

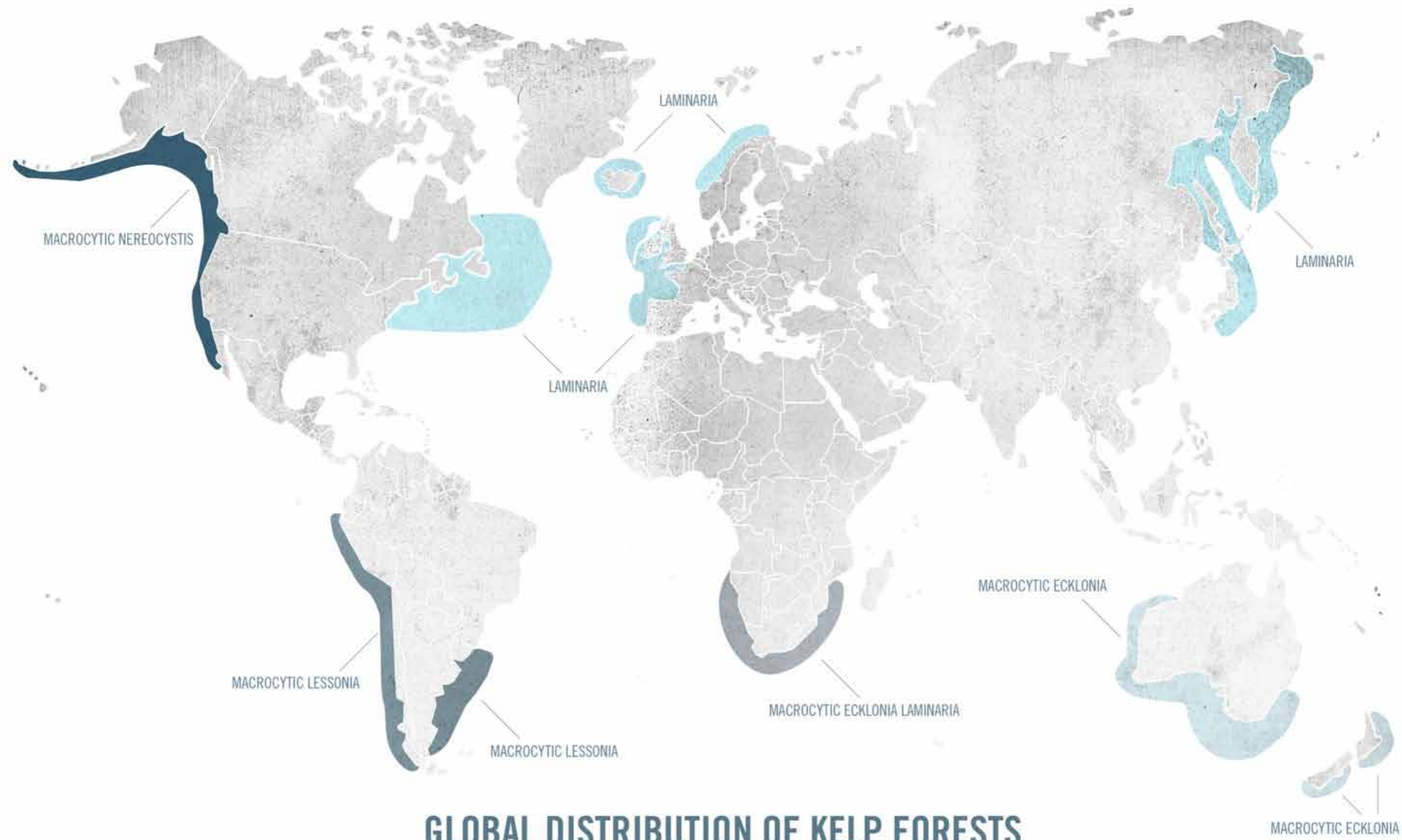
# PROCESSING FACILITY FOR SEAWEED

Cecilie Schjetlein Sundt, AHO, spring 2017

## SEAWEED - AN UNEXPLOITED NATURAL RESOURCES

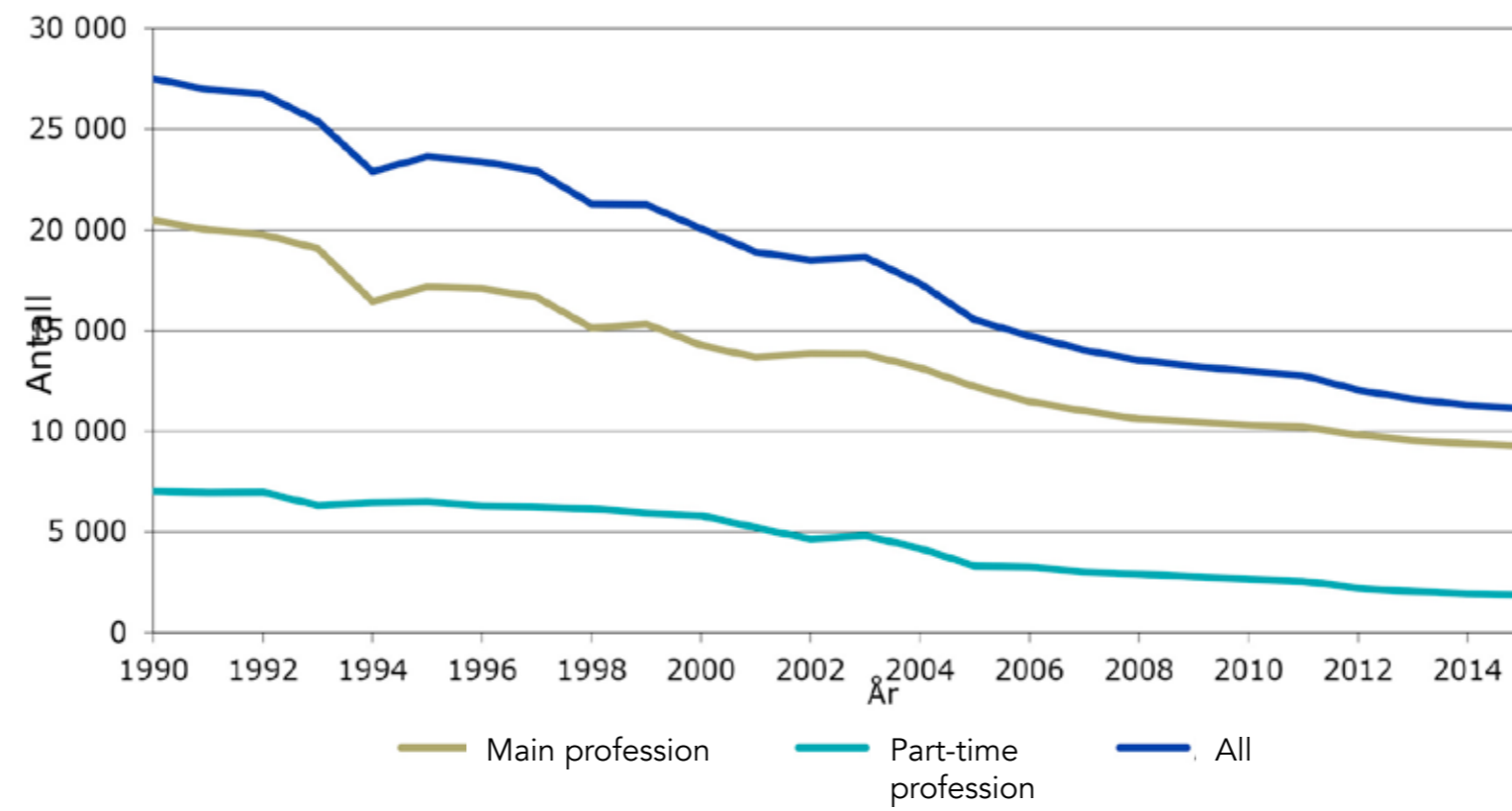


Photo by Alex Asensi

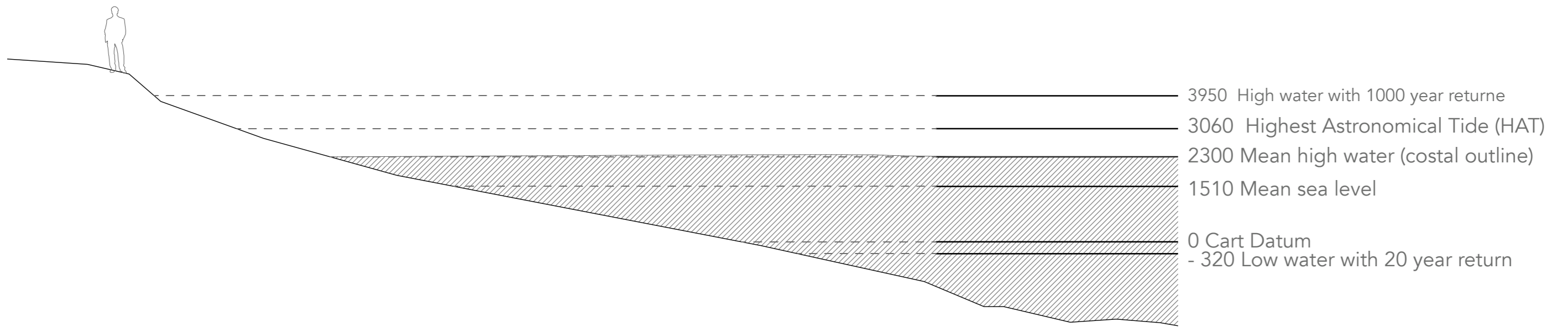


# COSTAL COMMUNITIES THAT CAN BENEFIT FROM THIS NATURAL RESOURCES

## Number of fishermen in Norway



# A COASTAL CHALLENGE - THE TIDE



LARGE SCALE OCEAN FARMING OF SEAWEED  
VS.  
WILD GROWING SEAWEED AND THE MEDIUM SCALE INDUSTRY

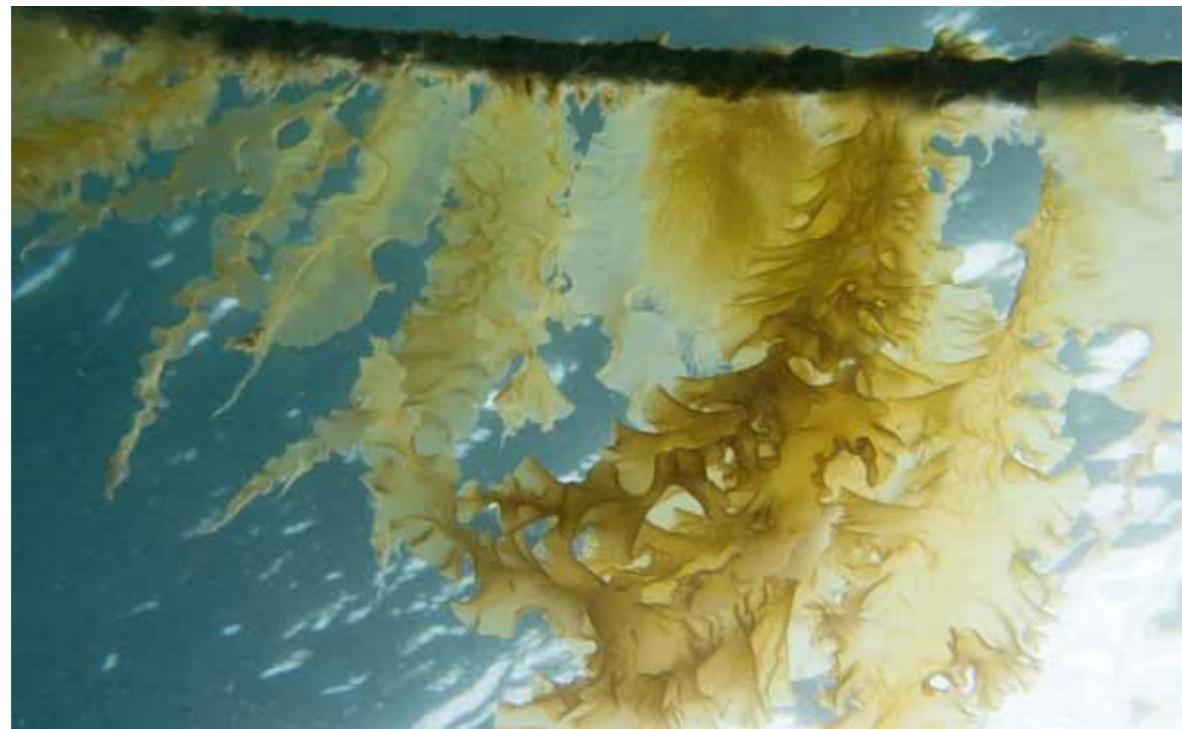


Photo by Alex Asensi



Photo by Alex Asensi

# THE NORTHERN COMPANY



Photo by Alex Asensi



Photo by Alex Asensi



Photo by Alex Asensi

The Northern Company has served as the business template for this typology and project.

# SEAWEED AS FOOD



Seaspaghetti/Remtang/Himanthalia elongata (Green Algae)



Suger Kelp/Sukkertare/Laminaria saccharina (Brown Algae)



Oarweed /Fingertare/Laminaria digitatae (Brown Algae)

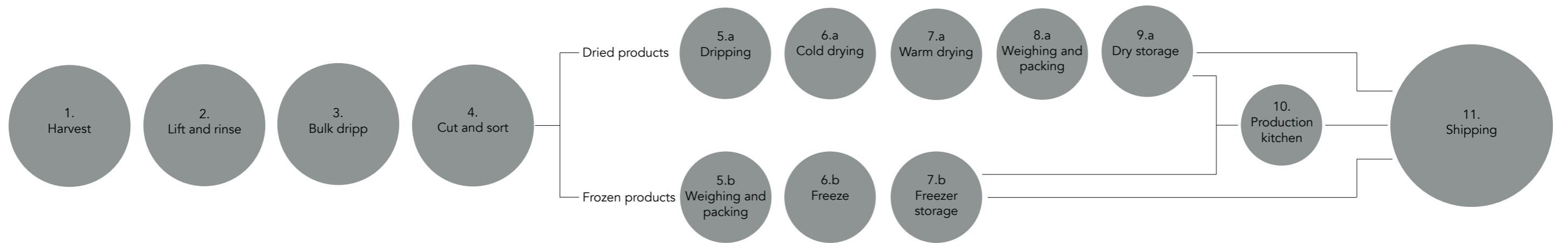


Wakame/Butare / Vingetang/Alaria esculenta (Brown Algae)



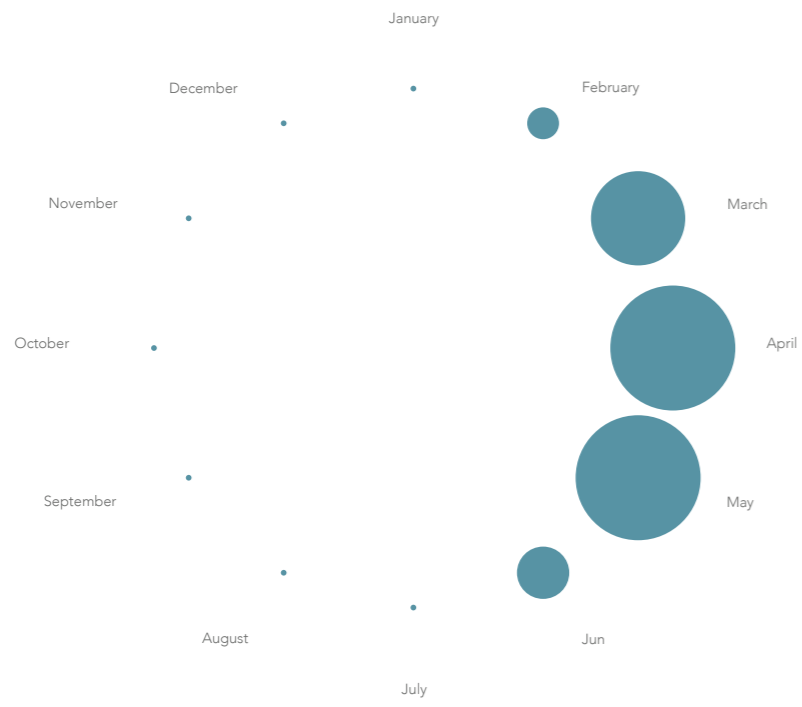


# PRODUCTION LINE

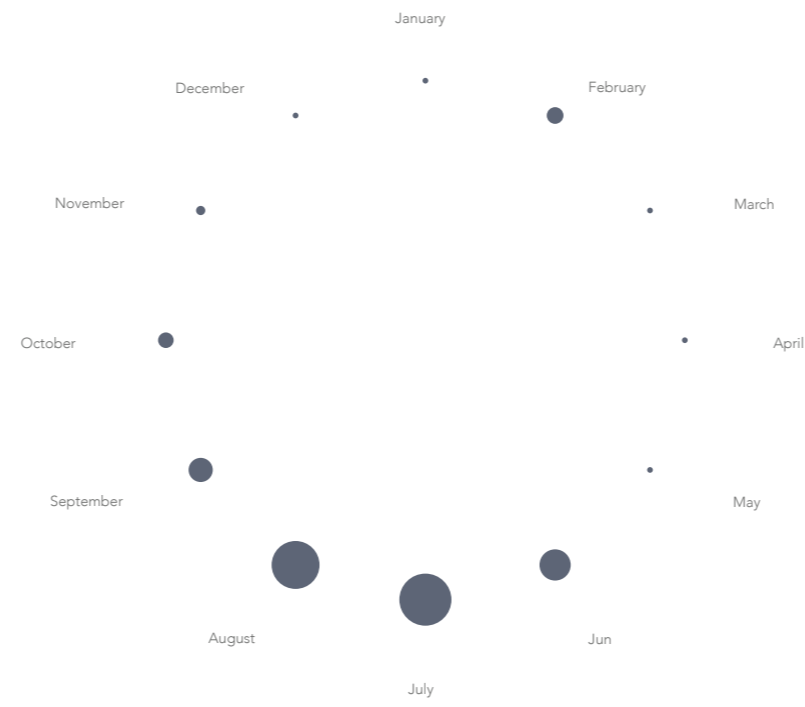


# SEASONS

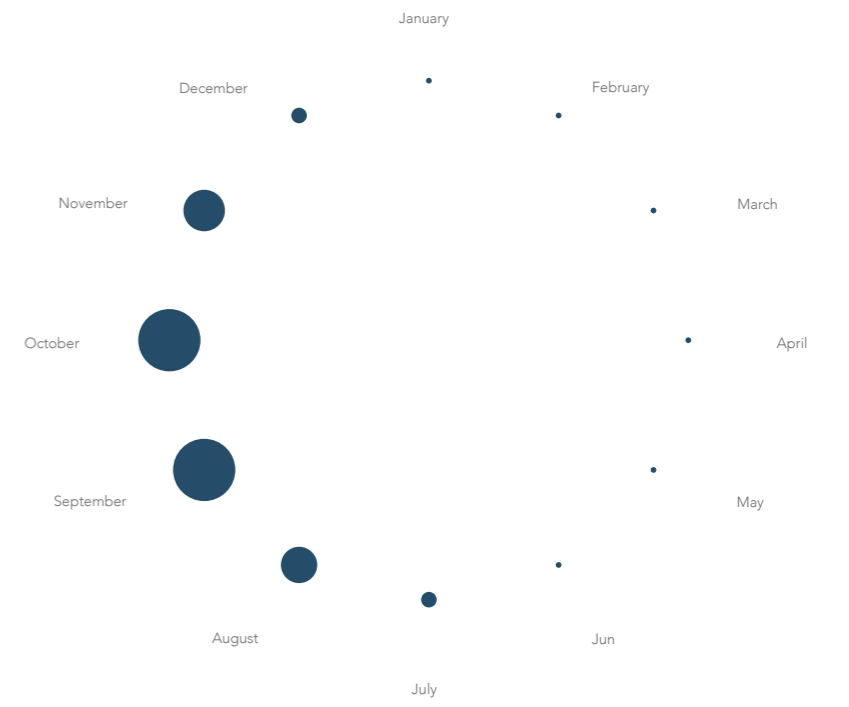
## Harvest



## Foodlabs



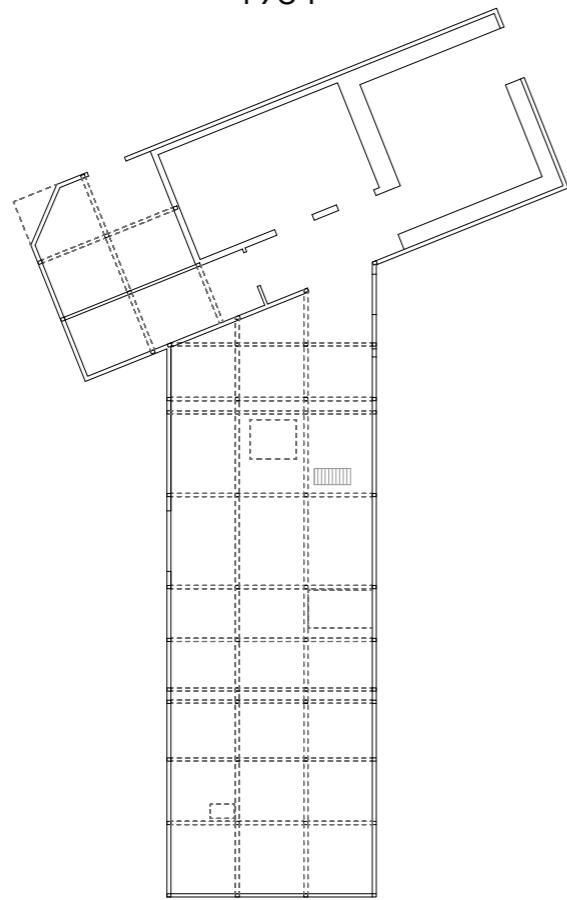
## Product development



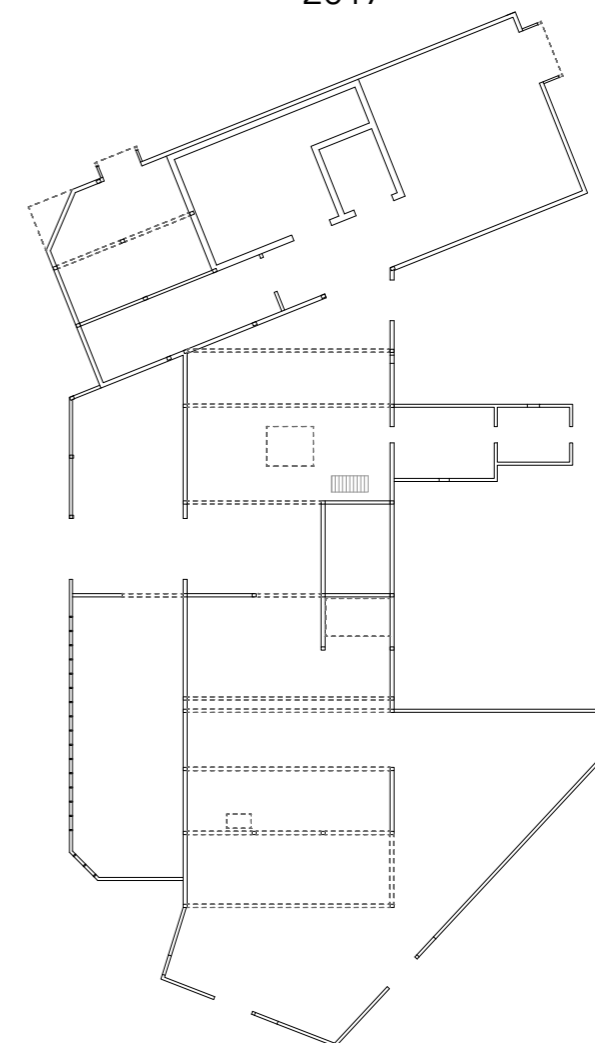
# MY PROCESS



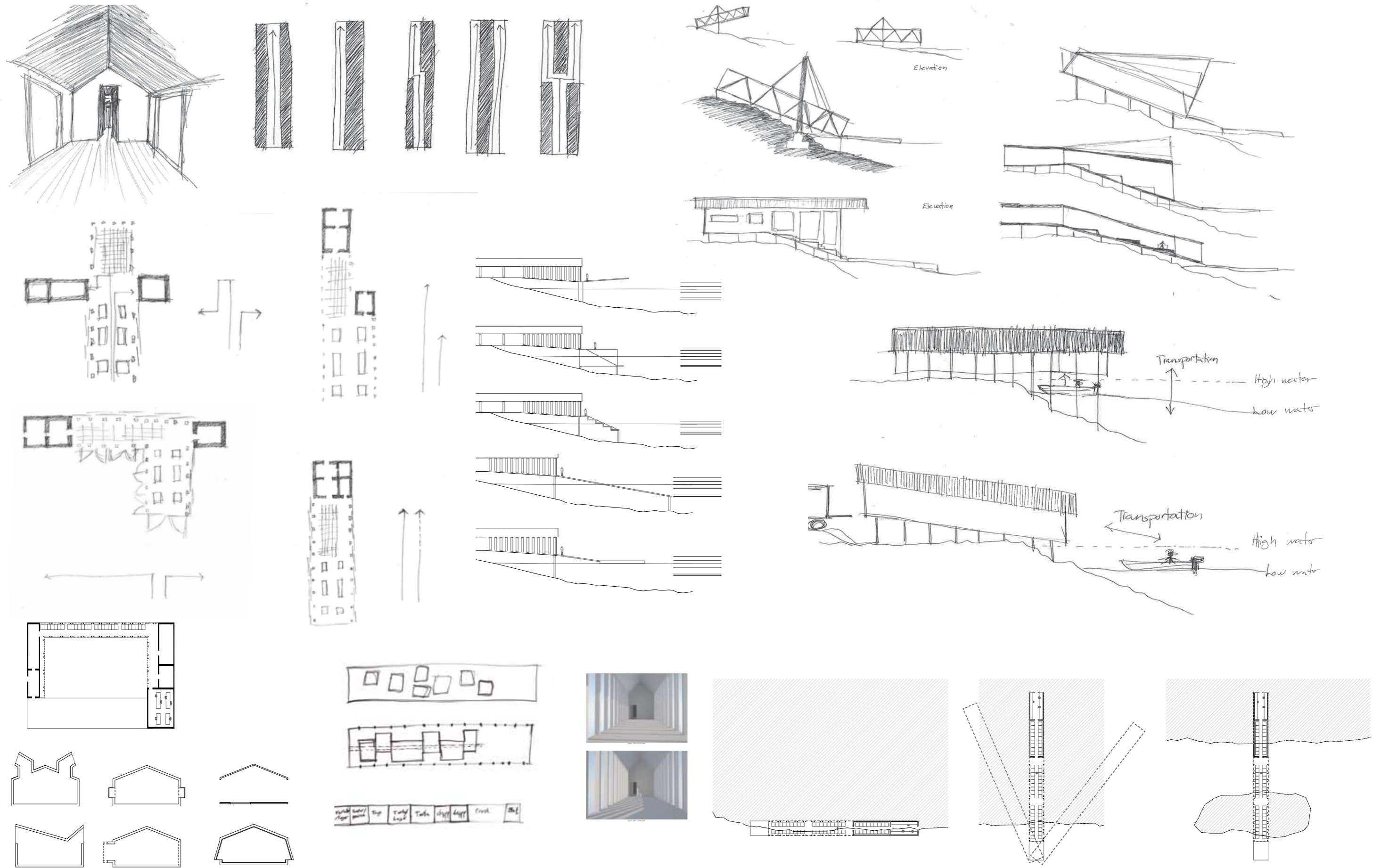
1964



2017



Re-use or a new typology?



Sketches (a new typology) - production flow, openings, meeting between land, water and building

## REQUIREMENTS FOR THE TYPOLOGY

After studying the production flow and the meeting between land, water, building these following requirements are needed for the typology:

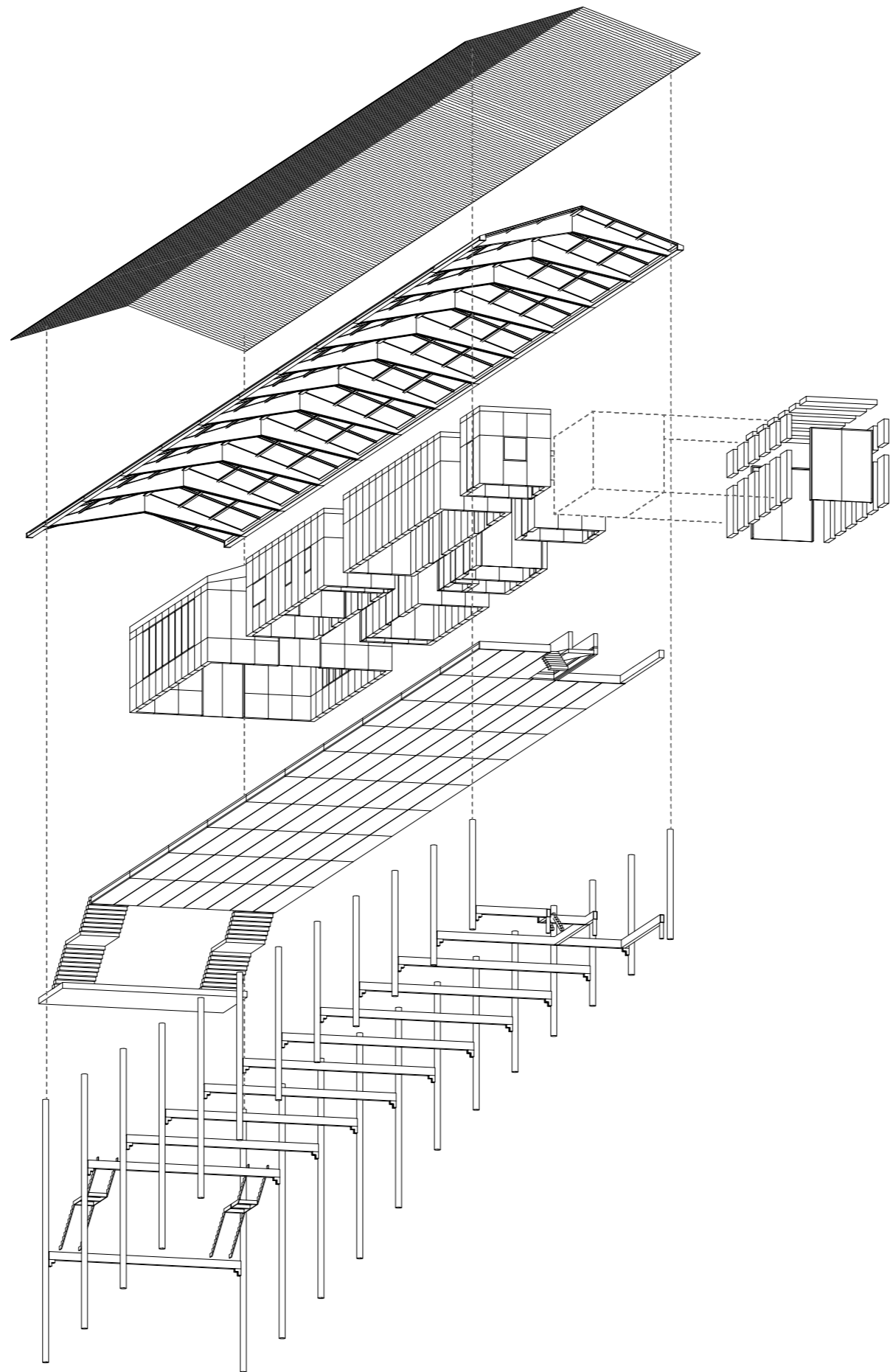
### Site

1. INFRASTRUCTURE - in close proximity of existing infrastructure (roads, electricity, freshwater, sewage system etc.)
3. SHORELINE - the site has to be by the shoreline to reduce the transportation distance of the harvested seaweed
4. TIDE - at low tide the sea level has to be high enough for a boat to be able to dock
5. TERRAIN - the terrain has to have a height difference of minimum 3 meters from the top and down to the shoreline because of the tidal water. The maximum and high difference depend on the size of the facility and the spesific inclination on the plot
6. SUN - excellent sun conditions throughout the whole day so it is possible to sundrie the seaweed
7. WIND - the site should in some degree be sheltered from the strongest winds from the west.
8. POLLUTION - the seawater in the area should contain as little pollution as possible

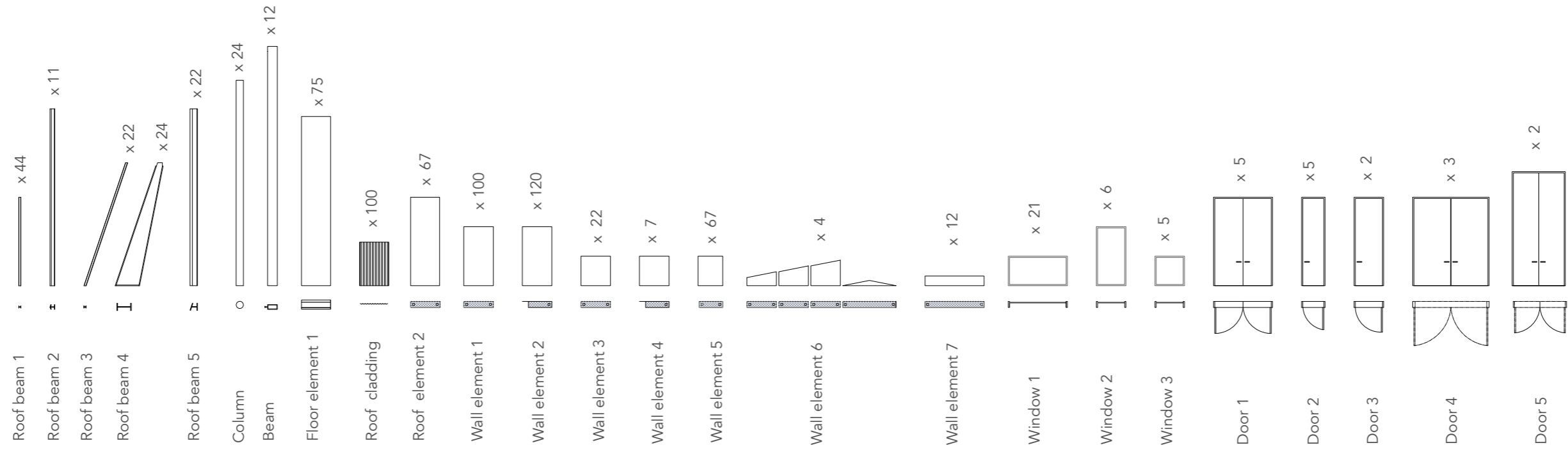
## Building

1. ON PILOTI - by placing the building on piloti the production facility can be placed in different terrain types
2. BRIDGE - the building needs to function as a bridge between the infrastructure on land and the water
3. SEPARATED - the structure must be free from the facade to give the needed flexibility in the floorplan
4. PRE-FABRICATION - the building is based on prefabricated elements to ensure that each producer can customize their facility for their production and their specific needs
5. ONE LEVEL - the entire production line must be on one level

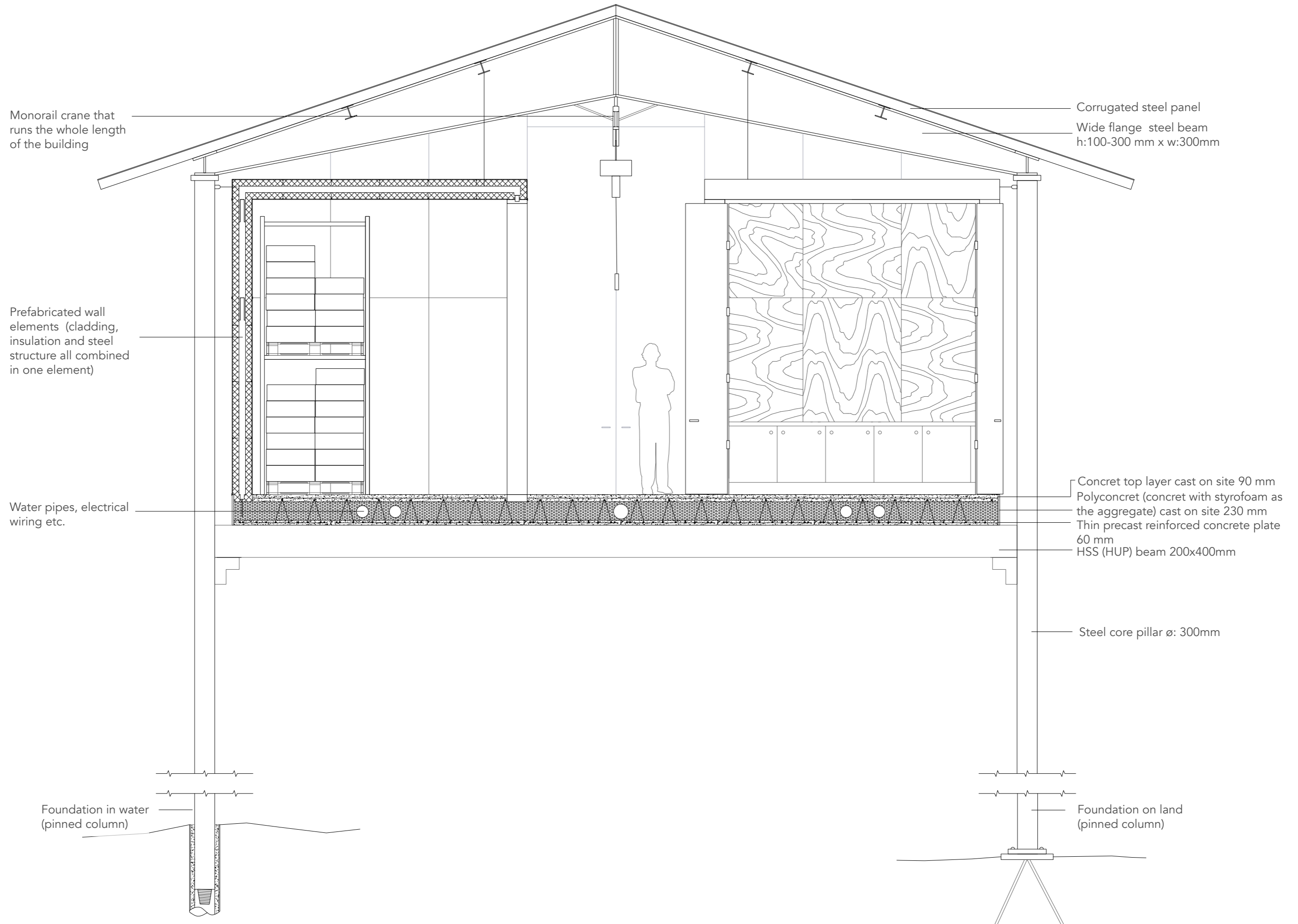
# THE TYPOLOGY



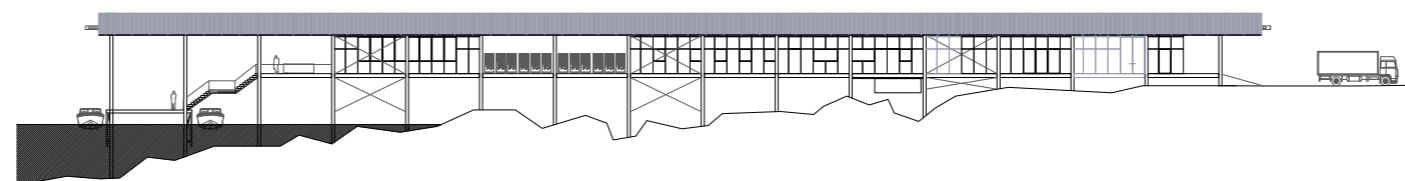
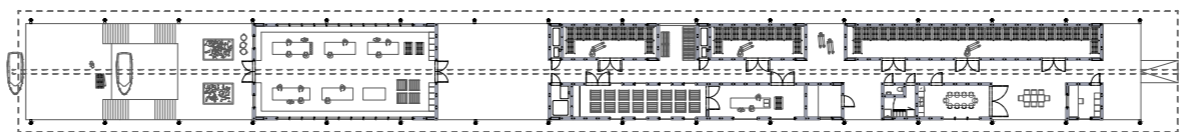
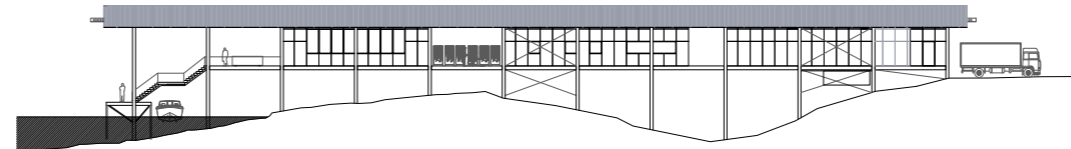
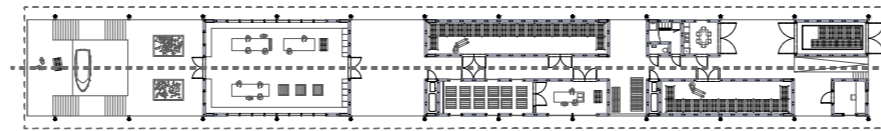
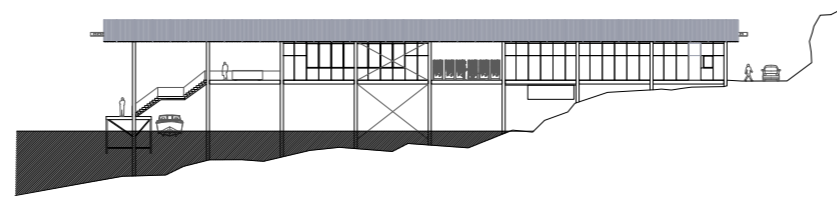
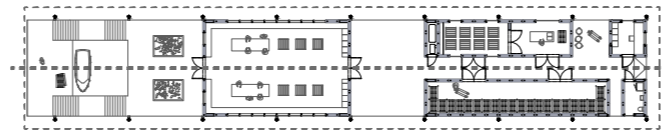
# PREFABRICATED ELEMENTS

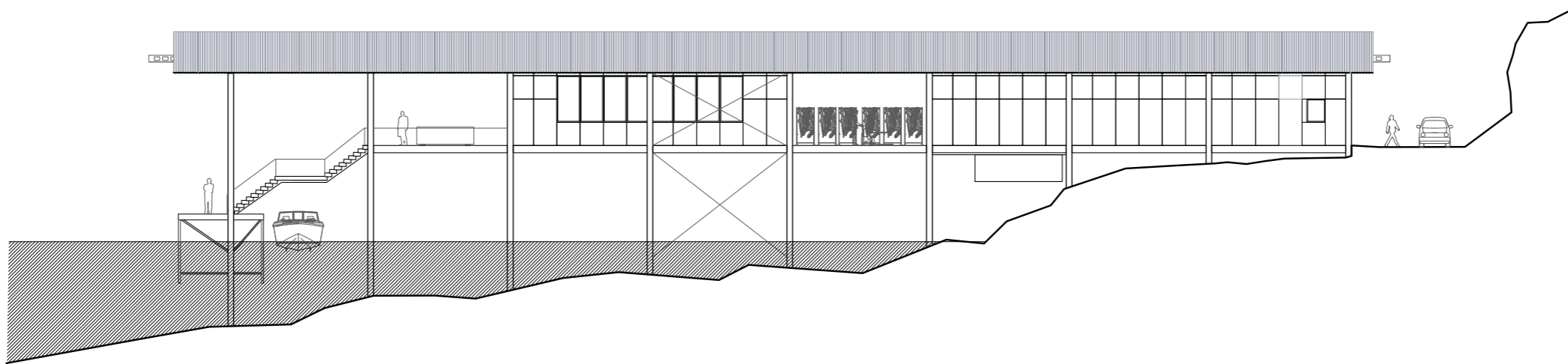
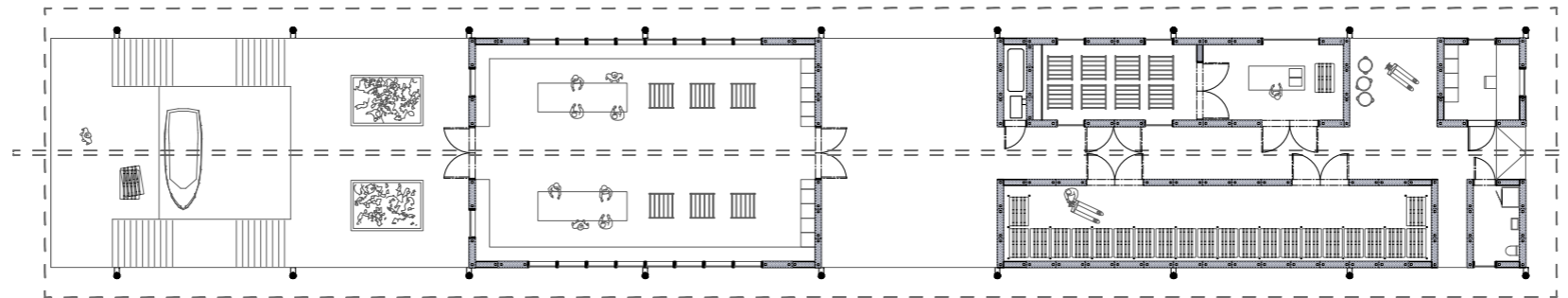


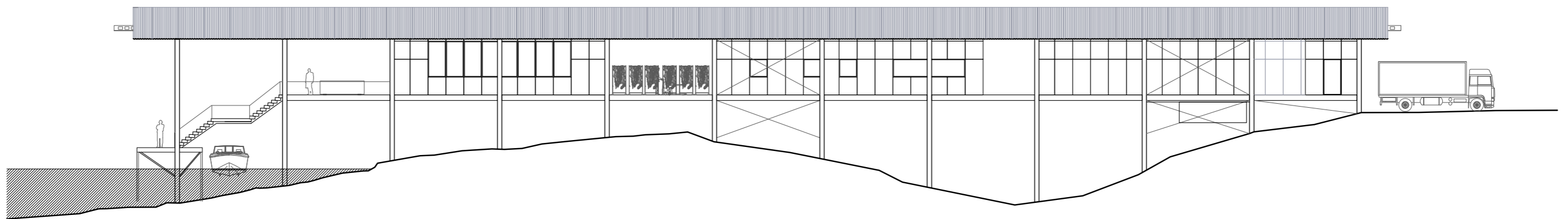
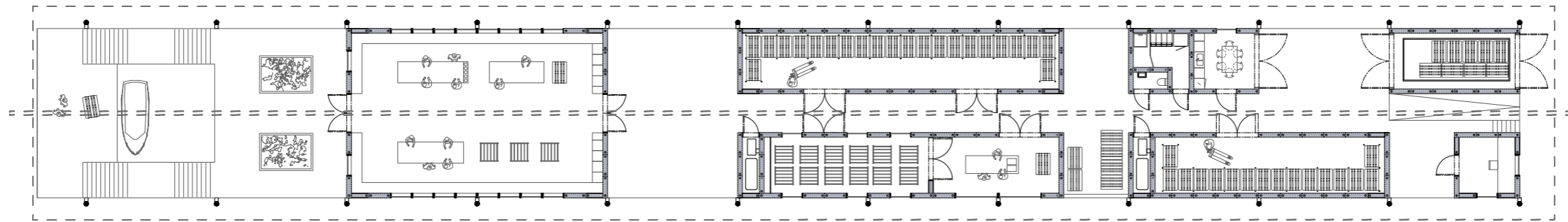


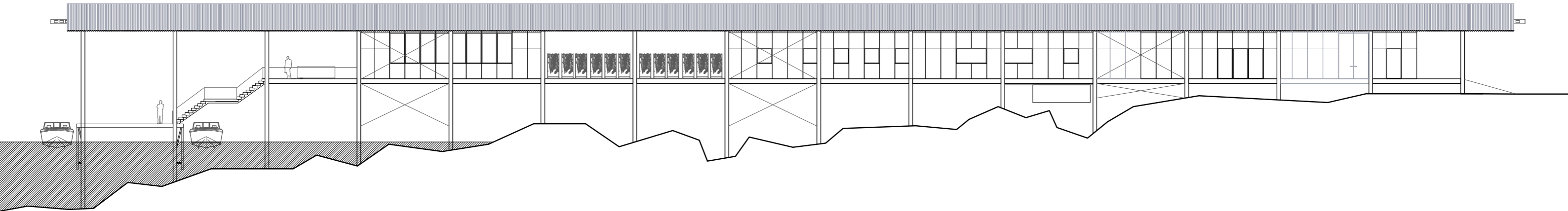
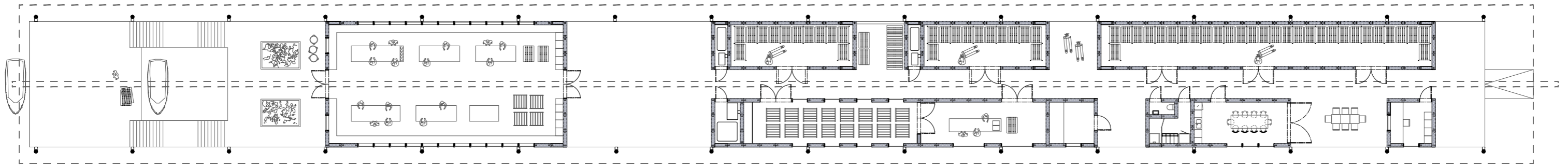


# EXAMPLES OF PROCESSING FACILITIES IN DIFFERENT TERRAIN TYPES











# MY CASE STUDY



Nordland



Nordland

Træna



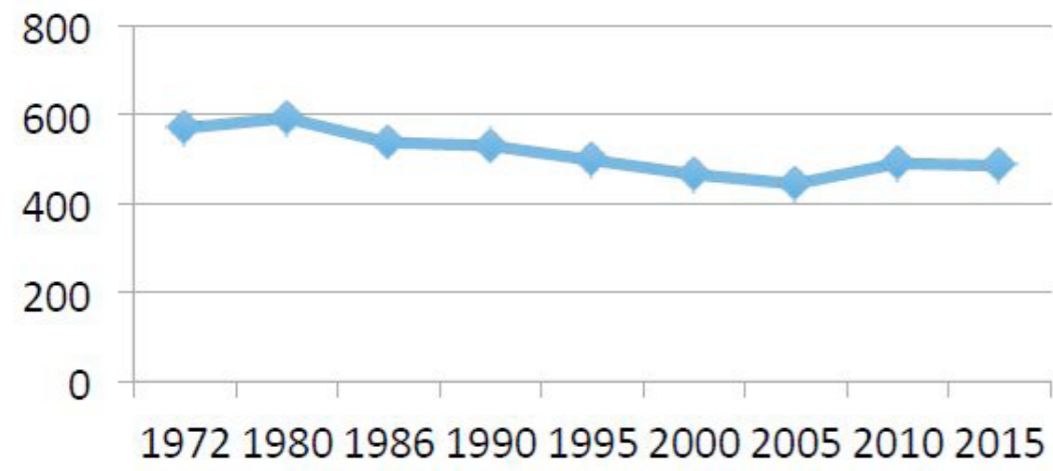
Træna



# TRÆNA



Population on Træna 1972-2015



Low income households with children

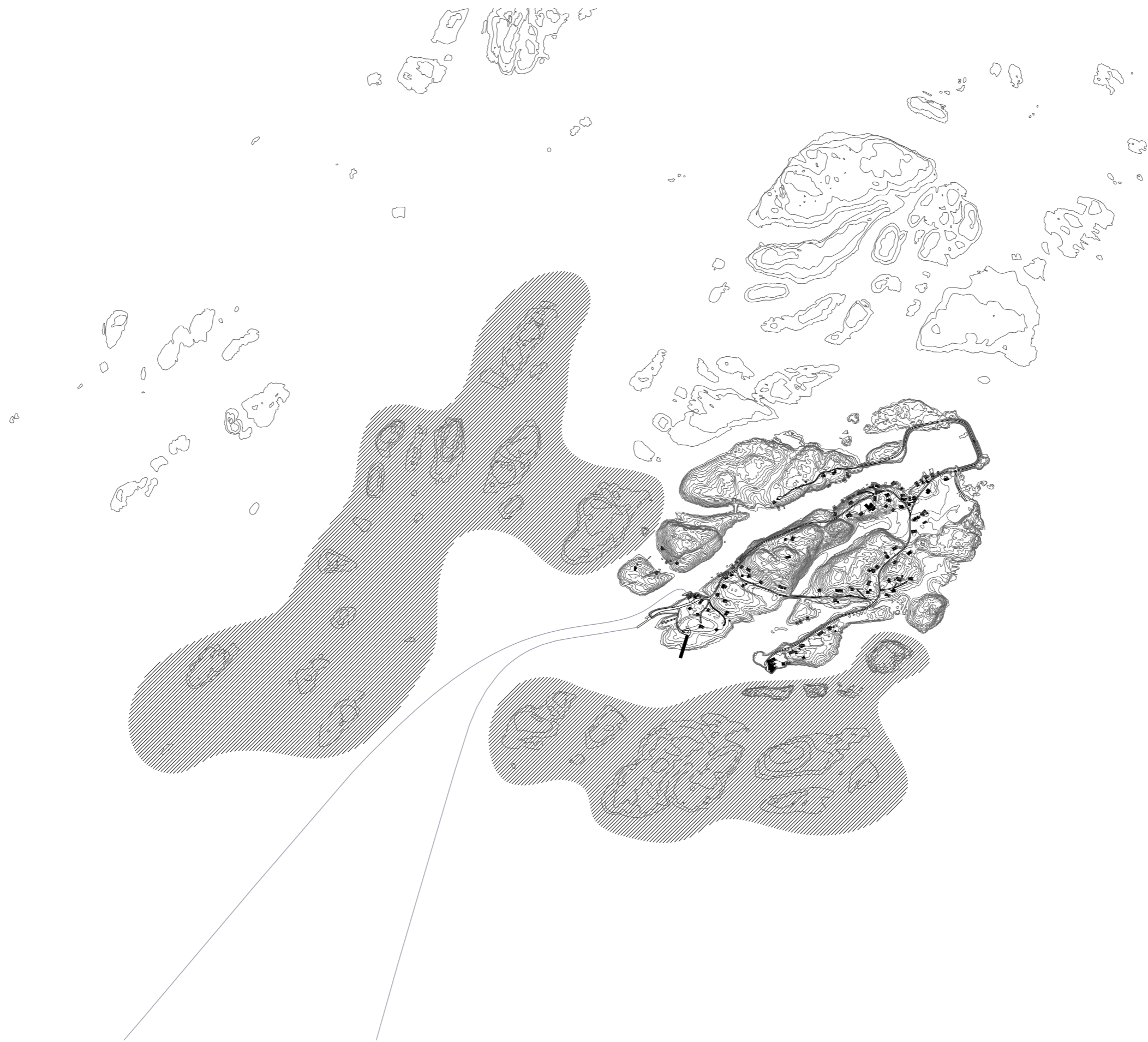






# SELVÆR





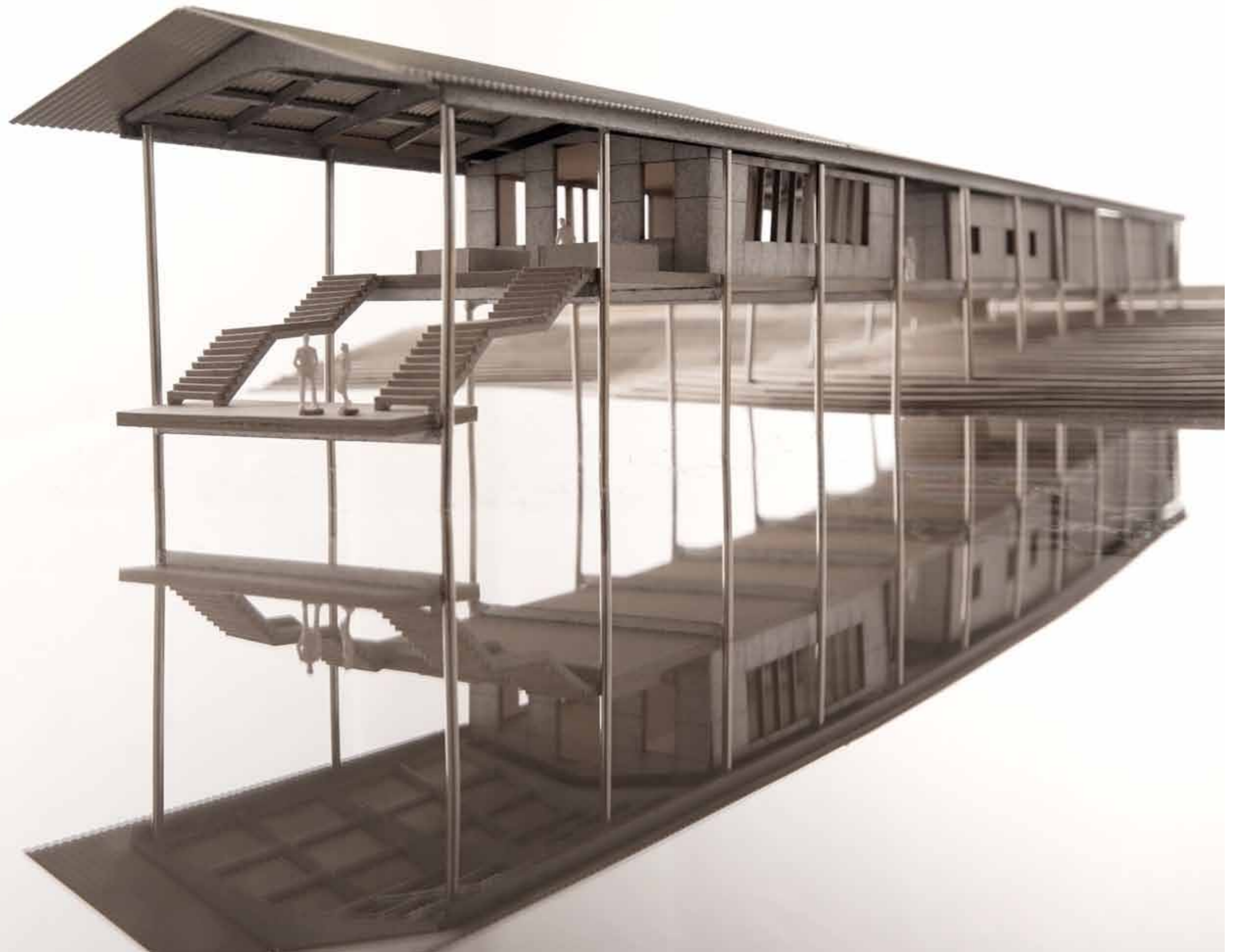
The Northern Company's current harvest areas



Siteplan



Site

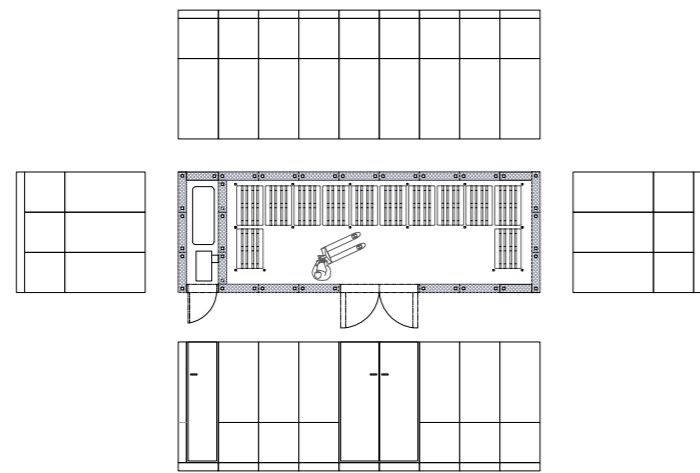


# THE NORTHERN COMPANY

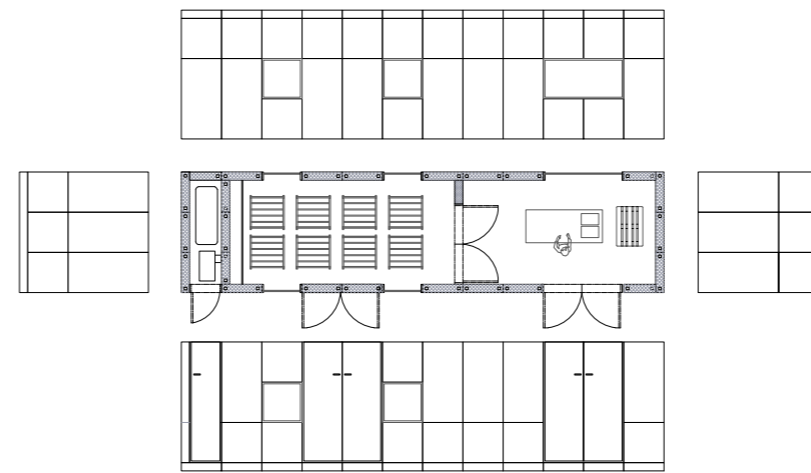
## Program

- PRODUCTION VOLUM:** 50 ton harvested seaweed pr. season (approx. 2 x 250kg is harvested each day at low tide and there are approx 100 harvest days pr. season)  
50 ton harvested seaweed =100 pallets finished products  
50 ton harvested seaweed requires 40 pallets of packaging  
1 pallets =1,2x0.8x1,5 and takes up 1m2 floorspace
- TYPES OF PRODUCTS:** Mainly dried products, but also frozen and other further processed products like pesto, pasta, snacks, soups, spices etc.
- NUMBER OF EMPLOYEES:** 4-10 people depending on the season
- NEEDED SPACE:** Approx. 700m2 of production space out of witch about 325m2 are insulated interior space and the rest outdoor floor space.

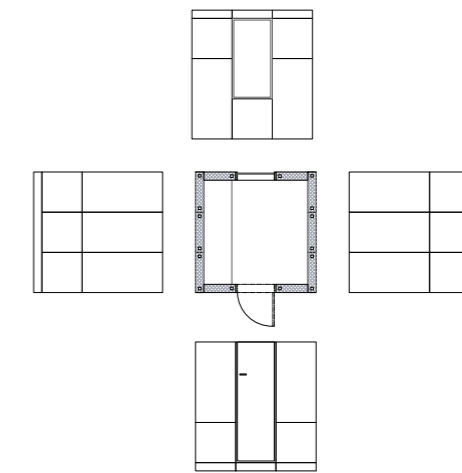
Lifting and rinsing space	130 m2	outdoor
Production space/kitchen to cut, sort and pack the seaweed - a space that can also be used for events	140 m2	indoor
Freezer storage	40 m2 (24 pallets)	indoor
Dripping/Cold drying room	70m2	outdoor
Warm drying room	30 m3 (200-300 kg)	indoor
Packing room	20m2	indoor
Dry storage	65 m2 (44 pallets)	indoor
Temporary storage for equipment, pallets and packaging for the products	10-60 m2	outdoor
Wardrobe with a toilet, shower and a drying cabinet	10 m2	indoor
Office space and break room	10 m2	indoor
Workshop and tool shed	10 m2	indoor
Container	25 m2	outdoor
Corridor	90 m2	outdoor



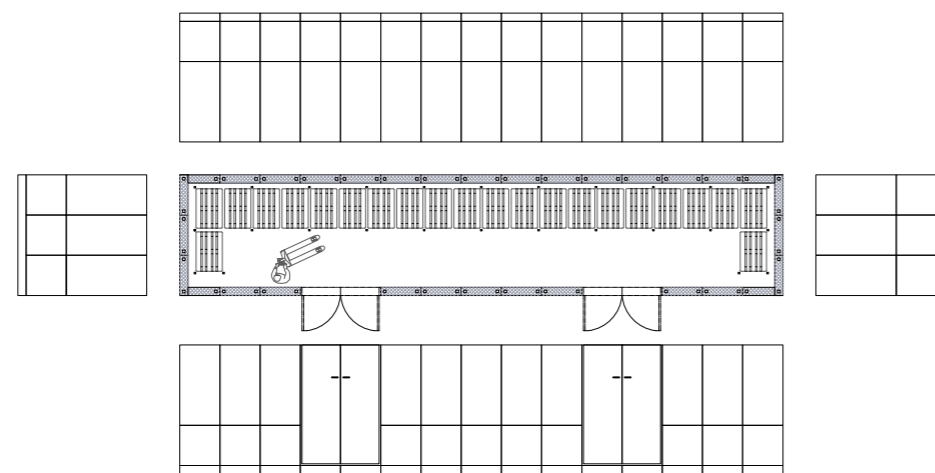
Freezer



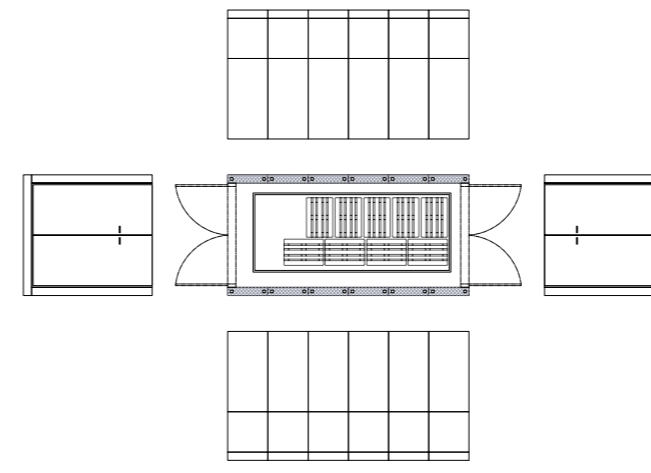
Warm drying and packing room



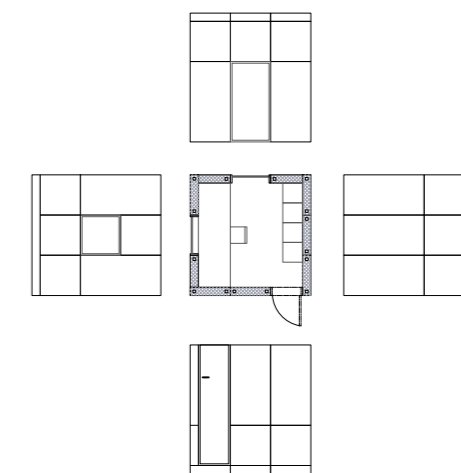
Tool shed



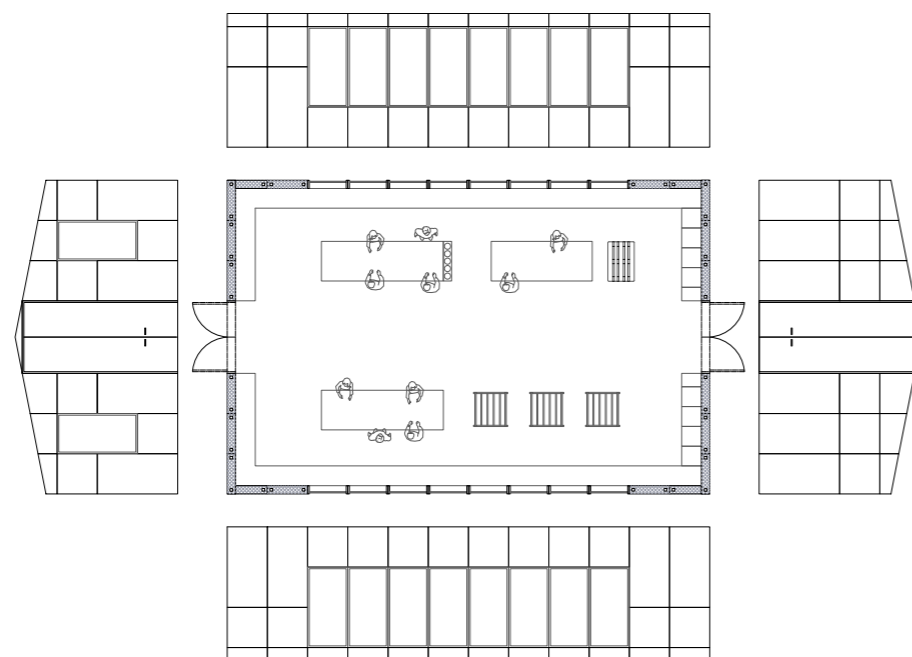
Dry storage



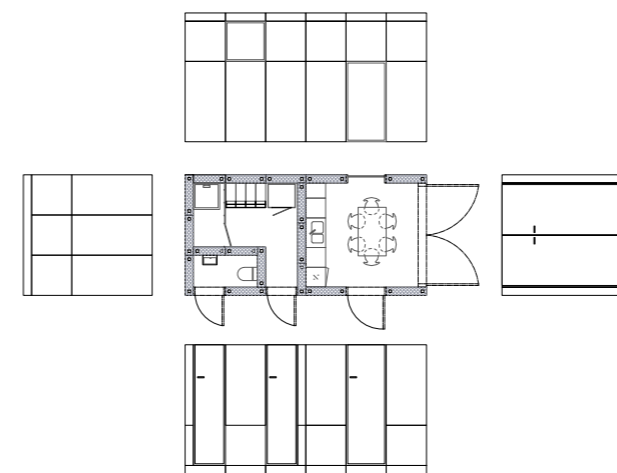
Container



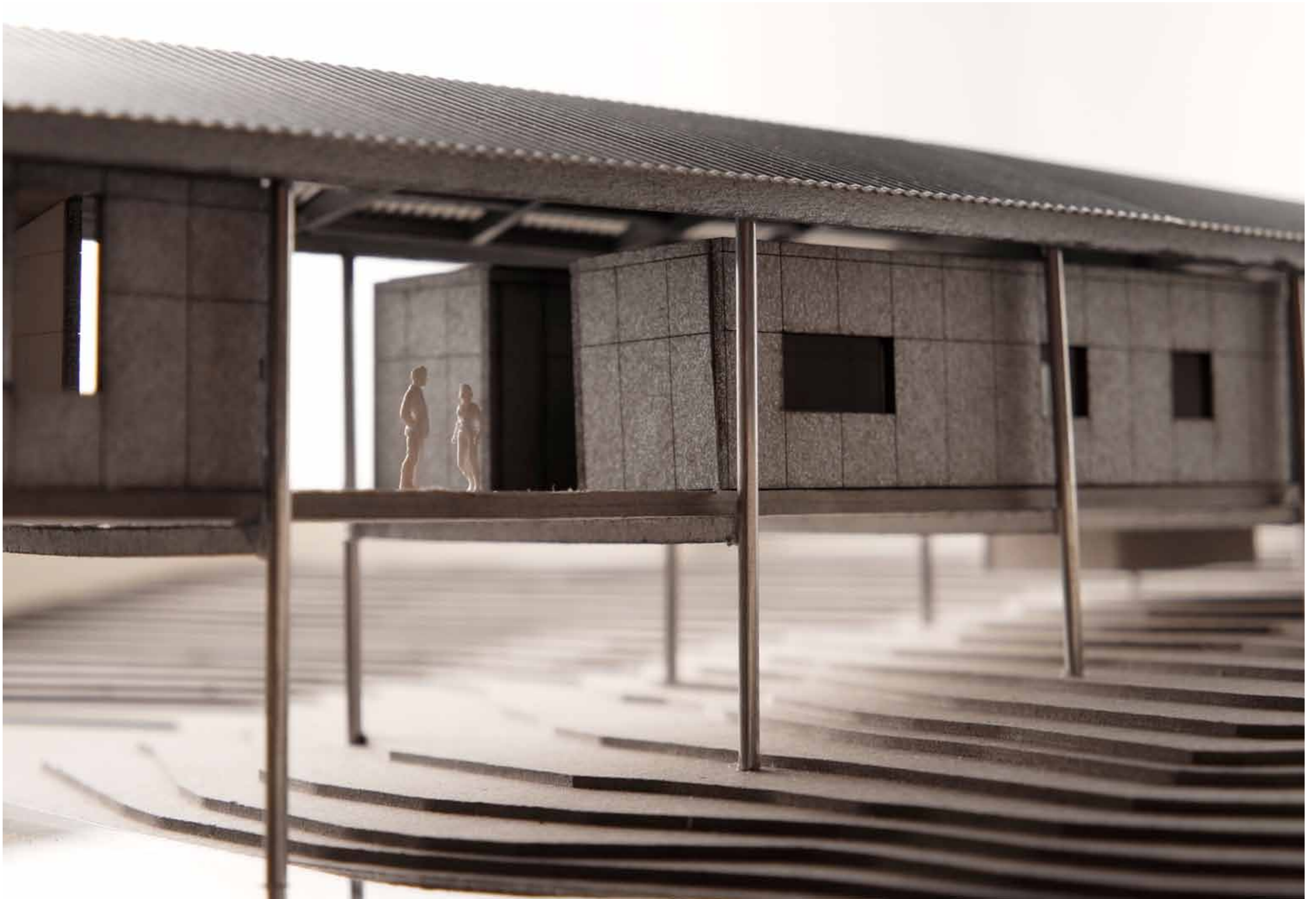
Office



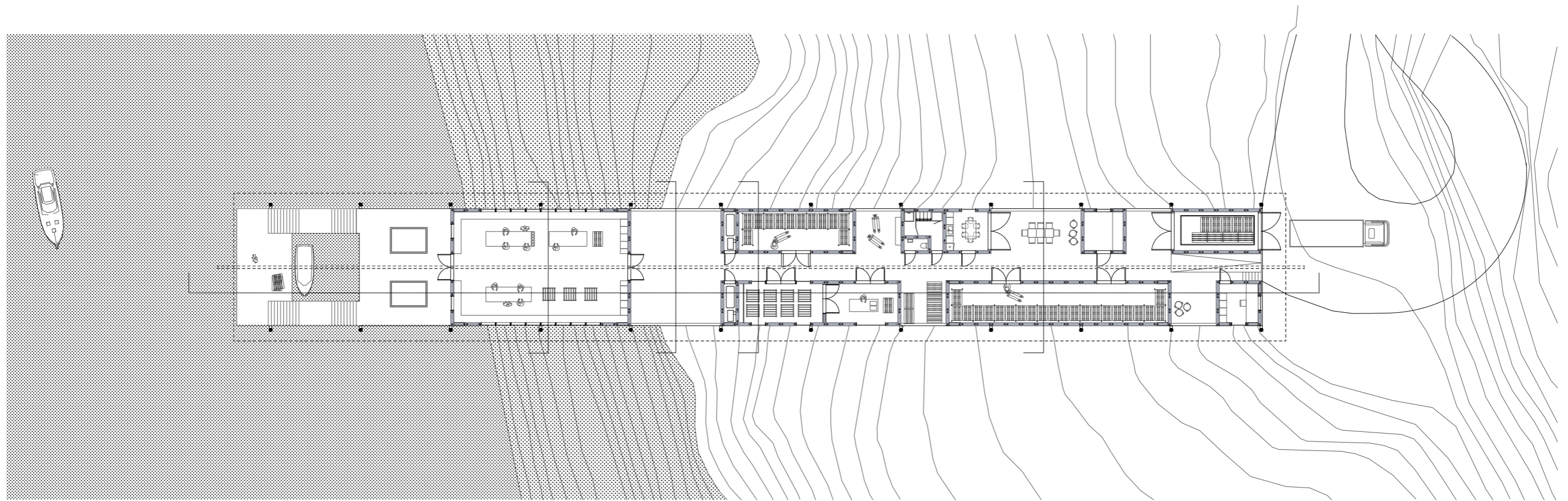
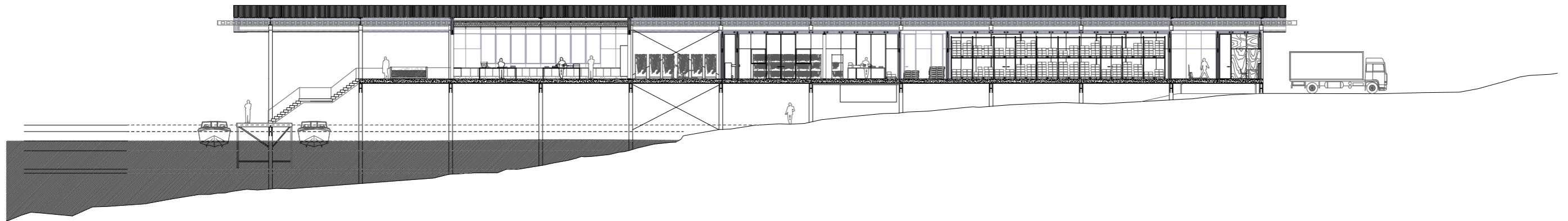
Main production space/kitchen



Wardrobe, wc and break room

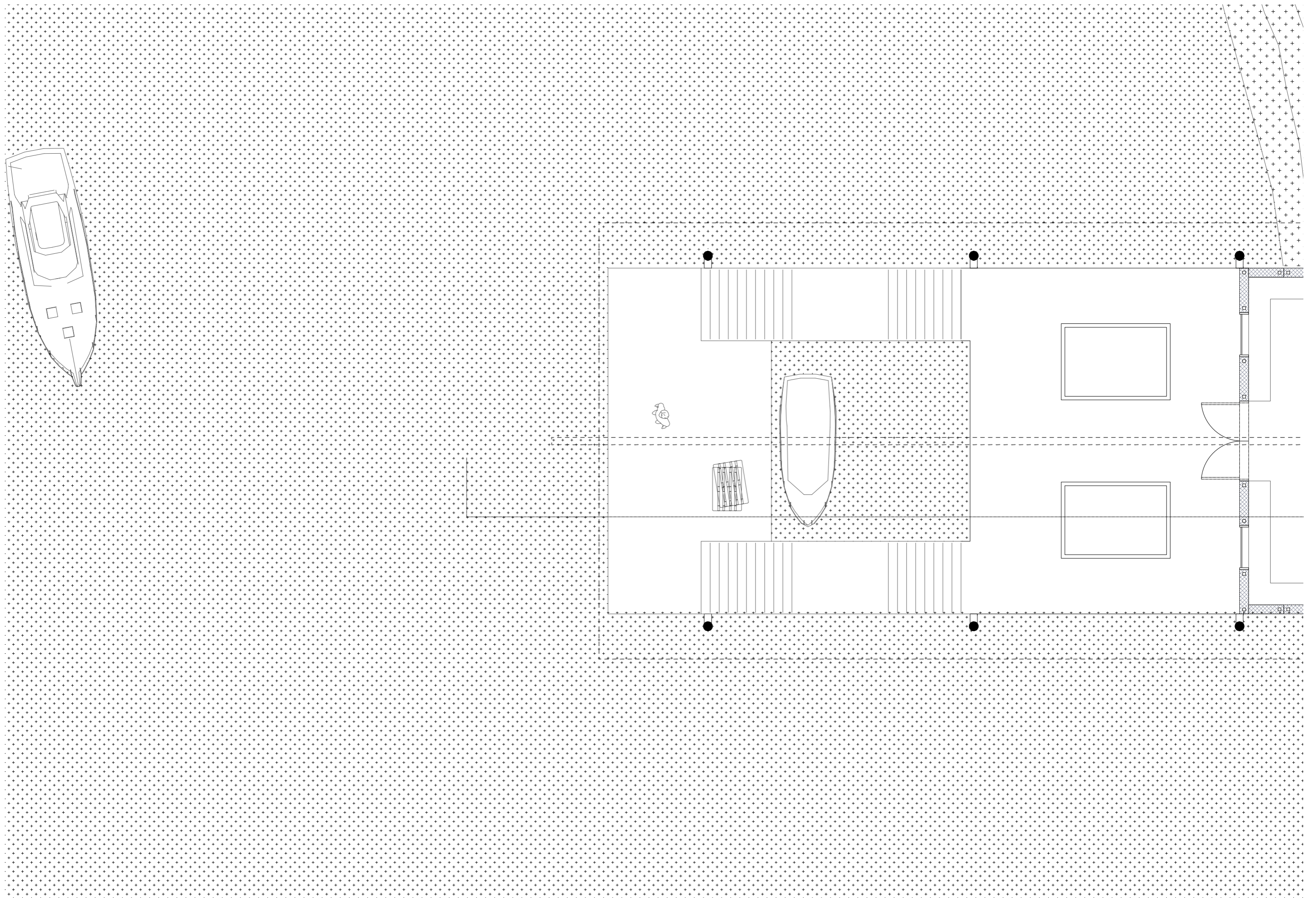




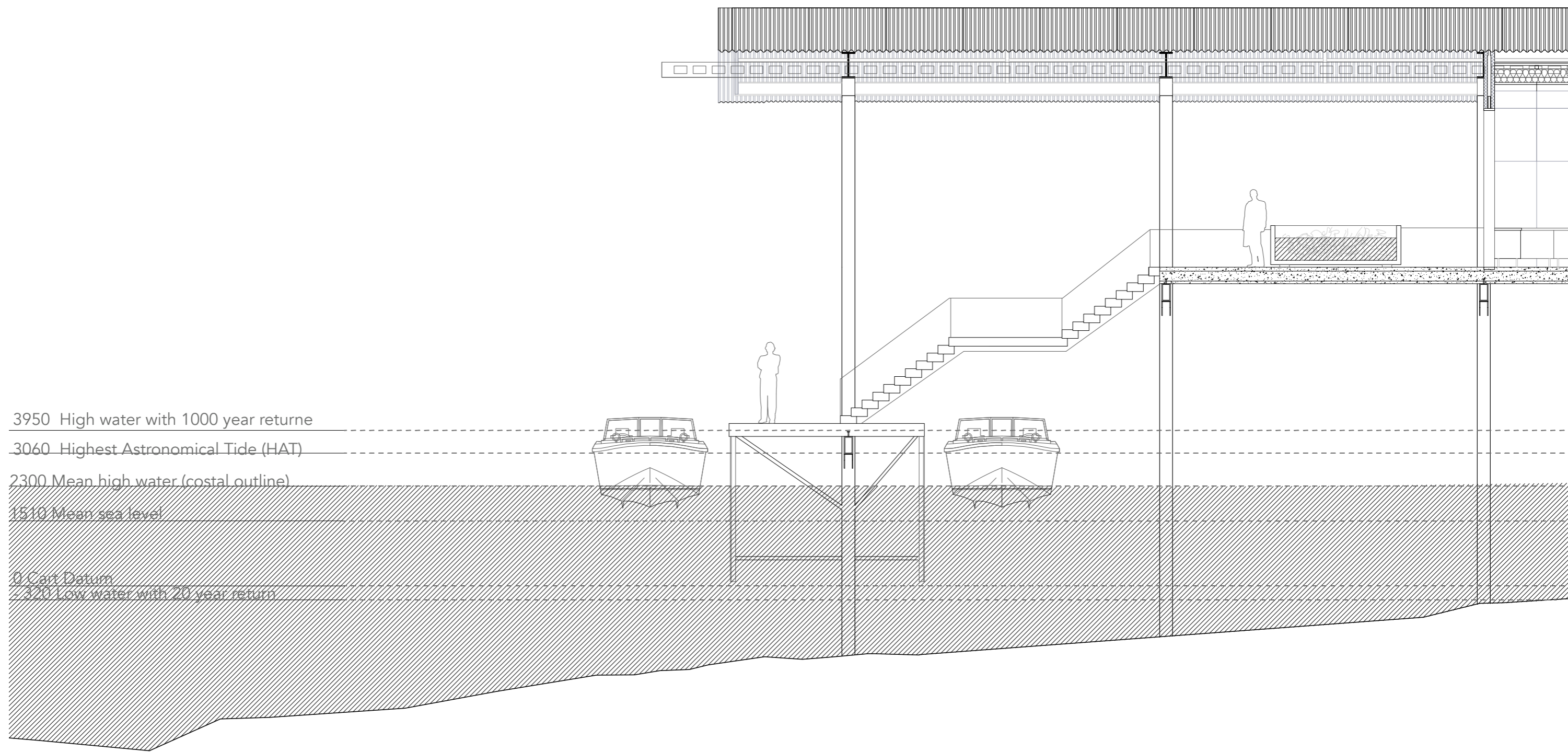


The Northern Company's processing facility





The pier where the harvest is lifted up from the boat to the rinsing tubes



3950 High water with 1000 year return

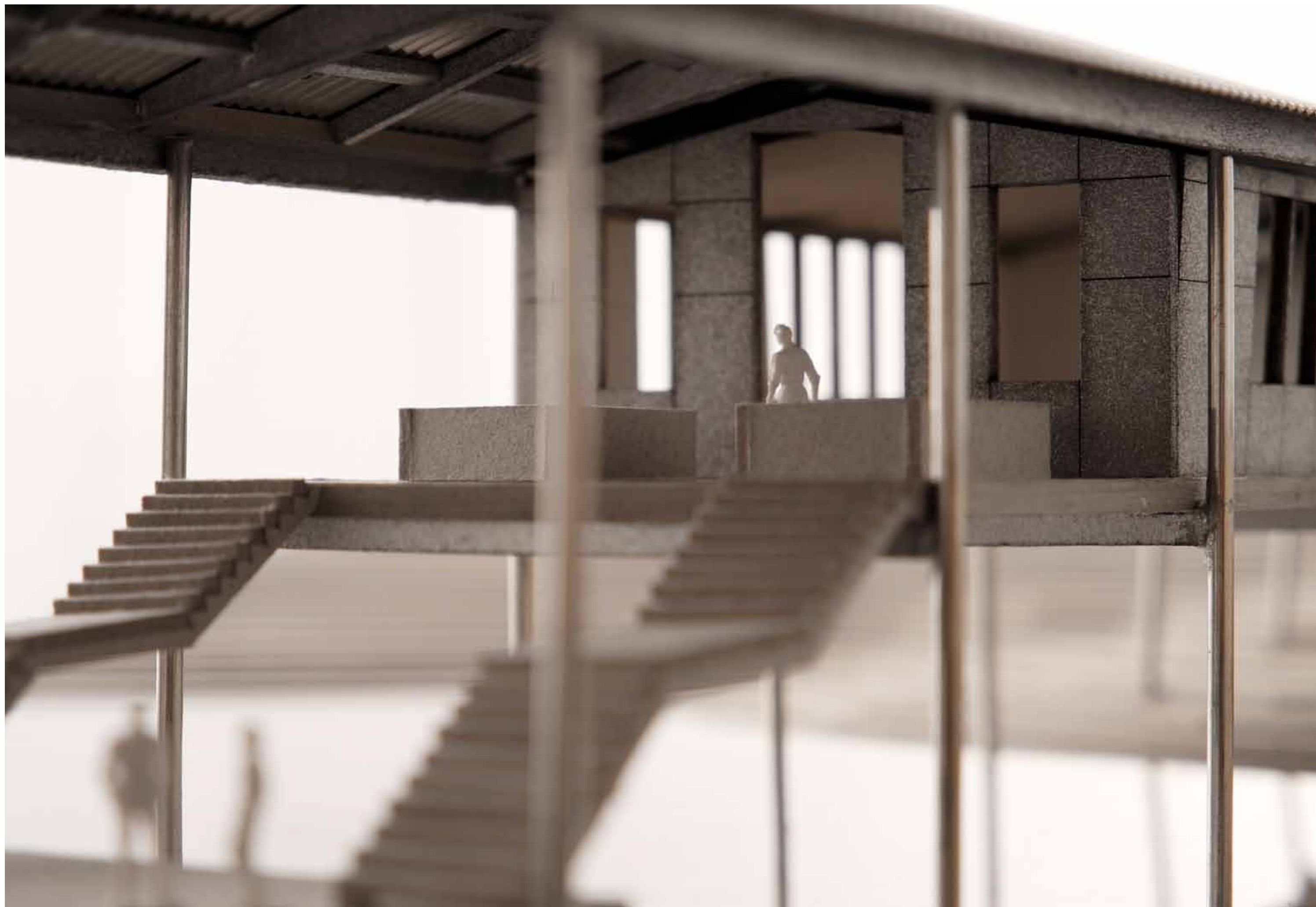
3060 Highest Astronomical Tide (HAT)

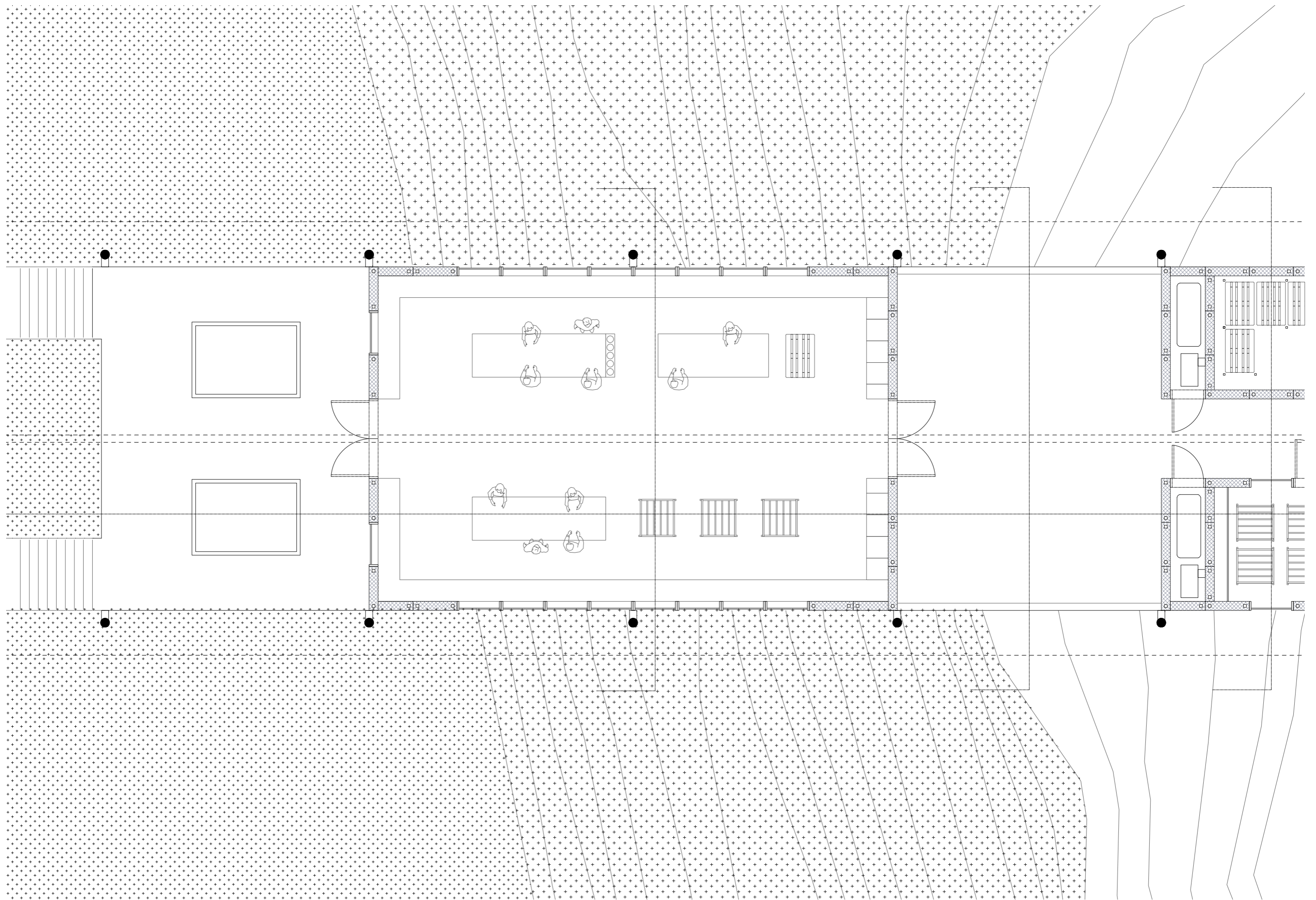
2300 Mean high water (costal outline)

1510 Mean sea level

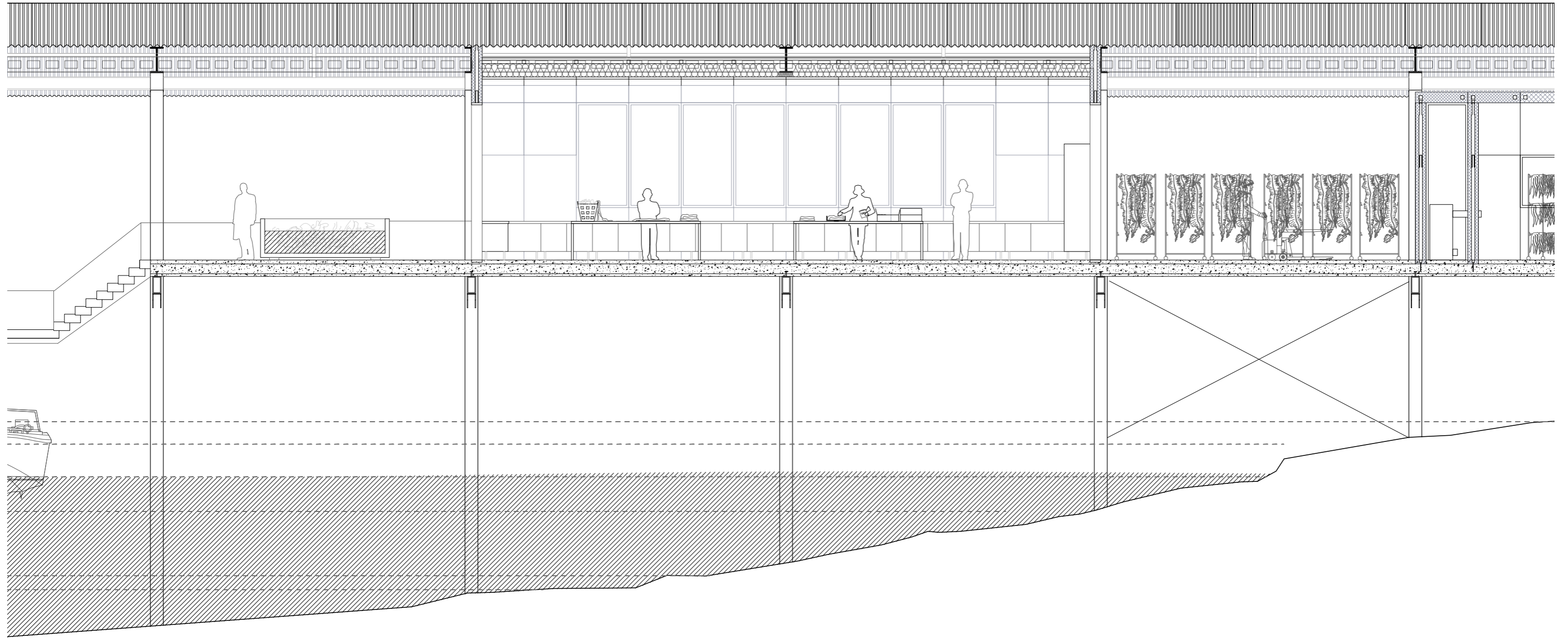
0 Cart Datum

-320 Low water with 20 year return



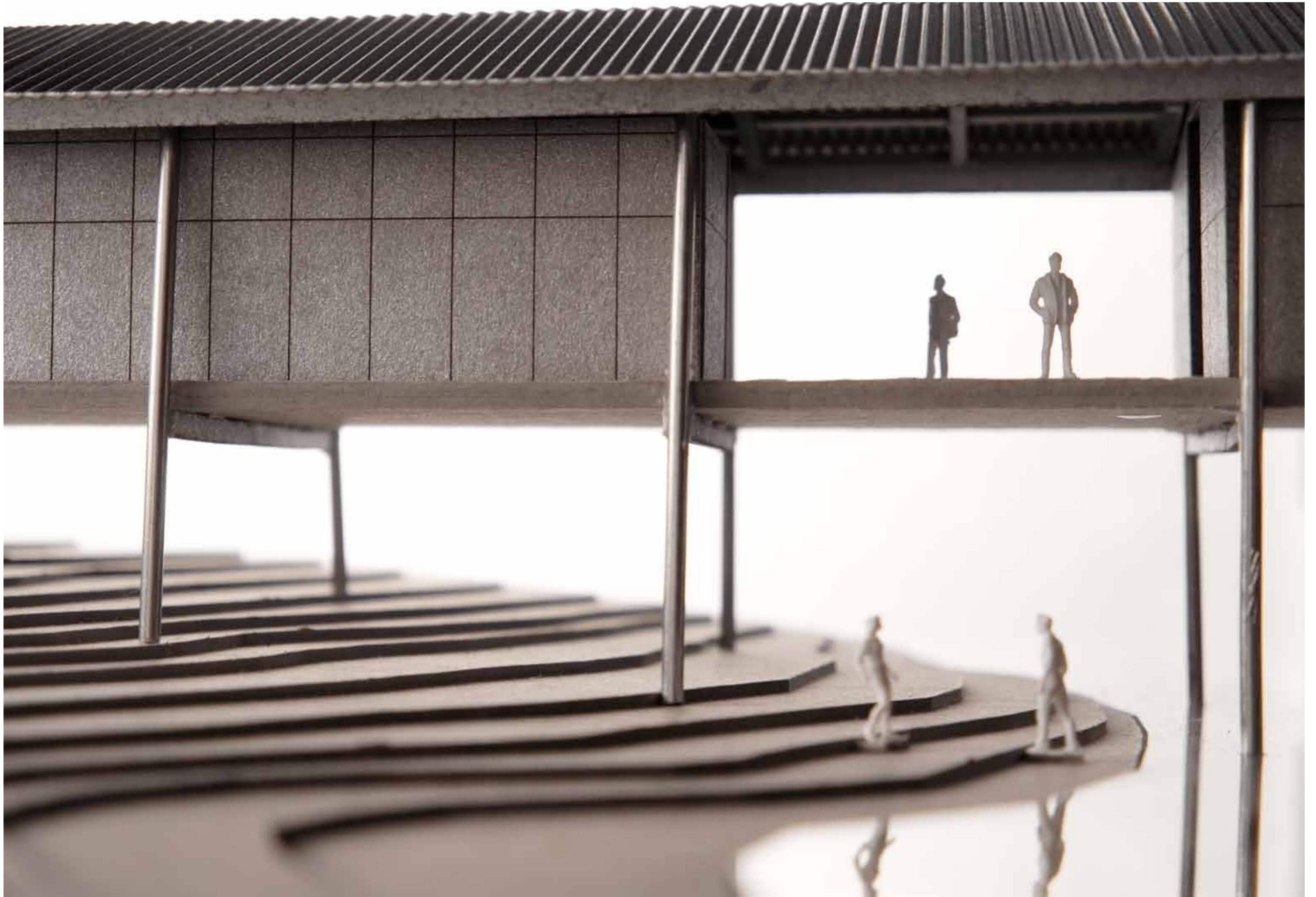


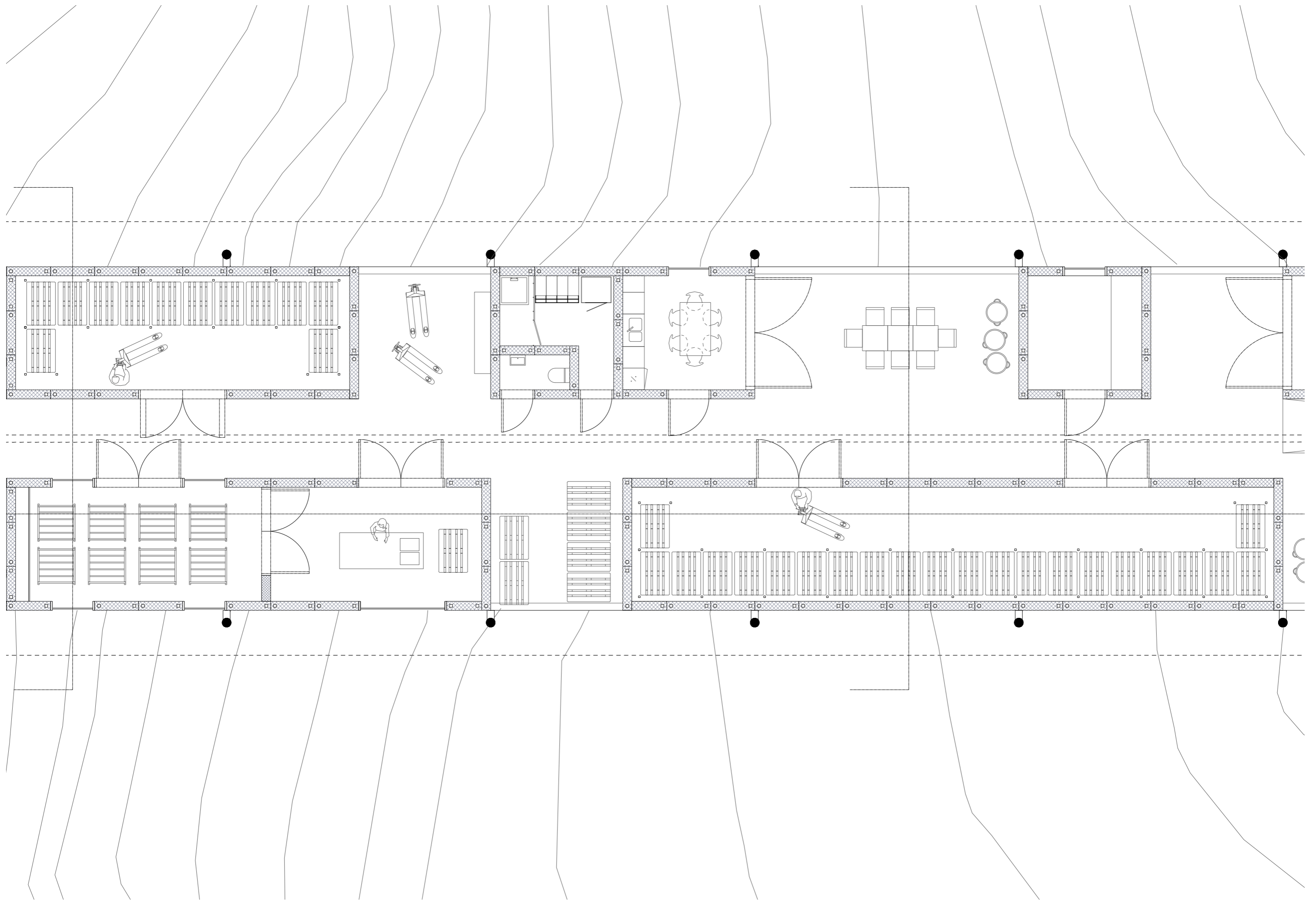
The production kitchen (where events also take place) and the outdoor cold drying area



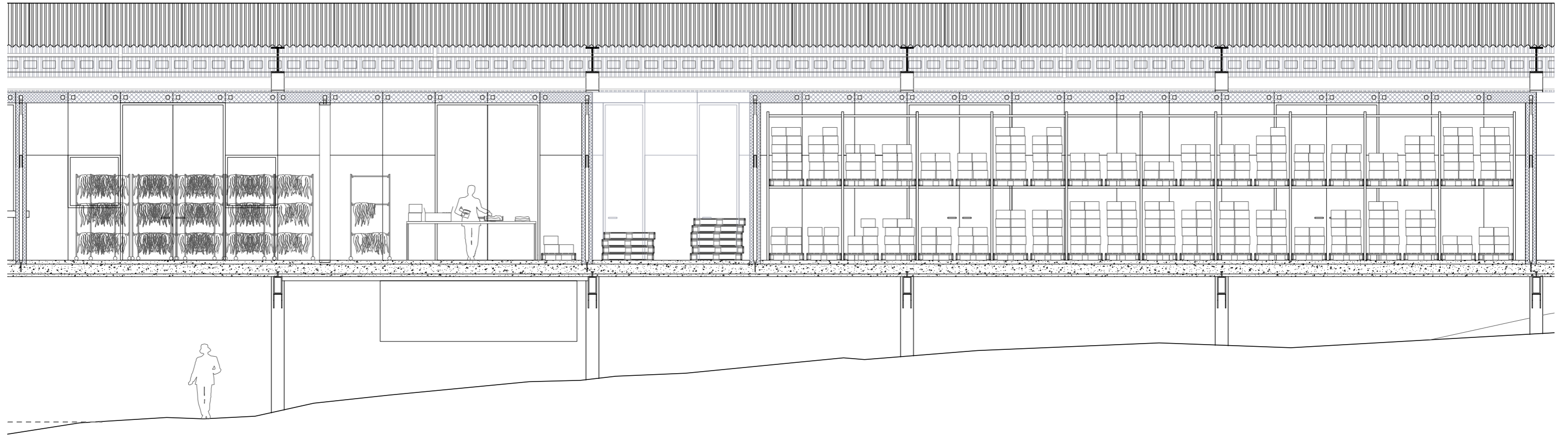




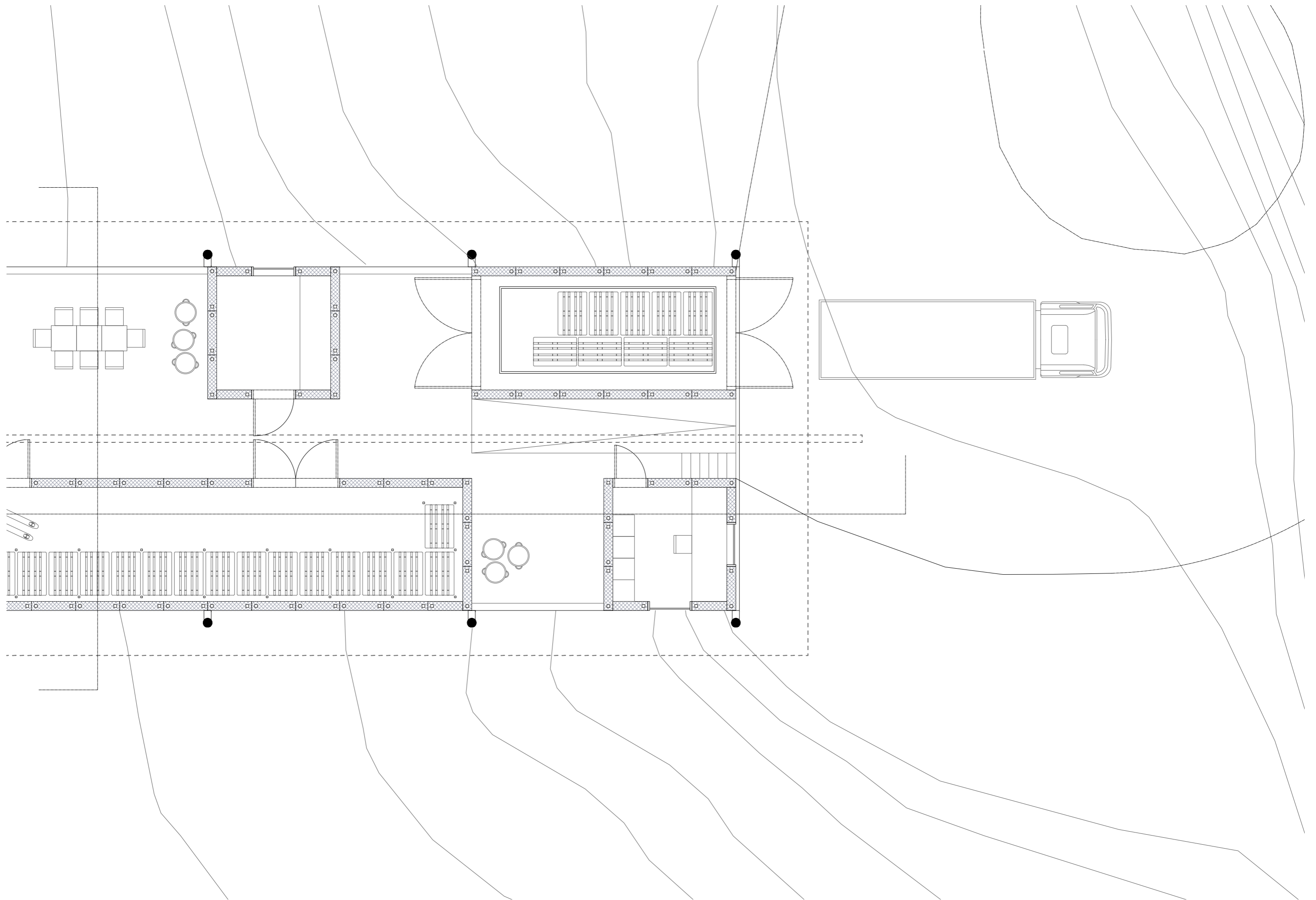




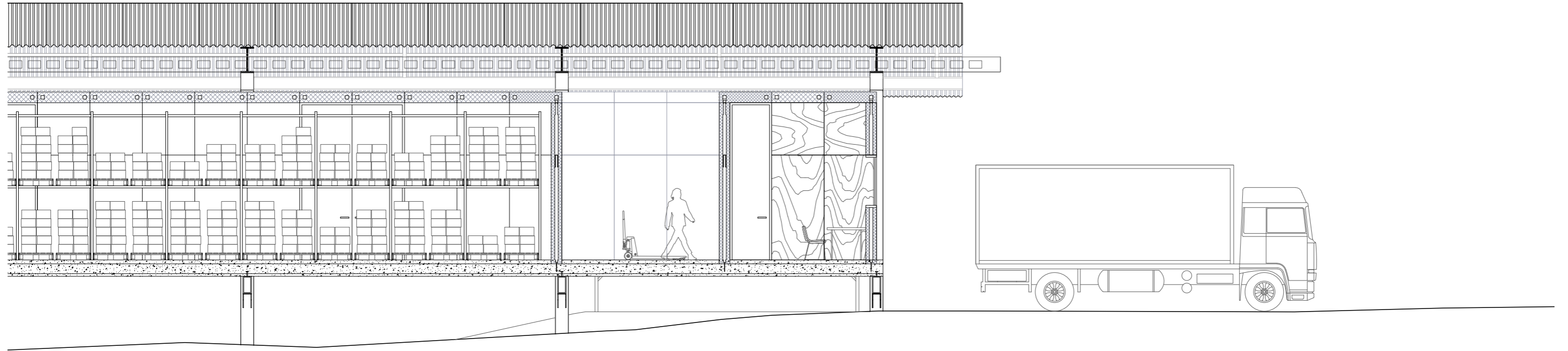
The freezer room, the drying room that is connected to the packing room, the dry storage, the wardrobe and the staff break room



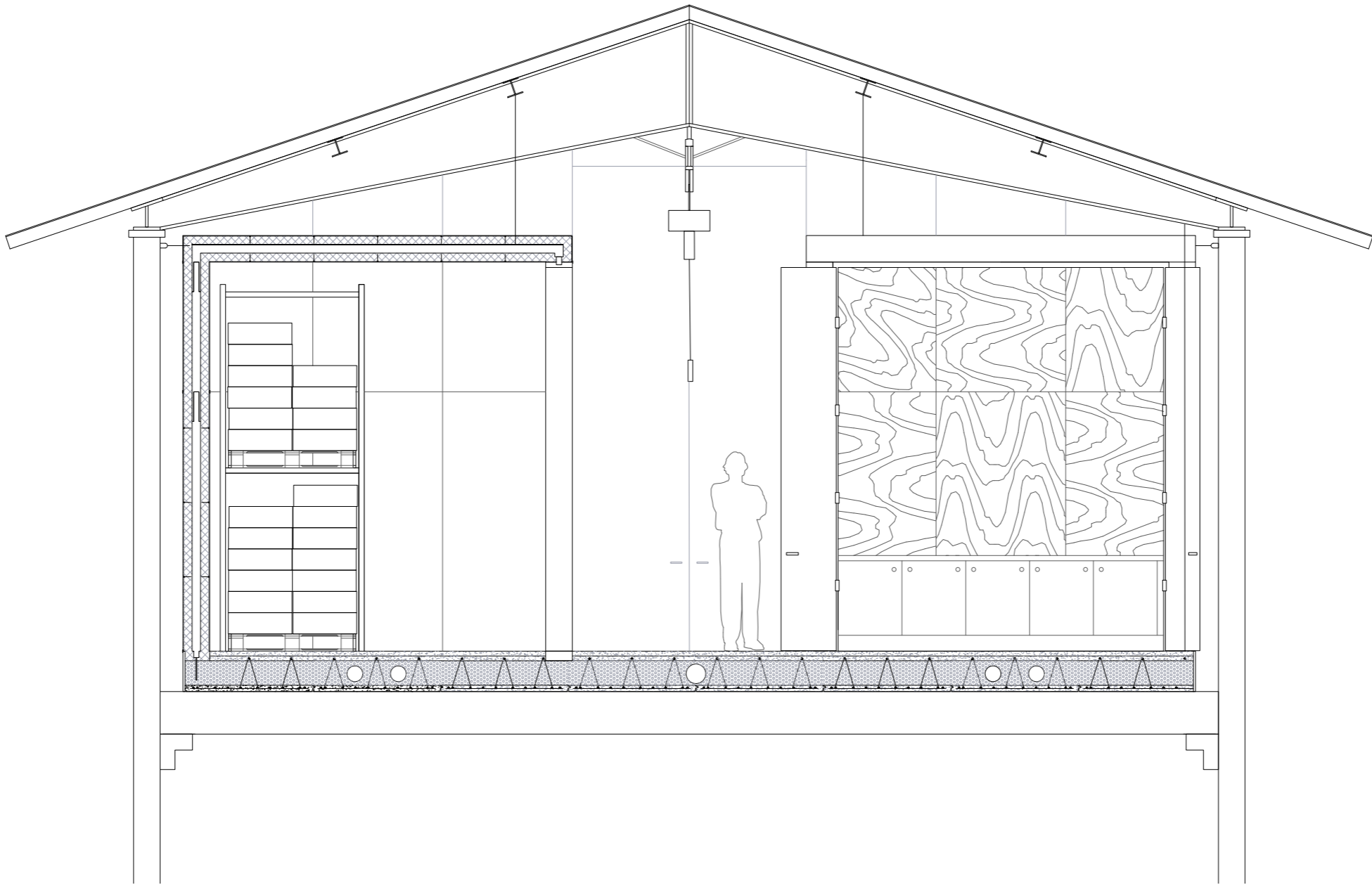




The loading dock/container and the office

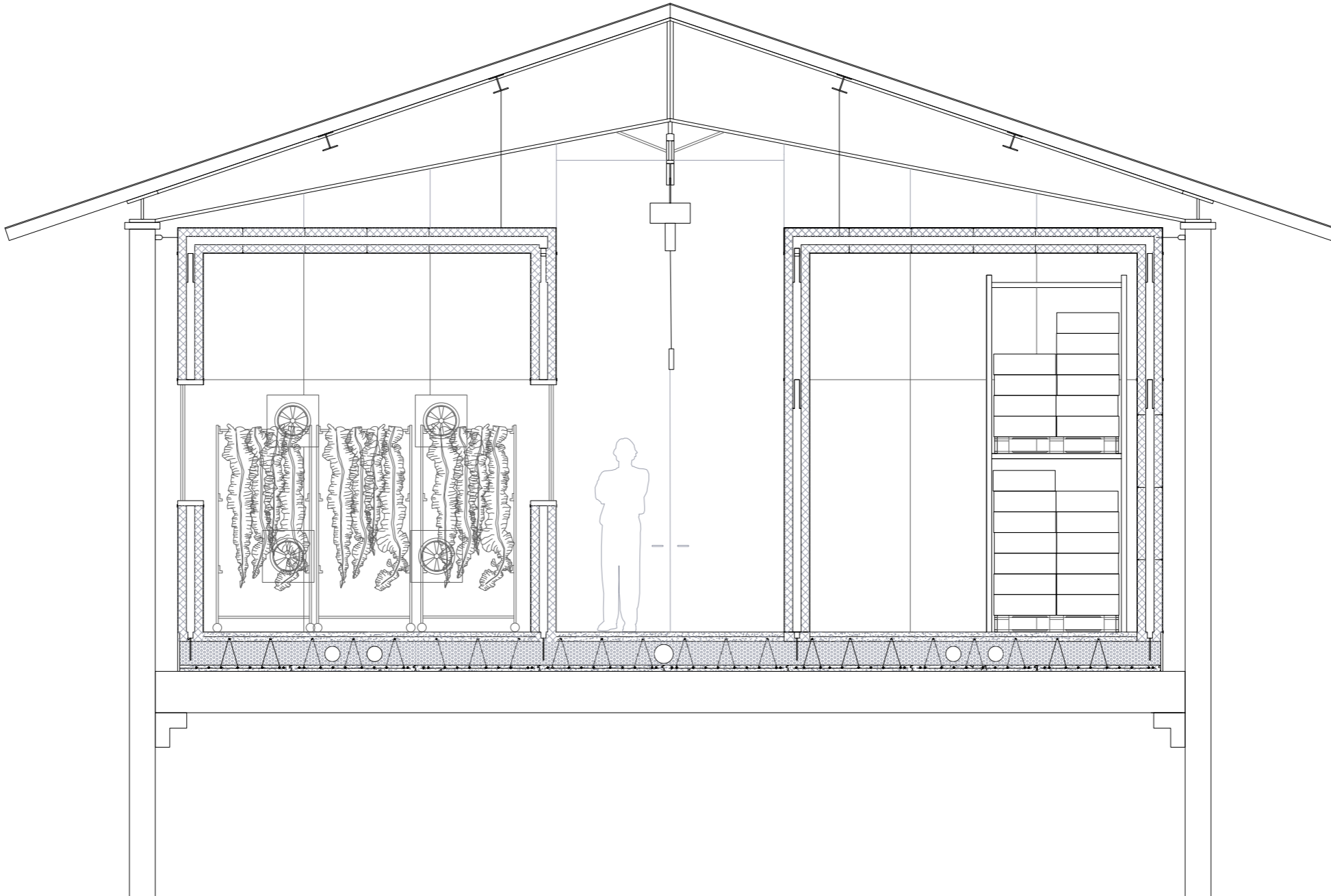




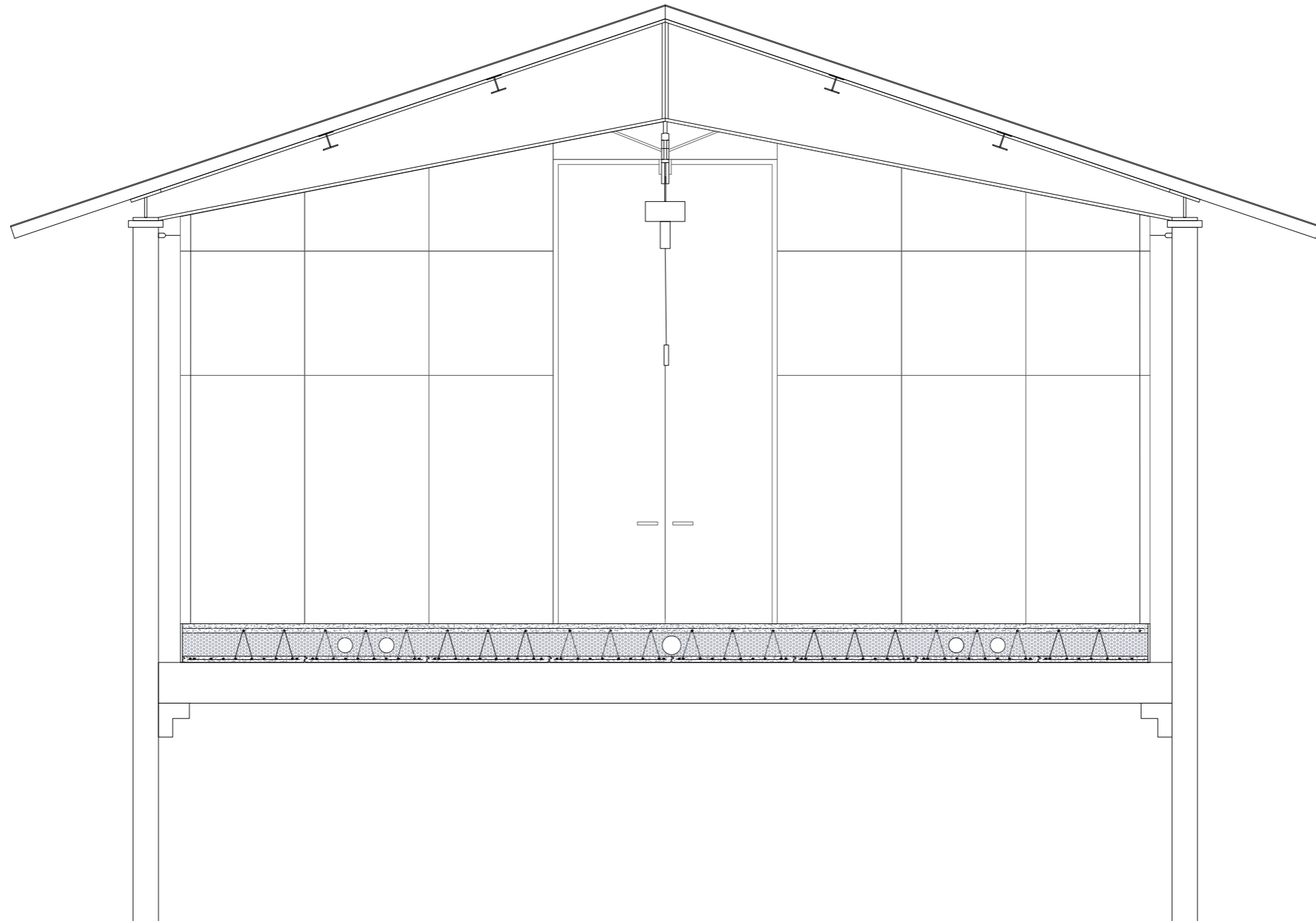


Section - situation 1

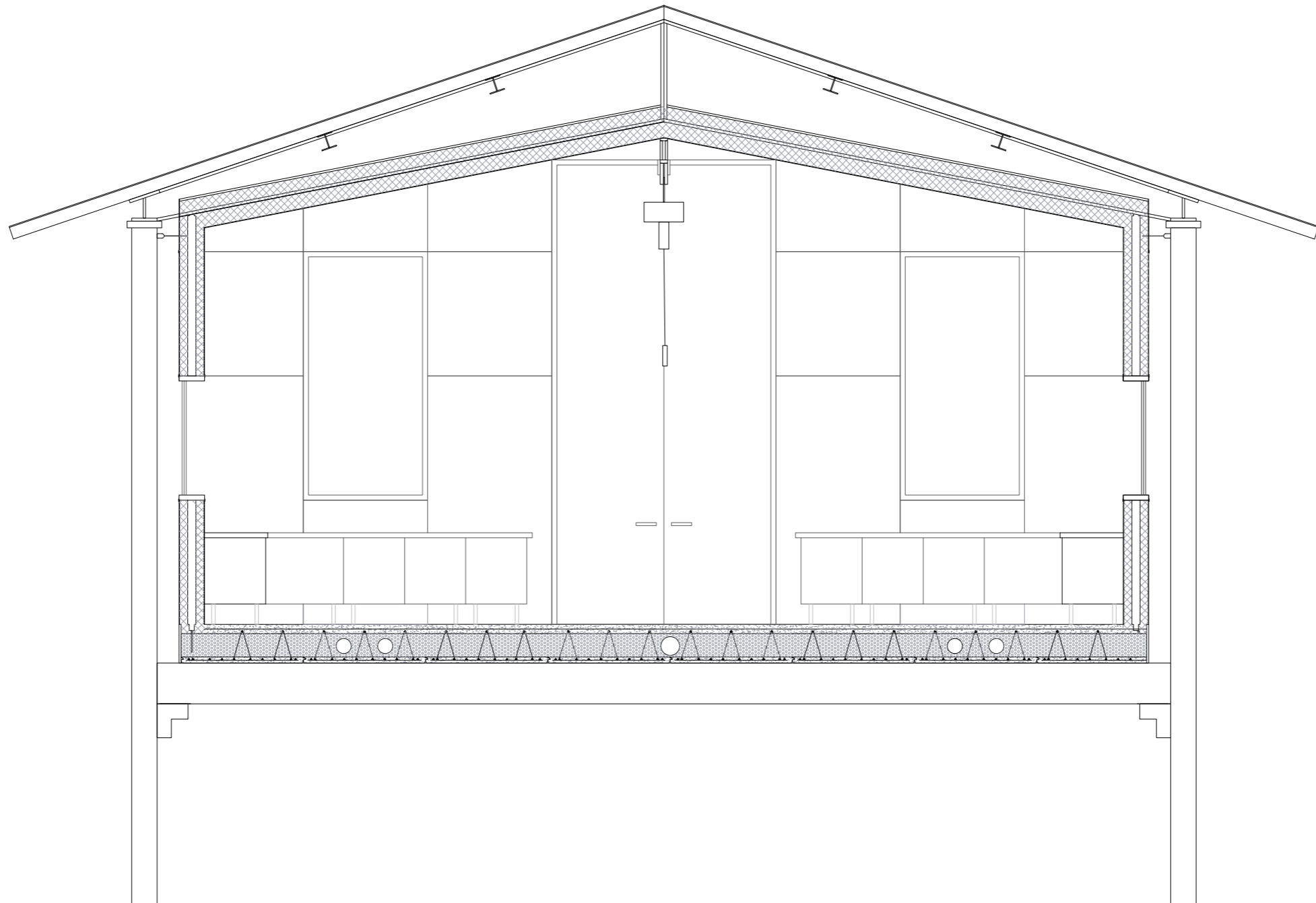




Section - situation 2



Section - situation 3



Section - situation 4



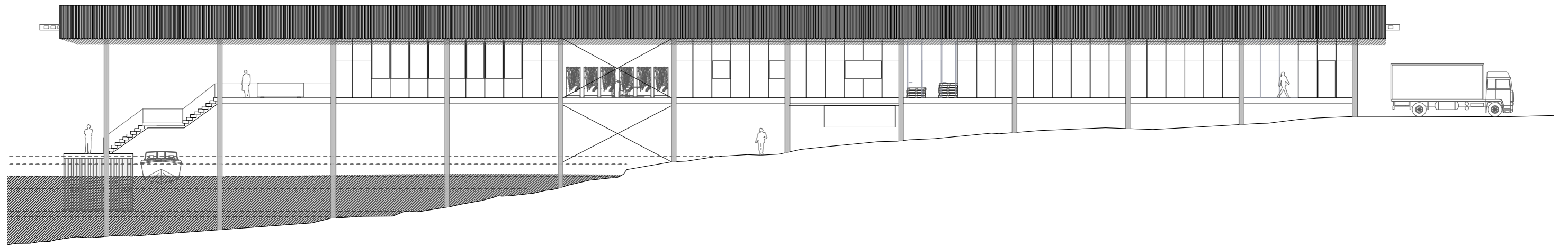
Model photos - situation 1, 2, 3 and 4



View from the front of the facility



View from the facility



Elevations

