

# Sarah Adekoya – Robotics Ranch

Contryside The Future

14.05.21

Our growing population and the greater environment of awareness means farmers need to produce more food more sustainable with the same amount of land and resources. It is ultimately technology that will change this. For this project I wanted to integrate technology into my design following up from my manifesto. This integration of technology will allow us to be more efficient in the work that we do. With the introduction of drones into the farm land, they can help to survey the land and locate pest in crops. Using eclectic self-driving tractors, the picking of apples can be done effectively and efficiently they can also help with the watering of trees and spraying of fertilizers.

This integration of technology into the actual architecture design was tricky. Learning from Le Corbusier “Architecture should be as efficient as machinery” The form of the building should follow the function. The basic form of my buildings was derived from the grid that the machinery uses and also bringing the grid form from the plan and onto the actual building, allowing the 3D grid structure to sit on the architecture and be exposed.

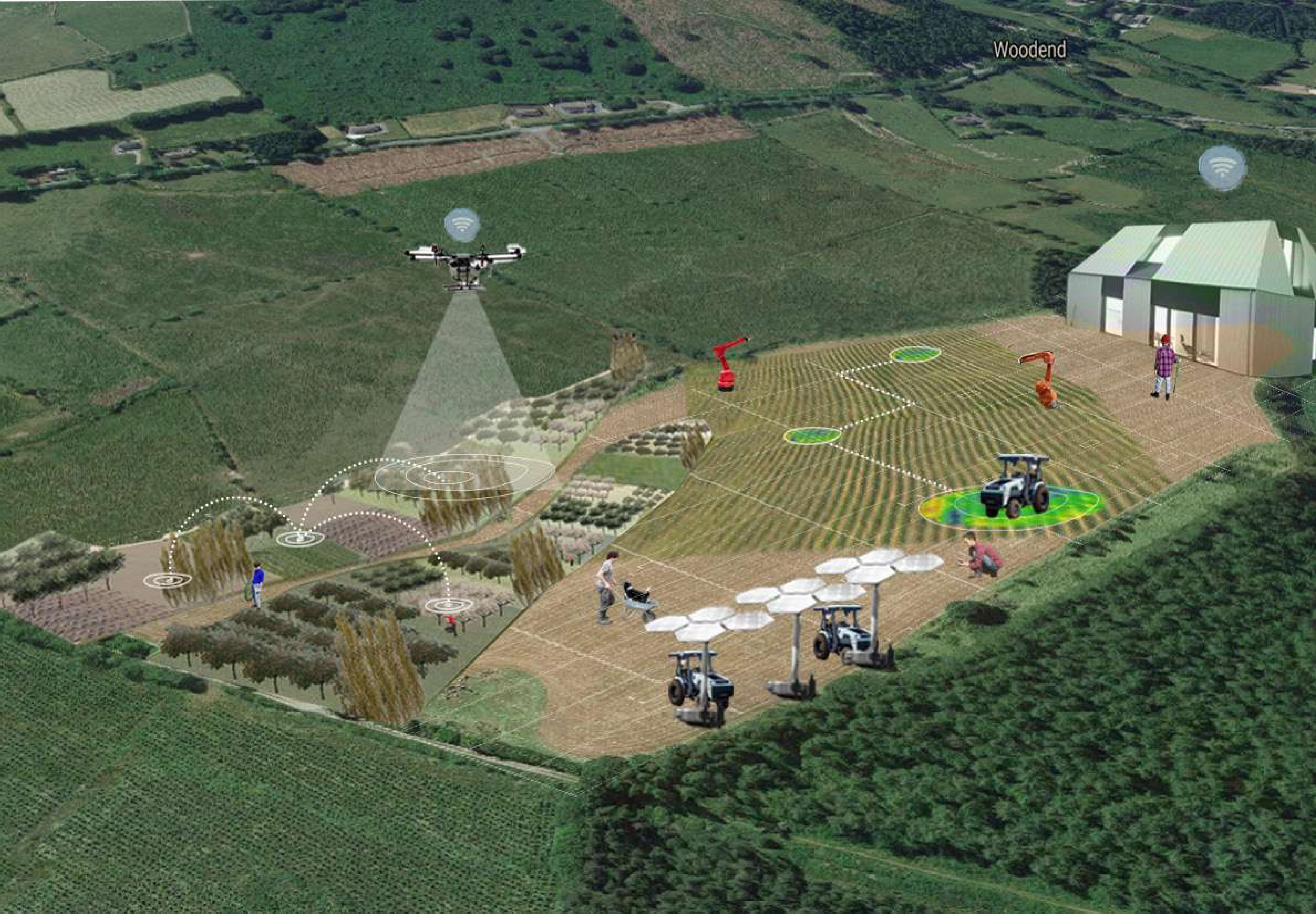


## Manifesto 1.1

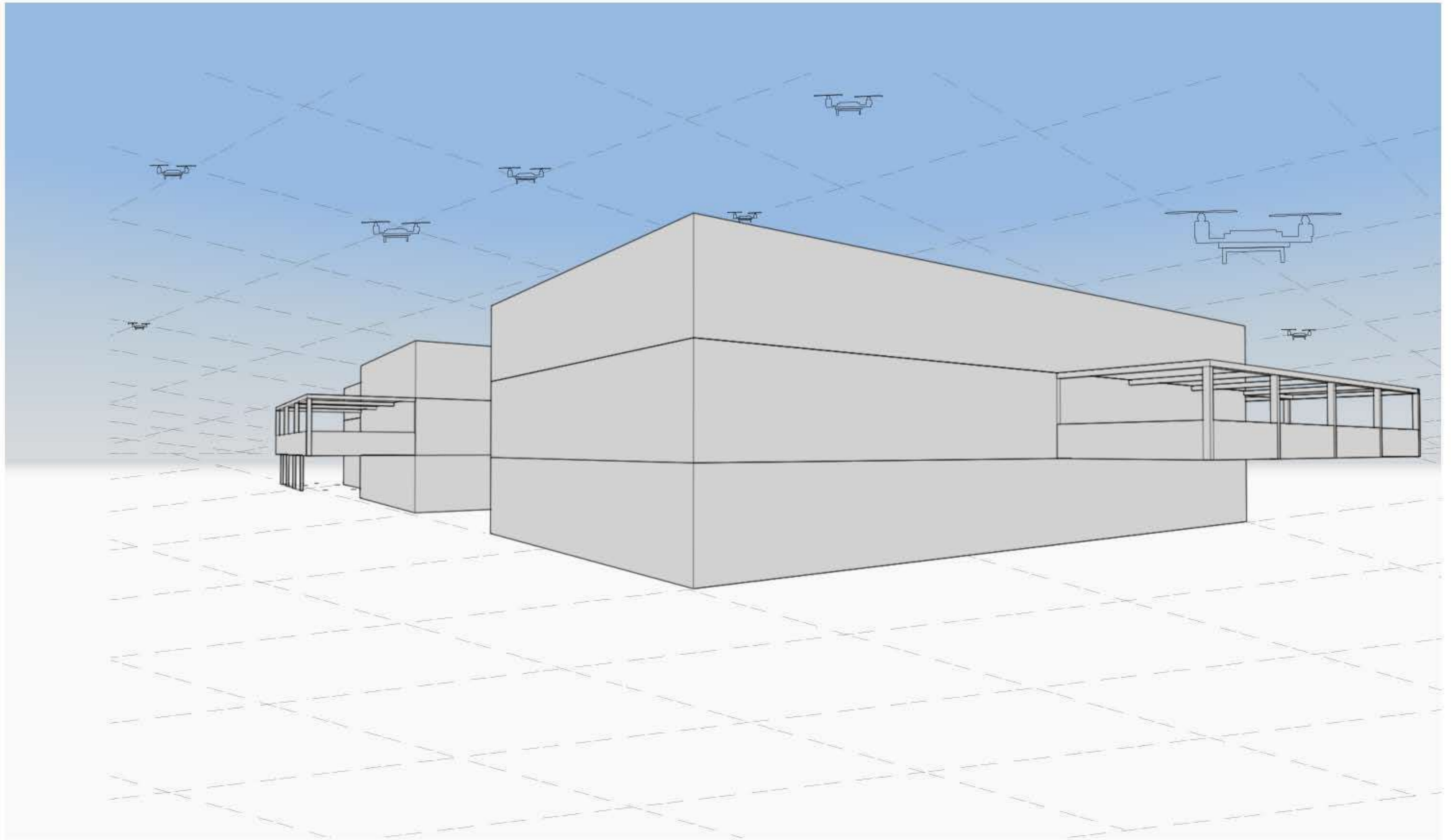


The way we have to start thinking about robots is not as a tool, but as something that we can collaborate with in a democratic way, and taking a different belief towards the way we see them for our own gain. Soon we'll be collaborating with the machines, exploiting their strengths while celebrating our own. This field does not see robots merely as man-made objects, but as a new social class. We do not need to believe that the psychological states, that we see in robots, are akin to our own in order to experience an authentic and meaningful emotional response. "The idea of egalitarianism was the transition of meaning of the entire idea of equality into another phase."

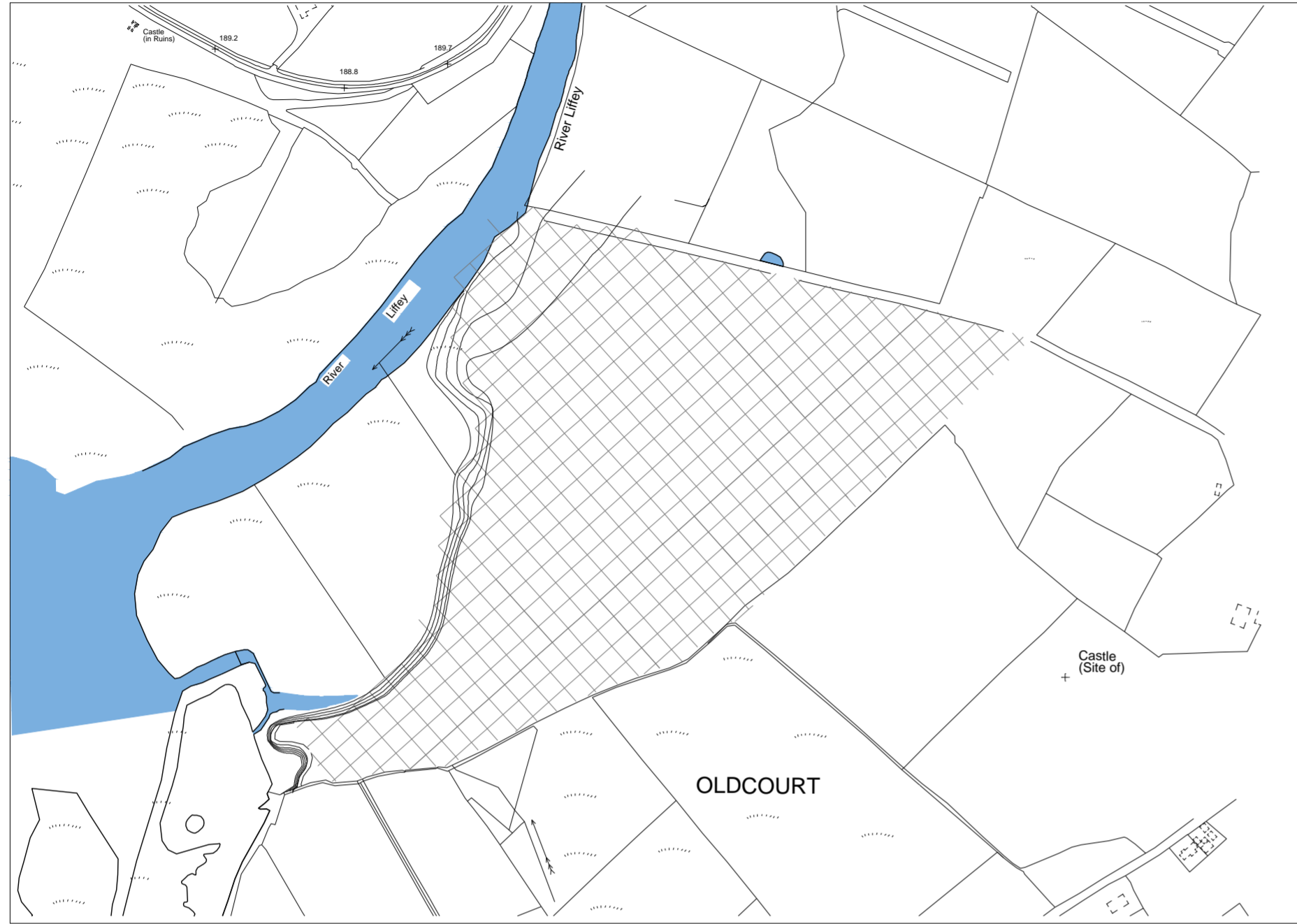
Manifesto 1.2



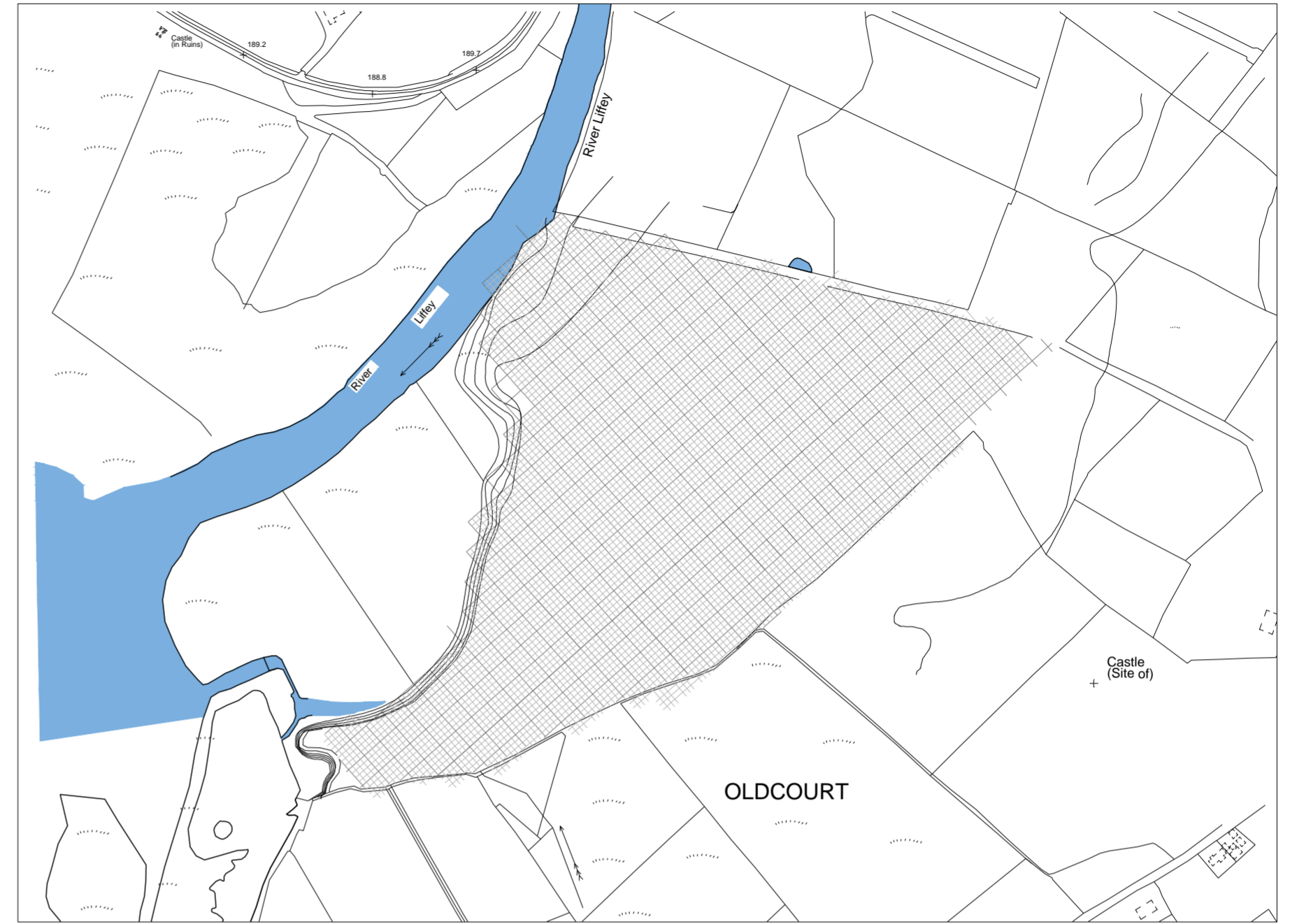
# Manifesto 1.3



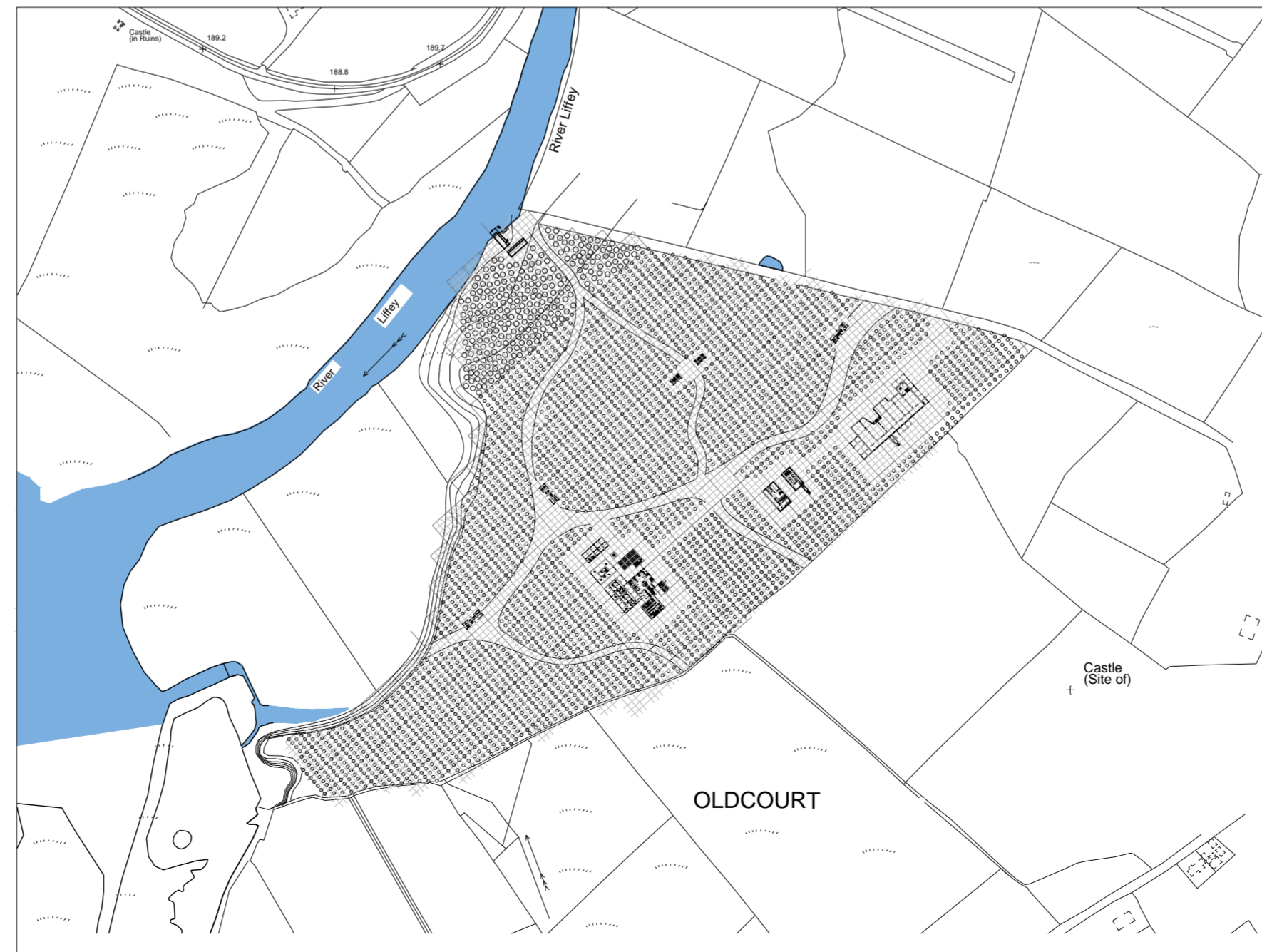
# Critical Thinking 1.1 - Grid Planning



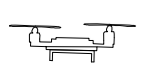
20 X 20 Grid



20 X 20 & 5 X 5 Grid



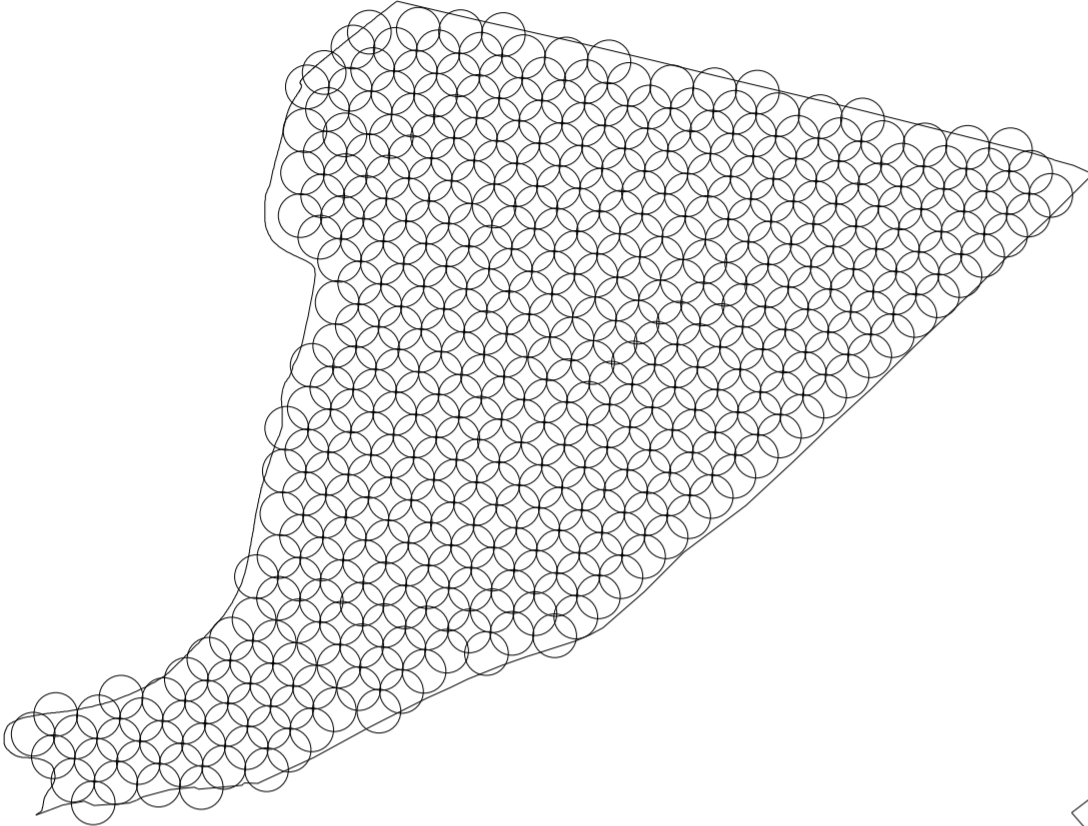
20 X 20 & 5 X 5 Grid with orchards and buildings



# Critical Thinking 1.2 - Grid Planning

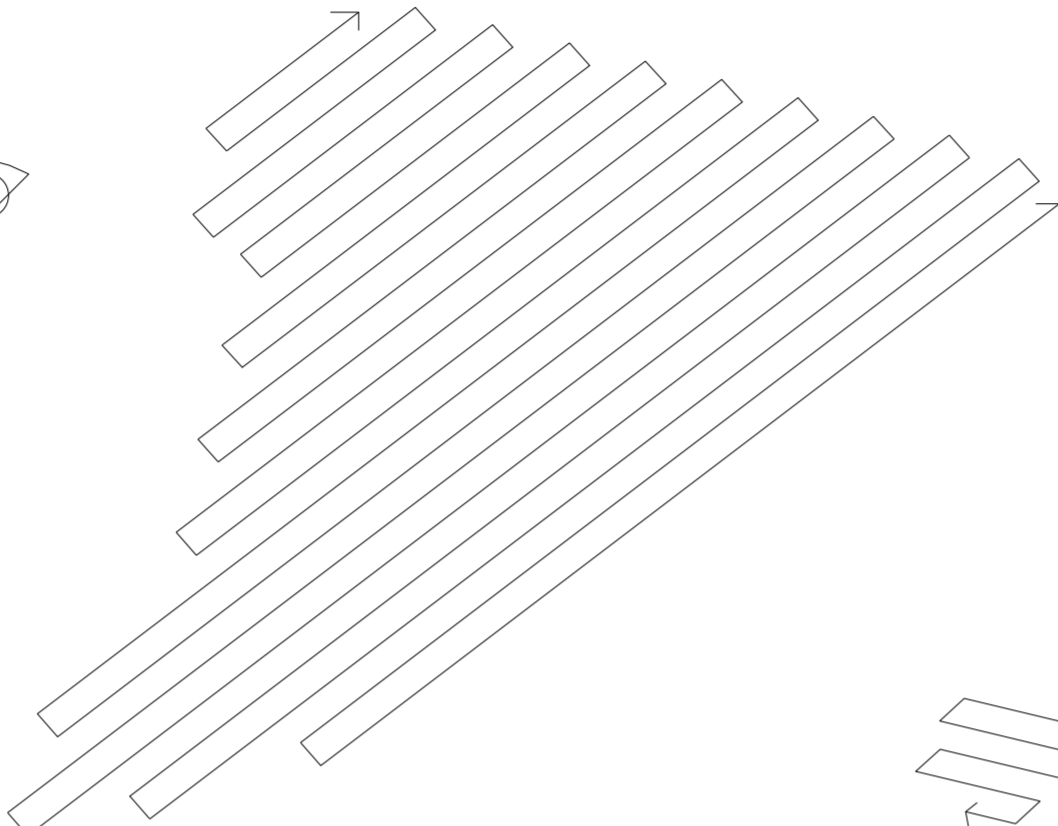


The circular grid is for each individual drone to use when surveying the farm, they would hover in the center of each circle and scan the circumference of the circle.

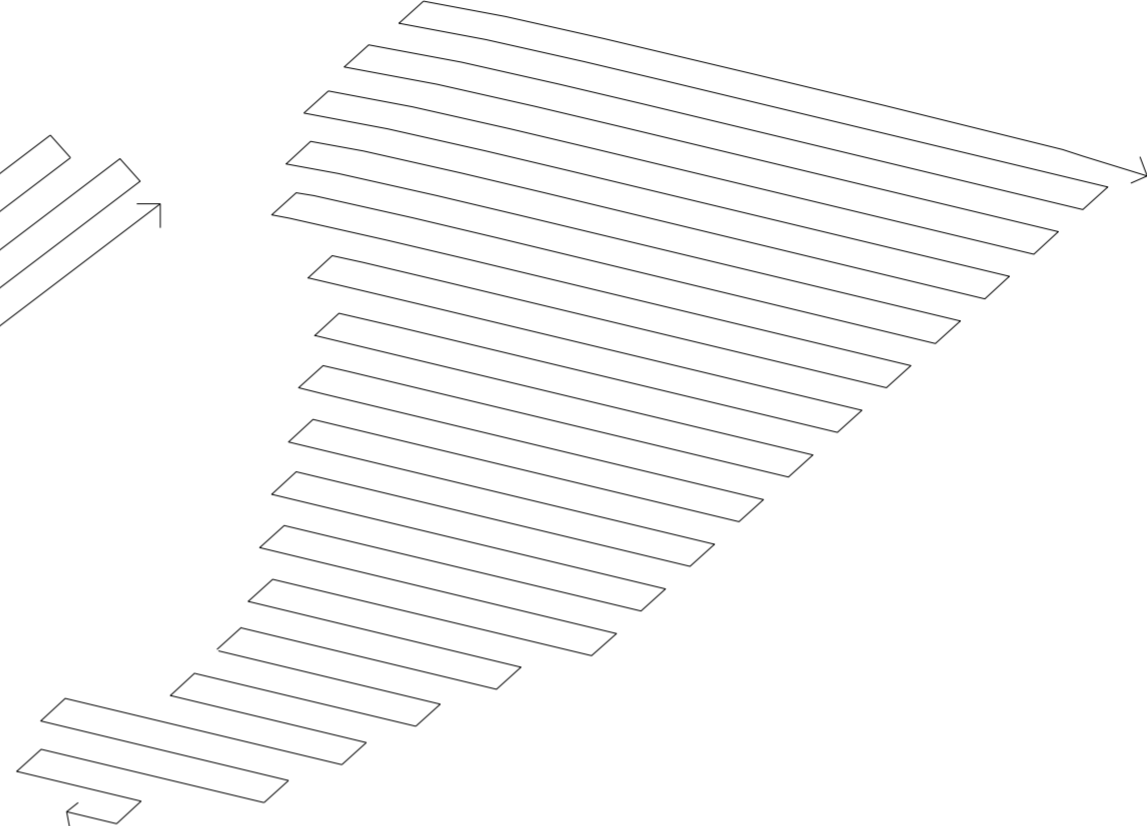


Circle Grid for drones

Drones work best in liner grid, I decided to create a vertical and a horizontal grid. This allows the drone to fly to a particular spot without having to go the length of the site.



Verticle Grid for drones and ractors

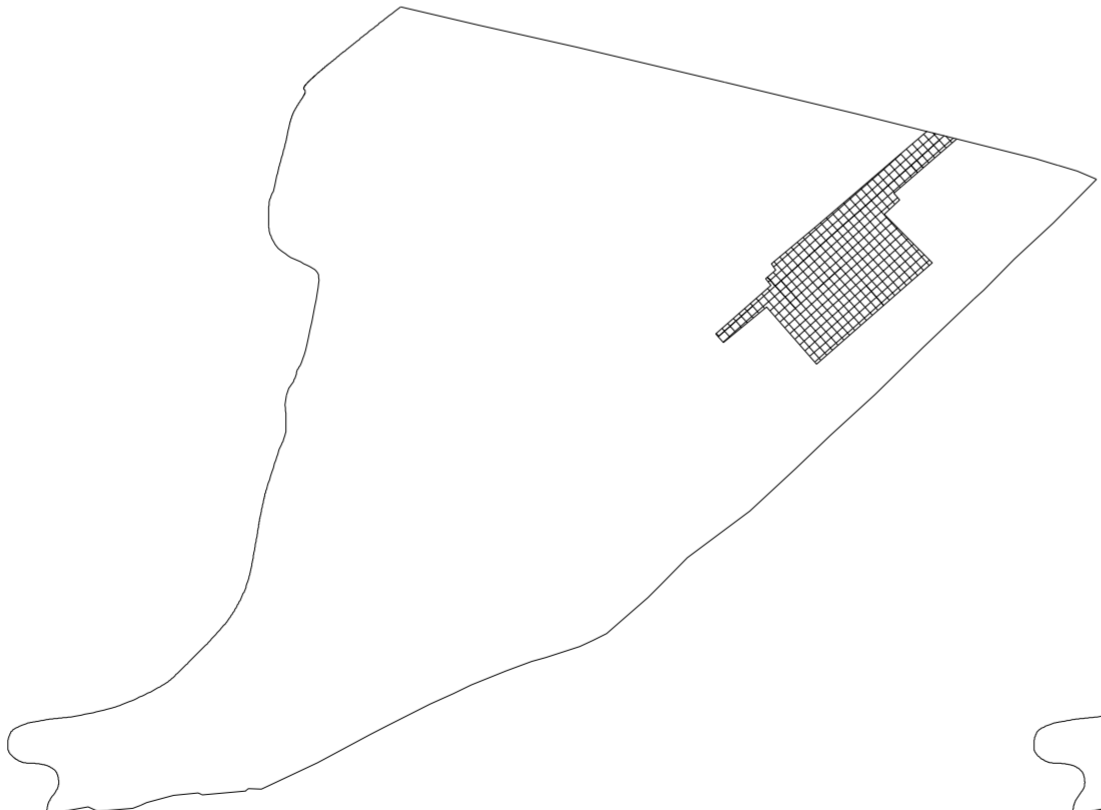


Horizontal Grid for drones and tractors

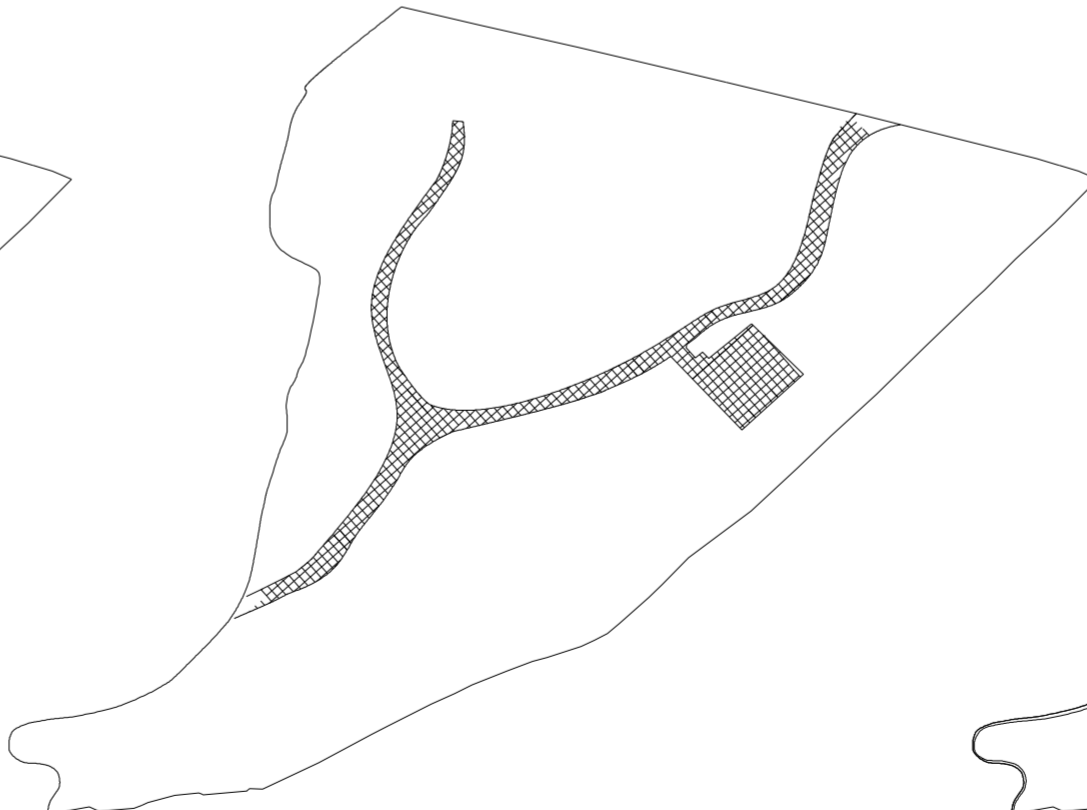
Because the drones don't hold charge for long, I had to think of the positioning of the charging stations. Placing the co-op at the entrance and having multiple drones allows sufficient time for the drones to fly out, do the job required and come back before the charge runs out and for another one to go out again when fully charged.

The orchard trees have to be planted 5 m apart. This allows sufficient space for the trees to grow to full bloom and also allows for my tractors to move safely and pick and spray the apples when needed. The tractors need a liner grid in order to operate properly.

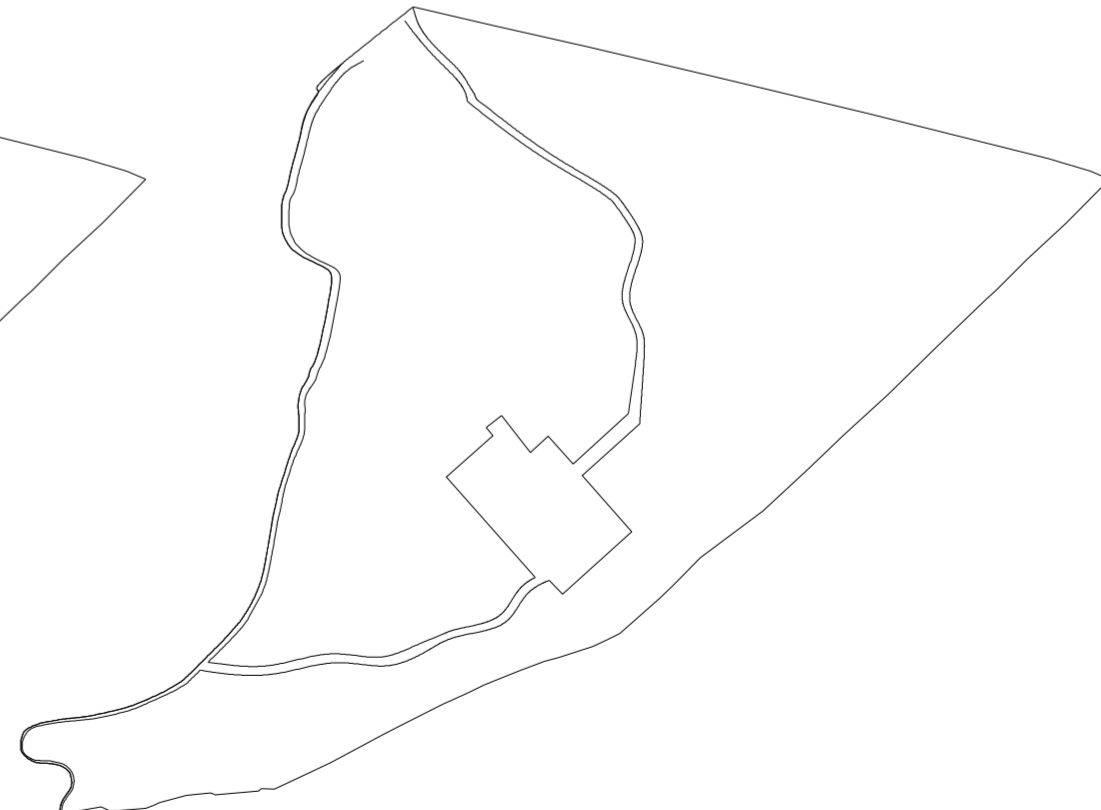
Both the pathway for the tractors and trucks have piezoelectric tiles in the ground which generate electricity for the Co-op and the farm. A small electrical charge is generated when a piezoelectric material is compressed, flexed, or vibrated. This system in heavily trafficked areas can produce a significant amount of electricity to be stored.



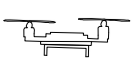
Path for trucks coming and going to the Co-op

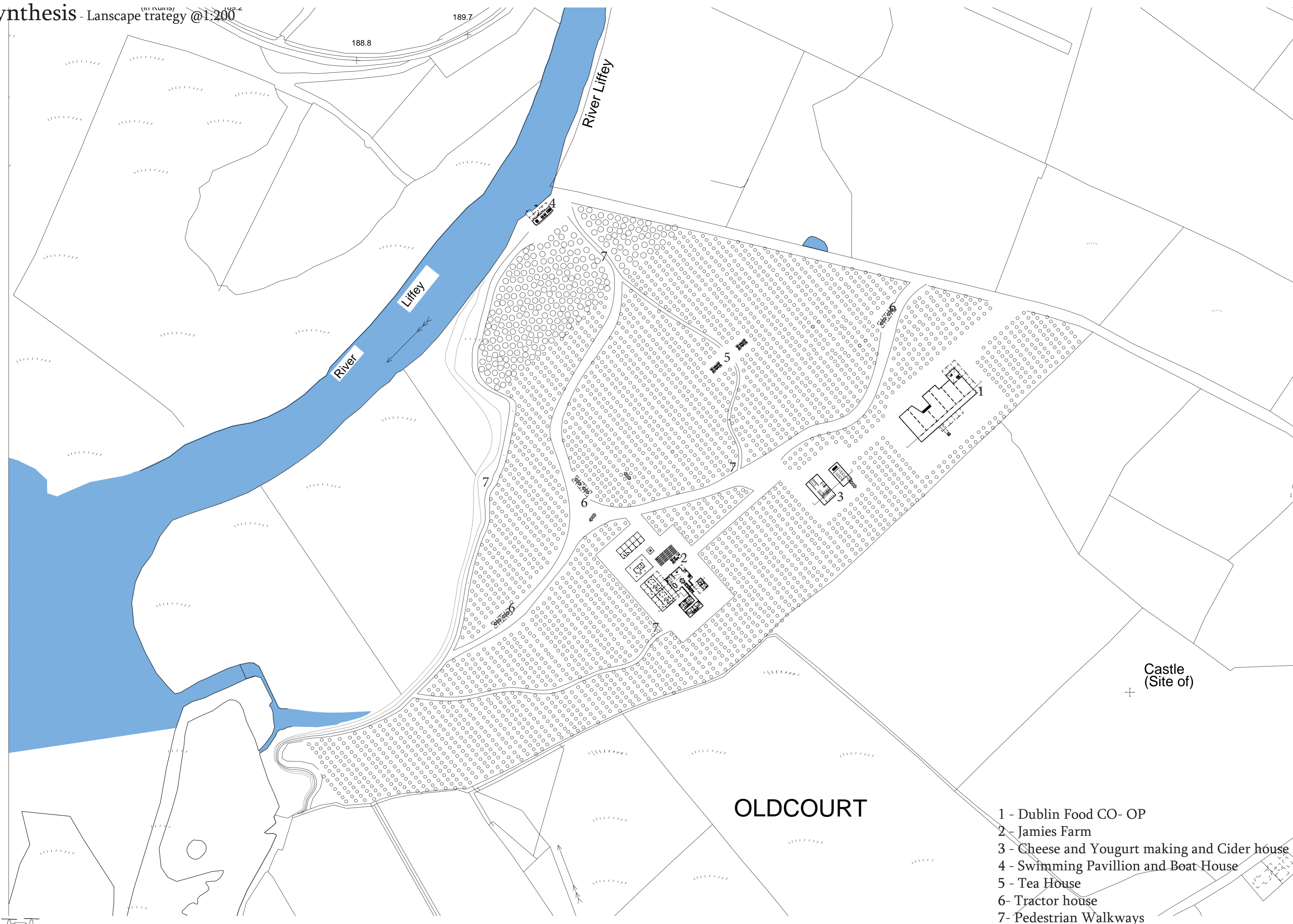


Path for self driving tractors



Pedestrian walkways





188.8

189.7

River Liffey

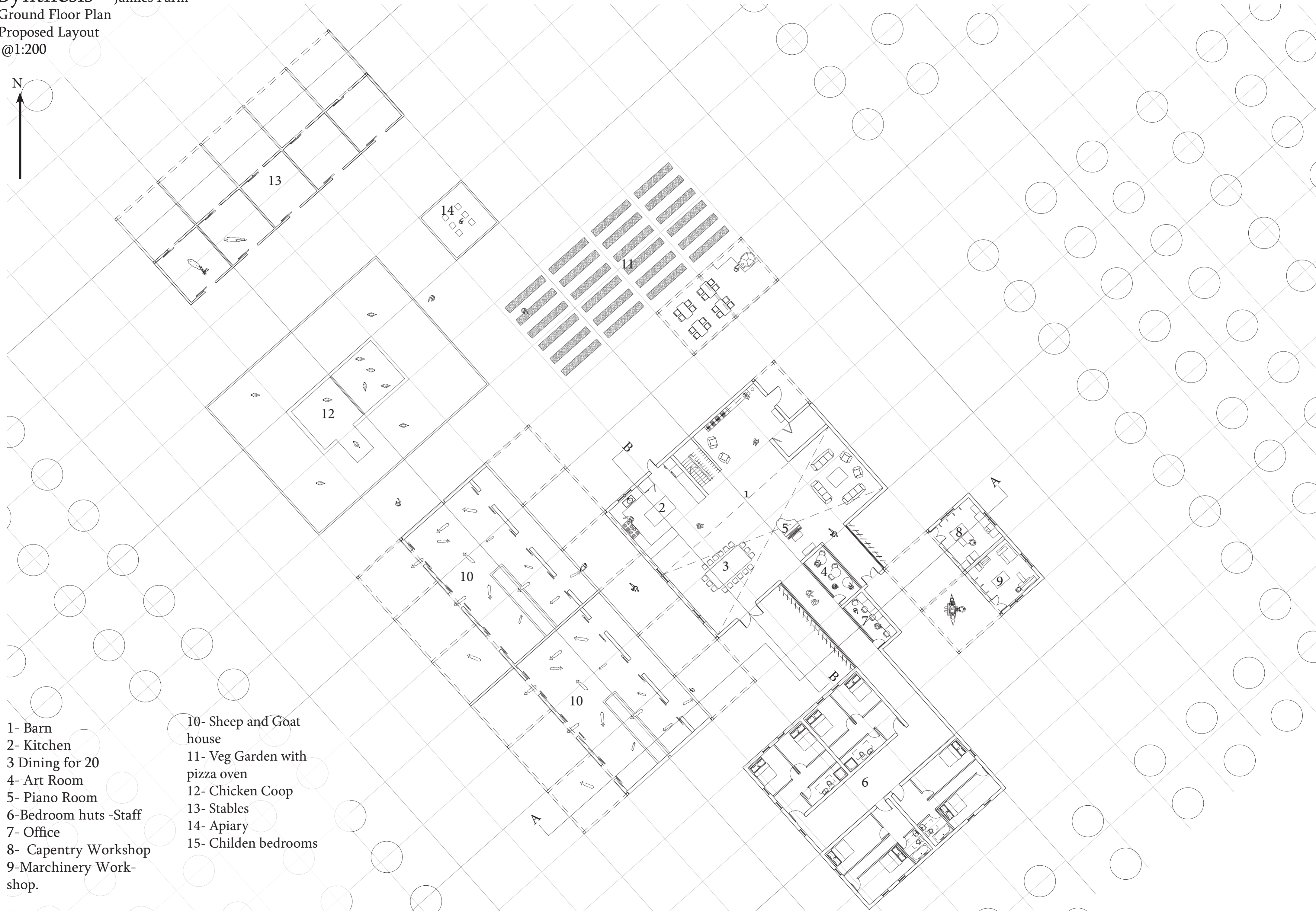
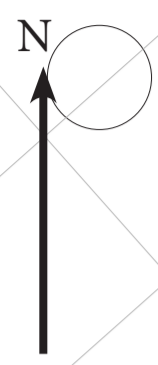
River Liffey

# OLDCOURT

Castle  
(Site of)

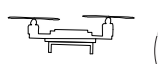
- 1 - Dublin Food CO- OP
- 2 - Jamies Farm
- 3 - Cheese and Yougurt making and Cider house
- 4 - Swimming Pavillion and Boat House
- 5 - Tea House
- 6 - Tractor house
- 7 - Pedestrian Walkways

**Synthesis - Jamies Farm -**  
**Ground Floor Plan**  
**Proposed Layout**  
**@1:200**



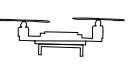
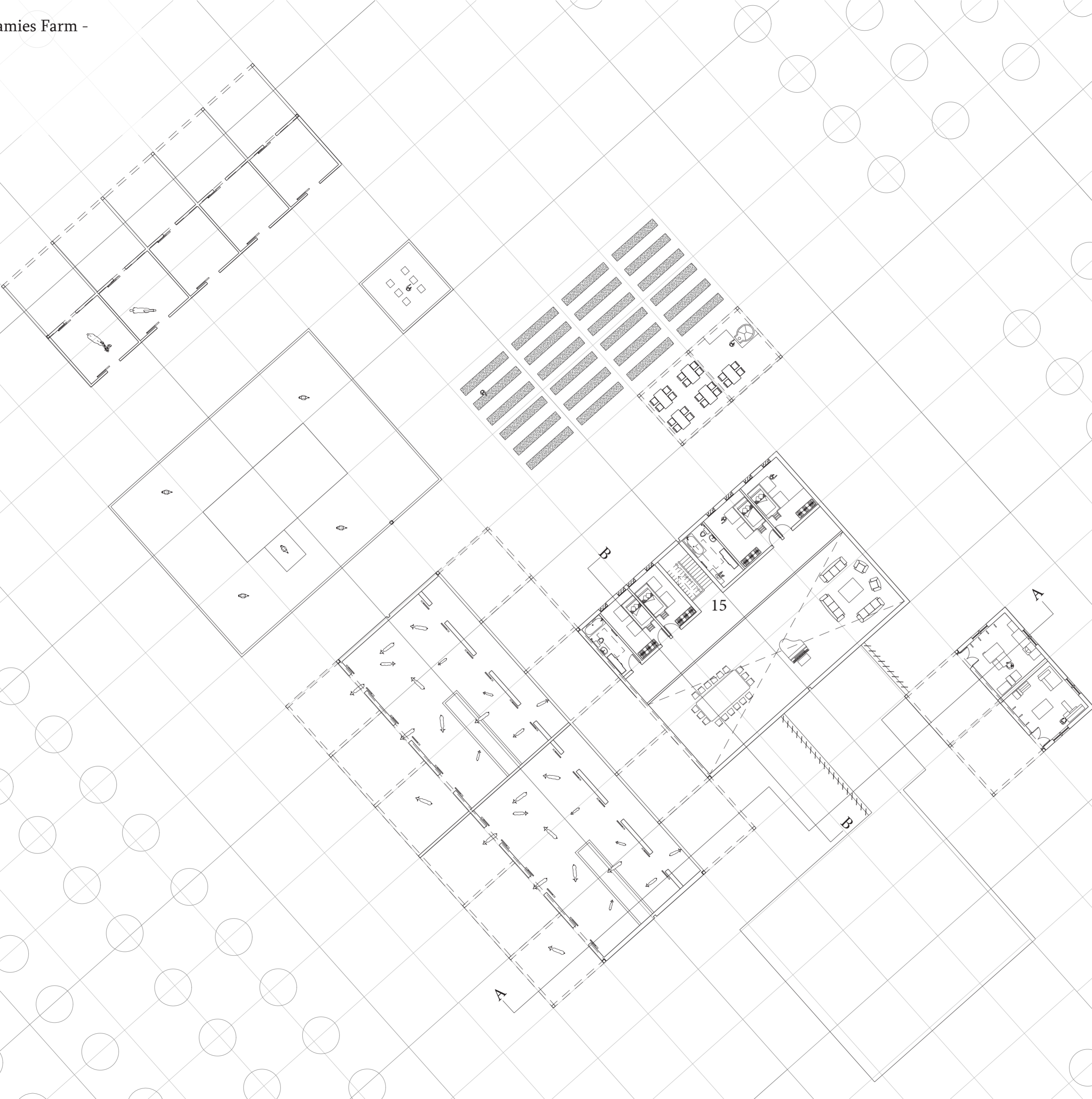
- 1- Barn
- 2- Kitchen
- 3 Dining for 20
- 4- Art Room
- 5- Piano Room
- 6- Bedroom huts -Staff
- 7- Office
- 8- Carpentry Workshop
- 9- Machinery Work-shop.

- 10- Sheep and Goat house
- 11- Veg Garden with pizza oven
- 12- Chicken Coop
- 13- Stables
- 14- Apiary
- 15- Children bedrooms

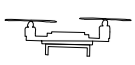
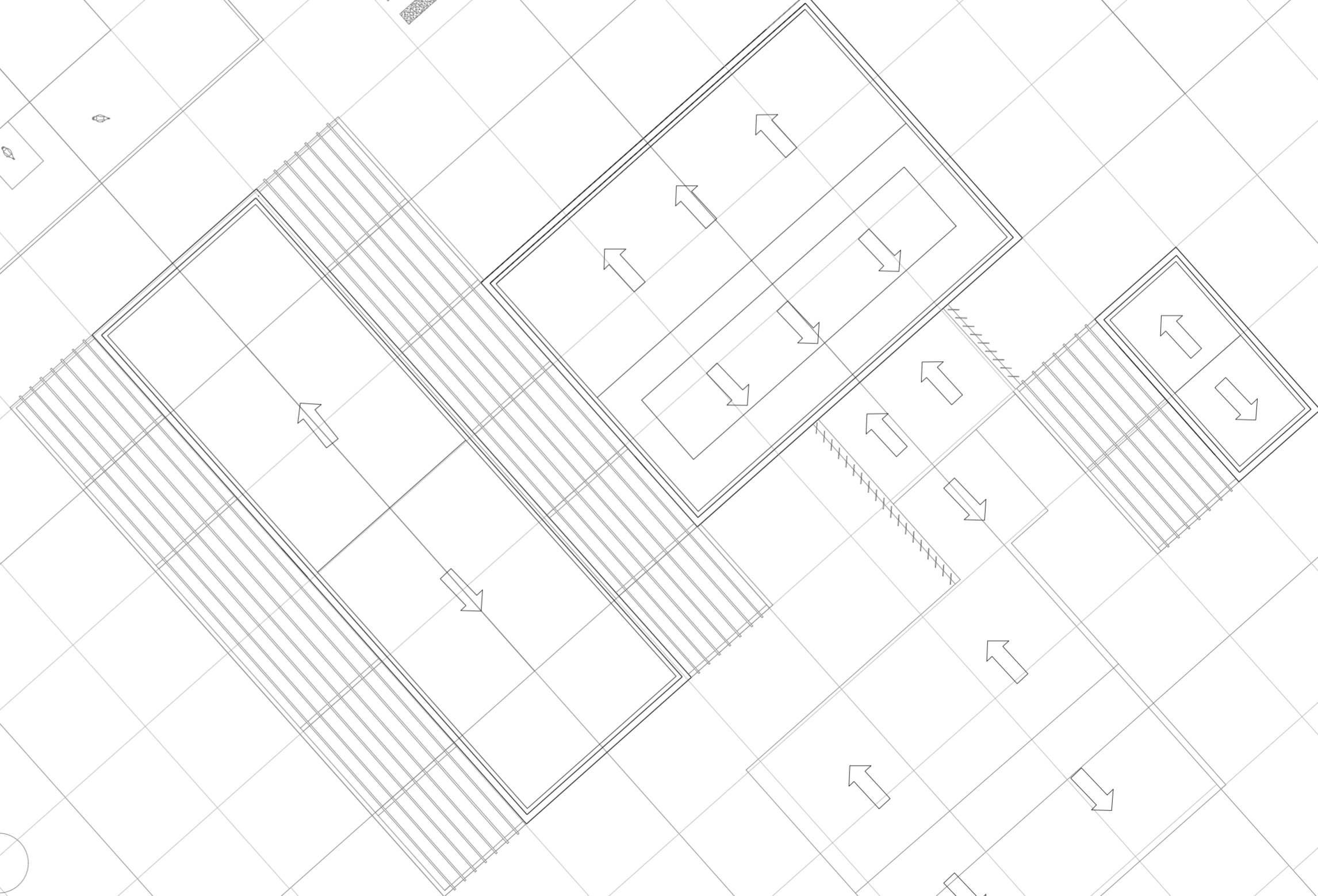
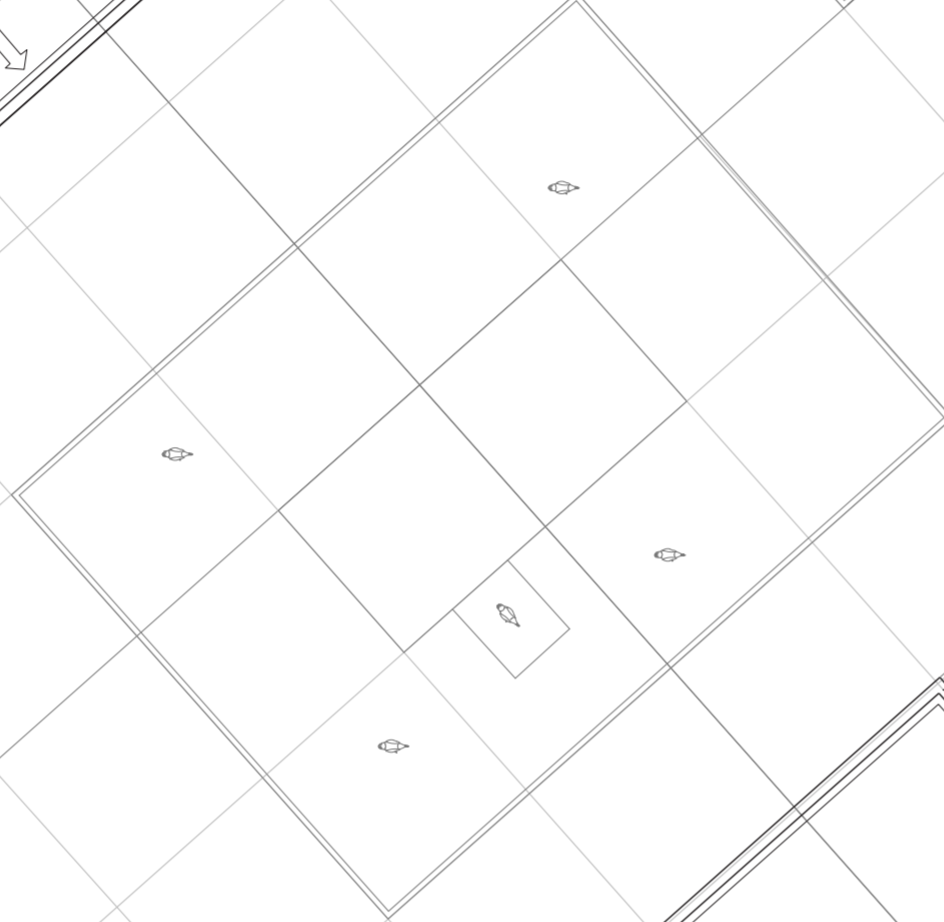
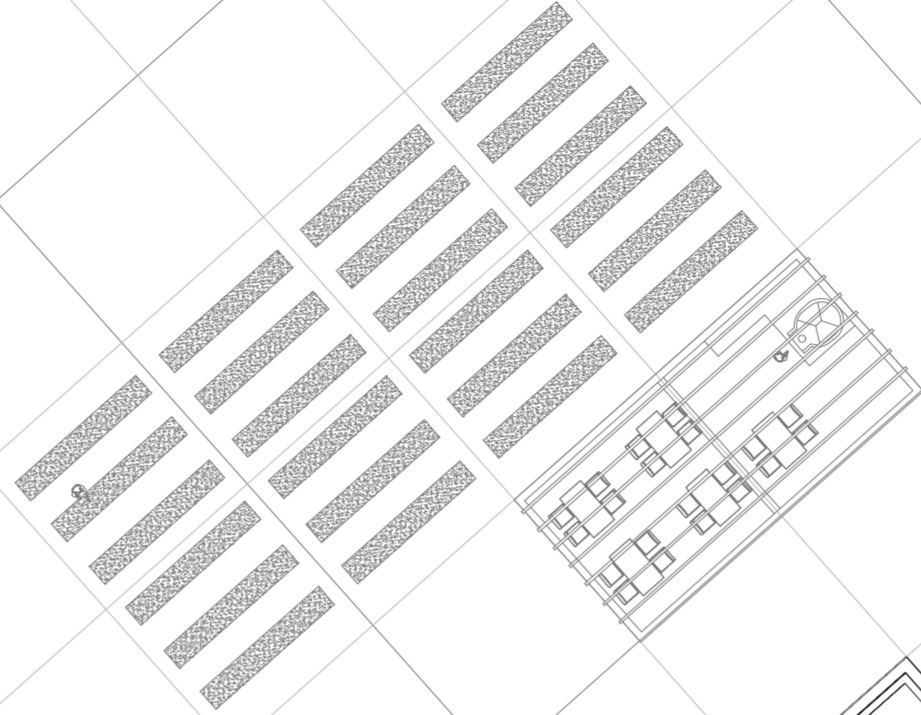
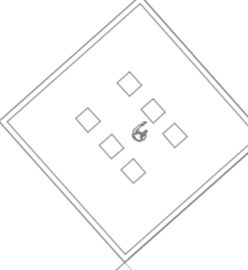
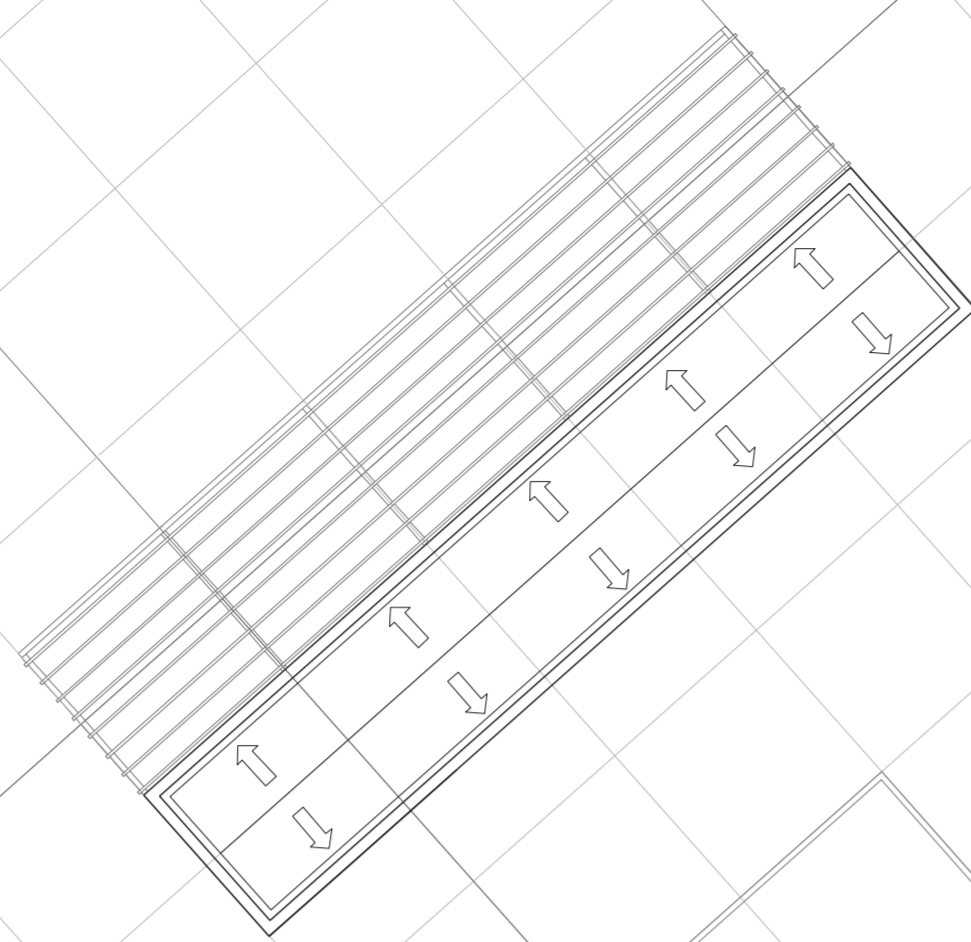


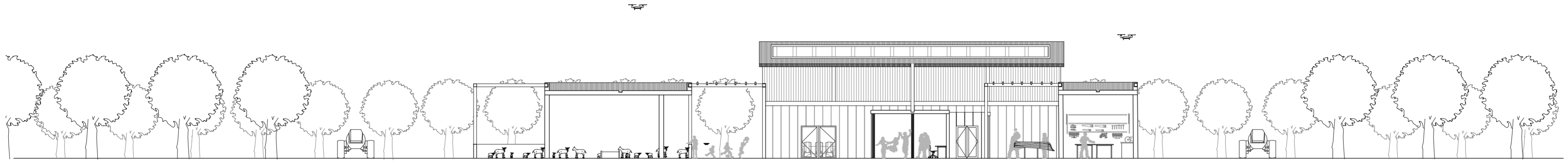


Synthesis- Jamies Farm -  
First Floor Plan  
Proposed Layout  
@1:200

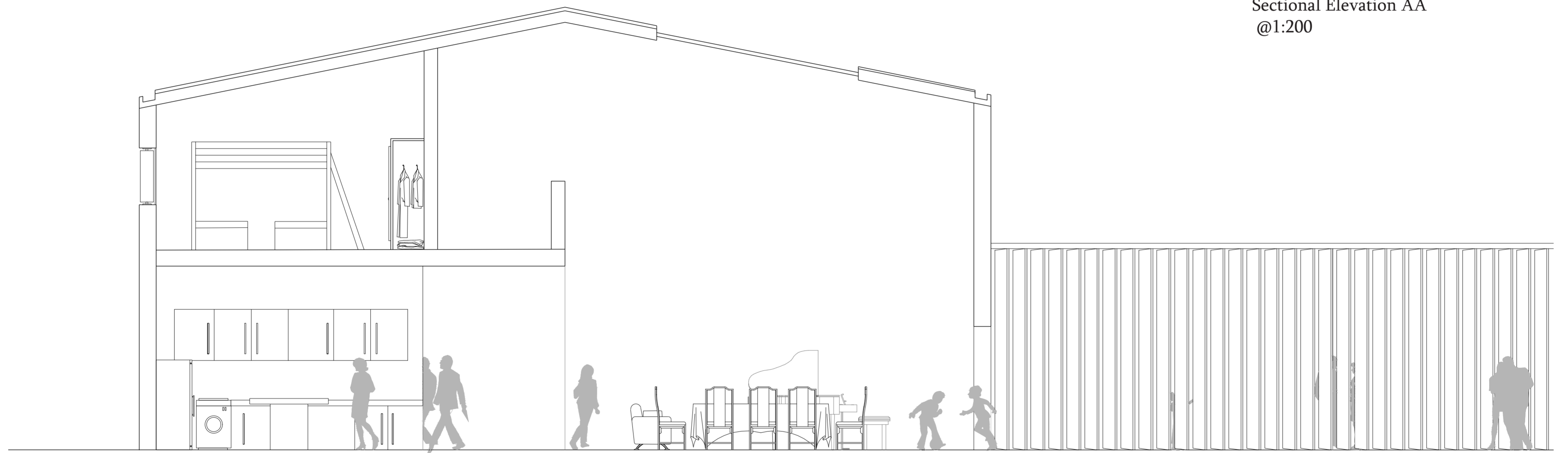


**Synthesis** - Jamies Farm -  
Roof Plan  
@1:200

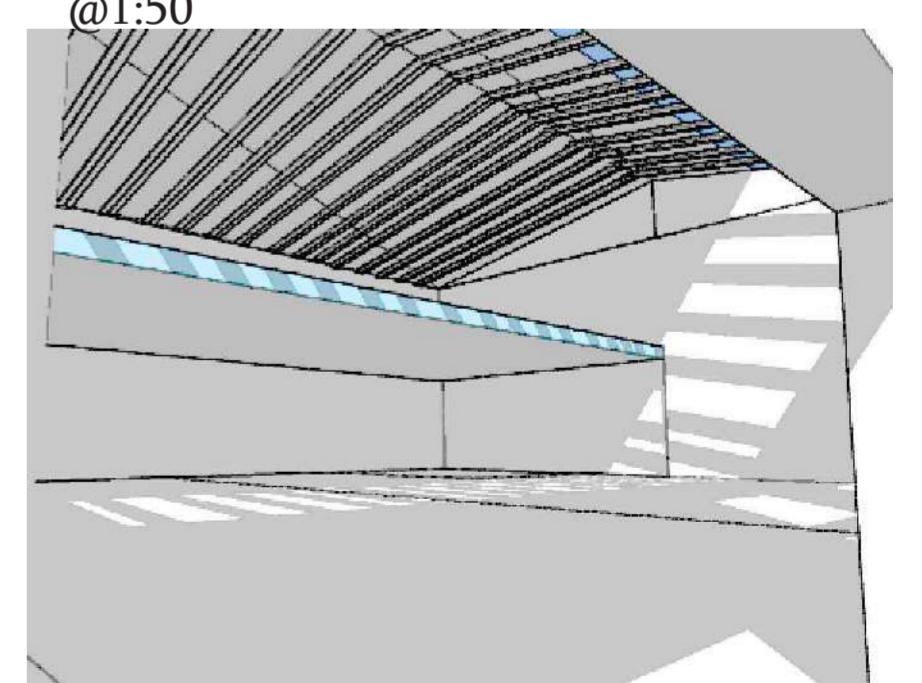
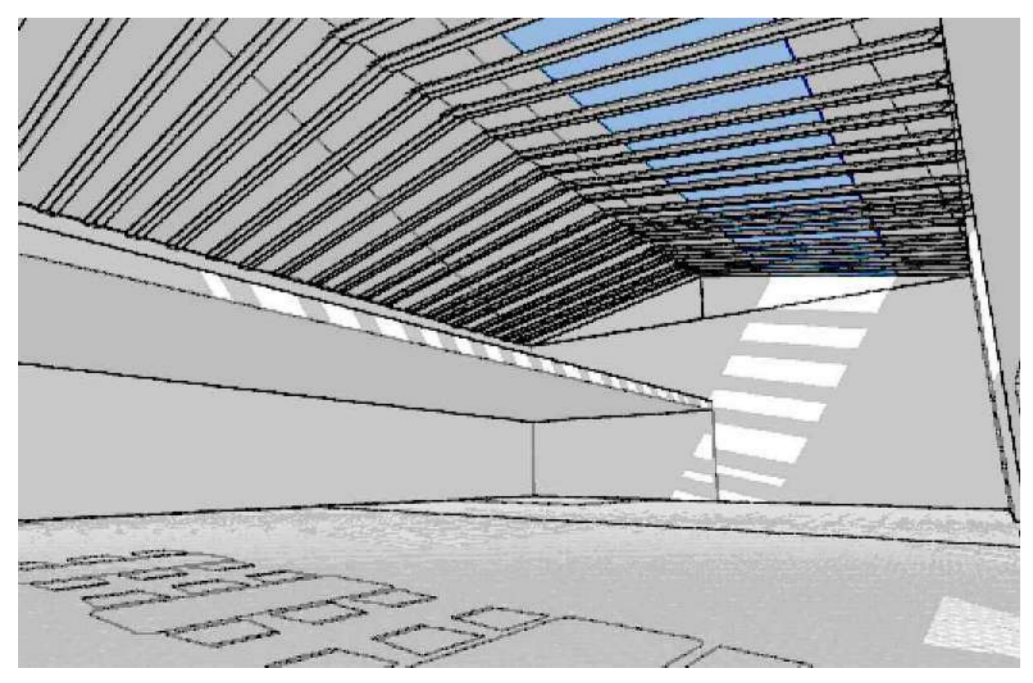




Jamies Farm -  
Sectional Elevation AA  
@1:200



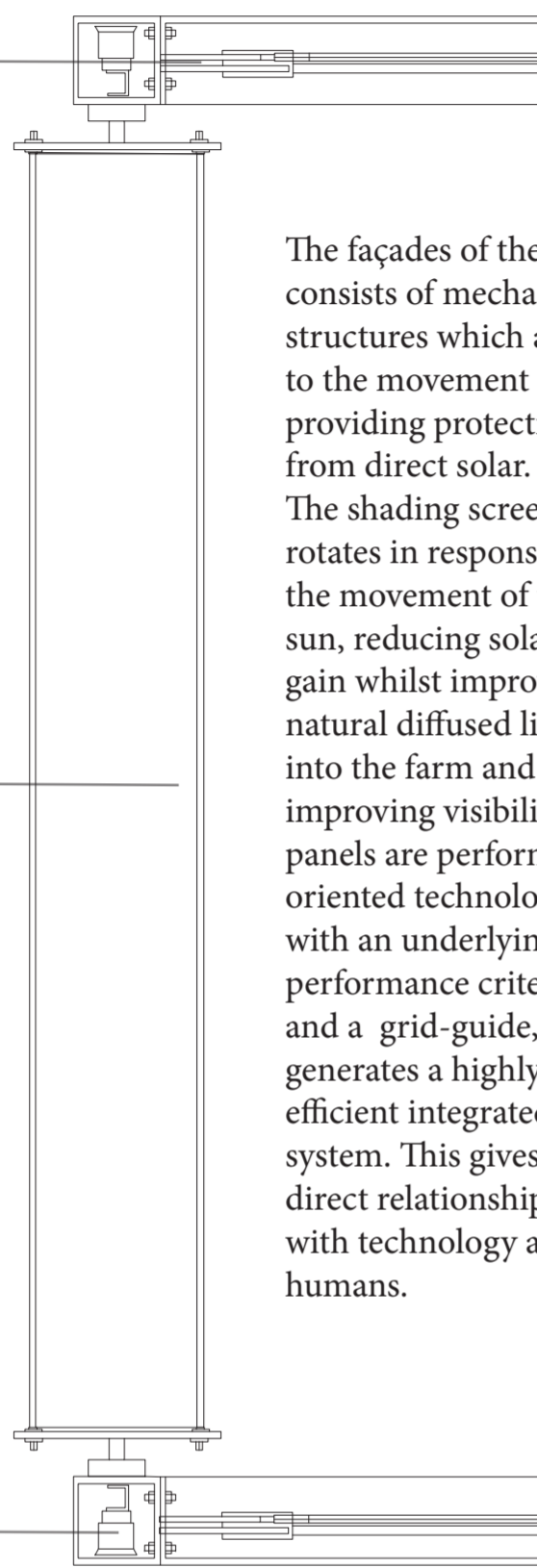
Jamies Farm -  
Section BB  
@1:50



Interior View of Jamies Farm

# Synthesis - Study of heroine space.

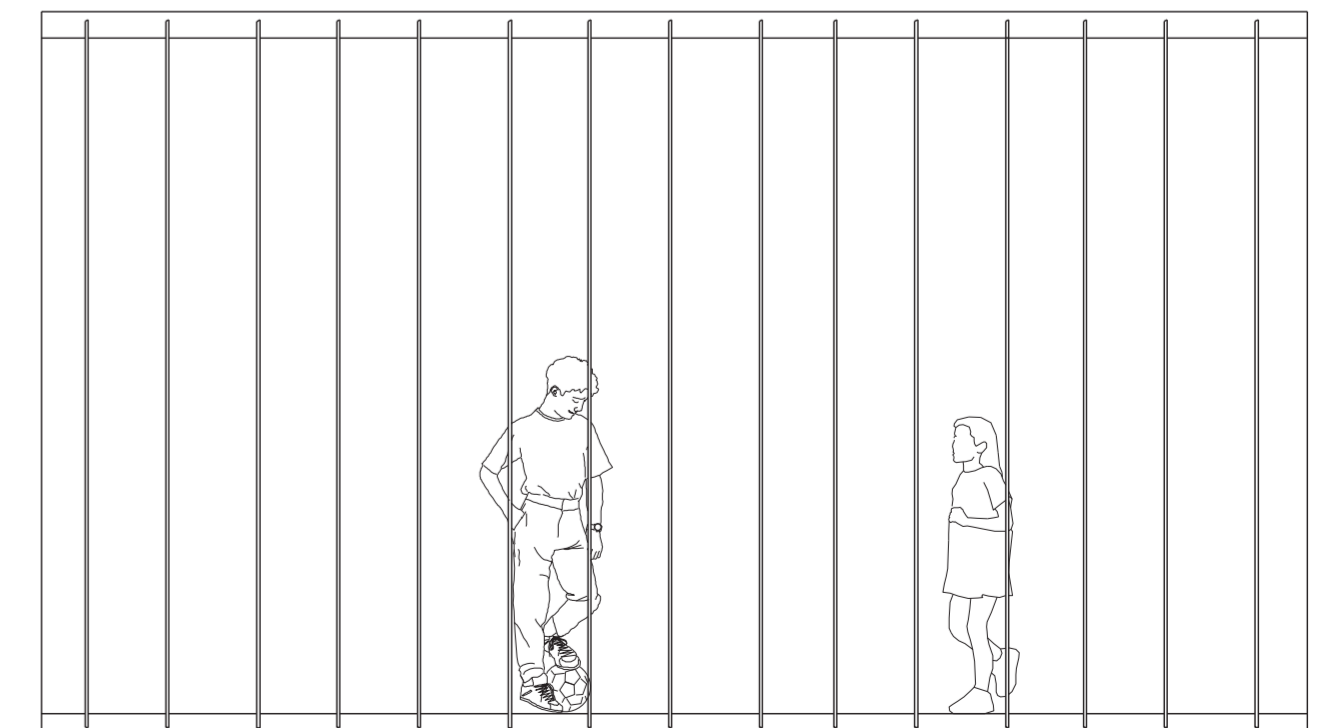
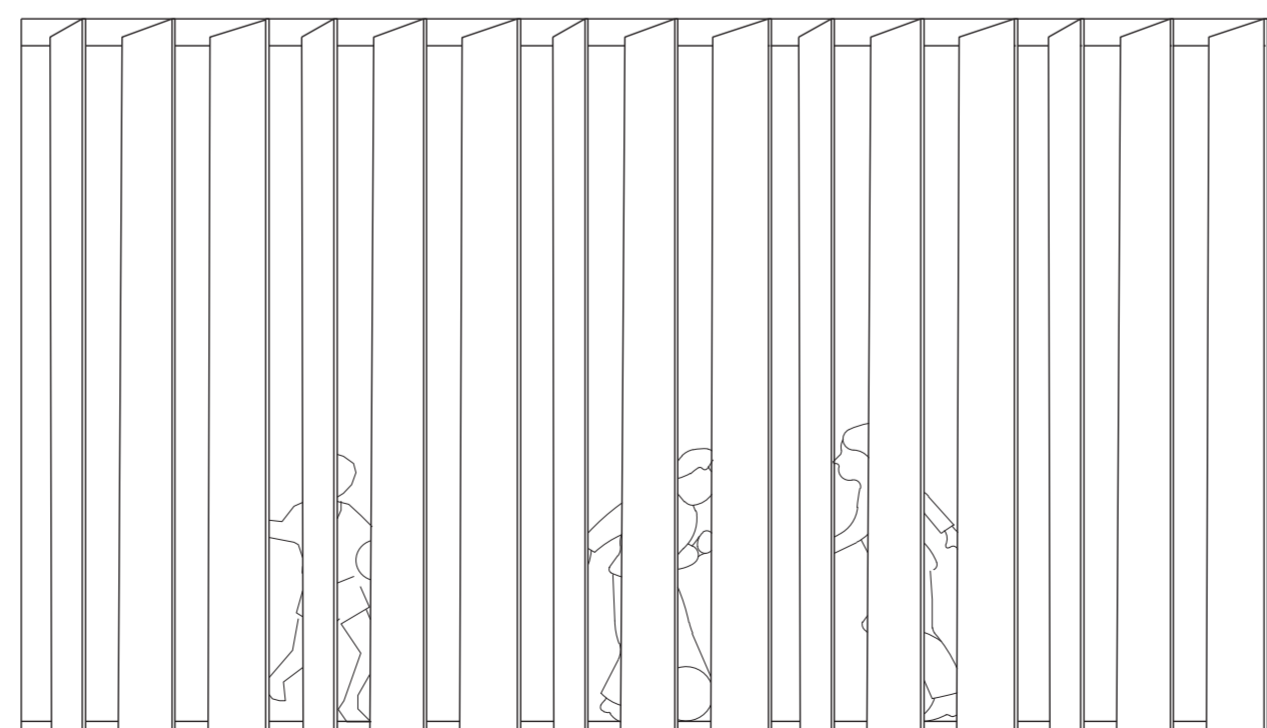
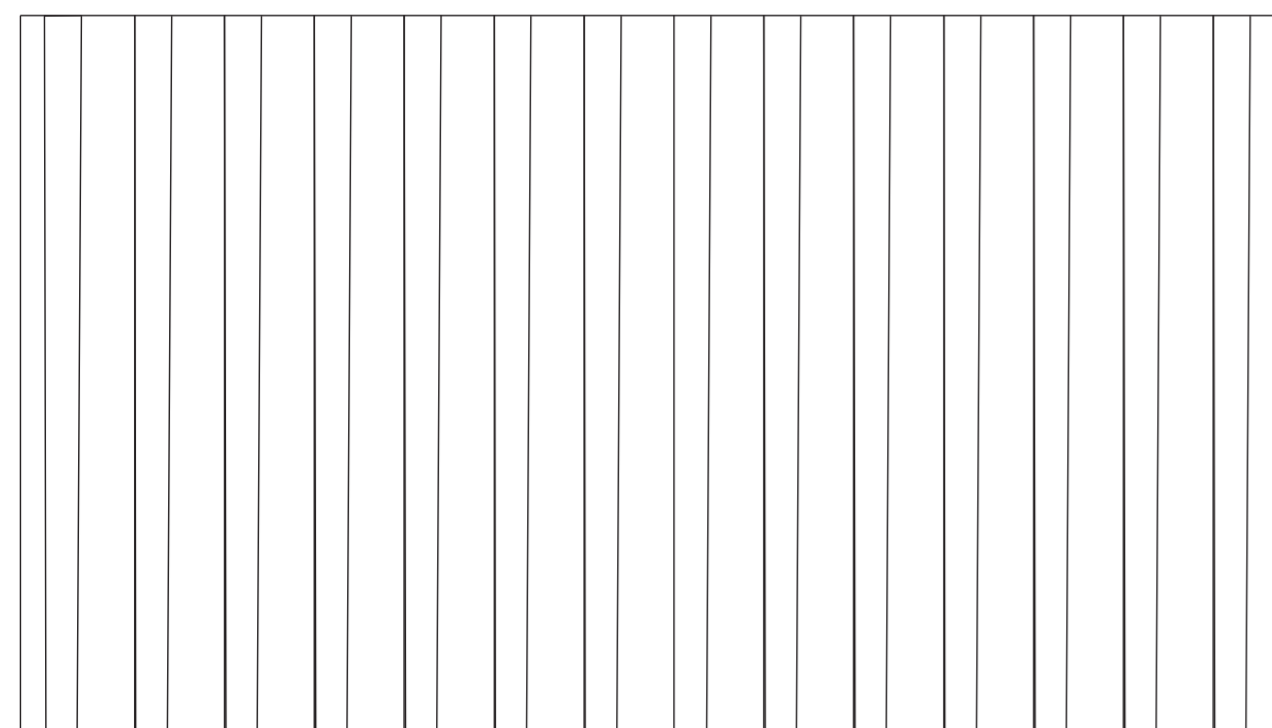
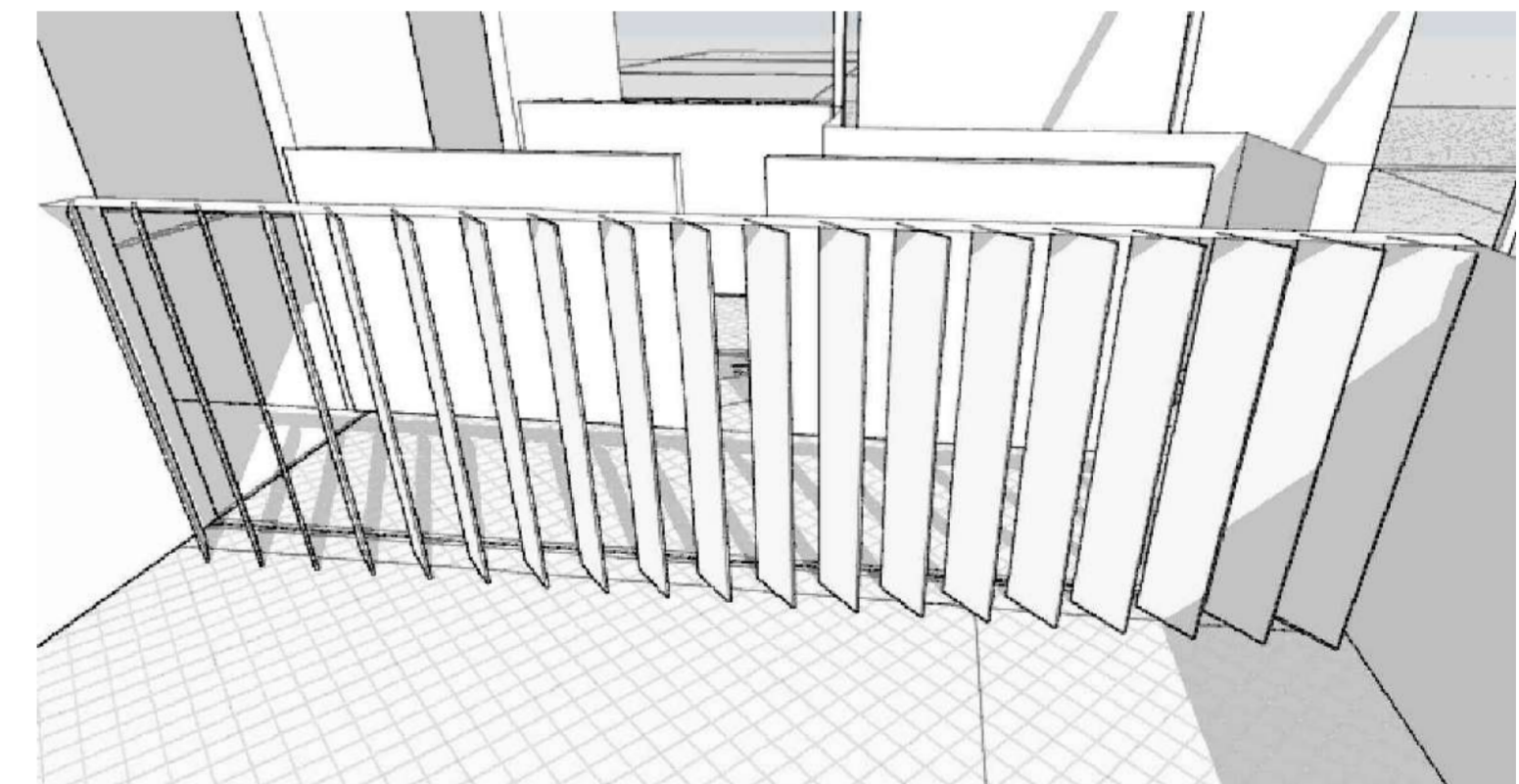
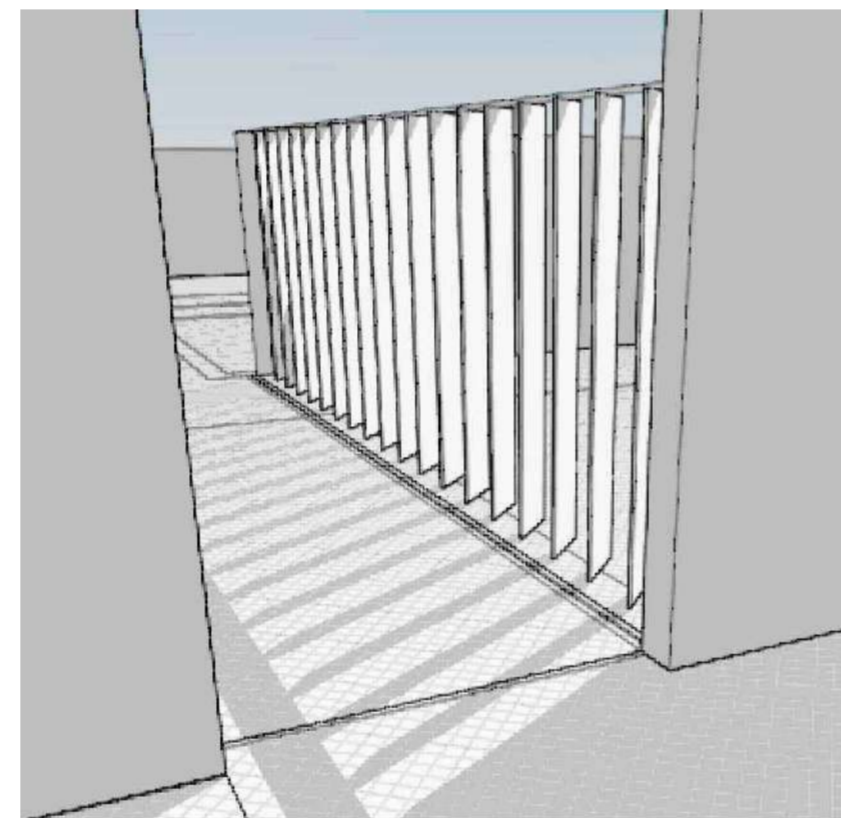
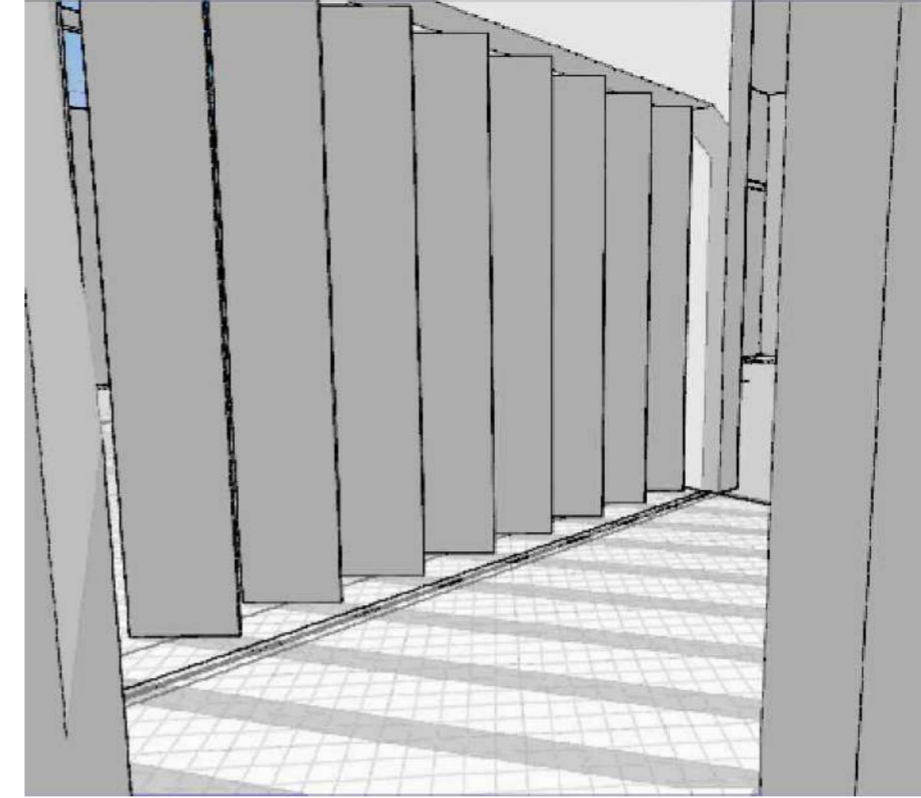
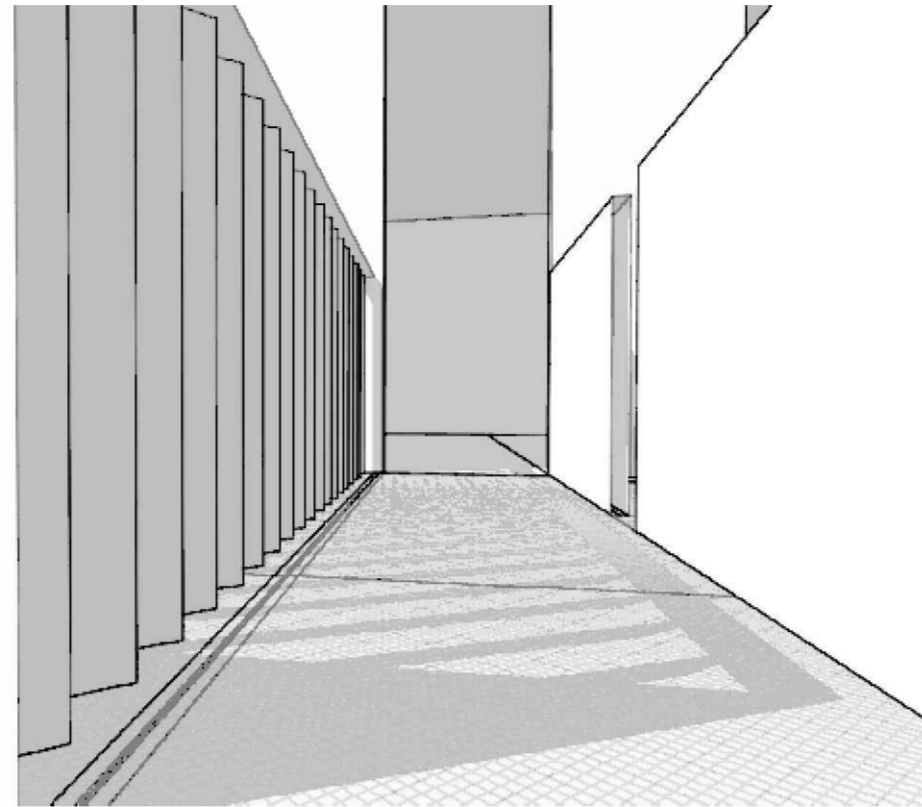
Tensioned steel cable fastened at head



Wooden Panels

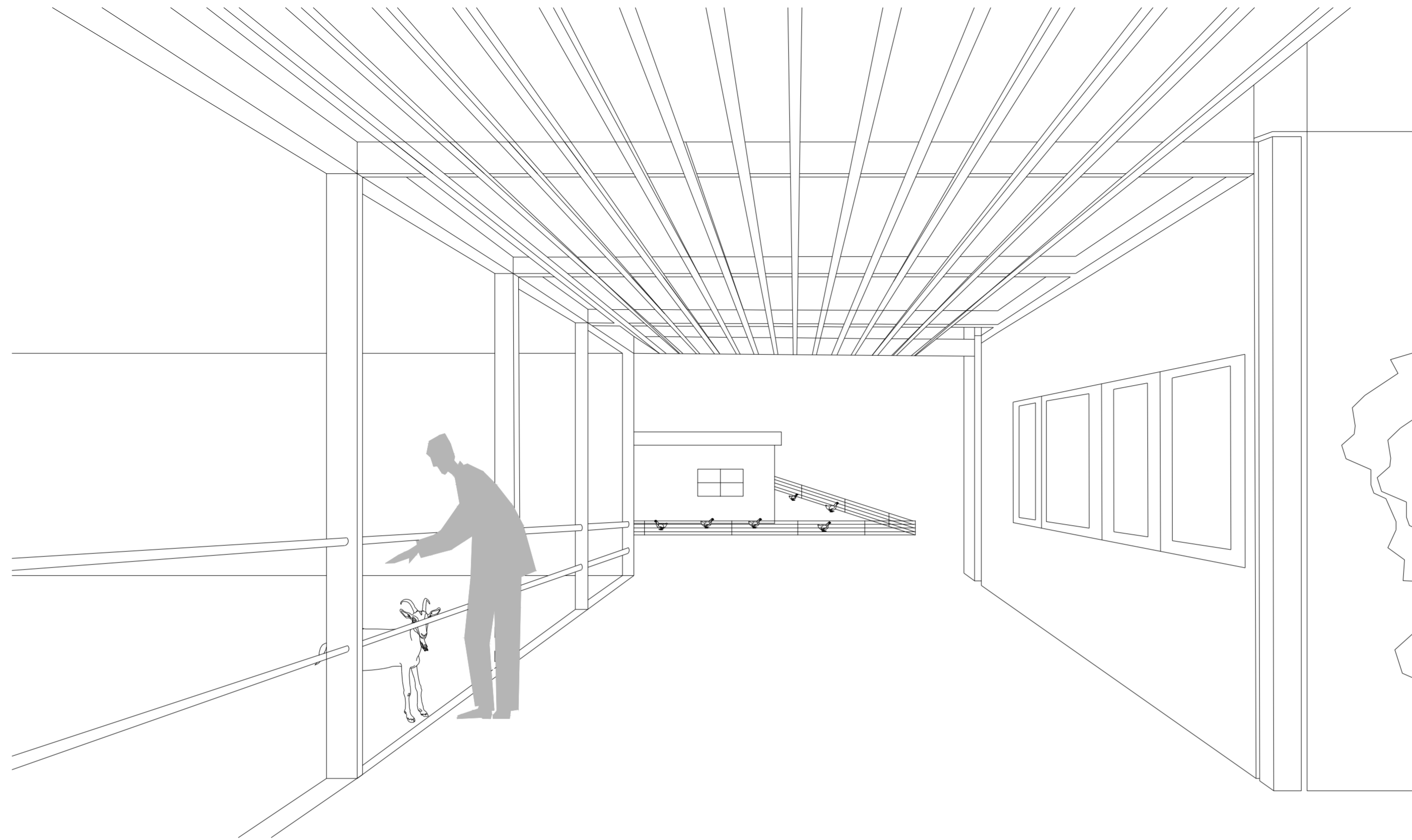
The façades of the farm consists of mechanized structures which adapt to the movement of sun providing protection from direct solar. The shading screen rotates in response to the movement of the sun, reducing solar gain whilst improving natural diffused light into the farm and improving visibility. The panels are performance oriented technology with an underlying performance criteria and a grid-guide, that generates a highly efficient integrated system. This gives a direct relationship with technology and us humans.

Pivoting mechanism

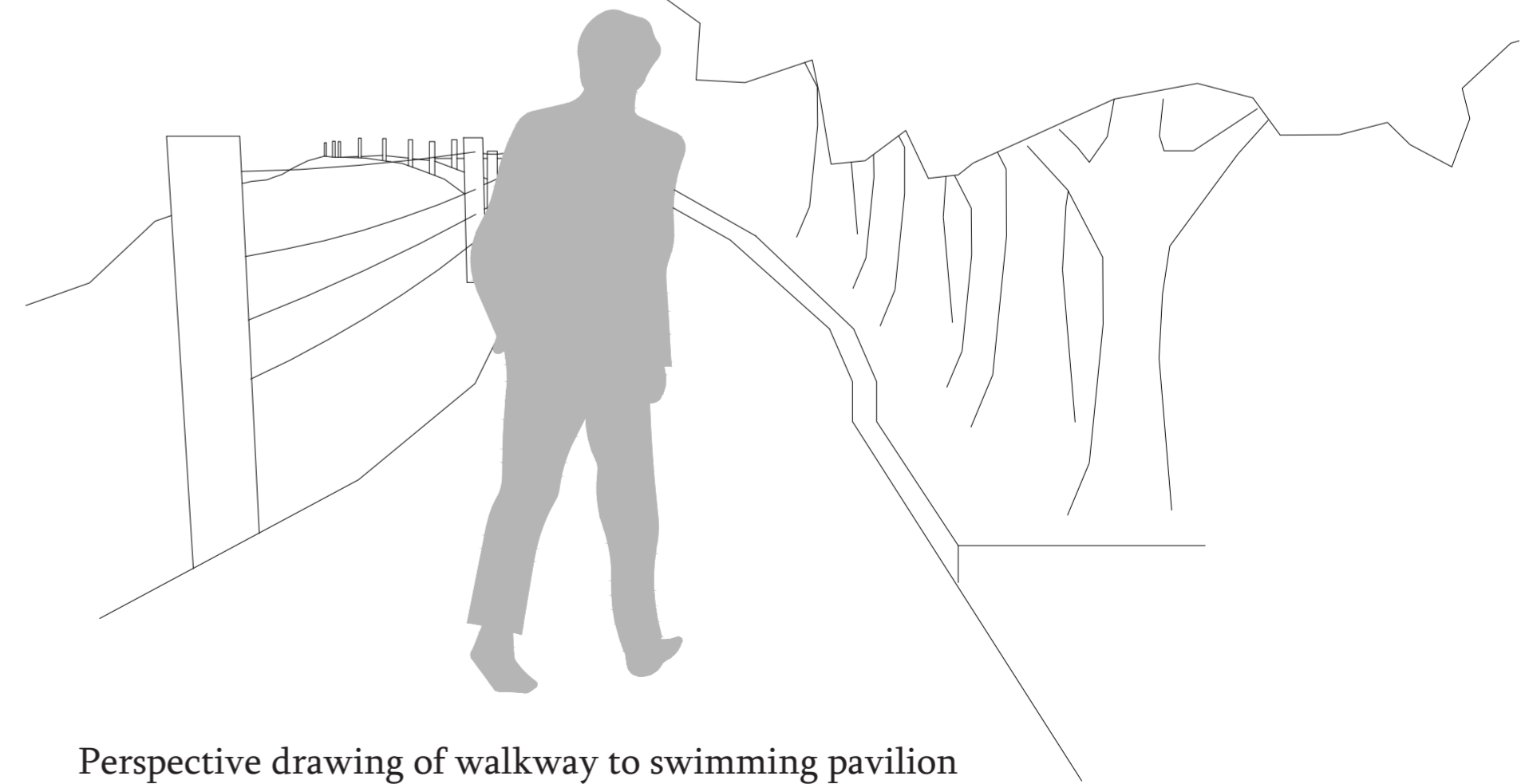
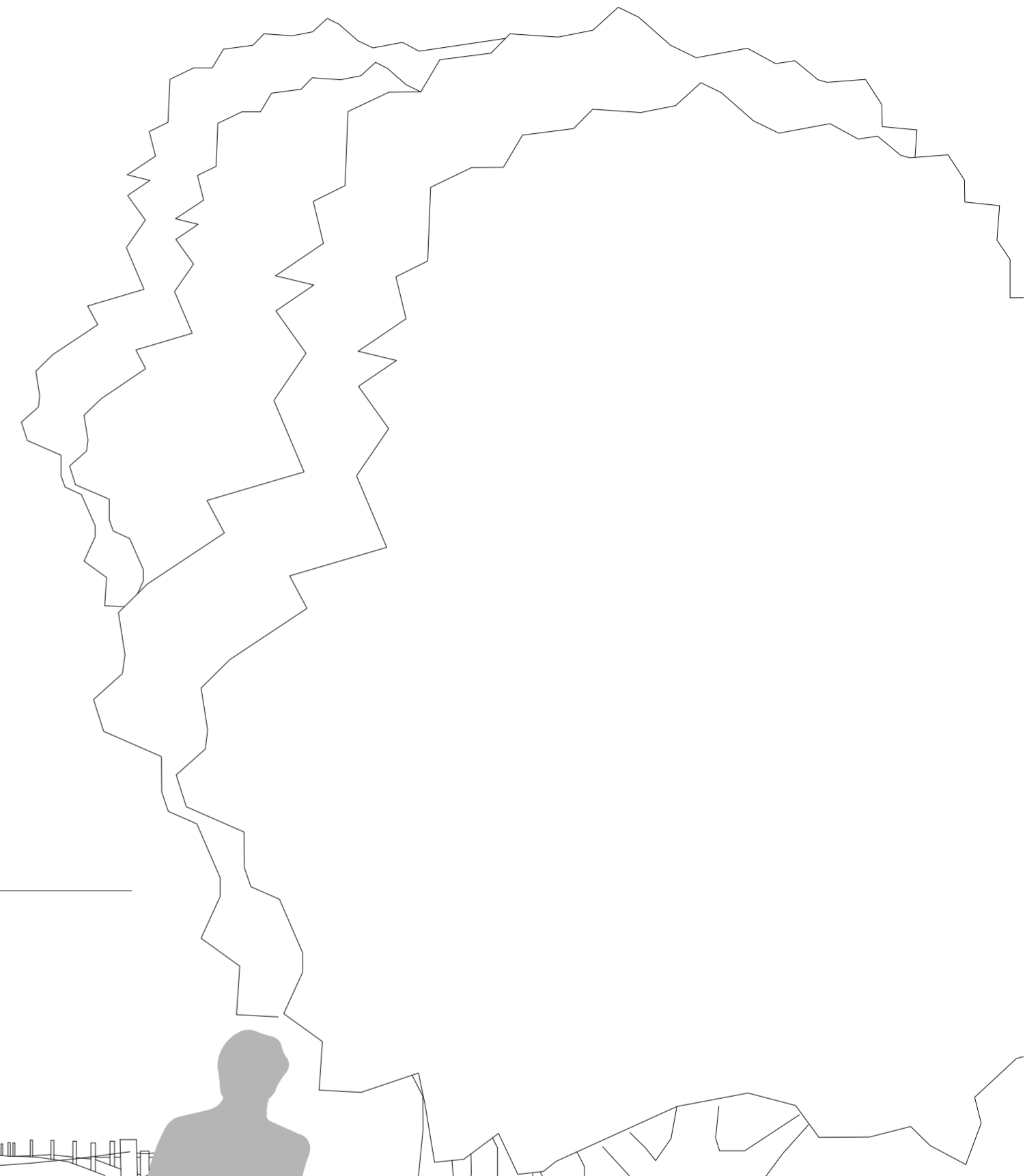


Jamies Farm - Sketch of interactive panels moving with the sun

# Synthesis



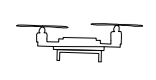
View of 3D Grids, and sheep/goat house



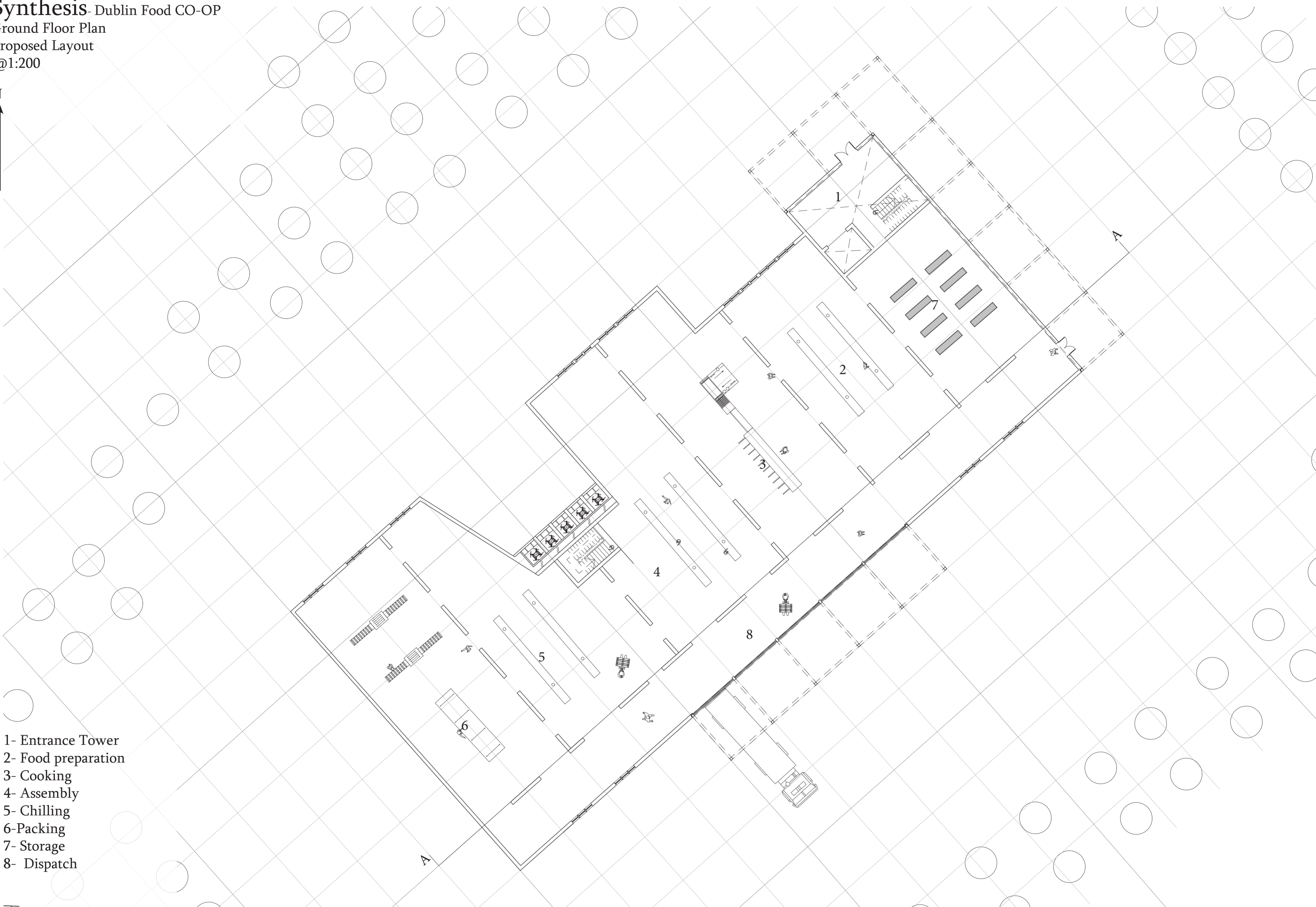
Perspective drawing of walkway to swimming pavilion



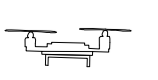
Long Section of walkway



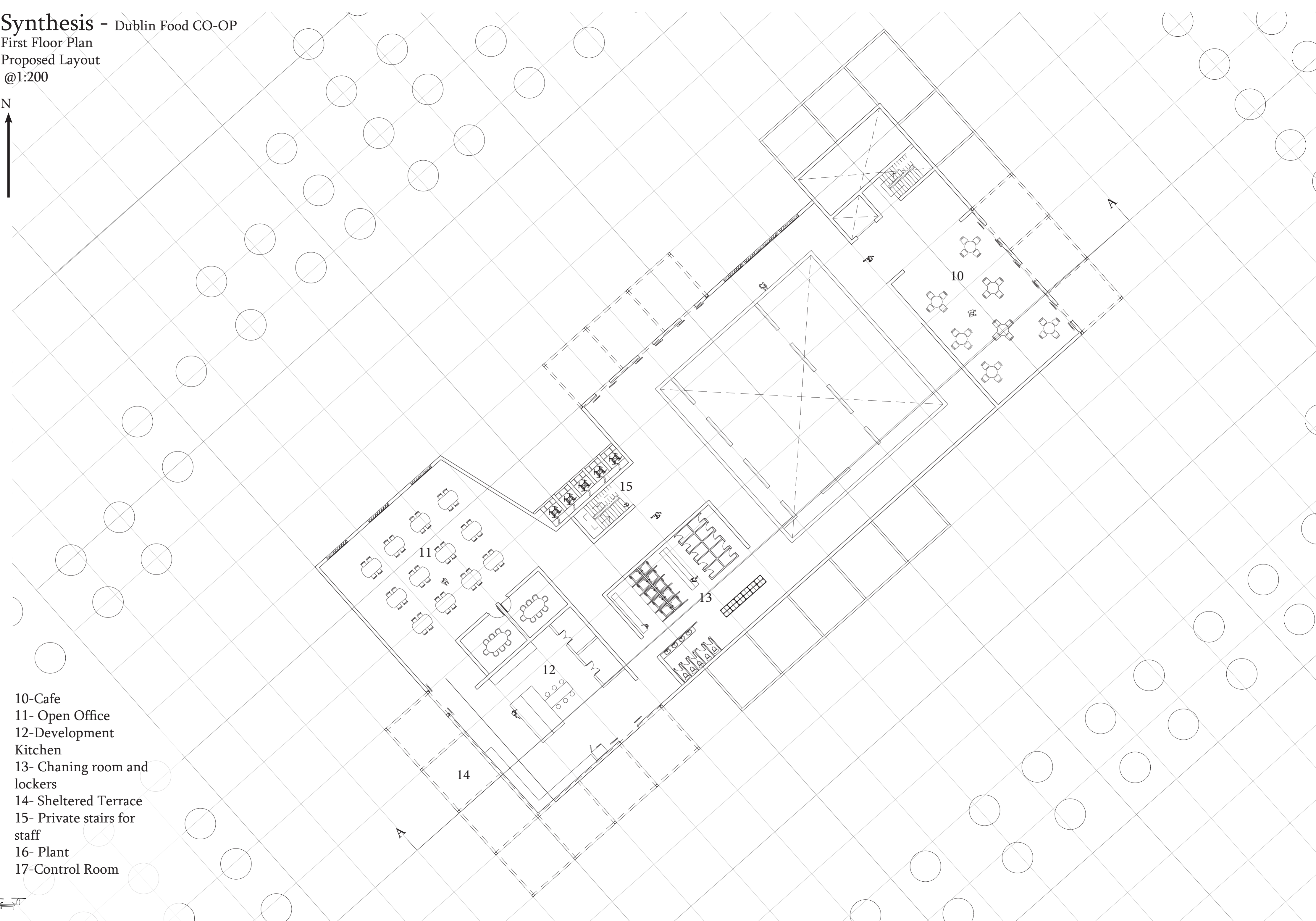
**Synthesis** - Dublin Food CO-OP  
Ground Floor Plan  
Proposed Layout  
@1:200



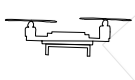
- 1- Entrance Tower
- 2- Food preparation
- 3- Cooking
- 4- Assembly
- 5- Chilling
- 6- Packing
- 7- Storage
- 8- Dispatch



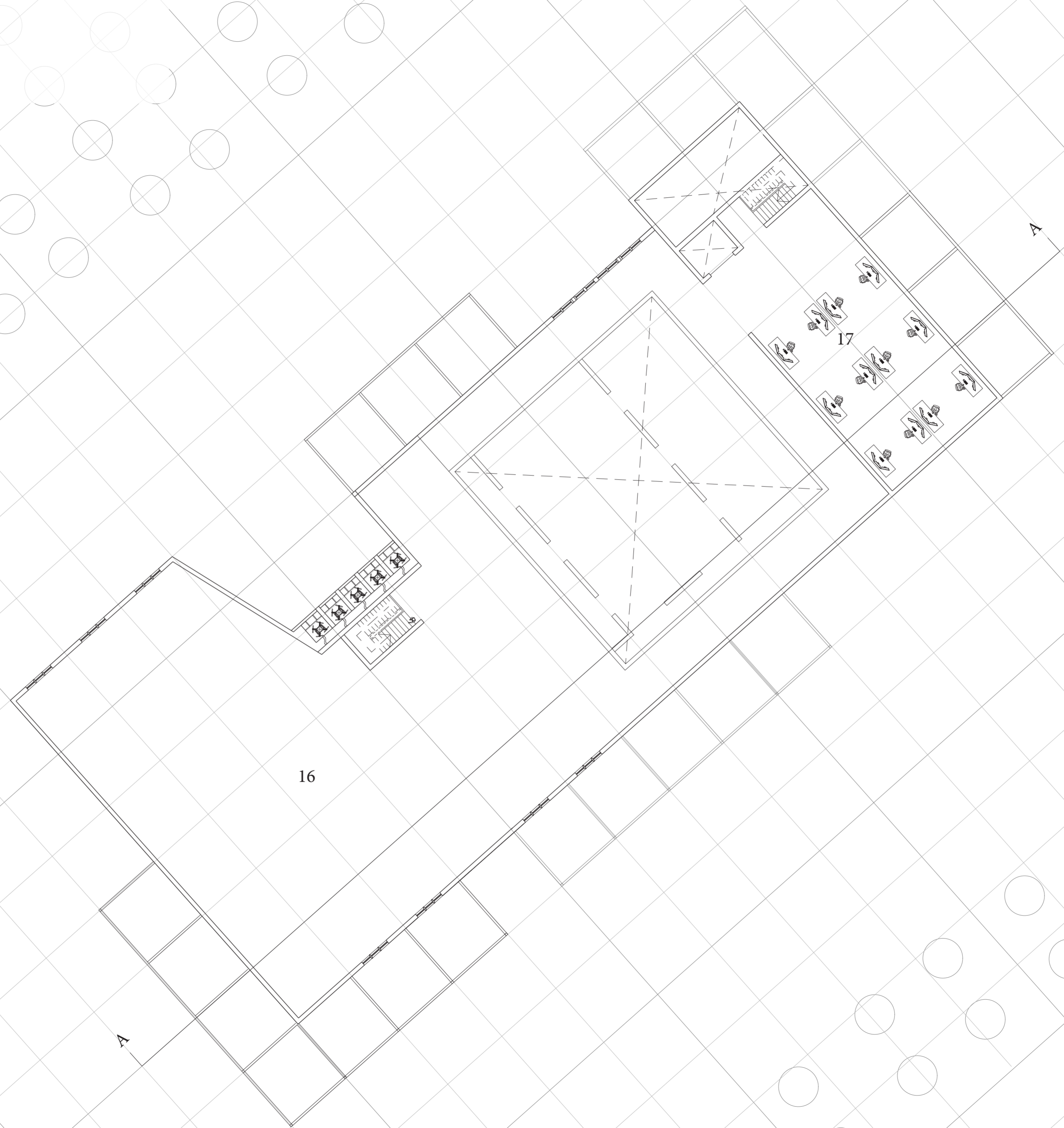
**Synthesis** - Dublin Food CO-OP  
First Floor Plan  
Proposed Layout  
@1:200



- 10-Cafe
- 11- Open Office
- 12-Development
- Kitchen
- 13- Chaning room and lockers
- 14- Sheltered Terrace
- 15- Private stairs for staff
- 16- Plant
- 17-Control Room



Synthesis - Dublin Food CO-OP  
Second Floor Plan  
Proposed Layout  
@1:200

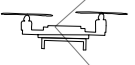


17

16

A

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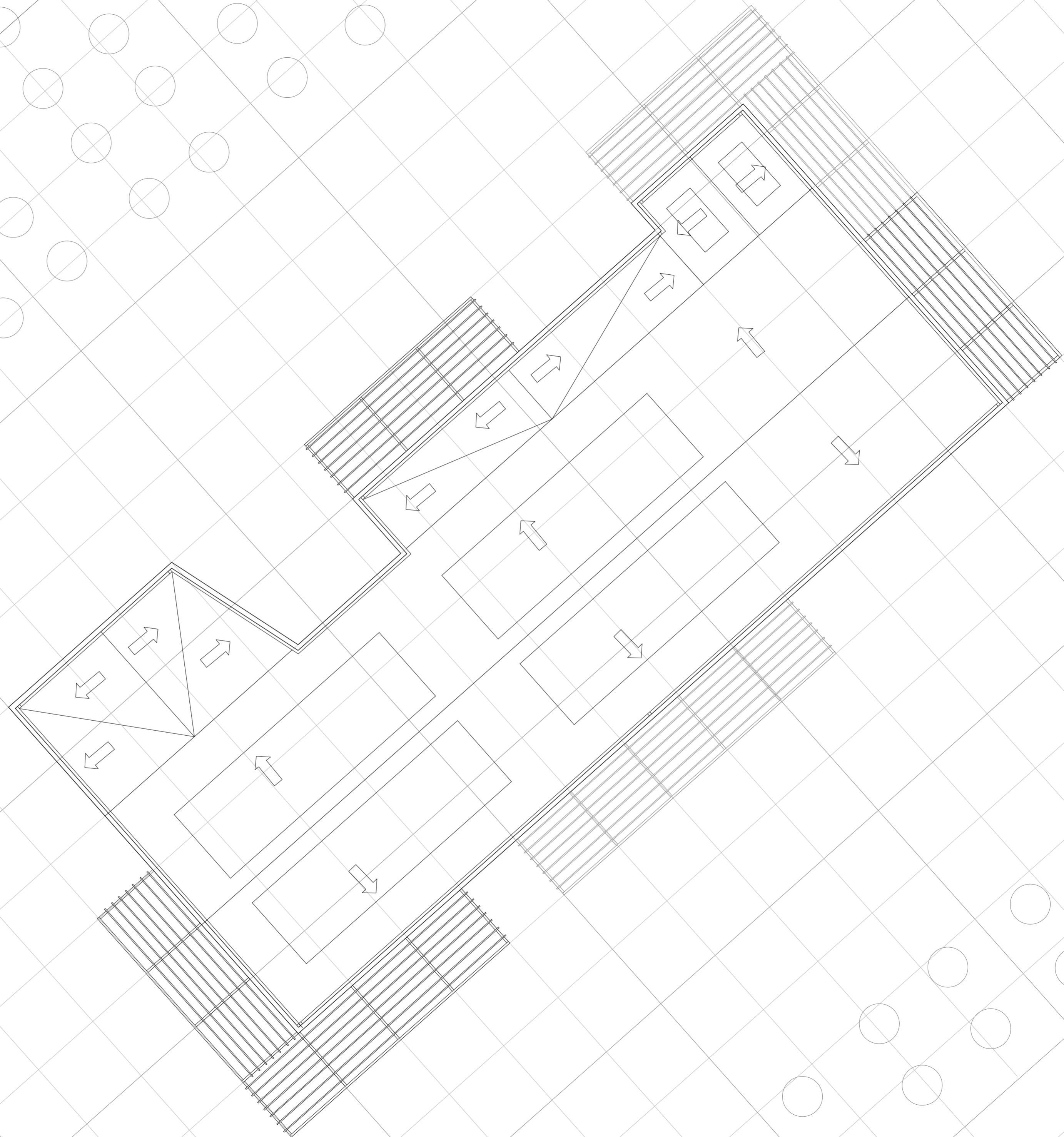


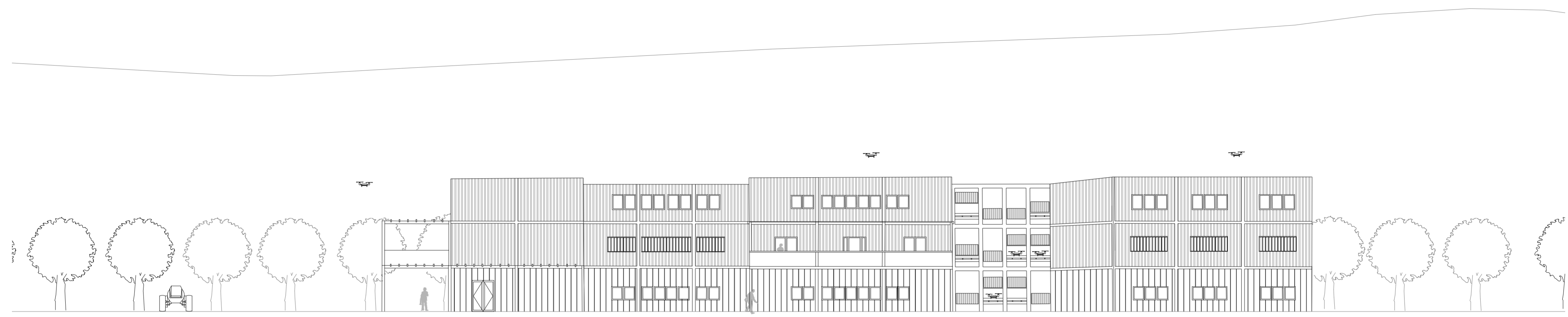


# Synthesis - Dublin Food CO-OP

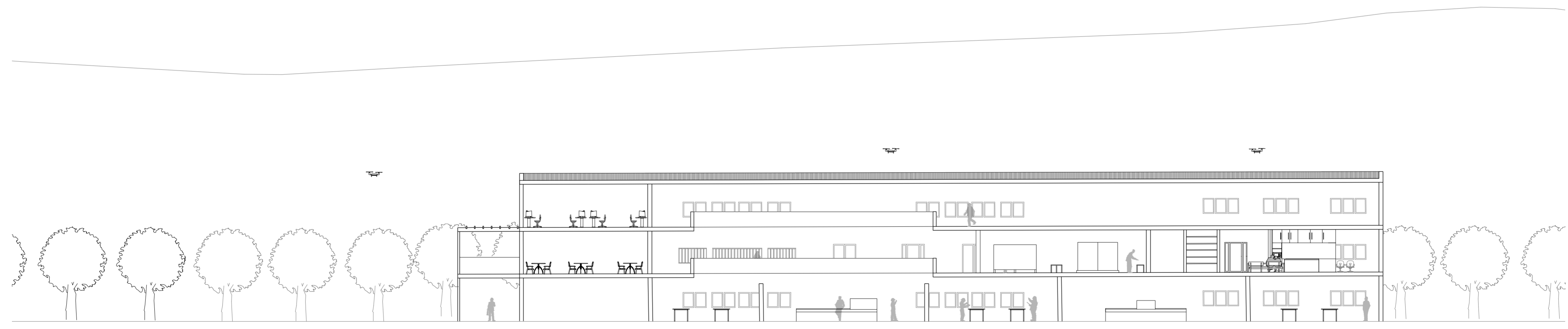
Roof Plan

@1:200

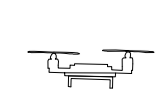




Dublin Food CO-OP  
Elevation AA  
@1:200

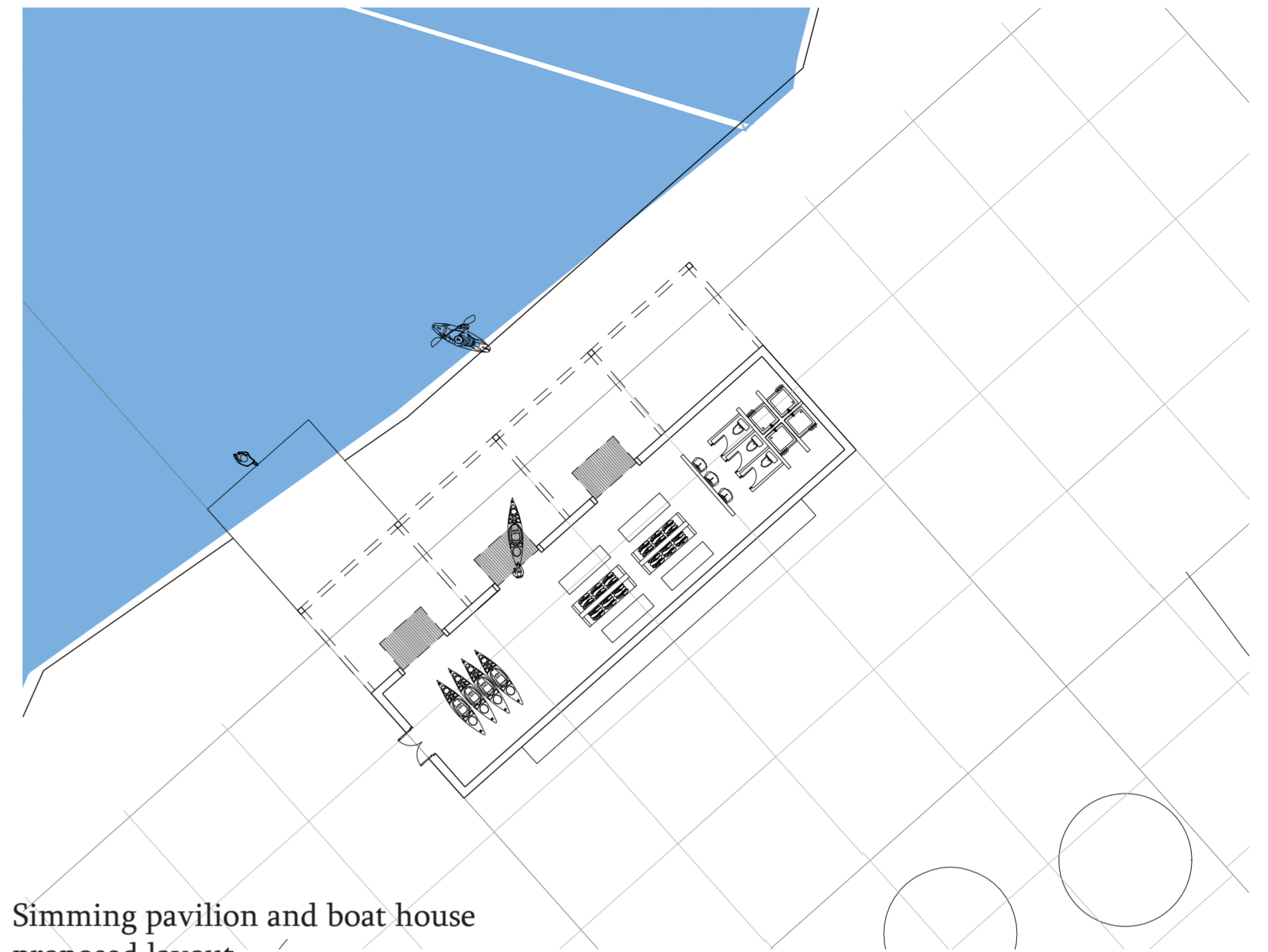
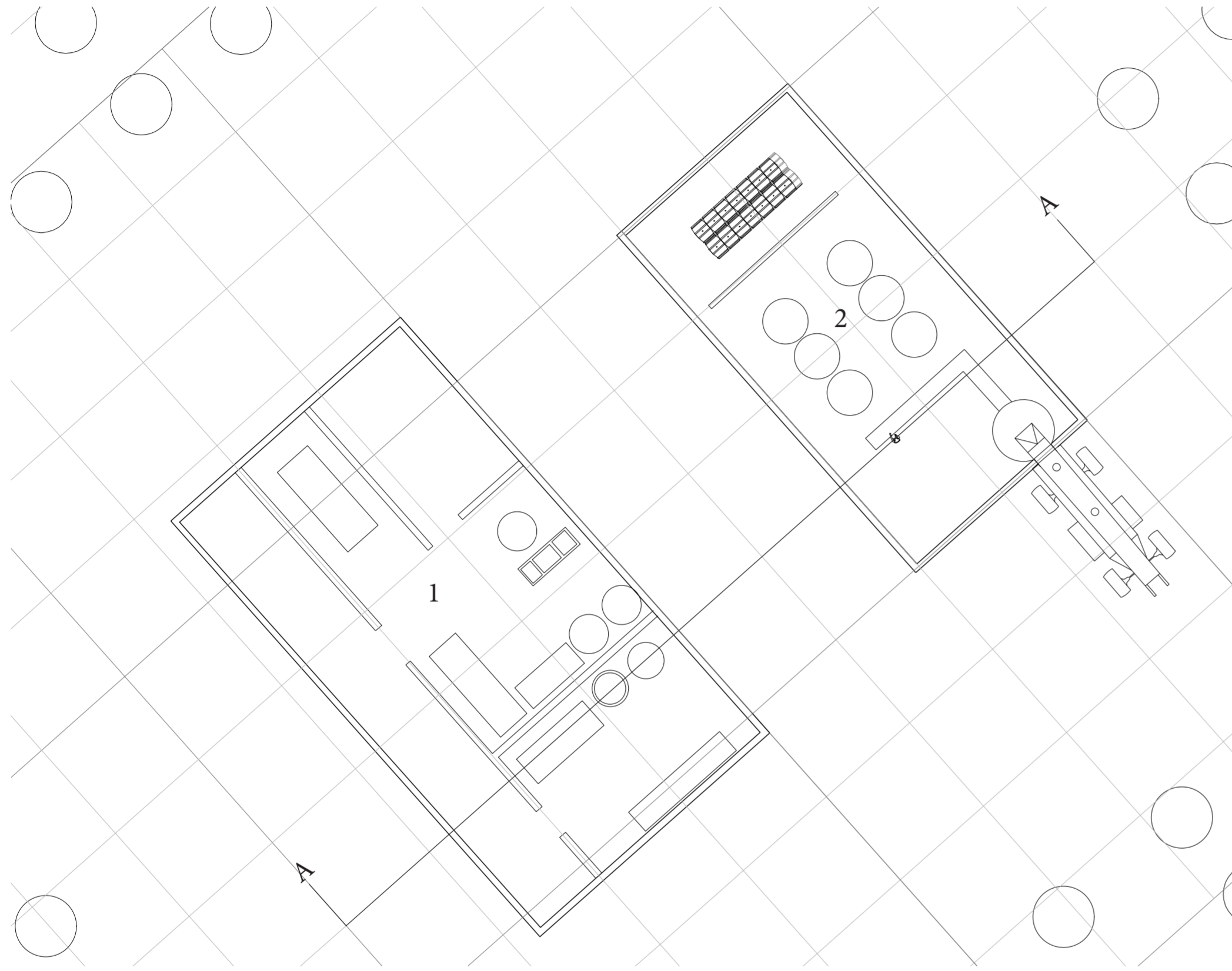


Dublin Food CO-OP  
Section AA  
@1:200

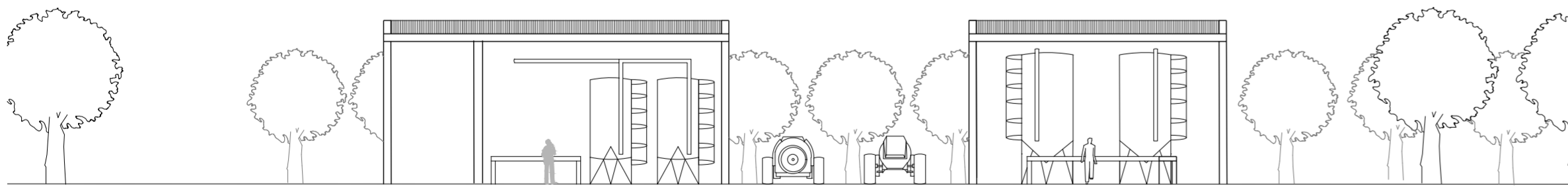


# Synthesis

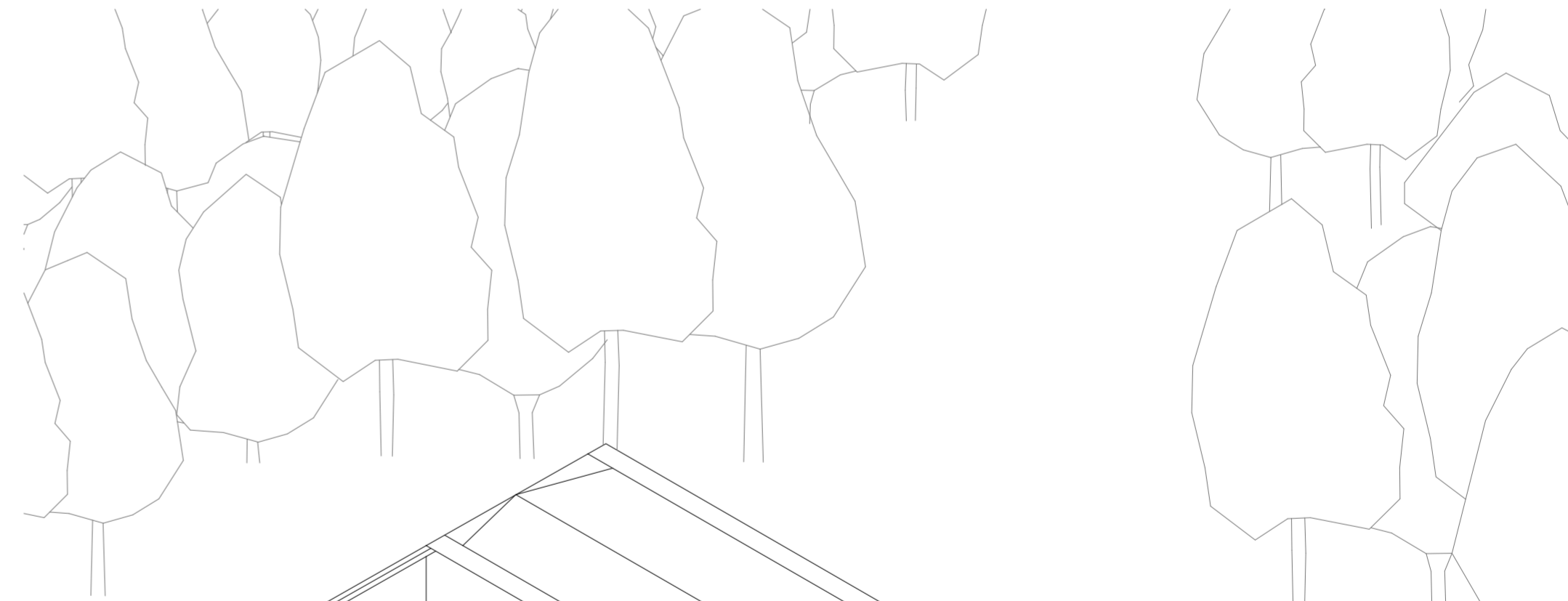
N  
↑  
1- Cheese and Yogurt making  
2- Cider House  
proposed layout @1:200



Swimming pavilion and boat house  
proposed layout  
@1:200

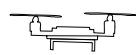
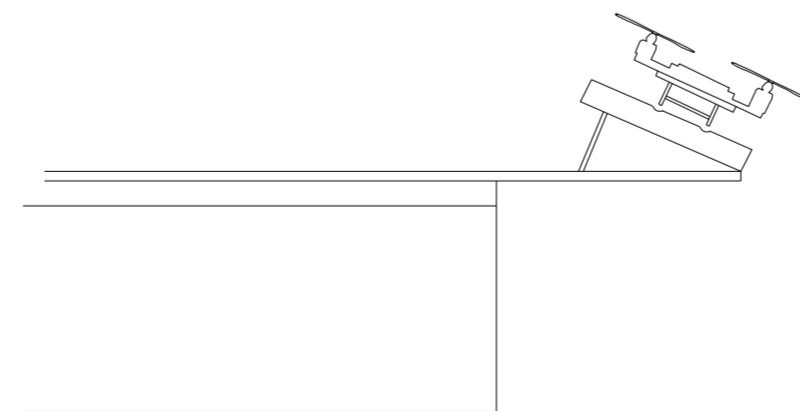
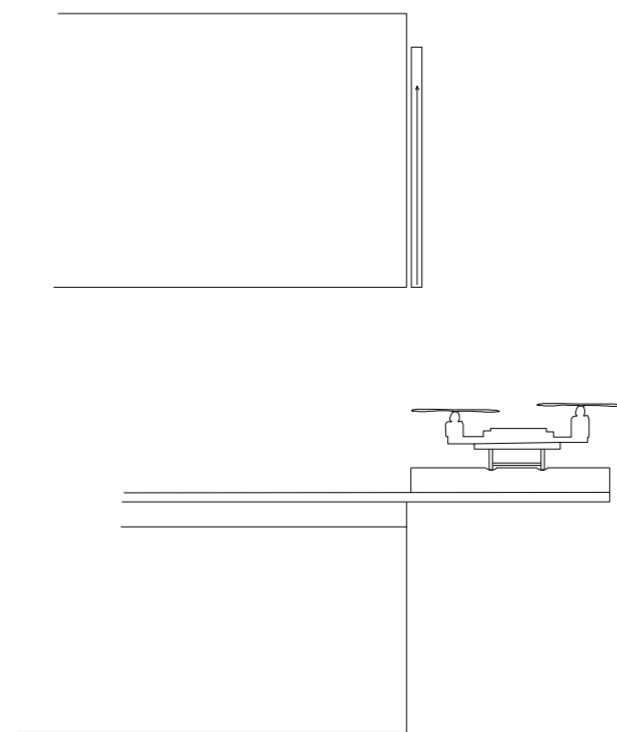
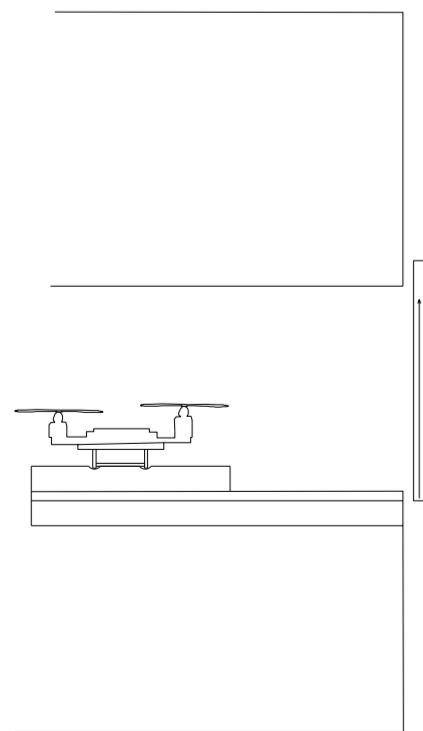
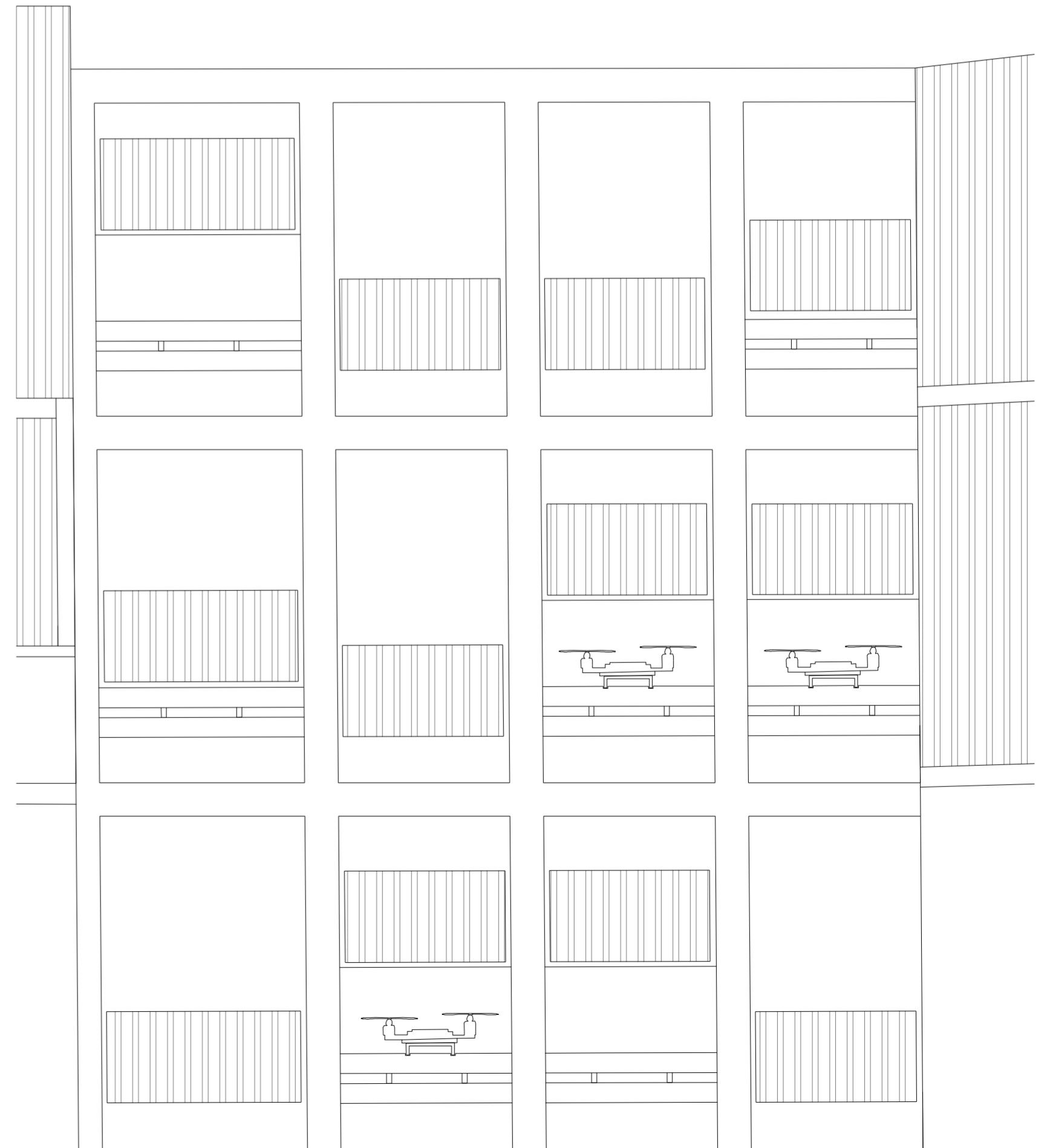
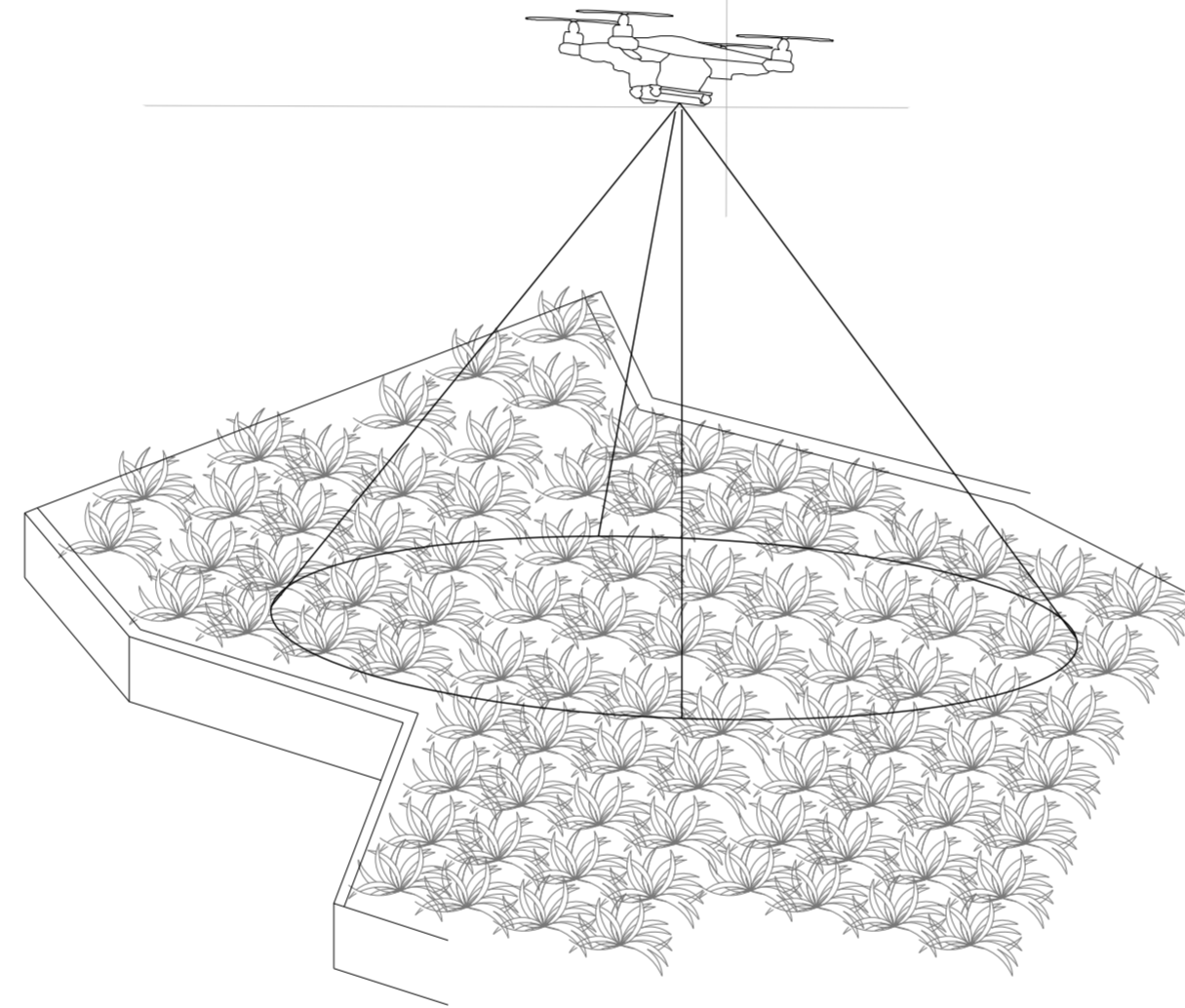
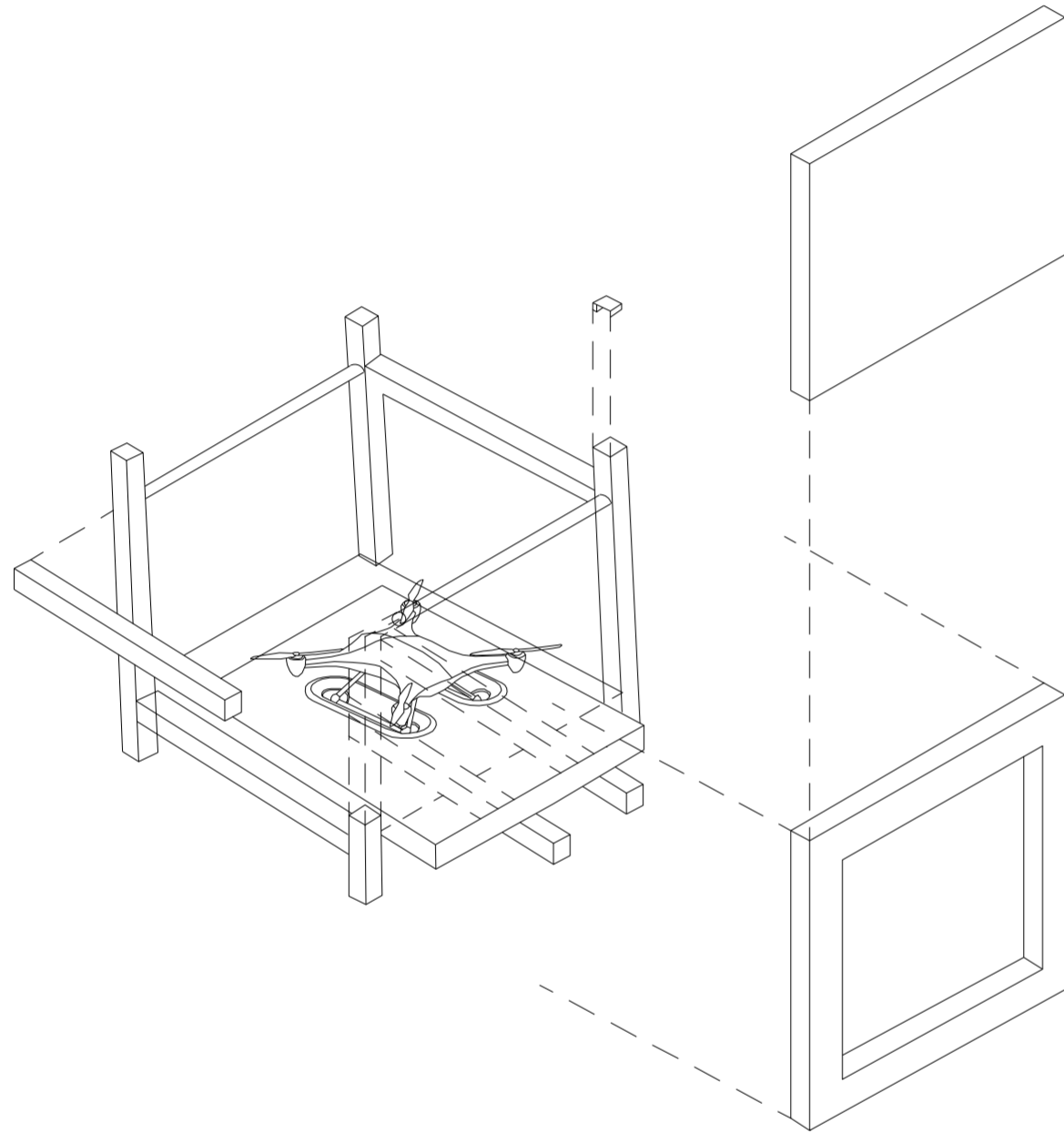
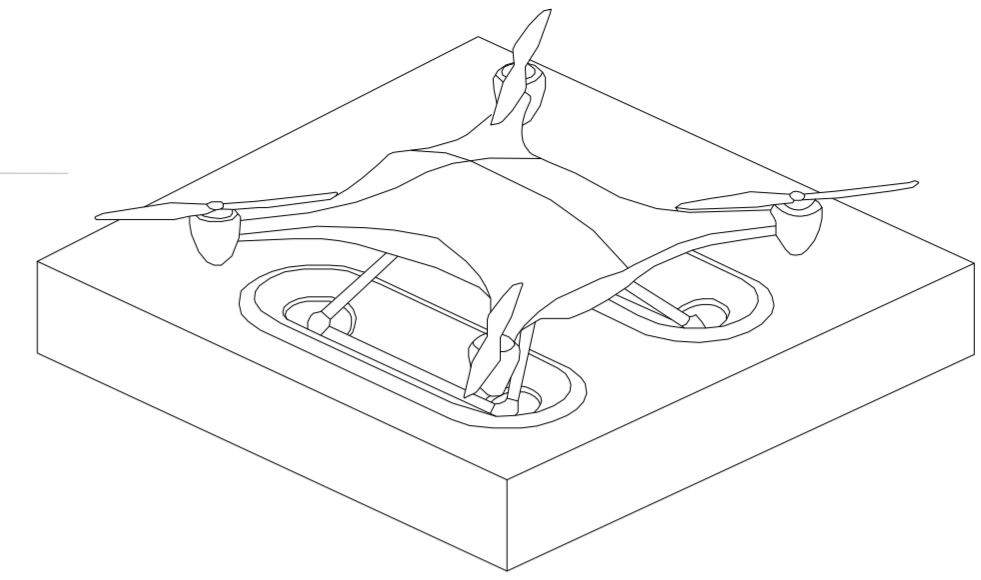
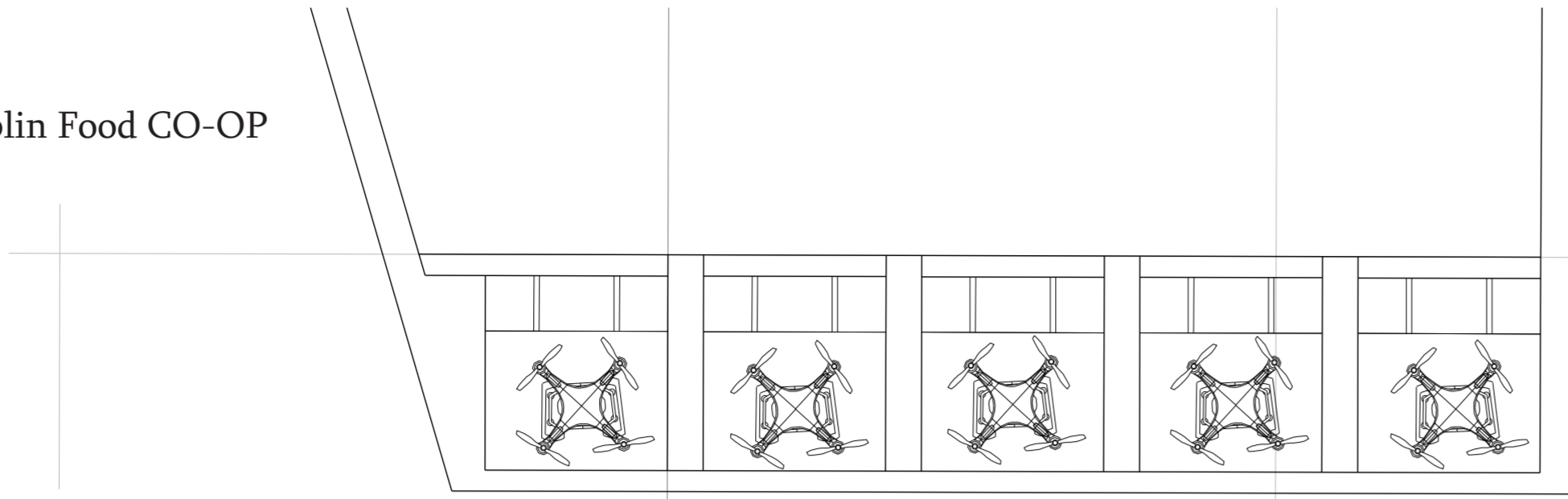


Cheese and Yogurt making & Cider House  
Section AA  
@1:200

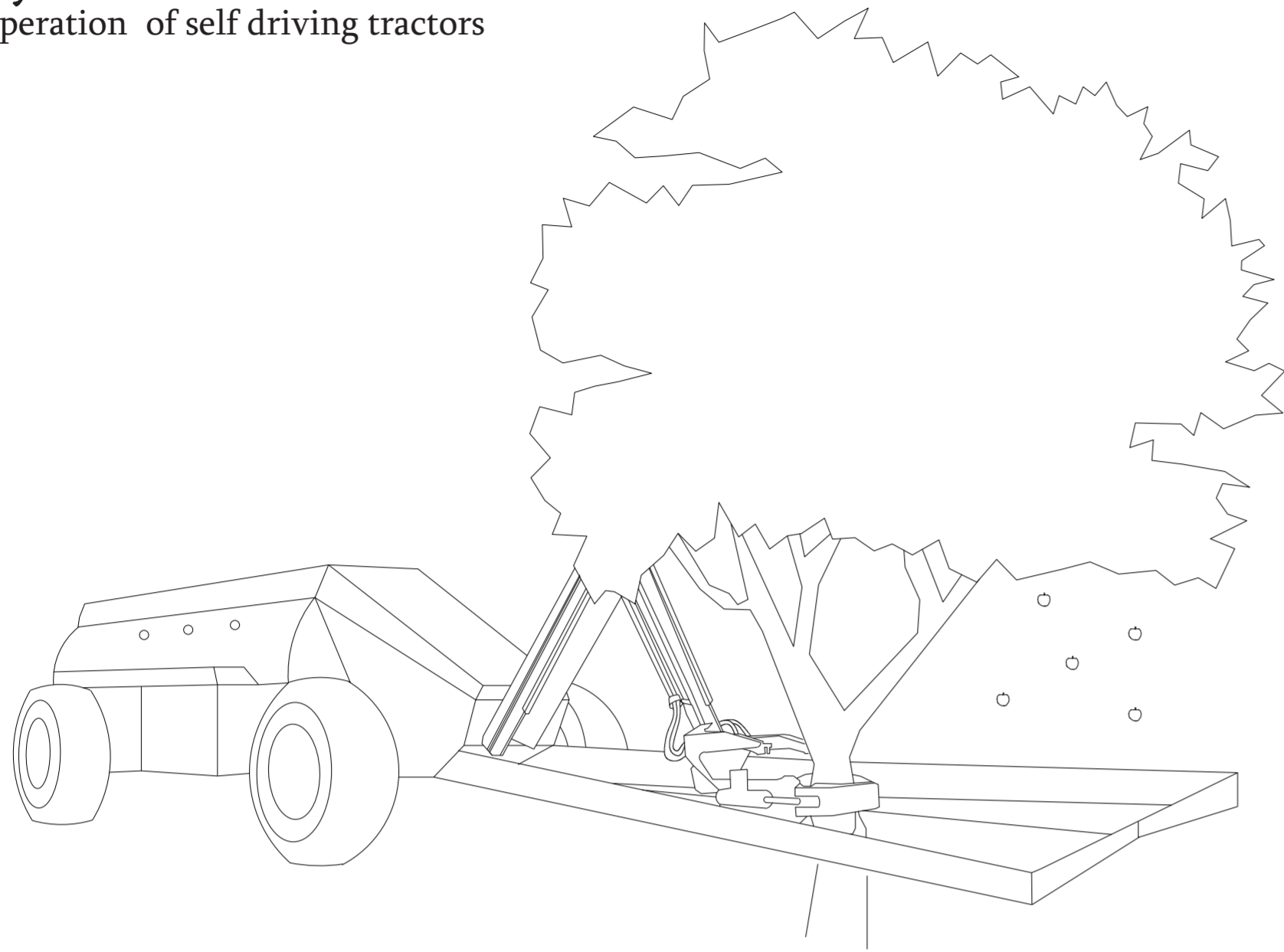


Axonometric of swimming pavilion and  
boat house

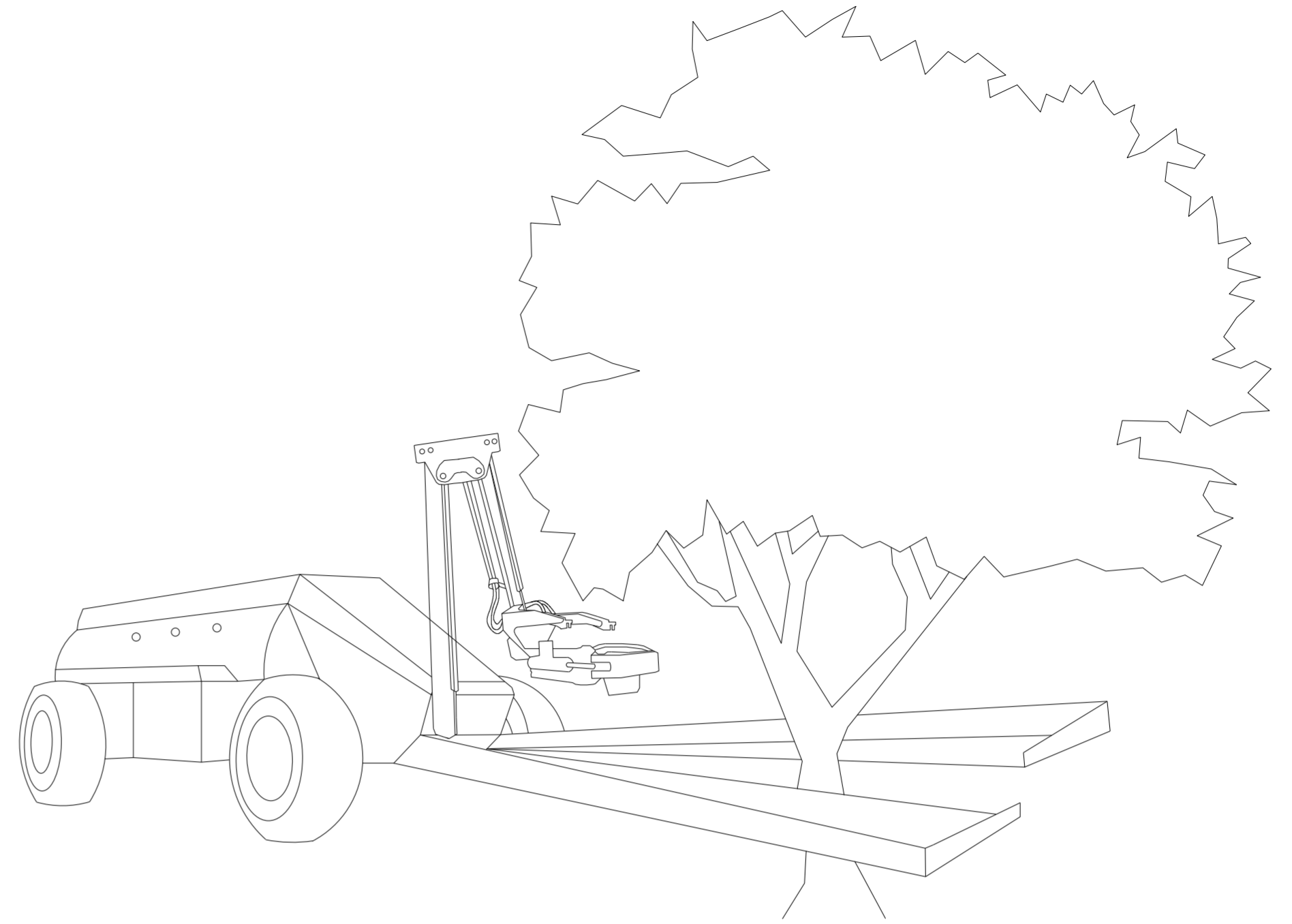
Synthesis - Dublin Food CO-OP  
organisation of drones



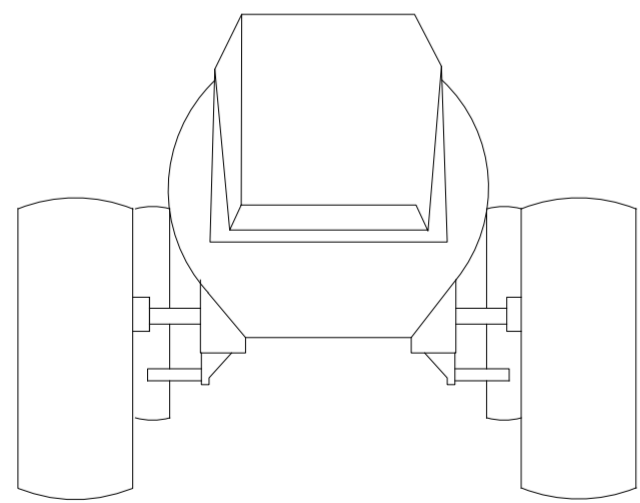
# Synthesis - operation of self driving tractors



An extendable arm and clamp with two moving fingers attaches to the trunk of the tree. A vibration is then applied which runs through the arm and shakes the trunk which releases the apples from the tree. The tray beneath the tree collects the fallen apples.



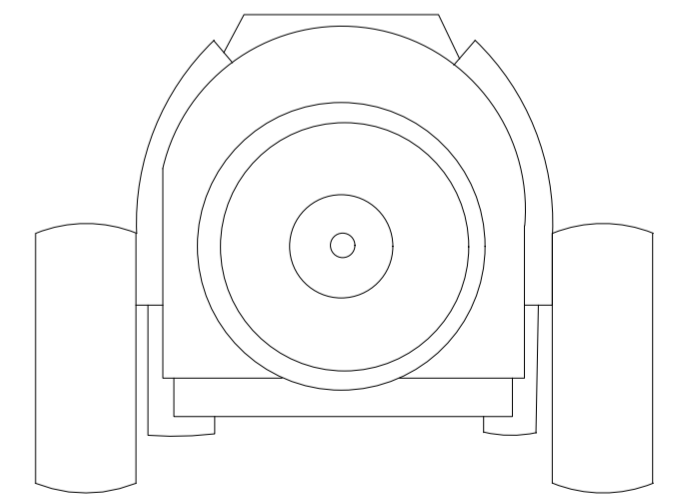
The tray is angled at the middle which allows the apples to fall to either side of the tray. This ensures that when the tray separates the apples don't fall to the ground.



Front Elevation



The tray then separates to retract back into the tractor with the collected apples.



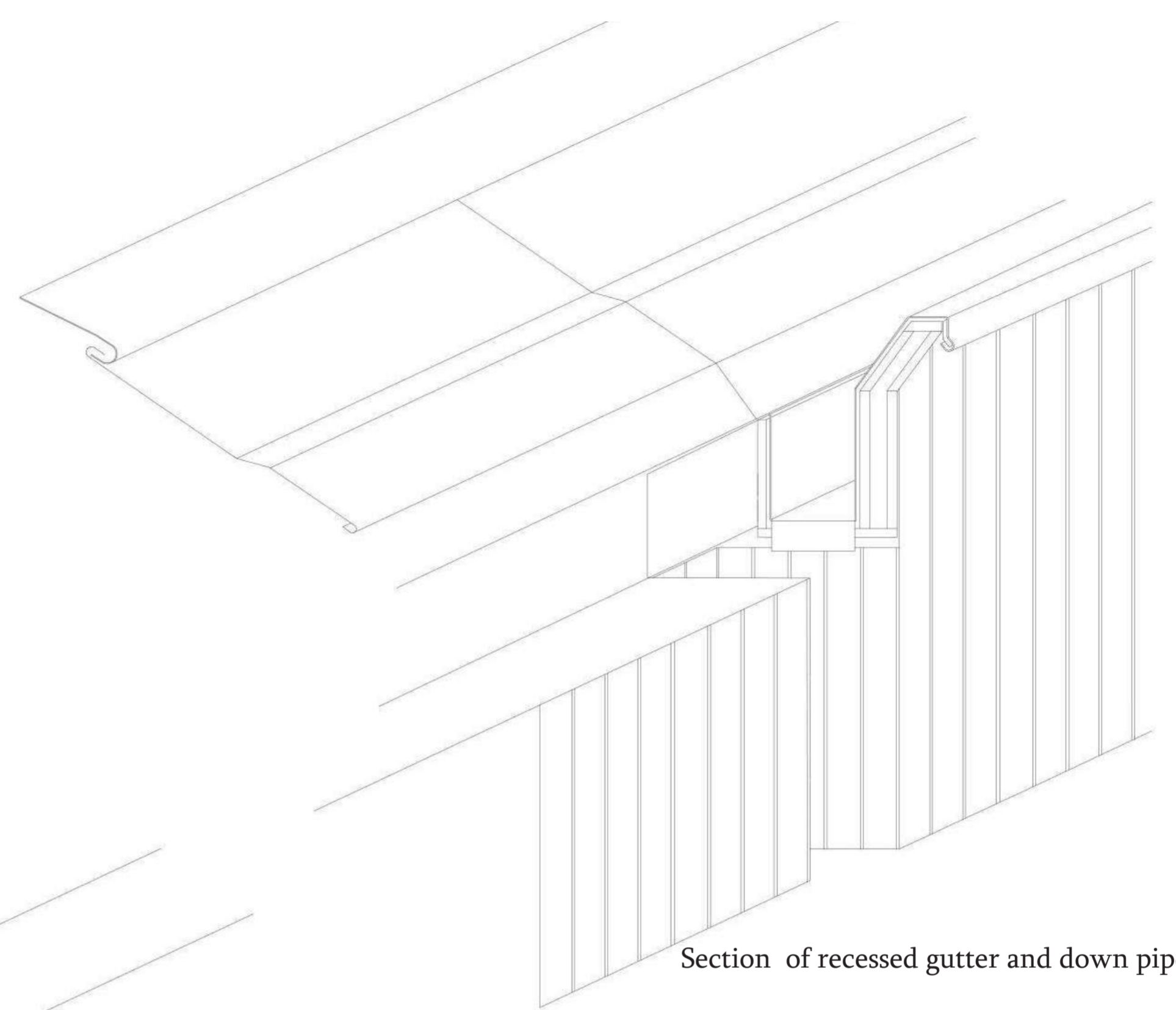
Back Elevation





Elevation of recessed down pipe.

To compliment the architecture of the buildings i decided to create gutters and down pipes that were recessed into the building. The gutter are hidden behind the eaves and then the architectures opens up for the down pipe which water is cascading down from. This allows the residents to have a connection the water beyond the site, allowing the water to flow freely. The deep recess of the down pipe allows some what of control with the water coming down. This also is a connection to my 3D grids which are also placed directly into the architecture.



Section of recessed gutter and down pipe.

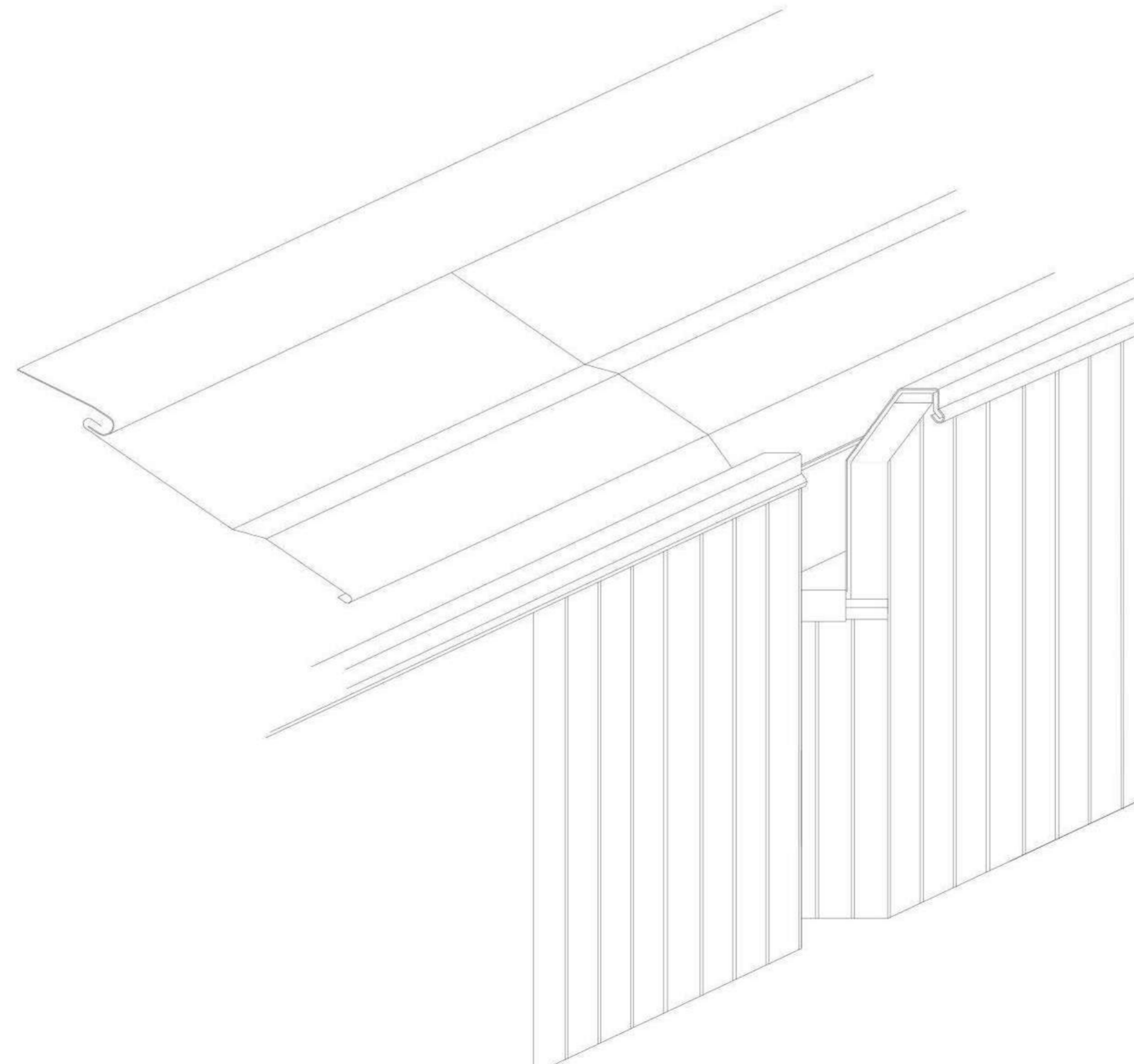
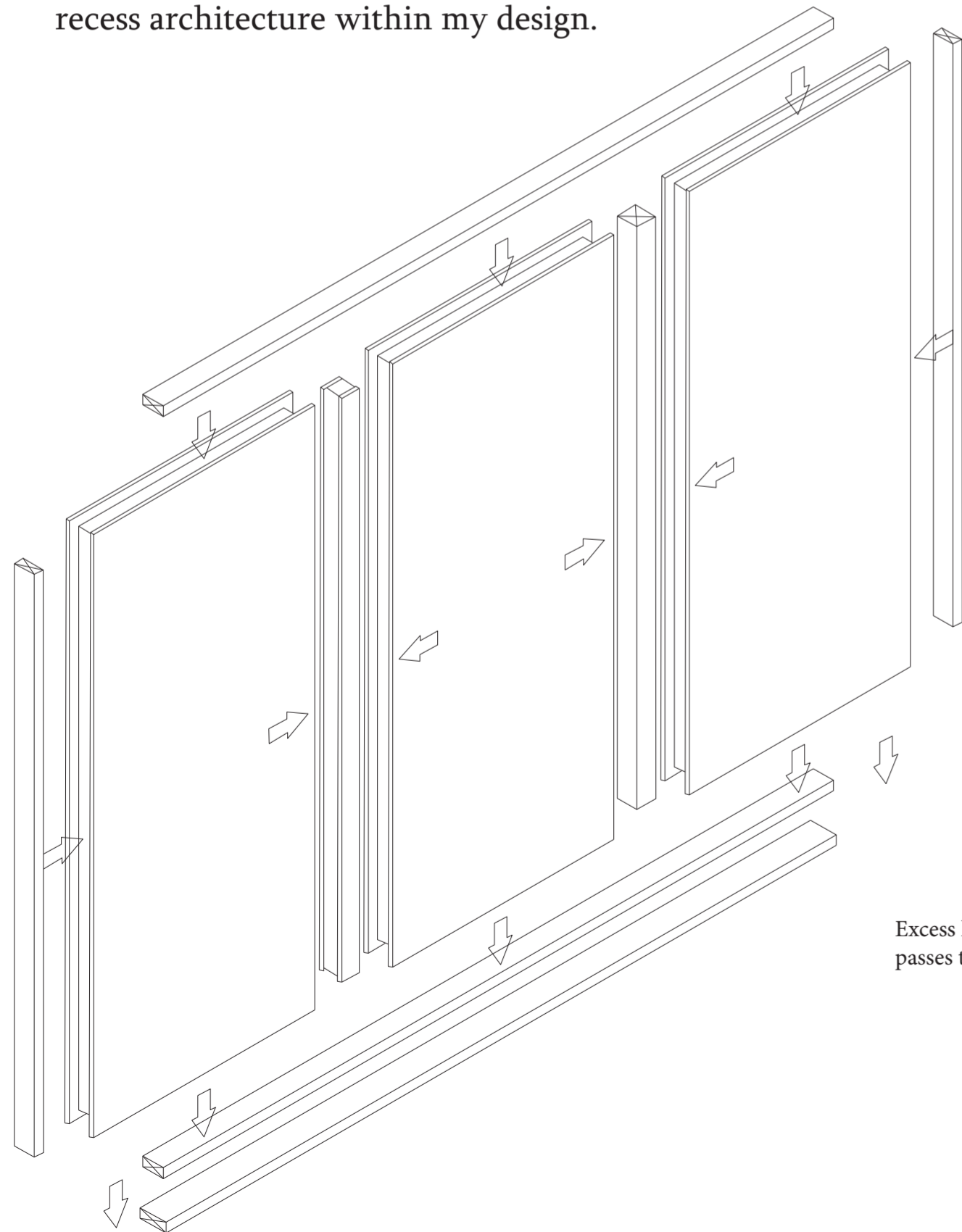
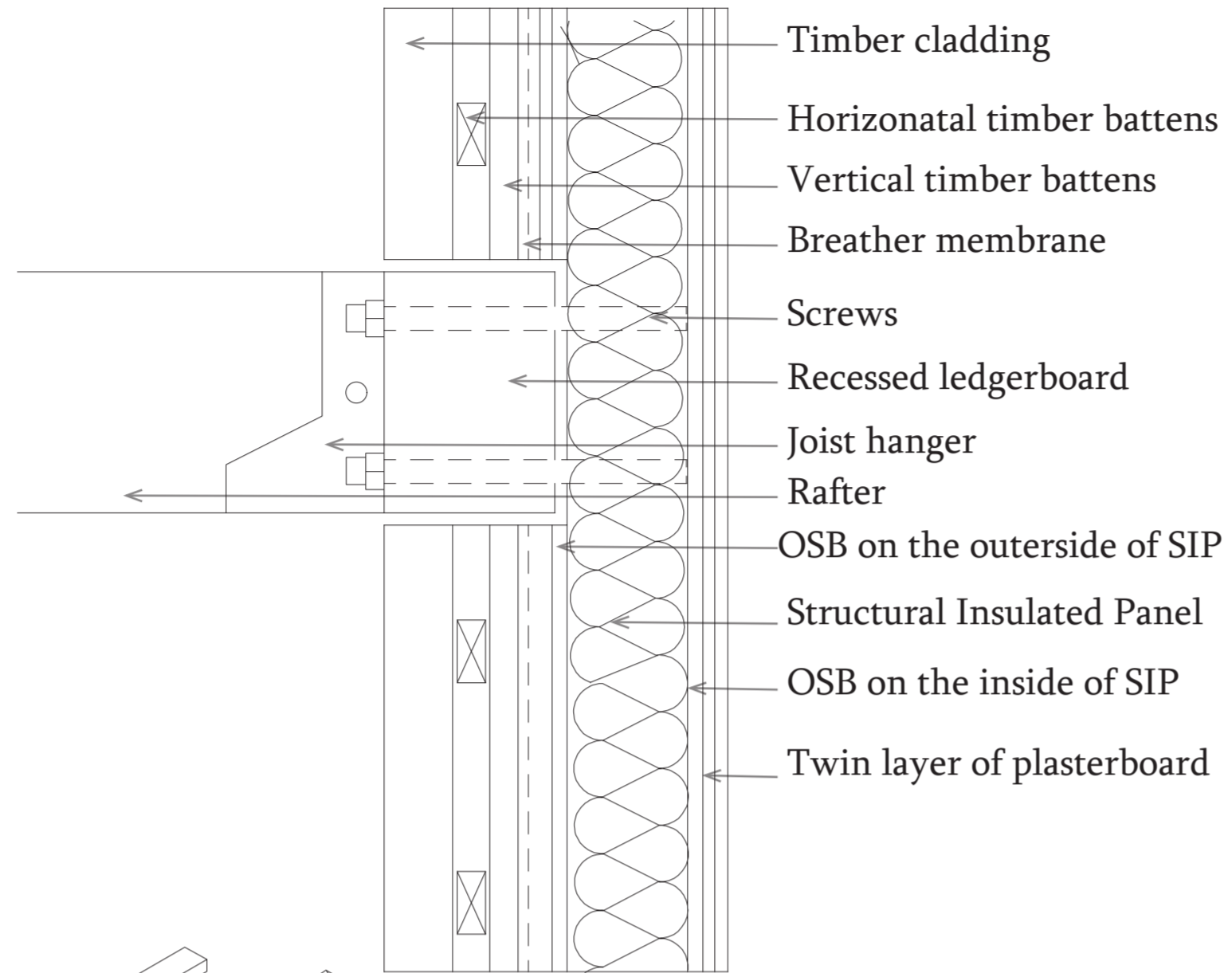


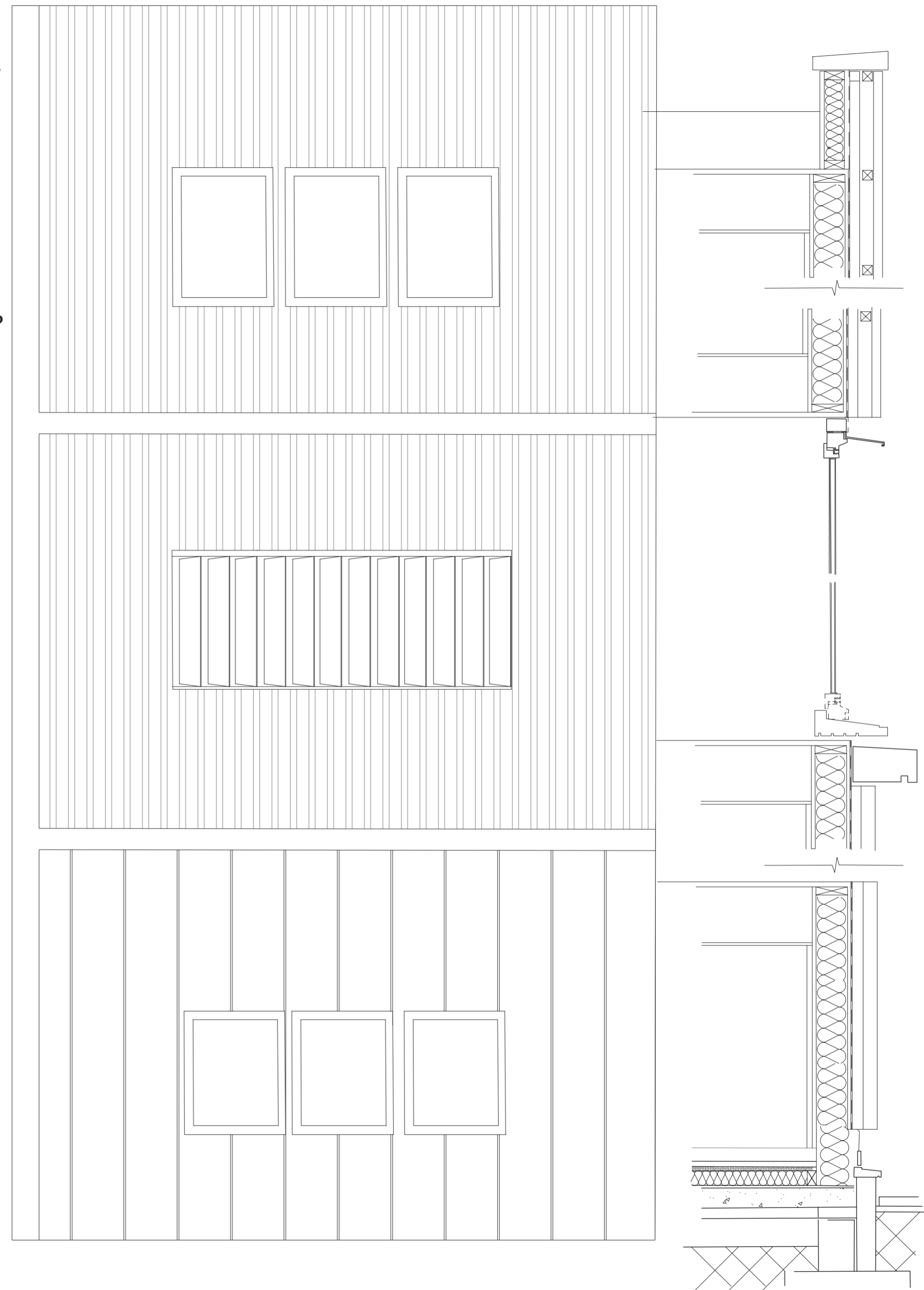
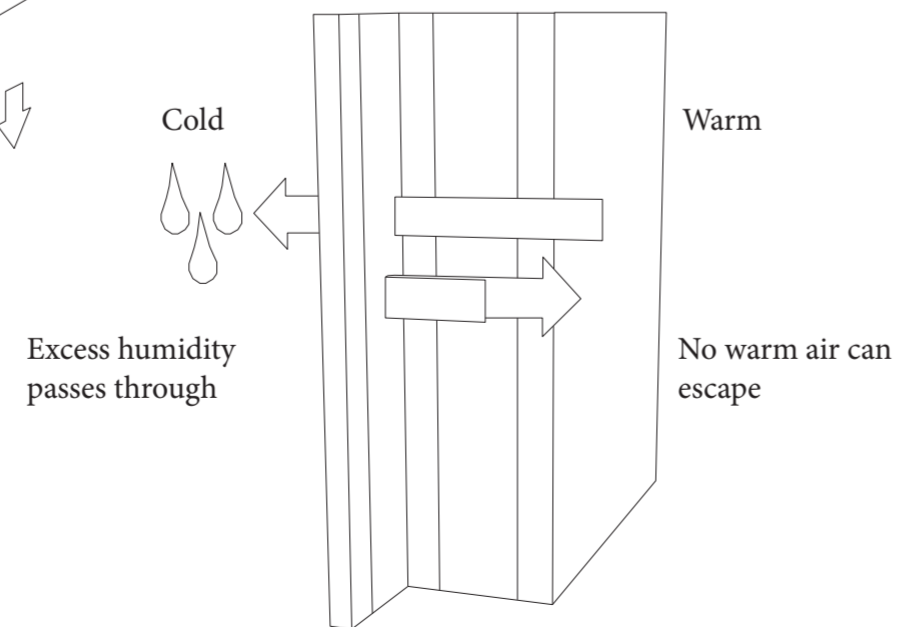
Image of gutter hidden behind parapet and down pipe recessed into the architect ure.

# Synthesis – Structure and Material Exporlation

The buildings are clad in a combination of timber cladding and ribbed steel. Using the timber cladding echoes the orchards that surround the buildings. I chose timber so it will weather over time and blend in with its natural setting. The buildings facades are clad in repeating timber batons on the upper half and broken by strategically placed windows that were placed to let light enter the buildings. Opting for steel clad, I wanted the facade to be more expressive, detailing a cladding system with an increased depth to the shallow generic standing-seam of typical metal-cladding systems to compliment the recess architecture within my design.

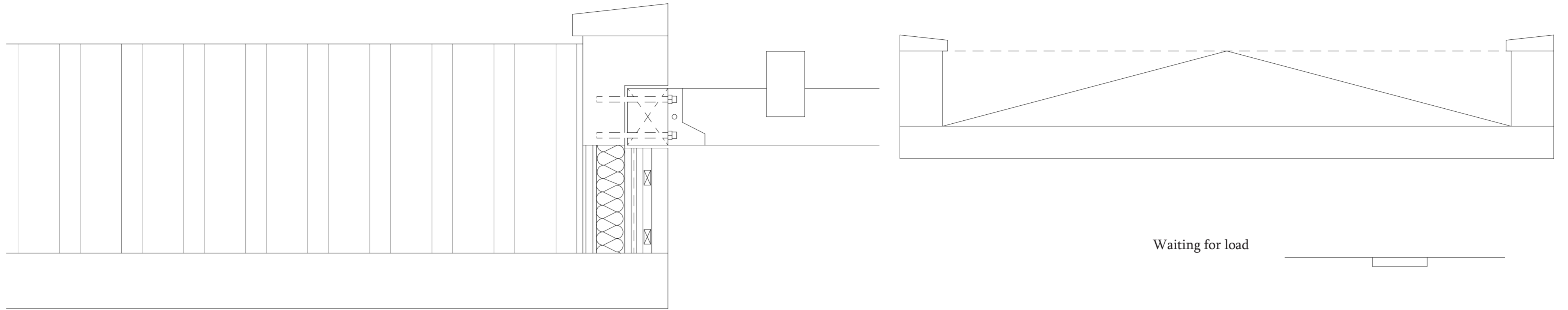


For my main structural element I used SIP panels. Structural insulated panels (SIPs) are a high performance building system. The panels consist of an insulating foam core sandwiched between two structural facings, typically OSB. SIPs buildings are generally more energy efficient, stronger, quieter and more airtight than older technologies. Less air leakage means less drafts, less noise and significantly lower energy bills, thus a reduction in CO2 emissions. The panels are made to your own bespoke requirements and then slotted together on site which speeds up construction time.



# Synthesis -

I decided to use a mono pitch roof covered by a parapet for majority of my buildings, giving the look of flat roof from the elevation. The parapet comes up high enough that you won't see the pitch from eye level. This is to allow the rain to easily fall from the roof into the recessed gutter. For my Jamie's farm I decided to use a pitch roof that would be visible, this is to give a sense of hierarchy to the site.

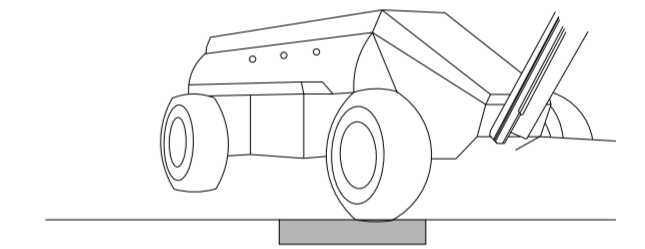


The piezoelectric tile energy harvester converts mechanical vibration energy into electrical energy. Inside each tile is an electromechanical system, which transforms the small vertical movement produced by the tractors into a rotating movement that drives a generator. Just like a sponge squeezes out water, the piezo element under pressure squeezes out electricity that can be harvested and stored. As the tractors move to and fro the tiles are squeezed and energy is collected and then later converts to electricity. The generator is constantly being recharged by the movement of the tractors and used to power the parts of the co-op and Jamie's farm. These tiles can be found on the tractor and truck paths as they would have to most movement.

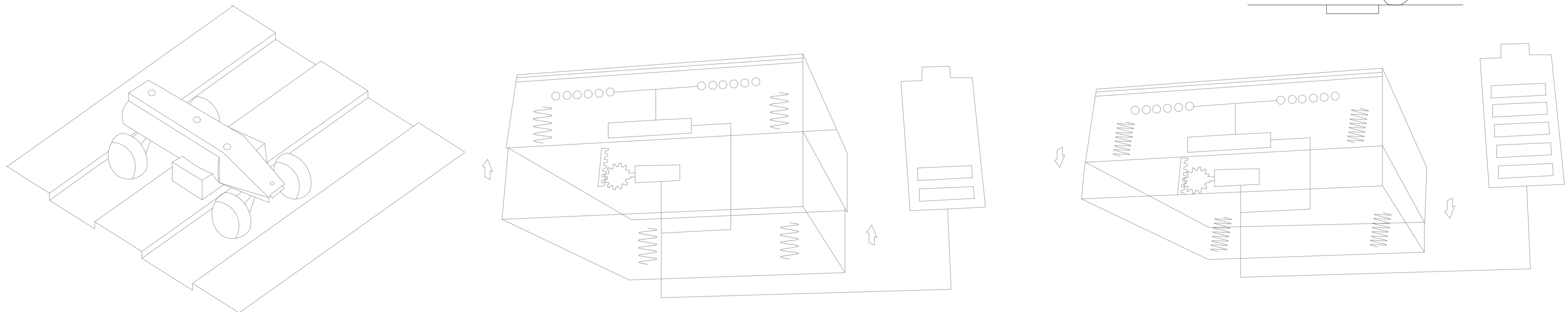
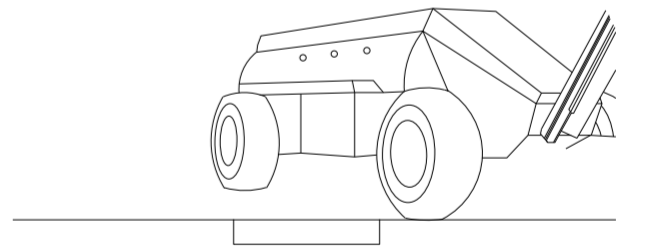
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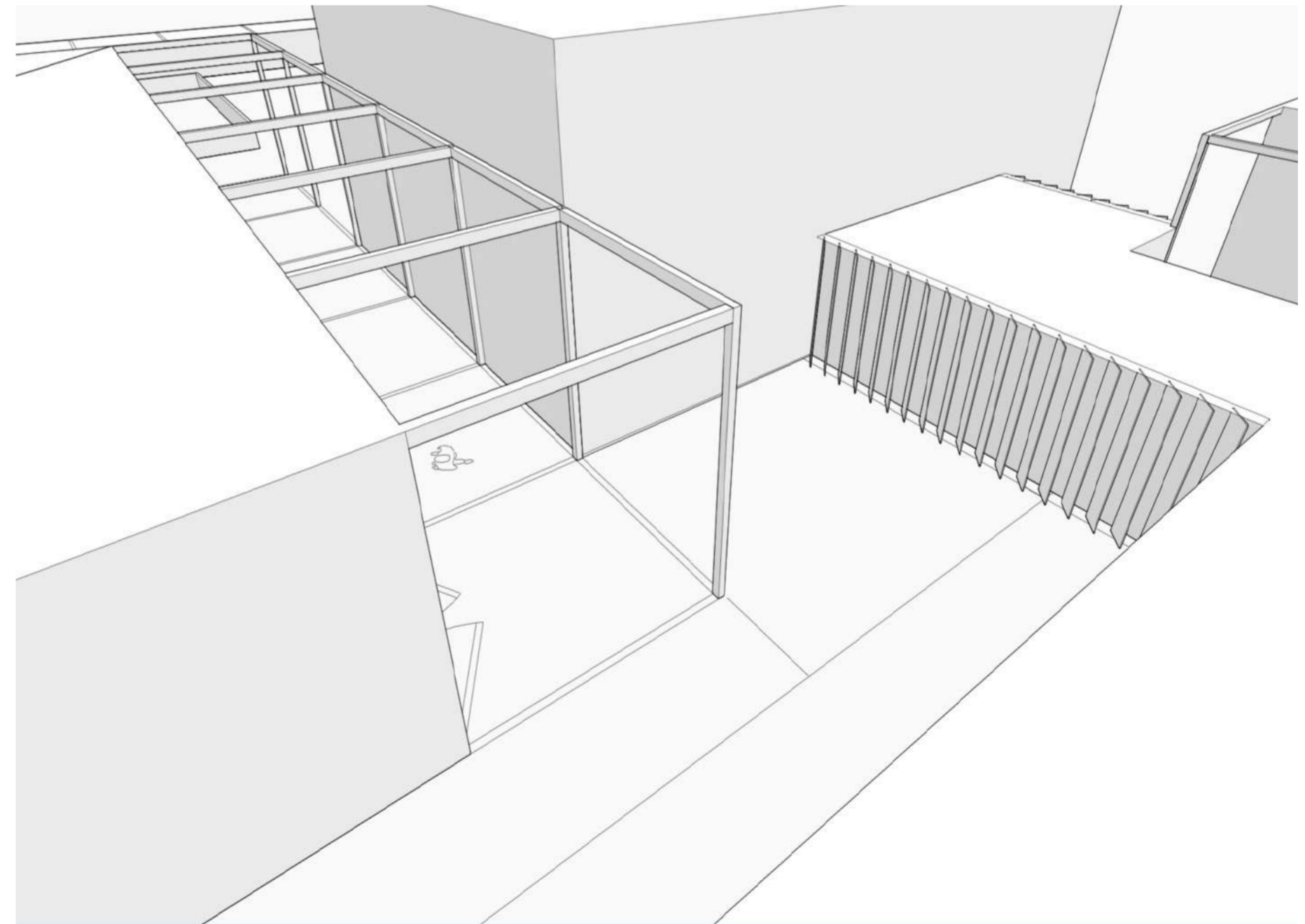
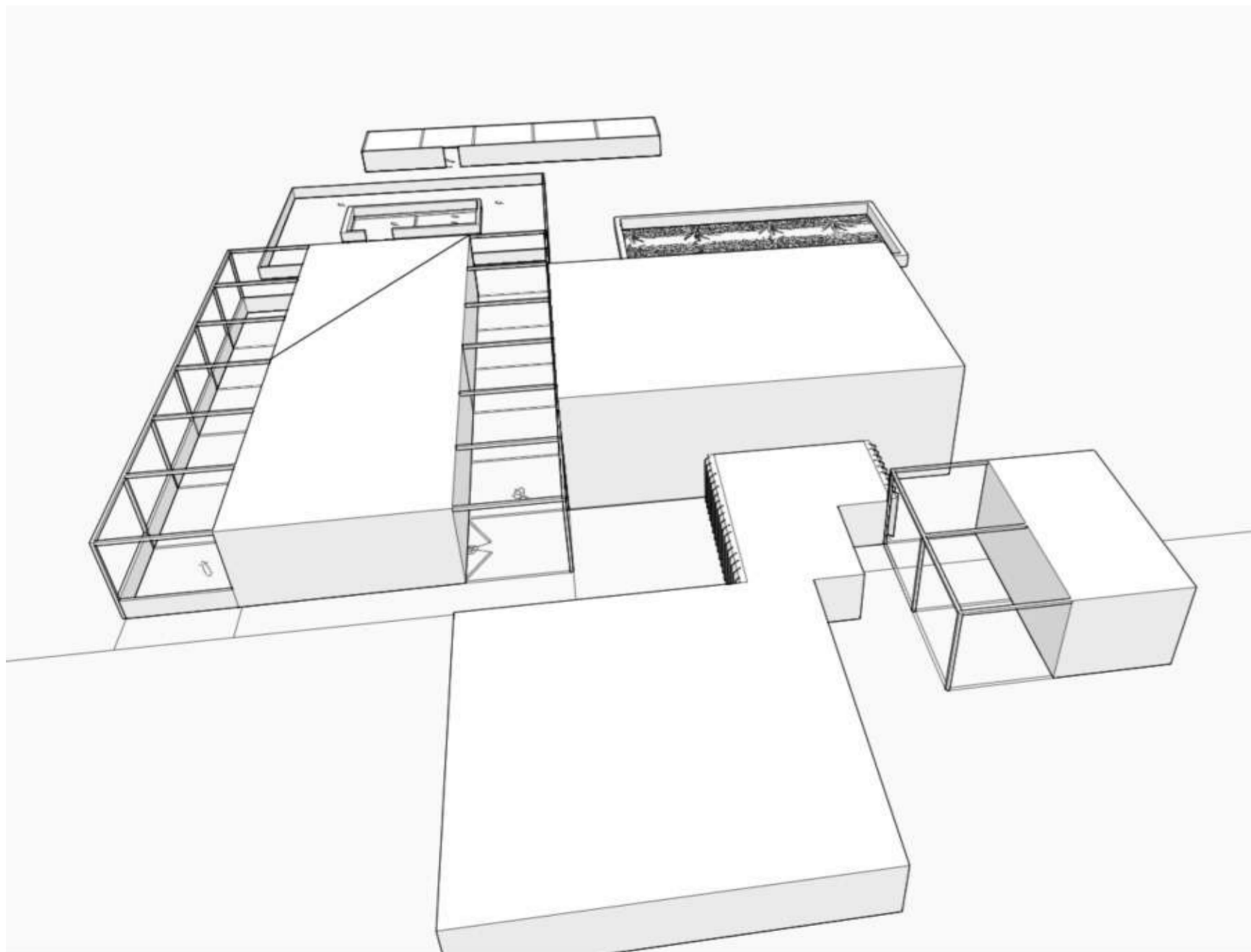
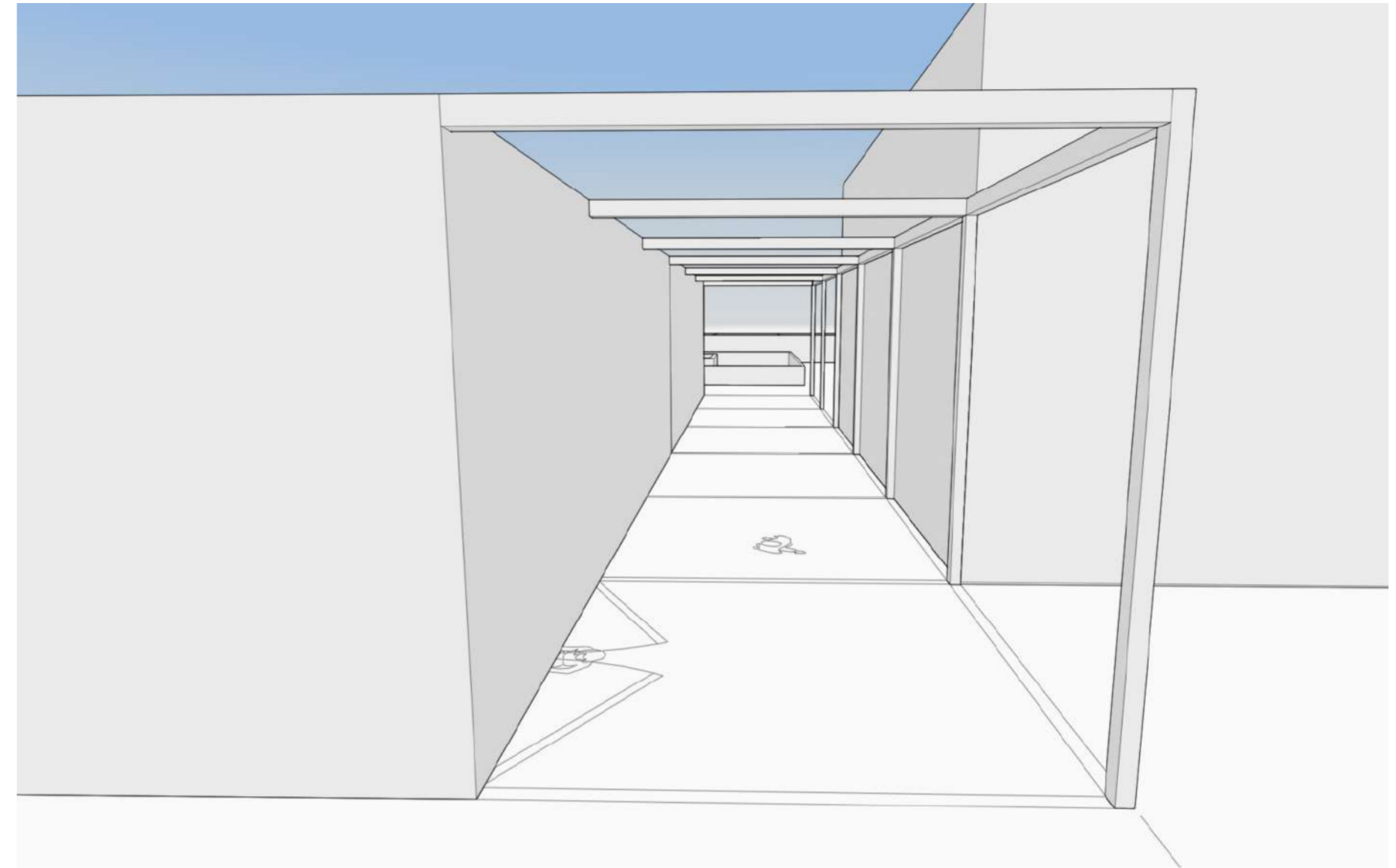
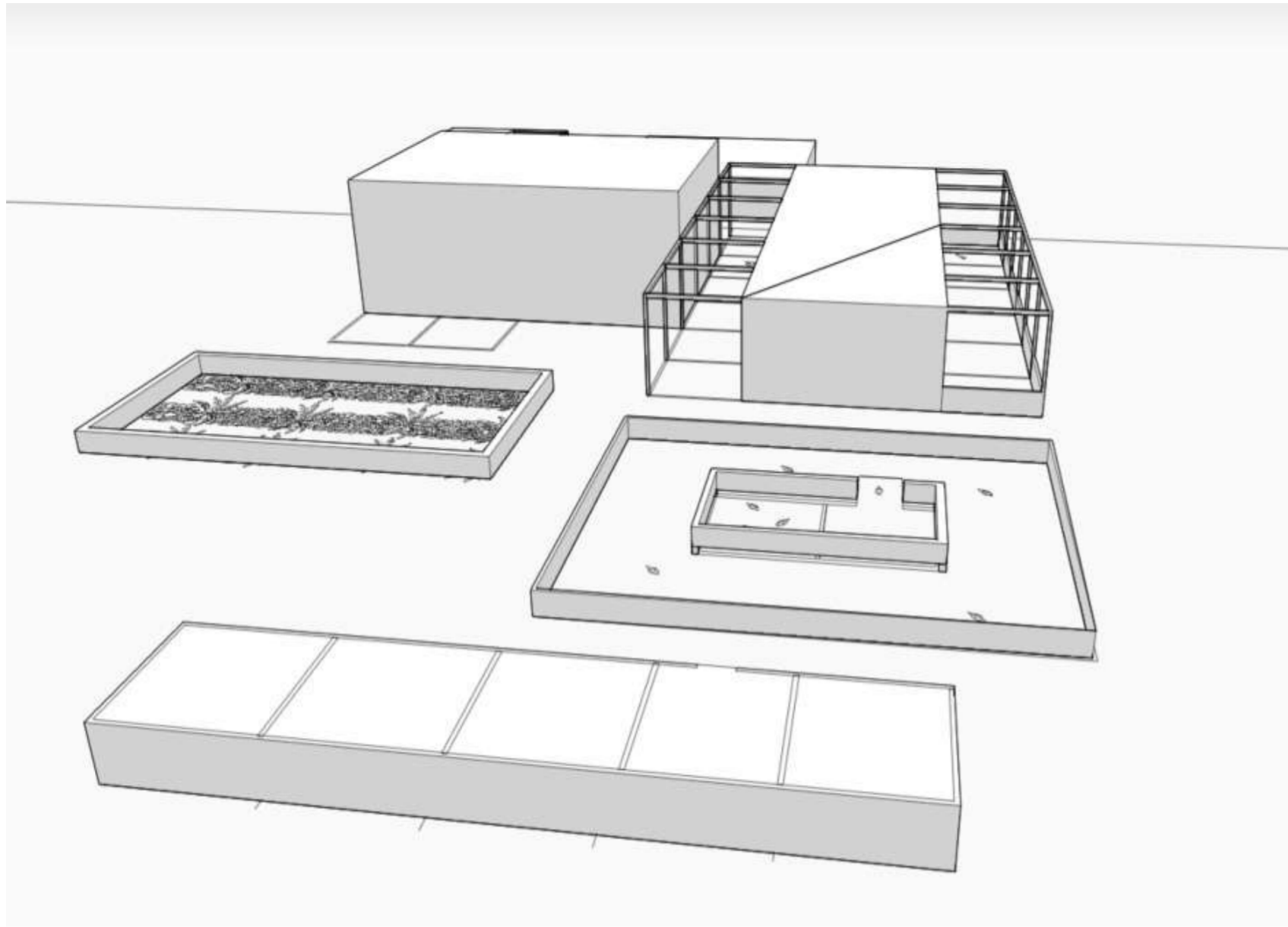


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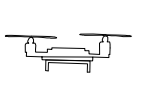
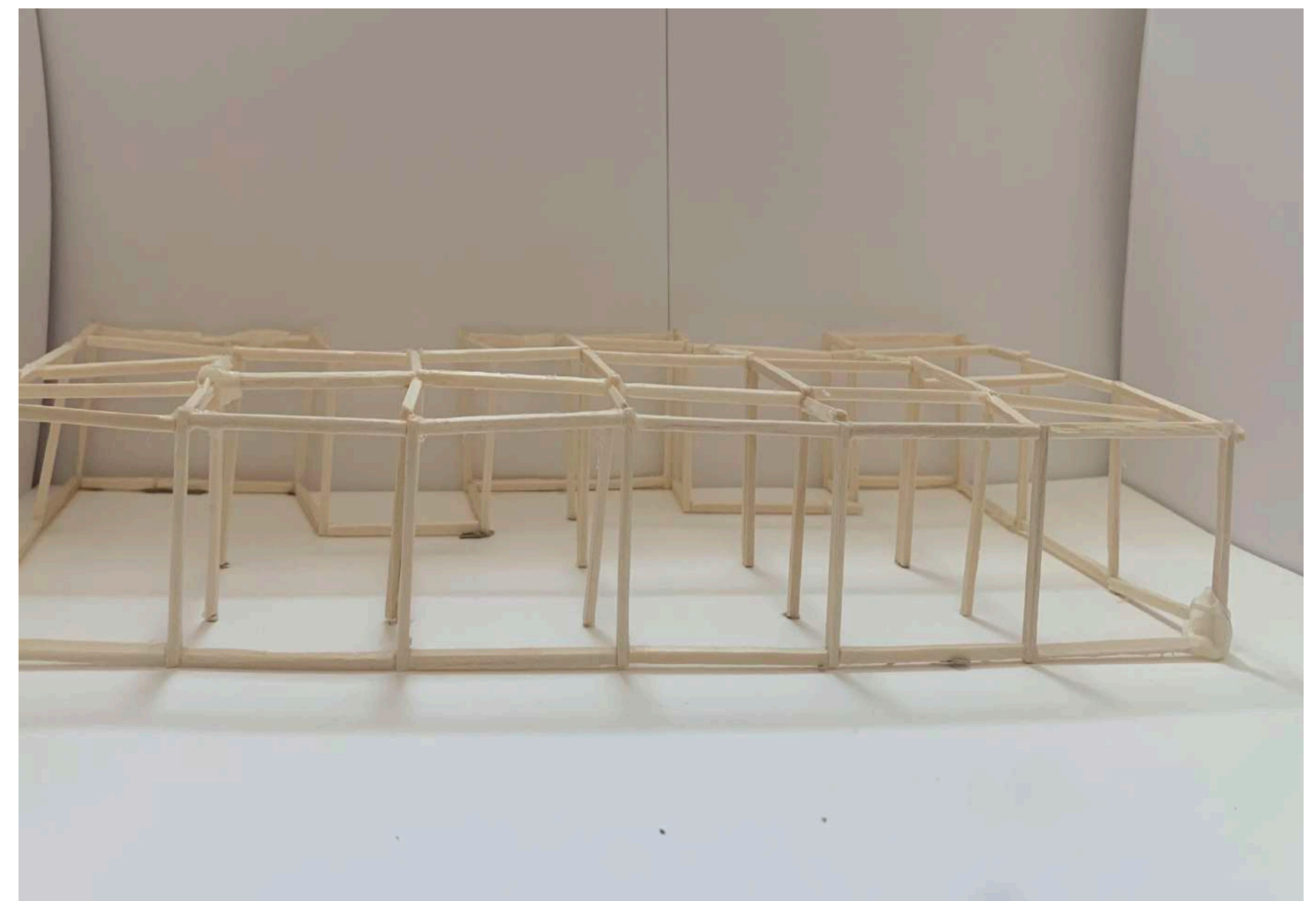
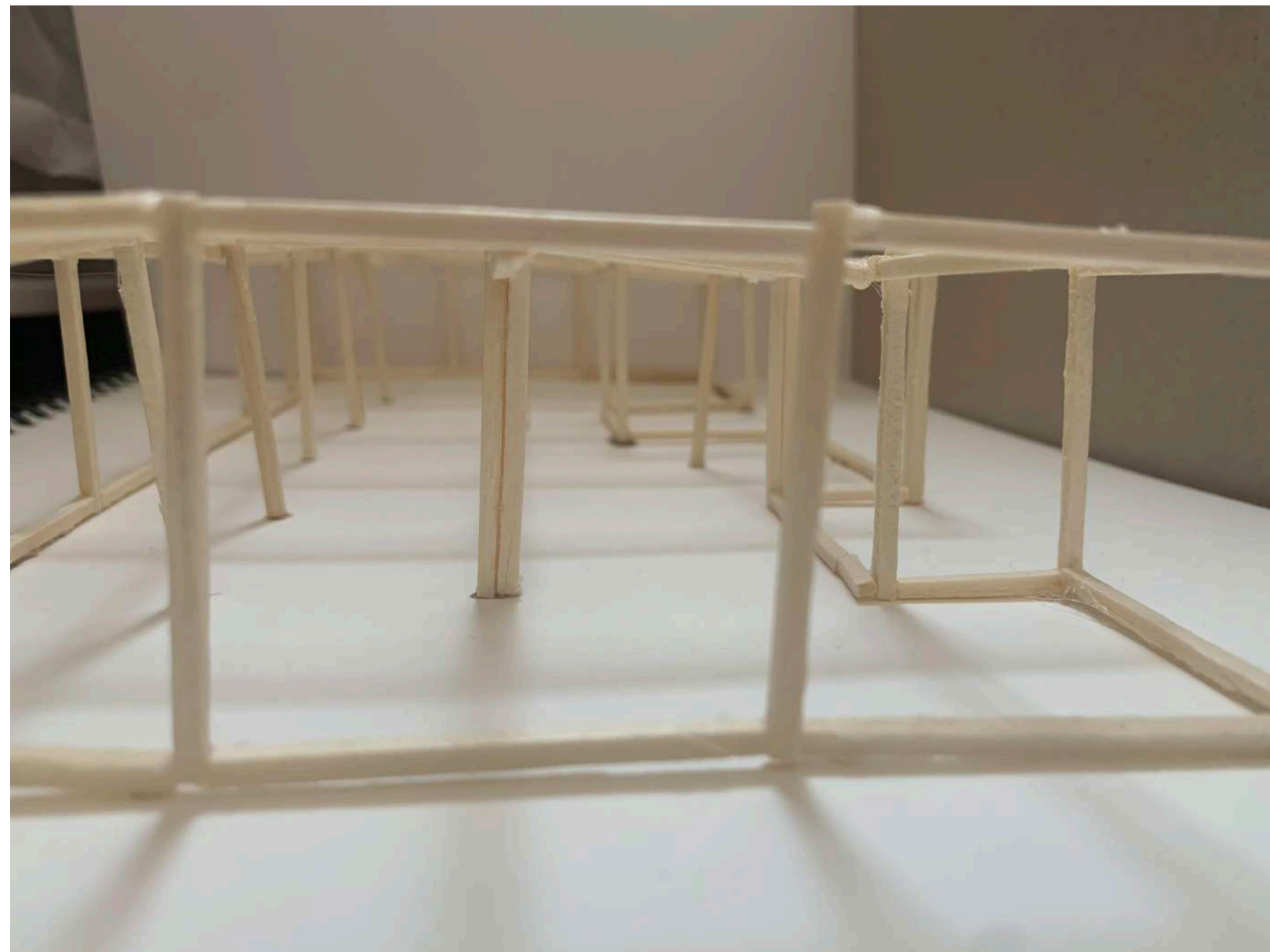
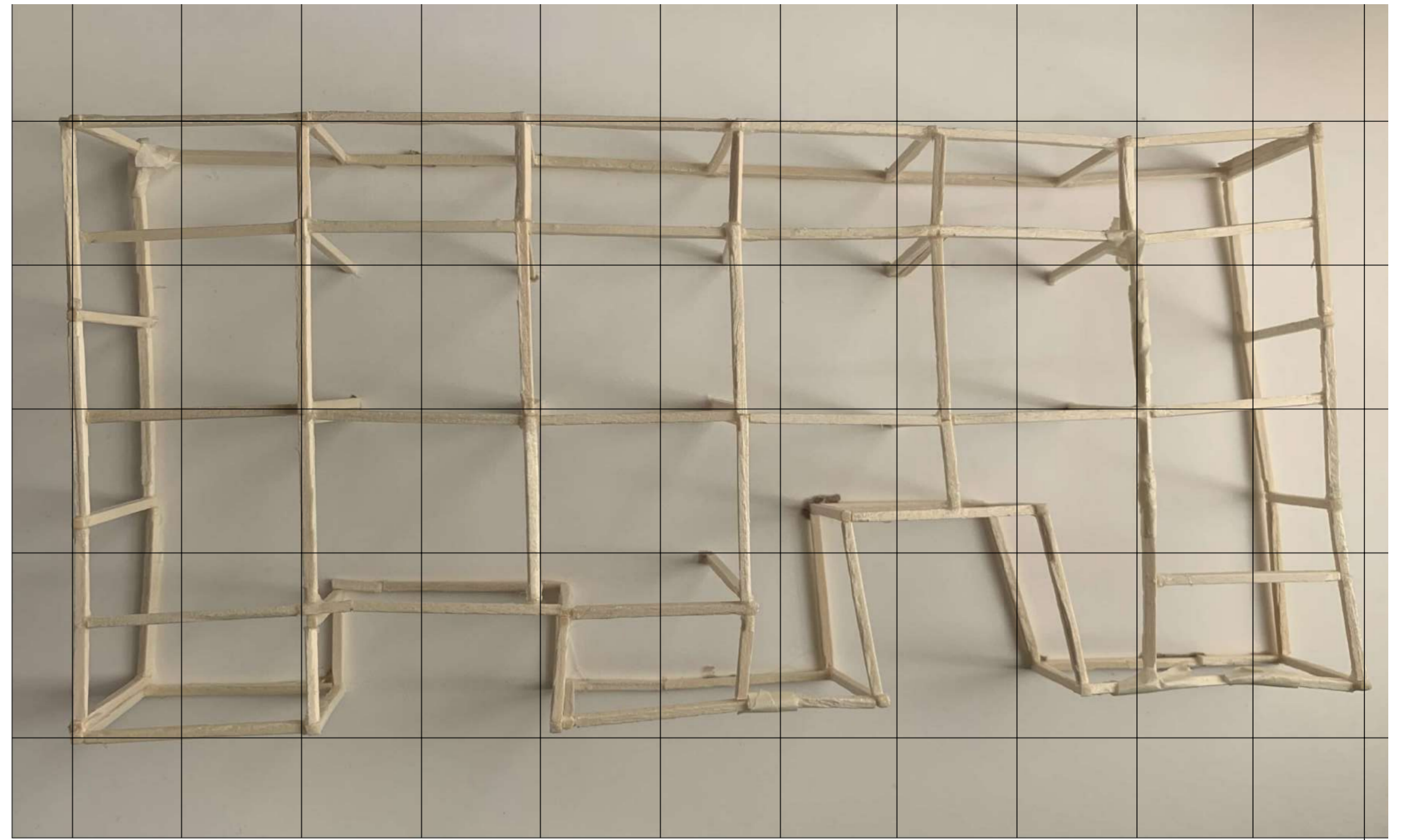




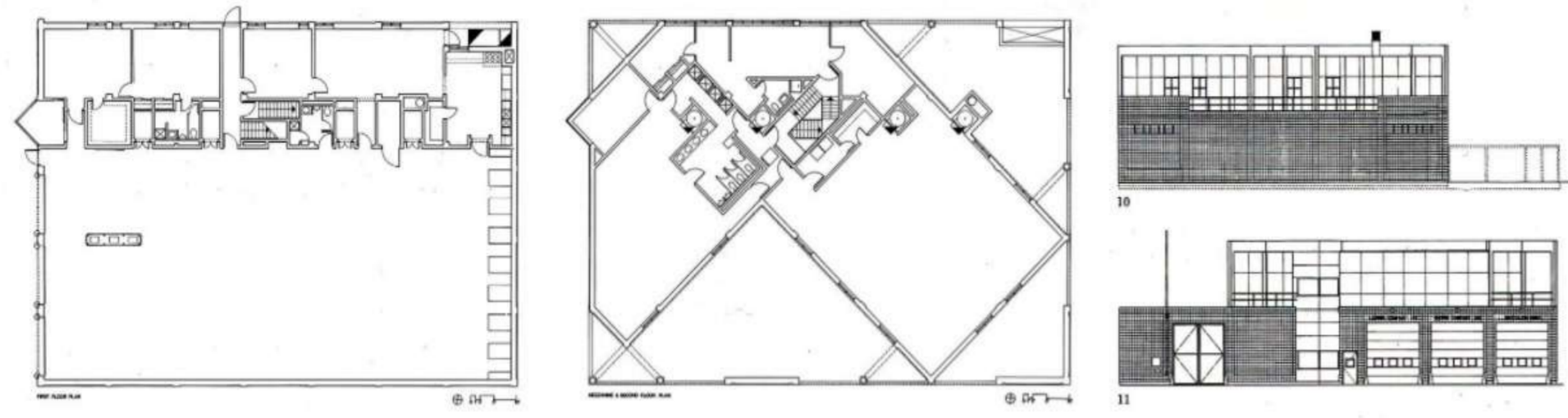
Analysis- massing model



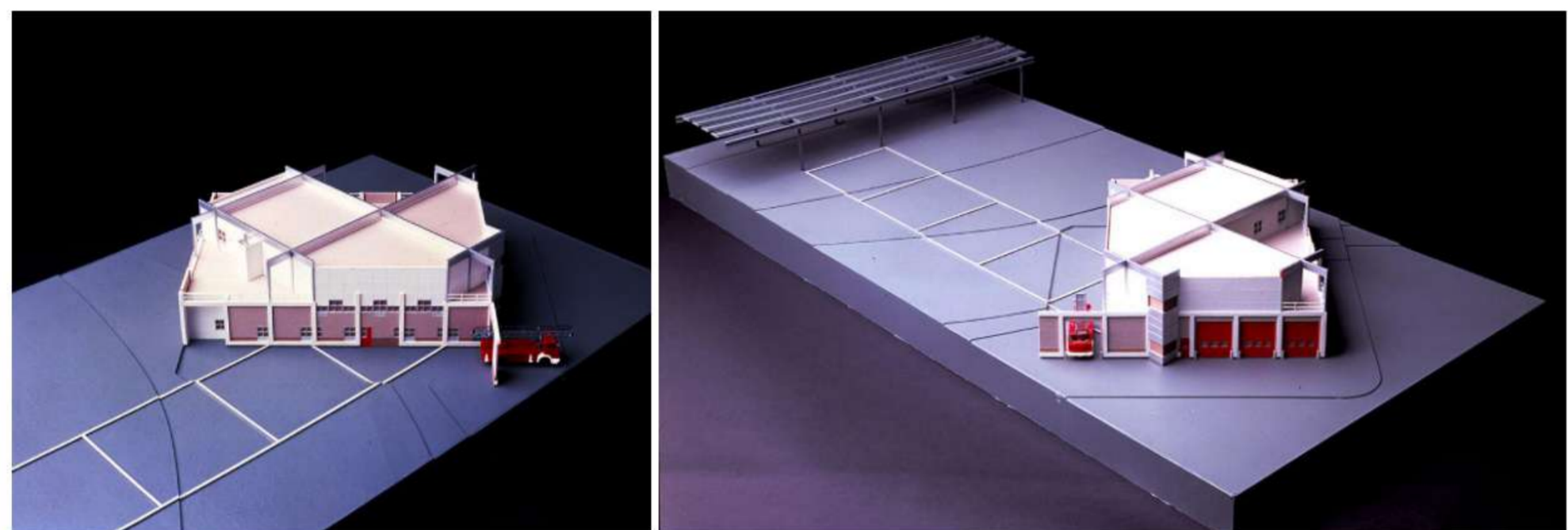
Analysis -Dublin Food CO-OP  
structural model



Research 1.1 - Case Studies



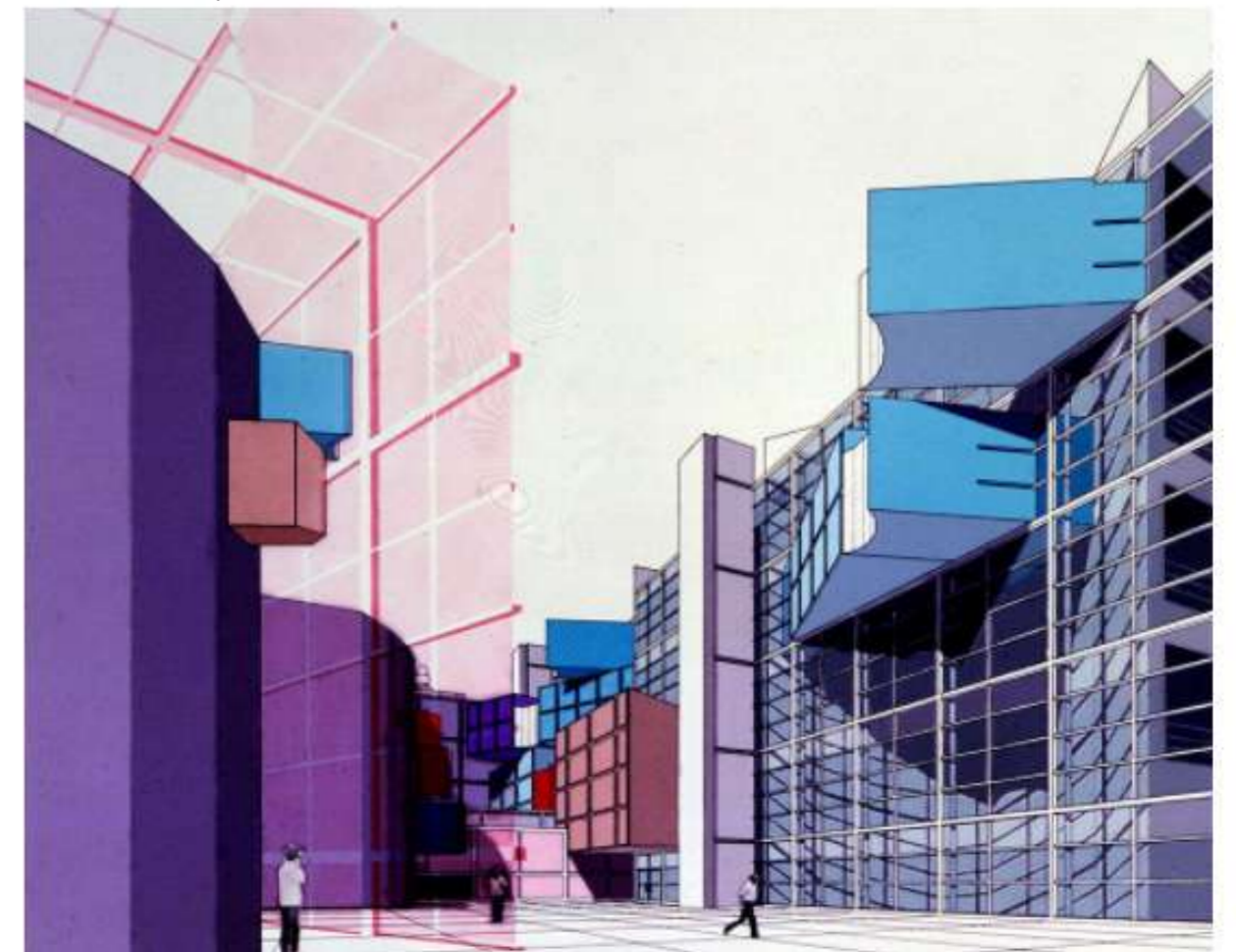
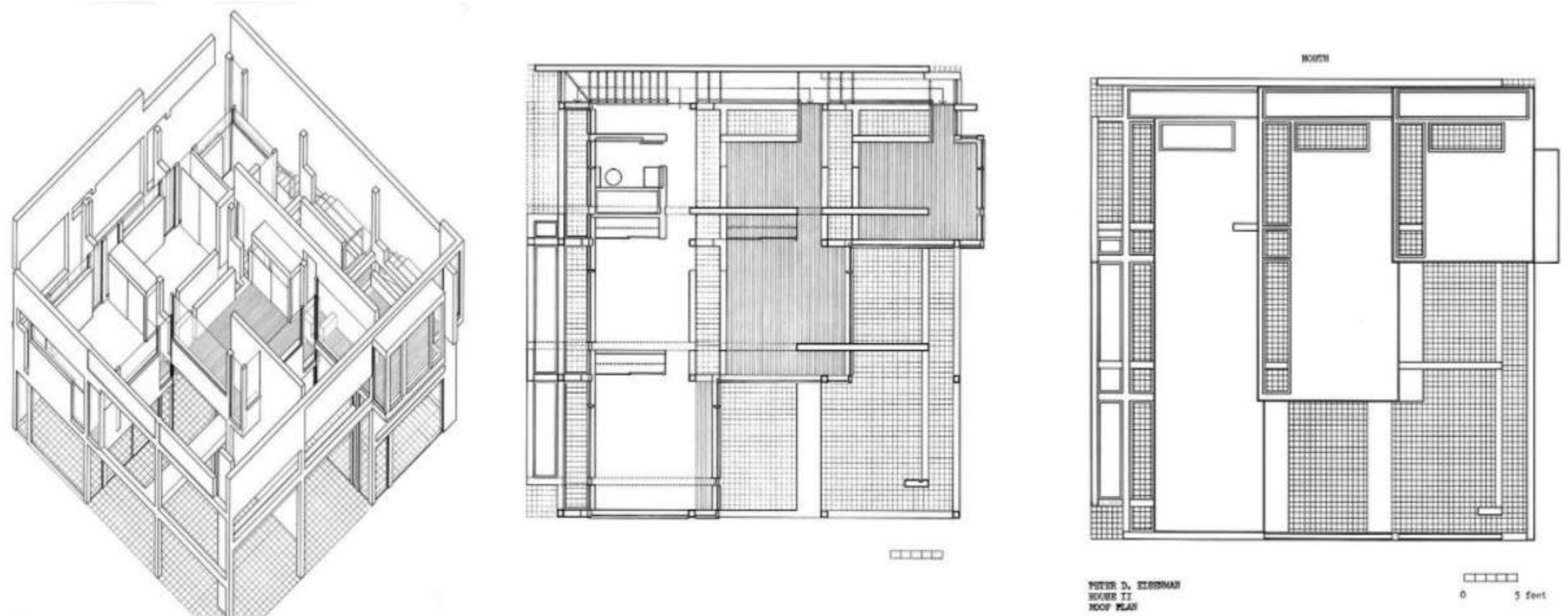
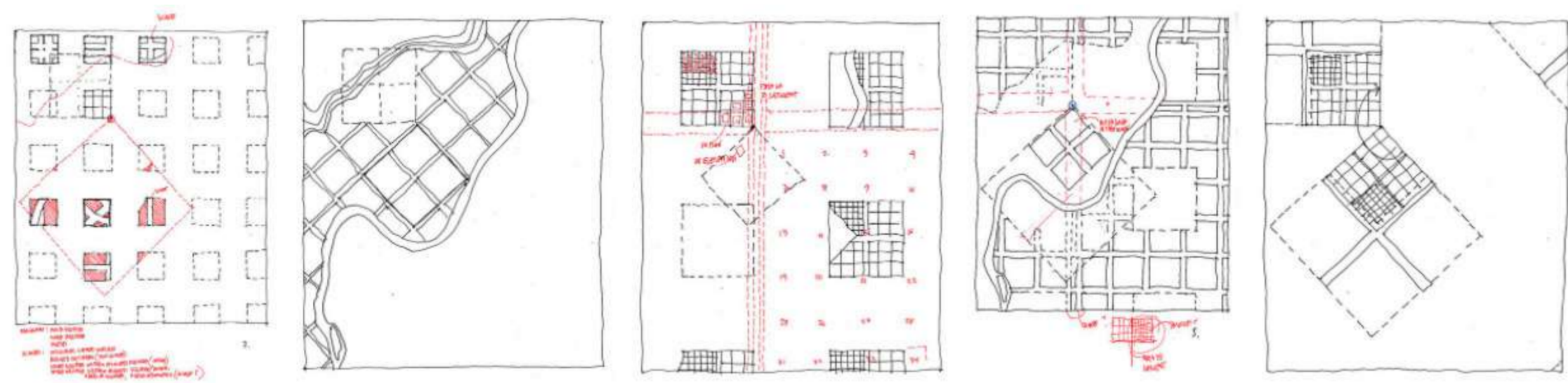
Model photos



eisenmanarchitects-

Eisenman studies the interaction between architectural signs: openings, walls, columns. The manipulation of a simple grid composed of pillars.

The geometrical order for the building is articulated by how far apart the orchard trees need to be to grow and how wide the self-driving tractors are and from there I created a grid and derived the shapes of my building from splitting the grid when needed. Not only using that grid in plan but bringing it on the section and elevations of the building, allowing the architecture to wear the structure on it sleeves creating these outdoor indoor spaces. These spaces form my 3D Grids

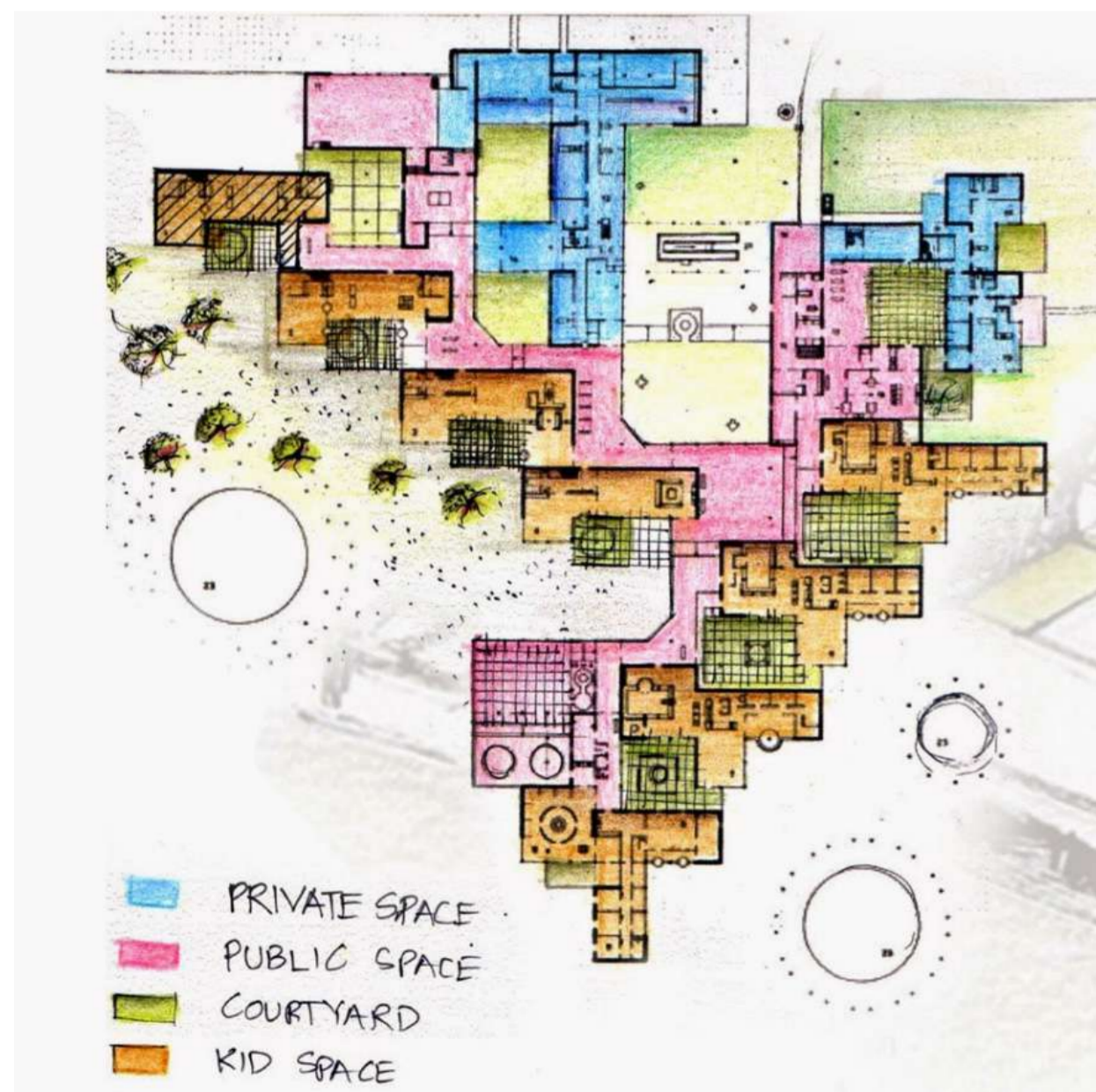
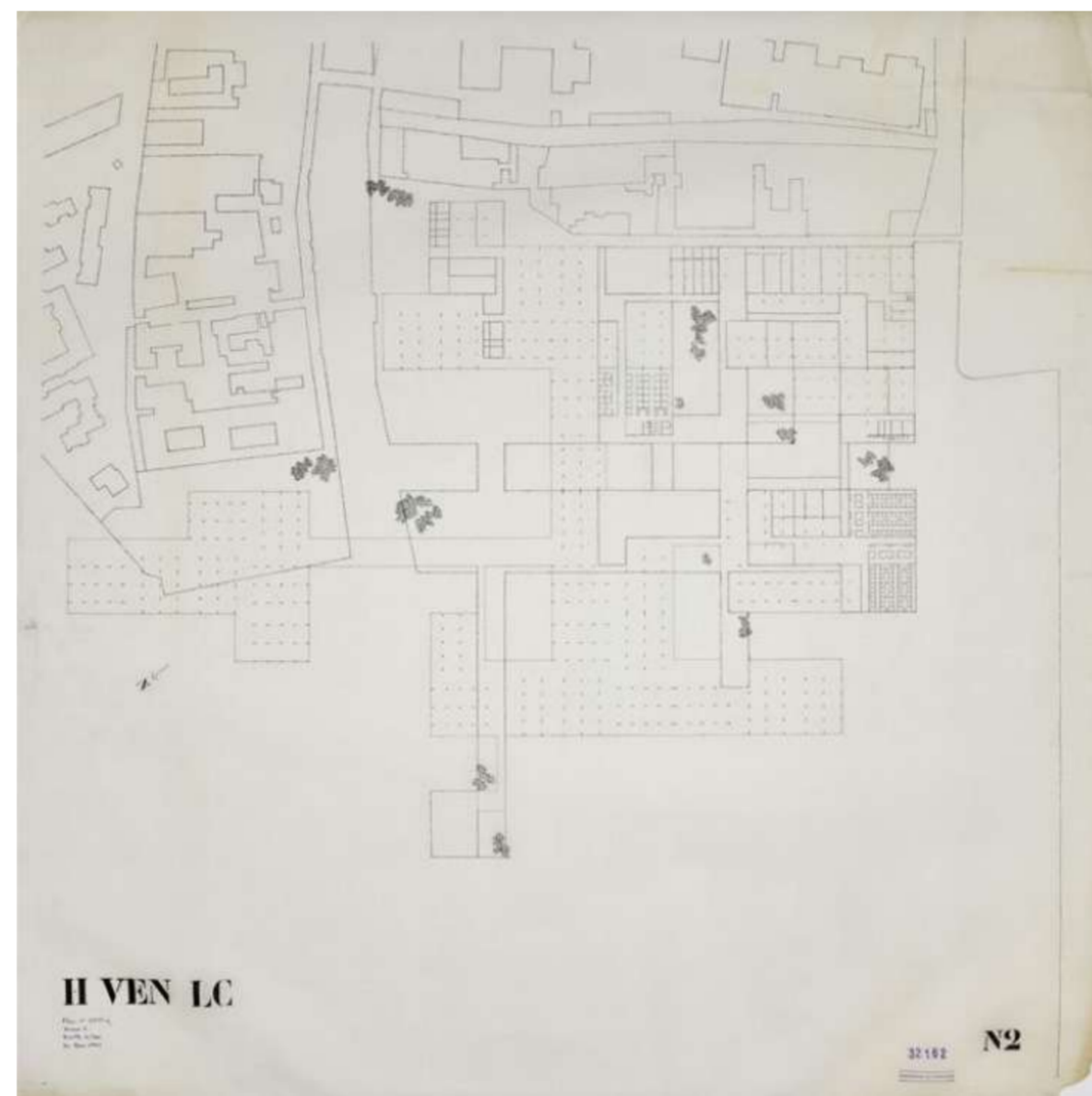
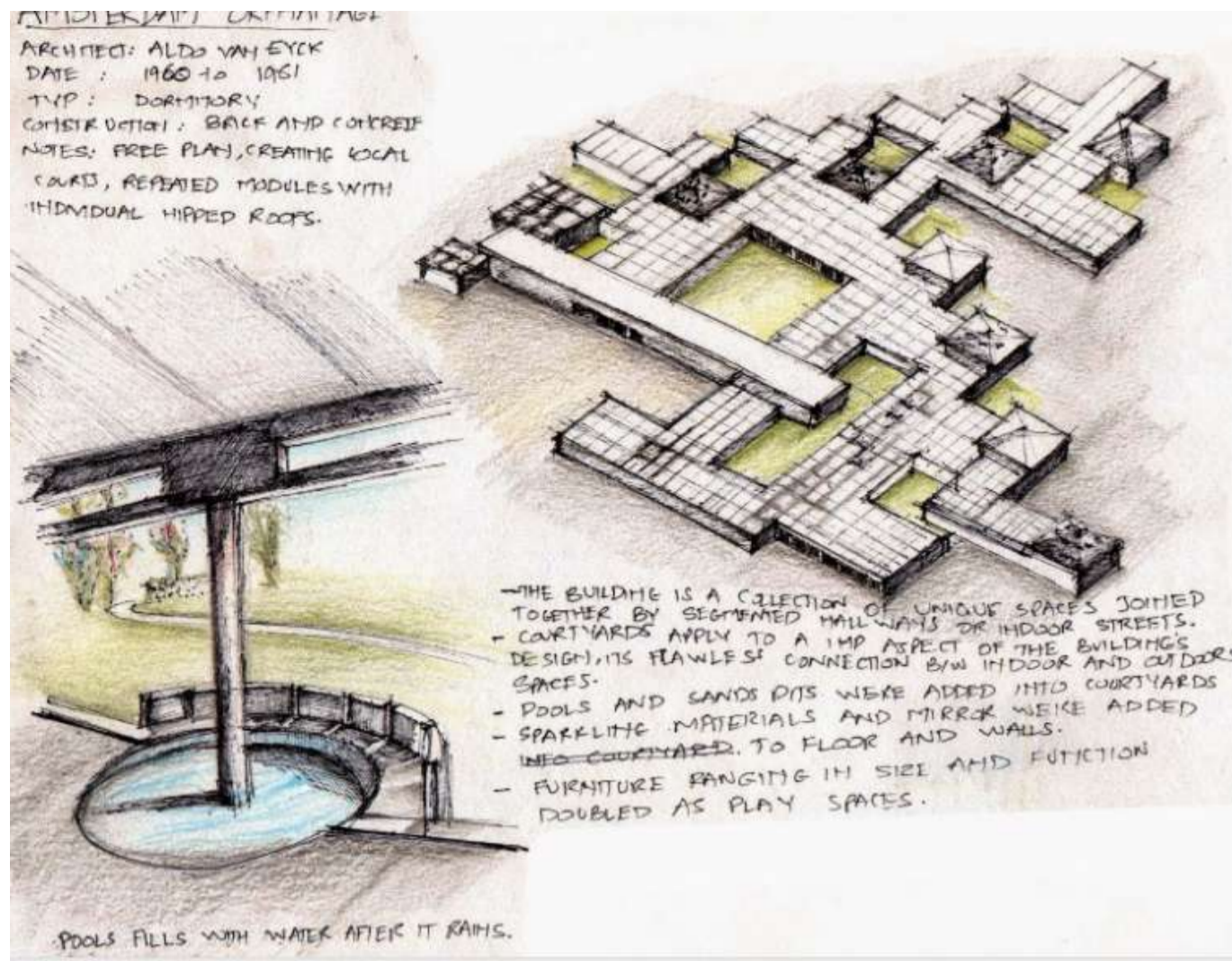
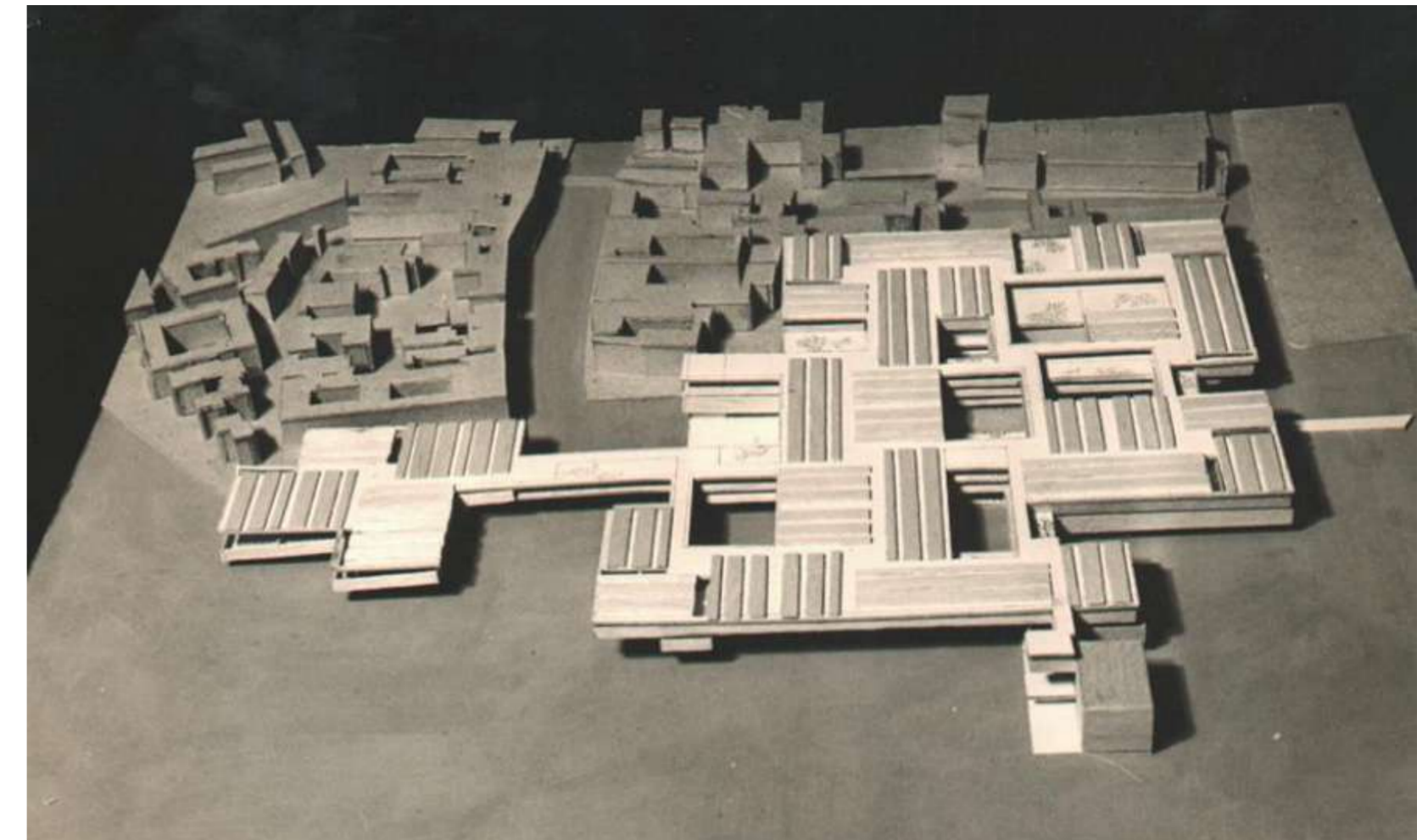


# Amsterdam Orphanage / Aldo van Eyck

Within the Orphanage, units of program are laid out on an orthogonal grid. The units project off two diagonal paths so that each unit has multiple exterior facades, each individual unit is then neighbored by its own outdoor space.

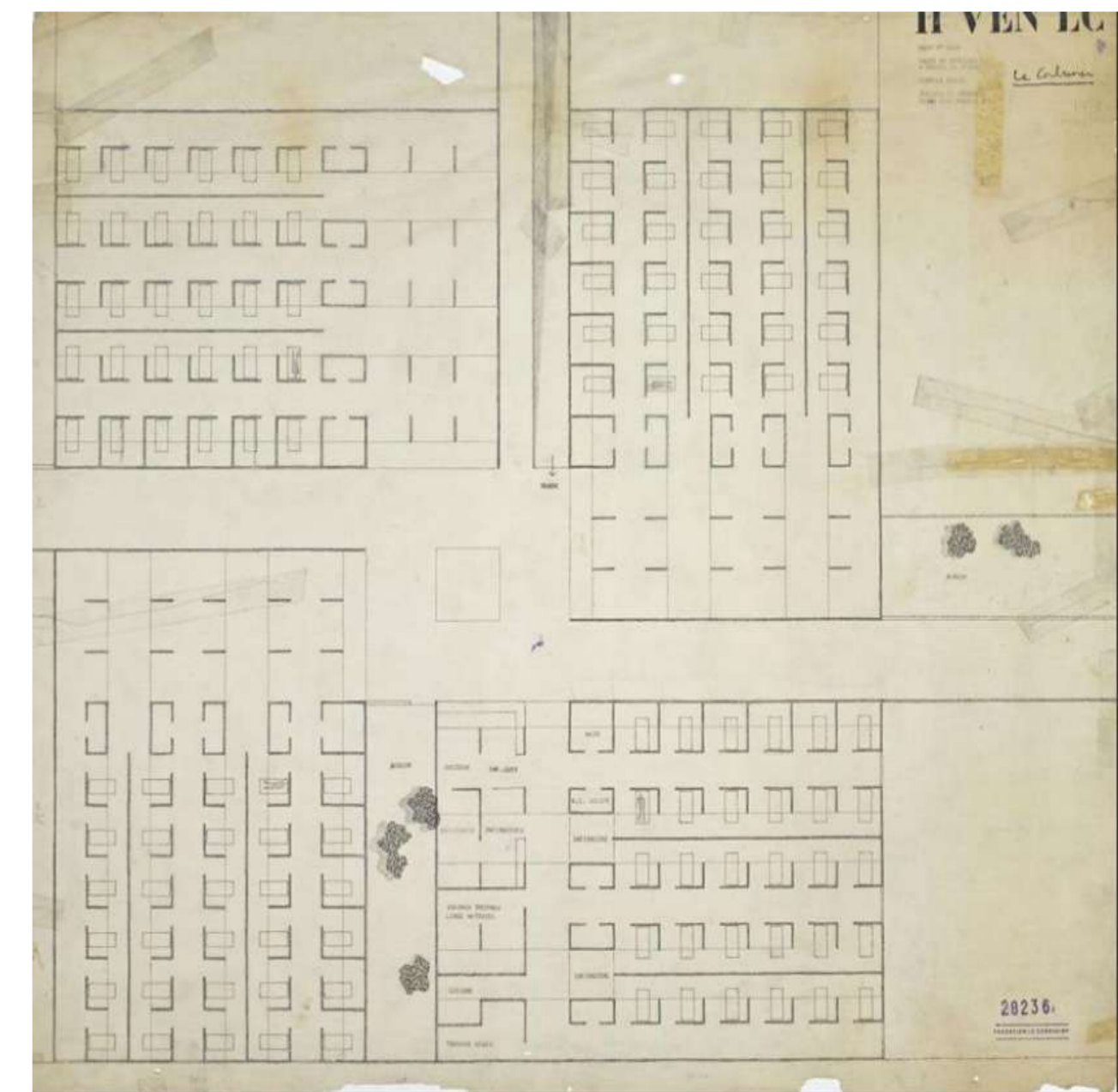
Creating little outdoor spaces was also an idea derived from van Eyck. A space where the children could bring the dinner table out to eat al fresco.

Van Eyck has created a series of boxes connected through a circulation space. When design Jamie's farm I wanted to replicate that using my grid to form buildings shape and then connect them using circulation.



# Hôpital, Venice, Italy, 1964, Le Corbusier

By means of the horizontal disposition of the hospital, Le Corbusier has tried to avoid any influence upon the historical skyline of Venice. His belief was that **architecture should be as efficient as machinery**. From this belief I decided to add the idea of advanced technology on the physical architecture design process, by adding interactive panels which move with the sun and adding a drone port into the into the walls of my design.



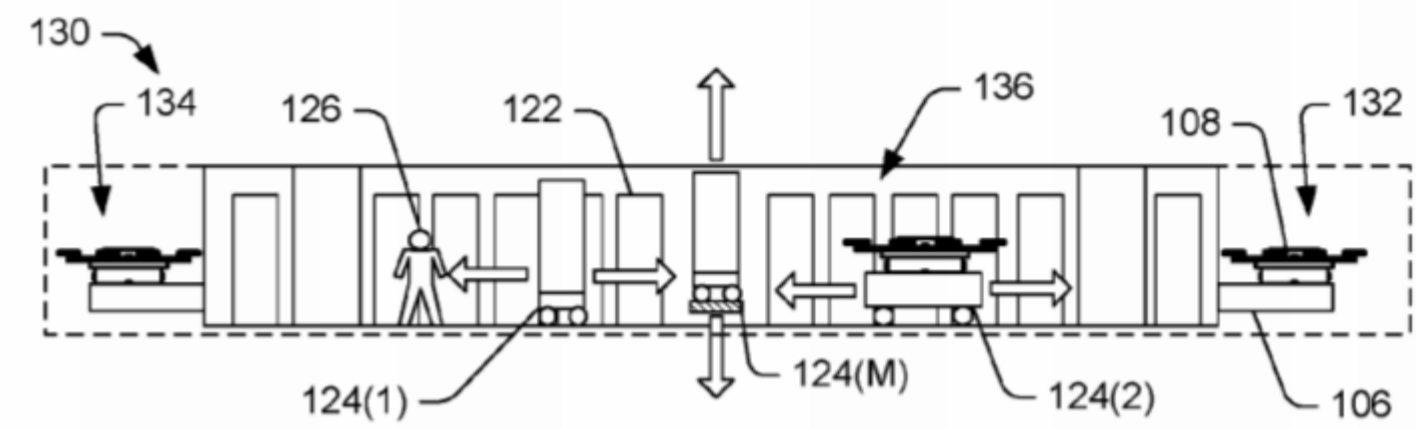
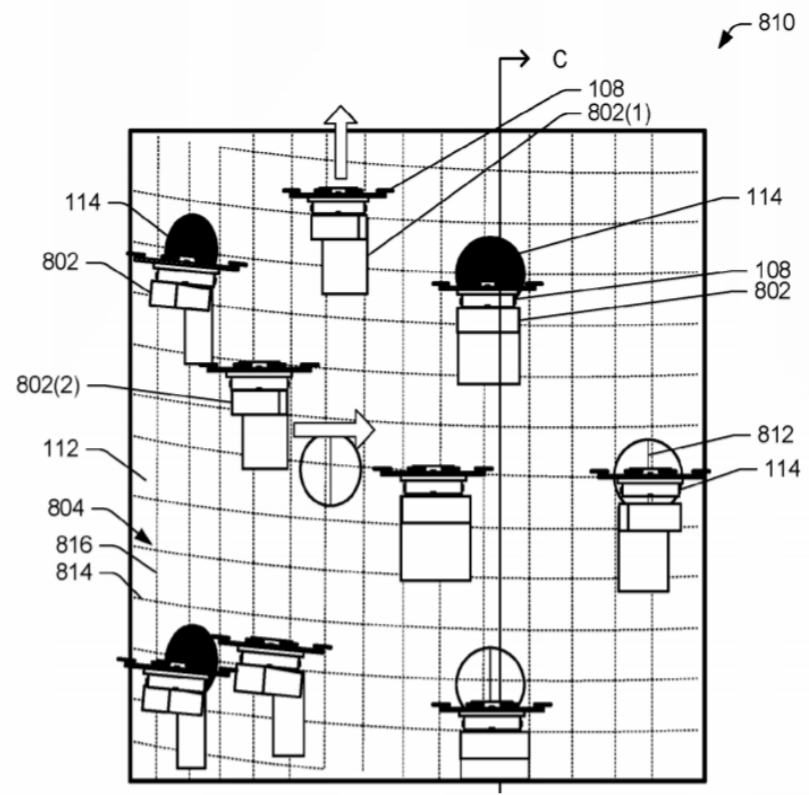
Research 1.3 - Case Studies



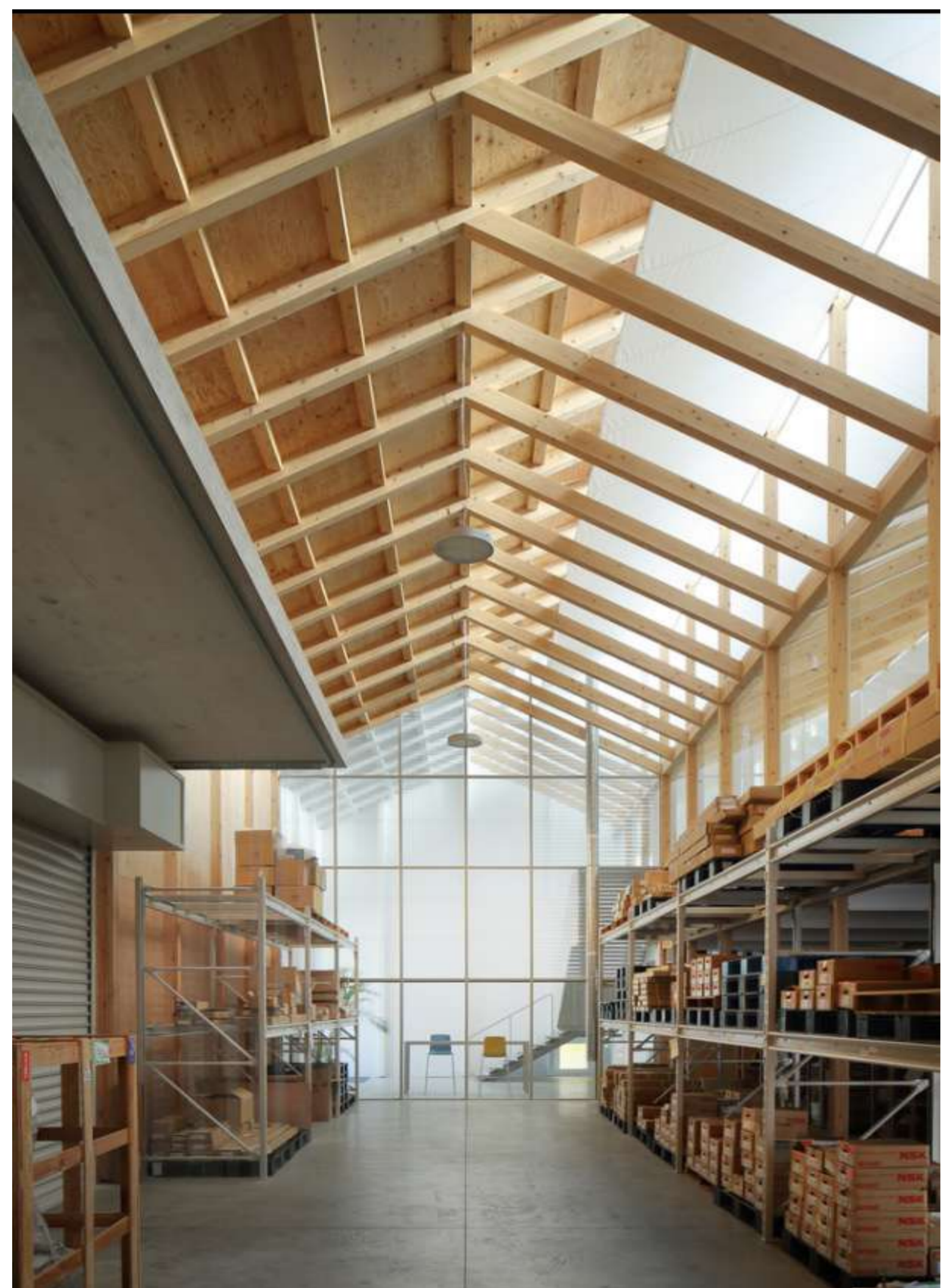
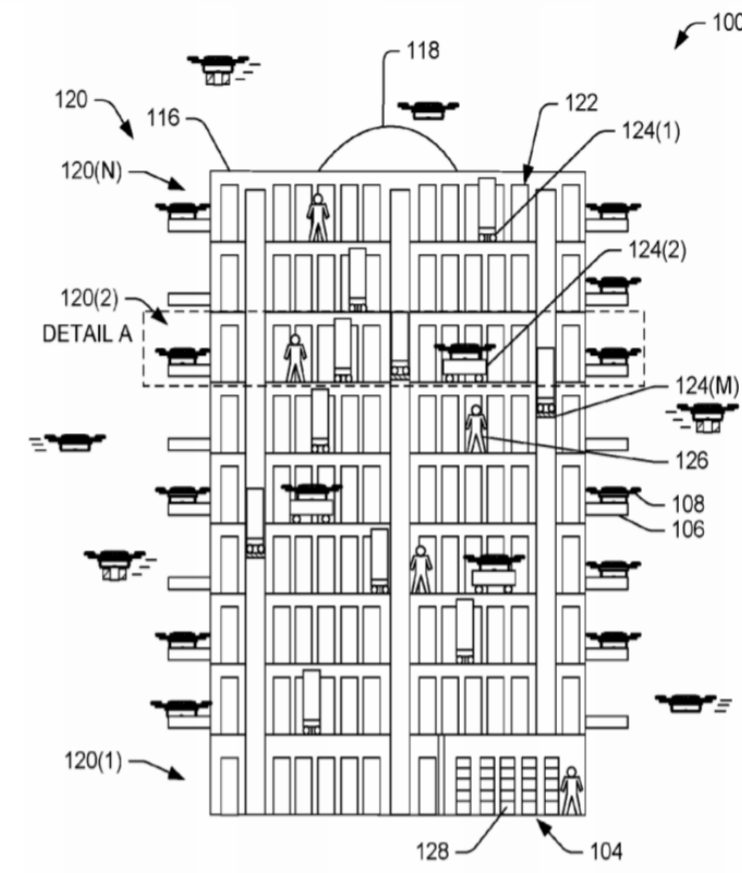
Leo A Daly / Drone Powered Hospital



Han Tumertekin / Bademli Fabrika



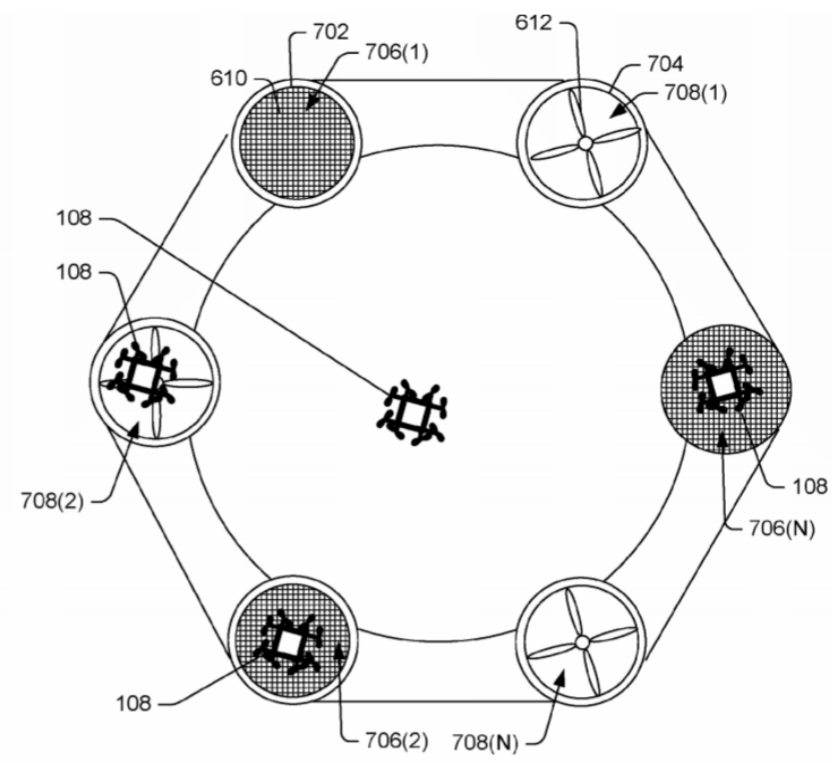
24' | Guss Technology / Orchard Tractors



Warehouse in Ageo / Arie Irie Architects



Brick Vault House / Space Popular



Jame Christopher Curlander / Amazon Technologies Inc Amazon Prime Air

**What if** we lived in a world where technology and huamans can live together?

