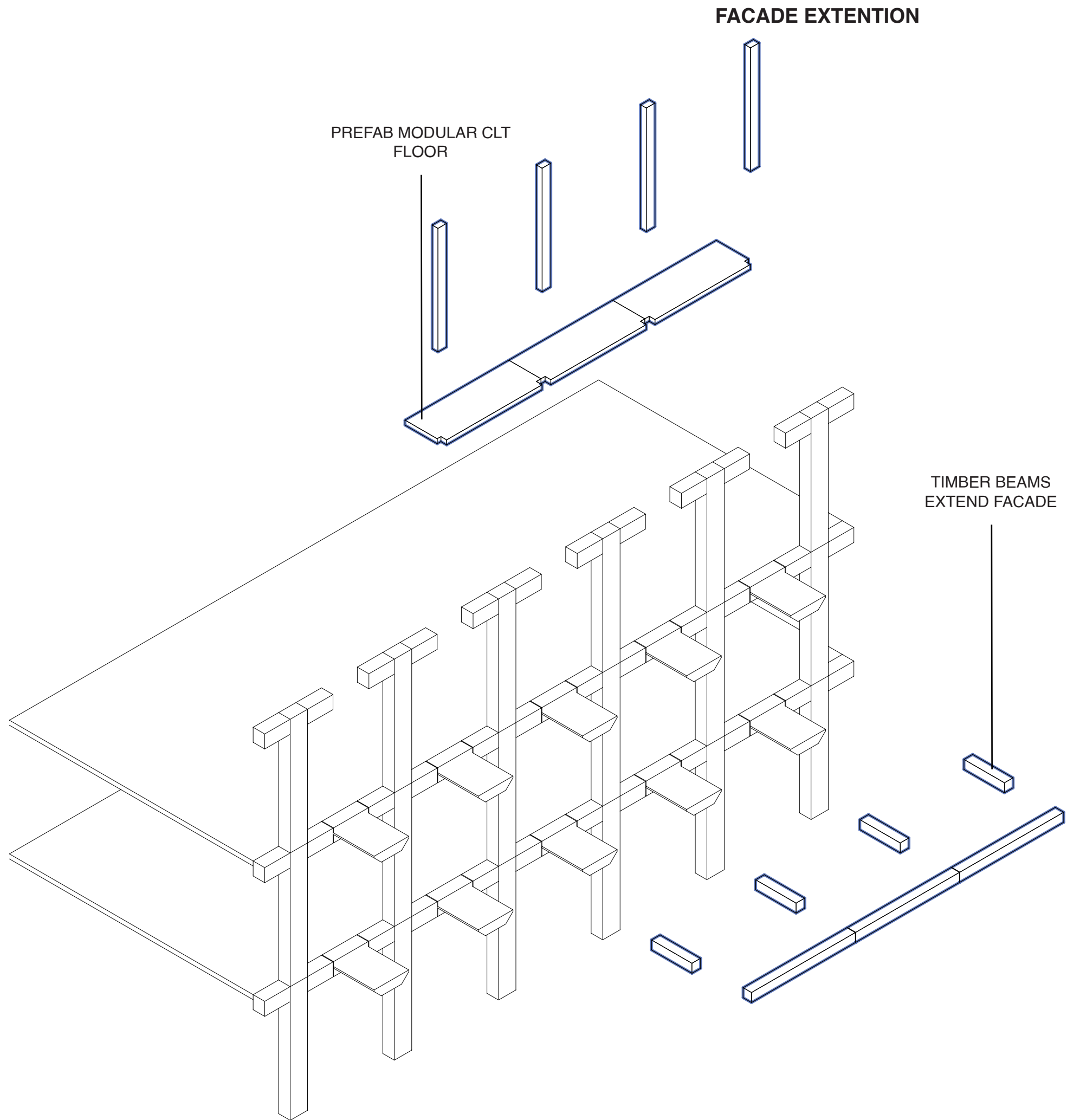


fluid plan  
labs - farms - co-working - startups  
flexible

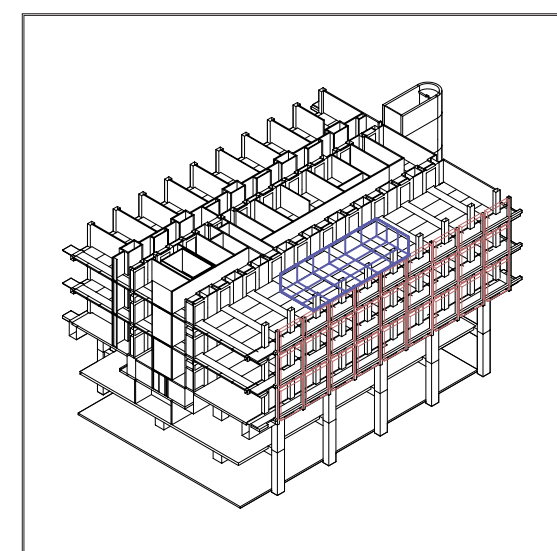
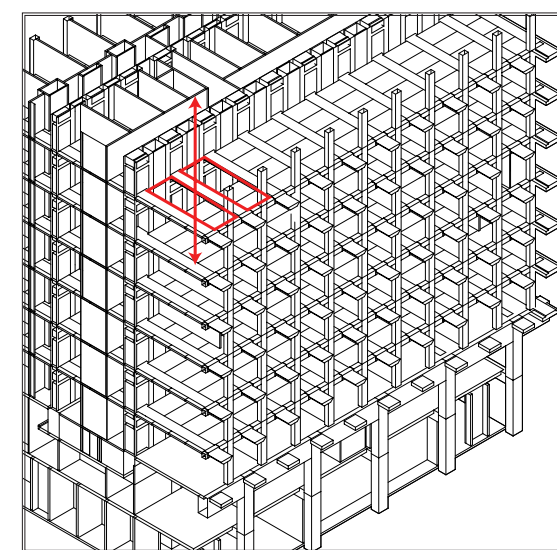
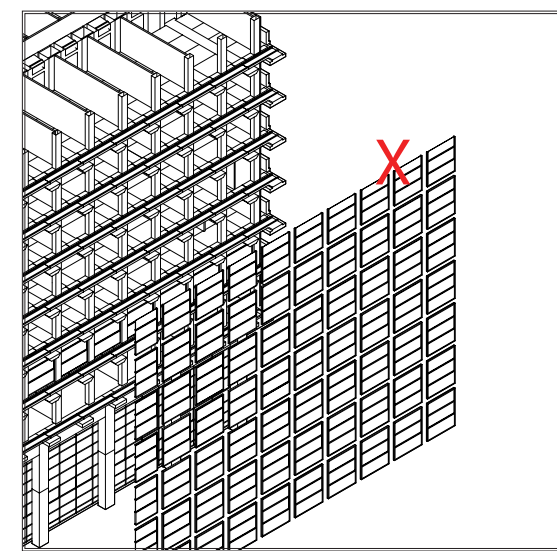
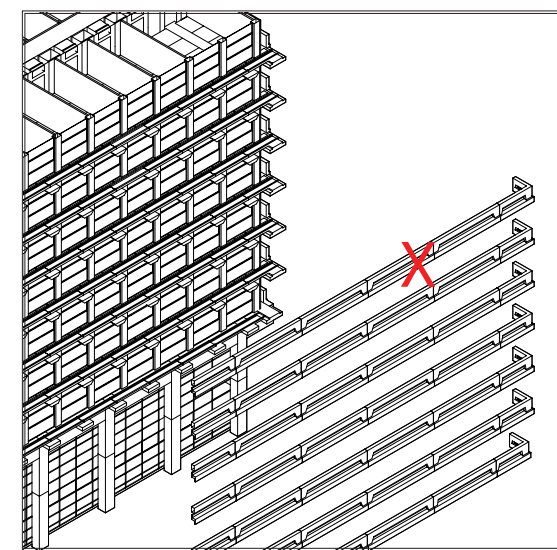


modular facade  
flexible



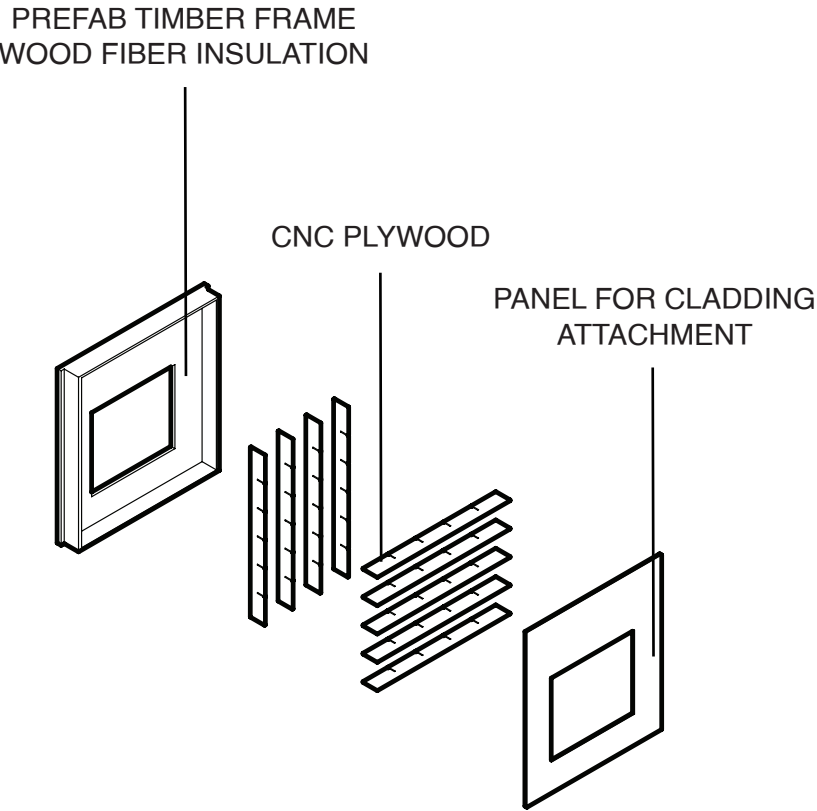
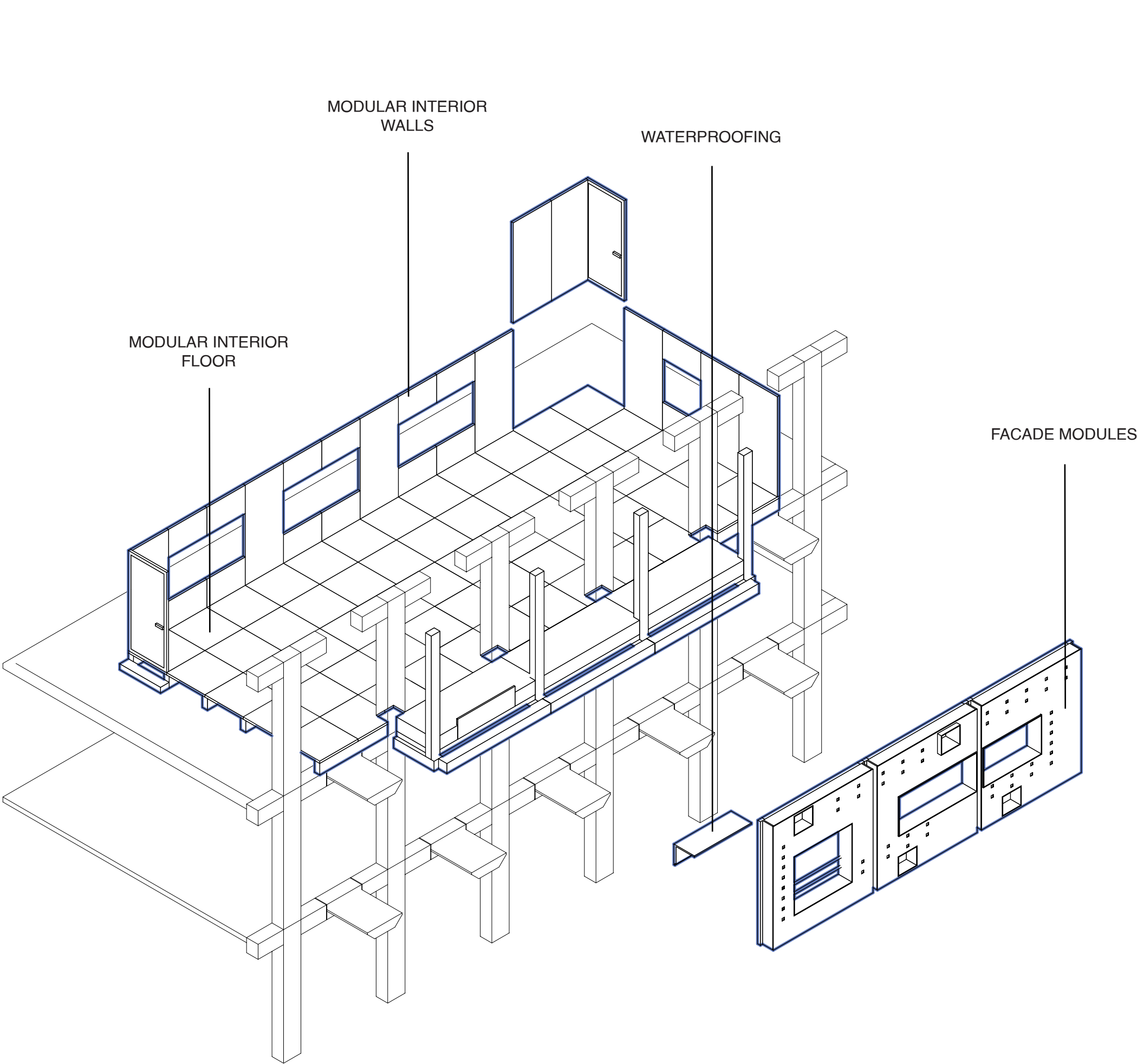


- Nature inclusive
- Non-toxic materials
- Agricultura waste
- Easy to manufacture
- Demountable
- Modular
- Recyclable
- Reusable
- Lightweight
- Local materials





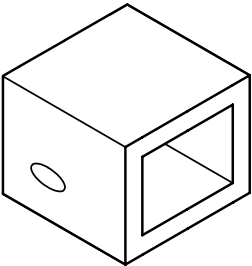
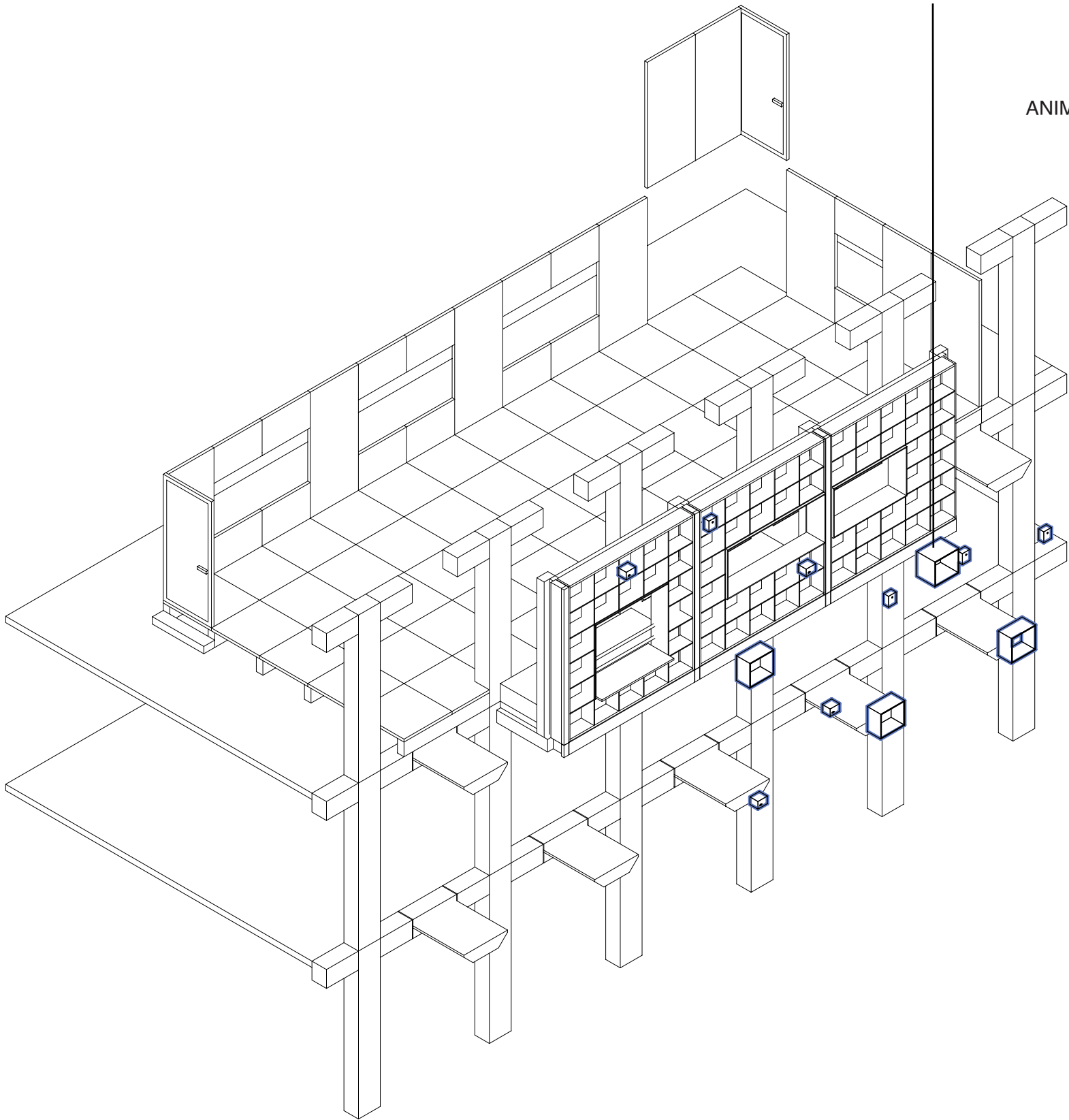
VARYING & CHANGEABLE INGREDIENTS



MATERIALS:  
INTERIOR SITUATION : OSB & MYCELIUM FILLING  
SEMI INTERIOR SITUATION : OSB WATERPROOF TREATMENT  
EXTERIOR SITUATION : FULL WATERPROOF SOLUTION

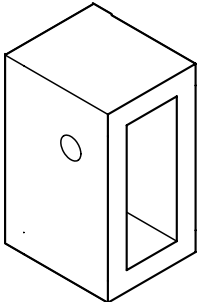


FLEXIBLE INFILL INGREDIENTS



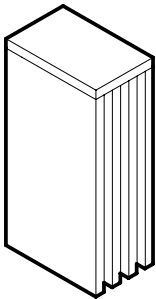
SWIFT NEST

NO MAINTENANCE  
LIFE SPAN:  $\leq$  25 YEARS



A VARIETY OF BIRDS  
NEST

MAINTENANCE (YEARLY)  
WORM PLACEMENT  
LIFE SPAN:  $\leq$  25 YEARS



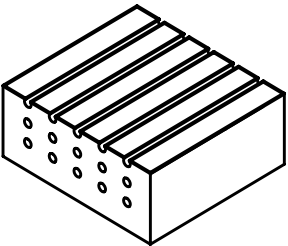
BAT ROOST

NO MAINTENANCE  
LIFE SPAN:  $\leq$  25 YEARS



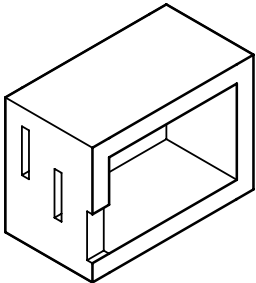
TRACKING DEVICE

INTERGRATED  
ADAPTABLE



SOLITARY BEE NEST

NO MAINTENANCE  
LIFE SPAN: = 1 YEAR

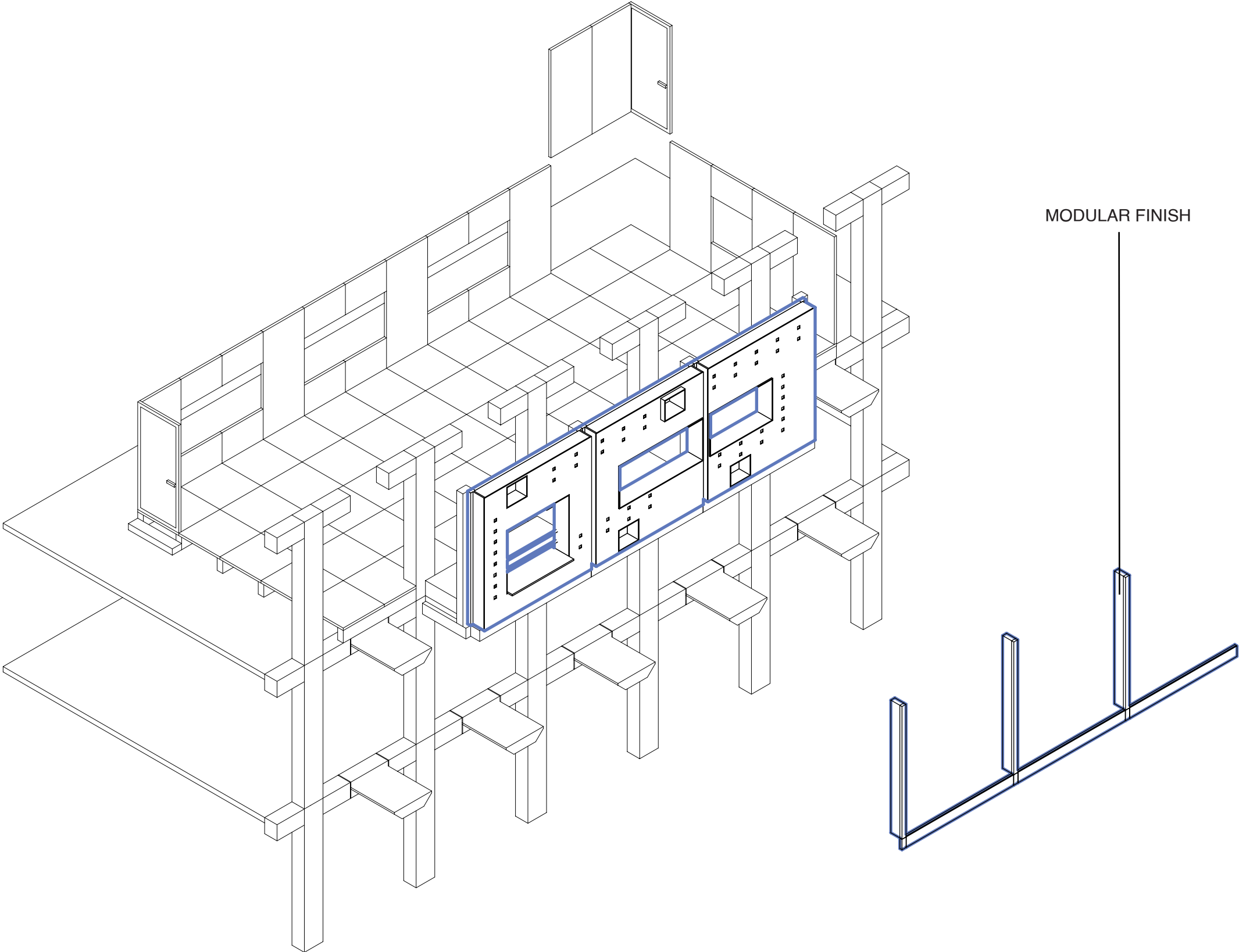


BUTTERFLY NEST

NO MAINTENANCE  
LIFE SPAN:  $\leq$  5 YEARS

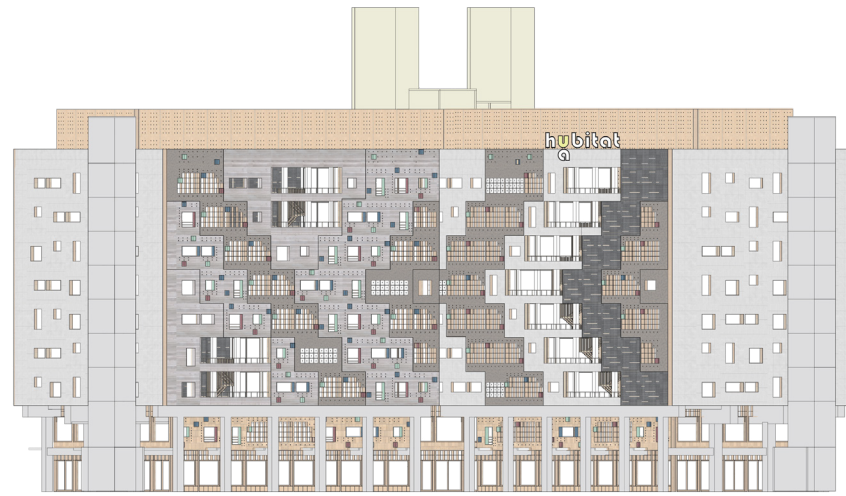


FLEXIBLE FACADE INGREDIENTS





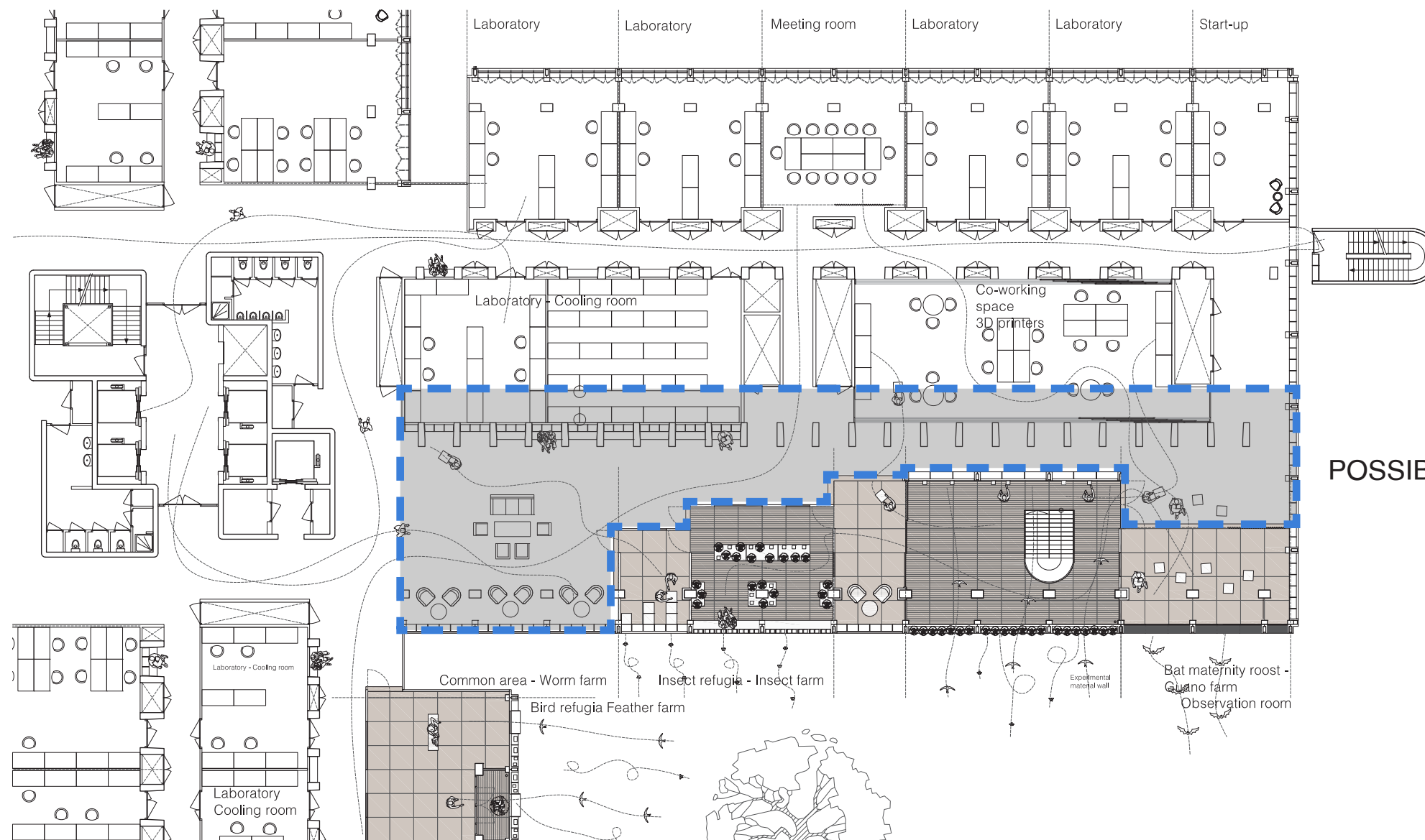
# BUILDING EVOLUTION



2030



2035



POSSIBILITY OF FUTURE EXTENTION



# CONCLUSION

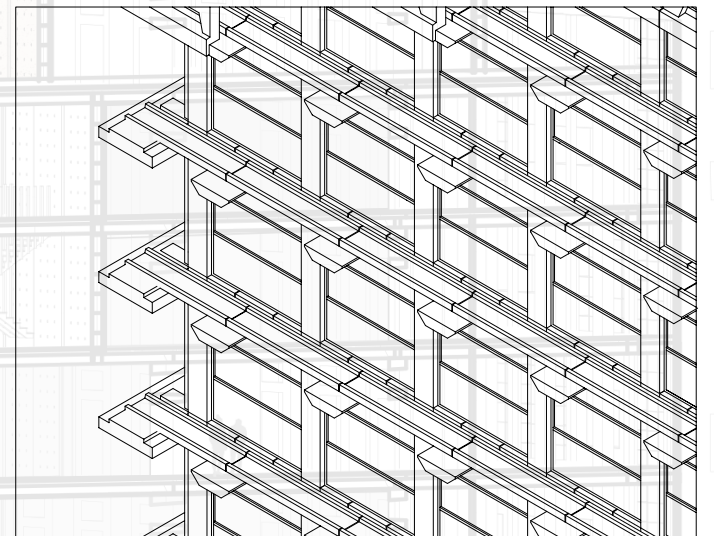
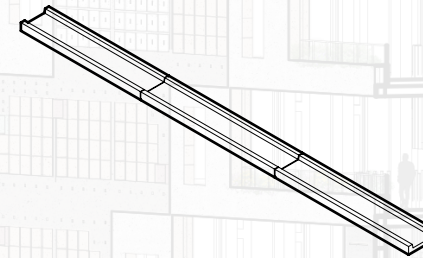
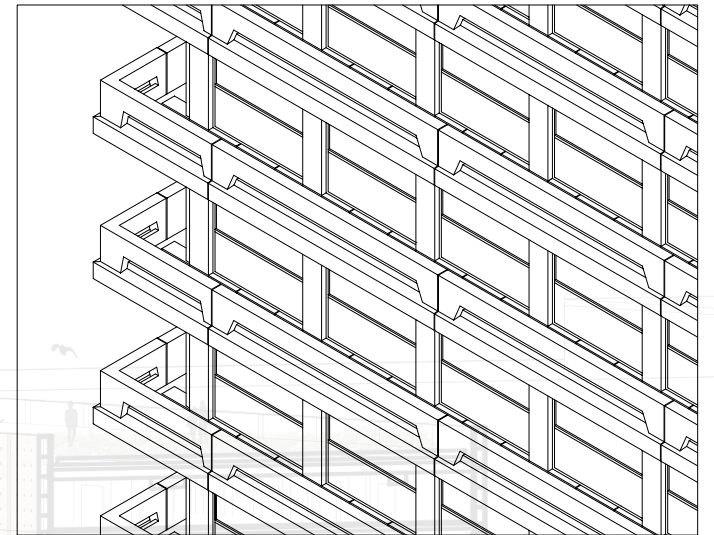
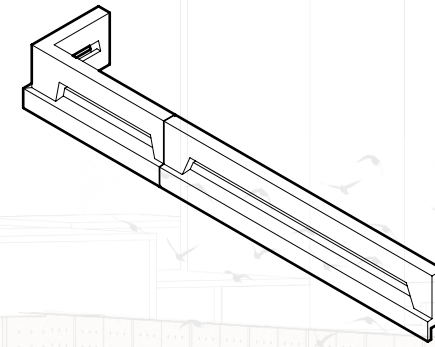
1. ANIMALS & HUMAN COEXISTENCE IT'S A WIN WIN.
2. NATURE INCLUSIVE DESIGN SPREADS THROUGHOUT THE CAMPUS.
3. BUILDING & CAMPUS SERVES AS A LIVING LAB.



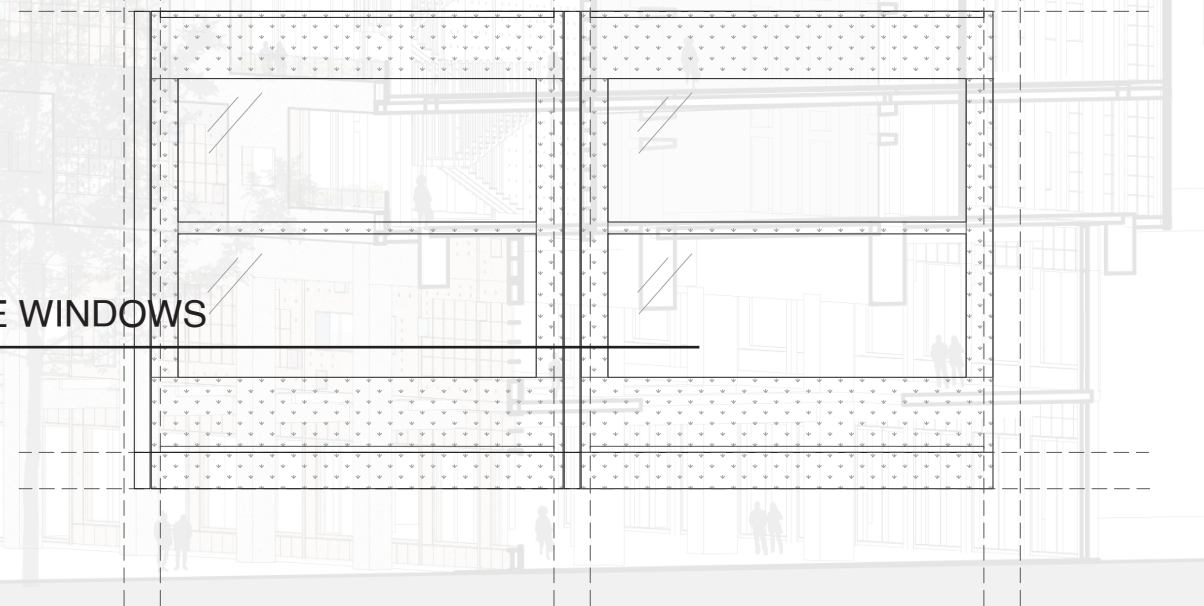
**THANK YOU!**



# REPURPOSE CONCRETE PARTS



REUSE WINDOWS





Circular Farms & Labs synergy

