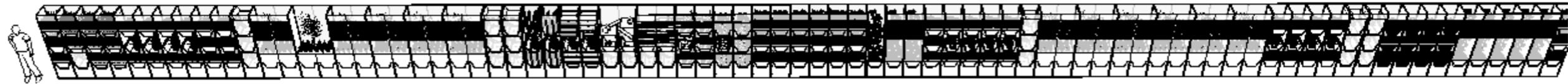
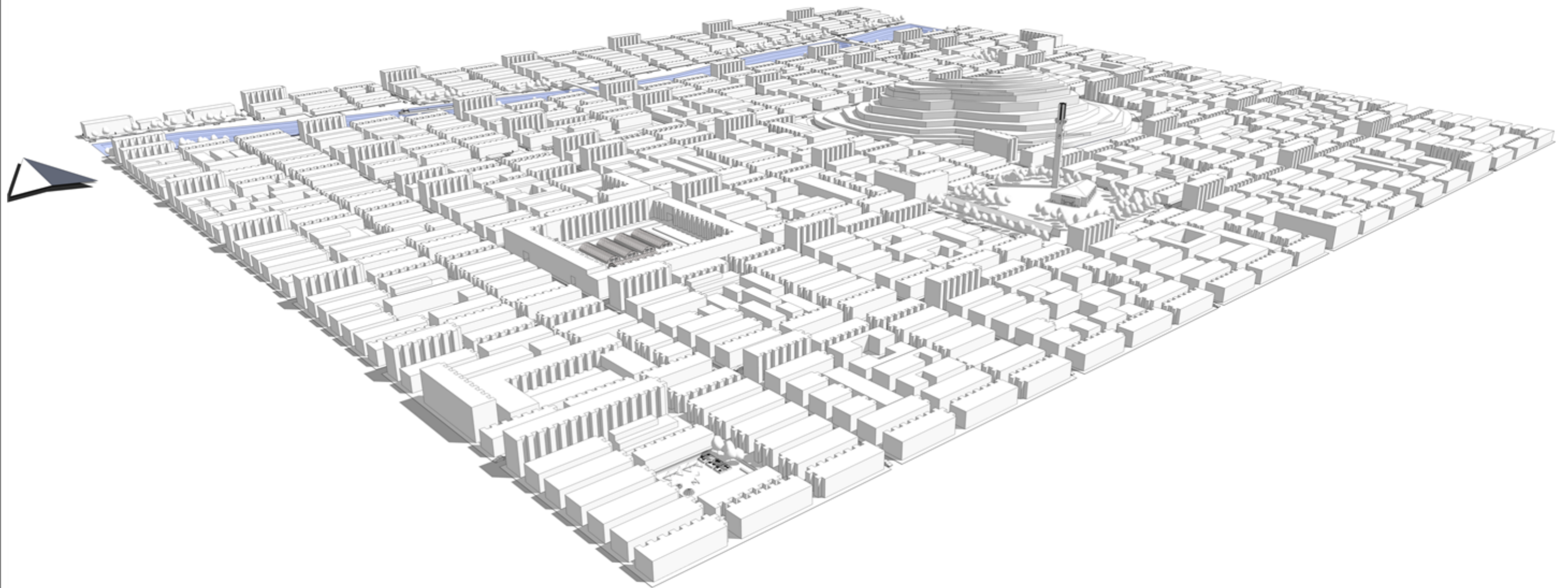
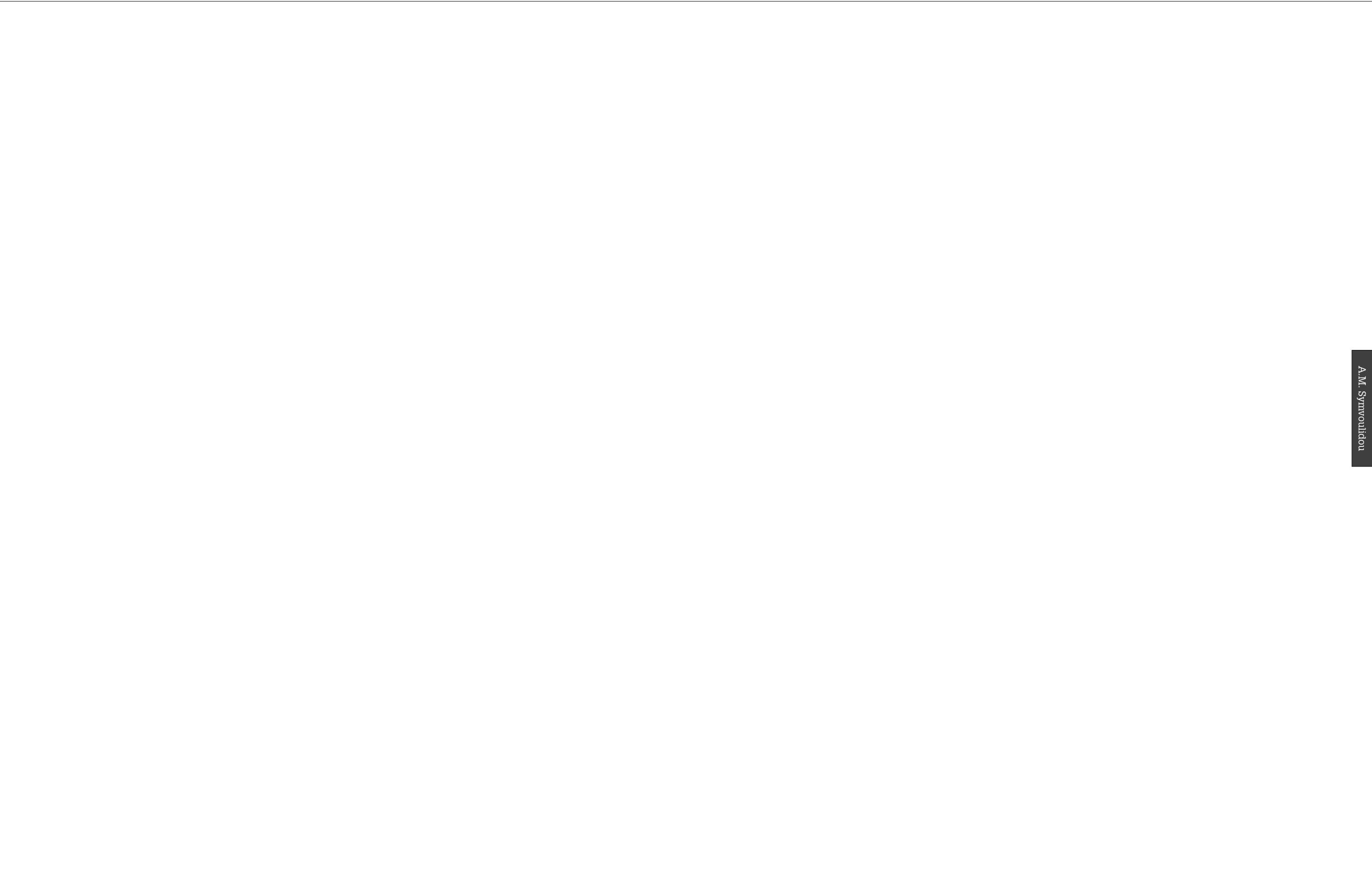


**This is the total number of crates needed to produce food for one person.**







# FOOD

# FOOD

Production

# FOOD

## Production



# FOOD

Production

Processing

# FOOD

Production

Processing





# FOOD

Production

Processing

Consumption

# FOOD

Production

Processing

Consumption



# FOOD

Production

Processing

Consumption

# FOOD

Production  
-Desertification

Processing

Consumption

# FOOD

Production

Processing

Consumption

-Desertification



# FOOD

Production

- Desertification
- Monoculture

Processing

Consumption

# FOOD

Production

- Desertification
- Monoculture



Processing

Consumption

# FOOD

## Production

- Desertification
- Monoculture
- Abuse of chemical fertilizers

## Processing

## Consumption



# FOOD

## Production

- Desertification
- Monoculture
- Abuse of chemical fertilizers



## Processing

## Consumption

# FOOD

## Production

- Desertification
- Monoculture
- Abuse of chemical fertilizers
- Soil erosion/ degradation

## Processing

## Consumption

# FOOD

## Production

- Desertification
- Monoculture
- Abuse of chemical fertilizers
- Soil erosion/ degradation



## Processing

## Consumption

# FOOD

## Production

- Desertification
- Monoculture
- Abuse of chemical fertilizers
- Soil erosion/ degradation
- GMOs/ hormones/ antibiotics

## Processing

## Consumption

# FOOD

## Production

- Desertification
- Monoculture
- Abuse of chemical fertilizers
- Soil erosion/ degradation
- GMOs/ hormones/ antibiotics



## Processing

## Consumption

# FOOD

## Production

- Desertification
- Monoculture
- Abuse of chemical fertilizers
- Soil erosion/ degradation
- GMOs/ hormones/ antibiotics

## Processing

- Processed foods=Great energy waste

## Consumption

# FOOD

## Production

- Desertification
- Monoculture
- Abuse of chemical fertilizers
- Soil erosion/ degradation
- GMOs/ hormones/ antibiotics

## Processing

- Processed foods=Great energy waste



## Consumption

# FOOD

## Production

- Desertification
- Monoculture
- Abuse of chemical fertilizers
- Soil erosion/ degradation
- GMOs/ hormones/ antibiotics

## Processing

- Processed foods=Great energy waste

## Consumption

- Increased meat consumption



# FOOD

## Production

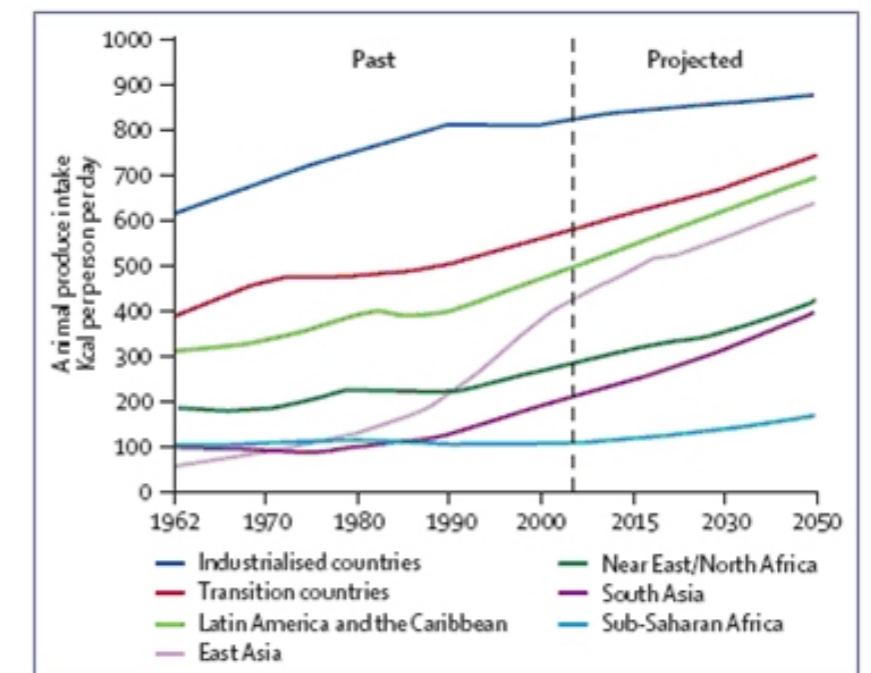
- Desertification
- Monoculture
- Abuse of chemical fertilizers
- Soil erosion/ degradation
- GMOs/ hormones/ antibiotics

## Processing

- Processed foods=Great energy waste

## Consumption

- Increased meat consumption



# FOOD

## Production

- Desertification
- Monoculture
- Abuse of chemical fertilizers
- Soil erosion/ degradation
- GMOs/ hormones/ antibiotics

## Processing

- Processed foods=Great energy waste

## Consumption

- Increased meat consumption
- Increased consumption of processed foods

# FOOD

## Production

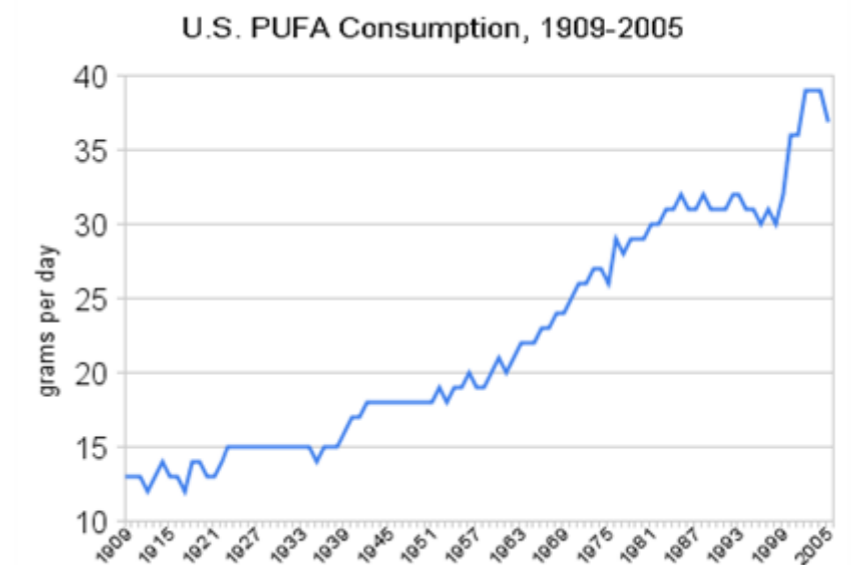
- Desertification
- Monoculture
- Abuse of chemical fertilizers
- Soil erosion/ degradation
- GMOs/ hormones/ antibiotics

## Processing

- Processed foods=Great energy waste

## Consumption

- Increased meat consumption
- Increased consumption of processed foods



# FOOD

## Production

- Desertification
- Monoculture
- Abuse of chemical fertilizers
- Soil erosion/ degradation
- GMOs/ hormones/ antibiotics

## Processing

- Processed foods=Great energy waste

## Consumption

- Increased meat consumption
- Increased consumption of processed foods
- Unhealthy food choices=Overloaded health system

Exploration of efficient ways of food production with the goal of food autarky.

Exploration of **energy and space** efficient ways of **environmental friendly and healthy** food production, **by the individual and the community**, with the goal of food autarky.

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- Innovative food production methods



Exploration of **energy and space** efficient ways of **environmental friendly and healthy** food production, **by the individual and the community**, with the goal of food autarky.

- Innovative food production methods
- Rethink food ingredients

Exploration of **energy and space** efficient ways of **environmental friendly and healthy** food production, **by the individual and the community**, with the goal of food autarky.

- Innovative food production methods
- Rethink food ingredients
- Improved diet (space - environment - health)

Exploration of **energy and space** efficient ways of **environmental friendly and healthy** food production, **by the individual and the community**, with the goal of food autarky.

- Innovative food production methods
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- Improved diet (space - environment - health)
- Passive microclimate system (no extra energy)

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- Innovative food production methods
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- No artificial lighting/ heating/ cooling for food growth

Exploration of **energy and space** efficient ways of **environmental friendly and healthy** food production, **by the individual and the community**, with the goal of food autarky.

- Innovative food production methods
- Rethink food ingredients
- Improved diet (space - environment - health)
- Passive microclimate system (no extra energy)
- No artificial lighting/ heating/ cooling for food growth
- User friendly

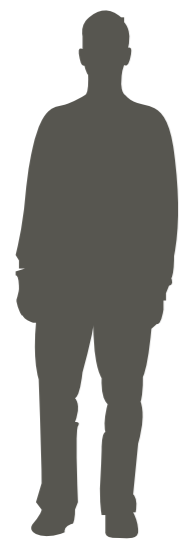
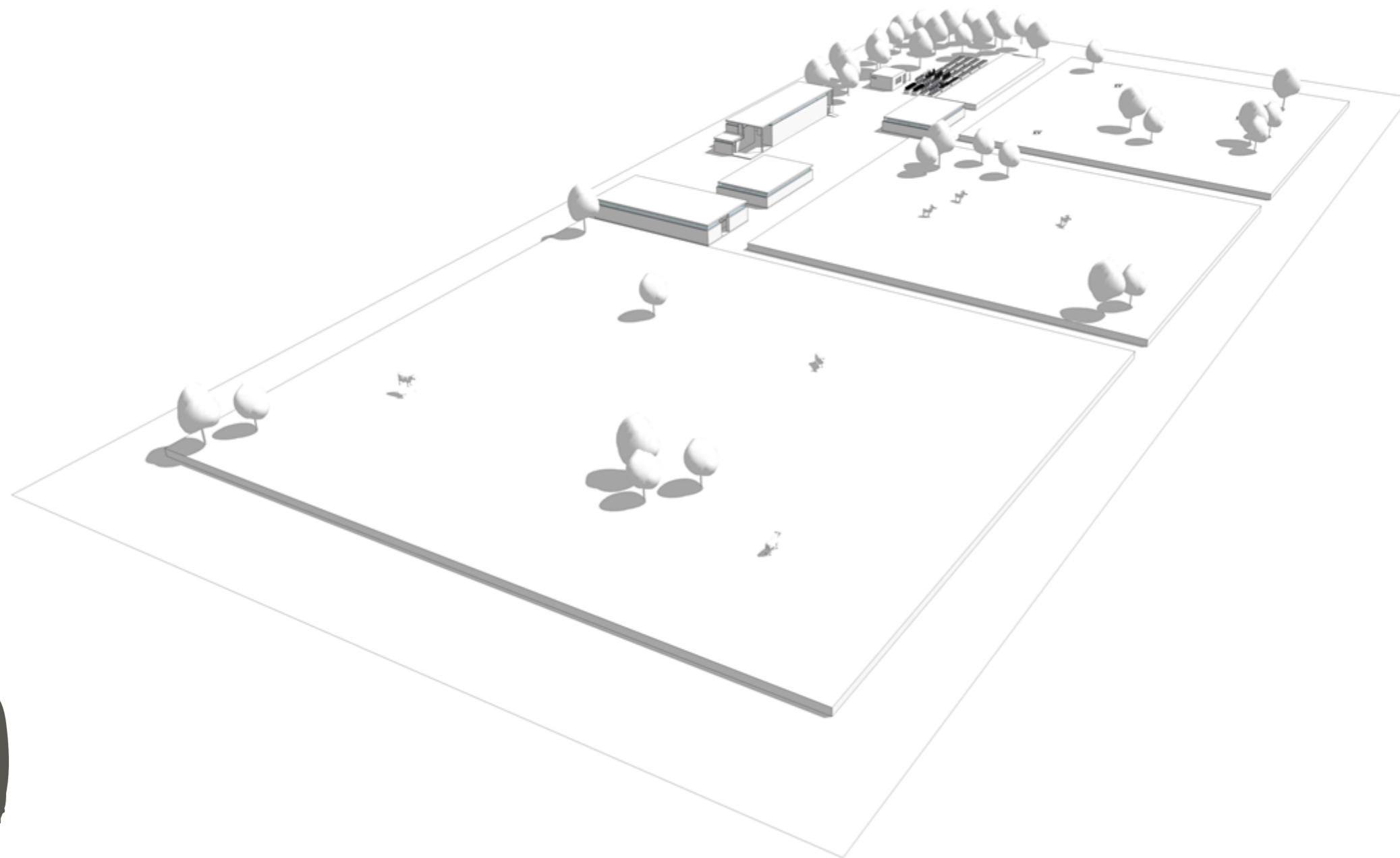
Exploration of **energy and space** efficient ways of **environmental friendly and healthy** food production, **by the individual and the community**, with the goal of food autarky.

- Innovative food production methods
- Rethink food ingredients
- Improved diet (space - environment - health)
- Passive microclimate system (no extra energy)
- No artificial lighting/ heating/ cooling for food growth
- User friendly
- Mass-production friendly

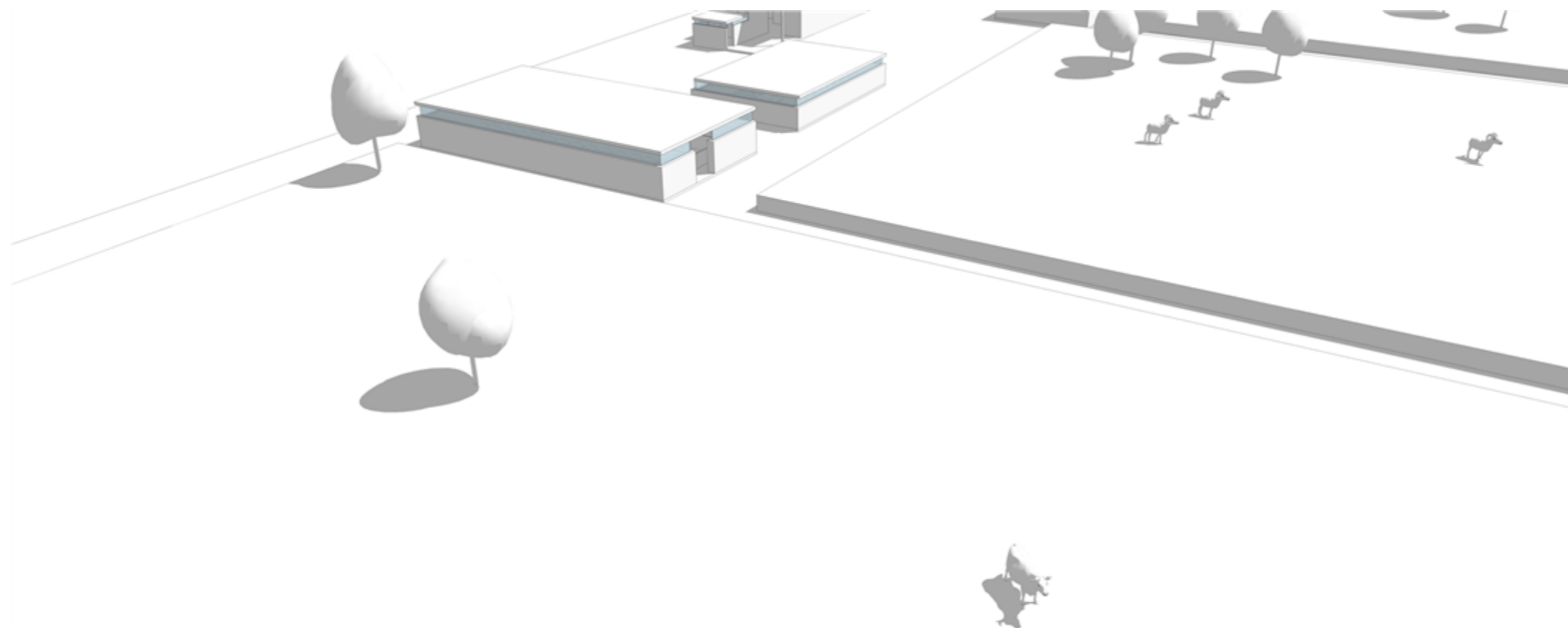
# Agro-City

? Collaboration = Efficiency ?

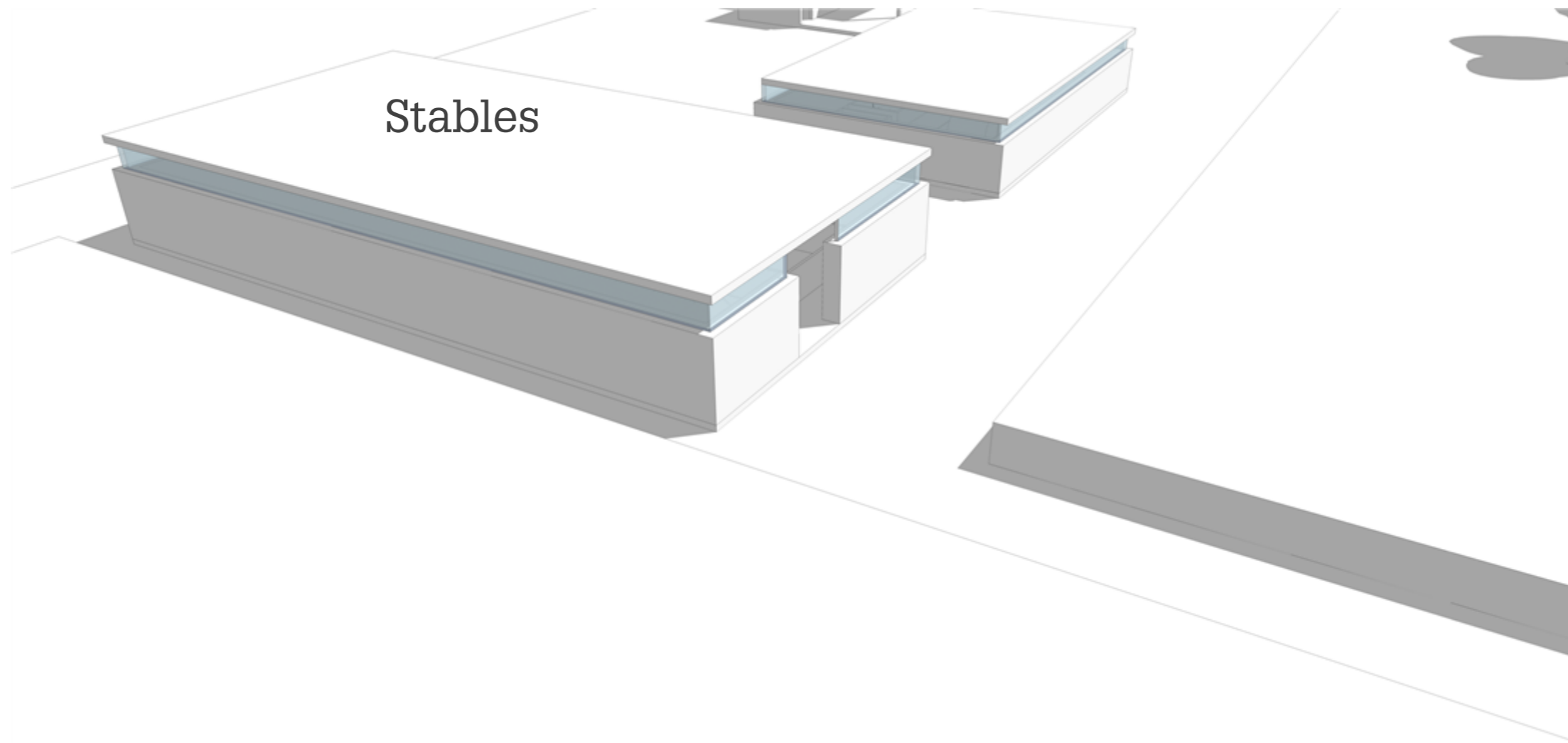


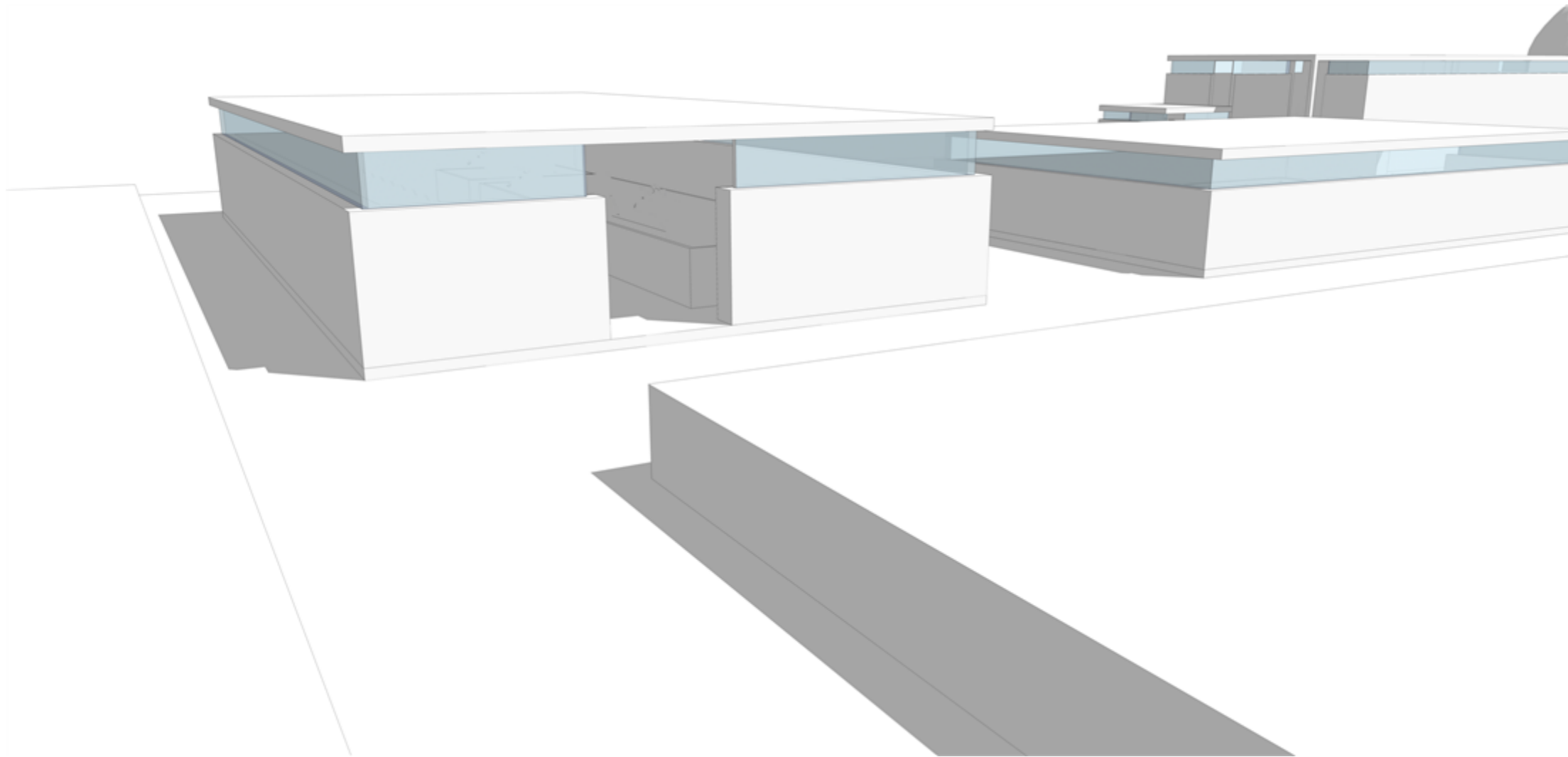


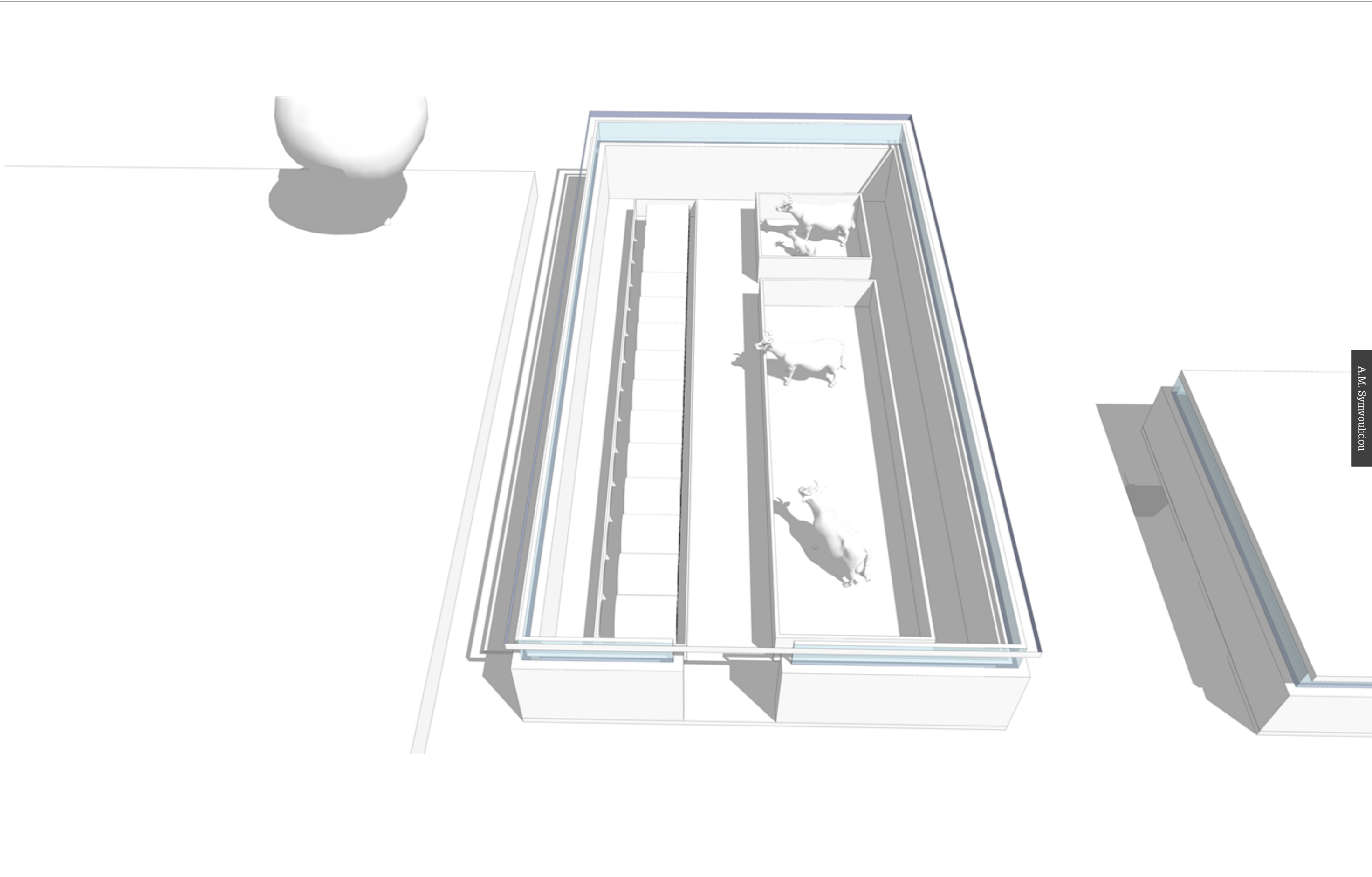
One person, full current european diet.



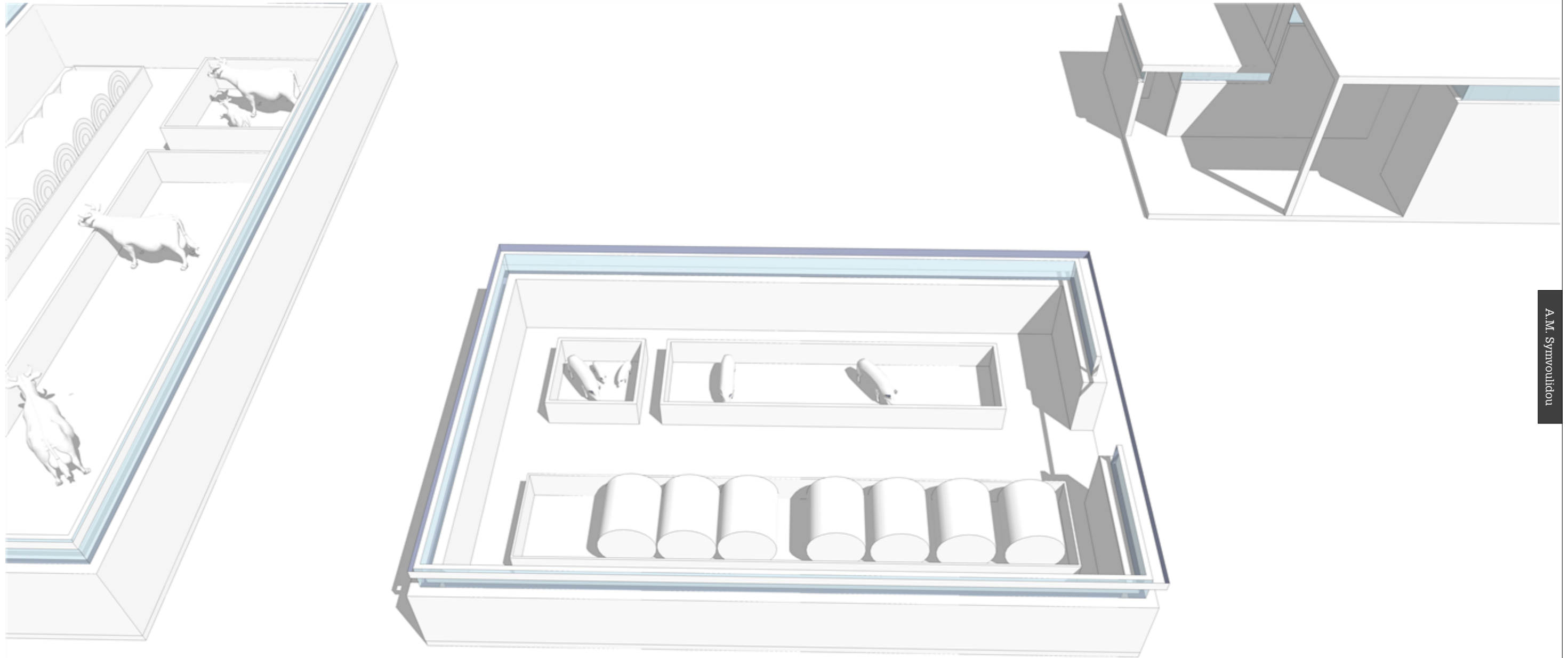
Organic, grass fed beef requires 1200 m<sup>2</sup> per cow.

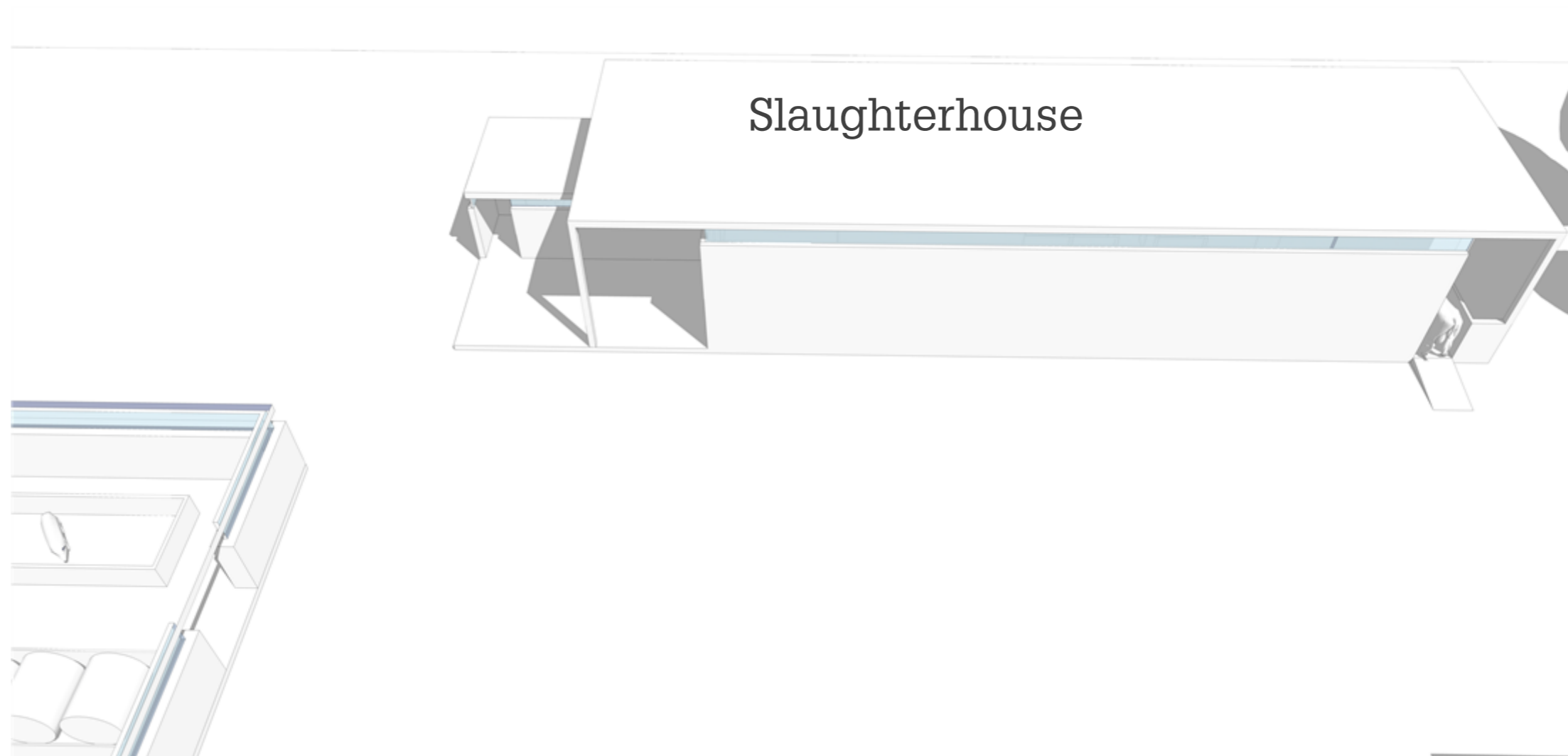


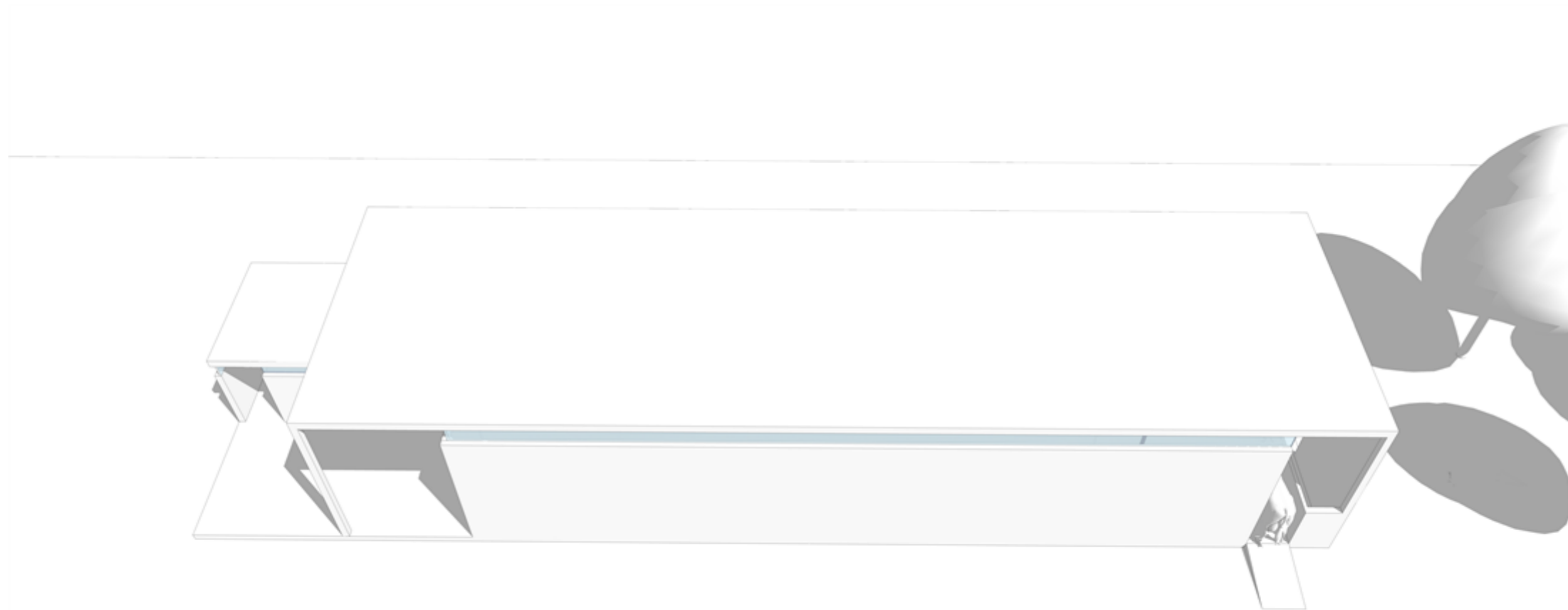




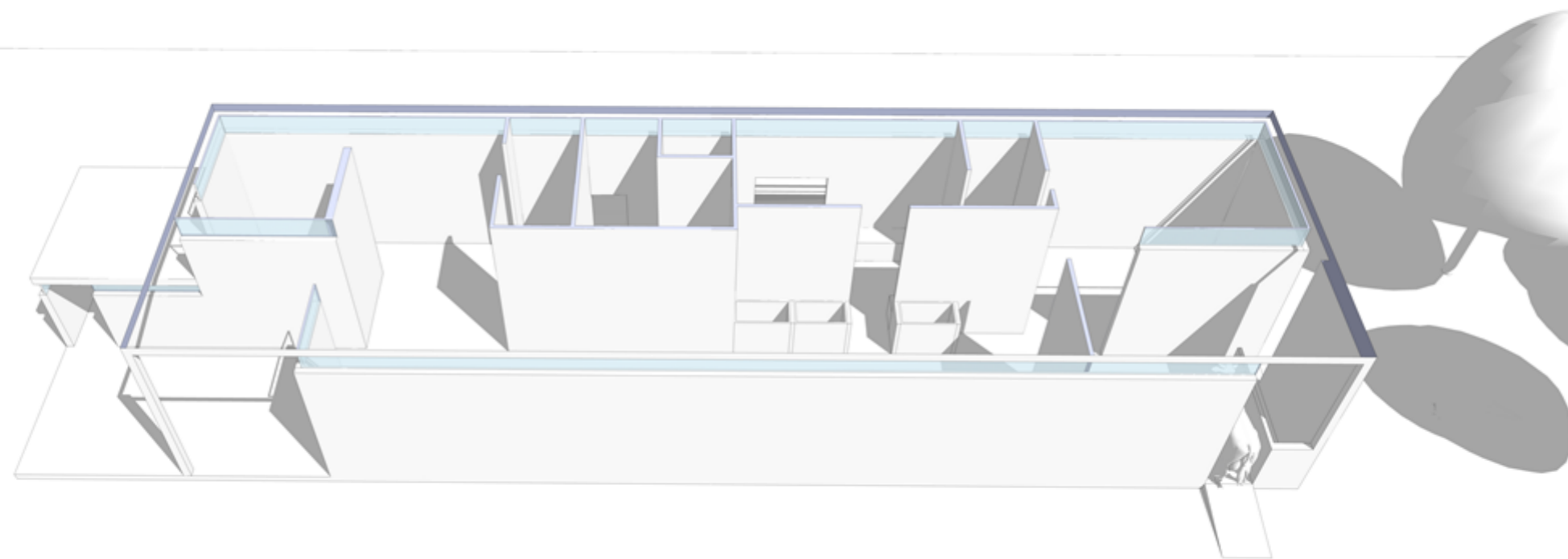
A.M. Symvoulidou

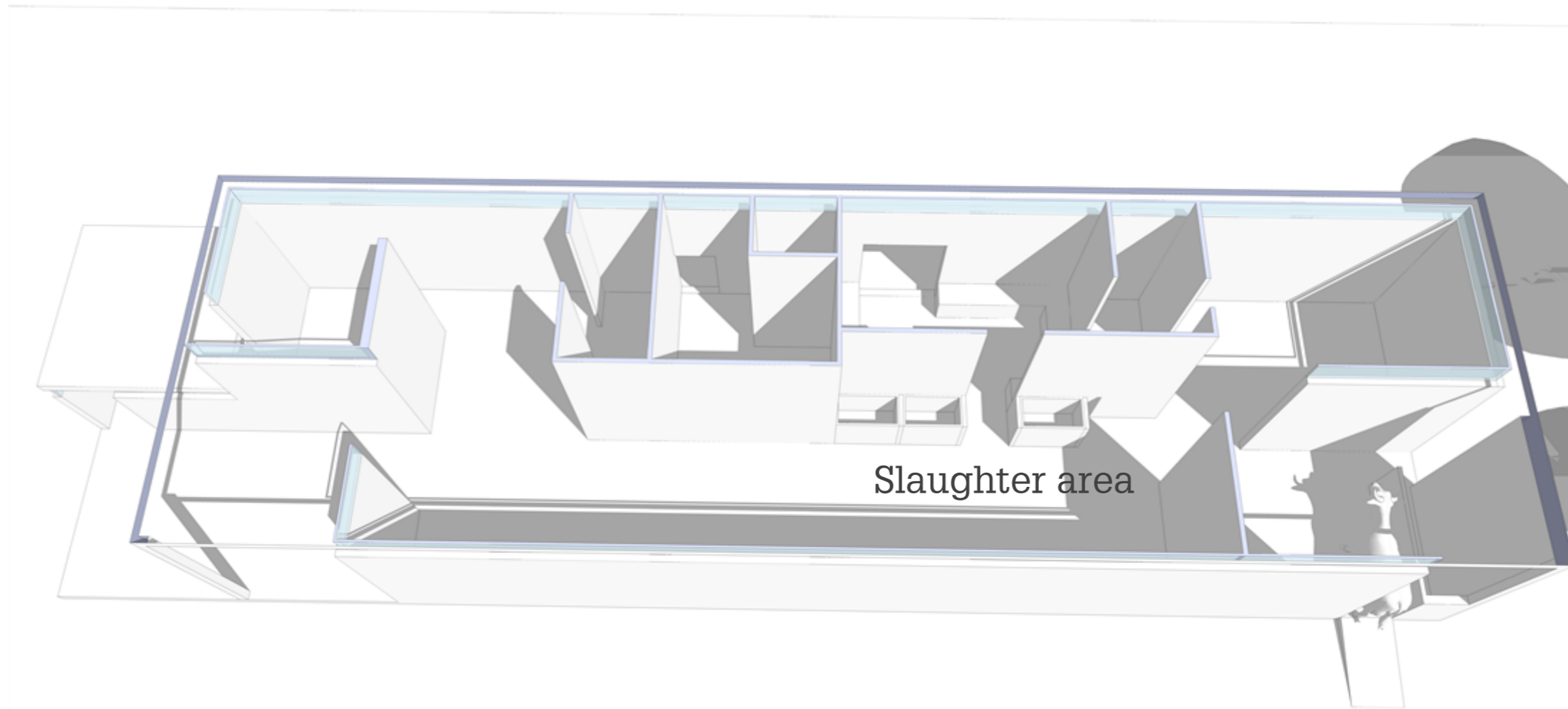


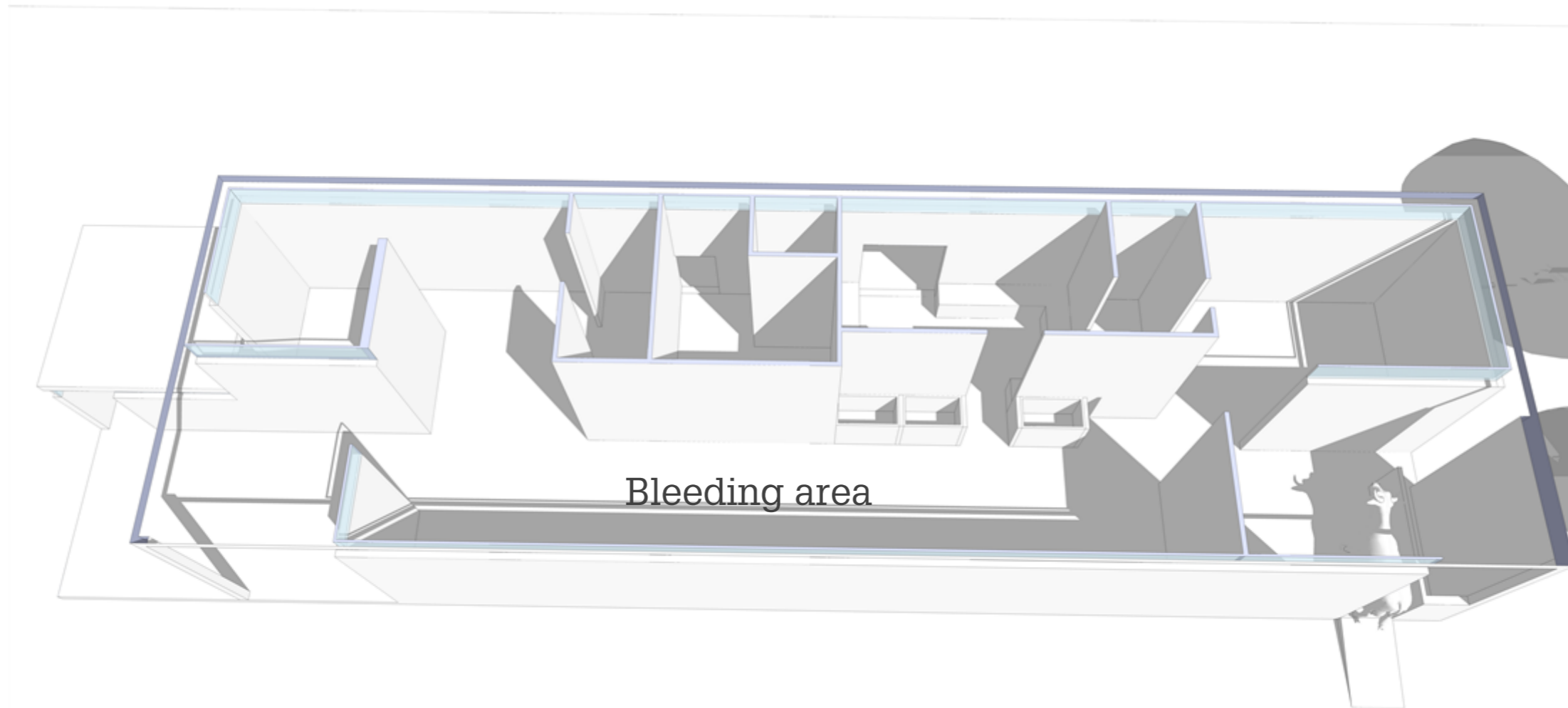


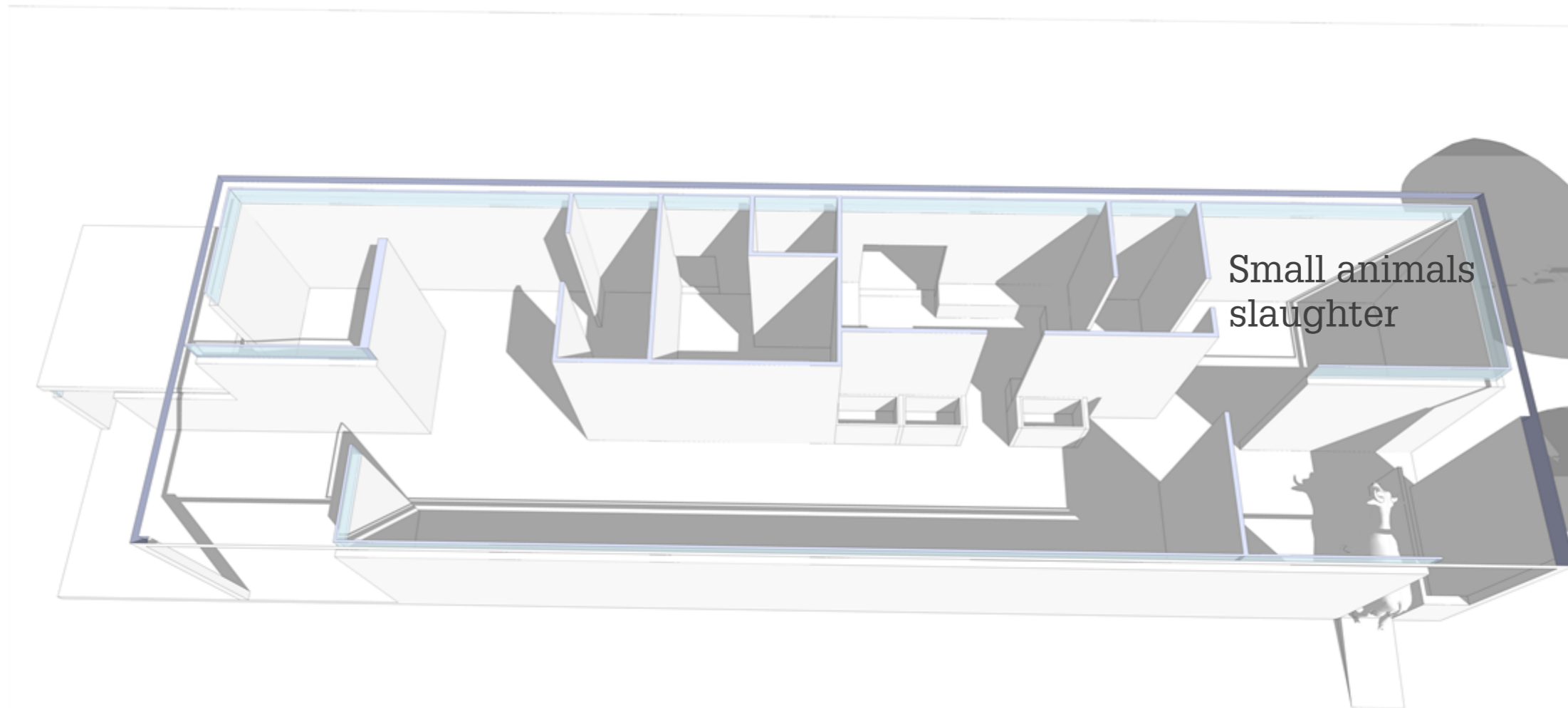


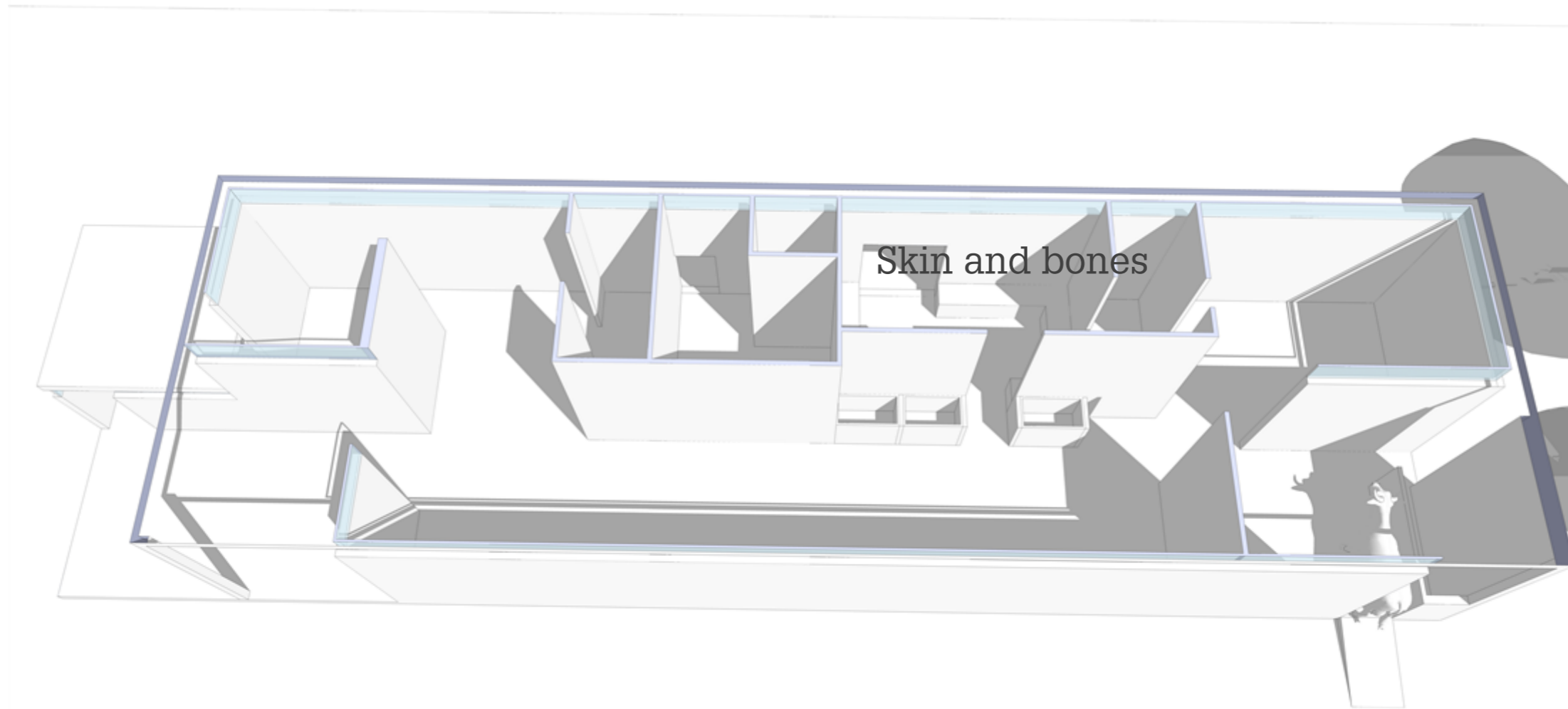


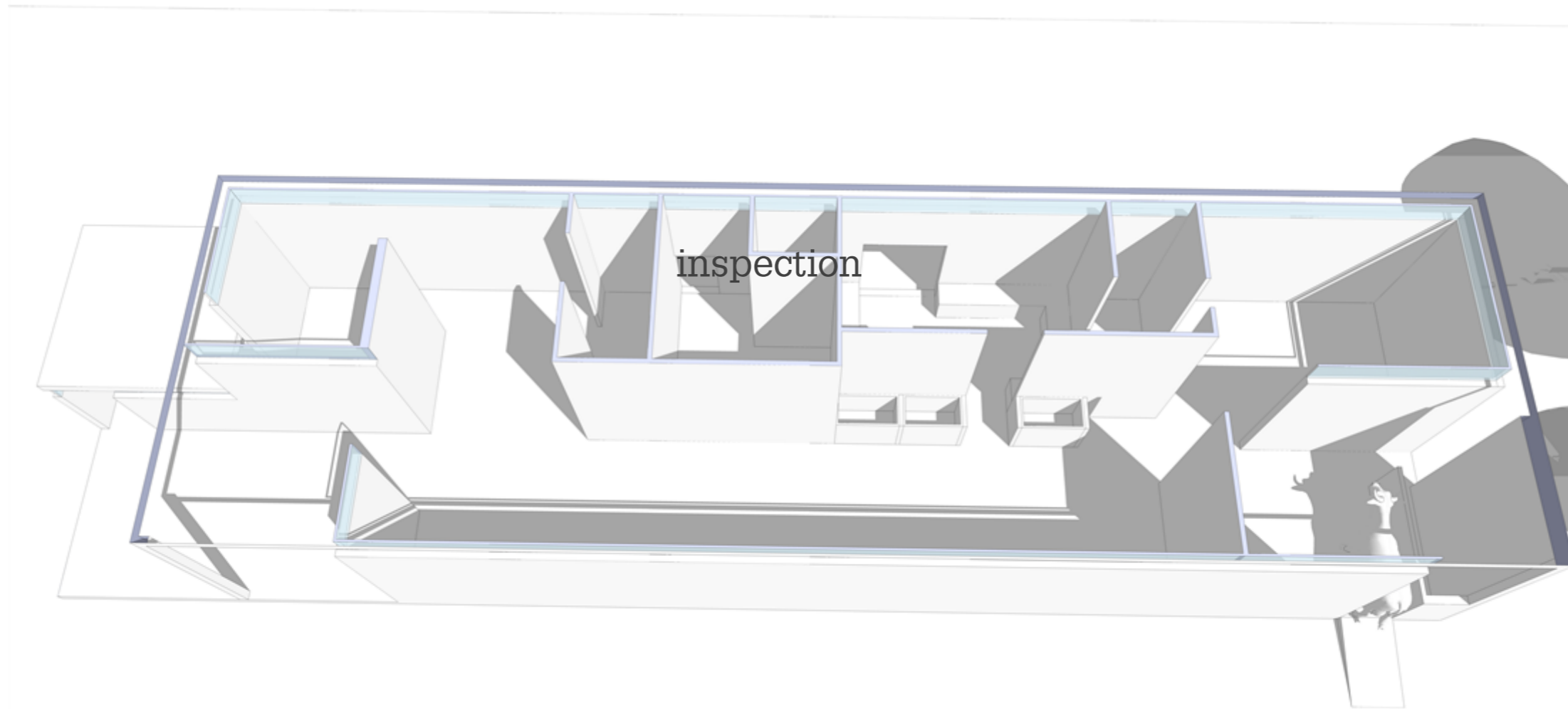


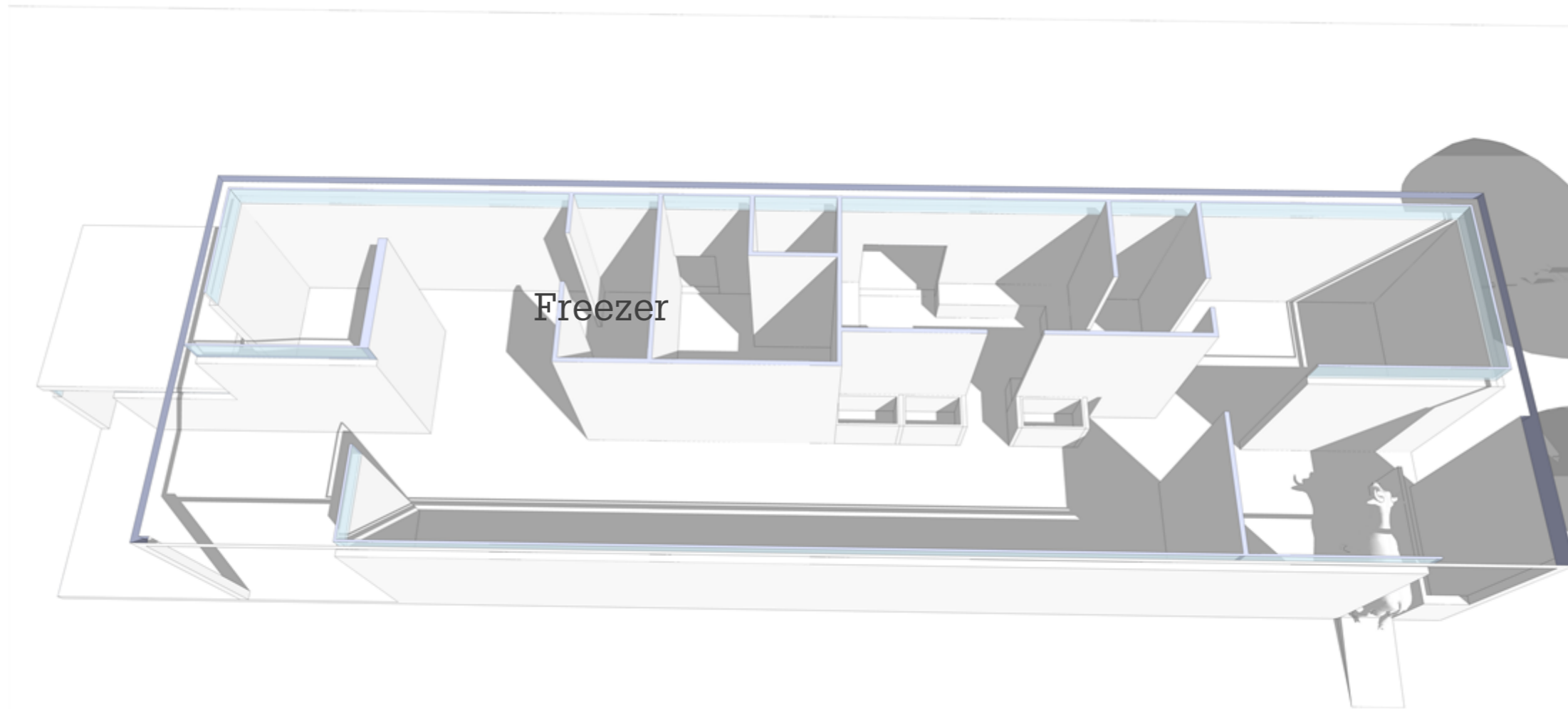


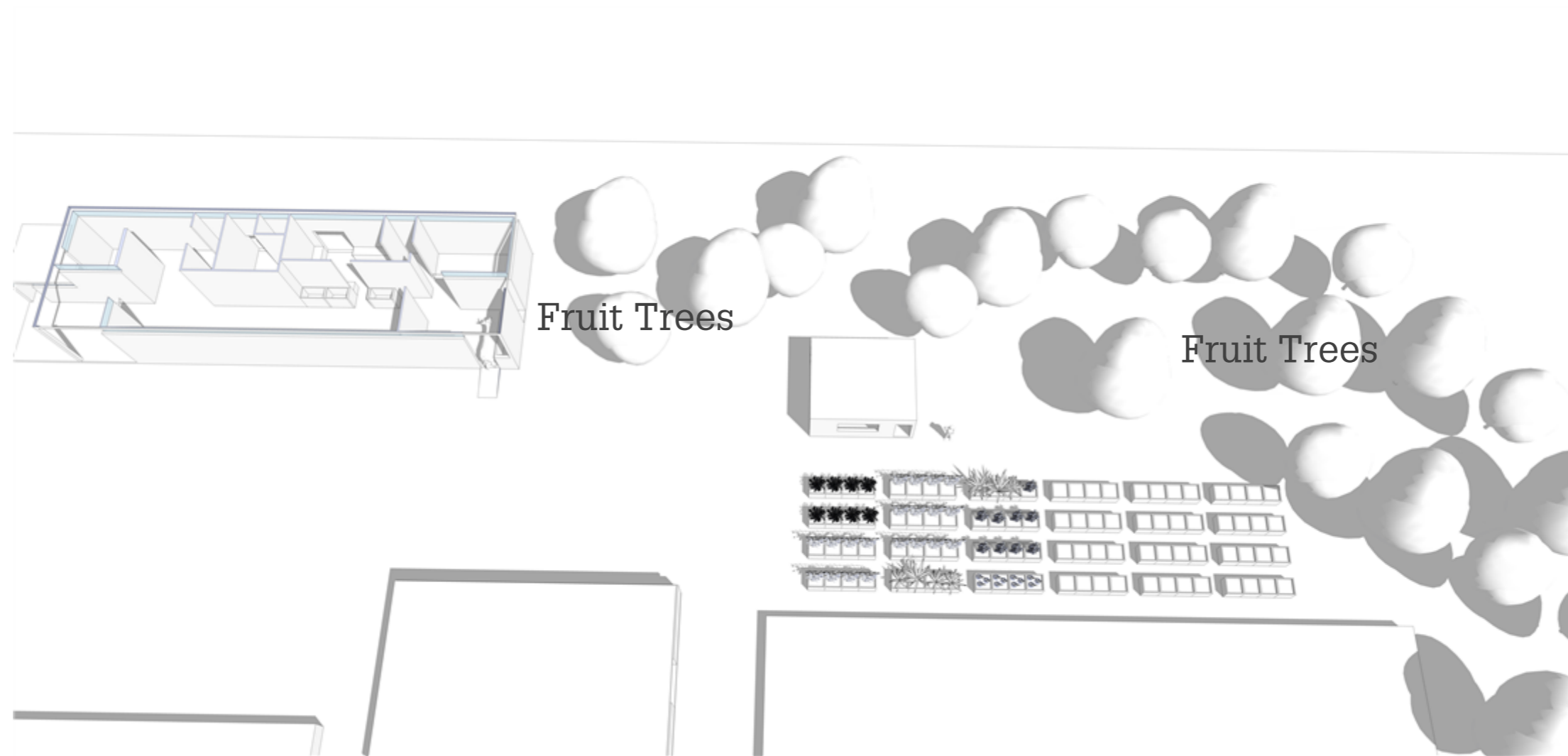




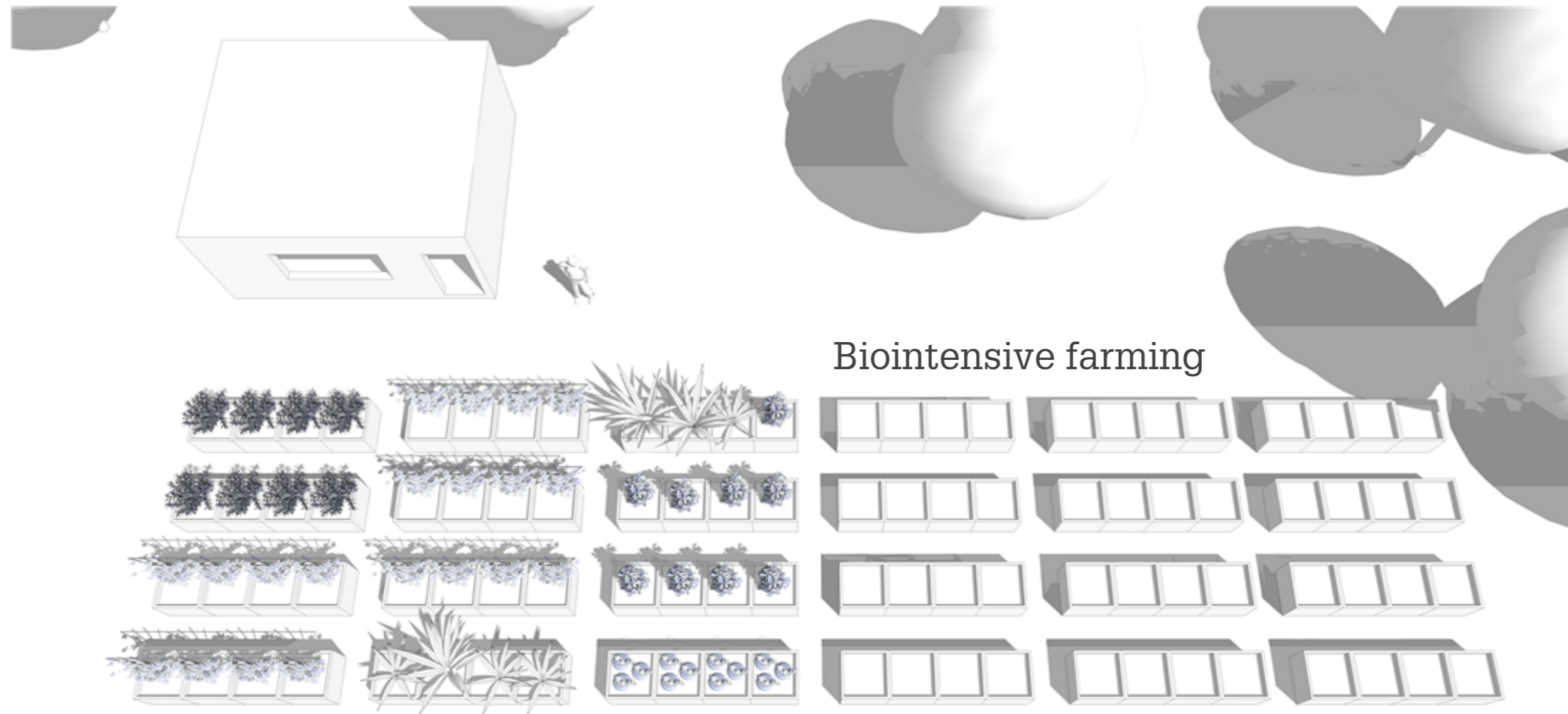


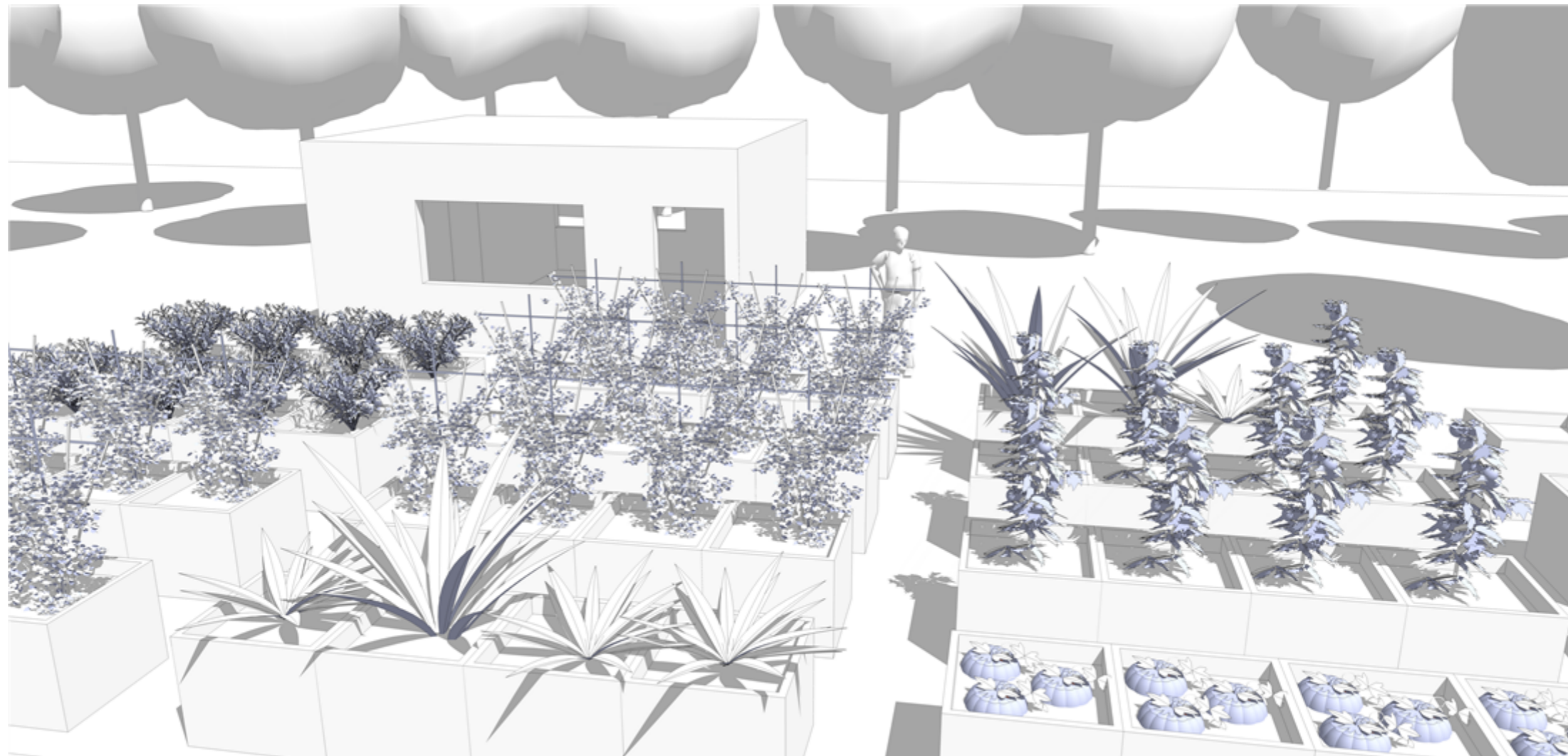


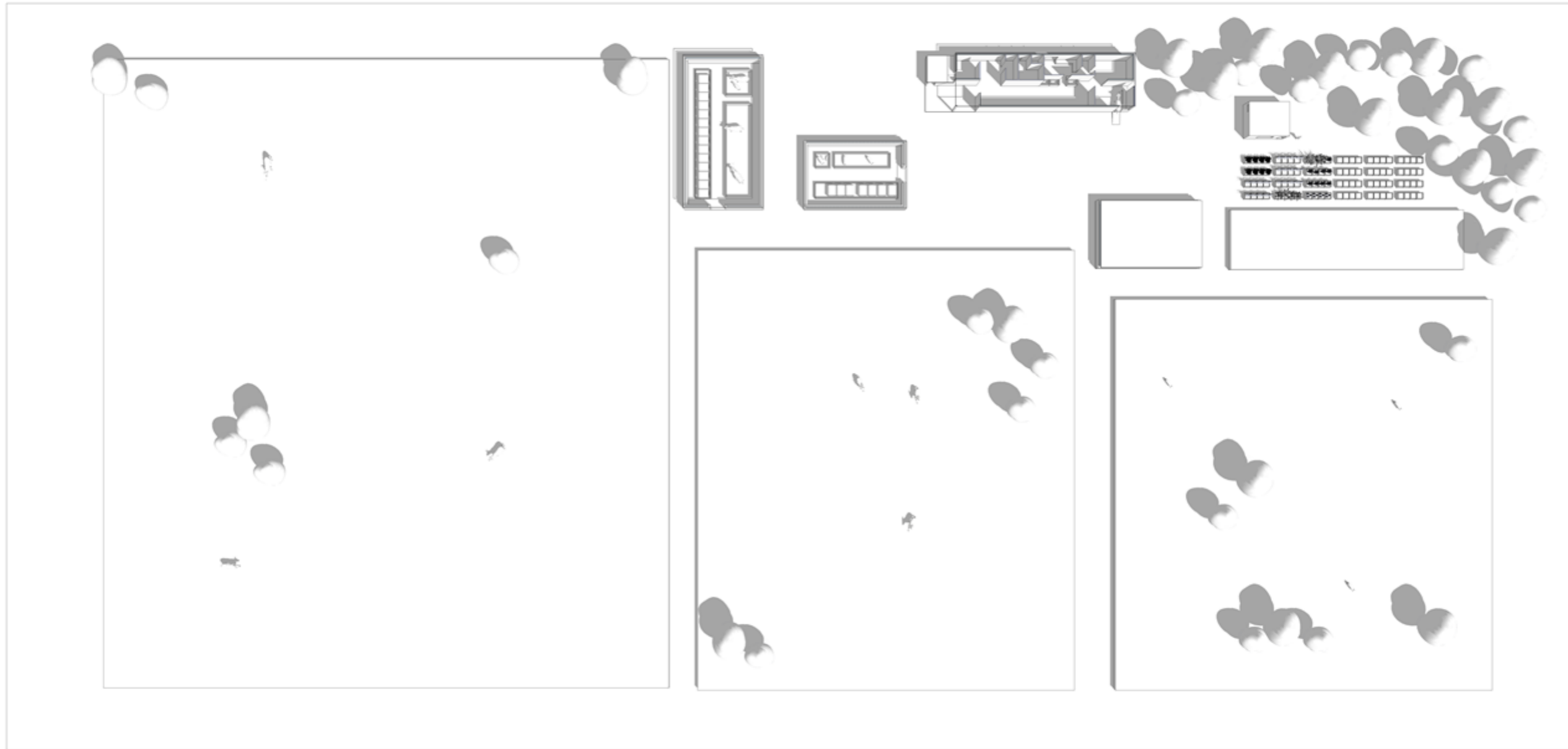




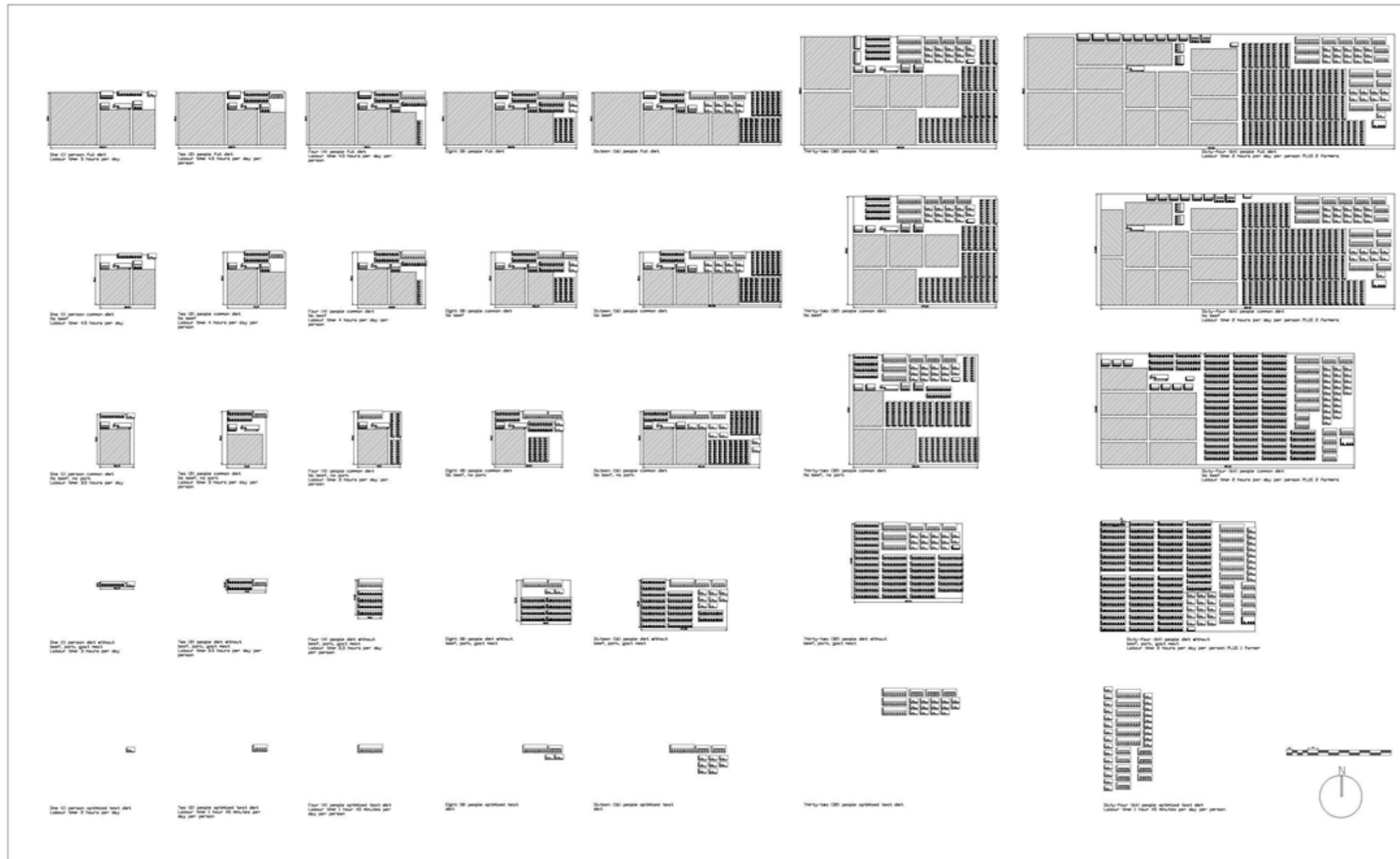


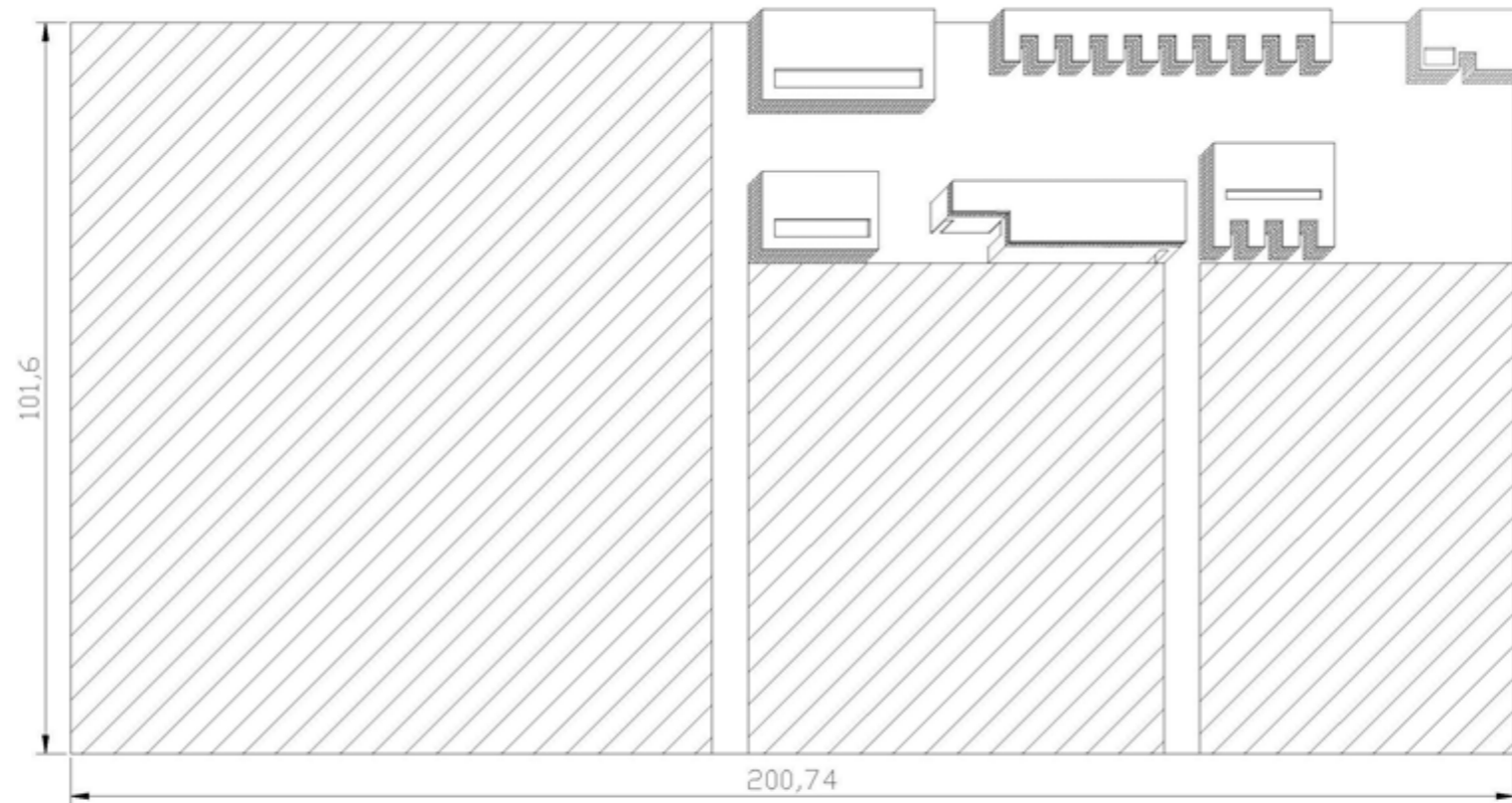




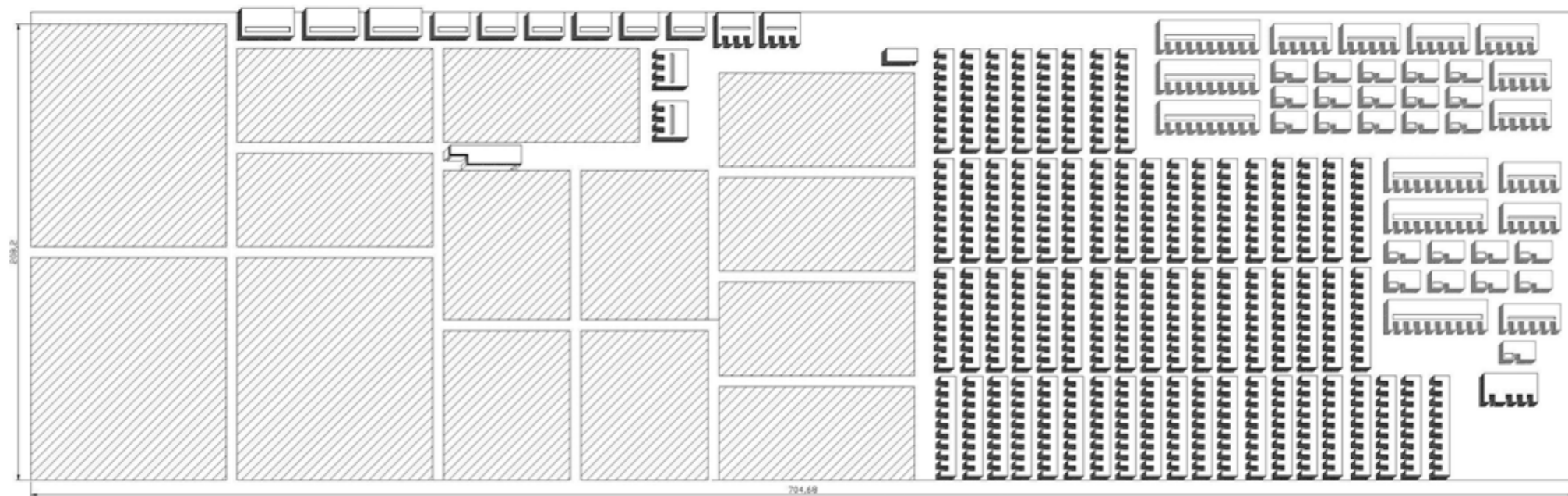


# Collaboration effect on different diets



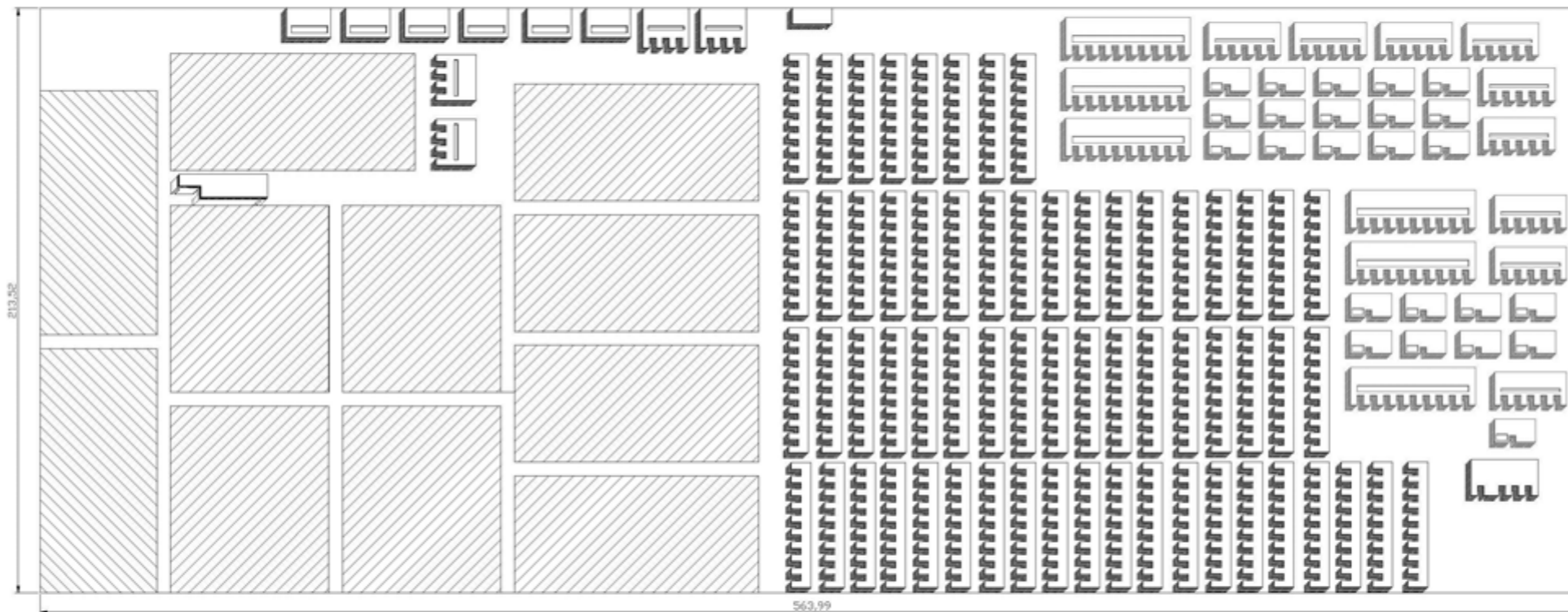


One (1) person full diet  
 Labour time: 5 hours per day



Sixty-Four (64) people full diet  
 Labour time: 2 hours per day per person PLUS 2 farmers





Sixty-four (64) people common diet  
 No beef  
 Labour time: 2 hours per day per person PLUS 2 farmers

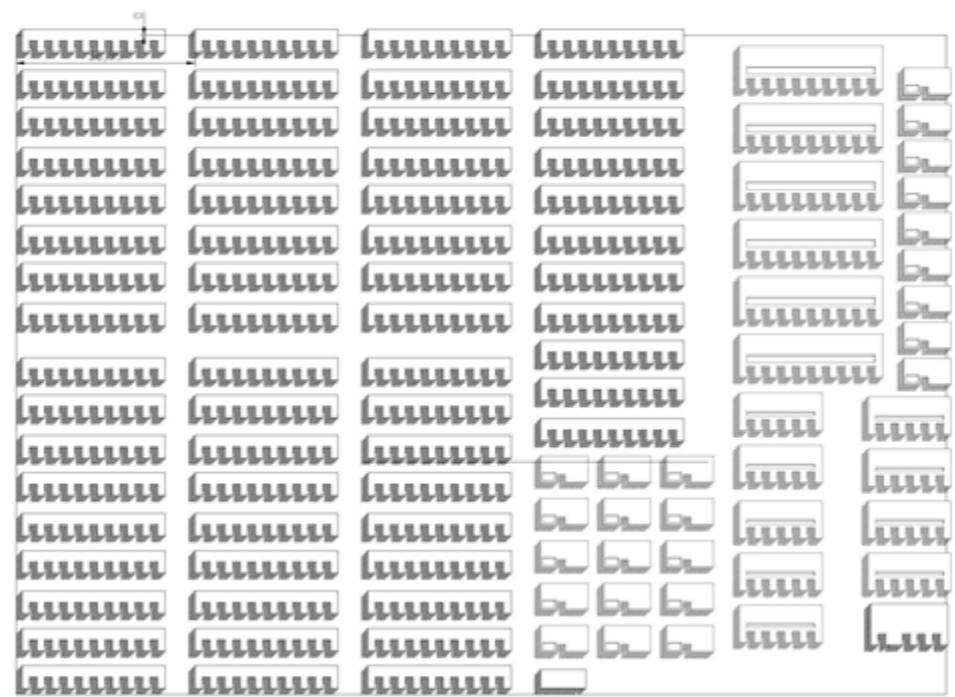




Sixty-four (64) people common diet  
 No beef  
 Labour time: 2 hours per day per person PLUS 2 farmers



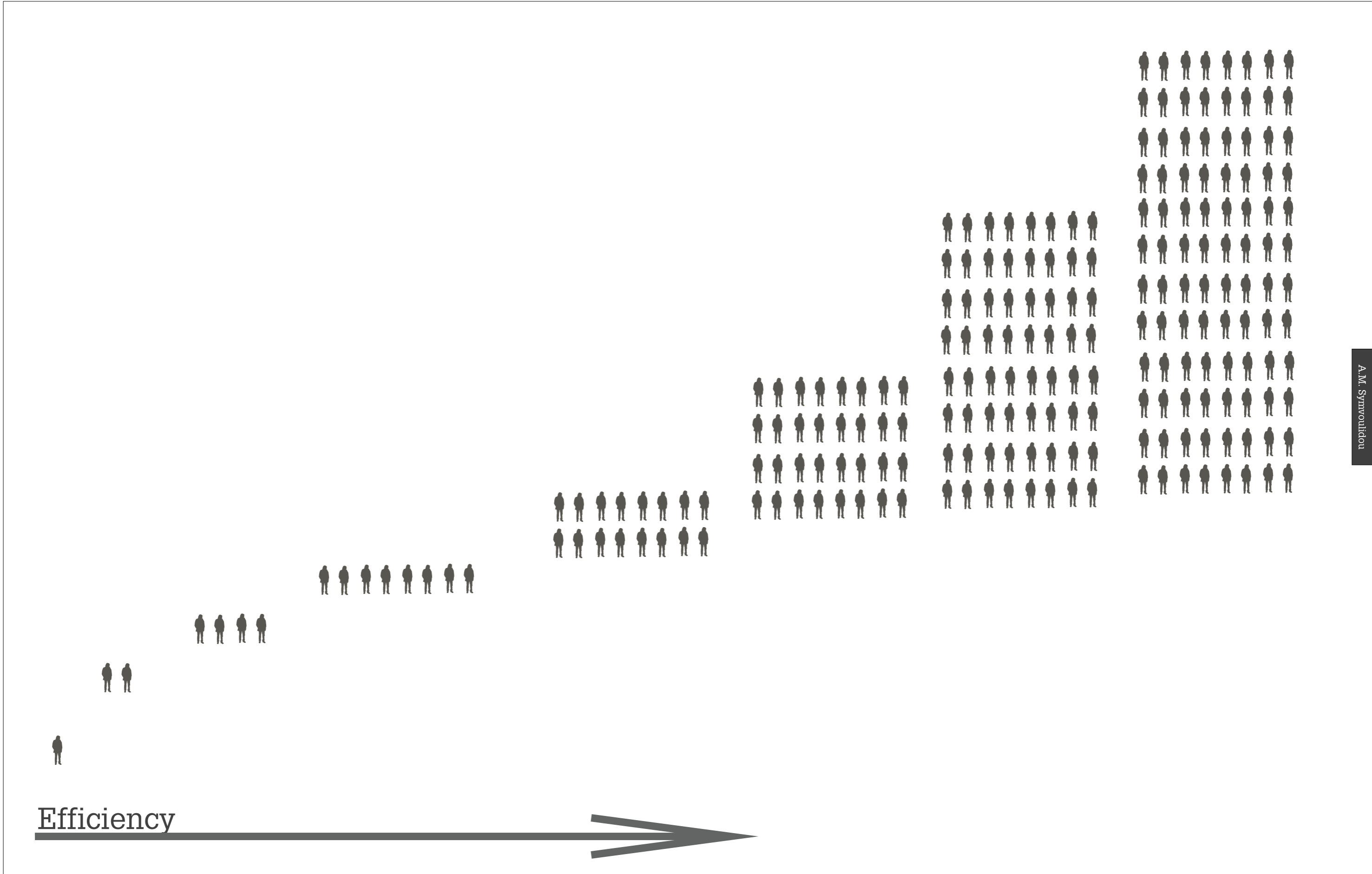




Sixty-four (64) people diet without  
 beef, pork, goat meat  
 Labour time: 2 hours per day per person PLUS 1 farmer











Space efficiency



Space efficiency

Food variety



Space efficiency

Food variety

Time efficiency



Space efficiency  
 Food variety  
 Time efficiency



Efficiency limited  
 to animal based  
 diets





Space efficiency

Food variety

Time efficiency

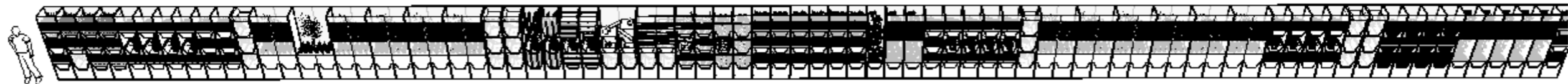


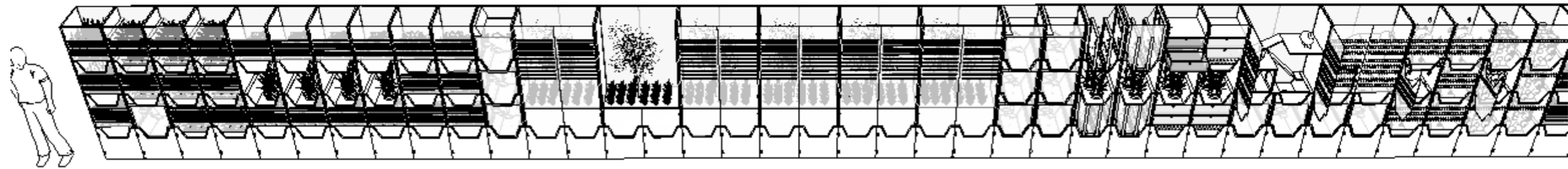
Efficiency limited to animal based diets

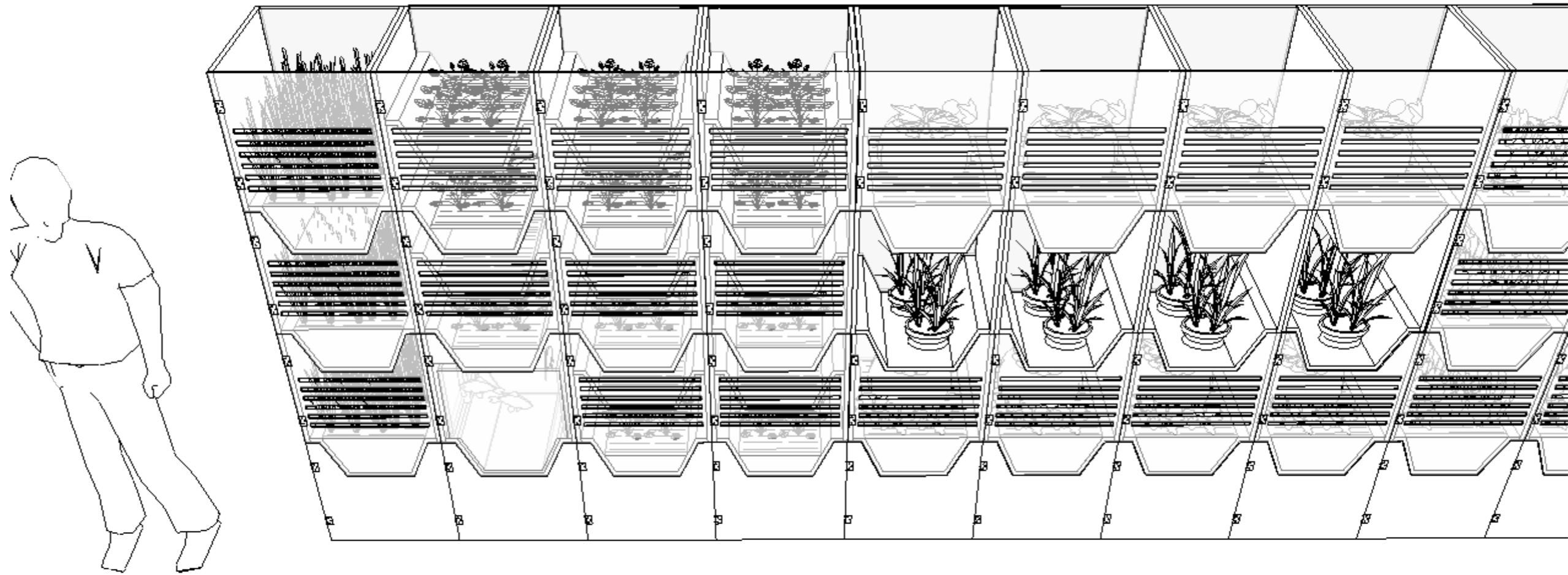
A full -animal including- diet is not feasible for less than 4 people

(Animation )

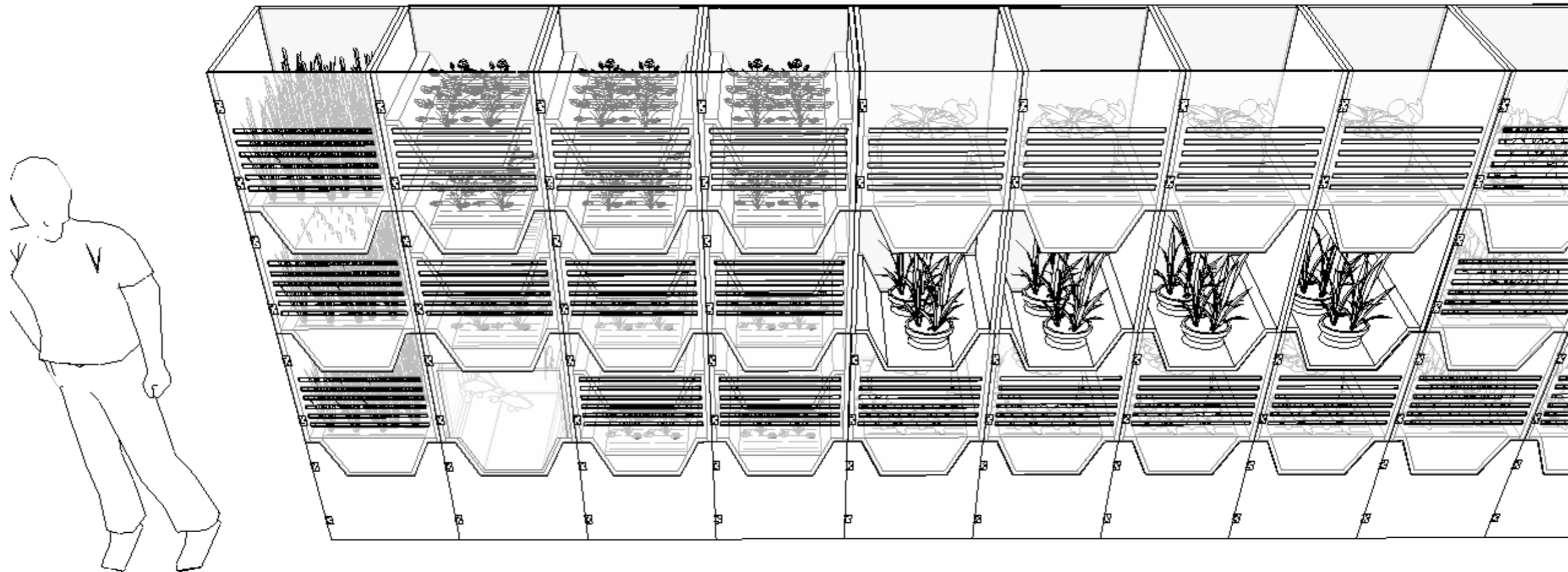
# The i-Crates



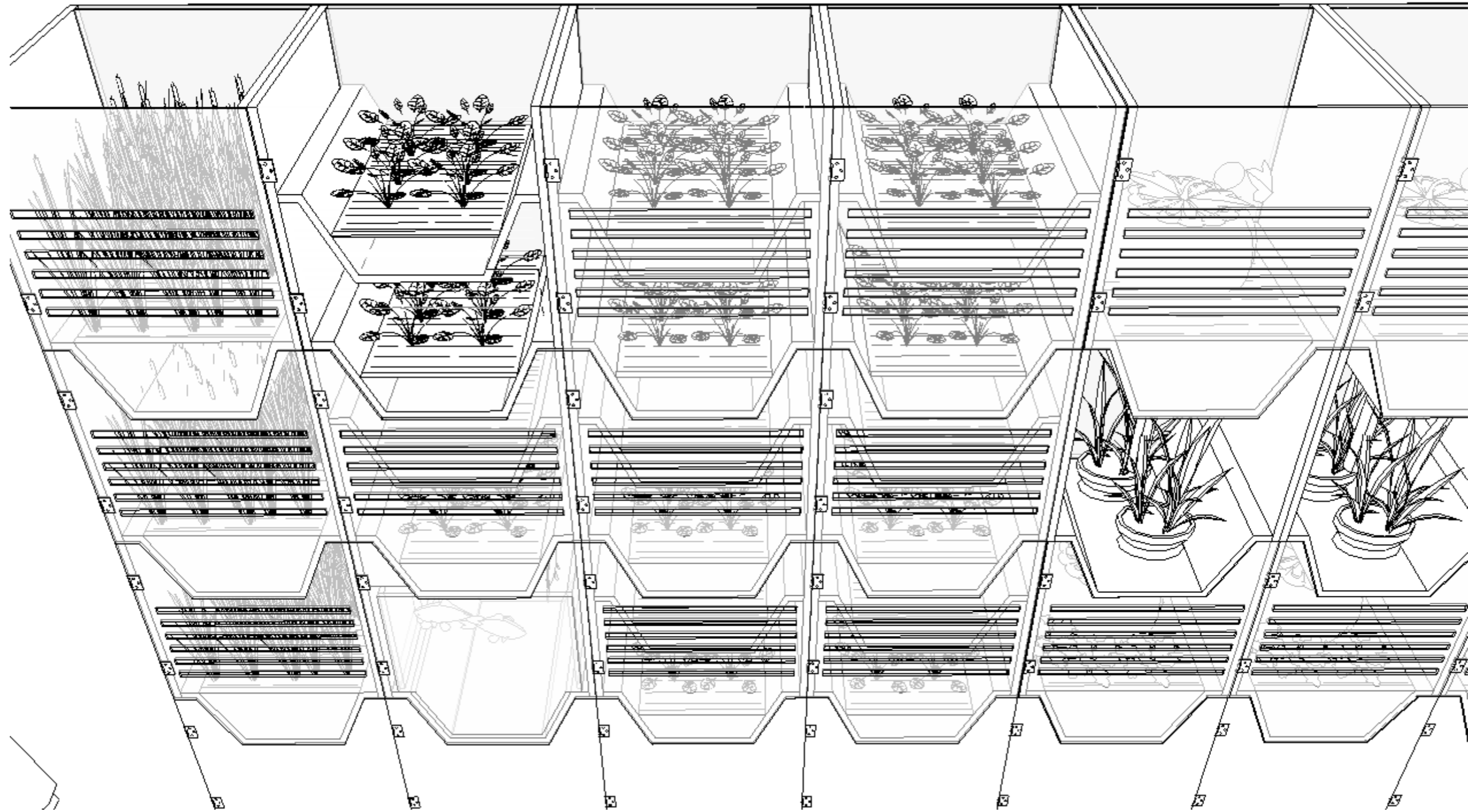




**i-Crates fall into a grid of 60 X 60 X 60 cm.**



**i-Crates fall into a grid of 60 X 60 X 60 cm.**

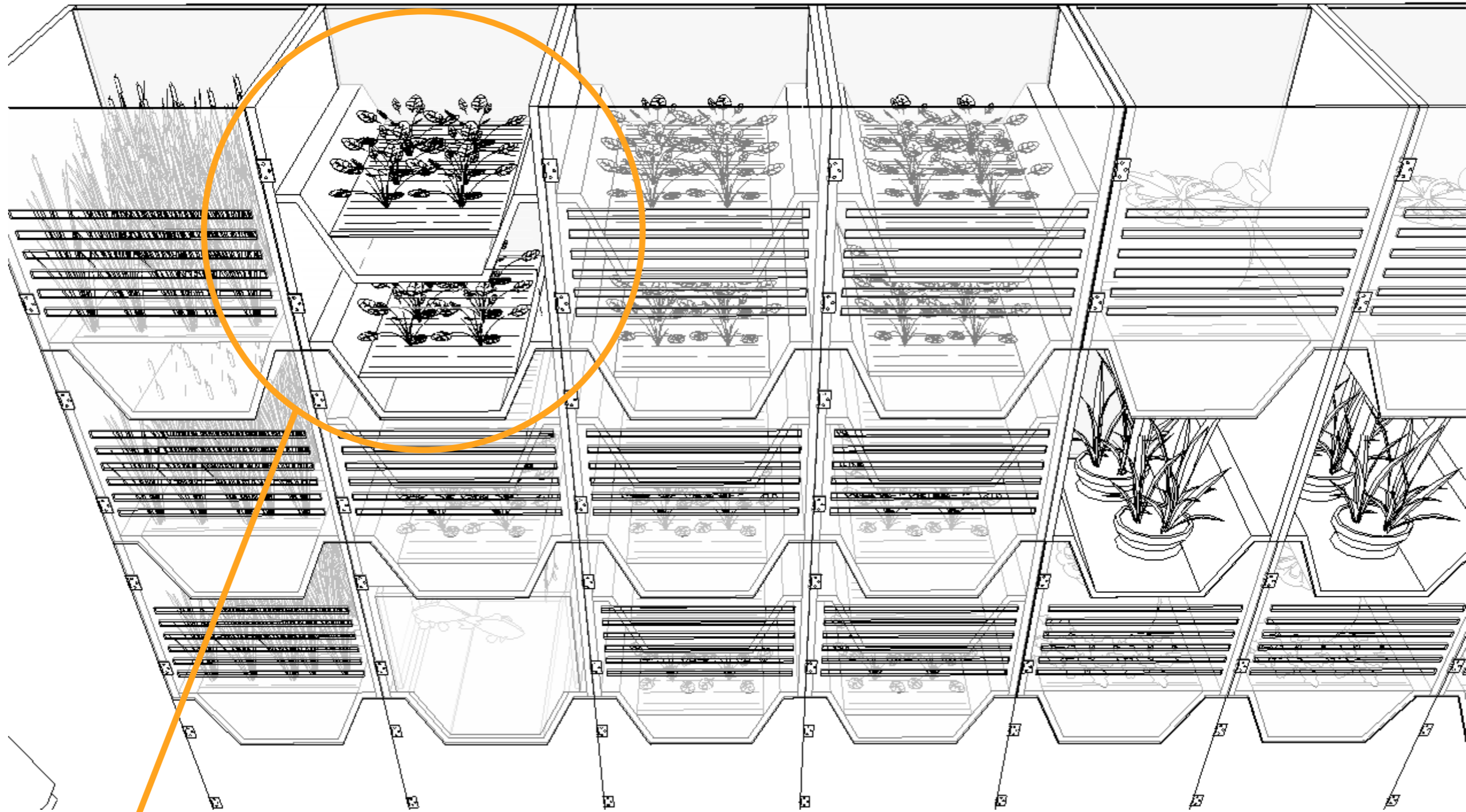




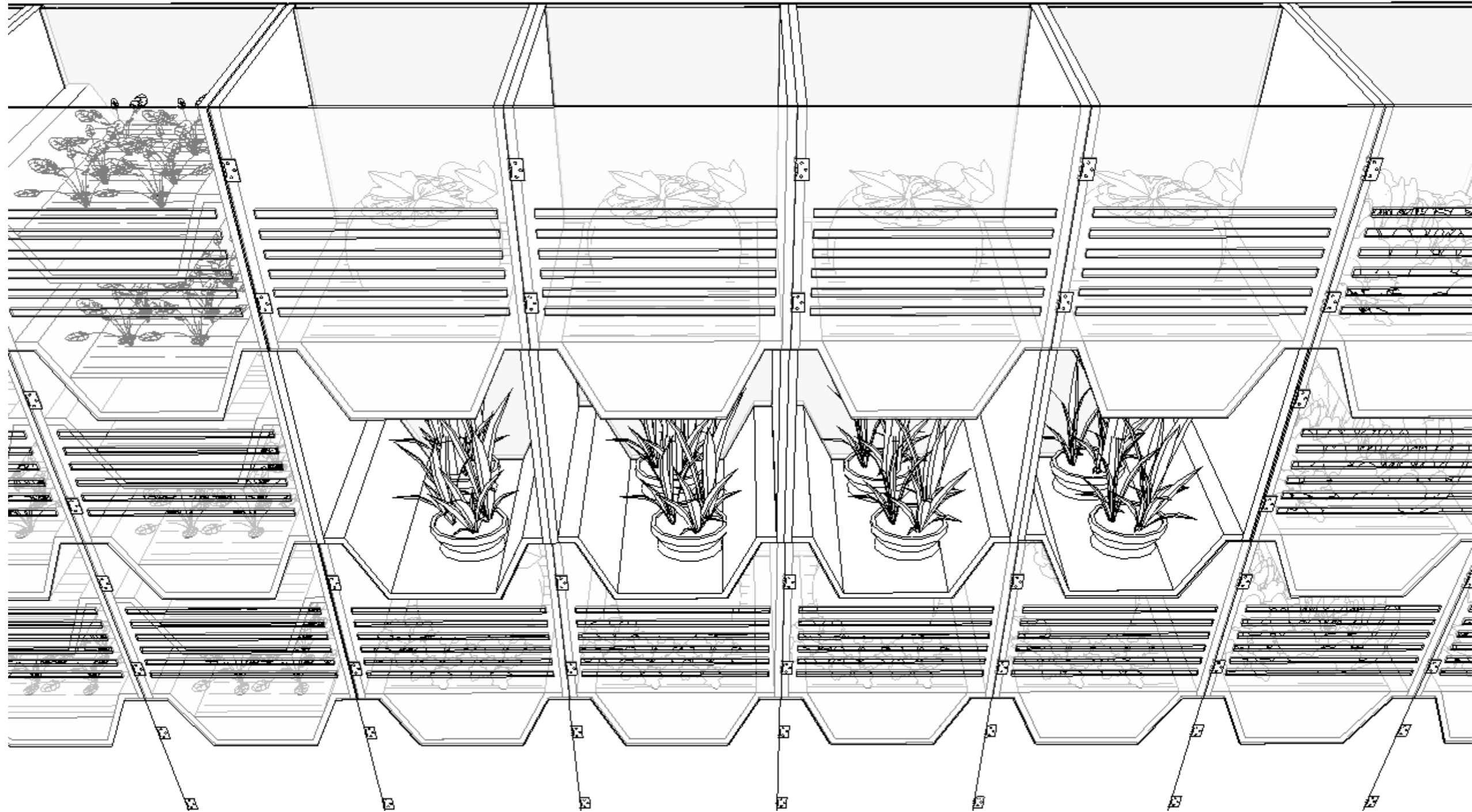
### Sprouting trays/ Small root plants trays



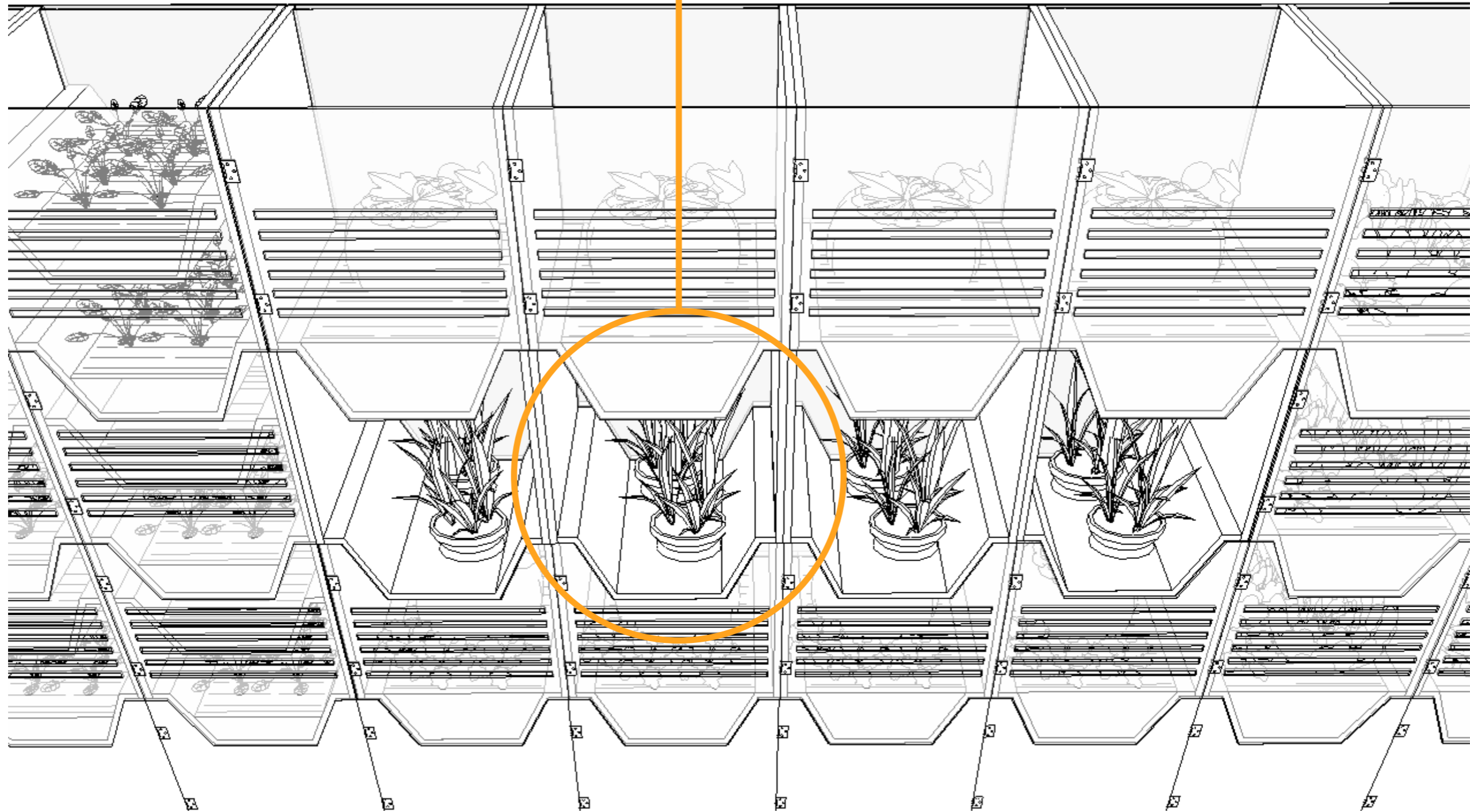
**Double production on a standard foodprint.**



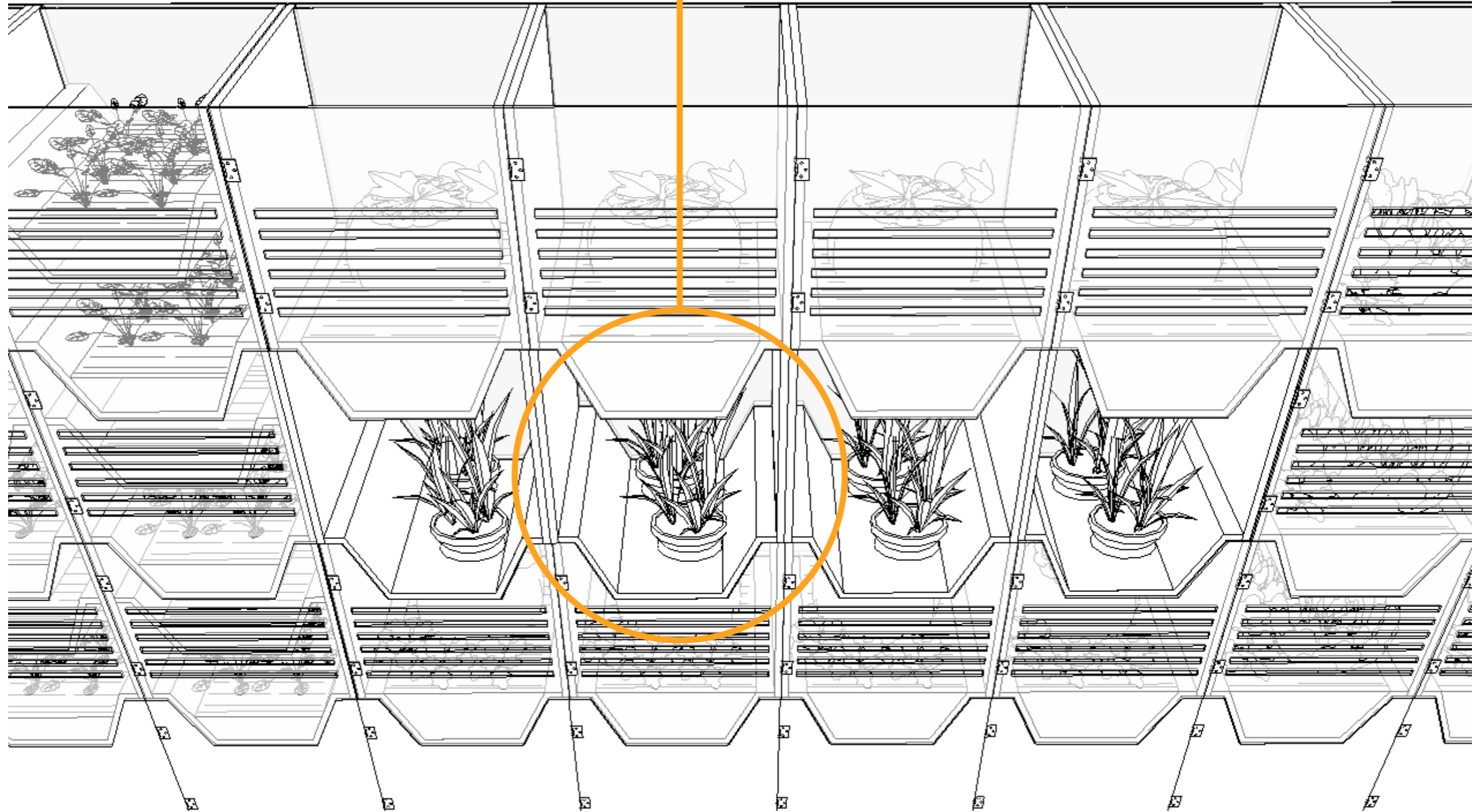
**Additional sprouting tray**



Opening crates



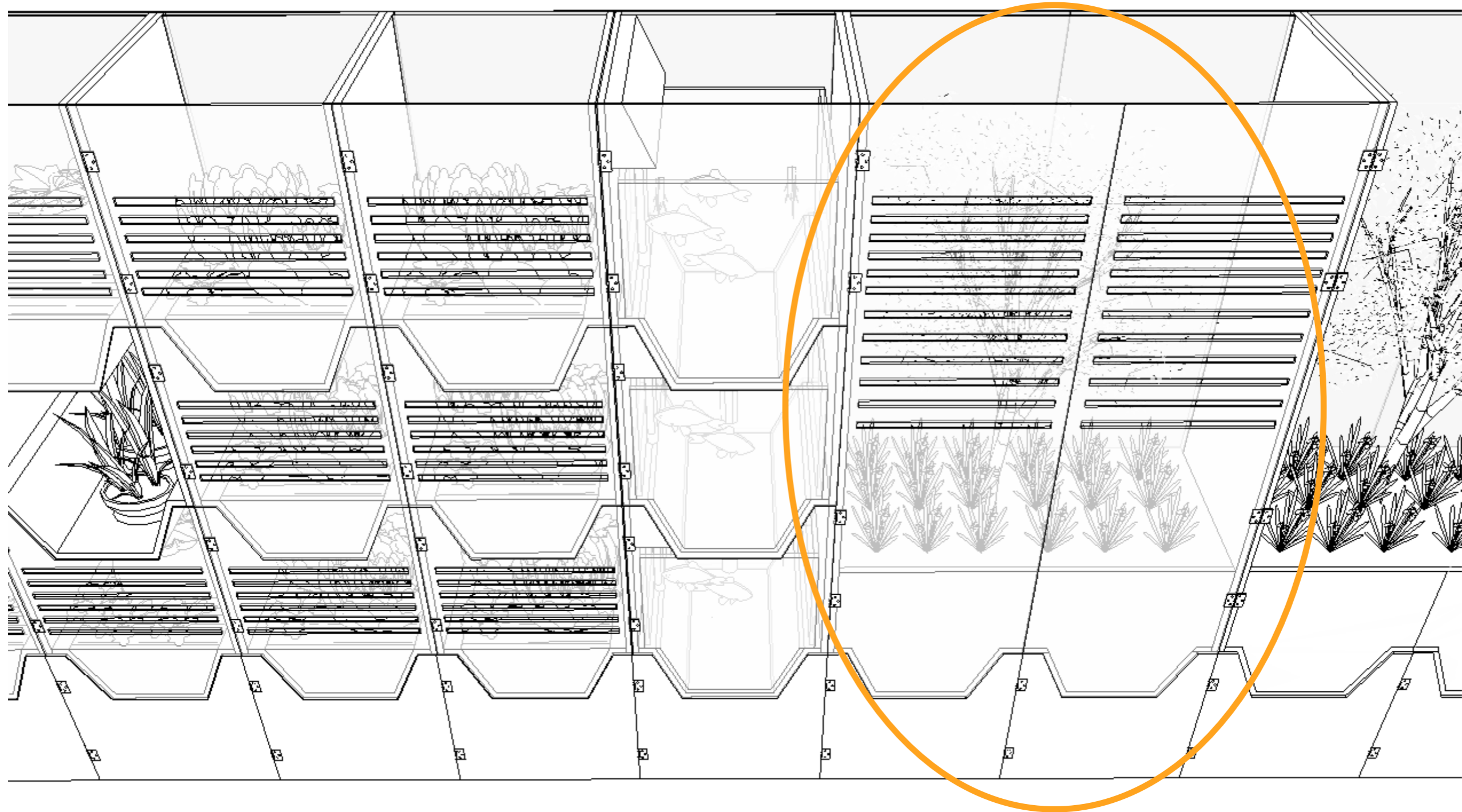
**These crates work as windows. They open completely, allowing fresh air in.**



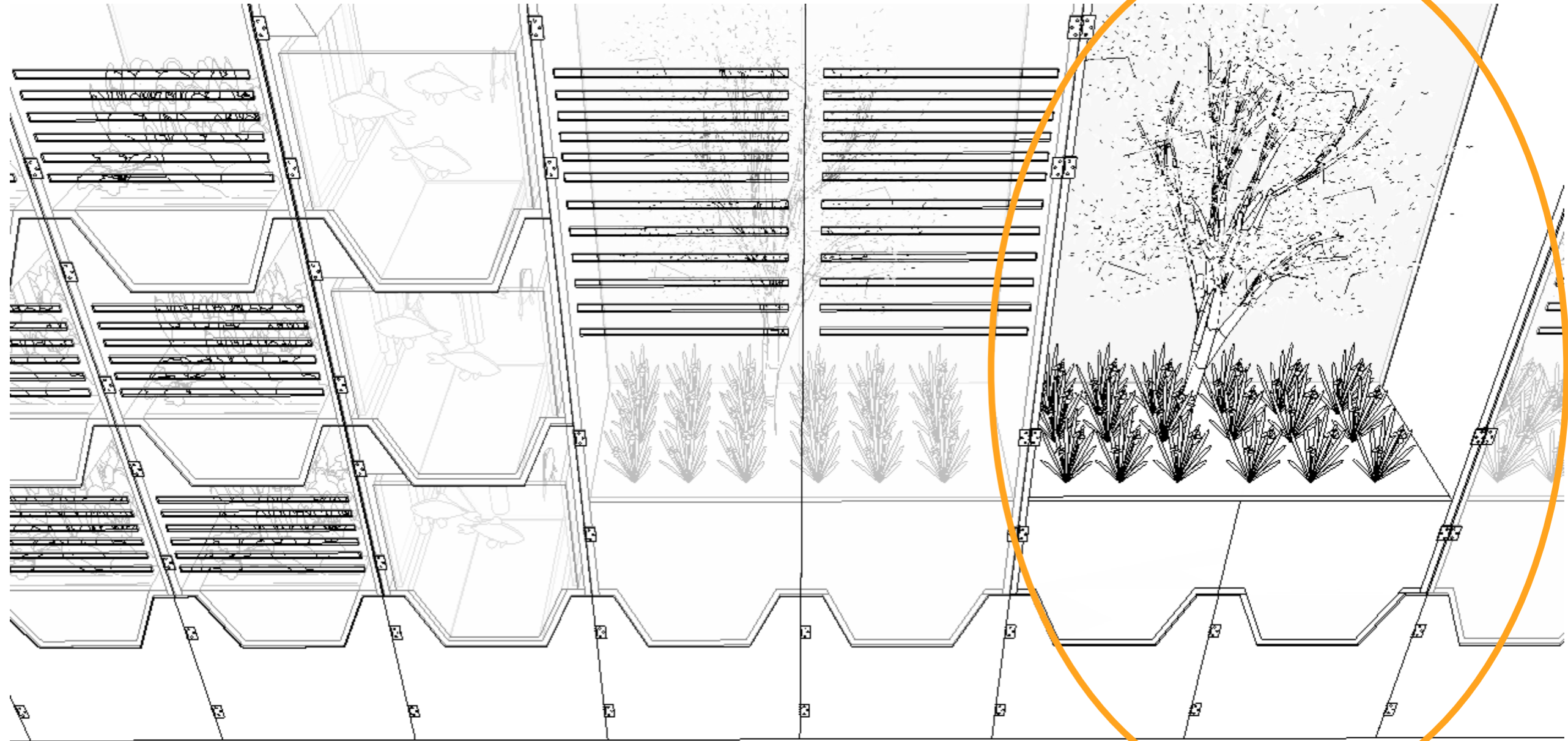
**They can also accommodate pots with hardy plants, like agave succulents.**



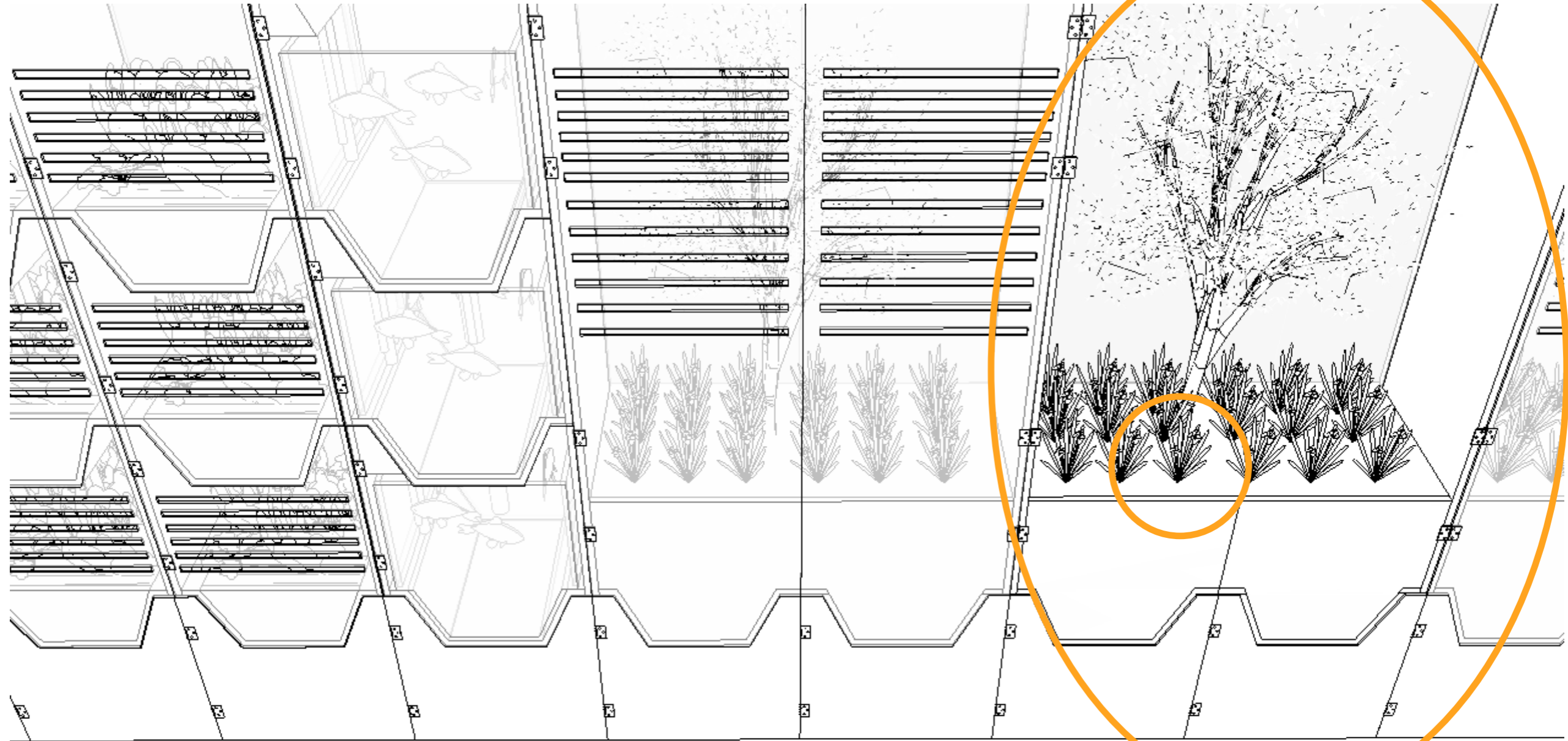
**These full-height crates can accommodate larger/ taller plants.**



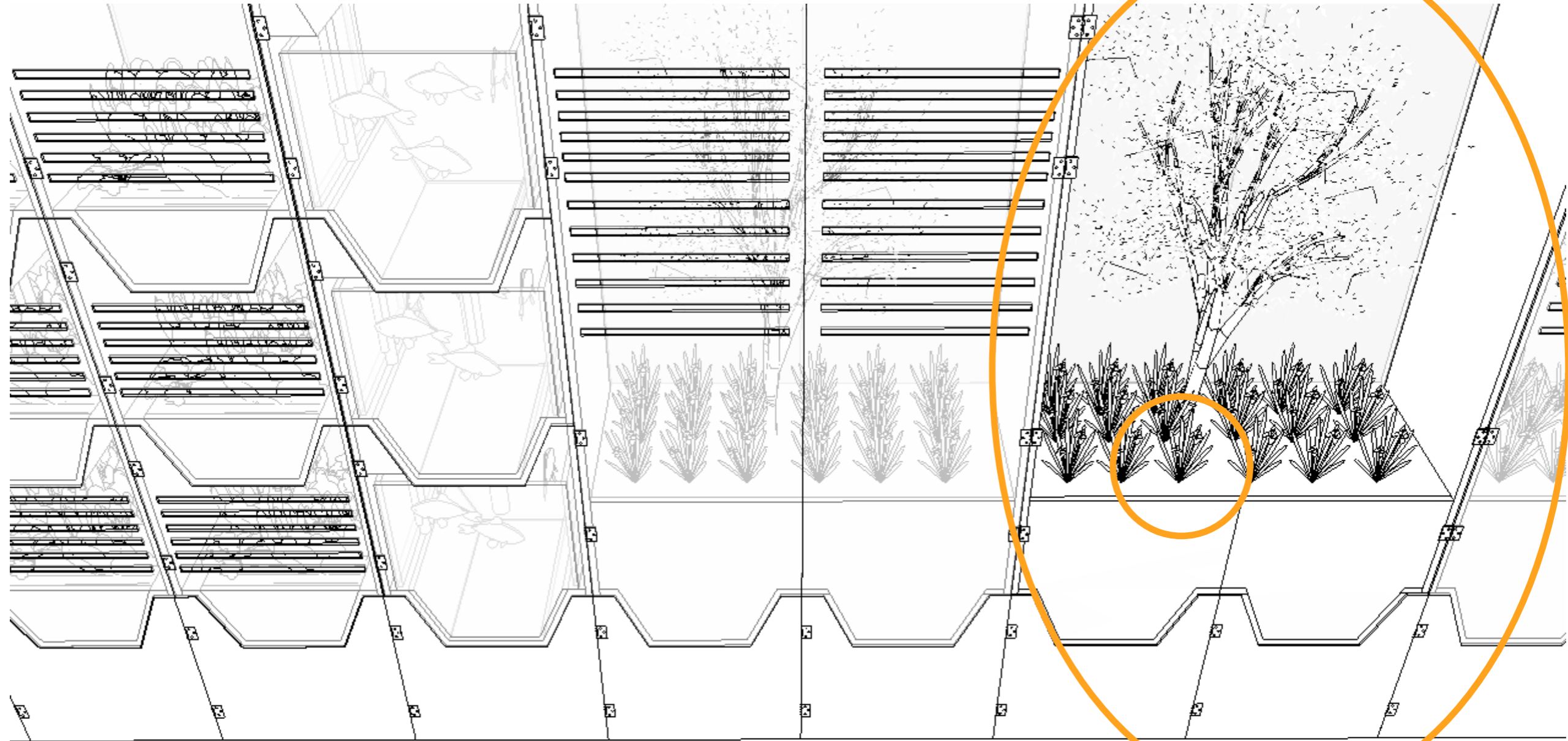
**Grafted dwarf trees can offer a variety of fruit, nuts, oils.**





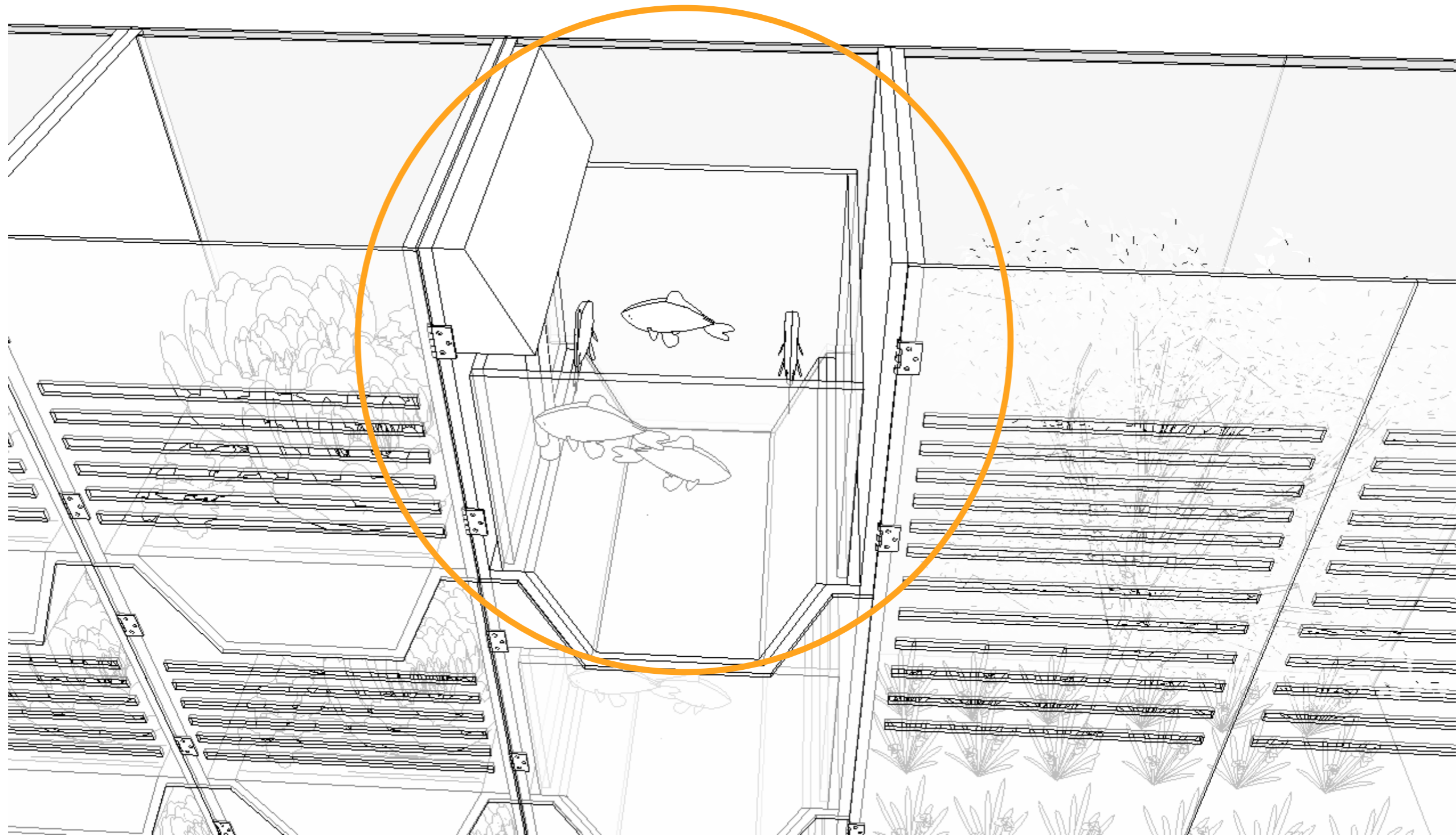


**To maximize production, INTERCROPPING is used.**

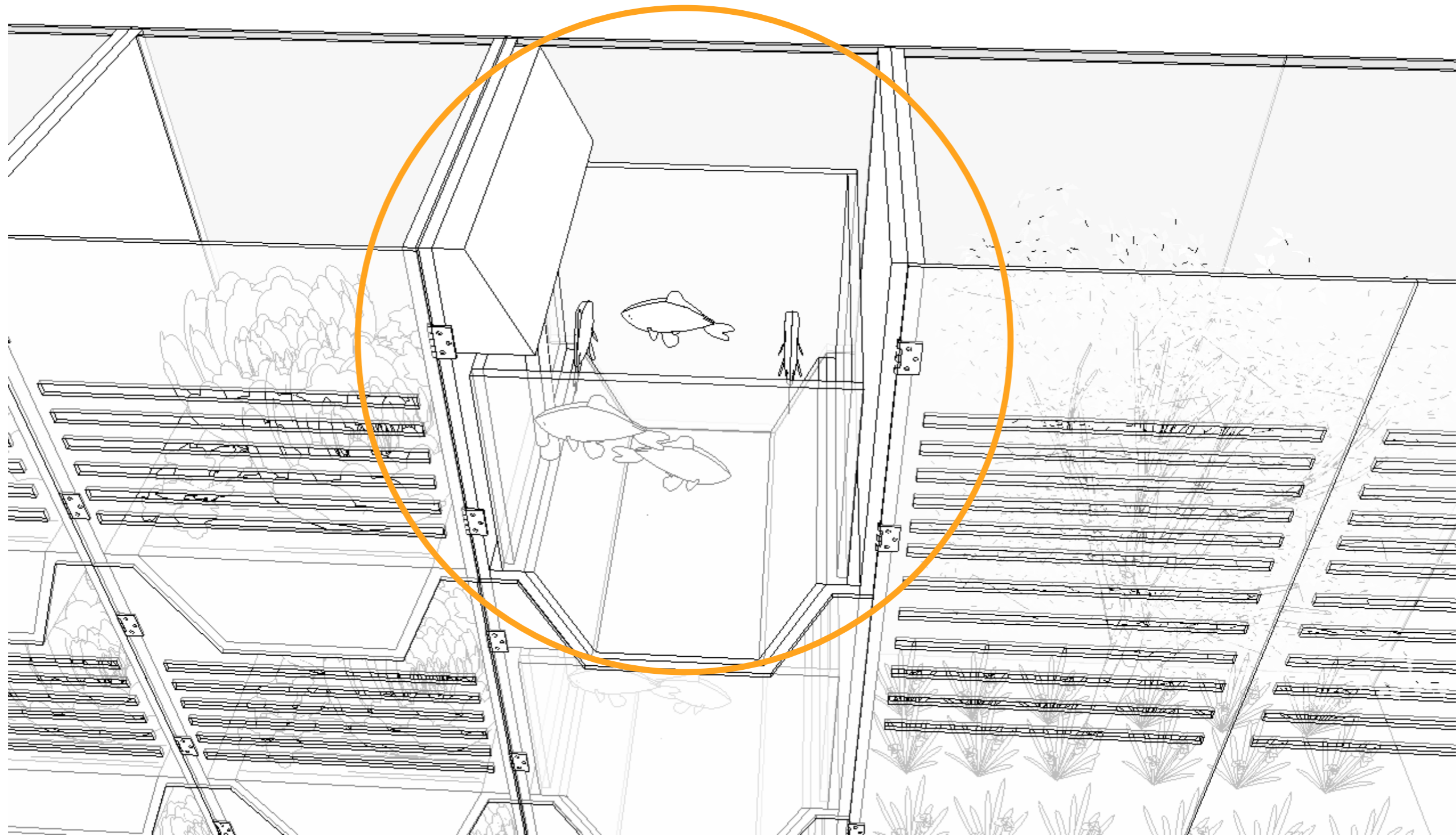


**This means growing smaller plants on the free ground area.**

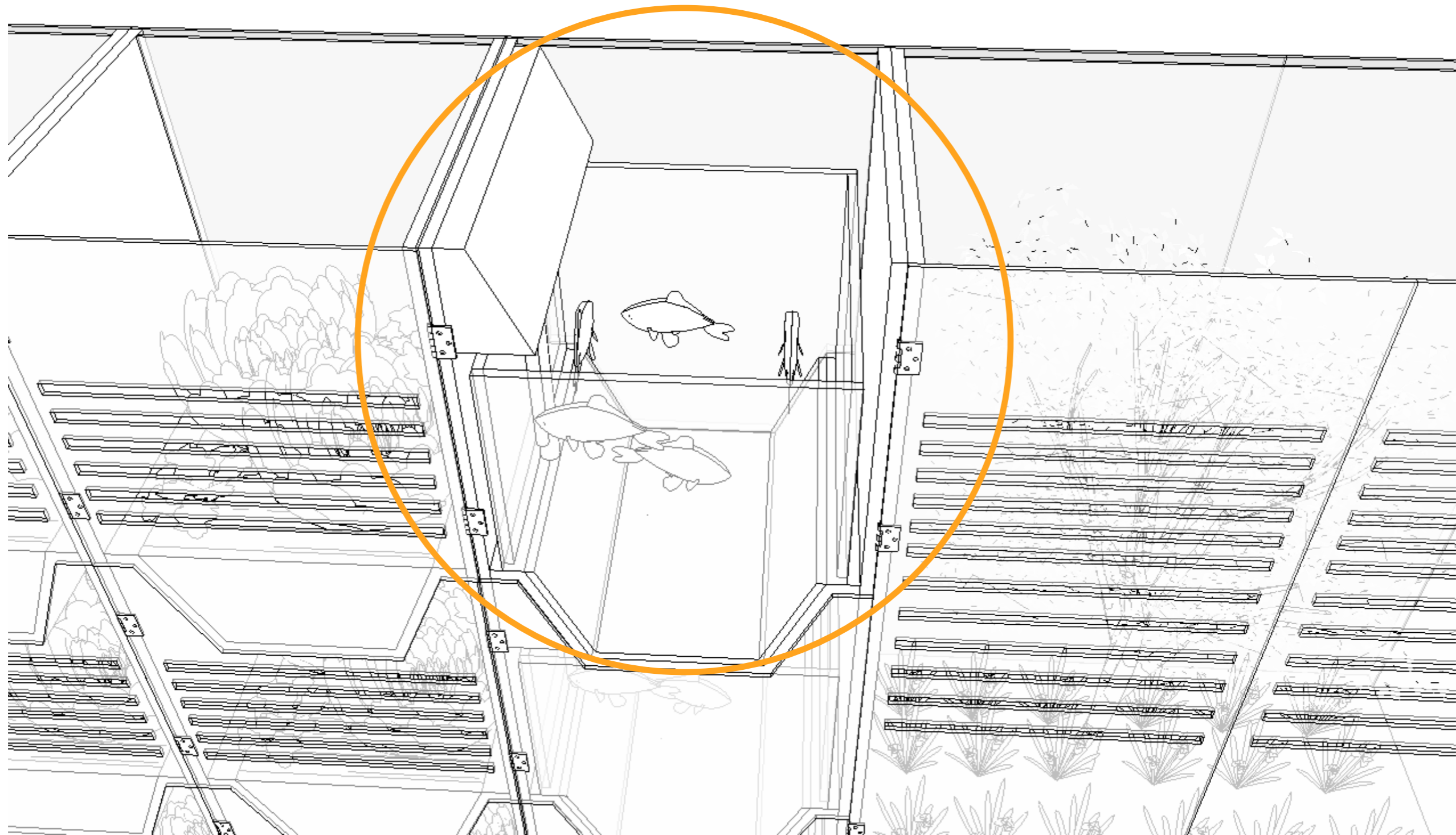
# introducing... AQUAPONICS



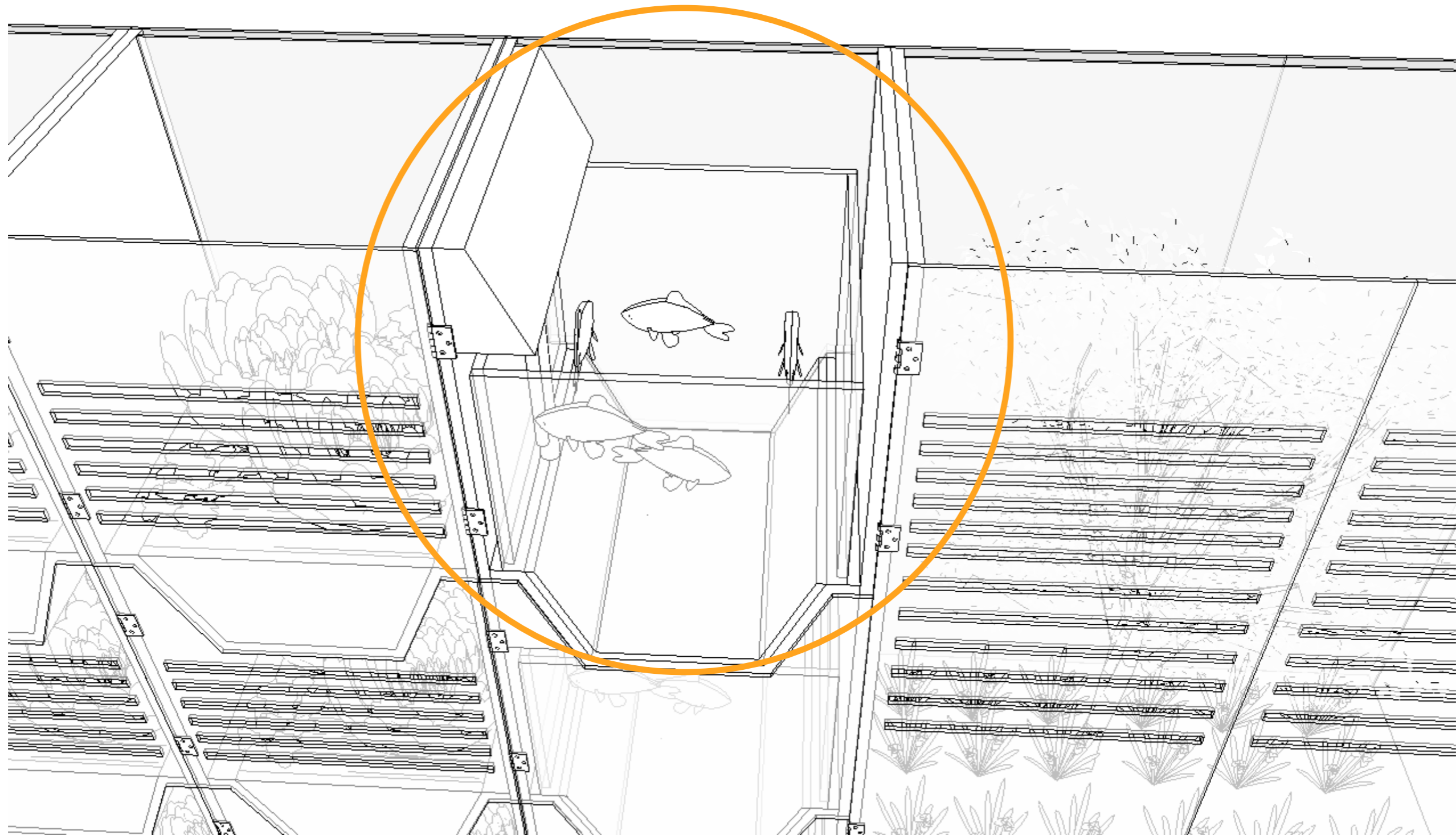
**Aquaponics is the system that combines hydroponics and aquaculture.**

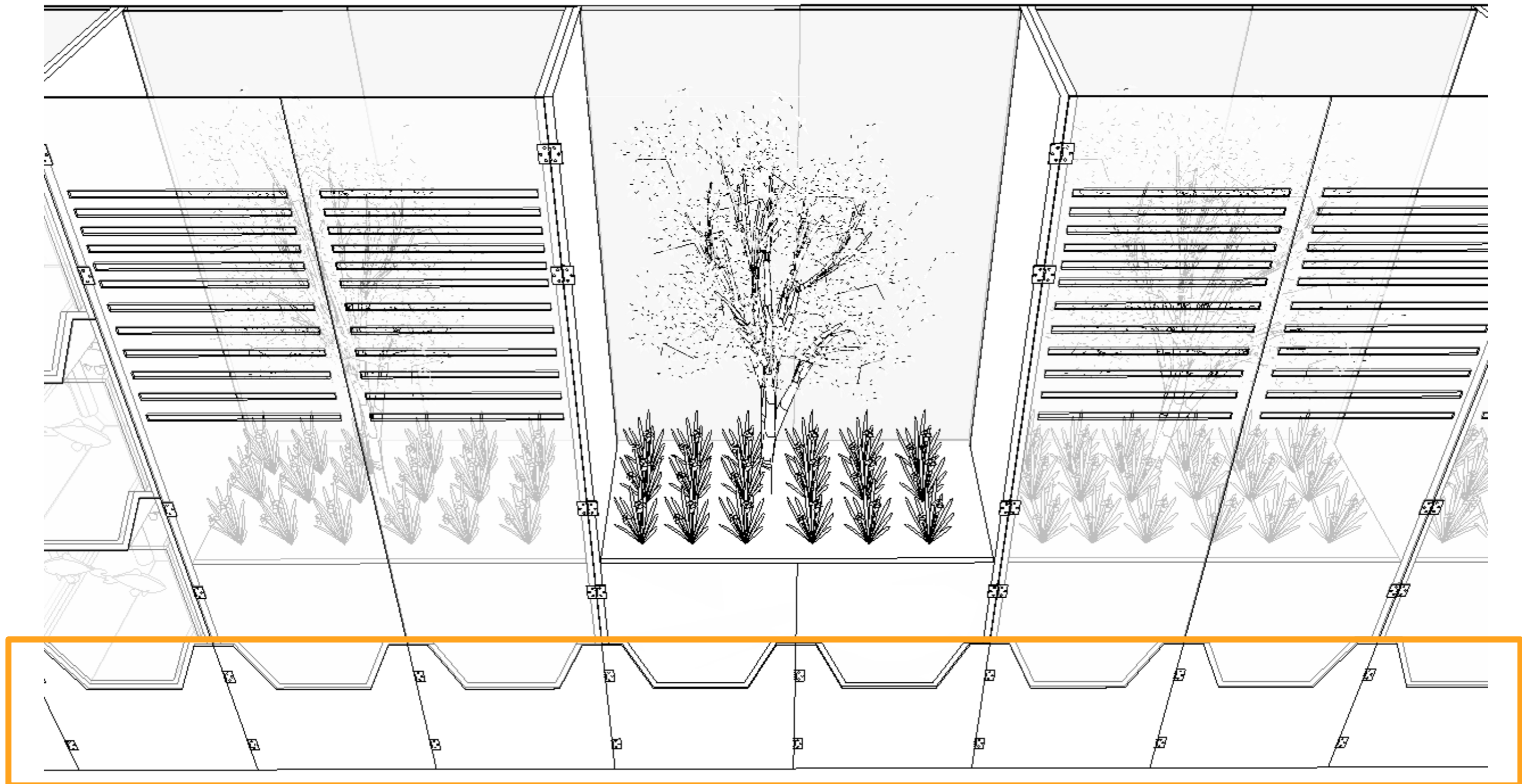


**The fish "manure" is a natural fertilizer for plants.**

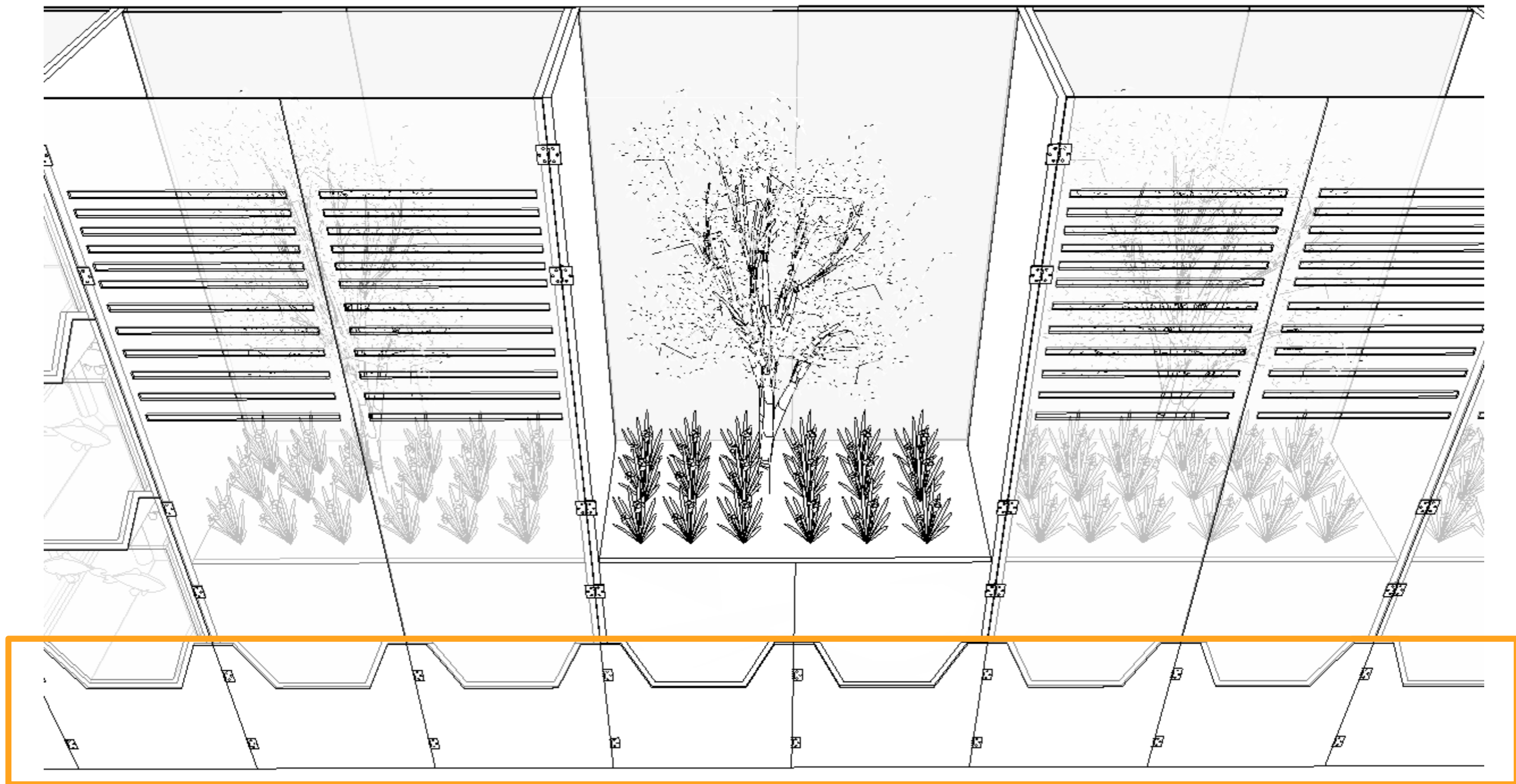


**By using water cycles that take the water from fish tanks to plants, fertilization and water purification take place.**



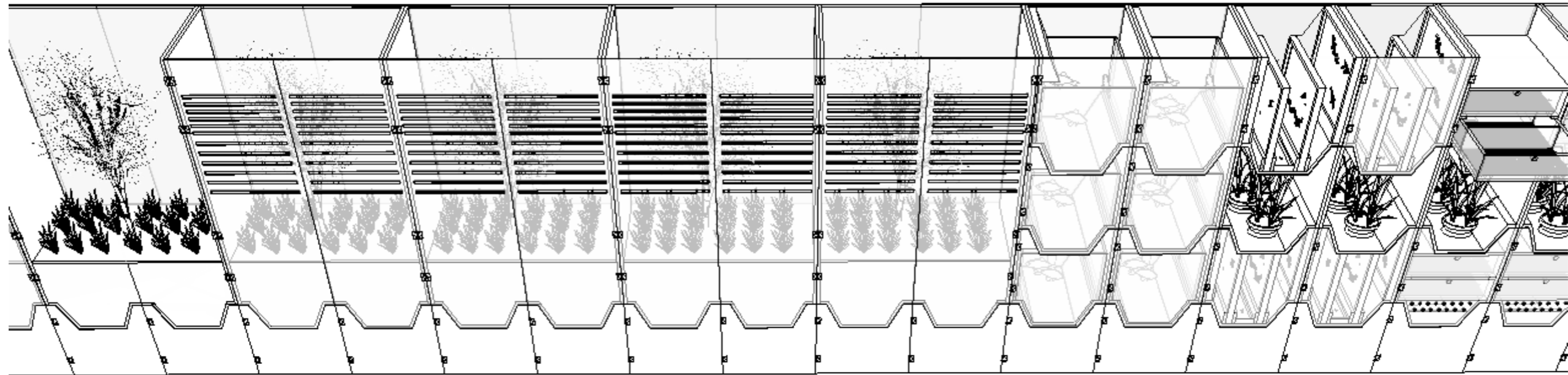


**The bottom crates are used to accommodate parts of the aquaponics system, such as water pumps.**

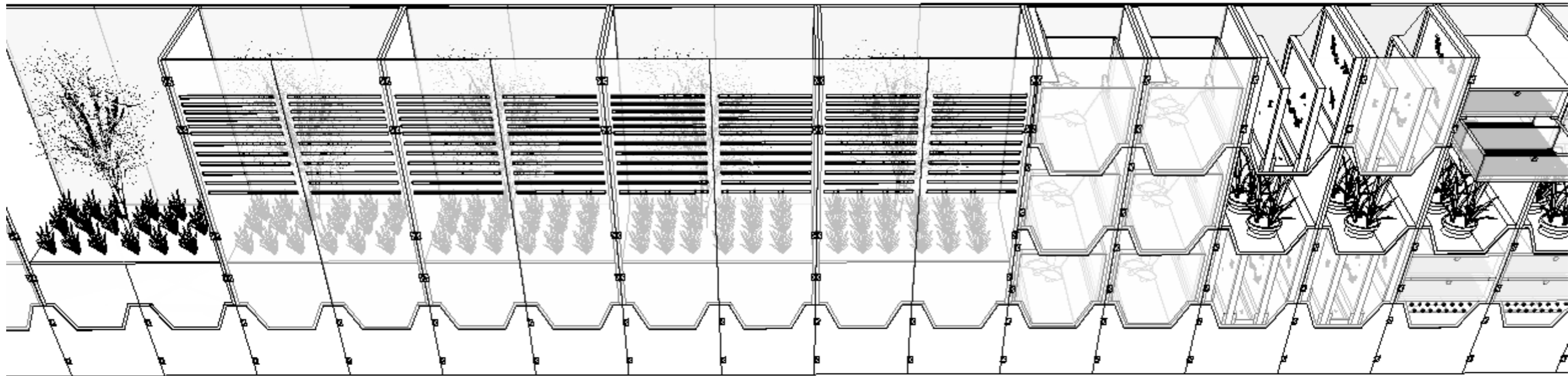


**They are also used to store extra soil, gravel, seeds and tools.**

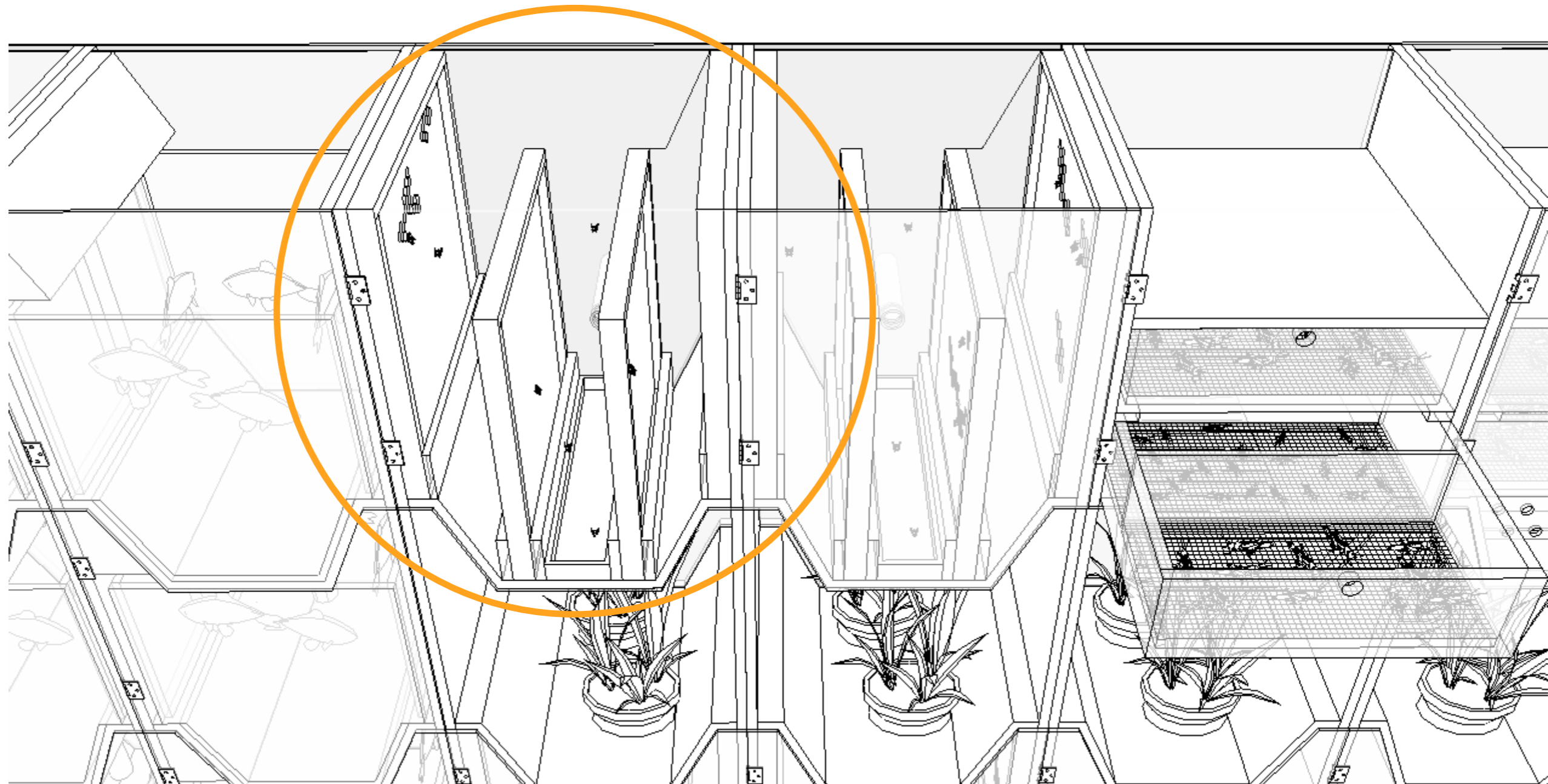




**Apart from plants, animals are also accommodated in the crates.**



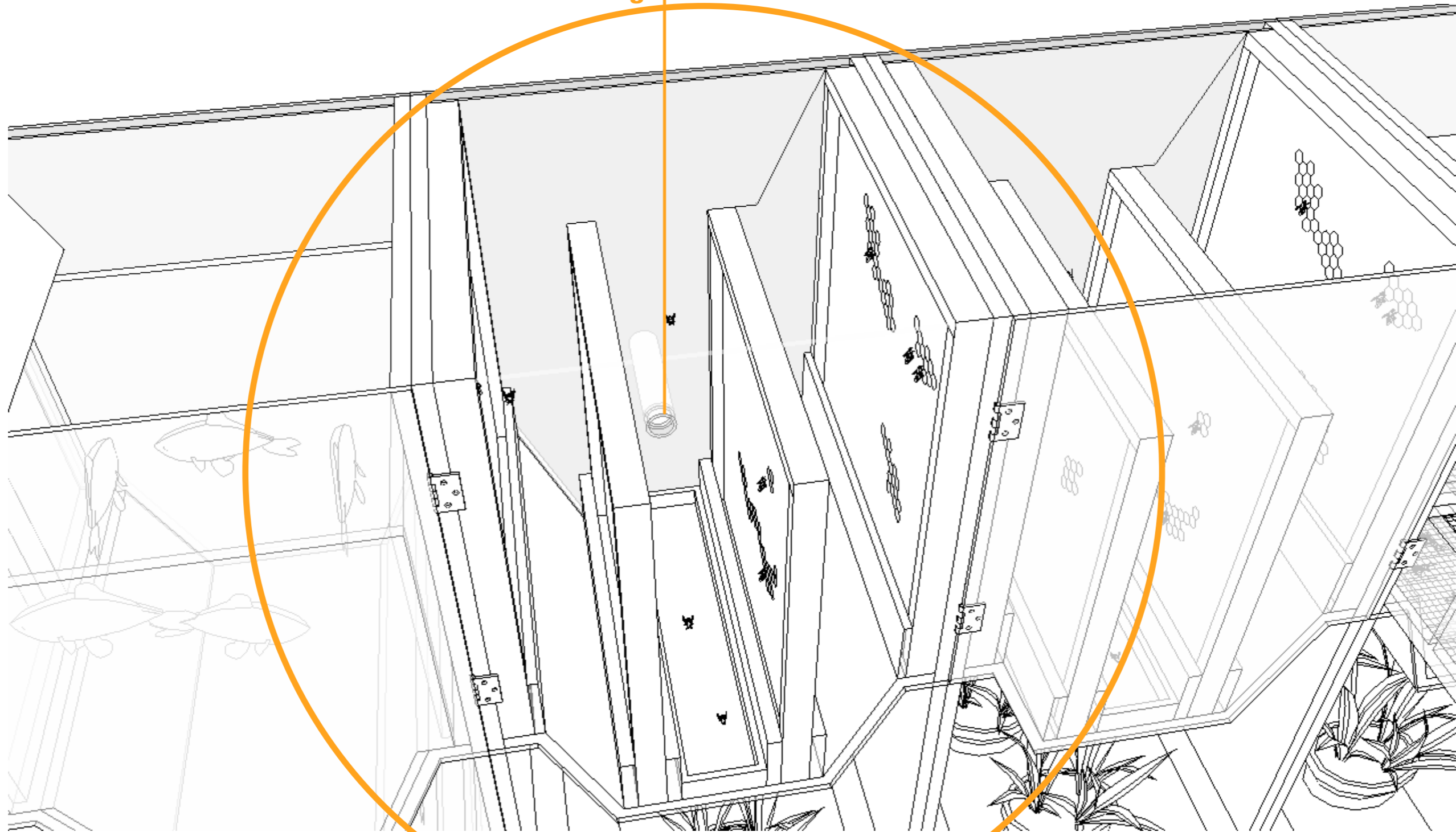
### Bee hives



**The hives are an adapted version of the traditional wooden panels.**



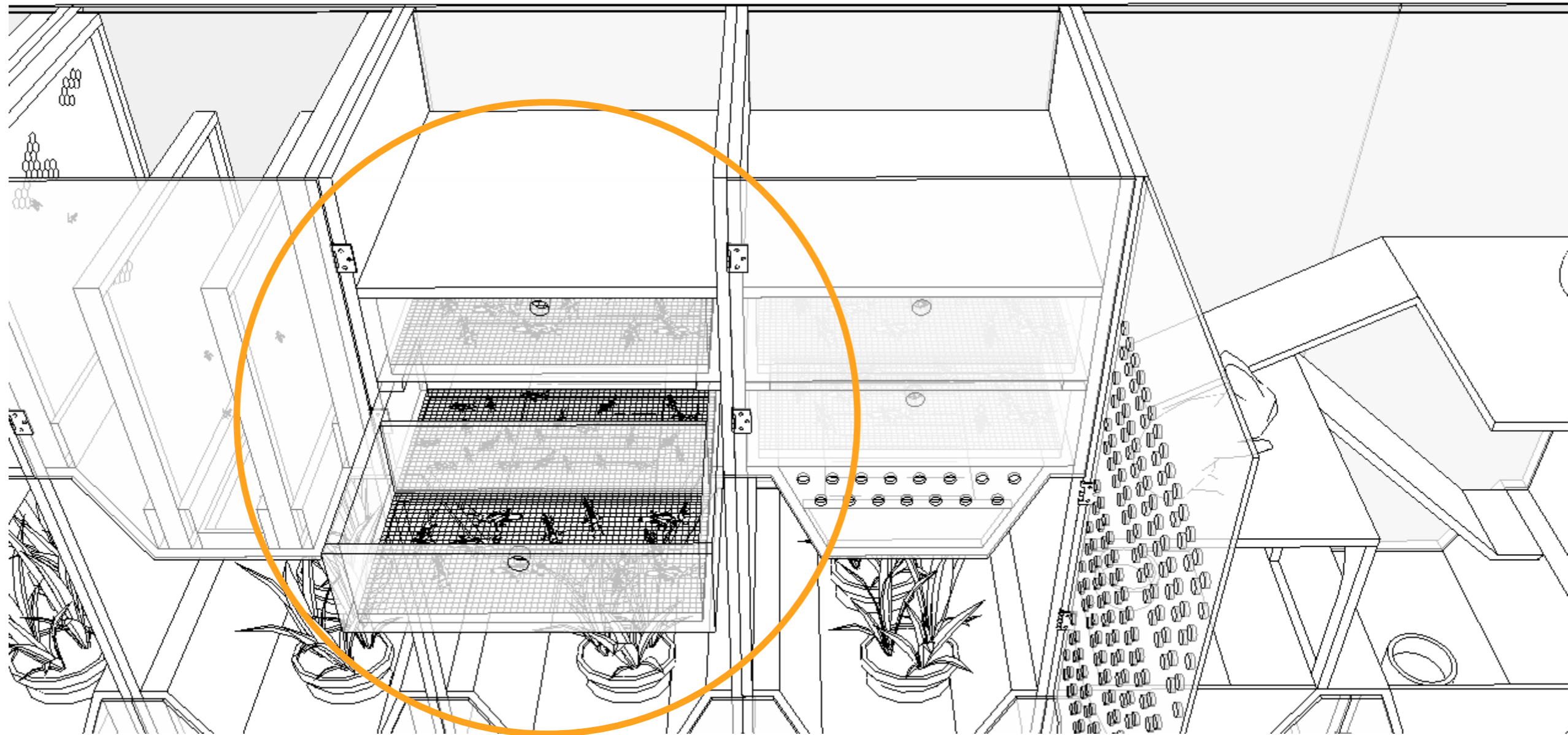
**The plexiglass pipe allows the bees to enter the crate, without interference with the inside of the dwelling.**

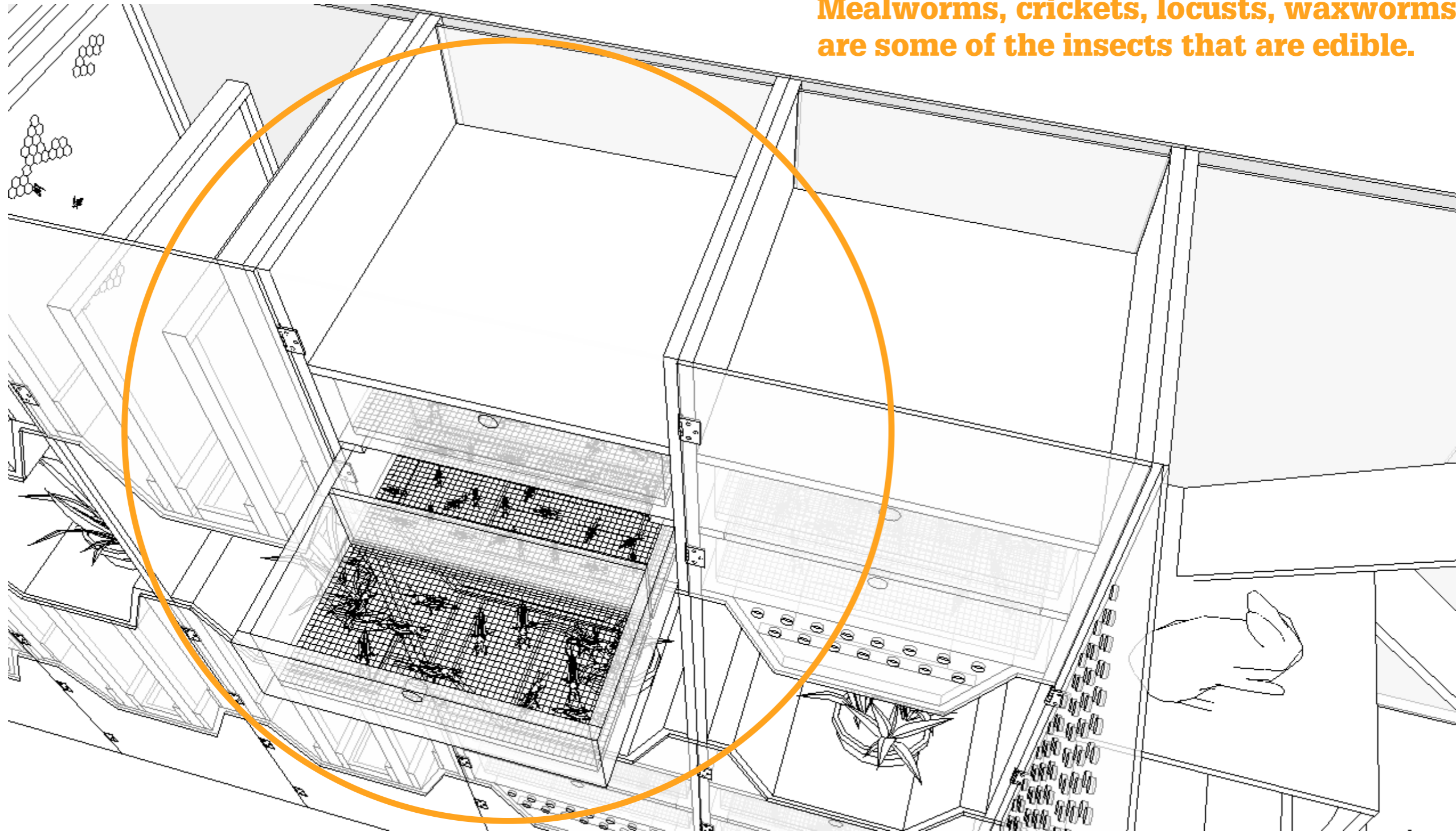




**The agave nectar tray offers food to the bees during the winter months**

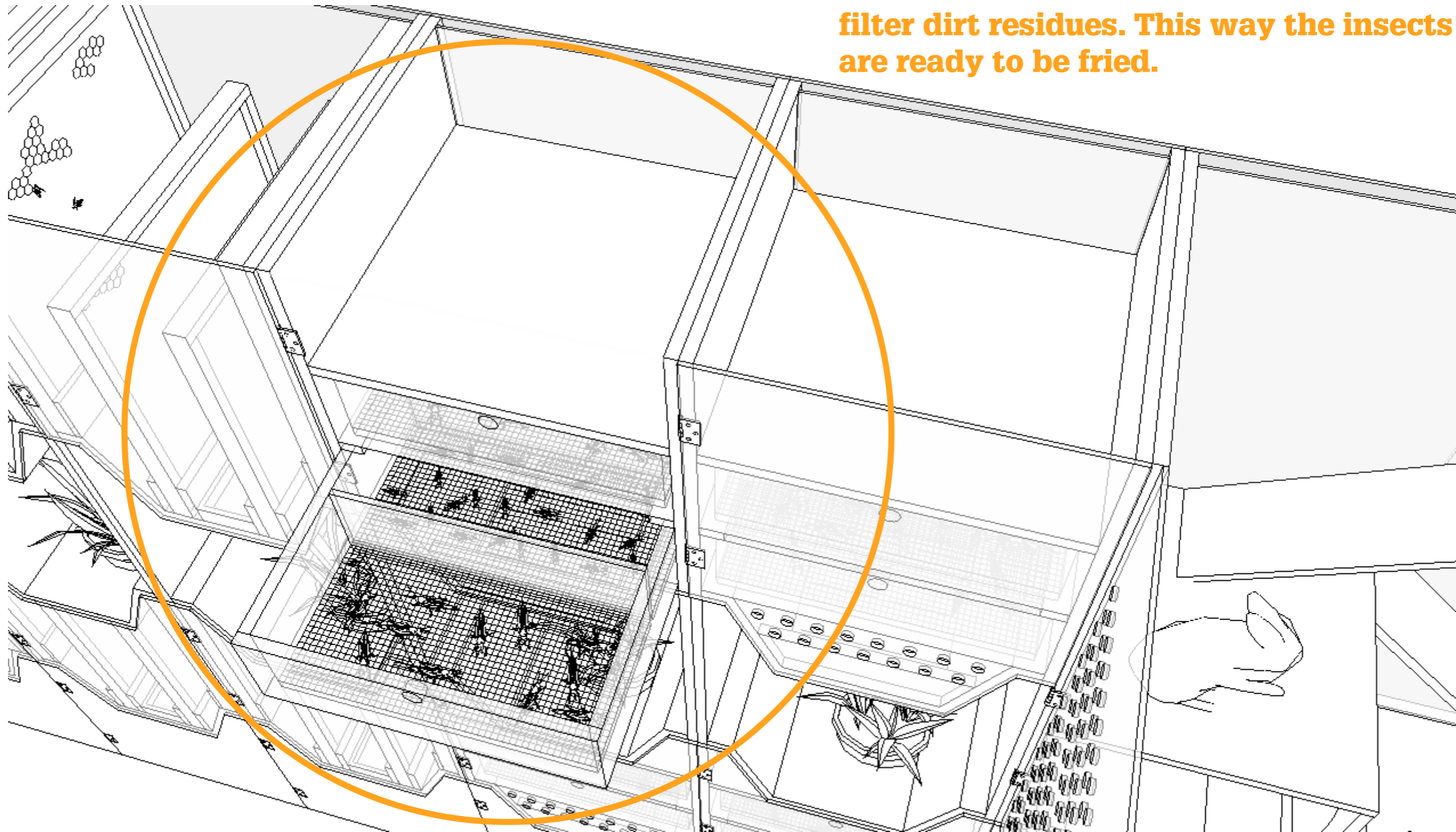
## Insect Crate





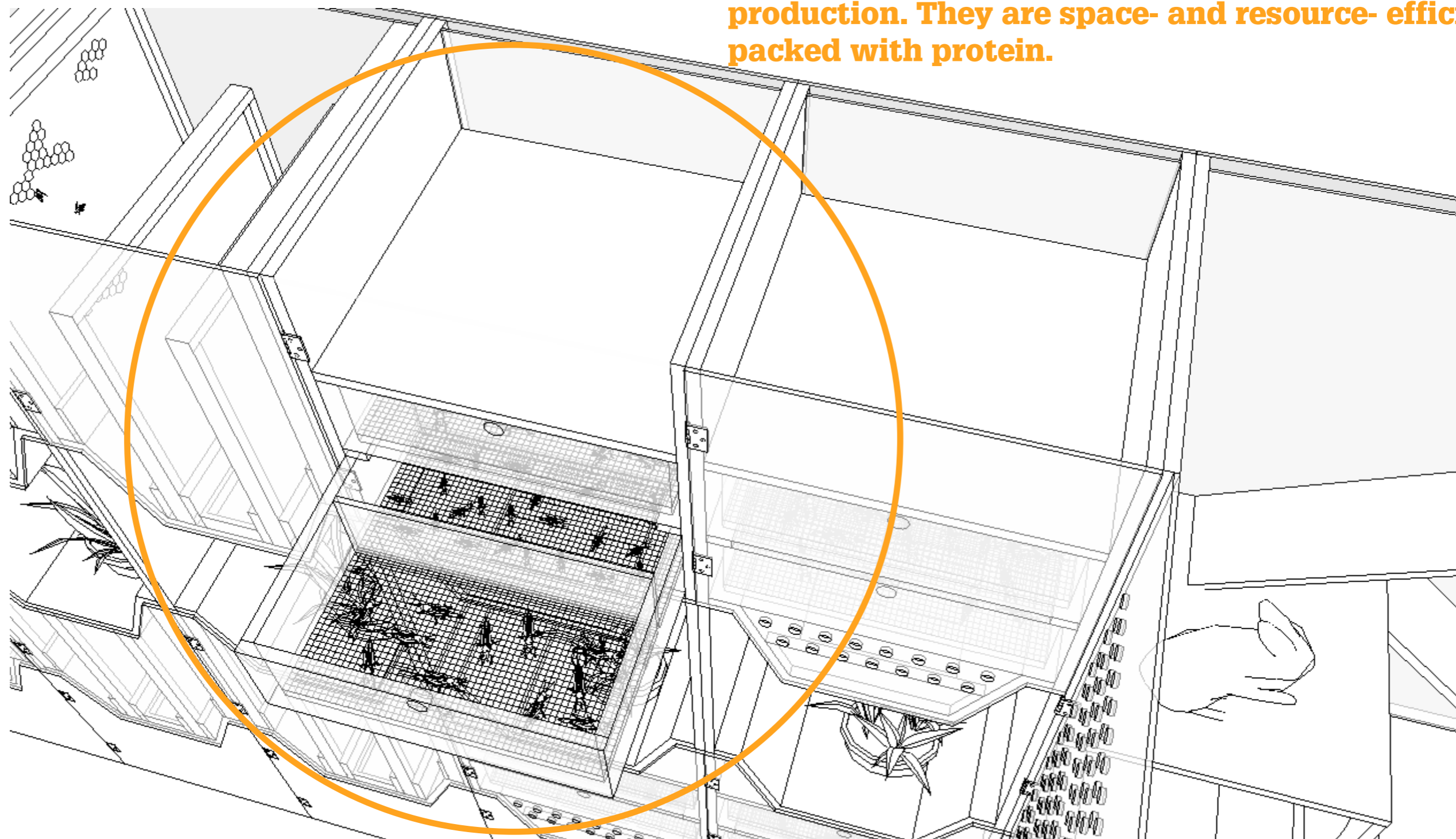
**Mealworms, crickets, locusts, waxworms are some of the insects that are edible.**



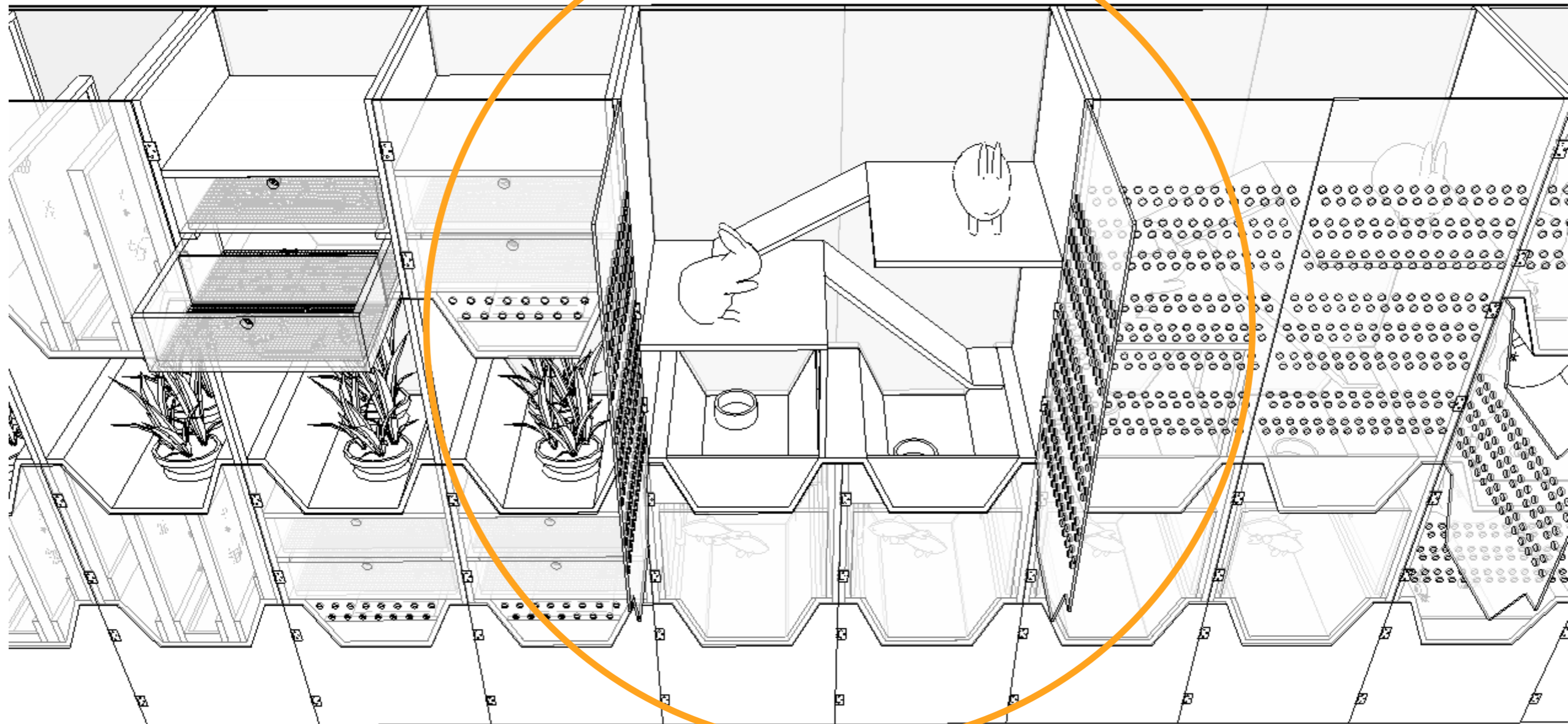


**The wire mesh at the bottom is used to filter dirt residues. This way the insects are ready to be fried.**

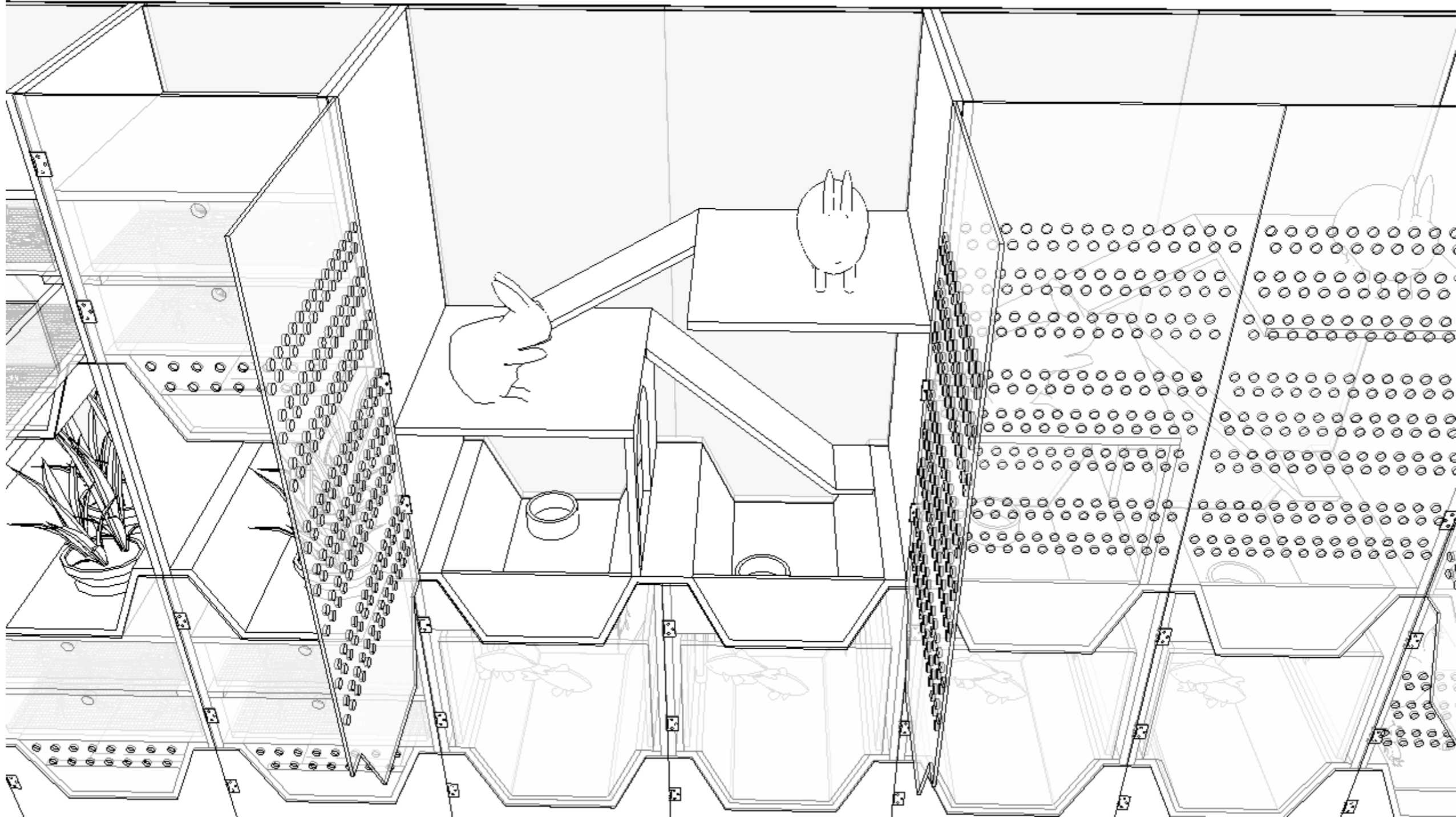
**Insects can also be fed to fish in case of over-production. They are space- and resource- efficient and packed with protein.**

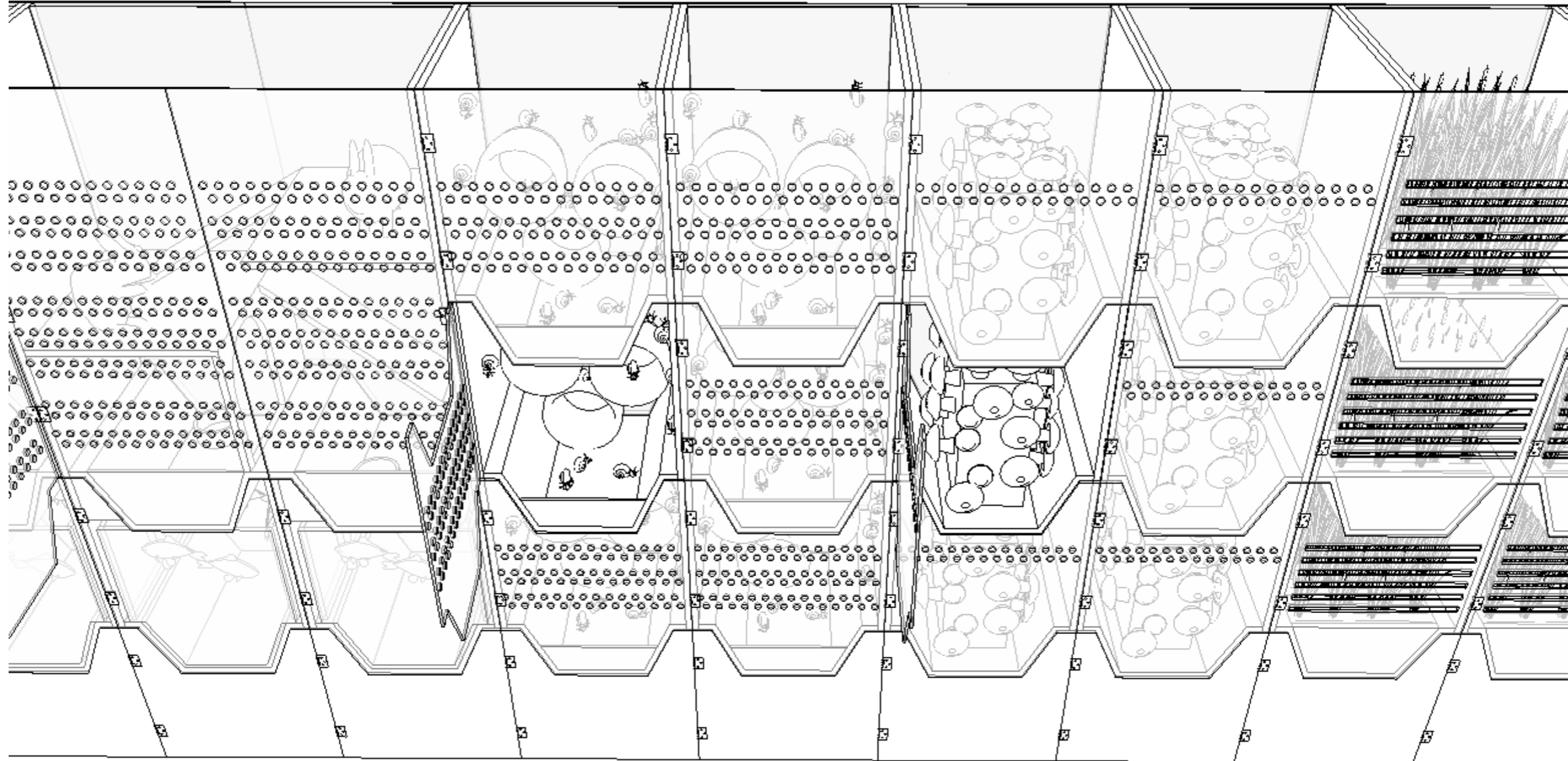


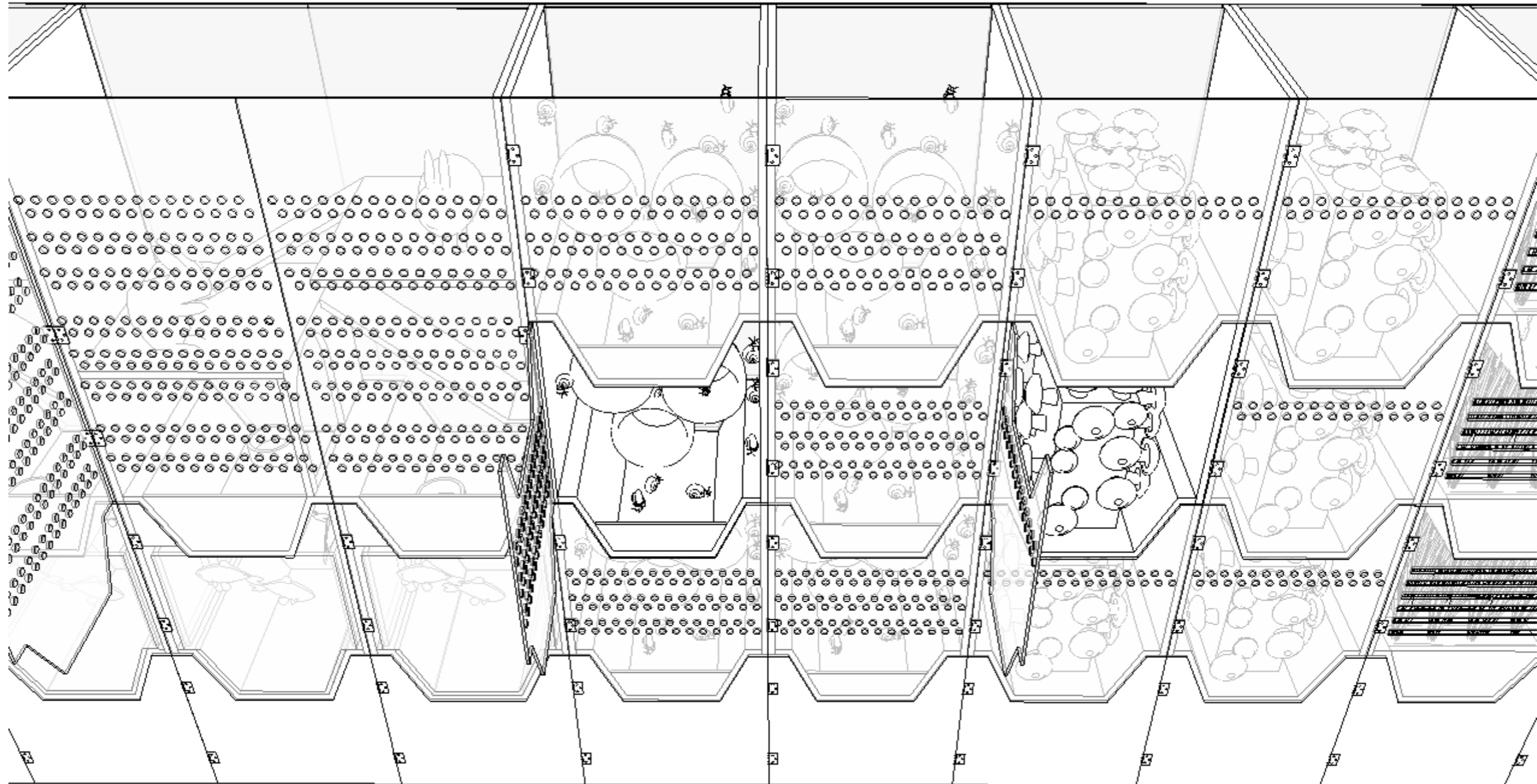
**Rabbits are a very efficient source of meat based protein.**



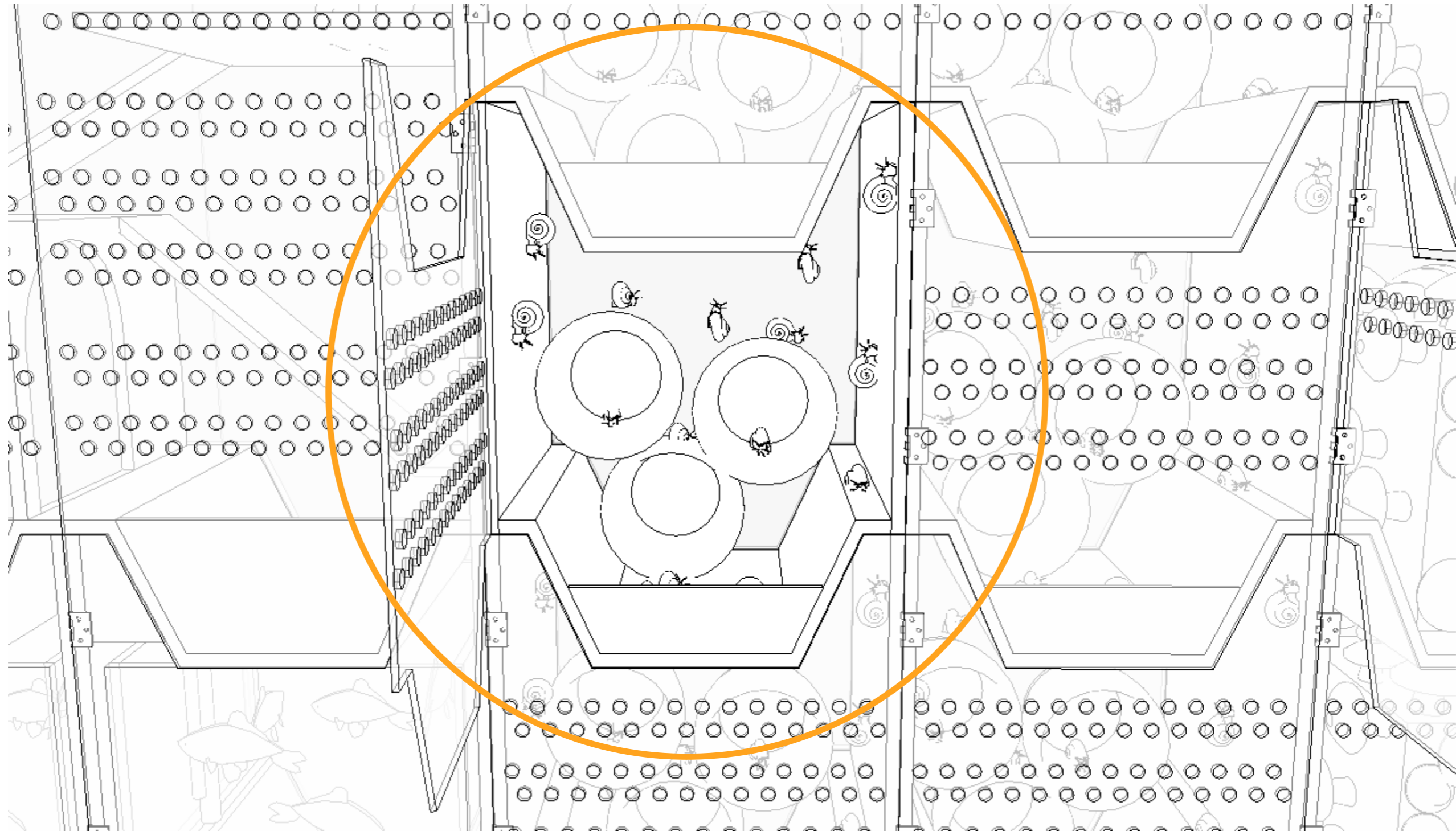
**They can be fed with plant parts that are not used for cooking. They produce cold manure, which means manure that can be directly used, without composting.**



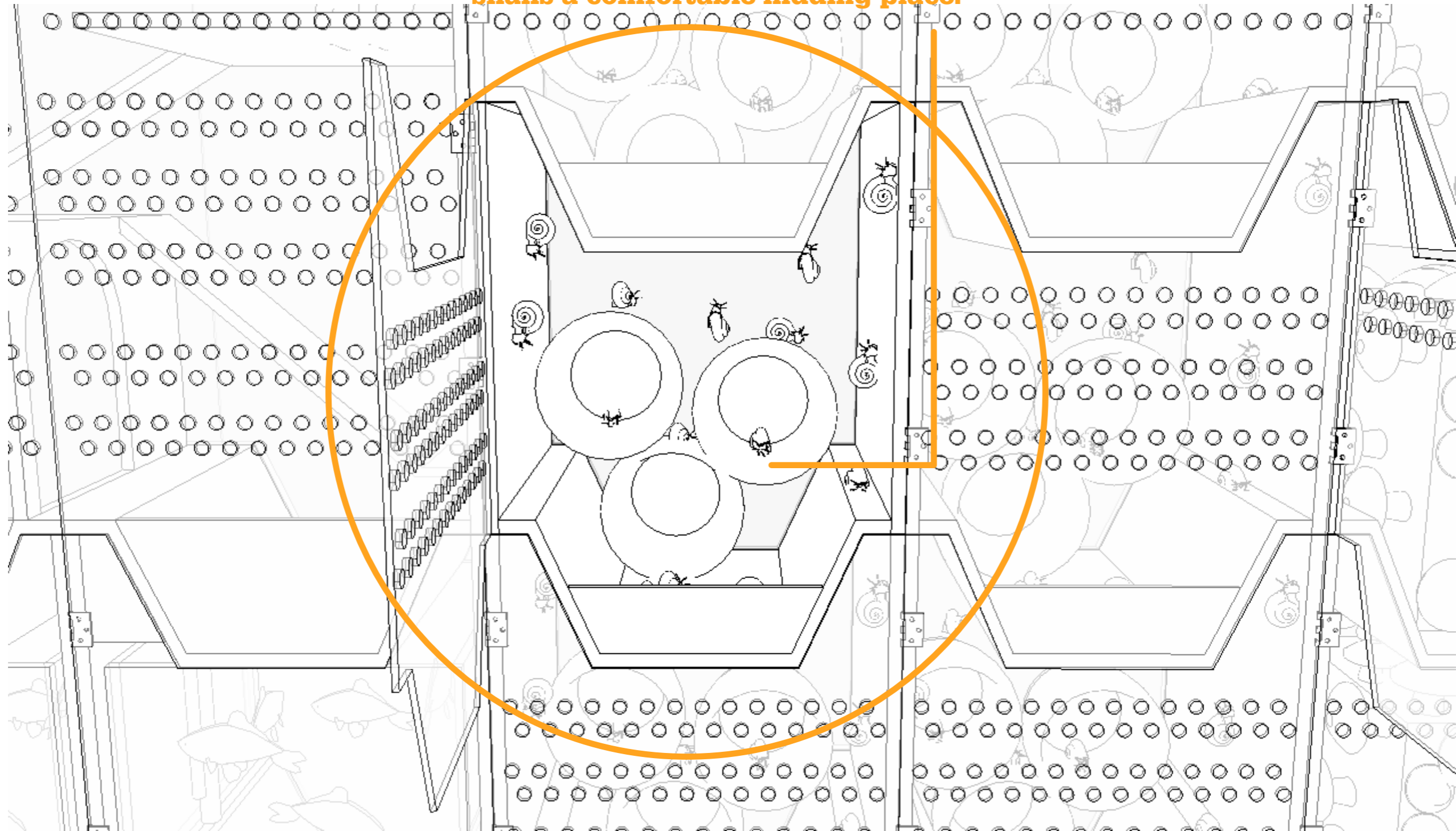




**Snails are space efficient, help brake down plant waste and thrive on humidity.**

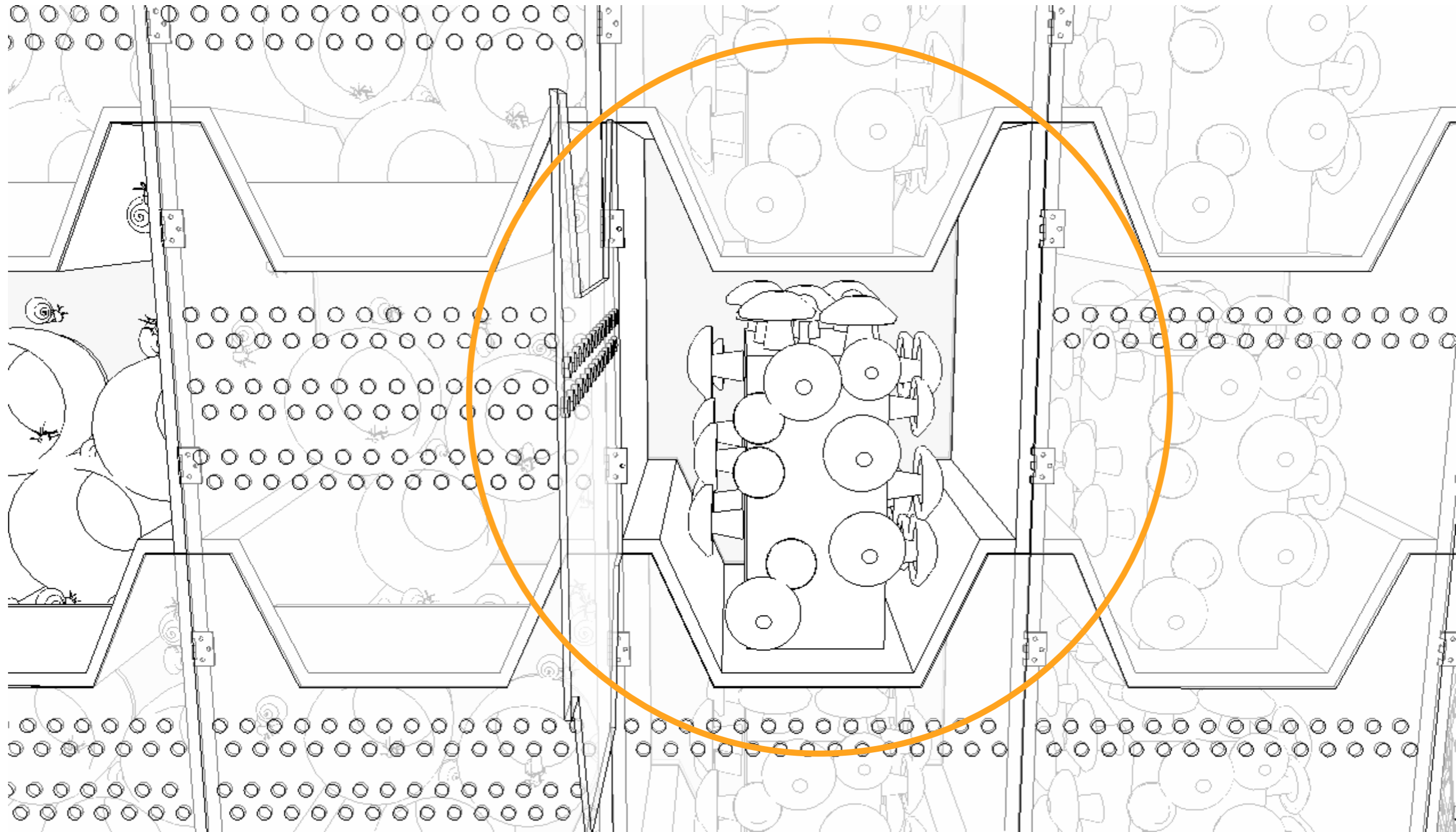


**The ceramic pots capture water, offering the snails a comfortable hiding place.**

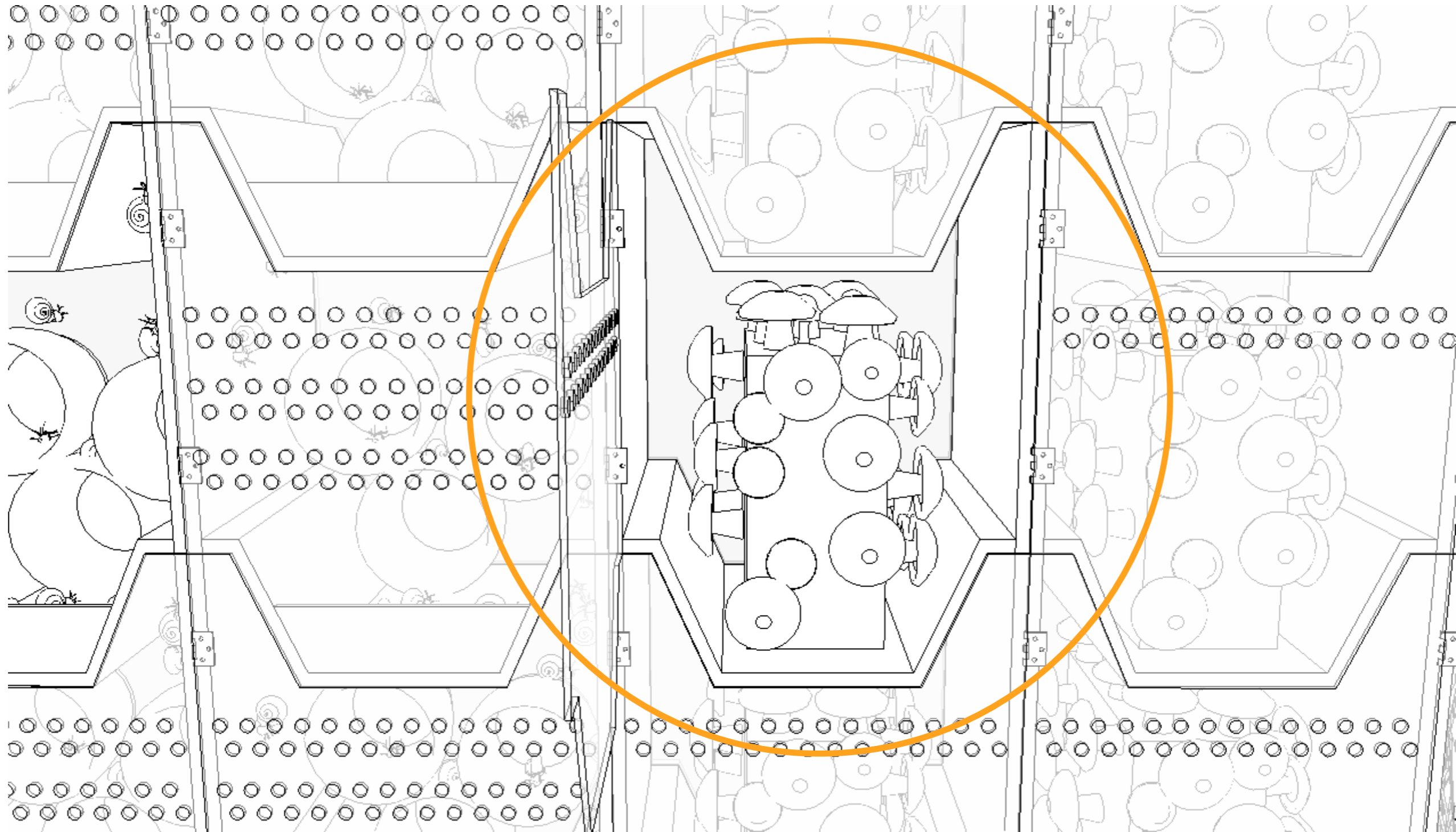




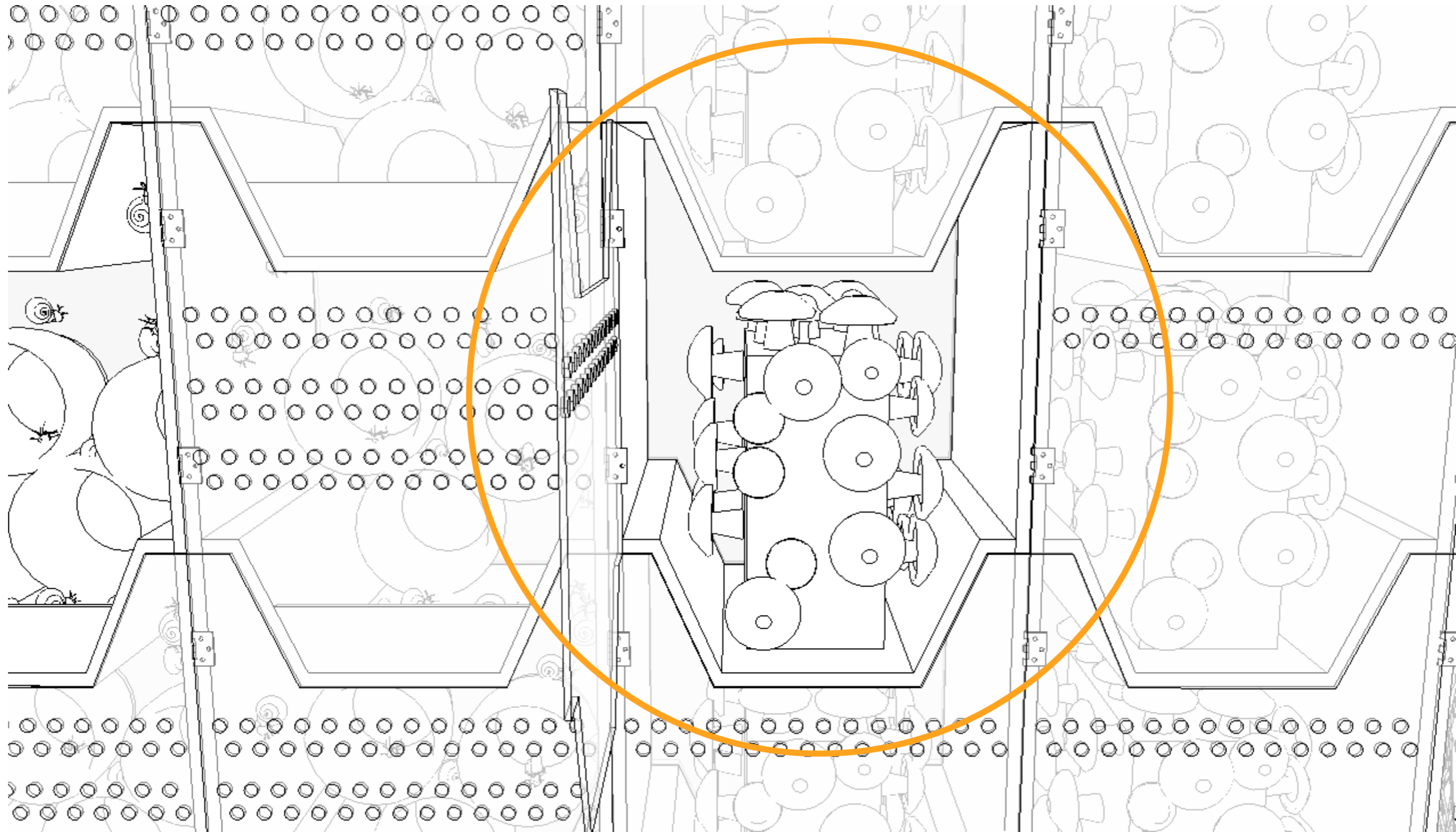
**Mushrooms grow easily on a dried plant base.**



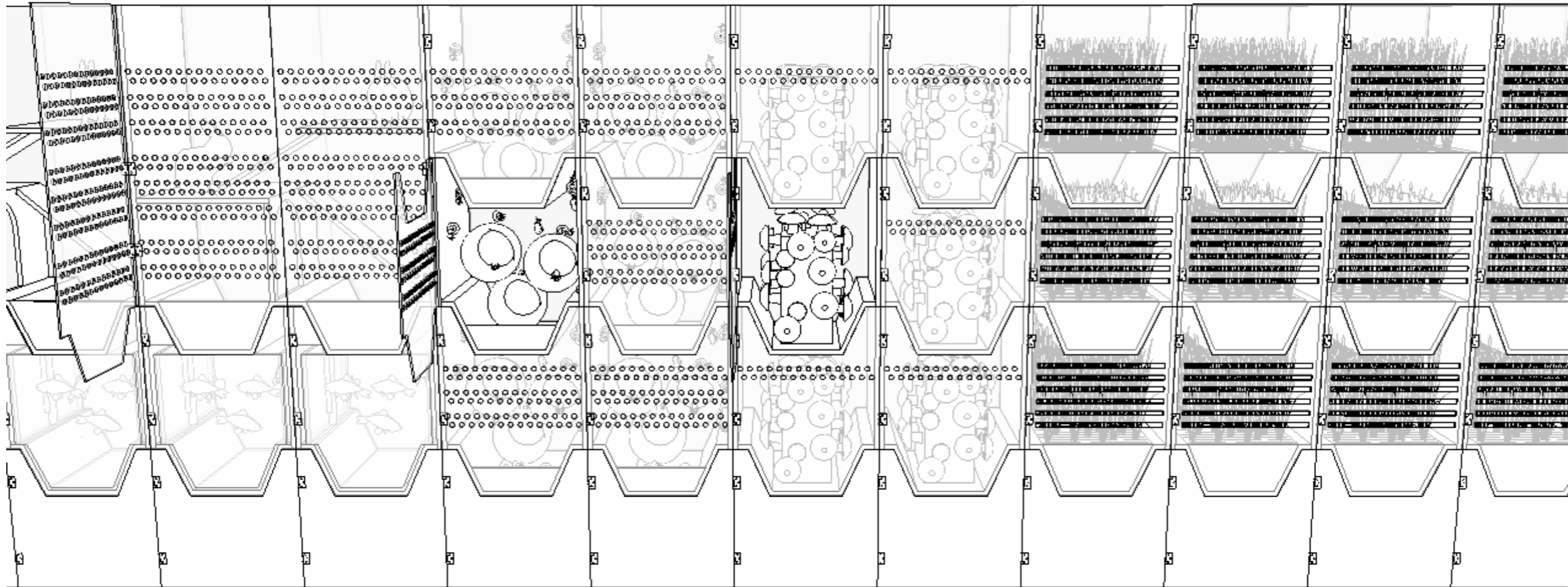
**Like snails, they need humidity, so they work well closely.**



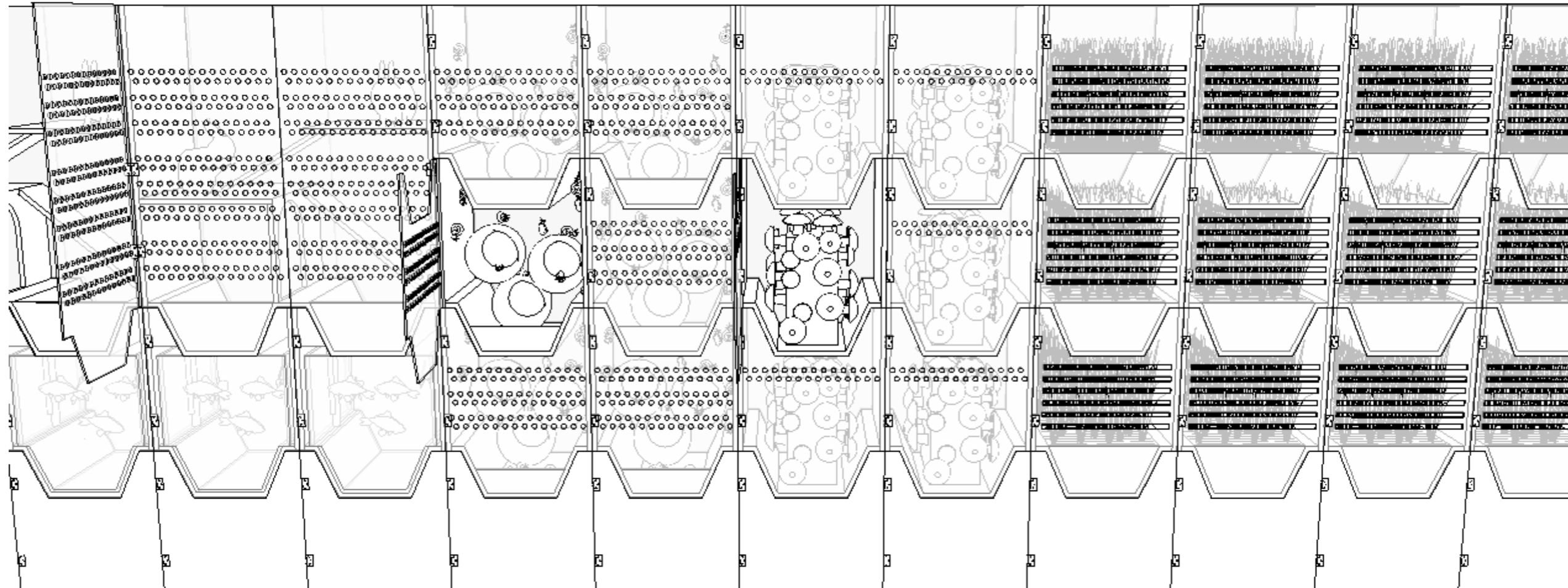
**And like snails, they need shade, thus being ideal for the north orientation.**



Different needs of humidity and fresh air lead to different types of openings.

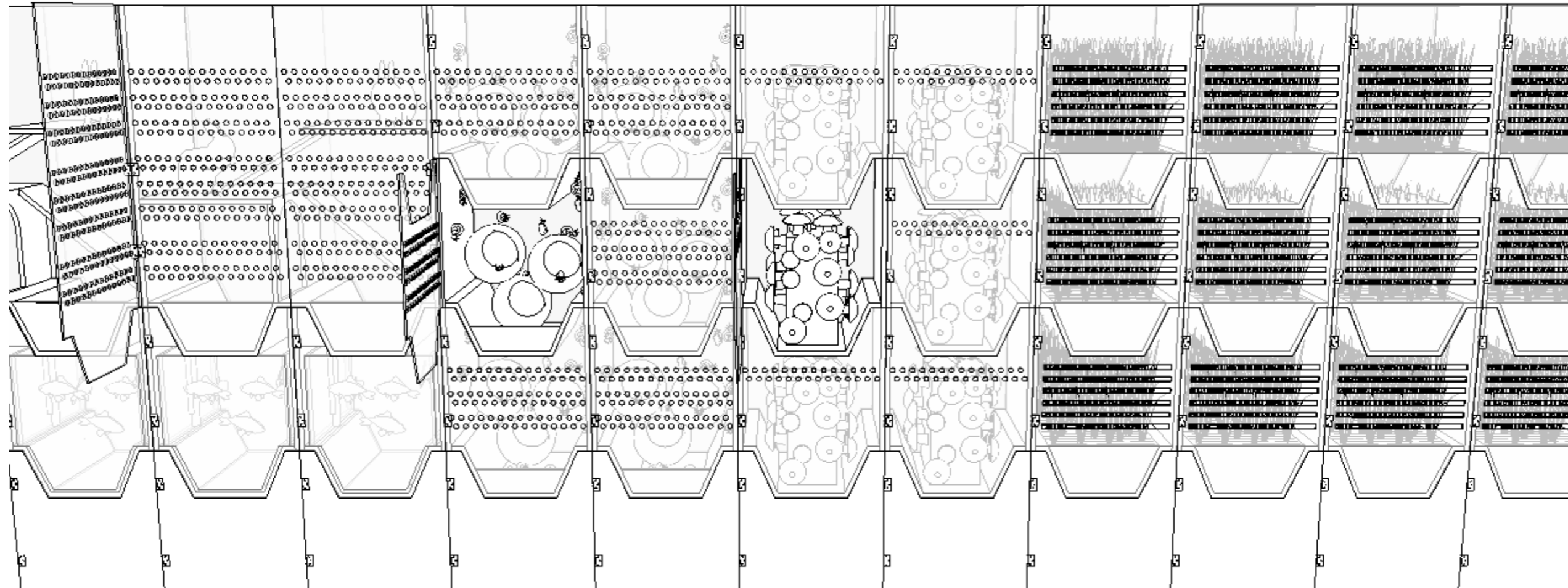


Rabbits: 40% open



Snails: 25% open

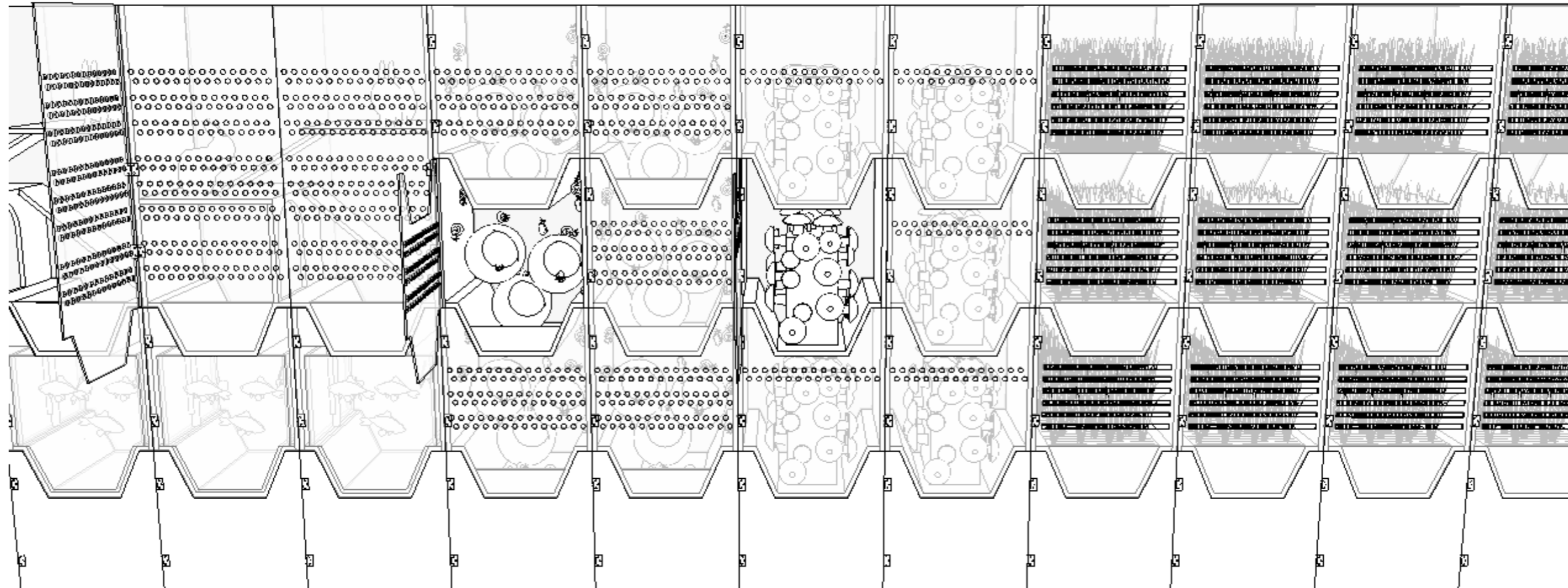
Rabbits: 40% open



Snails: 25% open

Rabbits: 40% open

Mushrooms: 5% open

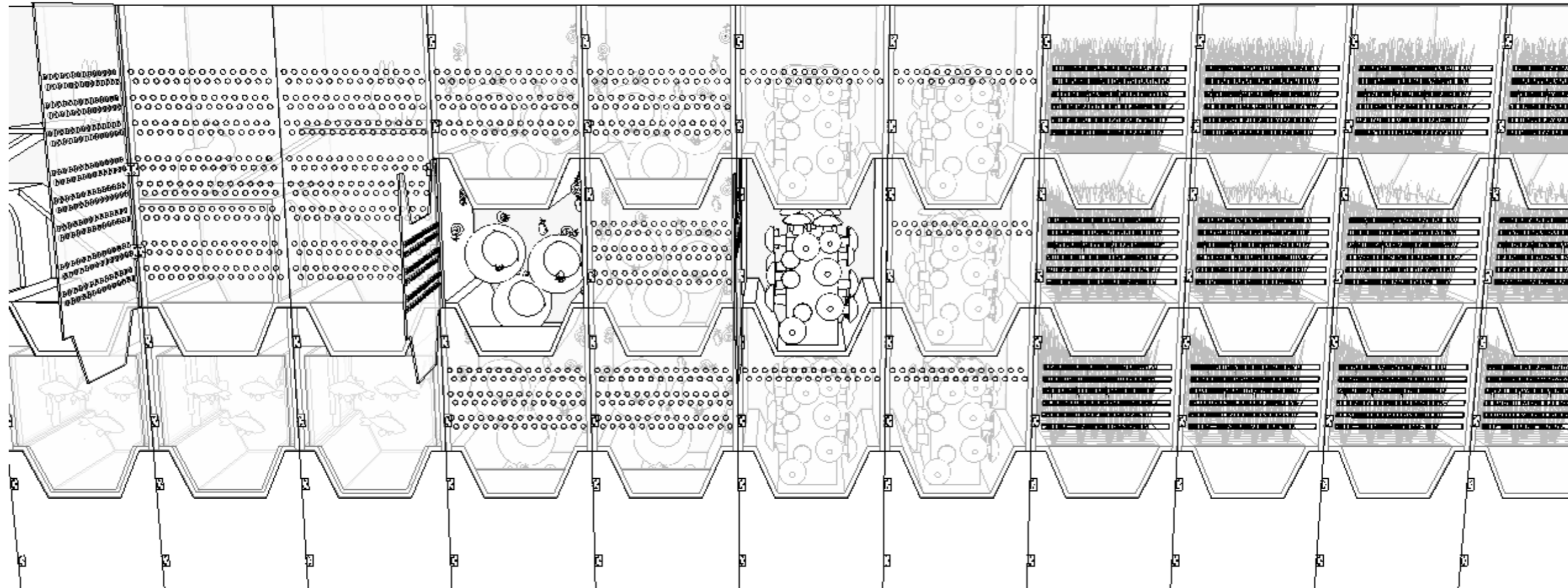


Snails: 25% open

Quinoa seeds: 30 % open

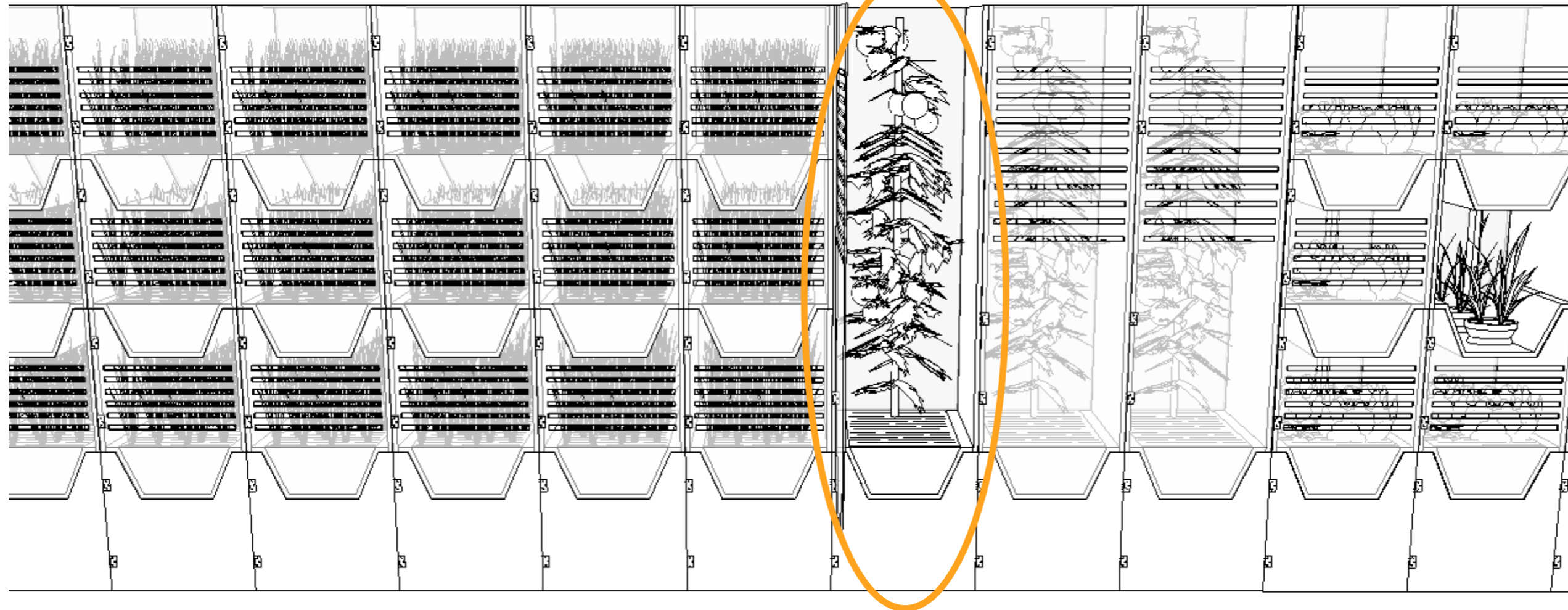
Rabbits: 40% open

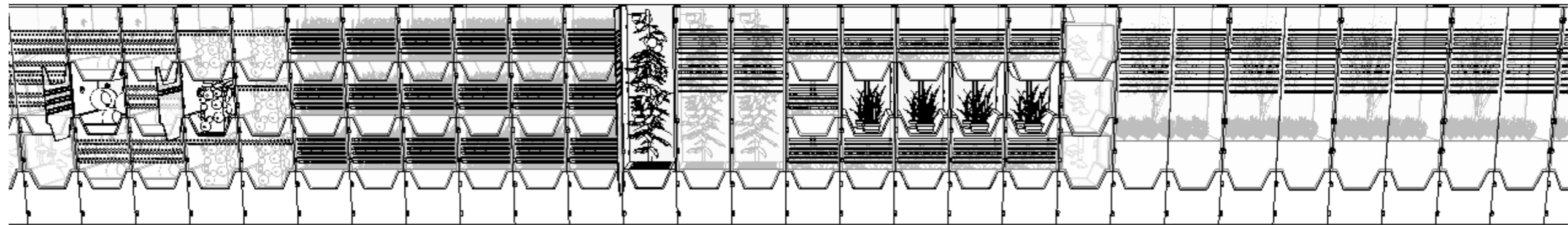
Mushrooms: 5% open

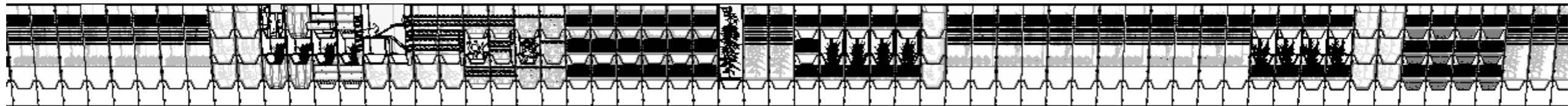


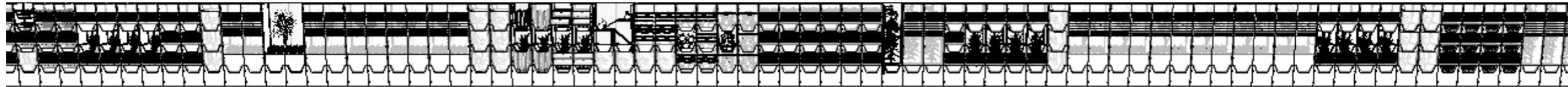


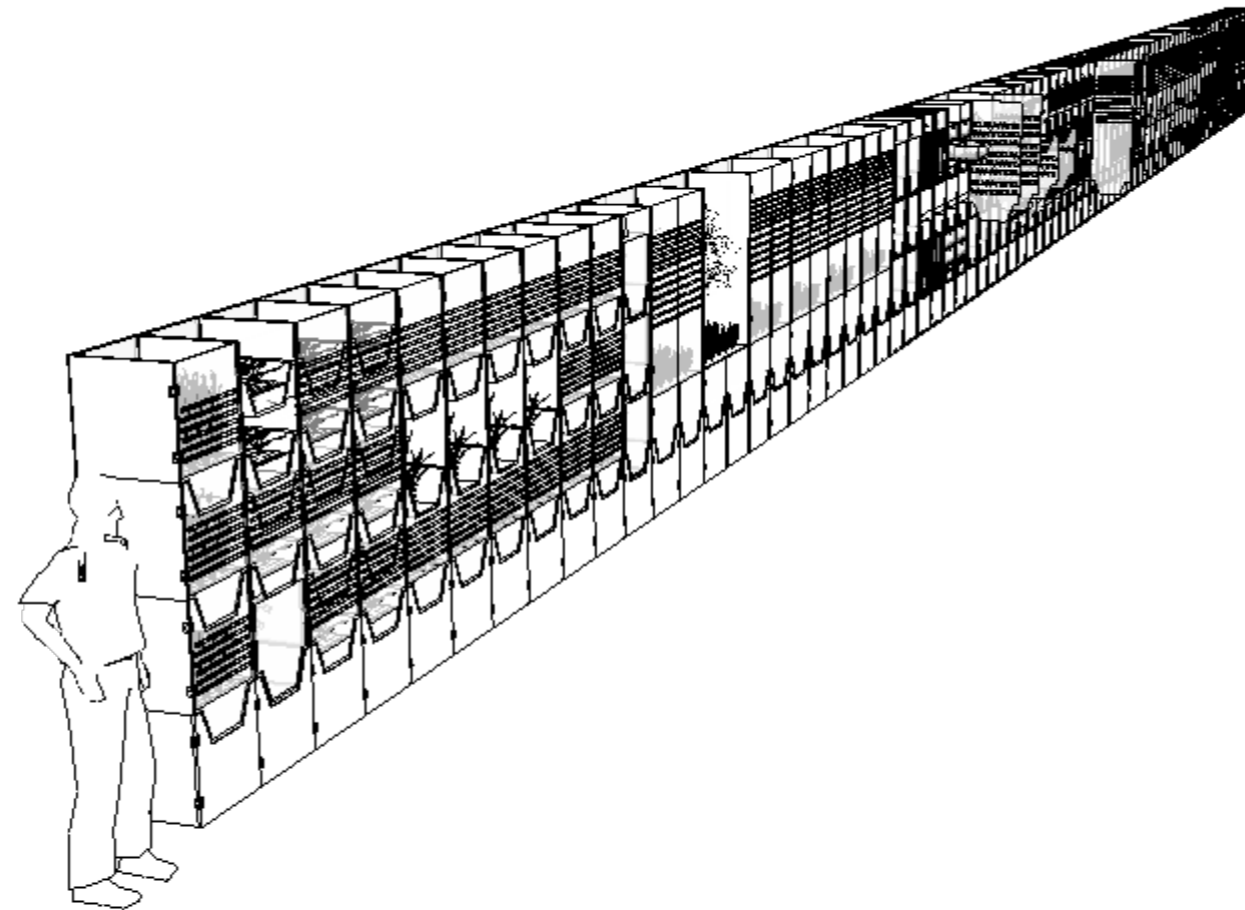
### Plants that grow upwards and vine-like plants



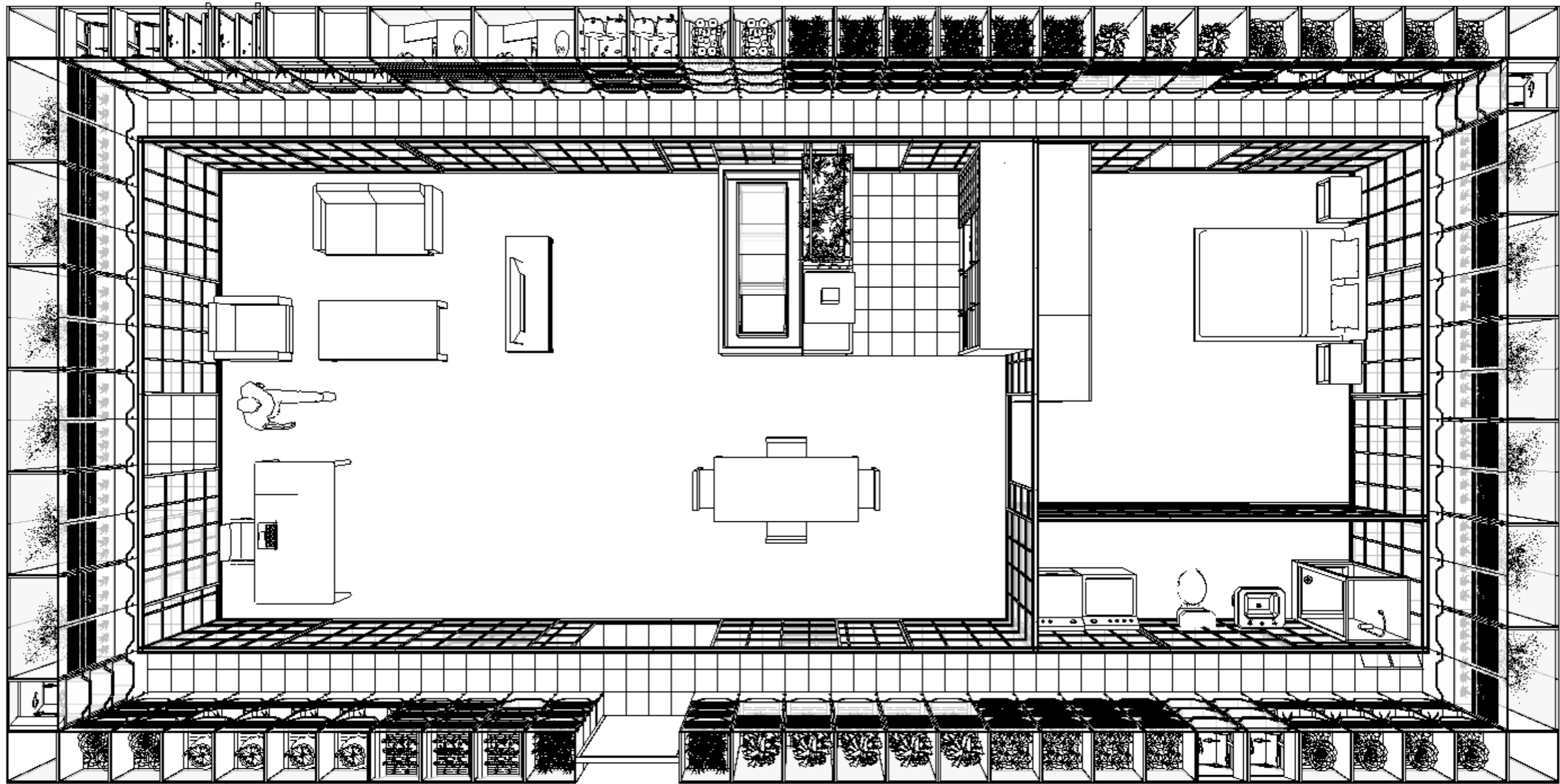


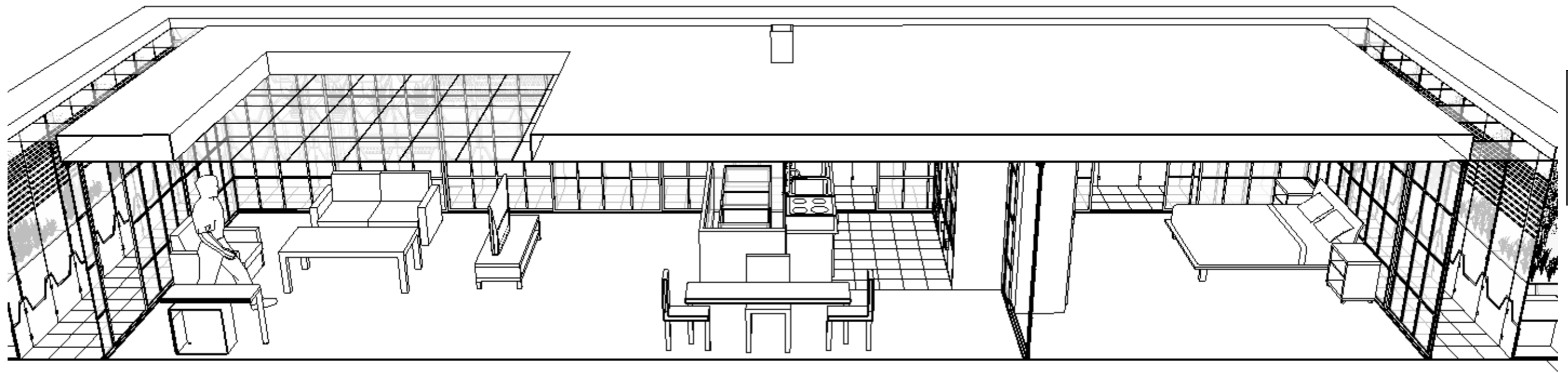






# The i-Dwelling

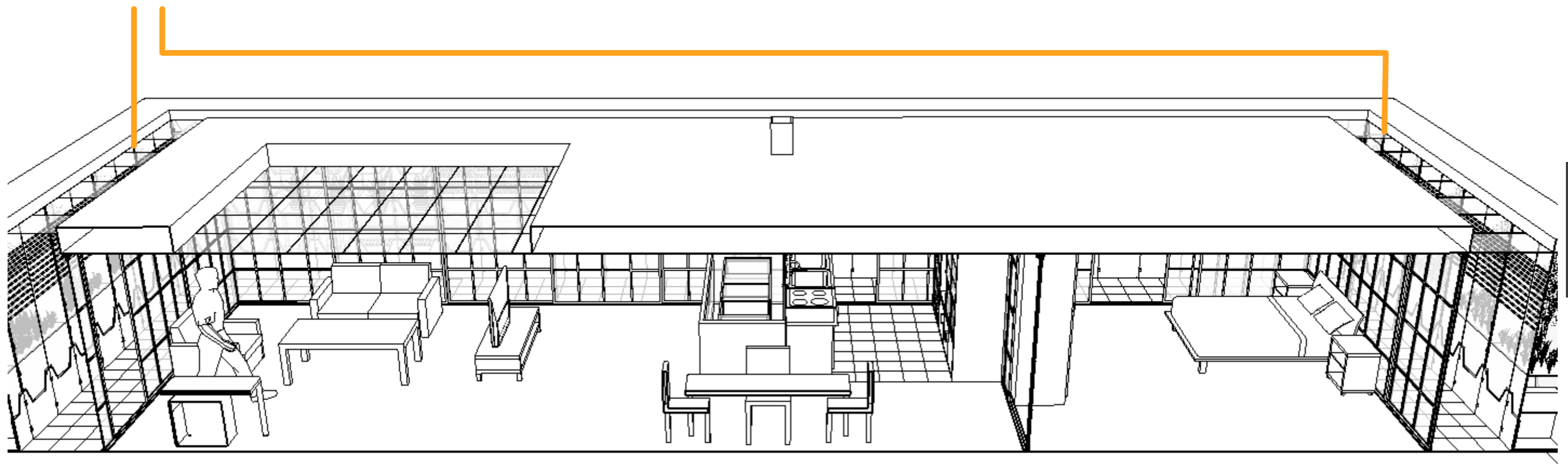


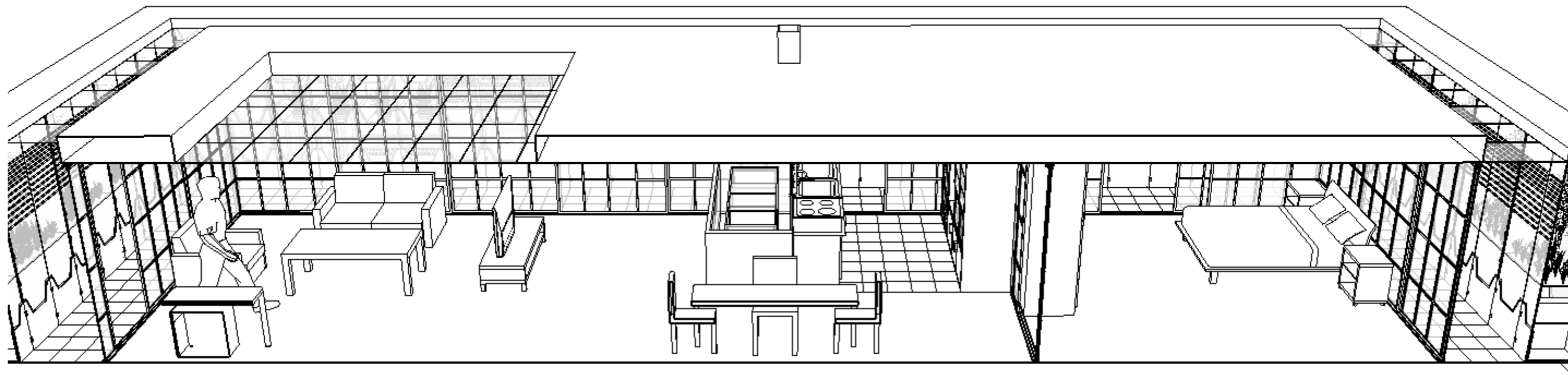


A.M. Symvoulidou



**The food production corridor has fresh air access through the top. This way humid, warm air can leave the dwelling without entering the living area.**





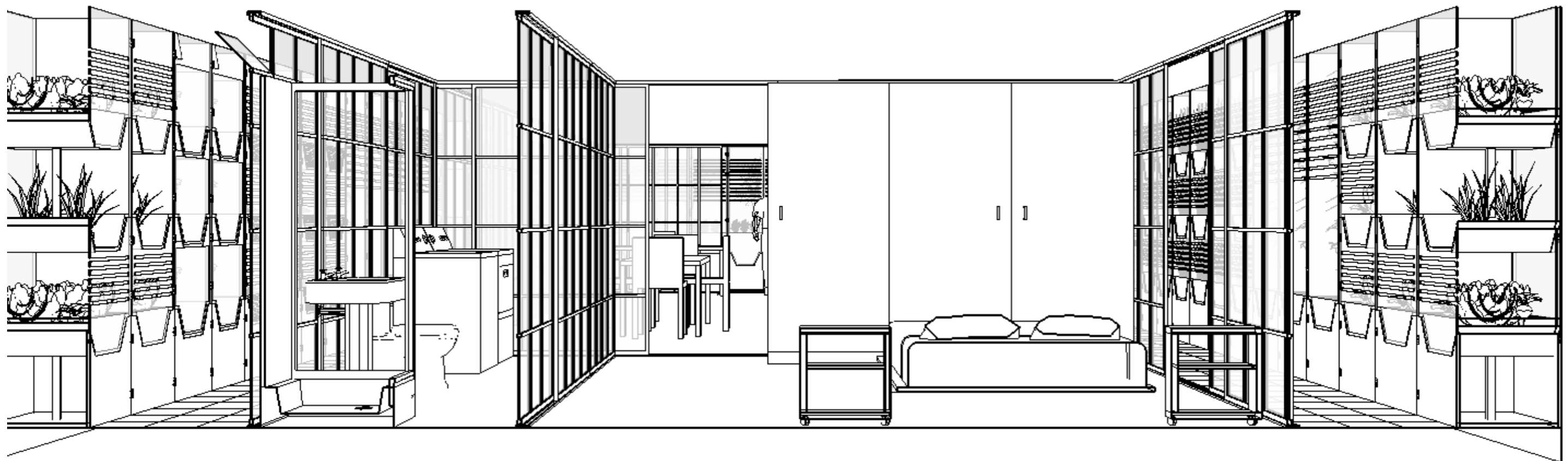
A.M. Symvoulidou



**Climate zone 1:**  
 humidity due  
 to evaporation  
 of the grow-  
 crates

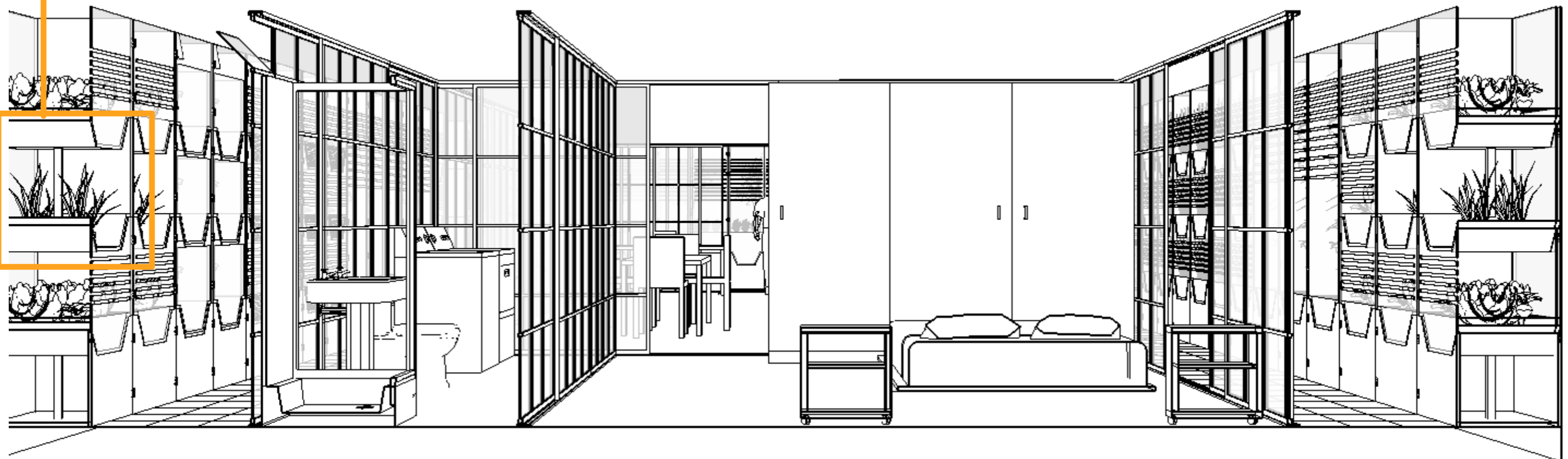
**Climate zone 2:**  
 Living area: by opening and closing the  
 shoji-like panels, humidity and temperature  
 can be adapted according to the climate.

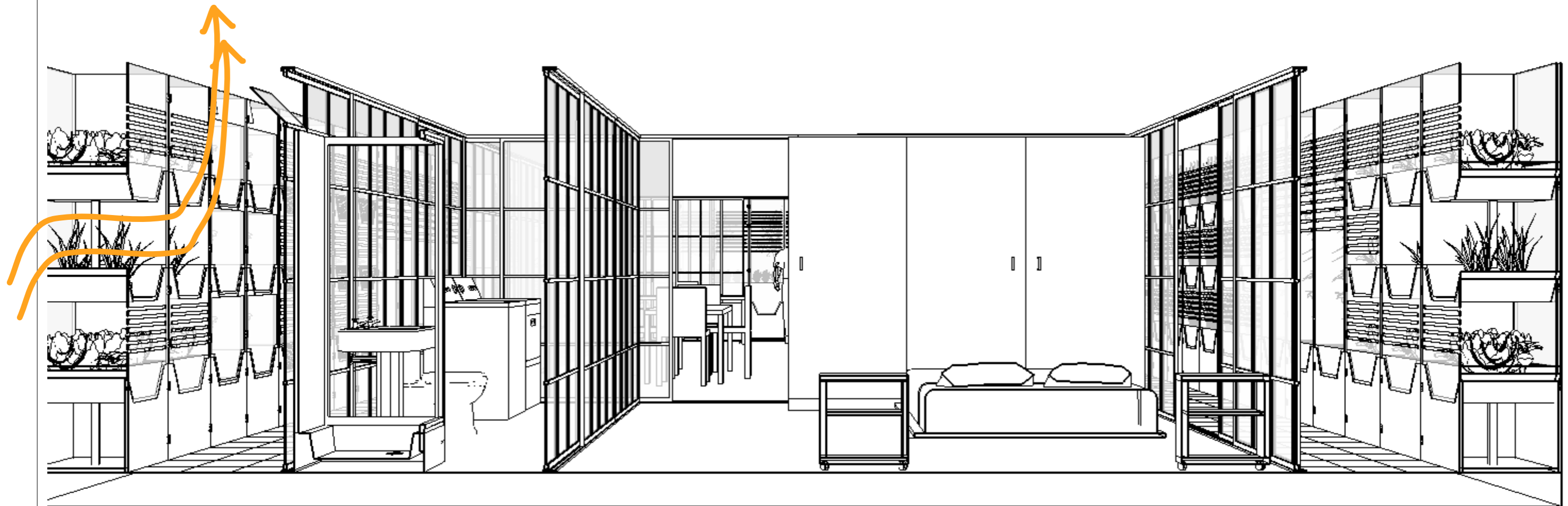
**Climate zone 1:**  
 humidity due  
 to evaporation  
 of the grow-  
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A. M. Symvoulidou

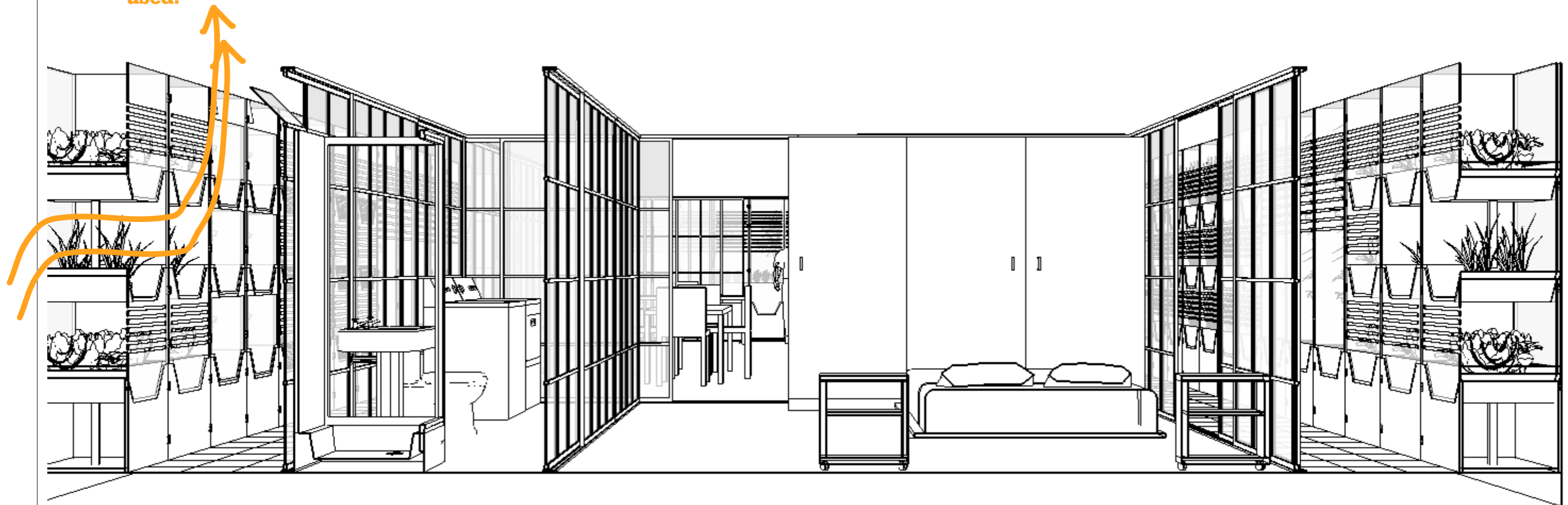
Parts of the GROW-facade open to allow fresh air in and promote circulation through the ceiling openings.





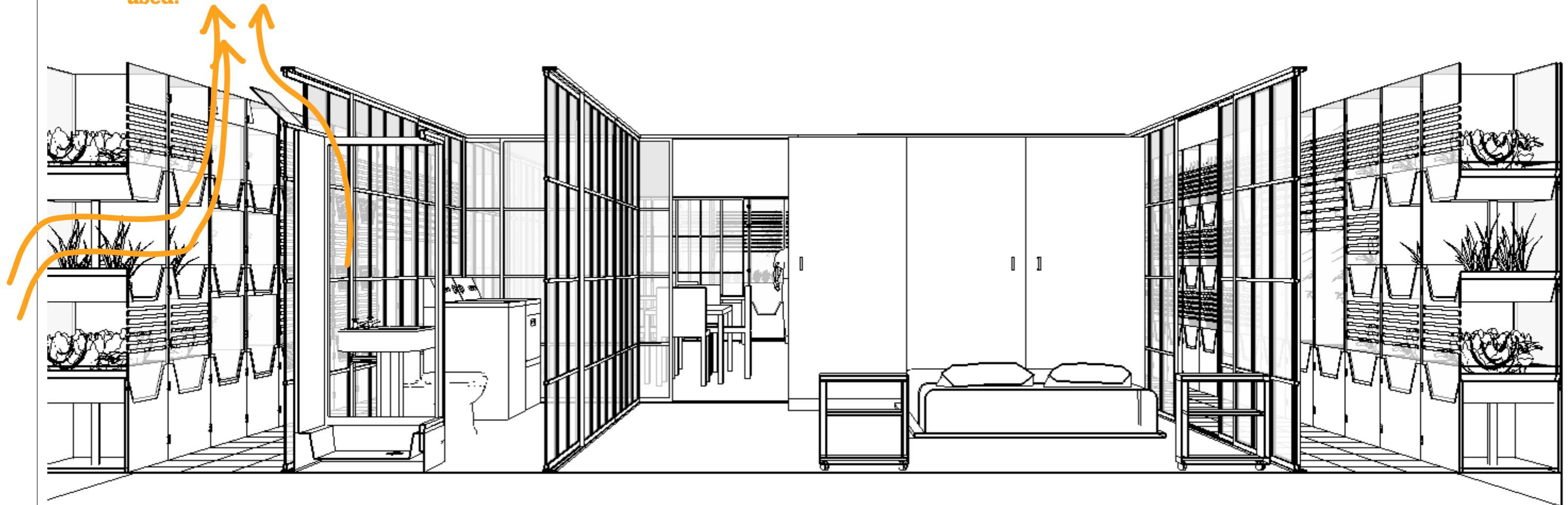
A. M. Symvoulidou

**The bathroom is another area that accumulates humidity. To solve this issue, shojis that have inclining openings are used.**



A. M. Symvoulidou

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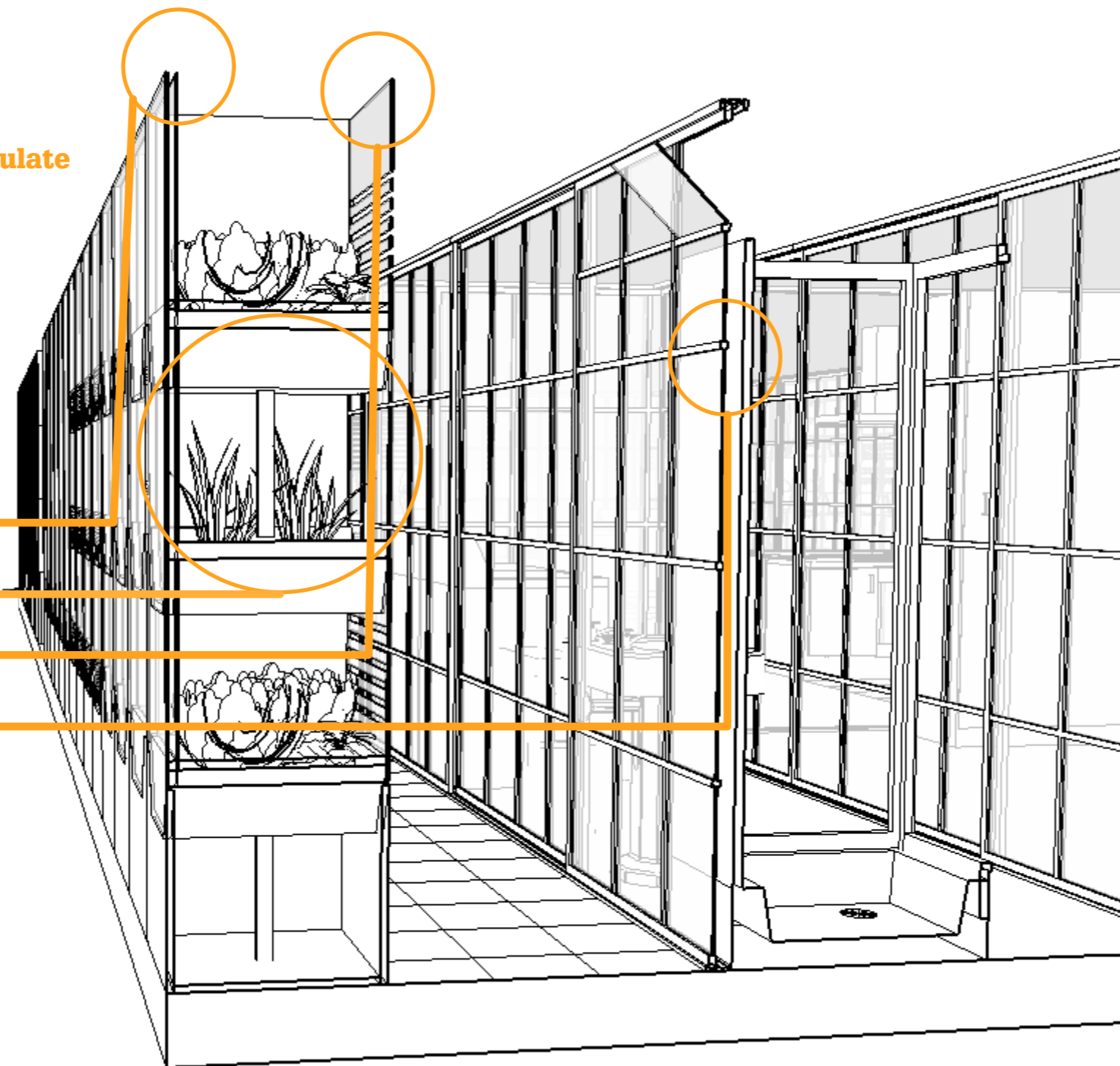
# Summer

In order to cool the living area, shoji panels, ceiling openings and facade openings are kept open, to let air circulate freely.

# Winter

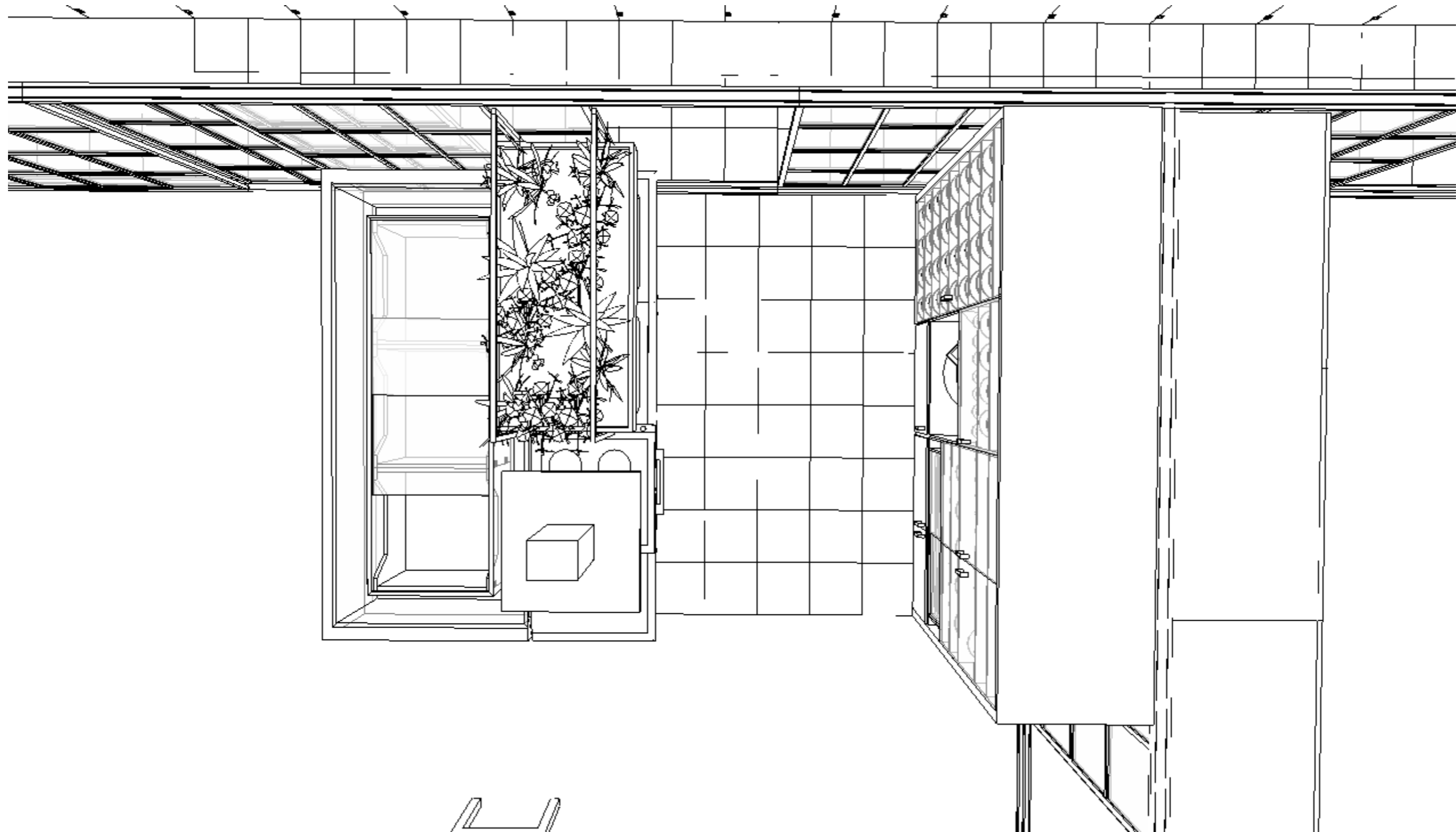
- The double glazing at the outside,
- the 60 cm crate zone,
- the single glazing,
- the GROW hallway and the shojis

are multiple layers making sure that the cold does not enter the living area.

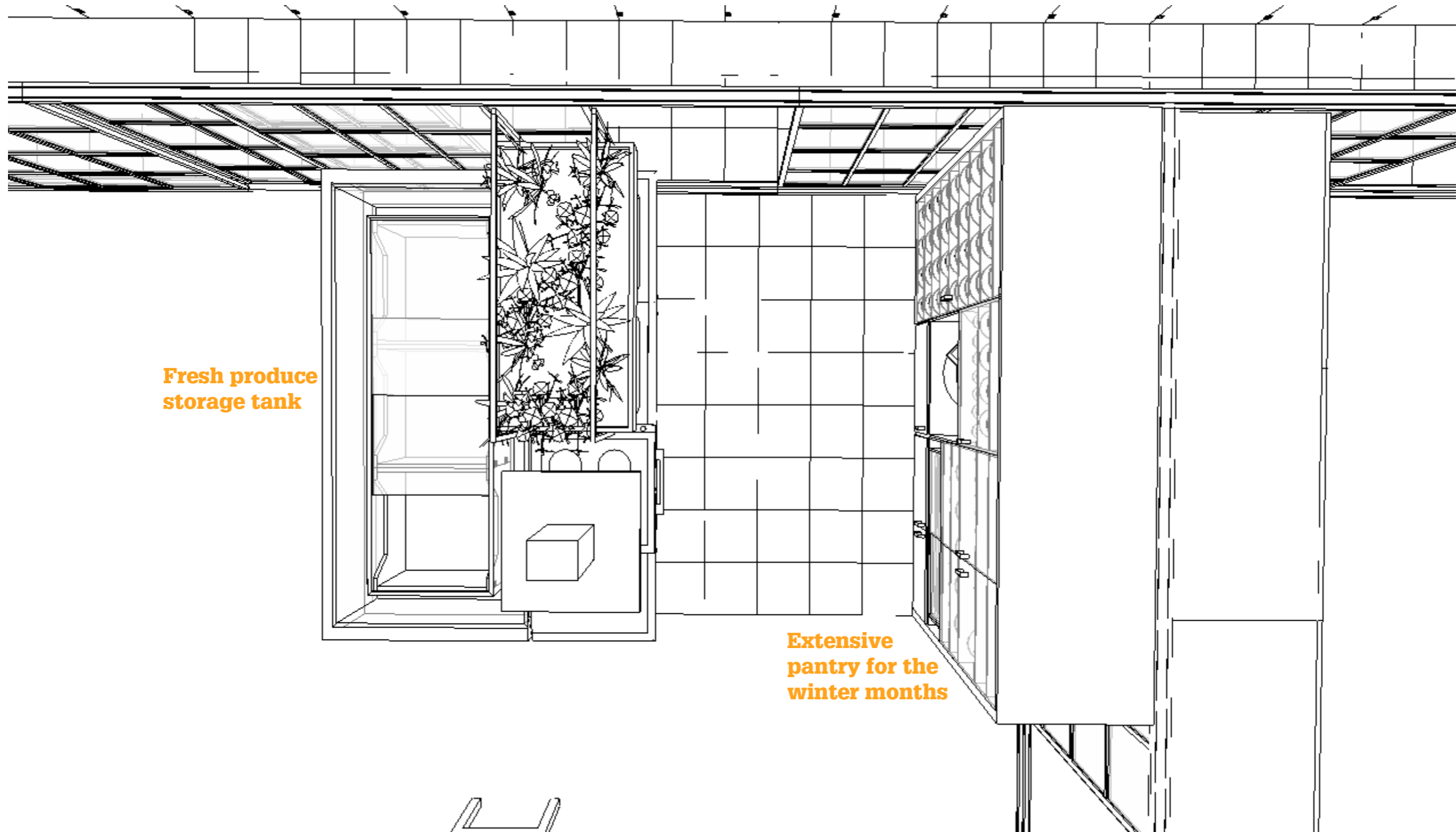




**The kitchen of the i-Dwelling has some added characteristics.**

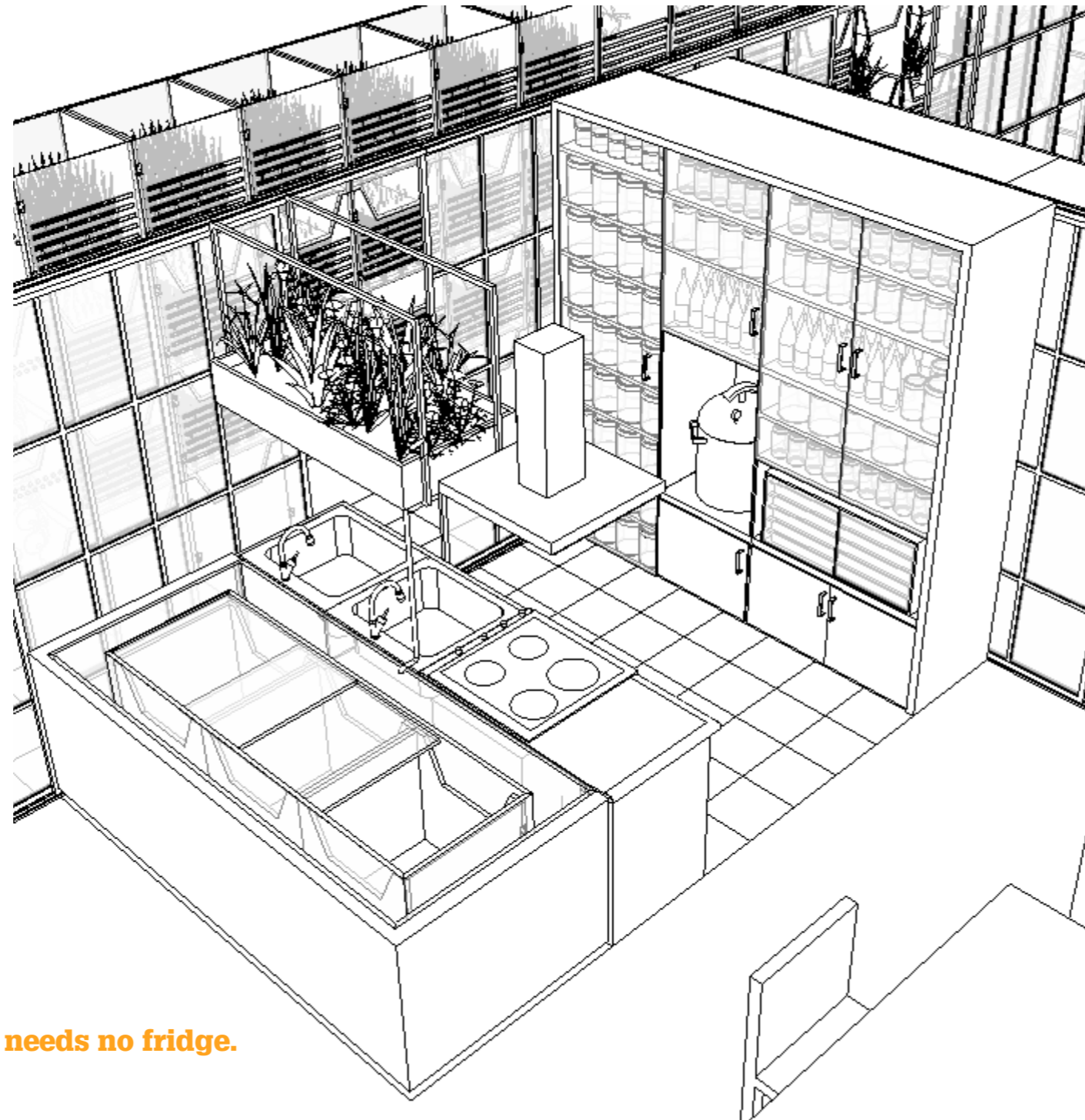


**The kitchen of the i-Dwelling has some added characteristics.**

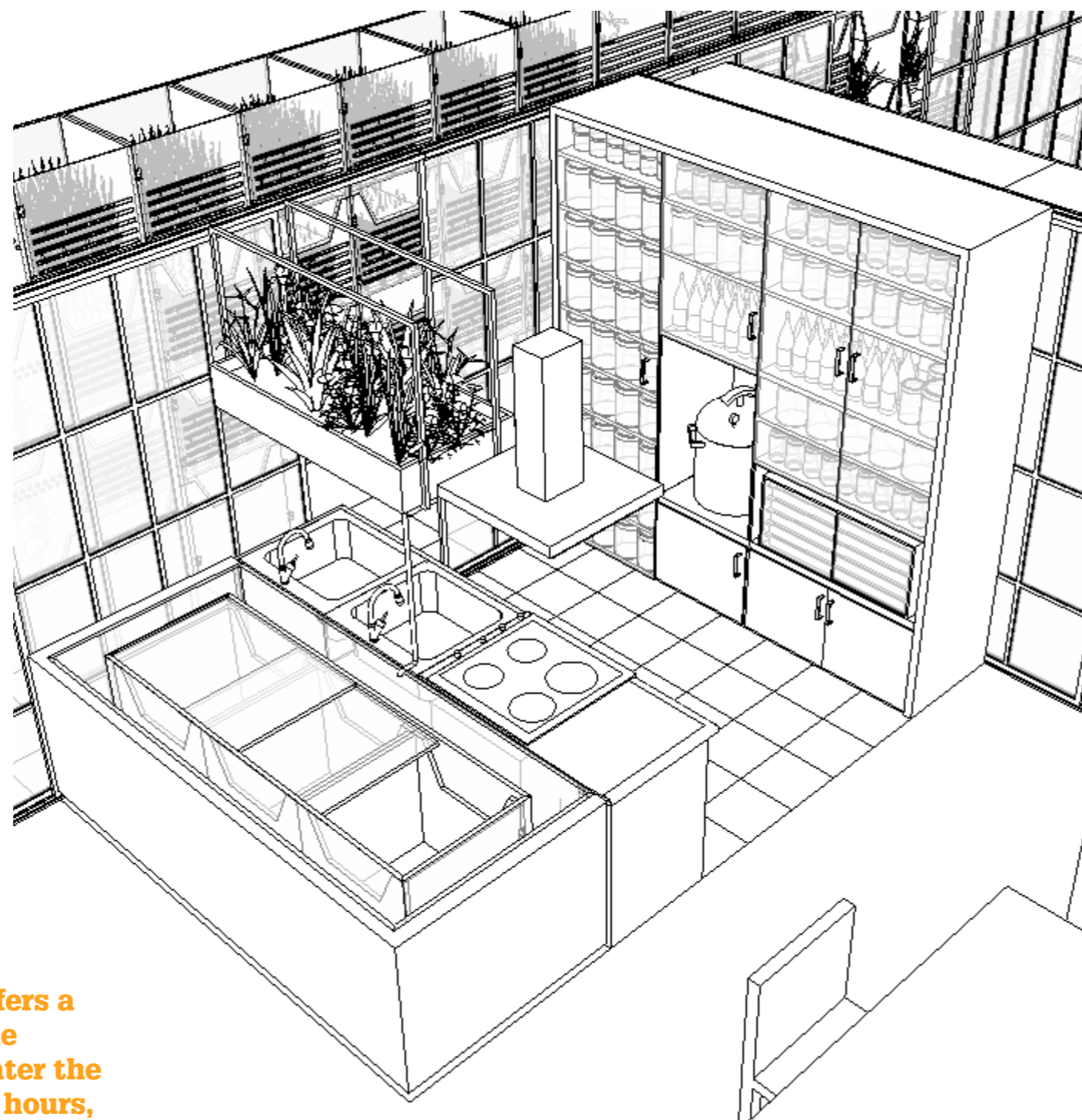


**Fresh produce storage tank**

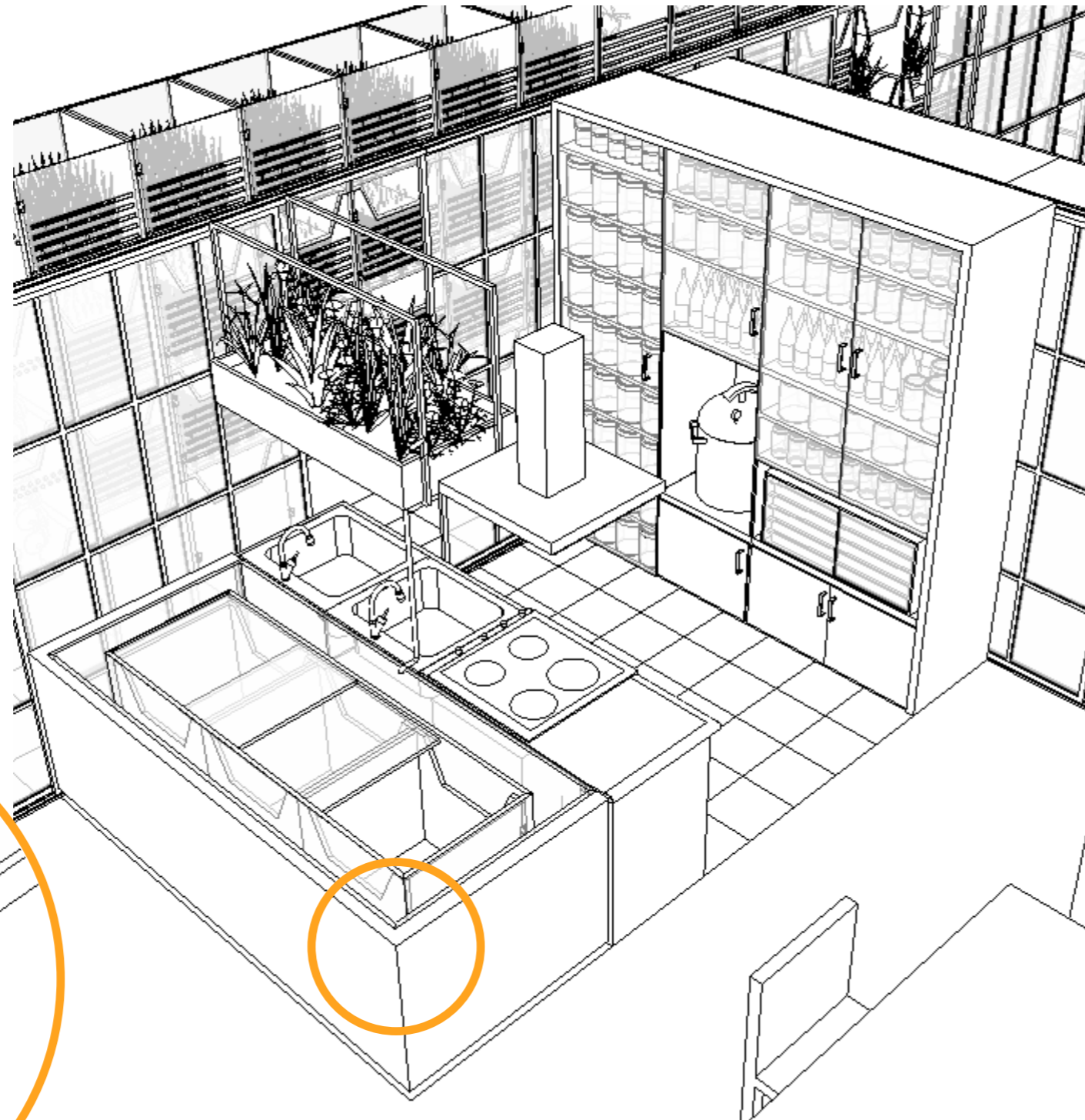
**Extensive pantry for the winter months**



**The i-Dwelling needs no fridge.**



**This storage configurations offers a temperature between 5-7 C. The underground water used to water the crates, stays in the tank for 12 hours, cooling the produce.**



insulation

fortified glass

water tank

**The i-Dwelling kitchen needs equipment.**

**As there is minimal food production during winter, canning is important to ensure food supplies for these months.**

**A pressure canner is easy to use and can ensure that pickled vegetables, marmelades, seeds, nuts and legumes will be well preserved, without the need of freezing.**

**A food drier is also useful as it can be used to create dried fruits and dark leafy greens "chips". These will ensure that the user has an adequate intake of vitamins and minerals throughout winter.**



But, what can I eat?





# Why invest in i-Crates?

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-personalized food production

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- personalized food production
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- personal control of food quality

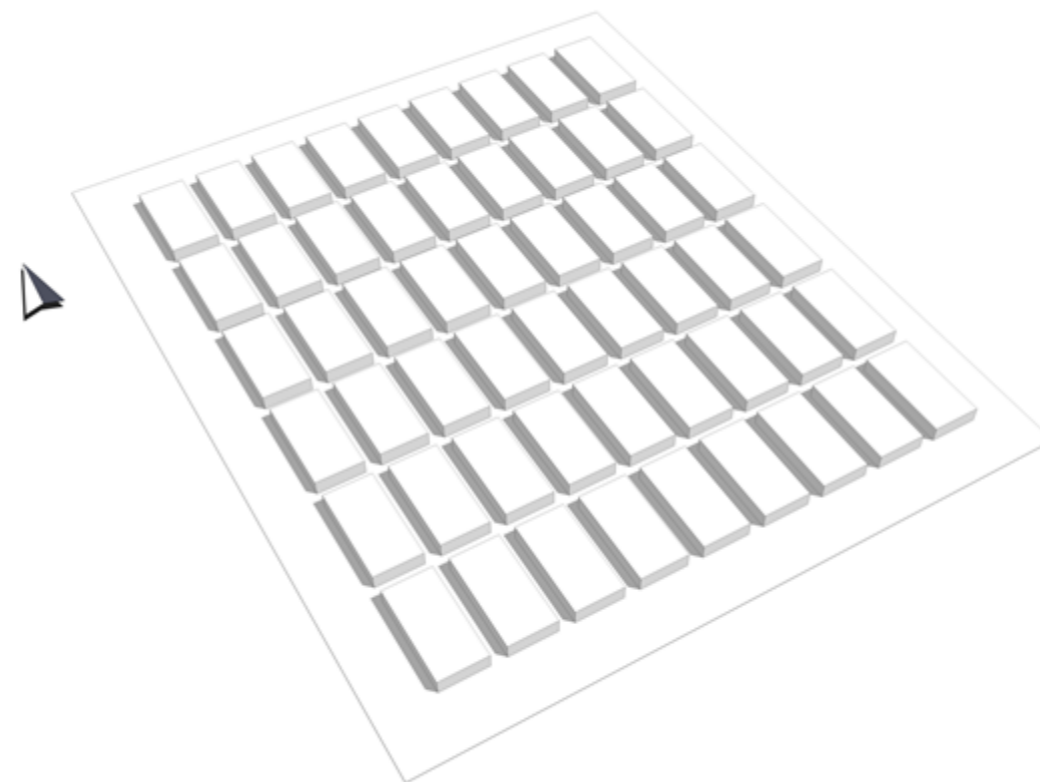
## Why invest in i-Crates?

- personalized food production
- no trips to the grocery store
- personal control of food quality
- passive system (minimal energy for heating/ cooling)

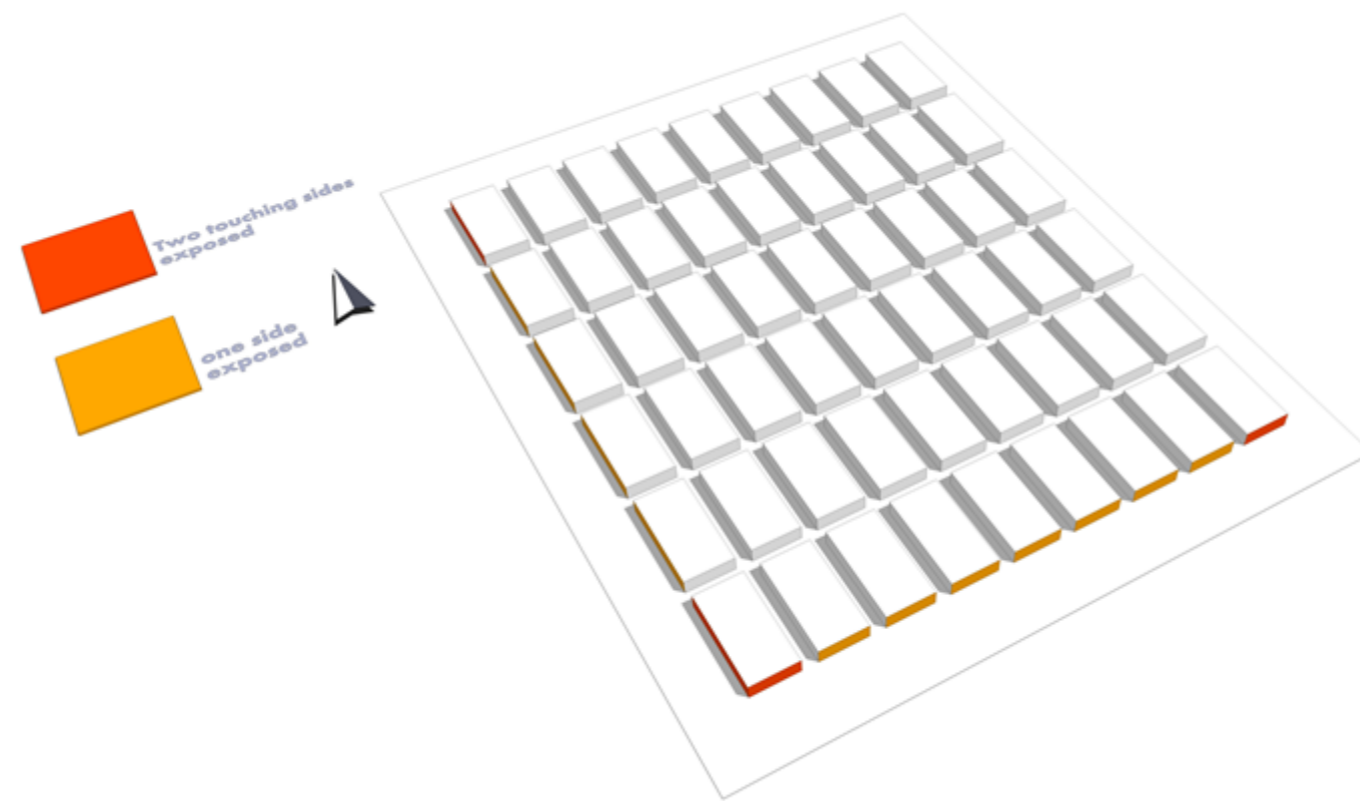
## Why invest in i-Crates?

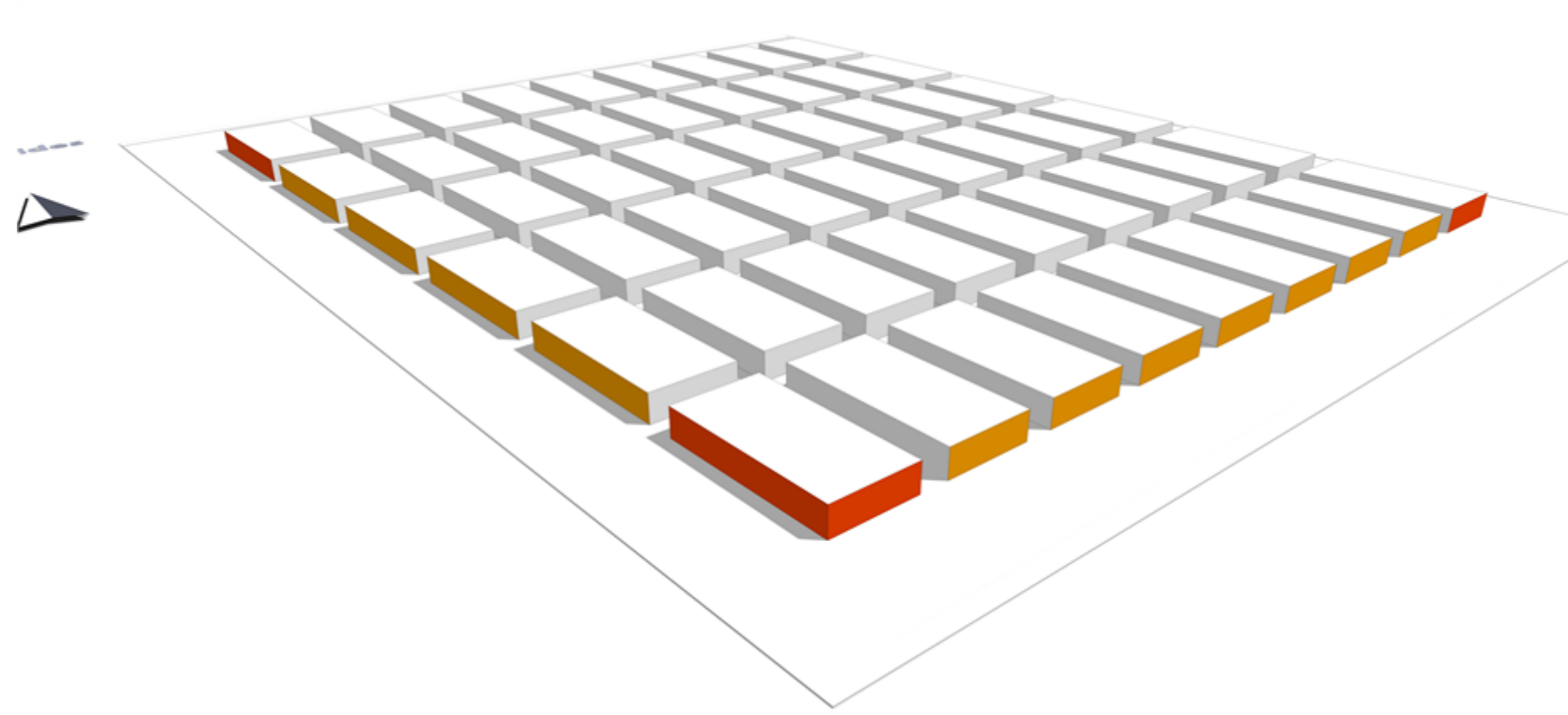
- personalized food production
- no trips to the grocery store
- personal control of food quality
- passive system (minimal energy for heating/ cooling)
- adaptability to family size

# Microclimate

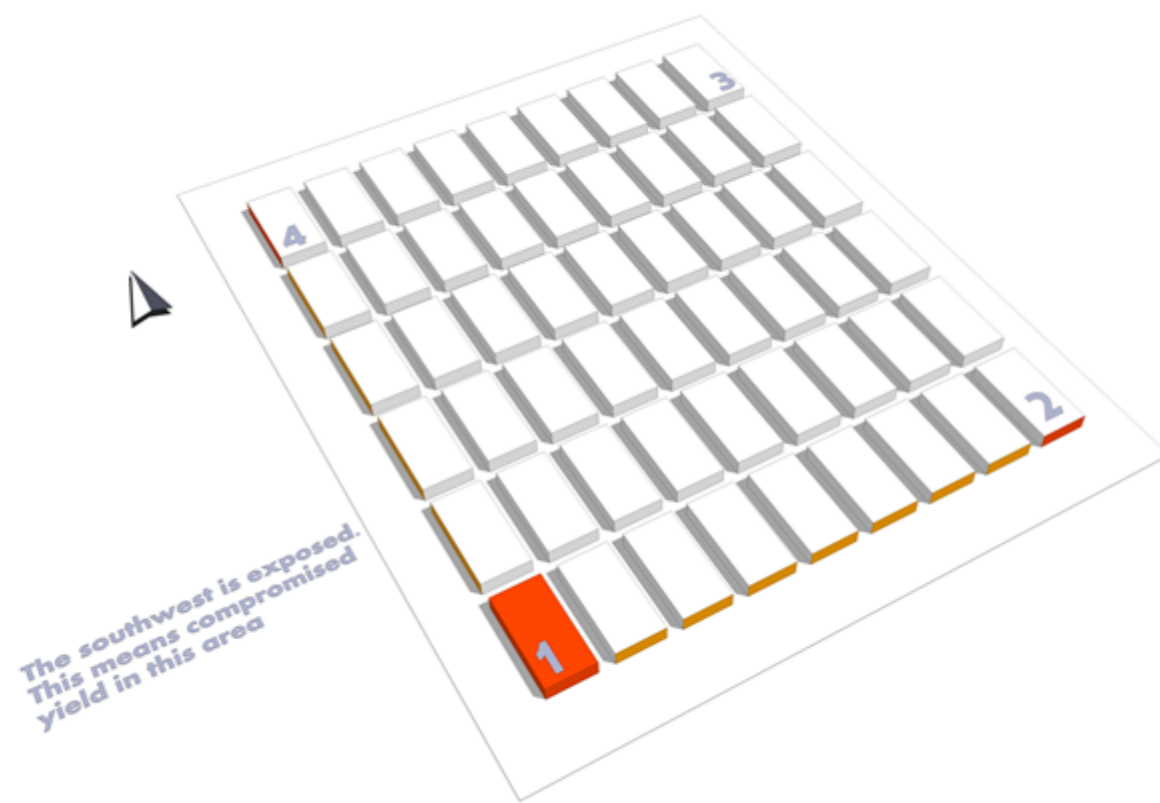




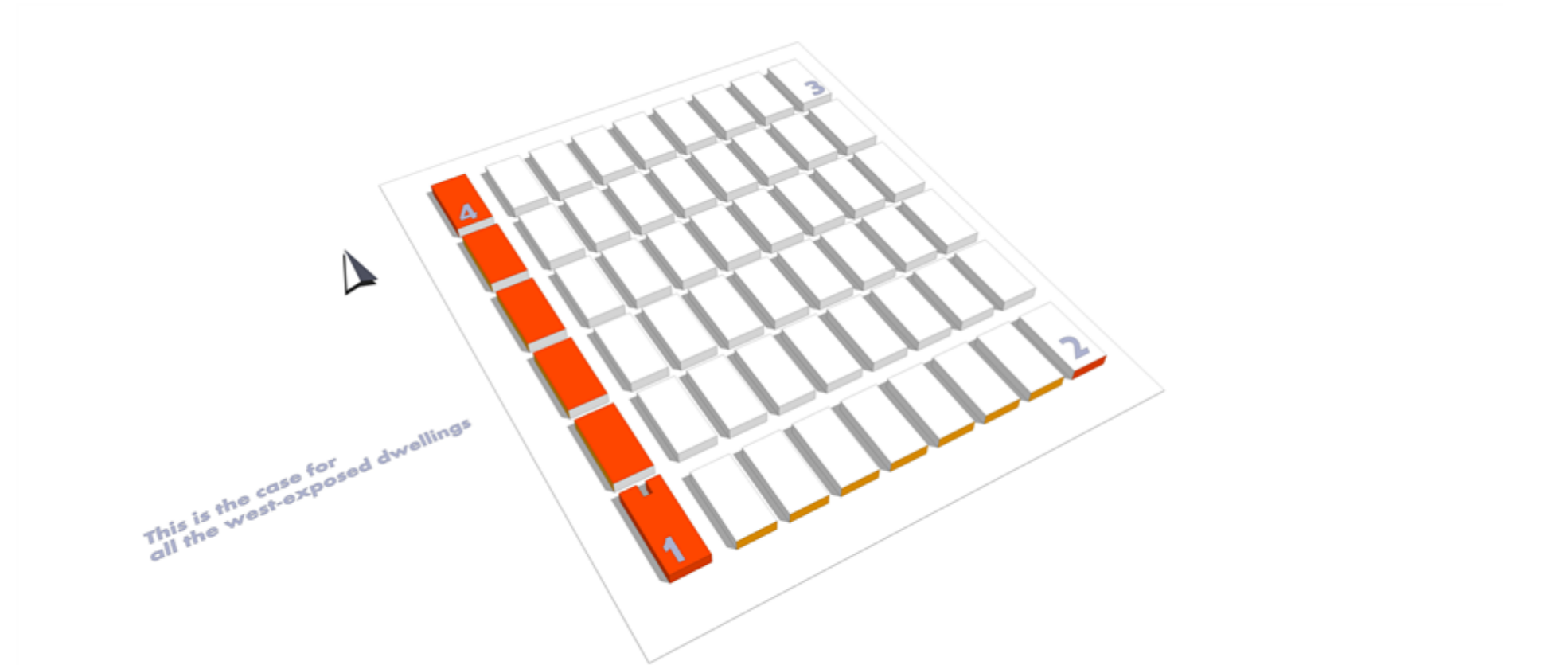


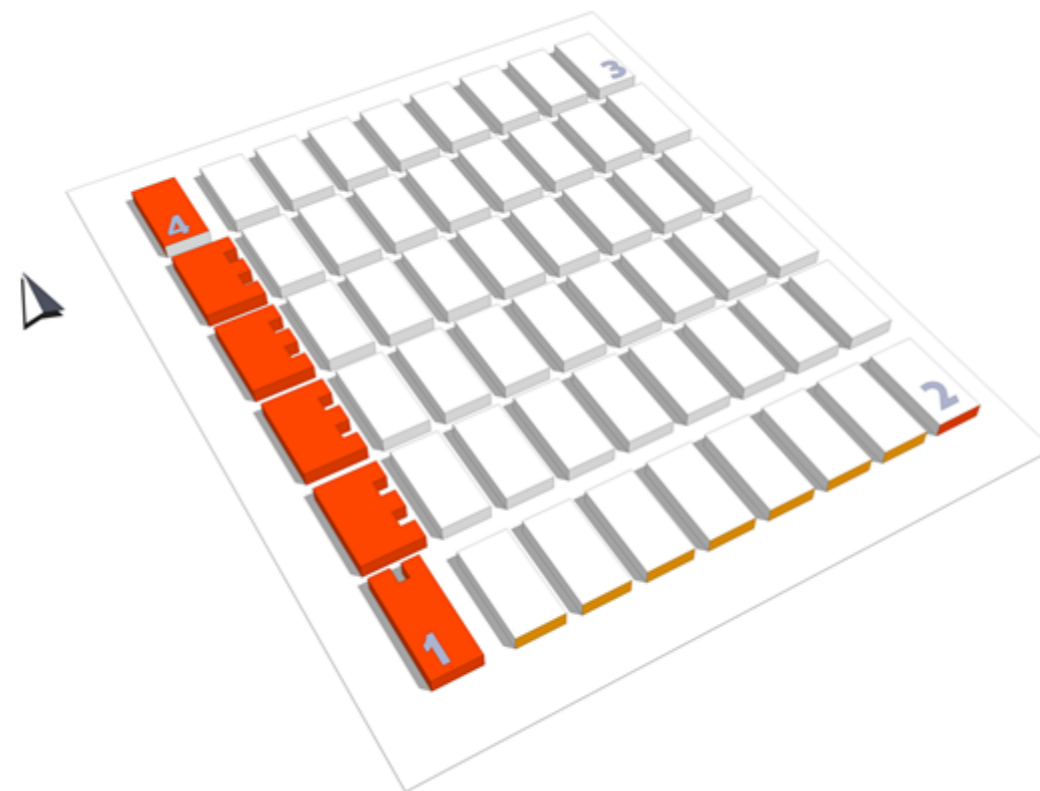


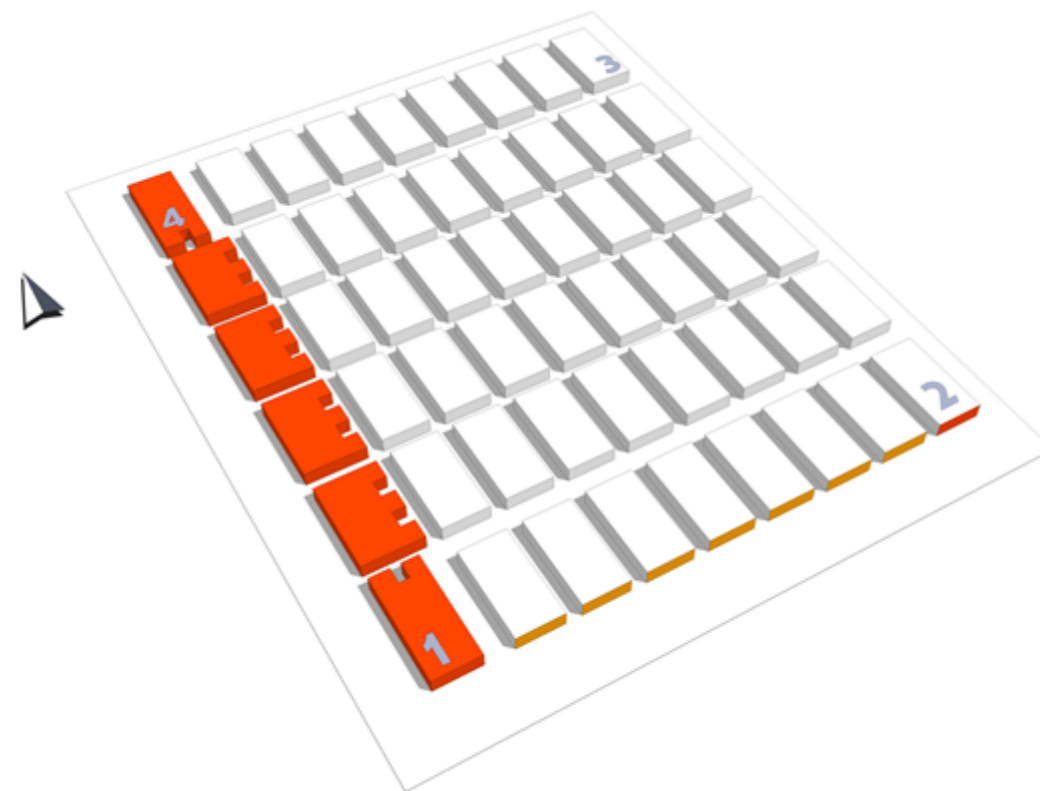




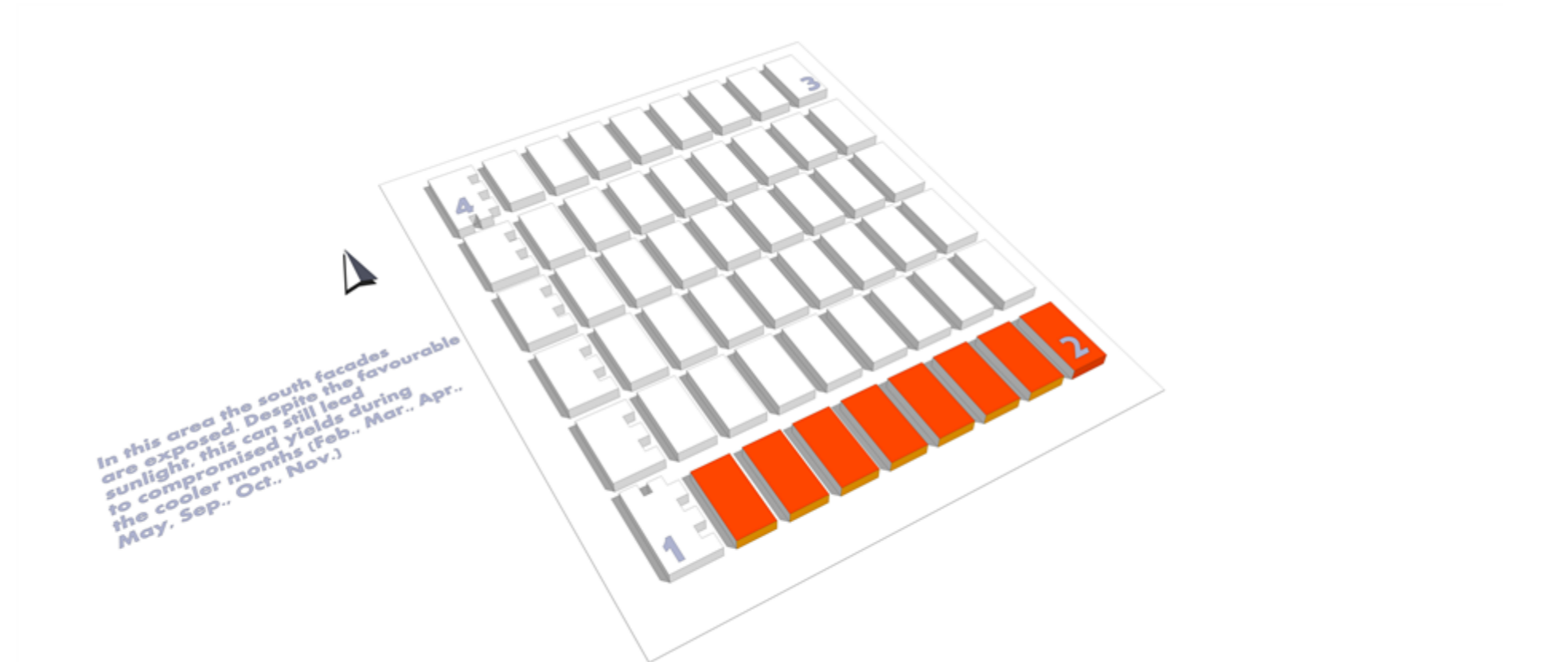


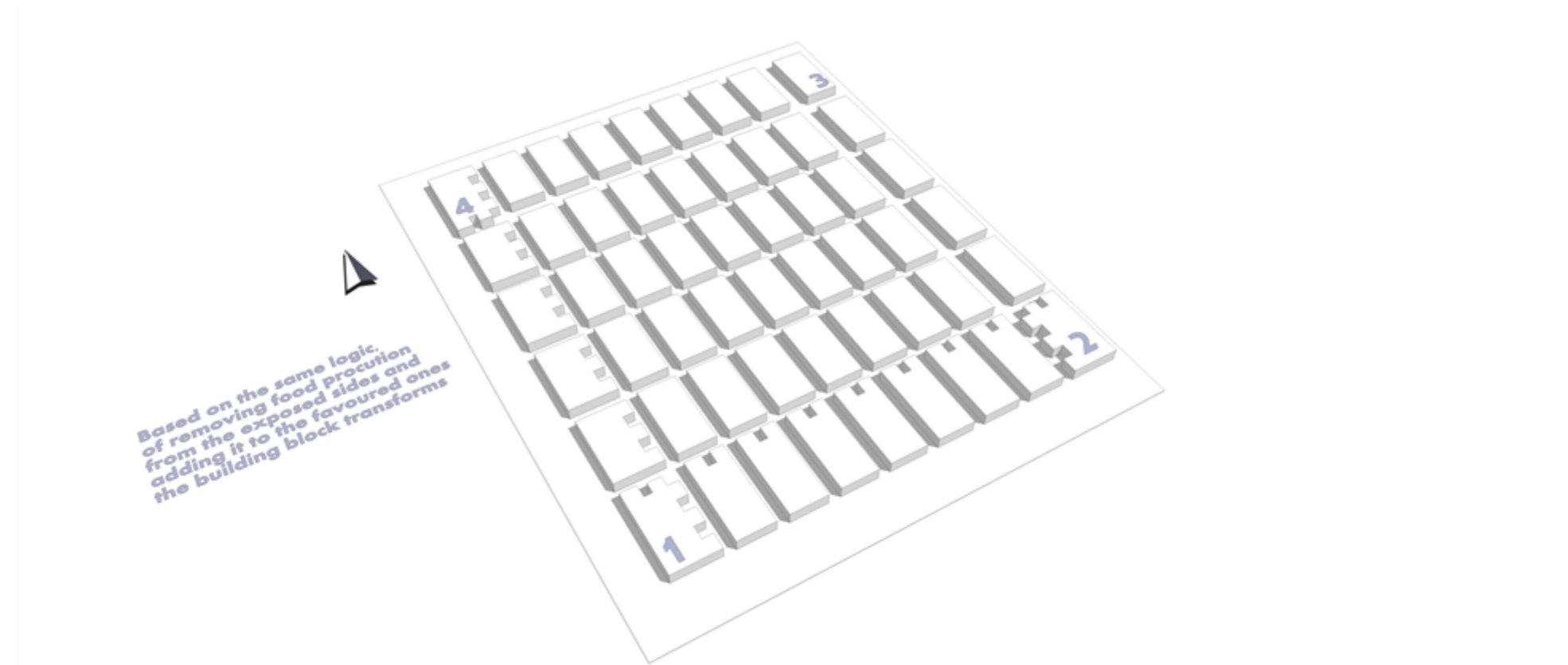


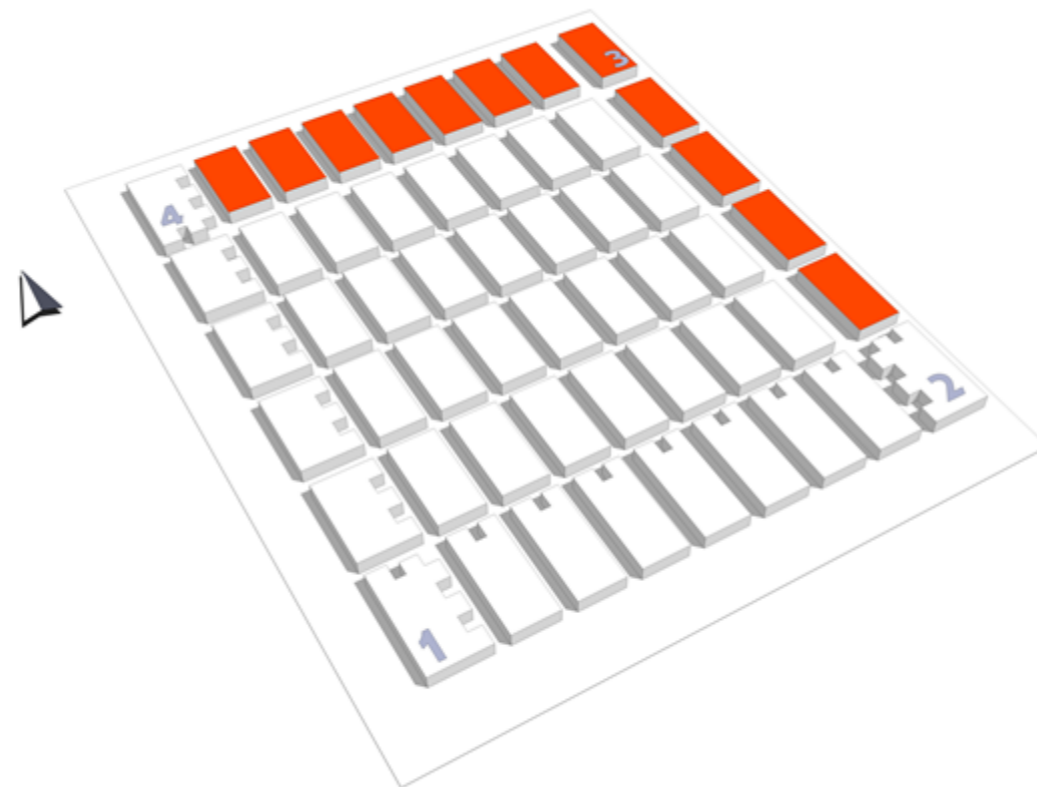


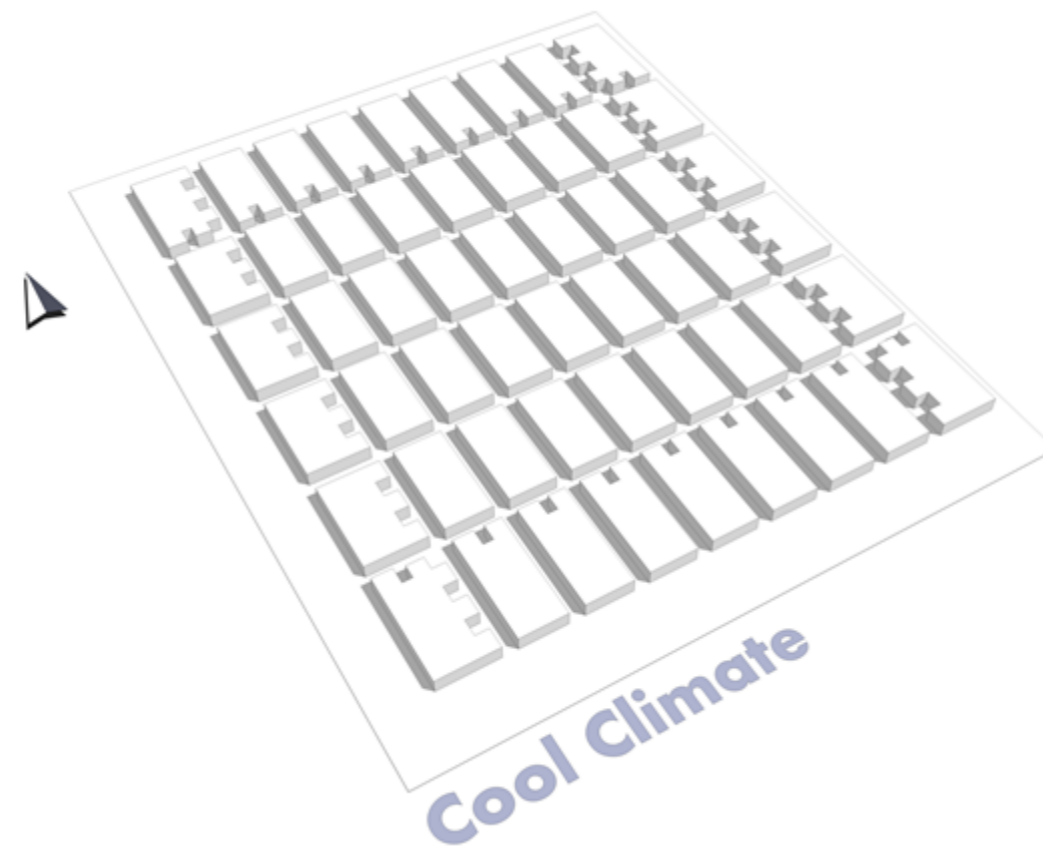


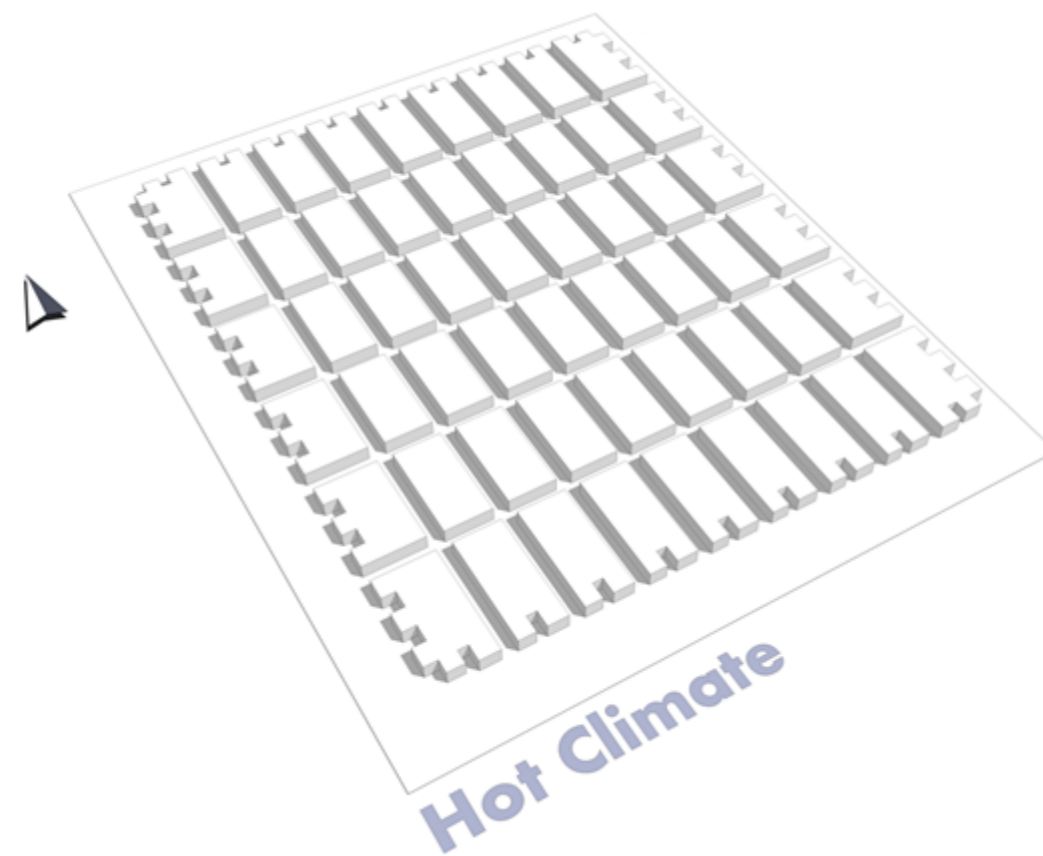


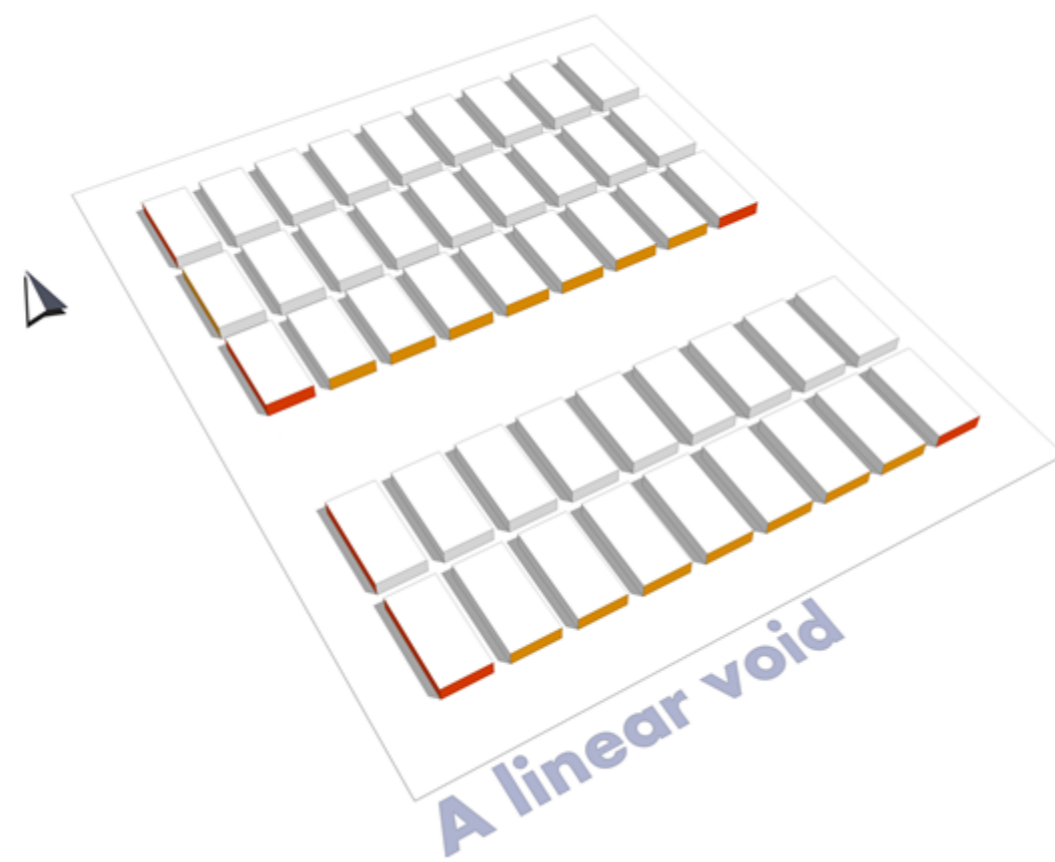


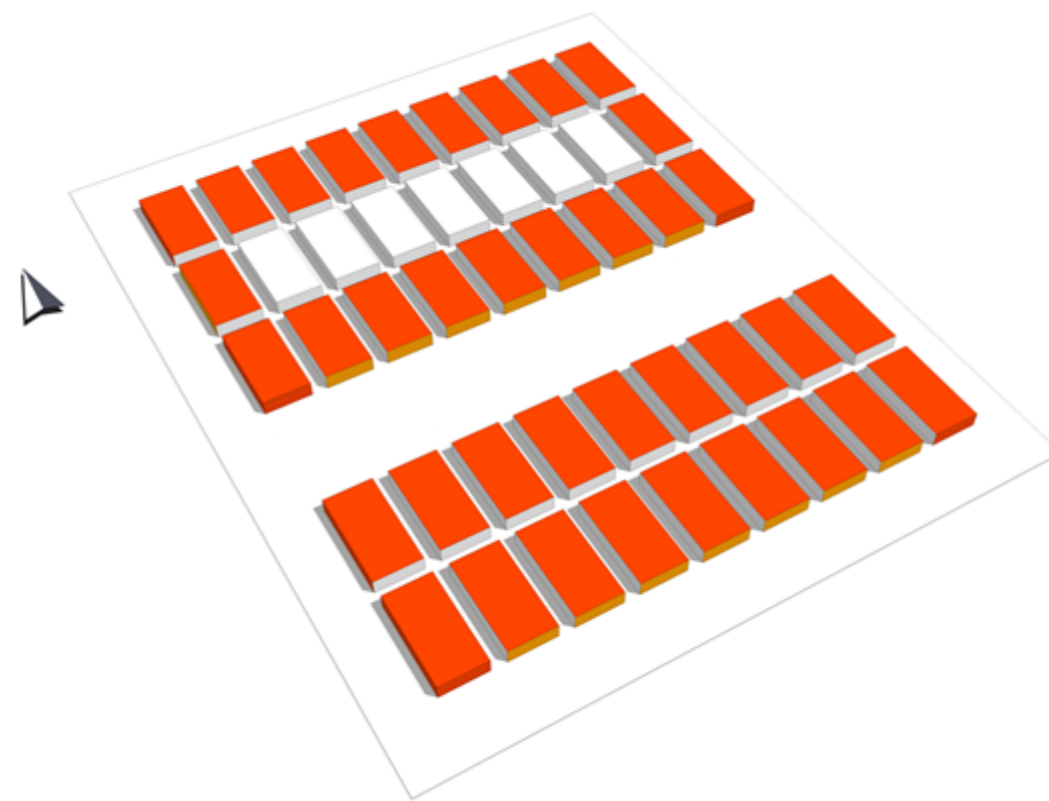


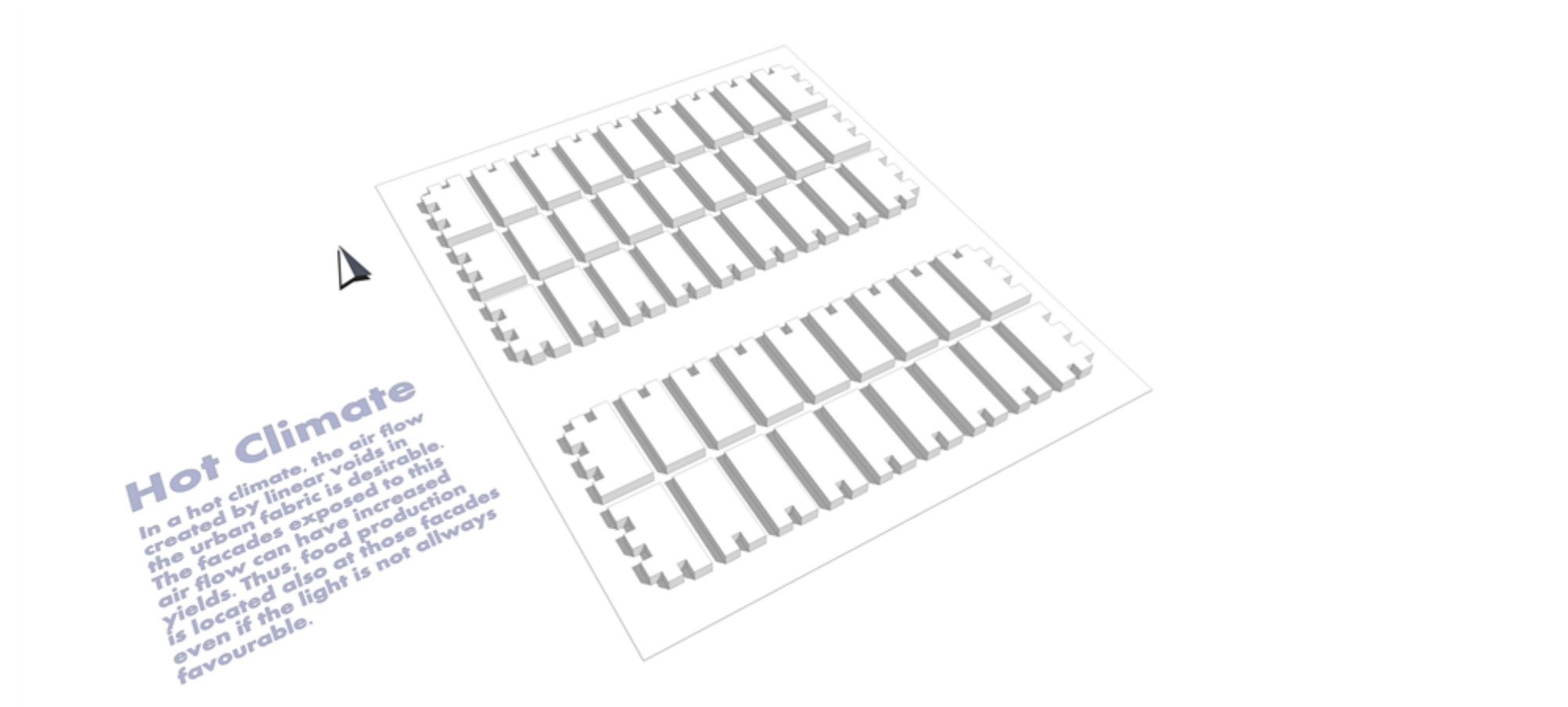








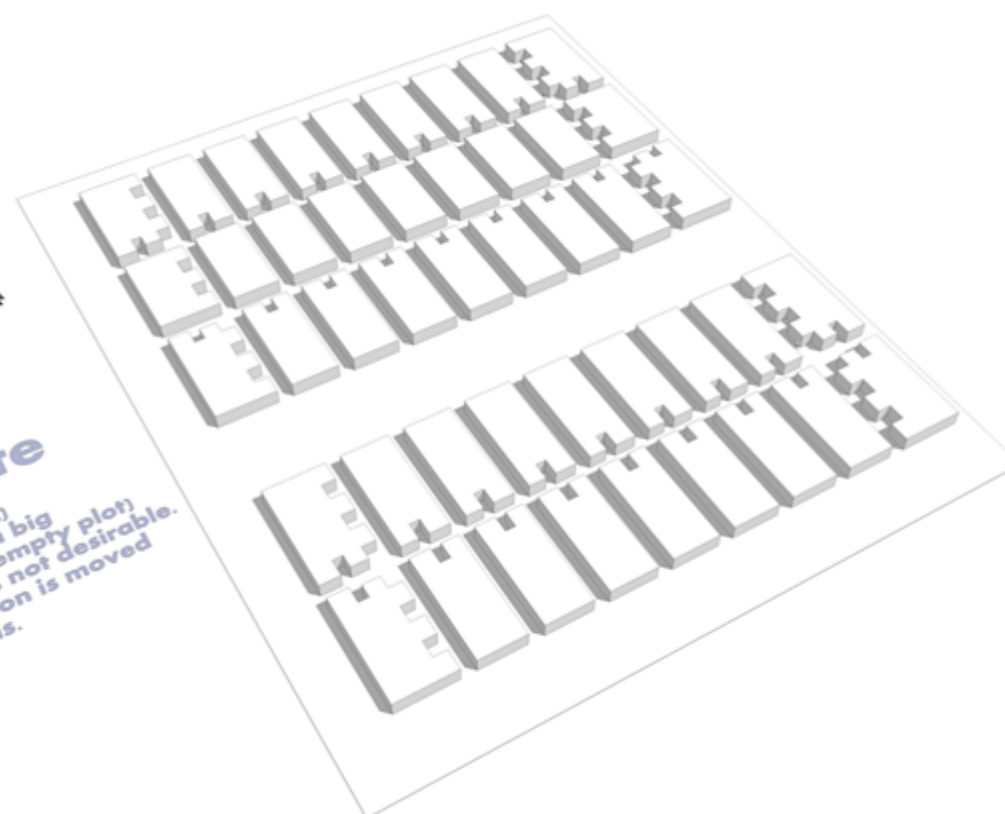


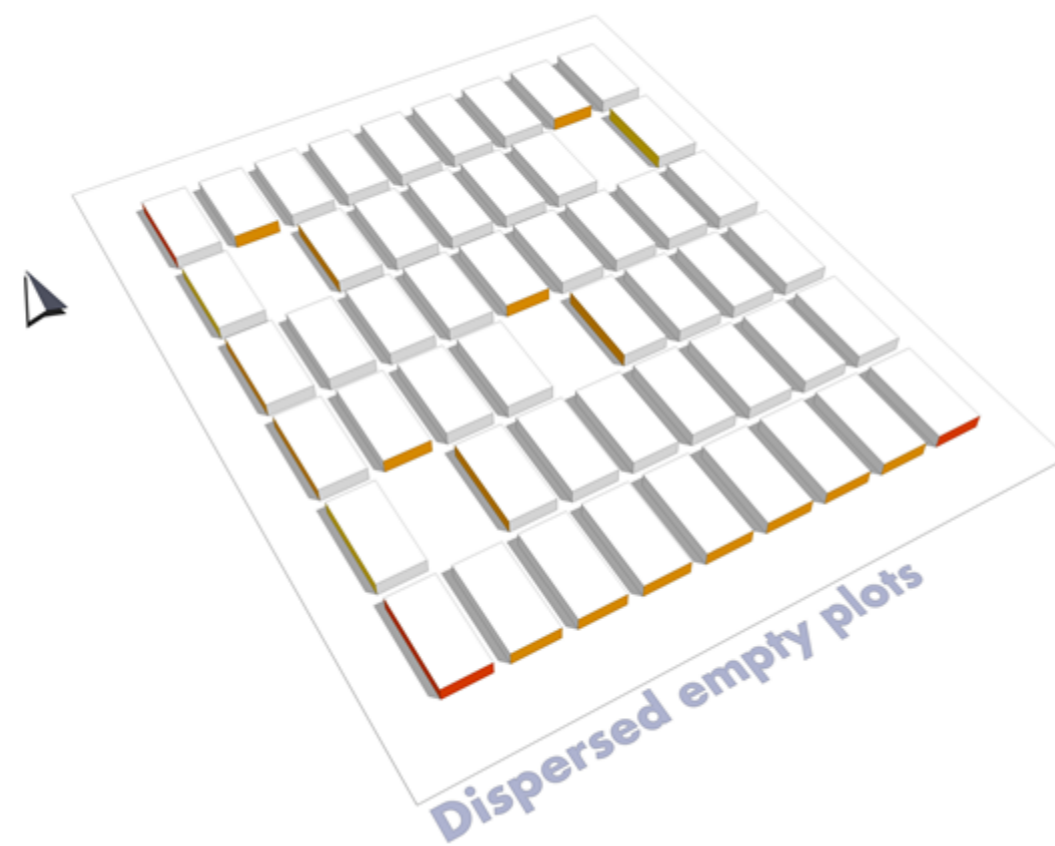


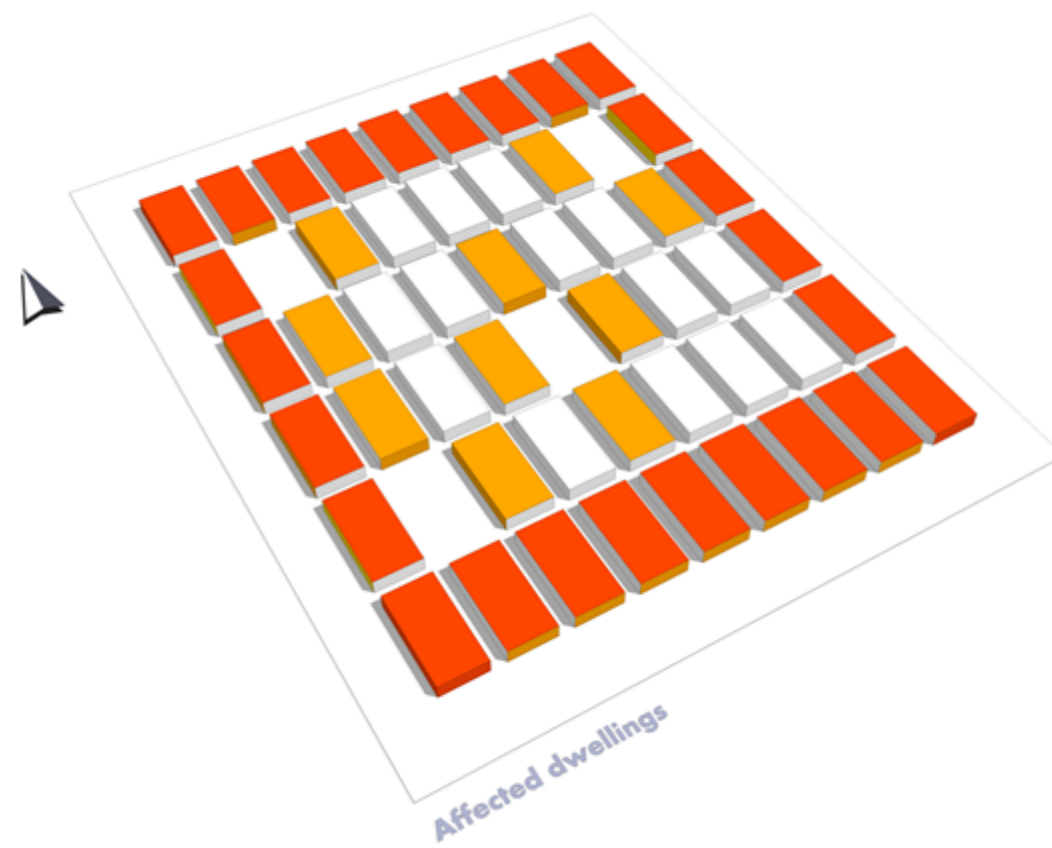


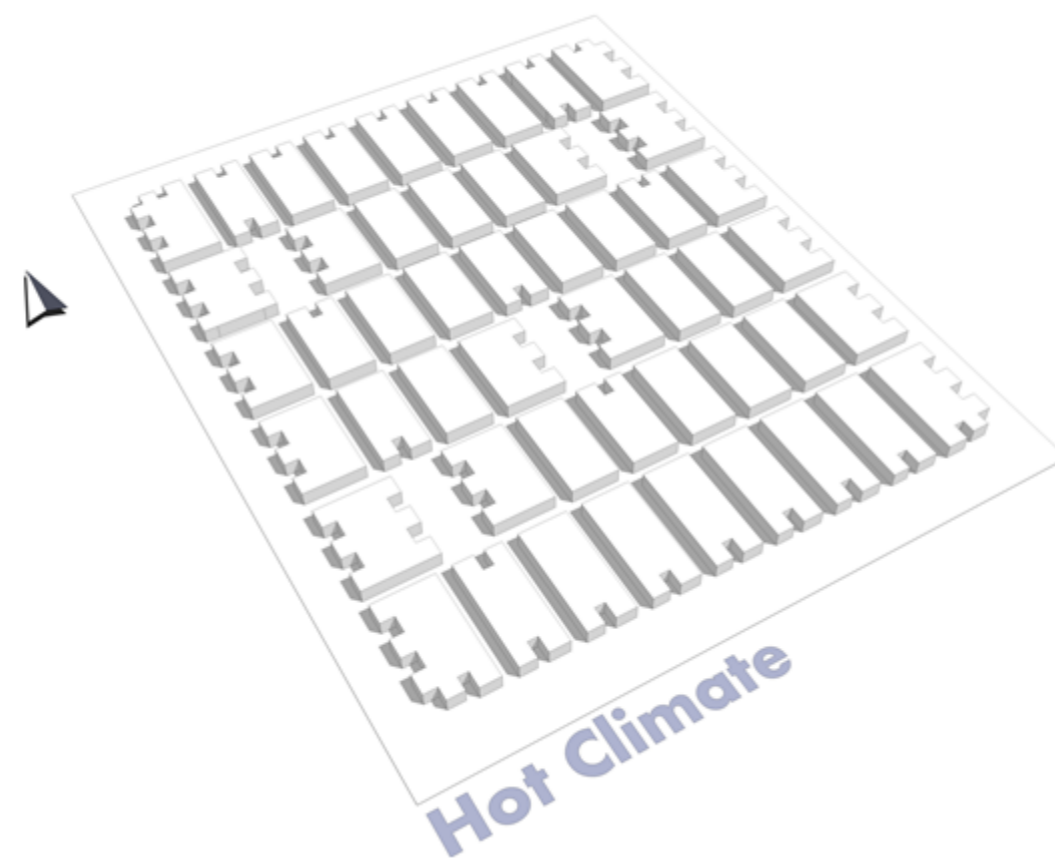
### Cool climate

In cooler climates (like NL) a linear void (may it be a big circulation artery or an empty plot) that creates air drafts is not desirable. Thus, the food production is moved away from these areas.



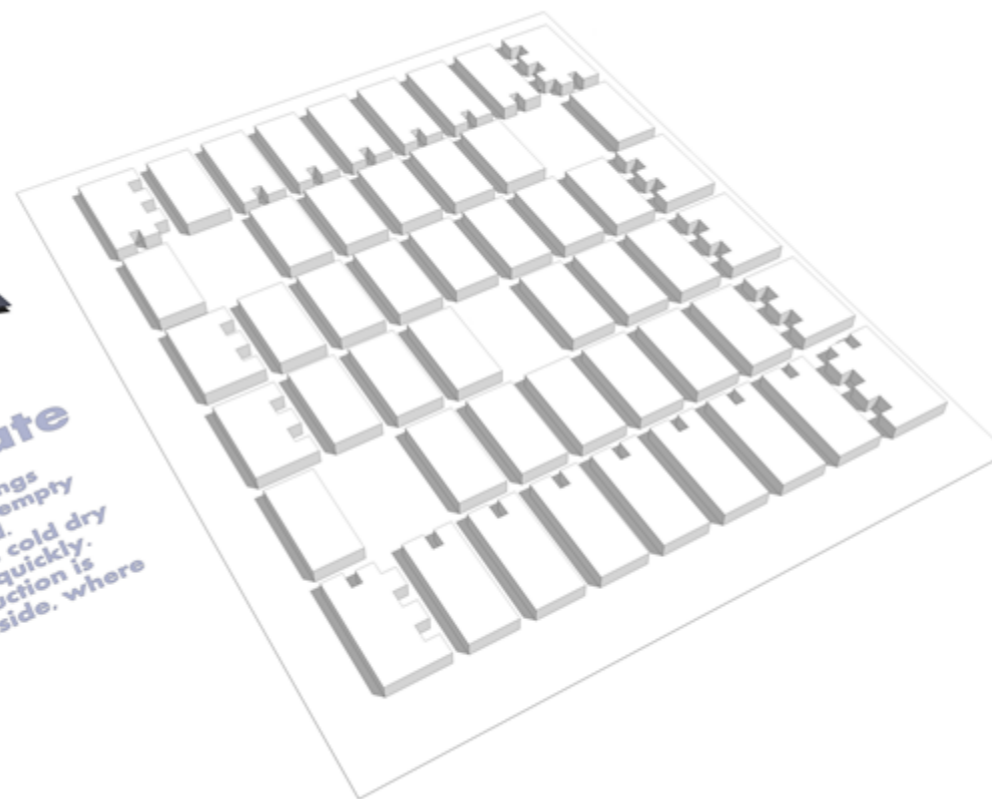




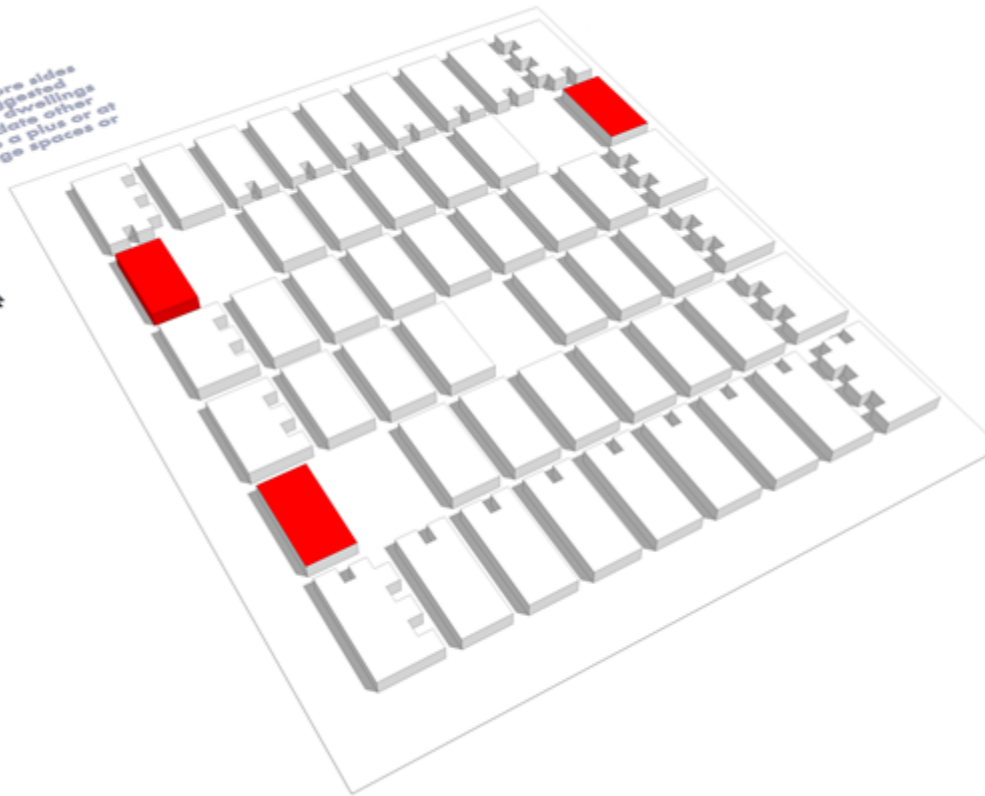


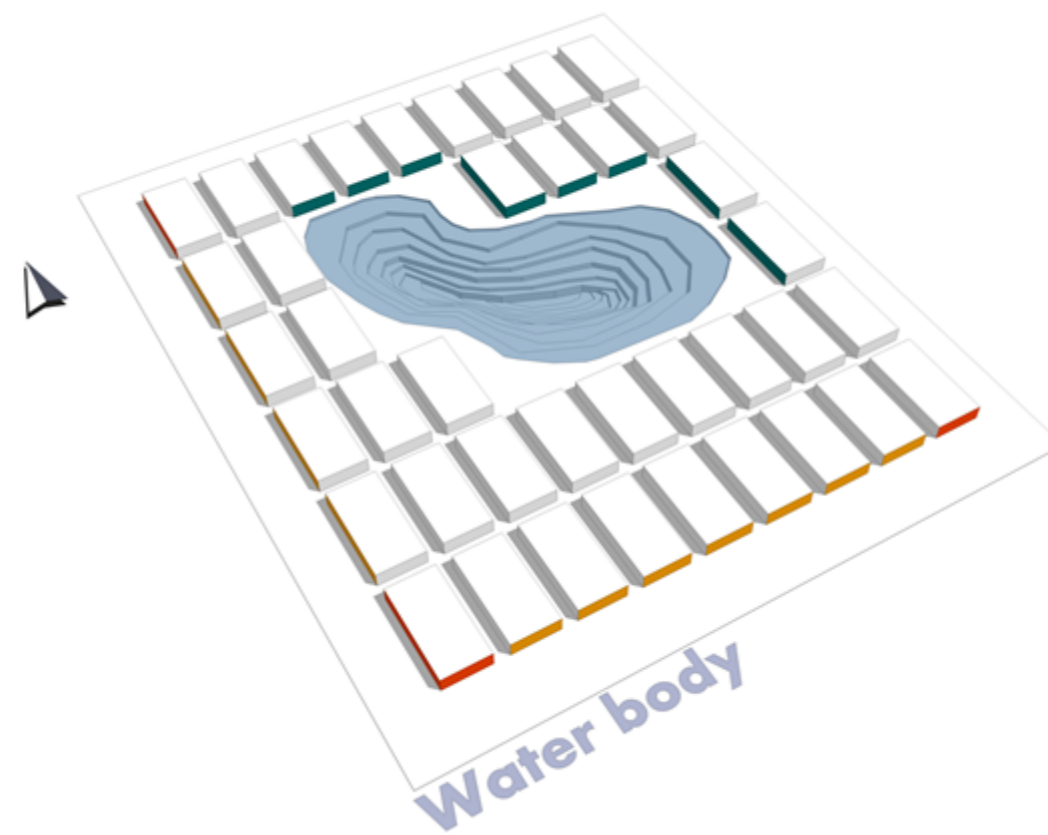
### Cool climate

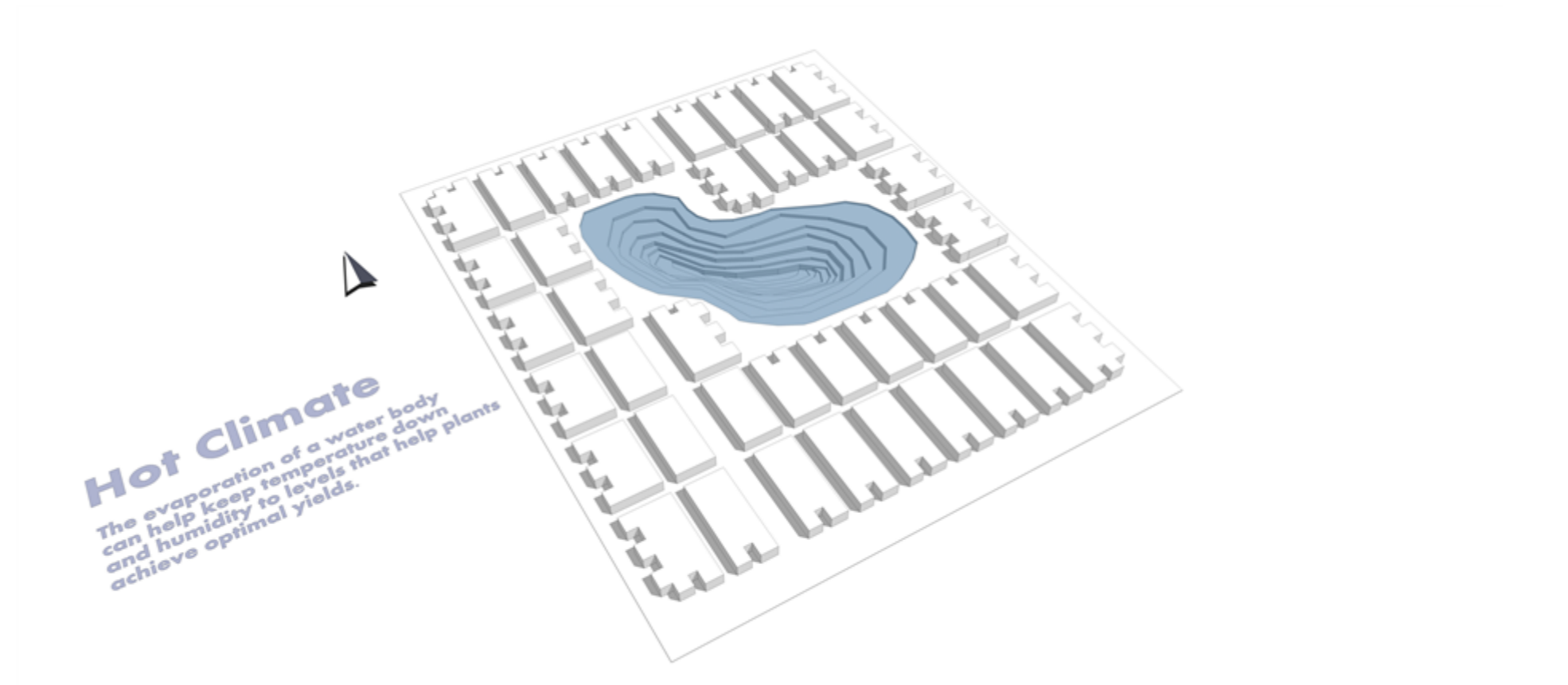
In a cool climate dwellings with sides exposed to empty plots are not favoured. During colder months cold dry air can freeze crops quickly. Thus, the food production is positioned to the inside, where possible.



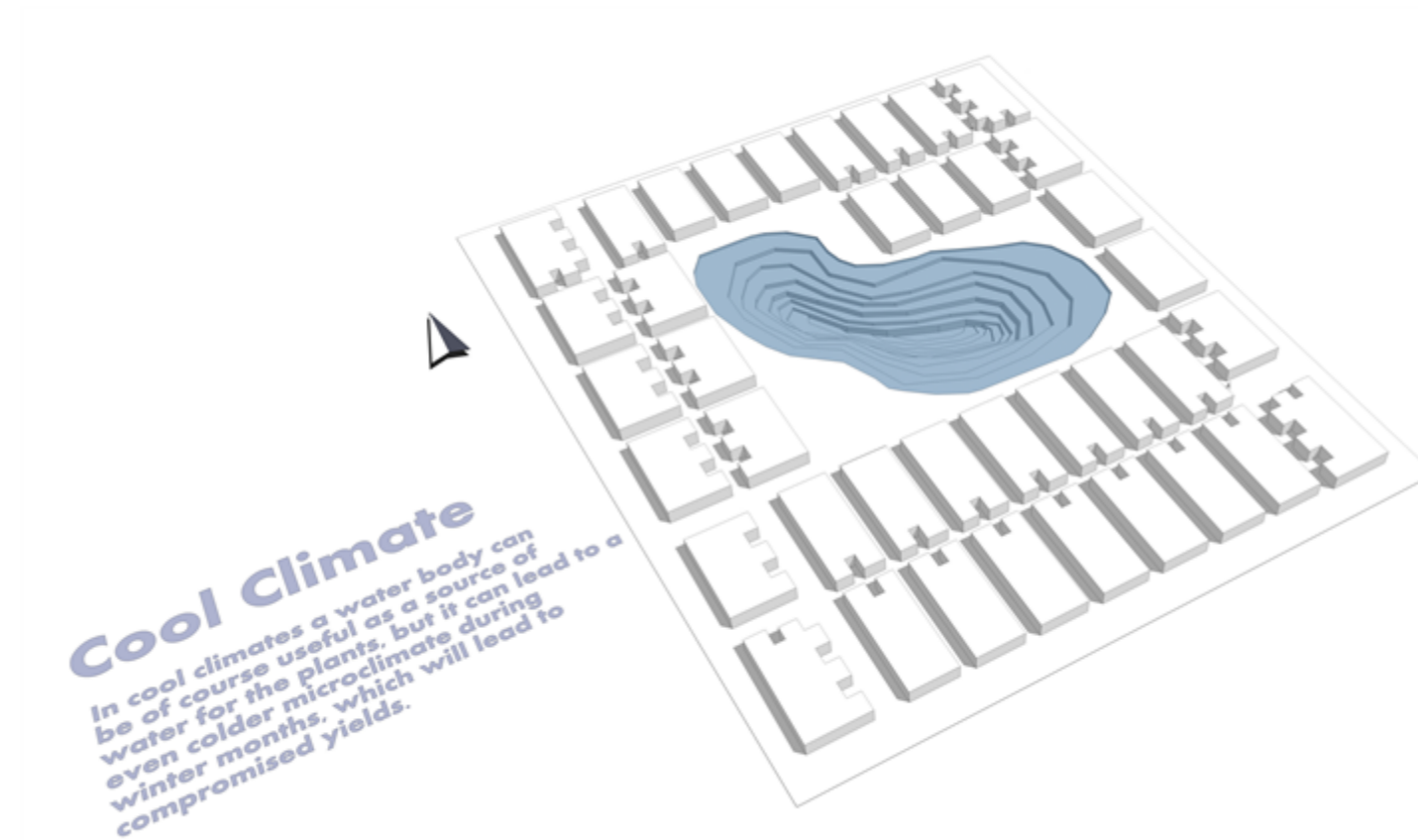
If there are dwellings with two or more sides exposed to open areas, then it is suggested that these buildings are used not as dwellings that grow food. They could accommodate other uses, where cool temperatures are a plus or at least not a problem, such as storage spaces or communal kitchens.

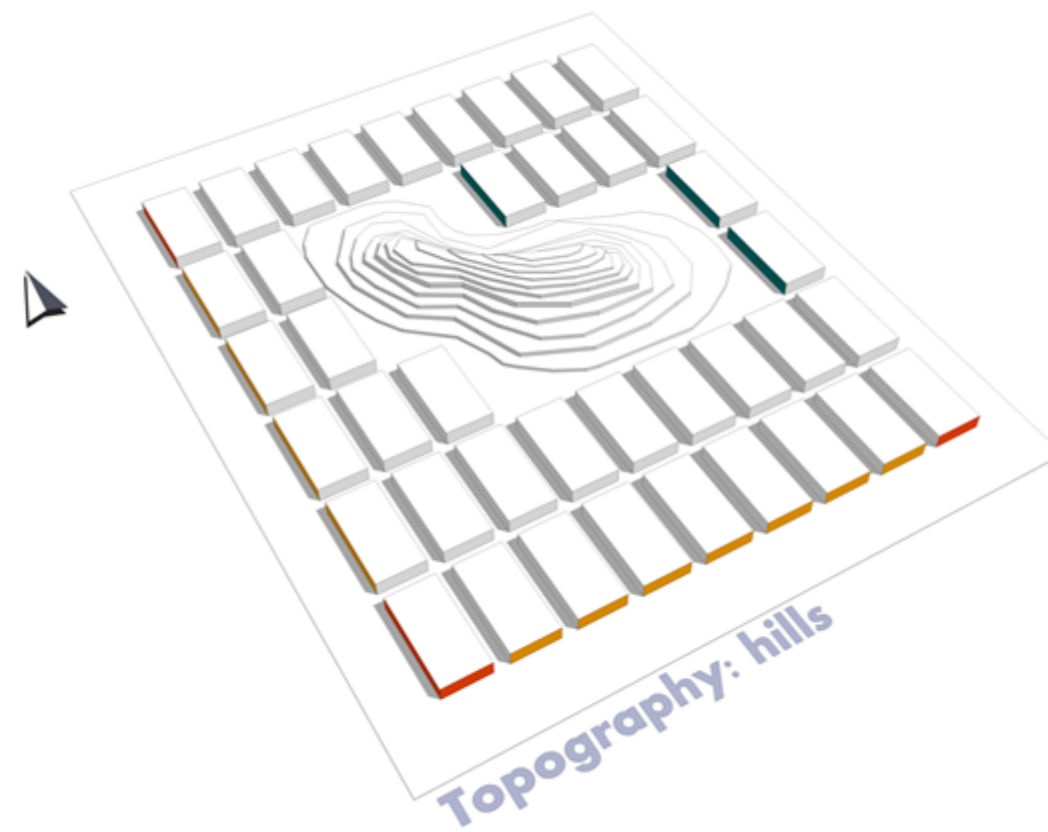


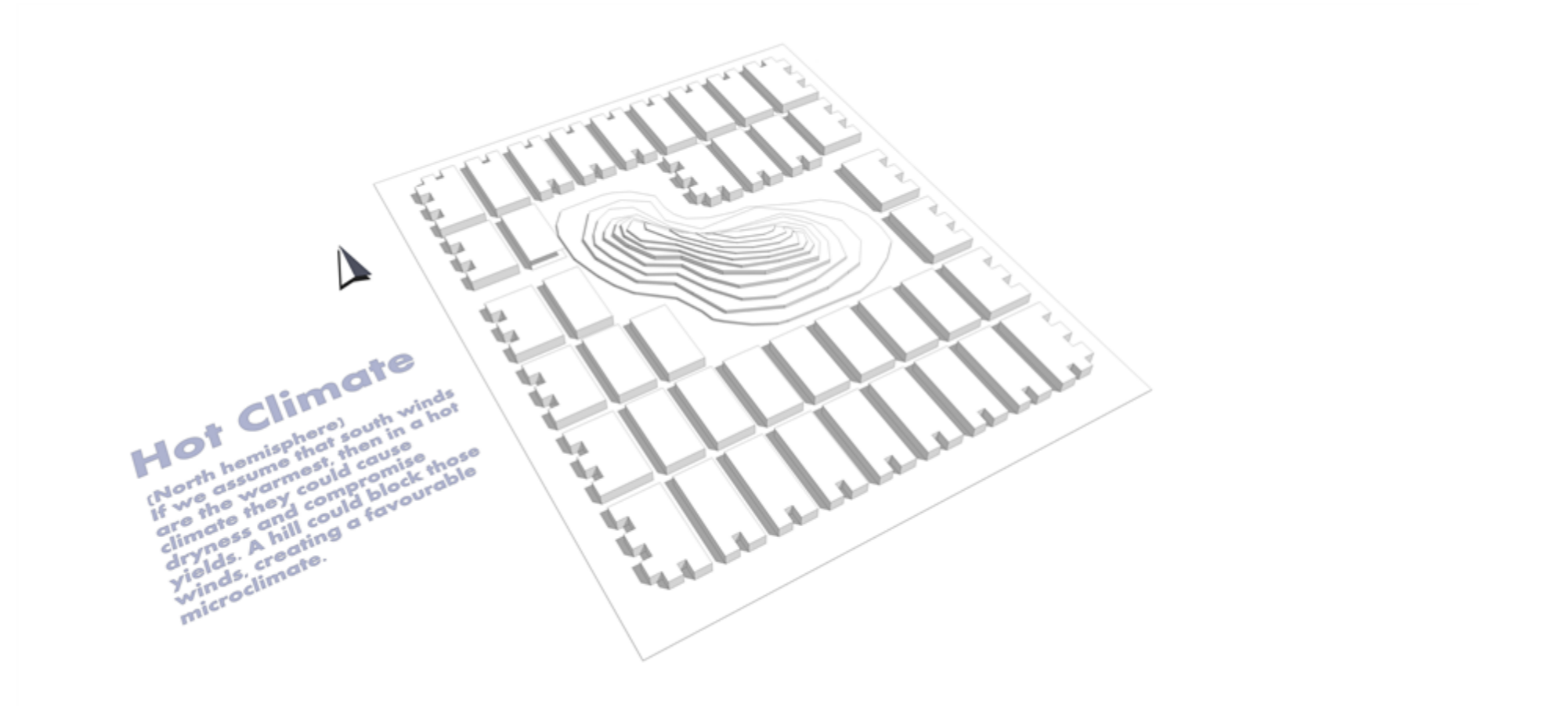






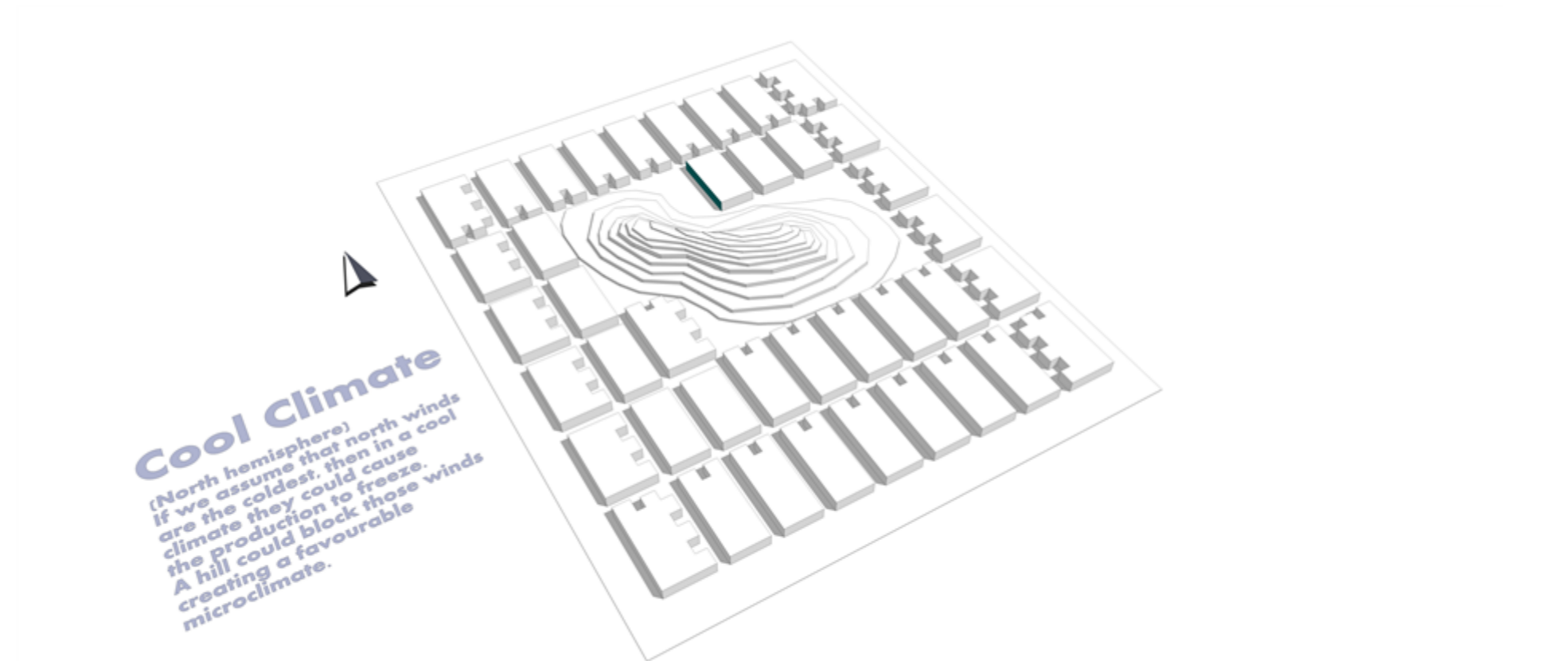




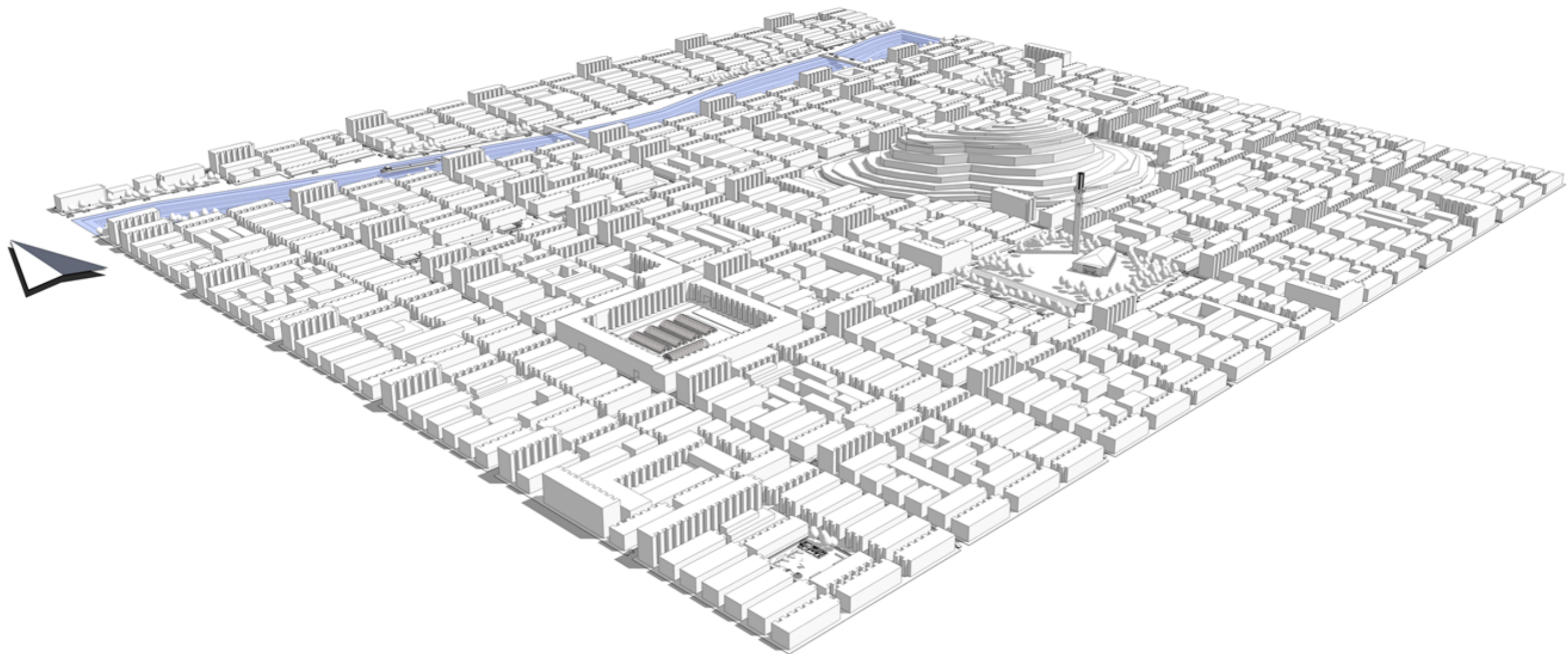


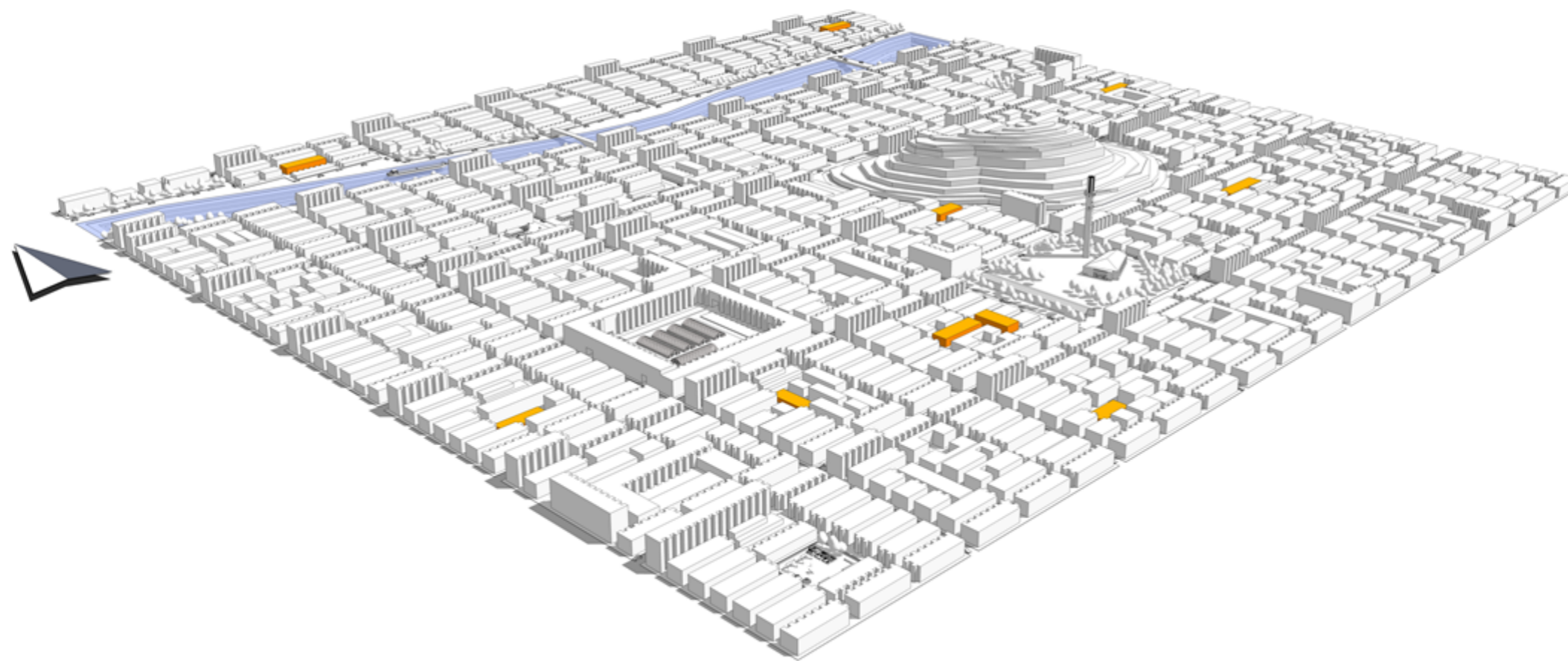
### Hot Climate

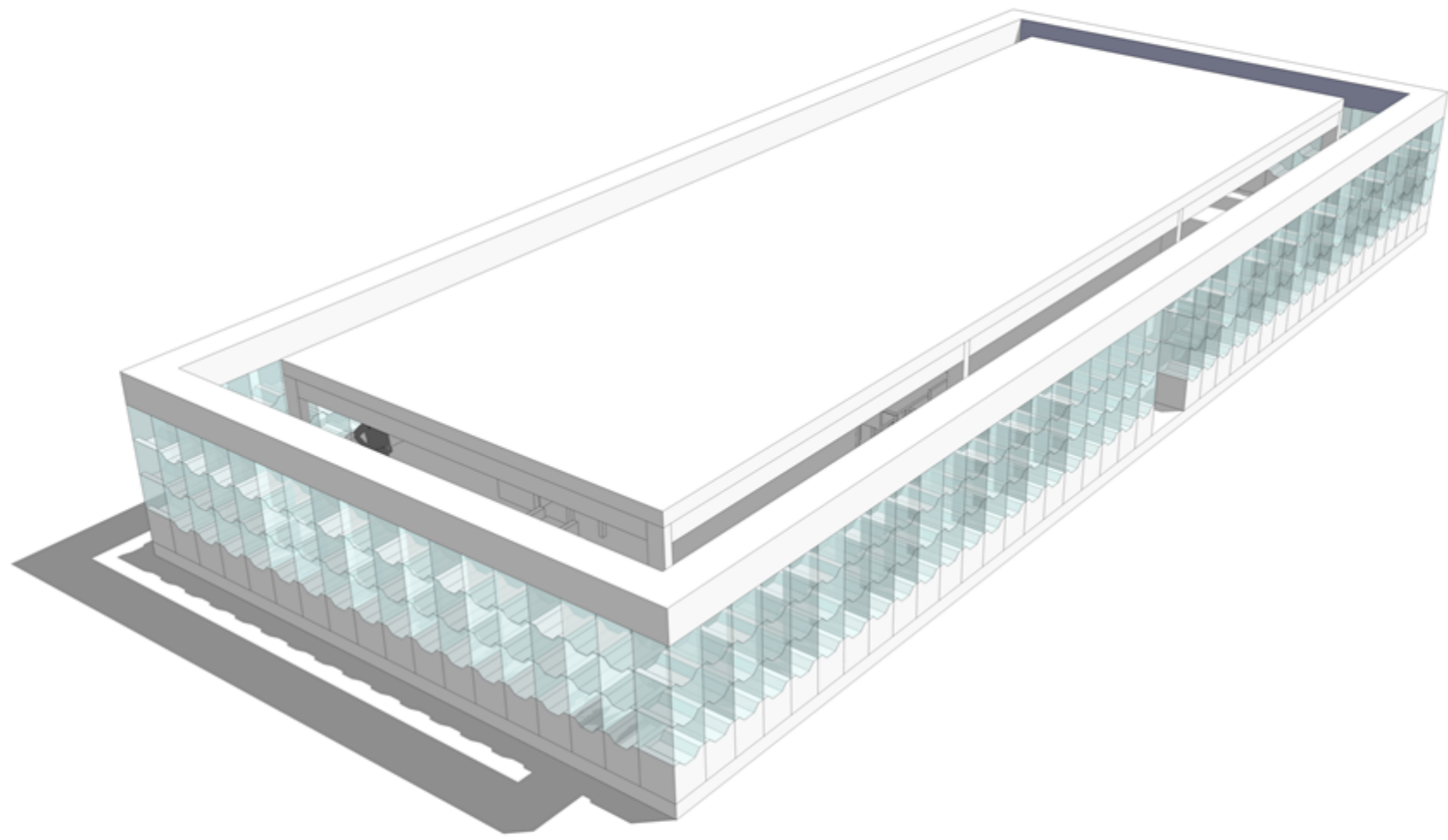
(North hemisphere)  
if we assume that south winds  
are the warmest, then in a hot  
climate they could cause  
dryness and compromise  
yields. A hill could block those  
winds, creating a favourable  
microclimate.



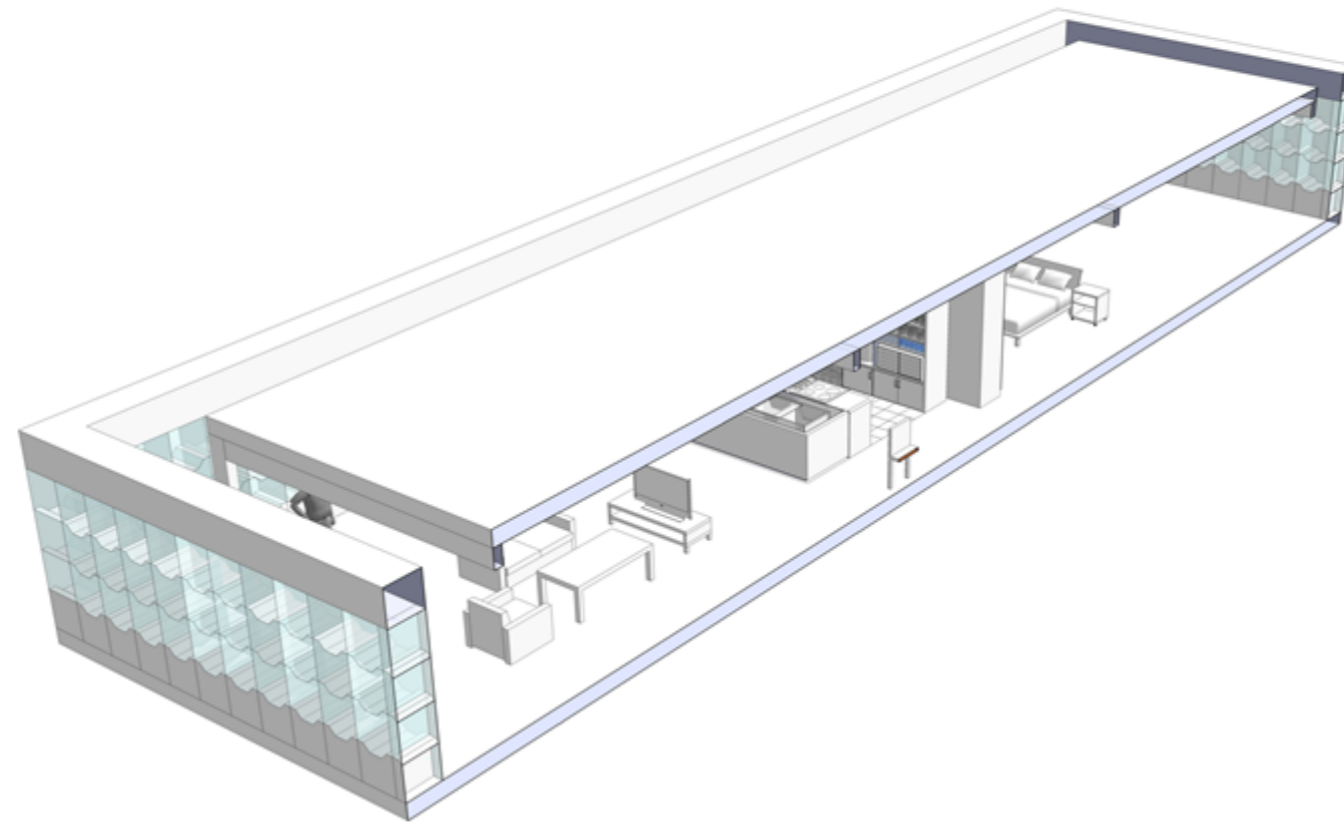
# The i-Food City

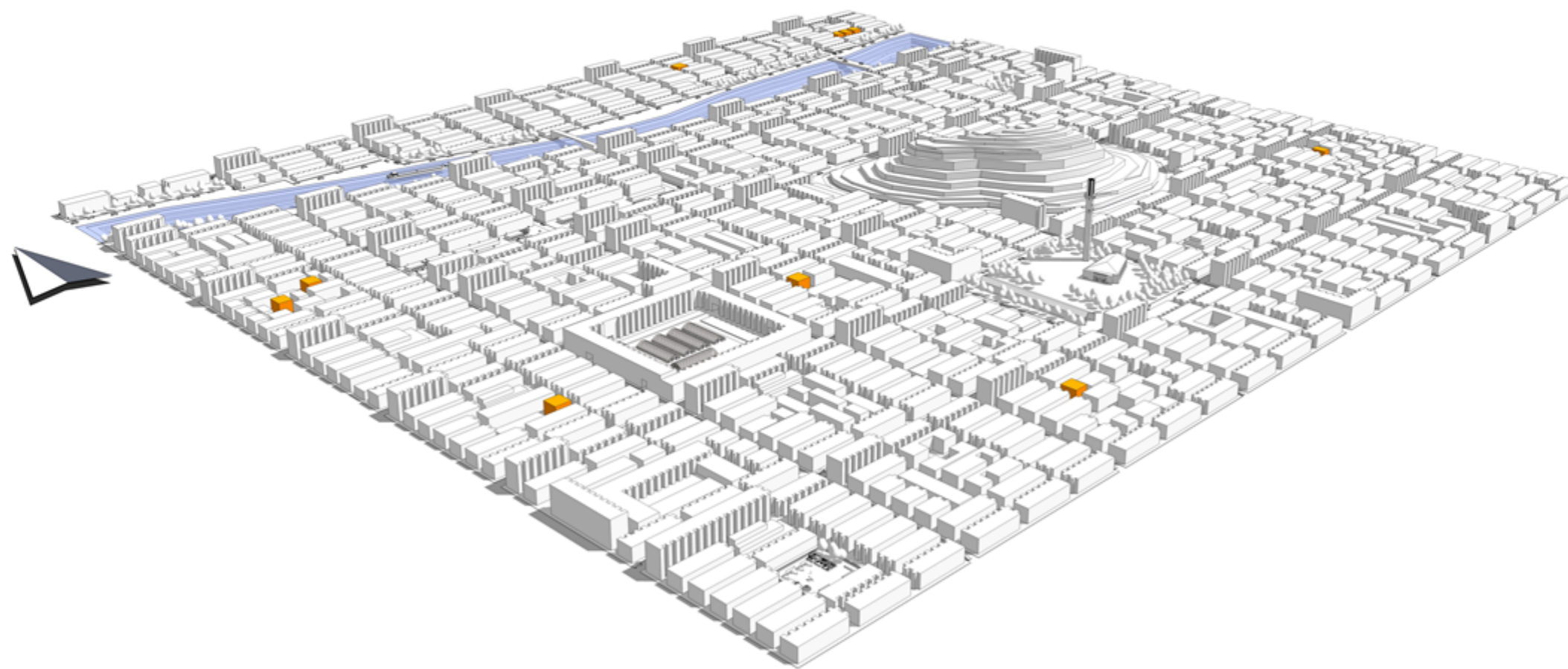


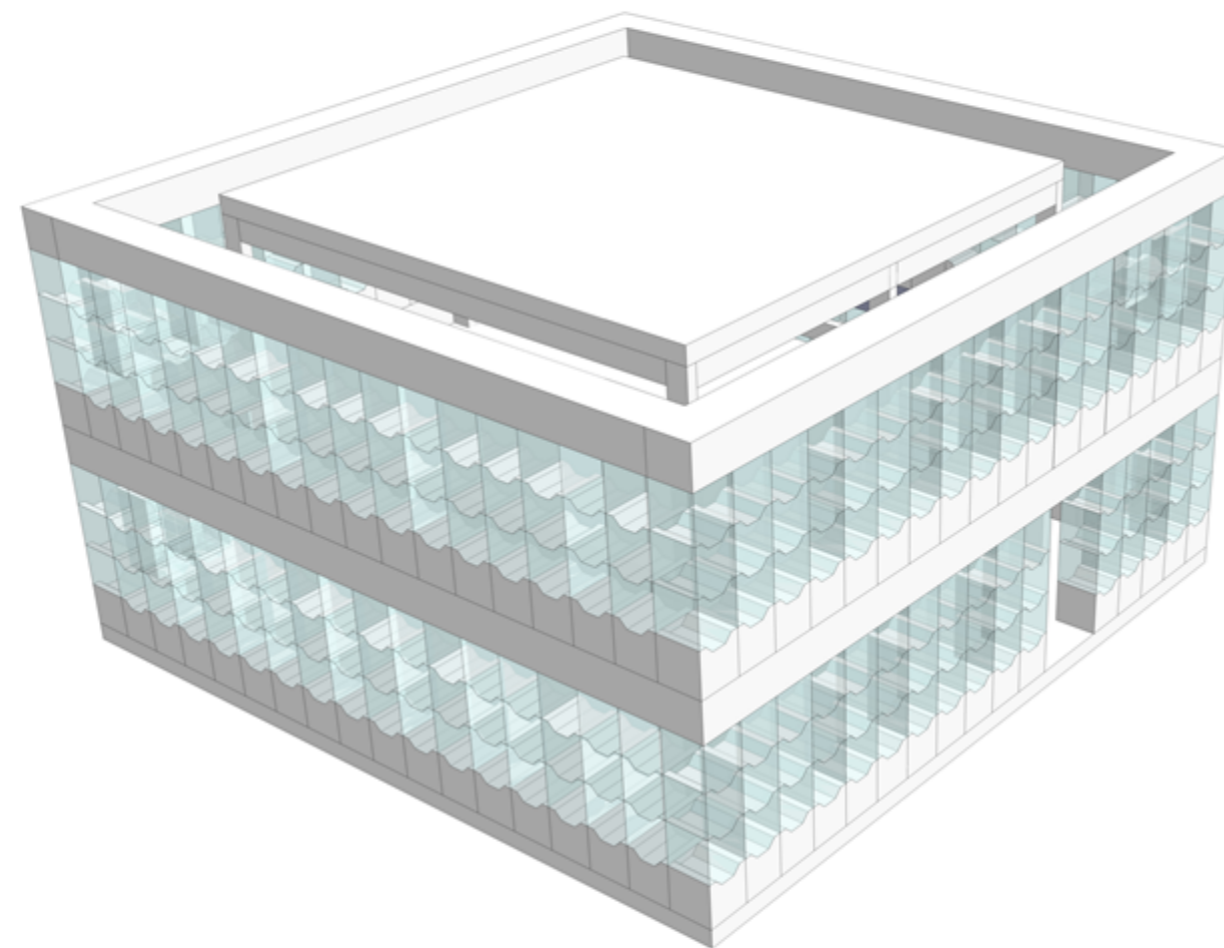


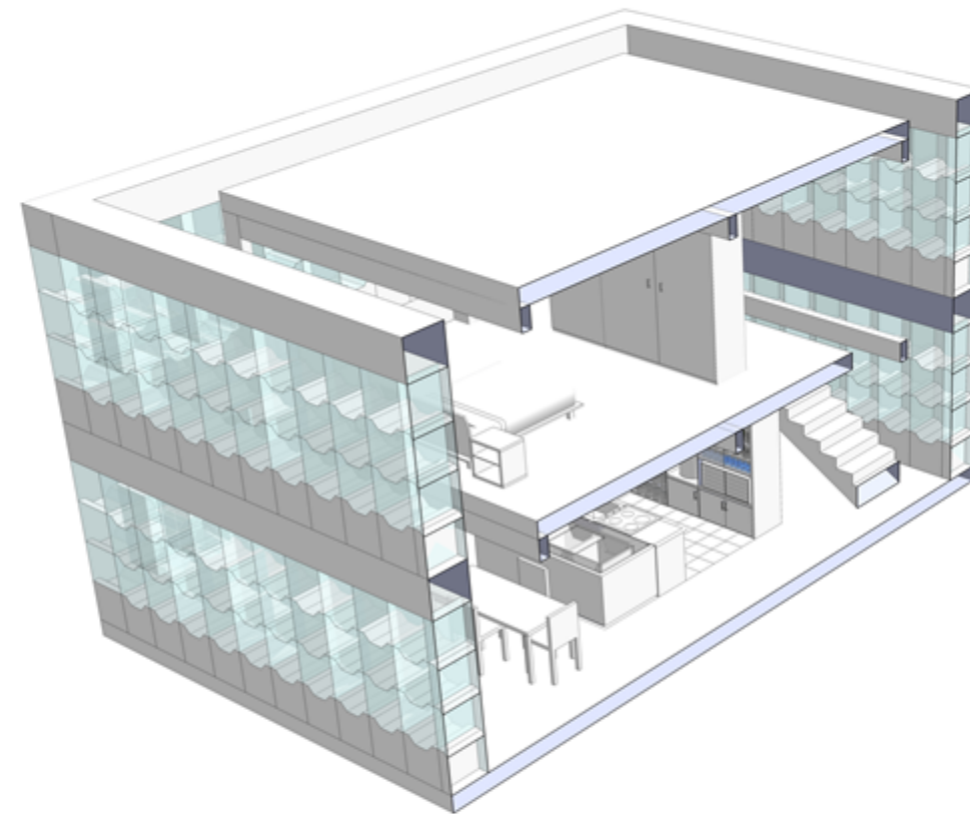


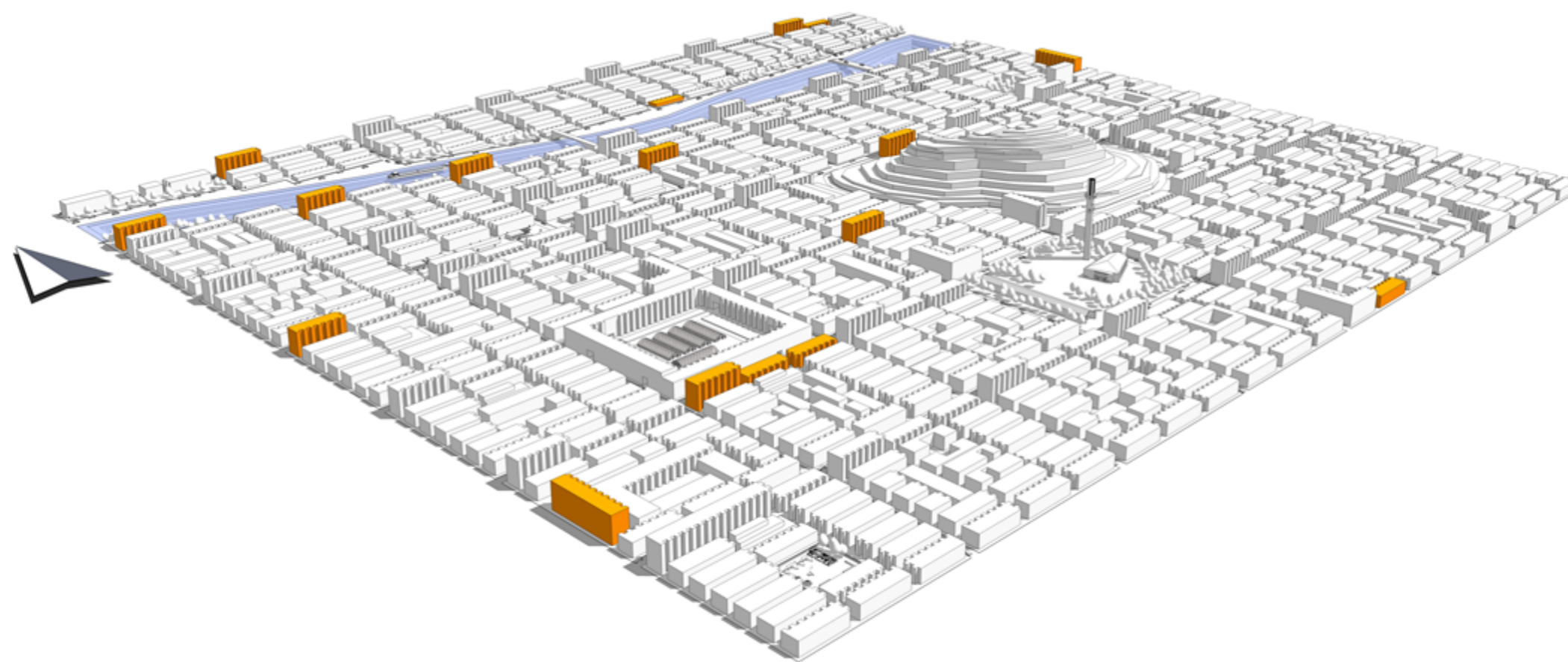


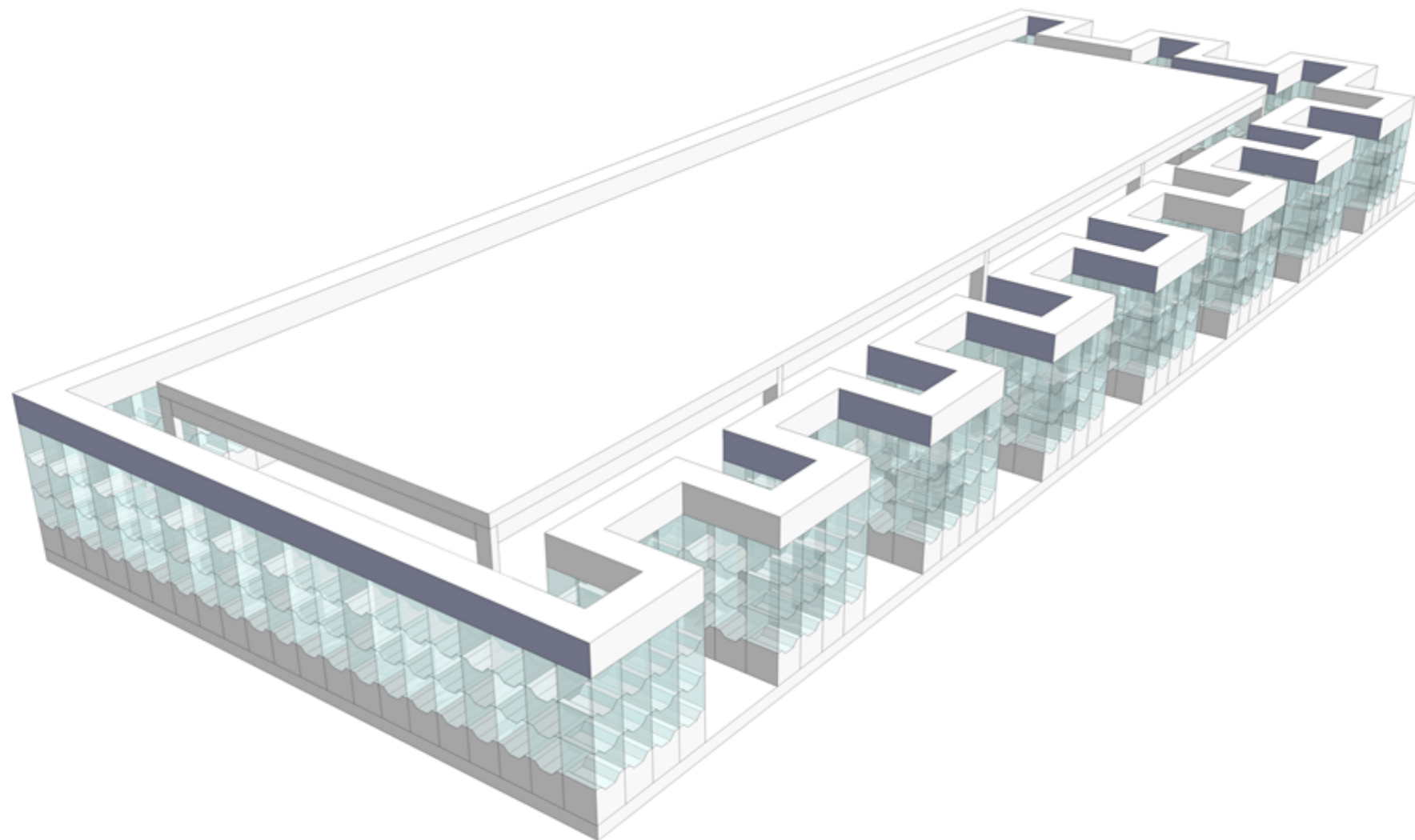


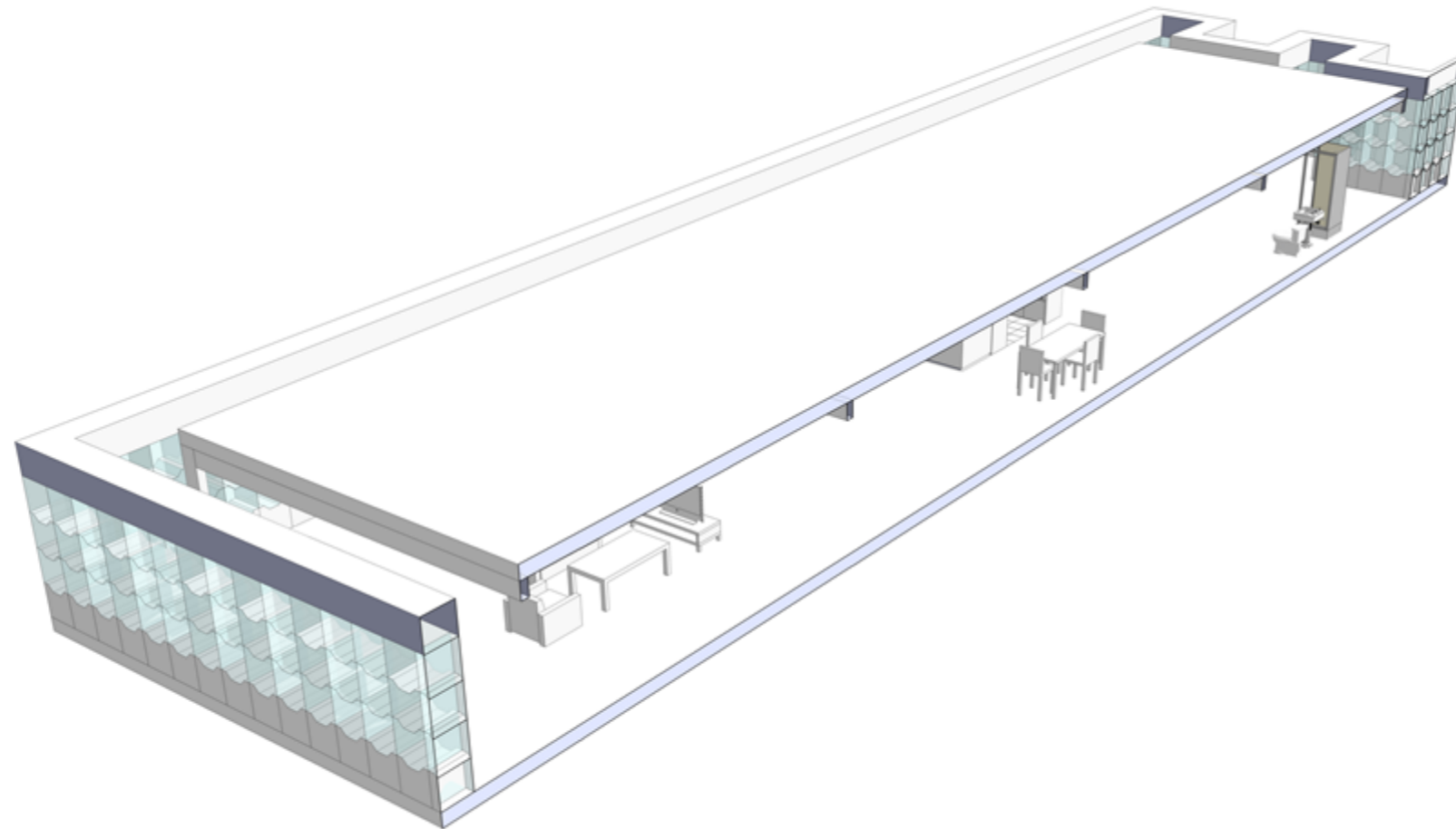


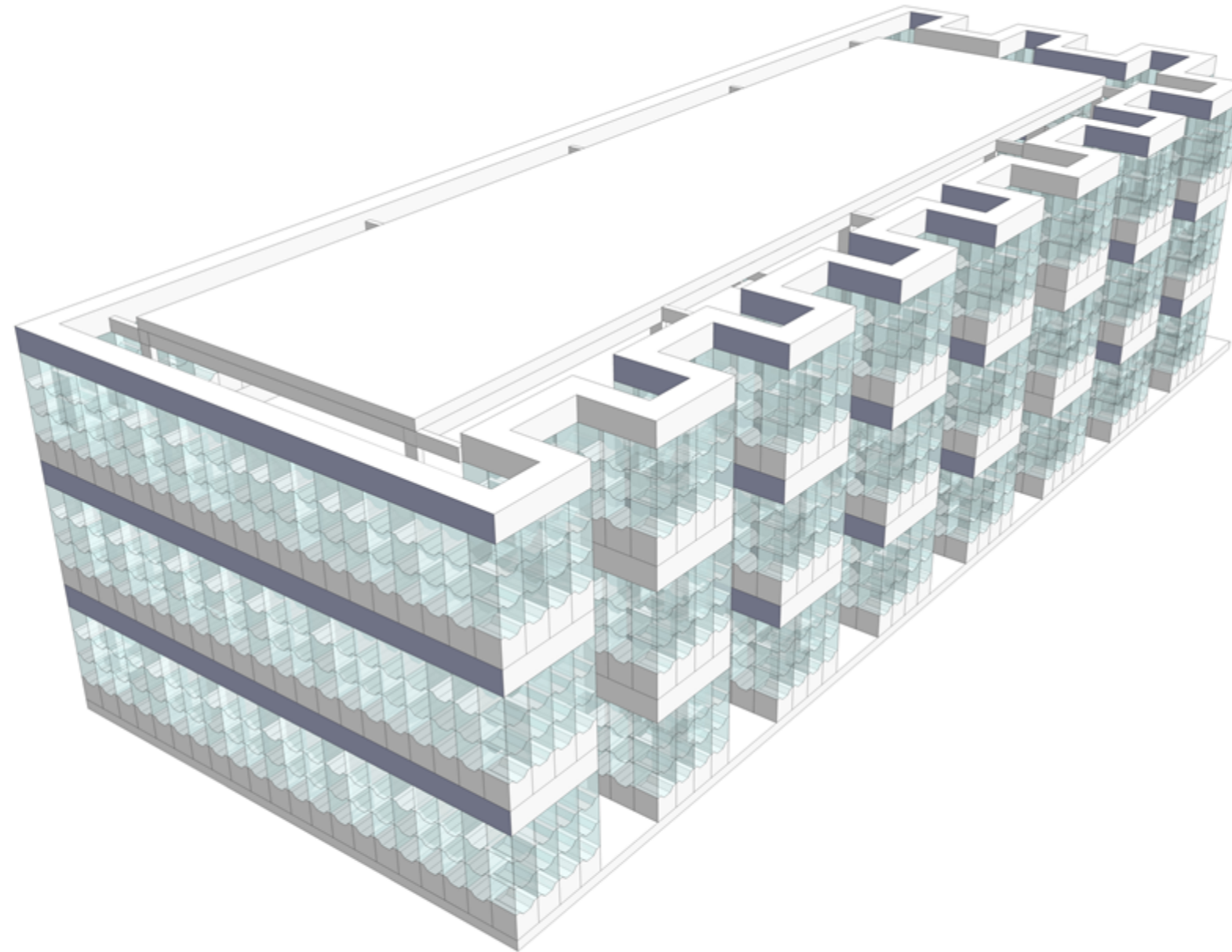




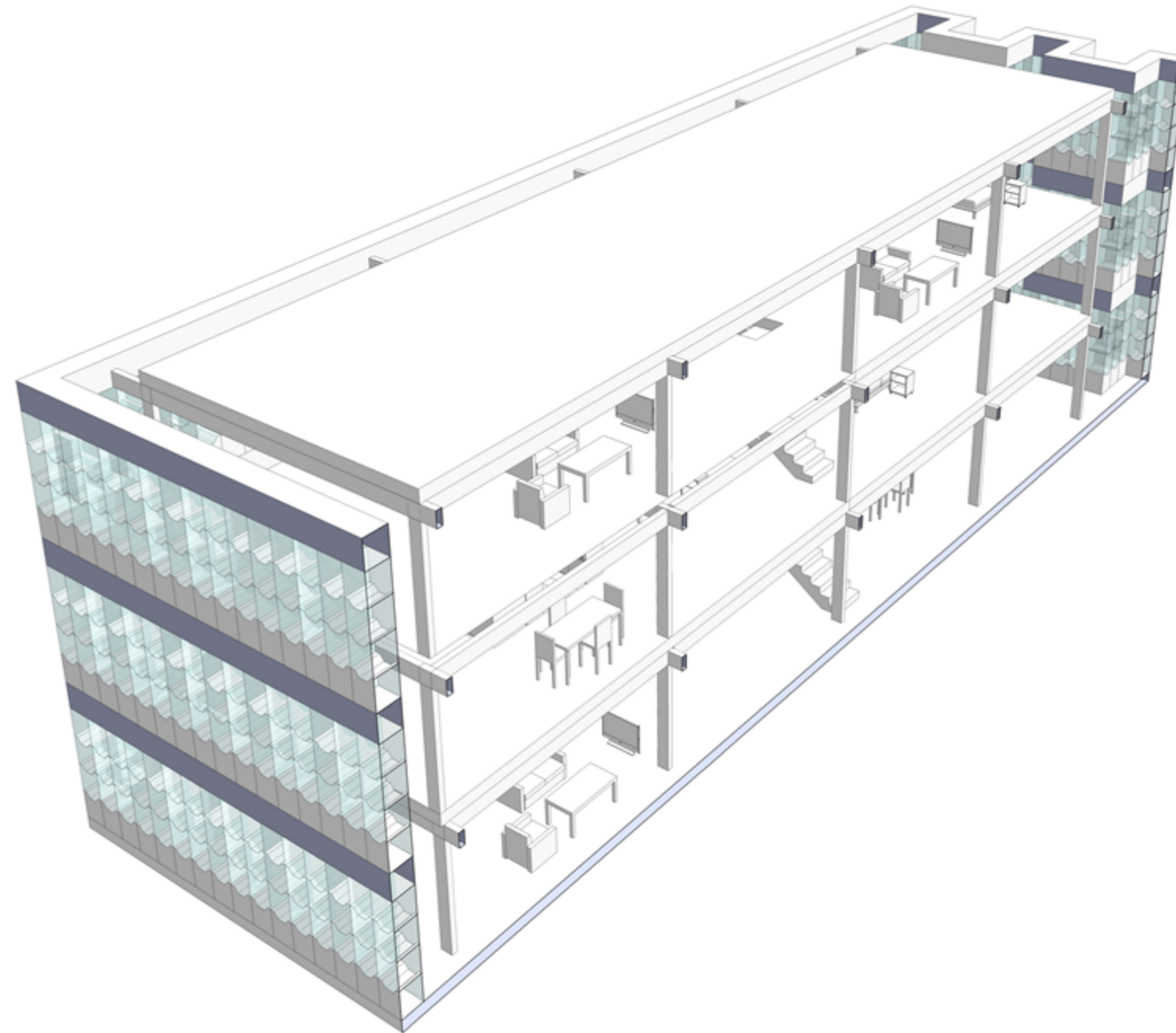


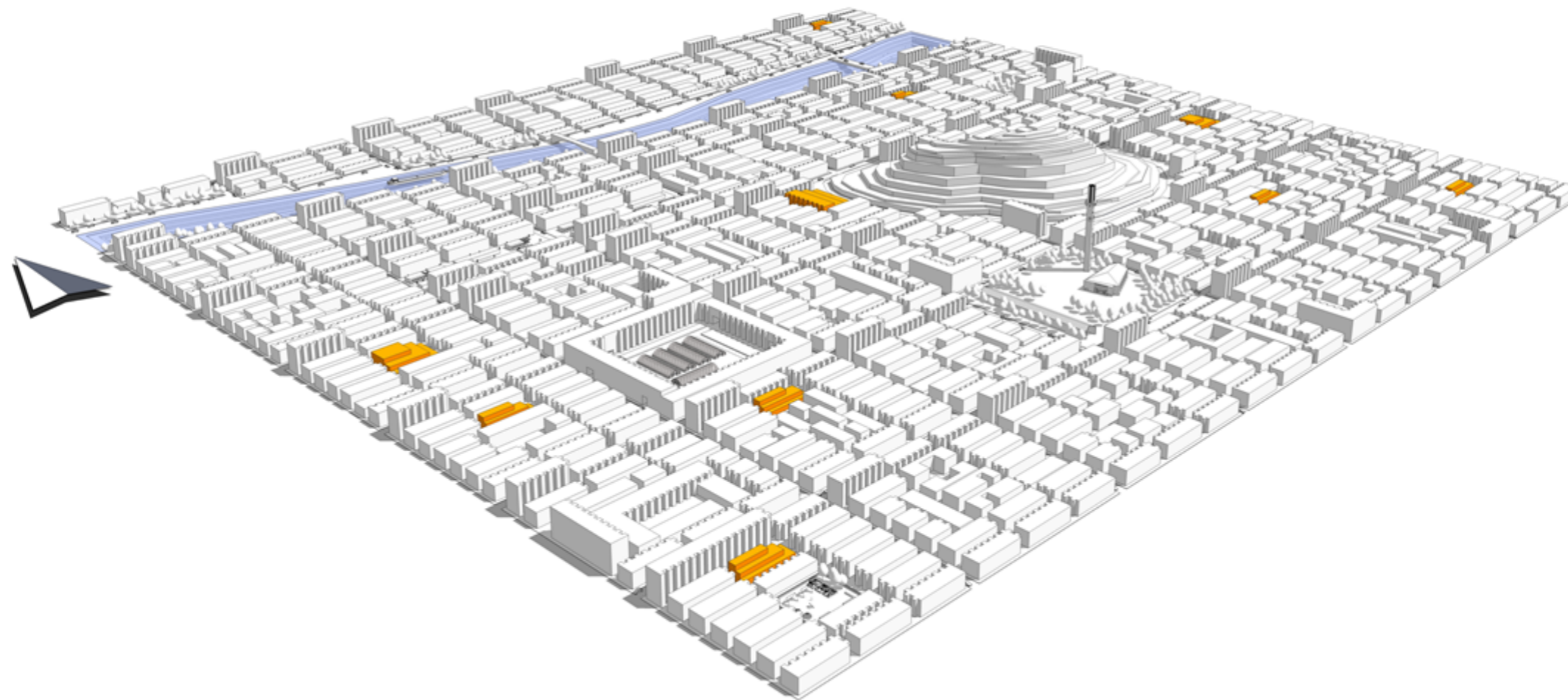


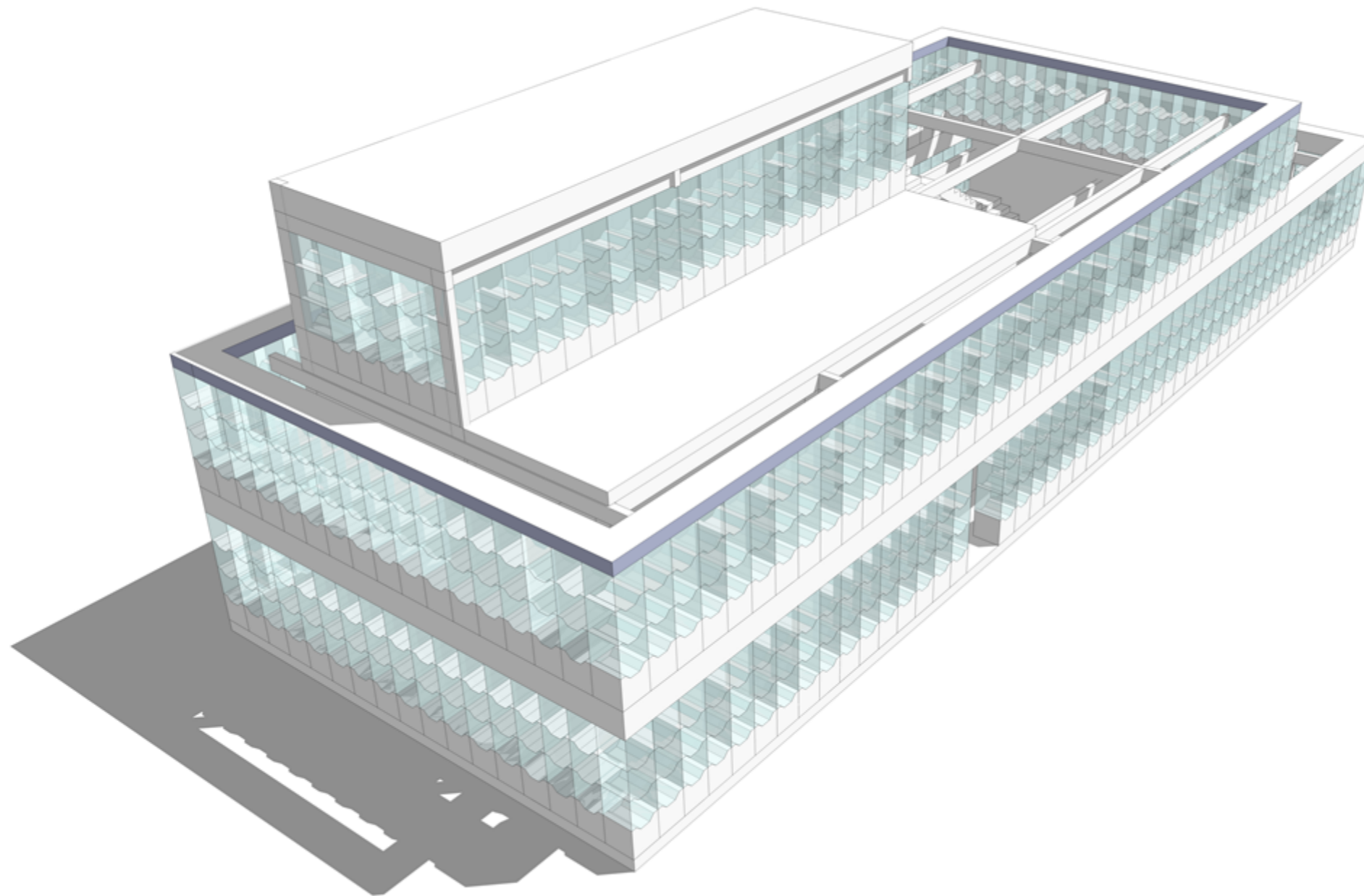


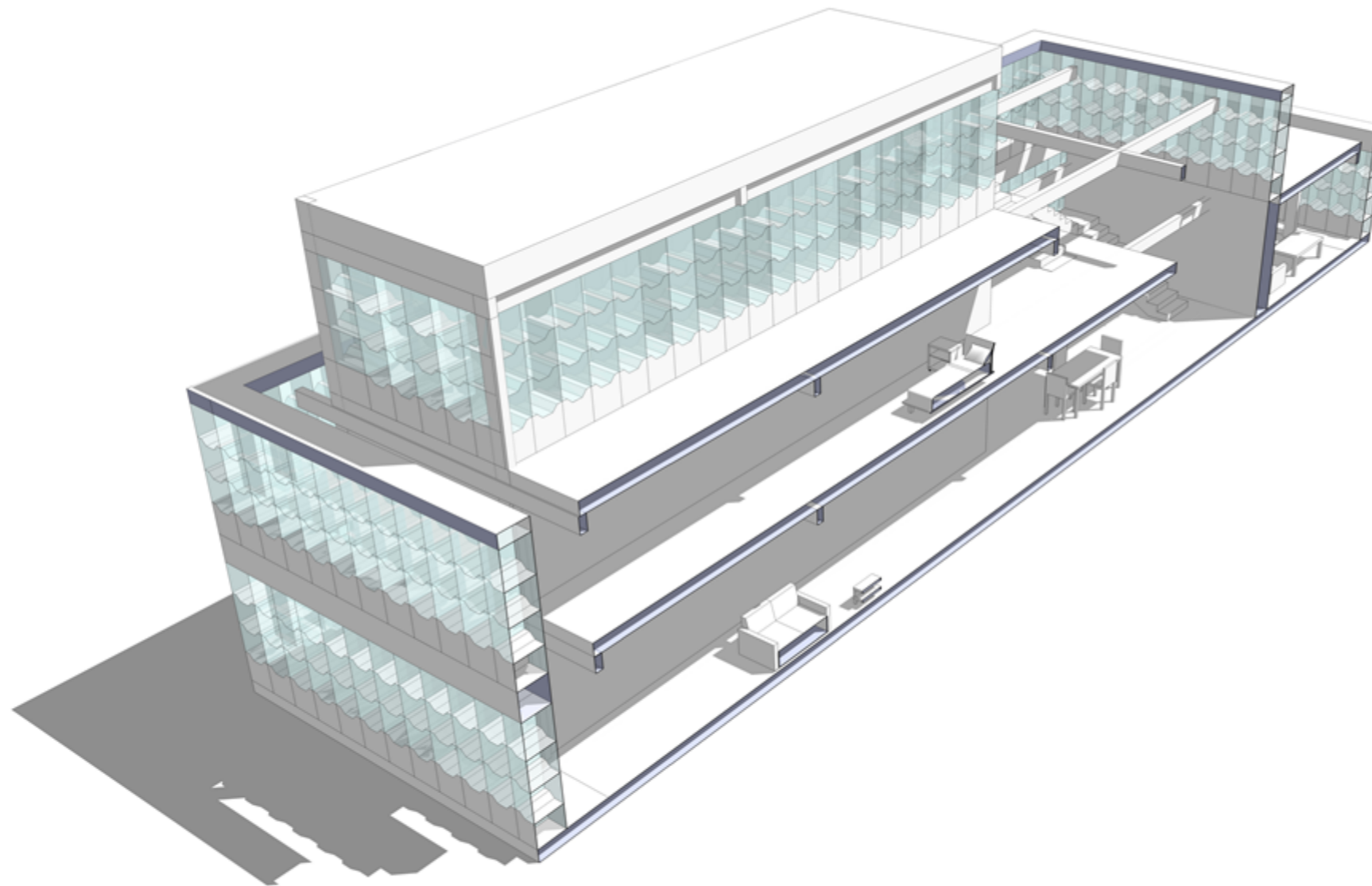


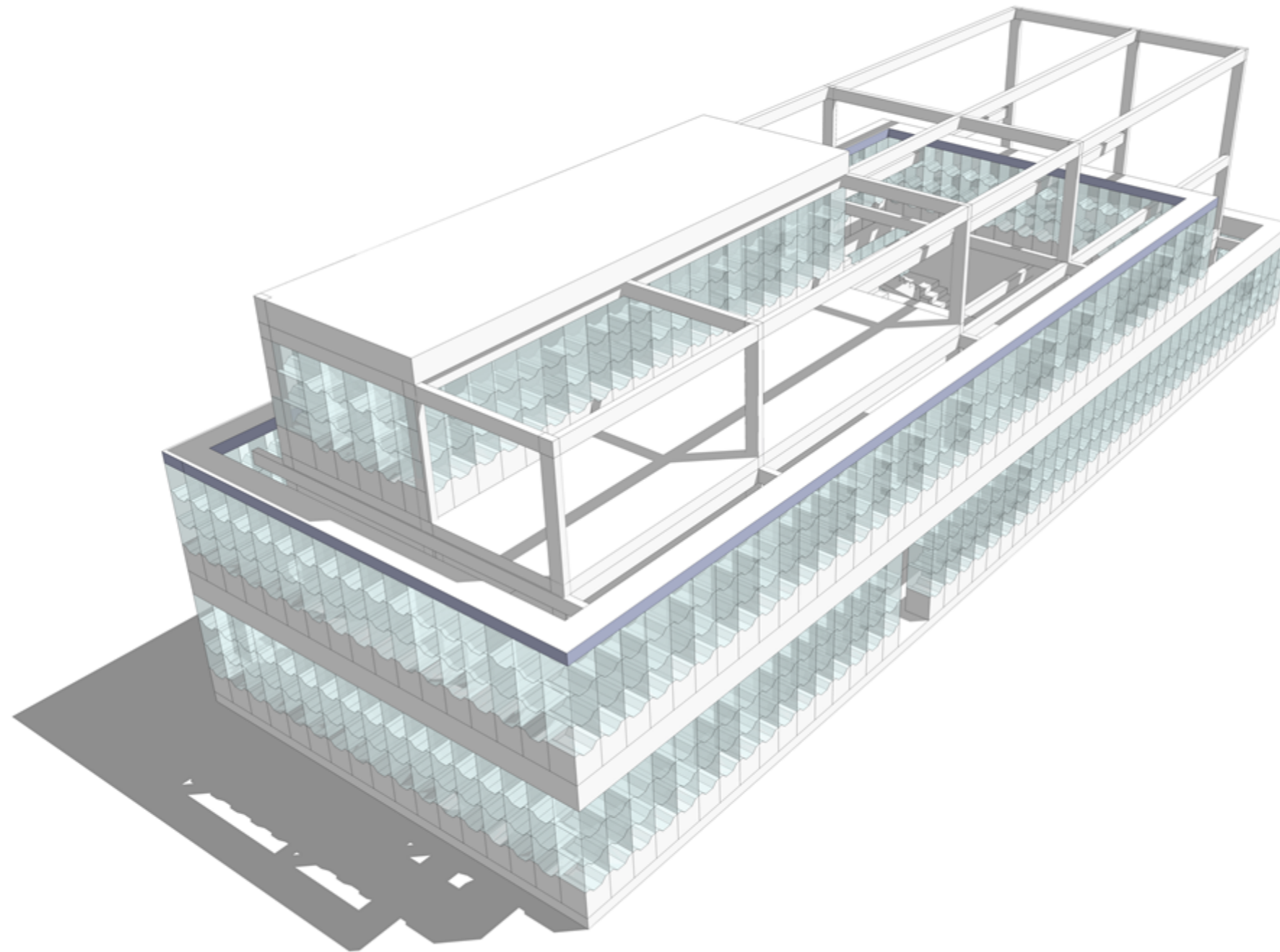


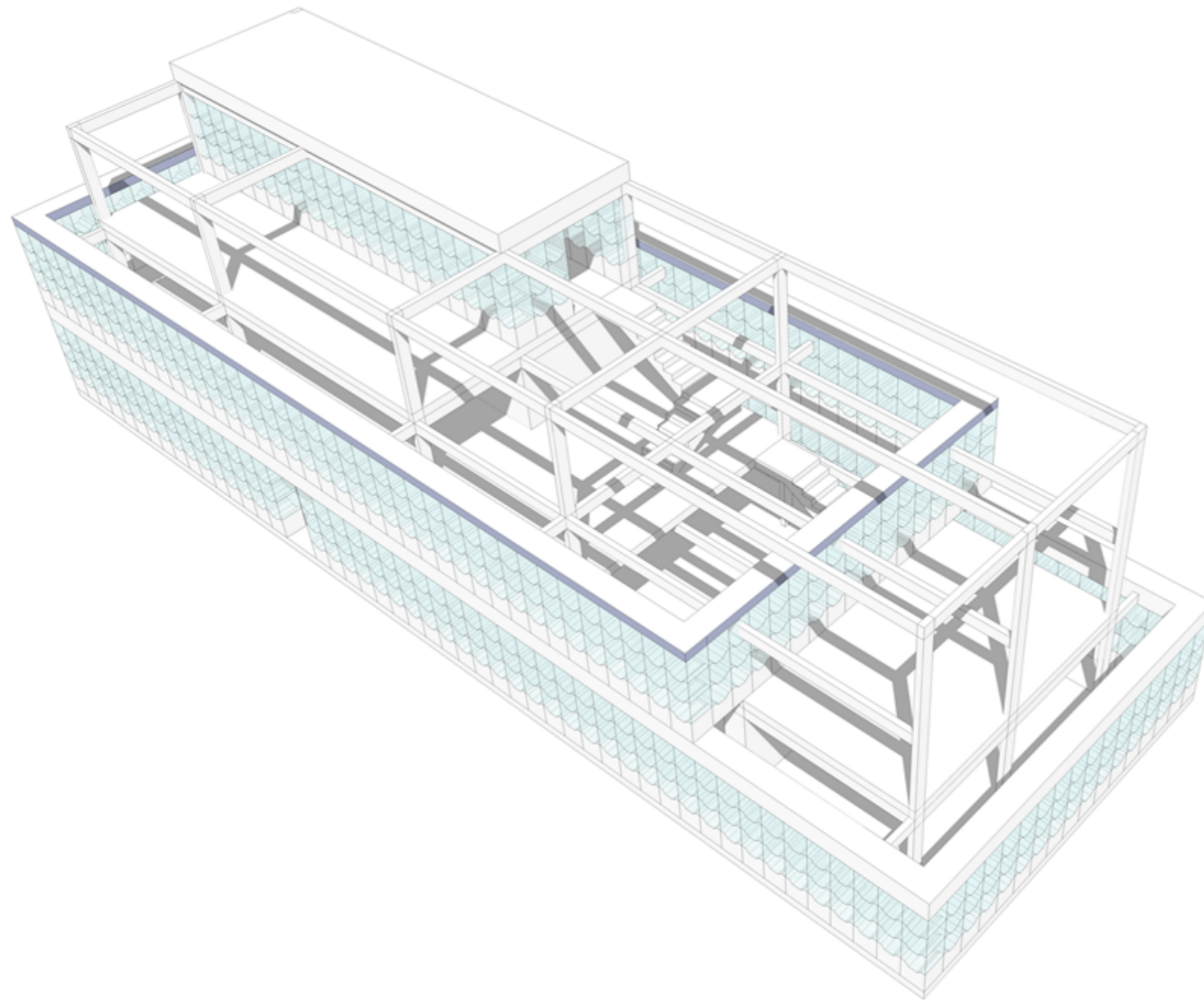


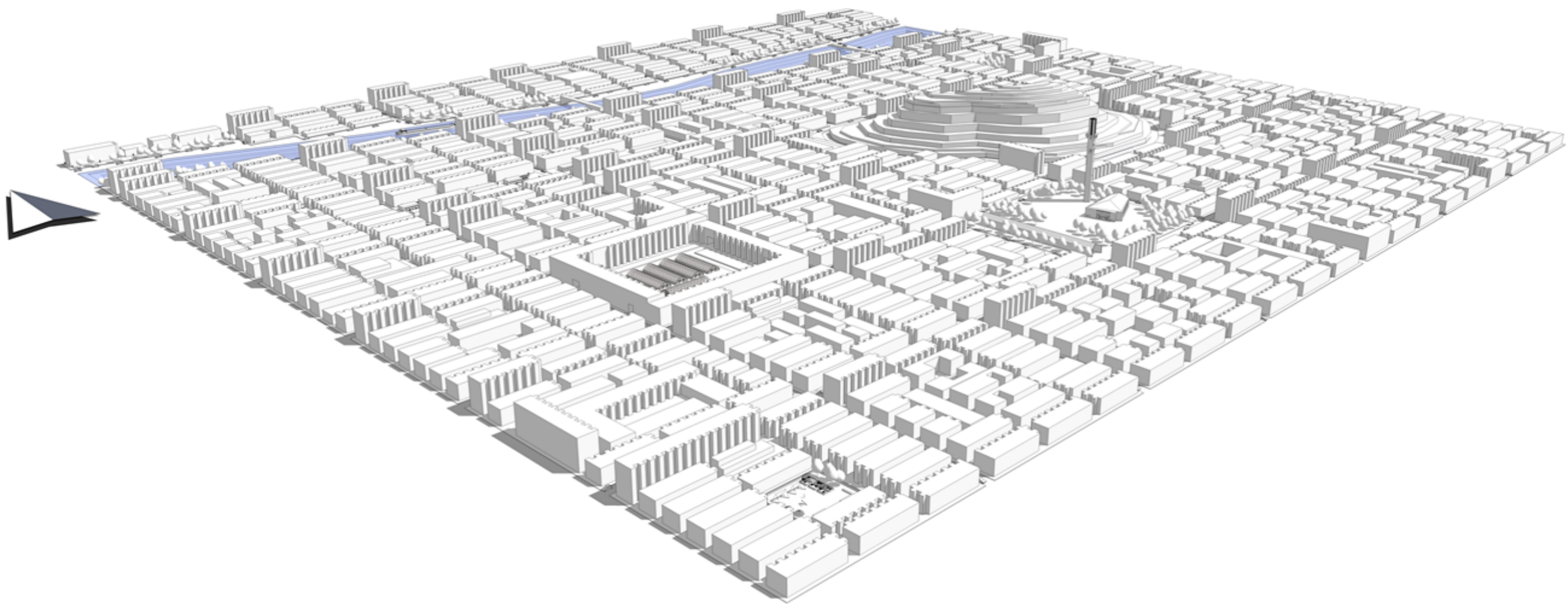


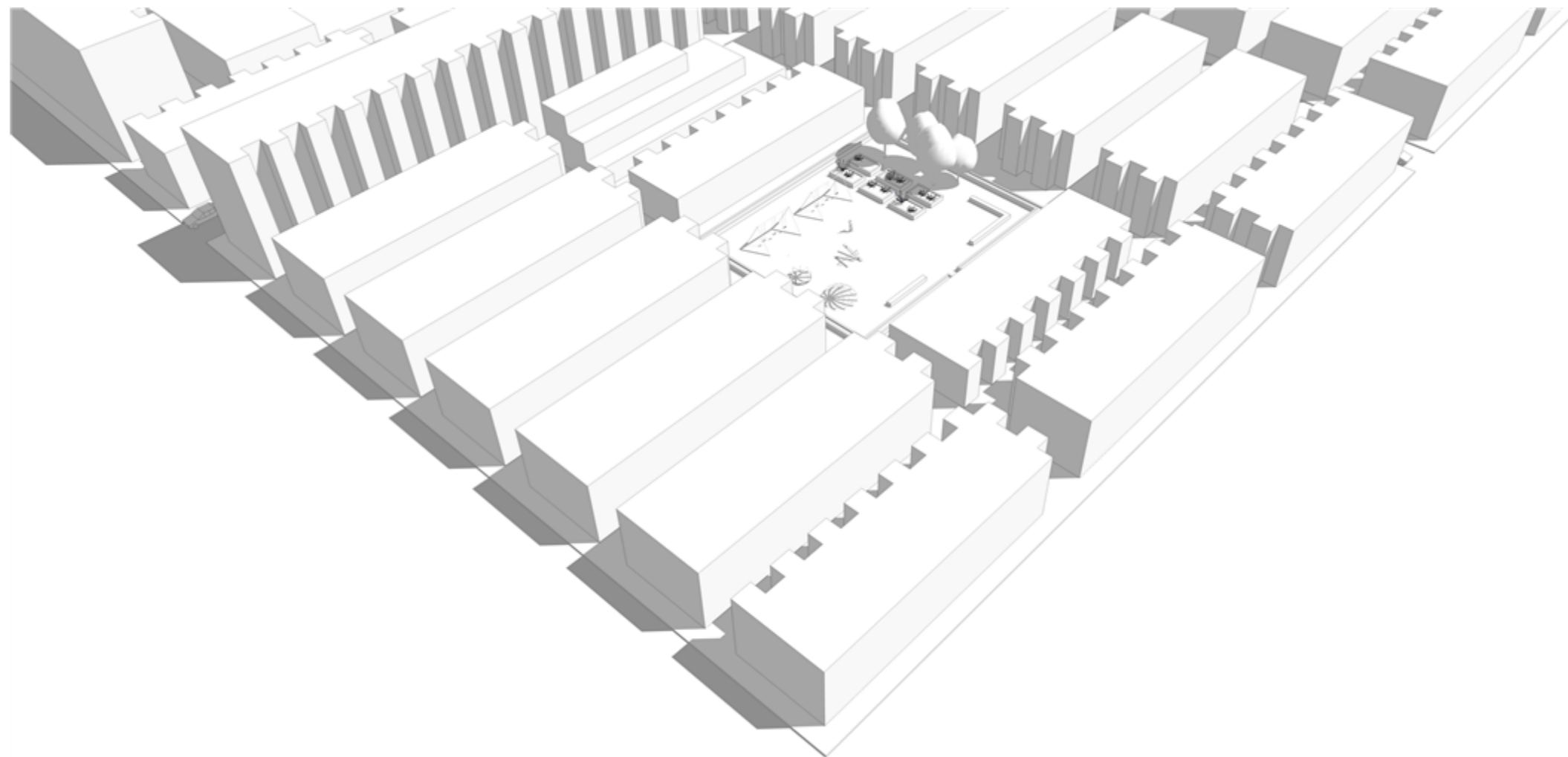




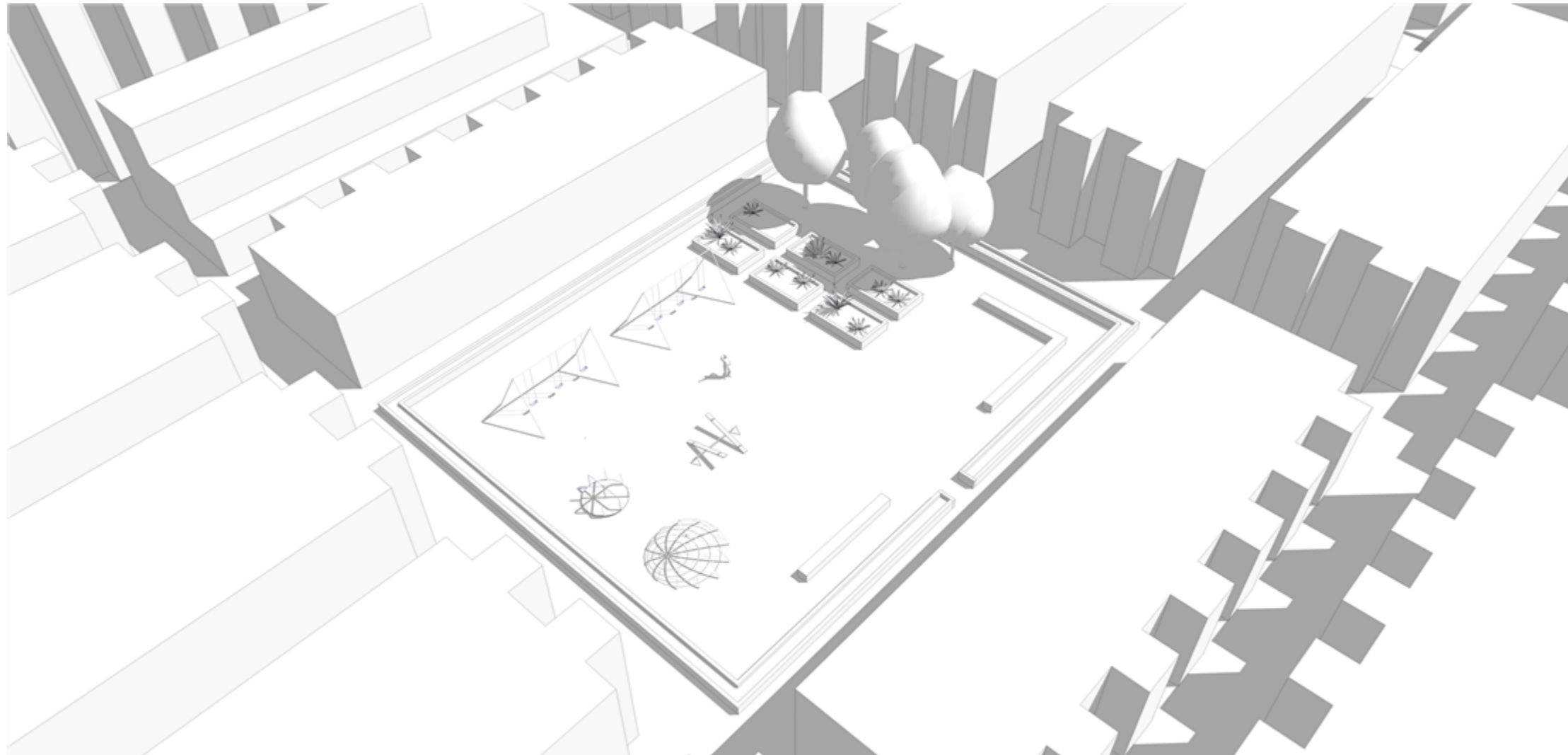


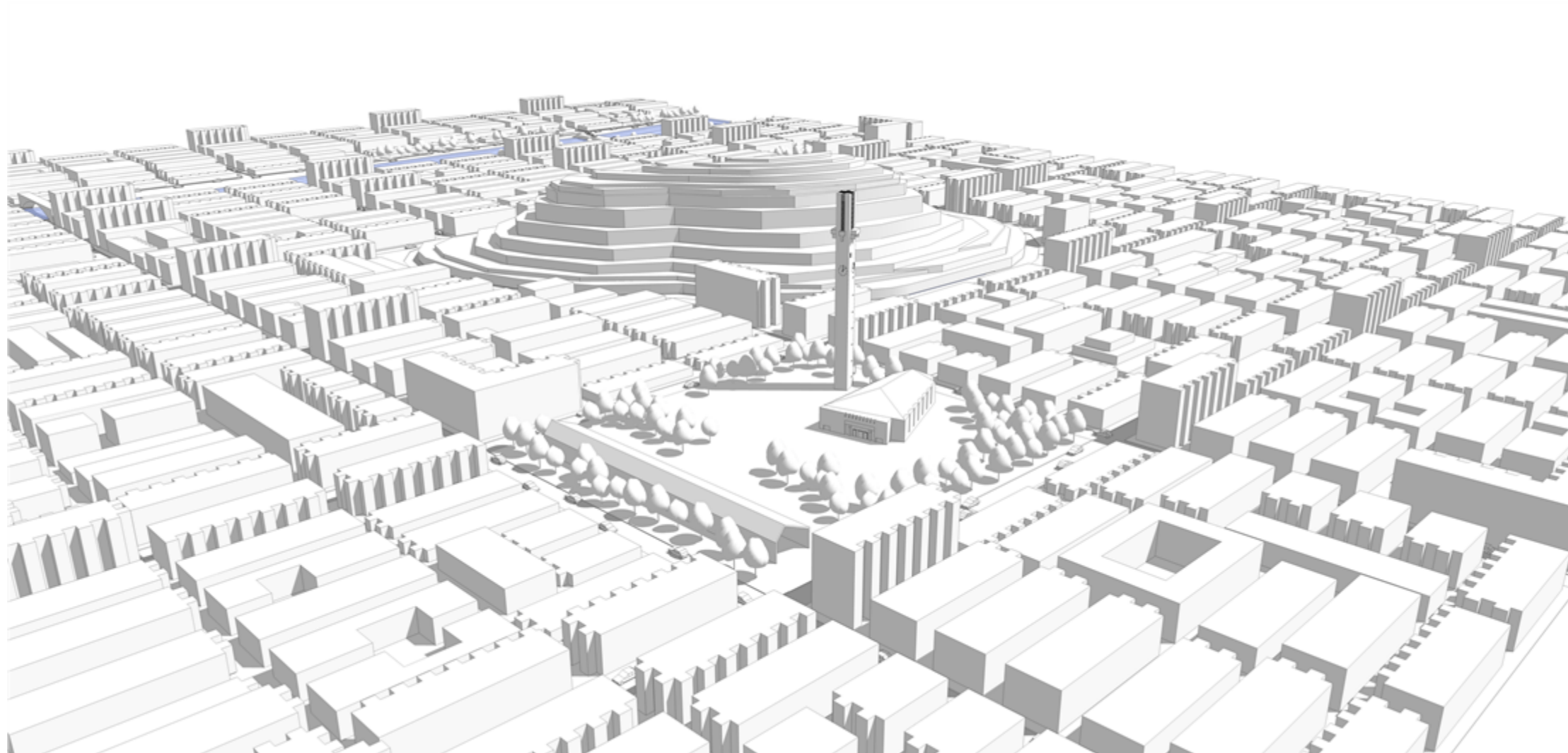


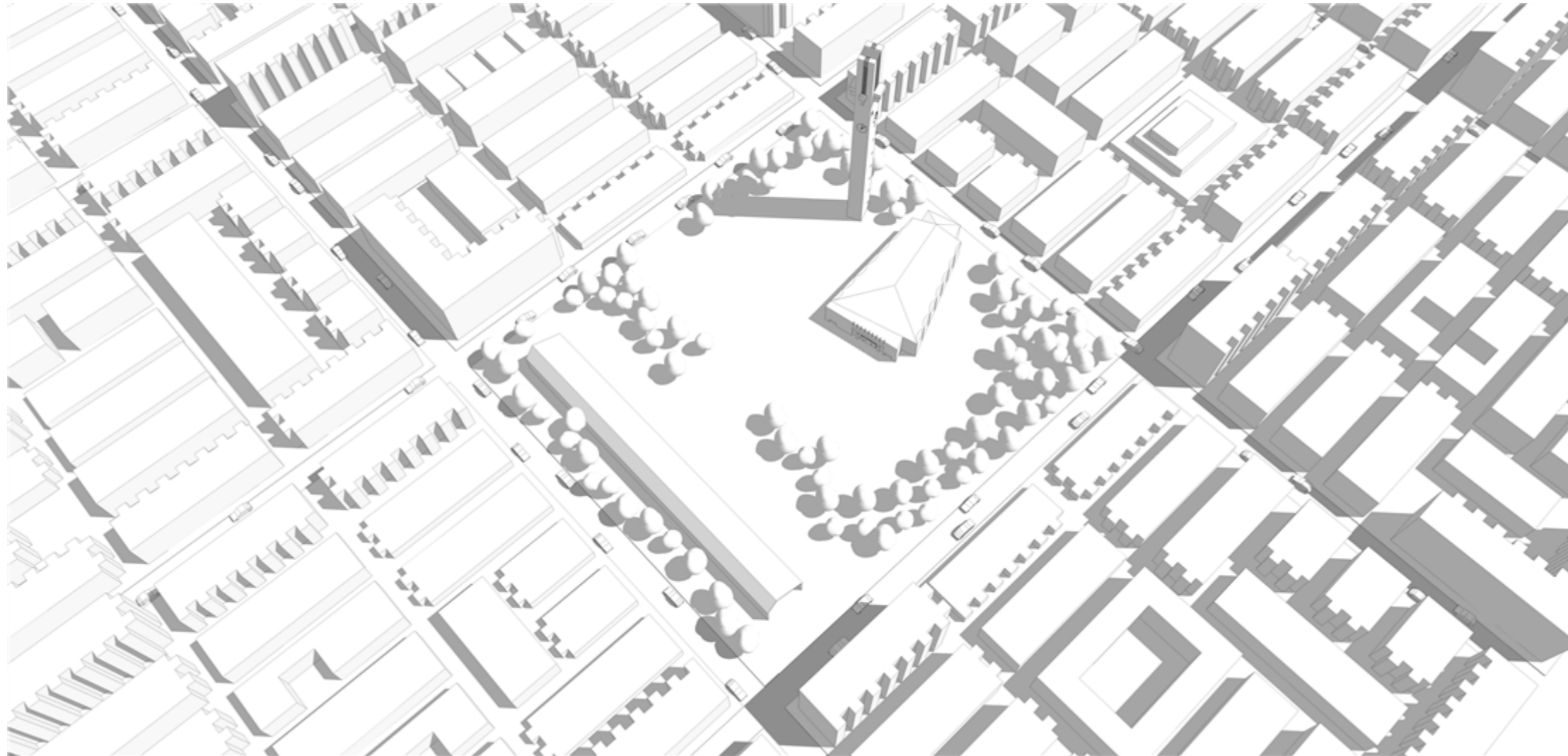


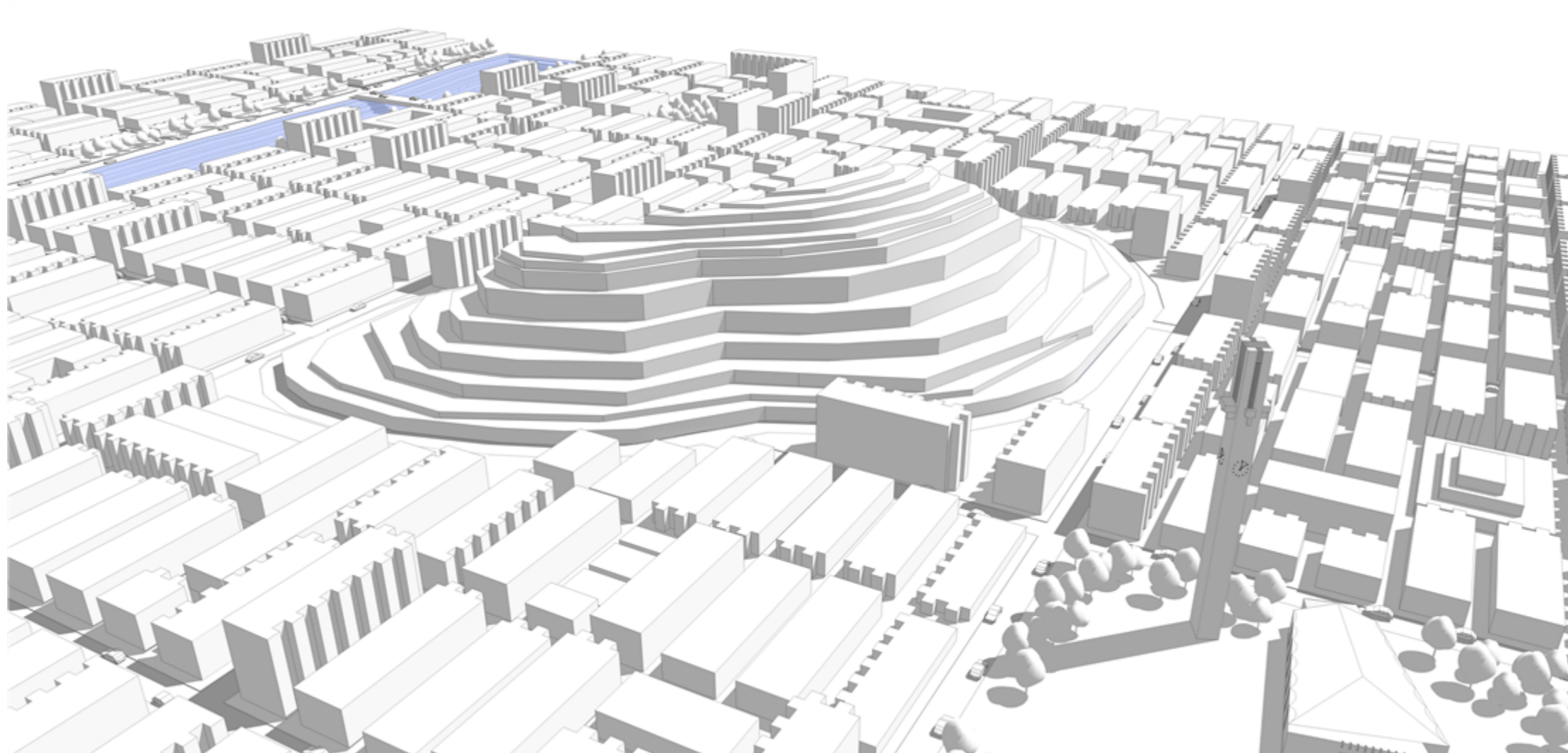


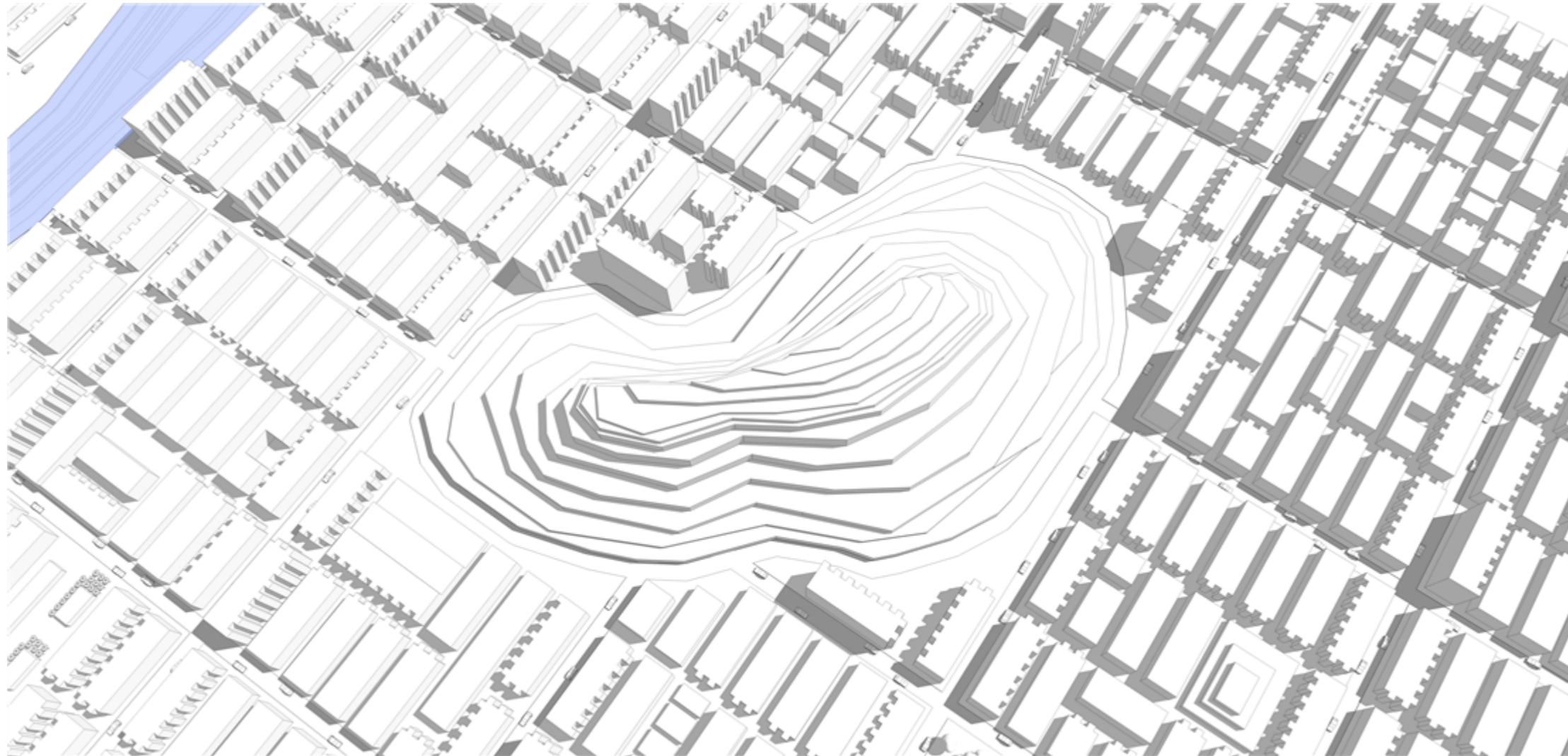


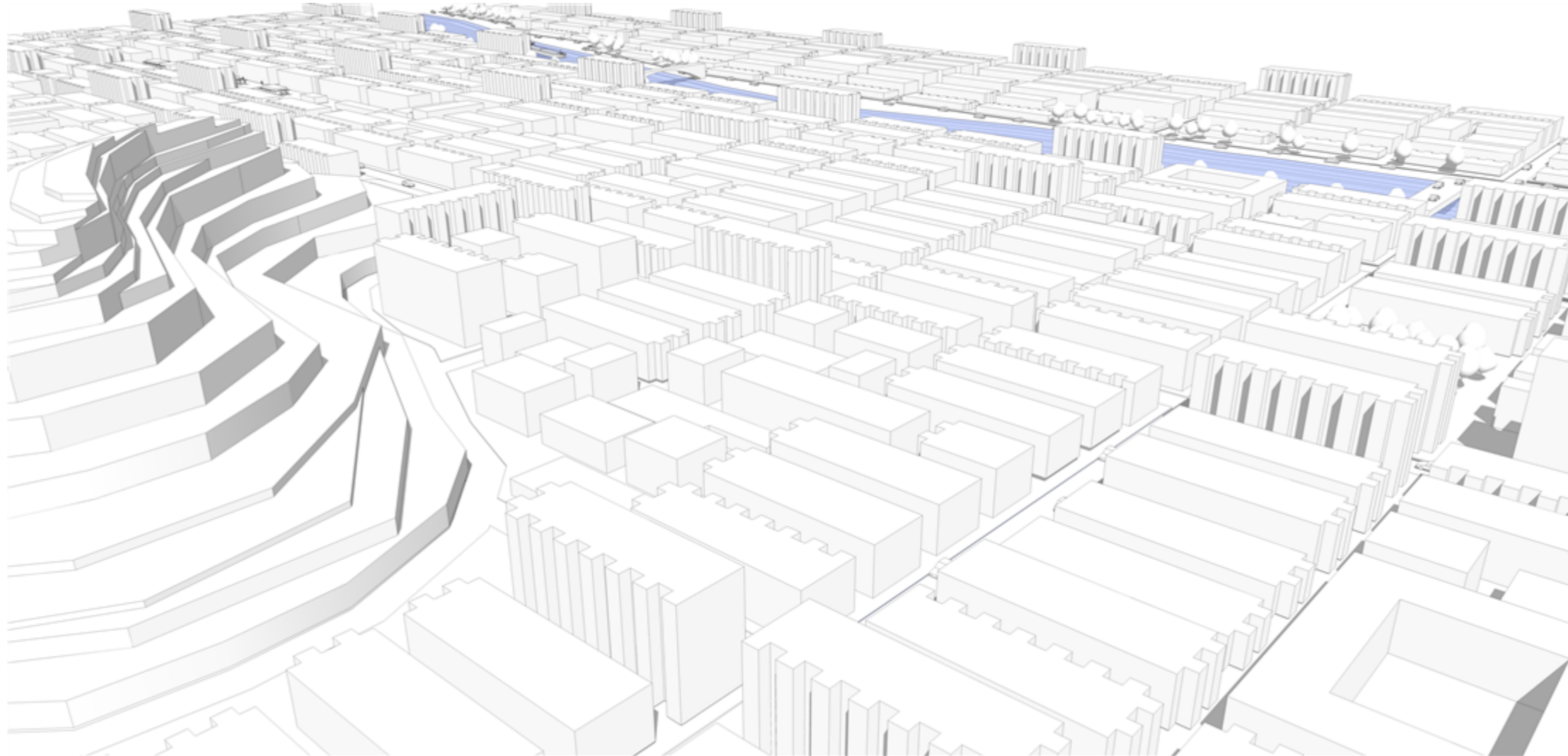


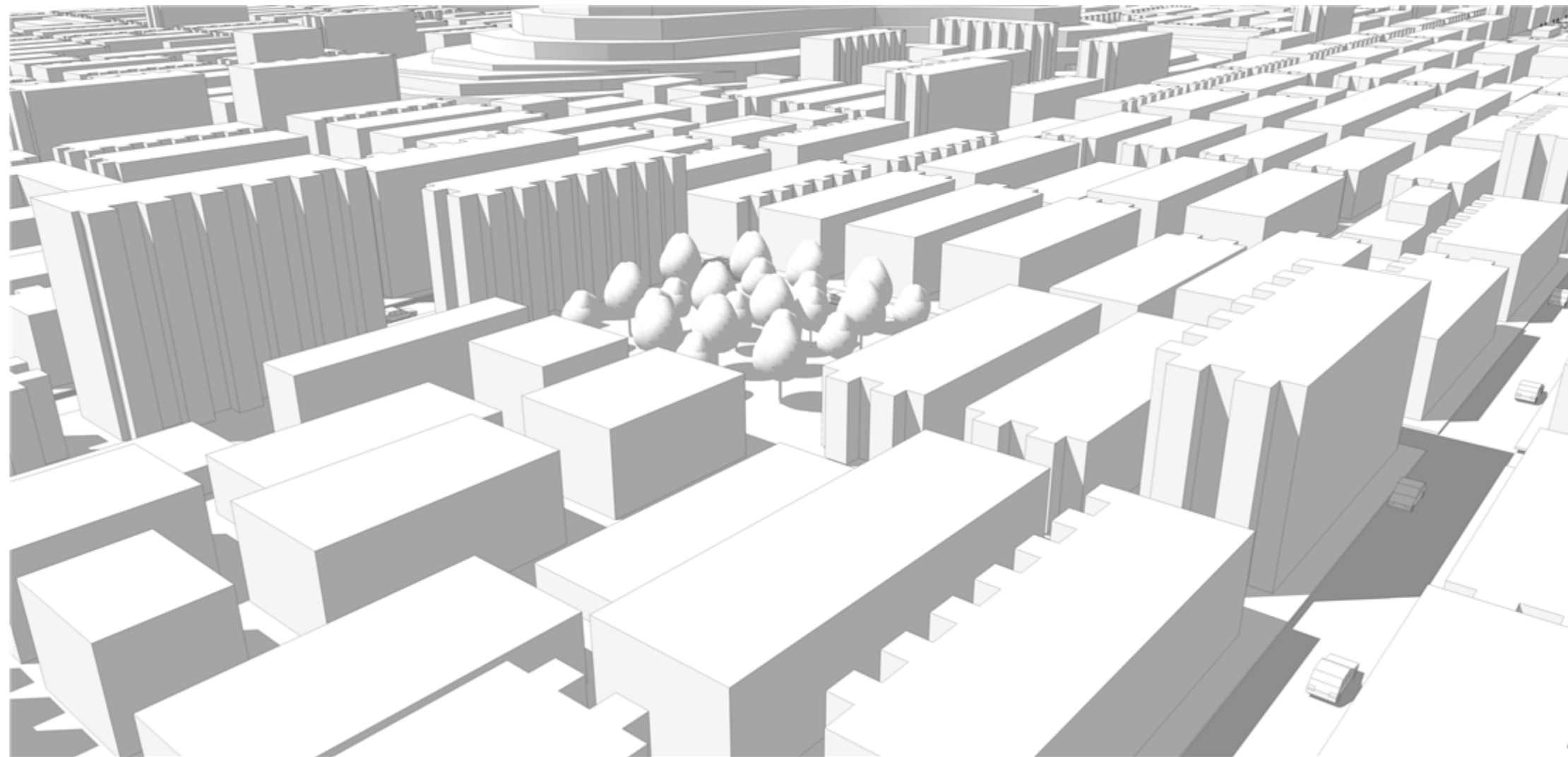


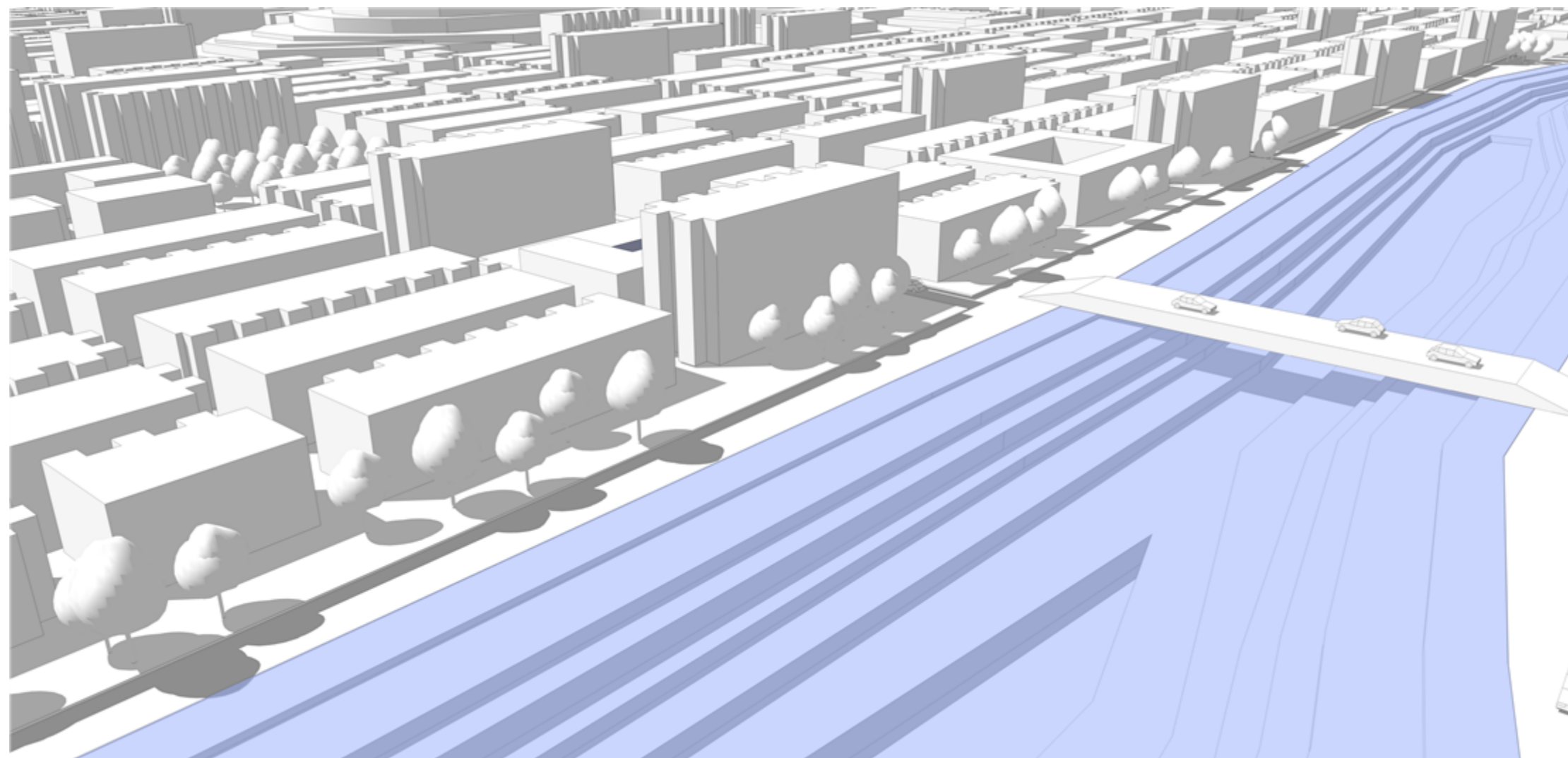




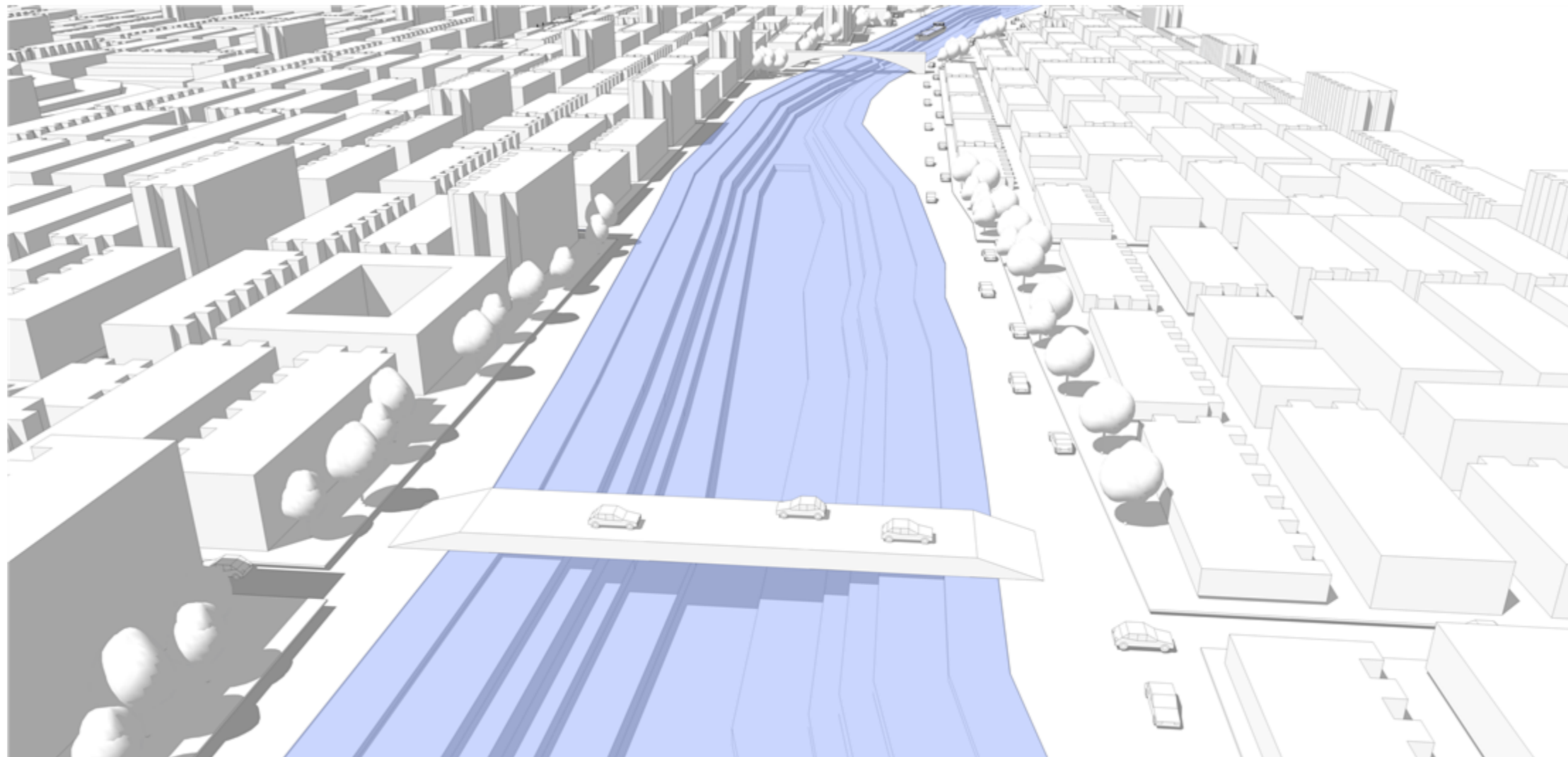


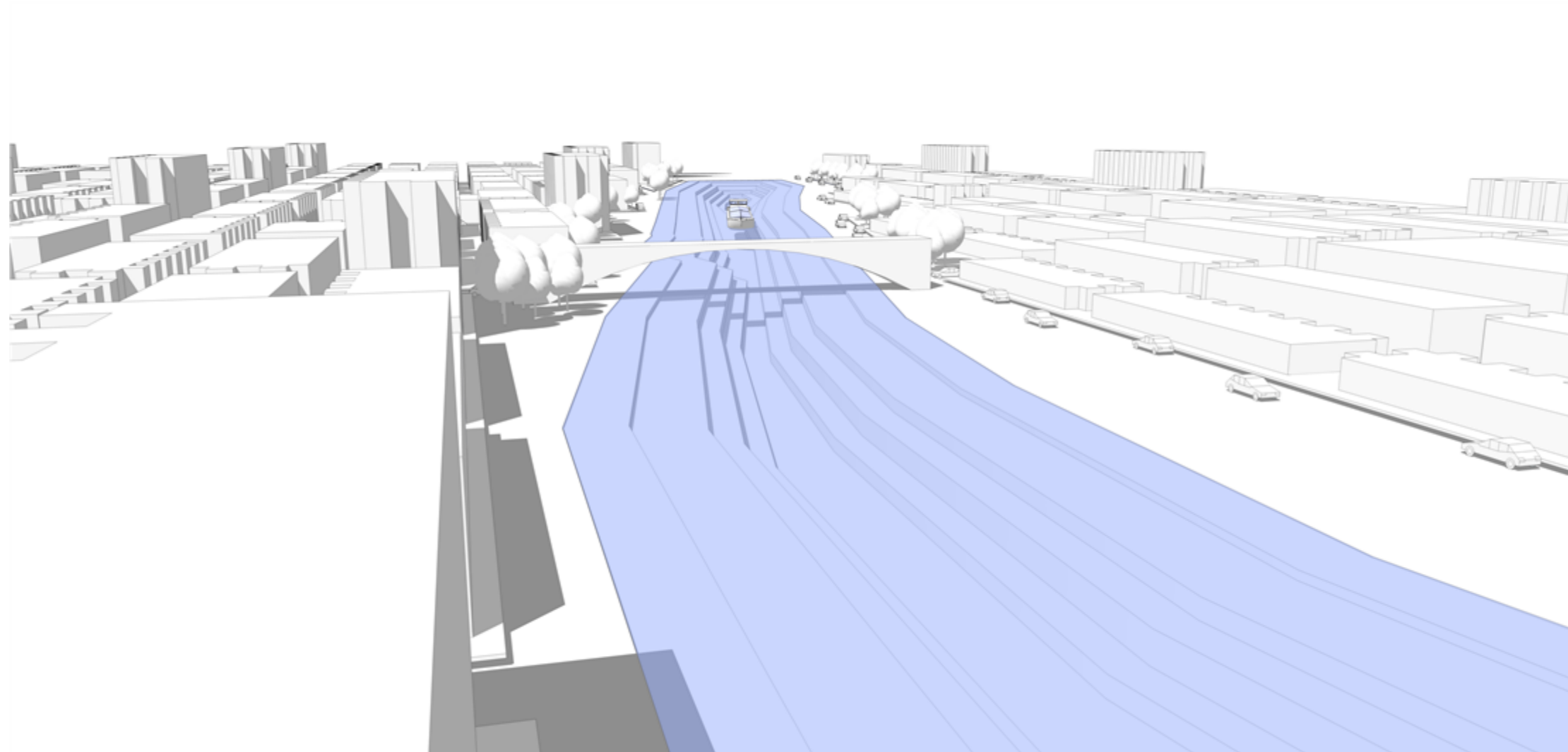


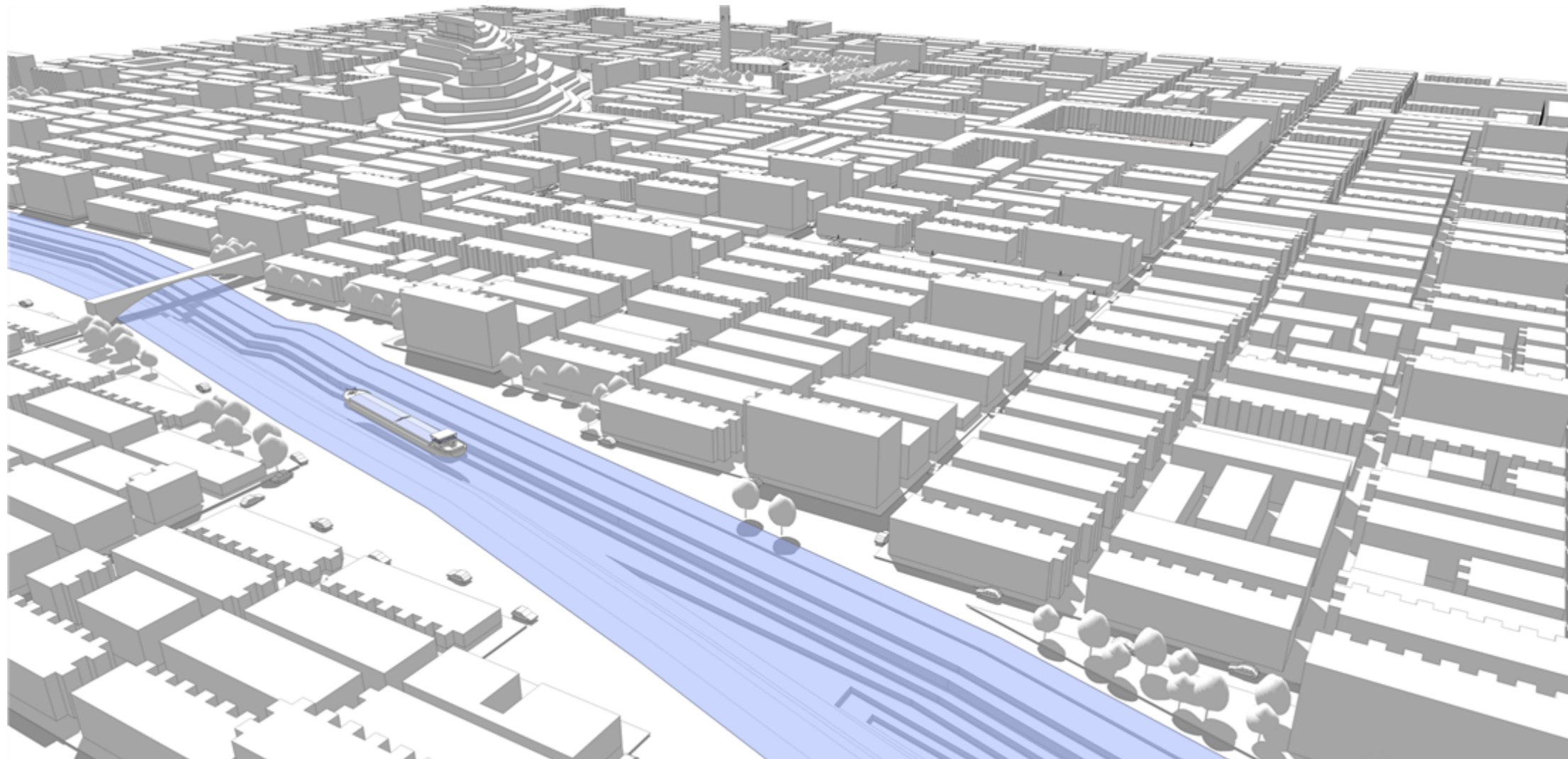




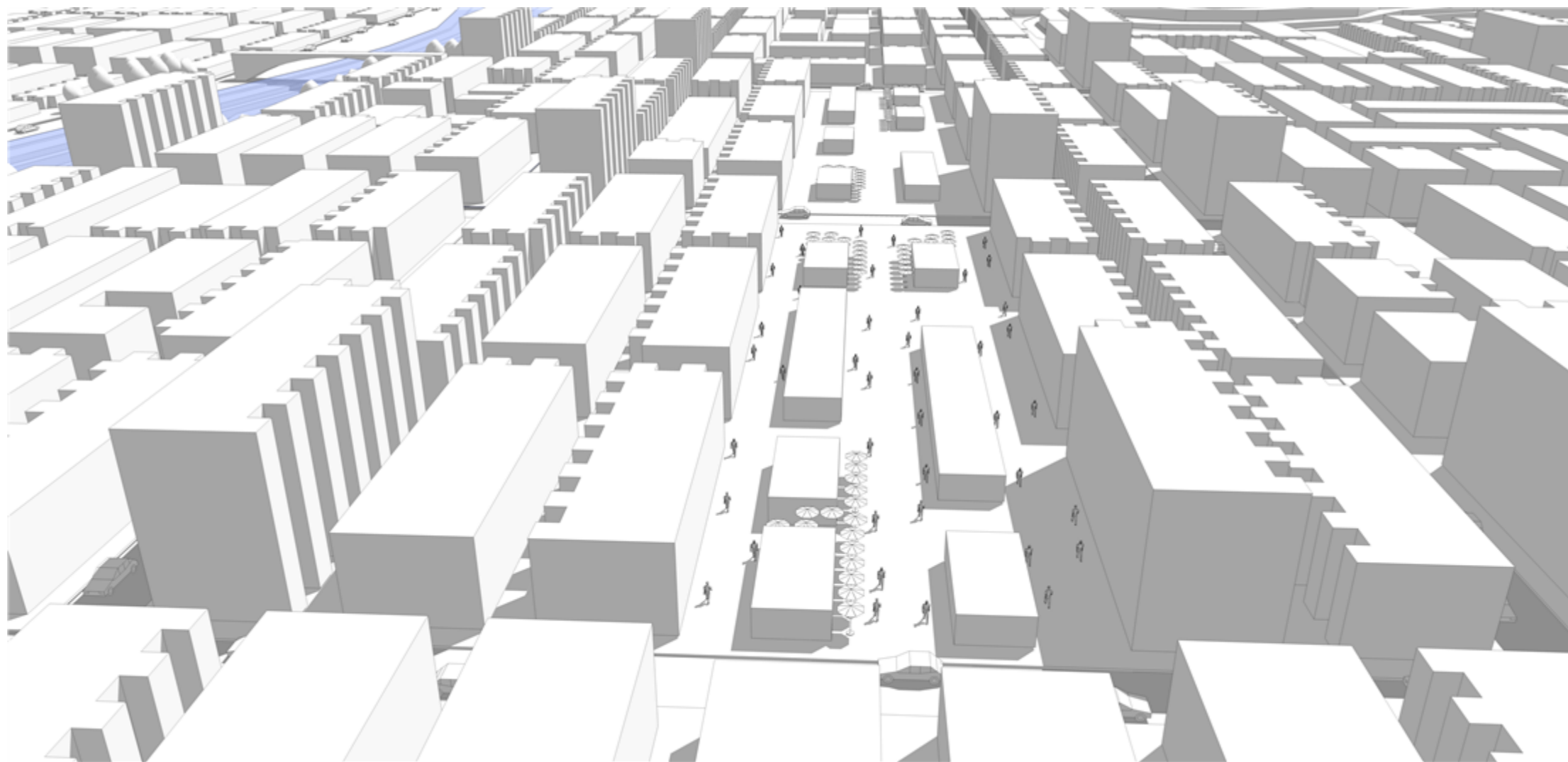


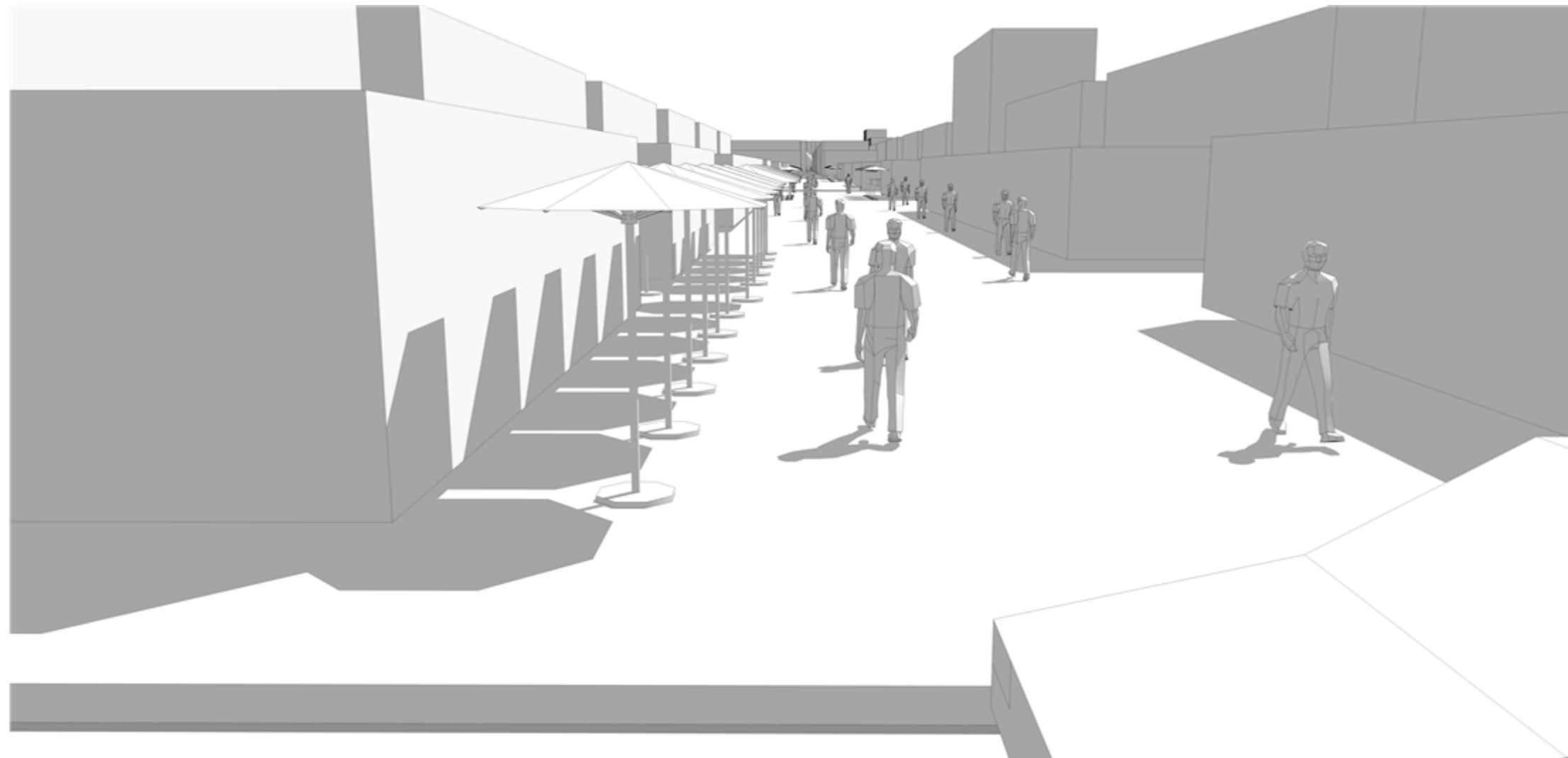


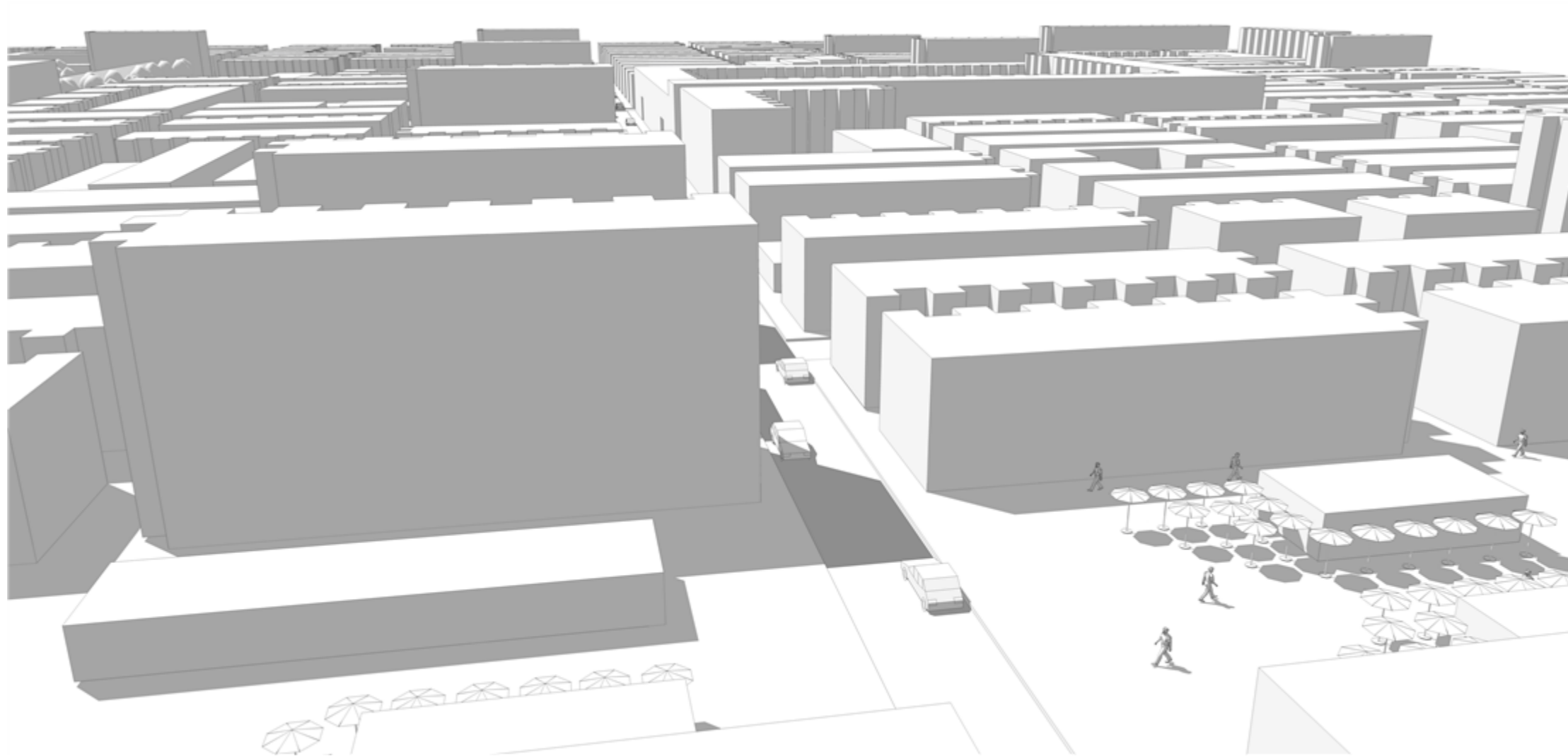


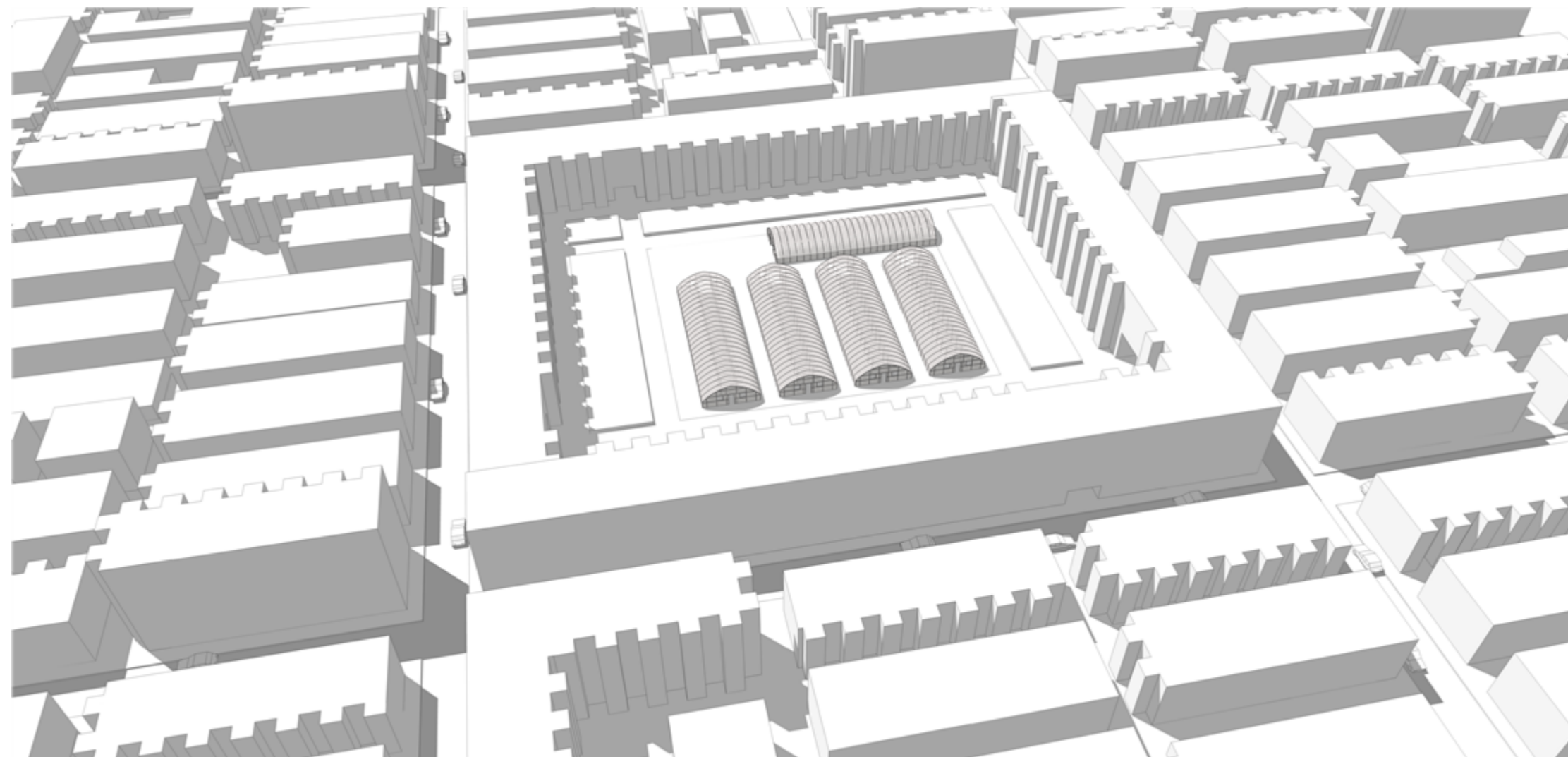




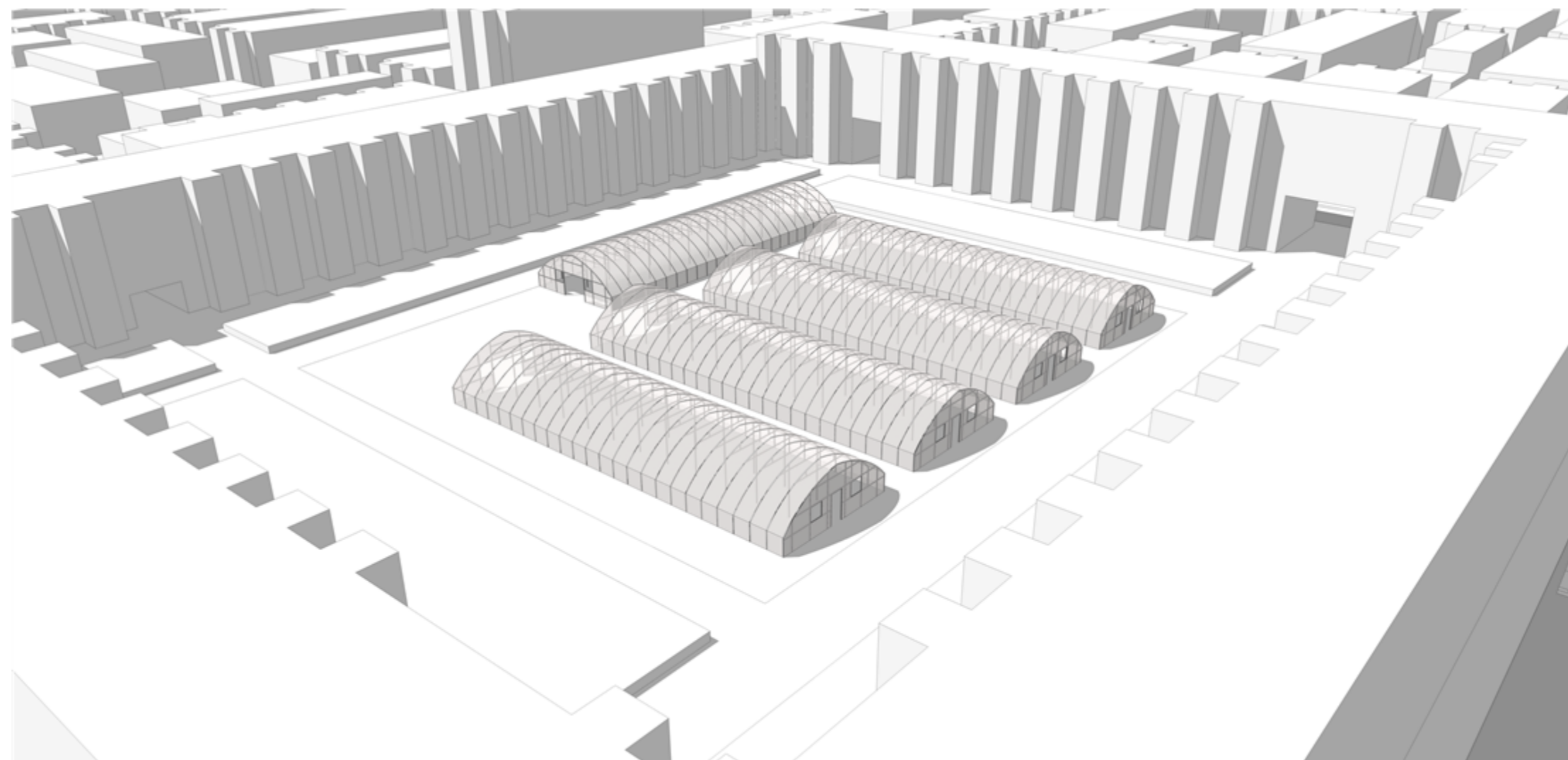


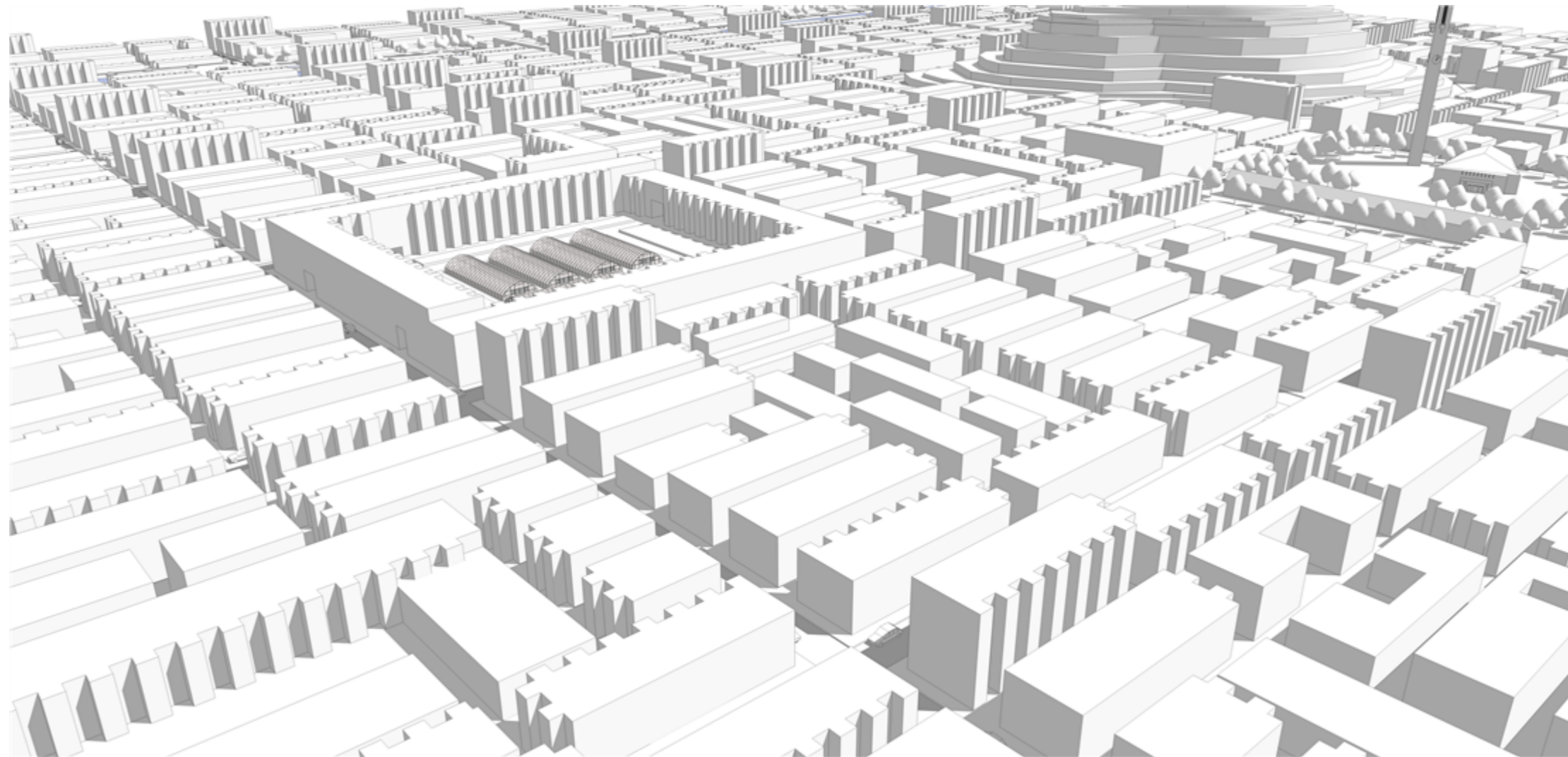


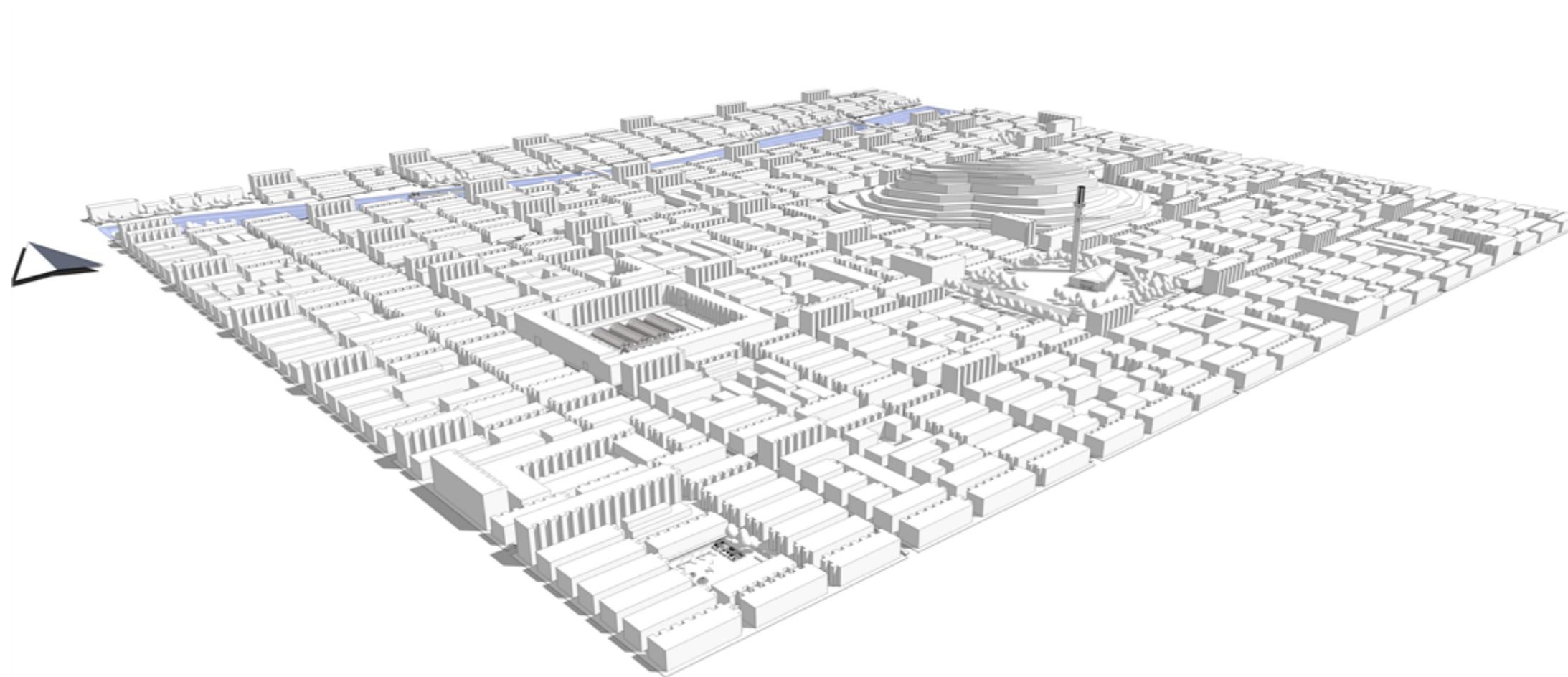


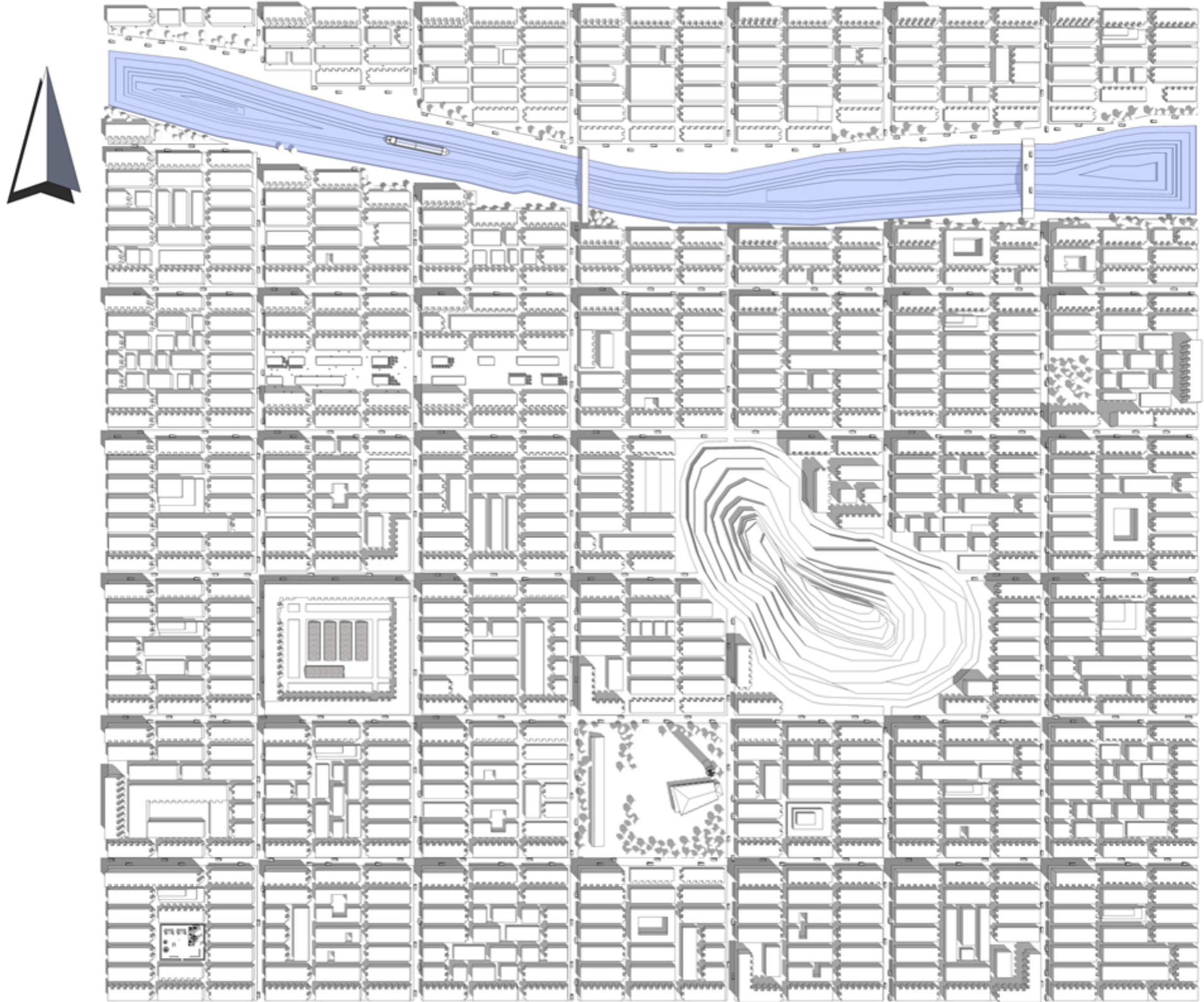


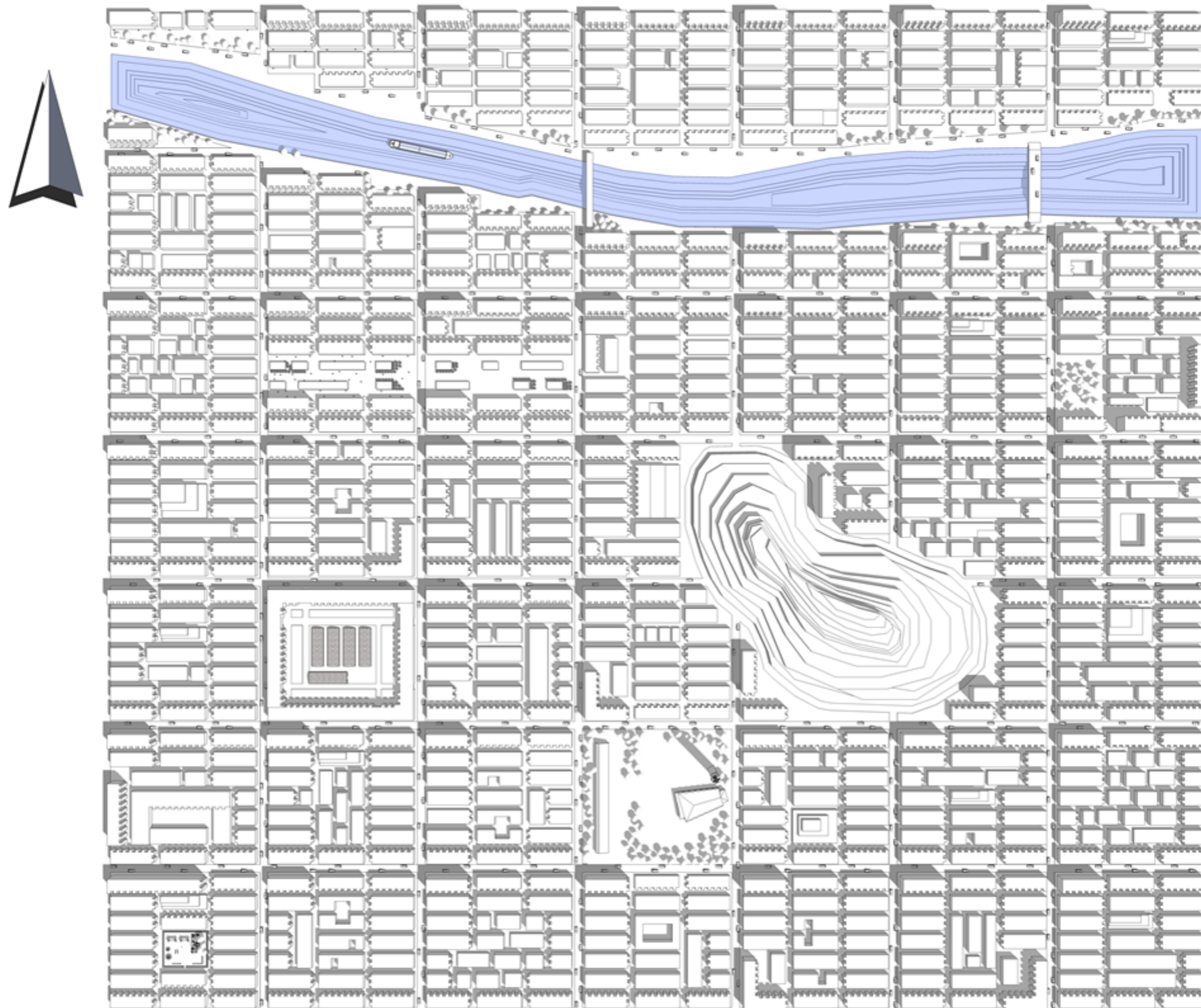












9000 inhabitants per km2

# Conclusions

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- Standardized crates system, mass production friendly

# Further Research

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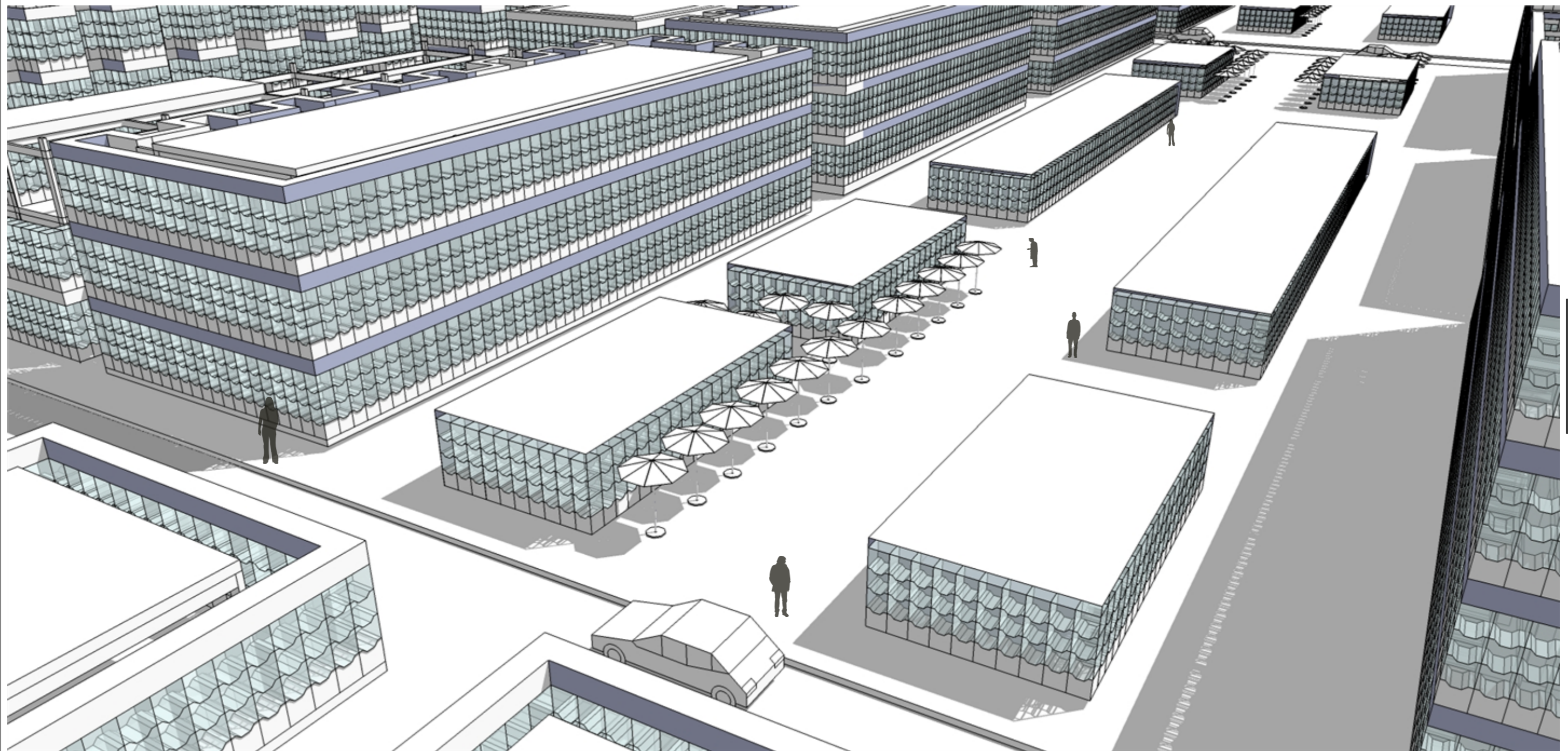
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- Marketing and design aspects: how could the i-Crates and the i-Dwelling be improved?



A.M. Symvoulidou